MANUAL, OPERATION, SERVICE AND REPAIR WITH PARTS BREAKDOWN

For

TESTER, PORTABLE HYDRAULIC
PART NO. 8301
(NSN 4910-00-868-6871)

Manufactured by
Hydraulic Technology Inc.
FSCM 29516
9725 Lurline Avenue
Chatsworth, California 91311

Contract; DAAA09-83-C-0116

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SECTION 1

INTRODUCTION AND DESCRIPTION

1-1. INTRODUCTION

1-2. This manual is issued as the basic manual for operation and service of the Tester, Portable Hydraulic, NSN 4910-00-868-6871, manufacturers part number 8301, manufactured by Hydraulic Technology Inc. FSCM 29516, Chatsworth, California.

1-3. PURPOSE OF EQUIPMENT

1-4. The tester provides facilities for testing hydraulic systems.

1-5. LEADING PARTICULARS

1-6. See table 1-1, Table of Leading Particulars

Overall dimensions	16.75 in. long X 10.75 in wide X 6.75 in. high
Flow Measurement Range	0 to 100 gpm in three ranges
Pressure Measurement Range	0 to 6000 psi
Temperature Measurement Range	50 to 250 degrees F.
Load Valve	0 to 6000 psi quick release
Inlet and Outlet Connections	AND10050-16 with Male Adapters to 1-5/16-12, 37 degree flare, SAE J514.
Protective Devices	Rupture Disc to prevent improper hookup
Weight	30 lbs. approx.

Table 1-1, Table of leading particulars

1-7. DESCRIPTION

1-8. The portable hydraulic tester is a completely self contained unit which may be used to test the pressure, flow and temperature characteristics of an hydraulic system, on the job, in a mobile or stationary application.

1-9. The unit is housed in a sheet metal carrying case and consists essentially of an hydraulic manifold which contains a pilot operated throttle valve, a pressure gauge, a temperature gauge and a flow measuring system, which, by means of a selector valve, may be selected to cover three distinct ranges between 0 and 100 gallons per minute (gpm).

1-10. Measurement of these parameters provides a convenient means to determine the efficiency of an hydraulic system and to isolate malfunctioning hydraulic components.

SECTION II

SPECIAL SERVICE TOOLS

2-1. SPECIAL TOOLS AND ADAPTERS

2-2. There are no special tools required to service or repair the portable hydraulic tester.

2-3. Table 2-1 is a listing of the special adapters furnished with the tester.

QUANTITY	PART NO.	NAME
4	8301401	Rupture Disc Assembly
2	8301402	Adapter, Hose Connection

Table 2-1. List of special adapters

SECTION III

PREPARATION FOR USE, STORAGE OR SHIPMENT

3-1. PREPARATION FOR USE

3-2. The tester as shipped is completely assembled. To place in operation requires only connection to the system under test by means of the hose adapters furnished and user furnished hydraulic hoses.

3-3. UNCRATING

a. Examine the exterior of the shipping container for possible shipping damage.

b. Remove tester from container.

3-4. PRELIMINARY INSPECTION

a. Inspect the tester for evidence of damage.

b. Check the loose equipment furnished with the tester. Refer to Table 2-1 for a numerical listing and quantities.

3-5. PREPARATION FOR STORAGE

a. Allow all the excess oil to drain from the tester. Remove hose adapters and cover tester openings with blanking plugs.

b. Coat the adapters and any other exposed ferrous surface with VV-L-800 preservative oil or equivalent.

c. Wrap the adapters and the spare rupture discs in greaseproof paper and dunnage and place in the accessory compartment of the tester.

3-6. PREPARATION FOR SHIPMENT

3-7. No special shipping instructions are required.

SECTION IV

OPERATING INSTRUCTIONS

4-1. INSTRUMENTATION AND CONTROLS

4-2. See figure 4-1 for the location of the instruments and controls.

4-3. PRIOR TO OPERATION

4-4. Prior to connecting the tester to the system being tested the following details must be determined for the system.

a. Pump

Type:	Piston - Gear - Vane etc.
Displacement:	Gallons per minute at operating speed.
	Operating speed if mobile equipment.
Controls:	Fixed or variable volume.
	Pressure compensated or not.
Pressure:	Maximum capability.
	System requirements

b. Fluid: The tester is supplied for use with petroleum based fluids. It may however be obtained for use with other hydraulic oils.

c. Relief Valve
Pressure setting
Type of valve and leakage characteristics.

d. Other Valves: The system may contain other types of valves such as sequence, flow control, pressure reducing, priority, selector and etc. The characteristics and settings of these components must be fully understood.

e. Hydraulic motors: The same information must be obtained as for the pump.

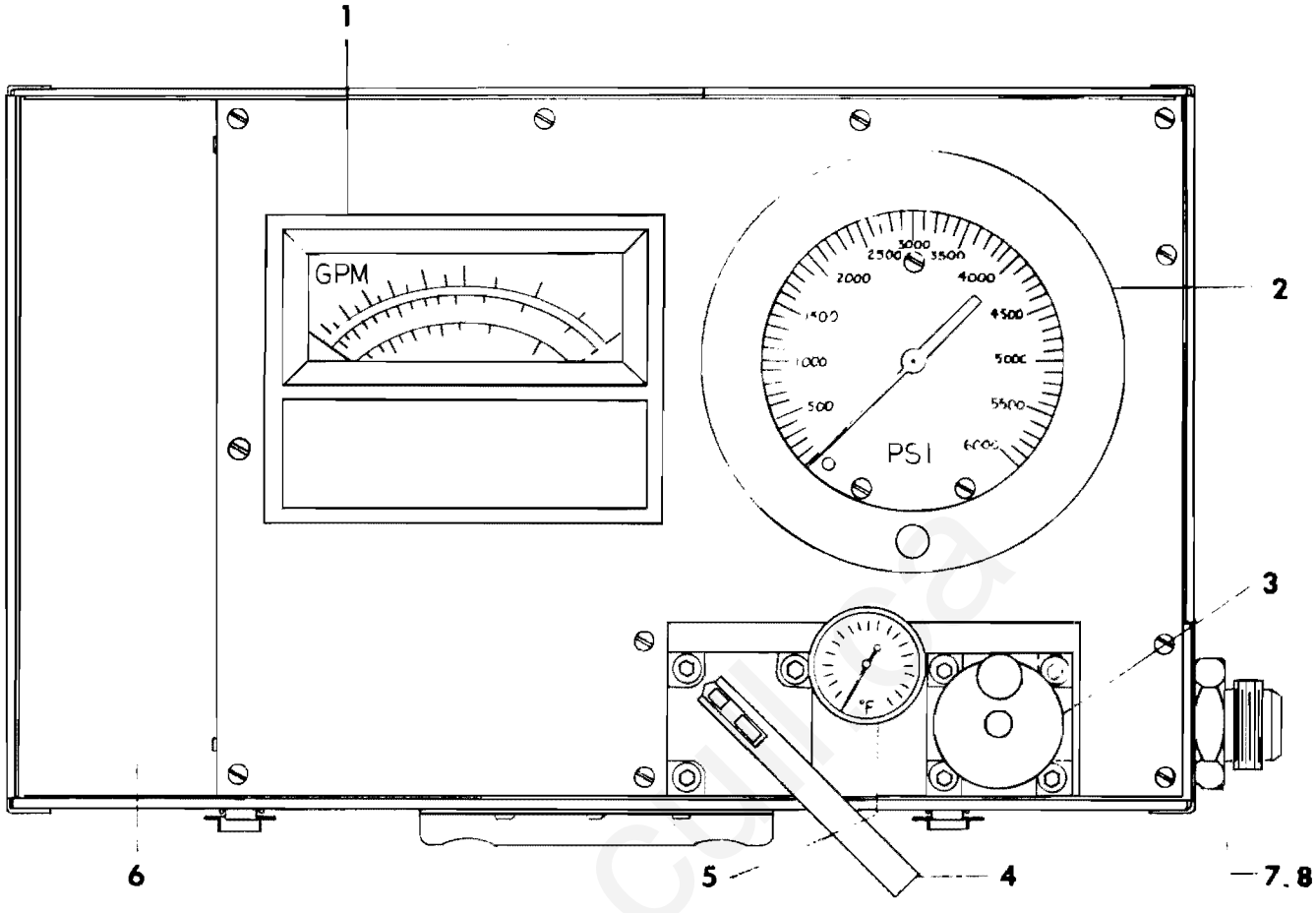
4-5. CONNECTING THE TESTER

4-6. Refer to figures 4-1 and 4-2.

4-7. The tester is normally connected from a point in the circuit, without restriction to the system reservoir. Refer to figure 4-2, points a, b, and c.

CAUTION

THE TESTER IS CAPABLE OF DEVELOPING PRESSURES IN EXCESS OF 6000 PSI. DO NOT EXCEED THE PRESSURE RATING OF THE SYSTEM UNDER TEST.



1. FLOWMETER
2. PRESSURE GAUGE
3. FLOWMETER SELECTOR VALVE
4. THROTTLE VALVE
5. TEMPERATURE GAUGE
6. ACCESSORY COMPARTMENT
7. OUTLET PORT
8. INLET PORT

Figure 4-1, Instruments and controls

4-8. The tester inlet pressure may be as high as 6000 psi but the outlet pressure must not be allowed to exceed 2000 psi. The inlet port must always be connected to the source of flow and the outlet to the lower pressure return. If these connections are reversed, flow through the tester will be blocked and a rupture disc will break, at approximately 3000 psi. Spare rupture discs are provided in the tester accessory compartment.

4-9. USING THE TESTER

4-10. Refer to figure 4-1, Operating Instruments and Controls, and figure 4-2, System Under Test. Figure 4-2 is a hypothetical hydraulic circuit which may be considered representative of actual systems. Numbers in parenthesis refer to instruments and controls in figure 4-1 and letters in parenthesis refer to test points in figure 4-2.

4-11. To obtain a general view of the overall system operation the tester may be connected as a tee from the circuit at point (A). By depressing the throttle valve (4) the system may be loaded up to the relief valve setting and a general view obtained of the fluid being delivered to the circuit. Be careful when using the throttle valve, as it is pilot operated and requires very little force to develop full pressure. Releasing the throttle valve (4) will immediately dump the pressure.

4-12. If the system under test is now disconnected at point (A) and connected through the tester to the reservoir, operation of the load valve to the pump rated operating pressure will provide a measurement of the pump volumetric efficiency. The pump discharge volume should be recorded at minimum discharge pressure, with valve (4) fully opened, and again at rated discharge pressure. Refer to paragraph 4-17 following for evaluation of the test results.

4-13. The system under test may be disconnected at successive points such as (B) through (J) figure 4-2 and the flow through the tester recorded in the loaded and the unloaded condition. Always connect the tester return directly to the reservoir or through an unrestricted return line to the reservoir. If the system contains a heat exchanger in the return system for cooling, the tester return line may be connected to pass through the cooler provided the back pressure does not exceed 2000 psi. Refer to paragraph 4-17 following for evaluation of the test results.

4-14. Always select the lowest flowmeter range which will cover the system being tested. If the system range is unknown, select the highest range at first and readjust to a lower range if necessary.

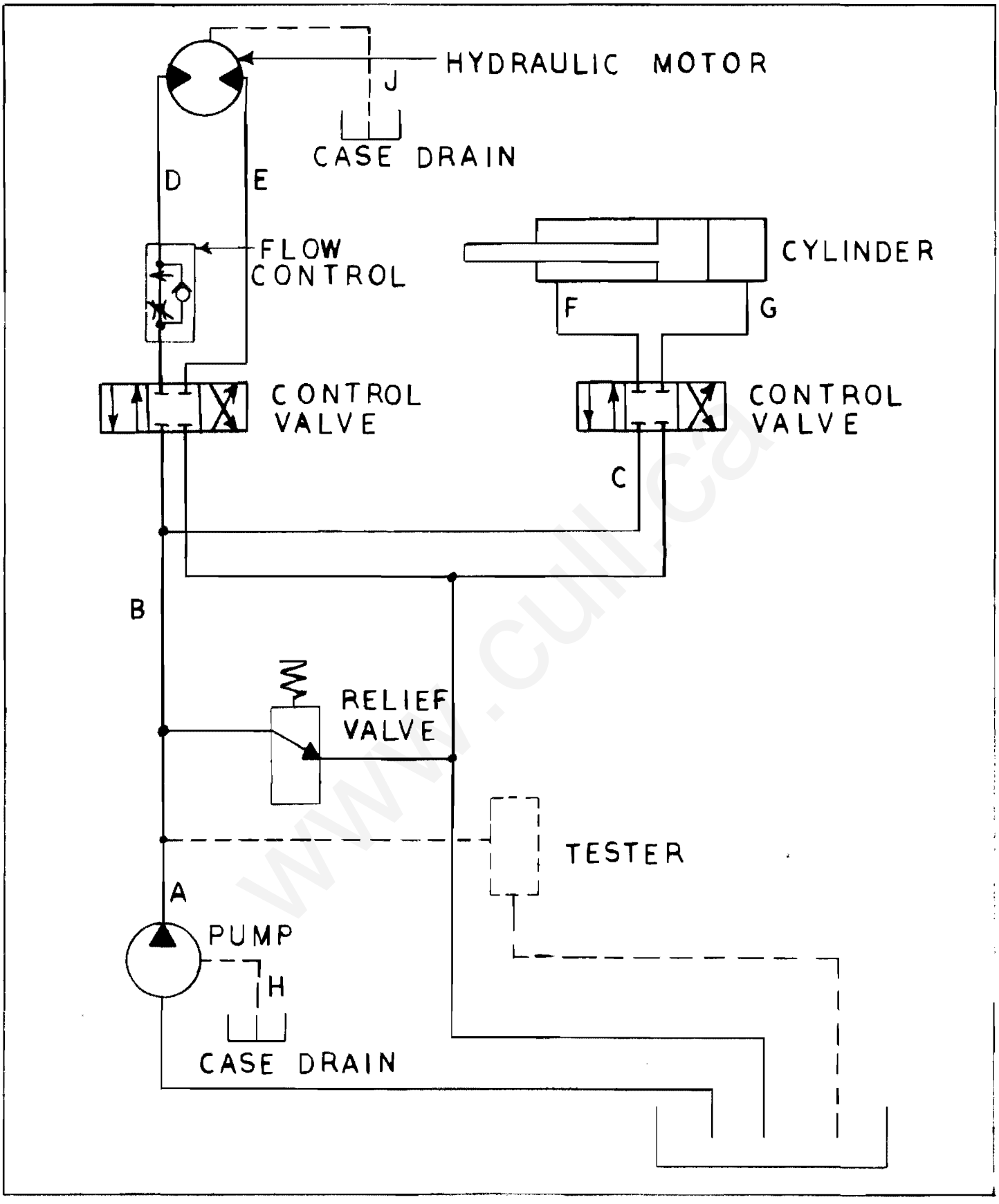


Figure 4-2, Typical hydraulic circuit

4-15. Record the temperature of the system under test as indicated on the temperature gauge (5). Testing should be performed where possible at system operating temperatures. 4-16. Where the system under test is engine driven, as in a mobile application, care must be taken to maintain a constant engine speed for the test duration.

4-17. EVALUATION OF THE TEST RESULTS.

4-18. When connected as a tee at point (A), loading the circuit to increase the pressure will indicate the pressure at which the relief valve is set to open or at which the pump is set to compensate, if it is a pressure compensated pump, and the actual flow being delivered up to that point. The temperature gauge is indicating the system temperature. If the results of this test are not to the required system specifications, it will be necessary to perform individual tests at successive points in the circuit to isolate the malfunction.

4-19. When the pump alone is tested, as in paragraph 4-12 preceding, the difference in flow obtained between the loaded and unloaded conditions is a measure of the volumetric efficiency of the pump. The amount of flow loss to be expected would be approximately 5% for a piston pump or 15% for a vane or gear pump. Refer to the pump manufacturers data for actual amounts.

4-20. Repeating these tests around the circuit before and after suspected components will determine the points of flow loss or malfunction.

SECTION V

TROUBLESHOOTING

5-1. GENERAL

5-2. Failures and malfunctions may often be traced to relatively simple causes. Table 5-1 is a trouble analysis check chart for the portable hydraulic tester. The chart contains the most common troubles that may be encountered, probable cause of the trouble, and action that may be taken to correct the condition. Refer to the parts list for parts replacement.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Tester leaks oil	Rupture disc broken	Replace rupture disc
Flowmeter does not read	Tester connected backwards	Correct connections
	Meter damaged	Replace
Pressure gauge does not read	Tester connected backwards	Correct connections
Erratic flow readings	Air in system	Check reservoir for content.
		Check pump suction lines for leaks.
Throttle valve inoperative.	Tester connected backwards.	Correct connections
	Defective valve	Repair or replace

Table 5-1, Trouble analysis check chart.

SECTION VI

CALIBRATION

6-1. GENERAL

6-2. The calibration accuracy of the instruments in the portable hydraulic tester should be checked periodically. Any gauge or instrument not meeting the required accuracy should be replaced.

6-3. TEMPERATURE GAUGE

6-4. The temperature gauge should be removed from the tester and tested in a temperature bath against a known standard. The required accuracy is plus or minus 5% at any reading.

6-5. PRESSURE GAUGE

6-6. The pressure gauge should be removed from the tester and tested against a known pressure standard. The required accuracy is plus or minus 5% of correct reading.

6-7. The pressure gauge zero may be adjusted by means of the screw in the micrometer pointer.

6-8. FLOWMETER

6-9. The flowmeter calibration is checked by connecting the portable tester in series with a known flow standard such as an electronic turbine meter. The required accuracy is within 5% of reading at any point except in the first and last 10% of any scale where 10 % accuracy is permissible.

6-10. An adjustment screw at the back of the flow meter gauge may be used to adjust the flow reading. This screw adjusts all ranges simultaneously. If a serious error exists between the different ranges this would be an indication of damage or malfunction in the flowmeter selector valve assembly.

SECTION VII

PERIODIC INSPECTION, MAINTENANCE, LUBRICATION AND REPAIR

7-1. INSPECTION

7-2. The tester should be inspected at intervals of six months for evidence of damage or missing parts. The instrument calibration should be checked at this time.

7-3. PERIODIC MAINTENANCE AND LUBRICATION

7-4. There are no periodic maintenance and lubrication requirements for the portable hydraulic tester.

7-5. REPAIR

7-6. Repair of the portable tester will consist of parts replacement and requires no specific instructions.

SECTION VIII

PARTS LIST

8-1. GENERAL

8-2. The purpose of the parts list is for the identification and requisitioning of spare parts. The parts list lists and describes, assemblies, subassemblies, and detail parts of the tester.

8-3. INSTRUCTIONS TO THE MILITARY USER

8-4. When requisitioning parts not identified by national stock number, it is mandatory that the following information be supplied to the supply office;

a. Manufacturers supply code 29516
b. Manufacturers part number exactly as listed herein.
c. Nomenclature, exactly as listed herein, including dimensions as necessary.
d. Manufacturers model number (end item).
e. Manufacturers serial number (end item).
f. Any other information such as type, frame number and electrical characteristics if applicable.

8-5. If DD form 1348 is used, fill in all blocks except 4,5,6 and remarks field in accordance with AR 725-50. Complete form as follows;

Noun.....Nomenclature of repair part
For.....NSN of end item
Mfr.....Manufacture of end item
Model.....Model number of end item
Serial.....Serial number of end item
Any other pertinent information such as, frame number, type, dimensions etc.

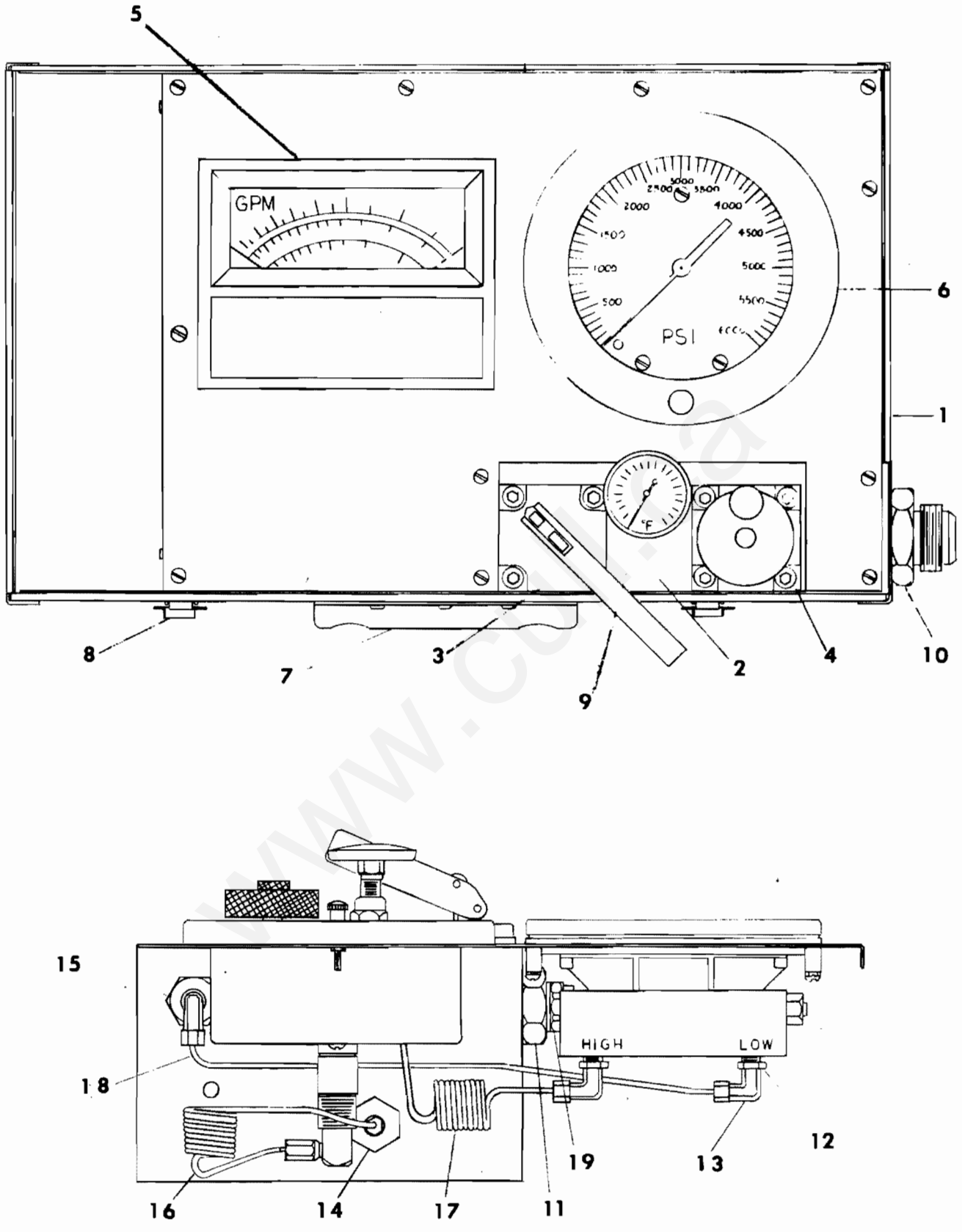


Figure 8-1, Portable hydraulic tester

GROUP ASSEMBLY PARTS LIST

FIG.& INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE
8-1-1	830101	Case, carrying	1	
8-1-2	830102	Block, manifold	1	
8-1-3	830103	Throttle valve assy.	1	
8-1-4	830104	Flowmeter range selector valve	1	
8-1-5	830105	Gauge, flowmeter	1	
8-1-6	830106	Gauge, pressure	1	
8-1-7	830107	Handle, carrying	1	
8-1-8	830108	Latch,carrying case	2	
8-1-9	830109	Gauge, temperature	1	
8-1-10	830110	Adapter, hose connection	2	
8-1-11	830111	Adapter, rupture disc	1	
8-1-12	830112	Bushing	2	
8-1-13	830113	Elbow, tube	4	
8-1-14	830114	Adapter	1	
8-1-15	830115	Adapter	1	
8-1-16	830116	Tube assy. pressure gauge	1	
8-1-17	830117	Tube assy. flowmeter, high	1	
8-1-18	830118	Tube assy. flowmeter, low	1	
8-1-19	830119	Rupture disc assy.	1	

8-3,8-4 Blank,