



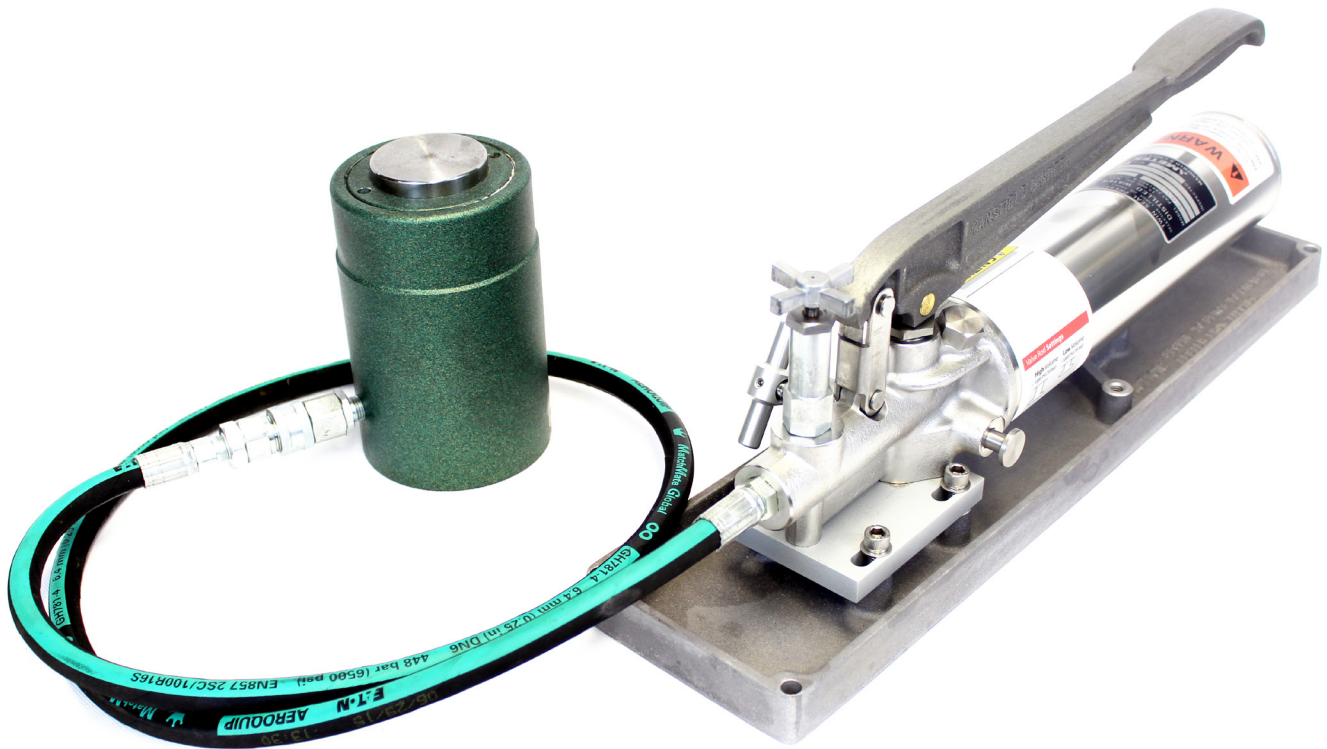
Morehouse
THE FORCE IN CALIBRATION SINCE 1925

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Operation and Instruction Manual

Hydraulic Hand Pump & Jack



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Introduction & Description

Hydraulic Jack

The Morehouse Hydraulic Jack, Figure 1, is specially designed and constructed to be suitable to perform precise calibration work. The Jack has a ram travel of one inch, maximum. Hydraulic pressure at capacity load is approximately 4500 psi.

Hand Pump

The hydraulic jack is activated by a two-speed hand pump. It is a dual volume design based on a double diameter piston. An auxiliary screw piston (Vernier piston) is provided on the pump for application of minute increments of force. The pump is connected to the hydraulic jack by means of a hydraulic hose assembly with a quick-disconnect coupling.

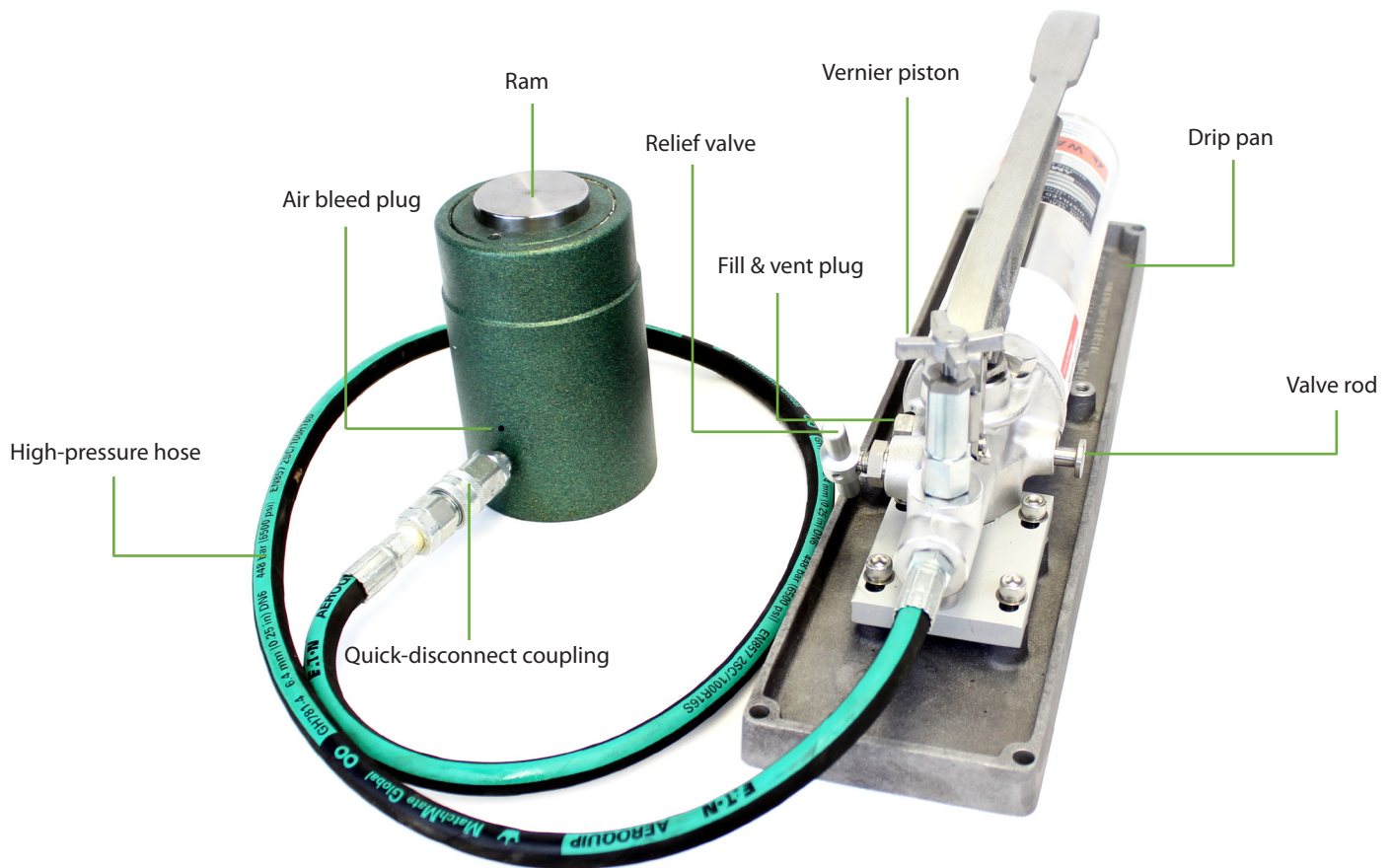


Figure 1: Hand Pump Connected to Hydraulic Jack

Preparation for Use

Preparing the Hand Pump for Use

Before connecting the hand pump to the jack, check the supply of fluid in the pump reservoir by removing the fill plug (item 30, Figure 2). The fill plug must be left open about two turns during operation to serve as a reservoir vent. If hydraulic fluid must be added be sure to use petroleum base anti-wear hydraulic fluid with an ISO Viscosity Grade of 22 or 32. The following hydraulic fluids are recommended, but any equal hydraulic fluid may also be used:

Arco.....	Dutro AW 32
Conoco.....	Super Hydraulic 32
Drydene Oil Co.....	Paradene 22 AW
Exxon.....	Nuto H 32
Gulf.....	Harmony 32 AW
Mobil.....	DTE 24
Texaco	Rando HD 32
Union.....	Unax AW 150

In choosing a hydraulic fluid be certain it is equal to one of the above listed recommendations. Many formulations may lack certain additives or are formulated for special reasons, such as lower cost, high detergency, leakage control, etc. Some of these fluids can be used successfully, however, others may prompt malfunctions and high rates of wear.

Preparing the Hydraulic Jack for Use

All hydraulic jacks are furnished with a self-sealing hose coupling. The jacks are fully bled and checked at the factory prior to shipment. However, if the hand pump and hydraulic jack seem rather “spongy” during use there may be air in the system. If this occurs the system will need to be bled of the entrapped air. The procedure for bleeding the entrapped air is outlined in Section 4, Maintenance, Disassembly, Repair, and Reassembly.

Operation

Hand Pump Operation

The hand pump is a dual-volume design based on a double-diameter piston. On the side of the pump is a valve rod (Figure 1-1) with a round handle. With the rod pulled out, the full diameter of the piston is effective for large volume, low pressure pumping; with the rod pushed in, the reduced diameter is effective for high pressure with a minimum of pumping effort.

Caution: Before pushing the rod in, release any downward pressure applied to the hand lever.

During pump operation, the fill plug on the upper right side of the pump body should be open about two turns to serve as a vent.

Operation of the hand pump is entirely conventional. Operating the hand lever causes oil to be pumped from the reservoir to the outlet. When the relief valve is closed (handle rotated toward the hose connection on the pump body), pressure is developed within the pump. Opening this valve relieves the oil back to the reservoir. In operating the relief valve, use modest pressure on the handle - just enough to prevent leakage.

The auxiliary screw piston (vernier piston) is a small-displacement precision piston. After pressure has been built up by means of the hand lever to obtain the approximate force desired, rotate the star wheel to operate the vernier piston and maintain a precise force. It is suggested that the Vernier piston adjustment be kept at its mid-position of travel to allow small increments of force to be increased or decreased. Experience will dictate the best position for individual requirements. A little practice in the use of this pump will enable extremely precise force application by means of the pump and jack.

If the hand pump and hydraulic jack seem rather “spongy” during use, there may be air in the system. If this occurs the trapped air will need to be bled out of the system. The procedure for bleeding the entrapped air is outlined in Section 4, Maintenance, Disassembly, Repair, and Reassembly.

Caution: Do not attempt to exceed the 1-inch stroke of the ram in the jack cylinder. Considerable damage may result if pressure is applied after the ram has reached its limit of travel.

Maintenance

General Maintenance

Routine maintenance is typically limited to replacing o-ring seals in the hand pump and hydraulic jack and adding hydraulic fluid as needed.

If the pump and jack fail to develop or hold pressure, corrective maintenance may be necessary. (All numbers in parenthesis refer to items in Figure 2)

If the hand lever is operated and the pump fails to develop pressure, be sure the relief valve is closed and there is sufficient fluid in the reservoir. If failure continues one or both of the check valves (33 and 38) may be leaking. Replace both o-rings to be sure.

If the pump builds up pressure but the pressure drops, examine all joints for leakage; a very small amount of leakage will result in considerable loss of pressure. As the pressure drops, watch the hand lever. If it rises, the discharge check valve (33) is leaking. Replace the o-ring (29).

If the hand lever does not rise as the pressure drops, then the relief valve is leaking. A foreign particle may be lodged on the seat, but more likely the o-ring (39) has failed and must be replaced.

The outlet in the pump body is tapped with 1/2"-20 NF threads and machined for o-ring seals (15). A firm joint will prevent leakage. If leakage develops, however, do not tighten the fitting excessively; replace the O-ring seal.

Caution: Do not screw pipe threads directly into the pump body outlet. The special adapter (53) is provided with pipe threads for making connections.

Air Bleed Procedure for Hydraulic Jack

If the hand pump and hydraulic jack seem rather "spongy" during use, there may be air in the system. If this occurs, the trapped air will need to be bled out of the system.

To bleed the hydraulic jack, place it on its side on a bench or other suitable work surface, then proceed as follows:

1. Check the supply of fluid in the pump reservoir by removing the fill plug (item 30, Figure 2). The fill plug must be left open about two turns during operation to serve as a reservoir vent. If hydraulic fluid must be added be sure to use petroleum base anti-wear hydraulic fluid with an ISO Viscosity Grade of 22 or 32 as recommended in Section 3, Preparation for Use.

2. With the hydraulic hose disconnected from the hydraulic jack and connected only to the hand pump, pump the hydraulic hose full of hydraulic fluid. (The poppet of the hose half of the self-sealing quick-disconnect coupling must be depressed to accomplish this).
3. Connect the hydraulic hose to the jack cylinder fitting, and pump the jack ram out to full stroke (approximately 25 mm or 1 inch).
4. Roll the jack to bring the air bleed location to the highest point.
5. Alternately open the air bleed and roll the jack back and forth. (The ram return spring will keep sufficient pressure on the fluid to purge the air.)
6. After the jack has been bled of all entrapped air, tighten the air bleed securely, and replace the jack to its original position on the calibrating machine.

Disassembly and Reassembly

Following are a few suggestions regarding the disassembly and reassembly of the hand pump. (All numbers in parentheses refer to items in Figure 2.)

Service Instructions for Hand Pump

When changing o-rings always lubricate the o-rings and all contacting metal parts before attempting assembly. For a lubricant, use the same fluid as will be used in the system.

The high pressure valve and retaining parts are held in place by the retaining plug (57). To reassemble, screw the retaining plug (57) into the body until all parts are solid, then back it off about two turns. This provides sufficient travel for the poppet.

The valve rod (41) is held in place by three parts (25, 26, and 27) which must be removed to enable disassembly of the valve rod. Access to these three parts is gained by removing the reservoir (2). Be sure to drain the hydraulic fluid before removing the reservoir.

The piston and hand lever can be removed as an assembly. Unscrew the cylinder retaining plug (16), disconnect from clevis (19), and pull straight up. At the end of the pressure stroke, the piston should bottom on the body plate (50) before the lever hits the cylinder retaining plug (16). If it does not, or more finger room between the hand lever and reservoir is desired, loosen piston pin (7), insert a small rod in the crosshole provided in the piston, and back off the piston (which is threaded into the piston pin (17) as needed. Be sure to re-tighten the set screw (7).

The cylinder pump (18) must be removed and reassembled from the top, otherwise, the o-ring will be cut by the angular, intersecting body casting bore. To remove the cylinder, detach the body plate (50) and push cylinder from the bottom. On reassembly, lubricate the o-rings and try to rotate the cylinder, as inserted, to avoid cutting or pinching the o-rings. A tapered piece of wood is helpful in rotating the cylinders.

The precision pressure adjustment mechanism can be unscrewed from the pump body as a unit. The star wheel (21), star wheel pin (22), piston cap (23) and piston (24) make up a subassembly which is removed from the pump body by unscrewing the piston body (24). Note that the star wheel (21) is attached to the Vernier piston (58) by means of a pin (22).

Priming Instructions for Hand Pump

If the pump runs out of fluid, it will be necessary for it to be primed. After filling the pump reservoir with the proper hydraulic fluid, as recommended in Section 2, the pump must be primed in accordance with the instructions in this section. When priming, pump with full strokes of the pump handle, not with partial or short strokes.

With the valve rod (41) out, the large volume low pressure side is in operation. Open the relief valve (13) and pump ten full strokes. Close the relief valve and operate the pump to be certain the large volume low pressure side is operating and holding pressure. Then open the relief valve and pump another ten full strokes.

When the pump runs out of fluid air becomes trapped in the high pressure check valve. To prime the high pressure low volume side of the pump the air must be vented. The venting procedure involves only three parts, the relief valve (13), the valve rod (41), and the high pressure check valve (33).

With the valve rod (41) out remove the high pressure check valve plug (28) and slowly pump two and one-half strokes so the pump handle is at a 45° angle. With the plug removed oil will flow out of the high pressure check valve, flushing the trapped air. Examine for air bubbles which may adhere to threads or parts. Replace the plug and when almost tight use slight pressure on the pump handle to cause leakage at the plug. This is a precaution to be sure the hole is completely filled with fluid. Tighten the plug.

With the relief valve closed and the valve rod out operate the pump until pressure develops on the large volume low pressure side. Push the valve rod in and pump with full strokes. The high pressure low volume side should be operating properly.

If the high pressure low volume side does not operate or operates only partially some air is still entrapped in the high pressure check valve and the priming procedure must be repeated.

Generally, when properly primed the pump will continue to operate without further attention. However, it is possible air entrapped in the pump reservoir may collect in the high pressure check valve. If that happens the pump will not develop pressure with the valve rod in the high pressure low volume position. Performing the above priming procedure will correct this condition.



Drawings and Parts Lists

Figure 2 and the associated parts list, included in this manual, illustrate replacement parts available for the standard hand pump commonly supplied with Morehouse Hydraulic Jacks. Drawings and parts lists for specific capacity hydraulic jacks are supplied separately. If copies of drawings and parts lists of a specific capacity jack are required write to us for the appropriate drawings.

When ordering repair parts, please include the serial number and capacity of the hydraulic jack (as stamped on the jack body) and state the part number, name, and quantity required. Order parts from at the address listed in the footer below.

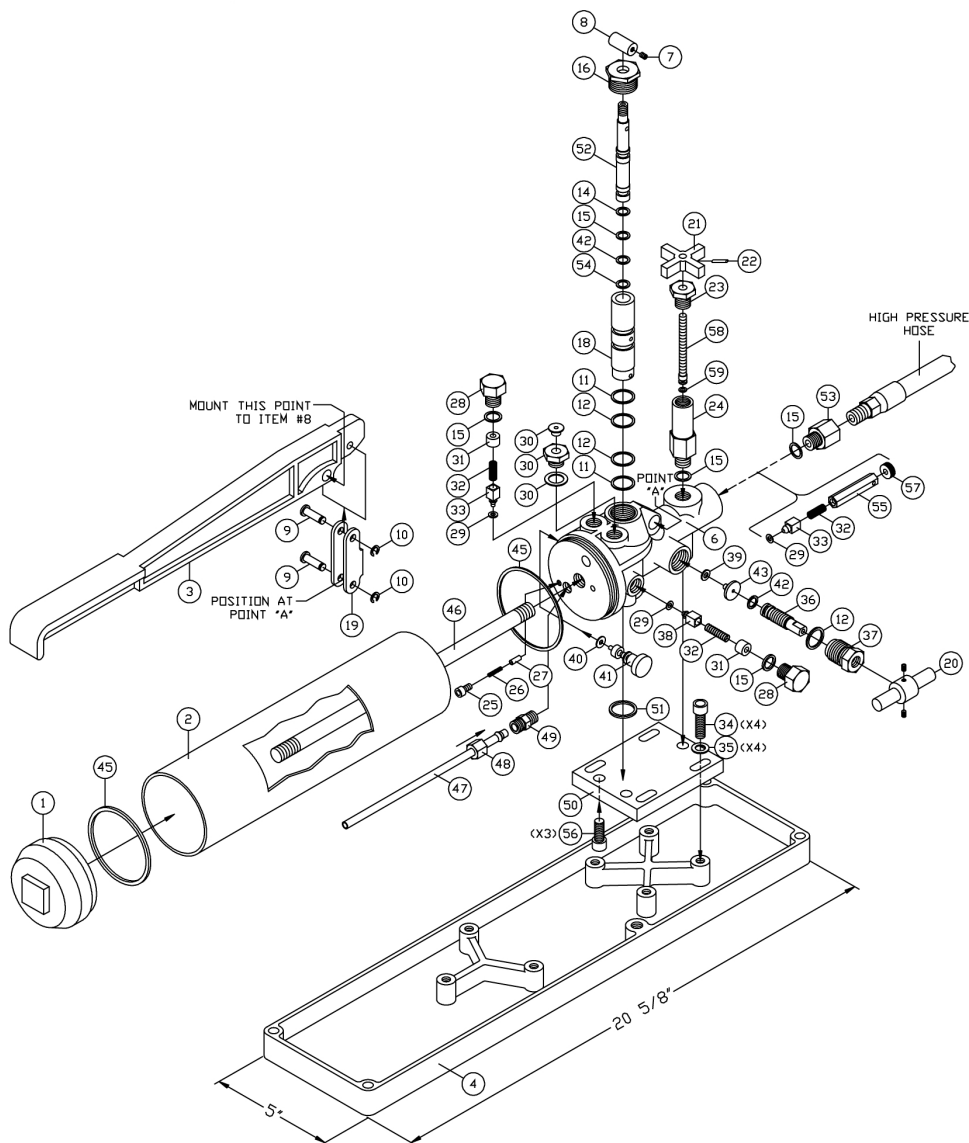


Figure 2: Hand Pump Assembly (Drawing 214000A-01)



Parts List for Hand Pump (1-38)

Item	Part No.	Nomenclature	Quantity
1	T-575	Reservoir Cap	1
2	T-421	Reservoir Tube	1
3	T-165	Pump Handle	1
4	T-118	Drip Pan	1
6	T-402	Pump Body	1
7	T-160	Piston Pin Screw	1
8	T-161	Piston Pin Shoe	1
9	T-142	Clevis Pin	2
10	T-144	Cotter Hair Pin	2
11	10-90020	Cylinder Back-Up Ring (T-112)	2
12	10-90013	O-Ring (T-153)	3
14	10-90019	Piston Back-Up Ring (T-158)	1
15	10-90027	O-Ring	5
16	T-108	Cylinder Retaining Plug	1
17	T-145	Piston Pin	1
18	T-236	Cylinder Pump	1
19	T-143	Clevis	1
20	T-773	Relief Valve Handle	1
21	P-17-33	Star Wheel	1
22	P-17-32	Star Wheel Pin	1
23	1GT-33	Piston Cap	1
24	1GT-32	Piston Body	1
25	T-405	Screw	1
26	T-116	Valve Rod Spring	1
27	T-133	Valve Rod Detent Pin	1
28	T-117	Pump Body Plug	2
29	10-90001	O-Ring (T-152)	3
30	1GT-302	Fill & Vent Plug	1
31	T-127	Check Valve Spacer	2
32	CV-1-5	Check Valve Spring	3
33	T-147	High Pressure Valve Poppet	2
34	T-406	Drip Pan Attaching Screw	4
35	T-167	Drip Pan Attaching Washer	4
36	T-110	Relief Valve Stem	1
37	T-109	Relief Valve Body	1
38	T-194	Poppet Valve	1



Parts List for Hand Pump (39-59)

Item	Part No.	Nomenclature	Quantity
39	10-90002	Relief Valve O-Ring (T-175)	1
40	10-90004	Valve Rod O-Ring (T-155)	1
41	T-115	Valve Rod	1
42	10-90005	O-Ring (T-151)	2
43	T-111	Relief Valve Seat	1
45	10-90010	Reservoir O-Ring (T-156)	2
46	T-130	Reservoir Stud	1
47	P-17-29	Inlet Tube	1
48	P-17-7	Inlet Tube Fitting	1
49	T-250	Inlet Tube Nipple	1
50	T-408	Body Plate	1
51	10-90012	Cylinder O-Ring (T-164)	1
52	T-106	Piston	1
53	CV2SS2	Special Adapter	1
54	10-90018	Piston Back-Up Ring (T-159)	1
55	T-107	Guide Rod	1
56	01-90003	Body Attaching Screw	3
57	IGT-10	Retaining Plug	1
58	IGT-34	Vernier Piston	1
59	10-90000	Seal Ring Piston	1