TECHNICAL MANUAL

AVIATION-CREW SYSTEMS

OXYGEN EQUIPMENT

(REGULATORS)

N68936-04-D-0008

This manual update includes Basic, dated 1 April 2001, thru Change 4, dated 1 August 2004.

This manual supersedes the following NAVAIR manuals, 13-20FP-1, 13-20FP-2, 13-20FP-5 and 13-20FP-6.

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1 APRIL 2001
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LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

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Total number of pages in this manual is 560, consisting of the following:

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Major changes resulting from this change are as follows:

1. Incorporation of Aircraft Accident Report Inspection information.
2. Miscellaneous changes.

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CHAPTER 1

INTRODUCTION

1-1. GENERAL.

WARNING

Unauthorized modifications to and deviations from prescribed life support and survival equipment by individual aircrewmembers could create unknown safety hazards. The OPNAVINST 3710.7 Series specifies minimum requirements for such equipment and is supplemented by the individual model NATOPS.

1-2. The OPNAVINST 4790.2 Series identifies NAVAIRSYSCOM as the only authority for modification to life support equipment and survival equipment, which is usually accomplished by the Fleet Support Team (FST) (formerly Cognizant Field Activity (CFA)) via Aircrew System Changes or a change to the equipment procurement package. This manual also permits operating activity with approval of the controlling custodian, to conditionally modify ONE unit of equipment in service to correct or overcome unsatisfactory conditions in that equipment item. Any other type of deviation, peculiar configuration, or modification to life support and survival equipment is not allowed, and Aircrew Survival Equipmentmen have no authority or responsibility to perform them.

1-3. If an omission or conflict should occur between FST documents and NATOPS requirements, if there is a need for clarification of equipment configuration, or if equipment deficiencies are discovered, the applicable FST should be notified. The FST for most of the life support and survival equipment is the Naval Air Warfare Center Aircraft Division (NAWCAD) Code 4.6.3.2, NAS Patuxent River, MD, 20670-1906. For parachutes and related hardware, including torso harnesses, the FST is the Naval Air Warfare Center Weapons Division, Code 463000D, China Lake, CA, 93555.

1-4. Naval Air Warfare Center, Indianapolis, Indiana has cognizance over all survival radios and emergency beacons.

1-5. This Aviation Crew Systems manual is released under the authority of the Naval Air Systems Command in compliance with the request of the Chief of Naval Operations. The instructions continued herein are mandatory. This manual consists of separately bound volumes as listed below:

Title	Publication Number
Inflatable Survival Equipment (Liferafts)	NAVAIR 13-1-6.1-1
Inflatable Survival Equipment (Life Preservers)	NAVAIR 13-1-6.1-2
Parachutes	NAVAIR 13-1-6.2
Seat Survival Kits (Oxygen Hoses and Non-SKU Seat Kits)	NAVAIR 13-1-6.3-1
Seat Survival Kits (SKU Series Seat Kits)	NAVAIR 13-1-6.3-2
Oxygen Equipment (Aircraft Equipment, Masks, and Other Systems)	NAVAIR 13-1-6.4-1
Oxygen Equipment (Regulators)	NAVAIR 13-1-6.4-2
Oxygen Equipment (Concentrators)	NAVAIR 13-1-6.4-3
Oxygen Equipment (Converters)	NAVAIR 13-1-6.4-4
Rescue and Survival Equipment	NAVAIR 13-1-6.5
Aircrew Personal Protective Equipment (Aircrew/Passenger Equipment)	NAVAIR 13-1-6.7-1
Aircrew Personal Protective Equipment (Clothing)	NAVAIR 13-1-6.7-2
Aircrew Personal Protective Equipment (Helmets and Masks)	NAVAIR 13-1-6.7-3
Aircrew Personal Protective Equipment (Protective Assembly, Aircrew Survival - Armor)	NAVAIR 13-1-6.7-4
Special Missions Aircrew Equipment	NAVAIR 13-1-6.10

1-6. The purpose of each volume is to provide technical information related to the configuration, application, function, operation, storage, and maintenance of a particular category of aircrew safety and survival equipment. The information contained in each volume is intended for Organizational, Intermediate, and Depot Levels of maintenance as established within the Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

1-7. DESCRIPTION OF NAVAIR 13-1-6.4-2.

1-8. CONTENTS. This volume contains information and instructions pertaining to the configuration, function, application, operation, storage, and maintenance of oxygen equipment.

1-9. CONFLICTS AND SUPERSEDURE. This volume shall take precedence over all other documents except for effective Aircrew System Bulletins and Changes and Interim Aircrew System Bulletins and Changes. These documents are effective until officially rescinded, canceled, or superseded.

1-10. The Modification Section of each chapter lists all effective changes which affect oxygen equipment and have been issued on or before the date of latest change or revision to this volume. When applicable, the subject matter of these documents has been incorporated within the text of the appropriate chapters of this volume.

1-11. Effective changes and bulletins which affect oxygen equipment and are issued between changes or revisions to this volume should be recorded in the modification section of the manual for the affected equipment by annotating the outer margin of the page with a vertical line and the number of the change or bulletin. A copy of the change or bulletin should be filed in a separate binder in the ALSS work center. When this volume is updated these documents will be listed in the modification sections of the applicable chapters and the text of the chapters will be updated as required.

1-12. UPDATING. This volume will be updated periodically by the issuance of a Revision which is a 100% replacement of pages. Between revisions, changes and rapid action changes will be released, which are partial replacement of pages. All added and changed pages shall be incorporated in the volume according to page number. Superseded and deleted pages shall be discarded in accordance with local security procedures for data containing distribution statements. A list of effective pages is provided with each change. A summary of the major changed areas for a particular change is located directly beneath the list of effective pages.

1-13. COMMENTS AND RECOMMENDATIONS. Comments and recommendations shall be submitted in accordance with OPNAVINST 4790.2 Series.

1-14. ENGINEERING DRAWINGS. Government engineering drawings are available to the fleet by submitting a letter of request to Commanding Officer, Naval Air Technical Data and Engineering Service Command, Naval Air Station North Island, P.O. Box 357031, Building 90 Distribution, San Diego, CA 92135-7031. Each request should include the equipment nomenclature, part number, and CAGE code. The Drawings will be provided in the form of aperture cards (Automatic Data Processing Punch Cards). Technical data may also be obtained online at the NATEC website located at http://www.natec.navy.mil. Authorized users must first establish an account prior to obtaining data. Access/account information can be obtained at the NATEC website.

1-15. TECHNICAL DIRECTIVES AND FORMS. NATEC is the central management activity for aeronautical technical publications, engineering drawings and associated technical services. Upon release, NATEC will forward to all designated activities, copies of Technical Directives and Forms. Additional copies are available utilizing the procedures shown in paragraph 1-14 as well as from the PMA-202 website at https://pma202.navair.navy.mil.

1-16. SUPPLEMENTARY PUBLICATIONS.

1-17. In addition to Aircrew Systems Bulletins and Changes and Interim Aircrew Systems Bulletins and Changes still in effect, the following publications supplement this volume.

1. Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

2. NAVAIR 00-35QH-2, Allowance List, Aviation Life Support System and Airborne Operation Equipment for Aircraft Squadrons Navy and Marine Corps.

3. Naval Logistical Library (NAVSUP 600), which lists directives and manuals available from the supply system.

4. The applicable Aircraft Maintenance Instruction Manuals, Planned Maintenance System Publications, NATOPS Flight Manuals, and Pilot's Handbooks.

5. OPNAVINST 4410.2A.

6. OPNAVINST 3710.7 Series provides general instructions on required minimums for aircrew personal protective equipment.

7. NAVFAC/DM-24. Naval Facilities Engineering Command design manual.

8. P2300. List of Repairable Assemblies and Applicability of Navy Aviation Materials.

9. P2310. List of Supporting Repair Parts of Navy Aviation Materials.

10. NAVSUPINST 4423.29 (Series). Naval Material Command (NMC) Uniform Source, Maintenance and Recoverability (SM&R) Codes.

11. NAVAIR 13-1-6-8 Aviation Crew Systems Work Unit Code Manual.

12. NAVAIR 01-1A-509 Cleaning and Corrosion Control Organizational and Intermediate Maintenance.

13. NAVAIR 06-30-501 Technical Manual of Oxygen/Nitrogen Cryogenic Systems.

14. NAVSUPINST 4440.128 Compressed Gases and Gas Cylinders, Storage, Handling and Testing.

15. Ground Support Equipment. All Ground Support Equipment comments and recommendations shall be directed to the cognizant activities, Naval Air Engineering Center, Ground Support Equipment Dept., Lakehurst, NJ 08733.

16. NAVSUP P-719 is a Guide for the Assignment and Use of Source, Maintenance and Recoverability (SM&R) Codes.

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CHAPTER 2

MAINTENANCE CONCEPTS, SCHEDULING, AND DOCUMENTATION

Section 2-1. Maintenance Concepts

2-1. GENERAL.

2-2. NAVAL AVIATION MAINTENANCE PROGRAM. All maintenance and inspection actions upon Aviation Life Support Systems (ALSS) equipment shall be made as part of the Naval Aviation Maintenance Program in accordance with OPNAVINST 4790.2 Series.

2-3. LEVELS OF MAINTENANCE. Maintenance of ALSS equipment shall be performed at the established level of maintenance in accordance with OPNAVINST 4790.2 Series.

2-4. QUALIFIED PERSONNEL. Refer to OPNAVINST 4790.2 Series for qualifications of personnel authorized to perform maintenance actions on ALSS equipment.

Section 2-2. Maintenance Scheduling

2-5. GENERAL.

2-6. INSPECTION CYCLES. Scheduled maintenance requirements for aircraft and man-mounted equipment are published in the applicable aircraft maintenance requirement cards and this manual.

NOTE

To meet unusual situations and facilitate workload scheduling, refer to OPNAVINST 4790.2 Series for authorized deviations to scheduled phase inspection intervals.

Section 2-2A. Accident Evaluation

2-6A. AIRCRAFT ACCIDENT REPORT INSPECTION.

2-6B. Any Aviation Life Support System Equipment along with related subassemblies or equipment which have been recovered following use in an emergency ditching/bailout or ejection (refer to NAVAIR 13-1-6.2 for personnel and drogue parachutes) will be returned to the nearest Naval Supply Activity for shipment via traceable means to: Code 4.6.3.3, Naval Air Warfare Center Aircraft Division, Bldg 2187, 48110 Shaw Rd., Unit 5, Patuxent River, MD 20670-1906.

NOTE

Under no circumstances will any piece of Aviation Life Support System equipment which has been subjected to ditching/bailout or ejection be returned to service.

2-6C. Stencil outside of container in 1 inch letters as follows: THIS EQUIPMENT HAS BEEN USED IN AN EMERGENCY. These items of equipment are required for evaluation and determination of design deficiency and to establish requirements for product improvement.

Section 2-3. Maintenance Documents

2-7. GENERAL.

2-8. DOCUMENTING MAINTENANCE ACTIONS. Upon completion of any maintenance action (e.g., inspections, repairs, modifications), appropriate entries shall be made on applicable maintenance records, in accordance with OPNAVINST 4790.2 Series. The entries by the Aircrew Survival Equipmentman shall provide a systematic record of equipment history and the documentation of all maintenance actions performed on the equipment.

2-9. MAINTENANCE DOCUMENTS. Refer to OPNAVINST 4790.2 Series for documents used to record history or to document maintenance actions or for additional information for completion of maintenance records. These records are designed to provide continuous configuration and inspection records throughout the service life of ALSS assemblies and their components.

Section 2-4. Illustrated Parts Breakdown Information

2-10. GENERAL.

2-11. This section explains the Illustrated Parts Breakdown (IPB) for ALSS equipment. The IPB can be found at the end of each chapter where applicable. The IPB should be used during maintenance when requisitioning and identifying parts.

2-12. SYMBOLS AND ABBREVIATIONS. Symbols and abbreviations used in the Illustrated Parts Breakdown are as follows:

Symbol	Definition
---*---	Closure (end) of attaching parts
#	Selected part, only one used
x	By (used in dimensions 12 in. x 6 in.)
&	And

Abbreviation	Definition
AR or A/R	As Required
CAGE	Commercial and Government Entity
COML	Commercially available
FIG, Fig	Figure
GAPL	Group Assembly Parts List
GFE	Government Furnished Equipment
IPB	Illustrated Parts Breakdown
L.H.	Left Hand
MAINT	Maintenance
NHA	Next Higher Assembly
No.	Number
RECOVER, RECY	Recoverability
REF	Reference
R.H.	Right Hand
SM&R	Source, Maintenance and Recoverability
Spec. Cont. Dwg. or SCD	Specification Control Drawing

2-13. GROUP ASSEMBLY PARTS LIST.

2-14. The Group Assembly Parts List (GAPL) contains illustrations and parts lists for each major assembly. These illustrations and accompanying lists show how the major assemblies are disassembled into subassemblies and detail parts. Each item illustrated is indexed for identification purposes. Each illustration is accompanied by a parts list providing a part number, description, and quantity for each item. The list is arranged in disassembly order. Through the use of a system of indentation, the relationship of the detail parts to the subassemblies and the relationship of the subassemblies to the main assembly, is shown.

2-15. FIGURE AND INDEX NUMBER COLUMN. The figure and index number of each item shown on the corresponding illustration appears in the Figure and Index Number Column, with the exception of assemblies and subassemblies which are not illustrated in assembled form. In these cases, the assemblies or subassemblies are listed but not indexed. The component parts thereof are both listed and indexed.

2-16. PART NUMBER COLUMN. This column contains the contractor's drawing number, government standard number, vendor drawing number or identifies the part as being commercial hardware (COML). Government standard parts are listed using the applicable MS, AN, AF, NAF, MIL, or JAN part number. Where the part number is controlled by a military specification, this specification number is listed in the Description Column.

2-17. DESCRIPTION COLUMN. This column lists the item name plus those modifiers necessary to identify the item. The description of a vendor-supplied item includes a five-digit number which identifies the manufacturer. This is the Commercial and Government Entity (CAGE) code. To correlate this CAGE code to the manufacturer's name, refer to the cataloging handbook H4/H8. CAGE codes may be omitted for prime manufacturer's parts and for government standard parts. When applicable, contractor's control drawing numbers and reference designations of electronic parts are also listed for general reference. When a separate exploded view is used to show the detail parts of an assembly or subassembly the Description Column contains an appropriate figure cross-reference in parenthesis following the description. This cross-reference appears both in the listing where the assembly is first described, and in the listing which the assembly is broken down. In the latter case, the abbreviation REF will appear in the Units Per Assembly column. Commercial hardware items (COML) are fully described so that they may be procured from normal commercial sources. Parts stocked in kits are identified with kit component code in this column, i.e., KD.

2-18. Indentation. The indentations headed "1" through "7" in the Description Column are provided to show the relationship of assemblies and their detail parts. The detail parts are indented one space to the right and listed below the assembly to which they belong. Determine the next higher assembly (NHA) of any detail part by locating, in the next space to the left (excluding attaching parts) the first item above the detailed part.

```
1 2 3 4 5 6 7
ARTICLE (or MAIN ASSEMBLY)
. Detailed parts for ARTICLE (or MAIN ASSEMBLY)
. ASSEMBLY
    (ATTACHING PARTS)
. ATTACHING PARTS FOR ASSEMBLY
    ---*---
. . Detailed parts for ASSEMBLY
. . SUBASSEMBLY
      (ATTACHING PARTS)
. . ATTACHING PARTS FOR SUBASSEMBLY
      ---*---
. . . Detailed parts for SUBASSEMBLY
. . . SUB-SUBASSEMBLY
        (ATTACHING PARTS)
. . . ATTACHING PARTS FOR
        SUB-SUBASSEMBLY
        ---*---
. . . . Detailed parts for SUB-SUBASSEMBLY
```

2-19. Attaching Parts. Attaching parts are items used to attach parts or assemblies to each other and follow immediately after the part to be attached. The attaching parts have the same indentation as the part attached. The caption "(ATTACHING PARTS)" is placed on the line immediately above the listing of attaching parts. The separation symbol ---*--- appears on the line immediately under the last attaching part. Quantities of attaching parts are listed per unit. For example, if two fittings are required for each assembly and one bolt is required to attach each fitting, the correct listing would be:

```
. FITTING ASSEMBLY, Hinge ..... 2
    (ATTACHING PARTS)
. BOLT ..... 1
    ---*---
```

2-20. UNITS PER ASSEMBLY COLUMN. This column shows the quantity of an item required in the next higher assembly. The abbreviation AR indicates when the quantity is "As Required".

2-21. USABLE ON CODE COLUMN. Usable on codes are used to indicate part usage where various models and serial numbers of the equipment or similar parts within the equipment use different parts. A code is assigned to each variation of the equipment and entered into the GAPL when a part is used only in a specified variation. Where no code is entered, the part is used on all units covered by the GAPL or when no variations from the original equipment exist.

2-22. NUMERICAL INDEX.

2-23. The numerical index which follows each GAPL contains all the part numbers listed in that GAPL, arranged in alphabetical-numerical sequence.

2-24. PART NUMBER COLUMN. This column contains the part numbers of the parts and assemblies. Part number arrangement starts at the extreme left-hand position and continues left to right, one position at a time, according to the following order or precedence:

Space	(blank column)
Diagonal	(Slant)
Point	(period)
Dash	(hyphen)
Letters	A through Z
Numerals	0 through 9

NOTE

Spaces, diagonals, points, and dashes do not appear in the extreme left-hand position of the part numbers. However, they may be used in the second and succeeding positions and take precedence over letters and numbers as indicated above.

2-25. FIGURE AND INDEX NUMBER COLUMN. In this column, the digits preceding the dash refer to the figure in which the parts are illustrated. The digits following the dash are the index numbers.

2-26. SOURCE, MAINTENANCE AND RECOVERABILITY (SM&R) CODE COLUMN. The five digit SM&R codes, assigned by Naval Air Systems Command Representatives are reflected in the SM&R code column. The code format is composed of three parts consisting of a two-position Source Code, a two-position Maintenance Code and a one-position Recoverability Code. See table 2-1 for basic information.

NOTE

For more complete information on Uniform SM&R Codes, refer to NAVSUPINST 4423.29, OPNAVINST 4410.2A, and NAVSUP P-719.

Table 2-1. Source, Maintenance, and Recoverability (SM&R) Code Definitions

SOURCE			MAINTENANCE			
1st POS	2nd POSITION		3rd POSITION		4th POSITION	
MEANS OF ACQUIRING SUPPORT			USE: LOWEST LEVEL AUTHORIZED TO REMOVE/ REPLACE THE ITEM.		REPAIR: LOWEST LEVEL WITH CAPABILITY AND RESOURCES TO PERFORM COMPLETE REPAIR ACTION.	
P	A	ITEM: STOCKED	O	ORG/UNIT	O	ORG/UNIT
	B	ITEM: STOCKED, INSURANCE				
	C	ITEM: STOCKED, DETERIORATIVE				
	D	ITEM: SUPPORT, INITIAL ISSUE OF OUTFITTING & STOCK ONLY FOR ADDITIONAL INITIAL ISSUE	2 3 4 5 6	MINESWEEPER SUBMARINES AUX/AMPHIB DESTROYER, FFG CRUISER/CARRIER	2 3 4 5 6	MINESWEEPER SUBMARINES AUX/AMPHIB DESTROYER, FFG CRUISER/CARRIER
	E	EQUIPMENT: SUPPORT, STOCKED FOR INITIAL ISSUE OR OUTFITTING OF SPECIFIED MAINTENANCE ACTIVITIES				
	F	EQUIPMENT: SUPPORT, NONSTOCKED, CENTRALLY PROCURED ON DEMAND	F	I/AFLOAT	F	I/AFLOAT
	G	ITEM: STOCKED FOR SUSTAINED SUPPORT. UNECONOMICAL TO PRODUCE AT A LATER TIME				
	H	ITEM: STOCKED, CONTAINS HAZMAT. HMIS/MSDS REPORTING REQUIRED	G	ASHORE AND AFLOAT	G	ASHORE AND AFLOAT
	R	TERMINAL OR OBSOLETE, REPLACED				
	Z	TERMINAL OR OBSOLETE, NOT REPLACED				
K	D	ITEM: DEPOT O/H & MAINTENANCE KITS	H	I/ASHORE	H	I/ASHORE
	F	ITEM: MAINTENANCE KIT, PLACE AT O, F, H, L				
	B	ITEM: IN BOTH DEPOT REPAIR AND MAINT. KITS				
M	O	MFR OR FAB AT UNIT LEVEL	K	CONTRACTOR FACILITY	K	CONTRACTOR FACILITY
	F	MFR OR FAB AT INTERMEDIATE/DS LEVEL				
	H	MFR OR FAB AT INTERMEDIATE/GS LEVEL				
	L	MFR OR FAB AT SPECIALIZED REPAIR ACTIVITY (SRA)				
	G	MFR OR FAB AT ASSEMBLED AFLOAT OR ASHORE				
	D	MFR OR FAB AT DEPOT MAINTENANCE LEVEL				
A	O	ITEM: ASSEMBLED AT ORG/UNIT	L	INTERMEDIATE SRA	L	INTERMEDIATE SRA
	F	ITEM: ASSEMBLED AT INTERMEDIATE LEVEL - AFLOAT				
	H	ITEM: ASSEMBLED AT INTERMEDIATE LEVEL - ASHORE	D	DEPOT	D	DEPOT
	L	ITEM: ASSEMBLED AT SRA				
	G	ITEM: ASSEMBLED AFLOAT OR ASHORE				
	D	ITEM: ASSEMBLED AT DEPOT MAINTENANCE LEVEL				
X	A	ITEM: REQUISITION NEXT HIGHER ASSEMBLY	Z	REF ONLY	Z	NON-REPAIRABLE
	B	ITEM: NOT PROCURED OR STOCKED, AVAILABLE THRU SALVAGE, REQ. BY CAGE/PART NUMBER				
	C	INSTALLATION DRAWING, DIAGRAM, INSTRUCTION SHEET, IDENTIFY BY CAGE/PART NUMBER			B	RECONDITION
	D	NON-STOCKED, OBTAIN VIA LOCAL PURCHASE				

RECOVERABILITY		SERVICE OPTION CODE	
5th POSITION		6th POSITION	
DISPOSITION: WHEN UNSERVICEABLE OR UNECONOMICALLY REPAIRABLE, CONDEMN OR DISPOSE.		ASSIGNED TO SUPPORT ITEMS TO CONVEY SPECIFIC INFORMATION TO THE SERVICE'S LOGISTICS COMMUNITY/OPERATING FORCES.	
O	ORG/UNIT	1	I-LEVEL 1ST DEGREE
F	I/AFLOAT	2	I-LEVEL 2ND DEGREE
G	ASHORE AND AFLOAT	3	I-LEVEL 3RD DEGREE
H	I/ASHORE	6	COMMERCIAL ITEM, ORGANICALLY MFR'D
K	DLR; CONTRACTOR FACILITY	8	NON-CONSUMABLE; 2ND DEGREE ENGINE I-LEVEL
		9	NON-CONSUMABLE; 3RD DEGREE ENGINE I-LEVEL
L	INTERMEDIATE SRA LEVEL	E	END TO END TEST
		J	INTER-SERVICE DLR REPAIRABLE BELOW D-LEVEL
D	DLR; CONDEMN OR DISPOSE AT DEPOT	P	PROGRESSIVE MAINTENANCE
Z	NON-REPAIRABLE	R	GOLD DISC REPAIR
A	NON-REPAIRABLE BUT REQUIRES SPECIAL HANDLING	T	TRAINING DEVICES

CHAPTER 3

OXYGEN EQUIPMENT – GENERAL INFORMATION, SAFETY, AND HANDLING

Section 3-1. Aircraft Oxygen Systems

3-1. GENERAL.

3-2. Aircraft Liquid Oxygen and Gaseous Oxygen Systems provide the aircrewmember with diluted or 100% oxygen for breathing. The Liquid Oxygen System provides facilities to store and convert liquid oxygen (LOX) to gaseous oxygen and to deliver the gaseous oxygen at a breathable temperature and pressure to the aircrewmember. The Gaseous Oxygen System provides facilities to store gaseous oxygen in cylinders at either high or low pressure and to deliver it to the aircrewmember at a reduced pressure for breathing. This chapter also contains safety precautions pertinent to handling and storage of liquid and gaseous oxygen equipment.

3-3. AIRCRAFT OXYGEN SYSTEMS.

3-4. Aircraft Oxygen Systems installed in naval aircraft fall into one of the following categories:

1. Gaseous Oxygen Systems

   a. Low Pressure (0-500 psig)

   b. High Pressure (0-1800 psig)

   c. Reduced High Pressure

2. Liquid Oxygen Systems

3-5. GASEOUS OXYGEN SYSTEMS. Gaseous Oxygen Systems are used primarily in multiplace aircraft where space and weight considerations are less important items. Basically, all Gaseous Oxygen Systems consist of the following:

1. A cylinder (or cylinders) for storing the oxygen supply.

2. Tubing to distribute the oxygen from the main supply to the user(s).

3. Various valves for directing the oxygen through the proper tubing.

4. A regulator (or regulators) to control the flow of oxygen to each user.

5. A gage (or gages) to indicate oxygen pressure.

6. A mask (or masks) to direct the flow of oxygen to each user.

NOTE

The aircraft Illustrated Parts Breakdown (IPB) shall be consulted for specific items used and make-up of the system for specific aircraft.

3-6. LIQUID OXYGEN SYSTEMS. Liquid Oxygen Systems are generally used in aircraft where space, weight, and mission considerations are paramount. The typical system consists of the following components:

1. A converter (or converters) for storing the liquid oxygen supply.

2. A filler valve for servicing the system.

3. A heat exchanger for warming the oxygen to normal breathing temperatures.

4. A control valve for maintaining desired system operating pressure.

5. A relief valve to relieve excess pressure.

6. Tubing to distribute oxygen to the user(s).

7. Regulator(s), quantity indicator(s), shutoff valve(s), and other essential cockpit (or cabin) equipment.

NOTE

The aircraft Illustrated Parts Breakdown (IPB) shall be consulted for specific items used and make-up of the system for specific aircraft.

3-7. OXYGEN BREATHING REGULATORS.

3-8. DILUTER DEMAND TYPE REGULATORS. Diluter Demand Regulators are currently installed in some naval aircraft. They are used with Gaseous Oxygen Systems. The Diluter Demand Regulator provides the aircrewmember with an air-oxygen mixture, or 100% oxygen, depending on mode of operation selected. By placing the diluter lever (or knob) in the NORMAL position, an air-oxygen mixture is supplied upon demand up to approximately 28,000 to 32,000 feet. The ratio of oxygen-to-air is automatically adjusted to supply increasing oxygen as altitude increases. At approximately 32,000 feet, ambient air is shut off, and the user receives 100% oxygen. By selecting 100% OXYGEN, the regulator supplies 100% oxygen at all altitudes.

3-9. AUTOMATIC POSITIVE PRESSURE DILUTER DEMAND TYPE REGULATORS. Several types of Automatic Positive Pressure Diluter Demand Regulators are currently installed in naval aircraft. These regulators are used with either Gaseous or Liquid Oxygen Systems. Operation of the Automatic Positive Pressure Diluter Demand Regulator at altitudes up to 28,000 to 32,000 feet is basically the same as the Diluter Demand Regulator. Above approximately 30,000 feet, added oxygen at a positive pressure is supplied to the mask. This added pressure increases with altitude. Service ceiling of these regulators is 50,000 feet, but due to human limitations, Automatic Positive Pressure Diluter Demand Regulators shall not be used above 43,000 feet, except for very short periods.

3-10. MINIATURE OXYGEN BREATHING REGULATORS. Miniature Oxygen Regulators reduce and regulate supply pressure, and deliver 100% oxygen to the user at a breathable pressure. A safety pressure feature automatically maintains a positive pressure of 0 to 2.5 in H_2O in the mask at all altitudes up to, and including, 34,000 feet. The pressure breathing feature maintains a positive pressure in the mask of up to 20.0 in H_2O at altitudes between 35,000 and 50,000 feet. The positive pressure increases as altitude increases. Miniature Oxygen Regulators can be used routinely up to approximately 43,000 feet, but due to human limitations, Miniature Oxygen Regulators shall not be used above 43,000 feet, except for very short periods.

3-11. DILUTER DEMAND TORSO-MOUNTED OXYGEN REGULATORS. These Diluter Demand Regulators are torso-mounted, multi-purpose regulators. They are designed to provide 100% oxygen or an air-oxygen mixture at the correct ratio and pressure to the aircrewmember, depending on altitude and mode selection. The regulators incorporate a selector knob (or lever) for selecting the 100% OXYGEN or DILUTER mode.

3-12. CONTINUOUS FLOW REGULATORS. Continuous Flow Regulators are used in a limited number of naval aircraft. These regulators do not satisfactorily meet all the oxygen requirements of varying degrees of aircrew activity. Continuous Flow Regulators are not authorized for use by aircrewmembers, but are authorized for passenger use.

Section 3-2. Oxygen Hazards, Safety, and Handling

3-13. GENERAL.

3-14. Personnel safety cannot be guaranteed. However, a high level of safety can be achieved if operating personnel have the proper attitude, understanding, and training. Safety regulations must be conscientiously practiced and rigidly enforced. It is the painful truth that many of these rules have been written because of the death or suffering of those who did not know them or chose to ignore them. The best assurance of personnel safety lies in the safety-education of the people themselves. If they can be made aware of the potential hazards and the means of protecting their own lives,

most of them will respond in a responsible fashion. Responsibility for the safety of one's self and others cannot, however, be obtained solely with a set of written regulations. Responsibility is secured on an individual basis, in varying degrees, and is the framework for all safety-education. There would be little need for safety rules if everyone were extremely responsible and knowledgeable. Unfortunately, this is not always the case. A lack of maturity on the part of an individual, or a new or unfamiliar job assignment, working a manner contrary to the possession of such responsibility and knowledge. Safety rules, then, become a primary tool in securing safety-conscious, well-trained personnel. In many instances, safety-education is conducted on a haphazard basis and only taken seriously when required by top management. It is not uncommon for safety procedures to evolve following a serious accident which has caused injury or death. The safety of personnel can be almost assured only when there is thorough understanding of potential hazards, correct procedures and equipment are used, and the equipment is kept in good working condition.

3-15. Safety precautions presented in this Section shall be followed by all personnel responsible for handling liquid and gaseous oxygen. To ensure personal safety and the safe and efficient handling of liquid and gaseous oxygen, all personnel shall be thoroughly familiar with the hazards involved. All operations involving the handling of LOX shall be performed by two or more qualified persons, except the removal and replacement of aircraft LOX converters. The filling of LOX converters removed from the aircraft shall require two qualified persons. (Refer to Glossary for definition of Qualified Personnel.)

WARNING

Use only small amounts of oxygen cleaning compound at a time. Use in a well ventilated open space. Avoid prolonged breathing. Oxygen cleaning compound vapors are hazardous and can cause death if too much is inhaled.

NOTE

Personnel servicing gaseous oxygen systems or LOX converters and operating ground support equipment servicing and transfer units shall be qualified and licensed in accordance with OPNAVINST 4790.2 Series.

1. All AIMD oxygen shops, ashore and afloat, shall have oxygen monitors installed to ensure oxygen content in the space is maintained at a safe level (both physiological and over-enriched). Most shops have new oxygen monitor models. However, some AIMD oxygen shops may still have older oxygen monitors installed which can remain in service until receipt of the new monitor. Contact CFA at NAWCAD Lakehurst, NJ for appropriate monitor settings. Refer to NAVAIR 06-30-501 for currently authorized oxygen monitor model numbers.

2. Quality Assurance Division shall audit the oxygen shop to ensure step 1 is complied with.

3-16. SAFETY PRECAUTIONS; OXYGEN CLEANING COMPOUND MIL-C-81302.

3-17. Oxygen cleaning compound may dilute or displace oxygen below levels necessary to sustain life. Low levels are especially susceptible to oxygen displacement. The following warning shall be displayed wherever cleaning compound MIL-C-81302 is used.

WARNING

Inhaling trichlorotrifluoroethane vapor can be fatal.

Vapor concentration, immediately dangerous to life, is almost odorless, colorless, and tasteless. It may cause impairment of manual dexterity and vigilance. Breathing high concentrations may cause death or serious physical harm. In case of spill, warn other personnel and evacuate immediately.

3-18. The following precautions shall be followed by all personnel handling cleaning compound, MIL-C-81302.

1. Avoid breathing vapors. Avoid skin and eye contact.

2. Use the least amount possible to perform the task.

3. Assure good ventilation to maintain vapor levels at an acceptable level.

4. Do not wear contact lenses when using MIL-C-81302 cleaning compound.

5. Wear safety goggles for eye protection.

6. First Aid. If required, perform the following first aid procedures as necessary:

a. In case of direct contact, remove contaminated clothing and wash involved skin with soap and water. Seek medical attention if irritation occurs.

b. In case of eye contact, flush with potable water for at least 5 minutes. Call a physician.

c. If inside, remove to fresh air. If not breathing, give artificial respiration preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician. Do not give epinephrine or similar drugs.

d. If ingested, do not induce vomiting.

NOTE FOR PHYSICIAN:

Trichlorotrifluoroethane has caused cardiac sensitization to epinephrine in experimental animals (dogs). Cardiac arrhythmia, including ventricular fibrillation, could occur if epinephrine or one of its congeners is administered to patients exposed to high concentrations of trichlorotrifluoroethane. Medical use of epinephrine or any of its congeners is contraindicated except for patients with no arterial perfusion.

3-19. GASEOUS OXYGEN HAZARDS.

3-20. Gaseous oxygen is extremely hazardous when used in the presence of readily combustible materials. Do not permit oil, grease, gasoline, kerosene, aviation fuel or any other readily combustible material to come in contact with oxygen.

3-21. GENERAL SAFETY PRECAUTIONS (GASEOUS OXYGEN).

3-22. The following safety precautions shall be followed by all personnel handling gaseous oxygen:

1. Only oxygen conforming to MIL-O-27210, Type I shall be used in aircraft gaseous oxygen systems.

2. Exercise care that compressed oxygen does not become contaminated in anyway with hydrogen, hydrocarbon gases, or oil base liquids as a serious explosion can result.

3. Oil or grease must never be allowed to come into contact with or be used in the presence of open cylinders, valves, regulators, gages or fittings. Fire or explosion may result.

4. Never lubricate oxygen valves, regulators, gages, or fittings with oil or any substance except an approved oxygen compatible lubricant, listed below.

Mil Spec	Description	NIIN
TYPE III	Krytox	
TYPE III	Tribolube	16

Specific lubricants approved for use with oxygen equipment are listed in the appropriate chapter of this manual describing specific oxygen equipment.

NOTE

Krytox and Tribolube shall not be used on aluminum or magnesium fittings in applications where shear stress would be encountered.

MIL-T-27730 Teflon tape shall be used specifically as a thread sealant.

MIL-M-7866 Molybdenum Disulfide shall be used on stainless steel flared fittings and on those applications where Teflon Type MIL-T-27730 cannot be used.

5. Hands should be clean and free from oil before using oxygen equipment; do not wear greasy gloves or clothing.

6. A spark is not necessary to cause a fire or explosion. The chemical reaction of having fuel gases and oils combine with oxygen is sufficient to develop spontaneous combustion, and could cause a fire or explosion.

7. Never permit oxygen cylinders to come into contact with electrical welding circuits or apparatus.

8. Do not allow sparks or flames from welding or cutting torch or any other source to contact cylinders.

9. Never use oxygen from a cylinder without reducing the pressure through a pressure reducing regulator.

10. Never mix other gases or compressed air in an oxygen cylinder.

11. Never test for pipe line leaks or blow-out pipe lines with oxygen unless lines are specifically made and

cleaned for oxygen use. Use water-pumped nitrogen, which does not support combustion, for this purpose. Pipes, pipe threads, and other pressure containers are sometimes greased or oiled. Using compressed oxygen for the general purpose of testing for leaks is extremely dangerous and almost certain to cause a violent explosion.

12. To aid in preventing leakage or material failure due to overtorque of gaseous oxygen system tubing and fittings, strict adherence to torque values listed in table 3-1 is mandatory.

13. Do not confuse air with oxygen. Oxygen is one of several elements contained in air and should always be described by its proper name. Any attempt to use oxygen in place of compressed air may result in an accident. Never use oxygen for pneumatic tools, for starting diesel engines, as a pressure agent in oil reservoirs, for paint spraying, or for any use other than breathing, welding, or cutting.

14. Aviator's breathing oxygen supply cylinders can be readily identified by their green color and 3-inch wide white band around the upper circumference of the cylinder. OXYGEN, AVIATOR'S shall be stenciled in white parallel to the longitudinal axis and on diametrically opposed sides in letters 1 3/4 to 2 inches high.

15. Before connecting oxygen cylinders to oxygen systems, be sure that each cylinder is properly and correctly identified as containing aviator's breathing oxygen.

16. Never pressurize an oxygen system without the proper adapter and safety disc installed on the transfer line.

17. The amount of oxygen in a cylinder is determined by pressure.

18. Under no circumstances shall carbon tetrachloride or similar cleaning fluids be used. Minute quantities of these materials will contaminate the oxygen supply.

19. Do not clean any elastomer parts (rubberized) that have become contaminated with oil or grease. All such parts shall be replaced.

20. Prior to using leak detection compound (MIL-L-25567, Type 1), inspect carefully. Compound which is not clear and free from suspended material sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

21. Use leak detection compound (MIL-L-25567, Type 1) sparingly as any solution entering oxygen equipment will contaminate the system. Remove all traces of the compound after test with a clean, damp, lint-free cloth.

22. The pressure in oxygen storage cylinders which service/replenish aircraft oxygen supply cylinders should not fall below 50 psig. Keep valve closed when not in use. Oxygen cylinders depleted to a pressure of approximately 50 psig shall be marked "EMPTY," tagged appropriately, and stored separately from charged oxygen cylinders. All cylinders which have a pressure below 15 psig shall be removed from service for vacuum and heat drying/hot nitrogen gas drying (MIL-STD-1411/MIL-STD-1359).

NOTE

A full oxygen cylinder is a cylinder which is charged to its rated pressure. With respect to a high pressure oxygen cylinder, 1800 psig is considered full.

To refill is to recharge a cylinder, regardless of the residual pressure remaining within the cylinder.

Cylinders that are less than 2 inches in outside diameter and less than 2 feet long do not require a hydrostatic retest.

Hydrostatic test interval for P-3 fixed installed oxygen cylinders (P/N 1084-514), shall not exceed eight years.

Low Pressure Oxygen Cylinders, Type MS21227-1 used on MA-1 Portable Emergency Oxygen System, do not have a Department of Transportation (D.O.T.) ICC number permanently stamped in the neck of the cylinder and therefore do not require hydrostatic testing. These cylinders are painted yellow in accordance with MIL-STD-101.

23. Never refill an oxygen cylinder that has gone beyond its hydrostatic test date (5 years after last test date stamped on cylinder shoulder). As long as the cylinder is full, it may remain in service.

24. Do not confuse aviator's breathing oxygen with welding or hospital oxygen. The latter types of oxygen usually have a moisture content that would freeze and plug the lines and valves of an aircraft oxygen system.

25. Leave cap on cylinder when not in use to protect valve. A broken valve may cause a cylinder to rocket like a torpedo, and could cause serious injury or death.

26. Before opening an oxygen cylinder valve, ensure cylinder is firmly supported. Cylinder valves are to be closed by hand only. If valve cannot be fully closed by hand, it shall be returned with cylinder for repair. A protective cap shall be installed on the valve of any cylinder not in use.

27. Open valves slowly, rapid surges in pressure can damage sensitive equipment and cause extreme temperature rise in small orifices and components.

28. Use existing or formulate charging stages when refilling oxygen cylinders and systems. Rapid pressurization creates heat which can result in fire or explosion.

WARNING

Wire-wrapped cylinders have wire-wrapping removed prior to hydrostatic testing; cylinders passing the hydrostatic test must be rewound prior to placing back in service.

NOTE

Not all cylinders require wire-wrapping. Wire wrapping is not required on 96 cubic inch cylinders manufactured under contracts N00363-78-M-7383 and N00383-77-C-2908.

29. Remove emergency oxygen cylinders or walk around bottles from aircraft for servicing.

30. Never fill aircraft systems without using a pressure reducing regulator. Aircraft have been demolished by failure to observe this precaution.

31. Ensure all oxygen equipment left outdoors is sheltered from the elements.

32. NAVSUPINST 4440.128 series contains instructions for storage, handling and hydrostatic testing intervals for compressed gases and gas cylinders.

3-23. LIQUID OXYGEN HAZARDS.

3-24. The potential hazards associated with the handling of liquid oxygen are due to its extremely cold temperature, rapid expansion upon conversion to gas at ambient (room) temperature, and its reactivity with any organic matter or flammable substance with which it comes in contact.

3-25. FREEZING. Because liquid oxygen has an extremely low temperature, it can freeze or seriously damage skin tissue upon contact. The effect is similar to frostbite or thermal burn. Use extreme caution when filling a warm container because vigorous boiling, splashing and evaporation will occur.

3-26. Metals and similar materials cooled by liquid oxygen may freeze to the skin upon contact. Flesh can be badly burned or torn in an attempt to free it. Always assume that frosted or uninsulated parts of liquid oxygen equipment are approximately -297°F (-182.7°C). Refer to Section 3-3 for protective clothing requirements.

3-27. FIRE AND EXPLOSION. Always handle liquid oxygen in well-ventilated areas. Never dispose of liquid oxygen in confined spaces. If liquid oxygen is spilled on a combustible substance, the substance will burn with great intensity if ignited.

3-28. Do not allow any organic matter or flammable substance to come in contact with liquid oxygen. Some of the materials that may react violently with oxygen under the right conditions of temperature and pressure are oil, grease, dirt containing oil or grease, tar, cotton, lamp black, coal dust, asphalt, gasoline, kerosene, JP fuel, propane, butane, naphtha, alcohol, ether, aniline, benzene, hydrogen, illuminating gas, acetylene, paint, sugar, sulfur, cloth and wood. If exposed to liquid oxygen, organic materials (such as those listed previously) will burn violently when ignited. All combustibles are potential explosion hazards when mixed with liquid oxygen. Mere mixture of liquid oxygen with powdered organic materials under certain conditions may cause explosion. If the vapor from liquid oxygen mixes with fuel vapor in the right proportions, the mixture will explode if ignited. Every fire involving liquid oxygen must therefore be regarded as an explosion hazard.

3-29. PRESSURE EXPLOSION. If liquid oxygen is vaporized and warmed to ambient temperature, one volume of liquid oxygen will expand to 862 volumes of gaseous oxygen. If this evaporation and expansion takes place in a confined space, explosive pressures in excess of 12,000 psig will be created. For this reason, all storage containers must be provided with pressure relief devices, unless the container is so vented that gas cannot be entrapped. All lines and equipment in which liquid may be trapped between closed valves must be equipped with pressure relief valves. All pressure relief valves and rupture discs must be placed and protected so that water cannot splash or condense upon them. Relief valves must be checked periodically to ensure that they are in proper operating condition.

3-30. GENERAL SAFETY PRECAUTIONS (LIQUID OXYGEN).

3-31. The following safety precautions shall be followed by all personnel handling liquid oxygen:

WARNING

Do not service LOX converters in an unsheltered area during inclement weather (rain, snow etc). Moisture can easily enter the vent port of the fill buildup vent valve and supply manifold. Moisture will freeze immediately upon contact with liquid oxygen rendering pressure closing or relief valve or both inoperative. This situation, if undetected, will lead to critical over pressurization and explosion of LOX converter:

LOX converters shall be drained in a well ventilated, clean area with limited access and protection from inclement weather so designated by type commanders or NAVSEA. A drip/drain pan with sides at least 6 inches high and free from dirt, grease, oil, fuel, hydraulic fluid, and other hydrocarbons, shall be used when draining LOX converters. Two qualified persons shall be present when draining LOX converters, one of which will be designated safety observer. A maximum of two LOX converters can be drained at one time.

1. Only liquid oxygen conforming to MIL-O-27210, Type II shall be used in aircraft liquid oxygen systems.

2. When transferring liquid oxygen or converting liquid oxygen to gaseous oxygen, the safety precautions pertaining to the handling of both liquid oxygen and gaseous oxygen apply.

3. Do not operate liquid oxygen equipment unless you are qualified or are working under the supervision of qualified personnel.

4. Wear goggles or a face shield when handling liquid oxygen.

5. Do not handle with bare hands any tubing or fittings through which liquid oxygen is flowing. Wear clean, dry gloves when handling parts of equipment cooled by liquid oxygen.

6. A rubber coated, cotton duck, impermeable apron shall be worn when working with liquid oxygen. The apron should be tied or secured in a fashion that would make it easy to remove in an emergency.

7. Cuffless coverall shall be worn. The coverall shall be worn over the gloves and the top of shoes, so that in the event of LOX spillage, the LOX will roll off the clothing and not become trapped in the gloves or boots.

8. Approved type liquid oxygen boots shall be worn.

9. In the event of accidental contact with liquid oxygen, quickly thaw the exposed area, preferably by immersion or by bathing area with large amounts of water. After the rapid thaw, wrap the exposed area loosely with clean dry dressing and report to a doctor immediately. Do not apply anything else to the affected area other than the clean dry dressing.

10. Do not permit smoking, open flames, or sparks in the liquid oxygen handling areas.

11. Do not carry matches in liquid oxygen handling areas.

12. Ensure all liquid oxygen equipment left outdoors is sheltered from the elements.

13. Keep work area and equipment free of oil, grease or any other combustible material.

14. Keep tools and clothing free of oil and grease.

15. Avoid spilling liquid oxygen on floor or deck areas. In case of accidental spillage, thoroughly ventilate the area.

16. Always call oxygen by its proper name. Do not confuse it with compressed air. Never use oxygen in place of compressed air for any purpose.

17. Handle converters, storage tanks and transfer hoses with care to avoid damage to the insulating space.

18. (Essex GCU-24/A Only) Prior to filling converter, inspect safety wire and Glyptal dots on relief valve and pressure closing valve for security.

19. When transferring liquid oxygen, do not leave valves open all the way. Open valves wide, and then immediately close them about one quarter turn; otherwise they may freeze in the open position.

20. Disconnect filling or transfer lines as soon as the transfer process is completed.

21. Do not leave liquid oxygen in a closed container, or trapped in a line between two valves; always open a valve on one end to avoid excessive pressure buildup.

22. Use only standard approved equipment in the handling and storage of liquid oxygen.

23. Do not introduce moisture into the system. Exercise care to ensure that no moisture is present on filler valve nozzles when they are connected or disconnected.

24. Purge piping and equipment with oil-free nitrogen, Type I, Class 1, Grade B, (Fed Spec BB-N-411).

25. To aid in preventing leakage or material failure due to over-torquing of liquid oxygen system tubing and fittings, strict adherence to torque values listed in table 3-1 is mandatory.

26. For additional precautions and information, refer to Technical Manual of Oxygen/Nitrogen Cryogenic Systems (NAVAIR 06-30-501).

3-32. (Converters Permanently Installed in Aircraft) Before recharging an aircraft liquid oxygen system with the converter installed, take the following precautions in addition to those already indicated. Ensure that:

1. The aircraft is in an open ventilated area.

2. The aircraft is not being fueled.

3. The aircraft is static grounded.

4. The aircraft electrical system is OFF.

5. No APUs or starting units are connected to the aircraft or are operating in the vicinity.

6. A CO_2 fire extinguisher is immediately available.

7. Personnel are kept clear of the aircraft overboard vent.

8. The deck under and in the immediate vicinity of the overboard vent is free from grease, oil, or any other combustible material.

9. A stainless steel, aluminum or copper drip pan is placed beneath the aircraft overboard vent.

3-33. (Converters Incorporating a Quick-Disconnect Mounting Plate) Converters shall be removed from aircraft prior to any servicing.

3-34. SAFETY PRECAUTIONS ABOARD SHIP. In addition to the general safety precautions, all personnel aboard ship shall follow these additional safety precautions:

Table 3-1. Torque Values for Tubing and Fittings

Torque Requirements for Flared Tube Connections (Aluminum)		
Tubing O.D. (inches)	Minimum Torque (pound-inches)	Maximum Torque (pound-inches)
5/16 3/8 1/2	100 200 300	125 250 400
Notes: Standard straight tapered pipe thread fittings have no torque values. Tape the pipe threads with two turns of teflon tape and install the fitting finger tight. Then attach wrench and tighten one to two turns maximum.		

WARNING

LOX converters shall be drained in a well ventilated, clean area with limited access and protection from inclement weather so designated by type commanders or NAVSEA. A drip/drain pan with sides at least 6 inches high and free from dirt, grease, oil, fuel, hydraulic fluid, and other hydrocarbons, shall be used when draining LOX converters. Two qualified persons shall be present when draining LOX converters, one of which will be designated safety observer. A maximum of two LOX converters can be drained at one time.

1. When smoking or when carrying an open or unshielded light or any potential spark-producing apparatus, do not enter an oxygen storage compartment. Do not approach any point where oxygen is being discharged or where there is a suspected leak in piping.

2. Exercise care in handling ammunition near oxygen.

3. Keep open flames at last 100 feet away from oxygen storage tanks or oxygen equipment.

4. Oxygen storage and handling compartments shall be sprayed with one coat of fire-resistant paint before being used. However, first remove any other existing paint from plant and equipment and thoroughly clean them to bare metal.

5. Do not permit painting when liquid oxygen is contained in the compartment.

6. During transfer operations, position the transfer trailer so that it will not shift with the pitch and roll of the ship. Lock the brakes and tie down the trailer.

7. Do not drain or vent oxygen in a closed compartment.

8. During transfer operations keep work area, equipment, tools, and clothing free from oil, grease of other hydrocarbon points.

9. Post LIQUID OXYGEN signs in a conspicuous place on all storage tanks, compartments, and handling rooms. Post CAUTION and NO SMOKING signs at entrances and hazardous points.

10. When liquid oxygen piping is not enclosed in a double wall or flame tight casing, post NO SMOKING signs in the compartments containing the piping.

3-35. STORAGE.

3-36. Liquid oxygen storage containers must be protected from excessive heat and direct rays of the sun. Liquid oxygen containers must be stored apart from containers of other gases or liquids and must not be stored within 50 feet of flammable material of any kind. Never transfer liquid oxygen in or around areas in which odors of any type may be absorbed by the liquid.

3-37. All storage containers must be provided with pressure-relief devices. These pressure-relief devices shall be checked periodically to ensure that they are in proper operating condition.

3-38. Oxygen must not be stored or used near flammable material or any substance likely to start or accelerate fire. Oxygen is not flammable, but supports combustion intensively. Store at least 50 feet from combustible materials.

3-39. Oxygen cylinders must not be stored with hydrogen or other combustible gas cylinders in an unventilated place. If stored inside, they shall be separated by a fire-resistant wall.

3-40. Do not store oxygen cylinders, LOX converters and apparatus under moving machinery, cranes, belts, or where exposed to residue from stack gasses. Oil and grease may drop and cause explosion, fire or contamination.

3-41. Gaseous and liquid oxygen servicing trailers can be stowed or parked inside enclosed buildings or hangars provided those spaces are constructed of concrete or steel and meet minimum ventilation requirements. Gaseous or liquid oxygen servicing trailers shall not be stowed or parked in enclosed wooden buildings. If approved stowage or parking facilities are not available, servicing trailers must be stowed or parked in a covered lean-to enclosed on three sides only. The lean-to should be positioned a minimum of 50 feet from traveled roadways, parking areas, and wooden structures.

3-42. LOX CONVERTER STORAGE. Liquid oxygen converters stored outdoors must be sheltered from the elements (e.g., direct rays of the sun, rain, snow, etc.), as moisture can easily enter vent or supply couplings. The moisture when frozen can render the presure closing valve or relief valve inoperative; this canlead to overpressurization and explosion of the LOX converter.

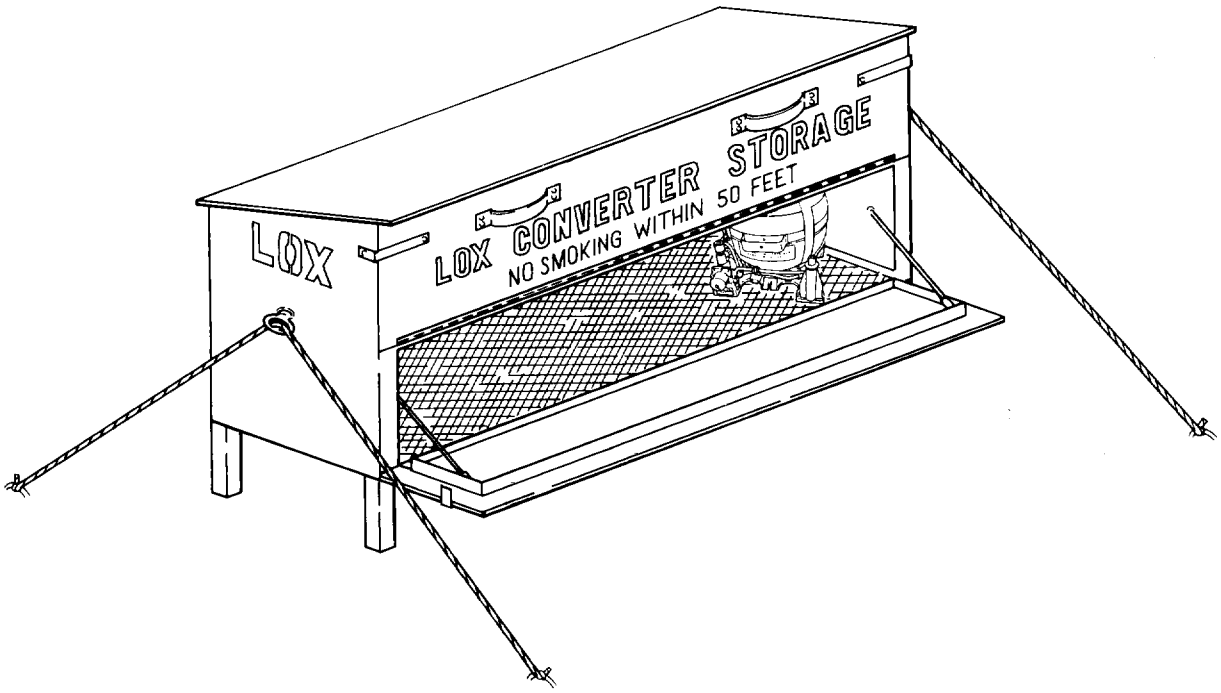

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Figure 3-1. Liquid Oxygen converter Storage Shelter

3-43. Protective shelters shall be provided for LOX converters which are stored outdoors (figure 3-1). Protective shelters may be locally manufactured to suit individual activity requirements. Protective shelters shall be manufactured according to these requirements:

1. Shelters must be well ventilated to prevent the buildup of potentially dangerous concentrations of oxygen.

2. Shelters must be constructed of noncombustible materials.

3. All shelves must be constructed of expanded stainless steel wire mesh or other perforated material to provide adequate ventilation.

4. Shelves shall be no less than 17 inches high. The shelf depth shall be no less than 18 inches. The length shall be determined by the number of converters to be stored, leaving 18 inches or more for each converter. The bottom shelf must be a minimum of 10 inches above the ground.

5. Shelters shall be painted white and marked “LOX CONVERTER STORAGE” using green reflective tape L-S-300B. Letters shall be no less than 4 inches high. In addition the warning “NO SMOKING WITHIN 50 FEET” shall be marked on the shelter using red reflective tape L-S-300B. Letters shall be no less than 2 inches high.

6. The shelter shall be provided with eyebolts or handles to provide a four-point tiedown.

Section 3-3. Protective Clothing

3-44. GENERAL.

3-45. Because of the hazards associated with handling liquid oxygen, it is imperative that all personnel working with liquid oxygen wear protective clothing.

3-46. The following is a list of approved protective clothing and authorized allowance that can be used when working with liquid oxygen:

Support Equipment Required

Quantity	Description	Reference Number
1 ea per individual	Apron, Impermeable, Cotton Duck, Rubber Coated	MIL-A-41829 (CAGE 81349) NIIN 00-082-6108
1 ea per individual	Face Shield, Industrial, Style B	L-F-36 (CAGE 81348) NIIN 00-202-9473
2 ea per individual	Coveralls, Explosive Handlers	MIL-C-14610 (CAGE 81349)
	X Small (32-34)	NIIN 00-279-2455
	Small (36-38)	NIIN 00-279-8719
	Medium (40-42)	NIIN 00-279-8720
	Large (44-46)	NIIN 00-279-8721
	X Large (48-50)	NIIN 00-279-8722
1 ea per individual	Shoe, Molders	MIL-S-82245 (CAGE 81349)
	7D	NIIN 00-926-9965
	7EE	NIIN 00-926-9966
	8D	NIIN 00-926-9967
	8EE	NIIN 00-926-9968
	9D	NIIN 00-926-9969
	9EE	NIIN 00-926-9970
	10D	NIIN 00-926-9971
	10EE	NIIN 00-926-9972
	11D	NIIN 00-926-9973
	11EE	NIIN 00-926-9974

Support Equipment Required (Cont)

Quantity	Description	Reference Number
1 pr per individual	Gloves, LOX Servicing (Note 1)	(CAGE 65370)
	Medium	LOX-MIL-M
	Large	LOX-MIL-L
	X-Large	LOX-MIL-XL

Notes: 1. LOX Servicing Gloves are not currently stocked in the Navy Supply System and must be ordered Open Purchased from the following vendor:
Tempshield Inc.
23 Industrial Way
Trenton Business Park
Trenton, Maine 04605
TEL: (800) 680-2796

1. Face Shield/Safety Goggles. Eye protection shall be worn at all times when working with liquid oxygen. When working in confined areas or overhead, wear face shield or safety goggles to protect the eyes. Safety glasses with side shields may also be used.

2. Always wear LOX servicing gloves when handling any equipment that is or may have been in recent contact with liquid oxygen. Gloves shall be loose fitting so that they can be quickly removed if LOX gets into them. In addition use protective gloves when handling purging units.

3. Coverall, explosive ordnance handlers, cotton sateen, fire resistant shall be used by liquid oxygen handlers. Cuffless sleeves and trouser legs shall be worn over the top of gloves and shoes.

4. Apron, impermeable, cotton duck, rubber coated, shall be worn when working with liquid oxygen. The apron shall be tied or secured in a fashion that would make it easy to remove in case of an emergency.

5. Shoes, LOX boots (shoes, safety, molders, congress style, black) a type that can be easily removed, shall be worn when working with liquid oxygen.

6. Clothing that is splashed by liquid oxygen shall be removed immediately and thoroughly aired for at least 1 hour.

Section 3-4. Aircraft Oxygen System Requirements

3-47. GENERAL.

3-48. Aircraft oxygen systems shall be purged when the system is left open to the atmosphere, when empty, or whenever contamination is suspected.

3-49. When maintenance action involves the removal and reinstallation of connecting hardware without a change in adjustment or alignment to the system, a thorough ground functional check shall be conducted prior to the aircraft being released for flight. (Refer to OPNAVINST 4790.2 Series.)

WARNING

Only clean plastic caps or plugs (MIL-C-5501) shall be used to close oxygen system openings. Under no circumstances will tape, rags, or paper be used to close openings created by removal of components.

3-50. When an aircraft oxygen system is opened for the removal/replacement of any component, all openings created shall be immediately plugged or capped to prevent entrance of moisture or contaminants.

3-51. PURGING OXYGEN SYSTEMS.

3-52. The following Materials Required, Support Equipment, and procedures shall be followed when purging oxygen systems:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Gas/LOX Purging Unit, Model A/M26M-3	3447AS100-1

3-53. PURGING LOW-PRESSURE OXYGEN SYSTEMS. Low-pressure gaseous oxygen systems shall be purged by one of the following methods:

1. Aircraft having filler and distribution lines connected to the same end of the cylinder shall be purged by charging the system with gaseous oxygen; then by depleting. Perform this procedure a minimum of three times.

WARNING

Use only oil-free nitrogen, Type I, Class 1, Grade B for purging oxygen systems. The use of aircraft nitrogen servicing trailers for purging oxygen systems is strictly prohibited. For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

2. Aircraft having the filler valve connected to one end of the cylinder and distribution lines to the opposite end (i.e., continuous flow system) shall be purged as follows:

a. Connect purging unit (P/N 3447AS100-1) to aircraft filler valve.

b. Disconnect regulator distribution line(s) at regulator(s) to permit a flow.

c. Pass heated oil-free nitrogen through system at maximum pressure of 120 psig and a minimum temperature of 90°F for 30 minutes. Create a flow through the system. This can be accomplished by various methods, depending on the type of aircraft system. Consult the applicable aircraft MIM for detailed instructions. If moisture or contaminants are still present, repeat purge as required.

d. Disconnect purging unit. Reconnect regulator(s) and recharge system with oxygen.

e. Drain system through regulator(s) to remove any residual nitrogen.

f. To complete purge, recharge system with oxygen.

3-54. PURGING HIGH-PRESSURE OXYGEN SYSTEMS. Two factors must be considered when purging high-pressure oxygen systems: purging for the removal of contamination or purging for the removal of moisture.

3-55. To purge a high-pressure oxygen system of contamination, proceed as follows:

NOTE

It can never be certain that moisture is not present. Therefore, the following purge procedures should only be used in emergency situations where the procedures outlined in paragraph 3-56 cannot be accomplished.

1. Charge system with gaseous oxygen; then drain system through regulator(s).

2. Repeat step 1 a minimum of two times.

3. To complete purge, recharge system with oxygen.

3-56. To purge a high-pressure oxygen system of moisture, proceed as follows:

WARNING

Cylinders which have been open to the atmosphere and voided of oxygen (to less than 15 psig) shall be removed from service for vacuum and heat drying/hot nitrogen gas drying (MIL-STD-1411 and MIL-STD-1359A) before recharging.

Use only oil-free nitrogen, Type I, Class 1, Grade B (Fed Spec BB-N-411) for purging oxygen systems. The use of aircraft nitrogen servicing trailers for purging oxygen systems is strictly prohibited. For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

1. (Manually Operated Cylinder Valve) Close cylinder valve; disconnect supply line at cylinder.

2. (Automatic Opening Cylinder Valve) Disconnect supply line at cylinder.

3. Disconnect regulator distribution line(s) at regulator(s) to permit a flow.

4. Connect purging unit (P/N 3447AS100-1) to aircraft filler valve and pass a flow of heated oil-free nitrogen (Fed Spec BB-N-411) through system at maximum pressure of 120 psig and a minimum temperature of 90 °F for 30 minutes. Create a flow through the system. This can be accomplished by various methods, depending on the type of aircraft system. Consult applicable aircraft MIM for detailed instructions. If moisture or contaminants are still present, repeat purge as required.

5. When purging is completed, disconnect purging unit, reconnect all lines, and open cylinder valve (if applicable).

6. Functionally test system in accordance with applicable Maintenance Instruction Manuals (MIMs).

3-57. PURGING AIRCRAFT LIQUID OXYGEN SYSTEMS. To purge aircraft liquid oxygen systems, proceed as follows:

WARNING

Use only oil-free nitrogen, Type I, Class 1, Grade B (Fed Spec BB-N-411) for purging oxygen systems. The use of aircraft nitrogen servicing trailers for purging oxygen systems is strictly prohibited. For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

1. Disconnect and, if necessary, remove LOX converter.

2. Connect purging unit (P/N 3447AS100-1) to aircraft system supply quick-disconnect.

3. Create a flow at user end of system. This can be accomplished by various methods, depending on type of aircraft system. Consult applicable MIM for detailed instructions.

4. Pass heated oil-free nitrogen (Fed Spec BB-N-411) through system at maximum pressure of 120 psig and a minimum temperature of 90°F for 30 minutes. If contaminants are still present, repeat purge as required.

5. When purging is completed, disconnect purge unit. Reconnect aircraft system supply quick-disconnect to LOX converter.

6. Fill aircraft system if applicable. Functionally test system in accordance with applicable MIM.

3-58. LOX CONVERTER MAINTENANCE.

3-59. QUICK-DISCONNECT CONVERTERS. A Calendar Inspection, consisting of a Visual Inspection followed by a Bench Test, shall be performed on all LOX converters incorporating a quick-disconnect mounting plate prior to being placed in service, and at intervals not exceeding 231 days thereafter. The Calendar Inspection shall be performed in accordance with the chapter in this manual, or the technical manual pertaining to the specific type and part number LOX converter to be serviced. These converters shall be removed from aircraft prior to servicing.

3-60. PERMANENTLY INSTALLED CONVERTERS. A Calendar Inspection shall be performed on all permanently installed LOX converters in accordance with the technical manual pertaining to the specific type and part number LOX converter to be serviced. These converters shall undergo bench testing during the Standard Depot Level Maintenance (SDLM) of the aircraft in which it is installed.

3-61. PURGING LOX CONVERTERS. LOX converters shall be purged when they have been emptied, or whenever moisture or contamination is suspected. Purging shall also be performed upon completion of any maintenance action which causes the system to be open to the atmosphere. In no case shall purge interval exceed 231 days. Purging of LOX converters shall be performed in accordance with the applicable chapter of this manual. To purge LOX converters not included in this manual, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class 1, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Gas/LOX Purging Unit, Model A/M26M-3	3447AS100-1

WARNING

Liquid oxygen converters shall be emptied of LOX and allowed to warm to ambient temperature prior to purging.

1. Connect purging unit to vent port of fill, buildup, and vent valve.

2. Attach adapter assembly to fill port of fill, buildup, and vent valve. Turn knurl knob clockwise until it seats and then back out counterclockwise two complete turns.

3. Attach converter drain line to converter supply quick-disconnect coupling.

NOTE

For ARO Corporation converter P/N 21170-10/-13, remove relief valve tubing and cap the two fittings that tubing was removed from.

4. Pass heated oil-free nitrogen through the converter at a pressure of 120 psig and a minimum discharge temperature of 90°F. Duration of purge is dependent on converter type. Purge duration is as follows:

NOTE

For converters that indicate internal probe shortage, it may be necessary to purge the converter for a longer period of time.

a. Essex Industries Inc. converters P/N 10C-0016-10A and 10C-0016-16 and Bendix Corporation P/N 29073-D2, 3263004-0201, and 3263006-0101 which are at ambient temperature shall be purged for a period of 30 minutes.

b. ARO Corporation converters P/N 21170-10/-13 which are at ambient temperature shall be purged for a period of 60 minutes.

5. When purging is completed, disconnect purging unit and bench test the converter.

Section 3-5. Oxygen System Components Maintenance Shop

3-62. GENERAL.

3-63. During the evolution of cleanliness requirements for oxygen systems, additional requirements have been generated. This has occurred partly because applications vary in scope from industrial use with the least stringent requirements, to manned space vehicles with the most demanding requirements. The major difference between aerospace cleanliness and industrial cleanliness is that the former eliminates airborne contaminants. Therefore, the aerospace industry requires particle count, white rooms and deionized water. These tiny particles are not considered significant contaminants by the oxygen industry. The exclusion of airborne particles is an extremely costly process requiring pressurized rooms, expensive filtration equipment and elaborate procedures. The AIMD/depot level cleanliness standards need not be of clean room quality, but an enclosed, air-conditioned clean area, segregated from contaminant-producing operations shall be considered adequate.

3-64. Shore-based operational facilities shop design criteria are presented in the Naval Facilities Engineering Command Design Manual (NAVFAC DM-24). Deviations from NAVFAC DM-24 shall not be made without prior approval of Naval Facilities Engineering Command Headquarters (NAVFAC HQ). See figure 3-2 for typical shore-based facility.

3-65. The climate control system must be able to maintain a temperature of 65° to 75°F. Oxygen facilities without LOX generating equipment may be heated by unit heaters (steam), or direct-fuel heaters employing an air distribution duct system, providing the heating unit is not located in the transfer shop. Oxygen facilities with LOX generating equipment may be heated by a central heating plant, or by electric heat. Open-fired heaters shall not be used.

3-66. VENTILATION.

3-67. All air supplied to a shop where gaseous or liquid oxygen/nitrogen is transferred from one unit to another shall be exhausted directly to the atmosphere. Under no circumstance shall the exhaust air be returned to the oxygen/nitrogen transfer area.

3-68. Ventilation shall be provided in LOX converter and oxygen components shop to prevent accumulation of potentially dangerous concentrations of oxygen or nitrogen. Mechanical exhaust fans capable of providing a minimum of 3 air changes per hour shall be used as a positive means of exhausting the air. Although oxygen is about 10 percent denser than air, it is not necessary to evacuate the air near the floor because oxygen rapidly diffuses into air.

3-69. Ventilation requirements for oxygen shops aboard ship that support OBOGS systems only, require only 2.0 air changes per hour. However those spaces must meet required safety standards when working with hazardous materials such as oxygen cleaning compound (MIL-C-81302), toluene, acetone and other materials associated with the repair and cleaning of OBOGS components.

3-70. ELECTRICAL.

3-71. All electrical wiring and electrical equipment shall be in accordance with NAVFAC Specification 9Y (latest revision). The following information has been extracted from this specification:

1. Rigid conduit shall be used in wiring installations.

2. Electrical receptacles on the outside of buildings shall be weatherproof, 250V ac, 20 ampere (minimum), 3-wire grounding-type, and shall be furnished with plugs. Receptacles shall be connected to 220V ac, single phase service.

3. Lighting fixtures may be standard type, except that where exposed to mechanical damage, a suitable guard or cover shall be provided.

4. Switches and motor starting shall be enclosed and of the general use type.

5. Motors shall be of a type that do not have arcing or contact making parts. Three-phase motors of squirrel cage type shall be used wherever possible.

6. All equipment shall be static-grounded.

7. Transformer banks shall be located a minimum of 50 feet from transfer shop or LOX storage tank areas.

3-72. INTERIOR FINISHING AND FIXTURES.

3-73. FLOORS. In shops where gaseous oxygen transfer operations are conducted, a concrete floor or vinyl-type floor covering is considered adequate. In shops where LOX transfer operations are conducted, the floor shall be concrete. Non-glazed, or rough-glazed ceramic tile is also a suitable floor finish.

3-74. WALLS. The walls shall be finished with a smooth, impact-resistant, non-chipping, non-flaking material.

3-75. CEILINGS. The ceilings shall be easily cleanable, non-dust accumulating acoustical-type material.

3-76. WORK BENCHES, TABLES AND STORAGE BINS. Work benches and table tops shall be of seamless, non-porous material free of hydrocarbon finishes. Color shall be in contrast to walls and ceilings to minimize eye fatigue. Storage bins shall not contain more than the required parts to maintain an orderly production rate. Work benches, tables and storage bins shall be maintained free of grease, oil and other combustible materials.

3-77. TOOLS.

3-78. All tools and equipment shall be maintained free of grease, oil and other combustible materials. Tools used on oxygen equipment shall not be used for any other purpose. Tools shall be marked OXYGEN USE ONLY, or other suitable methods of identification may be used.

3-79. WORK AREA CLEANLINESS.

3-80. Work areas shall be kept clean at all times. Dust and dirt removal shall be accomplished by a vacuum system at any time that dust is evident at any location in the work area. Damp mopping will be used to follow up the vacuum cleaning for dirt and dust removal. Heel and chair marks or other discolorations of the floors shall be removed by scrubbing. All spare parts shall be removed from the work benches or covered with a lint free covering at the end of the last work shift each day. Work benches and test equipment will be wiped clean prior to the start of each work day. Smoking, refreshments, or lunch containers of any kind shall not be permitted in the work area. Only ball type pens are permitted for use in the shop (no lead or erasures).

3-81. PERSONAL CLEANLINESS.

3-82. Solvent contact with the skin should be avoided where possible. Finger nail polish shall be removed prior to entering shop. Cosmetics and medication which may produce contamination shall not be worn by any personnel. In particular, eye makeup, rouge, face powder and hair spray shall be avoided. Under no conditions will makeup be applied in the shop area. Personnel with skin and/or upper respiratory diseases shall not be allowed to work in the overhaul shop area. Personnel with colds, temporary coughing, sneezing and severe sunburn shall be assigned temporary jobs outside the shop until they are sufficiently recovered.

3-83. QUALITY ASSURANCE.

3-84. Long, trouble-free service can only be expected when cleanliness in the shop is maintained. Frequent Quality Assurance inspections are required to ensure proficiency in work performed by shop personnel, and that cleanliness is maintained.

3-85. TRAINING.

3-86. Shop supervisors shall be responsible for conducting a continuing training program stressing the significance of oxygen system cleanliness, personal cleanliness and the oxygen safety program. Conscientious adherence to all cleanliness requirements and safety regulations shall be observed at all times.

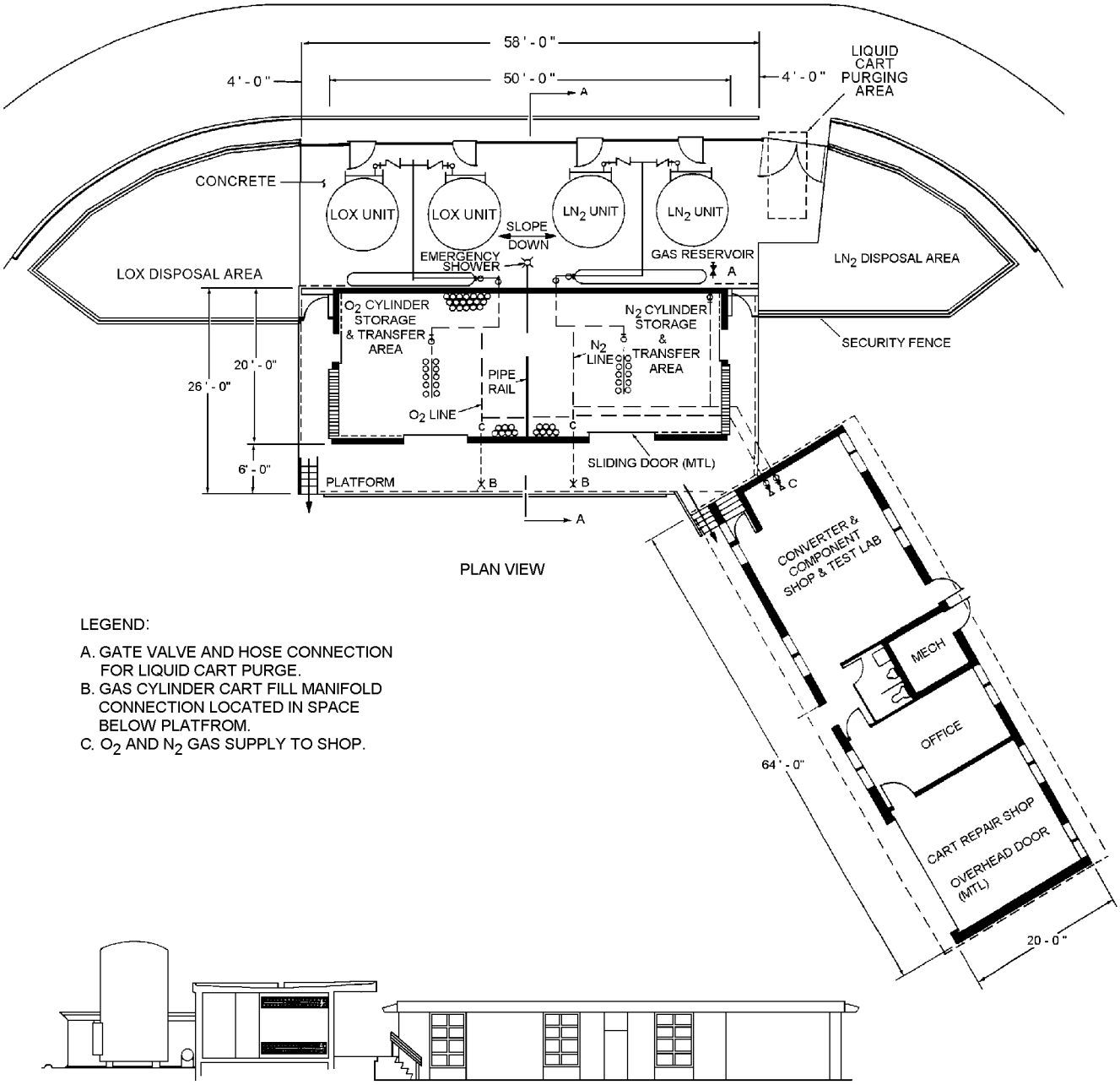

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Figure 3-2. Typical Oxygen Transfer and Components Maintenance Facility

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CHAPTER 4

AIRCRAFT DILUTER DEMAND OXYGEN REGULATORS

TYPE AN6004-1, SERIES 2858-A1, 2858-A1A, 2858-B1, AND 2858-C1

Section 4-1. Description

4-1. GENERAL.

4-2. Aircraft Diluter Demand Oxygen Regulators Pioneer Type AN6004-1, Series 2858 (figures 4-1 and 4-2) are manufactured by Pioneer Central Division of Bendix Aviation Corp (CAGE 06840 and 19315). They are designed to regulate breathing oxygen to the aircrewmember during flight. Table 4-1 contains the leading particulars for the regulators.

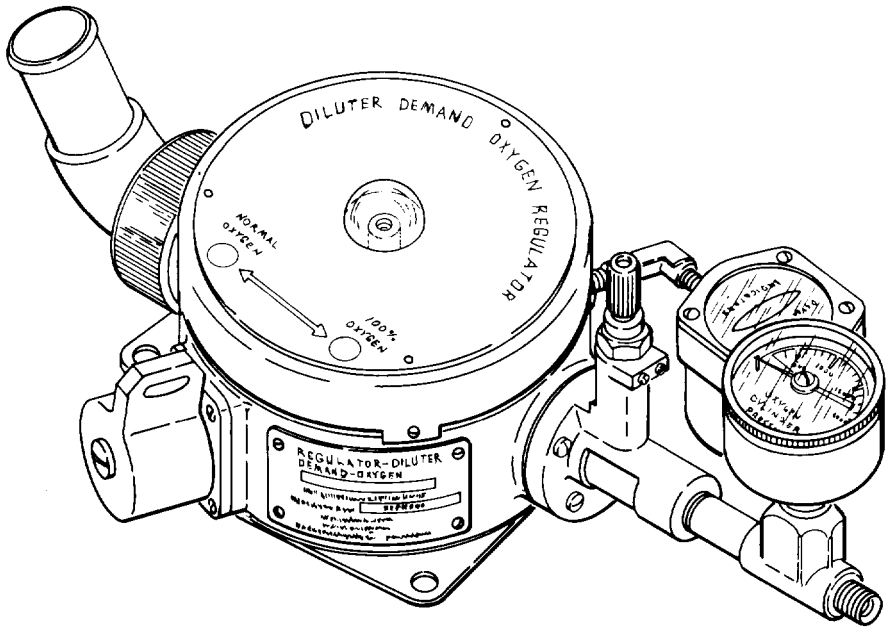

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Figure 4-1. Diluter Demand Oxygen Regulator – Pioneer Types 2858-A1 and 2858-A1A

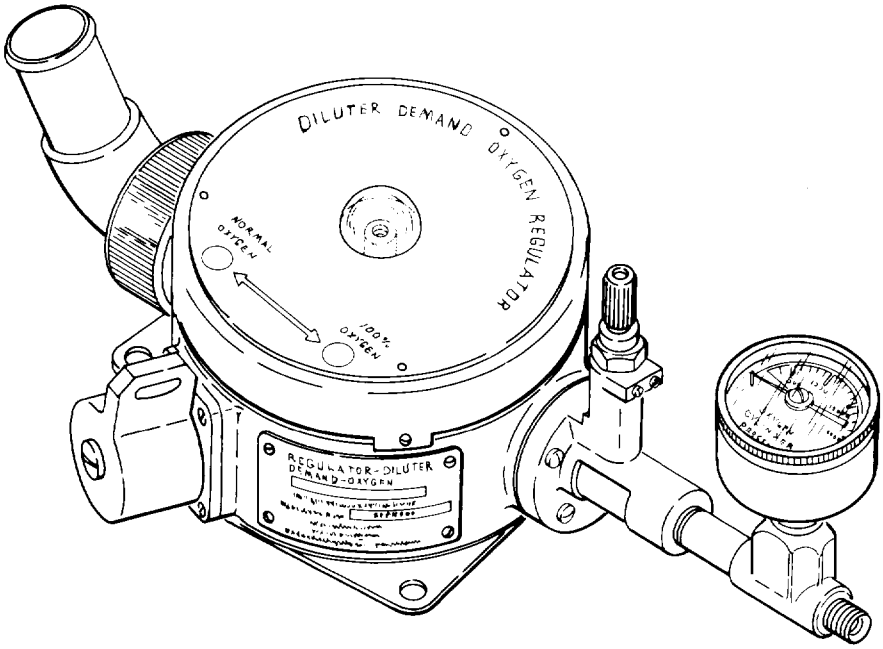

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Figure 4-2. Diluter Demand Oxygen Regulator – Pioneer Types 2858-B1 and 2858-C1

Table 4-1. Leading Particulars

Pioneer Type	Pressure	Altitude	Usable On Code
2858-A1	40-1800 psig	0-37,500 ft	A
2858-A1A	40-1800 psig	0-37,500 ft	B
2858-B1	40-1800 psig	0-37,500 ft	C
2858-C1	40-1800 psig	0-37,500 ft	D

Mounting	Surface
Visual Indicators	Pressure Gage Flow Indicator Air Valve Knob
Regulator Controls	
Air Valve Lever	Selects Normal or 100% Oxygen
Emergency Valve Knob	Removed by Acc. Bull. 24-61
Overall Dimensions	
Length	10-1/4 inches
Width	3-17/32 inches
Height	2-3/4 inches

4-3. The regulators are surface mounted diluter demand type regulators and are used with the MBU-14 series oxygen masks. The regulators incorporate an emergency valve.

WARNING

Accessory Bulletin 24-61 with supplement 1 of October 1961 directed that emergency knobs be removed from all type A-12 (P/N AN6004-1), Pioneer Central (P/N 2858) and ARO Equipment (P/N 17600) series oxygen regulators to preclude the possibility of over-pressurizing the MBU-14 series oxygen mask. Unrestricted flow from the emergency valve delivers oxygen to the mask at a pressure which is difficult to breath against, and may build up to a pressure within the mask great enough to blow the mask from the face. Possible injury to the lungs could also result.

4-4. CONFIGURATION.

4-5. Regulators are supplied in one basic configuration (table 4-1).

4-6. FUNCTION.

4-7. The characteristics and performance for which the regulators are designed are described below. Letters in parentheses relate to letters circled in figure 4-3.

1. Oxygen from the supply cylinder enters the regulator through the adapter assembly (A) and exerts pressure against the inlet valve (B), permitting oxygen to flow from the oxygen inlet orifice through the inlet valve and into the pressure reducer chamber which is the area around the pressure reducer (C).

2. Expansion and contraction of the bellows assembly (D) operates the pressure reducer lever (E) which controls the inlet and reduces cylinder pressure from 1800 pounds to 49 ±1 psig. When the chamber pressure reaches 49 ±1 psig, the bellows contracts, causing the pressure reducer lever to push the inlet valve up against the oxygen inlet orifice and shut off the flow of oxygen.

3. Relief valve assembly (NOT shown) covers the top of the pressure reducer chamber. It acts as a safety valve to prevent excessive pressure from building up within, if a malfunction should occur in the pressure reducer assembly. When pressure in the reducer chamber reaches 65 to 160 psig, the valve seat unseats and relieves excessive pressure.

4. Oxygen flows from the pressure reducer chamber into the lower half of the demand valve chamber (F). The demand valve is controlled by diaphragm (G) which, in turn, is controlled by the person using the regulator. The center of the diaphragm is attached to the diaphragm lever (H) by means of diaphragm knob (J) and diaphragm link (K). When the individual inhales, the diaphragm moves toward the demand valve which in turn causes the diaphragm lever to drop. When the diaphragm lever drops, pressure is exerted on the demand valve stem (L) which, in turn, opens the demand valve permitting oxygen to enter the upper half of the demand valve chamber. Oxygen then passes through the hole in the upper part of the demand valve chamber and into the injector assembly (M). When the user exhales, the diaphragm moves away from the demand valve, thus raising the diaphragm lever and releasing pressure on the demand valve stem, thereby closing the demand valve.

NOTE

If desired, either to check the operation of the regulator or to quickly obtain a continuous oxygen flow, the diaphragm knob (J) can be depressed by hand. This position will keep the demand valve open as long as the knob is depressed.

5. When air valve lever (N) is turned counterclockwise, the air valve cover and air valve body separate slightly, exposing two screen inlets, at the air valve entrance. Inside air valve is an aneroid assembly (O) which is sensitive to changes in atmospheric pressure. At sea level the aneroid contracts, permitting air to pass around the aneroid, unseat the air check valve disc (P) and enter the chamber when there is sufficient suction buildup caused by inhalation. As higher altitudes are reached, decreasing atmospheric pressure allows the aneroid to expand, gradually forcing the throttling plate (NOT shown) against the valve seat (NOT shown) and eventually shutting off the outside air flow into the chamber. This action occurs between 28,000 and 32,000 feet. Air admitted to the air chamber flows into the injector assembly. Should the user desire 100% oxygen prior to the aneroid expanding and cutting off outside air, turn the air valve lever clockwise and this action will shut off all outside air.

6. The air check valve, which closes when the regulator user exhales, is part of the check valve and aneroid assembly. This assembly prevents the escape of oxygen. It also prevents any flow of air until a definite suction is built up so the air-oxygen mixture will be the correct ratio for low flows.

7. Oxygen from the demand valve flows into the injector assembly. As it leaves the injector nozzle, the air from the air valve mixes with it. Upon inhalation, of the mixture of air and oxygen is drawn through the venturi (Q). The venturi delivers an air-oxygen mixture through the elbow assembly (R) to the oxygen mask.

8. The injector assembly is adapted to handle large quantities of oxygen under unusual conditions. The nozzle in the injector housing forms a valve with the injector seat. For high flows the nozzle unseats itself and releases a greater quantity of oxygen through the holes in the lower portion of the injector housing.

4-8. SERVICE LIFE.

4-9. Oxygen regulators shall remain in service for as long as they function correctly and do not require excessive repair (cost exceeds 75% of original cost of regulator). All affected silicone rubber parts shall be replaced whenever a regulator is disassembled for repair.

4-10. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

4-11. Section 4-5, Illustrated Parts Breakdown, contains information on each assembly, subassembly and component part of the regulators. The figure and index number, reference or part number, description, and units per assembly are provided with the breakdown.

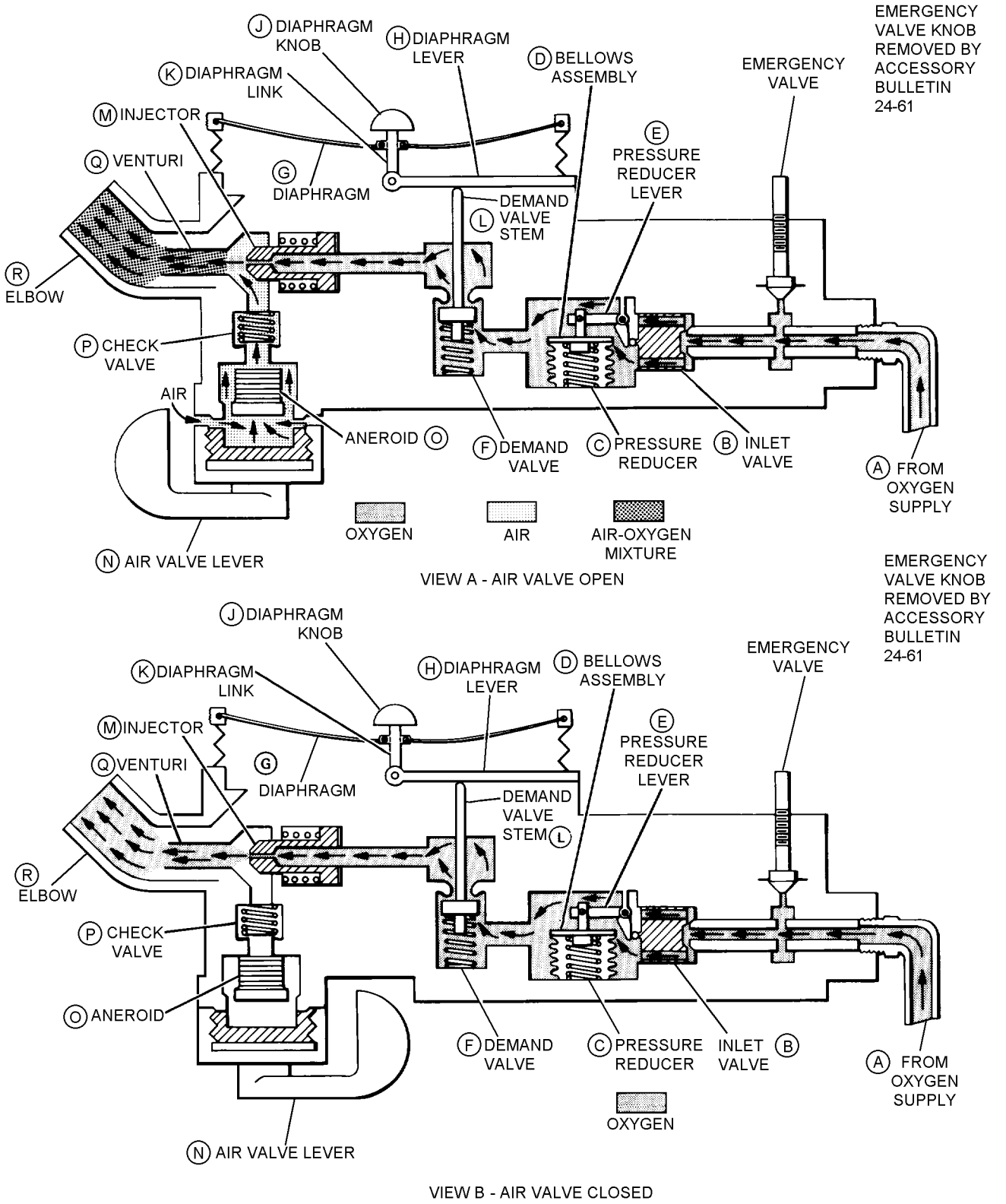


Figure 4-3. Schematic Operational Diagram – Normal Flow (View A and B)

Section 4-2. Modifications

4-12. GENERAL.

4-13. Oxygen Regulators P/N 2858-A1, 2858-A1A, 2858-B1, and 2858-C1 shall be modified in accordance with the following directive:

Accessory Bulletin 24-61.

Section 4-3. Performance Test Sheet Preparation

4-14. GENERAL.

4-15. Preparation of Oxygen Performance Test Sheets requires that, through the use of various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

4-16. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in the oxygen regulator test stands. The flows must be converted to inches of water pressure (inH_2O), the form of measurement which can be read on the test stand manometers.

NOTE

The various graphs supplied with each Oxygen System Components Test Stand, Model 62-A-116-E1, Model 1172AS100, and Model 1316AS100, are used in converting flows. These graphs are not interchangeable between test stands. A new set of graphs will be provided each time the test stand is calibrated.

4-17. The information provided in the tables in this section is to be recorded on the Performance Test Sheet (figure 4-4).

4-18. The Performances Test Sheet is a sample only, but may be reproduced for local use (figure 4-4).

4-19. The following tests require conversion of flows from actual lpm to indicated inH_2O:

1. Flow Indicator Test
2. Flow Suction Test
3. Oxygen Ratio Test

4-20. Each oxygen regulator must be subjected to the following tests:

1. High Pressure Leakage Test
2. Outward Leakage Test
3. Inward Leakage Test
4. Pressure Gage Test
5. Flow Indicator Test
6. Flow Suction Test
7. Oxygen Ratio Test

4-21. REGULATOR PERFORMANCE TESTS.

4-22. HIGH PRESSURE LEAKAGE TEST. Actual pressures and allowable leakage for the High Pressure Leakage Test are shown on the Performance Test Sheet (figure 4-4).

4-23. OUTWARD LEAKAGE TEST. Actual pressures and allowable leakage for the Outward Leakage Test are shown on the Performance Test Sheet (figure 4-4).

4-24. INWARD LEAKAGE TEST. Actual pressures and allowable leakage for the Inward Leakage Test are shown on the Performance Test Sheet (figure 4-4).

4-25. PRESSURE GAGE TEST. Actual pressures and tolerances for the Pressure Gage Test are shown on the Performance Test Sheet (figure 4-4).

4-26. FLOW INDICATOR TEST. Actual output flows (lpm) for the Blinker Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows, proceed as follows:

4-27. Diluter Lever Normal Oxygen Position. Use the air line of the Sea Level Output Graph.

1. Locate the actual output at the bottom of the graph and trace the selected line up to the air line.

2. Trace the line from where the actual output and air lines intersect across the graph to the left-hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

4-28. Diluter Lever 100% Oxygen Position (Sea Level). Use the N_2 line on the Sea Level Output Graph.

1. Locate actual output (lpm) at the bottom of the graph and trace the selected line up to the N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left-hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

4-29. FLOW SUCTION TEST. The Flow Suction Test shall be performed at sea level with the diluter control lever in both the 100% OXYGEN and NORMAL OXYGEN position. Actual (lpm) flows are converted to indicated (inH_2O) flows by using the Sea Level Output Graphs. The air line is used for NORMAL OXYGEN flows, and the N_2 line is used for 100% OXYGEN flows. Convert the actual flows as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure that specified graph is used.

1. Locate the desired lpm line at the bottom of the Sea Level Output Graph (figure 4-4).

2. Trace selected lpm line up to where it intersects the air line (NORMAL indicated output) on N_2 line (100% indicated output).

3. Trace the line from point of intersection across the graph to the left-hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 4-4.

4-30. OXYGEN RATIO TEST. Actual flows and oxygen percentages (figure 4-4) used for the Oxygen Ratio Test must be converted to indicated flows and oxygen averages. All actual flows must be converted to indicated flows. The results of these computations shall be entered in the appropriate columns within the Oxygen Ratio Test portion of the Performance Test Sheet. To find average oxygen, indicated output, corrected indicated output, actual, and indicated input flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure that specified graph is used.

4-31. Average Oxygen. These figures are provided but are computed as follows: Average oxygen is found by adding the minimum and maximum oxygen percentages (figure 4-4) then dividing the sum by 2 (e.g., 6% + 45% = 51% ÷ 2 = 25.5%).

1. Enter the resulting figure in the appropriate block on the Performance Test Sheet.

2. Repeat this procedure for all minimum and maximum oxygen percentages given in figure 4-4.

REGULATOR PERFORMANCE TEST SHEET
BENDIX PIONEER TYPES
2858-A1, 2858-A1A, 2858-B1, 2858-C1

DATE _____ TYPE _____ SERIAL NO. _____

TEST STAND SERIAL NO. _____ TESTED BY _____ CDI _____

1. HIGH PRESSURE LEAKAGE TEST _____ (50 psig – 3/16 in. bubble – 3 sec)

2. OUTWARD LEAKAGE TEST _____ (70 psig – 15 inH_2O allowable leakage 300 ccm)

3. INWARD LEAKAGE TEST _____ (5 inH_2O suction – allowable leakage 1450 ccm)

4. PRESSURE GAGE TEST, NOTE: TESTED AT AMBIENT TEMPERATURE OF 70°F.

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
500	±50		
1000	±50		
1500	±50		

5. BLINKER (IF FLOW INDICATOR) TEST (INLET PRESSURE 150 PSIG)

ALTITUDE/ PRESSURE	DILUTER KNOB	OUTPUT			BLINKER POSITION
		ACTUAL	INDICATED	READING	
SEA LEVEL	NORMAL	20			FULLY OPEN
SEA LEVEL	NORMAL	0			CLOSE IMMED
SEA LEVEL	100%	8			FULLY OPEN
SEA LEVEL	100%	0	0		CLOSE IMMED

6. FLOW SUCTION TEST

ALTITUDE	INLET PRESSURE (PSIG)	ACTUAL OUTPUT (LPM)	NORMAL		100 PERCENT		MAXIMUM SUCTION (inH_2O)
			INDICATED OUTPUT	READING	INDICATED OUTPUT	READING	
SEA LEVEL	50	30					-0.50
SEA LEVEL	150	50					-0.70
SEA LEVEL	150	70					-1.5

7. OXYGEN RATIO TEST (INLET PRESSURE 150 PSIG)

ALTITUDE (1000 FT)	OXYGEN PERCENT		OUTPUT				INPUT				
	MIN	MAX	AVERAGE PERCENT	ACTUAL OUTPUT (LPM)	INDICATED OUTPUT (inH_2O)	CORRECTED INDICATED OUTPUT	ACT HI	ACT LOW	IND HI	IND LOW	READING
10	6	45	25.5	15			14.1	8.25			
10	6	60	33	85			79.9	34			
20	24	55	39.5	15			11.4	6.75			
20	24	80	52	85			64.6	17			
28	60	100	80	15			6	0		0	
28	60	100	80	85			34	0		0	
32	98	100	99	85			1.7	0		0	

8. REGULATOR OXYGEN PURGE: APPLY 500 PSIG AVIATORS BREATHING OXYGEN AND FLOW 1 TO 3 MINUTES

Figure 4-4. Performance Test Sheet

4-32. Indicated Output. To convert actual output flows (lpm) given in figure 4-4 to indicated output flows (inH_2O), proceed as follows:

1. Locate the desired actual output at the bottom of the Output Graph (figure 4-4).

2. Trace the selected line up to the point of intersection with the appropriate altitude air line.

3. Trace the line on the graph from where the desired lpm and altitude air lines intersect across the graph to the left-hand column to determine indicated inH_2O.

4. Enter this figure in appropriate block on the Performance Test Sheet.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Output Graph (e.g., 30,000-foot Output Graph or 35,000-foot Output Graph).

4-33. Corrected Indicated Output. Corrected indicated output is indicated output with the required percentage of nitrogen subtracted. To find correct indicated output, proceed as follows:

NOTE

Use Oxygen/Air/Nitrogen Conversion Graph provided in NAVAIR 17-15BC-21 Technical Manual.

1. Locate the indicated output (inH_2O) at the bottom of the N_2 Conversion Graph.

2. Find the average oxygen percentage on the Performance Test Sheet corresponding to the selected indicated output.

NOTE

Select percentage line on N_2 Conversion Graph nearest to average oxygen figure selected from Average Oxygen column on Performance Test Sheet.

3. Follow the indicated output line selected on the N_2 Conversion Graph up to the appropriate N_2 percentage line.

4. Trace the line on the graph where the selected indicated output and N_2 percentage lines intersect across the left-hand column to determine inH_2O.

5. Enter this figure in the appropriate block on the Performance Test Sheet.

6. Repeat steps 1 through 5 for all required indicated output flows.

4-34. Actual High Air. These figures are provided, but are computed as follows: Find the actual high air by subtracting the minimum oxygen percentage (figure 4-4) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 6% = 94% x 85 lpm = 79.90 lpm).

1. Enter the resulting figure in the actual high air column on the Performance Test Sheet.

2. Repeat the procedure for all minimum oxygen percentages given in figure 4-4.

4-35. Actual Low Air. These figures are provided, but are computed as follows: Find the actual low air by subtracting the maximum oxygen percentage from 100%; multiply the result by the corresponding actual output (e.g., 100% - 60% = 40% x 85 lpm = 34.00 lpm).

1. Enter the resulting figure in the actual low air column on the Performance Test Sheet.

2. Repeat the procedure for all maximum oxygen percentages given in figure 4-4.

4-36. Indicated High Air (Input). To convert actual high air to indicated high air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Input Graph (e.g., 30,000-foot Input Graph or 35,000-foot Input Graph).

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left-hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all actual high air figures previously entered on Performance Test Sheet.

4-37. Indicated Low Air (Input). To convert actual low air to indicated low air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

2. Trace the selected line up where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left-hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all actual low air figures previously entered on Performance Test Sheet.

Section 4-4. Maintenance

4-38. GENERAL.

4-39. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly and adjusting of aircraft panel mounted oxygen regulators.

NOTE

The regulator shall be considered beyond economical repair when the costs of repair parts exceed approximately 75% of the cost of the regulator.

4-40. Procedural steps outlined in this section are listed under the aircraft inspection cycle in which they are required and are further listed in the sequence in which they normally occur.

4-41. Bench test shall be performed on aircraft oxygen regulators prior to being placed in service and during the Phase/Calendar or SDLM (Standard Depot Level Maintenance) Inspection cycle of the aircraft in which installed. See applicable PMS (Planned Maintenance System) publications for specific intervals. In no case shall the interval exceed 448 days. Regulators shall be subjected to a bench test if a malfunction is suspected, and after repair or replacement of damaged parts.

4-42. Bench test shall be performed using Oxygen Systems Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate Ground Support Equipment manual for identification of test stand controls and indicators referred to in bench test.

4-43. Due to the complexity of the Model 1172AS100 or 1316AS100 test stand, it is essential that the operator become thoroughly familiar with the test stand prior to performing bench test.

4-44. INSPECTION.

4-45. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTIONS. Turn-around/Preflight/Postflight/Transfer Inspections consist of a Visual Inspection performed in conjunction with aircraft inspection requirements for the aircraft in which these regulators are installed. Visually inspect the following:

1. Legibility of all markings.

2. Low or improper reading on regulator pressure gage.

3. Air valve lever in 100% OXYGEN position.

4. Supply control in OFF position.

5. Regulator and surrounding area for freedom from dirt and hydrocarbons.

6. Delivery hose and connector hose for cuts, fraying, kinking, hydrocarbons, and general condition.

4-46. If discrepancies are found or suspected, Maintenance Control shall be notified.

4-47. Regulators which do not pass inspection and cannot be repaired in the aircraft shall be removed and replaced by Ready For Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

4-48. ACCEPTANCE/DAILY INSPECTIONS. Acceptance/Daily Inspections consist of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. To perform the inspection, proceed as follows:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

4-49. Visually inspect the regulators in accordance with paragraph 4-45.

4-50. Functional Test. To perform a Functional Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210

1. Open supply control valve.

2. Oxygen cylinder pressure gage must read 1800 psig.

3. Place diluter control knob in NORMAL OXYGEN position.

4. Connect oxygen hose to quick-disconnect, place mask to face, and inhale. Proper regulator operation will be indicated by flow indicator assembly showing black during inhalation and white during exhalation.

NOTE

Flow indication may be achieved by depressing diaphragm knob or diaphragm depressor in the center of the regulator cover and by observing the oxygen flow indicator change from white to black.

4-51. Upon completion of functional test, secure regulator as follows:

1. Disconnect mask from supply hose.

2. Ensure that diluter control knob is in 100% OXYGEN position.

3. Close supply control valve.

4-52. If discrepancies are found or suspected, Maintenance Control shall be notified.

4-53. Regulators which do not pass inspection and can not be repaired in the aircraft, shall be removed and replaced by RFI regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

4-54. CALENDAR/PHASE/SPECIAL/SDLM INSPECTIONS. Calendar, Phase, Special, and SDLM Inspections require removal of the regulators from the aircraft. See applicable PMS publication for specified intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be subjected to a Visual Inspection and Bench Test.

4-55. Aircraft surface mounted regulators failing the Bench Test shall be repaired. SM&R codes define repairability of components and lowest level of maintenance authorized in accordance with Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

4-56. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type 1, Class 1, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators. Do not use 3500 psig nitrogen cylinder. These cylinders can not be certified contaminant free.

NOTE

Tests are arranged so they proceed from one test to the next with a minimum of flow and altitude changes. Troubleshooting tables are provided following each test (table 4-2 through 4-8). Regulators shall be mounted on a horizontal plane in the test chambers.

4-57. Unless otherwise specified in a specific test, the pressure applied, flows drawn, etc. shall be the same for all 2858 regulators.

4-58. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

NOTE

Nitrogen supply cylinders utilized in testing oxygen components contain a maximum pressure of 1800 psig. For tests requiring pressures of 1800 psig, utilize highest available pressure, but in no case shall this pressure be less than 500 psig.

4-59. HIGH PRESSURE LEAKAGE TEST. To perform the High Pressure Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-Free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure that test stand valves are closed, then open N_2 supply cylinder valve.

2. Ensure that regulator emergency valve is in OFF position.

3. Place regulator diluter control knob in 100% OXYGEN position.

NOTE

Regulator should be mounted on a horizontal plane in the test chamber.

4. Connect regulator inlet to N_2 INPUT connection (18) in altitude chamber.

5. Turn INLET PRESS. ON/OFF valve (L) to ON position.

6. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet.

7. Test shut-off by depressing and releasing the diaphragm knob several times, maintaining desired pressure.

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound having peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

8. Draw a film of leak detection compound across the regulator outlet. The bubble shall not advance more than 3/16 inch in 3 seconds. If bubble extends more than allowed, repeat test three or four times. Distension could be caused by expansion of gas by temperature difference between inside and outside of regulator.

NOTE

Determine whether the leak is coming through, or around the working parts of the regulator.

9. If bubble advance continues to be more than allowed, determine where leak is coming from by performing steps a through d and locate probable cause by using troubleshooting chart (table 4-2).

Table 4-2. Troubleshooting (High Pressure Leakage Test)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-10.		
High pressure leaks through working parts.	Diaphragm lever (72) set too high.	Reset diaphragm lever 11/64 inch above the top edge of regulator case.
	Demand valve not sealing (seat cut or seat retainer cocked).	Replace demand valve seat (61).
	Bent or burred demand valve stem (67).	Replace demand valve stem (67).
	Wrinkled or tight diaphragm (diaphragm lever locknut tightened before diaphragm assembly, positioned in case).	Reposition or replace diaphragm (36).
	Pressure reducer set too high.	Reset to 48 ± 1 (100 psig inlet).
	Weak demand valve spring (60).	Replace demand valve spring (60).
High pressure leaks around working parts.	Oxygen inlet gasket (16) defective.	Replace oxygen inlet gasket (16).
	Leakage around pressure reducer chamber.	Tighten all screws; if necessary, replace gasket (44).
	Inlet valve (13) leaking (scored seat or improper setting of inlet valve).	Readjust inlet valve setting or replace inlet valve assembly (13).
	Leakage around demand valve chamber.	Tighten screws (59) or replace gaskets (44) and (46).
	Leakage through emergency valve channel.	Replace packings (9, figure 4-14), and tighten emergency valve body (6, figure 4-14).
	Leakage through pressure reducer screw (15) (caused by hole in pressure reducer bellows).	Replace pressure reducer assembly (39).

a. Unscrew elbow nut and remove elbow.

b. Place a film of leak detection compound over the end of the venturi.

c. If bubble expands, the leak is through the working parts.

d. If bubble does not expand, the leak is around the working parts.

10. Relieve pressure to regulator by backing out on LOW PRESS. REGULATOR (N) and opening SYSTEM BLEED valve (S).

11. Close SYSTEM BLEED valve.

12. Using HIGH PRESS. REGULATOR (Q), apply 500 psig to regulator inlet.

13. Repeat steps 7 and 8.

14. Turn INLET PRESS. ON/OFF valve (L) to OFF position.

15. Turn HIGH PRESS. REGULATOR (Q) to vent.

16. Bleed test stand using SYSTEM BLEED valve (S).

17. Bleed test pressure from regulator by depressing diaphragm knob.

4-60. OUTWARD LEAKAGE TEST. To perform the Outward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type I	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Place regulator diluter control knob in NORMAL OXYGEN position.

2. Connect regulator outlet to piezometer (26) in altitude chamber. Connect a line from LOW PRESS. connection (19) to REF. TAP connection (21) in chamber.

3. Turn test stand INLET PRESS. ON/OFF valve (L) to OFF position.

4. Adjust LOW PRESS. REGULATOR (N) until 70 psig is indicated on a REGULATED LOW PRESS. gage (11).

5. Turn LEAKAGE SELECTOR valve (F) to the high range position.

6. Turn PRESS. SELECTOR valve (D) to H_2O position and slowly open LEAKAGE CONTROL valve (E) until 15.0 inH_2O is indicated on PRESS./SUCTION manometer (4).

NOTE

Maintain 15.0 inH_2O with LEAKAGE CONTROL valve (E) throughout test.

7. If leakage is indicated on HIGH RANGE LEAKAGE rotameter (8), maximum allowable leakage is 0.3 lpm (300 ccm).

8. Repeat steps 2 through 7 with diluter control knob in 100% OXYGEN position.

9. Close LEAKAGE CONTROL valve (E).

10. If leakage is excessive, locate probable cause using troubleshooting chart (table 4-3).

11. Back out on LOW PRESS. REGULATOR valve (N).

12. Slowly open SYSTEM BLEED valve (S) and LEAKAGE CONTROL valve (E), bleed system, and close both valves.

13. Disconnect hose from LOW PRESS. connection (19) and REF. TAP connection (21) in altitude chamber.

4-61. INWARD LEAKAGE TEST (TEST STAND 1172AS100 ONLY). To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter	Fabricate IAW NAVAIR Dwg 1172AS136
1	Oxygen System Components Test Stand	1172AS100

1. Ensure that test stand valves are closed, then open N_2 supply cylinder valve.

2. Place regulator diluter control knob in 100% OXYGEN position.

NOTE

Regulator should be mounted on a horizontal plane in the test chamber.

3. Cap regulator inlet.

Table 4-3. Troubleshooting (Outward Leakage Test)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-10.		
Excessive external leakage.	Leakage through air check valve (20) NORMAL position-bent or scored air check valve disc (8, figure 4-16).	Replace air check valve disc (8, figure 4-16).
	Leakage through air check valve 100% OXYGEN position-leakage around air valve body gasket (9, figure 4-15).	Tighten air valve body screws (18). Replace gasket (19).
	Ruptured or leaking diaphragm (36).	Replace diaphragm (36).
	Leakage through case.	Tighten all screws and replace gaskets as required.
	Leaking elbow connection (22).	Tighten elbow nut (21) and replace gasket (24) as required.
	Leakage through flow indicator piston seal (22, figure 4-18) after applying leak detection compound to flow indicator vent hole.	Replace flow indicator piston seal (22, figure 4-18).
	Leakage around flow indicator packing washer (9, figure 4-18).	Replace packing washer (9, figure 4-18).

4. Using an adapter (NAVAIR Drawing 1172AS136), connect the regulator outlet to N_2 INPUT connection (18) in the altitude chamber.

5. Connect a line from LOW PRESS. connection (19) to REF. TAP connection (21) in altitude chamber. Plug the rubber hose attached to piezometer (26), using piezometer plug supplied with the test stand.

WARNING

Ensure LOW PRESS, REGULATOR (N) is not loaded. This will prevent N_2 supply cylinder pressure from passing on to INLET PRESS. ON/OFF valve (L) which could damage the item under test or cause injury to the test stand operator.

Ensure that no pressure is indicated on regulated high pressure gage (10) regulated low pressure gage (11) and N_2 input pressure gage (27).

6. Turn INLET PRESS. ON/OFF valve (L) to the ON position.

7. Turn vacuum pump on.

8. Turn PRESS. Selector valve (D) to the H_2O position and fully open LEAKAGE CONTROL valve (E).

9. Ensure LEAKAGE SELECTOR valve (F) is in high range position.

NOTE

HIGH RANGE LEAKAGE rotameter (8) is calibrated with an applied pressure of 70 psig. The inward leakage test requires that a suction of 5.0 inH_2O be applied to the regulator outlet and the rotameter. This pressure difference (5.0 inH_2O at 70 psig) creates a wide variance between actual leakage and indicated leakage. The maximum allowable leakage for the inward leakage test is 500 ccm. An actual leakage of 500 ccm will be displayed on HIGH RANGE LEAKAGE rotameter (8) as an indicated 1450 ccm.

10. Slowly open OUTPUT valve (C) until 5 inH_2O suction is indicated on PRESS./SUCTION manometer (4). Any leakage will be displayed on HIGH RANGE LEAKAGE rotameter (8). The maximum allowable indicated leakage is 1450 ccm (actual 500 ccm). Record indicated leakage on Performance Test Sheet.

11. Close OUTPUT valve (C) and LEAKAGE CONTROL valve (E). Turn vacuum pump off. Turn INLET PRESS. ON/OFF valve (L) to the OFF position.

12. Disconnect line from LOW PRESS. connection (19) and REF. TAP connection (21) in altitude chamber. Disconnect regulator outlet from N_2 INPUT connection (18). Remove piezometer plug from piezometer (26).

13. If excessive leakage is indicated, locate probable cause using troubleshooting chart (table 4-4).

Table 4-4. Troubleshooting (Inward Leakage Test)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-10.		
Excessive external leakage.	Ruptured diaphragm (36), leakage through case.	Replace diaphragm (36); tighten screws or replace gaskets as required.
	Leakage through elbow connection (22).	Tighten elbow nut (21) or replace elbow gasket (24).
	Leakage through air valve.	Tighten screws (18) or replace gaskets (19) and (10, figure 4-15).
	Leakage through flow indicator piston seal (22, figure 4-18).	Replace flow indicator piston seal (22, figure 4-18).
	Leakage around flow indicator packing washer (9, figure 4-18).	Replace flow indicator packing washer (9, figure 4-18).

4-62. INWARD LEAKAGE TEST (TEST STAND MODEL 1316AS100 ONLY). To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1316AS100

1. Ensure all test stand valves and regulators are properly secured and open N_2 supply cylinder.

2. Place oxygen regulator supply control valve lever in the OFF position and diluter control lever in the 100% OXYGEN position.

3. Ensure oxygen regulator emergency pressure control lever is in NORMAL position and cap the regulator inlet.

4. Connect a line from 20 TO 200 LEAKAGE connection (20) to REF TAP and connection (21) in altitude chamber.

5. Connect regulator outlet to piezometer (26).

6. Turn on vacuum pump.

7. Turn PRESSURE SELECTOR valve (D) to H_2O position.

8. Place OVERBOARD ON/OFF valve (T) to ON position.

9. Slowly open INWARD LEAKAGE REF valve (P) until 9 inH_2O suction is indicated on pressure suction manometer (4).

10. Observe OVERBOARD LEAKAGE rotameter (6), maximum allowable leakage is 200 ccm. Record reading on Performance Test Sheet.

11. Close INWARD LEAKAGE REF valve (P) and place OVERBOARD ON/OFF valve (T) in the OFF position.

12. Disconnect line from 20 TO 200 LEAKAGE connection (20) and REF TAP and connection (21).

13. Disconnect regulator outlet from piezometer (26) and remove cap from regulator inlet.

14. If excessive leakage is indicated, locate probable cause using troubleshooting chart (table 4-4).

4-63. PRESSURE GAGE TEST. To perform the Pressure Gage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Connect regulator inlet to N_2 INPUT connection (18).

2. Turn INLET PRESS. ON/OFF valve (L) to ON.

CAUTION

LOW PRESS. REGULATOR (N) can only be used when applying pressures below gage guard setting (165 to 175 psig) to an item under test. For pressures above gage guard setting HIGH PRESS. REGULATOR (Q) must be used.

3. Using HIGH PRESS. REGULATOR (Q), slowly increase pressure to each test pressure specified in figure 4-4. Performance Test Sheet.

NOTE

Regulator pressure gage readings must be recorded twice, once before and once after tapping pressure gage.

4. Check tolerance by comparing regulator pressure gage reading with test stand N_2 INPUT PRESS. gage (27).

5. Back out LOW PRESS. REGULATOR (N).

6. Continue test for 500 psig pressure, using HIGH PRESS. REGULATOR (Q).

7. Turn HIGH PRESS. REGULATOR (Q) to vent.

8. Bleed test stand using SYSTEM BLEED valve (S). Bleed regulator by depressing diaphragm knob.

9. If pressure gage is not within tolerances, replace pressure gage.

4-64. FLOW INDICATOR TEST. To perform the Flow Indicator Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure that diluter control knob is in NORMAL OXYGEN position.

2. Connect regulator outlet to piezometer (26).

3. Using LOW PRESS. REGULATOR (N), apply 150 psig to the regulator inlet.

4. Turn vacuum pump on.

5. Using OUTPUT valve (C), draw 20 lpm through regulator. Blinker must be fully opened.

6. Close OUTPUT valve (C). Zero flow blinker must close immediately.

7. Place diluter control knob in the 100% OXYGEN position.

8. Using OUTPUT valve (C), draw 8 lpm flow through the regulator. Blinker must be fully open.

9. Close OUTPUT valve (C). Zero flow blinker must close immediately.

10. If flow indicator fails the above test, locate probable cause using troubleshooting chart (table 4-5).

Table 4-5. Troubleshooting (Flow Indicator)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-18.		
Sticking lever assembly (10).	Friction between frame (17) and lever assembly (10).	Disassemble indicator and check clearance between frame and the two levers.
Leakage (apply leak detection compound over vent and observe).	Loose retaining ring (7).	Using spanner wrench, tighten retaining ring (7).
	Defective packing washer (9).	Replace packing washer (9).
	Leaking piston seal (22).	Replace piston seal (22).

4-65. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Connect regular inlet to N_2 INPUT connection (18) in altitude chamber.

2. Connect regulator outlet to piezometer (26) in altitude chamber.

3. Ensure that PRESS. SELECTOR valve (D) is in the H_2O position.

4. Place regulator diluter knob in 100% OXYGEN position.

5. Turn test stand INLET PRESS. ON/OFF valve (L) to the ON position.

6. Turn vacuum pump on.

7. Using LOW PRESS. REGULATOR (N), set the inlet pressure at each inlet pressure specified on the Performance Test Sheet (figure 4-4).

8. Using OUTPUT valve (C), set flows specified in Performance Test Sheet on OUTPUT FLOW manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record readings on Performance Test Sheet.

9. If regulator fails the Flow Suction Test, locate probable cause using troubleshooting chart (table 4-6).

NOTE

With no suction on the regulator (OUTPUT valve (C) closed), maximum flow through regulator shall not exceed 0.01 lpm. This will cause a slight rise in PRESS./SUCTION manometer (4).

10. Close OUTPUT valve (C).

11. Back off LOW PRESS. REGULATOR (N).

12. Open system bleed valve(s) and bleed system.

Table 4-6. Troubleshooting (Flow Suction)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-10.		
Low suction.	Weak demand valve spring (60).	Replace demand valve spring (60).
	Weak injector spring (3, figure 4-13).	Replace injector spring (3, figure 4-13).
	Outlet screen out of position (23).	Realign screen (23).
	Low pressure reducer setting.	Reset to 48 ±1 psig.
	High pressure reducer setting.	
	Stiff demand valve spring (60).	Replace demand valve spring (60).
High suction.	Stiff injector spring (3, figure 4-13).	Replace injector spring (3, figure 4-13).
	Demand valve set too low.	Reset to 11/64 inch above case.
	Insufficient volume in pressure reducer (set too high).	Reset to 9/64 inch above surface to bellows cap.
	Low setting of diaphragm lever (72).	Readjust diaphragm lever screw (73).
	Pressure reducer creep.	Reset or replace inlet valve (13) and orifice.

4-66. OXYGEN RATIO TEST. To perform the Oxygen Ratio Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure that regulator diluter knob is in the NORMAL position.

2. Turn test stand INLET. PRESS. ON/OFF valve (L) to the ON position.

3. Using LOW PRESS. REGULATOR (N), apply 150 psig to the regulator inlet.

CAUTION

Maintain 3.0 inH_2O in OUTPUT FLOW manometer (I) with OUTPUT valve (C) while ascending to altitude.

Slowly open VACUUM CONTROL valve (B) and observe PRESS./ SUCTION manometer (4). If rapid increase in pressure is indicated, close down on VACUUM CONTROL valve (B) until pressure stabilizes. Increase of pressure on PRESS./SUCTION manometer (4) is caused by too fast a rate of climb in the altitude chamber.

4. Using VACUUM CONTROL valve (B), ascend to first test altitude shown on Performance Test Sheet.

5. Set output flows specified in Performance Test Sheet with OUTPUT valve (C) and stabilize altitude with INPUT valve (A).

6. Read INPUT FLOW manometer (2) and record readings on the Performance Test Sheet.

7. Continue the test for each specified altitude and outlet flow shown on the Performance Test Sheet.

8. Close OUTPUT valve (C) and INPUT valve (A). Descend to 27,000 feet using valve (K).

NOTE

If indicated input flows are not within limits, an Aneroid Closure Test must be performed.

4-67. ANEROID CLOSURE TEST. To perform the Aneroid Closure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

The Aneroid Closure Test is performed only if regulator fails Oxygen Ratio Test.

1. Descend to 25,000 feet, using CHAMBER BLEED valve (K).

2. Ensure that inlet pressure is set at 150 psig.

3. Set up a flow of 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C).

4. Aneroid shall close between 28,000 and 32,000 feet as indicated by no further advance in altitude on LOW RANGE ALTM. (13).

5. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

6. If regulator fails Aneroid Closure Test and/or Oxygen Ratio Test, locate probable cause using trouble-shooting chart (table 4-7 or table 4-8).

4-68. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen	MIL-O-27210, Type 1
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)

WARNING

Do not use oxygen test stand to regulate the oxygen purge pressure.

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

2. Apply 500 psig to regulator inlet.

3. Position air valve lever in the 100% position and depress diaphragm; allow oxygen to flow 1 to 3 minutes.

4. Shut off oxygen source and disconnect regulator.

NOTE

Upon completion of the bench test and/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series. All equipment forwarded from the Organizational Level maintenance to the intermediate and/or Depot Level, shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian.

5. After completion of oxygen purge, place oxygen regulator in plastic bag for storage.

Table 4-7. Troubleshooting (Oxygen Ratio)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-16.		
High air at 10,000 feet.	Weak air check valve spring (10).	Replace with stronger air check valve spring (10).
Low air at 10,000 feet.	Strong air check valve spring (10).	Replace with weaker air check valve spring (10).
	Leaking injector.	Tighten venturi (mixing tube) (26, figure 4-10.) Replace injector seat (5, figure 4-13) and/or injector washer (7, figure 4-13) as required.
High air at 20,000 feet.	Excessive throttling plate movement. Throttling plate too far from housing seat.	Replace plate retaining nut (3) with one having a longer shoulder.
Low air at 20,000 feet.	Throttling plate too close to housing seat.	Replace plate retaining nut (3) with one having a shorter shoulder.
	Leaking injector.	Tighten venturi (mixing tube) (26, figure 4-10) or replace injector washer (7, figure 4-13).
High air at 28,000 feet.	Aneroid air valve closure too high.	Readjust aneroid to close at 28,000 to 32,000 feet.
Low air at 28,000 feet.	Aneroid air valve close too low.	Readjust aneroid to close at 28,000 to 32,000 feet.
	Air check valve spring (10) too strong.	Replace with weaker air check valve spring (10).

Table 4-8. Troubleshooting (Aneroid Closure)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-16.		
Aneroid not closing at 32,000 feet.	Cocked aneroid (1).	Replace aneroid (1).
	Scored or dirty throttling plate/seat.	Polish with 4/0 polishing paper. Clean with no flash cleaning compound and blow dry using nitrogen (BB-N-411). If plate/seat is scored too deeply, replace as required.
Aneroid closing too soon.	Aneroid and throttling plate set too close to seat.	Loosen locknut (6) and turn aneroid threaded stem (1) counterclockwise (1/4 turn equals approx. 2,000 feet).
Aneroid closing too late.	Aneroid and throttling plate set too far from seat.	Loosen locknut (6) and turn the aneroid threaded stem (1) clockwise (ideal aneroid closure is 30,000 feet).

4-69. DISASSEMBLY.

4-70. Disassemble the oxygen regulator using the index numbers assigned to figure 4-10, unless otherwise noted. Disassemble the regulator only as far as required to correct any malfunctions.

CAUTION

All disassembly, inspection, repair, and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor, and ceiling should have a smooth finish and be painted with a non-chalking paint which can be kept clean and dust free. It is desirable to keep all parts for each individual regulator separated. Make careful note of the location and quantity of all parts. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

4-71. REQUIRED SPECIAL TOOLS. Figure 4-5 and table 4-9 list special tools and test equipment required in connection with the work prescribed for disassembly and assembly procedures.

NOTE

Special tools shown in figure 4-5 shall be locally manufactured.

4-72. REMOVAL OF EMERGENCY VALVE ASSEMBLY. To remove the emergency valve assembly, proceed as follows:

1. Remove tee (4, figure 4-10) and emergency gage (1) as one unit, by removing four screws (6) and four lockwashers (7), and carefully separate the emergency valve assembly (5).

2. Remove shipping plug (8) if provided.

CAUTION

Care must be used to avoid dropping inlet valve and insert assembly which rests inside the emergency valve.

Use extreme care when handing inlet valve (13). It must be kept smooth, flat, and free from nicks.

NOTE

Inlet valve and insert assembly (1, figure 4-17) and its mating part inlet orifice, (2, figure 4-17), are NOT interchangeable with the same parts of other regulators. They MUST be released as a MATCHED set.

3. Lift inlet valve and insert assembly (13, figure 4-10) out of emergency valve assembly (5).

4. Loosen nut (14) and remove screw (15) from inlet valve.

5. Remove oxygen inlet gasket (16).

4-73. EMERGENCY VALVE ASSEMBLY. To disassemble the emergency valve assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Nut, Orifice	Fabricate IAW figure 4-5

NOTE

Inlet valve and insert assembly (1, figure 4-17) and its mating part inlet orifice, (2, figure 4-17), are NOT interchangeable with the same parts of other regulators. They MUST be released as a MATCHED set.

1. Remove screen and retainer assembly (2, figure 4-14) from emergency valve body (1). It will be necessary to distort the retainer and screen in order to remove it. Use a new one upon reassembly.

2. Remove orifice nut (3) with orifice nut wrench. Lightly tap emergency valve body (1) to free inlet orifice (4). Remove gasket (5).

NOTE

Do NOT attempt to remove the ball and spacer from emergency valve shaft. If either part is damaged, replace emergency valve shaft assembly.

3. Unscrew stuffing box nut (7) and unscrew emergency valve shaft assembly (6) from emergency valve body (1).

4. Remove washer (8) and packing (9) from emergency valve body (1).

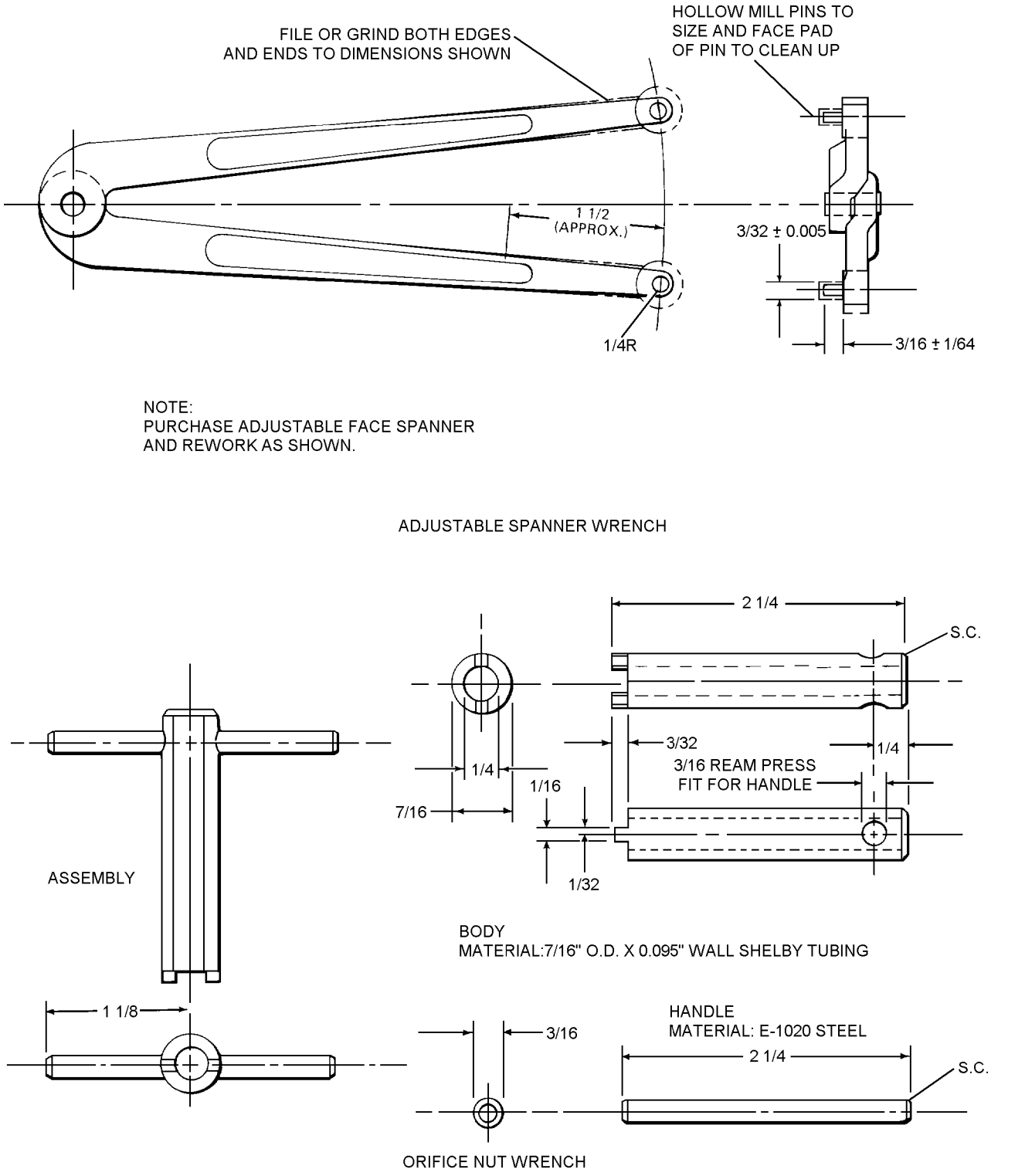
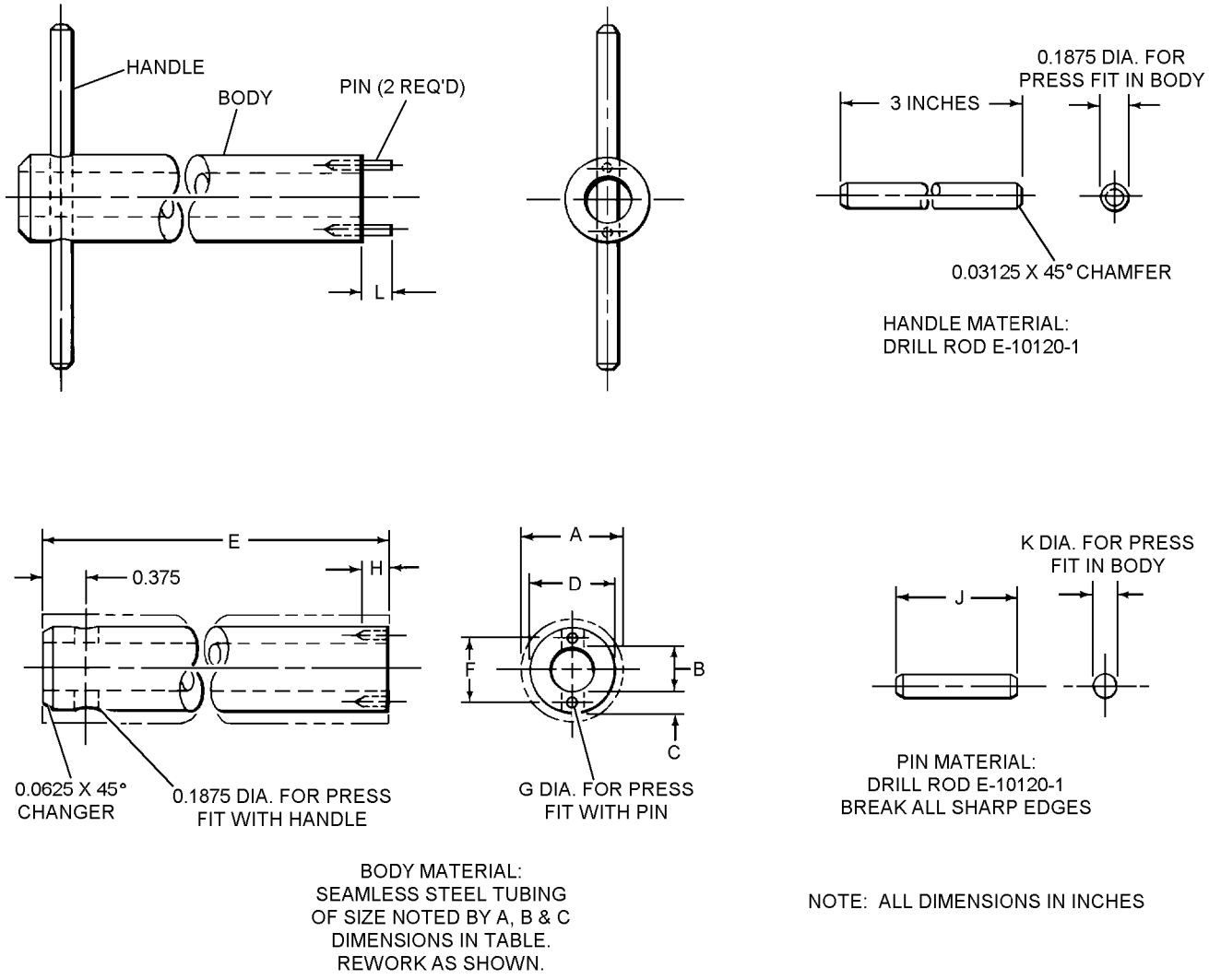


Figure 4-5. Special Tools and Test Equipment (Sheet 1 of 3)



FIXED SPANNER WRENCH (THREE SIZES REQUIRED)

	A	B	C	D	E	F	G	H	J	K	L
SIZE 1	0.750	0.437	0.156	0.750	3.5	±0.003 0.578	±0.001 0.062	0.187	0.343	±0.001 0.060	0.156
SIZE 2	0.8125	0.544 to 0.219	0.134 to 0.219	0.790	3.5	±0.002 0.675	±0.001 0.055	0.187	0.250	±0.001 0.055	0.062
SIZE 3	0.5625	0.187	0.187	0.5625	3.5	0.343	±0.001 0.070	0.187	0.234	±0.001 0.070	0.047

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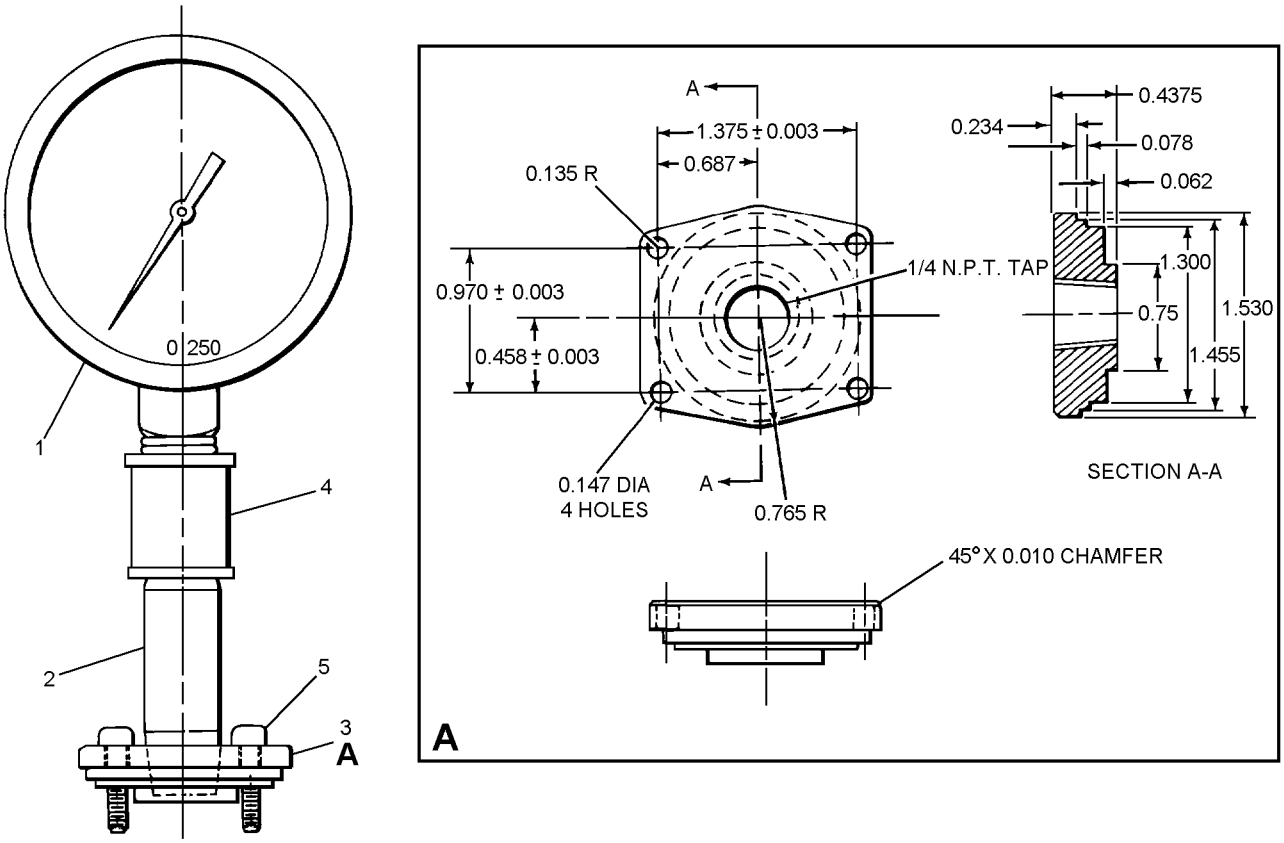
Figure 4-5. Special Tools and Test Equipment (Sheet 2 of 3)



PRESSURE GAGE TEST FIXTURE

ITEM NO.	DESCRIPTION	REFERENCE NUMBER	ASSEMBLY INSTRUCTIONS
1	250 PSI Oxygen Gage	F340-1017-4 (CAGE 97413) NIIN 00-056-9546	Anti-seize tape required
2	1/4 x 2 Inch Brass Pipe Nipple	NIIN 00-196-1972	Anti-seize tape required at both ends
3	Relief Valve Adapter	Fabricate in accordance with Detail A	–
4	1/4 Inch Brass Pipe Coupling	NIIN 00-187-7647	–
5	Cap screw, Socket Head Hexagon, Corrosion Resistant Steel, UNC-3A 1/2 Inch 4-40	MS-16995	4 required (7/64 inch allen wrench)

Notes: 1. After assembly, wash twice with cleaning compound MIL-C-81302 and air dry. Ensure that all oil has been removed.

00400503

Figure 4-5. Special Tools and Test Equipment (Sheet 3 of 3)

Table 4-9. Special Tools and Test Equipment List

Nomenclature	Application	Figure
Adjustable Spanner Wrench	Disassembly and reassembly of check valve and aneroid assembly.	4-5
Orifice Nut Wrench	Disassembly and reassembly of nut.	4-5
Fixed Pin Spanner Wrench (Note 1)	Adjustment of relief valve guide.	4-5
Pressure Gage Test Fixture	Adjustment of pressure reducer assembly; calibration of relief valve.	4-5
Spanner Wrench (Note 2)	Disassembly and reassembly of flow indicator.	Not Shown

Notes: 1. The fixed pin spanner wrench has three required sizes.
2. Procured from manufacturer (CAGE 19315) NIIN 00-094-8936.

4-74. ELBOW ASSEMBLY. To remove and disassemble elbow assembly, proceed as follows:

1. Unscrew elbow nut (21, figure 4-10) and remove elbow (22) and baffle (23).

2. Using a pair of tweezers, remove gasket (24).

NOTE

Baffle plate is soldered to elbow screen and further disassembly must not be undertaken. Damage or wear to either part necessitates replacing elbow screen.

3. Slide a finger through elbow (22) and push elbow screen and baffle (23) out of elbow.

4-75. INJECTOR ASSEMBLY. To remove injection assembly, proceed as follows:

1. Remove lock spring (25, figure 4-10) from venturi (26), using needle nose pliers.

2. Unscrew venturi (26) from case (76), using a wide bladed screwdriver.

3. Extract injector assembly (27), being careful not to mar injector assembly surface.

4-76. DISASSEMBLY OF INJECTOR ASSEMBLY. To disassemble injector assembly, proceed as follows:

CAUTION

Extreme care must be used in handling injector nozzle and injector seat. The contact surface of each must be smooth, flat, and free from nicks.

1. Remove washer (7, figure 4-13) that rests on injector seat (5), using tweezers.

2. Carefully release injector snap ring (6) and remove, using jeweler screwdriver.

3. Remove injector seat (5).

4. Tip injector housing (1) so injector nozzle (4), dampener spring (2), and injector spring (3) will drop out.

4-77. AIR VALVE ASSEMBLY. To remove air valve assembly, proceed as follows:

1. Remove four screws (18, figure 4-10). Remove body and cover assembly (17).

NOTE

Do NOT remove locating pin (77) unless it requires replacement.

2. Lift out check valve and aneroid assembly (20) with gasket (19). Remove gasket.

4-78. AIR VALVE BODY AND COVER ASSEMBLY. To disassemble air valve body and cover assembly, proceed as follows:

NOTE

Damage to either part will require replacement with a new assembly.

1. Remove screw (5, figure 4-15), lockwasher (6), cover assembly (1), spring retainer (7), and spring (8).

2. Remove screen (3).

3. Remove gasket (10) from air valve cover assembly (1). Further disassembly of air valve cover assembly must NOT be undertaken.

4. If necessary for replacement, pry loose air valve body gasket (9) from underside of air valve body (4).

4-79. AIR CHECK VALVE AND ANEROID ASSEMBLY. To disassemble air check valve and aneroid assembly, proceed as follows.

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Adjustable	Fabricate IAW figure 4-5

CAUTION

Extreme care must be used in handing check valve seat. The surface making contact with the throttling plate (2) is critical and must NOT be marred or scratched.

1. Slightly spread prongs of air check valve retainer (9, figure 4-16) and separate it from check valve seat (7).

2. Air check valve spring (10) and check valve disc (8) will come off with check valve retainer. Carefully separate them from air check valve retainer (9).

NOTE

Do NOT change adjustment or disassemble the aneroid (1), flange (5) or throttling plate (2) unless it is necessary to replace a damaged part. Disassembly requires recalibration of the assembly.

3. Using adjustable spanner wrench unscrew air valve flange (5) from check valve seat (7).

4. If it is necessary to disassemble the aneroid assembly further, proceed as follows:

a. Remove plate retaining nut (3) and lift throttling plate (2) and spring washer (4) from aneroid assembly (1).

NOTE

Damage or wear to any of the parts will necessitate replacement of aneroid assembly.

b. Unscrew two nuts (3 and 6) and air valve flange (5) from aneroid assembly (1). The aneroid syphon top, aneroid syphon bottom, and evacuation tube are soldered to the aneroid bellows; do not disassemble any further.

4-80. COVER ASSEMBLY, BOTTOM PLATE, AND DIAPHRAGM ASSEMBLY. To remove cover assembly, bottom plate, and diaphragm assembly, proceed as follows:

NOTE

For disassembly of the 2858-B1 and 2858-C1 cover assembly, do NOT separate dial (56, figure 4-10) which is riveted to cover (57) unless it is necessary and disassembly is required (figure 4-11).

1. Remove six diaphragm screws (37, figure 4-10), six bottom plate screws (35), and lift bottom plate (34) and bottom plate gasket (38) from case (76).

2. Remove four screws (54) and lift cover assembly (57) off regulator case (76).

NOTE

Damage to diaphragm will necessitate replacement of diaphragm assembly. Older models may have diaphragm knob (53), nut (52), washer (51), and lower disc (49) cemented in place, and may be damaged during disassembly which will necessitate replacement.

3. Unscrew diaphragm knob (53) and remove nut (52), using 3/16-inch wrench.

4. Lift off diaphragm washer (51) and diaphragm assembly (36).

5. Remove diaphragm ring gasket (50).

6. Slide lower disc (49) off diaphragm.

4-81. REMOVAL AND DISASSEMBLY OF DIAPHRAGM LEVER AND BRACKET ASSEMBLY. To remove and disassemble diaphragm lever and bracket assembly, proceed as follows:

1. Remove two screws (68, figure 4-10) and remove bracket and bushing assembly (69 and 70) with diaphragm lever assembly (72 through 75) attached.

2. Remove gasket (66) and lift demand valve stem (67) out.

NOTE

The bushing is a tight press fit in the bracket and disassembly must NOT be undertaken. Damage or wear to either part will necessitate replacement of bracket assembly.

3. If necessary for replacement purposes, the diaphragm lever assembly may be disassembled as follows:

a. Remove pin (75) and separate diaphragm link (74) from diaphragm lever (72).

b. Remove setscrew (73) from diaphragm lever (72).

4-82. REMOVAL OF RELIEF VALVE ASSEMBLY AND DEMAND VALVE. To remove relief valve assembly and demand valve, proceed as follows:

NOTE

The relief valve assembly requires separate calibration and special test equipment. The guide may be cemented into the top cover at the factory. The guide must not be loosened or adjusted except at depot level repair. Damage or wear to any part of the assembly will necessitate replacement of the relief valve assembly.

1. Remove four screws (48, figure 4-10) and lift out relief valve assembly (47) and gasket (46).

CAUTION

Some models do NOT have a bellows dampener (45). In order to prevent excessive vibration and oxygen leakage at low temperatures, this part must be used upon reassembly, if available.

2. Carefully remove bellows dampener (45) from around pressure reducer bellows (39).

3. Remove two screws (59) and lift low pressure cap (58) and gasket (63) from demand valve chamber.

4. Remove demand valve spring (60) and demand valve seat holder (62) with demand valve seat (61).

5. Lightly push demand valve (64) out of case (76), being careful NOT to damage the demand valve.

6. Remove gasket (65).

4-83. REMOVAL OF FLOW INDICATOR. To remove the flow indicator, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Adjustable	Fabricate IAW figure 4-5

NOTE

Do not remove screen (33, figure 4-10) unless necessary for replacement purposes.

1. Remove flow indicator (28, figure 4-10), extension (29), elbow (31), and flow indicator screen (33).

NOTE

On flow indicator P/N AN6029-1, an extension elbow (30) is used in place of the straight extension (29).

2. For further disassembly of flow indicator, proceed as follows:

a. Remove four screws (3, figure 4-18), bezel (2), glass (4), gasket (5) and dial (6).

b. Using spanner wrench, remove retaining ring (7) and ring (8).

c. Carefully remove entire blinker assembly, consisting of washer packing (9), lever and plate assembly (10), frame (17), and piston seal (22).

NOTE

Further disassembly shall be performed by depot level only.

4-84. PRESSURE REDUCER ASSEMBLY. To disassemble the pressure reducer assembly, proceed as follows:

1. Remove four screws (40, figure 4-10) and remove the pressure reducer assembly (39) from the case.

2. Remove gasket (44).

NOTE

Do not disassemble the pressure reducer assembly further if repairs are required. Replace entire assembly; adjustment is authorized.

4-85. CLEANING. To clean the disassembled oxygen regulator body and component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen, can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all metallic parts in accordance with NAVAIR 13-1-6.4-1.

WARNING

Do not attempt to clean any elastomer parts that have become contaminated with oil or grease. All such parts shall be replaced.

2. Prior to installation, wash all silicone-rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning, all internal surfaces shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Bag all complete assemblies that are not immediately returned to service.

4-86. INSPECTION OF DISASSEMBLED REGULATOR.

4-87. Inspect the disassembled regulator body and component parts in accordance with the special instructions in table 4-10.

4-88. REPAIR.

Materials Required

Quantity	Description	Reference Number
As Required	Lacquer, White	MIL-L-6805

4-89. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched up using lacquer.

4-90. ASSEMBLY.

4-91. Assembly of aircraft panel mounted regulators is essentially the reverse of disassembly. Tests are required on subassemblies as they are assembled into the regulator. Adjustment and calibration are also performed at time of assembly.

4-92. REQUIRED SPECIAL TOOLS. Figure 4-5 and table 4-9 list special tools and test equipment required in connection with the work prescribed for disassembly and assembly procedures.

NOTE

Special tools shown in figure 4-5 shall be locally manufactured.

CAUTION

Use extreme care in fitting precision parts to prevent damage. Ensure that each component is dust- and dirt-free.

NOTE

All silicone-rubber parts shall be discarded and replaced with new items at the time of assembly. They shall be washed in accordance with paragraph 4-85, step 2, prior to installation.

4-93. Assembly is effected in two separate operations; assembly of components into subassemblies and assembly of the subassemblies into the regulator housing.

4-94. EMERGENCY VALVE. To assemble the emergency valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC, Type III, Lubricant	MIL-G-27617 NIIN 00-961-8995
As Required	Tape, Anti-seize	MIL-T-27730

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Nut, Orifice	Fabricate IAW figure 4-5

Table 4-10. Inspection of Disassembled Regulator

Nomenclature	Figure and Index	Inspect For
Oxygen Inlet Orifice.	4-14-1	Wear or damage; surfaces must be smooth, flat and free of nicks.
		Mirror finish on orifice cone (polish with jeweler's rouge).
Inlet Valve and Insert Assembly.	4-10-13, -14 and -15	Smooth, flat, free from nicks, burrs and ripples.
Throttling Plate.	4-16-2	Smooth, flat and free of nicks.
Injector Seat and Nozzle.	4-13-4 and -5	Smooth and free from nicks and burrs.
Damping Spring.	4-13-2	Tension prongs must not be cocked or under uneven tension.
Pressure Reducer Bellows.	4-12-1	Distortion, dents or leaks.
Diaphragm Assembly.	4-10-36	Cracks, tears, wrinkles, or excessive wear. Diaphragm tightness on ring (must not rotate with hand pressure). Diaphragm detent (place lower disc on top and apply pressure; fabric must be flush or 1/16 inch below bottom edge.)
Demand Valve Stem.	4-10-67	Free operation.
Screens.	4-10-23 and -33	Clogged screens (blow out with compressed air).
Case.	4-10-76 and -77	Clogged passages, dents, cracks, or distortion.
Springs.	4-10-42 and -60 4-13-3 4-15-8 4-16-10	Damage or distortion.
Cover Assembly.	4-10-55, -56 and -57	Sharp edges, flush rivets, and smooth inner surfaces.
Flow Indicator.	4-10-28	Dents and distortion.
Diaphragm Lever Assembly.	4-10-72, -73, -74 and -75	Wear (must be smooth and without burrs).
Air Check Valve Discs.	4-16-8	Smooth (flat and free of nicks).
Air Check Valve Seat.	4-16-7	Smooth (flat and free of nicks and wear).

NOTE

Before beginning the assembly of the emergency valve assembly, be sure that ONLY emergency valve (Pioneer Type PB51693-2) is used. If the oxygen inlet orifice requires replacement, replace both the orifice and inlet valve as a matched assembly.

1. Insert gasket (5, figure 4-14) into emergency valve body (1) as far as it will go.

2. Place oxygen inlet orifice (4) wide end first next to the gasket.

3. Using orifice nut wrench screw orifice nut (3) into emergency valve body (1) to secure orifice in position.

4. Insert a new retainer and screen assembly (2) into position in the emergency valve body (1).

5. Apply a small amount of lubricant (Krytox 240 AC) to the first two threads of the emergency valve shaft (6), washer (8) and four packings (9).

6. Place stuffing box nut (7), washer (8) and four packings (9) on emergency valve shaft assembly (6), and screw shaft into emergency valve body (1). Tighten the shaft in the body until the ball in the shaft seats itself over the orifice in the body. Tighten stuffing box nut (7) into body sufficiently to prevent shaft (6) from being turned freely.

7. Fit oxygen inlet gasket (16, figure 4-10) over emergency valve body (5) and position body on case (76) so that the emergency valve shaft is on the top of the case (oxygen emergency valve bypass hole is in top side of case).

8. Secure emergency valve assembly (5) to case (76) with four screws (6) and lockwashers (7).

9. Wrap pipe threads of inlet tee (4) with two turns of anti-seize tape and install tee (4) into emergency valve assembly (5).

10. Wrap threads of pressure gage (1) with two turns of anti-seize tape and install into tee (4).

4-95. DEMAND VALVE. To assemble the demand valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240 AC, Type III, Lubricant	MIL-G-27617 NIIN 00-961-8995

NOTE

Demand valve (64, figure 4-10) has four holes spaced evenly around the large end. Seat the valve in the demand chamber so that one of these holes is opposite the diagonal hole in the case.

There are three gaskets used in the demand valve assembly, two thin ones (65) and one thick one (63).The thick one (63) is used on the low pressure valve cap (58).

1. Slip gasket (65, figure 4-10) over shoulder of small end of demand valve (64) and place it, gasket side down, in the demand valve chamber. Ensure that it is seated as deeply as possible.

NOTE

Use new seat and holder assembly when reassembling. If not available, use extreme care to avoid damage to valve seat holder when prying valve seat out of valve seat holder. Reinsert valve seat with reverse side up.

2. Place a dot of Krytox 240 AC lubricant in center of demand valve holder (62) and install demand valve seat (61).

3. Insert demand valve holder (62) and demand valve seat (61) into demand valve chamber, position seat down, and center on demand valve (64).

NOTE

The demand valve (64) and injector springs (60) are similar in appearance. THEY ARE NOT INTERCHANGEABLE. The injector spring can be identified by the tension, which is slightly stronger than the demand valve spring (figure 4-6).

4. Place demand valve spring (60, figure 4-10) over demand valve holder (62). Place gasket (63) on low pressure valve cap (58).

5. Gently place low pressure valve cap (58) on demand valve holder (62). Press lightly and ensure alignment of cap and demand valve holder.

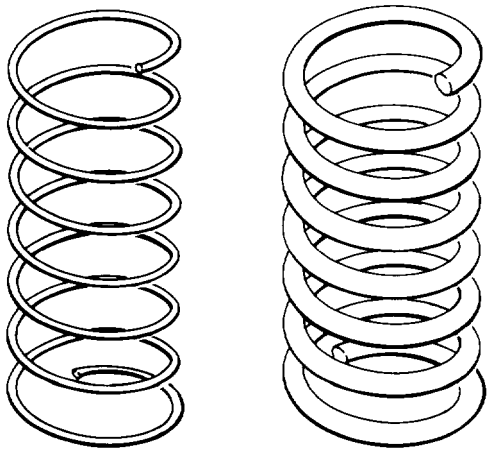


Figure 4-6. Difference Between Demand Valve/Injector Springs

NOTE

Carefully tighten screws evenly to prevent cocking the valve seat holder and thereby damaging the valve seat.

6. Secure valve cap (58) to case (76) with two screws.

4-96. DIAPHRAGM LEVER AND BRACKET ASSEMBLY. To assemble the diaphragm lever and bracket assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
As Required	Polishing Paper 4/0	C135E (CAGE 10646)

Support Equipment Required

Quantity	Description	Reference Number
1	Gage, Height	Fabricate IAW figure 4-7
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100
1	Straightedge	—

1. Polish the small diameter end of the demand valve stem (67, figure 4-10) with 4/0 polishing paper. Wash thoroughly and clean component in accordance with NAVAIR 13-1-6.4-1.

2. Check operation of the demand valve stem (67) in the bracket and bushing assembly (70 and 69) to ensure that it operates freely and does not bind. If it binds in the bushing (69), replace the demand valve stem (67).

NOTE

The side play between the diaphragm lever (72) and the diaphragm lever bracket (70) is to prevent sticking in the event of frost.

Use Allen wrench when tightening diaphragm lever set screw (73).

3. Place gasket (66) on shoulder of case (76) over demand valve orifice.

4. Place demand valve stem (67) in demand valve (64) with flanged end on top of valve seat (61).

5. Slide protruding end of demand valve stem (67) into bushing (69) in bracket (70) and secure bracket and bushing assembly to case (76) with two screws (68).

6. Connect regulator inlet to test stand N_2 INPUT connection 18 in altitude chamber.

7. Turn INLET PRESS. ON/OFF valve (L) to ON slowly.

8. Using LOW PRESS. REGULATOR (N), adjust input pressure to 100 psig.

9. Using an Allen wrench, loosen setscrew (73) and with 100-psig inlet pressure applied, adjust the height of the diaphragm lever (72) by means of the setscrew (73).

10. The height of the diaphragm lever (72) is adjusted so that the highest point of the diaphragm lever, with the link (74) hanging down vertically, is 11/64 inch above the top edge of the regulator case (76).

NOTE

The lever adjustment is critical and may be determined with a scale and straightedge, as shown in figure 4-7(A), or by using a height gage, figure 4-7(B). The height gage is made from aluminum or steel and may be locally manufactured.

11. When using the height gage, lay it across the regulator case (76) and adjust the setscrew (73) so that the diaphragm lever (72) just touches the top of the 11/64-inch slot.

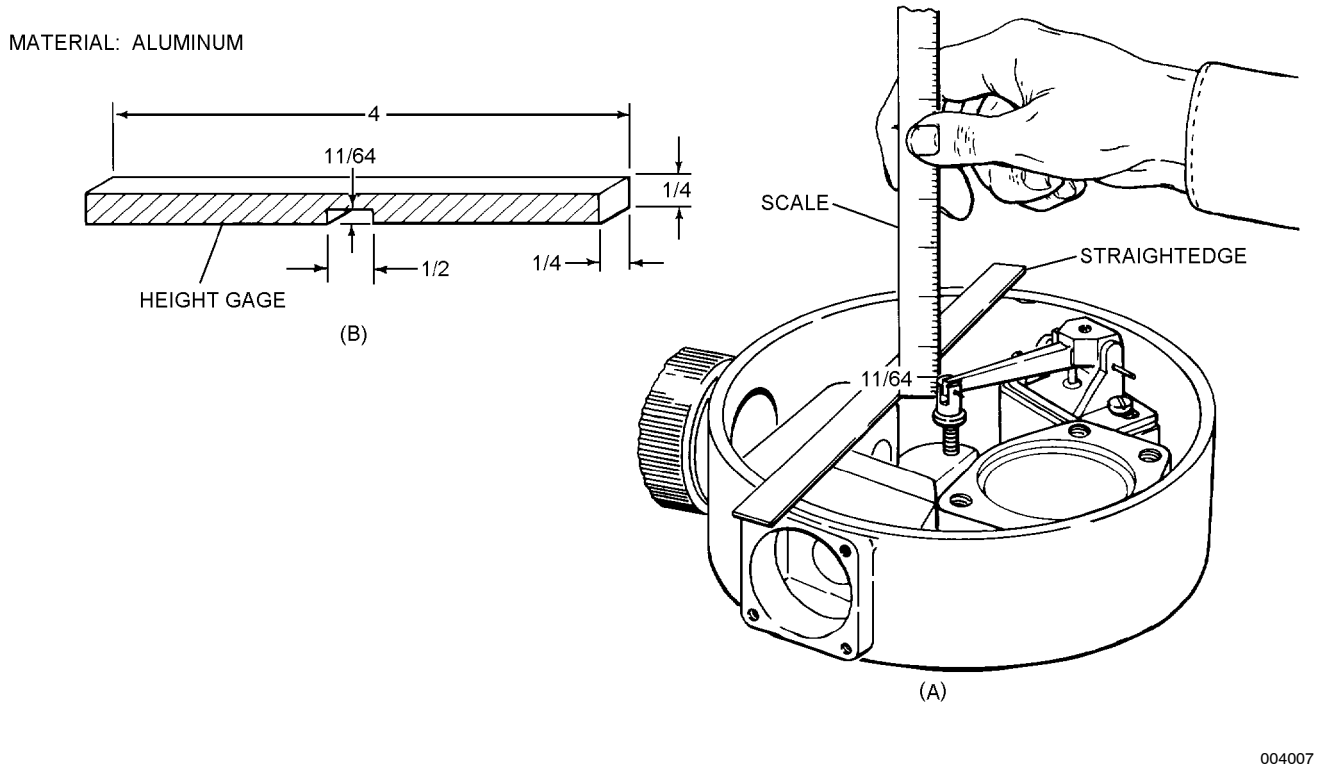


Figure 4-7. Adjustment of Diaphragm Lever

12. After the diaphragm lever (72) is properly adjusted, is should be checked for freedom of movement. Sluggishness is a sign of friction and must be corrected.

4-97. ASSEMBLY OF ELBOW ASSEMBLY. To assemble the elbow assembly, proceed as follows:

1. Slightly bend elbow screen and insert it into wide end of elbow (22, figure 4-10) so baffle plate (23) will be nearest venturi (26) when assembled.

2. Slide elbow (22) through elbow nut (21) and insert new gasket (24) in nut against elbow, securing them together.

3. Screw elbow nut (21) onto venturi outlet in case (76).

4-98. TESTING AND ADJUSTING RELIEF VALVE ASSEMBLY. To test and adjust the relief valve assembly, proceed as follows:

WARNING

Soap solution or leak detection compound should not be used during this test as the presence of water vapor in the relief valve assembly may result in faulty operation.

Materials Required

Quantity	Description	Reference Number
As Required	Glyptal	1201B (CAGE 24452)
As Required	Heater hose, 3/4-Inch ID	Commercial
2	Hose Clamp, 1 to 1 1/2-Inch ID	Commercial
As Required	Plug	NAVAIR Dwg 11725-142

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100
1	Pressure Gage Test Fixture	Fabricated IAW figure 4-5
1	Wrench, Spanner, Fixed Pin, Size 3	Fabricated IAW figure 4-5

1. Insert gasket (46, figure 4-10) into regulator case (76).

2. Install relief valve assembly (47) and secure with four screws (48).

3. Install 3-inch length of 3/4-inch ID heater hose over elbow (22) outlet and secure using hose clamp. Insert plug (DWG no. NAVAIR 11725-142) and secure with hose clamp.

4. Insert gasket (44) into regulator case (76). Install pressure gage test fixture and secure with four screws provided with fixture.

5. Connect regulator to test stand N_2 INPUT connection 18. Open INLET PRESS. ON/OFF valve (L).

6. Apply 160 psig, using LOW PRESS. REGULATOR (N); relief valve shall be fully open.

7. Close INLET PRESS. ON/OFF valve and observe pressure gage test fixture.

CAUTION

Prior to relief valve adjustment, use acetone to dissolve Glyptal from relief valve guide. Use extreme care to prevent acetone from contacting relief valve seat (figure 4-8).

NOTE

Relief valve test pressure shall drop to 65 ±5 psig and shall remain leak tight.

8. Relief valve shall be fully open at 160 psig and leak tight at 65 ±5 psig. If not, adjust relief valve, using fixed pin spanner wrench, size 3.

9. If pressures fall within tolerances, proceed to step 10. If not, proceed as follows:

a. If test pressure falls below 65 ±5 psig tolerance, rotate relief valve guide clockwise and repeat steps 6 through 9.

b. If test pressure does not drop to 65 ±5 psig, rotate relief valve guide counter-clockwise and repeat steps 6 through 9.

10. Apply Glyptal dot to relief valve guide. Ensure that dot covers both guide and body (figure 4-8).

11. Bleed test pressure from pressure reducing valve chamber by gently depressing demand valve lever (72, figure 4-10).

12. Remove hose, two clamps, and plug from elbow assembly and remove elbow assembly.

13. Back out LOW PRESS. REGULATOR (N) and bleed pressure, using SYSTEM BLEED valve (S).

14. Disconnect regulator from N_2 INPUT connection 18 and remove regulator from test stand.

15. Remove four screws provided with fixture and remove pressure gage test fixture.

16. Remove four screws (48) and remove relief valve assembly (47).

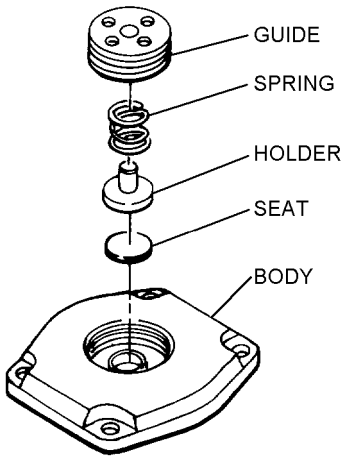


Figure 4-8. Relief Valve Assembly

4-99. INLET VALVE. To assemble the inlet valve, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Micrometer	—
1	Straightedge	—

1. Install nut (14, figure 4-10) to screw (15).

NOTE

Using a micrometer, adjust screw so the distance from the front face to screw head is 0.519 inch. Lock screw into place by tightening nut. If a micrometer is not available, use machinist rule and adjust to 33/64 inch.

2. Install screw into inlet valve and insert assembly (13).

3. Install inlet valve and insert assembly (13) into emergency valve assembly (5).

4. Holding valve by screw, insert inlet valve through pressure reducer chamber into emergency valve assembly (5) so the center drill hole is aligned with oxygen inlet orifice.

4-100. PRESSURE REDUCER ASSEMBLY. To assemble the pressure reducer assembly, proceed as follows:

NOTE

Repairs to the pressure reducer are not authorized.

1. Invert regulator case (76, figure 4-10). Install gasket (44) on rim of pressure reducer chamber.

2. Place pressure reducer in bottom of the pressure reducer chamber in such a manner that the short leg of the pressure reducer lever (3, figure 4-12) is aligned against the inlet valve screw (15, figure 4-10).

3. Secure the pressure reducer assembly (39) to the regulator case (76) using four screws (40).

4. Turn regulator case right side up.

4-101. Adjustment of the Pressure Reducer Assembly. To adjust the pressure reducer assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100
1	Pressure Gage Test Fixture	Fabricated IAW figure 4-5

1. Place the pressure reducer bellows dampener (45, figure 4-10) around the pressure reducer bellows (figure 4-9).

2. Place gasket (46, figure 4-10) in rim of pressure reducer chamber case (76).

3. Install pressure gage test fixture and secure in place using four screws (48).

4. Connect regulator to test stand N_2 INPUT connection (18). Open INLET PRESS. ON/OFF valve (L).

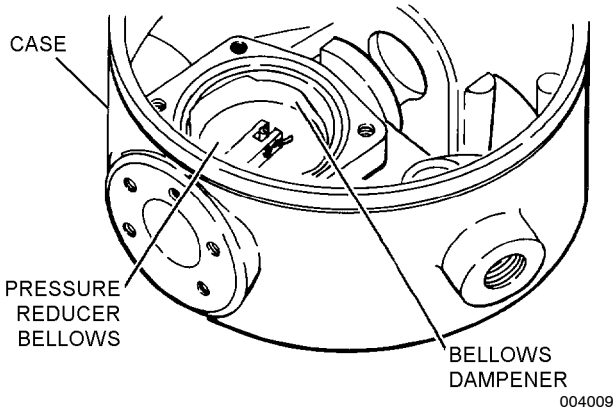


Figure 4-9. Positioning of Bellows Dampener in Pressure Reducer Assembly

5. Apply 100 psig, using LOW PRESS. REGULATOR (N), to the regulator inlet tee (4, figure 4-10).

6. Adjust the inlet valve screw (15) so that the pressure gage reads 48 ±1 psig. If pressure is not within tolerance, locate probable cause using troubleshooting chart (table 4-11).

7. After the pressure reducer (39) has been set at 48 ±1 psig, open the demand valve by depressing the diaphragm valve lever (72).

8. Allow the demand valve to close.

9. Note thse pressure on the test fixture pressure gage when the flow ceases. The pressure shall not increase more than 3 psig. If the pressure creeps, locate probable cause using troubleshooting chart (table 4-11).

10. Check the pressure reducer assembly (39) for vibration by opening and closing the demand valve several times.

11. Close N_2 supply cylinder valve. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), relieve all pressure in the test stand. Secure all test stand valves.

12. Disconnect regulator from test stand N_2, INPUT connection (18).

13. Remove pressure gage test fixture.

14. Ensure that gasket (46) is still securely seated in rim of pressure reducer chamber case (76).

15. Install relief valve assembly (47), and secure with four screws (48).

4-102. INJECTOR ASSEMBLY. To assemble the injector assembly, proceed as follows:

NOTE

The demand valve and injector springs are very similar in appearance. THEY ARE NOT INTERCHANGEABLE. The injector spring can be identified by the tension, which is slightly stronger than the demand valve spring (figure 4-6).

1. Slide injector spring (3, figure 4-13) over injector nozzle (4).

2. Place damping spring (2) over sloped end of the injector nozzle (4), so that the prongs of the spring slide between injector nozzle (4) and injector spring (3).

3. Place injector nozzle (4), with injector spring (3) and dampening spring (2) into injector housing (1).

NOTE

Use extreme care in handing the injector seat. The valve seat surface must be smooth, flat and free of nicks to provide a perfect fit with the injector nozzle.

4. Place injector seat (5) over the injector nozzle (4), with the beveled surface of the seat next to the injector nozzle.

5. Hold down the injector seat (5), compressing the injector spring (3), and insert the injector snap ring (6) in the groove in the injector housing (1). Install washer (7).

6. Slide the washer end of the injector assembly (27, figure 4-10) into the regulator case (76) through the regulator outlet orifice.

7. Using a wide bladed screwdriver, screw the venturi (26) over the injector assembly (27) into the case (76), thereby securing the injector assembly in place.

8. Press the lock spring (25) over the slotted end of the venturi (26) until the last coil, with the bent end, is outboard and even with the venturi slots.

9. Lock the spring (25) to the case (76) by bending the end of the spring, using needle nose pliers, until it grips against the casting or the case.

4-103. CHECKING THE INJECTOR ASSEMBLY. To check the injector assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
1	Oxygen Gage, 0-60 psi	—

Table 4-11. Troubleshooting (Pressure Reducer)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-10.		
Test pressure below 48 ±1 psig.	Improperly adjusted inlet valve screw (15).	Adjust screw (15) counterclockwise.
Test pressure above 48 ±1 psig.	Improperly adjusted inlet valve screw (15).	Adjust screw (15) clockwise.
Pressure reducer creep exceeds 3 psig.	Inlet valve screw (15) out of adjustment.	Adjust inlet valve screw (15) clockwise approx. 1/8 of a turn until pressure is again 48 ± 1 psig.
Pressure reducer creeps more than 3 psig, but gradually shuts off before maximum gage pressure capacity.	Defective oxygen inlet orifice (4, figure 4-14).	Replace oxygen inlet orifice (4, figure 4-14).
	Defective inlet valve assembly (13).	Replace inlet valve assembly (13).
	Improper adjustment of pressure reducer lever (3, figure 4-12).	Readjust pressure reducer link screw (4, figure 4-12).
Pressure reducer creeps continually until it indicates supply pressure.	Leakage at gasket (5, figure 4-14) between oxygen inlet orifice (4, figure 4-14) and emergency valve body (1, figure 4-14).	Tighten orifice nut (3, figure 4-14) or replace gasket (5, figure 4-14).
	Defective thread in emergency valve body (1, figure 4-14).	If threads cannot be chased, replace emergency valve body (1, figure 4-14).

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

The injector assembly is checked to determine at which pressure the injector nozzle unseats, allowing added flow of oxygen to the user.

1. Attach a 0-60 psi pressure gage to the flow indicator outlet port, which leads to the demand valve chamber.

2. Connect the regulator to test stand N_2. INPUT connection (18), and open INLET PRESS. ON/OFF valve (L)

3. Apply 150 psig, using LOW PRESS. REGULATOR (N), to the regulator inlet tee (4).

4. Gradually depress the diaphragm lever until oxygen starts to flow through the radial holes of the injector housing.

5. During the operation, the pressure gage attached to the flow indicator outlet port will slowly rise and then hesitate a few seconds before continuing to rise. This hesitation of the gage indicates the injector nozzle is lifting off the injector seat. When this condition exists, the pressure gage attached must read between 13 and 25 psig. If the pressure is not within tolerance, locate probable cause using troubleshooting chart (table 4-12).

NOTE

Repeat test after replacing injector spring if corrective action was necessary.

6. Fully depress the diaphragm lever (72) to check the injector assembly (27) for vibration. If vibration (howling) is noted, locate probable cause using troubleshooting chart (table 4-12).

Table 4-12. Troubleshooting (Injector Assembly)

Trouble	Probable Cause	Remedy
Unless otherwise noted, index numbers in parentheses refer to figure 4-13.		
Test pressure below 13 psig.	Injector spring (3) too weak.	Replace injector spring (3) with stronger spring.
Test pressure above 25 psig.	Injector spring (3) too strong.	Replace injector spring (3) with weaker one.
Excessive vibration howling of injector assembly (27, figure 4-10).	Damping spring (2).	Replace damping spring (2).

7. Close N_2 supply cylinder valve, bleed system using SYSTEM BLEED valve (S), relieve all pressure in the test stand, and disconnect N_2 INPUT connection 18. Remove regulator from test stand.

8. Back out LOW PRESS. REGULATOR (N) and secure all test stand valves.

4-104. DIAPHRAGM AND COVER ASSEMBLIES AND BOTTOM PLATE. To assemble the diaphragm and cover assemblies and bottom plate, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV-734 (CAGE 94499)

1. Carefully turn case over with relief valve (47, figure 4-10) facing down, being careful NOT to damage the diaphragm lever (72).

2. Place new bottom plate gasket (38) and bottom plate (34) with counter sink holes facing up over case (76).

3. Align 12 screw holes in gasket (38) and bottom plate (34) with screw holes in case (76).

4. Secure bottom plate gasket (38) and bottom plate (34) to case (76) with six screws (35).

5. Turn case over so that it is resting on bottom plate (34).

6. Place diaphragm ring gasket (50) on shoulder of case (76). Align notch of gasket with diaphragm lever bracket (70). Install one screw (37) through bottom cover (34) and gasket (38) to ensure alignment of gasket (50).

7. Turn up diaphragm link (74) and slide lower disc (49) over it.

8. Insert diaphragm link (74) through center hole in diaphragm assembly (36).

9. Slide diaphragm washer (51) over link protruding through diaphragm.

10. Screw nut (52) over two or three threads on diaphragm link (74) to prevent link from dropping out of diaphragm, and to allow free turning of the diaphragm during alignment.

11. Align diaphragm assembly (36) in position, turn case (76) and secure diaphragm assembly to case and bottom plate (34) with remaining five screws (37).

12. Tighten nut (52) on diaphragm link (74).

13. Place a small amount of rubber cement on diaphragm link (74) threads, install diaphragm knob (53), and secure.

14. Place cover assembly (57) over diaphragm and line up four screw holes in the case with those in the cover.

15. When the cover and case screw holes are lined up, the dial cover will be in correct position in relation to emergency valve and air valve.

16. Screw cover assembly (57) to case (76) with four screws (54).

4-105. AIR CHECK VALVE AND ANEROID BODY AND COVER ASSEMBLY. To assemble the Air Check Valve and Aneroid Body and Cover Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV-734 (CAGE 94499)
As Required	Krytox 240 AC, Type III, Lubricant	MIL-G-27617 NIIN 00-961-8995
As Required	Toluene	TT-T-548 (CAGE 81348)
As Required	Xylene	TT-X-916 (CAGE 81348)

NOTE

Spring washer (4, figure 4-16) must be crimped or bent 5/32 inch from flat surface before assembly.

1. If check valve and aneroid assembly (20, figure 4-10) was disassembled, reassemble as follows:

a. Place spring washer (4, figure 4-16) on the aneroid syphon on top of aneroid assembly (1).

b. Slide throttling plate (2) on top of spring washer (4). The spring washer fits around hub of throttling plate.

c. Place extended portion of plate retaining nut (3) through hole in throttling plate (2) and screw plate retaining nut (3) on top portion of aneroid assembly (1). Tighten nut securely against throttling plate.

2. Throttling plate (2) must rock and rotate freely and must NOT stick or cock; otherwise it will NOT shut off the flow of air at high altitudes.

NOTE

Throttling plate spring washer (4) must be just stiff enough to ensure proper positioning of throttling plate (2) and to prevent vibration which will cause excessive wear. Too stiff a spring will be detrimental to the action of the aneroid (1). Spring washer may be adjusted by bending.

3. Slightly ream hole in throttling plate (2) if it binds on extended portion of plate retaining nut (3).

NOTE

Exact position of air valve flange (5) will be determined during calibration.

4. Screw air valve flange (5) to the bottom portion of the aneroid assembly (1).

5. For a preliminary adjustment, screw flange (5) on the aneroid assembly (1) until flange is approximately 1/8 inch from the aneroid bottom.

6. After adjusting the flange, lock it in place with nut (6).

7. Place aneroid assembly (1), plate retaining nut (3) first, into check valve seat (7).

8. Screw air valve flange (5) into check valve seat (7) as far as it will go, using adjustable spanner wrench.

9. Place check valve spring (10) inside check valve retainer (9) and place check valve disc (8) on top of check valve spring.

NOTE

Ensure that check valve disc (8) moves freely when spring (10) is compressed. Ensure that retainer (9) is firmly clamped in place onto check valve seat (7) so that it will NOT move under vibration.

10. Snap check valve retainer (9) onto check valve seat (7).

11. Cement gasket (10, figure 4-15) to air valve body (4) using method described as follows:

a. Clean surface to be bonded with Xylene or Toluene and allow to air dry.

b. Coat the metal sealing surface of the air valve body (4) and gasket (10) with RTV-734 and allow to air dry for five minutes.

c. Bond gasket (10) to air valve body (4) and allow to cure at room temperature for 24 hours with a minimum relative humidity of 20%.

d. Visually examine to ensure there are no air pockets in the bond. The parts must be flat, even and firmly cemented to each other.

12. Paint gasket (9) with the same rubber cement and, with a pair of tweezers, place it in the bottom of the air valve cover assembly (1).

13. Apply a coating of grease (Krytox 240 AC) on the two cams of air valve body (4).

14. Slide air valve body (4) inside air valve cover (1) so the two molded ridges inside the cover ride in the two cams in the air valve body, permitting cover and body to separate partially when air valve body is held stationary and air valve cover assembly is rotated.

15. Slide air valve spring (8) over spring retainer (7) and place both inside air valve body (4).

16. Compress spring (8) and secure retainer (7) and cover (1) together with screw (5) and shakeproof lockwasher (6).

17. Insert air valve screen (3) around spring retainer (7) inside the air valve body (4).

18. Place gasket (19, figure 4-10) on shoulder of check valve seat (7, figure 4-16).

19. Insert check valve and aneroid assembly (20, figure 4-10) into case (76).

NOTE

Locating pin (77) is used to correctly position lever button (2, figure 4-15) in relation to the dial.

20. Line up locking pin (77, figure 4-10) in the case (76) with the hole in the air valve body and press air valve body and cover assembly (17) in position over the check valve and aneroid assembly (20).

21. Secure body and cover assembly (17) to case (76) with four screws (18).

4-106. FLOW INDICATOR ASSEMBLY. To assemble the flow indicator, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Adjustable	Fabricate IAW figure 4-5

1. Carefully pull a new piston seal (22, figure 4-18) over the diaphragm shield (20) and the outside of the frame (17) until the bead on the piston seal rests on the shoulder of the frame.

2. Place the frame (17) in the case (1) so that the white blinker plate is nearest the vent hole.

3. Install new packing washer (9) around rim of the frame (17). Ensure that the entire circumference is fitted properly.

4. Install ring (8) on top of the packing washer (9).

5. Install retaining ring (7), using spanner wrench. Use extreme care to avoid damage to the blinker plate.

6. Install dial (6) so that the two cutouts in the dial fit over the two knob pins (23). Install gasket (5).

7. Install dial glass (4) over dial (6) and secure bezel (2) to the case (1) using four screws (3).

4-107. FLOW INDICATOR INSTALLATION. To install the flow indicator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Anti-seize	MIL-T-27730

WARNING

When using Series 2858-B1 or 2858-C1 regulators on portable oxygen systems, the oxygen flow indicator must be installed.

NOTE

There are two types of oxygen flow indicators: the older flow indicator P/N DJ-2-1 and the newer flow indicator P/N AN6029-1. Whenever possible, the new flow indicator should be used in place of the older flow indicator. Installation procedures are given for both.

1. Install oxygen flow indicator P/N DJ-2-1 as follows:

a. Ensure that flow indicator screen (33, figure 4-10) is installed in flow indicator outlet orifice of the regulator case (76). If screen is damaged or missing, install a new one.

b. Install elbow (31) into regulator case (76) using anti-seize tape.

c. Install extension (29) into end of elbow (31) Using anti-seize tape.

d. Install flow indicator (28) on extension (29) using anti-seize tape.

2. Install oxygen flow indicator P/N AN6029-1 as follows:

a. Ensure that flow indicator screen (33) is installed in flow indicator outlet orifice of the regulator case (76). If screen is damaged or missing, install a new one.

b. Install elbow extension (30) into regulator case (76) using anti-seize tape.

c. Install elbow (31) on extension elbow (30) using anti-seize tape.

d. Install flow indicator (28) on elbow (31) using anti-seize tape.

Section 4-5. Illustrated Parts Breakdown

4-108. GENERAL.

4-109. This section lists and illustrates the assemblies and detail parts of the regulators listed below, and manufactured by the Pioneer Central Division of Bendix Aviation Corp., Code Number (CAGE 06840 and 19315).

Part No.

2858-A1
2858-A1A
2858-B1
2858-C1

4-110. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

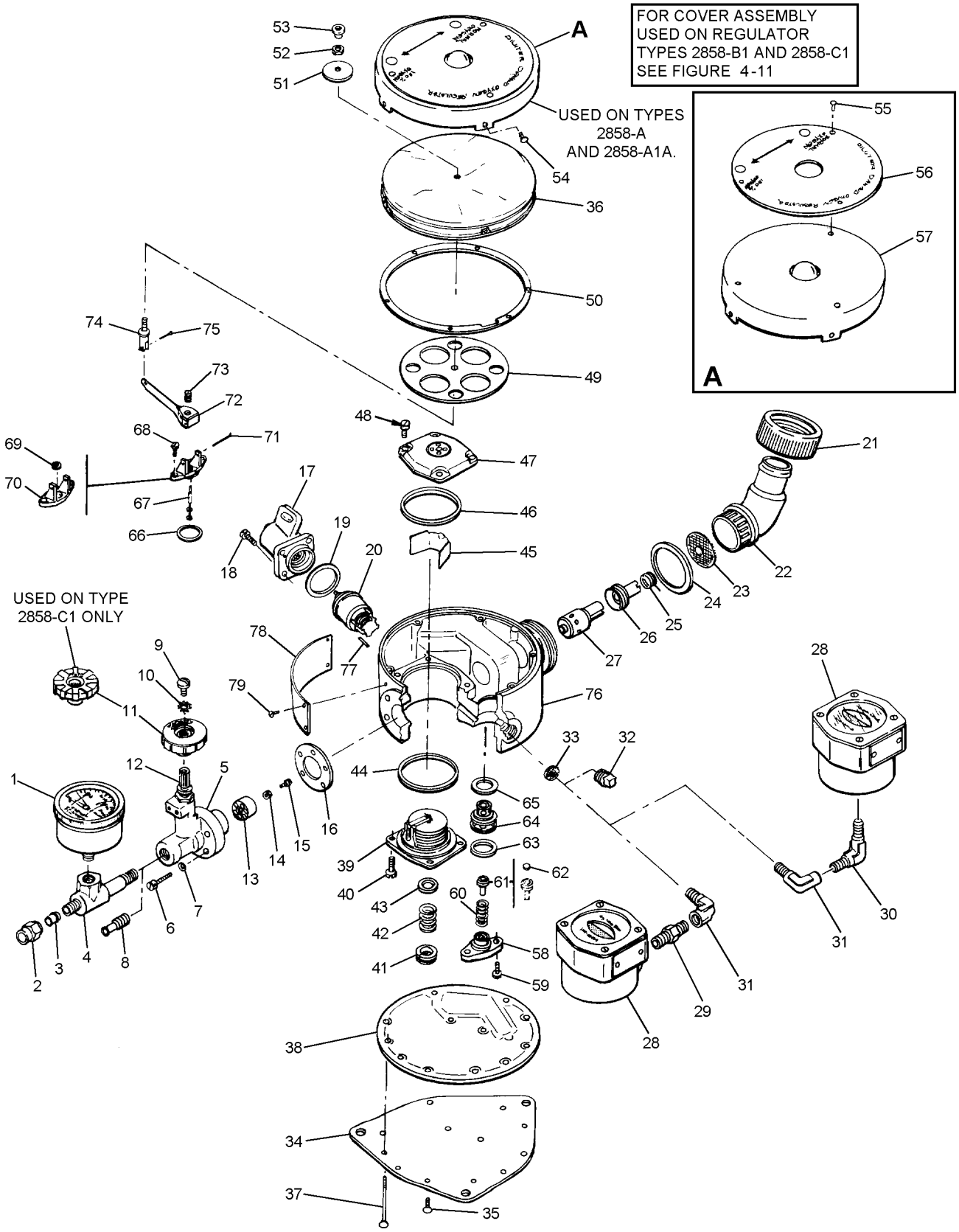


Figure 4-10. Diluter Demand Oxygen Regulator Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-10	2858-A1	REGULATOR, Diluter demand oxygen	REF	A
	2858-A1A	REGULATOR, Diluter demand oxygen	REF	B
	2858-B1	REGULATOR, Diluter demand oxygen	REF	C
	2858-C1	REGULATOR, Diluter demand oxygen	REF	D
-1	11135	. GAGE, Oxygen	1	A,B,D
-2	AN805-3	. NUT	1	
-3	AN800 3	. CONE	1	
-4	C800349-1	. TEE	1	A,B,C
-5	C800493-2	. VALVE ASSEMBLY, Emergency (figure 4-14 for BKDN) (ATTACHING PARTS)	1	
-6	B801503-1	. SCREW	4	
-7	LWO-4BN	. LOCKWASHER ---*---	4	
-8	AN913-1	. . PLUG, Shipping	1	A,C,D
-9	PB50859-1	. . SCREW	1	
-10	SLWO-1808BN	. . LOCKWASHER, Shakeproof	1	
-11	C800274-1	. . KNOB, Emergency valve	1	
	C800204 1	. . KNOB, Emergency valve	1	
-12	PB52099-1	. . STOP, Emergency valve	1	D
-13	PB53670-1	. INLET VALVE ASSEMBLY (figure 4-17 for BKDN)	1	
-14	NO-2	. . NUT	1	
-15	PB52684-1	. . SCREW	1	
	PB52684 2	. . SCREW	1	
-16	PB50835-2	. GASKET, Oxygen inlet	1	
-17	PC52176-3	. BODY AND COVER ASSEMBLY (figure 4-15 for BKDN) (ATTACHING PARTS)	1	D
-18	FFILO-606BN	. SCREW	4	
-19	PB53677-1	. GASKET	1	
-20	PB52720-3	. AIR CHECK VALVE AND ANEROID ASSEMBLY (figure 4-16 for BKDN)	1	A,B,C
-21	PB53863-1	. NUT, Elbow	1	
	PB53425-1	. ELBOW ASSEMBLY	1	
-22	PC52776-1	. . ELBOW	1	
-23	PB50815-2	. . BAFFLE ASSEMBLY, Elbow	1	
-24	PB51219-1	. GASKET	1	
-25	PB51086-1	. SPRING, Lock	1	
-26	PB50840-1	. VENTURI	1	
-27	B800494-1	. INJECTOR ASSEMBLY (figure 4-13 for BKDN)	1	
-28	DJ-2-1	. INDICATOR, Oxygen flow (figure 4-18 for BKDN)	1	
	AN6029-1	. INDICATOR, Oxygen flow (Note 1)	1	
-29	3325X2	. EXTENSION (Note 2)	1	
-30	B-2-ME 4046866-12	. ELBOW, Male pipe (CAGE 1164907187) (Note 3)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-10-31	3400X2	. ELBOW	1	
-32	B800510-1	. PLUG	1	
-33	PB50428-1	. SCREEN, Flow indicator	1	
-34	PC52098-1	. PLATE, Bottom (ATTACHING PARTS)	1	
-35	FO-404B	. SCREWS	6	
	FO-404BN	. SCREWS ---*---	6	
-36	PB52084-1	. DIAPHRAGM ASSEMBLY (ATTACHING PARTS)	1	
-37	PB52072-1	. SCREW ---*---	6	
-38	PB52097-1	. GASKET, Bottom plate	1	
-39	B812010-1	. REDUCER ASSEMBLY, Pressure (figure 4-12 for BKDN) (ATTACHING PARTS)	1	
-40	FFILO-605	. SCREW ---*---	4	
-41	PB52073-1	. . SCREW, Adjusting	1	
-42	PB50785-1	. . SPRING, Bellows	1	
-43	PB53203-1	. . SPACER	1	
-44	PB50834-2	. GASKET	1	
-45	PB54270-1	. DAMPENER, Bellows	1	
-46	PB50834-2	. GASKET	1	
-47	PB50790-1	. VALVE ASSEMBLY, Relief (ATTACHING PARTS)	1	
-48	FFILO-605	. SCREW ---*---	4	
-49	PB50853-1	. DISC, Lower Diaphragm	1	
-50	PB52085-1	. GASKET, Diaphragm	1	
-51	PB50854-1	. WASHER, Diaphragm	1	A,B
-52	NO-3BN	. NUT	1	A,B,C
-53	B801204-1	. KNOB, Diaphragm		C,D
-54	RO-303BN	. SCREW	4	
	PC53420-2	. COVER ASSEMBLY	1	A,B
	C801146-1	. COVER ASSEMBLY (figure 4-11 for BKDN)	1	D
	C801146-2	. COVER ASSEMBLY (figure 4-11 for BKDN) (ATTACHING PARTS)	1	C
-55	RRO-202A	. RIVET ---*---	3	
-56	PD53878-1	. . DIAL	1	
-57	PB53409-1	. . COVER	1	C
-58	PB50845-1	. CAP, Low pressure valve (ATTACHING PARTS)	1	
-59	FFILO-605	. SCREW ---*---	2	
-60	PB50848-1	. SPRING	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-10-61	PB53958-1	. SEAT, Demand valve	1	D
	B812022-1	. SEAT, Demand valve	1	D
-62	PB53957-1	. SEAT HOLDER, Demand valve	1	
-63	PB50834-3	. GASKET	1	
-64	PB52544-1	. VALVE, Demand	1	
-65	PB50775-2	. GASKET	1	
-66	PB50775-2	. GASKET	1	
-67	B800593-1	. STEM, Demand valve	1	
	B800162-1	. BRACKET AND BUSHING ASSEMBLY	1	
	B800162-2	. BRACKET AND BUSHING ASSEMBLY (ATTACHING PARTS)	1	
-68	EFILO-605	. SCREW ---*---	2	
-69	B800163-1	. . BUSHING	1	
	B800163-2	. . BUSHING	1	
-70	C800164-1	. . BRACKET, Diaphragm lever	1	
	PB52706-3	. LEVER ASSEMBLY, Diaphragm (ATTACHING PARTS)	1	A,B
-71	PB50788-4	. PIN ---*---	1	
-72	PC52673-1	. . LEVER, Diaphragm	1	
-73	B801340-1	. . SETSCREW	1	
-74	PB50803-1	. . LINK, Diaphragm	1	
-75	PB50788-3	. . PIN	1	
	PC53231-2	. CONE AND LOCATING PIN	1	
-76	PE52780-1	. . CASE	1	
-77	PB53586-1	. . PIN, Locating	1	
-78	PC53687-4	. IDENTIFICATION PLATE	1	A,B
		. IDENTIFICATION PLATE (ATTACHING PARTS)	1	C,D
-79	0-330-3	. SCREW, Self-tapping	4	

Notes:
1. When replacing Oxygen Flow Indicator P/N DJ-2-1, replace with Oxygen Flow Indicator P/N AN6029-1.
2. Extension P/N 3325X2 is used when securing Oxygen Flow Indicator P/N DJ-2-1 to regulator.
3. Elbow, male pipe, P/N B-2-ME and 4046866-12 are used for securing Oxygen Flow Indicator P/N AN6029-1 to regulator.

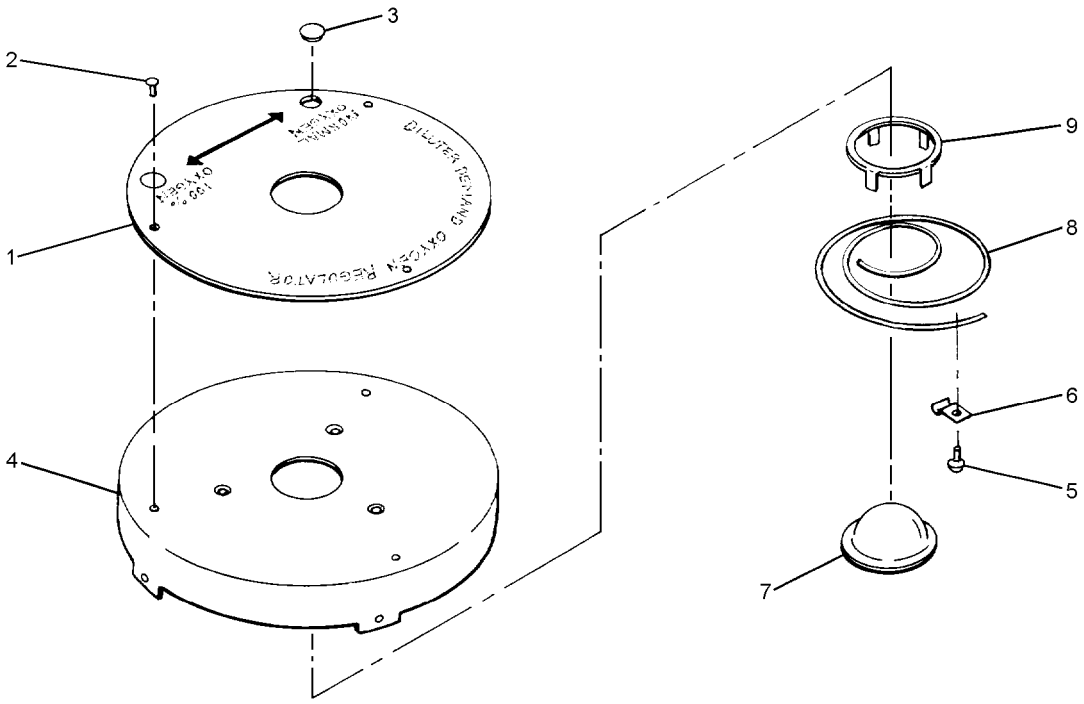
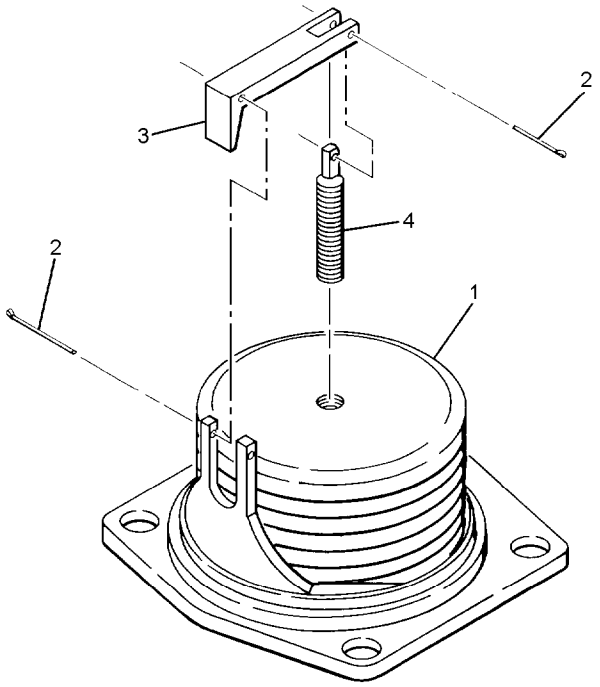


Figure 4-11. Cover Assembly – Pioneer Type 2858-B1 and 2858-C1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-11	C801146-1	COVER ASSEMBLY	REF	D
	C801146-2	COVER ASSEMBLY (figure 4-10 for NHA)	REF	C
-1	PD53878-1	. DIAL (ATTACHING PARTS)	1	
-2	RRD-202A	. RIVET ---*---	3	
-3	B800652-1	. . BUTTON	2	
-4	PB53409-1	. COVER	1	
	B801150-1	. . DEPRESSOR ASSEMBLY (ATTACHING PARTS)	1	
-5	RRO-202A	. . RIVET	3	
-6	B801092-1	. . CLIP, Spring ---*---	3	
-7	B801094-1	. . . DIAPHRAGM, Depressor	1	
-8	B801095-1	. . . SPRING	1	
-9	B801093-1	. . . RING, Spring retaining	1	



004012

Figure 4-12. Pressure Reducer Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-12	B812010-1	REDUCER ASSEMBLY, Pressure	REF	B,C,D
	PB50777-1	REDUCER ASSEMBLY, Pressure . . . . . (figure 4-10 for NHA)	1	A
-1	PB50778-1	. REDUCER, Pressure	1	
-2	PB50788-5	. PIN	2	
-3	PB50782-1	. LEVER, Pressure reducer	1	
-4	PB50783-1	. SCREW, Pressure reducer link	1	

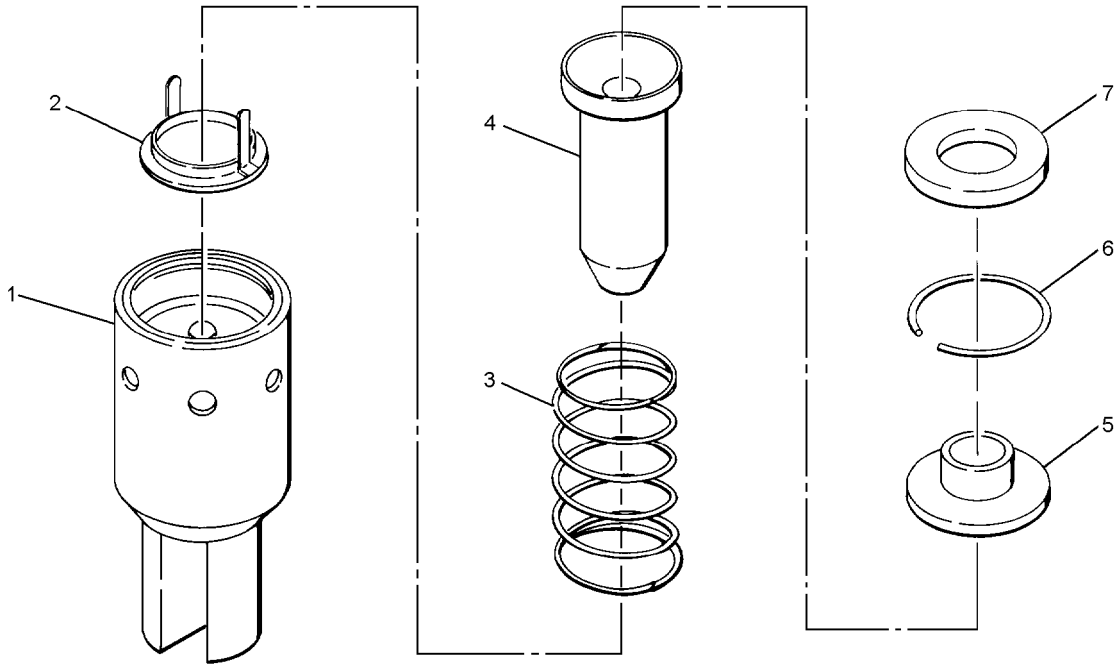


Figure 4-13. Injector Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-13	B800494-1	INJECTOR ASSEMBLY . . . . . (figure 4-10 for NHA)	REF	
-1	PB50797-1	. HOUSING, Injector	1	
-2	PB50342-1	. SPRING, Damping	1	
-3	PB54188-1	. SPRING, Injector	1	
-4	PB50798-1	. NOZZLE, Injector	1	
-5	PB50800-1	. SEAT, Injector	1	
-6	PB50801-1	. RING, Injector snap	1	
-7	PB50834-1	. WASHER		

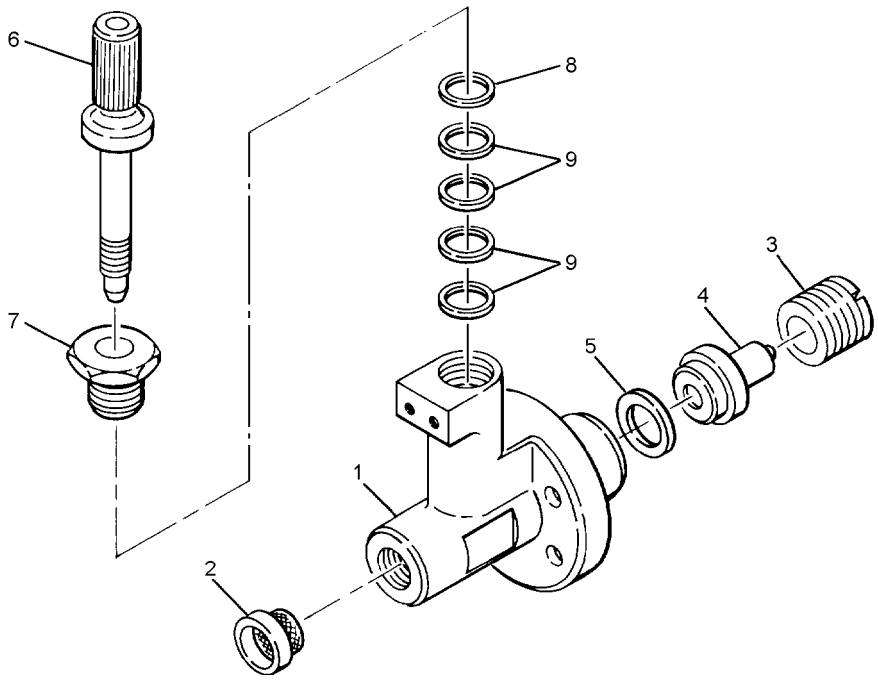
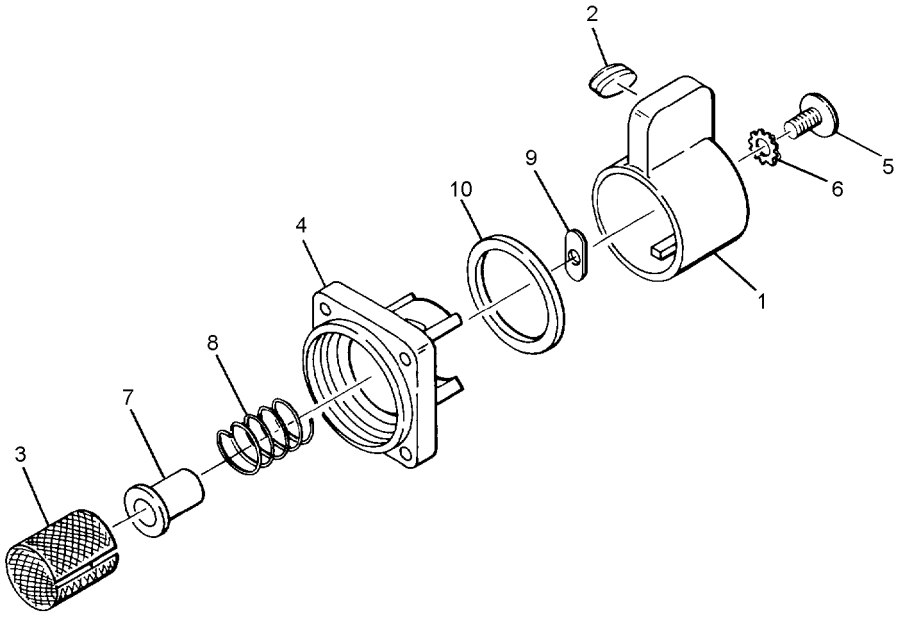


Figure 4-14. Emergency Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-14	C800493-2	VALVE ASSEMBLY, Emergency . . . . . (figure 4-10 for NHA)	REF	
-1	PB51693-2	. BODY, Emergency valve	1	
-2	PB53827-1	. SCREEN AND RETAINER ASSEMBLY	1	
	PB53827-2	. SCREEN AND RETAINER ASSEMBLY	1	
-3	PB52083-1	. NUT, Orifice	1	
-4	B801604-1	. ORIFICE, Oxygen inlet	1	
-5	PB50775-4	. GASKET	1	
-6	PB53045-1	. SHAFT ASSEMBLY, Emergency valve	1	
-7	PB52075-1	. NUT, Stuffing box	1	
-8	PB52076-1	. WASHER	1	
-9	PB52077-1	. PACKING	4	



004015

Figure 4-15. Body and Cover Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-15	PC52176-3	BODY AND COVER ASSEMBLY . . . . . (figure 4-10 for NHA)	REF	
-1	PA52091-1	. COVER ASSEMBLY, Air valve	1	A,B,C
	PB52091-3	. COVER ASSEMBLY, Air valve	1	D
-2	B812005-1	. BUTTON, Lever	1	D
	PB52093-1	. BUTTON, Lever	1	C
-3	PB50870-2	. SCREEN	1	
-4	PC52683-1	. BODY, Air valve	1	
-5	PB50859-2	. SCREW	1	
-6	SLWO-1808BN	. LOCKWASHER, Shakeproof	1	
-7	PB52165-1	. RETAINER, Spring	1	
-8	PB50869-1	. SPRING, Air valve	1	
-9	PB53150-1	. GASKET, Air valve body	1	
-10	PB50873-1	. GASKET	1	

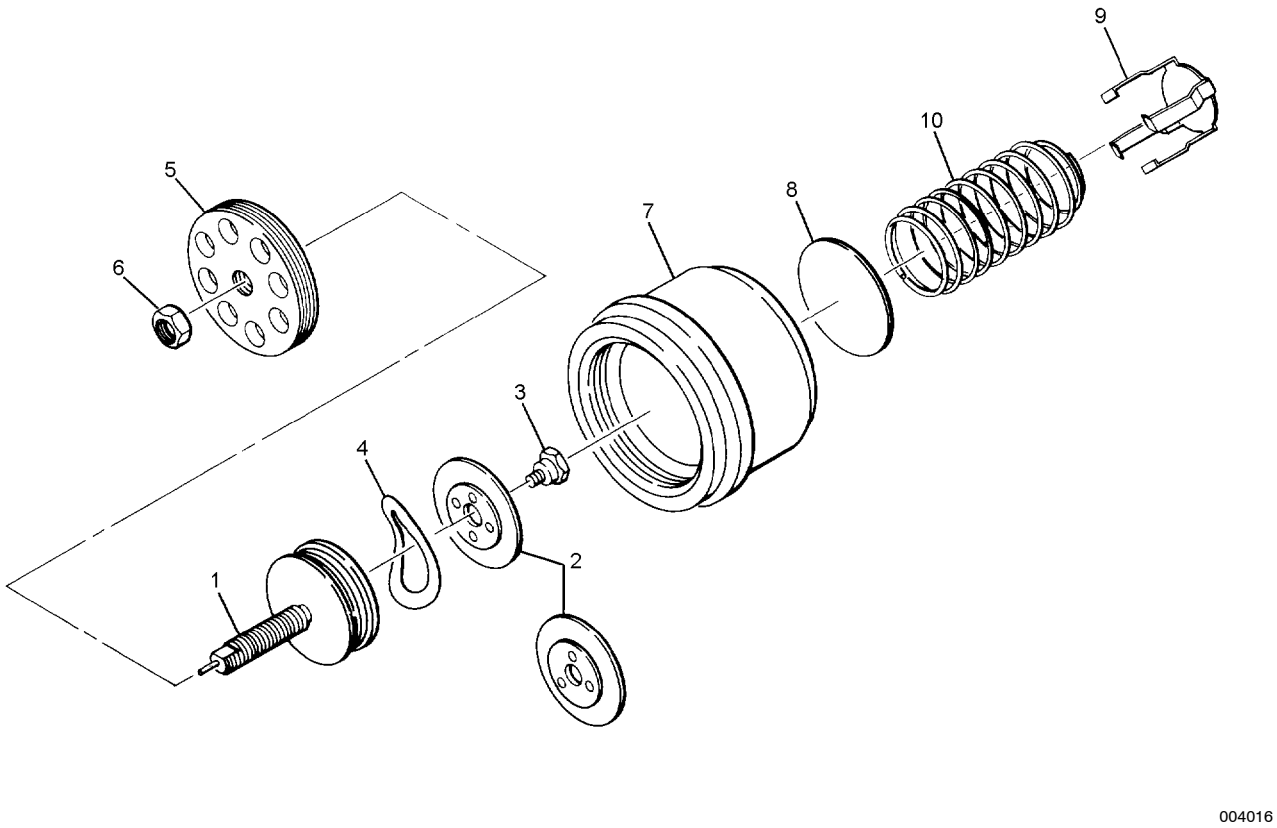
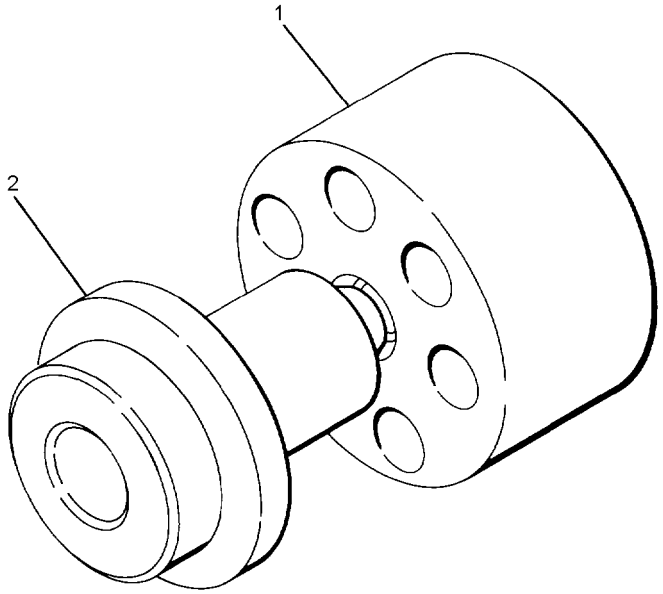


Figure 4-16. Air Check Valve and Aneroid Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-16	PB52720-3	AIR CHECK VALVE AND ANEROID ASSEMBLY (figure 4-10 for NHA)	REF	
-1	PB50821-1	. ANEROID ASSEMBLY	1	
-2	PB50826-1	. PLATE, Throttling	1	
-3	PB50827-1	. NUT, Plate retaining	1	
-4	PB50828-1	. WASHER, Spring	1	
-5	PB52721-1	. FLANGE, Air valve	1	
-6	NO-10	. NUT	1	
-7	PC52678-1	. SEAT, Check valve	1	
-8	PB53041-1	. DISC, Check valve	1	
-9	PB50832-1	. RETAINER, Check valve	1	
-10	PB50833-1	. SPRING, Check valve	1	



004017

Figure 4-17. Inlet Orifice and Inlet Valve Matched Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-17	PB53670-1	INLET VALVE ASSEMBLY . . . . . (figure 4-10 for NHA)	REF	
-1	NO NUMBER	. INLET VALVE AND INSERT ASSEMBLY	1	
-2	NO NUMBER	. ORIFICE, Oxygen inlet	1	

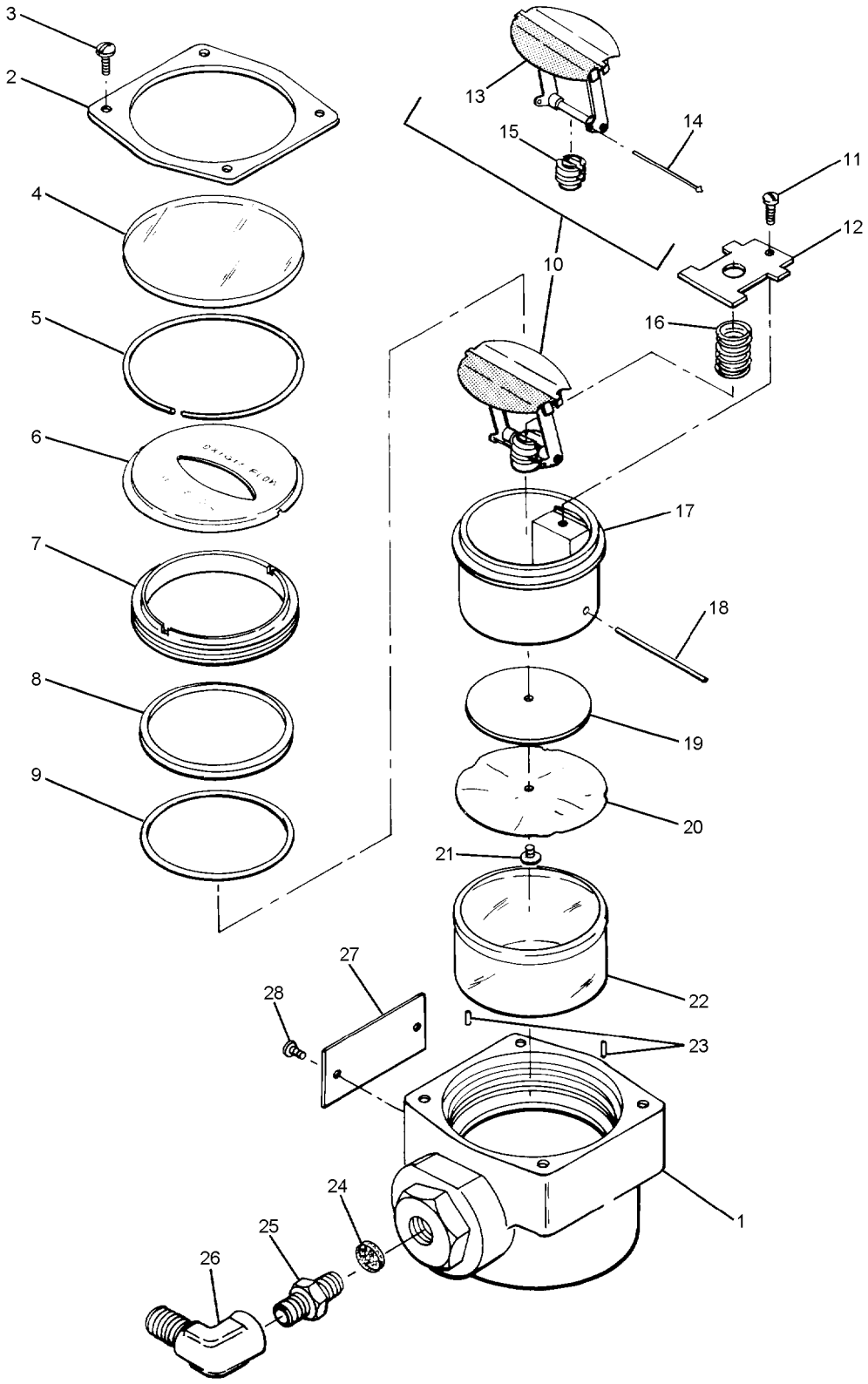


Figure 4-18. Oxygen Flow Indicator – Pioneer Type DJ-2-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-18	DJ-2-1	INDICATOR ASSEMBLY, Oxygen flow ..... (figure 4-10 for NHA)	REF	
-1	D7114-93-1	. CASE	1	A
	D813183	. CASE	1	B,C,D
-2	PB52332-1	. BEZEL ..... (ATTACHING PARTS)	1	
-3	ST406SBN	. SCREW, Self-tapping ..... ---*---	4	
-4	PB52333-1	. GLASS, Dial	1	
-5	PC51217-7	. GASKET	1	A
	PC51217-6	. GASKET	1	B,C,D
-6	PC52342-1	. DIAL	1	
-7	B800109-1	. RING, Retaining	1	
-8	PB52670-1	. RING	1	
-9	PB53330-1	. WASHER, Packing	1	
-10	B800110-1	. LEVER ASSEMBLY ..... (ATTACHING PARTS)	1	
-11	ST406SBN	. SCREW, Self-tapping	1	
-12	PB41821-1	. PLATE ..... ---*---	1	
-13	B796679-1	. . LEVER AND PLATE ASSEMBLY	1	A
	B800113-1	. . LEVER AND PLATE ASSEMBLY	1	B,C,D
-14	PB50788-4	. . PIN	1	
-15	B800114-1	. . HUB, Diaphragm	1	
-16	PB41838-1	. SPRING	1	
-17	PD41835-1	. FRAME	1	
-18	PB41820-1	. PIN	1	
-19	PB41833-1	. PLATE, Diaphragm	1	
-20	PB54242-1	. SHIELD, Diaphragm ..... (ATTACHING PARTS)	1	
-21	PB54190-1	. SCREW ..... ---*---	1	
-22	PB53606-2	. SEAL, Piston	1	
-23	PB23563-1	. PIN, Knob	2	
-24	PB50428-1	. SCREEN	1	
-25	3325X2	. EXTENSION (Note 1)	1	
-26	3400X2	. ELBOW	1	
-27	C80070-1	. PLATE, Name ..... (ATTACHING PARTS)	1	
-28	0-330-1	. SCREW, Self-tapping ..... ---*---	2	
	Notes: 1. Oxygen Flow Indicator (P/N DJ-2-1) is attached to Regulator Case (P/N PE52780-1) with Elbow (P/N 3400X2) and Extension (P/N 3325X2). When replacing with new Oxygen Flow Indicator P/N AN6029-1, use Elbow, male-pipe (P/N B-2-ME and 4046866-12) (figure 4-10).			

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
AN6029-1	4-10-28	
AN800-3	4-10-3	
AN805-3	4-10-2	
AN913-1	4-10-8	PAOZZ
B796679-1	4-18-13	
B800110-1	4-18-10	
B800113-1	4-18-13	
B800114-1	4-18-15	
B800162-1	4-10-67	
B800162-2	4-10-67	
B800163-1	4-10-69	
B800163-2	4-10-69	
B800494-1	4-10-27	
	4-13	
B800593-1	4-10-67	PADZZ
B800652-1	4-11-3	
B801092-1	4-11-6	
B801093-1	4-11-9	
B801094-1	4-11-7	
B801095-1	4-11-8	
B801150-1	4-11-4	
B801204-1	4-10-53	
B801340-1	4-10-73	
B801503-1	4-10-6	
B801604-1	4-14-4	
B812005-1	4-15-2	
B812010-1	4-12	
	4-10-39	
B812022-1	4-10-61	
C800164-1	4-10-70	
C800204-1	4-10-11	
C800274-1	4-10-11	
C800349-1	4-10-4	
C800493-2	4-10-5	PAOZZ
	4-14	
C80070-1	4-18-27	
C801146-1	4-11	
C801146-2	4-11	
DJ-2-1	4-10-28	
	4-18	
D7114-93-1	4-18-1	
D813183	4-18-1	
FFILO-605	4-10-40	
	4-10-48	
FFILO-605	4-10-59	
	4-10-68	
FFILO-606BN	4-10-18	
FO404B	4-10-35	
FO404BN	4-10-35	
LWO-4BN	4-10-7	
NO-10	4-16-6	
NO-2	4-10-14	
NO-3BN	4-10-52	
PB23563-1	4-18-23	
PB41820-1	4-18-18	
PB41821-1	4-18-12	
PB41833-1	4-18-19	
PB41838-1	4-18-16	
PB50342-1	4-13-2	
PB50428-1	4-10-33	
	4-18-24	
PB50775-2	4-10-65	
	4-10-66	
PB50775-4	4-14-5	
PB50777-1	4-12	PAOZZ
PB50778-1	4-12-1	
PB50782-1	4-12-3	
PB50783-1	4-12-4	
PB50785-1	4-10-42	
PB50788-3	4-10-75	
PB50788-4	4-10-71	
	4-18-14	
PB50788-5	4-12-2	
PB50790-1	4-10-47	
PB50797-1	4-14-1	
PB50798-1	4-14-4	
PB50800-1	4-14-5	
PB50801-1	4-14-6	
PB50803-1	4-10-74	
PB50815-2	4-10-23	
PB50821-1	4-16-1	
PB50826-1	4-16-2	
PB50827-1	4-16-3	
PB50828-1	4-16-4	PAOZZ
PB50832-1	4-16-9	
PB50833-1	4-16-10	PAOZZ
PB50834-1	4-13-7	PCOZZ
PB50834-2	4-10-44	
	4-10-46	
PB50834-3	4-10-63	
PB50835-2	4-10-16	
PB50840-1	4-10-26	
PB50845-1	4-10-58	
PB50848-1	4-10-60	PAOZZ

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CHAPTER 5

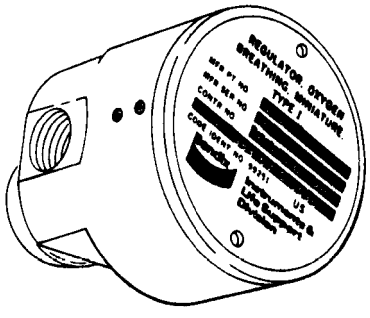
MINIATURE OXYGEN BREATHING REGULATORS

TYPE CRU-79/P

Section 5-1. Description

5-1. GENERAL.

5-2. Miniature Oxygen Breathing Regulator, Model 29267-A1 is manufactured by Litton Life Support, formerly Bendix Aviation Corp. (CAGE 99251) and Model 3260024-0101 is manufactured by Litton Life Support, formerly Clifton Precision (CAGE 99251) (figure 5-1). Model 900-002-025-05 is manufactured by Robertshaw Controls Co. (CAGE 00543) and Sabre Industries (CAGE 27045 figure 5-2). Model F2700-200C is manufactured by Carleton Technology Inc., formerly Aro Corp. (CAGE 97413) (figure 5-3). Model 900-002-025-07 is manufactured by Sabre Industries (CAGE 27045) (figure 5-4). They are designed to regulate 100% oxygen to the aircrewmember during flight. Table 5-1 contains the leading particulars for the regulators.



005001

Figure 5-1. Miniature Oxygen Breathing Regulator, Model 29267-A1/3260024-0101

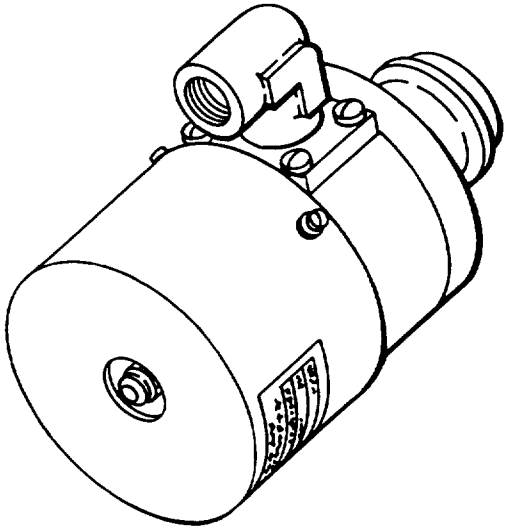
Table 5-1. Leading Particulars

Recommended Inlet Pressure . . .	40 to 120 psig
Flow	0 to 100 lpm
Operating Altitude Range	0 to 50,000 feet
Operating Temperature Range . .	-65°F to +160°F
Weight	5.0 ounces max

WARNING

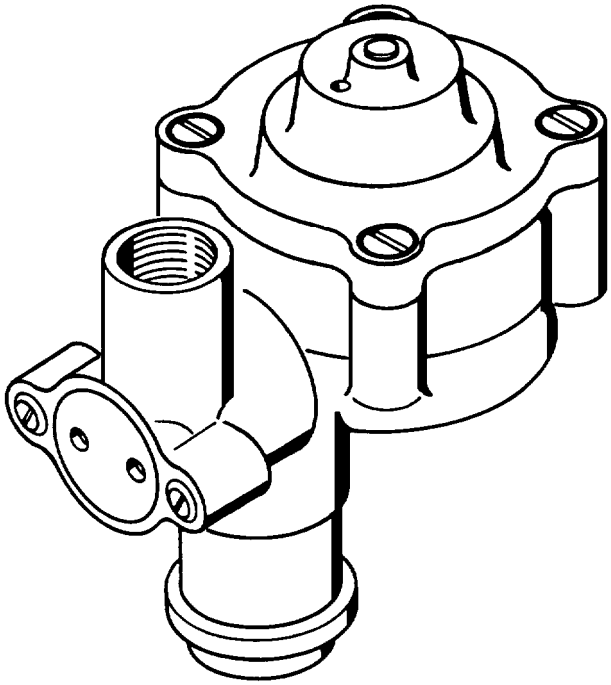
At no time shall operational altitude exceed 50,000 feet.

5-3. The miniature regulator reduces and regulates supply oxygen pressure for breathing of 100 percent oxygen. The safety-pressure feature automatically maintains a positive pressure in the mask of 0.50 to 2.5 inches of water at all altitudes up to and including 30,000 feet. The pressure-breathing feature maintains a positive pressure in the mask of up to 20.0 inches of water at altitudes between 34,000 and 50,000 feet, with the positive pressure increasing in proportion to the altitude. Miniature regulators can be used routinely up to approximately 45,000 feet. However, due to human limitations, miniature regulators shall not be used above 50,000 feet except for very short periods.



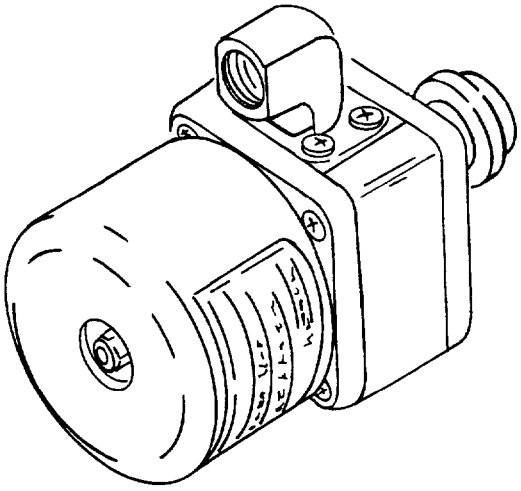
005002

Figure 5-2. Miniature Oxygen Breathing Regulator, Model 900-002-025-05



005003

Figure 5-3. Miniature Oxygen Breathing Regulator, Model F2700-200C



005004

Figure 5-4. Miniature Oxygen Breathing Regulator, Model 900-002-025-07

5-4. CONFIGURATION.

5-5. Miniature regulators are designed for use with the MBU-14 Series oxygen mask as part of the oxygen system in all aircraft requiring 100% oxygen chest mounted regulators. Refer to NAVAIR 13-1-6.7-3 for personal configurations of the MBU-14 Series oxygen masks.

Section 5-2. Modifications

5-6. GENERAL.

5-7. There are no modifications to the Type CRU-79/P regulators required/authorized at this time.

Section 5-3. Performance Test Sheet Preparation

5-8. GENERAL.

5-9. Preparation of the Oxygen Regulator Performance Test Sheet utilized during bench tests requires that through the use of various graphs, actual flows provided in this section be converted to indicated flows. Flows are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flows must be converted to inches of water pressure (inH_2O), the form of measurement which can be read on the test stand manometers. Zero lpm flows do not require conversion, as 0 lpm = 0 inH_2O.

NOTE

The various graphs supplied with each Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands. The regulators deliver 100 percent oxygen at all times. Therefore only the nitrogen (N_2) line on the Output Graph for the specified altitude will be used.

5-10. The Performance Test Sheet will be prepared as shown in figure 5-5. The Performance Test Sheet is a sample only, but may be reproduced for local use.

5-11. The following tests require conversion of flow from actual lpm to indicated inH_2O:

1. Safety Pressure Test.
2. Pressure Breathing Test.

5-12. REGULATOR PERFORMANCE TESTS.

5-13. SAFETY PRESSURE TEST. To convert the 100 lpm flow, proceed as follows:

1. Using the Sea Level Output Graph, locate the 100 lpm line on the bottom of the graph, and trace the line up to where it intersects the N_2 line.
2. Trace the line from the point of intersection across the graph to the left hand column to determine inH_2O.
3. Enter this figure in the appropriate block of the 100 lpm column on the Performance Test Sheet.

REGULATOR PERFORMANCE TEST SHEET

MINIATURE OXYGEN BREATHING REGULATORS
TYPE CRU-79/P

DATE _____ TYPE _____ SERIAL NO. _____

TEST STAND SERIAL NO. _____ TEST STAND OPERATOR: _____ CDI _____

1. OVERLOAD TEST: (MODELS 29267-A1, 3260024-0101, AND F2700-200C ONLY) 25 INH_2O (1.85 INHg) HOLD FOR 2 MINUTES. NO DAMAGE TO REGULATOR ALLOWED
   A. MODEL 29267-A1/3260024-0101 ALLOWABLE LEAKAGE 600 CCM: _____
   B. MODEL F2700-200C ALLOWABLE LEAKAGE 1750 CCM: _____
2. BODY LEAKAGE TEST (MODELS 900-002-025-05 AND 900-002-025-07 ONLY) 10 INH_2O NO LEAKAGE ALLOWED: _____
3. DEMAND VALVE LEAKAGE TEST: 110 PSIG INLET PRESSURE. OUTLET PRESSURE NOT TO EXCEED 2.50 INH_2O IN 5 MINUTES _____
4. SAFETY PRESSURE TEST: READING MUST BE BETWEEN 0.50 AND 2.50 INH_2O

ALTITUDE (FEET)	INLET PRESS (PSIG)	0 LPM FLOW (INH_2O)	READING	100 LPM FLOW (INH_2O)	READING
SEA LEVEL	40	0			
SEA LEVEL	80	0			
30,000	40	0			
30,000	80	0			

5. PRESSURE BREATHING TEST: (MODELS F2700-200C, 29267-A1, 3260024-0101, AND 900-002-025-05 ONLY)

ALTITUDE (FEET)	INLET PRESS (PSIG)	0 LPM FLOW (INH_2O)	READING	100 LPM FLOW (INH_2O)	READING	OUTLET PRESSURE (INH_2O)	
						MIN	MAX
34,000	80	0				1.0	3.7
40,000	80	0				8.0	10.5
45,000	80	0				13.0	16.0
50,000	80	0				16.0	20.0

Figure 5-5. Regulator Performance Test Sheet (Sheet 1 of 2)

6. PRESSURE BREATHING TEST: (MODEL 900-002-025-07 ONLY.)

ALTITUDE (FEET)	INLET PRESS (PSIG)	0 LPM FLOW (INH_2O)	READING	100 LPM FLOW (INH_2O)	READING	OUTLET PRESSURE (INH_2O)	
						MIN	MAX
35,000	80	0				0.5	30.0
40,000	80	0				5.0	9.5
45,000	80	0				10.5	15.5
50,000	80	0				14.0	20.0

7. REGULATOR OXYGEN PURGE: APPLY 90 PSIG, AVIATORS BREATHING OXYGEN AND FLOW 1 TO 3 MINUTES. ■

Figure 5-5. Regulator Performance Test Sheet (Sheet 2 of 2)

NOTE

For test stands provided with only one Output Graph for all altitudes, use appropriate altitude N_2 line.

4. Convert the 100 lpm flow for 30,000 feet using applicable altitude Output Graph N_2 line and same procedures as in steps 1 through 3.

5-14. PRESSURE BREATHING TEST. To convert the 100 lpm flows, proceed as follows:

1. Using the 34,000-foot Output Graph (35,000-foot graph for model 900-002-025-07 only), locate the 100 lpm line on the bottom of the graph and trace the line up to where it intersects the N_2 line.

2. Trace the line from the point of intersection across the graph to the left-hand column, and determine inH_2O.

3. Enter this figure in the appropriate block of the 100 lpm column on the Performance Test Sheet.

NOTE

For test stands provided with only one Output Graph for all altitudes, use appropriate altitude N_2 line.

4. Repeat steps 1 through 3 for 40,000, 45,000 and 50,000 foot 100 lpm flows.

Section 5-4. Maintenance

5-15. GENERAL.

5-16. Maintenance of the Miniature Oxygen Regulator Type CRU-79/P is limited to inspection, testing, adjustment of the pressure breathing aneroid, and tightening of loose screws. Ensure that anti-seize tape (MIL-T-27730) is used on pipe threads. This section contains only the procedural steps necessary to meet these requirements.

NOTE

Upon completion of any maintenance action (e.g. inspection, adjustment, modification, etc.) make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

Prior to disposing of Type CRU-79/P Oxygen Regulators, remove pressure breathing aneroid, breathing diaphragm, and all screws. Retain all serviceable removed parts, for limited repair action to CRU-79/P Oxygen Regulators, under the guidelines established in OPNAVINST 4790.2 Series.

5-17. If the regulator fails any inspection or testing requirements, it shall be disposed of in accordance with local directives and replaced with a ready for issue (RFI) component.

5-18. The regulator shall remain in service as long as it continues to function correctly and does not require other than authorized adjustment.

5-19. Procedural steps outlined in this section are listed under the inspection cycle in which they are required, and in the sequence in which they normally occur.

5-20. INSPECTION.

5-21. DAILY/PREFLIGHT INSPECTIONS. The Daily/Preflight Inspection is a Visual Inspection performed by the aircrewmember to whom the regulator is passed, daily or prior to each flight. To perform the inspection, visually inspect the following:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible material. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Inlet and outlet connections for security of attachment. Ensure that all clamps, locknuts, fittings and screws are tight.

2. Regulator body for dents, scratches, corrosion, condition of nameplate, cracks, or any other damage.

3. Perform a functional test in accordance with paragraph 5-23, steps 2, 3, and 4.

5-22. If discrepancies are found or suspected, the regulator shall be taken to the Aviator's Equipment Branch for the required corrective maintenance action.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate Level shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the bench test and/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

5-23. SPECIAL INSPECTIONS. Special Inspections are required at specified intervals in addition to the Daily/Preflight or Calendar Inspections. The interval for miniature oxygen regulators is 30 days. This inspection consists of a Visual Inspection and a Functional Test, both performed by personnel of the Aviator's Equipment Branch. To perform the Special Inspection, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210

1. Visually inspect the regulator in accordance with paragraph 5-21.

WARNING

When working with oxygen, make certain that clothing, tubing fittings and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible material. Fire or explosion can result when even slight traces of combustible material come in contact with oxygen under pressure.

2. Perform the Functional Test by attaching the miniature regulator, delivery tube and mask assembly to a suitable oxygen supply source. Use regulator-to-seat kit hose for attachment.

3. Turn supply source on. There should be a flow of oxygen through the mask.

NOTE

Resistance during exhalation is due to positive pressure feature of the regulator.

4. Don mask and breathe. There should be a slight resistance on exhalation.

5. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

5-24. CALENDAR INSPECTION.

5-25. The Calendar Inspection shall be performed on all miniature regulators upon issue prior to being installed in an inservice personal oxygen configuration, and shall be performed on all miniature regulators in service at least every 90 days.

5-26. The Calendar Inspection consists of a Visual Inspection and a Bench Test. All work shall be performed in a clean, dust-free and oil-free area.

5-27. Visual Inspection. To visually inspect the miniature regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

1. Disconnect the communication connectors.

2. Loosen hose clamp securing regulator outlet to mask delivery hose; and remove regulator from hose. Retain hose clamp.

3. Loosen locknut and remove regulator-to-seat kit hose from regulator inlet.

4. Inspect regulator inlet and outlet for foreign objects, dirt, corrosion, dents, cracks and other damage.

5. Carefully remove inlet filter screen and flush clean with water. Blow-dry screen with water pumped nitrogen and reinstall in regulator inlet.

6. Inspect regulator body for dents, cracks, corrosion, condition of nameplate, security of screws and fittings, and for other obvious damage.

5-28. Miniature regulators failing the Visual Inspection or the Bench Test (paragraph 5-29) shall be disposed of in accordance with local directives.

5-29. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type I, Class 1, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig nitrogen cylinders. These cylinders can not be certified contaminant free.

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

5-30. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to the appropriate ground support equipment manual for identification of test stand controls and indicators referred to in the bench test procedures that follow. Do not attempt to perform any bench test before becoming thoroughly familiar with the test stand. Utilize Performance Test Sheet when performing bench test (figure 5-5).

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

5-31. OVERLOAD TEST. (Models 29267-A1, 3260024-0101, and F2700-200C only.) To perform the Overload Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Cap the regulator inlet and attach regulator outlet to the short hose attached to piezometer (26) in the chamber. Ensure all test stand valves are in the secured position, then open the N_2 supply cylinder valve.

NOTE

Ensure regulator outlet and piezometer (26) are one inch apart.

2. Using hose supplied with test stand, connect LOW PRESS. connection (19) to REF. TAP connection (21) in the chamber.

3. Ensure FLOW SELECTOR valve (M) is in REGULATOR position.

4. Adjust LOW PRESS. REGULATOR (N) so that REGULATED LOW PRESS gage (11) indicates 70 psig.

NOTE

When the in-system leakage rotameters are used, an inlet pressure of 70 psig will normally be used, as this is the pressure used to calibrate the rotameters.

5. Place PRESS. SELECTOR valve (D) in the Hg position.

6. Slowly open LEAKAGE CONTROL valve (E) until 1.85 inHg is indicated on Hg manometer (5). Maintain 1.85 inHg for two minutes.

7. If no leakage is indicated on HIGH RANGE LEAKAGE rotameter (B), turn LEAKAGE SELECTOR valve (F) to LOW RANGE position and check for leakage on LOW RANGE LEAKAGE rotameter (7). Maximum allowable leakage shall be no more than the allowable leakage for each model shown on the performance test sheet.

8. If leakage is excessive dispose of the regulator in accordance with local directives.

9. Close LEAKAGE CONTROL valve (E). Leave position of all other controls and connections unchanged.

5-32. BODY LEAKAGE TEST (MODELS 900-002-025-05 AND 900-002-025-07 ONLY). To perform the Body Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Compound, Leak Detection Type 1	MIL-L-25567
As required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

1. Cap regulator inlet.

NOTE

This regulator does not require the use of a piezometer restrictor for bench testing.

Ensure regulator outlet and piezometer (26) are one inch apart.

2. Attach regulator outlet to the short hose attached to piezometer (26) in the chamber. Ensure all test stand valves are in the secured position, then open N_2 supply cylinder valve.

3. Adjust LOW PRESS. REGULATOR (N) so that REGULATED LOW PRESS. gage (11) indicates 70 psig.

CAUTION

Do not turn PRESS. SELECTOR valve (D) to H_2O position if pressure is indicated on Hg manometer (5). If pressure is indicated open OUTPUT valve (C) to relieve pressure.

4. Ensure FLOW SELECTOR valve (M) is in REGULATOR position. Slowly turn PRESS. SELECTOR valve (D) to H_2O position.

5. Using line supplied with test stand, connect low pressure connection (19) to REF. TAP connection (21) in the altitude chamber.

6. Slowly open leakage control valve (E) to maintain 10.0 inH_2O pressure to regulator outlet as indicated on PRESS./SUCTION manometer (4).

NOTE

Disregard leakage indicated on leakage rotameters 7 and 8 when performing step 7. This is a controlled bleed coming through an orifice in the diaphragm and exiting the regulator through the holes in the aneroid protective cover.

7. Apply leak detection compound (MIL-L-25567, Type I) to the seam joining the outlet fitting to the regulator body. There shall be no leakage.

8. If leakage is indicated, dispose of the regulator in accordance with local directives.

9. Close leakage control valve (E) and disconnect line from low pressure connection (19) and REF. TAP and connection (21).

5-33. DEMAND VALVE LEAKAGE TEST. To perform the Demand Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

WARNING

Never block the outlet of the miniature regulator while a pressure is applied to the inlet. This will seriously damage the regulator.

NOTE

If high reading is encountered during this test, make sure pressure breathing aneroid is not screwed into regulator housing too far before disposing of the regulator. Turn pressure breathing aneroid counterclockwise out of regulator housing and recheck readings.

1. Disconnect hose from LOW PRESS. connection (19) and REF. TAP connection (21) in altitude chamber.

2. Uncap regulator inlet and connect regulator inlet to N_2 INPUT connection (18) in altitude chamber.

3. Place PRESS. SELECTOR valve (D) in Hg position.

4. Turn vacuum pump on.

5. Turn INLET PRESS. ON/OFF valve (L) to ON slowly.

6. Using LOW PRESS. REGULATOR (N), apply 110 psig to idle regulator inlet. Pressure will be indicated on N_2 INPUT PRESS. gage (27).

7. Open OUTPUT valve (C) to draw a flow through regulator, then close valve (C).

8. Place PRESS. SELECTOR valve (D) inH2O position.

9. Observe PRESS./SUCTION manometer (4) for five minutes. Pressure must not exceed 2.5 inH_2O. After the five minute period, read manometer (4) and enter reading in appropriate block on Performance Test Sheet.

10. If leakage is excessive dispose of regulator in accordance with local directives.

11. Leave position of all controls and connections unchanged.

5-34. SAFETY PRESSURE TEST. To perform the Safety Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

If high reading is encountered during this test, make sure pressure breathing aneroid is not screwed into regulator housing too far before disposing of the regulator. Refer to pressure breathing troubleshooting table 5-2, figure 5-7 (Model 29267-A1), figure 5-8 (Model 3260024-0101), figure 5-9 (Model F2700- 200C), figure 5-10 (Model 900-002-025-05), and figure 5-11 (Model 900-002-025-07) for adjustment of the pressure breathing aneroids.

To slow down ascents in altitude chamber during the following tests, install a restrictor in the BYPASS port (BP). Restrictor can be fabricated locally by drilling a 1/4 inch hole in center of a plug made to fit the bypass opening. When ascending to altitude open and maintain an output flow of 3.0 inH_2O.

Open flutter dampener valve (J) 1/4 turn. When ascending to altitude, open and maintain an output flow of 3.0 inH_2O.

1. Adjust LOW PRESS. REGULATOR (N) to 40 psig as indicated on N_2 INPUT PRESS. gage (27).

CAUTION

Open FLUTTER DAMPENER valve (J) 1/4 turn. If regulator causes fluid in PRESS./SUCTION manometer (4) to flutter, open FLUTTER DAMPENER valve (J) slowly until flutter is eliminated. If at altitude descend to sea level prior to opening valve (J) as PRESS./SUCTION manometer can be easily overloaded. When ascending to altitude maintain an output flow of 3.0 inH_2O.

NOTE

When increasing flows, inlet pressure must be adjusted to maintain correct inlet pressure on N_2 INPUT PRESS. GAGE (27).

2. With OUTPUT valve (C) closed, read PRESS./SUCTION manometer (4) and enter reading in appropriate block on Performance Test Sheet.

3. Adjust OUTPUT valve (C) to the equivalent of 100 lpm as indicated on OUTPUT manometer (1). Read safety pressure as indicated on PRESS./SUCTION manometer (4) and enter this figure on Performance Test Sheet. Safety pressure shall be not less than 0.50 nor greater than 2.5 inH_2O for all flows.

4. Adjust LOW PRESS. REGULATOR (N) to 80 psig as indicated on N_2 INPUT PRESS. gage (27).

5. Repeat steps 2 and 3.

6. Close altitude chamber door.

7. Ensure REF. PRESS SELECTOR valve (O) is in ALT. position.

NOTE

A 3.0 inH_2O flow must be drawn with OUTPUT valve (C). OPEN FLUTTER DAMPENER valve (J) 1/4 turn.

If altitude chamber is inadvertently taken above test altitudes, open chamber bleed valve (K) slowly and descend to desired altitude. Close valve (K).

8. Using VACUUM CONTROL valve (B) ascend to 30,000 feet as indicated on LOW RANGE ALTM. (13).

9. Repeat steps 1 through 5.

NOTE

If low safety pressure is encountered, dispose of the regulator in accordance with local directives.

If high safety pressure is encountered at 30,000 feet, before disposing of the regulator, ensure that pressure breathing has not cut-in before 34,000 feet giving a false indication of high safety pressure.

10. Leave position of all controls and connections unchanged, and continue to pressure breathing test.

5-35. PRESSURE BREATHING TEST. To perform the Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As required	Acetone	O-A-51
As required	Glyptal	1201B (CAGE 24452)
As required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

If problems are encountered during this test refer to pressure breathing troubleshooting table 5-2, figure 5-7 (Model 29267-A1), figure 5-8 (Model 3260024-0101), figure 5-9 (Model F2700-200C), figure 5-10 (Model 900-002-025-05) and figure 5-11 (Model 900-002-025-07) for adjustment of the pressure breathing aneroid.

1. Open OUTPUT valve (C) and draw a flow of 3.0 inH_2O through regulator. Using VACUUM CONTROL valve (B) ascend to 34,000 feet (35,000 feet for model 900-002-025-07 only) as indicated on LOW RANGE ALTM. (13).

2. Using LOW PRESS. REGULATOR (N), adjust inlet pressure to 80 psig. Close OUTPUT valve (C).

3. Read PRESS./SUCTION manometer (4). Reading shall be between 1.0 and 3.7 inH_2O (0.5 and 3.0 inH_2O for model 900-002-025-07 only). Enter reading in appropriate block of Performance Test Sheet.

4. Adjust OUTPUT valve (C) to a flow of 100 lpm, and read PRESS./SUCTION manometer (4). Reading shall be between 1.0 and 3.7 inH_2O (0.5 and 3.0 inH_2O for model 900-002-025-07 only). Enter reading in appropriate block of Performance Test Sheet.

5. Increase altitude to 40,000 feet using VACUUM CONTROL valve (B). Altitude will be indicated on HIGH RANGE ALTM. (12).

6. Repeat steps 2 through 5. Readings on PRESS./SUCTION manometer (4) at 40,000 feet shall be between 8.0 and 10.5 inH_2O (5.0 and 9.5 inH_2O for model 900-002-025-07 only).

7. Increase altitude to 45,000 feet using VACUUM CONTROL valve (B). Altitude will be indicated on HIGH RANGE ALTM. (12).

8. Repeat steps 2 through 5. Reading on PRESS. SUCTION manometer (4) at 45,000 feet shall be between 13.0 and 16.0 inH_2O (10.5 and 15.5 inH_2O for model 900-002-025-07 only).

9. Increase altitude to 50,000 feet using VACUUM CONTROL valve (B). Altitude will be indicated on HIGH RANGE ALTM. (12).

10. Repeat steps 2 through 5. Readings on PRESS./SUCTION manometer (4) at 50,000 feet shall be between 16.0 and 20.0 inH_2O (14.0 and 20.0 inH_2O for model 900-002-025-07 only).

11. If malfunctions were noted, locate probable cause using troubleshooting chart, table 5-2. To adjust the pressure breathing aneroid refer to the applicable step, steps 16, 17, 18, or 19 for model of regulator being tested. If unable to adjust pressure breathing aneroid within tolerance, dispose of the regulator in accordance with local directives.

Table 5-2. Troubleshooting (Pressure Breathing Test)

Trouble	Probable Cause	Remedy
Pressure breathing too high at 34,000 feet (35,000 feet for model 900-002-025-07 only).	Aneroid assembly too far into regulator housing.	Adjust aneroid assembly counterclockwise.
Pressure breathing too low at 34,000 feet (35,000 feet for model 900-002-025-07 only).	Aneroid assembly too far out of regulator housing.	Adjust aneroid assembly clockwise.
Pressure breathing cannot be adjusted within limits.	Defective or damaged aneroid assembly.	Replace regulator with RFI component.

12. After completion of Pressure Breathing Test, leave OUTPUT valve (C) slightly open. Open CHAMBER BLEED valve (K) and return chamber to sea level.

13. Open chamber door and close valve (C). Turn off vacuum pump.

14. Turn INLET PRESS. ON/OFF valve (L) to OFF, and remove regulator from test stand.

15. Close N_2 supply cylinder valve and, using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), relieve all pressure in the test stand. Secure all test stand valves.

16. (Model 29267-A1 Only) Prior to aneroid adjustment, remove Glyptal paint from aneroid lockscrew (figure 5-7) by applying a small amount of acetone to the aneroid lockscrew. Loosen the aneroid lockscrew using a 0.035-inch Allen wrench and adjust the aneroid assembly using retaining ring pliers in accordance with pressure breathing test troubleshooting table 5-2. When adjustment is complete tighten aneroid lockscrew and apply Glyptal to the aneroid lockscrew.

17. (Model 3260024-0101 Only) Prior to aneroid adjustment, loosen aneroid lockscrew locknut using a 3/16 inch socket wrench. Loosen the aneroid lockscrew using a 0.035-inch Allen wrench (figure 5-8). Adjust the aneroid assembly using retaining ring pliers in accordance with Pressure Breathing Test Troubleshooting table 5-2. When adjustment is complete tighten aneroid lockscrew and aneroid lockscrew locknut and apply Glyptal tamper dot to aneroid lockscrew locknut.

18. (Model F2700-200C only) using a Bristol wrench adjust the aneroid assembly (figure 5-9) in accordance with Pressure Breathing Test Troubleshooting table 5-2.

NOTE

Clockwise rotation of the aneroid assembly increases outlet pressure. Counterclockwise rotation of the aneroid assembly decreases outlet pressure. This applies to models 29267-A1 and 3260024-0101.

19. (Models 900-002-025-05/-07 only). Fit special tool (figure 5-6) on to locknut with Allen wrench seated in setscrew (figure 5-10 or 5-11, as applicable). To adjust pressure breathing outlet pressure, hold Allen wrench still and loosen locknut by turning grommet counterclockwise. Hold grommet still and rotate setscrew with Allen wrench. When adjustment is complete, hold Allen wrench still and retighten locknut by turning grommet clockwise.

5-36. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)

WARNING

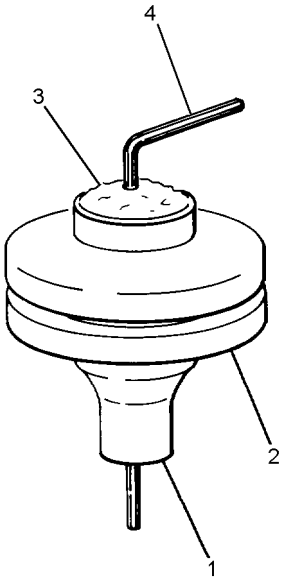
Do not use oxygen test stand to regulate the oxygen purge pressure.

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

WARNING

Never block the outlet of the miniature regulator while pressure is applied to the inlet. This will seriously damage the regulator.

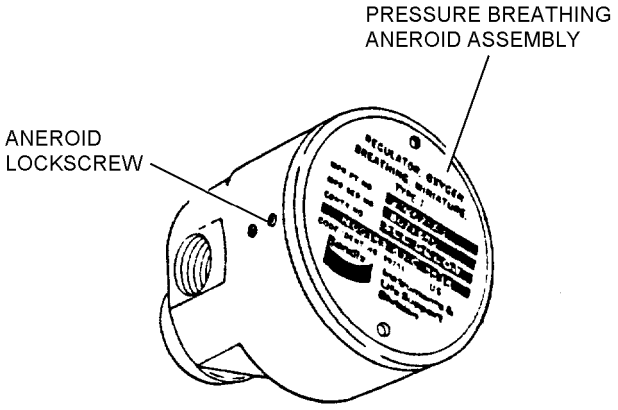
2. Apply 90 psig to regulator inlet; allow oxygen to flow 1 to 3 minutes.



ITEM NO.	DESCRIPTION	REFERENCE NUMBER	ASSEMBLY INSTRUCTIONS
1	3/16″ Socket 1/4″ drive	—	—
2	Grommet	MS35489-13 (CAGE 96906)	Insert socket into grommet
3	Silicone Adhesive	RTV102 (CAGE 01139)	Fill inside top of socket with adhesive
4	0.050-inch Allen wrench	—	Insert wrench through socket

005006

Figure 5-6. Aneroid Adjustment Tool for Models 900-002-025-04/-05



005007

Figure 5-7. Miniature Oxygen Breathing Regulator, Model 29267-A1

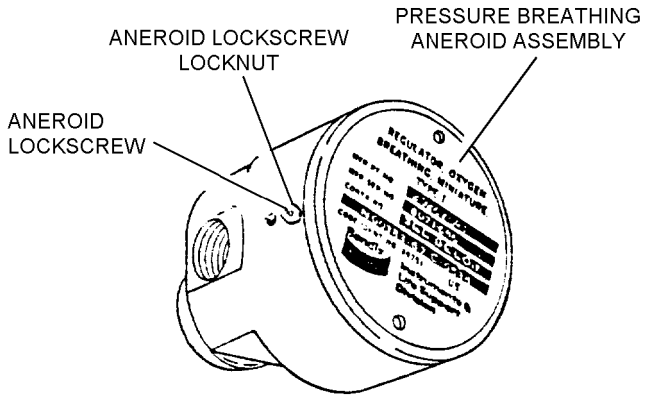


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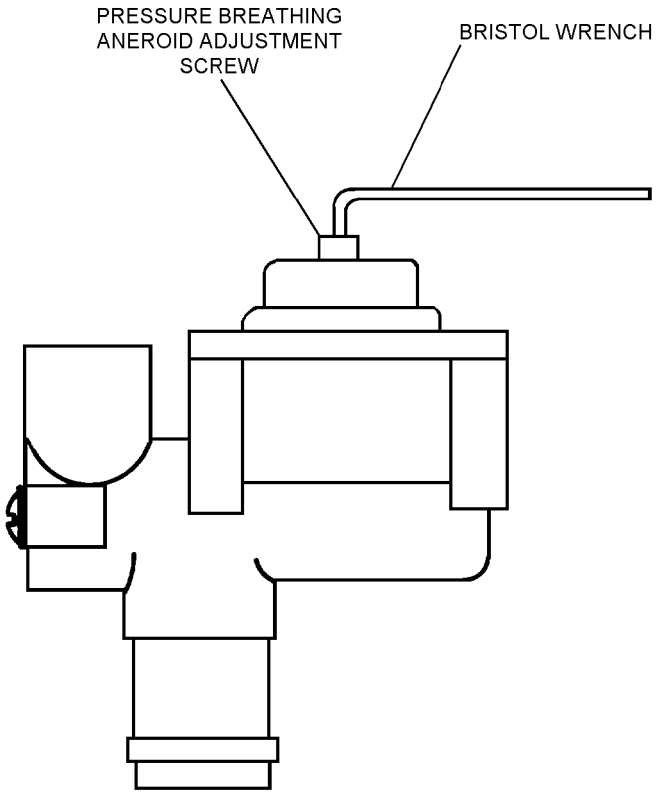
Figure 5-8. Miniature Oxygen Breathing Regulator, Model 3260024-0101



005009

Figure 5-9. Miniature Oxygen Breathing Regulator, Model F2700-200C, Pressure Breathing Aneroid Adjustment

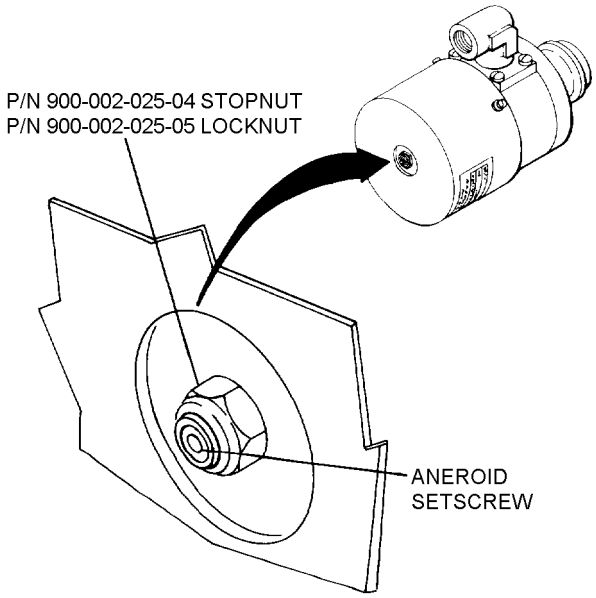


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Figure 5-10. Miniature Regulator, Model 900-002-025-05, Aneroid Adjustment

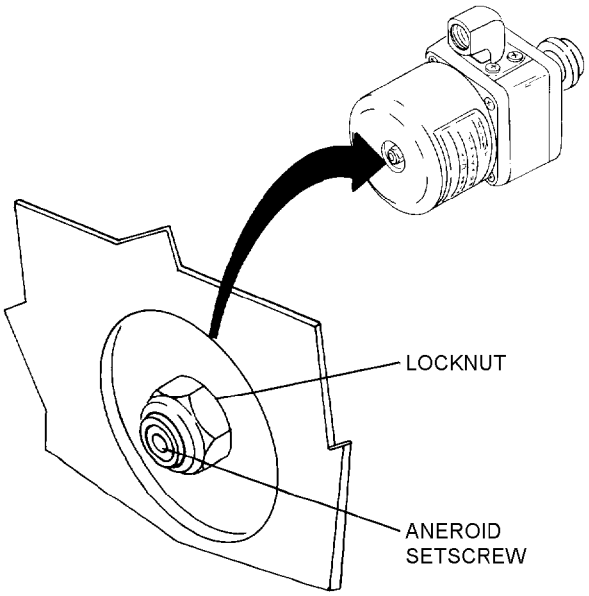

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Figure 5-11. Miniature Regulator, Model 900-002-025-07, Aneroid Adjustment

3. Shut off oxygen source and disconnect regulator.

WARNING

Collateral duty inspectors shall make the following entry, on the appropriate form in accordance with OPNAVINST 4790.2 Series, in the local use section using red ink. WARNING: CRU-79/P, Model 900-002-025-07, (CAGE 27045) cannot be used in aircraft that have been serviced with EONS produced oxygen. Organizational Level Aircrew Life Support Equipment Division personnel shall ensure aircrew members are advised of this prior to issuing them the CRU-79/P, Model 900-002-025-07 Type Oxygen Regulator. The CRU-79/P, Model 900-002-025-07 pressure breathing schedules cannot be adjusted.

When affixing serviceable condition label to regulator, do not block pressure breathing aneroid vent holes.

NOTE

All equipment forwarded from the organizational level maintenance to the intermediate level shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the bench test and/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

4. After completion of oxygen purge, place regulator in a plastic bag for storage.

CHAPTER 6

AIRCRAFT PANEL MOUNTED OXYGEN REGULATORS

TYPE MD-1, MD-2, CRU-52/A, CRU-54/A, CRU-55/A, CRU-57/A, AND CRU-72/A

Section 6-1. Description

6-1. GENERAL.

6-2. Aircraft Panel Mounted Oxygen Regulators, Type MD-1 (P/N 14950-7B), CRU-52/A (P/N 14950-26A), CRU-54/A (P/N 14950-27A), CRU-55/A (P/N 14950-28A) (figure 6-1), and CRU-57/A (P/N 14950-30A), Type MD-2 (P/N 14800-8B), CRU-72/A (P/N 14800-8C) (figure 6-2) are manufactured by Carleton Technology Inc, formerly Aro Corporation (CAGE 03990). They are designed to regulate breathing oxygen supplied to the aircrewmember during flight. Table 6-1 contains leading particulars for the regulators.

6-3. All controls and indicators necessary for indication of performance and operation of the regulator are located on an illuminated panel with the regulating components attached to the mounting plate and controls assembly.

NOTE

The equipment is identified by type, part number and description. Type designation only will be used as reference in this chapter.

6-4. The regulators are panel-mounted, automatic positive pressure diluter demand type regulators and are used in conjunction with a pressure breathing type oxygen mask. The regulators provide 100 percent oxygen, or an air/oxygen mixture at the correct ratio depending on altitude, to the user on demand. The regulators incorporate an emergency pressure control lever. During normal operation, the lever is set in the NORMAL position. A TEST MASK position is provided to test the oxygen supply function of the regulators at low altitudes, and at ground level. When in the EMERGENCY position the regulators deliver 100 percent oxygen to the user at a positive pressure. The EMERGENCY position is used when inadequate oxygen supply is suspected.

6-5. CONFIGURATION.

6-6. The regulators are supplied in two basic configurations: low pressure (50 to 500 psig operating pressure range), and high pressure (50 to 2000 psig operating range). Refer to table 6-1 for applicable models and part numbers.

6-7. FUNCTION.

6-8. Characteristics and performance for which the regulators are designed are described below. Letters in parentheses relate to letters circled in figure 6-3.

1. The following steps outline the functions of the Aircraft Panel Mounted Oxygen Regulators, utilize figure 6-3 to follow the path of flow. With the emergency pressure control lever (Q) in the normal position, manual dilution control lever (N) in the normal oxygen position, and inlet supply lever (B) in the off position. Supply oxygen enters through oxygen inlet (A) and is filtered and passes into the manifold inlet assembly, and will indicate on the oxygen supply pressure gage.

Table 6-1. Leading Particulars

MD-1	14950-7B	50 to 500 psig
CRU-52/A	149500-26A	50 to 500 psig
CRU-54/A	149500-27A	50 to 500 psig
CRU-55/A	149500-28A	50 to 500 psig
CRU-57/A	149500-30A	50 to 500 psig
MD-2	14800-8B	50 to 2000 psig
CRU-72/A	14800-8C	50 to 2000 psig

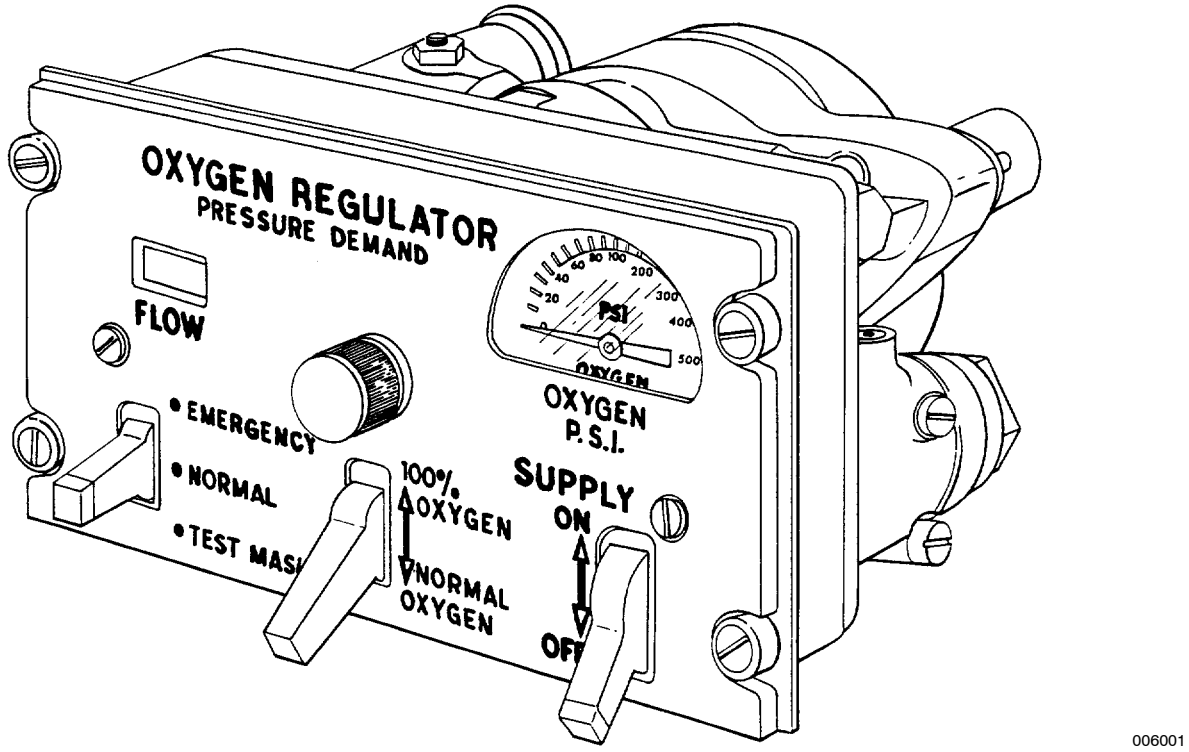
Voltage	28Vdc
Mounting	Panel
Operating Altitude Range:	
Normal Breathing	Up to 30,000 ft
Pressure Breathing Starts	At 30,000 ft
Air-Oxygen Mixture	Up to 32,000 ft
100% Oxygen Delivery Starts	At 32,000 ft
Visual Indicators	Pressure Gage and Flow Indicator on Front Panel
Regulator Controls:	
Diluter Lever	Selects NORMAL or 100% OXYGEN
Supply Lever	Opens and closes oxygen supply
Emergency Lever	For emergency, and ground test of mask
Overall Dimensions:	
Length	47/32 in
Width	5 3/4 in
Height	3 in
Weight	2.85 lb

2. Placing the inlet supply lever (B) in the ON position will allow oxygen to flow into the first stage reduction changer (C). The first-stage reduction chamber (C) is set to reduce the supply oxygen pressure to 32-35 psi. This is accomplished when inlet pressure compresses a bellows which in turn, by means of linkage, will cause an element to move to the inlet and manifold assembly and seat; stopping the flow of oxygen to (C) Chamber (C) is provided with a first-stage relief valve assembly (D): set to relieve at 55-60 psi. This safety feature is to protect the regulator from over pressures. With the regulator in a static flow condition, once oxygen enters chamber (C), it will also be present at the first-stage relief-valve (D) demand valve (E), and the safety pressure, pressure breather valve (V).

3. Demand valve assembly (E) is opened when there is a pressure differential across the inter demand diaphragm (W) which forces demand valve level (G) up. This pressure differential exists during the inhalation cycle by creating a reduction in pressure at outlet (H). The reduction in pressure at outlet (H) is sensed in the demand diaphragm chamber (J) through sensing port (K).

4. During periods of inhalation, the oxygen flow passes from the demand valve assembly (E) through a line at (L) to actuate the blinker assembly by passing through a sensing line indicated by this symbol ◓. At the same time, the oxygen passes through the Venturi assembly (L). The flow of oxygen mixes after it leaves (L) with ambient air, which enters the regulator through inlet port (M) because of the Venturi action creating a high velocity jet stream. The ambient air added to oxygen is controlled by manual diluter control lever (N), and by the diluter aneroid assembly (O), which automatically produces a 100 percent oxygen concentration at altitudes above 32,000 feet, because the diluter aneroid assembly (O) has expanded and seated stopping the flow of ambient air into the regulator.

5. Upon exhalation, a pressure build-up is sensed back through outlet (H), sensing port (K), and (J), which



006001

Figure 6-1. Aircraft Panel Mounted Oxygen Regulator, Type MD-1, CRU-52/A, CRU-54/A, CRU-55/A, and CRU-57/A

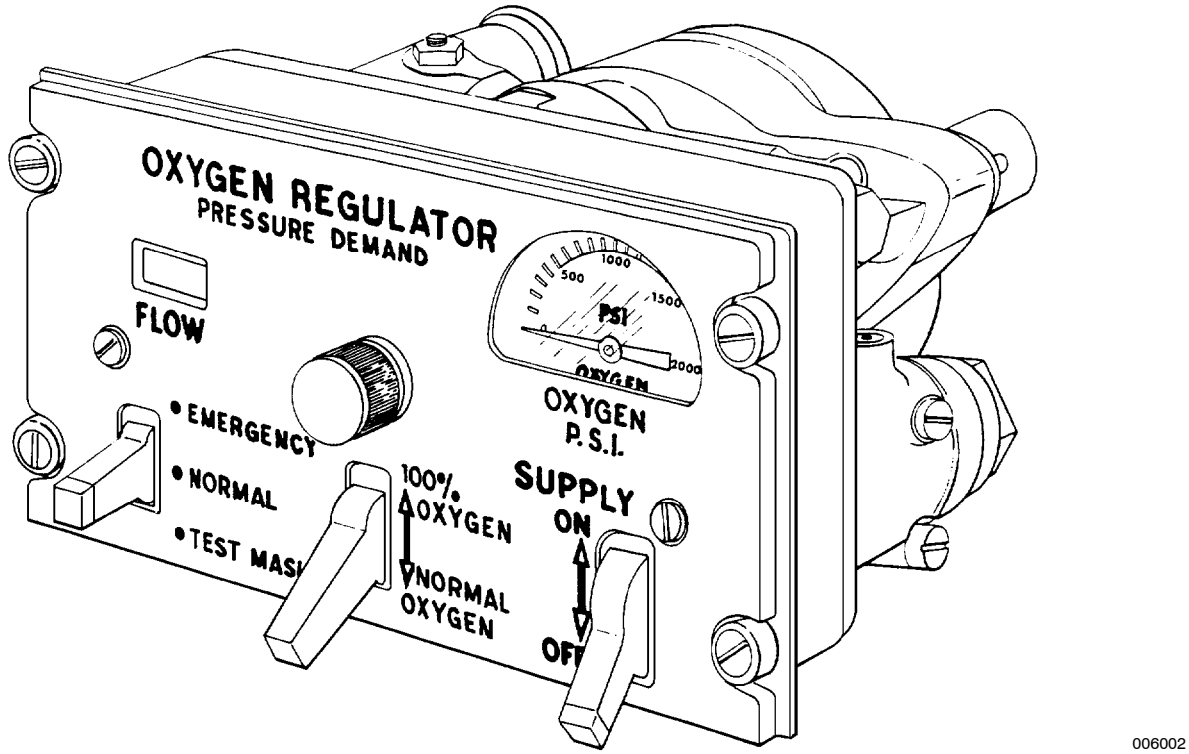


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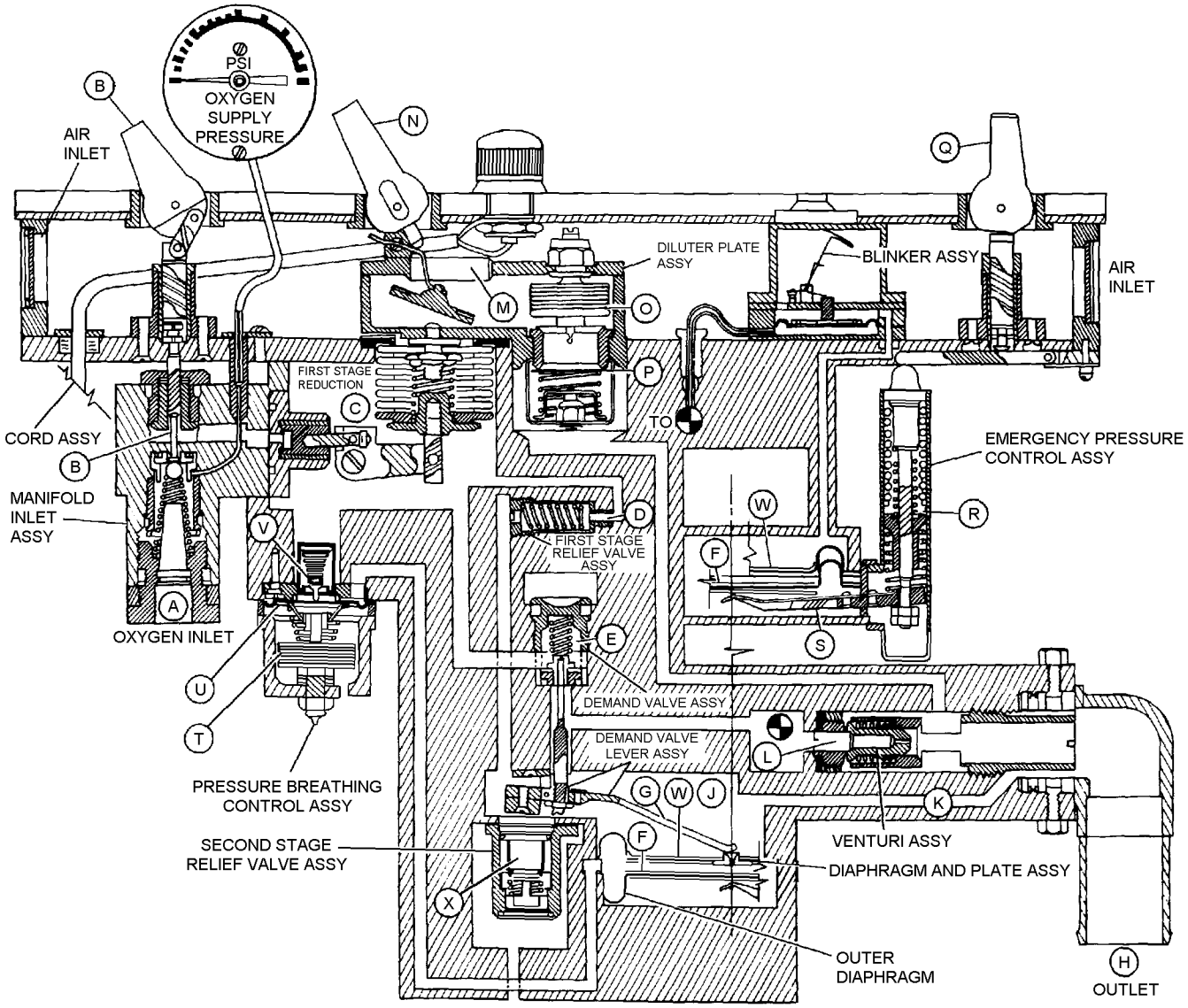
Figure 6-2. Aircraft Panel Mounted Oxygen Regulator, Type MD-2, CRU-72/A



006003

Figure 6-3. Regulator Operation

will move inter diaphragm (W) away from demand valve lever (G) allowing demand valve (E) to seat. This pressure build-up will also close the blinker assembly. The aneroid check valve assembly (P) prevents the flow of oxygen out through inlet port (M).

6. Emergency pressure control lever (Q) applies force to emergency pressure control test spring (R), which mechanically loads the outer diaphragm (F) through control lever and center assembly (S). Mechanical loading of outer diaphragm (F) provides positive pressure at the regulator outlet (H). (2 to 4 inH_2O emergency position and 6 to 16 inH_2O in the test mask position).

7. Automatic safety pressure and pressure breathing at altitudes above 30,000 feet is provided through pneumatic actuation of aneroid assembly (T). This function begins at approximately 27,000 feet altitude. The force exerted on diaphragm assembly (U) by aneroid assembly (T) actuates the pressure breather valve assembly (V) allowing oxygen to flow to diaphragm and plate assembly (W). Diaphragm and plate assembly (W) is pressure loaded by this volume of oxygen in proportion to altitude actuating the demand valve lever assembly (G) to the extent that the positive pressure is built up at outlet (H) as the altitude is increased.

8. Additional safety is obtained through the inclusion of the second state relief valve assembly (X) in the regulator. It will vent 45 lpm at 40.7 inH_2O.

NOTE

When the manual diluter control lever is in the 100 percent position, the flow of oxygen is identical to normal flow, except that there will be no dilution of oxygen with ambient air.

6-9. SERVICE LIFE.

6-10. Oxygen regulators shall remain in service for as long as they function correctly and do not require excessive repair (exceeds 75% of original cost of regulator). All affected silicone rubber parts shall be replaced whenever a regulator is disassembled for repair.

6-11. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

6-12. Section 6-5, Illustrated Parts Breakdown, contains information on each assembly, subassembly, and component part of the regulators. The figure and index number, reference or part number, description, and units per assembly are provided with the breakdown.

Section 6-2. Modifications

6-13. GENERAL.

6-14. There are no authorized modifications to the oxygen regulators at this time.

Section 6-3. Performance Test Sheet Preparation

6-15. GENERAL.

6-16. Preparation of Oxygen Regulator Performance Test Sheets require that, through the use of various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

6-17. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flows must be converted to inches of water pressure (inH_2O), the form of measurement which can be read on the test stand manometers.

NOTE

The various graphs supplied with each Oxygen System Components Test Stand, Model 1172AS100 and 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

6-18. The information provided in the tables in this section is to be recorded on the Performance Test Sheet (figure 6-4).

6-19. The Performance Test Sheet (figure 6-4) is a sample only, but may be reproduced for local use.

6-20. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Second Stage Relief Valve Test.
2. Flow Suction Test.
3. Oxygen Ratio Test.
4. Safety Pressure/Pressure Breathing Test.
5. Blinker (Flow Indicator) Test.
6. Emergency Pressure Test.

6-21. REGULATOR PERFORMANCE TESTS.

6-22. SECOND STAGE RELIEF VALVE TEST. The second stage relief valve shall vent at least 45 lpm at a specified pressure. The actual 45 lpm flow must be converted to an indicated inH_2O flow by using the nitrogen (N_2) line of the Vent Flow Graph. Convert the actual flow as follows:

1. Locate the 45 lpm line on the bottom of the Vent Flow Graph, and trace the line up to where it intersects the N_2 line.

2. Trace the line on the graph where the lpm and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this information in the appropriate block on the Performance Test Sheet.

6-23. FLOW SUCTION TEST. The Flow Suction Test shall be performed at sea level with the diluter control lever in both the 100% OXYGEN and NORMAL OXYGEN position. Actual (lpm) flows are converted to indicated (inH_2O) flows by using the Sea Level Output Graph. The air line is used for NORMAL OXYGEN flows, and the N_2 line is used for 100% OXYGEN flows. Convert the actual flows as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired lpm line (figure 6-4) at the bottom of the Sea Level Output Graph.

2. Trace selected lpm line up to where it intersects the air line (NORMAL indicated output) or N_2 line (100% indicated output).

3. Trace the line from point of intersection across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 6-4.

6-24. OXYGEN RATIO TEST. Actual flows and oxygen percentages (figure 6-4) used for the Oxygen Ratio Test must be converted to indicated flows and oxygen averages. All actual flows must be converted to indicated flows. The results of these computations shall be entered in the appropriate columns within the Oxygen Ratio Test portion of the Performance Test Sheet. To find average oxygen, indicated output, corrected indicated output, actual and indicated input flows, refer to paragraphs 6-25 through 6-31.

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

6-25. Average Oxygen. These figures are provided, but are computed as follows. Average oxygen is found by adding the minimum and maximum oxygen percentages (figure 6-4) then dividing the sum by 2 (e.g., 6% + 45% = 51% ÷ 2 = 25.5%).

1. Enter the resulting figure, 25.5% in the appropriate block on the Performance Test Sheet.

2. Repeat this procedure for all minimum and maximum oxygen percentages given in figure 6-4.

REGULATOR PERFORMANCE TEST SHEET

ARO TYPES
MD-1, MD-2, CRU-52/A, CRU-54/A,
CRU-55/A, CRU-57/A, AND CRU-72/A

DATE _____ TYPE _____ SERIAL NO. _____

TEST STAND SERIAL NO. _____ TESTED BY _____ CDI _____

1. INWARD LEAKAGE TEST _____ 2. OUTLET LEAKAGE TEST _____
3. OXYGEN SUPPLY VALVE LEAKAGE TEST _____ 4. OVERALL LEAKAGE TEST _____
5. PRESSURE GAGE TEST: NOTE: TESTED AT AMBIENT TEMPERATURE OF 70°F.

LOW PRESSURE REGULATOR ONLY

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
50	±10		
100	±25		
500	±25		

HIGH PRESSURE REGULATORS ONLY

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
500	±50		
1000	±50		
1500	±50		

6. OUTWARD LEAKAGE TEST _____
7. RELIEF VALVE TEST
   a. VENTS 45 LPM _____ AT 40.7 inH_2O (3 INHg)
   b. LEAKAGE AT 17 INH_2O _____
8. FLOW SUCTION TEST

ALTITUDE	INLET PRESSURE (PSIG)	ACTUAL OUTPUT (LPM)	NORMAL		100 PERCENT		MAXIMUM SUCTION (INH_2O)
			INDICATED OUTPUT	READING	INDICATED OUTPUT	READING	
SEA LEVEL	50	30					-0.50
SEA LEVEL	150	50					-0.70
SEA LEVEL	150	85					-1.0

9. OXYGEN RATIO TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
   (INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OXYGEN PERCENT		OUTPUT				INPUT				
	MIN	MAX	AVERAGE PERCENT	ACTUAL OUTPUT (LPM)	INDICATED OUTPUT (INH_2O)	CORRECTED INDICATED OUTPUT	ACT HI	ACT LOW	IND HI	IND LOW	READING
10	6	45	25.5	15			14.1	8.25			
10	6	60	33	85			79.9	34			
20	24	55	39.5	15			11.4	6.75			
20	24	80	52	85			64.6	17			
28	60	100	80	15			6	0		0	
28	60	100	80	85			34	0		0	
32	98	100	99	85			1.7	0		0	

10. ANEROID AIR VALVE CLOSURE TEST (28,000 TO 32,000 FEET) PERFORMED ONLY IF REGULATOR FAILS OXYGEN RATIO TEST _____

Figure 6-4. Performance Test Sheet (Sheet 1 of 2)

11. SAFETY PRESSURE/PRESSURE BREATHING TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
(INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OUTPUT		PRESSURE (INH_2O)		
	ACTUAL (LPM)	INDICATED (INH_2O)	MINIMUM	READING	MAXIMUM
30	0	0	0.01		2.50
30	85		0.01		2.50
40	0	0	0.30		5.60
40	85		0.30		5.60
43	0	0	5.30		12.50
43	85		5.30		12.50
50	0	0	11.20		18.20
50	85		11.20		18.20

12. BLINKER (FLOW INDICATOR) TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
(INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

ALTITUDE/ PRESSURE	DILUTER LEVER	OUTPUT		READING	BLINKER POSITION
		ACTUAL	INDICATED		
SEA LEVEL	NORMAL	20			FULLY OPEN
SEA LEVEL	100%	8			FULLY OPEN
17 INH_2O	100%	12			FULLY OPEN
17 INH_2O	100%	0	0		CLOSE IMMED

13. EMERGENCY PRESSURE TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
(INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

OUTPUT		DILUTER LEVER	EMERGENCY LEVER	PRESSURE READING	TOLERANCE (INH_2O)
ACTUAL	INDICATED				
10 LPM		NORMAL	EMERGENCY		2.0 TO 4.0
80 LPM		100%	EMERGENCY		1.0 MIN.
10 LPM		100%	TEST MASK		6.0 TO 16.0

Notes: WITH ZERO FLOW, OUTLET PRESSURE SHALL NOT EXCEED 17.5 INH_2O WITH EMERGENCY PRESSURE CONTROL LEVER IN TEST MASK POSITION. WITH EMERGENCY PRESSURE CONTROL LEVER IN EMERGENCY POSITION, OUTLET PRESSURE SHALL NOT EXCEED 5.5 INH_2O.

14. REGULATOR OXYGEN PURGE: APPLY 500 PSIG TO LOW PRESSURE REGULATORS AND 500 PSIG TO HIGH PRESSURE REGULATORS, AVIATORS BREATHING OXYGEN AND FLOW 1 TO 3 MINUTES.

Figure 6-4. Performance Test Sheet (Sheet 2 of 2)

6-26. Indicated Output. To convert actual output flows (lpm) given in figure 6-4 to indicated output flows (inH_2O), proceed as follows:

1. Locate the desired actual output at the bottom of the Output Graph (figure 6-4).

2. Trace the selected line up to the point of intersection with the appropriate altitude air line.

3. Trace the line on the graph from where the desired lpm and altitude air lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in appropriate block on Performance Test Sheet.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Output Graph (e.g., 30,000-foot Output Graph or 35,000-foot Output Graph).

5. Repeat steps 1 through 4 for all actual output flows given in figure 6-4.

6-27. Corrected Indicated Output. Corrected indicated output is indicated output with the required percentage of nitrogen added. To find corrected indicated output, proceed as follows:

NOTE

Use Oxygen/Air/Nitrogen Conversion Graph provided in NAVAIR 17-15BC-21 Technical Manual.

1. Locate the indicated output (inH_2O) at the bottom of the N_2 Conversion Graph.

2. Find the average oxygen percentage on the Performance Test Sheet corresponding to the selected indicated output.

NOTE

Select percentage line on N_2 Conversion Graph nearest to average oxygen figure selected from Average Oxygen column on Performance Test Sheet.

3. Follow the indicated output line selected on the N_2 Conversion Graph up to the appropriate N_2 percentage line.

4. Trace the line on the graph where the selected indicated output and N_2 percentage lines intersect across the left hand column to determine inH_2O.

5. Enter this figure in the appropriate block on the Performance Test Sheet.

6. Repeat steps 1 through 5 for all required indicated output flows.

6-28. Actual High Air. These figures are provided, but are computed as follows. Find the actual high air by subtracting the minimum oxygen percentage (figure 6-4) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 6% = 94% x 15 lpm = 14.10 lpm).

1. Enter 14.10 lpm in the actual high air column on the Performance Test Sheet.

2. Repeat the procedure for all minimum oxygen percentages given in figure 6-4.

6-29. Actual Low Air. These figures are provided, but are computed as follows. Find the actual low air by subtracting the maximum oxygen percentage (figure 6-4) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 45% = 55% x 15 lpm = 8.25 lpm).

1. Enter 8.25 lpm in the actual low air column on the Performance Test Sheet.

2. Repeat the procedure for all maximum oxygen percentages given in figure 6-4.

6-30. Indicated High Air (Input). To convert actual high air to indicated high air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Input Graph (e.g., 30,000-foot Input Graph or 35,000-foot Input Graph).

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all actual high air figures previously entered on Performance Test Sheet.

6-31. Indicated Low Air (Input). To convert actual low air to indicated low air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all actual low air figures previously entered on Performance Test Sheet.

6-32. SAFETY PRESSURE AND PRESSURE BREATHING TEST. Actual output flows (lpm) given in the Safety Pressure and Pressure Breathing Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired actual output (figure 6-4) at the bottom of the test stand Output Graph.

2. Trace the selected line up to where it intersects the N_2 line, then across the graph to the left hand column to determine inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 43,000 feet are converted using the 45,000 foot N_2 line on the Output Graph, or the 45,000-foot Output Graph.

4. Repeat steps 1 through 4 for all actual flows given in Safety Pressure/Pressure Breathing Test section of figure 6-4.

6-33. BLINKER (FLOW INDICATOR) TEST. Actual flows (lpm) for the Blinker Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows, refer to paragraphs 6-34 through 6-36.

6-34. Diluter Lever Normal Oxygen Position. Use the air line of the Sea Level Output Graph.

1. Locate the actual output (figure 6-4) at the bottom of the graph and trace the selected line up to the air line.

2. Trace the line from where the actual output and air lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

6-35. Diluter Lever 100 Percent Oxygen Position (Sea Level). Use the N_2 line on the Sea Level Output Graph.

1. Locate actual output (lpm) (figure 6-4) at the bottom of the graph and trace the selected line up to the N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

6-36. DILUTER LEVER 100 PERCENT OXYGEN POSITION (17 inH_2O). Use the 50,000 foot N_2 line on the Output Graph.

1. Locate actual output (lpm) (figure 6-4) at the bottom of the Output Graph (or 50,000-foot Output Graph) and follow selected line up to the 50,000 foot N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

6-37. EMERGENCY PRESSURE TEST. Actual output flows (lpm) specified for the Emergency Pressure Test section of the Performance Test Sheet. Actual flows must be converted to indicated flows (inH_2O). To convert the flows, refer to paragraphs 6-38 and 6-39.

6-38. Diluter Lever Normal Oxygen Position. Use air line of Sea Level Output Graph.

1. Locate actual output (lpm) (figure 6-4) at bottom of Sea Level Output Graph and trace selected line up to air line.

2. Trace the line from where the actual output and air lines intersect across the graph to the left-hand column to determine indicated inH_2O.

3. Enter this figure in appropriate block on Performance Test Sheet.

6-39. Diluter Lever 100 Percent Oxygen Position. Use N_2 line of Sea Level Output Graph.

1. Locate actual output (lpm) (figure 6-4) at bottom of Sea Level Output Graph and trace selected line up to N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left-hand column to determine indicated inH_2O.

3. Enter this figure in appropriate block on Performance Test Sheet.

Section 6-4. Maintenance

6-40. GENERAL.

6-41. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly and adjusting of Aircraft Panel Mounted Oxygen Regulators.

NOTE

The regulator shall be considered beyond economical repair when the cost of repair parts exceeds approximately 75% of the cost of the regulator.

Upon completion of any maintenance action (e.g., inspection, repair, modification, etc.), be sure to make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

6-42. Procedural steps outlined in this section are listed under the aircraft inspection cycle in which they are required, and in the sequence in which they normally occur.

6-43. Bench Tests shall be performed on Aircraft Panel Mounted Oxygen Regulators prior to being placed in service, and during the Phase/Calendar or SDLM (Standard Depot Level Maintenance) Inspection cycle of the aircraft in which installed. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. The regulators shall also be subjected to a Bench Test if malfunction is suspected, and after repair or replacement of damaged parts. To ensure damage did not occur during extensive transportation and shipment (via commercial/U.S. Mail), all regulators shall be subjected to a Bench Test, when received from supply, prior to being placed in service.

6-44. Bench Tests shall be performed using Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to the appropriate Ground Support Equipment Manual for identification of test stand controls and indicators referred to in Bench Test.

6-45. Due to the complexity of the 1172AS100 and 1316AS100 test stand, it is essential that the operator become thoroughly familiar with the test stand prior to performing bench tests. Refer to appropriate ground support equipment manual.

6-46. INSPECTION.

6-47. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTIONS. The Turnaround/Preflight/Postflight/Transfer Inspections consist of a Visual Inspection performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. See table 6-2 for assistance in troubleshooting. To perform the inspection, visually inspect the following:

1. Electrical performance of panel light.

2. Legibility of all markings.

3. Plastic lighting plate for cracks and discoloration.

4. Low or improper reading on regulator pressure gage.

5. Emergency pressure control lever in NORMAL position.

6. Diluter control lever in 100% OXYGEN position.

7. Supply control lever in OFF position.

8. Regulator and surrounding area for freedom from dirt and hydrocarbons.

9. Delivery hose and connector for cuts, fraying, kinking, hydrocarbons and general condition.

6-48. If discrepancies are found or suspected, Maintenance Control shall be notified.

6-49. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by Ready For Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

6-50. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance/Special/Daily Inspections consist of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 6-2 for assistance in troubleshooting. To perform the inspection, proceed as follows:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

6-51. Visually inspect the regulators in accordance with paragraph 6-47.

6-52. FUNCTIONAL TEST. To perform Functional Test proceed as follows:

1. Place supply valve control lever in ON position.

2. Place diluter control lever in NORMAL OXYGEN position.

3. Connect oxygen hose to quick-disconnect, place mask to face and inhale. Proper regulator operation will be indicated by flow indicator assembly showing white during inhalation and black during exhalation.

NOTE

While at ground level, the regulator will not normally supply oxygen from the supply system to the mask. The emergency pressure control lever must therefore be used in order to check out the oxygen supply function of the regulator at low altitudes. The emergency lever is spring loaded at the NORMAL position, and will return to NORMAL when released.

4. Hold emergency pressure control lever in TEST MASK position and observe flow indicator. Flow indicator should be white, indicating a flow through regulator.

6-53. Upon completion of Functional Test, secure regulator as follows:

1. Disconnect mask from supply hose.

2. Ensure emergency pressure control lever returns to NORMAL position.

3. Place diluter control lever in 100% position.

4. Place supply valve control lever in OFF position.

6-54. If discrepancies are found or suspected, Maintenance Control shall be notified.

6-55. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by RFI regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

6-56. CALENDAR/PHASED/SDLM INSPECTIONS. Calendar, Phased or SDLM Inspections require removal of the regulators from the aircraft. See applicable Planned Maintenance System (PMS) publications for specified intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be subjected to a Visual Inspection and Bench Test.

Table 6-2. Troubleshooting (Daily, Preflight, Special, Turnaround, Transfer and Acceptance Inspections)

Trouble	Probable Cause	Remedy
Oxygen cylinder pressure gage fails to indicate proper pressure.	Defective gage.	Replace regulator.
	Blocked or leaking supply line.	Replace or clean supply line to regulator.
	Low cylinder pressure.	Refill.
	Defective manifold inlet assembly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and other than emergency setting on regulator.	Regulator controls improperly positioned.	Correct position of controls.
	Hose to mask is kinked.	Straighten hose and reposition outlet.
	Regulator not functioning properly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and regulator control set at EMERGENCY.	Kink or other malfunction between hose and mask.	Replace or readjust equipment as necessary.
	Faulty linkage from emergency pressure control lever.	Replace regulator.
Oxygen available at mask but flow is not indicated.	Defective blinker assembly.	Replace regulator.
Gage pressure drops when regulator is not in use.	Loose or leaking connections.	Tighten or replace connections as necessary.
	Defective manifold inlet assembly.	Replace regulator.
Panel light fails to light.	Burned out lamp.	Replace lamp.
	Faulty assembly.	Replace Regulator.
	Faulty electrical hookup to power source.	Repair electrical hookup.

6-57. Aircraft panel mounted regulators failing the bench test shall be repaired. SM&R codes define repairability of components and lowest level of maintenance authorized. Instructions can be found in the current issues of Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

6-58. Visual Inspection. To visually inspect the regulator proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Lint-free, White	MIL-C-85043 (CAGE 81349)

1. Inspect regulator inlet and outlet for foreign objects, dirt, corrosion, bends dents, cracks, damaged threads and any other obvious damage.

2. Ensure that regulator inlet filter is properly installed.

3. Inspect regulator body for bends, dents, cracks, corrosion, condition and legibility of name plate, security of screws and fittings and other obvious damage.

4. Inspect regulator for contamination in the form of a black/gray residue caused by wear/vibration as follows:

NOTE

It has been determined that this form of contamination poses no threat to the aircrewmembers health.

a. Disassemble the emergency pressure control and diaphragm assembly of the regulator in accordance with paragraph 6-96.

b. Using a clean lint free cloth swab area around the emergency pressure control lever and center assembly (68, figure 6-12) for traces of contamination.

c. Thoroughly inspect emergency pressure control lever and center assembly (9, figure 6-16) for wear at the attachment of the center assembly to the control lever.

d. Inspect the outer diaphragm (73, figure 6-12) and diaphragm and plate assembly (75, figure 6-12) for evidence of wear/contamination.

e. Inspect the demand valve lever assembly (76, figure 6-12) for wear.

f. If no wear/contamination is found, assemble the diaphragm and plate assembly in accordance with paragraph 6-117 and perform Bench Test.

g. If wear/contamination is found, proceed with steps 4h through 4k.

h. Disassemble regulator in accordance with paragraphs 6-77.

i. Clean the disassembled parts in accordance with NAVAIR 13-1-6.4-1.

j. Replace worn or defective parts and assemble regulator in accordance with paragraph 6-101 through 6-117.

k. Perform Bench Test on assembled regulator.

6-59. BENCH TEST.

6-60. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100, proceed as follows:

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type I, Class I, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig nitrogen cylinders. These cylinders cannot be certified contaminate free.

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

NOTE

Nitrogen supply cylinders utilized in testing oxygen components contain a maximum pressure of 1800 psig. For tests requiring pressures of 1800 psig, utilize highest available pressure, but in no case shall this pressure be less than 500 psig.

Tests are arranged so they proceed from one test to the next with a minimum of flow and altitude changes. Troubleshooting tables are provided following each test.

6-61. Unless otherwise specified in a specific test, the pressure applied, control lever settings, flows drawn, etc., shall be the same for the MD-1, MD-2, CRU-52/A, CRU-54/A, CRU-55/A, CRU-57/A, and CRU-72/A regulators.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

6-62. INWARD LEAKAGE TEST (TEST STAND MODEL 1172AS100 ONLY). To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter	Fabricate IAW NAVAIR Dwg 1172AS136
1	Oxygen System Components Test Stand	1172AS100

1. Ensure test stand valves are closed, then open N_2 supply cylinder valve.

2. Place regulator supply control valve lever in the OFF position, and diluter control lever in the 100% OXYGEN position.

3. Ensure regulator emergency pressure control lever is in NORMAL position. Cap regulator inlet.

NOTE

Regulator shall be mounted on a horizontal plane in the test chamber.

4. Using adapter (NAVAIR Drawing No. 1172AS136), connect the regulator outlet to N_2 INPUT connection (18) in the altitude chamber.

5. Connect a line from LOW PRESS. connection (19) to REF. TAP (21) in altitude chamber. Plug rubber hose attached to piezometer (26) using piezometer plug supplied with the test stand.

WARNING

Ensure that no pressure is indicated on regulated HIGH PRESS. gage (10), regulated LOW PRESS. gage (11), and N_2 INPUT PRESS gage (27). Ensure LOW PRESS. REGULATOR (N) is not loaded. This will prevent N_2 supply cylinder pressure from passing on to INLET PRESS. ON/OFF valve (L), which could damage the test item, or cause injury to the test stand operator.

6. Turn INLET PRESS. ON/OFF valve (L) to the ON position.

CAUTION

Vacuum pump vent (54) must be opened one to two turns when operating vacuum pump. Refer to appropriate ground support equipment manual.

7. Turn vacuum pump on.

8. Turn PRESS. SELECTOR valve (D) to the H_2O position, and fully open LEAKAGE CONTROL valve (E).

9. Ensure LEAKAGE SELECTOR valve (F) is in HIGH RANGE position.

NOTE

Leakage rotameter (8) is calibrated with an applied pressure of 70 psig. The inward leakage test requires that a suction of 9.0 inH_2O be applied to the regulator outlet and the rotameter. This pressure difference (9.0 inH_2O vice 70 psig) creates a wide variance between actual leakage and indicated leakage. The maximum allowable leakage for the inward leakage test is 200 ccm. An actual leakage of 200 ccm will be displayed on HIGH RANGE LEAKAGE rotameter (8) as an indicated 740 ccm.

10. Slowly open OUTPUT valve (C) until 9 inH_2O suction is indicated on PRESS./SUCTION manometer

(4). Any leakage will be displayed on HIGH RANGE LEAKAGE rotameter (8). The maximum allowable indicated leakage is 740 ccm (actual 200 ccm). Record indicated leakage on the Performance Test Sheet.

11. Close OUTPUT valve (C) and LEAKAGE CONTROL valve (E). Turn vacuum pump OFF. Turn INLET PRESS. ON/OFF valve (L) to the OFF position.

12. Disconnect line from LOW PRESS. connection (19) and REF. TAP (21) in altitude chamber. Disconnect regulator outlet from N_2 INPUT connection (18). Remove plug from piezometer. Remove cap from regulator inlet and remove adapter (NAVAIR drawing no. 1172AS136) from regulator outlet.

13. If excessive leakage is indicated, locate probable cause, using troubleshooting chart, table 6-3.

6-63. INWARD LEAKAGE TEST (TEST STAND MODEL 1316AS100 ONLY). To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1316AS100

1. Ensure all test stand valves and regulators are properly secured and open N_2 supply cylinder.

2. Place oxygen regulator supply control valve lever in the OFF position and diluter control lever in the 100% OXYGEN position.

3. Ensure oxygen regulator emergency pressure control lever is in NORMAL position and cap the regulator inlet.

4. Connect a line from 20 TO 200 LEAKAGE connection (20) to REF TAP and connection (21) in altitude chamber.

5. Connect regulator outlet to piezometer (26).

6. Turn on vacuum pump.

7. Turn PRESSURE SELECTOR valve (D) to H_2O position.

8. Place OVERBOARD ON/OFF valve (T) to ON position.

9. Slowly open INWARD LEAKAGE REF valve (P) until 9 inH_2O suction is indicated on pressure suction manometer (4).

10. Observe OVERBOARD LEAKAGE rotameter (6), maximum allowable leakage is 200 ccm. Record reading on Performance Test Sheet.

11. Close INWARD LEAKAGE REF valve (P) and place OVERBOARD ON/OFF valve (T) in the OFF position.

12. Disconnect line from 20 TO 200 LEAKAGE connection (20) and REF TAP and connection (21).

13. Disconnect regulator outlet from piezometer (26) and remove cap from regulator inlet.

14. If excessive leakage is indicated, locate probable cause using troubleshooting table 6-3.

6-64. OUTLET LEAKAGE TEST. To perform Outlet Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

Table 6-3. Troubleshooting (Inward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 6-17.		
Diluter plate control housing and check valve assembly leaking.	Damaged diluter valve assembly (8).	Replace diluter valve assembly (8).
	Diluter housing gasket (14) leaking.	Tighten screws (2), or replace diluter housing gasket (14).
	Preformed packing (15) leaking.	Replace preformed packing (15).
	Diluter plate and seat assembly (13) damaged.	Replace diluter plate and seat assembly (13).
	Manual diluter valve lever (10) bent or binding.	Replace manual diluter valve lever (10).
Diluter valve control lever leaking.	Diluter valve control lever (12, figure 6-13) not adjusted properly.	Adjust diluter valve control lever (refer to paragraph 6-116).
Leakage from regulator outlet.	Preformed packing (128, figure 6-12) leaking.	Replace preformed packing (128, figure 6-12).
	Loose screws (126, 127, figure 6-12).	Tighten screws (126, 127, figure 6-12).
Leakage at relief valve.	Leakage past relief valve (8, figure 6-15), or relief valve seat (5) excessive.	Replace relief valve (8, figure 6-15) and seat (5).
Notes: Probable causes in table 6-9, Troubleshooting (Outward Leakage Test) could also cause excessive inward leakage.		

1. Place regulator supply valve control lever in ON position.

2. Ensure diluter control lever is in 100% OXYGEN position.

3. Ensure emergency pressure control lever is in NORMAL position.

NOTE

Regulator shall be mounted on a horizontal plane in the test chamber.

4. Connect regulator inlet to N_2 INPUT connection (18) in altitude chamber.

5. Using LOW PRESS. REGULATOR (N), apply 150 psig to the regulator inlet.

6. Slowly turn INLET PRESS. ON/OFF valve (L) to ON.

7. Activate emergency pressure control lever to allow a flow through the regulator. Return lever to NORMAL position.

8. Draw a film of leak detection compound across the regulator outlet. Film shall not advance more than 1/2 inch in 10 seconds. If film advance is more than allowable, repeat test three or four times. (Distension could be caused by difference in temperature between inside and outside of regulator.)

9. If film advance continues to be more than allowed, locate probable cause using troubleshooting chart, table 6-4.

10. Relieve pressure to regulator by backing out on LOW PRESS. REGULATOR (N).

Table 6-4. Troubleshooting (Outlet Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 6-12.		
Demand valve assembly leaking.	Damaged demand valve seat (108).	Replace seat (108).
	Damaged demand valve assembly (107).	Replace assembly (107).
	Damaged preformed packings (105) or (109).	Replace packing (105) or (109).
Emergency pressure control assembly loading.	Emergency pressure lever stem out of adjustment (4, figure 6-16).	Readjust elastic nut (5, figure 6-16) so that emergency pressure control assembly is not loading diaphragm.
Pressure breathing aneroid assembly.	Expanded aneroid (43).	Replace aneroid (43).
	Improperly adjusted aneroid.	Add or delete shims (44).
First stage reduction pressure.	Pressure too high.	Adjust to 32 to 35 psig (paragraph 6-115).
First stage regulator valve and lever assembly (92).	First stage regulator valve and lever assembly (92) out of adjustment.	Readjust until approx. 2 or 3 threads show (paragraph 6-115).
First stage relief valve.	Damaged relief valve seat (121).	Replace seat (121).
	Pressure too low.	Adjust to 55 to 60 psig (paragraph 6-116).
	Weak relief valve spring (119).	Replace spring (119).
	Damaged preformed packing (122).	Replace packing (122).

6-65. OXYGEN SUPPLY VALVE LEAKAGE TEST. To perform the Oxygen Supply Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Place regulator oxygen supply valve lever in OFF position.

2. Place emergency pressure control lever in EMERGENCY position. Close altitude chamber door.

3. Turn INLET PRESS. ON/OFF valve (L) to on.

4. Using HIGH PRESS. REGULATOR (Q), apply pressure specified in table 6-5 to regulator inlet.

5. Draw a film of leak detection compound across regulator outlet fitting.

Table 6-5. Inlet Pressure (Oxygen Supply Valve Leakage Test)

TYPE	INLET PRESSURE (PSIG)
MD-1	500
MD-2	1800
CRU-52/A	500
CRU-54/A	500
CRU-55/A	500
CRU-57/A	500
CRU-72/A	1800

6. There is no allowable leakage. If leakage is noted, locate probable cause using troubleshooting chart, table 6-6.

7. Place emergency control lever in NORMAL position.

6-66. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

Perform this test with diluter lever in 100% OXYGEN position, and then in the NORMAL OXYGEN position.

1. Place regulator oxygen supply valve lever in ON position, and emergency pressure control lever in NORMAL position.

2. Using test stand HIGH PRESS. REGULATOR (Q), apply pressure specified in table 6-7 to regulator inlet.

3. Turn INLET PRESS. ON/OFF valve (L) to OFF. Leave regulator oxygen supply valve lever in ON position.

4. Leakage will be indicated on the regulator pressure gage. Allowable leakage shall not exceed 60 psig over a 2-minute period.

Table 6-6. Troubleshooting (Oxygen Supply Valve Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 6-18.		
Loading of manifold inlet assembly.	Supply valve control stem (7, figure 6-13) out of adjustment.	Readjust supply valve control stem (7).
Leaking manifold inlet assembly.	Damaged ball (8).	Replace ball (8).
	Damaged supply valve seat (10).	Replace seat (10).
	Damaged supply valve seat retainer (9).	Replace retainer (9).
	Damaged preformed packings (4, 11, 14, 15, 20).	Replace damaged packing(s).

5. If allowable leakage is exceeded, locate probable cause using troubleshooting chart (table 6-8).

6. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed regulator by placing emergency pressure control lever in EMERGENCY position. Return lever to NORMAL.

8. Bleed test stand using SYSTEM BLEED valve (S).

6-67. REGULATOR PRESSURE GAGE SCALE AND ERROR TEST. To perform the Regulator Pressure Gage Scale and Error Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

CAUTION

LOW PRESS REGULATOR (N) can only be used when applying pressures below gage guard setting (165 to 175 psig) to an item under test. For pressures above gage guard setting, HIGH PRESS. REGULATOR (Q) must be used.

2. Using LOW PRESS. REGULATOR (N), slowly increase pressure to each test pressure 100 psig and below specified in figure 6-4.

NOTE

Regulator pressure gage readings must be recorded twice, once before and once after tapping regulator pressure gage.

3. Check tolerance by comparing regulator pressure gage reading with test stand INPUT PRESS. gage (27).

Table 6-7. Inlet Pressure (Overall Leakage Test)

TYPE	INLET PRESSURE (PSIG)
MD-1	500
MD-2	1800
CRU-52/A	500
CRU-54/A	500
CRU-55/A	500
CRU-57/A	500
CRU-72/A	1800

Table 6-8. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 6-12.		
Manifold inlet assembly leaking.	Loose manifold inlet adapter (3, figure 6-18).	Tighten or replace manifold inlet adapter (3).
	Damaged preformed packings (4, 11, 14, 15 or 20, figure 6-18).	Replace damaged packing(s).
	Loose manifold inlet assembly screws (98).	Tighten screws (98).
Pressure gage leaking.	Oxygen cylinder pressure gage assembly (33).	Replace pressure gage (33).
	Damaged preformed packing (36).	Replace packing (36).
	Loose screws (28).	Tighten screws (28).
First stage reduction chamber leaking.	Loose screws (90) on first stage cover plate (89).	Tighten screws (90).
	Damaged first stage gasket (91).	Replace gasket (91).
	Damaged first stage bellows gasket (96).	Replace gasket (96).
Pressure breather assembly leaking.	Loose screws (54).	Tighten screws (54).
	Damaged preformed packing (57).	Replace packing (57).
	Damaged pressure breather valve assembly (51).	Replace assembly (51).
Emergency pressure control assembly loading.	Emergency pressure control lever and center assembly (9, figure 6-16) loading diaphragrn and plate assembly (75).	Adjust emergency pressure control stem by tightening or loosening elastic nut (5, figure 6-16).
	Wrong size emergency pressure spring guide (12, figure 6-16).	Replace with shorter guide (12, figure 6-16).

4. Back out on LOW PRESS. REGULATOR (N).

5. Continue test for 500 psig pressure using HIGH PRESS. REGULATOR (Q).

6. Turn INLET PRESS. ON/OFF valve (L) off. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed test stand using SYSTEM BLEED valve (S). Bleed regulator using emergency pressure control lever.

6-68. OUTWARD LEAKAGE TEST. Perform the Outward Leakage Test as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

During this test the relief valve shall not be covered. The allowable leakage through this valve at 17.0 inH_2O is included in the maximum allowable leakage, 0.12 lpm (120 ccm).

1. Place regulator supply valve control lever in OFF position, and diluter control lever in NORMAL OXYGEN position.

2. Connect regulator outlet to piezometer (26) in altitude chamber.

3. Connect a line from LOW PRESS. connection (19) to REF. TAP (21) in chamber.

4. Ensure test stand INLET PRESS. ON/OFF valve (L) to the OFF position.

5. Adjust LOW PRESS. REGULATOR (N) until 70 psig is indicated on REGULATED LOW PRESS. gage (11).

6. Turn PRESS. SELECTOR valve (D) to H_2O position, and slowly open LEAKAGE CONTROL valve (E) until 17.0 inH_2O is indicated on PRESS./SUCTION manometer (4).

NOTE

Maintain 17.0 inH_2O with LEAKAGE CONTROL valve (E) throughout test.

7. If no leakage is indicated on HIGH RANGE LEAKAGE rotameter (8), turn LEAKAGE SELECTOR valve (F) to low range position, and check for indication of leakage on LOW RANGE LEAKAGE rotameter (7). Allowable leakage is 0.12 lpm (120 ccm).

8. Switch LEAKAGE SELECTOR valve (F) to HIGH position, and close LEAKAGE CONTROL valve (E).

9. Repeat steps 6, 7 and 8 with diluter control lever in 100% OXYGEN position.

10. If leakage is excessive, locate probable cause using troubleshooting chart, table 6-9.

6-69. SECOND STAGE RELIEF VALVE TEST. To perform the Second Stage Relief Valve Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Turn PRESS. SELECTOR valve (D) to Hg position, and place FLOW SELECTOR valve (M) in SUIT SIMULATOR position on.

2. Ensure diluter control lever is in 100% OXYGEN position.

3. Using VENT PRESS. valve (H), slowly apply 3 inches of mercury (inHg) to the regulator outlet. Regulator relief valve shall be venting at least 45 lpm as indicated on VENT FLOW manometer (3).

4. Close VENT PRESS. valve (H) and bleed pressure down to 0 inHg using VENT AMBIENT valve (I).

5. Turn FLOW SELECTOR valve (M) to REGULATOR position. Close valve (I).

6. Slowly move PRESS. SELECTOR valve (D) to H_2O position.

7. Turn LEAKAGE SELECTOR valve (F) to LOW position.

8. Open LEAKAGE CONTROL valve (E). Apply and maintain 17.0 inH_2O to regulator outlet. Maximum allowable leakage is 0.12 lpm (120 ccm).

Table 6-9. Troubleshooting (Outward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 6-17.		
Diluter plate control housing and check valve assembly leaking.	Damaged diluter plate control housing and check valve gasket (14) and preformed packings (15).	Replace gasket (14) and packing (15).
	Damaged air valve seat (23).	Replace diluter control housing (24).
	Damaged check valve disc (19).	Replace disc (19).
	Improperly adjusted diluter plate control housing and check valve assembly.	Adjust spring and screw adapter assembly (17).
	Loose screws (2).	Tighten screws (2).
Regulator outlet leaking.	Damaged preformed packings (128, figure 6-12).	Replace packings (128, figure 6-12).
	Damaged or loose outlet (124, figure 6-12).	Tighten, or replace outlet (124, figure 6-12).
Flow indicator leaking.	Damaged blinker diaphragm assembly (11, figure 6-14).	Replace blinker diaphragm assembly (11, figure 6-14).
	Damaged blinker tubing and base plate (12, figure 6-14).	Replace blinker tubing and base plate (12, figure 6-14).
	Loose screws (2, figure 6-14).	Tighten screws (2, figure 6-14).
Second stage relief valve leaking.	Out of adjustment.	Adjust spring retainer clockwise (3, figure 6-15).
	Weak second stage relief valve spring (4, figure 6-15).	Replace spring (4, figure 6-15).
	Loose housing screws (62, figure 6-12).	Tighten screws (62, figure 6-12).
	Damaged gasket (65, figure 6-12).	Replace gasket (65, figure 6-12).
	Damaged preformed packings (7, figure 6-15).	Replace packing (7, figure 6-15).
Outer diaphragm, diaphragm and plate assembly leaking.	Loose screws (71, figure 6-12).	Tighten screws (71, figure 6-12).
	Damaged outer diaphragm (73, figure 6-12).	Replace outer diaphragm (73, figure 6-12).
	Damaged diaphragm and plate assembly (75, figure 6-12).	Replace diaphragm and plate assembly (75, figure 6-12).

9. Close LEAKAGE CONTROL valve (E).

10. Back out on LOW PRESS. REGULATOR (N). Bleed pressure with SYSTEM BLEED valve (S).

11. Turn LEAKAGE SELECTOR valve (F) to HIGH RANGE position.

12. If excessive leakage is found, locate probable cause using troubleshooting chart (table 6-9). If relief valve does not vent, locate probable cause using troubleshooting chart, table 6-10.

6-70. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

1. Disconnect hose from LOW PRESS connection (19) and REF. TAP connection (21) in altitude chamber.

2. Turn vacuum pump ON.

3. Ensure PRESS. SELECTOR valve (D) is in the H_2O position.

4. Ensure regulator diluter control lever in 100% OXYGEN position.

5. Ensure INLET PRESS. ON/OFF valve (L) is ON.

6. Ensure regulator supply valve control lever in ON position.

7. Using LOW PRESS. REGULATOR (N), set the inlet pressure at each inlet pressure specified on Performance Test Sheet.

NOTE

Readings must be recorded with regulator diluter control lever in both NORMAL and 100% OXYGEN positions for each outlet flow specified on Performance Test Sheet.

8. Using OUTPUT valve (C), set flows specified in Performance Test Sheet on OUTPUT manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record readings on Performance Test Sheet. Back out on LOW PRESS. REGULATOR (N). Bleed pressure with SYSTEM BLEED valve (S).

NOTE

When drawing flows with output valve (C) ensure inlet pressure is maintained.

With no suction on regulator (OUTPUT valve (C) closed), maximum flow through regulator shall not exceed 0.01 lpm. This will cause a slight rise in PRESS./SUCTION manometer (4).

9. Close OUTPUT valve (C).

10. If regulator fails the Flow Suction Test, locate probable cause using troubleshooting chart, table 6-11.

6-71. OXYGEN RATIO TEST. To perform the Oxygen Ratio Test, proceed as follows:

1. Ensure regulator supply valve control lever is in ON position, and diluter control lever is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

Table 6-10. Troubleshooting (Second Stage Relief Valve Test)

Trouble	Probable Cause	Remedy
Second stage relief valve does not vent 45 lpm.	Out of adjustment.	Adjust spring retainer counterclockwise (3, figure 6-15).
	Second stage relief valve spring too strong (4, figure 6-15).	Replace spring (4, figure 6-15).
Second stage relief valve leaks excessively.	See table 6-9 for probable cause and remedy.	

CAUTION

Maintain 3.0 inH_20 on OUTPUT FLOW manometer (I) with OUTPUT valve (C) while ascending to altitude.

Slowly open VACUUM CONTROL valve (B) and observe PRESS./SUCTION manometer (4). If a rapid increase in pressure is indicated, close down on VACUUM CONTROL valve (B) until pressure stabilizes. This rapid increase of pressure shown on PRESS/SUCTION manometer (4) is caused by too fast a rate of climb in the altitude chamber.

3. Using VACUUM CONTROL valve (B) ascend to first test altitude shown on Performance Test Sheet.

4. Set output flows specified in Performance Test Sheet with OUTPUT valve (C) and stabilize altitude with INPUT valve (A).

5. Read INPUT manometer (2), and record readings on Performance Test Sheet.

6. Continue the test for each specified altitude and output flow shown on Performance Test Sheet.

7. Close OUTPUT valve (C) and INPUT valve (A). Descend to 27,000 feet using CHAMBER BLEED valve (K).

NOTE

If indicated input flows are not within limits, an Aneroid Closure Test must be performed.

8. If Oxygen Ratio Test was satisfactory, proceed to paragraph 6-73, Safety Pressure and Pressure Breathing Test.

6-72. ANEROID CLOSURE TEST. To perform the Aneroid Closure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

Table 6-11. Troubleshooting (Flow Suction Test)

Trouble	Probable Cause	Remedy
First stage reduction chamber out of adjustment.	Low first stage pressure.	Reset to 32 to 35 psig (paragraph 6-115 and 6-116, and figure 6-8).
Demand valve lever assembly.	Vane mounting pin (77, figure 6-12) sticking.	Replace mounting pin (77, figure 6-12).
	Strong demand valve lever spring (106, figure 6-12).	Replace demand valve lever spring (106, figure 6-12).
	Demand valve lever (76, figure 6-12) bent, or improperly adjusted.	Replace, or adjust (paragraph 6-116).
Manifold inlet assembly.	Clogged inlet filter (1, figure 6-18).	Replace inlet filter (1, figure 6-18).
Venturi assembly.	Strong injector spring (3, figure 6-19).	Replace injector spring (3, figure 6-19).

NOTE

Aneroid Closure Test is performed only if regulator fails Oxygen Ratio Test.

1. Descend to 25,000 feet using CHAMBER BLEED valve (K).

2. Ensure inlet pressure is set at 50 psig for low pressure regulators and 150 psig for high pressure regulators.

3. Set up a flow of 3.0 inH_2O on OUTPUT FLOW manometer with OUTPUT valve (C).

4. Aneroid shall close between 28,000 and 32,000 feet, as indicated by no further advance in altitude on LOW RANGE ALTM. indicator (13).

5. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

6. If regulator fails Aneroid Closure Test and/or Oxygen Ratio Test, locate probable cause using troubleshooting chart (table 6-12).

6-73. SAFETY PRESSURE AND PRESSURE BREATHING TEST. To perform the Safety Pressure and Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

NOTE

If chamber altitude is not at 30,000 feet, adjust altitude. Use VACUUM CONTROL valve (B) to increase altitude, or CHAMBER BLEED VALVE (K) to decrease altitude.

2. Using OUTPUT valve (C), draw flows of 0 and 85 lpm through the regulator. Delivery pressure must be within limits shown on Regulator Performance Test Sheet.

Table 6-12. Troubleshooting (Oxygen Ratio/Aneroid Closure Tests)

Trouble	Probable Cause	Remedy
Note: Index numbers in parentheses refer to figure 6-17.		
Incorrect air/oxygen ratios for flows 40 lpm or less.	Low air.	Turn screw in spring and screw adapter assembly (17) counterclockwise.
	High air.	Turn screw in spring and screw adapter assembly (17) clockwise.
Incorrect air/oxygen ration for flows above 40 lpm.	Low air.	Install shorter shouldering screw (4).
	High air.	Install longer shouldering screw (4).
Aneroid closes below 28,000 feet.	Aneroid assembly (7) out of adjustment.	Turn aneroid assembly (7) counterclockwise.
Aneroid closes above 32,000 feet.	Aneroid assembly (7) out of adjustment.	Turn aneroid assembly (7) clockwise.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

NOTE

Reading for 0 lpm must also be recorded at each test altitude.

3. Repeat step 2 for each altitude shown on Performance Test Sheet.

4. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

5. If Safety Pressure/Pressure Breathing flows are not within limits, locate probable cause using troubleshooting chart, table 6-13.

6-74. BLINKER ASSEMBLY TEST. To perform the Blinker Assembly Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure diluter control lever is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

3. Using OUTPUT valve (C), draw 20 lpm flow through regulator. Blinker must open fully.

4. Reduce output flow to 8 lpm flow and place diluter control lever in 100% OXYGEN position. Blinker must remain fully open.

5. Close OUTPUT valve (C). Blinker should close immediately.

6. Close altitude chamber door.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

7. Using VACUUM CONTROL valve (B), ascend in altitude until 17.0 inH_2O is indicated on PRESS./SUCTION manometer. (4).

8. Using OUTPUT valve (C), draw a 12 lpm flow through regulator. Blinker must open fully.

9. Close OUTPUT valve (C). Blinker should close immediately.

10. Descend to sea level using CHAMBER BLEED valve (K).

NOTE

See paragraph 6-109 and figure 6-7 for adjustment instructions.

11. Adjust (figure 6-7) or replace improperly functioning blinkers.

Table 6-13. Troubleshooting (Safety Pressure/Pressure Breathing Test)

Trouble	Probable Cause	Remedy
Note: Index numbers in parentheses refer to figure 6-12.		
Low safety pressure/pressure breathing 30,000 and 40,000 feet.	Damaged inner diaphragm (75).	Replace diaphragm (75).
	Diaphragm (75) blocking pressure breather port.	Install diaphragm (75) correctly.
	Aneroid shims (44) too thin.	Replace aneroid shims (44) with thicker ones.
	Spring (47) too weak.	Replace spring (47).
	Aneroid locknut (45) too short.	Replace aneroid locknut (45) with longer one.
	Pressure breather (valve (51) sticking or bent.	Replace pressure breather valve (51).
High safety pressure/pressure breathing 30,000 and 40,000 feet.	Aneroid shims (44) too thick.	Replace aneroid shims (44) with thinner ones.
	Aneroid screw (48) too thick.	Replace aneroid screw (48) with shorter one.
	Cocked aneroid (43).	Replace aneroid (43).
Low safety pressure/pressure breathing 43,000 and 50,000 feet.	Aneroid screw (48) too short.	Replace aneroid screw (48) with longer one.
High safety pressure/pressure breathing 43,000 and 50,000 feet.	Aneroid screw (48) too long.	Replace aneroid screw (48) with shorter one.
	Pressure breather valve (51) sticking in open position.	Replace pressure breather valve (51).

6-75. EMERGENCY PRESSURE TEST. To perform the Emergency Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure diluter control lever is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

3. Open OUTPUT valve (C) and draw a 10 lpm flow through the regulator.

4. Place emergency control lever in EMERGENCY position. Pressure indicated on PRESS./SUCTION manometer (4) shall read 2.0 to 4.0 inH_2O.

NOTE

Ensure inlet pressure is maintained when performing step 5.

5. Adjust OUTPUT valve (C) to draw 80 lpm through regulator.

6. Place diluter control lever in 100% OXYGEN position. Pressure at outlet of regulator, as indicated on PRESS./SUCTION manometer (4), shall be no less than 1.0 inH_2O.

7. Close OUTPUT valve (C). With zero flow, outlet pressure shall not exceed 5.5 inH_2O.

8. Adjust output to 10 lpm flow. Hold emergency pressure control lever in TEST MASK position. Output flow, as indicated on PRESS./SUCTION manometer (4), shall be 6.0 to 16.0 inH_2O.

9. Close OUTPUT valve (C). With zero flow, outlet pressure shall not exceed 17.5 inH_2O. Release emergency pressure control lever.

NOTE

Adjust emergency pressure control lever stem (17, figure 6-12) to obtain 2.0 to 4.0 inH_2O at 10 lpm first, then compensate for excessive pressure drop at 80 lpm flow with elastic stop nut (5, figure 6-16).

10. If emergency pressure flows are not within tolerance, locate probable cause using troubleshooting chart, table 6-14.

11. Turn off VACUUM PUMP. Close N_2 supply cylinder valve. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), relieve all pressure in the test stand. Secure all test stand valves.

6-76. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen	MIL-O-27210, Type 1

WARNING

Do not use oxygen test stand to regulate the oxygen purge pressure.

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

Table 6-14. Troubleshooting (Emergency Pressure Test)

Trouble	Probable Cause	Remedy
High emergency pressure at 10 lpm flow.	Emergency pressure control stem (17, figure 6-12) out of adjustment.	Turn emergency pressure control stem (17, figure 6-12) clockwise.
Low emergency pressure at 10 lpm flow.	Emergency pressure control stem (17, figure 6-12) out of adjustment.	Turn emergency pressure control stem (17, figure 6-12) counterclockwise.
Low emergency pressure at 80 lpm flow.	Elastic stop nut (5, figure 6-16) out of adjustment. Faulty venturi assembly (figure 6-19).	Adjust elastic stop nut (5, figure 6-13) counterclockwise. Replace venturi assembly (figure 6-19).
Low TEST MASK pressure.	Emergency pressure spring guide (12, figure 6-16) too short.	Install longer emergency pressure spring guide (12, figure 6-16).
High TEST MASK pressure.	Emergency pressure spring guide (12, figure 6-16) too long.	Install shorter emergency pressure spring guide (12, figure 6-16).

2. Apply 500 psig to regulator inlet on both low and high pressure regulators.

3. Position diluter lever in 100% position, supply lever in ON position, and emergency pressure control lever in the emergency position; allow oxygen to flow 1 to 3 minutes.

4. Shut off oxygen source and disconnect regulator.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate and/or Depot Level, shall be accompanied by the appropriate form in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test and/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

6-77. DISASSEMBLY.

6-78. Disassemble the oxygen regulator using the index numbers assigned to figure 6-12, unless otherwise noted. Disassemble the regulator only as far as required to correct any malfunctions. Disassemble the regulator as follows:

CAUTION

All disassembly, inspection, repair and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor and ceiling should have a smooth finish, and be painted with a non-chalking paint which can be kept clean and dust free. It is desirable to keep all parts for each individual regulator separated. Make careful note of the location and quantity of all shims, spacers and packings. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

6-79. PLASTIC LIGHTING PLATE. To remove the Plastic Lighting Plate, proceed as follows:

1. Remove light cap and spacer from light assembly (20, figure 6-13). Remove lamp (21, figure 6-13).

2. Remove screws (2), washers (3) and plastic lighting plate (1).

6-80. MOUNTING PLATE AND CONTROLS ASSEMBLY. To remove Mounting Plate and Controls Assembly, proceed as follows:

NOTE

Do not remove panel light electrical cord bushing (117) and panel light cord anchor plate (114) from electrical cable unless cable is damaged and must be replaced. If cable does not require removal, proceed to step 2.

1. Remove screws (115), washers (116), panel light cord anchor plate (114) and panel light electrical cord bushing (117).

2. Remove screws (6), washers (7) and mounting plate and controls assembly (5).

3. Remove emergency pressure control adjusting stem assembly (17).

6-81. EMERGENCY PRESSURE CONTROL GUARD AND BEAM AND FULCRUM ASSEMBLY. To remove the Emergency Pressure Control Guard and the Beam and Fulcrum Assembly, proceed as follows:

1. Remove screws (9), washers (10) and emergency pressure control guard (8).

2. Remove screw (12), washer (13), and beam and fulcrum assembly (11).

6-82. RETAINER SCREEN AND SHROUD ASSEMBLY. To remove the Retainer Screen and Shroud Assembly, remove screws (15) and washers (16); remove retainer screen and shroud assembly (14). Remove demand valve feed port plug (111), gasket (112), and preformed packing (113).

6-83. OXYGEN CYLINDER PRESSURE GAGE ASSEMBLY. To remove the Oxygen Cylinder Pressure Gage, proceed as follows:

1. Remove screws (28) and washers (29 and 32).

2. Gently work oxygen cylinder pressure gage assembly (33) from regulator body.

3. Remove preformed packing (36) from pressure gage tube.

6-84. BLINKER ASSEMBLY. To remove and disassemble the Blinker Assembly, proceed as follows:

1. Remove screws (24) and loosen and remove blinker tubing nut from regulator body, and lift blinker from regulator. Remove preformed packing (25) from regulator housing.

NOTE

Index numbers in steps 2, 3 and 4 refer to figure 6-14.

2. Remove screws (2), retainer plate (1), cover (3) and gasket (9).

3. Remove blinker pin (5), blinker spring (6) and blinker flag and lever assembly (4) from actuator guide (8).

4. Remove screw (7) from actuator guide (8), blinker actuator (10) and blinker diaphragm assembly (11) from blinker tubing and base plate assembly (12).

6-85. EMERGENCY PRESSURE CONTROL STEM GUIDE. To remove Emergency Pressure Control Stem Guide (58), remove screws (59).

6-86. PRESSURE BREATHING VALVE CONTROL ASSEMBLY. To remove and disassemble the Pressure Breathing Valve Control Assembly, proceed as follows:

CAUTION

Prior to removing pressure breathing aneroid housing (42), scribe housing to mark its position. Pressure breathing/safety pressure readings will be affected if rotated 180° from original position during reassembly.

1. Remove two screws (37) and washers (39), and remove pressure breathing aneroid housing (42) from regulator.

2. Remove nut (40), washer (41), aneroid assembly (43), shim (44) Allen screw (48), locknut (45), spring retainer (46) and safety pressure auto pressure breather spring (47).

3. Remove two screws (38), washers (39), pressure breather housing spacer (49) and diaphragm assembly (50).

6-87. PRESSURE BREATHER VALVE ASSEMBLY. To remove and disassemble the Pressure Breather Valve Assembly, proceed as follows:

1. Loosen three screws (54), lift pressure breather valve assembly (51) out of regulator housing. Remove three screws (54), plate (52), guide (53), actuating pin (55), shim (56) and preformed packing (57) from pressure breather valve (51).

6-88. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY. To remove and disassemble the Diluter Plate Control Housing and Check Valve Assembly, proceed as follows:

CAUTION

When removing diluter plate control housing and check valve, apply a firm pressure to the assembly to prevent stripping of screws (86 and 85) or damage to the regulator housing. This is necessary because of spring tension applied by spring (88).

1. Remove screws (85 and 86) and washers (87). Lift out the diluter plate control housing and check valve assembly (84) and first stage regulating spring (88) from regulator housing.

NOTE

Index numbers in steps 2 through 6 refer to figure 6-17.

2. Remove screws (2), washers (3), diluter plate assembly (1) and diluter housing gasket (14) from diluter control housing (24).

NOTE

Retain screw (4). It is a selected part. Bench test may reveal need for a screw with shorter or longer shoulder.

3. Remove screw (4), throttling plate (5), spring washer (6) and aneroid assembly (7) from diluter plate and seat assembly (13).

4. Remove diluter lever clip (9), diluter valve assembly (8), retaining clip (11), bushing (12) and manual diluter valve lever (10) from diluter plate and seat assembly (13).

5. Remove aneroid check valve retainer assembly (16), spring and screw adapter assembly (17), aneroid check valve spring (18) and check valve disc (19) from diluter control housing (24).

6. Remove preformed packing (15), first stage adjusting lock nut (20), first stage adjusting nut (21), first stage adjusting screw (22) and check valve seat (23) from housing (24).

6-89. DEMAND VALVE ASSEMBLY. To remove the Demand Valve Assembly from the regulator housing, remove demand valve retaining screw (104), preformed packing (105), demand valve spring (106), demand valve assembly (107), demand valve seat (108), preformed packing (109) and demand valve pin (110).

6-90. MANIFOLD INLET ASSEMBLY. To remove and disassemble the Manifold Inlet Assembly, proceed as follows:

1. Remove screws (98) and washers (99).

2. Depress supply valve stem (12, figure 6-18) with blunt instrument and lift manifold inlet assembly (97, figure 6-12) from regulator housing. Remove preformed packing (100).

NOTE

Index numbers in steps 3 through 7 refer to figure 6-18.

3. Remove snap ring (2), oxygen filter (1), manifold inlet adapter (3), locking spacer (6), packing backup ring (5) and preformed packing (4).

4. Remove conical compression supply valve spring (7), and turn manifold so ball (8) falls from manifold.

5. Remove inlet supply valve seat retainer (9), valve seat (10) and preformed packing (11) from manifold.

6. Remove inlet valve retainer (18) inlet valve first stage seat (19) and preformed packing (20) from manifold.

7. Remove manifold seal retainer (13), preformed packing (14), packing retainer (16), preformed packing (15), packing retainer (16), manifold valve stem seal retainer (17) and supply valve stem (12) from manifold.

6-91. SUPPLY CONTROL STEM GUIDE. To remove Supply Control Stem Guide assembly (60), remove screws (61), and lift from regulator body.

6-92. FIRST STAGE BELLOWS ASSEMBLY. To remove and disassemble the First Stage Bellows Assembly, proceed as follows:

1. Remove screws (90), first stage cover plate (89) and first stage gasket (91) from regulator body.

2. Remove first stage lever pivot screw (93) and tension washer (94) from the first stage valve and lever assembly (92).

3. Lift first stage bellows assembly (95) from regulator body, and remove first stage bellows gasket (96).

6-93. SECOND STAGE RELIEF VALVE ASSEMBLY. To remove and disassemble the Second Stage Relief Valve Assembly, proceed as follows:

1. Remove screws (63) and washers (64).

2. Lift second stage relief valve assembly (62) from regulator housing and remove second stage relief valve gasket (65).

NOTE

Index numbers in steps 3 and 4 refer to figure 6-15.

3. Remove internal retainer ring (2), relief valve screen (1), spring retainer (3) and second stage relief valve spring (4) from second stage relief valve housing (10).

4. Remove second stage relief retaining ring (6), preformed packing (7), second stage relief valve seat (5), second stage relief valve (8) and second stage relief valve guide sleeve (9) from second stage relief valve housing (10).

6-94. REGULATOR OUTLET. To remove the Regulator Outlet, proceed as follows:

1. Remove nuts (125) and screws (126 and 127).

2. Remove regulator outlet (124), preformed packing (128) and venturi screen (129).

6-95. VENTURI ASSEMBLY. To remove and disassemble the Venturi Assembly proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Piloted	QB-70750-9 (CAGE 55974) NIIN 00-302-6456

1. Using piloted spanner wrench, unscrew venturi assembly (130) from regulator housing.

2. Lift venturi assembly (130) and venturi nozzle gasket (131) from regulator housing.

NOTE

Index numbers in step 3 refer to figure 6-19.

3. Remove venturi seat (1) injector nozzle (2), injector spring (3) and damping spring (4) from venturi housing (5).

6-96. EMERGENCY PRESSURE CONTROL AND DIAPHRAGM ASSEMBLY. To remove and disassemble the Emergency Pressure Control and Diaphragm Assembly, proceed as follows:

1. Remove screws (71), washers (72), screw (69) and washers (70).

2. Remove emergency pressure control assembly (68), outer diaphragm (73), diaphragm spacer (74) and diaphragm and plate assembly (75) from regulator housing.

NOTE

Index numbers in steps 3 through 6 refer to figure 6-16.

3. Remove screws (2), washers (3) and emergency pressure housing control cap (1).

4. Remove elastic nut (5), emergency pressure swivel (6) and emergency pressure lever stem (4).

5. Remove emergency pressure control return spring (7), emergency pressure control test spring (8), screws (14) and washers (15).

6. Remove pin (10), emergency pressure control housing (16), emergency pressure control lever and center assembly (9), helical compression spring (11) and emergency pressure spring guide (12).

6-97. DEMAND VALVE LEVER ASSEMBLY. To remove the Demand Valve Lever Assembly, proceed as follows:

NOTE

Ensure lead counterweight has been removed from the demand valve lever after disassembly.

1. Remove screw (82), washer (83), remove vane mounting pin (77). Remove demand valve lever assembly (76) from demand valve fulcrum (81). Remove palnut (78) and screw (79) from demand valve lever (76) demand valve lever spring (80) will dropout. Remove demand valve lever (76) and fulcrum (81) from regulator.

NOTE

Demand valve lever spring (80) is used only on CRU-52/A, CRU-54/A, CRU-55/A, CRU-57/A, and CRU-72/A regulators.

2. Inspect the demand guide (133) while still installed in the demand valve chamber of the regulator housing for damage. Remove demand guide (133) only if it is damaged.

6-98. FIRST STAGE RELIEF VALVE ASSEMBLY. To disassemble the First Stage Relief Valve Assembly, remove relief valve spring retainer (118), relief valve spring (119), first stage relief valve assembly (120), relief valve seat (121) and preformed packing (122) from regulator body.

6-99. CLEANING.

6-100. To clean the disassembled oxygen regulator body and component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all metallic parts in accordance with NAVAIR 13-1-6.4-1.

CAUTION

Do not attempt to clean any elastomer parts that have become contaminated with oil or grease. All such parts shall be replaced.

2. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning all internal surfaces, they shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Also, bag all complete assemblies that are not immediately returned to service.

6-101. INSPECTION OF DISASSEMBLED REGULATOR.

6-102. Inspect the disassembled regulator body and component parts in accordance with table 6-15.

1. Make certain lamp (21, figure 6-13) is wired in accordance with figure 6-5.

6-103. REPAIR.

Materials Required

Quantity	Description	Reference Number
As Required	Lacquer, white	MIL-L-6805 (CAGE 81349)

6-104. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched-up using Lacquer.

6-105. ASSEMBLY.

6-106. Assembly of Aircraft Panel Mounted Regulators is essentially the reverse of disassembly. Tests are required on subassemblies as they are assembled into the regulator. Adjustment and calibration is also performed at time of assembly.

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

CAUTION

Use extreme care in fitting precision parts to prevent damage. Ensure each component is dust and dirt-free.

NOTE

All silicone-rubber parts shall be discarded, and replaced with new items at time of assembly. They shall be washed in accordance with paragraph 6-100, step 2 prior to installation.

6-107. Assembly is effected in two separate operations; assembly of components into subassemblies (mounting plate and controls assembly, injector assembly, etc.), and assembly of the subassemblies into the regulator housing.

6-108. MOUNTING PLATE AND CONTROLS ASSEMBLY. Assemble the Mounting Plate and Controls Assembly (figure 6-13) as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealing	MIL-S-22473
As Required	Solder, Lead, Tin	QQ-S-571 (CAGE 81348)

NOTE

Unless otherwise noted, index numbers in this paragraph refer to figure 6-13.

1. If control lever pins (2, 3, and 13) have been removed, replace with new control lever pins and stake lightly in place.

2. If cord assembly (19) has been removed from light assembly (20) and terminal lug (22), solder new cord in place using solder and cover solder joint with sealing compound.

3. Do not attempt to reuse Dzus fasteners (23), if fasteners have been removed from the mounting plate assembly (18). Replace with new fasteners.

4. Do not install lamp (21) or cap (part of (20)) until plastic lighting plate (1, figure 6-12) has been installed.

5. Attachment to regulating housing shall be covered later in this section.

6-109. BLINKER ASSEMBLY. Assemble the Blinker Assembly (figure 6-14) as follows:

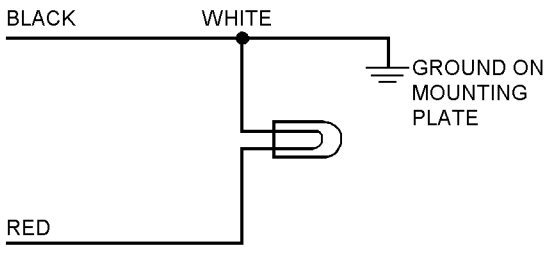


Figure 6-5. Wiring Diagram

1. Install screw (7) in actuator guide (8), leaving three threads visible (this setting should ensure blinker will meet blinker test requirements of paragraph 6-74).

2. Using blinker pin (5), attach blinker spring (6) and blinker flag and lever assembly (4) to actuator guide (8).

3. Place blinker diaphragm assembly (11), blinker actuator (10) and actuator guide (8) on blinker tubing and base plate assembly (12). Ensure screw holes are aligned.

4. Place gasket (9) on actuator guide (8). Notch in gasket must be aligned with hole in actuator guide.

5. Install cover (3) and retaining plate (1). Secure entire blinker assembly together with screws (2).

6. Preset blinker assembly to dimensions shown in figure 6-7.

7. After assembly of blinker in regulator, should blinker fail to pass the test in paragraph 6-74, adjust (figure 6-7) as follows:

a. If flag did not completely open at flow of 8 lpm, remove plastic cover (3), and rotate adjustment screw one turn clockwise.

b. If flag does not completely close when flow is reduced to zero (17 inH_2O), rotate adjustment screw one turn counterclockwise.

8. Installation into the regulator housing shall be covered later in this section.

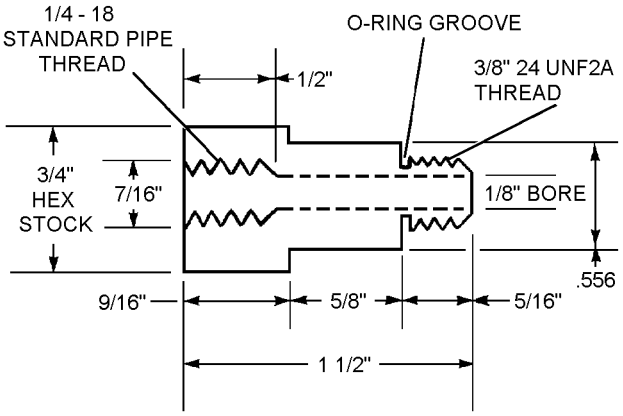


Figure 6-6. Brass Reducer Adapter

Table 6-15. Inspection of Disassembled Regulator Components

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Plate, Plastic, Lighting.	6-12-1	Cracks scratches and chipped paint.	Replace plastic lighting plastic if cracked, touch up paint as necessary.
Retainer Screen and Shroud Assembly.	6-12-14	Cracks in casting marred mating sufaces damaged screens and stripped threads in tapped holes.	Replace reatiner screen and shroud assembly if defective.
Pointer, Pressure Gage.	6-12-34	Distortion and chipped or dirty paint.	Replace pressure gage pointer if distorted, touh up paint as necessary.
Dial, Pressure Gage.	6-12-35	Distortion screatches and chipped or dirty paint.	Replace pressure gage dial if distorted or scratched, touch up paint as necessary.
Gage Assembly.	6-12-33	Free passage of air through tubing.	Replace gage assembly if tubing is blocked or kinked.
Aneroid Assembly.	6-12-43	Dents and uneven spacing of convolutions or expanded.	Replace aneroid assembly if defective.
Valve Assembly.	6-12-51	External defects.	Replace entire valve assembly if any parts are defective.
Screw.	6-12-93	Rounded surface of screw to be smooth and free of surface defects.	Replace screw if defective.
Bellows Assembly.	6-12-95	Dents in and uneven spacing of convolutions.	Replace bellows assembly if defective.
Seat, Valve, First Stage.	6-12-102	Surface of insert and face to be free of nicks and scratches.	Replace first stage valve seat if defective.
Seat, Demand Valve.	6-12-108	Nicks, scratches or burrs on raised edge of seat.	Replace demand valve seat if defective.
Valve Assembly, First Stage Relief.	6-12-120	Rounded edge of rubber insert to be free of surface defects.	Replace first stage relief valve if defective.
Seat, Relief Valve.	6-12-121	Seating surface to be free of nicks, scratches, or burrs.	Replace relief valve seat if defective.
Housing Assembly, Regulator and Demand Valve Bushing.	6-12-134	Cracks in casting stripped threads in tapped holes and marred mating surfaces.	Replace housing assembly if defective.
Follower, Diluter Lever.	6-13-16	Wear on ball tip.	Replace diluter lever follower if defective.

Table 6-15. Inspection of Disassembled Regulator Components (Cont)

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Mounting Plate Assembly, Regulator.	6-13-18	Condition of wiring; components of Dzus fasteners; bent panel.	Replace defective parts or entire mounting plate assembly if panel is bent.
Lamp.	6-13-21	Burned out condition by applying 28 Vdc.	Replace lamp if defective.
Blinker Tubing and Base Plate Assembly or kinked.	6-14-12	Free passage of air through tubing.	Replace blinker tubing and base plate assembly if tubing is blocked.
Flag and Lever Assembly, Blinker.	6-14-4	Chipped or dirty painted surface.	Touch up paint on flag and lever assembly as necessary.
Guide, Actuator.	6-14-8	Guide hole for excessive wear.	Replace actuator guide if worn.
Screen, Relief Valve.	6-15-1	Damage or distortion.	Replace relief valve screen if defective.
Seat, Second Stage Relief Valve.	6-15-5	Lapped face and inner and outer edges of set to be free of nicks, scratches or burrs.	Replace second stage relief valve seat if defective.
Valve, Second Stage Relief.	6-15-8	Lapped face to be free to nicks scratches or burrs.	Replace second stage relief valve if defective.
Stem, Emergency Pressure Lever.	6-16-4	All outside diameters for nicks, scratches or burrs.	Replace emergency pressure lever stem if defective.
Guide, Emergency Pressure Spring.	6-16-12	Large OD and bore must be free of nicks, scratches or burrs.	Replace emergency pressure spring guide if defective.
Housing, Emergency Pressure Control.	6-16-16	Inside diameter of be free of nicks, scratches or burrs.	Replace emergency pressure control housing if defective.
Plate, Throttling.	6-17-5	Valve seat surfaces to be free of scratches or nicks.	Replace throttling plate if defective.
Aneroid Assembly.	6-17-7	Dents in, uneven spacing of convolutions; face for nicks and scratches, also expanded.	Replace aneroid assembly if defective.
Plate and Seat Assembly, Diluter.	6-17-13	Seat for nicks and scratches.	Replace diluter plate and seat assembly if defective.
Disc, Check Valve.	6-17-19	Edges clean cut and surface flat and smooth.	Replace check valve disc if defective.
Housing, Dilute Control.	6-17-24	Seat for nicks and scratches.	Replace diluter control housing if defective.

Table 6-15. Inpsection of Disassembled Regulator Components (Cont)

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Ball.	6-18-8	Surface of insert to be flat and free of defects.	Replace ball if defective.
Seat, Supply Valve.	6-18-10	Raised edge of seat to be free of nicks, scratches or burrs.	Replace supply valve seat if defective.
Stem, Supply Valve.	6-18-12	Flattened end of stem to be smooth and flat, large OD to be polished.	Replace supply valve stem if defective.
Seat, First Stage Inlet Valve.	6-18-19	Raised edge of seat to be free of nicks, scratches or burrs.	Replace first stage inlet valve seat if defective.
Seat, Venturi.	6-19-1	Seating surface to be free of nicks, scratches of burrs.	Replace venturi seat if defective.
Nozzle, Injector.	6-19-2	Mating surfaces to be free of nicks or scratches.	Replace injector nozzle if defective.
Spring, Injector.	6-19-3	Deformation.	Replace injector spring.

6-110. SECOND STAGE RELIEF VALVE ASSEMBLY. Assemble the Second Stage Relief Valve (figure 6-15) as follows:

NOTE

Index numbers in this paragraph refer to figure 6-15.

1. Insert new preformed packing (7) into groove in second stage relief valve seat (5).

2. Install second stage relief valve (8) with lapped face toward second stage relief valve seat (5).

NOTE

Select applicable sleeve (9) for regulator. Consult USABLE ON CODE column of Parts List, figure 6-14.

3. Seat (5) and second stage relief valve guide sleeve (9) must be in a bottomed position in second stage relief valve housing (10) after seating second stage relief valve retaining ring (6).

4. Install spring retainer (3). Final position of retainer will be determined during post-assembly bench test.

5. Do not install relief valve screen (1) or retainer ring (2) until completion of post-assembly bench test.

6. Attachment to the regulator housing shall be covered later in this section.

6-111. EMERGENCY PRESSURE CONTROL ASSEMBLY. Assemble the Emergency Pressure Control Assembly (figure 6-16) as follows:

NOTE

Index numbers in this paragraph refer to figure 6-16.

1. Attach emergency pressure control housing (16) to second stage cover (13) with washers (15) and screws (14).

2. Install emergency pressure spring guide (12), helical compression spring (11) and emergency pressure control lever and center assembly (9) into emergency pressure control housing (16). Secure with pin (10).

3. Drop emergency pressure control test spring (8) into emergency pressure control housing (16).

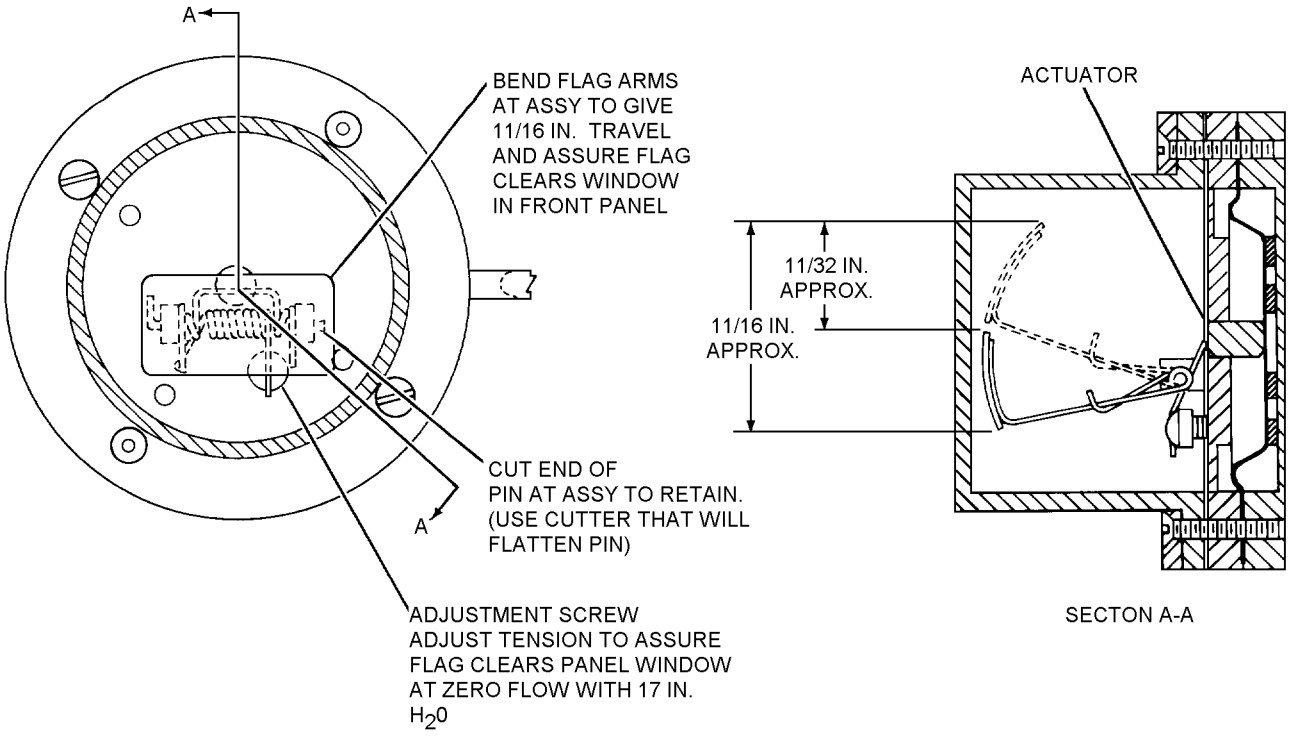


Figure 6-7. Blinker Assembly Adjustments

4. Install emergency pressure control return spring (7) into emergency pressure control housing (16) so that it slips over emergency pressure control test spring (8).

5. Install emergency pressure lever stem (4) into emergency pressure control housing (16). Secure in place with emergency pressure swivel (6) and elastic nut (5).

6. Do not install emergency pressure control housing cap (1), screw (2) and washer (3) until completion of post-assembly bench test.

7. Attachment to the regulator housing shall be covered later in this section.

6-112. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY. Assemble the Diluter Plate Control Housing and Check Valve Assembly (figure 6-17) as follows:

NOTE

Index numbers in this paragraph refer to figure 6-17.

1. Install spring and screw adapter assembly (17), check valve spring (18) and check valve disc (19) into aneroid check valve retainer assembly (16).

2. Install check valve seat (23) and preformed packing (15) on diluter control housing (24). Attach aneroid check valve retainer assembly (16) to check valve seat (23).

3. Install first stage adjusting screw (22) in diluter control housing (24). Secure with first stage adjusting nut (21) and first stage adjusting locknut (20).

4. Install aneroid assembly (7) on diluter plate and seat assembly (13). Using same screw (4) removed during disassembly, attach spring washer (6) and throttling plate (5) to bottom of aneroid assembly (7). (Post assembly bench test may indicate need for a screw (4) with longer or shorter shoulder.)

5. Using diluter lever clip (9), attach diluter valve assembly (8) to manual diluter valve lever (10).

6. Install bushing (12) and retaining clip (11) on diluter plate and seat assembly (13). Insert manual diluter valve lever (10) through hole in diluter plate and seat assembly (13) so that is rests on bushing (12) and retaining clip (11).

7. During this step, ensure manual diluter lever (10) stays in position on retaining clip (11). Using washers (3) and screws (2), attach diluter plate and seat assembly (13) and gasket (14) to diluter control housing (24).

8. Attachment of this assembly to the regulator housing will be covered later in this section.

6-113. MANIFOLD INLET ASSEMBLY. Assemble the Manifold Inlet Assembly (figure 6-18) as follows:

NOTE

Index numbers in this paragraph refer to figure 6-18.

1. Assemble supply valve stem (12) into manifold valve stem seal retainer (17). Assemble new packing retainer (16) onto supply valve stem (12).

NOTE

Use only new preformed packings and packing retainers.

2. Assemble new preformed packing (15) onto supply valve stem (12), and slide second packing retainer (16) onto supply valve stem (12).

3. Place new preformed packing (14) on manifold seal retainer (13).

NOTE

Ensure proper inlet valve first stage seat (19, figure 6-18) is used. The high pressure regulator (MD-2 and CRU-72A) inlet valve first stage seat has a small hole in its center. The other regulators (MD-1, CRU-52/A, CRU-54/A, CRU-55/A, and CRU-57/A) have a larger hole in the center of inlet valve first stage seat.

4. Install assembled parts (12 through 17), plug (21), new preformed packing (20), inlet valve first stage seat (19), and inlet valve retainer (18) to inlet supply manifold (22).

5. Install new preformed packing (11), supply valve seat (10), and inlet supply valve retainer seat (9) into assembly (22).

6. Install oxygen filter (1) and snap ring (2) into manifold inlet adapter (3).

7. Install ball (8) and conical compressor spring (7) into assembly.

8. Assemble locking spacer (6), packing backup ring (5) and new preformed packing (4) to manifold inlet adapter (3). Install this assembly into inlet supply manifold (22).

9. Installation to regulator body will be covered later in this section.

6-114. VENTURI ASSEMBLY. Assemble the venturi assembly (figure 6-19) as follows:

CAUTION

Exercise care in handling venturi seat (1) and injector nozzle (2) to prevent mating surfaces from becoming scratched or nicked.

NOTE

Index numbers in this paragraph refer to figure 6-19.

1. Install damping spring (4), injector spring (3), injector nozzle (2) and venturi seat (1) into venturi housing (5).

2. Installation into the regulator housing will be covered later in this section.

6-115. ASSEMBLY OF INTERNAL PARTS INTO REGULATOR HOUSING. To assemble the internal parts into the regulator housing, attach the previously assembled components, and test or adjust the assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC, Type III, Lubricant	MIL-G-27617 NIIN 00-961-8995

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Piloted	QB-70750-9 (CAGE 55974) NIIN 00-302-6456

NOTE

Index numbers in the following paragraphs refer to figure 6-12 unless otherwise noted.

1. If demand valve guide (133) has been removed from regulator housing because of damage, press in new guide within 1/16 inch of adjacent surface of housing. Burnish inside diameter of guide to 0.1250 + 0.005, -0.000 in. Burnished hole to be perpendicular to the bottom of centerbored hole opposite end of guide with 0.005 in. total indicator reading.

2. Using piloted spanner wrench install new venturi nozzle gasket (131) and venturi assembly (130) into regulator body, then install venturi screen (129).

NOTE

The regulator outlet (124) must be pointing away from the regulator face.

3. Install new preformed packing (128) into groove on regulator outlet (124) and secure outlet to regulator body with screws (126, 127) and nuts (125).

NOTE

First stage relief valve will be adjusted later in assembly.

4. Install new preformed packing (122) into groove on relief valve seat (121) and install in regulator body. Install first stage relief valve assembly (120), relief valve spring (119) and relief valve spring retainer (118).

NOTE

Perform step 5 only if electrical cord was removed.

5. Install panel light electrical cord bushing (117) and panel light cord anchor plate (114). Secure with screws (115) and washers (116).

6. Install demand valve lever spring (80) if applicable.

NOTE

Demand valve lever spring (80) is used only on CRU-52/A, CRU-54/A, CRU-55/A, CRU-57/A, and CRU-72/A regulators.

Ensure lead counterweight has been removed from demand valve lever prior to assembly.

7. Place demand valve fulcrum (81) and demand valve lever (76) in regulator body. Tilt demand valve fulcrum (81) demand valve lever and insert vane mounting pin (77) through holes in assemblies.

NOTE

If palnut (78) and screw (79) were removed from demand valve lever assembly (76), thread screw into lever and tighten nut to a torque value of 1/4 pound-inch (minimum).

8. Place demand valve fulcrum (81) into regulator body, and secure with screw (82) and washer (83).

9. Install new preformed packing (105) on demand valve retaining screw (104). Insert demand valve pin (110), new preformed packing (109), demand valve seat (108), demand valve assembly (107) and demand valve spring (106). Install small end on demand assembly (107) into regulator body. Secure with retaining screw (104).

10. While looking through demand valve feed port, depress and release demand lever (76) several times while observing demand valve (107) moving off demand valve seat (108) and then seating again, to ensure proper alignment.

11. Attach supply control stem guide assembly (60) with screws (61).

12. Install grommet (101) into inlet valve retainer (18, figure 6-18).

13. Install new preformed packing (100) into counterbore in regulator body. Secure manifold inlet assembly (97) to body with screws (98) and washers (99).

14. Lubricate stud protruding from end of first stage regulator valve and lever assembly (92) with oxygen cleaning compound.

NOTE

Apply a light film of Krytox 240AC on screw (93) before assembly.

15. Insert stud protruding from end of first stage regulator valve and lever assembly (92) into grommet (101), pressing in as far as possible.

16. Screw stud on first stage regulator valve and lever assembly (92) into threaded opening in bellows, ensure approximately 2 to 3 threads remain showing (figure 6-8).

17. Install new first stage bellows gasket (96) on first stage bellows assembly (95), and place in recess of regulator body.

18. Secure first stage regulator valve and lever assembly in place with first stage lever pivot screw (93) and tension washer (94).

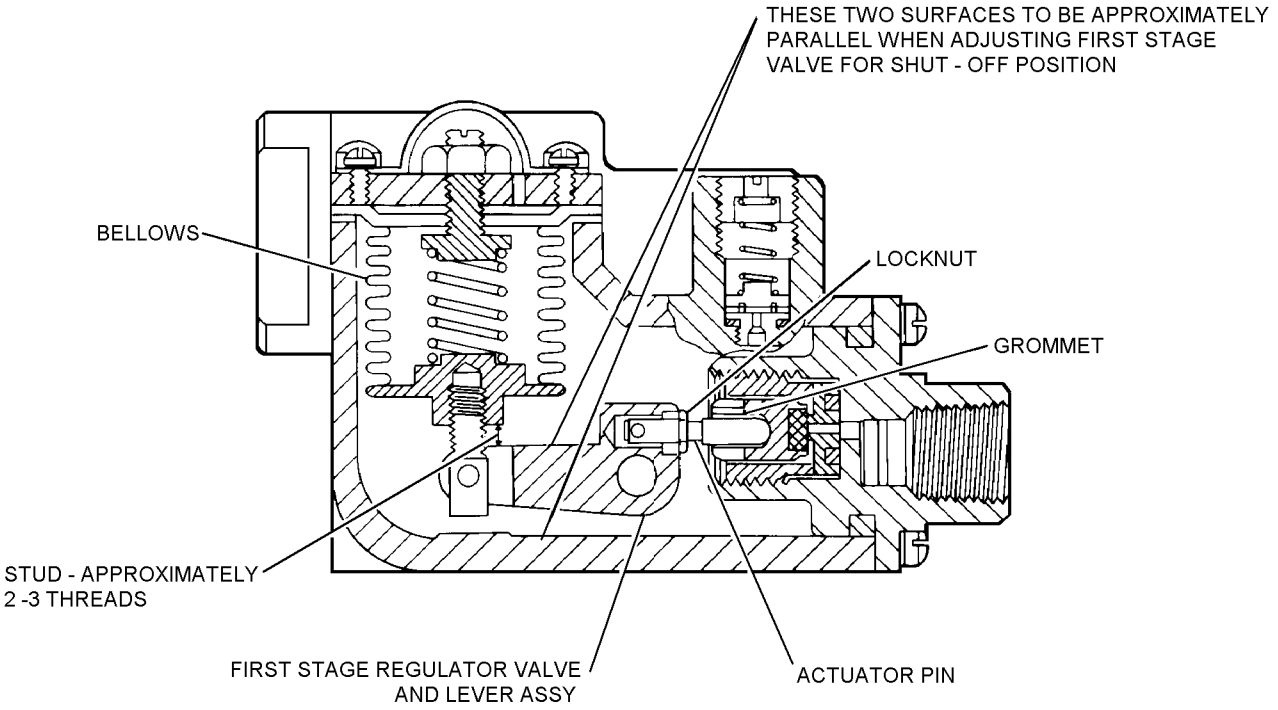


Figure 6-8. First Stage Relief Valve Adjustment

CAUTION

Crosspin in first stage valve and lever assembly (92) must engage slots in first stage valve seat assembly (102). First stage lever pivot screw (93) must be tight.

19. Install new first stage gasket (91) on first stage cover plate (89) and attach to regulator body with screws (90).

20. Place first stage regulating spring (88) into recess in first stage regulator bellows assembly (95). Align holes in bellows and gasket with screw holes in regulator body.

21. Place diluter plate control and check valve assembly (84) over first stage regulator bellows assembly (95), and secure in place with screws (85 and 86) and washers (87).

22. Attach emergency pressure control guide assembly (58) to regulator body with screws (59).

NOTE

If pressure breather valve assembly (51) was disassembled (paragraph 6-86), reassemble in reverse order.

23. Install new preformed packing (57) on pressure breather valve assembly (51) and install in regulator with screws (54), and new diaphragm assembly (50). Protruding ridge on diaphragm face up.

24. Install pressure breather housing spacer (49) with serrated side against diaphragm assembly (50), and secure to regulator body with screws (38), and washers (39). Long screws (37) go to top left and bottom right.

25. Install new preformed packing (25) and blinker assembly (23) to regulator body and secure with screws (24) and insert blinker tubing in threaded blinker port. Tighten blinker tubing nut.

NOTE

At this point, partially assembled regulator must be checked for leakage, and the demand valve lever and first stage relief valve adjusted.

6-116. LEAKAGE TEST AND ADJUSTMENTS. To test for leakage, and make adjustments to the partially assembled regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Compound, Sealing	MIL-S-224732
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter	AN816-4J NIIN 00-689-4035
1	Adapter	AN816-4-4
1	Gage, Pressure, 0 to 160 psi	F340-1017-4 (CAGE 97413) NIIN 00-056-9546
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

Salvage the tubing from a discarded pressure gage and pinch and silver solder the end of the tubing.

1. Install pinched-and-soldered pressure gage tubing and preformed packing (37) into pressure gage port.

CAUTION

Upon completion of tests and adjustments, remove metal strip from between regulator body and inlet manifold.

2. Install a thin strip of metal between the regulator body and manifold inlet assembly (97) so that it depresses the inlet manifold stem.

3. Attach adapter fixture to the 0 to 160 psi pressure gage, install 0 to 160 psi pressure gage, gasket (112), and preformed packing (113) into port normally occupied by demand valve feed port plug (111) (figure 6-9).

4. Install adapter (AN816-4J) into manifold inlet assembly (figure 6-9).

5. Ensure all test stand valves are secured and turn on N_2 supply cylinder.

6. Connect regulator inlet to N_2 input connection (18) in the altitude chamber.

7. Using low pressure regulator (N) apply 150 psig.

8. Turn inlet ON/OFF valve (L) to ON position, 0 to 160 psi pressure gage should indicate 32 to 35 psig. If pressure is not within limits adjust shutoff position of first stage regulator valve and lever assembly (figure 6-8).

9. Reduce supply pressure to 30 psig using system bleed valve (S) and apply leak detection compound to safety pressure/pressure breathing port (figure 6-10). Allowable leakage is 0.2 ccm (cubic centimeters) in 30 seconds. Any bubble distention at this port is excessive leakage, and requires inspection/adjustment or replacement of pressure breather valve assembly (51) (table 6-11).

NOTE

Demand valve lever should protrude slightly above regulator body.

10. Using LOW PRESS. REGULATOR (N) increase inlet pressure to 150 psig and check demand valve lever assembly (76) adjustment by sliding a straight edge across regulator body. Straight edge should actuate demand valve, producing a slight flow.

11. Demand valve height adjustment is made by turning the adjustment screw (79) clockwise to raise lever, and counterclockwise to lower lever (figure 6-10).

12. Fully depress demand valve lever. Pressure drop on 0 to 160 psi pressure gage shall not be more than 3 psig.

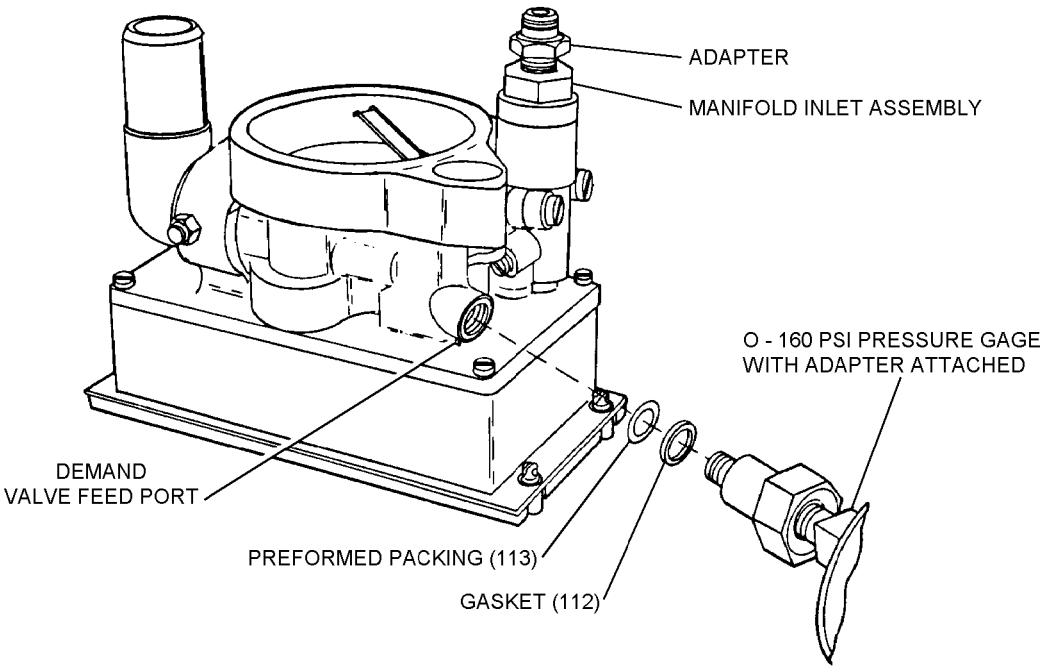


Figure 6-9. Attachment of 0-160 PSI Pressure Gage to Demand Valve Feed Port for Leakage and Adjustment Test

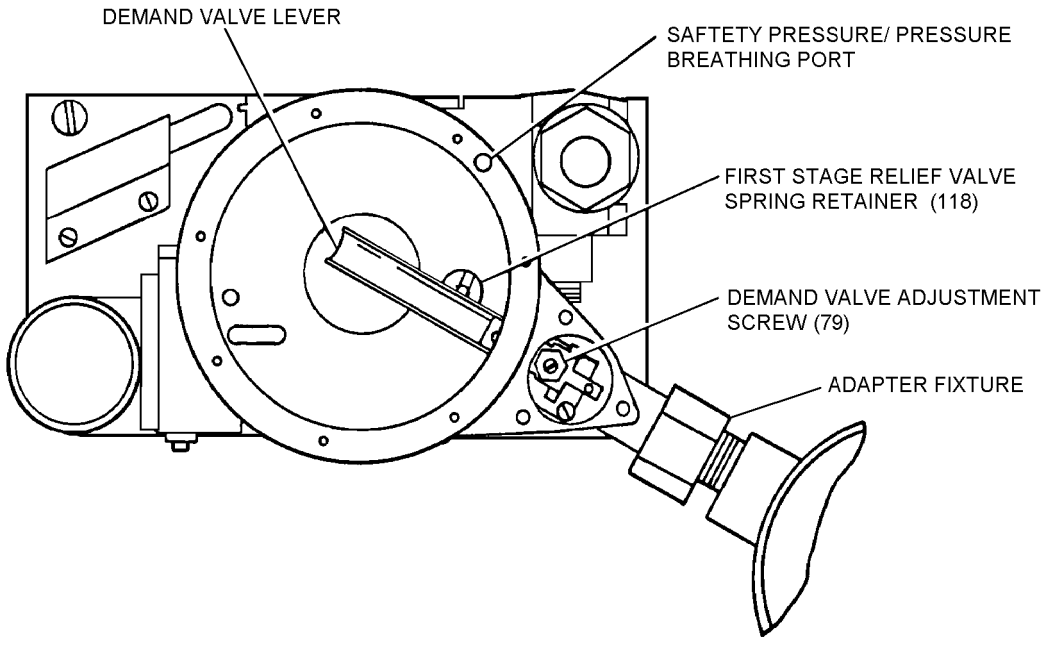


Figure 6-10. Attachment of Adapter Fixture to Regulator for Leakage and Adjustment Test.

13. Depress demand valve lever and release while observing blinker assembly. Blinker assembly should open when demand valve lever is depressed and close immediately when released. (Adjust in accordance with paragraph 6-109 and figure 6-7.)

14. Depress demand valve lever (76) to produce a flow, apply leak detection compound to blinker tubing nut and around base of blinker assembly, release demand lever (76). (If leakage is present, repair in accordance with paragraph 6-109 and figure 6-7.)

15. Apply leak detection compound to base of diluter plate control housing (84). If leakage is present replace gasket (96).

16. Apply leak detection compound to first stage cover plate (89). (If leakage is present repair in accordance with table 6-7.)

17. Apply leak detection compound to regulator outlet (124). (If leakage is present repair in accordance with table 6-3.)

18. Remove metal strip from between regulator body and manifold inlet assembly. Apply leak detection compound to the following areas (figure 6-11) (A), (C), (D), (E) and (F). If leakage is present locate probable cause using table 6-5 and repair manifold inlet assembly.

19. Turn inlet pressure ON/OFF valve (L) to OFF, back out on low pressure regulator (N), open system bleed valve (S) and bleed pressure from regulated low pressure gage (11), and close system bleed valve (S).

20. Disconnect regulator from N_2 input connection (18), remove 0 to 160 psi pressure gage from demand valve feed port.

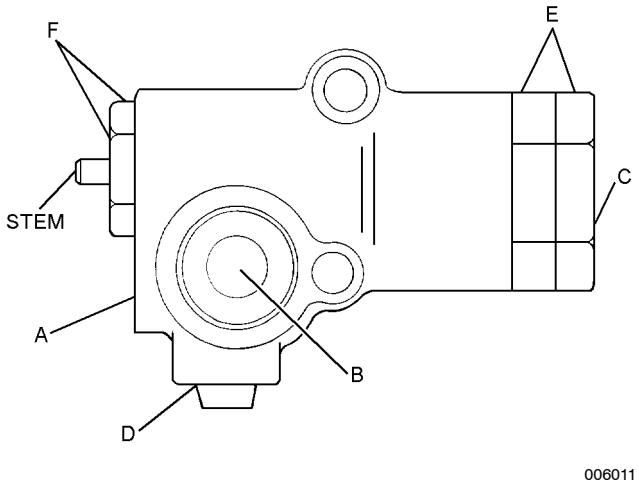


Figure 6-11. Test Areas, Manifold Inlet Assembly

21. Remove 0 to 160 psi pressure gage from adapter fixture.

22. Attach adapter (AN816-4-4) to adapter fixture and install adapter fixture, gasket (112), and preformed packing (113) into demand valve feed port (figure 6-10).

23. Connect regulator and adapter fixture to N_2 input connection (18), turn inlet pressure ON/OFF valve (L) to ON. Using LOW PRESS. REGULATOR (N) apply 60 psig to the regulator.

24. Adjust first stage relief valve spring retainer (118) so that first stage relief valve vents between 55 and 60 psig (figure 6-10). (Clockwise to relieve later, counterclockwise to relieve earlier).

25. Reduce pressure to 50 psig using system bleed valve (S) and apply leak detection compound to area around first stage relief valve spring retainer (118). There shall be no leakage.

26. Turn inlet pressure ON/OFF valve (L) to OFF.

27. Turn N_2 supply cylinder off and bleed pressure from test stand using LOW PRESS. REGULATOR (N) and system bleed valve (S). Secure all test stand valves.

28. Remove regulator from test stand, remove adapter fixture, gasket (112), and preformed packing (113) from demand valve feed port.

29. Apply sealing compound or equivalent, to the first stage relief valve spring retainer (118).

30. Install new gasket (112), new preformed packing (113), and demand valve feed port plug (111) into demand valve feed port.

6-117. COMPLETION OF ASSEMBLY. To complete assembly of the regulator, proceed as follows:

CAUTION

Consult Group Assembly Parts List (GAPL), section 6-5 for selection of correct diaphragm and plate assembly for regulator type.

NOTE

To aid in determining part placement and location the plastic lighting panel shall be considered the front of the regulator.

1. (Models CRU-52/A, CRU-54/A, CRU-55/A and CRU-57/A) Install new diaphragm and plate assembly

(75), with the protruding ridge facing away from front of regulator, diaphragm spacer (74), and new outer diaphragm (73), with protruding ridge facing away from front of regulator. Install emergency pressure control assembly (68). Secure with screws (71, 69) and washers (72, 70).

2. (Models MD-1, MD-2, and CRU-72/A) Install new diaphragm and plate assembly (75), with protruding edge facing in towards front of regulator, diaphragm spacer (74), and new outer diaphragm (73), protruding edge facing away from front of regulator. Install emergency pressure control assembly (68). Secure with screws (71, 69) and washers (72, 70).

CAUTION

Consult GAPL, section 6-5 for selection of correct second stage relief valve for regulator type.

3. Install new relief valve gasket (65) and second stage relief valve assembly (62). Secure with screws (63) and washers (64).

4. Install aneroid assembly (43) into pressure breathing aneroid housing (42) utilizing same quantity and thicknesses of shims (44) as removed. Secure aneroid in housing with nut (40) and washer (41).

5. Remove the two long screws (37) and washers (39).

6. Thread screw (48) into locknut (45), and install spring retainer (46) over screw (48). Install safety pressure auto pressure breather spring (47) so it rests on spring retainer (46).

7. Attach screw (48), locknut (45), spring (47), and spring retainer (46) to aneroid (43). Ensure screw (48) and locknut (45) are tight. Place pressure breathing aneroid housing (42) on diaphragm assembly and secure to regulator with long screws (37) and washers (39).

CAUTION

Consult GAPL, section 6-5 for correct pressure gage and bracket assembly for regulator type.

8. Install new preformed packing (36) cylinder pressure gage and bracket assembly, sleeve (27) and connector (26) into regulator body. Secure with screws (28) and washers (29, 32).

NOTE

If panel light electrical cord (19, figure 6-13) was removed, it must be installed prior to attaching retainer screen and shroud assembly.

9. Install retainer screen and shroud assembly (14) with screws (15) and washers (16).

10. Attach beam and fulcrum assembly (11) to regulator with screw (12) and washer (13).

11. Place emergency pressure control guard (8) over beam and fulcrum assembly (11) and secure with screws (9) and washers (10).

12. Install emergency pressure control adjusting stem assembly (17).

13. Install mounting plate and controls assembly (5) with screws (6) and washers (7).

14. Perform complete bench test. Refer to paragraph 6-59.

CAUTION

Exercise care in tightening screws to prevent chipping plastic plate.

15. Install plastic lighting plate (1) with screws (2) and washers (3).

16. Install emergency pressure control housing cap (1, figure 6-16) with screws (2, figure 6-16) and washers (3, figure 6-16).

NOTE

Index numbers in step 17 refer to figure 6-13 unless otherwise noted.

17. Place diluter control lever in NORMAL OXYGEN position. A slight amount of play (loose movement) should exist. If lever is too tight, or too loose, remove screw (4, figure 6-12), setscrew (14) and diluter lever spring (15). Turn screw (17) clockwise to increase, and counterclockwise to decrease movement. Reinstall diluter lever spring (15) and setscrew (14). Head of setscrew (14) should be approximately 1/8 inch below end of lever. Lock adjustment with screw (4, figure 6-12).

18. Install plug (103, figure 6-12), and sealing cap (123, figure 6-12).

19. Install relief valve screen (1, figure 6-15) and ring retainer (2, figure 6-15).

20. Make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

Section 6-5. Illustrated Parts Breakdown

6-118. GENERAL.

6-119. This section lists and illustrates the assemblies and detail parts of the regulators listed below, and manufactured by Carleton Technologies Inc, formerly ARO Corporation, Bryan, Ohio, CAGE 03990.

Type	Part No.
MD-1	14950-7B
MD-2	14800-8B
CRU-72/A	14800-8C
CRU-52/A	14950-26A
CRU-54/A	14950-27A
CRU-55/A	14950-28A
CRU-57/A	14950-30A

6-120. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

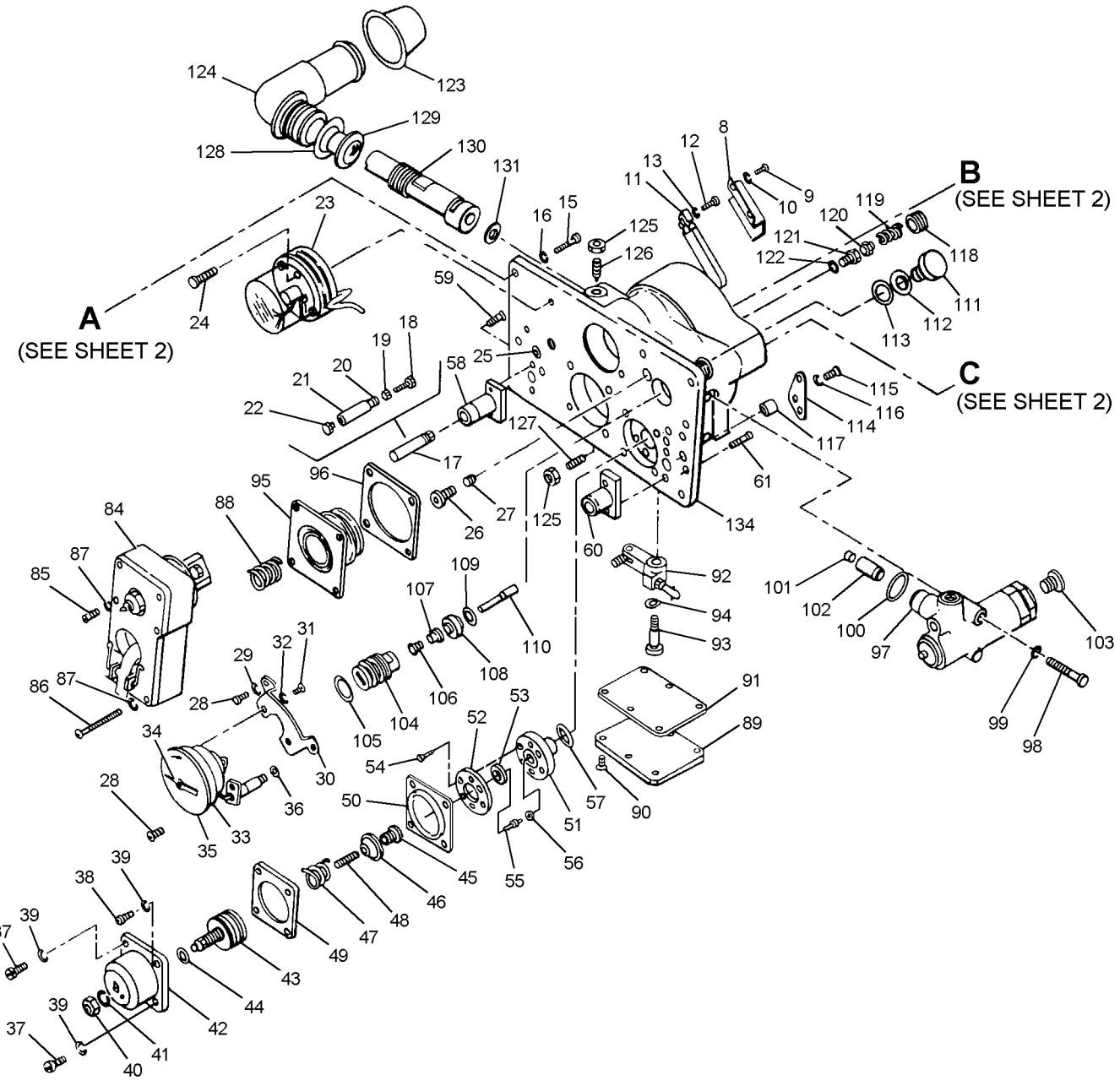


Figure 6-12. MD-1, MD-2, CRU-52/A, CRU-54/A, CRU-55/A, CRU-57/A, and CRU-72/A Panel Mounted Oxygen Regulators (Sheet 1 of 2)

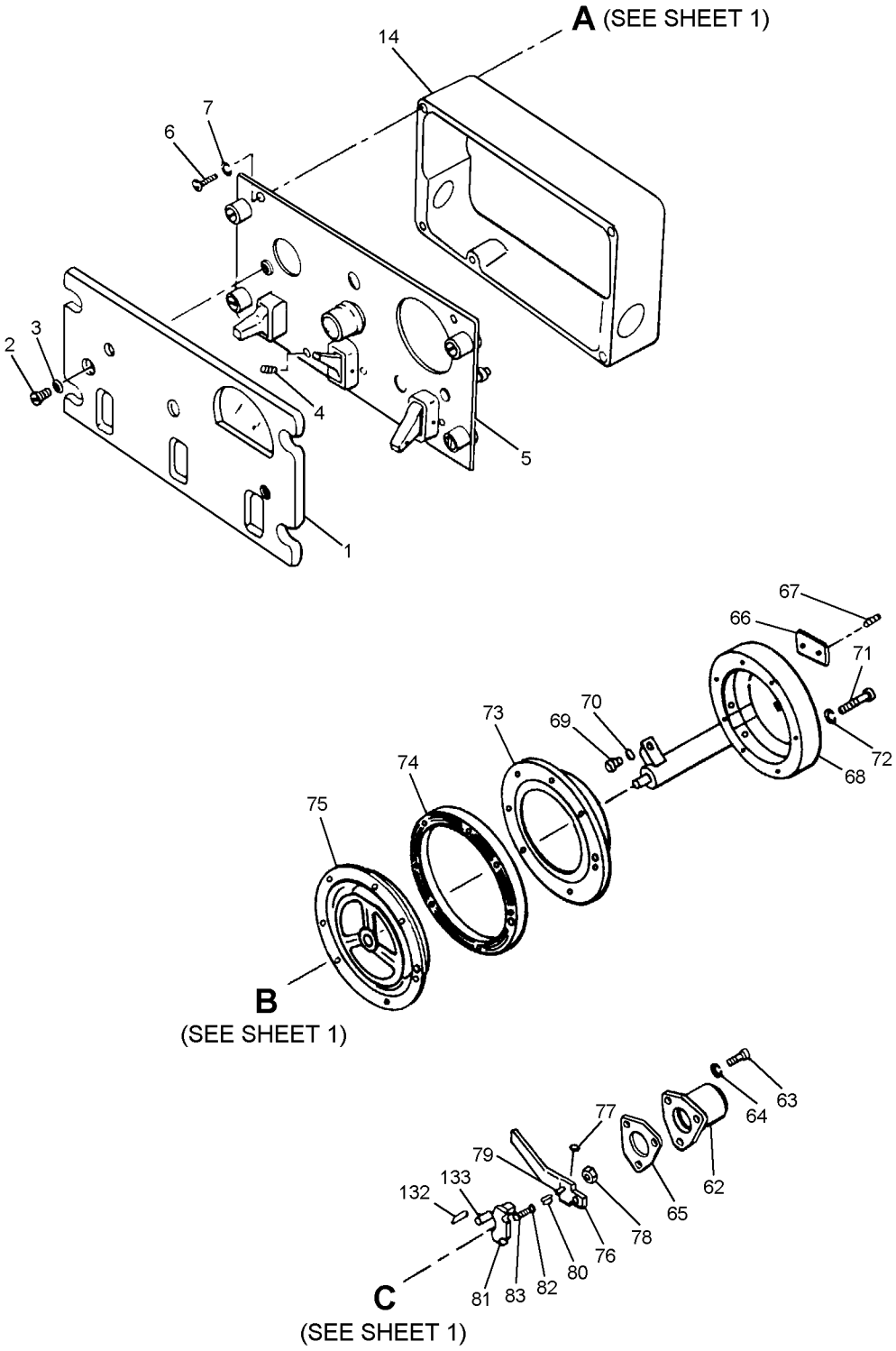


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Figure 6-12. MD-1, MD-2, CRU-52/A, CRU-54/A, CRU-55/A, CRU-57/A, and CRU-72/A Panel Mounted Oxygen Regulators (Sheet 2 of 2)

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-12	14950-7B	REGULATOR, Oxygen (Parts Kits Available)	1	A
	14800-8B	REGULATOR, Oxygen (Parts Kits Available)	1	B
	14800-8C	REGULATOR, Oxygen (Parts Kits Available)	1	C
	14950-26A	REGULATOR, Oxygen (Parts Kits Available)	1	D
	14950-27A	REGULATOR, Oxygen (Parts Kits Available)	1	E
	14950-28A	REGULATOR, Oxygen (Parts Kits Available)	1	F
	14950-30	REGULATOR, Oxygen (Parts Kits Available)	1	G
	14951-7B	. REGULATOR, Oxygen (General Assy Dwg)	REF	A
	14801-8B	. REGULATOR, Oxygen (General Assy Dwg)	REF	B
	14801-8C	. REGULATOR, Oxygen (General Assy Dwg)	REF	C
	14951-26A	. REGULATOR, Oxygen (General Assy Dwg)	REF	D
	14951-27A	. REGULATOR, Oxygen (General Assy Dwg)	REF	E
	14951-28A	. REGULATOR, Oxygen (General Assy Dwg)	REF	F
	14951-30	. REGULATOR, Oxygen (General Assy Dwg)	REF	G
-1	14807	. . PLATE, Plastic lighting	1	ABCDE
	19539	. . PLATE, Plastic lighting	1	FG
		(ATTACHING PARTS)		
-2	MS35265-25	. . SCREW (KD)	2	
-3	MS35333-37	. . WASHER (KD)	2	
		---*---		
-4	AS103CC832F2	. . SETSCREW (KD)	1	
-5	14805-7	. . MOUNTING PLATE AND CONTROLS	1	ABCD
		ASSY (figure 6-13 for BKDN)		
	14805-18	. . MOUNTING PLATE AND CONTROLS	1	E
		ASSY (figure 6-13 for BKDN)		
	14805-19	. . MOUNTING PLATE AND CONTROLS	1	F
		ASSY (figure 6-13 for BKDN)		
	14805-24	. . MOUNTING PLATE AND CONTROLS	1	G
		ASSY (figure 6-13 for BKDN)		
		(ATTACHING PARTS)		
-6	MS35206-228	. . SCREW (KD)	5	
-7	MS35338-41	. . WASHER (KD)	5	
		---*---		
-8	14986	. . GUARD, Emergency pressure control	1	
		(ATTACHING PARTS)		
-9	MS35206-213	. . SCREW (KD)	2	
-10	MS35338-40	. . WASHER (KD)	2	
		---*---		
-11	14842	. . BEAM AND FULCRUM ASSY	1	
		(ATTACHING PARTS)		
-12	MS35265-16	. . SCREW (KD)	1	
-13	MS35338-40	. . WASHER (KD)	1	
		---*---		
-14	14804	. . RETAINER SCREEN AND	1	
		SHROUD ASSY		
		(ATTACHING PARTS)		
-15	MS35265-30	. . SCREW (KD)	4	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-12-16	MS35338-41	. . WASHER (KD)	4	
		---*---		
-17	14836-1	. . STEM ASSY, Emergency pressure control adjusting	1	
-18	14839	. . . SCREW, Emergency pressure control adjusting	1	
-19	14853	. . . NUT, Adjustment lock	1	
-20	AS142CC4	. . . WASHER (KD)	1	
-21	14838-1	. . . STEM, Emergency pressure control	1	
-22	14837-1	. . . BEARING, Emergency pressure control stem	1	
-23	19626	. . BLINKER ASSY (figure 6-14 for BKDN)	1	
		(ATTACHING PARTS)		
-24	19543-2	. . SCREW (KD)	2	
-25	149010-1	. . PACKING, Preformed (KC)	1	
-26	14827	. . CONNECTOR, 3/32 tubing (KD)	1	
-27	14826	. . SLEEVE, 3/32 tubing (KD)	1	
	17923	. . GAGE AND BRACKET ASSY, Oxygen cylinder pressure	1	ADEF
	16152	. . GAGE AND BRACKET ASSY, Oxygen cylinder pressure	1	BC
		(ATTACHING PARTS)		
-28	MS35206-213	. . SCREW (KD)	3	
-29	MS35338-40	. . WASHER (KD)	3	
		---*---		
-30	14941	. . . BRACKET, Gage mounting	1	
		(ATTACHING PARTS)		
-31	Y3-6-2C	. . . SCREW	2	
-32	MS35338-41	. . . WASHER (KD)	2	
		---*---		
-33	14953	. . . GAGE ASSY, Oxygen cylinder pressure	1	ADEF
	14938	. . . GAGE ASSY, Oxygen cylinder pressure	1	BC
-34	15750	. . . . POINTER	1	
-35	15749	. . . . DIAL, Face	1	ADEF
	15751	. . . . DIAL, Face	1	BC
-36	14945	. . PACKING, Preformed (KC)	1	
	17922	. . CONTROL ASSY, Pressure breathing valve	1	
		(ATTACHING PARTS)		
-37	MS35265-16	. . SCREW (KD)	2	
-38	MS35265-14	. . SCREW (KD)	2	
-39	AS142CC4	. . WASHER (KD)	4	
		---*---		
-40	12249	. . . NUT (KD)	1	
-41	MS35333-39	. . . WASHER (KD)	1	
-42	14931	. . . HOUSING, Pressure breathing aneroid	1	
-43	17815	. . . ANEROID ASSY	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-12-44	17750-1	. . . SHIM, 0.002 inch thick (KD)	AR	
	17750-2	. . . SHIM, 0.003 inch thick (KD)	AR	CDEF
	17750-3	. . . SHIM, 0.005 inch thick (KD)	AR	CDFF
	17750-4	. . . SHIM, 0.010 inch thick (KD)	AR	
	17750-5	. . . SHIM, 0.020 inch thick	AR	CDEF
	17750-6	. . . SHIM, 0.155 inch thick (KD)	AR	
	17750-7	. . . SHIM, 0.100 inch thick	AR	CDEF
	17750-8	. . . SHIM, 0.050 inch thick	AR	CDEF
-45	#14954-1	. . . LOCKNUT, 0.109 inch long (KD)	1	
	#14954-2	. . . LOCKNUT, 0.127 inch long (KD)	1	
	#14954-3	. . . LOCKNUT, 0.144 inch long (KD)	1	
	#14954-4	. . . LOCKNUT, 0.162 inch long (KD)	1	
-46	14955	. . . RETAINER, Spring (KD)	1	
-47	14959	. . . SPRING, Safety pressure auto . . . . . pressure breather (KD)	1	
-48	#17621-1	. . . SCREW, Socket set 5/16 inch long (KD) . . .	1	
	#17621-2	. . . SCREW, Socket set 3/8 inch long (KD)	1	
	#17621-3	. . . SCREW, Socket set 7/16 inch long (KD) . . .	1	
	#17621-4	. . . SCREW, Socket set 1/2 inch long (KD)	1	CDEF
-49	14930	. . SPACER, Pressure breather housing	1	
-50	14944	. . DIAPHRAGM ASSY (KC)	1	
-51	14934	. . VALVE ASSY, Pressure breather	1	
-52	16210	. . . PLATE	1	
-53	16157	. . . GUIDE . . . . . (ATTACHING PARTS)	1	
-54	AS108CC348-5	. . . SCREW (KD) . . . . . ---*---	3	
-55	900212	. . . PIN, Actuating (KD)	1	
-56	#15959-1	. . . SHIM (KD)	1	
	#15959-2	. . . SHIM (KD)	1	
	#15959-3	. . . SHIM (KD)	1	
	#15959-4	. . . SHIM (KD)	1	
	#15959-5	. . . SHIM (KD)	1	
	#15959-6	. . . SHIM (KD)	1	AB
	#15959-7	. . . SHIM (KD)	1	AB
-57	15697	. . . PACKING, Preformed (KC)	1	
-58	14840-1	. . GUIDE ASSY, Emergency pressure . . . . . control stem (ATTACHING PARTS)	1	
-59	AS108CC440-7	. . SCREW (KD) . . . . . ---*---	2	
-60	14851-1	. . GUIDE ASSY, Supply control stem . . . . . (ATTACHING PARTS)	1	
-61	AS108CC440-7	. . SCREW (KD) . . . . . ---*---	2	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-12-62	14880	. . VALVE ASSY, Second stage relief ..... (figure 6-15 for BKDN)	1	AB
	14880-2	. . VALVE ASSY, Second stage relief ..... (figure 6-15 for BKDN) (ATTACHING PARTS)	1	CDEFG
-63	MS35265-13	. . SCREW (KD)	3	
-64	MS35338-40	. . WASHER (KD) ..... ---*---	3	
-65	14908	. . GASKET, Relief valve (KC)	1	
-66	19551	. . . PLATE, Identification	1	A
	19159	. . . PLATE, Identification	1	B
	19630	. . . PLATE, Identification	1	C
	19652	. . . PLATE, Identification	1	D
	19654	. . . PLATE, Identification	1	E
	19653	. . . PLATE, Identification	1	F
	19656	. . . PLATE, Identification ..... (ATTACHING PARTS)	1	G
-67	MS35206-201	. . . SCREW (KD) ..... ---*---	2	
-68	14866	. . CONTROL ASSY, Emergency pressure ..... (figure 6-16 for BKDN) (ATTACHING PARTS)	1	
-69	MS35265-13	. . SCREW (KD)	1	
-70	MS35338-40	. . WASHER (KD)	1	
-71	MS35265-10	. . SCREW (KD)	7	
-72	MS35338-39	. . WASHER (KD) ..... ---*---	7	
-73	14863	. . DIAPHRAGM, Outer (KC)	1	
-74	14865	. . SPACER, Diaphragm	1	
-75	19457	. . DIAPHRAGM AND PLATE ASSY (KC)	1	
-76	14975	. . LEVER ASSY, Demand valve ..... (ATTACHING PARTS)	1	
-77	16343	. . PIN, Vane mounting (KD) ..... ---*---	1	
-78	14562	. . PALNUT, (KD)	1	
-79	14978	. . SCREW (KD)	1	
-80	19571	. . SPRING, Demand valve lever (KD)	1	CDEFG
-81	14979	. . FULCRUM, Demand valve (KD) ..... (ATTACHING PARTS)	1	
-82	MS35206-203	. . SCREW (KD)	1	
-83	MS35333-35	. . WASHER (KD) ..... ---*---	1	
-84	14949-1	. . DILUTER PLATE CONTROL ..... HOUSING AND CHECK VALVE ASSY (figure 6-17 for BKDN) (ATTACHING PARTS)	1	
-85	MS35206-215	. . SCREW (KD)	4	
-86	MS35206-221	. . SCREW (KD)	2	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-12-87	MS35338-40	. . WASHER (KD)	4	
		---*---		
-88	14831-1	. . SPRING, First stage regulating (KD)	1	
-89	14903-1	. . PLATE, First stage cover	1	
		(ATTACHING PARTS)		
-90	AS108CC440-4	. . SCREW (KD)	6	
		---*---		
-91	14904-1	. . GASKET, First stage (KC)	1	
-92	14832	. . VALVE AND LEVER ASSY, First	1	
		stage regulator		
		(ATTACHING PARTS)		
-93	14958	. . SCREW, First stage lever pivot (KD)	1	
-94	14957	. . WASHER, Tension (KD)	1	
		---*---		
-95	14905	. . BELLOWS ASSY, First stage regulator	1	
-96	14907	. . GASKET, First stage bellows (KC)	1	
-97	14890-8	. . MANIFOLD INLET ASSY	1	ADEFG
		(figure 6-18 for BKDN)		
	14890-9	. . MANIFOLD INLET ASSY	1	BC
		(figure 6-18 for BKDN)		
		(ATTACHING PARTS)		
-98	MS35266-67	. . SCREW (KD)	2	
-99	MS35338-43	. . WASHER (KD)	2	
		---*---		
-100	14909-11	. . PACKING, Preformed (KC)	1	
-101	16695	. . GROMMET (KC)	1	
-102	14966-2	. . SEAT VALVE ASSY, First stage (KD)	1	
-103	13040-1	. . PLUG, Pipe 1/8 (KD)	1	
-104	14972	. . SCREW, Demand valve retaining	1	
-105	14909-9	. . PACKING, Preformed (KC)	1	
-106	16212	. . SPRING, Demand valve (KD)	1	
-107	15882	. . VALVE ASSY, Demand (KC)	1	
-108	14973	. . SEAT, Demand valve (KD)	1	
-109	14909-5	. . PACKING, Preformed (KC)	1	
-110	14982	. . PIN, Demand valve (KD)	1	
-111	14879	. . PLUG, Demand valve feed port (KD)	1	
-112	16664	. . GASKET (KC)	1	
-113	14909-5	. . PACKING, Preformed (KC)	1	
-114	14824	. . PLATE Panel light cord anchor	1	
		(ATTACHING PARTS)		
-115	MS35206-213	. . SCREW (KD)	2	
-116	MS35338-40	. . WASHER (KD)	2	
-117	14823	. . BUSHING, Panel light electrical cord (KC) . . .	1	
-118	9177	. . RETAINER, Relief valve spring (KD)	1	
-119	16381	. . SPRING, Relief valve (KD)	1	
-120	16379	. . VALVE ASSY, First stage relief (KC)	1	
-121	11221	. . SEAT, Relief valve (KD)	1	
-122	14909-2	. . PACKING, Preformed (KC)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-12-123	812097-1	. . CAP, Sealing (KD)	1	
-124	14932	. . OUTLET, Regulator	1	
		(ATTACHING PARTS)		
-125	MS35649-282	. . NUT (KD)	2	
-126	AS103CC832H6	. . SCREW (KD)	1	
-127	AS103CC832H8	. . SCREW (KD)	1	
		---*---		
-128	14825-19	. . PACKING, Preformed (KC)	1	
-129	16480	. . SCREEN, Venturi (KD)	1	
-130	11760	. . VENTURI ASSY (figure 6-19 for BKDN)	1	
-131	11761	. . GASKET, Venturi nozzle (KC)	1	
-132	14998	. . . PIN, FULCRUM POSITIONING	1	
-133	14981-2	. . . GUIDE, Demand valve (KD)	1	
-134	14803-1	. . REGULATOR HOUSING AND DEMAND . . .	1	
		VALVE BUSHING ASSY		
	19660	PARTS KIT (Cure Date)	1	
	19552	PARTS KIT (Major Overhaul)	1	

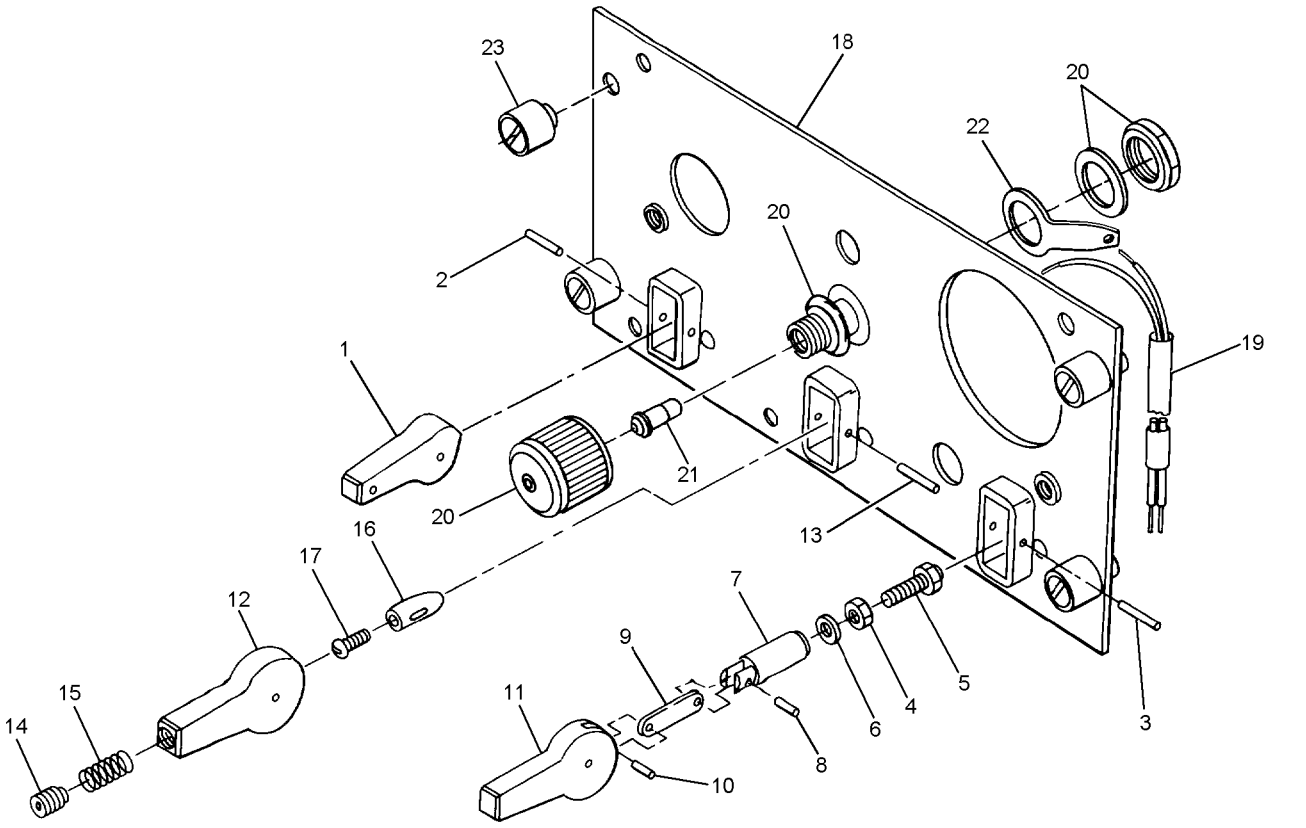


Figure 6-13. Mounting Plate and Controls Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-13	14805-7	MOUNTING PLATE AND CONTROLS ASSY . . . . (figure 6-12 for NHA)	REF	ABCD
	14805-18	MOUNTING PLATE AND CONTROLS ASSY . . . . (figure 6-12 for NHA)	REF	E
	14805-19	MOUNTING PLATE AND CONTROLS ASSY . . . . (figure 6-12 for NHA)	REF	F
	14805-24	MOUNTING PLATE AND CONTROLS ASSY . . . . (figure 6-12 for NHA)	REF	G
-1	14841-2	. LEVER, Emergency pressure control	1	
-2	14850	. PIN, Control lever (KD)	1	
	14852	. LEVER AND STEM ASSY, Supply valve control . . . . . (ATTACHING PARTS)	1	
-3	14850	. PIN, Control lever (KD) . . . . . ---*---	1	
-4	14853	. . NUT, Lock adjusting	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-13-5	14854	. . SCREW, Adjusting (KD)	1	
-6	AS142CC4	. . WASHER (KD)	1	
-7	14855	. . STEM, Supply valve control (ATTACHING PARTS)	1	
-8	14856	. . PIN, Stem, supply valve control ---*---	1	
-9	14858	. . LINK, Supply valve control (ATTACHING PARTS)	1	
-10	14857	. . PIN, Lever, supply valve control ---*---	1	
-11	14859	. . LEVER, Supply valve control	1	
-12	14849-1	. LEVER, Diluter valve control (ATTACHING PARTS)	1	
-13	14850	. PIN, Control lever (KD) ---*---	1	
-14	AS103CC832H6	. SCREW, Set (KD)	1	
-15	14847	. SPRING, Diluter lever follower (KD)	1	
-16	14848-3	. FOLLOWER ASSY, Diluter lever	1	
-17	AS105S080-4	. SCREW (KD)		
-18	14806	. REGULATOR MOUNTING PLATE ASSY	1	ABCD
	14806-12	. REGULATOR MOUNTING PLATE ASSY	1	E
	14806-13	. REGULATOR MOUNTING PLATE ASSY	1	F
	14806-16	. REGULATOR MOUNTING PLATE ASSY (Partial BKDN Follows)	1	G
-19	14809	. . CORD ASSY	1	
-20	MS25453-1	. . LIGHT ASSY	1	ABCDE
	19179-1	. . LIGHT ASSY	1	FG
-21	MS25237-327	. . LAMP (KD)	1	ABCDG
	MS25237-328	. . LAMP (KD)	1	EF
-22	742555-1	. . LUG, Terminal	1	
-23	19870	. . FASTENERS, DZUS	4	

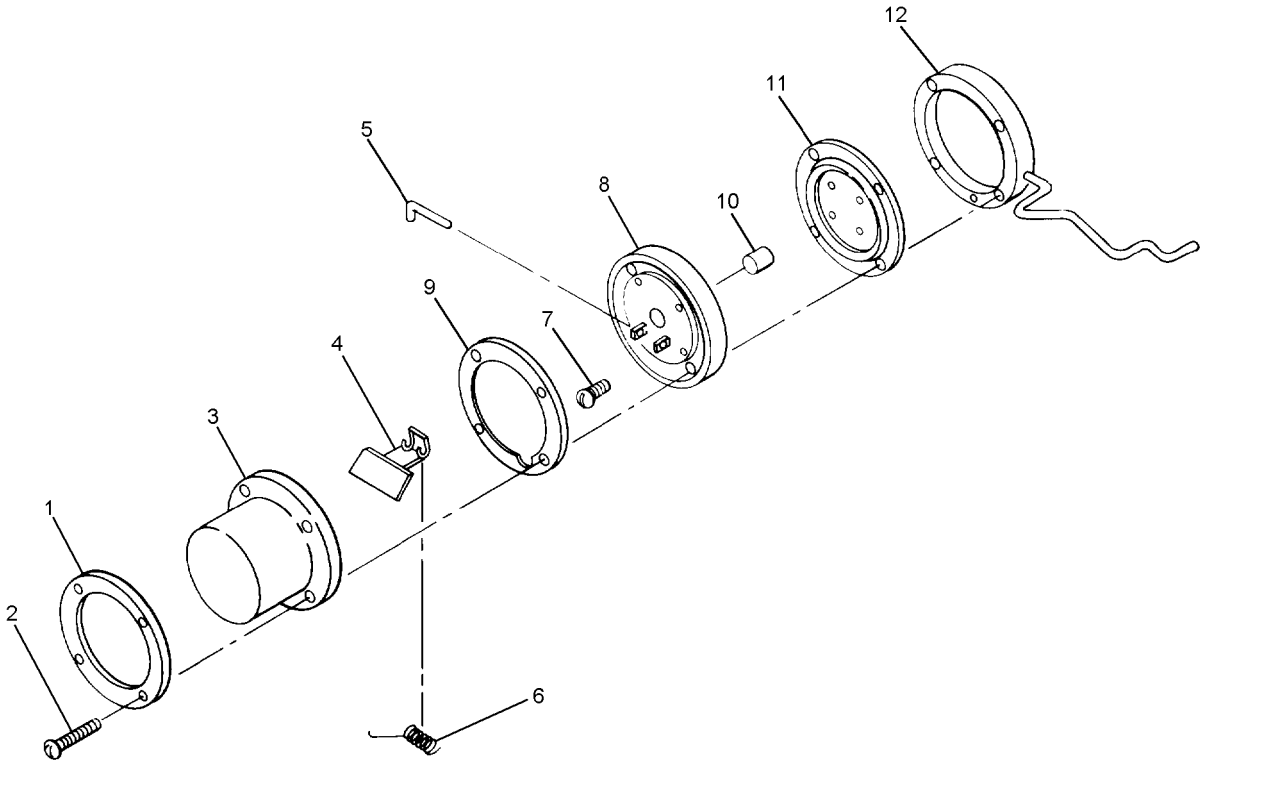
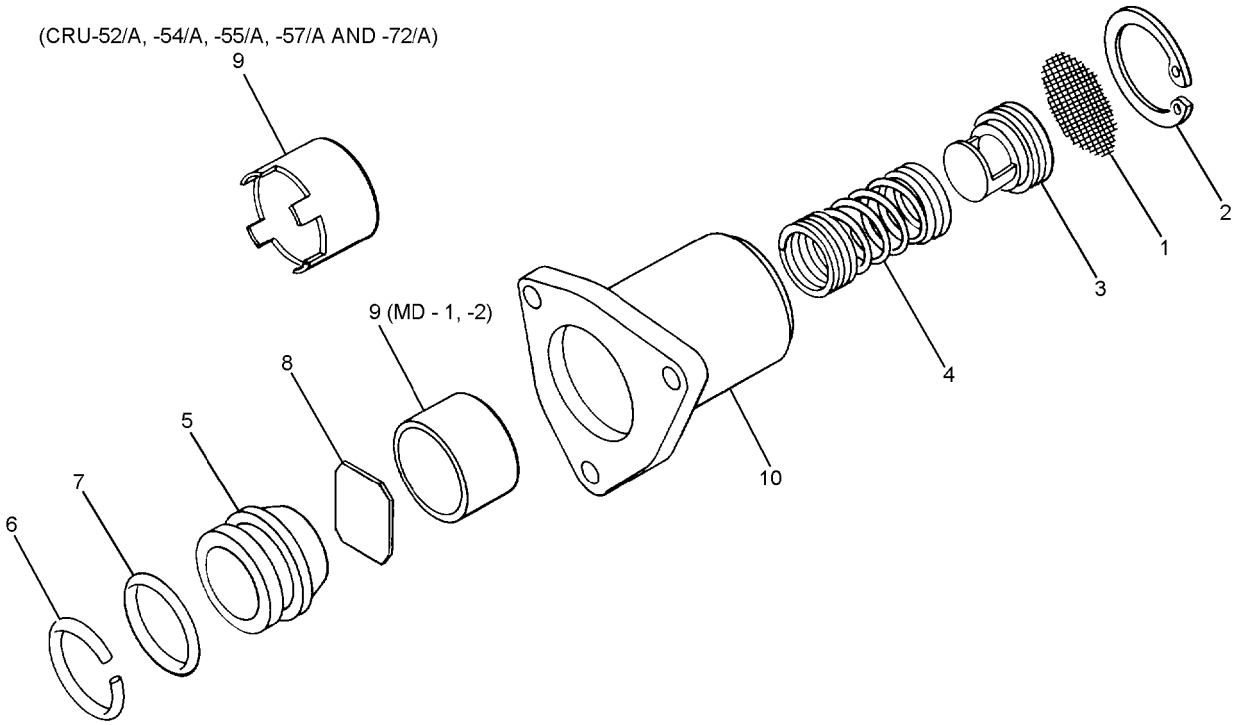


Figure 6-14. Blinker Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-14	19626	BLINKER ASSY . . . . . (figure 6-12 for NHA)	REF	
-1	19546	. RETAINER, Plate . . . . . (ATTACHING PARTS)	1	
-2	19543-1	. SCREW (KD) . . . . . ---*---	2	
-3	19618	. COVER	1	
-4	14819	. FLAG AND LEVER ASSY, Blinker . . . . . (ATTACHING PARTS)	1	
-5	14983	. PIN, Blinker (KD) . . . . . ---*---	1	
-6	14984	. SPRING, Blinker (KD)	1	
-7	MS35265-1	. SCREW	1	
-8	19616	. GUIDE, Actuator	1	
-9	19624	. GASKET (KC)	1	
-10	19623	. ACTUATOR, Blinker (KD)	1	
-11	14821	. DIAPHRAGM ASSY, Blinker (KC)	1	
-12	14987	. BLINKER TUBING AND BASE PLATE ASSY	1	



006015

Figure 6-15. Second Stage Relief Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-15	14880	VALVE ASSY, Second stage relief . . . . . (figure 6-12 for NHA)	REF	AB
	14880-2	VALVE ASSY, Second stage relief . . . . . (figure 6-12 for NHA)	REF	CDEFG
-1	708760-1	. SCREEN, Relief valve (KD) . . . . . (ATTACHING PARTS)	1	
-2	92587-50	. RETAINER, Ring internal type (KD) . . . . . ---*---	1	
-3	708763-1	. RETAINER, Spring (KD)	1	
-4	14886	. SPRING, Second stage relief valve (KD)	1	
-5	14883	. SEAT, Second stage relief valve (KD)	1	AB
	19332	. SEAT, Second stage relief valve (KD) . . . . . (ATTACHING PARTS)	1	CDEFG
-6	14881	. RING, Retaining, second stage relief (KD) . . . . . ---*---	1	
-7	14909-7	. PACKING, Preformed (KC)	1	
-8	14885	. VALVE, Second stage relief (KD)	1	
-9	14884	. SLEEVE, Second stage relief valve . . . . . guide (KD)	1	AB
	19333	. SLEEVE, Second stage relief valve . . . . . guide (KD)	1	CDEFG
-10	14882	. HOUSING, Second stage relief valve	1	AB
	14882-1	. HOUSING, Second stage relief valve		CDEFG

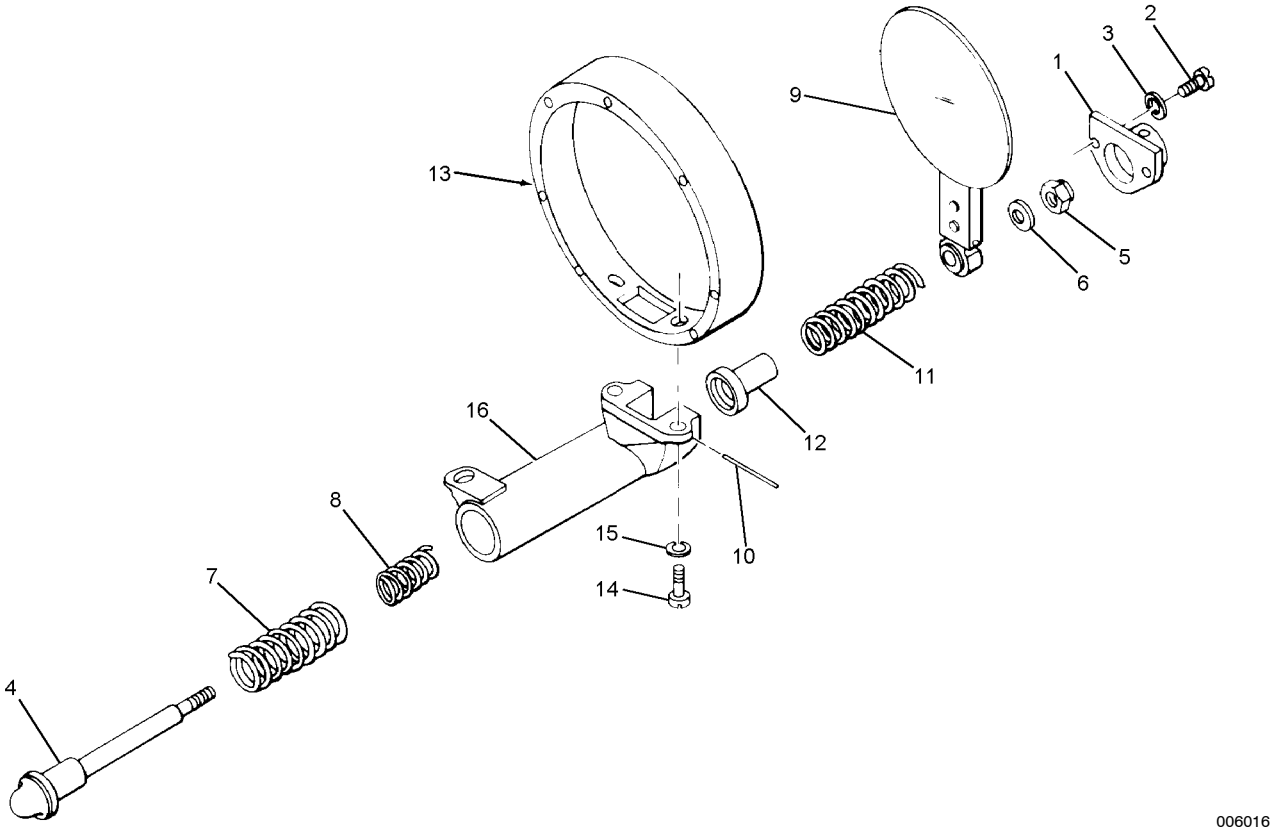
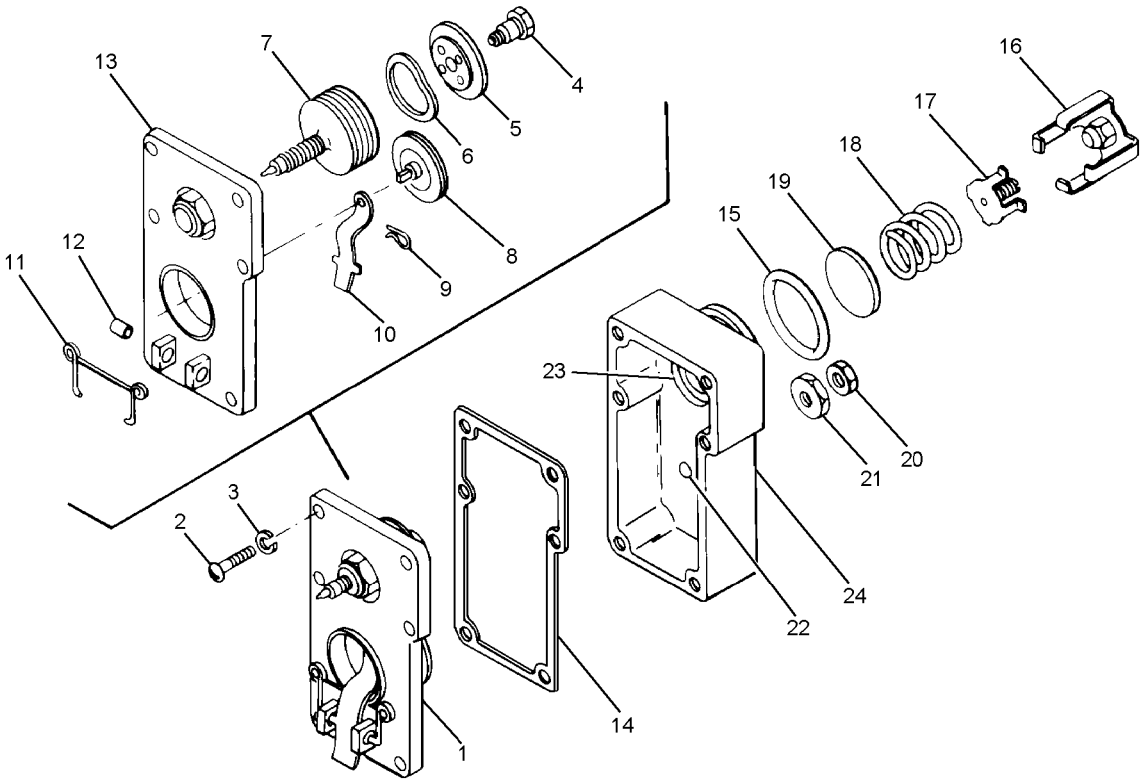


Figure 6-16. Emergency Pressure Control Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-16	14866	CONTROL ASSY, Emergency pressure . . . . . (figure 6-12 for NHA)	REF	
-1	14868	. CAP, Emergency pressure control . . . . . housing (KD) (ATTACHING PARTS)	1	
-2	MS35265-2	. SCREW (KD)	2	
-3	MS35338-39	. WASHER (KD) . . . . . ---*---	2	
-4	14875	. STEM, Emergency pressure lever (KD) . . . . . (ATTACHING PARTS)	1	
-5	16557	. NUT, Elastic (KD)	1	
-6	16479	. SWIVEL, Emergency pressure (KD) . . . . . ---*---	1	
-7	14878-1	. SPRING, Return emergency . . . . . pressure control (KD)	1	
-8	14877	. SPRING, Emergency pressure . . . . . control test (KD)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-16-9	14870	. CONTROL LEVER AND CENTER ASSY, Emergency pressure (ATTACHING PARTS)	1	
-10	14961	. PIN (KD) ---*---	1	
-11	14876	. SPRING, Helical compression emergency pressure (KD)	1	
-12	#14874-1	. GUIDE, Emergency pressure spring 0.500 inch long	1	
	#14874-2	. GUIDE, Emergency pressure spring 0.531 inch long	1	
	#14874-3	. GUIDE, Emergency pressure spring 0.546 inch long	1	
	#14874-4	. GUIDE, Emergency pressure spring 0.562 inch long	1	
	#14874-5	. GUIDE, Emergency pressure spring 0.578 inch long	1	
	#14874-6	. GUIDE, Emergency pressure spring 0.593 inch long	1	
	#14874-7	. GUIDE, Emergency pressure spring 0.662 inch long	1	
	#14874-8	. GUIDE, Emergency pressure spring 0.682 inch long	1	
	#14874-9	. GUIDE, Emergency pressure spring 0.702 inch long	1	
-13	14869	. COVER, Second stage (ATTACHING PARTS)	1	
-14	MS35265-13	. SCREW (KD)	2	
-15	MS35338-40	. WASHER (KD) ---*---	2	
-16	14867	. HOUSING, Emergency pressure control	1	



006017

Figure 6-17. Diluter Plate Control Housing and Check Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-17	14949-1	DILUTER PLATE CONTROL HOUSING . . . . . AND CHECK VALVE ASSY (figure 6-12 for NHA)	REF	
-1	14912-1	. PLATE ASSY, Diluter . . . . . (ATTACHING PARTS)	1	
-2	MS35206-216	. SCREW (KD)	4	
-3	MS35338-40	. WASHER (KD) . . . . . ---*---	4	
-4	#16284-1	. . SCREW, 0.062 inch long shoulder (KD)	1	
	#16284-2	. . SCREW, 0.067 inch long shoulder (KD)	1	
	#16284-3	. . SCREW, 0.073 inch long shoulder (KD)	1	
	#16284-4	. . SCREW, 0.078 inch long shoulder (KD)	1	
-5	766097-1	. . PLATE, Throttling (KD)	1	
-6	PB50828-1	. . WASHER, Spring (KD)	1	
-7	758632-1	. . ANEROID ASSY	1	
-8	14917	. . DILUTER VALVE ASSY (KC) . . . . . (ATTACHING PARTS)	1	
-9	16478	. . CLIP, Diluter lever (KD) . . . . . ---*---	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-17-10	14918-1	. . LEVER, Valve manual diluter (KD)	1	
-11	14920	. . CLIP, Retaining (KD)	1	
-12	14919	. . BUSHING (KD)	2	
-13	14913	. . PLATE AND SEAT ASSY, Diluter	1	
-14	14921	. GASKET, Diluter housing (KC)	1	
-15	14825-21	. PACKING, Preformed (KC)	1	
-16	11707	. RETAINER ASSY, Aneroid check valve	1	
-17	14937	. ADAPTER ASSY, Spring and screw (KD)	1	
-18	11706	. SPRING, Aneroid check valve (KD)	1	
-19	11705	. DISC, Check valve (KD)	1	
	14935-1	. HOUSING ASSY, Diluter control	1	
-20	19014	. . NUT, Lock, first stage adjusting (KD)	1	
-21	14830	. . NUT, First stage adjusting (KD)	1	
-22	14926	. . SCREW, First stage adjusting	1	
-23	14923	. . SEAT, Check valve	1	
-24	14910	. . HOUSING, Diluter control	1	

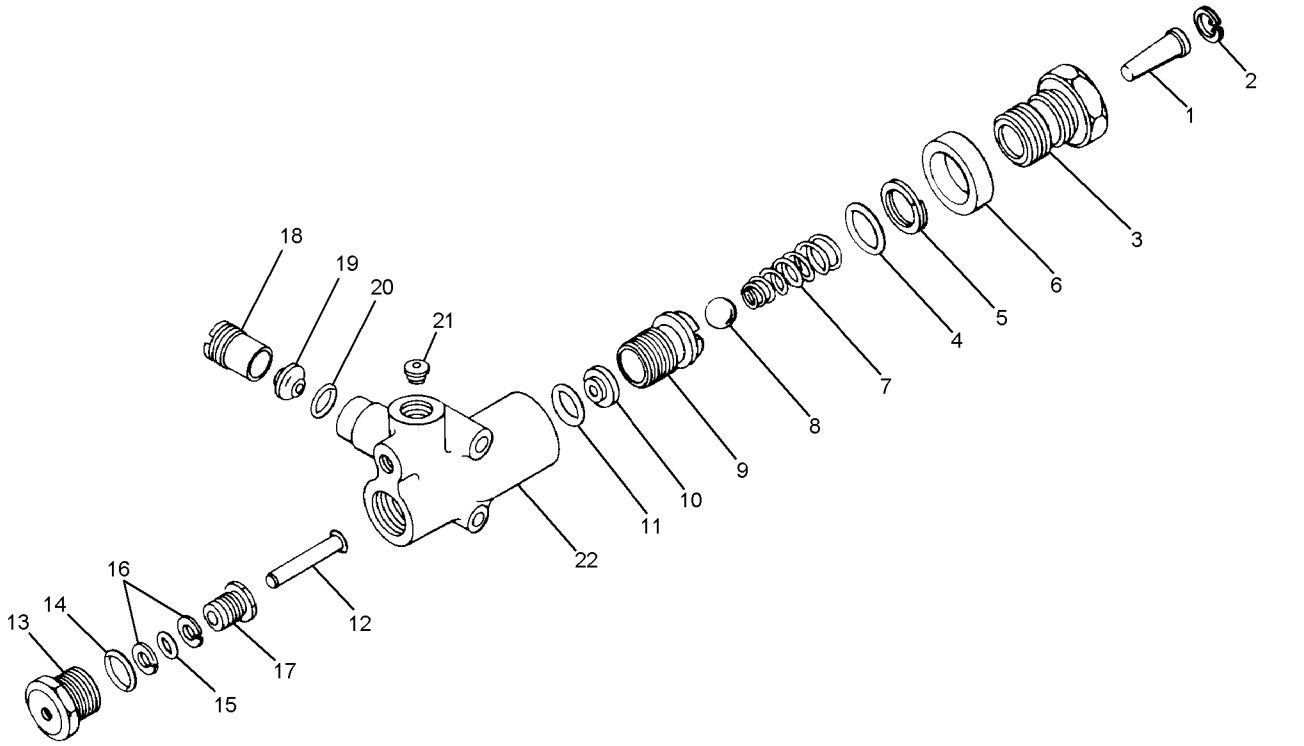
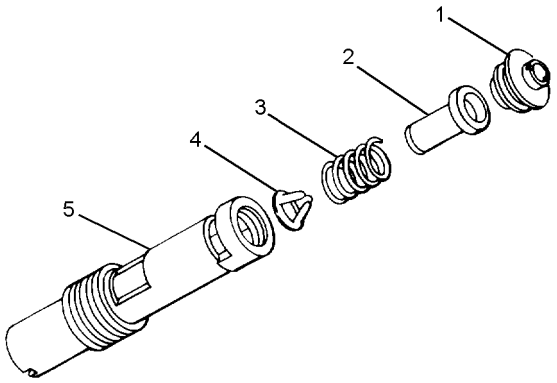


Figure 6-18. Manifold Inlet Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-18	14890-8	MANIFOLD INLET ASSY . . . . . (figure 6-12 for NHA)	REF	ADEF
	14890-9	MANIFOLD INLET ASSY . . . . . (figure 6-12 for NHA)	REF	BC
-1	14898	. FILTER, Oxygen (KD) . . . . . (ATTACHING PARTS)	1	
-2	0-521-72A	. RING, Snap (KD) . . . . . ---*---	1	
-3	14947	. ADAPTER, Manifold inlet	1	
-4	14909-11	. PACKING, Preformed (KC)	1	
-5	15746	. RING, Packing backup (KC)	1	
-6	14948	. SPACER, Locking (KD)	1	
-7	14899	. SPRING, Conical compression supply . . . . . valve (KD)	1	
-8	19755	. BALL (KD)	1	
-9	14900-1	. RETAINER, Inlet supply valve seat (KD)	1	
-10	19753	. SEAT, Supply valve (KD)	1	
-11	14909-5	. PACKING, Preformed (KC)	1	
-12	19754	. STEM, Supply valve (KD)	1	
-13	16798	. RETAINER, Manifold seal (KD)	1	
-14	14825-13	. PACKING, Preformed (KC)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-18-15	19157	. PACKING, Preformed (KC)	1	
-16	16795	. RETAINER, Packing (KC)	2	
-17	16796	. RETAINER, Manifold valve stem seal (KD)	1	
-18	15877	. RETAINER, Inlet valve (KD)	1	
-19	14902	. SEAT, Inlet valve first stage (KD)	1	BC
	16494	. SEAT, Inlet valve first stage (KD)	1	ADEFG
-20	14909-4	. PACKING, Preformed (KC)	1	
-21	AS140CBI	. PLUG (KD)	1	
-22	14893-2	. MANIFOLD, Inlet supply	1	



006019

Figure 6-19. Venturi Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-19	11760	VENTURI ASSY . . . . . (figure 6-12 for NHA)	REF	
-1	11795	. SEAT, Venturi (KD)	1	
-2	14943	. NOZZLE, Injector (KD)	1	
-3	PB54188-3	. SPRING, Injector (KD)	1	
-4	PB53042-1	. SPRING, Damping (KD)	1	
-5	11794	. HOUSING, Venturi	1	

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#14874-5	6-16-12	
#14874-6	6-16-12	
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#14874-8	6-16-12	
#14874-9	6-16-12	PAGZZ
#14954-1	6-12-45	
#14954-2	6-12-45	
#14954-3	6-12-45	
#14954-4	6-12-45	
#15959-1	6-12-56	PAHZZ
#15959-2	6-12-56	
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#15959-4	6-12-56	
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#15959-6	6-12-56	
#15959-7	6-12-56	PAOZZ
#16284-1	6-17-4	
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AS108CC440-4	6-12-90	
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MS35206-213	6-12-9	PAOZZ
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MS35206-221	6-12-86	PAOZZ
MS35206-228	6-12-6	PAOZZ
MS35265-1	6-14-7	PAGZZ
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MS35265-10	6-12-71	PADZZ
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MS35265-25	6-12-2	PAOZZ
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MS35266-67	6-12-98	
MS35333-35	6-12-83	PAOZZ
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MS35338-43	6-12-99	PAOZZ
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PB50828-1	6-17-6	PAOZZ
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11707	6-17-16	PAOZZ
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14838-1	6-12-21	
14839	6-12-18	
14840-1	6-12-58	PAHZZ
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14875	6-16-4	PAOZZ
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14883	6-15-5	PAOZZ
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14885	6-15-8	
14886	6-15-4	
14890-8	6-12-97	
	6-18-	
14890-9	6-12-97	
	6-18-	
14893-2	6-18-22	PADZZ
14898	6-18-1	
14899	6-18-7	
14900-1	6-18-9	

NUMERICAL INDEX (Cont)

Part Number	Figure and Index Number	SM&R Code
14902	6-18-19	PAOZZ
14903-1	6-12-89	PAOZZ
14904-1	6-12-91	
14905	6-12-95	PAOZZ
14907	6-12-96	
14908	6-12-65	PAGZZ
14909-1	6-12-25	
14909-11	6-12-100	
	6-18-4	
14909-2	6-12-122	
14909-4	6-18-20	
14909-5	6-12-109	
	6-12-113	
	6-18-11	
14909-7	6-15-7	
14909-9	6-12-105	
14910	6-17-24	
14912-1	6-17-1	
14913	6-17-13	PAOZZ
14917	6-17-8	
14918-1	6-17-10	PAOZZ
14919	6-17-12	
14920	6-17-11	
14921	6-17-14	
14923	6-17-23	
14926	6-17-22	
14930	6-12-49	
14931	6-12-42	
14932	6-12-124	PAOZZ
14934	6-12-51	PAOZZ
14935-1	6-17-19	PAOZZ
14937	6-17-17	
14938	6-12-33	PAGZZ
14941	6-12-30	
14943	6-19-2	PAOZZ
14944	6-12-50	
14945	6-12-36	
14947	6-18-3	PAOZZ
14948	6-18-6	
14949-1	6-12-84	
	6-17	
14950-26A	6-12	PAOHD
14950-27A	6-12	PAOGD
14950-28A	6-12	PAOGD
14950-30	6-12	PAHHD
14950-7B	6-12	PAHHD
14951-26A	6-12	

Part Number	Figure and Index Number	SM&R Code
14951-27A	6-12	
14951-28A	6-12	
14951-30	6-12	
14951-7B	6-12	
14953	6-12-33	
14955	6-12-46	
14957	6-12-94	
14958	6-12-93	
14959	6-12-47	
14961	6-16-10	
14966-2	6-12-102	PAOZZ
14972	6-12-104	PAOZZ
14973	6-12-108	PAOZZ
14975	6-12-76	PAOZZ
14978	6-12-79	PAOZZ
14979	6-12-81	
14981-2	6-12-133	
14982	6-12-110	
14983	6-14-5	
14984	6-14-6	
14986	6-12-8	
14987	6-14-12	PAOZZ
14998	6-12-132	
15697	6-12-57	
15746	6-18-5	
15749	6-12-35	
15750	6-12-34	
15751	6-12-35	PAGZZ
15877	6-18-18	
15882	6-12-107	
16152	6-12-27	PAOZZ
16157	6-12-53	
16210	6-12-52	PAGZZ
16212	6-12-106	
16343	6-12-77	
16379	6-12-120	
16381	6-12-119	
16478	6-17-9	
16479	6-16-6	
16480	6-12-129	
16494	6-18-19	PAOZZ
16557	6-16-5	
16664	6-12-112	
16695	6-12-101	
16795	6-18-16	
16796	6-18-17	
16798	6-18-13	

NUMERICAL INDEX (Cont)

Part Number	Figure and Index Number	SM&R Code
17750-1	6-12-44	
17750-2	6-12-44	
17750-3	6-12-44	
17750-4	6-12-44	
17750-5	6-12-44	
17750-6	6-12-44	
17750-7	6-12-44	
17750-8	6-12-44	
17815	6-12-43	PADZZ
17922	6-12-36	PAOGZ
17923	6-12-27	PADZZ
19014	6-17-20	PAOZZ
19157	6-18-15	
19159	6-12-66	
19179-1	6-13-20	
19332	6-15-5	PAOZZ
19333	6-15-9	
19457	6-12-75	
19539	6-12-1	PAOZZ
19543-1	6-14-2	
19543-2	6-12-24	PAOZZ
19546	6-14-1	
19551	6-12-66	
19552	6-12-134	PAOZZ
19571	6-12-80	PAOZZ
19616	6-14-8	PADZZ
19618	6-14-3	PAOZZ
19623	6-14-10	
19624	6-14-9	
19626	6-12-23	PAOZZ
	6-14	
19630	6-12-66	
19652	6-12-66	
19653	6-12-66	
19654	6-12-66	
19656	6-12-66	
19660	6-12-134	PAOZZ
19753	6-18-10	
19754	6-18-12	
19755	6-18-8	PAOZZ
19870	6-13-23	
708760-1	6-15-1	
708763-1	6-15-3	PAOZZ
742555-1	6-13-22	PAOZZ
758632-1	6-17-7	PAOZZ
766097-1	6-17-5	PAOZZ
812097-1	6-12-123	
900212	6-12-55	
9177	6-12-118	
92587-50	6-15-2	PAOZZ

CHAPTER 7

AIRCRAFT PANEL MOUNTED OXYGEN REGULATORS P/N 29255 SERIES

Section 7-1. Description

7-1. GENERAL.

NOTE

For CRU-96/A, P/N 29255-6BB1 and CRU-97/A, P/N 29255-10AB-12, refer to Chapter 13 for Bench Testing and Lamp Installation procedures.

7-2. Aircraft Panel Mounted Oxygen Regulators, P/N 29255 Series (figure 7-1 and 7-2) are manufactured by Litton Life Support, formerly the Bendix Corporation (CAGE 99251). They are designed to regulate breathing oxygen supplied to the aircrewmember during flight. Table 7-1 contains leading particulars for the regulators.

7-3. All controls and indicators necessary for indication of performance and operation of the regulator are located on an illuminated panel with the regulating components attached to the mounting plate and controls assembly.

7-4. The regulators are panel mounted, automatic positive pressure diluter demand-type regulators and are used in conjunction with a pressure breathing-type oxygen mask. The regulators provide 100% oxygen or an air/oxygen mixture at the correct ratio, depending on altitude, to the user on demand. The regulators incorporate an emergency pressure control toggle. During normal operation, the toggle is set in the NORMAL position. A TEST MASK position is provided to test the oxygen supply function of the regulator at low altitudes and ground level. When in the EMERGENCY position, the regulator delivers 100% oxygen to the user at a positive pressure. The EMERGENCY position is used when inadequate oxygen supply is suspected.

7-5. CONFIGURATION.

7-6. The regulators are supplied in two basic configurations: low pressure (50 to 500 psig operating pressure range), and high pressure (50 to 2000 psig operating range).

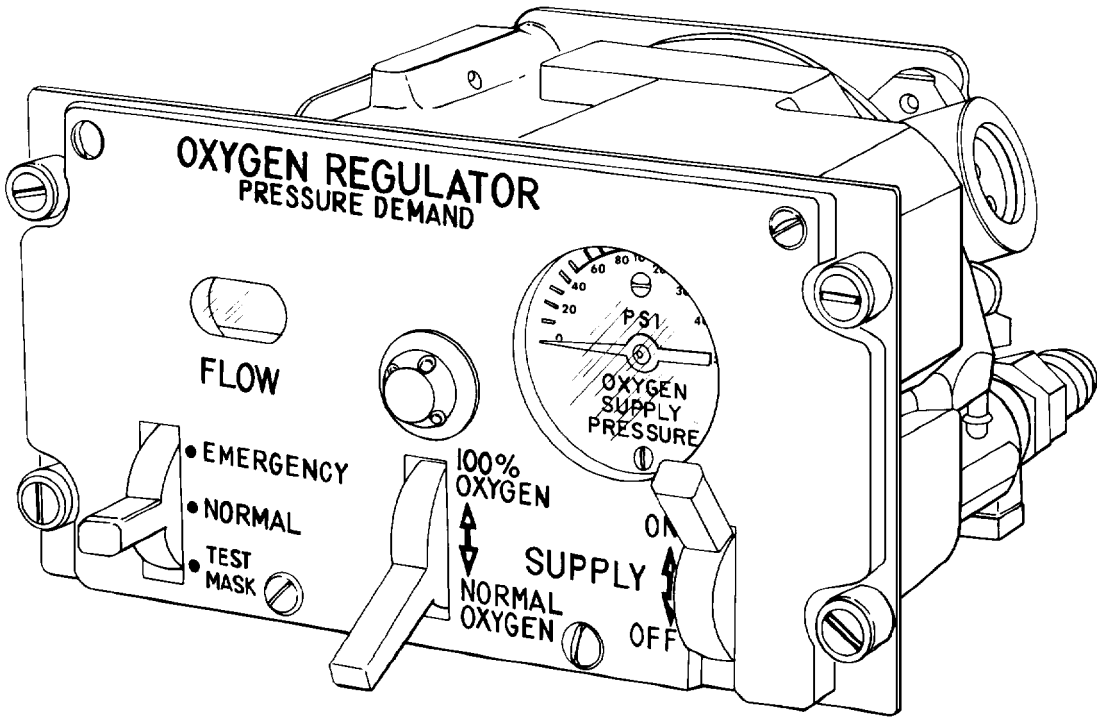
7-7. FUNCTION.

7-8. Characteristics and performance for which the regulators are designed are described below. Numbers in parentheses relate to numbers in figure 7-3.

1. Supply oxygen is admitted to the regulator through the inlet valve assembly (1) and is registered on the supply pressure gage (23) regardless of the position of the supply toggle (15). The oxygen passes into the pressure reducer assembly (2) where pressure is reduced to 37 to 45 psig.

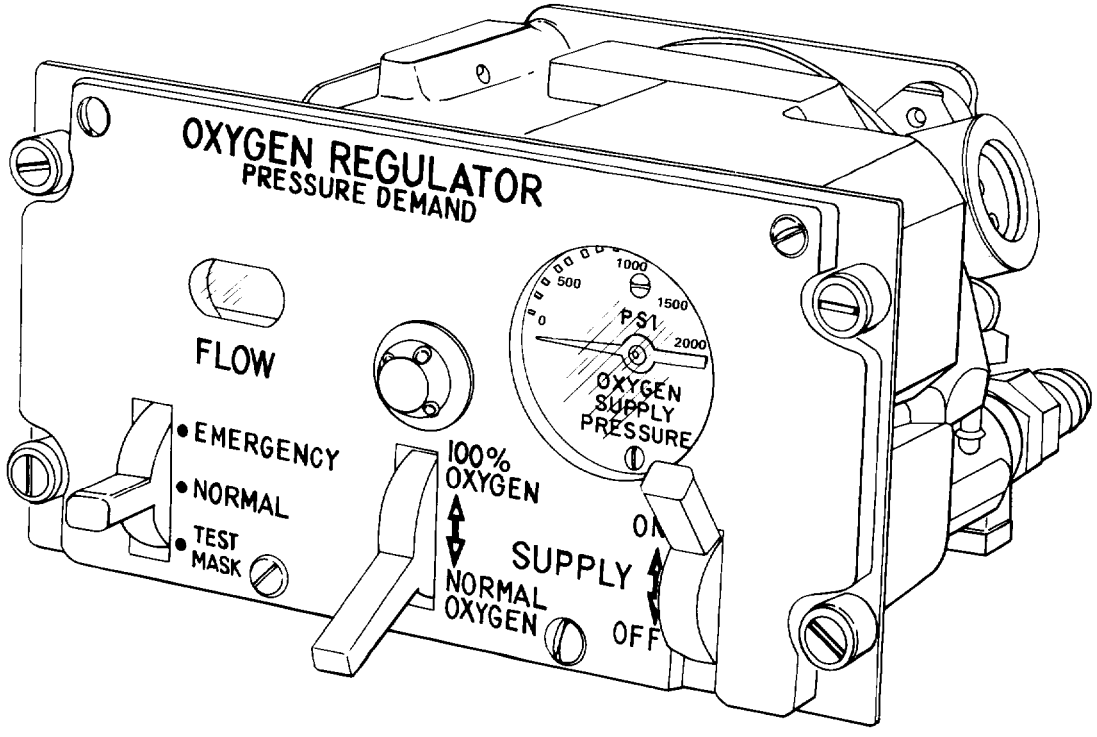
2. Air is admitted to the regulator through the aneroid and air shutoff assembly (4). The air-oxygen mixture is delivered to the mask by means of a flexible hose attached to the outlet of the regulator (5).

3. The flow indicator blinker assembly (6) is secured in the mounting panel and is seen through the window in the panel. The pressure drop across the injector (8) operates the blinker assembly. When the face shows white, the blinker is in a breathing cycle. When the flow stops, the pressure is equalized through the flow indicator feedback passage (14). The blinker returns to the normal position and the face shows black. Thus, an indication of flow is shown at each breathing cycle.



007001

Figure 7-1. Aircraft Panel Mounted Oxygen Regulator, Low Pressure, P/Ns 29255-10A-A1, 29255-10A-B9, 29255-10A-A2, 29255-10A-A4, 29255-10A-A5, 29255-10A-A9, 29255-10A-A17, 29255-10AB10 (CRU-54/A), 29255-10AB11 (CRU-55/A), 29255-10A-A1A, 29255-10A-B9A, 29255-10A-A2A, 29255-10A-A4A, 29255-10A-A5A, 29255-10A-A9A, 29255-10A-A17A, 29255-10A-B10A, and 29255-10A-B11A



007002

Figure 7-2. Aircraft Panel Mounted Oxygen Regulator, High Pressure, P/Ns 29255-6B-B1, 29255-6B-A1, 29255-6B-A1A, and 29255-6B-B1A

Table 7-1. Leading Particulars

Low Pressure	50 to 500 psig
High Pressure	50 to 2000 psig
Voltage	28 Vdc
Mounting	Panel
Operating Altitude Range:	
Normal Breathing	Up to 30,000 ft
Pressure Breathing starts	At 30,000 ft
Air-Oxygen Mixture	Up to 32,000 ft
100% Oxygen Delivery Starts	At 32,000 ft
Visual Indicators	Pressure Gage and Flow
Regulator Controls:	Indicator on Front Panel
Diluter Toggle	Selects NORMAL or 100% OXYGEN
Supply Toggle	Opens and closes oxygen supply
Emergency Toggle	For emergency, and ground test of mask
Overall Dimensions:	
Length	5.75 in
Width	3.00 in
Height	4.25 in
Weight	2.75 lb

4. The demand valve assembly (7) is positioned in a chamber which has three openings. The one at the upstream end of the valve opens into the pressure reducer chamber. The other two are on the downstream side of the valve. One opens into the flow indicator channel and the other opens into the injector assembly (8). The valve is maintained in its normally-closed position by the spring-loaded demand valve lever which is in contact with the valve stem. When the mask wearer inhales, the inner diaphragm (11) moves inward and opens the demand valve through the medium of a linkage system.

5. The injector (8) consists of a silicone nozzle and a housing. These are mounted in the regulator housing, downstream from the demand valve (7) and upstream from the mixing tube (16). The injector housing is positioned in the regulator housing so the cutaway portion of the injector housing is open to the port from the aneroid and air shutoff assembly (4). When the demand valve is opened, oxygen is forced through the nozzle in the injector, and to the oxygen mask. The flow of oxygen through the nozzle causes a low pressure area that opens the check valve adapter and spring assembly, allowing

ambient air to mix with the oxygen, when the diluter toggle is at NORMAL OXYGEN and altitude is below 32,000 feet. Excessive pressure in the regulator is prevented by the relief valve (18).

6. The aneroid and air shutoff assembly (4) contains an aneroid which gradually expands as atmospheric pressure decreases. Expansion of the aneroid progressively decreases the distance separating a throttling plate and an air valve flange (19) until, at an altitude of approximately 32,000 feet, the air passage through the regulator is completely closed.

7. The check valve adapter and spring assembly (9) consists of a spring-loaded disc pressing against a seat at the bottom of the aneroid housing. When seated, the check valve closes the air passage. Inhalation unseats the check valve and allows air to be sucked in through the aneroid and air shutoff assembly (4). The air mixes with the oxygen in the mixing tube (16) and the resulting mixture passes to the mask.

8. The lever and bracket assembly (10) is part of a linkage system connecting the inner diaphragm (11) and the demand valve assembly (7). By placing the emergency pressure toggle (20) in the EMERGENCY or TEST MASK position, the lever and bracket assembly will be depressed which, in turn, depresses the demand valve lever and opens the demand valve (7) to permit a flow of oxygen.

9. The manual safety pressure assembly (13) is a mechanism which can be manually operated under emergency conditions to increase the outlet pressure of the oxygen regulator. The mechanism includes the emergency pressure toggle which can be moved to the EMERGENCY, NORMAL, or TEST MASK position.

10. The pressure breathing assembly consists of an aneroid (21) and a seat and matched valve assembly (22). At approximately 30,000 feet the assembly begins to function, delivering an automatic positive pressure to the user.

7-9. SERVICE LIFE.

7-10. Oxygen regulators shall remain in service for as long as they function correctly and do not require excessive repair (exceeds 75% of original cost of regulator). All affected silicone rubber parts shall be replaced whenever a regulator is disassembled for repair.

7-11. REFERENCE NUMBERS, ITEMS AND SUPPLY DATA.

7-12. Section 7-5, Illustrated Parts Breakdown, contains information on each assembly, subassembly, and component part of the regulators. The figure and index number, reference or part number, description, and units per assembly are provided with the breakdown.

Section 7-2. Modifications

7-13. GENERAL.

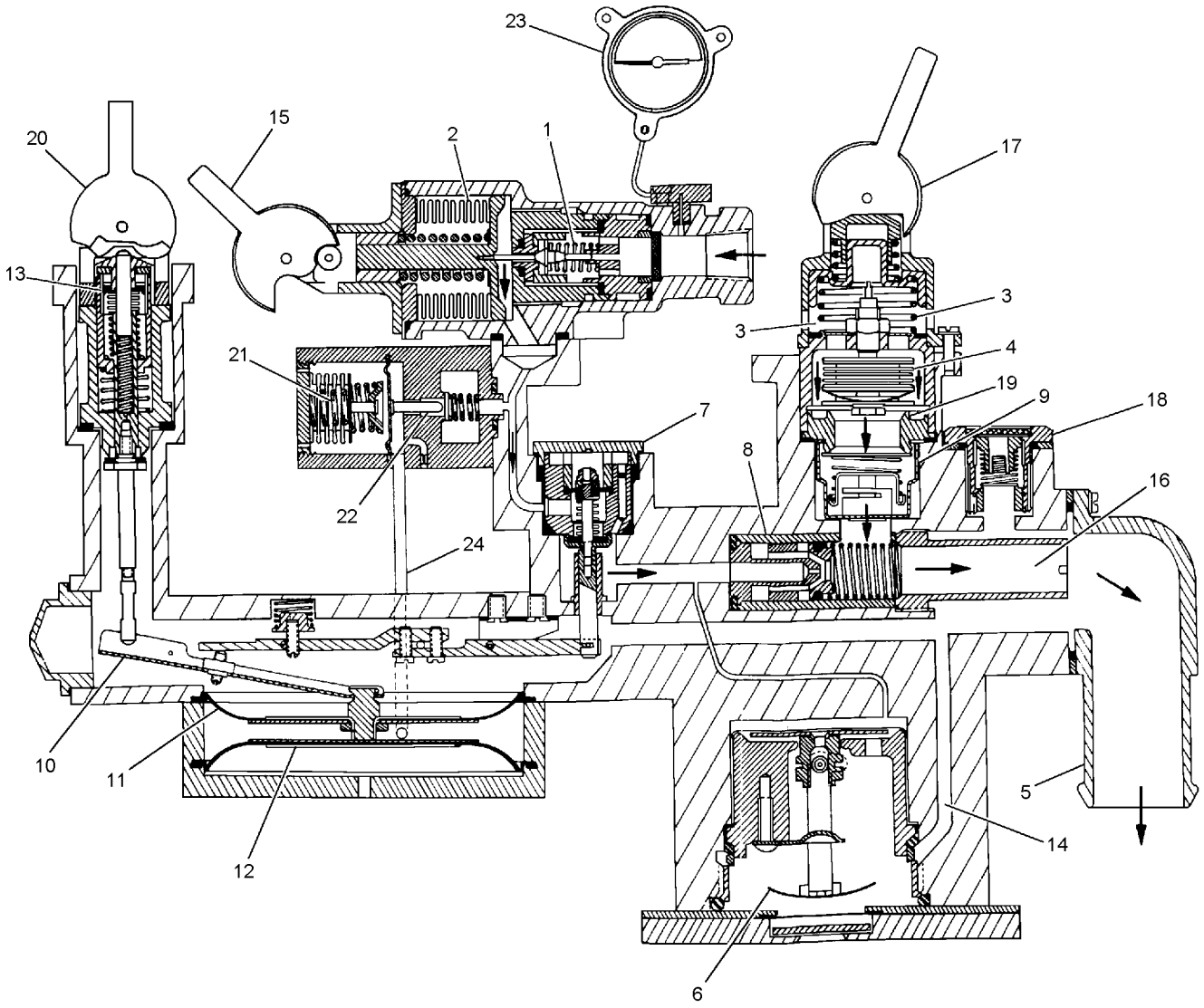
7-14. There are no authorized modifications to the 29255 series oxygen regulators at this time.

Section 7-3. Performance Test Sheet Preparation

7-15. GENERAL.

7-16. Preparation of Oxygen Regulator Performance Test Sheets require that, through the use of various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

7-17. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flows must be converted to inches of water pressure (inH_2O), the form of measurement which can be read on the test stand manometers.



1. INLET VALVE ASSEMBLY
2. PRESSURE REDUCER ASSEMBLY
3. AIR
4. ANEROID/ AIR SHUTOFF ASSEMBLY
5. REGULATOR OUTLET
6. FLOW INDICATOR
7. DEMAND VALVE
8. INJECTOR
9. CHECK VALVE ADAPTER AND SPRING ASSEMBLY
10. LEVER AND BRACKET ASSEMBLY
11. INNER DIAPHRAGM
12. OUTER DIAPHRAGM
13. MANUAL SAFETY PRESSURE ASSEMBLY
14. FLOW INDICATOR FEED BACK PASSAGE
15. SUPPLY TOGGLE
16. MIXING TUBE
17. DILUTER TOGGLE
18. RELIEF VALVE
19. AIR VALVE FLANGE
20. EMERGENCY PRESSURE TOGGLE
21. PRESSURE BREATHING ANEROID
22. PRESSURE BREATHING SEAT AND MATCHED VALVE ASSEMBLY
23. OXYGEN SUPPLY PRESSURE GAGE
24. PRESSURE BREATHING SENSING TUBE

007003

Figure 7-3. Regulator Operation

NOTE

The various graphs supplied with each Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

7-18. The information provided in the tables in this Section is to be recorded on the Performance Test Sheet (figure 7-4).

7-19. The Performance Test Sheet (figure 7-4) is a sample only, but may be reproduced for local use.

7-20. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Relief Valve Test.
2. Flow Suction Test.
3. Oxygen Ratio Test.
4. Safety Pressure/Pressure Breathing Test.
5. Blinker (Flow Indicator) Test.
6. Emergency Pressure Test.

7-21. REGULATOR PERFORMANCE TESTS.

7-22. RELIEF VALVE TEST. The relief valve shall vent at least 45 lpm at a specified pressure. The actual 45 lpm flow must be converted to an indicated inH_2O flow by using the nitrogen (N_2) line of the Vent Flow Graph. Convert the actual flow as follows:

1. Locate the 45 lpm line on the bottom of the Vent Flow Graph, and trace the line up to where it intersects the N_2 line.

2. Trace the line on the graph where the lpm and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this information in the appropriate block on the Performance Test Sheet.

7-23. FLOW SUCTION TEST. The Flow Suction Test shall be performed at sea level with the diluter control lever in both the 100% OXYGEN and NORMAL OXYGEN position. Actual (lpm) flows are converted to indicated (inH_2O) flows by using the sea level Output Graph. The air line is used for NORMAL OXYGEN flows, and the N_2 line is used for 100% OXYGEN flows. Convert the actual flows as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

1. Locate the desired lpm line (Performance Test Sheet, figure 7-4) at the bottom of the Sea Level Output Graph.

2. Trace selected lpm line up to where it intersects the air line (NORMAL indicated output) or N_2 line (100% indicated output).

3. Trace the line from point of intersection across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 7-4.

7-24. OXYGEN RATIO TEST. Actual flows and oxygen percentages (figure 7-4) used for the Oxygen Ratio Test must be converted to indicated flows and oxygen averages. All actual flows must be converted to indicated flows. The results of these computations shall be entered in the appropriate columns within the Oxygen Ratio Test portion of the Performance Test Sheet. To find average oxygen, indicated output, corrected indicated output, actual and indicated input flows, proceed as follows:

REGULATOR PERFORMANCE TEST SHEET

BENDIX 29255
SERIES REGULATORS

DATE _____ TYPE _____ SERIAL NO. _____

TEST STAND SERIAL NO. _____ TESTED BY _____ CDI _____

1. INWARD LEAKAGE TEST _____ 2. OUTLET LEAKAGE TEST _____
3. OXYGEN SUPPLY VALVE LEAKAGE TEST _____ 4. OVERALL LEAKAGE TEST _____
5. PRESSURE GAGE TEST: NOTE: TESTED AT AMBIENT TEMPERATURE OF 70°F.

LOW PRESSURE REGULATOR ONLY

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
50	±10		
100	±25		
500	±25		

HIGH PRESSURE REGULATORS ONLY

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
500	±50		
1000	±50		
1500	±50		

6. OUTWARD LEAKAGE TEST _____
7. RELIEF VALVE TEST
   a. VENTS 45 LPM _____ AT 40.7 inH_2O (3 INHg)
   b. LEAKAGE AT 17 INH_2O _____
8. FLOW SUCTION TEST

ALTITUDE	INLET PRESSURE (PSIG)	ACTUAL OUTPUT (LPM)	NORMAL		100 PERCENT		MAXIMUM SUCTION (INH_2O)
			INDICATED OUTPUT	READING	INDICATED OUTPUT	READING	
SEA LEVEL	50	30					-0.50
SEA LEVEL	150	50					-0.70
SEA LEVEL	150	85					-1.0

9. OXYGEN RATIO TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
   (INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OXYGEN PERCENT		OUTPUT				INPUT				
	MIN	MAX	AVERAGE PERCENT	ACTUAL OUTPUT (LPM)	INDICATED OUTPUT (INH_2O)	CORRECTED INDICATED OUTPUT	ACT HI	ACT LOW	IND HI	IND LOW	READING
10	6	45	25.5	15			14.1	8.25			
10	6	60	33	85			79.9	34			
20	24	55	39.5	15			11.4	6.75			
20	24	80	52	85			64.6	17			
28	60	100	80	15			6	0		0	
28	60	100	80	85			34	0		0	
32	98	100	99	85			1.7	0		0	

10. ANEROID AIR VALVE CLOSURE TEST (28,000 TO 32,000 FEET) PERFORMED ONLY IF REGULATOR FAILS OXYGEN RATIO TEST _____

Figure 7-4. Performance Test Sheet (Sheet 1 of 2)

11. SAFETY PRESSURE/PRESSURE BREATHING TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
(INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OUTPUT		PRESSURE (INH_2O)		
	ACTUAL (LPM)	INDICATED (INH_2O)	MINIMUM	READING	MAXIMUM
30	0	0	0.01		2.50
30	85		0.01		2.50
40	0	0	0.30		5.60
40	85		0.30		5.60
43	0	0	5.30		12.50
43	85		5.30		12.50
50	0	0	11.20		18.20
50	85		11.20		18.20

12. BLINKER (FLOW INDICATOR) TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
(INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

ALTITUDE/ PRESSURE	DILUTER LEVER	OUTPUT		READING	BLINKER POSITION
		ACTUAL	INDICATED		
SEA LEVEL	NORMAL	20			FULLY OPEN
SEA LEVEL	100%	8			FULLY OPEN
17 INH_2O	100%	12			FULLY OPEN
17 INH_2O	100%	0	0		CLOSE IMMED

13. EMERGENCY PRESSURE TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)
(INLET PRESSURE 150 PSIG FOR HIGH PRESSURE REGULATORS)

OUTPUT		DILUTER LEVER	EMERGENCY LEVER	PRESSURE READING	TOLERANCE (INH_2O)
ACTUAL	INDICATED				
10 LPM		NORMAL	EMERGENCY		2.0 TO 4.0
80 LPM		100%	EMERGENCY		1.0 MIN.
10 LPM		100%	TEST MASK		6.0 TO 16.0

Notes: WITH ZERO FLOW, OUTLET PRESSURE SHALL NOT EXCEED 17.5 INH_2O WITH EMERGENCY PRESSURE CONTROL LEVER IN TEST MASK POSITION. WITH EMERGENCY PRESSURE CONTROL LEVER IN EMERGENCY POSITION, OUTLET PRESSURE SHALL NOT EXCEED 5.5 INH_2O.

14. REGULATOR OXYGEN PURGE: APPLY 500 PSIG TO LOW PRESSURE REGULATORS AND 500 PSIG TO HIGH PRESSURE REGULATORS, AVIATORS BREATHING OXYGEN AND FLOW 1 TO 3 MINUTES.

Figure 7-4. Performance Test Sheet (Sheet 2 of 2)

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

7-25. Average Oxygen. These figures are provided but are computed as follows. Average oxygen is found by adding the minimum and maximum oxygen percentage (figure 7-4) then dividing the sum by 2 (e.g., 6% + 45% = 51% ÷ 2 = 25.5%).

1. Enter the resulting figure, 25.5% in the appropriate block on the Performance Test Sheet.

2. Repeat this procedure for all minimum and maximum oxygen percentages given in figure 7-4.

7-26. Indicated Output. To convert actual output flows (lpm) given in figure 7-4 to indicated output flows (inH_2O), proceed as follows:

1. Locate the desired actual output at the bottom of the Output Graph (figure 7-4).

2. Trace the selected line up to the point of intersection with the appropriate altitude air line.

3. Trace the line on the graph from where the desired lpm and altitude air lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Output Graph (e.g., 30,000 foot Output Graph or 35,000-foot Output Graph).

5. Repeat steps 1 through 4 for all actual output flows given in figure 7-4.

7-27. Corrected Indicated Output. Corrected indicated output is indicated output with the required percentage of nitrogen added. To find corrected indicated output, proceed as follows:

NOTE

Use Oxygen/Air/Nitrogen Conversion Graph provided in NAVAIR 17-15BC-21 Technical Manual.

1. Locate the indicated output (inH_2O) at the bottom of the Oxygen/Air/Nitrogen Conversion Graph.

2. Find the average oxygen percentage on the Performance Test Sheet corresponding to the selected indicated output.

NOTE

Select percentage line on Oxygen/Air/Nitrogen Conversion Graph nearest to average oxygen figure selected from Average Oxygen column on Performance Test Sheet.

3. Follow the indicated output line selected on the Oxygen/Air/Nitrogen Conversion Graph up to the appropriate N_2 percentage line.

4. Trace the line on the graph where the selected indicated output and N_2 percentage lines intersect across the left hand column to determine inH_2O.

5. Enter this figure in the appropriate block on the Performance Test Sheet.

6. Repeat steps 1 through 5 for all required indicated output flows.

7-28. Actual High Air. These figures are provided, but are computed as follows. Find the actual high air by subtracting the minimum oxygen percentage (figure 7-4) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 6% = 94% x 15 lpm = 14.10 lpm).

1. Enter 14.10 lpm in the actual high air column on the Performance Test Sheet.

2. Repeat the procedure for all minimum oxygen percentages given in figure 7-4.

7-29. Actual Low Air. These figures are provided but are computed as follows. Find the actual low air by subtracting the maximum oxygen percentage (figure 7-4) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 45% = 55% x 15 lpm = 8.25 lpm).

1. Enter 8.25 lpm in the actual low air column on the Performance Test Sheet.

2. Repeat the procedure for all maximum oxygen percentages given in figure 7-4.

7-30. Indicated High Air (Input). To convert actual high air to indicated high air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Input Graph (e.g., 30,000-foot Input Graph or 35,000-foot Input Graph).

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all actual high air figures previously entered on Performance Test Sheet.

7-31. Indicated Low Air (Input). To convert actual low air to indicated low air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all actual low air figures previously entered on Performance Test Sheet.

7-32. SAFETY PRESSURE AND PRESSURE BREATHING TEST. Actual output flows (lpm) given in the Safety Pressure Breathing Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and an input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired actual output (figure 7-4) at the bottom of the test stand Output Graph.

2. Trace the selected line up to where it intersects the N_2 line, then across the graph to the left hand column to determine inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 43,000 feet are converted using the 45,000 foot N_2 line on the Output Graph, or the 45,000 foot Output Graph.

4. Repeat steps 1 through 4 for all actual flows given in Safety Pressure/Pressure Breathing Test section of figure 7-4.

7-33. BLINKER (FLOW INDICATOR) TEST. Actual output flows (lpm) for the Blinker Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows refer to paragraphs 7-34 through 7-36.

7-34. Diluter Toggle Normal Oxygen Position. Use the air line of the Sea Level Output Graph.

1. Locate the actual output (figure 7-4) at the bottom of the graph and trace the selected line up to the air line.

2. Trace the line from where the actual output and air lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

7-35. Diluter Toggle 100 Percent Oxygen Position (Sea Level). Use the N_2 line on the Sea Level Output Graph.

1. Locate actual output (lpm) (figure 7-4) at the bottom of the graph and trace the selected line up to the N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

7-36. Diluter Toggle 100 Percent Oxygen Position (17 inH_2O). Use the 50,000 foot N_2 line on the Output Graph.

1. Locate actual output (lpm) (figure 7-4) at the bottom of the Output Graph (or 50,000 foot Output Graph) and follow selected line up the 50,000 foot N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

7-37. EMERGENCY PRESSURE TEST. Actual output flows (lpm) specified for the Emergency Pressure Test can be found in the Emergency Pressure Test section of the Performance Test Sheet. Actual flows must be converted to indicated flows (inH_2O). To convert the flows, refer to paragraphs 7-38 and 7-39.

7-38. Diluter Toggle Normal Oxygen Position. Use air line of Sea Level Output Graph.

1. Locate actual output (lpm) (figure 7-4) at bottom of Sea Level Output Graph and trace selected line up to air line.

2. Trace the line from where the actual output and air lines intersect across the graph to the left-hand column to determine indicated inH_2O.

3. Enter this figure in appropriate block on Performance Test Sheet.

7-39. Diluter Toggle 100 Percent Oxygen Position. Use N_2 line of Sea Level Output Graph.

1. Locate actual output (lpm) (see figure 7-4) at bottom of Sea Level Output Graph and trace selected line up to N_2 line.

2. Trace the line from where the actual output and N_2 lines intersect across the graph to the left-hand column to determine indicated inH_2O.

3. Enter this figure in appropriate block on Performance Test Sheet.

Section 7-4. Maintenance

7-40. GENERAL.

7-41. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly and adjusting of aircraft panel mounted oxygen regulators.

NOTE

The regulator shall be considered beyond economical repair when the cost of repair parts exceeds approximately 75% of the cost of the regulator.

Upon completion of any maintenance action (e.g., inspection, repair, modification, etc.), make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

7-42. Procedural steps outlined in this section are listed under the aircraft inspection cycle in which they are required, and are in the sequence in which they normally occur.

7-43. Bench tests shall be performed on Aircraft Panel Mounted Oxygen Regulators prior to being placed in service, and during the Phase/Calendar or SDLM (Standard Depot Level Maintenance) Inspection cycle of the aircraft in which installed. See applicable Planned Maintenance System (PMS) publications for specified intervals. In no case shall the interval exceed 448 days. The regulators shall also be subjected to a bench test if malfunction is suspected, and after repair or replacement of damaged parts. To ensure damage did not occur during extensive transportation and shipment (via commercial/U.S. Mail); all regulators shall be subjected to a Bench Test, when received from supply, prior to being placed in service.

7-44. Bench tests shall be performed using Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate ground support equipment manual for identification of test stand controls and indicators referred to in Bench Test.

7-45. Due to the complexity of the 1172AS100 or 1316AS100 test stand, it is essential that the operator become thoroughly familiar with the test stand prior to performing bench tests. Refer to appropriate ground support equipment manual.

7-46. INSPECTION.

7-47. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTION. The Turnaround/Preflight/Postflight/Transfer inspections consist of a Visual Inspection performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 7-2 for assistance in troubleshooting. To perform the inspection, visually inspect the following:

1. Electrical performance of panel light.

2. Legibility of all markings.

3. Plastic lighting plate for cracks and discoloration.

4. Low, or improper reading on regulator pressure gage.

5. Emergency pressure control toggle in NORMAL position.

6. Diluter control toggle in 100% OXYGEN position.

7. Supply control toggle in OFF position.

8. Regulator and surrounding area for freedom from dirt and hydrocarbons.

9. Delivery hose and connector for cuts, fraying, kinking, hydrocarbons and general condition.

7-48. If discrepancies are found or suspected, Maintenance Control shall be notified.

7-49. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by Ready For Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

7-50. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance/Special/Daily Inspections consist of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 7-2 for assistance in troubleshooting. To perform the inspection, proceed as follows:

WARNING

Make certain that when working with oxygen, clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

7-51. Visually inspect the regulators in accordance with paragraph 7-58.

7-52. Functional Test. To perform Functional Test, proceed as follows:

1. Place supply valve control toggle in ON position.

Table 7-2. Troubleshooting (Daily, Preflight, Special, Turnaround, Transfer and Acceptance Inspections)

Trouble	Probable Cause	Remedy
Regulator fails to deliver oxygen with emergency toggle in emergency position.	Failure of demand valve to operate.	Replace regulator.
Howling sound or vibration noise emitted from regulator.	Pressure reducer faulty.	Replace regulator.
Regulator delivers constant flow of oxygen when all toggles are in OFF/ NORMAL position.	Oxygen inlet valve or demand valve is leaking.	
Oxygen cylinder pressure gage fails to indicate proper pressure.	Defective gage.	Replace regulator.
	Blocked or leaking supply line.	Replace or clean supply line to regulator.
	Low cylinder pressure.	Refill.
	Defective inlet valve assembly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and other than EMERGENCY setting on regulator.	Regulator controls improperly positioned.	Correct position of controls.
	Hose to mask is kinked.	Straighten hose and reposition outlet.
	Regulator not functioning properly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and regulator control set at EMERGENCY.	Kink or other malfunction between hose and mask.	Replace or readjust equipment as necessary.
	Faulty linkage from emergency pressure control toggle.	Replace regulator.
Oxygen available at mask but flow is not indicated.	Defective blinker assembly.	Replace regulator.
Gage pressure drops when regulator is not in use.	Loose or leaking connections.	Tighten or replace connections as necessary.
	Defective inlet valve assembly.	Replace regulator.
Panel lamp fails to light.	Burned out lamp.	Replace lamp.
	Faulty lamp assembly.	Replace regulator.
	Faulty electrical hookup to power source.	Repair electrical hookup (figure 7-5).

2. Place diluter control toggle in NORMAL OXYGEN position.

3. Connect oxygen hose to quick disconnect, place mask to face and inhale. Proper regulator operation will be indicated by flow indicator assembly showing white during inhalation and black during exhalation.

NOTE

While at ground level, the Regulator will not normally supply oxygen from the supply system to the mask. The emergency pressure control toggle must therefore be used in order to check out the oxygen supply function of the regulator at low altitudes. The emergency toggle is spring loaded at the NORMAL position, and will return to NORMAL when released.

4. Hold emergency pressure control toggle in TEST MASK position and observe flow indicator. Flow indicator should be white, indicating a flow through regulator.

7-53. Upon completion of functional test, secure regulator as follows:

1. Disconnect mask from supply hose.

2. Ensure that emergency pressure control toggle returns to NORMAL position.

3. Place diluter control toggle in 100% position.

4. Place supply valve control toggle in OFF position.

7-54. If discrepancies are found or suspected, Maintenance Control shall be notified.

7-55. Regulators which do not pass inspection and cannot be repaired in the aircraft shall be removed and replaced by RFI regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

7-56. CALENDAR/PHASED/SDLM INSPECTIONS. Calendar/Phased/SDLM Inspections require removal of the regulators from the aircraft. See applicable Planned Maintenance System (PMS) publications for specified intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be subjected to a Visual Inspection and Bench Test. All work shall be performed in a clean dust-free and oil-free area.

7-57. Aircraft panel-mounted regulators failing Visual Inspection or Bench Test shall be repaired. SM&R codes define repairability of components and lowest level of maintenance authorized. Instructions can be found in the current issue of Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

7-58. Visual Inspection. To visually inspect the regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Lint-free, White	MIL-C-85043

1. Inspect regulator inlet and outlet for foreign objects, dirt, corrosion, bends, dents, cracks, damaged threads, and any other obvious damage.

2. Ensure that regulator inlet filter is properly installed.

3. Inspect regulator body for bends, dents, cracks, corrosion, condition and legibility of nameplate, security of screws and fittings, and any other obvious damage.

4. Inspect regulator for wear/contamination as follows:

NOTE

It has been determined that this form of lead contamination poses no threat to the aircrewmember's health.

Index numbers in parentheses refer to figure 7-6.

a. Disassemble diaphragm assembly of regulator in accordance with paragraph 7-90.

NOTE

Contamination can be seen in the form of powder which is dull black/gray in color.

b. Using a clean lint-free piece of white cloth, swab area around emergency pressure lever assembly (69). Examine cloth for traces of contamination. Inspect lever assembly for presence of leak counter weight. If present, replace lever assembly with new lever assembly with stainless steel counter weight.

NOTE

If no contamination is found, assemble the diaphragm assembly in accordance with paragraph 7-113 and perform Bench Test. If wear/contamination is found, proceed with steps 4c through 4f.

c. Disassemble regulator in accordance with paragraph 7-77.

d. Clean the disassembled parts in accordance with paragraph 7-94.

e. Assemble regulator in accordance with paragraph 7-100. Ensure emergency pressure lever assembly is replaced by new assembly.

f. Bench Test assembled regulator.

7-59. BENCH TEST.

7-60. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Proceed as follows:

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type 1, Class 1, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig nitrogen supply cylinders. These cylinders cannot be certified contaminate free.

NOTE

Nitrogen supply cylinders utilized in testing oxygen components contain a maximum pressure of 1800 psig. For tests requiring pressures of 1800 psig, utilize highest available pressure, but in no case shall this pressure be less than 500 psig.

Tests are arranged so they proceed from one test to the next with a minimum of flow and altitude changes. Troubleshooting tables are provided following each test.

7-61. Unless otherwise specified in specific tests, the pressure applied, control toggle settings, flows drawn, etc., shall be the same for all 29255 series regulators.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

7-62. INWARD LEAKAGE TEST (TEST STAND MODEL 1172AS100 ONLY). To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter	Fabricate IAW NAVAIR Dwg 1172AS136
1	Oxygen System Components Test Stand	1172AS100

1. Ensure test stand valves are closed, then open N_2 supply cylinder valve.

2. Place regulator supply control valve lever in the OFF position, and diluter control lever in the 100 OXYGEN position.

3. Ensure regulator emergency pressure control lever is in NORMAL position. Cap regulator inlet.

NOTE

Regulator shall be mounted on a horizontal plane in the test chamber.

4. Using an adapter (NAVAIR Drawing No. 1172AS136), connect the regulator outlet to N_2 INPUT connection (18) in the altitude chamber.

5. Connect a line from LOW PRESS. connection (19) to REF. TAP (21) in altitude chamber. Plug the rubber hose attached to piezometer (26) using piezometer plug supplied with test stand.

WARNING

Ensure that no pressure is indicated on regulated high pressure gage (10), regulated low pressure gage (11) and N_2 input pressure gage (27).

Ensure LOW PRESS. REGULATOR (N) is not loaded. This will prevent N_2 supply cylinder pressure from passing on to INLET PRESS. ON/OFF valve (L), which could damage the test item, or cause injury to the test stand operator.

6. Turn INLET PRESS. ON/OFF valve (L) to the ON position.

CAUTION

Vacuum pump vent (54) must be opened one to two turns when operating vacuum pump. Refer to appropriate ground support equipment manual.

7. Turn vacuum pump on.

8. Turn PRESS. SELECTOR valve (D) to the H_2O position, and fully open LEAKAGE CONTROL valve (E).

9. Ensure LEAKAGE SELECTOR valve (F) is in HIGH RANGE position.

NOTE

Leakage rotameter (8) is calibrated with an applied pressure of 70 psig. The inward leakage test requires that a suction of 9.0 inH_2O be applied to the regulator outlet and the rotameter. This pressure difference (9.0 inH_2O vice 70 psig) creates a wide variance between actual leakage and indicated leakage. The maximum allowable leakage for the inward leakage test is 200 ccm. An actual leakage of 200 ccm will be displayed on HIGH RANGE LEAKAGE rotameter (8) as an indicated 740 ccm.

10. Slowly open OUTPUT valve (C) until 9.0 inH_2O suction is indicated on PRESS./SUCTION manometer (4). Any leakage will be displayed on HIGH RANGE LEAKAGE rotameter (8). The maximum allowable indicated leakage is 740 ccm (actual 200 ccm). Record indicated leakage on the Performance Test Sheet.

11. Close OUTPUT valve (C) and LEAKAGE CONTROL valve (E). Turn vacuum pump OFF. Turn INLET PRESS. ON/OFF valve (L) to the OFF position.

12. Disconnect line from LOW PRESS. Connection (19) and REF. TAP (21) in altitude chamber. Disconnect regulator outlet from N_2 INPUT connection (18). Remove piezometer plug from piezometer (26). Remove cap from regulator inlet.

13. If excessive leakage is indicated, locate probable cause, using troubleshooting table 7-3.

7-63. INWARD LEAKAGE TEST (TEST STAND MODEL 1316AS100 ONLY). To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1316AS100

1. Ensure all test stand valves and regulators are properly secured and open N_2 supply cylinder.

2. Place oxygen regulator supply control valve lever in the OFF position and diluter control lever in the 100% OXYGEN position.

3. Ensure oxygen regulator emergency pressure control lever is in NORMAL position and cap the regulator inlet.

4. Connect a line from 20 TO 200 LEAKAGE connection (20) to REF TAP and connection (21) in altitude chamber.

5. Connect regulator outlet to piezometer (26).

6. Turn on vacuum pump.

7. Turn PRESSURE SELECTOR valve (D) to H_2O position.

8. Place OVERBOARD ON/OFF valve (T) to the ON position.

9. Slowly open INWARD LEAKAGE REF valve (P) until 9 inH_2O suction is indicated on pressure suction manometer (4).

10. Observe OVERBOARD LEAKAGE rotameter (6), maximum allowable leakage is 200 ccm. Record reading on Performance Test Sheet.

11. Close INWARD LEAKAGE REF valve (P) and place OVERBOARD ON/OFF valve (T) in the OFF position.

12. Disconnect line from 20 TO 200 LEAKAGE connection (20) and REF TAP and connection (21).

13. Disconnect regulator outlet from piezometer (26) and remove cap from regulator inlet.

14. If excessive leakage is indicated, locate probable cause using troubleshooting table 7-3.

7-64. OUTLET LEAKAGE TEST. To perform Outlet Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

Table 7-3. Troubleshooting (Inward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 7-9.		
Leakage through aneroid and air shutoff valve assembly.	Air shutoff sleeve (8) damaged.	Replace air shutoff sleeve (8).
	Gasket (16) damaged.	Replace gasket (16).
Leakage at outlet.	Preformed packing (44, figure 7-6) damaged.	Replace preformed packing (44, figure 7-6).
	Loose screws (41).	Tighten screws (41, figure 7-6).
Notes: Probable causes in table 7-7, Troubleshooting (Outward Leakage Test) could also cause excessive inward leakage.		

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

1. Place regulator supply valve control toggle in ON position.

2. Place diluter control toggle in 100% OXYGEN position.

3. Ensure emergency pressure control toggle is in NORMAL position.

NOTE

Regulator shall be mounted on a horizontal plane in the test chamber.

4. Connect regulator inlet to N_2 INPUT connection (18) in altitude chamber.

5. Using LOW PRESS. REGULATOR (N), apply 150 psig to the regulator inlet.

6. Slowly turn INLET PRESS. ON/OFF valve (L) to ON.

7. Activate emergency pressure control toggle to allow a flow through the regulator. Return toggle to NORMAL position.

8. Draw a film of leak detection compound across the regulator outlet. Film shall not advance more than 1/2 inch in 10 seconds. If film advance is more than allowable, repeat test three or four times. (Distention could be caused by difference in temperature between inside and outside of regulator.)

9. If film advance continues to be more than allowed, locate probable cause using troubleshooting table 7-4.

10. Relieve pressure to regulator by backing out on LOW PRESS. REGULATOR (N).

7-65. OXYGEN INLET VALVE LEAKAGE TEST. To perform the Oxygen Inlet Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Table 7-4. Troubleshooting (Outlet Leakage Test)

Trouble	Probable Cause	Remedy
Note: Index numbers refer to figure 7-6, unless otherwise noted.		
Demand valve assembly leaking.	Demand valve bushing (113). Demand valve O-rings (106, 108, and 114). Demand valve seat (105.) Stem assembly (107).	Replace defective part(s).
	Valve lever connector (110) set too high.	Adjust by turning valve lever connector (110) clockwise.
Demand valve loading.	Manual safety pressure assembly (28) out of adjustment.	Turn adjusting screw (1) counterclockwise or cap screw (4, figure 7-11) clockwise.
Seat and matched valve assembly (95).	Out of adjustment.	Adjust aneroid assembly (86) counterclockwise.
	Faulty.	Replace seat and matched valve assembly (95).
	Out of Adjustment.	Adjust setscrew (90) clockwise.

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Place regulator oxygen inlet valve toggle in OFF position.

2. Place emergency pressure control toggle in EMERGENCY position.

3. Using HIGH PRESS. REGULATOR (Q), apply 500 psig to inlet of low-pressure regulators. Apply 1800 psig to inlet of high-pressure regulators.

4. Draw a film of leak detection compound across regulator outlet fitting.

5. There is no allowable leakage. If leakage is noted, locate probable cause using troubleshooting table 7-5.

7-66. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

Perform this test with diluter toggle in 100% OXYGEN position, and then in the NORMAL OXYGEN position.

1. Place regulator oxygen inlet valve toggle in ON position, and emergency pressure control toggle in NORMAL position.

2. Ensure pressure specified in paragraph 7-65 step 3 is still applied to regulator inlet.

3. Turn INLET PRESS. ON/OFF valve (L) to OFF. Leave regulator oxygen inlet valve toggle in ON position.

4. Leakage will be indicated on the regulator pressure gage. Allowable leakage shall not exceed 60 psig over a two minute period.

5. If leakage is excessive, locate probable cause using troubleshooting table 7-6.

6. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed regulator by placing emergency pressure control toggle in EMERGENCY position. Return toggle to NORMAL.

8. Bleed test stand using SYSTEM BLEED valve (S).

Table 7-5. Troubleshooting (Oxygen Inlet Valve Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers refer to figure 7-8.		
Inlet valve (31, figure 7-6) leaking.	Valve stem (5) leaking.	Replace valve stem (5).
	Seat insert (6) damaged.	Replace seat insert (6).
	Out of adjustment.	Add or delete shims (16).

Table 7-6. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Excessive leakage.	Pressure gage screws (8, figure 7-7) loose.	Tighten screws.
	Faulty pressure gage tubing.	Replace pressure gage (4, figure 7-7).
	Faulty pressure gage.	
	Inlet valve housing screws (32, figure 7-6) loose.	Tighten screws (32, figure 7-6).
	Damaged inlet valve preformed packing (22, figure 7-8).	Replace packing (22, figure 7-8).
	Manual safety pressure assembly (28, figure 7-6) loading diaphragm.	Adjust adjusting screw (1, figure 7-11) counterclockwise, or cap screw (4, figure 7-11) clockwise.

7-67. REGULATOR PRESSURE GAGE SCALE AND ERROR TEST. To perform the Regulator Pressure Gage Scale and Error Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Turn INLET PRESS. ON/OFF valve (L) to ON.

CAUTION

LOW PRESS. REGULATOR (N) can only be used when applying pressures of below gage guard setting (165 to 175 psig) to an item under test. For pressures above gage guard setting, HIGH PRESS. REGULATOR (Q) must be used.

2. Using LOW PRESS. REGULATOR (N), slowly increase pressure to each test pressure 100 psig and below specified in figure 7-4.

NOTE

Regulator pressure gage readings must be recorded twice, once before and once after tapping regulator pressure gage.

3. Check tolerance by comparing regulator pressure.

4. Back out on LOW PRESS. REGULATOR (N).

5. Continue test for 500 psig using HIGH PRESS. REGULATOR (Q).

6. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed test stand using SYSTEM BLEED valve (S). Bleed regulator using Emergency Pressure Control toggle.

7-68. OUTWARD LEAKAGE TEST. To perform the Outward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

During this test the relief valve shall not be covered. The allowable leakage through this valve at 17 inH_2O is included in the maximum allowable leakage, 0.12 lpm (120 ccm).

1. Place regulator inlet valve control toggle in OFF position, and diluter control toggle in NORMAL OXYGEN position.

2. Connect regulator outlet to piezometer (26) in altitude chamber.

3. Connect a line from LOW PRESS. connection (19) to REF. TAP (21) in chamber.

4. Turn test stand INLET PRESS. ON/OFF valve (L) to the OFF position.

5. Adjust LOW PRESS. REGULATOR (N) until 70 psig is indicated on REGULATED LOW PRESS. gage (11).

6. Turn PRESS. SELECTOR valve (D) to H_2O position, and slowly open LEAKAGE CONTROL valve (E) until 17 inH_2O is indicated on PRESS./SUCTION manometer (4).

NOTE

Maintain 17 inH_2O with LEAKAGE CONTROL valve (E) throughout test.

7. If no leakage is indicated on HIGH RANGE LEAKAGE rotameter (8), turn LEAKAGE SELECTOR valve (F) to low range position, and check for indication of leakage on LOW RANGE LEAKAGE rotameter (7). Allowable leakage is 0.12 lpm (120 ccm).

8. Switch LEAKAGE SELECTOR valve (F) to HIGH position, and close LEAKAGE CONTROL valve (E).

9. Repeat steps 6, 7 and 8 with diluter control lever in 100% OXYGEN position.

10. If leakage is excessive, locate probable cause using troubleshooting table 7-7.

7-69. RELIEF VALVE TEST. To perform the Relief Valve Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Turn PRESS. SELECTOR valve (D) to the Hg position, and place FLOW SELECTOR valve (M) SUIT SIMULATOR position.

2. Ensure diluter control lever is in 100% OXYGEN position.

3. Using VENT PRESS. valve (H), slowly apply 3 inches of mercury (inHg) to the regulator outlet. Regulator relief valve shall be venting at least 45 lpm as indicated on VENT FLOW manometer (3).

4. Close VENT PRESS. valve (H) and bleed pressure down to 1.25 inHg using VENT AMBIENT valve (I). Close valve (I).

5. Turn FLOW SELECTOR valve (M) to the REGULATOR position. Drain suit simulator tank by slowly opening VENT Ambient valve (I).

6. Slowly move PRESS. SELECTOR valve (D) to H_2O position.

7. Turn LEAKAGE SELECTOR valve (F) to LOW position.

8. Open LEAKAGE CONTROL valve (E). Apply and maintain 17 inH_2O to regulator outlet. Maximum allowable leakage is 0.12 lpm (120 ccm).

9. Close LEAKAGE CONTROL valve (E).

10. Back out on LOW PRESS. REGULATOR (N). Bleed pressure with SYSTEM BLEED valve (S).

11. Turn LEAKAGE SELECTOR valve (F) to high range position.

12. If excessive leakage is found or if relief valve fails to vent, locate probable cause using troubleshooting table 7-8.

7-70. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Disconnect hose from LOW PRESS. connection (19) and REF. TAP connection (21) in altitude chamber.

2. Turn vacuum pump ON.

3. Ensure PRESS. SELECTOR valve (D) is in the H_2O position.

5. Ensure INLET PRESS. ON/OFF valve (L) is ON.

6. Place regulator inlet valve control toggle in ON position.

7. Using LOW PRESS. REGULATOR (N), set the inlet pressure at each inlet pressure specified on Performance Test Sheet.

NOTE

Readings must be recorded with regulator diluter control toggle in both NORMAL and 100% OXYGEN positions for each outlet flow specified on Performance Test Sheet.

8. Using OUTPUT valve (C), set flows specified in Performance Test Sheet on OUTPUT manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record readings on Performance Test Sheet.

NOTE

With no suction on regulator (OUTPUT valve (C) closed), maximum flow through regulator shall not exceed 0.01 lpm. This will cause a slight rise in PRESS./SUCTION manometer (4).

9. Close OUTPUT valve (C).

10. If regulator fails the Flow Suction Test, locate probable cause using troubleshooting table 7-9.

Table 7-7. Troubleshooting (Outward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Index numbers refer to figure 7-6, unless otherwise noted.		
Plug (100) leaking.	Faulty preformed packing (101).	Replace packing (101).
Outlet leaking.	Loose screws (41).	Tighten screws (41).
	Damage preformed packing (44).	Replace packing (44).
Inlet valve (31) leaking.	Loose screws (32).	Tighten screws (32).
	Damaged O-Ring.	Replace O-ring.
Diaphragm cover (57) leaking.	Loose screws (58).	Tighten screws (58).
	Ruptured diaphragm (60).	Replace diaphragm (60).
Diaphragm assembly (63) leaking.	Improper installation.	Reinstall, or replace diaphragm assembly (63).
Flow indicator leaking.	Damaged O-ring (11).	Replace faulty part(s).
	Damaged gasket (4).	
	Bent washer (14).	
	Ruptured diaphragm (17).	
Manual safety pressure assembly leaking.	Damaged preformed packing (29). Damaged washer (7, figure 7-11).	
Check valve adapter and spring assembly leaking.	Damaged check valve disc (4) or adapter (5). Damaged gaskets (36, 38).	

Table 7-8. Troubleshooting (Relief Valve Test)

Trouble	Probable Cause	Remedy
Leakage in excess of 0.01 lpm.	Relief valve (figure 7-12) out of adjustment. Weak spring (2, figure 7-12).	Adjust by turning spring retainer (1) clockwise Replace spring.
Relief valve fails to vent 45 lpm.	Spring (2, figure 7-12) tension too strong.	Replace spring (2, figure 7-12).
	Relief Valve (figure 7-12) out of adjustment.	Adjust by turning spring retainer (1, figure 7-12) counterclockwise.

Table 7-9. Troubleshooting (Flow Suction Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers refer to figure 7-6.		
Flow indicator leaking (High suction).	Damaged blinker assembly (15).	Replace blinker assembly (15).
	Damaged O-ring (11), gasket (4), washer (14) or diaphragm (17).	Replace defective part(s).
Injector assembly (High or low suction).	Stiff injector nozzle (48).	Replace injector nozzle (48).
Inlet valve assembly.	(High suction) Clogged filter (2, figure 7-8).	Replace filter (2, figure 7-8).
	(High or low suction) Inlet valve assembly (figure 7-8) out of adjustment.	Add or delete shims (16, figure 7-8).

7-71. OXYGEN RATIO TEST. To perform the Oxygen Ratio Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure regulator inlet valve control toggle is in ON position, and diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

NOTE

To slow ascents in altitude chamber during the following tests, install a restrictor in the BYPASS port (BP). Restrictor can be fabricated locally by drilling a 1/4-inch hole in center of a plug made to fit the bypass opening.

CAUTION

Slowly open VACUUM CONTROL valve (B) and observe PRESS./ SUCTION manometer (4). If rapid increase in pressure is indicated, close down on VACUUM CONTROL valve (B) until pressure stabilizes. This rapid increase of pressure shown on PRESS./ SUCTION manometer (4) is caused by too fast a rate of climb in the altitude chamber.

3. Using VACUUM CONTROL valve (13), ascend to first test altitude shown on Performance Test Sheet.

4. Set output flows specified in Performance Test Sheet with OUTPUT valve (C) and stabilize altitude with INPUT valve (A).

5. Read INPUT FLOW manometer (2), and record readings on Performance Test Sheet.

6. Continue the test for each specified altitude and outlet flow shown on Performance Test Sheet.

7. Close OUTPUT valve (C) and INPUT valve (A). Descend to 27,000 feet using CHAMBER BLEED valve (K).

NOTE

If indicated input flows are not within limits, an Aneroid Closure Test must be performed.

8. If Oxygen Ratio Test was satisfactory, proceed to paragraph 7-73, Safety Pressure and Pressure Breathing Test.

7-72. ANEROID CLOSURE TEST. To perform the Aneroid Closure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

Aneroid Closure Test is performed only if regulator fails Oxygen Ratio Test.

1. Descend to 25,000 feet using CHAMBER BLEED valve (K).

2. Ensure inlet pressure is set at 50 psig for low pressure regulators and 150 psig for high pressure regulators.

3. Set up a flow of 3.0 inH_2O on OUTPUT FLOW manometer (I) with OUTPUT valve (C).

4. Aneroid shall close between 28,000 and 32,000 feet, as indicated by no further advance in altitude on LOW RANGE ALTM. (13).

5. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

6. If regulator fails Aneroid Closure Test and/or Oxygen Ratio Test, locate probable cause using trouble-shooting table 7-10.

7-73. SAFETY PRESSURE AND PRESSURE BREATHING TEST. To perform the Safety Pressure and Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

NOTE

If chamber altitude is not at 30,000 feet, adjust altitude. Use VACUUM CONTROL valve (B) to increase altitude or CHAMBER BLEED valve (K) to decrease altitude.

2. Using OUTPUT valve (C), draw flows of 0 and 85 lpm through the regulator. Delivery pressure must be within limits shown on Regulator Performance Test Sheet.

Table 7-10. Troubleshooting (Oxygen Ratio/Aneroid Closure Tests)

Trouble	Probable Cause	Remedy
Incorrect oxygen ratio at 10,000 and 15,000 feet (low air).	Excessive check valve spring (3, figure 7-10) tension.	Turn adjusting screw retainer assembly (1, figure 7-10) counterclockwise.
	Leaking injector (47, figure 7-6).	Tighten mixing tube (45, figure 7-6). Replace preformed packing (44, figure 7-6).
	Incorrectly positioned injector sleeve (47, figure 7-6).	Align port in injector sleeve with port in regulator.
High air at 10,000 and 15,000 feet.	Insufficient check valve spring (3, figure 7-10) tension.	Turn adjusting screw (1, figure 7-10) clockwise, or replace springs.
Low air at 20,000 feet.	Distance too short between throttling plate (10, figure 7-9) and aneroid housing (17, figure 7-9).	Install shorter shouldering screw (11, figure 7-9).
High air at 20,000 feet.	Distance too great between throttling plate (10, figure 7-9) and aneroid housing (17, figure 7-9).	Install longer shouldering screw (11, figure 7-9).
Incorrect oxygen ratio at 25,000 to 30,000 feet.	Aneroid (13, figure 7-9) incorrectly adjusted.	Too high-turn aneroid (13, figure 7-9) counterclockwise. Too low-turn aneroid (13, figure 7-9) clockwise.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

NOTE

Reading for 0 lpm must also be recorded at each test altitude.

3. Repeat step 2 for each altitude shown on Performance Test Sheet.

4. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

5. If safety pressure/pressure breathing flows are not within limits, locate probable cause using troubleshooting table 7-11.

7-74. BLINKER ASSEMBLY TEST. To perform the Blinker Assembly Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

Table 7-11. Troubleshooting (Safety Pressure/Pressure Breathing Test)

Trouble	Probable Cause	Remedy
Note: Index numbers refer to figure 7-6.		
Low safety pressure/pressure breathing.	Pressure breathing aneroid (86) or setscrew (90) on end of stud screw (87) too far from valve control diaphragm (93).	Adjust aneroid or setscrew closer to valve control diaphragm.
High safety pressure/pressure breathing.	Pressure breathing aneroid (86) or setscrew (90) on end of stud screw (87) too close to valve control diaphragm (93).	Adjust aneroid or setscrew farther from valve control diaphragm.
Safety pressure creep at zero flow.	Seat and matched valve assembly (95) leaking.	Replace seat and matched valve assembly.
Safety pressure drops below minimum at higher flows.	Tube and ring assembly (61) leaking, or improperly installed.	Replace preformed packing (62) on end of tube, or install correctly.
	Inner diaphragm (63) and/or outer diaphragm (62) damaged or improperly installed.	Replace, or install correctly.

1. Ensure diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

3. Using OUTPUT valve (C), draw 20 lpm through regulator. Blinker must open fully.

4. Reduce output flow to 8 lpm and place diluter control toggle in 100% OXYGEN position. Blinker must remain fully open.

5. Close OUTPUT valve (C). Blinker should close immediately.

6. Close altitude chamber door.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

7. Using VACUUM CONTROL valve (B), ascend in altitude until 17.0 inH_2O is indicated on PRESS./ SUCTION manometer (4).

8. Open OUTPUT valve (C) and draw a flow of 12 lpm through the regulator. The blinker should be fully open. Close OUTPUT valve (C). Blinker should close immediately.

9. Descend to sea level using CHAMBER BLEED valve (K).

10. If malfunctions are noted, locate probable cause using troubleshooting table 7-12.

7-75. EMERGENCY PRESSURE TEST. To perform the Emergency Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Table 7-12. Troubleshooting (Blinker Assembly Test)

Trouble	Probable Cause	Remedy
Note: Index numbers in parentheses refer to figure 7-6.		
Flow indicator fails to open or close.	Ruptured diaphragm (17).	Replace diaphragm (17).
	Bent, or distorted blinker assembly (15).	Replace flow indicator.

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet of low pressure regulators or 150 psig to regulator inlet of high pressure regulators.

3. Open OUTPUT valve (C) and draw a 10 lpm flow through the regulator.

4. Place emergency control toggle in EMERGENCY position. Pressure indicated on PRESS./SUCTION manometer (4) shall read 2.0 to 4.0 inH_2O.

NOTE

Ensure inlet pressure is maintained when performing step 5.

5. Adjust OUTPUT valve (C) to draw 80 lpm through regulator.

6. Place diluter control toggle in 100% OXYGEN position. Pressure at outlet of regulator, as indicated on PRESS./SUCTION manometer (4), shall be no less than 1.0 inH_2O.

7. Adjust output to 10 lpm. Hold emergency pressure control toggle in TEST MASK position. Output flow, as indicated on PRESS./SUCTION manometer (4), shall be 6.0 to 16.0 inH_2O.

8. If emergency pressure flows are not within tolerance, locate probable cause using Troubleshooting Chart (table 7-13).

9. Close N_2 supply cylinder valve. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), relieve all pressure in the test stand. Secure all test stand valves.

7-76. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen Type 1	MIL-O-27210,

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

WARNING

Do not use oxygen test stand to regulate the oxygen purge pressure.

2. Apply 500 psig to regulator inlet on low pressure regulators and 500 psig to regulator inlet on high pressure regulators.

Table 7-13. Troubleshooting (Emergency Pressure Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 7-11.		
High or low emergency pressure.	Demand valve stem assembly (112, figure 7-6) bent or sticking.	Replace demand valve stem assembly (112, figure 7-6).
Low emergency pressure.	Spring (2) tension weak.	Increase spring tension with adjusting screw (1).
High emergency pressure.	Spring (2) tension too strong.	Decrease spring tension with adjusting screw (1).
Test mask pressure low.	Short cap screw (4).	Increase length of cap screw (4) by turning counterclockwise.
Test mask pressure high.	Long cap screw (4).	Decrease length of cap screw (4) by turning clockwise.
Low emergency pressure at 80 lpm flow.	Faulty injector nozzle (48, figure 7-6).	Replace injector nozzle (48, figure 7-6).

3. Position diluter toggle in the 100% position, supply toggle in ON position and emergency pressure control toggle in the emergency position. Allow oxygen to flow 1 to 3 minutes.

4. Shut off oxygen source and disconnect regulator.

NOTE

All equipment forwarded from the organizational level maintenance to the intermediate and/or depot level, shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the bench test and/or Calendar Inspection, the organizational custodian shall retain the the appropriate forms in accordance with OPNAVINST 4790.2 Series.

7-77. DISASSEMBLY.

7-78. Disassemble the oxygen regulator using the index numbers assigned to figure 7-6, unless otherwise noted. Disassemble the regulator as follows:

CAUTION

All disassembly, inspection, repair and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor and ceiling should have a smooth finish, and be painted with a non-chalking paint which can be kept clean and dust free. It is desirable to keep all parts for each individual regulator separated. Make careful note of the location and quantity of all shims, spacers and packings. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

NOTE

Special tools shall be requisitioned directly from manufacturer (99251), or obtain commercial equivalents.

7-79. PLASTIC LIGHTING PLATE. To remove the Plastic Lighting Plate, proceed as follows:

1. Remove panel light assembly (1, figure 7-7) and lamp (2, figure 7-7).

2. Remove four screws (3) and lift off light plate (2).

7-80. GAGE AND LIGHT MOUNTING PLATE ASSEMBLY. Remove the Gage and Light Mounting Plate Assembly as follows:

1. Remove gaskets (4) and (6). Remove four screws (9) and two screws (8). Carefully remove pressure gage line from inlet valve assembly (31).

2. Lift off gage and light mounting plate assembly (7) and flow indicator O-ring (11).

NOTE

Do not remove electrical wire (10, figure 7-7) unless damaged.

7-81. PRESSURE GAGE ASSEMBLY. Remove the Pressure Gage Assembly as follows:

NOTE

Index numbers in this paragraph refer to figure 7-7 unless otherwise noted.

1. Remove two screws (7), screw (8), nut (5), lock washer (6), and clamp (9). Use 1/4-inch open end wrench to hold nut.

2. Remove pressure gage (4) and O-ring packing (10, figure 7-6).

7-82. INLET VALVE ASSEMBLY. Disassemble the Inlet Valve Assembly as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Special Pliers, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

1. Remove three screws (32), lock washers (33), inlet valve assembly (31) and O-ring packing (34).

NOTE

Index numbers in steps 2, 3 and 4 refer to figure 7-8.

2. Using special pliers remove retaining ring (1). Remove filter (2), sleeve (3) and helical compression spring (4). Remove cap and toggle assembly (8 through 14) as a unit by removing screws (15). Remove shims (16).

3. Using a jeweler's screwdriver, remove valve stem (5), seat insert (6) and O-ring packing (7) from piston assembly (17).

4. Remove piston assembly (17).

7-83. TOGGLE AND FOLLOWER ASSEMBLY. If required, disassemble the Toggle and Follower Assembly as follows:

NOTE

Index numbers in this paragraph refer to figure 7-8.

1. Remove roll pin (9), toggle (8) and follower assembly (10).

2. Remove pin (12) and roller (11) from follower sleeve (13).

7-84. ANEROID AND AIR SHUTOFF VALVE ASSEMBLY. Disassemble the Aneroid and Air Shutoff Valve Assembly as follows:

NOTE

Index numbers in steps 1 through 6 refer to figure 7-9 unless otherwise noted.

When performing step 1 apply pressure to aneroid and air shutoff valve assembly to prevent loss of parts, because it is under spring tension.

1. Using a jeweler's screwdriver, remove retaining ring (3). Remove toggle (1), roll pin (2) and pivot block (4) as a unit.

2. Remove spring retaining cap (5), washer (6), helical compression spring (7), air shutoff sleeve (8) and conical compression spring (9).

3. Remove remainder of assembly from regulator housing (115, figure 7-6) by turning counterclockwise.

4. Remove gasket (16). (Cemented to housing (17)).

5. Using a 5/16-inch deep well socket wrench, remove nut (14) and aneroid screen (15).

NOTE

Retain screw (11) for reuse during assembly.

6. Remove aneroid (13). Remove screw (11), throttling plate (10) and washer (12) from aneroid (13).

7. Remove gasket (36, figure 7-6).

7-85. CHECK VALVE ADAPTER AND SPRING ASSEMBLY. Remove Check Valve Adapter and Spring Assembly (37) and aneroid air shutoff valve assembly from regulator housing by turning regulator housing upside down. Disassemble the check valve adapter and spring assembly in the order of Index Numbers assigned to figure 7-11.

1. Separate the parts by carefully separating prongs on retainer assembly (1).

CAUTION

Use extreme care when handling check valve disc (4) to avoid scratching or marring surface.

2. Remove gasket (38, figure 7-6).

7-86. MANUAL SAFETY PRESSURE ASSEMBLY. Disassemble the Manual Safety Pressure Assembly as follows:

1. Remove two screws (19) and lock washers (20). Remove toggle assembly (18).

2. Remove manual safety pressure assembly (28) from regulator housing (115). Remove preformed packing (29).

3. Remove top plate (25), push rod (24), shim (26) and helical compression spring (27) (by turning manual safety pressure assembly (28) upside down).

NOTE

Index numbers in steps 4 through 6 refer to figure 7-11.

4. To remove the push rod assembly (3), hold manual safety pressure housing (11) between fingers, and apply thumb pressure to adjusting screw (1), thereby applying pressure against manual safety guide (9) which compresses spring (10) and releases pressure from nonmetallic washer (7). Using a 5/16-inch open end wrench, remove push rod assembly (3).

5. Remove manual safety guide (9), helical compression spring (10), adjusting screw (1), helical compression spring (2) and actuating rod (8).

6. Using a 3/16-inch open end wrench, remove hex nut (5) and cap screw (4) from push rod (6).

7-87. BLINKER ASSEMBLY. Disassemble the Blinker Assembly as follows:

1. Using retaining ring pliers, remove retaining ring (12).

2. Carefully remove spacer (13), washer (14), blinker assembly (15), sealing ring (16) and diaphragm (17).

7-88. ANEROID AND MATCHED VALVE ASSEMBLY. Disassemble the Aneroid and Matched Valve Assembly as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	31TA10529 (CAGE 99251)

1. Remove three screws (92), and remove aneroid housing (91) as a unit.

2. Remove valve control diaphragm (93). Using retaining ring pliers, remove retaining ring (94).

3. Remove seat and matched valve assembly (95), O-ring (96) and helical compression spring (98).

4. Loosen setscrew (53) in aneroid housing (91). Using spanner wrench remove aneroid (86).

5. Remove screw (87), spring retainer (88) and helical spring (89).

7-89. RELIEF VALVE ASSEMBLY. Disassemble the Relief Valve Assembly as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Punch, Relief Valve	31TA10523 (CAGE 99251)

1. Using retaining ring pliers, remove retaining ring (49), relief valve screen (50), relief valve assembly (51) and preformed packing (52).

NOTE

Index numbers in steps 2 and 3 refer to figure 7-12.

2. Remove spring retainer (1), relief valve spring (2) and relief valve disc (3) from relief valve housing (5).

3. Using relief valve punch, remove relief valve seat (4) from relief valve housing (5).

7-90. DIAPHRAGM ASSEMBLY. Disassemble the Diaphragm Assembly as follows:

1. Remove four screws (58) and lock washers (59). Remove diaphragm cover (57) and diaphragm and plate assembly (60).

2. Remove tube and ring assembly (61) and preformed packing (62). Remove diaphragm assembly (63) by carefully moving it up and away from the outlet side of the regulator.

7-91. EMERGENCY PRESSURE LEVER ASSEMBLY AND DEMAND VALVE LEVER ASSEMBLY. Disassemble the Emergency Pressure Lever Assembly, and the Demand Valve Lever Assembly as follows:

NOTE

Ensure lead counterweight is not present on demand valve lever. If demand valve lever has lead counterweight, discard it and order new demand valve lever with stainless steel counterweight.

1. Using retaining ring pliers, remove retaining ring (99). Remove plug (100) and preformed packing (101) by pushing from inside regulator to outside with a blunt instrument.

2. Remove bind screw (55) and lock-o-seal (56) from regulator.

3. Remove two screws (83) from lever bracket (82).

4. Remove two screws (76) from lever bracket (78).

5. Insert jeweler's screwdriver through hole that bind screw (55) was removed from and remove valve lever connector (110) from demand valve stem assembly (112).

6. Carefully depress spring guide (84) against helical compression spring (85). Slide demand valve lever assembly (75) away from demand valve stem (109), detaching demand valve lever assembly (75).

7. Remove spring guide (84) and helical compression spring (85). Remove demand valve lever assembly (75) and emergency pressure lever assembly (69).

7-92. DEMAND VALVE. Disassemble the Demand Valve as follows:

1. Using retaining ring pliers, remove retaining ring (102), valve retainer (103) and preformed packing (104).

2. Apply gentle pressure to demand valve through plug (100) port, and remove demand valve assembly from regulator housing (115).

3. Remove extension stem assembly (107), O-ring packing (108) from demand valve seat (105).

4. Remove O-ring (106), demand valve bushing (113) and O-ring (114).

7-93. OUTLET, MIXING TUBE, AND INJECTOR ASSEMBLY. Disassemble the Outlet, Mixing Tube and the Injector Assembly as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Piloted	QB-70750-9 (CAGE 55974) NIIN 00-302-6456

1. Remove two screws (41), lockwashers (42), flat washers (43) and outlet (40). Remove preformed packing (44).

2. Using piloted spanner wrench, remove mixing tube (45).

3. Remove mixing tube screen (46), injector sleeve (47) and injector nozzle (48).

7-94. CLEANING.

7-95. To clean the disassembled oxygen regulator body and component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

*If available (optional item)

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint and fine metal particles are also dangerous.

1. Clean all metallic parts in accordance with NAVAIR 13-1-6.4-1.

WARNING

Do not attempt to clean any elastomer parts that have become contaminated with oil or grease. All such parts shall be replaced.

2. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning, all internal surfaces shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Bag all complete assemblies that are not immediately returned to service.

7-96. INSPECTION OF DISASSEMBLED REGULATOR.

7-97. Inspect the disassembled regulator body and component parts in accordance with the following special instructions and table 7-14.

1. Make certain lamp (2, figure 7-7) is wired in accordance with figure 7-5.

7-98. REPAIR.

Materials Required

Quantity	Description	Reference Number
As Required	Lacquer, white	MIL-L-6805 (CAGE 81349)

7-99. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched-up using Lacquer.

7-100. ASSEMBLY.

7-101. Assembly of Aircraft Panel Mounted Regulators is essentially the reverse of disassembly. Tests are required on subassemblies as they are assembled into the regulator. Adjustment and calibration is also performed at time of assembly.

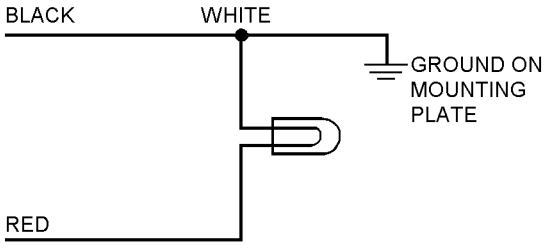


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Figure 7-5. Wiring Diagram

Table 7-14. Inspection of Disassembled Regulator Components

Nomenclature	Figure and Index No.	Inspect For
Gage and light mounting assembly.	7-6-7	Cracks or other damage to plate or lamps.
		Check fasteners, spring and cups for proper mating action.
Manual safety pressure assembly.	7-6-28	Smooth operation (no sticking or binding).
Inlet valve assembly.	7-6-31	Scratches or excessive wear on sealing surfaces.
Aneroid and air shutoff assembly.	7-6-35	Scratches or excessive wear on sealing surfaces.
Check valve adapter and spring assembly.	7-6-37	Scratches or excessive wear on sealing surfaces.
Relief valve assembly.	7-6-51	Scratches or excessive wear on sealing surfaces.
Diaphragm assembly.	7-6-63	Pinholes, minute ruptures, discoloring, spotting or other damage likely to cause leakage in diaphragm. Check diaphragm rim for cuts or other damage on sealing surfaces.
Emergency pressure lever assembly.	7-6-69	Disintegration of lead counter weight.
Aneroid assembly.	7-6-86	Evenly spaced convolutions (no cocks or dents).
Lamp.	7-7-2	Burned out condition by applying 28 Vdc.
Tube and pressure gage assembly.	7-7-4	Chips or breaks in glass. Tubing for kinks or blockage.
Wire assembly.	7-7-10	Damaged insulation and loose solder joints.
Fasteners.	7-7-12	Excessive wear in slots.
Filter.	7-8-2	Clogging.
Valve stem.	7-8-5	Scratches, rings, or excessive wear.
Seat insert.	7-8-6	Scratches, rings, or excessive wear.
Throttling plate.	7-9-10	Smooth, flat surfaces, entirely free of nicks or scratches.
Aneroid assembly.	7-9-13	Evenly spaced convolutions (no cocks or dents).
Retainer assembly.	7-10-1	Bent or deformed prongs.
Check valve disc.	7-10-4	Smooth, flat surfaces, entirely free of nicks or scratches.

Table 7-14. Inspection of Disassembled Regulator Components (Cont)

Nomenclature	Figure and Index No.	Inspect For
Cap screw.	7-10-4	Marks or scratches.
Manual safety housing.	7-10-11	Nicks or scratches on seat surface.
Relief valve disc.	7-12-3	Bright surface, free of nicks and scratches on lapped and polished side of disc.
Relief valve seat.	7-12-4	Nicks, scratches or excessive wear.
Emergency pressure lever assembly.	7-6-69	Check for presence of lead counter weight. If present, replace lever with one containing stainless steel counter weight.

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

CAUTION

Use extreme care in fitting precision parts to prevent damage. Ensure each component is dust- and dirt-free.

NOTE

All silicone-rubber parts shall be discarded and replaced with new items at time of assembly. They shall be washed in accordance with paragraph 7-95, step 2, prior to installation.

Unless otherwise noted, index numbers refer to figure 7-6.

7-102. Assembly is effected in two separate operations; assembly of components into subassemblies (mounting plate and controls assembly, injector assembly, etc.), and assembly of the subassemblies into the regulator body.

7-103. RELIEF VALVE ASSEMBLY. To assemble the Relief Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Glyptal	1201B (General Electric)

NOTE

Index numbers in steps 1 through 3 refer to figure 7-12. Index numbers in steps 4 and 5 refer to figure 7-6.

1. Lock and seal relief valve seat (4) to relief valve housing (5) using Glyptal.

2. Before installing relief valve disc (3), polish surface of disc that contacts relief valve seat (4).

3. Install spring (2) and spring retainer (1) in relief valve housing (5).

4. Install preformed packing (52) and relief valve assembly (51) in regulator housing (115).

5. Install relief valve screen (50) and retaining ring (49).

6. Final adjustment of spring retainer will be made during post assembly bench test.

7-104. ANEROID AND AIR SHUTOFF VALVE ASSEMBLY. To assemble the Aneroid and Air Shutoff Valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV-734 (CAGE 94499)
As Required	Toluene	TT-T-548 (CAGE 81348)
As Required	Xylene	TT-X-916 (CAGE 81348)

NOTE

Index numbers in this paragraph refer to figure 7-9.

1. Cement gasket (16) to aneroid housing (17) using method described in steps 2 through 5.

2. Clean surfaces to be bonded with Xylene or Toluene and allow to air dry.

3. Coat the metal sealing surface of the aneroid housing (17) and gasket (16) with adhesive RTV-734 and allow to air dry for five minutes.

4. Bond gasket (16) to aneroid housing (17) and allow to cure at room temperature for 24 hours with a minimum relative humidity of 20 percent.

5. Visually examine to be certain there are no air pockets in the bond. The parts must flat, even and firmly cemented to each other.

6. Use same screw (11) removed at disassembly.

7. Assemble washer (12), throttling plate (10) and screw (11) to aneroid (13).

8. Screw aneroid (13) into aneroid housing (17).

9. Install aneroid screen (15) and nut (14) on aneroid (13).

10. Assemble conical compression spring (9), air shutoff sleeve (8), helical compression spring (7), washer (6), retaining cap (5) and pivot block (4) into aneroid housing (17). Secure in place with retaining ring (3).

11. Final adjustments to the aneroid and air shutoff valve assembly will be accomplished during post assembly bench test.

7-105. CHECK VALVE ADAPTER AND SPRING ASSEMBLY. To assemble the Check Valve Adapter and Spring Assembly, proceed as follows:

NOTE

Index numbers in steps 1 and 2 refer to figure 7-10.

1. Install spring adapter assembly (2) into retainer assembly (1).

NOTE

Handle retainer assembly (1) carefully. Do not bend the four prongs.

2. Install aneroid check valve spring (3), check valve disc (4) and check valve adapter (2) into retainer assembly (1).

3. Final adjustment of the air check valve adapter and spring assembly (37) will be accomplished during post assembly bench test.

4. Install gasket (38) and air check valve adapter and spring assembly (37) into regulator housing (115).

5. Install gasket (36) and aneroid and air shutoff valve assembly (35) into regulator housing (115).

7-106. INLET VALVE ASSEMBLY. To assemble the Inlet Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC, Type II, Lubricant	NIIN 00-961-8995 (CAGE 81349)
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Punch, Filter	31TA10527 CAGE 99251
1	Fixture, Spring Clamp	31TA10203 (CAGE 99521) NIIN 00-831-5376
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

Unless otherwise noted, index numbers in this paragraph refer to figure 7-8.

Use only new preformed packings and O-rings. Clean in accordance with paragraph 7-95 step 2, prior to installation.

1. To assemble piston assembly (17), install shim (21) on piston (23). Using spring clamp fixture, install helical compression spring (20) and guide washer (19). Secure to piston (23) with spring retaining screw (18).

2. Apply a light film of lubricant to preformed packing (22) and insert into inlet valve body (24).

WARNING

Ensure insert seat (6) is correct part for regulator being repaired. Check insert seat part number against Usable On Code column. Insert seat (P/N 1602937-1) is clear in color and can be used only on 50-500 psi (low pressure) type ventilators. Insert seat (P/N 1602937-2) is dark or gray in color and can be used on either low or high pressure regulators.

3. Insert O-ring packing (7), seat insert (6) and valve stem (5) into inlet body (24).

4. Align valve stem (5) with threaded hole in piston assembly (17). Insert a screwdriver through inlet port of inlet valve body (24) and tighten valve stem (5). Push down on piston assembly (17) while tightening valve stem (5) raise stem off seat insert (6). Turn valve stem (5) into piston assembly (17) until top of piston assembly is 1/2-inch from top of inlet valve body (24).

5. Salvage the tubing and inlet valve attaching block from a discarded pressure gage assembly. Cut, pinch and silver solder the tubing end.

6. Install pinched-and-soldered tubing and O-ring (10, figure 7-6) into inlet valve pressure gage port with screws (8, figure 7-6).

7. Install helical compression spring (4) and sleeve (3) into inlet valve body (24). Using filter punch, install filter (2). Secure in place with retaining ring (1).

NOTE

At this point, it is necessary to check the inlet valve assembly for leakage.

8. Using test stand, apply 50 psig to inlet of the valve assembly. Apply leak detection compound to valve outlet. There shall be no leakage.

9. If leakage occurs, refer to troubleshooting table 7-5.

10. Install following assembly (10) and toggle assembly (8) on toggle cap (14). Secure with roll pin (9).

11. Insert appropriate shim (16) into toggle cap (14) and secure toggle cap (14) to inlet valve body with screw (15).

12. Repeat inlet valve leakage test (step 8).

13. Turn off nitrogen source, bleed pressure from test stand and inlet valve assembly. Disconnect inlet valve from test stand.

7-107. ANEROID AND MATCHED VALVE ASSEMBLY. To assemble the Aneroid and Matched Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV-734 (CAGE 94499)
As Required	Tape, Anti-Seize	MIL-T-27730 (CAGE 81349) NIIN 00-398-4130
As Required	Krytox 240AC, Type II, Lubricant	NIIN 00-961-8995 (CAGE 81349)

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	31TA10529 (CAGE 99251)

1. Apply a light film of lubricant to helical compression spring (98). Install O-ring (97) and matched valve assembly (95) into regulator housing (115). Secure in place with internal retaining ring (94).

2. Install setscrew (90) into stud screw (87). Lock threads of setscrew (90) in place using RTV 734 adhesive.

3. Wrap threads of stud screw (87) with 1 1/2 turns of anti-seize tape. Keep tape back one thread from end of screw.

4. Install stud screw (87) into spring retainer (88).

5. Assemble aneroid assembly (86), helical compression spring (89) and spring retainer (88).

6. Using spanner wrench, install aneroid assembly (86) into aneroid housing (91).

7. Installation of aneroid housing assembly (91) will be accomplished after demand valve/seat and matched valve leakage test (paragraph 7-112).

7-108. DEMAND VALVE ASSEMBLY. To assemble the Demand Valve Assembly, proceed as follows:

CAUTION

Use extreme care during assembly to prevent damage to demand valve seat (105).

1. Install O-ring packing (114) and demand valve bushing (113) ensuring hole in bushing aligns with hole in regulator housing (115).

2. Install O-ring (108) and stem assembly (107) into demand valve seat (105).

3. Assemble demand valve stem (112), locking insert (111) and valve lever connector (110) . Turn valve lever connector (110) into demand valve stem (112) until four threads are showing.

4. Pass end of extension stem assembly (107) through demand valve seat (105) and assembly to valve stem assembly (109). Turn valve stem assembly (109) onto extension stem assembly (107) until valve is just seated.

5. Install O-ring packing (106).

6. Install extension stem assembly (109), demand valve seat (105), O-ring (108) and demand valve stem assembly (106) as a unit into the regulator housing (115). Ensure hole in demand valve seat (105) aligns with hole in inlet valve.

7. Install preformed packing (104) so that it lies around demand valve seat (105). Install valve retainer (102) into regulator housing (115). Secure in place with retaining ring (102).

7-109. MANUAL SAFETY PRESSURE ASSEMBLY. To assemble the Manual Safety Pressure Assembly, proceed as follows:

NOTE

Index numbers in steps 1 through 5 refer to figure 7-11.

1. Assemble cap screw (4), hex nut (5) and push rod (6) until approximately 5/16-inch of cap screw (4) extends from push rod (6). Tighten hex nut (5) against push rod (6) after adjusting cap screw (4).

2. Install helical compression spring (10), manual safety guide (9) and actuating rod (8) in manual safety housing (11).

3. Install helical compression spring (2). Secure with adjusting screw (1). Adjusting screw (1) shall be flush with top of safety pressure assembly (28).

4. Hold manual safety housing (11) between fingers and apply pressure on adjusting screw (1).

5. Place washer (7) on manual safety housing (11). Align push rod assembly (3) with actuating rod (8) threads. Using a 5/16-inch open end wrench, tighten push rod assembly (3) to actuating rod (8).

NOTE

Index numbers in steps 6 and 7 refer to figure 7-7.

6. Install preformed packing (29) and manual safety pressure assembly (28) into regulator housing (115).

7. Install helical compression spring (27), shim (26), top plate (25), push rod (24) and toggle assembly (18) into regulator housing (115) with emergency position in board. Attach with two washers (20) and two screws (19).

NOTE

Ensure toggle returns from TEST MASK position to NORMAL when released.

8. Final adjustments will be performed during post assembly bench test.

7-110. EMERGENCY PRESSURE LEVER ASSEMBLY AND DEMAND VALVE LEVER ASSEMBLY. To assemble the Emergency Pressure Lever Assembly and Demand Valve Lever Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC, Type II, Lubricant	NIIN 00-961-8995 (CAGE 81349)

NOTE

Ensure demand valve lever has stainless steel counterweight and not a lead counterweight.

1. If necessary to assemble demand valve lever assembly (75), or emergency pressure lever assembly (69), coat threads on setscrews with Krytox 240AC before assembling levers. Using pliers, crimp pins (70) and (77) during assembly.

2. Install emergency lever assembly (69) into regulator housing (115) and secure loosely with screws (83).

3. Insert demand valve lever assembly (75) through plug (100) port.

4. Using a pair of tweezers insert valve lever connector (110) in plug (100) port. Using a jeweler screwdriver inserted in screw (55) hole; Screw valve lever connector (110) into demand valve stem assembly (112) until 4 threads remain showing.

NOTE

It may be necessary to hold demand valve stem assembly (112). If so care must be taken to ensure no damage to demand valve stem assembly (112).

5. Compress guide (84) and spring (85) and place in cavity under demand valve lever assembly (75).

6. Place fork of demand valve lever assembly (75) into slot of valve lever connector (110) and secure demand valve lever (75) to regulator housing (115) with screws (76).

7. Tighten screws (83).

8. Depress emergency pressure lever assembly (69) and demand valve lever assembly (75) while observing through plug (100) port for proper operation of demand valve assembly.

7-111. DEMAND VALVE LEVER AND EMERGENCY PRESSURE LEVER ASSEMBLY ADJUSTMENTS. Adjust Demand Lever Assembly (75) and Emergency Pressure Lever Assembly (69) as follows:

1. To adjust demand valve lever assembly (75), insert jeweler's screwdriver through screw (55) hole, in regulator housing (115) and turn valve lever connector (110). While making adjustments, prevent valve stem assembly (109) from turning with needle nose pliers inserted through plug (100) port.

2. Adjust demand valve lever (75) so that the back of the lever is 1/32 inch lower than the front. Take the back measurement in front of setscrew (79). Take the front measurement between the two access holes in lever bracket (78). Measurements are made from the bottom of regulator housing (115).

3. Turn setscrew (72) on lever bracket (82) so that emergency pressure lever assembly (69) is 5/16 inch above demand valve lever assembly (75) when emergency pressure lever (69) is depressed far enough to touch lever assembly (75). Take measurement from forked end of emergency pressure lever assembly (69) down to demand valve lever assembly (75).

4. Install O-ring (101), plug (100), retaining ring (99), screw (55) and seal (56).

5. After demand valve lever adjustments are completed, install O-ring packing (34) and inlet valve assembly (31) on regulator housing (115) with screws (32) and lock washers (33).

7-112. DEMAND VALVE/SEAT AND MATCHED VALVE LEAKAGE TEST. Test the Demand Valve/Seat and Matched Valve Assembly for leakage as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Tube, Leak Test	31TA10205 NIIN 00-831-5428

1. Screw leak test tube into injector nozzle port in regulator housing. Apply 50 psig pressure to the regulator inlet and draw a film of leak detection solution across the outlet of the leak test tube.

2. If film distends, leakage is indicated. Recheck assembly and adjustments of valve stem assembly (109) and demand valve lever assembly (75).

3. After test, remove leak test tube.

4. Draw a film of leak detection solution over retaining ring (94) and matched valve assembly (95).

5. If film distends, leakage is indicated. Recheck retaining ring (94) and O-ring (97) for proper installation. Check matched valve assembly (95) for scoring. Replace as required.

6. Install diaphragm (93) (with protruding ridge up) on aneroid housing (91) into regulator housing (115). Secure with screws (92).

7. When installing aneroid housing, rotate the assembly so hole for setscrew (53) is accessible from front of regulator between inlet valve assembly (31) and aneroid and air shutoff assembly (35).

8. Final adjustment of the seat and matched valve assembly will be accomplished during post assembly bench test.

7-113. DIAPHRAGM ASSEMBLIES. To assemble the Diaphragm Assemblies, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV-734 (CAGE 94499)
As Required	Krytox 240AC, Type II, Lubricant	NIIN 00-961-8995 (CAGE 81349)

1. When assembling diaphragm (67) to diaphragm plate (68), cement parts together with adhesive RTV 734.

2. Apply a light coat of Krytox 240AC to inner surface of diaphragm plate (66), inner surface of diaphragm cover (57) and around diaphragm flange (65). Install diaphragm nut (64) and tighten.

3. Attach diaphragm assembly (63) to emergency pressure lever assembly (69) by sliding lever forks over flange (65).

4. Install preformed packing (62) on the tube and ring assembly (61). Install tube and ring assembly (61), diaphragm and plate assembly (60) and cover (57) on regulator housing (115). Secure with four washers (59) and four screws (58).

5. Install filter (54).

7-114. OUTLET, MIXING TUBE, AND INJECTOR ASSEMBLY. To assemble the Outlet, Mixing Tube, and Injector Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Piloted	QB-70750-9 (CAGE 55974) NIIN 00-302-6456

1. Insert injector nozzle (48) and injector sleeve (47) into regulator housing (115). Align window of injector sleeve (47) with port from aneroid and air shutoff assembly (35).

2. Install screen assembly (46) and mixing tube (45). Tighten mixing tube with piloted spanner.

3. Install preformed packing (44) and outlet (40) into regulator housing (115). Secure with plain washers (43), lock washers (42) and screws (41).

7-115. BLINKER ASSEMBLY. To install Blinker Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealing	MIL-S-22473 (CAGE 73925)
As Required	Glyptal	1201B (General Electric)

Support Equipment Required

Quantity	Description	Reference Number
1	Sight Gage, Parallel	31TA10087 (CAGE 99521) NIIN 00-572-5565

1. Install diaphragm assembly (17), (with metal plate facing up), sealing ring (16), (flat surface facing up) blinker assembly (15), flat washer (14) and spacer (13) in regulator housing (115).

2. Place parallel sight gage over blinker assembly (15) and align.

3. Install retaining ring (12) and O-ring (11).

4. Place protecting cover (P/N 31TA10086) over blinker assembly.

NOTE

Regulator pressure gage scale and error test cannot be performed at this time.

7-116. Perform bench test in accordance with paragraph 7-59 through 7-75.

7-117. The following operations must be accomplished prior to completing assembly of the regulator.

1. Following adjustment of relief valve (table 7-8), apply sealing compound to retainer threads, install relief valve screen (50), and retaining ring (44).

2. Aneroid and Air Shutoff Valve Assembly. When proper adjustment has been obtained (table 7-10), tighten nut (14, figure 7-9) using 5/16-inch deep socket to secure aneroid assembly. Apply Glyptal to adjusting screw (1, figure 7-10) in retainer assembly. Ensure screw slot is clear of Glyptal.

3. Aneroid and Matched Valve Assembly. When final adjustment has been obtained, install setscrew (53). Secure screws, (53 and 92, figure 7-6) in place with Glyptal.

7-118. GAGE AND LIGHT MOUNTING PLATE ASSEMBLY. To assemble the Gage and Light Mounting Plate Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Cover, Protecting	31TA10086 (CAGE 99251) NIIN 00-571-3666

NOTE

Index numbers in steps 2 and 3 refer to figure 7-7.

1. Remove protective cover from blinker assembly.

2. Assemble pressure gage assembly if required. Attach pressure gage (4) to mounting plate assembly (11) with two screws (7).

3. Attach wire assembly (10) to mounting plate assembly (11) with clamp (9), screw (8), lock washer (6) and nut (5).

4. Remove the pinched-and-soldered tubing and block from inlet valve body (31) by removing two screws (8).

5. Install new O-ring (10) on pressure gage tubing block. Secure block to inlet valve body (31) with two screws (8).

6. Attach gage and light mounting plate assembly (7) to regulator housing (115) with screws (9).

7-119. PLASTIC LIGHTING PLATE. To assemble and install the Plastic Lighting Plate, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Plastic Bag	MIL-B-117 (CAGE 81349)

1. Install gaskets (4) and (6).

2. Attach plastic plate (2) to gage and light mounting plate assembly (7) with four screws (3).

3. Install lamp (2, figure 7-7) and light assembly (1, figure 7-7).

7-120. Place air shutoff toggle in 100% OXYGEN position. Make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

7-121. After bench test, place regulator in plastic bag for storage.

Section 7-5. Illustrated Parts Breakdown

7-122. GENERAL.

7-123. This section lists and illustrates the assemblies and detail parts of the regulators listed below, and manufactured by Litton Life Support, formerly Bendix Corporation, CAGE 99251.

Part Number

29255-10A-A1	29255-10A-A17A
29255-10A-A1A	29255-10A-B9
29255-10A-A2	29255-10A-B9A
29255-10A-A2A	29255-10A-B10
29255-10A-A4	29255-10A-B10A
29255-10A-A4A	29255-10A-B11
29255-10A-A5	29255-10A-B11A
29255-10A-A5A	29255-6B-A1
29255-10A-A9	29255-6B-A1A
29255-10A-A9A	29255-6B-B1
29255-10A-A17	29255-6B-B1A

7-124. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

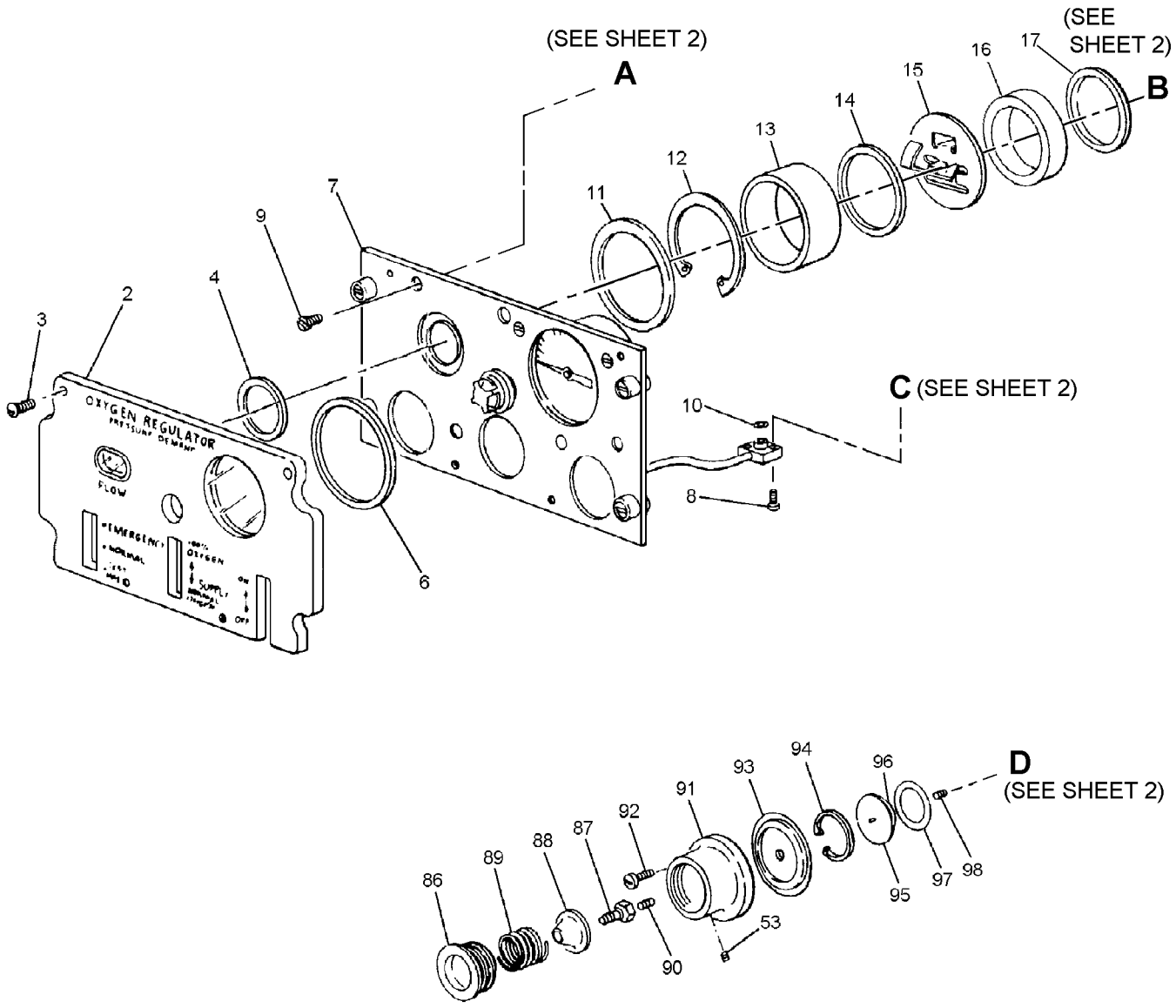

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Figure 7-6. 29255 Panel Mounted Oxygen Regulators (Sheet 1 of 3)

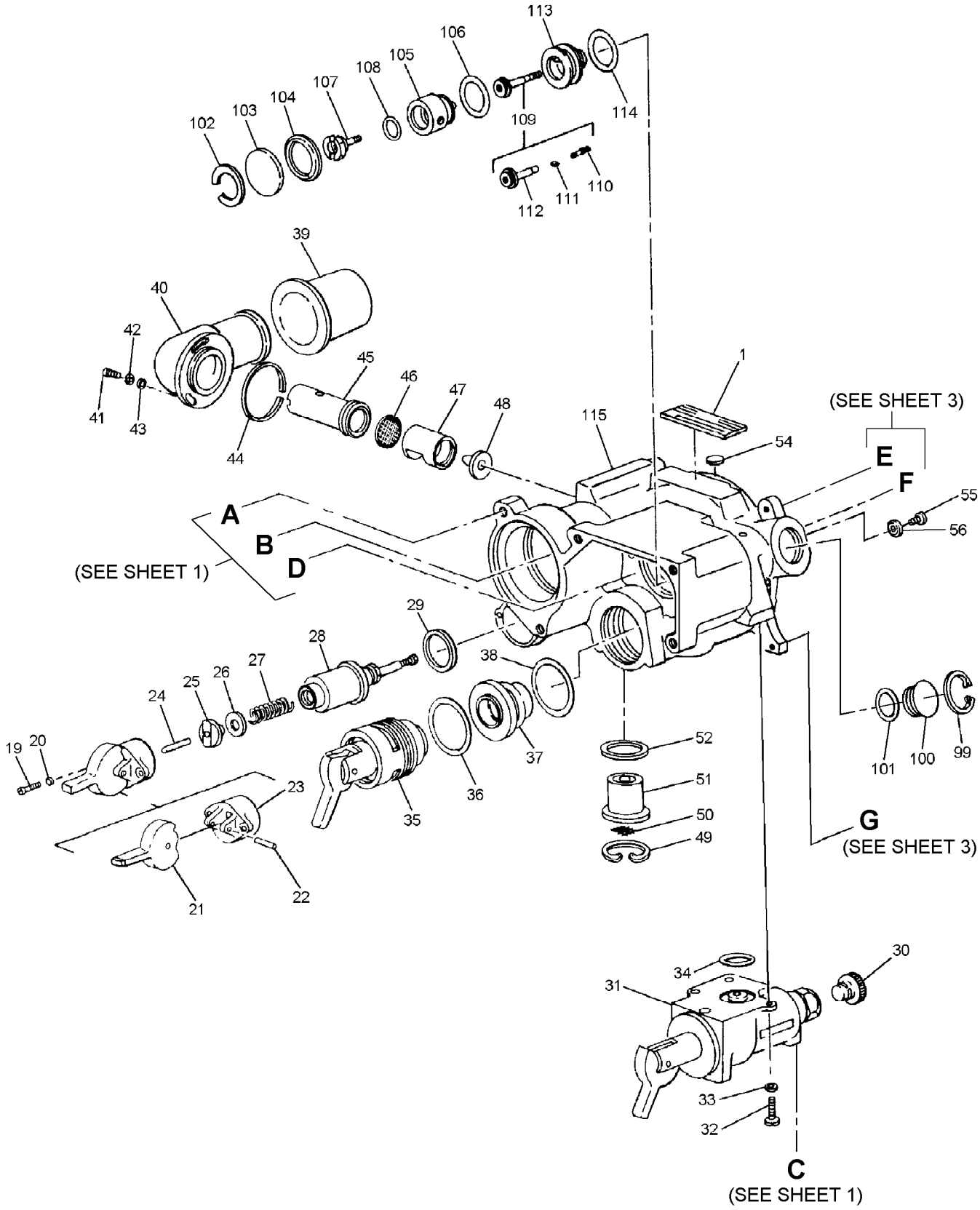

Figure 7-6. 29255 Panel Mounted Oxygen Regulators (Sheet 2 of 3)

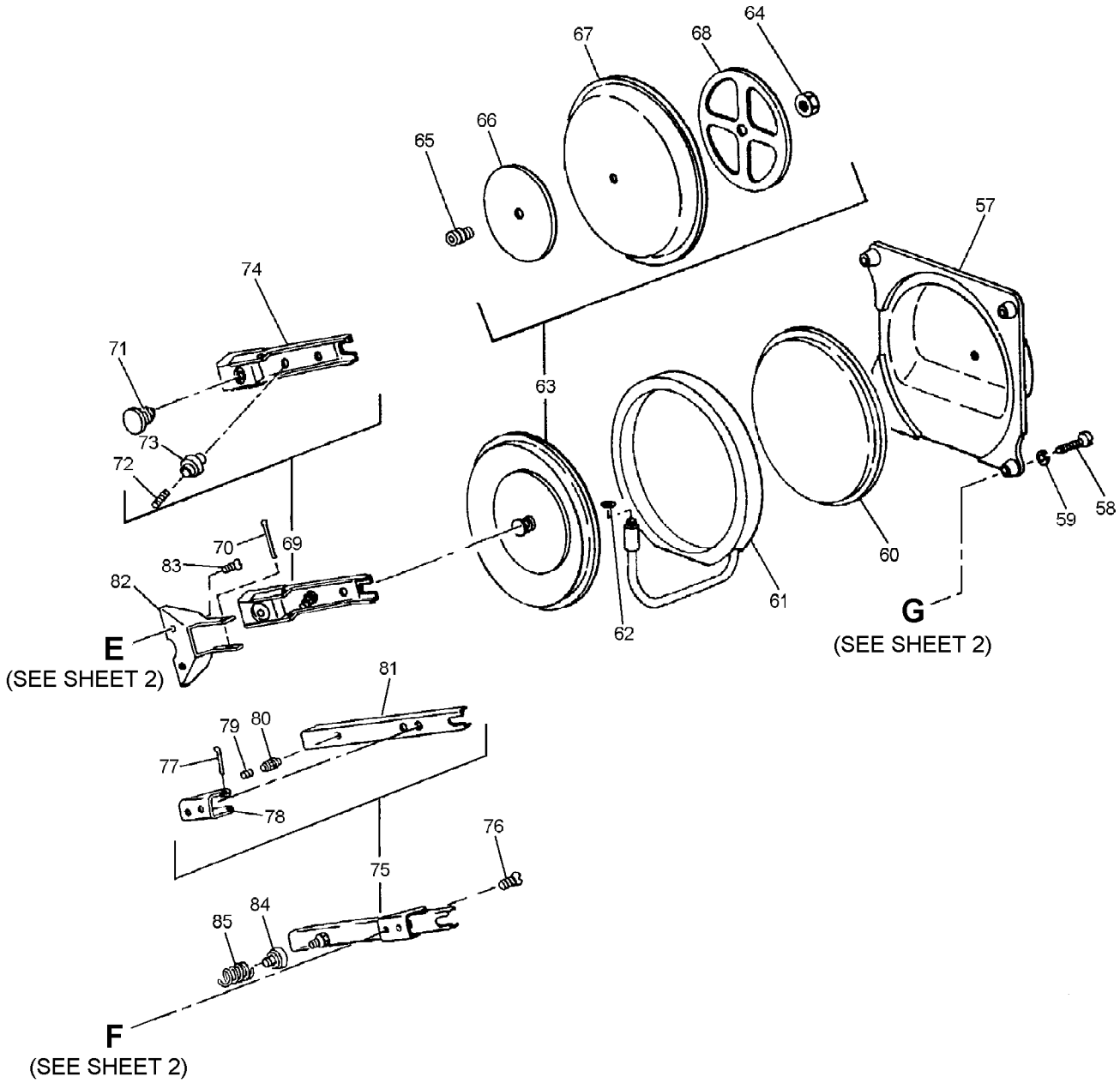

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Figure 7-6. 29255 Panel Mounted Oxygen Regulators (Sheet 3 of 3)

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-6	29255-10A-A1	REGULATOR, Pressure demand oxygen	1	A
	29255-10A-A1A	REGULATOR, Pressure demand oxygen	1	A
	29255-10A-B9	REGULATOR, Pressure demand oxygen	1	B
	29255-10A-B9A	REGULATOR, Pressure demand oxygen	1	B
	29255-6B-B1	REGULATOR, Pressure demand oxygen	1	C
	29255-6B-B1A	REGULATOR, Pressure demand oxygen	1	C
	29255-10A-A2	REGULATOR, Pressure demand oxygen	1	D
	29255-10A-A2A	REGULATOR, Pressure demand oxygen	1	D
	29255-10A-A4	REGULATOR, Pressure demand oxygen	1	E
	29255-10A-A4A	REGULATOR, Pressure demand oxygen	1	E
	29255-10A-A5	REGULATOR, Pressure demand oxygen	1	F
	29255-10A-A5A	REGULATOR, Pressure demand oxygen	1	F
	29255-10A-A9	REGULATOR, Pressure demand oxygen	1	G
	29255-10A-A9A	REGULATOR, Pressure demand oxygen	1	G
	29255-10A-A17	REGULATOR, Pressure demand oxygen	1	H
	29255-10A-A17A	REGULATOR, Pressure demand oxygen	1	H
	29255-10A-B10	REGULATOR, Pressure demand oxygen	1	H
	29255-10A-B10A	REGULATOR, Pressure demand oxygen	1	H
	29255-10A-B11	REGULATOR, Pressure demand oxygen	1	H
	29255-10A-B11A	REGULATOR, Pressure demand oxygen	1	H
	29255-6B-A1	REGULATOR, Pressure demand oxygen	1	K
	29255-6B-A1A	REGULATOR, Pressure demand oxygen	1	K
-1	1612820-1	. PLATE, Identification	1	ABC EJK
	1612820-2	. PLATE, Identification	1	D
	1612820-3	. PLATE, Identification	1	FH
-2	1611735-1	. PLATE, Light	1	
		(ATTACHING PARTS)		
-3	MRO-607BN	. SCREW, RD, HD, BRS BLK NI PL NO . . . . . 6-32 X 7/16 IN. LG (KFP)	4	
		---*---		
-4	813112	. GASKET (KCP)	1	
-5	1621386-1	. COVER, Plate (without gage, light, ... mounting screws) Not shown	1	ABC
-6	813111	. GASKET (KCP)	1	
-7	1612055-3	. PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-7 for BKDN)	1	ABG
	1612055-5	. PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-7 for BKDN)	1	CK
	1612055-2	. PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-7 for BKDN)	1	D
	1612055-1	. PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-7 for BKDN)	1	E
	1612055-4	. PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-7 for BKDN)	1	F

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
	1612055-9	. PLATE ASSEMBLY, Gage and light mounting (figure 7-7 for BKDN) (ATTACHING PARTS)	1	H
-8	FFILO-303-1/ 2BN	. SCREW, Flat FIL H, BRS BLK NI PL NO 3-56 X 7/32 IN. LG (KF)	2	
-9	MFO-605BN	. SCREW, Flat HD, BRS BLK NI PL NO 6-32 X 5/16 IN. LG (KFP) ---*---	4	
-10	813061	. PACKING, "O" ring (KCP)	1	
-11	812921	. RING, "O" (KCP)	1	
-12	MS16629-1137	. RING, Retaining (KFP)	1	
-13	1614152	. SPACER	1	
-14	1603660-120	. WASHER, Flat	AR	
-15	1614148-1	. BLINKER ASSEMBLY	1	
-16	1614153-1	. RING, Sealing	1	
-17	1614155-1	. DIAPHRAGM ASSEMBLY, Blinker (KC)	1	

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Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-6-18	1604108-1	. TOGGLE ASSEMBLY	1	
		(ATTACHING PARTS)		
-19	FFILO-406BN	. SCREW, Flat FIL H, BRS BLK NI PL	2	
		NO 4-48 X 3/8 IN. LG (KFP)		
-20	LWO-4	. WASHER, Lock, BRZ for NO. 4 SCR (KFP)	2	
		---*---		
-21	1604107-1	. . TOGGLE, Emergency	1	
		(ATTACHING PARTS)		
-22	RP62-500SS	. . PIN, Roll. CRES 0.062 NOM DIA X 0.500 ...	1	
		IN. LG (KFP)		
		---*---		
-23	813062	. . BLOCK, Clevis	1	
-24	816764	. ROD, Push (KFP)	1	
-25	1623317- 1	. PLATE, Top	1	ABC
	814423	. PLATE, Top	1	DEF GHK
-26	814921-1	. SHIM (0.015 IN. THK) (KPF)	AR	
	814921-2	. SHIM (0.032 IN. THK) (KPF)	AR	
-27	814993	. SPRING, Helical compression (KFP)	1	
-28	1602949-1	. PRESSURE ASSEMBLY, Manual safety	1	
		(figure 7-11 for BKDN)		
-29	1602321-5	. PACKING, Preformed (KCP)	1	
-30	812429-8	. PLUG, Pipe (for shipping and stocking	1	
		only) (KFP)		
-31	1611738-1	. VALVE ASSEMBLY, Inlet	1	ADE FGH
		(figure 7-8 for BKDN)		
	1611738-2	. VALVE ASSEMBLY, Inlet	1	K
		(figure 7-8 for BKDN)		
	1611738-4	. VALVE ASSEMBLY, Inlet	1	B
		(figure 7-8 for BKDN)		
	1611738-5	. VALVE ASSEMBLY, Inlet	1	C
		(figure 7-8 for BKDN)		
		(ATTACHING PARTS)		
-32	MFILO-607BN	. SCREW, FIL H, BRS BLK NI PL	3	
		NO 6-32 X 7/16 IN. LG (KG)		
-33	LWO-6	. WASHER Lock, BRZ for NO. 6 SCR (KFP)	3	
		---*---		
-34	813058	. PACKING, “O” ring (KC)	1	
-35	1611714-1	. SHUTOFF ASSEMBLY, Aneroid and air	1	
		(figure 7-9 for BKDN)		
-36	1623977-1	. GASKET	1	A
	779490-7	. GASKET (KCP)	1	BCD EFG HK
-37	1611726-1	. ADAPTER AND SPRING ASSEMBLY, ...	1	
		Check valve (figure 7-10 for BKDN)		
-38	1623977-2	. GASKET	1	A
	779490-7	. GASKET, (KC)	1	BCD EFG K

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-6-39	1613723-17	. CAP, Shipping (For shipping and stocking only) (KFP)	1	ABC K
	213	. CAP, Shipping (81904) (Bendix Spec Cont Dwg 812097-l)(For shipping and stocking only) (KD)	1	DEF GH
-40	1612829-1	. OUTLET (ATTACHING PARTS)	1	
-41	FFILO-405-1/2BN	. SCREW, Flat FIL H, BRS BLK NI PL NO. 4-48 X 11/32 IN. LG (KF)	2	
-42	LWO-4	. WASHER, Lock, BRZ for NO. 4 SCR (KF)	2	
-43	WO-4SS	. WASHER, Plain, CRES 0.119 ID X 9/32 OD X 0.025 IN. THK (KFP) ---*---	2	
-44	1602321-29	. PACKING, Preformed (KCP)	1	
-45	761800-2	. TUBE, Mixing	1	
-46	812614-1	. SCREEN ASSEMBLY, Mixing tube (KF)	1	
-47	1602956-1	. SLEEVE, Injector	1	
-48	1602821-1	. NOZZLE, Injector (KCP)	1	
-49	MS16629-1081	. RING, Retaining, internal (KF)	1	
-50	814765-5	. SCREEN, Relief valve (KF)	1	
-51	1610650-1	. VALVE ASSEMBLY, Relief (figure 7-12 for BKDN)	1	
-52	1602321-35	. PACKING, Preformed (KCP)	1	
-53	FSO-201-1/2SS	. SETSCREW, Slotted, CRES NO 2-64 X 3/32 IN. LG (KF)	1	
-54	1603942-4	. FILTER, Inlet (KF)	1	
-55	BH402-1/2BN	. SCREW, BIND. HD, BRS BLK NI PL NO. 4-48 X 5/32 IN. LG (KFP)	1	
-56	741790-2	. LOCK-O-SEAL, High temperature (KC)	1	
-57	1612830-1	. COVER, Diaphragm (ATTACHING PARTS)	1	
-58	MFFILO-609-1/2BN	. SCREW, Flat FIL H, BRS BLK NI PL NO. 6-32 X 19/32 IN. LG (KF)	4	
-59	LWO-6	. WASHER, Lock, BRZ for No. 6 SCR (KF) ---*---	4	
-60	1611734-1	. DIAPHRAGM AND PLATE ASSEMBLY (KC)	1	
-61	1611729-1	. TUBE AND RING ASSEMBLY	1	
-62	1602321-24	. PACKING, Preformed (KCP)	1	
-63	1600632-2	. DIAPHRAGM ASSEMBLY	1	
-64	793515-1	. . NUT, Diaphragm (KFP)	1	
-65	791765-2	. . FLANGE, Diaphragm, (KF)	1	
-66	1602045-1	. . PLATE, Diaphragm	1	
-67	814441	. . DIAPHRAGM (KCP)	1	
-68	814442	. . PLATE, Diaphragm	1	
-69	1616994-3	. LEVER ASSEMBLY, Emergency pressure (ATTACHING PARTS)	1	
-70	1613131-2	. PIN ---*---	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-6-71	1610626-1	. . POST	1	
-72	1612419-10	. . SETSCREW (KF)	1	
-73	50FMP11-356	. . NUT, Clinch, PASS., 3-56 X 0.179 IN. THK (56878) (Bendix Spec Cont Dwg 1610694-1)	1	
-74	1602912-1	. LEVER, Emergency pressure	1	
-75	1602916-1	. LEVER ASSEMBLY, Demand valve (ATTACHING PARTS)	1	
-76	FO-304BN	. SCREW, Flat HD, BRS BLK NI PL NO 3-56 X 1/4 IN. LG (KF) ---*---	2	
-77	PB50788-5	. . PIN	1	
-78	1602914-1	. . BRACKET, Lever	1	
-79	1612419-10	. . SETSCREW (KF)	1	
-80	1610694-1	. . NUT, Clinch, self-locking	1	
-81	1602915-1	. . LEVER	1	
-82	814646	. BRACKET, Lever (ATTACHING PARTS)	1	
-83	FO-304BN	. SCREW, Flat HD, BRS NI PL NO 3-56 X 1/4 IN. LG (KF) ---*---	2	
-84	815601	. GUIDE, Spring (KF)	1	
-85	814793	. SPRING, Helical compression (KFP)	1	
	816308	. SPRING, Helical compression (KFP)	1	
-86	1611722-1	. ANEROID ASSEMBLY	1	
-87	1611782-1	. SCREW, Stud (KF)	1	
-88	1611741-1	. RETAINER, Spring (KF)	1	
-89	1611742-1	. SPRING, Helical compression (KF)	1	
	1611742-2	. SPRING, Helical compression (KF)	1	
-90	HOS-202-1/2SS	. SETSCREW, Allen, CRES NO 2 64 X 5/32 IN. LG (KF)	1	
-91	1611740-1	. HOUSING, Aneroid (ATTACHING PARTS)	1	
-92	1607617-5	. SCREW, Special (KF) ---*---	3	
-93	1611730-1	. DIAPHRAGM, Valve control (KC)	1	
-94	MS16629-1068	. RING, Retaining, internal (KF)	1	
-95	1632425-1	. VALVE SEAT (Note 1)	1	
-96	1611739-1	. VALVE ASSEMBLY (Note 1)	1	
-97	1602321-65	. PACKING, “O” ring (KCP) (Note 1)	1	
-98	1611770-1	. SPRING, Helical compression (KF)	1	
-99	MS16625-1062	. RING, Retaining, internal (KFP)	1	
-100	1611723-1	. PLUG	1	
-101	1602321-3	. PACKING, Preformed (KCP)	1	
-102	MS16629-1081	. RING, Retaining, internal (KF)	1	
-103	1611718-1	. RETAINER, Valve	1	
-104	1602321-5	. PACKING, Preformed (KC)	1	
-105	1611715-1	. SEAT, Demand valve	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-6-106	815678	. PACKING "O" ring (KC)	1	
-107	1611717-1	. STEM ASSEMBLY, Extension (KC)	1	
-108	813752	. RING, "O" (KCP)	1	
-109	1602922-2	. STEM ASSEMBLY, Valve (KCP)	1	
-110	1602920-1	. . CONNECTOR, Valve lever	1	
-111	812462-1	. . INSERT, Locking	1	
-112	1623897-1	. . STEM ASSEMBLY, Demand valve	1	ABC
	1605331-1	. . STEM ASSEMBLY, Demand valve	1	DEF GHK
-113	1602972-1	. BUSHING, Demand valve	1	
-114	815678	. PACKING, "O" ring (KC)	1	
-115	1610652-1	. HOUSING (Note 2)		
	1601914-1	KIT, Parts, pressure demand oxygen regulator field (F)	1	AE
	1601573-1	KIT, Parts, pressure demand oxygen regulator cure-date (C)	1	AE
	1601915-1	KIT, Parts, pressure demand oxygen regulator field (F)	1	BC
	1601588-1	KIT, Parts, pressure demand oxygen regulator cure-date (C)	1	BC

Notes:

1. Matched seat and valve assembly P/N 1611737-1 can no longer be ordered as a complete assembly. Individual parts consisting of valve seat P/N 1632425-1, valve P/N 1611739-1 and preformed packing P/N 1602321-65 must be ordered.
2. For regulators with Usable on Codes D, F, G, H, and K, there are no parts kits available. Parts must be individually ordered.

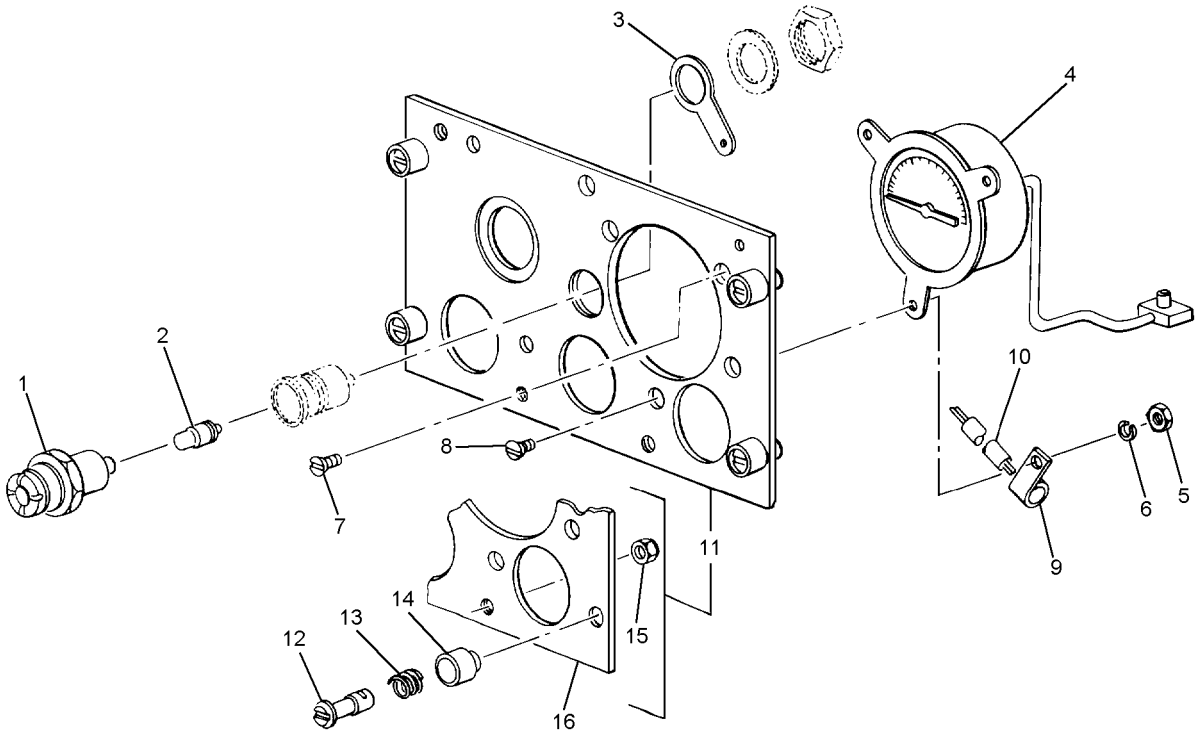


Figure 7-7. Gage and Light Mounting Plate Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-7	1612055-3	PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-6 for NHA)	REF	ABG
	1612055-5	PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-6 for NHA)	REF	CK
	1612055-1	PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-6 for NHA)	REF	E
	1612055-2	PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-6 for NHA)	REF	D
	1612055-4	PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-6 for NHA)	REF	F
	1612055-9	PLATE ASSEMBLY, Gage and light . . . . . mounting (figure 7-6 for NHA)	REF	H

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-7-1	MS25011-2A	. LIGHT ASSEMBLY, Panel	1	ABCGK
	A7075-1	. LIGHT ASSEMBLY, Panel (72914) (Bendix Spec Cont Dwg 1607344-1)	1	HD
	A7075-5	. LIGHT ASSEMBLY, Panel (72914) (Bendix Spec Cont Dwg 1607344-2)	1	EF
-2	MS25237-327	. LAMP, Incandescent	1	ABC EGHK
	MS25237-328	. LAMP, Incandescent	1	DF
-3	816554	. LUG, TERMINAL	1	
-4	813095-1	. GAGE ASSEMBLY, Tube and pressure	1	ABD EFGH
	813095-2	. GAGE ASSEMBLY, Tube and pressure (ATTACHING PARTS)	1	CK
-5	NO-6SS	. NUT, HEX, CRES NO. 6-40 X 0.125 IN. THK (KFP)	3	
-6	LWO-6	. WASHER, Lock, BRZ for NO. 6 SCR (KF)	3	
-7	FO-604SS	. SCREW, Flat HD, CRES NO 6-40 X 1/4 IN. LG (KF)	2	
-8	FO-605SS	. SCREW, Flat HD, CRES NO 6-40 X 5/16 IN. LG (KFP)	1	
-9	TA557TSS3	. CLAMP, Loop type (84971) (Bendix Spec Cont Dwg 815753-2) ---*---	1	
-10	1608564-1	. WIRE ASSEMBLY	1	
-11	816593-1	. PLATE ASSEMBLY, Mounting	1	
-12	PF3-1/2-38	. . FASTENER (72794) (Bendix Spec Cont Dwg 799812-1)	4	
-13	PS3-1-2	. . SPRING (72794) (Bendix Spec Cont Dwg 799814-1)	4	
-14	PC3-1/2	. . CUP (72794) (Bendix Spec Cont Dwg 799813-1)	4	
-15	812762-1	. . NUT, Clinch CRES NO. 6-30 X 0.180 IN. THK	3	
-16	813089	. . PLATE, Mounting	1	

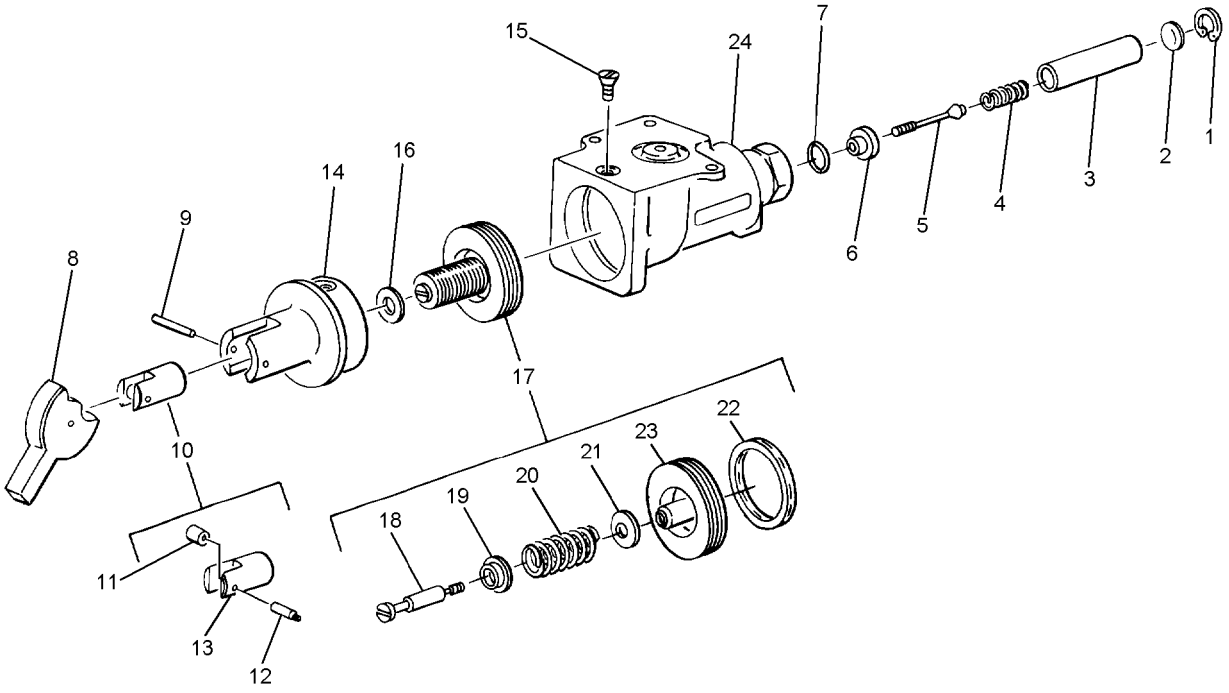
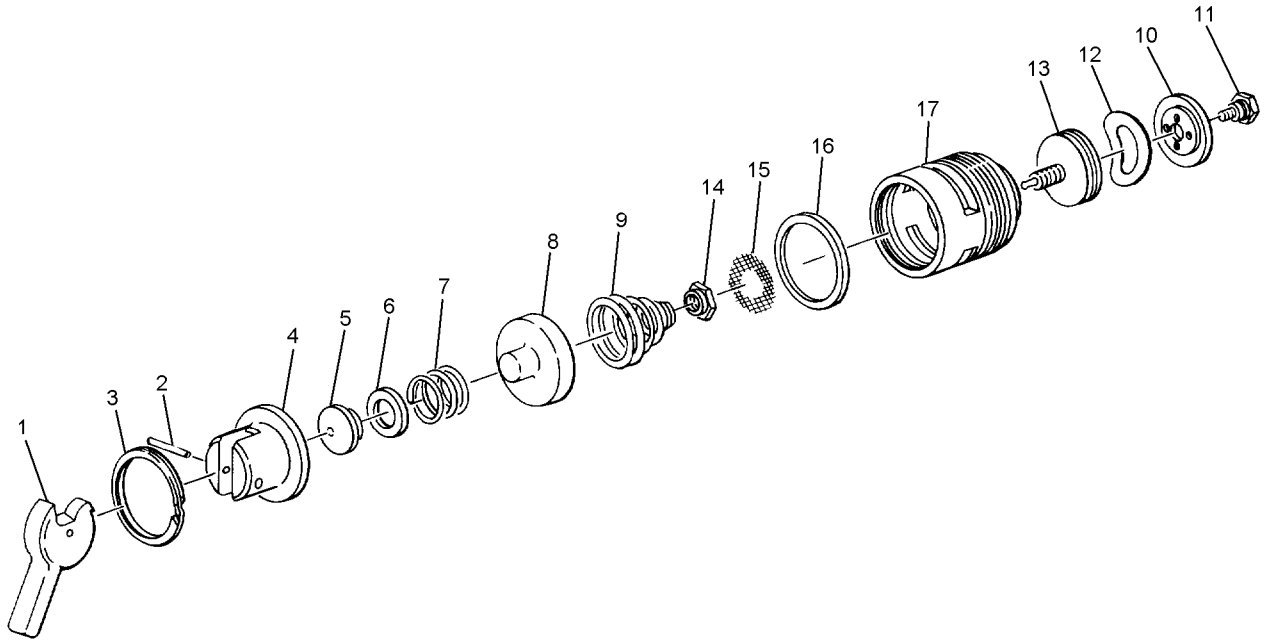


Figure 7-8. Inlet Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-8	1611738-1	VALVE ASSEMBLY, Inlet . . . . . (figure 7-6 for NHA)	REF	ADE FGH
	1611738-4	VALVE ASSEMBLY, Inlet . . . . . (figure 7-6 for NHA)	REF	B
	1611738-5	VALVE ASSEMBLY, Inlet . . . . . (figure 7-6 for NHA)	REF	C
	1611738-2	VALVE ASSEMBLY, Inlet . . . . . (figure 7-6 for NHA)	REF	K
-1	MS16629-1031	. RING, Retaining, internal (KFP)	1	
-2	1612057-1	. FILTER (KF)	1	
-3	1611732-1	. SLEEVE	1	
-4	1602929-1	. SPRING, Helical compression (KFP)	1	
-5	1602930-1	. STEM, Valve (KFP)	1	
-6	1602937-1	. INSERT, Seat (KC)	1	ADE FGH K
	1620718-1	. INSERT, Seat	1	B
	1620718-2	. INSERT, Seat	1	C
-7	1600099	. PACKING, “O” ring (83259) (Bendix Spec . . . . . Cont Dwg 1600099)(KCP)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-8-8	1617369-1	. TOGGLE, Inlet	1	ABC HK
	1603412-1	. TOGGLE, Inlet (KD) (ATTACHING PARTS)	1	DEFG
-9	RP62-500SS	. PIN, ROLL, CRES 0.062 NOM DIA X 0.500 IN. LG ---*---	1	
-10	1602925-1	. FOLLOWER ASSEMBLY, Sleeve	1	
-11	1603411-1	. . ROLLER (ATTACHING PARTS)	1	
-12	814381-1	. . PIN ---*---	1	
-13	1602924-2	. . SLEEVE, Follower	1	
-14	1610647-1	. CAP, Toggle (ATTACHING PARTS)	1	
-15	FO-605BN	. SCREW, Flat HD, BRS BLK NI PL NO 6-40 X 5/16 IN. LG (KF) ---*---	2	
-16	1605349-1	. SHIM (0.0050 IN. THK) (KF)	AR	
	1605349-2	. SHIM (0.0100 IN. THK) (KF)	AR	
	1605349-3	. SHIM (0.0150 IN. THK) (KF)	AR	
-17	1602935-1	. PISTON ASSEMBLY	1	
-18	1602932-1	. . SCREW, Spring retaining (KFP)	1	
-19	1602933-1	. . WASHER, Guide (KFP)	1	
-20	1602931-1	. . SPRING, Helical compression (KFP)	1	
-21	814450-1	. . SHIM (0.0050 IN. Select at Assembly THK) (KF)		
	814450-2	. . SHIM (0.0100 IN. (Not part of piston THK) (KFP)	AR	
	814450-3	. . SHIM (0.0150 IN. assembly, item 17) (THK) (KFP)	AR	
-22	816919-3	. . PACKING, Preformed (KCP)	1	
-23	1602934-1	. . PISTON	1	
-24	1611733-1	. BODY, Inlet valve	1	

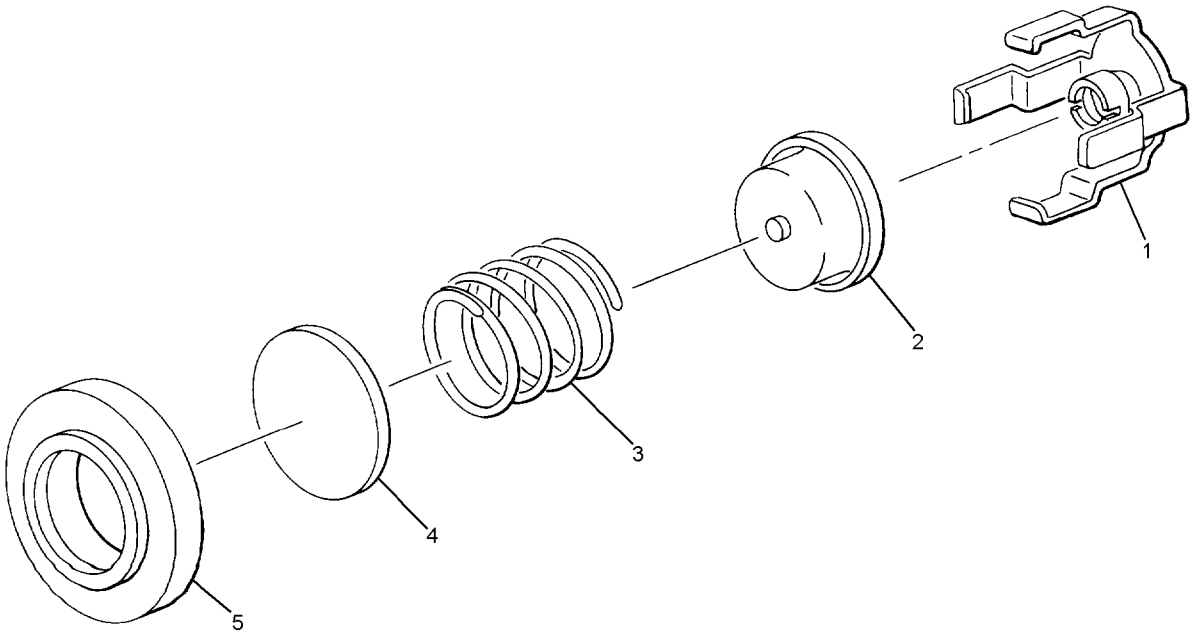


007009

Figure 7-9. Aneroid and Air Shutoff Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-9	1611714-1	SHUTOFF ASSEMBLY, Aneroid and air . . . . . (figure 7-6 for NHA)	REF	
-1	1604106-1	. TOGGLE, Diluter (KFP) . . . . . (ATTACHING PARTS)	1	
-2	RP62-500SS	. PIN, Roll, CRES 0.062 NOM DIA . . . . . X 0.500 IN. LG (KF) ---*---	1	
-3	UR-100-C	. RING, Retaining (80756) (Bendix Spec . . . . . Cont Dwg 1602678-4) (KF)	1	
-4	1610654-1	. BLOCK, Pivot	1	
-5	1604111-1	. CAP, Spring retaining	1	
-6	1603660-6	. WASHER, Flat	AR	
-7	813079-1	. SPRING, Helical compression (KFP)	1	
-8	1610655-1	. SLEEVE, Air shutoff	1	
-9	1611713-1	. SPRING, Conical compression (KF)	1	
-10	766097-1	. PLATE, Throttling . . . . . (ATTACHING PARTS)	1	
-11	758649-1	. SCREW (KFP)	1	
	758649-2	. SCREW (KFP)	1	
	758649-3	. SCREW (KFP)	1	
	758649-4	. SCREW (KFP) . . . . . ---*---	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-9-12	PB50828-1	. WASHER, Spring (KFP)	1	
-13	758632-1	. ANEROID ASSEMBLY	1	
		(ATTACHING PARTS)		
-14	1611712-1	. NUT (KF)	1	
		---*---		
-15	813077	. SCREEN, Aneroid (KFP)	1	
-16	813115	. GASKET (KCP)	1	
-17	1610653-1	. HOUSING, Aneroid	1	



007010

Figure 7-10. Check Valve Adapter and Spring Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-10	1611726-1	ADAPTER AND SPRING ASSEMBLY, Check valve (figure 7-6 for NHA)	REF	
-1	1611725-1	. RETAINER ASSEMBLY (KF)	1	
-2	763204-1	. ADAPTER ASSEMBLY, Spring	1	
-3	758636-1	. SPRING, Aneroid check valve (KFP)	1	
-4	PB53041-1	. DISC, Check valve (KFP)	1	
-5	1611719-1	. ADAPTER, Check valve	1	

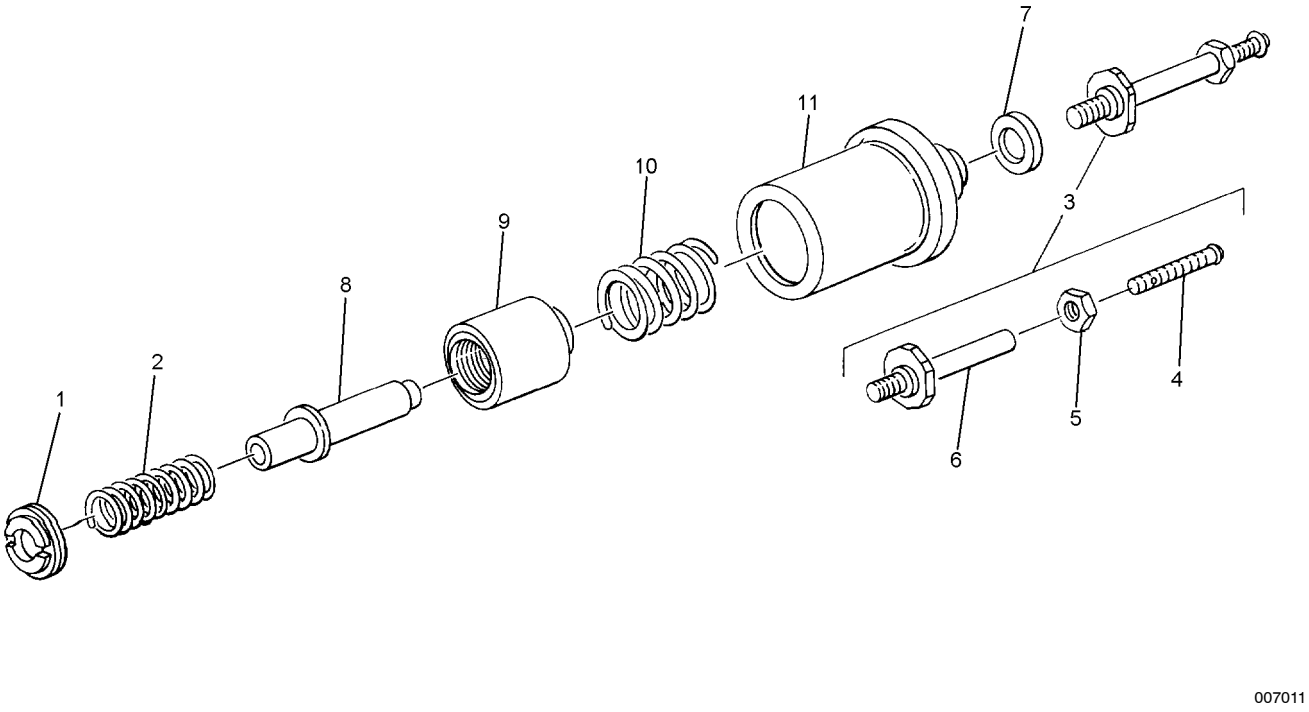
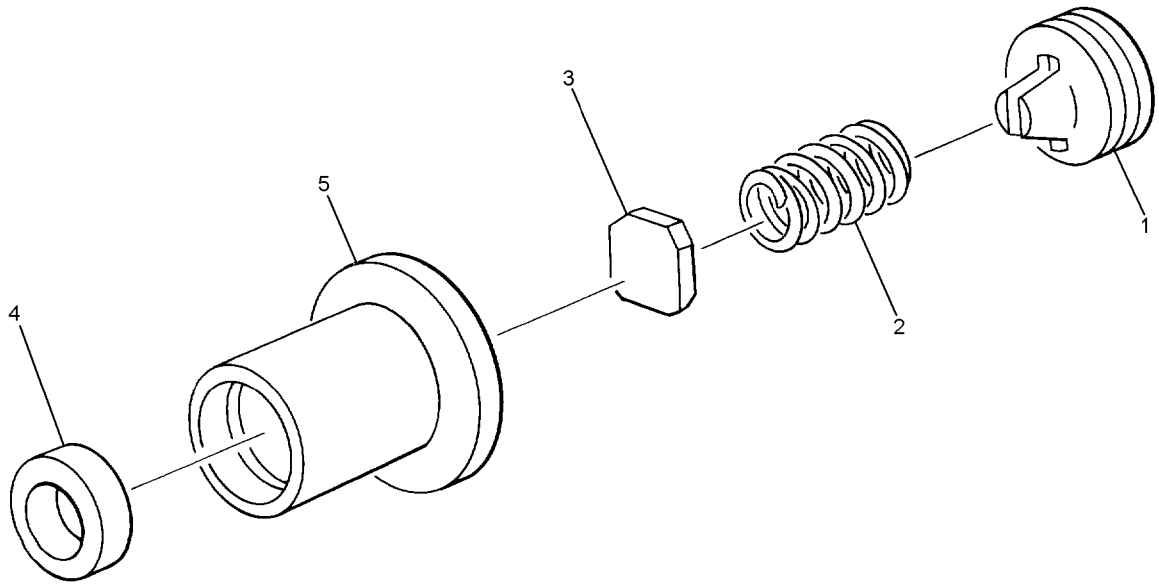


Figure 7-11. Manual Safety Pressure Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-11	1602949-1	PRESSURE ASSEMBLY, Manual safety . . . . . (figure 7-6 for NHA)	REF	
-1	813108	. SCREW, Adjusting	1	
-2	815619	. SPRING, Helical compression (KFP)	1	
-3	1602947-1	. ROD ASSEMBLY, Push	1	
-4	1605328-1	. . SCREW, Cap	1	
-5	NO-2SS	. . NUT, HEX	1	
-6	814427	. . ROD, Push	1	
-7	1602951-1	. WASHER, Non-metallic (KC)	1	
-8	814425	. ROD, Actuating	1	
-9	814424	. GUIDE, Manual safety	1	
-10	815504	. SPRING, Helical compression (KFP)	1	
-11	1602948-1	. HOUSING, Manual safety	1	



007012

Figure 7-12. Relief Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
7-12	1610650-1	VALVE ASSEMBLY, Relief (figure 7-6 for NHA)	REF	
-1	1610648-1	. RETAINER, Spring	1	
-2	708766-1	. SPRING, Relief valve (KF)	1	
-3	708762-1	. DISC, Relief valve (KF)	1	
-4	1610646-1	. SEAT, Relief valve	1	
-5	1610649-1	. HOUSING, Relief valve	1	

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
A7075-1	7-7-1	PAOZZ
A7075-5	7-7-1	
BH402-1/2BN	7-6-55	
FFILO-303-1/2BN	7-6-8	
FFILO-405-1/2BN	7-6-41	
FFILO-406BN	7-6-19	
FO-304BN	7-6-76	
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MS16629-1137	7-6-12	PAOZZ
MS25010-2A	7-7-1	PAOZZ
MS25237-327	7-7-2	PAOZZ
MS25237-328	7-7-2	PAOZZ
NO-2SS	7-11-5	PAOZZ
NO-6SS	7-7-5	PAOZZ
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1601573-1	7-6-115	PAOZZ
1601588-1	7-6-115	
1601914-1	7-6-115	PAOZZ
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1602321-35	7-6-52	PAGZZ
1602321-5	7-6-29	PAGZZ
	7-6-104	
1602321-65	7-6-97	PAOZZ
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1602912-1	7-6-74	PAGZZ
1602914-1	7-6-78	
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1602916-1	7-6-75	PAGZZ
1602920-1	7-6-110	
1602922-2	7-6-109	PAOZZ
1602924-2	7-8-13	
1602925-1	7-8-10	PAGZZ
1602929-1	7-8-4	
1602930-1	7-8-5	PAOZZ
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1602932-1	7-8-18	
1602933-1	7-8-19	
1602934-1	7-8-23	PADZZ
1602935-1	7-8-17	
1602937-1	7-8-6	PAGZZ
1602947-1	7-11-3	PAOZZ
1602948-1	7-11-11	
1602949-1	7-6-28	PAGZZ
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1602951-1	7-11-7	
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1602972-1	7-6-113	PADZZ
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1608564-1	7-7-10	
1610626-1	7-6-71	
1610646-1	7-12-4	PAOZZ
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1610648-1	7-12-1	PAOZZ
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1611715-1	7-6-105	PAOZZ
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1611722-1	7-6-86	PAOZZ
1611723-1	7-6-100	
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1611738-5	7-6-31	PAGZZ
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1614148-1	7-6-15	PAOZZ
1614152	7-6-13	PAOZZ
1614153-1	7-6-16	PADZZ
1614155-1	7-6-17	
1616994-3	7-6-69	PAOZZ
1617369-1	7-8-8	
1620718-1	7-8-6	
1620718-2	7-8-6	PAGZZ
1621386-1	7-6-5	PAOZZ
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29255-10A-A17	7-6	PAOHD
29255-10A-A17A	7-6	PAOHD
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29255-10A-A9	7-6	PAOHD
29255-10A-A9A	7-6	PAOHD
29255-10A-B10	7-6	PAOHD
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741790-2	7-6-56	
758632-1	7-9-13	PAOZZ
758636-1	7-10-3	PAOZZ
758649-1	7-9-11	
758649-2	7-9-11	PAOZZ
758649-3	7-9-11	PAOZZ
758649-4	7-9-11	PAGZZ
761800-2	7-6-45	PAOZZ
763204-1	7-10-2	PAOZZ
766097-1	7-9-10	
779490-7	7-6-36	PAOZZ
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812762-1	7-7-15	
812921	7-6-11	PAGZZ
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813095-1	7-7-4	PAOZZ
813095-2	7-7-4	PAOZZ
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813752	7-6-108	
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814425	7-11-8	
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814441	7-6-67	PAGZZ
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814450-2	7-8-21	
814450-3	7-8-21	PAOZZ
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815504	7-11-10	
815601	7-6-84	
815619	7-11-2	
815678	7-6-106	PAGZZ
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816308	7-6-85	
816554	7-7-3	
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816764	7-6-24	
816919-3	7-8-22	PAOZZ

CHAPTER 8

CHEST MOUNTED OXYGEN REGULATOR

CRU-82/P, P/N 3260014-0401

Section 8-1. Description

8-1. GENERAL.

8-2. Chest Mounted Oxygen Regulator (CRU-82/P), P/N 3260014-0401, (figure 8-1) is manufactured by Litton Life Support, formerly Clifton Precision (CAGE 99251) and is designed to regulate oxygen enriched air to the aircrewmember during flight. Table 8-1 contains the leading particulars for the regulator.

Table 8-1. Leading Particulars

Recommended Inlet Pressure	5 to 120 psig
Flow	0 to 100 lpm
Operating Altitude Range	0 to 50,000 feet
Operating Temperature Range ...	-65°F to +160°F
Weight	9.5 ounces

WARNING

At no time shall the CRU-82/P Chest Mounted Oxygen Regulator be used at operational altitudes above 50,000 feet. Life support requirements cannot be reliably maintained by the CRU-82/P regulator above specified altitudes.

8-3. The Chest Mounted Oxygen Regulator reduces and regulates supply pressure for breathing oxygen enriched air. The safety-pressure feature automatically maintains a positive pressure in the mask of 0.40 to 2.5 inches of water (inH_2O) at all altitudes up to and including 34,000 feet. The pressure-breathing feature maintains a positive pressure in the mask of up to 20.0 inH_2O at altitudes between 34,000 and 50,000 feet, with the positive pressure increasing in proportion to the altitude. Chest Mounted Oxygen Regulators can be used routinely up to approximately 43,000 feet. However, due to human limitations, chest mounted regulators shall not be used above 41,000 feet except for very short periods.

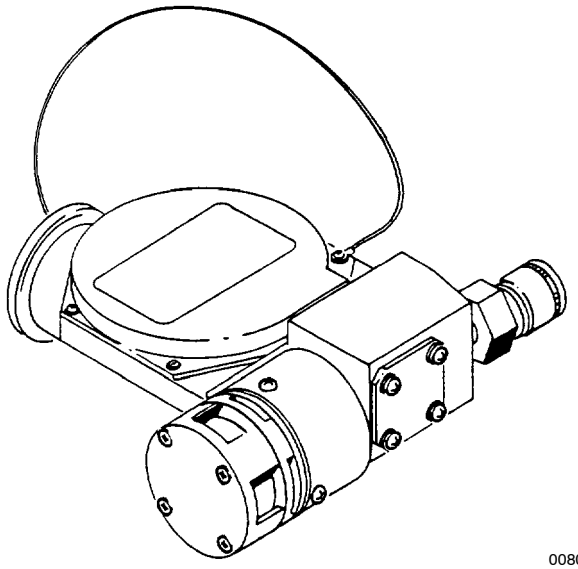

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Figure 8-1. Chest Mounted Oxygen Regulator, CRU-82/P, P/N 3260014-0401

8-4. CONFIGURATION.

8-5. Chest Mounted regulators are designed for use with the MBU-14 series oxygen mask as part of the oxygen system in aircraft with onboard oxygen generating systems.

8-6. FUNCTION.

8-7. Operational characteristics and performance for which oxygen regulator (P/N 3260014-0401) is designed are as follows (figure 8-2):

1. Oxygen enriched air, at an inlet pressure of 5 to 120 psi, enters the regulator through the inlet (19), flows through the inlet screen (18), and is controlled by the balanced main valve (6).

2. At lower altitudes, the pressure breathing aneroid (14) is compressed, opening the gas loading valve (8) and venting bleed air through the aneroid chamber and out the ambient pod (13). The safety pressure spring (4) loads the diaphragm lever (5) to produce a positive safety pressure at the regulator outlet (1) in the range of 0.4 to 2.5 inches of water.

3. At higher altitudes, the pressure breathing aneroid (14) assembly expands due to the low ambient pressure. Oxygen enriched air then flows through the bleed orifice (7) in the housing assembly (23) to provide gas loading on the diaphragm (3) and spring assembly (20). The gas loading valve (8) meters bleed gas flow to maintain proper gas loading pressure on the breathing diaphragm (3), thus providing controlled pressure breathing.

8-8. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

8-9. The Illustrated Parts Breakdown, Section 8-5, contains information on each assembly, subassembly, and component part of the regulator. The figure and index numbers, reference or part number, description, and units per assembly are provided with the breakdown.

Section 8-2. Modifications

8-10. GENERAL.

8-11. There are no modifications to oxygen regulator (P/N 3260014-0401) required/authorized at this time.

Section 8-3. Performance Test Sheet Preparation

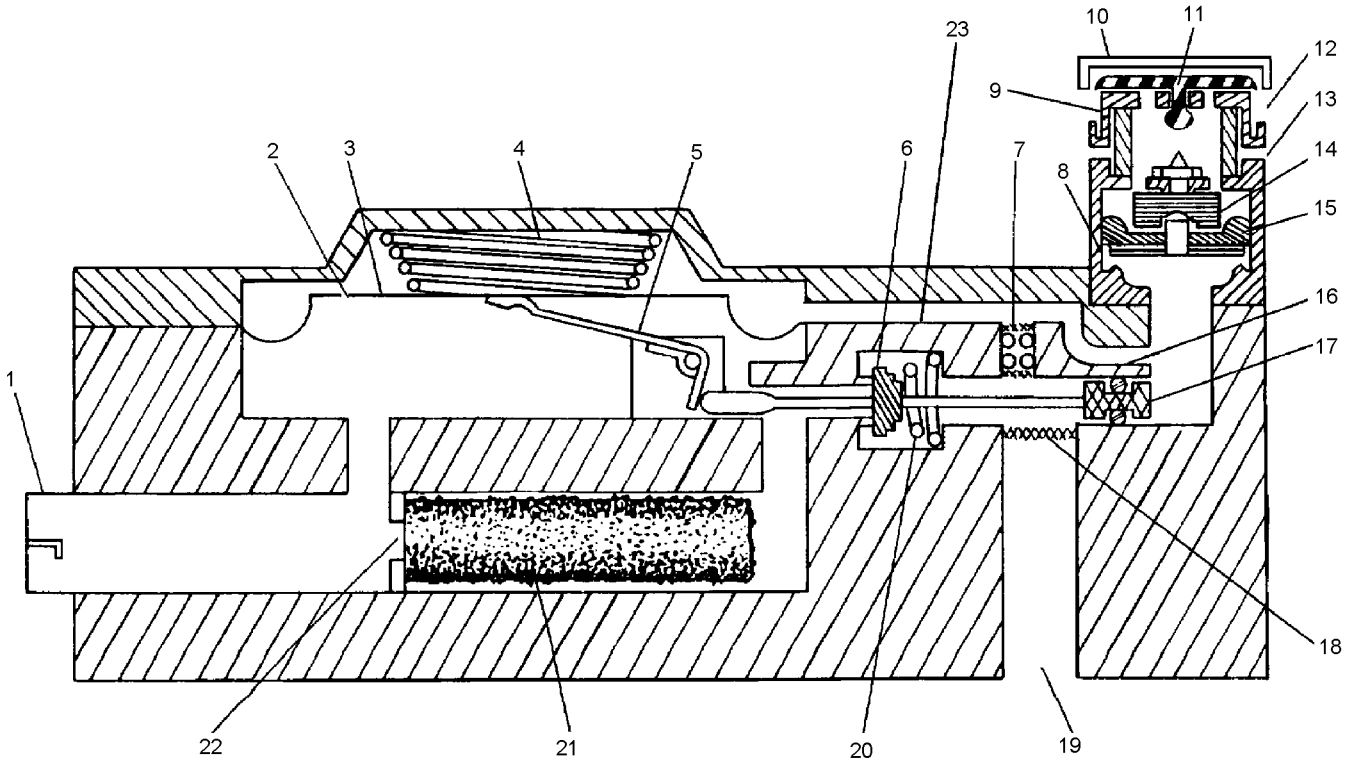
8-12. GENERAL.

8-13. Preparation of the Oxygen Regulator Performance Test Sheet used during Bench Tests requires that all actual flow values provided in this section be converted to indicated flow values. Actual flow values are stated in liters per minute (lpm), a value which cannot be measured by the manometers used in the test stands. The test stand manometers are calibrated to indicate inches of water (inH_2O) pressure. Conversion of actual flows (lpm) to indicated flows (inH_2O) can be accomplished using the various graphs which are prepared for, and accompany each individual test stand. Note that 0 liters per minute need not be converted, since 0 lpm = 0 inH_2O.

NOTE

The various graphs supplied with each Oxygen Systems Components Test Stand, Model 1172AS100 or Model 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands. The Model 3260014-0401 regulator delivers 100% oxygen enriched air at all times. Therefore only the nitrogen (N_2) line on the Outlet Graph for the specified altitude will be used.

8-14. The Performance Test Sheet shall be prepared as shown in the figure 8-3. The Performance Test Sheet illustrated is a sample only, but may be reproduced for local use.



1. OUTLET
2. BLEED ORIFICE
3. BREATHING DIAPHRAGM
4. SAFETY PRESSURE SPRING
5. LEVER
6. BALANCED MAIN VALVE
7. BLEED ORIFICE
8. GAS LOADING VALVE
9. VENT FILTER
10. VENT VALVE COVER
11. VENT VALVE
12. VENT PORT
13. AMBIENT PORT
14. PRESSURE BREATHING ANEROID
15. VALVE GUIDE
16. PASSAGEWAY
17. PISTON AND SEAL
18. INLET SCREEN
19. INLET
20. SPRING
21. OUTLET FILTER
22. OUTLET ORIFICE
23. HOUSING ASSEMBLY

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Figure 8-2. Chest Mounted Oxygen Regulator CRU-82/P Schematic Diagram

8-15. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Safety Pressure Test.

2. Pressure Breathing Test.

8-16. REGULATOR PERFORMANCE TESTS.

8-17. SAFETY PRESSURE TEST. To convert the 50 and 100 lpm flow, proceed as follows:

1. Using the specified altitude output graph, locate the 50 lpm line on the bottom of the graph and trace the line up to where it intersects the N_2 line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O.

3. Using the specified altitude output graph, locate the 100 lpm line on the bottom of the graph and trace the line up to where it intersects the N_2 line.

4. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O.

8-18. PRESSURE BREATHING TEST. To convert the 100 lpm flows, proceed as follows:

1. Using the specified altitude output graph, locate the 100 lpm line on the bottom of the graph and trace the line up to where it intersects the N_2 line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O.

3. Repeat steps 1 and 2 for all actual flows given in Pressure Breathing Test section of figure 8-3.

Section 8-4. Maintenance

8-19. GENERAL.

8-20. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembling, cleaning, assembling, and adjusting the Chest Mounted Oxygen Regulator (CRU-82/P), P/N 3260014-0401.

NOTE

The regulator will be considered beyond economical repair when the cost of the parts exceeds approximately 75 percent of the cost of the regulator.

Upon completion of any maintenance action to a regulator (e.g., inspection, repair, modification, etc.) make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

8-21. The Chest Mounted Oxygen Regulator (CRU-82/P), P/N 3260014-0401, shall be maintained at the lowest level of maintenance authorized to perform the maintenance functions. Major repair of the regulator is not authorized. Minor repairs and testing shall be performed at the Intermediate Maintenance level. Minor repairs include replacement of worn, defective, or otherwise damaged parts with available replacement component parts. Minor repairs to component parts (chasing crossed threads or slightly damaged threads or smoothing of slight burrs) is authorized where such repair does not cause leakage.

8-22. The regulator shall remain in service for as long as it continues to function correctly and does not require excessive repair. All affected silicone rubber parts shall be replaced routinely whenever a regulator is disassembled for repair.

8-23. Procedural steps outlined in this section are listed under the inspection cycle in which they are required and are further listed in the sequence in which they normally occur.

REGULATOR PERFORMANCE TEST SHEET

CLIFTON PRECISION REGULATOR
TYPE CRU-82/P (OBOGS) (P/N 3260014-0401)

DATE: _____ REGULATOR SERIAL NO: _____ TEST STAND SERIAL NO: _____

TEST STAND OPERATOR: _____ CDI _____

1. OVERALL LEAKAGE TEST: 70 PSIG. (ALLOWABLE LEAKAGE 750 CCM) LEAKAGE _____ CCM _____

2. DEMAND VALVE LEAKAGE TEST: NOTE: READING AFTER 5 MINUTES SHALL NOT EXCEED ± 0.1 INH_2O DIFFERENCE FROM INITIAL READING

   30 PSIG INLET PRESSURE — INITIAL OUTLET READING _____ 0 - 1.5 INH_2O
   5 MINUTES READING _____ 0 - 1.5 INH_2O

   120 PSIG INLET PRESSURE — INITIAL OUTLET READING _____ 0 - 1.5 INH_2O
   5 MINUTES READING _____ 0 - 1.5 INH_2O

3. SAFETY PRESSURE TEST:

ALTITUDE (FEET)	INLET PRESS. (PSIG)	0 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING	50 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING	100 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING
SEA LEVEL	10	0	0.0 - 1.5			0.0 - 1.5			0.5 - 3.0	
SEA LEVEL	90	0	0.0 - 1.5			0.0 - 1.5			0.5 - 3.0	
10,000	10	0	0.0 - 1.5			0.0 - 1.5			0.5 - 3.0	
10,000	90	0	0.0 - 1.5			0.0 - 1.5			0.5 - 3.0	
30,000	10	0	0.0 - 1.5			0.0 - 1.5			0.5 - 3.0	
30,000	90	0	0.0 - 1.5			0.0 - 1.5			0.5 - 3.0	

4. PRESSURE BREATHING TEST:

ALTITUDE (FEET)	INLET PRESS. (PSIG)	0 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING	100 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING
34,000	10	0	0.0 - 2.7			0.5 - 3.7	
34,000	90	0	0.0 - 2.7			0.5 - 3.7	
45,000	10	0	13.0 - 16.0			13.0 - 16.0	
45,000	90	0	13.0 - 16.0			13.0 - 16.0	
50,000	10	0	16.0 - 20.0			16.0 - 20.0	
50,000	90	0	16.0 - 20.0			16.0 - 20.0	

Figure 8-3. Regulator Performance Test Sheet

8-24. INSPECTION.

8-25. DAILY/PREFLIGHT INSPECTION.

8-26. The Daily/Preflight Inspection is a visual-type inspection performed by the aircrewmember to whom the regulator is issued, daily or prior to each flight. To perform the inspection, visually inspect the following:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are force of oil, grease, fuel, hydraulic fluid, or any combustible material. Fire or explosion can result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Inlet and outlet connections for security of attachment.

2. Regulator body for bends, dents, scratches, corrosion, condition of nameplate, cracks, or any other damage.

3. Perform a functional test in accordance with paragraph 8-29.

8-27. If discrepancies are found or suspected, the defective regulator shall be removed and a Ready For Issue (RFI) regulator installed. The defective regulator shall be taken to the Aviator's Equipment Branch for the required corrective maintenance action.

8-28. SPECIAL INSPECTIONS.

8-29. Special Inspections are required at specified intervals other than Daily/Preflight or Calendar Inspections. The interval for Chest Mounted Oxygen Regulator is 30 days. This inspection consists of a Visual Inspection and a Functional Test, both performed by personnel of Aviator's Equipment Branch. To perform the Special Inspection, proceed as follows:

1. Visually inspect the regulator in accordance with paragraph 8-26.

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible material. Fire or explosion can result when even slight traces of combustible material comes in contact with oxygen under pressure.

2. Functionally test the regulator by attaching the oxygen mask, regulator, and hose assembly to a suitable oxygen supply source.

3. Turn supply source on. There should be a flow of oxygen through the mask.

NOTE

Resistance during exhalation is due to positive pressure feature of the regulator.

4. Don mask and breathe. There should be a slight resistance on exhalation and no mechanical noise or vibrations from the regulator.

5. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

8-30. CALENDAR INSPECTION.

8-31. The Calendar Inspection shall be performed on all Chest Mounted regulators upon issue prior to being installed in an in-service personal oxygen configuration, and shall be performed on all Chest Mounted regulators in service at least every 90 days.

8-32. The Calendar Inspection consists of a Visual Inspection and a Bench Test. All work shall be performed in a clean, dust-free and oil-free area.

8-33. Visual Inspection. To visually inspect the regulator, proceed as follows:

1. Disconnect the communications connections.

2. Loosen hose clamp securing regulator outlet to mask delivery hose, and remove regulator from hose. Retain hose clamp.

3. Loosen locknut and remove regulator-to-seat kit hose from regulator inlet.

4. Inspect regulator inlet and outlet for foreign objects, din, corrosion, bends, dents, cracks, and other damage. Ensure regulator inlet filter is properly installed.

5. Inspect regulator body for bends, dents, cracks, corrosion, condition of nameplate, security of screws, and fittings for other obvious damage.

8-34. Regulators failing the Visual Inspection or the Bench Test (paragraph 8-35) shall be repaired, if specified repair is authorized. SM&R Codes define repairable components and level of maintenance authorized for repair. Further explanation is contained in the Naval Aviation Maintenance Program Manual, OPNAVINST 4790.2 Series.

8-35. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type I, Class I, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

Do not use the 3500 psig water-pumped, oil-free, gaseous nitrogen cylinders which are normally components of aircraft servicing carts. The possibility exists that these cylinders may be contaminated.

8-36. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate Ground Support Equipment Manual for identification of test stand controls and indicators referred to in the Bench Test procedures that follow. Do not attempt to perform any Bench Test before becoming thoroughly familiar with the test stand. Utilize Performance Test Sheet when performing Bench Test (figure 8-3).

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

The outlet filter installed in the regulator shall be removed and inspected prior to bench testing to ensure it remains intact and has not become brittle due to age.

NOTE

Index numbers refer to figure 8-7 unless otherwise noted.

8-37. INSPECTION OF OUTLET FILTER. To inspect the outlet filter, proceed as follows:

1. Remove retaining ring (40), flow disc (41), screen (42), and outlet filter (43) from outlet of housing assembly (36).

2. Inspect outlet of housing assembly (36) for filter particles from outlet filters (43).

3. Inspect outlet filter (43) to ensure it remains spongy and not brittle.

4. If the outlet filter (43) is not in good condition it must be replaced and the regulator must be disassembled, cleaned, and reassembled in accordance with paragraphs 8-44, 8-52, and 8-58.

5. If the outlet filter (43) is in good condition, install outlet filter (43), screen (42), flow disc (41), into outlet of housing assembly (36) and secure in place with retaining ring (40). Continue on to body leakage test.

8-38. LUBRICATION OF MAIN VALVE AND STEM ASSEMBLY. The main valve and stem assembly must be lubricated prior to performing Bench Test every 90 days. To lubricate the main valve and stem assembly, proceed as follows:

1. Disassemble the main valve and stem assembly in accordance with paragraph 8-49.

2. Lubricate and reassemble main valve and stem assembly in accordance with paragraph 8-63.

3. Perform lever assembly (6) adjustment in accordance with paragraph 8-69.

4. Proceed with the Overall Leakage Test (paragraph 8-39).

8-39. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. A compound giving off peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

1. Cap regulator outlet.

2. Remove lug from tee connector (28), install adapter, and cap INPUT connection (18).

3. Connect oxygen regulator inlet to hose attached to N_2 tee connector (28).

4. Ensure all test stand valves are in the secured position then open N_2 supply cylinder valve.

5. Turn inlet ON/OFF valve (L) on.

6. Adjust LOW PRESS. REGULATOR (N) so that REGULATED LOW PRESS. gage (11) and N2 input press. gage (27) indicate 70 psig.

NOTE

When flows are drawn through the in-system leakage rotameters, inlet pressure of 70 psig will normally be used as this is the pressure used to calibrate the rotameters.

7. Turn LEAK SELECTOR valve (F) to HIGH position.

8. Slowly turn leakage ON/OFF valve (G) on and inlet press. ON/OFF valve (L) off.

9. Leakage will be indicated on HIGH RANGE LEAKAGE rotameter (8). Allowable leakage is 750 ccm.

10. Record reading on Performance Test Sheet.

11. If excessive leakage is indicated, refer to table 8-2, Troubleshooting (Overall Leakage Test), for probable causes and remedies.

12. Close LEAKAGE ON/OFF valve (G).

8-40. DEMAND VALVE LEAKAGE TEST. To perform the Demand Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Uncap regulator outlet.

NOTE

For remaining test do not substitute flared tube fitting (P/N 1643340-1) or inlet fitting modified, 90° elbow (P/N 1654461-1) (46, figure 8-7). Using substitute fitting will give a false indication of regulator failure.

Ensure regulator outlet and piezometer (26) are one inch apart.

2. Connect the regulator outlet to piezometer (26).

3. Place PRESS. SELECTOR valve (D) in HG position.

4. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), adjust pressure to 30 psig as indicated on REGULATOR LOW PRESS. gage (11).

5. Turn vacuum pump on.

6. Turn INLET PRESS. ON/OFF valve (L) to ON position slowly.

7. Open OUTPUT valve (C) slightly to draw a flow through the regulator, then close valve (C). Place PRESS. SELECTOR valve (D) in H_2O position.

8. Observe PRESS./SUCTION manometer (4) and record initial reading on Performance Test Sheet in space provided. (Reading should be 0.0 to 1.5 inH_2O).

9. Observe PRESS./SUCTION manometer (4) for five minutes. Pressure must not increase or decrease more than 0.1 inH_2O from the initial reading taken. Record reading on Performance Test Sheet.

10. Using LOW PRESS. REGULATOR (N), increase inlet pressure to 120 psig as indicated on N_2 INPUT PRESS. gage (27).

11. Repeat steps 8 and 9.

12. If excessive leakage is indicated, refer to table 8-3, Troubleshooting (Demand Valve Leakage Test) for probable cause and remedies.

13. Leave position of all controls and connections unchanged.

Table 8-2. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Note: Index numbers in this table refer to figure 8-7.		
Overall leakage.	Loose external screws.	Tighten external screws (2).
	Damaged performed packing (4).	Replace preformed packing (4) (paragraph 8-48).
	Damaged preformed packing (44).	Replace preformed packing (44) (paragraph 8-51).
	Damaged diaphragm and spring assembly (5).	Replace diaphragm and spring assembly (5) (paragraph 8-48).
	Damaged preformed packing (21).	Replace main valve and stem assembly (11) (paragraph 8-49).

Table 8-3. Troubleshooting (Demand Valve Leakage Test)

Trouble	Probable Cause	Remedy
Note: Index numbers in this table refer to figure 8-7.		
Outlet reading exceeds limits.	Defective main valve and stem assembly (11).	Replace main valve and stem assembly (11) assembly (11) (paragraph 8-49).

8-41. SAFETY PRESSURE TEST. To perform Safety Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

CAUTION

Open FLUTTER DAMPENER valve (J) one quarter turn. If regulator causes PRESS./SUCTION manometer (4) to flutter, open FLUTTER DAMPENER valve (J) slowly until flutter is eliminated. If at altitude, descend to sea level prior to opening valve (J) as PRESS./SUCTION manometer can be easily overloaded. When ascending to altitude, maintain an output flow of 3.0 inH_2O.

1. Using LOW PRESS. regulator (N) and SYSTEM BLEED valve (S), set an inlet pressure of 10 psig.

CAUTION

If inlet pressure falls below 10 psig, it will cause PRESS./SUCTION MANOMETER (4) to overload.

NOTE

Ensure inlet pressure is maintained when performing high flows.

2. Using OUTPUT valve (C), setflows of 0, 50, and 100 lpm and record readings from PRESS./SUCTION manometer (4) on Performance Test Sheet.

3. Using LOW PRESS./REGULATOR (N), increase inlet pressure to 90 psig.

4. Using OUTPUT valve (C), set flows of 0, 50, and 100 lpm and record readings from PRESS./SUCTION manometer (4) on Performance Test Sheet.

5. Open OUTPUT valve (C) and draw a flow of 3.0 inH_2O.

6. Using VACUUM CONTROL valve (B) ascend to test altitudes of 10,000 and 30,000 ft. and repeat steps 1, 2, 3, and 4.

7. If safety pressure flows are not within limits, locate probable cause using table 8-4, Troubleshooting (Safety Pressure Test).

Table 8-4. Troubleshooting (Safety Pressure Test)

Trouble	Probable Cause	Remedy
Note: Index numbers in this table refer to figure 8-7.		
Low safety pressure.	Inlet screen (45) blocked.	Remove foreign material from inlet screen (45).
	Outlet filter (43) and screen (42) blocked.	Remove and clean outlet filter (43) and screen (42).
	Valve retainer (16) misaligned or dry.	Lubricate or align flow ports of valve retainer (16) with opening to flared inlet fitting (46) (paragraph 8-49).
	Incorrect height on lever assembly (6).	Adjust height of lever assembly (6) with lever height gauge (paragraph 8-69).
	Damaged lever assembly (6).	Replace lever assembly (6) (paragraph 8-48).
	Damaged diaphragm and spring assembly (5).	Replace diaphragm and spring assembly (5) (paragraph 8-48).
	Defective main valve and stem assembly (11).	Replace or lubricate main valve and stem assembly (11) (paragraph 8-49).
High safety.	Incorrect height on lever assembly (6).	Adjust height of lever assembly (6) with lever height gauge (paragraph 8-69).
	Damaged lever assembly (6).	Replace lever assembly (6) (paragraph 8-48).
	Damaged diaphragm and spring assembly (5).	Replace diaphragm and spring assembly (5) (paragraph 8-48).

8-42. PRESSURE BREATHING TEST. To perform the Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), set an inlet pressure of 10 psig.

2. Open OUTPUT valve (C) and draw a flow of 3.0 inH_2O.

3. Using VACUUM CONTROL valve (B), ascend to 34,000 ft.

4. Using OUTPUT valve (C), set flows of 0 and 100 lpm and record readings from PRESS./SUCTION manometer (4) on Performance Test Sheet.

5. Using LOW PRESS. REGULATOR (N), increase inlet pressure to 90 psig.

6. Using OUTPUT valve (C), set flows of 0 and 100 lpm and record readings from PRESS./SUCTION manometer (4) on Performance Test Sheet.

7. Open OUTPUT valve (C) and draw a flow of 3.0 inH_2O.

8. Using VACUUM CONTROL valve (B) ascend to test altitudes of 45,000 and 50,000 ft.

9. Repeat steps 1, 4, 5, and 6.

10. Close OUTPUT valve (C).

CAUTION

Ensure that at least 90 psig is on N_2 INPUT PRESS. gage (27) in order to eliminate the suction on PRESS./SUCTION MANOMETER (4).

11. Open CHAMBER BLEED valve (K) and descend to sea level.

12. Turn INLET PRESS. ON/OFF valve (L) to OFF position.

13. Disconnect regulator from test stand and secure all test valves.

14. If pressure breathing outlet pressures are not within tolerance, locate probable cause using table 8-5, Troubleshooting Pressure Breathing Test.

8-43. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)

WARNING

Do not use oxygen test stand to regulate the oxygen pressure.

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

CAUTION

Never block the outlet of the regulator while a pressure is applied to the inlet. This will seriously damage the regulator.

2. Apply 90 psig to regulator inlet; allow oxygen to flow 1 to 3 minutes.

3. Shut off oxygen source and disconnect regulator.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate Level shall be accompanied by the appropriate form in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

4. Affix serviceable condition label with CDI stamp and date to regulator.

5. After completion of oxygen purge, place regulator in a plastic bag for storage.

Table 8-5. Troubleshooting (Pressure Breathing Test)

Trouble	Probable Cause	Remedy
Note: Index numbers in this table refer to figure 8-7.		
Low or high pressure breathing at all altitudes.	Aneroid assembly (30) out of adjustment.	Adjust Aneroid (30) in accordance with paragraph 8-68.
Can not adjust pressure breathing schedule within limits.	Aneroid assembly (30) or gas loading valve seat (33) defective.	Replace defective aneroid (30) or gas loading valve seat (33) paragraph 8-62.

8-44. DISASSEMBLY.

8-45. Disassemble the regulator using figure 8-7 as a guide for identifying parts. Do not remove the identification plate unless replacement is necessary. Special instructions for disassembling the regulator are contained in the following paragraphs.

8-46. Disassemble the regulator only as far as required to correct any malfunctions.

8-47. All affected silicone rubber parts shall be replaced each time a regulator is disassembled for replacement of damaged parts. All replacement parts shall be of the same part number as the damaged or removed part and must be individually requisitioned.

CAUTION

All disassembly, inspection, repair, and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor and ceiling should have a smooth finish, and be painted with a non-chalking paint which can be kept clean and dust-free. It is desirable to keep all parts for each individual regulator separated. Make careful note of the location and quantity of all shims, spacers, and packings. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assemblies.

NOTE

Special tools shall be requisitioned directly from the manufacturer (99251) or obtain commercial equivalent.

Index numbers for the following paragraphs refer to figure 8-7.

8-48. DIAPHRAGM, SPRING, AND LEVER ASSEMBLY. To disassemble the Diaphragm, Spring, and Lever Assembly proceed as follows:

1. Remove four screws (2), lockwashers (3), and the attached end of cap and cord assembly (39) from cover assembly (1).

2. Slide cover assembly (1) away from housing assembly (36) until connector tube on the cover assembly (1) is clear of the housing assembly (36).

3. Lift the cover assembly (1) off of housing assembly (36).

NOTE

The diaphragm and spring assembly (5) may lift off with the cover assembly (1).

4. Remove the diaphragm and spring assembly (5).

5. Remove and discard preformed packing (4) from housing assembly (36).

6. Remove lever assembly (6) by removing two screws (7), lockwashers (8), and flatwashers (9) securing lever assembly (6) to housing assembly (36).

8-49. MAIN VALVE AND STEM ASSEMBLY. To disassemble the Main Valve and Stem Assembly proceed as follows:

CAUTION

Do not touch any outer cylindrical parts of main valve and stem assembly with either fingers or tools. Grip center stem only by using tweezers. Disturbing lubrication or contaminating sealing surfaces can affect regulator performance by adding friction or causing leaks. Do not touch or damage sealing surfaces of main valve stem assembly or inner diameter of valve seat.

1. Place regulator on workbench with main valve and stem assembly plate (12) upward.

CAUTION

Main valve and stem assembly (11) is spring loaded. Be sure to remove plate (12) slowly so that parts are retained in housing assembly (36).

2. Remove four screws (13) and four lockwashers (14) securing plate (12) to housing assembly (36).

3. Remove plate (12) from housing assembly (36).

4. Remove preformed packing (15) from housing assembly (36).

5. Remove main valve retainer (16) with attached preformed packing (17) from housing assembly (36).

6. Use tweezers to remove conical spring (18), valve assembly (19), and main valve seat (20) from housing assembly (36).

7. Use tweezers to remove preformed packing (21).

8. Dispose of all parts removed.

8-50. ANEROID ASSEMBLY. To disassemble the Aneroid Assembly proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
As Required	Acetone	O-A-51

1. Remove three screws (38) and lockwashers (37) from housing assembly (36).

CAUTION

Gas loading seat (33) and preformed packing (35) remain in housing assembly (36) secured by screw (34). These parts shall not be removed unless replacement is necessary.

NOTE

Valve cover (22) and all parts through gas loading valve (32) are removed from housing assembly (36) as a unit for further disassembly.

2. Remove vent valve (24), with valve cover (22) and Aneroid Assembly (30), and spacer (31) with gas loading valve (32), from the housing assembly (36).

WARNING

The gas loading valve (32) has sharp edges.

CAUTION

The gas loading valve (32) is critical to proper operation of the regulator and must be handled carefully. Do not use any tools on the gas loading valve (32) or gas loading valve seat (33).

NOTE

The gas loading valve (32) is attached to spacer (31) with sealing compound at the factory and may be difficult to remove.

3. Visually inspect exposed face of gas loading valve (32) and exposed surface of gas loading valve seat (33) for scratches, excessive wear, dirt, oil, corrosion or other foreign material.

4. If the gas loading valve seat (33) fails visual inspection and must be replaced, proceed as follows:

a. Remove screw (34) and use tweezers to remove gas loading valve seat (33) and preformed packing (35).

5. If the gas loading valve (32) fails visual inspection and must be replaced, proceed as follows:

WARNING

The gas loading valve (32) has sharp edges.

a. Unscrew the gas loading valve (32) and spacer (31) counterclockwise from Aneroid Assembly (30).

b. Remove spacer (31) from gas loading valve (32).

c. If gas loading valve (32) and spacer (31) do not readily separate, soak in a small amount of acetone until sealing compound dissolves and parts wash clean.

d. Blow dry using oil-free nitrogen.

6. Remove four screws (23) securing valve cover (22) to aneroid mounting disc (28).

NOTE

Vent valve (24) will be attached to cover (25).

7. Remove valve cover (22), vent valve (24), cover (25), and filter (26).

NOTE

A 5/16 inch socket may be needed for removing nut (27) securing aneroid mounting disc (28) to Aneroid Assembly (30).

8. Remove nut (27) securing aneroid mounting disc (28) to the Aneroid Assembly (30).

9. Unscrew Aneroid Assembly (30) from aneroid mounting disc (28).

10. Remove preformed packing (29) from aneroid mounting disc (28).

8-51. OUTLET FILTER AND SCREEN. To disassemble the Outlet Filter and Screen proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Retaining Ring	3301098-6001

1. Remove cap assembly (39) from outlet of regulator.

2. Use tweezers to remove preformed packing (44) from housing assembly (36).

NOTE

After the internal retaining ring (40) has been removed, the flow disc (41) and screen (42) can fall out of the regulator. Hold the regulator with the outlet end up. The flow disc (41) does not wear out and must stay with the regulator.

3. Use retaining ring pliers to remove internal retaining ring (40).

4. Use tweezers to remove flow disc (41) and screen (42).

5. Use tweezers to remove outlet filter (43) from housing assembly (36).

6. Remove flared tube fitting (46) from regulator inlet.

8-52. CLEANING.

8-53. To clean the disassembled oxygen regulator main assembly and component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

* If available (optional item)

WARNING

Do not use oil, or any material containing oil in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint and fine metal particles are also dangerous.

Use respiratory and eye protective equipment during cleaning and blow drying procedures.

1. Clean all metallic parts using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

2. Prior to installation; wash all silicone-rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning, all internal surfaces shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Bag all complete assemblies that are not immediately returned to service.

8-54. INSPECTION OF DISASSEMBLED PARTS.

8-55. Inspect the disassembled parts in accordance with the following general instructions and table 8-6.

1. All silicone rubber parts shall be replaced each time the regulator is disassembled.

2. Inspect all metal parts for cracks, nicks, burrs, scratches, or other imperfections which could cause leakage or malfunctions in the regulator.

3. Inspect all threaded areas of parts for condition and cleanliness.

4. Ensure that all parts and cavities are clean and free of foreign material.

5. Inspect identification plate for condition and legibility.

NOTE

All springs used in this regulator are designed to the manufacturer's specification. If defective springs are detected, replace with new spring having same part number.

6. Inspect screens, filters, and springs for obstructions, distortion, and corrosion.

7. Refer to table 8-6 for specific inspection procedures.

8-56. LUBRICATION.

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, or fine metal particles are also dangerous.

8-57. Parts which require lubrication, and lubricants required will be covered during the assembly portion of this section.

Table 8-6. Inspection of Disassembled Regulator

Nomenclature	Figure and Index No.	Inspect for
Diaphragm & Spring.	8-7-5	Pinholes, minute ruptures, discoloring, spotting, or other damage likely to cause leakage in diaphragm. Check diaphragm rim for cuts or other damage on sealing surface.
Valve Assembly.	-19	Scratches, corrosion, excessive wear.
Main Valve Seat.	-20	Nicks, scratches or excessive wear on seating area.
Vent Valve.	-24	Tears on seating surface.
Aneroid Assembly leaks.	-30	Pinholes, minute ruptures, discoloring, spotting, or other damage likely to cause.
Gas Loading Valve.	-32	Scratches, excessive wear, dirt, oil, corrosion or other foreign material.
Gas Loading Valve Seat.	-33	Scratches, excessive wear, dirt, oil, corrosion or other foreign material.

8-58. ASSEMBLY.

8-59. Assembly of the regulator components is essentially the reverse of disassembly, with special instructions noted.

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. A compound giving off peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

NOTE

All silicone-rubber parts shall be discarded, and replaced with new items at time of assembly. The new items shall be washed in accordance with paragraph 8-53, step 2 prior to installation.

8-60. ASSEMBLY OF COMPONENTS. Individual components are first assembled into the major subassemblies for installation into the main assembly. This assembly will be performed in accordance with the following paragraphs.

NOTE

Index numbers for the following paragraph refer to figure 8-7.

8-61. OUTLET FILTER AND SCREEN. To assemble the Outlet Filter and Screen proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240 AC, Type II, Lubricant	NIIN 00-961-8995

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Retaining Ring	3301098-6001
1	Punch, Hollow, Retaining Ring	3301114-1

1. Install outlet filter (43) in housing assembly (36).

2. Use tweezers to install screen (42) and flow disc (41) in housing assembly (36).

3. Use retaining ring pliers to install retaining ring (40) in housing assembly (36). Use the retaining ring hollow punch to set the retaining ring in the groove at edge of housing assembly (36).

4. Using Krytox 240 AC, lightly lubricate preformed packing (44) and use tweezers to install preformed packing (44) in housing assembly (36).

5. Install cap assembly (39) on outlet of regulator housing assembly.

8-62. ANEROID ASSEMBLY. To assemble the Aneroid Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealing	MIL-S-22473 GRH
As Required	Glyptal	1201B (CAGE 24452)
As Required	Krytox 240 AC, Type II, Lubricant	NIIN 00-961-8995

1. If removed, lightly lubricate new preformed packing (35) Krytox 240 AC and position on gas loading valve seat (33).

2. Install gas loading valve seat (33) in housing assembly (36).

3. Apply sealing compound to screw (34) and secure gas loading valve seat (33) with screw (34).

4. Screw Aneroid Assembly (30) into aneroid mounting disc (28).

CAUTION

Do not overtighten nut (27) on stem of Aneroid Assembly (30).

5. Install nut (27) on stem of Aneroid Assembly (30).

6. Lightly lubricate new preformed packing (29) with Krytox 240 AC and install on aneroid mounting disc (28).

CAUTION

When working with the gas loading valve (32), do not use any mechanical tools such as pliers, etc.

7. Install spacer (31) onto gas loading valve (32) using sealing compound.

8. Install gas loading valve (32) onto Aneroid Assembly (30) until face of gas loading valve (32) is 3/4 inch from lip of the aneroid mounting disc as illustrated in figure 8-4.

9. Install filter (26) over nut (27).

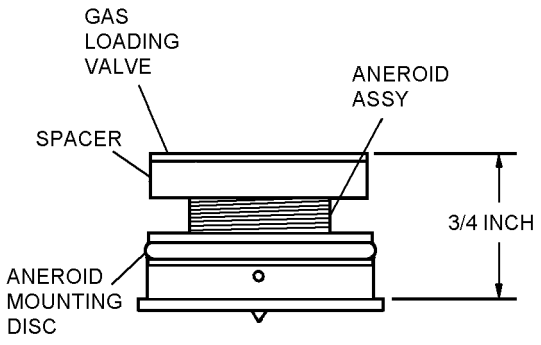


Figure 8-4. Gas Loading Valve/Aneroid Mounting Disc Assembly Dimensions

10. Install vent valve (24) and cover (25). Install retaining ring (49) over tip of vent valve (24) to secure vent valve (24) to cover (25). Position cover (25) over aneroid mounting disc (28).

11. Install valve cover (22) over vent valve (24).

12. Install four screws (23) into valve cover (22).

13. Install aneroid mounting disc (28) into housing assembly (36) and secure with three lockwashers (37) and screws (38).

14. Apply a Glyptal dot to top of screws (38).

8-63. MAIN VALVE AND STEM ASSEMBLY. To assemble the Main Valve and Stem Assembly proceed as follows:

Materials Required

Quantity	Description	Reference Number
	Grease, Molybdenum	Molykote-Z (CAGE 94499) NIIN 00-053-0101

CAUTION

Use clean tweezers for installing components of the Main Valve and Stem Assembly (11). Do not touch components with hands.

1. Clean tweezers in cleaning compound.

NOTE

The plate (12), lockwashers (14), and screws (13) used on shipping container (10) are to be used in installing new Main Valve and Stem Assembly (11) in housing assembly (36).

2. Remove four screws (13) and lockwashers (14) that secure plate (12) to shipping container (10).

NOTE

An extra preformed packing (51) has been positioned between the valve assembly (19) and shipping container (10). This preformed packing may be discarded.

3. Remove Main Valve and Stem Assembly (11) from shipping container.

4. Install preformed packing (21) and main valve seat (20) with beveled side facing up in housing assembly (36).

5. Apply Molykote-Z to entire length and circumference of valve assembly (19).

NOTE

The six external rings on valve stem are for sound attenuation. Openings on the rings must be positioned alternately at 180° apart.

6. Install valve assembly (19) in housing assembly (36).

WARNING

Ensure that the small end of conical spring (18) is installed on valve assembly (19). Failure to do so will result in failure of the oxygen regulator delivering insufficient or excessive outlet pressure, resulting in possible loss of aircraft or aircrew.

7. Position conical spring (18) with small end of spring on valve assembly (19).

8. Apply Molykote-Z to inside diameter of main valve retainer (16).

9. Position flow ports of main valve retainer (16) with attached preformed packing (17), with opening toward flared tube fitting (46) and install main valve retainer (16) in housing assembly (36).

10. Install preformed packing (15) in housing assembly (36).

11. Install new plate (12) from shipping container (10) over the main valve retainer (16) and secure with four screws (13) and lockwashers (14).

8-64. LEVER ASSEMBLY. To assemble the Lever Assembly proceed as follows:

1. Position Lever Assembly (6) in housing assembly (36).

2. Secure Lever Assembly (6) with two screws (7), lockwashers (8), and flat washers (9).

3. Perform Lever Assembly adjustment procedures in paragraph 8-69.

8-65. DIAPHRAGM AND SPRING ASSEMBLY. To assemble the Diaphragm and Spring Assembly proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealing	MIL-S-22473 GRH
As Required	Glyptal	1201B (CAGE 24452)
As Required	Krytox 240 AC, Type II, Lubricant	NIIN 00-961-8995
As Required	Lubricant, Flurocarbon	MIL-L-60326
As Required	Power, Talcum	A-A-42A
As Required	Tape, Anti-seize	MIL-T-27730

NOTE

If spring is separated from diaphragm during maintenance, secure with adhesive.

1. Apply a thin film of fluorocarbon lubricant to top contact surface of Lever Assembly (6) and center metal portion of Diaphragm and Spring Assembly (5).

2. Lightly lubricate new preformed packing (4) with Krytox 240 AC and install in housing assembly (36).

3. Lightly dust Diaphragm and Spring Assembly (5) with talcum powder and blow off excess.

4. Install the Diaphragm and Spring Assembly (5) by lightly pressing the diaphragm onto the groove on housing assembly (36).

5. Center spring of Diaphragm and Spring Assembly (5) in spring guide of cover assembly (1).

CAUTION

When removing or installing cover assembly (1), note that there is a resistance between the connector tube of cover assembly (1) and the preformed packing (4) in cover assembly (1). Excessive force could damage the preformed packing (4) or the connector tube on the cover assembly (1).

6. Carefully press the cover assembly (1) onto housing assembly (36), inserting connector tube into the housing assembly (36). Ensure that the diaphragm sealing edge is properly seated in grove of the housing assembly.

7. Install cord end of cap and cord assembly (39) on cover assembly (1).

8. Secure cover assembly (1) with four screws (2) and lockwashers (3).

NOTE

Inlet fitting modified, 90 ° elbow (P/N 1654461-1) (figure 8-7) may be used vice flared tube fitting (46). If inlet fitting modified, 90° elbow is used, refer to NAVAIR 13-1-6.7-3 for aircrew orientation of 90° elbow.

9. Wrap two turns of anti-seize tape around pipe threads of flared tube fitting (46). Screw flared tube fitting (46) into inlet of regulator housing (36) finger tight, then tighten one to two turns with a wrench.

8-66. ALIGNMENT, ADJUSTMENT AND CALIBRATION.

8-67. All alignment, adjustments, and calibration shall be accomplished during assembly and testing of the regulator in accordance with the following paragraphs:

NOTE

Unless otherwise noted, index numbers refer to figure 8-7.

8-68. ADJUSTMENT OF THE PRESSURE BREATHING ANEROID. To adjust the Pressure Breathing Aneroid, proceed as follows: Refer to paragraph 8-42 for test procedures.

1. Remove four screws (23) securing valve cover (22) to aneroid mounting disc (28).

2. Remove valve cover (22), vent valve (24), cover (25), and filter (26).

NOTE

Adjusting aneroid assembly clockwise increases the outlet pressure. Adjusting aneroid assembly counterclockwise decreases the outlet pressure. A change of 1/8 revolution will cause a change in the water pressure of approximately 1.0 inch.

3. Loosen nut (27).

4. Hold the aneroid in place with 1/8 inch wrench when loosening or tightening aneroid locking nut.

5. Make small angular adjustments to aneroid assembly (30).

6. Tighten nut (27) after each adjustment.

7. Perform Pressure Breathing Test in accordance with paragraph 8-42 after each adjustment of aneroid assembly (30).

8. When final adjustments to pressure breathing have been completed, install filter (26), cover (25), vent valve (24), and valve cover (22).

9. Install four screws (23) into valve cover (22) and apply a Glyptal dot to top of screws.

8-69. LEVER ASSEMBLY ADJUSTMENT. To adjust the Lever Assembly, proceed as follows:

Special Tools

Description	Reference Number
Gage, Lever Height	3301113-1 or Local Manufacture IAW Figure 8-5.

1. Remove cover assembly (1) and diaphragm and spring assembly (5) to gain access to lever assembly (6) (paragraph 8-48).

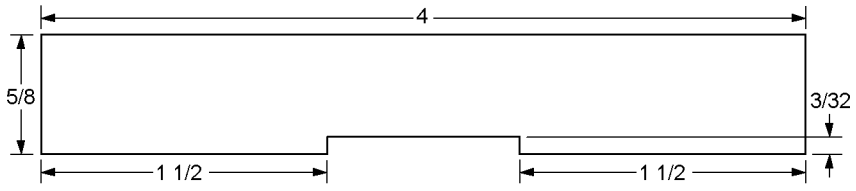
NOTE

Keep bottom of lever assembly (6) square with housing assembly (36) when adjusting lever assembly (6). Bottom of lever assembly (6) should be moved back towards main valve and stem assembly (1).

2. Loosen screws (7). Position lever height gage, on housing assembly (36) across lever assembly (6) (figure 8-6). Slide lever assembly fore or aft along attaching screw slots until lever assembly just touches the bottom edge of lever height gage notch (figure 8-6).

3. Tighten screws (7) and recheck the clearance of lever assembly (6) with lever height gage.

4. Assemble regulator.



NOTE: MADE FROM 3/16 INCH ALUMINUM STOCK.

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Figure 8-5. Lever Height Gage

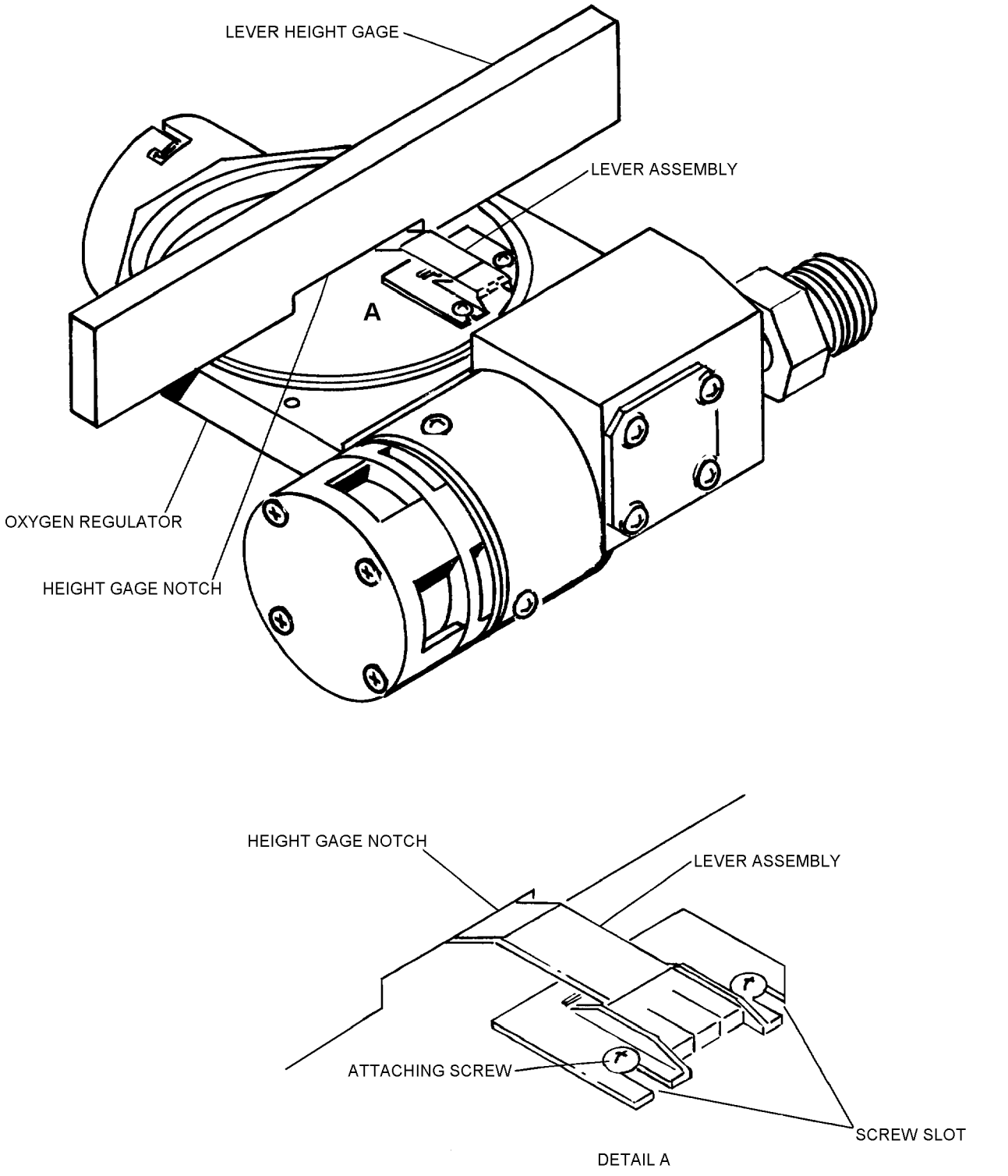

Figure 8-6. Lever Height Adjustment

Section 8-5. Illustrated Parts Breakdown

8-70. GENERAL.

8-71. This section lists and illustrates the procurable parts of the Chest Mounted Oxygen Regulator (CRU-82P), P/N 3260014-0401.

8-72. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

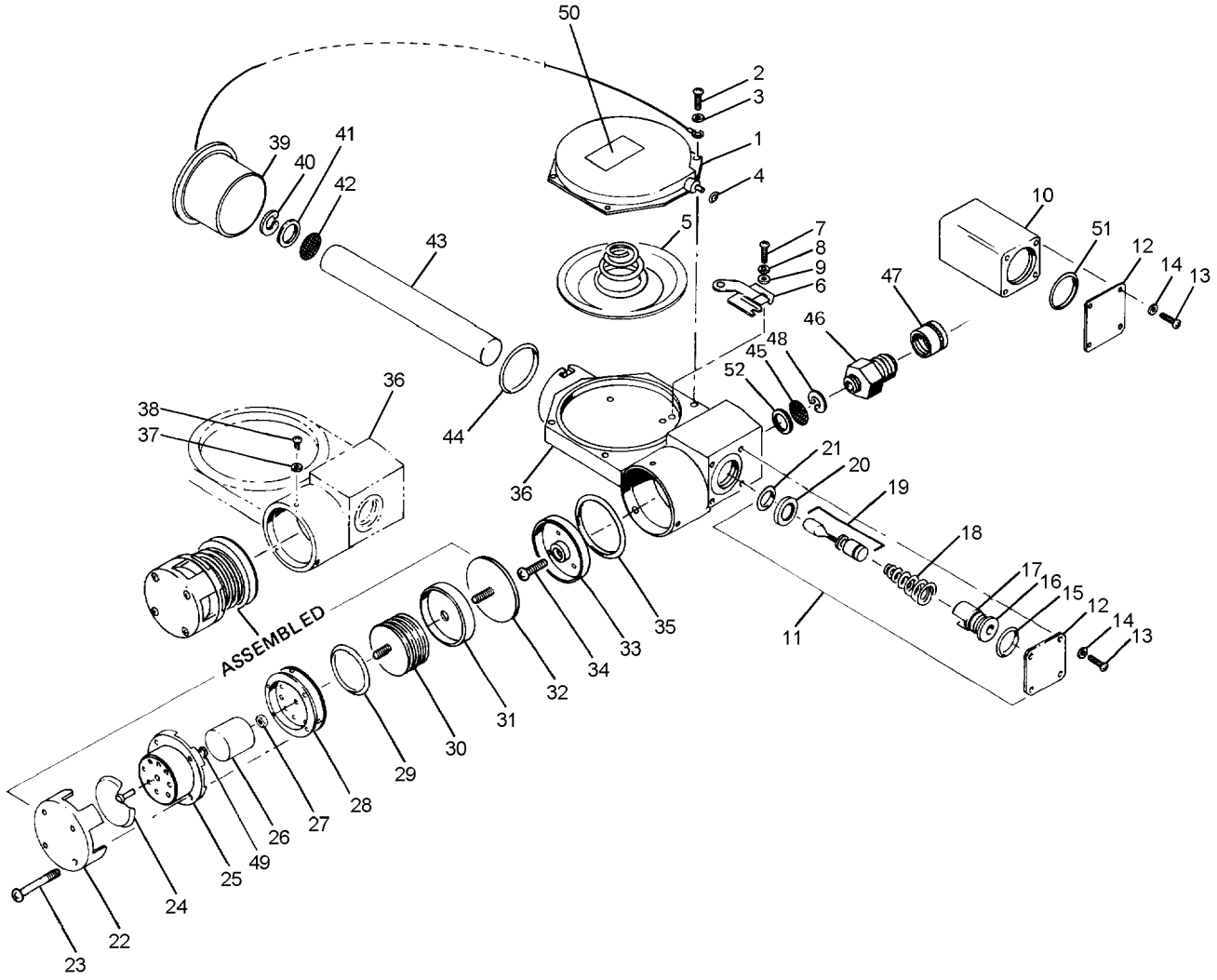

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Figure 8-7. Chest Mounted Oxygen Regulator (CRU-82/P)

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
8-7	3260014-0401	REGULATOR, Oxygen, Chest Mounted, (CRU-82/P)	REF	
-1	163893-1	. COVER ASSEMBLY	1	
		(ATTACHING PARTS)		
-2	MS51957-3	. SCREW, Machine	4	
-3	MS35338-153	. LOCKWASHER	4	
		---*---		
-4	1602321-7	. PACKING, Preformed	1	
-5	1632265-2	. DIAPHRAGM ASSEMBLY	1	
-6	1632642-1	. LEVER ASSEMBLY	1	
		(ATTACHING PARTS)		
-7	MS51957-3	. SCREW, Machine	2	
-8	MS35338-153	. LOCKWASHER	2	
-9	1603660-25	. WASHER, Flat	2	
		---*---		
-10	1632786-1	. CONTAINER, Shipping (Note 1)	1	
-11	1632785-1	. MAIN VALVE AND STEM ASSEMBLY (Note 2)	1	
-12	1632693-1	. . PLATE	1	
		(ATTACHING PARTS)		
-13	MS51957-3	. . SCREW	4	
-14	MS35338-153	. . LOCKWASHER	4	
		---*---		
-15	1602321-5	. . PACKING, Preformed	1	
-16	1632643-1	. . RETAINER, Main Valve	1	
-17	1602321-59	. . PACKING, Preformed	1	
-18	1632692-1	. . SPRING, Conical	1	
-19	1632694-2	. . VALVE ASSEMBLY	1	
-20	163245-1	. . VALVE SEAT, Main	1	
-21	1602321-59	. . PACKING, Preformed	1	
-22	1632805-1	. COVER, Valve	1	
		(ATTACHING PARTS)		
-23	MS51959-8	. SCREW, Machine	4	
		---*---		
-24	1632862-1	. VALVE, Vent	1	
-25	1632589-1	. COVER	1	
-26	1632528-3	. FILTER	1	
-27	1611712-1	. NUT	1	
-28	1632456-1	. DISC, Aneroid Mounting	1	
-29	MS9068-023	. PACKING, Preformed	1	
-30	1643050-1	. ANEROID ASSEMBLY	1	
-31	1632695-1	. SPACER	1	
-32	1632260-2	. VALVE, Gas Loading	1	
-33	163088-3	. SEAT, Gas Loading Valve	1	
		(ATTACHING PARTS)		
-34	MS51959-26	. SCREW, Machine	1	
		---*---		

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
8-7-35	1602321-18	. PACKING, Preformed	1	
-36	1632650-1	. HOUSING ASSEMBLY (ATTACHING PARTS FOR ASSEMBLED ITEMS 22 THRU 32)	1	
-37	MS35338-153	. LOCKWASHER	3	
-38	MS51957-3	. SCREW, Machine ---*---	3	
-39	1622021-5	. CAP AND CORD ASSEMBLY	1	
-40	MS16625-4050	. RING, Retaining, Internal	1	
-41	1632307-5	. DISC, Flow	1	
	1632307-6	(ALTERNATE PART)		
	1632307-7	(ALTERNATE PART)		
	1632307-8	(ALTERNATE PART)		
	1632307-9	(ALTERNATE PART)		
-42	1631278-3	. SCREEN	1	
-43	1631882-1	. FILTER, Outlet	1	
-44	1602321-73	. PACKING, Preformed	1	
-45	1632651-1	. SCREEN	1	
-46	1643340-1	. FITTING, Flared Tube	1	
	1654461-1	. INLET FITTING, Modified 90-degree Elbow	1	
-47	812787-8	. CAP, Protective	1	
-48	1632689-1	. RING, Retaining	1	
-49	MS16633-4009	. RING, Retaining, External	1	
-50	1632697-1	. PLATE, Identification	1	
-51	1602321-66	. PACKING, Preformed	1	
-52	1632691-1	. GASKET	1	
	Notes: 1. Shipping Container, P/N 1632786-1, used only for shipping Main Valve and Stem Assembly. 2. Index numbers 12 thru 21 come as one assembly. Order Main Valve and Stem Assembly, P/N 1632785-1.			

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
MS16625-4050	8-7-40	PAOZZ
MS16633-4009	8-7-49	PAOZZ
MS35338-153	8-7-3	PAOZZ
	8-7-8	
	8-7-14	
	8-7-37	
MS51957-3	8-7-2	PAOZZ
	8-7-7	
	8-7-13	
	8-7-38	
MS51959-8	8-7-23	PAOZZ
MS51959-26	8-7-34	PAOZZ
MS9068-023	8-7-29	PAOZZ
1602321-18	8-7-35	PAOZZ
1602321-5	8-7-15	PAGZZ
1602321-59	8-7-17	PAOZZ
	8-7-21	
1602321-66	8-7-51	PAOZZ
1602321-7	8-7-4	PAGZZ
1602321-73	8-7-44	PAGZZ
1603660-25	8-7-9	PAGZZ
1611712-1	8-7-27	PAGZZ
1622021-5	8-7-39	
1630883-1	8-7-33	
1630893-1	8-7-1	
1631278-3	8-7-42	PAGZZ
1631882-1	8-7-43	PAGZZ
1632260-2	8-7-32	PAGZZ
1632265-2	8-7-5	PAGZZ
1632307-5	8-7-41	PAGZZ
1632307-6	8-7-41	PAGZZ
1632307-7	8-7-41	PAGZZ
1632307-8	8-7-41	PAGZZ
1632307-9	8-7-41	PAGZZ
1632456-1	8-7-28	PAGZZ
1632528-3	8-7-26	PAGZZ
1632589-1	8-7-25	
1632642-1	8-7-6	PAGZZ
1632643-1	8-7-16	
1632645-1	8-7-20	
1632650-1	8-7-36	
1632651-1	8-7-45	PAGZZ
1632689-1	8-7-48	PAGZZ
1632691-1	8-7-52	PAGZZ
1632692-1	8-7-18	
1632693-1	8-7-12	
1632694-2	8-7-19	
1632695-1	8-7-31	PAGZZ
1632697-1	8-7-50	
1632785-1	8-7-11	PAGZZ
1632786-1	8-7-10	
1632805-1	8-7-22	
1632862-1	8-7-24	
1643050-1	8-7-30	PAGZZ
1643340-1	8-7-46	PAGZZ
1654461-1	8-7-46	PAGZZ
3260014-0401	8-7-REF	PAOGG
812787-8	8-7-47	PAGZZ

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CHAPTER 9

CHEST MOUNTED POSITIVE PRESSURE REGULATOR

CRU-88/P, P/N 2900W000

Section 9-1. Description

9-1. GENERAL.

9-2. The Chest Mounted Positive Pressure Regulator, CRU-88/P, P/N 2900W000 (figure 9-1) is manufactured by Normalair-Garrett Limited (CAGE U1605) and is designed to regulate oxygen enriched air to the aircrewmembers during flight. Table 9-1 contains the leading particulars of the regulator.

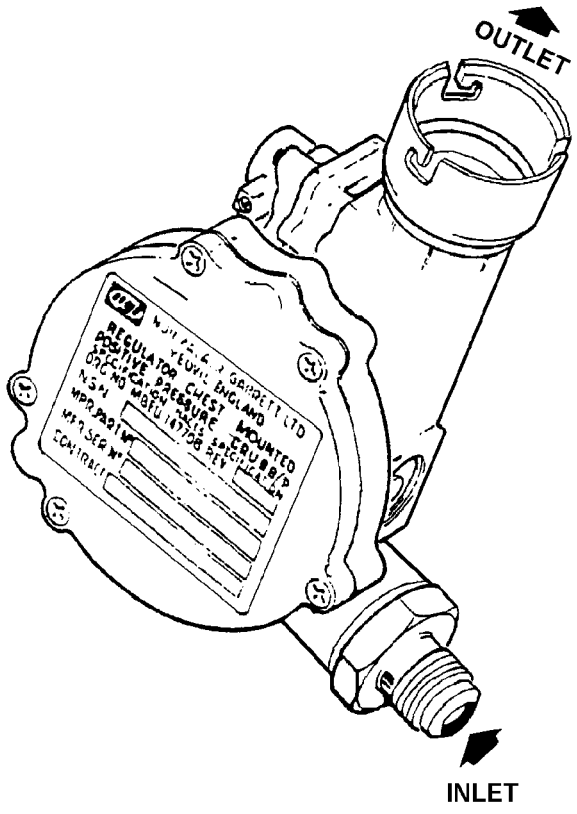


Figure 9-1. Chest Mount Positive Pressure Regulator, CRU-88P, P/N 2900W000

Table 9-1. Leading Particulars

Inlet Pressure	5 to 120 psig
Flow	0 to 180 lpm
Operating Altitude	0 to 50,000 feet
Operating Temperature	-65° to +165°F
Weight	10.25 oz
Inlet Connection	Per MS33656-6 (to mate with 0.375 in OD flared tube per MS33583 or MS33584
Outlet Connection	Per figure 6 of MIL-C-38271 (to mate with three pronged bayonet connector per MS27796)
Mounting	Two mounting pins per Naval Air Systems Command drawing 1440AS101

9-3. The Chest Mounted Positive Pressure Regulator reduces and regulates supply pressure for breathing oxygen enriched air. The safety pressure feature automatically maintains a positive pressure in the mask of 0.5 to 4.0 inches of water (inH_2O) at all altitudes up to approximately 34,000 feet. The pressure breathing maintains a positive pressure in the mask up to 20 inH_2O at altitudes between 34,000 and 50,000 feet with the positive pressure increasing with altitude.

9-4. Chest-mounted oxygen regulators can be used routinely up to approximately 43,000 feet (cockpit altitude) with 100% oxygen and up to approximately 41,000 feet with OBOGS. However, due to human limitations, chest-mounted regulators shall not be used above these altitudes (depending on the oxygen system) except for very short periods. Above these altitudes, aircrew will suffer rapid and severe hypoxia.

9-5. CONFIGURATION.

9-6. The CRU-88/P regulator a chest mounted and is designed for use with the MBU-14 series oxygen mask. Refer to NAVAIR 13-1-6.7-3 for personal configurations of the MBU-14 series oxygen mask.

9-7. FUNCTION.

9-8. The functional characteristics of the regulator are as follows:

NOTE

Refer to figure 9-2 for index numbers referred to unless otherwise noted.

1. The balance demanded valve (8) is held in the slightly open position by the action of the safety pressure spring (11) loading the sensing diaphragm (13). This gives the regulator its constant safety pressure feature. Loss of gas is prevented by either donning the mask or isolating the gas supply.

2. The use of the balanced demand valve (8), which has a piston at one end of equal area to the valve head at the other end, ensures that breathing effort is kept to a minimum.

3. Leakage from the labyrinth seal (7) at the piston end of the balanced demand valve (8) is allowed to spill into the sensing chamber (1). From the sensing chamber, it passes through the orifice (12) in the sensing diaphragm (13) into the pneumatic control system of the regulator.

4. Linked to the pneumatic control system is the pressure breathing control which is formed by the pressure breathing aneroid (14) and its respective seating, the dump valve (2) and maximum pressure relief valve (1).

5. The flow through the sensing diaphragm (13) is utilized for raising the control pressure in the pneumatic control system, where it acts on the control side of the sensing diaphragm (13) to bias the balanced demand valve (8), raising the delivery pressure of the regulator.

6. The increase in control pressure is achieved by restricting the flow to ambient at the pressure breathing control at altitudes above 35,000 feet.

7. The control pressure also provides the compensating pressure to the control side of the dump valve diaphragm (2). This is required for pressure breathing conditions to prevent the valve from venting unnecessarily.

8. Under normal conditions, the dump valve (2) is held closed by a light spring load. This allows the valve to open due to the slightest abnormal use in delivery pressure under such conditions as explosive decompression. rapid rates of climb, pumping of the mask due to head movement and of constant flow failure of the regulator.

9. Excessive pressure in the pneumatic control system is prevented by the maximum pressure relief valve (1).

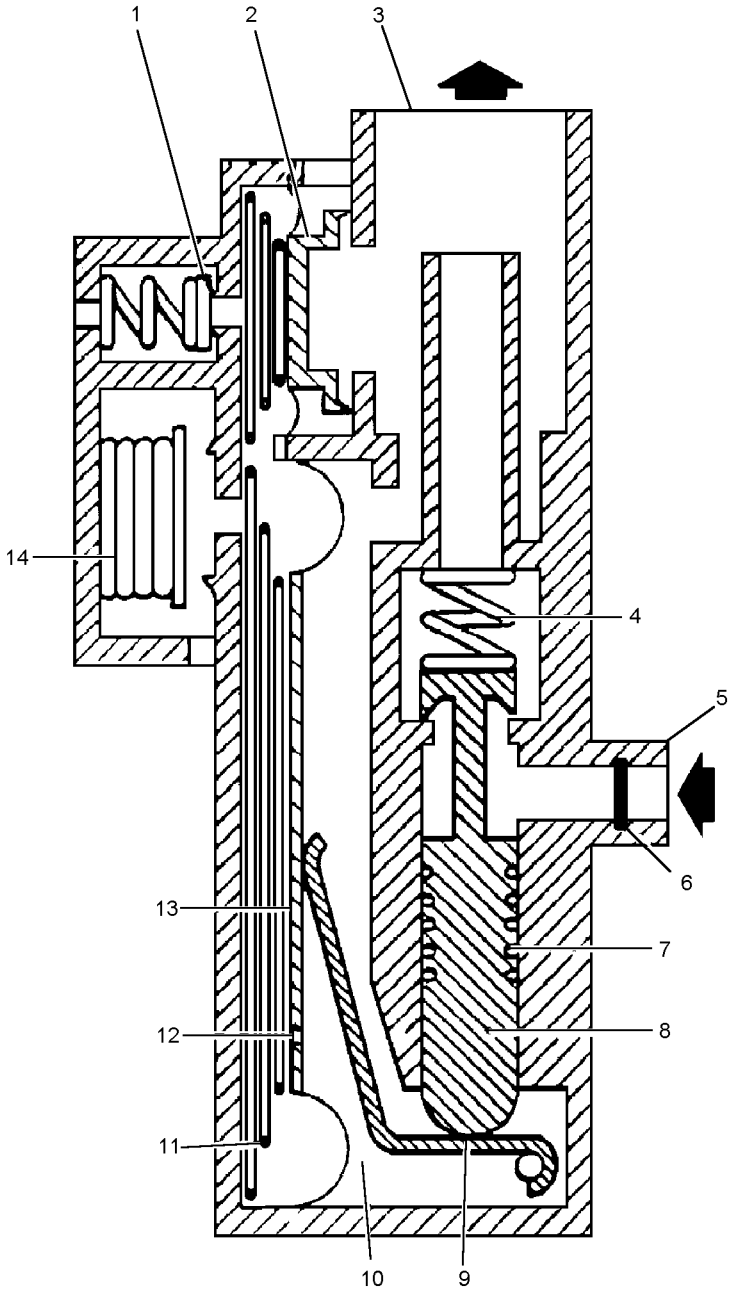
9-9. OPERATION.

9-10. The operation characteristics of the regulator are as follows:

NOTE

Refer to figure 9-2 for index numbers referred to unless otherwise noted.

1. Oxygen enriched air enters the regulator at the inlet (5) where it passes through a 2 micron filter (6) before reaching the balanced demand valve (8) where it applies an equal gas load to the valve head and piston. The safety pressure spring (11) loading through the sensing diaphragm (13) and lever (9) will hold the balanced demand valve in an open position until there is a restriction of the delivery flow (such as donning the mask) causing the pressure at the outlet (3) and sensing chamber (10) to rise to the preset level of safety pressure. This causes the sensing diaphragm to be pushed back against the safety pressure spring (11) and allows the demand valve to close under the action of the return spring (4).



1. MAXIMUM PRESSURE RELIEF VALVE
2. DUMP VALVE
3. OUTLET
4. RETURN SPRING
5. INLET
6. FILTER
7. LABYRINTH SEAL
8. BALANCED DEMAND VALVE
9. LEVER
10. SENSING CHAMBER
11. SAFETY PRESSURE SPRING
12. ORIFICE
13. SENSING DIAPHRAM
14. PRESSURE BREATHING ANEROID

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Figure 9-2. Chest Mounted Positive Pressure Regulator (CRU-88/P) Schematic Diagram

2. The regulator remains in the balanced state until a demand is applied, when the resultant pressure reduction in the sensing chamber (10) causes the sensing diaphragm (13) to deflect the lever (9) and gas to flow from the demand valve to satisfy the demand.

3. Bleed flow sensing through the pneumatic control system is restricted by the pressure breathing control, which is loaded by the expansion of the pressure breathing aneroid (14). The control pressure is raised until it balances the load applied by the pressure breathing aneroid onto its valve seat.

9-11. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

9-12. The Illustrated Parts Breakdown, Section 9-5, contains information on each assembly, subassembly, and component part of the regulator. The figure and index numbers, reference or part number, description, and units per assembly are provided with the breakdown.

Section 9-2. Modifications

9-13. GENERAL.

9-14. There are no modifications to the Chest Mounted Positive Pressure Regulator (CRU-88/P) required/authorized at this time.

Section 9-3. Performance Test Sheet Preparation

9-15. GENERAL.

9-16. Preparation of the positive pressure regulator Performance Test Sheet used during Bench Tests requires that, through the use of various graphs, actual flows provided in this section be converted to indicated flows. Actual flows are stated in liters per minute (lpm) and are not measurable by the manometers used on oxygen regulator tests stands. The flows must be converted to inH_2O pressure, the form of measurement which can be read on the test stand manometers. Zero lpm flows do not require conversion as 0 lpm = 0 inH_2O.

NOTE

The Various graphs supplied with each Oxygen System Components Test Stand, Models 1172AS100 and 1316AS100 are used in converting flows. The graphs supplied with aneroid each test stand are not interchangeable. The model 2900W000 regulator delivers 100% enriched gas produced by LOX and 94% enriched gas produced by OBOGS at all times. Therefore only the nitrogen (N_2) line on the outlet graph for the specified altitude will be used.

9-17. The Performance Test Sheet shall be prepared as shown in figure 9-3. The Performance Test Sheet is a sample only, but may be reproduced for local use.

9-18. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Safety pressure test.

2. Pressure breathing test.

9-19. REGULATOR PERFORMANCE TESTS.

9-20. SAFETY PRESSURE TEST. To convert the 50 and 100 lpm flows, proceed as follows:

1. Using the specified altitude output graph, locate the 50 and 100 lpm line on the bottom of the graph and trace the line up to where each lpm line intersects the 100% N_2 line.

2. Trace each line from the point of intersection across the graph to determine inH_2O.

3. Enter the inH_2O figures for their respective 50 or 100 lpm flows in the appropriate block on the Performance Test Sheet.

REGULATOR PERFORMANCE TEST SHEET

NORMALAIR-GARRET REGULATOR
TYPE CRU-88/P (OBOGS) (P/N 2900W000)

DATE _____ REGULATOR SERIAL NO. _____ TEST STAND SERIAL NO. _____

TEST STAND OPERATOR: _____ CDI _____

1. OVERALL LEAKAGE TEST: 70 PSIG. (ALLOWABLE LEAKAGE 750 CCM) _____ CCM

1A. MAXIMUM PRESSURE RELIEF VALVE TEST: (17 - 20 INH_2O) READING _____

2. DEMAND VALVE LEAKAGE TEST: NOTE: READING AFTER 5 MINUTES SHALL NOT EXCEED ± 0.1 INH_2O DIFFERENCE FROM INITIAL READING

30 PSIG INLET PRESSURE — INITIAL OUTLET READING _____ 0.5 - 1.5 INH_2O

5 MINUTES READING _____

120 PSIG INLET PRESSURE — INITIAL OUTLET READING _____ 0.5 - 1.5 INH_2O

5 MINUTES READING _____

3. SAFETY PRESSURE TEST:

ALTITUDE (FEET)	INLET PRESS. (PSIG)	0 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING	50 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING	100 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING
SEA LEVEL	10	0	0.5 - 1.5			0.5 - 1.5			0.5 - 3.0	
SEA LEVEL	90	0	0.5 - 1.5			0.5 - 1.5			0.5 - 3.0	
10,000	10	0	0.5 - 1.5			0.5 - 1.5			0.5 - 3.0	
10,000	90	0	0.5 - 1.5			0.5 - 1.5			0.5 - 3.0	
30,000	10	0	0.5 - 1.5			0.5 - 1.5			0.5 - 3.0	
30,000	90	0	0.5 - 1.5			0.5 - 1.5			0.5 - 3.0	

4. PRESSURE BREATHING TEST:

ALTITUDE (FEET)	INLET PRESS. (PSIG)	0 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING	100 LPM FLOW (INH_2O)	OUTLET PRESS. (INH_2O)	READING
34,000	10	0	0.5 - 2.7			0.5 - 3.7	
34,000	90	0	0.5 - 2.7			0.5 - 3.7	
45,000	10	0	13.0 - 16.0			13.0 - 16.0	
45,000	90	0	13.0 - 16.0			13.0 - 16.0	
50,000	10	0	16.0 - 20.0			16.0 - 20.0	
50,000	90	0	16.0 - 20.0			16.0 - 20.0	

Figure 9-3. Regulator Performance Test Sheet

9-21. PRESSURE BREATHING TEST. To convert the actual lpm flows, proceed as follows:

NOTE

Some test stands have an output graph for each altitude. However, some test stands are provided with only one output graph for all altitudes. Use appropriate altitude N_2 line on these graphs. To ensure the correct regulator outlet performance is recorded, a 10 lpm demand must be applied during all altitude changes prior to taking the 0 lpm reading.

1. Using the 34,000-feet output graph, locate the 100 lpm line on the bottom of the graph and trace the line up to where it intersects the N_2 line.

2. Trace the line from the point of intersection across the graph to the left hand column and determine the inH_2O.

3. Enter the inH_2O figure in the appropriate block on the Performance Test Sheet.

NOTE

If a graph is not provided for an altitude of 34,000 feet, use the 35,000-feet graph.

4. Repeat steps 1 through 3 for 45,000 and 50,000 feet to convert to 100 lpm flows to inH_2O.

Section 9-4. Maintenance

9-22. GENERAL.

9-23. This section contains the information necessary to inspect, test, troubleshoot, disassemble, clean, assemble and adjust the Chest Mounted Positive Pressure Regulator at the Intermediate Level maintenance.

NOTE

The regulator will be considered beyond economical repair when the cost of the parts exceed approximately 75 percent of the cost of the regulator. Whenever any repair or replacement of parts is made to a regulator, a corresponding entry shall be made on the Aircrew Personal Equipment Record for that regulator. Upon completion of any maintenance action (e.g. inspection repair modification etc.) be sure to complete the required Maintenance Data Collection system forms.

9-24. The Chest Mounted Regulator shall be maintained at the lowest level of maintenance authorized to perform the maintenance functions. Major repair of the regulator is not authorized. Minor repairs and testing shall be performed at the Intermediate Level maintenance. Minor repairs include replacement of worn, defective, or otherwise damaged parts with available replacement component parts. Minor repairs to component parts (chasing crossed threads or slightly damaged threads or smoothing of slight burrs) are authorized where such repairs does not cause leakage.

9-25. The regulator shall remain in service for as long as it continues to function correctly and does not require excessive repair. All affected silicone rubber parts shall be replaced routinely whenever a regulator is disassemblesd for repair.

9-26. Procedure steps outlined in this section are listed under the inspection cycle in which they are required, and in the sequence in which they normally occur.

9-27. INSPECTION.

9-28. DAILY/PREFLIGHT INSPECTION. The Daily/Preflight Inspection is a Visual Inspection performed by the aircrewmember to whom the regulator is issued. These procedures shall be performed daily or prior to each flight. To perform the inspection, visually inspect the following:

WARNING

When working with oxygen, ensure that clothing, tubing, fittings and equipment are free from oil, grease, fuel, hydraulic fluid or any combustible material. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Inlet and outlet connections for security of attachment. Ensure that all clamps, locknuts, fittings and screws are tight.

2. Regulator body for dents, scratches, corrosion, condition of nameplate, cracks or any other damage.

3. Perform a Functional Test in accordance with paragraph 9-30, steps 2, 3 and 4.

9-29. If discrepancies are found or suspected, the defective regulator shall be removed and a Ready For Issue (RFI) regulator installed, The defective regulator shall be taken to the Aviators Equipment Branch for the required corrective maintenance action.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate Level shall be accompanied by the appropriate form in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test and/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

9-30. SPECIAL INSPECTION. Special Inspections are required at 30-day intervals in addition to the Daily/Preflight or Calendar Inspections. These inspections consist of a Visual Inspection and a Functional Test, both performed by personnel of the Aviators Equipment Branch. To perform the Special Inspection, proceed as follows:

1. Visually inspect the regulator in accordance with paragraph 9-28.

WARNING

When working with oxygen, ensure that clothing, tubing fittings and equipment are free from oil, grease, fuel, hydraulic fluid or any combustible material. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

2. Functionally test by attaching the regulator, delivery tube and mask assembly to a suitable oxygen supply source. Use regulator-to-seat kit hose for attachment.

3. Turn supply source on. There should be a flow of oxygen through the mask.

NOTE

Resistance during exhalation is due to the positive pressure feature of the regulator.

4. Don mask and breathe. There should be a slight resistance on exhalation, and no mechanical noise or vibration from the regulator.

9-31. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

9-32. CALENDAR INSPECTION. The Calendar Inspection shall be performed on all chest mounted regulators upon issue prior to installation in an in-service personal oxygen configuration, and shall be performed on all chest-mounted regulators in service at least every 90 days.

9-33. The Calendar Inspection consists of a Visual Inspection and a Bench Test. All work shall be performed in a clean, dust-free and oil-free area.

9-34. Visual Inspection. To perform Visual Inspection, proceed as follows:

1. Inspect regulator inlet and outlet for foreign objects, dirt corrosion, dents, cracks and other damage.

2. Inspect regulator body for dents, cracks, corrosion, condition of nameplate, security of screws and fittings and for other obvious damage.

9-35. Regulators failing the Visual Inspection or Bench Test (paragraph 9-36) shall be repaired, if specified repair is authorized. SM&R Codes define repairable components and level of maintenance authorized for repair. Further explanation is contained in the Naval Aviation Maintenance Program Manual, OPNAVINST 4790.2 Series.

9-36. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water pumped nitrogen, Type I, Class I, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from any cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig nitrogen cylinders used on NAN servicing cart. These cylinders can not be certified contaminant free.

9-37. The Bench Test shall be performed using an Oxygen Systems Components Test Stand, Model 1172AS100 or 1316AS100. Refer to the appropriate ground support equipment manual for identification of test stand controls and indicators referred to in the Bench Test procedures that follow. Do not attempt to perform any Bench Test before becoming thoroughly familiar with the test stand. Utilize the Performance Test Sheet (figure 9-3) when performing Bench Test.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

9-38. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

WARNING

Prior to use, inspect leak detection compound. Compound is not clear and free from suspended material sediment is considered contaminated and shall be disposed of. A compound giving off peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of. Do not use MIL-L-25567 Type II leak detection compound.

CAUTION

At no time shall the regulator be placed in a vise for loosening or adjustment of components. Do not attempt any adjustments to regulator without first removing all traces of sealant and tamper dots. Apply only Krytox or other authorized lubricant to components as directed herein.

NOTE

Tests are arranged to proceed from one test to the next with minimal changes to test set-up or valve positioning.

NOTE

Index numbers refer to figure 9-6 unless otherwise noted.

1. Cap oxygen input connector (18) in altitude chamber.

2. Remove lug from tee connection (28) in altitude chamber and install adapter into tee connection (28). Attach a hose with number 6 caps to adapter.

3. Remove inlet connector assembly (2) and preformed packing (3) from regulator, clean and reinstall in accordance with paragraph 9-47.

4. Remove preformed packing (1) from regulator. Clean in accordance with paragraph 9-49, lubricate preformed packing sparingly with Krytox 240 AC and reinstall in regulator.

5. Cap the regulator body assembly (49) outlet.

6. Connect inlet connector assembly (2) to hose attached to tee connection (28).

7. Ensure all test stand valves and regulators are properly secured and turn on N_2 supply cylinder.

8. Turn INLET PRESS. ON/OFF valve (L) on.

9. Using LOW PRESS REGULATOR (N), slowly apply 70 psig to the regulator inlet.

10. Turn LEAKAGE ON/OFF valve (G) to ON and turn INLET PRESS. ON/OFF valve (L) to OFF.

11. Turn LEAKAGE SELECTOR valve (F) to high position and record leakage on HIGH RANGE LEAKAGE rotameter (8) on Performance Test Sheet. Maximum allowable leakage is 750 ccm.

12. Turn LEAKAGE ON/OFF valve (G) OFF and uncap regulator outlets.

13. Disconnect regulator inlet connector (2) from hose attached to T-connection (28). Proceed to maximum Pressure Relief Valve Test.

14. Refer to table 9-2 for overall leakage test troubleshooting. Use leak detection compound to determine source of excessive leakage.

9-39. MAXIMUM PRESSURE RELIEF VALVE TEST. Perform the maximum Pressure Relief Valve Test as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Cap regulator inlet connector (2) and connect regulator body assembly (49) outlet to piezometer (26). Turn on vacuum pump.

2. Connect line from low pressure connection (19) to Ref. Tap and connection (21) in altitude chamber. Turn PRESSURE SELECTOR valve (D) to H_2O position.

3. Slowly open leakage control valve (E) until 750 CCM is indicated on HIGH RANGE LEAKAGE rotometer (8).

4. Using thumb, block the aneroid vent port of the regulator.

5. Observe PRESS/SUCTION manometer (4). Maximum pressure relief valve should relieve between 17 and 20 inH_2O. Record reading on Performance Test Sheet.

6. If reading is within range, proceed to step 7. If reading is not within range, proceed to paragraph 9-45 for adjustment procedures.

7. Close leakage control valve (E). Disconnect line from low pressure connection (19) and Ref. Tap and connection (21) in altitude chamber.

8. Remove cap from regulator inlet connector (2) and connect regulator inlet connection (2) to hose attached to T-connection (28).

9. Proceed to Demand Valve Leakage Test, paragraph 9-40.

Table 9-2. Troubleshooting (Overall and Demand Valve Leakage)

Trouble	Probable Cause	Remedy
Leakage around joints.	Loose screws.	Tighten any loose screws in accordance with Assembly (paragraph 9-54).
	Damaged gasket.	Locate damaged item and replace in packing accordance with Disassembly and Assembly (paragraph 9-48).
	Damaged preformed packing.	
Leaking inlet connector assembly (2).	Damaged inlet connector cone.	Replace in accordance with Disassembly and Assembly (paragraph 9-48).
Leaking seat/diaphragm assembly (30).	Leaking balance valve assembly.	Change the balance valve assembly in accordance with Disassembly and Assembly (paragraph 9-48).
Outlet pressure high at 30 psig, zero demand flow.	Pressure trapped in outlet hose.	Apply a 10 lpm demand flow and reset to zero flow.
	Lever (45) height not correctly set.	Disassemble in accordance with paragaph 9-49 steps 17 and 21. Check, adjust and assemble in accordance with paragraph 9-55 step 7 and steps 9 and 10.
Outlet pressure high at 120 psig, zero demand flow. From 1.5 to 2.0 inH_2O.	Pressure trapped in outlet hose.	Apply 10 lpm demand flow and reset to zero flow.
	Balanced valve bleed flow, not matched with diaphragm assembly.	Change the diaphragm assembly in accordance with Disassembly and Assembly (paragraph 9-48).
Outlet pressure over 1.5 inH_2O after the above remedy or for pressures in excess or +2.0 inH_2O.	Leaking balance valve assembly.	Change the balance valve assembly in accordance with Disassembly and Assembly (paragraph 9-48).
Outlet pressure exceeds +0.001 inH_2O of initial reading after 5 minutes.	Leaking balance valve assembly.	Change the balance valve assembly in accordance with Disassembly and Assembly (paragraph 9-48).

9-40. DEMAND VALVE LEAKAGE TEST. To perform the Demand Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

NOTE

This regulator does not require the use of a piezometer restrictor for Bench Testing. Ensure regulator body assembly (49) outlet and piezometer (26) are one inch apart.

1. Connect regulator body assembly (49) outlet to piezometer (26).

2. Turn INLET PRESS ON/OFF valve (L) to ON.

3. Turn on vacuum pump.

CAUTION

Do not turn PRESS SELECTOR valve (D) to H_2O position if pressure is indicated on DIFF PRESS. GAGE inHg (5). If pressure is indicated open OUTPUT valve (C) to relieve pressure.

4. Turn PRESS SELECTOR valve (D) to H_2O position.

5. Using LOW PRESS REGULATOR (N), adjust inlet pressure to 30 psig as indicated on N_2 INPUT PRESS gage (27).

6. Open then close output valve (C).

7. With output valve (C) closed, read PRESS/SUCTION manometer (4). Record inH_2O reading on Performance Test Sheet. Reading must be between 0.5 and 1.5 inH_2O.

8. With the regulator maintained at step 6 above, record inH_2O reading after a period of 5 minutes. This reading from PRESS/SUCTION manometer (4) on Performance Test Sheet reading must not exceed +0.1 inH_2O of the initial reading.

9. Open and adjust OUTPUT valve (C) to give a 10 lpm flow. Increase inlet pressure with LOW PRESSURE REGULATOR (N) to 120 psig. Close OUTPUT valve (C) Read PRESS/SUCTION manometer (4). Record H_2O reading on Performance Test Sheet. Reading must be between 0.5 and 1.5 inH_2O.

10. With the regulator maintained at 120 psig, record H_2O reading from PRESS/SUCTION manometer (4) on Performance Test Sheet after a period of 5 minutes. This reading must not exceed +0.1 inH_2O of the initial reading.

11. Proceed to Safety Pressure Test.

12. Refer to table 9-2 for Demand Valve Leakage troubleshooting procedures.

9-41. SAFETY PRESSURE TEST. To perform the Safety Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

1. Ensure INLET PRESS. ON/OFF valve (L) is ON and PRESS SELECTOR valve (D) is inH_2O position.

2. Using LOW PRESSURE REGULATOR (N), adjust inlet pressure to 10 psig as indicated on N_2 INPUT PRESS gage (27).

CAUTION

Open FLUTTER DAMPENER valve (J) one quarter of a turn, if regulator causes fluid in PRESS/SUCTION manometer (4) to flutter, open FLUTTER DAMPENER valve (J) slowly under flutter is eliminated.

3. With OUTPUT valve (C) closed, read PRESS/SUCTION manometer (4). Record 0 lpm flow reading on Performance Test Sheet. Reading must be between 0.5 and 1.5 inH_2O.

NOTE

When increasing flows, inlet pressure must be adjusted to maintain correct inlet pressure on N_2 input press. gage (27).

4. Adjust OUTPUT valve (C) to the equivalent of 50 lpm as indicated on output manometer (1). Record reading from PRESS/SUCTION manometer (4) on Performance Test Sheet. Reading must be between 0.5 and 1.5 inH_2O.

5. Adjust OUTPUT valve (C) to the equivalent of 100 1pm as indicated on OUTPUT manometer (1). Record reading from PRESS/SUCTION manometer (4) on Performance Test Sheet. Reading must be between 0.5 and 3.0 inH_2O.

6. Using LOW PRESS REGULATOR (N), adjust inlet pressure to 90 psig as indicated on N_2 INPUT PRESS gage (27).

7. Close OUTPUT valve (C). Record reading from PRESS/SUCTION manometer (4) for 0 lpm flow on Performance Test Sheet. Reading must be between 0.5 and 1.5 inH_2O.

8. Adjust OUTPUT valve (C) to the equivalent of 50 lpm as indicated on OUTPUT manometer (1). Record reading from PRESS/SUCTION manometer (4) on Performance Test Sheet. Reading must be between 0.5 and 1.5 inH_2O.

9. Adjust OUTPUT valve (C) to the equivalent of 100 lpm as indicated on OUTPUT manometer (1). Record reading from PRESS/SUCTION manometer (4) on Performance Test Sheet. Reading must be between 0.5 and 3.0 inH_2O.

CAUTION

When ascending to test altitude maintain a 3.0 inH_2O as indicated on PRESSURE/SUCTION manometer (4) using output valve (C) open flutter dampener valve (J) one quarter turn.

NOTE

If altitude chamber is inadvertently taken above test altitudes, open CHAMBER BLEED valve (K) slowly and descend to desired altitude. Close CHAMBER BLEED valve (K).

10. Using VACUUM CONTROL valve (B), ascend to 10,000 feet as indicated on LOW RANGE ALTM (13).

11. Repeat steps 2 through 9 at an altitude of 10,000 feet.

12. Using VACUUM CONTROL valve (B) ascend to 30,000 feet as indicated on LOW RANGE ALTM (13).

13. Repeat step 2 through 9 at an altitude of 30,000 feet.

14. Continue on to Pressure Breathing Test.

15. If regulator fails Safety Pressure Test, refer to table 9-3, Troubleshooting (Safety Pressure Test).

9-42. PRESSURE BREATHING TEST. To perform the Pressure Breathing Test, proceed as follows.

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	AN816-6D NIIN 00-196-9580
1	Oxygen System Components Test Stand	1172AS100 or 1316AS100

Table 9-3. Troubleshooting (Safety Pressure Test)

Trouble	Probable Cause	Remedy
Low outlet pressure at 10 psig, 50 or 100 lpm demand flow.	Partially blocked inlet filter.	Clean inlet filter in accordance with paragraph 9-46.
	Lever (45) height not correctly set.	Disassemble in accordance with paragraph 9-49 steps 17 and 21. Check, adjust and assemble in accordance with paragraph 9-55 step 7 and steps 9 and 10.
High outlet pressure at zero demand flow.	Pressure trapped in outlet hose.	Apply 10 lpm demand flow and reset to zero flow.
High outlet pressure at 30,000 feet.	Pressure breathing aneroid not set correctly.	Adjust in accordance with paragraph 9-44.

NOTE

A 3.0 inH_2O flow must be drawn with OUTPUT valve (C), when ascending to altitude. Open FLUTTER DAMPENER valve (J) one quarter of a turn.

If altitude chamber is inadvertently taken above test altitudes, open CHAMBER BLEED valve (K) slowly and descend to desired altitude. Close CHAMBER BLEED valve (K).

1. Using VACUUM CONTROL valve (B), ascend to 34,000 feet as indicated on LOW RANGE ALTM (13).

2. Using LOW PRESS REGULATOR (N), adjust inlet pressure to 10 psig as indicated on N_2 INPUT PRESS gage (27).

3. With OUTPUT valve (C) closed to 0 lpm flow reading from PRESS/SUCTION manometer (4) on Performance Test Sheet. Reading must be between 0.5 and 2.7 inH_2O.

4. Adjust OUTPUT valve (C) to obtain the equivalent of 100 lpm as indicated on OUTPUT manometer (1). Record reading from PRESS/SUCTION manometer (4) on Performance Test Sheet Reading must be between 0.5 and 3.7 inH_2O.

5. Using low press regulator (N) adjust inlet pressure to 90 psig.

6. With OUTPUT valve (C) closed record 0 lpm flow reading from PRESS/SUCTION manometer (4) on Performance Test Sheet reading must be between 0.5 and 2.7 inH_2O.

7. Adjust OUTPUT valve (C) to obtain the equivalent of 100 lpm as indicated on OUTPUT manometer (1). Record reading from PRESS/SUCTION manometer (4) on Performance Test Sheet. Reading must be between 0.5 and 3.7 inH_2O.

8. Using VACUUM CONTROL valve (B) ascend to 45,000 feet as indicated on HIGH RANGE ALTM (12).

9. Repeat steps 2 thru 7. Reading on PRESS/SUCTION manometer (4) at 45,000 feet must be between 13.0 and 16.0 inH_2O.

10. Using VACUUM CONTROL valve (B), ascend to 50,000 feet as indicated on HIGH RANGE ALTM (12).

11. Repeat steps 2 thru 7. Reading on PRESS/SUCTION manometer (4) at 50,000 feet must be between 16.0 and 20.0 inH_2O.

12. If malfunctions are recorded during Pressure Breathing Test, locate probable cause using table 9-4 Troubleshooting (Pressure Breathing Test).

13. After completion of Pressure Breathing Test, leave OUTPUT valve (C) slightly open. Open CHAMBER BLEED valve (K) and return chamber to sea level. Open chamber door and close OUTPUT valve (C). Turn off vacuum pump.

14. Turn INLET PRESS ON/OFF valve (L) to OFF and remove regulator from test stand.

15. Close N_2 supply cylinder valve and, using LOW PRESS REGULATOR (N) and SYSTEM BLEED VALVE (S), relieve all pressure in the test stand. Secure all test stand valves.

9-43. ADJUSTMENTS.

9-44. PRESSURE BREATHING ANEROID ADJUSTMENT. To adjust the Pressure Breathing Aneroid, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51
As Required	Cloth, Lint-free	—
As Required	Glyptal	1201B (CAGE 24452)

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Adjustment Peg, Aneroid	3150T000 or locally manufacture

Table 9-4. Troubleshooting (Pressure Breathing Test)

Trouble	Probable Cause	Remedy
Outlet pressure does not increase.	Maximum Pressure Relief Valve not assembled correctly.	Disassemble valve in accordance with paragraph 9-49 steps 9 through 14. Assemble valve in accordance with paragraph 9-55 steps 14 through 18. Adjust valve in accordance with paragraph 9-45.
	Ruptured vent valve diaphragm (seated diaphragm assembly).	Visually check the seat and diaphragm assembly. Replace in accordance with Disassembly (paragraph 9-48) and Assembly (paragraph 9-54).
	Pressure Breathing Aneroid failed.	Change aneroid assembly in accordance with Disassembly (paragraph 9-48), Assembly (paragraph 9-54) and Adjustment (paragraph 9-44).
Outlet pressures will not increase when ascending from 34,000 to 45,000 or from 45,000 to 50,000 feet.	Maximum Pressure Relief Valve not correctly set.	Adjust valve in accordance with paragraph 9-45.
Outlet pressure readings out of limits at 34,000, 45,000 and 50,000 feet.	Pressure Breathing Aneroid not correctly set.	Adjust breathing aneroid in accordance with paragraph 9-44.
Outlet pressure within upper limit range at 34,000 and 45,000 feet but outlet pressure is low at 50,000 feet.	Maximum Pressure Relief Valve set too low.	Adjust valve to higher side of 17 to 20 inH_2O range in accordance with paragraph 9-45.

CAUTION

Do not attempt adjustment of Pressure Breathing Aneroid by turning aneroid post screw located in center of aneroid adjuster. Turning aneroid post screw can cause damage to the aneroid and seat assemblies.

NOTE

Regulators from Serial No. 001 thru 0250 will require the removal of synthetic rubber material from the aneroid assembly (8) adjuster thread, to enable adjustment, using acetone.

1. Apply a small amount of acetone to set screw (6) to soften synthetic rubber material.

2. Loosen set screw (6) using an Allen wrench.

3. Remove all traces of acetone and rubber by wiping the area with a clean lint-free cloth.

4. Using peg spanner wrench, adjust aneroid assembly (8) as necessary. Adjust clockwise to increase outlet pressures or counterclockwise to decrease outlet pressures.

5. Repeat Pressure Breathing Test (paragraph 9-42).

6. When adjustments have been completed, tighten set screw (6) and apply a tamper dot to its end to prevent movement using Glyptal.

9-45. MAXIMUM PRESSURE RELIEF VALVE ADJUSTMENT AND TROUBLESHOOTING PROCEDURES. Adjust and troubleshoot the Maximum Pressure Relief Valve as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51
As Required	Cloth, Lint-free	—

Materials Required (Cont)

Quantity	Description	Reference Number
As Required	Glyptal	1201B (CAGE 24452)
As Required	Sealant	Vibratite NIIN 00-163-5792

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Valve Peg, Pressure Relief, Maximum	3151T000 or locally manufacture

CAUTION

When attempting to adjust the Maximum Pressure Relief Valve, if the slightest resistance is met when turning adjuster (18) do not proceed. Poppet (20) and adjuster (18) are not aligned properly. Disassemble the Maximum Pressure Relief Valve in accordance with paragraph 9-48 and reassemble in accordance with paragraph 9-54.

NOTE

Index numbers refer to figure 9-6 unless otherwise noted.

1. Using acetone, remove sealant from setscrew (16) and loosen setscrew.

2. Remove retaining ring (14) and mesh disc (15).

3. Cap regulator inlet connector (2).

4. Connect regulator body (49) outlet to piezometer (26) in altitude chamber.

5. Using LOW PRESS REGULATOR (N) apply 70 psig to the test stand as indicated on REGULATED LOW PRESS gage (11).

6. Connect line from LOW PRESS CONNECTION (19) to REF TAP and connection (21) in altitude chamber.

7. Turn PRESS SELECTOR valve (D) to H_2O position.

8. Open LEAKAGE CONTROL valve (E) until 750 CCM is indicated on HIGH RANGE LEAKAGE rotometer (8).

9. Using thumb, block aneroid vent port (oval screen port located just below setscrew (6).

10. Observe PRESS/SUCTION manometer (4). Maximum Pressure Relief Valve should relieve between 17 and 20 inH_20. If reading is not within range, perform steps 11, 12, and 13, as applicable. If reading is within range, proceed to step 14.

NOTE

When performing steps 11 and 12, turning adjuster (18) one full turn will change reading approximately 2.0 inH_2O. If turning adjuster (18) does not affect reading on PRESS/SUCTION manometer (4), proceed to step 13.

11. If reading is below 17 inH_2O, turn adjuster (18) clockwise.

12. If reading is above 20 inH_2O, turn adjuster (18) counterclockwise.

13. If turning adjuster (18) does not change reading, block the aneroid vent with your thumb and adjuster (18) with your forefinger and perform step 10. If water fails to rise on PRESS/SUCTION manometer (4), perform following corrective action.

a. Apply acetone to setscrew (6) to remove sealant and loosen setscrew (6).

(1) Using spanner wrench, remove aneroid and adjuster (8).

(2) Clean adjuster threads and apply thin coat of vibratite sealant. Allow sealant to dry for 30 minutes.

(3) Reinstall aneroid and adjuster (8) into regulator body (49) using spanner wrench until adjuster (8) is just below top of regulator body (49).

(4) Retest in accordance with steps 3 through 10.

b. Disassemble Maximum Pressure Relief Valve in accordance with paragraph 9-49. Clean and/or replace dirty or defective parts as applicable and reassemble Maximum Pressure Relief Valve in accordance with paragraph 9-54. Retest in accordance with steps 3 through 10.

c. If dump valve assembly is leaking, replace spring (29), clean or replace diaphragm and seat assembly (30) and retest in accordance with steps 3 through 10.

14. Disconnect line from LOW PRESS CONNECTION (19) and Ref Tap and connection (21), disconnect regulator from piezometer (26) and remove cap from regulator inlet.

15. Tighten setscrew (16) and apply tamper dot using Glyptal to setscrew (16) to prevent movement. Install mesh disc (15) and retaining ring (14). Perform Bench Test in accordance with paragraph 9-36.

9-46. CLEANING.

9-47. INLET CONNECTOR ASSEMBLY FILTER SCREEN. To clean Inlet Connector Assembly (2) Filter Screen, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

1. Remove inlet connector assembly (2) from regulator and preformed packing (3).

2. Clean Inlet Connector Assembly (2) Filter Screen using reverse action flushing with distilled water. Wash preformed packing (3) in distilled water.

3. Blow inlet connector assembly (2) and preformed packing (3) dry with water pumped nitrogen.

4. Install preformed packing (3) on inlet connector assembly (2).

5. Install inlet connector assembly (2) into regulator body assembly (49) and tighten to a torque of 130 to 150 lb-in.

9-48. DISASSEMBLY.

CAUTION

All disassembly procedures must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floors and ceilings should have a smooth finish and be painted with a nonchalking paint which can be kept clean and dust-free. When disassembling more than one regulator, it is desirable to keep all parts for each individual regulator separated. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture.

NOTE

Complete disassembly procedures are provided. However, disassemble only to the extent necessary to accomplish repair. Remove protective caps, where necessary, before disassembling components. All screws are assembled using synthetic rubber material or Glyptal 1201B. A small amount of acetone may be used to soften the material prior to removal.

Refer to figure 9-6 for index numbers referred to unless otherwise noted.

9-49. DISASSEMBLY OF REGULATOR. Disassemble the regulator in the following sequence:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner, Adjustment Peg, Aneroid	3150T000 or locally manufacture
1	Wrench, Spanner, Valve Peg, Pressure Relief, Maximum	3151T000 or locally manufacture

CAUTION

Do not use magnetized tools at any time when working on oxygen regulators.

1. Remove and discard preformed packing (1) from regulator body assembly (49) outlet connector.

2. Remove inlet connector assembly (2) from regulator body assembly (49) and discard preformed packing (3).

3. Remove pan head screw (4) and non-metallic seal (5) from regulator body assembly (49). Discard non-metallic seal.

4. Remove set screw (6) and pin (7) from regulator body assembly (49).

5. Using peg scanner wrench, unscrew and remove aneroid assembly (8) from regulator body assembly (49).

6. Remove three countersunk head screws (10) and carefully remove plate (9) and preformed packing (11) from regulator body assembly (49). Discard preformed packing. (Acetone may be required to soften synthetic rubber material).

7. Remove two countersunk head screws (13) and remove mounting pin (12).

8. Repeat step 7 to remove the other mounting pin (12).

9. Remove retaining ring (14) and mesh disc (15) from housing (21).

10. Remove set screw (16) and pin (17) from housing (21).

11. Using peg spanner wrench, unscrew and remove adjuster (18) from housing (71).

12. Remove spring (19) and popper (20) from housing (21).

13. Remove three pan head screws (27) and three flat washers (23) and remove housing (21) from regulator body assembly (49).

14. Remove seat (24) and gasket (75) from regulator body assembly (49). Discard gasket.

15. Remove four pan head screws (27) and four flat washers (28) and remove cover assembly (26) from regulator body assembly (49).

16. Remove helical compression spring (29), diaphragm and seat assembly (30), guide (31) and preformed packing (32) from regulator body assembly (49). Discard preformed packing.

17. Remove five countersunk head screws (34) and remove cover (33) and conical spring (35) from regulator body assembly (49).

18. Remove diaphragm assembly (36) from regulator body assembly (49).

19. If necessary, remove identification plate (37) from cover (33). Record engraved details from identification plate in operation for installation of a new plate during assembly. Discard identification plate.

20. Remove two countersunk head screws (43) and remove end cap assembly (42) and preformed packing (44) from regulator body assembly (49). Discard preformed packing.

21. Remove lever (45) from regulator body assembly (49).

CAUTION

Do not damage the balanced valve assembly (46) when removing from the regulator body.

22. Carefully remove balanced valve assembly (46) and spring (41) the regulator assembly (49). Remove and discard two preformed packing (47) from the valve (46).

23. Remove retaining ring (38), remove plug (39) by slightly tapping plug after removal of valve (46), remove and discard preformed packing (40).

24. Remove filter (48) from regulator body assembly (49).

9-50. CLEANING OF DISASSEMBLED PARTS.

9-51. To clean the disassembled parts of the regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

WARNING

Do not use oil or any material containing oil in conjunction with this equipment. Oil, even in small quantities, coming into contact with oxygen can cause explosion or fire. Dust, lint and fine metal particles are also dangerous.

1. If the identification plate (37) has been removed and the original cover (33) is required for assembly, remove all residual identification plate adhesive from the cover using acetone prior to cleaning.

2. Clean all metallic parts using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

3. Wash all rubber parts in distilled water and blow dry with oil-free nitrogen.

4. After cleaning, inspect all internal surfaces of components to ensure absolute cleanliness. Should further contamination be found, repeat the appropriate cleaning procedure.

5. On satisfactory completion of cleaning, seal all parts in plastic bags for storage or in preparation for inspection and assembly. Bag all complete assemblies that are not immediately returned to service.

9-52. INSPECTION OF DISASSEMBLED PARTS.

CAUTION

All inspection procedures must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floors and ceilings should have a smooth finish and be printed with a non-chalking paint which can be kept clean and dust-free. Parts submitted for inspection should be returned to their plastic bags immediately after the inspection task to protect from dirt and moisture.

9-53. Inspect the disassembled parts of the regulator as follows:

1. Inspect all metallic parts for cracks, nicks, burns, scratches or other imperfections which could cause leakage or malfunctions of the regulator.

2. Inspect threads of all components for serviceability.

3. Inspect diaphragm and seat assembly (30) and diaphragm assembly (36) for punctures, tears and signs of deteriorating.

4. Inspect identification plate (37) for condition and legibility. The plate may still be attached to cover (33).

5. Inspect all springs, replace any spring which shows signs of obvious damage or distortion.

6. Ensure the cleanliness of all components has been maintained. Clean any soiled parts in accordance with Cleaning (paragraph 9-50).

9-54. ASSEMBLY.

CAUTION

All assembly procedures must be done on benches having good lighting and in area provided with air conditioning or air filtering. Walls, floors and ceilings should have a smooth finish and be painted with a non-chalking paint which can be kept clean and dust-free.

NOTE

Remove protective caps, where necessary, before assembling components.

All screws are to be locked with Glyptal.

Preformed packing may be very sparingly coated with Krytox 240 AC Type II to ease assembly.

9-55. Assemble the regulator in the following sequence:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive/Sealant, 3145 RTV, Dow Corning	MIL-A-46146
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995
As Required	Loctite Multibond	Depend 350
As Required	Glyptal	1201B (CAGE 24452)
As Required	Sealant	Vibratite NIIN 00-163-5792
1	Wrench, Spanner, Adjustment Peg, Aneroid	3150T000 or locally manufacture
1	Wrench, Spanner, Valve Peg, Pressure Relief, Maximum	3151T000 or locally manufacture
1	Wrench, Torque, 300 lb-in	TE25A (CAGE 55719) NIIN 00-776-1841 or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Adjustment, Lever Height, Demand Valve	2792T000 or locally manufacture (figure 9-4)

CAUTION

Do not use magnetized tools at any time when working on oxygen regulators.

NOTE

Lubricate all preformed packing with Krytox 240 AC prior to installing in regulator.

1. Install filter (48) into regulator body assembly (49) with split in filter diametrically opposite outlet hole.

2. Install two new preformed packing (47) on balanced valve assembly (46) and install balanced valve assembly into regulator body assembly (49).

3. Install new preformed packing (44) on end cap assembly (42).

CAUTION

When installed, toe flange of end cap assembly (42) does not seat flush against regulator body assembly (49). Countersunk head screws (43) must be tightened evenly to avoid stressing the flange. Do not overtighten.

4. Position lever (45) over balanced valve assembly (46). Install end cap assembly (42) in regulator body assembly (49) ensuring pin of end cap engages lever. Secure end cap to body with two countersunk head screws (43). Tighten screws evenly to a torque of 2.0 to 2.5 lbs-in.

5. Install new preformed packing (40) on plug (39).

6. Install spring (41) and plug (39) into regulator body assembly (49) ensuring spring is located between plug and balanced valve assembly (46). Secure plug in position with retaining ring (38).

7. With the regulator held in the horizontal position, so that the mounting pins (12) are lowermost, check that the tip of the lever (45) is between 0.000 in. and 0.020 in. below the body surface using demand valve lever height adjustment tool. It is permissible to remove and carefully bend the lever (45) at its elbow to achieve the required height (figure 9-5).

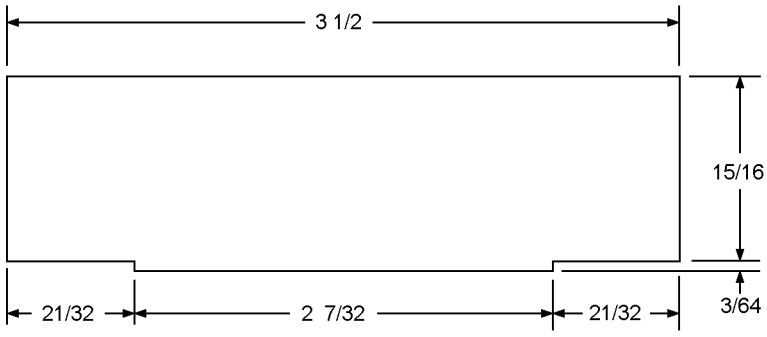

Figure 9-4. Demand Valve Lever Height Adjustment Tool

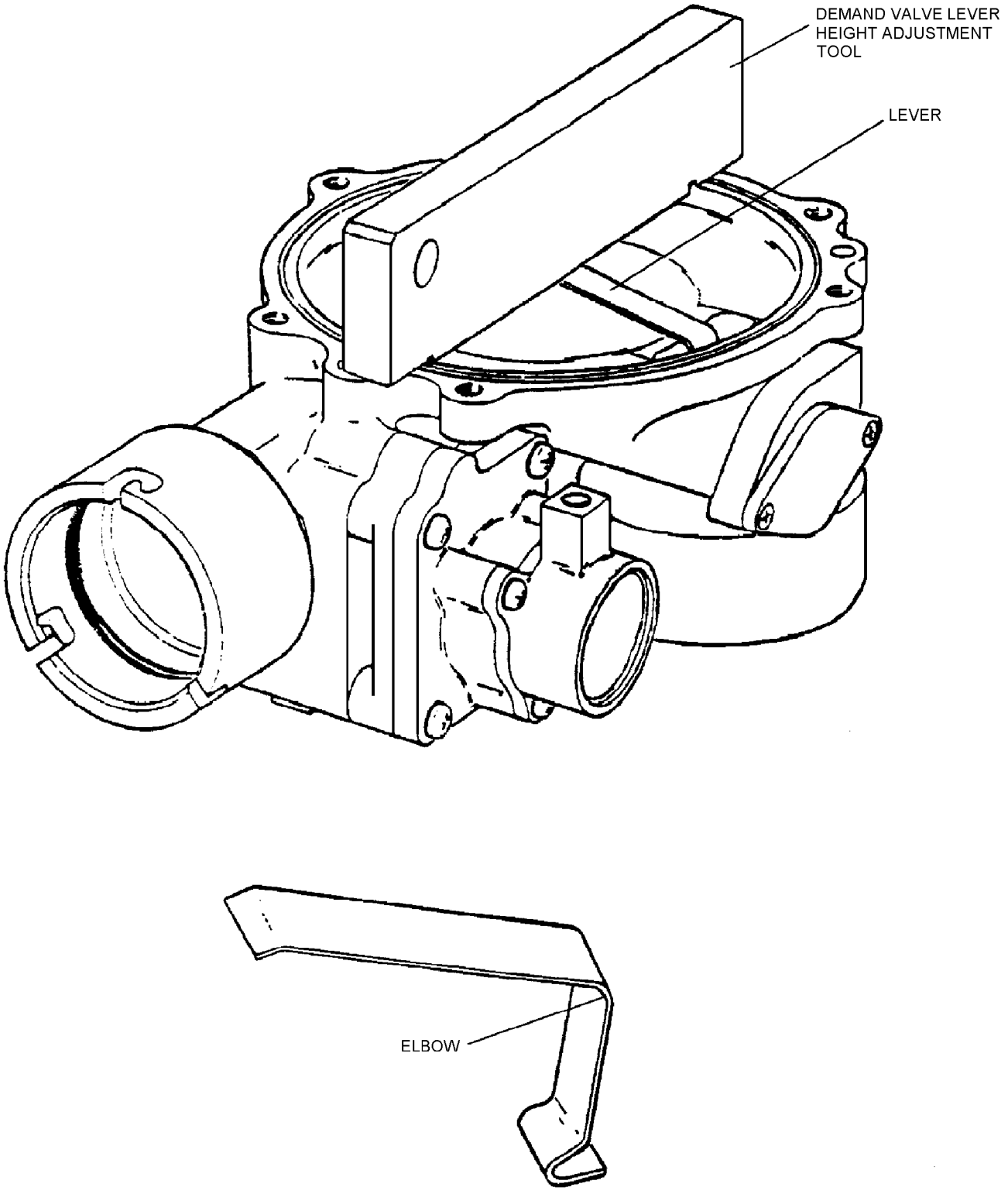

Figure 9-5. Lever Height Adjustment

8. If it was found necessary to remove identification plate (37), install a new plate as follows:

a. Permanently mark a new identification plate (37) with the details recorded during disassembly.

b. Ensure that the identification plate (37) and cover (33) have been cleaned in accordance with paragraph 9-50.

NOTE

Loctite Multibond is supplied in two parts, an adhesive and activator.

c. Apply an even coating of Loctite Multibond adhesive to the rear of the identification plate (37). Apply an even coating of Loctite Multibond activator to the area of the cover (33) where the plate is to be installed. Position the identification plate (37) on the cover (33) and press down firmly.

NOTE

After the adhesive and activator has been brought into contact, handling strength will be reached within 4 minutes.

d. Remove surplus Loctite and clean the assembly in accordance with paragraph 9-50.

9. Locate diaphragm assembly (36) in its groove in regulator body assembly (49).

10. Install conical spring (35) and cover (33) on diaphragm assembly (36) and attach cover to regulator body assembly with five countersunk head screws (34). Tighten screws to a torque of 4.0 to 5.0 lbs-in.

11. Install new preformed packing (32) into groove in regulator body assembly (49).

12. Install diaphragm and seat assembly (30) into guide (31) locating diaphragm in groove in guide.

13. Position helical compression spring (29) on diaphragm and seat assembly (30) and install cover assembly (26) over spring and diaphragm. Ensuring diaphragm locates correctly in grooves in cover and guide, attach this assembly to regular body assembly (49) with four pan head screws (27) and four flat washers (28). Tighten screws to a torque of 4.0 to 5.0 lbs-in.

14. Install a new gasket (25) and seat (24) into cover assembly (26).

15. Install housing (21) into cover assembly (26), with set screw facing towards the cover (33) of the regulator and attach with three pan head screws (22) and three flat washers (23). Tighten screws to a torque of 1.5 to 2.0 lbs-in.

CAUTION

Ensure the poppet stem is engaged into the adjuster properly, if not poppet will not operate and may become damaged.

16. Install poppet (20), spring (19) and adjuster (18) into housing (21). Use peg spanner wrench to screw in adjuster.

17. Install pin (17) and set screw (16) into housing (21).

18. Install mesh disc (15) into housing (21) and retain with retaining ring (14).

19. Install mounting pin (12) on regulator body assembly (49) and attach with two countersunk head screws (13). Tighten screws to a torque of 1.5 to 2.0 lbs-in.

20. Repeat step 19 to install the other mounting pin (12).

21. Install new preformed packing (11) in groove in plate (9).

22. Install plate (9) into regulator body assembly (49) and attach with three countersunk head screws (10). Tighten screws to a torque of 2.0 to 2.5 lbs-in.

NOTE

Prior to performing step 23, apply Vibra-tite sealant to threads of aneroid adjuster (8) and allow to cure for 30 minutes.

23. Using peg spanner wrench, install aneroid assembly (8) into regulator body assembly (49).

24. Install pin (7) and set screw (6) into regulator body assembly (49).

25. Install pan head screw (4) and a new non-metallic seal (5) into regulator body assembly (49). Tighten screw to a torque of 4.0 to 5.0 lbs-in.

26. Install new preformed packing (3) on inlet connector assembly (2).

27. Install inlet connector assembly (2) into regulator body assembly (49). Tighten connector to a torque of 130 to 150 lbs-in.

28. Install new preformed packing (1) in regulator body assembly (49) outlet.

29. Install protective cap (50) on inlet connector assembly (2).

30. Install protective cap (51) on regulator body assembly (49) outlet.

31. Using small amount of Dow Corning 3145 RTV, apply sealant over aneroid post screw located in center of aneroid adjuster.

NOTE

Regulator must be tested to the requirements of paragraphs 9-36, 9-38, 9-40, 9-41 and 9-42 following any disassembly/rebuild activity.

Section 9-5. Illustrated Parts Breakdown

9-56. GENERAL.

9-57. This section lists and illustrates the procurable parts of the Chest Mounted Positive Pressure Regulator, CRU88/P, P/N 2900W000.

9-58. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

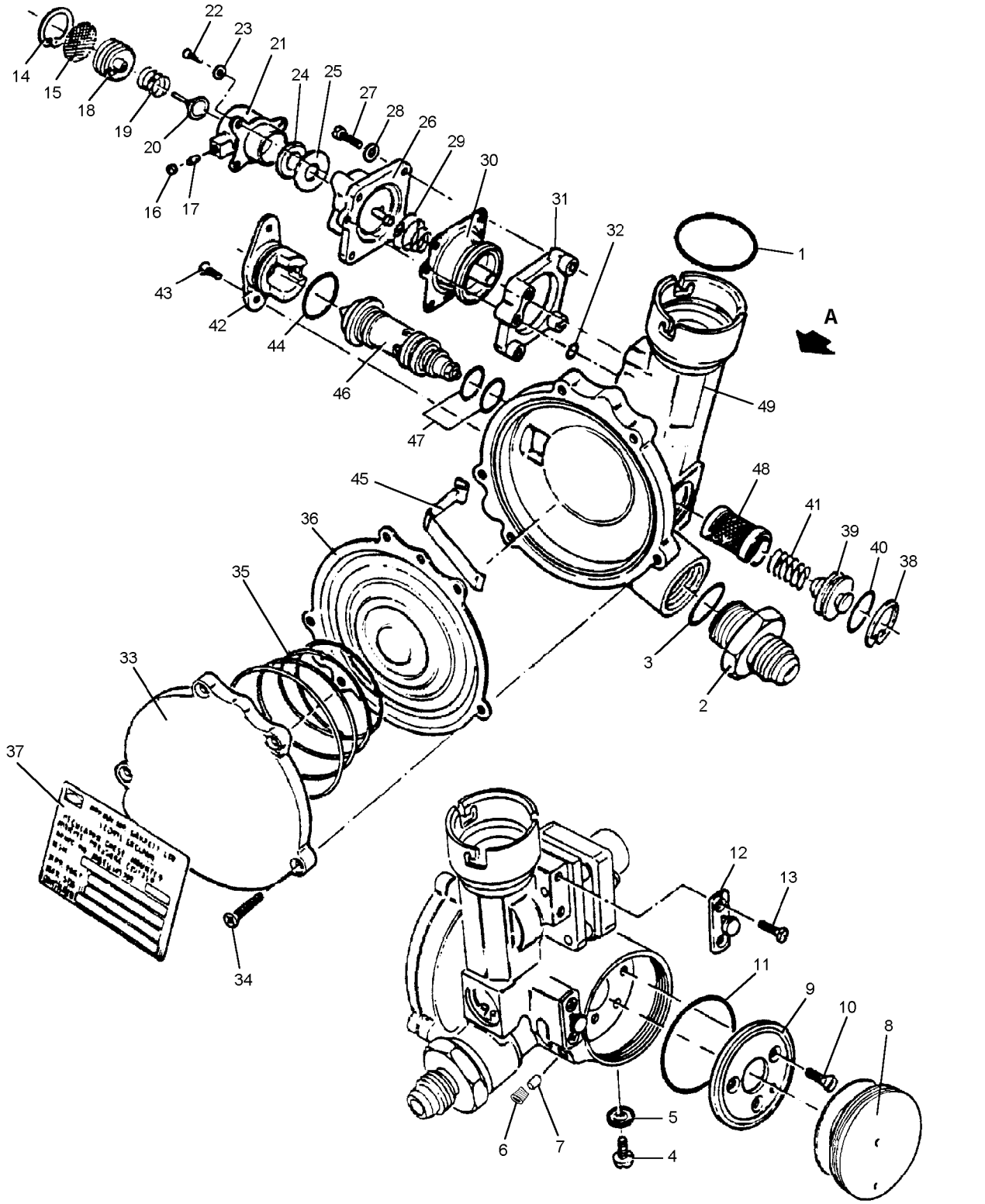

Figure 9-6. Chest Mounted Positive Pressure Regulator

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-6	2900W000-001	REGULATOR, POSITIVE PRESSURE ..... CHEST MOUNTED (CRU-88/P)	REF	
-1	MS9068-021	. PACKING, Preformed	1	
-2	2900W080	. CONNECTOR, ASSEMBLY, Inlet	1	
-3	MS9385-06	. PACKING, Preformed	1	
-4	MS35206-225	. SCREW, Pan Head	1	
-5	2478W118	. SEAL, Non-Metallic	1	
-6	AN565A8H2	. SCREW, Set	1	
-7	2845W069	. PIN	1	
-8	2900W710	. ANEROID ASSEMBLY, Complete with ..... Adjuster	1	
-9	2900W175	. PLATE ..... (ATTACHING PARTS)	1	
-10	MS24693-S2	. SCREW, Countersunk Head ..... ---*---	3	
-11	MS9068-024	. PACKING, Performed	1	
-12	2900W094	. PIN, Mounting ..... (ATTACHING PARTS)	2	
-13	MS51959-4	. SCREW, Countersunk Head ..... ---*---	4	
-14	MS16625-1050	. RING, Retaining	1	
-15	2845W065	. DISC, Mesh	1	
-16	AN565A8H2	. SCREW, Set	1	
-17	2845W069	. PIN	1	
-18	2845W068	. ADJUSTER	1	
-19	2900W177	. SPRING	1	
-20	2845W063	. POPPET	1	
-21	2900W119	. HOUSING ..... (ATTACHING PARTS)	1	
-22	MS35206-203	. SCREW, Pan Head	3	
-23	NAS620-2	. WASHER, Flat ..... ---*---	3	
-24	2845W064	. SEAT	1	
-25	2845W066	. GASKET	1	
-26	2900W100	. COVER ASSEMBLY ..... (ATTACHING PARTS)	1	
-27	MS35206-218	. SCREW, Pan Head	4	
-28	NAS620-4L	. WASHER, Flat ..... ---*---	4	
-29	2284W177	. SPRING, Helical Compression	1	
-30	2900W700	. DIAPHRAGM AND SEAT ASSEMBLY	1	
-31	2845W177	. GUIDE	1	
-32	1532S014	. PACKING, Preformed	1	
-33	2900W093	. COVER ..... (ATTACHING PARTS)	1	
-34	MS24693-S4	. SCREW, Countersunk Head ..... ---*---	5	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-6-35	2900W174	. SPRING, Conical	1	
-36	2900W220	. DIAPHRAGM ASSEMBLY	1	
-37	2900W176	. PLATE, Identification	1	
-38	MS16625-1056	. RING, Retaining	1	
-39	2900W095	. PLUG	1	
-40	MS9068-013	. PACKING, Preformed	1	
-41	2900W097	. SPRING	1	
-42	2900W040	. CAP ASSEMBLY, End	1	
		(ATTACHING PARTS)		
-43	MS24693-S2	. SCREW, Countersunk Head	2	
		---*---		
-44	MS9068-014	. PACKING, Preformed	1	
-45	2284W103	. LEVER	1	
-46	2900W020	. VALVE ASSEMBLY, Balanced	1	
-47	MS9068-012	. PACKING, Preformed	2	
-48	2900W118	. FILTER	1	
-49	2900W010	. BODY ASSEMBLY, Regulator	1	
-50	NAS817-6	. CAP, Protective	1	
-51	M5501-7-F23	. CAP, Protective	1	

NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
AN565A8H2	9-6-6	PAGZZ
	9-6-16	PAGZZ
MS16625-1050	9-6-14	PAGZZ
MS16625-1056	9-6-38	PAGZZ
MS24693-S2	9-6-10	PAGZZ
	9-6-43	PAGZZ
MS24693-S4	9-6-34	PAGZZ
MS35206-203	9-6-22	PAGZZ
MS35206-218	9-6-27	PAGZZ
MS35206-225	9-6-4	PAGZZ
MS51959-4	9-6-13	PAGZZ
MS9068-012	9-6-47	PAGZZ
MS9068-013	9-6-40	PAGZZ
MS9068-014	9-6-44	
MS9068-021	9-6-1	PCGZZ
MS9068-024	9-6-11	PCGZZ
MS9385-06	9-6-3	PCGZZ
M5501-7-F23	9-6-51	
NAS620-2	9-6-23	PAGZZ
NAS620-4L	9-6-28	PAGZZ
NAS817-6	9-6-50	
1532S014	9-6-32	PAGZZ
2284W103	9-6-45	
2284W177	9-6-29	PAGZZ
2478W118	9-6-5	PAGZZ
2845W063	9-6-20	PAGZZ
2845W064	9-6-24	PAGZZ
2845W065	9-6-15	PAGZZ
2845W066	9-6-25	PAGZZ
2845W068	9-6-18	PAGZZ
2845W069	9-6-7	PAGZZ
	9-6-17	PAGZZ
2845W177	9-6-31	PAGZZ
2900W000-001	9-6-	PAOGG
2900W010	9-6-49	XAGZZ
2900W020	9-6-46	PAGZZ
2900W040	9-6-42	PAGZZ
2900W080	9-6-2	PAGZZ
2900W093	9-6-33	PCGZZ
2900W094	9-6-12	PAGZZ
2900W095	9-6-39	PAGZZ
2900W097	9-6-41	PCGZZ
2900W100	9-6-26	PAGZZ
2900W118	9-6-48	PAGZZ
2900W119	9-6-21	PAGZZ
2900W174	9-6-35	PAGZZ
2900W175	9-6-9	PAGZZ
2900W176	9-6-37	MGGZZ
2900W177	9-6-19	PAGZZ
2900W220	9-6-36	PAGZZ
2900W700	9-6-30	PAGZZ
2900W710	9-6-8	PAGZZ

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CHAPTER 10

DEMAND OXYGEN REGULATOR

TYPE CRU-103/P, P/N F241-2300-3

Section 10-1. Description

10-1. GENERAL.

10-2. The Demand Oxygen Regulator, Type CRU-103/P (P/N F241-2300-3, figure 10-1) is manufactured by Carleton Technologies Inc. (CAGE 04577). It is designed to regulate oxygen to the aircrewmember during flight. The regulator is a chest-mounted, positive pressure, g-modulated regulator that provides demand oxygen flow to the aircrewmember, Pressure Breathing for Altitude (PBA), and Pressure Breathing for gs (PBG). Table 10-1 contains the leading particulars for the regulator.

10-3. The regulator is a chest-mounted, positive pressure, g-modulated regulator that provides demand oxygen flow to the aircrewmember, Pressure Breathing for Altitude (PBA), and Pressure Breathing for gs (PBG).

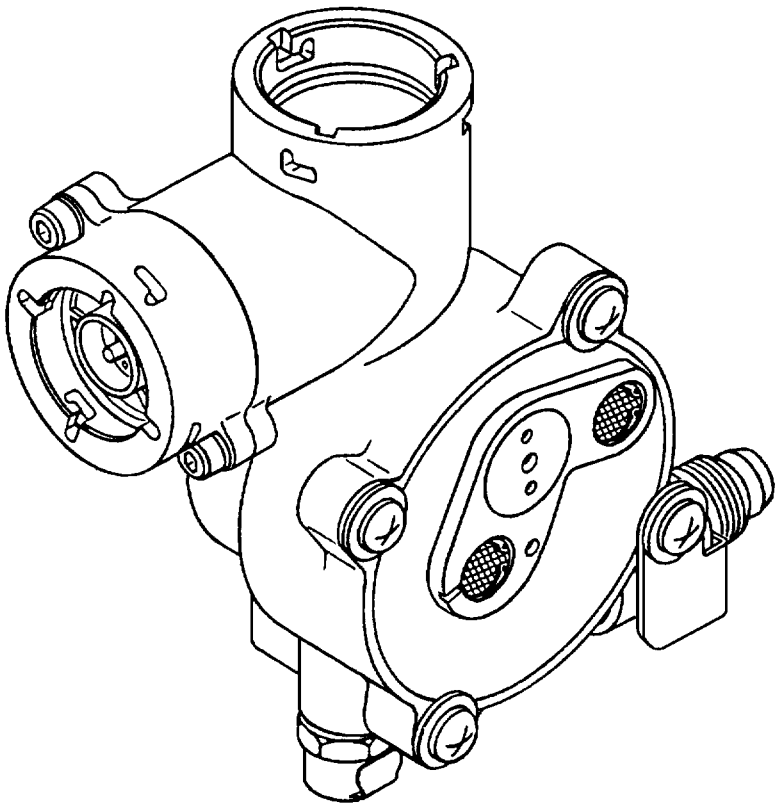

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Figure 10-1. Demand Oxygen Regulator, Type CRU-103/P

Table 10-1. Leading Particulars

Recommended Inlet Pressure	5 to 120 psig
Flow	0 to 240 lpm
Operating Altitude Range	0 to 50,000 ft
Operating Temperature Range	-65° to +160°F
Weight (approx)	12 ounces
Dimensions (approx)	3 x 4 x 2 inches

WARNING

At no time should the demand oxygen regulator, Type CRU-103/P, be used at operational altitudes above 50,000 feet. Life support requirements cannot be reliably maintained by the regulator above specified altitudes.

10-4. The safety pressure feature of the Type CPU-103/P regulator automatically maintains a positive pressure in the mask of 0.5 to 1.8 inches of water (inH_2O) at all altitudes up to approximately 34,000 feet. The pressure-breathing feature maintains a positive pressure in the mask of up to 20.0 inH_2O at altitudes between 34,000 and 50,000 feet, with the positive pressure increasing in proportion to the altitude. Oxygen demand regulators can be used routinely up to 43,000 feet, and up to 50,000 feet for short periods in case of an emergency.

10-5. CONFIGURATION.

10-6. Demand Oxygen Regulators are designed for use with the MBU-20P series oxygen mask as part of the oxygen system in aircraft with liquid oxygen systems (LOX) or on-board oxygen generating systems (OBOGS). See figure 10-1A for proper OBOGS, LOX, or E-2C Configuration.

10-7. FUNCTION.

10-8. Characteristics and performance for which the regulator is designed are described in the following paragraphs. The regulator is shown in figure 10-2. Index numbers of components shown in the figure are referred to in parenthesis in the following discussion of regulator operation.

1. Pressurized oxygen, in the range of 5-120 pounds per square inch gage (psig), is supplied to the regulator at breathing gas inlet (1). This gas is provided by the aircraft liquid oxygen (LOX) system, or the on-board oxygen generating system (OBOGS). A pressure balanced demand valve (2) is used to minimize the effects of differing inlet pressures, demand valve (2) is actuated by bell crank mechanism (3) with force from safety pressure spring (4) and the differential pressure across breathing diaphragm (5). In the pressure demand mode, the aircrewmember inhales, thereby lowering the pressure at the regulator outlet. This pulls breathing diaphragm (5) down (due to the pressure difference) and opens demand valve (2) to provide oxygen flow to noise attenuator (20) and mask outlet (15).

2. To provide PBA, positive pressure that is controlled by PBA aneroid assembly (7), is applied to the top of breathing diaphragm (5) by the PBA subsystem. The PBA subsystem consists of the PBA aneroid assembly (7), ambient vent (8), lapped metal to metal valve (9), and spring (10). A constant bleed through the breathing diaphragm bleed orifice (6) provides a slow flow of oxygen through the PBG and PBA subsystems to ambient vent (8). As altitude increases, PBA aneroid assembly (7) expands and restricts the bleed flow through ambient vent (8), thereby increasing pressure above breathing diaphragm (5) and opening demand valve (2) to provide positive oxygen flow to the aircrewmember through noise attenuator (20) and mask outlet (15).

3. To provide PBG, PBG bellows assembly (11) is pressurized by an externally provided anti-g reference pressure that is supplied to the regulator at anti-g ref pressure inlet (21). The PBG bellows assembly (11) controls positive pressure applied to the top of breathing diaphragm (5). The PBG subsystem includes PBG bellows assembly (11), lapped metal to metal valve (12), diaphragm (14), and spring (13). A constant bleed through breathing diaphragm bleed orifice (6) provides a slow flow of oxygen through the PBG and PBA subsystems to ambient vent (8). As the anti-g reference pressure increases, PBG bellows assembly (11) expands and restricts the bleed flow through ambient vent (8), thereby increasing pressure above breathing diaphragm (5) and opening demand valve (2) to provide positive oxygen flow to the aircrewmember. Diaphragm (14) pressure balances valve (12) so PBA pressure does not affect PBG. The higher of the desired PBA or PBG pressure is provided by the regulator.

4. In the event of an explosive decompression or failed anti-g valve, relief valve (23) limits the internal g signal to approximately 11.5 psig regardless of applied g signal value.

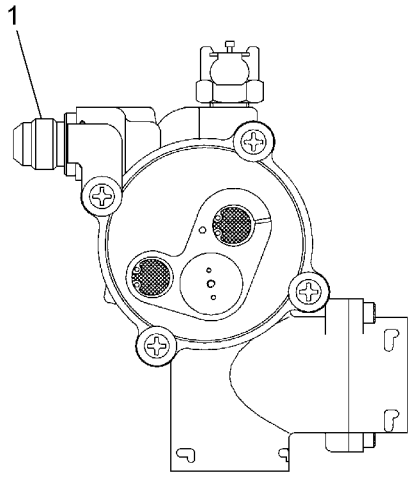
5. The regulator has two outlets that provide breathing gas at the appropriate pressure. Mask outlet (15) connects to the breathing hose of the MBU-20/P mask and tensioning bladder. Vest outlet (16) connects to the vest hose of the CSU-17/P counter pressure vest. Vest outlet (16) includes check valve (17) and vest relief valve (18). When the vest is not connected, vest relief valve (18) limits the breathing pressure to a value between 20 and 24 inches of water.

6. Main relief valve (19) is designed to open and vent to ambient at a minimum of 30 inH_2O and reseat at approximately 30 inH_2O. In addition, main relief valve (19) can be opened by outlet pressure in excess of the required PBA or PBG schedule. This venting is caused by breathing diaphragm (5) moving upward, rotating bell crank (3) counterclockwise which pushes main relief valve (19) open allowing excess pressure to escape to ambient.

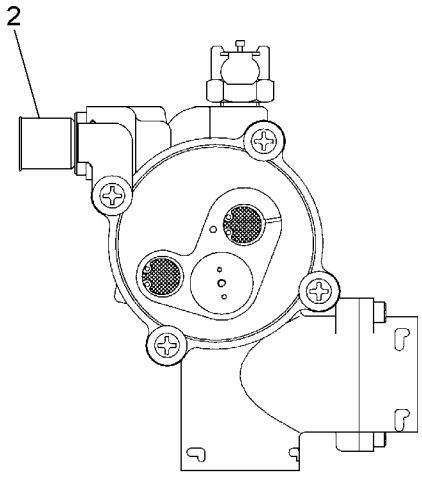
7. Bell crank mechanism (3), that pulls demand valve (2) open on demand, is linked to breathing diaphragm (5). It allows the tension shaft to slide through one crank arm so that an opposite arm can push open main relief valve (19) and vent excess pressure sensed by breathing diaphragm (5). The longer arm on the bell crank (3) is connected to the breathing diaphragm (5). Compression spring (22), positioned between bell crank (3) and demand valve (2), increases the closing force to demand valve (2) during overpressure venting, but does not increase the opening force for demand valve (2) in the demand mode.

10-9. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

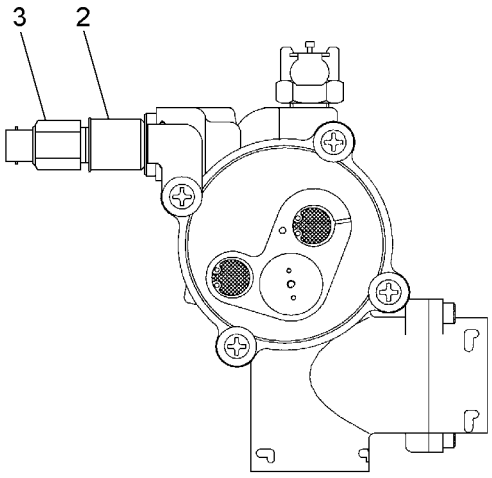
10-10. The Illustrated Parts Breakdown, Section 10-5, contains information on each assembly, subassembly and component part of the Type CRU-103/P demand oxygen regulator. The figure and index numbers, reference or part number, description and units per assembly are provided with the breakdown.



VIEW 1. OBOGS CONFIGURATION



VIEW 2. LOX CONFIGURATION



VIEW 3. E-2C CONFIGURATION

1. OBOGS INLET FITTING
   P/N F395-1106-1
2. LOX INLET FITTING
   P/N B40918-1 (SEE NOTE 1)
3. E-2C INLET FITTING
   P/N 36728-01 (SEE NOTES 1
   AND 2)

NOTES:

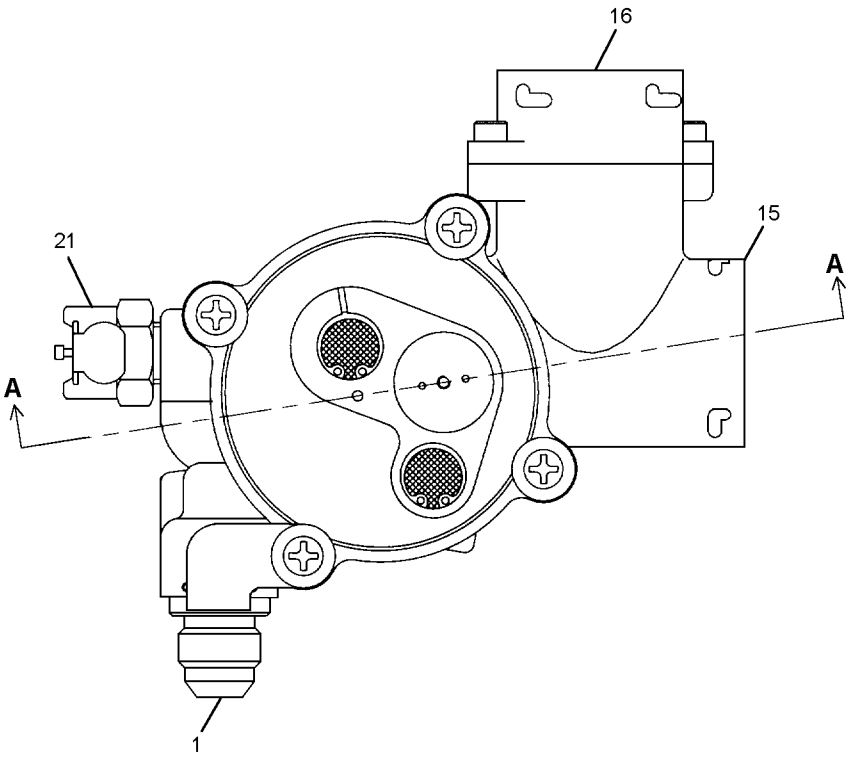
1. ENSURE PIPE THREADS OF ITEM 3 AND MALE ADAPTER FOR LOX AND E-2C CONFIGURATION ARE WRAPPED WITH ANTI-SIEZE TAPE PRIOR TO SCREWING INTO LOX INLET FITTING (2).

2. P/N 36728-01 MUST BE ORDERED OPEN PURCHASE FROM SCOTT AVIATION, CAGE 53655, BUFFALO NY.

010001a

Figure 10-1A. Demand Oxygen Regulator, Type CRU-103/P, OBOGS, LOX, and E-2C Configurations

1. BREATHING GAS INLET
2. DEMAND VALVE
3. BELL CRANK
4. SAFETY SPRING
5. BREATHING DIAPHRAGM
6. BLEED ORIFICE
7. PBA ANEROID ASSY
8. AMBIENT VENT
9. VALVE
10. SPRING
11. PBG BELLOWS ASSY
12. VALVE
13. SPRING
14. DIAPHRAGM
15. MASK OUTLET
16. VEST OUTLET
17. CHECK VALVE
18. VEST RELIEF VALVE
19. MAIN RELIEF VALVE
20. NOISE ATTENUATOR
21. ANTI-G REF PRESSURE INLET
22. COMPRESSION SPRING
23. RELIEF VALVE



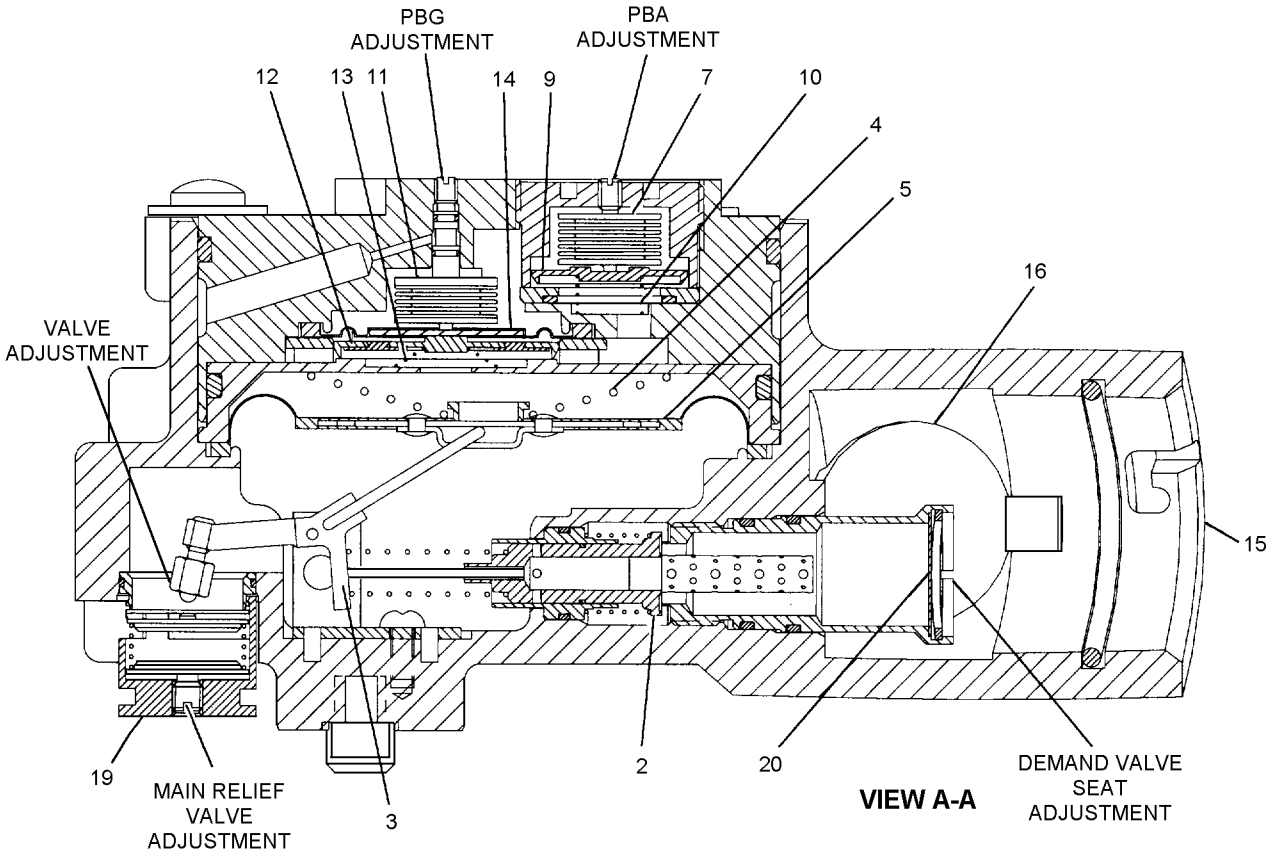


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Figure 10-2. Demand Oxygen Regulator Schematic (Sheet 1 of 2)

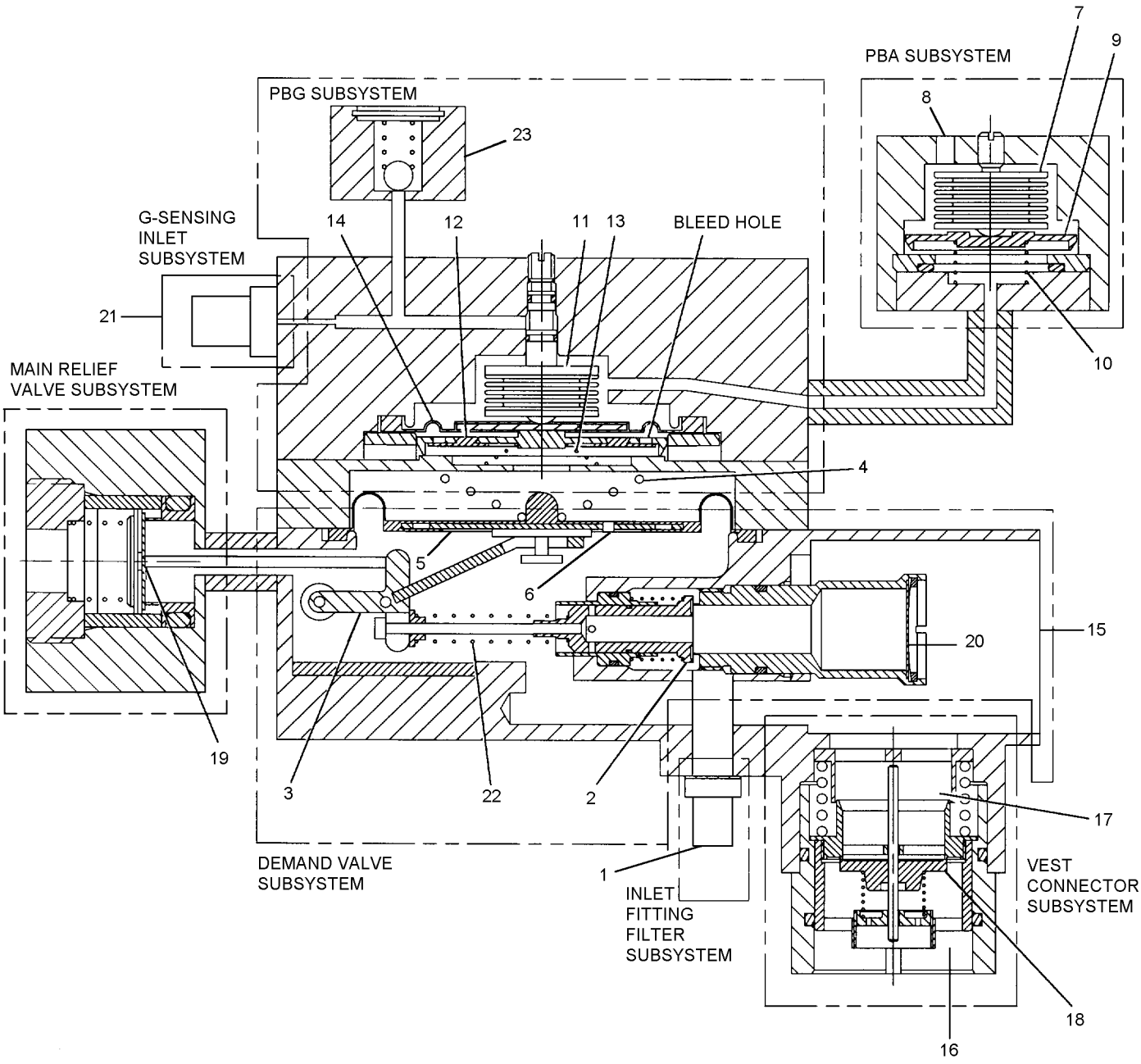

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Figure 10-2. Demand Oxygen Regulator Schematic (Sheet 2 of 2)

Section 10-2. Modifications

10-11. GENERAL.

10-12. The Demand Oxygen Regulator, Type CRU-103/P should be updated by comparing the configuration of the regulator with the directives listed in table 10-1A.

Section 10-3. Performance Test Sheet Preparation

10-13. GENERAL.

10-14. Preparation of the Demand Oxygen Regulator Performance Test Sheet used during Bench Test requires that all actual flow values provided in this section be converted to indicated flow values. Actual flow values are stated in liters per minute (lpm), a value which cannot be measured by the manometers used in the oxygen systems test stands. The test stand manometers are calibrated to indicate inches of water (inH_2O) pressure. Conversion of actual flows (lpm) to indicated flows (inH_2O) can be accomplished using the various graphs which are prepared for, and accompany each individual test stand. Note that 0 liters per minute need not be converted, since 0 lpm = 0 inH_2O.

NOTE

The various graphs supplied with each Oxygen Systems Components Test Stand, Model 1172AS100 or Model 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

10-15. The Performance Test Sheet shall be prepared as shown in figure 10-3. The Performance Test Sheet illustrated is a sample only, but may be reproduced for local use.

Table 10-1A. Demand Oxygen Regulator, Type CRU-103/P Directives

Description of Modification	Application	Modification Code
Modification of the G-inlet Fitting	CRU-103/P	670

REGULATOR PERFORMANCE TEST SHEET
DEMAND OXYGEN REGULATOR TYPE CRU-103/P

DATE: _____ REGULATOR SERIAL NO: _____ TEST STAND SERIAL NO: _____

TECHNICIAN: _____ CDI: _____

1. MAIN RELIEF VALVE OVERLOAD TEST (LOW PRESSURE):
   RELIEF VALUE (3.8 INH_2O MIN, 10 INH_2O MAX) _____ INH_2O

2. VEST RELIEF VALVE OVERLOAD TEST:
   INITIAL DESIGN BLEED _____ CCM
   INITIAL SAFETY PRESSURE _____ INH_2O
   RELIEF VALUE (20 INH_2O MIN, 24 INH_2O MAX) _____ INH_2O
   FINAL DESIGN BLEED (INITIAL ±100 CCM) _____ CCM
   FINAL SAFETY PRESSURE (INITIAL ±0.5 INH_2O) _____ INH_2O

3. MAIN RELIEF VALVE OVERLOAD TEST (HIGH PRESSURE):
   INITIAL DESIGN BLEED _____ CCM
   INITIAL SAFETY PRESSURE _____ INH_2O
   RELIEF VALUE (30 INH_2O MIN, 36 INH_2O MAX) _____ INH_2O
   FINAL DESIGN BLEED (INITIAL ±100 CCM) _____ CCM
   FINAL SAFETY PRESSURE (INITIAL ±0.5 INH_2O) _____ INH_2O

4. OVERALL LEAKAGE TEST:
   900 CCM ALLOWABLE LEAKAGE _____ CCM

5. DEMAND VALVE LEAKAGE TEST:
   30 PSIG-INITIAL READING (0.5 TO 1.8 INH_2O) _____ INH_2O
   3 MINUTE READING (INITIAL ±0.1 INH_2O) _____ INH_2O
   80 PSIG-INITIAL READING (0.5 TO 1.8 INH_2O) _____ INH_2O
   3 MINUTE READING (INITIAL ±0.1 INH_2O) _____ INH_2O

6. SAFETY PRESSURE TEST: (GROUND LEVEL)

INLET PRESSURE	FLOW LPM	FLOW INH_2O	INH_2O MINIMUM	INH_2O MAXIMUM	INH_2O READ
10 PSI	0	0	0.5	1.8	
10 PSI	75		0.5	1.8	
80 PSI	0	0	0.5	1.8	
80 PSI	240		3.0	4.0	

Figure 10-3. Performance Test Sheet Preparation (Sheet 1 of 2)

7. PRESSURE BREATHING FOR ALTITUDE (PBA) TEST:

ALT	INLET PRES.	75 LPM INH_2O	0 & 75 MIN	0 & 75 MAX	0 LPM READ	75 LPM READ	240 LPM INH_2O	240 LPM MIN	240 LPM MAX	240 LPM READ
30	10		0.5	2.5						
30	80		0.5	2.5				1.2	3.2	
34	10		0.5	4.0						
34	80		0.5	4.0				1.1	4.6	
36	10		3.0	6.0						
36	80		3.0	6.0				3.0	6.0	
45	10		13.0	16.0						
45	80		13.0	16.0				13.0	16.0	
50	10		16.0	20.0						
50	80		16.0	20.0				16.0	20.0	

8. PRESSURE BREATHING FOR Gs (PBG) TEST: (INLET PRESSURE - 80 PSIG)

ALTITUDE	FLOW LPM	FLOW INH_2O	G-SIGNAL PSI	INH_2O MINIMUM	INH_2O MAXIMUM	INH_2O READ
GROUND	0	0	3.5	0.5	4.3	
GROUND	150		3.5	1.5	5.3	
GROUND	0	0	9.5	23.5	27.8	
GROUND	150		9.5	24.5	28.8	
50,000	0	0	3.5	16.0	20.0	
50,000	150		3.5	16.0	20.0	
50,000	0	0	9.5	23.5	27.8	
50,000	150		9.5	23.5	27.8	

NOTE 1: CONVERSION BETWEEN LPM AND INH_2O VALUES MUST BE MADE USING TEST STAND CALIBRATION CHARTS.

Figure 10-3. Performance Test Sheet Preparation (Sheet 2 of 2)

10-16. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Safety Pressure Test.

2. Pressure Breathing for Altitude (PBA) Test.

3. Pressure Breathing for Gs (PBG) Test.

10-17. REGULATOR PERFORMANCE TESTS.

10-18. SAFETY PRESSURE TEST. To convert actual liters per minute (lpm) flows to indicated inches of water (inH_2O) flows, proceed as follows:

1. Using the sea level output graph, locate the 75 lpm line on the bottom of the graph and trace the line up to where it intersects with the nitrogen line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O equivalent.

3. Repeat steps 1 and 2 for converting the 240 lpm flow.

10-19. PRESSURE BREATHING FOR ALTITUDE (PBA) TEST. To convert actual lpm flows to indicated inH_2O flows, proceed as follows:

1. Using the 30,000 feet altitude output graph, locate the 75 lpm line on the bottom of the graph and trace the line up to where it intersects with the nitrogen line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O equivalent.

3. Repeat steps 1 and 2 for converting the 240 lpm flow.

4. Repeat steps 1, 2 and 3 using the 34,000, 36,000, 45,000, and 50,000 feet altitude output graphs.

10-20. PRESSURE BREATHING FOR GS (PBG) TEST. To convert actual lpm flows to indicated inH_2O flows, proceed as follows:

1. Using the sea level output graph, locate the 150 lpm line on the bottom of the graph and trace the line up to where it intersects the nitrogen line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O equivalent.

3. Repeat steps 1 and 2 using the 50,000 feet altitude output graph.

Section 10-4. Maintenance

10-21. GENERAL.

10-22. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly and adjusting the Demand Oxygen Regulator, Type CRU-103/P.

NOTE

The regulator will be considered beyond economical repair when the cost of the parts exceeds approximately 75% of the cost of the regulator.

Document all special inspections by making the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

All maintenance actions shall be documented by making the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

10-23. The Demand Oxygen Regulator, Type CRU-103/P, shall be maintained at the lowest level of maintenance authorized to perform the maintenance functions. The preflight inspection is conducted at Organizational Level maintenance by the aircrewmembers to verify operation of the regulator and demand breathing output pressure. Repairs and testing shall be performed at the Intermediate Level maintenance. The regulator shall remain in service for as long as it continues to function correctly and does not require excessive repair.

10-24. Procedural steps outlined in this section are listed under the inspection cycle in which they are required and are further listed in the sequence in which they normally occur.

10-25. INSPECTION.

10-26. DAILY/PREFLIGHT INSPECTION. The Daily/Preflight Inspection is a Visual Inspection performed by the aircrewmember to whom the regulator is issued, daily or prior to each flight. To perform the inspection, visually inspect the following:

WARNING

When working with oxygen, make certain that clothing, tubing fittings and equipment are free of oil, grease, fuel, hydraulic fluid or any combustible material. Fire or explosion can result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Inlet and outlet connections for security of attachment.

2. Regulator body for bends, dents, scratches, corrosion, condition of nameplate, cracks or any other damage.

3. Perform a Functional Test in accordance with paragraph 10-28.

10-27. If discrepancies are found or suspected, the defective regulator shall be removed and a Ready-For-Issue (RFI) regulator installed. The defective regulator shall be taken to the Aviator's Equipment Branch for the required corrective maintenance action.

10-28. SPECIAL 30-DAY INSPECTIONS. Special inspections are required at specified intervals other than Daily/Preflight Inspections. The intervals for the Demand Oxygen Regulator, Type CRU-103/P, Special Inspection is 30 days. This Special 30-Day Inspection consists of a Visual Inspection and a Functional Test, both performed by personnel of the Aviator's Equipment Branch. To perform the Special 30-Day Inspection, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210

1. Visually inspect the regulator in accordance with paragraph 10-30.

WARNING

When working with oxygen, make certain that clothing, tubing fittings and equipment are free of oil, grease, fuel, hydraulic fluid or any combustible material. Fire or explosion can result when even slight traces of combustible material come in contact with oxygen under pressure.

2. Functionally test the regulator by attaching the oxygen mask, regulator, and hose assembly to an oxygen supply source which conforms with Aviators Breathing Oxygen.

3. Turn supply source on. There should be a flow of oxygen through the mask.

NOTE

Resistance during exhalation is due to the positive pressure feature of the regulator.

4. Don mask and breathe. There should be a slight resistance on exhalation and no mechanical noise or vibration from the regulator.

5. Upon completion of the Special 30-Day Inspection, make the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

10-29. SPECIAL 90-DAY INSPECTION. The Special 90-Day Inspection shall be performed on all Demand Oxygen Regulators, Type CRU-103/P upon issue prior to being installed in an in-service personal oxygen configuration, and shall be performed on all demand oxygen regulators in service at least every 90 days. Regulators in service require removal from the aircraft to perform this special inspection. The Special 90-Day Inspection consists of a Visual Inspection and a Bench Test. All work shall be performed in a clean, dust-free and oil-free area.

10-30. Visual Inspection. To perform a Visual Inspection of the regulator, proceed as follows:

1. Disconnect communications connections.

2. Disconnect mask delivery hose from regulator mask outlet.

3. Disconnect vest hose from regulator vest outlet.

4. Disconnect inlet supply hose from regulator breathing gas inlet.

5. Disconnect anti-g hose from regulator anti-g ref pressure inlet.

6. Inspect regulator inlets and outlets for foreign objects, dirt, corrosion, bends, dents, cracks, and other damage. Ensure regulator breathing gas inlet filter is properly installed.

7. Inspect regulator body for bends, dents, cracks, corrosion, condition of nameplate, security of screws, and fittings for other obvious damage.

NOTE

If personnel mounting pins are loose, missing, or damaged in any way, do not BCM the CRU-103 Oxygen Regulator. Submit Hazardous Material Report (HMR) to Aviation Oxygen Fleet Support Team, Naval Air Warfare Center Aircraft Division, Patuxent River, MD. Attention Code 4.6.3.2. requesting Engineering Investigation. No FST response required. Ship regulator with defective mounting pins to the following address for repair: Commander, Naval Air Warfare Center-Aircraft Division, ATTN: Code 4.6.3.2, 48110 Shaw Rd Unit 5, Patuxent River, MD 20670-1906.

CRU-103/P Oxygen Regulators that are used with protective pocket manufactured in accordance with Aircrew Systems Change No. 598 Revision A, instead of the mounting bracket, do not require mounting pins and are not required to have an HMR submitted to the Aviation Oxygen Fleet Support Team. These regulators can be bench tested and returned to service.

8. Inspect personnel mounting pins for security of attachment and good condition.

9. Inspect PBG inlet fitting for damage and security of attachment. Repair as necessary in accordance with paragraph 10-62.

10. Upon completion of the Special 90 Day Inspection, make the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

10-31. Regulators failing the Visual Inspection or the Bench Test (paragraph 10-32) shall be repaired, if specified repair is authorized. SM&R Codes define repairable components and level of maintenance authorized for repair. Further explanation is contained in the Naval Aviation Maintenance Program Manual, OPNAVINST 4790.2 Series.

10-32. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type 1, Class 1, Grade A (Fed Spec BB-N-411) shall be used for testing Demand Oxygen Regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

3500 psig water-pumped, oil-free, gaseous nitrogen cylinders are normally components of aircraft servicing carts. The possibility exists that these cylinders may be contaminated. Do not use these cylinders.

10-33. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate Ground Support Equipment Manual for identification of test stand controls and indicators referred to in the Bench Test procedures that follow. Do not attempt to perform any Bench Test before becoming thoroughly familiar with the test stand. Utilize Performance Test Sheet, (figure 10-3) when performing Bench Test.

CAUTION

Many of the regulator components have lapped surfaces. To maintain proper performance, these parts should be handled using plastic tweezers to avoid scratches, nicks, or contamination from technician's hands.

NOTE

Refer to figure 10-4 for index number identification of special tools and test equipment used to Bench Test the Type CRU-103/P regulator and referenced in each test description. Figure 10-5 identifies hose assembly interface with test stand altitude chamber.

The following Bench Test procedures are arranged to proceed from one test to another with minimal change in test set up and valve positioning.

10-34. CLEANING AND LUBRICATION OF PREFORMED PACKINGS. To clean and lubricate preformed packings, proceed as follows:

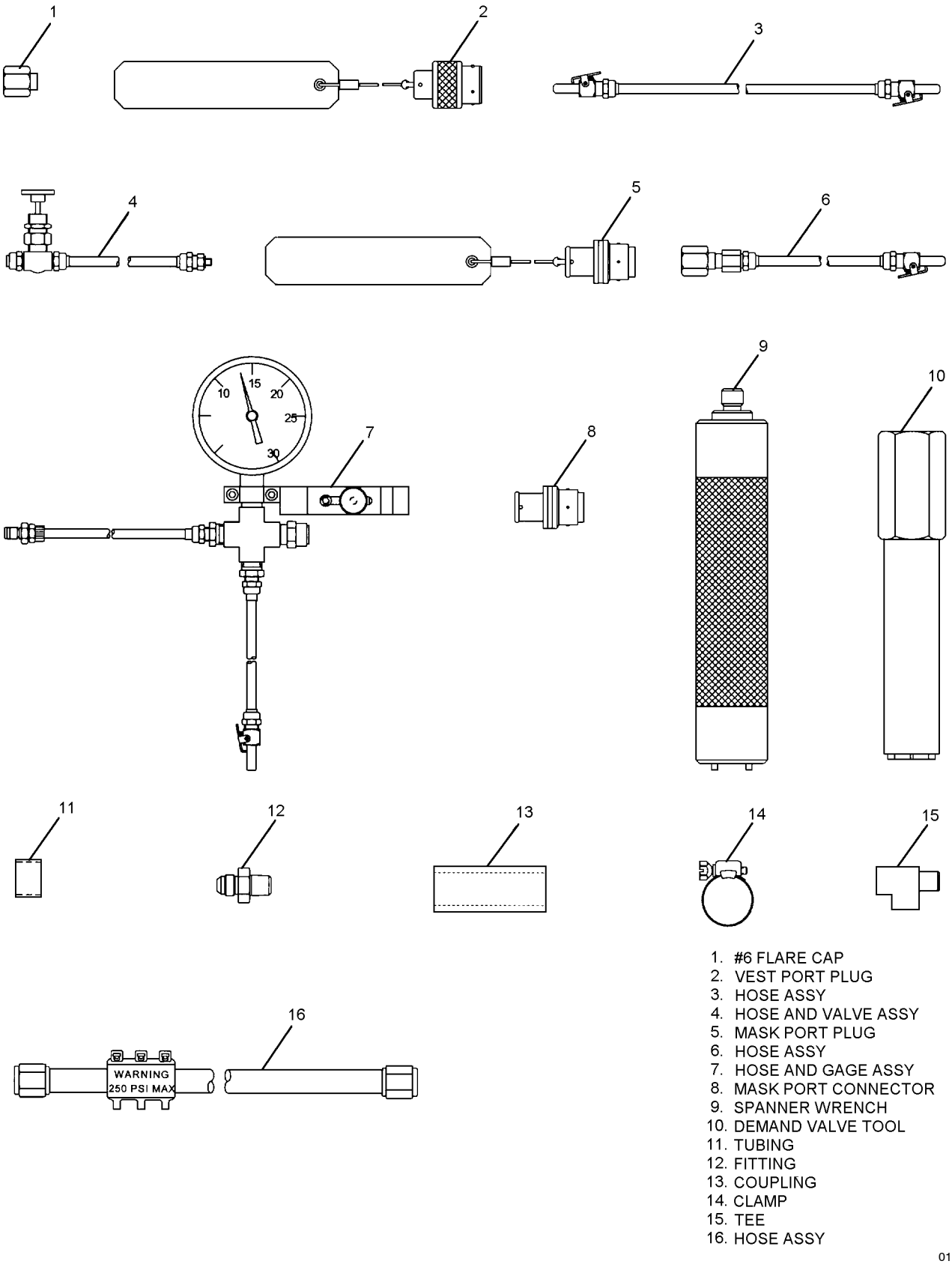

Figure 10-4. Special Tools and Test Equipment

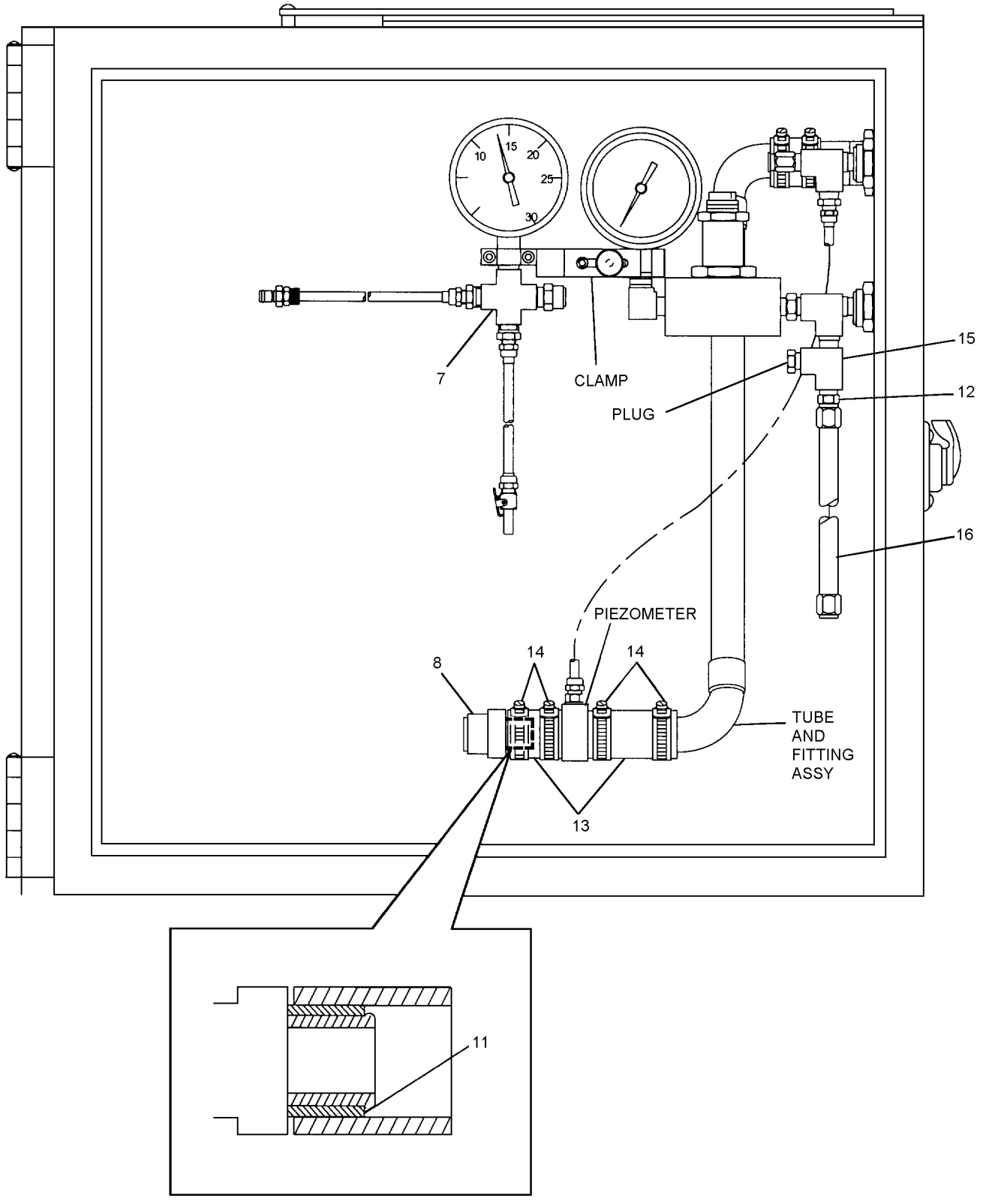

Figure 10-5. Test Stand Altitude Chamber Bench Test Arrangement

NOTE

Refer to figure 10-17 for identification of components referenced by index numbers in this procedure.

It will not be necessary to replace vest connector subsystem component parts during this cleaning and lubrication function.

1. Disassemble vest connector subsystem in accordance with paragraph 10-53.

2. Clean and lubricate two preformed packing (53) in accordance with paragraphs 10-55, 10-56, and 10-59.

3. Assemble vest connector subsystem in accordance with paragraph 10-67.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

10-35. MAIN RELIEF VALVE OVERLOAD TEST (LOW PRESSURE). To perform the Main Relief Valve Overload Test (Low Pressure), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Ensure regulator outlet and Piezometer (26) are a maximum one inch apart.

In order to read the new PRESS./SUCTION Manometer (4) digital gage, it will be necessary to turn on the test vacuum pump. Vacuum pump shall remain on for all tests during Bench Test.

For Bench Testing, the CRU-103/P Regulator must be configured for OBOGS application using oxygen inlet fitting, P/N F395-1106-1 to eliminate the possibility of false indication of malfunction.

1. Cap regulator breathing gas inlet with cap (1) and tighten with a 11/16-inch wrench.

2. Plug regulator vest outlet with vest port plug (2).

3. Use Hose Assembly (3) to connect LOW PRESS. Connection (19) to REF TAP Connection (21) in the altitude chamber.

4. Install regulator mask outlet on mask connector (8).

5. Ensure all test stand valves are secured.

6. Turn on supply cylinder valve.

7. Set LEAKAGE Valve (F) to HIGH position.

8. Set FLOW SELECTOR Valve (M) to REGULATOR.

9. Slowly set PRESS. SELECTOR Valve (D) to H_2O position.

10. Slowly open LOW PRESS. REGULATOR (N) until REGULATED LOW PRESS. gage (11) indicates 70 psig.

11. Slowly open and stabilize LEAKAGE CONTROL Valve (E) until High Range LEAKAGE ROTAMETER (8) indicates 2000 ccm.

12. Observe PRESS./SUCTION Manometer (4). The regulator shall begin to relieve pressure at 3.8 inH_2O minimum, 10 inH_2O maximum. Record results on Performance Test Sheet.

13. Close Leakage Control Valve (E).

14. Disconnect Hose Assembly (3) from LOW PRESS. Connection (19) and REF TAP Connection (21).

15. Disconnect regulator from mask connector (8).

16. Remove cap (1) and vest port plug (2) from regulator breathing gas inlet and vest outlet.

17. If malfunction occurs, locate probable cause using troubleshooting chart, table 10-2.

Table 10-2. Troubleshooting Main Relief Valve Overload Test (Low Pressure)

Trouble	Probable Cause	Remedy
Main relief valve vents at less than 3.8 inH_2O.	Adjustment setscrew (41, figure 10-17) out of adjustment.	Remove relief valve subsystem. Turn adjustment screw clockwise in half turn increments. Install relief valve subsystem and retest.
	Faulty main relief valve subsystem.	Replace main relief valve subsystem using parts kit P/N F417-1016-3.
Main relief valve vents at less than 3.0 inH_2O.	Diaphragm (26, figure 10-17) damaged or improperly installed.	Replace or reseat diaphragm (26, figure 10-17).
Main relief valve vents at a pressure greater than 10.0 inH_2O.	Adjustment setscrew (41, figure 10-17) out of adjustment.	Remove relief valve subsystem. Turn adjustment setscrew counterclockwise in half-turn increments to lower readings until they are within range. Install relief valve subsystem and retest.

10-36. VEST RELIEF VALVE OVERLOAD TEST. To perform the Vest Relief Valve Overload Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove ring (10) and screen (7) from regulator bleed port.

2. Connect hose assembly (4) to the regulator bleed port. Fully open hose assembly (4) flow control valve (full counterclockwise).

CAUTION

Be careful not to block the outlet of hose assembly (4) flow control valve.

3. Use hose assembly (6) to connect regulator breathing gas inlet to chamber LOW PRESS. Connection (19).

4. Install regulator on mask port connector (8).

5. Ensure all test stand valves are secured.

6. Set PRESS. SELECTOR Valve (D) to H_2O position.

7. Fully open LEAKAGE CONTROL Valve (E).

8. Adjust LOW PRESS. REGULATOR (N) until REGULATED LOW PRESS. gage (11) indicates 70 psig.

NOTE

Slowly close and open hose assembly (4) flow control valve to exercise vest relief valve prior to performing step 9.

9. Observe High Range LEAKAGE ROTAMETER (8). Record initial design bleed on Performance Test Sheet.

10. Observe PRESS./SUCTION Manometer (4). Record initial safety pressure on Performance Test Sheet.

11. Slowly close hose assembly (4) flow control valve (clockwise) while observing PRESS./SUCTION Manometer (4).

12. Observe PRESS./SUCTION Manometer (4). The regulator shall begin to relieve outlet pressure at 20 inH_2O minimum, 24 inH_2O maximum. Record results on Performance Test Sheet.

13. Slowly, fully open hose assembly (4) flow control valve (counterclockwise).

14. Observe High Range LEAKAGE ROTAMETER (8). Final design bleed must be within ± 100 ccm of initial design bleed. Record final design bleed on Performance Test Sheet.

15. Observe PRESS./SUCTION Manometer (4). Final safety pressure must be within ± 0.5 inH_2O of initial safety pressure. Record final safety pressure on Performance Test Sheet.

NOTE

An in-tolerance condition per steps 14 and 15 indicates that the vest relief valve is reseating properly.

16. If malfunction occurs, locate the probable cause and remedy by using troubleshooting chart, table 10-3.

10-37. MAIN RELIEF VALVE OVERLOAD TEST (HIGH PRESSURE). To perform Main Relief Valve Overload Test (High Pressure), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Cap regulator vest outlet with vest port plug (2).

2. Set PRESS. SELECTOR Valve (D) to H_2O position.

3. Adjust LOW PRESS. REGULATOR (N) until REGULATED LOW PRESS. gage (11) indicates 70 psig.

NOTE

Slowly close and open hose assembly (4) flow control valve to exercise main relief valve prior to performing step 4.

4. Observe High Range LEAKAGE ROTAMETER (8). Record initial design bleed on Performance Test Sheet.

5. Observe PRESS./SUCTION Manometer (4). Record initial safety pressure on Performance Test Sheet.

6. Slowly close hose assembly (4) flow control valve (clockwise) while observing PRESS./SUCTION Manometer (4).

Table 10-3. Troubleshooting (Vest Relief Valve Overload Test)

Trouble	Probable Cause	Remedy
Vest relief valve vents at less than 20 inH_2O.	Defective vest relief valve.	Replace vest relief valve using vest connector subsystem parts kit P/N F417-1015-3.
Vest relief valve vents at greater than 24 inH_2O.	Defective vest relief valve.	Replace vest relief valve using vest connector subsystem parts kit P/N F417-1015-3.
Vest relief valve out of tolerance per steps 15 or 16.	Defective vest relief valve.	Replace vest relief valve using vest connector subsystem parts kit P/N F417-1015-3.
PRESS./SUCTION Manometer (4) creeps slowly when design bleed port is closed.	Demand valve contaminated or preformed packing (36, figure 10-17) needs lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.

7. Observe PRESS./SUCTION Manometer (4). The regulator shall begin to relieve outlet pressure at 30 inH_2O minimum, 36 inH_2O maximum. Record results on Performance Test Sheet.

8. Slowly, fully open hose assembly (4) flow control valve (counterclockwise).

NOTE

An in tolerance condition per steps 9 and 10 indicates that the main relief valve is reseating properly.

9. Observe High Range LEAKAGE ROTAMETER (8). Final design bleed must be within ±100 ccm of initial design bleed. Record final design bleed on Performance Test Sheet.

10. Observe PRESS./SUCTION Manometer (4). Final safety pressure must be within ±0.5 inH_2O of initial safety pressure. Record final safety pressure on Performance Test Sheet.

11. Close LEAKAGE CONTROL Valve (E).

12. Disconnect regulator outlet from Piezometer (26).

CAUTION

Ensure LEAKAGE CONTROL Valve (E) is fully closed prior to performing step 13. Damage to test stand could occur.

13. Disconnect hose assembly (6) from LOW PRESS. Connection (19) and regulator inlet.

14. Disconnect hose assembly (4) from regulator bleed port.

15. Remove vest port plug (2) from vest outlet port.

16. Install screen (7, figure 10-17) and ring (10, figure 10-17) on regulator bleed port.

17. If malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-4.

Table 10-4. Troubleshooting (Main Relief Valve Overload Test)

Trouble	Probable Cause	Remedy
Main relief valve vents at less than 30 inH_2O.	Valve out of adjustment.	Refer to figure 10-2. Turn main relief valve adjustment screw clockwise in 1/4 turn increments and retest.
Main relief valve vents at greater than 36 inH_2O.	Valve out of adjustment.	Refer to figure 10-2. Turn main relief valve adjustment screw counterclockwise in 1/4 turn increments and retest.
Main relief valve out of tolerance per step 9 or 10.	Seat leakage.	Replace main relief valve subsystem using parts kit P/N F417-1016-3.
PRESS./SUCTION Manometer (4) creeps slowly when design bleed is closed.	Demand valve contaminated or preformed packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.

10-38. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Cap the regulator mask outlet with mask port plug (5).

2. Use hose assembly (16) to connect regulator breathing gas inlet to N_2 INPUT Connection (18).

3. Ensure all test stand valves are secured.

4. Turn INLET PRESS. Valve (L) to ON.

5. Adjust LOW PRESS. REGULATOR (N) until N_2 INPUT PRESS. gage (27) indicates 70 psig.

6. Turn LEAKAGE Valve (G) to ON.

7. Turn INLET PRESS. Valve (L) to OFF.

8. Observe High Range LEAKAGE ROTAMETER (8). Maximum allowable overall leakage is 900 ccm. Record results on Performance Test Sheet.

9. Turn LEAKAGE Valve (G) to OFF.

10. If malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-5.

Table 10-5. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Regulator overall leakage is greater than 900 ccm.	Damaged breathing diaphragm (26, figure 10-17).	Replace diaphragm using demand valve subsystem parts kit P/N F417-1017-3.
	Excessive demand valve leakage.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
	Leakage from inlet fitting (45) packing.	Replace packing using inlet fitting subsystem parts kit P/N F417-1014-3.
	Leakage from mask port packing.	Replace packing using inlet fitting subsystem parts kit P/N F417-1014-3.

10-39. DEMAND VALVE LEAKAGE TEST. To perform the Demand Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	62-A-116-E1 or 1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove mask port plug (5) from regulator mask outlet. Connect regulator mask outlet to mask port connector (8).

2. Slowly set PRESS. SELECTOR Valve (D) to H_2O position.

3. Turn INLET PRESS. Valve (L) to ON.

4. Adjust LOW PRESS. REGULATOR (N) until N_2 INPUT PRESS. gage (27) indicates 30 psig.

5. Turn vacuum pump to ON.

6. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

7. Maintain pressure for a period of 3 minutes. After 3 minutes, the outlet pressure shall be within ±0.1 inH_2O of the outlet pressure recorded per step 6. Record results on Performance Test Sheet.

8. Slowly adjust LOW PRESS. REGULATOR (N) until N_2 INPUT PRESS. gage (27) indicates 80 psig.

9. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

10. Maintain pressure for a period of 3 minutes. After 3 minutes, the outlet pressure shall be within ±0.1 of the outlet pressure recorded per step 9. Record results on Performance Test Sheet.

11. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-6.

10-40. SAFETY PRESSURE TEST. To perform the Safety Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Cap regulator vest outlet with vest port plug (2).

2. Adjust LOW PRESS. REGULATOR (N) until 10 psig is indicated on N_2 INPUT PRESS. Gage (27).

3. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained when applying specified flow.

4. Slowly open and adjust OUTPUT Flow Control Valve (C) until the equivalent of 75 lpm is observed on OUTPUT FLOW Manometer (1).

5. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 75 lpm flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

6. Close OUTPUT Flow Control Valve (C).

7. Adjust LOW PRESS. REGULATOR (N) until 80 psig is indicated on N_2 INPUT PRESS. Gage (27).

8. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

NOTE

Adjust LOW PRESS. REGULATOR (N) as required to maintain 80 psig on N_2 INPUT PRESS. Gage (27).

9. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inH_2O equivalent of 240 lpm is observed on OUTPUT FLOW Manometer (1).

10. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 240 lpm flow shall be between 3.0 and 4.0 inH_2O. Record results on Performance Test Sheet.

11. Close OUTPUT Flow Control Valve (C).

12. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-7.

10-41. PRESSURE BREATHING FOR ALTITUDE (PBA) TEST. Proceed with the Pressure Breathing for Altitude Test as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

Table 10-6. Troubleshooting (Demand Valve Leakage Test)

Trouble	Probable Cause	Remedy
Demand valve outlet pressure at 30 or 80 psig and zero flow is less than 0.5 inH_2O.	Demand valve out of adjustment.	Refer to figure 10-2. Turn demand valve seat adjustment counterclockwise in 1/8 turn increments and retest.
Demand valve outlet pressure at 30 or 80 psig and zero flow is greater than 1.8 inH_2O.	Demand valve out of adjustment.	Turn demand valve seat adjustment clockwise in 1/8 turn increments and retest.
After 3 minutes demand valve outlet pressure at 30 or 80 psig is not within $\pm$0.1 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.

Table 10-7. Troubleshooting (Safety Pressure Test)

Trouble	Probable Cause	Remedy
Safety pressure at 10 psig and zero flow or 75 lpm is less than 0.5 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 10 psig and zero flow or 75 lpm is greater than 1.8 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 80 psig and zero flow is less than 0.5 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 80 psig and zero flow is greater than 1.8 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 80 psig and 240 lpm is less than 3.0 inH_2O.	Screen (28, figure 10-17) is not causing enough back pressure.	Refer to figure 10-6 - remove ring (29, figure 10-17) and rotate screen (28, figure 10-17) ten degrees - install ring (29, figure 10-17) and retest - repeat as required.
Safety pressure at 80 psig and 240 lpm is greater than 4.0 inH_2O.	Screen (28, Figure 10-17) is causing too much back pressure.	

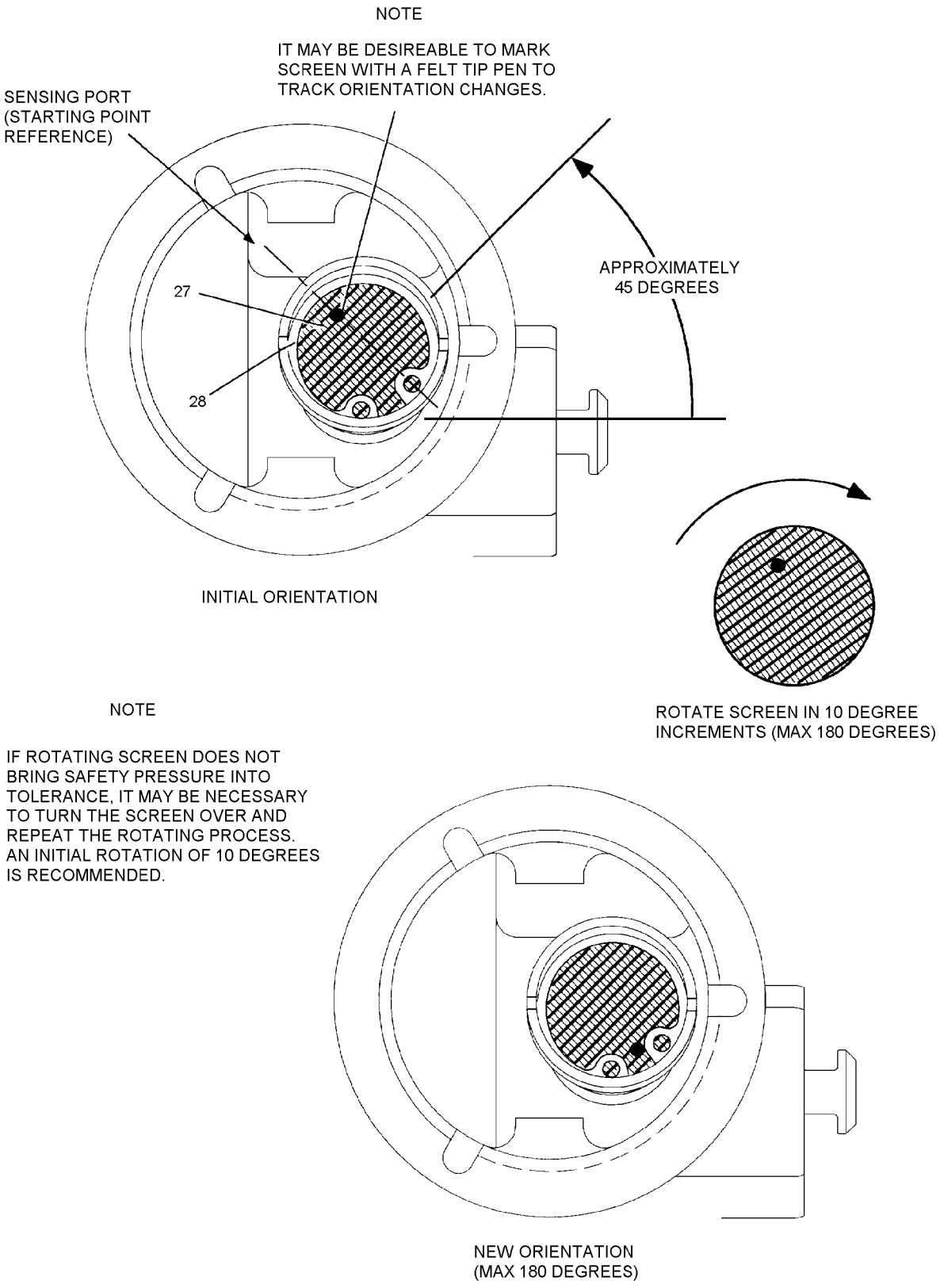

Figure 10-6. Screen Adjustment

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Close altitude chamber door.

NOTE

When ascending to test altitudes, maintain a flow of 3 inH_2O as indicated on OUTPUT FLOW MANOMETER (1).

2. Turn vacuum pump on. Open and adjust OUTPUT Flow Control Valve (C) until 3 inH_2O is observed on OUTPUT FLOW Manometer (1).

3. Observe LOW RANGE ALTM (13) and adjust VACUUM CONTROL Valve (B) to ascend to 30,000 feet.

4. Adjust LOW PRESS. REGULATOR (N) and SYSTEM BLEED Valve (S) until 10 psig is indicated on N_2 INPUT PRESS. Gage (27).

5. Close OUTPUT Flow Control Valve (C). Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 2.5 inH_2O. Record results on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained when applying specified flows.

6. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inches of water equivalent of 75 lpm is observed on OUTPUT FLOW Manometer (1).

7. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 75 lpm flow shall be between 0.5 and 2.5 inH_2O. Record results on Performance Test Sheet.

8. Close OUTPUT Flow Control Valve (C).

9. Adjust LOW PRESS. REGULATOR (N) until 80 psig is indicated on N_2 INPUT PRESS. Gage (27).

10. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 2.5 inH_2O. Record results on Performance Test Sheet.

11. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inH_2O equivalent of 240 lpm is observed on OUTPUT FLOW Manometer (1).

NOTE

Adjust LOW PRESS. REGULATOR (N) as required to maintain 80 psig on N_2 INPUT PRESS. Gage (27).

12. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 240 lpm flow shall be between 1.2 and 3.2 inH_2O. Record results on Performance Test Sheet.

13. Close OUTPUT Flow Control Valve (C).

14. Repeat steps 2 thru 13 at altitudes of 34,000, 36,000, 45,000, and 50,000 feet. Record readings on Performance Test Sheet.

15. When testing has been completed, close VACUUM CONTROL Valve (B).

16. Adjust OUTPUT Flow Control Valve (C) until 1 inH_2O is indicated on OUTPUT FLOW Manometer (1).

17. Adjust LOW PRESS. REGULATOR (N) until 50 psig indicated on REGULATED LOW PRESS. Gage (11).

18. Open CHAMBER BLEED Valve (K) to vent altitude chamber to ambient. Open chamber door.

19. Close OUTPUT Flow Control Valve (C).

CAUTION

Prior to performing the next test, insert one end of hose assembly (3) with two QD fittings into LOW PRESS. CONNECTION (19) to vent any trapped pressure between (19) and LEAKAGE CONTROL Valve (E). Trapped pressure could damage hose and gage assembly (7). Disconnect hose.

20. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-8.

10-42. PRESSURE BREATHING FOR GS (PBG) TEST. To perform the Pressure Breathing for gs (PBG) Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Connect one hose from gage assembly (7) to chamber LOW PRESS. Connection (19).

2. Connect the other hose from gage assembly (7) to the regulator anti-g ref. port.

3. Set PRESS. SELECTOR Valve (D) to H_2O position.

4. Adjust LOW PRESS. REGULATOR (N) until 80 psig is indicated on N_2 INPUT PRESS. gage (27).

5. Slowly adjust LEAKAGE CONTROL Valve (E) until 3.5 psig is indicated on hose and gage assembly (7).

Table 10-8. Troubleshooting (Pressure Breathing for Altitude Test)

Note: For readings out of tolerance at 30,000 feet refer to table 10-7.

Trouble	Probable Cause	Remedy
PBA is less than minimum value specified at 10 psig (zero flow and 75 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw clockwise in very small increments and retest.
PBA is greater than maximum value specified at 10 psig (zero flow and 75 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw counterclockwise in very small increments and retest.
	PBA aneroid (2, figure 10-17) is leaking.	Repair PBA subsystem using parts kit P/N F417-1011-3.
PBA is less than minimum value specified at 80 psig (zero flow and 240 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw clockwise in very small increments and retest.
PBA is greater than maximum value specified at 80 psig (zero flow and 240 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw counterclockwise in very small increments and retest.
	PBA aneroid (2, figure 10-17) is leaking.	Repair PBA subsystem using parts kit P/N F417-1011-3.

6. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet (figure 10-3). Record results on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained on N_2 INPUT PRESS. gage (27) and hose and gage assembly (7) pressure gage when setting high flow rates with OUTPUT Flow Control Valve (C).

7. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inches of water equivalent of 150 lpm is observed on OUTPUT FLOW Manometer (1).

8. Slowly adjust inlet pressure using LOW PRESS. REGULATOR (N) and LEAKAGE CONTROL Valve (E) to maintain 80 psig on N_2 INPUT PRESS. gage (27) and 3.5 psig on hose assembly pressure gage.

9. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at 150 lpm flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet. Record results on Performance Test Sheet.

10. Close OUTPUT Flow Control Valve (C).

11. Slowly adjust inlet pressure using LOW PRESS. REGULATOR (N) and LEAKAGE CONTROL Valve (E) to maintain 80 psig on N_2 INPUT PRESS. gage (27) and 9.5 psig on hose and gage assembly (7).

12. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet. Record results on Performance Test Sheet.

13. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inH_2O equivalent of 150 lpm is observed on OUTPUT FLOW Manometer (1).

14. Slowly adjust inlet pressure using LOW PRESS. REGULATOR (N) and LEAKAGE CONTROL Valve (E) to maintain 80 psig on N_2 INPUT PRESS. gage (27) and 9.5 psig on hose assembly pressure gage.

15. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at 150 lpm flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet. Record results on Performance Test Sheet

16. Close LEAKAGE CONTROL Valve (E).

17. Close altitude chamber door.

18. Turn vacuum pump on. Open and adjust OUTPUT Flow Control Valve (C) until 3 inH_2O is observed on OUTPUT FLOW manometer (1).

19. Observe LOW RANGE ALTM (13) and adjust VACUUM CONTROL Valve (B) to ascend to 50,000 feet.

20. Repeat steps 5 thru 16 at altitude using the tolerances specified on the Performance Test Sheet.

21. When testing has been completed, close LEAKAGE CONTROL Valve (E).

22. Adjust OUTPUT Flow Control Valve (C) until 1 inH_2O is observed on OUTPUT FLOW manometer (1).

23. Open CHAMBER BLEED Valve (K) to vent altitude chamber to ambient.

24. Close OUTPUT Flow Control Valve (C).

25. Turn off vacuum pump.

26. Set INLET PRESS. Valve (L) to OFF.

27. Back LOW PRESS. REGULATOR (N) out counterclockwise.

28. Open and close SYSTEM BLEED Valve (S) to vent any trapped pressure.

29. Open altitude chamber door and disconnect regulator from test.

30. Secure test stand.

31. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-9.

10-43. PURGE OXYGEN REGULATOR. After completion of all tests, the demand oxygen regulator is purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)

CAUTION

Oxygen Components Test Stands cannot be used for oxygen purge. These test stands use nitrogen for a test gas.

1. Connect regulator breathing gas inlet to a regulated source of aviator's breathing oxygen.

CAUTION

Never block the outlet of the regulator while a pressure is applied to the inlet. This will seriously damage the regulator. The anti-g ref pressure inlet and the vest outlet connection shall also be uncapped during the oxygen purge.

2. Apply 90 psig to regulator inlet; allow oxygen to flow for a period of 1 to 3 minutes.

Table 10-9. Troubleshooting (Pressure Breathing for Gs Test)

Trouble	Probable Cause	Remedy
PBG is less than minimum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 3.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Refer to figure 10-2. Turn PBG adjustment screw clockwise in very small increments and retest.
	PBG bellows (22, figure 10-17) is leaking.	Repair PBG subsystem using parts kit P/N F417-1012-3.
	G-sensing inlet fitting (43, figure 10-17) packing is leaking.	Repair g-sensing inlet subsystem using parts kit P/N F417-1013-3.
PBG is greater than maximum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 3.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Refer to figure 10-2. Turn PBG adjustment screw counterclockwise in very small increments and retest.
PBG is less than minimum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 9.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Turn PBG adjustment screw clockwise in very small increments and retest.
	PBG bellows (22, figure 10-17) is leaking.	Repair PBG subsystem using parts kit P/N F417-1012-3.
	G-sensing inlet fitting (43, figure 10-17) is leaking.	Repair g-sensing inlet subsystem using parts kit P/N F417-1013-3.
PBG is greater than maximum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 9.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Turn PBG adjustment screw counterclockwise in very small increments and retest.

3. Shut off oxygen source and disconnect regulator.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate Level maintenance shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test or special inspection, the organizational custodian shall retain the Aircrew Systems Record, Performance Test Sheet and VIDS/MAF.

4. Affix serviceable condition label with CDI stamp and date to regulator.

5. After completion of oxygen purge, place regulator in a plastic bag for storage.

10-44. DISASSEMBLY.

10-45. Disassemble the demand oxygen regulator using figure 10-17 as a guide for identifying parts. Do not remove the identification plate unless replacement is necessary. Special instructions for disassembling the regulator are contained in the following paragraphs.

10-46. The regulator is broken down into seven subsystems as follows:

1. PBA Subsystem
2. PBG Subsystem
3. Demand Valve Subsystem
4. G-sensing Inlet Subsystem
5. Inlet Fitting/Filter Subsystem
6. Vest Connector Subsystem
7. Main Relief Valve Subsystem

10-47. Only the regulator subsystems which require maintenance are to be disassembled and repaired as required. Parts kits to support each subsystem are listed in Section 10-5, Illustrated Parts Breakdown. Upon completion of any subsystem maintenance, the entire Bench Test must be completed prior to returning the regulator to service.

CAUTION

All disassembly, inspection, repair, and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor and ceiling should have a smooth finish, and be painted with non-chalking paint which can be kept clean and dust-free. It is desirable to keep all parts for each individual regulator separated. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

NOTE

Special tools shall be requisitioned directly from the manufacturer Carleton Technologies (CAGE 04577), or obtain commercial equivalent.

For identification of regulator components referenced by index numbers used in the following paragraphs refer to figure 10-17. Refer to figure 10-4 for index numbers used for special tools and test equipment. Damaged or worn parts removed from the regulator at disassembly must be discarded and replaced at assembly with like parts from the applicable subsystem parts kit.

10-48. PBA SUBSYSTEM. To disassemble the PBA Subsystem, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	F395-1096-MT

1. Using spanner wrench (9, figure 10-4), disassemble PBA aneroid housing (1, figure 10-17) from PBA/PBG housing (11).

2. Remove PBA aneroid (2) from PBA aneroid housing (1).

3. Remove valve (3), spring (6), seat (4) and preformed packing (5) from PBA/PBG housing (11).

4. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild PBA subsystem using parts kit F417-1011-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59 and 10-71, respectively.

10-49. PBG SUBSYSTEM. To disassemble the PBG Subsystem, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	F395-1096-MT
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove two filter screens (7) by removing two retaining rings (10) from PBA/PBG housing (11). Remove spring (8) and ball (9).

2. Disassemble PBA/PBG housing (11) and retainer (46) from regulator body (61) by removing four screws (12) and four washers (13). Install the threaded end of spanner wrench (9, figure 10-4) in regulator bleed port. Carefully pull PBA/PBG housing from regulator body (61). (Spring (25) may pop out).

3. Remove spanner wrench and preformed packing (14) from PBA/PBG housing (11).

CAUTION

Refer to figure 10-7. Diaphragm Cover (15) has a lapped surface, use extreme care when handling.

4. Remove diaphragm cover (15) from PBA/PBG housing (11).

5. Remove spring (17), preformed packing (16), check valve (18), PBG valve (19), diaphragm bushing (20) and diaphragm (21).

6. Remove PBG bellows (22) from PBA/PBG housing (11).

7. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild PBG subsystem using parts kit F417-1012-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59 and 10-70, respectively.

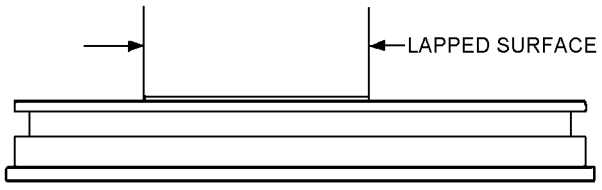

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Figure 10-7. Diaphragm Cover Lapped Surface Identification

10-50. DEMAND VALVE SUBSYSTEM. To disassemble the Demand Valve Subsystem, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Demand Valve	F395-1091-MT
1	Wrench, Spanner	F395-1096-MT
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove filter screen (7) from bleed port by removing retaining ring (10) from PBA/PBG housing (11).

2. Disassemble PBA/PBG housing (11) and retainer (46) from regulator body (61) by removing four screws (12) and four washers (13). Install the threaded end of spanner wrench (9, figure 10-4) in regulator bleed port. Carefully pull PBA/PBG housing (11) from regulator body (61). (Spring (25) may pop out).

3. Remove spanner wrench and preformed packing (14) from PBA/PBG housing (11).

4. Remove spring (25) from regulator body (61).

5. Carefully disengage underside of diaphragm (26) from bell crank (39) by rotating diaphragm approximately 1/4 turn counterclockwise. Remove diaphragm (26).

6. Remove screw (27).

7. Remove filter screen (28) by removing retaining ring (29) from seat (30).

8. Using demand valve tool (10, figure 10-4), disassemble seat (30, figure 10-17) from regulator body (61) by rotating counterclockwise.

9. Remove pin (40) from bracket (42). Remove bracket (42).

10. Remove bellcrank (39) by disengaging from poppet and cable assembly (32).

11. Remove poppet and cable assy (32), spring (34), bushing (35), and spring (37).

12. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild demand valve subsystem using parts kit P/N F417-1017-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-70, respectively.

10-51. G-SENSING INLET SUBSYSTEM. To disassemble the G-sensing Inlet Subsystem, proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove g-sensing inlet fitting (43) from regulator body (61).

2. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild G-sensing Inlet Subsystem using parts kit P/N F417-1013-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-69, respectively.

10-52. INLET FITTING/FILTER SUBSYSTEM. To disassemble the Inlet Fitting/Filter Subsystem, proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove retainer (46) by removing one screw (12) and one washer (13) from regulator body (61).

CAUTION

Use extreme care when removing retaining clip (47) to prevent damage to inlet fitting (45) and regulator body (61).

2. Remove inlet fitting (45) by removing retaining clip (47) from regulator body (61).

3. Remove preformed packing (48), retaining ring (50) and filter (49).

4. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild inlet fitting/filter subsystem using parts kit P/N F417-1014-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-68, respectively.

10-53. VEST CONNECTOR SUBSYSTEM. To disassemble the Vest Connector Subsystem, proceed as follows:

CAUTION

Housing (51) is under spring pressure. Retain housing (51) while removing screws (52).

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove two screws (52) from regulator body (61).

2. Remove housing (51) and spring (55).

3. Remove relief valve (54) from housing (51) by gently pushing from vest outlet side.

4. Remove two preformed packings (53) and seat (56).

5. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild vest connector subsystem using parts kit P/N F417-1015-3. Clean, inspect, lubricate and reassemble in accordance with paragraph 10-55, 10-57, 10-59, and 10-67, respectively.

10-54. MAIN RELIEF VALVE SUBSYSTEM. To disassemble the Main Relief Valve Subsystem, proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove relief valve assembly (57) by removing two screws (58) and two lockwashers (59) from regulator body (61).

2. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, replace main relief valve subsystem using parts kit P/N F417-1016-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-66, respectively.

10-55. CLEANING OF DISASSEMBLED PARTS.

10-56. To clean the disassembled oxygen regulator components, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
As Required	Bottle, Wash, Polyethylene Squeeze	MS36070A
1	Goggles or Face Shield	NIIN 00-052-3776
As Required	Respirator	—

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause an explosion or fire. Dust, lint and fine metal particles are also dangerous.

Use respiratory and eye protective equipment during cleaning and blow drying procedures. Do not wipe lapped parts to dry, scratches may result.

1. Clean metallic parts by using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

2. After cleaning, all internal surfaces shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

3. Cleaned parts shall be sealed in plastic bags for storage. Bag all complete assemblies that are not immediately returned to service.

10-57. INSPECTION OF DISASSEMBLED REGULATOR.

10-58. Inspect the regulator disassembled parts in accordance with the following general instructions and table 10-10.

1. All parts supplied in kits shall be replaced each time a regulator subsystem is disassembled.

2. Inspect all metal parts for cracks, nicks, burrs, scratches or other imperfections which could cause leakage or malfunctions in the regulator.

3. Inspect all threaded areas of parts for condition and cleanliness.

4. Ensure that all parts and cavities are clean and free of foreign material.

5. Inspect identification plate for condition and legibility.

10-59. LUBRICATION.

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause an explosion or fire. Dust, lint or fine metal particles are also dangerous.

10-60. Parts which require lubrication, and lubricants required will be covered in the assembly portion of this section.

Materials Required

Quantity	Description	Reference Number
As Required	Christo-Lube, MCG111, Type 1	MIL-G-27617
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Sealant	Vibratite NIIN 00-163-5792 (CAGE 04866)

Table 10-10. Inspection of Disassembled Regulator Components

Nomenclature	Figure & Index No.	Inspect For	Remedy
PBA aneroid housing.	10-17-1	Damaged threads, cracked or scratched mating surfaces.	Replace if defective.
Diaphragm cover.	10-17-15	Obvious defects and scratched mating surfaces.	Replace if defective.
PBA/PBG housing.	10-17-11	Damaged threads, cracked or scratched mating surfaces.	Replace if defective.
Bell crank.	10-17-39	Damaged threads, distortion and burrs.	Replace if defective.
Bracket.	10-17-42	Obvious damage or distortion.	Replace if defective.
Inlet fitting.	10-17-45	Damaged threads.	Replace if defective.
Relief valve housing.	10-17-51	Cracked or scratched mating surfaces.	Replace if defective.
Body assy.	10-17-61	Damaged threads, cracked or scratched mating surfaces.	Replace if defective.

NOTE

All disassembled parts shall be replaced with like parts supplied in parts kits. Old parts shall be discarded.

Prior to assembly, apply a light film of Crisco-lube or Krytox to all preformed packings.

Prior to assembly, apply a small amount of Vibratite to all new screw threads (third and fourth threads only). Allow threads to cure for one to two hours at room temperature.

Refer to figure 10-17 for identification of regulator components referenced by index numbers used in the following paragraphs.

10-61. REPAIR.

10-62. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched up using Lacquer (MIL-L-6805).

10-63. REMOVAL OF PBG INLET FITTING. To remove a PBG fitting which has been broken off flush, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Easy-out, No. 5, 17/64 in.	NIIN 00-240-5219

NOTE

If the following steps can not be accomplished, submit a hazardous material report to Oxygen FST, COMNAVAIRWARCENACDIV Patuxent River, MD requesting an engineering investigation. Do not BCM oxygen regulator.

1. Install easy-out, no. 5, 17/64 inch into center of broken PBG inlet fitting (43, figure 10-17) using only your hand until a slight restriction is felt.

2. Using only your hand, carefuly turn easy-out counterclockwise to remove broken inlet fitting (43).

3. Install new inlet fitting (43) into regulator in accordance with procedures outlined in paragraph 10-69.

10-64. ASSEMBLY.

10-65. Assembly of the demand oxygen regulator components is essentially the reverse of disassembly, with special instructions noted. After completion of any subsystem maintenance action or when subassemblies are being assembled, complete Bench Test described in paragraphs 10-32 thru 10-42 must be successfully performed before the regulator can be returned to service.

10-66. MAIN RELIEF VALVE SUBSYSTEM. To assemble the Main Relief Valve Subsystem, and install it in the regulator, use parts kit F417-1016-3 and proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install preformed packing (60) on relief valve assy (57).

2. Install relief valve assy (57) in regulator body (61) and secure with two washers (59) and two screws (58). Torque screws (58) to between 5 and 6 lbs-in.

3. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-67. VEST CONNECTOR SUBSYSTEM. To assemble the Vest Connector Subsystem, use parts kit F417-1015-3 and proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install seat (56) and spring (55) into regulator body (61).

2. Install two preformed packings (53) on housing (51).

3. Install relief valve assembly (54) into housing (51).

4. Install housing (51) and secure with two allen head screws (52). Torque screws (52) to between 8 and 10 lbs-in.

5. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-68. INLET FITTING/FILTER SUBSYSTEM. To assemble the Inlet Fitting/Filter Subsystem, use parts kit F417-1014-3 and proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install filter (49) in regulator body (61) with fine mesh facing up and secure with retaining ring (50).

2. Install preformed packing (48) on inlet fitting (45).

3. Install and align inlet fitting (45). Install retaining clip (47). Position retainer (46) over clip (47) and secure with one washer (13) and one screw (12). Torque screw (12) to between 8 and 10 lbs-in.

4. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-69. G-SENSING INLET SUBSYSTEM. To assemble the G-sensing Inlet Subsystem, use parts kit F417-1013-3 and proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Apply one turn teflon tape MIL-T-27730 to fitting (43). Install fitting (43) onto regulator body (61) hand tight, then using a wrench, tighten fitting (43) up to one full turn or until release clip and spring of fitting (43) faces as per orientation in view A, figure 10-2, item 21.

2. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-70. DEMAND VALVE SUBSYSTEM. To assemble the Demand Valve Subsystem, use parts kit F417-1017-3 and proceed as follows:

Materials Required

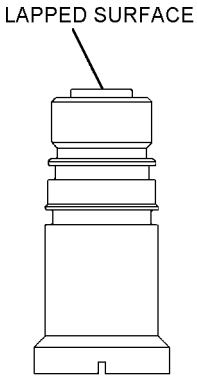
Quantity	Description	Reference Number
As Required	Christo-Lube, MCG111, Type 1	MIL-G-27617
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Tape, Anti-seize	MIL-T-27730

Support Equipment Required

Quantity	Description	Reference Number
1	Instrument, Blunt, Non-metallic	—
1	Tool, Demand Valve	F395-1091-MT
1	Wrench, Spanner	F395-1096-MT
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

CAUTION

Refer to figure 10-8. Seat (30) has a lapped surface, use extreme care when handling.



010008

Figure 10-8. Seat Lapped Surface Identification

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install preformed packing (31) on seat (30).

2. Install preformed packing (33) on poppet and cable assembly (32).

3. Install preformed packing (36) on bushing (35).

4. Install preformed packing (38) on regulator body (61).

CAUTION

Prior to installation, apply a light film of Cristo-lube to the ball on poppet and cable assembly (32). Do not substitute Krytox lubricant for Cristo-lube.

5. Refer to figure 10-17 for orientation of bushing (35). Using a non-metallic blunt instrument, install bushing (35) into regulator body (61) until bushing preformed packing (36) seats.

6. Install spring (34) and spring (37) onto poppet and cable assembly (32). Using a blunt instrument, insert poppet and cable assembly (32) into bushing (35).

7. While holding poppet and cable assembly (32) in bushing (35), grasp cable to retain poppet for step 8.

CAUTION

Use extreme care while performing step 8 to prevent damage to poppet seating surface and seat (30).

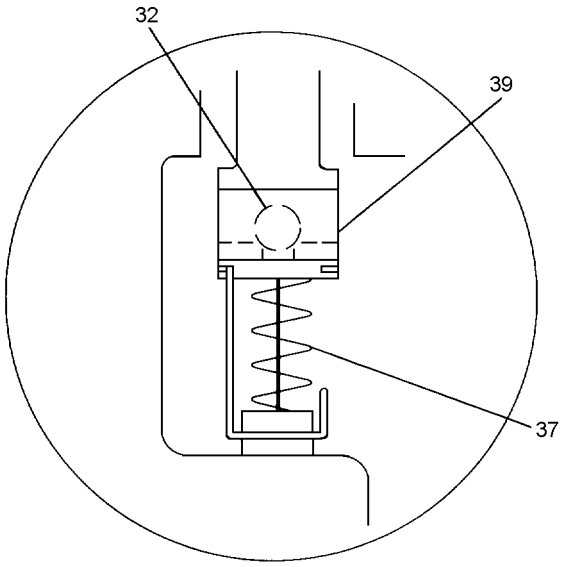
8. Using demand valve tool (10, figure 10-4), install seat (30) into regulator body (61). Turn seat (30) clockwise one and one half turns.

9. Refer to figure 10-9. Engage poppet and cable assembly (32) ball with bell crank (39) fork as shown.

10. Refer to figure 10-10. Install bracket (42) on bell crank (39) using pin (40) as shown.

NOTE

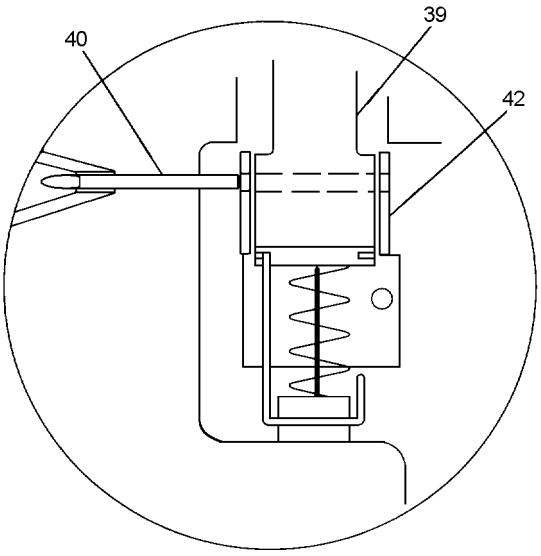
Prior to installing screw (27), align bracket (42) with locator pins in bottom of regulator housing.



RETRACT SPRING (37) AND ENGAGE CABLE (32) BALL INTO BELLCRANK (39) FORK

010009

Figure 10-9. Cable Ball and Bell Crank Fork Assembly



ALIGN HOLES IN BELLCRANK (39) AND BRACKET (42). INSTALL PIN (40) WITH TWEEZERS.

010010

Figure 10-10. Bracket and Bell Crank Assembly

11. Using screw (27), install bracket (42) on regulator body (61). Torque screw (27) to between 2 and 3 lbs-in.

CAUTION

To prevent damage to poppet and cable assembly (32), depress bellcrank assembly prior to adjusting demand valve seat (30).

12. Using demand valve tool (10, figure 10-4), turn seat (30) until it bottoms, then turn counterclockwise one half turn.

NOTE

Because screen (28) orientation causes varying amounts of back pressure at high flow, it may be necessary to reposition it during testing.

13. Refer to figure 10-11. Position screen (28) in demand valve seat (30) as shown and secure with retaining ring (29).

14. Perform demand valve leakage test.

a. Connect regulator breathing gas inlet to test stand N_2 INPUT connection (18).

b. Ensure all test stand valves are secured.

c. Open N_2 supply cylinder.

d. Turn INLET PRESS. VALVE (L) on.

e. Adjust LOW PRESS. Regulator (N) until N_2 INPUT PRESS. gage (27) indicates 50 psig.

f. Depress arm on bell crank (39) to ensure flow through regulator and release arm on bell crank (39), flow through regulator should stop. Apply film of leakage detection compound to regulator outlet. No leakage should be detected or allowed. Repeat this procedure two times before proceeding to step g.

g. If leakage is observed during step f, disassemble demand valve and reassemble demand valve assembly in accordance with steps 1 through 13 and then repeat leakage test described in step f.

h. Secure test stand and disconnect regulator from N_2 INPUT connection (18).

CAUTION

After performing step 15, ensure diaphragm (26) is secured on arm of bell crank (39) by carefully pulling diaphragm (26) up and away from regulator main body.

NOTE

Index marks are provided on regulator body to assist in radial orientation of diaphragm (26). Refer to figure 10-12.

15. Carefully engage diaphragm (26) stirrup with bell crank (39) arm. (Orientation to be approximately 90°).

16. Install packing (14) on PBA/PBG housing (11).

17. Position spring (25) on diaphragm (26).

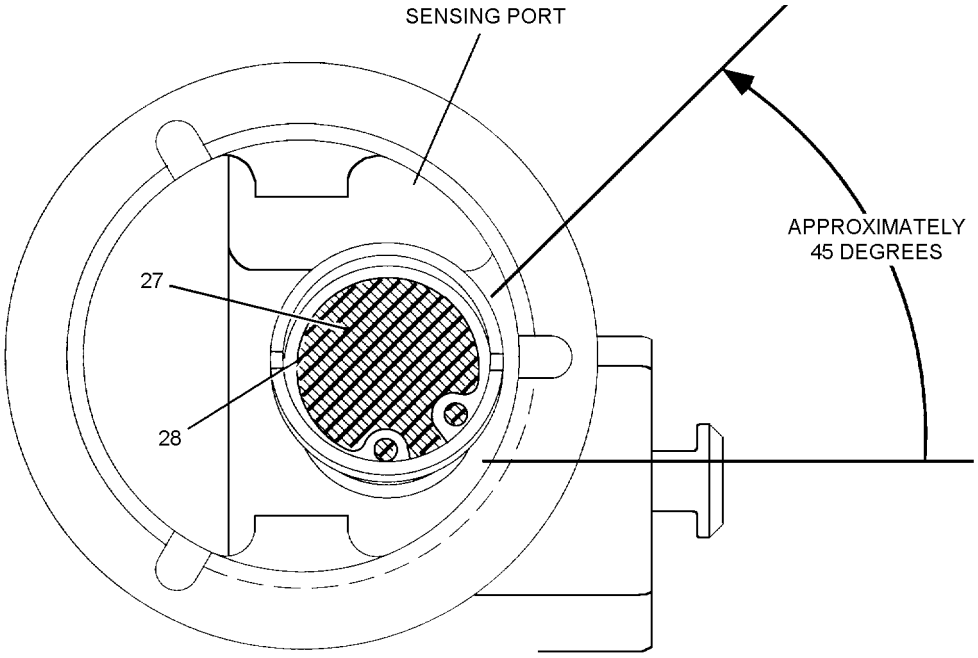
NOTE

Any orientation of PBA/PBG housing is acceptable. Do not rotate PBA/PBG housing during assembly. Diaphragm (26) may be damaged.

18. Carefully install PBA/PBG housing (11) and retainer (46) on regulator body (61) and secure with four washers (13) and four screws (12). Torque screws (12) to between 8 and 10 lbs-in.

19. Install filter screen (7) on PBA/PBG housing and secure with retaining ring (10).

20. Install preformed packing (38) supplied with parts kit in regulator outlet.

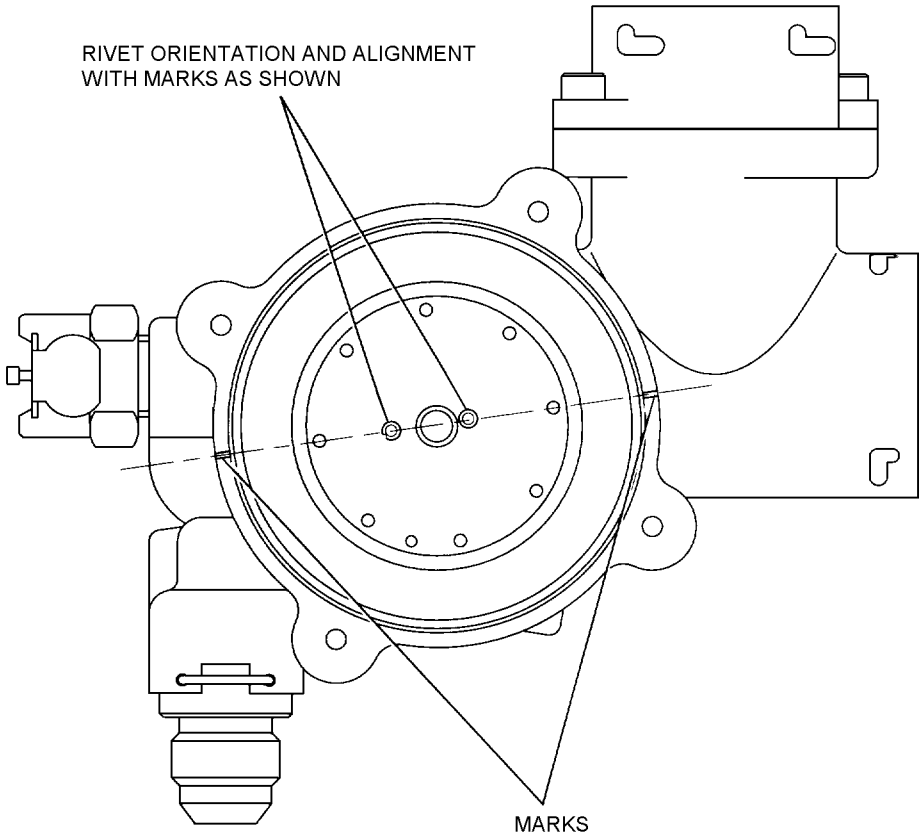


NOTE

FOR EASE OF ACCESS, THE RETAINING RING SHOULD
ALSO BE LOCATED APPROXIMATELY AS SHOWN.

010011

Figure 10-11. Screen Initial Orientation



010012

Figure 10-12. Diaphragm Orientation

10-71. PBG SUBSYSTEM. To assemble the PBG Subsystem, use parts kit F417-1012-3 and proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Alcohol, Isopropyl	TT-I-735 NIIN 00-655-8366

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

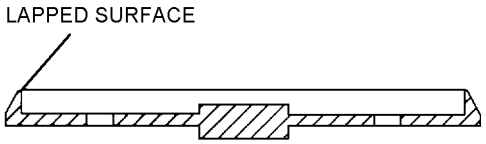
1. Insure preformed packing (24) and preformed packing (23) are on PBG bellows (22).

2. Install bellows (22) in PBA/PBG housing (11).

CAUTION

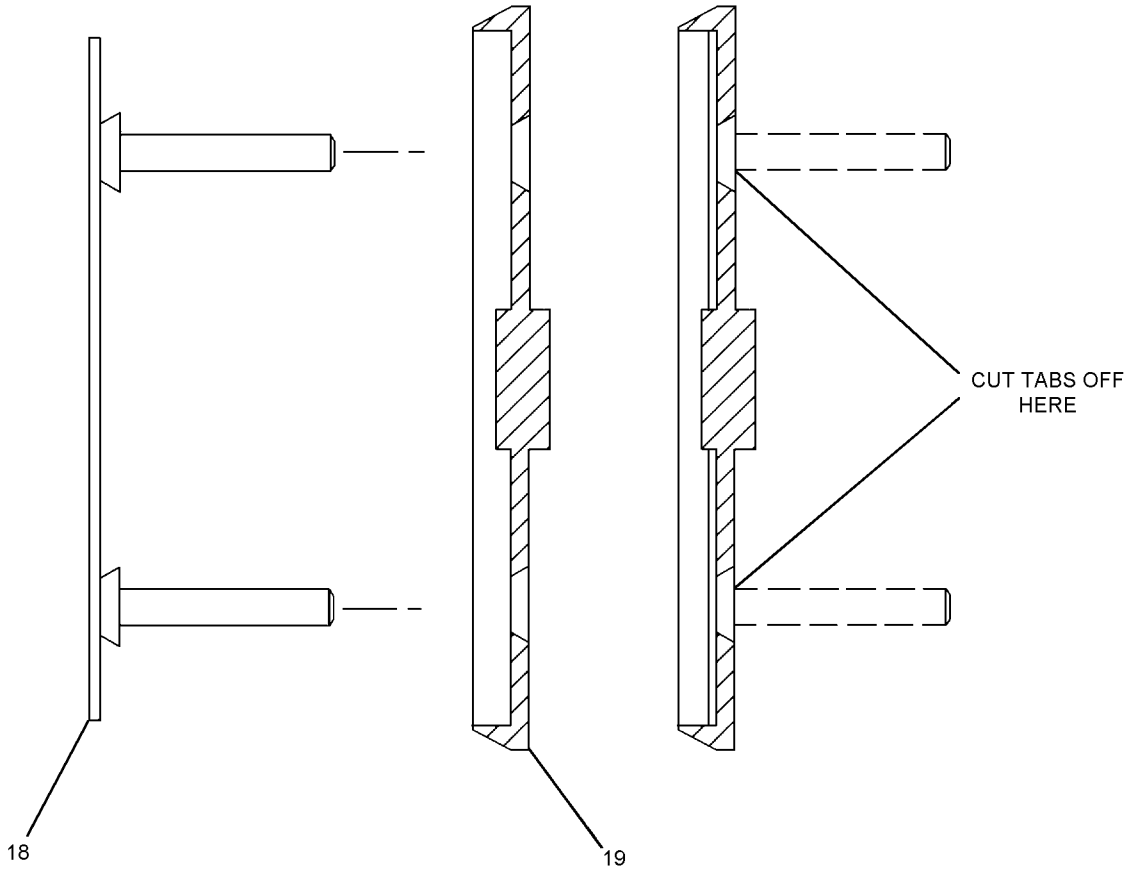
Refer to figure 10-13. Valve (19) has a lapped surface, use extreme care when handling.

3. Insure check valve (18) is installed on valve (19) as shown in figure 10-14. Cut check valve (18) tabs flush with surface of valve (19). Rinse assembly in alcohol.



010013

Figure 10-13. Valve Lapped Surface Identification



010014

Figure 10-14. Check Valve Installation on Valve

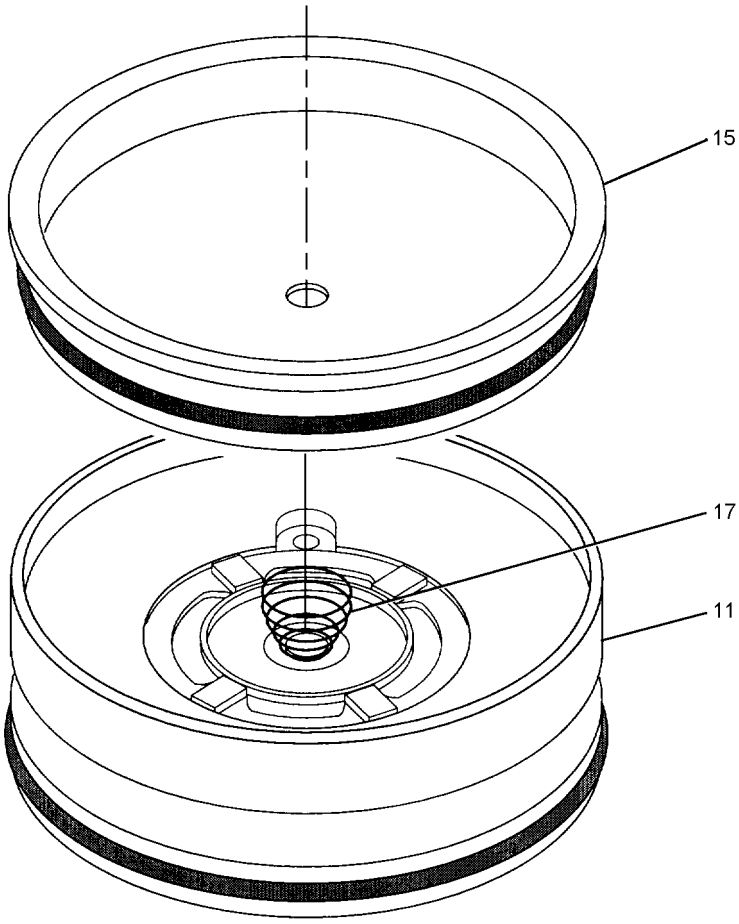
4. Install diaphragm (21), bushing (20), PBG valve (19) and check valve (18) and spring (17).

CAUTION

Refer to figure 10-7. Diaphragm Cover (15) has a lapped surface, use extreme care when handling.

5. Install preformed packing (16) on diaphragm cover (15). Refer to figure 10-15 and insure diaphragm cover (15) seating area is centered on conical spring (17) as shown. Install diaphragm cover (15) on PBA/PBG housing (11).

6. Install packing (14) on PBA/PBG housing (11).



NOTE

ALIGN HOLE IN DIAPHRAGM COVER (15) WITH CENTER OF SPRING (17). GENTLY PRESS DIAPHRAGM COVER (15) INTO PBA/PBG HOUSING (11).

010015

Figure 10-15. Diaphragm Cover Alignment

NOTE

Any orientation of PBA/PBG housing is acceptable. Do not rotate PBA/PBG housing during assembly. Diaphragm (26) may be damaged.

7. Install spring (25) on diaphragm (26).

8. Carefully install PBA/PBG housing (11) and retainer (46) on regulator body (61) and secure with four washers (13) and four screws (12). Torque screws (12) to between 8 and 10 lbs-in.

9. Install filter screen (7) on PBA/PBG housing and secure with retaining ring (10).

10. Install ball (9) and spring (8). Install second filter screen (7) on PBA/PBG housing and secure with second retaining ring (10).

11. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-72. PBA SUBSYSTEM. To assemble the PBA Subsystem, use parts kit F417-1011-3 and proceed as follows:

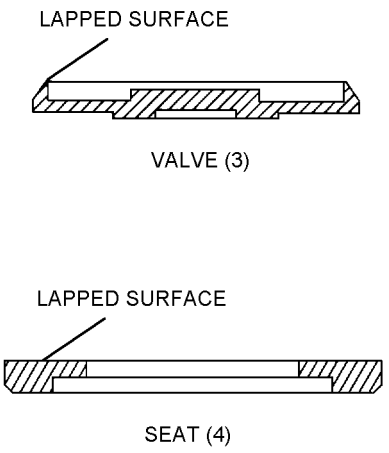
Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	F395-1096-MT
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

1. Install PBA aneroid (2) in PBA aneroid housing (1). (Top of screw to be flush with housing.)

CAUTION

Refer to figure 10-16. Valve (3) and seat (4) have lapped surfaces, use extreme care when handling.



010016

Figure 10-16. Valve and Seat Lapped Surface Identification

2. Install preformed packing (5) on seat (4).

3. Install seat (4), spring (6) and valve (3) into PBA/PBG housing (11).

4. Install PBA aneroid housing (1) on PBA/PBG housing and secure with spanner wrench (9, figure 10-4).

5. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-73. TESTING. After completion of any subsystem maintenance action, the complete Bench Test, described in paragraphs 10-32 thru 10-43, must be successfully performed before the regulator can be returned to service.

Section 10-5. Illustrated Parts Breakdown

10-74. GENERAL.

10-75. This section lists and illustrates the procurable parts of the Demand Oxygen Regulator Type CRU-103/P (P/N F241-2300-3).

10-76. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

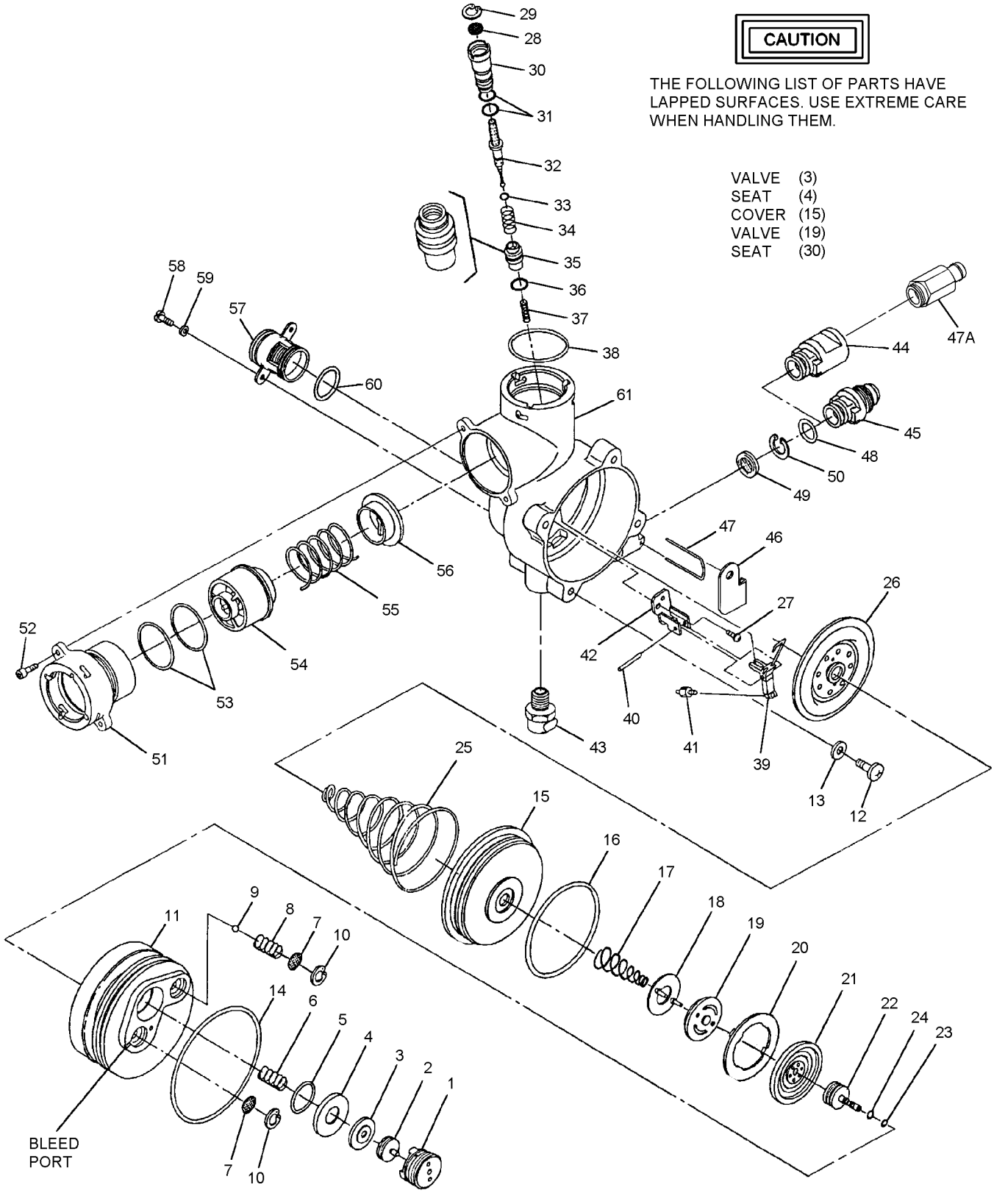


Figure 10-17. Demand Oxygen Regulator, CRU-103/P

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
10-17	F241-2300-3	REGULATOR, Oxygen, Demand (Type CRU-103/P) (Parts Kits Available)	REF	
-1	F395-1096-1	. HOUSING, Aneroid (PBA)		
-2	F395-1095-1	. ANEROID ASSEMBLY (PBA)	1	
-3	F395-1097-1	. VALVE (PBA)	1	
-4	F395-1098-1	. SEAT (PBA)	1	
-5	F337-1146-10	. PACKING, Preformed (PBA)	1	
-6	F258-1336-1	. SPRING, Compression (PBA)	1	
-7	14011-1	. SCREEN, Filter (PBG)	2	
-8	B41407-1	. SPRING (PBG)	1	
-9	B41406-1	. BALL (PBG)	1	
		(ATTACHING PARTS)		
-10	MS16629-4045	. RING (PBG)	2	
		---*---		
-11	F395-1099-1	. HOUSING, (PBA/PBG)	1	
		(ATTACHING PARTS)		
-12	MS51957-26	. SCREW (PBG)	4	
-13	F281-1030-15	. WASHER, Flat (PBG)	4	
		---*---		
-14	FS5701-032	. PACKING, Preformed (PBG, DV)	1	
-15	F395-1094-1	. COVER, Diaphragm	1	
-16	FS5701-032	. PACKING, Preformed (PBG)	1	
-17	F5539072	. SPRING, Conical (PBG)	1	
-18	F334-1066-1	. VALVE, Check (PBG)	1	
-19	F395-1078-1	. VALVE (PBG)	1	
-20	F395-1085-1	. BUSHING, Diaphragm (PBG)	1	
-21	F395-1088-1	. DIAPHRAGM ASSEMBLY (PBG)	1	
-22	F395-1086-1	. BELLOWS ASSEMBLY (PBG)	1	
-23	F337-1146-5	. PACKING, Preformed (PBG)	1	
-24	F337-1146-6	. PACKING, Preformed (PBG)	1	
-25	B41023-1	. SPRING, Conical (DV)	1	
-26	F395-1093-1	. DIAPHRAGM ASSEMBLY (DV) (Note 2)	1	
-27	MS51957-2	. SCREW (DV)	1	
-28	14011-1	. SCREEN, Filter (DV)	1	
		(ATTACHING PARTS)		
-29	MS16629-4045	. RING (DV)	1	
		---*---		
-30	F395-1091-1	. SEAT, Demand valve (DV)	1	
-31	F337-1146-4	. PACKING, Preformed (DV)	2	
-32	F395-1054-1	. POPPET AND CABLE ASSEMBLY (DV)	1	
-33	F337-1146-9	. PACKING, Preformed (DV)	1	
-34	F258-1333-1	. SPRING, Compression (DV)	1	
-35	F395-1118-1	. BUSHING, Demand valve (DV)	1	
-36	F337-1146-3	. PACKING, Preformed (DV)	1	
-37	F258-1332-1	. SPRING (DV)	1	
-38	MS29513-021	. PACKING (PBA, PBG, GST, IF, VC, RV, DV)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
10-17-39	F395-1052-1	. BELL CRANK ASSEMBLY	1	
		(ATTACHING PARTS)		
-40	F395-1112-1	. PIN, Pivot, valve stem (DV)	1	
		---*---		
-41	F395-1111-1	. SETSCREW, Adjustment, relief valve	1	
-42	F395-1114-1	. BRACKET, Valve stem	1	
-43	B41413-1	. FITTING ASSEMBLY, Inlet, G-sensing, QD (GSI)	1	
-44	B40918-1	. FITTING, Inlet, Oxygen (Alternate) (LOX)	1	
-45	F395-1106-1	. FITTING, Inlet, Oxygen (OBOGS)	1	
		(ATTACHING PARTS FOR ITEMS 44 AND 45)		
-46	F395-1190-1	. RETAINER (IF)	1	
-47	F281-1137-1	. CLIP, Retaining (IF)	1	
		---*---		
-47A	36728-01	. FITTING, Inlet, Oxygen (E-2C only) (Note 1)	1	
-48	FS5701-012	. PACKING, Preformed (IF)	1	
-49	F395-1105-1	. FILTER ASSEMBLY (IF)	1	
		(ATTACHING PARTS)		
-50	MS16629-4045	. RING (IF)	1	
		---*---		
-51	F395-1157-1	. HOUSING, Relief valve	1	
		(ATTACHING PARTS)		
-52	NAS1352C06 LB6B	. SCREW (VC)	2	
		---*---		
-53	MS29513-022	. PACKING (VC)	2	
-54	F395-1153-2	. VALVE ASSEMBLY, Relief (VC)	1	
-55	F258-1313-1	. SPRING (VC)	1	
-56	F395-1156-1	. SEAT, Spring and pin (VC)	1	
-57	B40912-1	. VALVE ASSEMBLY, Relief (RV)	1	
		(ATTACHING PARTS)		
-58	MS35275-213	. SCREW (RV)	2	
-59	MS35338-135	. WASHER (RV)	2	
		---*---		
-60	F337-1146-1	. PACKING, Preformed (RV)	1	
-61	F395-1103-1	. BODY SUBASSEMBLY, Regulator	1	
	F417-1011-3	PARTS KIT, PBA Subsystem (PBA)	REF	
	F417-1012-3	PARTS KIT, PBG Subsystem (PBG)	REF	
	F417-1013-3	PARTS KIT, G-sensing (GSI)	REF	
	F417-1014-3	PARTS KIT, Inlet Fitting (IF)	REF	
	F417-1015-3	PARTS KIT, Vest Connector (VC)	REF	
	F417-1016-3	PARTS KIT, Main Relief Valve (RV)	REF	
	F417-1017-3	PARTS KIT, Demand Valve (DV)	REF	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
		Notes: 1. Item 47A is not a component of the CRU-103/P oxygen regulator. It is a special inlet fitting designed specifically for the E-2C aircraft. This item must be open purchased from Scott Aviation (CAGE 53655), Buffalo, NY. 2. Diaphragm assembly, P/N F395-1093-1 can either be obtained by ordering demand valve kit, P/N F417-1017-3 or ordering the diaphragm assembly, P/N F395-1093-1 as an individual item under NSN 1660-01-515-2334 (be sure to indicate quantity).		

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NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
B40912-1	10-17-57	KF
B40918-1	10-17-44	PAGZZ
B41023-1	10-17-25	KF
B41406-1	10-17-9	KF
B41407-1	10-17-8	KF
B41413-1	10-17-43	KF
FS5701-012	10-17-48	KF
FS5701-032	10-17-14	KF
	10-17-16	KF
F241-2300-3	10-17	PAOGG
F258-1313-1	10-17-55	KF
F258-1332-1	10-17-37	KF
F258-1333-1	10-17-34	KF
F258-1336-1	10-17-6	KF
F281-1030-15	10-17-13	KF
F281-1137-1	10-17-47	KF
F334-1066-1	10-17-18	KF
F337-1146-1	10-17-60	KF
F337-1146-10	10-17-5	KF
F337-1146-3	10-17-36	KF
F337-1146-4	10-17-31	KF
F337-1146-5	10-17-23	KF
F337-1146-6	10-17-24	KF
F337-1146-9	10-17-33	KF
F395-1052-1	10-17-39	PAGZZ
F395-1054-1	10-17-32	KF
F395-1078-1	10-17-19	KF
F395-1085-1	10-17-20	KF
F395-1086-1	10-17-22	KF
F395-1088-1	10-17-21	KF
F395-1091-1	10-17-30	KF
F395-1093-1	10-17-26	KF
F395-1094-1	10-17-15	PAGZZ
F395-1095-1	10-17-2	KF
F395-1096-1	10-17-1	PAGZZ
F395-1097-1	10-17-3	KF
F395-1098-1	10-17-4	KF
F395-1099-1	10-17-11	PAGZZ
F395-1103-1	10-17-61	XA
F395-1105-1	10-17-49	KF
F395-1106-1	10-17-45	PAGZZ
F395-1111-1	10-17-41	PAGZZ
F395-1112-1	10-17-40	KF
F395-1114-1	10-17-42	PAGZZ
F395-1118-1	10-17-35	KF
F395-1153-2	10-17-54	KF
F395-1156-1	10-17-56	KF
F395-1157-1	10-17-51	PAGZZ
F395-1190-1	10-17-46	KF
F417-1011-3	10-17	PAGZZ
F417-1012-3	10-17	PAGZZ
F417-1013-3	10-17	PAGZZ
F417-1014-3	10-17	PAGZZ
F417-1015-3	10-17	PAGZZ
F417-1016-3	10-17	PAGZZ
F417-1017-3	10-17	PAGZZ
F5539072	10-17-17	KF
MS16629-4045	10-17-10	KF
	10-17-29	
	10-17-50	
MS29513-021	10-17-38	KF
MS29513-022	10-17-53	KF
MS35275-213	10-17-58	KF
MS35338-135	10-17-59	KF
MS51957-2	10-17-27	KF
MS51957-26	10-17-12	KF
NAS1352C06LB6B	10-17-52	KF
14011-1	10-17-7	KF
	10-17-28	
36728-01	10-17-47A	

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CHAPTER 11

PORTABLE BREATHING OXYGEN REGULATOR AND CYLINDER

TYPE MA-1 (CLIFTON PRECISION TYPE)

Section 11-1. Description

11-1. GENERAL.

11-2. The Portable Breathing Oxygen Regulator and Cylinder, Type MA-1, using regulator P/N 3260007-0101, is manufactured by Litton Life Suppport formerly Clifton Precision (CAGE 99251) (figure 11-1). The regulator and cylinder, is a self-contained portable breathing device capable of supplying breathing oxygen to flight personnel for normal or emergency use. The regulator type A-21 (P/N 3260007-0101 and P/N 3341007-1), hereafter referred to as the A-21 which forms part of the unit, is a demand/pressure breathing type regulator which will deliver oxygen to the user upon demand or provide a positive pressure to the mask depending upon the positioning of the selector knob. The unit is intended for use with the full face smoke mask (P/N 651-280) or the MBU-12 oxygen mask configuration. During normal operation the selector knob is positioned in the norm position and deliver 100% oxygen upon demand. When the selector knob is placed in the 30M, 42M, or EMER position, the unit will deliver 100% oxygen at a positive pressure of 1.6 to 14.0 inH_2O depending upon the positioning of the selector knob from sea level to the service ceiling of the aircraft. See table 11-1 for leading particulars.

11-3. CONFIGURATION.

11-4. The regulators are supplied in one basic configuration: low pressure (50 to 500 psig operating pressure range).

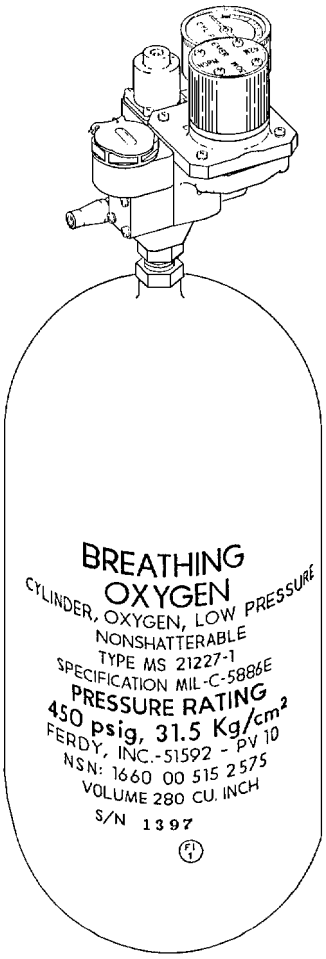

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Figure 11-1. Portable Breathing Oxygen Cylinder and Regulator, Type MA-1

Table 11-1. Leading Particulars

CHARACTERISTICS
A-21 . . . . . P/Ns 3260007-0101 and 3341007-1 . . . . . 50 to 500 psig
Mounting . . . . . MA-1 Portable walk around cylinder
Operating Altitude . . . . . Range Sea Level to 43,000 ft
Visual Indicator . . . . . Pressure gage
Selector knob:
NORM . . . . . 100% Oxygen on demand
30M . . . . . Provides 100% oxygen at a positive pressure of 1.6 to 2.4 inH_2O
42M . . . . . Provides 100% oxygen at a positive pressure of 5.5 to 6.5 inH_2O
EMER . . . . . Provides 100% oxygen at a positive pressure of 12.0 to 14.0 inH_2O
Overall Dimensions:
Pressure gage
Length . . . . . 5 7/8 in.
Width . . . . . 5 1/4 in.
Height . . . . . 3 5/8 in.
Weight . . . . . 2.2 lbs.

11-5. SERVICE LIFE.

NOTE

Low Pressure Oxygen Cylinders, Type MS21227-1 used on MA-1 Portable Emergency Oxygen System, do not have a Department of Transportation (D.O.T.) ICC number permanently stamped in the neck of the cylinder and therefore do not require hydrostatic testing. These cylinders are painted yellow in accordance with MIL-STD-101.

11-6. The regulator shall remain in service as long as it continues to function correctly and does not require other than authorized adjustment or repair.

Section 11-2. Modifications

11-7. GENERAL.

11-8. There are no authorized modifications to the Type A-21 regulator.

Section 11-3. Performance Test Sheet Preparation

11-9. GENERAL.

11-10. Preparation of the oxygen regulator Performance Test Sheet requires that, through the use of various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

11-11. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flows must be converted to inches of water pressure (inH_2O), the form of measurement which can be read on the test stand manometers.

NOTE

The various graphs supplied with each oxygen system components test stand, models 1172AS100 and 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

11-12. The information provided in the tables in this section are to be recorded on the Performance Test Sheet (figure 11-2).

11-13. The Performance Test Sheet (figure 11-2) is a sample only, but may be reproduced for local use.

11-14. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Flow Suction Test.

2. Pressure Breathing Test.

11-15. REGULATOR PERFORMANCE TESTS.

11-16. FLOW SUCTION TEST. The flow suction test shall be performed at sea level with the selector knob in the norm position. Actual (lpm) flows are converted to indicated (inH_2O) output flows by using the sea level output graph N_2 line. Convert the actual flows as follows:

NOTE

Test stand output flow graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired lpm line (figure 11-2) at the bottom of the sea level output graph.

2. Trace selected lpm line up to where it intersects the N_2 line.

3. Trace the line from point of intersection across the graph to the left-hand column to determine indicated output inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (LPM) given in figure 11-2.

11-17. PRESSURE BREATHING TEST. The Pressure Breathing Test shall be performed at sea level with the selector knob in the 30M, 42M, and EMER positions. Actual (lpm) flows are converted to indicated (inH_2O) output flows by using the sea level output graph N_2 line. Convert the actual flows as follows:

NOTE

Test stand output flow graphs may vary in makeup, according to the activity performing the test calibration. Some test stands may have a single output graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired lpm line (figure 11-2) at the bottom of the sea level output graph.

2. Trace selected lpm line up to where it intersects the N_2 line.

3. Trace the line from point of intersection across the graph to the left-hand column to determine indicated output inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 11-2.

Section 11-4. Maintenance

11-18. GENERAL.

11-19. Maintenance of the Portable Breathing Oxygen Cylinder and Regulator, Type MA-1, is limited to inspection, testing, adjustment of the pressure breathing assembly, and tightening of loose screws and fittings. Ensure that anti-seize tape is used on pipe threads. This section contains only the procedural steps necessary to meet these requirements.

REGULATOR PERFORMANCE TEST SHEET
TYPE A-21
3260007-0101 and 3341007-1

DATE: _____ TYPE: _____ SERIAL NUMBER: _____

TEST STAND SERIAL NUMBER: _____ TESTED BY: _____ CDI: _____

1. OVERALL LEAKAGE TEST: _____

2. PRESSURE GAGE SCALE AND ERROR TEST:

INLET PRESSURE	TOLERANCE	PRESSURE GAGE READING
200 PSIG	± 25 PSIG	
300 PSIG	± 25 PSIG	
400 PSIG	± 25 PSIG	

3. FLOW SUCTION TEST:

SELECTOR KNOB SETTING	INLET PRESSURE	ACTUAL OUTPUT LPM	INDICATED OUTPUT INH_2O	READING	MAXIMUM ALLOWABLE SUCTION
NORM	50	10			-0.4
NORM	50	50			-1.4
NORM	150	100			-1.4
NORM	500	10			-1.4
NORM	500	50			-1.4
NORM	500	100			-1.4

Figure 11-2. Performance Test Sheet Preparation (Sheet 1 of 2)

4. PRESSURE BREATHING TEST:

SELECTOR KNOB SETTING	INLET PRESSURE (PSIG)	ACTUAL OUTPUT LPM	INDICATED OUTPUT IN H_2O	READING	MAXIMUM ALLOWABLE SUCTION
30M	150	10			+1.6 TO +2.4
30M	150	90			-1.0 NOTE 1
30M	150	0	0		+1.0 NTOE 2
42M	150	10			+5.5 TO +6.5
42M	150	90			-1.5 NOTE 1
42M	150	0	0		+1.5 NOTE 2
EMER	150	10			+12.0 TO +14.0
EMER	150	90			-2.0 NOTE 1
EMER	150	0	0		+2.0 NOTE 2

5. OXYGEN CYLINDER AND REGULATOR PURGE _____

FILL PRESS.	DEPLETE	FILL PRESS.	DEPLETE	FILL PRESS.	DEPLETE
450 PSIG		450 PSIG		450 PSIG	

NOTES:

1. MAXIMUM ALLOWABLE PRESSURE DECREASE FROM 10 LPM READING.
2. MAXIMUM ALLOWABLE PRESSURE INCREASE ADDED TO 10 LPM READING.

Figure 11-2. Performance Test Sheet Preparation (Sheet 2 of 2)

NOTE

Upon completion of any maintenance action (e.g., inspection, adjustment, repair, etc), be sure to complete the required maintenance data collection system form.

11-20. INSPECTIONS.

11-21. If the regulator fails any inspection or testing requirements and cannot be adjusted within limits which are authorized, it shall be removed from service and sent to Air Force Depot Level Maintenance for repair and replaced with a Ready-For-Issue (RFI) component.

11-22. Procedural steps outlined in this section are listed under the inspection cycle in which they are required, and in the sequence in which they normally occur.

11-23. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTIONS. The Turnaround/Preflight/Postflight/Transfer Inspections consist of a visual inspection performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. See table 11-2 for assistance in troubleshooting. To perform the inspection, visually inspect the following:

1. Legibility of all markings.

2. Low or improper reading on regulator pressure gage.

3. Selector knob in NORM position.

4. Regulator and surrounding area for freedom from dirt and hydrocarbons.

5. Delivery hose and connector for cuts, fraying, kinking, hydrocarbons and general condition.

11-24. If discrepancies are found or suspected, Maintenance Control shall be notified.

11-25. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by Ready-For-Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

11-26. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance/Special/Daily Inspections consist of a visual inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 11-2 for assistance in troubleshooting. To perform the inspection, proceed as follows:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

11-27. Visually inspect the regulators in accordance with paragraph 11-23.

11-28. FUNCTIONAL TEST. To perform the Functional Test, proceed as follows:

1. Place selector knob in NORM position.

2. Connect oxygen hose to quick-disconnect, place mask to face and inhale, there should be no restriction inhaling or exhaling.

3. Turn selector knob to 30M, 42M, and EMER positions. There should be a progressively higher flow rate when moving selector knob from 30M to 42M and from 42M to EMER positions.

11-29. Upon completion of Functional Test, secure regulator as follows:

1. Place selector knob in NORM position.

2. Disconnect mask hose from regulator.

11-30. If discrepancies are found or suspected, maintenance control shall be notified.

11-31. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by RFI regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

11-32. CALENDAR/PHASED/SDLM INSPECTIONS. Calendar, Phased or SDLM Inspections require removal of the regulators from the aircraft. See applicable planned maintenance system (PMS) publications for specified intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be visually inspected (paragraph 11-23) and bench tested (paragraph 11-34).

Table 11-2. Troubleshooting (Daily, Preflight, Special, Turnaround, Transfer, and Acceptance Inspections)

Trouble	Probable Cause	Remedy
Oxygen cylinder pressure gage fails to indicate proper pressure.	Defective gage.	Replace regulator.
	Low cylinder pressure.	Refill.
	Defective inlet assembly.	Replace regulator.
Oxygen not available at mask with selector knob in NORM position with proper pressure source to regulator.	Hose to mask is kinked.	Straighten hose and reposition outlet.
	Regulator not functioning properly.	Replace regulator.
Oxygen not available at mask with proper source to regulator with selector knob in 30M, 42M, and EMER positions.	Kinked or other malfunction between hose and mask.	Replace or readjust equipment as necessary.
	Regulator malfunctioning or out of adjustment.	Replace regulator.
Gage pressure drops when regulator is not in use.	Loose or leaking connections.	Tighten or replace connections as necessary.
	Defective regulator.	Replace regulator.

11-33. Aircraft type A-21 regulators failing the Bench Test and cannot be adjusted within limits shall be shipped to Depot Level repair.

11-34. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type I, Class I, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig nitrogen cylinders. These cylinders cannot be certified contaminant free.

NOTE

Tests are arranged so they proceed from one test to the next with a minimum of flow changes. Troubleshooting tables are provided following each test.

11-35. Bench Test shall be performed on aircraft oxygen regulators prior to being placed in service, and during the Phase/Calendar or SDLM (Standard Depot Level Maintenance) Inspection cycle of the aircraft in which installed. See applicable planned maintenance system (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. The regulators shall also be subjected to a Bench Test if malfunction is suspected, and after repair or replacement of damaged parts.

11-36. Bench Test shall be performed using Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to the appropriate ground support equipment manual for identification of test stand controls and indicators referred to in Bench Test.

11-37. Due to the complexity of the 1172AS100 and 1316AS100 test stand, it is essential that the operator become thoroughly familiar with the test stand prior to performing Bench Test. Refer to appropriate ground support equipment manual.

11-38. DEPLETION OF OXYGEN CYLINDER AND REMOVAL OF OXYGEN REGULATOR FROM CYLINDER. To deplete oxygen and remove regulator from cylinder, proceed as follows:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

Deplete oxygen from the oxygen cylinder in an area free from dirt, grease, oil, or other hydrocarbons.

1. Turn selector knob to the EMER position and completely deplete oxygen from oxygen cylinder.

CAUTION

Use care not to damage regulator or cylinder during regulator removal from cylinder. Make certain wrench is firmly on hexagon flats at base of regulator.

NOTE

For step 2 index numbers for removing regulator from oxygen cylinder, refer to figure 11-3.

2. Remove regulator (1) from cylinder (4) by firmly grasping adapters (2) at base of regulator and hexagon boss (3) at cylinder neck with two 3/4 inch wrenches.

3. Cap open port of cylinder with plug and stow cylinder in bin free from dirt, grease, oil, and other hydrocarbons.

11-39. MODIFICATION OF OXYGEN HOSE COUPLING ASSEMBLY. To modify the oxygen hose coupling assembly (MS22016), proceed as follows:

1. Modify oxygen hose coupling assembly by removing spring and valve assembly and cross bar support from inside of oxygen hose coupling assembly; to provide a clear passage with no restrictions for flows being drawn.

2. Attach modified oxygen hose coupling to piezometer (26) using a short hose maintaining one inch between the oxygen hose coupling and piezometer (26).

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3 sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

11-40. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
As Required	Tape, Anti-seize	MIL-T-27730A, NIIN 00-889-3535 (CAGE 81349)
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter, Straight	MS24398D8-4 (CAGE 96906) NIIN 00-684-7292
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Apply anti-seize tape to inlet fitting of the regulator.

2. Attach adapter to inlet fitting of the regulator.

3. Ensure all test stand valves are secure and open N_2 supply cylinder.

4. Attach inlet of regulator to N_2 INPUT connection (18) in the altitude chamber.

5. Turn INLET PRESSURE ON/OFF valve (L) ON.

6. Place selector knob of regulator in NORM position.

7. Using high pressure regulator (Q) slowly apply 500 psig to regulator.

8. Using leak detection compound, draw a film over outlet of regulator. No leakage allowed.

9. Using leak detection compound, check for leakage on pressure gage, relief valve, inlet fitting, and filler valve. No leakage allowed.

10. Turn INLET PRESS. ON/OFF valve (L) OFF.

11. If leakage is excessive, locate probable cause using troubleshooting chart (table 11-3).

12. Turn high pressure regulator (Q) to vent.

13. Bleed pressure from regulator by placing selector knob in 30M position. Bleed pressure from test stand with system bleed valve (S).

14. Turn system bleed valve (S) OFF and place regulator selector knob in NORM position.

11-41. PRESSURE GAGE SCALE AND ERROR TEST. To perform the Pressure Gage Scale and Error Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Turn INLET PRESSURE ON/OFF valve (L) ON.

WARNING

When applying inlet pressure using high pressure regulator (Q), apply pressures slowly.

2. Using high pressure regulator (Q), slowly increase pressure to each test pressure specified on Performance Test Sheet (figure 11-2).

3. Check tolerance by comparing regulator pressure gage reading with test stand regulated high pressure gage (10).

4. Regulators failing the pressure gage scale and error test shall be BCM to Air Force Depot Level Maintenance for repair.

5. Turn high pressure regulator (Q) to vent position.

6. Bleed test stand using system bleed valve (S). Bleed pressure from regulator by placing selector knob in 30M position. Close system bleed valve (S).

11-42. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

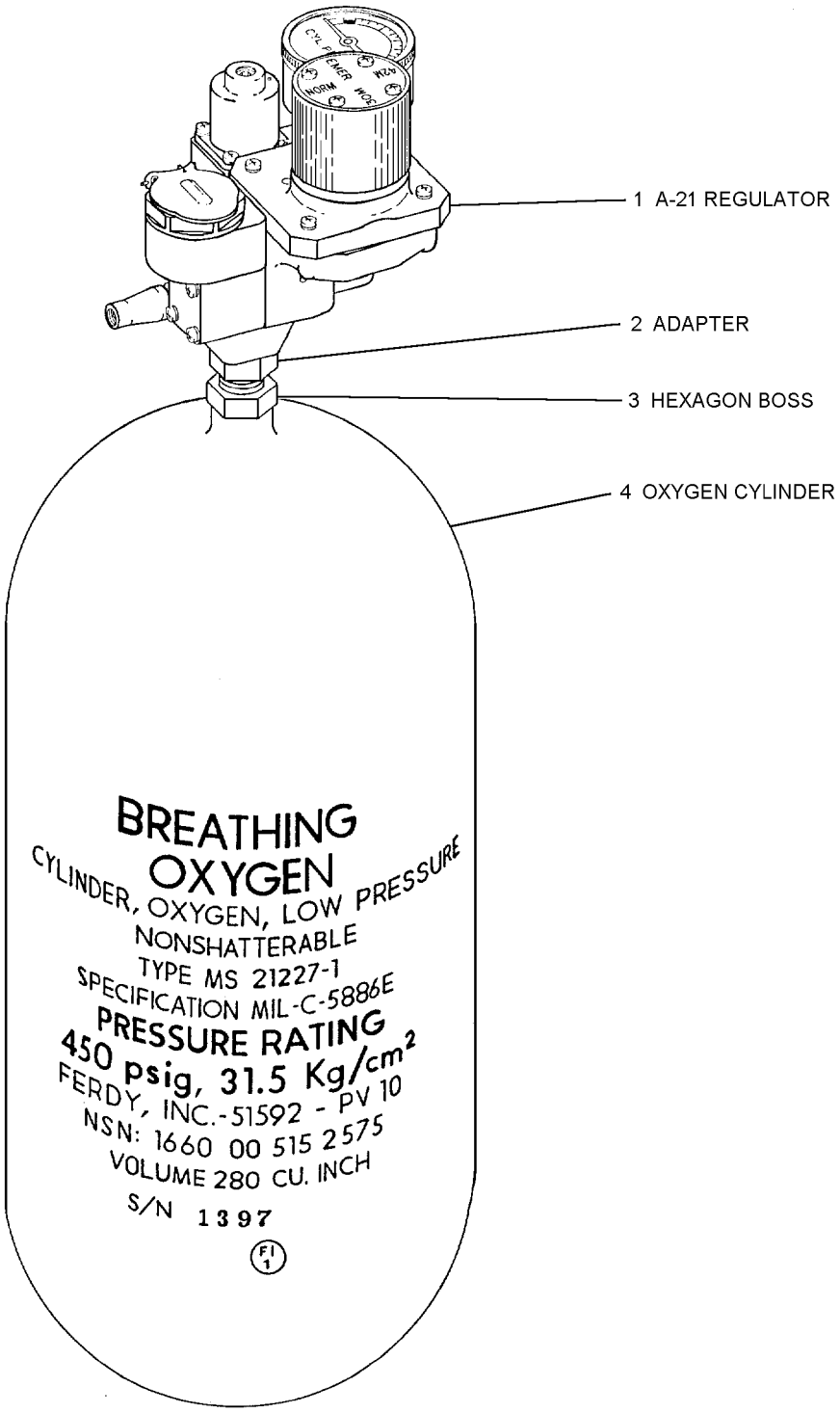

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Figure 11-3. Type MA-1 Portable Breathing Oxygen Cylinder and Regulator

CAUTION

LOW PRESSURE REGULATOR (N) can only be used when applying pressures below gage guard setting (165 to 175 psig) to an item under test. For pressure above gage guard setting, HIGH PRESSURE REGULATOR (Q) must be used.

1. Place selector knob in NORM position.

2. Attach regulator outlet to piezometer (26).

3. Turn on vacuum pump.

4. Using LOW PRESS. REGULATOR (N), set inlet pressures of 50 and 150 psig as specified on Performance Test Sheet (figure 11-2).

NOTE

When drawing flows with OUTPUT valve (C), ensure inlet pressure is maintained.

5. Place PRESSURE SELECTOR valve (D) inH_2O position.

6. Using OUTPUT valve (C), set flows specified on performance test sheet on output manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record suction readings on Performance Test Sheet.

7. Close OUTPUT valve (C) and back out on low press. regulator (N).

8. Using HIGH PRESSURE REGULATOR (Q), slowly set inlet pressure of 500 psig as specified on Performance Test Sheet.

9. Using OUTPUT valve (C), set flows specified in Performance Test Sheet on output manometer (1). Suction values will be displayed on press/suction manometer (4). Record suction readings on Performance Test Sheet.

10. Regulators failing flow suction test shall be BCM to Air Force Depot Level Maintenance for repair.

11. Close OUTPUT valve (C).

12. Turn HIGH PRESSURE REGULATOR (Q) to vent.

13. Bleed pressure from test stand by opening system bleed valve (S). Bleed pressure from regulator by turning selector knob to 30M position. Close system bleed valve (S).

11-43. PRESSURE BREATHING TEST. To perform Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Place selector knob in 30M position.

2. Using LOW PRESS. REGULATOR (N), set inlet pressure of 150 psig as specified on Performance Test Sheet.

NOTE

When drawing flows with output valve (C), ensure inlet pressure is maintained.

3. Using OUTPUT valve (C), draw a 10 lpm flow as indicated on output manometer (1).

Table 11-3. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Inlet fitting leaking.	Loose inlet fitting.	Tighten inlet fitting.
	Damaged threads on inlet fitting.	BCM regulator.
Pressure gage leaking.	Loose pressure gage.	Tighten pressure gage.
	Damage pressure gage.	BCM regulator.
Oxygen filler valve leaking.	Defective filler valve.	BCM regulator.
Relief valve leaking.	Defective relief valve.	BCM regulator.
Leaking first stage bellows assembly.	Defective first stage bellows or gasket.	BCM regulator.
Leakage at demand valve port.	Damaged tilt valve.	BCM regulator.

4. Reading on PRESS./SUCTION manometer (4) shall be within minimum and maximum allowable inH_2O specified on Performance Test Sheet. Record reading on Performance Test Sheet.

NOTE

The initial value obtained at a 10 lpm flow at 30M, 42M, and EMER selector knob settings establishes the base line for determining minimum allowable reading for 90 lpm flows and maximum allowable reading for 0 lpm flow.

Example: Computing minimum allowable reading for 90 lpm at 50 psig, 30M selector knob setting.

A. 10 lpm reading at 50 psig =1.8 inH_2O

B. Minus maximum allowable pressure drop = 1.0 inH_2O

C. Minimum allowable reading for 90 lpm flow at 50 psig = .8 inH_2O

Example: Computing maximum allowable reading for 0 lpm flow at 50 psig, 30M selector knob setting.

A. 10 lpm reading at 50 psig = 1.8 inH_2O

B. Plus maximum allowable pressure increase= 1.0 inH_2O

C. Maximum allowable reading for 0 lpm flow at 50 psig = 2.8 inH_2O

5. Using output valve (C), draw a 90 lpm flow as indicated on output manometer (1).

6. Reading on PRESS./SUCTION manometer (4) shall not decrease more than the specified inH_2O allowable decrease on the Performance Test Sheet. Record reading on Performance Test Sheet.

7. Close output valve (C).

8. Reading on PRESS./SUCTION manometer (4) shall not increase more than the specified inH_2O allowable increase on the Performance Test Sheet. Record reading on Performance Test Sheet.

9. Repeat steps 2 through 8 with selector knob in the 42M and EMER positions.

10. If the regulator fails the Pressure Breathing Test, refer to paragraph 11-44.

11. Turn off vacuum pump. Close N_2 supply cylinder. Using LOW PRESS. REGULATOR (N) and system bleed valves (S), relieve all pressure in test stand. Secure all test stand valves and disconnect A-21 regulator from test stand.

11-44. ADJUSTMENT PROCEDURES FOR 30M, 42M, AND EMER. SPRING GUIDE SCREWS. To adjust 30M, 42M, and EMER. Spring Guide Screws, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

To adjust spring guide screws, refer to figure 11-4 for steps 1 through 17.

1. Remove cover (2) from regulator by removing four screws (1).

2. Ensure all test stand valves are secure, then open N_2 supply cylinder.

3. Connect inlet of regulator to N_2 INPUT connection (18).

4. Connect outlet of regulator to piezometer (26).

5. Turn on vacuum pump.

6. Turn INLET PRESSURE ON/OFF valve (L) ON.

7. Using LOW PRESS. REGULATOR (N), apply 150 psig to regulator as indicated on regulated low press. gage (11).

8. Open OUTPUT valve (C) and draw a 10 lpm flow as indicated on output manometer (1).

9. Turn PRESS. selector valve (D) to H_2O position.

10. Turn regulator selector knob clockwise to 30M position.

NOTE

When performing steps 12, 14, and 16 to increase outlet pressure, turn spring guide screws (3, 4, and 5) clockwise. To decrease outlet pressure, turn spring guide screws (3, 4, and 5) counterclockwise.

11. With 10 lpm flow indicated on output manometer (1), adjust spring guide screw (3) to obtain a reading of 1.6 to 2.4 inH_2O as indicated on PRESS./SUCTION manometer (4).

12. Turn regulator selector knob clockwise to 42M position.

13. With 10 lpm flow indicated on output manometer (1), adjust spring guide screw (4) to obtain a reading of 5.5 to 6.5 inH_2O as indicated on PRESS./SUCTION manometer (4).

14. Turn regulator selector knob clockwise to EMER position.

15. With 10 lpm flow indicated on output manometer (1), adjust spring guide screw (5) to obtain a reading of 12.0 to 14.0 inH_2O as indicated on PRESS./SUCTION manometer (4). Close OUTPUT valve (C). Place selector knob in NORM position.

16. Install cover (2) on regulator and secure in place with four screws (1).

NOTE

At this time, it is necessary to perform the Pressure Breathing Test (paragraph 11-43) in its entirely.

11-45. OXYGEN CYLINDER AND REGULATOR PURGE. To perform purge, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type I	MIL-O-27210
As Required	Tape, Anti-seize	MIL-T-27730A, NIIN 00-889-3535 (CAGE 81349)

WARNING

Do not use oxygen system components test stand to regulate the oxygen purge pressure.

1. Using anti-seize tape, tape the pipe threads of the inlet adapter.

WARNING

Use extreme care not to damage cylinder and regulator threads when attaching regulator to oxygen cylinder.

2. Install oxygen regulator on oxygen cylinder.

3. Connect regulator filler adapter to a regulated source of aviator's breathing oxygen.

4. Slowly charge the oxygen cylinder to 450 psig.

5. Shut off oxygen source and disconnect regulator and oxygen cylinder from regulated source of aviator's breathing oxygen.

6. Turn selector knob to 30M position and oxygen from oxygen cylinder through regulator.

7. Turn selector knob to NORM position and repeat steps 3 through 6, twice.

NOTE

After purging is completed, fill MA-1 portable walk around unit to 450 psig.

All equipment forwarded from the Organizational Level Maintenance to the AIMD shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

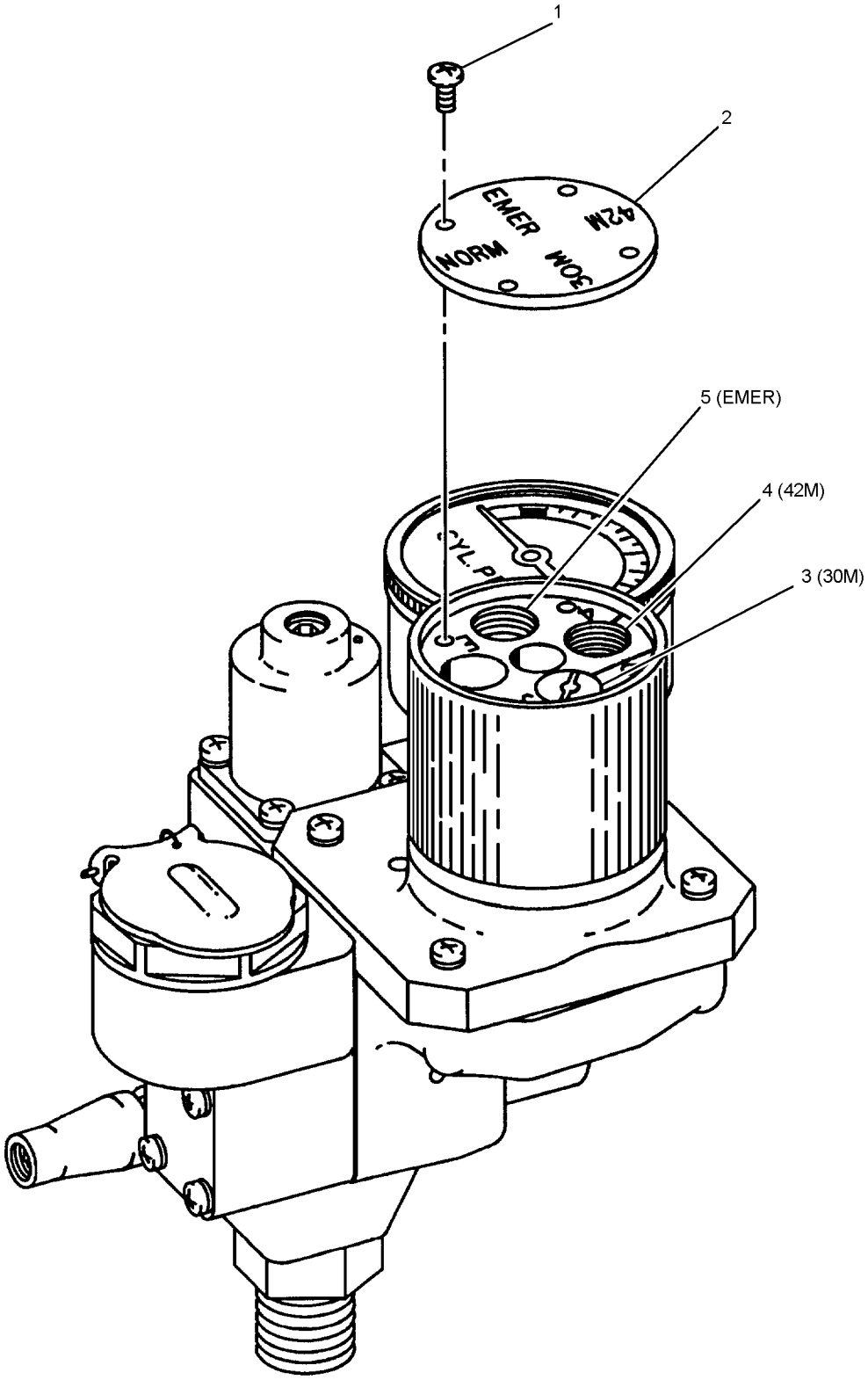

Figure 11-4. Adjustment of 30M, 42M and EMER Springs

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CHAPTER 12

PORTABLE BREATHING OXYGEN REGULATOR AND CYLINDER

TYPE MA-1 (SCOTT AVIATION TYPE)

Section 12-1. Description

12-1. GENERAL.

12-2. The Portable Breathing Oxygen Regulator and Cylinder Type MA-1, P/N 9000A-1 thru 9010A-2, is manufactured by Scott Aviation (CAGE 53655) (figure 12-1). The Portable Breathing Oxygen Regulator and Cylinder Type MA-1, is a self-contained portable breathing device capable of supplying breathing oxygen to flight personnel for normal or emergency use. The regulator type A-21 P/Ns 9000A, 9000A-1, 9010A, 9010A-1, and 9010A-2, hereafter referred to as the A-21 which forms part of the unit, is a demand/pressure breathing type regulator which will deliver oxygen to the user upon demand or provide a positive pressure to the mask depending upon the positioning of the selector knob. The unit is intended for use with the full face smoke mask (P/N 651-280) or the MBU-12 oxygen mask configuration. During normal operation the selector knob is positioned in the norm position and will deliver 100% oxygen upon demand. When the selector knob is placed in the 30M, 42M, or EMER position, the unit will deliver 100% oxygen at a positive pressure of 1.6 to 14.0 inH_2O depending upon the positioning of the selector knob from sea level to the service ceiling of the aircraft. See Table 12-1 for leading particulars.

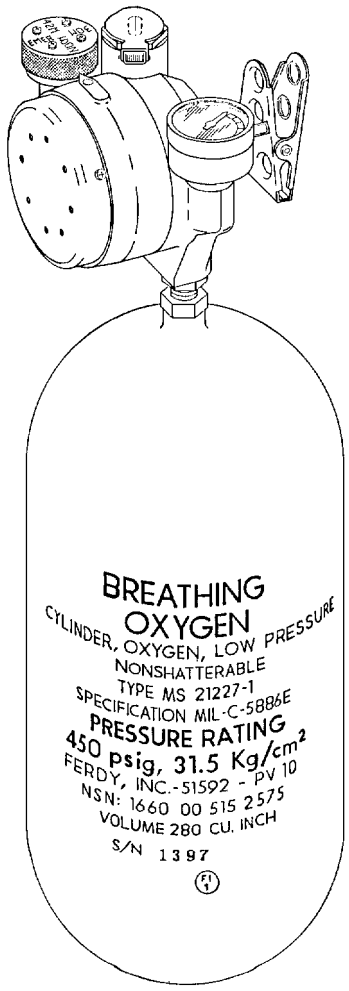

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Figure 12-1. Portable Breathing Oxygen Regulator and Cylinder, Type MA-1

12-3. CONFIGURATION.

12-4. The regulators are supplied in one basic configuration: low pressure (50 to 500 psig operating pressure range).

Table 12-1. Leading Particulars

CHARACTERISTICS	
A-21 ..... 9000A	..... 50 to 500 psig
A-21 ..... 9000A-1	..... 50 to 500 psig
A-21 ..... 9010A	..... 50 to 500 psig
A-21 ..... 9010A-1	..... 50 to 500 psig
A-21 ..... 9010A-2	..... 50 to 500 psig
Mounting	MA-1 portable walk around cylinder
Operating Altitude Range	Sea Level to 43,000 ft
Visual Indicator	Pressure gage
Selector knob:	
NORM	100% Oxygen on demand
30M	Provides 100% Oxygen at a positive pressure of 1.6 to 2.4 inH_2O
42M	Provides 100% Oxygen at a positive pressure of 5.5 to 6.5 inH_2O
EMER	Provides 100% Oxygen at a positive pressure of 12.0 to 14.0 inH_2O
Overall Dimensions:	
Length	5 9/16 in.
Width	5 1/2 in.
Height	4 9/16 in.
Weight	2.1 lb.

12-5. SERVICE LIFE.

NOTE

Low Pressure Oxygen Cylinders, Type MS21227-1 used on MA-1 Portable Emergency Oxygen System, do not have a Department of Transportation (D.O.T.) ICC number permanently stamped in the neck of the cylinder and therefore do not require hydrostatic testing. These cylinders are painted yellow in accordance with MIL-STD-101.

12-6. The regulator shall remain in service as long as it continues to function correctly and does not require other than authorized adjustment or repair.

Section 12-2. Modifications

12-7. GENERAL.

12-8. There are no authorized modifications to the Type A-21 regulator.

Section 12-3. Performance Test Sheet Preparation

12-9. GENERAL.

12-10. Preparation of oxygen regulator Performance Test Sheet require that, through the use of various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

12-11. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flows must be converted to inches of water pressure (inH_2O), the form of measurement which can be read on the test stand manometers.

NOTE

The various graphs supplied with each oxygen system components test stand, models 1172AS100 and 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

12-12. The information provided in the tables in this section are to be recorded on the Performance Test Sheet (figure 12-2).

12-13. The Performance Test Sheet (figure 12-2) is a sample only, but may be reproduced for local use.

12-14. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Flow Suction Test.

2. Pressure Breathing Test.

12-15. REGULATOR PERFORMANCE TESTS.

12-16. FLOW SUCTION TEST. The Flow Suction Test shall be performed at sea level with the selector knob in the NORM position. Actual (lpm) flows are converted to indicated (inH_2O) output flows by using the sea level output graph N_2 line. Convert the actual flows as follows:

NOTE

Test stand output flow graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired lpm line (figure 12-2) at the bottom of the sea level output graph.

2. Trace selected lpm line up to where it intersects the N_2 line.

3. Trace the line from point of intersection across the graph to the left-hand column to determine indicated output inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 12-2.

12-17. PRESSURE BREATHING TEST. The Pressure Breathing Test shall be performed at sea level with the selector knob in the 30M, 42M, and EMER positions. Actual (lpm) flows are converted to indicated (inH_2O) output flows by using the sea level output graph N_2 line. Convert the actual flows as follows:

NOTE

Test stand output flow graphs may vary in makeup, according to the activity performing the test calibration. Some test stands may have a single output graph with various altitude lines, while others may have separate graphs for each altitude. Ensure specified graph is used.

1. Locate the desired lpm line (figure 12-2) at the bottom of the sea level output graph.

REGULATOR PERFORMANCE TEST SHEET

SCOTT TYPES A-21
9000A, 9000A-1, 9010A-1, AND 9010A-2

DATE: _____ TYPE: _____ SERIAL NUMBER: _____

TEST STAND SERIAL NUMBER: _____ TESTED BY: _____ CDI: _____

1. OVERALL LEAKAGE TEST: _____

2. PRESSURE GAGE SCALE AND ERROR TEST:

INLET PRESSURE	TOLERANCE	PRESSURE GAGE READING
200 PSIG	± 25 PSIG	
300 PSIG	± 25 PSIG	
400 PSIG	± 25 PSIG	

3. FLOW SUCTION TEST:

SELECTOR KNOB SETTING	INLET PRESSURE	LPM	INDICATED OUTPUT	READING	MAXIMUM SUCTION
NORM	50	10			-.4
NORM	50	50			-1.4
NORM	150	10			-.4
NORM	150	50			-1.4
NORM	150	100			-1.4
NORM	500	10			-.4
NORM	500	50			-1.4
NORM	500	100			-1.4

Figure 12-2. Performance Test Sheet Preparation (Sheet 1 of 2)

4. PRESSURE BREATHING TEST:

SELECTOR KNOB SETTING	INLET PRESSURE (PSIG)	ACTUAL OUTPUT LPM	INDICATED OUTPUT INH_2O	READING	MAXIMUM ALLOWABLE SUCTION
30M	50	10			+1.6 TO +2.4
30M	50	50			-1.0 NOTE 1
30M	50	0	0		+1.0 NOTE 2
30M	500	10			+1.6 TO +2.4
30M	500	50			-1.0 NOTE 1
30M	500	90			-1.0 NOTE 1
30M	500	0	0		+1.0 NOTE 2
42M	50	10			+5.5 TO +6.5
42M	50	50			-1.5 NOTE 1
42M	50	0	0		+1.5 NOTE 2
42M	500	10			+5.5 TO +6.5
42M	500	50			-1.5 NOTE 1
42M	500	90			-1.5 NOTE 1
42M	500	0	0		+1.5 NOTE 2
EMER	50	10			+12.0 TO +14.0
EMER	50	50			-2.0 NOTE 1
EMER	50	0	0		+2.0 NOTE 2
EMER	500	10			+12.0 TO +14.0
EMER	500	50			-2.0 NOTE 1
EMER	500	90			-2.0 NOTE 1
EMER	500	0	0		+2.0 NOTE 2

5. OXYGEN CYLINDER AND REGULATOR PURGE _____

NOTES:

1. MAXIMUM ALLOWABLE PRESSURE DECREASE FROM 10 LPM READING.
2. MAXIMUM ALLOWABLE PRESSURE INCREASE ADDED TO 10 LPM READING.

Figure 12-2. Performance Test Sheet Preparation (Sheet 2 of 2)

2. Trace selected lpm line up to where it intersects the N_2 line.

3. Trace the line from point of intersection across the graph to the left-hand column to determine indicated output inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 12-2.

Section 12-4. Maintenance

12-18. GENERAL.

12-19. Maintenance of the Scott Aviation Portable Breathing Oxygen Regulator and Cylinder Type MA-1, is limited to inspection testing, adjustment of the pressure breathing assembly, and tightening of loose screws and fittings. Ensure that anti-seize tape is used on pipe threads. This section contains only the procedural steps necessary to meet these requirements.

NOTE

Upon completion of any maintenance action (e.g., inspection, adjustment, repair, etc), be sure to complete the required maintenance data collection system form.

12-20. INSPECTIONS.

12-21. If the regulator fails any inspection or testing requirements and cannot be adjusted within limits which are authorized, it shall be removed from service and sent to Air Force Depot Level Maintenance for repair and replaced with a Ready-For-Issue (RFI) component.

12-22. Procedural steps outlined in this section are listed under the inspection cycle in which they are required, and in the sequence in which they normally occur.

12-23. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTIONS. The Turnaround/Preflight/Postflight/Transfer Inspections consist of a Visual Inspection performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. See table 12-2 for assistance in troubleshooting. To perform the inspection, visually inspect the following:

1. Legibility of all markings.

2. Low or improper reading on regulator pressure gage.

3. Selector knob in NORM position.

4. Regulator and surrounding area for freedom from dirt and hydrocarbons.

5. Delivery hose and connector for cuts, fraying, kinking, hydrocarbons and general condition.

12-24. If discrepancies are found or suspected, Maintenance Control shall be notified.

12-25. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by Ready-For-Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

12-26. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance/Special/Daily Inspections consist of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 12-2 for assistance in troubleshooting. To perform the inspection, proceed as follows:

Table 12-2. Troubleshooting (Daily, Preflight, Special, Turnaround Transfer, and Acceptance Inspections)

Trouble	Probable Cause	Remedy
Oxygen cylinder pressure gage fails to indicate proper pressure.	Defective gage.	Replace regulator.
	Low cylinder pressure.	Refill.
	Defective inlet assembly.	Replace regulator.
Oxygen not available at mask with selector knob in NORM position with proper pressure source to regulator.	Hose to mask is kinked.	Straighten hose and reposition outlet.
	Regulator not functioning properly.	Replace regulator.
Oxygen not available at mask with proper source to regulator with selector knob in 30M, 42M, and EMER positions.	Kinked or other malfunction between hose and mask.	Replace or readjust equipment as necessary.
	Regulator malfunctioning or out of adjustment.	Replace regulator.
Gage pressure drops when regulator is not in use.	Loose or leaking connections.	Tighten or replace connections as necessary.
	Defective regulator.	Replace regulator.

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

12-27. Visually inspect the regulators in accordance with paragraph 12-23.

12-28. FUNCTIONAL TEST. To perform the Functional Test, proceed as follows:

1. Place selector knob in NORM position.

2. Connect oxygen hose to quick-disconnect, place mask to face and inhale, there should be no restriction inhaling or exhaling.

3. Turn selector knob to 30M, 42M, and EMER positions. There should be a progressively higher flow rate when moving selector knob from 30M to 42M and from 42M to EMER positions.

12-29. Upon completion of Functional Test, secure regulator as follows:

1. Place selector knob in NORM position.

2. Disconnect mask hose from regulator.

12-30. If discrepancies are found or suspected maintenance control shall be notified.

12-31. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by RFI regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

12-32. CALENDAR/PHASED/SDLM INSPECTIONS. Calendar, Phased or SDLM Inspections require removal of the regulators from the aircraft. See applicable planned maintenance system (PMS) publications for specified intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be visually inspected (paragraph 12-23) and Bench Tested (paragraph 12-34).

12-33. Aircraft type A-21 regulators failing the Bench Test and cannot be adjusted within limits shall be shipped to Depot Level repair.

12-34. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type I, Class I, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig cylinder. These cylinders cannot be certified contaminant free.

NOTE

Tests are arranged so they proceed from one test to the next with a minimum of flow changes. Troubleshooting tables are provided following each test.

12-35. Bench Test shall be performed on aircraft oxygen regulators prior to being placed in service, and during the Phase/Calendar or SDLM (Standard Depot Level Maintenance) Inspection cycle of the aircraft in which installed. See applicable planned maintenance system (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. The regulators shall also be subjected to a Bench Test if malfunction is suspected, and after repair or replacement of damaged parts.

12-36. Bench Test shall be performed using Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to the appropriate ground support equipment manual for identification of test stand controls and indicators referred to in Bench Test.

12-37. Due to the complexity of the 1172AS100 and 1316AS100 test stand, it is essential that the operator become thoroughly familiar with the test stand prior to performing Bench Test. Refer to appropriate ground support equipment manual.

12-38. DEPLETION OF OXYGEN CYLINDER AND REMOVAL OF OXYGEN REGULATOR FROM CYLINDER. To deplete oxygen and remove regulator from cylinder, proceed as follows:

WARNING

When working with oxygen, make certain that clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

Deplete oxygen from the oxygen cylinder in an area free from dirt, grease, oil or other hydrocarbons.

1. Turn selector knob to the EMER position and completely deplete oxygen from oxygen cylinder.

CAUTION

Use care not to damage regulator or cylinder during regulator removal from cylinder. Make certain wrench is firmly on hexagon flats at base of regulator.

NOTE

For index numbers in the following step, refer to figure 12-3.

2. Remove regulator (1) from cylinder (4) by firmly grasping adapters (2) at base of regulator and hexagon boss (3) at cylinder neck with two 3/4-inch wrenches.

3. Cap open port of cylinder with plug and stow cylinder in bin free from dirt, grease, oil, and other hydrocarbons.

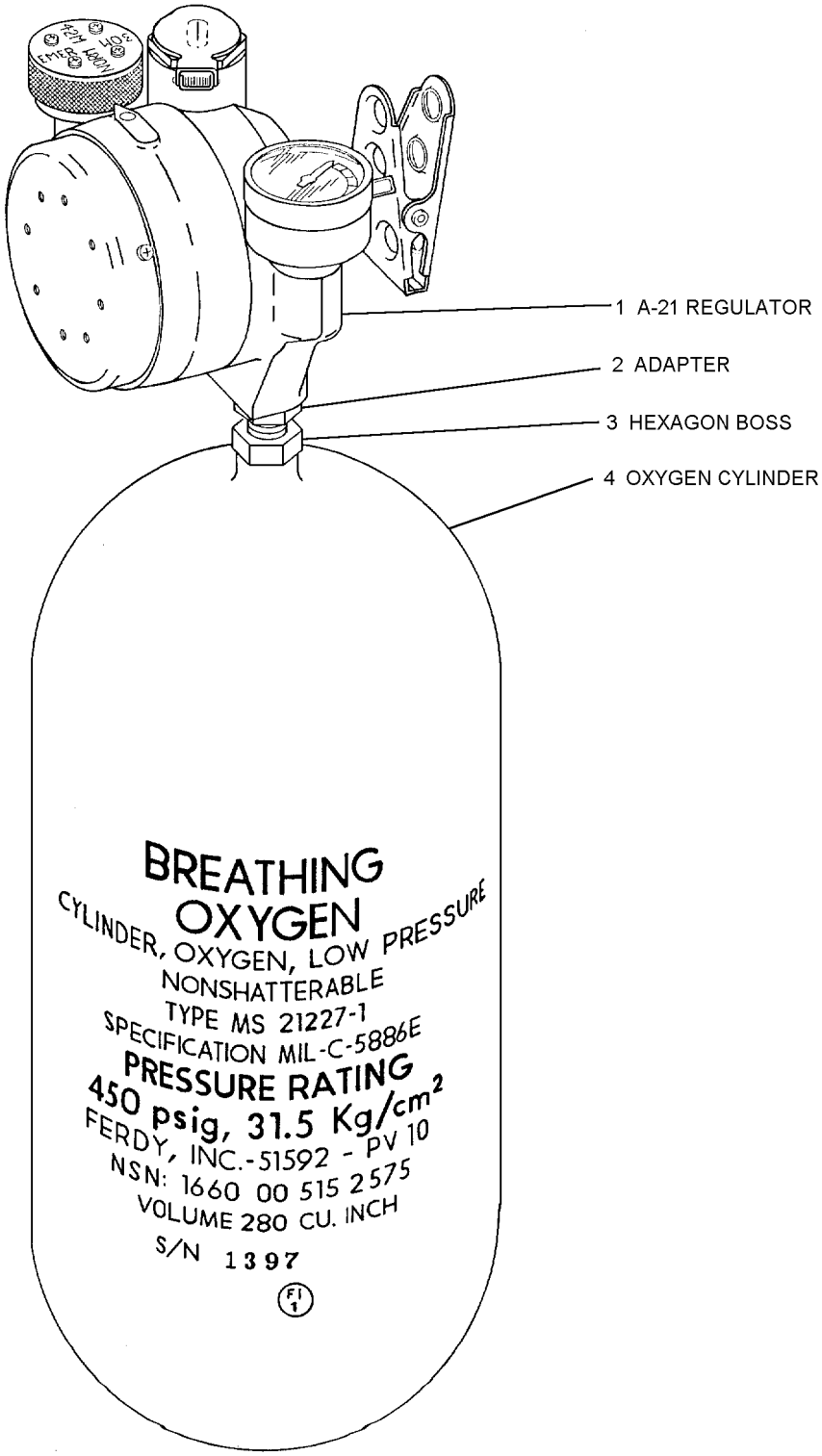

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Figure 12-3. Type MA-1 Portable Breathing Oxygen Cylinder and Regulator

12-39. MODIFICATION OF OXYGEN HOSE COUPLING ASSEMBLY. To modify the Oxygen Hose Coupling Assembly (MS22016), proceed as follows:

1. Modify oxygen hose coupling assembly by removing spring and valve assembly and cross bar support from inside of oxygen hose coupling assembly; to provide a clear passage with no restrictions for flows being drawn.

2. Attach modified oxygen hose coupling to piezometer (26) using a short hose maintaining one inch between the oxygen hose coupling and piezometer (26).

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

12-40. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
As Required	Tape, Anti-seize	MIL-T-27730A, NIIN 00-889-3535 (CAGE 81349)
As Required	Compound, Leak Detection, Type I	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter, Straight	MS24398D8-4 (CAGE 96906) NIIN 00-684-7292
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Apply anti-seize tape to inlet fitting of the regulator.

2. Attach adapter to inlet fitting of the regulator.

3. Ensure all test stand valves are secure and open N_2 supply cylinder.

4. Attach inlet of regulator to N_2 input connection (18) in the altitude chamber.

5. Turn inlet pressure ON/OFF valve (L) ON.

6. Place selector knob of regulator in NORM position.

7. Using high pressure regulator (Q), slowly apply 500 psig to regulator.

8. Using leak detection compound, check for leaks at the outlet of the regulator, filler valve, pressure gage, relief valve, and threaded areas. No leakage allowed.

9. If leakage occurs, locate probable cause using troubleshooting chart (table 12-3).

10. Turn INLET PRESSURE ON/OFF valve (L) to OFF.

11. Turn high pressure regulator (Q) to vent.

12. Bleed pressure from regulator by placing selector knob in 30M position. Bleed pressure from test stand with system bleed valve (S).

13. Turn system bleed valve (S) OFF and place regulator selector knob in NORM position.

Table 12-3. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Inlet fitting leaking.	Loose inlet fitting.	Tighten inlet fitting.
	Damaged threads on inlet fitting.	BCM regulator.
Pressure gage leaking.	Loose pressure gage.	Tighten pressure gage.
	Damage pressure gage.	BCM regulator.
Oxygen filler valve leaking.	Defective filler valve.	BCM regulator.
Relief valve leaking.	Defective relief valve.	BCM regulator.
Leaking first stage bellows assembly.	Defective first stage bellows or gasket.	BCM regulator.
Leakage at demand valve port.	Damaged tilt valve.	BCM regulator.

12-41. PRESSURE GAGE SCALE AND ERROR TEST. To perform the Pressure Gage Scale and Error Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Turn inlet pressure ON/OFF valve (L) ON.

WARNING

When applying inlet pressure using high pressure regulator (Q), apply pressures slowly.

2. Using high pressure regulator (Q), slowly increase pressure to each test pressure specified on Performance Test Sheet (figure 12-2).

3. Check tolerance by comparing regulator pressure gage reading with test stand regulated high pressure gage (10).

4. Regulators failing the pressure gage scale and error test shall be BCM to Air Force Depot Level maintenance for repair.

5. Turn high pressure regulator (Q) to vent position.

6. Bleed test stand using system bleed valve (S). Bleed pressure from regulator by placing selector knob in 30M position. Close system bleed valve (S).

12-42. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

CAUTION

Low pressure regulator (N) can only be used when applying pressures below gage guard setting (165 to 175 psig) to an item under test. For pressure above gage guard setting, high pressure regulator (Q) must be used.

1. Place selector knob in NORM position.

2. Attach regulator outlet to piezometer (26).

3. Turn on vacuum pump.

4. Using low press. regulator (N) set inlet pressures of 50 and 150 psig as specified on Performance Test Sheet (figure 12-2).

NOTE

When drawing flows with output valve (C), ensure inlet pressure is maintained.

5. Place pressure selector valve (D) inH_2O position.

6. Using output valve (C), set flows specified on Performance Test Sheet on output manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record suction readings on Performance Test Sheet.

7. Close output valve (C) and back out on low press. regulator (N).

8. Using high pressure regulator (Q) slowly set inlet pressure of 500 psig as specified on Performance Test Sheet.

9. Using output valve (C), set flows specified in Performance Test Sheet on output manometer (1). Suction values will be displayed on press./suction manometer (4). Record suction readings on Performance Test Sheet.

10. Regulators failing Flow Suction Test shall be BCM to Air Force Depot Level maintenance for repair.

11. Close output valve (C).

12. Turn high pressure regulator (Q) to vent.

13. Bleed pressure from test stand by opening system bleed valve (S). Bleed pressure from regulator by turning selector knob to 30M position. Close system bleed valve (S).

12-43. PRESSURE BREATHING TEST. To perform Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Place selector knob in 30M position.

2. Using low press. regulator (N) set inlet pressure of 50 psig as specified on Performance Test Sheet.

NOTE

When drawing flows with output valve (C) ensure inlet pressure is maintained.

3. Using output valve (C) draw a 10 lpm flow as indicated on output manometer (1).

4. Reading on PRESS./SUCTION manometer (4) shall be within minimum and maximum allowable inH_2O specified on Performance Test Sheet. Record reading on Performance Test Sheet.

NOTE

The initial value obtained at a 10 lpm flow at 30M, 42M, and EMER selector knob settings establishes the base line for determining minimum allowable reading for 50 and 90 lpm flows and maximum allowable reading for 0 lpm flow.

Example: Computing minimum allowable reading for 50 lpm at 50 psig, 30M selector knob setting.

A. 10 lpm reading at 50 psig = 1.8 inH_2O.

B. Minus maximum allowable pressure drop = 1.0 inH_2O.

C. Minimum allowable reading for 50 lpm flow at 50 psig = 0.8 inH_2O.

Example: Computing maximum allowable reading for 0 lpm flow at 50 psig, 30M selector knob setting.

A. 10 lpm reading at 50 psig = 1.8 inH_2O.

B. Plus maximum allowable pressure increase = 1.0 inH_2O.

C. Maximum allowable reading for 0 lpm flow at 50 psig = 2.8 inH_2O.

5. Using output valve (C) draw a 50 lpm flow as indicated on output manometer (1).

6. Reading on PRESS./SUCTION manometer (4) shall not decrease more than the specified inH_2O allowable decrease on the Performance Test Sheet. Record reading on Performance Test Sheet.

7. Close output valve (C).

8. Reading on PRESS./SUCTION manometer (4) shall not increase more than the specified inH_2O allowable increase on the Performance Test Sheet. Record reading on Performance Test Sheet.

9. Place selector knob in NORM position.

10. Back out on low PRESS. regulator (N).

11. Place selector knob in 30M position.

12. Using high pressure regulator (Q) slowly set inlet pressure of 500 psig as specified on Performance Test Sheet.

13. Using output valve (C) draw a 10 lpm flow as indicated on output manometer (1).

14. Reading on PRESS./SUCTION manometer (4) shall be within minimum and maximum allowable inH_2O specified on Performance Test Sheet. Record reading on Performance Test Sheet.

15. Using output valve (C) draw a 50 lpm flow as indicated on output manometer (1).

16. Reading on pressure suction manometer (4) shall not decrease more than the specified inH_2O allowable decrease on the Performance Test Sheet. Record reading on Performance Test Sheet.

17. Using output valve (C) draw a 90 lpm flow as indicated on output manometer (1).

18. Reading on PRESS./SUCTION manometer (4) shall not decrease more than the specified inH_2O allowable decrease on the Performance Test Sheet. Record reading on Performance Test Sheet.

19. Close output valve (C).

20. Reading on PRESS./SUCTION manometer (4) shall not increase more than the specified inH_2O allowable increase on the Performance Test Sheet. Record reading on Performance Test Sheet.

21. Place selector knob in NORM position.

22. Turn high pressure regulator (Q) to vent position.

23. Bleed pressure from test stand using system bleed valve (S).

24. Bleed pressure from regulator by turning selector knob to 30M position, then close system bleed valve (S).

25. Repeat steps 2 thru 24 with selector knob in the 42M and EMER position.

26. If the regulator fails the Pressure Breathing Test, refer to paragraph 12-44.

27. Turn off vacuum pump. Close N_2 supply cylinder valve. Using low PRESS. regulator (N) and system bleed valve (S), relieve all pressure in the test stand. Secure all test stand valves. Disconnect A-21 regulator from test stand.

12-44. ADJUSTMENT PROCEDURES FOR 30M, 42M, AND EMER. SPRING GUIDE SCREWS. To adjust 30M, 42M, and EMER. spring guide screws, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

To adjust spring guide screws, refer to figure 12-4 for steps 1 through 21.

1. Remove cover (9) from regulator by removing three screws (1).

2. Using a 0.0312-inch allen wrench, loosen 3 setscrews (2).

3. Ensure all test stand valves are secure, then open N_2 supply cylinder.

4. Connect inlet of regulator to N_2 input connection (18).

5. Connect outlet of regulator to piezometer (26).

6. Turn on vacuum pump.

7. Turn inlet pressure ON/OFF valve (L) ON.

8. Using low press. regulator (N), apply 150 psig to regulator as indicated on N_2 input PRESS. gage (27).

9. Open output valve (C) and draw a 10 lpm flow as indicated on output manometer (1).

10. Turn PRESS. selector valve (D) to H_2O position.

11. Turn selector knob to 30M position.

NOTE

When performing steps 13, 16, and 19 to increase outlet pressure, turn adjusting screws clockwise. To decrease outlet pressure, turn adjusting screws counterclockwise.

12. Using 3/16-inch wrench, hold spring adapter (3) in place.

13. With 10 lpm flow indicated on output manometer (1) adjust spring guide screw (4) to obtain a reading of 1.6 to 2.4 inH_2O as indicated on PRESS./SUCTION manometer (4).

14. Turn regulator selector knob clockwise to 42M position.

15. Using 3/16-inch wrench, hold spring adapter (5) in place.

16. With 10 lpm flow indicated on output manometer (1) adjust spring guide screw (6) to obtain a reading of 5.5 to 6.5 inH_2O as indicated on PRESS./SUCTION manometer (4).

17. Turn regulator selector knob clockwise to EMER position.

18. Using 3/16-inch wrench, hold spring adapter (7) in place.

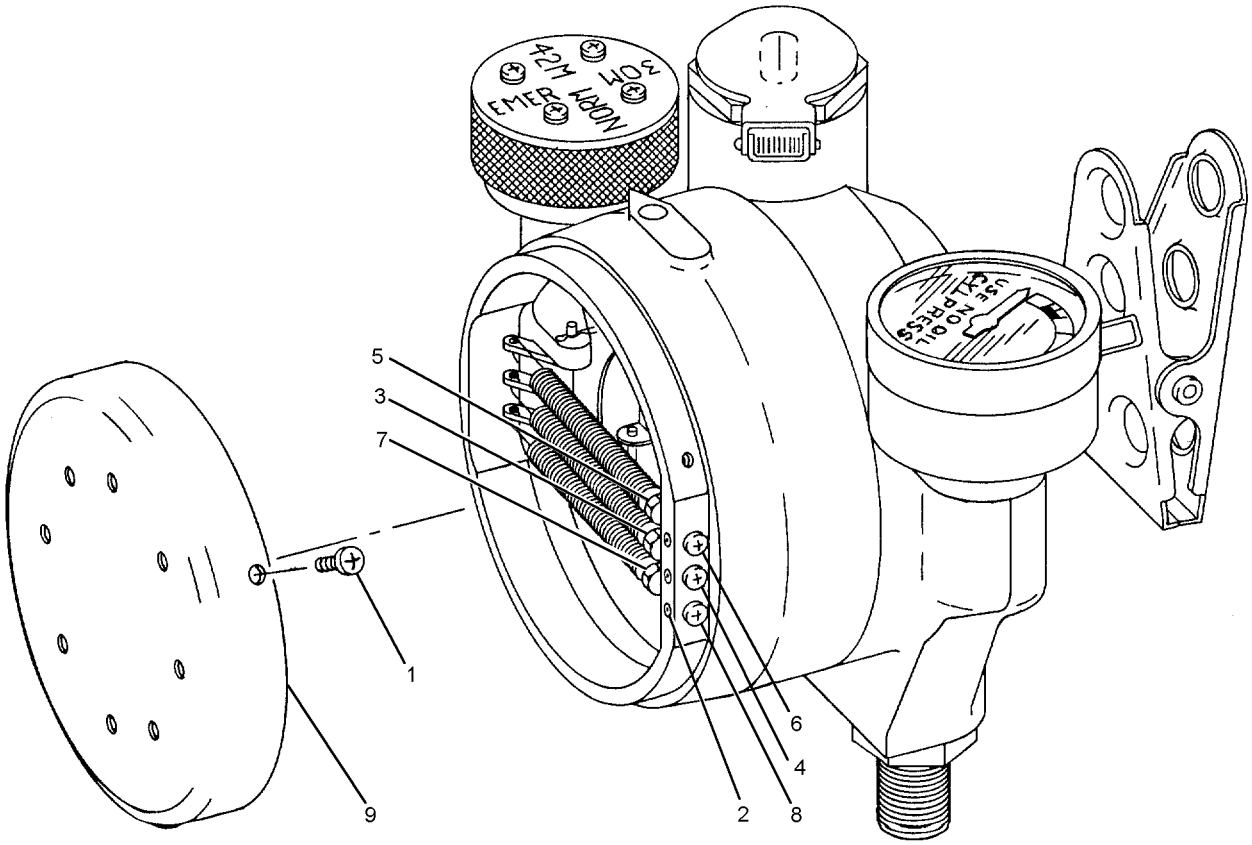

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Figure 12-4. Adjustment of 30M, 42M, and EMER Springs

19. With 10 lpm flow indicated on output manometer (1) adjust spring guide screw (8) to obtain a reading of 12.0 to 14.0 inH_2O as indicated on PRESS./SUCTION manometer (4). Close output valve (C). Place selector knob in NORM position.

20. Tighten 3 setscrews (2) and install cover (9) on regulator and secure in place with three screws (1).

NOTE

At this time it is necessary to perform the Pressure Breathing Test (paragraph 12-43) in its entirety.

12-45. OXYGEN CYLINDER AND REGULATOR PURGE. To perform the Oxygen Cylinder and Regulator Purge, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Anti-seize	MIL-T-27730A, NIIN 00-889-3535 (CAGE 81349)
As Required	Aviator's Breathing Oxygen, Type I	MIL-O-27210

WARNING

Do not use oxygen system components test stand to regulate the oxygen purge pressure.

1. Using anti-seize tape, tape the pipe threads of the inlet adapter.

WARNING

Use extreme care not to damage cylinder and regulator to oxygen cylinder.

2. Install oxygen regulator on oxygen cylinder.

3. Connect regulator filler adapter to a regulated source of aviator's breathing oxygen.

4. Slowly charge the oxygen cylinder to 450 psig.

5. Shut off oxygen source and disconnect regulator and oxygen cylinder from regulated source of aviator's breathing oxygen.

6. Turn selector knob to 30M position and deplete oxygen from oxygen cylinder through regulator.

7. Turn selector knob to NORM position and repeat steps 3 through 6, twice.

NOTE

After purging is completed, fill MA-1 portable walk around unit to 450 psig.

All equipment forwarded from the Organizational Level maintenance to the AIMD shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test/or Calendar Inspection, the organizational custodian shall retain the appropriate forms in accordance with OPNAVINST 4790.2 Series.

CHAPTER 13

AIRCRAFT PANEL MOUNTED OXYGEN REGULATORS 29270 AND 3260011 SERIES

Section 13-1. Description

13-1. GENERAL.

NOTE

For CRU-96/A, P/N 29255-6BB1 and CRU-97/A, P/N 29255-10AB-12, refer to paragraph 13-59 for Bench Testing procedures and paragraph 13-115, step 3 for lamp installation procedures until formal maintenance chapters are incorporated in manual. Record bench test readings utilizing figure 13-3.

13-2. Aircraft Panel Mounted Oxygen Regulators, P/N 29270 and 3260011 Series (CAGE 99251) (figure 13-1), are manufactured by Litton Industries. They are designed to regulate breathing oxygen supplied to the aircrewmember during flight. Table 13-1 contains leading particulars for the regulators.

13-3. All controls and indicators necessary for indication of performance and operation of the regulator are located on an illuminated panel with the regulating components attached to the mounting plate and controls assembly.

13-4. The regulators are panel-mounted, automatic positive pressure diluter demand-type regulators and are used in conjunction with a pressure breathing type oxygen mask. The regulators provide 100% oxygen or an air/oxygen mixture at the correct ratio, depending on altitude, to the user on demand. The regulators incorporate an emergency pressure control toggle. During normal operation, the toggle is set in the NORMAL position. A TEST MASK position is provided to test the oxygen supply function of the regulator at low altitudes and ground level. When in the EMERGENCY position, the regulator delivers 100% oxygen to the user at a positive pressure. The EMERGENCY position is used when inadequate oxygen supply is suspected.

13-5. CONFIGURATION.

13-6. The regulators are supplied in one basic configuration: low pressure (50 to 500 psig operating pressure range).

13-7. FUNCTION.

13-8. Characteristics and performance for which the regulators are designed are described below.

NOTE

Numbers in parentheses relate to numbers in figure 13-2.

1. Supply oxygen is admitted to the regulator through the inlet valve assembly (1) and is registered on the oxygen supply pressure gage (23) regardless of the position of the supply toggle (15). The oxygen passes into the pressure reducer assembly (2) where pressure is reduced to 37 to 47 psig.

2. Air is admitted to the regulator through the aneroid and air shutoff assembly (4). The air oxygen mixture is delivered to the mask by means of a flexible hose attached to the regulator outlet (5).

3. The flow indicator blinker assembly (6) is secured in the mounting panel and is seen through the window in the panel. The pressure drop across the injector assembly (8) operates the blinker assembly. When the face shows white, the blinker is in a breathing cycle. When the flow stops, the pressure is equalized through the flow indicator feedback passage (14). The blinker returns to the normal position and the face shows black. Thus, an indication of flow is shown at each breathing cycle.

4. The demand valve assembly (7) is positioned in a chamber that has three openings. The one at the upstream end of the valve opens into the pressure-reducer chamber. The other two are on the downstream side of the valve. One opens into the flow indicator channel and the other opens into the injector assembly (8). The valve is maintained in its normally closed position by the spring-loaded demand valve lever that is in contact with the valve stem. When the mask wearer inhales, the inner diaphragm (11) moves inward and opens the demand valve through the medium of a linkage system.

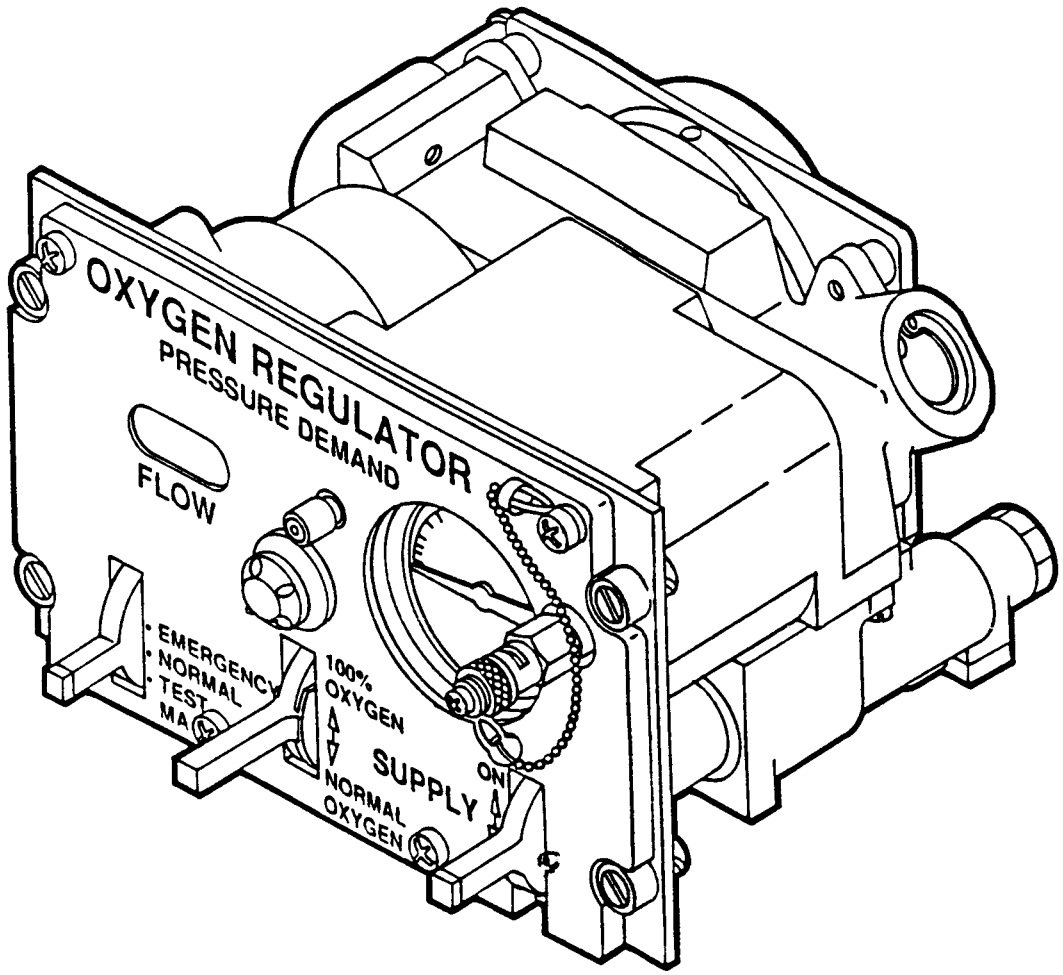

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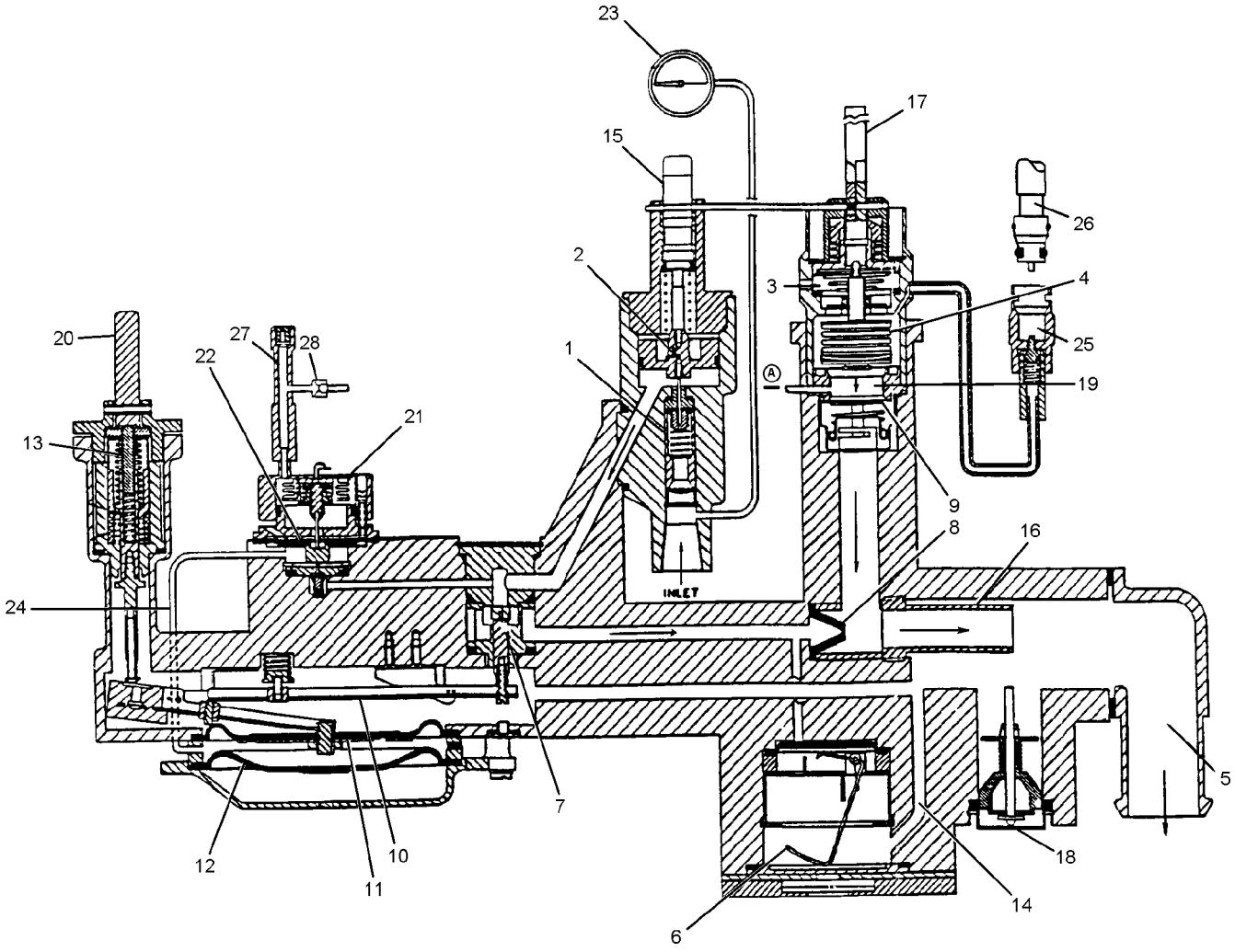
Figure 13-1. Aircraft Panel Mounted Regulator, Low Pressure, P/Ns 29270-10A-B1, 29270-10A-B2, 29270-10A-A1, 3260011-0701, and 3260011-0101



1. INLET VALVE ASSEMBLY
2. PRESSURE REDUCER ASSEMBLY
3. AIR
4. ANEROID/AIR SHUTOFF ASSEMBLY
5. REGULATOR OUTLET
6. FLOW INDICATOR BLINKER ASSEMBLY
7. DEMAND VALVE ASSEMBLY
8. INJECTOR ASSEMBLY
9. CHECK VALVE ADAPTER AND SPRING ASSEMBLY
10. LEVER AND BRACKET ASSEMBLY
11. INNER DIAPHRAGM
12. OUTER DIAPHRAGM
13. MANUAL SAFETY PRESSURE ASSEMBLY
14. FLOW INDICATOR FEED BACK PASSAGE
15. SUPPLY TOGGLE
16. MIXING TUBE
17. DILUTER TOGGLE
18. RELIEF VALVE
19. AIR VALVE FLANGE
20. EMERGENCY PRESSURE TOGGLE
21. PRESSURE BREATHING ANEROID
22. PRESSURE BREATHING SEAT AND MATCHED VALVE ASSEMBLY
23. OXYGEN SUPPLY PRESSURE GAGE
24. PRESSURE BREATHING SENSING TUBE
25. AIR INLET TEST PORT
26. HOSE AND FITTING ASSEMBLY
27. VACUUM PORT
28. AIR SHUTOFF CHECK VALVE

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Figure 13-2. Regulator Operation

Table 13-1. Leading Particulars

Low Pressure	50 to 500 psig
Voltage	6 or 28 Vdc
Mounting	Panel
Operating Altitude Range:	
Normal Breathing	Up to 30,000 ft
Pressure Breathing Starts	At 30,000 ft
Air-Oxygen Mixture	At 32,000 ft
Visual Indicators	Pressure Gage and Flow
Regulator Controls:	Indicator on Front Panel
Diluter Toggle	Selects NORMAL or 100% OXYGEN
Supply Toggle	Opens and closes oxygen supply
Emergency Toggle	For emergency, and ground test of mask
Overall Dimensions:	
Length	5.75 in.
Width	3.00 in.
Height	4.25 in.
Weight	2.75 lb

5. The injector assembly (8) consists of a silicone nozzle and a housing. These are mounted in the regulator housing, downstream from the demand valve assembly (7) and upstream from the mixing tube (16). The injector housing is positioned in the regulator housing so the cutaway portion of the injector is open to the port from the aneroid and air shutoff assembly (4). When the demand valve is opened, oxygen is forced through the nozzle in the injector, and to the oxygen mask. The flow of oxygen through the nozzle causes a low pressure area that opens the check valve adapter and spring assembly, allowing ambient air to mix with the oxygen, when the diluter toggle is at NORMAL OXYGEN and altitude is below 32,000 feet. Excessive pressure in the regulator is prevented by the relief valve (18).

6. The aneroid and air shut off assembly (4) contains an aneroid that gradually expands as atmospheric pressure decreases. Expansion of the aneroid progressively decreases the distance separating a throttling plate and an air valve flange (19) until, at an altitude approximately 32,000 feet, the air passage through the regulator is completely closed.

7. The check valve adapter and spring assembly (9) consists of a spring-loaded disc pressing against a seat at the bottom of the aneroid housing. When seated, the check valve closes the air passage. Inhalation unseats the check valve and allows air to be sucked in through the aneroid and air shut off assembly (4). The air mixes with the oxygen in the mixing tube (16) and the resulting mixture passes to the mask.

8. The lever and bracket assembly (10) is part of a linkage system connecting the inner diaphragm (11) and the demand valve assembly (7). By placing the emergency pressure toggle (20) in the EMERGENCY or TEST MASK position, the lever and bracket assembly will be depressed which, in turn, depresses the demand valve lever and opens the demand valve assembly (7) to permit a flow of oxygen.

9. The manual safety pressure assembly (13) is a mechanism that can be manually operated under emergency conditions to increase the outlet pressure of the oxygen regulator. The mechanism includes the emergency pressure toggle that can be moved to the EMERGENCY, NORMAL, or TEST MASK position.

10. The pressure breathing assembly consists of a pressure breathing aneroid (21) and a pressure breathing seat and matched valve assembly (22). At approximately 30,000 feet the assembly begins to function, delivering an automatic positive pressure to the user.

13-9. SERVICE LIFE.

13-10. Oxygen regulators shall remain in service for as long as they function correctly and do not require excessive repair (exceeds 75% of original cost of regulator). All affected silicone rubber parts shall be replaced whenever a regulator is disassembled for repair.

13-11. REFERENCE NUMBERS, ITEMS AND SUPPLY DATA.

13-12. Section 13-5, Illustrated Parts Breakdown contains information on each assembly, subassembly, and component part of the regulators. The figure and index number, reference or part number, description, units per assembly are provided with the breakdown.

Section 13-2. Modifications

13-13. GENERAL.

13-14. There are currently no authorized modifications for the Aircraft Panel Mounted Oxygen Regulators.

Section 13-3. Performance Test Sheet Preparation

13-15. GENERAL.

13-16. Preparation of Oxygen Regulator Performance Test Sheets require that, through the various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

13-17. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flow must be converted to inches of water pressure (inH_2O), the form of measurement that can be read on the test stand manometers.

NOTE

The various graphs supplied with each Oxygen System Components Test Stand, Model 1172AS100 or Model 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

13-18. The information provided in the tables in this section is to be recorded on the Performance Test Sheet (figure 13-3).

13-19. The Performance Test Sheet (figure 13-3) is a sample only, but may be reproduced for local use.

13-20. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Relief Valve Test.
2. Flow Suction Test.
3. Oxygen Ratio Test.
4. Safety Pressure/Pressure Breathing Test.
5. Blinker (Flow Indicator) Test.
6. Emergency Pressure Test.

13-21. REGULATOR PERFORMANCE TESTS.

13-22. RELIEF VALVE TEST. The relief valve shall vent at least 45 lpm at a specified pressure. The actual 45 lpm flow must be converted to an indicated inH_2O flow by using the nitrogen (N_2) line of the Vent Flow Graph. Convert the actual flow as follows:

1. Locate the 45 lpm line on the bottom of the Vent Flow Graph, and trace the line up to where it intersects the N_2 line.

2. Trace the line on the graph where the lpm and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this information in the appropriate block on the Performance Test Sheet.

13-23. FLOW SUCTION TEST. The Flow Suction Test shall be performed at sea level with the diluter control lever in both the 100% OXYGEN and NORMAL OXYGEN position. Actual (lpm) flows are converted to indicated (inH_2O) flows by using the Sea Level Output Graph. The air line is used for NORMAL OXYGEN flows, and the N_2 line is used for 100% OXYGEN flows. Convert the actual flows as follows.

REGULATOR PERFORMANCE TEST SHEET

29270 AND 3260011
SERIES REGULATORS

DATE _____ TYPE _____ SERIAL NO. _____

TEST STAND SERIAL NO. _____ TESTED BY _____ CDI _____

1. INWARD LEAKAGE TEST _____ 2. OUTLET LEAKAGE TEST _____
3. OXYGEN SUPPLY VALVE LEAKAGE TEST _____ 4. OVERALL LEAKAGE TEST _____
5. PRESSURE GAGE TEST: NOTE: TESTED AT AMBIENT TEMPERATURE OF 70°F.

LOW PRESSURE REGULATOR ONLY

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
50	± 10		
100	± 25		
500	± 25		

6. OUTWARD LEAKAGE TEST _____
7. RELIEF VALVE TEST
   a. VENTS 45 LPM _____ AT 40.7 INH_2O (3 INHg)
   b. LEAKAGE AT 17 INH_2O _____
8. FLOW SUCTION TEST

ALTITUDE	INLET PRESSURE (PSIG)	ACTUAL OUTPUT (LPM)	NORMAL		100 PERCENT		MAXIMUM SUCTION (INH_2O)
			INDICATED OUTPUT	READING	INDICATED OUTPUT	READING	
SEA LEVEL	50	30					-0.50
SEA LEVEL	150	50					-0.70
SEA LEVEL	150	85					-1.0

9. OXYGEN RATIO TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OXYGEN PERCENT		OUTPUT				INPUT				
	MIN	MAX	AVERAGE PERCENT	ACTUAL OUTPUT (LPM)	INDICATED OUTPUT (INH_2O)	CORRECTED INDICATED OUTPUT	ACT HI	ACT LOW	IND HI	IND LOW	READING
10	6	45	25.5	15			14.1	8.25			
10	6	60	33	85			79.9	34			
20	24	55	39.5	15			11.4	6.75			
20	24	80	52	85			64.6	17			
28	60	100	80	15			6	0		0	
28	60	100	80	85			34	0		0	
32	98	100	99	85			1.7	0		0	

10. ANEROID AIR VALVE CLOSURE TEST (28,000 TO 32,000 FEET) PERFORMED ONLY IF REGULATOR FAILS OXYGEN RATIO TEST _____

Figure 13-3. Performance Test Sheet (Sheet 1 of 2)

11. SAFETY PRESSURE/PRESSURE BREATHING TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OUTPUT		PRESSURE (INH_2O)		
	ACTUAL (LPM)	INDICATED (INH_2O)	MINIMUM	READING	MAXIMUM
30	0	0	0.01		2.50
30	85		0.01		2.50
40	0	0	0.30		5.60
40	85		0.30		5.60
43	0	0	5.30		12.50
43	85		5.30		12.50
50	0	0	11.20		18.20
50	85		11.20		18.20

12. BLINKER (FLOW INDICATOR) TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

ALTITUDE/ PRESSURE	DILUTER LEVER	OUTPUT		READING	BLINKER POSITION
		ACTUAL	INDICATED		
SEA LEVEL	NORMAL	20			FULLY OPEN
SEA LEVEL	100%	8			FULLY OPEN
SEA LEVEL	100%	0	0		CLOSE IMMED
17 INH_2O	100%	12			FULLY OPEN
17 INH_2O	100%	0	0		CLOSE IMMED

13. EMERGENCY PRESSURE TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

OUTPUT		DILUTER LEVER	EMERGENCY LEVER	PRESSURE READING	TOLERANCE (INH_2O)
ACTUAL	INDICATED				
10 LPM		NORMAL	EMERGENCY		2.0 TO 4.0
80 LPM		100%	EMERGENCY		1.0 MIN.
10 LPM		100%	TEST MASK		6.0 TO 16.0

NOTES: WITH ZERO FLOW, OUTLET PRESSURE SHALL NOT EXCEED 17.5 INH_2O WITH EMERGENCY PRESSURE CONTROL LEVER IN TEST MASK POSITION. WITH EMERGENCY PRESSURE CONTROL LEVER IN EMERGENCY POSITION, OUTLET PRESSURE SHALL NOT EXCEED 5.5 INH_2O.

14. REGULATOR OXYGEN PURGE: APPLY 500 PSIG TO LOW PRESSURE REGULATORS WITH AVIATORS BREATHING OXYGEN AND FLOW 1 TO 3 MINUTES.

Figure 13-3. Performance Test Sheet (Sheet 2 of 2)

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

1. Locate the desired lpm line (figure 13-3) at the bottom of the Sea Level Output Graph.

2. Trace selected lpm line up to where it intersects the air line (NORMAL indicated output) or N_2 line (100% indicated output).

3. Trace the line from point of intersection across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 13-3.

13-24. OXYGEN RATIO TEST. Actual flows and oxygen percentages (figure 13-3) used for the Oxygen Ratio Test must be converted to indicated flows and oxygen averages. All actual flows must be converted to indicated flows. The results of these computations shall be entered in the appropriate columns within the Oxygen Ratio Test portion of the Performance Test Sheet. To find average oxygen, indicated output, corrected indicated output, actual and indicated input flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

13-25. Average Oxygen. These figures are provided but are computed as follows. Average Oxygen is found by adding the minimum and maximum oxygen percentage (figure 13-3) then dividing the sum by 2 (e.g., 6% + 45% = 51% ÷ 2 = 25.5%).

1. Enter the resulting figure (25.5%) in the appropriate block on the Performance Test Sheet.

2. Repeat this procedure for all minimum and maximum oxygen percentages.

13-26. Indicated Output. To convert the actual output flows (lpm) given in figure 13-3 to Indicated Output flows (inH_2O), proceed as follows:

1. Locate the desired actual output at the bottom of the Output Graph. (figure 13-3).

2. Trace the selected line up to the point of intersection with the appropriate altitude air line.

3. Trace the line on the graph from where the desired lpm and the altitude air lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Output Graph (e.g. 30,000-foot Output Graph or 35,000-foot Output Graph).

5. Repeat steps 1 through 4 for all actual output flows given in figure 13-3.

13-27. Corrected Indicated Output. Corrected Indicated Output is indicated output with the required percentage of nitrogen added. To find Corrected Indicated Output, proceed as follows:

NOTE

Use Oxygen/Air/Nitrogen Conversion Graph provided in NAVAIR 17-15BC-21.

1. Locate the indicated output (inH_2O) at the bottom of the Oxygen/Air/Nitrogen Conversion Graph.

2. Find the average oxygen percentage on the Performance Test Sheet corresponding to the selected indicated output.

NOTE

Select percentage line on Oxygen/Air/Nitrogen Conversion Graph nearest to average oxygen figure selected from Average Oxygen column on Performance Test Sheet.

3. Follow the indicated output line selected on the Oxygen/Air/Nitrogen Conversion Graph up to the appropriate N_2 percentage line.

4. Trace the line on the graph where the selected indicated output and N_2 percentage lines intersect across the left hand column to determine inH_2O.

5. Enter this figure in the appropriate block on the Performance Test Sheet.

6. Repeat steps 1 through 5 for all required indicated output flows.

13-28. Actual High Air. These figures are provided, but are computed as follows. Find the Actual High Air by subtracting the minimum oxygen percentage (figure 13-3) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 6% = 94% x 15 lpm = 14.10 lpm).

1. Enter 14.10 lpm in the actual high air column on the Performance Test Sheet.

2. Repeat the procedures for all minimum oxygen procedures given.

13-29. Actual Low Air. These figures are provided but are computed as follows. Find the Actual Low Air by subtracting the maximum oxygen percentage (figure 13-3) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 45% = 55% x 15 lpm = 8.25 lpm).

1. Enter 8.25 lpm in the actual low air column on the Performance Test Sheet.

2. Repeat the procedures for all maximum oxygen percentages given.

13-30. Indicated High Air (Input). To convert Actual High Air to Indicated High Air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Input Graph (e.g. 30,000-foot Input Graph or 35,000-foot Input Graph).

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all Actual High Air figures previously entered on Performance Test Sheet.

13-31. Indicated Low Air (Input). To convert Actual Low Air to Indicated Low Air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all Actual Low Air figures previously entered on Performance Test Sheet.

13-32. SAFETY PRESSURE AND PRESSURE BREATHING TEST. Actual output flows (lpm) given in the Safety Pressure Breathing Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

1. Locate the desired actual output (figure 13-3) at the bottom of the Test Stand Output Graph.

2. Trace the selected line up to where it intersects the N_2 line, then across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 43,000 feet are converted using the 45,000-foot N_2 line on the Output Graph, or the 45,000-foot Output Graph.

4. Repeat steps 1 through 4 for all actual flows given in the Safety Pressure and Pressure Breathing Test section on Performance Test Sheet.

13-33. BLINKER (FLOW INDICATOR) TEST. Actual output flows (lpm) for the Blinker Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows refer to paragraphs 13-34 through 13-36.

13-34. Diluter Toggle Normal Oxygen Position. Use the air line of the Sea Level Output Graph.

1. Locate the actual output (figure 13-3) at the bottom of the graph and trace the selected line up to the air line.

2. Trace the line where the actual output and air lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

13-35. Diluter Toggle 100 Percent Oxygen Position (Sea Level). Use the N_2 line on the Sea Level Output Graph.

1. Locate actual output (lpm) (figure 13-3) at the bottom of the graph and trace the selected line up to the N_2 line.

2. Trace the line where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

13-36. Diluter Toggle 100 Percent Oxygen Position (17 inH_2O). Use the 50,000-foot N_2 line on the Output Graph.

1. Locate actual output (lpm) (figure 13-3) at the bottom of the Output Graph (or 50,000-foot Output Graph) and follow selected line up to the 50,000-foot N_2 line.

2. Trace the line where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

13-37. EMERGENCY PRESSURE TEST. Actual output flows (lpm) specified for the Emergency Pressure Test can be found in the Emergency Pressure Test section of the Performance Test Sheet. Actual flows must be converted to indicated flows (inH_2O). To convert the flows, refer to paragraphs 13-38 through 13-39.

13-38. Diluter Toggle Normal Oxygen Position. Use air line of Sea Level Output Graph.

1. Locate the actual output (lpm) (figure 13-3) at the bottom of the Sea Level Output Graph and trace the selected line up to the air line.

2. Trace the line where the actual output and air lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

13-39. Diluter Toggle 100 Percent Oxygen Position. Use the N_2 line on the Sea Level Output Graph.

1. Locate the actual output (lpm) (figure 13-3) at the bottom of the Sea Level Output Graph and trace the selected line up to the N_2 line.

2. Trace the line where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

Section 13-4. Maintenance

13-40. GENERAL.

13-41. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly, and adjusting of aircraft panel mounted oxygen regulators.

NOTE

The regulators shall be considered beyond economical repair when the cost of repair parts exceeds 75% of original cost of regulator. Upon completion of any maintenance action (e.g., inspection, repair, modification, etc.), be sure to complete the required Maintenance Data Collection System forms.

13-42. Procedural steps outlined in this section are listed under the aircraft inspection cycle in which they are required, and are in the sequence in which they normally occur.

13-43. Bench Test shall be performed on aircraft panel mounted oxygen regulators prior to be being placed in service, and during the Phase/Calendar or Standard Depot Level Maintenance (SDLM) inspection cycle of the aircraft in which installed. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. The regulators shall also be subjected to a Bench Test if malfunction is suspected, and after repair or replacement of damaged parts. To ensure damage did not occur during extensive transportation and shipment (via commercial/US Mail); all regulators shall be subjected to a Bench Test, when received from supply, prior to being placed in service.

13-44. Bench Test shall be performed using Oxygen Systems Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate ground support equipment manual for identification of test stand controls and indicators referred to in Bench Test.

13-45. Due to the complexity of the Model 1172AS100 or 1316AS100 test stands, it is essential that the operator become thoroughly familiar with the test stand prior to performing Bench Test. Refer to appropriate ground support equipment manual.

13-46. INSPECTION.

13-47. TURNAROUND/PREFLIGHT/POST FLIGHT/TRANSFER INSPECTION. The Turnaround/Preflight/Postflight/Transfer Inspection consists of a Visual Inspection performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 13-2 for assistance in troubleshooting. To perform the inspection, visually inspect the following:

1. Electrical performance of panel light.

2. Legibility of all markings.

3. Plastic lighting plate for cracks and discoloration.

4. Low, or improper reading on pressure gage.

5. Emergency pressure control toggle in NORMAL position.

6. Diluter control toggle in 100% OXYGEN position.

7. Supply control toggle in OFF position.

8. Regulator and surrounding area for freedom from dirt and hydrocarbons.

9. Delivery hose and connector for cuts, fraying, kinking, hydrocarbons, and general condition.

13-48. If discrepancies are found or suspected, Maintenance Control shall be notified.

13-49. Regulators that do not pass inspection and cannot be repaired in the aircraft shall be removed and replaced by Ready-For-Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

13-50. ACCEPTANCE/SPECIAL/DAILY INSPECTION. The Acceptance/Special/Daily Inspection consists of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 13-2 for assistance in troubleshooting. To perform the inspection, proceed as follows:

WARNING

Make certain that when working with oxygen; clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

13-51. Visual Inspection. Visually inspect the regulators in accordance with paragraph 13-58.

13-52. Functional Test. To perform Functional Test, proceed as follows:

1. Place supply valve control toggle in ON position.

2. Place diluter control toggle in NORMAL OXYGEN position.

3. Connect oxygen hose quick disconnect. Place mask to face and inhale. Proper regulator operation will be indicated by flow indicator assembly showing white during inhalation and black during exhalation.

NOTE

While at ground level, the regulator will not normally supply oxygen from the supply system to the mask. The emergency pressure control toggle must therefore be used in order to check out the oxygen supply function of the regulator at low altitudes. The emergency toggle is spring loaded at the NORMAL position and will return to NORMAL when released.

4. Hold emergency pressure toggle in TEST MASK position and observe flow indicator. Flow indicator should be white, indicating a flow through regulator.

13-53. Upon completion of Functional Test, secure regulator as follows:

1. Disconnect mask from supply hose.

2. Ensure that emergency pressure control toggle returns to NORMAL position.

3. Place diluter control toggle in 100% OXYGEN position.

4. Place supply valve control toggle in OFF position.

13-54. If discrepancies are found or suspected, Maintenance Control shall be notified.

13-55. Regulators that do not pass inspection and cannot be repaired in the aircraft shall be removed and replaced by Ready-For-Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

13-56. CALENDAR/PHASED/SDLM INSPECTION. Calendar, Phased, or SDLM Inspection require removal of the regulators from the aircraft. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be inspected and bench tested. All work shall be performed in a clean dust-free and oil-free area.

13-57. Aircraft Panel Mounted Oxygen Regulators failing Visual Inspection or Bench Test shall be repaired. SM&R codes define reparability of components and the lowest level of maintenance authorized. Instructions can be found in the current issue of Naval Aviation Maintenance Program, OPNAVINST 4790.2 (Series).

13-58. Visual Inspection. To visually inspect the regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Lint-free, White	MIL-C-85043

1. Inspect regulator inlet and outlet for foreign objects, dirt, corrosion, bends, dents, cracks, damaged threads, and any other obvious damage.

2. Ensure that regulator inlet filter is properly installed.

3. Inspect regulator body for bends, dents, cracks, corrosion, condition and legibility of nameplate, security of screws and fittings, and any other obvious damage.

4. Inspect regulator for wear/contamination as follows:

NOTE

It has been determined that this form of lead contamination poses no threat to aircrewmember's health.

Index numbers in parentheses refer to Figure 13-6.

a. Disassemble diaphragm assembly of regulator in accordance with paragraph 13-86.

NOTE

Contamination can be seen in the form of powder that is dull black/gray in color.

b. Using a clean lint-free piece of white cloth, swab area around emergency pressure lever and bracket assembly (121). Examine cloth for traces of contamination.

NOTE

If no contamination is found, assemble the diaphragm assembly in accordance with paragraph 13-110 and perform bench test. If wear/contamination is found, proceed with steps c through f.

c. Disassemble regulator in accordance with paragraph 13-76.

d. Clean the disassembled parts in accordance with paragraph 13-90.

e. Assembly regulator in accordance paragraph 13-96. Ensure emergency pressure lever assembly is replaced with new assembly.

f. Bench Test assembled regulator in accordance with paragraph 13-59.

Table 13-2. Troubleshooting (Daily, Preflight, Special, Turnaround, Transfer, and Acceptance Inspection)

Trouble	Probable Cause	Remedy
Regulator fails to deliver oxygen with emergency toggle in emergency position.	Failure of demand valve to operate.	Replace regulator.
Howling sound or vibration noise emitted from regulator.	Pressure reducer faulty.	Replace regulator.
Regulator delivers constant flow of oxygen when all toggles are in OFF/NORMAL position.	Oxygen inlet valve or demand valve is leaking.	Replace regulator.
Oxygen cylinder pressure gage fails to indicate proper pressure.	Defective gage.	Replace regulator.
	Blocked or leaking supply line.	Replace or clean supply line to regulator.
	Low cylinder pressure.	Refill.
	Defective inlet valve assembly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and other than EMERGENCY setting on regulator.	Regulator controls improperly position.	Correct position of controls.
	Hose to mask is kinked.	Straighten hose and reposition outlet.
	Regulator not functioning properly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and regulator control set at EMERGENCY.	Kink or other malfunction between hose and mask.	Replace or readjust equipment as necessary.
	Faulty linkage from emergency pressure control toggle.	Replace regulator.
Oxygen available at mask but flow is not indicated.	Defective blinker assembly.	Replace regulator.
Gage pressure drops when regulator is not in use.	Loose or leaking connections.	Tighten or replace connections as necessary.
	Defective inlet valve assembly.	Replace regulator.
Panel lamp fails to light.	Burned out lamp.	Replace lamp.
	Faulty lamp assembly.	Replace regulator.
	Faulty electrical hookup to power source.	Repair electrical hookup (figure 13-4).

13-59. BENCH TEST.

13-60. The Bench Test shall be performed using Oxygen Systems Components Test Stand, Model 1172AS100 or 1316AS100. Proceed as follows:

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type 1, Class 1, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators. Do not use 3500 psig cylinders. These cylinders can not be certified contaminant free.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

NOTE

Nitrogen supply cylinders utilized in testing oxygen components contain a maximum pressure of 1800 psig. For tests requiring pressures of 1800 psig, utilize highest available pressure, but in no case shall this pressure be less than 500 psig.

Tests are arranged so they proceed from one test to the next with a minimum of flow and altitude changes. Troubleshooting tables are provided following each test.

13-61. Unless otherwise specified in specific tests, the pressure applied, control toggle settings, flows drawn, etc., shall be the same for all regulators.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

13-62. INWARD LEAKAGE TEST. To perform the inward leakage test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	NAVAIR Dwg No. 1172AS136
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

WARNING

Prior to use, inspect leak detection compound. Compound that is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

NOTE

Regulators Bench Tested in this chapter have been designed with test ports located on the face plate. The test ports will not be used during Bench Testing, however the test ports will be checked for leakage.

1. Ensure test stand valves are closed and then open N_2 supply cylinder valve.

2. Place regulator supply control valve lever in the OFF position, and the diluter control lever in the 100% OXYGEN position.

3. Ensure regulator emergency pressure control lever is in NORMAL position. Cap regulator inlet.

NOTE

Regulator shall be mounted on a horizontal plane in the test chamber.

4. If using the Model 1316AS100 test stand, proceed to step 5. If using the Model 1172AS100 test stand, perform the inward leakage test as follows:

a. Using an adapter (NAVAIR Drawing No. 1172AS136), connect the regulator outlet to N_2 INPUT connection (18) in the altitude chamber.

b. Connect a line from LOW PRESS. connection (19) to REF. TAP and connection (21) in altitude chamber. Plug the rubber hose attached to piezometer (26) using piezometer plug supplied with test stand.

WARNING

Ensure that no pressure is indicated on regulated high pressure gage (10), regulated low pressure gage (11), and N_2 input pressure gage (27).

Ensure LOW PRESS. REGULATOR (N) is not loaded. This will prevent N_2 supply cylinder pressure from passing on to INLET PRESS. ON/OFF valve (L), which could damage the test item or cause injury to the test stand operator.

c. Turn INLET PRESS. ON/OFF valve (L) to the ON position.

CAUTION

Vacuum pump vent (54) must be opened one to two turns when operating vacuum pump. Refer to appropriate ground support equipment manual.

d. Turn vacuum pump on.

e. Turn PRESS. SELECTOR valve (D) to the H_2O position. Fully open LEAKAGE CONTROL valve (E).

f. Ensure LEAKAGE SELECTOR valve (F) is in HIGH RANGE position.

NOTE

HIGH RANGE LEAKAGE rotameter (8) is calibrated with an applied pressure of 70 psig. The inward leakage test requires that a suction of 9.0 inH_2O be applied to the regulator outlet and the rotameter. This pressure difference (9.0 inH_2O vice 70 psig) creates a wide variance between actual leakage and indicated leakage. The maximum allowable leakage for the inward leakage test is 200 ccm. An actual leakage of 200 ccm will be displayed on HIGH RANGE LEAKAGE rotameter (8) as an indicated 740 ccm.

g. Slowly open OUTPUT valve (C) until a suction of 9.0 inH_2O is indicated on PRESS./SUCTION manometer (4). Any leakage will be displayed on HIGH RANGE LEAKAGE rotameter (8). The maximum allowable indicated leakage is 740 ccm (actual 200). Record indicated leakage on the Performance Test Sheet.

h. Close OUTPUT valve (C) and LEAKAGE CONTROL valve (E). Turn vacuum pump OFF. Turn INLET PRESS. ON/OFF valve (L) to the OFF position.

i. Disconnect line from LOW PRESS. connection (19) and REF. TAP and connection (21) in altitude chamber. Disconnect regulator outlet from N_2 INPUT connection (18). Remove piezometer plug from piezometer (26). Remove cap from regulator inlet.

j. If excessive leakage is indicated, locate probable cause, using troubleshooting table 13-3.

5. If using the Model 1316AS100 test stand proceed as follows:

a. Connect piezometer (26) to regulator outlet. Connect a line from REF. TAP and connection (21) to 20 to 200 ccm leakage connection (20) in altitude chamber.

CAUTION

Vacuum pump vent (54) must be opened one to two turns when operating vacuum pump. Refer to appropriate ground support equipment manual.

b. Turn vacuum pump on.

c. Turn PRESS. SELECTOR valve (D) to the H_2O position.

d. Open OVERBOARD toggle (T).

e. Ensure LEAKAGE SELECTOR valve (F) is in HIGH RANGE position.

f. Open INWARD REF. TAP (P) until 9.0 inH_2O suction is indicated on PRESS./SUCTION manometer (4). Any leakage will be displayed on leakage rotameter (6). The maximum allowable indicated leakage is 200 ccm. Record indicated leakage on the Performance Test Sheet.

g. Close INWARD REF. TAP (P) and OVERBOARD toggle (T). Disconnect line from 20 to 200 ccm leakage connection (20) and REF. TAP and connection (21) in altitude chamber. Turn vacuum pump OFF and disconnect piezometer (26) from regulator outlet.

h. If excessive leakage is indicated, locate probable cause, using troubleshooting table 13-3.

Table 13-3. Troubleshooting (Inward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Leakage through aneroid and air shutoff valve assembly.	Air shutoff sleeve (64) damaged.	Replace air shutoff sleeve (64).
	Gasket (73) damaged.	Replace damaged gasket (73).
Leakage at outlet.	Packing (94) damaged.	Replace damaged packing (94).
	Loose screws (94).	Tighten screws (91).
	Faulty assembly.	Replace seat (86) and valve (88).
Notes: 1. Probable causes in Table 13-7. Troubleshooting (Outward Leakage Test) and Table 13-8. Troubleshooting (Relief Valve Test) could also cause excessive inward leakage.		

13-63. OUTLET LEAKAGE TEST. To perform Outlet Leakage Test, proceed as follows.

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Place regulator supply valve control toggle in ON position.

2. Place diluter control toggle in 100% OXYGEN position.

3. Ensure regulator emergency pressure control lever is in NORMAL position.

4. Connect regulator inlet to N_2 INPUT connection (18) in the altitude chamber.

5. Using LOW PRESSURE REGULATOR (N), apply 150 psig to the regulator inlet.

6. Slowly turn INLET PRESS. ON/OFF valve (L) to ON.

7. Activate emergency pressure control toggle to allow flow through the regulator. Return toggle to NORMAL position.

8. Draw a film of leak detection compound across the regulator outlet. Film shall not advance more than 1/2 inch in ten seconds. If film advance is more than allowable, repeat test three or four times. (Distention could be caused by difference in temperature between inside and outside of regulator.) Record reading on Performance Test Sheet.

9. If film advance continues to be more than allowed, locate probable cause using troubleshooting table 13-4.

10. Relieve pressure on test stand to 50 psig by backing out on LOW PRESSURE REGULATOR (N) and using SYSTEM BLEED VALVE (S).

Table 13-4. Troubleshooting (Outlet Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Demand valve assembly leaking.	Damaged demand valve bushing (130 or 141).	Replace defective part(s).
	Damaged packings (126, 127, 131, 137 or 139).	
	Damaged seat (125 or 138).	
	Damaged stem assembly (129 or 140).	
Demand valve loading.	Manual safety pressure assembly (44) out of adjustment.	Adjust screw (4, figure 13-8) clockwise.
Seat and matched valve assembly (83 and 85) leaking.	Out of adjustment.	Adjust aneroid assembly (75) farther away from assembly.
	Faulty assembly.	Replace seat (83) and valve (85).

13-64. OXYGEN INLET VALVE LEAKAGE TEST. To perform the Oxygen Inlet Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Place regulator supply valve control toggle in OFF position.

2. Place emergency control toggle in EMERGENCY position.

3. Using HIGH PRESS. REGULATOR (Q), apply 500 psig to inlet of regulator.

4. Draw a film of leak detection compound across the regulator outlet.

5. There is no allowable leakage. Record reading on Performance Test Sheet. If leakage is noted locate probable cause using troubleshooting table 13-5.

13-65. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Perform this test with diluter toggle in 100% OXYGEN position, and then in the NORMAL OXYGEN position.

1. Place regulator oxygen inlet valve control toggle in ON position, Place emergency pressure control toggle in NORMAL position.

Table 13-5. Troubleshooting (Oxygen Inlet Valve Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-10.		
Inlet valve (52, figure 13-6) leaking.	Valve stem (21) leaking.	Replace valve stem (21).
	Seat insert (22) leaking.	Replace seat insert (22).
	Valve (18) leaking.	Replace valve (18).
	Seat (19) leaking.	Replace seat (19).
	Out of adjustment.	Adjust in accordance with paragraph 13-101.
	Cracked inlet body (23).	Replace body (23).

2. Ensure 500 psig pressure is still applied to regulator inlet.

3. Turn INLET PRESS. ON/OFF valve (L) to OFF. Leave regulator oxygen inlet valve toggle in ON position.

4. Leakage will be indicated on the regulator pressure gage. Allowable leakage shall not exceed 60 psig over a two-minute period. Record reading on Performance Test Sheet.

5. If leakage is excessive, locate probable cause using troubleshooting chart, table 13-6.

6. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed regulator by placing emergency pressure control toggle in EMERGENCY position, return toggle to NORMAL.

8. Bleed test stand using SYSTEM BLEED (S).

13-66. REGULATOR PRESSURE GAGE SCALE AND ERROR TEST. To perform the Regulator Pressure Gage Scale and Error Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Turn INLET PRESS. ON/OFF valve (L) to ON.

CAUTION

LOW PRESS. REGULATOR (N) can only be used when applying pressures of below gage guard setting (165 to 175 psig) to an item under test. For pressures above gage guard setting, HIGH PRESS. REGULATOR (Q) must be used.

NOTE

Regulator pressure gage readings must be recorded twice, once before and once after tapping regulator pressure gage.

2. Using LOW PRESS. REGULATOR (N), slowly increase pressure to each test pressure 50 and 100 psig as specified in figure 13-3.

3. Check tolerance by comparing regulator pressure gage with test stand LOW/HIGH pressure gages. Record reading on Performance Test Sheet.

4. Back out on LOW PRESS. REGULATOR (N) until 70 psig is indicated on REGULATED LOW PRESSURE GAGE (11).

Table 13-6. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Excessive leakage.	Pressure gage screws (21) loose.	Tighten screws.
	Faulty pressure gage or pressure gage tubing.	Replace pressure gage assembly (1, figure 13-7).
	Inlet valve housing screws (50) loose.	Tighten screws.
	Damaged packing (22).	Replace packing (22).
	Manual safety pressure assembly (44) loading diaphragm.	Adjust screw (4, figure 13-8) clockwise as required.

5. Using HIGH PRESS. REGULATOR (Q), apply 500 psig. Record reading on Performance Test Sheet.

6. Turn INLET PRESS. ON/OFF valve (L) to OFF.

7. Turn HIGH PRESS. REGULATOR (Q) to VENT.

8. Bleed test stand to 70 psig using SYSTEM BLEED (S). Bleed regulator by placing emergency pressure control toggle in EMERGENCY position, return toggle to NORMAL.

13-67. OUTWARD LEAKAGE TEST. To perform Outward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

During this test the relief valve shall not be covered. The allowable leakage through this valve at 17 inH_2O is included in the maximum allowable leakage, 0.12 lpm (120 ccm).

1. Place regulator inlet valve control toggle in ON position, and diluter control toggle in NORMAL OXYGEN position. Cap regulator inlet valve.

2. Connect regulator outlet to piezometer (26) in altitude chamber.

3. Connect a line from LOW PRESS. connection (19) to REF. TAP and connection (21) in altitude chamber.

4. Ensure INLET PRESS. ON/OFF valve (L) is in the OFF position.

5. Adjust LOW PRESS. REGULATOR (N), until 70 psig is indicated on REGULATED LOW PRESS. gage (11).

6. Turn PRESS. SELECTOR valve (D) to H_2O position, and slowly open LEAKAGE CONTROL valve (E) until 17 inH_2O is indicated on PRESS/SUCTION manometer (4).

NOTE

Maintain 17 inH_2O with LEAKAGE CONTROL valve (E) throughout the test.

7. If no leakage is indicated on HIGH RANGE LEAKAGE rotameter (8), turn LEAKAGE SELECTOR valve (F) to low range position, and check for indication of leakage on LOW RANGE LEAKAGE rotameter (7). Allowable leakage is 0.12 lpm (120 ccm).

8. Switch LEAKAGE SELECTOR valve (F) to HIGH position, and close LEAKAGE CONTROL valve (E).

9. Repeat steps 6, 7, and 8 with diluter control lever 100% OXYGEN position.

10. If leakage is excessive, locate probable cause using troubleshooting table 13-7.

Table 13-7. Troubleshooting (Outward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Plug (99) leaking.	Faulty preformed packing (97).	Replace packing (97).
Outlet leaking.	Loose screws (88).	Tighten screws (88).
	Damaged packing (91).	Replace packing (91).
Inlet valve (52) leaking.	Loose screws (50).	Tighten screws (50).
	Damaged packing (55).	Replace packing (55).
Diaphragm cover (108) leaking.	Loose screws (106).	Tighten screws (106).
	Ruptured diaphragm (108).	Replace diaphragm (108).
Diaphragm (115) leaking.	Improper installation or assembly.	Reassemble diaphragm (figure 13-14) or replace diaphragm assembly (112).
Flow indicator leaking.	Damaged packing (30).	Replace faulty parts.
	Damaged gasket (16) if installed.	
	Bent washer (32).	
	Ruptured diaphragm (36).	
Manual safety pressure assembly leaking.	Damaged packing (45).	
	Damaged washer (7, figure 13-8).	
Check valve adapter and spring assembly leaking.	Damaged check valve disc or adapter (2 or 1, figure 13-11).	
	Damaged gaskets (72 or 74).	
Test port assemblies leaking.	Damaged items 23 through 28.	
	Damaged packing (12).	
	Damaged tubes (23, 46, and 47).	
	Damaged cap assembly (11).	

13-68. RELIEF VALVE TEST. To perform the Relief Valve Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	NAVAIR Dwg No. 1172AS136
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Turn PRESS. SELECTOR valve (D) to Hg position, and place FLOW SELECTOR valve (M) in SUIT SIMULATOR position.

2. Place diluter control lever is in 100% OXYGEN position and oxygen supply toggle on regulator to the OFF position.

3. Using VENT PRESS. valve (H), slowly apply 3 inches of mercury (inHg) to the regulator outlet. Regulator relief valve shall be venting at least 45 lpm as indicated on VENT FLOW manometer (3). Record reading on Performance Test Sheet.

4. Close VENT PRESS. valve (H), open VENT AMBIENT valve (I), place FLOW SELECTOR valve (M) in REGULATOR position, and close valve (I).

5. Slowly move PRESS. SELECTOR valve (D) to H_2O position.

6. Turn LEAKAGE SELECTOR valve (F) to LOW range position.

7. Open LEAKAGE CONTROL valve (E). Apply and maintain 17 inH_2O to regulator outlet. Maximum allowable leakage is 0.12 lpm (120 ccm). Record reading on Performance Test Sheet.

8. Close LEAKAGE CONTROL valve (E).

9. Bleed pressure on test stand to 50 psig using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S).

10. Turn LEAKAGE SELECTOR valve (F) to HIGH range position.

11. If excessive leakage is found or if relief valve fails to vent, locate probable cause using troubleshooting table 13-8.

13-69. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

Table 13-8. Troubleshooting (Relief Valve Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-13.		
Leakage in excess of 0.01 lpm.	Relief valve (figure 13-13) out of adjustment.	Adjust by turning nut (1) clockwise.
	Weak spring (3).	Replace spring (3).
Relief valve fails to vent 45 lpm.	Spring (3) tension too strong.	Replace spring (3).
	Nut (1) out of adjustment.	Turn nut (1) counterclockwise.
	Sticking valve disc (6).	Replace disc (6).

1. Disconnect hose from LOW PRESS. connection (19) to REF. TAP and connection (21) in altitude chamber.

2. Turn vacuum pump ON.

3. Ensure PRESS. SELECTOR valve (D) is in the H_2O position.

4. Ensure INLET PRESS. ON/OFF valve (L) is ON.

5. Place regulator inlet valve control toggle in ON position.

6. Using LOW PRESS. REGULATOR (N), set the inlet pressure at each inlet pressure specified on Performance Test Sheet.

NOTE

Readings must be recorded with the regulator diluter toggle in both NORMAL and 100% OXYGEN positions for each outlet flow specified on Performance Test Sheet.

Ensure inlet pressure is maintained when applying outlet flows.

7. Using OUTPUT valve (C), set flows specified in Performance Test Sheet on OUTPUT manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record readings on Performance Test Sheet.

NOTE

With no suction on regulator (OUTPUT valve (C) closed), maximum flow through regulator shall not exceed 0.01 lpm. This will cause a slight rise in PRESS./SUCTION manometer (4).

8. Close OUTPUT valve (C).

9. If regulator fails the Flow Suction Test, locate probable cause using troubleshooting table 13-9.

13-70. OXYGEN RATIO TEST. To perform the Oxygen Ratio Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

Table 13-9. Troubleshooting (Flow Suction Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Flow indicator leaking (high suction).	Damaged blinker assembly (34).	Replace blinker assembly (34).
	Damaged packing (30), gasket (16, if installed), washer (32), or diaphragm (36).	Replace defective part(s).
Injector assembly (high or low suction).	Stiff injector nozzle (94).	Replace injector nozzle (94).
Inlet valve assembly.	(High suction) clogged filter (15, figure 13-10).	Replace filter (15).
	(High or low suction) inlet valve assembly (49) out of adjustment.	Adjust inlet valve assembly in accordance with paragraph 13-101.
Low flow suction 100% mode.	Demand valve seat (128 or 141) ports not aligned with regulator housing ports from inlet valve assembly (49).	Align seat ports with regulator housing ports.

1. Ensure regulator inlet valve control toggle is in ON position, and diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N) apply 50 psig to regulator inlet.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

Slowly open VACUUM CONTROL valve (B) and observe PRESS./SUCTION manometer (4). If rapid increase in pressure is indicated, close down on VACUUM CONTROL valve (B) until pressure stabilizes. This rapid increase of pressure shown on PRESS./SUCTION manometer (4) is caused by too fast a rate of climb in the altitude chamber.

3. Using VACUUM CONTROL valve (B), ascend to first test altitude shown on Performance Test Sheet.

4. Set output flows specified in Performance Test Sheet with OUTPUT valve (C) and stabilize altitude with INPUT valve (A).

5. Read INPUT FLOW manometer (2), and record readings on Performance Test Sheet.

6. Continue the test for each specified altitude and outlet flow shown on Performance Test Sheet.

7. Close OUTPUT valve (C) and INPUT valve (A). Descend to 30,000 feet using CHAMBER BLEED valve (K).

NOTE

If indicated input flows are not within limits, an Aneroid Closure Test must be performed.

8. If Oxygen Ratio Test was satisfactory, proceed to Safety Pressure and Pressure Breathing Test (paragraph 13-72).

13-71. ANEROID CLOSURE TEST. To perform the Aneroid Closure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Aneroid Closure Test is performed only if regulator fails Oxygen Ratio Test.

1. Descend to 25,000 feet using CHAMBER BLEED valve (K).

2. Ensure inlet pressure is set at 50 psig.

3. Set up a flow of 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C).

4. Aneroid shall close between 28,000 and 32,000 feet, as indicated by no further advance in altitude on LOW RANGE ALTM. (13).

5. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

6. If regulator fails Aneroid Closure Test and/or Oxygen Ratio Test, locate probable cause using troubleshooting table 13-10.

13-72. SAFETY PRESSURE AND PRESSURE BREATHING TEST. To perform the Safety Pressure and Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Table 13-10. Troubleshooting (Oxygen Ratio/Aneroid Closure Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Incorrect oxygen ratio at 10,000 and 15,000 feet (low air).	Excessive check valve spring (3, figure 13-11).	Turn adjusting screw retainer (5, figure 13-11) counterclockwise.
	Leaking injector sleeve (93).	Tighten mixing tube (92) or replace packing (91).
	Incorrectly positioned injector sleeve (93).	Align port in injector sleeve with port in regulator.
High air at 10,000 and 15,000 feet.	Insufficient check valve spring (3, figure 13-11).	Turn adjusting retainer (5, figure 13-11) clockwise or replace spring.
Low air at 20,000 feet.	Distance to short between throttling plate (64) and aneroid housing (69).	Install shorter shouldering screw (63).
High air at 20,000 feet.	Distance to great between throttling plate (64) and aneroid housing (69).	Install longer shouldering screw (66).
Incorrect oxygen ratio at 25,000 to 30,000 feet.	Aneroid (68) incorrectly adjusted.	Too high turn aneroid (68) counter-clockwise. Too low turn aneroid (68) clockwise.

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure inlet pressure is set at 50 psig.

NOTE

If chamber altitude is not at 30,000 feet adjust altitude, use VACUUM CONTROL valve (B) to increase altitude or CHAMBER BLEED valve (K) to decrease altitude.

2. Using OUTPUT valve (C), draw flows of 0 and 85 lpm through the regulator. Delivery pressure must be within limits shown on Regulator Performance Test Sheet. Record reading on Performance Test Sheet.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

NOTE

Readings for 0 and 85 lpm must also be recorded at each test altitude

3. Repeat step 2 for each altitude shown on Performance Test Sheet.

4. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

5. If safety pressure/pressure breathing flows are not within limits, locate probable cause using troubleshooting table 13-11.

13-73. BLINKER ASSEMBLY TEST. To perform the Blinker Assembly Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Table 13-11. Troubleshooting (Safety Pressure/Pressure Breathing Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Low safety pressure/pressure breathing.	Pressure breathing aneroid (75) or setscrew (3, figure 13-12) too far from valve control diaphragm (81).	Adjust aneroid or setscrew closer to valve control diaphragm.
High safety pressure/pressure breathing.	Pressure breathing aneroid (75) or pressure adjusting screw (3, figure 13-12) too close to valve control diaphragm (81).	Adjust aneroid or setscrew farther from valve control diaphragm.
Safety pressure creeps at zero flow.	Seat (83) and matched valve assembly (85) leaking.	Replace seat (83) and matched valve assembly (85).
Safety pressure drops below minimum at higher flows.	Tube and ring assembly (109) leaking or improperly installed.	Replace preformed packing (111) or install tube and ring (109) correctly.
	Inner diaphragm (112) or outer diaphragm (108) damaged or improperly installed.	Replace or install correctly.

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	NAVAIR Dwg No. 1172AS136
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure diluter control toggle is in NORMAL OXYGEN POSITION.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet.

3. Using OUTPUT valve (C), draw a flow of 20 lpm through regulator. Blinker must open fully. Record reading on Performance Test Sheet.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

4. Reduce Output flow to 8 lpm and place diluter control toggle in 100% OXYGEN position. Blinker must remain fully open. Record reading on Performance Test Sheet.

5. Close OUTPUT valve (C). Blinker should close immediately. Record reading on Performance Test Sheet.

6. Close altitude chamber door.

7. Using VACUUM CONTROL valve (B), ascend in altitude until 17.0 inH_2O is indicated on PRESS./SUCTION manometer (4).

8. Open OUTPUT valve (C) and draw a flow of 12 lpm through the regulator. The blinker should be fully open. Record reading on Performance Test Sheet. Close OUTPUT valve (C). Blinker should close immediately. Record reading on Performance Test Sheet.

9. Descend to sea level using CHAMBER BLEED valve (K).

10. If malfunctions are noted, locate probable cause using troubleshooting table 13-12.

13-74. EMERGENCY PRESSURE TEST. To perform the Emergency Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Table 13-12. Troubleshooting (Blinker Assembly Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-6.		
Flow indicator fails to open or close.	Ruptured diaphragm (36).	Replace diaphragm (36).
	Bent or distorted blinker assembly (34).	Replace blinker assembly (34).

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure the diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet.

3. Open OUTPUT valve (C) and draw a flow of 10 lpm through the regulator.

4. Place emergency control toggle in EMERGENCY position. Pressure indicated on PRESS./SUCTION manometer (4) shall read 2.0 to 4.0 inH_2O. Record reading on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained when performing step 5.

5. Adjust OUTPUT valve (C) to draw 80 lpm flow through regulator.

6. Place diluter control toggle in 100% OXYGEN position. Pressure at outlet of regulator, as indicated on PRESS./SUCTION manometer (4), shall be no less than 1.0 inH_2O. Record reading on Performance Test Sheet.

7. Adjust output to a 10 lpm flow. Hold emergency pressure control toggle in TEST MASK position. Output flow, as indicated PRESS./SUCTION manometer (4), shall be 6.0 to 16.0 inH_2O. Record reading on Performance Test Sheet.

8. If emergency pressure flows are not within tolerance, locate probable cause using troubleshooting table 13-13.

9. Close N_2 supply cylinder valve. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), relieve all pressure from test stand. Turn INLET PRESS. ON/OFF valve OFF and remove regulator from test stand.

13-75. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type I	MIL-O-27210

WARNING

Do not use oxygen test stand to regulate the oxygen purge pressure.

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

2. Apply 500 psig to regulator inlet.

3. Position diluter control toggle in the 100% position, supply toggle in the ON position and emergency pressure control toggle in the EMERGENCY position, allow oxygen to flow 1 to 3 minutes.

4. Shut off oxygen source and disconnect regulator.

Table 13-13. Troubleshooting (Emergency Pressure Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 13-8.		
High or low emergency pressure.	Demand valve stem assembly (142, or seat 138, figure 13-6) bent or sticking.	Replace demand valve stem (142) or seat (138).
Low emergency pressure.	Spring (2) tension weak.	Increase spring tension with adjusting screw (1).
High emergency pressure.	Spring (2) tension weak.	Decrease spring tension with adjusting screw (1).
Test mask pressure low.	Cap screw (4) adjustment to short.	Increase length of cap screw (4).
Test mask pressure high.	Cap screw (4) adjustment to long.	Decrease length of cap screw (4).
Low emergency pressure at 80 lpm flow.	Faulty injector nozzle (94, figure 13-6).	Replace injector nozzle (94).
Low emergency pressure at 80 lpm flow.	Port openings on demand valve seat (125 or 138, figure 13-6) are not aligned with ports in regulator housing (132).	Readjust demand valve assembly in accordance with paragraph 13-107.

NOTE

All equipment forwarded from the Organizational Level maintenance to Intermediate and/or Depot Level maintenance shall be accompanied by an Aircrew Systems Record (OPNAV 4790/138). The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test and/or Calendar Inspection, the organizational custodian shall retain the Aircrew Systems Record, Performance Test Sheet, and VIDS/MAF.

13-76. DISASSEMBLY.

13-77. Disassemble the oxygen regulator using index numbers assigned to figure 13-6, unless otherwise noted. Disassemble the oxygen regulator as follows:

CAUTION

All disassembly, inspection, repair, and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor, and ceiling should have a smooth finish, and be painted with a non-chalking paint which can be kept clean and dust free. It is desirable to keep all parts for each individual regulator separated. Make careful note of the location and quantity of all shims, spacers, and packings. Plastic partitioned boxes with covers or similar storage facilities should be used to keep parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

NOTE

Special tools shall be requisitioned directly from manufacturer (99251), or obtain commercial equivalents.

13-78. PLASTIC LIGHT PLATE. To remove the Plastic Light Plate, proceed as follows:

1. Remove lamp holder (4) and grommet (5). Remove bulb (1) from lamp holder (4).

2. Remove screw (9), washer (10) and screws (14) from light plate (13).

3. Remove cap (11) and attaching parts from fitting (24).

4. Remove light plate (13) from plate assembly (19).

13-79. GAGE AND LIGHT MOUNTING PLATE ASSEMBLY. To remove the Gage and Light Mounting Plate Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

1. Remove gasket (15). (Remove gasket (16) and cover plate (17) if installed.

2. Remove retaining ring (18) from test port (48).

3. Remove screws (21) which attach gage assembly (1, figure 13-7) to inlet valve assembly (49). Remove screws (20).

CAUTION

When removing tubes, use tweezers or a common hand tool to lift tube ends from housing to avoid barb damage from pulling on tubes.

4. Disconnect tube (23) from barb on air inlet housing assembly (69).

CAUTION

Take care not to damage gauge tubing (1, figure 13-7) or wiring when removing gage and light mounting plate assembly (19).

5. Remove gage and light mounting plate assembly (19).

6. Remove packing (22) from inlet valve assembly (49).

NOTE

Do not disassemble check valve assembly (24) and (28) and attaching parts from gage and light mounting plate unless damaged. If disassembly is required proceed with steps 7 and 8.

7. Remove check valve fitting (24) from check valve guide (28). Remove check valve guide (28) and attaching parts (25 through 27) from light mounting plate (19).

8. Reassemble check valve guide (28) and attaching parts (25 through 27) and install check valve fitting (24) onto check valve guide (28). Install cap assembly (11).

NOTE

Do not remove electrical wire (7, figure 13-7) unless damaged.

13-80. PRESSURE GAGE ASSEMBLY. To remove the Pressure Gage Assembly, proceed as follows:

NOTE

Remove pressure gage from light mounting plate only if damaged

Index numbers in this paragraph refer to figure 13-7 unless otherwise noted.

1. Remove two screws (4), screw (5), nuts (2), washers (3) and clamp (6). Use 1/4-inch open end wrench to hold nut.

2. Remove pressure gage (1).

13-81. BLINKER ASSEMBLY. To disassemble the Blinker Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

1. Remove window (29), and packing (30).

2. Using retaining ring pliers, remove retaining ring (31).

3. Carefully remove washer (32, if present), spacer (33), blinker assembly (34), sealing ring (35) and diaphragm (36).

13-82. MANUAL SAFETY PRESSURE ASSEMBLY. To disassemble the Manual Safety Pressure Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Punch, Relief Valve	31TA10523 (CAGE 99251)

1. Remove two screws (38), lock washers (39), and remove toggle assembly (37).

2. Remove push rod (42), top plate (40), shim (41), spring (43), pressure assembly (44), and packing (45) from regulator housing.

NOTE

Index numbers in steps 3 through 5 refer to figure 13-8.

3. To remove the actuating rod (8), hold manual safety housing (11) between fingers, and apply thumb pressure to adjusting screw (1) thereby applying pressure against manual safety guide (9) which compresses spring (10) and releases pressure from non-metallic washer (7). Using a 5/16-inch open end wrench, remove push rod assembly (3).

4. Remove manual safety guide (9), helical compression spring (10), adjusting screw (1), helical compression spring (2), and actuating rod (8).

5. Using a 3/16-inch open end wrench, remove hex nut (5) and cap screw (4) from push rod (6).

13-83. TEST PORT, INLET VALVE, AIR INLET HOUSING, AND CHECK VALVE ASSEMBLIES. To disassemble the Test Port, Inlet Valve, Air Inlet Housing, and Check Valve Assemblies, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

NOTE

When removing tube, use tweezers or a common hand tool to lift tube ends from housing to avoid barb damage from pulling on tubes.

1. Disconnect tube (46) from barb on aneroid assembly (75). Disconnect tube (47) from barb on air inlet housing assembly (69). Remove test port assembly (48).

2. Turn supply toggle on and remove two setscrews (53) from cam (52). Remove three screws (50) and washers (54). Remove inlet valve assembly (49) and air inlet housing assembly (69) from regulator. Slide shaft of inlet valve assembly (49) from cam (52), toggle (54), and pivot block (60). Remove cam (55), toggle (57), and packing (58).

NOTE

Index numbers for disassembly of the inlet valve assembly, steps 3 through 9 refer to figure 13-10.

3. Turn inlet supply toggle to OFF position. Remove two screws (2) and remove toggle cap (1).

4. Remove cam follower (5), shims (6) if present. (Regulator P/N 29270 Series only.) Remove piston assembly (7) and packing (13).

5. Use special retaining ring pliers to remove retaining ring (14) from inlet valve body (23).

6. (Regulator P/N 29270 Series only.) Remove filter (15), sleeve (16), spring (17), valve (18), seat (19), and packing (20).

7. (Regulator P/N 3260011-0101 and 3260011-0701 only.) Remove filter (15), sleeve (16), spring (17), valve stem (21), insert (22), and packing (20). Remove piston assembly (7) and packing (13).

8. If required, disassemble toggle assembly as follows: Remove pin (4) and separate toggle (3) from toggle cap (1).

9. If required disassemble piston assembly (7) as follows: Remove screw (8), washer (9), helical compression spring (10), shim (24) (regulator P/N 3260011-0101 and 3260011-0701 only), and push rod (11) from piston (12).

10. Remove check valve assembly (73), tube (71), gasket (72), and gasket (74) from regulator housing (132).

NOTE

Index numbers in step 11 disassembly of check valve adapter and spring assembly, refer to figure 13-11.

Use extreme care when handling check valve disc (2) to avoid scratching or marring surface.

11. Carefully spread prongs of retainer assembly (5). Remove check valve adapter (1), check valve disc (2), spring (3), and spring adapter assembly (4).

12. Remove ring (56), pivot block (57), cap (58), washer (59) if present, spring (60), sleeve (61), and spring (62).

CAUTION

Use extreme care when handling throttling plate (64). Plate has very polished, lapped surface. Oil from skin, nicks, or scratches can damage plate.

13. Remove screw (63), throttling plate (64), and washer (65) from aneroid assembly (68).

14. Remove nut (66), screen (67), and gasket (70). Remove aneroid assembly (68) from air inlet housing assembly (69).

NOTE

Do not disassemble the test port assembly (48) unless damaged. Refer to figure 13-9 if disassembly is required and proceed to step 15.

15. Remove two screws (1), cover assembly (2), and check valve (3) from fitting assembly (4).

13-84. PRESSURE BREATHING ANEROID ASSEMBLY. To disassemble the Pressure Breathing Aneroid Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

1. Remove three screws (79). Remove aneroid assembly (75) push rod (77), and diaphragm (81).

2. Use retaining ring pliers to remove retaining ring (82). Remove valve seat (83), packing (84), valve (85) and spring (86).

3. Remove three lowest positioned screws (76) that secure cover (78) to aneroid assembly (75). Remove packing (80). Do not loosen or remove the three remaining screws (76) from aneroid assembly (75) they will be used for initial positioning during assembly.

NOTE

Disassemble the aneroid assembly (75) in step 4 only if required, Index numbers refer to figure 13-12.

4. Disassemble aneroid housing assembly (5) as follows:

a. Remove ring (1), retainer (2), spring (4), and screw (3).

b. (Regulators P/N 29270-10A-A1, 3260011-0701 and 3260011-0101.) Remove baffle (7) and screen (8).

13-85. RELIEF VALVE ASSEMBLY. To disassemble the Relief Valve Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

1. Use retaining ring pliers, remove retaining ring (100), cover retaining washer (101), cover (102), relief valve assembly (103), and packing (104).

NOTE

Index numbers in step 2, refer to figure 13-13.

2. Remove nut (1), retainer (2), spring (3). Separate guide (4), gasket (5), and disc (6) from seat (7).

13-86. DIAPHRAGM ASSEMBLY. To disassemble the Diaphragm Assembly, proceed as follows:

1. Remove four screws (106), washers (107). Remove diaphragm cover (105), diaphragm (108), tube and ring assembly (109), and packing (111). Remove filter (110) only if damaged.

2. Remove diaphragm assembly (112) by carefully moving it up and away from the outlet side of the regulator.

NOTE

Index numbers in step 3, refer to figure 13-14.

3. Remove nut (1), plate (2), washer (3) if present, diaphragm (4), plate (5) and flange (6).

13-87. MAIN ASSEMBLY. To disassemble Main Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

1. Remove screw (98) and lock-o-seal (99) from regulator housing. Using retaining ring pliers, remove retaining ring (95). Remove plug (96) and packing (97) by pushing from inside regulator to outside with a blunt instrument.

2. (Regulator P/N 29270 Series only.) Using retaining ring pliers, remove retaining ring (123), washer (124) if present, valve seat (125), and packing (126). Remove packing (127), valve (128), bushing (130), packing (131), and stem assembly (129).

3. (Regulator P/N 3260011-0101 and 3260011-0701 only.) Use needle nose pliers to hold stem (129) through plug (96), while using jeweler's screwdriver inserted through hole that binding head screw (98) was removed and remove valve lever connector (144) from stem assembly (129).

NOTE

Index numbers in step 4 will be used for regulator part numbers 3260011-0101 and 3260011-0701 only.

4. Remove retaining ring (123), retainer (134), packing (135), stem assembly (136), packing (137), seat (138), packing (139), stem assembly (140), bushing (141), and packing (131).

13-88. LEVER AND BRACKET ASSEMBLIES. To disassemble the Lever and Bracket Assemblies, proceed as follows:

1. Remove screw (115), screw (116), and washer (117) that attach lever assembly (113) to regulator housing. Remove lever assembly (113), spring (122), and spring guide (121) through plug (96) opening.

2. Remove two screws (120) that attach lever and bracket assembly (118) to regulator housing. Remove lever and bracket assembly (118) from regulator housing. Remove setscrews (119) and (114) from lever assemblies only if damaged.

13-89. OUTLET, MIXING TUBE, AND INJECTOR ASSEMBLY. To disassemble the Outlet, Mixing Tube, and Injector Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	QB70750-9 NIIN 00-302-6456

1. Remove screws (88), lockwashers (89), flat washers (90), and outlet (87). Remove preformed packing (91).

2. Using piloted spanner wrench, remove mixing tube (92).

3. Remove injector sleeve (93) and injector nozzle (94) from regulator housing (132).

13-90. CLEANING.

13-91. To clean the disassembled oxygen regulator body and components parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Bottle, Polyethylene Squeeze	—
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all metallic parts using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

CAUTION

Do not attempt to clean any elastomer parts that have become contaminated with oil or grease. All such parts shall be replaced.

2. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning all internal surfaces, they shall be examined for cleanliness. Should further contamination be found, re-clean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Also, bag all complete assemblies that are not immediately returned to service.

13-92. INSPECTION OF DISASSEMBLED REGULATOR.

13-93. Inspect the disassembled regulator body and component parts in accordance with table 13-14. Ensure lamp retainer assembly (8, figure 13-7) is wired in accordance with figure 13-4.

Table 13-14. Inspection of Disassembled Regulator Components

Nomenclature	Figure and Index No.	Inspect For
Gage and Light Mounting Plate Assembly.	13-7	Cracks or other damage to plate or lamps.
		Check fasteners, spring, or cups for proper action.
Manual Safety Pressure Assembly.	13-6-44	Smooth operation (no sticking or binding).
Inlet Valve Assembly.	13-6-49	Scratches or excessive wear on sealing surfaces.
Aneroid and Air Shutoff Assembly.	13-6-69	Scratches or excessive wear on sealing surfaces.
Check Valve Adapter and Spring Assembly.	13-6-73	Scratches or excessive wear on sealing surfaces.
Relief Valve Assembly.	13-6-103	Scratches or excessive wear on sealing surfaces.
Diaphragm Assembly.	13-6-112	Pinholes, minute ruptures, discoloring, spotting, or other damage. Diaphragm rim for cuts or other damage on sealing surface.
Emergency Pressure Lever Assembly.	13-6-113	Disintegration of lead counterweight.
Aneroid Assembly.	13-6-75	Evenly spaced convolutions (no cocks or dents).
Lamp.	13-6-1	Burned out condition by applying +28 Vdc.
Tube and Pressure Gage Assembly.	13-7-1	Chips or breaks in glass. Tubing for kinks or blockage.
Wire Assembly.	13-7-7	Damaged insulation or loose solder joints.
Fasteners.	13-7-13	Excessive wear in slots.
Filter.	13-10-15	Clogging
Valve Stem.	13-10-21	Scratches, rings, or excessive wear.
Seat Insert.	13-10-22	Scratches, rings, or excessive wear.
Throttling Plate.	13-6-64	Smooth flat surfaces, entirely free of nicks or scratches.
Aneroid Assembly.	13-6-65	Evenly spaced convolutions (no cocks or dents).
Retainer Assembly.	13-11-5	Bent or deformed prongs.
Check Valve Disc.	13-11-2	Smooth flat surfaces, entirely free of nicks or scratches.
Adapter Assembly.	13-11-4	Marks or scratches.
Manual Safety Housing.	13-8-11	Nicks or scratches on seat surface.
Relief Valve Disc.	13-13-6	Bright surface, free of nicks and scratches on lapped and polished side of disc.
Relief Valve Seat.	13-13-7	Nicks, scratches, or excessive wear.

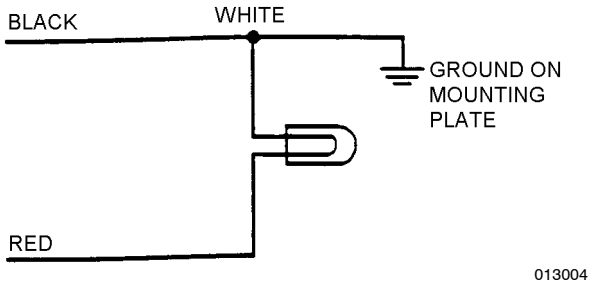


Figure 13-4. Wiring Diagram

13-94. REPAIR.

13-95. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched-up using lacquer (MIL-L-6805).

13-96. ASSEMBLY.

13-97. Assembly of Aircraft Panel Mounted Regulators is essentially the reverse of Disassembly. Tests are required on subassemblies as they are assembled into the regulator. Adjustment and calibration is also performed at time of assembly.

WARNING

Prior to use, inspect leak detection compound. Compound that is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

CAUTION

Use extreme care in fitting precision parts to prevent damage. Ensure each component is dust and dirt free.

NOTE

All silicone-rubber parts shall be discarded, and replaced with new items at time of assembly. They shall be washed in accordance with paragraph 13-91, step 2 prior to installation.

13-98. Assembly is affected in two separate operations; assembly of components into subassemblies (mounting plate and controls assembly, injector assembly; etc.), and assembly of subassemblies into regulator housing. Assemble the oxygen regulator using index numbers assigned to figure 13-6, unless otherwise noted. Assemble the oxygen regulator as follows:

13-99. RELIEF VALVE ASSEMBLY. To assemble the Relief Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant, Type II	(CAGE 81349) NIIN 00-961-8995

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Special, Retaining Ring	31TA10528 (CAGE 99251) NIIN 01-096-9701

NOTE

Index numbers in steps 1 through 3, refer to figure 13-13.

1. Install gasket (5) onto guide (4). Install disc (6) onto guide (4) with unlapped surface against gasket (5).

2. Apply lubricant to bore of seat (7) and wipe off any excess with a lint free cloth.

3. Install guide (4) to seat (7). Install spring (3), retainer (2) and nut (1) onto guide (4). Nut should be tightened to approximately mid point of guide (4).

4. Install packing (104) and relief valve assembly (103) into regulator housing (132).

5. Install cover (102) and washer (101) into regulator housing (132). Use retaining ring pliers and install ring (100) into groove in regulator housing.

6. Final adjustment of relief valve will be made during post assembly Bench Test.

13-100. CHECK VALVE ASSEMBLY. To assemble the check valve assembly, proceed as follows:

CAUTION

Use extreme care when handling disc (2, figure 13-11). Do not scratch or mar.

NOTE

Prongs on retainer assembly (5, figure 13-11) must fit tight into the groove of the check valve adapter (1).

Index numbers in steps 1 and 2, refer to figure 13-11.

1. Screw spring adapter assembly (4) into retainer assembly (5) until threads are flush with the back of the retainer assembly.

2. Place spring (3) onto spring adapter assembly (4). Place disc (2) on top of spring. Attach check valve adapter (1) to retainer assembly (5). Ensure disc (2) has free movement along entire length of retainer assembly (5).

3. Install tube (71) into hole on check valve assembly (73) with angled end down and oriented toward the center. Install gasket (72) over tube (71) and check valve assembly (73).

4. Install gasket (74) and check valve assembly (73) into regulator housing (132) with tube (71) oriented toward emergency toggle assembly.

13-101. INLET VALVE ASSEMBLY. To assemble the Inlet Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Krytox 240AC Lubricant, Type II	(CAGE 81349) NIIN 00-961-8995
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Punch, Filter	31TA10527 (CAGE 99251)

CAUTION

Be extremely careful when handling piston assembly (7, figure 13-10). The length and degree of parallelism of the cord is very critical. Do not bend or damage the rod of the piston assembly.

NOTE

Unless otherwise noted, index numbers in this paragraph, refer to figure 13-10.

Use only new preformed packings and O-rings. Clean in accordance with paragraph 13-91, step 2 prior to installation.

1. If required assemble piston assembly (7). Install helical compression spring (10) and guide washer (9), shim (24), (regulator P/N 3260011-0101 and 3260011-0701 only) and push rod (11) (regulator P/N 29270 Series only) and secure to piston (12) with screw (8).

2. Assemble inlet toggle (3), pin (4), and toggle cap (1) as shown in figure 13-5.

NOTE

Be sure flat on pin (4) is in the proper orientation during assembly.

3. (Regulators P/N 29270 Series only.) Place packing (20) onto seat (19). Install packing (20) and seat (19), packing side down, into the bore of inlet valve body (23). Install valve (18).

4. (Regulators P/N 29270 Series only.) Install spring (17), with small end of spring toward valve (18) or valve stem (21). Install filter (15) on top of sleeve (16, with fine mesh down) and install over spring (17) in inlet valve body (23). Insert retaining ring (14) and use filter punch to seat retaining ring into groove.

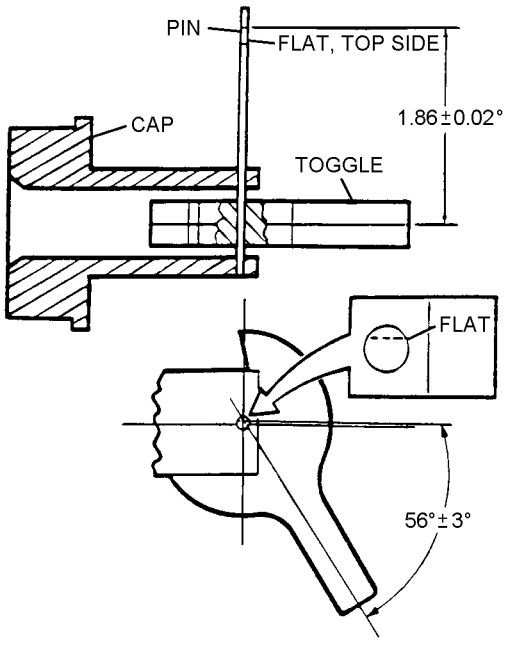


Figure 13-5. Inlet Valve Toggle Assembly

5. Install packing (13) onto the groove of piston assembly (7). Fill the groove of packing (13) with (Krytox 240 AC).

6. Install piston assembly (7) into inlet valve body (23).

7. (Regulator P/N 3260011-0101 and 3260011-0701 only.) Insert packing (20), seat insert (22), and valve stem (21) into inlet valve body (23).

8. (Regulator P/N 3260011-0101 and 3260011-0701 only.) Align valve stem (21) with threaded hole in piston assembly (7). Insert a screwdriver through inlet port of inlet valve body (23) and tighten valve stem (21). Push down on piston assembly (7) while tightening valve stem (21) raise stem off seat insert (22). Turn valve stem (21) into piston assembly (7) until top of piston assembly is 1/2 inch from top of inlet valve body (23).

9. (Regulator P/N 3260011-0101 and 3260011-0701 only.) Install spring (17), with small end of spring toward valve (18) or valve stem (21). Install filter (15) on top of sleeve (16, with fine mesh down) and install over spring (17) in inlet valve body (23). Insert retaining ring (14) and use filter punch to seat retaining ring into groove.

10. Install cam follower (5) and toggle cap (1) onto inlet valve body (23) and secure with screws (2).

NOTE

With the toggle in the OFF position, the toggle should have a slight amount of free play (approximately 1/16 inch). Proceed with steps 11 and 12 for adjustment of toggle assembly.

11. To adjust the freeplay, remove two screws (2), toggle cap (1), and cam follower (5). Proceed to do one of the following:

a. For too much freeplay, add shims (6) as required.

b. For no freeplay, remove shims (6) as required or remove piston assembly (7) and turn the screw of the piston assembly counterclockwise to shorten the length.

12. Reinstall piston assembly (7), cam follower (5) toggle cap (1) and secure with screws (2). Recheck freeplay of toggle, if freeplay is not acceptable, repeat steps above.

13. Salvage the tubing and inlet valve attaching block from a discarded pressure gage assembly. Cut, pinch and silver solder the tubing end.

14. Install pinched-and -soldered tubing and packing (22, figure 13-6) into inlet valve pressure gage port with screws (21, figure 13-6).

NOTE

At this point it is necessary to check the inlet valve assembly for leakage. Ensure inlet toggle is in OFF position.

15. Using test stand, apply 50 psig to inlet of the valve assembly. Apply leak detection compound to valve outlet. There shall be no leakage.

16. If leakage occurs, refer to troubleshooting table 13-5.

17. Turn off nitrogen source, bleed pressure from test stand and Inlet Valve Assembly. Disconnect inlet valve from test stand.

13-102. ANEROID AND AIR INLET HOUSING ASSEMBLY. To assemble the Aneroid and Air Inlet Housing Assembly, proceed as follows:

NOTE

Cement gasket (70) to air inlet housing assembly (69) using method described in steps 1 through 4.

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV 734 (CAGE 81349)
As Required	Toluene	TT-T-548 NIIN 00-281-2002
As Required	Xylene	TT-X-916 (CAGE 81348)

1. Clean surfaces to be bonded with Xylene or Toluene and allow to air dry.

2. Coat the metal sealing surface of the air inlet housing assembly (69) and gasket (70) with adhesive and allow to air dry for five minutes.

3. Bond gasket (70) to air inlet housing assembly (69) and allow to cure at room temperature for 24 hours.

4. Visually examine gasket (70) and air inlet housing assembly (69) to be certain there are no air pockets in the bond. The parts must be flat, even, and firmly cemented to each other.

CAUTION

Use extreme care when handling throttling plate (64). Throttling plate has a polished, lapped surface. Oil from skin, nicks, or scratches can damage plate.

NOTE

Start installation with a 0.071 shoulder screw (63).

5. Place spring washer (65) on shoulder of throttling plate (64), convex portion of washer toward plate. Hold spring washer (65) and throttling plate (64) against bottom of aneroid assembly (68), attach with screw (63).

6. Screw the aneroid into air inlet housing assembly (69). With throttling plate (64) held flat against aneroid assembly (68), the depth of the plate below the end of the housing should be preset to 3/32 inch.

7. Install screen (67) and nut (66) while holding aneroid assembly (68) in place. Tighten nut (66) snugly.

8. Place spring (62) on shoulder of nut (66). Place sleeve (61), spring (60), one washer (59), and cap (58) on top of spring (62).

9. Install pivot block (57) into air inlet housing assembly (69) and secure in place with retaining ring (56).

10. Install one setscrew (53) into cam (52). Do not tighten.

CAUTION

When installing air inlet housing assembly (69), ensure tube (71) located on check valve assembly (73) is aligned properly. Tube (71) should be on the emergency toggle side of the regulator.

NOTE

Flat side on cam (52) will be positioned toward inlet valve assembly (49) and radius on cam (52) will be toward radius of toggle (54).

11. Position cam (52) and toggle (54) in the slot of pivot block (57) and insert the pin attached to the inlet valve assembly (49) through each part. Install packing (55), inlet valve assembly (49), and air inlet housing assembly (69) onto regulator housing (132). Secure the inlet valve assembly to regulator housing with screws (50) and washers (51).

NOTE

Ensure after step 12; When the supply toggle is in the OFF position, the regulator NORMAL/100% sleeve (61) should automatically be placed in the 100% mode. Toggle (54) shall have no spring tension at this time in the NORMAL mode position.

12. Place supply toggle in the ON position. Rotate cam (52) so setscrew (53) is visible on the bottom of cam (52) and air inlet housing assembly (69) and regulator housing (132). Tighten setscrew (53) already installed in cam (52) onto the flat of the pin (figure 13-5). Install second setscrew (53).

13-103. TEST PORT ASSEMBLY. To assemble the Test Port Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Glyptal	1201B (CAGE 24452)
As Required	Powder, Talc	—
As Required	Toothpick	—

NOTE

If disassembled, perform steps 1 through 3

Index numbers in steps 1 through 3 refer to figure 13-9.

1. Using a toothpick, apply talc to the slit opening of valve (3) from the open end. Blow excess talc through the slit opening with compressed air.

2. Install valve (3) into fitting assembly (4).

3. Secure cover assembly (2) to fitting assembly (4) with two screws (1) locked in place with a dot of Glyptal.

13-104. PRESSURE BREATHING ANEROID ASSEMBLY. To assemble the Pressure Breathing Aneroid Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant, Type II	(CAGE 81349) NIIN 00-961-8995

Support Equipment Required

Quantity	Description	Reference Number
1	Ruler	—
1	Scale, Preset	3301338-6001
1	Wrench, Torque	—

NOTE

Index numbers in step 1, refer to figure 13-12.

1. If required, assemble aneroid assembly (6). (Regulators P/N 29270-10A-A1, 3260011-0701, and 3260011-0101 see note figure 13-12) Install baffle (7) and screen (8). Install screw (3) until screw protrudes through retainer (2) 1/32 inch. Install spring (4), retainer (2) with screw (3) installed onto aneroid assembly housing (5) and secure in place with retaining ring (1).

2. Apply a light film of lubricant to packing (80) and install packing into groove on cover assembly (78).

3. Press aneroid assembly (75) onto cover assembly (78). Ensure air port opening on cover assembly (78) is aligned with test port opening on housing of aneroid assembly (75). Align screw holes in cover with the through holes in the aneroid assembly. Start three screws (76). Do not tighten.

4. Place the aneroid preset scale between the aneroid assembly (75) and cover assembly (78). The preset height shall be 0.045 to 0.050 inch or 3/64 inch if ruler is used.

5. Turn the three screws (76) into the cover until the preset scale is snug.

6. Remove the preset scale and install the remaining three remaining screws (76). Tighten all screws equally and torque to 10 to 12 oz-in.

7. Place spring (86) into counterbore of control valve well in regulator housing (132). Apply a light film of lubricant to packing (84) and place into groove on valve seat (83).

8. Apply a light coat of lubricant to stem of valve (85) and valve seat (83). Wipe off excess with lint free cloth. Insert stem of valve (85) through hole grooved side in valve seat (83) and grip stem with tweezers. Install the valve and valve seat over spring (86) and secure with retaining ring (82). Ensure retaining ring is seated in groove.

9. Installation of the aneroid assembly (75) will be accomplished after Demand Valve/Seat and Matched Valve Leakage Test (paragraph 13-109).

13-105. EMERGENCY PRESSURE LEVER ASSEMBLY AND DEMAND VALVE LEVER ASSEMBLY. To assemble the Emergency Pressure Lever Assembly and Demand Valve Lever Assembly, proceed as follows:

1. Reinstall setscrews (119) and (114) into lever assemblies (118) and (113) if required. Install emergency lever and bracket assembly (118) into regulator housing (132) and secure with screws (120).

2. Position spring (122) and guide (121) in recess in regulator housing (132).

3. Insert demand valve lever assembly (113) through port plug (96) opening. Position valve lever assembly (113) over guide (121) and spring (122).

4. Secure demand valve lever assembly (113) with screw (115) first to draw down lever assembly (113). Install washer (117) and screw (116). The screw and washer is installed inboard of regulator housing (132).

13-106. MANUAL SAFETY PRESSURE ASSEMBLY. To assemble the Manual Safety Pressure Assembly, proceed as follows:

NOTE

Index numbers in steps 1 through 5, refer to figure 13-8.

1. Assemble cap screw (4), hex nut (5), and push rod (6) until approximately 7/16 inch of cap screw (4) extends from push rod (6). Tighten hex nut (5) against push rod (6) after adjusting the cap screw (4).

2. Install helical compression spring (10), manual safety guide (9) and actuating rod (8) in manual safety housing (11).

3. Install helical compression spring (2). Secure with adjusting screw (1). Adjusting screw (1) shall be flush with top of manual safety pressure assembly (47, figure 13-6).

4. Hold manual safety housing (11) between fingers and apply pressure on adjusting screw (1).

5. Place washer (7) on manual safety housing (11). Align push rod assembly (3) with actuating rod (8). Using a 5/16-inch open end wrench, tighten push rod assembly (3) to actuating rod (8).

6. Install performed packing (45) and manual safety pressure assembly (44) into regulator housing (132).

7. If required, assemble toggle assembly (34) as follows: Install emergency toggle (36) in clevis block (37) and secure with pin (35).

8. Install helical compression spring (43), shim (41), top plate (40), push rod (42), and toggle assembly (34) into regulator housing (132) with emergency position inboard. Attach with washers (39) and screws (38).

NOTE

Ensure toggle returns from TEST MASK position to NORMAL when released.

9. Final adjustments will be performed during post assembly Bench Test (paragraph 13-59).

13-107. DEMAND VALVE ASSEMBLY. To assemble the Demand Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant, Type II	(CAGE 81349) NIIN 00-961-8995

CAUTION

Use extreme care during assembly to prevent damage to demand valve seat (125).

NOTE

Steps 1 through 4 are for regulator P/N 29270 Series only. Steps 5 through 11 are for regulator P/N 3260011-0101 and 3260011-0701 only.

1. Install packing (131) into regulator housing (132).

NOTE

It may be necessary to hold demand valve stem assembly (129) when adjusting screw. If so, care must be taken to ensure no damage is done to demand valve stem assembly (129).

2. If required, install stem adjusting screw onto stem assembly (129) until two threads remain. Using tweezers, pass stem assembly (129) through port plug (96) opening and align slot on valve lever connector (144) with slot opening on lever assembly (113). Continue to hold stem assembly (129) and carefully align bushing (130) and stem assembly (129) in regulator port and slide bushing (130) onto stem assembly (129). Ensure port hole in bushing aligns with port hole to outlet of regulator.

3. Place packing (127) on top of bushing (130). Using tweezers, place valve (128) on top of stem assembly (129).

NOTE

During assembly of valve seat (125) in step 4, it is extremely important to align port hole on valve seat (125) and port in regulator housing (135) from inlet valve assembly (49). Failure to align ports will result in regulator failing Flow Suction Test during Bench Test.

4. Mark port location of valve seat (125) and port location of inlet valve assembly on regulator housing (132). Apply a light film of lubricant to packing (126) and place packing (126) on shoulder of seat (125) and place into demand valve bore and secure in place with retaining ring (123). (If assembly is loose, install washer (124) as required). Ensure port in demand valve seat (125) aligns with port in regulator housing (132).

5. Install packing (131) and demand valve bushing (130) ensuring hole in bushing aligns with hole in regulator housing (132).

6. Install packing (137) and extension stem assembly (136) into demand valve seat (138).

7. Pass end of extension stem assembly (136) through demand valve seat (138) and assemble to valve stem assembly (140). Turn valve stem assembly (140) onto extension stem assembly (136) until valve is just seated.

8. Install packing (139) on top of demand valve bushing (130) in regulator housing (132).

NOTE

Mark the port location of the inlet port on the regulator housing (132) and the port hole location on top of demand valve seat (138) prior to performing step 9 and 10.

9. Install extension stem assembly (136), demand valve seat (138) and valve stem assembly (140) as a unit into the regulator housing (132). Turn regulator hous-

ing (132) so port plug access faces up. Using tweezers insert screw (98) between fork on lever assembly (113) and align screw (98) with valve stem assembly (140) (it may be necessary to push demand valve seat (138) in toward bushing (141) to install screw). When aligned, push slightly with free hand and push demand valve seat (138) toward screw (101). Continue to apply pressure and remove tweezers. Insert a jeweler's screwdriver through hole located above screw (98) and install screw (98) into valve stem assembly (140) approximately two turns.

10. Using needle nose pliers, hold valve stem assembly (140) and adjust screw (98) until three threads remain showing between screw (98) and valve stem assembly (140).

11. Ensure alignment marks are aligned. Install packing (135) so that it lies around demand valve seat (138). Install valve retainer (134) and secure with retaining ring (123).

12. Depress emergency pressure lever and bracket assembly (118) and lever assembly (113) while observing through plug (96) port for proper operation of Demand Valve Assembly.

13-108. DEMAND VALVE ADJUSTMENTS. To adjust lever assembly (113) and emergency pressure lever assembly (118), proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Ruler	—

1. To adjust lever assembly (113), insert jeweler's screwdriver through screw (98) hole, in regulator housing (132) and turn valve lever connector (147). While making adjustments, prevent valve stem assembly (129) from turning with needle nose pliers inserted through plug (96) port.

2. Adjust lever assembly (113) so that the back of the lever is 1/32 inch lower than the front. Take the back measurement in front of setscrew (114). Take the front measurement between the two access holes for screws (115) and (116). Measurements are made from the bottom of regulator housing (132).

3. Turn setscrew (119) on lever and bracket assembly (118) so that lever and bracket assembly (118) is 5/16 inch above lever assembly (113). Take measurement from forked end of lever and bracket assembly (118) down to lever assembly (113).

4. Install packing (97), plug (96), retaining ring (95), screw (98), and lock-o-seal (99), into regulator housing (132).

13-109. DEMAND VALVE/SEAT AND MATCHED VALVE ASSEMBLY LEAKAGE TEST. To perform the Demand Valve/Seat and Matched Valve Assembly Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Tube, Leak Test	31TA10205 NIIN 00-831-5428

1. Screw leak test tube into injector nozzle port in regulator housing. Apply 50 psig pressure to regulator inlet. Turn supply toggle to the on position and draw a film of leak detection solution across the outlet of the leak test tube.

2. If film distends, leakage is indicated. Recheck assembly and adjustments of valve stem assembly (129) and lever assembly (113).

3. After test, remove leak test tube.

4. Draw a film of leak detection solution over retaining ring (82) and valve seat (83).

5. If film distends, leakage is indicated. Recheck retaining ring (82) and packing (84) for proper installation. Check valve seat (83) for scoring. Replace as required. Remove regulator from test stand and remove pinched-and-soldered tubing and packing (22) from inlet valve pressure gage port.

6. Install push rod (77) through hole in cover assembly (78) and valve control diaphragm (81) (with protruding ridge up) on cover assembly (78).

NOTE

Regulators P/N 3260011-0101 and 3260011-0701 incorporate a retaining ring screw plate (P/N 1648004-1) not listed in IPB. If installed, continue to use. The retaining ring screw plate is not required on regulator P/N 29270 Series.

7. Install aneroid assembly (75) with barb positioned toward top of regulator housing (132). If required, place retaining ring screw noted above around aneroid assembly (75) and secure with screws (79).

8. Final adjustments of the seat and matched valve assembly will be accomplished during post assembly Bench Test (paragraph 13-59).

13-110. DIAPHRAGM ASSEMBLIES. To assemble the Diaphragm Assemblies, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive	RTV 734 (CAGE 81349)
As Required	Krytox 240AC Lubricant, Type II	(CAGE 81349) NIIN 00-961-8995

NOTE

Index numbers in steps 1 and 2, refer to figure 13-14.

1. When assembling diaphragm (4) to diaphragm plate (2), cement parts together with adhesive.

2. Apply a light coat of lubricant to inner surface of diaphragm plate (5), inner surface of diaphragm cover (108, figure 13-6) and around diaphragm flange (6). Install diaphragm nut (1) and tighten.

3. Attach diaphragm assembly (112) to emergency lever and bracket assembly (118) by sliding lever forks over flange on diaphragm assembly (112).

4. Install packing (111) on the tube and ring assembly (109). Install tube and ring assembly (109), diaphragm (108) and diaphragm cover (105) on regulator housing (132). Secure with washers (107) and screws (106).

5. Install inlet filter (110) if required.

13-111. OUTLET, MIXING TUBE, AND INJECTOR ASSEMBLY. To assemble the Outlet, Mixing Tube, and Injector Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	QB70750-9 NIIN 00-302-6456

1. Insert injector nozzle (94) and injector sleeve (93) into regulator housing (132). Align window of injector sleeve (93) with port in regulator housing (132).

2. Install mixing tube (92) with spanner wrench.

3. Install packing (91) and outlet (87) into regulator housing (132). Secure with plain washers (90), lock washers (89), and screws (88).

13-112. TEST PORT ASSEMBLY. To install the Test Port Assembly, proceed as follows:

1. Install tubes (46) and (47) onto test port assembly (48).

2. Position test port assembly (48) into regulator housing (132) between aneroid assembly (75) and blinker assembly (31) cavity. Connect tube (46) to aneroid assembly (75) and connect tube (47) to barb located on emergency toggle side of air inlet housing assembly (69).

13-113. BLINKER ASSEMBLY. To install the Blinker Assembly, proceed as follows:

1. Install blinker diaphragm (36), (with metal plate facing up), sealing ring (35), (flat surface facing up), blinker assembly (34), spacer (33) and flat washer (32) (if required) into regulator housing (132).

2. Install retaining ring (31), packing (30) and observation window (29).

13-114. GAGE AND LIGHT MOUNTING PLATE ASSEMBLY. To assemble the Gage and Light Mounting Plate Assembly, proceed as follows:

NOTE

Index numbers in steps 2 and 3, refer to figure 13-7.

1. Assemble pressure gage assembly if required. Attach oxygen pressure gage assembly (1) to mounting plate assembly (12) with two screws (4), two washers (3) and two nuts (2).

2. Attach wire assembly (7) to mounting plate assembly (12) with clamp (6), screw (5), washer (3) and nut (2). Tighten gage assembly.

3. Install check valve guide (28) through back of gage and light mounting plate assembly (19) and secure with check valve fitting (24). Ensure items 25 through 27 remained in place during assembly.

4. Install new packing (22) on pressure gage tubing block. Route tubing and wire assembly between regulator housing (132) and interlock assembly from inlet valve and air inlet housing assembly (69).

5. Align test port assembly (48) and hole in gage and light mounting plate assembly (19) and install light mounting plate (19) onto regulator housing (132). Route tube (23) between gage tube and electrical wire. Using needle nose pliers, connect tube (23) to air inlet housing assembly (69). Secure block to inlet valve assembly (49) with screws (21).

6. Secure gage and light mounting plate assembly (19) to regulator housing (132) with screws (20). Ensure check valve fitting (24) is tight.

7. Install assembled dust cap assembly (11) to check valve fitting (24).

8. Perform Bench Test in accordance with paragraph 13-59.

13-115. PLASTIC LIGHT PLATE. To assemble the Plastic Light Plate, proceed as follows:

NOTE

Items (16 and 17) are used on regulators P/N 29270-10A-A1, 3260011-0101, and 3260011-0701. If regulators have the observation window (29) installed, items (16 and 17) are not required.

1. Secure test port assembly (48) with retaining ring (18). Install gasket (15). Install gasket (16) and cover plate (17) if required.

2. Remove dust cap assembly (11) from check valve fitting (24). Install plastic light plate (13) onto gage and light mounting plate assembly (19). Install dust cap assembly (11) into check valve fitting (24) and cord assembly (6) with screw (9) and washer (10). Secure plastic light plate with screws (14).

3. Install lamp (1) into lamp holder and filter assembly (4). Install grommet (5) and lamp holder and filter assembly (4).

4. Place the supply toggle in the OFF position and the air shutoff toggle in the 100% OXYGEN position. Complete required Maintenance Data Collection Systems forms.

13-116. STORAGE OF READY-FOR-ISSUE (RFI) OXYGEN REGULATORS. To store Ready-For-Issue (RFI) oxygen regulators, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)

1. Place oxygen regulator in plastic bag for storage.

Section 13-5. Illustrated Parts Breakdown

13-117. GENERAL.

13-118. This section lists and illustrates the assemblies and detail parts of the regulators listed in table 13-15. This table also lists the usable on codes used throughout this illustrated parts breakdown. The regulators are manufactured by Litton Industries, Davenport, Iowa, CAGE 99251.

13-119. The Illustrated Parts Breakdown should be used when requisitioning, storing, issuing, and identifying parts. It also illustrates disassembly and assembly relationships.

Table 13-15. Regulator Usable On Codes

Part No.	Usable On Code
29270-10A-B1	A
29270-10A-A1	B
3260011-0701	C
3260011-0101	D
29270-10A-B2	E

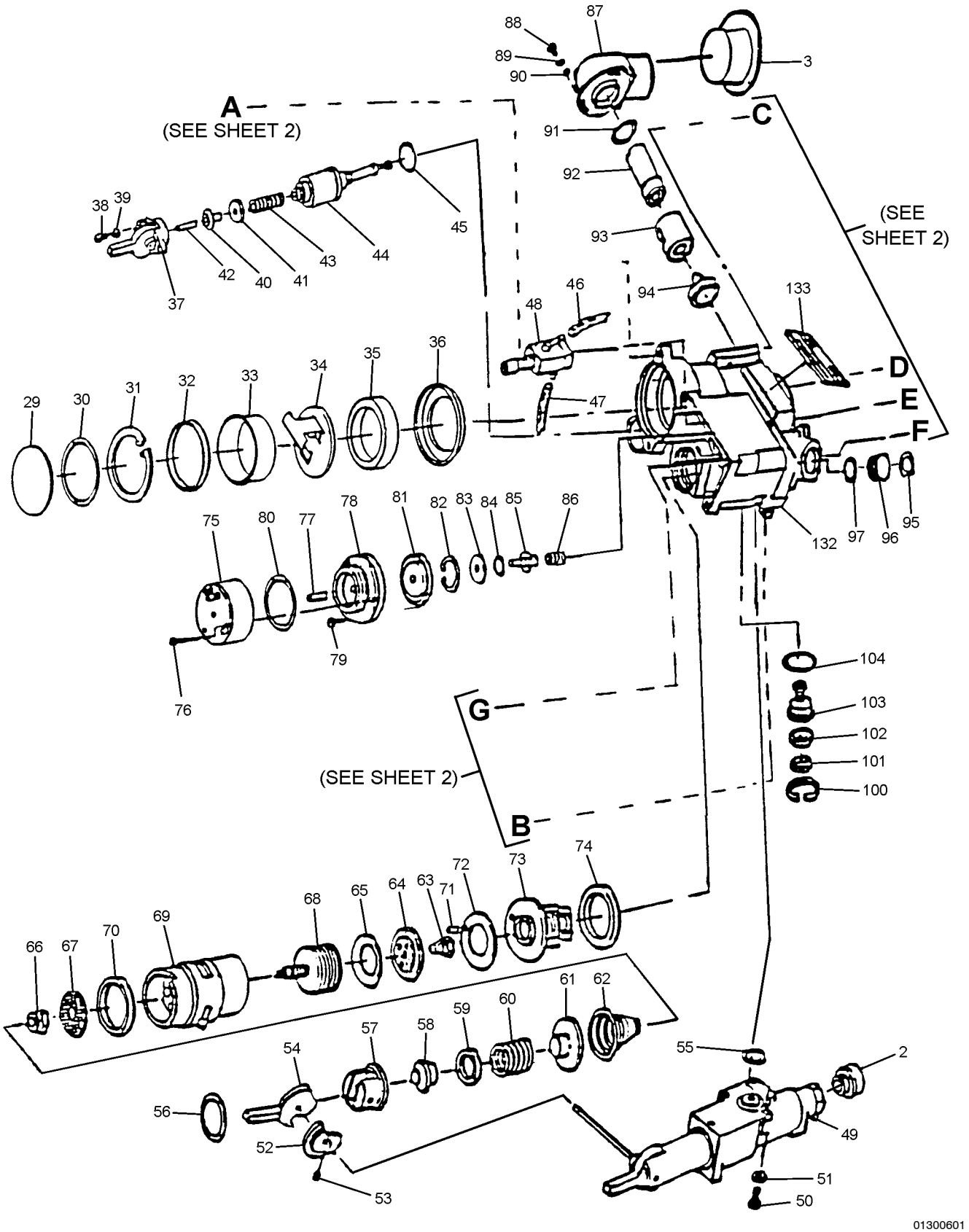


Figure 13-6. Aircraft Panel Mounted Regulators, 29270 and 3260011 (Sheet 1 of 2)

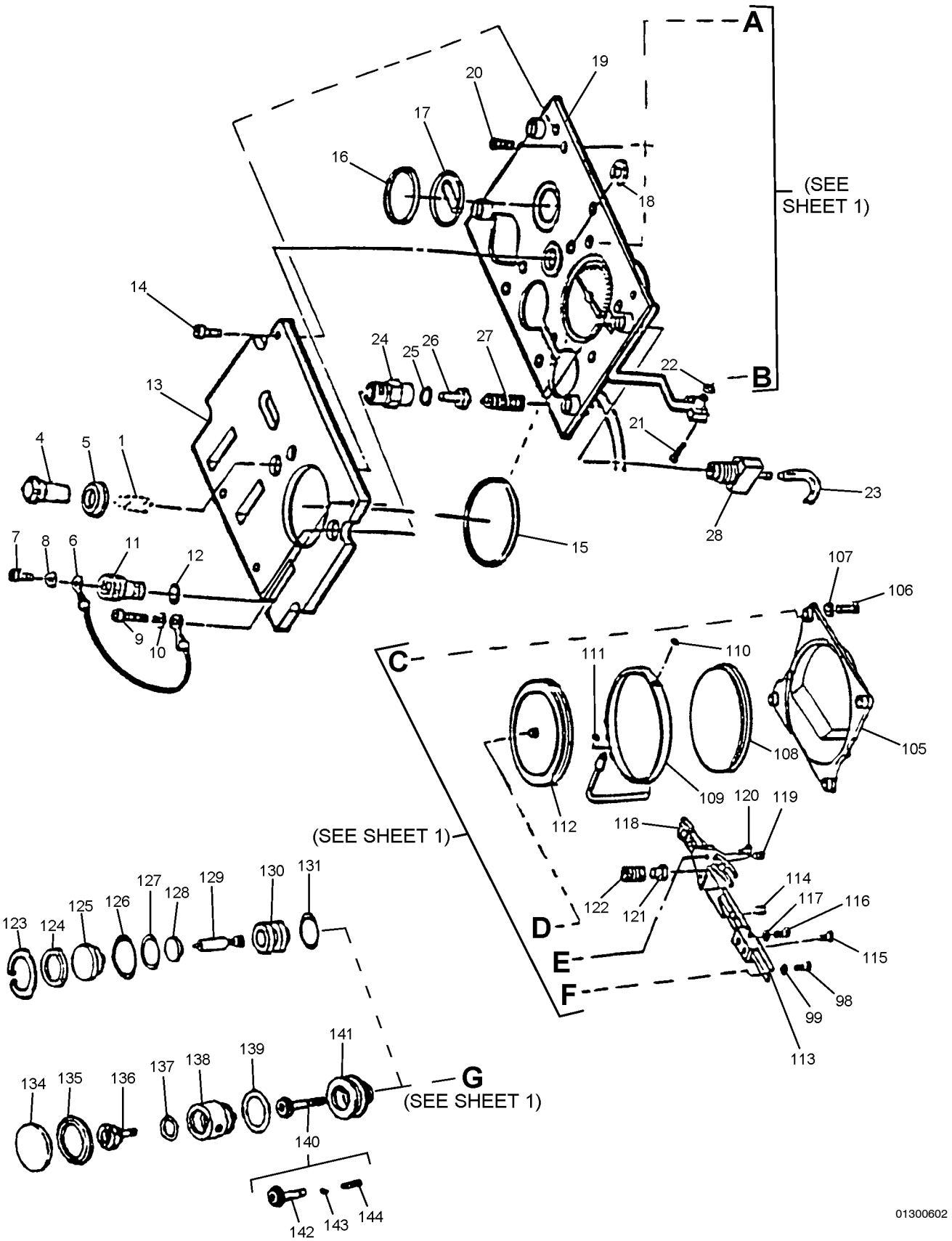


Figure 13-6. Aircraft Panel Mounted Regulators, 29270 and 3260011 (Sheet 2 of 2)

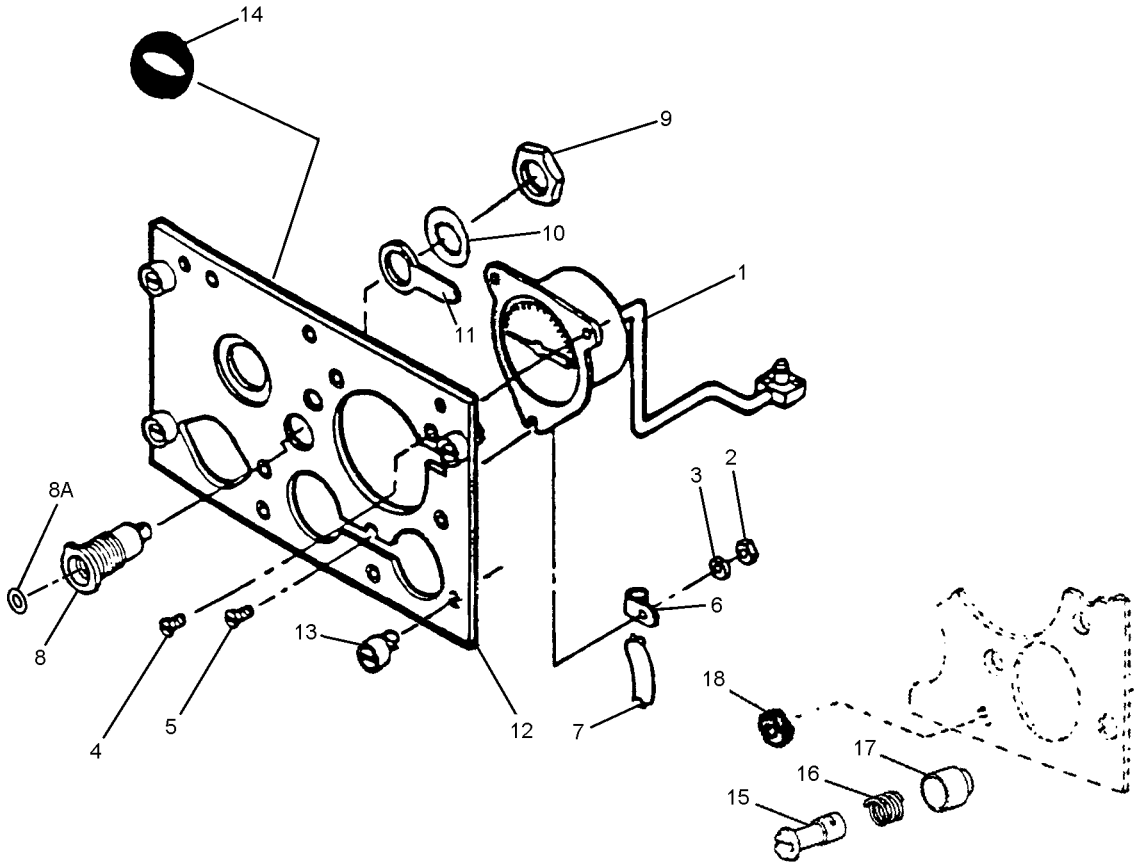
Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-6	29270-10A-B1	REGULATOR, Oxygen	REF	A
	29270-10A-A1	REGULATOR, Oxygen	REF	B
	3260011-0701	REGULATOR, Oxygen	REF	C
	3260011-0101	REGULATOR, Oxygen	REF	D
	29270-10A-B2	REGULATOR, Oxygen	REF	E
-1	MS25237-327	. LAMP, Incandescent	1	
-2	M5501/5-R2	. PLUG, Pipe thread	1	
-3	1613723-17	. PLUG, Shipping (KC)	1	
-4	A-7077-1	. LAMP HOLDER AND FILTER ASSEMBLY (99251 SCD 1612292-1)	1	
-5	1612293-1	. GROMMET (KC)	1	
-6	1617301-1	. CORD ASSEMBLY	1	
-7	NAS1190E04P3N	. SCREW (KF)	1	
-8	1603660-35	. WASHER, Flat (KF)	1	
-9	MS35214-27	. SCREW (KF)	1	
-10	NAS620C6	. WASHER, Flat (KF)	1	
-11	16117200-1	. CAP ASSEMBLY, Dust	1	
-12	MS9068-006	. PACKING, Preformed (KC)	1	
-13	1616332-1	. PLATE, Light	1	A, B, C
	1611735-4	. PLATE, Light	1	D
	1654318-1	. PLATE, Light, NVIIS	1	E
-14	MS35214-26	. SCREW (KF)	3	
-15	813111-1	. GASKET (KC)	1	
-16	813112-1	. GASKET (KC) (Note 1)	1	B, C, D
-17	1621386-2	. COVER, Plate	1	D
-18	MS16632-4025	. RING, Retaining (KF)	1	A, B, C, E
-19	1612055-14	. PLATE ASSEMBLY, Gage and light mounting (figure 13-7 for BKDN)	1	A, B, C
	1612055-9	. PLATE ASSEMBLY, Gage and light mounting (figure 13-7 for BKDN)	1	D
	1612055-25	. PLATE ASSEMBLY, Gage and light mounting (figure 13-7 for BKDN)	1	E
-20	MS51959-27	. SCREW (KF)	4	
-21	FFILO-3031/2SS	. SCREW (KF)	2	
-22	1631697-1	. PACKING, Preformed (KC)	1	
-23	L1201-030-1	. TUBE (Note 1)	1	A, B, C, E
-24	1648005-1	. FITTING, Check valve	1	A, E
	1617195-1	. FITTING, Check valve	1	B, C, D
-25	MS9068-008	. PACKING, Preformed (KC)	1	A, E
-26	1617201-1	. VALVE, Check	1	
-27	1617202-5	. SPRING, Helical compression	1	
-28	1648006-1	. GUIDE, Check valve (Note 1)	1	A, B, C, E
-29	1648614-1	. WINDOW, Observation (Note 1)	1	A, B, C, E
-30	1602321-94	. PACKING, Preformed (KC) (Note 1)	1	A, E
	812921-1	. PACKING, Preformed (KC)	1	B, C, D
-31	L1001-294137	. RING, Retaining (KF)	1	
-32	1603660-120	. WASHER, Flat (KF)	AR	
-33	1614152-1	. SPACER	1	
-34	1614148-2	. BLINKER ASSEMBLY	1	
-35	1614153-1	. RING, Sealing (KF)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-6-36	1614155-1	. DIAPHRAGM, Blinker (KC)	1	
-37	1604108-1	. TOGGLE ASSEMBLY (KF)	1	
-38	FFILO-4051/2SS	. SCREW (KF)	2	
-39	MS35338-154	. WASHER (KF)	2	
-40	1623317-1	. PLATE, Top	1	
-41	814921-1	. SHIM (KF) (Note 2)	AR	
	814921-2	. SHIM (KF) (Note 2)	AR	
-42	1617226-1	. ROD, Push (KF)	1	A, B, E
	816764	. ROD, Push	1	C, D
-43	814993	. SPRING, Helical compression (KF)	1	
-44	1602949-2	. PRESSURE ASSEMBLY, Manual Safety (figure 13-8 for BKDN)	1	
-45	1602321-5	. PACKING, Preformed (KC)	1	
-46	L1201-010-1	. TUBE (Note 1)	1	A, B, C, E
-47	L1201-025-1	. TUBE (Note 1)	1	A, B, C, E
-48	1648603-1	. TEST PORT ASSEMBLY (figure 13-9 for BKDN) (Note 1)	1	
-49	1625350-4	. VALVE ASSEMBLY, Inlet (figure 13-10 for BKDN)	1	
-50	MFILO-607SS	. SCREW (KF)	3	
-51	MS35338-155	. WASHER, Lock (KF)	3	
-52	1617298-1	. CAM (KF)	1	A, B, C, E
-53	AN565D2L2	. SETSCREW (KF)	2	A, B, C, E
-54	1649548-1	. TOGGLE, Diluter (KF)	1	A, B, C, E
	1604106-1	. TOGGLE, Diluter	1	D
	RP-62-500SS	. PIN, Roll (Not pictured in IPB)	1	D
	1617194-2	. BLOCK, Pivot (Not pictured in IPB)	1	D
-55	813058-1	. PACKING, Preformed (KC)	1	
-56	1602678-4	. RING (99251 SCD 1602678-4) (KF)	1	
-57	1617194-1	. BLOCK , Pivot	1	A, B, C, E
-58	1604110-1	. CAP, Spring retaining	1	
-59	1603660-6	. WASHER, Flat (KF)	AR	
-60	1647782-1	. SPRING, Helical compression (KF)	1	A, B, C, E
	1626796-1	. SPRING, Helical compression	1	D
-61	1626803-1	. SLEEVE, Air shutoff (KF)	1	
-62	1611713-1	. SPRING, Conical compression	1	
-63	758649-1	. SCREW .071 (KF) (Note 2)	1	
	758649-2	. SCREW .081 (KF) (Note 2)		
	758649-3	. SCREW .087 (KF) (Note 2)		
	758649-4	. SCREW .062 (KF) (Note 2)		
-64	766097-1	. PLATE, Throttling (KF)	1	
-65	PB50828-1	. WASHER, Spring (KF)	1	
-66	1611712-1	. NUT (KF)	1	
-67	813077-1	. SCREEN, Aneroid (KF)	1	
-68	758632-1	. ANEROID ASSEMBLY	1	
-69	1648608-1	. HOUSING ASSEMBLY, Air Inlet (Note 1)	1	A, E
	1617279-1	. HOUSING ASSEMBLY, Air Inlet (Note 1) (Not pictured in IPB)	1	B, C, D
-70	813115-1	. GASKET (KC)	1	
-71	1648606-1	. TUBE	1	A,E

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-6-72	1648607-1	. GASKET (KC)	1	A, E
	1617224-1	. GASKET (KC)	1	B, C, D
-73	1648613-1	. ADAPTER AND SPRING ASSEMBLY, Check Valve (figure 13-11 for BKDN)	1	A, E
	1611726-1	. ADAPTER AND SPRING ASSEMBLY, Check Valve (figure 13-11 for BKDN)	1	B, C, D
-74	1623977-2	. GASKET (KC)	1	
-75	1647686-2	. ANEROID ASSEMBLY (figure 13-12 for BKDN)	1	A, E
	1624912-2	. ANEROID ASSEMBLY (figure 13-12 for BKDN)	1	B, C, D
-76	FFILO-1051/2SS	. SCREW (KF)	6	
-77	1617192-2	. ROD, Push (KF)	1	
-78	1617227-1	. COVER ASSEMBLY	1	
-79	1607617-5	. SCREW, Special (KF)	3	
-80	1602321-5	. PACKING, Preformed (KC)	1	
-81	1611730-1	. DIAPHRAGM, Valve control (KC)	1	
-82	L1001-254068	. RING, Retaining (KF)	1	
-83	1632425-1	. SEAT, Valve (KF)	1	
-84	1602321-65	. PACKING, Preformed (KC)	1	
-85	1611739-1	. VALVE (KF)	1	
-86	1625748-1	. SPRING, Helical compression (KF)	1	
-87	1612813-1	. OUTLET	1	
-88	FFILO-4051/2 SS	. SCREW (KF)	2	
-89	MS35338-154	. WASHER, Lock (KF)	2	
-90	WO-4SS	. WASHER, Flat (KF)	2	
-91	1602321-29	. PACKING, Preformed (KC)	1	
-92	761800-2	. TUBE, Mixing	1	
-93	1602956-1	. SLEEVE, Injector	1	
-94	1602821-1	. NOZZLE, Injector (KC)	1	
-95	MS16625-4062	. RING, Retaining (KF)	1	
-96	1611723-1	. PLUG	1	
-97	1602321-3	. PACKING, Preformed (KC)	1	
-98	BH-4021/2SS	. SCREW, Binding Head (KF)	1	
-99	741790-2	. LOCK-O-SEAL (KC)	1	
-100	MS16629-4081	. RING, Retaining (KF)	1	
-101	1626798-1	. WASHER, Cover retaining (KF)	1	
-102	1626797-1	. COVER, Valve relief	1	
-103	1619048-4	. VALVE ASSEMBLY, Relief (figure 13-13 for BKDN)	1	
-104	1602321-35	. PACKING, Preformed (KC)	1	
-105	1612830-1	. COVER, Diaphragm	1	
-106	MFFILO-6091/2SS	. SCREW (KF)	4	
-107	MS35338-155	. WASHER, Lock (KF)	4	
-108	1611734-1	. DIAPHRAGM (KC)	1	
-109	1611729-1	. TUBE AND RING ASSEMBLY	1	
-110	1603942-4	. FILTER, Inlet (KF)	1	
-111	1602321-24	. PACKING, Preformed (KC)	1	
-112	1600632-4	. DIAPHRAGM ASSEMBLY (figure 13-14 for BKDN) (KC)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-6-113	1624909-1	. LEVER ASSEMBLY	1	A, B, E
	1602916-1	. LEVER ASSEMBLY	1	C, D
-114	FO-304SS	. SCREW (KF)	1	
-115	FO-304SS	. SCREW (KF)	1	
-116	FFILO-304SS	. SCREW (KF)	1	
-117	WO-3SS	. WASHER, Flat (KF)	1	
-118	1616994-3	. LEVER AND BRACKET ASSEMBLY	1	A, B, E
	1627610-1	. LEVER AND BRACKET ASSEMBLY	1	C, D
-119	AN565FC4L3	. SETSCREW	1	A, B, E
	1612419-15	. SETSCREW	1	C, D
-120	FO-304SS	. SCREW (KF)	2	A, E
	FO-304BN	. SCREW	2	B, C, D
-121	815601-1	. GUIDE, Spring (KF)	1	
-122	1617202-1	. SPRING, Helical compression (KF)	1	
-123	MS16629-4081	. RING, Retaining (KF)	1	
-124	1626798-1	. WASHER	AR	
-125	1617204-1	. SEAT, Valve (KF)	1	A, B, E
-126	1602321-5	. PACKING, Preformed (KC)	1	
-127	815678-1	. PACKING, Preformed (KC)	1	A, B, E
-128	1617205-1	. VALVE (KF)	1	A, B, E
-129	1625697-1	. STEM ASSEMBLY (KF)	1	A, B, E
-130	1617214-1	. BUSHING (KC)	1	A, B, E
-131	815678-1	. PACKING, Preformed (KC)	1	
-132	1610652-1	. HOUSING, Regulator	1	
-133	1612820-3	. PLATE, Identification (KF)	1	A, B, E
	1612820-5	. PLATE, Identification	1	C, D
-134	1611718-1	. RETAINER, Valve	1	C, D
-135	1602321-5	. PACKING, Preformed	1	C, D
-136	1611717-1	. STEM ASSEMBLY, Extension	1	C, D
-137	813752-1	. PACKING, O-ring	1	C, D
-138	1611715-1	. SEAT, Demand valve	1	C, D
-139	815678-1	. PACKING, O-ring	1	C, D
-140	1602922-2	. STEM ASSEMBLY	1	C, D
-141	1602972-1	. BUSHING, Demand valve	1	C, D
-142	1623897-1	. STEM	1	C, D
-143	812462-1	. INSERT, Locking	1	C, D
-144	1625867-1	. CONNECTOR, Valve lever	1	C, D
	1601343-1	KIT, Parts, pressure demand oxygen regulator field (F) (Note 3)	1	A, B, E
	1601607-1	KIT, Parts, pressure demand oxygen regulator cure-date (C) (Note 3)	1	A, B, E

Notes:
1. Regulator P/Ns 29270-10A-A1, 3260011-0701 and 3260011-0101 are currently being configured to regulator P/N 29270-10A-B1 by Air Force rework facilities. The regulators in this chapter will be maintained at their current configuration during Bench Test. Close attention to Usable On Codes is required. If regulators have updated items installed to configuration 29270-10A-B1, then usable on code (A) will apply for repair for that section only.
2. Selected at assembly.
3. These parts kits do not have stock numbers. If they are needed for repair of the regulator, they must be open purchased by part number from the manufacturer, Litton Industries, Davenport, IA., CAGE 99251.

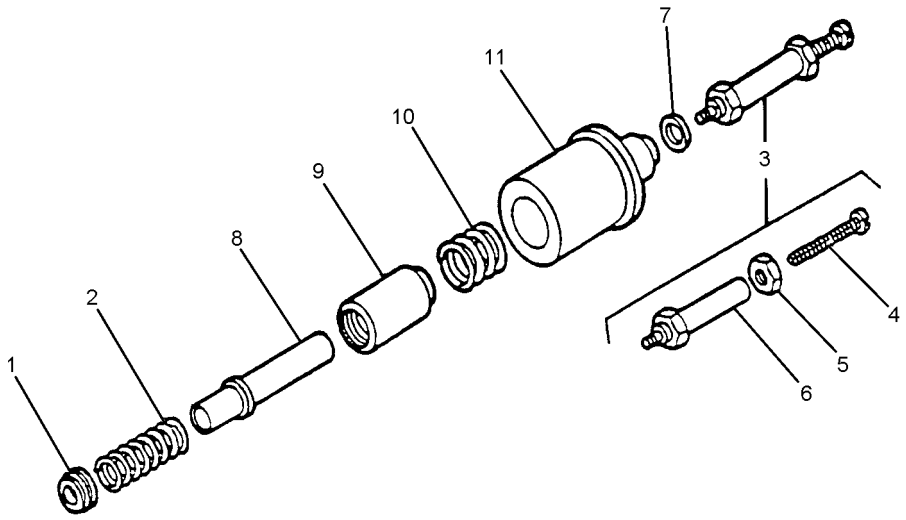


013007

Figure 13-7. Gage and Light Mounting Plate Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-7	1612055-14	. PLATE ASSEMBLY, Gage and light mounting (figure 13-6 for NHA)	1	A, B, C
	1612055-9	. PLATE ASSEMBLY, Gage and light mounting (figure 13-6 for NHA)	1	D
	1612055-25	. PLATE ASSEMBLY, Gage and light mounting (figure 13-6 for NHA)	1	E
-1	813095-1	. GAGE ASSEMBLY, Oxygen Pressure	1	
-2	NO-6SS	. NUT (KD)	3	
-3	LWO-6	. WASHER (KF)	3	
-4	F0-604SS	. SCREW (KF)	3	
-5	1627710-1	. SCREW (KF)	1	
-6	1625446-1	. CLAMP, Loop type (KF)	1	
-7	1608564-1	. WIRE ASSEMBLY (KF)	1	
-8	A-4996	. RETAINER ASSEMBLY, Lamp (99251 SCD 1612294-1)	1	
	1612294-1	. RETAINER ASSEMBLY, Lamp (99251) (Note 1)	1	E
-8A	MS90335-9	. RECEPTACLE CONNECTOR (Note 1)	1	E
-9	MS25082-21	. NUT	1	
-10	AN936A716S	. WASHER	1	
-11	816554	. LUG, Terminal	1	
-12	1646456-1	. PLATE ASSEMBLY, Mounting	1	A, B, C, E
	816593-8	. PLATE ASSEMBLY, Mounting	1	D
-13	1625328-1	. FASTENER, Panel (KF)	4	
-14	9332641	. BLINKER DECAL	AR	
-15	PF3-1/2-38	. FASTENER (72794) (Bendix Spec Cont DWG 799812-1)	4	D
-16	PS3-1/2	. SPRING (72794) (Bendix Cont DWG 799813-1)	4	D
-17	PC3-11/2	. CUP (72794) (Bendix Cont DWG 799813-1)	4	D
-18	812762-1	. CLINCH NUT	3	D

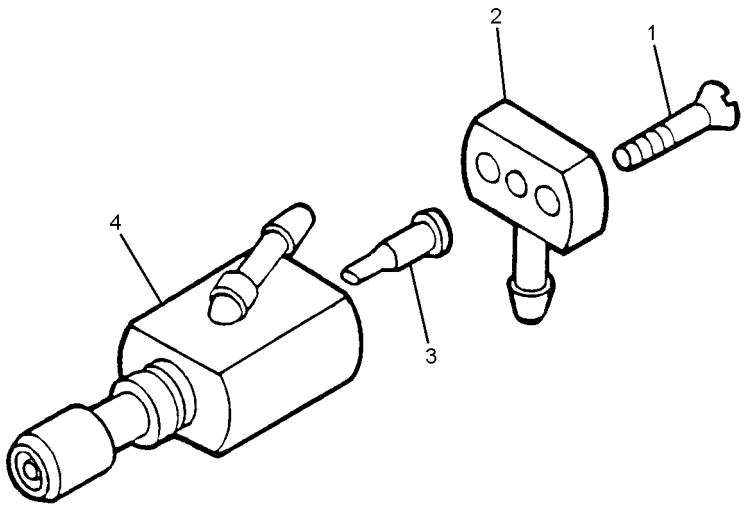
Notes: 1. Receptacle connector P/N MS90335-9 must be inserted into retainer assembly P/N 1612294-1.



013008

Figure 13-8. Manual Safety Pressure Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-8	1648603-1	. PRESSURE ASSEMBLY, Manual safety pressure (figure 13-6 for NHA)	REF	
-1	813108-1	. SCREW, Adjusting (KF)	1	
-2	1608284-1	. SPRING, Helical compression (KF)	1	
-3	1602947-1	. ROD ASSEMBLY, Push	1	
-4	1605328-1	. SCREW, Cap	1	
-5	NO-2SS	. NUT	1	
-6	814427	. ROD, Push	1	
-7	1602951-1	. WASHER, Non-metallic (KC)	1	
-8	814425-1	. ROD, Actuating (KF)	1	
-9	814424-1	. GUIDE, Manual safety (KF)	1	
-10	815504-1	. SPRING, Helical compression (KF)	1	
-11	1602948-1	. HOUSING, Manual safety	1	

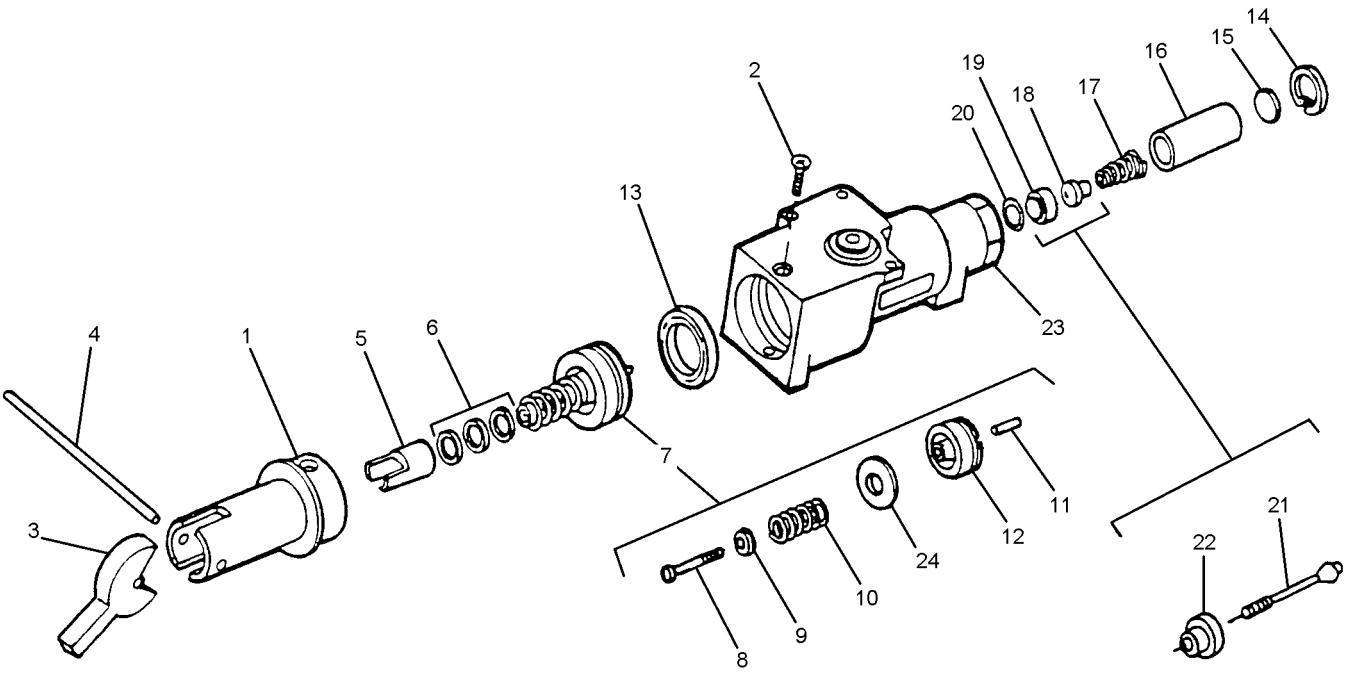


013009

Figure 13-9. Test Port Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-9	1648603-1	. TEST PORT ASSEMBLY . . . . . (figure 13-6 for NHA) (Note 1)	REF	
-1	MS51959-4	. SCREW	2	A
-2	1650852-1	. COVER ASSEMBLY	1	A
-3	1648602-1	. VALVE, Check	1	A
-4	1650851-1	. FITTING ASSEMBLY	1	A

Notes: 1. Regulator P/Ns 3260011-0101, 3260011-0701, and 29270-10A-A1 are currently being configured to P/N 29270-10A-B1 by Air Force rework facilities. If test port is installed on regulators, do not remove. The regulator will be inspected as a 29270-10A-B1 and Usable On Code A will apply.

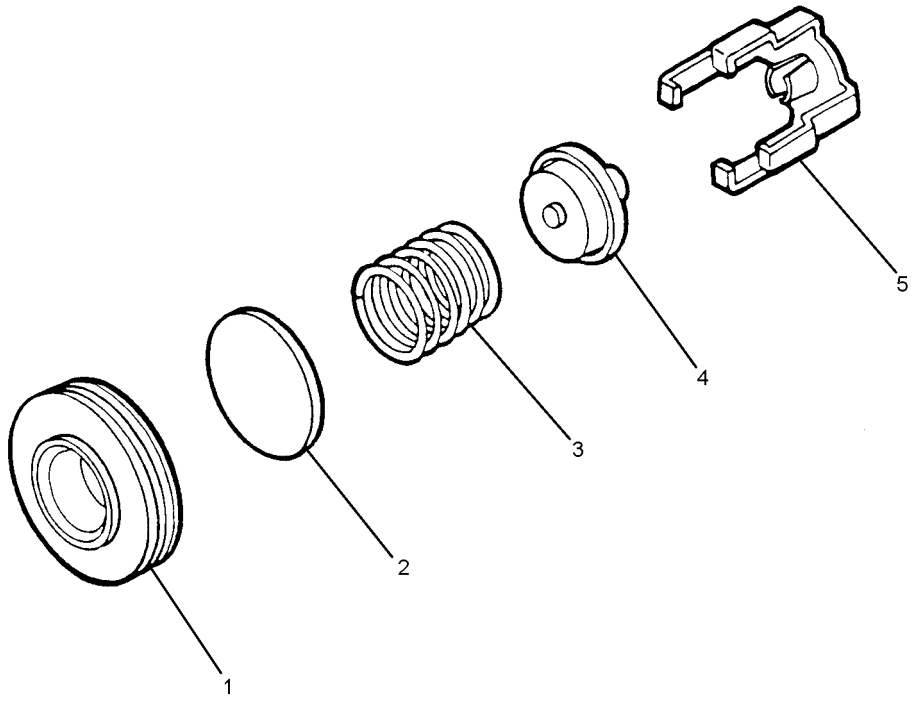


013010

Figure 13-10. Inlet Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-10	1625350-4	. VALVE ASSEMBLY, Inlet (figure 13-6 for NHA)	REF	
-1	1623463-1	. CAP, Toggle	1	A, B, E
	1610647-1	. CAP, Toggle	1	C, D
-2	MS51960-30	. SCREW (KF)	2	
-3	1627791-1	. TOGGLE, Inlet (KF)	1	
-4	1617191-1	. PIN (KF)	1	A, B, C, E
	RP-62-562SS	. PIN	1	D
-5	1631091-1	. FOLLOWER, Cam (KF)	1	
-6	1605349-1	. SHIM (0.0050 IN THK) (KF) (Note 1)	AR	
	1605349-2	. SHIM (0.0100 IN THK) (KF) (Note 1)	AR	
	1605349-3	. SHIM (0.0150 IN THK) (KF) (Note 1)	AR	
-7	1624905-4	. PISTON ASSEMBLY (KF)	1	A, B, E
	1602935-1	. PISTON ASSEMBLY	1	C, D
-8	NAS1190E04P12L	. SCREW	1	A, B, E
	1602932-1	. SCREW	1	C, D
-9	1602933-1	. WASHER, Guide	1	
-10	1648085-1	. SPRING, Helical compression	1	A, B, E
	1602931-1	. SPRING, Helical compression	1	C, D
-11	1602948-1	. ROD, Valve Push	1	A, B, E
-12	1617225-1	. PISTON	1	A, B, E
	1602934-1	. PISTON	1	C, D
-13	816919-18	. PACKING, Preformed (KC)	1	A, E
	816919-3	. PACKING, Preformed (KC)	1	B, C, D
-14	L1001-294031	. RING, Retaining (KF)	1	
-15	1624904-1	. FILTER, Inlet Valve (KF)	1	A, B, E
	1612057-1	. FILTER, Inlet Valve	1	C, D
-16	1626621-1	. SLEEVE	1	
-17	1654948-1	. SPRING, Conical compression (KF)	1	
-18	1654946-1	. VALVE (KF)	1	A, B, E
-19	1654777-1	. SEAT, Inlet valve (KF)	1	A, B, E
-20	1600099-1	. PACKING, O-ring (KC)	1	
-21	1602930-1	. STEM, Valve	1	C, D
-22	1602937-1	. INSERT, Seat	1	C, D
-23	1622735-1	. BODY, Inlet Valve	1	A, B, E
	1611733-1	. BODY, Inlet Valve	1	C, D
-24	814450-1	. SHIM (0.0050 IN THK) (Note 1)	AR	C, D
	814450-2	. SHIM (0.0100 IN THK) (Note 1)	AR	C, D
	814450-3	. SHIM (0.0150 IN THK) (Note 1)	AR	C, D

Notes: 1. Selected at assembly.

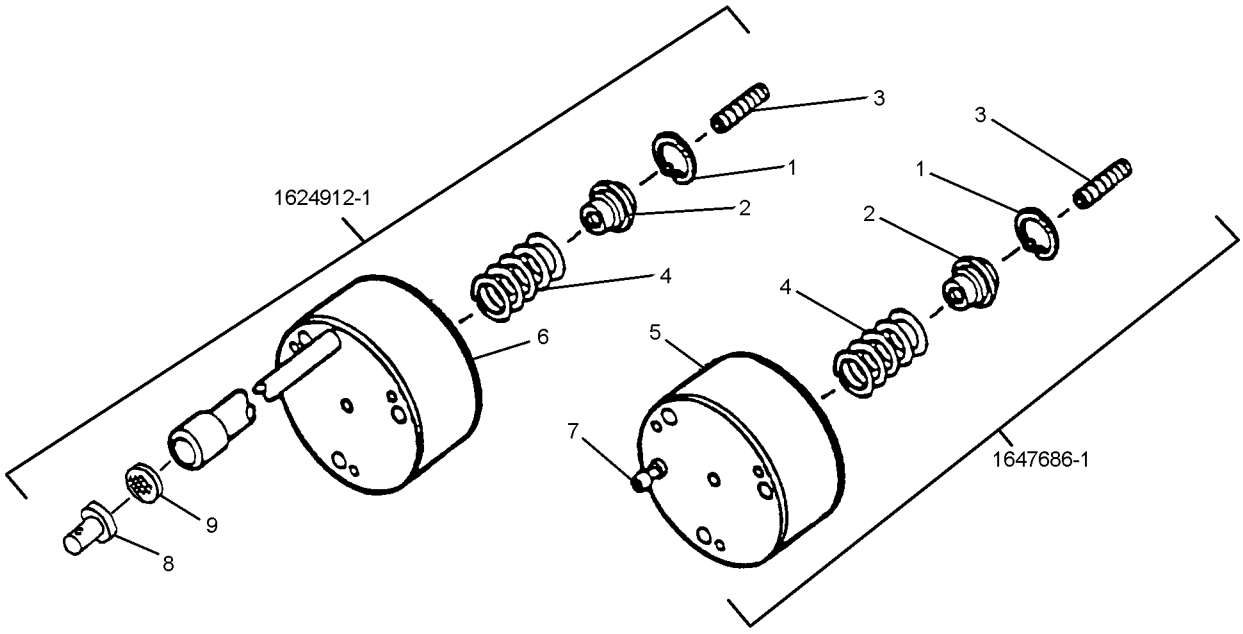


013011

Figure 13-11. Adapter and Spring Assembly, Check Valve

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-11	1648613-1	. ADAPTER AND SPRING ASSEMBLY, ... Check valve (figure 13-6 for NHA) (Note 1)	REF	A, E
	1611726-1	. ADAPTER AND SPRING ASSEMBLY, ... Check valve (figure 13-6 for NHA) (Note 1)	REF	B, C, D
-1	1648601-1	. ADAPTER, Check valve	1	A, E
	1611719-1	. ADAPTER, Check valve	1	B, C, D
-2	PB53041-1	. DISC, Check valve (KC)	1	
-3	758636-1	. SPRING, Helical (KF)	1	
-4	763204-1	. ADAPTER ASSEMBLY, Spring (KF)	1	
-5	1611725-1	. RETAINER ASSEMBLY (KF)	1	

Notes: 1. If aneroid housing P/N 1648608-1 and test port assembly (figure 13-9) are installed on regulator P/Ns 3260011-0101, 3260011-0701, and 29270-10A-A1, then Usable On Code A will apply to regulators.

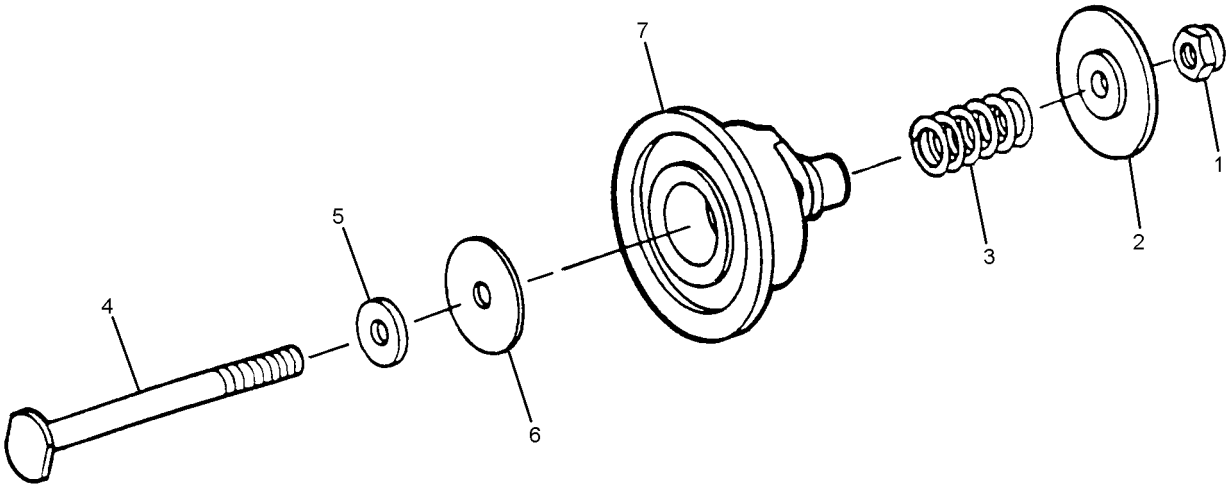


013012

Figure 13-12. Aneroid Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-12	1647686-1	. ANEROID ASSEMBLY ..... (figure 13-6 for NHA) (Note 1)	REF	A, E
	1624912-1	. ANEROID ASSEMBLY ..... (figure 13-6 for NHA) (Note 1)	REF	B, C, D
-1	MS16625-4031	. RING (KF)	1	
-2	1617210-1	. RETAINER, Spring	1	
-3	1623461-1	. SCREW, Pressure Adjusting	1	
	1623461-2	. SCREW, Pressure Adjusting	1	
	1623461-3	. SCREW, Pressure Adjusting	1	
-4	1617202-1	. SPRING, Helical Compression	1	
-5	1647663-1	. HOUSING ASSEMBLY, Aneroid	1	A, E
-6	1617280-1	. HOUSING ASSEMBLY, Aneroid	1	B, C, D
-7	1627503-1	. FITTING ASSEMBLY, Barb	1	A, E
-8	1617213-1	. BAFFLE, Inlet	1	B, C, D
-9	815840-2	. SCREEN	1	B, C, D

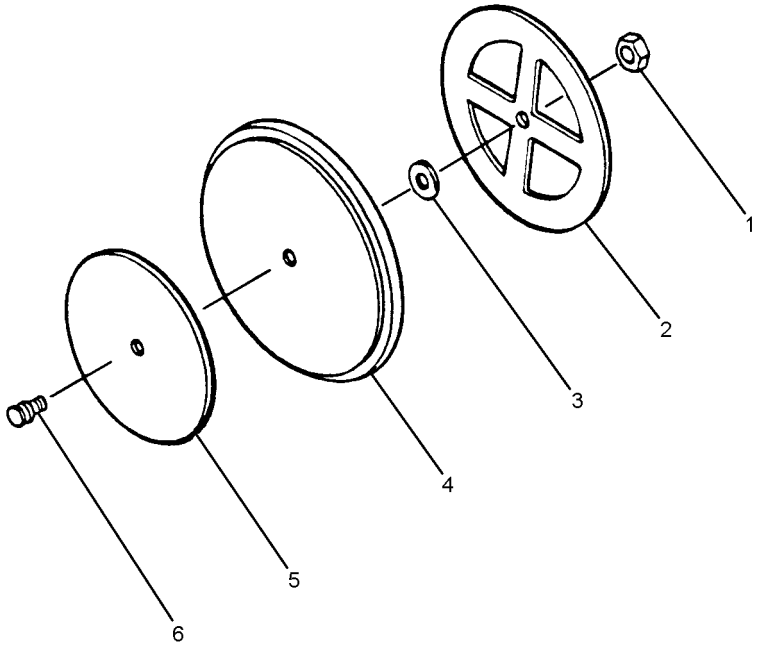
Notes: 1. If aneroid housing P/N 1647663-1 and test port assembly (figure 13-6) are installed on regulator P/Ns 3260011-0101, 3260011-0701, and 29270-10A-A1, then Usable On Code A will apply to regulators.



013013

Figure 13-13. Relief Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-13	1619048-4	. VALVE ASSEMBLY, Relief . . . . . (figure 13-6 for NHA)	REF	
-1	92-1660-00	. NUT, Elastic stop (99251 SCD 1624848-1)	1	
-2	1625025-1	. RETAINER, Spring	1	
-3	1619070-7	. SPRING, Helical compression	1	
-4	1617241-1	. GUIDE, Valve	1	
-5	1617243-1	. GASKET (KC)	1	
-6	1617244-1	. DISC, Valve	1	
-7	1620717-1	. SEAT, Relief valve	1	



013014

Figure 13-14. Diaphragm Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
13-14	1600632-4	. DIAPHRAGM ASSEMBLY ..... (figure 13-6 for NHA)	REF	
-1	793515-1	. NUT, Diaphragm (KC)	1	
-2	814442	. PLATE, Diaphragm	1	
-3	1603661-85	. WASHER, Non-metallic	1	A, B, E
-4	814441-3	. DIAPHRAGM	1	A, C, D, E
	1643631-1	. DIAPHRAGM	1	B
-5	1602045-1	. PLATE, Diaphragm	1	
-6	791765-2	. FLANGE, Diaphragm	1	

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CHAPTER 14

AIRCRAFT PANEL MOUNTED OXYGEN REGULATORS TYPES CRU-73/A, CRU-68A/A, AND CRU-92/A

Section 14-1. Description

14-1. GENERAL.

NOTE

For CRU-96/A, P/N 14800-11 and CRU-97/A, P/N 14950-46, refer to paragraph 14-59 for Bench Testing procedures and paragraph 14-116, step 22 for lamp installation procedures until formal maintenance chapters are incorporated in manual. Record bench test readings utilizing figure 14-3.

14-2. Aircraft Panel Mounted Oxygen Regulators, Types CRU-73/A, CRU-68A/A, and CRU-92/A (CAGE 03390) (figure 14-1) are manufactured by Carleton Technologies. They are designed to regulate breathing oxygen supplied to the aircrewmember during flight. Table 14-1 contains leading particulars for the regulators.

14-3. All controls and indicators necessary for indication of performance and operation of the regulator are located on an illuminated panel with the regulating components attached to the mounting plate and controls assembly.

NOTE

The equipment is identified by type, part number, and description. Type designation only will be used as reference in this chapter.

14-4. The regulators are panel-mounted, automatic positive pressure diluter demand type regulators and are used in conjunction with a pressure breathing type oxygen mask. The regulators provide 100 percent oxygen, or an air/oxygen mixture at the correct ratio depending on altitude, to the user on demand. The regulators incorporate an emergency pressure control lever. During normal operation, the lever is set in the NORMAL position. A TEST MASK position is provided to test the oxygen supply function of the regulator at low altitudes, and at ground level. When in the EMERGENCY position, the regulators deliver 100 percent oxygen to the user at a positive pressure. The EMERGENCY position is used when inadequate oxygen supply is suspected. The regulators are designed for Air Force aircraft and have been modified with test ports for in-place aircraft testing of the regulators. These test ports will not be used for testing in this chapter.

14-5. CONFIGURATION.

14-6. The regulators are supplied in one basic configuration: low pressure (50 to 500 psig operating range). Currently USAF rework facilities are modifying all regulators covered in this chapter to P/N B40550-1. Regulators in this chapter will be maintained at their current configuration and part number.

14-7. FUNCTION.

NOTE

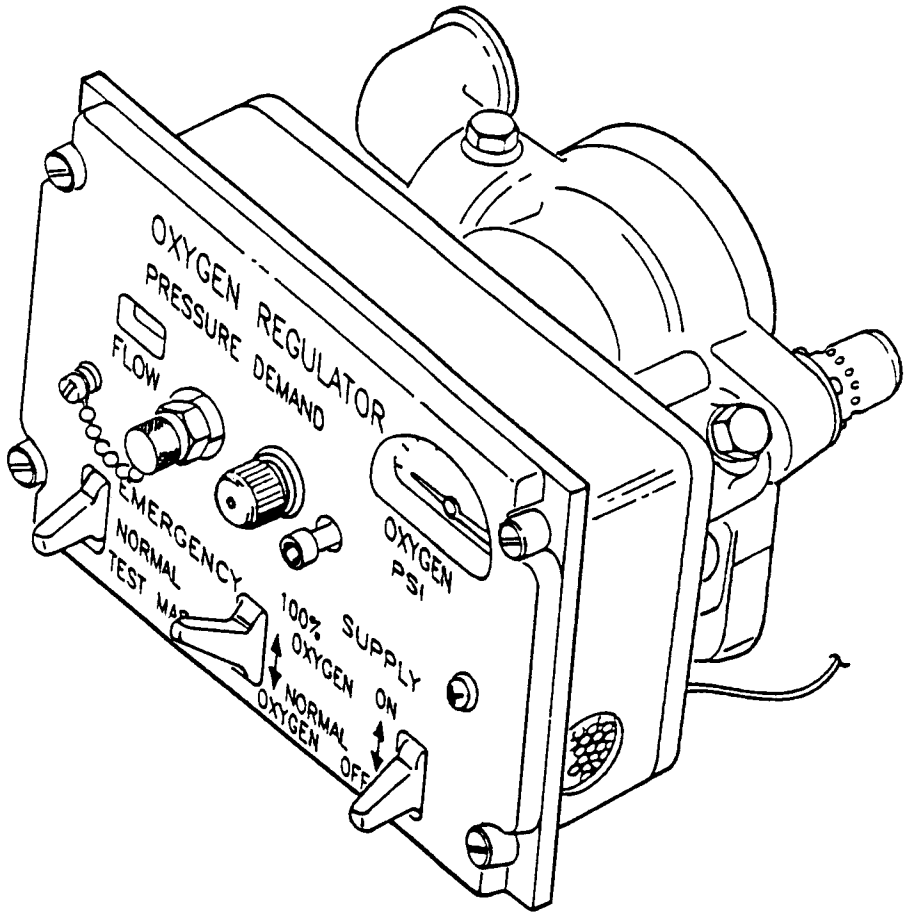
When the supply lever (B) is placed in the OFF position, the diluter lever (N) will toggle to the 100 percent OXYGEN position. Diluter lever (N) can only be positioned to NORMAL OXYGEN when the SUPPLY lever (B) is in ON position.

14-8. Characteristics and performance for which the regulators are designed are described below. Letters in parentheses relate to letters circled in figure 14-2.

1. When supply lever (B) is placed in the ON position, and the diluter lever (N) is in the NORMAL OXYGEN position, oxygen enters at inlet (A) through the inlet supply assembly and flows to first stage reduction chamber (C). This chamber ensures a consistent and predictable outlet pressure and flow through the required wide range of inlet pressures. First stage relief valve (D) protects against over pressure conditions.

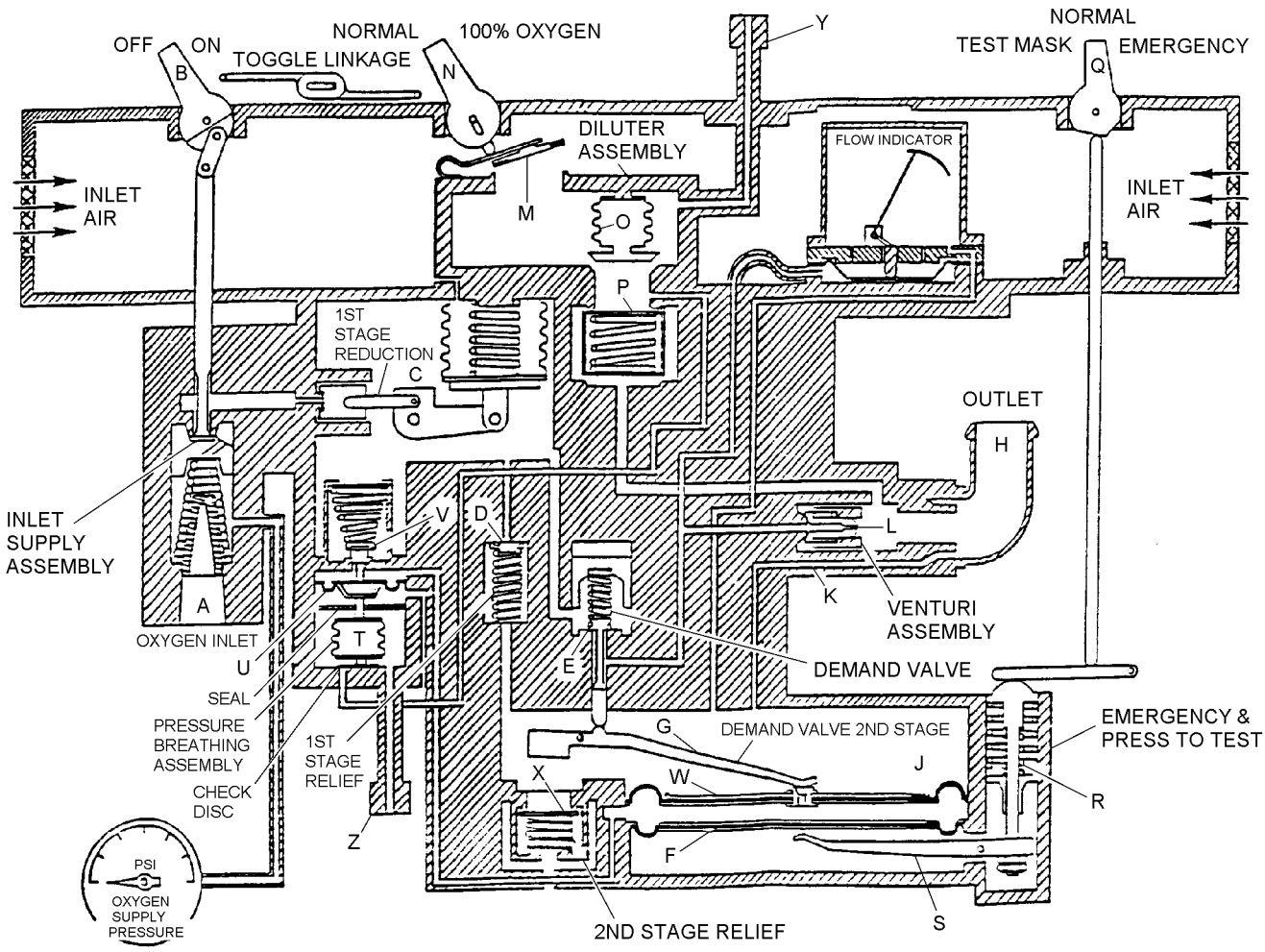
2. Demand valve (E) opens when the pressure differential across diaphragm (W) exceeds the force required to move the second stage demand valve lever (G) up. This differential is created at outlet (H) during inhalation. A reduction in pressure is sensed in the demand diaphragm chamber (J) through sensing port (K).

3. During periods of flow, oxygen from demand valve (E) flows through venturi (L) causing the flow indicator to show white. Oxygen from the venturi assembly is mixed with inlet air that is drawn in by the venturi assembly through diluter valve (M), (metered by the seat of the diluter aneroid (O)) and through diluter check valve (P). Diluter check valve (P) prevents the loss of oxygen outward through diluter valve (M) during the pressure (PB) mode at high altitudes, 100 percent oxygen at a safety pressure is supplied automatically.



014001

Figure 14-1. Aircraft Panel Mounted Oxygen Regulator, Types CRU-68A/A, CRU-73/A, and CRU-92/A



LEGEND

A. OXYGEN INLET
B. SUPPLY LEVER
C. 1ST STAGE REDUCTION CHAMBER
D. 1ST STAGE RELIEF VALVE
E. DEMAND VALVE
F. DEMAND DIAPHRAGM
G. 2ND STAGE DEMAND VALVE LEVER
H. OXYGEN OUTLET
J. DEMAND DIAPHRAGM CHAMBER
K. SENSING PORT
L. VENTURI ASSEMBLY
M. DILUTER VALVE
N. DILUTER LEVER
O. DILUTER ANEROID
P. DILUTER CHECK VALVE
Q. EMERGENCY LEVER
R. RELIEF VALVE SPRING
S. EMERGENCY AND PRESS TO TEST LEVER
T. ANEROID
U. ANEROID T DIAPHRAGM
V. BALL VALVE ASSEMBLY
W. PRESSURE BREATHING DIAPHRAGM
X. 2ND STAGE RELIEF VALVE
Y. AIR INLET TEST PORT
Z. PRESSURE BREATHING TEST PORT

014002

Figure 14-2. Regulator Operation

Table 14-1. Leading Particulars

CHARACTERISTICS		
CRU-73/A	B40550-1	50 to 500 psi
CRU-92/A	B40860-1	50 to 500 psi
CRU-73/A	14950-45	50 to 500 psi
CRU-73/A	14950-40	50 to 500 psi
CRU-68A/A	14950-34M	50 to 500 psi
Voltage		28 Vdc
Mounting		Panel
Dimensions:		
Width		5.750 in.
Height		3.000 in.
Depth		4.250 in.
Weight		2.769 lb.
Operating Altitude Ranges:		
Air-Oxygen Mixture		Up to 32,000 ft
100% Oxygen (Normal plus Pressure Breathing)		Up to 43,000 ft
100% Oxygen (Normal plus Pressure Breathing)		Up to 50,000 ft
Visual Indications		Oxygen PSI Gage and Flow Indicator
Regulator Controls:		
Diluter Lever		To select NORMAL or 100% OXYGEN
Supply Lever		To select ON or OFF
Emergency Lever		To select emergency or ground test of mask

4. At altitudes above 32,000 feet, in the normal supply mode with supply lever (B) in the ON position and diluter lever (N) in NORMAL OXYGEN position, aneroid (O) expands and closes diluter valve (M), preventing inlet air from diluting the oxygen. 100 percent oxygen is supplied from inlet (A), through the inlet supply assembly, into the first stage reduction chamber (C), through demand valve (E), venturi assembly (L), and outlet (H).

5. At altitudes above 30,000 feet, in the normal supply mode with supply lever (B) in the ON position and diluter lever (N) in the NORMAL OXYGEN position, the regulator automatically supplies pressure and pressure breathing by utilizing a pneumatic device actuated by aneroid (T) starting at approximately 27,000 feet. As altitude is increased, aneroid (T) forces diaphragm (U) to expand and actuate pressure breathing ball valve assembly (V) permitting oxygen to flow to pressure breathing diaphragm (W). As diaphragm (W) moves on second demand valve lever (G), positive pressure is increased at oxygen outlet (H). Second stage relief valve (X) prevents an over pressurization of demand diaphragm chamber (J).

6. At altitudes below 32,000 feet, with the supply lever (B) in the ON position, and diluter lever (N) in the 100% OXYGEN position, diluter valve (M) will close and 100 percent oxygen will be available. The 100 percent oxygen is supplied from inlet (A), through the inlet supply assembly, into first stage reduction chamber (C), through demand valve (E), then through venturi (L), and outlet (H).

7. When the emergency lever (Q) is placed in the EMERGENCY position, a force is applied to spring (R). Lever (S), attached to spring (R), mechanically loads the demand diaphragm (F). Pressure breathing diaphragm (W) is pressure loaded, acting on second stage demand valve lever (G). Demand valve (E) is opened when second stage demand valve lever (G) is forced up, providing positive pressure at outlet (H).

8. When the emergency lever (Q) is momentarily placed in the TEST MASK position, a force is applied to spring (R). Spring (R) loads pressure breathing diaphragm (W) through lever (S) moving diaphragm (F). Diaphragm (F) applies a pressure load to pressure breathing diaphragm (W) which acts on demand valve lever (G). Demand valve lever (G) provides positive pressure to the oxygen mask. The resulting outlet pressure will be higher than the emergency pressure. This feature allows the pilot to check the mask for leakage and proper fit before use.

9. The air inlet test port (Y) is used to check the altitude at which aneroid (O) stops the flow of added air. By pulling a vacuum at test port (Z) with diluter lever (N) in the 100% OXYGEN position, monitoring of test port (Y) with an altimeter will check operation of the diluter aneroid (O). Pressure breathing test port (Z) is also used to check the pressure at outlet (H) when aneroid (T) is subjected to various levels of vacuum to simulated altitude.

10. The regulator has two visual indicators. They are the flow indicator and the oxygen psi pressure gage. The pressure gage is calibrated to display supply pressure to the regulator in psig.

11. During periods of flow to outlet (H), oxygen also flows to the flow indicator. Pressure on the indicator diaphragm will rotate a white flag to show in a window indicating oxygen flow. Whenever an oxygen source is connected to inlet (A), regardless of the position of supply lever (B), pressure is indicated on the oxygen supply gage.

14-9. SERVICE LIFE.

14-10. Oxygen regulators shall remain in service for as long as they function correctly and do not require excessive repair (exceeds 75% of original cost of regulator). All affected silicone rubber parts shall be replaced whenever a regulator is disassembled for repair.

14-11. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

14-12. Section 14-5, Illustrated Parts Breakdown, contains information on each assembly, subassembly, and component part of the regulators. The figure and index number, reference or part number, description, and units per assembly are provided with the breakdown.

Section 14-2. Modifications

14-13. GENERAL.

14-14. There are currently no authorized modifications for the Aircraft Panel Mounted Oxygen Regulators.

Section 14-3. Performance Test Sheet Preparation

14-15. GENERAL.

14-16. Preparation of Oxygen Regulator Performance Test Sheets require that, through the various graphs, actual flows given in applicable directives and provided in this section be converted to indicated flows.

14-17. Flows provided in applicable directives are stated in liters per minute (lpm) and are not measurable by the manometers used in oxygen regulator test stands. The flow must be converted to inches of water pressure (inH_2O), the form of measurement that can be read on the test stand manometers.

NOTE

The various graphs supplied with each Oxygen System Components Test Stand, Model 1172AS100 and 1316AS100, are used in converting flows. The graphs supplied are not interchangeable between test stands.

14-18. The information provided in the tables in this Section is to be recorded on the Performance Test Sheet (figure 14-3).

14-19. The Performance Test Sheet (figure 14-3) is a sample only, but may be reproduced for local use.

REGULATOR PERFORMANCE TEST SHEET

CARLETON TYPES CRU-73/A, CRU-92/A, AND
CRU-68A/A REGULATORS

DATE _____ TYPE _____ SERIAL NO. _____

TEST STAND SERIAL NO. _____ TESTED BY _____ CDI _____

1. INWARD LEAKAGE TEST _____ 2. OUTLET LEAKAGE TEST _____
3. OXYGEN SUPPLY VALVE LEAKAGE TEST _____ 4. OVERALL LEAKAGE TEST _____
5. PRESSURE GAGE TEST: NOTE: TESTED AT AMBIENT TEMPERATURE OF 70°F.

LOW PRESSURE REGULATOR ONLY

PRESSURE GAGE (PSIG)	TOLERANCE PSIG	BEFORE TAP	AFTER TAP
50	± 10		
100	± 25		
500	± 25		

6. OUTWARD LEAKAGE TEST _____
7. RELIEF VALVE TEST
   a. VENTS 45 LPM _____ AT 40.7 INH_2O (3 INHg)
   b. LEAKAGE AT 17 INH_2O _____
8. FLOW SUCTION TEST

ALTITUDE	INLET PRESSURE (PSIG)	ACTUAL OUTPUT (LPM)	NORMAL		100 PERCENT		MAXIMUM SUCTION (INH_2O)
			INDICATED OUTPUT	READING	INDICATED OUTPUT	READING	
SEA LEVEL	50	30					-0.50
SEA LEVEL	150	50					-0.70
SEA LEVEL	150	85					-1.0

9. OXYGEN RATIO TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OXYGEN PERCENT		OUTPUT				INPUT				
	MIN	MAX	AVERAGE PERCENT	ACTUAL OUTPUT (LPM)	INDICATED OUTPUT (INH_2O)	CORRECTED INDICATED OUTPUT	ACT HI	ACT LOW	IND HI	IND LOW	READING
10	6	45	25.5	15			14.1	8.25			
10	6	60	33	85			79.9	34			
20	24	55	39.5	15			11.4	6.75			
20	24	80	52	85			64.6	17			
28	60	100	80	15			6	0		0	
28	60	100	80	85			34	0		0	
32	98	100	99	85			1.7	0		0	

10. ANEROID AIR VALVE CLOSURE TEST (28,000 TO 32,000 FEET) PERFORMED ONLY IF REGULATOR FAILS OXYGEN RATIO TEST _____

Figure 14-3. Performance Test Sheet (Sheet 1 of 2)

11. SAFETY PRESSURE/PRESSURE BREATHING TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

ALTITUDE (1000 FT)	OUTPUT		PRESSURE (INH_2O)		
	ACTUAL (LPM)	INDICATED (INH_2O)	MINIMUM	READING	MAXIMUM
30	0	0	0.01		2.50
30	85		0.01		2.50
40	0	0	0.30		5.60
40	85		0.30		5.60
43	0	0	5.30		12.50
43	85		5.30		12.50
50	0	0	11.20		18.20
50	85		11.20		18.20

12. BLINKER (FLOW INDICATOR) TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

ALTITUDE/ PRESSURE	DILUTER LEVER	OUTPUT		READING	BLINKER POSITION
		ACTUAL	INDICATED		
SEA LEVEL	NORMAL	20			FULLY OPEN
SEA LEVEL	100%	8			FULLY OPEN
SEA LEVEL	100%	0	0		CLOSE IMMED
17 INH_2O	100%	12			FULLY OPEN
17 INH_2O	100%	0	0		CLOSE IMMED

13. EMERGENCY PRESSURE TEST (INLET PRESSURE 50 PSIG FOR LOW PRESSURE REGULATORS)

OUTPUT		DILUTER LEVER	EMERGENCY LEVER	PRESSURE READING	TOLERANCE (INH_2O)
ACTUAL	INDICATED				
10 LPM		NORMAL	EMERGENCY		2.0 TO 4.0
80 LPM		100%	EMERGENCY		1.0 MIN.
10 LPM		100%	TEST MASK		6.0 TO 16.0

NOTES: WITH ZERO FLOW, OUTLET PRESSURE SHALL NOT EXCEED 17.5 INH_2O WITH EMERGENCY PRESSURE CONTROL LEVER IN TEST MASK POSITION. WITH EMERGENCY PRESSURE CONTROL LEVER IN EMERGENCY POSITION, OUTLET PRESSURE SHALL NOT EXCEED 5.5 INH_2O.

14. REGULATOR OXYGEN PURGE: APPLY 500 PSIG TO LOW PRESSURE REGULATORS WITH AVIATORS BREATHING OXYGEN AND FLOW 1 TO 3 MINUTES.

Figure 14-3. Performance Test Sheet (Sheet 2 of 2)

14-20. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Relief Valve Test.
2. Flow Suction Test.
3. Oxygen Ratio Test.
4. Safety Pressure/Pressure Breathing Test.
5. Blinker (Flow Indicator) Test.
6. Emergency Pressure Test.

14-21. REGULATOR PERFORMANCE TESTS.

14-22. SECOND STAGE RELIEF VALVE TEST. The relief valve shall vent at least 45 lpm at a specified pressure. The actual 45 lpm flow must be converted to an indicated inH_2O flow by using the nitrogen (N_2) line of the Vent Flow Graph. Convert the actual flow as follows:

1. Locate the 45 lpm line on the bottom of the Vent Flow Graph, and trace the line up to where it intersects the N_2 line.

2. Trace the line on the graph where the lpm and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this information in the appropriate block on the Performance Test Sheet.

14-23. FLOW SUCTION TEST. The Flow Suction Test shall be performed at sea level with the diluter control lever in both the 100% OXYGEN and NORMAL OXYGEN position. Actual (lpm) flows are converted to indicated (inH_2O) flows by using the Sea Level Output Graph. The air line is used for NORMAL OXYGEN flows, and the N_2 line is used for 100% OXYGEN flows. Convert the actual flows as follows.

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

1. Locate the desired lpm line (figure 14-3) at the bottom of the Sea Level Output Graph.

2. Trace selected lpm line up to where it intersects the air line (NORMAL indicated output) or N_2 line (100% indicated output).

3. Trace the line from point of intersection across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all output flows (lpm) given in figure 14-3.

14-24. OXYGEN RATIO TEST. Actual flows and oxygen percentages (figure 14-3) used for the Oxygen Ratio Test must be converted to indicated flows and oxygen averages. All actual flows must be converted to indicated flows. The results of these computations shall be entered in the appropriate columns within the Oxygen Ratio Test portion of the Performance Test Sheet. To find average oxygen, indicated output, corrected indicated output, actual and indicated input flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

14-25. AVERAGE OXYGEN. These figures are provided but are computed as follows. Average Oxygen is found by adding the minimum and maximum oxygen percentage (figure 14-3) then dividing the sum by 2 (e.g., 6% + 45% = 51% ÷ 2 = 25.5%).

1. Enter the resulting figure (25.5%) in the appropriate block on the Performance Test Sheet.

2. Repeat this procedure for all minimum and maximum oxygen percentages.

14-26. Indicated Output. To convert the actual output flows (lpm) given in figure 14-3 to Indicated Output flows (inH_2O), proceed as follows:

1. Locate the desired actual output at the bottom of the Output Graph (figure 14-3).

2. Trace the selected line up to the point of intersection with the appropriate altitude air line.

3. Trace the line on the graph from where the desired lpm and the altitude air lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Output Graph (e.g. 30,000-foot Output Graph or 35,000-foot Output Graph).

5. Repeat steps 1 through 4 for all actual output flows given in figure 14-3.

14-27. Corrected Indicated Output. Corrected Indicated Output is indicated output with the required percentage of nitrogen added. To find Corrected Indicated Output, proceed as follows:

NOTE

Use Oxygen/Air/Nitrogen Conversion Graph provided in NAVAIR 17-15BC-21.

1. Locate the indicated output (inH_2O) at the bottom of the Oxygen/Air/Nitrogen Conversion Graph.

2. Find the average oxygen percentage on the Performance Test Sheet corresponding to the selected indicated output.

NOTE

Select percentage line on Oxygen/Air/Nitrogen Conversion Graph nearest to average oxygen figure selected from Average Oxygen column on Performance Test Sheet.

3. Follow the indicated output line selected on the Oxygen/Air/Nitrogen Conversion Graph up to the appropriate N_2 percentage line.

4. Trace the line on the graph where the selected indicated output and N_2 percentage lines intersect across the left hand column to determine inH_2O.

5. Enter this figure in the appropriate block on the Performance Test Sheet.

6. Repeat steps 1 through 5 for all required indicated output flows.

14-28. Actual High Air. These figures are provided, but are computed as follows. Find the Actual High Air by subtracting the minimum oxygen percentage (figure 14-3) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 6% = 94% x 15 lpm = 14.10 lpm).

1. Enter 14.10 lpm in the Actual High Air column on the Performance Test Sheet.

2. Repeat the procedures for all minimum oxygen procedures given.

14-29. Actual Low Air. These figures are provided but are computed as follows. Find the Actual Low Air by subtracting the maximum oxygen percentage (figure 14-3) from 100%; multiply the result by the corresponding actual output (e.g., 100% - 45% = 55% x 15 lpm = 8.25 lpm).

1. Enter 8.25 lpm in the Actual Low Air column on the Performance Test Sheet.

2. Repeat the procedures for all maximum oxygen percentages given.

14-30. Indicated High Air (Input). To convert Actual High Air to Indicated High Air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

NOTE

Flows at 28,000 and 32,000 feet are converted by using the next higher altitude air line or Input Graph (e.g. 30,000-foot Input Graph or 35,000-foot Input Graph).

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all Actual High Air figures previously entered on Performance Test Sheet.

14-31. Indicated Low Air (Input). To convert Actual Low Air to indicated low air, proceed as follows:

1. Locate the actual input (lpm) at the bottom of the Test Stand Input Graph.

2. Trace the selected line up to where it intersects the appropriate altitude line.

3. Trace the line on the graph where the actual input and desired altitude lines intersect across the graph to the left hand column to determine indicated inH_2O.

4. Enter this figure in the appropriate block on the Performance Test Sheet.

5. Repeat steps 1 through 4 for all Actual Low Air figures previously entered on Performance Test Sheet.

14-32. SAFETY PRESSURE AND PRESSURE BREATHING TEST. Actual output flows (lpm) given in the Safety Pressure Breathing Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows, proceed as follows:

NOTE

Test Stand Input and Output Flow Graphs may vary in makeup, according to the activity performing the test stand calibration. Some test stands may have a single output graph and input graph with various altitude lines, while others may have separate graphs for each altitude. Ensure the specified graph is used.

1. Locate the desired actual output (figure 14-3) at the bottom of the test stand Output Graph.

2. Trace the selected line up to where it intersect the N_2 line, then across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

NOTE

Flows at 43,000 feet are converted using the 45,000-foot N_2 line on the Output Graph or the 45,000-Output Graph.

4. Repeat steps 1 through 4 for all actual flows given in the Safety Pressure and Pressure Breathing Test section on Performance Test Sheet.

14-33. BLINKER (FLOW INDICATOR) TEST. Actual output flows (lpm) for the Blinker Test section of the Performance Test Sheet must be converted to indicated output flows (inH_2O). To convert the flows refer to paragraphs 14-34 through 14-36.

14-34. Diluter Toggle Normal Oxygen Position. Use the air line of the Sea Level Output Graph.

1. Locate the actual output (figure 14-3) at the bottom of the graph and trace the selected line up to the air line.

2. Trace the line where the actual output and air lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

14-35. Diluter Toggle 100 Percent Oxygen Position (Sea Level). Use the N_2 line on the Sea Level Output Graph.

1. Locate actual output (lpm) (figure 14-3) at the bottom of the graph and trace the selected line up to the N_2 line.

2. Trace the line where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

14-36. Diluter Toggle 100 Percent Oxygen Position (17 inH_2O). Use the 50,000-foot N_2 line on the Output Graph.

1. Locate actual output (lpm) (figure 14-3) at the bottom of the Output Graph (or 50,000-foot Output Graph) and follow selected line up to the 50,000-foot N_2 line.

2. Trace the line where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

14-37. EMERGENCY PRESSURE TEST. Actual output flows (lpm) specified for the Emergency Pressure Test can be found in the Emergency Pressure Test section of the Performance Test Sheet. Actual flows must be converted to indicated flows (inH_2O). To convert the flows, refer to paragraphs 14-38 through 14-39.

14-38. Diluter Toggle Normal Oxygen Position. Use air line of Sea Level Output Graph.

1. Locate the actual output (lpm) (figure 14-3) at the bottom of the Sea Level Output Graph and trace the selected line up to the air line.

2. Trace the line where the actual output and air lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

14-39. Diluter Toggle 100 Percent Oxygen Position. Use the N_2 line on the Sea Level Output Graph.

1. Locate the actual output (lpm) (figure 14-3) at the bottom of the Sea Level Output Graph and trace the selected line up to the N_2 line.

2. Trace the line where the actual output and N_2 lines intersect across the graph to the left hand column to determine indicated inH_2O.

3. Enter this figure in the appropriate block on the Performance Test Sheet.

Section 14-4. Maintenance

14-40. GENERAL.

14-41. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly, and adjusting of Aircraft Panel Mounted Oxygen Regulators.

NOTE

The regulators shall be considered beyond economical repair when the cost of repair parts exceeds 75% of original cost of regulator. Upon completion of any maintenance action (e.g., inspection, repair, modification, etc), be sure to complete the required Maintenance Data Collection System forms.

14-42. Procedural steps outlined in this section are listed under the aircraft inspection cycle in which they are required, and are in the sequence in which they normally occur.

14-43. Bench Tests shall be performed on aircraft panel mounted oxygen regulators prior to be being placed in service, and during the Phase/Calendar or SDLM (Standard Depot Level Maintenance) inspection cycle of the aircraft in which installed. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. The regulators shall also be subjected to a bench test if malfunction is suspected, and after repair or replacement of damaged parts. To ensure damage did not occur during extensive transportation and shipment (via commercial/U.S. Mail); all regulators shall be subjected to a Bench Test, when received from supply, and prior to being placed in service.

14-44. Bench Test shall be performed using Oxygen Systems Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate ground support equipment manual for identification of test stand controls and indicators referred to in Bench Test.

14-45. Due to the complexity of the Model 1172AS100 or 1316AS100 Test Stands, it is essential that the operator become thoroughly familiar with the test stand prior to performing Bench Test. Refer to appropriate ground support equipment manual.

14-46. INSPECTION.

14-47. TURNAROUND/PREFLIGHT/POST FLIGHT/TRANSFER INSPECTION. The Turnaround/Preflight/Postflight/Transfer Inspection consists of a Visual Inspection performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 14-2 for assistance in troubleshooting. To perform the inspection, visually inspect the following:

1. Electrical performance of panel light.

2. Legibility of all markings.

3. Plastic lighting plate for cracks and discoloration.

4. Low or improper reading on pressure gage

5. Emergency pressure control toggle in NORMAL position.

6. Diluter control toggle in 100% OXYGEN position.

7. Supply control toggle in OFF position.

8. Regulator and surrounding area for freedom from dirt and hydrocarbons.

9. Delivery hose and connector for cuts, fraying, kinking, hydrocarbons and general condition.

14-48. If discrepancies are found or suspected, Maintenance Control shall be notified.

14-49. Regulators that do not pass inspection and cannot be repaired in the aircraft shall be removed and replaced with Ready-For-Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

14-50. ACCEPTANCE/SPECIAL/DAILY INSPECTION. The Acceptance/Special/Daily Inspection consists of a Visual Inspection followed by a Functional Test. These inspections and tests shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the regulators are installed. Refer to table 14-2 for assistance in troubleshooting. To perform the inspection, proceed as follows:

WARNING

Make certain that when working with oxygen; clothing, tubing fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even the slight traces of combustible material come in contact with oxygen under pressure.

14-51. Visual Inspection. Visually inspect the regulators in accordance with paragraph 14-58.

14-52. Functional Test. To perform Functional Test, proceed as follows:

1. Place supply valve control toggle in ON position.

2. Place diluter control toggle in NORMAL OXYGEN position.

3. Connect oxygen hose quick disconnect. Place mask to face and inhale. Proper regulator operation will be indicated by flow indicator assembly showing white during inhalation and black during exhalation.

Table 14-2. Troubleshooting (Daily/Preflight/Special/Turnaround/Transfer and Acceptance Inspection)

Trouble	Probable Cause	Remedy
Oxygen cylinder pressure gage fails to indicate proper pressure.	Defective gage.	Replace regulator.
	Blocked or leaking supply line.	Replace or clean supply line to regulator.
	Low cylinder.	Refill.
	Defective inlet valve assembly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and other than emergency setting on regulator.	Regulator controls improperly position.	Correct position of controls.
	Hose to mask is kinked.	Straighten hose and reposition outlet.
	Regulator not functioning properly.	Replace regulator.
Oxygen not available at mask with proper pressure source to regulator and regulator set at EMERGENCY.	Kink or other malfunction between hose and mask.	Replace or readjust equipment as necessary.
	Faulty linkage from emergency pressure control lever.	Replace regulator.
Oxygen available at mask but flow is not indicated.	Defective blinker assembly.	Replace regulator.
Gage pressure drops when regulator is not in use.	Loose or leaking connections.	Tighten or replace connections as necessary.
	Defective manifold inlet assembly.	Replace regulator.
Panel lamp fails to light.	Burned out lamp.	Replace lamp.
	Faulty lamp assembly.	Replace regulator.
	Faulty electrical hookup to power source.	Repair electrical hookup.

NOTE

While at ground level, the regulator will not normally supply oxygen from the supply system to the mask. The emergency pressure control toggle must therefore be used in order to check out the oxygen supply function of the regulator at low altitudes. The emergency toggle is spring loaded at the TEST MASK position and will return to NORMAL when released.

4. Hold emergency pressure toggle in TEST MASK position and observe flow indicator. Flow indicator should be white, indicating a flow through regulator.

14-53. Upon completion of Functional Test, secure regulator as follows:

1. Disconnect mask from supply hose.

2. Ensure that emergency pressure control toggle returns to NORMAL position.

3. Place supply control toggle in the off position, the diluter control toggle should automatically be placed in the 100% OXYGEN position.

14-54. If discrepancies are found or suspected, Maintenance Control shall be notified.

14-55. Regulators which do not pass inspection and cannot be repaired in the aircraft, shall be removed and replaced by Ready-For-Issue (RFI) regulators. Non-RFI regulators shall be forwarded to the nearest maintenance activity having repair capability.

14-56. CALENDAR/PHASED/SDLM INSPECTION. Calendar, Phased, or SDLM Inspection require removal of the regulators from the aircraft. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 448 days. Upon removal from the aircraft, regulators shall be inspected and bench tested. All work shall be performed in a clean dust-free and oil-free area.

14-57. Aircraft Panel Mounted Oxygen Regulators failing Visual Inspection or Bench Test shall be repaired. SM&R codes define reparability of components and the lowest level of maintenance authorized. Instructions can be found in the current issue of Naval Aviation Maintenance Program, OPNAVINST 4790.2 (Series).

14-58. Visual Inspection. To visually inspect the regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Lint-free, White	MIL-C-85043

1. Inspect regulator inlet and outlet for foreign objects, dirt, corrosion, bends, dents, cracks, damaged threads, and any other obvious damage.

2. Ensure that regulator inlet filter is properly installed.

3. Inspect regulator body for bends, dents, cracks, corrosion, condition and legibility of nameplate, security of screws and fittings, and any other obvious damage.

4. Inspect regulator for contamination in the form of a black/gray residue caused by wear/vibration as follows:

NOTE

It has been determined that this form of lead contamination poses no threat to aircrewmember's health.

Index numbers in parentheses refer to figure 14-11, unless otherwise noted.

a. Disassemble the emergency pressure control and diaphragm assembly of regulator in accordance with paragraph 14-95.

b. Using a clean lint-free piece of white cloth, swab area around emergency pressure control assembly (70). Examine cloth for traces of contamination.

c. Thoroughly inspect emergency pressure control lever and center assembly (79, figure 14-15) for wear at the attachment of the assembly to the control lever.

d. Inspect the outer diaphragm (75) and diaphragm and plate assembly (77) for evidence of wear/contamination.

e. Inspect the demand valve lever assembly (78) for wear.

f. If no wear/contamination is found, assemble the diaphragm and plate assembly (77) in accordance with paragraph 14-116 and perform Bench Test.

g. If wear/contamination is found proceed with steps h through k.

h. Disassemble regulator in accordance with paragraph 14-76.

i. Clean the disassembled parts in accordance with paragraph 14-98.

j. Replace worn or defective parts and assemble regulator in accordance with paragraph 14-104.

k. Bench Test assembled regulator.

14-59. BENCH TEST.

14-60. The Bench Test shall be performed using Oxygen Systems Components Test Stand, Model 1172AS100 or 1316AS100. Proceed as follows:

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type 1, Class 1, Grade B (Fed Spec BB-N-411) shall be used in testing oxygen regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders. Do not use 3500 psig cylinders. These cylinders can not be certified contaminant free.

NOTE

Nitrogen supply cylinders utilized in testing oxygen components contain a maximum pressure of 1800 psig. For tests requiring pressures of 1800 psig, utilize highest available pressure, but in no case shall this pressure be less than 500 psig.

Tests are arranged so they proceed from one test to the next with a minimum of flow and altitude changes. Troubleshooting tables are provided following each test.

14-61. Unless otherwise specified in specific tests, the pressure applied, control toggle settings, flows drawn, etc., shall be the same for all regulators.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

14-62. INWARD LEAKAGE TEST. To perform the Inward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	NAVAIR Dwg No. 1172AS136
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

NOTE

Regulators bench tested in this chapter have in plane test ports located on the face plate for Air Force specifications. The test ports will not be used during bench testing, however the test ports will be checked for leakage.

1. Ensure test stand valves are closed and then open N_2 supply cylinder valve.

2. Place regulator supply control valve lever in the OFF position, and the diluter control lever in the 100% OXYGEN position.

NOTE

Properly functioning levers/toggles can be determined when the ON/OFF toggle is placed in the OFF position, the NORMAL/100% OXYGEN toggle will automatically be toggled to the 100% OXYGEN mode. When the ON/OFF toggle is in the ON position, either NORMAL or 100% mode of operation can be selected.

3. Ensure regulator emergency pressure control lever is in NORMAL position. Cap regulator inlet.

NOTE

Regulator shall be mounted on a horizontal plane in the test chamber.

4. If using the Model 1316AS100 test stand proceed to step 5. If using the 1172AS100 test stand, perform the Leakage Test as follows:

a. Using an adapter (NAVAIR Drawing No. 1172AS136), connect the regulator outlet to N_2 INPUT connection (18) in the altitude chamber.

b. Connect a line from LOW PRESS. connection (19) to REF. TAP and connection (21) in altitude chamber. Plug the rubber hose attached to piezometer (26) using piezometer plug supplied with test stand.

WARNING

Ensure that no pressure is indicated on regulated high pressure gage (10), regulated low pressure gage (11), and N_2 input pressure gage (27).

Ensure LOW PRESS. REGULATOR. (N) is not loaded. This will prevent N_2 supply cylinder pressure from passing on to INLET PRESS. ON/OFF valve (L), which could damage the test item, or cause injury to the test stand operator.

c. Turn INLET PRESS. ON/OFF valve (L) to the ON position.

CAUTION

Vacuum pump vent (54) must be opened one to two turns when operating vacuum pump. Refer to appropriate ground support equipment manual.

d. Turn vacuum pump on.

e. Turn PRESS. SELECTOR valve (D) to the H_2O position. Fully open LEAKAGE CONTROL valve (E).

f. Ensure LEAKAGE SELECTOR valve (F) is in HIGH RANGE position.

NOTE

HIGH RANGE LEAKAGE rotameter (8) is calibrated with an applied pressure of 70 psig. The inward leakage test requires that a suction of 9.0 inH_2O be applied to the regulator outlet and the rotameter. This pressure difference (9.0 inH_2O vice 70 psig) creates a wide variance between actual leakage and indicated leakage. The maximum allowable leakage for the Inward Leakage Test is 200 ccm. An actual leakage of 200 ccm will be displayed on HIGH RANGE LEAKAGE rotameter (8) as an indicated 740 ccm.

g. Slowly open OUTPUT valve (C) until 9.0 inH_2O suction is indicated on PRESS./SUCTION manometer (4). Any leakage will be displayed on HIGH RANGE LEAKAGE rotameter (8). The maximum allowable indicated leakage is 740 ccm (actual 200). Record indicated leakage on the Performance Test Sheet

h. Close OUTPUT valve (C) and LEAKAGE CONTROL valve (E). Turn vacuum pump OFF. Turn INLET PRESS. ON/OFF valve (L) to the OFF position.

i. Disconnect line from LOW PRESS. connection (19) and REF. TAP and connection (21) in altitude chamber. Disconnect regulator outlet from N_2 INPUT connection (18). Remove piezometer plug from piezometer (26). Remove cap from regulator inlet.

j. If excessive leakage is indicated, locate probable cause, using troubleshooting table 14-3.

5. If using the Model 1316AS100 test stand, proceed as follows:

a. Connect piezometer (26) to regulator outlet. Connect a line from 20 to 200 ccm leakage connection (20) to REF. TAP and connection (21) in altitude chamber.

CAUTION

Vacuum pump vent (54) must be opened one to two turns when operating vacuum pump. Refer to appropriate ground support equipment manual.

b. Turn vacuum pump on.

c. Turn PRESS. SELECTOR valve (D) to the H_2O position.

d. Open OVERBOARD toggle (T).

e. Ensure LEAKAGE SELECTOR valve (F) is in HIGH RANGE position.

f. Open INWARD REF. TAP (P) until 9.0 inH_2O suction is indicated on PRESS./SUCTION manometer (4). Any leakage will be displayed on leakage rotameter (6). The maximum allowable indicated leakage is 200 ccm. Record indicated leakage on the Performance Test Sheet

g. Close INWARD REF. TAP (P) and OVERBOARD toggle (T). Disconnect line from 20 to 200 ccm leakage connection (20) and REF. TAP and connection (21) in altitude chamber. Turn vacuum pump OFF and disconnect piezometer (26) from regulator outlet.

h. If excessive leakage is indicated, locate probable cause, using troubleshooting table 14-3.

Table 14-3. Troubleshooting (Inward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-16.		
Diluter plate control housing and check valve assembly leaking.	Damaged diluter valve assembly (23).	Replace diluter valve assembly (23).
	Diluter housing gasket (8) leaking.	Tighten screws (1) or replace diluter housing gasket (8).
	Preformed packing (9) leaking.	Replace preformed packing (9).
	Diluter plate (6) and seat assembly (23) damaged.	Replace diluter plate (6) and seat assembly (23).
	Manual diluter valve control lever (88, figure 14-11) bent or binding.	Replace manual diluter valve control lever (88, figure 14-11).
Diluter valve control lever leaking.	Diluter valve control lever (88, figure 14-11) not adjusted properly.	Adjust diluter valve control lever (paragraph 14-116).
Leakage from regulator outlet.	Preformed packing (136, figure 14-11) leaking.	Replace preformed packing (136, figure 14-11).
	Loose screws (134, 135, figure 14-11).	Tighten screws (134, 135, figure 14-11).
Leakage at relief valve.	Leakage past relief valve (8, figure 14-14), or relief valve seat (5) excessive.	Replace relief valve (8, figure 14-14) and seat (5).
Leakage at diluter test port.	Loose nut (13).	Tighten nut (13).
	Packings (14, 18) leaking.	Replace packing (14, 18).
	Tube and adapter assembly (19) leaking.	Replace tube and adapter assembly (19).
	Poppet valve (16) leaking.	Replace poppet valve (16).
	Fitting (15) leaking.	Replace fitting (15).
Notes: 1. Probable causes in table 14-9 Troubleshooting (Outward Leakage Test) could also cause excessive inward leakage.		

14-63. OUTLET LEAKAGE TEST. To perform Outlet Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Place regulator supply valve control toggle in ON position.

2. Place diluter control toggle in 100% OXYGEN position.

3. Ensure regulator emergency pressure control lever is in NORMAL position.

4. Connect regulator inlet to N_2 INPUT connection (18) in the altitude chamber.

5. Using LOW PRESSURE REGULATOR (N), apply 150 psig to the regulator inlet.

6. Slowly turn INLET PRESS. ON/OFF valve (L) to ON.

7. Activate emergency pressure control toggle to allow flow through the regulator. Return toggle to NORMAL position.

8. Draw a film of leak detection compound across the regulator outlet. Film shall not advance more than 1/2 inch in ten seconds. If film advance is more than allowable, repeat test three or four times (distention could be caused by difference in temperature between inside and outside of regulator). Record reading on Performance Test Sheet.

9. If film advance continues to be more than allowed, locate probable cause using troubleshooting table 14-4.

10. Relieve pressure on regulator to 50 psig by backing out on LOW PRESSURE REGULATOR (N) and using SYSTEM BLEED VALVE (S).

14-64. OXYGEN SUPPLY VALVE LEAKAGE TEST. To perform the Oxygen Supply Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Table 14-4. Troubleshooting (Outlet Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-11.		
Demand valve assembly leaking.	Damaged demand valve seat (115).	Replace seat (115).
	Damaged demand valve assy (114).	Replace assy (114).
	Damaged preformed packings (112) or (116).	Replace packings (112) or (116).
Emergency pressure control assy Loading.	Emergency pressure lever stem out of adjustment (4, figure 14-15).	Readjust elastic nut (5, figure 14-15) so that emergency pressure control assy is not loading diaphragm.
Pressure breathing aneroid assy.	Expanded aneroid (48).	Replace aneroid (48).
First stage reduction pressure.	Pressure to high.	Adjust to 32 to 35 psi (paragraph 14-114).
First stage regulator valve and lever assy.	First stage regulator valve and lever assy (99) out of adjustment.	Readjust until approx. 2 or 3 threads show (paragraph 14-114).
First stage relief valve.	Damaged relief valve seat (129).	Replace seat (129).
	Pressure to low.	Adjust to 55 to 60 psig (paragraph 14-115).
	Weak relief valve spring (127).	Replace spring (127).
	Damaged preformed packing (130).	Replace packing (130).

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Place regulator supply valve control toggle in OFF position.

2. Place emergency control toggle in EMERGENCY position. Close altitude chamber door.

3. Ensure INLET PRESS. ON/OFF valve (L) is ON.

4. Using HIGH PRESS. REGULATOR (Q), apply 500 psig specified in table 14-5 to inlet of regulator.

5. Draw a film of leak detection compound across the regulator outlet. Record reading on Performance Test Sheet.

6. There is no allowable leakage. If leakage is noted locate probable cause using troubleshooting table 14-6.

Table 14-5. Inlet Pressure (Oxygen Supply Valve Leakage Test)

Type	Inlet Pressure (psig)
CRU-73/A	500
CRU-68A/A	500

14-65. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

NOTE

Perform this test with diluter toggle in 100% OXYGEN position, and then in the NORMAL OXYGEN position.

1. Place regulator oxygen inlet valve control toggle in ON position. Place emergency pressure control toggle in NORMAL position.

2. Ensure 500 psig pressure is still applied to regulator inlet in accordance with table 14-7.

3. Turn INLET PRESS. ON/OFF valve (L) to OFF. Leave regulator oxygen inlet valve toggle in ON position.

4. Leakage will be indicated on the regulator pressure gage. Allowable leakage shall not exceed 60 psig over a two minute period. Record reading on Performance Test Sheet.

5. If leakage is excessive, locate probable cause using troubleshooting table 14-8.

6. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed regulator by placing emergency pressure control toggle in EMERGENCY position, return toggle to NORMAL.

8. Bleed test stand to 50 psig using SYSTEM BLEED (S).

Table 14-6. Troubleshooting (Oxygen Supply Valve Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-17.		
Loading of manifold inlet assembly.	Supply valve control stem (index 3, figure 14-12 out of adjustment.	Readjust supply valve control stem (3, figure 14-12).
Leaking manifold inlet assy.	Damaged ball (8).	Replace ball (8).
	Damaged supply valve seat (10).	Replace seat (10).
	Damaged supply valve seat retainer (9).	Replace retainer (9).
	Damaged preformed packings (4, 5, 11, 13, 14, 15, 20).	Replace damaged packing(s) (4, 5, 11, 13, 14, 15, 20).

Table 14-7. Inlet Pressure (Overall Leakage Test)

Type	Inlet Pressure (psig)
CRU-73/A	500
CRU-68A/A	500

14-66. REGULATOR PRESSURE GAGE SCALE AND ERROR TEST. To perform the regulator pressure gage scale and error test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Turn INLET PRESS. ON/OFF valve (L) to ON.

Table 14-8. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-11.		
Manifold inlet assy leaking.	Loose manifold inlet adapter (3, figure 14-17).	Tighten or replace manifold inlet adapter (3, figure 14-17).
	Damaged preformed packings (4, 5, 11, 13, 14, 15, 20, figure 14-17).	Replace damaged packing(s) (4, 5, 11, 13, 14, 15, 20, figure 14-17).
	Loose manifold inlet assembly screws (105).	Tighten screws (105).
Pressure gage leaking.	Oxygen cylinder pressure gage (34).	Replace pressure gage (34).
	Damaged preformed packing (37).	Replace packing (37).
	Loose screws (35).	Tighten screws (35).
First stage reduction chamber leaking.	Loose screws (97) on first stage cover plate (96).	Tighten screws (97).
	Damaged first stage gasket (98).	Replace gasket (98).
	Damaged first stage bellows gasket (103).	Replace gasket (103).
Pressure breather assy leaking.	Loose screws (58).	Tighten screws (58).
	Damaged preformed packing (60).	Replace packing (60).
	Damaged pressure breather valve assy (57).	Replace assembly (57).
Emergency pressure control assembly leaking.	Emergency pressure control lever and center assembly (28) loading diaphragm and plate assy (77).	Adjust emergency pressure control stem by tightening or loosening elastic nut (27).
	Wrong size emergency pressure spring guide (12, figure 14-15).	Replace with shorter guide (12, figure 14-15).

CAUTION

LOW PRESS. REGULATOR (N) can only be used when applying pressures of below gage guard setting (165 to 175 psig) to an item under test. For pressures above gage guard setting, HIGH PRESS. REGULATOR (Q), must be used.

NOTE

Regulator pressure gage readings must be recorded twice, once before and once after tapping regulator pressure gage.

2. Using LOW PRESS. REGULATOR (N), slowly increase pressure to each test pressure 50 and 100 psig as specified in figure 14-3.

3. Check tolerance by comparing regulator pressure gage with test stand LOW/HIGH pressure gages. Record reading on Performance Test Sheet.

4. Back out on LOW PRESS. REGULATOR (N) until 70 psig is indicated on REGULATED LOW PRESSURE GAGE (11).

5. Using HIGH PRESS. REGULATOR (Q), apply 500 psig. Record reading on Performance Test Sheet.

6. Turn HIGH PRESS. REGULATOR (Q) to VENT.

7. Bleed test stand to 70 psig using SYSTEM BLEED (S). Bleed regulator by placing emergency pressure control toggle in EMERGENCY position, return toggle to NORMAL.

14-67. OUTWARD LEAKAGE TEST. To perform Outward Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

During this test the relief valve shall not be covered. The allowable leakage through this valve at 17 inH_2O is included in the maximum allowable leakage, 0.12 lpm (120 ccm).

1. Place regulator inlet valve control toggle in ON position, and diluter control toggle in NORMAL OXYGEN position. Cap the regulator inlet valve.

2. Connect regulator outlet to piezometer (26) in altitude chamber.

3. Connect a line from LOW PRESS. connection (19) to REF. TAP and connection (21) in altitude chamber.

4. Turn INLET PRESS. ON/OFF valve (L) to the OFF position.

5. Adjust LOW PRESS. REGULATOR (N), until 70 psig is indicated on REGULATED LOW PRESS. gage (11).

6. Turn PRESS. SELECTOR valve (D) to H_2O position, and slowly open LEAKAGE CONTROL valve (E) until 17 inH_2O is indicated on PRESS/SUCTION manometer (4).

NOTE

Maintain 17 inH_2O with LEAKAGE CONTROL valve (E) throughout the test.

7. If no leakage is indicated on HIGH RANGE LEAKAGE rotameter (8), turn LEAKAGE SELECTOR valve (F) to low range position, and check for indication of leakage on LOW RANGE LEAKAGE rotameter (7). Allowable leakage is 0.12 lpm (120 ccm). Record reading on Performance Test Sheet.

8. Switch LEAKAGE SELECTOR valve (F) to HIGH position, and close LEAKAGE CONTROL valve (E).

9. Repeat steps 6, 7, and 8 with diluter control lever 100% OXYGEN position and supply toggle on the regulator in the OFF position.

10. If leakage is excessive, locate probable cause using troubleshooting table 14-9.

Table 14-9. Troubleshooting (Outward Leakage Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-16.		
Diluter plate control housing and check valve assembly leaking.	Damaged diluter plate control housing and check valve preformed packings (9 and 14).	Replace packings (9 and 14).
	Damaged diluter valve seat (23).	Replace diluter control housing (24).
	Damaged check valve disc (12).	Replace disc (12).
	Improperly adjusted diluter plate control housing and check valve assy.	Adjust spring and screw adapter assembly (10).
	Loose screws (1).	Tighten screws (1).
Regulator outlet leaking.	Damaged preformed packings (136, 139, figure 14-11).	Replace packings (136 and 139, figure 14-11).
	Damaged or loose outlet (132, figure 14-11).	Tighten or replace outlet (132, figure 14-11).
Flow indicator leaking.	Damaged blinker diaphragm assembly (11, figure 14-13).	Replace blinker diaphragm assembly (11, figure 14-13).
	Damaged blinker tubing and base plate (12, figure 14-13).	Replace blinker tubing and base plate (12, figure 14-13).
Second stage relief valve leaking.	Out of adjustment.	Adjust spring retainer (3, figure 14-14).
	Weak second stage relief valve spring (4, figure 14-14).	Replace spring (4, figure 14-11).
	Loose housing screws (66, figure 14-11).	Tighten screws (66, figure 14-11).
	Damaged gasket (68, figure 14-11).	Replace gasket (68, figure 14-11).
	Damaged preformed packing (7, figure 14-14).	Replace packing (7, figure 14-14).
Outer diaphragm, diaphragm and plate assembly leaking.	Loose screws (73, figure 14-11).	Tighten screws (73, figure 14-11).
	Damaged outer diaphragm (75, figure 14-11).	Replace outer diaphragm (75, figure 14-11).
	Damaged diaphragm and plate assembly (77, figure 14-11).	Replace diaphragm and plate assembly (77, figure 14-11).
Leakage at diluter test port assembly.	Nut (13) loose.	Tighten nut (13).
	Damaged packings (9, 14, 18).	Replace packing(s) (9, 14, 18).
	Damaged tube and adapter assembly (19).	Replace tube and adapter assembly (19).
	Fitting (15) leaking.	Replace fitting (15).

14-68. SECOND STAGE RELIEF VALVE TEST. To perform the Second Stage Relief Valve Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Turn PRESS. SELECTOR valve (D) to Hg position, and place FLOW SELECTOR valve (M) SUIT SIMULATOR position.

2. Ensure diluter control lever is in 100% OXYGEN position.

3. Using VENT PRESS. valve (H), slowly apply 3 inches of mercury (inHg) to the regulator outlet. Regulator relief valve shall be venting at least 45 lpm as indicated on VENT FLOW manometer (3). Record reading on Performance Test Sheet.

4. Close VENT PRESS. valve (H), open VENT AMBIENT valve (I), place FLOW SELECTOR valve (M) in REGULATOR position, and Close valve (I).

5. Slowly move PRESS. SELECTOR valve (D) to H_2O position.

6. Turn LEAKAGE SELECTOR valve (F) to LOW range position.

7. Open LEAKAGE CONTROL valve (E) Apply and maintain 17 inH_2O to regulator outlet. Maximum allowable leakage is 0.12 lpm (120 ccm). Record reading on Performance Test Sheet.

8. Close LEAKAGE CONTROL valve (E).

9. Bleed pressure on test stand to 50 psig using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S)

10. Turn LEAKAGE SELECTOR valve (F) to HIGH range position

11. If excessive leakage is found or if relief valve fails to vent, locate probable cause using troubleshooting table 14-10.

14-69. FLOW SUCTION TEST. To perform the Flow Suction Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

Table 14-10. Troubleshooting (Second Stage Relief Valve Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-14.		
Second stage relief valve does not vent 45 lpm.	Out of adjustment.	Adjust spring retainer (3) counterclockwise.
	Second stage relief valve spring (4) too strong.	Replace spring (4).
Second stage relief valve leaks excessively.	See Table 14-9 for probable cause and remedy.	

1. Disconnect hose from LOW PRESS. connection (19) to REF. TAP and connection (21) in altitude chamber.

2. Turn vacuum pump ON.

3. Ensure PRESS. SELECTOR valve (D) is in the H_2O position.

4. Ensure INLET PRESS. ON/OFF valve (L) is ON.

5. Place regulator inlet valve control toggle in ON position.

6. Using LOW PRESS. REGULATOR (N), set the inlet pressure at each inlet pressure specified on Performance Test Sheet.

NOTE

Readings must be recorded with the regulator diluter toggle in both NORMAL and 100% OXYGEN positions for each outlet flow specified on Performance Test Sheet.

Ensure inlet pressure is maintained when pulling outlet flows.

7. Using OUTPUT valve (C), set flows specified in Performance Test Sheet on OUTPUT manometer (1). Suction values will be displayed on PRESS./SUCTION manometer (4). Record readings on Performance Test Sheet.

NOTE

With no suction on regulator (OUTPUT valve (C) closed), maximum flow through regulator shall not exceed 0.01 lpm. This will cause a slight rise in PRESS./SUCTION manometer (4).

8. Close OUTPUT valve (C).

9. If regulator fails the Flow Suction Test, locate probable cause using troubleshooting table 14-11.

14-70. OXYGEN RATIO TEST. To perform the Oxygen Ratio Test , proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure regulator inlet valve control toggle is in ON position, and diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N) apply 50 psig to regulator inlet. Close chamber door.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

Slowly open VACUUM CONTROL valve (B) and observe PRESS./ SUCTION manometer (4). If rapid increase in pressure is indicated, close down on VACUUM CONTROL valve (B) until pressure stabilizes. This rapid increase of pressure shown on PRESS./ SUCTION manometer (4) is caused by too fast a rate of climb in the altitude chamber.

3. Using VACUUM CONTROL valve (B), ascend to first test altitude shown on Performance Test Sheet.

4. Set output flows specified in Performance Test Sheet with OUTPUT valve (C) and stabilize altitude with INPUT valve (A).

5. Read INPUT FLOW manometer (2), and record readings on Performance Test Sheet.

6. Continue the test for each specified altitude and outlet flow shown on Performance Test Sheet.

7. Close OUTPUT valve (C) and INPUT valve (A). Descend to 30,000 feet using CHAMBER BLEED valve (K).

NOTE

If indicated input flows are not within limits, an Aneroid Closure Test must be performed.

8. If Oxygen Ratio Test was satisfactory, proceed to Safety Pressure and Pressure Breathing Test (paragraph 14-72).

Table 14-11. Troubleshooting (Flow Suction Test)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-14.		
First stage reduction chamber out of adjustment.	Low first stage pressure.	Reset to 32 to 35 psig (paragraph 14-114, 14-115 and figure 14-8).
Demand valve lever assembly.	Vane mounting pin (117, figure 14-11) sticking.	Replace mounting pin (117).
	Strong demand valve lever spring (113, figure 14-11).	Replace demand valve lever spring (113, figure 14-11).
	Demand valve lever (78, figure 14-11) bent or improperly adjusted.	Replace or adjust (paragraph 14-115).
Manifold inlet assembly.	Clogged inlet filter (1, figure 14-17).	Replace inlet filter (1, figure 14-17).
Venturi assembly.	Strong injector spring (3, figure 14-18).	Replace injector spring (3, figure 14-18).

14-71. ANEROID CLOSURE TEST. To perform the Aneroid Closure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Aneroid Closure Test is performed only if regulator fails Oxygen Ratio Test.

1. Descend to 25,000 feet using CHAMBER BLEED valve (K).

2. Ensure inlet pressure is set at 50 psig.

3. Set up a flow of 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C).

4. Aneroid shall close between 28,000 and 32,000 feet, as indicated by no further advance in altitude on LOW RANGE ALTM. (13).

5. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

6. If regulator fails Aneroid Closure Test and or Oxygen Ratio Test, locate probable cause using trouble-shooting table 14-12.

14-72. SAFETY PRESSURE AND PRESSURE BREATHING TEST. To perform the Safety Pressure and Pressure Breathing Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure inlet pressure is set at 50 psig.

Table 14-12. Troubleshooting (Oxygen Ratio/Aneroid Closure Tests)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-16.		
Incorrect air/oxygen ratios for flows 40 lpm or less.	Low air.	Turn screw in spring and screw adapter assembly (10) counterclockwise.
	High air.	Turn screw in spring and screw adapter (10) clockwise.
Incorrect air/oxygen ratios for flows above 40 lpm.	Low air.	Adjust aneroid (5) clockwise.
	High air.	Adjust aneroid (5) counterclockwise.
Aneroid closes below 28,000 feet.	Aneroid assembly (5) out of adjustment.	Turn aneroid assembly (5) counterclockwise.
Aneroid closes above 32,000 feet.	Aneroid assembly (5) out of adjustment.	Turn aneroid assembly (5) clockwise.

NOTE

If chamber altitude is not at 30,000 feet adjust altitude. Use VACUUM CONTROL valve (B) to increase altitude or CHAMBER BLEED valve (K) to decrease altitude.

2. Using OUTPUT valve (C), draw flows of 0 and 85 lpm through the regulator. Delivery pressure must be within limits shown on Regulator Performance Test Sheet. Record reading on Performance Test Sheet.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

NOTE

Reading for 0 and 85 lpm must also be recorded at each test altitude.

3. Repeat step 2 for each altitude shown on Performance Test Sheet.

4. Close OUTPUT valve (C) and descend to sea level using CHAMBER BLEED valve (K).

5. If safety pressure/pressure breathing flows are not within limits, locate probable cause using troubleshooting table 14-13.

14-73. BLINKER ASSEMBLY TEST. To perform the Blinker Assembly Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure diluter control toggle is in NORMAL OXYGEN POSITION.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet.

3. Using OUTPUT valve (C), draw 20 lpm through regulator. Blinker must open fully. Record reading on Performance Test Sheet.

4. Reduce Output flow to 8 lpm and place diluter control toggle in 100% OXYGEN position. Blinker must remain fully open. Record reading on Performance Test Sheet.

5. Close OUTPUT valve (C). Blinker should close immediately. Record reading on Performance Test Sheet.

6. Close altitude chamber door.

CAUTION

Maintain 3.0 inH_2O on OUTPUT FLOW manometer (1) with OUTPUT valve (C) while ascending to altitude.

7. Using VACUUM CONTROL valve (B), ascend in altitude until 17.0 inH_2O is indicated on PRESS./SUCTION manometer (4).

8. Open OUTPUT valve (C) and draw a flow of 12 lpm through the regulator. The blinker should be fully open. Close OUTPUT valve (C). Blinker should close immediately. Record reading on Performance Test Sheet.

9. Descend to sea level using CHAMBER BLEED valve (K).

10. If malfunctions are noted, locate probable cause using troubleshooting table 14-13.

14-74. EMERGENCY PRESSURE TEST. To perform the Emergency Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

1. Ensure the diluter control toggle is in NORMAL OXYGEN position.

2. Using LOW PRESS. REGULATOR (N), apply 50 psig to regulator inlet.

3. Open OUTPUT valve (C) and draw a flow of 10 lpm through the regulator.

4. Place emergency control toggle in EMERGENCY position. Pressure indicated on PRESS./SUCTION manometer (4) shall read 2.0 to 4.0 inH_2O. Record reading on Performance Test Sheet.

Table 14-13. Troubleshooting (Safety Pressure/Pressure BreathingTest)

Trouble	Probable Cause	Remedy
Note: Unless otherwise noted, index numbers in parentheses refer to figure 14-16.		
Low safety pressure/pressure breathing 30,000 and 40,000 feet.	Damaged inner diaphragm (77).	Replace diaphragm (77).
	Diaphragm (75) blocking pressure breather port.	Install diaphragm (75) correctly.
	Spring (44) too weak.	Replace spring (44).
	Pressure breather valve (57) sticking or bent.	Replace pressure breather valve (57).
High safety pressure/pressure breathing 30,000 and 40,000 feet.	Index numbers 40 through 53 improperly assembled or aneroid assembly (48) not adjusted correctly.	Reassemble index numbers 40 through 53. Adjust IAW paragraph 14-116 steps 5 and 6.
Low safety pressure/pressure breathing 43,000 and 50,000 feet.	Index numbers 40 through 53 improperly assembled or aneroid assembly (48) not adjusted correctly.	Reassemble index numbers 40 through 53. Adjust IAW paragraph 14-116 steps 5 and 6.
High safety pressure/pressure breathing 40,000 and 50,000 feet.	Index numbers 40 through 53 improperly assembled or aneroid assembly (48) not adjusted correctly.	Reassemble index numbers 40 through 53. Adjust IAW paragraph 14-116 steps 5 and 6.

NOTE

Ensure inlet pressure is maintained when performing step 5.

5. Adjust OUTPUT valve (C) to draw 80 lpm flow through regulator.

6. Place diluter control toggle in 100% OXYGEN position. Pressure at outlet of regulator, as indicated on PRESS./SUCTION manometer (4), shall be no less than 1.0 inH_2O. Record reading on Performance Test Sheet.

7. Adjust output to 10 lpm flow. Hold emergency pressure control toggle in TEST MASK position. Output flow, as indicated PRESS./SUCTION manometer (4), shall be 6.0 to 16.0 inH_2O. Record reading on Performance Test Sheet.

8. If emergency pressure flows are not within tolerance, locate probable cause using troubleshooting table 14-14.

9. Close N_2 supply cylinder valve. Using LOW PRESS. REGULATOR (N) and SYSTEM BLEED valve (S), relieve all pressure in the test stand. Remove regulator from test stand.

14-75. REGULATOR OXYGEN PURGE. After completion of all tests, the regulator shall be purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen	MIL-O-27210, Type I

WARNING

Do not use oxygen test stand to regulate the oxygen purge pressure.

1. Connect regulator inlet to a regulated source of aviator's breathing oxygen.

2. Apply 500 psig to regulator inlet.

3. Position diluter control toggle in the 100% OXYGEN position, supply toggle in the ON position and emergency pressure control toggle in the EMERGENCY position, allow oxygen to flow 1 to 3 minutes.

4. Shut off oxygen source and disconnect regulator.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate and/or Depot Level maintenance, shall be accompanied by an Aircrew Systems Record (OPNAV 4790/138). The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test and/or Calendar Inspection, the organizational custodian shall retain the Aircrew Systems Record, Performance Test Sheet, and VIDS/MAF.

14-76. DISASSEMBLY.

14-77. Disassemble the oxygen regulator using index numbers assigned to figure 14-11, unless otherwise noted. Disassemble the regulator only as far as required to correct any malfunctions. Disassemble the regulator as follows:

Table 14-14. Troubleshooting (Emergency Pressure Test)

Trouble	Probable Cause	Remedy
High emergency pressure at 10 lpm.	Emergency pressure control stem (26, figure 14-11) out of adjustment.	Turn emergency pressure control stem (25, figure 14-11) clockwise.
Low emergency pressure at 10 lpm.	Emergency pressure control stem (26, figure 14-11) out of adjustment.	Turn emergency pressure control stem (25, figure 14-11) counterclockwise.
Low emergency pressure at 80 lpm.	Elastic stop nut (5, figure 14-16) out of adjustment.	Adjust elastic stop nut (5, figure 14-16) counterclockwise.
	Faulty venturi assembly (figure 14-18).	Replace venturi assembly (figure 14-18).
Low test mask pressure.	Emergency pressure spring guide (12, figure 14-15) too short.	Install longer emergency pressure spring guide (12, figure 14-15).
High test mask pressure.	Emergency pressure spring guide (12, figure 14-15) too long.	Install shorter emergency pressure spring guide (12, figure 14-15).

CAUTION

All disassembly, inspection, repair and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor and ceiling should have a smooth finish, and be painted with a non-chalking paint which can be kept clean and dust free. It is desirable to keep all parts for each individual regulator separated. Make careful note of the location and quantity of all shims, spacers and packings. Plastic partitioned boxes with covers or similar storage facilities should be used to keep parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

14-78. PLASTIC LIGHTING PLATE. To remove the Plastic Lighting Plate, proceed as follows:

1. Remove cap, grommet and bulb from light assembly (18, figure 14-12). Remove screw (4), washer (6), dust cap assembly (1) and spacer (3).

2. Remove screw (5), washer (6) and plastic lighting plate (2).

14-79. MOUNTING PLATE AND CONTROLS ASSEMBLY. To remove Mounting Plate and Controls Assembly, proceed as follows:

NOTE

Do not remove panel light electrical cord bushing (125) and panel light cord plate (121) from electrical cable unless cable is damaged and must be replaced. If cable does not require removal, proceed to step 2.

1. Remove screws (122), washers (123), plate (121), and bushing (125).

2. Remove screw (9), screw (10), washers (11), screws (8), and mounting plate and controls assembly (7).

3. Remove emergency pressure control stem assembly (25). Remove screw (26) and locknut (27) from emergency pressure control stem assembly (25).

NOTE

Index number in steps 4 through 6 refer to figure 14-12 for disassemble of mounting plate and control assembly. Do not disassemble unless damaged.

Pin (4) in step 4 must be removed from right to left.

4. Remove control lever pins (2, 6, and 4) and levers (1, 5, and 3). Remove screw (8) and follower assembly (7) from lever (5).

5. Remove nut (13), washer (12), screw (10), toggle linkage (9) and washer (11).

6. Remove cord assembly (14), light assembly (18) and terminal lug (19) from mounting plate (21).

14-80. EMERGENCY PRESSURE CONTROL BEAM GUARD AND BEAM AND FULCRUM ASSEMBLY. To remove the Emergency Pressure Control Beam Guard and Beam and Fulcrum Assembly, proceed as follows:

1. Remove screws (14) washers (15) and emergency pressure control beam guard (13).

2. Remove screw (17), washer (18) and beam and fulcrum assembly (16).

14-81. RETAINER SCREEN AND SHROUD ASSEMBLY. To remove the Retainer Screen and Shroud Assembly, proceed as follows:

1. Remove screws (23), washers (24) and shroud and screen assembly. Remove demand valve feed port plug (118), gasket (119), and packing (120).

14-82. OXYGEN CYLINDER PRESSURE GAGE ASSEMBLY. To remove the Oxygen Cylinder Pressure Gage Assembly, proceed as follows:

1. Remove screws (35), washers (36), and gently work gage and bracket assembly (34) from regulator body (142).

2. Remove preformed packing (37).

14-83. BLINKER ASSEMBLY. To remove the Blinker Assembly, proceed as follows:

1. Remove screws (30). Using wrench, disconnect blinker tubing from regulator body and remove blinker. Remove packing (31) from regulator body (142).

NOTE

Index numbers in steps 2, 3, and 4 refer to figure 14-13.

2. Remove screws (2), plate retainer (1), cover (3) and gasket (9).

3. Remove blinker pin (5) blinker spring (6) and blinker flag and lever assembly (4) from actuator guide (8).

4. Remove screw (7) from actuator guide (8), blinker actuator (10), and blinker diaphragm assembly (11) from blinker tubing and base plate assembly (12).

14-84. EMERGENCY PRESSURE CONTROL STEM GUIDE. To remove Emergency Pressure Control Stem Guide, proceed as follows:

1. Remove screws (62) and remove emergency pressure control stem guide (61).

14-85. PRESSURE BREATHING VALVE CONTROL ASSEMBLY. To remove and disassemble the Pressure Breathing Valve Control Assembly, proceed as follows:

CAUTION

(Regulators part number 14950-45 only) use extreme care when removing unreinforced tubing (55) from barb on side of diluter plate control housing and check valve assembly (89).

1. Remove unreinforced tubing (55), screws (38), washers (39), and remove top housing assembly (53) from regulator.

NOTE

Due not remove test port assembly (52) and packing (51) unless damaged

2. If required, remove test port assembly (52), packing (51)

3. Remove nut (42), retainer (43), spring (44), seal (46), bottom housing (45), and gasket (47) from aneroid and pin assembly (48).

4. Remove nut (40) packing (41) aneroid and pin assembly (48), spring (49), and check disk (50) from top housing assembly (53 or 54).

14-86. PRESSURE BREATHER VALVE ASSEMBLY. To remove and disassemble the Pressure Breather Valve Assembly, proceed as follows:

1. Remove diaphragm assembly (56), screws (58) retaining plate (59), pressure breather valve assembly (57), and packing (60) from regulator body (142).

14-87. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY. To remove and disassemble the Diluter Plate Control Housing and Check Valve Assembly, proceed as follows:

CAUTION

When removing diluter plate control housing and check valve, apply a firm pressure to the assembly to prevent stripping of screws (93), (91) and (90) or damage to the regulator housing. This is necessary because of spring tension applied by spring (95).

1. Remove screws (90 and 93) and washers (92 and 94). Remove diluter plate control housing and check valve assembly (89).

2. Remove screw (91) washer (94) and diluter lever (88). Remove screw (87) from diluter valve body (86) if damaged. Remove spring (95) from bellows assembly (102).

NOTE

Index numbers in steps 3 through 6 refer to figure 14-16.

3. Carefully distend legs of retainer assembly (10) and remove from diluter control housing (24). Remove check valve disk (12), spring (11), and packing (9).

4. Remove screws (1) washers (2), diluter valve plate assembly (6) and gasket (8) from housing assembly.

5. Remove aneroid assembly (5) from diluter valve plate assembly (6). Remove throttling plate screw (3), and throttling plate (4) from aneroid assembly (5). Remove diluter seal (7) from diluter valve plate assembly (6).

NOTE

Do not remove or disassemble tube and adapter assembly (19) from diluter control housing (24) unless damaged. If damaged, proceed to step 6.

6. If required, remove nut (13), packing (14), and tube and adapter assembly (19) from diluter control housing (24). Remove test port fitting (15), poppet valve (16), spring (17), and packing (18) from tube and adapter assembly (19).

14-88. DEMAND VALVE ASSEMBLY. To remove Demand Valve Assembly, proceed as follows:

1. Remove demand valve retaining screw (111), packing (112), demand valve spring (113), demand valve assembly (114), demand valve seat (115), demand valve pin (117) and packing (116) from regulator body (142).

14-89. MANIFOLD INLET ASSEMBLY. To remove and disassemble the Manifold Inlet Assembly, proceed as follows:

1. Remove screws (105) and washers (106). Using blunt instrument, depress supply valve stem and lift inlet manifold assembly (104) from regulator body (142). Remove performed packing (107).

NOTE

Index numbers steps 2 through 6 refer to figure 14-17.

2. Remove retaining ring (2), oxygen filter (1), manifold inlet adapter (3), spacer (6), backup ring (5), and packing (4).

3. Remove spring (7), and seat ball (8) from seat retainer (9).

4. Remove seat retainer (9), inlet seat assembly (10) and packing (11).

5. Remove manifold seal retainer (12), and packing (13) from supply inlet manifold (21).

6. Remove manifold valve stem seal retainer (16), inlet supply actuator stem (17), packing retainer (14) and packing (15) from manifold.

7. Remove inlet valve retainer (18), first stage inlet valve seat (19), and packing (20) from manifold.

NOTE

Do not remove plug (22) from the manifold body unless leakage has been detected. Removal of the plug is not necessary to clean, inspect, or test the inlet manifold assembly.

8. Remove plug (22) if required.

14-90. SUPPLY CONTROL STEM GUIDE. To remove the Supply Control Stem Guide, proceed as follows:

1. Remove screws (64) from supply control stem guide (63) and lift from regulator body (142).

14-91. FIRST STAGE BELLOWS ASSEMBLY. To remove first stage bellows assembly, proceed as follows:

1. Remove screws (97), first stage cover plate (96), and gasket (98).

2. Remove screw (100), washer (101) from valve lever assembly (99).

3. Lift first stage bellows assembly (102) and valve lever assembly (99) from regulator body (142).

4. Remove gasket (103), first stage seat valve assembly (109), and grommet (108).

5. Remove valve lever assembly (99) from first stage bellows assembly (102).

14-92. SECOND STAGE RELIEF VALVE ASSEMBLY. To remove and disassemble the Second Stage Relief Valve Assembly, proceed as follows:

1. Remove screws (66), washers (67) and lift second stage relief valve assembly (65) from regulator body (142). Remove gasket (68).

NOTE

Index numbers in steps 2 and 3 refer to figure 14-14.

2. Remove internal retaining ring (2), relief valve screen (1), spring retainer (3), and spring (4) from second stage relief valve housing (10).

3. Remove retaining ring (6), packing (7), relief valve seat (5), relief valve (8) and guide sleeve (9) from second stage relief valve housing (10).

14-93. REGULATOR OUTLET. To remove the Regulator Outlet, proceed as follows:

1. Remove nuts (133) and screws (134 and 135).

2. Remove regulator outlet (132), packing (136) and venturi screen (137) from regulator housing.

14-94. VENTURI ASSEMBLY. To remove and disassemble the venturi assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	QB70750-9 NIIN 00-302-6456

1. Using spanner wrench, remove venturi assembly (138) and gasket (139) from regulator body (142).

NOTE

Index numbers in step 2 refer to figure 14-18.

2. Remove venturi seat (1), injector nozzle (2), injector spring (3), and dampening spring (4) from venturi housing (5).

14-95. EMERGENCY PRESSURE CONTROL AND DIAPHRAGM ASSEMBLY. To remove and disassemble the Emergency Pressure Control and Diaphragm Assembly, proceed as follows:

1. Remove screws (73), washers (74), screw (71) and washer (72).

2. Remove emergency pressure control assembly (70), outer diaphragm (75), diaphragm spacer assembly (76) and diaphragm and plate assembly (77) from regulator body (142).

3. Remove identification plate (69) if damaged. If removed, retain with regulator for identification.

NOTE

Index numbers in steps 4 through 6 refer to figure 14-15.

4. Remove screws (2), washers (3) and cap (1) from emergency pressure control housing (16).

5. Remove nut (5), swivel (6), stem (4), emergency pressure control spring (7) and emergency pressure control test spring (8) from emergency pressure control housing (16).

6. Remove screws (14) washers (15) and pin (10). Remove second stage regulator cover (13) and control lever and center assembly (9) from emergency pressure control housing (16).

7. Remove spring (11) and select fit emergency pressure spring guide (12).

14-96. DEMAND VALVE LEVER ASSEMBLY. To remove the Demand Valve Lever Assembly, proceed as follows:

1. Remove palnut (80), screw (82) screw (84) and washer (85). Tilt demand valve lever assembly (78) and remove vane mounting pin (79), demand valve fulcrum (83), demand valve lever spring (81) and demand valve lever assembly (78) from regulator body (142).

2. Inspect pin dowel (140) and demand valve pin guide (141). The guides are installed during the manufacturing process and cannot be removed from the regulator body. If damaged replace regulator body (142).

14-97. FIRST STAGE RELIEF VALVE ASSEMBLY. To disassemble the First Stage Relief Valve Assembly, proceed as follows:

1. Remove relief valve spring retainer (126), relief valve spring (127), first stage relief valve assembly (128), relief valve seat (129) and packing (130) from regulator body (142).

14-98. CLEANING.

14-99. To clean the disassembled oxygen regulator body and components parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Bottle, Polyethylene Squeeze	—
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all metallic parts using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

CAUTION

Do not attempt to clean any elastomer parts that have become contaminated with oil or grease. All such parts shall be replaced.

2. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free nitrogen.

3. After cleaning all internal surfaces, they shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

4. Cleaned parts shall be sealed in plastic bags for storage. Also, bag all complete assemblies that are not immediately returned to service.

14-100. INSPECTION OF DISASSEMBLED REGULATOR.

14-101. Inspect the disassembled regulator body and component parts in accordance with table 14-15.

1. Make certain lamp (18, figure 14-12) is wired in accordance with figure 14-4.

14-102. REPAIR.

14-103. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched-up using lacquer (MIL-L-6805).

14-104. ASSEMBLY

14-105. Assembly of Aircraft Panel Mounted Oxygen Regulators is essentially the reverse of disassembly. Tests are required on subassemblies as they are assembled into the regulator. Adjustment and calibration is also performed at time of assembly.

WARNING

Prior to use, inspect leak detection compound. Compound which is not clear and free from suspended material/sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

CAUTION

Use extreme care in fitting precision parts to prevent damage. Ensure each component is dust and dirt free.

NOTE

All silicone-rubber parts shall be discarded, and replaced with new items at time of assembly. They shall be washed in accordance with paragraph 14-99, step 2 prior to installation.

14-106. Assembly is affected in two separate operations; assembly of components into subassemblies (mounting plate and controls assembly, injector assembly, etc), and assembly of subassemblies into regulator housing.

14-107. MOUNTING PLATE AND CONTROLS ASSEMBLY. To assemble the Mounting Plate and Controls Assembly (figure 14-12), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	MIL-S-22473
As Required	Flux	—
As Required	Solder, Lead, Tin	QQ-S-571 (CAGE 81348)

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Fastener	PT-3-1/2
1	Wrench, Torque	—

1. If required, install fastener assembly (20) using fastener tool.

2. If removed, install bushing (15) by swaging over and staking in three places. Bushing must not turn when subjected to 1 ft-lb of torque.

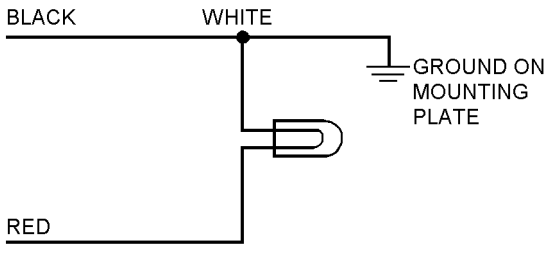


Figure 14-4. Wiring Diagram

Table 14-15. Inspection of Disassembled Regulator Components

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Follower.	14-12-7	Deformation, loose or missing ball.	Replace if defective.
Toggle Linkage.	14-12-9	Distortion, marred mating surfaces, and cracks.	Replace if defective.
Cord Assembly.	14-12-14	Condition of wiring.	Replace if defective.
Light Assembly.	14-12-18	Damaged lens, disfigured solder lead, or damaged threads.	Replace if defective.
Terminal Lug.	14-12-19	Distortion.	Replace if defective.
Mounting Plate.	14-12-21	Loose fasteners and bushings.	Replace if defective.
Regulator Shroud.	14-11-22	Cracks in casting, marred mating surfaces, or damaged threads in tapped holes.	Replace if defective.
Diluter Valve Body.	14-11-86	Marred or burred mating surface, or damage to internal threads.	Replace if defective.
Aneroid Assembly.	14-16-5	Dents, uneven spacing of convultions, or expanded.	Replace if defective.
Throttling Plate.	14-16-4	Seat surfaces free of nicks and scratches.	Replace if defective.
Test Port Fitting.	14-16-15	Damaged threads, or obvious external damage.	Replace if defective.
Poppet Valve.	14-16-16	Marred or burred surfaces.	Replace if defective.
Spring.	14-16-17	Uneven spacing of coils or distorted.	Replace if defective.
Tube and Adapter Assembly.	14-16-19	Damaged internal threads, fractured or obstructed tube.	Replace if defective.
Diluter Control Housing.	14-16-24	Seat surfaces free of nicks, scratches, or damaged threads.	Replace if defective.
Check Valve Disk.	14-16-12	Split or fractured edges.	Replace if defective.
Retainer Assembly.	14-16-10	Bent or uneven spacing between legs, or damaged threads.	Replace if defective.
Spring.	14-16-11	Damaged, distorted, or uneven spacing between coils.	Replace if defective.
Diluter Valve Plate Assembly.	14-16-6	Nicks or scratches.	Replace if defective.
Diluter Seal.	14-16-7	Nicks or scratches.	Replace if defective.
Stem.	14-11-28	Marred or burred exterior surfaces.	Replace if defective.
Bellows Assembly.	14-11-102	Dents or uneven spacing of convolutions.	Replace if defective.
Regulator Body.	14-11-142	Cracks in casting, marred mating surfaces, or damaged threads.	Replace if defective. Repair threads if possible.
Pressure Breather Valve Assembly.	14-11-57	Inspect externally for defects.	Replace assembly.
Retainer.	14-11-43	Distortion, marred, scratched or burred mating surfaces.	Replace if defective.
Regulator Outlet.	14-11-132	Cracks, marred mating surfaces at hose attachment, or damaged O-ring groove.	Replace if defective.

Table 14-15. Inspection of Disassembled Regulator Components (Cont)

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Control Housing Cap.	14-15-1	Obvious damage.	Replace if defective.
Emergency Pressure Lever Stem.	14-15-4	All outside diameters for nicks, scratches and burrs.	Replace if defective.
Emergency Pressure Swivel.	14-15-6	Marred mating surfaces.	Replace if defective.
Springs.	14-15-7, 8, and 11	Damaged, distorted, or uneven spacing between coils.	Replace if defective.
Control Lever and Center Assembly.	14-15-9	Free movement of disk, cracks, or damaged rivets.	Replace if defective.
Pin.	14-15-10	Bent or deformed.	Replace if defective.
Guide.	14-15-12	Large outer diameter and bore must be free of nicks, scratches and burrs.	Replace if defective.
Second Stage Regulator Cover.	14-15-13	Cracks in casting, burrs in bores, or marred mating surface.	Replace if defective.
Emergency Pressure Control Housing.	14-15-16	Cracks or damaged threads.	Replace if defective.
Demand Valve Lever Spring.	14-11-81	Damaged, distorted, or uneven spacing between coils.	Replace if defective.
Demand Valve Fulcrum.	14-11-83	Obvious damage.	Replace if defective.
Demand Valve Lever Assembly.	14-11-78	Marred or burred surfaces, and cracked or loose rivets.	Replace if defective.
Second Stage Relief Valve Assembly.	14-11-65	Obvious damage.	Replace if defective.
Relief Valve Screen.	14-14-1	Distortion or separation of wire ends.	Replace if defective.
Retaining Ring.	14-14-2	Obvious damage.	Replace if defective.
Spring Retainer.	14-14-3	Damage to threads.	Replace if defective.
Second Stage Relief Valve Spring.	14-14-4	Damaged, distorted, or uneven spacing between coils.	Replace if defective.
Second Stage Relief Valve Seat.	14-14-5	Mating surface of seat must be free of nicks, scratches and burrs.	Replace if defective.
Retaining Ring.	14-14-6	Deformation.	Replace if defective.
Second Stage Relief Valve.	14-14-8	Face free of nicks, scratches and burrs.	Replace if defective.
Guide Sleeve.	14-14-9	Marred mating surfaces.	Replace if defective.
Second Stage Relief Valve Housing.	14-14-10	Cracks in casting, or marred mating surfaces.	Replace if defective.
Relief Valve Spring Retainer.	14-11-126	Damaged threads, marred slot, or excessive sealant.	Replace if defective.
Relief Valve Spring.	14-11-127	Obvious damage, distortion, or uneven spacing between coils.	Replace if defective.
Relief Valve Seat.	14-11-129	Surface free of nicks, scratches, burrs, or damaged threads.	Replace if defective.

Table 14-15. Inspection of Disassembled Regulator Components (Cont)

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Spring.	14-11-44	Damage, distortion, or uneven spacing between coils.	Replace if defective.
Seal.	14-11-46	Dents, marred, scratches or burred mating surfaces.	Replace if defective.
Aneroid and Pin Assembly.	14-11-48	Dents and uneven spacing of convolutions, damage to pin.	Replace if defective.
Top Housing Assembly.	14-11-53	Cracks in housing or marred mating surfaces.	Replace if defective.
Valve Lever Assembly.	14-11-99	Bent pin, damaged threads, and large bore must be free of scratches or burrs.	Replace if defective.
Screw.	14-11-100	Outer diameter free from nicks, scratches or burrs.	Replace if defective.
Gage and Bracket Assembly.	14-11-34	Free passage of air through tubing.	Replace if defective.
Plate Retainer.	14-13-1	Cracks or deformation.	Replace if defective.
Cover.	14-13-3	Adhesion of decal and clarity of lens.	Replace if defective.
Flag and Lever Assembly.	14-13-4	Separation of plate and legs, or distortion of legs.	Replace if defective.
Blinker Pin.	14-13-5	Obvious deformation.	Replace if defective.
Blinker Spring.	14-13-6	Deformation of ends and coil.	Replace if defective.
Actuator Guide.	14-13-8	Cracks, marred mating surfaces. Damage to center hole.	Replace if defective.
Blinker Actuator.	14-13-10	Marred or burred outer diameters.	Replace if defective.
Blinker Tubing and Base Plate Assembly.	14-13-12	Damaged or obstructed tubing.	Replace if tubing is blocked or kinked
Demand Valve Assembly.	14-11-114	Voids in silicone surface of seat.	Replace if defective.
Demand Valve Seat.	14-11-115	Nicks,scratches, or burrs on seat.	Replace if defective.
Demand Valve Pin.	14-11-117	Must be free of nicks,scratches or burrs.	Replace if defective.
Venturi Seat.	14-18-1	Marred mating surfaces or damaged threads.	Replace if defective.
Injector Nozzle.	14-18-2	Outer diameter and bore must be free of nicks, scratches or burrs.	Replace if defective.
Spring Injector.	14-18-3	Obvious damage, distortion, and uneven spacing between coils.	Replace if defective.
Dampening Spring.	14-18-4	Distortion of ring or legs.	Replace if defective.
Venturi Housing.	14-18-5	Marred surfaces or damage to threads.	Replace if defective.
Venturi Screen.	14-11-137	Distortion or separation of wire ends.	Replace if defective.
Tubing Sleeve.	14-11-33	Over-compressed or distorted.	Replace if defective.
Tube Connector.	14-11-32	Damaged threads or sealing surface.	Replace if defective.
Manifold Inlet Adapter.	14-17-3	Damaged threads or obvious damage.	Replace if defective.

Table 14-15. Inspection of Disassembled Regulator Components (Cont)

Part Nomenclature	Figure and Index No.	Inspect for	Remedy
Inlet Supply Valve Seat Retainer.	14-17-9	Cracks in sleeve or marred surfaces.	Replace if defective.
Inlet Seat Assembly.	14-17-10	Raised edge of seat to be free of nicks scratches or burrs.	Replace if defective.
Inlet Supply Actuator Stem.	14-17-17	Obvious distortion, scratches or burrs.	Replace if defective.
Supply Inlet Manifold.	14-17-21	Cracks in casting, marred mating surfaces, or damaged threads.	Replace if defective.
First Stage Inlet Valve Seat.	14-17-19	Nicks, scratches or burrs on raised edge of seat.	Replace if defective.
Inlet Valve Retainer.	14-17-18	Cracks, marred mating surfaces, or damaged threads.	Replace if defective.
Manifold Valve Stem Seal Retainer.	14-17-16	Bore must be free of nicks, scratches, burrs, or damaged threads.	Replace if defective.
Manifold Seal Retainer.	14-17-12	Bore must be free of nicks, scratches, burrs, or damaged threads.	Replace if defective.
Panel Light Cord Plate.	14-11-121	Distortion, scratches, or burrs.	Replace if defective.
Demand Valve Pin Guide.	14-11-141	Marred or disfigured surfaces.	Replace if defective.
Demand Valve Feed Port Plug.	14-11-118	Marred or disfigured surface, or damaged threads.	Replace if defective.
Emergency Pressure Control Beam Guard.	14-11-13	Marred or disfigured surface.	Replace if defective.
Beam and Fulcrum Assembly.	14-11-16	Obvious damage.	Replace if defective.

3. Install bushing (16) with rivets (17).

4. Insert light assembly (18) through mounting plate (21). Install terminal lug (19) and washer (18). Ensure terminal lug is positioned down and between inlet valve and NORMAL/100% toggle.

5. If cord assembly (14) has been removed, solder new cord in place using solder and liquid flux to complete connections of cord assembly (14). Solder red wire to center of light assembly (18) and white wire with black trace to terminal lug (19). Apply sealing compound to solder connections.

6. Install emergency pressure control lever (1) in bushing and secure from left to right with control lever pin (2). Install follower assembly (7) in lever (5) aligning slot in follower and install control lever pin (6). Install screw (8) in lever (5). Adjustment will be made during final assembly.

7. Install lever and stem assembly (3) to bushing (16) and secure with control lever pin (4). Place toggle linkage (9) and washer (11) on screw (10) and install in mounting plate (21). Install washer (12) and nut (13) on screw (10) and tighten.

8. Attachment to regulating housing shall be covered later in this section.

14-108. BLINKER ASSEMBLY. To assemble the Blinker Assembly (figure 14-13), proceed as follows:

1. Turn screw (7) into guide (8), leaving three threads showing, as illustrated in figure 14-5.

2. Install the flag and lever assembly (4) and spring (6) onto guide (8) with blinker pin (5). End of blinker spring (6) must be positioned to rest in slotted head of screw (7), as illustrated in figure 14-5.

3. Crimp end of blinker pin (5) to retain assembled parts.

4. Stack blinker diaphragm assembly (11), actuator guide (8), and actuator guide on blinker tubing and base plate assembly (12). Ensure screw holes are aligned.

5. Adjust flag and lever assembly as shown in figure 14-5.

6. Install gasket (9) Ensure notch in gasket (9) is aligned with hole in blinker tubing and base plate assembly (12). Install cover (3), plate retainer (1) and secure with screws (2).

7. After assembly of blinker in regulator, should blinker fail to pass the test in paragraph 14-73, adjust as follows:

a. If flag did not completely open at flows of 8 lpm, remove plastic cover (3), and rotate adjustment screw one turn clockwise.

b. If flag does not completely close as flow is reduced to zero (17 inH_2O), rotate adjustment screw one turn counterclockwise.

c. Reinstall cover (3).

8. Installation into the regulator housing shall be covered later in this section.

14-109. SECOND STAGE RELIEF VALVE ASSEMBLY. To assemble the Second Stage Relief Valve Assembly (figure 14-14), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant	(CAGE 73925) NIIN 00-961-8995

1. Apply a light film of lubricant to packing (7) and install into groove on valve seat (5).

2. Insert guide sleeve (9) into housing (10). Ensure sleeve is bottomed in housing.

NOTE

Ensure polished surface of valve (8) is against seat (5).

3. Insert seat (5) into housing (10). Do not bottom seat against sleeve (9). Insert valve (8) through top of housing (10).

4. Install spring (4) and retainer (3) into housing (10). Do not install screen (1) and retaining ring (2) until completion of post assembly bench testing.

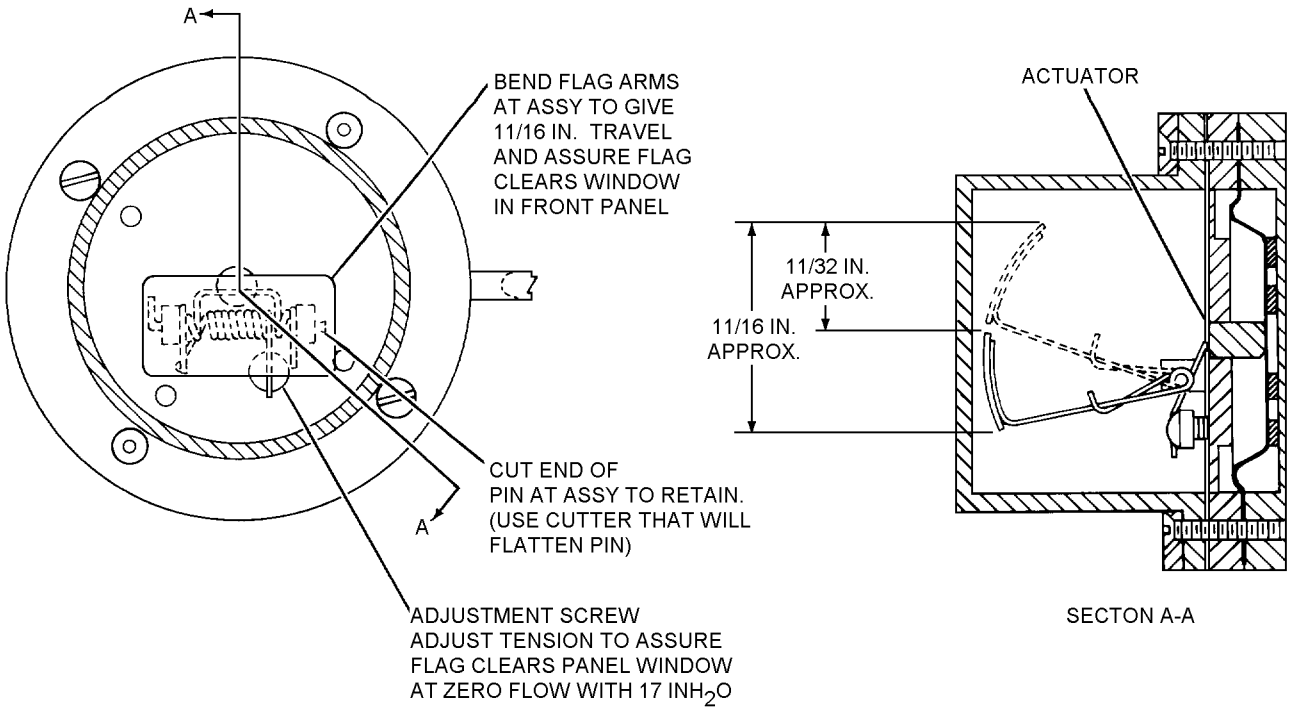


Figure 14-5. Blinker Assembly Adjustments

5. Press seat (5) into second stage relief valve housing (10) until bottomed. Install retaining ring (6) and ensure ring is seated in groove.

6. Attachment to the regulator housing shall be covered later in this section.

14-110. EMERGENCY PRESSURE CONTROL ASSEMBLY. To assemble the Emergency Pressure Control Assembly (figure 14-15), proceed as follows:

1. Insert emergency pressure spring guide (12) and spring (11) into emergency pressure control housing (16).

2. Insert and position control lever and center assembly (9) into second stage regulator cover (13).

3. Compress spring (11) to assemble second stage regulator cover (13) and control lever and center assembly (9) into emergency pressure control housing (16). Install pin (10), washer (15), and screw (14).

4. Slide emergency pressure control test spring (8) and emergency pressure control spring (7) onto stem (4).

5. Insert stem (4) into emergency pressure control housing (16). Install swivel (6) and nut (5). Do not install cap (1) and screw (2) and washer (3) until completion of post-assembly bench maintenance.

6. Attachment to the regulator housing shall be covered later in this section.

14-111. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY. To assemble the Diluter Plate Control Housing and Check Valve Assembly (figure 14-16), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant	(CAGE 73925) NIIN 00-961-8995

1. Install packing (18), spring (17), poppet valve (16), and test port fitting (15) into tube and adapter assembly (19).

2. Install tube and adapter assembly (19) and packing (14) in diluter control housing (24) with nut (13). Ensure that tube and adapter assembly (19) is correctly positioned.

3. Install diluter seal (7) by pressing into diluter valve plate assembly (6). Install throttling plate (4) and throttling plate screw (3) on aneroid assembly (5).

4. Install aneroid assembly (5) in diluter valve plate assembly (6).

5. Install gasket (8) and diluter valve plate assembly (6) on diluter control housing assembly, using washers (2) and screws (1).

6. Apply a light film of lubricant to packing (9) and install on diluter control housing (24).

NOTE

Ensure that spring (11) and check valve disk (12) are installed parallel to retainer assembly (10).

7. Carefully distend legs of retainer assembly (10) and install spring (11) and check valve disk (12).

8. Slightly distends legs of retainer assembly (10) and install on diluter control housing (24). Ensure that legs of retainer assembly (10) are properly installed in grooves on diluter control housing (24).

9. Attachment to the regulator housing shall be covered later in this section.

14-112. MANIFOLD INLET ASSEMBLY. To assemble the Manifold Inlet Assembly (figure 14-17), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant	(CAGE 73925) NIIN 00-961-8995

1. Install packing retainer (14) into manifold seal retainer (12). Apply a light film of lubricant to packing (15). Install packing (15) followed by second packing retainer (14) into manifold seal retainer (12). Thread manifold valve stem seal retainer (16) into manifold seal retainer (12). Do not tighten manifold valve stem seal retainer (16).

2. Insert inlet supply actuator stem (17) through manifold valve stem seal retainer (16) and manifold seal retainer (12). Tighten manifold valve stem seal retainer (16) into manifold seal retainer (12).

3. Apply a light film of lubricant on packing (13) and install onto manifold seal retainer (12).

4. Install manifold seal retainer (12) into supply inlet manifold (21).

5. Apply a light film of lubricant on packing (11). Install packing (11) and inlet seat assembly (10) into supply inlet manifold (21).

6. Install seat retainer (9) into supply inlet manifold (21).

7. If removed during disassembly, install plug (22) to supply inlet manifold (21).

8. Apply a light film of lubricant on packing (20). Install packing (20) and first stage inlet valve seat (19) into supply inlet manifold (21). Install inlet valve retainer (18) into supply inlet manifold (21).

9. Press oxygen filter (1) into manifold inlet adapter (3) and secure with retaining ring (2).

10. Install spacer (6) and backup ring (5) on manifold inlet adapter (3).

11. Apply a light film of lubricant on packing (4) and install onto manifold inlet adapter (3).

12. Insert seat ball (8), spring (7) and assembled parts (1) thru (6) into supply inlet manifold (21).

13. Attachment to the regulator housing shall be covered later in this section.

14-113. VENTURI ASSEMBLY. To assemble the Venturi Assembly (figure 14-18), proceed as follows:

CAUTION

Exercise care in handling seat (1) and nozzle (2) to prevent mating surfaces from becoming nicked or scratched.

1. Install injector nozzle (2) into dampening spring (4) and check for slight amount of drag. Adjust dampening spring (4) as required. Remove dampening spring (4) from injector nozzle (2).

2. Install injector nozzle (2) into injector spring (3) and dampening spring (4) into injector spring (3). Install assembled parts (2, 3, and 4) into housing (5). Install venturi seat (1) into venturi housing (5).

3. Depress injector nozzle (2) away from venturi seat (1) and check for free movement with no drag.

4. Attachment to the regulator housing shall be covered later in this section.

14-114. ASSEMBLY OF INTERNAL PARTS INTO THE REGULATOR HOUSING. To assemble the internal parts into the regulator housing, attach the previously assembled components, and test or adjust assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240AC Lubricant	(CAGE 73925) NIIN 00-961-8995

Support Equipment Required

Quantity	Description	Reference Number
1	Screwdriver	OT 234
1	Tool, Burnishing	85447-TEA
1	Wrench	OT 287

NOTE

Index numbers in the following paragraphs refer to figure 14-11 unless otherwise noted.

Apply a light film of lubricant to all packings before installation into regulator housing.

1. If required, use burnishing tool on demand valve pin guide (141) until demand valve pin (117) falls freely through guide without sticking or binding.

2. Install packing (130) on relief valve seat (129). Insert relief valve seat (129) into regulator body (142).

3. Place relief valve spring (127) over first stage relief valve assembly (129). Install relief valve spring retainer (126) into first stage cavity of regulator body (142) and tighten until flush with regulator body (142).

NOTE

First stage relief valve will be adjusted later in assembly.

4. Insert demand valve fulcrum (83) into regulator body (142) and position against pin dowel (140). Place demand valve lever spring (81) over demand valve pin guide (141).

5. Insert demand valve lever assembly (78) into regulator body (142) and hold against the compressed demand valve lever spring (81) by inserting a positioning pin through threaded hole of demand valve lever assembly (78) into demand valve lever spring (81). Secure demand valve lever assembly (78) to demand valve fulcrum (83) with vane mounting pin (79).

6. Remove positioning pin and secure demand valve fulcrum (83) to regulator body (142) with washer (85) and screw (84).

7. Thread screw (84) into palnut (80) approximately half way. Depress demand valve lever assembly (78) and center it. Demand valve fulcrum (83) should be positioned firmly against pin dowel (140). Thread screw (84) and palnut (80) into demand valve lever assembly (78).

CAUTION

Handle demand valve seat (115) with care to avoid nicks, scratches, etc. This damage can cause leaks in regulator.

8. Install packing (116) onto demand valve seat (115). Insert seat with packing side down into demand valve cavity of regulator body (142) and center in cavity.

9. Insert demand valve pin (117) with larger diameter first into regulator body (142). Inspect demand valve assembly (114) closely for defects and install valve assembly (silicone side down) on demand valve pin (117).

10. Install demand valve spring (113) (with small diameter down) onto demand valve assembly (114). Install packing (112) in groove of demand valve retaining screw (111). Thread demand valve retaining screw (111) into regulator body (142) until it bottoms out.

11. Verify operation of demand section by depressing demand valve lever assembly (78) and observe movement of demand valve pin (117) moving off demand valve seat (115) and then seating again through the first stage gage port.

12. If removed, install supply control stem guide (63) on regulator body (142) using screw (64).

13. If removed, install emergency pressure control stem guide (61) on regulator body (142) with screw (62).

14. Insert gasket (139) into venturi port of regulator body (142). Ensure gasket is lying flat. Using wrench, install venturi assembly (138) into regulator body (142).

15. Install setscrew (135) and nut (133) into first stage cavity side of injector port. Install setscrew (134) and nut (133) on opposite side. Both screws should be flush with inside of regulator port.

16. Install venturi screen (137) onto end of venturi assembly (138). Install packing (136) in first groove of regulator outlet (132).

17. Install regulator outlet (132) into regulator body (142). Using screwdriver and wrench, tighten setscrews (135, 134) and nuts (133).

18. Insert grommet (108) and press into first stage seat valve assembly (109). Ensure grommet is bottomed in valve assembly.

19. Press valve lever assembly (99) into first stage seat valve assembly (109) until bottomed.

CAUTION

Verify that cross pin on valve lever assembly (99) is engaged in slots in first stage seat valve assembly (109). Damage to assembly may result when mounting screw (100) is tightened.

20. Thread first stage bellows assembly (102) onto valve lever assembly (99). Ensure approximately 2 to 3 threads remain shown (figure 14-6). Install gasket (103) over valve lever assembly (99) onto first stage bellows assembly (102). Insert first stage bellows assembly (102) and assembled parts through opening in regulator body (142). Apply a light film of lubricant to screw (100). Secure first stage bellows assembly and assembled valve lever assembly with washer (101) and screw (100).

NOTE

Ensure valve lever assembly (99) is positioned in center of inlet assembly port located in regulator housing prior to installation of inlet manifold assembly (104).

21. Insert packing (107) into regulator body (142). Ensure valve lever assembly (99) and inlet manifold assembly (104) are aligned properly. Install inlet manifold assembly (104) to regulator body (142) using washers (106) and screws (105).

22. Align gasket (103) with hole pattern in regulator body (142). Position spring (95) in recess of first stage bellows assembly (102).

NOTE

The short screws (90) are used in flange holes on diluter plate control housing and check valve assembly (89).

23. Install diluter plate control housing and check valve assembly (89) to regulator body (142) using washers (92 and 94) and screws (90, 91, and 93). Ensure diluter valve body (86) is centered before tightening screws.

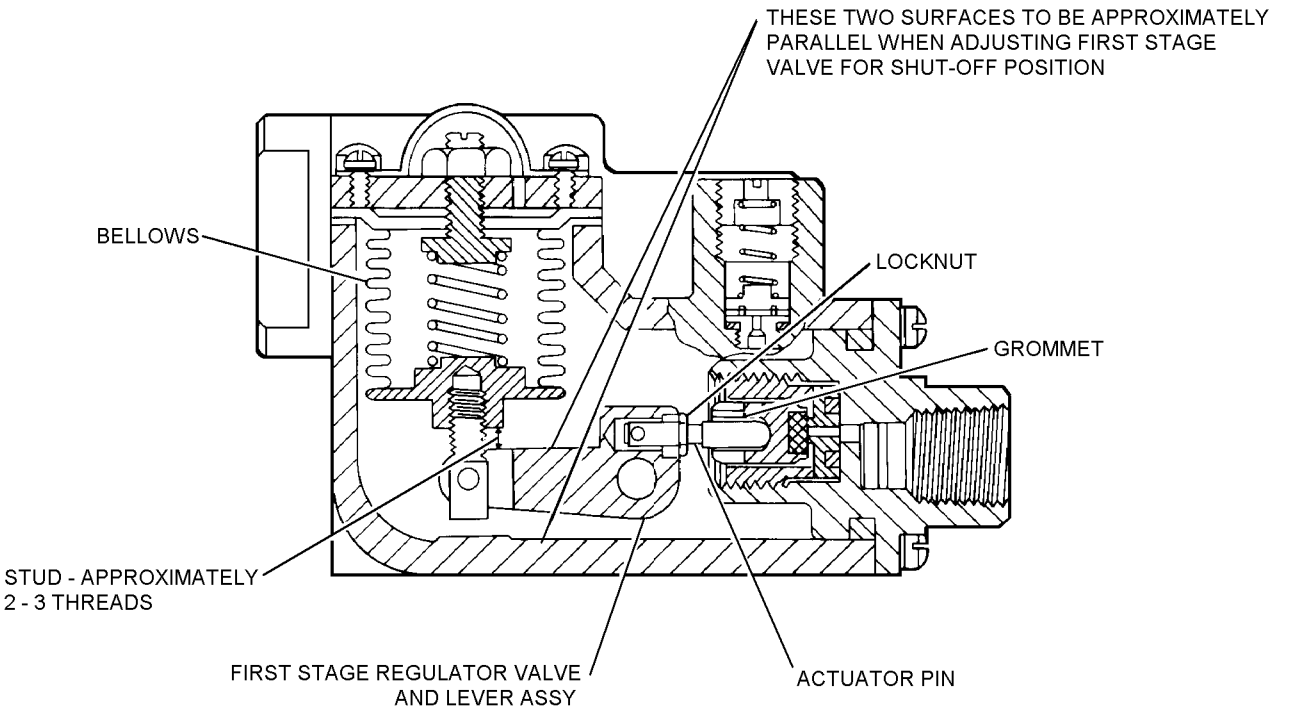


Figure 14-6. First Stage Relief Valve Adjustments

24. Install gasket (98) and cover plate (96) with screws (97).

25. Insert packing (31) into blinker port of regulator body (142). If removed during disassembly, reinstall tube connector (32) and tubing sleeve (33) onto blinker assembly (29). Install blinker assembly (29) to regulator body (142) with screws (30) and tighten tube connector (32).

26. Install packing (60) onto pressure breather valve assembly (57). Insert pressure breather valve assembly (57) into cavity of regulator housing (142). Ensuring holes are properly aligned, install retaining plate (59) and secure with screws (58).

14-115. LEAKAGE TEST AND ADJUSTMENTS. To test for leakage, and make adjustments to the partially assembled regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Compound, Sealant	MIL-S-22473

Materials Required (Cont)

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Brass Reducer Adapter	Local Manufacture, figure 14-7
1	Adapter Assembly	AN816-4-4
1	Adapter Assembly	AN816-4J
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Salvage the tubing from a discarded pressure gage, then pinch and silver solder the end of the tubing.

1. Install pressure gage tubing and preformed packing (37) into pressure gage port. Secure with washer (36) and screw (35).

CAUTION

Upon completion of tests and adjustments, remove metal strip from between regulator body (142) and inlet manifold assembly (104).

2. Install a thin strip of metal between the regulator body (142) and inlet manifold assembly (104) so that it depresses the inlet manifold stem.

3. Attach adapter fixture (figure 14-7) to the 0 to 160 psi pressure gage. Install gage, preformed packing (120) and gasket (119) into port normally occupied by demand valve feed port plug (118) (figure 14-8).

4. Install adapter (AN816-4J) into inlet manifold assembly (104) (figure 14-8).

5. Ensure all test stand valves are secured and turn on N_2 supply cylinder.

6. Connect regulator inlet to N_2 input connection (18) in the altitude chamber.

7. Using low pressure regulator (N) apply 150 psig.

8. Turn inlet ON/OFF valve (L) to ON position, 0 to 160 psi pressure gage should indicate 32 to 35 psig. If pressure is not within limits, adjust shutoff position of first stage regulator valve lever assembly (99) (figure 14-6).

9. Reduce supply pressure to 30 psig using system bleed (S) and apply leak detection compound to safety pressure/pressure breathing port (figure 14-9). Allowable leakage is 0.2 ccm (cubic centimeters) in 30 seconds. Any bubble distention at this port is excessive leakage and requires inspection/adjustment, or replacement of pressure breather valve assembly (57) (table 14-11).

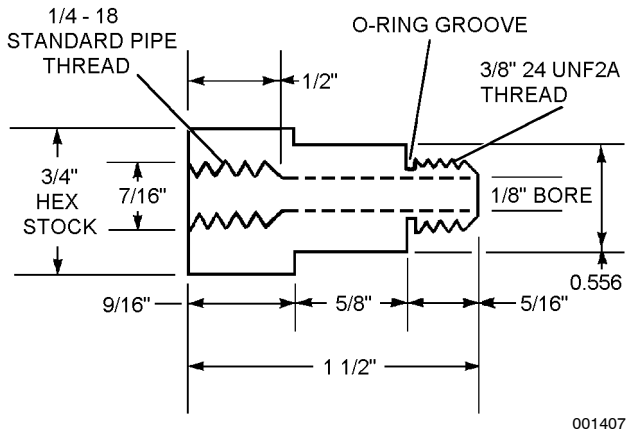


Figure 14-7. Brass Reducer Adapter

NOTE

Demand valve lever assembly (78) should protrude slightly above regulator body (142).

10. Using LOW PRESS. REGULATOR (N) increase inlet pressure to 150 psig and check demand valve lever assembly (78) adjustment by sliding a straight edge across regulator body (142). Straight edge should actuate demand valve, producing a slight flow.

11. Demand valve height adjustment is made by turning the adjustment screw (82) clockwise to raise lever, and counterclockwise to lower lever (figure 14-9).

12. Fully depress demand valve lever assembly (78). Pressure drop on 0 to 160 psi pressure gage shall not be more than 3 psig.

13. Depress demand valve lever assembly (78) and release while observing blinker assembly (29). Blinker assembly (29) should open when demand valve lever assembly (78) is depressed, and close immediately when released. Adjust in accordance with paragraph 14-108 and figure 14-5.

14. Depress demand valve lever assembly (78) to produce a flow, apply leak detection compound to blinker tubing nut and around base of blinker assembly (29), release demand valve lever assembly (78). If leakage is present, repair in accordance with paragraph 14-108 and figure 14-5.

15. Apply leak detection compound to base of diluter plate control housing and check valve assembly (89). If leakage is present, replace gasket (103).

16. Apply leak detection compound to first stage cover plate (96). If leakage is present, repair in accordance with table 14-8.

17. Apply leak detection compound to regulator outlet (132). If leakage is present, repair in accordance with table 14-3.

18. Remove metal strip from between regulator body (142) and inlet manifold assembly (104). Apply leak detection compound to the following areas (A, C, D, E and F, figure 14-10). If leakage is present, locate probable cause using table 14-5, and repair inlet manifold assembly (104).

19. Turn inlet pressure ON/OFF valve (L) to OFF, back out on low pressure regulator (N), open system bleed valve (S) and bleed pressure from regulated low pressure gage (11), and close system bleed (S).

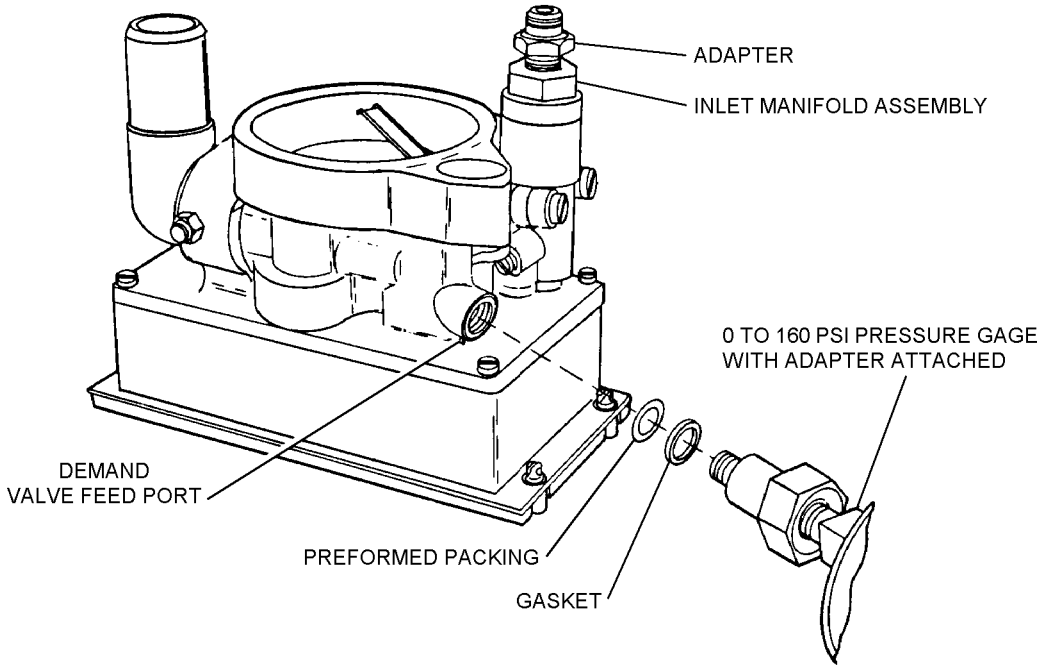


Figure 14-8. Attachment of 0 to 160 psi Pressure Gage to Demand Valve Feed Port for Leakage and Adjustment Test

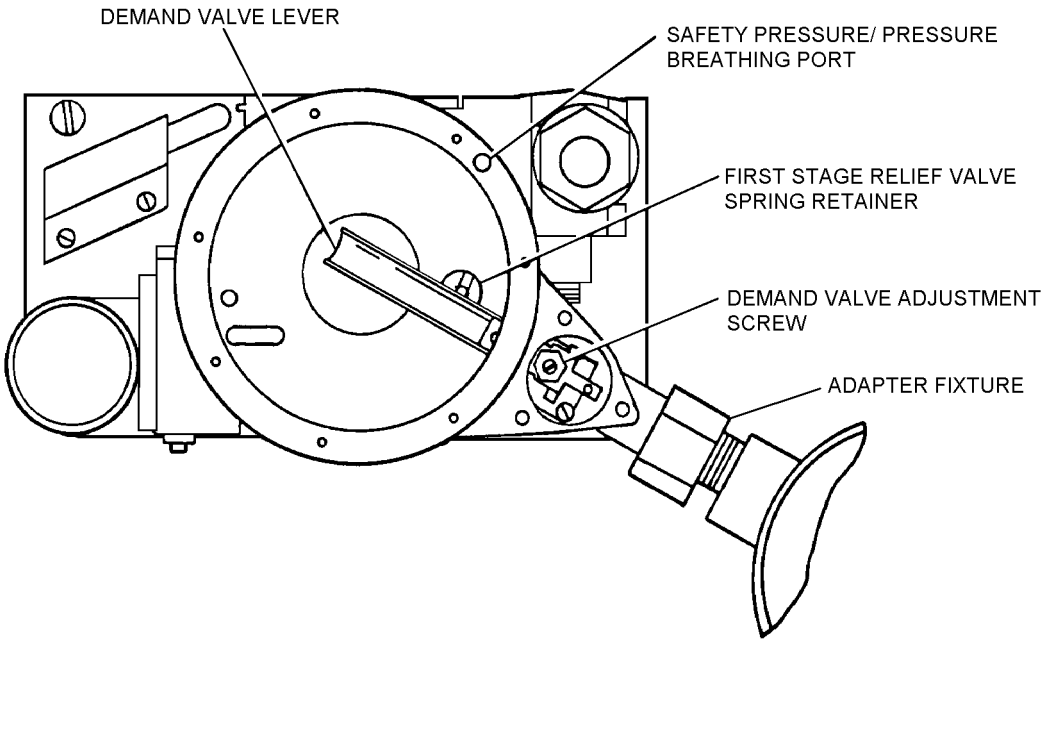


Figure 14-9. Attachment of Adapter Fixture to Regulator for Leakage and Adjustment Test

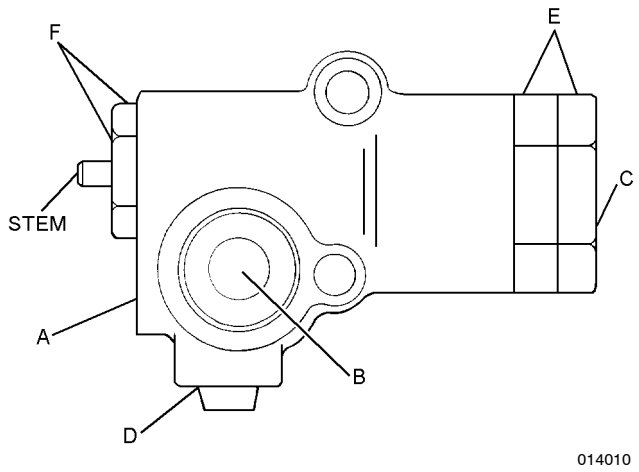


Figure 14-10. Test Areas, Manifold Inlet Assembly

20. Disconnect regulator from N_2 input connection (18), and remove 0 to 160 psi pressure gage from demand valve feed port.

21. Remove 0 to 160 psi pressure gage from adapter fixture.

22. Attach adapter (AN816-4-4) to adapter fixture and install adapter fixture, preformed packing (120), and gasket (119) into demand valve feed port (figure 14-8).

23. Connect regulator and adapter fixture to N_2 input connection (18), turn inlet pressure ON/OFF valve (L) to ON. Using LOW PRESS. REGULATOR (N), apply 60 psig to the regulator.

24. Adjust first stage relief valve spring retainer (126) so that first stage relief valve vents between 55 and 60 psig (figure 14-9). Clockwise to relieve later, counterclockwise to relieve earlier.

25. Reduce pressure to 50 psig using system bleed valve (S) and apply leak detection compound to area around first stage relief valve spring retainer (126). There shall be no leakage.

26. Turn inlet pressure ON/OFF valve (L) to OFF.

27. Turn N_2 supply cylinder off and bleed pressure from test stand using LOW PRESS. REGULATOR (N) and system bleed valve (S). Secure all test stand valves and disconnect regulator from N_2 input connection (18).

28. Remove adapter fixture, preformed packing (120) and gasket (119) from demand valve feed port.

29. Apply sealing compound (MIL-S-22347) or equivalent, to the first stage relief valve spring retainer (126).

30. Install new preformed packing (120), new gasket (119), and demand valve feed port plug (118) into demand valve feed port.

31. Remove screw (35), washer (36) and pinched and soldered pressure gage tubing from pressure gage port.

14-116. COMPLETION OF ASSEMBLY. To complete assembly of the regulator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Lamp, Incandescent	MS25237-327

NOTE

To aide in determining part placement and location, the plastic lighting panel shall be considered the front of the regulator.

1. Install washers (74) and screws (73) through holes on flat side of emergency pressure control assembly (70).

NOTE

Outer diaphragm (75) and diaphragm and plate assembly (77) must be installed with convoluted side down.

2. Stack outer diaphragm (75), diaphragm spacer assembly (76) and diaphragm and plate assembly (77) onto emergency pressure control assembly (70). Secure the assembled items to regulator body (142) with screws (73), washers (74), washer (72) and screw (71).

3. Install gasket (68) and second stage relief valve assembly (65) to cavity of regulator body (142) and secure with washers (67) and screws (66).

4. (Regulator part numbers 14950-45 only) install check disk (50) and spring (49).

5. Install aneroid and pin assembly (48) into top housing assembly (53 or 54) until aneroid is approximately 1/8 of a inch inside aneroid housing. Place packing (41) over stem of aneroid assembly and secure with nut (40).

6. Mate gasket (47) and bottom housing (45) with top housing assembly (53 or 54). Place seal (46), with large diameter of tapered hole adjacent to bottom housing (45), over pin of aneroid and pin assembly (48). Install spring (44) and retainer (43). Install and adjust nut (42) so that pin on aneroid and pin assembly (48) protrudes approximately two threads through nut (42).

NOTE

Ensure top housing assembly (53 or 54), when installed, is positioned with test port assembly (52) on outlet side of regulator.

7. Place diaphragm assembly (56) onto regulator body (142) with convolutions toward the front of regulator. Install top housing assembly (53 or 54) and secure with washers (39) and screws (38).

8. Attach unreinforced tubing (55) to top housing assembly (53). Attach free end of unreinforced tubing (55) to diluter plate control housing and check valve assembly (89).

9. If removed during disassembly, install packing (51) on test port assembly (52) and install test port assembly (52) into top housing assembly (53).

NOTE

Ensure that unreinforced tubing (55) is routed under bourbon tube of gage and bracket assembly (34).

10. Place packing (37) onto groove on gage and bracket assembly (34). Install gage and bracket assembly (34) to regulator body (142) with washers (36) and screws (35).

11. Install regulator shroud (22) to regulator body (142) with washers (24) and screws (23).

12. Install beam and fulcrum assembly (16) using washers (18) and screws (17) to regulator body (142).

13. Adjust locknut (27) and screw (26) to a dimension of 1.10 to 1.15 inches from end of emergency pressure control stem (28). Insert emergency pressure control stem assembly (28) into emergency pressure control stem guide (61).

14. If removed during disassembly, install diluter valve body (86) to diluter lever (88), using screw (87).

NOTE

Diluter valve body (86) should be centered over diluter port of diluter plate control housing and check valve assembly (89).

15. Remove two lower screws (90 and 92) with washers (93) from diluter plate control housing and check valve assembly (89). Install diluter lever (88) using washers (93) and screws (90 and 92) previously removed.

16. If removed during disassembly, insert cord assembly through counterbore of regulator body (142). Slide cord through bushing (125) and plate (121). Secure with washers (123) and screw (122).

17. Install mounting plate and control assembly (7) on regulator shroud (22) using screws (8). It may be necessary to align diluter test port with panel while installing.

18. Secure dilution test port located on diluter plate control housing and check valve assembly (89) and top housing assembly (53 or 54) test port with washers (11) and screws (9 and 10).

19. Install dust cap assembly (1) on test port located on diluter plate control housing and check valve assembly (89).

20. Perform complete Bench Test (paragraph 14-59).

21. Remove dust cap assembly (1). Install plastic lighting plate (2) onto mounting plate and controls assembly (7). Place washer (6), cap assembly (1), and bushing (3) onto screw (4). Install screw (4), washer (6), and screw (5) into mounting plate and controls assembly (7).

22. Install lamp, grommet, and cap to light assembly (18, figure 14-12), protruding through mounting plate and controls assembly (7) and plastic lighting plate (2).

23. If removed, install identification plate (69) onto emergency pressure control assembly (70).

24. Install screw (12) into dilution lever.

25. Install cap (1, figure 14-15), using washers and screws (3 and 2, figure 14-15).

26. Install oxygen filter (1, figure 14-17) and retaining ring (2, figure 14-17).

27. Install sealing cap (131) and protective plug (110).

28. Complete required Maintenance Data Collection System forms.

Section 14-5. Illustrated Parts Breakdown

14-117. GENERAL.

14-118. This section lists and illustrates the assemblies and detail parts of the regulators listed in table 14-16. This table also lists Usable On Codes used throughout this illustrated parts breakdown. These regulators are manufactured by Carleton Technologies, CAGE 03990.

14-119. The Illustrated Parts Breakdown should be used when requisitioning, storing, issuing, and identifying parts. It also illustrates disassembly and assembly relationships.

Table 14-16. Regulator Usable On Codes

Type	Part No.	Usable On Code
CRU-73/A	B40550-1	A
CRU-73/A	14950-45	B
CRU-73/A	14950-40	C
CRU-68A/A	14950-34M	D
CRU-92/A	B40860-1	E

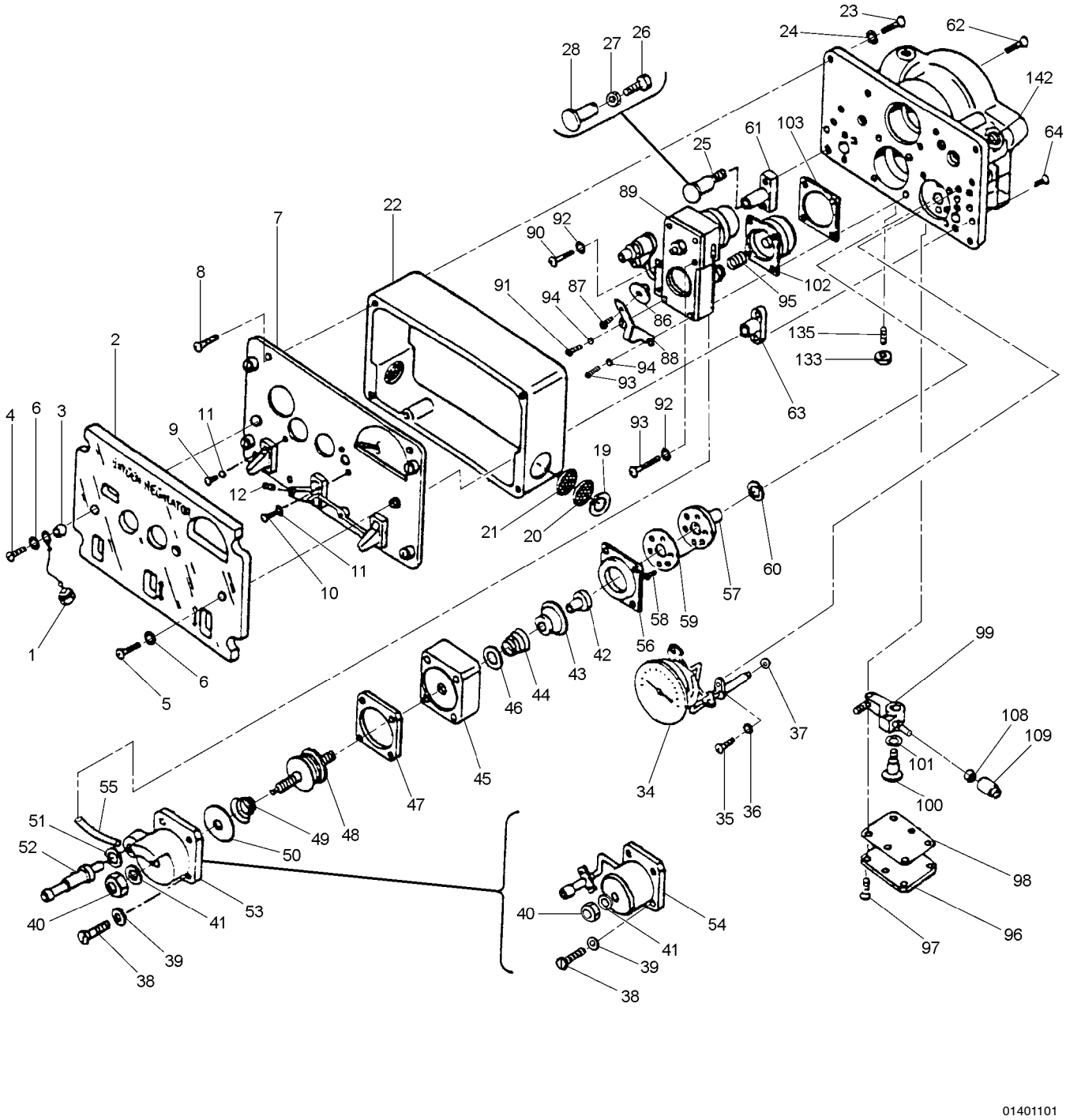


Figure 14-11. Aircraft Panel Mounted Oxygen Regulator, Types CRU-73/A, CRU-68A/A, and CRU-92/A (Sheet 1 of 2)

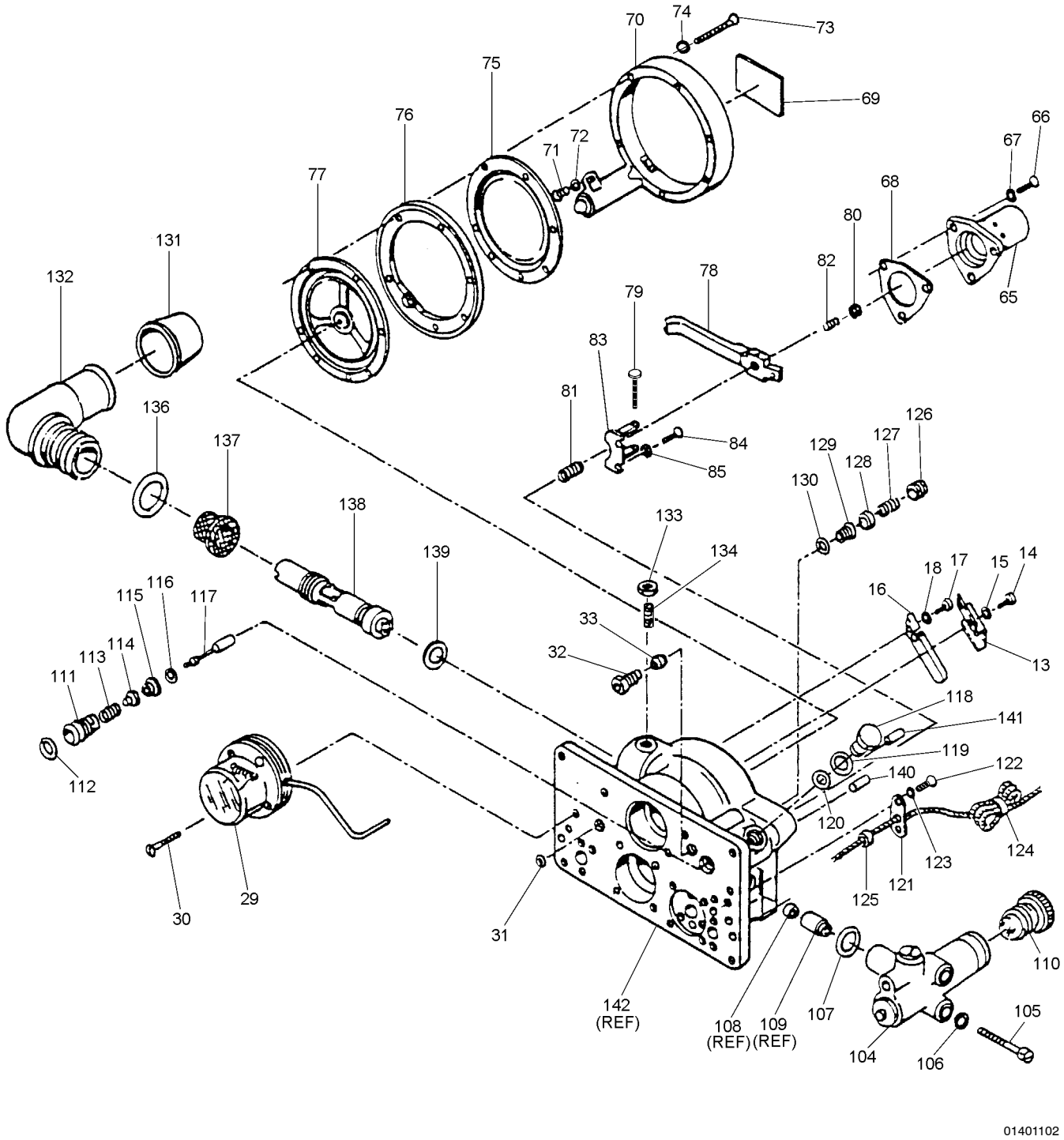


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Figure 14-11. Aircraft Panel Mounted Oxygen Regulator, Types CRU-73/A, CRU-68A/A, and CRU-92/A (Sheet 2 of 2)

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-11	B40550-1	REGULATOR, Oxygen (Parts Kit Available)	1	A
	14950-45	REGULATOR, Oxygen (Parts Kit Available)	1	B
	14950-40	REGULATOR, Oxygen (Parts Kit Available)	1	C
	14950-34M	REGULATOR, Oxygen (Parts Kit Available)	1	D
	B40860-1	REGULATOR, Oxygen (Parts Kit Available)	1	E
	14951-45	REGULATOR, Automatic Pressure Breathing, ... Diluter Demand, Oxygen	REF	B
	14951-40	REGULATOR, Automatic Pressure Breathing, ... Diluter Demand, Oxygen	REF	C
	14951-34M	REGULATOR, Automatic Pressure Breathing, ... Diluter Demand, Oxygen	REF	D
-1	19726-3	. CAP ASSEMBLY, Dust	1	A
	19726-2	. CAP ASSEMBLY, Dust	1	B
	19726-1	. CAP ASSEMBLY, Dust	1	C
-2	19578	. PLATE, Plastic Lighting	1	A, B
	19578-1	. PLATE, Plastic Lighting	1	C
	19578-2	. PLATE, Plastic Lighting	1	E
-3	19498-1	. SPACER	1	
-4	MS35265-27	. SCREW (KF)	1	
-5	MS35265-25	. SCREW (KF)	1	
-6	MS35333-37	. WASHER (KF)	2	
-7	B40595-1	. MOUNTING PLATE AND CONTROLS . . . . . ASSEMBLY (figure 14-12 for BKDN)	1	A
	19579	. MOUNTING PLATE AND CONTROLS . . . . . ASSEMBLY (figure 14-12 for BKDN)	1	B, C
	19579-1	. MOUNTING PLATE AND CONTROLS . . . . . ASSEMBLY (figure 14-12 for BKDN)	1	D
	B40863-1	. MOUNTING PLATE AND CONTROLS . . . . . ASSEMBLY (NVIIS) (figure 14-12 for BKDN)	1	E
-8	MS24693S26	. SCREW (KF)	5	
-9	MS51957-13	. SCREW (KF)	1	C
	MS51957-17	. SCREW	1	D
-10	MS51957-12	. SCREW (KF)	2	C, D
-11	MS35338-40	. WASHER (KF)	3	C, D
-12	AS103CC832F2	. SCREW	1	B, C, D
-13	14986	. GUARD, Emergency Pressure Control Beam	1	
-14	MS35206-213	. SCREW (KF)	2	
-15	MS35338-40	. WASHER (KF)	2	
-16	14842	. BEAM AND FULCRUM ASSEMBLY	1	
-17	MS35265-16	. SCREW (KF)	1	
-18	MS35338-40	. WASHER (KF)	1	
	14804	. SHROUD AND SCREEN ASSEMBLY	1	
-19	14889	. RING, Screen Retaining	2	
-20	14887	. GUARD, Air Port Screen	2	
-21	14888	. SCREEN, Air Port	2	
-22	14974	. SHROUD, Regulator	1	
-23	MS35265-30	. SCREW (KF)	4	
-24	MS35338-41	. WASHER (KF)	4	
-25	14836-3	. STEM ASSEMBLY, Emergency Pressure . . . . . Control	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-11-26	14839	. SCREW, Emergency Pressure Control Adjust	1	
-27	MS21043-04	. NUT	1	
-28	907713-1	. STEM, Emergency Pressure Control	1	
-29	19626	. BLINKER ASSEMBLY ..... (figure 14-13 for BKDN)	1	
-30	19543-2	. SCREW (KF)	2	
-31	14909-1	. PACKING, Preformed (KC)	1	
-32	14827	. CONNECTOR, Tube	1	
-33	14826	. SLEEVE, Tubing	1	
-34	17923	. GAGE AND BRACKET ASSEMBLY	1	
-35	MS35206-213	. SCREW (KF)	3	
-36	MS35338-40	. WASHER (KF)	3	
-37	14945	. PACKING, Preformed (KC)	1	
	B905739-2	. CONTROL ASSEMBLY, Pressure Breathing	1	A, E
	905739-1	. CONTROL ASSEMBLY, Pressure Breathing	1	B
	19727	. CONTROL ASSEMBLY, Pressure Breathing	1	C, D
-38	MS35265-18	. SCREW (KF)	4	
-39	AS142CC4	. WASHER (KF)	4	
-40	12249	. NUT	1	
-41	19846	. PACKING, Preformed (KC)	1	
-42	19573	. NUT (KF)	1	
-43	19666	. RETAINER	1	
-44	14959-1	. SPRING (KF)	1	
-45	19567	. HOUSING	1	A, B, E
-46	19568	. SEAL (KC)	1	
-47	19566	. GASKET (KC)	1	
-48	19855	. ANEROID AND PIN ASSEMBLY	1	
-49	905731-1	. SPRING	1	B
-50	905730-1	. DISK, Check	1	B
-51	14909-3	. PACKING, Preformed (KC)	1	B
-52	905733-1	. TEST PORT ASSEMBLY	1	B
-53	905736-1	. HOUSING ASSEMBLY	1	B
-54	19649	. HOUSING ASSEMBLY	1	C, D
-55	FS8650-020	. TUBING, Unreinforced	1	B
-56	14944	. DIAPHRAGM ASSEMBLY (KC)	1	
-57	14934	. VALVE ASSEMBLY, Pressure Breather	1	
-58	AS108CC348-5	. SCREW (KF)	3	
-59	16210	. PLATE, Retaining	1	
-60	15697	. PACKING, Preformed (KC)	1	
-61	14840-1	. GUIDE, Emergency Pressure Control Stem	1	
-62	AS108CC348-5	. SCREW (KF)	2	
-63	14851-1	. GUIDE, Supply Control Stem	1	
-64	AS108CC440-7	. SCREW (KF)	2	
-65	14880-3	. VALVE ASSEMBLY, Second Stage Relief ..... (figure 14-14 for BKDN)	1	
-66	MS35265-13	. SCREW (KF)	3	
-67	MS35338-40	. WASHER (KF)	3	
-68	14908	. GASKET, Preformed (KC)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-11--69	B40593-1	. PLATE, Identification	1	A
	905748-1	. PLATE, Identification	1	B
	19665	. PLATE, Identification	1	C
	16579	. PLATE, Identification	1	D
	905746-1	. PLATE, Identification	1	E
-70	14866	. CONTROL ASSEMBLY, Emergency Pressure (figure 14-15 for BKDN)	1	
-71	MS35265-13	. SCREW (KF)	1	
-72	MS35333-36	. WASHER (KF)	1	
-73	MS35265-10	. SCREW (KF)	7	
-74	MS35338-39	. WASHER (KF)	7	
-75	14863	. DIAPHRAGM, Outer (KC)	1	
-76	14865	. SPACER ASSEMBLY, Diaphragm	1	
-77	19457	. DIAPHRAGM AND PLATE ASSEMBLY	1	A, B, E
	19813	. DIAPHRAGM AND PLATE ASSEMBLY	1	C, D
-78	19810	. LEVER ASSEMBLY, Demand Valve	1	
-79	19682	. PIN, Vane Mounting	1	
-80	14562	. PALNUT	1	
-81	19571	. SPRING, Demand Valve Lever	1	
-82	19683	. SCREW	1	
-83	19686	. FULCRUM, Demand Valve	1	
-84	MS35206-203	. SCREW (KF)	1	
-85	MS35333-35	. WASHER (KF)	1	
-86	19976	. BODY, Diluter Valve (KC)	1	
-87	19715	. SCREW, Shoulder (KF)	1	
-88	19646	. LEVER, Diluter (KF)	1	
-89	B40596-1	. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY (figure 14-16 for BKDN)	1	A, E
	905740-1	. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY (figure 14-16 for BKDN)	1	B
	19731-2	. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY (figure 14-16 for BKDN)	1	C, D
-90	MS35206-215	. SCREW (KF)	2	
-91	MS35206-216	. SCREW (KF)	1	
-92	MS35338-40	. WASHER (KF)	3	
-93	MS35206-221	. SCREW (KF)	2	
-94	MS35333-36	. WASHER (KF)	2	
-95	14831-1	. SPRING, Helical, First Stage	1	
-96	14903-1	. PLATE, First Stage Cover	1	
-97	AS108CC440-4	. SCREW (KF)	6	
-98	14904-1	. GASKET, First Stage (KC)	1	
-99	14832	. VALVE LEVER ASSEMBLY, First Stage	1	
-100	14958	. SCREW	1	
-101	14957	. WASHER	1	
-102	14905	. BELLOWS ASSEMBLY, First Stage	1	
-103	14907	. GASKET, First Stage Bellows (KC)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-11-104	14890-8	. MANIFOLD INLET ASSEMBLY (figure 14-17 for BKDN)	1	
-105	MS35266-67	. SCREW (KF)	2	
-106	MS35338-43	. WASHER (KF)	2	
-107	14909-11	. PACKING, Preformed (KC)	1	
-108	16695	. GROMMET (KC)	1	
-109	14966-2	. VALVE ASSEMBLY, First Stage Seat (KF)	1	
-110	13040-1	. PLUG, Protective (KF)	1	
-111	14972	. SCREW, Demand Valve Retaining	1	
-112	14909-9	. PACKING, Preformed (KC)	1	
-113	16212	. SPRING, Demand Valve (KF)	1	
-114	15882	. VALVE ASSEMBLY, Demand (KC)	1	
-115	14973	. SEAT, Demand Valve (KC)	1	
-116	14909-5	. PACKING, Preformed (KC)	1	
-117	14982	. PIN, Demand Valve (KF)	1	
-118	14879	. PLUG, Demand Valve Feed Port	1	
-119	16664	. GASKET, Plug (KC)	1	
-120	14909-5	. PACKING, Preformed (KC)	1	
-121	14824	. PLATE, Panel Light Cord	1	
-122	MS35206-213	. SCREW (KF)	2	
-123	MS35338-40	. WASHER (KF)	2	
-124	17436	. WIRE HOLDER	1	
-125	14823	. BUSHING, Panel Light Electrical Cord (KC)	1	
-126	9177	. RETAINER, Relief Valve Spring	1	
-127	16381	. SPRING, Relief Valve (KF)	1	
-128	16379	. VALVE ASSEMBLY, First Stage Relief	1	
-129	11221	. SEAT, Relief Valve (KC)	1	
-130	14909-2	. PACKING, Preformed (KC)	1	
-131	812097-1	. CAP, Sealing (KF)	1	
-132	14932	. OUTLET, Regulator	1	
-133	MS35649-282	. NUT (KF)	2	
-134	AS103CC832H6	. SETSCREW (KF)	1	
-135	AS103CC832H8	. SETSCREW (KF)	1	
-136	14825-19	. PACKING, Preformed (KC)	1	
-137	16480	. SCREEN, Venturi (KF)	1	
-138	19795	. VENTURI ASSEMBLY (figure 14-18 for BKDN)	1	
-139	11761	. GASKET, Venturi Nozzle (KC)	1	
	14803	. HOUSING AND DEMAND VALVE BUSHING ASSEMBLY	1	
-140	14998	. PIN DOWEL	1	
-141	14981-2	. GUIDE, Demand Valve Pin	1	
-142	14802	. BODY, Regulator	1	
	B43387-1	PARTS KIT (Cure Date) (Note 1)	1	
	B43388-1	PARTS KIT (Major Overhaul) (Note 1)	1	

Note: 1. These parts kits do not have stock numbers assigned. If they are needed for repair of the regulator, they must be open purchased via supply system from the manufacturer Carleton Technologies, Orange Park, NY CAGE 03390.

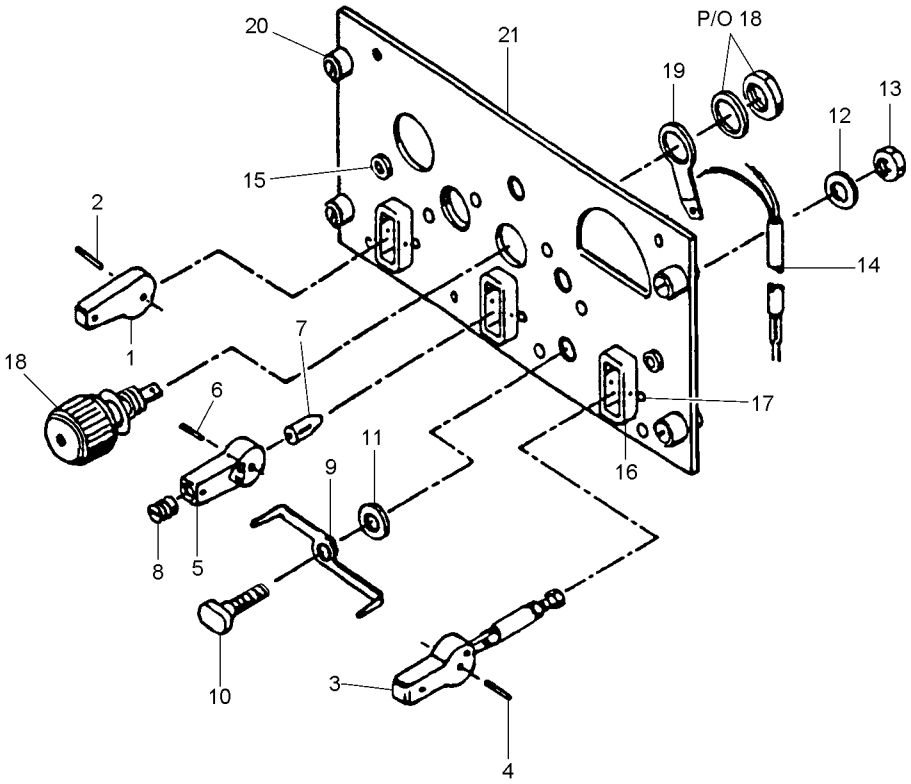
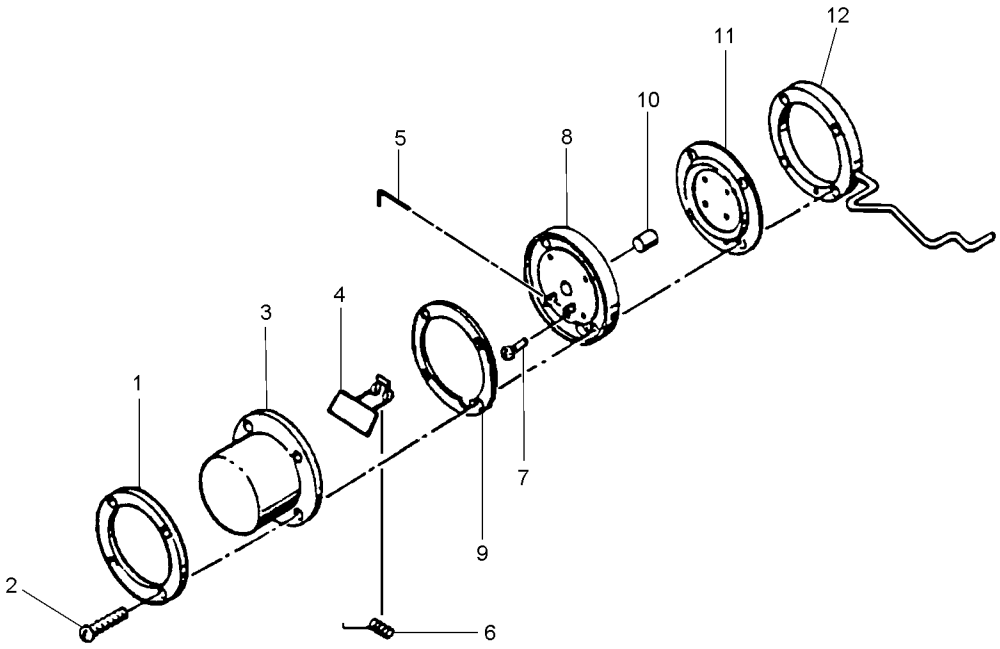


Figure 14-12. Mounting Plate and Controls Assembly

014012

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-12	B40595-1	. MOUNTING PLATE AND CONTROLS ASSEMBLY (figure 14-11 for NHA)	REF	A
	19579	. MOUNTING PLATE AND CONTROLS ASSEMBLY (figure 14-11 for NHA)	REF	B, C
	19579-1	. MOUNTING PLATE AND CONTROLS ASSEMBLY (figure 14-11 for NHA)	REF	D
	B40863-1	. MOUNTING PLATE AND CONTROLS ASSEMBLY (NVIIS) (figure 14-11 for NHA)	REF	E
-1	905714-1	. LEVER, Emergency Pressure Control (KF)	1	
-2	14850	. PIN, Control Lever (KF)	1	B, C, D
-3	19658	. LEVER AND STEM ASSEMBLY, Supply Valve Control	1	A, B, E
	19658-1	. LEVER AND STEM ASSEMBLY, Supply Valve Control	1	C
-4	14850	. PIN, Control Lever (KF)	1	
-5	905715-1	. LEVER, Diluter Control Valve	1	A, B, E
	905715-2	. LEVER, Diluter Control Valve	1	C
-6	14850	. PIN, Control Lever (KF)	1	
-7	14848-4	. FOLLOWER ASSEMBLY, Diluter Lever (KF)	1	
-8	AS103CC832H10	. SCREW, Adjustment	1	
-9	19582	. LINKAGE, Toggle	1	
-10	19583	. SCREW, Shoulder	1	
-11	AN960C3	. WASHER	1	
-12	AS142CC3	. WASHER	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-12-13	AS115S356	. NUT	1	
	19581	. PLATE ASSEMBLY, Mounting	1	
-14	14809	. CORD ASSEMBLY, Panel Light (KF)	1	
-15	14828	. BUSHING	2	
-16	14846	. BUSHING	3	
-17	MS20426DD2-3	. RIVET	6	
-18	19179-4	. LIGHT ASSEMBLY	1	
-19	742555-1	. LUG, Terminal	1	
-20	19870	. FASTENER ASSEMBLY (KF)	4	
-21	19577	. PLATE, Mounting	1	



014013

Figure 14-13. Blinker Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-13	19626	BLINKER ASSEMBLY (figure 14-11 for NHA)	REF	
-1	19546	. RETAINER, Plate	1	
-2	19543-1	. SCREW (KF)	2	
-3	19618	. COVER (KF)	1	
-4	14819	. FLAG AND LEVER ASSEMBLY	1	
-5	14983	. PIN, Blinker (KF)	1	
-6	14984	. SPRING, Blinker (KF)	1	
-7	MS35265-1	. SCREW (KF)	1	
-8	19616	. GUIDE, Actuator (KF)	1	
-9	19624	. GASKET (KC)	1	
-10	19623	. ACTUATOR, Blinker (KF)	1	
-11	14821	. DIAPHRAGM ASSEMBLY, Blinker (KC)	1	
-12	14987	. BLINKER TUBING AND BASE PLATE ASSEMBLY	1	

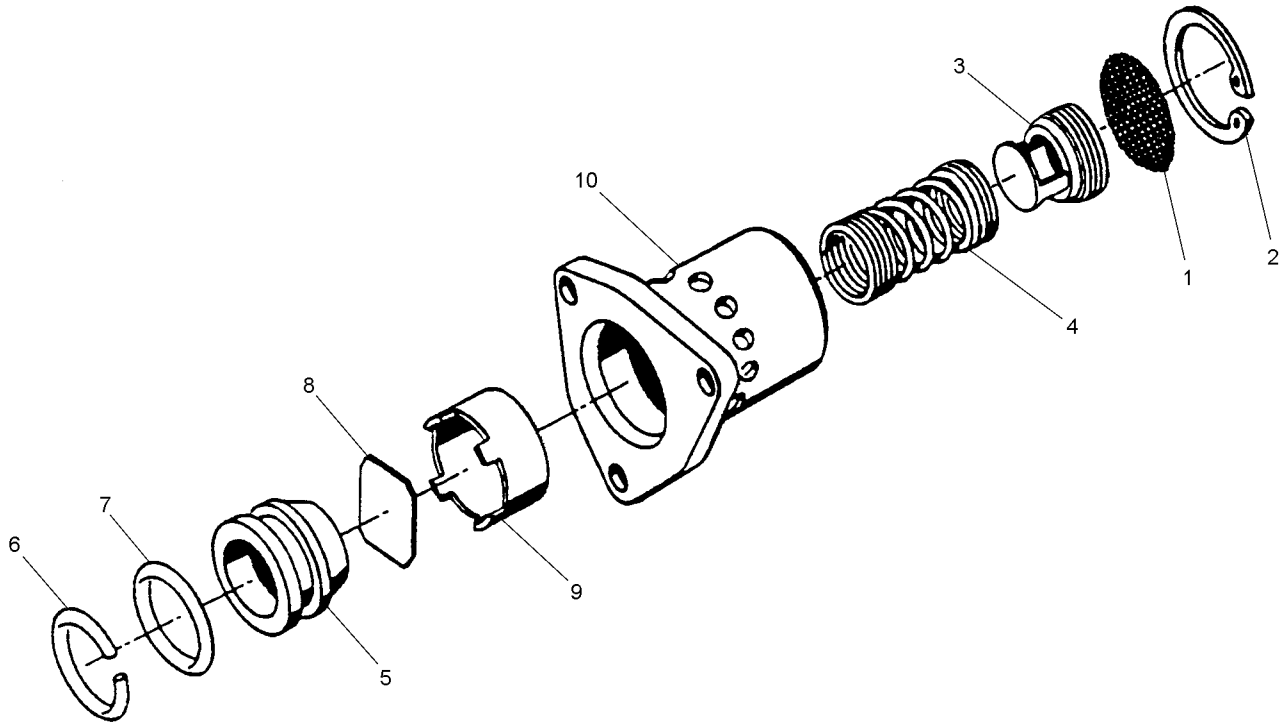


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Figure 14-14. Second Stage Relief Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-14	14880-3	VALVE ASSY, Second Stage Relief . . . . . (figure 14-11 for NHA)	REF	
-1	708760-1	. SCREEN, Relief Valve (KF)	1	
-2	92587-50	. RING, Retaining (KF)	1	
-3	708763-1	. RETAINER, Spring	1	
-4	14886	. SPRING, Second Stage Relief Valve (KF)	1	
-5	19332	. SEAT, Second Stage Relief Valve (KF)	1	
-6	14881	. RING, Retaining (KF)	1	
-7	14909-7	. PACKING, Preformed (KC)	1	
-8	14885	. VALVE, Second Stage Relief (KF)	1	
-9	19333	. SLEEVE, Guide (KF)	1	
-10	14882-1	. HOUSING, Second Stage Relief Valve	1	

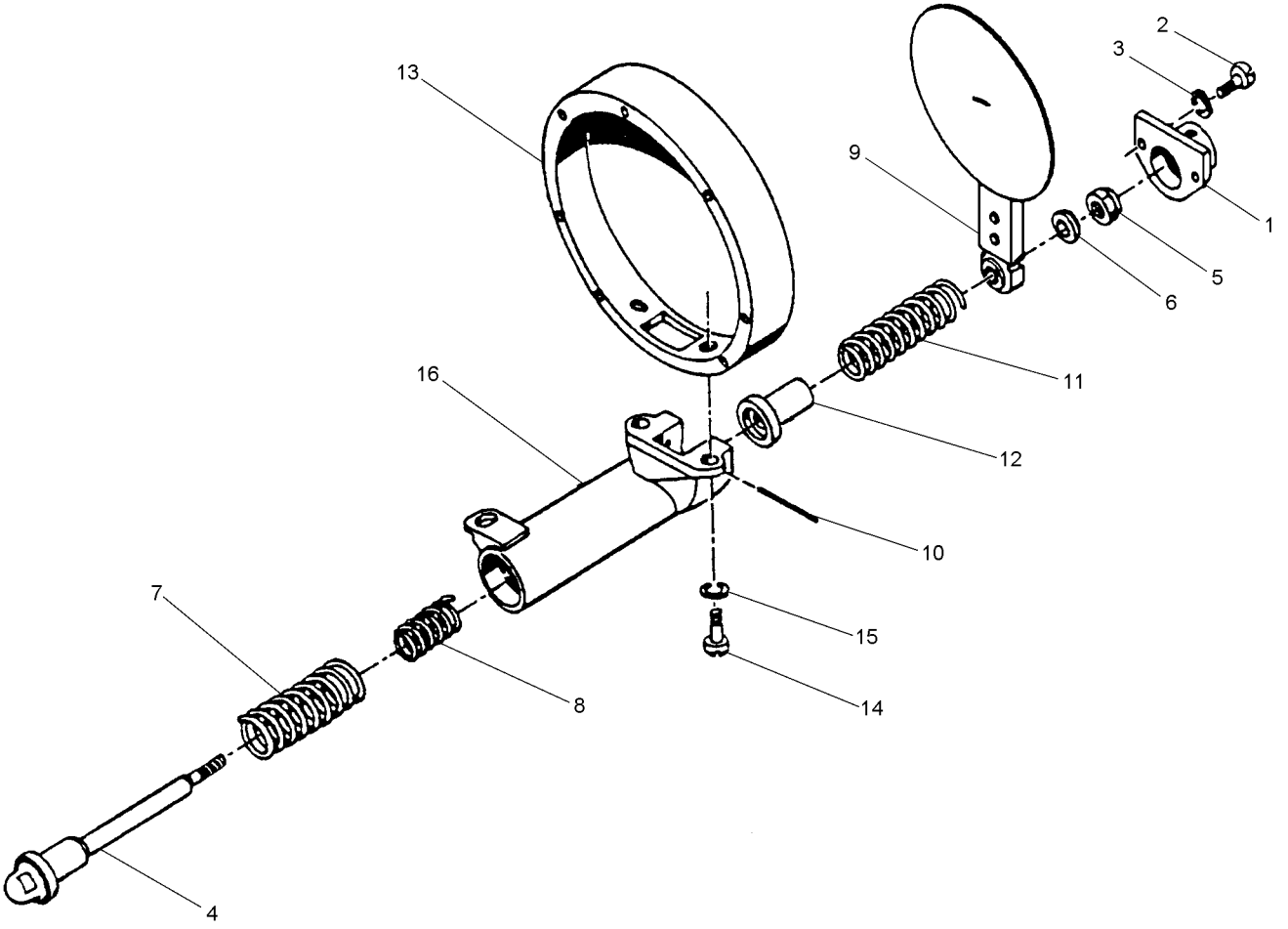

Figure 14-15. Emergency Pressure Control Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-15	14866	CONTROL ASSEMBLY, Emergency Pressure . . . . . (figure 14-11 for NHA)	REF	
-1	14868	. CAP, Emergency Pressure Control . . . . . Housing	1	
-2	MS35265-2	. SCREW (KF)	2	
-3	MS35333-35	. WASHER (KF)	2	
-4	14875	. STEM, Emergency Pressure Lever	1	
-5	16557	. NUT, Self Locking Hex (KF)	1	
-6	16479	. SWIVEL, Emergency Pressure (KF)	1	
-7	14878-1	. SPRING, Emergency Pressure Control (KF)	1	
-8	14877	. SPRING, Emergency Pressure Control . . . . . Test (KF)	1	
-9	14870	. CONTROL LEVER AND CENTER . . . . . ASSEMBLY, Emergency Pressure	1	
-10	14961	. PIN (KF)	1	
-11	14876	. SPRING, Helical Compression Emergency . . . . . Pressure (KF)	1	
-12	14874-1	. GUIDE, Emergency Pressure Spring . . . . . 0.500-Inch Long (KF)	1	
	14874-2	. GUIDE, Emergency Pressure Spring . . . . . 0.531-Inch Long (KF)	1	
	14874-3	. GUIDE, Emergency Pressure Spring . . . . . 0.546-Inch Long (KF)	1	
	14874-4	. GUIDE, Emergency Pressure Spring . . . . . 0.562-Inch Long	1	
	14874-5	. GUIDE, Emergency Pressure Spring . . . . . 0.578-Inch Long (KF)	1	
	14874-6	. GUIDE, Emergency Pressure Spring . . . . . 0.593-Inch Long	1	
	14874-7	. GUIDE, Emergency Pressure Spring . . . . . 0.662-Inch Long (KF)	1	
	14874-8	. GUIDE, Emergency Pressure Spring . . . . . 0.682-Inch Long	1	
	14874-9	. GUIDE, Emergency Pressure Spring . . . . . 0.531-Inch Long (KF)	1	
	14874-10	. GUIDE, Emergency Pressure Spring . . . . . 0.375-Inch Long	1	
-13	14869	. COVER, Second Stage Regulator	1	
-14	MS35265-13	. SCREW (KF)	2	
-15	MS35333-36	. WASHER (KF)	2	
-16	14867	. HOUSING, Emergency Pressure Control (KF) . . .	1	

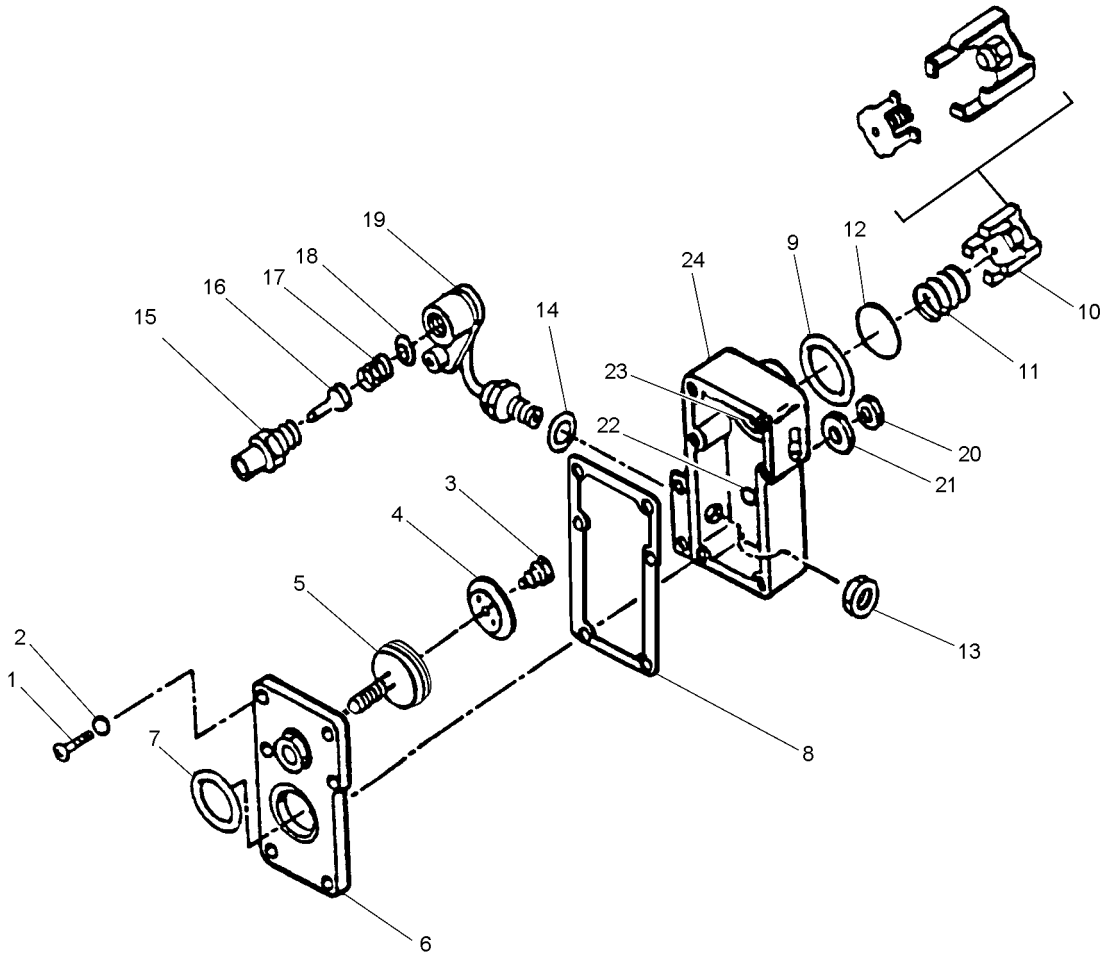

Figure 14-16. Diluter Plate Control Housing and Check Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-16	B40596-1	. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY (figure 14-11 for NHA)	REF	A, E
	905740-1	. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY (figure 14-11 for NHA)	REF	B
	19731-2	. DILUTER PLATE CONTROL HOUSING AND CHECK VALVE ASSEMBLY (figure 14-11 for NHA)	REF	C, D
	19648	. PLATE ASSEMBLY, Diluter	1	
-1	MS35206-216	. SCREW (KF)	3	
-2	MS35338-40	. WASHER (KF)	3	
-3	16284-1	. SCREW, Throttling Plate (KF)	1	
-4	19949	. PLATE, Throttling (KF)	1	C, D
-5	758632-2	. ANEROID ASSEMBLY	1	
-6	19809-2	. PLATE ASSEMBLY, Diluter Valve	1	B, C, D
-7	19977	. SEAL, Diluter (KC)	1	
-8	14921	. GASKET, Diluter Housing (KC)	1	
-9	14825-21	. PACKING, Preformed (KC)	1	
-10	11707	. RETAINER ASSEMBLY, Aneroid Check Valve (KF)	1	
-11	11706	. SPRING, Aneroid Check Valve (KF)	1	
-12	11705	. DISK, Check Valve (KC)	1	
	905741-1	. HOUSING ASSEMBLY, Diluter Control	1	A, E
	19732-1	. HOUSING ASSEMBLY, Diluter Control	1	B, C
-13	MS21044C08	. NUT	1	
-14	14909-3	. PACKING, Preformed (KC)	1	
-15	19718-2	. FITTING, Test Port	1	
-16	19704	. POPPET VALVE, Test Port	1	
-17	19703	. SPRING	1	
-18	14909-6	. PACKING, Preformed (KC)	1	
-19	19822-3	. TUBE AND ADAPTER ASSEMBLY	1	
-20	19014	. NUT, First Stage Adjusting Lock	1	B, C
-21	14830	. NUT, First Stage Adjusting	1	B, C
-22	14926	. SCREW, First Stage Adjusting	1	B, C
-23	14923	. SEAT, Diluter Valve	1	C, D
-24	19719	. HOUSING, Diluter Control	1	C, D
	905738-1	. HOUSING AND BARB ASSEMBLY, Diluter Control	1	A, B, E
	14937	ADAPTER SPRING AND SCREW ASSEMBLY (Note 1)	1	

Notes: 1. See index number 10.

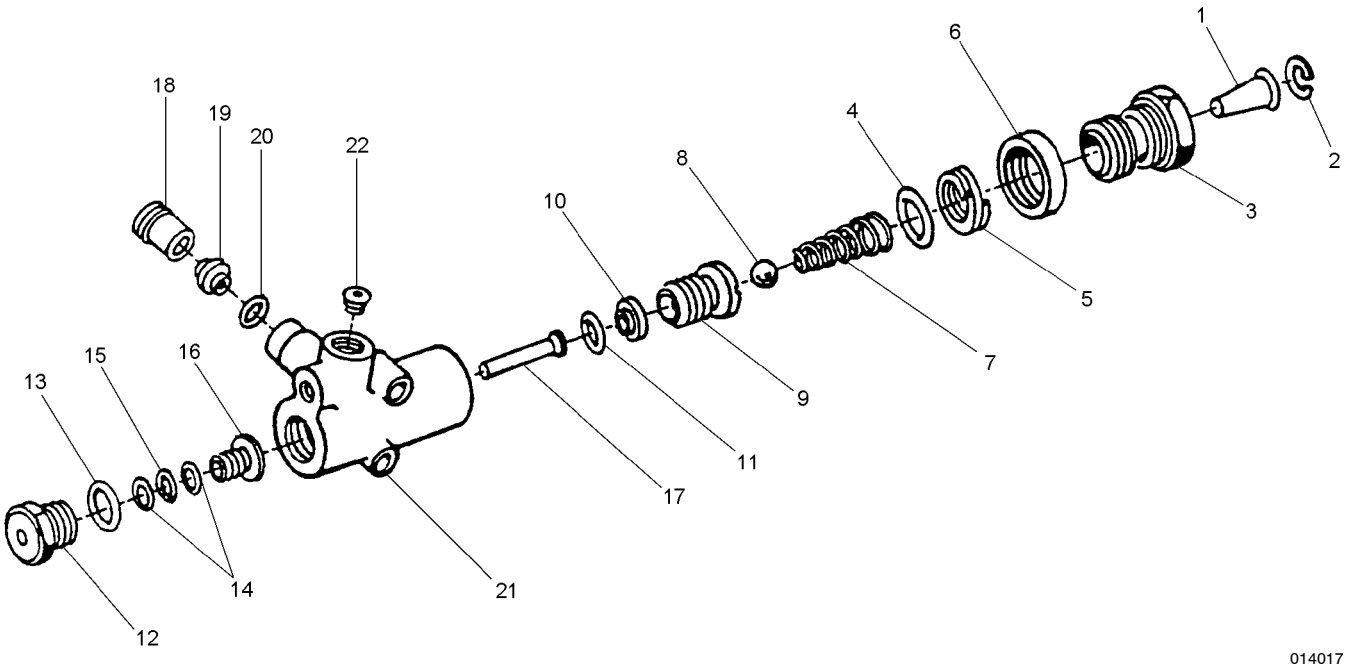

Figure 14-17. Manifold Inlet Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-17	14890-8	MANIFOLD INLET ASSEMBLY . . . . . (figure 14-11 for NHA)	REF	
-1	14898	. FILTER, Oxygen (KF)	1	
-2	0-521-72A	. RING, Retaining (KF)	1	
-3	14947	. ADAPTER, Manifold Inlet	1	
-4	14909-11	. PACKING, Preformed (KC)	1	
-5	15746	. RING, Packing Backup (KC)	1	
-6	14948	. SPACER, Locking (KF)	1	
-7	14899	. SPRING, Supply Valve Conical Compression (KF)	1	
-8	19755	. BALL, Seat (KF)	1	
-9	14900-1	. RETAINER, Inlet Supply Valve Seat (KF)	1	
-10	19753	. INLET SEAT ASSEMBLY (KF)	1	
-11	14909-5	. PACKING, Preformed (KC)	1	
-12	16798	. RETAINER, Manifold Seal	1	
-13	14825-13	. PACKING, Preformed (KC)	1	
-14	16795	. RETAINER, Packing (KC)	2	
-15	19157	. PACKING, Preformed (KC)	1	
-16	16796	. RETAINER, Manifold Valve Stem Seal	1	
-17	19754	. STEM, Inlet Supply Actuator (KF)	1	
-18	15877	. RETAINER, Inlet Valve	1	
-19	16494	. SEAT, First Stage Inlet Valve (KF)	1	
-20	14909-4	. PACKING, Preformed (KC)	1	
-21	14893-2	. MANIFOLD, Supply Inlet	1	
-22	AS140CB1	. PLUG	1	

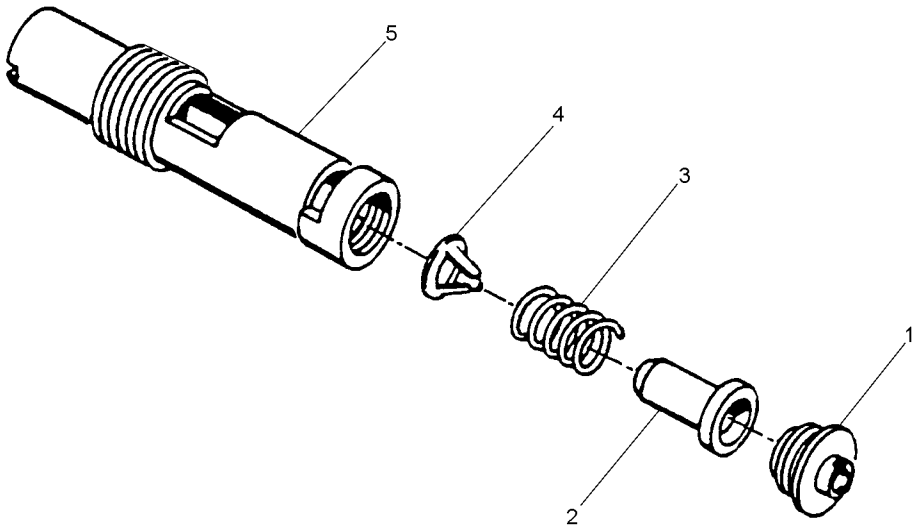

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Figure 14-18. Venturi Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
14-18	19795	VENTURI ASSEMBLY . . . . . (figure 14-11 for NHA)	REF	
-1	19812	. SEAT, Venturi (KF)	1	
-2	19797	. NOZZLE, Injector (KF)	1	
-3	PB54188-3	. SPRING, Injector (KF)	1	
-4	PB53042-1	. SPRING, Damping (KF)	1	
-5	11794	. HOUSING, Venturi	1	

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GLOSSARY

ACC. Abbreviation for Air Crew Systems Change.

AIRCREWMEMBER. An aircraft crewmember. Passengers are not considered aircrewmembers.

ANTI-SEIZE TAPE. A tape of any of several thin plastic-film materials (such as tetrafluorethylene) characterized by a waxy, oily texture, and used to prevent binding between mating surfaces of threaded parts when applied to the male threaded portion.

APPROX. Abbreviation for approximately.

ASSEMBLY. A grouping of parts fitted together to form a complete unit.

ATMOSPHERIC PRESSURE. Pressure at sea level, expressed as 14.696 pounds per square inch, absolute, or 29.92 inches mercury column (barometer). See also: PSIA and INHg.

C. Abbreviation for Celsius.

CAUTION. Indicates danger to equipment. The caution precedes the step or item to which it refers.

CDI. Abbreviation for collateral duty inspector.

CCM. Abbreviation for cubic centimeters per minute.

CO_2. Abbreviation for carbon dioxide.

COMBUSTIBLE MATERIAL/SUBSTANCE. Any material or substance capable of burning in the presence of oxygen. See also: EXPLOSIVE MIXTURE, FLAMMABLE MATERIAL.

COML. Abbreviation for commercial. Refers to parts that are commercially available.

COMPONENT. Item of equipment making up part of an assembly or subassembly.

CONFIGURATION. The makeup, size, shape, and relative location of parts of an item of equipment and its accessories. This includes the composition of the materials as well as marking details. The configuration of each equipment is specified by Government drawings, military specifications and modification instructions.

CONVOLUTION. Used in this manual as the protruding side or portion of a diaphragm.

DETAIL PART. See COMPONENT.

DIA. Abbreviation for diameter.

DISPOSITION. Instructions on what is to be done with or to an item.

ELASTOMER. Any of various elastic substances resembling rubber.

ENSURE. To inspect closely, and to test the condition of an item.

EXAMINE. To inspect closely, and to test the condition of an item.

EXPLOSIVE MIXTURE. Any mixture of a combustible material or substance and oxygen capable of violent burning (detonation) either spontaneously or with the external application of heat. See also: COMBUSTIBLE MATERIAL/SUBSTANCE, FLAMMABLE MATERIAL.

F. Abbreviation for Fahrenheit.

FLAMMABLE MATERIAL. Any material capable of being easily ignited and of burning with extreme rapidity.

FLAP PATTERN. See TEMPLATE.

FLUID. Gas, vapor, or liquid.

FREEZING POINT. Temperature at which a given liquid substance will solidify or freeze upon removal of heat. Freezing point of water is 32°F (0°C).

FULL. (In reference to oxygen cylinders) A full oxygen cylinder is a cylinder which is pressurized to its rated pressure. With respect to a high pressure oxygen cylinder. 1800 psig is considered full.

FUNCTIONAL TEST. A test which puts an item to use to determine if it operates properly.

GAPL. Abbreviation for Group Assembly Parts List. The GAPL, a section of the Illustrated Parts Breakdown, shows how major assemblies are disassembled into assemblies and detail parts.

HEAT EXCHANGER. Apparatus in which heat is exchanged from one fluid to another.

H_2O. Abbreviation for water.

Hg. Abbreviation for mercury.

IN. Abbreviation for inches.

IND. Abbreviation for indicated.

INH_2O. Abbreviation for inches of water column (27.68 inH_2O equals 1.0 PSI equals 2.036 inHg). See Also: INHg.

INHg. Abbreviation for inches of mercury column (0.07349 inHg equals 1.0 inH_2O). See also: INH_2O.

INSPECTION. A close examination for damage, wear and dirt. Also, a regularly scheduled examination of oxygen equipment and accessories.

LBS. Abbreviation for pounds.

LOX. Abbreviation for liquid oxygen.

LPM. Abbreviation for liters per minute.

MANUFACTURER'S CODES. Identification codes for every manufacturer listed as a procurement source in accordance with cataloging handbooks H4/H8, Commercial and Government Entity Codes.

MM. Abbreviation for millimeters.

MOLECULAR SIEVE. A cannister containing a nitrogen-absorbing chemical compound (zeolite) through which air is forced, providing enriched breathing oxygen.

NOC. Abbreviation for Navy Oxygen Cleaner.

NOTE. An informative item. The note may precede or follow the step or item to which it refers.

NUMERICAL INDEX. A part of the Illustrated Parts Breakdown. The numerical index includes all the part numbers listed in the GAPL, arranged in alphabetical-numerical sequence.

OBOGS. Abbreviation for Onboard Oxygen Generating System.

OEAS. Abbreviation for Oxygen Enriched Air System.

PRESSURE. The force exerted by a liquid or gas per unit of area on the walls of a container. See also: PSI, PSIA, and ATMOSPHERIC PRESSURE.

PRESSURE DROP. Loss in pressure, as from one end of a distribution line to the other, due to friction and other factors.

PRESSURE EXPLOSION. Explosion caused by rapid conversion of liquid oxygen to gaseous oxygen in a confined space due to evaporation and warming.

PROPER. Correct or authorized configuration or method.

PSI. Abbreviation for pounds per square inch. See also: PSIA and PSIG.

PSIA. Abbreviation for pounds per square inch, absolute. Absolute pressure is measured from absolute zero (100% vacuum), rather than from normal, or atmospheric pressure. It equals gage pressure plus 14.696 pounds per square inch. See also: PSI, PSIG, and ATMOSPHERIC PRESSURE.

PSIG. Abbreviation for pounds per square inch, gage. Indicates pressure above ambient pressure, as indicated on a pressure gage vented to the atmosphere. See also: PSI and PSIA.

QA. Abbreviation for quality assurance.

QUALIFIED PERSONNEL. Qualified personnel are defined as personnel who have satisfactorily completed a prescribed course at a Navy Training School Fleet Readiness Aviation Maintenance Personnel Training Program (AMP), Inter Service/Factory Training, formal or informal In-Service Training (refer to OPNAVINST 4790.2 Series). In addition, a practical demonstration of the skills acquired in any of the foregoing training situations, to the satisfaction of the Work Center Supervisor/Division Officer is required before the designation "Qualified" can be assigned.

R. Abbreviation for radius.

REFILL. (In reference to oxygen cylinders) To refill is to recharge a cylinder, regardless of the residual pressure remaining within the cylinder.

REPAIRS, MAJOR. Repairs requiring special equipment, personnel, or materials normally not available at intermediate or local levels of maintenance.

REPAIRS, MINOR. Repairs that can be effected at intermediate or local levels of maintenance.

REF. Abbreviation for reference.

SM&R CODES. Abbreviation for source, maintenance, and recoverability codes. Comprised of three parts, a two-position source code, a two-position maintenance code, and a one-position recoverability code. Refer to NAVSUPINST 4423.29 for further details.

SPECIFIC GRAVITY. Density of fluid compared to density of water.

TEMPLATE. A pattern or gage usually in the form of a thin plate of cardboard, wood, or metal. It is used as a guide in the layout or cutting of flat work.

TORQUE. A force, or combination of forces, that tend to produce a rotating or twisting motion. Torque is often expressed pounds-inch (lbs-in.) or pounds-foot (lbs-ft.). A torque wrench is used to apply a measured torque.

TYP. Abbreviation for typical.

WARNING. Indicates danger to personnel. The warning precedes the step or item to which it refers.

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