

Operation and Maintenance Manual



SmartSet[®] Saw

Component Saw

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U.S. and other patents pending.

MiTek
Machinery Division
301 Fountain Lakes Industrial Dr.
St. Charles, MO 63303
phone: 800-523-3380
fax: 636-328-9218
www.mii.com

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Legal Notice

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

U.S. 6,539,830

U.S. 6,702,096

Other Patents Pending

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Return goods cannot be accepted without prior authorization and are subject to a restocking charge. The Seller certifies the articles specified herein were produced in compliance with all provisions of the Fair Labor Standards Act of 1938, as amended, including Section 12.—Rev. 6/98.

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To report errors or to recommend improvements to this manual, please complete the document evaluation form at the back of this document. Mail or fax the form to:

MiTek, Machinery Division
301 Fountain Lakes Industrial Dr.
St. Charles, MO 63301
Attn: Engineering Manager
Fax: 636-298-9218

Your support in helping MiTek provide unsurpassed machinery and support is appreciated.

Safety (English)

For safety information in Spanish, refer to page xix.

**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, 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 xiii.

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 xviii.
- 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



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

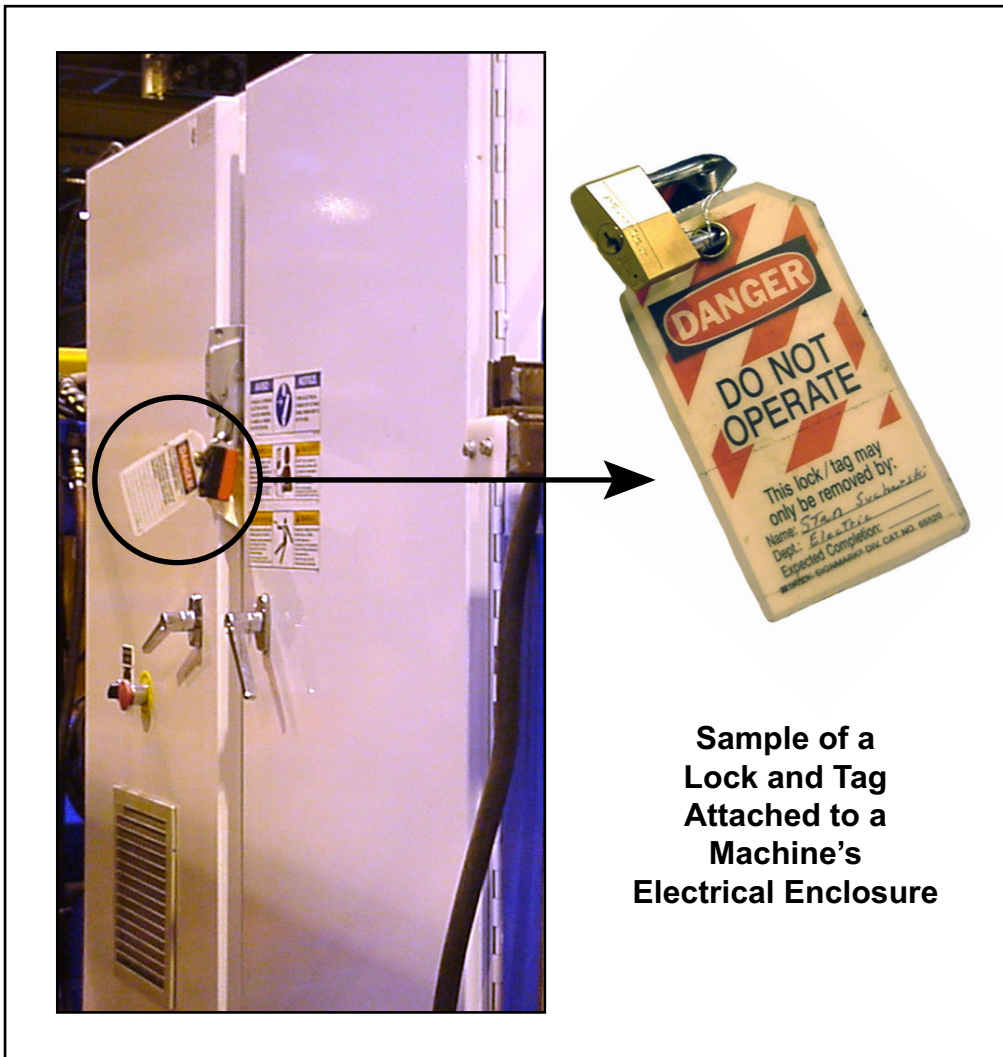
Before performing maintenance on any machine with electrical power, lockout/tagout the machine properly. When working on a machine outside of the machine’s main electrical enclosure, not including work on the electrical transmission line to the machine, follow your company’s approved lockout/tagout procedures 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 5-1.

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>

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.

Figure 5-1: Lockout/Tagout on the Main 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 5-2.
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 5-2: 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.

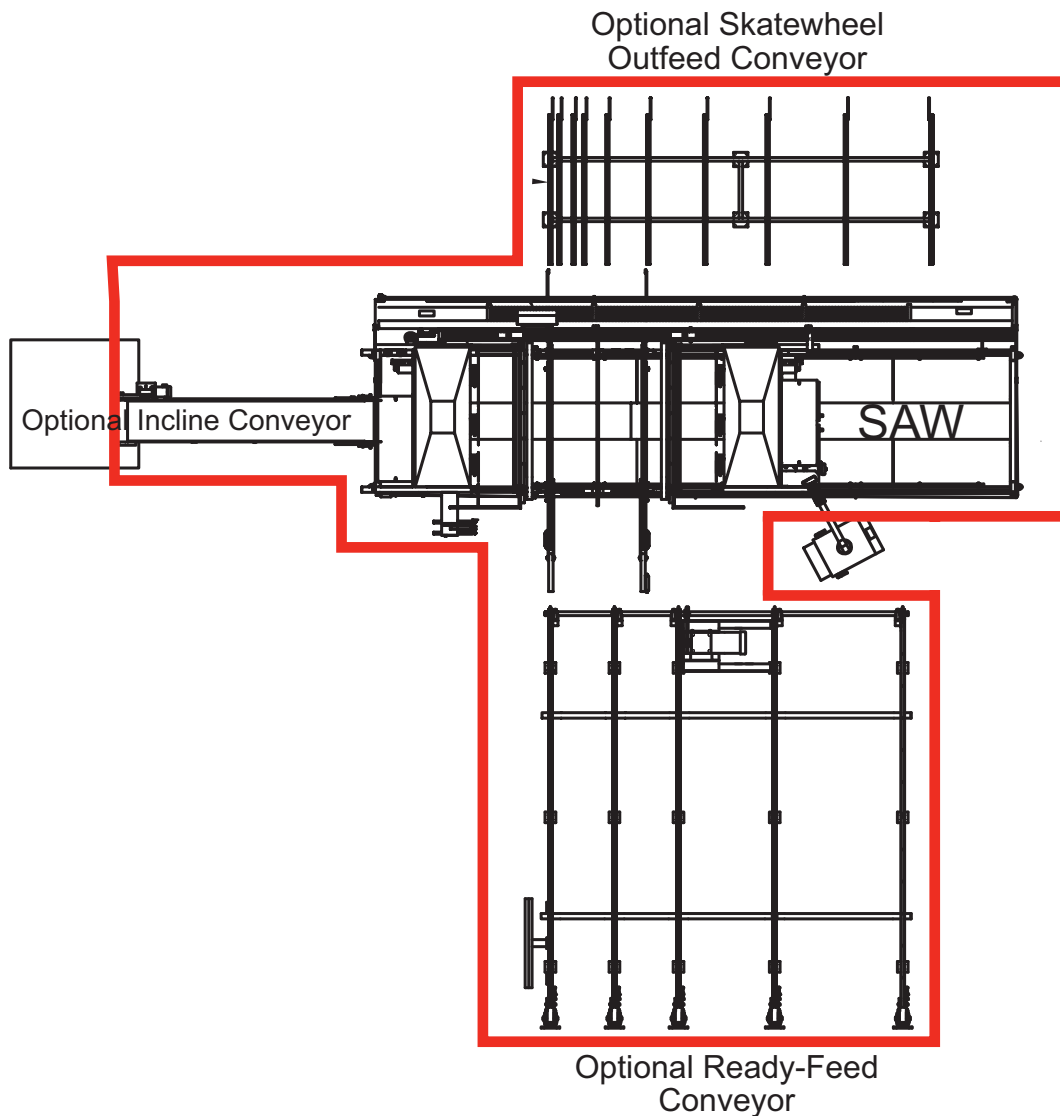
Troubleshooting With an Energized Machine

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



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 sistema neumático, 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 xxiv.

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 xxvii.

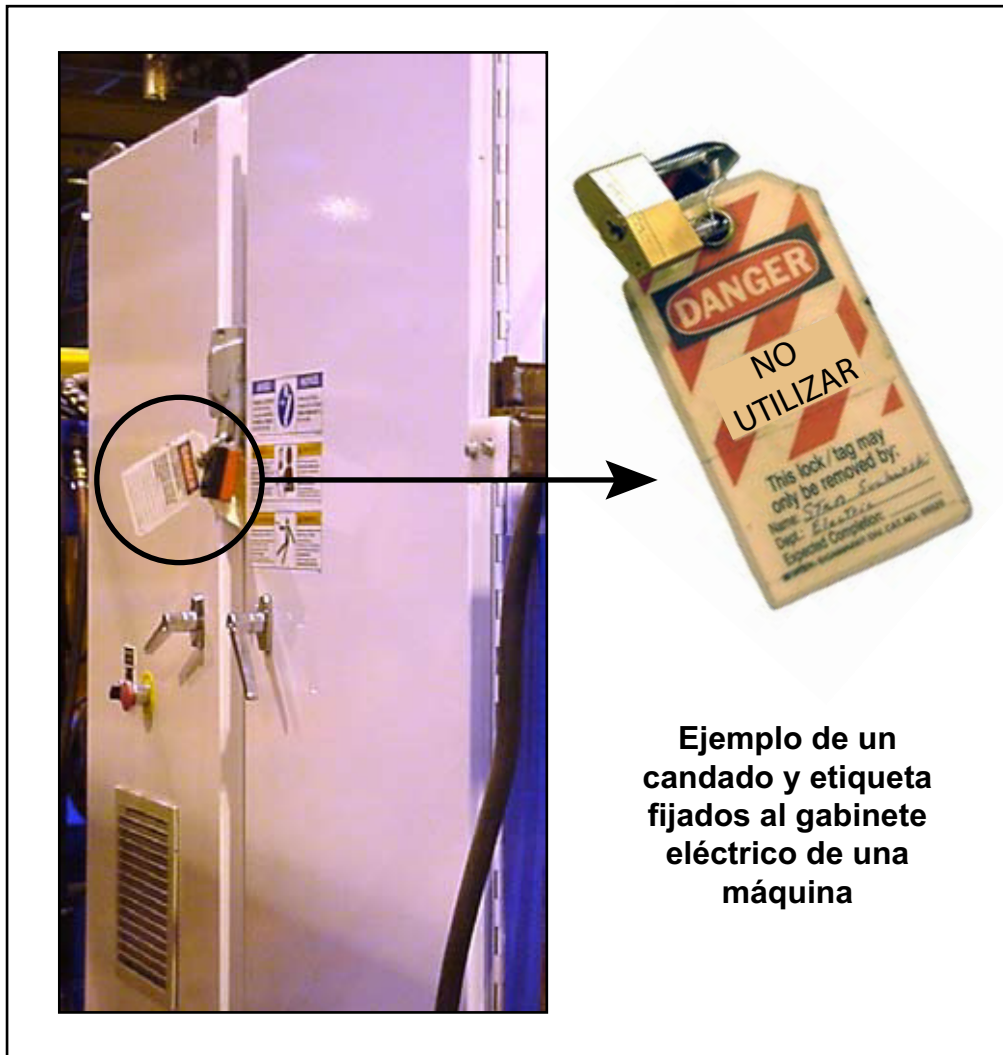
Antes de realizar el mantenimiento de cualquier máquina con alimentación eléctrica, bloquee y etiquete la máquina de forma adecuada. Cuando trabaje en una máquina fuera del gabinete eléctrico principal de la máquina, salvo en el caso de trabajos en la línea de transmisión eléctrica a la máquina, siga 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.

	<p>RIESGO DE ELECTROCUCIÓN.</p> <p>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!</p>

3. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA.
4. Trabe o desenergice todos los componente neumáticos, componentes hidráulicos y otras piezas que tengan alimentación directa o almacenada.

Figura 6-1: Bloqueo/etiquetado en el gabinete eléctrico principal



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 6-2: 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.

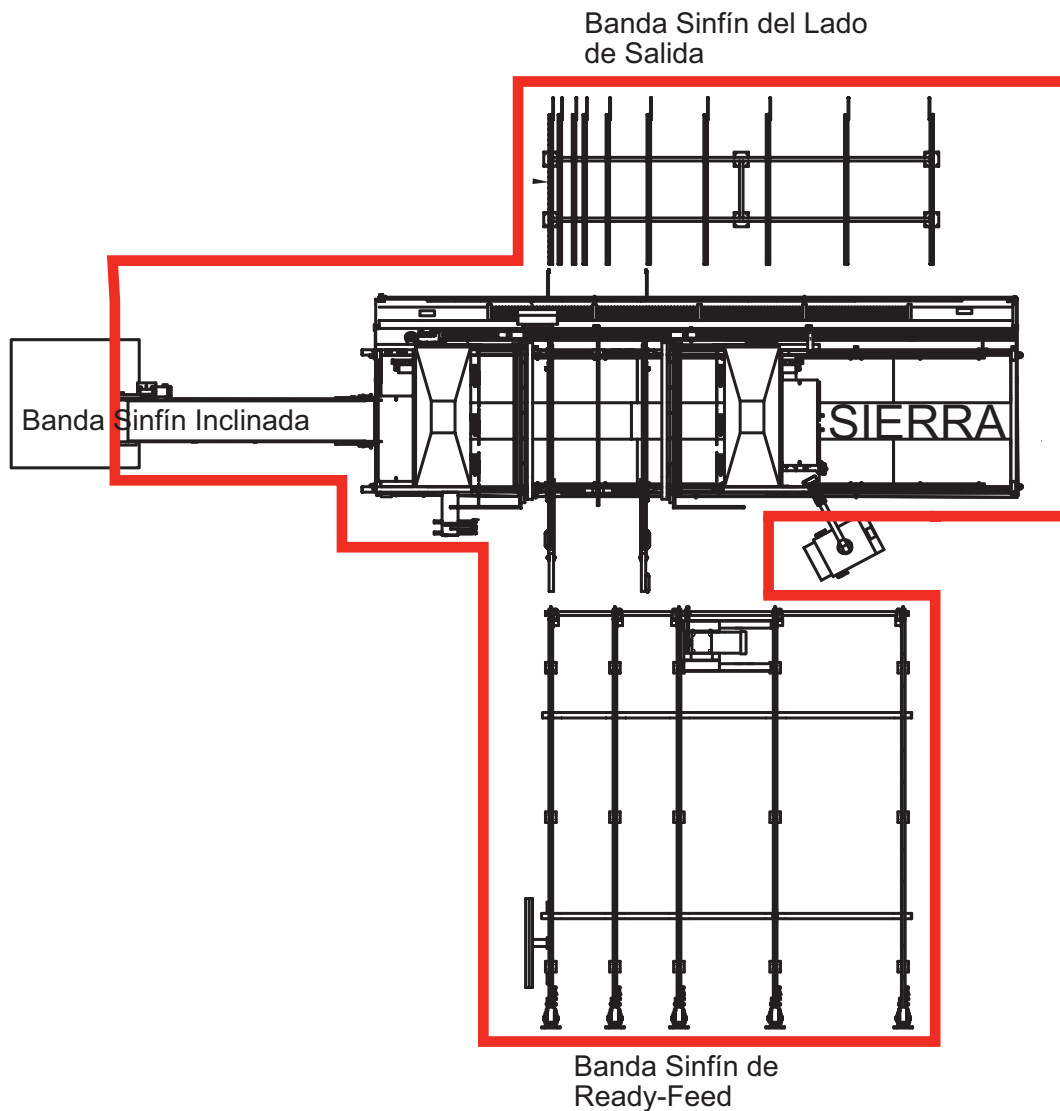
Solución de problemas con una máquina energizada

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

	<p>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.</p>
---	--



Purpose of Chapter

The purpose of the *General Information* chapter is to introduce you to this manual and to provide an overview of your equipment and how to identify it.

DANGER	
	<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 warnings must be read and observed. Failure to do so may result in economic loss, property damage, personal injury and/or death.</p> <p>This manual must always be available to personnel operating and maintaining this equipment.</p>

Introduction to This Manual

Purpose of This Manual

This manual provides the information necessary to operate and maintain this equipment. 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.

Most maintenance, troubleshooting, and part number questions can be answered with the information in this manual. If you can not locate the answer or solution, contact the MiTek Machinery Division Customer Service Department using the contact information in Figure 1-1.

Figure 1-1: Contacting MiTek

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

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

Technical Assistance
 Phone: 800-523-3380
 Fax: 636-328-9218
machinerysupport@mii.com

Web Site
www.mitek-us.com



This manual addresses the *SmartSet* saw. It does not address the *SmartSet Pro* saw.

Using This Manual

Review the *Table of Contents* to understand the structure of the chapters and appendices. The glossary and index are also valuable tools for getting the most out of your equipment.

To follow the procedures in this manual, you must first understand the formatting cues used. Table 1-1 describes how to read the cues provided in this text.

Table 1-1: How to Read the Formatting Cues

If Text Looks Like...	It Indicates...	
All caps	Key on keyboard or button on touch screen	Press ENTER
Initial cap and italic	Menu or field or virtual button that you must find or select	Click on the <i>File</i> menu
Initial cap only, no italics	Menu or field or virtual button when simply referring to it	While in the Main Menu
Plus sign (+)	Hold buttons at the same time	CTRL+ALT+DELETE
Greater Than sign (>)	Next selection	<i>File>Open</i>

Introduction to This Equipment

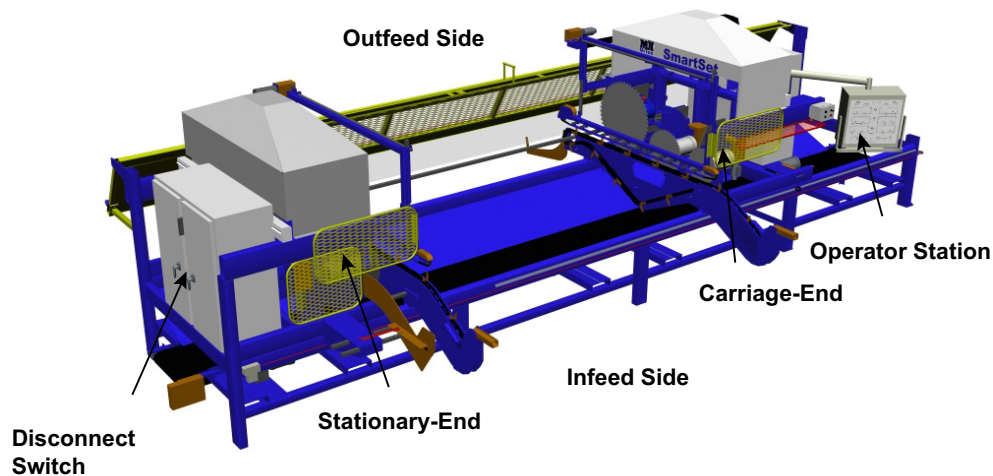
Purpose of the Equipment

The *SmartSet* saw is designed for the fast, accurate, and economical production of wood trusses using MiTek connector plates. The primary function of this machine is to cut top and bottom chords for roof trusses. A secondary function is for cutting webs for roof and floor trusses.

Overview of the Equipment

The system consists of a machine base with scrap conveyor, a stationary end assembly featuring saws #1, #2, (6 optional), a carriage-end assembly featuring saws #3, 4, and 5, two feed chain assemblies, two hold-down assemblies, two dust covers, and an optional incline waste conveyor. Some of the main components are labeled in Figure 1-2.

Figure 1-2: Main Components



Components and Options

Table 1-2 lists the main components that comprise this system.

Table 1-2: Main Components

Component	Description
#1 saw	5-hp - 3450 rpm with 20" carbide-tip blade
#2 saw	5-hp - 3450 rpm with 16" carbide-tip blade
#3 saw	5-hp - 3450 rpm with 16" carbide-tip blade
#4 saw	5-hp - 3450 rpm with 20" carbide-tip blade
#5 saw	10-hp - 1735 rpm with 32" carbide-tip blade

Table 1-2: Main Components

Component	Description
Powered angulation on all saws	
Powered carriage travel	
Powered lateral adjustment for in- and out-of-cut on saw #5	Optional #6
Powered vertical adjustment for in- an out-of-cut on saw #1, 2, 3, 4	
Pneumatic brakes on all saws	
24" wide full length waste conveyor belt powered by 1-hp gearmotor	
Electronic lumber counter	
Heavy-duty 2120 feed chains with pusher lugs	
Fixed feed chain sprockets for synchronizing pushers	
Rack and pinion micro-adjustable lumber stop with scale	
Center support table	
LH scarfing skid bar	RH optional with #6 saw
Tru-Cut tracking blade	
Master operator shut-off control	
Perimeter mounted shut down cable	
Fully shrouded protective guards and shields	
Powered movements controlled by toggle switch	

Table 1-3 lists the options available with this system.

Table 1-3: Optional Components and Features

Component	Description
#6 saw	10-hp - 1725 rpm with 32" carbide-tip blade
12' long incline waste conveyor mounted at stationary-end	Operator's left
12' long incline waste conveyor mounted at carriage-end	Operator's right
2nd scarfing skid bar	Right-hand scarfing skid bar for #6 saw

System Identification

Table 1-4: Available Models

System Description	Part #
<i>SmartSet</i> saw	78610

This manual only addresses the *SmartSet* saw. The *SmartSet Pro* saw is addressed in a separate manual.



General Specifications

Table 1-5: General Specifications

Length without incline waste conveyor	32'
Length with incline waste conveyor	45'
Width	12'
Height without hoods	6' 7"
Height with hoods	9' 1"
Shipping weight	18,000 lbs
Electrical service required	125 amps minimum / 220-240 volts
Maximum lumber size	2" x 12"
Maximum straight cut length	20'
Minimum straight cut length	18"
Minimum 2x4 45° cut length	24"
Maximum scarf cut length #5 32" blade	29-1/2" Optional #6
Maximum scarf cut length #2 saw 16" blade	10-1/2"
Maximum scarf cut length #1 saw 20" blade	16"

Purpose of Chapter

The purpose of the *Prior to Installation* chapter is to communicate 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 provides the following information.
 - 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 made 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.
- The MiTek CST will ensure that the Equipment Manual is present. One (1) manual is provided for every piece of equipment.
- The MiTek CST is not responsible for providing tools or performing the work during installation.
- The MiTek CST is not responsible for training personnel on how to build a truss.

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 the items that must be taken care of before your machine is installed. Each topic is explained in detail in the text following the table.

If these requirements are not satisfied before the scheduled installation date, the installation may need to be rescheduled. If travel arrangements have already been made for the CST, they will be the customer's responsibility.

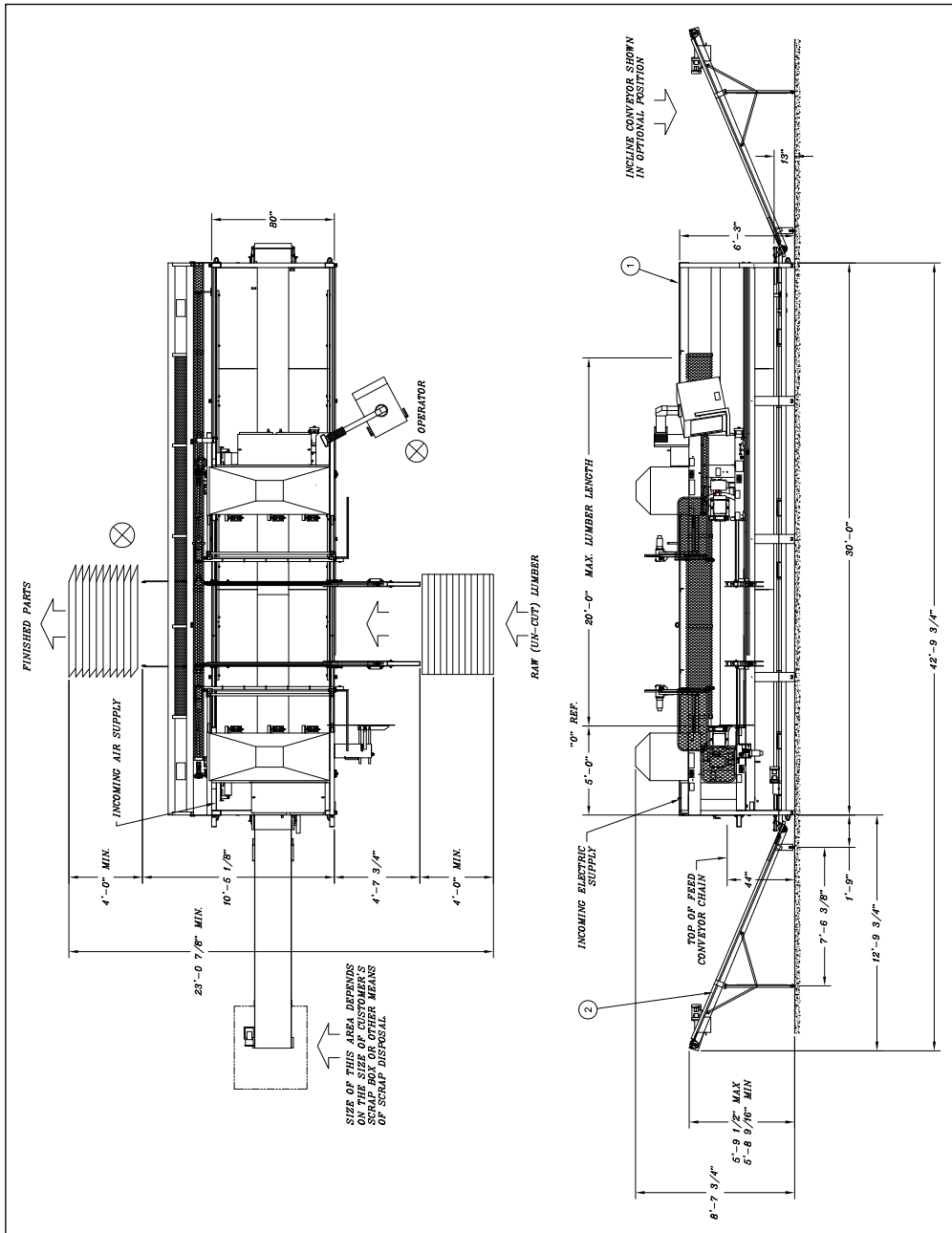
Table 2-1: Summary of the Customer's Responsibility

Space Requirements	This equipment requires enough space to allow for the machine dimensions listed in Table 2-2, plus additional working space for operation and maintenance. Operation space should ensure safety, freedom of movement, storage, and a free flow of materials. Space should have adequate lighting.
Location Requirements	Concrete, a minimum of 6 in. thick 3500 psi, is required under the weight of the saw. 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 2-3. Contact your MiTek representative immediately if custom power specifications need to be arranged.
Pneumatic Requirements (Compressed Air)	See Table 2-4.
Shipping Weights	See Table 2-5.
Customer-Supplied Items Required	The customer is responsible for having the supplies listed in Table 2-6 at the time of installation.

Space Requirements

Refer to the guidelines described here when planning your space allocation. MiTek can provide help with plant layout and space utilization upon request.

Figure 2-1: Sample of a Layout for a Complete System



Space for the Equipment

It is the customer's responsibility to provide adequate space for the installation, operation, and maintenance of the equipment. The physical dimensions of the equipment are shown in Table 2-2.

Table 2-2: Approximate Equipment Dimensions

Length without incline waste conveyor	32'
Length with incline waste conveyor	45'
Height	6' 7"
Width	12'

Space for Operation and Maintenance

Additional space must be allocated for operation and maintenance. Operation space should provide safety, 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 3500 psi. Refer to your layout drawing.

Environment

The saw and conveyors 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

The standard electrical requirements are shown in Table 2-3.

Table 2-3: Electrical Requirements Prior to Installation

Horsepower	55.5 hp
Voltage	230 VAC
FLA Plus Control Amperage	152.2 amps
Equipment Disconnect Protection	150 amps
Cycles (Frequency)	60 Hz
Phases	3

Pneumatic System Requirements

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 2-4 describes the pneumatic system requirements.

Table 2-4: Pneumatic System Specifications


Air Source Tank	Connecting Air Source to System	Pressure	Avg. Flow Rate
Minimum of 60 gal	Minimum of 3/8-in. diameter tube between air source and filter, regulator, and lubricator	100 psi	10 scfm

Shipping Information

When the equipment arrives, you must have the proper transport and lifting equipment available to removed it from the truck and place it in your facility. Table 2-5 shows the weight of the individual components of a typical system.

Table 2-5: Shipping Information

Contents of Shipment	Approximate Weight
<i>SmartSet</i> saw	18,000 lb
Incline Waste Conveyor	700 lb

DANGER	
	<p>Transport and lifting equipment must be rated appropriately! They should be rated at a minimum of twice (2x) the weight of the load to account for dynamic loads. The weight of each major component is listed in Table 2-5.</p> <p>Inadequate transport equipment may result in property damage, personal injury, or death.</p>

Customer-Supplied Parts

The customer must supply the parts shown in Table 2-6. Some must be installed before installation occurs and some must be available for use at the time of installation.

Table 2-6: Customer-Supplied Parts

Item	Description	
Compressed Air	Supply line from air compressor to air regulator that meets the requirements in Table 2-4.	
	Air compressor that can meet the requirements in Table 2-4.	
	Connector for tube from air source to 3/8-in. NPT port on the air regulator.	
Electrical Equipment	All electrical requirements to provide power to the disconnect enclosure on the gantry head are the customer's responsibility.	
	Electrical requirements for the stand-alone conveyors include hard conduit, junction boxes, flex conduit, and 1/2-in. connectors.	
Transport Equipment	At least two heavy-duty forklifts or truck wreckers are required to move the equipment during unloading and placement of the machine. Chains and spreader bars may also be required.	
	All transport and lifting equipment must be capable of carrying 18,000 lb.	
Tools That May Need to be Rented	Transit with measuring stick	
	Industrial hammer-drill	
	Hydraulic jack	
	Welding equipment and welder	
General Tools	Screwdrivers	Socket wrench and sockets
	Optical or laser level with accuracy of 1/16 in.	Pliers
	Open end wrenches	Hammer
		Allen wrenches

Training Provided

In the case where MiTek is overseeing the installation of your equipment, the MiTek representative will ensure that your operators and maintenance personnel understand how to operate and maintain this equipment. They will explain warranty information and ensure that the Equipment Manual is present.

MiTek will NOT provide training related to building or engineering trusses.

Floor Positioning

The saw should be positioned on a flat, level concrete floor or slab with a minimum thickness of 6 in., 3500 psi. The floor space required for this machine is 25 ft wide by 40 ft long with an additional 15 ft length required for the incline conveyor. After positioning the machine in its designated location, remove the incline conveyor, tail-off arms and all accessories from the conveyor bed they were shipped in.

Leveling

To maintain accuracy of the saw it is essential that it be on a level plane. There are three (3) leveling footpads on each side of the machine base frame for the purpose of leveling the saw. After positioning the machine in its designated location, check level both longitudinally and transversely with a transit. Adjust the leveling footpads to bring the machine base to a perfectly level plane both lengthwise and crosswise. After leveling is completed, a lock nut is provided to lock the footpads in position.

Electrical Connection

Before making electrical connection from the in-house supply, check the following:

- Voltage nameplate located on the primary (large) panel box. This is the voltage the saw has been wired for at the factory. If your incoming voltage is different from that of the nameplate, contact the factory for further instructions.
- The ampere rating of your service entrance box. The minimum acceptable rating is 125 amperes.

The machine has been completely wired at the factory and is ready for use except for service hookup. The following are general recommendation for wire size, conduit size etc. and should be followed as close as possible. Consult and follow all local code requirements, as they supersede this manual.

Table 2-7: Electrical Service Chart

Output	220 Volt
Conduit Size	1-1/4"
Wire	AWG #3
Length Of Run	100'
Fuse Circuit Breaker Size	125 amp

A 1-3/4-in. knockout punch will be required for service entrance into the primary (large) panel box for 1-1/4-in. conduit. This knockout should be located as convenient as possible to the disconnect switch located inside the box.

Connect the three incoming source wires to the top of the main disconnect switch inside the box where it says “line”. Close the box and secure the door.

Pneumatic Connection

A 3/8-in. air line with a quick disconnect fitting should now be connected to the fitting on the filter/regulator/lubricator assembly (FRL), located at the left rear corner of the saw base frame. Set the regulator to 100 psi.

Purpose of Chapter

The purpose of the *Installation* chapter is to describe 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.

Delivery


Unloading

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 2-5 in the *Prior to Installation* chapter.

DANGER	
	<p>Transport and lifting equipment must be rated appropriately! They should be rated at a minimum of twice (2x) the weight of the load to account for dynamic loads.</p> <p>Lift the equipment only at the lift points indicated by MiTek!</p> <p>If the equipment is transported incorrectly, equipment damage, personal injury, or death may result.</p>

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 at least two (2) forklifts or a crane appropriate to the weight of each unit. Lift the equipment to remove the pallet, and gently place each unit in its new location. Directions to lift the saw are described below.

Lifting Methods

Use a crane or multiple forklift trucks to lift and move the saw. This section describes the proper procedure for both methods.

Crane

Using a crane, hook chains from a spreader bar to the ends of the machine. Take care when lifting the saw. Another option is to wrap chains or straps around the legs of the saw. Connect the chains or straps to the crane and lift with care. You do not need to use both a spreader bar and chains.


WARNING	
	<p>CRUSH HAZARD.</p> <p>Use caution when lifting the saw. Failure to exercise caution may result in severe injury or death.</p>

Figure 3-1: Lift Points

Lifting Methods

Option A

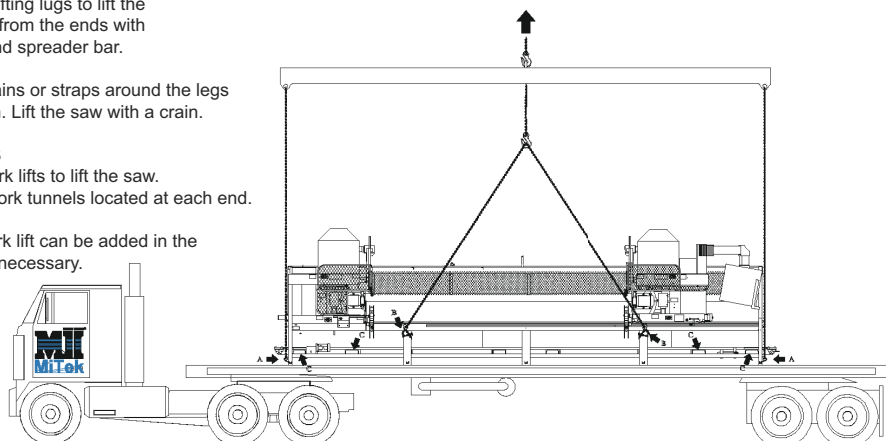
Use the lifting lugs to lift the machine from the ends with chains and spreader bar.

Wrap chains or straps around the legs as shown. Lift the saw with a crane.

Option B

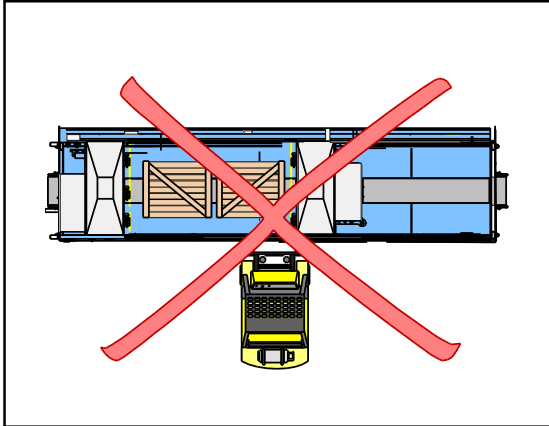
Use 2 Fork lifts to lift the saw. Use the fork tunnels located at each end.

A third fork lift can be added in the middle if necessary.



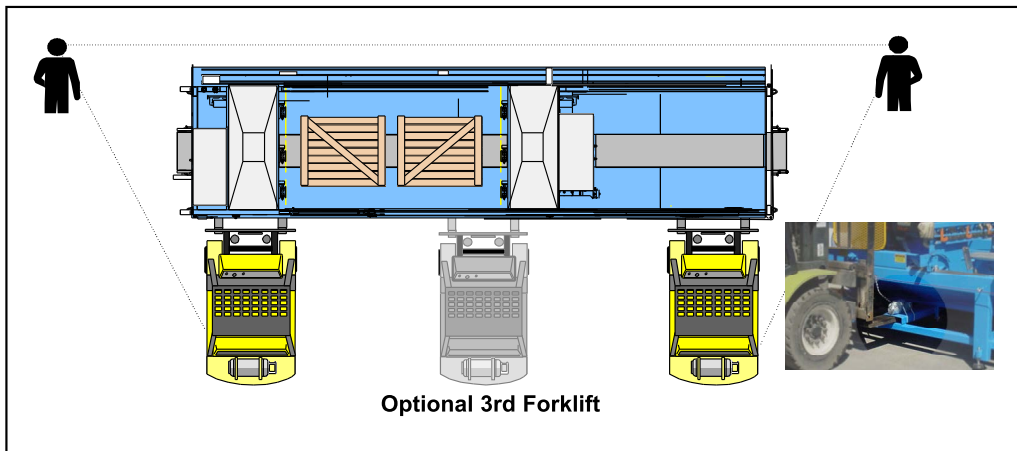
Forklift Trucks

Using multiple forklift trucks is the third option. Once the tractor trailer is in the position for unloading the saw, remove the shipping straps.



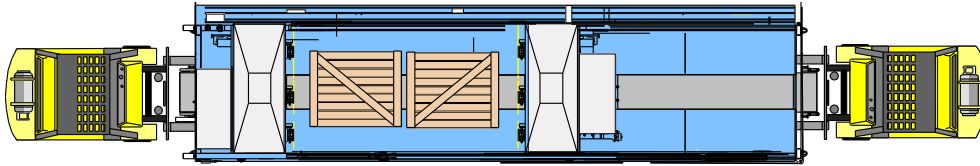
WARNING	
	<p>CRUSH HAZARD.</p> <p>Do not move or lift the saw with one forklift truck. Two or three forklift trucks are required to move the saw safely.</p>

Before lifting the saw, a person should be positioned at each end and on each side of the saw to watch for dangerous situations. These people must be positioned to see all potential hazards but far enough away to allow movement of the saw, including the potential for the saw to tip over.



Position two or three forklift trucks as shown. Do not use one truck. Forklift trucks must be positioned on the same side of the saw and forks must be inserted in the fork tubes. The center fork tubes should only be used if lifting the saw with three forklift trucks.

If necessary to pass through a narrow opening in a building or maneuver around obstacles, two forklift trucks with the required lifting capacity can be used to lift at each end. Before using this method, space the forks, determine the pick up point, measure how far the forks can be inserted safely without hitting any components. Use care to ensure all components, including those that may be obstructed from easy viewing, are identified. Clamp a 2x4 to the forks at a distance 12 inches shorter than the measured clearance. The 12 inches will allow maneuvering of the forklift trucks without swinging into components of the saw.



Avoid dips and bumps that will cause the saw to be carried out of level. Do not carry the saw over ditches or large bumps that require the use of planking or other material to cross over. When passing under an overhead obstruction, check the lifted height of the saw and the height of the obstruction before passing under the obstruction. Before passing through an opening, plan your path and measure the opening's width and height and the width and height of the saw. Planning your path, especially if lifting from the ends, is important. You must determine how you will swing into a building if you cannot move straight through the opening.

Equipment Layout

Each component must be located in specific locations. A sample layout is shown in Figure 2-1 in the *Prior to Installation* chapter, but refer to your own layout during installation. Your MiTek representative will provide your layout to you before the equipment is installed.

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 2-4 in the *Prior to Installation* chapter lists the specifications for the pneumatic air source, tubing, and connectors.

Information about the pneumatic components, including location of each, is shown in Table 3-1. The regulator should be set to 100 psi.

Table 3-1: Components and Connections in the Pneumatic System

Component	Location	Connector/Mount Description
Filter/Regulator/Lubricator	Rear corner near the base	Quick disconnect fitting

Electrical System

WARNING	
	<p>Electrical hazard!</p> <p>All electrical work must be performed by a qualified electrician.</p> <p>Follow approved lockout/tagout procedures (OSHA 29 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 qualified electrician. The machine design addresses electrical components starting with the disconnect enclosure. Installation and maintenance of all electrical requirements up to the disconnect enclosure are the responsibility of the customer. Your MiTek representative can provide guidance regarding when the electrical will need to be available during the installation.

The disconnect enclosure is located at the stationary end of the saw..

Installing Tail-Off Arms

There are two tail-off arms, a left- and a right-hand arm. Each one is bolted to the outside of the rear feed chain assembly.

Installing Pre-Feed Arms

The pre-feed chain arms are partially installed at the factory. To complete the installation, rotate the arm on the shipping pivot until it is in line with the straight portion of the feed chains. Next push the arm into position in line with the straight portion, using the tube and shank as a guide. When both halves mate together, install a bolt in the lower shank and draw it tight. Now remove the shipping pivot pin and install a bolt in its place.

Installing Lumber Stop

The lumber stop will be assembled using four separate sub-assemblies, which are the mounting bracket, rack and guide, lumber stop, and the pointer. Install the mounting bracket first, using the four bolts provided to bolt the bracket to the front panel, at the left of the #2 saw. Next, install the rack and guide into the mounting bracket square tube housings, from the feed chain side, with the rack gear toward the operator. When the rack engages with the pinion gear, turn the square end shaft with the crank handle for full engagement of the two gears. Now bolt the red lumber stop to the rack and guide using the two bolts provided. Finally, bolt the pointer to the lumber stop to the rack and guide using the two bolts provided.

Installing the Incline Conveyor (Optional)

There are 2x6 cross braces on the conveyor used for shipping. **DO NOT REMOVE THESE CROSS BRACES.** They will be used to assist in raising the conveyor to its incline position. The incline conveyor is normally mounted at the stationary-end of the saw (to the operator's left). However, the optional position (operator's right) is sometimes specified. These instructions will apply to the installation at either end. Use a forklift truck to move the conveyor.

Position the conveyor at the designated end of the saw's base frame with the drive motor and gear reducer pointed away from the saw. If this is a used saw being moved and re-assembled you will need a wood 2x6 approximately 5 ft long at this point, to place crossways under the drive motor end behind the drive motor-gear reducer. New saws use shipping braces. Using a forklift, pick this end up slowly until the leg supports swing down and take a vertical position. While still holding the end up with the forklift, attach the longitudinal tie bars to the incline frame with the bolts provided.

This being accomplished, a sturdy triangle now exists between the incline frame and the vertical leg supports. Lower the forklift to allow the incline conveyor to be free standing. Remove the 2x6 used for assistance. Further alignment to the main waste conveyor belt on the saw is now necessary. Manpower can be used to position the incline conveyor as close as possible to the main conveyor belt. Attach the two tie bars between the incline conveyor side angle and the vertical mounted angles on the main saw conveyor extension arms, with the bolts provided.

There are two adjustable footpads to level the incline conveyor. After leveling, the lock nuts must be used to lock the footpads in the level position. The source electrical supply line comes directly from the large primary electrical box located at the stationary end of the saw. The flexible conduit elbow can be seen hanging from the main box. A junction box mounted on the right hand side of the incline conveyor is where the hook-up takes place. A knockout hole on the junction box is used to connect the source conduit elbow, while the feed wires go into the junction box. Three of the source wires are black and one is green. Match the wires, color for color joining them together and capping the ends with a connector cover. Replace cover on junction box. It may become necessary to reverse two of the three black wires at "start-up" time if the incline runs backwards.

Installing Guards

There are two guards shipped loose for field installation. One guard for the front left hand side, and one for the front right hand side. Both guards are attached to the respective hold-down moveable structure in such a fashion, that guards move up and down together with the hold-down. Each guard is fastened with six socket head cap screws. A rear guard assembly is shipped with the two side braces removed and the lower section of guard strapped to saw structure, to minimize shipping width. To install the guards, remove the straps and secure the braces with the hex head cap screws.

The front right hand side hold-down guard has been designed with sufficient flexibility to actuate the emergency push button under the hinged guard whenever the right end of the guard is pushed towards the saw.

Pre-Start Motor Check

Make a visual check of electrical connections and anchoring devices on the following motors:

1. Horizontal Waste Conveyor
2. Incline Waste Conveyor (if used)
3. No. 1 Saw Centerline Actuator
4. No. 2 Saw Centerline Actuator
5. Stationary End Hold-Down Actuator
6. Carriage End Hold-Down Actuator
7. No. 3 Saw Centerline Actuator
8. No. 4 Saw Centerline Actuator
9. No. 5 Saw Centerline Actuator
10. No. 1 Saw Motor
11. No. 2 Saw Motor
12. No. 3 Saw Motor
13. No. 4 Saw Motor
14. No. 5 Saw Motor

Check the ease of rotation on each saw blade to be certain no binding or drag is evident. To do this, disconnect the air line with the quick disconnect where it plugs into the FRL assembly at the rear of the main base frame. With all air disconnected, hand rotate each saw blade. They should rotate freely without binding or drag. If they do not rotate freely, chances are the brake needs adjusting. Follow the procedure outlined in the *Maintenance* chapter.

Pre-Start Check List

Before turning the power on and starting the motors, a pre-start checklist is provided below to make certain proper conditions exist for startup.

1. Check the emergency perimeter stop switch to be certain it is not tripped. If the switch has been tripped, it must be manually reset before the saw will start.



The saw will not start when emergency limit switches have been tripped. All guards must be in place and operative. The E-stop button on the operator console indicates when the emergency limit switch or emergency push buttons are actuated, or the air supply is disconnected.

2. At the operator control station, behind the RH upper guard and at LH control station, there are three E-stop red mushroom buttons. Each of these buttons must be pulled out to start the saw.
3. Connect the air supply to the machine at the left rear where it plugs into the FRL assembly.



The saw will not start without 100 psi minimum air supply.

Start-Up


Initial start-up will consist of functional testing of all motion components of the saw except for the main horizontal waste conveyor and the incline conveyor. Testing of these two items will be covered under the *Waste Conveyor Belt Tracking* section on page 28. The tests should be conducted in the order in which they are presented here to avoid pitfalls that could occur if the sequence is not followed. Before commencement of the test, first turn the electric power “on” from the in-house supply to the saw. Then turn the switch on the primary (large) electric panel of the saw to the “on” position. When power to the saw is on, a green “power on” light indicator will be illuminated.

The green “power on” indicator light serves to warn operator that power is on, and to remind him that power should be turned off whenever saw is left unattended. Always tagout the power supply in the off position to prevent unauthorized use.



The saw must be in “Setup” mode for any axis movement. The saw must be in “Saw” mode for saw motor and feed conveyor to start.

Tests

DANGER	
	Make sure all personnel are clear before proceeding with the tests.

Test 1 - Feed Chain Motor

1. To start the feed chain conveyor switch MODE selector switch to SETUP. Set FEED CONVEYOR switch to FWD position
2. Depress green push button marked START.
3. The lumber feed chains should move forward in a motion to carry the lumber toward the saw blades. The conveyor speed control is set by the black knob to the right of the start push button. Turning the knob clockwise increases the speed, and turning the knob counterclockwise decreases the speed.

Test 2 - Hold-Down Motors

1. Ensure that the MODE selector switch is on SETUP.
2. Activate the joystick on the operator's console on the upper left of the console marked STATIONARY HOLD-DOWN by pushing up to make the stationary (left) hold-down raise. Conversely, pushing the joystick down will cause the stationary hold-down to lower.
3. Repeat the operation for the carriage hold-down with the joystick marked CARRIAGE HOLD-DOWN on the upper right of the console.

Test 3 - Centerline Motors

1. Ensure that the MODE selector switch is on SETUP.
2. Use the joystick marked CENTERLINE of #3 saw and push it up. Centerline actuator on # 3 saw will raise the complete saw assembly.
3. Raise it until the digital read out reads at 1.75. It is now set to cut on the centerline of a 2x4.
4. Repeat this procedure until all five saw centerlines are at the 1.75 reading. All five saws are now set to cut on the centerline of a 2x4.

Test 3 - Lateral Adjustment Actuator

1. Ensure that the MODE selector switch is on SETUP. Only the #5 (and optional #6) saw has lateral adjustment to bring it into or take it out of the cut. Above the angulation joystick for #5 and #6 saw is the toggle switch marked IN/OUT.
2. Test this by pushing the toggle switch to the right or to the left as the case may be. The direction you push it is the direction the saw will move.

Test 5 - Saw Angulation Motors

1. Ensure that the MODE selector switch is on SETUP.
2. Push the ANGLE joystick for #1 saw up. The #1 saw will start to angulate. Return it back to 90 degrees and stop.
3. Now use the ANGLE joystick for #2 saw and push it down. The #2 saw will start to angulate. Return it back to 90 degrees and stop.
4. Repeat these procedures for #3, 4, and 5 saws.

Test 6 - Saw Motors



Before this test is begun, all guards must be in place and operative. The feed chains and hold-downs must be clear of the saw blades by a minimum of six in. and the air supply must be connected to various ports.

1. Switch the MODE selector switch to SAW.
2. On the operators console will be found three selector switches marked BLADE.

3. To start saw # 1 rotate the switch toward the “1” mark. Saw #1 will start. A quick observation should be made after starting each saw to be certain rotation is correct.

CAUTION

All saw blades must rotate toward the operator so as to cut lumber from top to bottom.

4. After starting #1 saw and observing correct blade rotation, push the red E-STOP button at the lower right of the console to stop the #1 saw.
5. Pull out the red mushroom E-STOP button and proceed to start #2 saw, then #3, #4, and #5, stopping each saw before starting the next. The functional start up test is now complete, except for waste and incline conveyors, which require tensioning as covered next in the *Waste Conveyor Belt Tracking* section.


Every time an E-stop is activated or saw is in Setup mode, the air brake is actuated. Saw blade should stop rotating within a very short interval. If it does not stop or takes too long to stop, refer to the *Maintenance* chapter for tips on adjusting the air brake.

Waste Conveyor Belt Tracking

The waste conveyor belt has been tensioned at the factory before shipment. However, further adjustment is almost always required for correct tracking, due to movement and vibration during shipping. If the belt is not tracking correctly, adjustments at each end will be required. Refer to the *Adjusting the Belt Tracking/Tension* section on page 98.

Purpose of Chapter

The purpose of the *Operation* chapter is to describe the operating mechanisms on this equipment and the procedure to operate it in most circumstances.

DANGER	
	<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 warnings must be read and observed. Failure to do so may result in economic loss, property damage, personal injury and/or death.</p> <p>This manual must always be available to personnel operating and maintaining this equipment.</p>

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

Things to Know Before You Begin

Emergency Stop (E-Stop) Pushbuttons

A typical E-stop pushbutton is shown in Figure 5-1. Note the E-stop button locations before operating this equipment:

- Operator control station
- Behind the right-hand upper guard
- Left-hand control station

Push one of the red emergency stop (E-stop) buttons to cease power transmitting to the control circuit. To release the E-stop, pull straight up on the pushbutton. It will return to its extended position and the machine will operate again.

Figure 5-1: E-Stop Pushbutton




Disconnect Switch

Figure 5-2 shows the disconnect switch which controls the power supplied from that switch to the rest of the machine. 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 always be turned off when the machine is not in use.

Figure 5-2: Disconnect Switch

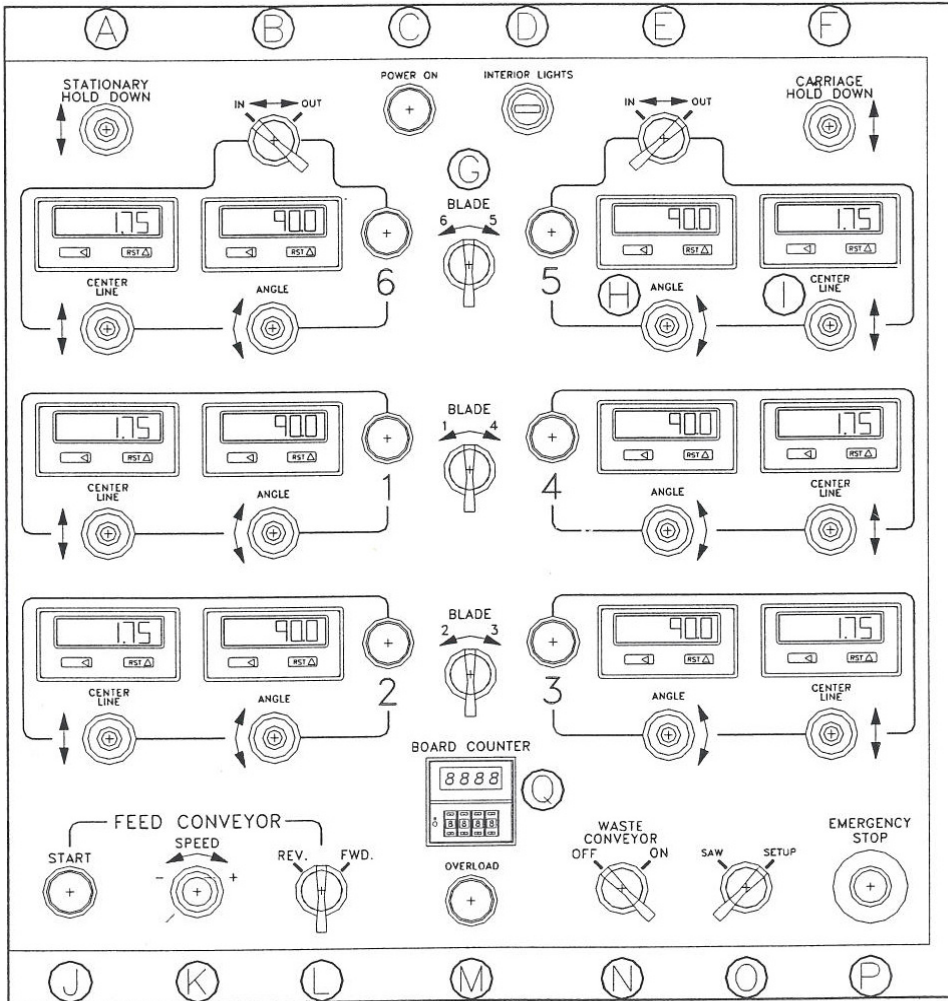


WARNING	
	<p>When the disconnect switch is OFF, there is still live power up to the disconnect switch's enclosure. Always turn off power at the main power source before opening this enclosure!</p>

Operator Interface

The operator runs the machine by using the operator's control station, described below, and the carriage control panel.

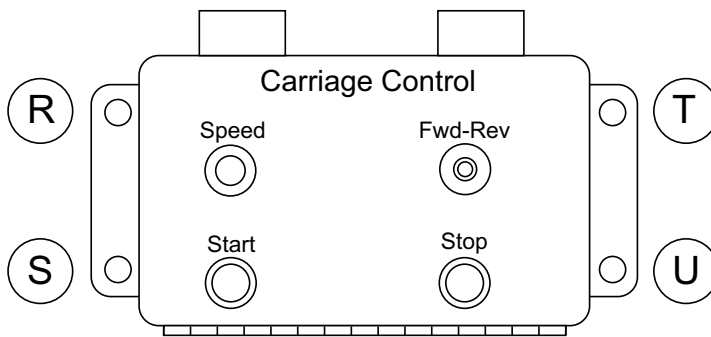
Operator's Control Station



- Stationary-End Vertical Hold-Down Adjustment Joystick
- Blade #6 In-/Out-of-Cut Joystick
- Power On Indicator
- Interior Lights Switch
- Blade #5 In-/Out-of-Cut Joystick

- f) Carriage-End Vertical Hold-Down Adjustment Joystick
- g) Blade Start Selector Switch
- h) Quadrant Angle Adjustment Joystick And Digital Display
- i) Quadrant Center Lint Adjustment Joystick And Digital Display
- j) Feed Conveyor Start Pushbutton
- k) Feed Conveyor Speed Adjustment
- l) Feed Conveyor Direction Selector Switch
- m) Motor Overload Indicator Light
- n) Waste Conveyor Selector Switch
- o) Mode Selector Switch
- p) Emergency Stop Pushbutton
- q) Board Counter

Carriage Control Station



- r) Carriage Speed Adjustment Knob
- s) Carriage Traverse Start Pushbutton
- t) Carriage Traverse Direction Control Switch
- u) Carriage Traverse Stop Pushbutton

Feed Chain Speed Control

A black knob located on the operator control station regulates the feed chain speed. Turning the knob clockwise will increase the feed chain speed and turning the knob counter-clockwise will decrease the feed chain speed.

Carriage Traverse Control

A switch located on the carriage control station controls the carriage traverse direction. A black knob located on the carriage control station controls the carriage traverse speed. Turning the knob clockwise will increase the carriage traverse speed and turning the knob counter-clockwise will decrease the carriage traverse speed. Pressing the green button on the carriage control station enables carriage traverse movement. Once the carriage is in position, pressing the red stop button on the carriage control station will disable carriage traverse.

Components Quantity Counter

The components quantity counter located on the operator control station counts every piece of lumber on the feed chain that activates a limit switch located by the #3 saw. The operator should reset this counter at the beginning of each run and pre-set the number to pieces to be cut. The counter will deduct 1 count from the pre-set number each time a board actuates the limit switch and sound an audible when the quantity has been reached.

Safety Interlocks

The Mode Selector switch is an important safety interlock that ensures that the saw blades will not be rotating and the feed conveyor will not be moving whenever the saw is in setup mode. To start the saw motors and the feed conveyor, the saw must be in saw mode. For additional safety, power to the carriage traverse driver is cut off when the saw is in saw mode.

Sample Cuts

Sample 1 - Bottom Chord

Type Truss: Howe

Pitch and Span: 3:12 pitch; 24' 8" span; 1/4" heel

Saws Used: #2, #3, and #5

Feed Speed: Approximately the middle setting on variable speed control

Lumber Size: 2x4

Attachments used:

- Heel cut skid bar
- Center skid bar
- Lumber stop

Settings

- #1 Saw: Move out of cut and do not use *
- #2 Saw: Set at 90°
- #3 Saw: Set at 90°
- #4 Saw: Move out of cut and do not use *
- #5 Saw: Set at 14°
- Carriage: Set length at 12' 4"
- Centerline: Set #5 at 1" linear mark on scale
- Lumber Stop: Set at 1/2" mark to the left of "0" on scale
- Feed Chains: Position 8" to 10" from the saw blades
- Heel Cut Skid Bar: Position approximately 2" from blades, between blades and feed chain, lock in place
- Hold-Downs: Position approximately 2" to the inside of feed chains and set both at the 2x4 setting on the scale
- Center Lumber Support: Position approximately midway between feed chains lock in place



* To move #1 and #4 saws out of cut, angulate blade to 15° with horizontal plane and raise centerline above lumber width.

Trial Run

1. Turn power on.
2. Angulate saw #5 to 14°.
3. Be sure all other saws are at 90°.
4. Place 2x4 on edge in feed conveyor at the root of the lumber pivot arm and push it against the lumber stop.
5. Press the START button on touch screen.
6. The 2x4 will be carried into the saw by the feed chains and emerge with a 14° scarf cut and a 1/4" heel. It will also be trimmed to a length of 12' 4".
7. Check all dimensions on the 2x4 for accuracy.
8. Repeat as desired.

Sample 2 - Top Chord

Type Truss: Howe

Pitch and Span: 3:12 pitch; 24' 8" span; 1/4" heel

Saws Used: #1 and #3

Feed Speed: Approximately the middle setting on variable speed control

Lumber Size: 2x4

Attachments used:

- Heel cut skid bar
- Lumber stop

Settings

- #1 Saw: Angulate to 76°.
- #2 Saw: Move out of cut and do not use. *
- #3 Saw: Angulate to 76°.
- #4 Saw: Move out of cut and do not use. *
- #5 Saw: Move out of cut and do not use. *
- Carriage: Set to desired length.
- Centerline: Set #1 and #3 saws to centerline of material.

- Lumber Stop: Set at 1/2" mark to the left of "0" on scale.
- Feed Chains: Position 8" to 10" from the saw blades.
- Heel Cut Skid Bar: Do not use.
- Hold-downs: Position approximately 2" to the inside of feed.
- Chains and set both at the 2x4 setting on the scale.
- Center Lumber Support: Position approximately midway between feed chains, lock in place.



To move #2 saws out of cut, angulate blade to 15° with horizontal plane and raise centerline above lumber width. To move #4 saw out of cut, angulate blade to 10° past 90° (vertical plane) and raise centerline above lumber width. To move #5 saw out of cut, angulate to 90°.

Trial Run

1. Turn power ON.
2. Angulate saw #1 to 76°.
3. Angulate saw #3 to 76°.
4. Be sure all other saws are out of cut.
5. Place 2x4 on edge in feed conveyor at the root of the lumber pivot arm and push it against the lumber stop.
6. Press the START button on touch screen.
7. The 2x4 will be carried into the saw by the feed chains and emerge with two 76° cuts at the length you have selected.
8. Check all dimensions on the 2x4 for accuracy.
9. Repeat as desired.

Sample 3 - Webs

Type Truss: Howe

Pitch and Span: 3:12 pitch; 24' 8" span

Type Web: Long

Saws Used: #1, #2, #3, and #4

Feed Speed: Approximately the middle setting on variable speed control

Lumber Size: 2x4

Attachments used: Lumber stop

Settings

- #1 Saw: Angulate to 28°.
- #2 Saw: Angulate to 76°.
- #3 Saw: Angulate to 76°.
- #4 Saw: Angulate to 14°.
- #5 Saw: Move out of cut and do not use. *
- Carriage: Set to 5' 8-5/8"
- Centerline: Set all four saws to centerline of material.
- Lumber Stop: Set at 1/2" mark to the left of "0" on scale.
- Feed Chains: Position 8" to 10" from the saw blades.
- Heel Cut Skid Bar: Do not use.
- Hold-downs: Position approximately 2" to the inside of feed chains and set both at the 2x4 setting on the scale.
- Center Lumber Support: Do not use.



To move #5 saw out of cut, angulate blade to 90° and raise centerline above lumber width.

Trial Run

1. Follow procedures outlined in *Trial Run* for bottom and top chord.
2. For short webs utilize the same saws and attachments, following cutting list for size and cut angles.



Please note that some cutting lists use 0° when the saws are vertical. This saw is 90° when saws are vertical.

Sample 4 - Floor Web

Type Truss: Howe

Pitch and Span: 3:12 pitch; 24' 8" span

Type Web: Long

Saws Used: #1, #2, #3, and #4

Feed Speed: Approximately the middle setting on variable speed control

Lumber Size: 2x4

Attachments used: Lumber stop

Settings

- #1 Saw: Angulate to 28°.
- #2 Saw: Angulate to 76°.
- #3 Saw: Angulate to 76°.
- #4 Saw: Angulate to 14°.
- #5 Saw: Move out of cut and do not use. *
- Carriage: Set to 5' 8-5/8".
- Centerline: Set all four saws to centerline of material.
- Lumber Stop: Set at 1/2" mark to the left of "0" on scale.
- Feed Chains: Position 8" to 10" from the saw blades.
- Heel Cut Skid Bar: Do not use.
- Hold-downs: Position approximately 2" to the inside of feed chains and set both at the 2x4 setting on the scale

- Center Lumber Support: Do not use.



* To move #5 saw out of cut, angulate blade to 90° and raise centerline above lumber width.

Trial Run

1. Follow procedures outlined in *Trial Run* for bottom and top chord.
2. For short webs utilize the same saws and attachments, following cutting list for size and cut angles.



Please note that some cutting lists use 0° when the saws are vertical. This saw is 90° when saws are vertical.

Figure 5-3: Saw Heel Data

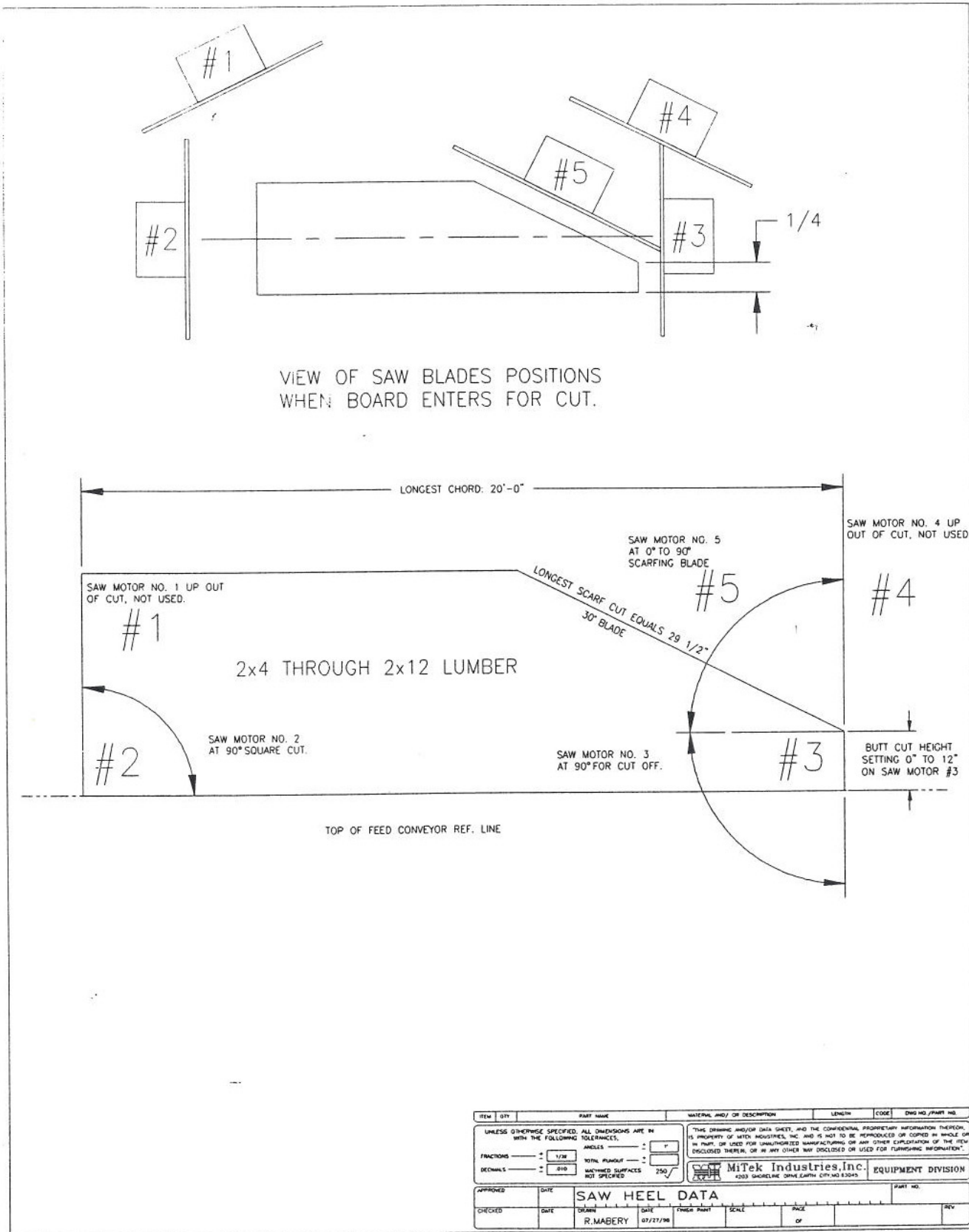


Figure 5-4: Saw Scissors Heel Data

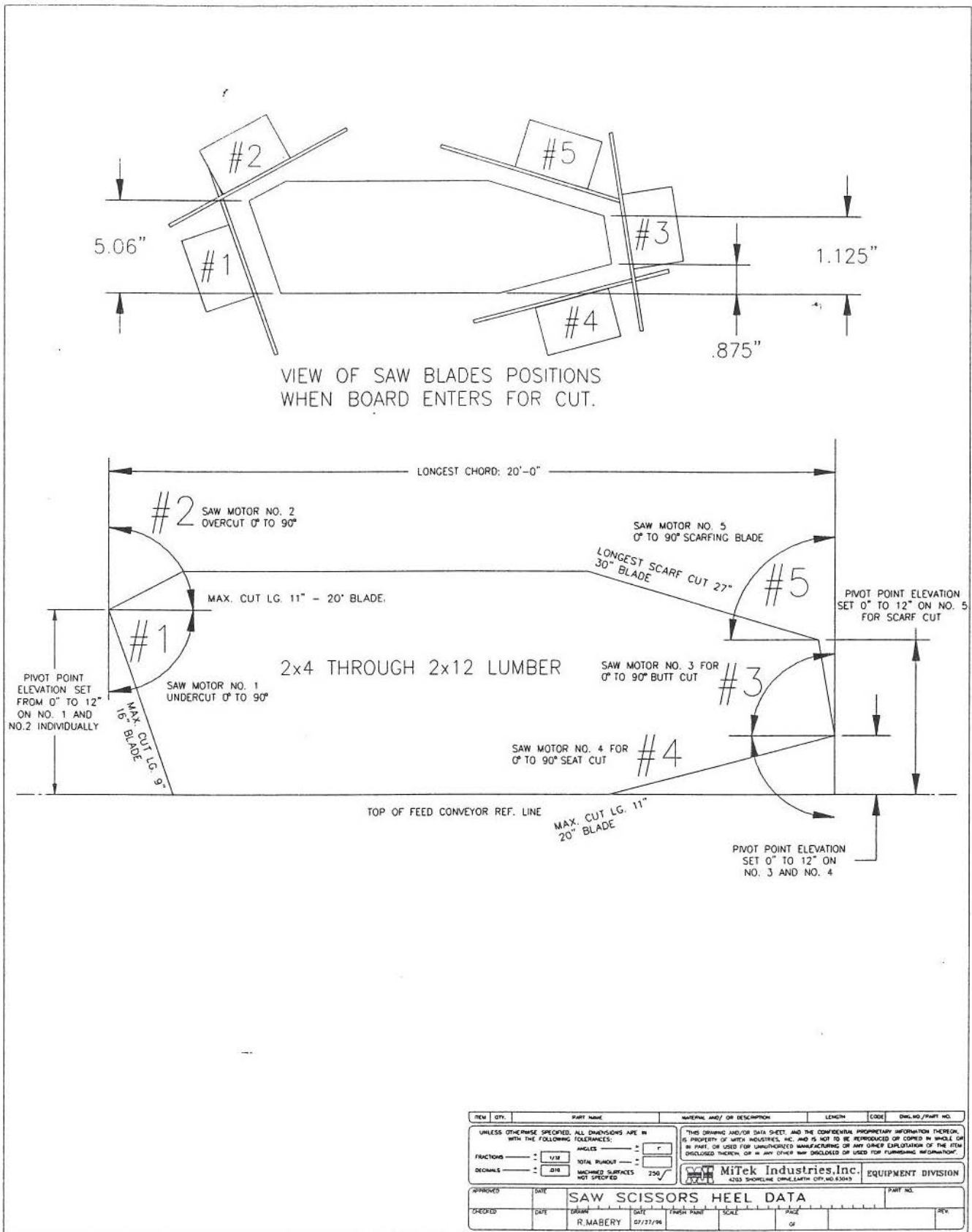
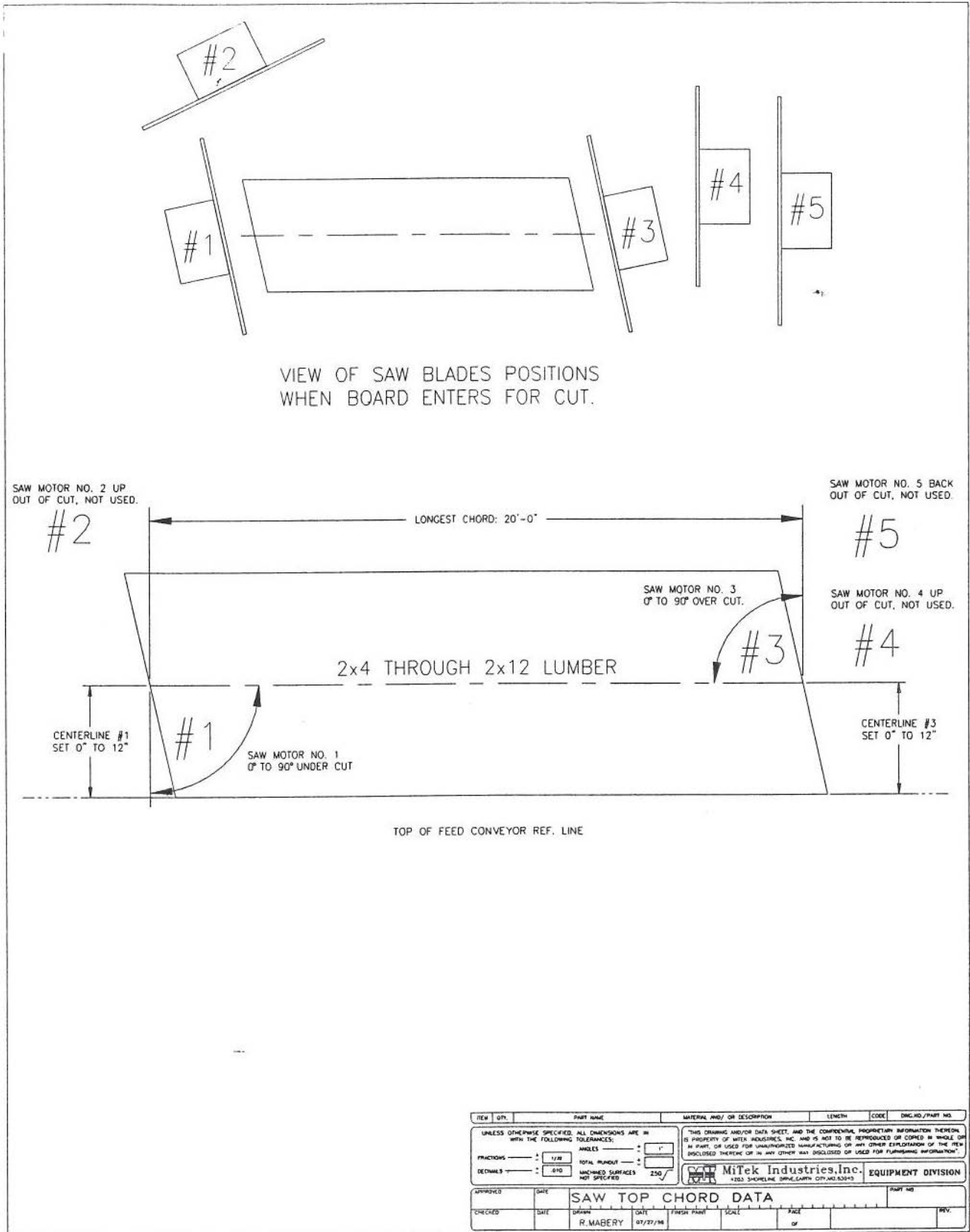
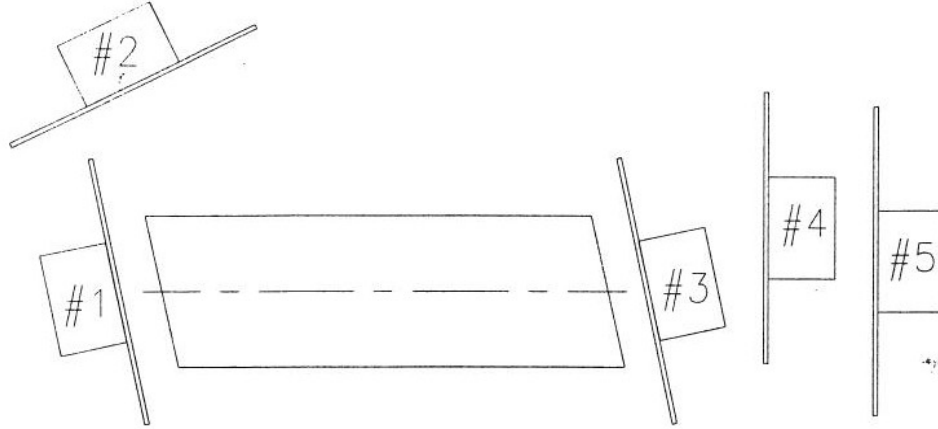


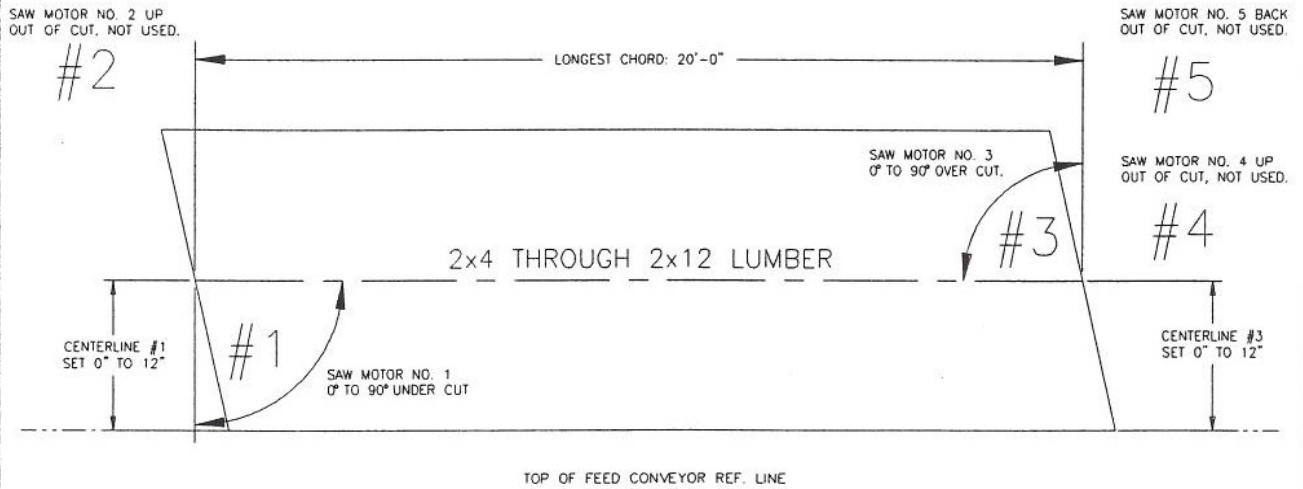
Figure 5-5: Saw Top Chord Data



Saw Top Chord Data Sheet 2



VIEW OF SAW BLADE POSITIONS WHEN BOARD ENTERS FOR CUT.



TOP OF FEED CONVEYOR REF. LINE

REV	QTY	PART NAME	MATERIAL AND/OR DESCRIPTION	LENGTH	CODE	ENGR. NO./PART NO.
<small>UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES. FRACTIONS: 1/32 ANGLES: 1° DECIMALS: .010 MACHINED SURFACES NOT SPECIFIED 250</small>						
<small>THIS DRAWING AND/OR DATA SHEET, AND THE CONFIDENTIAL PROPRIETARY INFORMATION THEREON, IS PROPERTY OF MITEK INDUSTRIES, INC. AND IS NOT TO BE REPRODUCED OR COPIED IN WHOLE OR IN PART, OR USED FOR UNAUTHORIZED MANUFACTURING OR ANY OTHER EXPLOITATION OF THE ITEM DISCLOSED THEREON OR IN ANY OTHER WAY DISCLOSED OR USED FOR FURNISHING INFORMATION.</small>						
			EQUIPMENT DIVISION			
APPROVED	DATE	SAW TOP CHORD DATA				PART NO.
CHECKED	DATE	DESIGN	DATE	FRSH PART	SCALE	PAGE
		R.MABERY	07/27/98			1

Purpose of Chapter

The purpose of the *Maintenance* chapter is to provide 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.

Additional Information about Maintenance


It is critical to the future performance of the *SmartSet* saw that only specified replacement parts are used if maintenance replacement is required. Further, no electrical system component, cable, connector, or device should be modified, removed, disconnected or otherwise changed without specific approval and guidance from the manufacturer.

CAUTION

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

Performing Maintenance Safely


Before Operating This Equipment

DANGER	
	<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 property damage, and/or personal injury or death.</p> <p>This manual must always be available to personnel operating and maintaining this equipment.</p>

Before Getting Close to Any Parts That Could Move



- 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.
- Always lock and tag the stationary-end disconnect switch. The carriage-end disconnect switch only shuts off power to the carriage end.

WARNING	
	<p>CRUSH, CUT, ELECTROCUTION AND HIGH PRESSURE HAZARDS.</p> <p>Always turn the saw off by activating an E-stop when the saw 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. Bleed lines if appropriate.</p>

Making Adjustments to the Machine

CAUTION

Failure to follow the step-by-step procedure may result in incorrect adjustment of this machine and could cause blade collisions and incorrect cuts.

Only trained personnel should make mechanical adjustments to this machine.

Performing Electrical Work

WARNING



ELECTROCUTION HAZARD!

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.

All electrical work must be performed by a qualified electrician.

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

Wearing Personal Protective Equipment

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

General Maintenance

At the end of each workday, the following maintenance is recommended.



To blow off dust, use compressed air.

To lubricate chains and sprockets, rack and pinions, spur gears, slides, and castings, and Acme screws, use a kerosene and oil mixture:

10 parts kerosene: 1 part 30-weight motor oil

For the carriage V-track and the square drive shaft, use straight kerosene to avoid sawdust buildup.

Do NOT use diesel fuel.

Cleaning the Machine

Use a compressed-air hose to clean and blow off all sawdust and wood chips that have accumulated during the day. Rotate angulation plates to their limits and clean the guide tracks with compressed air. Wear safety goggles and a dust mask during this cleaning.

Lubricating the Machine

Use a mixed solution of 10 parts kerosene and 1 part 30 W motor oil for lubrication of all chains and sprockets. For all other moving parts including but not limited to motor plate guide tracks, feed chains guides, hold-down shoe pivot links, rack and pinions, spur gears, ACME screws, tracks, centerline slides, and square drive shaft, use straight kerosene.

Calibration

Review the section *Changing Calibration Settings* if you are unfamiliar with the calibration process.

Checking Daily Calibration

Check calibration of the saw every day to ensure the accuracy of the cuts. The daily procedure includes checking:

- Angles
- Centerlines
- Lumber stop and carriage positions
- Hold-down position and tension

Summary

Using good, straight lumber, perform a test by cutting two boards as shown in Figure 6-1. Check the angles, centerlines, and length of these cuts. If all measurements are within acceptable tolerances, no further calibration is required. If any measurement is outside of tolerance, see Figure 6-4.

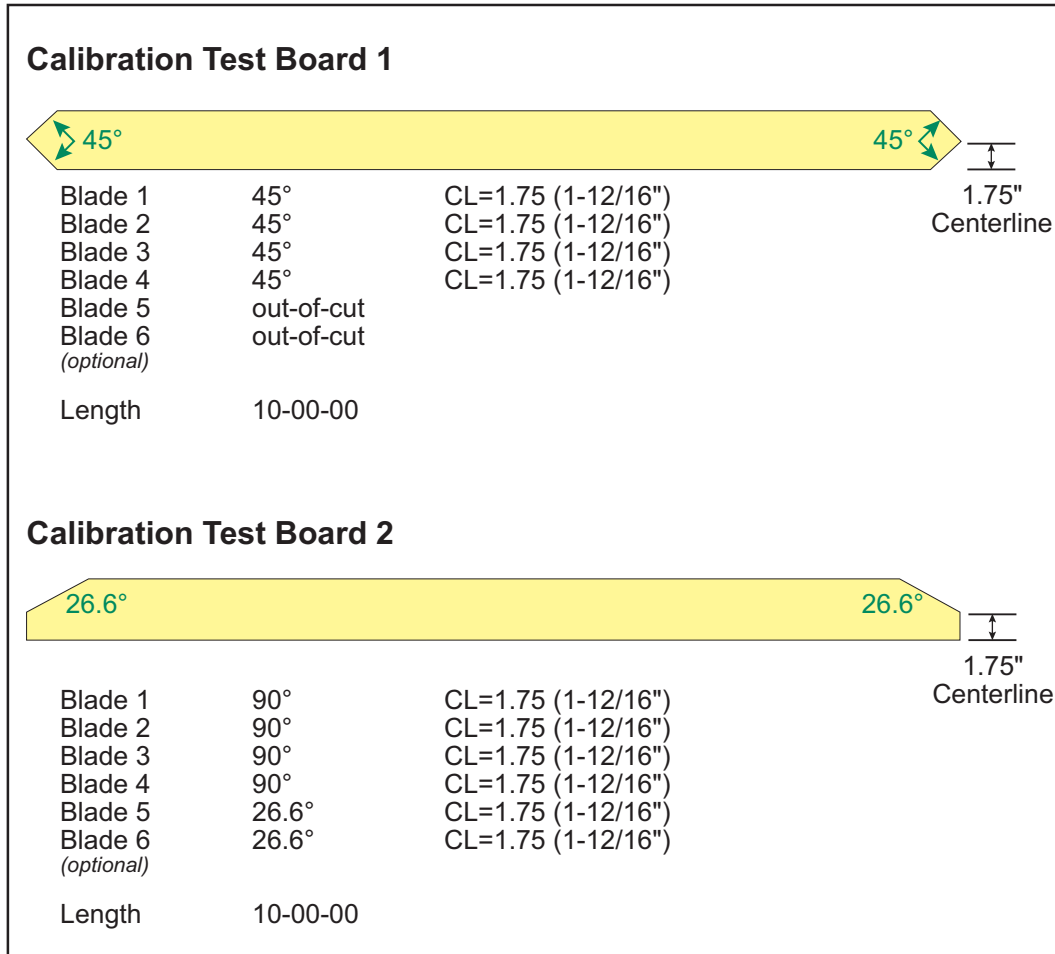


2 straight boards,
2x4x12

framing square

tape measure

Figure 6-1: Daily Calibration Test Boards



Procedure

1. Set up the angles and centerlines for Test Board 1 as shown in Figure 6-1.
2. Watch the hold-downs as the board passes through the saw. They should hold the board firmly and the hold-down springs should compress slightly.
3. Start the blades and infeed conveyors and run a 2x4x12-in. board through the saw.
4. Set up the angles and centerlines for Test Board 2 as shown in Figure 6-1.
5. Watch the second board as it passes through the saw to verify that the hold-downs are tensioned properly.
6. Start the blades and infeed conveyors and run a 2x4x12-in. board through the saw.
7. Check the length of both boards with a tape measure. Allow 1/16-in. tolerance.

8. Check the angles with a framing square. Allow 1/16-in. tolerance.
9. Check the centerlines with a framing square. Measure from the bottom, which is always the side with the notch in it. Allow 1/16-in. tolerance.

Figure 6-2: Checking Angles on Test Boards

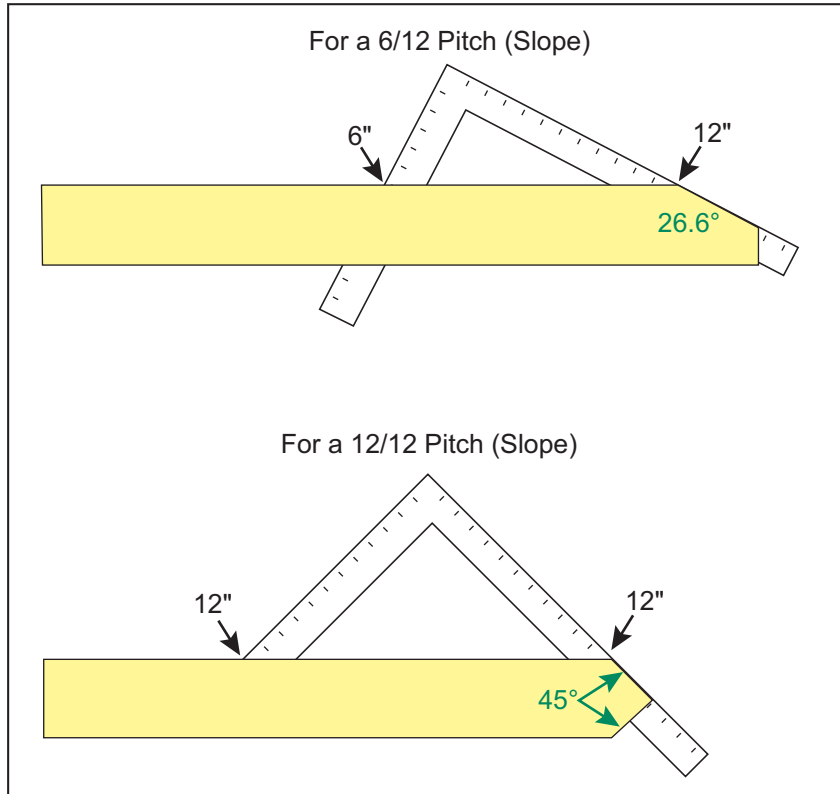
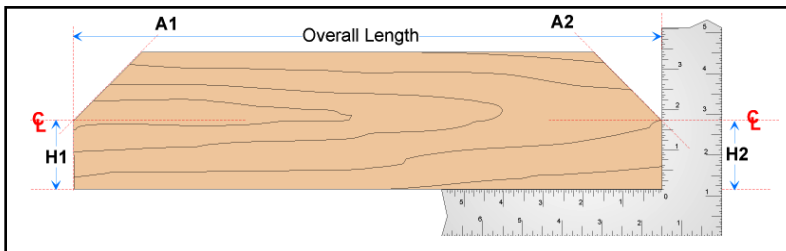


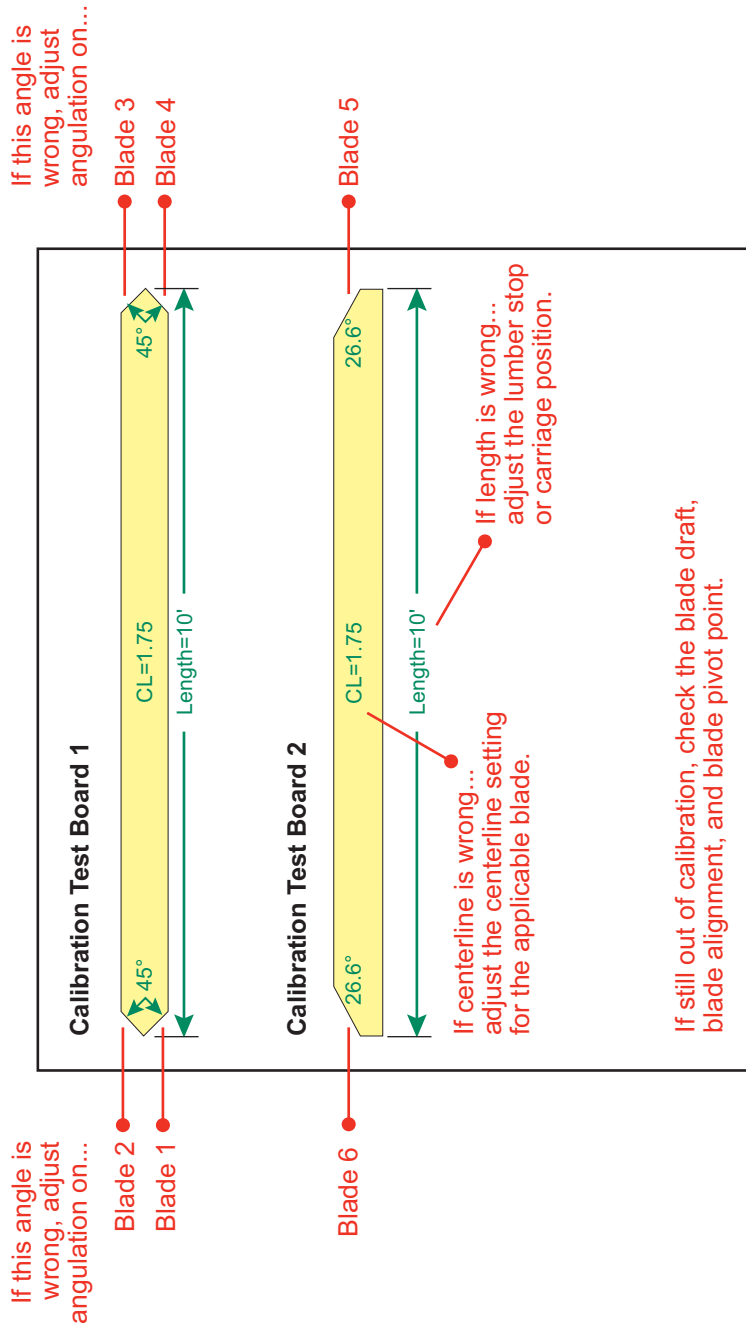
Figure 6-3: Checking Length and Centerline on Test Boards



Always measure the centerline from the bottom of the board.

10. If any of the measurements taken during this check do not match what was expected, refer to the applicable section of this manual for instructions of how to adjust the correct component at fault.

Figure 6-4: Resolving Calibration for a Failed Test



Changing Calibration Settings



If you attempt to adjust a setting before checking these items, the miscalibration may get worse instead of better!

If the numbers displaying on the digital readouts do not match the numbers measured on the cut board, change the calibration settings. Before recalibrating:

- Check the quality of the test lumber. If it is bowed, twisted, or distorted in any way, it will make the test unusable.
- Check that the digital readouts indicate the correct numbers during the calibration test.

Calibrating the Blades

See the sections on *Checking and Adjusting the Blade Draft*, *Checking and Adjusting the Blade Alignment*, and *Checking and Adjusting the Blade Pivot Point* for instructions on adjusting the saw blades to be calibrated with the rest of the saw.

Lubrication



Use a high-quality bearing grease to lubricate the following components.

The *Maintenance Checklists* list cleaning and inspection actions that should be taken at the beginning of each shift, every two (2) hours, weekly, monthly, and quarterly. This section provides more detailed information for the actions on the checklists that require it.

Cleaning and Lubricating


It is the responsibility of saw owners to choose a cleaning and lubrication solution that maintains the saw in good working order, inhibits rust and corrosion, and complies with all governing environmental regulations.



To blow off dust, use compressed air.

To lubricate chains and sprockets, use a kerosene and oil mixture: 10 parts kerosene: 1 part 30-weight motor oil

Do NOT use diesel fuel.

CAUTION	
	<p>AIRBORNE PARTICLES, CHEMICALS, SLIP HAZARD, AND LOUD NOISE HAZARD.</p> <p>Wear ear and eye protection for all cleaning activities.</p> <p>When using cleaning and lubrication solutions, use a properly rated respirator and gloves.</p> <p>Clean up overspray from the floor to prevent a slip hazard.</p> <p>Do NOT spray electrical parts with lubricant or compressed air. Spraying electrical components will damage them.</p>

CAUTION

Do not use compressed air inside the electrical enclosures! It may force contaminants into the electrical connections.

Figure 6-5: Never Use Compressed Air Inside an Electrical Enclosure



Every 2 Hours



1. Set all blades to 30°.
2. Lockout/tagout the equipment.
3. Using a 4-ft long wand (with an L-shaped end for the blower), blow off all sawdust and wood chips that have accumulated during the day on the saw. The *Maintenance Checklists* list specific components that are affected.
4. Lubricate all moving axes by spraying with a kerosene and oil mixture. The *Maintenance Checklists* list specific components that are affected.

Every Month



The daily cleaning that occurs using compressed air and a kerosene and oil mixture prevents extreme buildup, but some components should be cleaned by hand every month. To manually clean metal parts on this equipment, wipe the part with a rag and a light solvent. Any household cleaner containing ammonia works well. The components that should be concentrated on are listed in the *Maintenance Checklists* in the appendices.

Inspecting



Every Day

Every day, visually examine the saw for loose components such as sprockets, gears, and bearings. Look at the condition of the blades, guards, chains, and labels. Be aware of the general condition of the saw and fix or replace anything that is damaged.



Quarterly Inspection

Every three months, a maintenance person should perform a thorough inspection of the saw. Look for loose or missing parts including bolts, nuts, screws, and electrical connections. Look at all gears and sprockets and ensure they are clean and lubricated.

Ensure that safety devices are in place, working properly, and labels are legible. Watch for loose set screws that hold the keys in gearbox sprockets. Replace or repair anything that requires it.

Lubricating the Gear Reducers

There are eleven worm gear reducers on the saw. There is a square-head pipe plug on the side near the top of each gear reducer housing.

Once each month remove these plugs to check the oil level in the gear reducer. When the plug is removed, oil should seep out of the hole indicating the oil level is at the prescribed level. If oil does not seep out of the hole, oil should be added. Using a small funnel inserted into the hole, add oil to bring the level up to the bottom of the hole. See Table 6-1.

Once each year the oil should be drained and replaced. An Allen-head screw located on the side near the bottom is provided for draining.

Lubricating the Saw Blade Motors

Lubricate the saw blade motors by inserting approximately one pump of oil into the grease zert on the shaft end and bearing end of the motor. Motor bearings should be greased at least every three (3) months. Use Shell Dolium R or Chevron SRI intervals: 5 hp and 10 hp (6 months or 2200 hours).

Table 6-1: Worm Gear-Reducer Oil Specifications

Ambient Temperature	-30°F to 15°F	16°F to 50°F	51°F to 110°F	111°F to 165°F
Max. Operating Temp.	150°F	185°F	200°F	200°F
Viscosity @ 100 F,SUS		1919 to 2346	2837 to 3467	4171 to 5098
ISO Viscosity Grade	320	460	680	1000
Compounded with:	3% to 10% fatty or synthetic fatty oils or mild EP additives			
AGMA Lubricant No.		#7 Comp.	#8 Comp.	#8A Comp.
Cities Service Co.	CITCO EP Comp.68	CITCO Cyl. Oil 680-7	CITCO Cyl. Oil 680-7	CITCO Cyl. Oil 680-7
Fiske Bros. Refining	SPO-233	SPO-277	SPO-288	SPO-288
Gulf Oil Corp.	SL-460 EP	Transgear EP 460	Transgear EP 680	Transgear EP 800
Keystone Div.	KSL-365	KSL-366	K-600	K-620
Mobile Oil Corp.	SHC 629	Mobil 600W	Mobil 600W Super	Mobil Extra Hecla
Shell Oil Corp.	Omala 68	Omala 460	Omala 680	Omala 800
Sun Oil Corp.	Sunep 1050	Sunep 1110	Sunep 1150	Sunoco Gear Oil 8 AC
Texaco, Inc.	Meropa 68	Vanguard Cyl. Oil 140		
American Lub., Inc.	SHC 9065	Ind. Gear Oil 140	AGMA #8 Gear Oil	AGMA #8 Gear Oil
Chevron	NL Gear Comp. 100	NL Gear Comp. 460	NL Gear Comp 680	NL Gear Comp 1500

Lubricating the Angulation Plates

Once a month rotate the six angulation plates to their extreme position, and clean the retaining grooves with a bristle brush and kerosene. This prevents a pitch buildup, which if not removed will make it increasingly difficult to angulate. After cleaning is complete, dry the retaining grooves with an absorbent cloth and spray a light coat of kerosene/oil mixture on the grooves.

Lubricating the Feed Conveyor Extension Rack and Pinion Gear

Once a month thoroughly clean the feed conveyor extension rack and pinion gear and lubricate with a light spray coat of kerosene/oil mixture.

Lubricating the Square Drive Tube

Once a month spray the square drive tube with a light coat of kerosene/oil mixture. Pay particular attention to the telescoping tube that drives the hold-downs.

Lubricating the Hold-Down Extension Rack and Pinion

Once a month clean and spray the hold-down extension rack and pinion with a light coat of kerosene/oil mixture.

Lubricating the Lumber Stop Tubes

Each thirty-day interval lubricate the tube as well as the rack and pinion gear with kerosene/oil mixture.

Lubricating the Sprockets and Chains

Each week clean all sprockets and chains thoroughly with compressed air, and lubricate with kerosene/oil mixture. Pay special attention to the feed chains and sprockets.

Lubricating the Carriage V-Wheels

Each month lubricate the axles of the carriage V-wheels with WD 40 light oil. This should be a light application, because too much oil will attract sawdust.

Lubricating the Air Line Lubricator

Each week fill the pneumatic lubricator at the stationary end of the saw with oil.



Disconnect air supply before filling the pneumatic lubricator.

In temperatures above 40°F, use SAE 5 W oil.

In temperatures below 40°F, use a mixture of 50/50 and light machine oil such as WD40.

Lubricating the Air Brake Cylinders

Each week inject five or six drops of light machine oil such as WD40 into the air line of each pancake cylinder at the drain cock of the cylinder. Disconnect all air to the machine and then systematically disconnect the air line at each cylinder; inject the oil into the cylinder, then reconnect the air line. Do this at all five saw blades. This will lubricate the cylinder and keep the brakes in good working order.

Lubricating the Vertical Acme Screws

Once a day clean and spray the vertical Acme screws with a light coat of kerosene/oil mixture.

Lubricating With Grease

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. Lubrication guidelines are given in this chapter for each part or system that requires lubrication.

CAUTION

Never mix synthetic lubricants with mineral lubricants.

Bearings

Grease flange bearings by pumping two shots of grease into each grease fitting approximately once a month.

Motor bearings should be greased at least every three (3) months.

All other bearings should be monitored and greased at regular intervals according to their needs.

Motors and Gearboxes

Manually Releasing a Brake

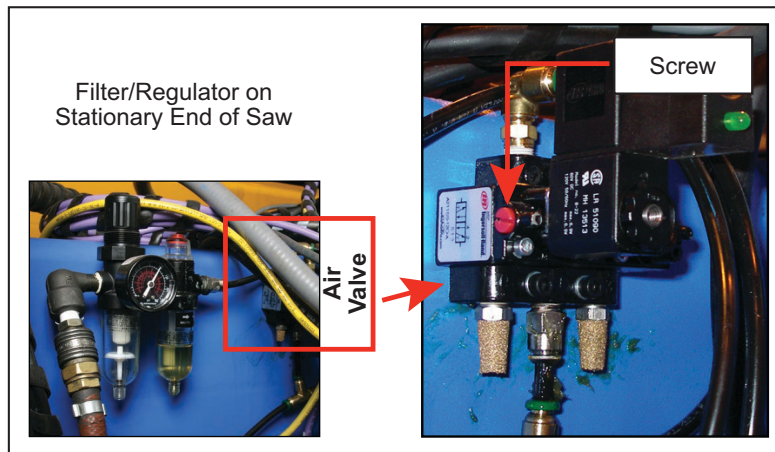
When at rest under normal conditions, the blade brakes are on. If the blade will spin by hand, the brakes are released.

Motors using pneumatic brakes do not have a manual brake lever, but you can manually release them using the correct air valve. Figure 6-6 shows the air valve for all blade brake motors. The air valve for the carriage motor is under the carriage frame near the motor.



small slotted
screwdriver

Figure 6-6: Override for Blade Brakes




To release the pneumatic brakes manually:

1. Using a small slotted screwdriver, turn the screw head shown in Figure 6-6 approximately 1/4 turn to release the brakes.
2. Perform the maintenance work.
3. Return the valve to its original position.

Cleaning Motors



Remove motor guards every week to clean and lubricate the motors, gearbox assemblies, chains, and sprockets that are under the guards.

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 maintenance is complete and before removing the lockout/tagout device.</p>

Lubricating Motors

Greasing Saw Blade Motors



grease gun

Dow Corning 44 medium grease



Older blade motors do not have grease fittings. These instructions apply only if your blade motors have grease fittings on them.

Lubricate saw blade motors every 90 days to prevent motor damage, which can occur from excessive temperatures due to contaminated grease. Motor bearings should be greased at least every three (3) months. Use the grease fitting supplied to administer the grease.

1. Locate both grease fittings on a saw blade motor.
2. Add the recommended amount of Dow Corning 44 medium consistency grease to the motor.



CAUTION	
<p>Failure to use the specified type and amount of grease can cause motor failure. Take care when lubricating the motors.</p>	

3. Grease all of the blade motors at their fittings.
4. Ensure that all personnel are clear and restore power to the saw.
5. Run the motor for 15 to 30 minutes to allow purging of any excess grease.

6. Return motor to normal service.



It is the responsibility of saw owners and operators to choose cleaning and lubrication solutions that comply with all local, state, and federal regulations, especially, environmental regulations. In the event kerosene and oil mixtures are prohibited, select a cleaning and lubrication solution that will remove pitch and protect against rust and corrosion.

Greasing All Other Motors

Most motors on the saw are sealed and do not need to be greased.

Adding and Changing Oil in Gearboxes

When additional oil is needed, use an oil recommended in Table 6-2 or a comparable type.

Table 6-2: Recommended Motor Oils

Ambient Temperature	-30° to 15°F	16° to 50°F	51° to 110°F	111° to 165°F	
Max. Operating Temp.	150°F	185°F	200°F	200°F	
Viscosity @ 100°F, SUS	—	1,919 to 2,346	2,837 to 3,467	4,171 to 5,098	
ISO Viscosity Grade	320	460	680	1000	
Compounded with:	3% to 10% fatty or synthetic fatty oils or mild EP additives				
AGMA Lubricant No.	—	#7 Comp.	#8 Comp.	#8A Comp	
Recommended Types	Mobil Oil Corp.	SHC 629	Mobil 600W	Mobil 600W Super	Mobil Extra Hecla
	Shell Oil Corp.	Omala 68	Omala 460	Omala 680	Omala 800
	Sun Oil Corp.	Sunep 1050	Sunep 1110	Sunep 1150	Sunoco Gear Oil 8 AC
	Texaco, Inc.	Meropa 68	Vanguard Cyl. Oil 460	Honor Cyl. Oil 680	650T Cyl. Oil 1000
	Chevron	NL Gear Comp. 100	NL Gear Comp. 460	NL Gear Comp. 680	NL Gear Comp. 1500

Adding Oil

Some motors are sealed, but others are not and require the oil to be replenished occasionally. Check the oil level in these gearboxes every month and add oil when necessary.

Replacing Oil

Once a year, follow these steps to completely drain and refill the oil in the unsealed gearboxes:



1. Remove the gearbox from the motor and the bracket holding it to the saw frame.
2. Remove the drain plug and drain the oil into an approved container.
3. Replace the drain plug and open the fill plug on top of the gearbox.
4. Fill until the oil seeps out of the vent plug on the side of the gearbox.
5. Replace square head vent plug on the side of the gear reducer housing.

6. Replace the vent plug.

ENVIRONMENTAL
Please recycle used oil.

Replacing Motors

Read Before Replacing a Saw Blade Motor


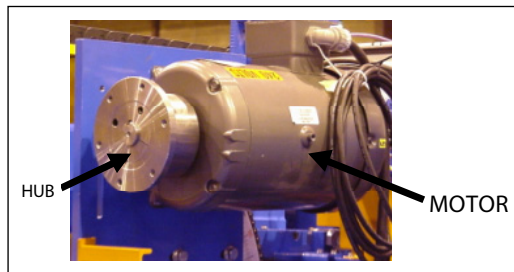
DANGER	
	<p>CUT AND PERSONAL INJURY HAZARD.</p> <p>The motor assembly, which consists of the motor and hub, is not serviceable by customers. Only MiTek personnel shall make adjustments to the hub on the motor shaft. If service is required, remove the entire motor and call MiTek Customer Service to arrange for service.</p> <p>Failure to follow this restriction may result in blades coming loose from the motor shaft, which can result in severe injury, including death.</p>

Figure 6-7: Blade Motor and Hub




Removing Motors



If you are replacing a Baldor motor with an Emerson (US) motor, additional steps will need to be taken. Request Service Bulletin 155 for these instructions.



The following steps list the basic procedure for replacing any motor on the *SmartSet* saw:

WARNING	
	<p>CUT HAZARD.</p> <p>Lockout/tagout before removing any motor.</p> <p>Before removing a blade motor, remove the blade. Never separate the saw blade hub and motor. Only MiTek personnel are trained to re-assemble the hub with a motor.</p> <p>Before removing an angulation motor, lock the quad in place.</p>

- Disconnect appropriate components and lines per Table 6-3:

Table 6-3: Disconnecting Each Motor



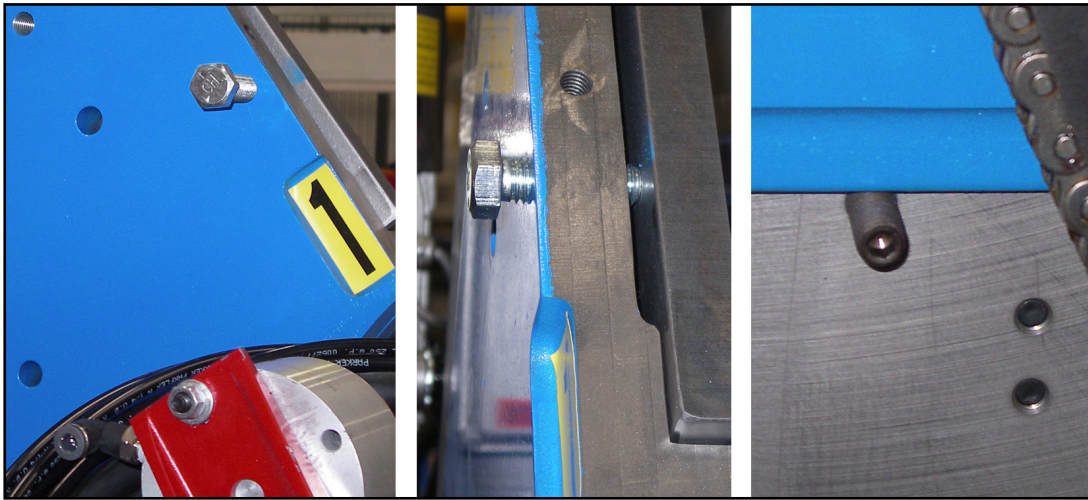

If...	See Warning	Then...
Blade motor		Remove blade. Disconnect air supply. Remove hub and motor assembly and send to MiTek to assemble new motor with hub. Align the brakes after new motor is in place.
Carriage motor		Disconnect coupler. You will need to remove the plug to view if the coupler is properly seated in the gear reducer when re-assembling.
Angulation motor		Lock quad in place with a 1/2"-13 hex head cap screw. The screw should be tight against the slide without dislodging or damaging the slide. Disconnect two output shafts from the gear reducer.
Hold-down motor		There may be a coupler to disconnect.
Centerline motor		Disconnect coupler.

Figure 6-8: Lock the Quad in Place



8. Disconnect wiring from the motor.

CAUTION	
	<p>PERSONAL INJURY HAZARD.</p> <p>The motor is heavy. Use appropriate personnel and proper lifting techniques.</p>

9. Remove the bolts attaching the motor to the motor plate and remove the motor.

Installing a New Motor



Hold-down and lumber stop motors have high- and low-voltage wiring options. Ensure it's wired for low voltage.

1. Place the motor on the mounting plate and re-install the mounting bolts.
2. Reconnect the wiring.
3. Reconnect all components that were removed per Table 6-3.
4. Start the motor and check the motor rotation (verify that the component is moving in the correct direction).
 - Saw blades should rotate toward the operator.
 - All other components should move in the direction of the arrow that you are pressing on the touch screen (in Manual Mode).
5. If the motor rotation is incorrect:
 - a) Reverse any two power leads going to the motor.
 - b) Recheck the direction.
6. If replacing a blade motor, continue to the *Additional Steps for Installing a Blade Motor* section. For all other motors, remove the lockout/tagout devices, and restore the air supply.
7. Make test cuts to verify current calibration of the component affected. Refer to the instructions to correct any calibration problems that may occur.



Additional Steps for Installing a Blade Motor

1. Check the brake stopping time.
2. Install the saw blade as directed in the *Saw Blades* section.
3. Make test cuts to verify current calibration of the saw head. Refer to the instructions to correct any calibration problems that may occur.

Changing the Rotation of a Motor



All motors are 3-phase motors. If a motor is rotating in the wrong direction, swap two (2) of the 3-phase wires powering the motor and retest.

Chains

Lubricating Chains

Lubricate the chains with a kerosene and oil mixture (10 parts kerosene: 1 part 30-weight motor oil). Spray the mixture lightly onto the chain. Avoid saturation.

- Lubricate angle chains every 2 hours.
- Lubricate all other chains a minimum of once a week.

Checking and Adjusting Chain Tension

Tension Requirements

The various chains on the equipment have different tension requirements.

- Hold-down chain: Center of chain should just barely touch bottom of channel. There should be no visible sag, but just tight enough to barely touch.
- Infeed chain: Chain should have about 3-4 in. of slack when lifted at the middle of the conveyor.
- Drive chain (connects motor to square drive shaft): Chain should be snug, but slightly move when pushed between the drive shafts.
- Angulation chain: When blade is in its horizontal position, chain should have approximately 1/4 in. of side-to-side movement but can not be pulled away from sprockets.
- Encoders: Centerline encoder chain should be straight and snug. Angulation encoder should have slight movement at the center of the chain.

Checking Tension

Check all the chain tensions approximately once per month. Slack in a chain can cause the saw to fall out of calibration. A chain that is too tight can cause premature motor failure.

1. Adjust the component so you can reach the chain at about the midpoint of its span.
2. Turn off all power to the saw following approved lockout/tagout procedures.
3. Grab the chain in the middle of the open span and determine if the tension is correct per the guidelines in *Tension Requirements* on page 66.



Adjusting the Tension for Chains With a Take-Up Bracket

If the chain has too much or too little slack, adjust using these steps. Refer to Figure 6-9 to see the angulation chain.

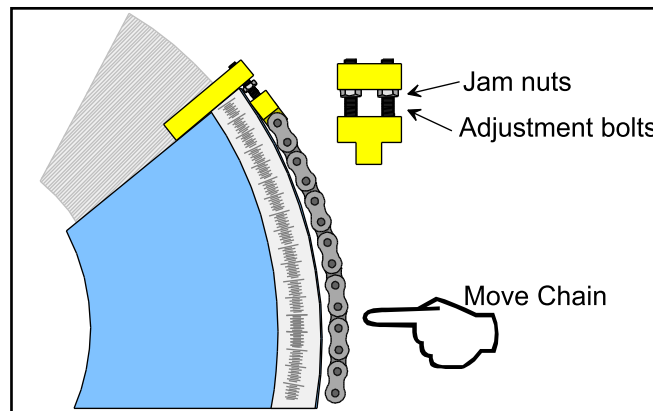
CAUTION

Do not remove links to adjust the chain tension!



1. Loosen the jam nut(s).
2. Tighten the adjustment bolt(s) evenly until the chain meets the guidelines in *Tension Requirements* on page 66.
3. Tighten the jam nut(s).

Figure 6-9: Adjusting the Tension on the Angulation Chain



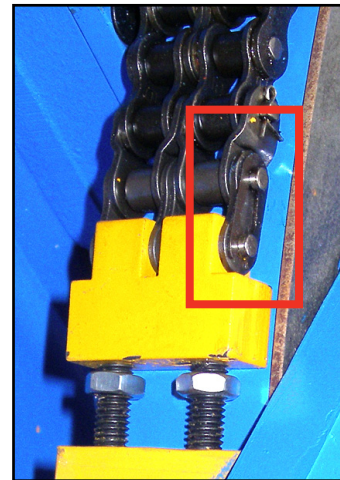
Replacing a Chain

When replacing a chain, pay careful attention to how the chain is threaded before removing it.

1. Lock the quad in place with a 1/2-13 hex head cap screw. The screw should be tight enough to hold the quad in place without damaging or dislodging the slide. See Figure 6-8 on page 64.
2. Position the chain so the master link is clear of the sprockets so it can easily be reached. A typical master link is shown in Figure 6-10.
3. Lockout/tagout the machine.
4. Loosen the tension on the chain.
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.
7. Connect the chain to itself by placing the master link between two links and pressing together with pliers.
8. Adjust the tension. Refer to *Tension Requirements* for the tension of each chain.
9. Replace any guards that were removed.



Figure 6-10: Master Link on a Chain



Roll Pins

Roll pins attach spur gears to all rack and pinion drive shafts. To replace a roll pin:

1. Unscrew the bolts on the bearings.
2. Slide the bearing along the shaft.
3. The gear can then be seen and rotated by hand to see if it is securely fixed to the shaft.
4. Inspect the teeth of the gear for signs of damage.



Air Brakes for Saw Blades

Inspecting Air Brakes

1. As you run and stop each blade, watch to determine if all blades are stopping correctly.

The blade should stop in under 6 seconds. If not, adjust the brakes using the *Aligning Air Brakes* procedure.



2. Lockout/tagout the machine.
3. Inspect the saw blade brake lining:
 - a) Turn each blade by hand and visually check:
 - That the brake lining is not rubbing the blade hub.
 - The brake calipers and adjust if necessary (using the *Aligning Air Brakes* procedure)
 - That there is no drag causing the motor to work harder than it should.
 - b) Check the brake lining for excessive wear.
 - c) Check that the brake lining is not pulling away from the metal it is bonded to.
4. Remove the inlet line to each brake air cylinder and add two drops of oil.

Aligning Air Brakes

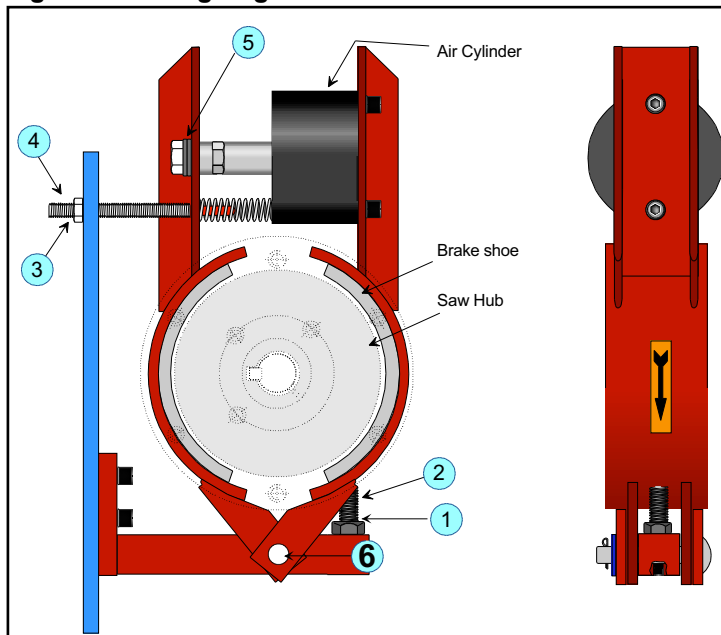
Adjust the brakes to get the brake shoes as close to the hub as possible without letting them rub. The adjustment screws hold the shoes close to the hub. As the brakes wear, it may become necessary to adjust the brakes or remove the gap caused by the wearing of the shoe.

All brakes are adjusted in the same basic manner, even though configuration differs from front to rear saws. The procedure below is for blade 1, but the procedure applies to all saw heads. Each half of the caliper brake assembly has its own adjustment. If no adjustment is evident when using the adjustment screws, check that the brake lining is not worn down. When the brakes are adjusted correctly, the brake should stop in under 6 seconds.



1. Disconnect the air supply at the rear of the machine.
2. Remove the saw blade. It is helpful for the brakes to be locked on when doing so.
3. Manually override the brakes (see *Manually Releasing a Brake* on page 58) or disconnect the air lines to release the saw blade brakes.

Figure 6-11: Aligning Air Brakes

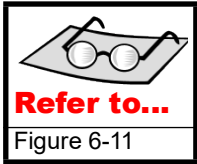


4. Loosen the jam nuts (labeled 1 and 3).
5. Turn in the adjustment bolts (labeled 2 and 4) until the pads touch the hub, then back off the bolt a full turn.
6. Visually verify that the clearance is just enough for hub to spin freely.
7. Tighten the jam nuts (labeled 1 and 3).
8. Make sure the spherical washers (labeled 5) are snug. If loose, the washers will vibrate and create excessive noise.
9. Spin the saw hub by hand to make sure it still rotates freely. If the hub binds on the shoes, back out the adjusting screw until the hub rotates freely.
10. Remove the brake override or reconnect the air lines.
11. Reconnect power to the saw and start the motor without the blade.
12. Test the stopping time before reattaching the saw blades.
13. Lockout/tagout power before reattaching the blades.
14. Reattach the saw blades.



Replacing Brake Pads

The brake lining, or brake pads, should be replaced when the blade stopping time exceeds 6 seconds and adjusting the brakes doesn't solve the problem. Even if the blade stopping time is within 6 seconds, replace the brake lining if the pad or hub has grooves worn in it.



1. Remove the air lines from the pneumatic assembly on the stationary end.
2. Remove the screw in the air cylinder shaft (labeled 5) in Figure 6-11.
 - a) Hold the shaft with a wrench to prevent it from turning.
 - b) Turn the screw (labeled 6) and remove it from the shaft.
3. Loosen the jam nuts and adjustment screws (labeled 1, 2, 3, 4)
4. Loosen the set screw under the pin (labeled 6).
5. Remove the cotter pin and remove the pin (labeled 6).
6. Remove the right shoe first. The air cylinder will come with it.
7. Remove the left shoe next, being careful not to lose the spring.
8. Install the new left shoe and then the new right shoe by reversing the disassembly steps.
9. Align the brakes by completing the relevant steps in the *Aligning Air Brakes* section on page 69.
10. Reconnect air and power to the saw.
11. Test the stopping time before reattaching the saw blades. Adjust the stopping time by loosening or tightening the bolt in the cylinder shaft.
12. Lockout/tagout power before reattaching the blades.
13. Reattach the saw blades.



Saw Blades

Inspecting Saw Blades




1. Inspect the brakes using the procedure in the *Air Brakes for Saw Blades* section on page 69.
2. Saw blades must be kept sharp and smooth. Check for the following items on a daily basis, and replace, repair, or re-tip the blades if any of the following characteristics are found.
 - Chipped or missing teeth
 - Dull edges
 - Pitch build-up
 - Bending or warping of the blade

Replacing Saw Blades

When to Replace Blades


Sharp, high-quality blades are essential for proper saw operation.

CAUTION	
	<p>Keep saw blades sharp and in good condition. Have the saw blade re-tipped if carbide tips become chipped or come off.</p> <p>Dull blades cause high kickback forces, which can cause injury.</p> <p>Motor life and quality of cut also diminish due to dull blades.</p>

The frequency of blade changes and of repairs depend on the amount of use and the species and grade of lumber that is cut. Certain blades will wear faster than others because of their location to the incoming lumber. Table 6-4 gives minimum recommendations for when to replace the blade on each quad, but you may find your plant needs to change the blades more often for optimum saw operation.

Table 6-4: Recommended Minimum Schedule for Replacing Blades

	40-Hour Work Week	80-Hour Work Week
Every 2 weeks	—	Blades 1-4
Every month	Blades 1-4	Blades 5-6
Every 2 months	Blades 5-6	—

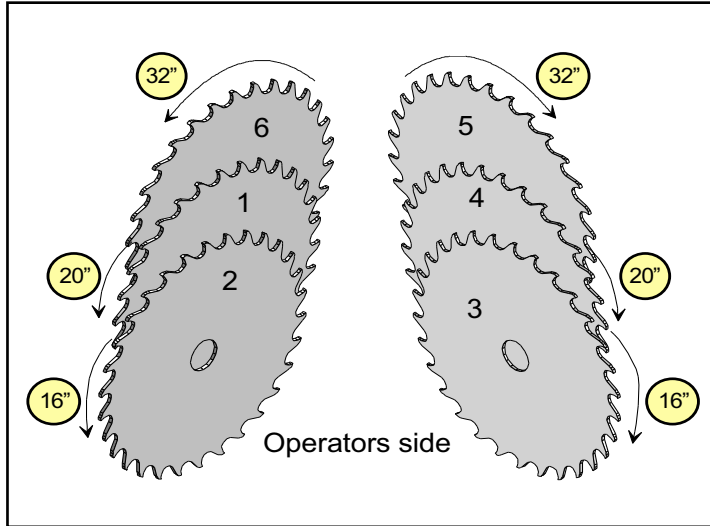


Individual plant circumstances including wood, quality of blades, and actual working hours may require modification of this schedule.

Correct Direction of Blade Teeth

Correct tooth direction is achieved when the tooth at the top of the blade looking from the operator’s side of the machine is facing the operator. The location and recommended size of each saw blade is shown in Figure 6-12. Notice the direction of the teeth in relation to the operator’s side.

Figure 6-12: Blade Orientation and Typical Size



How to Replace a Saw Blade


CAUTION	
	<p>CUT HAZARD. Saw blades are sharp. Wear gloves when handling blades.</p>



Some blades are covered with a wax coating over the teeth to make them easier to handle and to protect the teeth from breakage during shipping. Remove this coating before starting the blade

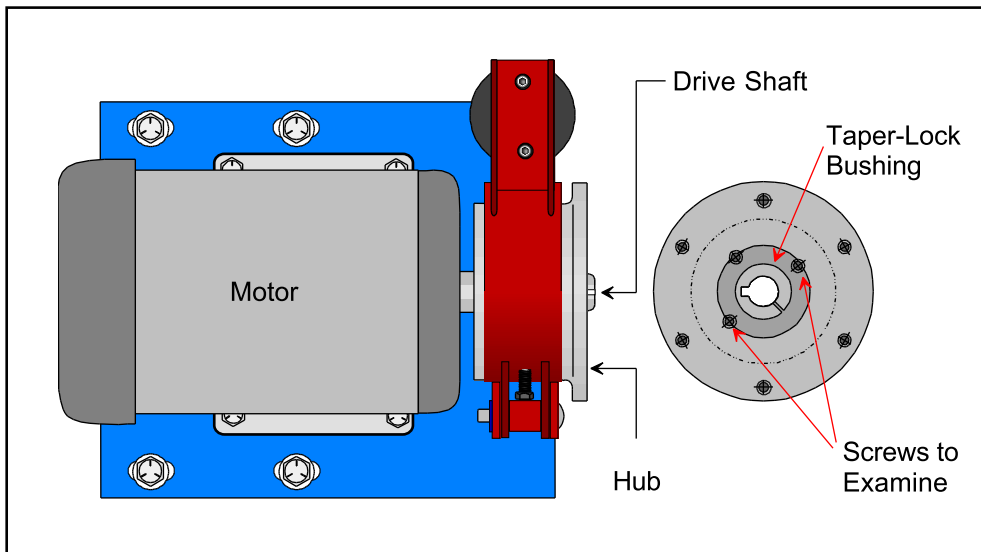
1. Turn off all power to the saw following approved lockout/tagout procedures, but leave the air on so the brakes will hold the hub in place.
2. Using an Allen wrench, remove the screws that attach the blade to the hub.
3. Remove the blade and install a new blade, ensuring the teeth are facing the correct direction, as illustrated in Figure 6-12.
4. Replace the screws.
5. Using a torque wrench fitted with an Allen bit, tighten the screws to a torque between 18 to 20 ft-lb.

Saw Blade Taper-Lock Bushing Screws

WARNING	
	<p>Do not attempt to perform any maintenance that requires the removal or repositioning of the hub from the motor shaft, e.g., replacement of a damaged or worn hub, motor shaft, or motor. This activity must be performed at MiTek's factory to eliminate any risk of the hub and blade coming off the motor shaft during operation due to improper installation. Even with proper installation, the tightness of the screws must be checked regularly. See the <i>Saw Blade Taper-Lock Bushing Screws</i> section.</p>

The drive shaft on each blade motor holds a saw hub. They are attached to each other with a taper-lock bushing in the center of the saw hub. The saw blades are then attached to the saw hub face. See Figure 6-13 for clarification.

Figure 6-13: Taper-Lock Bushing Screws



Checking the Tightness

In order to ensure a safe operating environment, MiTek recommends that you check the tightness of all taper-lock bushings on a monthly basis and whenever a saw blade is changed. Use the recommended torque settings in Table 6-5.

Table 6-5: Recommended Bushing Tightness

Quad on Saw	Bushing ID	in-lbs		ft-lbs	
		Min.	Max.	Min.	Max.
1-4	1215	175	193	14.6	16
5-6	2517	430	473	35.8	39.4

Tightening the Hub to the Motor



1. Set a torque wrench to the appropriate minimum and maximum settings as shown in the table above.

Figure 6-14: Tighten Hub Screws



2. To hold the hub in position, fasten two (2) cap screws to the saw hub. They should be the same size as, but not the same ones used on, the saw blade.
3. Position a large screwdriver between the two (2) cap screws, as shown in Figure 6-14.
4. Hold the hub in place with the screwdriver while tightening the taper lock bushing with the torque wrench set to the appropriate settings.

Adjusting the Angulation

It is important to keep the angulation chain tightened properly. Slack in the chain can cause the angulation of the saw to fall out of calibration. A chain that is too tight can cause premature angulation motor failure. Tension guidelines and adjustment procedures are given in the *Checking and Adjusting Chain Tension* section starting on page 66.

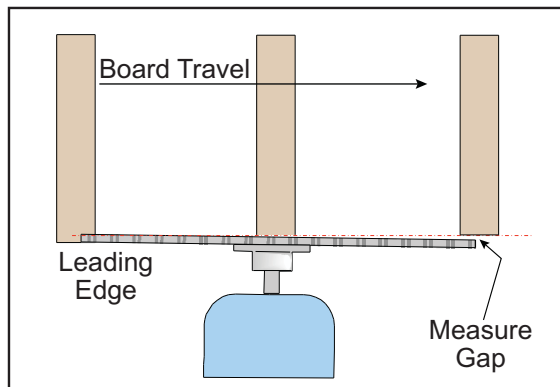
Blade Adjustments

Checking and Adjusting the Blade Draft

Blade draft refers to the correct angle of a saw blade so that the leading edge of the blade contacts the lumber and the trailing edge does not. An accurate blade draft prevents splintering of the lumber. Figure 6-15 illustrates proper blade draft.

The angle should be very slight and is set by MiTek during manufacturing. Small adjustments may be necessary after certain maintenance is performed.

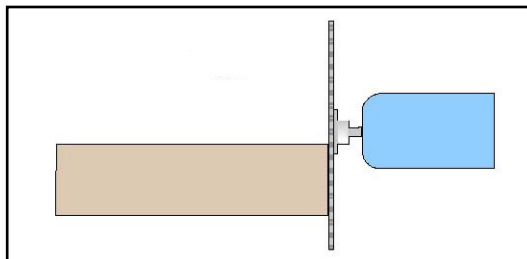
Figure 6-15: Overhead View of Blade Draft



Checking the Blade Draft at 90°

1. Enter 90° for all blade angles.

Figure 6-16: Checking Blade Draft With Blades at 90°



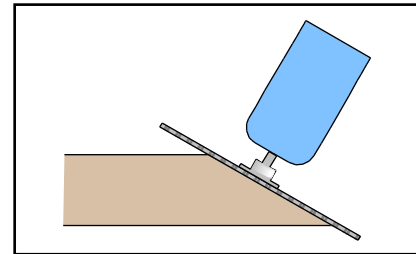
2. Enter 1-3/4 for all the blade centerlines.
3. Enter the board length.
4. Turn on the CYCLE START switch to start the blades.
5. Using the infeed conveyor FORWARD button, cut the board.

6. Press STOP to stop the blades.
7. Using the infeed conveyor FORWARD button, move the board to the trailing side of the blade.
8. Measure the distance between the board and the blade. It must measure between 1/32 and 3/32 in.
9. Repeat the check for each blade.
10. Continue to the *Checking the Blade Draft at 30°* section.

Checking the Blade Draft at 30°

1. Set all the blades to 30°.
2. Turn on the CYCLE START switch to start the blades.
3. Using the infeed conveyor FORWARD button, cut the board.
4. Switch the SAW/SETUP switch to stop the blades.
5. Using the infeed conveyor FORWARD button, move the board to the trailing side of the blade.
6. Measure the distance between the board and the blade. It must measure between 1/32 and 3/32 in.
7. Repeat the check for each blade.
8. If the blade draft needs to be adjusted refer to *Checking and Adjusting the Blade Draft* for the procedure.

Figure 6-17: Checking Blade Draft With Blades at 30°



Adjusting the Blade Draft

After checking the blade draft, if an adjustment is required, follow these steps and refer to Figure 6-18.

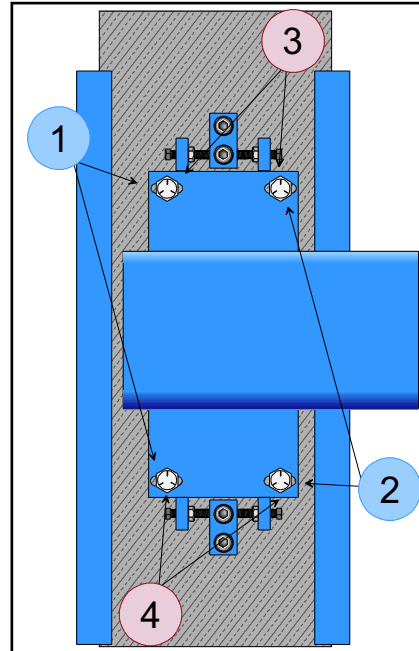


1. To increase draft in the 90° position add shims to the back (labeled 2).
2. To decrease draft in the 90° position add shims to the front (labeled 1).
3. To increase draft at the 30° position for blades 2,3,5, and 6, add shims to the top (labeled 3).
4. To increase draft at the 30° position for blades 1 and 4, add shims to the bottom (labeled 4).



If using more than 3/16 in. of shim material, use longer mounting bolts.

Figure 6-18: Locations of Shims



Checking and Adjusting the Blade Alignment



Do not adjust the blade alignment until you have checked that the blades are not bent and the draft is set properly.

Blade alignment is how well the blades line up with each other. When blades are aligned properly and in home position, the next blade in line should touch the board but not cut more than 1/64 in. off the board.

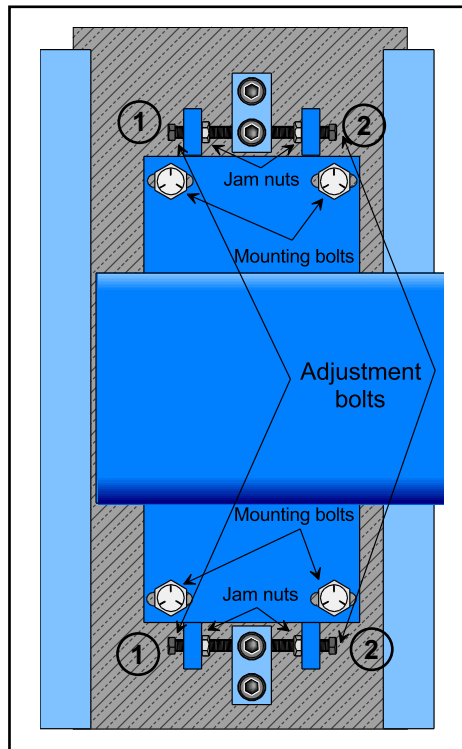
Checking Blade Alignment

1. Check that the blades are not warped.
2. Check the blade draft. See *Checking and Adjusting the Blade Draft*.
3. Enter 90° for all blade angles.
4. Enter 175 for all the blade centerlines when using a 2x4.
5. Set the board length.
6. Turn on the CYCLE START switch to start the blades.
7. Using the infeed conveyor FORWARD button, cut the board with blade 3.
8. Continue to move the board toward blade 4, and begin to cut it, but do not go all the way through the board.
9. Switch the SAW/SETUP switch to stop the blades.
10. Using the infeed conveyor REVERSE button, back the board out of the saw. A properly aligned blade will cut off less than 1/64 in. of the board when it enters the saw. It should not cut off any additional material when the board is backed out.
11. Repeat to check blade 5.
12. Repeat for the stationary end of the saw, using blades 1, 2, and 6.
13. If any blade is out of alignment, make the necessary adjustments as described in this section.

Adjusting the Blade Alignment for Blades 1-4

Follow this procedure and refer to Figure 6-19 to adjust the alignment of blades 1 through 4.

Figure 6-19: Blade Alignment for Blades 1-4



1. Loosen all jam nuts and mounting bolts.

CAUTION

Be careful not to lose any shim material behind the mounting bolts. This material is used for blade draft.

2. To have the blade touch the board more, tighten the bolts labeled 1 in Figure 6-19. Use a level to ensure the bolts are evenly adjusted on top and bottom.
3. To have the blade touch the board less, tighten the bolts labeled 2 in Figure 6-19. Use a level to ensure the bolts are evenly adjusted on top and bottom.
4. Tighten all the jam nuts.
5. Tighten the mounting bolts using 75 ft-lb of torque.
6. Recheck the alignment.

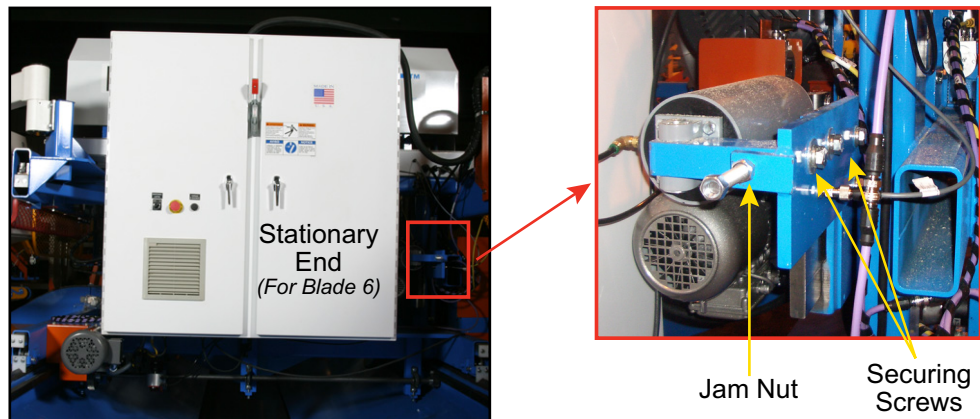


One turn on the adjuster equals 1/16 in. movement in the plate.

Adjusting the Blade Alignment for Blades 5 and 6

Follow this procedure and refer to Figure 6-20 to adjust the alignment of blade 5 and blade 6.

Figure 6-20: Adjusting Blade Alignment for Blade 6

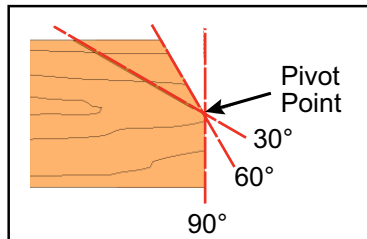


1. Loosen the securing screws and jam nuts.
2. Adjust the adjustment screw located at the jam nuts to move the blade either in or out.
3. Tighten the jam nuts and the securing screws.
4. Recheck the alignment.

Checking and Adjusting the Blade Pivot Point

The pivot point is the point on the lumber where the blade pivots.

Figure 6-21: Blade Pivot Point



Checking Blade Pivot Point

Summary

Make a 90° cut, a 60° cut, and a 30° cut. On the first two cuts, cut all the way through the board. On the third cut, cut only halfway through the board. Make sure the board stays in place under the hold-downs and on the lumber guide as you back it away from the blades.

Procedure

1. Set 30° for all blade angles.
2. Set 175 for all the blade centerlines.
3. Set the board length.
4. Move the blades not being used out of the cut.
5. Turn on the CYCLE START switch to start the blades.
6. Use the infeed conveyor FORWARD button to cut the board.
7. Switch the SAW/SETUP switch to stop the blades.
8. Use the REVERSE jog button to back the board out far enough to clear the blade, but do not move it past the end of the hold-downs or lumber guide.
9. Set the angle to 60°, and repeat steps 6-10.
10. Set the angle to 90° and take the following steps:
 - a) Using the infeed conveyor FORWARD button, move the board so that the blade cuts halfway through the board.
 - b) Switch the SAW/SETUP switch to stop the blades.
 - c) Using the REVERSE button, move the board out of the machine.

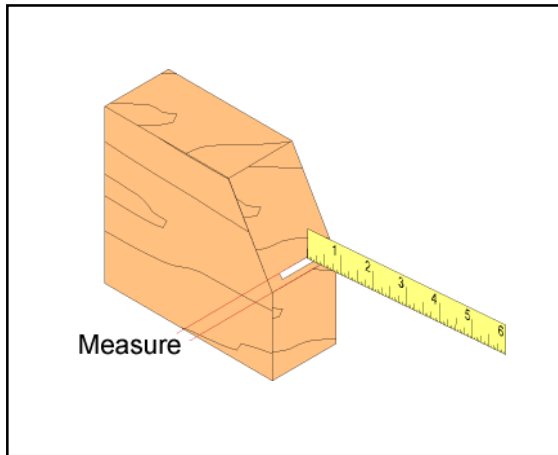
11. All three cuts should intersect at one place. If not, refer to *Checking and Adjusting the Blade Pivot Point* for the procedure.

Adjusting the Blade Pivot Point

Procedure

1. Measure the distance from the inside of the 60° cut to the edge of the board, as shown in Figure 6-22.

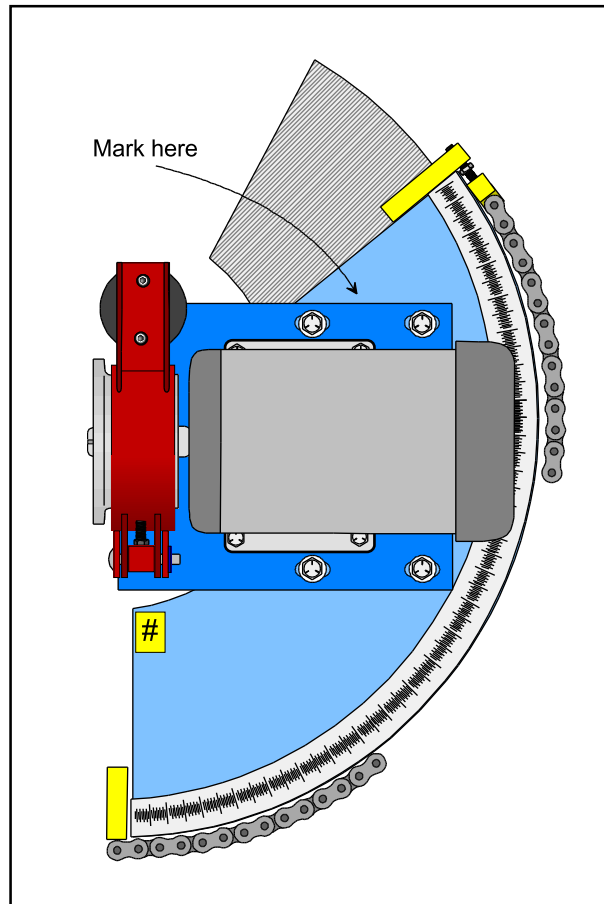
Figure 6-22: Measuring the Pivot Point Discrepancy



2. Multiply this measurement by two (2).
3. Lockout/tagout.

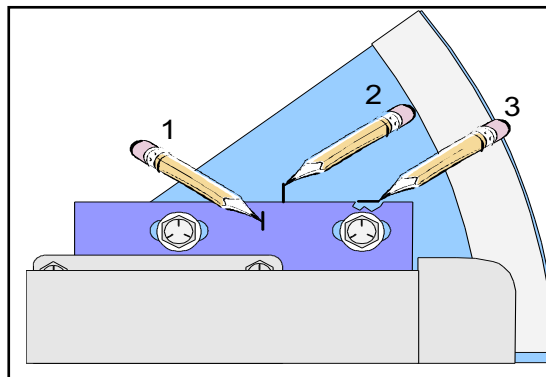


Figure 6-23: Mounting Plate on the Slide



4. Mark the mounting plate for height.
5. Mark the mounting plate for depth (mark 1 on Figure 6-24).

Figure 6-24: Marking the Mounting Plate



6. Make a second line for the amount needed to move the head (mark 1 on Figure 6-24).
7. Mark along the top of the motor mount as a reference point for alignment (mark 1 on Figure 6-24).
8. Loosen the mounting bolts.
9. Move the plate back to the measured distance from Mark 1 to Mark 2.
10. Ensure the reference line (Mark 3):
 - a) Is perpendicular to the plate
 - b) Is at the same height as the motor mount plate
11. Tighten the mounting bolts and torque to 75 ft-lb.
12. Recheck the pivot point.

Infeed Conveyors

Adjusting the Infeed Conveyor Chain Tension

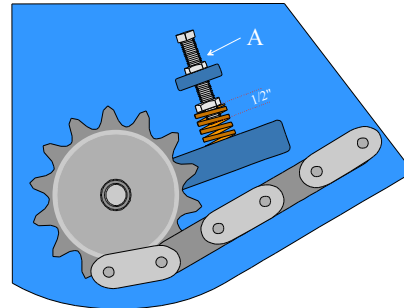
The infeed conveyor chain should have enough slack so that you can gently pull up on the chain and see approximately 1 chain link distance of slack. Tension guidelines are given on page 66.



Adjust as follows:

1. Adjust the bolt (labeled A in Figure 6-25) so it is halfway through the spring.
 - a) Loosen the top jam nut.
 - b) Loosen the bottom jam nut until the bolt is halfway through the spring.
2. Tighten the top jam nut.
3. Tighten the bottom jam nut to add tension to the chain.

Figure 6-25: Infeed Conveyor Chain Tension Assembly



Keeping the Infeed Conveyors Aligned With the Blades

Checking the Infeed Conveyor Alignment

1. Place the saw in the Semiautomatic Mode by pressing the SEMI-AUTO button on the touch screen's Main Menu.
2. Enter 90° for all blade angles.
3. Place a board on the conveyor so that it will not touch the blades as it passes them.
4. Use the infeed conveyor FORWARD jog button to move the board until it is under the hold-down and on the lumber guide.
5. Mark the board on both sides of the flight on both sides of the machine.
6. Move the board to the exit side and stop it before it leaves the lumber guide.
7. Measure the distance between the mark and the flights.
8. If the measurement is more than 1/16 in., adjust to parallel.

Adjusting the Infeed Conveyor Alignment

Always start with the stationary-end infeed conveyor and align the carriage-end infeed conveyors immediately afterward.

1. Move the stationary-end infeed conveyor a comfortable distance away from the saw blades.
2. Lockout/tagout.
3. Choose two points within the cutting chamber of the saw and measure from the frame (under the saw blades) to the conveyor edge to determine how far out of alignment it is from front to back.
4. Loosen the bearing bolts on the front (infeed) side only, and push or pull to make it even with the saw frame.
5. Repeat this procedure for the carriage-end infeed conveyor.

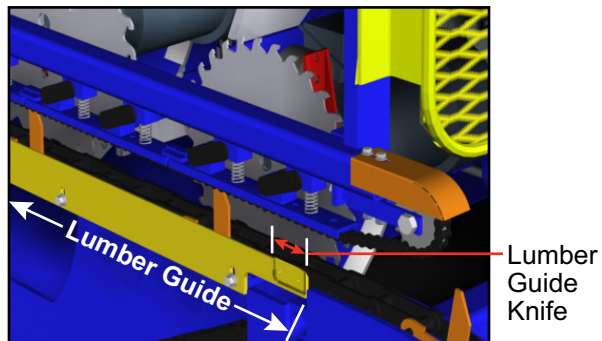


Maintaining the Lumber Guide

Inspecting the Lumber Guide and Knife

Inspect the lumber guide weekly. Figure 6-26 shows the location of the lumber guide and lumber guide knife. Check for missing teeth at the beginning of the knife, and ensure that the top of the knife is not notched or chipped. Replace the knife if it shows signs of damage.

Figure 6-26: Location of Lumber Guide and Knife



If the knife has a notch, the lumber may “jump” out of position before moving to the next blade.

Check that the blade edge on the lumber guide knife is the correct height. See Figure 6-27.

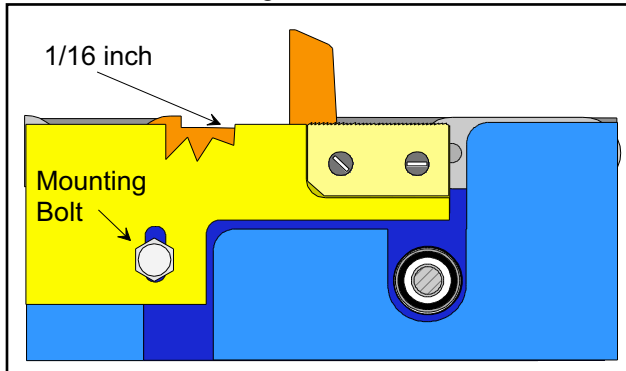
Replacing the Lumber Guide Knife

To replace the lumber guide knife, remove the two (2) bolts holding it to the lumber guide and replace the knife.

Adjusting the Lumber Guide Height

The blade edge should be set at 1/16 in. above the surface of the flight (dog) that supports the board.

Figure 6-27: Adjusting the Lumber Guide and Knife



1. Loosen the five (5) mounting bolts.
2. Use a rule to measure the height of the tracking blade.
3. Tighten the bolt and check the other end and do the same and tighten the bolt.
4. Tighten the three (3) middle bolts.

Replacing the Infeed Conveyor Sprocket

The feed chain sprockets should be replaced every three (3) years or sooner, depending on use.

Disassembly



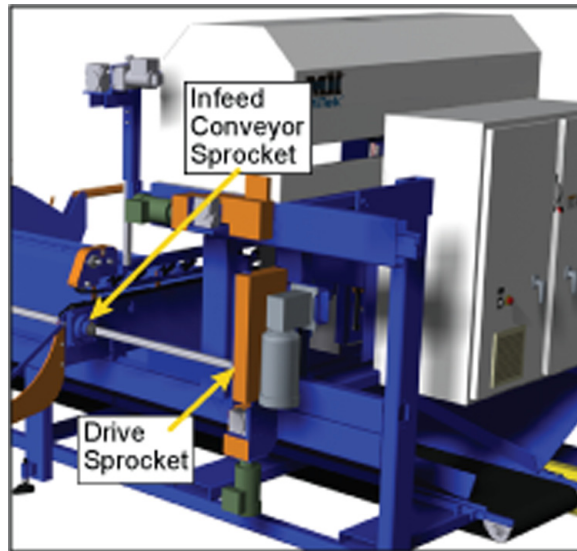
1. Relieve the chain tension at the take-up sprocket.
2. Remove the feed chain.
3. Remove the square tube drive.
4. Remove the bolts holding the drive sprockets.

Assembly



1. Install new sprockets after coating axle bolts with Lubriplate lubricant.
2. Install the infeed chain.
3. Tension the infeed chain with the take-up sprocket.
4. Adjust the chain tension.

Figure 6-28: Stationary End, Outfeed Side



Adjusting the Drive Sprocket Tension

The tension should be set where the drive chain can deflect about one (1) chain link when pushed between the drive sprocket and the idler sprocket.

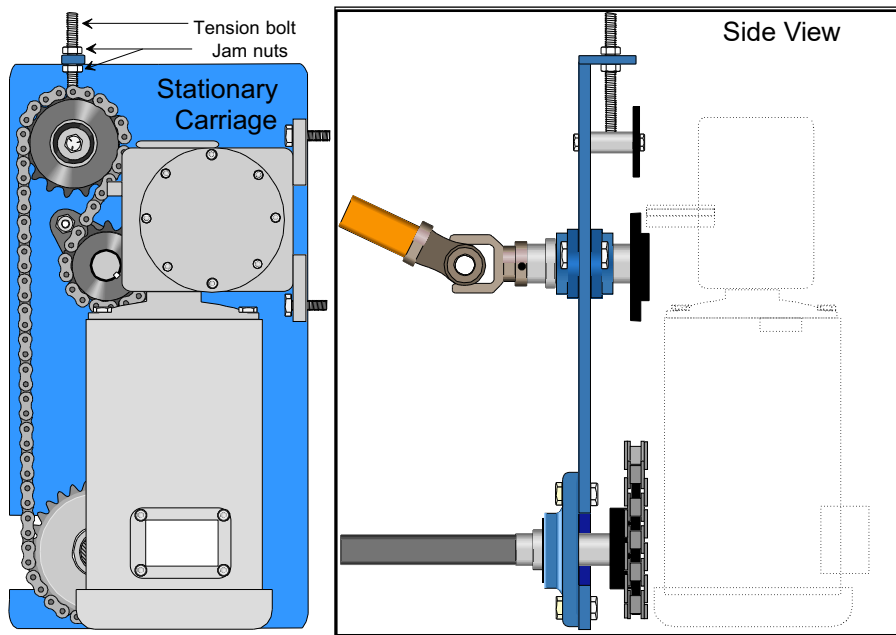


1. Loosen the idler bolt.
2. Loosen the two jam nuts on the adjuster.
3. Use the top jam nut to draw up the idler sprocket until the tension is correct.
4. Tighten the bottom jam nut.
5. Tighten the idler bolt.

Replacing the Drive Sprocket

The drive sprockets are normally replaced at three (3) year intervals. Use the following guide when replacing these sprockets.

Figure 6-29: Drive Sprocket Assembly, Front and Side View



Disassembly



1. Remove the chain from the drive clusters.
2. Loosen the setscrews from the universal joints of the hold-down drive shaft, next to the sprocket drive cluster.

3. Slide the universal joint off the shaft, being careful not to lose the key.
4. Remove the long square drive shaft.
5. Remove the main drive sprocket in the following manner:
 - a) Loosen the setscrews on the square shaft drive sprockets.
 - b) Slide the sprocket and tube out of the square bore bearings.
6. Remove the hold-down drive sprockets by removing the shaft collar tapping shaft through bearings, being careful not to lose the key from the keyway.
7. Remove the idler (top) sprocket by loosening the nut on the axle bolt and withdrawing the bolt from the cluster assembly.
8. Remove the main gearbox drive sprocket by loosening the set screws and pulling the sprocket from the motor shaft, being careful not to lose the key from the keyway.
9. Repeat this procedure for the other drive sprocket.

Assembly



1. Install the new sprocket on the main gearbox shaft, with the hub of the sprocket toward the motor. Be sure the key is in the keyway and tap the sprocket on the motor shaft until it is flush with the end of the shaft. Tighten the set screws.
2. Install the twin drive sprocket assembly at the motor drive end, through the first square bore bearing. Then, slip the shaft collar over the square tube before going through the second bearing. Slip the second square shaft collar on after going through the second bearing.
3. Install the single drive sprocket assembly at the stationary end, using the same basic procedure.
4. Install the hold-down drive sprocket next, using washer spacers to align it with the square tube sprocket below.
5. Install the idler sprocket with the axle bolt, but do not tighten.
6. Install the square tube drive shaft.
7. Align all sprockets with a straight edge and tighten all the set screws.
8. Slide universal joints onto the hold-down drive shaft with the key in the keyway and tighten the set screws.
9. Install the drive chain.

10. Tension the motor to the main drive shaft sprocket chain, using the slotted holes at the machine end of the motor mounting bracket.
11. Tension the hold-down drive chain pushing the idler (top) sprocket up in the slotted hole and tighten the axle nut.
12. Repeat this procedure for the other drive sprocket.

Inspecting and Replacing Infeed Roll Pins

If the infeed conveyors will not move horizontally or are not calibrating properly, a roll pin that attaches the spur gears to the drive shaft could be sheared. To inspect and replace the roll pin, do the following:

1. Cut the welds on the tabs at the end of the racks.
2. Disconnect the chain that turns the shaft, located on the outfeed side of the saw.
3. With the spur gear disengaged from the racks, pull both racks out of the frame until they completely lose contact with both spur gears.
4. On the infeed end of the shaft, remove the pin from the locking nut and unscrew the locking nut.
5. Loosen the set screws on the infeed-side bearing.
6. On the outfeed end, unscrew the bolts holding the bearings to the frame.
7. Pull bearing and shaft assembly from the outfeed side to reach both spur gears.
8. Try to rotate each spur gear by hand.
 - If a spur gear rotates on the shaft, the roll pin is broken, and you should continue this procedure.
 - If neither spur gear rotates on the shaft, the roll pin is still in place, and you should reverse the steps to re-assemble the saw.
9. If a roll pin is broken, drive the old roll pin out of the spur gear, being careful not to let the spur gear fall.
10. Drive a new roll pin in place.
11. Examine the spur gear to ensure the teeth are in good condition. If the spur gear needs to be replaced, now is the ideal time.
12. Reverse these steps to re-assemble the parts.
13. Weld the tabs back on the end of the racks.

Hold-Downs



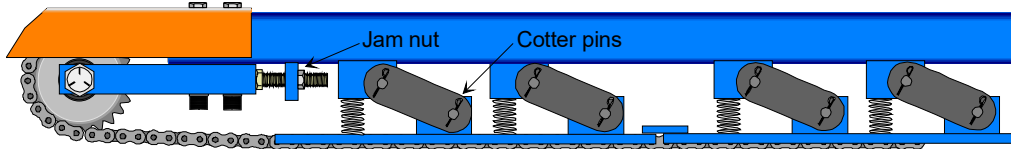
The hold-down chains must be the proper length of 207-1/4 in. Chains that are too long could result in improper tension on the shoes and loose springs.

Adjusting the Hold-Down Chain Tension

Refer to the *Tension Requirements* section on page 66 for the correct tension guidelines. If the tension is incorrect, see Figure 6-30 and perform these steps to adjust the tension:

1. Loosen the jam nut on the tension bolt.
2. Adjust the tension bolt on the hold-down until the chain tension loosens or tightens the desired amount.
3. Tighten the jam nut.

Figure 6-30: Hold-Down Shoes on Hold-Down Assembly



Keeping the Hold-Downs Aligned With the Infeed

Checking the Hold-Down Alignment

1. Place the saw in the Semiautomatic Mode by pressing the SEMI-AUTO button on the touch screen's Main Menu.
2. Enter 90° for all blade angles.
3. Place a board on the conveyor so that it will not touch the blades as it passes them.
4. Use the infeed conveyor FORWARD jog button to move the board until it is under the hold-down and on the lumber guide.
5. Press an E-stop.
6. Mark the board on both sides of the flight on both sides of the machine.
7. Move the board to the exit side and stop it before it leaves the lumber guide.
8. Measure the distance between the mark and the flights.
9. If the measurement is more than 1/16 in., continue with this procedure.

Adjusting the Hold-Down Alignment

1. Move the stationary-end infeed conveyor and hold-down a comfortable distance away from the saw blades.
2. Lockout/tagout.
3. Loosen the bearing bolts on the front (infeed) side only and push or pull to make it perfectly aligned above the infeed conveyor.
4. Repeat this procedure for the carriage-end hold-down.



Replacing Hold-Down Shoes

Disassembly

1. Place the saw in the Manual Mode by pressing the MANUAL button on the touch screen's Main Menu.
2. Use the infeed conveyor FORWARD jog button to move the chain connection link near the front sprocket.
3. Turn off all power to the saw using approved lockout/tagout procedures.
4. Relieve chain tension by loosening the jam nut shown in Figure 6-30.
5. Remove the cotter pins in the chain links in the shoe that needs replacement and remove the link.



Assembly

1. Install the new shoe using the original links and cotter pins.
2. Tension the chain with front sprocket adjustment until the chain has the correct amount of tension as described in the *Tension Requirements* section on page 001047 Rev. B-66.
3. Remove the lockout device.



Replacing Hold-Down Sprockets

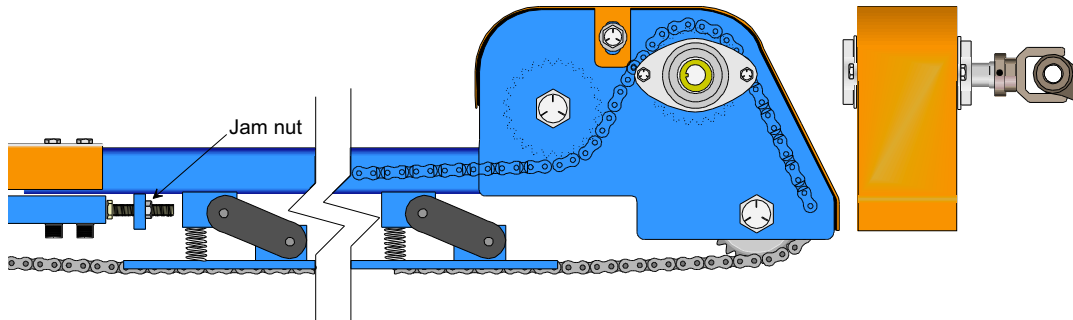
The hold-down sprockets should be replaced every three (3) years or sooner, depending on use.

Disassembly

1. Place the saw in the Manual Mode by pressing the MANUAL button on the touch screen's Main Menu.
2. Use the infeed conveyor FORWARD jog button to move the chain connection link near the front sprocket.
3. Turn off all power to the saw.
4. Relieve chain tension by loosening the jam nut on the tension bolt and loosening the tensioning bolt on the hold-down until the chain droops in the center.
5. Disengage the chain connecting link and allow the chain to hang at each end.
6. Remove the rear sprocket as follows:
 - a) Disengage the universal joint by loosening the set screw at the hold-down sprocket shaft
 - b) Pull the universal joint off the sprocket shaft, taking care not to lose the key in the keyway.
 - c) Loosen the three (3) set screws that hold the shaft to the two shaft collars and sprocket.
 - d) Using a 1/2-in. diameter steel rod approximately 6 in. long and a hammer, tap the sprocket shaft out through the bearing and sprocket until the sprocket falls free. Do not lose the key.
7. Remove the front sprocket as follows:
 - a) Loosen the hex nut and take the cap screw out of the take-up fork.
 - b) Remove the nut, lock, cap screw, and sprocket.



Figure 6-31: Hold-Down Sprocket and Hold-Down Assembly



Assembly



1. Replace the front sprocket as follows:
 - a) Place the new sprocket in place and line it up with the bolt hole.
 - b) Place the cap screw back in place and attach with the lock washer and nut.
 - c) Tighten the cap screw.

2. Replace the rear sprocket as follows:
 - a) Insert the shaft from the drive side through the first bearing.
 - b) Thread a shaft collar, the new sprocket with the square key stock in the keyway, and the second shaft collar over the shaft before going through the second bearing.
 - c) The end of the shaft should be flush with the second (inboard) bearing, leaving approximately 3 in. of the shaft protruding on the drive side.
 - d) Position the shaft collars adjacent to the bearing and tighten the set screws. Do not tighten the set screws on the sprocket aligned with the wear strips.
 - e) Bring the universal joint up to the protruding shaft and position the key in the keyway.
 - f) Slip the universal joint over the shaft making sure the key stays in its position between the two keyways.
 - g) Tighten the universal joint set screws.

3. Install the chain as follows:
 - a) Bring the chain around both sprockets and connect it with the connecting link.

- b) Position the rear sprocket for chain alignment with the rear strips and tighten the set screws.
- c) Adjust the chain tension with front adjusting bolts to where the chain is on a horizontal plane with the slack indicated on page 66.
- d) Tighten the jam nut on the tension bolt.
- e) Remove lockout devices.

Replacing a Roll Pin in the Hold-Down Spur Gears

If a roll pin breaks in a hold-down spur gear, contact Machinery Division Customer Service.

Carriage

Preventive Maintenance for the Carriage

Lubricate the axes of the carriage V-wheels with a light coat of WD-40. (Excessive oil attracts sawdust.)

Replacing a Roll Pin in the Hold-Down Spur Gears

The carriage drive spur gear on the outfeed side has a roll pin that could shear if put in a bind. If the pin breaks, drive the remainder of the broken pin out of the hole and replace it with a new pin.

The carriage drive spur gear on the infeed side is keyed, so there is no roll pin.

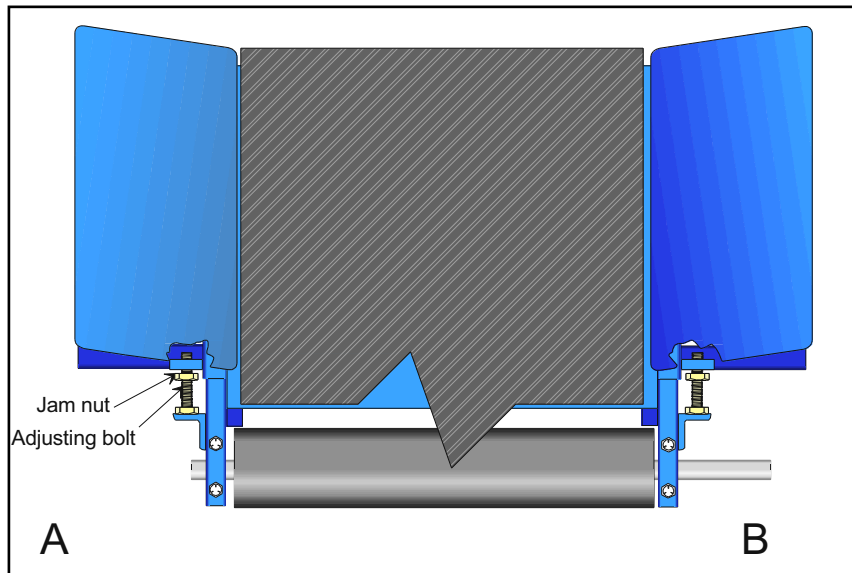
Waste Conveyor and Incline Conveyor

Adjusting the Belt Tracking/Tension

Correct belt tracking (alignment) and tension is achieved when the belt sag between the idler rollers is approximately 1-1/2 in. and the belt tracks in the center of the pan. If the belt is moving toward one side and climbing the side guides, adjust the roller on that side only.

Refer to Figure 6-32 while following the adjustment procedure.

Figure 6-32: Adjusting the Conveyor Belt Tension



1. Activate an E-stop.
2. Using two 15/16-in. open end wrenches, loosen the locknut from the rear of the tension adjusting screw on the side to be adjusted.
3. Tighten the adjusting bolt. Turn the bolt only one (1) turn of the wrench at a time.



When the adjustment is made at the drive end, loosen the bolts that hold the gear reducer to its mounting plate to allow it to move with the roller as the adjustment takes place. Retighten these gear reducer bolts before conveyor start-up. In addition, the drive chain must be checked for proper tension before final tightening of adjusting bolts.

Be careful not to loosen the bolts too much and lose tension in the belt.

4. Start the conveyor by turning on the conveyor switch. Run the conveyor for approximately 5 minutes, and observe tracking. It may take more than a single adjustment to align the belt correctly.

5. Activate an E-stop.
6. Repeat this procedure at each end of the conveyor, making sure the conveyor is off during each adjustment.
7. Check the belt tracking (alignment) every 2 hours until the conveyor remains aligned.

Replacing a Conveyor Belt

The waste conveyor and optional incline conveyor belting usually needs replacing every 3 years, depending on use and maintenance. Use the following steps as a guide for replacing either the main belt or the incline belt.

1. Use the WASTE CONVEYOR switch to run the conveyor until the lacing connection is near the head roller at the drive end.
2. Turn off all power to the saw, following approved lockout/tagout procedures.
3. Relieve the tension on the belt using the tensioning bolts (next to the roller).
4. Using a pair of pliers, remove the wire that is threaded through the lacing and save the wire for reassembly.
5. Remove the old belt.
6. Clean the sawdust and chips from the entire length of the metal conveyor bed.



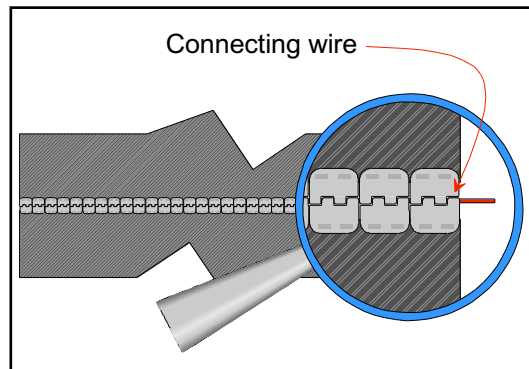
Assembly

1. Install a new belt with the lacing connection near the head roller.



To pull the new belt through the machine more easily, thread the new belt to the old one and pull it through the machine. This will help thread the belt into the rollers on the bottom.

2. Bring the belt together so the lacing intermeshes, and slide the rod or wire through the lacing as shown in Figure 6-33.


Figure 6-33: Connecting Wire on Belt Lacing

3. Bend the ends of the rod or wire to prevent it from coming out.
4. Adjust the belt tension evenly at the head roller adjusting bolts. See the *Adjusting the Belt Tracking/Tension* section for correct tensioning guidelines.
5. Run the conveyor for at least five (5) minutes and check the belt tracking. If the belt does not track correctly, follow the *Adjusting the Belt Tracking/Tension* section.

Pneumatic System Maintenance

Figure 6-34 shows the pneumatic assembly.

The pneumatic system located on the saw frame controls the saw blade brakes, carriage brakes, and moves blades 5 and 6 out-of-cut.

WARNING	
	<p>COMPRESSED AIR HAZARD.</p> <p>To avoid injury, bleed all pressure from the lines before removing the reservoir.</p> <p>Ensure that the reservoir is securely attached to the lubricator body before returning pressure to the lines.</p>

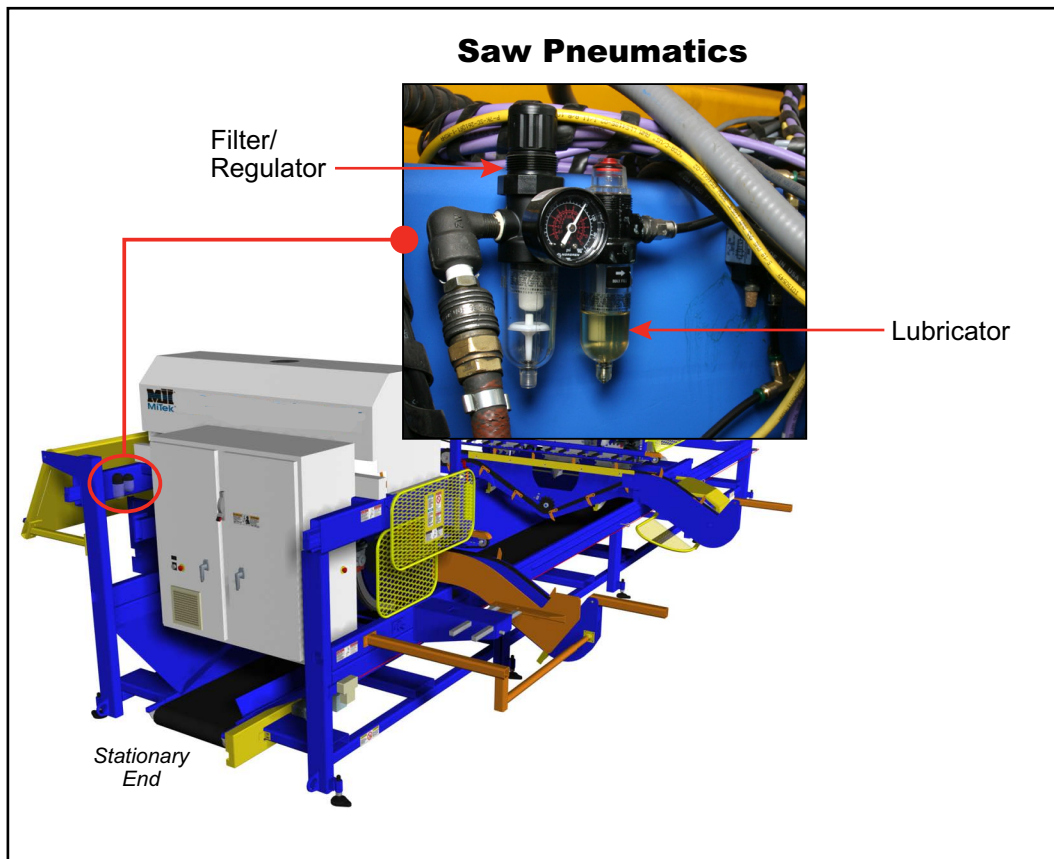
At the beginning of the day, check the saw pneumatics:

- Filter/regulator should read approximately 100 psi
- Lubricator oil level should be 1/4 to 3/4 full
- Ensure the filter is draining the water out of its bowl

At the beginning of the day, check the PC enclosure pneumatics:

- Filter/regulator should read approximately 100 psi
- Ensure the filter is draining the water out of its bowl

Figure 6-34: Pneumatic System Components



Maintaining the Lubricator on the Saw


The saw's pneumatic system uses a lubricator to keep gaskets and seals in good condition.

Checking the Oil Reservoir

Check the oil level daily by viewing the sight gauge located on the reservoir daily. Refill or top off the oil when the reservoir is less than 3/4 full.

Filling the Oil Reservoir

Use a misting type pneumatic oil that is suitable for compressed air tools. To refill the oil reservoir:

WARNING	
	<p>COMPRESSED AIR HAZARD.</p> <p>To avoid injury, bleed all pressure from the lines before removing the reservoir.</p> <p>Ensure that the reservoir is securely attached to the lubricator body before returning pressure to the lines.</p>

1. Depressurize the system.
2. Remove the reservoir from the lubricator body by twisting approximately 1/4 turn clockwise while pushing up on the reservoir. Then pull down and remove the reservoir from the body.
3. Pour the oil into the reservoir to the fill line.
4. Place the reservoir back onto the lubricator body by pushing up and turning counterclockwise. Make sure it is securely attached.


Adjusting the Density of the Lubricant Fog

The pneumatic system lubricator injects a fog of oil into a flowing stream of compressed air to provide internal lubrication. The density of the fog can be controlled. Turn the socket-head fitting counterclockwise to increase the fog density or clockwise to decrease it.



Excessive oil seepage from valves and cylinder seals may be an indication of too much oil being injected. Minor oil seepage from valve exhaust ports is expected.

Additional Maintenance

WARNING	
	<p>COMPRESSED AIR HAZARD.</p> <p>To avoid injury, bleed all pressure from the lines before removing the reservoir.</p> <p>Ensure that the reservoir is securely attached to the lubricator body before returning pressure to the lines.</p>

Proper preventive maintenance for the lubricator also includes replacing the O-rings, seals, and gaskets at regular intervals. We recommend that these items be replaced every 2 years. Contact the lubricator manufacturer to purchase the seal kit components.

To perform maintenance on the lubricator, remove the lubricator from the frame by removing the two (2) screws on the front side.

Maintaining the Regulators

This section applies to the regulators on the saw and the PC enclosure.

Replacing the Filter Element

The regulator uses a 40-micron filter element that must be replaced every six (6) months. This filter can be purchased from MiTek.

1. When replacing the filter element, the system cannot be pressurized. To depressurize the system:
 - a) Close the shut-off valve on the regulator.
 - b) Bleed the pressure from all the lines in that setup by opening any setup pilot valve.
 - c) Ensure the gauge reads “0” before unscrewing the filter guard.
2. Remove the bowl from the regulator body by twisting approximately 1/4 turn clockwise while pushing up on the filter guard. Then pull down and remove the filter guard from the body.
3. Unscrew the filter element and remove it from the regulator. Be sure to keep the spring that is resting in the filter element.
4. Place the spring in the new filter element.
5. Screw the new filter element in its place.



The saw's regulator is combined with the filter assembly.

6. Place the bowl back onto the regulator body by pushing up and turning counterclockwise. Make sure it is securely attached before returning pressure to the lines.

Adjusting the Pressure

The operating pressure of the saw's pneumatic system should be 100 psi or slightly below. To adjust the system pressure to 100 psi:

1. Unlock the pressure adjustment knob on the regulator by pulling it straight up.
2. Turn the knob clockwise to increase pressure or counterclockwise to decrease pressure.
3. Once a pressure of 100 psi is achieved, push the knob down to lock it in place.




The saw regulator gauge must register 80-100 psi at all times! If the pressure drops below 80 psi, the pneumatic system will not function properly.

Manual Drain

At the bottom of the regulator is a thumbscrew that operates a drain. Condensation can form in pneumatic lines due to temperature changes. When condensation gathers, it will show up in the bowl's sight glass. Where the sight glass comes in contact with water, it turns red, indicating the water level. Open this drain periodically to drain fluid from the system. If condensation becomes a serious problem, an air dryer is available.

If the handle on the drain breaks, you can replace it by ordering the valve only. If the entire drain must be replaced, order the valve plus the valve body and O-ring. All three parts can be purchased by contacting the manufacturer directly.

Additional Maintenance

WARNING	
	COMPRESSED AIR HAZARD. To avoid injury, bleed all pressure from the lines before disassembling the regulator.

If a regulator is not operating at its optimum capacity, we recommend cleaning the regulator and replacing the O-rings, gaskets, diaphragm, and valve assembly.

Mufflers on the filter/regulator should be replaced periodically, when air pressure becomes inefficient. Keep muffler vents clean and free of dust to extend their lives.

Limit Switches

Finding the Limit Switch

The limit switch counts the number of boards going into the saw.

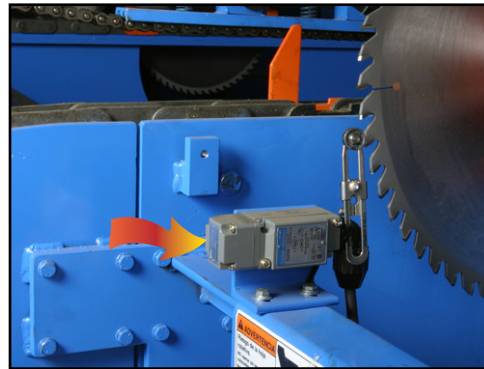
An infeed count switch is located on the saw frame near the stationary-end infeed conveyor on the infeed side, as shown in Figure 6-35.

Adjusting the Limit Switch

To adjust the location of the limit switch:

1. Loosen the screws in the mounting bracket and move the bracket and limit switch assembly along the slotted holes.
2. Retighten the screws.

Figure 6-35: Infeed Count Limit Switch



Proximity (Prox) Switches

How a Prox Switch Works

Proximity (prox) switches communicate certain information to the PLC regarding the location of components. They use an electromagnetic field to detect when an object is near.

The prox switches on this equipment monitor a shaft or cam with holes drilled at specific points. The prox switch “sees” the metal on the shaft, and when the component moves, the shaft moves. When the hole in the shaft passes by the prox switch, it stops “seeing” metal, which indicates the location of that component.

Finding a Prox Switch

Each prox switch is described in Table 6-6.

Table 6-6: Prox Switch Locations

Prox Switch	Component It Affect	Description
Count	Blade 1 Angle	Tracks the angle of blade 1
		Verifies the angle calibration of blade 1
Count	Blade 2 Angle	Tracks the angle of blade 2
		Verifies the angle calibration of blade 2
Count	Blade 3 Angle	Tracks the angle of blade 3
		Verifies the angle calibration of blade 3
Count	Blade 4 Angle	Tracks the angle of blade 4
		Verifies the angle calibration of blade 4
Count	Blade 5 Angle	Tracks the angle of blade 5
		Verifies the angle calibration of blade 5
Count	Blade 6 Angle	Tracks the angle of blade 6
		Verifies the angle calibration of blade 6
Count	Blade 1 Centerline	Tracks the centerline of blade 1
		Verifies the centerline calibration of blade 1
Count	Blade 2 Centerline	Tracks the centerline of blade 2
		Verifies the centerline calibration of blade 2
Count	Blade 3 Centerline	Tracks the centerline of blade 3
		Verifies the centerline calibration of blade 3
Count	Blade 4 Centerline	Tracks the centerline of blade 4
		Verifies the centerline calibration of blade 4
Count	Blade 5 Centerline	Tracks the centerline of blade 5
		Verifies the centerline calibration of blade 5

Table 6-6: Prox Switch Locations (Continued)

Prox Switch	Component It Affect	Description
Count	Blade 6 Centerline	Tracks the centerline of blade 6
		Verifies the centerline calibration of blade 6
Out-Of-Cut	Blade 5	Tracks when blade 5 is positioned out-of-cut
Out-Of-Cut	Blade 6	Tracks when blade 6 is positioned out-of-cut

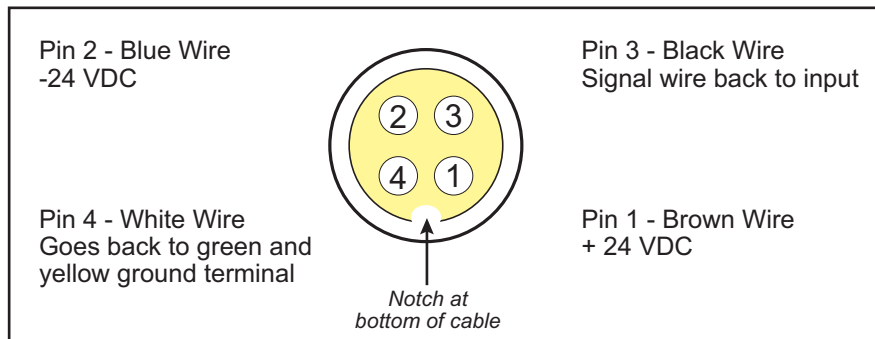
Adjusting a Prox Switch

Each prox switch should be .025 to .040 in. from its target. To adjust this distance, screw the prox switch in or out while using a feeler gauge to establish the desired distance from the target.

Testing a Prox Switch Cable


If a prox switch is not communicating with the PLC, it may be caused by faulty cabling. Using a voltmeter and referring to Figure 6-36, follow these steps:

Figure 6-36: Prox Switch Cable at the Switch



1. Disconnect the cable from the prox switch.

2. Turn the voltmeter to DC VOLTS. If it does not have auto-range, set it to at least 24 VDC.

WARNING	
	<p>ELECTROCUTION HAZARD!</p> <p>Verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures before performing any maintenance.</p> <p>All electrical work must be performed by a qualified electrician.</p> <p>If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.</p>

3. To determine if voltage is going out to the prox switch:
 - a) Place the positive (red) voltmeter lead in pin 1 and the negative (black) voltmeter lead in pin 2.
 - b) If the cable is operating to the switch, the voltmeter will display 24 volts.
4. To determine if the cable back to the PLC input is working:
 - a) Create a jumper by stripping a piece of wire at both ends.
 - b) Place the jumper between pins 2 and 3.
 - c) Check the appropriate green LED light on the appropriate 24 VDC input card in the PLC rack.
 - d) If the cable is working, the green LED light will be on.


Electrical Components



The stationary-end disconnect switch shuts off power to the entire saw. The carriage-end disconnect switch shuts off power only to the carriage end.

This equipment relies on highly technical electrical components to operate correctly. Most of the electrical components are located in the stationary-end electrical enclosure and the carriage-end electrical enclosure.

The stationary-end electrical enclosure is the main electrical enclosure. Although the 3-phase wiring enters into this enclosure to power the entire saw, most components in this enclosure control the stationary end of the saw. Likewise, most components in the carriage-end electrical enclosure control only the carriage end of the saw.

WARNING	
	<p>ELECTRICAL HAZARD!</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>All electrical work must be performed by a qualified electrician.</p> <p>If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.</p>

Keeping Electrical Enclosures Clean



CAUTION
<p>Do NOT use compressed air inside electrical enclosures. Remove the filter from the enclosure before blowing out dust.</p>

Vacuum dust from the electrical enclosures every week.

Checking for Voltage To and From Components

One of the first steps to take when troubleshooting an electrical component problem in the saw is to determine which electrical component is not working properly and why.

To determine which electrical component is not working, you must first determine if power is getting to the component, then determine if power is proceeding on to the next component in the loop. Here are some pointers:

- Use an auto-ranging digital multimeter or voltmeter to measure the voltage.
- Wires entering the top of a component are generally for incoming power, but read your electrical schematics to confirm.
- Wires exiting the bottom of a component are generally for outgoing power, but read your electrical schematics to confirm.

VFD

Understanding VFDs



A VFD (variable frequency drive) is part of the communication loop between the PLC and electrical components that require variable speed control. Each variable speed electrical component has its own VFD.

A VFD is one of the first links in the electrical circuit, so verifying voltage in and out of the affected VFD is always a good first step in an electrical troubleshooting process.

The VFD display window is helpful when troubleshooting. The following scenarios may exist in the display window:

- When a VFD is powered but is not accepting any commands at that moment, “-000” flashes.
- When a VFD is receiving an input, the Run light comes on and a speed command shows.
- If a VFD experiences a fault, one of the fault numbers listed in Table A-16 in the *Troubleshooting* appendix will appear.

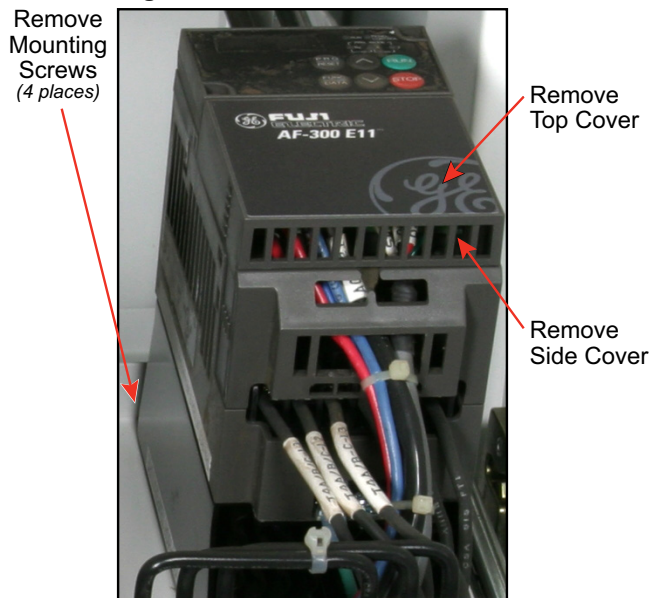
Setting VFD Parameters

Recommended VFD settings are listed in your electrical drawings. Contact MiTek Machinery Division Customer Service before attempting to reset any setting.

Replacing a VFD (Variable Frequency Drive)

There are two (2) VFDs on the saw. Refer to your electrical drawings and schematic to determine what each VFD controls and the replacement part number.

Figure 6-37: VFD



All VFDs should be ordered through MiTek because they must be programmed before use.

To replace a VFD:



1. Remove the two (2) covers labeled in Figure 6-37.
2. Ensure all wires entering the VFD have wire labels. If not, refer to your electrical drawings and adhere wire labels before disconnecting anything.
3. Remove all wires from the VFD. They will need to be connected to the new VFD in the same way that they were connected to the VFD in need of repair.
4. Remove the four (4) mounting screws.
5. Install the new or repaired VFD by reversing the procedure above.



If MiTek drop ships a VFD directly from the manufacturer, your electrical schematic shows the parameter settings needed. Program the VFD according to these settings. If the new VFD is made by a different manufacturer than the original VFD, call MiTek Machinery Division Customer Service for the new settings. MiTek will provide support only for VFDs purchased through MiTek.

Circuit Breakers

Circuit breakers are used for certain components as an electrical circuit protection device.

Using the Handle

Manually operate the circuit breaker using the handle and the PUSH-TO-TRIP button on the circuit breaker. The handle has three (3) positions: On, Trip, and Off.

Manually Tripping the Circuit Breaker to Test

Manually trip the circuit breaker by pushing the PUSH-TO-TRIP button.

Resetting a Tripped Circuit Breaker

Reset the circuit breaker after it has been tripped by moving the handle to the off position, and then back to the on position.

Motor Starters and Overloads

Motor starters turn motors on and off. Overloads are usually mounted to the output side of the motor starter and act as safety switches. Certain alarms are associated with motor starter problems. A common cause of the alarms is the contacts are not making complete contact. This section describes the alarms and how to clean the contacts.

Environmental Temperature

The air temperature around the saw should never exceed 110°F. In high ambient temperatures, the motors are unable to dissipate heat effectively. When the temperature of the motor windings exceeds a preset value, the motor overload will automatically shut down the motor to prevent it from burning up.

Alarms Associated With Motor Starters

Motor Thermal Overload Alarm—If an overload trips, reset it by pressing the red button located on the overload. An alarm appears on the touch screen monitor when this condition occurs.

Cleaning Contacts

To clean the motor starter contacts:

CAUTION

Never use pneumatic air inside electrical cabinets. It will force dust and particles into electrical components causing them to fail.

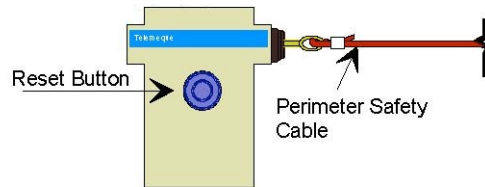


1. Lockout/tagout at the wall before opening the enclosure.
2. Vacuum dust from the enclosure and around the contacts.
3. Cycle the contacts by pressing the center spring loaded tabs of the starter up and down with a small screw driver while blowing canned air into the chamber. **DO NOT USE PNEUMATIC AIR FROM YOUR PLANT!**

Maintaining the Perimeter Safety Cable

A properly tensioned perimeter safety cable will trip the E-stop switch when someone pulls it approximately 8 in. from its rest position at the mid-section of the saw.

Figure 6-38: Safety Cable and Switch



Resetting the Switch

Once the cable is pulled, reset the E-stop circuit by pressing the button labeled in Figure 6-38.

Adjusting the Perimeter Safety Cable

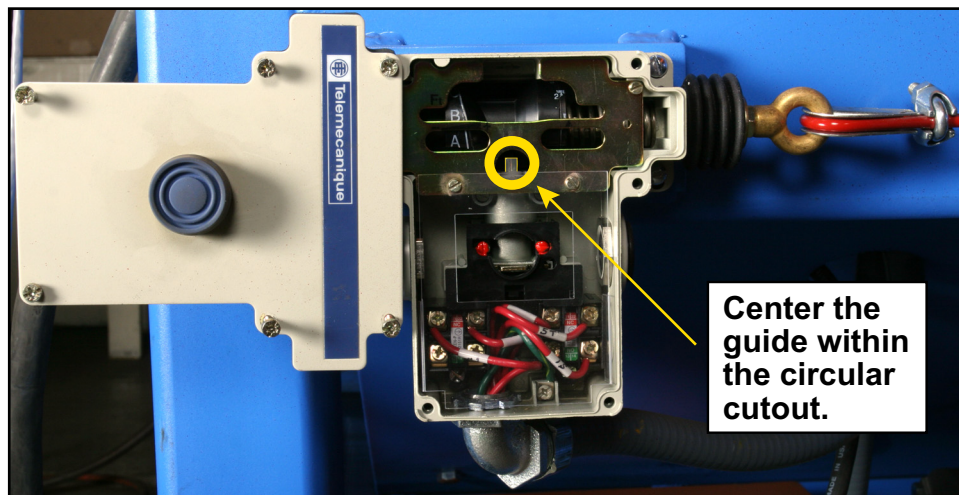
If the perimeter safety cable switch is not adjusted properly, a control power interrupt fault will appear, or the saw will fail to stop quickly enough.



To adjust the perimeter safety cable setting:

1. Remove the cover on the reset box.
2. Loosen the jam nut on the safety cable switch.
3. Turn the tensioning nut until the internal switch is centered in the cam. The internal switch and cam are circled in Figure .
4. Retighten the jam nut.
5. Replace the cover and tighten the screws.

Adjusting the Perimeter Safety Cable Switch



Recommended Preventive Maintenance

Daily Schedule

Every 2 hours (break time), do as follows:


1. Angulate all blades to 30° and blow down the saw motors, chains, and axis with air.
2. Visually check every length, angle, and centerline indicator.
3. Report any scale indicators that are wrong. If required and approved by production manager, the maintenance man will make any necessary adjustments.



At lunchtime and end of shift (twice daily), do as follows:

1. Shut down and lockout/tagout the saw.
2. Thoroughly clean all axes, chains, screws, and inside guards.
3. Lubricate all the moving axes with proper lubrication.
4. Angulate all blades to 30° and blow down the saw motors, chains, and axis with air.
5. Visually check every length, angle, and centerline indicator.
6. Report any scale indicators that are wrong. If required and approved by production manager, the maintenance man will make any necessary adjustments.

Weekly Schedule

WARNING	
	<p>MOVING PARTS CAN CRUSH AND CUT.</p> <p>Always verify that power to the machine has been turned off and follow approved lockout/tagout procedures.</p> <p>Bleed air lines if appropriate.</p>

1. Remove all guards from motors, gearboxes, infeeds, and hold-downs. Blow out all dust and debris. Ensure that the tubes in which the infeeds and hold-downs slide are free of debris.
2. Blow out all dust and debris from all drive sprockets. Lubricate the sprockets with kerosene/oil mixture.

3. Check the air brakes for each saw blade motor. Run and stop each blade, and watch to see if all blades are stopping correctly. Adjust brake calipers if necessary as directed in the *Air Brakes for Saw Blades* section of this chapter.
4. With air switched OFF, turn each blade by hand and visually check if the hub is rubbing on the brake lining while it is spinning. Adjust brake calipers if necessary as directed in the *Air Brakes for Saw Blades* section of this chapter.
5. Check to make sure the brake lining is not worn down.
6. With air switched OFF, remove the inlet line to each air-brake cylinder and squirt two drops of oil (10W) into the line. This stops brakes from sticking.
7. For any problem axes—those that have not been setting up consistently during daily checks—check that the coupling inserts are okay.
8. Check tension on all chains.
9. Synchronize the infeed chains if required. The chain can skip over a tooth or two on the sprockets if an offcut or other debris gets caught in-between the end of the chain and the sprocket, causing the lumber lugs to get out of alignment.
10. Check that no sprocket, gear, or bearing is loose on its shaft or mount.
11. Go to the operator's side of the carriage-end electrical box and locate the two spur gears on the carriage drive. Grab the gears and check that they are fixed securely on the shaft and cannot be moved.
12. Unscrew the bolts holding the flange bearings on the hold-down and infeed shafts for horizontal movement. Remove the jam nut from the shaft at the rear of the saw. Slide the shaft and bearing so that the spur gear can be seen. Inspect the teeth of the gear for signs of damage.
13. Check the knife-edge setting on the carriage-end infeed. The knife should sit above the top of the infeed frame by 1.6 mm (1/16 in.). Check that no teeth at the beginning of the knife have broken off and that the top of the knife is not notched or chipped. If the knife is notched or chipped the lumber will “catch” and may “jump” out of position before moving to the next blade. Replace the knife if it is damaged.
14. Lubricate the infeed chains and sprockets with a garden sprayer and kerosene/oil mixture.
15. Lubricate all racks, carriage tracks, gears, square drive shaft, and centerline screws with straight kerosene/oil mixture.
16. Check conveyor belt tension. Increase the tension by undoing the locknuts on the adjustment screws at the end of the conveyor frame and tightening the screws. If the conveyor is adjusted, the maintenance man must return to the conveyor to

check the belt tracking (alignment) every 2 hours until he is confident that the conveyor is remaining aligned.

17. Check conveyor belt tracking. Realign as necessary using the adjustment procedure described above. If the conveyor is adjusted, the maintenance man must return to the conveyor to check the belt tracking (alignment) every 2 hours until he is confident that the conveyor is remaining aligned.
18. Check that the air-line lubricator and the inlet line are full.

Weekly Test Cut

Conduct the following checks weekly or as required:

1. Set the angles on blades 2 and 3 to 90°, and cut a piece of lumber to length. Do not remove it from the lumber knife. With a tape measure, check to make sure that the length matches the indicator on the length scale. Check that the angle indicators are exactly on 90°. Adjust if necessary.
2. Set the angles on blades 2 and 3 to 45°, then jog the lumber in and out. Check that the centerlines are correct using a square. If there is a problem, take a much wider piece of lumber and cut the 45° angles before making any calibration adjustments.
3. Repeat steps 1 and 2 for blades 1 and 4, then blades 5 and 6. When cutting to length at 90°, make sure that the lumber is also cut by any two blades on the operator side of those blades. That is, for blades 1 and 4, the lumber must be cut first by blades 2 and 3.
4. Also check the blade draft and pivot point for accuracy.

Monthly Schedule

Cleaning and Lubrication

Check the gearbox oil levels following the instructions for lubricating the gear reducers in the *General Maintenance* section on page 47.

1. Clean the infeed, hold-down, and lumber stop sliders. Drive the axis to its extreme in each direction and clean it. Lubricate with straight kerosene.
2. Clean the square drive shaft using a wire brush. Do not use a grinder or sander, because this may take too much material off the shaft. Lubricate with straight kerosene.
3. Clean the angle and centerline slides and ways. A *way* is the steel plate and bracing in which the slide travels. Run the blades to their extremes of travel in

each direction and clean with a wet rag or steel wool. Remove all grease or debris from the slides and lubricate with straight kerosene.

4. Inject grease into all bearings on the saw including, but not limited to, all rack and pinion shafts, centerline screws, and square drive shaft bearings.
5. Lubricate the carriage V-wheels with WD40.
6. Clean all the scales.
7. Clean any debris from the lumber stop.

Open the electrical cabinets and inspect them for dust buildup. Blow all dust off contactors, overloads, etc. with low-pressure air. Vacuum any dust from the shelves with a small vacuum cleaner.


Maintenance for Saw Blades

Refer to Table 6-4 on page 72 for the saw blade replacement schedule.

Six-Month Schedule

Inject grease into the grease fittings at the front and back of each motor. A couple of shots of grease in each is sufficient.

Navigating the Troubleshooting Appendix



Refer to...

Maintenance chapter for procedures and graphics

General Information chapter for truss terminology

Glossary for additional terminology

This appendix is divided into tables according to the symptoms the machine is having. Most solutions have a more detailed explanation in the *Maintenance* chapter. If you have an electronic file of this manual, click on any reference to another page or section, and it will take you there.

Symptoms and Solutions

Table #		Page
Table A-1	General	page 123
Table A-2	Mis-Cut Boards	page 123
Table A-3	Saw Not Operating Correctly	page 126
Table A-4	Centerlines and Angles	page 129
Table A-5	Infeed Conveyors	page 131
Table A-6	Hold-Downs	page 132
Table A-7	Lumber Stop	page 133
Table A-8	Carriage	page 134
Table A-9	Alarm Conditions	page 136
Table A-10	Motors	page 138
Table A-11	VFD Protective Operations	page 139

Should you lockout/tagout to safely perform this action?

Safety Notes for Troubleshooting

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>



- All warnings located in the safety section in the preliminary pages apply at all times.
- When this graphic appears, you must lockout and tagout 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 qualified 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.

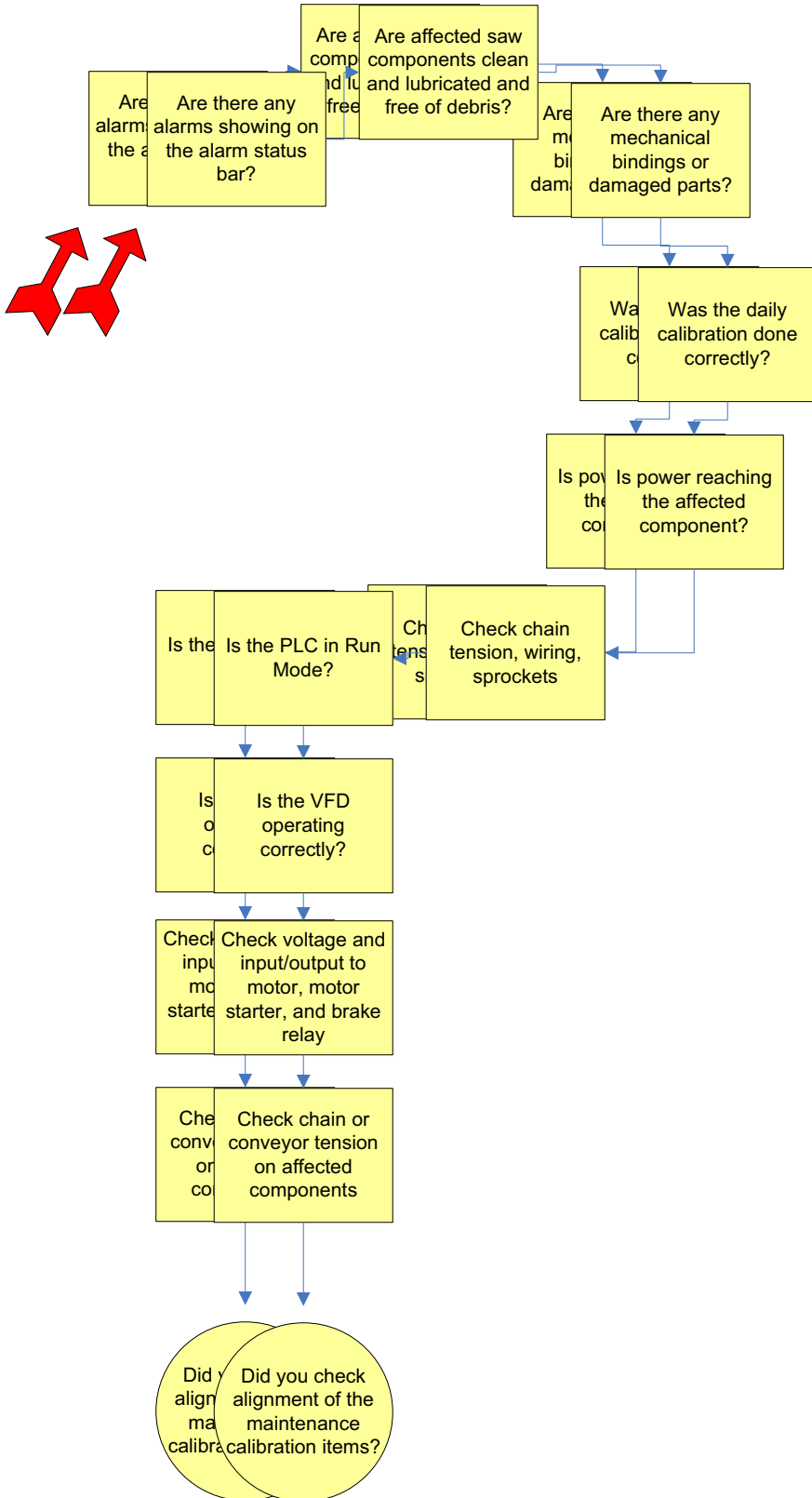
Operational Notes for Troubleshooting

- Do not use compressed air inside the electrical enclosures! It may force contaminants into the electrical connections.
- Clean and lubricate the equipment as a first step in most troubleshooting processes. Most malfunctions are caused by inadequate preventive maintenance.

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



Figure A-2: Start Here to Determine Solutions





Should you lockout/tagout to safely perform this action?



Symptoms and Solutions

Table A-1: General

Problem	Possible Cause	Possible Solution
Nothing operates— Power ON light not illuminated	No power	Machine or in-house main switch
	Fuse or breaker	Main incoming fuse or breaker
	Circuits open	10 amp fuse in Box 2
Power ON light illuminated, but saws will not start	Airline not connected	Connect airline
	Air pressure too low	Increase air pressure
	Circuits open	Saw setup switch to setup position
Engage emergency stop switches		
One blade will not start	Motor starter overloads	Reset starter overloads
	Air leak	Air leak on break
Saw brakes are not working	Brake adjustment	Adjust brakes
	Air cylinders sticking	Lubricate air cylinders

Mis-Cut Boards

Most problems you will encounter will be due to the machine being out of calibration or adjusted incorrectly. Before spending valuable time searching for a problem, check the following:

Table A-2: Mis-Cut Boards

Problem	Possible Cause	Possible Solution
Overall lengths change from setup to setup or between types of cuts	Lumber is not fully supported	Use the center lumber support for long boards or a heel cut skid bar for log scarfs.
	Lumber is bouncing off the lumber stop	Tighten the lumber stop. There should be little or no play in the lumber stop when you use two hands to rock it back and forth.
	Lumber guide knife is worn or notched	Replace lumber guide knife.
	Blades are cupped	Replace blades.
	Blades are not parallel to the infeed conveyors	Check that infeed conveyor is parallel to blades and to the other infeed conveyor.
	Blade pivot points are incorrect	Check the blade pivot points.
	Carriage is not square	Align carriage properly.




Should you lockout/tagout to safely perform this action?



Table A-2: Mis-Cut Boards (Continued)

Problem	Possible Cause	Possible Solution
Angle is wrong	Calibration is wrong	Check angle calibration.
	Angulation chain too tight or loose	Check the angulation chain for proper tension.
	Lumber guide knife dull or at wrong height	Check the lumber guide knife height setting.
	If hold-downs are wearing out on one side and angle is wrong, infeed conveyors not aligned	Check that infeed conveyor is parallel to blades and to the other infeed conveyor.
	Gearbox or spiders are bad	Replace gearbox or spiders.
Board has a heel when it should not	Blade alignment is incorrect	Align blades.
	Lumber guide knife dull or at wrong height	Check the condition and height of lumber guide knife.
	Center support not used or not adjusted correctly	If the center lumber support was used, ensure the height is adjusted properly. If it was not used, setup for the cut and check the touch screen for indication that the center lumber support should be used.
	Centerline position is wrong	Check centerline actual position on screen compared to set point. Check centerline calibration.
	Lumber stop incorrectly positioned	Check that the lumber stop is calibrated correctly and not set too far back. Check that the lumber stop is secure. There should be little or no play in the lumber stop when you use two hands to rock it back and forth.
Scissor bottom chord heel (butt cut) is too short or tall	Lumber guide knife dull or at wrong height	Check the condition and height of lumber guide knife.
	Blades are not parallel to the infeed conveyors	Check that infeed conveyor is parallel to blades and to the other infeed conveyor.
	Centerline of blade 4 or 5 is wrong	Check centerline actual position on screen compared to set point. Check centerline calibration.




Should you lockout/tagout to safely perform this action?



Table A-2: Mis-Cut Boards (Continued)

Problem	Possible Cause	Possible Solution
Height of butt cuts are different within the same setup	Lumber is not fully supported	Use the center lumber support for long boards or a heel cut skid bar for long scarfs.
	Lumber is bowed, twisted, or warped	Use heel cut skid bar. Improve lumber quality in the future.
	Blades are not square at 90°	Check that the vertical dimension of the blades are a true 90° and recalibrate if necessary.
	Blades are not parallel to the infeed conveyors	Check that infeed conveyor is parallel to blades and to the other infeed conveyor.
	Hold-downs not parallel or square to the blades and infeed	Check hold-down alignment.
	Carriage infeed and lumber knife are at the wrong height	Adjust lumber knife. Replace knife edge.
Scarf cut is too short	Lumber guide knife dull or at wrong height	Check the condition and height of lumber guide knife.
	Blades are not parallel to the infeed conveyors	Check that infeed conveyor is parallel to blades and to the other infeed conveyor.
	If the scarf cut is too short and the butt (heel) cut and lengths are correct, then the actual angle cut is wrong.	
Too many boards were cut for the setup	Boards not consistently hitting infeed and outfeed limit switches	Adjust the limit switch.
When the boards are laid out on assembly table, there are large gaps at joints	Assembly table setup is wrong	Verify jiggging is in the correct location. Due to variations in lumber quality, it may be necessary to reposition jiggging.
	Lumber is not straight	Check the straightness of the board along all edges. Lumber that is not straight will result in incorrect cuts.
	Accuracy or quality of the cut is not sufficient	Perform the calibration test and correct any miscalibrated components.



Should you lockout/tagout to safely perform this action?



Saw Not Operating Correctly

Setup problems specifically related to a centerline, angle, infeed, hold-down are covered in other tables in this appendix.

Table A-3: Saw Not Operating Correctly

Problem	Possible Cause	Possible Solution
Power is reaching saw (maintenance lights come on), but it does not run	E-stop is engaged	Pull any depressed pushbuttons and reset pull cord switch and swing guard switch.
	An alarm condition exists	Check for alarm conditions and reset or correct problem causing alarm. See Table A-9.
	Voltage is not transmitting through a faulty component, cable, or connection	Determine where in the circuit the voltage stops transmitting and troubleshoot those components.
	Control power relay(s) not engaged	Using the electrical schematics, check control power relays for proper operation.
	Touch screen locked up	Shut down touch screen completely and restart.
Saw will not turn on	Incoming power is turned off	Ensure the main power source from your plant electrical system is on. Ensure the disconnect switches on both the stationary and carriage-end enclosures are on.
	Transformer feeding the saw has failed	Check that there is power on the output side of the transformer using a voltmeter.
No blades will turn ON	E-stop is engaged	Pull any depressed pushbuttons and reset pull cord switch and swing guard switch.
	Loss of control power	Replace burned-out fuses on primary side of transformer or the output of 24 VDC power supply. Make sure 120 VAC is present on the secondary side of transformer and 24 VDC is present on the output of DC power supply.
	No or low air pressure	Make sure air supply valve is connected to saw and correct air pressure is set.
One blade will not turn on	Failed electrical component	Using the electrical schematics, inspect all components and wire connections associated with that blade.
	Blade is out of cut	Pull the maintenance jumper, move axis back to operating zone. Push the maintenance jumper back in.
	Motor locked up	Look for mechanical bindings, dirt build-up, etc. Check to ensure that brake valve is releasing brake.




Should you lockout/tagout to safely perform this action?



Table A-3: Saw Not Operating Correctly (Continued)

Problem	Possible Cause	Possible Solution
One blade runs in the wrong direction	Wrong connection	Swap any two phases of supply to the motor.
Blade angle will not move & no alarms exist	Double roller sprocket is full of sawdust	Remove debris.
	Brake is not released	Check to make sure the angle brake is released.
	Angle is jammed	Remove any debris that may be preventing the axis from moving. Clean and lubricate the quad. Dirt and pitch may be preventing movement.
Carriage will not move & no alarms exist	Carriage is not properly calibrated	Verify carriage calibration.
	Carriage drive VFD settings are incorrect	Check VFD settings. Settings are listed on the VFD HELP screen. New drives will have to be set.
	Carriage mechanical drive components are damaged or worn	Check the carriage drive gears and coupling.
Infeed Conveyor chains will not run	A blade that is in the cut has not started or does not appear to have started	A safety interlock prevents the Infeed from starting in automatic when a blade that is in-cut is not running.
	Chain drive component has become disconnected	Check drive couplings and chains.
	Chains are jammed	Look for debris jamming chains. Clean and lubricate.
Carriage length inaccurate	Encoder spur gear not properly meshed with rack	Ensure that encoder drive spur gear is tight in rack.
	Spur gear or other component is loose	Check set screws that joins encoder to shaft. Check that spur gear is tight on shaft. Check coupling.
	Encoder or encoder wiring is faulty	Check encoder and encoder wire connections.
Several axes will not move	One of the electrical cabinets does not have power	Ensure that power is on to both control panels.
	E-stop is activated	Ensure that an E-stop is not activated.
Infeed conveyor will not go faster	VFD settings are incorrectly set	Check VFD settings.
	Infeed chains are bound up	Check that nothing is preventing the chains from moving.
Blades 1 through 4 will not move out of or into the cut	Angle will not move	See Table A-4.
	Centerline will not move	See Table A-4.



Should you lockout/tagout to safely perform this action?






Table A-3: Saw Not Operating Correctly (Continued)

Problem	Possible Cause	Possible Solution
Blades 5 or 6 will not move out of or into the cut	Centerline unable to move to 3"	Check centerline movement by using Manual Mode to move the centerline. Check for obstructions.
	Angle unable to move to 90.0 deg.	Check angle movement by using Manual Mode to move the angle. Check for obstructions.
	Air supply is inadequate	Check for water in the lines or frozen lines. Replace mufflers.
	Air valve not operating properly	Check for debris or other items that may be preventing the slide from moving. Clean and lubricate the horizontal slide. Check air valve manual override is not actuated. Manual override is a red screw on the solenoid. Check air valve solenoid is not bad by checking for continuity across the coil. Check that PLC output turns on and off.




Should you lockout/tagout to safely perform this action?



Centerlines and Angles

Table A-4: Centerlines and Angles

Problem	Possible Cause	Possible Solution
Centerline will not hold calibration	Spider is bad or coupler is loose	Replace spider. Tighten coupler.
	Brakes on motor are worn	Replace brake or motor.
	Acme nut loose	Tighten nut.
Centerline hunts for position during automatic or semiautomatic setup	Spider is bad or coupler is loose	Replace spider. Tighten coupler.
	Axis cannot move freely	Clean and lubricate. Inspect for damage.
	ACME nut loose or misaligned	Check mounting bolts. Check alignment.
Angle hunts for position during automatic or semiautomatic setup	Spider is bad or coupler is loose	Replace spider. Tighten coupler.
	Axis is dirty	Clean and lubricate. Inspect for damage.
	Speed settings are incorrect	Adjust the VFD speed settings.
	Angle chain tension is incorrect	Check chain tension and chain tensioners.
	Drive sprocket is damaged or not secure to shaft	Check for damage to the sprocket and that the sprocket is secure to the shaft.
Centerline does not move	Axis is already in position	Press INITIATE SETUP. If an "All axes in position" message displays, then the centerline should be in the correct position for the setup. If not, proceed with troubleshooting.
	Spider coupling is not assembled properly	Check insert and set screws.
	Axis cannot move freely	Clean and lubricate. Inspect for damage.
	An alarm condition exists	Check for alarms and fix the fault. See Table A-9.
	Motor starter, brake, or motor is faulty	See Table A-9.
During setup, centerline moves and stops but screen indicates "All axes not in position"	Axis cannot move freely	Clean and lubricate. Inspect for damage.



Should you lockout/tagout to safely perform this action?






Table A-4: Centerlines and Angles (Continued)

Problem	Possible Cause	Possible Solution
Centerline does not move smoothly or vibrates when moving	Mechanical binding	Clean, lubricate and inspect the slide and acme nut.
	Axis is dirty and needs lubrication	Clean and lubricate. Inspect for damage.
	Slide is damaged	Inspect and repair if needed.
	Acme screw and/or nut is worn	Inspect and replace if needed.
Centerline is abnormally noisy when it moves	Axis cannot move freely	Clean and lubricate. Inspect for damage.
	Motor is not receiving required power or power quality	Check phase-to-phase and phase-to-ground voltage readings of all three legs of power. Readings should be within +/- 10% of each other.
	Motor bearings are damaged	With power removed from the saw, disconnect the motor from its load. Release the brake. Rotate the motor shaft and listen for any abnormal noise. If noise exists in the bearings, replace them.




Should you lockout/tagout to safely perform this action?




Infeed Conveyors

Table A-5: Infeed Conveyors

Problem:	Possible Cause:	What To Do:	
All blades are running but the infeed conveyor chains do not start	Bad conveyor motor, motor starter, or overload	Determine which parts are faulty and replace them.	
	Loose or broken wiring	Use the electrical schematic to determine which connections to inspect.	
Infeed conveyor vibrates when moving	Axis is dirty and needs lubrication	Clean, lubricate and inspect the moving components.	
Infeed conveyor does not travel	Axis cannot move freely	Clean, lubricate and inspect the moving components.	
Infeed conveyor does not travel smoothly	Axis cannot move freely	Clean, lubricate and inspect the moving components.	
	Axis mechanical components are dirty or need lubrication	Clean, lubricate and inspect the moving components.	
	Infeed conveyor is not parallel to blades (misaligned)		Check for loose bearings on Infeed Conveyor drive shaft.
			Check if infeed conveyor is parallel to blades.
			Check for loose bearings on the infeed conveyor drive shaft.
			Determine if the pinion has jumped one or more teeth on the rack. Check the pinions for damaged teeth.
	Extend the infeed conveyor and inspect the racks for damaged teeth.		
Infeed conveyors bind on square drive shaft		Clean and lubricate square drive shaft.	
		Move the carriage back and forth looking for any indication that the square drive shaft is causing excessive drag on the infeed conveyor.	
		Check alignment of the square drive shaft.	




Should you lockout/tagout to safely perform this action?




Hold-Downs

Table A-6: Hold-Downs

Problem:	Possible Cause:	What To Do:
Hold-down does not move at all	Spider coupling is not assembled properly	Check insert. Check set screws.
	Axis cannot move freely	Clean, lubricate and inspect the moving components.
Hold-down is abnormally noisy when it moves	Axis mechanical components are dirty or need lubrication	Clean, lubricate and inspect the moving components.
	Hold-down is not parallel to blades (misaligned)	Check for loose bearings on hold-down drive shaft.
		Extend the hold-down and inspect the racks for damaged teeth. Ensure that the pinion did not jump teeth on the rack. Check the pinions for damaged teeth.
Hold-down vibrates when moving	Axis is dirty and needs lubrication	Clean and lubricate.
	For vertical movement: Gear rack is damaged	Inspect and repair if needed.
Hold-down wearing out on one side	Infeed conveyor is crooked	Align infeed conveyors with hold-downs.




Should you lockout/tagout to safely perform this action?




Lumber Stops

Table A-7: Lumber Stop

Problem:	Possible Cause:	What To Do:
Lumber stop does not move	Spider coupling is not assembled properly	Check insert. Check set screws.
	Axis cannot move freely	Clean, lubricate and inspect the moving components. Inspect for damage.
Lumber stop does not move smoothly	Mechanical components are misaligned	Check alignment of rack and pinion and that they are properly meshed. Check the drive coupling.
		Clean, lubricate and inspect the moving components.
Lumber stop is abnormally noisy when it moves	Axis cannot move freely	Clean, lubricate and inspect the moving components.
	Mechanical components are misaligned	Check alignment of rack and pinion and that they are properly meshed. Check the drive coupling.
Lumber stop vibrates when moving	Mechanical components are misaligned	Check alignment of rack and pinion and that they are properly meshed. Check the drive coupling.
		Check the drive coupling.



Should you lockout/tagout to safely perform this action?



Carriage

Table A-8: Carriage

Problem:	Possible Cause:	What To Do:
Carriage does not move	Axis is already in position	Press INITIATE SETUP. If an “All axes in position” message displays, then the carriage should be in the correct position for the setup. If not, proceed with troubleshooting.
	Roll pin broken or spur gear worn.	Inspect spur gears and roll pins and replace if necessary.
	Brake not releasing	Check air pressure. Check for electrical problems (output cards, wire connections, etc.).
	Drive gear disengaged	Check gear mesh between gearbox and jack shaft. Check gear mesh between jackshaft and rack.
	An alarm condition exists	Check for an alarm. See Table A-9.
	Axis cannot move freely	Clean, lubricate and inspect the moving components. Move the carriage back and forth looking for any indication that the square drive shaft is causing excessive drag on the carriage or infeed conveyor. Check alignment of the square drive shaft.
Carriage will only move in one direction	Square drive shaft worn	Repair damage or replace tube.
During setup, carriage moves and stops but screen indicates “All axes not in position”	Axis cannot move freely	Clean, lubricate and inspect the moving components.
	A fault occurred while moving	Correct fault condition. See Table A-9.
Carriage does not move smoothly	Sawdust is stuck in rack	Blow sawdust off rack surfaces including inside the carriage tubes.
	Square drive shaft worn	Repair damage or replace the tube.
Carriage is abnormally noisy or vibrates when it moves	Square drive shaft worn	Repair damage or replace the tube.
	V-wheels or angle are damaged or dirty	Clean, lubricate and inspect the moving components. Repair damage or replace the damaged part.



Should you lockout/tagout to safely perform this action?



Table A-8: Carriage (Continued)

Problem:	Possible Cause:	What To Do:
Carriage moves in the opposite direction than it should be moving	Carriage was improperly calibrated	Recalibrate.
	Encoder not counting properly	Check alignment of rack and pinion and that they are properly meshed.
		Check the pinion for damaged teeth.
		Check the drive coupling.
		Check the pinion shaft for any play which would indicate damaged bearings.
VFD trips frequently (OC2)	Axis cannot move freely	Clean, lubricate and inspect the moving components.
		Move the carriage back and forth looking for any indication that the square drive shaft is causing excessive drag on the carriage or infeed conveyor.
		Check alignment of the square drive shaft.
	Carriage brake	Adjust brake so it does not drag on the brake hub.
		Test the valves and airlines to see if it is fully releasing. Adjust carriage brake advance setting on the Default Speeds screen.
	Carriage speeds not set properly	Adjust carriage speed setting on Default Speeds screen.
VFD not set properly	Reset them, and prevent them from being changed in the future.	
Loose wiring	Check all connections.	
VFD trips frequently (OC3)	Electrical problem	Inspect for loose or broken wires. Remove and inspect the motor starter and contactor. Clean or replace as necessary.
	VFD settings are incorrect	Verify VFD settings per your electrical drawings.



Alarm Conditions

Alarms are specific conditions recognized by the saw that notify the operator something is or could be wrong. An alarm causes an icon on the alarms status bar located at the top of the Main Menu to illuminate.

Table A-9: Alarm Conditions

Problem	Possible Cause	Possible Solution	
Motor thermal overload alarm	Mechanical bind	Clean, lubricate, and inspect all axes associated with that overload.	
	Chain tension is wrong	Retension the chain that moves the axis associated with that encoder.	
	Low incoming voltage		Have the 3 phase power checked by a qualified electrician.
			Remove and inspect the motor starter and contactor. Clean or replace as necessary.
	Overload is faulty	Swap the overload with another. If the overload trips, then the original overload was OK.	
	Power to motor is incorrect	Check phase to phase and phase to ground voltage readings of all three legs of power. Readings should be within +/- 10% of each other.	
	Motor is faulty		Check motor for shorted or grounded winding and repair. Remove and inspect the motor starter and contactor. Clean or replace as necessary.
			Inspect the brakes: For air brakes (blade motors and carriage motor). For electric brakes (all other motors).
	Load on motor has changed		Clean and lubricate all components of the axis. Check and condition of mechanical drive components.
			If motor is a replacement, verify that the rating is the same as the old motor.
		Disconnect the motor from its load and, with the motor running, measure its current draw. It should not exceed the full load amp rating stamped on the nameplate.	
Temporary condition causing overload		Reset overload. If overload recurs, continue with troubleshooting.	
Motor fan is not working (does not apply to blade motors)		Inspect the fan housing for damage that may prevent the fan from turning.	
		Disconnect the load from the motor. Remove the motor fan housing at the rear of the motor. Rotate the motor shaft while holding the fan blades. The fan should not slip on the shaft.	
Ambient temperature is high		Generally, air temperature should remain under 110°F at the operating site. Any temperature higher than 80°F may cause overloads to shut down motors.	




Should you lockout/tagout to safely perform this action?



Table A-9: Alarm Conditions (Continued)

Problem	Possible Cause	Possible Solution
Emergency stop alarm	E-stop is activated	Go to E-stop status screen to determine which e-stop button or switch is activated. Reset the activated E-stop.
	Loose wiring in E-stop circuit	Check wiring.
VFD has a fault	Brake relay did not energize	Check wire connections to brake relay.
		Clean sawdust and other debris from brake relay.
		Check that the brake relay is functioning properly.
		Check for a signal from the VFD to the brake relay.
	VFD generated a fault	Reset fault on screen or on the VFD itself. If fault recurs, continue with troubleshooting. Read the error code displaying on the VFD and refer to Table A-11 to determine the source of the error.
Chain is too tight	Mechanical components of the axis are jammed	Ensure that axis is able to move freely. Check to make sure angle chains are not too loose and no obstructions such as wedge in chain.
	Chain is too tight	Check chain tension.
Low air fault	Low or no air pressure	Ensure that air supply is connected to saw and the air source is working properly. Remove moisture from the lines. Ensure lines are not frozen. Clean air valve. Replace mufflers if necessary. Listen to see if valve is shifting smoothly. If not, replace valve.



Should you lockout/tagout to safely perform this action?

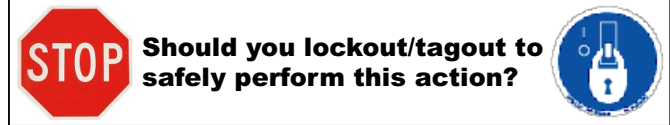


Motors

Refer to the Alarms troubleshooting chart before proceeding with this chart.

Table A-10: Motors

Problem:	Possible Cause:	What To Do:
Motor runs but slows down	Bad motor	Replace motor.
	Motor connections are loose	Check motor connections.
	Low voltage	Check incoming voltage and find source of problem.
	Brake not releasing	Check voltage to motor. Check for loose connections or other electrical issues. Repair or replace motor and brake assembly.
Motor takes too long to reach full speed	Line voltage drops below motor rated voltage	Delay start one motor after another.
	Inertia of load is too high	Check motor for sign of binding. Re-align motor.
At start up, the motor makes a loud rubbing or grinding sound	Thrust from load or misalignment	Re-align coupling.



VFD Faults

The VFDs have many protective functions that occur when there is an error. The name of the alarm will be displayed on the LED when an error occurs and the motor will coast to a stop. Table A-11 lists alarm displays and protective operations.

Table A-11: VFD Protective Operations

Name of Alarm	Display	Description of Operation
Overcurrent protection	OC1 (During acceleration)	<p>Drive output current exceeds the overcurrent detection level due to an overcurrent flowing in the motor, or a short circuit or ground fault in the output circuit.</p> <p>Remedies:</p> <p>Clean and lubricate the moving components.</p> <p>Inspect the slide and casting surfaces for damage and repair it.</p> <p>Check and correct VFD settings.</p> <p>Have a qualified electrician check incoming voltage.</p>
	OC2 (During deceleration)	<p>Remedies:</p> <p>Check and correct VFD settings.</p> <p>Have a qualified electrician check incoming voltage.</p>
	OC3 (During constant speed)	<p>Remedies:</p> <p>Inspect for loose or broken wires.</p> <p>Remove and inspect the motor starter and contactor. Clean or replace as necessary.</p> <p>Check and correct VFD settings.</p>
Overvoltage protection	OU1 (During acceleration)	<p>The regenerative power from the motor increases, causing the DC link voltage of the main circuit to exceed the overvoltage detection level (400 VDC for 230V input, 800 VDC for 460V input). Although the drive trips due to overvoltage, drive protection against the overvoltage is impossible.</p>
	OU2 (During deceleration)	
	OU3 (During constant speed)	
Undervoltage protection	LU	<p>The source voltage drops, causing the DC link voltage in the main circuit to become lower than the undervoltage detection level (200 VDC for 230V input, 400 VDC for 460V input). If F14 Restart after momentary power failure has been selected, or if the voltage drops below the control power maintenance level, no alarm is displayed.</p>
Input phase loss protection	Lin	<p>If input power L1/R, L2/3, L3/T has any phases of the 3 phase power "OPEN" or if there is a significant disparity between phases, the rectifying diode or smoothing capacitors may be damaged.</p>



Table A-11: VFD Protective Operations (Continued)

Name of Alarm	Display	Description of Operation
Heat sink overheat	OH1	The temperature of the heat sink of the drive is high, possibly due to a broken cooling fan or other reasons.
External alarm input	OH2	An external device such as the braking unit, braking resistor, and external thermal overload relay connected to the control circuit terminal (THR) has activated an alarm contact, or an overheat protective function is activated by the PTC thermometer.
Braking resistor overheat	dbH	If the electronic thermal overload relay (for the braking resistor) has been selected for code F13, the protective function is activated by a high operation frequency of the braking resistor to prevent the resistor from being burned.
Motor 1 overload	OL1	If electronic thermal overload relay 1 has been selected for code F10, the protective function is activated by a motor current exceeding the set operation level.
Motor 2 overload	OL2	If motor 2 has been selected and driven and electronic thermal overload relay 2 has been selected for code A06, the protective function is activated by the current in motor 2 exceeding the set operation level.
Drive overload	OLU	An output current has exceeded the overload current rating and the protective function has been activated to protect the semiconductor elements in the main circuit of the drive.
Memory error	Er1	A data writing error or other error in the memory has occurred.
Keypad panel communication error	Er2	A data transmission error or transmission stoppage has been detected between the keypad panel and the control section in the keypad operation mode.
CPU error	Er3	Electric noise or other errors have developed in the CPU.
Option error	Er4 Er5	An error has occurred during the operation of an option.
Operating error	Er6	A drive operating error has occurred during drive startup, or FWD or REV connected to terminal AM when Main power is applied to the drive (F02 setting 3 or 4). This error will also display if the STOP key on the keypad is pressed in terminal operation (F02 setting 1 or 3).
Output phase loss	Er7	There is a broken wire, or no connection exists in the drive output circuit during auto tuning.
RS485 communication error	Er8	A communication error has occurred during communication through RS485.



Maintenance Checklists

Appendix G

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 supplied with the intent that you will photocopy them and document the date that maintenance is done, leaving the original in the manual for future use.

Checklist	Refer to
Daily Checklist	page 142
Monthly Checklist	page 143
Periodic Checklist	page 144

Maintenance Checklist

Daily Checklist

Month and Year: _____ Week: _____

Action		MON	TUE	WED	THU	FRI	SAT	SUN
Lubricate the drive wheel chain (every 8 working hours)	Shift 1							
	Shift 2							
	Shift 3							
Lubricate the motor drive chain (every 8 working hours)	Shift 1							
	Shift 2							
	Shift 3							

Notes

Date

Maintenance Checklist

Monthly Checklist

Year: _____

MONTH (first half of year)		JAN	FEB	MAR	APRIL	MAY	JUNE
Replace saw blades	1 month						
Grease the take-up bearing	3 months						
Inspect and dust brake motor	3 months						
Check regulator filter (6 months)	6 months						
Grease the guide wheels	6 months						
Check oil level in brake motor	6 months						
Lubricator service kit	2 years						
Drain and change gearbox oil	10,000 working hours						

MONTH (second half of year)		JULY	AUG	SEPT	OCT	NOV	DEC
Replace saw blades	1 month						
Grease the take-up bearing	3 months						
Inspect and dust brake motor	3 months						
Check filter (6 months)	6 months						
Grease the guide wheels	6 months						
Check oil level in brake motor	6 months						
Lubricator service kit	2 years						
Drain and change gearbox oil	10,000 working hours						

Maintenance Checklist

Periodic Checklist

Year: _____

Preventive Maintenance Action		Sign and Date When Action is Performed				
Inspect and dust brake motor	3 months					
Check oil level in brake motor	6 months					
Lubricator service kit	2 years					
Drain and change gearbox oil	10,000 working hours					

Notes

Date



Document Evaluation

Appendix G

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.

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SmartSet® Saw	Equipment Manual	001047
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General Ratings:

	Poor	Fair	Good	Excellent
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Accuracy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Compared to other truss machinery manufacturers' documentation, how would you rate this document?

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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.	
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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.

This appendix provides general information that will help you better understand how this equipment works.

Understanding Overloads

Purpose and Scope

The information below has been collected to help you understand the role of an overload, how an overload works, and how to calculate the overload setting to protect the motor.

The Importance of Protecting Your Motor

The following statement describes the importance of protecting electric motors and is a good illustration of why we need overloads.

Proper Motor Protection Safeguards Your Investments

With electric motors driving the majority of today's manufacturing processes, proper motor protection is critical. Not surprisingly, a significant amount of effort and resources have recently been invested in motor protection technology, resulting in cost-effective solutions to many of today's common motor problems.

Motors fail for a number of reasons—moisture and contamination, short circuits, mechanical problems and old age—but the primary reason is excessive heat, caused by excess current (greater than normal motor full load current), high ambient temperatures, and poor ventilation of the motor. If a motor is continuously overheated by only 10 degrees, its life can be reduced by as much as 50%.

Steve Zimmerman
Control Engineering
December 1, 1997

What is an Overload?

So, what is an overload? The term literally means that too much load (what the motor is driving) has been placed on the motor. A motor is designed to run at a certain speed, called its synchronous speed. If the load on the motor increases, the motor draws more current to continue running at its synchronous speed.

It is quite possible to put so much load on a motor that it will draw more and more current without being able to reach synchronous speed. If this happens for a long enough period of time, the motor can melt its insulation and burn out, resulting in damage to the motor windings. This excessive load condition is called an overload.

In fact, the motor could stop turning altogether (called a locked rotor) under a large enough load. This is another example of an overload condition. Even though the motor shaft is unable to turn, the motor continues to draw current, attempting to reach its synchronous speed.

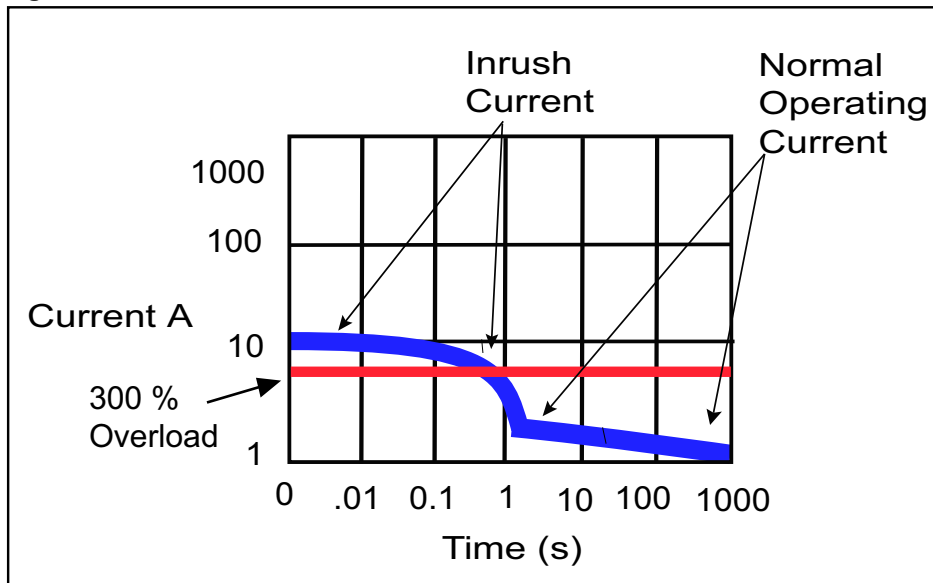
Although the running motor may not draw enough current to blow the fuses or trip circuit breakers, it can produce sufficient heat to burn up the motor. This heat, generated by excessive current in the windings, causes the insulation to fail and the motor to burn out. We use the term “locked rotor amps” to describe when the motor is in this state and is drawing the maximum amount of current.

Due to the possibility of excessive current draw, an overload protection device is required that does not open the circuit while the motor is starting, but opens the circuit if the motor gets overloaded.

Starting Current

When a motor is started, it must perform work to overcome the inertia of the rotating portion of the motor and the attached load. The starting current measured on the incoming line is typically 600% of full-load current when rated voltage and frequency is first applied to a NEMA B motor. The stationary portion of the motor current decreases to its rated value as the rotor comes up to speed.

Figure G-1: Motor Inrush Curve



An overload condition will occur when the rotor has difficulty turning and draws more current than it normally would need to keep it turning. When an overload occurs the current being drawn is usually between 2 to 6 times the normal operating current.

For example if a conveyor belt becomes jammed and does not allow the rotor to turn, the motor will draw about as much amperage as it would on startup to try to get the rotor to turn. As long as the rotor does not turn, this increased current will continue to flow. The key thing to remember in an overload condition is that the current flows through the normal circuit path. Continued overload current will cause excess heating in the motor and the motor circuit. If the over current protective device does not operate in a timely manner, the motor could short out a winding, or cause insulation damage to a winding which could lead to a short circuit later.

Overload Relays

The overload relay is the device used in starters for motor overload protection. It limits the amount of current drawn to protect the motor from overheating.

An overload relay consists of:

- A current sensing unit (connected in the circuit to the motor)
- A mechanism to break the circuit, either directly or indirectly

Overload relays have the following features:

- A time delay which ignores harmless temporary overloads caused by normal motor starting, without breaking the circuit
- A means of resetting the circuit once the overload is removed

- A design that meets the special protective needs of motor control circuits
- Allow harmless temporary overloads, such as motor starting, without disrupting the circuit
- Will trip and open a circuit if current is high enough to cause motor damage over a period of time
- Can be reset once the overload is removed

Bimetallic Overload Relays

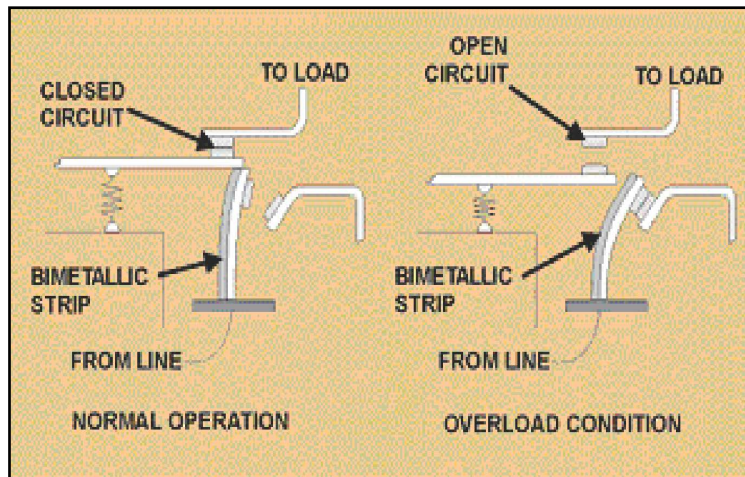
Overload protection is accomplished with the use of a bimetallic strip. This component consists of a small heater element wired in series with the motor and a bimetallic strip that can be used as a trip lever. A bimetallic strip is made of two dissimilar metals bonded together. The two metals have different thermal expansion characteristics, so the bimetallic bends at a given rate when heated.

Under normal operating conditions the heat generated by the heater element will be insufficient to cause the bimetallic strip to bend enough to trip the overload relay.

As current rises, heat also rises. The hotter the bimetallic becomes, the more it bends. In an overload condition the heat generated from the heater will cause the bimetallic strip to bend until the mechanism is tripped, stopping the motor.

If heat begins to rise, the strip bends, and the spring pulls the contacts apart, breaking the circuit, as shown in Figure G-2.

Figure G-2: The Warping Effect of the Bimetallic Strip



Once the tripping action has taken place, the bimetallic strip cools and reshapes itself, automatically resetting the circuit. The motor can be restarted even when the overload condition has not been cleared, and will trip and reset itself again and again. (This assumes an automatic reset and can also be equipped with a manual reset.)

Electronic Overload Relay

Electronic overload relays are another option for motor protection. The features and benefits of electronic overload relays vary but there are a few common traits. One advantage offered by electronic overload relays is heater-less design. This reduces installation cost and the need to stock a variety of heaters to match motor ratings. Electronic overload relays can detect a phase loss and disconnect the motor from the power source. This feature is not available on mechanical types of overload relays.

Overload Classifications

Overload relays also have an assigned trip class. The trip class is the maximum time in seconds at which the overload relay will trip when the carrying current is at 600% of its current rating. Bimetallic overload relays can be rated as Class 10, meaning that they can be counted on to break the circuit no more than ten seconds after a locked rotor condition begins. Melting alloy overload relays are generally *Class 20*.

American industry has standardized on Class 20 overload protection. The Europeans have standardized on Class 10.

Class 20 will give a nominal 590-second trip (9.83 minutes) at an overload of 125% of full load amps, a 29-second trip at a 500% overload, and a 20-second trip at a 600% overload. Thus, a motor that is stalled and drawing locked rotor amperage will be taken off-line in 20 to 29 seconds. However, a motor that draws a continuous locked rotor current can be expected to burn out before 20 seconds.

Class 10 will give a nominal 230-second trip (3.83 minutes) at 125% overload, 15 seconds at 500% overload, and 10 seconds at 600% overload.

Class 30 has a longer time delay to be used on high inertia loads that require a long acceleration or have shock loading that causes repetitive motor inrush.



The overload class that *MiTek* normally specifies for equipment is a Class 10. Since it is possible to burn out a motor in less than 20 seconds, we have chosen to protect the motor with the highest degree of protection.

Codes And Standards

NFPA 79—Electrical Standard for Industrial Machinery, 2002

7.3.1.1 Motors. Motor overload protection shall be provided to each motor in accordance with Article 430, Part III, of NFPA 70, *National Electrical Code*.

NEC 2002—National Electrical Code

430.32 (A) (1) Separate Overload Device. A separate overload device that is responsive to motor current. This device shall be rated at no more than the percentages shown in Table G-1.

Table G-1: Full Load Current Tolerances

Nameplate Full Load Current Rating	% Allowed Above Full Load Current Rating
Service Factor of 1.15	125%
Motors with a marked temperature rise of 40°C or less	125%
All other motors	115%

Example 1

15 hp, 208V, 3 phase, induction motor, 40°C rise, *design B*, *FLA* 48 amps. Overload Protection = 48 amps times 125% = 60 amps

Example 2

25 hp, 208V, 3 phase, induction motor, 1.15 s.f., *design C*, *FLA* 72A. Overload Protection = 72 amps times 125% = 90 amps

Example 3

40 hp, 208V, 3 phase, wound rotor motor, FLA 118 amps. Overload Protection = 118 amps times 115%=136 amps

The motor overloads must be calculated using the nameplate current and not from Tables 430-148 or 430-150 of the National Electrical Code.



In Example 1, the motor has a 40°C rise, the O.L. unit is sized at 125% of the full load motor current.

In Example 2, the motor has a s.f. (service factor) of 1.15. The O.L. unit is sized at 125% of the full load motor current.

In Example 3, where neither of the two conditions exists, it is sized at 115%.

Glossary of Overload Terms

Full Load Amps (FLA)

This is the current flow required by a motor during normal operation under normal loading to produce its designated horsepower. Motors having nothing attached to their shaft will draw less than the FLA current.

Insulation Class

The National Electrical Manufacturers Association (NEMA) has established insulation classes to meet motor temperature requirements found in different operating environments. The four insulation classes are A, B, F, and H. Class F is commonly used. Class A is seldom used. Before a motor is started, its windings are at the temperature of the surrounding air. This is known as ambient temperature. NEMA has standardized on an ambient temperature of 104°F, or 40°C for all motor classes.

Temperature rises in the motor as soon as it is started. The combination of ambient temperature and allowed temperature rise equals the maximum winding temperature in a motor. A margin is allowed for a point at the center of the motor’s windings where the temperature is higher. This is referred to as the motor’s hot spot.

The operating temperature of a motor is important to efficient operation and long life. Operating a motor above the limits of the insulation class reduces the motor life expectancy. A 50°F (10°C) increase in the operating temperature can decrease the life expectancy of a motor by as much as 50%.

Table G-2: Maximum Winding Temperature

Class A	Class B	Class F	Class H
221°F (105°C)	266°F (130°C)	311°F (155°C)	356°F (180°C)

Locked Rotor Amps

Also known as inrush current, locked rotor amps is the amount of current the motor can be expected to draw under starting conditions when full voltage is applied. This is the current taken from the supply line at rated voltage and frequency with the rotor at rest.

Motor Load

A motor provides the conversion of electrical energy to mechanical energy that enables a machine to do work. The energy that a machine requires from a motor is known as the

motor load. The motor load “seen” by a motor is dependant upon how the load is connected to the motor, the dimensions of the load, and the weight of the load.

A load connected to a motor by a gearbox reduces the load by the square of the gear ratio. If a load is attached to a motor through a 3:1 gear ratio, the load is 1/9 of the load the motor would see if the load were attached directly to the motor.

A round object attached to the motor shaft has a load related to the square of the radius of the object. If a 16" saw blade is a load of weight multiplied by the radius squared, the load is $8^2 \times \text{weight} = 64 \times \text{weight}$. A 20" saw blade is a load of $10^2 \times \text{weight} = 100 \times \text{weight}$. The 20" saw blade is 56% more load than the 16" saw blade due to the dimensions.

A motor load is directly related to the weight of an object. A 16" blade weighs 9.28 pounds. A 20" blade weighs 14.61 pounds, or 5.33 pounds more. The 20" blade is 56% more load than the 16" blade due to weight. Remember, weight is the volume of an object times its density, so weight is also related to the dimensions.

In the example of the saw blades, the combined effect of the longer radius, and longer weight means the 20" saw blade is approximately 125% more load on a motor than a 16" saw blade, which partially explains why motors on quads 1 and 4 are more likely to burn out or trip an overload.

NEMA Design Ratings

NEMA ratings refer to the torque ratings. The following ratings apply to motors:

NEMA B

The NEMA B motor's percentage of slip ranges from 2 to 4%. It has medium values for starting or locked rotor torque, and a high value of breakdown torque.

NEMA A

The NEMA A motor is similar in many ways to the NEMA B motor. It typically has a higher value of locked rotor torque and its slip can be higher.

NEMA C

The NEMA C motors are well suited to starting high-inertia loads. This is because they have high locked rotor torque capability. Their slip is around 5%, and their starting current requirement is average.

NEMA D

The NEMA D motor is found in heavy duty, high-inertia applications. It has high values of slip (up to 8%), and very high locked rotor torque capability.

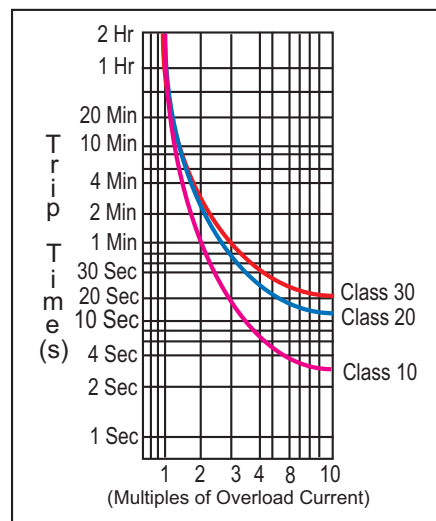
Service Factor (s.f.)

A motor designed to operate at its nameplate horsepower rating has a service factor of 1.0. Some applications may require a motor to exceed the rated horsepower. In these cases a motor with a service factor of 1.15 can be specified. The service factor is a multiplier that may be applied to the rated power. A 1.15 service factor motor can be operated 15% higher than the motor's nameplate horsepower.

Trip Class

Overload relays are rated by a trip class, which defines the length of time it will take for the relay to trip in an overload condition. The most common trip classes are Class 10,


Figure G-3: Trip Times for Trip



Class 20, and Class 30. Class 10, for example, has to trip the motor off-line in 10 seconds or less at 600% of the full load amps. This is usually sufficient time for the motor to reach full speed.

Understanding Motor Starting Problems

There are three major sources of motor starting problems: voltage source problems, control circuit problems, and drive faults. Diagnosing and resolving these problems can be a time-consuming process, but some time can be saved by using an organized process of elimination. The following sections address the most common sources of motor starter problems.

WARNING	
	<p>ELECTROCUTION HAZARD.</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>If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.</p>

Voltage Source Problems

1. Check the incoming power source. Verify that all three phases of power have the proper voltage using a digital multimeter set to voltage mode. If any of the three phases of incoming power are low or missing, disconnect power at the primary disconnect switch and reset the circuit breaker or replace the fuse.
2. Before restoring power at the primary disconnect, verify that there are no phase-to-phase or phase-to-ground shorts at the motor starter line contactors. If necessary, replace starter contacts to correct shorts.
3. Check that motor thermal overloads have not been tripped. Reset the overloads by pressing the reset pushbutton.
4. Check the motor starter leads for phase-to-phase and phase-to-ground shorts. Check for discoloration, hot spots, melted wire or damaged fuses. Correct the motor lead wiring if necessary.

5. Check the motor leads for phase-to-phase and phase-to-ground shorts. Check for discoloration, hot spots, melted wire or damaged fuses. Replace the motor if necessary.
6. Determine if motor windings are breaking down by testing the motor insulation with an insulation tester or taking the motor to a repair shop for testing.
7. Disconnect the motor from its load. Start the motor. If it runs correctly, the problem is associated with the mechanical drive train. If it does not run correctly, replace the motor bearings.

Control Circuit Problems

1. If the incoming power source has all three phases of power, check the motor starter overloads. Reset the motor starter overloads by pressing the reset button.
2. Verify that the control voltage transformer fuse is operating correctly using a digital multimeter set to Ohms. The multimeter should have a low reading. If the multimeter registers no reading or an infinite reading, replace the fuse.
3. Disconnect the motor starter contactor coil. Check for a short or ground. If necessary, replace the motor starter coil.
4. Check the control circuit wiring to the contactor coil while the coil is still disconnected. If a short or ground is present, disconnect the field wiring circuit to the motor starter. Determine whether the problem is with the motor contactor overload circuit or the field control wiring.
5. If a ground is found in the motor starter overloads circuit, replace the overloads. Reconnect the starter coil and control field wiring.
6. If a ground is found in the field wiring circuit, clear the ground. Reconnect the starter coil and control field wiring.
7. Check for an open circuit in the motor overloads or control circuit by using a digital multimeter set for Ohms to verify the motor overloads control circuit is working correctly.
8. Check the PLC contact closure, relay contact closure or start/stop pushbutton circuit that supplies the start signal to the motor starter.

Drive Faults

Before troubleshooting a drive fault, determine whether the fault is a motor, drive, or application fault. Use the fault codes of the drive. If you are unable to locate the source of the fault, contact MiTek Customer Service.

Drawings are inserted at the back of the manual.

Table G-1: Attached Drawings

Drawing Description	Drawing Number
Swingarm enclosure assembly	519663
Carriage wheel assembly	64515
Carriage hold-down assembly	77146
Motor brake assembly, 5-hp	77513
Lumber conveyor assembly, stationary	77754
Motor brake assembly, 10-hp	77764
Lumber conveyor assembly, carriage	77765
Hold-down assembly, powered, right-hand	77776
Carriage drive/conveyor adjustment assembly	77806
Hold-down assembly, carriage	77809
Hold-down assembly, powered, left-hand	77810
Quad #1 assembly, 5-hp	78525
Quad #2 assembly, 5-hp	78530
Quad #3 assembly, 5-hp	78535
Quad #4 assembly, 5-hp	78540
Quad #5 assembly, 10-hp	78545
Quad #6 assembly, centerline	78550
Lumber stop assembly	78560
Electrical assembly	78605
<i>SmartSet</i> assembly, quads 1-5	78610
<i>SmartSet</i> assembly, 30'	78655
Guards and safety devices	78660
Pneumatic assembly, 5-blade	79745
Electrical schematic	90124
Incline conveyor assembly, 24"	7022100

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 ends of the tie
cushion	an attribute of a hydraulic cylinder that allows adjustment of the pressure in each cylinder
directional buttons	the 2 black buttons on the pendant control station that tell the gantry head which direction to move
jigging	any of several devices used to hold the truss in place on the tables
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
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>

Glossary

PLC	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.
port	a connection point for a peripheral device
proximity switch	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
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
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
solenoid	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
Stand-Alone Conveyor	the conveyor system that carries the truss from the tables to the Finish Roller and out to the stacker
torque	a turning or twisting force
transfer roller	a motorized roller sitting perpendicular to the tables on an auto-eject system; it automatically transfers the truss from the Ejectors to the stand-alone conveyors

Glossary

transmitter bar	the light bar that transmits the signal to the receiver bar; every light bar set consists of a receiver bar and a transmitter bar
VFD	Variable Frequency Device; controls the speed of the cycle
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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