



2311FA **Pressure Tester**

USER INSTRUCTION MANUAL
BARFIELD M/N 2311FA

56-101-00212
Revision D
September 16, 2014

BARFIELD, INC.

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SAFETY

Before using this instrument the operator should read and understand all of the related data. This includes the applicable local safety procedures, this publication, and the instructions for the accessories/options/equipment you are using it with and the system under test.

Before you start an operation or procedure in this publication, make sure that you have the necessary skills (if necessary, with qualifications from an approved training establishment).

Follow good engineering practice at all times.

GENERAL WARNINGS

- It is dangerous to ignore the specified limits for the instrument or to use the instrument when it is not in its normal condition. Use the applicable protection and obey all safety precautions.
- Do not use the instrument in locations with explosive gas, vapor or dust. There is a risk of an explosion.
- Be sure all hydraulic connections are of the proper pressure rating and are fully tightened.
- When adding or draining fluids, utilize appropriate skin and eye protection.
- It is not recommended that a pressure gauge be used for multiple applications having different fluids in use as cross contamination and even explosive failure may occur (Ref. ASME B40.100-2005).
- Never operate the tester without an open vent plug or equivalent installed on the reservoir.
- Read and understand this manual, as stated by the WARNING label below.

PRESSURE WARNINGS

- Many liquid and gas mixtures are dangerous. This includes mixtures that occur due to contamination. Ensure that the equipment is safe to use with all accessories.
- Pressurized gases and fluids are dangerous. Before attaching or disconnecting pressure equipment, safely release all pressure.
- Prevent a dangerous release of pressure by making sure all the related pipes, hoses and equipment have the correct pressure rating, are safe to use and are correctly attached.

SYMBOLS ON THE INSTRUMENT



CAUTIONS

- To prevent damage to the instrument, do not let dirt get into the pressure mechanism. Before you attach equipment, make sure it is clean.
- Do not allow Master Gauge to go below zero.
- Never apply a vacuum or a hydraulic vacuum to the Master Gauge.
- Never insert objects into the Master Gauge.
- Never operate the tester without an open vent plug or equivalent installed on the reservoir.
- A Vented Plug must be installed on the reservoir before Tester use.
- Make sure that the maximum working pressure of the Tester (600 psig), or the maximum working pressure of the Master Gauge being used, whichever is lowest, is not exceeded during the test.
- Place a rag over the Vented Plug while removing it, to avoid possible exhaust spray.
- Use Teflon tape if necessary to help prevent leaks.
- Teflon tape is an excellent thread sealer; however, if not properly applied, pieces may enter the hydraulic system and cause malfunctions or damage.
- When changing from one type of fluid to another, complete disassembly and cleaning is necessary to prevent contamination of the system being checked, following the procedure of section 2.2.
- Do not use *alcohol* to clean the O-rings.



ATTENTION

Although every effort has been made to provide the end user of this equipment with the most current and accurate information, it may be necessary to revise this manual in the future. Please be sure to complete and return the enclosed **OWNER WARRANTY REGISTRATION CARD** to Barfield in order to validate the warranty and to ensure that you will receive updated information when published. You **MUST** have your name and address on file at Barfield as a registered user of this equipment, to be able to obtain the service covered by the warranty.

Visit the company website, <http://barfieldinc.com/>, for publication updates.

Please send the Registration Card to:

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Miami, FL 33142 USA

CONTACT INFORMATION

Users are requested to notify the manufacturer of any discrepancy, omission, or error found in this manual. Inquiries should include specific questions and reference the publication title, number, chapter, page, figure, paragraph, and effective date.

Please send comments to:

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REVISION RECORD

REV.	ECO #	REV. DATE	DESCRIPTION OF CHANGE
A	N/A	04/01/99	Initial Release
B	260-00717	01/25/08	Chapters 2 and 3 were reorganized. Updated Fig. 1, 4 and 5, Table of Gauges, and Maintenance Information. Updated Manual Format.
C	260-00829	04/12/11	Updated warranty information.
D	260-01009	9/16/14	Reformatted for CE, updated logo

MAINTENANCE AND REPAIR INFORMATION

The manufacturer of this equipment does not recommend the user to attempt any maintenance or repair. In case of malfunction, contact the manufacturer, to obtain the list of approved repair facilities worldwide, ensuring that this equipment will be serviced using proper procedures and certified instruments.

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INTRODUCTION

1. PUBLICATION BREAKDOWN

This user instruction manual establishes the standards of operation for the 2311FA Pressure Tester.

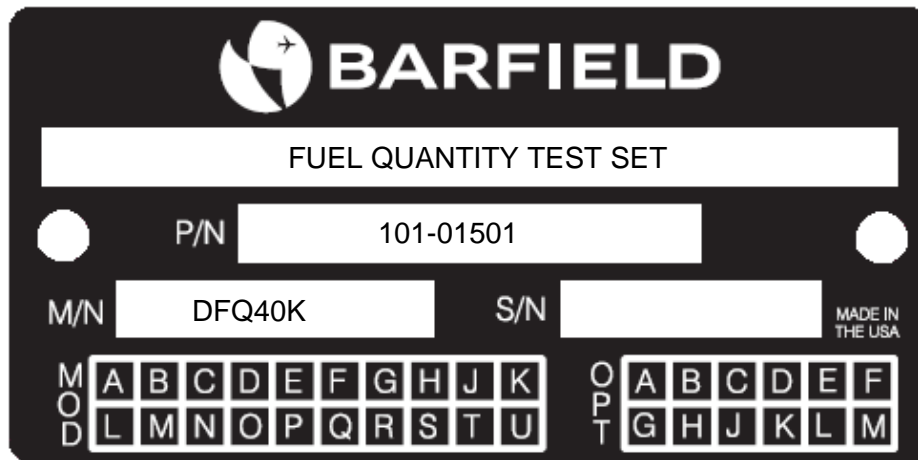
Its purpose is to provide sufficient information for the personnel unfamiliar with this Tester to understand this equipment, identify its parts, and operate it in accordance with proper procedures, operating techniques, precautions and limitations.

2. INFORMATION PROVIDED WITH THE UNIT

Besides this User Instruction Manual, the Tester is delivered with the items described below.

- A. The identification label, (Figure 1), located on the front bulkhead of the Test Set, provides the following information:

	Manufacturer Name
	Designation of Equipment
	Equipment Part Number
Equipment Model Number	Equipment Serial Number
Equipment Modification (if applicable)	Equipment Options (if applicable)



- B. Each new or re-certified unit is delivered with a Certificate that shows the date when the unit was tested by the manufacturer, its serial number, and when the next certification is due. This certificate confirms that the unit performed according to its design specifications.

3. RECERTIFICATION

The Test Set P/N 101-00212 has a one-year recertification requirement. Any attached Barfield Pressure Gauge also has a one-year recertification requirement. The Maintenance required by the Test Set and the Pressure Gauge must be performed by qualified technicians in a shop equipped with the necessary tooling and facilities.

LIMITED ONE YEAR WARRANTY

BARFIELD INC. ("BARFIELD") warrants only to the original Purchaser of this product from BARFIELD or an authorized distributor that this product will be free from defects in material and workmanship under normal use and service for one year after date of purchase. BARFIELD reserves the right, before having any obligation under this limited warranty, to inspect the damaged BARFIELD product, and all costs of shipping the BARFIELD product to BARFIELD for inspection shall be borne solely by the Purchaser. In order to recover under this limited warranty, Purchaser must make claim to BARFIELD within 60 days of occurrence, and must present acceptable proof of original ownership (such as a purchase order, invoice, warranty card registration, or other documentation BARFIELD deems acceptable) for the product. BARFIELD, at its option, shall repair or replace the defective unit covered by this warranty. Please retain the dated sales receipt as evidence of the original purchaser's date of purchase. You will need it for any warranty service. In order to keep this limited warranty in effect, the product must have been handled and used as prescribed in the instructions accompanying this product. This limited warranty does not cover any damage due to accident, misuse, abuse or negligence. This limited warranty is non-transferable and does not apply to any purchaser who bought the product from a reseller or distributor not authorized by BARFIELD, including but not limited to purchases from internet sites. This warranty does not affect any other legal rights you may have by operation of law. Contact BARFIELD at www.Barfieldinc.com or customer service at (305) 894-5506 for warranty service procedures.

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Form 7.5.3-13
Dated 09/01/2014, Rev. 1



Figure 2. LIMITED ONE YEAR WARRANTY

CHAPTER 1

GENERAL INFORMATION

1. PURPOSE OF THE UNIT

The Barfield Inc. 2311FA Pressure Tester, equipped with a suitable Pressure Gauge (not included), fulfills the need for field-testing of aircraft pressure systems for both reciprocating and turbine engines as well as airframe pressure systems. It provides pressure for driving all types of pressure transmitters, warning switches, pressure-type torque (BMEP) indicators and for system leak testing in the 0-600 PSI range. The Tester is proof-tested to 1200 psi.

2. DESCRIPTION

The Barfield Inc. 2311FA Pressure Tester (Fig. 3) consists of a cylinder equipped with a manually operated piston for obtaining the desired outlet pressure. A fluid reservoir, located on top of the cylinder, is connected through a control valve to the inside of the cylinder. A 1/8 NPT female outlet port is provided at the control valve for attachment to the unit or system to be tested. The Tester is portable, rugged, and accurate with a wide range capability. It is simple to operate, self-contained and, is both line and shop proven. Its dimensions and weight are listed in Table 1.

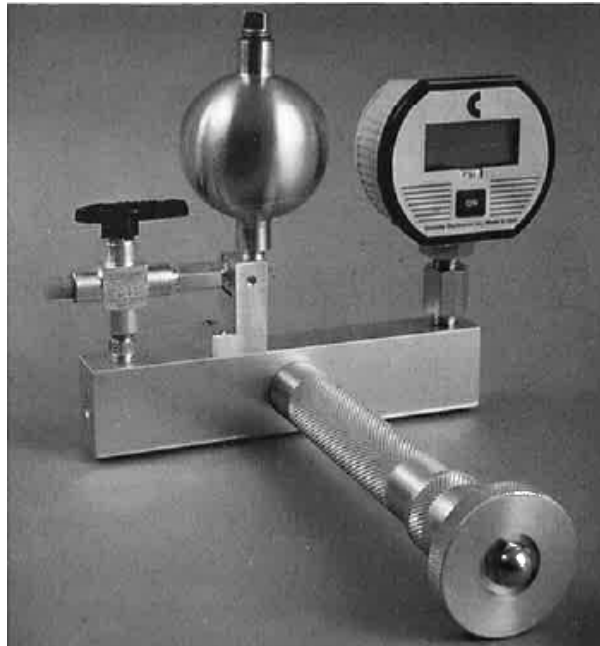


Figure 3. 2311FA PRESSURE TESTER WITH A DIGITAL GAUGE (not included)

Table 1. GENERAL SPECIFICATIONS

Operating temperature	0 to 40°C (32 to 104°F)
Storage temperature	-20 to 60°C (-4 to 140°F)
Humidity	N/A
Pressure safety	Pressure Equipment Directive - Class: Sound Engineering Practice (SEP)
Approved	Not CE Marked as per the Directive
Size (L: W: H)*	9.8in (24.9cm), 7.8in (19.8cm), 7.5in (19.1cm)
Weight*	3.0lbs (1.36kg)
Pressure connection	1/8 Female NPT
Pressure Gauge connection	1/4 Female NPT
Hydraulic fluid	Reservoir capacity: 134 cm ³ (8.18 in ³)

* The dimensions listed exclude the Master Pressure Gauge connected at the Adapter (#14, Figure 4). The range, accuracy and type for the Master Pressure Gauge, which is sold separately, depends on the requirements of the system(s) to be tested and the user's preferences.

3. RECOMMENDED GAUGES

A Master Pressure Gauge is connected at the Adapter (#14, Figure 4) to the right side of the manifold body. Three types of gauges are recommended and available depending on the requirements of the user: standard, inspector test, and digital.

Table 2. SPECIFICATIONS OF RECOMMENDED GAUGES

TYPE	ACCURACY	PRESSURE RANGE	BARFIELD P/N
STANDARD (ANALOG)	± 2% Full Scale	0-60 PSIG	304-00003
		0-200 PSIG	304-00004
		0-600 PSIG	304-00005
INSPECTOR TEST (ANALOG)	± 0.5% Full Scale	0-60 PSIG	304-00100
		0-100 PSIG	304-00101
		0-160 PSIG	304-00102
		0-200 PSIG	304-00109
		0-300 PSIG	304-00103
		0-600 PSIG	304-00104
DIGITAL	± 0.25% Full Scale	0-200 PSIG	304-00006
		0-500 PSIG	304-00007
		0-7 Bar	304-00008

4. RECOMMENDED FLUIDS

The use of VITON (Fluoro -carbon) seals on the piston permits the use of any fuel, lubricating or hydraulic fluid except Skydrol or automotive hydraulic fluid. Any mineral or vegetable oil may be used with VITON seals. *The principal NON-COMPATIBLE fluids which are NOT to be used with VITON seals are: alcohols, aldehydes, amines, alkyl phosphate esters (Skydrol), ethers and ketones.*

CAUTION: When changing from one type of fluid to another, complete disassembly and cleaning is necessary to prevent contamination of the system being checked, following the procedure of section 2.2.

5. CONSUMABLES

Vaseline FED SPEC W-P-236A

Teflon Tape MIL-T-27730A (obsolete), A-A-58092

Silicon Grease Parker Super-O-Lube, Dow Corning Molykote 55

6. SHIPPING AND STORAGE

A. Shipping

Prior to shipping it is recommended that the tester be drained of all fluid as detailed in Chapter 2 Section 2.

The metal components consist of brass, aluminum and corrosive resistant steel. Normal care and no abusive handling will provide a longer life for the Tester.

There is no limit to the manner of transport.

B. Short Term Storage

When storing the Tester for short periods it is recommended that:

1. There are no trapped pressures left.
2. The reservoir's vented plug is replaced with a solid plug.

CAUTION: A Vented Plug must be reinstalled on the reservoir before Tester use

3. The Selector Valve is positioned midway – pointing toward the back.
4. If any hose is left attached to the outlet port that it be capped.
5. The Tester is tagged with the type of fluid contained.

C. Extended Storage

If the Tester is to be stored for an extended period it is recommended that the tester be drained, disassembled, cleaned and reassembled as detailed in Chapter 2 Section 2.

CHAPTER 2

FILLING AND FLUID-CHANGING PROCEDURES

NOTE: When adding or draining fluids, utilize appropriate skin and eye protection as well as a work area that will prevent contamination of the work surface.

1. FILLING THE TESTER WITH FLUID

The Pressure Tester 2311FA is supplied empty for the convenience of the user, who can fill it with the liquid appropriate for its intended use (refer to Section 1.4, for the list of recommended fluids). For this first filling, or after the Tester has been emptied so its working fluid can be changed (as explained in the following section), applying the procedure below ensures that this task will be accomplished correctly, that is, without leaving any air bubbles trapped inside this equipment.

NOTE: Refer to Figure 4 to identify items referenced in this section.

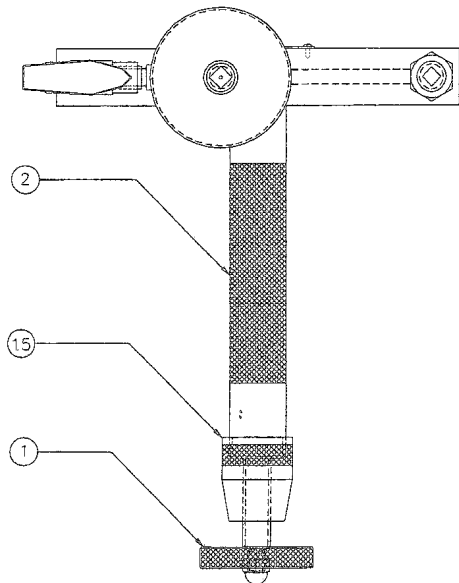
1. Verify that the Master Gauge connected at the Adapter (#14) has sufficient range and accuracy for the test to be performed. Verify that it is securely installed on the Tester.

CAUTION: Use Teflon tape if necessary to help prevent leaks.

2. Verify that the fluid to be used in the Tester is compatible with the unit and or the system to be tested (refer to Section 1.4, "Recommended Fluids").
3. Install a fitting (#18, not supplied) in the outlet of the Selector Valve (#9), which is a 1/8" NPT port. This fitting has to match with the hose or tubing that connects the Pressure Tester with the unit or system to be tested.
4. With the Selector Valve (#9) arrow pointing toward the Reservoir (#3), rotate the Screw Handle (#1) fully clockwise (CW).
5. Remove the Vented Plug (#16) from the Reservoir (#3). Fill the reservoir completely with the appropriate fluid.

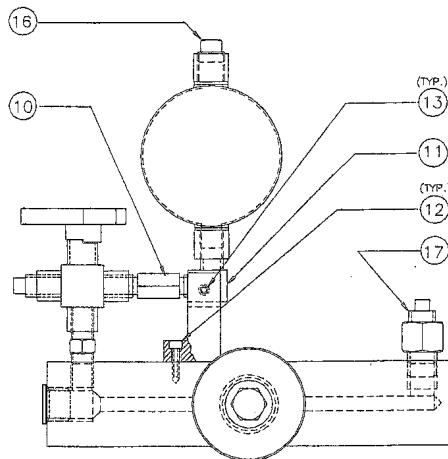
NOTE: Once filled, the Tester must be maintained in a position approximately level with the Reservoir (#3) up. If not, the fluid will spill through the Vented Plug (#16).

6. Rotate the Screw Handle (#1) fully counterclockwise (CCW) and add fluid to the reservoir until within 1/8 inch of full.
7. Rotate the Selector Valve 90° or halfway between the reservoir position and the outlet position.

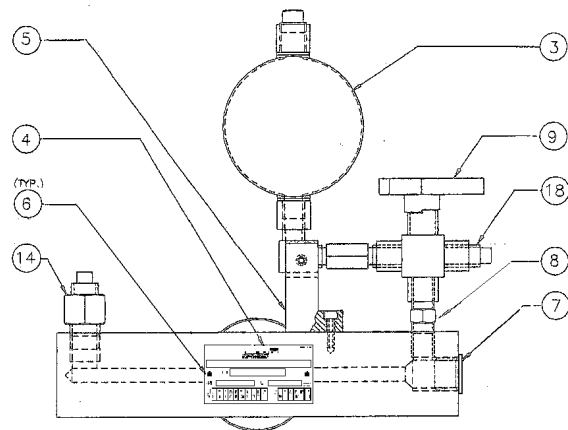


TOP VIEW

Item	Description
1	Piston, Shaft, and Handle Assembly
2	Manifold and Sleeve Assembly
3	Hydraulic Fluid Reservoir
4	Name Plate
5	Tank Fastening Spacer
6	Screw
7	Plug
8	Nipple
9	Selector Valve
10	Hex Long Nipple
11	Elbow
12	Cap Screw with Lock Washer
13	Set Screw
14	Adapter
15	Nut
16	Vented Plug
17	Cap
18	Outlet Fitting (Not Included)



FRONT VIEW



REAR VIEW

Figure 4. IDENTIFICATION OF PARTS OF THE 2311FA PRESSURE TESTER

NOTE: The Plug (#7) is needed only due to a manufacturing step of the Manifold (#2). This plug has no function in the operation of the Tester, and it is permanently attached to the Manifold. The user should not attempt to drive this Plug under any circumstance. This action could cause damage to the both parts, leading to leaks.

8. Gradually turn the Screw Handle (#1) CW while observing the Master Gauge until the gauge reaches full scale.
9. Allow a few seconds for the pressure to stabilize; then observe the Master Gauge for one minute to note if leakage occurs.

NOTE: Depending on the viscosity of the fluid in the Tester, a slight leakage may occur. If leakage is no more than 5% of full scale in one minute, the accuracy of later test readings will not be affected. However, the leakage rate must be considered if subsequent tests involve leak detection.

10. Rotate the Screw Handle (#1) CCW until the Master Gauge reaches zero.

CAUTION: Do not allow Master Gauge to go below zero.

11. Turn the Selector Valve (#9) arrow toward the Reservoir (#3) and continue rotating the Screw Handle (#1) fully CCW.
12. Turn the Selector Valve (#9) arrow toward the Outlet Fitting (#18) and **slowly** turn the Screw Handle (#1) until fluid appears at that port.
13. The Tester is now ready for use.

2. CHANGING THE TESTER FLUID

In the event that the working fluid of the Tester needs to be replaced with a different one, follow the procedure below to make sure that there will be no residues of the previous liquid remaining inside the Tester, which can contaminate the new fluid.

WARNING: Insure the Master Gauge reads zero before proceeding.

NOTE: Refer to Figure 4 to identify items referenced in this section.

1. Remove the Master Gauge from the Adapter (#14) using a wrench on the fitting only.

CAUTION: Do not attempt to turn the gauge by forcing the housing.

CAUTION: It is not recommended that a pressure gauge be used for multiple applications having different fluids in use as cross contamination and even explosive failure may occur (Ref. ASME B40.100-2005).

NOTE: To perform steps 2, 3, and 4 below, place the Tester inside a large plastic container to avoid spills of the hydraulic liquid.

2. Remove the Vented Plug (#16) from the Reservoir (#3).
3. Unscrew the Nut (#15) on the end of the cylinder and remove the Piston, Shaft, and Handle Assembly (#1) from the Tester.
4. Drain all the liquid from the Piston, Shaft, and Handle Assembly (#1) and from the Manifold and Sleeve Assembly (#2), in the plastic container referred above.

5. Carefully remove the O-rings from the Piston, Shaft, and Handle Assembly (#1) to avoid scratching the Piston. Rinse the O-rings in hot running water, and blow dry.

CAUTION: Do not use alcohol to clean the O-rings.

6. Rinse all metal parts in a solvent such as mineral spirits or naphtha. Then, rinse in hot running water.

NOTE: While cleaning and drying the Tester, turn the Selector Valve (#9) alternately between the Reservoir (#3) and the Outlet Fitting (#18) positions.

7. Drain all of the water. Then, rinse in alcohol and blow dry.

CAUTION: Do not use wood alcohol.

8. Install the O-rings (cleaned and dried in step 5) on the Piston, Shaft, and Handle Assembly (#1).

9. Using the large Nut (#15), assemble the Piston, Shaft, and Handle Assembly (#1) together with the Manifold and Sleeve Assembly (#2). To do this, lubricate the Threaded Shaft (#1) with commercial Vaseline, and the O-rings with silicon grease. Refer to Chapter 1 Section 5 for details.

10. Install the Master Gauge on the Adapter (#14) using Teflon tape.

11. Follow the procedure of Section 2.1, to fill the Tester with the new fluid.

CHAPTER 3

OPERATION

1. GENERAL

This chapter describes how to use the Pressure Tester 2311FA to deliver fluid, at the pressures needed by the user, to the unit or system to be tested.

2. OPERATION PROCEDURE

After completing all steps listed in Section 2.1 (Filling Procedure), connect, with the appropriate hose or tubing, the Tester Outlet Fitting (#18, not included) to the unit or system to be tested. The size of the outlet port of the Selector Valve (#9) is 1/8" NPT. Then, perform the following steps.

NOTE: Refer to Figure 4 to identify items referenced in this chapter.

CAUTION: Make sure that the maximum working pressure of the Tester (600 psig), or the maximum working pressure of the Master Gauge being used, whichever is lowest, is not exceeded during the test.

1. While observing the Master Gauge and the system or unit-under-test, and with the Selector Valve arrow (#9) pointing toward the Outlet Fitting (#18), rotate slowly the Screw Handle (#1) clockwise (CW), until reaching the desired testing pressure. Lightly tap the Master Gauge when taking test readings.

NOTE: When connected to units or systems with long lines, the Shaft Screw (#1) may reach the fully CW position, before the target testing pressure is achieved. If this happens, perform steps 2 through 9, and then continue with the rest of the test. If this situation does not happen, skip those steps and proceed directly to step 10.

2. Turn the Selector Valve arrow (#9) to point toward the Reservoir (#3).
3. Remove the Vented Plug (#16) from the Reservoir (#3).

CAUTION: Place a rag over the Vented Plug (#16) while removing it, to avoid possible exhaust spray.

4. Fill the Reservoir (#3) completely with the same type of fluid that was used during the previous steps.
5. Rotate the Screw Handle (#1) fully counterclockwise (CCW).
6. Refill the Reservoir (#3) until the level is approximately 1/8 inch under the top edge of the fitting.
7. Put the Vented Plug (#16) back in its place on the reservoir.
8. Turn the Selector Valve arrow (#9) to point toward the Outlet Fitting (#18).

9. Repeat step 1 above. If the required test pressure is not achieved yet, this cycle can be repeated as many times as needed.
10. After all testing is completed, rotate the Screw Handle (#1) CCW until the Master Gauge reaches zero pressure. If this Handle reaches full CCW before the Master Gauge reaches zero, skip step 11 and perform step 12 and on.

CAUTION: Do **NOT** keep rotating the Screw Handle CCW after the gauge indicates zero pressure.

11. Turn the Selector Valve (#9) toward the Reservoir (#3) and disconnect the test line between the Tester and the unit or system that was being tested.
12. If the Screw Handle (#1) reaches full CCW before the Master Gauge reaches zero, hold a rag over the Vented Plug (#16), because some overflow through it may occur, and turn the Selector Valve (#9) toward the Reservoir (#3). Rotate the Screw Handle (#1) fully CW.

NOTE: If a large volume of fluid was used during the test, to collect it back it is advisable to turn the Tester upside down, if the connecting hose allows it, and point the Vented Plug toward a container to receive the fluid.

13. Return the Selector Valve (#9) to the outlet position and repeat step 10. This cycle can be repeated as many times as necessary, in order to collect back the fluid pumped during the test.

CHAPTER 4

MAINTENANCE / REPAIR

1. MAINTENANCE

The term “Maintenance” refers to the action required for ordinary, periodic care to maintain the tester in serviceable condition.

Refer to Section 2 of Chapter 2 for detailed instructions on the disassembly, cleaning and reassembly of the tester in order to maintain the tester in serviceable condition.

2. REPAIR

The term “repair” refers to the action necessary to restore the tester to serviceable condition.

If during normal operation of the tester an excessive leak (more than 5% of full scale in one minute) is observed, then proceed as follows.

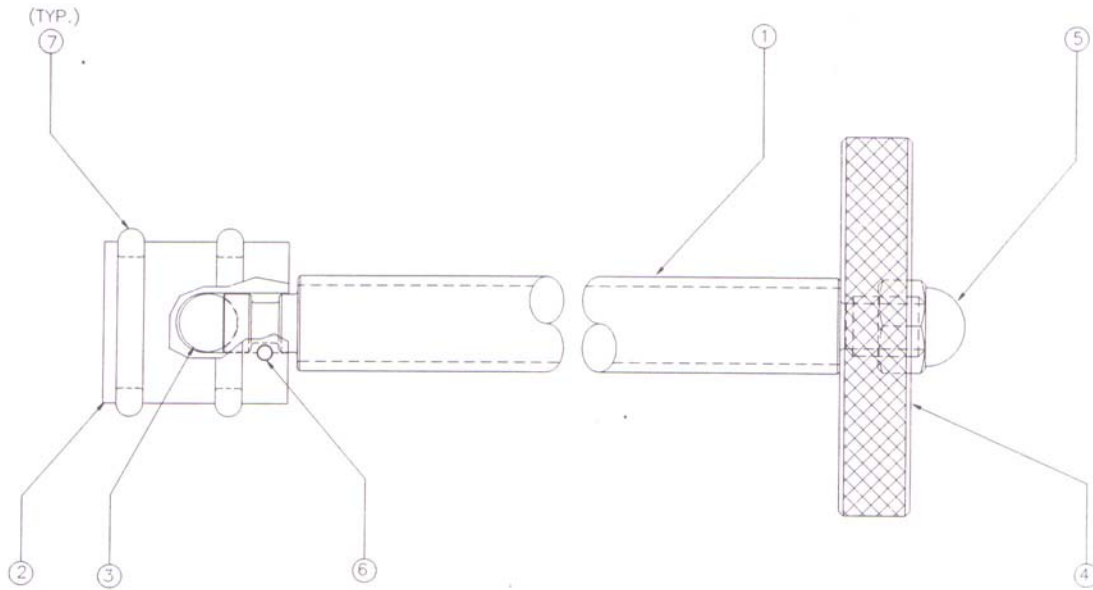
1. Return the Master Gauge to zero, reference instructions of Chapter 3.
2. Disconnect the tester from the unit or system under test.
3. Rotate the Selector Valve 90° or halfway between the reservoir position and the outlet position.
4. Gradually turn the Screw Handle (#1) CW while observing the Master Gauge until the gauge reaches full scale.
5. Allow a few seconds for the pressure to stabilize, then observe the Master Gauge for one minute to note the leakage.
6. If the excessive leak is no longer observed then the leak is in the unit or system under test or in the interconnecting lines or both.

NOTE: Subtract Tester leak from that observed with the entire system.

7. If the same excessive leak is still observed then visually inspect the tester for evidence of fluid leaking, paying particular attention to the connection for the Master Gauge.
8. If there is visual evidence found then note where and return the Master Gauge to zero.

CAUTION: Do **NOT** keep rotating the Screw Handle CCW after the gauge indicates zero pressure.

9. Fix the leak by tightening the fitting or by draining, disassembling as per Chapter Section 2 and applying new Teflon tape then reassemble, refill and repeat the test again.
10. If there was no visual evidence found then the problem may be the 2 O-Rings (#7) located on the piston (#2) of Figure 5.



2311FA
ASSEMBLY PISTON, SHAFT AND HANDLE
Figure 5

11. Unscrew the large nut (#15, Refer to Figure 4) at the end of the cylinder and carefully withdraw from the Sleeve (#2, Refer to Figure 4).
12. Carefully remove the O-Rings from the Piston, Shaft, and Handle Assembly (#1) to avoid scratching the Piston.
13. Carefully install 2 new O-Rings M83248-1-115 (see Chapter 1 Section 5) onto the Piston, applying Vaseline on the Shaft Screw and Silicone on the O-Rings.
14. Carefully insert the Piston into the Sleeve of the Manifold and Sleeve Assembly and push it in until the Shaft Retaining Nut can be screwed in the thread of the Sleeve and tighten the nut securely to 10.0 in-lbs (1.13 N-m).