

CARVER[®]

OPERATION, INSTALLATION AND MAINTENANCE MANUAL

AUTO SERIES NE AUTOMATIC HYDRAULIC PRESSES

AUTO "C", AUTO "M", AUTOFOUR/15, AUTOFOUR/30,
AUTOFOUR/1515, AUTOFOUR/3015

IMPORTANT:

PLEASE READ CAREFULLY BEFORE INSTALLING OR OPERATING THIS EQUIPMENT.



CARVER, INC.

1569 Morris Street, P.O. Box 544

Wabash, IN 46992-0544 USA

PH: 260-563-7577 FAX: 260-563-7625

<http://www.carverpress.com> Email: carverpress@corpemail.com

NOTE: Performance figures stated in this manual are based on a standard atmosphere of 59° F., 29.92” Hg at seal level and using 60 Hz 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.

All Rights Reserved

Part #: 1520.73

Revision A1

Effective 05/25/10

TABLE OF CONTENTS

SECTION ONE		INTRODUCTION.....	1-1
1.1	INTRODUCTION		1-1
1.2	ACCESSORIES		1-1
1.3	CUSTOMER SERVICE		1-1
SECTION TWO		SAFETY	2-1
2.1	SAFETY CONSIDERATIONS		2-1
2.2	PRINCIPAL FACTORS THAT CAN RESULT IN INJURY		2-1
2.3	GENERAL OPERATING SAFETY		2-1
2.4	SAFE GUARDING THE POINT-OF-OPERATION		2-2
2.5	SUPERVISION AND SAFETY ENFORCEMENT		2-2
2.6	INSPECTION AND MAINTENANCE		2-3
2.7	TRAINING		2-3
2.8	REPORTING A SAFETY DEFECT		2-4
SECTION THREE		INSTALLATION	3-1
3.1	AUTO “C” and AUTO “M” PRESS DESCRIPTION		3-1
3.2	AUTOFOUR PRESS DESCRIPTION		3-2
3.2.3	THIS PAGE INTENTIONALLY LEFT BLANK		3-3
3.3	INSTALLATION		3-4
3.4	SETTING UP		3-4
3.5	RAM FORCE CALCULATION		3-4
3.6	FILLING THE OIL RESERVOIR.....		3-4
3.7	GASES OR DUST REMOVAL		3-5
3.8	DAYLIGHT ADJUSTMENT.....		3-5
3.8.1	TO RAISE THE TOP (HEAD) BOLSTER:.....		3-5
3.8.2	TO LOWER THE TOP (HEAD) BOLSTER:.....		3-7
3.9	CONNECTING UTILITIES.....		3-8
3.9.1	ELECTRICAL CONNECTION		3-8
3.9.2	WATER AND AIR INLET CONNECTIONS (for presses with cooling option).....		3-8
3.9.3	COOLING OUTLET MANIFOLD CONNECTIONS (for presses with cooling option)		3-9
SECTION FOUR		CONTROL SYSTEM	4-10
4.1	CONTROL SYSTEM OVERVIEW		4-10
4.2	MAIN MENU		4-10
4.2.1	AUTOMATIC MODE.....		4-10
4.2.2	MANUAL MODE		4-12
4.2.3	RECIPE MAINTENACE		4-13
4.2.3.1	LOAD/SAVE/EDIT A RECIPE		4-13
4.2.3.2	LOAD RECIPE		4-14
4.2.3.3	SAVE RECIPE		4-14
4.2.3.4	EDIT A RECIPE		4-14
4.2.3.5	EDITING BASIC RECIPE PARAMETERS		4-15
4.2.3.6	EDITING SEGMENT PARAMETERS		4-17
4.2.4	SETUP		4-19
4.2.4.1	GENERAL SETUP		4-19
4.2.4.2	COUNTER		4-21
4.2.4.3	INPUTS		4-22
4.2.4.4	OUTPUTS		4-23
4.2.4.5	SECURITY SETUP		4-24
4.2.5	ALARM BANNERS.....		4-24
4.3	“SLOW DOWN” PROXIMITY SWITCH ADJUSTMENT.....		4-25
4.4	AUTO SERIES NE CONTROL SYSTEM PROGRAMMING MENU STRUCTURE		4-26

SECTION FIVE		OPERATION	5-1
5.1	OPERATOR SAFETY		5-1
5.2	AUTO MODE SEQUENCE OF OPERATION		5-1
5.3	MANUAL MODE SEQUENCE OF OPERATION		5-2
SECTION SIX		RECIPE RECORD	6-1
6.1	TEST RECIPES.....		6-1
6.2	RECIPE RECORD SHEETS.....		6-1
SECTION SEVEN		PREVENTATIVE MAINTENANCE	7-1
7.1	CARVER, INC. AUTO SERIES PRESS PREVENTATIVE MAINTENANCE CHECKLIST		7-1
7.2	TROUBLESHOOTING.....		7-2
SECTION EIGHT		HYDRAULIC OIL	8-1
8.1	RECOMMENDED HYDRAULIC OILS FOR CARVER PRESSES		8-1
SECTION NINE		ACCESSORY EQUIPMENT	9-1
SECTION TEN		CARVER, INC. PARTS AND SERVICE.....	10-1
10.1	TECHNICAL ASSISTANCE.....		10-1
10.2	RETURNED MATERIAL POLICY		10-1
SECTION ELEVEN		WARRANTY	11-1
11.1	WARRANTY RETURNS		11-1
11.2	WARRANTY		11-1

1.1 INTRODUCTION

We are pleased to supply a **CARVER** “Auto” Series Press for your facility. **CARVER** presses are used in many applications including research and development, specialized or low volume production 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 **CARVER** presses, including Heated Platens, Heating/Cooling or Channeled Platens, Test Cylinder Outfits, Swivel Bearing Plates, Pelletizing Dies and Cage Equipment. All original **CARVER** accessories ensure precise results for many applications, such as oil determination tests on food products, crushing analysis on cement core samples, molding of plastic quality control specimens, 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 at any time you have a question regarding installation, service, repair, custom equipment, or applications, please do not hesitate to call or write for the information required. Prices for press, accessories, or repair parts will be furnished promptly on request.

<p>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.</p>
--

2.1 SAFETY CONSIDERATIONS

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

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

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

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

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 Item 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

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

WARNING: 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.

SECTION THREE

INSTALLATION

3.1 AUTO “C” and AUTO “M” PRESS DESCRIPTION

TABLE 3-1

CATALOG #		3888	3889	4089	3890	3891	4091
MODEL		Auto “C”	Auto “C”	Auto “C”	Auto “M”	Auto “M”	Auto “M”
CLAMP FORCE	US TONS	15	15	15	25	25	25
	Kn	133.5	133.5	133.5	222.5	222.5	222.5
MAX. TEMP.	°F	N/A	650	650	N/A	650	650
	°C	N/A	343	343	N/A	343	343
PLATENS	IN.	6 x 6	6 x 6	6 x 6	9 x 9	9 x 9	9 x 9
	MM.	152 x 152	152 x 152	152 x 152	228 x 228	228 x 228	228 x 228
RAM STROKE	IN.	6	6	6	6	6	6
	MM.	152	152	152	152	152	152
DAYLIGHT (OPENING)	IN.	.75-17	0-14	2 @ 3	.75-16	0-13	2 @ 3
	MM.	19-431	0-355	2 @ 76	19-406	0-330	2 @ 76
FOOTPRINT W x D	IN.	37 x 22					
	MM.	940 x 559					
HEIGHT	IN.	43	49	49	46	52	52
	MM.	1093	1245	1245	1169	1321	1321
WEIGHT	lbs	331	375	421	505	621	700
	kg	151	170	191	229	282	318
NOISE LEVEL							
FULL LOAD CURRENT	115V	8	19	N/A	8	N/A	N/A
	230V	6	12	18	6	18	30
MAX. SYSTEM PRESSURE	PSI	5817	5817	5817	7073	7073	7073
	BAR	401	401	401	488	488	488

N/A = NOT APPLICABLE

3.2 AUTOFOUR PRESS DESCRIPTION

TABLE 3-2

CATALOG #		3892	3893	4093	3894	3895	4095	4530	4531	4532	4533
MODEL		AutoFour/15	AutoFour/15	AutoFour/15	AutoFour/30	AutoFour/30	AutoFour/30	AutoFour/15	AutoFour/15	AutoFour/30	AutoFour/30
CLAMP FORCE	US TONS	15	15	15	30	30	30	15	15	30	30
	Kn	133.5	133.5	133.5	267	267	267	133.5	133.5	267	267
MAX. TEMP.	°F	N/A	650	650	N/A	650	650	N/A	650	N/A	650
	°C	N/A	343	343	N/A	343	343	N/A	343	N/A	343
PLATENS or WORK AREA	IN.	12 x 12	15 x 15	15x15	15 x 15	15 x 15					
	MM.	305 x 305	381 x 381	381x381	381 x 381	381 x 381					
RAM STROKE	IN.	6	6	6	6	6	6	6	6	6	6
	MM.	152	152	152	152	152	152	152	152	152	152
DAYLIGHT (OPENING)	IN.	1-18.5	0-13.5	2 @ 3	1-17	0-12	0-12		3-12		
	MM.	25.4-470	0-342	2 @ 76	25.4 - 431	0-304	0-304		76-304		
FOOTPRINT W x D	IN.	45 x 22									
	MM.	1131 x 559									
HEIGHT	IN.	45	45-56	45-56	45	45-56	45-56	45	53	46	46
	MM.	1143	1143-1422	1143-1422	1143	1143-1422	1143-1422	1143	1346	1168	1168
WEIGHT	lbs	845	1050	1300	845	1050	1300	1166	1463	1166	1463
	kg	384	477	590	384	509	590	529	644	529	664
NOISE LEVEL											
FULL LOAD CURRENT	115V	6	N/A	N/A	6	N/A	N/A	8	N/A	8	N/A
	230V	3	26	48	3	48	26	6	32	6	32
MAX. SYSTEM PRESSURE	PSI	5817	5817	5817	8488	8488	8488	5817	5817	8488	8488
	BAR	401	401	401	586	586	586	401	401	586	586

N/A = NOT APPLICABLE

3.2.3 THIS PAGE INTENTIONALLY LEFT BLANK

- Clean up any spilled oil.

IMPORTANT: Tighten filler plug 1/2 to 1 turn after o-ring contacts sealing surface. Over-tightening or under-tightening can cause pump damage.

IMPORTANT: Brake fluid and similar products will damage your unit and **VOID THE WARRANTY**. Verify oil level before turning hydraulic system on.

WARNING: Before replenishing the oil level, make certain that the cylinder is fully retracted to prevent overfilling the reservoir. Overfilling may cause personal injury due to excessive reservoir pressure (the reservoir is a bladder) created when the cylinder is retracted.

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

3.7 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. Air flow will then be drawn up, around the material, and out through the top of the press.

IMPORTANT: Excessive airflow will affect platen temperature uniformity and heat up rate.

3.8 DAYLIGHT ADJUSTMENT

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

3.8.1 TO RAISE THE TOP (HEAD) BOLSTER:

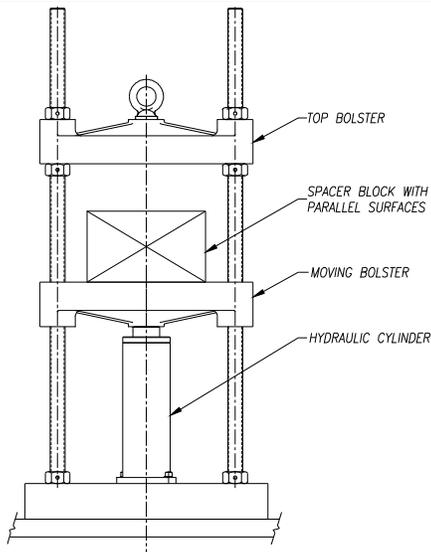


Figure 3-1

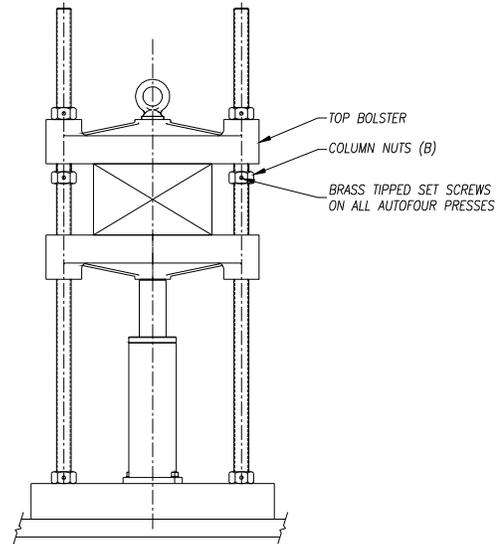


Figure 3-2

- 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 and small enough to remove after daylight has been set), jog the hydraulic unit to build force to the maximum capacity of the press. (FIG 3-1)
- With the press at maximum applied force, loosen the column nuts (B) located directly below the top bolster (FIG 3-2). On Auto Four presses, a brass tipped set screw must be loosened on each nut before nuts are loosened.

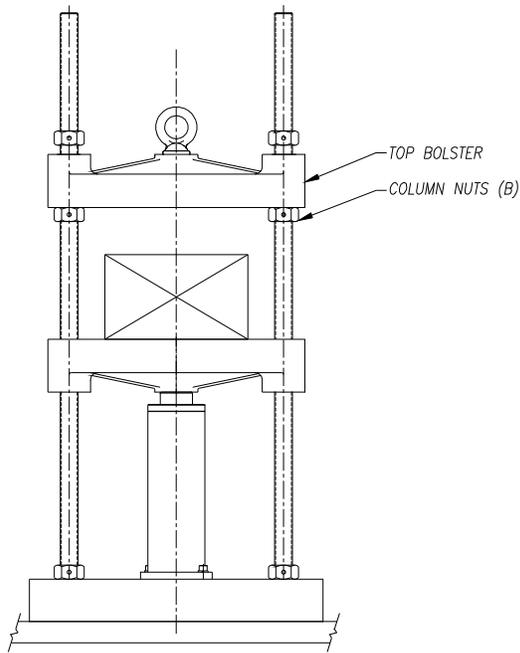


Figure 3-3

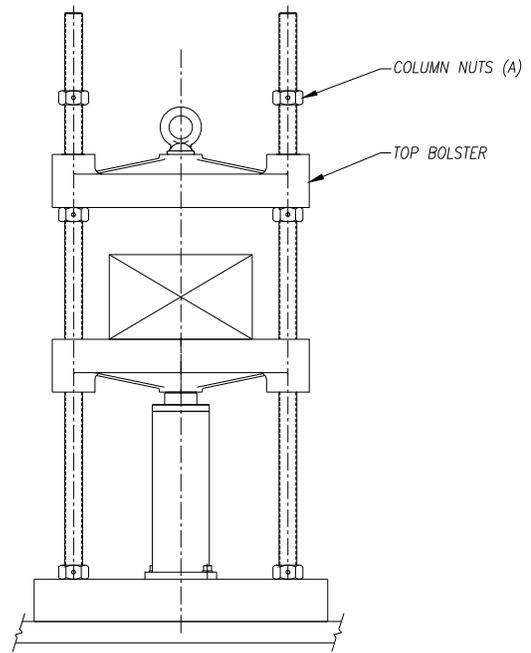


Figure 3-4

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

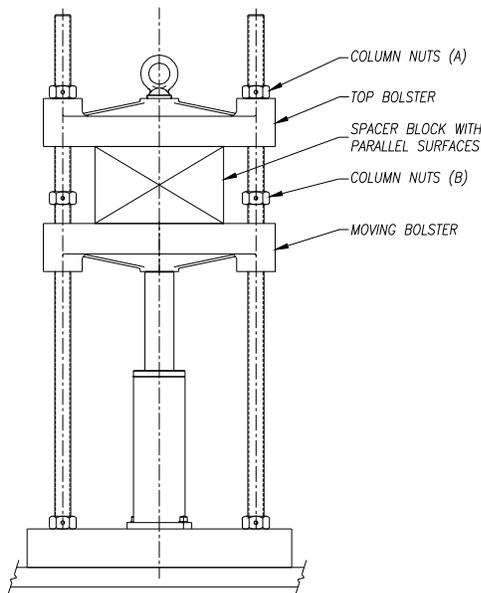


Figure 3-5

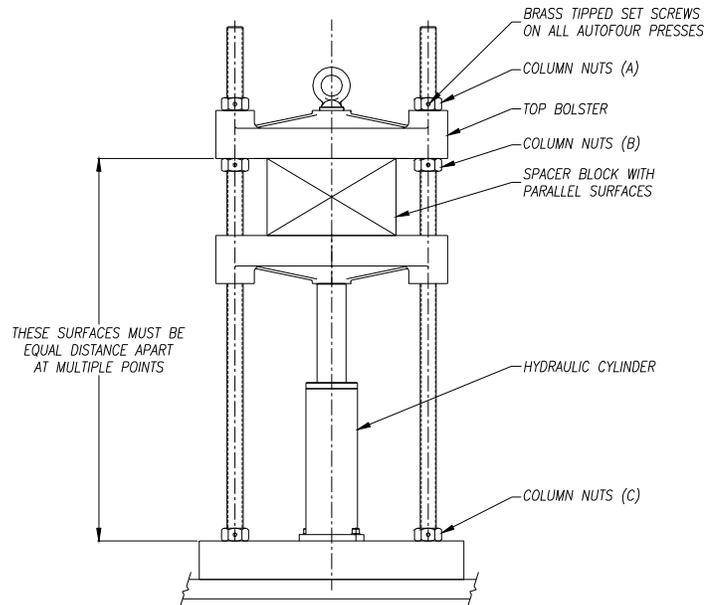


Figure 3-6

5. Insert the spacer block on the moving bolster and raise the top bolster against the upper column nuts (A) (FIG 3-5) and tighten the lower column nuts (B) (Fig 3-6) 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 Auto Four presses) as far apart as possible (FIG 3-6). 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. Jog 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 an AutoFour). Open press and remove spacer, the press is now ready to operate.

3.8.2 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 spacer) (FIG 3-1), jog 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 (B) located directly below the top bolster. Move these column nuts (B) to the position required creating the desired daylight. On AutoFour 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 3-3).
4. Tighten the upper column nuts (A) finger tight against the top surface of the top bolster.
5. Follow steps 6 through 10 as described above.

IMPORTANT: AutoFour models utilize a setscrew in the column nuts. These must be loosened prior to adjusting daylight, and retightened after adjusting daylight. (Reference FIG. 3.2 and 3.6)

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 the maximum stroke of the hydraulic cylinder is not exceeded. Maximum cylinder stroke for Auto "C", Auto "M", and AutoFour is six inches (6").

WARNING: Spacer block must be centered on moving bolster (or platen). Assure that the spacer is strong enough to withstand the maximum applied force of the press and that its area is great enough to prevent "coining" the bolster (or platen) surface.

3.9 CONNECTING UTILITIES

3.9.1 ELECTRICAL CONNECTION

Most **CARVER** Auto Series NE presses are supplied with a power cord and plug. A properly sized electrical outlet will be required to operate the unit. **Verify that your outlet is rated for the full load rating of the press.** Presses with Full Load Amperage exceeding 50A are not supplied with power cords and plugs; they must be hard wired. Please refer to the electrical drawing provided with this manual.

The Voltage, Phase, and Current draw information is 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%.

Install a fused disconnect with a lockout feature in the power main leading to the press. Connect main power to the press through the disconnect.

The power drop must include a ground wire.

WARNING: Connection should only be made by a qualified electrician.

3.9.2 WATER AND AIR INLET CONNECTIONS (for presses with cooling option)

Connect a water supply line to the 3/8" NPT port labeled "Water Inlet" or "WTR◀". Refer to the appropriate assembly drawing for the location of this port.

Connect a clean, dry, regulated compressed air source to the 1/8" NPT port labeled "Air Inlet" or "AIR◀". Refer to the appropriate assembly drawing for the size and location of this port.

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.

IMPORTANT: A ball valve is located in each platen cooling line to balance the flow of cooling medium to each platen, allowing the platen temperature to drop evenly. If an uneven cooling rate between platens is consistently experienced, it should be corrected by slightly adjusting the ball valves.

IMPORTANT: Verify that the water pressure is greater than the air pressure or the water will not enter the platen cooling channels. The air regulator setting must be less than the water pressure.

Water Treatment Considerations

Water treatment is an integral part of the system. In some locations, water may cause large deposits of scale, erosion, algae, and/or corrosion. A system using a good quality scale and corrosion inhibitor is recommended.

The use of poor quality water may result in inefficient operation, heat exchanger damage, and pump seal damage. Consult a qualified water treatment specialist to determine whether treatment is needed.

Carver, Inc. does not recommend the use of deionized water for cooling due to possible corrosion in the system.

3.9.3 COOLING OUTLET MANIFOLD CONNECTIONS (for presses with cooling option)

The outlet manifold must be connected to a drain and vented for steam with steel pipe. Refer to appropriate assembly drawing for size and location of this NPT port.

IMPORTANT: Do not vent steam line with copper or plastic. Use only steel pipe and install to standard steam specifications. The outlet manifold must be plumbed downward 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. A manual shutoff valve in each line will aid in future maintenance procedures.

IMPORTANT: A ball valve located in each platen cooling line is preset by **CARVER, INC.** to balance the flow of cooling medium to each platen, allowing the platen temperature to drop evenly.

If an uneven cooling rate between platens is consistently experienced, it should be corrected by slightly adjusting the ball valves.

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° and 350°F (315° and 177°C).

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

4.1 CONTROL SYSTEM OVERVIEW

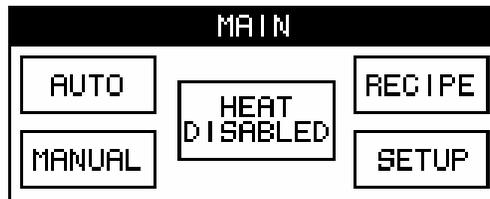
The “AUTO” Series NE presses are designed to automatically operate a pre-programmed recipe after the cycle is manually initiated. The system is capable of storing ten recipes plus a working recipe; has the ability to program up to (20) segments in each recipe. The press is controlled through the use of a Human Machine Interface (HMI).

When heated platens are provided, the PLC provides P.I.D. temperature control for each platen. The setpoint for each platen may be entered in each segment of the recipe, and when in automatic mode the temperature setpoint for each segment is used sequentially.

If the heated platens are provided with the cooling option, the control system will initiate cooling as required by the segment temperature setpoint.

4.2 MAIN MENU

SCREEN 4-1



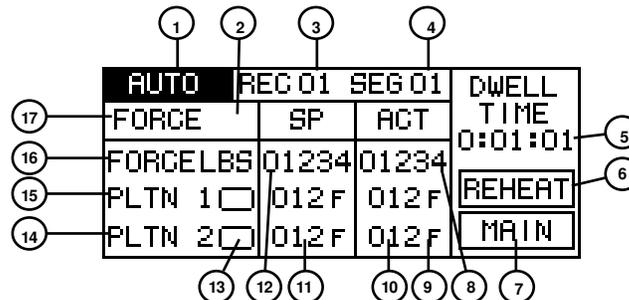
Active buttons functions on this screen:

- | | |
|--|---|
| AUTO - | Goes to the Automatic screen (Screen 4-2) |
| MANUAL - | Goes to the Manual screen (Screen 4-3) |
| RECIPE - | Goes to the Recipe Maintenance screen (Screen 4-4) |
| SETUP - | Goes to the Setup screen (Screen 4-22) |
| HEAT ENABLE/DISABLE -
(heated presses only) | This button when touched turns the platen heat "ON" (HEAT ENABLED) or "OFF" (HEAT DISABLED) |

4.2.1 AUTOMATIC MODE

Select the AUTO mode screen on the HMI from the Main Menu screen.

SCREEN 4-2



Functions that are available on the Auto screen are as follows:

1. This indicates that the screen displayed is the AUTO Mode screen. If this area of the screen is touched the mode of Operation will change from AUTO to MANUAL.
2. This area indicates whether cooling is active or not. If cooling is not required the area will be blank. If cooling is required (air and/or water) by the current segment parameters the symbol  will appear. Cooling must be enabled on the GENERAL SETUP COOLING/ BUMP ENABLE screen (4-5.2) for this to apply. Cooling stops when the actual temperature values are less than setpoint plus the temperature deadband value. If air purging is active, on the Auto screen (4-2) the Cooling indicator  will flash.

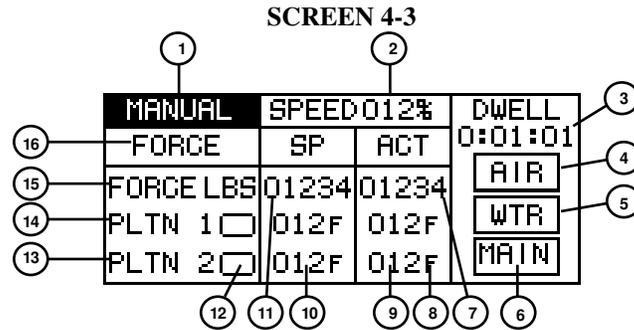
3. This indicates the recipe that is currently selected.
4. This indicates the segment that is currently being run if a cycle is active or 01 if a cycle is not active.
5. This indicates the current segment Dwell Time that remains. When the start condition for the segment (force or temperature) is achieved, this value will start at the programmed value of each segment and run in a count-down fashion.
6. Touching this area of the screen will either turn reheat on or off. This happens each time the button is pressed. The symbol  indicates the reheat function is OFF. The symbol  indicates the reheat function is ON. With the reheat function ON the platens will be heated to the first segment setpoint before the automatic cycle is started. With the reheat function OFF the platens will remain at the temperature until the automatic cycle is started. Heating must be enabled on the MAIN screen for any heating to take place.
7. Touching this area of the screen displays the MAIN MENU screen and will abort any active cycle.

IMPORTANT: Touching this  area of the screen will abort any active cycle.

8. This value displays the actual force the press is applying to the working area between the platens. The value is displayed in the currently selected unit of measure. The unit of measure can be changed by following #16. A value in reverse video (i.e. ) indicates that the value is within the dead-band limits.
9. This displays the currently selected temperature unit of measure. If the symbol **F** or **C** is touched the unit of measure can be changed from Fahrenheit to Celsius and vice versa. Touching any of the temperature unit of measure indicators will perform this function.
10. These values are the actual temperature displays for the platens. The values will be displayed in the currently selected temperature unit of measure. To change the units of measure follow #9. A value in reverse video (i.e. ) indicates that the temperature value is within the dead-band limits.
11. These are the temperature setpoint displays for the current segment for the platens. These values will change as the recipe progresses through the segments if the setpoints change.
12. This is the force setpoint display for the current segment. This value will change as the recipe progresses through the segments if the setpoint changes.
13. These areas indicate whether heat is being applied to the corresponding platen or not. The symbol  indicates that the heat relay is OFF and heat is not being applied to that particular platen. The symbol  indicates that the heat relay is ON and heat is being applied to that particular platen. Heating must be enabled on the MAIN MENU screen for any heating to take place.
14. This line indicates the status of Platen 2. Heat relay state, setpoint and actual temperature are displayed in the three columns.
15. This line indicates the status of Platen 1. Heat relay state, setpoint and actual temperature are displayed in the three columns.
16. This line indicates the status of the force being applied to the working area between the platens. Unit of measure, setpoint and actual force are displayed in the three columns. The unit of measure can be changed by touching the word **FORCE** repeatedly. Every time this area of the screen is touched the unit of measure will change in the following rotation: **LBS – TON – KGS – m e T** The abbreviations represent pounds, tons, kilograms and tonnes respectively.
17. The start condition of the current segment is indicated by the word displayed in this location. The word **FORCE** indicates dwell time will start counting down when the force setpoint for the current segment is achieved. The word **TEMP** indicates dwell time will start counting down when the temperature setpoints for all the platens for the current segment are achieved.

4.2.2 MANUAL MODE

Select the Manual mode screen on the HMI from the Main Menu screen.



Functions that are available on the Manual screen are as follows:

1. This indicates that the screen displayed is the MANUAL Mode screen. If this area of the screen is touched the mode of Operation will change from MANUAL to AUTO.
2. This indicates the current press closing speed. This is the speed that the press closes at until the slow down proximity switch is activated. This value can be changed by touching the number and entering the desired speed.
3. This indicates how long the press has been within either the force or temperature parameter. The Dwell Time will start counting up when the selected start condition (force or temperature) is achieved. To select the start condition see #16. The setpoints for these conditions can be changed by following #10 for temperature or #11 for force. This timer runs in a count-up fashion.
4. Touching this area of the screen will either turn the air cooling solenoid valve on or off. This happens each time the button is pressed. The symbol AIR indicates the air cooling function is OFF. The symbol AIR indicates the air cooling function is ON. Cooling must be enabled on the GENERAL SETUP screen for any cooling to take place.
5. Touching this area of the screen will either turn the water cooling solenoid valve on or off. This happens each time the button is pressed. The symbol WTR indicates the water cooling function is OFF. The symbol WTR indicates the water cooling function is ON. Any time the water cooling solenoid valve is turned ON, when it turns OFF the air cooling solenoid valve will turn ON for the programmed air purge time. If purging is active, on the Manual screen the AIR indicator will flash. Cooling must be enabled on the GENERAL SETUP screen (4-25) for any cooling to take place.
6. Touching this area of the screen displays the MAIN MENU screen and will abort any active cycle.

IMPORTANT: Touching this MAIN area of the screen will abort any active cycle.

7. This value displays the actual force the press is applying to the working area between the platens. The value is displayed in the currently selected unit of measure. The unit of measure can be changed by following #16. A value in reverse video (i.e. 01234) indicates that the force value is within the dead-band limits.
8. This displays the currently selected temperature unit of measure. If the symbol **F** or **C** is touched the unit of measure can be changed from Fahrenheit to Celsius and vice versa. Touching any of the temperature unit of measure indicators will perform this function.
9. These values are the actual temperature displays for the platens. The values will be displayed in the currently selected temperature unit of measure. To change the units of measure follow #8. A value in reverse video (i.e. 01234) indicates that the temperature value is within the dead-band limits.
10. These are the temperature setpoint entry cells for the platens. The values are changed by pressing the number for the corresponding platen temperature to be changed. The value should be entered in the currently selected temperature unit of measure. To change the units of measure follow #8.

11. This is the force setpoint entry cell. The value is changed by touching the number. The value should be entered in the currently selected force unit of measure. If the desired setpoint contains a decimal point (i.e. tons and tonnes), it has to be entered in the data entry screen that is displayed. To change the units of measure follow #15.
12. These areas indicate whether heat is being applied to the corresponding platen or not. The symbol indicates that the heat relay is OFF and heat is not being applied to that particular platen. The symbol indicates that the heat relay is ON and heat is being applied to that particular platen. Heating must be enabled on the MAIN screen for any heating to take place.
13. This line indicates the status of Platen 2. Heat relay state, setpoint and actual temperature are displayed in the three columns.
14. This line indicates the status of Platen 1. Heat relay state, setpoint and actual temperature are displayed in the three columns.
15. This line indicates the status of the force being applied to the working area between the platens. Unit of measure, setpoint and actual force are displayed in the three columns. The unit of measure can be changed by touching the word **FORCE** repeatedly. Every time this area of the screen is touched the unit of measure will change in the following rotation: **LBS – TON – KGS – m e T**. The abbreviations represent pounds, tons, kilograms and tonnes respectively.
16. The start condition for the Dwell Time is indicated by the word displayed in this location. The word **FORCE** indicates dwell time will start counting up when the force setpoint is achieved. The word **TEMP** indicates dwell time will start counting up when the temperature setpoints for all the platens are achieved.

4.2.3 RECIPE MAINTENANCE

Select the Recipe screen on the HMI from the Main Menu screen.

4.2.3.1 LOAD/SAVE/EDIT A RECIPE

Automatic mode uses recipes to control the press force and platen temperatures. Recipes consist of basic recipe parameters that apply to all the segments in a recipe and segment parameters that only apply to that particular segment and thus can change from segment to segment as the recipe progresses. Recipes are loaded, saved and/or edited by following the procedures detailed below:

From the MAIN MENU touch the button, if the Recipe Editing function is locked a password is required to bring up the Recipe Maintenance screen. The default password is "0".

SCREEN 4-4

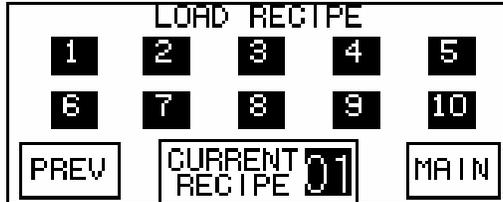


The three options on this screen are for loading, saving and editing a recipe. All three selections require a security password to be entered if recipe editing is not unlocked. Loading and saving are discussed in section 4.2.3.2 and 4.2.3.3.

4.2.3.2 LOAD RECIPE

Touch the  button and the following screen will appear.

SCREEN 4-5



Recipes are loaded (recalled) by touching the number of the desired recipe and waiting for the Current Recipe number located at the bottom of the screen to change to the selected recipe. If the number of the current recipe and the desired recipe are the same a pause of 2-3 seconds should be a sufficient wait period. After the number has changed to the correct recipe, return to the MAIN MENU to perform other function (i.e. enter Auto Mode) or touch the  button to return to the Recipe Maintenance screen to edit the selected recipe.

4.2.3.3 SAVE RECIPE

Touch the  button and the following screen will appear.

SCREEN 4-6



Recipes are saved (stored to memory) by touching the number of the recipe to be saved and waiting for the word , located at the bottom of the screen to stop flashing. After  has stopped flashing, return to the MAIN MENU to perform other function (i.e. enter Auto Mode) or touch the  button to return to the Recipe Maintenance screen to edit the selected recipe.

NOTE: If changes are made to a recipe the changes are not automatically saved. The above procedure should be performed if changes have been made and need to be stored for later use.

4.2.3.4 EDIT A RECIPE

Touch the  button and the following screen will appear.

SCREEN 4-7



From this screen select to edit the basic recipe parameters or the segment parameters.

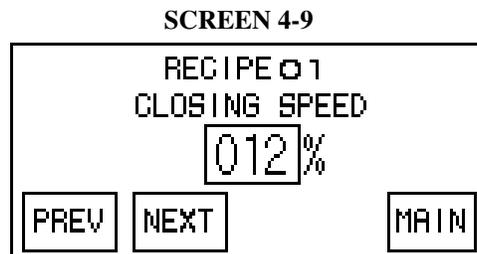
4.2.3.5 EDITING BASIC RECIPE PARAMETERS

Touch the  button to edit the basic recipe parameters. The screen to enter the number of segments the recipe should contain will appear as shown below.

Touch the  button and enter the desired number of segments for the recipe.



After the number is entered touch the  button to proceed to the press closing speed screen as shown.

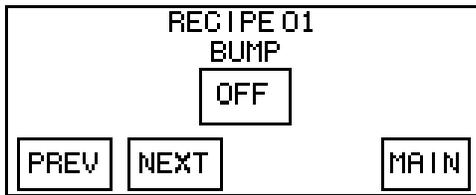


Touch the  button to enter the desired press closing speed. This is the speed the press will close at until the slow down proximity switch is activated. The button will contain the previously entered value when this screen is first displayed.

After the number is entered touch the  button to proceed to the bump enable screen if bumping is enabled in the general setup screen. If bumping is disabled in the general setup screen then the  button will return to the edit parameters screen.

The bump enable screen is shown below and allows bumping to be turned ON or OFF for the entire recipe. If bumping is OFF, no bump setup screens will appear during basic recipe parameter setup or segment parameter setup.

SCREEN 4-10



SCREEN 4-11

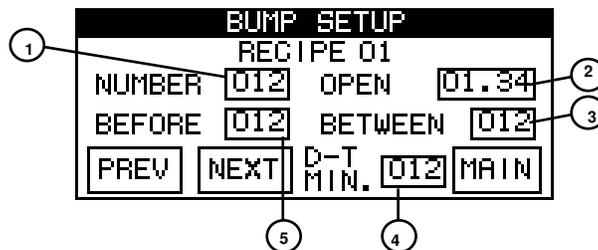


Touch the button to turn recipe bumping ON or if it is already enabled press the button to turn bumping OFF.

Touch the button to proceed to the bump setup screen if bumping was enabled in the last step or return to the edit parameters screen if bumping was disabled.

If bumping is enabled for the recipe the bump setup screen will appear and is shown below.

SCREEN 4-12



This screen shows the bumping parameters that will be used any time a bump is programmed into a segment. Parameters that can be entered on this screen are discussed below:

1. Touch this button to change the number of bumps that will be performed any time a bump is enabled in a segment.
2. Touch this button to change the bump open time. This is the amount of time that the press will open for before it starts to close again. This value allows time to be entered in seconds with 2 decimal place accuracy.
3. Touch this button to change the time between successive bumps.
4. This represents the minimum dwell time value that results from the bump settings that are currently entered. It is a calculated number that includes the total number of bumps and the timing before and between those bumps. If a dwell time value less than this value is entered in a segment that has a bump sequence enable, the press will not complete the automatic cycle properly.
5. Touch this button to change the time before the first bump of the sequence.

4.2.3.6 EDITING SEGMENT PARAMETERS

Touch the  button to edit the segment parameter and the screen to select the number of segment within the recipe that needs to be edited.

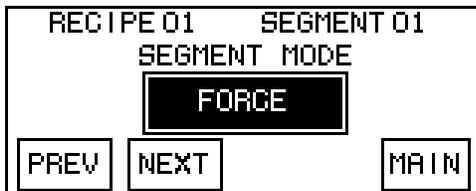
SCREEN 4-13



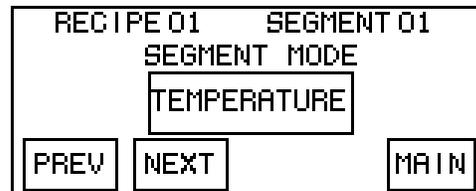
Touch the  button and enter the desired number for the segment to be edited. After the segment number is entered touch the  button to start the editing process. If all the segments need to be reviewed, edited or created for the first time just touch the  button without changing the segment number.

The first segment parameter screen allows the selection of the segment mode. Segments can operate based on either Force or Temperature. Force-based segments use the Force setpoint as the start condition for the Dwell Timer. Temperature-based segments use the temperature setpoints as the start condition for the Dwell Timer. The screens are shown below; touching the **FORCE** or **TEMP** button will change the mode to the alternate option.

SCREEN 4-14



SCREEN 4-15



After the mode has been selected as desired touch the  button to proceed to the screen to enter the force and change the display units.

SCREEN 4-16

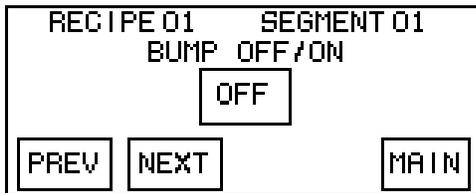


Touch the  button to enter the desired force setpoint for the current segment which is shown at the top of the screen. The display unit can be changed by touching the word **FORCE** repeatedly. Every time this area of the screen is touched the unit of measure will change in the following rotation: **LBS - TON - KGS - MET**. The abbreviations represent pounds, tons, kilograms and tonnes respectively.

After the force setpoint has been changed or if no change is necessary touch the  button to proceed to the next screen and select whether bumping in the segment is needed. If bumping is disabled in the general setup screen or turned OFF for the recipe then the  button will display the Dwell Time entry screen.

The bump enable screen is shown below and allows bumping to be turned ON or OFF for the current segment. If bumping is OFF, no bump setup screens will appear during basic recipe parameter setup or segment parameter setup.

SCREEN 4-17



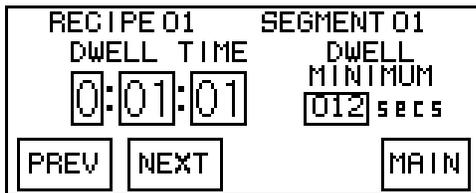
SCREEN 4-18



Touch the **OFF** button to turn segment bumping ON or if it is already enabled press the **ON** button to turn bumping OFF.

Touch the **NEXT** button to proceed to Dwell Time entry screen. If bumping was enabled in the last step, the screen on the left will appear. If bumping is disabled as detailed above, the screen on the right will appear.

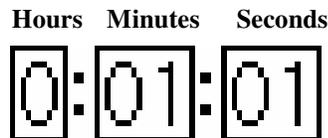
SCREEN 4-19



SCREEN 4-20



The dwell time is entered by touching the appropriate time value box. The boxes represent the following time values:

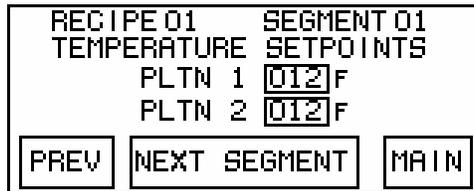


Touch the Hours number if the segment dwell time needs a value for hours and repeat this process for the Minutes and Seconds values. For example, a Dwell Time of 1 hour, 20 minutes and 45 seconds would be entered as a 1 in the hours box, a 20 in the minutes box and a 45 in the seconds box. Dwell Times expressed only in seconds will need to be converted to an H:MM:SS format for entry in this screen. For example, a Dwell time of 450 seconds would be entered as 7 minutes and 30 seconds.

If bumping is enabled, the Dwell Time entry screen will show a value for the minimum Dwell Time that can be entered to assure the bumping sequence completes fully before the Dwell Timer expires. When this screen is initially displayed the minimum Dwell Time will automatically be entered into the Dwell Timer values.

Touch the **NEXT** button to proceed to the Temperature Setpoint entry screen shown below:

SCREEN 4-21



Touch the **[012]** button next to the Platen Temperature that needs to be changed and enter the desired value.

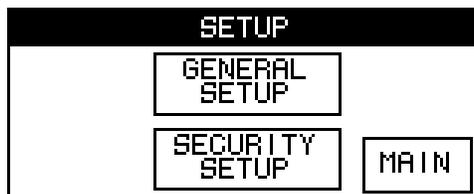
When the temperature values have been entered touch the **NEXT SEGMENT** button to return to the screen that allows the user to select the segment to be edited. The number in the box will be incremented to the next sequential number to allow for faster segment editing.

At any point in the process of editing segment parameter data the user can stop following the editing sequence and return to the main screen. The data that has been entered up to that point has been saved in the “working recipe” and can be used in the Automatic Cycle. For example, if a recipe has 20 segments and only segment 2 needs to be modified, view and edit only segment 2. This should speed up the editing process and reduce the chance for errors in recipes.

4.2.4 SETUP

Select the Setup screen on the HMI from the Main Menu screen.

SCREEN 4-22

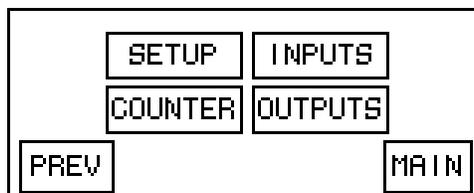


4.2.4.1 GENERAL SETUP

Select the General Setup screen on the HMI from the Setup screen.

Touch the **GENERAL SETUP** button to enter the General Setup screens. The first of which is displayed below:

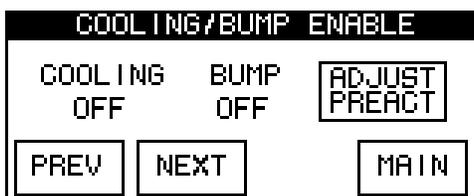
SCREEN 4-23



This screen shows options for entering setup, counter, inputs and outputs.

Touch the **SETUP** button to display the first Setup screen as shown below:

SCREEN 4-24

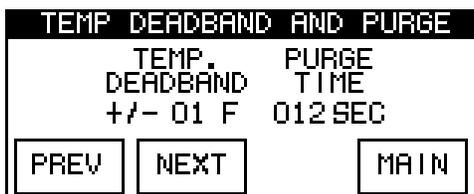


This screen allows the user to turn cooling and bump on or off for the press. This will disable the desired function totally and any screen that has a reference to the disabled function will not have that functionality. The functions are enabled or disabled by pressing the word OFF or ON located below the function name.

The **ADJUST PREACT** button allows the user with the entry of the appropriate password to adjust important pump control parameters. This is a function that should only be performed with the assistance of the Carver, Inc. Service Department.

Touch the **NEXT** button to proceed to the next general setup screen, shown below:

SCREEN 4-25



This screen allows the user to change the temperature dead band and the cooling purge time.

The Temperature Dead band controls how close the actual platens temperatures have to be with respect to the setpoint temperatures to satisfy the start condition for temperature-based segments. If a heating segment (temperature setpoint increases from one segment to the next) is initiated, the actual temperatures have to reach the setpoint temperatures and before the start condition will be satisfied. If a cooling segment (temperature setpoint decreases from one segment to the next) is initiated, the actual temperatures must be within the number of degrees shown by this number of the setpoint to satisfy the start condition of a temperature-based segment. If the symbol **F** or **C** is touched the unit of measure can be changed from Fahrenheit to Celsius and vice versa.

The Purge Time value indicates the amount of time that the press will energize the AIR valve solenoid after water has been requested for a cooling segment. The air is used to purge the water from the platen cooling passages before heat is applied to the platens again. If this value is changed from the factory set value the heating uniformity characteristics of the platen package will be compromised. Consult the Carver, Inc. Service Department for more information.

If purging is active, on the Manual screen (Screen 4-3) the AIR indicator will flash and on the Auto screen (Screen 4-2) the Cooling indicator **C** will flash.

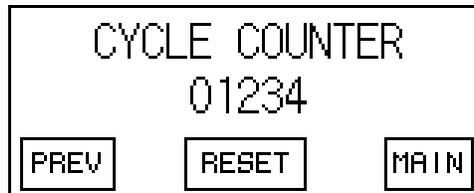
CAUTION: **CARVER, INC.** recommends a minimum of 45 seconds Air Purge. This is to purge any residual water from the platen cooling cores. Failure to do so can result in slower platen heat up time and will turn residual water to steam if the temperature setpoint is high enough.

Touch the **MAIN** button to return to the Main Menu screen.

4.2.4.2 COUNTER

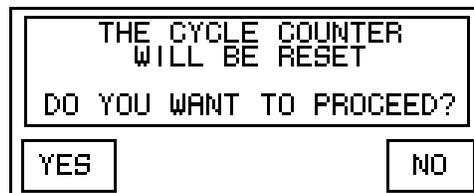
Touch the button on the General Setup Screen (Screen 4-23) to display Automatic Cycle Counter screen, shown below:

SCREEN 4-26



This screen displays the number of automatic cycles that have been completed on the press since the last time the counter was reset. If the user needs to reset this counter touch the button and the counter reset verification screen will appear.

SCREEN 4-27

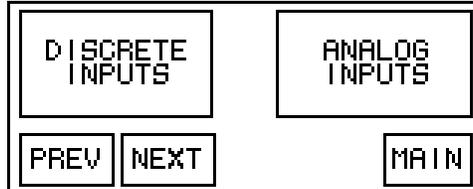


Touch the button and the Cycle Counter screen will be displayed with the counter value set to zero. Touch the button and the Cycle Counter screen will be displayed with the counter value unchanged. Touch the MAIN button to return to the Main Menu screen.

4.2.4.3 INPUTS

Touch the **INPUTS** button on the General Setup Menu to access screens that display the status of the discrete and analog inputs that are used on the press. The Inputs Menu screen is shown below.

SCREEN 4-28



Touch the **DISCRETE INPUTS** button to display the screen that shows the first four discrete inputs (shown below on the left), whether they are ON or OFF and a description of the function of that input. Touch the **NEXT** button to display the next four discrete inputs (shown below on the right).

SCREEN 4-29



SCREEN 4-30



Touch the **MAIN** button to return to the Main Menu screen.

Touch the **ANALOG INPUTS** button to display the screen that shows the first four Analog inputs (shown below on the left), whether they are ON or OFF and a description of the function of that input. Touch the **NEXT** button to display the next four analog inputs (shown below on the right).

SCREEN 4-31



SCREEN 4-32



Touch the **MAIN** button to return to the Main Menu screen.

4.2.4.4 OUTPUTS

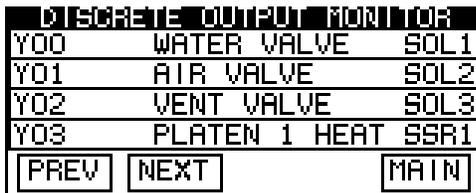
Touch the **OUTPUTS** button on the General Setup Menu and the user can access screens that display the status of the discrete and analog outputs that are used on the press. The Outputs Menu screen is shown below.

SCREEN 4-33



Touch the **DISCRETE OUTPUTS** button to display the screen that shows the first four discrete outputs (shown below on the left), whether they are ON or OFF and a description of the function of that output. Touch the **NEXT** button to display the next four discrete outputs (shown below on the right).

SCREEN 4-34



SCREEN 4-35



Touch the **MAIN** button to return to the Main Menu screen.

Touch the **ANALOG OUTPUTS** button on the Outputs Screen to display the screen that shows the first four analog outputs (shown below on the left), whether they are ON or OFF and a description of the function of that output.

SCREEN 4-36



4.2.4.5 SECURITY SETUP

Touch the  button on the Setup Menu; enter the default password "1" to bring up the Security Setup screen shown below:

SCREEN 4-37



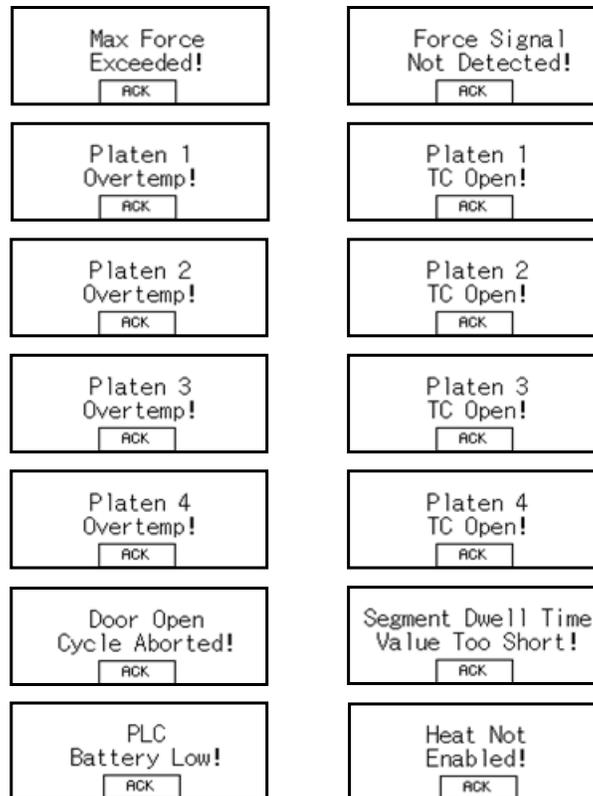
This screen allows the user to either lock or unlock recipe editing and other Security Level 1 functions.

Touching the  or  will change the security level from level 00 to 01 and vice versa. If recipe editing is locked a password (default password is "0") will be required to enter the recipe parameter editing screens and general setup screens. If recipe editing is unlocked these functions will be available to any user of the press without entering a password.

Touch the  button to return to the Main Menu screen.

4.2.5 ALARM BANNERS

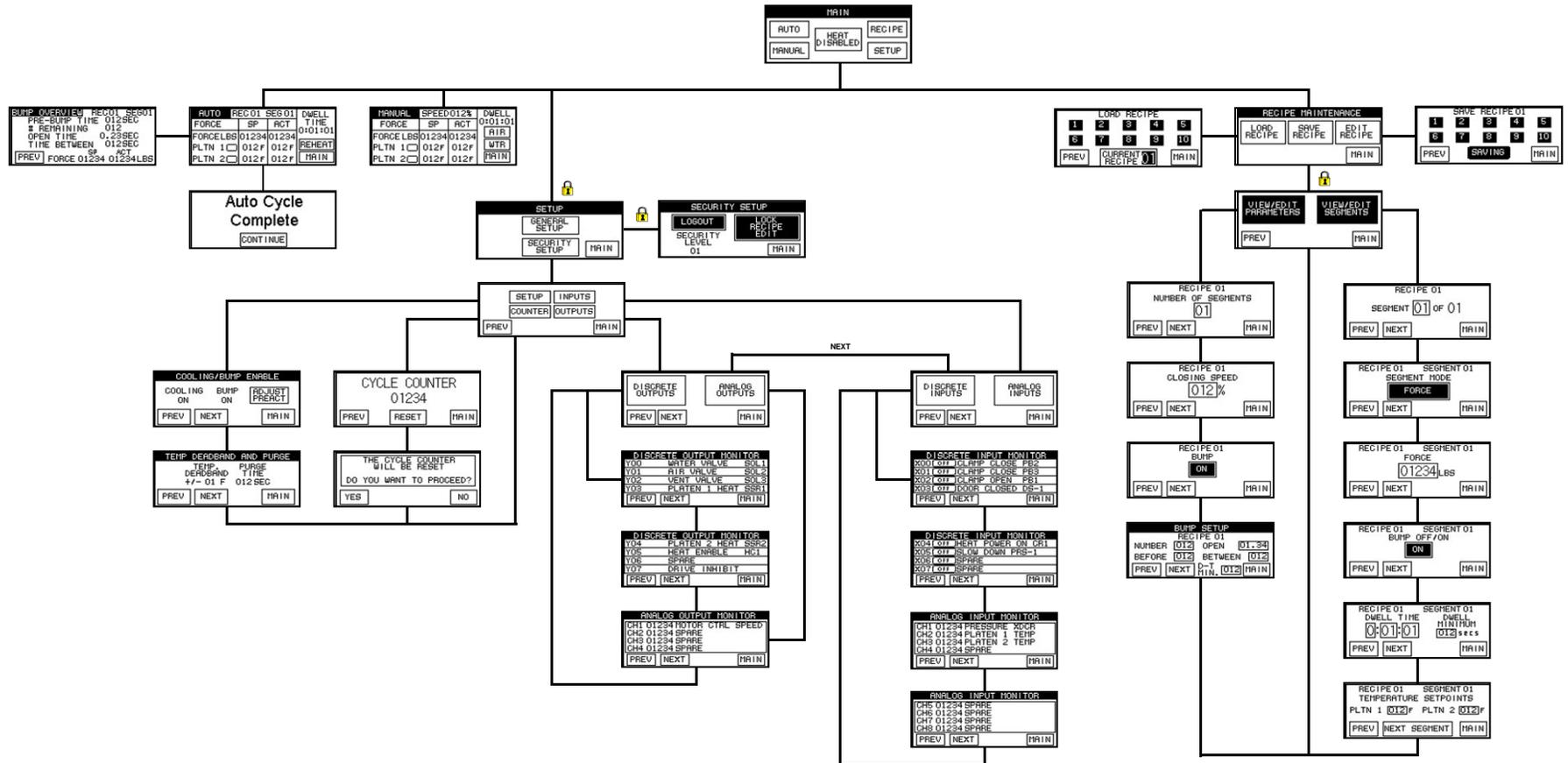
The alarm banner will be displayed on the HMI when an alarm condition becomes active. The banner will automatically disappear when the alarm condition no longer exists. The following is a list of the alarm banners.



4.3 “SLOW DOWN” PROXIMITY SWITCH ADJUSTMENT

Adjust the “SLOWDOWN” proximity switch by sliding the switch until the light on the proximity switch is illuminated. Position the “SLOWDOWN” proximity switch at the location where the slowdown sequence is to begin, typically 1/8” before mold contact is made.

4.4 AUTO SERIES NE CONTROL SYSTEM PROGRAMMING MENU STRUCTURE



5.1 OPERATOR SAFETY

1. An integral safety shield is included 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 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 material being pressed. Locator plates are available on request.
5. Please read the enclosed, “SAFETY...IT’S EVERYONES’ BUSINESS” manual for important **SAFETY INFORMATION** for everyone in your company who will have access to hydraulic press equipment.

IMPORTANT: CARVER, INC. recommends bolting the press to a work table whenever possible.

5.2 AUTO MODE SEQUENCE OF OPERATION

In Auto Mode, a cycle consists of the following:

1. Select a recipe or modify the “working recipe” to perform as desired. This procedure is explained in section 4.2.3
2. Select the AUTO mode screen on the HMI. The functions on the AUTO screen are discussed in section 4.2.1.

SCREEN 4-2

AUTO	REC 01	SEG 01	DWELL
FORCE	SP	ACT	TIME
FORCE LBS	01234	01234	0:01:01
PLTN 1 <input type="checkbox"/>	012 F	012 F	REHEAT
PLTN 2 <input type="checkbox"/>	012 F	012 F	MAIN

3. Close shield door.
4. Press the CLOSE buttons simultaneously until the slow down proximity switch has been activated if either of the buttons are released before the proximity switch is activated, the press will open.
5. After the slow down proximity switch is ON the CLOSE buttons can be released and the cycle will continue.
6. The press will build force to the programmed setpoint of the first segment of the recipe, maintaining this setpoint by regeneration of the pressure when needed.
7. For Force-Based segments the press will hold the setpoint pressure for the dwell time specified for that segment. The dwell timer starts counting down when the force setpoint is reached.

For Temperature-Based segments the press will hold the pressure, but the dwell timer will start counting down when the setpoint temperatures for the platens are reached.

8. The press will repeat these steps for the remaining segments and then open.
9. If the Auto Cycle was fully completed an Auto Cycle Complete screen will appear on the HMI. If the cycle is stopped by pressing the OPEN pushbutton, opening the safety door or leaving the AUTO screen the Auto Cycle Complete screen will not appear.

Note: When selecting settings on the HMI be sure to press the required area gently but firmly and do not use a tapping motion. Tapping will not reliably activate the touched portion of the screen.

IMPORTANT: Do not vent steam line with copper or plastic. Use only steel pipe and install to standard steam specifications.
 The outlet manifold must be plumbed downward 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.
 A manual shutoff valve in each line will aid in future maintenance procedures.

IMPORTANT: An air purge will complete its specified time regardless of dwell time expiring and the start of the next segment.

WARNING: If your press has the safety shield interlock option, opening the safety door will have the same result as depressing the "OPEN" pushbutton. **CARVER INC.** recommends, however, that the "open" pushbutton be used to open the press before the safety shield is opened. The cycle abort screen will be displayed..

5.3 MANUAL MODE SEQUENCE OF OPERATION

1. Select the MANUAL mode screen on the HMI. The functions on this screen have been discussed in section 4.2.2.

SCREEN 4-3

MANUAL	SPEED 012%		DWELL
FORCE	SP	ACT	0:01:01
FORCE TON	01.34	01.34	AIR
PLTN 1 <input type="checkbox"/>	012F	012F	WTR
PLTN 2 <input type="checkbox"/>	012F	012F	MAIN

2. Set the desired force and temperature setpoints and whether the timer should start based on force or temperature.
3. Close shield door.
4. Press the CLOSE buttons simultaneously until the slow down proximity switch has been activated, (if either of these buttons are released before the proximity switch is activated, the press will open).
5. After the slow down proximity switch is ON the CLOSE buttons can be released and the cycle will continue.
6. The press will build force to the programmed setpoint of the first segment of the recipe, maintaining this setpoint by regeneration of the pressure when needed.

7. During Force-Based operation of the timer the press will hold the setpoint pressure and the dwell timer starts when the force setpoint is met and counts up until the cycle is stopped by pressing the OPEN pushbutton, opening the safety door or leaving the MANUAL screen.

During Temperature-Based operation the press will hold the pressure and the dwell timer will start counting up when the setpoint temperatures for the platens are reached. The timer will count until the cycle is stopped by pressing the OPEN pushbutton, opening the safety door or leaving the MANUAL screen.

<p>IMPORTANT: If the platens are not preheated before the force setpoint is achieved, pressure overshoot will occur due to thermal expansion of the steel.</p>

SECTION SIX

RECIPE RECORD

6.1 TEST RECIPES

Some recipes may have data that was used to test the press prior to shipment. This data can be overwritten as needed.

6.2 RECIPE RECORD SHEETS

A Sample Recipe Record Sheet has been provided for your convenience in recording new recipes you program into your **CARVER** press (see next page).

IMPORTANT: CARVER, INC. recommends that each recipe programmed into your press be recorded.

SECTION SEVEN

PREVENTATIVE MAINTENANCE

7.1 CARVER, INC. AUTO SERIES PRESS PREVENTATIVE MAINTENANCE CHECKLIST

CARVER, INC. recommends that the following preventative maintenance schedule be adhered to as closely as possible to provide a longer machine life and quality product.

INSPECTION DATE: _____

Model # _____ Serial # _____

WEEKLY INSPECTION	WK 1	BY	WK 2	BY	WK 3	BY	WK 4	BY
Check column nuts to make sure they are tight.								
Check Platen mounting cap screws to make sure they are tight.								

MONTHLY INSPECTION	PERFORMED BY	DATE
Disconnect and lock out power. Check heater elements for continuity with an ohmmeter.		/ /
Check platen temperature tracking with an external pyrometer.		/ /
Check hydraulic oil level.		/ /

YEARLY INSPECTION	DATE OF LAST INSPECTION	NEXT SCHEDULED INSPECTION
*Replace hydraulic oil		
*Calibrate Pressure Indicator		
*Level Platens		

*Should be performed by CARVER, INC. Service Technician.

7.2 TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	CORRECTION
Heating Platen does not have uniform heat distribution.	Defective cartridge heater.	Locate and replace defective heater.
	Wrong voltage or wattage heater.	Replace with correct heater.
	Residual water in platen cooling cores.	Purge residual water from platen cores with compressed air.
Heating platens do not reach temperature setpoint.	Thermocouple not fully engaged in platen.	Push Thermocouple in tight and secure bayonet fitting.
	Thermocouple lead connections loose.	Secure connections.
	Defective Thermocouple.	Replace defective Thermocouple.
	Bad heater lead connection.	Repair connection
	Defective or burned out heater	Locate and replace defective heater.
Heating platens do not heat.	Temperature control setpoint is lower than current platen temperature.	Adjust setpoint.
	Blown heater fuses.	Replace heater fuses.
	Defective heat relay.	Replace heat relay.
	Defective heater wiring.	Repair wiring.
OIT does not illuminate	No power or wrong voltage supplied to unit.	Voltage must be within 10% of voltage as stamped on electrical identification tag.
	Blown control power fuse.	Replace control power fuse.
	Defective disconnect switch.	Replace defective switch.
Press will not close. (Power is on)	No force parameter entered.	Enter valve for force parameter.
	Blown motor fuse.	Replace defective fuse.
Press Closes Slow	Slow Close proximity switch not adjusted correctly	Adjust Slow Close proximity switch

SECTION EIGHT

HYDRAULIC OIL

8.1 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 sealed one pint or five gallon containers. Contact **CARVER, INC.** Parts Department for information.

A premium grade of mineral base, high pressure, hydraulic oil with anti-wear and anti-foaming additives with an ISO viscosity rating of 32 cSt (Centistokes) at 40°C (105°F) to 49°C (120°F) with equivalent or greater specification of the oil listed below, can be used, provided it is filtered through a 10 micron absolute filter, prior to being added to the hydraulic reservoir.

IMPORTANT: Do not use fire retardant ester based oils, transmission fluid, brake fluid, or water-glycol mixes. Always add clean oil to the reservoir from a clean container through a 10 Micron absolute filter.

WARNING: If any oil is used other than CARVER #2170 and is not filtered through a **10 MICRON ABSOLUTE FILTER** before being placed into the hydraulic reservoir, the **WARRANTY MAY BE VOID.**

<u>SUPPLIER</u>	<u>RECOMMENDED HYDRAULIC OIL</u>	<u>PRODUCT NAME</u>
Mobil		DTE 24
Exxon.....		NUTO H32
Gulf		Harmony 32AW
Kendall.....		Kenoil 051
Amoco.....		Rykon 46R or Amoco AW32
Shell.....		Tellus 32

SECTION NINE

ACCESSORY EQUIPMENT

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	Tile Molds	Heated Platens
Heating/cooling Plates	Pharmaceutical Die Holders	Filter Pads
Kbr Buffer Plates	Test Cylinders	Blotters
Polished Plates	Heated Test Cylinders	Cage Equipment
Color Dispersion Molds	Gauge Damper Kit	Pressure Cells
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

For more details on available equipment and accessories, please refer to the CARVER catalog supplied with this Manual.

SECTION TEN

CARVER, INC. PARTS AND SERVICE

10.1 TECHNICAL ASSISTANCE

CARVER, INC. PARTS DEPARTMENT

Call from 8:00 a.m. to 4:30 p.m., Eastern Standard Time
(260) 563-7577

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 customer 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

CARVER, INC. has a qualified Service Department ready to install, start up, or service your press. Preventative maintenance contracts and gauge calibration services are also available for most products.

CARVER, INC. SALES DEPARTMENT

Call from 8:00 a.m. to 4:30 p.m., Eastern Standard Time
(260) 563-7577

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.

10.2 RETURNED MATERIAL POLICY

CREDIT RETURNS

1. Prior to the return of any material, **CARVER, INC. must give authorization.** A RMA number will be assigned for the equipment to be returned.
2. Reason for requesting the return must be given.
3. ALL returned material purchased from **CARVER, INC.** returned is subject to 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.
7. ALL items will be subject to review of **CARVER'S** inventory on hand, before return authorization will be granted.

11.1 WARRANTY RETURNS

1. Prior to the return of any material, **CARVER, INC** must give authorization. A RMA number will be assigned for the 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, serial # 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.

11.2 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 disclose them 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 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.