

USERS HANDBOOK

Hydraulic Comparison Test Pump

1.0 GENERAL

The Comparison Test Pump is used for checking pressure measuring instruments against Master Test Gauges.

Note: The term 'Master Test Gauge' or 'Gauge' in this document, means any pressure measuring instrument such as; Transfer Standards, Digital Calibrators and Transducers.

This system is only as accurate as the Master Test gauge used. The Master Test gauge must be regularly calibrated on a Deadweight Tester (Primary Pressure Reference Standard) to ensure accuracy is maintained.

2.0 SPECIFICATION

Maximum Range	:	20000 psi/1400 bar
Instrument Overall Dimensions	:	46.5 x 32.5 x 20.5cm
Instrument Weight	:	13kg
Reservoir Volume	:	250 cc
Barrel Volume (Ram extended)	:	5.5 cc
Pump Displacement (Per Stroke)	:	4.8 cc
Operating Fluids	:	
Model T1300	:	Any oil-based fluid compatible with Nitril Rubber.
Model T1301	:	Any fluid compatible with Stainless Steel and Nitril Rubber

Supplied as standard with each Test Pump:

Female Adaptors: 1/8", 1/4", 3/8" & 2 off 1/2" BSP or NPT.
Spare seals (45, 59, 79)

4.0 ANCILLARY EQUIPMENT

If you require further information on any of the following equipment, please contact your local agent.

T3600 LIQUID TO LIQUID SEPARATOR

Model T3600 maximum range 8000 psi/600 bar, T3601 maximum range 10000 psi/700 bar.

If there is any doubt that the Gauge is not internally clean, then the addition of a T3600 Liquid Separator will protect the comparison test pump system from contamination and possible damage.

The T3600 is also particularly useful for applications where the gauge must not be contaminated by the operating fluid in the comparison test pump.

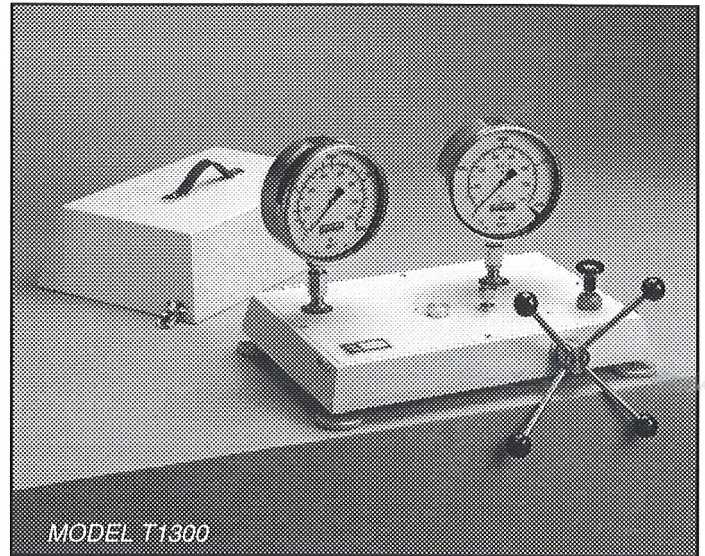
It contains a flexible 'Viton' diaphragm which separates the two working fluids, preventing transfer either way. Any fluid can be used that is compatible with Viton and Aluminium Bronze.

T3700 ANGLE ADAPTOR

To calibrate rear/back Connection Gauges in their correct position, an Angle Adaptor must be used. The Angle Adaptor fits directly onto either Test Station, converting it through 90 degrees, allowing the same Adaptors to be used.

T4600 POINTER REMOVER/PUNCH

To remove and refit the pointer of a Pressure Gauge. This two in one tool has a spring-loaded plunger to quickly and consistently refit the pointer.



3.0 STORAGE AND TRANSPORTATION

- 3.1 With both Test Stations (41 & 92) plugged, open Valve (6) and screw Capstan (36) fully in, close Valve (6).
- 3.2 Disassemble Capstan (36) and store in the case lid.
- 3.3 Fluid can remain in the Reservoir (15) during transport, providing that the Tester remains horizontal.
- 3.4 Replace lid, ensuring that the Hinges (27) are properly engaged, and secure with Toggle Clips (25) at sides.

5.0 PREPARATION

- 5.1 Find a level, stable surface.
- 5.2 Remove Capstan (36) from case lid using Allen Key (29) and fit to Hub (55) on front of Tester.
- 5.3 Level the Tester using the four Adjustable Feet (20).
- 5.4 Remove Reservoir Bung (17) and fill Reservoir (15) approximately 3/4 full with the appropriate fluid.
- 5.5 Fit Master Test Gauge to Test Station (41).

Note: Two 1/2" Adaptors (44) are supplied, on the assumption that one will be used for the Master Test Gauge. If another size Adaptor is used, then that size Adaptor will not be available for the instrument to be tested. Additional Adaptors can be purchased from your local agent.

5.5.1 Screw the appropriate Adaptor fully onto Gauge.

5.5.2 Screw assembly down on the Test Station.

Note: The internal thread in the lower half of the Adaptor is LEFT-HANDED.

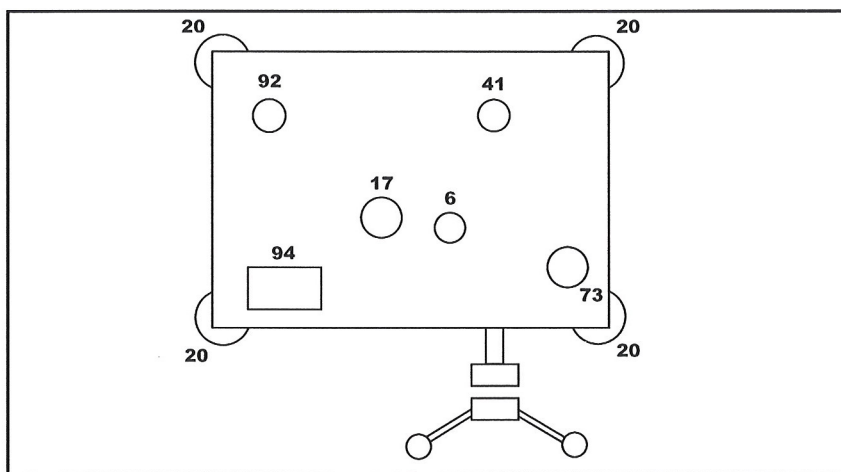
Hand-tight is sufficient, ensure the bottom face contacts the Test Seal (45) on the Test Station (41).

5.5.3 To adjust position to face forward. Hold the Adaptor and unscrew the Gauge **ANTI-CLOCKWISE** until it faces forward. Hold the Gauge steady whilst turning the Adaptor **ANTI-CLOCKWISE** until it pulls down onto the Test Seal.

5.5.4 To calibrate rear Connection Gauges, use a T3700 Angle Adaptor - see Ancillary Equipment, Section 4, Page 1.

IMPORTANT: ENSURE THAT ANY GAUGE FITTED TO THE TEST STATION IS INTERNALLY CLEAN - See Ancillary Equipment: T3600, Section 4, page 1.

- 5.6 Fit gauge to be tested to Auxillary Test Station (92). (See 5.5.1 above).



6.0 PRIMING

6.1 Open Valve (6) one turn anti-clockwise and screw Capstan (36) fully in.

6.2 Pump twice (73).

6.3 * Close Valve and screw Capstan FULLY OUT.

6.4 Open Valve and screw Capstan FULLY IN.

Note: During this operation bubbles may appear in the Reservoir (15), as trapped air is expelled.

For large volume Gauges repeat steps 6.3 and 6.4 until no further bubbles appear.

6.5 With Valve (6) open, screw Capstan FULLY OUT and close Valve (6). The test pump is now ready for use.

***WARNING:**

Screwing the Capstan (36) out, with Valve (6) closed, will generate 0.5 bar/15 in Hg vacuum. If the Gauges fitted are vacuum sensitive, leave Valve open during operation 6.3.

7.0 OPERATION

7.1 Use the Handpump (73) to generate the initial pressure up to 100 psi/7 bar, for higher pressure screw the Capstan (36) in.

7.2 Compare the reading of the gauge under the test with that of the Master Gauge.

7.3 For next, higher calibration point, repeat from 7.1 above.

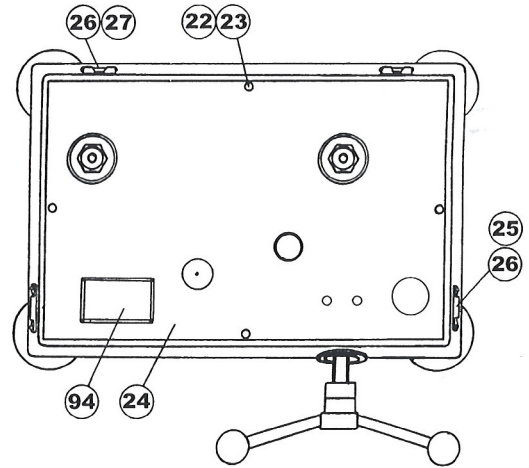
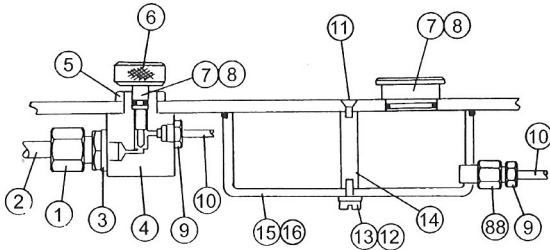
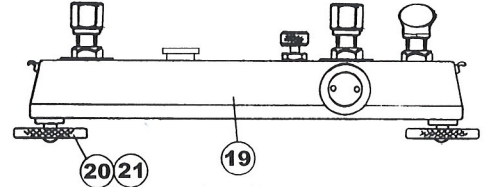
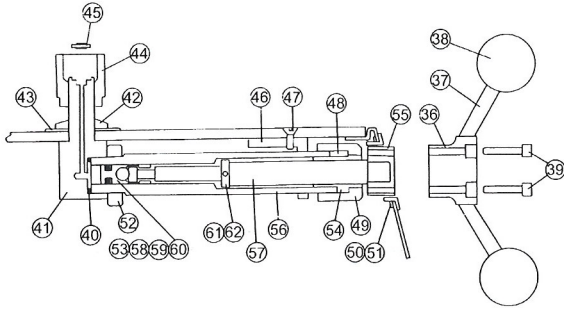
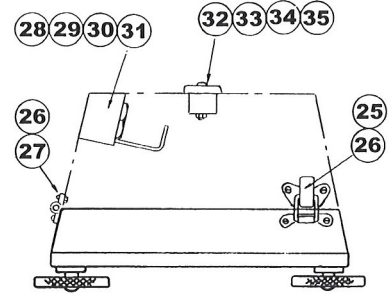
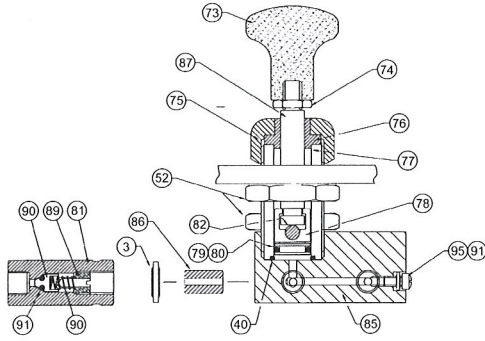
7.4 To measure reducing pressures, screw the Capstan out.

7.5 Depressurise by screwing the Capstan FULLY OUT.

7.6 Any pressure remaining in the system can now be released by SLOWLY opening Valve (6).

NEVER RELEASE SYSTEM PRESSURE WITHOUT SCREWING CAPSTAN FULLY OUT FIRST.

GENERAL ARRANGEMENT DRAWINGS & PARTS LIST



ITEM	PART	DESCRIPTION	ITEM	PART	DESCRIPTION
1	B1910	NUT/OLIVE/COUPLING	39	B1042	SCREW
2	D4108	PIPE	40	B1054	'O' RING
3	B1033	BONDED SEAL	41	D4728	TEST STATION
4	D1810	VALVE BODY	42	D1039	DOME NUT
5	D1807	LOCKNUT	43	D1098	LABEL: HAND TIGHT ONLY
6	D1207	VALVE SCREW CAP	44	D1018	ADAPTORS
7	D1811	VALVE SCREW	45	B1066	TEST SEAL
8	D1801	'O' RING	46	D1823	SUPPORT BRACKET
9	B1806B	MALE COUPLING	47	B1043	SCREW
10	D1804	NYLON PIPE	48	D1053	KEY
11	B1808	SCREW	49	D1019	BARREL UNION
12	B1025	SEAL	50	D1087	'C' CLIP
13	B1822	SCREW	51	D1050	SHROUD
14	D1064	RESERVOIR SUPPORT	52	B1023	LOCKNUT
15	D4713	RESERVOIR	53	B1022	BALL
16	B4716	'O' RING	54	D2813	RAM NUT
17	D1809	RESERVOIR BUNG	55	D3908	INNER HUB
18	B1069	'O' RING	56	D2808	BARREL
19	101332/3	CASE	57	D2812	RAM SCREW
20	D1048	FOOT	58	D2811	RAMBLER
21	B1047	STUD	59	B2809	'O' RING
22	B1086	SCREW	60	B2810	ANTI-EXTRUSION RING
23	B1082	CAPTIVE NUT	61	D2814	COLLAR
24	101302	TOP PLATE	62	B2817	GRUB SCREW
25	B1076	TOGGLE CLIP	73	B4735	PUMP HANDLE
26	B1097	RIVET	74	B2420	LOCKNUT
27	B1077	HINGE	75	D4727	BARREL UNION
28	D4113	ACCESSORY BLOCK	76	D4703	BUSH
29	B1071	ALLEN KEY (LARGE)	77	D4704	PUMP BARREL
30	D1018	ADAPTORS	78	102838	RAMBLER
31	B4114	SPARES BOTTLE	79	B4707	'O' RING
32	D1836	SUPPORT BAR	80	D4708	ANTI-EXTRUSION RING
33	B1078	STRAP HANDLE	81	D4730	NON-RETURN VALVE BODY
34	B1075	SCREW	82	B1022	BALL
35	B1081	NUT	83	B4733	SPRING
36	D1041	OUTER HUB	84	B4734	'O' RING
37	D1020	SPOKE	85	D4736	END BLOCK
38	B1021	KNOB	86	D4720	CONNECTOR

87	D4701	SPINDLE
88	B1805	COUPLING
89	D4732	SPOOL
90	D4731	BULLET
91	B8152	SEAL
92	D5020	REMOTE TEST STATION
93	B1407	LOCK WASHER
94	D1036	LABEL
95	B8111	SCREW

When ordering parts for T1301
Water Operated Tester, add 'W' after part.
Example: Item 45 becomes B1066W.

9.0 FAULT FINDING

9.1 SYSTEM WILL NOT PRIME

- 9.1.1 Check valve (6) is closed.
- 9.1.2 Check there is sufficient fluid in the Reservoir (15).
- 9.1.3 Check for damaged/missing/dirty Seal (45) in Test Station (41 or 92).
- 9.1.4 Check that the faces of the Gauges contact the Test Seal (45), and that they are not scored or dented.

9.2 SYSTEM WILL NOT PRESSURISE

- 9.2.1 Check 9.1.
- 9.2.2 Ensure correct Valve operation during Priming step 6.5.
- 9.2.3 Check the Gauges are not leaking.
- 9.2.4 Clean system externally, check for fluid leak by trying to pressurise. Wherever fluid appears, replace the Seal - check sealing faces are clean and undamaged before re-assembly.

9.3 HANDPUMP MALFUNCTION

- 9.3.1 Check 9.2.
- 9.3.2a If pumping generates no pressure, then the Inlet Non-Return Valve (81) has probably failed.
- 9.3.2b This should be disassembled and inspected for dirt or damage to valve seat and Seal. After inspection, clean all parts thoroughly, replacing as required, and re-assemble correctly.
- 9.3.3 If the system pressurises and depressurises in conjunction with the downward and upward strokes of the Pump (73), then the Outlet Non-Return Valve (81) has failed completely. Inspect as per 9.3.2b.
- 9.3.4 If the Pump Handle (73) rises, then the Outlet Non-Return Valve (81) is leaking. Inspect as per 9.3.2b.

Note: Do not continue to pressurise if Pump Handle rises, as this can damage the pump Inlet Non-Return Valve (81).

9.4 PRESSURE FALLS AWAY

- 9.4.1 Check Valve (6) is properly closed.
- 9.4.2 Check 9.2.
- 9.4.3 If the system has been pressurised quickly then it must be allowed time to thermally stabilise. Continue to re-pressurise until it stabilises, this should take no longer than one minute.
- 9.4.4 Valve (6) leaking.
Remove Reservoir Bung (17) and observe fluid level, it will rise slowly if Valve (6) is leaking. This indicates that the valve seat may be damaged or dirty. It should be disassembled, cleaned and inspected, then re-tested or replaced if necessary.
- 9.4.5 Rambler Seal (59) leaking - Check Ram Screw (57) for 'wetness' when extended (Should be greased, not running with operating fluid).
If Ram Screw (57) is 'wet', then replace Rambler seal (59) with the spare provided.

9.5 CANNOT ATTAIN MAXIMUM PRESSURE HAVING SCREWED CAPSTAN FULLY IN

- 9.5.1 Check 9.2.
- 9.5.2 Ensure that the Capstan (36) is FULLY OUT and that the Hand Pump (73) is used for initial pressurisation. See Section 6, Page 2.
- 9.5.3 If the gauge has a large internal volume or an air pocket exists, then re-prime, see Section 6, Page 2, increasing the initial pressurisation with Hand Pump (73) from 100 psi/7 bar to at least 200 psi/14 bar.