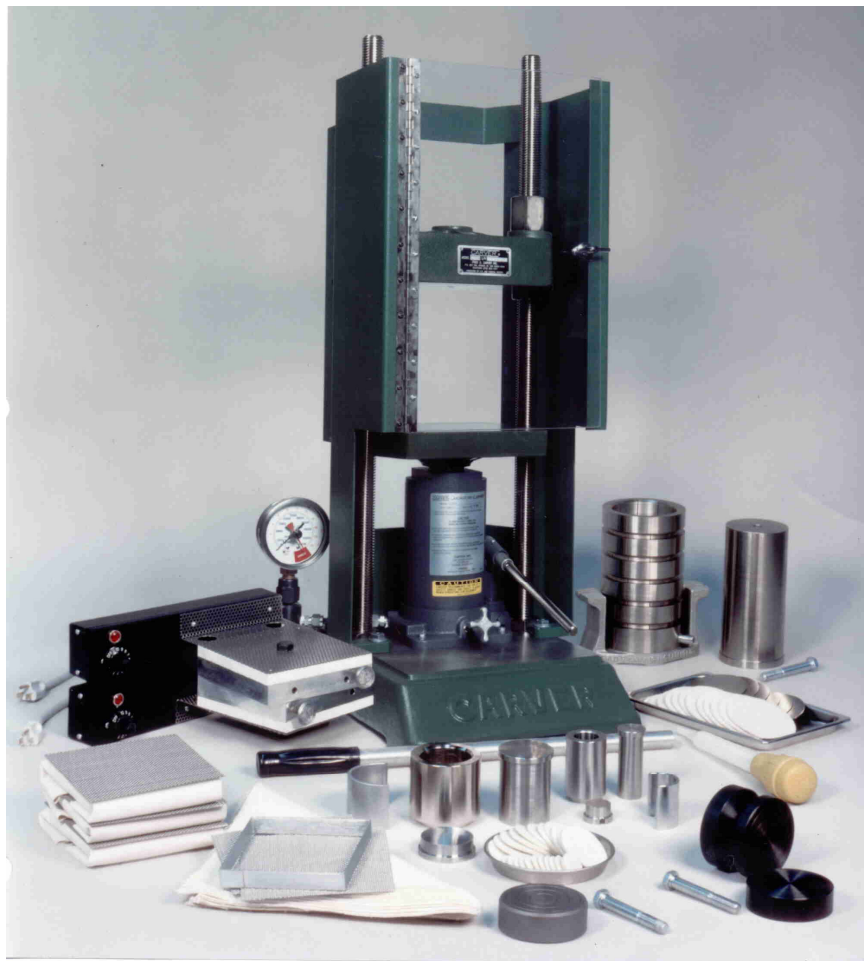

CARVER[®]

OPERATION, INSTALLATION AND MAINTENANCE MANUAL

UNHEATED TWO and FOUR POST
MANUAL HYDRAULIC PRESSES

IMPORTANT:

PLEASE READ CAREFULLY BEFORE INSTALLING OR OPERATING THIS EQUIPMENT



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NOTE: Performance figures stated in this manual are based on a Standard Atmosphere of 59 degrees F. (15 degrees C.) and 29.92" Hg (10,331 Kg/m²) at sea level. These factors are important considerations when selecting a hydraulic press. CARVER, INC. can advise you on proper selection and sizing of systems for the operating environment at your location.

CARVER, INC. is committed to a continuing program of product improvement. Specifications, prices, appearance, and dimensions described in this manual are subject to change without notice.

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1.1 INTRODUCTION

We are pleased to supply CARVER Laboratory Equipment for your facility. CARVER presses are used in many applications including research and development, specialized or low volume development situations, and quality testing. Thousands of presses are in use all over the world for numerous applications in the chemical, physical, biological, and mechanical fields wherever pressing is required.

1.2 ACCESSORIES

CARVER, INC. offers a variety of standard accessories for your press including Heated Platens, Heating and Cooling, or Cored Platens, Test Cylinder Outfits, French Pressure Cells, Swivel Bearing Plates, and Cage Equipment. All original CARVER accessories are designed and manufactured by CARVER, INC. These accessories ensure precise results for many applications, such as oil determination tests in food products, crushing analysis on cement core samples, molding of plastic quality control specimens, and preparing KBr or tracer pellets, etc.

Each accessory allows you to tailor the hydraulic press to your specific application. In addition to these standard items, we also manufacture custom presses and accessories for unique applications.

1.3 CUSTOMER SERVICE

The intent of this manual is to familiarize the operator and maintenance personnel with this equipment and help your organization get the maximum service from your press. If you have any questions regarding installation, service, repair, custom equipment or applications, please do not hesitate to call or write for the information required. Prices for presses, accessories, or repair parts will be furnished promptly on request.

NOTICE: If you desire to use a press for an application other than that for which it was purchased, please contact our factory to verify compatibility of the equipment with the new process. Misapplication of the equipment could result in injury to the operator or damage to the equipment.

2.1 SAFETY CONSIDERATIONS

The terms **NOTICE**, **CAUTION**, **WARNING**, and **DANGER** have specific meanings in this manual.

A **NOTICE** is used to indicate a statement of company policy directly or indirectly related to the safety of personnel or protection of property.

A **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

A **WARNING** indicates a potentially hazardous situation which, if not avoided could result in death or serious injury.

A **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This word will be limited to the most serious situation(s).

The term **IMPORTANT** emphasizes areas where equipment damage could result, or provides additional information to make a step or procedure easier to understand. Disregarding information marked **IMPORTANT** would not be likely to cause personal injury.

2.2 PRINCIPAL FACTORS THAT CAN RESULT IN INJURY

1. Failure to center the work over the ram in the platen area, resulting in eccentric loading, tilting, and possible movement of the work piece, which can then become a projectile.
2. Failure to level the top head of the press after it has been repositioned, which can produce the same results as in Number One, above.
3. Fracture of a specimen or part of the apparatus due to overload, resulting in flying fragments.
4. Occasional squirting of liquid from a pressed specimen.

2.3 GENERAL OPERATING SAFETY

1. Management should promote safe practices and safe machine operating procedures by establishing an effective plant safety program.
2. A knowledgeable and well-trained safety coordinator should be responsible for plant safety requirements, regulations and enforcement.
3. The safety coordinator must investigate all accidents and "close calls". The causes should be analyzed, corrective action taken accurate records maintained.
4. Establish machine safety rules and inform each employee of his responsibilities.
5. Display in prominent locations, the procedures to be followed in case of accidents. List names, addresses, and phone numbers of physicians, hospitals and personnel who are to be notified.
6. It is the employer's responsibility to provide an adequate work area around the machine that is clean, safe and uncluttered.
7. Provide safe and convenient methods and procedures for material handling.
8. Do not allow a machine to be operated if it is poorly maintained, malfunctioning or in need of guards or safety devices that protect the operator from potential hazards.
9. Pay strict attention to all caution, warning, and danger signs.

10. Do not wear loose clothing or jewelry of any kind which could get caught in moving parts.
11. Never reach into moving parts to clear a jam of any type.

2.4 SAFE GUARDING THE POINT-OF-OPERATION

1. It is the employer's responsibility to evaluate each machine operation and to determine and implement the best method of protecting the operator from injury at the point-of-operation.
2. Each machine application must be examined and evaluated to determine which type offers maximum operator protection for each machine application.
3. The employer should become familiar with the many and various types of safety devices available in order to determine which type offers maximum operator protection for each machine application.
4. Never allow machine guards or safety devices to be bypassed or removed.
5. Do not release the machine for production before installing and testing all protective guards, covers and safety devices.
6. Evaluate all point-of-operation guards, safety devices and work procedures frequently while the machine is in operation. Immediately correct any unsafe condition.

2.5 SUPERVISION AND SAFETY ENFORCEMENT

1. All levels of management must enforce every safety rule and regulation. To make machine safety effective, every violation should be reported, recorded and result in appropriate disciplinary action.
2. Never allow any operator, regardless of his experience, to start a new job assignment without a complete and detailed explanation of the job and the safe procedures to be followed.
3. It is the supervisor's responsibility to maintain absolute authority over the machine controls. The actuation of the main disconnect switch, mode selector switch and other keyed switches should always be under his supervision. The keys should be removed and in his possession at all times to prevent unauthorized use or adjustment of the machine.
4. Conduct frequent inspections of the machine operations. Be sure the operator and helpers are using proper safety devices and are working safely.
5. Never allow machine guards or safety devices to be removed, altered or bypassed.
6. Never allow untrained personnel to operate the machine.
7. Never allow personnel who are under the influence of drugs or alcohol, or otherwise not physically or mentally alert, to operate the machine.
8. Never allow minors to operate or assist in the operation of a machine.
9. Be alert to unsafe machine or operating conditions. A poorly maintained machine or a machine that is malfunctioning should be shut down until the unsafe condition has been corrected.

2.6 INSPECTION AND MAINTENANCE

1. To maintain a high level of machine reliability and to obtain advance warning of any possible hazards or malfunctions, a daily, weekly and monthly program of machine inspection and preventive maintenance should be established.
2. A check list should be used and records maintained of all maintenance and repair work performed.
3. Only highly qualified, competent personnel should be assigned this job of inspection and maintaining the machine. They should be specifically instructed and have thorough understanding of the controls and the operating and maintenance procedures outlined in this manual.
4. Establish and follow a safe shutdown procedure for machine inspection.
5. To ensure optimum performance and safe operating condition of the machine, careful inspections of the electrical and hydraulic systems should be made.
6. Auxiliary equipment and safeguards must be inspected and maintained in safe operating condition.
7. Releasing the machine for production after inspection and maintenance should be the responsibility of qualified personnel assigned by management.
8. Never perform maintenance or repair work until you are sure the power is turned off at the main control panel and cannot be turned back on without your knowledge. Use a padlock or other safe lockout device.

2.7 TRAINING

1. All personnel who will be associated with the operation of the machine must read and have complete understanding of the contents of this manual.
2. Management must assume the responsibility of training all personnel associated with machine operation to eliminate accidents and injuries.
3. Only employees who understand and can communicate their knowledge of the machine, its operation, its dies and safety requirements, should be assigned the responsibility of training.
4. A supervisor must be knowledgeable in machine operation, machine guarding, safety guidelines, operator supervision, job instructions, and causes of accidents. He is also responsible for promoting safe working habits and attitudes of machine operators.
5. An operator-training program should include specific instructions in safety, safety devices, guarding, proper use of the machine and correct procedures in performing every machine job.
6. No operator should be given a machine assignment that they do not fully understand.
7. Only thoroughly trained and responsible personnel should be allowed to operate or work on the machine.

WARNING: BEFORE OPERATING THE MACHINE... Be sure that all personnel in your company who will have contact with hydraulic machine equipment thoroughly read and understand this installation and Operation manual provide by **CARVER INC.**

2.8 REPORTING A SAFETY DEFECT

NOTICE: If you believe that your equipment has a defect, which could cause injury, you should immediately discontinue its use and inform **CARVER, INC.**, at our address listed in this manual.

CAUTION: **CARVER** strongly recommends the use of a safety shield and safety glasses when operating pressing equipment.

3.1 TWO POST PRESS DESCRIPTION

TABLE 3-1 UNHEATED PRESSES WITH SAFETY SHIELD

CATALOG#	3850	3851	3853	3968
MODEL	MINI C	MODEL C	MODEL M	12-10
CLAMP FORCE	12 US Tons 24,000 Pounds 11 Metric Tons	12 US Tons 24,000 Pounds 11 Metric Tons	25 US Tons 50,000 Pounds 22.5 Metric Tons	12 US Tons 24,000 Pounds 11 Metric Tons
WORK AREA (In)	6 x 6	6 x 6	9 x 9	10 x 7
RAM STROKE (In)	5.1	5.1	6.5	5.1
RAM DIAMETER (In)	2.047	2.047	2.56	2.047
RAM AREA (In²)	3.29	3.29	5.15	3.29
DAYLIGHT OPENING (In)	.75-7	.75-18	.75-16	1-16
WIDTH x DEPTH (In)	12 x 15	16 x 15	18 x 23	17 x 18
HEIGHT (In)	25	39	42	39
WEIGHT - Unheated (Pounds)	135	200	350	420

TABLE 3-2 CROSS REFERENCE OLD/NEW UNHEATED PRESSES

CATALOG		MODEL
OLD #	NEW #	
3392	OBSOLETE	Mini C
3393	3850	Mini C
2086	3851	Model C
2089	3853	Model M
3724	3968	12-10

3.2 FOUR POST PRESS DESCRIPTION

TABLE 3-3 UNHEATED PRESSES WITH SAFETY SHIELD

CATALOG	3969	3855	3970
MODEL	12-12	25-12	30-12
CLAMP FORCE	12 US Tons 24,000 Pounds 11 Metric Tons	25 US Tons 50,000 Pounds 22.5 Metric Tons	30 US Tons 60,000 Pounds 27 Metric Tons
WORK AREA (In)	12 x 12	12 x 12	12 x 12
RAM STROKE (In)	5.1	6.5	6
RAM DIAMETER (In)	2.047	2.56	3.00
RAM AREA (In²)	3.29	5.15	7.07
DAYLIGHT OPENING (In)	1-15	1-14	1-17
WIDTH x DEPTH (In)	21 x 28	21 x 28	24 x 28
HEIGHT (In)	41	42	45
WEIGHT-Unheated (pounds)	585	600	625

TABLE 3-4 CROSS REFERENCE CHART FOR OLD/NEW UNHEATED PRESSES

CATALOG		MODEL
OLD #	NEW #	
2696	3969	12-12
2702	3855	25-12
2698	3970	30-12

TABLE 3-5 DRAWING REFERENCE CHART

PARENT NUMBER	MODEL NUMBER	G/A DRAWING	TOP VIEW OF PRESS	SAFETY SHIELD LAYOUT
3850	MINI C	100527D	N/A	110486D
3851-0	MODEL C	100521D	110580C	110487D
3851-1	MODEL C	100521D	110580C	110487D
3851-2	MODEL C	100521D	110580C	110487D
3851-3	MODEL C	100521D	110580C	110487D
3851-5	MODEL C	100521D	110580C	110487D
3851-7	MODEL C	100521D	110580C	110487D
3968.0010000	12-10	100528D	110586C	110489D
3969.0010000	12-12	100539D	110590C	110490D
3853-0	MODEL M	100524D	110579C	110488D
3853-1	MODEL M	100524D	110579C	110488D
3853-3	MODEL M	100524D	110579C	110488D
3855.0020000	25-12	100542D	110591C	110491D
3970.0110000	30-12	100549D	110593C	110592D

3.3 INSTALLATION

To assist in the installation and operation of this press, an assembly drawing (including part numbers) is included in the appendix of this manual.

3.4 SETTING UP

Installation Summary:

1. Bolt press to bench.
2. Rotate gauge and tighten coupling. (Per the instructions in section 3.5)
3. Remove plug in jack and replace with sintered breather. Refer to drawings 311014C and 311017C, located in the appendix.

IMPORTANT: DO NOT operate the hydraulic unit with the solid shipping plug in the oil fill hole or damage to the hydraulic unit may occur.

The CARVER Laboratory Press was carefully designed with a low center of gravity to remain stable under normal operating conditions. For a permanent installation, hold-down bolts may be used to fasten the press to a workbench. Holes are conveniently provided in the base for this purpose.

3.5 ADJUSTING GAUGE TO OPERATING POSITION

This **CARVER** press features a gauge union coupling for quick and easy alignment and interchangeability. While holding the coupling swivel to keep it from turning, turn the gauge into the coupling swivel until finger tight and position it for easy viewing by the operator. Hold the gauge in this position with a 7/8" open-end wrench on the stem directly under the gauge case, and using a second wrench, turn the coupling swivel counterclockwise until tight. If leakage occurs after tightening the gauge into the union-coupling swivel, an additional seal may be required. (See reference drawing 110478B in the appendix, and 5.3.3 in the maintenance section.)

IMPORTANT: DO NOT use more than two (2) seals at one time.

3.6 RAM FORCE CALCULATION

All **CARVER** gauges are calibrated for the specific ram diameter of the hydraulic unit. The Mini "C" and Model "C" 12-ton ram is 3.294 square inches and the Model "M" 25-ton ram area is 5.157 square inches. The standard gauge readings display the load, or force, in pounds as well as metric tons applied between the platen and head of the press. Accordingly, all calibrations show the load in pounds-force applied by the press to the material being pressed. For example: a 10,000 lb. load applied to material having an area of one square inch would be equal to a pressure of 10,000 lbs. per square inch applied to the material. Or, if the material being pressed has an area of four square inches a 10,000 lbs. applied load would be equal to 2,500 lb. per square inch on the material.

Check press description charts for correct Ram Diameter and Ram Area.

EXAMPLE: $\frac{10,000 \text{ lbs. force (44480 Newtons)}}{4 \text{ square inches (258.08 square mm)}} = 2,500 \text{ PSI (172.35 bar)}$

CARVER gauges are highly sensitive, precision instruments. Care should be taken to avoid sudden decompression, shock loading, over-pressurization, etc., which will result in damage to the gauge and void the warranty.

A variety of standard gauges are available with different calibrated ranges. The standard gauge provided with your press is calibrated for full press tonnage. If an additional gauge is required, for a lower operating range, a **CARVER** Two-Gauge Manifold will permit simultaneous mounting of two separate gauges.

3.7 FILLING THE OIL RESERVOIR

The hydraulic unit is filled with oil at **CARVER, INC.** and should not require additional oil. In the event there is some oil loss, lower the platen, remove the sintered breather plug, and fill with oil to the level of the filler hole on 12 & 25 (107 & 223 Kn) ton models. Fill 30-ton (267 Kn) pump to within 2" (50mm) of top of reservoir. Only special **CARVER # 2170** Hydraulic Fluid, or a brand name filtered **HYDRAULIC JACK OIL**, should be used. Refer to Section 6 for recommended substitutes.

IMPORTANT: Brake fluid and similar products may damage your unit and will void the warranty.

4.1 OPERATOR SAFETY

1. A press safety shield is standard equipment and is recommended by **CARVER** for safe operation of your press.
2. The operator should wear safety glasses or a face shield when performing operations under high load conditions to prevent eye or face injury should a test specimen burst and scatter.
3. When using caustic or acid test specimens, a face shield, apron, and rubber gloves should be used for the protection of the operator.
4. The testing apparatus or test specimen must be centered, both front to back and left to right on the press bolster. This will prevent tilting of the bolster and possible ejection of the work piece under pressure. Always avoid uneven loading of the press components. Locator plates are available from **CARVER, INC.** upon request.
5. **CARVER, INC.** recommends bolting the press to a worktable whenever possible.

WARNING: The use of an extension handle longer than provided with the standard press may cause the press to be unstable, and may cause an "over pressure" condition, resulting in damage to the hydraulic unit

CAUTION: **CARVER** recommends the use of safety glasses while operating this equipment.

6. Always check the pressure rating of the apparatus to be pressed prior to pressing, to be sure it is rated for the applied pressure.

IMPORTANT: The gauge on the **CARVER** laboratory press shows the total force exerted by the press. It **DOES NOT** show the pressure (PSI) on the specimen. To find the **PRESSURE (P)** on the specimen, the observed **FORCE (F)** reading on the gauge must be divided by the specimen **AREA (A)**, per the equation $P=F/A$. When using a **CARVER** test cylinder outfit, use the **ID** measurement to find the actual **AREA (A)** of the specimen

7. To protect against squirting fluid, the apparatus may be placed inside a can or wrapped in a cloth. The best protection is the **CARVER** safety shield, which has steel sides and a clear polycarbonate door.

4.1.1 SAFETY GUIDELINES FOR OPERATORS

This section of the manual is directed to all personnel who are associated with the operation of **CARVER INC.** Presses. Whether you have years of experience working with presses or whether you are new on the job, this section is for your benefit. General and specific safety guidelines and caution notes are included here and throughout the manual for your protection and to help you avoid injury to yourself and to your co-workers. Since it would be impossible to cover every situation that could arise, the following list of points is not intended to be complete, nor does the order in which they are listed relate to their importance. It is your responsibility to immediately report any unsafe condition or unusual machine performance to your supervisor.

4.1.2 BEFORE STARTING MACHINE

1. Never operate the machine until you have read and fully understand the safety, control description and operating sections in this manual.

2. Inspect the machine before each shift for loose, worn or broken parts. Report any unsafe conditions to your supervisor immediately and do not operate the machine until the necessary repairs are made.
3. An important part of machine safety is good preventive maintenance. Keep your machine clean and in good condition by cleaning daily.
4. Clean your work area frequently. Keep it uncluttered and free of loose tools, discarded work pieces, rags, wires, oil, grease, water or anything that can inhibit your movement or cause you to trip or fall.
5. Be sure machine safety shield and other safety devices are correctly installed in their proper position.
6. It is your employer's responsibility to evaluate each machine operation and to determine and implement the best method of protecting you from injury at the point-of-operation in accordance with current federal, state and local codes and standards.
7. Never attempt to bypass or remove any point-of-operation guard or safety device on your machine. They are there for your protection.
8. Be alert for possible hazards or safety irregularities that could cause injury.

4.1.3 MACHINE OPERATION

1. Pay attention to the warning and caution signs on the machine. They are there for your benefit.
2. Do not reach around, under or over any safety shields or guards.
3. Never bypass, remove or alter any machine safety shields, guards or other safety devices.
4. Never stack parts or other objects on the bolsters or platens. Use part containers and scrap bins of sufficient size to accommodate the job.
5. Use care and judgment in the work you are doing. Take the time to evaluate the operation - **Is it safe? Are you working a safe procedure?**
6. Stay alert at all times. Do not become overconfident and careless. Avoid inattention, pre-occupation and distractions.
7. If you leave the machine for any length of time, always check to make sure the set-up parameters are as you left them before restarting the machine. They may have been modified during your absence.
8. Know who or where to call for immediate help in the event of any emergency or injury.
9. Have all injuries treated, no matter how small.

4.2 OPERATING THE HYDRAULIC PRESS

1. Rotate the release valve knob clockwise until it is hand tight (on 12 & 25 ton models). 30 ton models are equipped with a lever rather than a knob. The cam release lever should be in the vertical position before the press is closed.
2. Close the press by pumping the handle of the hydraulic unit. Please keep in mind that no hydraulic unit will maintain constant pressure without some additional pumping. This is especially true when pressing against a soft or yielding material. Some pumping is required to offset normal packing leakage. After the desired pressure is obtained, an occasional stroke or two will normally maintain the pressure.

- To open the press (on the 12 & 25 ton models) rotate the release valve knob counter clockwise approximately one-half turn. The release valve stop should allow for less than one full turn of rotation. To open the 30 ton models, pull the cam release lever toward the operator to the horizontal position.

IMPORTANT: DO NOT rotate the release valve more than one full turn in the counterclockwise direction. (Release valve stop screw will contact Jack base at the full open position)

4.3 DAYLIGHT ADJUSTMENT

Threaded columns allow for daylight adjustment between the moving bolster and top bolster.

4.3.1 TO RAISE THE TOP (HEAD) BOLSTER:

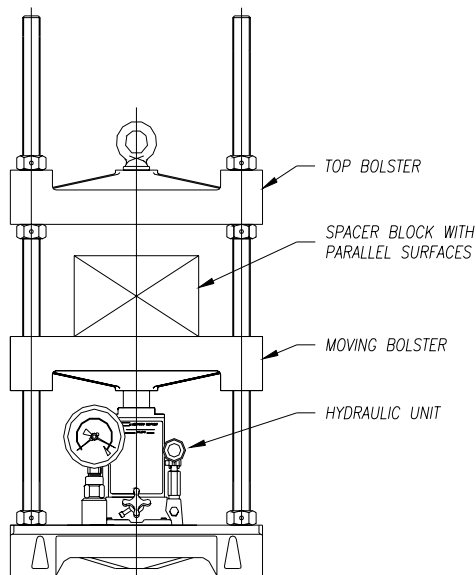


FIGURE 4-1

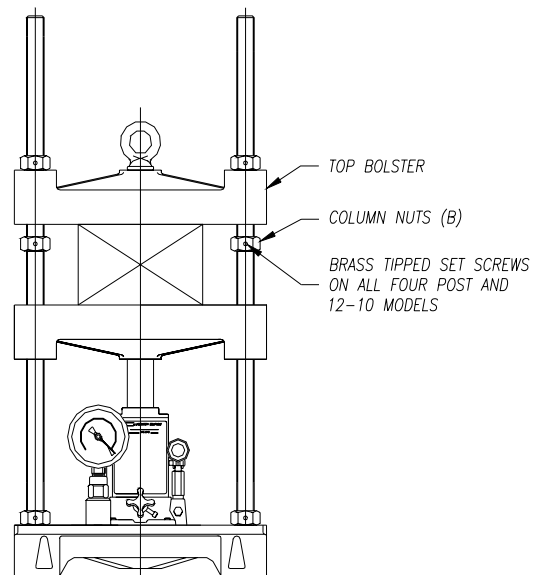


FIGURE 4-2

- Insert a spacer block with parallel surfaces between the moving bolster and top bolster (spacer must be tall enough to build force on the spacer), pump the hydraulic unit to build force to the maximum capacity of the press. (FIG 4-1)
- With the press at maximum applied force, loosen the column nuts (B) located directly below the top bolster. (FIG 4-2) On Four Post and Model 12-10 presses, a brass tipped set screw must be loosened on each nut before nuts are loosened.

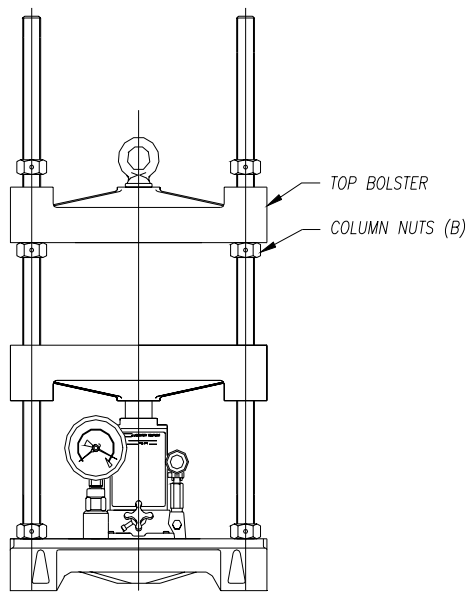


FIGURE 4-3

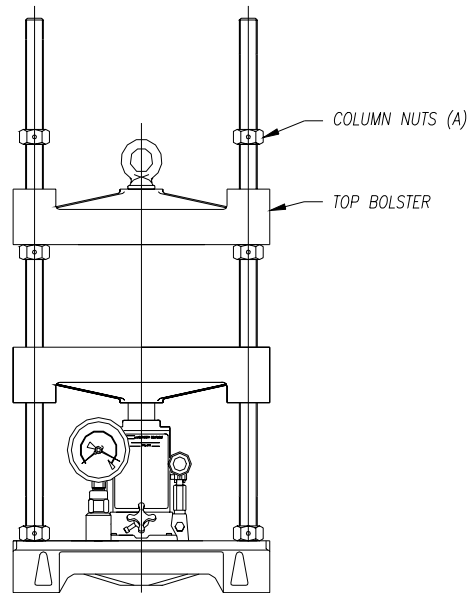


FIGURE 4-4

3. Release hydraulic force and remove the spacer, allowing the top bolster to rest on the lower column nuts (B) (FIG 4-3).
4. Move the upper column nuts (A) to the position required creating the desired daylight. (FIG 4-4)

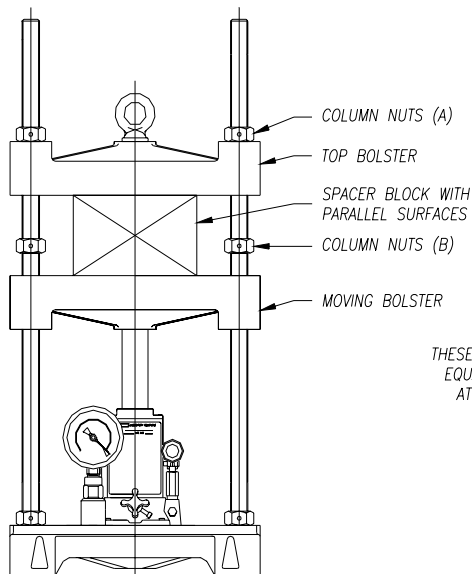


FIGURE 4-5

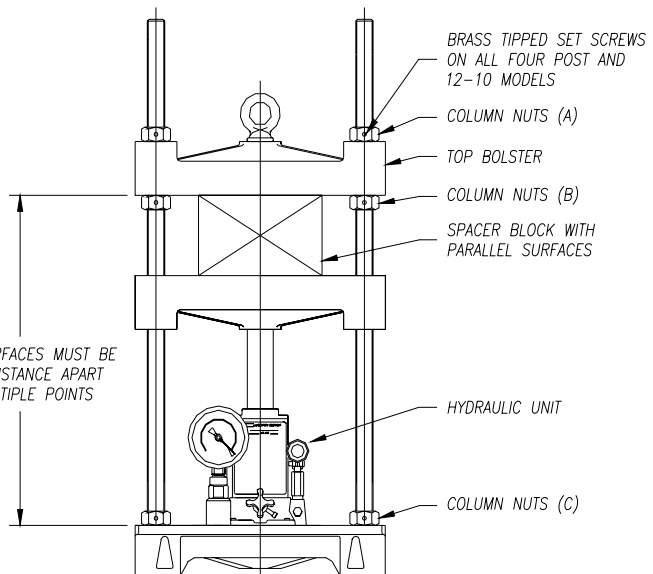


FIGURE 4-6

5. Insert the spacer block on the moving bolster and raise the top bolster against the upper column nuts (A) (FIG 4-5) and tighten the lower column nuts (B) (Fig 4-6) finger tight against the bottom of the top bolster.

6. Measure and equalize the distance from the bottom surface of the top bolster to the top surface of the base bolster at two points (four points on Four Post presses) as far apart as possible (FIG 4-6). Adjust the lower column nuts (B) as needed to insure parallelism between the top bolster and base bolster. Turn the upper column nuts (A) finger tight against the top bolster.
7. Pump the hydraulic unit to build force to the maximum capacity of the press.
8. Tighten the lower column nuts (B) against the bottom surface of the top bolster as tight as possible.
9. This is a good time to check the column nuts (C) on top of the base bolster and retighten if necessary.
10. Tighten brass tipped set screws in nuts (if your press is a Four Post, or model 12-10). Open press and remove spacer, the press is now ready to operate.

4.3.2 TO LOWER THE TOP (HEAD) BOLSTER:

1. Insert a spacer block with parallel surfaces between the moving bolster and top bolster (spacer must be tall enough to build force on the spacer) (FIG 4-1), pump the hydraulic unit to build force to the maximum capacity of the press (FIG 4-2).
2. With the press at maximum applied force, loosen the column nuts (B) located directly below the top bolster. Move these column nuts (B) to the position required creating the desired daylight. On Four Post and model 12-10 presses, a brass tipped set screw must be loosened on each nut before nuts are loosened.
3. Release hydraulic force and remove the spacer allowing the top bolster to rest on the lower column nuts (B) (FIG 4-3).
4. Tighten the upper column nuts (A) finger tight against the top surface of the top bolster.
5. Follow steps 6 thru 10 as described above.

IMPORTANT: Four Post Models utilize a set screw in the column nuts. These must be loosened prior to adjusting daylight, and retightened after adjusting daylight.

WARNING: After adjusting the daylight, be sure the top bolster is parallel to the top surface of the base bolster before applying pressure.

IMPORTANT: In all cases, size the spacer block so that maximum stroke of the hydraulic unit is not exceeded. For Model "C" and Mini "C" 12-Ton Presses, the maximum stroke is 5.1". for the Model "M" 25-Ton Press, the maximum stroke is 6.5".

WARNING: Spacer block must be centered on moving bolster both left to right and front to back. Be certain that spacer is strong enough to withstand maximum applied force of press and that its area is great enough to prevent coining the bolster surface.

5.1 MAINTENANCE INTRODUCTION

Each CARVER Laboratory Press is thoroughly tested to provide trouble-free performance. Manufacturing and assembly processes are closely controlled in our factory under rigid inspection and testing procedures. Follow these instructions, and with proper care, your press should give many years of trouble-free service.

5.2 TROUBLESHOOTING

To maintain constant pressure, the hydraulic unit may require occasional pumping, especially when pressing against a soft or yielding material. If the pressure drops slowly as shown on the gauge, it should be considered normal. If you are experiencing problems with the operation of your hydraulic unit, refer to Tables 5-1 and 5-2.

TABLE 5-1 TROUBLESHOOTING 12 & 25 TON HYDRAULIC UNITS

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Rapid drop in pressure	<ul style="list-style-type: none"> a) Low oil level due to leakage. b) Open release valve. c) Worn or dislodged internal packing. d) Dirty valve seat 	<ul style="list-style-type: none"> a) Tighten hydraulic connections & fill with oil. b) Close release valve. c) Replace packing or seals where necessary. d) Remove release valve & clean valve seat. Hydraulic unit may require flushing with solvent, such as agitene.
No pressure when pumping	<ul style="list-style-type: none"> a) Open release valve. b) Worn packing in pump. c) Release valve ball missing. d) Release valve contaminated. e) Air entrapment. 	<ul style="list-style-type: none"> a) Close release valve. b) Replace or rebuild hydraulic unit pump. c) Replace ball. d) Remove and clean. e) Purge air from system (see Air Bleed Procedure in Section 5, and #2 below).
Slow drop in pressure	<ul style="list-style-type: none"> a) Open release valve b) Worn release valve seat. c) Worn ram seal 	<ul style="list-style-type: none"> a) Close release valve. b) Contact factory for replacement. c) Replace ram seal.
Ram will not retract	<ul style="list-style-type: none"> a) Defective ram seal 	<ul style="list-style-type: none"> a) Install rebuild kit (see note #4 below)
Oil leakage in gauge coupling	<ul style="list-style-type: none"> a) Loose gauge fitting. b) Gauge not sealing. 	<ul style="list-style-type: none"> a) Tighten gauge fitting. b) Add copper gauge seal (maximum of two)

NOTE: Refer to the exploded view drawings (311014C and 311017C) for the location of seals, packing, and gaskets in the 12 & 25 ton hydraulic units. These drawings are located in the appendix.

TABLE 5-2 TROUBLESHOOTING 30 TON HYDRAULIC UNITS

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Pump will not hold pressure	<ul style="list-style-type: none"> a) Release valve ball not seating properly b) Ball Valves not seating properly c) Overload valve ball not seating properly. d) Large pump relief valve seal faulty. 	<ul style="list-style-type: none"> a) Refer - Release Valve Repair (5.8.3) b) Refer - Pump Valve Repair (5.8.2) c) Refer - Overload Valve Repair (5.8.4) d) Refer - Large Piston Relief Valve (5.8.5)
Pump fails to supply pressure	<ul style="list-style-type: none"> a) Lack of oil b) Air bound pump. c) Release valve ball not seating properly d) Small ball in ball valve circuit not seating properly e) Overload valve ball not seating properly f) Large pump relief valve seal faulty 	<ul style="list-style-type: none"> a) Refer -Check Oil Level (5.6.2) b) Refer -Air Bleeding Procedure (5.5) c) Refer - Release Valve Repair (5.8.3) d) Refer - Pump Valves Repair (5.8.2) e) Refer - Overload Valve Repair (5.8.4) f) Refer - Relief Valve Repair (5.8.5)
Pump piston does not draw a full charge. (This is evident by a cushion effect at the top of the pump stroke.)	<ul style="list-style-type: none"> a) Air bound system b) Lack of oil 	<ul style="list-style-type: none"> a) Refer -Air Bleeding Procedure (5.5) b) Refer - Check Oil Level (5.6.2)
Pump piston raises by itself under pressure (handle rise)	<ul style="list-style-type: none"> a) Large ball in ball valve circuit not seating properly 	<ul style="list-style-type: none"> a) Refer - Pump Valves Repair (5.8.2)
Pump functions properly but will generate only a given pressure below its normal pressure maximum	<ul style="list-style-type: none"> a) Overload valve not set properly 	<ul style="list-style-type: none"> a) Refer - Overload Valve Repair (5.8.4)
Pump fails to supply greater output at no load than under load	<ul style="list-style-type: none"> a) Large pump relief valve not set properly 	<ul style="list-style-type: none"> a) Refer - Relief Valves Repair (5.8.5)

5.3 PRESSURE LOSS

All hydraulic systems will lose some pressure and will require additional pumping to maintain pressure for extended periods of time.

5.3.1 PRESSURE LOSS DUE TO YIELDING MATERIAL

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 with parallel surfaces 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 section 5.7 Rebuilding the Hydraulic Unit)

5.3.2 PRESSURE LOSS DUE TO LEAKS AROUND TUBE FITTINGS

Consult the Carver Service Department.

5.3.3 PRESSURE LOSS DUE TO LEAKING AT THE GAUGE UNION COUPLING

Refer to drawing 110478B, located in the appendix.

Any external leak in the gauge equipment 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.

After 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 set screw (inside the small hole on the side of the coupling base) or the socket head cap screw and the coupling base will be damaged.

After loosening the socket 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 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 a straight thread not standard tapered pipe thread and are not designed to create a seal.

5.4 12 & 25 TON UNITS FAIL TO BUILD OR HOLD PRESSURE

If the unit will not build or hold pressure, the release valve ball may be missing. This can occur if the release valve has been loosened and the release valve spindle has been removed momentarily. When the release valve spindle assembly

is unscrewed all the way, oil will leak out and the 7/32" ball will usually come out of the unit. With the oil coming out the operator may not notice the ball coming out of the unit.

It is a good idea to determine if the ball is in place before assuming the unit needs to be rebuilt. A missing release valve ball will prevent the unit from building or holding pressure (See part H on drawings 311014C & 311017C located in the appendix). To check for the ball you will want to have some rags available because oil will come out of the unit. Also have a flashlight to check for the ball inside the unit (The ball will usually come out but not always).

WARNING: Before removing the release valve spindle assembly, the hydraulic ram should be retracted all the way (all the way down) with no pressure in the cylinder, the pressure gauge on the press should show 0 force. If there is pressure in the cylinder when the release valve spindle assembly is removed, pressurized oil and the ball will be forced out of the hydraulic unit and personal injury could occur.

Loosen the release valve stop screw and unscrew the release valve spindle assembly until it comes out of the unit. 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.

5.5 HYDRAULIC UNIT - AIR BLEED PROCEDURE

An occasional cause of hydraulic system malfunction is air entrapment in the hydraulic circuit. This will cause erratic action and may appear as pump failure. To purge the system, open the release valve 1/2 turn on 12 and 25 ton models or raise the cam release lever on 30 ton Models, and pump the unit about 12 times. Close the release valve and test. If pressure does not build properly, repeat this procedure.

IMPORTANT: To avoid damage to the hydraulic unit ram seal, **DO NOT** exceed the maximum ram travel:

<u>TONNAGE</u>	<u>STROKE</u>
12	5.1"
25	6.5"
30	6.0"

(Refer to the label on the front of the hydraulic unit).

5.6 REFILLING THE HYDRAULIC OIL RESERVOIR

Before checking the oil level, be sure the ram is fully lowered.

5.6.1 REFILLING THE HYDRAULIC RESERVOIR ON 12 & 25 TON UNITS

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 breather 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.

5.6.2 REFILLING THE HYDRAULIC RESERVOIR ON 30 TON UNITS

Before checking the oil level, be sure the cylinder ram is fully lowered.

The oil reservoir is located on the two-speed hydraulic hand pump (Refer to figure 5-1).

Remove the filler/breather cap by turning counterclockwise. Fill to within two inches of top cap as indicated in figure 5-1 and reinstall the filler/breather cap.

5.7 REBUILDING 12 & 25 TON HYDRAULIC UNITS

Kits are available from **CARVER INC.** to rebuild the 12 and 25 ton hydraulic units. Each kit includes a complete set of seals and gaskets, plus oil to refill the unit.

Kits available from **CARVER INC.** for rebuilding these units are:

- #3729 for rebuilding the 12 ton units (refer to drawing 311017C).
- #3730 for rebuilding the 25 ton units (refer to drawing 311014C).

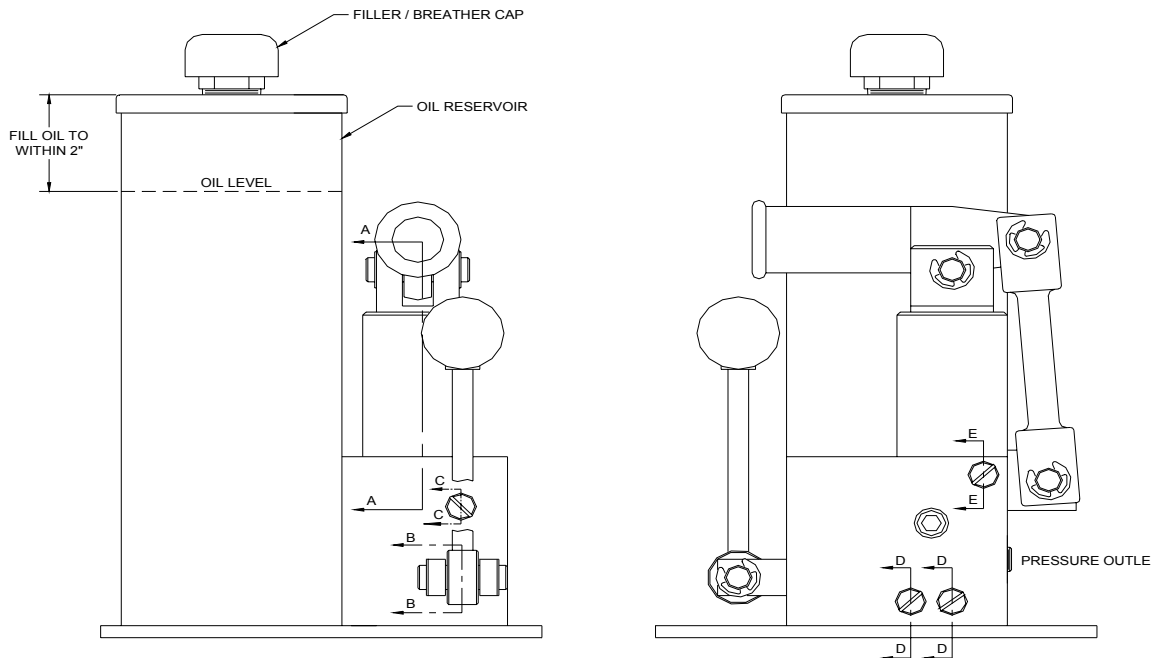
These drawings are located in the appendix of this manual.

NOTE: 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. 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.

5.8 TWO SPEED HAND PUMP FOR 30 TON UNITS

The 30 ton **CARVER** presses are equipped with a 3" bore single acting cylinder powered by a two-speed (hi-lo) hand operated pump with an attached oil reservoir. Figure 5-1 is a typical assembly drawing of the two-speed pump showing sectional view locations. Use these section drawings along with table 5-2 to troubleshoot and maintain the two-speed pump.

IMPORTANT: In servicing the hydraulic unit, cleanliness is of utmost importance. A clean work place and proper tools are necessary to insure efficient and effective repairs. Special tools can be purchased from **CARVER INC.**



TYPICAL ASSEMBLY DRAWING OF TWO SPEED PUMP SHOWING SECTIONAL VIEW LOCATION

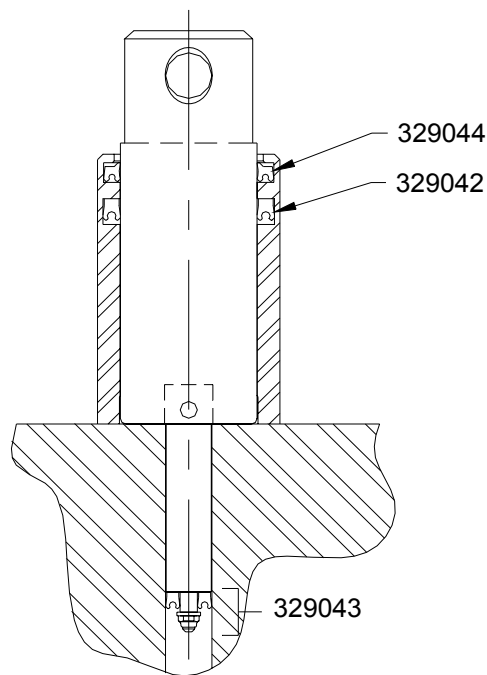
FIGURE 5-1

5.8.1 PUMP PISTON REPAIR - TWO SPEED HAND PUMP

Leakage of oil around the pump piston indicates worn or damaged piston packing.

To replace packing:

1. Remove piston-actuating linkage.
2. Remove piston. (See 5-2)
3. Remove all packing. (See 5-2)
4. Clean all parts and dry with compressed air.
5. Install new packing, wipers and static seals, being sure, packing sealing lips, face down toward the pressure. (Dip each part into clean hydraulic oil before assembly.)
6. Open the release valve (to allow air to bleed from piston barrel back to reservoir) and insert the piston.
7. Replace piston linkage.
8. NOTE: With release valve open, stroke pump about a dozen times to bleed air completely from pump.

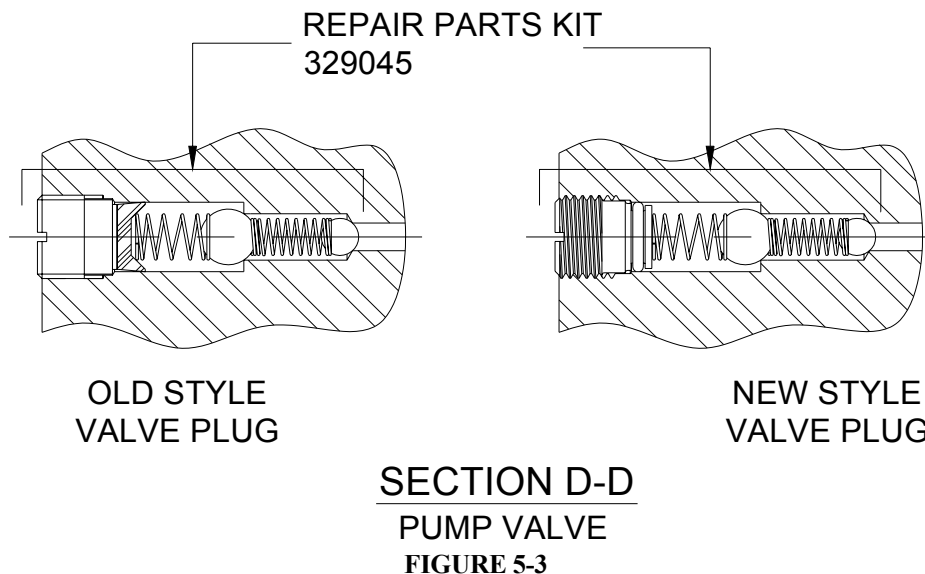


SECTION A-A
PUMP PISTON
FIGURE 5-2

5.8.2 PUMP VALVES REPAIR – TWO SPEED HAND PUMP (See Figure 5-3)

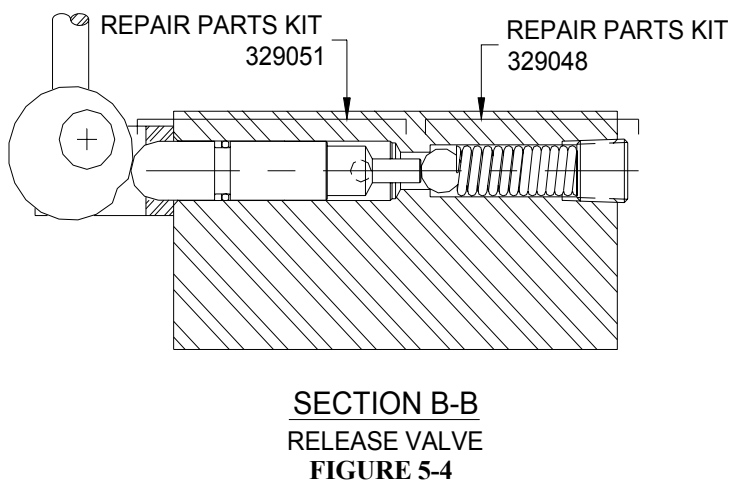
If the pump fails to supply pressure or if the pump piston is under pressure at all times, the pump valves may need a cleaning. Stand pump in upright position while removing valve plug and valve seal. Tilt pump to remove valve springs and balls. Allow oil to drain from the reservoir through these valve holes to wash foreign matter from hole. Lay pump on its side to clean and inspect valve chamber. Be careful not to mar or nick ball valve seats. Clean valve balls and spring in a solvent. Replace rusted or corroded balls. Do not stretch ball springs. To reassemble, insert, in sequence, small ball, small spring, large ball and large spring in cleaned chamber. Using the valve seal inserting tool (329061), assemble new valve seal. Finally, screw in valve seal plug.

This procedure should be carried out in all ball valve circuits. If the valves fail to operate properly after they have been cleaned, it may be necessary to reseat the valve balls. Remove the springs and tap each ball lightly in its respective seat using the 1/4" ball seating tool (329063) for the small ball and 7/16" ball seating tool (329064) for the large ball. Remove balls to make sure they are not stuck to the seats. Reassemble pump valves as before.



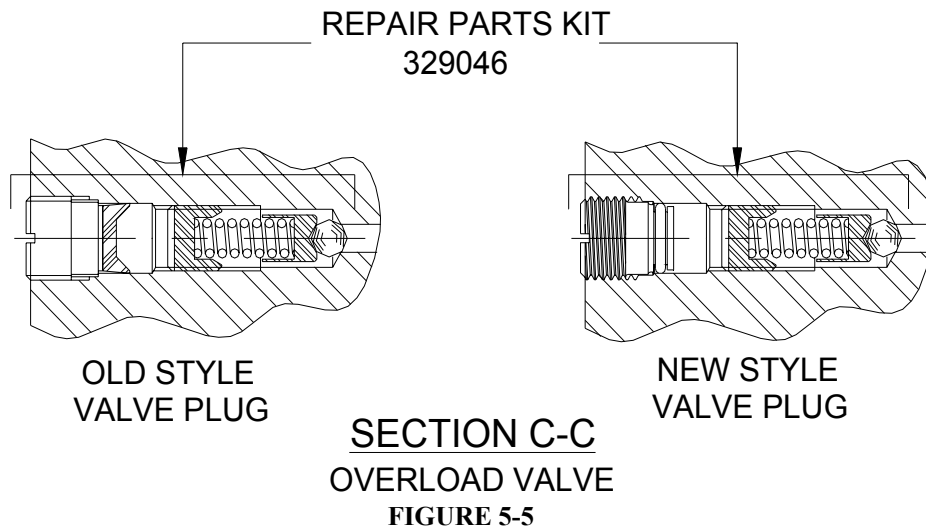
5.8.3 RELEASE VALVE REPAIR – TWO SPEED HAND PUMP (See Figure 5-4)

If the pump fails to lift or hold a load, the release valve may be dirty. From back of pump remove release valve plug, release ball spring and release ball. From front remove release lever pin, release lever, and release plunger. Clean release valve chamber and inspect ball seat. If necessary, reseat release ball by tapping it lightly on the ball seat, using the 3/8" ball seating tool (329064). Clean plunger and inspect plunger packing. Replace if necessary. To reassemble, insert ball, ball spring, and release valve plug. Dip release plunger packing in clean hydraulic oil and carefully insert into plunger chamber. Replace release lever and lever pin.



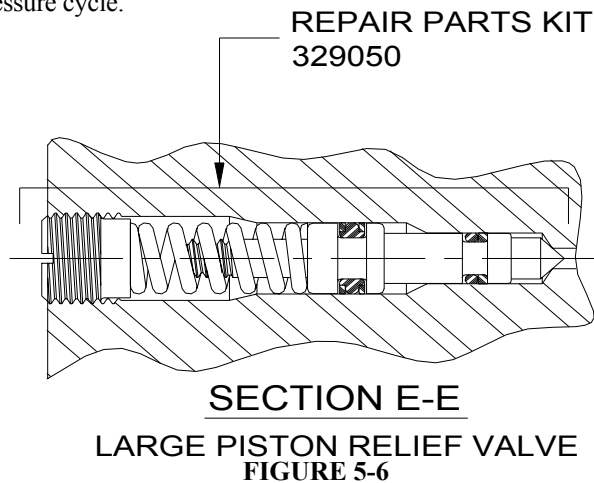
5.8.4 OVERLOAD VALVE REPAIR – TWO SPEED HAND PUMP (See Figure 5-5)

If the pump fails to lift or hold a load after the release valve and pump valves have been checked, the overload valve may be dirty. To clean valve, remove valve plug and valve plug seal. Using a screwdriver, remove the overload valve screw. Tip pump forward to remove valve spring, valve plunger and steel ball. Clean valve, remove valve spring, valve plunger and steel ball. Clean and inspect valve hole. If the ball seat is marred, re-seat same by lightly tapping ball on seat, using tool (329063). Remove ball to prevent sticking. Reassemble ball, plunger, spring and valve screw. Connect a pressure gauge to the pressure outlet. Stroke pump to obtain maximum desired pressure. Turn valve screw clockwise to increase pressure reading and counter-clockwise to reduce maximum reading. After valve is set properly, replace valve seal and valve plug.



5.8.5 LARGE PISTON PUMP RELIEF VALVE REPAIR – TWO SPEED HAND PUMP (See Figure 5-6)

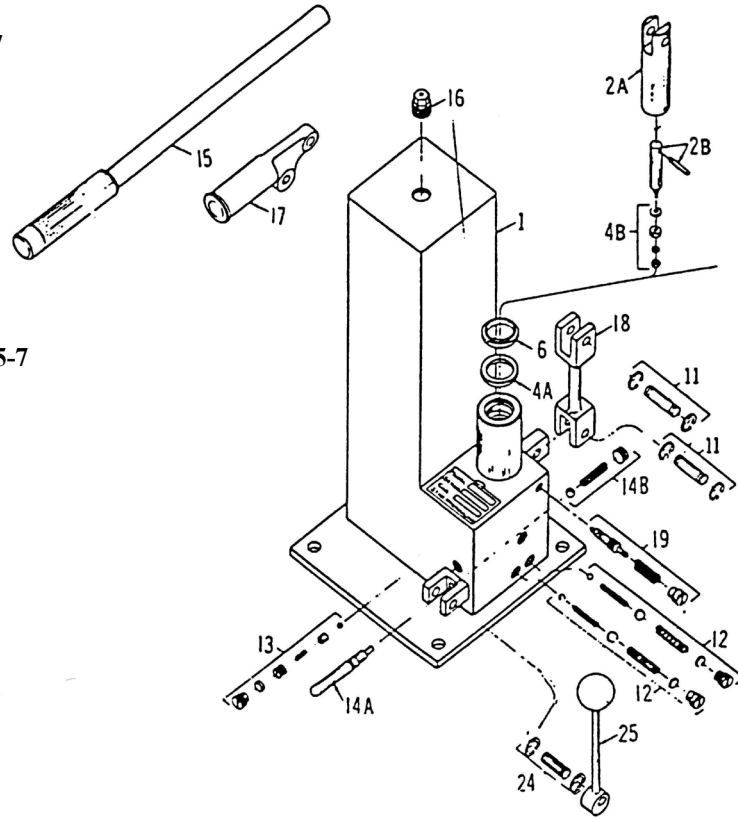
If the pump fails to lift faster under no load than it does under heavy load, the large piston relief valve may be dirty. This valve is covered with sealing compound to prevent tampering with large piston changeover point. Remove sealing compound, relief valve screw, valve spring and relief plunger. Use threaded socket tool (329080) for removing plunger. Clean and inspect valve hole. Inspect plunger packing and replace if necessary. To reassemble, dip plunger packing in clean oil and carefully insert into hole, taking care not to damage packing during insertion of plunger. Reassemble valve spring and valve screw. Tighten screw to obtain desired effort on lever bar at large pump changeover point. If screw is tightened too far, it will restrict the relief valve movement and cause excessive handle effort throughout the high-pressure cycle.



5.8.6 PARTS BREAKDOWN – TWO SPEED (HI-LO) HAND PUMP

MODEL #QWCP14-150, Carver #321007

FIGURE 5-7



*PARTS INCLUDED IN CARVER #3789 REPAIR KIT

<u>ITEM#</u>	<u>PART NAME</u>	<u>PART#</u>	<u>CARVER #</u>
2A	Large Piston	P5-2	329071
2B	Small Piston (incl. pin)	CP13-4	329072
*4A	Large Piston Packing	P5-4	329042
*4B	Small Piston Packing	CP13-5	329043
*6	Piston Wiper	P5-6	329044
10	Piston Pin (incl. rings)	CP14-10	329073
11	Link Pin (incl. rings)	CP13-10	329065
*12	Pump Valve (complete)	P1-12	329045
*13	Overload Valve (complete)	CP13-13	329046
*14A	Release Plunger (complete)	CP13-17	329051
*14B	Release Valve (complete)	PAC-18	32948
15	Lever Handle with grip	CP13-23	329161
16	Breather Screw	P1-16	329074
17	Pump Socket	CP13-9	329066
18	Pump Link	CP13-12	329076
*19	Relief Valve (complete)	CP13-25	329050
24	Release lever Pin (incl. rings)	CP13-10	329065
25	Cam Release Lever	CP13-14	329078
Tool	Pump valve Insertion Tool	CP13-44	329061
Tool	1/4 Ball Seating Tool	CP13-42	329063
Tool	7/16 Ball Seating Tool	CP13-43	329064
Tool	Threaded Socket Tool (for release valve removal)	CP13-41	329080

6.1 RECOMMENDED HYDRAULIC OILS FOR CARVER PRESSES

The hydraulic fluid is a special grade which conforms to MIL-SPEC #17672-A.

CARVER Special Hydraulic Fluid (Catalog #2170) is supplied in one pint (.47 liters) containers. Contact **CARVER, INC.** Parts department for information.

Any good grade of mineral base hydraulic oil with anti-wear and anti-foaming additives in the viscosity range of 150 SSU @ 100° F. (38° C) and a viscosity index of 90 + can be used, provided it is filtered prior to being added to the hydraulic reservoir.

IMPORTANT: DO NOT use fire retardant ester base oil, transmission fluid, brake fluid, or water-glycol mixes. Always add **clean** oil to the reservoir from a **clean** container through a filter

RECOMMENDED SUBSTITUTES

- Standard Oil..... Stanoil 21
- Mobil..... DTE 24
- Exxon..... Terrestic 32
- Texaco..... Rando HD 32
- Amoco PQ 32
- Other Any brand name Hydraulic Jack Oil
with above specifications

7.1 TECHNICAL ASSISTANCE

CARVER, INC. PARTS DEPARTMENT
Call from 8:00 a.m. to 4:30 p.m. Eastern Standard Time
(260)-563-7577, Extension 237 or 225

The Parts Department at **CARVER, INC.** is ready to provide the parts to keep your equipment up and running. Original replacement parts ensure operation at design specifications. Please have the model and serial number of your equipment available when you call. Consult the Parts List included in your information packet for replacement part numbers.

CARVER, INC. SERVICE DEPARTMENT
Call from 8:00 a.m. to 4:30 p.m. Eastern Standard Time
(260)-563-7577, Extension 238 or 243

CARVER, INC. has a qualified Service Department ready to install, start-up, or service your press. Gauge calibration services are available. Contact Service Department for details.

CARVER, INC. SALES DEPARTMENT
Call from 8:00 a.m. to 4:30 p.m. Eastern Standard Time
(260)-563-7577, Extension 252

CARVER products are sold through a worldwide network of independent sales representatives and distributors, as well as in-house sales personnel. Contact our Sales Department for the name of the sales representative or distributor nearest you.

7.2 RETURNED MATERIAL POLICY

1. Prior to the return of any material, authorization must be given by **CARVER, INC.** An RMA number will be assigned for the equipment to be returned.
2. A reason for requesting the return must be given.
3. All returned material purchased from **CARVER, INC.** is subject to a 15% (\$75.00 minimum) restocking charge.
4. All returns are to be shipped prepaid.
5. The invoice number and date, or purchase order number and date, must be supplied.
6. No credit will be issued for material that is not within the manufacturer's warranty period, and/or in new and unused condition, suitable for resale.

8.1 WARRANTY RETURNS

1. Prior to the return of any material, authorization must be given by **CARVER, INC.** An RMA number will be assigned for the part or equipment to be returned.
2. Reason for requesting the return must be given.
3. All returns are to be shipped prepaid.
4. The invoice number and date, or purchase order number and date, must be supplied.
5. After inspecting the material, a replacement or credit will be given at **CARVER's** discretion, if the item is found to be defective in materials or workmanship and **CARVER, INC.** manufactured it. Purchased components are covered under their specific warranty terms.

8.2 WARRANTY

CARVER, INC. warrants all equipment we manufacture to be free from defects in workmanship and materials when used under recommended conditions. The Company's obligation under this warranty is limited to those parts which, within twelve (12) months from delivery of equipment to original purchaser, are returned to the factory with transportation prepaid, and upon examination shall be found to be defective.

CARVER neither assumes, nor authorizes any other persons to assume any liability in connection with the sale of its equipment, except under the conditions of this warranty.

This warranty does not cover any labor charges for replacement of parts, adjustment, repair, or any other work done. This warranty shall not apply to any apparatus which, in our opinion, has been subjected to misuse, negligence, or pressures in excess of the limits recommended, or which shall have been repaired or altered outside of the factory.

Replacement of defective material(s) will be FOB from the **CARVER, INC.** factory. Replacement of component parts not manufactured by **CARVER, INC.** will be limited to the warranty of the manufacturer of such parts.

CARVER®

Laboratory Accessories for Carver Presses



Press Floor Stand

- ❑ **No. 223171C Press Floor Stand**
30" high enclosed floor stand for all 2 and 4 column presses *except* AccuStamp® Series.
- ❑ **No. 223160C AccuStamp Floor Stand**
30" high, open floor stand with work table.
- ❑ **No. 223175C Press Stand for Auto Series**
30" high enclosed floor stand.
- ❑ **No. 223199C Press Stand for Auto Series**
30" high with hinged rear doors.



Safety Shield

Attractive cabinet encloses pressing area to protect operator from objects which might fly from the compression area. Hinged front access door is clear, shatterproof polycarbonate. **Recommended for use on all presses.** Will accommodate heated platens.

- ❑ **No. 3404 Safety Shield**
Mini C No. 3392, 3393
- ❑ **No. 3295 Safety Shield**
Model C No. 2086

- ❑ **No. 3253 Safety Shield**
Model M No. 2089
- ❑ **No. 3322 Safety Shield**
Model 12-10 No. 3724
- ❑ **No. 3418 Safety Shield**
Model 12-12 No. 2696,
Model 25-12 No. 2702 and
Model 30-12 No. 2698
- ❑ **No. 4427 Safety Shield**
Model 3690,
Model 3693



Repair parts for all Carver hydraulic units. Repair kits contain hydraulic oil, seals, gaskets, pins, fittings, valve parts and jack handle bracket for quick maintenance.

- ❑ **No. 3729 12 ton hydraulic unit repair kit**
- ❑ **No. 3730 25 ton hydraulic unit repair kit**

ACCESSORIES

Catalog number cross reference index

HEATING/COOLING

Platens for Model C Presses
(Specify °F or °C)

- 2101** 6"x 6" heating aluminum platen, 150° to 500°F
- 2102.1** 6"x 6" heating steel platens, 150° to 500°F
- 3796** 6"x 6" heating steel platens, digital temperature controllers, to 650°F, 115V
- 4286** 6"x 6" heating steel platens, digital temperature controllers, to 650°F, 230V
- 2103.1** 6"x 6" heating & cooling steel platens, 150° to 500°F with hoses
- 2104** 6"x 6" cooling aluminum platens, with valve and hose assemblies
- 3772** 6"x 6" heating & cooling steel platens, digital temperature controllers, to 650°F, 115V
- 3988** 6"x 6" heating & cooling steel platens, digital temperature controllers, to 650°F, 230V



- 2105** 6"x 6" steam heat aluminum with insulation and hoses

Platens for Model M Presses
(Specify °F or °C)

- 2107.1** 9"x 9" heating steel platens, 150° to 500°F

- 3973** 9"x 9" heating steel platens, digital temperature controllers, to 650°F, 230V with mounting feet
- 2108.1** 9"x 9" heating & cooling steel platens, 150° to 500°F with hoses

- 2109** 9"x 9" steam heating steel platens with hoses
- 3972** 9"x 9" heating & cooling steel platens, digital temperature controllers, to 650°F, 230V, platens for two-column presses

Platens for two-column presses
(Specify °F or °C)

- 2644** 9"x 12" heating aluminum platens, 150° to 500°F
- 2645** 9"x 12" cooling aluminum platens with valve and hose assemblies

Platens for four-column presses
(Specify °F or °C)

- 3906** 12"x 12" heating steel platens, digital temperature controllers, to 650°F, 230V
- 3749** 12"x 12" heating & cooling steel platens, digital temperature controllers, to 650°F, 230V
- 3975** 8"x 8" high temperature heating steel platens, to 1100°F, 230V
- 3976** 8"x 8" high temperature heating & cooling steel platens, to 1100°F, 230V

Carver reserves the right to change specifications without notice. Presses and accessories may differ from photos shown. Carver strongly recommends the use of a safety shield and safety glasses when operating Carver equipment.

MOLDS AND DIES

(See page 13)

Test Cylinders and Pellet Molds

- 2090** Test cylinder outfit, 1.125" I.D.
- 2090.1** Set of 12 filter pads for 2090
- 2091** Test cylinder outfit, 2.25" I.D.
- 2091.1** Set of 12 filter pads for 2091
- 237005** Stainless steel pan for either
- 2091.2** Test cylinder outfit all stainless steel, 2.25" I.D.
- 3619** 13mm pellet die for KBr pellets
- 3902** 31mm pellet die, 440 Stainless steel
- 3876** 40mm pellet die, 440 Stainless steel

Anvils

- 2092** Swivel bearing plate (Requires safety shield)
- 2095** KBr buffer plate

ASTM Molds

(See page 10)

- 4074** 4"x 4" chase assembly, Teflon
- 4080** 4"x 4" chase assembly, Stainless steel
- 4081** 4"x 4" chase assembly, Brass
- 4082** 6"x 6" chase assembly, Teflon
- 4083** 6"x 6" chase assembly, Stainless steel
- 4084** 6"x 6" chase assembly, Brass
- 4085** 8"x 8" chase assembly, Teflon
- 4086** 8"x 8" chase assembly, Stainless steel
- 4087** 8"x 8" chase assembly, Brass
- 4161** (100) 6"x 6" mylar sheets for 4"x 4" molds
- 4162** (100) 8"x 8" mylar sheets for 6"x 6" molds
- 4163** (100) 10"x 10" mylar sheets for 8"x 8" molds
- 818697D** 12"x 12" picture frame mold, 1mm, 2mm or 5mm thick, Stainless steel
- 818698D** 4"x 4" tile mold, 1mm, 2mm or 5mm thick, Stainless steel
- 818699D** 6"x 6" tile mold, 1mm, 2mm or 5mm thick, Stainless steel

- 818700D** 10"x 10" tile mold, 1mm, 2mm or 5mm thick, Stainless steel
- 818701D** 50mm x 50mm tile mold, 1mm, 2mm or 5mm thick, Stainless steel
- 818702D** 100mm x 100mm tile mold, 1mm, 2mm or 5mm thick, Stainless steel
- 818703D** 150mm x 150mm tile mold, 1mm, 2mm or 5mm thick, Stainless steel
- 818704C** 50mm diameter color dispersion disc, 1mm, 2mm or 5mm thick, Stainless steel
- 818705C** 100mm diameter color dispersion disc, 1mm, 2mm or 5mm thick, Stainless steel
- 818744C** Pharmaceutical pellet die holder

TESTING/PROCESSING

(See pages 9 and 13)

Pressure Cell Assemblies

- 2953** Pressure cell, 50 ml
- 3343** Pressure cell, 100 ml (Model M only)

Plate and Cloth Equipment

- 2093** Plate and cloth, tray, forming frame and rolled screens

Cage Equipment

- 2094** Cage equipment including felt discs, steel discs, tray, bulb type syringe and mounting hardware. Minimum daylight opening of 16" required.

Polished Chrome Plates and Blotters

(For laminating applications)

- 235020** Plate with 2-3 micro-inch finish, 1 side polished, 6"x 6" x .031" thick
- 235021** Plate with 2-3 micro-inch finish, 1 side polished, 9"x 9" x .031" thick
- 235022** Plate with 2-3 micro-inch finish, 1 side polished, 9"x 12" x .031" thick
- 235023** Plate with 2-3 micro-inch finish, 1 side polished, 12"x 12" x .031" thick
- 823003** Protective blotter, 6"x 6"
- 823012** Protective blotter, 9"x 9"

- 823005** Protective blotter, 9"x 12"

Heated Test Cylinders

- 2472** Heating jacket with 1.125" test cylinder
- 2417** Heating jacket with 2.25" test cylinder

SAFETY SHIELDS

(See page 14)

- 3404** For all Mini C Presses
- 3295** For all Model C Presses
- 3253** For all Model M Presses
- 3322** For all presses with 10"x 7" platens
- 3418** For all presses with 12"x 12" platens
- 4427** For 3690 and 3693 with 15"x 15" platens

GAUGES/THERMOMETERS

(See page 13)



Gauges for Model C

- 381005** Gauge normally furnished with Model C, 0 - 24,000 lb applied force, 11,000 kg, 200 lb increments
- 381042** Model C gauge, 0 - 500 lb, 250 kg, 5 lb increments
- 381001** Model C gauge, 0 - 1,000 lb, 450 kg, 10 lb increments
- 381002** Model C gauge, 0 - 2,000 lb, 900 kg, 20 lb increments
- 381003** Model C gauge, 0 - 5,000 lb, 2,250 kg, 50 lb for high and low pressure readings
- 381004** Model C gauge, 0 - 10,000 lb, 4,500 kg, 100 lb increments

Gauges for Model M

- 381008** Gauge normally furnished with Model M, 0 - 50,000 lb applied force, 22,500 kg, 500 lb increments
- 381006** Model M Gauge, 0 - 5,000 lb, 2,250 kg, 50 lb increments
- 381007** Model M Gauge, 0 - 10,000 lb, 4,500 kg, 100 lb increments

Two Gauge Manifold

- 2096** Two gauge manifold
- 3676** Digital force display

Dial Thermometers



- 385001** Dial face thermometer 150°F to 750°F
- 385002** Dial face thermometer 50°C to 400°C

HYDRAULIC UNITS

(Specify press Catalog Number)

- 3912** 12 ton hydraulic unit
- 3437** 12 ton hydraulic unit with gauge and coupling assembly
- 3925** 25 ton hydraulic unit
- 3438** 25 ton hydraulic unit with gauge and coupling assembly
- 321007** Pump and reservoir for 30 ton presses
- 3467** Hydraulic cylinder for 30 ton presses
- 3729** 12 ton repair kit
- 3730** 25 ton repair kit
- 2170** Carver hydraulic fluid

AUTOPAK POWER UNITS

(See page 16)

- 3946D** AutoPak/12, for 12 ton presses, digital control
- 3947D** AutoPak/25, for 25 ton presses, digital control
- 3948D** AutoPak/30, for 30 ton presses, digital control

FLOOR STANDS

(See page 14)

- 223160C** Press stand for AccuStamp® presses, 30" high
- 223171C** Press stand for 2 column and 4 column presses
- 223175C** Press stand for Auto Series 30" high
- 223199C** Press stand for Auto Series with hinged rear doors

Consult factory for other accessories not listed here

NOTES:

3912, 3912.P & 3912CE 12 TON UNIT

* - 3729 PACKING REPAIR KIT PARTS
 ~ - 3558 RELEASE VALVE KIT PARTS

APPLY A THIN EVEN COAT OF YAMABOND #4 LIQUID GASKET OVER O-RING.

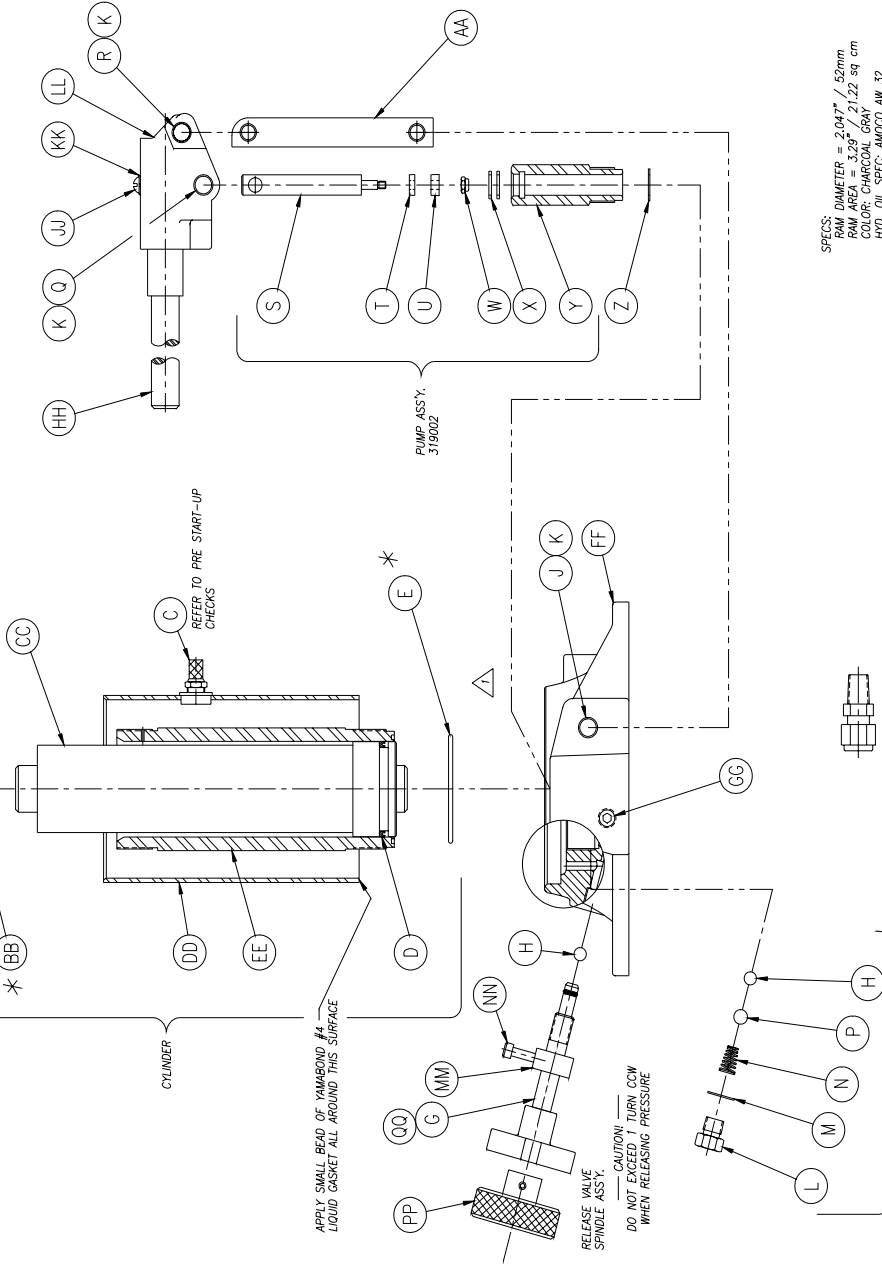
APPLY A THIN EVEN COAT OF YAMABOND #4 LIQUID GASKET ALL AROUND THIS SURFACE.

REFER TO PRE START-UP CHECKS

DO NOT EXCEED 1 TURN CCW WHEN RELASING PRESSURE

APPLY A THIN EVEN COAT OF YAMABOND #4 LIQUID GASKET ALL AROUND ON THESE SURFACES.

FULL SCALE VIEW



GUAGE FITTINGS	
PART #	USED WITH CATALOG #
965001	2086, 2089, 2112, 2114, 3851CE, 3853CE, 4130CE, & 4131CE
965027	2518, 2696, 2697, 2702, 4126CE, 3968CE, 4122CE, 3856CE, 3866CE, 4120CE,
965182	2729, 2730, 3724, 3725, 4123CE, 4126CE, 3968CE, 4121CE, & 4124CE
965253	3392, 3393, 3620, 3989CE, & 3850CE
3905	ACCOUSTAMP SERIES
	GUAGE FITTING KIT (ALL FITTINGS)

GUAGE FITTINGS	
PART #	USED WITH CATALOG #
965001	2086, 2089, 2112, 2114, 3851CE, 3853CE, 4130CE, & 4131CE
965027	2518, 2696, 2697, 2702, 4126CE, 3968CE, 4122CE, 3856CE, 3866CE, 4120CE,
965182	2729, 2730, 3724, 3725, 4123CE, 4126CE, 3968CE, 4121CE, & 4124CE
965253	3392, 3393, 3620, 3989CE, & 3850CE
3905	ACCOUSTAMP SERIES
	GUAGE FITTING KIT (ALL FITTINGS)



ITEM	QTY	PART #	DESCRIPTION
A	1	319020	QUAD RING
B	1	963061	TOP CAP O-RING
C	1	363028	BREATHER
D	1	319157	RAM SEAL
E	1	963110	CYLINDER SEAL
F	1	319273A	RELEASE VALVE SPINDLE ASSEMBLY
G	2	319025	7/32 DIA BALL
H	1	931002	CLEVIS PIN, 5/16 DIA. x 1 1/8" LG.
I	3	935004	COTTER PIN
J	1	965026	PIPE PLUG
K	1	319028	COPPER WASHER
L	1	319027	SPRING
M	1	319026	5/16 DIA BALL
N	1	931003	CLEVIS PIN, 5/16 DIA. x 1" LG.
O	1	931004	CLEVIS PIN, 5/16 DIA. x 7/8" LG.
P	1	319138A	PUMP PLUNGER
Q	1	319023	BACK-UP SEAL
R	1	319024	PUMP CAP
S	1	916087	HEX NUT
T	1	319137A	PUMP CYLINDER
U	1	963112	FLAT URETHANE SEAL
V	1	319264A	LINK
W	1	319142B	TOP CAP
X	1	319165B	RAM
Y	1	319141B	RESERVOIR
Z	1	319139B	CYLINDER
AA	1	2120620	BASE
AB	1	964007	PIPE PLUG
AC	1	262001	SHORT HANDLE
AD	1	914001	#10-24 x 3/8 RD HD MACH SCR
AE	1	922027	LOCK WASHER
AF	1	319038A	BEAM
AG	1	645035	SET COLLAR
AH	1	911039	SHCS 1/4-20 x 1" LG.
AI	1	966014	KNURLED KNOB
AJ	1	319284B	EXTENDED SPINDLE

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 SINTERED AIR BREATHER FROM THE FILL PORT ON THE BACK SIDE OF THE HYDRAULIC UNIT.
 4. DRAIN THE CONTAMINATED OIL FROM THE HYDRAULIC UNIT.
 5. FILL WITH SPECIAL CARVER HYDRAULIC OIL TO LEVEL OF GAUGE PORT.
 6. INSTALL THE SINTERED AIR BREATHER IN THE OIL FILL PORT OF THE HYDRAULIC UNIT.
 7. SECURE THE GAUGE LINE IN THE GAUGE PORT ON THE HYDRAULIC UNIT.
 8. SECURE THE HYDRAULIC UNIT TO THE PRESS BASE.

HYDRAULIC UNIT AIR BLEED PROCEDURE
 AN OCCASIONAL CAUSE OF HYDRAULIC SYSTEM MALFUNCTION IS AIR ENTRAPMENT. TO PURGE THE SYSTEM, OPEN THE RELEASE VALVE 1/2 TURN AND PUMP DOWN THE PRESS 12 TIMES. CLOSE THE RELEASE VALVE. AND TEST. IF PRESSURE DOES NOT BUILD UP, REPEAT THIS PROCEDURE.

CAUTION: TO AVOID DAMAGE TO THE HYDRAULIC UNIT RAM SEAL, DO NOT EXCEED THE MAXIMUM RAM TRAVEL OF 12 TON (107 KG) RATED PRESSES. EXCEEDING THIS TRAVEL ON (225 KG) PRESSES. REFER TO LABEL ON THE FRONT OF HYDRAULIC UNIT.

UNIT BY	DATE	BY	DATE
BT	1-9-94		

TOLERANCES	
XXX	± .005
XX	± .010
X	± .015

SOURCE NUMBER MATRICES	
REV	DATE
1	12/10/94
2	12/10/94
3	2-24-98
4	4-14-97
5	5-27-98
6	11-17-98
7	11-17-98

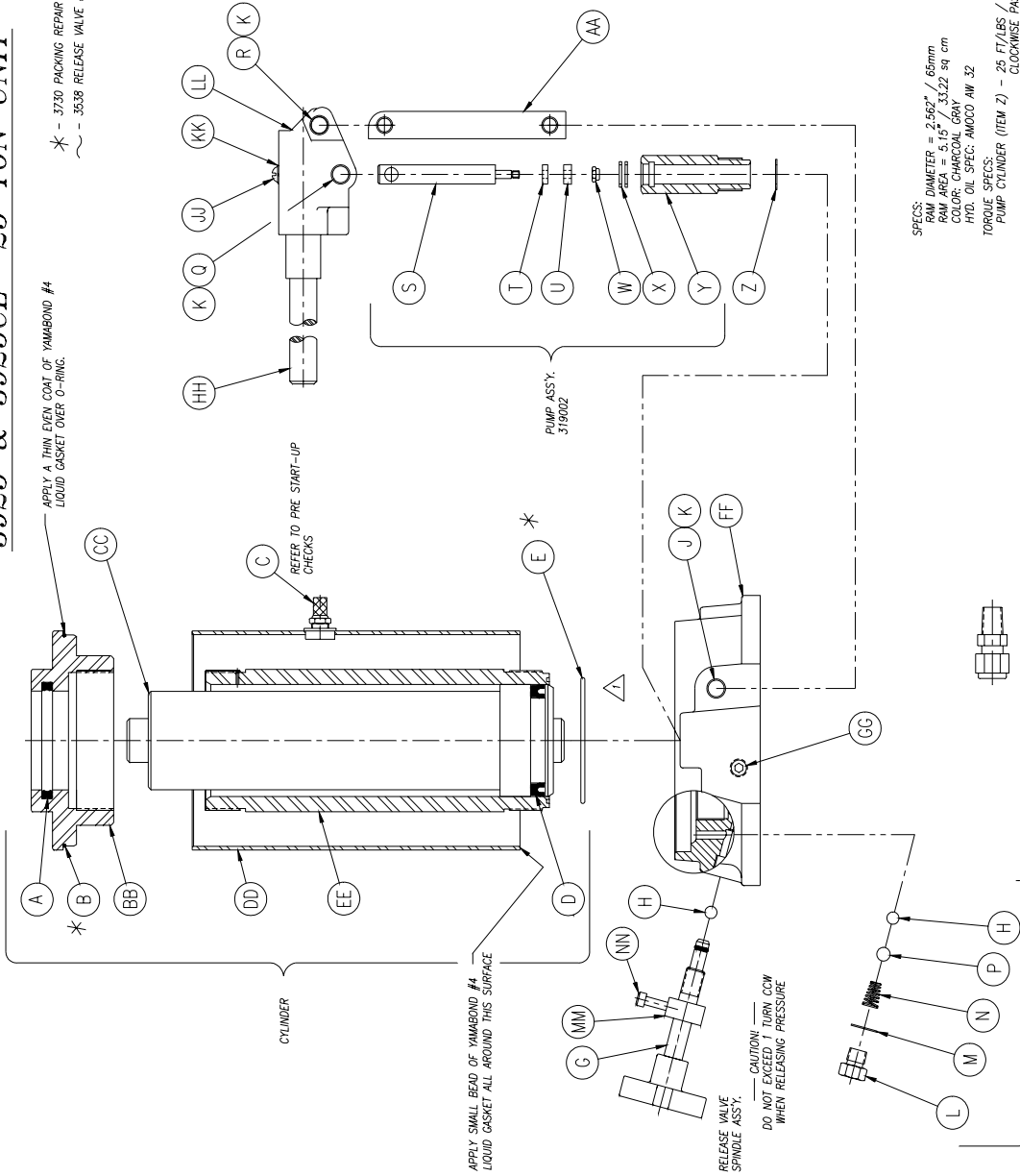
SOURCE NUMBER MATRICES	
REV	DATE
1	12/10/94
2	12/10/94
3	2-24-98
4	4-14-97
5	5-27-98
6	11-17-98
7	11-17-98

SOURCE NUMBER MATRICES	
REV	DATE
1	12/10/94
2	12/10/94
3	2-24-98
4	4-14-97
5	5-27-98
6	11-17-98
7	11-17-98

CARVER® CARVER, INC.	
TITLE	3912, 3912.P & 3912CE HYDRAULIC UNIT
MATERIAL	LISTED
MODELS	12 TON
ORDER/SERIAL	311017C
SCALE	1/2-1

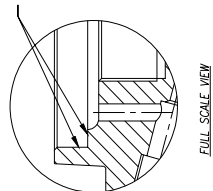
3925 & 3925CE 25 TON UNIT

* - 3730 PACKING REPAIR KIT PARTS
 ~ - 3538 RELEASE VALVE KIT PARTS



PART #	USED WITH CATALOG #
965001	2086, 2089, 2112, 2114, 3651CE, 3653CE, 4130CE, & 4131CE
965027	2518, 2696, 2697, 2702, 4125CE, 3969CE, 4122CE, 3685CE, 3856CE, 4120CE,
965182	2729, 2730, 3724, 3725, 4123CE, 4126CE, 3968CE, 4121CE, & 4124CE
965253	3392, 3393, 3620, 3989CE, & 3850CE
3905	ACCUSTAMP SERIES
	GAUGE FITTING KIT (ALL FITTINGS)

APPLY A THIN EVEN COAT OF YAMABOND #4 LIQUID GASKET ALL AROUND ON THESE SURFACES.



THIS COMPANY'S POLICY IS TO PROVIDE THE BEST SERVICE POSSIBLE. IF YOU ARE NOT COMPLETELY SATISFIED WITH THE QUALITY OF THE PRODUCT, WE WILL REPAIR OR REPLACE IT AT NO CHARGE. IF YOU ARE NOT COMPLETELY SATISFIED WITH THE SERVICE, WE WILL REPAIR OR REPLACE IT AT NO CHARGE. WE WILL NOT ACCEPT PAYMENT FOR ANY PRODUCT OR SERVICE UNLESS YOU ARE COMPLETELY SATISFIED. WE WILL NOT ACCEPT PAYMENT FOR ANY PRODUCT OR SERVICE UNLESS YOU ARE COMPLETELY SATISFIED. WE WILL NOT ACCEPT PAYMENT FOR ANY PRODUCT OR SERVICE UNLESS YOU ARE COMPLETELY SATISFIED.

ITEM	QTY	PART #	DESCRIPTION
* A	1	319222	QUAD RING
* B	1	981111	TOP CAP O-RING
* C	1	362028	BREASHER
* D	1	319215	RAM SEAL
* E	1	983109	CYLINDER SEAL
* F	1	3192734	RELEASE VALVE SPINDLE ASSEMBLY
* G	2	319025	7/32 DIA BALL
* H	1	931002	CLEVIS PIN
* I	3	935004	COTTER PIN
* J	1	965026	PIPE PLUG
* K	1	319028	COPPER WASHER
* L	1	319027	SPRING
* M	1	319026	5/16 DIA BALL
* N	1	931003	CLEVIS PIN, 5/16 DIA. x 1" LG.
* O	1	931004	CLEVIS PIN, 5/16 DIA. x 7/8" LG.
* P	1	3191384	PUMP PLUNGER
* Q	1	319023	BACK-UP SEAL
* R	1	319024	PUMP CUP
* S	1	916087	HEX NUT
* T	1	319022	LEATHER WASHER
* U	2	319137A	PUMP CYLINDER
* V	1	983112	FLAT URETHANE SEAL
* W	1	319264A	LINK
* X	1	319219B	TOP CAP
* Y	1	319212B	RESERVOIR
* Z	1	319211B	CYLINDER
AA	1	212066D	BASE
BB	1	964007	PIPE PLUG
CC	1	262001	SHORT HANDLE
DD	1	914001	#10-24 x 3/8 RD HD MCHT SCR
EE	1	922027	LOCK WASHER
FF	1	645035	SET COLLAR
GG	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. THE OIL FILL PORT MUST BE PROPERLY SEaled WITH BRONZE BREASHER 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 SWIRLED AIR BREASHER FROM THE FILL PORT.
5. DRAIN THE CONTAMINATED OIL FROM THE HYDRAULIC UNIT.
6. FILL WITH SPECIAL CARVER HYDRAULIC OIL TO LEVEL OF FILL PORT.
7. INSTALL THE SWIRLED AIR BREASHER 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.

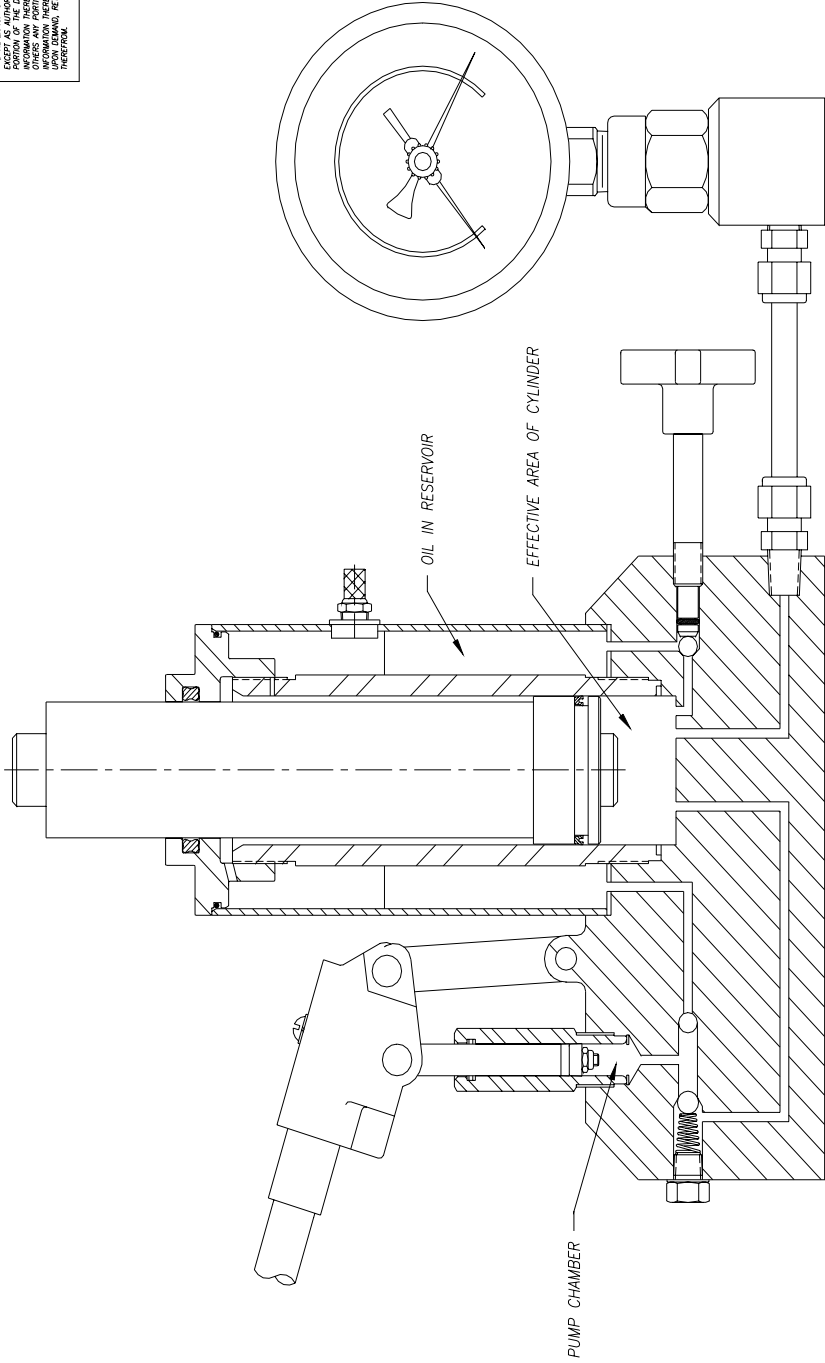
HYDRAULIC UNIT AIR BLEED PROCEDURE

AN OCCASIONAL CAUSE OF HYDRAULIC SYSTEM MALFUNCTION IS AIR IN THE HYDRAULIC UNIT. TO REMOVE AIR FROM THE HYDRAULIC UNIT, TURN AND PUMP THE UNIT ABOUT 1/2 TIMES. CLOSE THE RELEASE VALVE AND TEST. IF PRESSURE DOES NOT BUILD UP, REPEAT THIS PROCEDURE.

CAUTION: TO AVOID DAMAGE TO THE HYDRAULIC UNIT, RAM SEAL DO NOT EXCEED THE MAXIMUM RAM TRAVE OF 5-1/2" FROM THE 1/2 TON (100 LB) RATED PRESSURES, AND 6-1/2" ON THE 25 TON (223 KG) PRESSURES. (REFER TO LABEL ON THE FRONT OF HYDRAULIC UNIT.)

DATE: BT 3-22-94
 CHECKED BY: []
 TITLE: 3925 & 3925CE HYDRAULIC UNIT
 MATERIAL: LISTED
 MODELS: 25 TON
 DRAWING NO.: 311014C
 SCALE: 1/2"=1'
 REV: 5

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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)

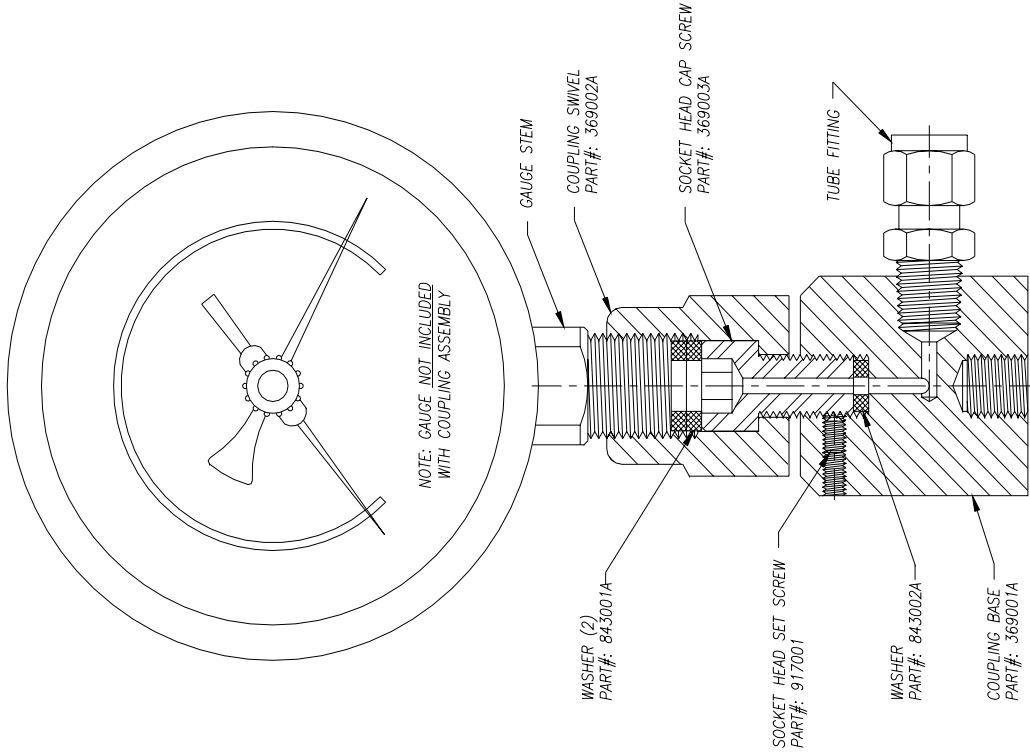
DWN BY GWM	DATE 1-22-96	CARVER, INC. P.O. BOX 544 WILSON, VIRGINIA 46092-0544	REV. 1
CHK'D BY	DATE		110479B
TOLERANCES .XXX = ± .005 .XX = ± .015 .X = ± .05		TITLE HYDRAULIC UNIT SCHEMATIC / SECTION VIEW	SCALE
ADDED TEXT TO IDENTIFY SPECIFIC AREAS		MATERIAL	REV. 1
DESCRIPTION		ORDER/SERIAL NO.	110479B

REV.	CODE	BY	DATE	DESCRIPTION
1		GWM	1/8/04	

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NOTE: LOOSENING THE GAUGE
IT IS VERY IMPORTANT TO HOLD THE COUPLING SWIVEL STATIONARY AND TURN ONLY THE GAUGE STEM COUNTERCLOCKWISE TO LOOSEN OR REMOVE THE GAUGE.

NOTE: TIGHTENING THE GAUGE
TIGHTEN THE GAUGE COUPLING BY HOLDING THE GAUGE STEM STATIONARY AND TURNING THE GAUGE SWIVEL COUNTERCLOCKWISE UNTIL IT IS TIGHT.



REFERENCE:
3277 - STANDARD GAUGE UNION COUPLING ASSEMBLY
3303 - GAUGE UNION COUPLING ASSEMBLY FOR MINI-C AND PELLET PASSES

DWN BY DS		DATE 1-19-96	CARVER, INC. P.O. BOX 644 WABASH, INDIANA 46982-0644	
CHK'D BY		DATE	GAUGE UNION COUPLING ASSEMBLY	
TOLERANCES .XXX = ± .005 .XX = ± .015 .X = ± .06		MATERIAL	REQ'D	SCALE
CHANGE PART NUMBER ON PRINT TO INCLUDE LETTER				FULL
NOTES ON LOOSENING AND TIGHTENING		ORDER/SERIAL	DWG. NO.	REV.
DESCRIPTION			110478B	2