

# Operation and Maintenance Manual



## **100-Ton MH TrussMaker™**

Mobile Home Truss Press

# Operation and Maintenance Manual

## 100-Ton MH TrussMaker™

Mobile Home Truss Press



*U.S. and other patents pending.*

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Made and sold under one or more of the following patents\*:

U.S. RE37,797	U.S. 6,145,684
U.S. 5,454,687	U.S. 6,330,963
U.S. 5,468,118	U.S. 6,405,916
U.S. 5,553,375	U.S. 6,651,306
U.S. 6,079,325	U.S. 6,807,903

\*Other patents pending.

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Attn: Engineering Manager  
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Your support in helping MiTek provide unsurpassed machinery and support is appreciated.

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# Safety Indicators

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The following safety alert symbols and signal words are used throughout this document to indicate safety hazards. Please pay careful attention when you see them. The level of severity differs for each symbol or signal word. The definitions below can also be found in ANSI z535.4-2002.

Failure to comply with the instructions accompanying the safety alert symbol may result in property damage, personal injury, or even death. Personnel must follow all safety procedures and practices to ensure the safest possible operation and maintenance of this equipment. However, at no time is this document a substitute for common sense. Personnel must ensure that the work environment is safe and free of distractions



## **DANGER**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



## **WARNING**

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



## **CAUTION**

When CAUTION is used *with* the safety alert symbol shown here, it indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

When CAUTION is used *without* the safety alert symbol shown here, it indicates a potentially hazardous situation which may result in equipment damage.

**NOTICE**

## **NOTICE**

Calls attention to information that is significant to understanding the operation at hand.

**ENVIRONMENTAL**

## **ENVIRONMENTAL**

Applies to conditions that may affect the environment but does not have an immediate, direct effect on personnel or equipment.

# General Safety Rules

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Because it is impossible to anticipate every circumstance that might involve a hazard, the safety information provided in this manual and on the machine is not all-inclusive. If this machine is operated or serviced using a procedure not specifically recommended by the manufacturer, the procedure shall be approved by a professional engineer to ensure it will not render the equipment unsafe. Use extreme caution and common sense at all times!

1. All personnel shall read this manual completely before using or maintaining the equipment. Do not operate this machine unless you have a thorough knowledge of the controls, safety devices, emergency stops, and general operating procedures outlined in this manual.
2. All safety notes shall be read and observed before operating the machine or performing maintenance. Failure to comply with these instructions may result in economic loss, property damage, and/or serious personal injury including death.
3. Only qualified personnel shall operate, perform maintenance on, or be unsupervised near this equipment. “Qualified personnel” is defined as:

*...a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training, or experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work—ANSI B30.2-1983*

*...one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved—NEC 2002 Handbook*
4. Refer to the lockout/tagout guidelines on the following pages to safely perform maintenance and troubleshooting of this equipment.
5. Check that all safety devices are in working order before each shift starts. All protective guards and safety devices must be in place before and during use of the machine. Never disconnect or bypass any safety device or electrical interlock.
6. Observe and obey all safety labels. Replace worn labels immediately.
7. Check for worn or damaged parts regularly. Repair or replace them immediately.
8. Always wear safety glasses and hearing protection in an industrial environment.
9. Utilize a filtering facepiece (dust mask) when working near sawdust.
10. Use caution when lifting heavy parts or material.
11. Wear proper apparel and appropriate personal protective equipment. Do not wear loose clothing or jewelry. Confine long hair by tying it back.

- 
12. Keep children away. All visitors should be kept a safe distance from the work area. Hazards may not be apparent to individuals unfamiliar with the machine.
  13. Keep the work area clean and free of any trip or slip hazards.
  14. Do not use any liquids in the interior of electrical cabinets.
  15. When using solvents on and around the machine, remove power to the machine to eliminate the chance of sparking, which may result in explosion or fire. Wear a respirator approved for use with solvents. Wear protective clothing, gloves, and safety glasses.
  16. Do not use in damp or wet locations, or expose the machine to rain or snow.
  17. Keep work areas well lit.
  18. Ensure that all tools and foreign objects are clear of the restricted zones before operating this equipment. The restricted zones are shown on page xii.
  19. Periodically inspect the quality of the finished product to ensure it will perform its intended function safely. Use only materials certified for the intended use. Truss designs must be approved by a qualified design engineer. Qualification of design engineers is dictated by local, state, and federal regulations.
  20. Use this equipment solely for the purpose described in this manual.
  21. In case of machine malfunction, stop the machine immediately and report the malfunction to a supervisor.
  22. Never leave the machine running unattended. Turn the power off! Do not leave the machine until all parts have come to a complete stop and all electrical power has been shut off.
  23. Follow installation instructions completely. This equipment shall be installed following all guidelines in this manual.
  24. This equipment shall be installed, operated, and maintained in accordance with all current governing standards, including local, state, and national codes for the location in which it resides.
  25. Keep the hydraulic, pneumatic, and electrical systems in good working order at all times. Repair leaks and loose connections immediately. Never exceed the recommended pressure or electrical power.
  26. Before performing maintenance on the pneumatic or hydraulic systems, bleed the lines to eliminate pressure.

# Lockout/Tagout Guidelines

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## Lockout/Tagout

The term “lockout”, as used in this manual, means placing a lockout device on any and all energy sources to ensure that the energy isolating device and the equipment being controlled cannot be re-energized or operated until the lockout device is removed. The photos on the next page show where the electrical disconnects are located for this machine.



- Energy sources include electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- In the case of electrical energy sources, the main power and control power to the machinery must be turned off and physically locked in the “off” position.
- In the case of hydraulic and pneumatic systems, bleed pressure from lines before attempting maintenance or repairs.
- A lockout device is usually a keyed padlock.
- If more than one person is working in a restricted zone, use a group lockout device that will allow each person to use a lock that can be removed only by the person performing the maintenance.

“Tagout” means that a prominent warning is securely fastened to an energy isolating device to indicate that the equipment shall not be operated.

# Lockout/Tagout Guidelines

## De-Energizing Electrical Power at the Machine's Disconnect Switch



## Performing Maintenance Outside a Machine's Electrical Enclosures

When performing any maintenance or adjustments outside the electrical enclosure, turn off the disconnect handle on the machine. Notify other personnel in the area that you are working on the machine by tagging and locking the disconnect handle in the “off” position as shown in the photo. If performing maintenance inside the electrical enclosure, refer to the next section.

## De-Energizing the Source of Electrical Power



## Performing Maintenance Inside a Machine's Electrical Enclosures

Before opening an electrical enclosure on a piece of equipment, turn off the machine's disconnect handle and lockout/tagout the source of power. This is necessary because when the disconnect handle is turned off, power is still live between the power source and the disconnect switch's enclosure.

The source of power is usually located in an electrical panel mounted on the building wall, similar to the panel shown in the photo. When

you open the electrical enclosure, check the voltage inside the enclosure using a multimeter to ensure that there is no live power.

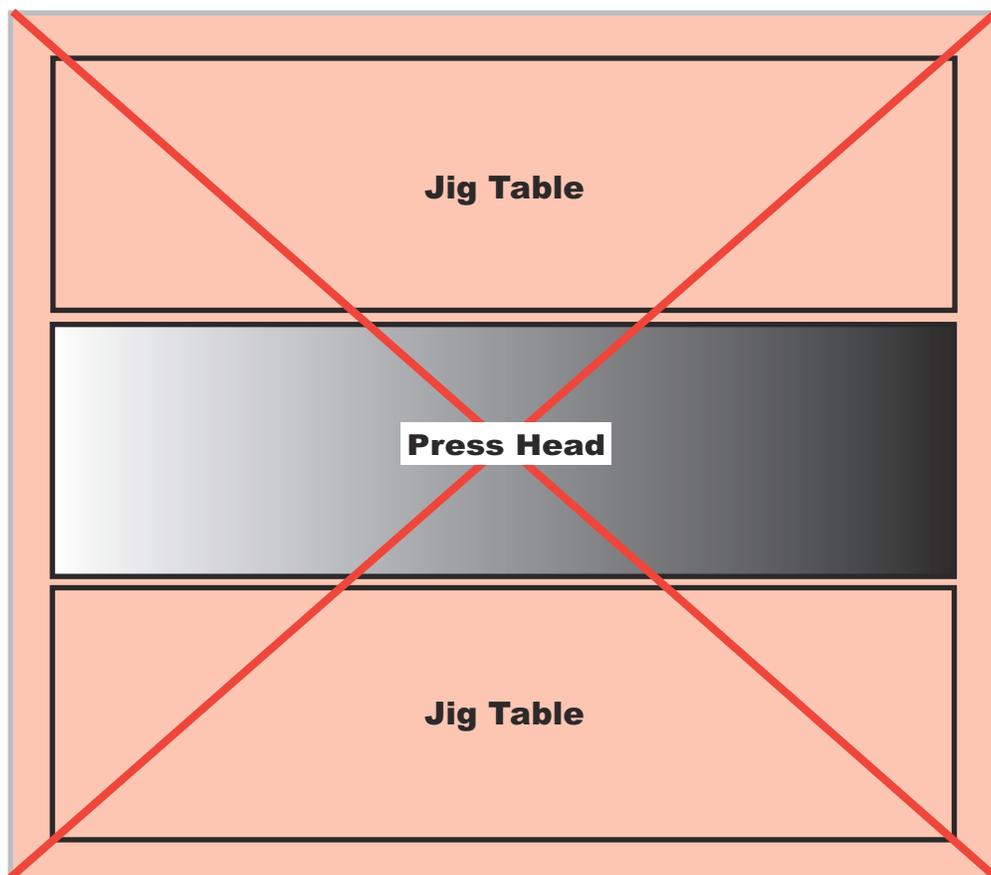
## Troubleshooting With an Energized Machine

If a troubleshooting or repair activity cannot be accomplished with the power turned off, refer to *NFPA 70E* for the personal protective equipment required. Any time maintenance is performed while the equipment is electrically energized, there is a potential electric arc flash hazard. Pneumatic and hydraulic components may move unexpectedly if not de-energized. Any components capable of movement should be physically restrained when working on or near those components. Every effort should be made to avoid energized areas, but when it is necessary to troubleshoot an energized machine, take every precaution possible.

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All personnel must stay clear of the restricted zones indicated by the red X below when the machine is in use. The operator must check and clear this entire area before putting the machine in motion. The restricted zone covers all areas that the press head can reach or be reached from and the location of all moving parts.

<b>DANGER</b>	
	<p><b>Stay clear of the restricted zones when machine is in use!</b></p> <p><b>Serious injury or death may result to personnel who are in the restricted zones.</b></p>



### Purpose of Chapter

*This chapter introduces you to this manual and provides an overview of your equipment and the means to identify it.*

<b>DANGER</b>	
	<p><b>Read this manual completely before using this equipment!</b></p> <p><b>Do not operate this machine until you have a thorough understanding of all controls, safety devices, emergency stops, and operating procedures outlined in this manual.</b></p> <p><b>All warnings must be read and observed. Failure to do so may result in economic loss, property damage, and/or personal injury.</b></p> <p><b>This manual must always be available to personnel operating and maintaining this equipment.</b></p>

## ***Introduction to This Manual***

### ***Purpose of This Manual***

This manual provides the information necessary to operate and maintain the *MH TrussMaker* press, which includes the platen press and two (2) jig tables.

In order for this manual to be useful, it must be kept with the machine so the operators and maintenance personnel have easy access to it. You can order the most recent revision of this manual by referring to the part number 001082. If you require a previous revision, talk to a Customer Service Technician.

Most questions that will arise about maintenance, troubleshooting, and part numbers are answered in this manual. If you cannot locate the answer or solution, contact the MiTek Machinery Division Customer Service Department using the contact information in Figure 1-1.

**Figure 1-1: Contacting MiTek**

**MiTek Machinery Division**  
Customer Service Department  
301 Fountain Lakes Industrial Drive  
St. Charles, MO 63301

**Parts Orders (with part number)**  
E-mail: [mitekparts@mii.com](mailto:mitekparts@mii.com)

**Technical Assistance**  
Phone: 800-523-3380  
Fax: 636-328-9218  
[machinerysupport@mii.com](mailto:machinerysupport@mii.com)

**Web Site**  
[www.mitek-us.com](http://www.mitek-us.com)



### ***Using This Manual***

Review the Table of Contents to understand the organization and content of the chapters and appendices. The Glossary and Index are also valuable tools that will help you get the most out of your equipment.

## ***Introduction to This Equipment***

### ***Purpose of the Equipment***

The *MiTek® MH TrussMaker™* press is designed for the fast, accurate, and economical production of wood trusses for the construction of manufactured homes.

### ***Overview of the Equipment***

The *MH TrussMaker* press is a 100-ton capacity, hydraulically operated press with manual and automatic controls. The standard press is a double-press truss machine with a truss height capacity of 57 in. and a length capacity of 18 ft. An optional single-press machine is available with a smaller jig table providing a lower truss height capacity.

The press is equipped with steel tables to support and guide the jig tables on both sides of the machine. Rack and pinion drives at each end drive the jig tables in and out of the press while being synchronized by a common drive shaft using a hydraulic motor. A hydraulic cylinder powers the upper press platen's vertical lifting and pressing motion at the top of the press. The press cylinder is mechanically linked to synchronize vertical movement at both ends of the press platen.

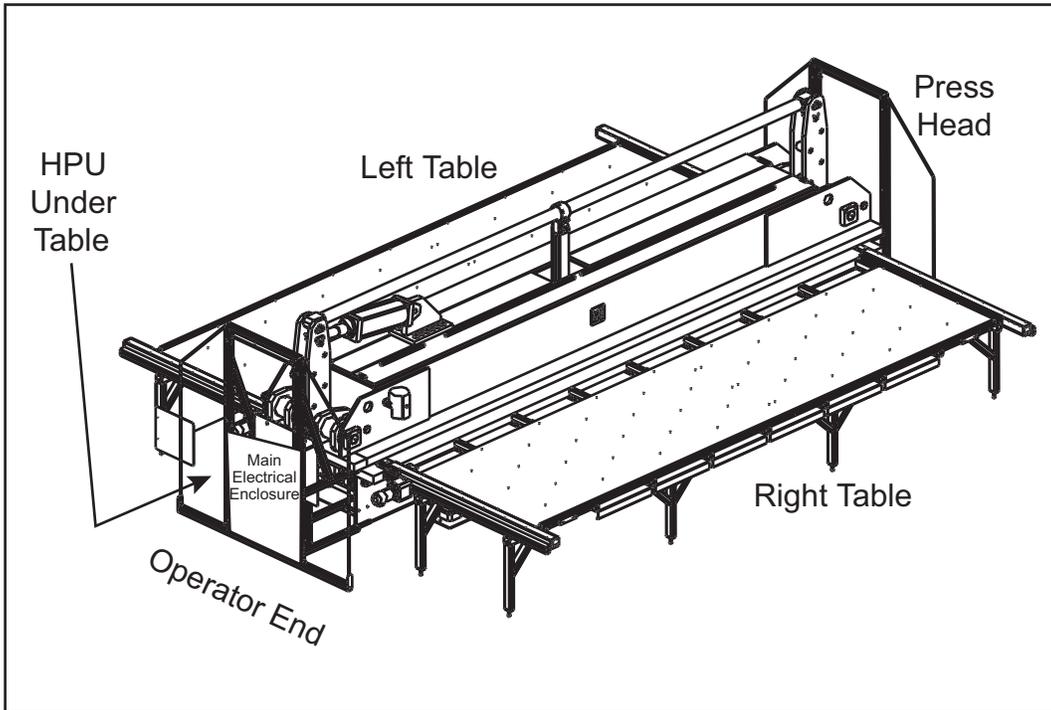
The jig tables are designed to house a customized jig system that is customer-supplied. Together, the tables and a properly configured jig system will allow easy and accurate placement of the pre-cut wood members and connector plates needed to form a truss. A flat jig at table height makes setups faster and truss dimensions easier to control.

### ***Components and Options***

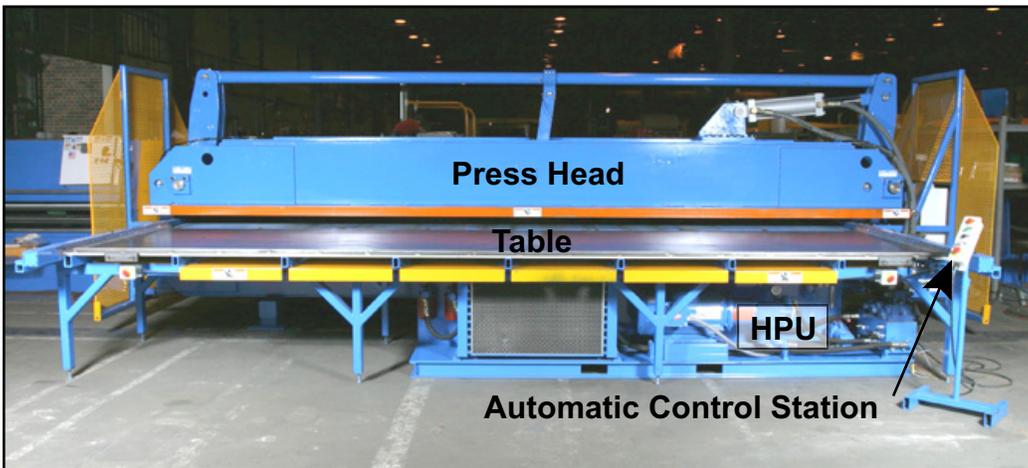
The *MH TrussMaker* system consists of a *MiTek* 100-ton press, two (2) jig tables, a hydraulic power unit (HPU), and two (2) pedestals referred to as automatic control stations. Refer to your specific layout for exact component placement.

The tables and press head are shown in Figure 1-2. The HPU is located under the left table. The automatic control stations are detached components on wheels. Although they are not shown in Figure 1-2, an automatic control station is labeled in Figure 1-3.

**Figure 1-2: Diagram of System Components**



**Figure 1-3: Photo of System Components**



Refer to Table 1-1 and Table 1-2 to identify which system you have and the options installed.

**Table 1-1: Machine Variations**

System Name	MiTek Part #	Description
Double-press 460 VAC	88203-502	Allows single or double-press cycles.  The double-press cycle uses two (2) separate pressing actions to press connector plates into a truss that is larger than the platen head.
Single-press 460 VAC	88203-501	Allows single-press cycles only.

**Table 1-2: Options Available**

System Name	MiTek Part #	Description
Immersion heater in hydraulic fluid reservoir	88259-901 if installed at MiTek  88259-902 for field install	The immersion heater warms the fluid in the hydraulic power unit's reservoir, allowing production to begin sooner during cold weather and eliminating the need to change hydraulic fluid when weather changes.

## General Specifications

**Table 1-3: General Specifications**

<b>General</b>		
Press Capacity	100 tons	
Max. Truss Length	18'	
Max. Truss Height	57"	
Cycle Time (at optimum settings)	10 seconds	
Platen Area	48" x 18' 3"	
Working Table Surface	48" x 18'	
Min. Open Height Between Platens	2-3/8"	
Max. Open Height Between Platens	7-1/8"	
Weight	See Table 2-6	
Size	See Table 2-2	
Connector Plates	Use any connector plate appropriately rated for the truss.  <i>MiTek M20®</i> plates are recommended for most applications.	
Building Material	Most lumber appropriate for mobile home trusses	
<b>Motors—Electric</b>		
Horsepower Rating	30 hp	
Motor Speed	1,800 rpm	
Starting Switch	Full voltage	
Voltage	See Table 2-4	
Amperage		
Cycles		
Phases		
<b>Hydraulic System</b>		
Flow	Press: Rated 30 GPM	Tables: Rated 22 GPM
Nominal Operating Pressure	Press: 2,050 psi	Tables: 1,500 psi
Speed Controls (2 per table)	Table IN speed and table OUT speed	
Hydraulic Fluid Reservoir	120 gallons	
Recommended Oil	See Table 2-5	
Filters	2 spin-on return line filters, $\beta_{18} = 200$ or higher, paper media	
Control Valves	Solenoid-controlled, pilot-operated, 4-way, 3-position directional control valve; spring-centered	

**Table 1-3: General Specifications (Continued)**

<b>Hydraulic Cylinder</b>	
Bore	6"
Stroke	18"
Action	Double
Rod (hard chrome finish)	4" diameter
Pressure Rating	3,000 psi
<b>Jig Table (Standard)</b>	
Thickness	11/16"
Width	57"
Length	18' 2-3/8"

## ***Supplemental Documentation***

In addition to this Operation and Maintenance Manual, the documentation listed in this section is provided at the time of installation. Refer to these documents for more detailed information on the applicable topics.

- Lincoln automatic lubrication manual
- John Henry Foster hydraulic system manual

### Purpose of Chapter

*This chapter covers what you must consider or complete before this equipment can be installed.*

## MiTek's Responsibilities

### Prior to Installation

MiTek will provide the following items and information prior to the installation date.

1. A Prior to Installation package that:
  - Outlines this chapter and requests your signature of agreement.
  - Gives dates to expect shipment, delivery, and installation.
  - Explains the number of people required to help with installation.
  - Provides guidelines on providing an electrician, welder, and other specialists.
  - Describes payment information.
2. A layout of the equipment, specifically prepared for your building.

### During Installation

A MiTek Customer Service Technician (CST) will be present to manage the installation of your equipment. The MiTek CST will:

- Train your personnel on how to operate and maintain the equipment.
- Ensure that the Operation and Maintenance Manual is present. One (1) manual is provided for every piece of equipment, but additional manuals can be purchased.

## Customer's Responsibilities

Before the installation of your equipment, the items and procedures in this chapter must be arranged, purchased, or assembled. Table 2-1 provides an overview of these items. Each topic listed in the table is explained in detail in the text following the table.

If these requirements are not satisfied before the scheduled installation date, it may be necessary to reschedule the installation. Any additional cost may be the customer's responsibility.

**Table 2-1: Summary of Customer's Responsibilities**

Space	This equipment requires enough space to allow for the machine dimensions listed in Table 2-2, plus additional working space for operation and maintenance. Operating space should ensure safety, freedom of movement, storage, and a free flow of materials. The area should have adequate lighting.
Location	Concrete, a minimum of 6 in. thick 5,000 psi, is required under the weight of the press and tables.  The <i>MH TrussMaker</i> system must be located in a covered area without extreme temperature changes.
Electrical	The standard electrical requirements are shown in Table 2-4. Contact your MiTek representative immediately if custom power specifications need to be arranged.
Hydraulics	The correct hydraulic fluid must be available at installation.
Table Jigging	Guidelines are provided for the table jiggling that must be installed prior to startup.
Transport Equipment	A machinery rigger capable of transporting the weights described in Table 2-6 must be arranged prior to delivery.
Customer-Supplied Parts	The customer is responsible for having the supplies listed in Table 2-7 available at the time of installation.

## Space Requirements

Refer to these guidelines when planning your space allocation. MiTek can provide help in plant layout and space utilization on request.

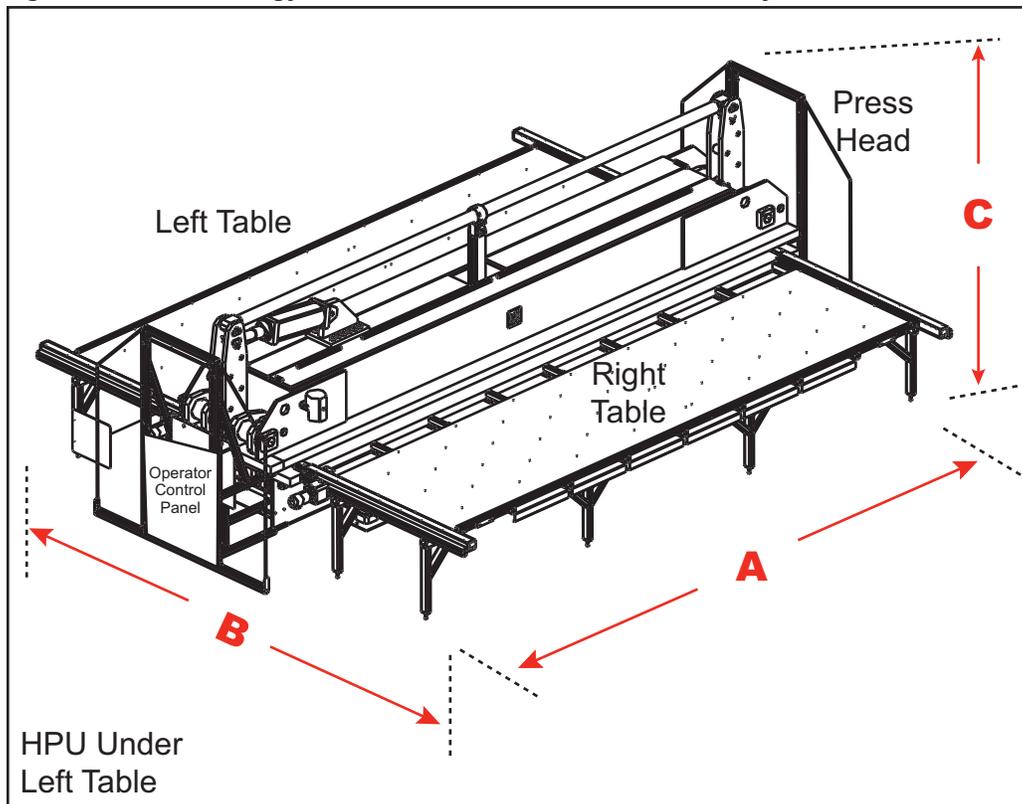
### Space for the Equipment

It is the customer's responsibility to provide adequate space for the installation, operation, and protection of the equipment. The physical dimensions of the *MH TrussMaker* system are shown in Table 2-2 and Table 2-3. Additional space is required for operation, maintenance, and optional equipment.

**Table 2-2: Approximate Dimensions of Entire System**

System Dimension	Approximate Measurement
Dimension A	23'
Dimension B	17'
Dimension C	7' 1"

**Figure 2-1: Terminology For Dimensions, Shown for Entire System**



**Table 2-3: Approximate Dimensions of Individual Components**

<b>Component</b>	<b>Approximate Measurement A x B x C</b>
Press	23' x 6' 8" x 7' 1"
1 Table	19' 0" x 6' 5" x 3' 0"
HPU	11' 0" x 3' 0" x 2' 3"

### ***Space for Operation and Maintenance***

Additional space must be allocated for operation and maintenance. Operation space should allow for safe operation, freedom of movement, storage space, and free flow of raw and finished materials. There must also be adequate space for safe handling of the raw and finished materials throughout the process.

## ***Location Requirements***

### ***Floor Structure***

A level and structurally sound concrete slab must be provided for the installation of the equipment. This slab should be designed and installed in accordance with local building code requirements and, if required, under supervision of a professional engineer. Concrete should be a minimum of 6 in. thick. Five thousand (5,000) psi concrete is recommended. Refer to your layout drawing.

### ***Environment***

The equipment must be located in a covered area without extreme temperature changes. It must be completely protected by a roof to keep all precipitation from contacting the equipment. Lighting should be adequate for safe operation and maintenance.

## *Electrical Requirements*

The standard electrical requirements are shown in Table 2-4. Each machine can be designed for any of the incoming voltages listed.

The power supply must have a fused disconnect switch, separate from the disconnect switch on the machine. The power supply line must be long enough to reach the disconnect enclosure on the machine.

You shall pre-check the voltage at the proposed location of the machine and notify MiTek of the type of power available so that, if necessary, revisions to motors, etc. may be made before shipment.

**Table 2-4: Electrical Requirements**

<b>Equipment Voltage</b>	<b>Amperage Requirement</b>
Horsepower	30 hp
Voltage	460/230/208 VAC
FLA Plus Control Amperage	39/77/85 amps
Equipment Disconnect Protection	70/125/150 amps
Cycles (Frequency)	60
Phases	3

## Hydraulic System

The customer must have 130 gallons of hydraulic fluid on hand for the initial charge of the machine. The hydraulic reservoir holds 120 gallons when filled to within two (2) inches from the top. Additional oil is required to charge the lines, etc.

- Mobile DTE 24 or an equivalent hydraulic fluid is recommended for operation within the recommended temperature range. It contains beneficial additives that other ISO 32 oils may not have.
- Refer to Table 2-5 for hydraulic fluid specifications. See the footnotes if operating outside the recommended temperature range.
- The specifications are also shown in Table 6-2 in the *Maintenance* chapter.

**Table 2-5: Recommended Hydraulic Fluid**

Recommended ISO Grade <sup>a</sup>		ISO 32
Recommended Operating Viscosity Range		60-245 SUS
Temperature <sup>b</sup>	At Startup	> 68°F
	During Operation	86°F-120°F
Reservoir Capacity		120 gallons
Capacity of Hydraulic Lines		Up to 10 gallons

a. If operating outside the recommended temperature range, select a hydraulic fluid that will operate at the proper SUS range for your temperatures. See the *Determining the Correct Hydraulic Fluid* section in the *Maintenance* chapter if leaking occurs.

b. HPUs manufactured after April 2005 have couplings for easy installation of an immersion heater. See Table 1-2 to order the heater option for your hydraulic fluid reservoir.

### CAUTION

**Hydraulic fluid must be above 68°F before starting the HPU with ISO 32 hydraulic fluid or serious damage to the hydraulic components may result.**

**Use an immersion heater to warm the hydraulic fluid prior to starting the equipment in cold weather.**

## Jigging

It is the customer’s responsibility to make and install jigging onto the jig tables. The jigging must be in place to complete the installation. There are many different possibilities for your jigging. The press is designed for a 1-in. thick jigging surface. MiTek recommends making the bottom 1/2 in. out of UHMW plastic and the top 1/2 in. out of a steel plate.

A *Unistrut*® U-channel is mounted to the outer edge of each jig table and may be utilized for mounting your jigging. *Unistrut* hardware is **not** included with your equipment.



*The jigging must be in place to complete the installation. Table speed adjustments will be made during the startup process to account for the weight of your tables with the jigging installed.*

## Transport Equipment

### Weight

Table 2-6 lists the approximate weight of the major components in the system. This information will be useful in planning the unloading and installation of the equipment.

**Table 2-6: Approximate Weight of Major Components**

Component	Weight
Press Head	43,000 lb
1 Table	2,700 lb
HPU (with reservoir empty)	2,175 lb

### Preparing for Delivery

It is highly recommended that you secure the services of a professional, insured machinery rigger with appropriate equipment to handle the weight of the press head. The following equipment, with operators, will be needed to unload the equipment when it arrives at your site.

- One crane or rigger appropriate for carrying the weight of the press head
- One forklift with at least a 3-ton capacity

It is the customer’s responsibility to provide equipment and labor for unloading, placement, and wiring of the machine. Please contact your MiTek representative if you have any questions.

<b>DANGER</b>	
	<p><b>Transport and lifting equipment such as forklifts and cranes must be designed and rated for the load and application. The weight of each major component is given in Table 2-6.</b></p> <p><b>Inadequate transport equipment may result in property damage, personal injury, or death.</b></p>

## *Customer-Supplied Parts*

The customer must supply the parts and equipment listed in Table 2-7. Most are described in detail in the applicable section of this chapter. Some requirements must be satisfied or arranged for before installation occurs and some must be available for use at the time of installation.

**Table 2-7: Customer-Supplied Parts**

Item	Description
Electrical Equipment	All electrical requirements to provide power to the disconnect enclosure on the press head are the customer’s responsibility
Hydraulic Fluid	130 gallons of hydraulic fluid matching the specification in Table 2-5
Jigging	Table jigging for both tables that meets the mounting requirements described in this chapter
Transport Equipment	Transportation equipment appropriate for lifting and carrying the weights listed in Table 2-6
General Tools	2" wrench for hydraulic hoses
	Level
	Pry bars
	Standard set of wrenches and screwdrivers
	Metal shims to use for leveling tables and press

### Purpose of Chapter

*This chapter describes the entire installation process in detail. The instructions assume that the prior-to-installation requirements have been satisfied.*

## Responsibilities During Installation

MiTek will provide installation supervision to ensure that the system is installed properly and operates correctly. We will also provide operating and maintenance training at the time the equipment is installed. The customer is responsible for providing all labor and equipment needed to complete the installation. These requirements are explained in the *Prior to Installation* chapter.



*All customer responsibilities before and during installation are described in the *Prior to Installation* chapter!*

## Tasks to be Completed Prior to the Scheduled Date for MiTek to Arrive

### Delivery and Unloading

Usually, the equipment is delivered to your site before the MiTek representative arrives. Refer to the *Prior to Installation* chapter for information regarding preparing for the delivery.

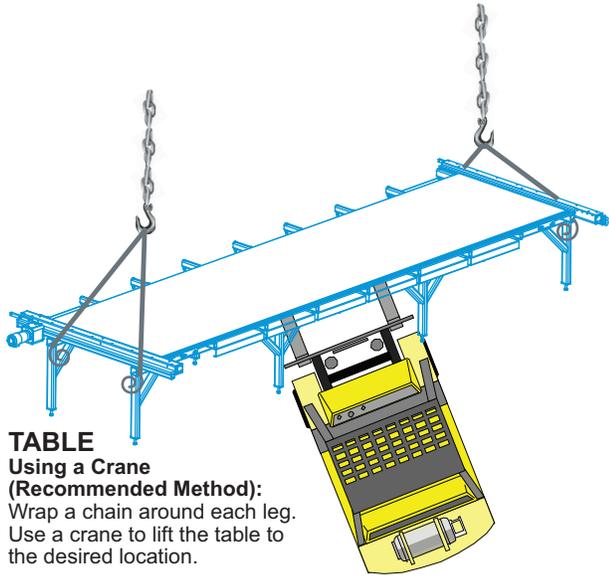
Even if a MiTek representative is present, it is the customer's responsibility to provide equipment and labor for unloading, placement, and wiring of the equipment.

Exercise extreme caution to avoid damage or misalignment during unloading. Do not apply pressure on any moving parts or fittings. Figure 3-1 shows how to lift and move the equipment safely.

Component weights are listed in Table 2-6 in the *Prior to Installation* chapter.

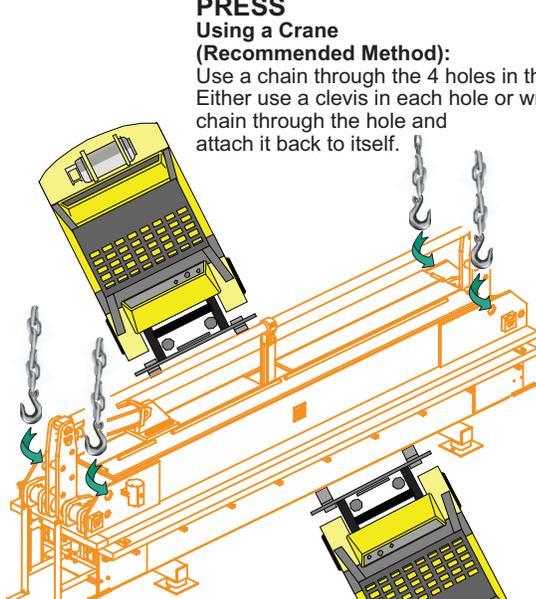
<b>DANGER</b>	
	<p>Transport and lifting equipment such as forklifts and cranes must be designed and rated for the load and application. The weight of each major component is given in Table 2-6.</p> <p>Lift the equipment only at the lift points indicated by MiTek! See Figure 3-1.</p> <p>If the equipment is transported incorrectly, equipment damage, personal injury, or death may result.</p>

Figure 3-1: Lift Points on the Tables and Press Head

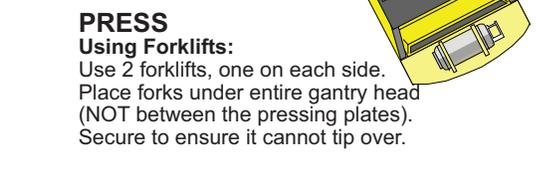


**TABLE**  
Using a Crane  
(Recommended Method):  
Wrap a chain around each leg.  
Use a crane to lift the table to the desired location.

**Using a Forklift:**  
Drive 1 forklift to the center of the length of the table. Place forks under the table top and lift.



**PRESS**  
Using a Crane  
(Recommended Method):  
Use a chain through the 4 holes in the frame. Either use a clevis in each hole or wrap the chain through the hole and attach it back to itself.



**PRESS**  
Using Forklifts:  
Use 2 forklifts, one on each side. Place forks under entire gantry head (NOT between the pressing plates). Secure to ensure it cannot tip over.

## Unpacking

After successful unloading, detach and set aside all loose parts. Move the equipment to the desired location using equipment appropriate to the weight of each component. Component weights are listed in Table 2-6.

## Placing Components

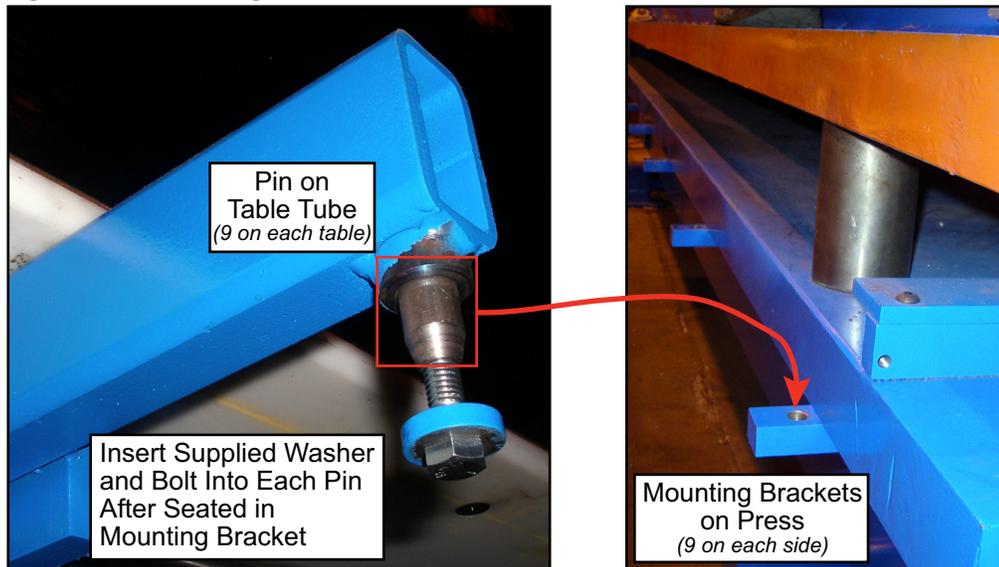
The HPU, press, and two (2) tables are not attached together during shipment. Two (2) automatic control stations are also shipped unattached. Refer to Figure 1-2 in the *General* chapter for component locations, along with your layout.



*Level the press while the machine movers (crane or rigger operators) are still on site.*

1. Place the press head in its exact location.
2. Ensure that the lower press platen is completely level. If necessary, use steel shims under the base of the machine to level the press, using the lower platen as your guide.
3. Place the HPU next to the press in the location shown in Figure 1-2. It should be completely covered by the left table, and it will be difficult to move once the table is in place.
4. Place each table as described here. Refer to Figure 3-2.
  - a) Raise the table up and over so the pin on each table tube seats itself into the hole in each mounting bracket on the press. All nine (9) pins must be clearly seated through the mounting brackets.
  - b) Secure the table with a supplied washer and 3/8-16x1 hex head cap screw in each pin.

**Figure 3-2: Mounting the Tables to the Press**



5. Level the tables so the table surfaces are flush with the surface of the lower platen. If necessary, use steel shims between the mounting bracket and table tube.
6. Place one (1) automatic control station anywhere near each table.

## Connecting Electrical Power

All electrical work is the customer’s responsibility and must be performed by a qualified electrician. The machine design addresses electrical components starting with the disconnect enclosure. Installation and maintenance of all electrical requirements between the power source and the disconnect enclosure are the responsibility of the customer. Refer to Table 2-4 in the *Prior to Installation* chapter for electrical requirements.

<b>WARNING</b>	
	<p><b>Electrical hazard!</b></p> <p><b>All electrical work must be performed by a qualified electrician.</b></p> <p><b>Follow approved lockout and tagout procedures (OSHA 29 CFR 1910.147).</b></p>

### Checking Existing Wiring

Heavy gauge wire can work loose during shipping and handling. Before power is connected to the machine, conduct a pull test on all pre-wired connections in the main electrical box.

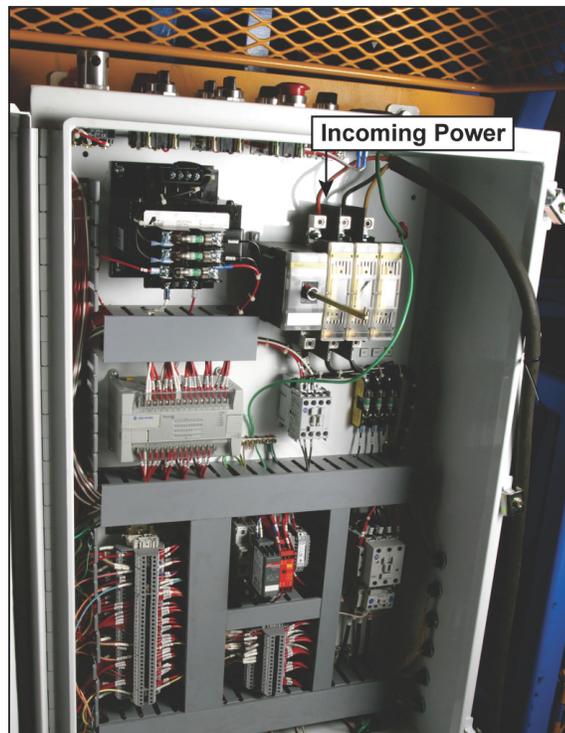
### Connecting Power to the Press

The main electrical enclosure is located on the operator end of the press head. Bring power into the main enclosure and connect it to the terminals on top of the disconnect fuses. See Figure 3-3.

The order in which they are connected is irrelevant because you will perform a test later and switch the wires if the direction of travel is incorrect. Refer to your electrical schematic for detailed wiring instructions.

1. Drill a hole in the main electrical enclosure for the power source wires to enter the main electrical

**Figure 3-3: Connecting Incoming Power**



enclosure. See Table 2-4 for electrical requirements.

2. Connect the wires at the fuse disconnects.
3. Wire the E-stops on the tables (1 per table)

## Tasks to be Completed With MiTek Supervision



1. Connect an electrical cable to each of the six (6) solenoids on the HPU. Use your electrical schematics along with Figure 6-4, Figure 6-5 and Figure 6-6 in the *Maintenance* chapter to ensure the correct cable is used on each solenoid.
2. Connect the main electrical enclosure to the pressure switch on the HPU, behind the valve stack for the press cylinder.
3. Connect power to the fan in the cooler.
4. Connect both automatic control stations to the main electrical enclosure.
5. Attach the prox switches.
  - a) Attach all seven (7) prox switches to their bracket. Use your electrical schematics along with Figure 6-23 in the *Maintenance* chapter to ensure the correct cable is used on each prox switch.
  - b) Connect the cable to each prox switch.
6. Attach the hydraulic hoses using Figure 6-4 in the *Maintenance* chapter.
  - a) Attach the two (2) hydraulic hoses between the HPU and the press cylinder.
  - b) Attach the three (3) hydraulic hoses between the HPU and each table motor.

## Jigging

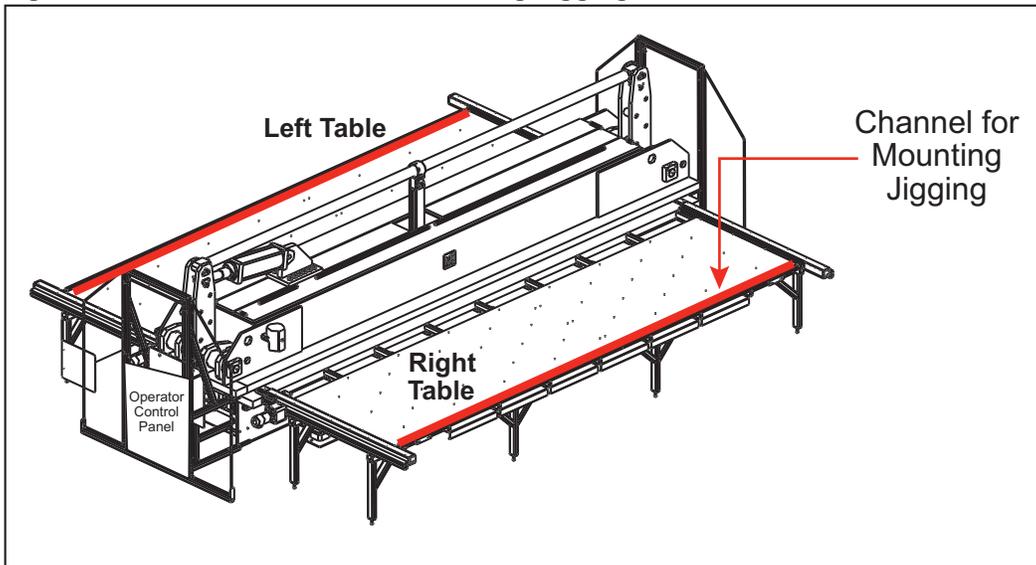
It is the customer's responsibility to make and install jigging onto the jig tables. The jigging must be in place to complete the installation. There are many different possibilities for your jigging. The press is designed for a 1-in. thick jigging surface. MiTek recommends making the bottom 1/2 in. out of UHMW plastic and the top 1/2 in. out of a steel plate.

A *Unistrut*® U-channel is mounted to the outer edge of each jig table and may be utilized for mounting your jigging. *Unistrut* hardware is **not** included with your equipment.



*The jigging must be in place to complete the installation. Table speed adjustments will be made during the startup process to account for the weight of your tables with the jigging installed.*

**Figure 3-4: Unistrut Channel for Mounting Jigging**



<b>DANGER</b>	
	<p><b>Do not attempt to start the system without a <i>MiTek</i> representative present!</b></p> <p><b>Serious injury and/or equipment damage may result.</b></p>

### Purpose of Chapter

This chapter describes the procedures required before operating your equipment.

<b>DANGER</b>	
	<p><b>DO NOT ATTEMPT TO START THE SYSTEM WITHOUT A MITEK REPRESENTATIVE PRESENT!</b></p> <p><b>Serious injury and/or equipment damage may result.</b></p>

## Preparing the Hydraulic System

Perform the following steps to prepare the hydraulic system for operation:

- Refer to the *Checking and Adding Hydraulic Fluid* section in the *Maintenance* chapter to properly fill the hydraulic reservoir.
- Before turning on the motor, fill the hydraulic reservoir and lines until the oil is within 2 in. of the top of the reservoir. Use a hydraulic fluid recommended in Table 2-5.
- After connecting electrical power and running the system for a few minutes, check for leaks throughout all hoses and fittings.

<b>CAUTION</b>	
	<p><b>Slip hazard.</b></p> <p><b>Do NOT overfill. Avoid spillage.</b></p> <p><b>Clean up any spillage immediately.</b></p>

## Checking Motor Rotation

**After** filling the hydraulic fluid reservoir, check the direction that the motors are turning. Each motor should be turning in the direction of the arrow on that motor. Figure 4-1 shows a typical motor and arrow.

1. Turn on the motors by pressing the START HPU button on the manual control panel.

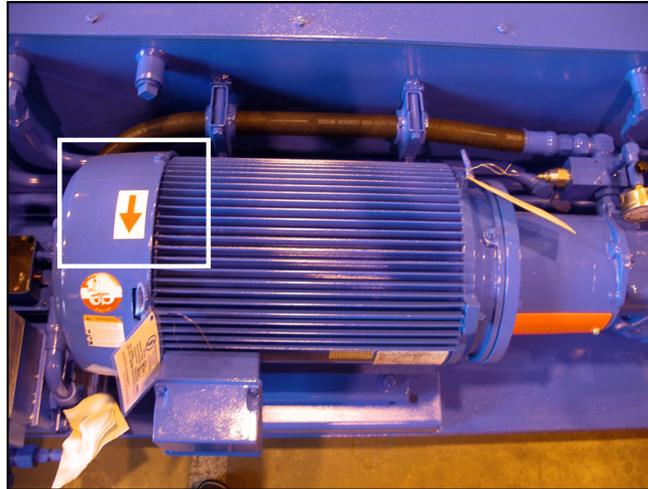
2. Observe the motor rotation on each of the three (3) electric motors.

- 1 on main HPU motor
- 2 on the fans on the HPU

3. Correct the motor rotation, if necessary.

- If all three (3) motors are turning in the wrong direction, switch any two (2) of the three (3) wires entering the top of the disconnect fuses in the main electrical enclosure on the machine.
- If only one (1) or two (2) of the motors are turning in the wrong direction, switch two (2) of the wires on that motor's overload or contactor to reverse the motor direction.

**Figure 4-1: Arrow Showing Motor Direction**



## Adjusting the Table Movement

Once the jigg is installed on the tables, the table pressure must be adjusted to account for the change in weight. Refer to the *Adjusting Operating Pressure for Jig Table Movement* section in the *Maintenance* chapter to adjust the hydraulic settings that control the jig table movement.

## ***Safety Test***

The following test procedure **MUST** be performed by qualified personnel at startup and after **ANY** maintenance, adjustment, or modification. Testing ensures that the emergency stop system and machine control system work together to properly stop the machine.

It is recommended that this test be performed daily to ensure that the safety features remain in working order.

1. Allow power to enter the machine by turning the disconnect handle to ON.
2. Check that the CONTROL POWER light on the manual control panel illuminates.
3. Press START HPU.
4. Press an E-stop and ensure that the HPU shuts off immediately and that all movement stops.
5. Repeat for all seven (7) E-stops.

### Purpose of Chapter

*This chapter describes the operating mechanisms on this equipment and the procedure to operate it in most circumstances.*

## Things to Know Before You Begin

<b>DANGER</b>	
	<p><b>Read this manual completely before using this equipment!</b></p> <p><b>Do not operate this machine until you have a thorough understanding of all controls, safety devices, emergency stops, and operating procedures outlined in this manual. Compliance with minimum recommendations outlined in this manual is essential.</b></p> <p><b>All warnings must be read and observed. Failure to do so may result in economic loss, property damage, personal injury and/or death.</b></p> <p><b>This manual must always be available to personnel operating and maintaining this equipment.</b></p>

<b>DANGER</b>	
	<p><b>Before turning on the equipment, make sure that all personnel and equipment are clear.</b></p>

## Selecting Connector Plates

This machine is designed to embed most truss connector plates. *MiTek* 20-gauge plates are recommended for most applications. It is the truss builder’s responsibility to ensure that the connector plates and embedment process meet all applicable codes and standards. Refer to Table 1-3 in the *General Information* chapter for data on capabilities.

## Stopping the Machine

### Emergency Stop (E-Stop)

Press any emergency stop (E-stop) button to stop power to the electric motor and all electrical circuits, which stops all motion. There are a total of seven (7) E-stops on the entire system. See Figure 5-1 and Table 5-1.

**Table 5-1: E-Stop Locations**

Qty.	Location
1	Electrical enclosure
2	Left table
2	Right table
1	Left automatic control station
1	Right automatic control station

### Disconnect Switch

Figure 5-2 shows the disconnect switch that controls the power supplied to the machine. It is shown in the OFF position. Turning the disconnect handle to the ON position supplies electrical power to the entire machine. To remove power to the machine, turn the disconnect handle to the OFF position. Always turn the disconnect handle off when the machine is not in use.

**Figure 5-1: E-Stop Button**



**Figure 5-2: Disconnect Handle**



## ***Starting the Machine***

A built-in electrical interlock automatically raises the press head when the HPU motor powers up.

All buttons and switches required for setup and starting of the press are on the top of the main electrical enclosure shown in Figure 5-2.

See the *Normal Operating Procedure* section in this chapter for detailed instructions on how to setup and start this equipment.

## ***Recommended Daily Safety Test***

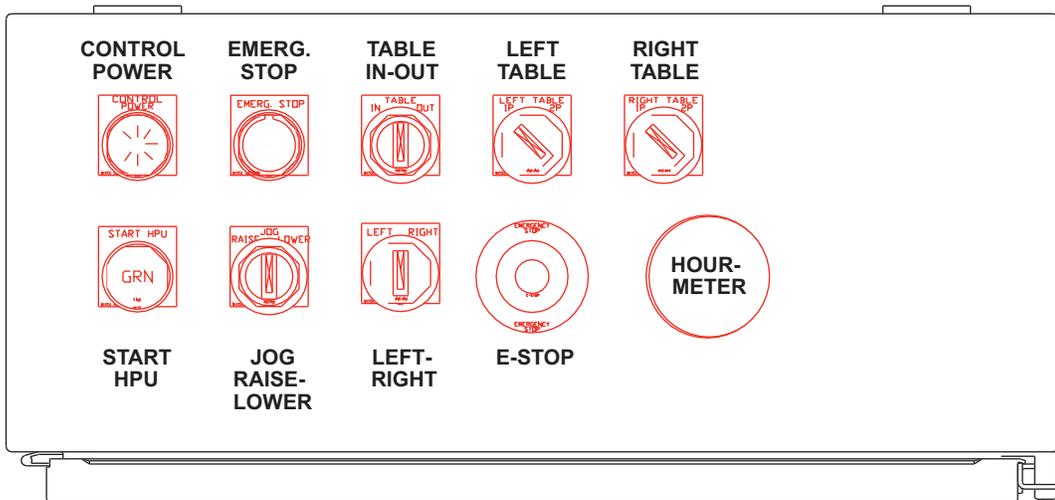
To ensure that the safety features remain in working order, perform the safety test recommended in the *Startup* chapter every day and after any maintenance, adjustments, or modifications.

## Manual Controls

All manual electric controls are located on top of the electrical cabinet. These controls are intended for use during truss setups and for troubleshooting purposes.

### Getting to Know the Manual Control Panel

Figure 5-3: Manual Control Panel



**Table 5-2: Manual Control Panel Functions**

Control Name	Type	Function
CONTROL POWER	Indicator light	Indicates when the power is turned on to the electrical panel; the disconnect handle is on, and the fuse disconnects are working
EMERG STOP	Indicator light	Indicates that an E-stop is activated and must be released before operation begins
TABLE IN-OUT	Selector switch	Moves the active jig table in or out of the press head while holding the selector switch; must hold LEFT-RIGHT switch at the same time
LEFT TABLE 1P-2P	Selector switch	Selects whether the left table cycle presses once (1P=single-press) or twice (2P=double-press)
RIGHT TABLE 1P-2P	Selector switch	Selects whether the right table cycle presses once (1P=single-press) or twice (2P=double-press)
START HPU	Button	Press to start the HPU; light in the center of the button will light up
JOG RAISE-LOWER	Selector switch	Moves press head in direction in which it is turned and held; switch returns to neutral center position when not being held; causes an automatic return cycle
LEFT-RIGHT	Selector switch	Determines which table will move when the TABLE IN-OUT selector switch is turned
EMERGENCY STOP	Mushroom pushbutton	Stops all motion; all 7 E-stops must be in their released position for the machine to operate
HOUR METER	Automatic meter to be used for maintenance purposes	Automatically tracks how long the HPU motor is running; use this information to perform scheduled preventive maintenance

## ***Cycling the Press Using Manual Controls***

The press head has an automatic return cycle, so that any time the platen lowers, it returns to home position when the pressure switch indicates the assigned pressure has been reached. The operator can initiate this automatic cycle from an automatic control station or the manual control panel.

To create a complete press cycle from the manual control panel, ensure that all E-stops are deactivated and the key is in the EN (engage) position on the applicable automatic control station.

1. Turn the press JOG selector switch toward LOWER and hold it there.

If you release the lever after the cycle is initiated, the press head will rise until the press cylinder prox switch is actuated or the hydraulic cylinder reaches the end of its stroke.

2. The press head moves down until it reaches resistance.
3. Hydraulic pressure builds up until it reaches the setting of the pressure switch.
4. At that time, the cycle reverses, and the press head automatically rises to the press cylinder prox switch cut-off.

## Automatic Controls

The *MH TrussMaker* press is equipped with two (2) identical automatic control stations, one for each jig table. They are on wheels for easy movement, but they can only move as far away from the main electrical enclosure as the cable will allow. The height is adjustable by loosening the handle on the front, then re-tightening at the desired height.

### Operating Both Tables Simultaneously

Each table is controlled by one automatic control station, but they are interlocked to prevent both tables from entering the press at the same time.

*FOR EXAMPLE:* After a START CYCLE button has been pressed on the left automatic control station, the right table will not move until the left table has returned to its home position. The right table operator can press the START CYCLE button at any time, and that cycle will begin as soon as the left table is back in its home position. The same scenario is true for both tables and both automatic control stations.

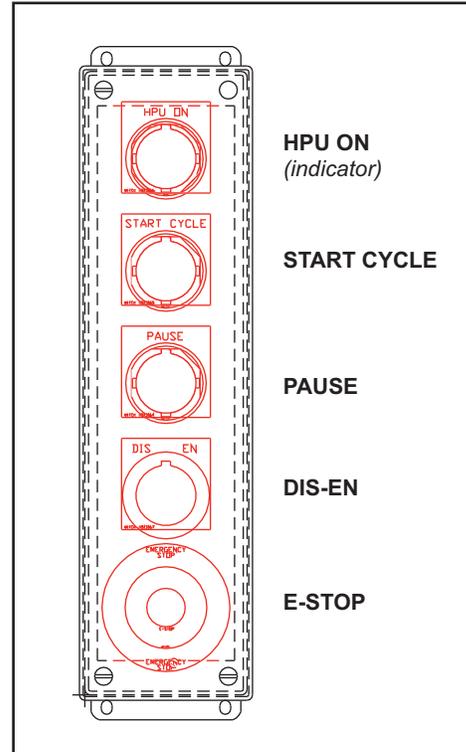
The E-stops on both automatic control stations stop motion and turn off the HPU motor.

### Getting to Know the Automatic Control Stations

**Table 5-3: Automatic Control Station Functions**

Control Name	Type	Function
HPU ON	Indicator light	Indicates that the HPU is on and the machine is operational
START CYCLE	Button	Starts the automatic sequence described below
PAUSE	Button	Pauses the table movement in the automatic sequence; see details below
DIS-EN	Key switch	When the key is in the DIS position, the jig table associated with that automatic control station cannot be cycled
EMERGENCY STOP	Mushroom pushbutton	Stops all electrical functions on the machine

**Figure 5-4: Automatic Control Station**



## Jigging and Blocking

It is the customer's responsibility to supply and install jiggling. Refer to the *Installation* chapter for details.

For small trusses, wooden blocks are required to prevent head rocking, which could result in uneven pressing action and unusually high wear on the bushings. Use blocks that are the same height as the truss material.



*Any truss that is smaller than 12 ft should be blocked on both sides of the truss. If the truss is not centered on the table, blocks may be required on larger trusses as well, but only on one side. Refer to Figure 5-5.*

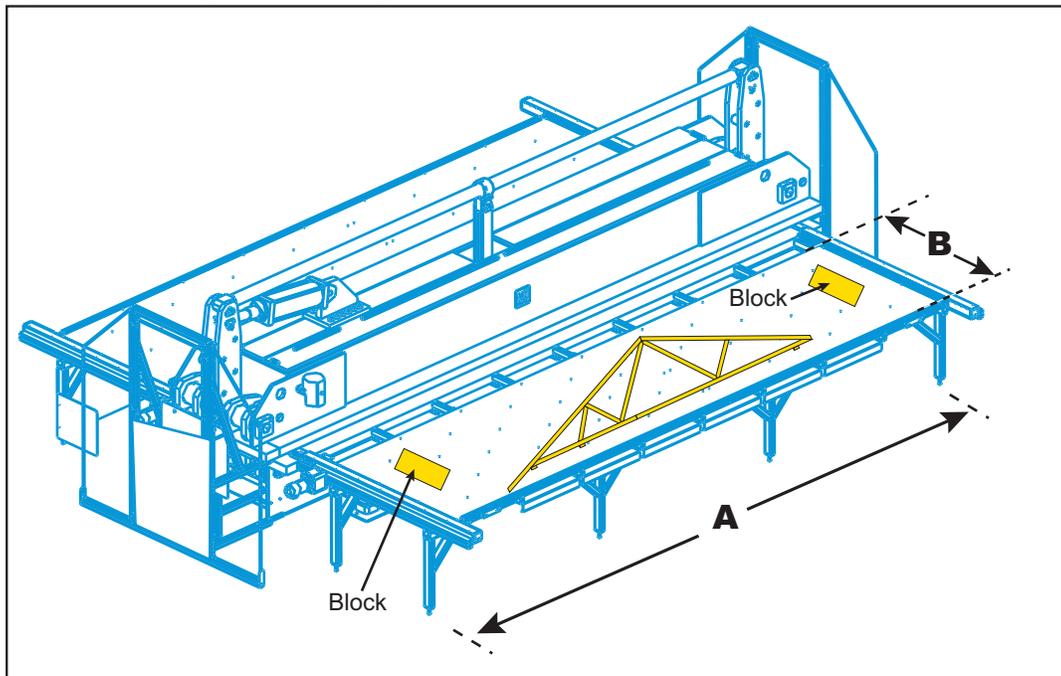
### Size of blocking:

- The thickness of the block must equal the thickness of the lumber used for the truss.
- The length of the block should cover over half of dimension B in Figure 5-5.

### Location of blocking:

- Place each block near the edge of dimension A and approximately centered in dimension B, as shown in Figure 5-5.

**Figure 5-5: Using Blocks to Jig Small Trusses**



## Normal Operating Procedure



Before any operation is started, check the IN and OUT proximity switches to ensure that they are properly set to stop the tables at the desired locations.

### Setting Up for a Cycle

1. Turn the DIS-EN key switch on the applicable automatic control station to DIS (disengaged), and remove the key.

<b>DANGER</b>	
	<p><b>Always remove the DIS-EN key from the automatic control station before entering the restricted zone!</b></p> <p><b>Failure to do so may allow someone to operate the press and could result in serious personal injury or death.</b></p>

2. Set up the truss on the jig table.
  - Use jiggling and blocking as described in the *Jiggling and Blocking* section.
  - Set the plates in place on both sides of the truss, and secure each plate with one (1) strike of a hammer.
3. Adjust the table prox switches to the desired location.
4. From the manual control panel:
  - a) Turn the disconnect handle to ON and ensure that the CONTROL POWER light on the manual control panel lights up.
  - b) Ensure that the EMERGENCY STOP indicator light is off. If not, locate the E-stop button that is activated and pull out on the button to deactivate it.
  - c) Select 1P (single-press) or 2P (double-press) for each table.
  - d) Press the START HPU button.

You are now ready to operate the press in automatic mode from the automatic control station.

## ***Cycling in Automatic Mode***

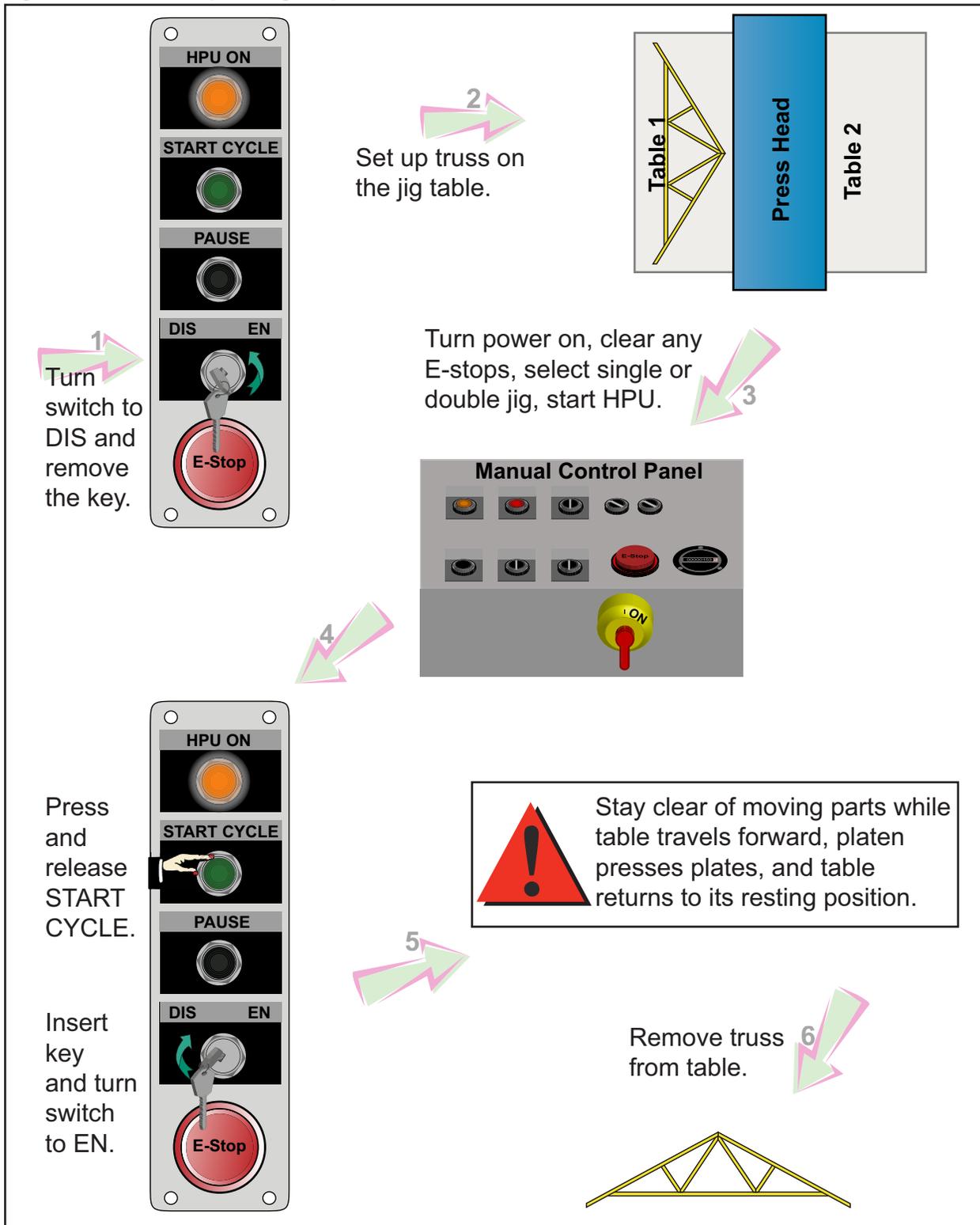
1. From the automatic control station, check to ensure that:
  - a) All personnel are clear of the restricted zones.
  - b) The HPU ON light is lit up.
  - c) The DIS-EN key switch is pointing to EN (engaged).
  - d) The 1P-2P selector switch is selecting the desired mode (for double-press machines only).
2. Press and release the START CYCLE button.
  - a) The jig table travels forward until the 1P table prox switch stops it under the press platen.
  - b) The press platen travels down until hydraulic pressure builds up to the pressure switch setting and the press dwell time is complete.
  - c) The press platen rises until it activates the press cylinder prox switch.
3. For double-press (2P) cycle only:
  - a) The jig table slides in until it reaches the 2P table prox switch.
  - b) The press platen travels down until hydraulic pressure builds up to the pressure switch setting and the press dwell time is complete.
  - c) The press platen rises until it activates the press cylinder prox switch.
4. When the jig table slides out and comes to a complete stop, remove the completed truss from the table.

## ***Pausing the Cycle***

Press the black PAUSE button on an automatic control station to temporarily stop the cycle. When the cycle is paused this way, there are two (2) options that allow operation to resume:

- Press the START button to resume the cycle at the point it stopped.
- OR
- Press PAUSE again to reset the cycle at the beginning.

Figure 5-6: Normal Operating Sequence



## **Resetting Output Circuit Breakers**

It is a possibility that something may trip the output circuit breaker inside the main electrical enclosure during operation. The press system will continue to function until the cycle is affected by the tripped circuit breaker. Depending on which circuit breaker is tripped, a valve or a prox switch may not communicate with the PLC, causing the cycle to pause.

To remedy this situation in the short term, follow the steps below.

<b>DANGER</b>	
	<p><b>Always disconnect all power from the power source before opening the electrical enclosure. Failure to do so may result in fatal injury!</b></p>

1. Press an E-stop button.
2. Lockout and tagout the main power source.
3. Open the main electrical enclosure.
4. Flip the handle on the tripped circuit breaker.
5. Remove the lockout and tagout devices and resume operation.

If the circuit breakers continue to trip, refer to the *Troubleshooting* chapter to locate the source of the problem.

## **Adjustments**

Refer to the *Maintenance* chapter for instructions on making adjustments to the equipment.

### Purpose of Chapter

*This chapter provides step-by-step instructions as well as information to help you understand how your equipment works to enable you to make repairs and perform preventive maintenance.*

## Introduction to Maintaining Your Equipment

This manual contains sufficient information for proper operation and maintenance under most conditions. Certain operating environments may necessitate preventive maintenance at more frequent intervals. Consistent preventive maintenance is important for keeping mechanical equipment in good operating condition. MiTek recommends that you stock certain replacement parts to minimize downtime.

The following information is available in the appendices and will assist you in maintaining your equipment:

- Troubleshooting information
- Replacement part numbers
- Recommended spare parts to stock
- Preventive maintenance checklist
- Drawings

<b>DANGER</b>	
	<p><b>Read this manual completely before using this equipment!</b></p> <p><b>Do not operate this machine until you have a thorough understanding of all controls, safety devices, emergency stops, and operating procedures outlined in this manual.</b></p> <p><b>All warnings must be read and observed. Failure to do so may result in economic loss, property damage, and/or personal injury.</b></p> <p><b>This manual must always be available to personnel operating and maintaining this equipment.</b></p>

## Performing Maintenance Safely

<b>DANGER</b>	
	<p><b>Only qualified personnel should attempt to install, operate, or perform maintenance on this equipment.</b></p> <p><b>Compliance with the minimum recommendations outlined throughout this manual is essential.</b></p>

Whenever it becomes necessary to enter the press area, use extreme caution. In addition to your company's safety procedures, the rules in preliminary pages of this manual along with the following guidelines will help you avoid personal injury and damage to the equipment while performing maintenance.

1. If working near the press, lower the upper platen as low as it will go.
2. Activate any E-stop.
3. Turn off and lock out the main disconnect handle on the machine.
4. If electrical service is required inside the main electrical enclosure, lock out the main service panel for this machine.
5. Never enter the press area or climb on a jig table while the press is powered on or operating.
6. If service requires entering the press area or climbing onto the jig tables, follow all safety procedures.
7. NEVER restart the machine until it is certain that ALL personnel and ALL obstructions are clear.
8. Perform the safety test recommended in the *Startup* chapter every day and after making repairs or adjustments to the machine.

## Lubrication

**CAUTION**

Never mix synthetic lubricants with mineral lubricants!

Do not inject excess grease into sealed bearings. It may rupture seals.

Proper amounts of motor oil and grease must be maintained at all times. The type of lubrication used, frequency of application, oxidation, and contamination of the lubricant affect service life and parts efficiency of gears and bearings. Improved performance will be obtained by following the guidelines in this manual. The information is also in the *Maintenance Checklist* appendix.

### Type of Lubrication

Always use an EP2 lithium-based grease or equivalent. It is recommended that you use Lubriplate #1242. Refer to the *Parts List* appendix for the MiTek part number.

### Manual Lubrication Required

#### Table Bearings

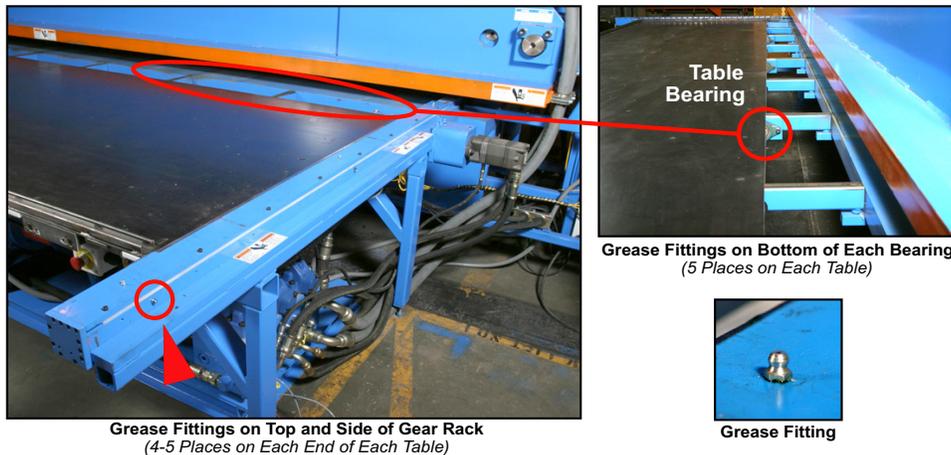
Each table has five (5) shaft bearings that must be greased manually. The amount of grease and frequency depends somewhat on your environment and usage schedule. We recommend using a small amount of grease approximately every 200 working hours. Too much grease will cause overheating.

The fittings are located under the motor and under every other table arm along each table shaft (under the table).

#### Gear Rack

There are 4 or 5 grease fittings along the top and side of the gear rack plates on both sides of the tables. The fittings reach through the guide strips to lubricate the gear rack. Every week, administer one (1) shot of grease to each of these fittings.

**Figure 6-1: Location of M3annual Grease Fittings**



## Automatic Lubrication System

This equipment has an automatic lubrication system for the press. Basic instructions are given here, but refer to the User Manual from Lincoln for more details on the auto-lube system. It is recommended that a complete system check be performed on a periodic basis. Refer to the *Troubleshooting* appendix.

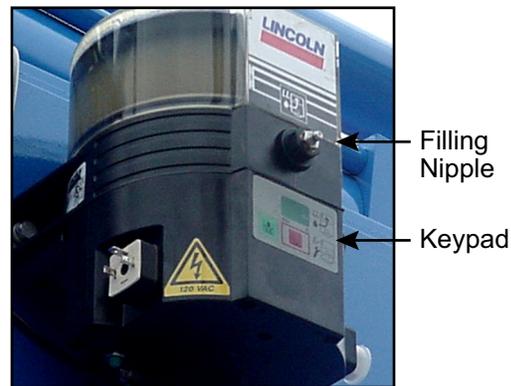
The automatic lubrication system consists of a reservoir that has a pump and a timer, and two (2) valve blocks.

### Checking Lubrication

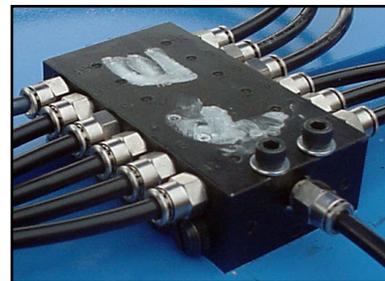
The machine has a convenient automatic lubrication (auto-lube) system that greases all grease points automatically. To do so, the auto-lube system must contain an adequate amount of grease. The grease level in the auto-lube system should be checked at least once per 8-hour shift. To add lubrication, follow the steps below, or refer to the User Manual from Lincoln.

1. View the MAX and MIN markings on the reservoir cover. The reservoir is the container above the filling nipple shown in Figure 6-2.
2. Check the stirring paddle in the reservoir. It should rotate at start-up and periodically during operating hours.
3. If the paddle is not rotating, follow the system test procedure in the installation and operation instructions of the Lincoln manual.

**Figure 6-2: Grease Reservoir**



**Figure 6-3: Grease Valve Block**



### Adding Lubrication

1. Fill the reservoir to the MAX line using the nipple on the front of the reservoir.
2. Make sure all air has been expelled from under the follower plate after refilling the reservoir.

*The follower plate sits on top of the grease inside the reservoir. The follower plate seal should contact the hole located on the top of the reservoir. A small amount of grease should be refilled to ensure expelling of air from under the follower plate.*

### **Overriding the Lubrication Timer**

The lubrication system is programmed by MiTek to cycle for 1 minute once every 2 hours. You can override this setting and manually trigger a grease cycle by pressing the green activation button on the keypad that is on the front of the reservoir. When you manually trigger a grease cycle, the clock tracking the two (2) hours between cycles resets to zero (0).

The frequency of the cycle can be adjusted. Refer to the User Manual from *Lincoln* for instructions.

### **Replacing the Pistons in the Lubrication System**

- If it becomes necessary to replace the pistons, remove each piston with caution. Note the direction of the top and bottom of each piston.
- During re-assembly, each piston **MUST** be returned to its respective bore **IN THE SAME ORIENTATION**.
- If blockage is extremely severe and hard, replace the **ENTIRE** divider valve block.

### **Maintaining the Electric Motor on the Lubrication System**

- Periodically inspect the electric motor for excessive dirt, friction, and vibration.
- Remove dust from inaccessible locations using compressed air.
- Keep the ventilator openings clear to allow free passage of air.

*The motor is equipped with double-shield ball bearings having sufficient grease to last indefinitely. When the motor is used continuously in a dirty, wet, or corrosive atmosphere, it is advisable to add ¼ ounce of grease per bearing after every 1,000 hours of operation.*

## **Motors**

### **Maintaining Motors**

#### **Location of Motors**

There are three (3) electric motors on the HPU:

- 30-hp electric motor that powers the HPU pump
- 1/4-hp electric motor that runs a cooler on the HPU
- 1/4-hp electric motor that runs a second cooler on the HPU

There is one (1) hydraulic motor on each of the two (2) tables.

#### **Preventive Maintenance**

Periodically inspect all three (3) electric motors for excessive dirt, friction, and vibration. Remove dust with a dry rag. Use compressed air to remove dirt and dust from inaccessible locations. Keep the ventilator openings clear to allow free passage of air.

The hydraulic motors are sealed so there are no ventilator openings to keep clean, but it is always a good idea to minimize dust build-up on all components.

### **Replacing Motors**

Refer to the *Parts List* appendix for part numbers.

## Hydraulic System Overview



### Refer to...

Look at the name plate on your HPU to determine your HPU number.

The pressing action and the table movement of this machine is accomplished by hydraulic pressure. Two (2) separate hydraulic motors control the two (2) tables' movement independently from one another. A cylinder on top of the press head controls the platen. A combination of valves affect the amount of pressure the system uses for different functions.

Use the graphics in this section to aid you in the procedures described throughout the *Maintenance* chapter. They will also be useful when troubleshooting and searching for replacement parts.

**Table 6-1: Valve Stack and Manifold for HPU #88259-501**

Callout in Figure 6-4	Label on HPU	Description	To Adjust
1	Pressure 3	Hose from back of pump, transports fluid out to press valve stack	N/A
2	CPRV 1B	Cross port relief valve (cushion valve), left table out	Loosen nut and turn screw
3	Relief Valve 3	Pressure relief valve for the press	Loosen nut and turn screw
4	Regen Check	Check valve for press; not adjustable	N/A
5	CPRV 2B	Cross port relief valve (cushion valve), right table in	Loosen nut and turn screw
6	Flow Control 1A	Left table in	Turn knob
7	Flow Control 1B	Left table out	Turn knob
8	Regen Valve	Regenerative circuit valve for press; see <i>Adjusting the Regenerative Circuit Valve</i>	Loosen nut and turn screw
9	Flow Control 2A	Right table out	Turn knob
10	Flow Control 2B	Right table in	Turn knob
11	Pressure 1-2	Hose; transports fluid out to both tables	N/A
12	Tank 1-2	Hose to cooler	N/A
13	Check Valve 1-2	Both tables	N/A
14	Relief Valve 1-2	Pressure relief valve for both tables	Loosen nut and turn screw
15	—	Valve stack for press	N/A
16	—	Valve stack for right table	N/A
17	—	Valve stack for left table	N/A
18	CPRV 1A	Cross port relief valve (cushion valve), left table in	Loosen nut and turn screw
19	Case 1	Small hose to motor on left table	N/A
20	CPRV 2A	Cross port relief valve (cushion valve), right table out	Loosen nut and turn screw

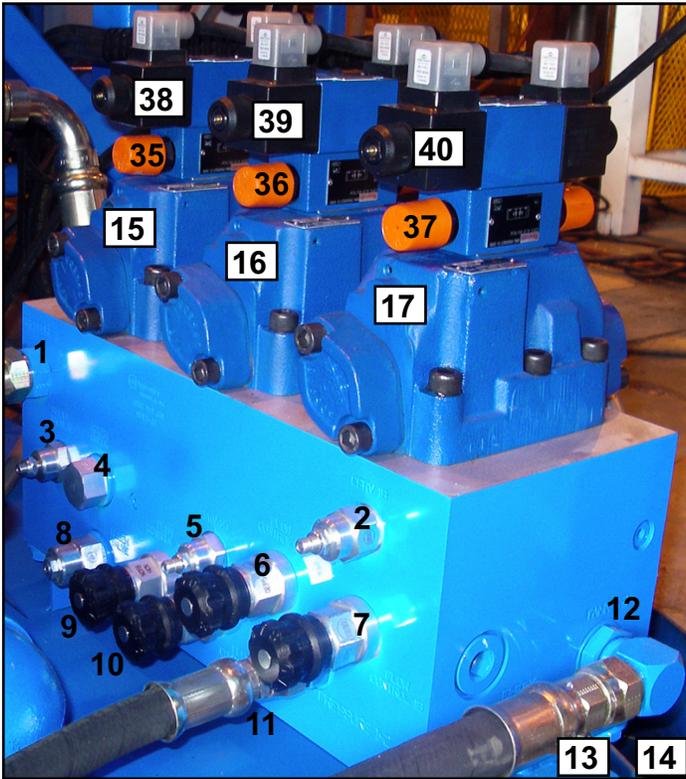
**Table 6-1: Valve Stack and Manifold for HPU #88259-501 (Continued)**

Callout in Figure 6-4	Label on HPU	Description	To Adjust
21	Case 2	Small hose to motor on right table	N/A
22	A3	Hose to press, cap end	N/A
23	B1	Moves left table out; hose to left table motor, right port (B)	N/A
24	A1	Moves left table in; hose to left table motor, left port (A)	N/A
25	Gage A3	Port to plug in temporary gauge for troubleshooting press	N/A
26	Counterbalance	Valve that causes platen to move down in a smooth motion; prevents free fall	Loosen nut and turn screw
27	Gage 1-2	Port to plug in temporary gauge for troubleshooting both tables	N/A
28	B2	Moves right table out; hose to right table motor, right port (B)	N/A
29	A2	Moves right table in; hose to right table motor, left port (A)	N/A
30	Gage B3	Port to plug in temporary gauge for troubleshooting press	N/A
31	B3	Hose to press, rod end	N/A
32	Check Valve 3	Press	N/A
33	Tank 3	Hose to reservoir	N/A
34	Gage 3	Hose to pressure switch	N/A
35	—	Pilot choke for press	Allen wrench
36	—	Pilot choke for right table	Allen wrench
37	—	Pilot choke for left table	Allen wrench
38	—	Solenoid for press; manually actuates press, back side controls “up”	Allen wrench
39	—	Solenoid for right table; manually actuates table, back side controls “in”	Allen wrench
40	—	Solenoid for left table; manually actuates table, back side controls “out”	Allen wrench
41	—	Pilot choke for left table	Allen wrench
42	—	Pilot choke for right table	Allen wrench
43	—	Pilot choke for press	Allen wrench
44	—	Solenoid for left table; manually actuates table, front side controls “in”	Allen wrench
45	—	Solenoid for right table; manually actuates table, front side controls “out”	Allen wrench
46	—	Solenoid for press; manually actuates press, front side controls “down”	Allen wrench

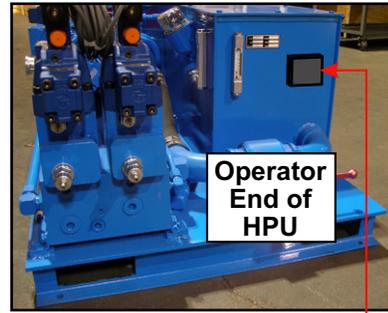
Figure 6-4: Valve Stacks on HPU #88259-501

## Valve Stacks on HPU #88259-501 For Press and Tables

Back Side of Valve Stack Manifold



General Location



Pressure Switch

Side Closest to Press Head



Front Side of Valve Stack Manifold

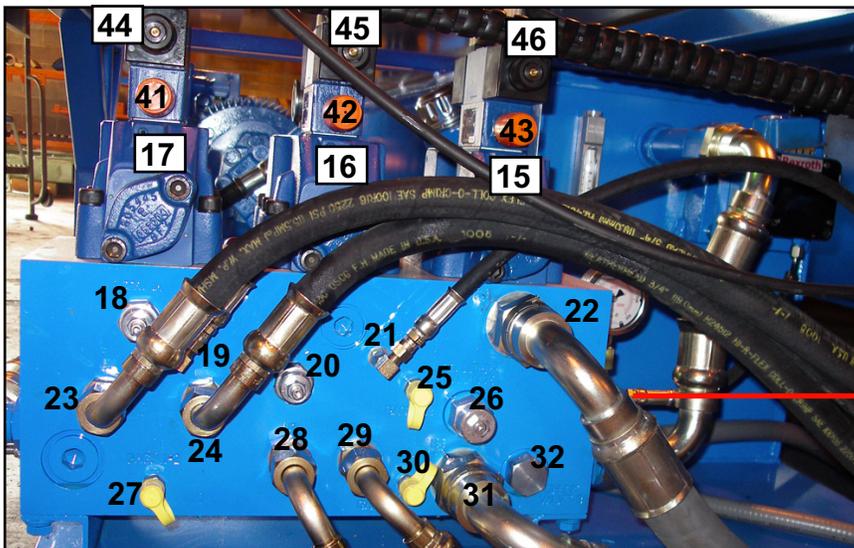


Figure 6-5: Valves for Adjusting the Tables, HPUs #88258-501 and JF Numbers Only

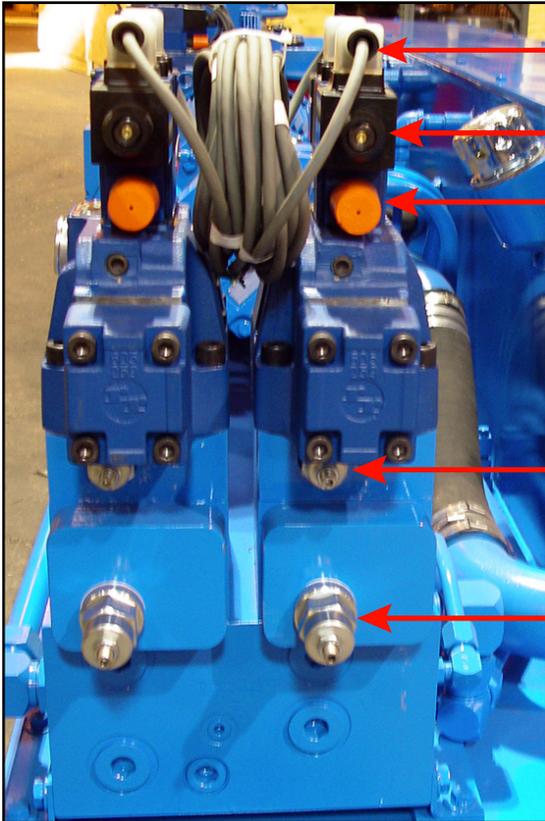
**Valve Stacks on HPUs  
#88258-501 and Prior Models  
Tables Only**  
(facing from operator end)

General Location



Left Table Valve Stack

Right Table Valve Stack



- Solenoid Cable
- Pilot Valve
- Pilot Choke
- Cushion Valve
- Flow Control Valve



HPU #88258-501 and #JF-664747/5687

HPU #JF-592879/4385-1 and #JF-592879/4385-2

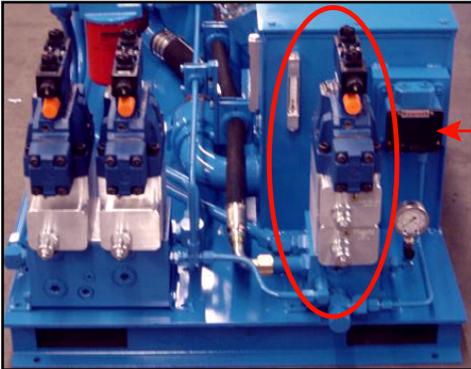
The return line filter for the table system is shown on the Valve Stack for Press graphic.  
The relief valve is shown in the Relief Valves graphic.

Figure 6-6: Valves for Adjusting the Press, HPUs #88258-501 and JF Numbers

## Valve Stacks on HPUs #88258-501 and Prior Models

### Press Only

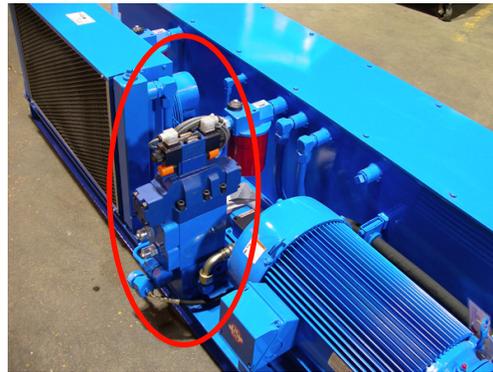
General Location for HPU #88258-501



See previous section for location of relief valves.

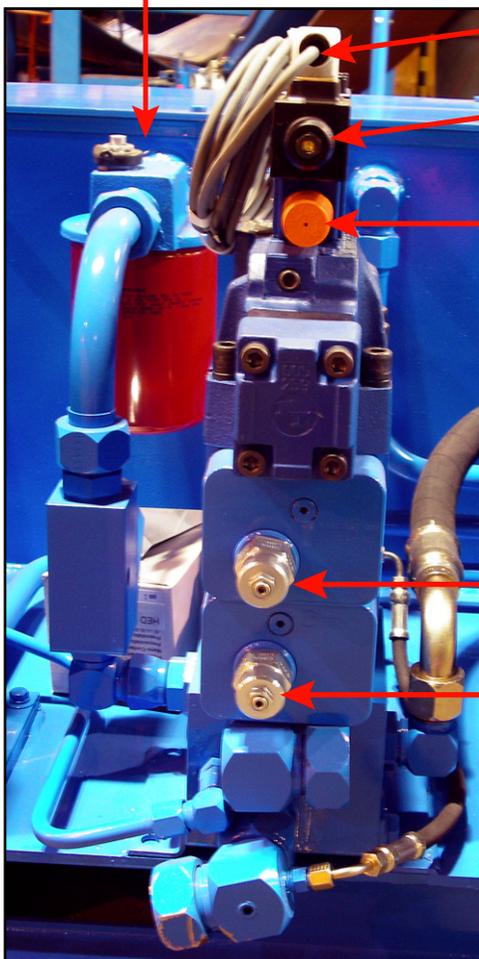
Pressure Switch

General Location for HPUs With Any JF #



Pressure switch is located behind valve stack. See subsequent section for location of relief valves.

Return Line Filter  
(2nd Return Line Filter Behind Fan)



HPUs #88258-501 and #JF-664747/5687

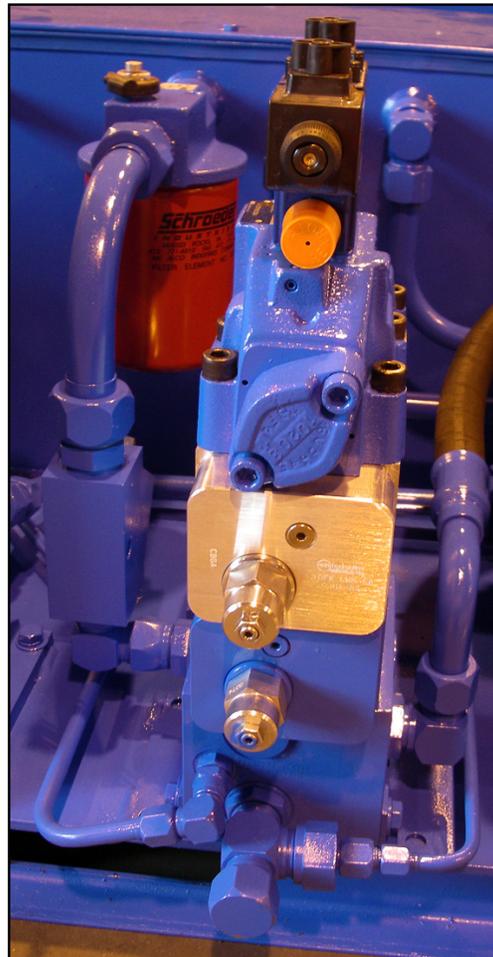
Solenoid Cable

Pilot Valve

Pilot Choke

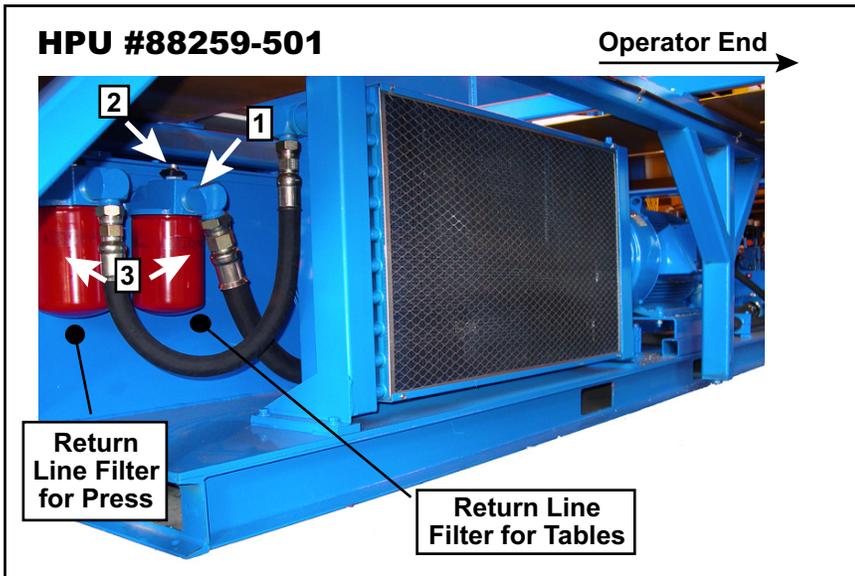
Regenerative Valve

Counterbalance Valve



HPU #JF-592879/4385-1 and #JF-592879/4385-2

Figure 6-7: Return Line Filters



- 1= Filter Base
- 2 = Pop-Up Gauge
- 3 = Cartridge  
*(holds filter element)*

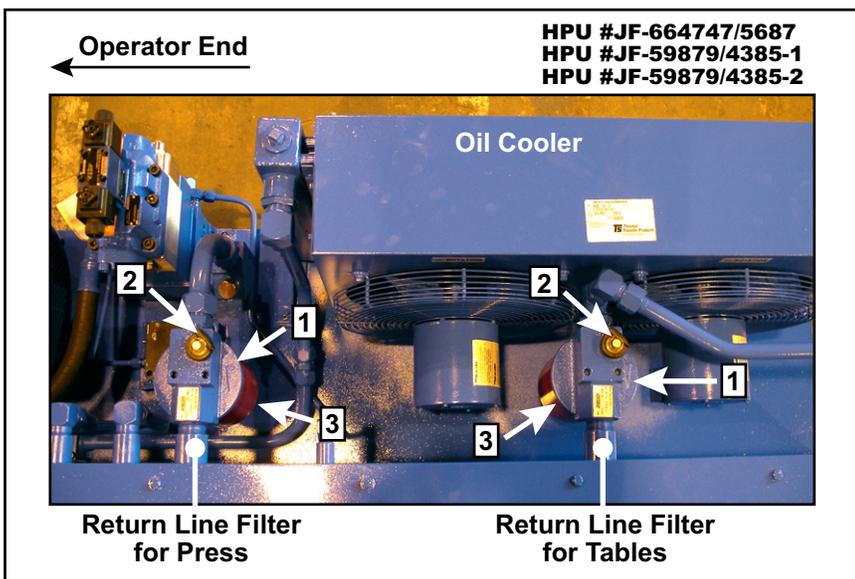
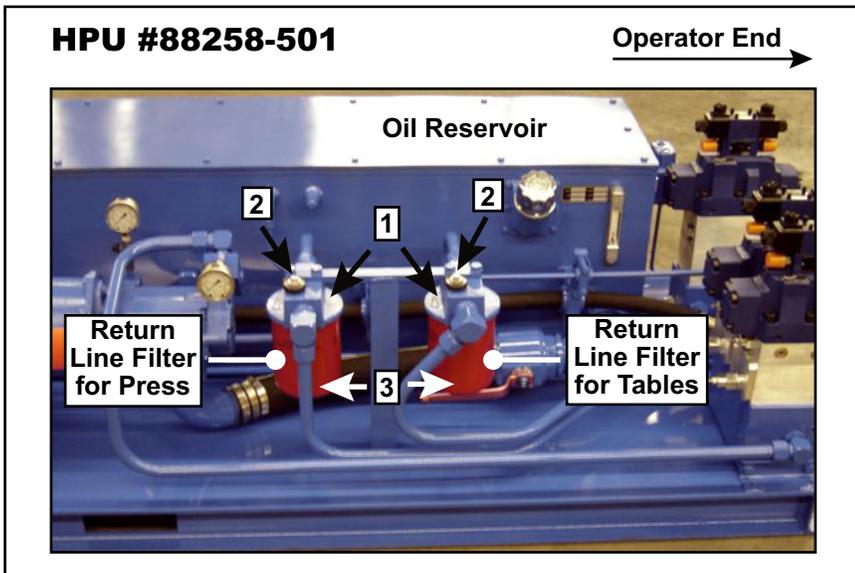
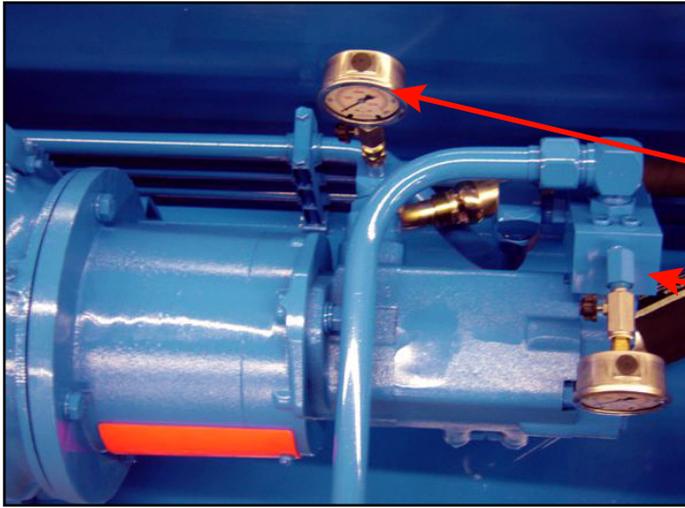


Figure 6-8: Pressure Relief Valves

**HPU #88259-501 - Refer to Valve Stack Graphic**

**HPU #88258-501**



Relief Valve for Press

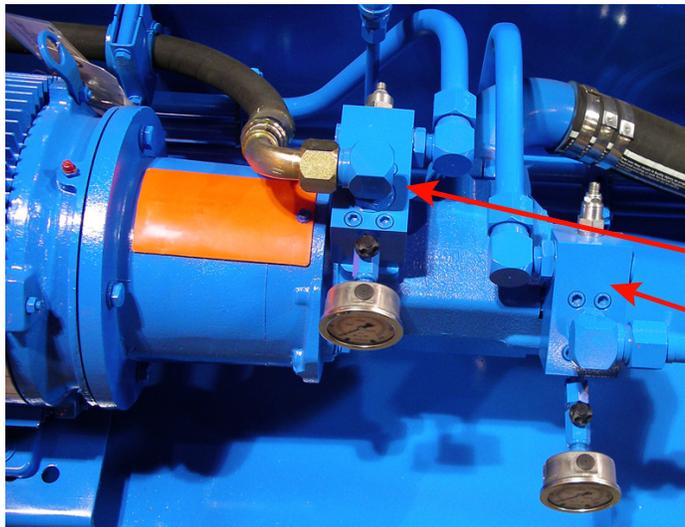
Gauge for Relief Valve for Press

Relief Valve for Tables

**Operator End of HPU #88258-501 Only**



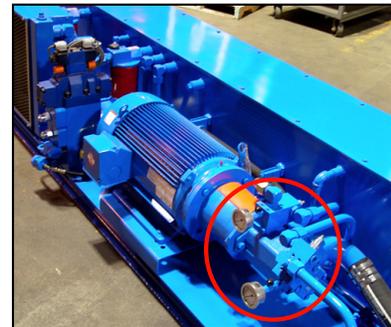
**HPU #JF-664747/5687**



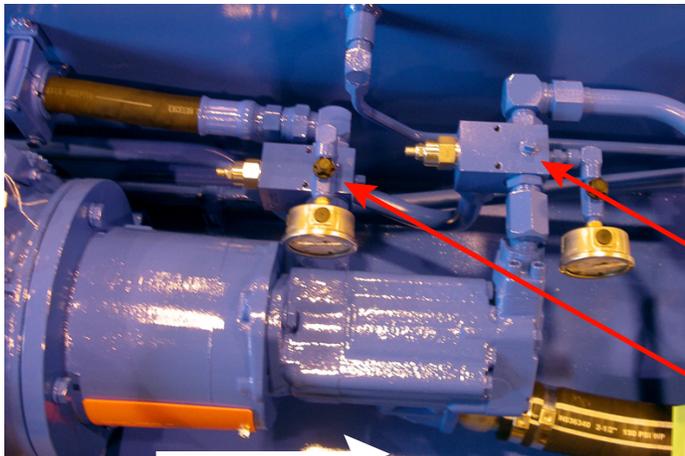
Relief Valve for Press

Relief Valve for Tables

**General Location**



**HPU #JF-59879/4385-1 and HPU #JF-59879/4385-2**



Relief Valve for Tables

Relief Valve for Press

## Hydraulic System Scheduled Maintenance

The hydraulic system consists of two (2) separate lines fed by the same reservoir. Refer to the hydraulic schematic for a detailed illustration.

### Hydraulic Fluid Specifications

In hydraulic systems, oil is a vital factor in equipment performance and maintenance. It both lubricates and transfers power. Oil used in the hydraulic power unit for the *MH TrussMaker* press must conform to the following specifications:

- 130 gallons of hydraulic fluid are required for initial charge.
- Mobile DTE 24 or an equivalent hydraulic fluid is recommended for operation within the recommended temperature range. It contains beneficial additives that other ISO 32 oils may not have.
- Anti-wear type industrial hydraulic petroleum oil should be used. Synthetic fluids or fluids containing water are not recommended for hydraulic systems.
- Refer to Table 6-2 for hydraulic fluid specifications. See the footnotes if operating outside the recommended temperature range.

**Table 6-2: Recommended Hydraulic Fluid**

Recommended ISO Grade <sup>a</sup>	ISO 32	
Recommended Operating Viscosity Range	60-245 SUS	
Operating Temperature <sup>b</sup>	At startup	> 68°F
	During Operation	86°F-120°F
Reservoir Capacity	120 gallons	
Capacity of Hydraulic Lines	>2 gallons	

a. If operating outside the recommended temperature range, select a hydraulic fluid that will operate at the proper SUS range for your temperatures. See the *Determining the Correct Hydraulic Fluid* section if leaking occurs.

b. HPU's manufactured after April 2005 have couplings for easy installation of an immersion heater. See Table 1-2 to order the heater option for your hydraulic fluid reservoir.

**CAUTION**

Hydraulic fluid must be above 68°F before starting the HPU with ISO 32 hydraulic fluid or serious damage to the hydraulic components may result.

Use an immersion heater to warm the hydraulic fluid prior to starting the equipment in cold weather.

## Determining the Correct Hydraulic Fluid

If back pressure through the filters is causing the filter gaskets to pull away from the housing and leak oil, change to a thinner hydraulic fluid. If currently running ISO 32 oil, move to ISO 22 oil. Be sure to use the proper filter element, listed in the *Parts List* appendix.

## Checking and Adding Hydraulic Fluid

See Figure 6-9. Check the level of the hydraulic fluid after every 200 working hours by viewing one of the two (2) sight gauges on the HPU.

To fill the reservoir, unscrew the reservoir cap and pour a recommended oil into the reservoir until the oil is within two (2) in. from the top of the reservoir. If pumping oil into the reservoir, you must remove the collar and screen underneath the cap.

**Figure 6-9: Operating the HPU**



**Remove cap to fill.**



As your hydraulic fluid is used, it begins to break down and may alter the performance of the machine.

Minor adjustments may be required after replacing hydraulic fluid.

Always replace the screen and cap immediately to prevent debris from falling into the reservoir.

## Replacing the Hydraulic Fluid

The hydraulic fluid in the reservoir should be sampled and lab-tested every three (3) months. Test results should be compared with the oil manufacturer's recommendations and tolerances. The life cycle of the oil will vary based on type of oil, ambient conditions, duty cycle of the machine, wear of hydraulic components, and frequency of filter replacements. Always follow the recommendations of the oil manufacturer.

Completely drain and refill the reservoir if you change the type of hydraulic fluid in use.



*New hydraulic fluid is not always filtered and may wear out the return line filters quickly. Ensure that you have two (2) filters to be used as replacement parts shortly after replacing hydraulic fluid.*

The reservoir has a drain plug to drain the fluid through. You must have 130 gallons of new fluid in stock to refill the reservoir and lines.

- It is best to change hydraulic fluid when the system is at operating temperature to promote drainage of the maximum amount of impurities in suspension.

- After the oil has drained completely, replace and secure the drain plug and fill the reservoir to the high-level mark with a recommended fluid.
- To eliminate the possibility of spillage, it is recommended that a suction pump be used to remove the fluid from the reservoir. Some suppliers offer this service.
- Always replace the return line filter when changing the fluid and shortly thereafter.

**CAUTION**

**Always dispose of used hydraulic fluid in accordance with local, state, and federal laws.**

### ***Replacing the Hydraulic System Filter Elements***

There are two (2) return line filters on the hydraulic power unit, one (1) for the press hydraulic system and one (1) for the table hydraulic system. Refer to Figure 6-7 for locations.

Replace the filter element before the pop-up gauge is activated to prevent obstructions from entering your hydraulic lines. When the gauge pops up, the system immediately starts bypassing the filter.

It is recommended that both filters be changed every 200 working hours. Because oil quality is affected by many different variables, this time span can be adjusted after recording the history of your machine for one (1) full year. Refer to the *Parts List* appendix for the filter, filter element, and pop-up gauge part numbers.

**CAUTION**

**The filter elements recommended for the *TrussMaker* are synthetic filters that last longer and filter more effectively than the paper elements commonly used.**

**The proper filter elements must be in place to guarantee the reliability of the hydraulic system.**

To replace the filter element, unscrew the canister from the filter base, replace the element inside, and screw the canister back onto the filter base.



*Most problems with hydraulic equipment are due to a lack of preventive maintenance. Follow all guidelines in this manual carefully to avoid unnecessary downtime.*

## Hydraulic System Repair Maintenance

### Closing the Fluid Line Exiting the Reservoir

A ball valve allows you to close off the path the oil takes out of the reservoir. It is open when the handle is parallel to the pipe (on some machines, open is in the horizontal position). The only time the valve should be closed is when you are replacing the pump or performing similar maintenance.

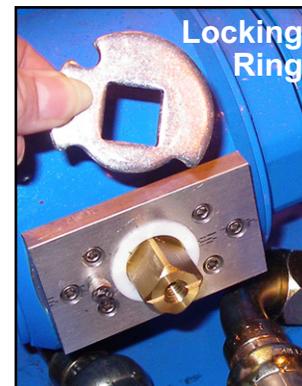
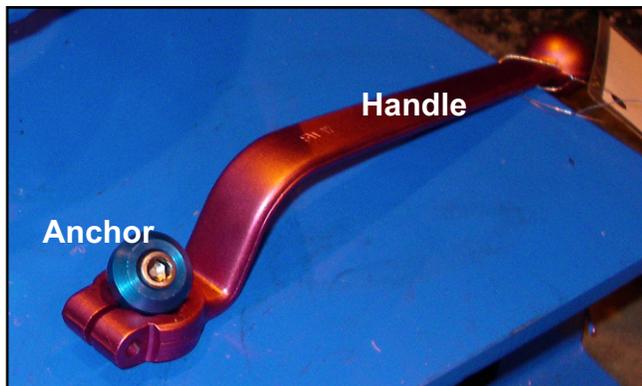
Shutting the valve prevents fluid from entering the hydraulic lines. To prevent the valve from being accidentally shut, there is a locking ring inside the handle.

The sign shown in Figure 6-10 is attached to the ball valve handle when the HPU is manufactured to remind you of the following steps required to close the ball valve.

**Figure 6-10: Reservoir Ball Valve**



**Figure 6-11: Closing the Lines from the Reservoir to the System**



1. Remove the handle and the locking ring.
  - a) Unscrew the anchor in Figure 6-11 using a 1/4-in. Allen wrench.
  - b) Pull the handle off.
  - c) Pull the locking ring off.
2. Replace the handle without the locking ring.
3. Turn the handle to its open position.
4. When maintenance is complete, replace the locking ring behind the handle and return the handle to its open position.

## ***Replacing the Pump***

### **Removing the Pump**

The pump is easily removed by unscrewing four (4) mounting bolts. It is **not** necessary to disconnect the oil lines for this operation.

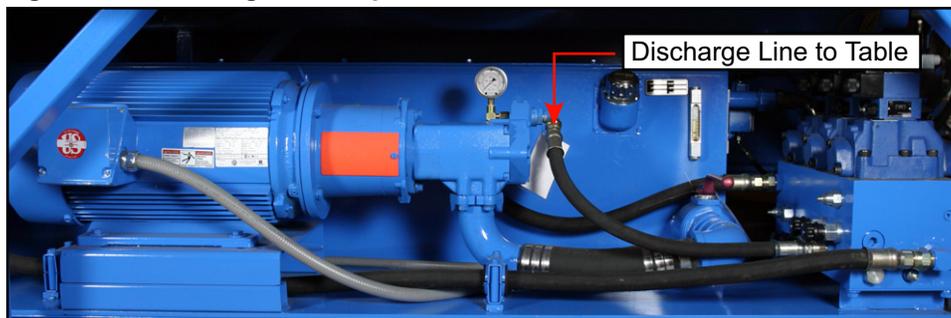
### **Installing the New Pump**

Replace the faulty pump with a new pump and mount it in place with the four (4) mounting bolts.

## ***Priming the Pump***

Although highly unlikely, it is possible for the vane pump to lose its prime. If this occurs, perform these steps while referring to Figure 6-12.

**Figure 6-12: Priming the Pump**



1. Slightly loosen (1/8 to 1/4 turn) one of the hex nuts connected to any one of the pump discharge lines.

*The air can escape through this slight opening and oil should eventually leak from the fitting connection point. If you back the nut off too far, oil will begin to spray out unnecessarily.*

2. When you see oil leaking from the connection point, securely tighten the nut. You should notice a dramatic change in the sound of the pump when it regains its prime.

## Installing or Replacing an Immersion Heater

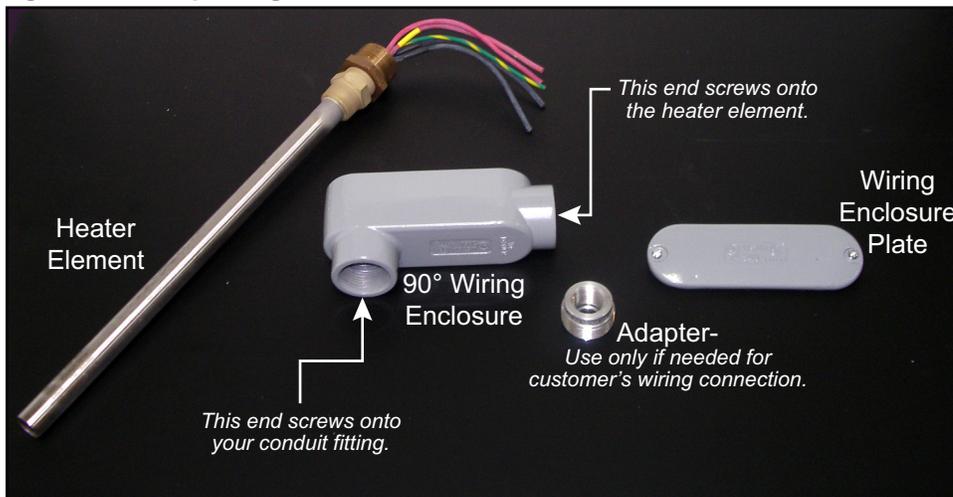
Immersion heaters are sometimes used in the hydraulic fluid reservoir to keep the temperature of the hydraulic fluid within the acceptable operating range. The option can be purchased from MiTek prior to installation of your machine or a field installation for the heaters can be purchased after your machine is installed.

If an immersion heater must be replaced, follow these steps while referring to Figure 6-13. Refer to the *Parts List* appendix for the part number.

If the immersion heaters are being installed for the first time on this machine, the electrical drawing lists the electrical supplies that must be supplied by the customer. Follow the schematic to install the necessary terminal blocks, DIN rail if necessary, and all electrical connections.

1. Remove the wiring enclosure plate from the back of the wiring enclosure.
2. Disconnect all wiring from inside the wiring enclosure.
3. Unscrew the wiring enclosure from the heater fitting.
4. Unscrew the heater from the reservoir port.
5. Reverse the steps above to install a new heater.

**Figure 6-13: Replacing an Immersion Heater**



## Adjustments



**Refer to...**

Figure 6-4

Figure 6-5

Figure 6-6

Figure 6-7

Figure 6-8

Look at the nameplate on your HPU to determine your HPU number.

Refer to Figure 6-5 and Figure 6-6 when making adjustments to the hydraulic system. Additional graphics are located throughout the text.

### Understanding the Table Valves

The relief valves (or pressure relief valves) control the amount of pressure reaching the other valves in the line, which are the cross port relief valves and flow control valves.

A cross port relief valve is also known as a cushion valve, cross over relief valve, or brake valve. The cross port relief valves prevent the hydraulic motor from over-pressurization due to a rapid stop. If set too low, the motor will never rotate. If set too high, motor stops may become too sudden.

There are two (2) sides to a cross port relief valve. One side controls the table going in and the other controls the table coming out. It is best to set one side at a time.

The flow control valves work with the cross port relief valves to fine-tune the setting.

The solenoids provide electrical signals to the pilot valves and are located on top of each valve stack.

### Adjusting Where the Tables Stop Motion

To adjust where the table stops after entering the press or exiting the press, adjust the location of the table prox switches. The procedure is given in the *Proximity (Prox) Switches* section in this chapter.

- Set each table-in prox switch so it stops the table just before the rubber bumpers touch the lower platen.
- Set each table-out prox switch to stop the table before the rack leaves the gear.

### Adjusting the Jig Table Speed (for Minor Adjustments)

To make minor adjustments to the speed of a jig table, complete the following steps:

1. Locate the correct flow control valve. It is located on the table valve stack for the applicable table. See the graphics in the *Hydraulic System Overview* section.
2. Unlock the flow control valve by pushing the locking collar toward the manifold.
3. Turn the flow control valve knob.
  - a) For all HPU units **EXCEPT** HPU #JF-59879/4385-2:
    - Clockwise increases the speed of the table\*



As your hydraulic fluid is used, it begins to break down and may alter the performance of the machine.

- Counterclockwise decreases the speed of the table
  - \* *The table is slowed by bleeding off the oil supply to the tank prior to the inlet on the motor.*

b) For HPU #JF-59879/4385-2:

- Clockwise decreases the speed of the table (slower)\*
- Counterclockwise increases the speed of the table (faster)
  - \* *The table is slowed by creating back pressure on the hydraulic motor. This back pressure may not allow the table to move at all due to the cushion valves relieving the pressure. If this happens, adjust the cushion valve setting to a higher pressure by slowly adjusting the screw clockwise. For more details, see the Adjusting the Cushion Valve section.*

4. Lock the flow control valve collar back in place.

## Adjusting Operating Pressure for Jig Table Movement

### Adjusting the Table Operating Pressure

Set both tables at the same time using these steps:

1. Turn all four (4) cross port relief valves clockwise all the way to open them completely.
2. Turn all four (4) flow control valves clockwise all the way to open them completely.
3. Hook up the temporary gauge to the port on the front of the manifold marked GAGE 1-2.
4. Set the pressure relief valve to approximately 1,500 psi by following these steps:



If the table moves too fast, it may damage certain table components. The most likely components to be damaged are shown in Figure 6-18.

CAUTION	
	<p><b>Pinch point and collision hazard. Fast table movement may damage table components.</b></p> <p><b>The table may move very fast. All personnel must stand clear of moving parts while testing the operating pressure.</b></p> <p><b>Test table speed by moving the table short distances to avoid damaging table components.</b></p>

- a) Actuate the table by depressing the applicable solenoid with an Allen wrench and holding it to allow the system to build up pressure. It is a

good idea to do this in short spurts because the table may move very fast and damage components.



Continue to keep the solenoid depressed.

- b) Locate the pressure relief valve which controls the pressure to both tables. See the graphics in the *Hydraulic System Overview* section.
  - c) Continue to keep the solenoid depressed.
  - d) Loosen the jam nut on the pressure relief valve.
  - e) Turn the adjustment screw until the pressure is at the desired level (1,500 psi).
  - f) Tighten the jam nut
5. Back out (turn counterclockwise) all four (4) cross port relief valves equally until the gauge reads approximately 1,000 psi.

*The pressure at which these valves are set depends on the desired speed of the tables and the weight of the jiggging and average truss on the tables.*

6. Fine-tune the setting using the flow control valves for each table while testing the operation of each table.
- a) Unlock the flow control valve by pushing the locking collar toward the manifold.
  - b) Back out (turn counterclockwise) the two (2) flow control valves that affect the table in operation as needed.



If the table moves too fast, it may damage certain table components. The most likely components to be damaged are shown in Figure 6-18.

<b>CAUTION</b>	
	<p><b>Pinch point and collision hazard. Fast table movement may damage table components.</b></p> <p><b>The table may move very fast. All personnel must stand clear of moving parts while testing the operating pressure.</b></p> <p><b>Test table speed by moving the table in short spurts to avoid damaging table components.</b></p>

- c) Actuate the table by depressing the applicable solenoid with an Allen wrench.
- d) Repeat until the table reacts properly.
- e) Lock the flow control valve collar back in place.
- f) Repeat for the other table.

## ***Adjusting the Location of a Prox Switch***

Adjusting the location of a prox switch affects the point in the cycle when a component stops or starts.

Follow these steps to adjust the location.

1. Locate the prox switch by referring to Figure 6-14.



*Before loosening the bolts, it is recommended to mark the location of the bracket or bolts so you know how much to adjust the bracket.*

2. Loosen the two (2) 9/16-in. hex head bolts on the prox switch bracket.
3. Adjust the prox switch bracket to its desired height and tighten the bolts.

## ***Adjusting the Height of the Press Platen Opening***

To adjust the height of the press platen opening, adjust the location of the prox switch that sends the signal telling the PLC that the platen is completely open. Refer to the *Proximity (Prox) Switches* section in this chapter.

The platen opening ranges from 2-3/8 in. to 7-1/8 in. It was set to approximately 5-1/2 in. at MiTek.

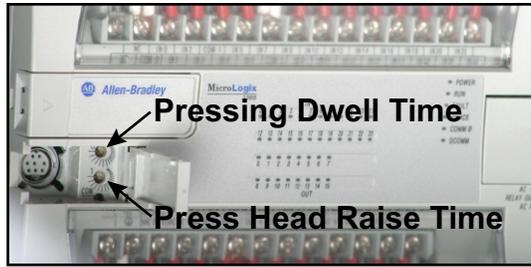
**Figure 6-14: Proximity Switch for Press Cylinder**



## ***Adjusting Pressing Dwell Time***

To adjust the length of time that the press platens continue pressing after maximum pressure has been reached, adjust the top potentiometer on the PLC, as shown in Figure 6-15.

**Figure 6-15: Potentiometer**



## ***Adjusting the Press Head Raise Time (for Double-Press Cycle)***

To adjust the amount of time that the press head raises up for a double-press cycle, adjust the bottom potentiometer on the PLC.

## Adjusting the Pressing Force on the Plates



The same effect can often be reached by adjusting the pressing dwell time. Adjust the dwell time before attempting to adjust the pressing force.

### CAUTION

**Do NOT attempt to set the pressure relief valve higher than 2,200 psi!**

**The press is designed for a maximum overall pressure of 2,200 psi. Setting the pressure relief valve higher than 2,200 psi may cause serious damage to the machine.**

1. Set the pressure relief valve to 2,050 psi.
  - a) Locate the pressure relief valve for the press platen. See Figure 6-8.
  - b) Loosen the jam nut.
  - c) Turn the adjustment screw until the pressure is at the desired level (2050 psi).
  - d) Tighten the jam nut
2. Set the pressure switch to 1,950 psi.
  - a) Locate the pressure switch behind or beside the press valve stack.
  - b) Loosen the jam nut.
  - c) Adjust the top adjustment screw until the switch closes at the maximum pressure (1,950 psi).
  - d) Tighten the jam nut.

*Only one (1) contact of the pressure switch is utilized in the system's design. Do not attempt to set the other contact.*



*On machines manufactured after April 2005, a small light illuminates when the pressure switch has reached the pressure set for the contact in use. The pointer gauges have a tendency to register the pressure more slowly than the system reacts, so the light is a more accurate indicator.*

## ***Adjusting the Regenerative Circuit Valve***

The cylinder operates in a rapid advance mode until contact is made with the material being pressed. Once the pressure begins to rise, the cylinder goes into a slower press mode. This is accomplished through the use of a regenerative circuit valve. The valve allows fluid from the rod end of the cylinder to recirculate to the cap end of the cylinder, providing a flow rate that is higher than the pump output. In order for the cylinder to develop high pressure, this regeneration valve needs to shift and direct the fluid from the rod side of the cylinder back to the reservoir. The adjustment setting on this valve controls the point at which this takes place.

Follow these steps to adjust the regenerative valve:

1. Loosen the locknut.
2. Adjust the screw counterclockwise until it bottoms out. **Do not overtighten as it will bind the valve!**
3. Tighten the locknut.

## ***Adjusting the Counterbalance Valve***

A counterbalance valve is used to hydraulically prevent the press head from free fall, which could cause harmful cavitation. The presence of the valve does not guarantee that the press head will never free fall, as other component failures could allow that to happen. The counterbalance valve primarily allows the press to come down in a smooth motion.

Follow these steps to adjust the counterbalance valve:

1. Loosen the locknut.
2. Adjust the screw clockwise until it bottoms out. **Do not overtighten the screw!**
3. Once it is bottomed out, tighten the locknut.

## ***Adjusting the Pilot Choke***

Each hydraulic directional valve is equipped with a pilot choke. The pilot choke controls the flow of fluid between the main spool and pilot spool, which controls the main spool speed and minimizes hydraulic shock due to rapid closure and reversal.

Follow these steps to adjust the pilot choke:

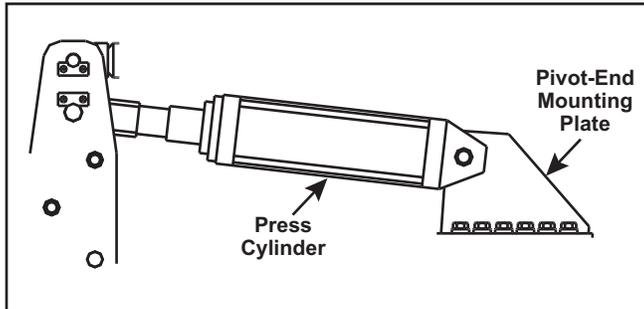
1. Locate the applicable pilot choke.
2. Loosen the locknut.
3. Start the hydraulic power unit by pressing the START button.
4. Have someone start the press down cycle.
5. Turn the adjusting screw until shock has been removed from the system.
  - Clockwise slows the shift inside the valve for less shock to the system and slower cycle times.
  - Counterclockwise speeds up the shift inside the valve for increased shock and faster cycle times.
6. Tighten the locknut.

## Press Cylinder

### Checking the Torque of the Pivot-End Mounting Plate

The press cylinder's pivot-end mounting plate is located on top of the press. During each pressing cycle, a large amount of pressure is placed on the upright, so it is imperative that the cap screws that hold the mounting plate in place are secure.

**Figure 6-16: Press Cylinder Pivot-End Mounting Plate**



At least once a month, inspect the screws and attempt to turn them with a wrench. If they show no movement, there is no need to re-torque them. If any movement appears in any of the screws, re-torque the entire assembly.

### Torquing the Screws



Torque wrench

Torque multiplier

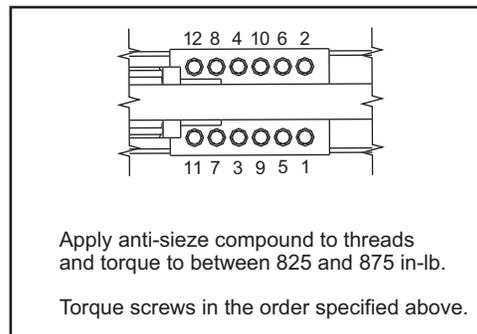
8" socket extension

1-1/2" impact socket

To torque the screws on the press cylinder's pivot-end mounting plate, perform the following steps.

1. Gather the supplies listed here.
2. Loosen all twelve (12) screws in the base of the mounting plate.
3. Using the supplies listed, and following the numerical order shown in Figure 6-17, tighten each screw with a torque wrench. Torque them to a value between 825 and 875 ft-lb.

**Figure 6-17: Tighten the Screws in Numerical Order**



## ***Table Drive Shaft***

The drive shaft on the table has a bushing on the idle end and sprockets and bearings on both ends. The bushing, sprockets, and bearings may need to be replaced if the table is not moving in and out smoothly. The configuration of the components is shown in Figure 6-18. The replacement part numbers are listed in the *Parts List* appendix.

## ***Guide Buttons and Guide Strips***

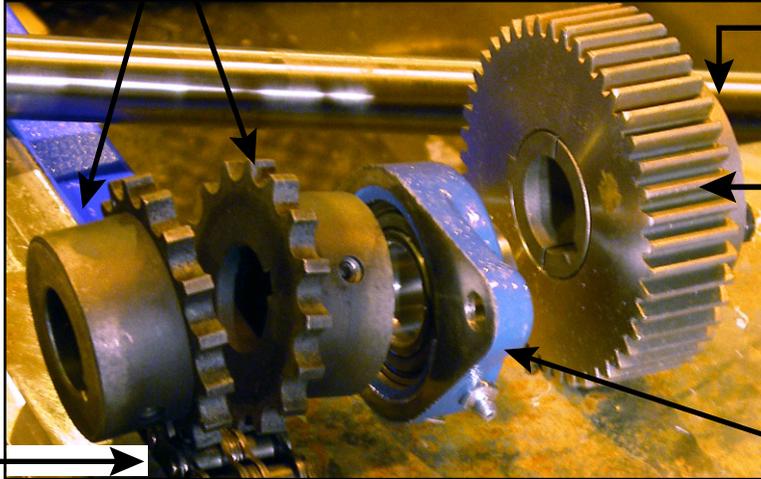
Some machines are fitted with guide buttons. The replacement part number for the buttons is listed in the *Parts List* appendix.

In place of buttons, other machines have guide strips. There is a top strip and a side strip that allow the tables to slide across their frame. Part numbers for both can be found in the *Parts List* appendix.

Figure 6-19 shows how to replace the guide strips.

**Figure 6-18: Assembly of Parts on Table Drive Shaft**

Half Couplings 557215  
 Keys 5/16" x 1-1/4" 15000200020-1.25



\*Taper Bushing 547148

Gear 544176

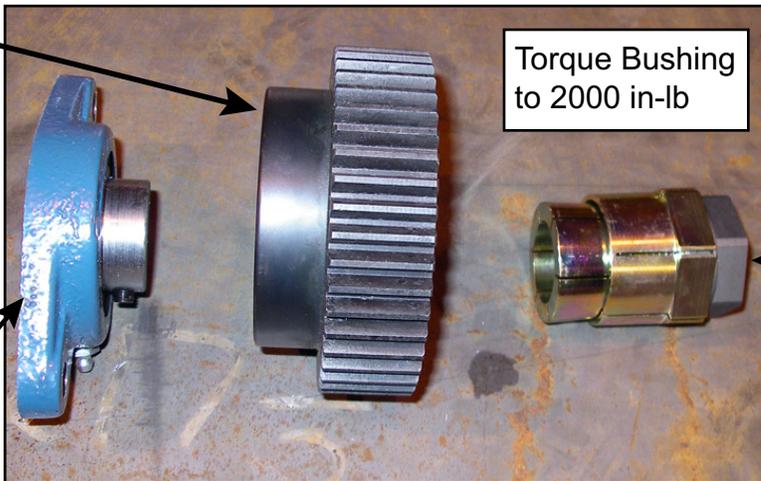
Key 5/16" x 2" 15000200020-2.00

Bearing 419786

Chain 557216

**Gear, Bearing, and Bushing Assembly on the Motor End of the Table Drive Shaft**

\*Spur Gear 544247



Torque Bushing to 2000 in-lb

\*Transtorque Bushing 547171

Bearing 419786

**Gear, Bearing, and Bushing Assembly on the Idle End of the Table Drive Shaft**

*\* On some machines, taper bushing 547148 and gear 544176 are used on both ends.*

**Figure 6-19: How to Replace the Guide Strips**

*NOTE: Thread adhesive was used on all screws shown here.*

- 1** Remove the screws from the top guard (9), back guard (4), and end guard (2) using a 3/16" hexagon socket wrench to free the top plate and top guide strip.



**2**

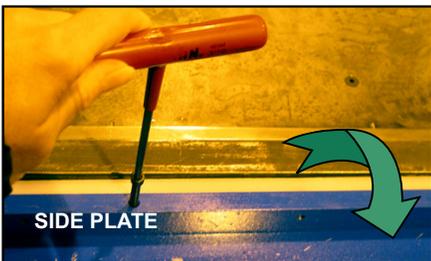
Remove the guards to see the top guide strip.



**3**

Remove the top guide strip.

- 4** Remove the screws from the side plate (8) and the remaining screws on the end plate (2) with a 3/16" hexagon socket wrench to free the side plate with the side guide strip attached.



- 5** Turn the side guide strip assembly so the white guide strip is facing up, and remove the button head hexagon socket screws (10) with a 5/32" wrench to free the side guide strip. Remove the side guide strip.

- 6** Using new guide strips, reverse the steps above to re-assemble the guide strip assemblies. Use a light thread adhesive on all screws.



## Table Maintenance

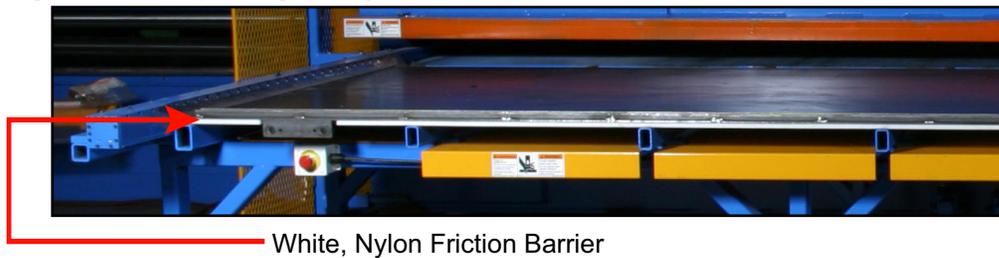
### Replacing the Nylon Friction Barrier

A white, nylon surface acts as a friction barrier between the jig table bottom surface and the table frame that it slides on. It is made from two (2) pieces of nylon material butted together and fastened with 72 cap screws.

There are some variations in the table top and hardware used, depending on when your tables were manufactured. The cap screw is the same for all variations and requires a 5/32-in. Allen wrench.

The part numbers for the nylon friction barrier and all hardware can be found in the *Parts List* appendix.

**Figure 6-20: Replacing the Nylon Friction Barrier**



## Replacing Table Bumpers

### Table-In Bumpers (446108)

There are four (4) small, rubber bumpers on each table that prevent the back end of the table from making contact with the press head frame when entering the press head. Two (2) bumpers are located at each end, attached to an angle.

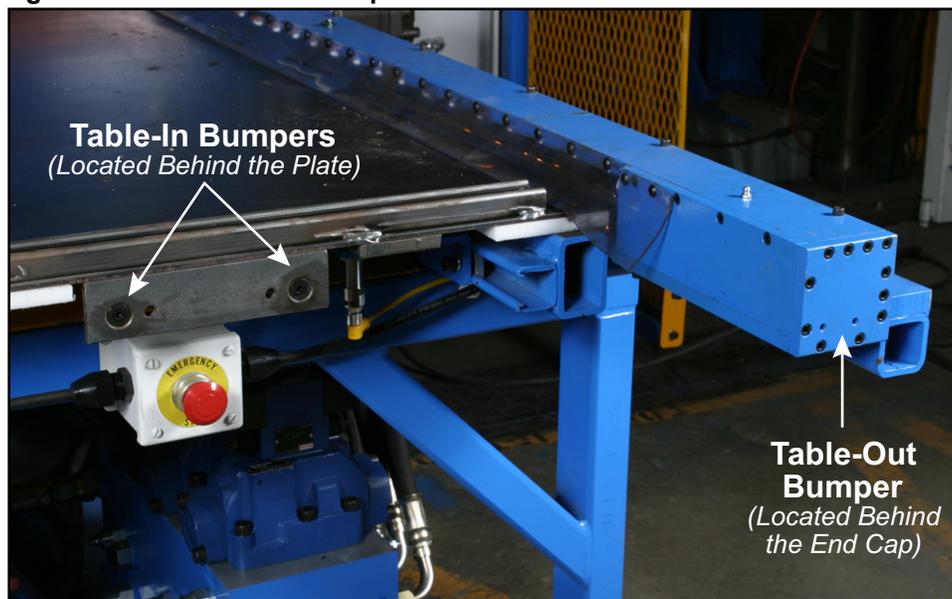
To replace a table-in bumper, remove the screw in the center of the bumper and screw a new bumper in its place.

### Table-Out Bumpers (88261)

Each table also has two (2) table-out bumpers to prevent the table from making contact with the table frame end cap when the table is moving out of the press head after pressing has occurred. The table-out bumpers are located inside the table frame behind the end caps.

To replace a table-out bumper, remove the end cap and remove the two (2) screws securing the bumper. Screw a new bumper in its place and replace the end cap.

**Figure 6-21: Location of Bumpers**



## ***Electrical***

An overview of the components inside the main electrical enclosure is shown in Figure 6-22.

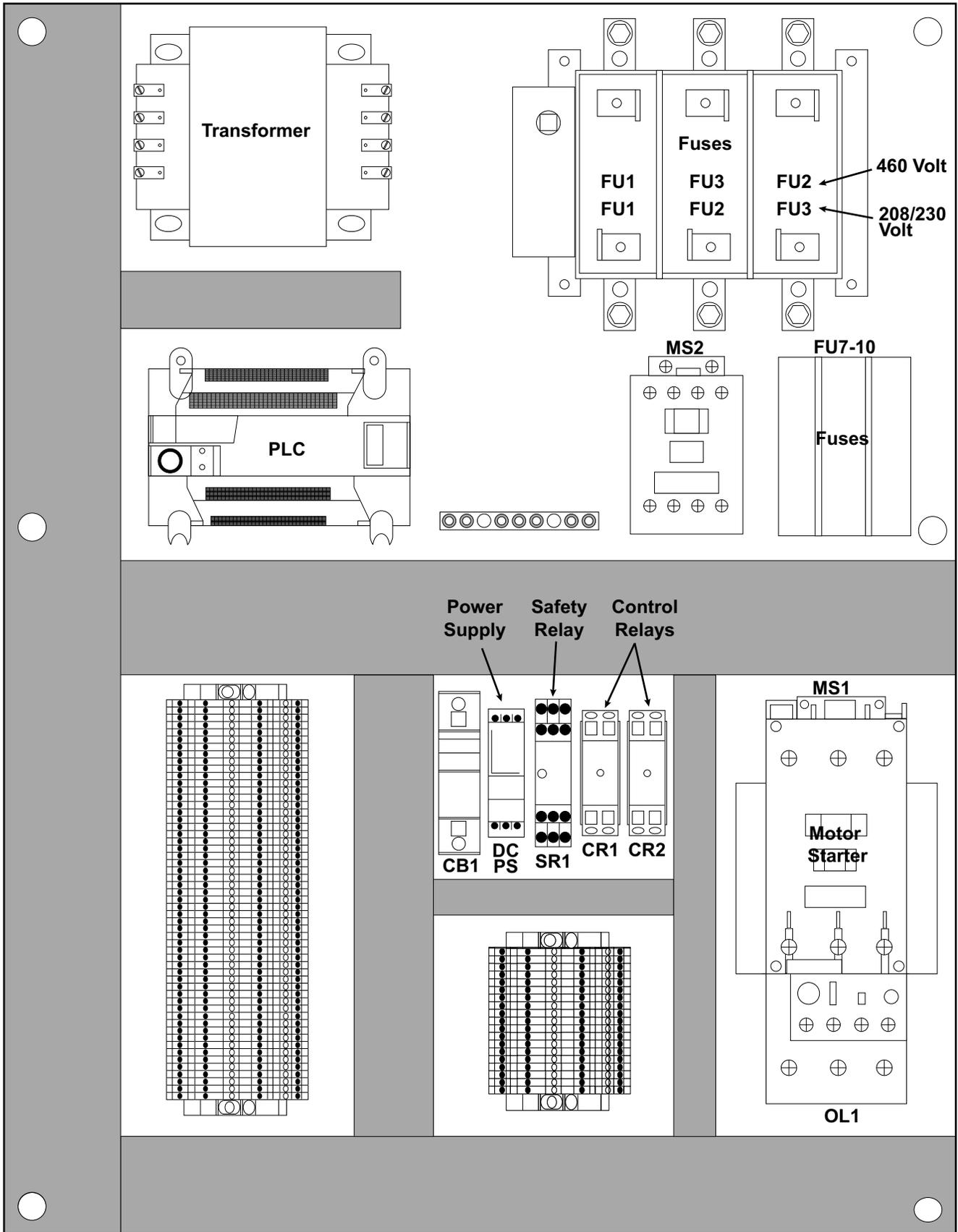
### ***Resetting Circuit Breakers***

Refer to *Resetting Output Circuit Breakers* in the *Operation* chapter.

### ***Understanding the Programmable Logic Controller (PLC)***

The PLC provides communication between the operating controls and the machine. The potentiometers on the PLC adjust the press dwell time and press head raise time. Refer to the *Adjustments* section.

Figure 6-22: Electrical Enclosure Overview



## Proximity (Prox) Switches

Proximity (prox) switches tell the PLC when a component should start or stop and enables the correct sequence of actions. Figure 6-14 shows a photo of a prox switch.

For instructions on adjusting the location of a prox switch, refer to *Proximity (Prox) Switches* in the *Adjustments* section.

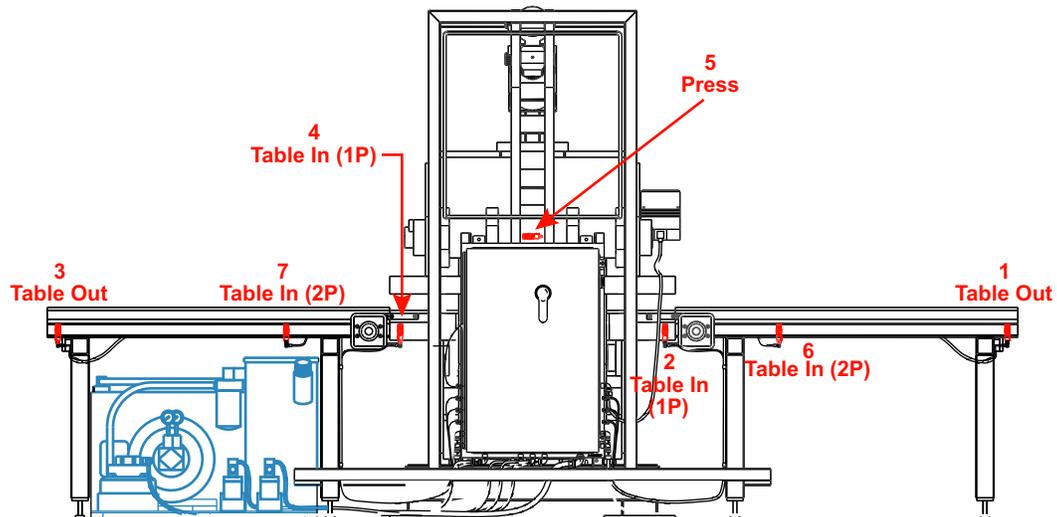
### Function of Prox Switches

Table 6-3: Prox Switch Functions

Prox Switch	Component	Tells the PLC That the Component Is...
1 PRS1—Table Out	Right Table	home
2 PRS2 (1P)—Table In	Right Table	at correct location for pressing in 1-press mode
3 PRS3—Table Out	Left Table	home
4 PRS4 (1P)—Table In	Left Table	at correct location for pressing in 1-press mode
5 PRS5	Press Cylinder	home
6 PRS6 (2P)—Table In	Right Table	at correct location for pressing in 2-press mode
7 PRS7 (2P)—Table In	Left Table	at correct location for pressing in 2-press mode

### Location of Each Prox Switch

Figure 6-23: Prox Switch Locations



### ***Navigating the Troubleshooting Appendix***

This appendix is divided into tables according to the system or components that are showing troublesome symptoms. The tables are presented in the order listed here. The topics within each table are arranged according to this list.

#### **Summary of Troubleshooting Information**

<b>System Showing Symptoms</b>	<b>Table Number</b>
Mechanical and Electrical Troubleshooting	Table A-1
Automatic Lubrication System Troubleshooting*	Table A-2

*\* Refer to the User Manual from Lincoln for more detailed information on troubleshooting the lubrication system.*

**Table A-1: Mechanical and Electrical Troubleshooting**

<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
Nothing operates; no lights	No power	Check power supply and fuses
		Check that disconnect handle is in ON position
Motor doesn't start, but power indicator light is on	Power is off	Check that all E-stops are released
	Starting circuit	Check starting circuits
		Repair or replace motor starter
Oil pressure fails to reach operating level or pressure is erratic, but motor is running	Low relief valve setting	Turn relief valve handle clockwise to increase pressure
	Worn or dirty relief valve	Clean relief valve thoroughly
	Hydraulic pump	Replace cylinder packing using the cylinder repair kit
Cycle time is too long	<i>See Table moves too slowly or too fast or not at all problem</i>	
	Press dwell time is longer than necessary	Adjust the top potentiometer on the PLC
	Press head raise time in 2P mode is longer than necessary	Adjust the bottom potentiometer on the PLC
Plates are not fully embedded	Inadequate press dwell time	Adjust top potentiometer on PLC
	Worn friction barrier	Replace friction barrier
	Low jiggling fixture	Raise height of jiggling fixture
	Low pressure switch setting	Increase operating pressure of press
Overheating of hydraulic system—not starting	Oil viscosity too high (pump noisy at start-up)	Change to recommended viscosity
	Low relief valve setting	Turn relief valve handle clockwise to increase pressure
	Low oil level	Fill to within 2" of top
	Worn pump (cylinder action sluggish)	A scored pump may cause galling of metal and overheat. Disassemble and evaluate for replacement

**Table A-1: Mechanical and Electrical Troubleshooting (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
Noisy pump	Low hydraulic fluid level	Fill reservoir to within 2" of top
	Leaks in suction piping, seals, lines, and fittings (in this type of leak, oil drips are not always apparent as air is sucked into the line)	With the pump running, place thick lubricating grease (like EP2) over suspected points. If the sound of the pump changes noticeably, the piping, etc., has a leak and must be replaced
	Worn or damaged shaft seals	Replace seals
	Shaft out of alignment	Check shaft for alignment; realign and check coupling and mounting bolts
	Loose mounting bolts	Check mounting bolts and tighten, if necessary
	Low oil temperature	Heat with an immersion heater. Temperature should be above 50°F at start-up
	High oil viscosity	Drain and replace with proper viscosity
	Worn or faulty bearings	Replace bearings
	Worn cam ring in pump	Replace with complete pump cartridge assembly
	Worn or sticking vanes	Replace with complete pump cartridge assembly
	Normal wear	Replace worn parts or entire pump
Unusual sounds detected during inspections	Cracked metal	Weld metal back in place, if feasible Call MiTek Machinery Division Customer Service for additional options
	Dry bearings	Grease bearings
	Worn bushings	Replace bushings
	Missing shaft retainer	Replace shaft retainer

**Table A-1: Mechanical and Electrical Troubleshooting (Continued)**

Problem	Possible Cause	Possible Solution
Press head does not move or jig table fails to move	Directional control valve not shifting	Dirt on chip may be preventing valve spool from shifting
	Electrical failure	Check circuits, then solenoids
	Mechanical bind preventing the solenoid from traveling to its full extent	Inspect entire press and frame to locate a barrier, damaged component, etc.
	Faulty pump operation	See "noisy pump"
	For tables—table bypassed proximity switch without recognizing it	Temporary solution: Manually move the tables by jogging the solenoid so it slowly passes back over the prox switch  Long-term solution: <ul style="list-style-type: none"> <li>• Adjust the prox switch location</li> <li>• Adjust the prox switch target on the table</li> <li>• Slow the speed of the table</li> </ul>
Worn or damaged cylinder or hydraulic motor	Replace all cylinder seals; check motor for wear and replace all seals	
Press does not function in 2P mode	Selector switch is in 1P mode	Turn the selector switch on the manual control panel to 2P
	Table bypassed proximity switch without recognizing it	Temporary solution: Hold a piece of steel under the appropriate prox switch to reset it  Long-term solution: <ul style="list-style-type: none"> <li>• Adjust the prox switch location</li> <li>• Adjust the prox switch target on the table</li> <li>• Slow the speed of the table</li> </ul>
Table moves too slowly or too fast or not at all	Incorrect table operating pressure	Refer to <i>Adjusting the Jig Table Speed (for Minor Adjustments)</i> and <i>Adjusting Operating Pressure for Jig Table Movement</i> , both in the <i>Maintenance</i> chapter
	Table out of square	Adjust transtorque bushing and spur gear
	Barrier inhibiting movement	Check track and under platen for barriers
Tables stop before completely under platen	Selector switch is in 2P mode	Normal for first press in 2P mode, turn toggle switch to 1P
	Prox switch is not aligned	See the <i>Maintenance</i> chapter for location and functions of prox switches
	Barrier preventing further movement	Check drive system and under platen for barriers
	Table not aligned on gear racks	Adjust transtorque bushing and spur gear

**Table A-1: Mechanical and Electrical Troubleshooting (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
Tables do not retract fully	Prox switch is not aligned	See the <i>Maintenance</i> chapter for location and functions of prox switches
	Barrier preventing further movement	Check drive system and under platen for barriers
	Table not aligned on gear racks	Adjust transtorque bushing and spur gear
Tables stop too abruptly when entering press	High operating pressure	Adjust cross port relief valves, flow control valves, and pilot choke
Tables stop too abruptly when retracting out of press; slam against end cap	High operating pressure	Adjust cross port relief valves, flow control valves, and pilot choke
	Table not aligned on gear racks; hitting side guard near end cap	Adjust transtorque bushing and spur gear
	“Table out” prox switch is not set correctly	Move the “table out” prox switch so the table actuates it at the correct moment

**Table A-2: Automatic Lubrication System Troubleshooting\***

<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
Stirring paddle is not rotating	No power	Be sure the power cable is connected
	Tripped breaker	Check breaker #2 on main AutoLube control; if tripped, reset or check fuse in AutoLube control panel
Divider valve cycles slowly or fails to cycle	Blockage in delivery line	Loosen line/fittings at divider valve block, one at a time, until lubricant under pressure emerges from port
		Retighten all lines and fittings
	Soap or contaminated grease buildup in the internal ports of the divider valve block	Remove each piston from the divider valve block and bathe the block and each piston in solvent

*\* Refer to the User Manual from Lincoln for more detailed troubleshooting on the lubrication system*

### Navigating the Parts List

The tables that make up this appendix are listed below.

Parts are grouped according to their part location category, then sorted by part name. The parts to keep in stock are indicated in the last column of each table.

#### Summary of the Parts List

System Requiring Parts	Table Number	Part Location Categories
Mechanical Parts	Table B-1	Control Station
		Guard
		HPU Heater
		Lubrication
		Press Head
	Tables	
Hydraulic Parts	Table B-2	Hydraulic System
Common Electrical Parts	Table B-3	Electrical System
Electrical Drawing Overview to Find Additional Part Numbers	Table B-4	Electrical System
Labels	Table B-5	—

**Table B-1: Mechanical Parts**

Part Location	MiTek Part #	Part Description	Refer to Drawing Number	Keep in Stock
Control Station	88219-501	Automatic control station pedestal (does not include electrical parts)	88203	
Guard, HPU	88275	HPU end guard	88023	
Guard, HPU	88274	HPU guard	88203	
Guard, Tables	88142	Vinyl guard, clear, 3x67", along table ends (2)	88297	
HPU Heater	88259-902	Immersion heater kit (3 heaters), field install	—	
	526001	Immersion heater, 1 heater only		
Lubrication	706073	Automatic lubrication pump (pump only)	—	
Lubrication	706074	Automatic lubrication system kit	88203	
Lubrication	620001	Grease—Lubriplate #1242		1
Press Head	415507	Bearing, on pivot end of cylinder	88127	
Press Head	88110-501	Connecting rod	—	
Press Head	88233-501	Cylinder assembly for rod end	88127	
Press Head	88158	Cylinder mounting plate, pivot-end, base	88127	
Press Head	88159	Cylinder mounting plate, pivot-end, upright	88127	
Press Head	798526	Cylinder, press cylinder—see	88127	
Press Head	327990	Screws for press cylinder mounting plate (12)	88127	
Press Head	798535	Seal kit for press cylinder	—	
Press Head	88227	Washers for press cylinder mounting plate (12)	88127	
Tables	419786	Bearing, table drive, along drive shaft (5 ea table)	88297	
Tables	88189-001	Bracket, table-to-press mounting bracket, LH	88297	
Tables	88189-002	Bracket, table-to-press mounting bracket, RH	88297	
Tables	446108	Bumper, table-in, round, black, rubber (4 per table)	—	
Tables	88261	Bumper, table-out, double press, mounts to end cap (2 per table)	88297	
Tables	547171	Bushing, transtorque, 1-1/4 x2	88297	
Tables	325155	Friction barrier cap screw, FSH, 1/4-20x5/8, for all nylon friction barriers (qty 72)	88267	
Tables	361212	Friction barrier nut, hex, tamper-resistant, for 88262 & 88263 friction barrier (qty 72)	88267	

**Table B-1: Mechanical Parts (Continued)**

Part Location	MiTek Part #	Part Description	Refer to Drawing Number	Keep in Stock
Tables	88263 88262	Friction Barrier <i>For customers with Dwg 88267 in their manual (built prior to Dec. 04):</i> White, nylon friction barrier, 57x120" White, nylon friction barrier, 57x96"	—	
Tables	88295 88294	Friction Barrier <i>For customers with Dwg 88297 in their manual (built after Dec. 04):</i> White, nylon friction barrier, 57x120" White, nylon friction barrier, 57x96"	—	
Tables	88194	Guide buttons/rollers <i>(for models without guide strips)</i>	88267	1
Tables	88284	Guide strip, side <i>(for models without guide buttons/rollers)</i>	88297	1
Tables	88283	Guide strip, top <i>(for models without guide buttons/rollers)</i>	88297	1
Tables	807132	Motor, hydraulic motor	88297	
Tables	363035	Nut, 1/4-20, for 88294 & 88295 (qty 72)	—	
Tables	88286	Prox switch mounting plate, 5x3x1/4"	88297	
Tables	See Figure 6-18	Sprockets, bushings, and bearings for table drive shaft	—	
Tables	<i>Left Table</i> 88300-501 <i>Right Table</i> 88300-502	Table assembly, including entire weldment and nylon table top	88297	

 <p><b>Refer to...</b></p>	For the parts listed in Table B-2 and for additional parts in the hydraulic system, refer to the appropriate hydraulic drawing.	
	If HPU Nameplate Shows...	Then Refer to Drawing
	JF-592879-4385-1 or JF-592879-4385-2	88257 rev -
	JF-664747/5687	88257 rev. A
	88258	88258
88259 or other	Listed in <i>Appendix D</i>	

**Table B-2: Hydraulic Parts**

Part Location	MiTek Part #	Part Description	Keep in Stock
Hydraulic System	802251	Check valve, cartridge, COHA-XEN	
Hydraulic System	802243	Check valve, cartridge, CXHA-XEN	
Hydraulic System	802248	Check valve, cartridge, reverse flow, NCFB-LCN	
Hydraulic System	802277	Counterbalance valve, cartridge, CBGA-LHN	
Hydraulic System	557345	Coupling insert at motor adaptor,	
Hydraulic System	557350	Coupling insert at motor adaptor, M40002806	
Hydraulic System	557331	Coupling insert at motor adaptor, M40012816	
Hydraulic System	798526	Cylinder, press cylinder (also found on Dwg 88127)	
Hydraulic System	798535	Cylinder seal kit, 6 bore	
Hydraulic System	798536	Cylinder seal kit for pistons and tubes	
Hydraulic System	798537	Cylinder seal kit for rod cartridge	
Hydraulic System	802003	Flow Control Valve	4
Hydraulic System	802261	Directional valve seal kit (for PN 802265)	
Hydraulic System	805227	Filter, return line filters (total of 2)	1
Hydraulic System	805228	Filter—replacement element, synthetic, MZ10	2
Hydraulic System	See "Refer to" note	HPU, the correct part number is the applicable drawing number	
Hydraulic System	88256-501	Hydraulic assembly (HPU plus hose kits)	
Hydraulic System	473002	Motor, 30 hp, HPU	
Hydraulic System	809038	Oil Cooler thermal transfer motor (for oil cooler, PN 809037)	
Hydraulic System	802280	Pilot Choke seal kit (for PN 802274)	
Hydraulic System	802274	Pilot choke valve	
Hydraulic System	802267	Pilot valve for directional valve (PN 802265)	
Hydraulic System	800285	Pump	



Table B-2: Hydraulic Parts (Continued)

Part Location	MiTek Part #	Part Description	Keep in Stock
Hydraulic System	802268	Relief valve, cartridge, RPEC-LAN	
Hydraulic System	802269	Relief valve, cartridge, RPGC-LAN	



**Refer to...**

For the parts listed in Table B-3 and for additional parts in the electrical system, refer to Drawing 90531. Table B-4 provides an overview of Drawing 90531.

**Table B-3: Common Electrical Parts**

Part Location	MiTek Part #	Part Description	Keep in Stock
Electrical System	477161	Breaker	
	509221	Contactator	
	515847	Cord set for prox switch, 90° (7 total)	
	516549 516479 516498	Fuses 1, 2, 3: 208V = 150 amp 230V = 125 amp 460V = 70 amp	2
	516389 516394 516394	Fuses 4, 5: 208V = 4 amp 230V = 3.5 amp 460V = 3.5 amp	2
	516387	Fuse 6 = 7 amp for all voltages	2
	516390 516390 516383	Fuses 7, 8, 9: 208V = 5 amp 230V = 5 amp 460V = 2 amp	2
	92165	PLC, 504614 programmed for <i>MH TrussMaker</i>	1
	504525	Power supply, 24 VDS, .5 amp	1
	515844	Prox switch (7 total)	2
	514186	Relay module	
	504271	Surge suppressor	
	504595	Transformer	

**Table B-4: Electrical Drawing Overview to Find Additional Part Numbers**
*\*Sheet numbers refer to revisions A-D of Drawing 90531. Later revisions may differ slightly.*

Part Location	Drawing Description	Sheet # That Calls Out Part on Drawing 90531*
Electrical System	Schematic	1-3
	Terminal block layout	4-5
	Main electrical enclosure	6-7
	Parts list for sheets 6-8	8
	Automatic control stations	9
	E-stops	10-11
	Electrical Assembly, operator-end view	12
	Electrical Assembly, side views	13
	Electrical Assembly, prox switches, pushbuttons	14
	Electrical Assembly, pressure switches, solenoids, motors, and autolube	15
	Parts list for sheets 12-15	16

Table B-5: Labels

MiTek Part #	Part Description				
691700	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;"><b>AVISO</b></td> <td style="width: 50%;"><b>NOTICE</b></td> </tr> <tr> <td style="text-align: left;">Es necesario realizar una lubricación rutinaria, para el funcionamiento correcto. Consultar el manual.</td> <td style="text-align: left;">Routine lubrication required for proper operation. Refer to manual.</td> </tr> </table>	<b>AVISO</b>	<b>NOTICE</b>	Es necesario realizar una lubricación rutinaria, para el funcionamiento correcto. Consultar el manual.	Routine lubrication required for proper operation. Refer to manual.
<b>AVISO</b>	<b>NOTICE</b>				
Es necesario realizar una lubricación rutinaria, para el funcionamiento correcto. Consultar el manual.	Routine lubrication required for proper operation. Refer to manual.				
691515	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. No operar sin la defensa colocada en su lugar. Antes de dar servicio, seguir los procedimientos de bloqueo. Antes de dar servicio, colocar bloques debajo de la platina para evitar que cierre la prensa.</p> </td> <td style="width: 33%; text-align: center; vertical-align: middle;">  </td> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ WARNING</b></p> <p>Crush hazard. Do not operate with guard removed. Follow lockout procedure before servicing. Before servicing, place blocks under platen to prevent press from closing.</p> </td> </tr> </table>	<p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. No operar sin la defensa colocada en su lugar. Antes de dar servicio, seguir los procedimientos de bloqueo. Antes de dar servicio, colocar bloques debajo de la platina para evitar que cierre la prensa.</p>		<p><b>⚠ WARNING</b></p> <p>Crush hazard. Do not operate with guard removed. Follow lockout procedure before servicing. Before servicing, place blocks under platen to prevent press from closing.</p>	
<p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. No operar sin la defensa colocada en su lugar. Antes de dar servicio, seguir los procedimientos de bloqueo. Antes de dar servicio, colocar bloques debajo de la platina para evitar que cierre la prensa.</p>		<p><b>⚠ WARNING</b></p> <p>Crush hazard. Do not operate with guard removed. Follow lockout procedure before servicing. Before servicing, place blocks under platen to prevent press from closing.</p>			
691505	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. Mantener las manos alejadas. No operar sin las defensas colocadas en su lugar. Antes de dar servicio, seguir exactamente los procedimientos de bloqueo.</p> </td> <td style="width: 33%; text-align: center; vertical-align: middle;">  </td> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ WARNING</b></p> <p>Crush hazard. Keep hands clear. Do not operate with guards removed. Follow lockout procedure before servicing.</p> </td> </tr> </table>	<p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. Mantener las manos alejadas. No operar sin las defensas colocadas en su lugar. Antes de dar servicio, seguir exactamente los procedimientos de bloqueo.</p>		<p><b>⚠ WARNING</b></p> <p>Crush hazard. Keep hands clear. Do not operate with guards removed. Follow lockout procedure before servicing.</p>	
<p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. Mantener las manos alejadas. No operar sin las defensas colocadas en su lugar. Antes de dar servicio, seguir exactamente los procedimientos de bloqueo.</p>		<p><b>⚠ WARNING</b></p> <p>Crush hazard. Keep hands clear. Do not operate with guards removed. Follow lockout procedure before servicing.</p>			
591502	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. Mantener las manos alejadas. Antes de dar servicio, seguir exactamente los procedimientos de bloqueo.</p> </td> <td style="width: 33%; text-align: center; vertical-align: middle;">  </td> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ WARNING</b></p> <p>Crush hazard. Keep hands clear. Follow lockout procedure before servicing.</p> </td> </tr> </table>	<p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. Mantener las manos alejadas. Antes de dar servicio, seguir exactamente los procedimientos de bloqueo.</p>		<p><b>⚠ WARNING</b></p> <p>Crush hazard. Keep hands clear. Follow lockout procedure before servicing.</p>	
<p><b>⚠ ADVERTENCIA</b></p> <p>Riesgo de aplastamiento. Mantener las manos alejadas. Antes de dar servicio, seguir exactamente los procedimientos de bloqueo.</p>		<p><b>⚠ WARNING</b></p> <p>Crush hazard. Keep hands clear. Follow lockout procedure before servicing.</p>			
691501	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ ADVERTENCIA</b></p> <p>Las piezas en movimiento pueden triturar y cortar. Mantenga alejadas las manos. Siga el procedimiento de cierre eléctrico antes de realizar servicio.</p> </td> <td style="width: 33%; text-align: center; vertical-align: middle;">  </td> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ WARNING</b></p> <p>Moving parts can crush and cut. Keep hands clear. Follow lockout procedure before servicing.</p> </td> </tr> </table>	<p><b>⚠ ADVERTENCIA</b></p> <p>Las piezas en movimiento pueden triturar y cortar. Mantenga alejadas las manos. Siga el procedimiento de cierre eléctrico antes de realizar servicio.</p>		<p><b>⚠ WARNING</b></p> <p>Moving parts can crush and cut. Keep hands clear. Follow lockout procedure before servicing.</p>	
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691408	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ PELIGRO</b></p> <p>Voltaje riesgoso. Desconectar la energía, bloquear y colocar etiquetas antes de dar servicio.</p> </td> <td style="width: 33%; text-align: center; vertical-align: middle;">  </td> <td style="width: 33%; vertical-align: top;"> <p><b>⚠ DANGER</b></p> <p>Hazardous voltage. Disconnect power, lockout and tagout before servicing motor.</p> </td> </tr> </table>	<p><b>⚠ PELIGRO</b></p> <p>Voltaje riesgoso. Desconectar la energía, bloquear y colocar etiquetas antes de dar servicio.</p>		<p><b>⚠ DANGER</b></p> <p>Hazardous voltage. Disconnect power, lockout and tagout before servicing motor.</p>	
<p><b>⚠ PELIGRO</b></p> <p>Voltaje riesgoso. Desconectar la energía, bloquear y colocar etiquetas antes de dar servicio.</p>		<p><b>⚠ DANGER</b></p> <p>Hazardous voltage. Disconnect power, lockout and tagout before servicing motor.</p>			



# Maintenance Checklists

## Appendix C

### ***Checklists for Preventive Maintenance***

Use the checklists in this appendix to schedule preventive maintenance. The checklists will guide you through all preventive maintenance tasks required to keep this equipment in top working condition.

These pages are formatted so you can photocopy them and document the date that maintenance is done, leaving the original in the manual for future use.

#### **MH TrussMaker™ Press**

<b>Checklist</b>	<b>Refer to</b>
Daily Checklist—Every 8-Hour Shift	page 89
Weekly Checklist	page 89
Checklist for Every 200 Working Hours	page 90
Checklist for Every 1,000 Working Hours	page 91

# MH TrussMaker™ Press

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Month and Year: \_\_\_\_\_ Week: \_\_\_\_\_

## ***Daily Checklist—Every 8-Hour Shift***

Preventive Maintenance Action	Dates Completed				
Check the table alignment when table stops at home position.					
Check the lubrication level in the auto-lube reservoir.					
Make sure the press is free of obstructions.					
Take measures to prevent anything from interfering with proper operation.					

Notes	Date

## ***Weekly Checklist***

Preventive Maintenance Action	Dates Completed				
Grease the gear rack.					

Notes	Date

# MH TrussMaker™ Press

Month and Year: \_\_\_\_\_

## Checklist for Every 200 Working Hours

Preventive Maintenance Action	Working Hours	Initial and Date When Action Is Performed				
Inspect/test main panel and pedestals.	200					
Inspect/test all breakers, controls, and E-stops for proper operation.	200					
Ensure the cables for the pedestals are protected from foot traffic and equipment traffic. They should be clear of all moving parts on the machine and clear of the work area.	200					
With the power locked and tagged out, check all connections inside the electrical box, mountings, wire connections, and solenoids. Tighten and repair as necessary.	200					
Check all cabling for proper clearance. Look for chafing or obstructions. Restrain where necessary.	200					
Clear dust and debris away from motor to ensure proper cooling and safe operation.	200					
Check hydraulic fluid level.	200					
Check oil pressure.	200					
Check hydraulic cylinder shaft. Ensure that shaft fully seats in the rod eye clevis.	200					
Check table-in and table-out positions.	200					
Clear debris.	200					
Tighten all bolts and screws.	200					
Lubricate table drive shaft bearings.	200					
Replace the return line filters. <i>[The frequency is dependent on many factors. This time span can be adjusted after recording history with your machine for one (1) full year.]</i>	200					

# MH TrussMaker™ Press

Year: \_\_\_\_\_

## Checklist for Every 1,000 Working Hours

Preventive Maintenance Action	Working Hours	Initial and Date When Action Is Performed				
Replace hydraulic fluid. <i>[The frequency is dependent on many factors. This time span can be adjusted after recording history with your machine for one (1) full year.]</i>	Every 3-6 months					
Inspect bell crank assemblies, including connecting rods and transfer bar: <ul style="list-style-type: none"> <li>• Check for signs of lubrication.</li> <li>• While machine is cycling, listen for unusual sounds. Refer to the <i>Troubleshooting</i> appendix to resolve.</li> </ul>	1,000					
Inspect the press beam: <ul style="list-style-type: none"> <li>• Check the top plates and end plates for any signs of cracks.</li> <li>• Check the fixed end of hydraulic cylinder mount for any sign of cracks.</li> <li>• Check the center guide pin for signs of lubrication and wear.</li> <li>• Replace worn guide pin bushings if excessive wear is evident.</li> </ul>	1,000					
Clear away excess grease.	1,000					
Look for any noticeable shaft or pin movement during normal cycling.	1,000					
Inspect all bell crank weldments. Look for any signs of metal stress.	1,000					
Inspect the connecting rod flanges for any sign of cracks in the flanges or the welds.	1,000					



### Drawing Set

The drawings in Table D-1 are inserted at the back of the manual.

**Table D-1: Attached Drawings**

Description	Drawing Number	
Connecting Rod Assembly	88110-501	Sheet 1 only
Press assembly	88127-501	
Transfer Bar Assembly	88136-501	Sheet 1 only
Pivot Block Sub-Assembly	88147-501	Sheet 1 only
Top level mechanical (dual-press)	88203-502	
Center Support Sub-Assembly	88230-501	Sheet 1 only
Bushing Housing Sub-Assembly	88231-501	Sheet 1 only
Rod End Sub-Assembly	88233-501	Sheet 1 only
Hydraulic Assembly (hoses and hardware)	88256-501	
HPU for serial #s starting with 88259*	88259-501	
Table for dual-press (88267 obsolete)	88297	
Electrical	90531	

\* See Table D-2 for correct drawing number for earlier versions of the HPU

The drawings in Table D-2 are NOT included in the standard manual because they are for earlier versions of the HPU. If you need an earlier version of a drawing, contact the MiTek Machinery Division Customer Service Department and request the correct drawing.

**Table D-2: Drawings for Earlier Versions of the HPU, NOT Included**

Number on HPU Nameplate	Drawing Number	Revision
S/N #JF 592879/4385-1 or #JF 592879/4385-2	88257-501	Rev. —
S/N #JF 664747-5687	88257-501	Rev. A
#88258	88258-501	Rev. —



# **MiTek Document Evaluation Form**

## ***Appendix E***

A form is included in this appendix so you can provide MiTek with feedback on the usefulness of this manual. We make an ongoing effort to improve the value of our documentation, and your views are important to us.

Please follow the instructions on the form to provide us with comments or suggestions that will help us improve the quality of our documentation services.

# Document Evaluation Form

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We appreciate your comments on how we can make this document more useful.

*Document Identification:*

MH TrussMaker™ Press	Operation and Maintenance Manual	001082 Rev. A
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*General Ratings:*

	Poor	Fair	Good	Excellent
Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accuracy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completeness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examples/Illustrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Readability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Compared to other truss machinery manufacturers' documentation, how would you rate this document?*

Poor     
  Fair     
  Good     
  Excellent

*Please rate the quality of service you received on the following topics:*

	Poor	Fair	Good	Excellent
Delivered on time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Installation process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Service technician	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the machine work as promised?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does it handle the production load?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*General Comments:*

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# Document Evaluation Form (cont'd)

<b>Instructions</b> Please provide as much information as possible. Identify the page and paragraph, and include a proposed rewrite if possible. Attach extra sheets as needed.	MH TrussMaker™ Press
	Operation and Maintenance Manual
	001082 Rev. A
<h2 style="color: #4F81BD;">Recommendation</h2>	
<h2 style="color: #4F81BD;">Reason for Recommendation</h2>	
Your Name:	Date:
Company Name:	Address:
Phone:	E-mail:
<b>Please mail this form to:</b> MiTek Machinery Operations 301 Fountain Lakes Industrial Drive St. Charles, MO 63301 Attn: Engineering Manager	
<b>Or fax this form to:</b> 636-328-9218 Attn: Engineering Manager	

*If you do not receive a reply within 45 days, please call our Customer Service Department and ask for the Documentation Specialist or Engineering Manager: 800-523-3380.*

# Glossary

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<b>actuate</b>	to activate, put into action
<b>amperage</b>	the strength of an electric current, expressed in amperes
<b>bus bar</b>	an electrical device that allows multiple gantry heads to be used simultaneously
<b>connector plate</b>	the nail-plate that is embedded into the production material to hold it together
<b>cushion</b>	an attribute of a hydraulic cylinder that allows adjustment of the pressure in each cylinder
<b>hour-meter</b>	a gauge that tells the amount of time that the hydraulic system motor is actually turning
<b>inner side</b>	refers to the end of the gantry head housing; the side closest to the tables; both ends have an inner side—one can see the inner side of both ends when standing on or between the tables
<b>jigging</b>	any of several devices used to hold the truss in place on the tables
<b>joystick</b>	an option that replaces the pendant control station to control movement of the gantry head
<b>layout</b>	a scaled diagram of the location of components and the space that they occupy
<b>limit switch</b>	an electro-mechanical device that consists of an actuator mechanically linked to a set of contacts; when an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection
<b>lockout/tagout</b>	a means of isolating a piece of equipment from its energy source so maintenance can safely occur; guidelines provided in OSHA 29 CFR 1910.147
<b>lubricator</b>	a device that allows controlled amounts of lubricants into the pneumatic system

# Glossary

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<b>operator end</b>	used to indicate which end of the press head is being discussed; the end where the manual control panel is attached
<b>operator control interface</b>	the method in which the operator controls the machine; it may be a touch screen, control panel, joystick, etc.
<b>pilot valve</b>	a pneumatic valve that operates the setup valve to control the release or cessation of air in each setup; it is located on the bottom-chord end of one table in each setup
<b>plate</b>	see <i>connector plate</i>
<b>PLC</b>	Programmable Logic Controller; a solid-state control device that can be programmed to control process or machine operations. It consists of five basic components: processor, memory, input/output module, the power supply, and the programming device.
<b>port</b>	a connection point for a peripheral device
<b>potentiometer</b>	a control knob that is a dial; allows a range of values to be set by turning the dial, commonly found on the PLC
<b>proximity switch</b>	a switch that uses an electromagnetic field to detect when an object is near, there is no physical contact between the object and the switch; inductive proximity switches detect only metal objects, capacitive proximity switches can sense both metallic and non-metallic objects
<b>qualified person</b>	a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training, or experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work—ANSI B30.2-1983; one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved—NEC2002 Handbook
<b>regulator</b>	a component of the pneumatic system that connects to the main air source and regulates the air pressure allowed into the system

# Glossary

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<b>Roller</b>	the large roller inside the gantry head that innately embeds the plates into the truss
<b>setup valve</b>	a component of the pneumatic system that control the flow of air to the rest of the setup
<b>solenoid</b>	an assembly used as a switch consisting of a coil and a metal core free to slide along the coil axis under the influence of the magnetic field
<b>stand-alone conveyor</b>	a powered conveyor system
<b>torque</b>	a turning or twisting force
<b>VFD</b>	Variable Frequency Device; controls the speed of the cycle
<b>voltage</b>	Equal to the difference of electric potential between two point on a conducting wire carrying a constant current of one ampere when the power between the points is one watt

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