STANDARD PROCEDURE FOR
Checking Jack Holding Pressure

Equipment Description:

Carver manual laboratory presses hydraulic unit.

Scope and Outline of Procedure:

This procedure is used to verify the hydraulic jacks used on the manual presses do not have any hydraulic leaks and are assembled correctly.

Test Equipment:

Jack test stand, and stop watch.

Test Specifications:

No handle rise at 1 metric ton, less than 800 lbs. pressure loss at mid scale, less than 600 lbs. Pressure loss at full scale, no handle skip.

Calibration Procedure

1. Pump jack until press is closed, gauge reads 1 metric ton and jack handle is in the down position.

2. At the end of the ten minutes, try to push handle down. Handle should not have risen.

3. Open press.

4. Pump jack until press is closed and gauge reads mid scale.

5. Dwell for 10 minutes.

6. Check gauge, pressure loss should not exceed 800 lbs. Force.

7. Open press.
8. Pump jack until press is closed and gauge reads full scale.

9. Dwell for 20 minutes.

10. Check gauge, pressure loss should not exceed 600 lbs. Force.

11. Open press.

12. Pump jack until press is closed and gauge reads full scale.

13. Raise handle as to apply a downward force on handle. Without increasing pressure, the handle should not lower.


15. Pump jack until press is closed and gauge reads full scale.

16. Shake handle up and down. Handle should not skip or go down.

17. Open press.

18. Pump jack to build pressure. As jack is being pumped, and press is under pressure, there should not be any popping noises while building pressure.

19. While press is under pressure, check the following areas for leaks:

   A. Pump Assembly
   B. 1/8” NPT plug
   C. Tube fittings
   D. Release knob
   E. Reservoir
   F. 7/16” SAE plug
## Troubleshooting 12 and 25 ton Carver Hydraulic units

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1.) **Pressure loss:** All hydraulic systems will lose some pressure and will require additional pumping to maintain pressure for extended periods of time. There are other factors that can affect the pressure holding capacity of your press such as yielding material. If you are pelletizing powders, extracting fluids or using a heated process to melt or laminate plastics, the pressure will drop off because the pressure and or temperature is causing the material to yield. In this type of process, it will be necessary to pump the hydraulic unit frequently at first, then occasionally to maintain a constant pressure on your process. If you suspect a problem in the hydraulic unit is causing pressure loss. Remove the molds and product and close the press with nothing in the daylight or use a metal spacer if the daylight is set larger than the ram stroke. The pressure loss at mid scale on the gauge should not exceed 800 lbs. in 10 minutes and at full scale, the pressure loss should not exceed 600 lbs. in 20 minutes. If your hydraulic unit looses pressure faster that the specifications listed above you will need to rebuild or replace your hydraulic unit. (See note #4 on rebuilding hydraulic unit) If the unit will not build or hold pressure, the release valve ball may be missing. This can occur if the operator accidentally unscrews the release valve more than one full turn. When the release valve is unscrewed all the way, oil and the 7/32” ball will usually come out, and because of the oil leak the operator may not notice the ball coming out. It is a good idea to check for the ball before assuming the unit needs rebuilt. A missing release valve ball will prevent the unit from building or holding pressure. (See part H in the drawings below) To check for the ball you will want to have some rags available because oil will come out and you may want to have a flashlight to check for the ball inside the unit. (The ball will usually come out but not always) Unscrew the release valve until it comes out. If the ball does not come out, use the flashlight to see if the ball is still in the release valve port. Work quickly to minimize oil loss. If the ball is present, simply place it back in the port and reinstall the release valve. If the ball is missing, temporarily reinstall the release valve until you can get a replacement ball.

If the pump handle raises back up when you release it check ball “P” is not seating properly. This ball is located behind the 9/16” hex plug directly beneath the pump handle. You will...
need to remove the plug and washer “L & P” and the spring part “N” remove the ball part “P” and check to be sure there is no dirt on the seat. Place ball “P” back against the seat and place a flat punch against the ball and strike it firmly with a hammer. This will reseat the ball and should stop any leakage around the ball. You may also want to stretch the spring, part “N” about ¼” so that it will apply more pressure to the ball. Then insert the spring with the small end against the ball and reinstall and tighten the plug. When under pressure the pump handle should not rise if the leak has stopped. It is best to check for handle rise at full pressure and end your pumping with the handle pressed all the way down, let the press sit for a few minutes and again try to press the handle down. If the handle is still fully down the leak has been corrected, but if you were able to press the handle down the hydraulic unit will have to be rebuilt or replaced.  
*Note: On very old units, the release valve will taper to a sharp point, on these models no release valve ball is used.

2.) **Procedure for Bleeding Air:** Open release valve one full turn counterclockwise and pump handle 12 full strokes. Then close release valve and re-test unit. Usually it will only be necessary to perform the air bleeding procedure if you have installed a new or rebuilt hydraulic unit or if the oil reservoir is empty or has been drained. If after performing the bleed procedure the unit will not function, the hydraulic unit will need to be rebuilt or replaced.

3.) **Refilling the Hydraulic Oil:** Before checking the oil level, be sure the ram is fully lowered. The oil fill port is on the back of the hydraulic unit, at approximately 2/3 of the height of the hydraulic unit. You will need to use a wrench to unscrew the pipe plug or breather cap from the port. The proper oil level is slightly below the fill port. *If the unit is over filled, oil can be forced out through the breather plug when the pressure is released which will cause oil to collect around the entire base. If your unit appears to have oil collecting around the base, you can perform a simple test to see if the oil is over flowing from the reservoir breather plug. Clean all oil residue from the back of the hydraulic unit then tape a piece of paper
below the breather plug. If the unit is overfilled, oil will appear on the paper after a few cycles. Some oil will need to be drained from the reservoir to correct the problem.

4.) **Rebuilding the Hydraulic Unit:** On older presses with green paint on the hydraulic unit, in most cases, it is best to replace the hydraulic unit instead of attempting a rebuild. (see note 2 below) In addition, some of the older units use a leather cup type ram seal, which is obsolete, which makes rebuilding the unit impossible. If you have purchased a kit from Carver and discover you can’t use it because of the leather cup ram seal, you can return it for credit if the parts have not been installed.

Kits available from Carver for rebuilding hydraulic units.
12-Ton units use kit #3729
25-Ton units use kit #3730
Each kit contains instructions, a complete set of seals and gaskets, and oil to refill the unit. 
*Note: Two things to be aware of when ordering kits.
1) In order to open the hydraulic unit, you will need a bench vice large enough to hold the base of the hydraulic unit and a 48” pipe wrench to unscrew the top cap.
2) Eventually the sealing surfaces, which are machined in the cast iron base, will wear out. If this is the case, the kit will not correct the problem and the hydraulic unit will need to be replaced.

5.) **External Leaks:** External leak in the gauge will cause significant pressure loss and must be corrected before the unit will build or hold pressure. The most common problem encountered with the gauge coupling results from improper procedures when loosening the gauge. It is very important to hold the coupling swivel stationary and turn only the gauge counterclockwise to loosen or remove the gauge. If the coupling swivel is allowed to turn, usually the socket head cap screw will loosen resulting in a leak between the coupling swivel and the coupling base. To correct this problem, you will need to loosen and remove the gauge from the coupling swivel then remove the copper washers from inside the coupling swivel. Once the washers have been removed, you will see the top of the socket-head cap
screw. **Before** turning the socket head cap screw, you **must** loosen the socket head set screw (inside the small hole on the side of the coupling base) otherwise the socket head cap screw and the coupling base will be damaged. After loosening the socket head set screw, tighten the socket head cap screw as tight as you can get it by hand using a hex Allen wrench, then retighten the socket head set screw. Finally, reinstall the washer or washers in the gauge socket and thread the gauge in by hand, stopping with the gauge aligned in the proper position for operating the press. Then tighten the gauge coupling by holding the gauge stationary and turning the gauge swivel counterclockwise until it is tight. If the gauge coupling leaks between the gauge and coupling swivel, you may need to add a second copper washer. (A maximum of two washers can be used) Using any type of thread sealant is not recommended because the threads on the gauge stem are straight thread not standard tapered pipe thread and are not designed to create a seal.

Leaks at the tube fittings cannot be corrected by tightening the nuts. The seal between the tubing and the tube fitting is created by an o-ring that seals on the outside of the tubing. When installing the tubing in the fittings, check for and remove any burrs on the ends of the tubing. Lubricate the tubing with hydraulic oil before inserting in the fitting, otherwise the o-ring can be damaged and cause a leak. The threaded ends of the fittings in the coupling base and the hydraulic unit are sealed at the factory with Loctite #569 and normally will not need to be removed unless you are replacing the hydraulic unit. Removal of these fittings will require the use of a six point deep well socket; otherwise, the fitting hex can be round off making removal impossible. Before installing the threaded end in the coupling base, remove any oil residue and apply Loctite #569. If you choose to use Teflon tape be sure to stay back a couple of threads from the end of the fitting, Otherwise some of the tape can shear off during tightening and will foul the check balls and cause the hydraulic unit to malfunction.
THIS DRAWING IS PROVIDED TO ILLUSTRATE THE OPERATIONAL FUNCTION OF THE CARVER 12 & 25 TON HYDRAULIC UNITS.
(SOME COMPONENTS ARE NOT SHOWN IN THEIR ACTUAL LOCATIONS)

Use a 3/32" Pin Punch to remove the 1/32" Relief valve bolt.
Try using a light M2-9 Hex Nut. However, use medium force to resist the bolt.

Remove Relief Valve Shaft

Hydraulic Fluid Fill Port

1/32" Dia Steel Wire

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3925 & 3925CE 25 TON UNIT

**Item**  | **Qty** | **Part #** | **Description**  
---|---|---|---  
A  | 1  | 378327 | QUAN RING 
B  | 1  | 383371 | TOP CAP O-RING  
C  | 1  | 383328 | BREATHER  
D  | 1  | 374612 | RAW SEAL  
E  | 1  | 383739 | CHILDS SEAL  
F  | 1  | 378313 | RELEASE VALVE SPACER ASSEMBLY  
G  | 2  | 378325 | 3/8" SM HNRL  
H  | 1  | 383732 | CLEVIS PIN  
I  | 1  | 374604 | CLEVIS PIN  
J  | 1  | 390694 | NPT PLUG  
K  | 1  | 383328 | CLEVIS WASHER  
L  | 1  | 374637 | RETAINER  
M  | 1  | 373626 | 3/4" SM HNRL  
N  | 1  | 378313 | CLEVIS PIN  
O  | 1  | 383703 | CLEVIS PIN, 3/16" OR 1/8" LG  
P  | 1  | 383704 | CLEVIS PIN, 3/16" OR 1/8" LG  
Q  | 1  | 378330 | PUMP CHAMBER  
R  | 1  | 373625 | BACK UP SEAL  
S  | 1  | 378324 | PUMP CUP  
T  | 1  | 390626 | AXIY AXIT  
PUMP ASSEMBLY  
U  | 1  | 373625 | CLEVIS WASHER  
V  | 1  | 383733 | PUMP CHAMBER  
W  | 1  | 374612 | FLAT ROLLER SEAL  
X  | 1  | 378344 | RFX  
Y  | 1  | 373628 | TOP CAP  
Z  | 1  | 373629 | RETAINER  
AA  | 1  | 374620 | CHILDS SEAL  
AB  | 1  | 374620 | RETAINER  
AC  | 1  | 378328 | PUMP PLUG  
AD  | 1  | 378207 | SHORT ARM  
AE  | 1  | 383627 | 3/4" & 3/8" OD HD W/ RHP SOR  
AF  | 1  | 383706 | LOCK NUT  
AG  | 1  | 378384 | APW  
AH  | 1  | 383731 | SCREW  
AI  | 1  | 378389 | SS SCREW  
AJ  | 1  | 383731 | SS SCREW  
AP  | 1  | 378384 | APW  
AQ  | 1  | 383731 | SCREW  
AR  | 1  | 378389 | SS SCREW  
AS  | 1  | 383731 | SS SCREW  
AT  | 1  | 378384 | APW  
AU  | 1  | 383731 | SCREW  
AV  | 1  | 378389 | SS SCREW

**SPECS**  
- **Diameter:** 2.562" / 65mm  
- **Width:** 5.125" / 130.27 sq cm  
- **Color:** CHARCOAL GRAY  
- **Material:** STEEL, AM20B, #232  

**Quick Start-Up Check:**  
- **Note:** Do not exceed 1/4 turn CP when releasing pressure.

**Caution:**  
- The use of the oil fill port has been removed from the oil fill port and the hydraulic power unit will be installed in its place.

**Rear Warning:**  
- Operating the press with the oil fill port will void the hydraulic power unit and void the warranty.

**Hydraulic Oil Replacement Procedure:**  
1. **Lower the ram to the fully retracted position**  
2. **Open the valve from the slave port on the hydraulic unit**  
3. **Remove the hydraulic unit from the press base**  
4. **Remove the valve from the slave port on the hydraulic unit**  
5. **Open the connection on the slave port on the hydraulic unit**  
6. **Fill with special grade hydraulic oil**  
7. **Install the valve and breather in the oil fill port**  
8. **Fill the slave port on the slave port on the hydraulic unit**  
9. **Secure the hydraulic unit to the press base**

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NOTE: GAUGE NOT INCLUDED WITH COUPLING ASSEMBLY

REFERENCE:

3277 - STANDARD GAUGE UNION COUPLING

3303 - GAUGE UNION COUPLING ASSEMBLY FOR MINI-C AND PELLET PRESSES