

2311FA Pressure Tester

USER INSTRUCTION MANUAL
M/N: 2311FA, P/N: 101-00212

Doc. P/N: 56-101-00212
Revision E
August 8, 2023



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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 or components under test.

This equipment was designed to be safe when used as per the procedures of this Instruction Manual.

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).

Always follow good engineering practices.

WARNING: A **WARNING** notice indicates a hazard with a potential for property damage, personal injury, or death if the instructions are not followed. The operator should not proceed beyond the **WARNING** notice until required conditions are understood and fully complied with.

CAUTION: A **CAUTION** notice indicates a hazard with a potential for damage to the equipment and or loss of data if the instructions are not followed. The operator should not proceed beyond the **CAUTION** notice until required conditions are understood and fully complied with.

GENERAL WARNINGS

WARNING: Do not use this equipment when it is not in its normal condition.

WARNING: When testing with this equipment follow the appropriate procedures as per the **WARNING** label.

WARNING: Do not use this equipment for purposes other than as specified in this manual.

WARNING: Do not use this equipment in an atmosphere with explosive gas, vapor, or dust.

WARNING: Utilize appropriate skin and eye protection when adding or draining fluids.

WARNING: It is not recommended that the same pressure gauge be used for different fluids as cross-contamination and even explosive failure may occur (Ref. ASME B40.100-2005).

WARNING: Do not use this equipment without an open vent plug or equivalent installed on the reservoir.

PRESSURE WARNINGS

WARNING: Ensure that the equipment is safe to use with all accessories. Many liquid and gas mixtures are dangerous. This includes mixtures that occur due to contamination.

WARNING: Before attaching or disconnecting pressure equipment, safely release all pressure. Pressurized gases and fluids are dangerous.

WARNING: 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.

CAUTIONS

- CAUTION:** To prevent damage to the instrument, do not let dirt get into the pressure mechanism. Before you attach equipment, make sure it is clean.
- CAUTION:** Do not allow Master Gauge to go below zero.
- CAUTION:** Do not apply vacuum or a hydraulic vacuum to Master Gauge.
- CAUTION:** Do not insert objects into the Master Gauge.
- CAUTION:** A Vented Plug must be installed on the reservoir before Tester use.
- 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.
- CAUTION:** Place a rag over the Vented Plug while removing it, to avoid possible exhaust spray.
- CAUTION:** Use Teflon tape if necessary to help prevent leaks.
- CAUTION:** Teflon tape is an excellent thread sealer; however, if not properly applied, pieces may enter the hydraulic system and cause malfunctions or damage.
- 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 **3.3 CHANGING TESTER FLUID**.
- CAUTION:** Do not use alcohol to clean the O-rings.

MARKING AND SYMBOLS



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:

TECHNICAL CUSTOMER SUPPORT - GSTE
BARFIELD, INC.
P.O. BOX 025367
MIAMI, FL 33102-5367
USA

Telephone **(305) 894-5400**
 (800) 321-1039

Fax **(305) 894-5401**

Email gsesales@barfieldinc.com

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.

BARFIELD PRODUCT SUPPORT DIVISION

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REVISION RECORD

REV.	ECO #	REV. DATE	DESCRIPTION OF CHANGE
A	N/A	April 1, 1999	Initial release.
B	260-00717	January 25, 2008	Chapters 2 and 3 were reorganized. Updated Figure 1, 4 and 5, Table of Gauges, and Maintenance Information. Updated Manual Format.
C	260-00829	April 12, 2011	Updated warranty information.
D	260-01009	September 16, 2014	Reformatted for CE and updated logo.
E	260-01426	August 8, 2023	Complete revision.

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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 it, identify its parts, and operate it in accordance with proper procedures, operating techniques, precautions, and limitations.

Note: The manufacturer has designed this equipment to be safe when operated using the procedures and instructions detailed in this manual. Do not use this equipment for any other purpose than that stated.

2. INFORMATION PROVIDED WITH THE TEST SET

In addition to this User Instruction Manual, the Test Set is delivered with the four information items described below.

- A. The identification label (refer to Figure 1) is located above the handle of the Test Set case and provides the following information:

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

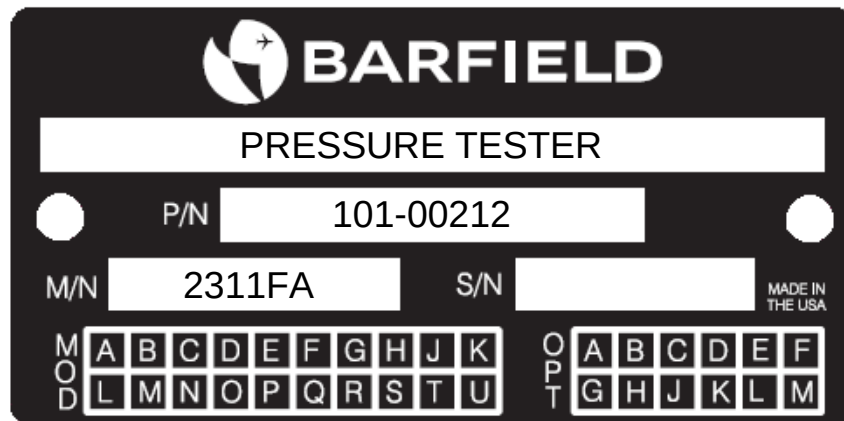


Figure 1 Identification Label

- B. The Owner's Warranty Registration card (refer to Figure 2), is to be completed by the owner and returned to Barfield, Inc. within **ten (10) days** of purchase to ensure automatic update of printed matter and validation of warranty.

To register your unit, please visit https://www.barfieldinc.com/warranty_registration or scan the QR code on the supplied Warranty Registration.



The image shows a 'WARRANTY REGISTRATION' card. At the top, it says 'WARRANTY REGISTRATION' in bold. Below that, it says 'Register your Barfield product in 2 minutes to get access to the latest technical updates and validate your warranty.' Then, it says 'You can use the following methods:'. There are two methods listed: 1. Use QR Code on the right: (bullet points: Open your phone camera, Aim the camera to the QR code, Click on the link.) 2. Visit our website: (bullet point: https://www.barfieldinc.com/warranty_registration). A QR code is shown to the right of the first method. At the bottom, it says 'Thank you for your purchase.' and the Barfield logo with the website 'www.barfieldinc.com'. In the bottom right corner, it says 'OW-28 REV / 5.0'.

Figure 2 Owner Warranty Registration Card

- C. Each new or re-certified unit is delivered with a Certificate (not pictured) 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.

- D. For 2311FA Limited One Year Warranty refer to Figure 3.

3. RECERTIFICATION

- A. The Test Set has a one-year recertification requirement. 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 resources. Contact Barfield for Maintenance and Calibration requirements.

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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BARFIELD INC.

*4101 NW 29th Street
Miami, Florida 33142, USA*

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



Figure 3 Limited Warranty

CHAPTER 1: GENERAL

1. INTENDED USE

- A. The Barfield 2311FA (P/N 101-00212) Pressure Tester, equipped with a suitable Pressure Gauge (not included), field-tests aircraft pressure systems for both reciprocating engines, turbine engines, and airframe pressure systems.
- B. The tester 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

- A. As depicted in Figure 4, the 2311FA 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.
- B. The Tester is portable, rugged, and accurate with a wide range capability. It is simple to operate, self-contained, and is line and shop proven.



Figure 4 2311FA Pressure Tester with a Digital Gauge (Not Included)

3. SPECIFICATIONS

Note: The dimensions listed below exclude the Master Pressure Gauge connected at the Adapter (refer to Figure 6, item #14). The range, accuracy, and type for the Master Pressure Gauge (sold separately) depends on the requirements of the system(s) to be tested and the user's preferences (refer to Table 4).

A. Physical Characteristics

Size (H, W, L)	9.8 in. (24.9 cm), 7.8 in. (19.8 cm), 7.5 in. (19.1 cm)
Weight	3.0 lbs. (1.36 kg)

Table 1 Physical Characteristics

B. Environmental

Operating Temp.	0°C to 40°C (32°F to 104°F)
Storage Temp.	-20°C to 60°C (-4°F to 140°F)
Operating Humidity	N/A
Pressure Connection	1/8 Female NPT
Pressure Gauge Connection	1/4 Female NPT
Hydraulic Fluid	Reservoir capacity: 134 cm ³ (8.18 in ³)

Table 2 Environmental

C. Conformity

Pressure Safety	Pressure Equipment Directive - Class: Sound Engineering Practice (SEP)
Approved	Not CE Marked as per the Directive

Table 3 Conformity

4. RECOMMENDED GAUGES

A. A Master Pressure Gauge is connected at the Adapter (refer to Figure 6, item #14) to the right side of the manifold body. Three types of gauges are recommended and available depending on the requirements of the user:

1. Standard
2. Inspector Test
3. Digital

Type	Accuracy	Pressure Range	Barfield P/N
Standard (Analog)	$\pm 2\%$ Full Scale	0-60 psig	304-00003
		0-200 psig	304-00004
		0-600 psig	304-00005
Inspector Test (Analog)	$\pm 0.5\%$ 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	$\pm 0.25\%$ Full Scale	0-200 psig	304-00006
		0-500 psig	304-00007
		0-7 Bar	304-00008

Table 4 Specifications of Recommended Gauges

5. RECOMMENDED FLUIDS

A. The use of Viton® (Fluorocarbon) 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.

B. Principal NON-COMPATIBLE fluids which are NOT to be used with Viton® seals include:

1. Alcohols
2. Aldehydes
3. Amines
4. Alkyl phosphate esters (Skydrol®)
5. Ethers
6. Ketones

CAUTION: WHEN CHANGING FROM ONE FLUID TO ANOTHER, COMPLETELY DISASSEMBLE AND CLEAN TESTER TO PREVENT CONTAMINATION OF THE CHECKED SYSTEM (REFER TO SECTION 3.3 CHANGING TESTER FLUID).

6. CONSUMMABLES

- A. Vaseline FED SPEC VV-P-236A
- B. Teflon Tape MIL-T-27730A (obsolete), A-A-58092
- C. Silicon Grease Parker Super-O-Lube, Dow Corning Molykote® 55

CHAPTER 2: INSTALLATION

1. ASSEMBLY

A. Package

Carefully unpack the Tester and conduct a visual inspection for evidence of damage that might have occurred during shipping. The user should take inventory of the package contents to ensure the following items are included:

1. 2311FA Pressure Tester, P/N 101-00212
2. Instruction Manual P/N 56-101-00212

B. Enclosure

1. A case, Barfield P/N 194-00079, facilitates protecting and carrying of the Tester. Case features include (refer to Figure 5):
 - a) An injected molded case. Airtight, watertight, and dustproof case.
 - b) An upper section with a lid which contains a custom PE foam insert to secure a hard copy of the instruction manual.
 - c) A lower section which contains a custom PE foam insert to secure the Tester and analog/digital gauge (not included) in place.

Note: Refer to Figure 5 for proper Tester orientation.



Figure 5 Container/Shipping Case, P/N 194-00079

CHAPTER 3: OPERATION

1. OPERATING CONTROLS

A. The 2311FA parts are depicted in Figure 6.

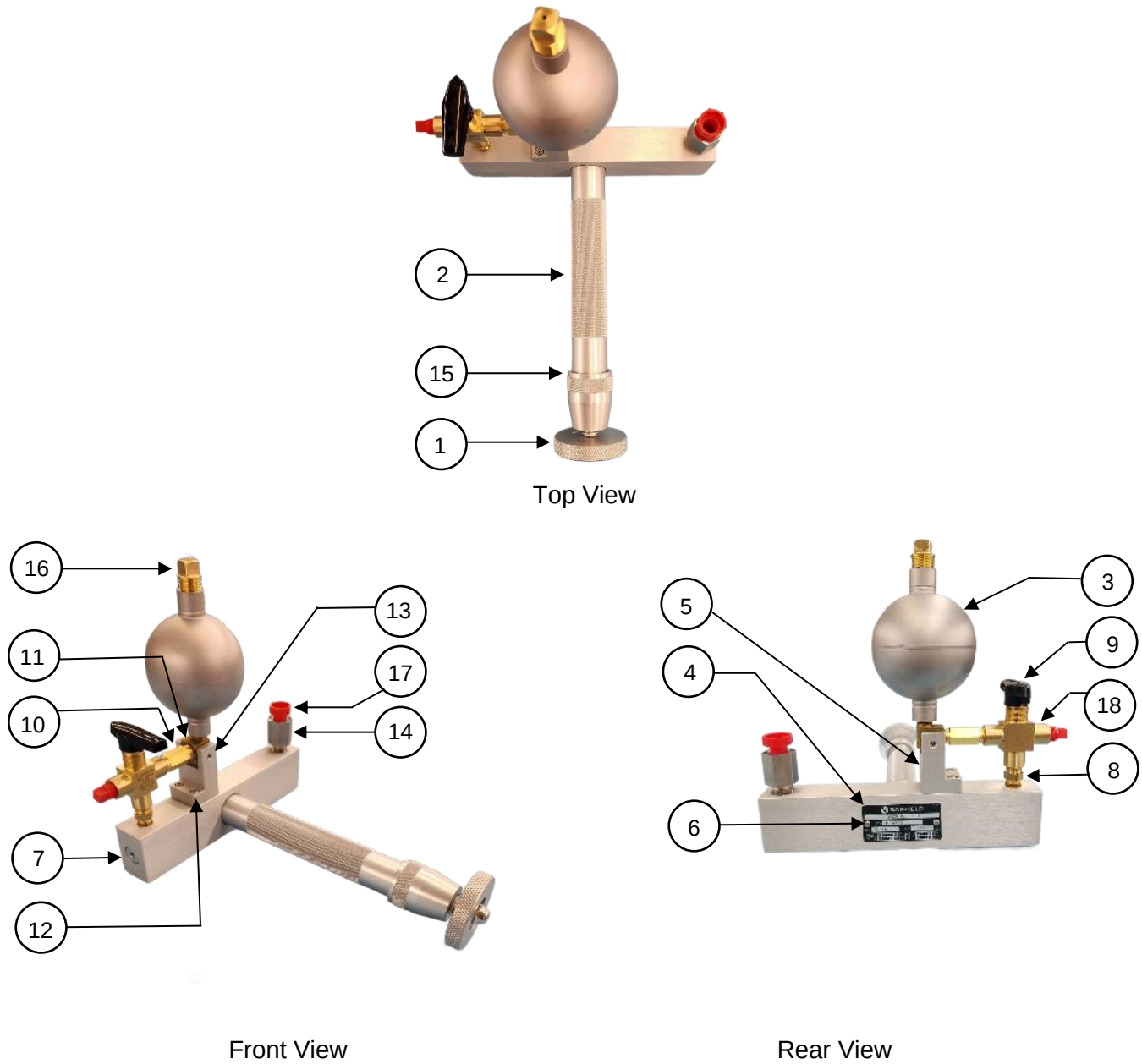


Figure 6 2311FA Pressure Tester Parts

Key to Figure 6	
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)

Note: Plug (#7) is needed only due to a manufacturing step requirement. 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 both parts, leading to leaks.

2. FILLING TESTER WITH FLUID

CAUTION: WHEN ADDING OR DRAINING FLUIDS, UTILIZE APPROPRIATE SKIN AND EYE PROTECTION. USE A WORK AREA THAT PREVENTS CONTAMINATION OF THE WORK SURFACE.

Note: Refer to Figure 6 to identify item numbers.

- A. Pressure Tester 2311FA is supplied empty, allowing users to fill it with the appropriate liquid according to its intended use (refer to section **1.5 RECOMMENDED FLUIDS**).

For the first filling, or after the Tester has been emptied so its working fluid can be changed, applying the procedure below ensures that this task will be accomplished correctly—without leaving air bubbles trapped inside this equipment.

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.

Note: If needed, use Teflon tape to help prevent leaks.

2. Verify that the fluid to be used in the Tester is compatible with the unit and the system to be tested (refer to section **1.5 RECOMMENDED FLUIDS** for the list of 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 must match 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" of full.
7. Rotate the Selector Valve 90° or halfway between the Reservoir position and the outlet position.
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.

3. CHANGING TESTER FLUID

CAUTION: ENSURE MASTER GAUGE READS ZERO BEFORE PROCEEDING.

Note: Refer to Figure 6 to identify item numbers.

- A. Follow the procedure below if the working fluid of the Tester needs to be replaced with a different one. This ensures there will be no residues of the previous liquid inside the Tester, which can contaminate the new fluid.
 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 MAY OCCUR (REF. ASME B40.100-2005).
 2. Place the Tester inside a large plastic container to avoid spills of the hydraulic liquid.
 3. Remove the Vented Plug (#16) from the Reservoir (#3).

4. Unscrew the Nut (#15) on the end of the cylinder and remove the Piston, Shaft, and Handle Assembly (#1) from the Tester.
5. Drain all the liquid from the Piston, Shaft, and Handle Assembly (#1) and from the Manifold and Sleeve Assembly (#2), in the plastic container.
6. Remove the Tester from the large plastic container.
7. 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 O-RINGS.
8. 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.
9. Drain all the water. Then, rinse in alcohol and blow dry.
CAUTION: DO NOT USE WOOD ALCOHOL.
10. Install the O-rings (cleaned and dried in step 3.3.A.7) on the Piston, Shaft, and Handle Assembly (#1).
11. 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 section **1.5 RECOMMENDED FLUIDS** for details).
12. Install the Master Gauge on the Adapter (#14) using Teflon tape.
13. Refer to section **3.2 FILLING TESTER WITH FLUID** to fill the Tester with the new fluid.

4. OPERATION PROCEDURES

- A. After completing all steps listed in section **3.2 FILLING TESTER WITH FLUID** 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.

CAUTION: ENSURE MAXIMUM WORKING PRESSURE FOR TESTER (600 psig) OR MASTER GAUGE (WHICHEVER IS LOWEST) IS NOT EXCEEDED DURING TEST.

Note: Refer to Figure 6 to identify item numbers.

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 3.4.A.2-3.4.A.9, and then continue with the rest of the test. If this situation does not happen, skip those steps, and proceed directly to step 3.4.A.10.

2. Turn the Selector Valve arrow (#9) to point toward the Reservoir (#3).

3. Remove the Vented Plug (#16) from the Reservoir (#3).
Note: 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 3.4.A.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 3.4.A.11 and perform step 3.4.A.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 3.4.A.10. This cycle can be repeated as many times as necessary, to collect back the fluid pumped during the test.

CHAPTER 4: RECEIVING, SHIPPING, AND STORAGE

1. RECEIVING

No special unpacking procedures are necessary. It is recommended that the factory-shipping container and packing materials be retained should it become necessary, for any reason, to re-ship the Tester, such as for the O.E.M. recertification.

It is also recommended that upon receipt the test set should be carefully inspected for damage. If the test set is damaged immediately, notify the carrier and the manufacturer.

2. SHIPPING

- A. It is recommended that the factory-shipping container and packing materials be retained should it become necessary, for any reason, to re-ship the Test Set, such as for the O.E.M. recertification.
- B. Drain tester of all fluid as detailed in section **3.3 CHANGING TESTER FLUID**.
- C. The metal components of the tester consist of brass, aluminum, and corrosive resistant steel. Normal care and no abusive handling will prolong the life of the tester.
- D. There is no limit to the manner of transport.

3. SHORT-TERM STORAGE

- A. Ensure no trapped pressures are left.
- B. Ensure reservoir's vented plug is replaced with a solid plug.
CAUTION: A VENTED PLUG MUST BE REINSTALLED ON THE RESERVOIR BEFORE TESTER USE.
- C. Position Selector Valve midway, pointing toward the back.
- D. If any hose is left attached to the outlet port that it be capped.
- E. Tester is tagged with the type of fluid contained.

4. EXTENDED STORAGE

- A. 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 section **3.3 CHANGING TESTER FLUID**.

CHAPTER 5: MAINTENANCE & REPAIR

1. GENERAL

- A. Refer to section **3.3 CHANGING TESTER FLUID** for detailed instructions on the disassembly, cleaning, and reassembly of the tester to maintain the tester in serviceable condition.

2. REPAIR

- A. 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:

Note: Except as noted, refer to Figure 6.

1. Return the Master Gauge to zero (refer to section **3.4 OPERATION PROCEDURES**).
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 section **3.2 FILLING TESTER WITH FLUID** 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 two O-Rings located on the Piston (#2) of Figure 7.

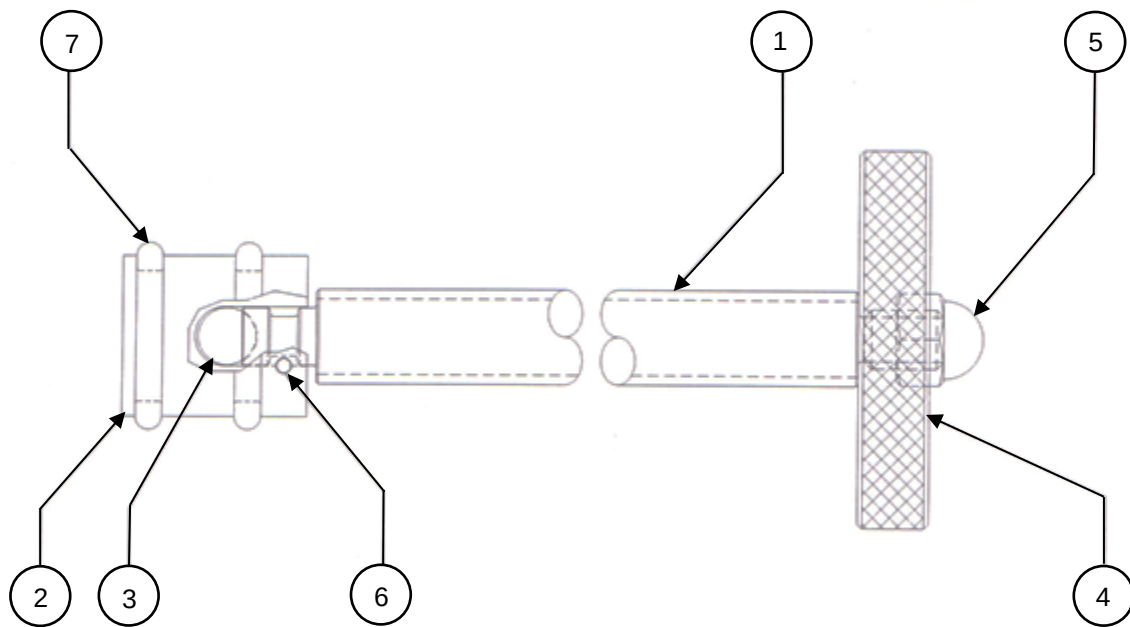


Figure 7 2311FA Piston, Shaft, & Handle Assembly

11. Unscrew the large nut (#15) at the end of the cylinder and carefully withdraw from the Sleeve (#2).
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 onto the Piston (#2), 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).