

---

# CARVER<sup>®</sup>

---

## TECHNICAL MANUAL

### CARVER 12 & 25 Ton Hydraulic Units

**MODEL #: 3912 & 3925**



CARVER, INC.  
1569 MORRIS ST., P.O. BOX 544  
WABASH, IN 46992  
PH: (260) 563-7577 Fax: (260) 563-7625  
E-MAIL: [carverpress@corpemail.com](mailto:carverpress@corpemail.com)

# **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:

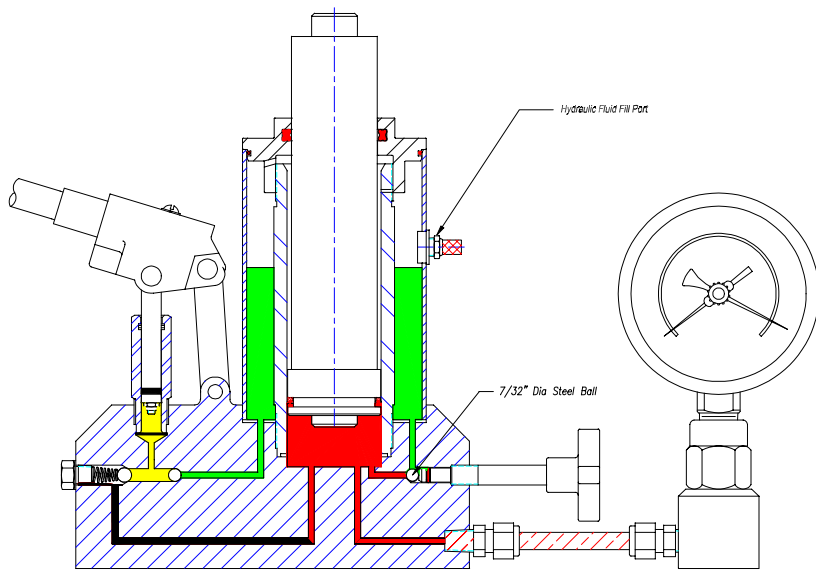
No handle rise at 1 metric ton, less than 800 lbs. pressure loss at mid scale, less than 600 lbs. Pressure loss at full scale, no handle skip.

## 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.
14. Open press.
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

System Pressure  
 Pump Pressure  
 Reservoir Fluid



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)

REV.	CODE	BY	DATE	DESCRIPTION

DWN BY GWM	DATE 1-22-96	<b>CARVER • CARVER, INC.</b>		P.O. BOX 644 WABASH, INDIANA 46989-0644	
CHK'D BY	DATE	TITLE HYDRAULIC UNIT SCHEMATIC / SECTION VIEW			
TOLERANCES .XXX = ± .005 .XX = ± .015 .X = ± .06		MATERIAL	REQ'D	SCALE	
MODELS	ORDER/SERIAL	DWG. NO.	110479B		REV.

## Troubleshooting 12 and 25 ton Carver Hydraulic units

Problem	Cause	Solution
Press will not close, build or hold pressure	Air entrapment  b) Low oil level due to leak  c) Missing release valve ball  Worn seals	Bleed air (see #2 below)  Repair leak and refill oil (see #3,#4 & #5 below) Replace ball (see #4 and part H on drawings below) Install rebuild kit (see #4 below)
Pressure drops off	Yielding material in process  Release valve not tight  External leak  Internal leak  Low oil level	(see note #1 below)  Tighten release valve  Locate and correct leak (see #3 below) Rebuild or replace hydraulic unit Repair leak and refill (see #3 below)
Ram will not retract	Defective ram seal	Install rebuild kit (see #4 below)
Leak in gauge coupling or fittings	Gauge loose in coupling  Worn seals  Socket head cap screw loose.	Tighten gauge in coupling (see #5 below) Replace seals (see drawing and note #5 below) Re-Tighten socket head cap screw (see drawing and note #5 below)

1.) **Pressure loss:** All hydraulic systems will loose 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 loses pressure faster than 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 reseal 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

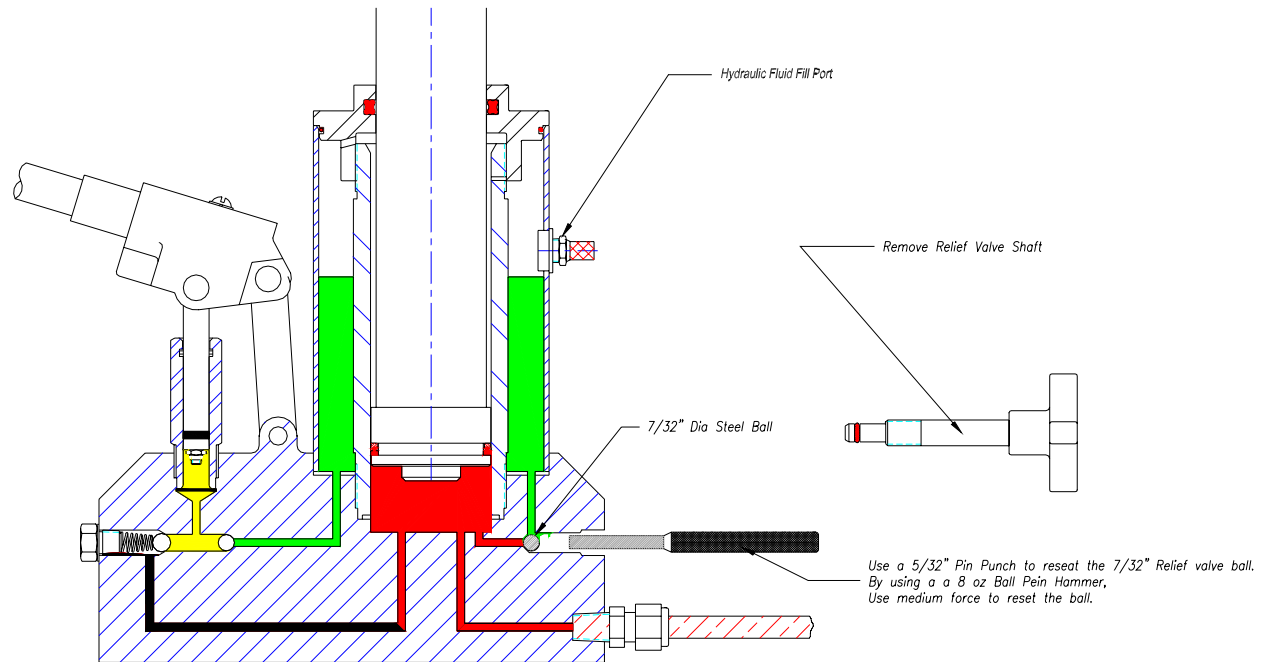


screw. Before turning the socket head cap screw, you must loosen the socket head set screw (inside the small hole on the side of the coupling base) otherwise the socket head cap screw and the coupling base will be damaged. After loosening the socket head set screw, tighten the socket head cap screw as 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.



System Pressure  
 Pump Pressure  
 Reservoir Fluid

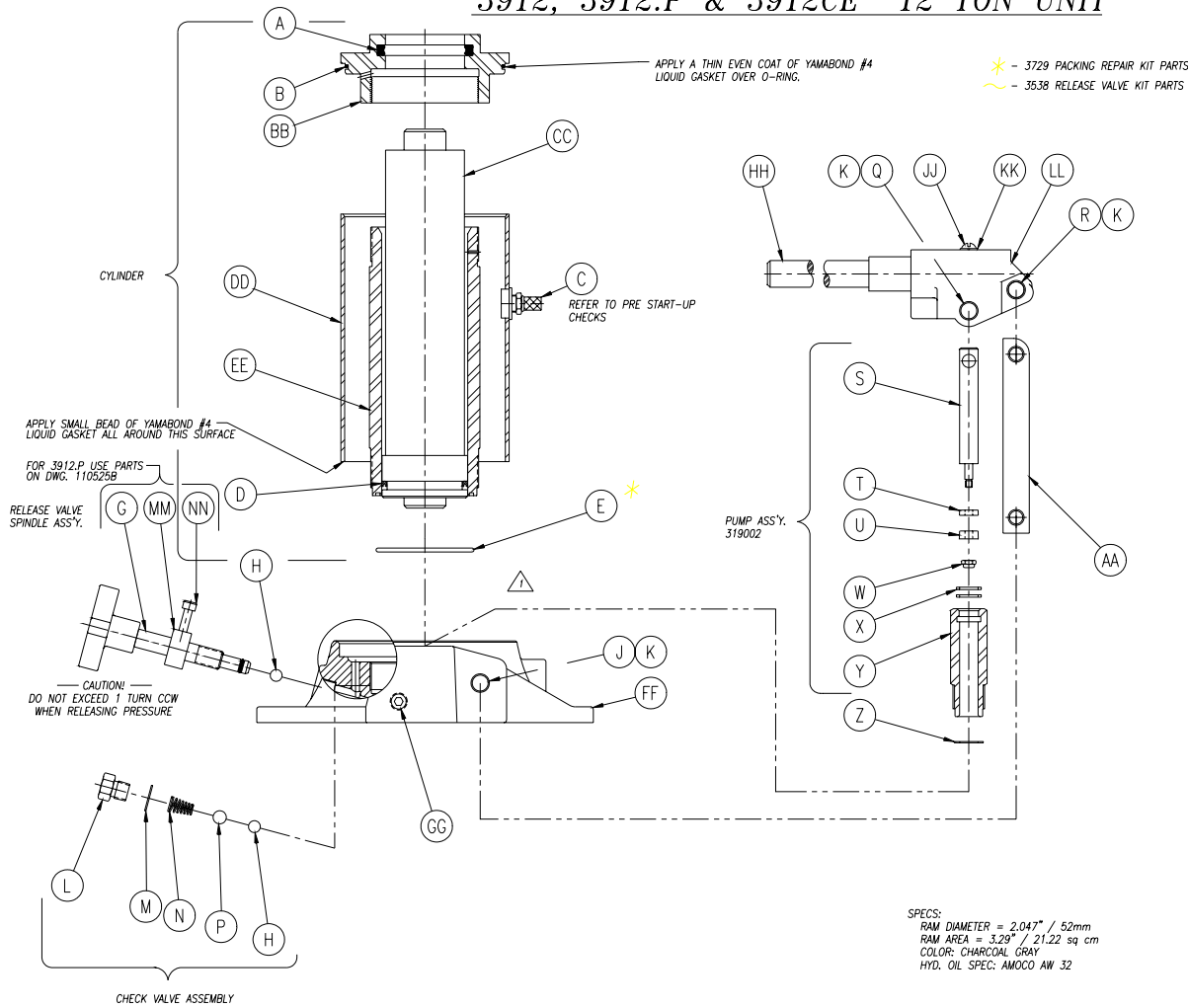


THIS DRAWING IS PROVIDED TO ILLUSTRATE THE OPERATIONAL FUNCTION OF THE CARVER 12 & 25 TON HYDRAULIC UNITS.  
 (SOME COMPONENTS ARE NOT SHOWN IN THEIR ACTUAL LOCATIONS)

REV.	CODE	BY	DATE	DESCRIPTION

DWN BY GWM	DATE 1-22-96	<b>CARVER • CARVER, INC.</b>		P.O. BOX 544 WABASH, INDIANA 46992-0544
CHK'D BY	DATE	TITLE HYDRAULIC UNIT SCHEMATIC / SECTION VIEW		
TOLERANCES .XXX = ± .005 .XX = ± .015 .X = ± .05		MATERIAL	REQ'D	SCALE
MODELS		ORDER/SERIAL	DWG. NO. 110479B	REV.

# 3912, 3912.P & 3912CE 12 TON UNIT



ITEM	QTY	PART #	DESCRIPTION
* A	1	319020	QUAD RING
* B	1	983061	TOP CAP O-RING
* C	1	363028	BREATHER
* D	1	319157	RAM SEAL
* E	1	983110	CYLINDER SEAL
G	1	319273A	RELEASE VALVE SPINDLE ASSEMBLY
* H	2	319026	7/32 DIA BALL
* J	1	931002	CLEVIS PIN, 5/16 DIA. x 1 1/8" LG.
* K	3	935004	COTTER PIN
* L	1	965026	PIPE PLUG
* M	1	319028	COPPER WASHER
* N	1	319027	SPRING
* P	1	319026	5/16 DIA BALL
* Q	1	931003	CLEVIS PIN, 5/16 DIA. x 1" LG.
* R	1	931004	CLEVIS PIN, 5/16 DIA. x 7/8" LG.
* S	1	319138A	PUMP PLUNGER
* T	1	319023	BACK-UP SEAL
* U	1	319024	PUMP CAP
* W	1	916087	HEX NUT
* X	2	319022	LEATHER WASHER
* Y	1	319137A	PUMP CYLINDER
* Z	1	983112	FLAT URETHANE SEAL
AA	1	319264A	LINK
BB	1	3191428	TOP CAP
CC	1	3191658	RAM
DD	1	3191418	RESERVOIR
EE	1	319139B	CYLINDER
FF	1	2120620	BASE
GG	1	964007	PIPE PLUG
HH	1	262001	SHORT HANDLE
JJ	1	914001	#10-24 x 3/8 RD HD MACH SCR
KK	1	922027	LOCK WASHER
LL	1	319038A	BEAM
MM	1	645035	SET COLLAR
NN	1	911029	SHCS 1/4-20 x 1" LG.

### PRE START-UP CHECKS

CHECK TO ENSURE THE SOLID SHIPPING PLUG HAS BEEN REMOVED FROM THE OIL FILL PORT ON THE HYDRAULIC POWER UNIT AND THE SINTERED BRONZE BREATHER FITTING (ITEM C) HAS BEEN INSTALLED IN ITS PLACE

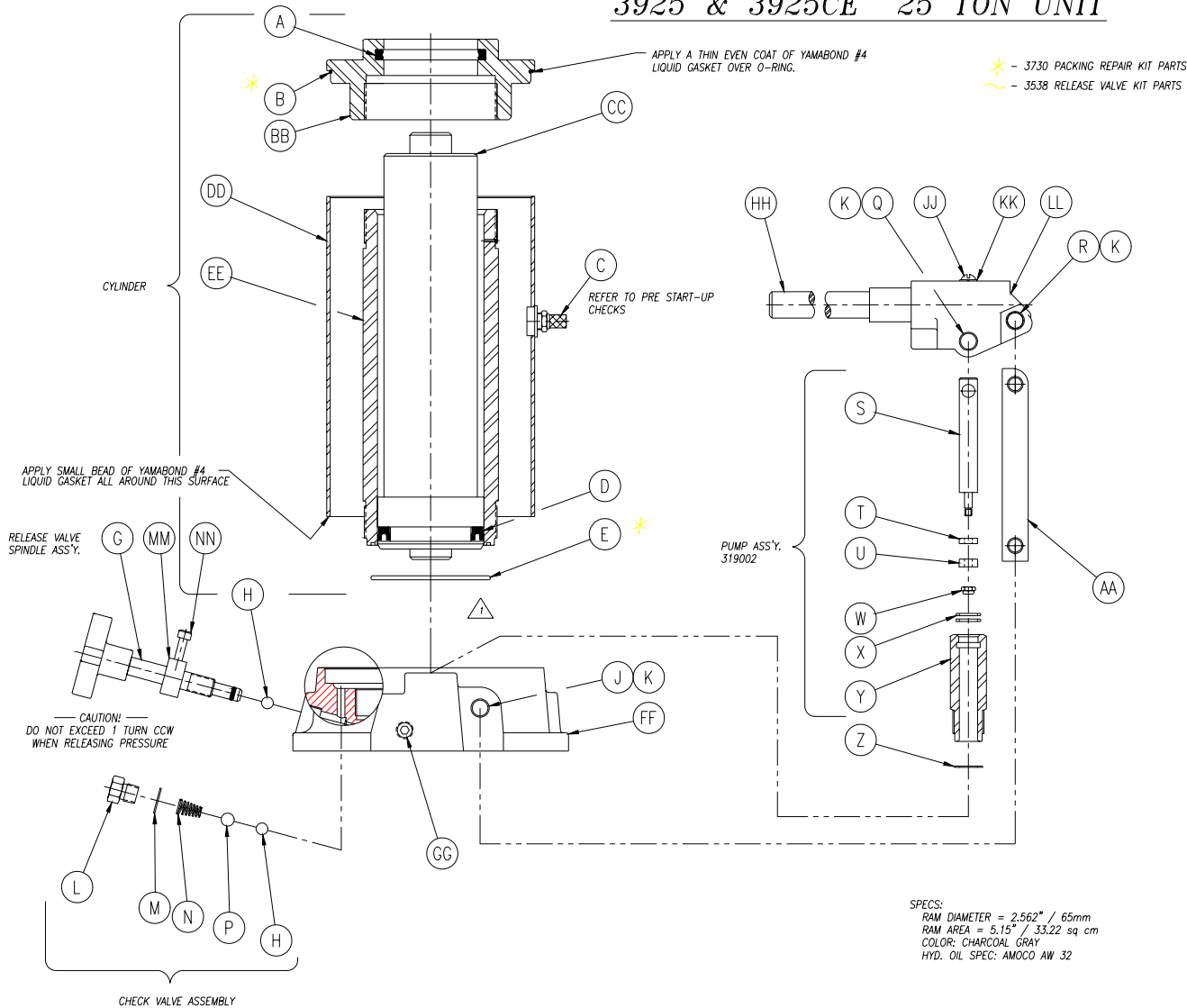
**WARNING!!!**  
 OPERATING THE PRESS WITH THE SOLID SHIPPING PLUG IN THE OIL FILL PORT WILL DAMAGE THE HYDRAULIC POWER UNIT AND VOID THE WARRANTY.

### HYDRAULIC OIL REPLACEMENT PROCEDURE

1. LOWER THE RAM TO THE FULLY RETRACTED POSITION.
2. REMOVE THE GAUGE LINE FROM THE GAUGE PORT ON THE HYDRAULIC UNIT.
3. REMOVE THE HYDRAULIC UNIT FROM THE PRESS BASE.
4. REMOVE THE SINTERED AIR BREATHER FROM THE FILL PORT ON THE BACK SIDE OF THE HYDRAULIC UNIT.
5. DRAIN THE CONTAMINATED OIL FROM THE HYDRAULIC UNIT.
6. FILL WITH SPECIAL CARVER HYDRAULIC OIL TO LEVEL OF FILL PORT.
7. INSTALL THE SINTERED AIR BREATHER IN THE OIL FILL PORT.
8. INSTALL THE GAUGE LINE IN THE GAUGE PORT ON THE HYDRAULIC UNIT.
9. SECURE THE HYDRAULIC UNIT TO THE PRESS BASE

SPECS:  
 RAM DIAMETER = 2.047" / 52mm  
 RAM AREA = 3.29" / 21.22 sq cm  
 COLOR: CHARCOAL GRAY  
 HYD. OIL SPEC: AMOCO AW 32

# 3925 & 3925CE 25 TON UNIT



ITEM	QTY	PART #	DESCRIPTION
* A	1	319222	QUAD RING
* B	1	983111	TOP CAP O-RING
* C	1	363028	BREATHER
* D	1	319215	RAM SEAL
* E	1	983109	CYLINDER SEAL
△			
G	1	319273A	RELEASE VALVE SPINDLE ASSEMBLY
* H	2	319025	7/32 DIA BALL
* J	1	931002	CLEVIS PIN
* K	3	935004	COTTER PIN
* L	1	965026	PIPE PLUG
* M	1	319028	COPPER WASHER
* N	1	319027	SPRING
* P	1	319026	5/16 DIA BALL
* Q	1	931003	CLEVIS PIN, 5/16 DIA. x 1" LG.
* R	1	931004	CLEVIS PIN, 5/16 DIA. x 7/8" LG.
* S	1	319138A	PUMP PLUNGER
* T	1	319023	BACK-UP SEAL
* U	1	319024	PUMP CUP
* W	1	916087	HEX NUT
* X	2	319022	LEATHER WASHER
* Y	1	319137A	PUMP CYLINDER
* Z	1	983112	FLAT URETHANE SEAL
* AA	1	319264A	LINK
BB	1	319219B	TOP CAP
CC	1	319220B	RAM
DD	1	319212B	RESERVOIR
EE	1	319221B	CYLINDER
FF	1	212052D	BASE
GG	1	964007	PIPE PLUG
HH	1	262001	SHORT HANDLE
JJ	1	914001	#10-24 x 3/8 RD HD MACH SCR
KK	1	922027	LOCK WASHER
* LL	1	319038A	BEAM
* MM	1	645038	SET COLLAR
* NN	1	911029	SHCS 1/4-20 X 1" LG.

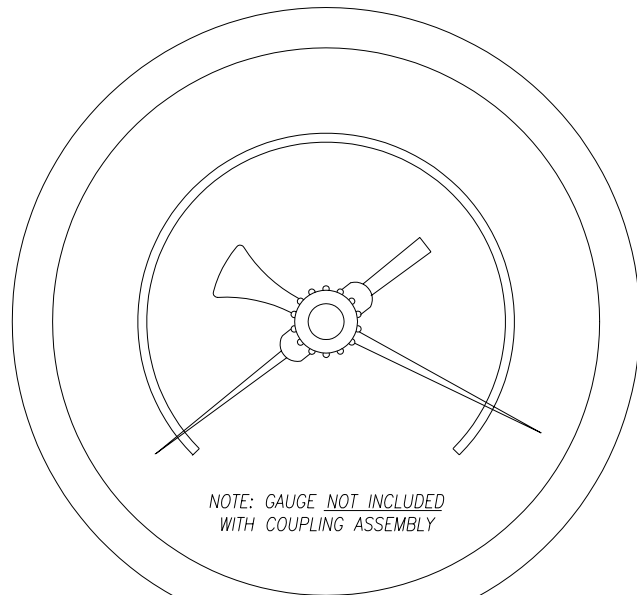
**PRE START-UP CHECKS**

CHECK TO ENSURE THE SOLID SHIPPING PLUG HAS BEEN REMOVED FROM THE OIL FILL PORT ON THE HYDRAULIC POWER UNIT AND THE SINTERED BRONZE BREATHER FITTING (ITEM C) HAS BEEN INSTALLED IN ITS PLACE.

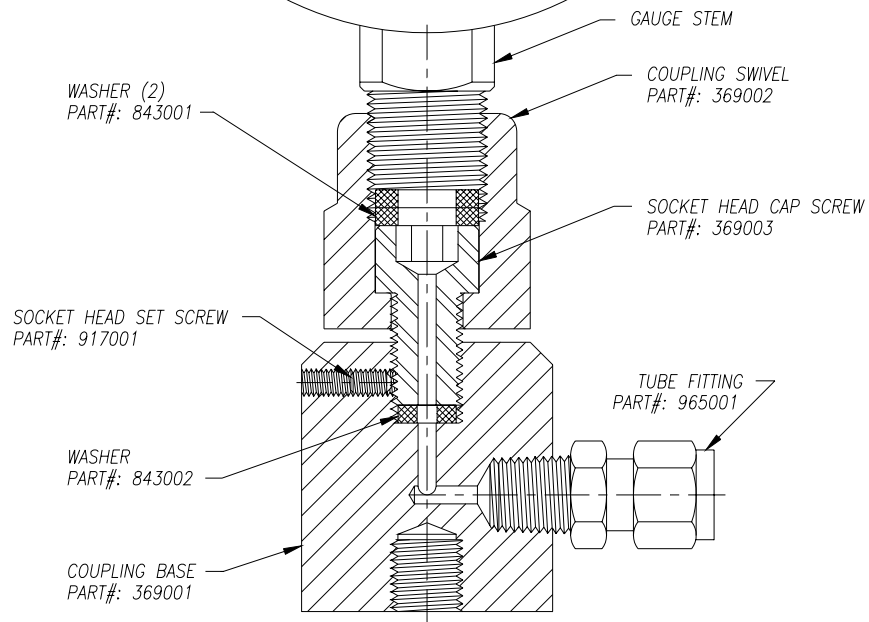
**WARNING!!!**  
 OPERATING THE PRESS WITH THE SOLID SHIPPING PLUG IN THE OIL FILL PORT WILL DAMAGE THE HYDRAULIC POWER UNIT AND VOID THE WARRANTY.

**HYDRAULIC OIL REPLACEMENT PROCEDURE**

1. LOWER THE RAM TO THE FULLY RETRACTED POSITION.
2. REMOVE THE GAUGE LINE FROM THE GAUGE PORT ON THE HYDRAULIC UNIT.
3. REMOVE THE HYDRAULIC UNIT FROM THE PRESS BASE.
4. REMOVE THE SINTERED AIR BREATHER FROM THE FILL PORT ON THE BACK SIDE OF THE HYDRAULIC UNIT.
5. DRAIN THE CONTAMINATED OIL FROM THE HYDRAULIC UNIT.
6. FILL WITH SPECIAL CARVER HYDRAULIC OIL TO LEVEL OF FILL PORT.
7. INSTALL THE SINTERED AIR BREATHER IN THE OIL FILL PORT.
8. INSTALL THE GAUGE LINE IN THE GAUGE PORT ON THE HYDRAULIC UNIT.
9. SECURE THE HYDRAULIC UNIT TO THE PRESS BASE



NOTE: GAUGE NOT INCLUDED  
WITH COUPLING ASSEMBLY



REFERENCE:

3277 - STANDARD GAUGE UNION COUPLING

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