

Equipment Manual



FT SplicerTM Roll-Fed Press

Equipment Manual

FT Splicer™

Roll-Fed Press



U.S. and other patents pending.

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Legal Notice

Patents

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

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U.S. 5,630,697	U.S. 5,636,494	U.S. 5,638,658	U.S. 5,640,832
U.S. 5,655,399	U.S. 5,678,395	U.S. 5,702,095	U.S. 5,707,204
U.S. 5,735,087	U.S. 5,810,341	U.S. 5,819,412	U.S. 5,833,222
U.S. 5,837,014	U.S. 5,854,747	U.S. 5,873,567	U.S. 5,884,448
U.S. 5,885,731	U.S. 5,906,264	U.S. 5,934,866	U.S. 5,947,460
U.S. 5,987,828	U.S. 5,996,303	U.S. 6,048,165	U.S. 6,112,968
U.S. 6,134,775	U.S. 6,170,688	U.S. 6,205,637	U.S. 6,212,849
U.S. 6,219,975	U.S. 6,260,263	U.S. 6,317,980	U.S. 6,389,762
U.S. 6,401,422	U.S. 6,412,246	U.S. 6,418,601	U.S. 6,539,615
U.S. 6,666,367	U.S. 6,702,269	U.S. 6,758,022	U.S. 6,817,392
U.S. 6,834,470	U.S. 6,907,820	*Other patents pending	

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Safety (English)

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.

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, is likely to result in death or serious injury.



WARNING

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



CAUTION

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

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

NOTICE

NOTICE

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

ENVIRONMENTAL

ENVIRONMENTAL

Applies to conditions that may affect the environment but 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 system, 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 xi.

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.
- 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 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

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




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

Before performing maintenance on any machine with electrical power, lockout/tagout the machine properly. When working on a machine outside of the machine’s 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.



Some machines may not have a disconnect switch. If your machine does not, lockout/tagout on the electrical service entry panel that supplies power to the machine.

1. Turn the disconnect switch handle on the main electrical enclosure to the Off position. See Figure 1.

WARNING	
	<p>ELECTROCUTION HAZARD.</p> <p>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!</p>

2. Attach a lock and tag that meet OSHA requirements for lockout/tagout.
3. Restrain or de-energize all pneumatic components and other parts that could have live or stored power.

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



Some machines may not have a disconnect switch.

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. 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. Attach a lock and tag that meets OSHA requirements for lockout/tagout.
3. Open the door to the main electrical enclosure, and using a multimeter, verify that the power is off.

Figure SAFETY-2: Lockout/Tagout on the Power Source Panel



Pneumatic System Lockout/Tagout Procedure

When Lockout/Tagout is Not Required

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

When Lockout/Tagout is Required

Before attempting repair or maintenance on a pneumatic line or component, 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. Follow instructions in the electrical lockout/tagout sections to lockout/tagout or prevent movement of these components.
2. De-energize the air source (i.e. compressor) by attaching a lock and tag that meet OSHA requirements for lockout/tagout to the air source.
3. Bleed all pressure from the reservoir.
4. Bleed residual pressure from all pneumatic lines by actuating all pneumatic valves associated with that air source.

Troubleshooting With an Energized Machine

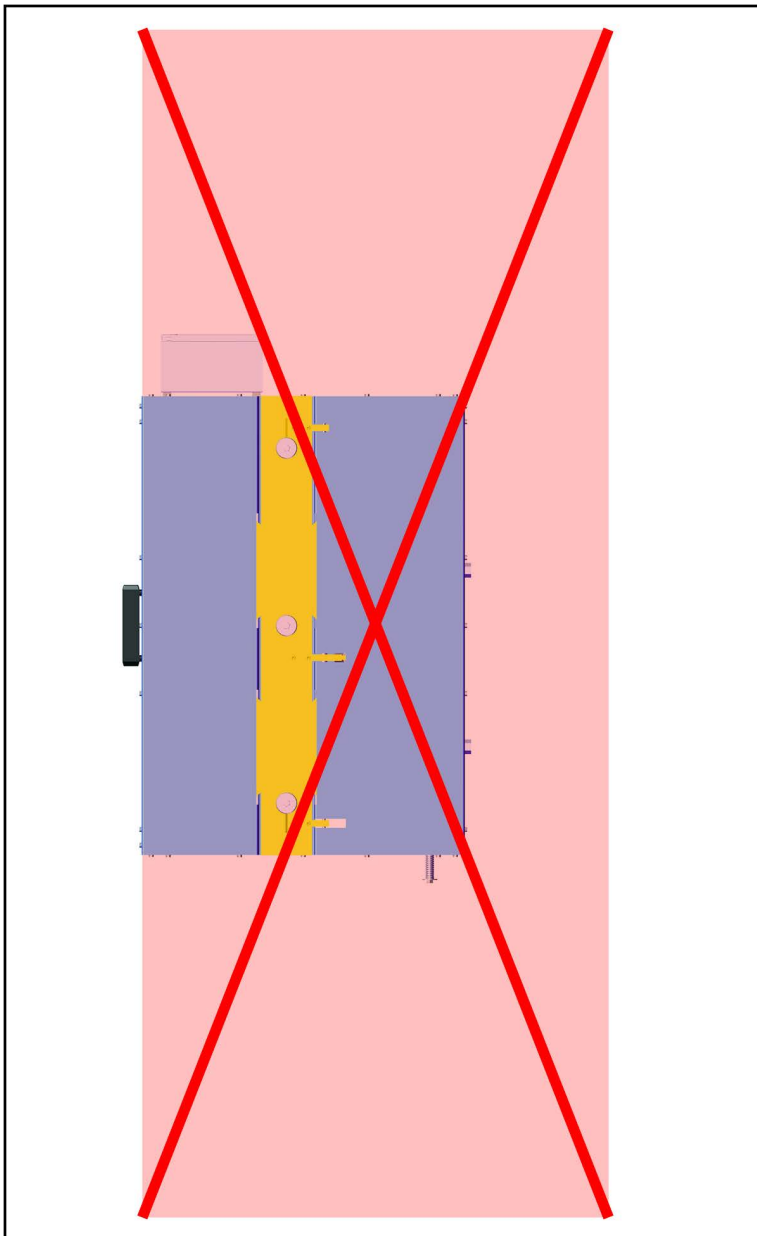
Only a qualified electrician, using the personal protective equipment and following the procedures recommended in NFPA 70E should ever attempt service or repair of or near an energized area or component of the machine.

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

DANGER	
	Stay out of the restricted zone when equipment is in use. Serious injury or death may result if personnel are in the restricted zone.

It is recommended that restricted zone tape be installed around the machinery before operation. See the *Startup* chapter on page 17 for information on installing restricted zone tape.



Seguridad (Español)

**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.

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, pudiera producir la muerte o lesiones graves.



ADVERTENCIA

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



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

AVISO

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

AMBIENTAL

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 frenos 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 apropiado (por ejemplo, anteojos de seguridad y protección auditiva.) No use ropa suelta ni joyas. Si tiene el cabello largo, áteselo 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, purgue las líneas para eliminar la presión.
- Bloquee y etiquete 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.
- 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 y etiquetado eléctrico

Cuando trabaja en una máquina fuera de su gabinete eléctrico principal




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. Salvo en el caso de trabajos realizados en la línea de transmisión eléctrica a la máquina, cuando trabaje en una máquina fuera de su gabinete eléctrico, siga los procedimientos de bloqueo y etiquetado aprobados por la compañía, los cuales deben incluir, entre otros, los pasos aquí indicados.



Algunas máquinas pueden no contar con un interruptor de desconexión. Si su máquina no cuenta con un interruptor de desconexión, Bloquee y etiquete el panel de entrada del suministro eléctrico que alimenta a la máquina

1. Coloque el mango del interruptor de desconexión en el gabinete eléctrico principal en la posición “Off” (Apagado). Vea la figura 2-1.

	<p>ADVERTENCIA: RIESGO DE ELECTROCUCIÓN.</p> <p>Cuando el interruptor de desconexión está apagado, aún sigue habiendo energía dentro del gabinete del interruptor. ¡Desconecte siempre la electricidad en la fuente de alimentación del edificio que va hacia el equipo antes de abrir este gabinete eléctrico!</p>

2. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo y etiquetado de la OSHA.
3. Trabe o desenergice todos los componentes neumáticos y otras piezas que pudieran tener alimentación directa o almacenada.

Figura SEGURIDAD-1: Bloqueo y etiquetado en el gabinete eléctrico principal



Algunas máquinas pueden no contar con un interruptor de desconexión.

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. 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.
2. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA.
3. Abra la puerta del gabinete al que necesita acceder y usando un multímetro verifique que la alimentación esté apagada.

Figura SEGURIDAD-2: Bloqueo/Etiquetado del panel de fuente de alimentación



Procedimiento de bloqueo/etiquetado del sistema neumático

Cuando no se requiere bloqueo/etiquetado

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

Cuando se requiere bloqueo/etiquetado

Antes de intentar reparar o realizar el mantenimiento de una línea o componente neumático, bloquee/etiquete la máquina en forma apropiada. Siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Siga las instrucciones de las secciones de bloqueo/etiquetado eléctrico y neumático para bloquear y etiquetar o evitar el movimiento de estos componentes.
2. Desenergice la fuente de aire (por ejemplo, el compresor) colocando un candado y una etiqueta que cumplan con los requisitos de bloqueo y etiquetado de la OSHA en la fuente de aire.
3. Purgue toda la presión del reservorio.
4. Purgue la presión de todas las líneas neumáticas activando las válvulas neumáticas asociadas con dicha fuente de aire.

Solución de problemas con una máquina energizada

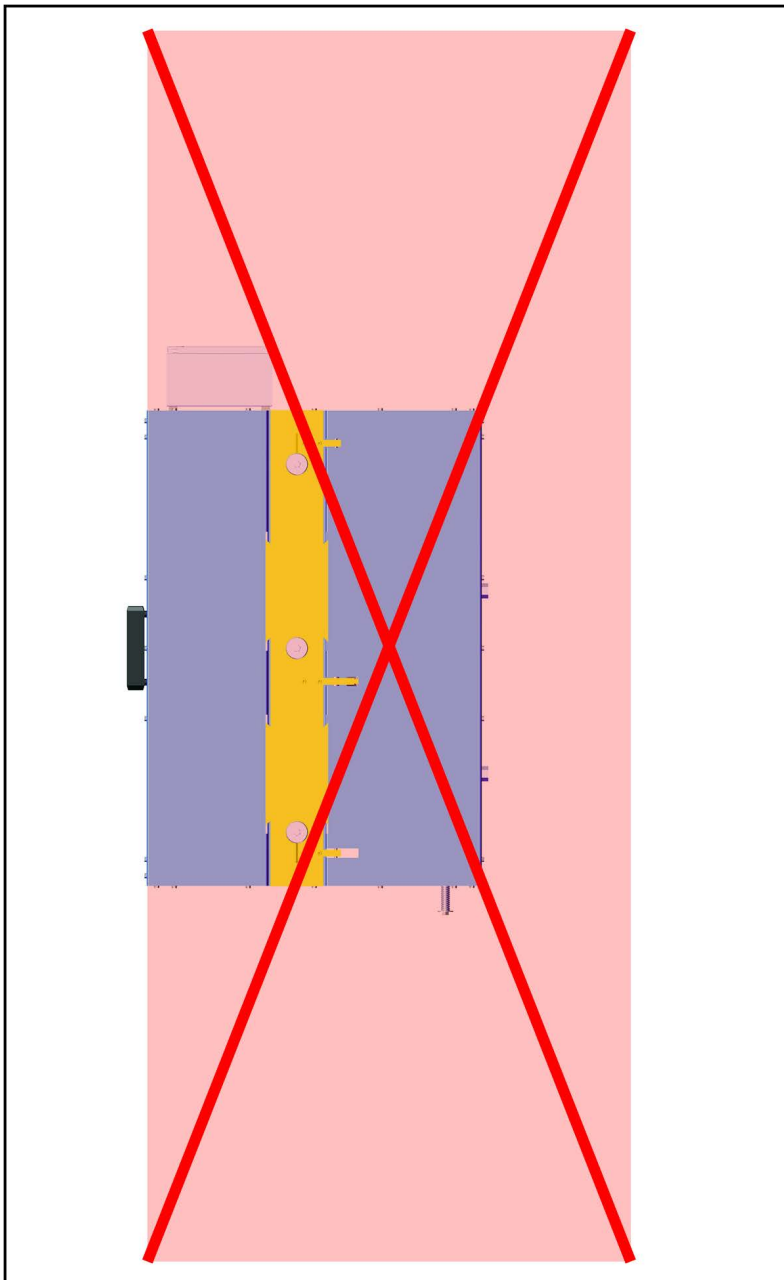
Sólo un electricista calificado que utilice el equipo de protección personal y siga los procedimientos recomendados en la norma NFPA 70E debe intentar realizar tareas de reparación o mantenimiento en un área o componente energizados de la máquina o en su proximidad.

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 afuera 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.



Purpose of Chapter

This chapter explains how to navigate through the equipment manual and how to contact MiTek.

Introduction to the Manual

WARNING	
	<p>Read this manual completely before using this equipment!</p> <p>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.</p> <p>All hazard instructions must be read and observed. Failure to do so may result in economic loss, property damage, and/or personal injury.</p> <p>This manual must always be available to personnel operating and maintaining this equipment.</p>

Purpose and Scope of This Equipment Manual

In order for this equipment manual to be useful, it must be kept in a location where operators and maintenance personnel have easy access to it.

This manual addresses the most recent versions of the equipment as of the creation or revision date on the title page. For earlier revisions, contact MiTek Machinery Division Customer Service. The part number is listed on the title page, but the revision you require depends on the date your equipment was manufactured.






This manual can be a valuable training tool.

- The Introduction and *General Information* chapter contains information on truss terminology and provides basic information about the equipment.
- The *Operation* chapter teaches operators how to efficiently operate the machine.
- The *Maintenance* chapter is written specifically for maintenance personnel.
- The appendices provide valuable technical and training information to keep your equipment running.

Navigation

The graphics in Table 1-1 are used throughout the manual to quickly communicate a specific type of information.

Table 1-1: Navigational Tools Used Throughout the Manual

Graphic	Explanation
	<p>Important safety note!</p> <p>Indicates that you must lockout/tagout at the disconnect switch located on the equipment using approved methods described in OSHA 29 CFR 1910.147 before continuing with the procedure.</p>
	<p>Indicates tools required before beginning a procedure.</p>
	<p>Gives additional information to the steps or text.</p>
	<p>Indicates how to get to or from the item discussed.</p>
	<p>Refers reader to another section, table, graphic, or drawing for further explanation.</p>

Additional Resources

Supplemental Documentation

In addition to the equipment manual, refer to the manufacturer's documentation. The supplemental documentation is provided at the time of installation, or it may be found inside an electrical enclosure. Refer to these documents when you need more detailed information on these components than the MiTek manual provides.

Web Site

Visit the MiTek Web site at www.mitek-us.com for up-to-date information on all MiTek equipment. The latest revision of this manual and all service bulletins are available there.

Contacting Us

For technical assistance or to order parts, contact the Machinery Division Customer Service Department using one of the methods listed in Figure 1-1.

Figure 1-1: Contacting MiTek

<p>MiTek Machinery Division Customer Service Department 301 Fountain Lakes Industrial Drive St. Charles, MO 63301</p> <p>Parts Orders (with part number) E-mail: mitekparts@mii.com</p> <p>Technical Assistance Phone: 800-523-3380 Fax: 636-328-9218 machinerysupport@mii.com</p> <p>Web Site www.mitek-us.com</p>	 The MiTek logo, consisting of the letters 'MI' in a large, bold, black font with three horizontal blue lines passing through them, and the word 'MiTek' in a smaller, blue, sans-serif font below it.
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Purpose of Chapter

This chapter provides an overview of the equipment and the means to identify it.

Introduction to the Equipment

Purpose of the Equipment

The *FT Splicer* roll-fed press splices 2x3, 2x4, and 2x6 lumber.

Description of the Equipment

The *FT Splicer* roll-fed press is a self-contained wood-splicing machine that uses a unique roller design to splice lumber together with nail plates.

The rollers press the nail plates into the lumber while simultaneously moving the lumber through the machine and ejecting the spliced material. The roller design consistently produces the tightest possible splices.

Figure 2-1 shows a *FT Splicer*. Refer to the *Maintenance* chapter for more detailed graphics.

Figure 2-1: FT Splicer Roll-Fed Press



General Specifications

Table 2-1: General Specifications

General	
Acceptable lumber	2x3, 2x4, or 2x6
Minimum total board length	32"
Minimum single board length	12"
Maximum plate size	5" x 12"
Recommended plate thickness	18 gauge high-strength or 20-gauge
Cycle time	5 sec
Motors	
Horsepower	2 hp
Dimensions of System Components	
See Table 3-2	
Weight of System Components	
See Table 3-5	

Purpose of Chapter

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

MiTek's Responsibilities

Prior to Installation

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

1. A Prior-to-Installation package that:
 - Outlines this chapter and requests your signature of agreement.
 - Gives dates to expect shipment, delivery, and installation.
 - Explains the number of people required to help with installation.
 - Provides guidelines on providing an electrician, welder, and other specialists.
2. Upon request, a layout showing how you have indicated that you wish the equipment to be arranged within your building.

During Installation

Upon request, a MiTek Customer Service Technician (CST) will be present to oversee the installation of your equipment.

Customer Responsibilities

Before the installation of your equipment, the items and procedures in this chapter must be arranged, purchased, or assembled. Table 3-1 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 3-1: Summary of Customer Responsibilities

Space Requirements	This equipment requires enough space to allow for the machine dimensions listed in Table 3-2, plus additional working space for operation and maintenance. Space should have adequate lighting.
Location Requirements	Reinforced concrete is required to support the weight of the machine. The equipment discussed in this manual must be used in dry conditions under a roofed area according to Type 1 electrical enclosure requirements.
Electrical Requirements	The standard electrical requirements are shown in Table 3-3. Contact your MiTek representative immediately if custom power specifications need to be accommodated.
Pneumatic Requirements (Compressed Air)	See Table 3-4.
Shipping Requirements	See Table 3-5 for shipping weights.
Customer-Supplied Items	The customer is responsible for having the supplies listed in Table 3-6 available at the time of installation.

Space Requirements

Refer to these guidelines when planning your space allocation. MiTek can provide help with plant layout and space utilization upon 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 equipment are shown in Table 3-2. Additional space is required for operation, maintenance, and optional equipment.

Table 3-2: Approximate Equipment Dimensions

Length	Width	Height
70"	38"	38"

Space for Operation and Maintenance

Additional space must be allocated for operation and maintenance. Space should allow for safe operation, freedom of movement, storage space, and free flow of raw and finished materials.

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. Reinforced concrete is recommended. Refer to your layout drawing.

Environment

The equipment must be used in dry conditions under a roofed area according to Type 1 electrical enclosure requirements.

Lighting should be adequate for safe operation and maintenance.

Electrical Requirements

WARNING	
	<p>ELECTRICAL HAZARD!</p> <p>All electrical work must be performed by a licensed electrician.</p> <p>Follow approved lockout/tagout procedures (OSHA 29 CFR 1910.147).</p>

The standard electrical requirements are shown in Table 3-3.


The customer must provide a power supply with a service disconnect.

You must indicate what voltage is available at the machine's proposed location when placing the order. This information must be correct. Depending on the voltage available, revisions to the electrical system or a transformer may be necessary.

Table 3-3: Minimum Electrical Requirements for This Equipment

Voltage	460 VAC
FLA plus control amperage	8 amps
Cycles (frequency)	60 Hz
Phases	3

Pneumatic System Requirements

WARNING	
	<p>HIGH PRESSURE HAZARD.</p> <p>Compressed air lines should be installed only by qualified personnel familiar with all governing regulations. Failure to use proper materials and installation practices can result in ruptured lines leading to personal injury, equipment damage, and equipment failure.</p>

This equipment uses compressed air, also referred to as pneumatic power. Your current air compressor may be adequate. If you need to install a new compressor, the air source must be supplied and installed prior to the scheduled installation date of the MiTek equipment. Table 3-4 describes the pneumatic system requirements.

Table 3-4: Pneumatic Requirements

Requirement	Specification
Tank size	60 gal. (minimum)
	Refrigerated compressed air dryer suggested
Tank flow capacity	3 cfm
Air line to machine	1/2" (minimum inner diameter)
Pressure	90 psi

Shipping Information

When the equipment arrives, you must have the proper transport and lifting equipment available to remove it from the truck and place it in your facility. Table 3-5 lists the weight of the individual components of a typical system.


DANGER	
	<p>Transport and lifting equipment such as forklifts and cranes must be designed and rated for the load and application. The weight of each major component is given in Table 3-5.</p> <p>Inadequate transport equipment may result in property damage, personal injury, or death.</p>

Table 3-5: Shipping Information

Contents of Shipment	Approximate Weight
<i>FT Splicer</i>	1,500 lbs

Customer-Supplied Parts

The customer must supply the parts shown in Table 3-6. Some must be installed before installation of the equipment and some must be available for use at the time of installation.

Table 3-6: Customer-Supplied Parts

Item	Description
Compressed Air	Air compressor that can meet the requirements in Table 3-4 Connector and tubing from air source to machine
Electrical Equipment	All electrical requirements to provide power to the electrical enclosure on the splicer are the customer's responsibility
Transport Equipment	A heavy-duty forklift or truck wrecker is required to move the machine during unloading and placement All transport and lifting equipment must meet the requirements given in the <i>Shipping Information</i> section
Tools That May Need to be Rented	Industrial hammer-drill
General Tools	Standard screwdriver set
	Standard wrench set

Training Provided

If MiTek is overseeing the installation of your equipment, the MiTek representative trains your operators and maintenance personnel on the equipment's proper operation and maintenance. The representative explains the warranty policy, gives an overview of the equipment manual, and requests your signature to verify your understanding of everything discussed.

If a MiTek representative is not required to be present, it is your responsibility to ensure all necessary personnel read the equipment manual and address all guidelines and safety instructions given.

Purpose of Chapter

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

Responsibilities During Installation

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



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

Delivery


Checking for Damage

All shipments from MiTek are covered with tarps. When your shipment arrives, check to ensure that the tarps are in place. Displaced tarps may indicate a potential problem.

After removing the tarps, inspect the shipment for water/moisture, debris, and damage. Report any findings as required by the transport company. Document any findings by taking photographs or a video. Note any and all damage to the equipment on the bill of lading to ensure proper documentation for insurance claims. Without this note, any damage in transit is the responsibility of the customer to repair.

Notify MiTek Machinery Division Customer Service of any unacceptable findings discovered during the receipt inspection. Although your findings may not appear to be a problem, they may cause premature failure of components, poor performance, or erratic performance.

Unloading



Refer to...
Table 3-5 on page 11 for the weight of each component

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. A heavy-duty forklift or truck wrecker is required to move the equipment during unloading and placement of the machine. The lifting equipment must be rated appropriately for the weights shown in Table 3-5 on page 11.

Exercise extreme caution to avoid damage or misalignment during unloading. Do not apply pressure on any moving parts or fittings. Figure 4-1 shows how to lift and move the equipment safely. Lift the machine from underneath, with the forks centered.


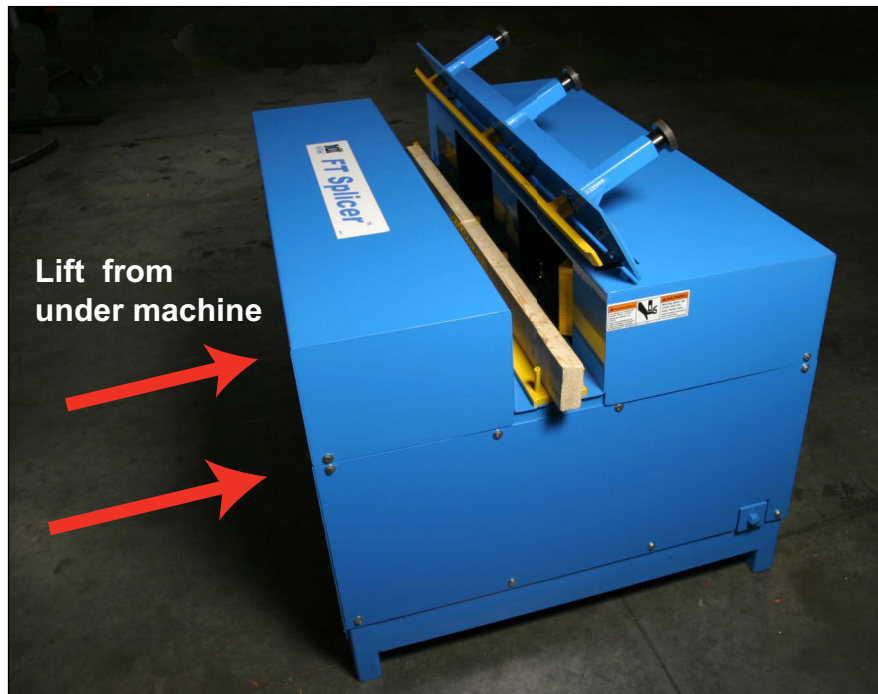
WARNING	
	<p>CRUSH HAZARD.</p> <p>Failure to lift the equipment in the prescribed manner may cause serious injury, including death, or equipment damage.</p> <p>Personnel not involved in the off-loading from the truck shall remain clear of the area.</p> <p>Transport and lifting equipment such as forklifts and cranes must be designed and rated for the load and application.</p>

Figure 4-1: Lift Points



Unpacking

After successful unloading, remove the protective crating material from the pallets. Detach and set aside all loose parts. Move the equipment to the desired location using a forklift or crane appropriate to the weight of each unit. Lift the equipment to remove the pallet, and gently place the unit in its new location.

Mechanical Installation


1. Place the equipment in the desired location.
2. Bolt the equipment to the floor.

Pneumatic System

This equipment uses compressed air, also referred to as pneumatic power. The air source must be supplied and installed prior to the scheduled installation date of the MiTek equipment. Table 3-4 on page 11 lists the specifications for the pneumatic air source.

Before using the machine for the first time, connect the pneumatic supply line to the filter / regulator. Operating pressure should be set at approximately 90 psi. Some adjustment may be necessary to ensure the lumber hold-down lid operates without excess speed or shock. See page 37 for information on adjusting system pressure.

Electrical System

DANGER	
	<p>ELECTRICAL HAZARD!</p> <p>All electrical work shall be done by a licensed electrician and shall conform to all regulating codes. In the event that information in this manual conflicts with local code requirements, please contact MiTek Machinery Division Customer Service.</p> <p>Do not turn on electrical power until you have read the startup procedure. Follow approved lockout and tagout procedures in accordance with OSHA 19 CFR 1910.147.</p>

Checking Existing Wiring

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

Connecting Power to the Equipment

All electrical work is the customer's responsibility and must be performed by a licensed electrician. Installation and maintenance of all electrical requirements up to and including the disconnect enclosure are the responsibility of the customer. Your MiTek representative can provide guidance regarding when electricity will need to be available during the installation.

Installation Checklist

- Check splicer for damage
- Unload *FT Splicer*
- Unpack *FT Splicer*
- Place *FT Splicer* in desired location
- Bolt *FT Splicer* to floor
- Check existing wiring
- Connect pneumatic power
- Connect power to the equipment

Purpose of Chapter

This chapter describes the procedures required before operating your equipment.

Installing Restricted Zone Tape

It is recommended that restricted zone tape be installed around the machinery before operation. See the following procedure for information on installing restricted zone tape.

Cleaning the Floor

Before installing the restricted zone tape, you must clean the floor thoroughly to ensure the adhesive properly sticks to the floor.

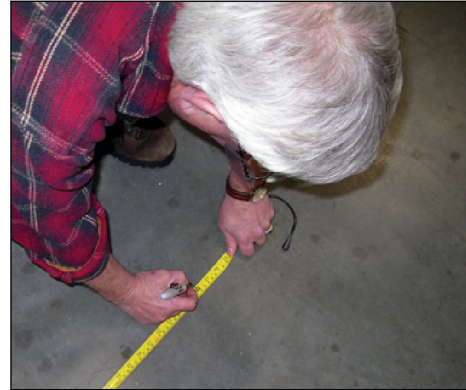
1. Sweep the floor around the machine where the tape will be applied. Mop the floor where the tape will be applied.
2. Wait for the floor to dry completely before continuing the procedure.

Marking Tape Location

1. Beginning at a corner of the machine on one end, measure directly outward three (3) ft.

2. Make a mark on the floor at the proper location. See Figure 1.
3. Measure directly outward three (3) ft from the other end corner.
4. Make a mark on the floor at the proper location. Using a chalk line, make a line on the floor that connects the marks made in steps 2 and 4.
5. Repeat this procedure until a chalk line has been made all the way around the machine.

Figure 1: Mark Tape Location



Placing the Tape



The person pressing the tape to the floor may want to wear gloves.

1. Peel the backing off of the end of the tape.
2. Place the end of the tape with the wording facing out at an outside corner of the chalk line.
3. Press the tape firmly onto the floor. See Figure 2. Ensure all bubbles and wrinkles are out to get the best adhesive retention.
4. Continue to remove the backing, unroll the tape and press it firmly onto the floor until the entire perimeter has been marked with tape.

Figure 2: Placing the Tape




Train all employees who work in the facility to stay outside the tape when the machine is operating.

Purpose of Chapter

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

Before You Begin

Safety Operating Notes

WARNING	
	<p>ELECTROCUTION, HIGH PRESSURE, CRUSH, AND CUT HAZARDS!</p> <p>Read this section AND the safety section in the preliminary pages before operating or maintaining this equipment.</p> <p>Do not operate this machine until you have a thorough understanding of all controls, safety devices, E-stops, and operating procedures outlined in this manual.</p> <p>Read and observe all warnings. Failure to do so may result in economic loss, property damage, and/or personal injury.</p> <p>This manual must always be available to personnel operating and maintaining this equipment.</p>

WARNING	
	<p>CRUSH AND CUT HAZARD.</p> <p>Before turning on the equipment, make sure that all personnel and equipment are out of the restricted zone (see page xvii).</p>

Stopping the Machine

The emergency stop (E-stop) immediately ceases electrical power transmitting to the control circuit. When the E-stop is pressed

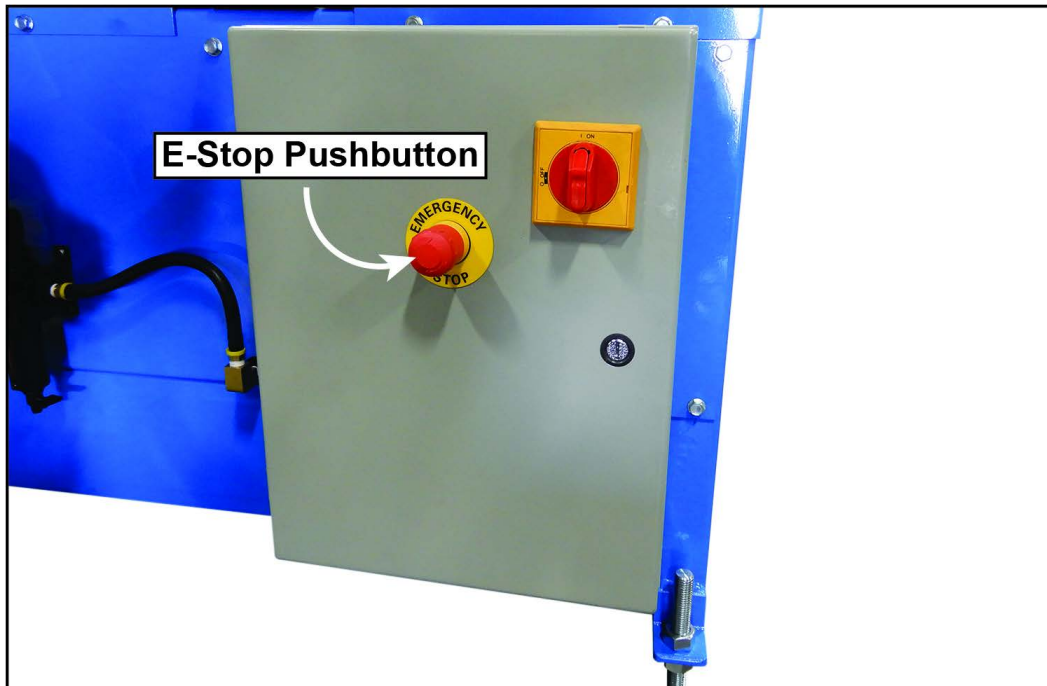
- the drive chain stops moving,
- the rollers stop revolving,
- and the lumber hold-down lid and bottom clamp open automatically.

Do not use the E-stop as a standard stopping method during the operation procedure. Using the E-stop as a standard stopping method might cause certain components to wear faster.

E-Stop Pushbutton

The E-stop pushbutton is shown in Figure 6-1. To activate a pushbutton, push the entire red button in. To release a pushbutton E-stop, twist the knob. It will return to its extended position and the machine will operate again.

Figure 6-1: E-Stop Pushbutton



Disconnect Switch

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. The disconnect handle should be turned off when the machine is not in use.


WARNING	
	<p>When the disconnect switch is off, there is still live power to the disconnect switch's enclosure. Always turn off power at the main power source before opening electrical enclosure!</p>

Figure 6-2: Disconnect Switch



Some machines may not have a disconnect switch.

Stopping During Normal Use

To stop the machine at the end of its cycle during normal use, release the dual-touch control buttons.

Starting the Machine

Refer to the *Operating Procedure* section on page 23 for the operating procedure.

Operator Control Overview

Operator Control Interface

Figure 6-3: Overview of Control Mechanisms

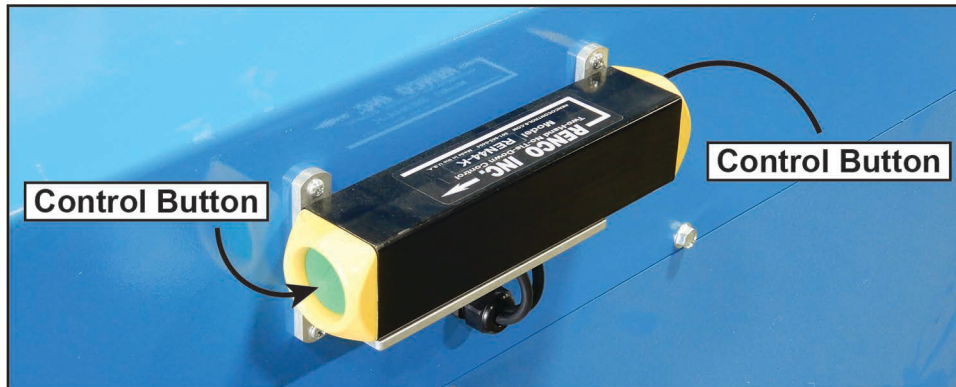


Table 6-1: Functions of Control Mechanisms

Control	Function
Dual-Touch Control Buttons	Activate the rollers and press the plates into the truss material while moving the material through the machine

Sequence of Events

1. Press dual-touch control buttons at the same time.
2. Lumber hold-down lid closes. The bottom clamp engages.
3. Prox switch is reset and master control relay is verified.
4. Motor turns on and rollers begin their rotation.
5. Prox switch recognizes when roller is in home position.
6. Motor turns off and rollers stop their rotation.
7. Clamp delay.
8. The bottom clamp releases.
9. Lumber hold-down lid rises.
10. Release dual-touch control buttons.

Operating Procedure

WARNING	
	CRUSH AND CUT HAZARD. Before turning on the equipment, make sure that all personnel and equipment are clear.

1. Place the two pieces of lumber to be spliced in the machine. The smaller piece **MUST** be placed on the output side of the machine.
 - The trailing edge of the first piece should be centered in the bottom clamp.
 - The leading edge of the second piece should be touching the trailing edge of the first piece.
2. Place a nail plate on each side of the lumber within the bottom clamp, with the center of each plate located where the boards meet.
If necessary, adjust the rollers. See the Adjusting the Roller Location section on page 30.
3. Make sure all personnel are clear of the restricted zone. See page xvii for restricted zone locations. Press and hold both dual-touch control buttons until the hold-down lid finishes actuating.
4. Remove the spliced lumber from the machine.

Pneumatic System Operation

The pneumatic system operates the lumber hold-down lid and bottom clamp. To operate the pneumatic system, follow the instructions in the *Operating Procedure* section. No additional steps are needed to operate the pneumatic system.

To adjust pneumatic pressure, see page 37.

Purpose of Chapter

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

Introduction to Maintaining Your Equipment

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

Review the table of contents and utilize the index to locate the information you need. The following appendices will also assist in maintaining and repairing your equipment:

- Troubleshooting
- Maintenance Checklists


Read the *Performing Maintenance Safely* section before beginning maintenance on this equipment.

Performing Maintenance Safely

Read the safety pages in the preliminary pages and adhere to all rules and guidelines. This section provides additional safety information specific to maintenance topics.

Before Operating This Equipment

Adhere to these warnings before operating this equipment:


WARNING	
	<p>ELECTROCUTION, HIGH PRESSURE, AND CRUSH HAZARDS!</p> <p>Read this section AND the safety section in the preliminary pages before operating or maintaining this equipment.</p> <p>Do not operate this machine until you have a thorough understanding of all controls, safety devices, E-stops, and operating procedures outlined in this manual.</p> <p>Read and observe all hazard instructions. Failure to do so may result in economic loss, property damage, and/or personal injury.</p> <p>This manual must always be available to personnel operating and maintaining this equipment.</p>

WARNING	
	<p>CRUSH AND CUT HAZARD.</p> <p>Before turning on the equipment, make sure that all personnel and equipment are clear.</p>




Lockout/Tagout

The lock and tag symbol shown here indicates that proper lockout/tagout procedures must be used prior to starting the procedure where the symbol occurs.

WARNING	
	<p>ELECTROCUTION AND HIGH PRESSURE HAZARDS.</p> <p>Always activate an E-stop and turn the power off when the equipment is not in operation.</p> <p>Always verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures (OSHA 29 CFR 1910.147) before performing any maintenance on this equipment.</p> <p>If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.</p> <p>Turn off the air switch if appropriate.</p> <p>Bleed pneumatic lines if appropriate.</p>

Making Adjustments

Be careful when making mechanical adjustments. Untrained personnel may damage the machine or cause harm to themselves and others.

WARNING	
	<p>The components on this machine can cause severe injury if adjusted improperly. Follow all procedures in this manual thoroughly and do not make adjustments to the machine without guidance from MiTek or MiTek documentation.</p> <p>Only trained personnel should make mechanical adjustments to this machine.</p>

Replacing Parts

Special materials have been used for some of the components of this equipment. It is critical to the future performance of this machine that only specified replacement parts are used. Order all replacement parts through MiTek. Do not substitute parts without first consulting MiTek to determine if it is safe and effective. No electrical system component, cable, connector, or device should be modified, removed, disconnected, changed without specific approval and guidance from MiTek.



Wearing Personal Protective Equipment

Follow OSHA guidelines regarding the proper personal protective equipment (PPE) while performing maintenance. The most common guidelines are in regards to eye protection, hearing protection, dust masks while blowing off sawdust, gloves while working with solvents, and fire- retardant clothing when troubleshooting an energized machine.

Conducting Safety Tests

Ensure all safety devices are always operating properly.

Overview Graphics

Figure 7-1 and Figure 7-2 provide an important overview of the equipment to help you better understand the procedures in the *Maintenance* chapter.

Figure 7-1: Lumber Hold-Down Lid Components

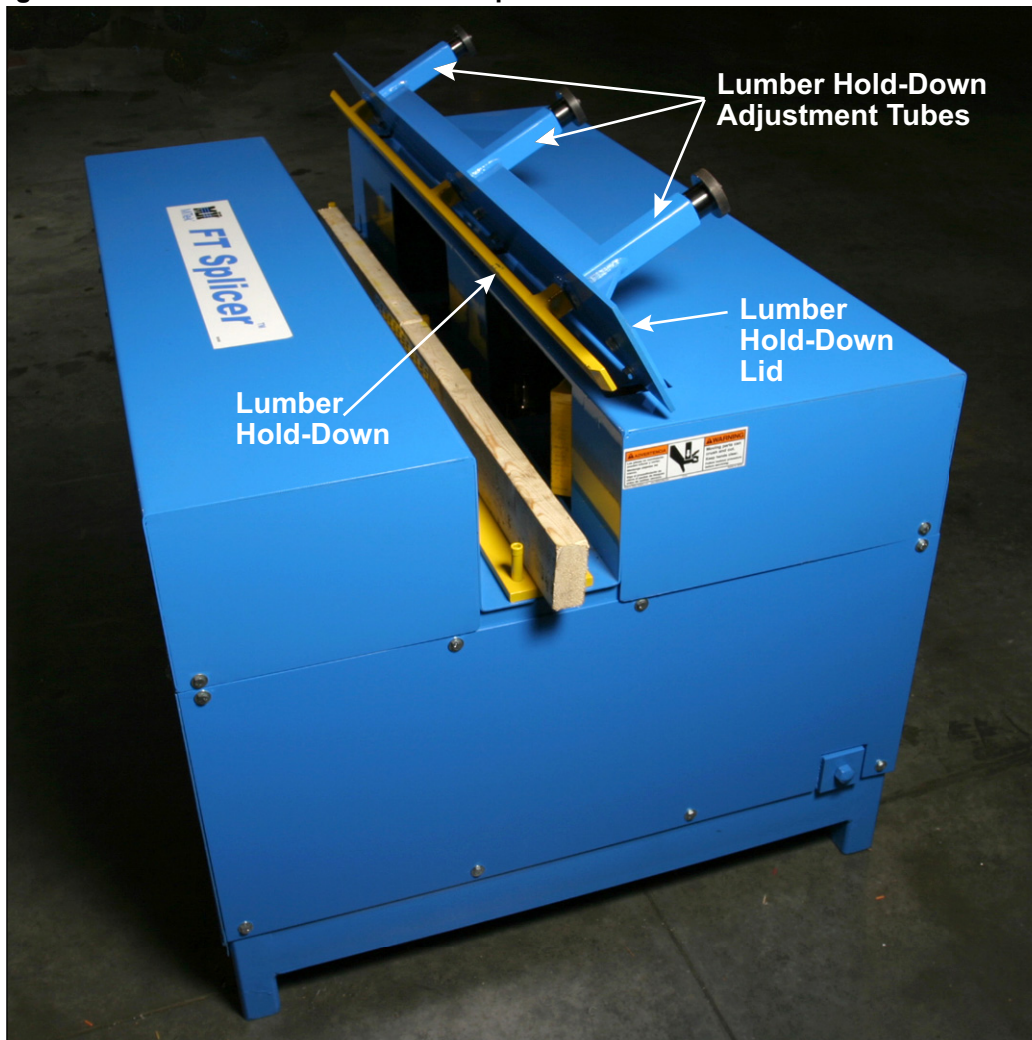
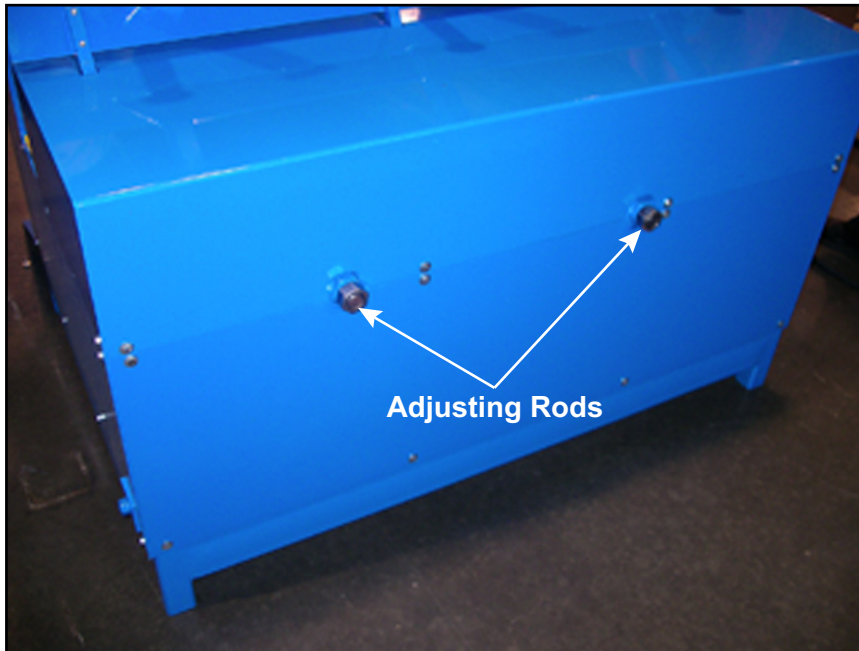


Figure 7-2: Roller Adjusting Rod Location




Adjustments

Adjusting the Roller Location



A proximity switch determines when the rollers have completed a cycle.

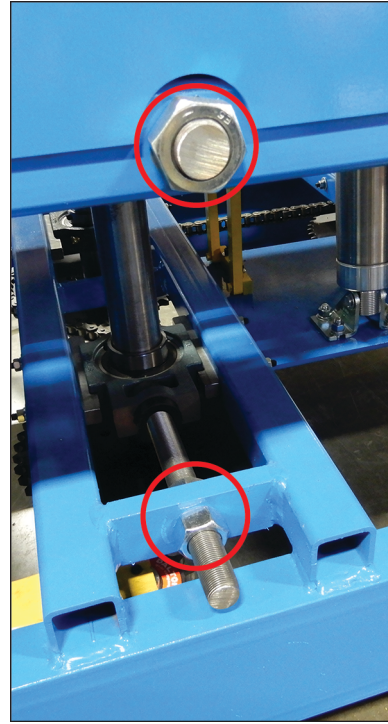
The rollers closest to the rear of the *FT Splicer* may be adjusted so that they press connector plates more deeply. The position of the rollers is controlled by four adjusting rods. See Figure 7-2 for locations of the top two adjusting rods.

WARNING	
	<p>CRUSH HAZARD.</p> <p>To complete this procedure, you must prop open the lid. Make sure all personnel are clear while maintenance is being performed.</p>

1. Bleed pneumatic pressure by using the steps on page 36.
2. Prop the lumber hold-down lid open using a piece of 2x4 lumber.
3. Bring the rollers into position by beginning a cycle and pressing an E-stop when the rollers have rotated into the gap.
4. Place a piece of lumber into position between the rollers.



5. Adjust the roller position in or out as needed using the nuts on the adjusting rods. There are two adjusting rods for each roller, one on the top and one on the bottom. Adjust both adjustment rods equally.
 - The plate press roller should be adjusted for a slip fit.
 - The push roller must be adjusted tightly so that it is able to drive the lumber forward during the operating cycle.
6. Remove the 2x4 that is holding up the lid.
7. Release the E-stop, and remove the lock and tag. Restore pneumatic pressure to the lines.
8. Restart the machine and use the dual-touch control buttons to allow the machine to finish its cycle.

Figure 7-3: Adjustment Nuts

Adjusting Lumber Hold-Down When Changing Lumber Size

The lumber hold-down lid uses spring tension to adjust automatically when switching between 2x3, 2x4 and 2x6 lumber.

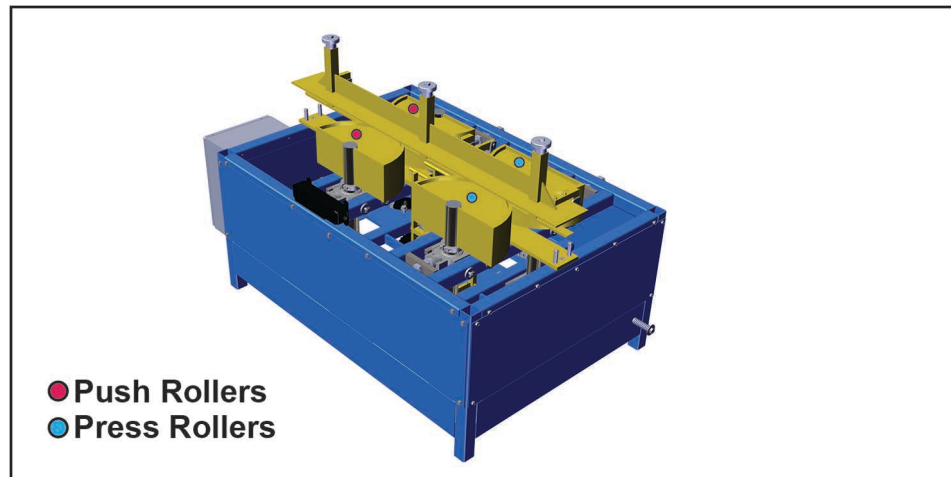
Adjusting the Position of the Rollers

If there are gaps in the splice between lumber, they can be corrected by adjusting the timing of the rollers. To adjust the timing:

1. Bleed pneumatic pressure by using the steps on page 36.
2. Lockout/tagout on the disconnect switch on the electrical enclosure.
3. Loosen the chain tension adjustment bolt.
4. Put the chain on the sprockets so that the flat sides of the roller are parallel to the lumber hold-down lid. Figure 7-4 distinguishes the push rollers from the press rollers and demonstrates the proper position of the rollers.




Figure 7-4: Roller Locations




5. Torque the chain tension adjustment bolt according to the instructions on page 34.
6. Remove the lockout/tagout equipment. Restore power and pneumatic pressure. Resume operation.

Cleaning, Lubricating, and Inspecting

Cleaning

DANGER	
	<p>CRUSH AND CUT HAZARD</p> <p>Guards must always be in place during operation to avoid serious injury and possibly death.</p> <p>Always replace guards after completing maintenance and before removing the lockout/tagout device.</p>

NOTICE	
	<p>Do NOT use compressed air inside of electrical enclosures.</p> <p>Compressed air may force contaminants into electrical connections.</p>

Lubricating

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. See page 53 for lubrication intervals.

CAUTION	
<p>Mixing synthetic lubricants with mineral lubricants is not recommended. Check with your lubricant supplier.</p>	

Table 7-1: Recommended Grease for Bearings

Attribute	Standard
Base oil type	Mineral oil
Thickener type	Lithium
Ambient temperature	-13 to 265°F (25 to 130°C)
Manufacturer and type	Shell Alvania #3 or equivalent



Motors

All motors are 3-phase motors. If a motor is rotating in the wrong direction, lockout / tagout on the disconnect switch on the electrical enclosure and swap two (2) of the 3-phase wires. Then test again.



Chain

Lubricating the Chain

The chain should be lubricated monthly. The lubricant used should be a high-grade, non-detergent, petroleum-base oil. Anti-foam, anti-rust, and film-strength improving additives are often beneficial. SAE 30 grade is recommended. To apply the oil, lockout/tagout on the disconnect switch on the electrical enclosure. Then brush oil on the inside surface of the chain. Apply it to the upper edges of the link plates in the lower span of the chain at a point close to where the chain engages a sprocket. Gravity and centrifugal force will aid in carrying the lubricant to the critical pin and bushing surfaces. Do not be concerned about surplus lubricant spilling over the link plate edges as it will lubricate the roller and bushing surfaces.

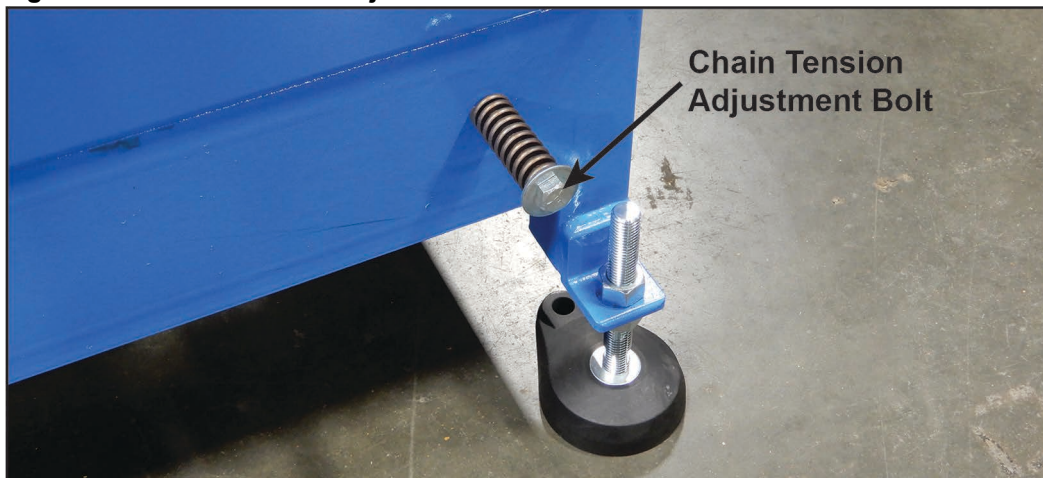


Adjusting the Chain Tension

The chain tension adjustment bolt moves the idler sprocket, increasing and decreasing chain tension. Remove the bottom rear guard to check the chain for play halfway between the drive sprocket and idler sprocket. The chain should have 1/4" of play both directions. If necessary, lockout / tagout on the disconnect switch on the electrical enclosure and adjust as follows:

- Turn the bolt clockwise to increase tension.
- Turn the bolt counterclockwise to decrease tension.

Figure 7-5: Chain Tension Adjustment Bolt





Replacing a Chain

The chain can be replaced using the following procedure. Refer to Figure 7-6.

1. Move the rollers to a position where the master link is clear of the sprockets so it can easily be reached. The master link is shown in Figure 7-6.
2. Bleed pneumatic pressure by using the steps on page 36.
3. Lockout/tagout on the disconnect switch on the electrical enclosure.
4. Note how the chain is threaded around the sprockets.
5. Remove the master link on the chain by pulling out the two (2) pins using pliers. The chain will come apart and can be removed from the sprockets.
6. Thread the new chain around the sprockets. See Figure 7-7 for reference.

Figure 7-6: Master Link on a Chain

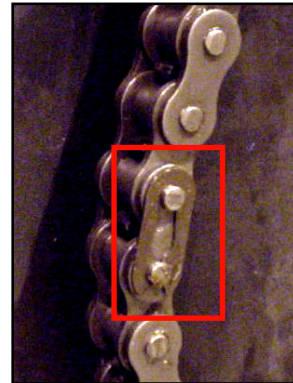
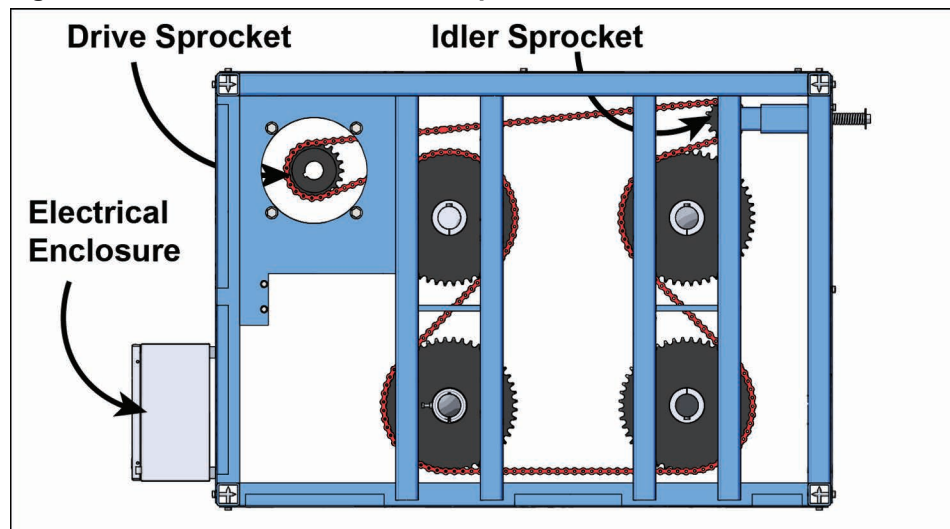



Figure 7-7: Chain Threaded Around Sprockets



Top view

7. Connect the chain to itself by placing the master link between two links and pressing together with pliers.
8. Adjust the chain tension. See page 34 for further detail.
9. Remove the lockout/tagout equipment. Restore power to the machine. Restore pneumatic pressure to the machine.

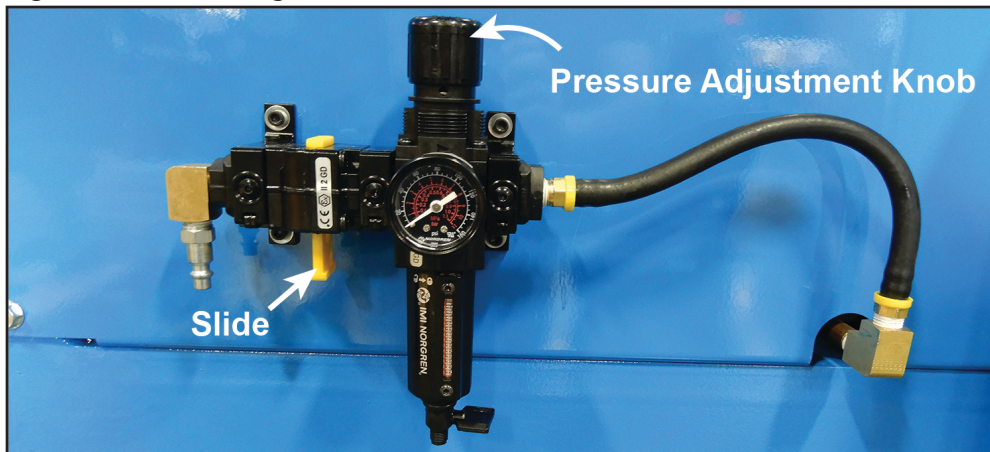
Pneumatic System

CAUTION	
	<p>HIGH PRESSURE HAZARD.</p> <p>To avoid injury, bleed all pressure from the lines before performing any maintenance on the pneumatic components!</p>


Overview

The pneumatic system controls the opening and closing of the lumber hold-down lid and the connector holding brackets. The air pressure of the pneumatic system is controlled by a filter / regulator.

Figure 7-8: Filter / Regulator



Bleeding Pressure from the System

CAUTION	
	<p>Keep clear of the lumber hold-down lid while bleeding pressure from pneumatic lines.</p> <p>The lumber hold-down lid may move while bleeding residual air, resulting in injury.</p>

Bleeding pressure from the system is required to perform some maintenance.

1. Push the yellow slide on the lockout valve up.
2. Lockout/tagout through the lockout hole on the yellow slide.
3. Press the dual-touch control buttons and actuate the lumber hold-down lid to remove residual pressure from the system.


Adjusting the Pressure

The operating pressure of the pneumatic system should be approximately 90 psi. To adjust the operating pressure of the system, use the following steps:

1. Pull the pressure adjustment knob up to unlock it. See Figure 7-8 for the location of the pressure adjustment knob.
2. Turn the knob clockwise to increase the pressure to slightly more than 90 psi.
3. Turn the knob counterclockwise to decrease the pressure to 90 psi.
4. Push the knob down to lock it back into place.

Draining the Filter / Regulator

Condensation can form in the pneumatic lines due to temperature changes. This condensation appears in the bowl's sight glass. The sight glass turns red where water touches it to indicate the water level.


CAUTION	
	<p>Use a bowl to prevent water from spilling onto the floor when draining the filter / regulator.</p> <p>Water from the filter / regulator may create slick conditions resulting in injury.</p>

A petcock at the bottom of the regulator operates a drain. Drain the regulator at least once a day.

Replacing a Filter Element on a Filter / Regulator

The regulator uses a 40-micron filter element that must be replaced every six months (one shift) or every three months (two shifts). This filter element can be purchased by calling MiTek Machinery Division Customer Service.

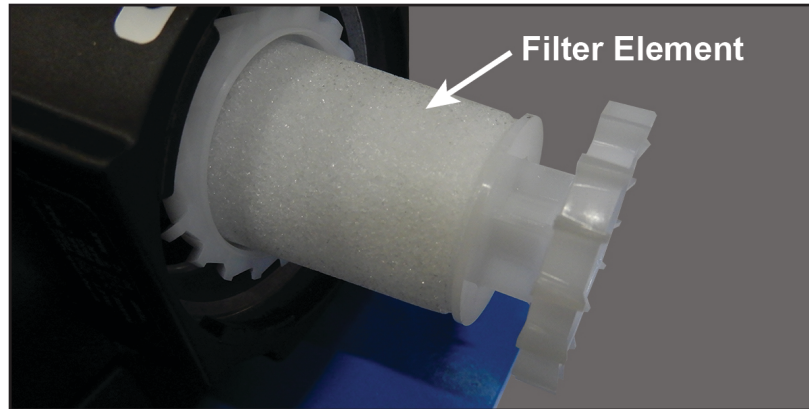
1. Bleed pressure from the system using the steps on page 36.

CAUTION	
	<p>Wear eye protection while removing the bowl from the filter / regulator.</p> <p>Residual pressure may vent while removing the bowl, causing eye injury.</p>

2. Remove the bowl from the regulator body by twisting approximately 1/4 turn clockwise while pushing up on the bowl. Then pull down to remove the bowl.

3. Unscrew the white plastic baffle that holds the filter element and remove it. See Figure 7-9.

Figure 7-9: Filter Element



4. Replace the filter element. Screw the white plastic baffle back into place.
5. Place the bowl back onto the regulator body by pushing up and turning counterclockwise. Make sure it is secure before returning pressure to the lines.

Additional Maintenance

If a filter / regulator is not operating at its optimum capacity, we recommend cleaning the regulator and replacing the O-rings, gaskets, diaphragm, and valve assembly. A service kit is available for the filter / regulator through MiTek Machinery Division Customer Service.

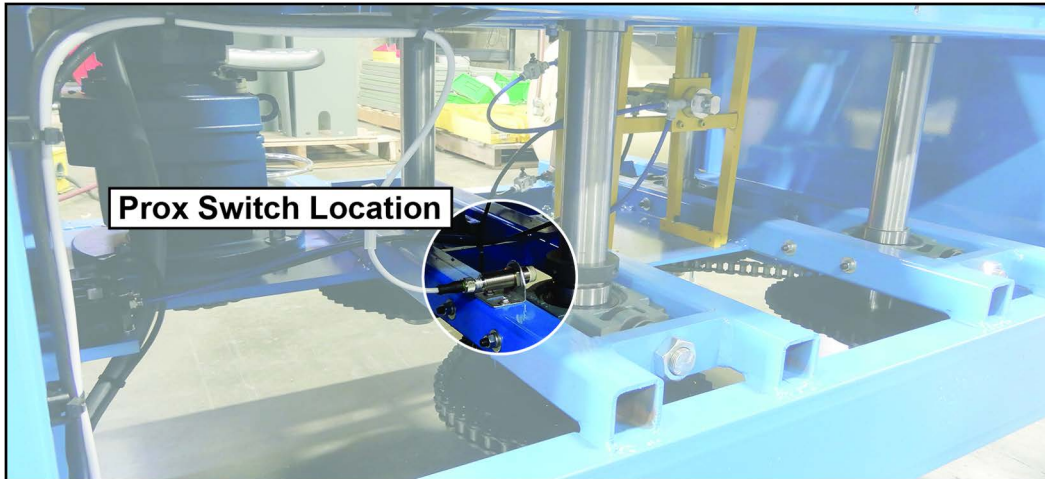
Cylinders

There are pneumatic cylinders inside the machine. They can be accessed by removing the side panels of the machine.

Proximity Switch for Cycle Completion

A proximity (prox) switch senses when the rollers have completed a rotation, telling the machine to raise the lumber hold-down. If the prox switch fails to sense the rollers, or if it is removed, the drums will continue rotating. If the prox switch fails in an “actuated” state, the rollers will not rotate because the switch will constantly be telling it to stop.

Figure 7-10: Prox Switch Location



Using the Troubleshooting Appendix



Refer to...

Maintenance chapter for procedures and graphics

Glossary for additional terminology


Figure 1-1 to contact MiTek Machinery Division Customer Service

Use this appendix to diagnose and remedy problems.

If you continue to have problems after performing all applicable troubleshooting steps and reviewing the topic in the *Maintenance* chapter, call MiTek Machinery Division Customer Service for assistance.

Safety Notes for Troubleshooting

General Troubleshooting Safety Tips

WARNING	
	<p>ELECTROCUTION, HIGH PRESSURE, CRUSH, CUT, AND CHEMICAL HAZARDS!</p> <p>Read all notes in this section AND the safety section in the preliminary pages before operating or maintaining this equipment.</p> <p>Most solutions are described in more detail in the <i>Maintenance</i> chapter and may have more safety notes included there.</p>

- **Read all warnings** located in the safety section in the preliminary pages and adhere to them at all times.
- **When this graphic appears, lockout/tagout at the disconnect switch located on the equipment** using approved methods described in OSHA 29 CFR 1910.147 before continuing with the procedure or troubleshooting.
- If the lockout/tagout graphic does not appear, it is recommended that you still **de-energize the machine** unless energy is required for the troubleshooting process. If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.
- **All electrical work must be performed by a licensed electrician.**
- **Read this manual** for information and procedures related to the specific maintenance or troubleshooting issue before attempting any maintenance!
- **Safety goggles and a dust mask** must be worn for all cleaning steps outlined in this manual. When using cleaning and lubrication solutions, a respirator rated for use with those solutions must be worn as well as gloves resistant to the solution.



Electrical Troubleshooting Safety Tips

- **Make sure you have the proper tools needed for the job.** See *Tools Needed* on page 42.
- **Ensure the person performing the troubleshooting is qualified** from an electrical knowledge standpoint. If you feel uncertain about troubleshooting electrical power, remember, the cost of hiring an electrician far outweighs the cost of an injury.
- **Remove rings and watches that you are wearing.** They are extremely conductive material and may catch on small components.
- **Get a helper.** You are most likely going to need a third hand at some point, and you shouldn't perform electrical work without someone close by to help if you get hurt.
- **Be patient.** Take your time and stay alert. Never shortcut or become too confident in what you are doing; electrical power will always be stronger than you.
- **Take notes** recording what you have checked, and what the readings were. This is also a good way to check your work when you are finished. Sometimes, the machine won't work because a wire was removed for testing, and overlooked when cleaning up. Having proper notes will make the process go much more smoothly.
- **ALWAYS turn the power off** if you are checking for ohms or swapping PLC cards.
- **ALWAYS push an E-stop button** before approaching a machine for any reason, but if you are working with the encoders it is especially important. An interruption to a powered encoder may cause components to move without warning.
- **Wear appropriate personal protective equipment (PPE)** for working with live power.

Getting Started With Troubleshooting

Tools Needed

Gather these tools before beginning the troubleshooting process and before calling MiTek for technical assistance.

1. Slotted screwdriver, insulated
2. Phillips screwdriver, insulated
3. Equipment manual and drawings, specifically electrical schematics
4. Pen and paper to take notes and document settings
5. Multimeter

A multimeter is an electronic measuring instrument. The analog versions were referred to as an analog volt-ohm-meter (VOM). A newer, digital model is called a digital-multi-meter (DMM). There are a large variety of volt-measuring devices available, but at a minimum, it should have these features:

- Voltage (volts) measurement
 - Resistance (ohms) measurement
 - Ability to measure both AC and DC power
 - Autoranging feature
 - It is highly beneficial to also have the ability to measure current (amps)
6. Various additional tools depending on which parts are in question
 7. Personal protective equipment as dictated by NFPA 70e

First Steps

For Mechanical Troubleshooting

Always clean and lubricate the equipment as a first step in most troubleshooting processes. Most mechanical malfunctions are caused by inadequate preventive maintenance.

For Electrical Troubleshooting



1. Lockout/tagout at the disconnect switch located on the equipment.

CAUTION

Do not use compressed air inside the electrical enclosures! It may force contaminants into the electrical connections. You may use canned air, which has a much lower compression than your plant air.

2. Vacuum and dust the electrical enclosure.
3. Remove the lockout/tagout equipment and attempt to run the machine again. If that didn't fix the problem, proceed with the next step.
4. Adhere to all regulations and guidelines given in NFPA 70e and in your company's energy control program. Some important safety tips are also addressed on page 41.

Figure A-1: Never Use Compressed Air Inside an Electrical Enclosure



WARNING



ELECTROCUTION HAZARD!

All electrical work must be performed by a licensed electrician.

If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.

5. Determine where the electrical problem begins. To do this, you need a multimeter.
 - Determine if you are working with AC (alternating current) or DC (direct current) before checking for voltage. Your multimeter should measure both, but you'll have to tell it which one to measure.
 - Measure incoming and outgoing voltage to specific components. Proceed along a logical order determined by your machine's specific problem, and write down the order that you check each item and the amount of voltage that it registers.



Should you lockout/tagout to safely perform this action?



Symptoms and Solutions

Table A-1: Troubleshooting

Problem	Possible Cause	Possible Solution
Machine does not start	No power	Check incoming power
	Wires disconnected	Check wiring for loose connections
	Disconnect turned to Off position	Turn disconnect to On position
	E-stop actuated	Twist and pull E-stop button to reset
	Fuse blown in 3-phase wiring	Check 3-phase fuse
	Fuse blown in controls	Check dual-touch control fuse
Board feeds from right to left instead of left to right	Machine running backward	Switch 2 of the 3-phase wires in electrical enclosure
Motor runs but neither clamp actuates	Low pressure	Adjust regulator to 90 psi
	Malfunctioning solenoid on valve or malfunctioning valve	Press and hold manual override button on solenoid. <ul style="list-style-type: none"> • If valve shifts, check for loose wiring to solenoid. If wires are connected properly, check solenoid. • If valve does not shift, check lines for water. If lines are clear, valve may be bad.
Motor runs but one clamp is not actuating	Malfunctioning cylinder	Check cylinder
Motor runs but rollers are not moving	Loose or broken chain	Check chain
Plates are irregularly pressed	Bottom clamp not tight enough	1. Loosen screws on cylinder mounting clamp holding small cylinder 2. Pull cylinder toward front of machine 3. Tighten screws on cylinder mounting clamp
	Rollers are timed incorrectly	Re-time rollers
	Malfunctioning small cylinder	Check small cylinder
Gap occurs between spliced boards	Flat sides of rollers are not parallel	1. Loosen chain 2. Turn roller until flat sides are parallel 3. Tighten chain

Navigating the Parts List Appendix

Finding the Part Number

The parts list provided here shows spare parts that you may need to repair your machine.


Ordering the Parts With Your Part Number



Each column in Table B-1 describes a method for ordering parts.




Table B-1: How to Order Your Part Using the Part Number

Using E-Mail	Using the Phone
Send an e-mail to mitekparts@mii.com with all relevant information, including the part number.	Call us at 1-800-523-3380 and select "Parts Orders".

Safety Notes for Replacing Parts

	<p>Only use the exact replacement parts that are specified by MiTek. Substitutions may harm your equipment.</p>

	 WARNING
	<p>ELECTRICAL HAZARD!</p> <p>All electrical work must be performed by a licensed electrician.</p> <p>Follow approved lockout/tagout procedures (OSHA 29 CFR 1910.147).</p>

	 WARNING
 	<p>ELECTROCUTION AND HIGH PRESSURE HAZARDS.</p> <p>Always turn the power off by activating an E-stop when the equipment is not in operation.</p> <p>Always verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures (OSHA 29 CFR 1910.147) before performing any maintenance on this equipment.</p> <p>Turn off the air switch or shutoff valve if appropriate.</p> <p>Bleed pneumatic lines if appropriate.</p>



Part Numbers

Mechanical Parts

Table B-2: Mechanical Replacement Parts

<i>MiTek Part #</i>	Part Description	Keep in Stock
480469	Gearmotor (2 hp)	—
535247	Roller sprocket	—
535246	Drive sprocket	—
591985	Idler sprocket	—
554007	Chain (need 13' 6")	—
532046	Take-up bearing (for roller shafts)	—
370523	Chain tension adjustment bolt spring	—
370524	Lumber hold-down lid spring	—

Pneumatic Parts

Table B-3: Pneumatic Replacement Parts

<i>MiTek Part #</i>	Part Description	Keep in Stock
21800574	Large pneumatic cylinder (cylinder assembly)	—
426082	Large pneumatic cylinder (rod, clevis, and nut only)	—
423458	Small pneumatic cylinder (cylinder assembly)	—
434466	Directional valve	—
438823	Filter / regulator	—
438828	Filter / regulator service kit	—
438827	Filter element	1



Electrical Parts

Table B-4: Electrical Replacement Parts

MiTek Part #	Part Description	Keep in Stock
519795	E-stop pushbutton	—
691114	E-stop nameplate	—
515080	E-stop contactor block	—
509499	Disconnect switch	—
509456	Disconnect switch handle	—
509457	Disconnect switch shaft	—
509350	Fuse block for 3-phase power (30A, 600V)	—
477118	Fuse for 3-phase power (15 A) (per fuse / 3 fuses used)	—
477119	Fuse for transformer (2A) (per fuse / 2 fuses used)	—
477116	Fuse for transformer secondary pole (1A) (per fuse / 1 fuse used)	—
504821	PLC power supply (1.3A)	—
504822	PLC (programmed)	—
514139	Control relay (10A, 120V)	—
478003	Control relay socket	—
504003	Dual-touch control button assembly	—

Documentation Part Numbers

Documentation	Qty	MiTek Part Number
Manual	1	001107
Labels	See page 49	

Label Part Numbers

Table B-5: Labels

MiTek Part #	Part Description
691407	<p>⚠ DANGER Hazardous voltage. Disconnect power, lockout and tagout before servicing motor. ⚠ PELIGRO Voltaje riesgoso. Desconectar la energía, bloquear y colocar etiquetas antes de dar servicio.</p>
691411	<p>⚠ PELIGRO Existe el peligro potencial de un arco instantáneo y descarga eléctrica cuando trabaja en equipo energizado. Cumplir con todos los requisitos de NFPA 70E para las prácticas seguras y equipo protector personal. <small>©Conair Safety Systems, LLC conairsafety.com 33434</small></p> <p>⚠ DANGER Potential arc flash and shock hazard exists while working on energized equipment. Follow all requirements in NFPA 70E for safe work practices and personal protective equipment. <small>MiTek PN 691411</small></p>
691500	<p>⚠ ADVERTENCIA Las piezas en movimiento pueden triturar y cortar. No opere la unidad sin el protector puesto. Siga el procedimiento de cierre eléctrico antes de realizar servicio. <small>©Conair Safety Systems, LLC conairsafety.com 33434</small></p> <p>⚠ WARNING Moving parts can crush and cut. Do not operate with guard removed. Follow lockout procedure before servicing. <small>MiTek PN 691500</small></p>
691509	<p>⚠ ADVERTENCIA Voltaje peligroso puede causar lesiones graves o la muerte. NO ejecutar ningún mantenimiento en este equipo sin primero desconectarlo de la fuente principal de energía. APAGAR Y BLOQUEAR LA ENERGÍA ANTES DE REALIZAR TAREAS DE SERVICIO. <small>©Conair Safety Systems, LLC conairsafety.com 33434</small></p> <p>⚠ WARNING Hazardous voltage will cause severe injury or death. DO NOT perform any maintenance on this equipment without first disconnecting from main power source. TURN OFF AND LOCK OUT POWER BEFORE SERVICING. <small>Part No. 021005</small></p>
691518	<p>⚠ ADVERTENCIA NO arrancar, operar o dar servicio a esta máquina hasta leer y comprender el Manual de operaciones y mantenimiento. El incumplimiento de las instrucciones de operación, mantenimiento y seguridad podrían resultar en la muerte o lesiones graves. <small>©Conair Safety Systems, LLC conairsafety.com 33434</small></p> <p>⚠ WARNING Do NOT start, operate or service this machine until you read and understand the Operations and Maintenance Manual. Failure to follow operating, maintenance and safety instructions could result in death or serious injury. <small>MiTek PN 691518</small></p>
691521	<p>⚠ ADVERTENCIA Riesgo de aplastamiento. Las alas móviles, piezas levantas y rodillos pueden aplastar y cortar cuando están retraídos. Mantener las manos alejadas. Bloquear y colocar etiquetas en las fuentes de aire comprimido y energía eléctrica antes de dar servicio. <small>©Conair Safety Systems, LLC conairsafety.com 33434</small></p> <p>⚠ WARNING Crush hazard. Flippers, pop-ups and rollers can crush and cut when retracted. Keep hands clear. Lockout and tagout compressed air and electric power sources before servicing. <small>MiTek PN 691521</small></p>
691839	<p>MiTek FT Splicer™ <small>©MiTek</small></p>


Navigating the Maintenance Checklists


These checklists guide you through all preventive maintenance tasks required to keep this equipment in top working condition.

These pages are supplied with the intent that you will photocopy them and leave the original in the manual for future use. Space is provided in each chart to place the date that the work is done and the initials of the person performing the work.

Checklist	Page
Daily Checklist	51
Weekly Checklist	52
Monthly Checklist	53

Safety Notes For Maintenance Checklists

WARNING	
	<p>CRUSH AND CUT HAZARD.</p> <p>Perform all safety tests before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.</p>

WARNING	
	<p>ELECTROCUTION AND HIGH PRESSURE HAZARDS.</p> <p>Always turn the power off and activate an E-stop when the equipment is not in operation.</p> <p>Always verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures (OSHA 29 CFR 1910.147) before performing any maintenance on this equipment.</p> <p>Turn off the air switch if appropriate.</p> <p>Bleed pneumatic lines if appropriate.</p>

FT Splicer™

Daily Checklist

Month and Year: _____ Week: _____

Action		Dates						
Clean and remove all debris from machine and work area	Shift 1							
	Shift 2							
	Shift 3							
Drain water from filter / regulator	Shift 1							
	Shift 2							
	Shift 3							
Make sure air pressure is set to 90 psi	Shift 1							
	Shift 2							
	Shift 3							

Notes

Date

FT Splicer™

Weekly Checklist

Year: _____

Month: _____

Action	Dates				
Check chain tension and adjust as needed					

Notes

Date

FT Splicer™

Monthly Checklist

Year: _____

Action	Months (one shift)	Months (two shifts)	Date				
Check all fittings and tighten if necessary	3	1.5					
Grease roller shaft bearings	6	3					
Replace filter element on filter / regulator	6	3					

Drawings are inserted at the back of the manual.

Table D-1: Attached Drawings

Description	Drawing Number
Electrical schematic	90641
Pneumatic schematic	30431



Document Evaluation

Appendix E

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

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

Document Evaluation Form

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

Document Identification:

FT Splicer™ Roll-Fed Press	Equipment Manual	001107
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General Ratings:

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

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

- Poor
 Fair
 Good
 Excellent

There is room for specific suggestions on the next page. Document general comments here.

Document Evaluation Form (cont'd)

Identify any inaccuracies in the document.

What are the three best features of the document?

What are the three worst features of the document?

What did you like/dislike about the illustrations?

Your Name:

Date:

Company Name:

Address:

Phone:

Email:

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.

Glossary

actuate	to activate, put into action
amperage	the strength of an electric current, expressed in amperes
anchor plate	a steel plate that holds the tables in place; it is anchored to the concrete floor and the tables are welded to it
connector plate	the nail-plate that is embedded into the production material to hold it together
layout	a scaled diagram of the location of components and the space that they occupy
leveling screws	large cap head screws that thread into the table legs and allow the table height to be adjusted and leveled
limit switch	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
lockout/tagout	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
lubricator	a device that allows controlled amounts of lubricants into the pneumatic system
operator control interface	the method in which the operator controls the machine; it may be a touch screen, a control panel, etc.
pilot valve	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
plate	see <i>connector plate</i>
qualified person	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

Glossary

regulator	a component of the pneumatic system that connects to the main air source and regulates the air pressure allowed into the system
setup valve	a component of the pneumatic system that control the flow of air to the rest of the setup
torque	a turning or twisting force
voltage	Equal to the difference of electric potential between two point on a conducting wire carrying a constant current of one ampere when the power between the points is one watt

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