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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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MiTek, Machinery Division
301 Fountain Lakes Industrial Drive
St. Charles, MO 63301
Attn: Engineering Manager
Fax: 636-328-9218

Your support in helping MiTek provide unsurpassed machinery and support is appreciated.
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Use this page to record Service Bulletins and Notices that you receive to keep your manual updated.

### Operation and Maintenance Manual
100-Ton *MH TrussMaker™* Press

<table>
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<th>Service Bulletin or Notice #</th>
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For safety information in Spanish, refer to page xviii.

Be Careful.
Be Safe.
Safety Indicators

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

**ENVIRONMENTAL**
Applies to conditions that may affect the environment but do not have an immediate, direct effect on personnel or equipment.
Safety Rules

Because it is impossible to anticipate every circumstance that might involve a hazard, the safety information provided in this equipment 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!

Know Your Equipment

• 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 operating procedures outlined in this manual.

• Read and follow all safety notes. Failure to comply with these instructions may result in economic loss, property damage, and/or personal injury including death.

• Refer to the lockout/tagout guidelines on the following pages to safely perform maintenance and troubleshooting of this equipment.

• Observe and obey all safety labels. Replace worn labels immediately.

• Use this equipment solely for the purpose described in this manual.

• Only qualified personnel should attempt to operate or perform maintenance on 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

Personal Safety

• Always wear safety glasses and hearing protection in an industrial environment.

• Utilize a filtering facepiece (dust mask) when working near sawdust.

• Wear proper clothing and appropriate personal protective equipment (e.g., safety glasses and hearing protection.) Do not wear loose clothing or jewelry. Confine long hair by tying it back.

• Use caution when lifting heavy parts or material.

Installing the Equipment

• Follow installation instructions completely.
Lockout/Tagout

- Before performing maintenance on the pneumatic or hydraulic systems, bleed the lines to eliminate pressure.
- Lockout/tagout all energized systems before performing maintenance on them. Refer to the Lockout/Tagout Guidelines section on page xii.

Keeping a Safe Environment

- 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.
- Keep work areas well lit.
- Keep the work area clean and free of any trip or slip hazards.
- Do not use the equipment in damp or wet locations, or expose it to rain or snow.

Operating and Maintaining the Equipment

- Ensure that all people, tools, and foreign objects are clear of the restricted zones before operating this equipment. The restricted zones are shown on page xvii.
- Perform safety tests to ensure all E-stops are working properly before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.
- In case of machine malfunction, stop the machine immediately using an E-stop and report the malfunction to a supervisor.
- 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.
- Check for worn or damaged parts regularly. Repair or replace them immediately.
- 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.
- 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.
- Periodically inspect the quality of the finished product.

Electrical Safety

- Do not use any liquids in the interior of electrical cabinets.
- When using solvents on and around the machine, remove power to the machine to eliminate the chance of sparking, resulting in explosion or fire. Wear a respirator approved for use with solvents. Wear protective clothing, gloves, and safety glasses.
Lockout/Tagout

Lockout/Tagout Guidelines

All lockout/tagout guidelines must be met according to OSHA 29 CFR 1910.147. A specific procedure should be included in your company’s energy control program. This manual is not intended to replace your company’s de-energizing or lockout/tagout procedure required by OSHA, but merely to provide general guidance.

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.
- 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.
Electrical Lockout/Tagout Procedures

When Working on a Machine Outside the Machine’s Main Electrical Enclosure

Before performing maintenance on any machine with electrical power, lockout/tagout the machine properly. When working on a machine outside of the machine’s main electrical enclosure, not including work on the electrical transmission line to the machine, follow your company’s approved lockout/tagout procedures which should include, but are not limited to the steps here.

1. Engage an E-stop on the machine.

2. Turn the disconnect switch handle to the “off” position. See Figure 2-1.

3. Attach a lock and tag that meet OSHA requirements for lockout/tagout.

4. Restrain or de-energize all pneumatic components, hydraulic components, and other parts that could have live or stored power.

WARNING

ELECTROCUTION HAZARD.

When the disconnect switch is off, there is still live power within the disconnect switch’s enclosure. Always turn off power at the building’s power source to the equipment before opening this electrical enclosure!

If working on the electrical transmission line to the machine, follow the procedure on page xv.

WARNING
Figure 2-1: Lockout/Tagout on the Main Electrical Enclosure

Sample of a Lock and Tag Attached to a Machine's Electrical Enclosure
When Working on a Machine Inside the Machine’s Main Electrical Enclosure or in the Electrical Transmission Line to the Machine

Before opening the main electrical enclosure, or attempting to repair or replace an electrical transmission line to the machine, lockout/tagout the machine properly. Follow your company’s approved lockout/tagout procedures which should include, but are not limited to the steps here.

1. Engage an E-stop on the machine.

2. Shut the power to the machine off at the machine’s power source which is usually an electrical service entry panel on the facility wall. One example of a locked-out power source panel is shown in Figure 2-2.

3. Attach a lock and tag that meets OSHA requirements for lockout/tagout.

4. Open the door to the enclosure in which you need access, and using a multimeter, verify that the power is off.

Figure 2-2: Lockout/Tagout on the Power Source Panel
Hydraulic System Lockout/Tagout Procedure

When Lockout/Tagout is Not Required

If working on components other than the hydraulic system, but that requires you to be near the vicinity of movable hydraulic components, you must, at a minimum, physically restrain the hydraulic components from moving. If this is not possible, lockout/tagout the entire hydraulic system.

When Lockout/Tagout is Required

Before attempting repair or maintenance on a hydraulic line or component, lockout/tagout the machine properly. Follow your company’s approved lockout/tagout procedures.

Troubleshooting With an Energized Machine

Only a qualified electrician, using the personal protective equipment and following the procedures recommended in NFPA 70E should ever attempt service or repair of or near an energized area or component of the machine.

Whenever maintenance is performed while the equipment is electrically energized, there is a potential electric arc flash hazard. Refer to NFPA 70E for the personal protective equipment required when working with electrically energized components. Pneumatic and hydraulic components may move unexpectedly if not de-energized. Physically restrain any components capable of movement when working on or near those components.
## Restricted Zone

<table>
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<th>DANGER</th>
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<tr>
<td>![Exclamation Mark]</td>
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<tr>
<td>Stay clear of the restricted zone when equipment is in use. Serious injury or death may result if personnel are in the restricted zone.</td>
</tr>
</tbody>
</table>

![Diagram of restricted zone]
Sea cuidadoso.
Protéjase.
Indicadores de seguridad

Los siguientes símbolos de alerta de seguridad y palabras de advertencia se utilizan a lo largo de este documento para indicar riesgos de seguridad. Preste suma atención cuando los vea. Cada símbolo o palabra indica un nivel de gravedad diferente. Las definiciones incluidas a continuación también pueden consultarse en la norma ANSI z535.4-2002.

El no cumplimiento de las instrucciones que acompañan a cada símbolo de alerta de seguridad puede producir daños a la propiedad, lesiones personales e incluso la muerte. El personal debe seguir todos los procedimientos y prácticas de seguridad establecidos para asegurar el uso más seguro posible de este equipo. No obstante, en ningún caso este documento reemplaza el sentido común. El personal debe asegurarse de que el entorno de trabajo sea seguro y esté libre de distracciones.

**PELIGRO**
Indica una situación de riesgo inminente que, si no se evita, producirá la muerte o lesiones graves.

![PELIGRO](image)

**ADVERTENCIA**
Indica una situación potencialmente peligrosa que, si no se evita, podría producir la muerte o lesiones graves.

![ADVERTENCIA](image)

**PRECAUCIÓN**
Cuando la PRECAUCIÓN se utiliza con el símbolo de alerta de seguridad aquí ilustrado, indica una situación potencialmente peligrosa que, si no se evita, puede producir lesiones menores o moderadas.

Cuando PRECAUCIÓN se utiliza sin el símbolo de alerta de seguridad aquí ilustrado, indica una situación potencialmente peligrosa que podría producir daños al equipo.

**AVISO**
Llama la atención a información importante para entender la operación que se desea realizar.

**AMBIENTAL**
Se aplica a condiciones que pueden afectar el entorno pero que no tienen un efecto inmediato o directo sobre el personal o el equipo.
Reglas de seguridad

Debido a la imposibilidad de anticipar todas las circunstancias que podrían constituir un riesgo, la información de seguridad suministrada en este manual del equipo y sobre la máquina no es exhaustiva. Si se utiliza o realiza el mantenimiento de esta máquina utilizando un procedimiento no recomendado específicamente por el fabricante, el procedimiento deberá ser aprobado por un ingeniero profesional para asegurarse de que no afecte la seguridad del equipo. ¡Manéjese! siempre con suma precaución y sentido común!

Conozca su equipo

- Lea este manual en su totalidad antes de utilizar o mantener el equipo. No utilice esta máquina a menos que esté perfectamente familiarizado con los controles, los dispositivos de seguridad, los frentos de emergencia y los procedimientos operativos que se describen en este manual.
- Lea y siga todas las notas de seguridad. El no cumplimiento de estas instrucciones podría producir pérdidas económicas, daños a la propiedad y lesiones personales, incluida la muerte.
- Refiérase a las pautas de bloqueo/etiquetado proporcionadas en las siguientes páginas para realizar el mantenimiento y solucionar problemas de este equipo en forma segura.
- Observe y cumpla con todas las etiquetas de seguridad. Cambie las etiquetas gastadas inmediatamente.
- Utilice este equipo únicamente para el propósito que se describe en este manual.
- Sólo personal calificado debe intentar utilizar o realizar el mantenimiento de este equipo. Por "personal calificado" se entiende:

  ...una persona o personas que, por el hecho de poseer un título o certificado de capacitación profesional reconocido o que, por sus amplios conocimientos o experiencia, han demostrado con éxito estar capacitados para resolver problemas relacionados con el tema y el trabajo en cuestión —ANSI B30.2-1983

  ...una persona que posee habilidades y conocimientos relacionados con la construcción y uso de equipos e instalaciones eléctricas y que ha recibido capacitación en seguridad sobre los riesgos posibles—NEC 2002 Handbook

Seguridad personal

- Use siempre anteojos de seguridad y protección auditiva en un entorno industrial.
- Utilice una máscara protectora cuando trabaje cerca de aserrín.
- Utilice ropa adecuada y equipo de protección personal apropriado (por ejemplo, anteojos de seguridad y protección auditiva.) No use ropa suelta ni joyas. Si tiene el cabello largo, ásteselo para atrás.
- Proceda con precaución cuando levante piezas o materiales pesados.
Instalación del equipo

- Siga las instrucciones de instalación al pie de la letra.

Procedimientos de Bloqueo/Etiquetado

- Antes de realizar el mantenimiento de los sistemas neumáticos o hidráulicos, purge las líneas para eliminar la presión.
- Bloquee y etique todos los sistemas energizados antes de realizar tareas de mantenimiento en ellos. Refiérase a la sección *Pautas de bloqueo/etiquetado* en la página xxiii.

Cómo mantener un entorno seguro

- Mantenga alejados a los niños. Todos los visitantes deben mantenerse a una distancia segura del área de trabajo. Los riesgos pueden no ser evidentes a las personas no familiarizadas con la máquina.
- Mantenga las áreas de trabajo bien iluminadas.
- Mantenga el área de trabajo limpia y libre de cualquier riesgo de tropiezo o resbalamiento.
- No utilice el equipo en lugares húmedos o mojados y no lo exponga a la lluvia o a la nieve.

Uso y mantenimiento del equipo

- Asegúrese de que no haya personas, herramientas y objetos extraños en las zonas restringidas antes de utilizar este equipo. Las zonas restringidas se indican en la página xxix.
- Realice pruebas de seguridad para verificar que todos los frenos de emergencia funcionen adecuadamente antes de utilizar el equipo por primera vez, después de realizar cualquier tarea de mantenimiento y según la frecuencia de mantenimiento establecida.
- En caso de que la máquina no funcione correctamente, deténgala inmediatamente utilizando un freno de emergencia e informe el problema a un supervisor.
- No deje nunca la máquina encendida si no está junto a ella. ¡Apáguela! No abandone la máquina hasta que todas las piezas se detengan completamente y hasta que se haya apagado la alimentación eléctrica.
- Verifique periódicamente que no haya piezas gastadas o dañadas. Repárelas o cámbielas inmediatamente.
- Mantenga los sistemas hidráulicos, neumáticos y eléctricos en buen funcionamiento en todo momento. Repare las fugas y las conexiones sueltas inmediatamente. No exceda nunca la presión ni potencia eléctrica recomendadas.
• Verifique que todos los dispositivos de seguridad estén en buen funcionamiento al comienzo de cada turno. Todos los dispositivos protectores y de seguridad deben estar en su lugar antes y durante el uso de la máquina. No desconecte ni evite nunca ningún dispositivo de seguridad ni interbloqueo eléctrico.

• Inspeccione periódicamente la calidad del producto terminado.

Seguridad eléctrica

• No utilice líquidos en el interior de los gabinetes eléctricos.

• Cuando utilice disolventes sobre o alrededor de la máquina, desconecte la alimentación para eliminar las probabilidades de chispas, que pueden producir una explosión o incendio. Use un respirador aprobado para el uso con disolventes. Use ropa protectora, guantes y anteojos de seguridad.
Bloqueo/Etiquetado

Pautas de bloqueo/etiquetado

Deben cumplir con todas las pautas de bloqueo/etiquetado conforme a la norma OSHA 29 CFR 1910.147. El programa de control de energía de la compañía debe incluir un procedimiento específico. El objetivo de este manual no es reemplazar el procedimiento de desenergización o bloqueo/etiquetado requerido por la OSHA, sino proporcionar pautas orientativas generales.

El término "bloqueo", según se utiliza en este manual, se refiere a la colocación de un dispositivo de bloqueo en las fuentes de energía para asegurar que el dispositivo aislador de energía y el equipo controlado por éste no puedan reenergizarse o utilizarse hasta que se retire dicho dispositivo.

Las fotos de la página siguiente muestran los lugares en los que se encuentran los interruptores de desconexión eléctrica de esta máquina.

- Las fuentes de energía incluyen energía eléctrica, mecánica, hidráulica, neumática, química, térmica y otras.
- En el caso de fuentes de energía eléctrica, la alimentación principal y la alimentación de control a la maquinaria deben apagarse y bloquearse físicamente en la posición "off" (apagado).
- Por lo general, como dispositivo de bloqueo se utiliza un candado con llave.
- Si hay más de una persona trabajando en una zona restringida, utilice un dispositivo de bloqueo grupal que permita a cada persona utilizar un candado que sólo pueda ser retirado por la persona que realiza el mantenimiento.

"Etiquetado" significa que debe colocarse una advertencia fácil de ver en un dispositivo aislador de energía que indique que el equipo no debe utilizarse.
Procedimientos de bloqueo/etiquetado eléctricos

Cuando trabaja en una máquina fuera del gabinete eléctrico principal de la máquina

Si trabaja en la línea de transmisión eléctrica a la máquina, siga el procedimiento de la página xxvi.

Antes de realizar el mantenimiento de cualquier máquina con alimentación eléctrica, bloquee y etiquete la máquina de forma adecuada. Cuando trabaje en una máquina fuera del gabinete eléctrico principal de la máquina, salvo en el caso de trabajos en la línea de transmisión eléctrica a la máquina, siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Coloque un freno de emergencia sobre la máquina.
2. Coloque el mango del interruptor con fusibles en la posición "apagado/apagada". Vea la figura 2-1.
3. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA.
4. Trabe o desenergice todos los componentes neumáticos, componentes hidráulicos y otras piezas que tengan alimentación directa o almacenada.

RIESGO DE ELECTROCUCIÓN.
Cuando el interruptor con fusibles está apagado, sigue habiendo energía dentro del gabinete del interruptor. ¡Apague siempre la alimentación en la fuente de alimentación del edificio antes de abrir este gabinete eléctrico!
Figura 3-1: Bloqueo/etiquetado en el gabinete eléctrico principal

Ejemplo de un candado y etiqueta fijados al gabinete eléctrico de una máquina
Cuando trabaje en una máquina dentro del gabinete eléctrico principal de la máquina o en la línea de transmisión eléctrica a la máquina

Antes de abrir el gabinete eléctrico principal o intentar reparar o reemplazar una línea de transmisión eléctrica a la máquina, bloquee y etiqueta la máquina en forma adecuada. Siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Coloque un freno de emergencia sobre la máquina.

2. Apague la alimentación a la máquina en la fuente de alimentación, que, por lo general, es un panel de entrada de suministro eléctrico que se encuentra en una pared de las instalaciones. En la figura 2-2 se muestra un ejemplo de panel de fuente de alimentación bloqueado.

3. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA.

4. Abra la puerta del gabinete al que necesita acceder y usando un multímetro verifique que la alimentación esté apagada.

**Figura 3-2: Bloqueo/Etiquetado del panel de fuente de alimentación**
Procedimiento de bloqueo/etiquetado de sistema hidráulico

Cuando no se requiere bloqueo/etiquetado

Si trabaja con componentes que no son del sistema hidráulico pero que requieren su presencia en la proximidad de componentes hidráulicos móviles, debe, como mínimo, trabar físicamente estos componentes para que no se muevan. Si no es posible, bloquee/etiquete todo el sistema hidráulico.

Cuando se requiere bloqueo/etiquetado

Antes de intentar reparar o realizar el mantenimiento de una línea o componente hidráulico, bloquee y etiquete la máquina en forma apropiada. Siga los procedimientos de bloqueo/etiquetado aprobados por la compañía.
Solución de problemas con una máquina energizada

Sólo un electricista calificado que utilice el equipo de protección personal y siga los procedimientos recomendados en la norma NFPA 70E debe intentar realizar tareas de reparación o mantenimiento en un área o componente energizados de la máquina o en su proximidad.

Cada vez que se realizan tareas de mantenimiento mientras el equipo está eléctricamente energizado, existe un riesgo potencial de formación de un arco eléctrico. Consulte en la norma NFPA 70E el equipo de protección personal requerido para trabajar con componentes eléctricamente energizados. Los componentes neumáticos e hidráulicos pueden moverse de manera imprevista si no se desenergizan. Trabe físicamente cualquier componente que pueda moverse cuando deba trabajar en ellos o en su proximidad.
Zonas restringida

Manténgase alejado de la zona restringida cuando el equipo esté en uso. Pueden producirse lesiones graves o incluso la muerte si el personal está en la zona restringida.
This chapter introduces you to this manual and provides an overview of your equipment and the means to identify it.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read this manual completely before using this equipment!</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>All warnings must be read and observed. Failure to do so may result in economic loss, property damage, and/or personal injury.</td>
</tr>
<tr>
<td>This manual must always be available to personnel operating and maintaining this equipment.</td>
</tr>
</tbody>
</table>
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.

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**

<table>
<thead>
<tr>
<th>System Name</th>
<th>MiTek Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>460 VAC</td>
<td></td>
<td>The double-press cycle uses two (2) separate pressing actions to press connector plates into a truss that is larger than the platen head.</td>
</tr>
<tr>
<td>460 VAC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1-2: Options Available**

<table>
<thead>
<tr>
<th>System Name</th>
<th>MiTek Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immersion heater in hydraulic fluid</td>
<td>88259-901</td>
<td>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.</td>
</tr>
<tr>
<td>reservoir</td>
<td>88259-902</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>for field install</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## General Specifications

### Table 1-3: General Specifications

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Capacity</td>
<td>100 tons</td>
</tr>
<tr>
<td>Max. Truss Length</td>
<td>18'</td>
</tr>
<tr>
<td>Max. Truss Height</td>
<td>57&quot;</td>
</tr>
<tr>
<td>Cycle Time (at optimum settings)</td>
<td>10 seconds</td>
</tr>
<tr>
<td>Platen Area</td>
<td>48&quot; x 18' 3&quot;</td>
</tr>
<tr>
<td>Working Table Surface</td>
<td>48&quot; x 18'</td>
</tr>
<tr>
<td>Min. Open Height Between Platens</td>
<td>2-3/8&quot;</td>
</tr>
<tr>
<td>Max. Open Height Between Platens</td>
<td>7-1/8&quot;</td>
</tr>
<tr>
<td>Weight</td>
<td>See Table 2-6</td>
</tr>
<tr>
<td>Size</td>
<td>See Table 2-2</td>
</tr>
</tbody>
</table>

**Connector Plates**

Use any connector plate appropriately rated for the truss. *MiTek M20® plates are recommended for most applications.*

**Building Material**

Most lumber appropriate for mobile home trusses

### Motors—Electric

<table>
<thead>
<tr>
<th>Horsepower Rating</th>
<th>30 hp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Speed</td>
<td>1,800 rpm</td>
</tr>
<tr>
<td>Starting Switch</td>
<td>Full voltage</td>
</tr>
<tr>
<td>Voltage</td>
<td></td>
</tr>
<tr>
<td>Amperage</td>
<td>See Table 2-4</td>
</tr>
<tr>
<td>Cycles</td>
<td></td>
</tr>
<tr>
<td>Phases</td>
<td></td>
</tr>
</tbody>
</table>

### Hydraulic System

<table>
<thead>
<tr>
<th>Flow</th>
<th>Press: Rated 30 GPM</th>
<th>Tables: Rated 22 GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Operating Pressure</td>
<td>Press: 2,050 psi</td>
<td>Tables: 1,500 psi</td>
</tr>
<tr>
<td>Speed Controls (2 per table)</td>
<td>Table IN speed and table OUT speed</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Fluid Reservoir</td>
<td>120 gallons</td>
<td></td>
</tr>
<tr>
<td>Recommended Oil</td>
<td>See Table 2-5</td>
<td></td>
</tr>
<tr>
<td>Filters</td>
<td>2 spin-on return line filters, $\beta_{10} = 200$ or higher, paper media</td>
<td></td>
</tr>
<tr>
<td>Control Valves</td>
<td>Solenoid-controlled, pilot-operated, 4-way, 3-position directional control valve; spring-centered</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Hydraulic Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore</td>
</tr>
<tr>
<td>Stroke</td>
</tr>
<tr>
<td>Action</td>
</tr>
<tr>
<td>Rod (hard chrome finish)</td>
</tr>
<tr>
<td>Pressure Rating</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jig Table (Standard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
</tr>
<tr>
<td>Width</td>
</tr>
<tr>
<td>Length</td>
</tr>
</tbody>
</table>

Table 1-3: General Specifications (Continued)
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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space</td>
<td>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.</td>
</tr>
<tr>
<td>Location</td>
<td>Concrete, a minimum of 6 in. thick 5,000 psi, is required under the weight of the press and tables.</td>
</tr>
<tr>
<td></td>
<td>The <em>MH TrussMaker</em> system must be located in a covered area without extreme temperature changes.</td>
</tr>
<tr>
<td>Electrical</td>
<td>The standard electrical requirements are shown in Table 2-4. Contact your MiTek representative immediately if custom power specifications need to be arranged.</td>
</tr>
<tr>
<td>Hydraulics</td>
<td>The correct hydraulic fluid must be available at installation.</td>
</tr>
<tr>
<td>Table Jigging</td>
<td>Guidelines are provided for the table jigging that must be installed prior to startup.</td>
</tr>
<tr>
<td>Transport Equipment</td>
<td>A machinery rigger capable of transporting the weights described in Table 2-6 must be arranged prior to delivery.</td>
</tr>
<tr>
<td>Customer-Supplied Parts</td>
<td>The customer is responsible for having the supplies listed in Table 2-7 available at the time of installation.</td>
</tr>
</tbody>
</table>
**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**

<table>
<thead>
<tr>
<th>System Dimension</th>
<th>Approximate Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension A</td>
<td>23'</td>
</tr>
<tr>
<td>Dimension B</td>
<td>17'</td>
</tr>
<tr>
<td>Dimension C</td>
<td>7' 1&quot;</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Recommended ISO Grade(^a)</th>
<th>ISO 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Operating Viscosity Range</td>
<td>60-245 SUS</td>
</tr>
<tr>
<td>Temperature(^b)</td>
<td>At Startup</td>
</tr>
<tr>
<td></td>
<td>During Operation</td>
</tr>
<tr>
<td>Reservoir Capacity</td>
<td>120 gallons</td>
</tr>
<tr>
<td>Capacity of Hydraulic Lines</td>
<td>Up to 10 gallons</td>
</tr>
</tbody>
</table>

\(^a\) 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>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Head</td>
<td>43,000 lb</td>
</tr>
<tr>
<td>1 Table</td>
<td>2,700 lb</td>
</tr>
<tr>
<td>HPU (with reservoir empty)</td>
<td>2,175 lb</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>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. Inadequate transport equipment may result in property damage, personal injury, or death.</td>
</tr>
</tbody>
</table>

**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**

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

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.
**DANGER**

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.

Lift the equipment only at the lift points indicated by MiTek! See Figure 3-1.

If the equipment is transported incorrectly, equipment damage, personal injury, or death may result.

---

**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.

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.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical hazard!</td>
</tr>
<tr>
<td>All electrical work must be performed by a qualified electrician.</td>
</tr>
<tr>
<td>Follow approved lockout and tagout procedures (OSHA 29 CFR 1910.147).</td>
</tr>
</tbody>
</table>

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
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**

---

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not attempt to start the system without a MiTek representative present!</td>
</tr>
<tr>
<td>Serious injury and/or equipment damage may result.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slip hazard.</td>
</tr>
<tr>
<td>Do NOT overfill. Avoid spillage.</td>
</tr>
<tr>
<td>Clean up any spillage immediately.</td>
</tr>
</tbody>
</table>
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.

Adjusting the Table Movement

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

Things to Know Before You Begin

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read this manual completely before using this equipment! 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. All warnings must be read and observed. Failure to do so may result in economic loss, property damage, personal injury and/or death. This manual must always be available to personnel operating and maintaining this equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before turning on the equipment, make sure that all personnel and equipment are clear.</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Qty.</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrical enclosure</td>
</tr>
<tr>
<td>2</td>
<td>Left table</td>
</tr>
<tr>
<td>2</td>
<td>Right table</td>
</tr>
<tr>
<td>1</td>
<td>Left automatic control station</td>
</tr>
<tr>
<td>1</td>
<td>Right automatic control station</td>
</tr>
</tbody>
</table>

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.
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>
<thead>
<tr>
<th>Control Name</th>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL POWER</td>
<td>Indicator light</td>
<td>Indicates when the power is turned on to the electrical panel; the disconnect handle is on, and the fuse disconnects are working</td>
</tr>
<tr>
<td>EMERG STOP</td>
<td>Indicator light</td>
<td>Indicates that an E-stop is activated and must be released before operation begins</td>
</tr>
<tr>
<td>TABLE IN-OUT</td>
<td>Selector switch</td>
<td>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</td>
</tr>
<tr>
<td>LEFT TABLE 1P-2P</td>
<td>Selector switch</td>
<td>Selects whether the left table cycle presses once (1P=single-press) or twice (2P=double-press)</td>
</tr>
<tr>
<td>RIGHT TABLE 1P-2P</td>
<td>Selector switch</td>
<td>Selects whether the right table cycle presses once (1P=single-press) or twice (2P=double-press)</td>
</tr>
<tr>
<td>START HPU</td>
<td>Button</td>
<td>Press to start the HPU; light in the center of the button will light up</td>
</tr>
<tr>
<td>JOG RAISE-LOWER</td>
<td>Selector switch</td>
<td>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</td>
</tr>
<tr>
<td>LEFT-RIGHT</td>
<td>Selector switch</td>
<td>Determines which table will move when the TABLE IN-OUT selector switch is turned</td>
</tr>
<tr>
<td>EMERGENCY STOP</td>
<td>Mushroom pushbutton</td>
<td>Stops all motion; all 7 E-stops must be in their released position for the machine to operate</td>
</tr>
<tr>
<td>HOUR METER</td>
<td>Automatic meter to be used for maintenance purposes</td>
<td>Automatically tracks how long the HPU motor is running; use this information to perform scheduled preventive maintenance</td>
</tr>
</tbody>
</table>
**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**

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

It is the customer’s responsibility to supply and install jigging. 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.

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

2. Set up the truss on the jig table.
   - Use jigging and blocking as described in the Jigging andBlocking 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

1. Turn switch to DIS and remove the key.

2. Set up truss on the jig table.

3. Turn power on, clear any E-stops, select single or double jig, start HPU.

4. Press and release START CYCLE.

5. Stay clear of moving parts while table travels forward, platen presses plates, and table returns to its resting position.

6. Remove truss from table.
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.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always disconnect all power from the power source before opening the electrical enclosure. Failure to do so may result in fatal injury!</td>
</tr>
</tbody>
</table>

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.
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

DANGER

Read this manual completely before using this equipment!

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.

All warnings must be read and observed. Failure to do so may result in economic loss, property damage, and/or personal injury.

This manual must always be available to personnel operating and maintaining this equipment.
Performing Maintenance Safely

<table>
<thead>
<tr>
<th></th>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Only qualified personnel should attempt to install, operate, or perform maintenance on this equipment.</td>
</tr>
<tr>
<td></td>
<td>Compliance with the minimum recommendations outlined throughout this manual is essential.</td>
</tr>
</tbody>
</table>

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

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 Manual 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.

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

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

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

Refer to...

Look at the name plate on your HPU to determine your HPU number.
Table 6-1: Valve Stack and Manifold for HPU #88259-501 (Continued)

<table>
<thead>
<tr>
<th>Callout in Figure 6-4</th>
<th>Label on HPU</th>
<th>Description</th>
<th>To Adjust</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Case 2</td>
<td>Small hose to motor on right table</td>
<td>N/A</td>
</tr>
<tr>
<td>22</td>
<td>A3</td>
<td>Hose to press, cap end</td>
<td>N/A</td>
</tr>
<tr>
<td>23</td>
<td>B1</td>
<td>Moves left table out; hose to left table motor, right port (B)</td>
<td>N/A</td>
</tr>
<tr>
<td>24</td>
<td>A1</td>
<td>Moves left table in; hose to left table motor, left port (A)</td>
<td>N/A</td>
</tr>
<tr>
<td>25</td>
<td>Gage A3</td>
<td>Port to plug in temporary gauge for troubleshooting press</td>
<td>N/A</td>
</tr>
<tr>
<td>26</td>
<td>Counterbalance</td>
<td>Valve that causes platen to move down in a smooth motion; prevents free fall</td>
<td>Loosen nut and turn screw</td>
</tr>
<tr>
<td>27</td>
<td>Gage 1-2</td>
<td>Port to plug in temporary gauge for troubleshooting both tables</td>
<td>N/A</td>
</tr>
<tr>
<td>28</td>
<td>B2</td>
<td>Moves right table out; hose to right table motor, right port (B)</td>
<td>N/A</td>
</tr>
<tr>
<td>29</td>
<td>A2</td>
<td>Moves right table in; hose to right table motor, left port (A)</td>
<td>N/A</td>
</tr>
<tr>
<td>30</td>
<td>Gage B3</td>
<td>Port to plug in temporary gauge for troubleshooting press</td>
<td>N/A</td>
</tr>
<tr>
<td>31</td>
<td>B3</td>
<td>Hose to press, rod end</td>
<td>N/A</td>
</tr>
<tr>
<td>32</td>
<td>Check Valve 3</td>
<td>Press</td>
<td>N/A</td>
</tr>
<tr>
<td>33</td>
<td>Tank 3</td>
<td>Hose to reservoir</td>
<td>N/A</td>
</tr>
<tr>
<td>34</td>
<td>Gage 3</td>
<td>Hose to pressure switch</td>
<td>N/A</td>
</tr>
<tr>
<td>35</td>
<td>—</td>
<td>Pilot choke for press</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>36</td>
<td>—</td>
<td>Pilot choke for right table</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>37</td>
<td>—</td>
<td>Pilot choke for left table</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>38</td>
<td>—</td>
<td>Solenoid for press; manually actuates press, back side controls “up”</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>39</td>
<td>—</td>
<td>Solenoid for right table; manually actuates table, back side controls “in”</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>40</td>
<td>—</td>
<td>Solenoid for left table; manually actuates table, back side controls “out”</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>41</td>
<td>—</td>
<td>Pilot choke for left table</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>42</td>
<td>—</td>
<td>Pilot choke for right table</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>43</td>
<td>—</td>
<td>Pilot choke for press</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>44</td>
<td>—</td>
<td>Solenoid for left table; manually actuates table, front side controls “in”</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>45</td>
<td>—</td>
<td>Solenoid for right table; manually actuates table, front side controls “out”</td>
<td>Allen wrench</td>
</tr>
<tr>
<td>46</td>
<td>—</td>
<td>Solenoid for press; manually actuates press, front side controls “down”</td>
<td>Allen wrench</td>
</tr>
</tbody>
</table>
Figure 6-4: Valve Stacks on HPU #88259-501

For Press and Tables

Valve Stacks on HPU #88259-501

Back Side of Valve Stack Manifold

Front Side of Valve Stack Manifold

General Location

Operator End of HPU

Pressure Switch

Side Closest to Press Head
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.
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

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

Solenoid Cable

Pilot Valve

Pilot Choke

Regenerative Valve

Counterbalance Valve

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

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

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

General Location for HPUs With Any JF #
Figure 6-7: Return Line Filters

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

HPU #88259-501
Operator End

Return Line Filter for Press
Return Line Filter for Tables

HPU #88258-501
Operator End

Return Line Filter for Press
Return Line Filter for Tables

Oil Reservoir

HPU #JF-664747/5687
HPU #JF-59879/4385-1
HPU #JF-59879/4385-2

Return Line Filter for Press
Return Line Filter for Tables
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

HPU #88258-501 - Refer to Valve Stack Graphic

HPU #88259-501 - Refer to Valve Stack Graphic
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

<table>
<thead>
<tr>
<th>Recommended ISO Grade&lt;sup&gt;a&lt;/sup&gt;</th>
<th>ISO 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Operating</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>60-245 SUS</td>
</tr>
<tr>
<td>Operating Temperature&lt;sup&gt;b&lt;/sup&gt;</td>
<td>At startup</td>
</tr>
<tr>
<td></td>
<td>&gt; 68°F</td>
</tr>
<tr>
<td></td>
<td>During Operation</td>
</tr>
<tr>
<td>Reservoir Capacity</td>
<td>120 gallons</td>
</tr>
<tr>
<td>Capacity of Hydraulic Lines</td>
<td>&gt;2 gallons</td>
</tr>
</tbody>
</table>

<sup>a</sup> 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.

<sup>b</sup> 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.
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.

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 6-11: 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.

Figure 6-10: Reservoir Ball Valve
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 6-5 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*
• 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:

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

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.

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 jigging 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.

   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.

   CAUTION

   Pinch point and collision hazard. Fast table movement may damage table components.

   The table may move very fast. All personnel must stand clear of moving parts while testing the operating pressure.

   Test table speed by moving the table in short spurts to avoid damaging table components.
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](image)

- Pressing Dwell Time
- Press Head Raise Time

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

**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

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

- Apply anti-sieze compound to threads and torque to between 825 and 875 in-lb.
- Torque screws in the order specified above.
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

- Gear, Bearing, and Bushing Assembly on the Motor End of the 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
  - *Spur Gear: 544247
  - *Transtorque Bushing: 547171

- Gear, Bearing, and Bushing Assembly on the Idle End of the Table Drive Shaft
  - Torque Bushing to 2000 in-lb
  - Bearing: 419786

* On some machines, taper bushing 547148 and gear 544176 are used on both ends.
Figure 6-19: How to Replace the Guide Strips

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

White, 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

Transformer

PLC

FU1
FU1
FU2
FU3
FU2
FU3
FU7-10

Power Supply

Safety Relay

Control Relays

CB1

DC
PS

SR1
CR1
CR2

MS1

Motor Starter

OL1

460 Volt

208/230 Volt
**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

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

**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

<table>
<thead>
<tr>
<th>System Showing Symptoms</th>
<th>Table Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical and Electrical Troubleshooting</td>
<td>Table A-1</td>
</tr>
<tr>
<td>Automatic Lubrication System Troubleshooting*</td>
<td>Table A-2</td>
</tr>
</tbody>
</table>

* Refer to the User Manual from Lincoln for more detailed information on troubleshooting the lubrication system.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing operates; no lights</td>
<td>No power</td>
<td>Check power supply and fuses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check that disconnect handle is in ON position</td>
</tr>
<tr>
<td>Motor doesn't start, but power indicator light is on</td>
<td>Power is off</td>
<td>Check that all E-stops are released</td>
</tr>
<tr>
<td></td>
<td>Starting circuit</td>
<td>Check starting circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repair or replace motor starter</td>
</tr>
<tr>
<td>Oil pressure fails to reach operating level or pressure is erratic, but motor is running</td>
<td>Low relief valve setting</td>
<td>Turn relief valve handle clockwise to increase pressure</td>
</tr>
<tr>
<td></td>
<td>Worn or dirty relief valve</td>
<td>Clean relief valve thoroughly</td>
</tr>
<tr>
<td></td>
<td>Hydraulic pump</td>
<td>Replace cylinder packing using the cylinder repair kit</td>
</tr>
<tr>
<td>Cycle time is too long</td>
<td>Press dwell time is longer than necessary</td>
<td>Adjust the top potentiometer on the PLC</td>
</tr>
<tr>
<td></td>
<td>Press head raise time in 2P mode is longer than necessary</td>
<td>Adjust the bottom potentiometer on the PLC</td>
</tr>
<tr>
<td>Plates are not fully embedded</td>
<td>Inadequate press dwell time</td>
<td>Adjust top potentiometer on PLC</td>
</tr>
<tr>
<td></td>
<td>Worn friction barrier</td>
<td>Replace friction barrier</td>
</tr>
<tr>
<td></td>
<td>Low jigging fixture</td>
<td>Raise height of jigging fixture</td>
</tr>
<tr>
<td></td>
<td>Low pressure switch setting</td>
<td>Increase operating pressure of press</td>
</tr>
<tr>
<td>Overheating of hydraulic system—not starting</td>
<td>Oil viscosity too high (pump noisy at start-up)</td>
<td>Change to recommended viscosity</td>
</tr>
<tr>
<td></td>
<td>Low relief valve setting</td>
<td>Turn relief valve handle clockwise to increase pressure</td>
</tr>
<tr>
<td></td>
<td>Low oil level</td>
<td>Fill to within 2&quot; of top</td>
</tr>
<tr>
<td></td>
<td>Worn pump (cylinder action sluggish)</td>
<td>A scored pump may cause galling of metal and overheat. Disassemble and evaluate for replacement</td>
</tr>
</tbody>
</table>
### Table A-1: Mechanical and Electrical Troubleshooting (Continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Noisy pump</strong></td>
<td>Low hydraulic fluid level</td>
<td>Fill reservoir to within 2&quot; of top</td>
</tr>
<tr>
<td></td>
<td>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)</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>Worn or damaged shaft seals</td>
<td>Replace seals</td>
</tr>
<tr>
<td></td>
<td>Shaft out of alignment</td>
<td>Check shaft for alignment; realign and check coupling and mounting bolts</td>
</tr>
<tr>
<td></td>
<td>Loose mounting bolts</td>
<td>Check mounting bolts and tighten, if necessary</td>
</tr>
<tr>
<td></td>
<td>Low oil temperature</td>
<td>Heat with an immersion heater. Temperature should be above 50°F at start-up</td>
</tr>
<tr>
<td></td>
<td>High oil viscosity</td>
<td>Drain and replace with proper viscosity</td>
</tr>
<tr>
<td></td>
<td>Worn or faulty bearings</td>
<td>Replace bearings</td>
</tr>
<tr>
<td></td>
<td>Worn cam ring in pump</td>
<td>Replace with complete pump cartridge assembly</td>
</tr>
<tr>
<td></td>
<td>Worn or sticking vanes</td>
<td>Replace with complete pump cartridge assembly</td>
</tr>
<tr>
<td></td>
<td>Normal wear</td>
<td>Replace worn parts or entire pump</td>
</tr>
<tr>
<td><strong>Unusual sounds detected during inspections</strong></td>
<td>Cracked metal</td>
<td>Weld metal back in place, if feasible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Call MiTek Machinery Division Customer Service for additional options</td>
</tr>
<tr>
<td></td>
<td>Dry bearings</td>
<td>Grease bearings</td>
</tr>
<tr>
<td></td>
<td>Worn bushings</td>
<td>Replace bushings</td>
</tr>
<tr>
<td></td>
<td>Missing shaft retainer</td>
<td>Replace shaft retainer</td>
</tr>
</tbody>
</table>
### Table A-1: Mechanical and Electrical Troubleshooting (Continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td>Directional control valve not shifting</td>
<td>Dirt on chip may be preventing valve spool from shifting</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td>Electrical failure</td>
<td>Check circuits, then solenoids</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td>Mechanical bind preventing the solenoid from traveling to its full extent</td>
<td>Inspect entire press and frame to locate a barrier, damaged component, etc.</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td>Faulty pump operation</td>
<td>See &quot;noisy pump&quot;</td>
</tr>
<tr>
<td>For tables—table bypassed proximity switch without recognizing it</td>
<td></td>
<td>Temporary solution: Manually move the tables by jogging the solenoid so it slowly passes back over the prox switch</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td></td>
<td>Long-term solution:</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td></td>
<td>• Adjust the prox switch location</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td></td>
<td>• Adjust the prox switch target on the table</td>
</tr>
<tr>
<td>Press head does not move or jig table fails to move</td>
<td></td>
<td>• Slow the speed of the table</td>
</tr>
<tr>
<td>Worn or damaged cylinder or hydraulic motor</td>
<td>Replace all cylinder seals; check motor for wear and replace all seals</td>
<td></td>
</tr>
<tr>
<td>Selector switch is in 1P mode</td>
<td>Temporary solution: Hold a piece of steel under the appropriate prox switch to reset it</td>
<td></td>
</tr>
<tr>
<td>Selector switch is in 1P mode</td>
<td>Long-term solution:</td>
<td></td>
</tr>
<tr>
<td>Selector switch is in 1P mode</td>
<td></td>
<td>• Adjust the prox switch location</td>
</tr>
<tr>
<td>Selector switch is in 1P mode</td>
<td></td>
<td>• Adjust the prox switch target on the table</td>
</tr>
<tr>
<td>Selector switch is in 1P mode</td>
<td></td>
<td>• Slow the speed of the table</td>
</tr>
<tr>
<td>Table bypassed proximity switch without recognizing it</td>
<td>Turn the selector switch on the manual control panel to 2P</td>
<td></td>
</tr>
<tr>
<td>Incorrect table operating pressure</td>
<td>Refer to Adjusting the Jig Table Speed (for Minor Adjustments) and Adjusting Operating Pressure for Jig Table Movement, both in the Maintenance chapter</td>
<td></td>
</tr>
<tr>
<td>Table out of square</td>
<td>Adjust transtorque bushing and spur gear</td>
<td></td>
</tr>
<tr>
<td>Barrier inhibiting movement</td>
<td>Check track and under platen for barriers</td>
<td></td>
</tr>
<tr>
<td>Table moves too slowly or too fast or not at all</td>
<td>Selector switch is in 2P mode</td>
<td>Normal for first press in 2P mode, turn toggle switch to 1P</td>
</tr>
<tr>
<td>Table moves too slowly or too fast or not at all</td>
<td>Prox switch is not aligned</td>
<td>See the Maintenance chapter for location and functions of prox switches</td>
</tr>
<tr>
<td>Table moves too slowly or too fast or not at all</td>
<td>Barrier preventing further movement</td>
<td>Check drive system and under platen for barriers</td>
</tr>
<tr>
<td>Table moves too slowly or too fast or not at all</td>
<td>Table not aligned on gear racks</td>
<td>Adjust transtorque bushing and spur gear</td>
</tr>
<tr>
<td>Tables stop before completely under platen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table A-1: Mechanical and Electrical Troubleshooting (Continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables do not retract fully</td>
<td>Prox switch is not aligned</td>
<td>See the <em>Maintenance</em> chapter for location and functions of prox switches</td>
</tr>
<tr>
<td></td>
<td>Barrier preventing further movement</td>
<td>Check drive system and under platen for barriers</td>
</tr>
<tr>
<td></td>
<td>Table not aligned on gear racks</td>
<td>Adjust transtorque bushing and spur gear</td>
</tr>
<tr>
<td>Tables stop too abruptly when entering press</td>
<td>High operating pressure</td>
<td>Adjust cross port relief valves, flow control valves, and pilot choke</td>
</tr>
<tr>
<td>Tables stop too abruptly when retracting out of press; slam against end cap</td>
<td>High operating pressure</td>
<td>Adjust cross port relief valves, flow control valves, and pilot choke</td>
</tr>
<tr>
<td></td>
<td>Table not aligned on gear racks; hitting side guard near end cap</td>
<td>Adjust transtorque bushing and spur gear</td>
</tr>
<tr>
<td></td>
<td>“Table out” prox switch is not set correctly</td>
<td>Move the “table out” prox switch so the table actuates it at the correct moment</td>
</tr>
</tbody>
</table>
### Table A-2: Automatic Lubrication System Troubleshooting*

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stirring paddle is not rotating</td>
<td>No power</td>
<td>Be sure the power cable is connected</td>
</tr>
<tr>
<td></td>
<td>Tripped breaker</td>
<td>Check breaker #2 on main AutoLube control; if tripped, reset or check fuse in AutoLube control panel</td>
</tr>
<tr>
<td>Divider valve cycles slowly or fails to cycle</td>
<td>Blockage in delivery line</td>
<td>Loosen line/fittings at divider valve block, one at a time, until lubricant under pressure emerges from port</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This indicates the blocked delivery line; trace this line to determine the cause of the problem; if all lines are clear, then the problem could be in the divider valve block.</td>
</tr>
<tr>
<td></td>
<td>Soap or contaminated grease buildup in the internal ports of the divider valve block</td>
<td>Retighten all lines and fittings</td>
</tr>
<tr>
<td></td>
<td>Remove each piston from the divider valve block and bathe the block and each piston in solvent</td>
<td></td>
</tr>
</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th>System Requiring Parts</th>
<th>Table Number</th>
<th>Part Location Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Parts</td>
<td>Table B-1</td>
<td>Control Station</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HPU Heater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lubrication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Press Head</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tables</td>
</tr>
<tr>
<td>Hydraulic Parts</td>
<td>Table B-2</td>
<td>Hydraulic System</td>
</tr>
<tr>
<td>Common Electrical Parts</td>
<td>Table B-3</td>
<td>Electrical System</td>
</tr>
<tr>
<td>Electrical Drawing Overview to Find Additional Part Numbers</td>
<td>Table B-4</td>
<td>Electrical System</td>
</tr>
<tr>
<td>Labels</td>
<td>Table B-5</td>
<td>—</td>
</tr>
</tbody>
</table>
### Table B-1: Mechanical Parts

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

<table>
<thead>
<tr>
<th>Part Location</th>
<th>MiTek Part #</th>
<th>Part Description</th>
<th>Refer to Drawing Number</th>
<th>Keep in Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables</td>
<td>88263</td>
<td>Friction Barrier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>88262</td>
<td>For customers with Dwg 88267 in their manual (built prior to Dec. 04):</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>White, nylon friction barrier, 57x120&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>White, nylon friction barrier, 57x96&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>88295</td>
<td>Friction Barrier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>88294</td>
<td>For customers with Dwg 88297 in their manual (built after Dec. 04):</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>White, nylon friction barrier, 57x120&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>White, nylon friction barrier, 57x96&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>88194</td>
<td>Guide buttons/rollers</td>
<td>88267</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for models without guide strips)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>88284</td>
<td>Guide strip, side</td>
<td>88297</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for models without guide buttons/rollers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>88283</td>
<td>Guide strip, top</td>
<td>88297</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for models without guide buttons/rollers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>807132</td>
<td>Motor, hydraulic motor</td>
<td>88297</td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>363035</td>
<td>Nut, 1/4-20, for 88294 &amp; 88295 (qty 72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>88286</td>
<td>Prox switch mounting plate, 5x3x1/4&quot;</td>
<td>88297</td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>See Figure 6-18</td>
<td>Sprockets, bushings, and bearings for table drive shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>Left Table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>88300-501</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>Right Table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>88300-502</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td></td>
<td>Table assembly, including entire weldment and nylon table top</td>
<td>88297</td>
<td></td>
</tr>
</tbody>
</table>
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
- 88259 or other Listed in Appendix D

#### Table B-2: Hydraulic Parts

<table>
<thead>
<tr>
<th>Part Location</th>
<th>MiTek Part #</th>
<th>Part Description</th>
<th>Keep in Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic System</td>
<td>802251</td>
<td>Check valve, cartridge, COHA-XEN</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802243</td>
<td>Check valve, cartridge, CXHA-XEN</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802248</td>
<td>Check valve, cartridge, reverse flow, NCFB-LCN</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802277</td>
<td>Counterbalance valve, cartridge, CBGA-LHN</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>557345</td>
<td>Coupling insert at motor adaptor,</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>557350</td>
<td>Coupling insert at motor adaptor, M40002806</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>557331</td>
<td>Coupling insert at motor adaptor, M40012816</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>798526</td>
<td>Cylinder, press cylinder (also found on Dwg 88127)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>798535</td>
<td>Cylinder seal kit, 6 bore</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>798536</td>
<td>Cylinder seal kit for pistons and tubes</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>798537</td>
<td>Cylinder seal kit for rod cartridge</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802003</td>
<td>Flow Control Valve</td>
<td>4</td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802261</td>
<td>Directional valve seal kit (for PN 802265)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>805227</td>
<td>Filter, return line filters (total of 2)</td>
<td>1</td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>805228</td>
<td>Filter—replacement element, synthetic, MZ10</td>
<td>2</td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>See &quot;Refer to&quot; note</td>
<td>HPU, the correct part number is the applicable drawing number</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>88256-501</td>
<td>Hydraulic assembly (HPU plus hose kits)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>473002</td>
<td>Motor, 30 hp, HPU</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>809038</td>
<td>Oil Cooler thermal transfer motor (for oil cooler, PN 809037)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802280</td>
<td>Pilot Choke seal kit (for PN 802274)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802274</td>
<td>Pilot choke valve</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802267</td>
<td>Pilot valve for directional valve (PN 802265)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>800285</td>
<td>Pump</td>
<td></td>
</tr>
<tr>
<td>Part Location</td>
<td>MiTek Part #</td>
<td>Part Description</td>
<td>Keep in Stock</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802268</td>
<td>Relief valve, cartridge, RPEC-LAN</td>
<td></td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>802269</td>
<td>Relief valve, cartridge, RPGC-LAN</td>
<td></td>
</tr>
</tbody>
</table>
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

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

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

<table>
<thead>
<tr>
<th>MiTek Part #</th>
<th>Part Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>691700</td>
<td><strong>AVISO</strong>&lt;br&gt;Es necesario realizar una lubricación rutinaria, para el funcionamiento correcto. Consultar el manual.</td>
</tr>
<tr>
<td>691515</td>
<td><strong>WARNING</strong>&lt;br&gt;Crush hazard. Do not operate with guard removed. Follow lockout procedure before servicing.</td>
</tr>
<tr>
<td>691505</td>
<td><strong>AVISO</strong>&lt;br&gt;Riesgo de aplastamiento. No operar sin las defensas colocadas en su lugar. Antes de dar servicio, seguir los procedimientos de bloqueo.</td>
</tr>
<tr>
<td>591502</td>
<td><strong>WARNING</strong>&lt;br&gt;Crush hazard. Keep hands clear. Follow lockout procedure before servicing.</td>
</tr>
<tr>
<td>691501</td>
<td><strong>AVISO</strong>&lt;br&gt;Riesgo de aplastamiento. Mantener las manos alejadas.</td>
</tr>
<tr>
<td>691408</td>
<td><strong>DANGER</strong>&lt;br&gt;Hazardous voltage. Disconnect power, lockout and tagout before servicing.</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Checklist</th>
<th>Refer to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Checklist—Every 8-Hour Shift</td>
<td>page 89</td>
</tr>
<tr>
<td>Weekly Checklist</td>
<td>page 89</td>
</tr>
<tr>
<td>Checklist for Every 200 Working Hours</td>
<td>page 90</td>
</tr>
<tr>
<td>Checklist for Every 1,000 Working Hours</td>
<td>page 91</td>
</tr>
</tbody>
</table>
## MH TrussMaker™ Press

Month and Year: _______________________ Week: __________________________

### Daily Checklist—Every 8-Hour Shift

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

Notes

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Weekly Checklist

<table>
<thead>
<tr>
<th>Preventive Maintenance Action</th>
<th>Dates Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grease the gear rack.</td>
<td></td>
</tr>
</tbody>
</table>

Notes

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

---

001082 Rev. B Maintenance Checklists 89
MH TrussMaker™ Press

Month and Year: ________________________________

**Checklist for Every 200 Working Hours**

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

**Checklist for Every 1,000 Working Hours**

<table>
<thead>
<tr>
<th>Preventive Maintenance Action</th>
<th>Working Hours</th>
<th>Initial and Date When Action Is Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace hydraulic fluid.</td>
<td>Every 3-6 months</td>
<td></td>
</tr>
<tr>
<td>[The frequency is dependent on many factors. This time span can be adjusted after recording history with your machine for one (1) full year.]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect bell crank assemblies, including connecting rods and transfer bar:</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>• Check for signs of lubrication.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• While machine is cycling, listen for unusual sounds. Refer to the Troubleshooting appendix to resolve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect the press beam:</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>• Check the top plates and end plates for any signs of cracks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Check the fixed end of hydraulic cylinder mount for any sign of cracks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Check the center guide pin for signs of lubrication and wear.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Replace worn guide pin bushings if excessive wear is evident.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear away excess grease.</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Look for any noticeable shaft or pin movement during normal cycling.</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Inspect all bell crank weldments. Look for any signs of metal stress.</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Inspect the connecting rod flanges for any sign of cracks in the flanges or the welds.</td>
<td>1,000</td>
<td></td>
</tr>
</tbody>
</table>
The drawings in Table D-1 are inserted at the back of the manual.

**Table D-1: Attached Drawings**

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

* 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**

<table>
<thead>
<tr>
<th>Number on HPU Nameplate</th>
<th>Drawing Number</th>
<th>Revision</th>
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<tr>
<td>S/N #JF 592879/4385-1 or #JF 592879/4385-2</td>
<td>88257-501</td>
<td>Rev. —</td>
</tr>
<tr>
<td>S/N #JF 664747-5687</td>
<td>88257-501</td>
<td>Rev. A</td>
</tr>
<tr>
<td>#88258</td>
<td>88258-501</td>
<td>Rev. —</td>
</tr>
</tbody>
</table>
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

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

General Ratings:

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
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<td>Organization</td>
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<td>Clarity</td>
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<tr>
<td>Completeness</td>
<td></td>
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<td></td>
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<tr>
<td>Examples/Illustrations</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Readability</td>
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</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
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<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
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<tr>
<td>Delivered on time</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service technician</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the machine work as promised?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it handle the production load?</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

General Comments:

________________________________________________________________________
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### Document Evaluation Form (cont'd)

**Instructions**
Please provide as much information as possible. Identify the page and paragraph, and include a proposed rewrite if possible. Attach extra sheets as needed.

<table>
<thead>
<tr>
<th>MH TrussMaker™ Press</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation and Maintenance Manual</td>
</tr>
<tr>
<td>001082 Rev. A</td>
</tr>
</tbody>
</table>

## Recommendation

### Reason for Recommendation

**Your Name:**

**Date:**

**Company Name:**

**Address:**

**Phone:**

**E-mail:**

**Please mail this form to:**
MiTek
Machinery Operations
301 Fountain Lakes Industrial Drive
St. Charles, MO 63301
Attn: Engineering Manager

**Or fax this form to:**
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.*
<p>| <strong>actuate</strong> | to activate, put into action |
| <strong>amperage</strong> | the strength of an electric current, expressed in amperes |
| <strong>bus bar</strong> | an electrical device that allows multiple gantry heads to be used simultaneously |
| <strong>connector plate</strong> | the nail-plate that is embedded into the production material to hold it together |
| <strong>cushion</strong> | an attribute of a hydraulic cylinder that allows adjustment of the pressure in each cylinder |
| <strong>hour-meter</strong> | a gauge that tells the amount of time that the hydraulic system motor is actually turning |
| <strong>inner side</strong> | 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 |
| <strong>jigging</strong> | any of several devices used to hold the truss in place on the tables |
| <strong>joystick</strong> | an option that replaces the pendant control station to control movement of the gantry head |
| <strong>layout</strong> | a scaled diagram of the location of components and the space that they occupy |
| <strong>limit switch</strong> | 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 |
| <strong>lockout/tagout</strong> | 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 |
| <strong>lubricator</strong> | a device that allows controlled amounts of lubricants into the pneumatic system |</p>
<table>
<thead>
<tr>
<th><strong>operator end</strong></th>
<th>used to indicate which end of the press head is being discussed; the end where the manual control panel is attached</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>operator control interface</strong></td>
<td>the method in which the operator controls the machine; it may be a touch screen, control panel, joystick, etc.</td>
</tr>
<tr>
<td><strong>pilot valve</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>plate</strong></td>
<td>see connector plate</td>
</tr>
<tr>
<td><strong>PLC</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>port</strong></td>
<td>a connection point for a peripheral device</td>
</tr>
<tr>
<td><strong>potentiometer</strong></td>
<td>a control knob that is a dial; allows a range of values to be set by turning the dial, commonly found on the PLC</td>
</tr>
<tr>
<td><strong>proximity switch</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>qualified person</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>regulator</strong></td>
<td>a component of the pneumatic system that connects to the main air source and regulates the air pressure allowed into the system</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Roller</td>
<td>the large roller inside the gantry head that innately embeds the plates into the truss</td>
</tr>
<tr>
<td>setup valve</td>
<td>a component of the pneumatic system that control the flow of air to the rest of the setup</td>
</tr>
<tr>
<td>solenoid</td>
<td>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</td>
</tr>
<tr>
<td>stand-alone conveyor</td>
<td>a powered conveyor system</td>
</tr>
<tr>
<td>torque</td>
<td>a turning or twisting force</td>
</tr>
<tr>
<td>VFD</td>
<td>Variable Frequency Device; controls the speed of the cycle</td>
</tr>
<tr>
<td>voltage</td>
<td>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</td>
</tr>
</tbody>
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