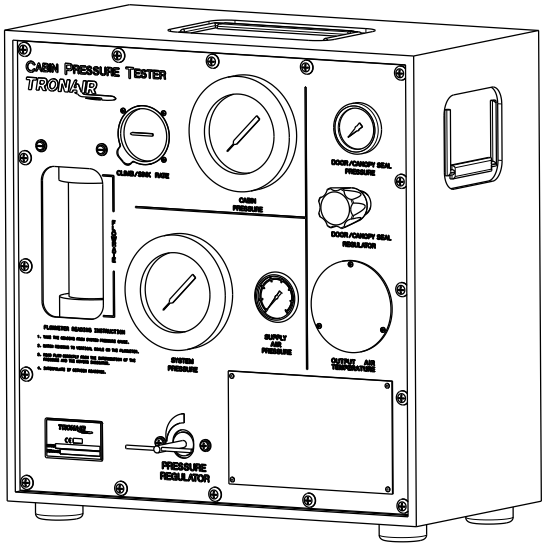
OPERATION & SERVICE MANUAL



Model: 15-7609-6000-FJ
Cabin Pressure Tester
(Compressed Air Operated)

CE

05/2023 – Rev. 04

For Spare Parts, Operations & Service Manuals or Service Needs
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REVISION	DATE	TEXT AFFECTED
01	11/2022	Original release
02	01/2023	Modified 5.3.1 Before Connection to Aircraft
03	03/2023	Modified 5.3.1 Before Connection to Aircraft, 6.1.1.a Compressed Air, 6.3.6 Filter/Separator, 10.1 Description of Equipment and Parts Lists
04	05/2023	Modified Parts Lists

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1.0 PRODUCT INFORMATION

1.1 DESCRIPTION

Cabin Pressure Tester

1.2 MODEL & SERIAL NUMBER

Reference nameplate on unit

1.3 MANUFACTURER

TRONAIR, Inc.
1 Air Cargo Pkwy East
Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301
Fax: (419) 867-0634
E-mail: sales@tronair.com
Website: www.tronair.com

1.4 FUNCTION

The Cabin Pressure Tester utilizes an external compressed air source (not included) to provide a controllable air supply for the pressurization of aircraft cabin for the purpose of cabin leakage testing, and/or outflow valve tests.

Continuous duty air supply of 110 cfm @ 100 psi (6.9 bar) minimum, (150 psi max) to operate this unit

This Cabin Pressure Tester is to be operated only by qualified trained technicians.

The technicians must be familiar with the operation of the unit before attempting to use.

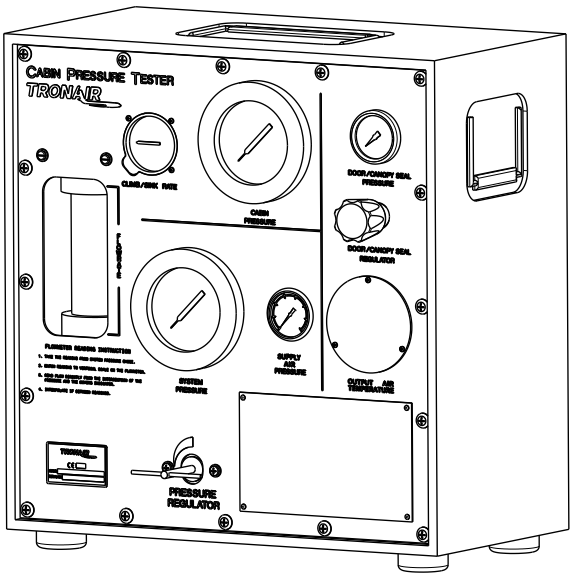
1.5 RELEVANT STANDARDS

a. The Cabin Pressure Tester has been designed to comply with the following directives:
   - 89/392/EEC: Machinery Directive

b. The following standards were used as guides to design the Cabin Pressure Tester:
   - EN ISO 12100-1
   - BS EN 983:1996
   - BS EN 1050:1997
   - prEC 1915-1:1995

1.6 OVERVIEW

See illustration



2.0 SAFETY INFORMATION

2.1 USAGE AND SAFETY INFORMATION

To insure safe operations please read the following statements and understand their meaning. Also refer to your equipment manufacturer's manual for other important safety information. This manual contains safety precautions which are explained below. Please read carefully.

WARNING!
Warning is used to indicate the presence of a hazard that can cause ***severe personal injury, death, and/or substantial property damage*** if the Warning Notice is ignored.

CAUTION!
Caution is used to indicate the presence of a hazard, which will or can cause ***minor personal injury or property damage*** is the Caution Notice is ignored.

2.2 EXPLANATION OF WARNING AND DANGER SIGNS

Misuse of machine can cause personal injury and/or property damage.

Operation of the Cabin Pressure Tester must be in accordance with this manual, and the airframe manufacturer's instructions

WARNING! Warning is used to indicate the presence of a hazard that ***can cause severe personal injury, death, and/or substantial property damage*** if the warning notice is ignored.

2.3 COMPONENT SAFETY FEATURES

Safety Valve stops flow of air to aircraft when cabin pressure reaches 13.25-13.75 psi (0.91-0.95 bar).

2.4 FUNCTIONAL SAFETY FEATURES

The Safety Valve is operated by a pilot signal supplied by an air switch. The air switch senses actual cabin pressure. When the cabin pressure set point is reached, the air switch sends full pressure pilot air to the safety valve, causing the valve to shift, and stop the flow of air to the aircraft. When cabin pressure drops below the set point, the safety valve will open, allowing air to flow into the cabin again.

2.5 STOPPING AIRFLOW TO CABIN

To stop the flow of air to the aircraft cabin, close the supply air in shut-off ball valve.

2.6 PERSONAL PROTECTIVE EQUIPMENT

Operators must use personal protective equipment in accordance with their employer's requirements.

2.7 CONDITIONS FOR SAFE USE

- Recommended Ambient Temperature Range: 32° to 90° F (0° to 32° C).

2.8 TECHNICAL EXPERTISE

- Connection of compressed air supply to this device is to be performed in accordance with all applicable regulations.
- This machine is to be used by skilled and trained aircraft technicians in accordance with this manual, and the airframe manufacturer's instructions.
- This machine is to be maintained by qualified maintenance personnel.

2.9 ADDITIONAL SAFETY INFORMATION

Always ensure **Shut-Off Ball-Valve** is closed, the **Airflow** control valve handle is turned fully counter-clockwise (no pressure), and **Door Seal Regulator** knob is turned fully counter-clockwise (no pressure), **before** connecting compressed air supply to the Cabin Pressure Tester.

CAUTION

- **ALWAYS follow the airframe manufacturer's instructions when pressurizing an aircraft.**
- **NEVER open any aircraft door or access panel while there is any pressure within the cabin.**
- **ALWAYS use applicable safety equipment required for aircraft pressurization tests.**

3.0 TRAINING

3.1 TRAINING REQUIREMENTS

- Cabin Pressure Tester operators **must** be properly trained in all aspects of aircraft cabin pressurization tests.
- It is the employer's responsibility to ensure that the operator is qualified to perform aircraft cabin pressurization and testing.
- This Cabin Pressure Tester Operation and Maintenance Manual does not provide qualified training to perform aircraft cabin pressurization and testing.

3.2 TRAINING PROGRAMS, MANUALS, METHODS, SUPERVISORS, AND OPERATORS

- Tronair does not provide training materials beyond the scope of this manual.
- It is the employer's responsibility to provide any training requirements beyond the scope of this manual.

4.0 ASSEMBLY

The Cabin Pressure Tester is shipped complete and ready to use, however all fasteners and hose connections should be checked for tightness prior to use.

5.0 INSTALLATION

5.1 INSTALLATION REQUIREMENTS

5.1.1 Compressed Air Connection

Compressed air must be supplied to the Cabin Pressure Tester. The connection is located on the back panel of the machine, and is labeled as SUPPLY AIR IN.
Maximum pressure..... 150 psi (10.3 bar)
Connection size..... Chicago Fitting, 1 in JIC 37º male fitting
Supply Line size ..... 1 in, 50 ft supplied
Airflow Recommendations..... 110 SCFM @ 100 psi

5.1.2 Safety Valve

The Safety Valve is factory set at 13.25-13.75 psi (0.91-0.95 bar). The air switch that controls this valve can be adjusted to a lower setting if required.

5.2 PERSONNEL REQUIREMENTS (TECHNICAL EXPERTISE) FOR INSTALLATION

5.2.1 Air Supply Connections

Air supply connections are to be made by qualified personnel per all applicable codes and regulations.

5.3 INSPECTION AND TESTING PROCEDURE ON INSTALLATION

5.3.1 Before Connection to Aircraft

- Do not connect any hoses to the aircraft.
- Ensure that the Pressure Regulator and the Door/Canopy Seal Regulator are set at minimum pressure setting (handles/knob turned fully counter-clockwise).
- Connect the compressed air supply to the Cabin Pressure Tester.
- Drain all fluids from supplied air system.

WARNING!

Purge air supply of free water before use.

- With the supply air to aircraft hose closed, slowly turn the handle on the Pressure Regulator, and verify that the system pressure increases as the handle is turned clockwise, and decreases as the handle is turned counter-clockwise.
- Remove all system pressure by turning the Pressure Regulator handle fully counter-clockwise until system pressure reads 0 psi.
- Slowly rotate the **Door/Canopy Seal Regulator** knob clockwise.
- Verify that air is flowing from **Regulated Air (To Aircraft)** connection on control panel.
- Slowly rotate the **Door/Canopy Seal Regulator** knob counter-clockwise.
- Verify that the air stops flowing from **Regulated Air (To Aircraft)** connection on control panel.

6.0 OPERATION

6.1 OPERATING PARAMETERS

The user must ***always*** follow the aircraft manufacturer's instructions regarding aircraft cabin pressurization procedures and pressure levels. It is mandatory that the operators read, and understand, this manual and the aircraft maintenance manual prior to using this equipment. For steps relating to test procedures on specific aircraft, reference the following:

Aircraft	Appendices	Kit
F-16	Appendix I	K-4943 Sensing Adapter Hose
		K-4946 Supply Hose Adapter

WARNING!

The operator must be familiar with <u>ALL</u> sections of this manual prior to use on aircraft.

WARNING!

To prevent personal Injury and/or damage to aircraft:

1. **ALWAYS follow aircraft manual procedures for aircraft pressurization.**
2. **NEVER exceed specified aircraft pressure levels.**
3. **NEVER operate this Cabin Pressure Tester prior to reading this manual.**
4. **NEVER open any aircraft cabin door or access panel if there is any pressure in the cabin.**
5. **ALWAYS use applicable safety equipment required for aircraft pressurization tests.**

6.1.1 General

This aircraft Cabin Pressure Tester is a pneumatic device and as such follows the laws of compressible fluids. The operator should be aware of the following information.

6.1.1.a Compressed Air

As air is compressed, a tremendous amount of energy is stored. This is similar to the energy stored in a coil spring when compressed. **Under no circumstances** is the aircraft canopy to be opened if there is any pressure at all in the aircraft above atmospheric pressure.

As an example, the force produced on an aircraft door two (2) feet (0.61 cm) wide by five (5) feet (152.4 cm) high with only one (1) psig (0.7 bar) is equal to 1,440 lbs (653 kg).

6.2 NUMERICAL VALUES AND LIMITS

6.2.1 General

Max Shop Air Supply Pressure .....150 psi (10.3 bar)
Pressure Range .....0 – 15 psi (0 – 1.03 bar)
Cabin Pressure Gauge.....0 – 15 psi (0 – 1.03 bar) 0.5% accuracy
System Pressure Gauge .....0 – 30 psi (0-2.0 bar) 0.5% accuracy
Door Seal Pressure Gauge .....0 – 120 psi (0-8.0 bar) 2% accuracy
Measurable Flow Range .....10-109 scfm (reference Appendix XII)
Maximum Flow.....109 scfm
Safety Valve setting.....13.25-13.75 psi (0.91-0.95 bar)
Calibrated Flowmeter .....Standard

6.2.2 Dimensions

Overall.....25¼ in x 21 in x 25¼ in (64 cm x 53 cm x 64 cm)
Cabin Supply Hose.....1½ in (3.8 cm) diameter x 20 ft (6 m) long
Cabin Sensor Feedback Hose .....¼ in (0.6 cm) diameter x 20 ft (6 m) long (red)
Door/Canopy Seal Supply Hose.....¼ in (0.6 cm) diameter x 20 ft (6 m) long (gray)
Weight.....239 lbs (108 kg)

6.2.3 Instrumentation

6.2.3.a Aircraft Cabin Data

Cabin Pressure Gauge.....0 – 15 psi (0 – 1.03 bar)
Climb/Sink Rate .....0 – 6,000 ft/min (0 – 1,829 m/min)

6.2.3.b Airflow Measurement Data

Flowrate Indicator.....10-115 scfm

6.2.3.c Door Seal Regulator

Pressure Gauge .....0 – 120 psi (0 – 8.0 bar)

6.3 FEATURES

6.3.1 Cabin Air Supply

The Cabin Pressure Tester uses an external compressed air supply to provide a source of clean, low-pressure air. As shown in the Pneumatic System Schematic, compressed air is supplied to a filter/separator, then to a high flow precision regulator. Regulated air is then passed through the safety valve, the Flowrate Indicator, and then out to the aircraft cabin.

6.3.2 Pressure Regulator

This is the pressure regulating valve used to supply air to the cabin. The valve handle must be fully turned counter-clockwise prior to connecting either the supply hose to the aircraft, opening the shut-off valve or connecting compressed air to the Cabin Pressure Tester.

This valve reduces the supply pressure (150 psi maximum) to 0 psi with the handle turned fully out (counter-clockwise). As this handle is slowly turned in clockwise, the valve will allow enough air to pass to raise the pressure downstream of the valve to the pressure set by the handle. The handle bears down on a pressure control bias spring contained within the control valve. Ultimately, it is the force generated by this spring, adjusted by the handle that determines the pressure downstream of the control valve.

6.3.3 Aircraft Cabin Instrumentation

Instruments are provided to measure the cabin pressure and rate of climb or descent inside the cabin.

6.3.4 Airflow Measurement

The Cabin Pressure Tester is equipped with an inline, variable orifice, multi-pressure flowmeter to determine leakage Flowrate.

Flow is read by first finding the “system pressure” displayed on the system pressure gauge, then match the pressure to a vertical scale on the flowmeter.

The leakage flowrate (SCFM) is read directly from the intersection of the pressure and the moving indicator. Interpolate if between readings.

6.3.5 Door Seal Regulator

The Cabin Pressure Tester is equipped with a regulator and pressure gauge for the purpose of supplying regulated air to the aircraft door/canopy seals.

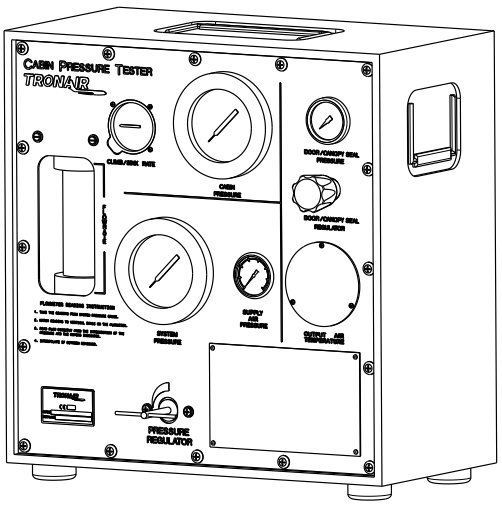
The valve knob must be fully turned counter-clockwise prior to connecting either the supply hose to the aircraft, or connecting compressed air to the Cabin Pressure Tester.

6.3.6 Filter/Separator

A Filter/Separator, equipped with a 40 micron filter element, is provided to remove dirt, water, and oil from the supplied air.

6.3.7 Additional Features

- Retractable towing handle
- CE Marked (Machinery Directive)
- Safety Valve



6.4 LOCATION AND LAYOUT OF CONTROLS

6.4.1 Instrument Panel

See illustration

6.4.2 Description of Controls

6.4.2.a Pressure Regulator

- Regulator - controls the flow of air into the aircraft cabin.

6.4.2.b Door/Canopy Seal Regulator

- Regulator – provides for supply of air to aircraft door and canopy seals.

6.4.2.c Shut-off Valve Located on the Cabin Supply Hose

- Ball valve – provides a means to stop the flow of air into the aircraft cabin.

6.4.2.d Aircraft Cabin Data

- Cabin Pressure Gauge – indicates air pressure inside aircraft cabin.
- Climb/Sink Rate – This is a Vertical Speed Indicator that displays the rate of climb or descent (rate of pressure change) inside the aircraft cabin in ft/min.

6.4.2.e Flowrate Indicator

- A direct acting, direct reading, multi-pressure flowmeter calibrated in scfm.

6.4.3 Connection Locations

- Aircraft Cabin Supply Air – Cabin Supply Hose from unit to aircraft.
- Aircraft Cabin Sensor Line – Feedback connection to aircraft.
- Shop Air In – Connection to facilities compressed air supply.
- Regulated Air (to Aircraft) – Regulated air supply for aircraft door seals.

6.5 PREPARATION PRIOR TO FIRST USE

1. Always ensure that **Shut-Off Ball-Valve** is closed, the **Pressure Regulator** control valve handle is turned fully counter-clockwise (no pressure), and **Door Seal Regulator** knob is turned fully counter-clockwise (no pressure), **before** connecting compressed air supply to the Cabin Pressure Tester.
2. Visually inspect the Cabin Pressure Tester for loose fasteners, shipping damage, loose internal air connections, etc. Repair any faults found.

6.6 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment must be used in accordance with employer's instructions, and local and federal regulations.

6.7 CHECKS PRIOR TO START UP

1. Reduce airflow thru Pressure Regulator by rotating handle fully counter-clockwise.
2. Reduce airflow thru Door Seal Regulator by rotating knob fully counter-clockwise.
3. Close ball valve.
4. Connect compressed air supply to "Supply Air In" connection.

6.8 GENERAL START UP PROCEDURE (NOT AIRCRAFT SPECIFIC)

CAUTION!

To prevent personal injury and/or damage to aircraft:

- **ALWAYS follow aircraft manual procedures for aircraft pressurization.**
- **NEVER exceed specified aircraft pressure levels.**
- **NEVER operate this Cabin Pressure Tester prior to reading this manual.**
- **NEVER open ANY aircraft cabin door or access panel if there is any pressure in the cabin.**
- **ALWAYS use applicable safety equipment required for aircraft pressurization tests.**

1. The Cabin Pressure Tester must be operated with the flowrate indicator vertical, as shown in section 7.4.1 Illustration.
2. Ensure that steps in section 7.7 have been completed.
3. Connect hoses from Cabin Pressure Tester to aircraft. (Adapter kits may be required for aircraft connection – See Appendix I.)
4. Connect air source to the back of the pressure test unit. Verify adequate shop air supply source pressure.

6.9 OPERATING PROCEDURES

6.9.1 Basic Operation

Follow aircraft manufacturer's instructions on cabin pressurization. See Appendices for more detailed instructions.

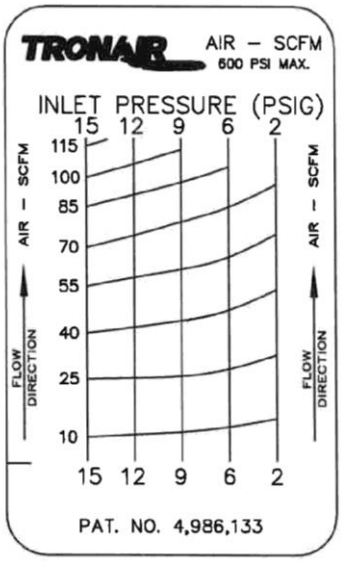
6.9.1.a Cabin Pressurization

1. Secure the aircraft per aircraft manufacturer's instructions and/or pertinent guidelines.
2. Slowly inflate door/canopy seals, using the Door/Canopy Seal Regulator to required pressure.
3. Ensure that the Pressure Regulator is set to zero pressure by turning handle fully counter-clockwise.
4. Slowly rotate the handle on the Pressure Regulator clockwise to begin increasing the pressure inside the aircraft cabin never exceeding 3 ft/min. as read on the climb/sink rate indicator.

Note As pressure is increased the climb/sink vertical speed indicator will show a negative (-) sink rate, As the pressure decreased the climb/sink vertical speed indicator will show a positive (+) climb rate.

WARNING!

Do not exceed the maximum rate of descent specified by the aircraft manufacturer.



5. As the cabin pressure approaches the test pressure specified by the aircraft manufacturer, begin reducing the rate of pressure increase by turning the Pressure Regulator counter-clockwise.
6. When the specified cabin test pressure has been reached, adjust the Pressure Regulator as required to maintain the test pressure, and to achieve a Climb/Descent Rate equal to 0 ft/min.

WARNING!

Do not exceed the maximum cabin pressure specified by aircraft manufacturer.

7. Read the system pressure display on the "system pressure" gauge.
8. Match the system pressure to a vertical scale on the flowmeter.
9. The leakage flowrate (SCFM) is read directly from the intersection of the pressure and the moving indicator. Interpolate if between readings (see scale to right).

6.9.1.b Cabin Pressure Tester Safety Valve Operation

The Cabin Pressure Tester is equipped with a safety valve system consisting of two pilot operated two-way, two position valves. The first valve is normally closed, and is called an air switch. It receives its pilot signal from the cabin pressure. The air switch has an adjustable bias spring which controls the amount of pilot pressure required to shift the valve. When this valve shifts, it directs full supply pressure to the pilot port on the safety valve. The safety valve is normally open, and is connected in line with the main air circuit, immediately upstream from the Pressure Regulator. When the air switch shifts and sends pressure to the safety valve pilot port, the safety valve shifts, and stops the flow of air into the aircraft. **Once the pressure inside the aircraft drops below the set point of the air switch, the safety valve will re-open automatically and allow air to flow into the aircraft cabin.**

6.9.1.c Stopping Airflow to Cabin

To stop the flow of air into the cabin, adjust Pressure Regulator to minimum setting (fully counterclockwise).

6.9.1.d Cabin Depressurization

Follow aircraft manufacturer's instructions on cabin pressurization. See Appendices for more detailed instructions.

1. Slowly turn the Pressure Regulator counter-clockwise to reduce the pressure inside the cabin never exceeding 3 ft/min.

WARNING!

Do not exceed the maximum Climb/Descent rate specified by the aircraft manufacturer.

2. After the Pressure Regulator has reached its full open position, close the ball valve.
3. Any remaining pressure inside the cabin will bleed off naturally.

WARNING!

NEVER open ANY aircraft cabin door or access panel if there is any pressure in the cabin.

6.9.2 General Plan

In general, aircraft cabin leakage testing should be done as follows:

a. Using the Cabin Pressure Tester, establish aircraft leakage rate.
b. Compare the leakage rate (scfm) to the aircraft manufacturer's specification.
c. Repair leaks, starting with major leaks first. Use low-pressure air, 1 – 2 psi (0.07 – 0.14 bar) to find leaks.
d. After repair, using the Cabin Pressure Tester again, determine the new leakage rate (scfm) and compare to aircraft specification.
e. Repeat steps c and d above until the cabin leakage rate meets or is less than that required by the aircraft manufacturer's specifications.

6.9.3 Test Methods

Two different test methods are generally specified by aircraft manufacturers to determine aircraft cabin leakage rates:

a. Flow measurement method
b. Pressure decay method

The following paragraphs explain each of the above methods.

CAUTION!

To prevent personal injury and/or damage to the aircraft, always follow the aircraft manufacturer's instructions for pressurizing aircraft.

a. Flow Measurement:

— The Flow Measurement method measures the rate of air leakage from the aircraft cabin in scfm.
— Pressurize the aircraft cabin to the required test pressure. Stabilize the cabin pressure, ensuring a 0 Climb/Descent Rate.
— Read the leakage from the Flowrate indicator. The basic procedure for this test method is given in Appendix III.

b. Pressure Decay Method:

The Pressure Decay method determines cabin air leakage by measuring the time required for the Cabin pressure to drop from a set pressure to a lower pressure. The time is normally measured in seconds. A stopwatch readable in 1/10 of a second may be used for this test. The basic procedure for this test method is given in Appendix IV.

6.9.4 Aircraft Leakage

Aircraft Cabins generally leak in the following areas:

- Door seals
- Outflow valves and valve gaskets
- Safety valves and valve gaskets
- Pneumatic air line connections
- Control cable seals in pressure bulkheads
- Electrical wiring bundles through pressure bulkheads
- Window seals
- Fuselage rivets and overlapping fuselage panels

6.9.5 Locating Aircraft Cabin Leaks

a. It does not require high-pressure air to find leakage points in the aircraft cabin. Whenever possible, all leakage investigations should be performed at aircraft cabin pressures of between 1 and 2 psig (0.07 – 0.14 kg/sq cm).
b. Non-audible leaks can be found by spraying the aircraft exterior with a soap and water solution. Leaks are revealed by the bubbles generated and can be marked with a colored grease pencil for later correction.

6.10 STOPPING PROCEDURES

a. To stop the output of the Cabin Pressure Tester, close the shut-off valve.
b. Drain the filter bowl after each use.

CAUTION!

Disconnecting the Supply Air In without shutting the ball valve may cause rapid depressurization of the aircraft.

6.11 EMERGENCY STOPPING PROCEDURES

If The Aircraft Is Not Pressurized
Close the shut-off valve

If The Aircraft Is Pressurized
Close the shut-off valve

7.0 PACKAGING AND STORAGE

7.1 PACKAGING REQUIREMENTS

Packaging for shipment should include a suitable pallet with surrounding crating, or container to prevent damage to unit. The machine should be securely strapped to the pallet.

7.2 METHODS OF HANDLING

The Cabin Pressure Tester can be rolled freely by hand by using the retractable handle. Recessed handles are provided for manual lifting. Consult OSHA and employer's limitations for maximum weight to be lifted by manual means.

No provisions for lifting by overhead crane are provided.

7.3 STORAGE

The Cabin Pressure Tester should be stored indoors.

7.4 STORAGE SPACE AND HANDLING FACILITIES

Minimum: 25 ¼ x 25 ¼ x 22 in (64 cm x 64 cm x 55 cm)
No specific handling facilities are required.

8.0 TRANSPORTATION

8.1 HANDLING POINTS

- Wheels and a telescoping handle are provided for manual movement.
- Recessed handles are provided on the sides of the case for manual or machine lifting.
- No other handling points are provided.

8.2 WEIGHT

15-7609-6000-FJ..... 239 lbs (108 kg)

9.0 TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	REMEDY
Cannot build required cabin air pressure – Flow HIGH – Cabin Pressure Tester Pressure LOWER	Excessive cabin leakage	Assure all aircraft inspection panels in place
		Assure door seal inflated
		Assure aircraft cabin air controls are properly set Check outflow and safety valves
Cannot build required cabin air pressure – Flow LOWER – CPU Pressure HIGH	Back pressure loss in aircraft system	Assure aircraft cabin air controls are set properly
		Common on aircraft where CPU air enters upstream of aircraft mass air flow valve. Re-plumb downstream of aircraft mass air flow valve
Low Cabin Pressure Tester output pressure and/or flow	Clogged filter	Drain and/or replace

10.0 MAINTENANCE

10.1 DESCRIPTION OF EQUIPMENT

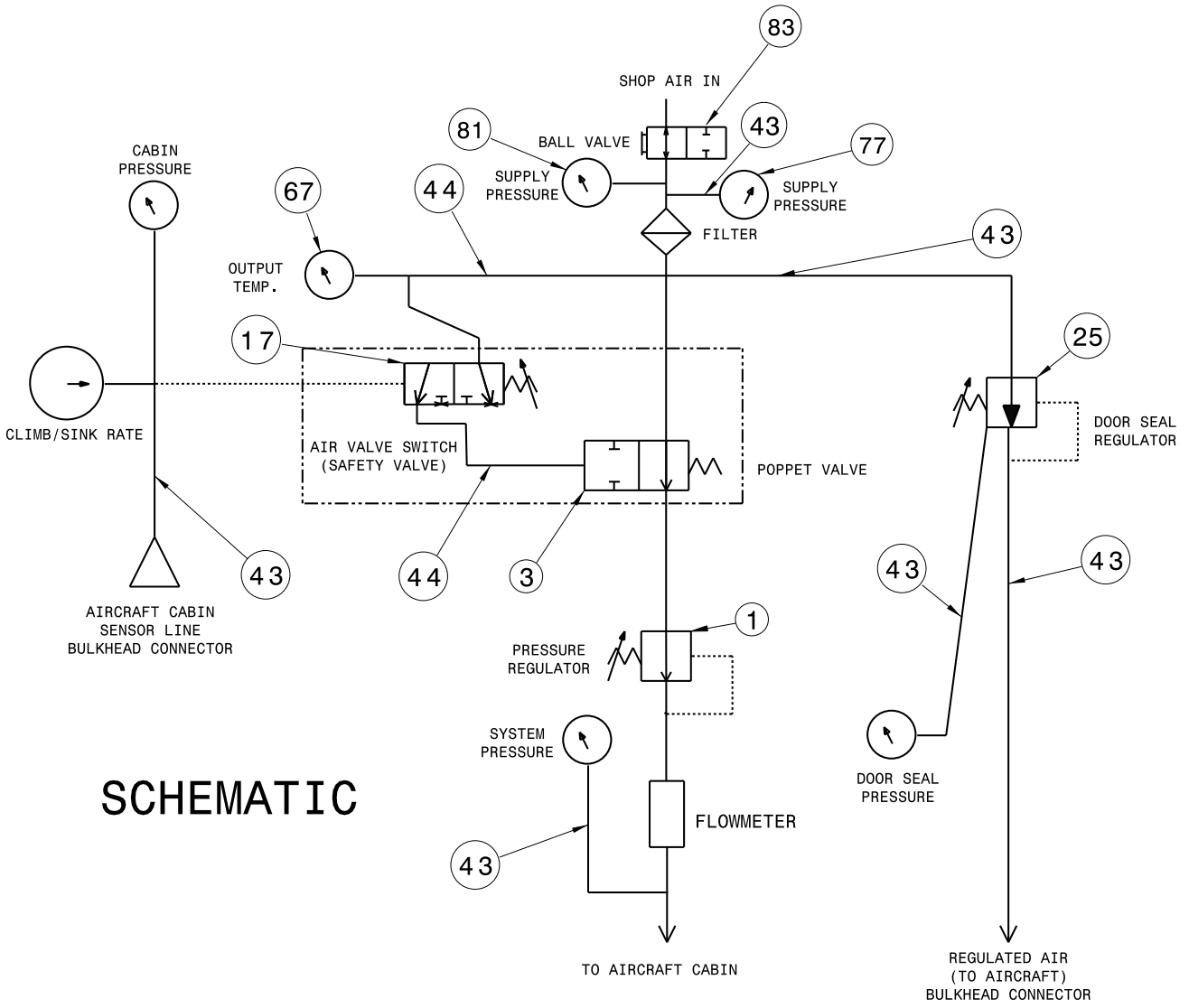
- Filter –Filter Separator with manual drain.
- Pressure Regulator – High flow precision pressure regulator.
- Poppet Valve – two-way, two-position pilot operated internal return (slaved by Safety Valve Air Switch).
- Safety Valve Air Switch – two-way, two-position pilot operated adjustable spring return (senses cabin pressure).
- Flowrate Indicator – variable orifice flowmeter 5% accuracy.

10.2 DESCRIPTION OF PNEUMATIC PROTECTION SYSTEMS

10.2.1 Safety Valve System

- The Cabin Pressure Tester is equipped with a safety valve system consisting of two pilot operated two-way, two position valves. The first valve is normally closed, and is called an air switch. It receives its pilot signal from the cabin pressure. The air switch has an adjustable bias spring which controls the amount of pilot pressure required to shift the valve. When this valve shifts, it directs full supply pressure to the pilot port on the safety valve. The safety valve is normally open, and is connected in line with the main air circuit, immediately upstream from the pressure regulator. When the air switch shifts and sends pressure to the safety valve pilot port, the safety valve shifts, and stops the flow of air into the aircraft. **Once the pressure inside the aircraft drops below the set point of the air switch, the safety valve will re-open automatically and allow air to flow into the aircraft cabin.**
- **DO NOT adjust the air switch.**
- If required, the set point on the air switch may be adjusted to a lower pressure; however Tronair Engineering Department must be contacted for approval and instructions prior to this adjustment.

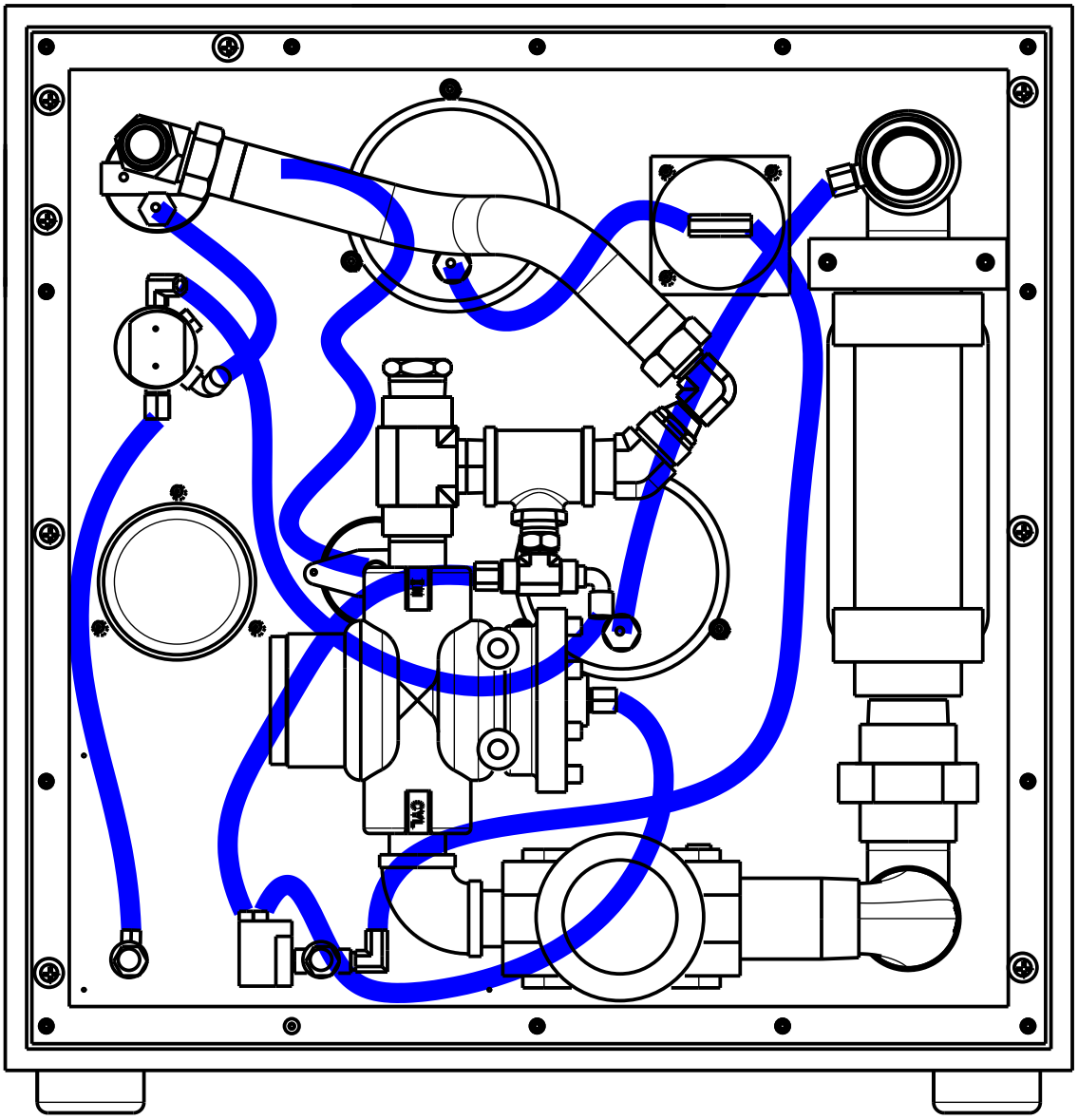
10.3 PNEUMATIC SCHEMATIC



Item	Part Number	Description	Qty
1	H-2706	Regulator, High Flow 1in	1
3	H-2707	Valve, Poppet Inline 1 in	1
17	H-2711	Switch, Air Valve	1
25	PC-1089-03	Regulator, Low Pressure, 0-100 psi	1
43	TF-1012*105.00	Hose, ¼ Polyethylene	1
44	TF-1139*024.00	Tube, Nylon 5/32	1
67	H-2651	Thermometer, Remote	1
77	HC-1787	Gauge, Pressure, 0-200 psi	1
81	HC-1836	Gauge, Pressure, 200 psi	1
83	H-2666-04	Valve, Ball	1

10.3 PNEUMATIC SCHEMATIC *(continued)*

Tube Routing Diagram



10.4 INSPECTION POINTS

- Drain filter bowl: Each use.
- Vertical Speed Indicator zeroing: Each use.
- Instrument Calibration: Verify last calibration is within previous 12 months.
  - Instruments are to be calibrated annually.

10.5 SCHEDULED MAINTENANCE

10.5.1 Instrumentation

All instruments are to be calibrated annually to maintain accuracy of machine.

10.5.2 Filter element

Replace annually or sooner if performance drops.

10.6 MAINTENANCE PERSONNEL REQUIREMENTS

Maintenance personnel should have a basic knowledge of mechanical, electrical, and pneumatic systems.

11.0 PROVISION OF SPARES

11.1 SOURCE OF SPARE PARTS

Spare parts may be obtained from the manufacturer:

TRONAIR, Inc.
1 Air Cargo Pkwy East
Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301
Fax: (419) 867-0634
E-mail: sales@tronair.com
Website: www.tronair.com

For Spare Parts, Operations & Service Manuals or Service Needs:
Scan the QR code or visit Tronair.com/aftermarket

11.2 RECOMMENDED SPARE PARTS LISTS

H-2726 .....Replacement Filter Element

12.0 IN SERVICE SUPPORT

Contact Tronair, Inc. for technical services and information. See Section 1.3 – Manufacturer.

13.0 GUARANTEES/LIMITATION OF LIABILITY

Tronair products are warranted to be free of manufacturing or material defects for a period of one year after shipment to the original customer. This is solely limited to the repair or replacement of defective components. This warranty does not cover the following items:

a) Parts required for normal maintenance
b) Parts covered by a component manufacturers warranty
c) Replacement parts have a 90-day warranty from date of shipment

If you have a problem that may require service, contact Tronair immediately. Do not attempt to repair or disassemble a product without first contacting Tronair, any action may affect warranty coverage. When you contact Tronair be prepared to provide the following information:

a) Product Model Number
b) Product Serial Number
c) Description of the problem

If warranty coverage is approved, either replacement parts will be sent or the product will have to be returned to Tronair for repairs. If the product is to be returned, a Return Material Authorization (RMA) number will be issued for reference purposes on any shipping documents. Failure to obtain a RMA in advance of returning an item will result in a service fee. A decision on the extent of warranty coverage on returned products is reserved pending inspection at Tronair. Any shipments to Tronair must be shipped freight prepaid. Freight costs on shipments to customers will be paid by Tronair on any warranty claims only. Any unauthorized modification of the Tronair products or use of the Tronair products in violation of cautions and warnings in any manual (including updates) or safety bulletins published or delivered by Tronair will immediately void any warranty, express or implied.

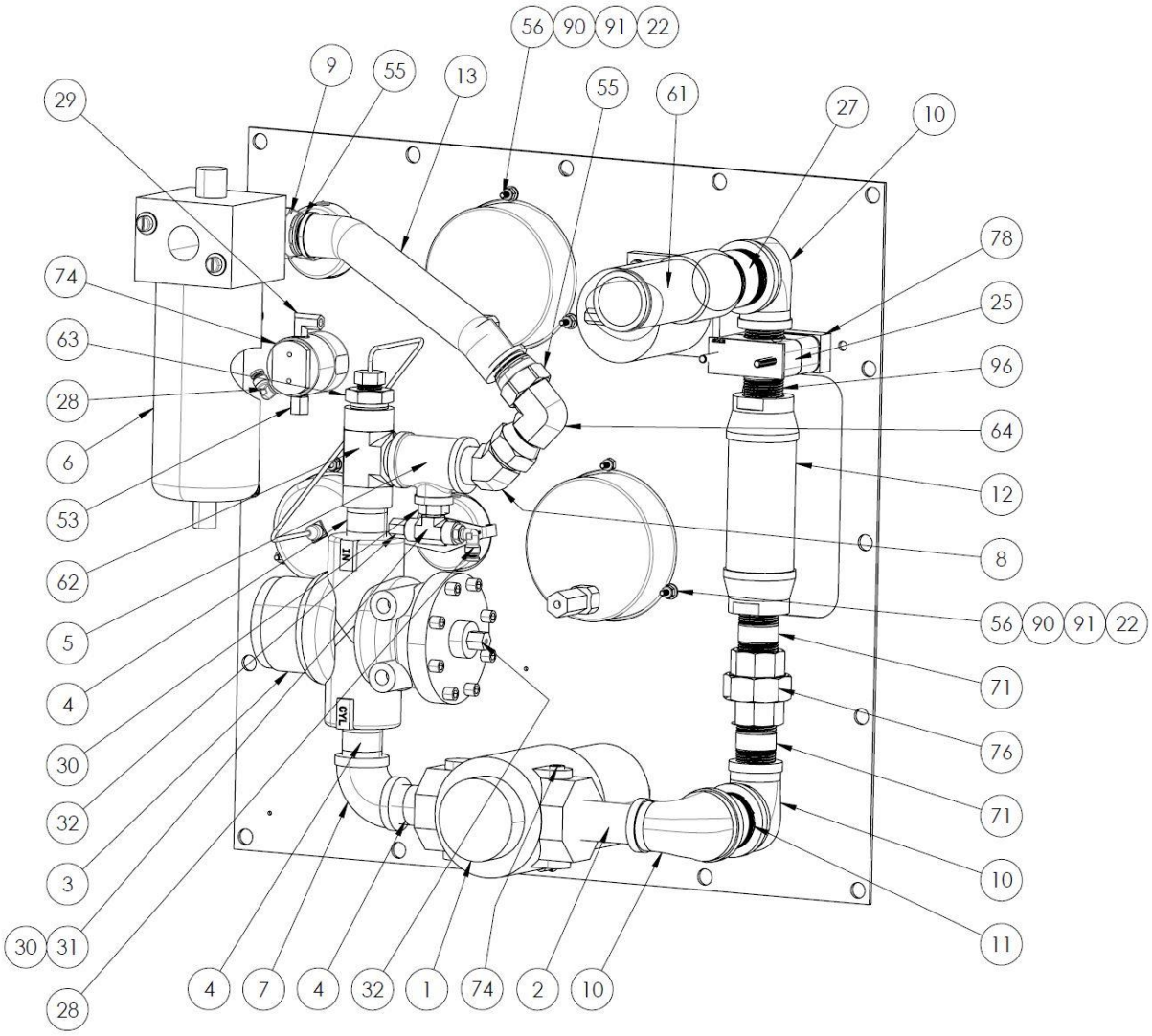
The obligations of Tronair expressly stated herein are in lieu of all other warranties or conditions expressed or implied. **Any unauthorized modification of the Tronair products or use of the Tronair products in violations of cautions and warnings in any manual (including updates) or safety bulletins published or delivered by Tronair will immediately *void any warranty, express or implied* and Tronair *disclaims any and all liability for injury (WITHOUT LIMITATION and including DEATH), loss or damage arising from or relating to such misuse*.**

14.0 APPENDICES

APPENDIX I	Cabin Pressure Tester Adapters
APPENDIX II	F-16 Cabin Pressure Test Job Guide
APPENDIX III	Leak Flow Rate Measurement Test Procedure
APPENDIX IV	Pressure Decay Test Procedure
APPENDIX V	Declaration Of Conformity
APPENDIX VI	Vertical Speed Indicator Calibration Data
APPENDIX VII	Pressure Gauge Calibration Data
APPENDIX VIII	Flowmeter Temperature Correction Chart and Conversion Chart – Cubic Feet to Pounds Per Minute
APPENDIX IX	Instrument Certification Notice

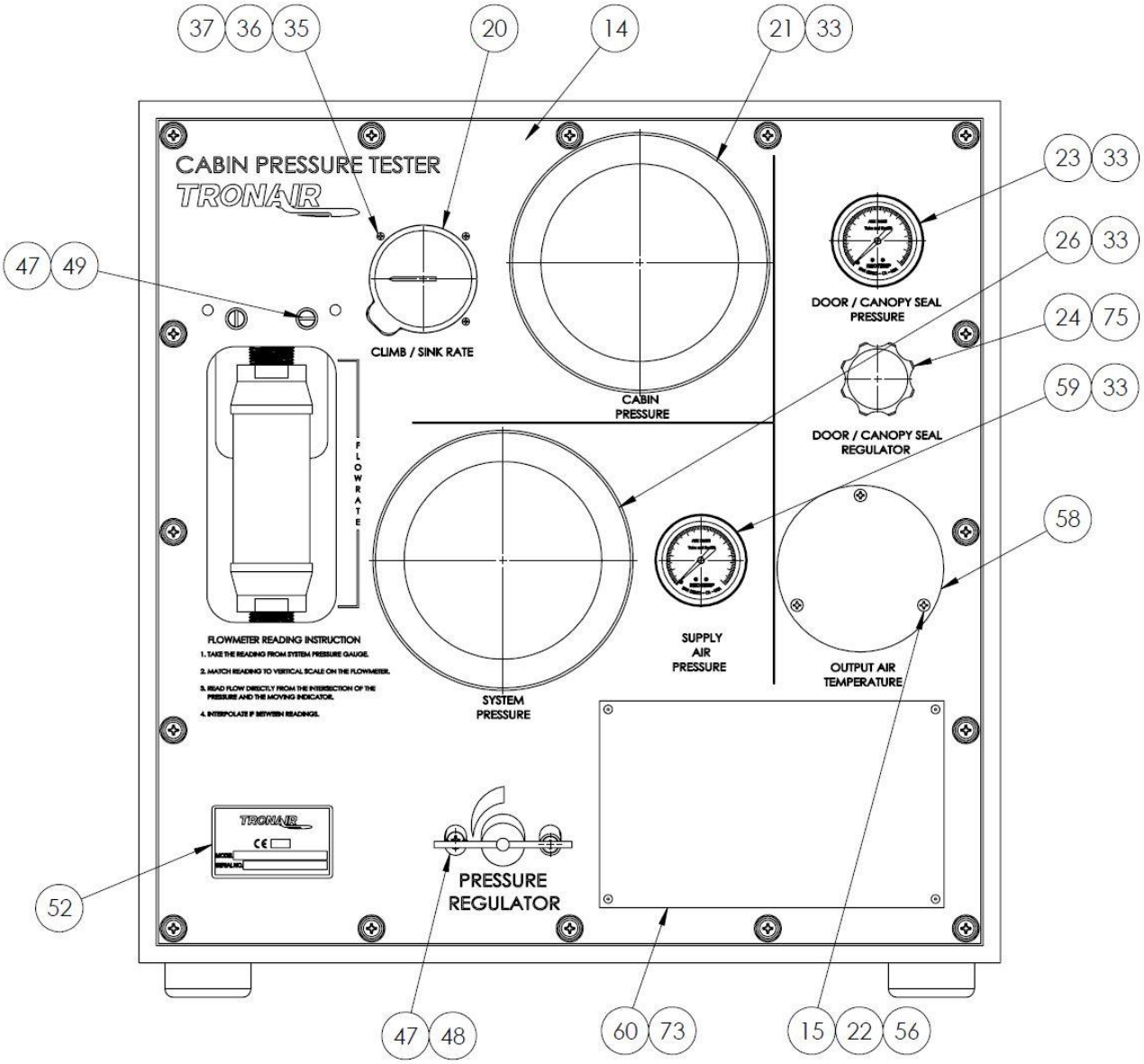
Parts List Illustration

When ordering replacement parts/kits, please specify model, serial number & color of your unit.



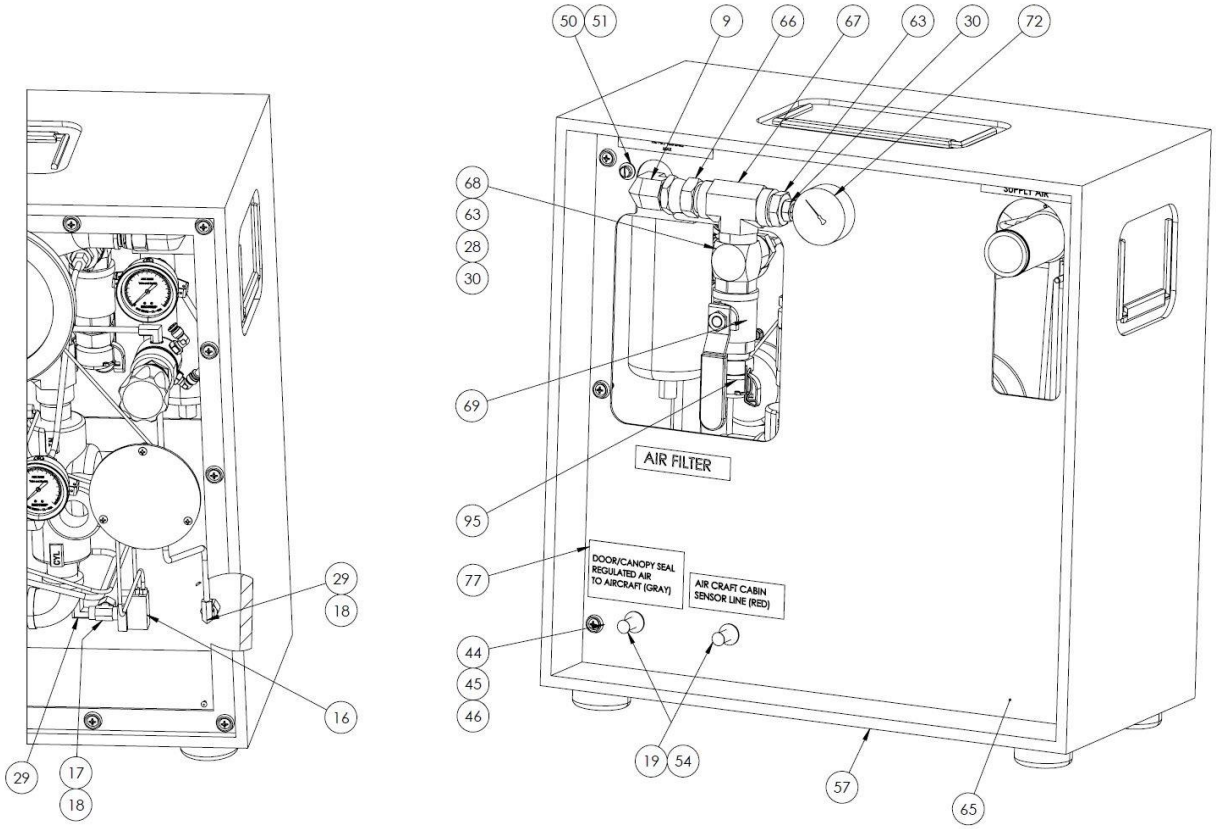
Parts List Illustration

When ordering replacement parts/kits, please specify model, serial number & color of your unit.



Parts List Illustration

When ordering replacement parts/kits, please specify model, serial number & color of your unit.



Item	Part Number	Description	Qty
1	H-2706	REGULATOR, HIGH FLOW 1"	1
2	N-2237-06-31	NIPPLE, GALVANIZED PIPE, 1" NPT X 3.5" LG	2
3	H-2707	VALVE, POPPET INLINE 1"	1
4	N-2237-06-28	NIPPLE, GALVANIZED PIPE, 1 NPT X 2 LG	3
5	N-2320-18	TEE, FEMALE PIPE GALVANIZED	1
6	H-2705	FILTER, HI FLOW 1"	1
7	N-2735-06	ELBOW, 90 DEG GALVANIZED	1
8	N-2021-23-S	ELBOW, MALE 45 DEG	1
9	N-2005-23-S	ELBOW, MALE	2
10	N-2737-01	ELBOW, 90 DEG REDUCING GALVANIZED	3
11	N-2237-08-29	NIPPLE, GALVINIZED PIPE	1
12	PC-1237	FLOWMETER, PNEUMATIC	1
13	TF-1047-08-12.0	HOSE, PUSH-LOK, 1" X 12.0 LG	1
14	H-3531	PANEL, CPT (P)	1
15	G-1159-103506	SCR, #10-32 RD HD CRS REC	3
16	H-2711	SWITCH, AIR VALVE	1
17	N-2208-01-S	TEE, MALE BRANCH	1
18	N-2024-03-S	BULKHEAD, #4 JIC X 1/8 NPT	2
19	H-1442-03	CAP, THREAD	2
20	H-2630	INDICATOR, VERTICAL SPEED	1
21	H-3528	GAUGE, PRESSURE 0-15 PSI	1
22	G-1250-1030N	FLATWASHER, #10 NARROW	9

Parts List

When ordering replacement parts/kits, please specify model, serial number & color of your unit.

Item	Part Number	Description	Qty
23	H-3770	GAUGE, PRESSURE 0-120 PSI	1
24	PC-1089-03	REGULATOR, LOW PRESSURE	1
25	H-4987	CLAMP, FLOW METER FJ	1
26	H-3529	GAUGE, PRESSURE 0-30 PSI	1
27	N-2237-08-30	NIPPLE, GALVANIZED PIPE 1-1/2 X 3.0 LG	1
28	N-2446-05	ELBOW, 90 DEG MALE	3
29	N-2446-04	ELBOW, 90 DEG MALE, 1/8 NPT X 1/4 TUBE	3
30	N-2210-08-S	REDUCER, PIPE THREAD	3
31	N-2208-03-S	TEE MALE BRANCH	1
32	N-2443-05	CONNECTOR, MALE, 1/4 NPT X 5/32 TUBE	2
33	N-2444-05	CONNECTOR, FEMALE, 1/4 PIPE X 1/4 TUBE	4
34	N-2448-03	SWIVEL, MALE BRANCH TEE,1/8NPTX 1/4 TUBE	1
35	G-1159-101012	SCR ROSS RECESSED, PAN HD, #6-32 X 1-1/4 LG	3
36	G-1250-1010N	FLATWASHER, #6 NARROW	3
37	G-1202-1010	STOPNUT, #6-32 ELASTIC	3
38	Z-1697-03	ASSEMBLY, HOSE RED CABIN	1
39	Z-1698-04	ASSEMBLY, HOSE GRAY DOOR CANOPY	1
40	TF-1012-105.00	HOSE, 1/4 POLYETHELENE	1
41	TF-1139 *036.00	TUBE, NYLON 5/32 OD	1
42	V-2066	LABEL, TRONAIR	2
43	G-1352-05	RIVET, 1/8 OPEN-END ALUM	8
44	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	22
45	G-1489	WASHER, COUNTERSUNK FINISH	22
46	G-1158-106110	SCR, 1/4-20 OVAL HD CRS RC	22
47	G-1250-1050N	FLATWASHER, 1/4 NARROW	4
48	G-1157-105005	SCR, 1/4-20 PAN HD CRS REC	2
49	G-1161-105044	SCR, PAN HD SLTD, 1/4-20	2
50	G-1250-1050W	FLATWASHER, 1/4 WIDE	2
51	G-1505	BOLT, METRIC PAN HD CLASS 8.8 X 20mm	2
52	V-1779	LABEL, SERIAL NUMBER CE	2
53	N-2443-08	CONNECTOR, MALE	3
54	G-1250-1080N	FLATWASHER, 7/16 NARROW	2
55	N-2026-13-B	SWIVEL, JIC 37 DEG	2
56	G-1202-1035	STOPNUT, #10-32 ELASTIC	9
57	H-2761	CASE, CPT	1
58	H-2651	THERMOMETER, REMOTE	1
59	HC-1787	GAUGE, PRESSURE 0-200 PSI	1
60	V-2450	LABEL, CPT CHART	1
61	TR-2338	CPT, HOSE OUTPUT	1
62	N-2208-18-S	TEE, MALE BRANCH	1
63	N-2210-16-S	REDUCER, PIPE THREAD	3
64	N-2002-10-S	ELBOW, SWIVEL NUT	1
65	J-5279-01	PANEL, REAR	1

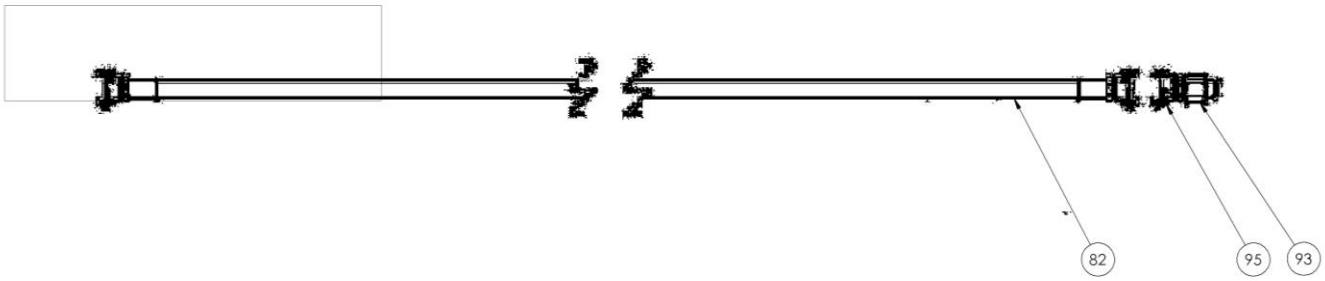
Parts List

When ordering replacement parts/kits, please specify model, serial number & color of your unit.

Item	Part Number	Description	Qty
66	N-2030-11-S	SWIVEL, #16 JIC X 1 NPT	1
67	N-2207-13-S	TEE-FEMALE PIPE	1
68	N-2239-06-S	TEE, PIPE	1
69	H-2666-05	VALVE, BALL (1 INCH)	1
71	N-2237-06-29	NIPPLE, GALVANIZED PIPE, 1 NPT X 2 1/2 LG	2
72	HC-1836	GAUGE, PRESSURE 200 PSI	1
73	G-1352-07	RIVET, 1/8 OPEN-END ALUM	4
74	N-2205-03-S	HOLLOW HEX PLUG 1/4 MPT	1
75	H-2259	NUT, PANEL (REGULATOR)	1
76	N-2233-05	UNION, STD PIPE GALVANIZED	1
77	V-2439	LABEL, REAR	1
78	J-8087	CLAMP SPACER, FLOW METER ASSY	1
80	INS-1745	TEST PROCEDURE	1
81	TF-1188-81.0	HOSE, FIRE	1
82	TF-1268	HOSE, 1", 50' LG UNI. ENDS	1
83	K-4943	KIT, SUPPLY HOSE	1
84	H-1426-10	CLAMP HOSE	4
85	Z-11860	ADAPTER, HOSE	1
86	450A6211	CARLANE CL-2-C, CABLE, NYLON C	3
87	450A5888	FERRULE	6
88	H-4845	CASE, TRANSPORT	1
89	K-4946	KIT, SENSE HOSE	1
90	G-1156-103506	SCR, FLAT HD MACH, #10-32 X 3/4 LG	6
91	G-1251-1030R	LOCKWASHER, #10 REGULAR	6
92	V-1197	LABEL, TRONAIR	1
93	N-2010-17-S	CONNECTOR, FEMALE	1
94	H-2726	FILTER, REPLACEMENT	1
95	N-3178	FITTING, CHICAGO 1" NPT MALE	2
96	N-2237-06-30	NIPPLE, GALVANIZED PIPE, 1NPT X 3 LG	1
97	K-4945	KIT, SUPPLY HOSE	1
98	K-5613	KIT, SUPPLY HOSE	1

Parts List

When ordering replacement parts/kits, please specify model, serial number & color of your unit.



Item	Part Number	Description	Qty
79	N-2210-16-S	REDUCER, PIPE THREAD	2
80	N-2210-08-S	REDUCER, PIPE THREAD	2
81	HC-1836	GAUGE, PRESSURE 200 PSI	1

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APPENDIX I

Cabin Pressure Tester Adapters

AIRCRAFT ADAPTERS

The following Cabin Pressure Tester aircraft Adapters are available from Tronair. If you cannot find the specific Adapter you require, please contact Tronair sales.

Aircraft	Adapter Kit	Description
A-10	K-4945	SENSING ADAPTER HOSE
A-10	K-4946	SUPPLY ADAPTER HOSE
F-15	K-5613	SENSING ADAPTER HOSE
F-15	K-4946	SUPPLY ADAPTER HOSE
F-16	K-4943	SENSING ADAPTER HOSE
F-16	K-4946	SUPPLY ADAPTER HOSE

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APPENDIX II

F-16 Cabin Pressure Test Job Guide

F-16 Cabin Pressure Test Job Guide

Ref: TO 1F-16( )-2-21JG-00-1
CHAPTER 3: OPERATIONAL CHECKOUT OF CABIN PRESSURIZATION SYSTEM
3-1. CABIN AIR PRESSURE RELIEF AND DUMP VALVE SOLENOID, OPERATIONAL CHECKOUT
3-1-1. OPERATIONAL CHECKOUT

INPUT CONDITIONS: Apply within input conditions for function 21-00-23

Aircraft Designation Symbols

The aircraft designation symbol **C** is used to identify functions of maintenance procedures applicable to F-16 aircraft. The aircraft designation symbol **D** is used to identify functions of maintenance procedures applicable to F-16D aircraft. Functions or maintenance procedures applicable to both models or obvious F-16D peculiar aft cabin configurations or procedures will not be identified by aircraft designation symbols.

C F-16C Aircraft

D F-16D Aircraft

Required Adapter Kits:
K-4943 Sensing Adapter Hose
K-4946 Supply Adapter Hose

WARNING!

The operator must be familiar with <u>ALL</u> sections of the Cabin Pressure Tester Operation & Service Manual prior to use on aircraft.

OPERATIONAL CHECKOUT

1. Remove cap from canopy seal test point 32, located inside access door 2101. See Figure 1.
2. Connect supply adapter hose (K-4946) to test point 32.
3. Remove cap from static pressure test point 30, located inside access door 2101.
4. Connect sensing adapter hose (K-4943) to test point 30.
5. Remove cap from test point 31.
6. Connect adapter to test point 31.See Figure 3.
7. Connect Aircraft Cabin Supply hose (TF-1188) to adapter. Hose clamp (H-1426-10) required for proper connection. See Figure 4.
8. Connect grey Door/Canopy hose (Z-1698-04) to Supply Adapter hose (K-4946).
9. Connect red Aircraft Cabin Sensor hose (Z-1697-03) to Sensing Adapter hose (K-4943).

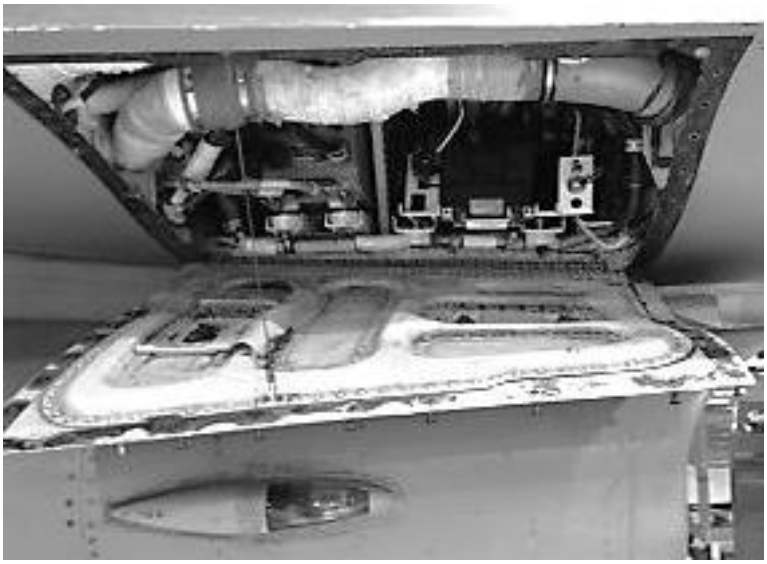


Figure 1

Figure 2

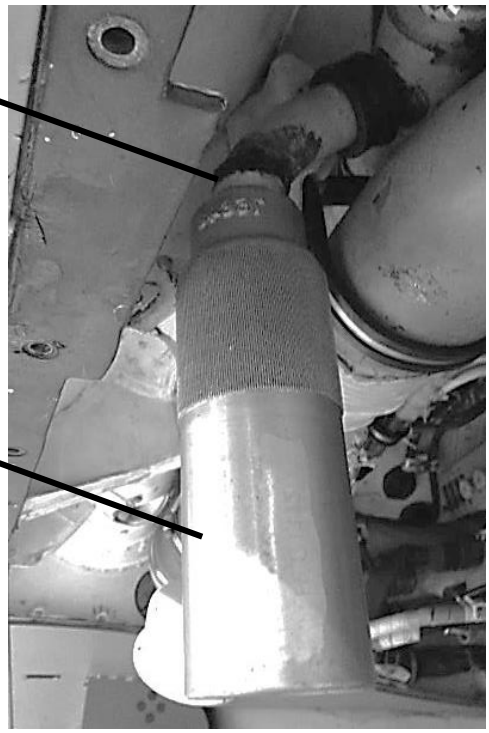


Figure 3

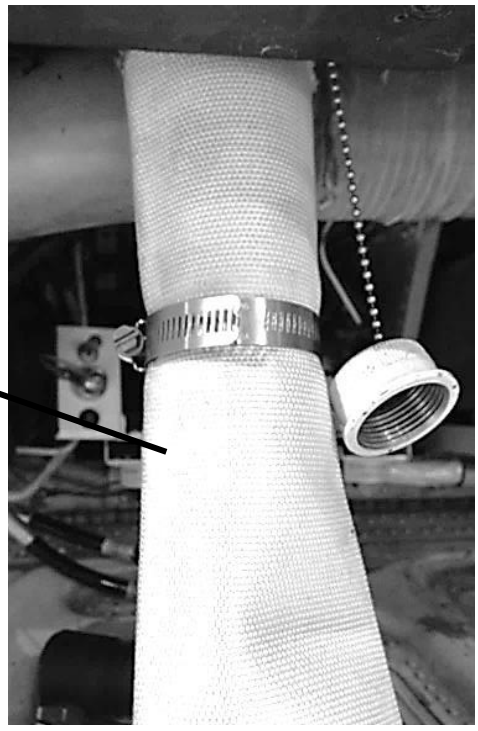


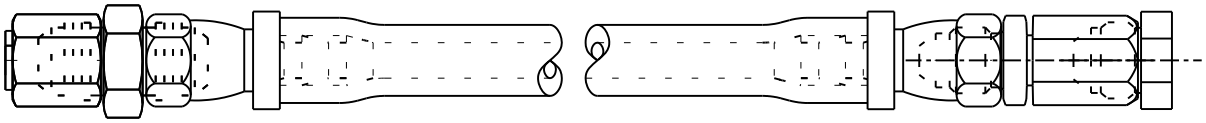
Figure 4

10. Connect Door/Canopy hose and Aircraft Cabin Sensor hose to the respective ports located on the pressure test unit. See Figure 5.
11. Connect Aircraft Cabin Supply hose to Aircraft Cabin Supply Air port located at the rear of the pressure test unit. Hose clamp (H-1426-01) required for proper connection.
12. Close Shop Air In valve located at the rear of the pressure test unit.
13. Connect shop air to the pressure test unit

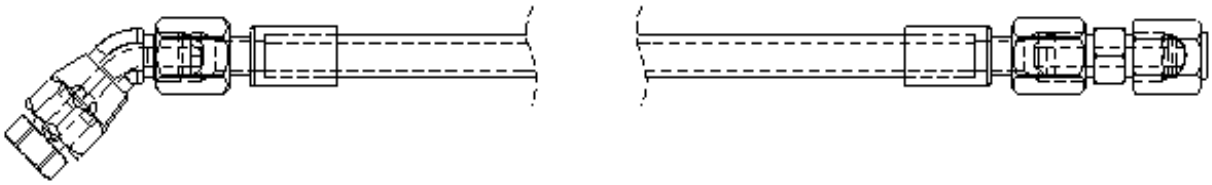
    Note: Continuous duty air supply of 110 cfm @ 100 psi (6.9 bar) minimum (150 psi maximum) to operate this unit.

Figure 5

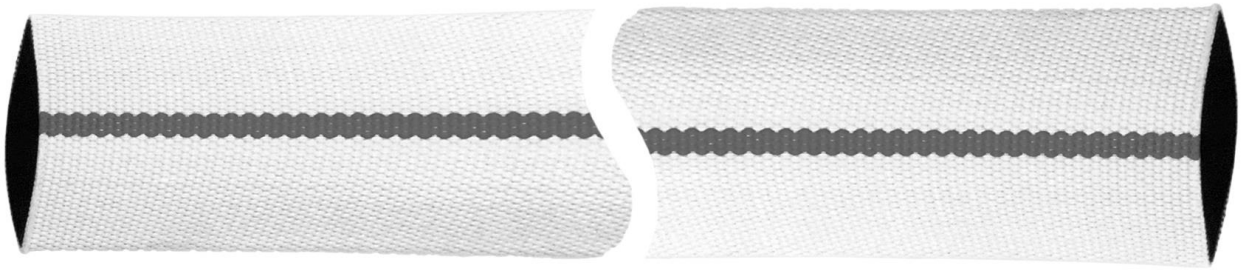
WARNING!
Shop air source will be filtered and oil free.

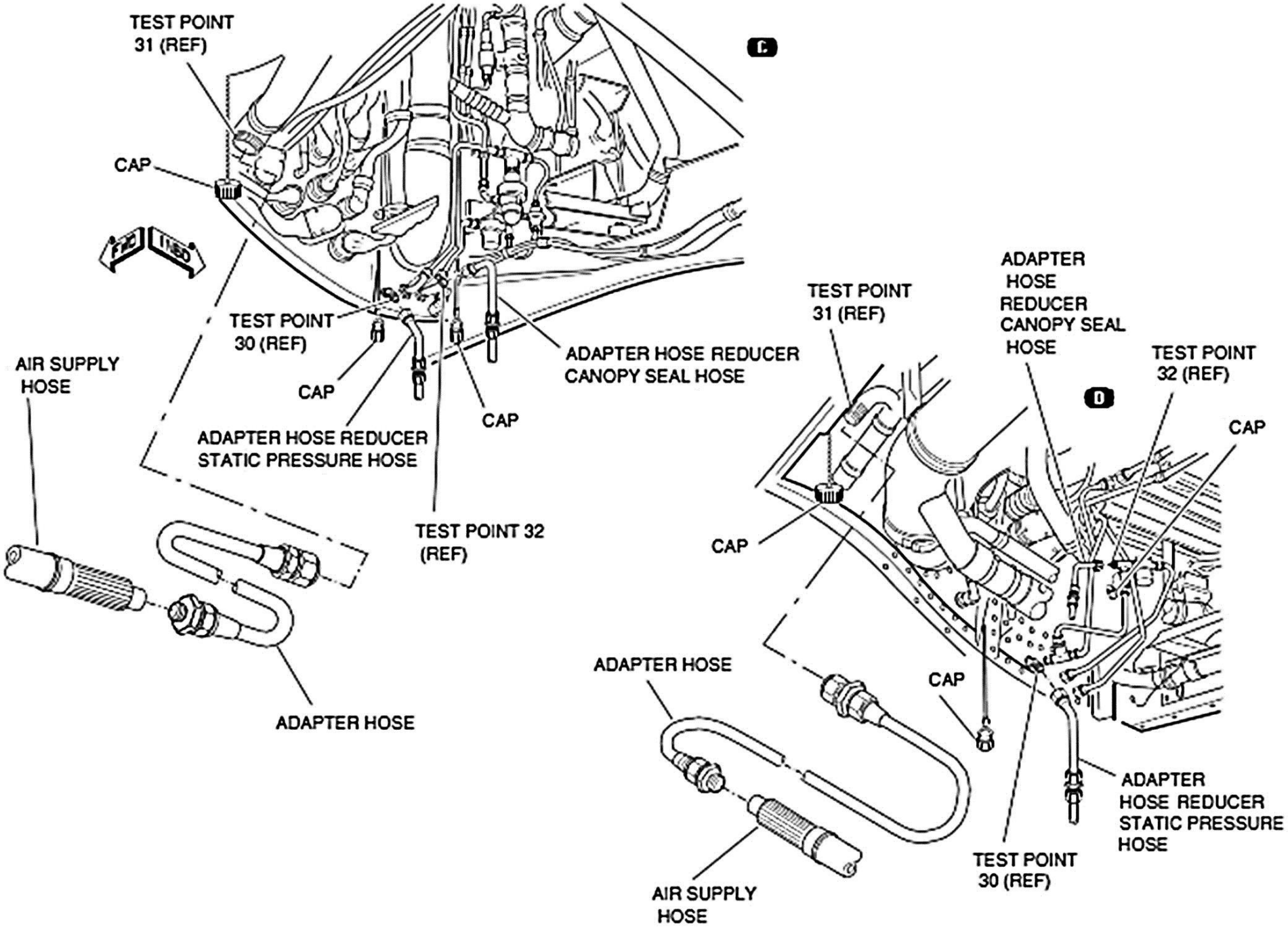


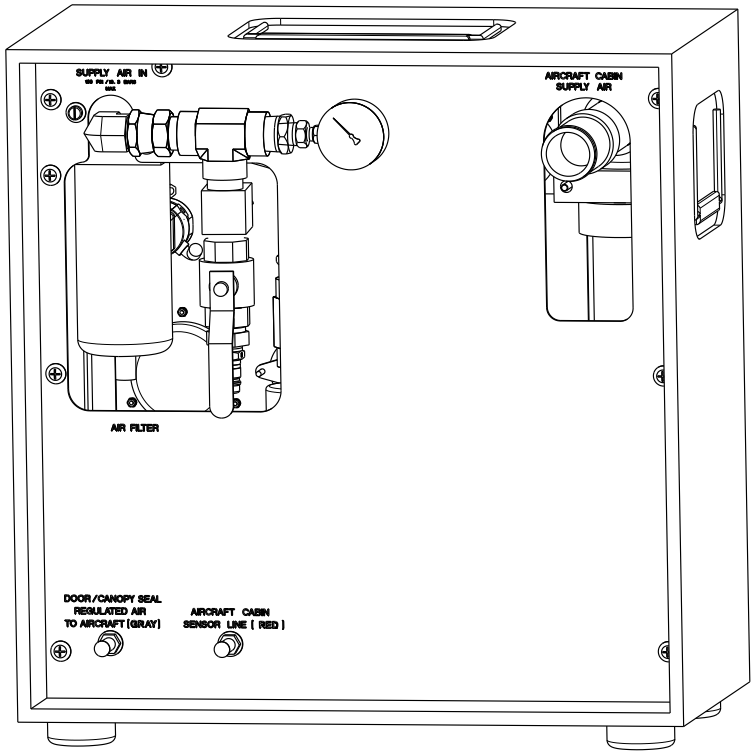
Supply Adapter Hose
K-4946



Sensing Adapter Hose
K-4943




TEST POINT
31 (REF)
CAP
C
TEST POINT
30 (REF)
CAP
ADAPTER HOSE REDUCER
CANOPY SEAL HOSE
AIR SUPPLY
HOSE
ADAPTER HOSE REDUCER
STATIC PRESSURE HOSE
CAP
TEST POINT 32
(REF)
ADAPTER HOSE
ADAPTER
HOSE
REDUCER
CANOPY SEAL
HOSE
TEST POINT
31 (REF)
TEST POINT
32 (REF)
D
CAP
CAP
ADAPTER HOSE
CAP
ADAPTER
HOSE REDUCER
STATIC PRESSURE
HOSE
TEST POINT
30 (REF)
AIR SUPPLY
HOSE



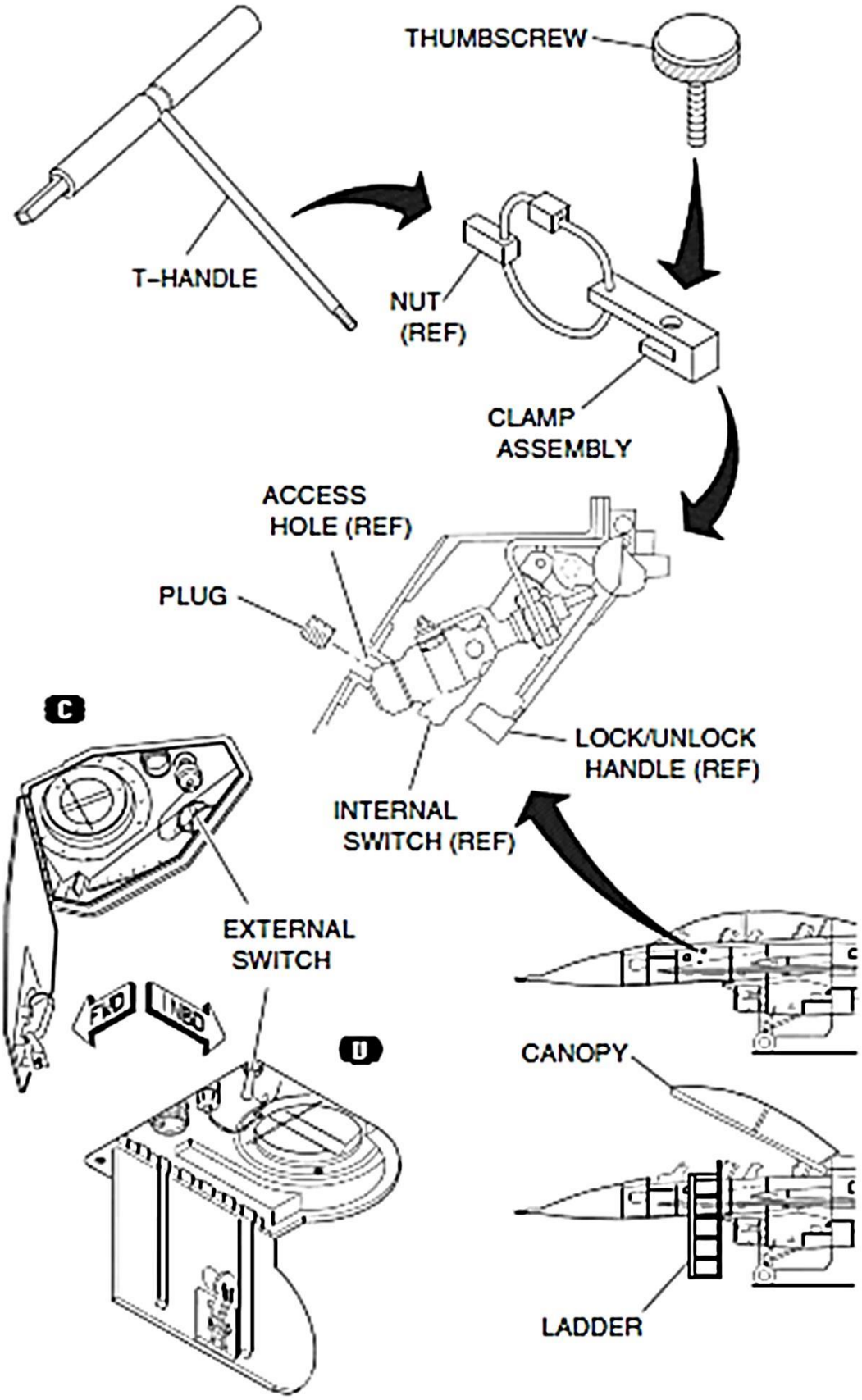
14. Remove plug from canopy lock/unlock handle access hole in fuselage. Discard plug.

CAUTION!

To prevent damage to canopy actuator and/or latch mechanism, verify canopy lock/unlock handle is full up (unlocked) and canopy internal open/close switch is in center (off) position prior to closing canopy with external open/close switch.

NOTE: To lock canopy from outside aircraft with cabin unoccupied, canopy lock clamp assembly shall be connected to canopy lock/unlock handle from inside.

15. Connect clamp assembly to lock/unlock handle.
16. Finger-tighten knurled thumbscrew to secure clamp assembly to lock/unlock handle.
17. Insert T-handle through access hole from outside and screw into nut attached to clamp assembly.
18. Remove crew entry ladder.
19. Position and hold canopy external open/close switch (access door **C** 2105 **D** 2107 ACCESS PANELS AND DOORS (1.2)) to close until canopy is fully closed and then release switch.
20. Lock canopy by pulling firmly on T-handle.
21. Unscrew and remove T-handle.
22. Install new plug in canopy lock/unlock handle access hole. Torque plug 15-25 inch-pounds.


THUMBSCREW
T-HANDLE
NUT
(REF)
CLAMP
ASSEMBLY
ACCESS
HOLE (REF)
PLUG
LOCK/UNLOCK
HANDLE (REF)
INTERNAL
SWITCH (REF)
C
EXTERNAL
SWITCH
FLD
LOCK
U
CANOPY
LADDER

CAUTION!

- **Sheet vinyl and pressure safety net shall not obstruct ambient pressure ports. Failure to comply may result in cabin air pressure regulator valve malfunction.**
- **Ensure that canopy transparency is free of dust, dirt, or debris prior to covering canopy with sheet vinyl. Failure to comply may result in damage to aircraft.**

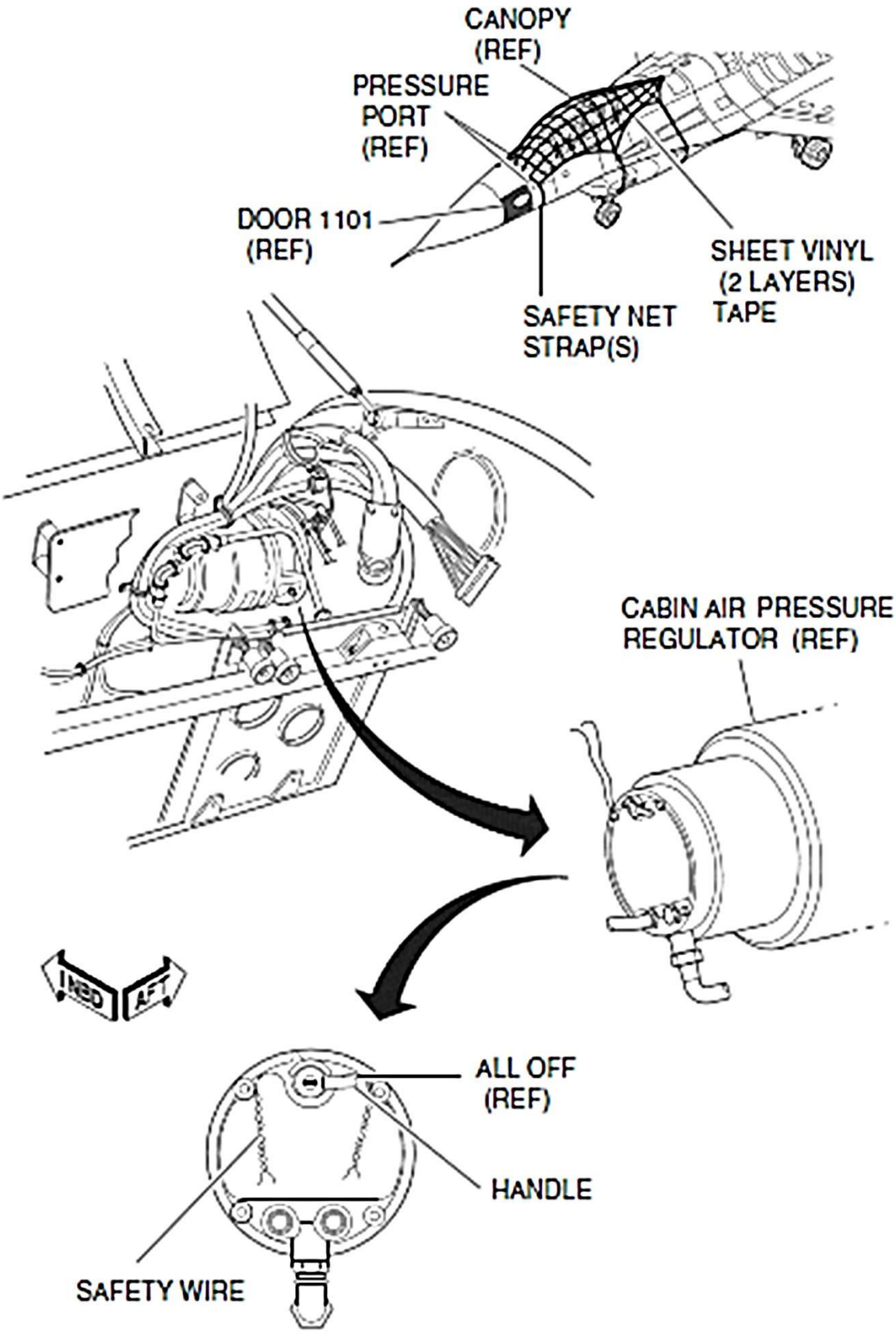
23. Verify that canopy is free of dust, dirt, or debris prior to installation of sheet vinyl and canopy net. Perform canopy transparency rinsing, cleaning, and polishing as required (JG12-30-01).
24. Cover all of canopy transparency with two layers of sheet vinyl. First layer shall be taped in place.

WARNING!

Cabin will be pressurized to approximately 5.5 psig during procedure. Safety net shall be properly installed and personnel shall be clear of aircraft. Failure to comply may result in injury or death to personnel.

25. Position safety net over canopy and secure net with straps. Verify that strap labeled LH FWD is secured aft of access door 1101.

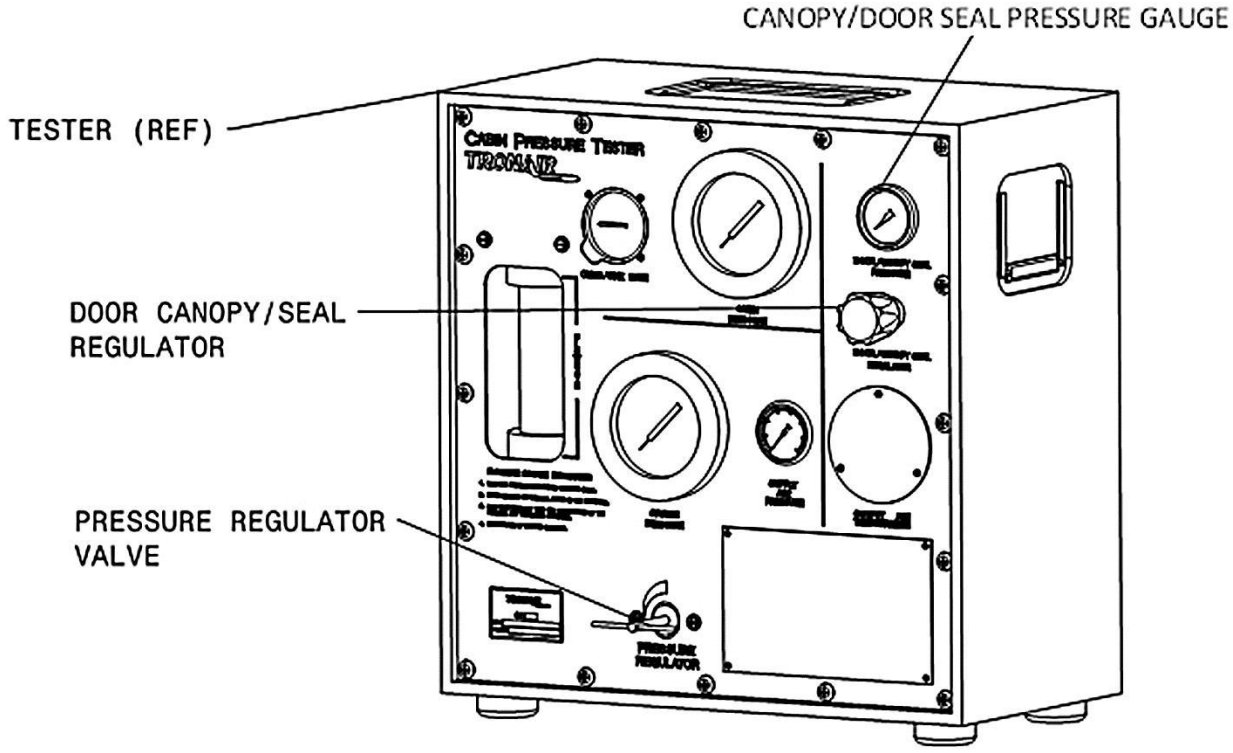
    NOTE: Relief and dump valve provides pressure relief for cabin only when pressure regulator handle is in ALL OFF position.
26. Remove safety wire from cabin air pressure regulator control handle.
27. Position cabin air pressure regulator control handle to ALL OFF.


CANOPY
(REF)
PRESSURE
PORT
(REF)
DOOR 1101
(REF)
SHEET VINYL
(2 LAYERS)
TAPE
SAFETY NET
STRAP(S)
CABIN AIR PRESSURE
REGULATOR (REF)
FWD
AFT
ALL OFF
(REF)
HANDLE
SAFETY WIRE

28. Turn Door/Canopy Seal Regulator knob counterclockwise until control feels loose (minimum setting).
29. Turn Pressure Regulator Valve counterclockwise to fully closed position.
30. Fully open Supply Air In valve in rear of unit.
31. Slowly turn Door/Canopy Seal Regulator clockwise and apply 50-60 psig to test point 32. Monitor Door/Canopy Seal Pressure gauge.

WARNING!

If indicated cabin pressure exceeds 5.55 psig and relief and dump valve fails to relieve, immediately reduce pressure by positioning Pressure Regulator Valve to open. Failure to comply may result in injury or death to personnel.



CAUTION!

System shall be allowed to stabilize after each turn of Pressure Regulator Valve. Temperature of air entering cabin should not exceed 120°F. Failure to comply may result in damage to equipment.

32. Increase pressure by turning Pressure Regulator Valve clockwise in one-half turn increments while monitoring Cabin Pressure gauge and Climb/Sink Rate gauge until Cabin Pressure gauge indicates 4.0 psig.

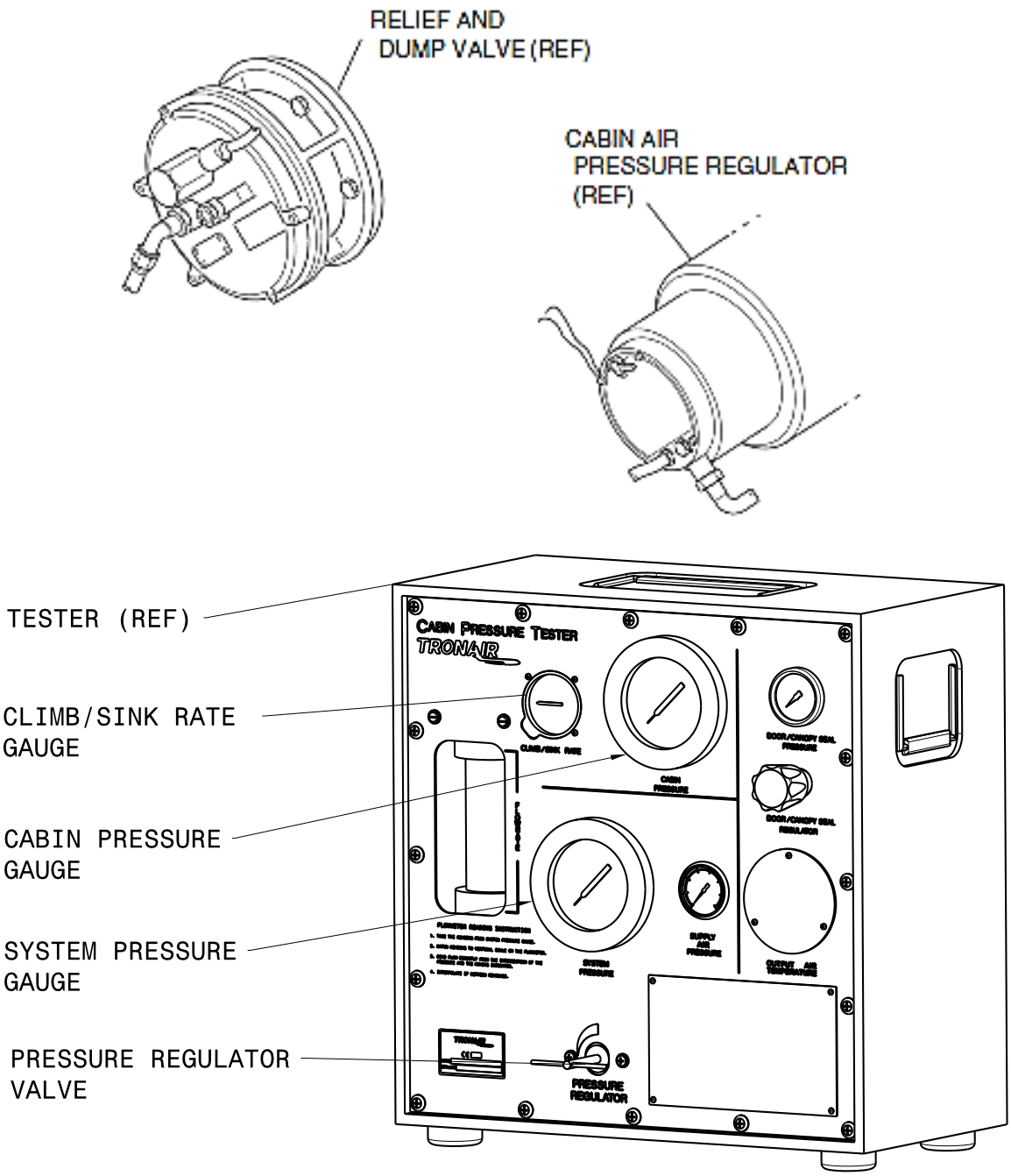
    NOTE: The Vertical Rate Of Climb/Sink Indicator will indicate down/sink as pressure is INCREASING. Never increase over 3 ft/min

33. When Cabin Pressure gauge indicates 4.0 psig, slowly turn Pressure Regulator Valve counterclockwise to reduce pressure rate of increase as indicated on Climb/Sink Rate gauge.

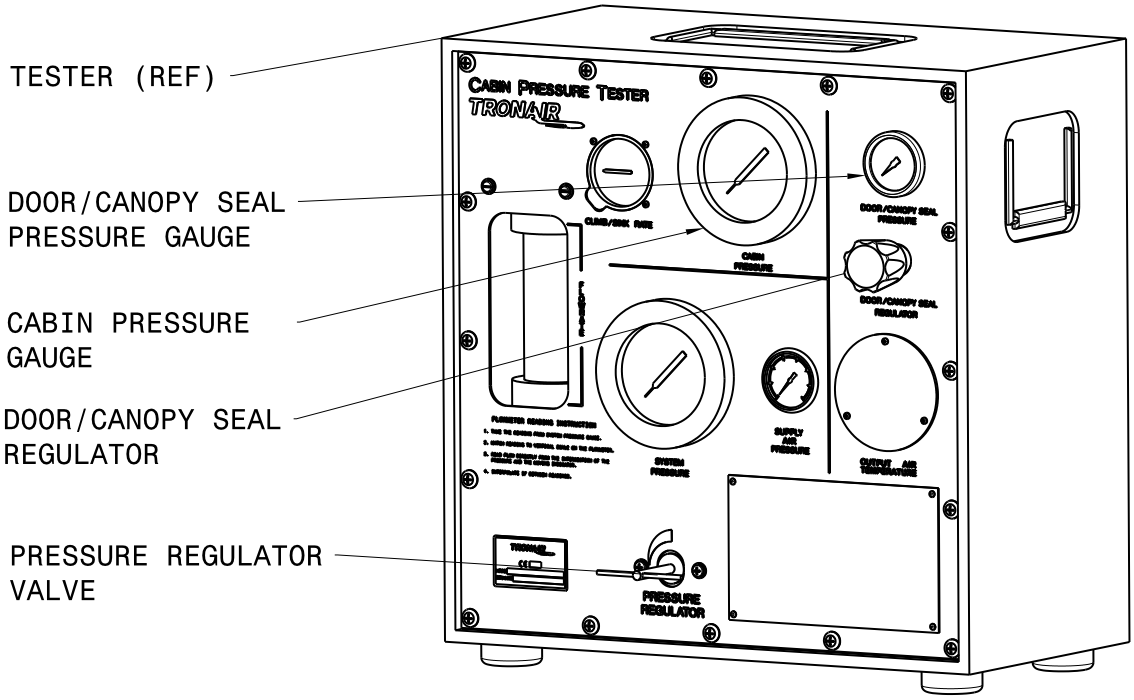
    NOTE: Leakage (blowing) is permitted from cabin air pressure regulator and relief and dump valve. Allowable leakage from valves is included in total allowable cabin leakage rate. Blowing leaks from between valve flanges and bulkheads are not permitted.

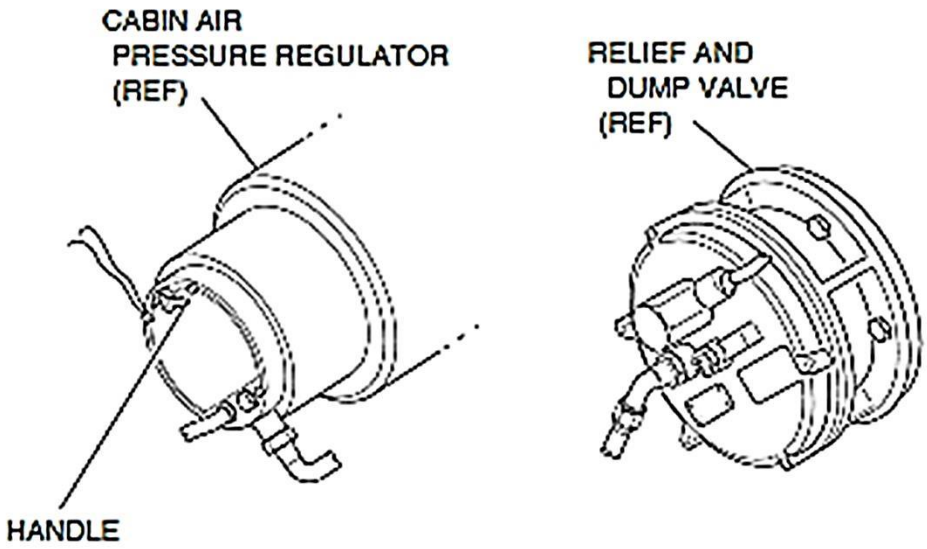
34. When cabin is pressurized to 4.8-5.2 psig as indicated on Cabin Pressure gauge and Climb/Sink Rate gauge reads 0.0 (zero), determine cabin leakage rate by observing System Pressure gauge and Flowmeter.

- Leakage shall not exceed **C** 55.0 Standard Cubic Feet per Minute (SCFM) **D** 70.0 SCFM. (21-30-XK)



35. Increase pressure by turning Pressure Regulator Valve clockwise in one-half turn increments until aircraft relief and dump valve is discharging noticeable airflow.
    - Relief and dump valve shall relieve and cabin pressure shall stabilize at 5.15-5.55 psig as read on Cabin Pressure gauge. (21-30-XJ)
36. Turn Pressure Regulator Valve counterclockwise in one-half turn increments until graduated dial indicates a minimum pressure of 2.0 psig.
37. Position cabin air pressure regulator valve handle to Flight position.
38. Turn Pressure Regulator Valve counterclockwise to fully closed position.
39. Turn Door/Canopy Seal Regulator counterclockwise until control feels loose (minimum position).
40. Slowly turn Door/Canopy Seal Regulator clockwise until Door/Canopy Seal Pressure gauge indicates 50-60 psig.

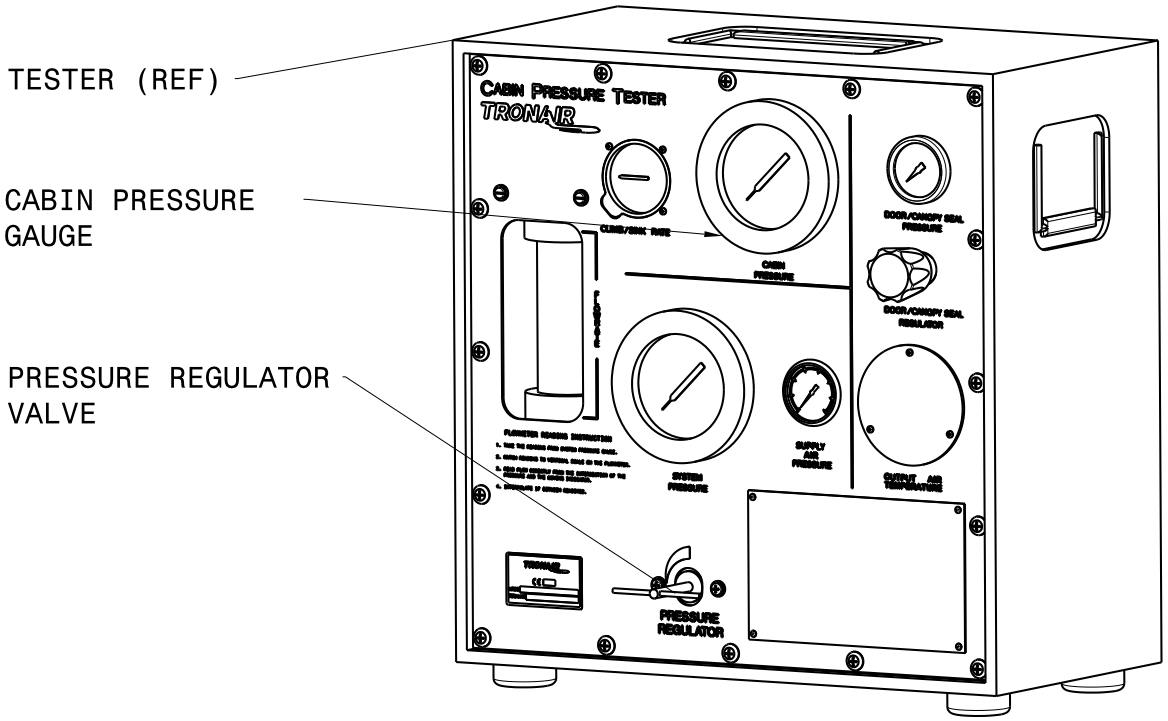


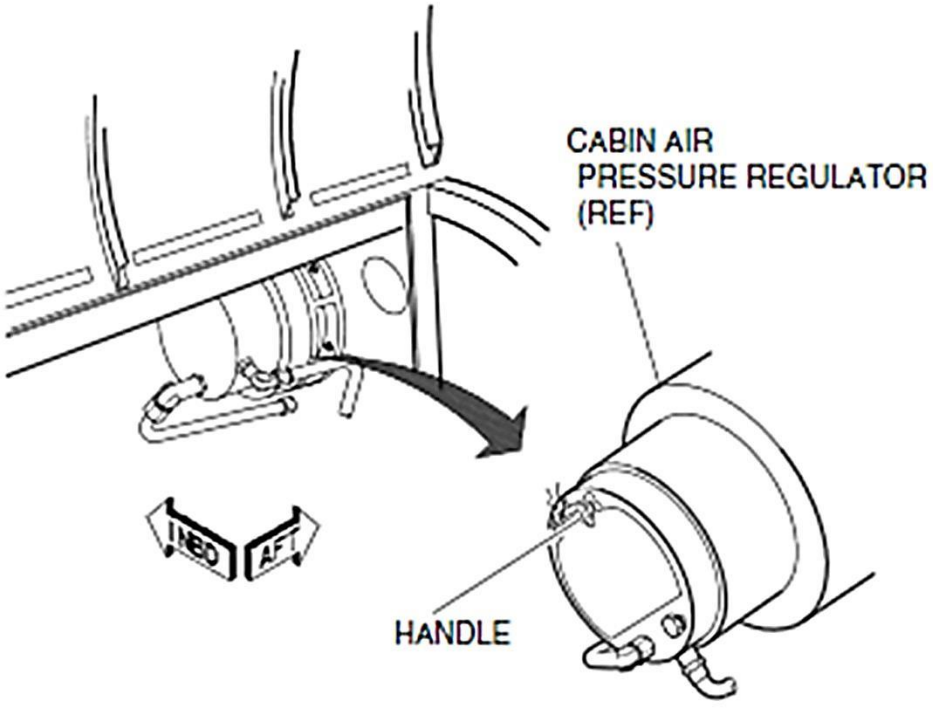


41. Turn Pressure Regulator Valve counterclockwise to fully closed position.
    - Cabin Pressure gauge reading does not exceed 0.3 psig. (21-30-XL)
42. Position cabin air pressure regulator valve handle to Diff On.
43. Turn Pressure Regulator Valve counterclockwise to fully closed.

WARNING!

- **Cabin will be pressurized to approximately 5.5 psig. Safety net shall be verified for proper installation and personnel shall remain clear of aircraft. Failure to comply may result in injury to and/or death of personnel.**
- **Immediately position Pressure Regulator Valve to Start (dump) if Cabin Pressure gauge exceeds 5.55 psig and relief and dump valve fails to relieve pressure. Failure to comply may result in injury to or death of personnel and/or damage to equipment.**


TESTER (REF)
CABIN PRESSURE GAUGE
PRESSURE REGULATOR VALVE
CABIN PRESSURE TESTER
TRONAIR
PRESSURE REGULATOR


CABIN AIR
PRESSURE REGULATOR
(REF)
HANDLE
FWD
AFT

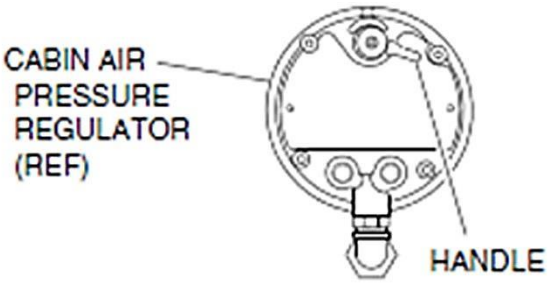
CAUTION!

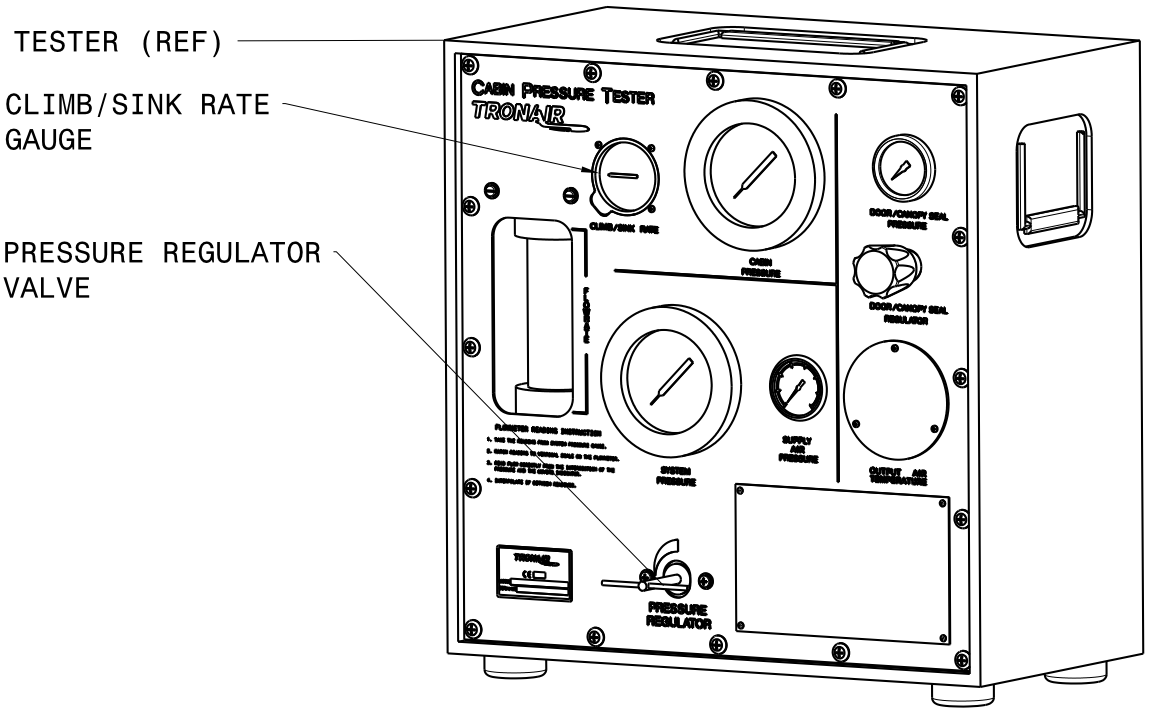
System shall be allowed to stabilize after each one-half turn of Pressure Regulator Valve (so temperature of air entering cabin will not exceed 120°F). Failure to comply may result in damage to equipment.

44. Turn Pressure Regulator Valve clockwise in one-half turn increments (while monitoring Cabin Pressure gauge and Climb/Sink Rate gauge) until Cabin Pressure gauge indicates 4.0 psig.

    NOTE: The Vertical Rate Of Climb/Sink Indicator will indicate up/climb as pressure is DECREASING. Never decrease over 3 ft/min

45. When Cabin Pressure gauge indicates 4.0 psig, reduce pressure rate of increase by slowly turning Pressure Regulator Valve clockwise (indicated on Climb/Sink Rate gauge) until cabin is pressurized 4.8-5.2 psig.
    - Cabin Pressure gauge stabilizes and maintains 4.8-5.2 psig. (21-30-XM)
46. Turn Pressure Regulator Valve counterclockwise until minimum pressure (2 psig) is indicated on graduated dial.
47. Position cabin air pressure regulator valve handle to All Off.
48. Turn Pressure Regulator Valve counterclockwise to fully closed.





FLOW RATE CHECK:

49. Turn Pressure Regulator Valve clockwise in one-half turn increments (while monitoring Cabin Pressure gauge and Climb/Sink Rate gauge) until Cabin Pressure gauge indicates 4.0 psig.

    NOTE: The Vertical Rate Of Climb/Sink Indicator will indicate down/sink as pressure is INCREASING. Never increase over 3 ft/min

50. Adjust PRESSURE REGULATOR VALVE until CABIN PRESSURE gauge indicates 4.8-5.2 psig and CLIMB/SINK RATE gauge indicates 0.

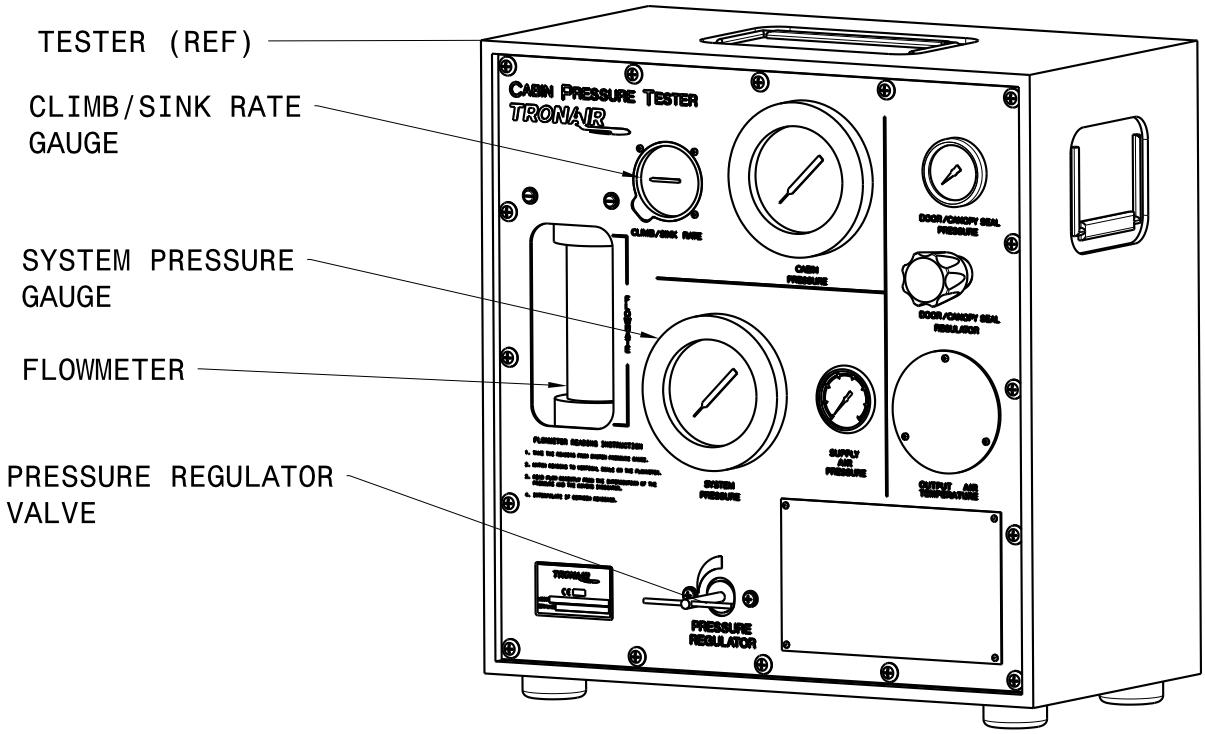
    NOTE: Leakage (blowing) between valve flanges and bulkheads is not permitted. Leakage is permitted from cabin air pressure regulator and relief and dump valve. Allowable leakage from valves is included in total allowable cabin leakage rate. Obvious blowing leaks from fuselage structure or canopy seals shall be repaired regardless of overall leakage rates.

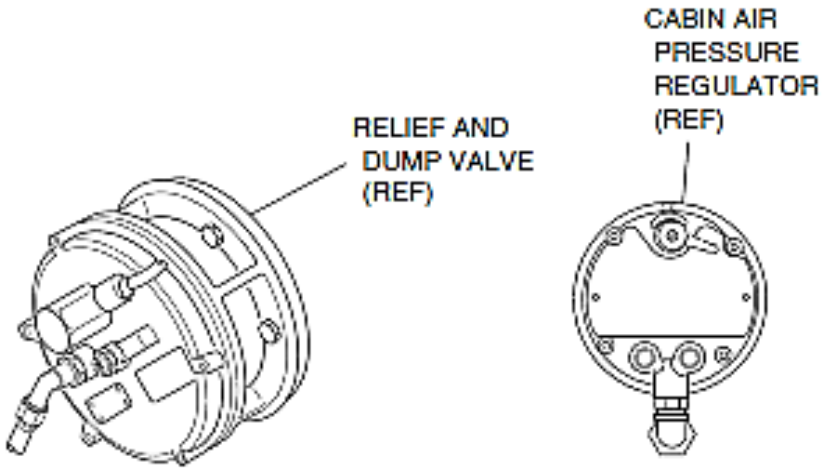
51. (A) When cabin is pressurized 4.8-5.2 psig as indicated on CABIN PRESSURE gauge and CLIMB/SINK RATE gauge reads 0, determine cabin leakage rate by observing SYSTEM PRESSURE gauge and FLOWMETER.

    - Leakage shall not exceed **C** 55.0 SCFM **D** 70.0 SCFM. (21-30-XK)

52. Turn Pressure Regulator Valve counterclockwise until minimum pressure is indicated on graduated dial.

    NOTE: The Vertical Rate Of Climb/Sink Indicator will indicate up/climb as pressure is DECREASING. Never decrease over 3 ft/min



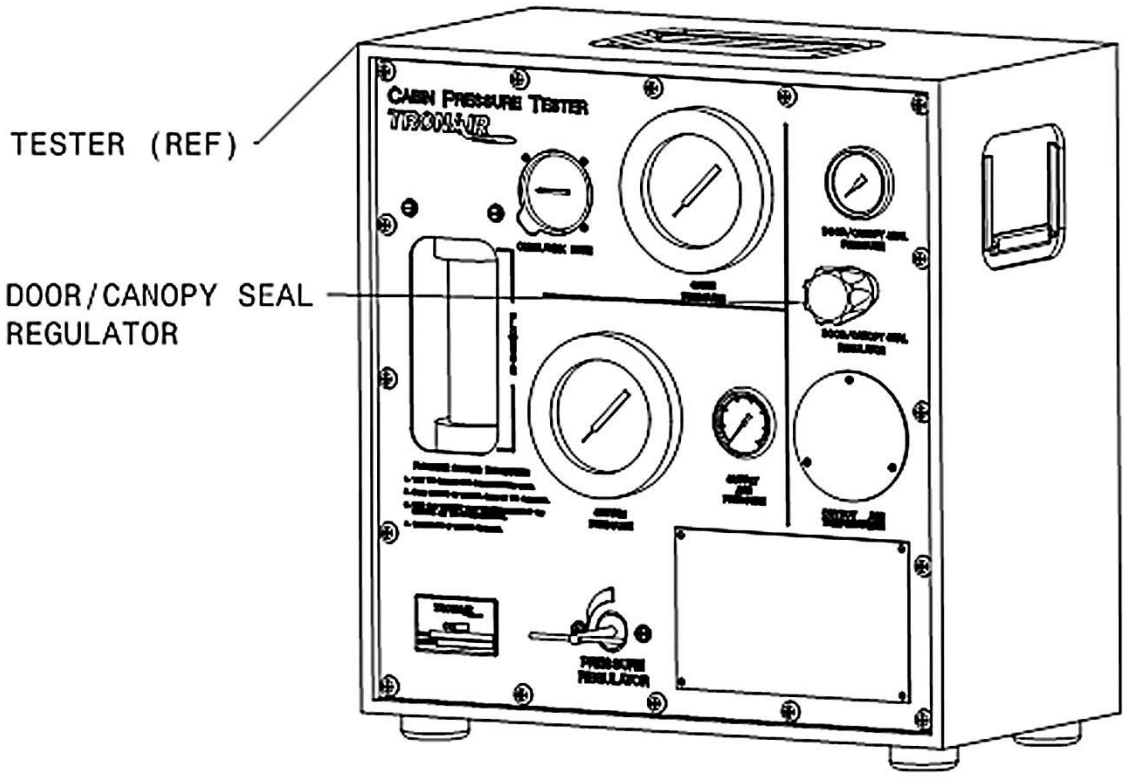


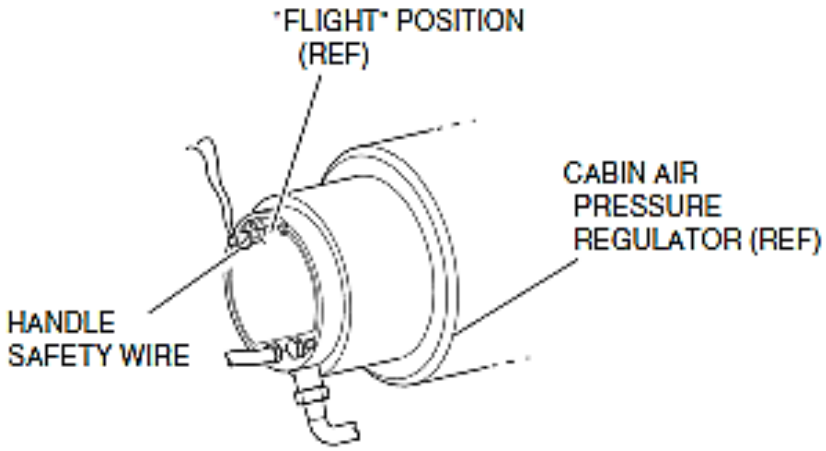
53. Turn Door/Canopy Seal Air Regulator counterclockwise to remove air supply from system. (Seals will remain pressurized until canopy is unlocked.)
54. Fully close Shop Air In Valve in rear of unit
55. Ensure Pressure Regulator Valve and Door/Canopy Seal Air Regulator are at minimum settings. System pressure gauge and Cabin Pressure gauge should read 0.0 (zero).
56. Disconnect shop air.

WARNING!

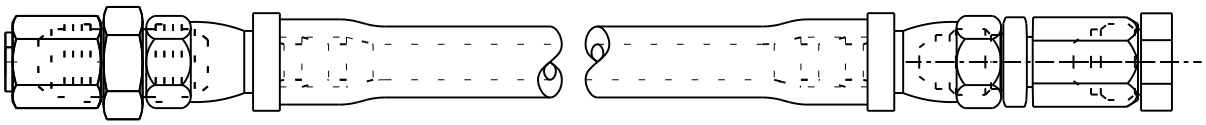
Cabin air pressure regulator handle shall be in Flight position at all times (except during testing). Failure to comply will result in aircraft unsafe for flight.

57. Position pressure regulator handle in Flight position and safety-wire handle.

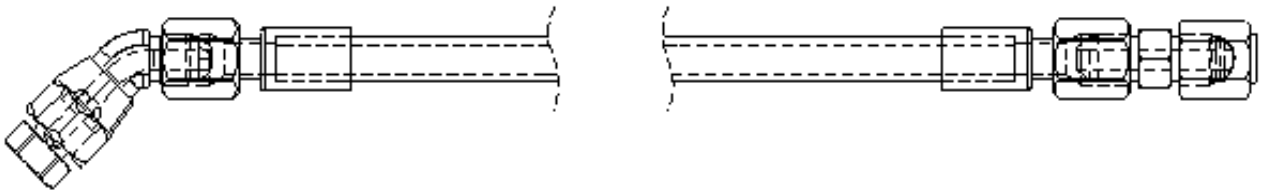




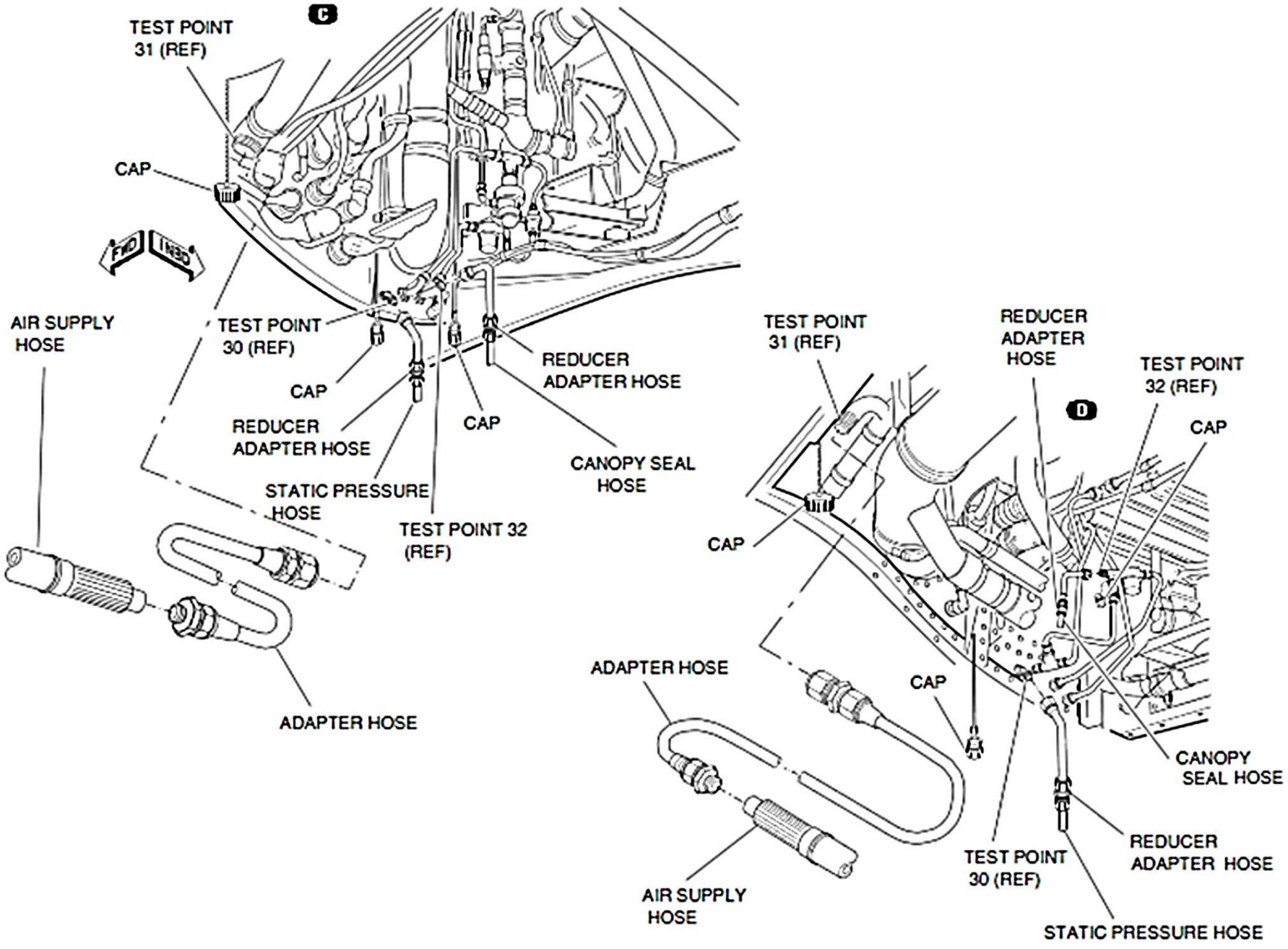
58. Remove aircraft cabin supply hose (TF-1188) from adapter.
59. Disconnect adapter from test point 31.
60. Install cap on test point 31 and hand tighten.
61. Disconnect grey Door/Canopy hose (Z-1698-04) from Supply Adapter hose (K-4946)
62. Disconnect red Aircraft Cabin Sensor hose (Z-1697-03) from Sensing Adapter hose (K-4943)
63. Disconnect Door/Canopy hose and Aircraft Cabin Sensor hose from the respective parts located on the pressure test unit.
64. Remove Supply Adapter hose (K-4946) from test point 32.
65. Install cap on test point 32. Torque cap 70-80 in/lbs.
66. Remove Sensing Adapter hose (K-4943) from test point 30.
67. Install cap on test point 30. Torque cap 45-55 in/lbs.



Supply Adapter Hose
K-4946



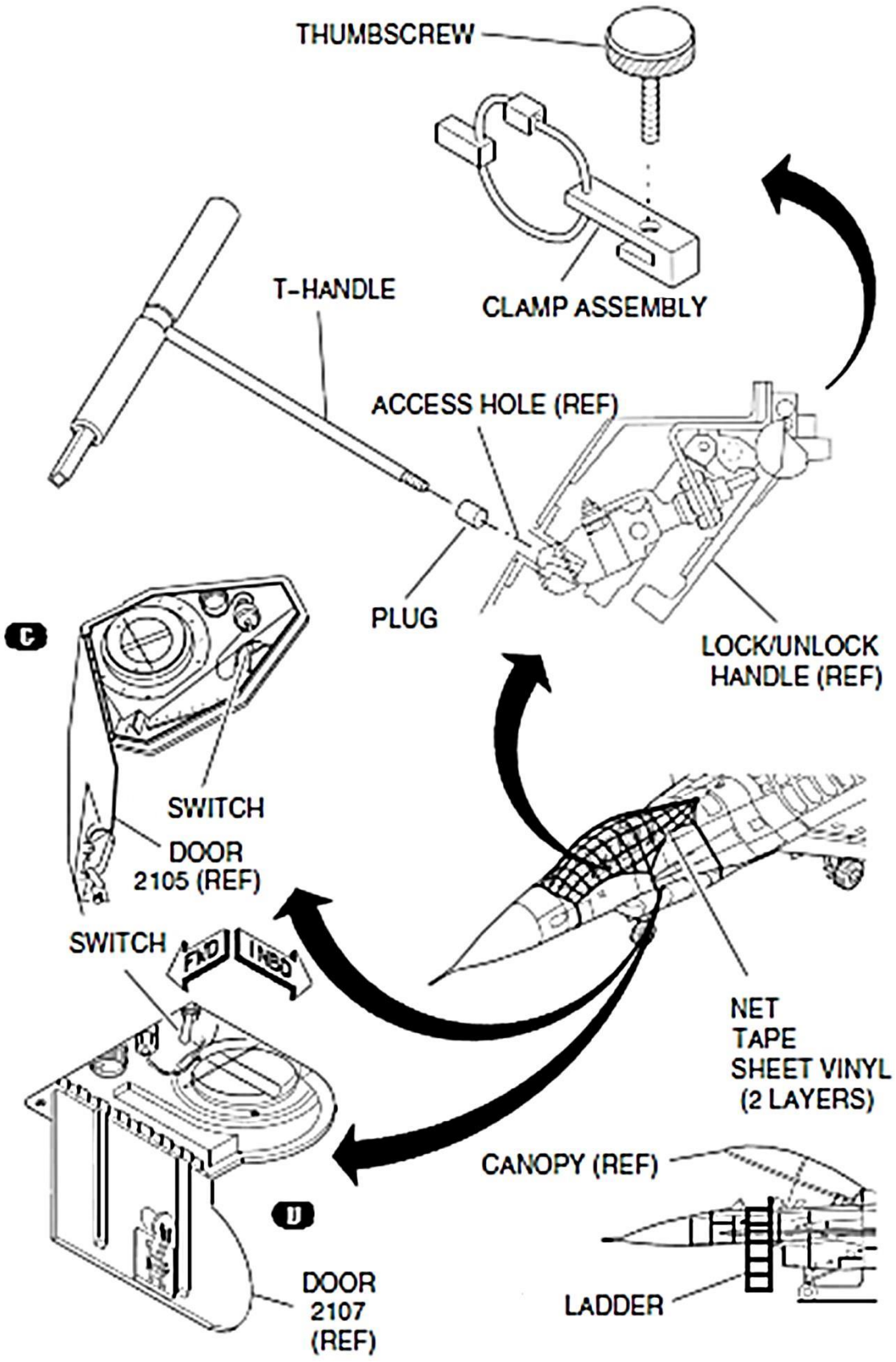
Sensing Adapter Hose
K-4943


C
TEST POINT
31 (REF)
CAP
FWD
INBD
AIR SUPPLY
HOSE
TEST POINT
30 (REF)
CAP
REDUCER
ADAPTER HOSE
STATIC PRESSURE
HOSE
TEST POINT 32
(REF)
CAP
REDUCER
ADAPTER HOSE
CANOPY SEAL
HOSE
ADAPTER HOSE
D
TEST POINT
31 (REF)
REDUCER
ADAPTER
HOSE
TEST POINT
32 (REF)
CAP
CAP
ADAPTER HOSE
CAP
CANOPY
SEAL HOSE
REDUCER
ADAPTER HOSE
TEST POINT
30 (REF)
AIR SUPPLY
HOSE
STATIC PRESSURE HOSE

68. Remove canopy safety net, tape, and two layers of sheet vinyl from canopy.
69. Remove plug from canopy lock/unlock handle access hole. Discard plug.

    NOTE: Canopy lock T-handle shall be inserted through access hole and pressed against canopy lock/unlock handle (to unlock canopy from outside aircraft with cabin unoccupied).

70. Using T-handle, press against lock/unlock handle and unlock canopy.
71. Position and hold canopy external open/close switch (access door **C** 2105 **D** 2107 Access Panels And Doors (1.2)) to close until canopy is fully open and then release switch.
72. Install crew entry ladder.
73. Loosen knurled thumbscrew and remove canopy lock clamp assembly from canopy lock/unlock handle.
74. Close and latch access door **C** 2105 **D** 2107. Access Panels And Doors (1.2).
75. Install new plug in canopy lock/unlock handle access hole. Torque plug 15-25 in/lbs.


THUMBSCREW
CLAMP ASSEMBLY
T-HANDLE
ACCESS HOLE (REF)
PLUG
LOCK/UNLOCK HANDLE (REF)
C
SWITCH
DOOR 2105 (REF)
SWITCH
FWD
REV
NET
TAPE
SHEET VINYL (2 LAYERS)
CANOPY (REF)
U
DOOR 2107 (REF)
LADDER

FOLLOW-ON MAINTENANCE: None

76. 4 Install combined altitude radar altimeter receiver-transmitter unit/ signal data converter (JG94-62-02).

NOTE: Engauge fasteners. Tighten as required to clamp up and fair in panel/door to match adjacent structure with no looseness in joint.

77. C Install access panel 2409 and install two fasteners. ACCESS PANELS AND DOORS
78. Close access door 2101 and install 20 fasteners. Access Panels And Doors
79. Close access door 2202 and install 20 fasteners. Access Panels And Doors
80. Close access door 1202 and install 14 fasteners. Access Panels And Doors
81. Close access door 1101 and engauge 14 fasteners. Access Panels And Doors

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APPENDIX III

Leak Flow Rate Measurement
Test Procedure

LEAK FLOW RATE MEASUREMENT TEST PROCEDURE

This test procedure should be used when the aircraft manufacturer requires Cabin air leakage be measured in terms of air flow; scfm (standard cubic feet per minute).

DANGER!

To prevent personal injury and/or damage to the aircraft:

1. **ALWAYS follow the aircraft manufacturer's instructions for pressurizing aircraft.**
2. **NEVER operate this Cabin Pressure Tester prior to reading and understanding this Operation and Service Manual.**

1. Determine the aircraft pressurization limits and leakage rates from the aircraft manufacturer's manual. A form for recording this data is provided at the end of this procedure.
2. Set aircraft cabin pressurization controls in the cabin in accordance with the aircraft manufacturer's instructions for ground pressurization testing using an external air source.
3. Secure all aircraft windows, access panels, and doors as if preparing the aircraft for takeoff.
4. Close the Cabin Pressure Tester Shut off valve located on the Cabin Supply Hose.
5. Ensure that the Pressure Regulator is turned fully counter-clockwise.
6. Ensure that the Door Seal Regulator knob is turned fully counter-clockwise.
7. Connect the compressed air source to the Supply Air In connection on the Cabin Pressure Tester.
8. Verify that the System Pressure gauge on the Cabin Pressure Tester indicates 0 psig.
9. Connect all hoses from the Cabin Pressure Tester to the aircraft (see Appendix II for a list of adapters).
10. Inflate door seals, using the Door Seal Regulator and gauge per aircraft manufacturer's instructions.
11. Open the ball valve to allow air to enter the aircraft cabin.
12. Slowly rotate the handle on the Pressure Regulator clockwise to begin increasing the pressure inside the aircraft cabin
    a. The Cabin Pressure Tester climb/descent rate gauge will start reading (on most aircraft) showing air is going into the aircraft.
    b. The climb/descent rate gauge indicates an **increase** in pressure when the needle moves in the **DOWN** direction (counter-clockwise).
    c. Check and correct any leaks in the air supply hose connections between Cabin Pressure Tester and aircraft as these will contribute to the aircraft leakage rate and give erroneous readings.
    NOTE: Do not exceed the maximum rate of descent specified by the aircraft manufacturer.
13. As the cabin pressure approaches the test pressure specified by the aircraft manufacturer, begin turning the Pressure Regulator counter-clockwise to slow down the rate of pressure increase.
14. When the specified cabin test pressure has been reached, adjust the Pressure Regulator as required to maintain the test pressure, and to achieve a Climb/Descent Rate equal to 0 ft/min.
    NOTE: Prior to each use, the regulator must be adjusted to its minimum setting and reset as required.

WARNING!

- **Damage to the aircraft instrumentation is possible.**
- **Do not exceed aircraft manufacturer's rate of climb specification.**
- **Do not exceed the rate of descent specified by the aircraft manufacturer.**
- **To prevent personal injury, attach warning tags to all door handles: "DO NOT OPEN".**

CAUTION!

To obtain true aircraft Cabin feedback data and prevent over- pressurizing the aircraft cabin:

1. **All connections must be tight and free of leaks.**
2. **Aircraft connection port must be unobstructed and connected directly to the cabin area.**

15. Maintaining the Cabin Pressure Tester's Climb/Descent Rate indicator at zero, record the following data:
    a. Flowrate
    b. Cabin Pressure
5. After the data has been obtained, close the ball valve located on the Cabin Supply Hose and allow the aircraft cabin pressure to bleed off to zero.

NOTES:
1. **If the bleed off rate is low, disconnect the compressed air supply to the Cabin Pressure Tester, and open the ball valve slightly to increase bleed off rate, however, do not exceed rate of descent limits.**
2. **The rate of climb gauge shows DECREASE in cabin pressure when the needle moves in the UP direction, (clockwise).**

17. Ensure all cabin pressure is bled off.

Test Procedure continued on following page.

LEAK FLOW RATE MEASUREMENT TEST PROCEDURE

NOTE: If the leakage rate is too high, the required pressure may not be attainable. At this point, record the data stated in Step 15 in Data Sheet .

WARNING!

- **Damage to the aircraft instrumentation is possible.**
- **DO NOT exceed aircraft manufacturer's rate of descent specification.**

DATA SHEET: LEAK RATE MEASUREMENT

Aircraft :	**Notes:**
Aircraft Registration No:	
Pressures: • Not to exceed _____psig • Safety Valve Operation _____psig • Leakage Test _____psig	
Rate of Climb (not to exceed): Ascent _____ft/min Descent _____ft/min	
Cabin Leakage Limit: Indicated Leakage Flowrate _____SCFM	
Tested By: Date:	
Repair Station Cert. No:	

APPENDIX IV

Pressure Decay Test Procedure

This test procedure should be used when the aircraft manufacturer requires cabin air leakage be measured in terms of pressure decay during a period of time; seconds.

PRESSURE DECAY TEST PROCEDURE

This test procedure should be used when the aircraft manufacturer requires Cabin air leakage be measured in terms of pressure decay during a period of time; seconds.

DANGER!

To prevent personal injury and/or damage to the aircraft:

1. **Always follow the aircraft manufacturer's instructions for pressurizing aircraft.**
2. **Never operate this Cabin Pressure Tester prior to reading and understanding this Operation and Service Manual.**

The Pressure Decay method determines cabin air leakage by measuring the time required for the cabin pressure to drop from a set pressure to a lower pressure. The time is normally measured in seconds. A stopwatch readable in 1/10 of a second may be used for this test.

1. Determine the aircraft pressurization limits and leakage rates from the aircraft manufacturer's manual. A form for recording this data is provided at the end of this procedure.
2. Set aircraft cabin pressurization controls in the cabin in accordance with the aircraft manufacturer's instructions for ground pressurization testing using an external air source.
3. Secure all aircraft windows, access panels, and doors as if preparing the aircraft for takeoff.
4. Close the Cabin Pressure Tester shut-off valve located on the Cabin Supply Hose.
5. Ensure that the Pressure Regulator is turned fully counter-clockwise.
6. Ensure that the Door Seal Regulator knob is turned fully counter-clockwise.
7. Connect the compressed air source to the Supply Air In connection on the Cabin Pressure Tester.
8. Connect all hoses from the Cabin Pressure Tester to the aircraft (See Adapters Appendix II).
9. Inflate door seals, using the Door Seal Regulator and gauge per aircraft manufacturer's instructions.
10. Open the ball valve to allow air to enter the aircraft cabin.
11. Slowly rotate the handle on the Pressure Regulator clockwise to begin increasing the pressure inside the aircraft cabin
    a. The Cabin Pressure Tester climb/descent rate gauge will start reading (on most aircraft) showing air is going into the aircraft.
    b. The climb/descent rate gauge indicates an **increase** in pressure when the needle moves in the **DOWN** direction (counter-clockwise).
    c. Check and correct any leaks in the air supply hose connections between Cabin Pressure Tester and aircraft as these will contribute to the aircraft leakage rate and give erroneous readings.

    NOTE: Do not exceed the maximum rate of descent specified by the aircraft manufacturer.
12. As the cabin pressure approaches the test pressure specified by the aircraft manufacturer, begin turning the Pressure Regulator counter-clockwise to slow down the rate of pressure increase.
13. When the specified cabin test pressure has been reached, adjust the Pressure Regulator as required to maintain the test pressure, and to achieve a Climb/Descent Rate equal to 0 ft/min.

    NOTE: Prior to each use, the regulator must be adjusted to its minimum setting and reset as required.

WARNING!

- **Do not exceed the maximum rate of descent specified by the aircraft manufacturer.**
- **Damage to the aircraft instrumentation is possible.**
- **DO NOT exceed aircraft manufacturer's rate of climb specification.**

CAUTION!

To obtain true aircraft cabin feedback data and prevent over- pressurizing the aircraft cabin:

1. **All connections must be tight and free of leaks.**
2. **Aircraft connection port must be unobstructed and connected directly to the cabin.**
3. **To prevent personal injury, attach warning tags to all door handles: "DO NOT OPEN".**

14. With the rate of climb gauges stabilized at zero (0), the following tasks must be performed in rapid succession:
    a. Close the Aircraft Cabin Supply Air ball valve located on the Cabin Supply Hose.
    b. Start the stop watch.
    c. Record the elapsed time rate between the two specified pressure levels.
15. After the data has been obtained, close the aircraft cabin supply air ball valve and allow the pressure to bleed off to zero.

Test Procedure continued on following page.

PRESSURE DECAY TEST PROCEDURE

NOTES: ***1. If the bleed off rate is low, disconnect the compressed air supply to the Cabin Pressure Tester, and open the ball valve slightly to increase bleed off rate, however, do not exceed rate of descent limits.***
2. The rate of climb gauge shows DECREASE in cabin pressure when the needle moves in the UP direction, (clockwise).

16. Ensure all cabin pressure is bled off.

DANGER!

Under possibility of bodily injury, DO NOT open cabin door until:

1. **Tapped cabin feed back pressure gauge reads zero (0).**
2. **Disconnected air supply hose from cabin pressurization unit is checked to assure no air is coming from aircraft.**
3. **Slowly unlatch cabin door.**

DATA SHEET: PRESSURE DECAY METHOD

Aircraft :	**Notes**
Aircraft Registration No:	
Pressures: • Not to exceed _____psig • Safety Valve Operation _____psig • Leakage Test: Initial Pressure _____psig Final Pressure _____psig	
Rate of Climb (not to exceed): • Ascent _____ft/min • Descent _____ft/min	
Cabin Pressure Decay: • Specification Time Limit _____sec • Actual Time _____sec	
Tested By:_____Date:_____	
Repair Station Cert. No:_____	
AIRCRAFT CABIN PRESSURE, NOT CABIN PRESSURE TESTER SYSTEM PRESSURE	

APPENDIX V

Declaration of Conformity

DECLARATION of CONFORMITY

The design, development and manufacture is in accordance with European Community guidelines

CABIN PRESSURE/LEAKAGE TESTER

Relevant provisions complied with by the machinery:
2006/42/EC

Relevant standards complied with by the machinery:
EN ISO 12100-1
BS EN 983:1996
BS EN 1050:1997
prEC 1915-1:1995

Identification of person empowered to sign on behalf of the manufacturer:

Patrick Finch

Quality Assurance Representative

Tronair, Inc.
1 Air Cargo Pkwy East
Swanton, OH 43558

Phone: (419) 866-6301 | 800-426-6301
Web: www.tronair.com
Email: sales@tronair.com

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APPENDIX VI

Vertical Speed Indicator
Calibration Data

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APPENDIX VII

Pressure Gauge Calibration Data

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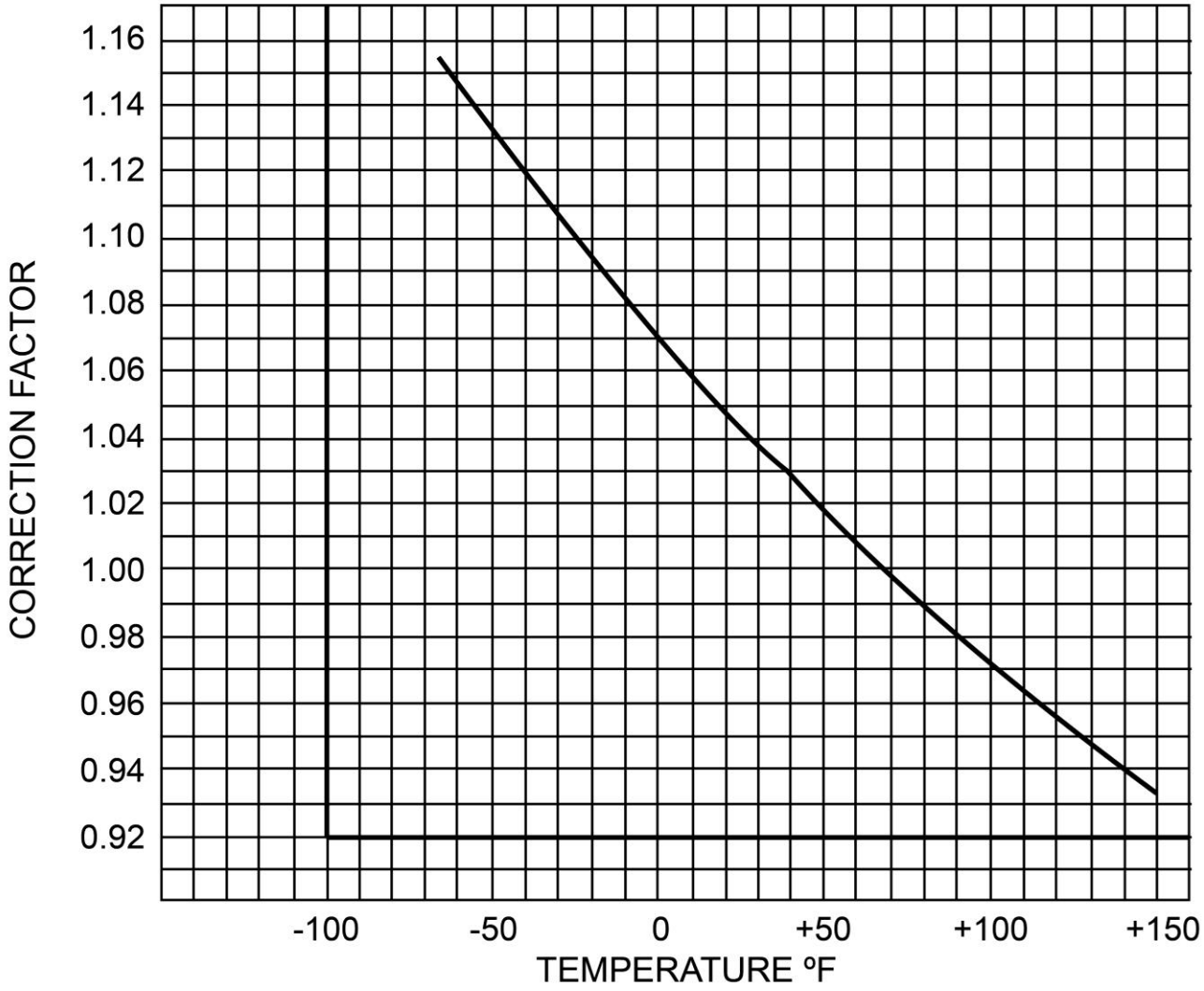
APPENDIX VIII

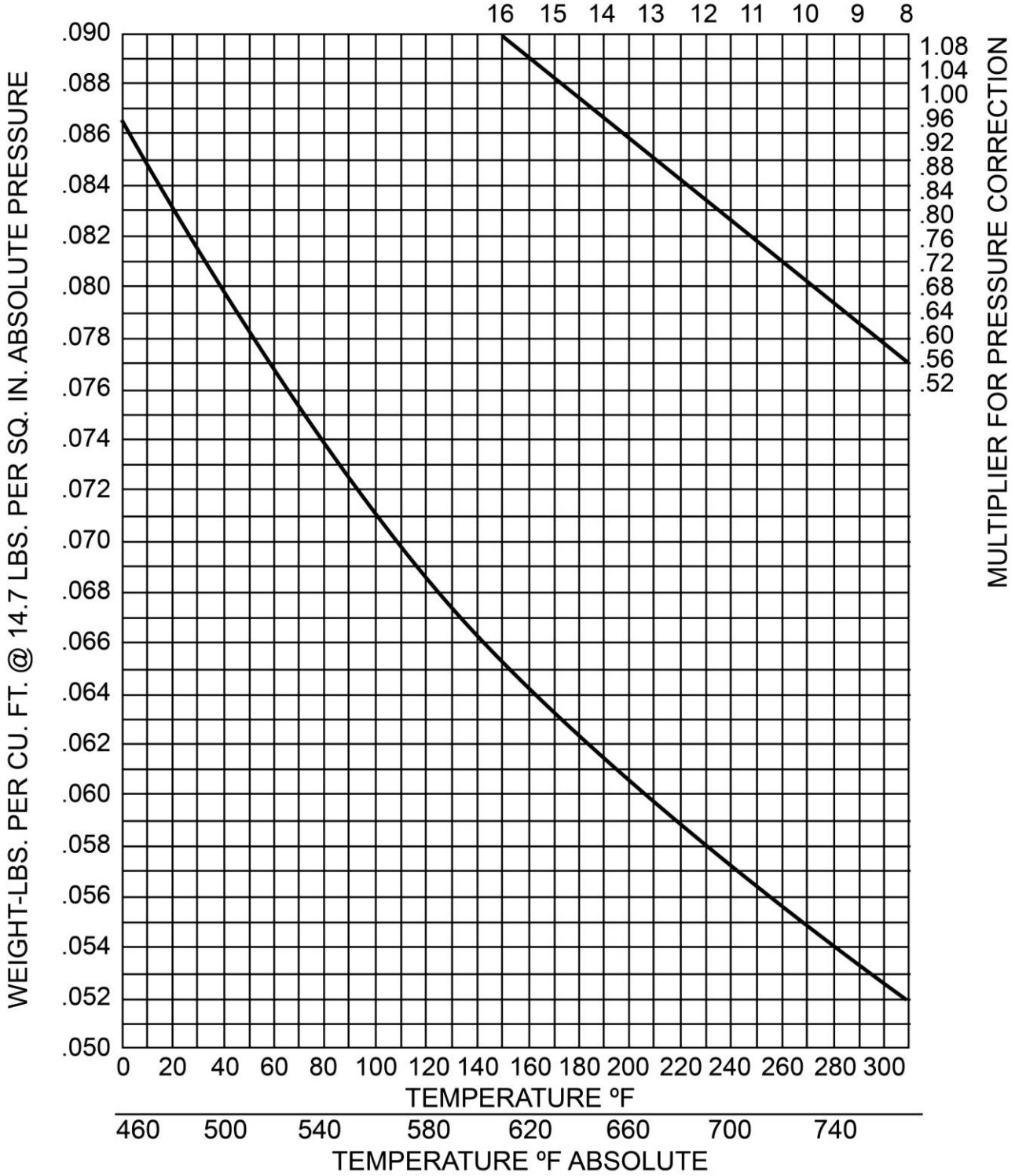
Flowmeter Temperature Correction Chart
And
Conversion Chart
Cubic Feet to Pounds per Minute

Flowmeter Temperature Correction Chart

Indicate Flow X Correction Factor = Corrected Flow



Conversion Chart - Cubic Feet to Pounds Per Minute



APPENDIX IX

Instrument Certification Notice

Instrument Certification Notice

The gauge Certificates of Calibration supplied for the gauge(s) on this unit contain the calibration data for the actual instrument calibrated, along with the calibration date of the **STANDARD** used to perform the calibration check.

The due date for re-calibration of the instrument should be based upon the date the instrument was placed in service in your facility. Re-calibration should be done on a periodic basis as dictated by the end user's quality system or other overriding requirements.

Note that Tronair, Inc. does not supply certificates of calibration on flow meters or pyrometers unless requested at the time of placed order. These instruments are considered reference indicators only and are not critical to the test(s) being performed on the aircraft.

Tronair, Inc.
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