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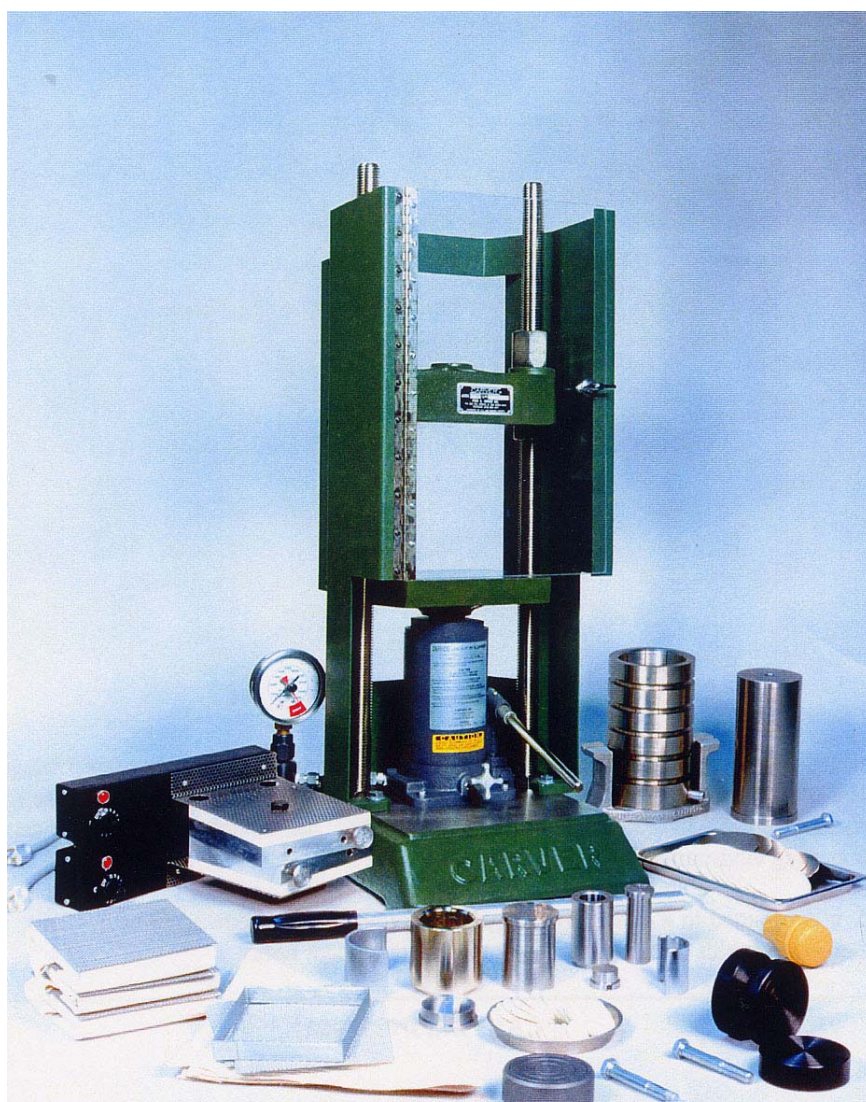
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Mode d'emploi

CARVER®

OPERATION, INSTALLATION AND MAINTENANCE MANUAL 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 and using 50 Hz electrical current. All of 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.

CARVER, INC. 1996

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Part #: 1520.2&4PSTUSCE

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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.

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.

The principle factors, which can result in injury, are:

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;
5. Contact with hot plates or heated apparatus can produce severe burns.

GENERAL RESPONSIBILITY**NO MATTER WHO YOU ARE...**

Press safety is important. Press owners, operators, mold setters, and maintenance personnel must realize that every day, all day, safety is a vital aspect of their jobs.

If your main concern is productivity, remember this. Loss of production always follows an accident involving a press:

- * loss of a skilled operator (temporarily or permanently)
- * breakdown of shop morale
- * costly damage to press and/or tooling
- * down time.

An effective press safety program is not only humanitarian, but is also economically sound.

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily press inspections in addition to regular maintenance checks. You will keep your presses safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to molding machine safety. This manual contains safety warnings throughout, specific to each function and point of operation. It is to promote and increase safe press operation in your company.

OPERATOR RESPONSIBILITY

It doesn't end with fast and efficient production. The press operator usually has the most daily contact with the press and intimately knows its capabilities and limitations.

Plant and personal safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward machinery formed over a period of months or years. Your employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your press.

ONLY YOU can make safety work for you by constantly thinking about what is safe and what is not. It is often the "just once" that a press operator reaches into a press to remove or adjust material, or rest a hand in the ram area while talking to a co-worker that results in serious injury.

Learn and always use safe press operation. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor or appropriate person.

REMEMBER:

- * **NEVER** place your hands or any part of your body in the mold area or other dangerous locations.
- * **NEVER** operate, service, or adjust press or molds without the appropriate training and first reading and understanding this manual.
- * **NEVER** try to pull material (either a part or scrap) out of the mold with your hands! If a part sticks in the mold, stop the press and call your supervisor.
- * Before you start the press, check the following:
 - remove all maintenance crew equipment from the press area;
 - make certain safety blocks are removed from the mold;
 - be sure no objects (tools, nuts, bolts, clamps, bars) are laying in the press clamp area;
 - carefully look for obstructions left in the mold;
- * If your press has been inoperative or unattended, even for a moment, check all settings before starting the next cycle.
- * If your press has multiple platens, be sure **ALL** floating platens are completely open before reaching into the clamp area.
- * At the beginning of your shift and after breaks, cycle the press several times to verify that the controls, press parts, molds and auxiliary equipment are functioning properly.
- * Keep all safety guards in place and in good repair. **NEVER** attempt to bypass, modify, or remove safety guards. Such alteration is not only unsafe, but will void the warranty on your equipment.
- * When changing press control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Test cycle the press to verify it will operate as planned. Locking selector switches should be adjusted only by authorized persons and the keys removed after setting.
- * Do not talk to others while operating a press. If you must talk, stop the press and step away from it until the conversation is completed.
- * Report the following occurrences **IMMEDIATELY**:
 - unsafe operation or condition
 - unusual press action
 - leakage
 - improper maintenance
- * **NEVER** stand or sit where you could slip or stumble into the press while operating it.

- * **DO NOT** wear loose clothing or jewelry, which can be caught while operating a press. Also cover or tie back long hair.
- * **DAILY** clean the press and surrounding area, and inspect the machine for loose, missing, or broken parts.
- * Shut off power to the press when it is not in use. Lock the control panel or disconnect switch in the **OFF** position or unplug press from power source.

2-4

MOLD SETTERS RESPONSIBILITY

What they sometimes forget is their own safety during the installation or removal of a mold. To successfully perform this job, the mold setter must gain a good working knowledge of the press, molds, materials, and must know how to use a mold truck and other handling equipment.

Technical knowledge is not enough. The mold setter's sense of personal safety is crucial. Installing and testing mold guards and point of operation safety devices is as important as properly mounting the mold to the press.

DON'T FORGET

- * **NEVER** place your hands or other part of your body within the mold area unless the power is **OFF** to the press.
- * If the press has multiple openings, be sure that **ALL** floating platens are completely open before installing tooling.
- * **NEVER** install, adjust, or remove molds without the appropriate training and first reading and understanding this manual.
- * **NEVER** move molds or service the press with the electric power on or without blocks in place.
- * Clean bolsters, platens, and molds before installing the mold set. Dirt or foreign materials can cause misalignment, resulting in operator injury and/or press and mold damage.
- * **ALWAYS** lock out the control panel or disconnect switch in the **[OFF]** position to prevent unauthorized use or accidental starting of the press.
- * **NEVER** install worn or damaged molds. Make sure the clamp pressure is properly adjusted, relative to the mold size (refer to the "Mold Size vs. Tonnage" chart in the Maintenance Section of this manual).
- * Secure all molds to the mold truck before you move them.
- * When clamping molds to the press, use the appropriate number and size of clamps to hold the molds securely (please consult your mold manufacturer if in doubt about appropriate clamp usage).
- * After installing molds, make all necessary adjustments **BEFORE** cycling the press.

- * Make sure all persons are clear of the press and remove all objects from mold area (tools, nuts, bolts, clamps, bars) before cycling.
- * Watch the press in operation to make sure molds and equipment are working properly.
- * Before the press is used for production, replace all guards and applicable safety devices to protect the operator.
- * If the press operator is required to load or unload parts, provide safe and appropriate tools (cotton gloves, safety tongs, vacuum lifters, pliers, or other mechanical devices) for his or her use.
- * When changing press control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Test cycle the press to verify it will operate as planned. Locking type selector switches should be adjusted only by authorized persons and the keys removed after setting.
- * **NEVER** change selector switches on the press during a cycle.
- * If the press has been inoperative or unattended, even for a moment, check all settings before starting the next cycle.
- * Report the following occurrences **IMMEDIATELY**:
 - unsafe operation or condition
 - unusual press action
 - leakage
 - improper maintenance

2-5 **MAINTENANCE RESPONSIBILITY**

Safety is essential to the good health of both man and machine. If you are a maintenance worker, you must make safety a priority in order to effectively repair and maintain press equipment.

BEFORE REMOVING, ADJUSTING, OR REPLACING PARTS ON A MACHINE, REMEMBER TO:

- * **BLEED** all pressure from system components (refer to the Maintenance Section of this manual.)
- * **TURN OFF** all air, water, and hydraulic pressure supplies and all accessory equipment at the machine.
- * **DISCONNECT AND LOCK OUT** electrical power and attach warning tags to the press disconnect switch and air shutoff valve.
- * If the press has multiple openings, be sure **ALL** floating platens are completely open before servicing.

When you need to perform maintenance or repair work on a press above floor level, use a solid platform, portable scaffolding lashed to the press, or a hydraulic elevator. If there is a permanently installed catwalk on your press, use it. The work platform should have secure footing and a place for tools and parts. **DO NOT** climb on presses or work from ladders.

If you need to repair a large press component, use appropriate handling equipment. Before you use handling equipment (portable "a" frames, electric boom trucks, fork trucks, overhead cranes) be sure the load does not exceed the capacity of the handling equipment or cause it to become unstable.

Carefully test the condition of lifting cables, chains, ropes, slings, and hooks before using them to lift a load.

Be sure that all non-current carrying parts of electrical apparatus, electrical component enclosures, and the press frame are correctly connected to earth ground with an electrical conductor, which complies with current codes. Install in accordance with the national and local codes, which apply.

When you have completed the repair or maintenance procedure, check your work, remove your tools, rigging, and handling equipment.

Do not restore power to the press until all persons clear the area. Start and run the press until you are sure all parts are functioning correctly.

BEFORE. you turn the press over to the operator for production, install and adjust all guards and safety devices.

SECTION THREE

INSTALLATION

3-1

TWO POST PRESS DESCRIPTION

CATALOG #		3850CE	3989CE	3851CE	3853CE	3968CE	4120CE	3620CE 3978CE	4350CE
MODEL		Mini C	Mini C	Model C	Model M	12-10	12-10H	Pellet	Pellet
CLAMP FORCE	US TONS Kn	12 106.8	12 106.8	12 106.8	25 222.5	12 106.8	12 106.8	12 106.8	12 106.8
MAXIMUM TEMP	°F °C	500 650 260 343	N/A N/A N/A N/A	500 650 260 343	500 350 260 343	N/A N/A N/A N/A	650 343	N/A N/A	N/A N/A
PLATENS	IN. MM.	6 x 6 152 x 152	4 DIA. 102 DIA.	6 x 6 152 x 152	9 x 9 228 x 228	10 x 7 254 x 178	10 x 7 254 x 178	4 DIA. 102 DIA.	4 DIA. 102 DIA.
RAM STROKE	IN. MM.	5.125 130	5.125 130	5.125 130	6.5 165	5.125 130	5.125 130	5.75 146	5.50 140
DAYLIGHT OPENING UNHEATED	IN. MM.	.75-7 19-178	.75-7 19-178	.75-18 19-457	.75-16 19-406	1-16 25-406	N/A N/A	0-5.75 0-146	0-5.5 0-140
(OPT)HEATED	IN. MM.	0-5.75 0-146	N/A N/A	0-16.75 0-425	0-14.75 0-374	N/A N/A	0-11 0-279	N/A N/A	N/A N/A
FOOTPRINT W x D	IN. MM	11 x 16 279 x 406	11 x 16 279 x 406	16 x 15 406 x 381	19 x 19 482 x 482	14 x 16 355 x 406	14 x 16 355 x 406	11 x 16 279 x 406	11 x 16 279 x 406
HEIGHT	IN. MM.	22 558	22 558	36 914	42 1066	37 939	37 939	22 558	25 635
WEIGHT (OPT) HEATED	lbs Kg	130 59	N/A N/A	170 77	300 136	N/A N/A	345 156	115 52	120 54.4
UNHEATED	lbs Kg	110 50	110 50	150 68	275 125	300 136	N/A N/A	N/A N/A	N/A N/A
NOISE LEVEL		<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)
FULL LOAD CURRENT -	115V 240V	12.18A 5.84A	N/A N/A	12.18A 5.84A	24.34A 11.66A	N/A N/A	17.4A 8.34A	N/A N/A	N/A N/A
MAX. SYSTEM PRESSURE -	PSI bar	7295 503	7295 503	7295 503	9709 669	7295 503	7295 503	7295 503	7295 503

N/A = NOT APPLICABLE

FOUR POST PRESS DESCRIPTION

CATALOG #	3969CE	4121CE	4122CE	4123CE	3855CE	4124CE
MODEL	12-12	12-12-2	12-12-H	12-12-2-H	25-12	25-12-2
CLAMP FORCE US TONS Kn	12 106.8	12 106.8	12 106.8	12 106.8	25 222.5	25. 222.5
MAX. TEMP. °F °C	N/A N/A	N/A N/A	650 343	650 343	N/A N/A	N/A N/A
PLATENS IN. MM.	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305
RAM STROKE IN. MM.	5.125 130	5.125 130	5.125 130	5.125 130	6.5 165	6.5 165
DAYLIGHT OPENING UNHEATED IN. MM. HEATED IN. MM.	1-15 25-381 N/A N/A	2 @ 9 2 @ 228 N/A N/A	N/A N/A 0-10 0-254	N/A N/A 2 @ 3 2 @ 76	1-14 25-355 N/A N/A	2 @ 9 2 @ 228 N/A N/A
FOOTPRINT W x D IN. MM.	18 x 18 457 x 457	18 x 18 457 x 457	18 x 25 457 x 635	18 x 25 457 x 635	18 x 18 457 x 457	18 x 18 457 x 457
HEIGHT IN. MM.	37 939	37 939	37 939	37 939	37 939	43 1091
WEIGHT UNHEATED lbs Kg HEATED lbs Kg	460 209 N/A N/A	795 361 N/A N/A	N/A N/A 610 277	N/A N/A 825 374	490 222 N/A N/A	810 367 N/A N/A
NOISE LEVEL	<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)
FULL LOAD CURRENT 230V	N/A	N/A	21.66A	43.32A	N/A	N/A
MAX. SYSTEM PRESSURE PSI BAR	7295 503	7295 503	7295 503	7295 503	9709 669	9709 669

N/A = NOT APPLICABLE

CATALOG #		3856CE	4126CE	3970CE	4127CE	4128CE	4129CE
MODEL		25-12H	25-12-2H	30-12	30-12-2	30-12H	30-12-2H
CLAMP FORCE	US TONS Kn	25 222.5	25 222.5	30 267	30 267	30 267	30 267
MAX. TEMP.	°F °C	650 343	650 343	N/A N/A	N/A N/A	650 343	650 343
PLATENS	IN. MM.	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305	12 x 12 305 x 305
RAM STROKE	IN. MM.	6.5 165	6.5 165	6 152	6 152	6 152	6 152
DAYLIGHT OPENING	UNHEATED IN. MM. HEATED IN. MM.	N/A N/A 0-9.5 0-241	N/A N/A 2 @ 3 2 @ 76	1-17 25-431 N/A N/A	2 @ 9 2 @ 228 N/A N/A	N/A N/A 0-12 0-305	N/A N/A 2 @ 3 2 @ 76
FOOTPRINT W x D	IN. MM.	18 X 25 457 X 635	18 X 25 457 X 635	18 X 18 457 X 457	18 X 18 457 X 457	18 X 25 457 X 635	18 X 25 457 X 635
HEIGHT	IN. MM.	37 939	43 1091	43 1091	43 1091	43 1091	43 1091
WEIGHT	UNHEATED lbs Kg HEATED lbs Kg	N/A N/A 640 290	N/A N/A 840 381	520 236 N/A N/A	810 367 N/A N/A	N/A N/A 650 295	N/A N/A 840 381
NOISE LEVEL		<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)	<70db(A)
FULL LOAD CURRENT	230V	21.66A	43.32A	N/A	N/A	21.66A	43.32A
MAX. SYSTEM PRESSURE	PSI BAR	9709 669	9709 669	8488 585	8488 585	8488 585	8488 585

N/A - NOT APPLICABLE

LAMINATING PRESS DESCRIPTION

CATALOG #		4130CE	4131CE	4132CE
MODEL		150-C	154-M	30-12-L
CLAMP FORCE	US TONS Kn	12 106.8	25 222.5	30 267
MAXIMUM TEMP	°F	500	500	650
	°C	260	260	343
PLATENS	IN. MM.	6 x 6 152 x 152	9 x 12 228 x 305	12 x 12 305 x 305
RAM STROKE	IN. MM.	5.125 130	6.5 165	6 152
DAYLIGHT OPENING	IN. MM.	2 @ 3 2 @ 76	2 @ 3 2 @ 76	2 @ 3 2 @ 76
FOOTPRINT W x D	IN. MM.	16 X 18 406 X 459	19 X 19 482 X 482	19 X 19 482 X 482
HEIGHT	IN. MM.	30 761	36 914	42 1066
WEIGHT	lbs. Kg.	190 83	380 166	575 250
NOISE LEVEL		<70db(A)	<70db(A)	<70db(A)
FULL LOAD CURRENT	115V 240V	12.2A 6.1A	24.4A 12.2A	N/A 22.6A
MAX. SYSTEM PRESSURE	PSI bar	7295 503	9709 669	8488 585

3-4 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.

3-5 SETTING UP

Installation Summary:

- Bolt press to bench.
- Rotate gauge and tighten coupling.
- Remove plug in jack and replace with sintered breather.

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.

- Verify electrical supply if press is equipped with heated platens.

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 directly in front of the columns for this purpose.

If the press is equipped with heated platens, verify the electrical supply and connect the press to the correct voltage source. The correct operating voltage and current draw information is printed on the ELECTRICAL DATA TAG which is located on the side of the press.

3-6 GAUGE INFORMATION

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 15/16" 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.)

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

3-7

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 (107Kn) ram is 3.294 square inches (21.253 square cm) and the Model "M" 25-ton (223 Kn) ram area is 5.157 square inches (33.273 square cm). 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. (44480n) load applied to material having an area of one square inch (one square mm) would be equal to a pressure of 10,000 lbs. per square inch (44480 Newtons per square mm) applied to the material. Or, if the material being pressed has an area of four square inches (258.08 square mm) a 10,000 lbs. (44480 Newton) applied load would be equal to 2,500 lb. per square inch (172.35 bar) on the material.

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** 2096CE Two-Gauge Manifold will permit simultaneous mounting of two separate gauges.

3-8

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 up to the level of the filler hole on 12 & 25 (107 & 223 Kn) ton models. Fill 30 ton (267 Kn) pump up 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.

3-9

GASES OR DUST REMOVAL

If the product you use in the press produces dust or gases that could be harmful to the operator, attach an exhaust system to the press. This can be done by either attaching the exhaust vent to the top of the guard housing or by cutting a hole in the back of the guard housing and attaching the exhaust vent over the cutout. The cutout must be completely covered. Airflow will then be drawn up, around the material, and out through the top of the press.

CONNECTING UTILITIES1. **Electrical Connection**

CARVER presses that have electrical devices are supplied with a disconnect switch or disconnect plug. Connect main power to the press through the disconnect.

CAUTION: On presses with thermostat control, customer is to provide short-circuit protection based upon the electrical nameplate current draw.

The voltage, phase and current draw information are listed on the serial number tag. Line voltage must be within $\pm 10\%$ of the voltage listed on the serial number tag or damage may occur. Phase imbalance must be within 5%.

Fulfill all national, state, and local safety and electrical code requirements.

The power drop must include a ground wire.

WARNING: CONNECTION SHOULD ONLY BE MADE BY A QUALIFIED ELECTRICIAN.

2. **Water and Air Inlet Connections**

If your press is equipped with cooling plates, then it will be necessary to connect the supplied Teflon lined stainless steel hoses to your plant air and water supplies. Each platen comes with an inlet and outlet hose attached. Determine which side of the platens you will use as the inlet. For this explanation the right side when facing the press will be considered the inlet side and the left the outlet side. The hoses are Teflon lined stainless steel, with a 3/8 inch NPT female fitting, on the end.

Each inlet hose will be used to supply water, air and water/air mix to the platen it is connected to. For this reason, the inlet hoses should be connected to a common manifold with the plant air and water supply connected to the manifold.

WARNING: CHECK VALVES SHOULD BE INSTALLED IN BOTH WATER AND AIR LINES TO PREVENT CONTAMINATING EITHER SUPPLY LINE WITH THE OTHER.

The addition of shutoff valves in both water and air lines will facilitate operation and maintenance.

IMPORTANT: After cooling with water, residual water should be purged from the platen cores with compressed air before the next heating cycle.

The air supply should be a clean, dry, regulated compressed air source.

IMPORTANT: Verify that the water pressure is greater than the air pressure or the water will not enter the

platen cooling channels. <u>Set regulator below water pressure.</u>

The following is to be used when determining the cooling medium required for the temperature being used.

AIR ONLY when temperature is above 600°F (315°C)

AIR/WATER MIX when temperature is between 600° & 350°F (315° & 177°C)

WATER ONLY when temperature is below 350°F (177°C)

3. WATER AND AIR OUTLET CONNECTIONS

Each outlet hose will be used to drain the water, air and water/air mix from the platen it is connected to. The outlet hoses can be connected to a common manifold or separately connected to the plants drain system.

The outlet manifold or hoses must be connected to a drain vented for steam with a steel pipe.

4. STEAM CONNECTIONS

Each platen is equipped with an inlet and outlet flexible metal hose for steam heat connections. The customer is to connect one hose of each platen, on the same side, to a steam source and the other hoses, opposite side, to a drain line, preferably through a steam trap.

IMPORTANT:	Do not vent steam line with copper or plastic. Use only steel pipe and install to standard steam specifications.
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The outlet manifold <u>must be plumbed downward</u> to drain the platens properly. If the manifold is plumbed upward, CARVER, INC. recommends the use of a check valve to eliminate backflow into the platens and a pump to recirculate the drain water.

CARVER, INC. will not guarantee proper cooling if the drain is not plumbed according to CARVER, INC. recommendations.

A pressure gauge and regulator are recommended components for your plant air supply.
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A manual shutoff valve in each line will aid in future maintenance procedures.
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4-1 OPERATOR SAFETY

1. 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.
2. When using caustic or acid test specimens, a face shield, apron, and rubber gloves should be used for the protection of the operator.
3. The testing apparatus or test specimen must be centered on the press platen. This will prevent tilting of the platen 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.
4. **CARVER, INC.** recommends bolting the press to a work table 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.
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CAUTION:	When using a press with hot plates, gauntlet gloves should be worn to protect the forearms and hands. Steam can be released from a specimen when pressure is applied.
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5. When the top head has been repositioned, the height on both sides must be measured to be sure that the head bolster is parallel with the base.

CAUTION:	CARVER recommends the use of safety glasses while operating this equipment.
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6. Always check the pressure rating of the pressed apparatus 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 <u>DOES NOT</u> show the pressure on the specimen (PSI/BAR). 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. (See Section 3)
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7. To protect against squirting fluid, the apparatus may be placed inside a can or wrapped in a cloth.

OPERATING THE HYDRAULIC PRESS

Before attempting to operate the hydraulic unit, make certain that the release valve screw is closed finger tight.

IMPORTANT: DO NOT rotate the release valve more than one full turn in the counterclockwise direction.

30-ton (267 Kn) 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.

Opening the release valve approximately one-half turn releases the pressure and allows the platen to open. The release valve is equipped with a mechanical stop to prevent the valve from being turned out too far. Pulling the cam release lever toward the operator to the horizontal position will allow the clamp on 30-ton (267 Kn) models to open. It may be necessary to push the platen down by hand when the press is new. After a short period of use, the platen will return under its own weight.

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.

4-3**DAYLIGHT ADJUSTMENT**

Refer to the following drawings for information describing your press.

Mini "C" 12-Ton(107Kn)	(3989CE)	drawing #100321D
Mini "C" 12-Ton(107Kn)	(3850CE)	drawing #100322D
Model "C" 12-ton(107Kn)	(3851CE)	drawing #110323D
Model "M" 25-Ton(223Kn)	(3853CE)	drawing #110324D
Model 12-10 12-Ton(107Kn)	(3968CE)	drawing #100325D
Model 12-10H 12-Ton(107Kn)	(4120CE)	drawing #100329D
Model 12-12 12-Ton(107Kn)	(3969CE)	drawing #100326D
Model 12-12-2 12-Ton(107Kn)	(4121CE)	drawing #100317D
Model 150-C 12-Ton(107Kn)	(4130CE)	drawing #100336D
Model 12-12H 12-Ton(107Kn)	(4122CE)	drawing #100330D
Model 12-12-2H 12-Ton(107Kn)	(4123CE)	drawing #100331D
Model 25-12 25-Ton(223Kn)	(3855CE)	drawing #100327D
Model 25-12-2 25-Ton(223Kn)	(4124CE)	drawing #100318D
Model 25-12H 25-Ton(223Kn)	(3856CE)	drawing #100332D
Model 25-12-2H 25-Ton(223Kn)	(4126CE)	drawing #100333D
Model 154M 25-Ton(223Kn)	(4131CE)	drawing #100337D
Model 30-12 30-Ton(267Kn)	(3970CE)	drawing #100328D
Model 30-12-2 30-Ton(267Kn)	(4127CE)	drawing #100319D
Model 30-12H 30-Ton(267Kn)	(4128CE)	drawing #100334D
Model 30-12-2H 30-Ton(267Kn)	(4129CE)	drawing #100335D
Model 30-12-L 30-Ton(267Kn)	(4132CE)	drawing #100338D
Manual Pellet 12-Ton(107Kn)	(3620/3978CE)	drawing #100377D
Manual Pellet 12-Ton(107Kn)	(4350CE)	drawing #100450D

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

To raise the top (head) bolster:

1. Insert a spacer block with parallel surfaces between the moving bolster and top bolster, pump the hydraulic unit to build force to the maximum capacity of the press.
2. With the press at maximum applied force, loosen the column nuts located directly below the top bolster. On Four Post 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.
4. Move the upper column nuts to the position required to create the desired daylight.
5. Raise the top bolster against the top nuts and tighten the lower nuts 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. Adjust the lower nuts as needed to insure parallelism between the top bolster and base bolster. Turn the upper column nuts finger tight against the top bolster.
7. Insert a spacer block with parallel surfaces between the moving bolster and the top bolster (spacer must be tall enough to build force on spacer), pump the hydraulic unit to build force to the maximum capacity of the press.
8. Tighten the lower nuts against the bottom surface of the top bolster as tight as possible.
9. This is a good time to check the nuts on top of the base bolster and if necessary, retighten.
10. Tighten brass tipped setscrews in nuts (if your press is a Four Post). Open press and remove spacer, the press is now ready to operate.

To lower the top (head) bolster:

1. Insert a spacer block with parallel surfaces between the moving bolster and top bolster, pump the hydraulic unit to build force to the maximum capacity of the press.
2. With the press at maximum applied force, loosen the column nuts located directly below the top bolster. Move these column nuts to the position required to create the desired daylight. On Four Post presses, a brass tipped setscrew 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.
4. Tighten the upper column nuts finger tight against the top surface of the top bolster.
5. Follow steps 6 thru 10 as described above.

<p>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.</p>

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

<p>IMPORTANT: In all cases, size the spacer block so the maximum stroke of the hydraulic unit is not exceeded.</p>

Refer to Section 3 to determine maximum stroke of your press.

WARNING: Spacer block must be centered on moving bolster (or platen). 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 (or platen) surface.

4-4 OPERATING PRESSES EQUIPPED WITH HEATED PLATENS

Close (energize) the ELECTRICAL DISCONNECT switch. Tighten the pressure release knob on the pump, close the press and preheat the platens to the set temperature.

Hot Plates with Thermostats:

If your press is equipped with individual thermostats located in the platen, rotate the knob clockwise to increase the temperature. Verify the temperature on the integral thermometer, and adjust the knobs accordingly.

CAUTION: On presses with thermostat control, customer is to provide short-circuit protection based upon the electrical nameplate current draw.

Digital Platen Control Systems:

Select the [ON] position of the ELECTRICAL DISCONNECT switch, located on the front of the control panel of presses equipped with digital, platen controller(s).

Heated presses equipped with digital controls include solid state heater contactors and digital temperature controllers. The platen temperature is controlled with 1/16 DIN digital temperature controller(s). The controller(s) are modular and can be removed from their mounting housing. They are preset at the factory and no field adjustment (other than the temperature setting) should be necessary.

The control panel located on the side of the press includes, the ELECTRICAL DISCONNECT switch, POWER ON-OFF BUTTONS and the temperature controller(s).

Adjust the digital temperature controller(s) to the desired operating temperature for your process by depressing the [ARROW UP] or [ARROW DOWN] key on the temperature controller(s).

To shut down the press, select the [OFF] position on the ELECTRICAL DISCONNECT switch or press power off button.

WARNING: When operating a press with heated platens, wear the appropriate personal safety gear, such as, insulated gloves to protect arms and hands from burns.

4-5 LAMINATING PRESSES

Introduction

We are pleased to provide a **CARVER** Laminating Press for your operations. Although this equipment is a standard apparatus for general laminating work, these presses have wide use for other applications where heating and chilling under pressure is required. Many of these presses are in daily use by the Armed Forces, Government Agencies, Universities and Industry for important jobs where securities, ease of operation and quality production are essential.

Description

The press is a complete, self-contained, hand-operated unit ready for connection to an electrical outlet and cooling source. No special wiring or plumbing is required for installation, nor is any previous skill needed for operation. Press Models 150-C and 154-M are supplied complete with all operating accessories including hose connections, extension cord, polished plates, blotters, holding plates, polished chrome plates, thermometers, interval timer, oil and operating instructions in the service manual. Model 30-12-L is not supplied with any laminating accessories.

Features

CARVER Laminating Presses incorporate two separate openings. The upper chamber features heating plates, while the lower chamber utilizes channeled cooling plates. This specially developed feature permits simultaneous heating and cooling of separate charges under the exact heat and pressure required to suit the particular plastic used. This results in faster, more efficient production of laminations.

Another feature of this press is the variety of standard laminating accessories available. These include **CARVER** polished chrome plates. These plates have a highly polished finish and have wide use for laminating, molding and similar finishing work where good surface finish is required. A variety of sizes are available from stock. We also carry in stock laminating-type blotters for use with these plates which are available in a variety of sizes.

Laminating Equipment

This press is shipped with various accessories; the purpose of each and their proper use is outlined below.

Holding Plates:

Six (6)-holding plates are supplied. They are made of hard aluminum alloy for quick transfer of heat. They provide for holding one or more laminations in order to keep the press in continuous operation (one heating, one cooling and one staged, ready for use). These holding plates are used on the top and bottom of each lamination as outlined in the section titled "Lamination".

Holding Clamps: (Optional)

The holding clamps are used for maintaining pressure on a lamination while transferring it from the hot to the cold opening of the press (see Laminating Procedure). The holding clamps are adjustable so that they may be use for stacks of laminations of varying thickness. The clamps may be adjusted as follows:

- 1) Hold the clamp in one hand with the lever up against the main body of the clamp.
- 2) Back off the adjusting screw by turning it in a counterclockwise direction (to the left) until the jaws are opened just enough to be placed over the stack of laminations, outside the holding plates.
- 3) Open the clamp lever.
- 4) Place the clamp in position on the projecting side of the holding plates.
- 5) Turn the adjusting screw about a half turn or so in a clockwise direction (to the right).
- 6) Close the clamp by squeezing on the lever. The lever should snap up against the main body of the clamp, grasping the stack firmly. If it does not, adjust the end screw until it performs as specified above. **IMPORTANT DO NOT GRIP THE STACK TOO TIGHTLY WITH THE HOLDING CLAMPS.** Just a firm grip, enough to hold the stack closed and afford easy transferring is all that is needed. Too much pressure on the holding clamps may spring the holding plates and produce bubbles in the laminations.

Polished Plates:

Polished plates are supplied in sets of (24) pieces; enough to build three stacks of laminations, six layers each, using seven plates per stack. The three extra plates are supplied as spares in case some become scratched or damaged. These plates are made of chrome-plated steel and are highly polished. When using the polished plates, be sure to center them on the holding plates.

Blotters:

A set of (50) blotters is provided. One or two blotters are generally used between the polished plates and the holding plates (see Method of Assembling Laminations). They are not intended as padding. Their main purpose is to prevent heat from entering the stack too rapidly and distribute the heat evenly throughout the stack. They also protect exposed surfaces of the polished plates. It is not necessary to replace the blotters for each lamination, however, if they become brittle and hard due to high heat, they should be replaced. These are special blotters made for this purpose and should last a considerable amount of time.

Thermometers:

Each press is supplied with (2) dial-faced thermometers with Centigrade (C°) gradations. These should be inserted into the holes in each heating plate. Care should be taken not to hit the lens of the thermometer or damage may occur.

Oil:

Each press is supplied with one pint (.47 liters) of Special Hydraulic Oil #2170, but this should only be needed if there has been some visible loss. Keep this bottle sealed from dirt and dust. We advise using only **CARVER** Hydraulic Fluid or those recommended as substitutes earlier in this manual.

Spare Seals:

Each press is supplied with a spare soft copper washer for use in the gauge connection. If one seal does not prevent oil leakage, two seals may be used.

LAMINATION:

This **CARVER** Laminating Press is the finest equipment of its type available. Properly operated, it produces superior laminations, which are not only pleasing in appearance and "feel" but are welded or fused together. Separation under ordinary conditions is impossible. Cards or papers are essentially tamer-proof and are protected indefinitely. Please take time to read and understand these instructions. A little practice is, of course, necessary, but you will be rewarded with outstanding results.

METHOD OF ASSEMBLING LAMINATIONS:

Generally laminations are laid up in one layer to stacks of six layers being separated by polished plates (see Drawing 110545B). In building up a stack of laminations, be sure to have plastic sheets cut to the same size or slightly smaller than the polished plates. A stack is made up as follows, beginning from the bottom.

- 1) One holding plate.
- 2) One, or two blotters.
- 3) One polished plate.
- 4) One plastic sheet (same size as polished plate).
- 5) Piece to be laminated. For smaller pieces, two, four or more may be laminated in the same layer. A border left around the edges for trimming - at least 1/4" (6.4mm) on all sides and 1/2" (12.5mm) between pieces is necessary.
- 6) One plastic sheet.
- 7) Repeat setups (3) through (6) until the desired number of layers is reached (never more than six layers). Finish last layer with one polished plate.
- 8) One or two blotters. Blotters are used only on the top and bottom of the stack, between holding plates and the out polished plates.
- 9) Holding plate.

The stack is prepared as above and is then ready to be placed in the hot opening of the press for lamination. If fewer than six layers are used, see time, temperature, pressure recommendations below.

LAMINATING PROCEDURE:

Place the stack of laminations between the hot plates. Tighten release valve screw and pump up the press quickly, using the short lever. As soon as the press openings are closed, place the long pump lever over the short pump lever and continue pumping until the hand on the gauge indicates the desired load. The load should equal about 350 pounds per square inch (24.1 bar) of plastic sheet (this figure may vary according to the nature of the particular plastic sheet used).

The desired load as read on the press gauge can be figured like the following example:

Using 9" x 12" (22.8cm x 30.5cm) plastic sheet

9" x 12" (22.8cm x 30.5cm) = 108 sq. inch (695.4 sq. cm)

108 sq. inch x 350# psi (695.4 sq. cm x 24.1 bar) = 37,800# load (168Kn)

Initially it is always desirable to pump up a few hundred pounds over the computed load to compensate for immediate compression of blotters and plastic. Additional pumping to maintain correct pressure may be done for the first two minutes of heating time, but should not be done after that time. Allow the stack to remain under heat for a period of time roughly determined by multiplying 3 minutes by the number of layers in the stack. Thus, a six-layer stack should take about 18 minutes to heat.

For example: 6 layers x 3 minutes = 18 minutes heat

This time may vary according to the thickness and condition of the plastic sheet used. (See notes and suggestions).

Use the manual timer provided on the press for timing laminating cycles.

After the stack has heated sufficiently for lamination to take place, it is then transferred to the cold opening.

The two holding clamps are used to hold the stack of laminations firmly while it is being transferred from the hot to cold opening. Aside from the fact that they make it more convenient to hold the hot stack, the proper use of the clamps is essential because they permit the maintenance of proper pressure on the stack to prevent bubbles from forming during transfer.

Open the guard door and attach the holding clamps to the holding plates, gripping the stack at the center of each projecting side, near the columns. Only firm pressure on the holding clamps is needed, just enough to keep the stack from expanding while the transfer is made.

After the holding clamps are in place on the heated stack, close the guard door and open the press by loosening the release valve screw to relieve pressure. After the press is open, open the guard door and transfer the heated stack from the hot to the cold chamber, using the holding clamps as handles. While the press is open, place a fresh stack of laminations between the hot plates. Follow by bringing up pressure to the desired point and allow the new stack to remain under heat and pressure for a sufficient time for lamination to take place, the same as before.

While this second stack is heating, the first stack will be cooling. The holding clamps may now be removed from the stack cooling and made ready to clamp the second stack in the heating chamber. This procedure is continued using the thick stack for the next transfer, thereby producing a stack of laminations every six to eight minutes.

TRIMMING:

After lamination, cards or photographs are trimmed using an ordinary 10" or 12" (25 or 30cm) straight-edge photograph trimming board, leaving a border of approximately 1/8" (3.2cm) of clear plastic around the laminated piece.

If it is desired to round the corners of the finished laminations, this can be done by using a photograph corner rounder. Trimming boards and corner rounders can usually be purchased through photographic supply houses.

NOTES AND SUGGESTIONS:

The following notes and suggestions are given as a guide toward successful laminating. They are the result of past study and observations. Although they are based on the use of vinyl or acetate as a laminating medium, they should also be considered when using other plastic material. Often the best results come after a number of trial runs.

- 1) The **CARVER** Laminating Press is adjustable for use with any of the thermoplastic materials used for laminating. Figures given on the preceding pages for temperature, pressure and time are based on the use of regular plastic sheets, either .010" or .015" (.25 or .38mm) thick.

When using vinylite plastic .010" (.25mm) thick the thermostats should be set to maintain a temperature of approximately 320 F. (160°C). The recommended pressure for vinylite is 350lbs.per sq. inch (21.4 bar) of plastic sheet. Time required to process a stack of laminations containing six layers will be from 16 to 18 minutes heating time depending on thickness of the vinylite used.

Temperature and pressure requirements may vary slightly due to local atmospheric conditions, therefore, figures given are for average conditions. You may find that a slight variance in these figures may be needed to suit particular conditions and requirements.

- 2) The pressure may drop as much as several hundred pounds (newtons) below the desired load without harm. This is partly due to the softening of the plastic as it heats and compression of the blotters.
- 3) Always have the plastic material cut to the same size as the polished plates. Plastic sheets smaller than the polished plates tend to spoil the flatness of the plates as well as cause uneven pressures on the laminations. Having plastic and polished plates of the same size also affords easy registering of the layers in a stack of laminations.
- 4) Store your supply of plastic material in accordance with manufacturers recommendations. Preferably in a room or enclosure having a high relative humidity (approx. 50 or 60%). It is suggested that the thickness of the cards or photographs be kept to a minimum and that it never exceed 25% of the thickness of the plastic used for each layer that is, if two sheets of .015" (.38mm) plastic are used the card or photograph should not exceed .0075" (.19mm) in thickness.
- 5) If two laminations are done in the same layer, they should be of the same thickness.
- 6) Don't use too heavy a clamping pressure when transferring the stacks from the heating to the cooling chamber. Use just enough pressure to hold the stack together.
- 7) Use the same number of layers per stack each time. If fewer than six layers are used, the time factor should be reduced proportionately. The general rule is to allow approximately one more minute than the number of layers being processed.
- 8) If one layer of the stack contains a pair of wallet-sized cards it is not advisable to put a long, narrow card or photograph in adjacent layer. Due to the tremendous pressure involved there is the danger of splitting or wrinkly the long card or photograph.

- 9) If you find that a laminated layer has not welded together sufficiently to leave a clear edge for trimming, it is usually possible to put the layer back in the next stack of laminations and go through the same procedure again, with a slight increase in time in order to allow thorough lamination.
- 10) Remember that consistency and regularity in operation of this press will pay dividends in a minimum of spoilage and "retakes".
- 11) In laminating, the thermoplastic material used is brought to a semi-liquid condition while between the heating plates. After transfer to the cold opening of the press, it is most important that proper pressure be maintained during the cooling cycle, for it is in the cooling cycle that the plastic sets or changes from a semi-liquid to a solid state. The press is designed so that the cooling operation will be a little faster than the heating, therefore maintaining a continuous flow of production.
- 12) Always keep in mind that a stack of laminations will require the same pressure for cooling as is required for heating. You cannot cool a stack of laminations have 5" x 6" (12.7 x 15.3cm) sheets of plastic at the same time you are heating a stack of laminations have 3" x 4", 4" x 5" (7.6 x 10.2, 10.2 x 12.7cm) or smaller sheets of plastic. It will be readily seen that the two stacks will not have equal pressure per square inch applied to the plastic.
- 13) Many of the thermoplastic materials on the market may be used with the **CARVER** Laminating Press such as acetate, vinylite and certain acrylic materials. Pressures, temperatures and time for laminating the various materials will however, be different.

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.

5-1 **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, it may be due to any of the following reasons:

PROBLEM	POSSIBLE CAUSE	SOLUTION
Rapid drop in pressure	a) Low oil level due to leakage. b) Open release valve. c) Worn or dislodged internal packing. d) Dirty valve seat. e) Air entrapment.	a) Tighten hydraulic connections and refill 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. e) Purge air from system (see Air Bleed Procedure in Section 5).
No pressure when pumping	a) Open release valve. b) Worn packing in pump. c) Release valve ball missing. d) Release valve contaminated.	a) Close release valve. b) Replace or rebuild hydraulic unit pump. c) Replace ball. d) Remove and clean.
Slow drop in pressure	a) Open release valve b) Worn release valve seat. c) Worn ram seal	a) Close release valve. b) Contact factory for replacement. c) Replace ram seal.
Oil leakage in gauge coupling	a) Loose gauge fitting. b) Gauge not sealing.	a) Tighten gauge fitting. b) Add copper gauge seal (maximum of two)

NOTE: Refer to the exploded view drawing accompanying this manual for the location of seals, packing, and gaskets in the hydraulic unit.

5-2 **HYDRAULIC UNIT - AIR BLEED PROCEDURE**

An occasional cause of hydraulic system malfunction is air entrapment in the hydraulic circuit. To purge the system, open the release valve 1/2 turn or raise the cam release lever on 30 ton(267Kn) 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, <u>DO NOT</u> exceed the maximum ram travel. Refer to Section 3 to determine the arm travel of your press. Refer to the label on the front of the hydraulic unit.

5-3 ELECTRICAL

WARNING: Before performing any maintenance on the electrical system, turn "OFF" the main electrical disconnect on the press.

1. Check all electrical connections. Make sure they are tight. Loose connections cause overheating which will lead to component failures or short circuits.
2. Check all fuses or circuit breakers for open circuits and proper operation.

5-4 MOLD SIZE VERSUS TONNAGE CHART

Maximum tonnage allowed on different mold sizes before platen coining occurs.

MOLD SHAPE				MOLD AREA		MAXIMUM ALLOWABLE TONS	
SQUARE		ROUND				TONS	
IN.	CM	IN.	CM	IN. ²	CM ²	SHORT	METRIC
		3	7.62	7.07	45.62	4.25	3.86
3	7.62			9.00	58.07	5.50	4.99
		4	10.16	12.56	81.04	7.50	6.80
4	10.16			16.00	103.23	9.60	8.71
		5	12.70	19.64	126.72	11.75	10.66
5	12.70			25.00	161.30	15.00	13.61
		6	15.24	28.27	182.40	17.00	15.42
6	15.24			36.00	232.27	21.60	19.59
		7	17.78	38.48	248.27	23.00	20.87
7	17.78			49.00	316.15	29.40	26.67
		8	20.32	50.27	324.34	30.15	27.35
8	20.32			64.00	412.93	38.40	34.84
		9	22.86	63.62	410.48	38.17	34.63
9	22.86			81.00	522.61	48.60	44.09
		10	25.40	78.54	506.74	47.12	42.75
10	25.40			100.00	645.20	60.00	54.43
		11	27.94	95.03	613.13	57.02	51.73
11	27.94			121.00	780.69	72.60	65.86
		12	30.48	113.13	729.91	67.85	61.55
12	30.48			144.00	929.09	86.40	78.38

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 oils, 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
OtherAny brand name Hydraulic Jack Oil
with above specifications

Thank you for the opportunity to supply **CARVER** equipment for your requirements. If there are any questions regarding the operation of this press or other **CARVER** accessories, please contact us for assistance.

CARVER offers a wide range of accessory equipment to satisfy your specific application(s).

Swivel Bearing Plates	Test Cylinders	Heated Platens
Heating/Cooling Plates	Heated Test Cylinders	Filter Pads
KBr Buffer Plates	Tile Molds	Blotters
Polished Plates	Cage Equipment	Pressure Cells
Color Dispersion Molds	Pharmaceutical Die Fixtures	Low Range Gauges

(MOST ACCESSORIES AVAILABLE FROM STOCK)

Our applications Group can also be of assistance with custom instrumentation and special accessories for your application.

OTHER **CARVER** EQUIPMENT

Manual Pellet Presses	Laminating Presses
Laboratory Chillers	Custom Hydraulic Presses & Systems
Rubber Stamp Presses	AutoPellet Presses

CARVER, INC. PARTS DEPARTMENT
Call from 8:00 a.m. to 4:30 p.m., Eastern Standard Time
(219) 563-7577, Extension 237 or 254

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
(219) 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
(219) 563-7577, Extension 252 or 237

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.

8-2 RETURNED MATERIAL POLICY

CREDIT RETURNS

1. Prior to the return of any material, authorization must be given by **CARVER, INC.** A RMS 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.

SECTION NINE

WARRANTY

9-1 WARRANTY RETURNS

1. Prior to the return of any material, authorization must be given by **CARVER, INC.** An RMS 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 it was manufactured by **CARVER, INC.** Purchased components are covered under their specific warranty terms.

9-2

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.

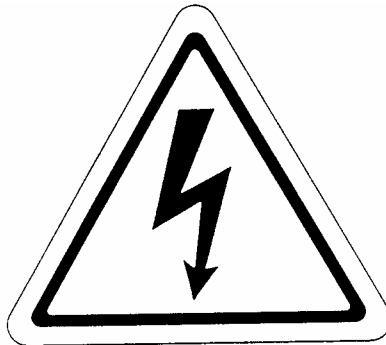
Replacement of defective material(s) will be FOB from the **CARVER, INC.** factory. Replacement of component parts not manufactured by **CARVER, INC.** will be limited to the warranty of the manufacturer of such parts.



HOT SURFACE



**HIGH VOLTAGE
INSIDE ENCLOSURE
ONLY**



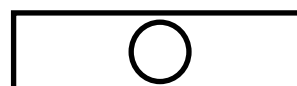
WARNING TAGS cont....

SHOCKING HAZARD



HIGH VOLTAGE

PUSHBUTTON TAGS



POWER ON

POWER OFF

IDENTIFICATION TAGS

○ TCU-1 ○

**TEMPERATURE CONTROL UNIT
NUMBER 1 FOR PLATEN 1**

○ TCU-2 ○

**TEMPERATURE CONTROL UNIT
NUMBER 2 FOR PLATEN 2**

○ TCU-3 ○

**TEMPERATURE CONTROL UNIT
NUMBER 3 FOR PLATEN 3**

○ TCU-4 ○

**TEMPERATURE CONTROL UNIT
NUMBER 4 FOR PLATEN 4**

○ PLTN-1 ○

PLATEN NUMBER 1

○ *PLTN-2* ○

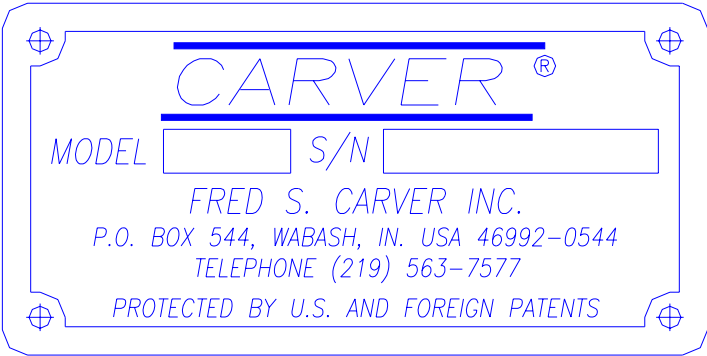
PLATEN NUMBER 2

○ *PLTN-3* ○

PLATEN NUMBER 3

○ *PLTN-4* ○

PLATEN NUMBER 4



PRESS IDENTIFICATION TAG

MODEL _____	SERIAL NO. _____
COMPRESSION FORCE _____	MFG. DATE _____
COMPRESSION CYLINDER _____	" DIAMETER _____
VOLTAGE _____	FULL LOAD AMPS _____
MOTOR H.P. _____	(____) PLATEN(S) _____ WATTS EA. _____
ELECTRICAL DWG. _____	
HYDRAULIC DWG. _____	
MANUFACTURED BY:	
<u>CARVER</u> ®	<i>CARVER, INC.</i>
1569 MORRIS STREET	
WABASH, INDIANA U.S.A. 46992-0544	
(219) 563-7577	
CARVER, INC. PART NO.: 973147A	

PRESS IDENTIFICATION TAG

<i>ELECTRICAL DATA</i>	
<input type="text"/> VOLTS	<input type="text"/> HZ
<input type="text"/> KW (HEAT)	<input type="text"/> PH
FULL LOAD AMPS	<input type="text"/>
<i>CARVER, INC.</i>	

ELECTRICAL INFORMATION TAG

<u>APPENDIX</u>	Hydraulic Unit Drawings - 12 ton, 25 ton
	Hydraulic Unit - Section View (Typical)
	Hydraulic Unit Drawing - 30 ton
	Gauge Union Coupling Assembly - Typical
	Hydraulic Cylinder - 30 ton
	Electrical Symbol Cross Reference
	Electrical Drawings
	Press Assembly Drawings

**Hi-Lo TWO SPEED PUMP - HAND OPERATED - MODEL EQCP14-150: with reservoir #321007
(Does not include #329161 Lever).**

**Pump valve Insertion Tool - #329061
1/4 Ball Seating Tool - #329063
7/16 Ball Seating Tool - #329064
Threaded Socket Tool - #329080
(for release valve removal)**

<u>ITEM #</u>	<u>PART NAME</u>	<u>STAR PART #</u>	<u>CARVER #</u>
2A	Large Piston	P5-2	329071
2B	Small Piston (incl.pin)	CP13-4RP	329072
*4A	Large Piston Packing	P5-4	329042
*4B	Small Piston Packing	CP13-5RP	329043
*6	Piston Wiper	P5-6	329044
10	Piston Pin (incl.rings)	CP14-10RP	329073
11	link Pin (incl.rings)	CP13-10RP	329065
*12	Pump Valve (complete)	P1-12RP	329045
*13	Overload Valve (complete)	CP13-13RP	329046
*14A	Release Plunger (complete)	CP13-17RP	329051
*14B	Release Valve (complete)	PAC-18Rp	329048
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)	CP13-25RP	329050
24	Release lever Pin (incl.rings)	CP13-10RP	329077
25	Cam Release Lever	CP13-14	329078

***CARVER #3789 REPR, KIT (WABASH #995.00157)**

MAINTENANCE

In servicing hydraulic units, cleanliness is of the utmost importance. A clean work place and proper tools are necessary to insure efficient and effective repair. Special tools can be furnished on request.

AIR BLEEDING

Air accumulation in a hydraulic system will cause erratic action. This may appear as pump failure to the inexperienced user. For this reason, it is advisable to air bleed each pump before attempting to operate. To remove air from the pump, open release valve with the pump in an upright position. Operate the pump slowly through the full piston stroke about a dozen times. Close the release valve. Pump should be ready for use.

TROUBLE	POSSIBLE CAUSE	CORRECTIVE REPAIR INSTRUCTIONS (Refer to pump Repair Section)
Pump will not hold pressure	1 - Release valve ball not seating properly Ball Valves not seating properly	Refer - "Release Valve"
	2 - Overload valve ball not seating properly	Refer - Pump Valve
	3 - Large pump relief valve seal faulty	Refer - Overload Valve
	4 - Lack of oil	Refer - Large Pump Relief Valve
Pump fails to supply pressure	1 - Air bound pump	Refer - Oil
	2 - Release valve ball not seating properly	Air Bleeding Section
	3 - Small ball in ball valve circuit not seating properly	Refer - Release Valve
	4 - Overload valve ball not seating properly	Refer - Pump Valve
	5 - Large pump relief valve seal faulty	Refer - Overload Valve
	6 - Air bound system	Refer - Relief Valve
Pump piston does not draw a full charge. (This is evident by a cushion effect at the top of the pump stroke.)	Lack of oil	Air Bleeding Section
Pump piston raises by itself under pressure	Large ball in ball valve circuit not seating properly	Refer - Oil
	Overload valve not set properly	Refer - Pump Valve
Pump functions properly but will generate only a given pressure below its normal pressure maximum	Large pump relief valve not set properly	Refer - Overload Valve
Pump fails to supply greater output at no load than under load		Refer - Relief Valve

OIL

If the pump fails to operate, check the oil level before attempting any repairs.

CAUTION: Use only Hydraulic Oil when refilling. **NEVER USE BRAKE FLUID**

PUMP PISTON

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

To replace packing:

- a) Remove piston actuating linkage.
- b) Remove piston. (See piston drawing.)
- c) Remove all packing. (See piston drawing.)
- d) Clean all parts and dry with compressed air.
- e) 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.)
- f) Open the release valve (to allow air to bleed from piston barrel back to reservoir) and insert the piston.
- g) Replace piston linkage.
- h) NOTE: With release valve open, stroke pump about a dozen times to bleed air completely from pump.

PUMP VALVES

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 (CP13-44), 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 (CP13-42) for the small ball and 7/16" ball seating tool (CP13-43) for the large ball. Remove balls to make sure they are not stuck to the seats. Reassemble pump valves as before.

RELEASE VALVE

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, reseal release ball by tapping it lightly on the ball seat, using the 3/8" ball seating tool (CP13-43). Clean plunger and inspect plunger packing. Replace if necessary. To reassemble, insert ball, ball spring, and release valve plug. Dip release plunger packing in hydraulic oil and carefully insert into plunger chamber. Replace release lever and lever pin.

OVERLOAD VALVE

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 (CP13-45). 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.

LARGE PISTON PUMP RELIEF VALVE

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 (CP13-41) for removing plunger. Clean and inspect valve hole. Inspect plunger packing and replace if necessary. To reassemble, dip plunger packing in 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.

NOTES: