Operation and Maintenance Manual

RoofTracker™

Roof Truss Roller Press

001075
Rev. F

Equipment Manual

RoofTracker™

Roof Truss Roller Press

U.S. and other patents pending

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U.S. 5,468,118
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U.S. 5,553,375
U.S. 6,079,325
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U.S. 6,330,963
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Notice of Change

Use this page to record Service Bulletins and Notices that you receive to keep your manual updated.

Equipment Manual
RoofTracker™ Roof Truss Roller Press

Service Bulletin or Notice #	Dated	Title

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Safety (English)

For safety information in Spanish, refer to page 11.

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

- Follow installation instructions completely.
- 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.

Lockout/Tagout

- Before performing maintenance on the pneumatic or hydraulic systems, bleed the lines to eliminate pressure.
- Lockout/tagout all energized systems before performing maintenance on them. Refer to the *Lockout/Tagout Guidelines* section on page 15.

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 19.
- Perform the safety tests recommended in the Safety Test section on page 20 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 18.

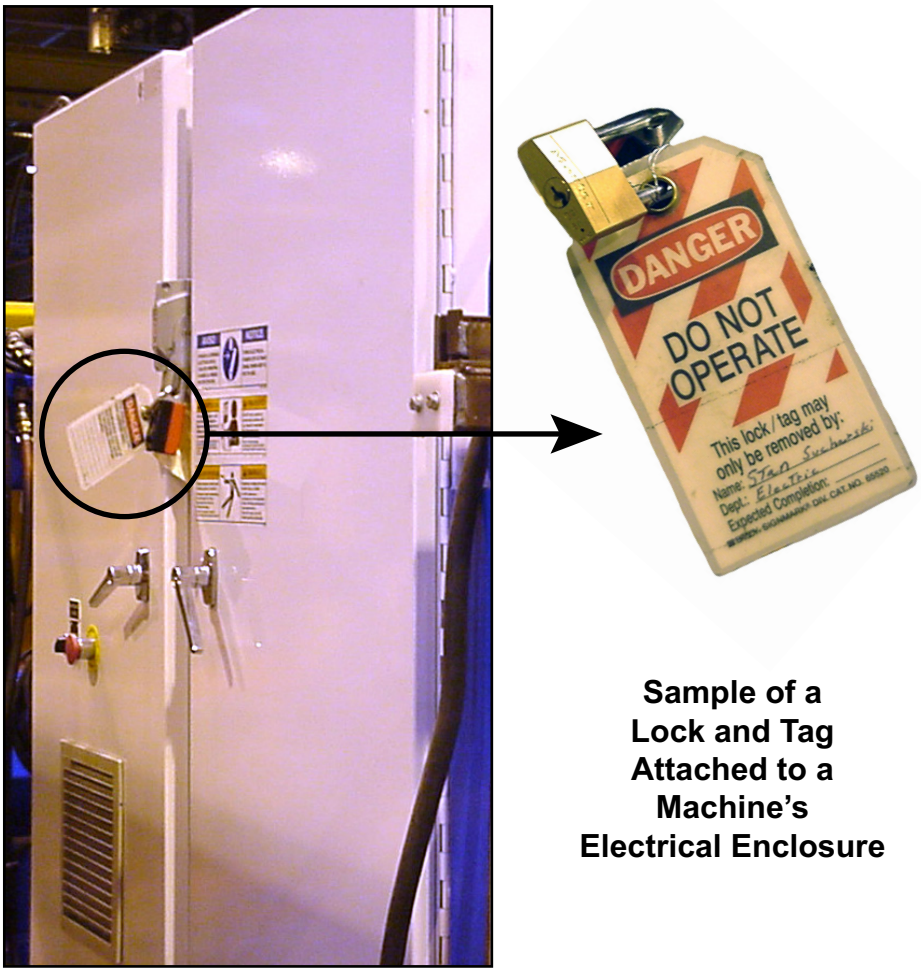
Before performing maintenance on any machine with electrical power, lockout/tagout the machine properly. When working on a machine outside of the machine's main electrical enclosure, not including work on the electrical transmission line to the machine, follow your company's approved lockout/tagout procedures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

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

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



Sample of a Lock and Tag Attached to a Machine's Electrical Enclosure

When Working on a Machine Inside the Machine's Main Electrical Enclosure or in the Electrical Transmission Line to the Machine

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

1. Engage an E-stop on the machine.
2. Shut the power to the machine off at the machine's power source which is usually an electrical service entry panel on the facility wall. One example of a locked-out power source panel is shown in Figure 2.
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 SAFETY-2: Lockout/Tagout on the Power Source Panel

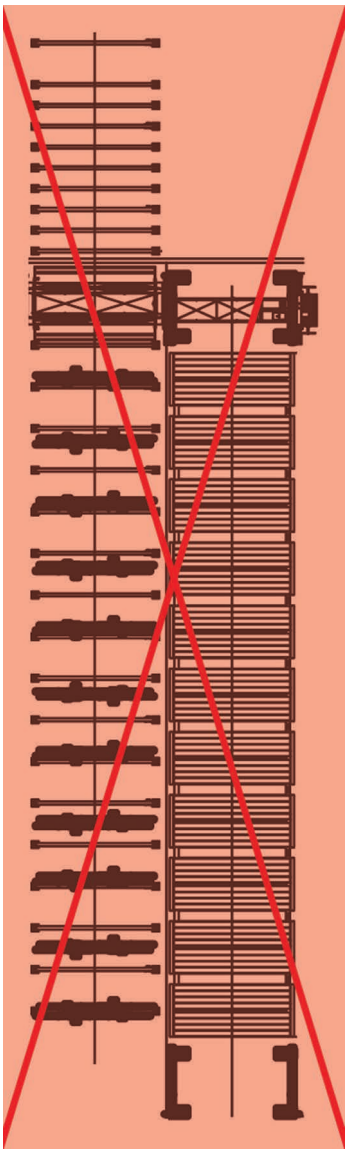
Troubleshooting With an Energized Machine

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

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

Restricted Zone

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



Safety Test

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

Performing the Test

Supplies Required

To perform this test, you will need two (2) pieces of lumber connected in the shape of a T so that the T will independently stand upside down to look like ⊥.

Terminology Used in This Procedure

You must be familiar with the following terms to follow this test procedure.

Table SAFETY-1: Definitions of Terminology Used

wooden T	Described in *Supplies Required*
right light bar set	The pair of light bars on the right side of the gantry head when facing it from the operator end
left light bar set	The pair of light bars on the left side of the gantry head when facing it from the operator end
RIGHT directional button LEFT directional button REVERSE directional button FORWARD directional button	On systems with one (1) electrical enclosure on top of the gantry head and a single-pendant control, the directional buttons are labeled LEFT and RIGHT. On systems with two (2) electrical enclosures on top of the gantry head and a single-pendant control, FORWARD is toward the left when facing the disconnect switch and REVERSE is toward the right.

	DANGER
	**Never stand directly in front of the gantry head!** **If the gantry head fails to stop when expected, serious injury or death may occur.**

Testing the Light Bars

1. Ensure the disconnect handle is in the ON position.
2. Press the START button on the pendant.
3. While the gantry head is sitting still, place the wooden T so it interrupts the beam between the right light bar set.
4. Verify that the green indicator light labeled RIGHT READY/REVERSE START turns off when the beam is interrupted.
5. Place the wooden T on the table so the T is upside down and it is freestanding. Locate it to the right and at least 10 ft away from the gantry head.
6. Press and release the START button to reset the safety indicators. This will tell the Press that it can resume motion.
7. Verify the green RIGHT READY/REVERSE START light illuminates when you press START.
8. Press and hold the RIGHT/REVERSE directional button on the pendant control (or push the joystick in the direction you want the gantry head to move while holding the white button).
9. Allow the gantry head to reach the wooden T. The motion of the machine should stop immediately.
10. Ensure the wooden T is continuing to block the light bar beam. If necessary, move the wooden T so it remains in the light bar detection zone.
11. Verify that the machine will **not** continue to move forward while the wooden T is in its detection zone by pressing the RIGHT/REVERSE directional button (or moving the joystick in the direction you want the gantry head to move while holding the white button).
12. Verify that the brake is working properly by noting any warnings or alarms on the brake monitor.

13. Repeat this test in the LEFT/ FORWARD direction.

14. If any of the light bars fail this test, refer to the *Correcting a Failed Test* section to repair the problem, then repeat the test in both directions.

The purpose of this test is to ensure that the electrical system is wired correctly so motion stops when a light bar beam is interrupted. It is important that both directions are tested.

15. Continue to the next section to test the bumpers.

Testing the Bumpers

1. Place a large, heavy, freestanding object (such as a trash can) in the path of the right, operator-side bumper, but at least 10 ft away from the bumper.

2. Press and hold the RIGHT/REVERSE directional button (or joystick and white button) until it hits the heavy object in its path. The gantry head should stop immediately when the bumper hits the object.

3. Test the remaining three (3) bumpers in this manner.

4. If any of the light bars or bumpers fail this test, refer to the *Correcting a Failed Test* section to repair the problem, then repeat the test in both directions

Correcting a Failed Test

If the gantry head moves in the opposite direction from what you expected, and the light bar on the side it is moving stops motion:

Switch the two (2) labels on the directional buttons on the pendant. The machine is wired correctly, but the labels on the pendant are backwards.

If the gantry head moves in the opposite direction from what you expected, and only the light bar on the opposite side stops it:

Swap any two (2) of the wires at the output side of the VFD.

If the gantry head moves in the expected direction, and only the light bar on the opposite side stops it:

Check the light bar wiring against the correct drawing:

Drawing 90524 for 2-enclosure machines

Drawing 90544 for 1-enclosure machines

If the wiring does **not** match the drawing, correct it. If the wiring **does** match the drawing, refer to the *Troubleshooting* appendix.

If a retracted bumper fails to stop the motion of the gantry head:

1. Examine the bumper for bent or damaged parts.
2. Examine all bearings.
3. Examine the location of the collars.
4. Examine the point of intersection between the bumper and the light bar beam.
5. Repair, re-align, or adjust any questionable components.
6. Repeat the bumper test.

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

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

Procedimientos de Bloqueo/Etiquetado

- Antes de realizar el mantenimiento de los sistemas neumáticos o hidráulicos, purgue las líneas para eliminar la presión.
- Bloquee y etiquete todos los sistemas energizados antes de realizar tareas de mantenimiento en ellos. Refiérase a la sección *Pautas de bloqueo/etiquetado* en la página 16.

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 21.
- Realice las pruebas de seguridad recomendadas en la sección Prueba de seguridad en la página 22 antes de utilizar el equipo por primera vez, después de cualquier tarea de mantenimiento y conforme a 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 19.

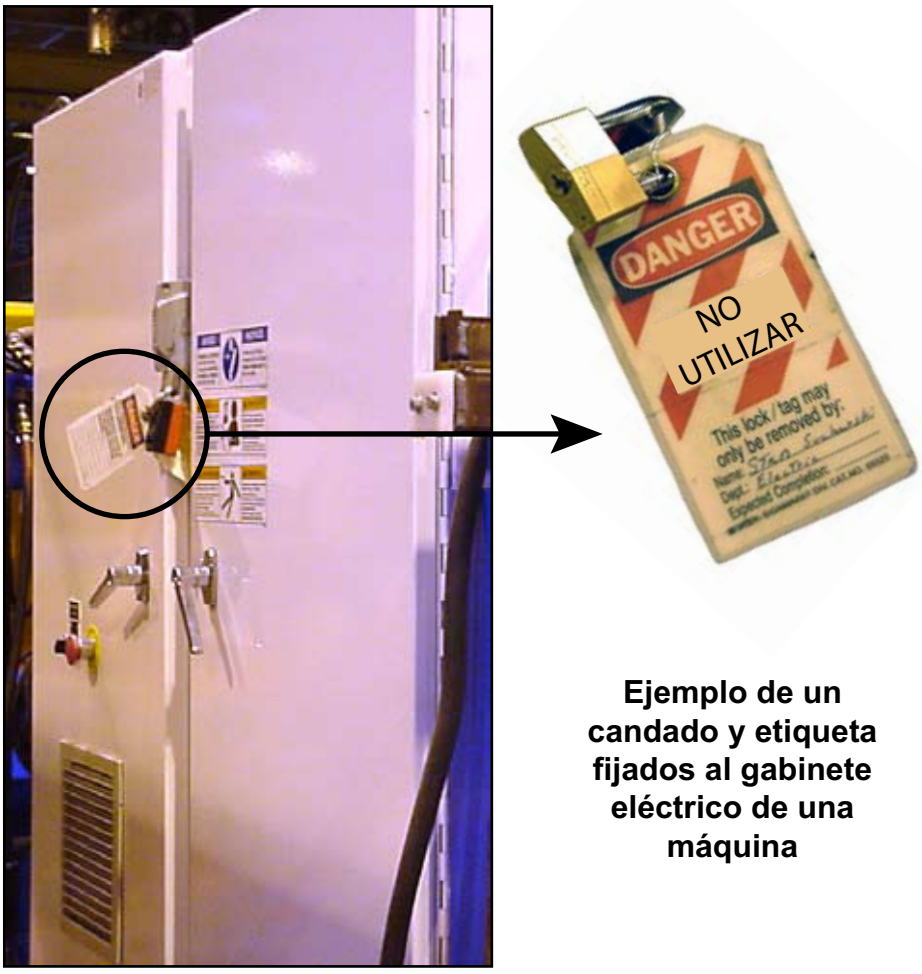
Antes de realizar el mantenimiento de cualquier máquina con alimentación eléctrica, bloquee y etiquete la máquina de forma adecuada. Cuando trabaje en una máquina fuera del gabinete eléctrico principal de la máquina, salvo en el caso de trabajos en la línea de transmisión eléctrica a la máquina, siga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

	RIESGO DE ELECTROCUCIÓN. **Cuando el interruptor con fusibles está apagado, sigue habiendo energía dentro del gabinete del interruptor. ¡Apague siempre la alimentación en la fuente de alimentación del edificio antes de abrir este gabinete eléctrico!**

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.

Figure SEGURIDAD-1: Bloqueo/etiquetado en el gabinete eléctrico principall



Ejemplo de un candado y etiqueta fijados al gabinete eléctrico de una máquina

Cuando trabaje en una máquina dentro del gabinete eléctrico principal de la máquina o en la línea de transmisión eléctrica a la máquina

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

1. Coloque un freno de emergencia sobre la máquina.

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

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

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

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

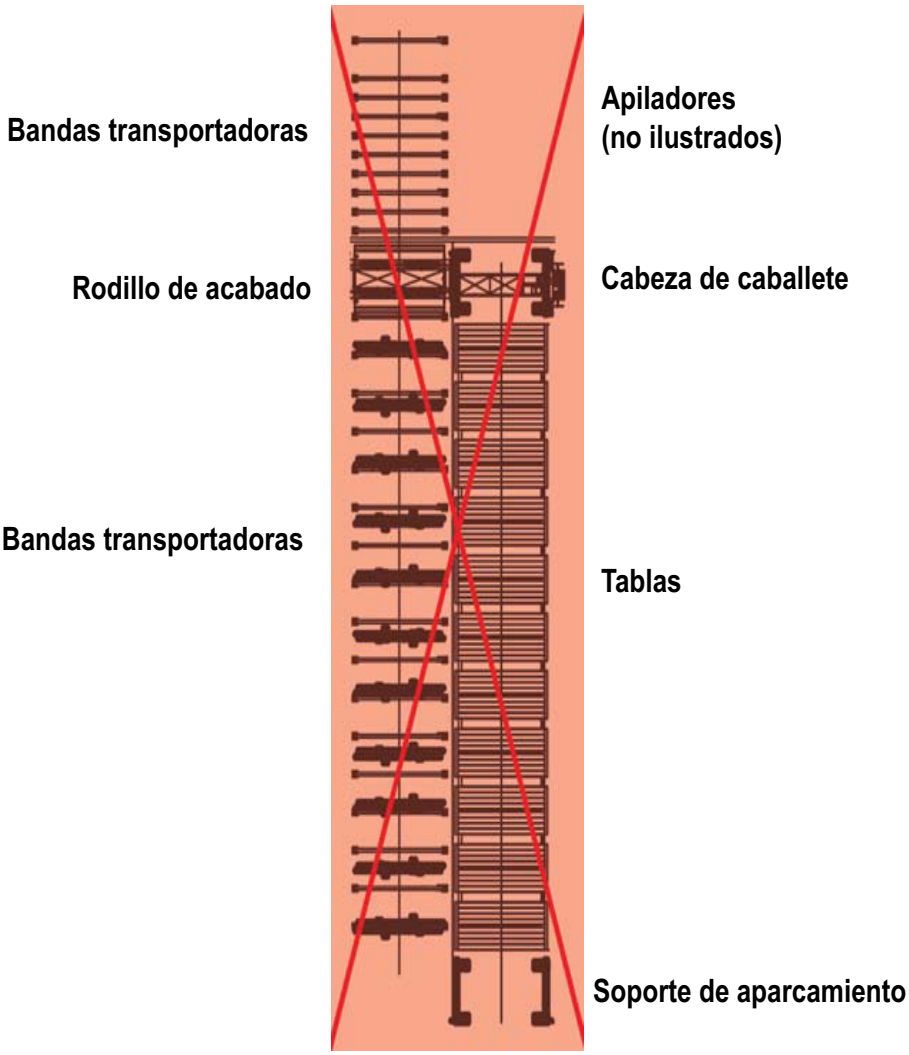
Solución de problemas con una máquina energizada

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

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

Zonas restringida

	Manténgase afuera de la zona restringida cuando el equipo esté en uso. Pueden producirse lesiones graves o incluso la muerte si el personal está en la zona restringida.



Prueba de seguridad

El siguiente procedimiento de prueba **DEBE** ser realizado por personal calificado después de **CUALQUIER** tarea de mantenimiento, ajuste o modificación. La prueba permite verificar que la barra de luz, el sistema de seguridad y el sistema de control de la máquina funcionen bien juntos para detener la máquina en forma adecuada.

Realización de la prueba

Materiales requeridos

Para realizar esta prueba, necesitará dos (2) piezas de madera unidas en forma de T que puedan colocarse y mantenerse por sí solas en posición invertida como se muestra. ⊥.

Terminología utilizada en este procedimiento

Para realizar este procedimiento de prueba debe estar familiarizado con los siguientes términos.

Tabla SEGURIDAD-1: Definiciones de los términos utilizados

T de madera	Se describe en la sección *Materiales requeridos*
juego de barras de luz derecho	Par de barras de luz del lado derecho del caballete cabeza vista desde el extremo del operador.
juego de barras de luz izquierdo	Par de barras de luz del lado izquierdo del caballete cabeza vista desde el extremo del operador.
Botón de dirección RIGHT (derecha) Botón de dirección LEFT (izquierda) Botón de dirección REVERSE (marcha atrás) Botón de dirección FORWARD (avance)	En los sistemas con una (1) caja eléctrica sobre la cabeza del caballete y un control de un solo suspensor, los botones de dirección están identificados como LEFT y RIGHT. En los sistemas con dos cajas eléctricas (2) sobre la cabeza del caballete y un control de un solo suspensor, el botón FORWARD se encuentra hacia la izquierda mirando de frente el interruptor con fusibles y el botón REVERSE hacia la derecha.

	PELIGRO
	**¡No se pare nunca delante de la cabeza del caballete!** **Si ésta no se detiene en el momento adecuado, podría sufrir lesiones serias, o incluso la muerte.**

Prueba de las barras de luz

1. Asegúrese de que el mango de desconexión está en la posición ON (encendido).
2. Pulse el botón START (arranque) en el suspensor.
3. Mientras la cabeza del caballete está fija, coloque la T de madera de modo tal que interrumpa el haz entre el juego de barras de luz derecho.
4. Verifique que la luz indicadora de color verde identificada como RIGHT READY/ REVERSE START (derecha lista/iniciar marcha atrás) se apague cuando se interrumpe el haz.
5. Coloque la T de madera sobre la mesa en posición invertida y estable. Ubíquela hacia la derecha y a una distancia de al menos 10 pies de la cabeza del caballete.
6. Presione y libere el botón START para resetear los indicadores de seguridad. Esto indicará a la prensa que puede reanudar el movimiento.
7. Verifique que la luz RIGHT READY/REVERSE START verde se ilumina al presionar START.
8. Presione y mantenga presionado el botón de dirección RIGHT/REVERSE en el control de suspensor (o empuje el joystick en la dirección en que desea que se mueva la cabeza del caballete mientras mantiene presionado el botón blanco).
9. Deje que la cabeza del caballete alcance la T de madera. El movimiento de la máquina debe detenerse inmediatamente.
10. Asegúrese de que la T de madera continúe bloqueando el haz de la barra de luz. Si es necesario, mueva la T de madera para que permanezca en la zona de detección de la barra de luz.
11. Verifique que la máquina **no** continúe avanzando mientras la T de madera está en su zona de detección presionando el botón de dirección RIGHT/REVERSE (o moviendo el joystick en la dirección en que desea mover la cabeza del caballete mientras mantiene presionado el botón blanco).
12. Verifique que el freno está funcionando de forma apropiada y tome nota de cualquier advertencia o alarma en el monitor del freno.

13. Repita esta prueba en la dirección LEFT/FORWARD

14. Si alguna de las barras de luz no pasa esta prueba, refiérase a la sección *Corrección en caso de no pasar la prueba* para solucionar el problema y luego repita la prueba en ambas direcciones.

El propósito de esta prueba es asegurarse de que el sistema eléctrico esté correctamente conectado de modo tal que el movimiento se detenga cuando se interrumpe el haz de una barra de luz. Es importante realizar la prueba en ambas direcciones.

15. Continúe con la siguiente sección para probar los topes.

Prueba de los topes

1. Coloque un objeto grande, pesado y autoestable (como un bote de basura) en el recorrido del tope derecho del lado del operador, pero a una distancia de al menos 10 pies del tope.

2. Presione y mantenga presionado el botón de dirección RIGHT/REVERSE (o el joystick y el botón blanco) hasta que golpee el objeto pesado en su recorrido. La cabeza del caballete debe detenerse inmediatamente cuando el tope golpea el objeto.

3. Pruebe los tres (3) topes restantes de la misma manera.

4. Si alguna de las barras de luz o topes no pasa la prueba, refiérase a la sección *Corrección en caso de no pasar la prueba* para solucionar el problema y luego repita la prueba en ambas direcciones

Corrección en caso de no pasar la prueba

Si la cabeza del caballete se mueve en dirección opuesta a la esperada y la barra de luz del lado en que se está moviendo la detiene:

Cambie las dos (2) etiquetas de los botones de dirección del suspensor. La máquina está correctamente conectada, pero las etiquetas del suspensor están invertidas.

Si la cabeza del caballete se mueve en dirección opuesta a la esperada, y sólo la barra de luz del lado opuesto la detiene:

Cambie cualquiera dos (2) de los cables del lado de salida del VFD.

Si la cabeza del caballete se mueve en la dirección esperada, y sólo la barra de luz del lado opuesto la detiene:

Inspeccione la conexión de la barra de luz con el plano correcto:

Plano 90524 para máquinas de 2 cajas

Plano 90544 para máquinas de 1 caja

Si la conexión **no** coincide con la del plano, corríjala. Si la conexión coincide con la del plano, refiérase al apéndice *Solución de problemas*.

Si un tope retraído no detiene el movimiento de la cabeza del caballete:

1. Examine el tope para verificar que no tenga partes dobladas ni dañadas.
2. Examine todos los cojinetes.
3. Examine la ubicación de los collares.
4. Examine el punto de intersección entre el tope y el haz de la barra de luz.
5. Repare, vuelva a alinear o ajuste cualquier componente cuestionable.
6. Repita la prueba del tope.

General Information

Chapter 1

Purpose of Chapter

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

Introduction

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

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

Table 1-1: Navigational Tools Used Throughout the Manual

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

Additional Resources

Supplemental Documentation

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

- Transient voltage suppressor
- Relay expansion module
- Fuse kits
- CD-ROM and manual for the VFD

Web Site

Visit the MiTek Web site at www.mii.com for up-to-date information on all MiTek equipment. View the latest revision of this manual and all Service Bulletins, or order parts on-line through our *eStore*™.

Contacting MiTek

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

Figure 1-1: Contacting MiTek

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

Introduction to the Equipment

Purpose

The primary function of the *RoofTracker*™ roof truss roller press system is to press *MiTek*® connector plates into roof trusses to connect roof truss components.

Overview

The *RoofTracker* roof truss roller press system consists of a gantry head, which houses the roller that causes the initial embedment of the connector plates; a set of tables that holds and supports the truss and gantry head; a Stand-Alone Conveyor system; and a Finish Roller that completes the plate embedment process. The system components can be seen in Figure 1-2. Refer also to Table 1-2 on page 16 and Table 1-3 on page 17.

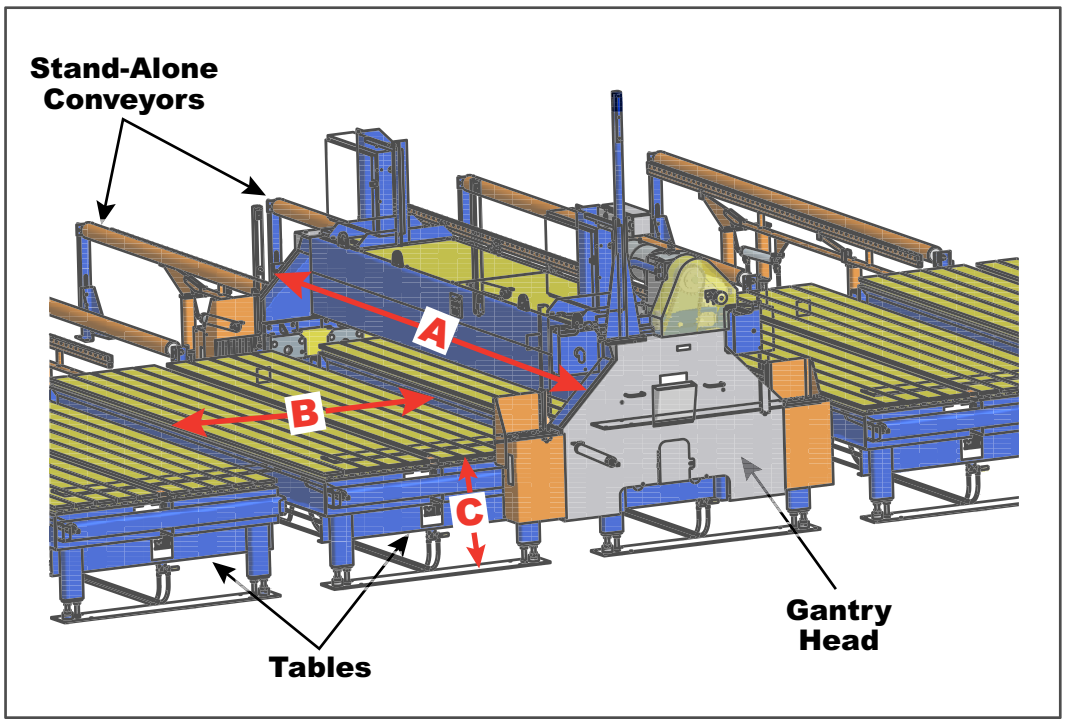
What This Manual Covers

This manual addresses the *RoofTracker* gantry head.

Separate manuals exist for the Finish Roller, Stand-Alone Conveyors, *STT* Tables, and for any gantry heads used along with the *RoofTracker* gantry head.

Throughout this manual, the term "*RoofTracker* press" is used to refer to the entire system.

Figure 1-2: *RoofTracker* Press, Shown With a 2-Enclosure Electrical System



Components and Options

Main Components

Table 1-2: Main Components of the *RoofTracker* Press

Component	Description	Part # to Order
Gantry Head WITHOUT operator platform, WITH pendant control station	Moves across the tables for the initial plate embedment	63750-501-(xxx)V
Gantry Head WITH operator platform, WITH joystick	Moves across the tables for the initial plate embedment	63826-501-(xxx)V
Tables	Support the truss material while being pressed by the gantry head; feature slotted tops for jigging, walk-through aisles, and several choices for ejection system configuration	See your *STT* Tables manual for part numbers, or speak to a MiTek Sales Representative
Parking Stands	Areas to park the gantry head to allow all working surfaces of the tables to be accessible.	63630-501 (left-hand) 63630-502 (right-hand)

Component Options

Table 1-3: Peripheral Components That May Be Used With the *RoofTracker* Press

Component	Description	Part # to Order
Receiver Stands	Receive the truss from the ejectors and place it on the Stand-Alone Conveyors	63635-501
Stand-Alone Conveyors	Transport the truss from the tables to the Finish Roller and from the Finish Roller to the stacking area	66225-501 *(electrical components sold separately)*
Stacker	Takes the truss from the conveyor system and stacks it for shipping (not discussed in this manual)	Dependant on type of stacker
Virtek™ Laser Projection System	Projects an exact laser template of the truss onto the table surface for easy and accurate setups (not discussed in this manual)	Contact Machinery Division Customer Service
Finish Roller	Completes the plate embedment process (not discussed in this manual)	68300-(xxx)V

Table 1-4: Optional Components and Parts

Component	Description	Part # to Order
Ejectors	Automatically lift the truss off the table and offset it for easy removal; contact your MiTek Sales representative for information on table options	Included in tables
Scale Kits for Tables	Measuring scales that adhere to the tables, recommended if not using a laser projection system	63761-501
Top-Chord Operator Platform	Saves space by allowing the operator of the gantry head to ride over the conveyor line instead of using the standard bottom-chord platform	65551-501
Interlock for Multiple Gantry Heads with Top-Chord Operator Platform	Prevents the gantries from colliding. All roof truss lines with multiple gantry heads and top-chord operator platforms must have this option. Contact MiTek Machinery Division Customer Service.	Varies based on number of gantries used

Operating Options

In addition to the optional operating mechanisms mentioned in Table 1-4, you may choose to install multiple gantry heads that use the same tables and conveyor system to give your plant more flexibility.

The table design allows a *RoofTracker* press to be used in conjunction with a *RoofGlider*® press or an *AutoPress*™ machine to add capabilities to an existing press.

A 12-ft gantry head is also available. Contact your MiTek Sales Representative for more information.

General Specifications

Table 1-5: General Specifications of the *RoofTracker* Press

GANTRY HEAD	
Speed	165 ft/min
Direction of Movement	Left and right (forward and reverse)
Height Adjustment	0" to 6"
Roller Diameter	24"
Roller Wall Thickness	3/4"
Baffles Per Roller	4
Throat Opening	14' 1-1/2"
Shaft Diameter	4"
Bearing Size	3-7/16"
Acceptable Wood Member Thickness	3/4" to 6"
MOTOR ON GANTRY HEAD- ELECTRIC	
Horsepower	10 hp
Voltage	575/460/230/208 VAC
Amperage	10.3/12.9/25.8/28.5 amps
Cycles (Frequency)	60 Hz
Phases	3
DIMENSIONS OF SYSTEM COMPONENTS	
See Table 2-2	
WEIGHT OF SYSTEM COMPONENTS	
See Table 2-5	

Truss Terminology

Table 1-6: Truss Terminology

Length Types	Height Types	
Overall length	H1	Board height
Centerline length	H2	Centerline height
Top length	H3	Centerline height
Bottom length	H4	Centerline height

Figure 1-3: Terminology Diagram

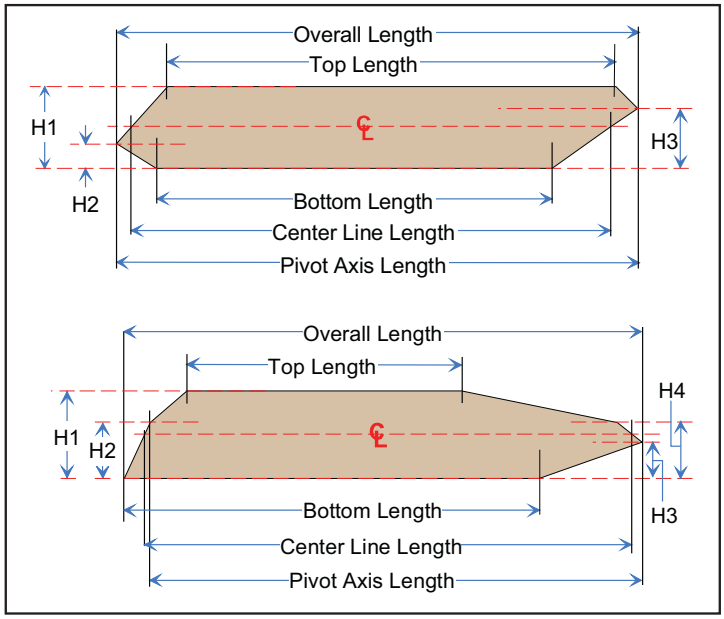
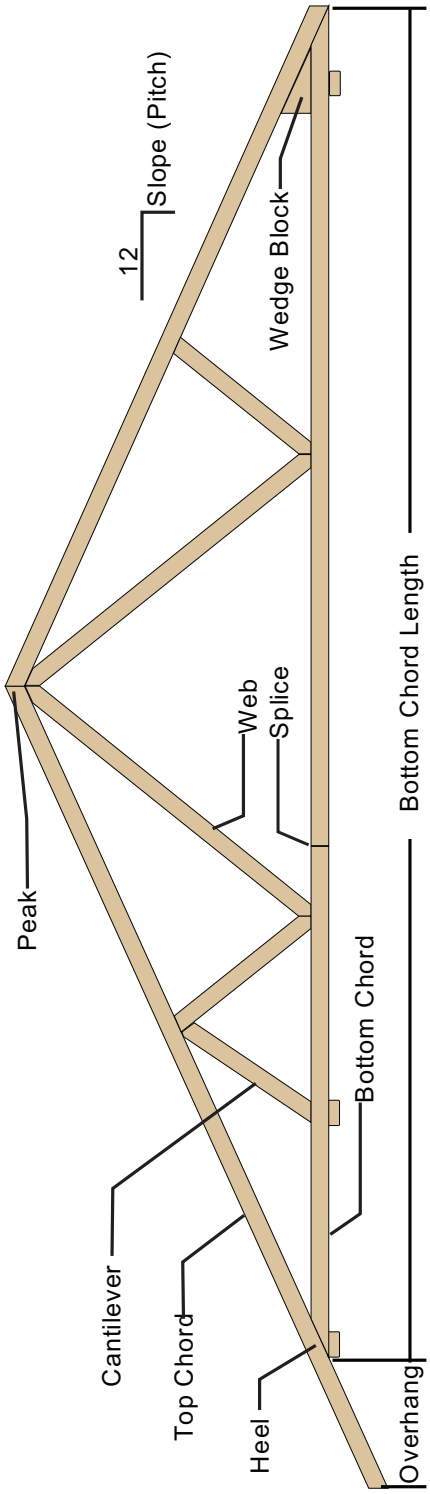


Figure 1-4: Parts of a Truss



Prior to Installation

Chapter 2

Purpose of Chapter

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

Pre-Installation Overview

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 a MiTek representative is managing the installation of your equipment, the requirements in Table 2-1 must be satisfied before the scheduled installation date, or the installation may need to be rescheduled. Refer to your Pre-Installation Agreement for more details.

Table 2-1: Pre-Installation Requirements

Space	This equipment requires enough space to allow for the machine dimensions listed in Table 2-2, plus additional working space for operation and maintenance. Operation space should ensure safety, freedom of movement, storage, and a free flow of materials. Space should have adequate lighting.
Location	Concrete, a minimum of 6” thick 5000 psi, is required under the weight of the *RoofTracker* system. The gantry head is made to be durable. It should be operated in a covered area without extreme temperature changes.
Electrical	The standard electrical requirements are shown in Table 2-3. Contact your MiTek representative if custom power specifications need to be arranged.
Customer-Supplied Parts	The customer is responsible for having the supplies listed in Table 2-4 at the time of installation.

Space Requirements

Space must be allocated for the following:

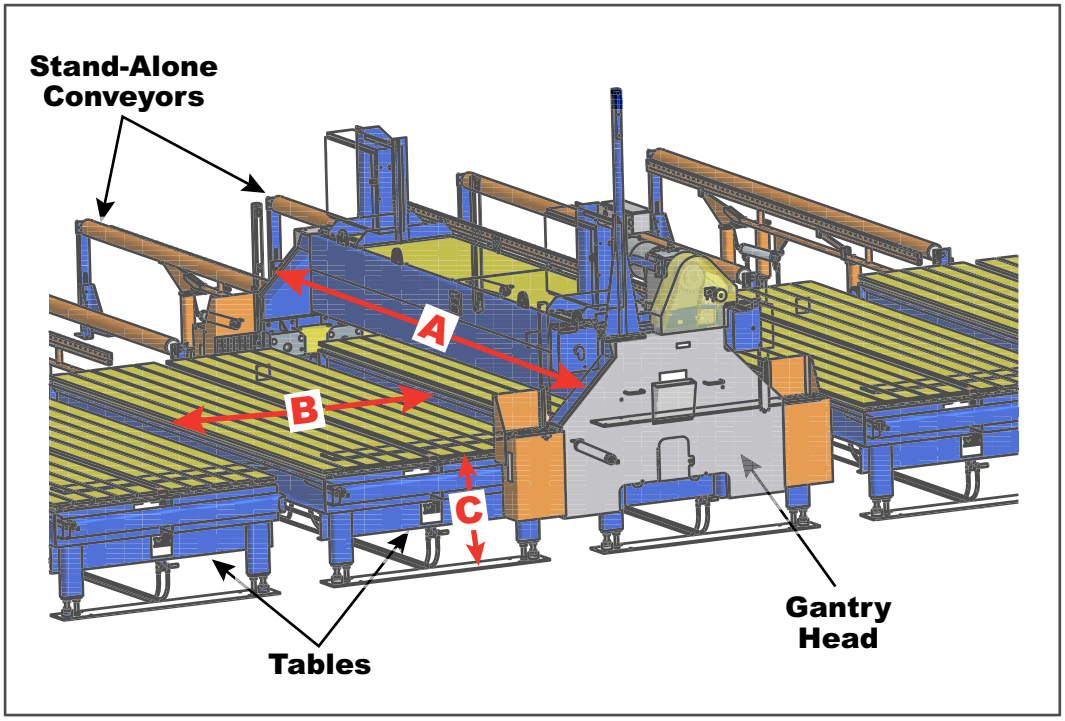
- Physical dimensions of the gantry head, tables, Stand-Alone Conveyors, Finish Roller, and all accessories.
- Space between tables, between Stand-Alone Conveyors, and between components.
- Adequate space for safe operation and maintenance of the equipment.

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

Space for the Equipment

It is the customer's responsibility to provide adequate space for the installation, operation, and protection of the equipment. Use Figure 2-1 in combination with Table 2-2 to determine the physical dimensions of your equipment. Additional space is required for operation, maintenance, and optional equipment.

Figure 2-1: Terminology for Dimensioning



Determining the Space Needed for Your System

Table 2-2: Approximate Equipment Dimensions

	Dimension A		Dimension B		Dimension C		Space Between	
	Feet & Inches	*Inches Only*	*Feet & Inches*	*Inches Only*	*Feet & Inches*	*Inches Only*	*Feet & Inches*	*Inches Only*
Gantry Head	16' 5"	197"	8' 4"	100"	approx. 10'	approx. 120"	N/A	N/A
Parking Stand	14' 11"	179"	8'	96"	even with tables	even with tables	—	up to 15"

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.

Electrical enclosures must have the required amount of space clear in front of them (usually 3 ft).

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 under the *RoofTracker* system. Five thousand (5000) psi concrete is recommended. Refer to your layout drawing.

Environment

The gantry head is made to be durable, but not all electrical enclosures are for outdoor use. It is recommended that the equipment be operated in a covered area without extreme temperature changes. Under no circumstances should the electrical enclosures be sprayed with a hose. Lighting should be adequate for safe operation and maintenance.

Electrical Requirements

Standard Electrical Requirements

The standard electrical requirements are shown in Table 2-3. Each machine can be designed for any of the incoming voltages listed.

Table 2-3: Electrical Requirements Prior to Installation

Horsepower	10 hp			
Voltage	208 VAC	230 VAC	460 VAC	575 VAC
FLA Plus Control Amps	33.3 amps	30.14 amps	15.08 amps	12.04 amps
Electrical Protection on Machine at Disconnect Switch (Time-Delay Fuses)	50 amps	50 amps	25 amps	20 amps
Cycles (Frequency)	60 Hz			
Phases	3			

Electric Cable or Bus Bar

Most systems utilize an electric cable held in place by cable trolleys to supply power to the gantry head, but a bus bar can be used instead. Depending on the length of your system and several other variables, a bus bar may be required. Discuss these options with your MiTek representative before the installation date.

Customer-Supplied Parts

The customer must supply the parts shown in Table 2-4. Some must be installed before installation occurs and some must be available for use at the time of installation.

Table 2-4: Customer-Supplied Parts

Item	Description	
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" connectors	
Transport Equipment	Forklift, chains, and spreader bars capable of carrying 8 tons	
Tools That May Need to be Rented	Transit with measuring stick	
	Industrial hammer-drill	
General Tools	Tape measures (2)	Hammers (2)
	Pliers to cut skid bands	Sockets: 3/4", 9/16"
	Chalk line	Allen wrenches: 1/8", 5/32"
	Sledge/mallet for concrete anchors	1/2" masonry drill bit

Shipping Information

Table 2-5 shows the weight of the individual components of a typical *RoofTracker* gantry head.

Table 2-5: Shipping Information

Contents of Shipment	Weight
Gantry Head	10,000 lb

Purpose of Chapter

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

MiTek will provide installation supervision to ensure that the system is installed properly and operates correctly. We will also provide operating and maintenance training.

Delivery

Unloading

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 *RoofTracker* gantry. Exercise extreme caution to avoid damage or misalignment during unloading. Do not apply pressure on any moving parts or fittings. Support the weight at the bottom of the machine base.

A heavy-duty forklift is required to move the equipment during unloading and placement of the machine. If there are any questions regarding the unloading or placement process, please contact your MiTek representative.

	CAUTION
	**Chains and spreader bars used to lift and unload the equipment must be rated appropriately. See Table 2-5 for the weight of each component.** **If a chain breaks while moving equipment, personal injury and equipment damage may result.**

Unpacking

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

Equipment Layout

The components of the *RoofTracker* system must be located in specific locations. Refer to your own layout during installation for specific measurements. Your MiTek representative will provide your layout to you before the equipment is installed.

Installing the Finish Roller

Refer to your Finish Roller manual for information on installing the Finish Roller.

Installing the Tables and Stand-Alone Conveyors

Refer to your *STT* Tables manual and Stand-Alone Conveyor manual for information on installing the table line and conveyor system.

Installing the Gantry Head

Supplies Needed

Customer-supplied parts required (also found in Table 2-4):

8-ton forklift
Transit w/measuring stick
Industrial hammer drill

Additional supplies needed for the Installing the Parking Stands section that follow:

Tape measure
Pliers to cut skid bands
Chalk line
Hammer
Sledge/mallet for concrete anchors
Sockets: 3/4", 9/16"
Allen wrenches: 1/8", 5/32"
1/2" concrete drill bit

Installing the Parking Stands and Gantry Head

Discuss with your *MiTek* representative when to install the parking stands. Your options vary depending on the amount of space available at either end of the tables for placing the gantry head. It may be necessary to install the gantry head before one of the parking stands is installed.

When installing the parking stands, the sides of the stands must be even with the sides of the tables. Place each parking stand up to 15 in. from the end of the first (or last) table. The anchor plates are already attached to the parking stands.

1. Install the first anchor plate.

    a) Determine the anchor configuration and locate the hardware.

        1) The anchor plates must be attached using all four holes.
        2) Concrete anchors (1/2 in. x 4-1/2 in.), washers, and nuts are supplied (50 of each per box).
        3) Additional boxes can be ordered if needed.

    b) Install four (4) concrete anchors per anchor plate

        1) Using an industrial hammer drill and a 1/2-in. drill bit, drill a hole at least 6 in. deep. For best results, drill the hole completely through the concrete pad.

If you do not drill completely through the concrete, you must vacuum out the concrete dust before proceeding with the next steps.

        2) Assemble a concrete anchor so one washer is placed onto the anchor, and a nut is screwed onto the end.
        3) Place the anchor in the hole, flanged end first.
        4) Use a mallet or hammer to pound the anchor into the hole until the nut reaches the anchor plate.
        5) Use an industrial hammer-drill and 3/4-in. hex head socket to tighten the nut onto the anchor. The nut should be slightly above the threads.

2. Place the second anchor plate.

Always measure subsequent anchor plates from the first anchor plate installed in that row!

3. Install the remaining anchor plates using the same procedure as for the first two. Refer to your individual layout for anchor plate locations.

After the parking stands are installed, the parker flags need to be welded onto the inside edge of the track tube. For a standard parking stand, the flags should be welded perpendicular to the tube, 85-1/4 in. from the leading edge of the track tube. Refer to Drawing 63630-501. For all other parking stands, contact your MiTek Customer Service Representative for the correct dimensions.

Releasing the Manual Brake

The installation of the gantry head should be supervised by a *MiTek* representative. When sliding the gantry head onto the tables, it is necessary to manually release the brake. The manual brake lever is shown in Figure 6-2 in the *Maintenance* chapter.

Aligning the Light Bars

The gantry head will not operate properly unless the light bars in each set are perfectly aligned with each other. This procedure is discussed in the *Assembling the Light Bars & Beacon* section under *Electrical* later in this chapter.

Adjusting the Roller Height

Once the gantry head is in place, you may need to adjust the height of the roller to accurately embed the connector plates. To adjust the roller height, follow the instructions in the *Adjusting the Roller Height* section in the *Maintenance* chapter.

Do not allow the gantry head to sit in one place for a long period of time after installing it on the table and parking stand assembly. This may cause flat spots to form on the polyurethane wheels.

Move the gantry head at least every three (3) days to prolong the life of the wheels.

Festoon Cable or Bus Bar

Most systems utilize an electric festoon cable held in place by cable trolleys to supply power to the gantry head, but a bus bar can be used instead. Depending on the length of your system and several other variables, a bus bar may be required. Discuss these options with your *MiTek* representative before installation.

Overview of the Festoon Cable System

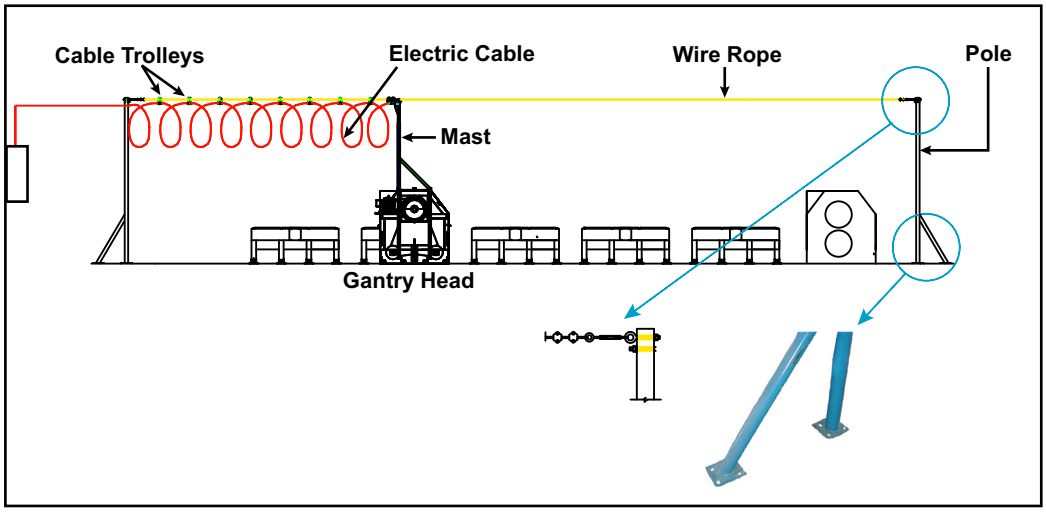
If your system is using a festoon cable, the gantry head receives its power from a traveling cable running from the appropriate electrical enclosure to the top of the gantry head. See

Figure 3-1. The cable is attached to a wire rope by trolleys that allow the cable to easily extend when the gantry head is at the opposite end of the table and neatly gather it to prevent it from hanging too low when the gantry head is at the end closest to the electrical enclosure. The wire line holding these trolleys can be attached directly to the wall or to a pole designed for this purpose.

Installing the Festoon Cable

Refer to your layout to determine the minimum amount of space the cable trolleys will require between the pole or the wall and the mast on the gantry head.

Figure 3-1: Festoon Cable Assembly



If using the pole, it is installed in the same manner that the parking stand anchor plates were installed. The pole has two (2) anchor plates, each with four (4) holes. The same anchor bolts used on the tables and conveyors will work here.

If attaching the wire rope directly to the wall, use an eye-hook bolt to penetrate completely through a wooden or metal stud, and fasten the eye-hook with washers and a nut on the opposite side of the wall.

Table 3-1: Wire Rope and Cable Trolley Requirements for a Festoon Cable System

# of Tables	Length of Wire Rope (feet)	# of Cable Trolleys (See your layout for space required.)
1	50	**9**
2	50	**9**
3	60	**9**
4	60	**9**
5	70	**10**
6	70	**10**
7	80	**10**
8	90	**11**
9	100	**12**
10	100	**12**
11	110	**13**
12	120	**14**
13	120	**14**
14	130	**15**
15	140	**16**
16	140	**16**
17	150	**17**
18	160	**18**
19	170	**19**
20	170	**19**
21	180	**20**
22	180	**21**
23	180	**21**
24	200	**22**
25	210	**23**

Overview of the Bus Bar System

If your system is using a bus bar system, the cable configuration will differ from that shown in Figure 3-1. Instead of the cable trolleys and wire rope, mount a junction box to the mast and the conductor bars that are attached to the ceiling. The trolleys in the bus bar assembly ride along the conductor bars and provide constant power to the machine without the need for a cable. A system overview is shown in Figure 3-2 and a close-up look at the components is shown in Figure 3-3.

Figure 3-2: Bus Bar System Overview

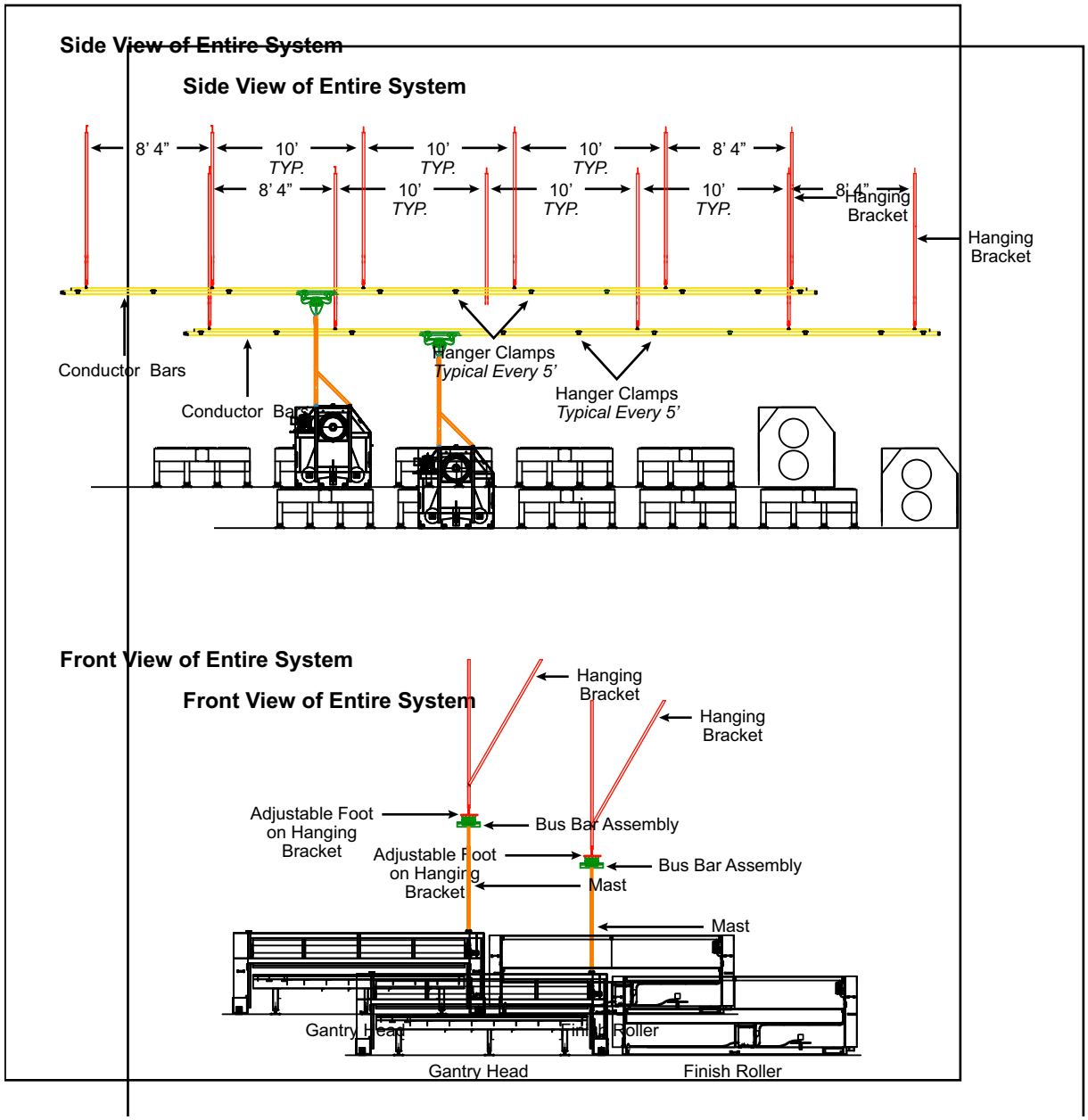
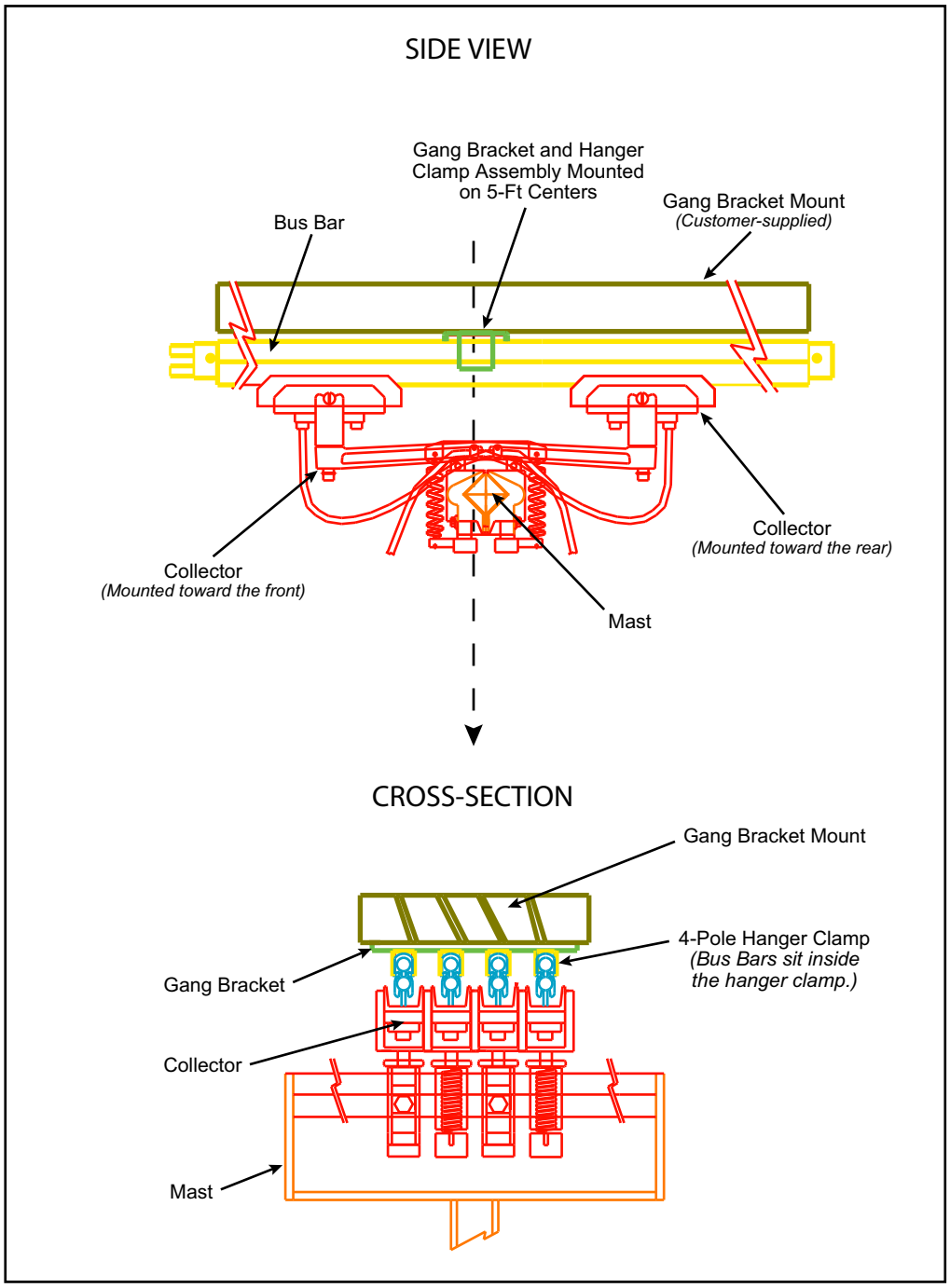


Figure 3-3: Components of a Bus Bar System



Installing the Bus Bar System

The customer must supply the hanging brackets. MiTek will provide drawings with the requirements for each bracket. The brackets consist of an upright, a gusset, and an adjustable foot. The instructions below address the installation of the components. The electrical needs are addressed in the *Electrical* section later in this chapter.

1. Once the hanging brackets are ready, determine the exact location of the bus bar system.

2. Hang the brackets from the ceiling at the spaces indicated on your drawing. A typical example is shown in Figure 3-2.

3. Attach the adjustable feet to a 2x6 board. The board is the gang bracket mount labeled in Figure 3-3. The height will be adjusted in a later step.

4. Attach the conductor bars to the gang bracket mount board using the hanger clamps at the intervals specified on your drawings. The typical spacing is 5 ft center-to-center.

5. Mount the trolley assembly to the mast.

6. Adjust the height of the hanging bracket feet so the conductor bars are at the correct height to hold the trolleys in place.

7. Push the newly cut tubes into the tee, one on each side, until the tube reaches the tube stop inside the tee. Turn the locking nut until the compression fitting is adequately tightened.

Electrical

	DANGER
	ELECTRICAL HAZARD. **All electrical work must be performed by a qualified electrician.** **Follow approved lockout and tagout procedures (OSHA 29 CFR 1910.147).**

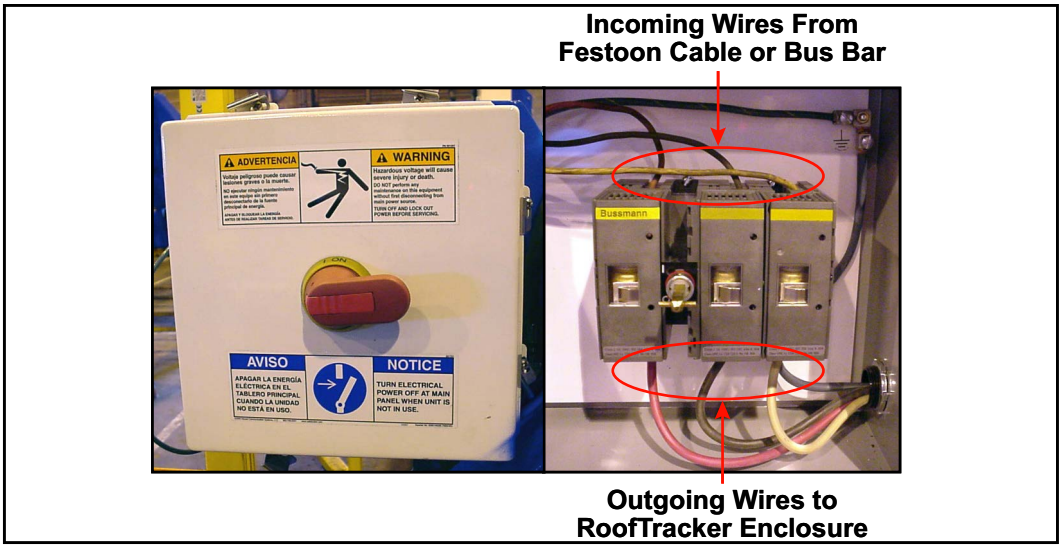
Connecting Power to the Gantry Head

All electrical work is the customer's responsibility and must be performed by a qualified electrician. The machine design addresses electrical components starting with the disconnect enclosure. Installation and maintenance of all electrical requirements between the power source and the disconnect enclosure are the responsibility of the customer.

Before connecting power, you must install the festoon cable or the bus bar that supplies power to your machine. Refer to the section titled *Festoon Cable or Bus Bar* on page 14.

The disconnect enclosure, shown in Figure 3-4, is located on the motor end of the gantry head.

Figure 3-4: Disconnect Enclosure on the Gantry Head



Power is brought into the disconnect enclosure and connected to the terminals on top of the fuses. The wires are labeled *Incoming Wires From Festoon Cable or Bus Bar* in Figure 3-4. The order in which they are connected is irrelevant because you will perform a test later and switch the wires at the VFD if the direction of travel is incorrect. Refer to your electrical schematic for detailed wiring instructions.

Connecting Power to a Bus Bar System

If your system has a bus bar instead of a festoon cable, an additional enclosure mounts to the end of the conductor bars. Run cables from your power source to this enclosure.

The trolley assembly mounts to the top of the mast on the gantry head. Run the wires from that assembly down the mast into the disconnect enclosure shown in Figure 3-4.

Assembling the Light Bars & Beacon

There are four (4) light bars (two sets of two each) on the gantry head that were disassembled for shipping purposes. The light bars must be mounted in place and connected to its respective cable that is clamped to the gantry head frame. Once mounted, the two (2) light bars in each set must be aligned with each other. Detailed instructions for mounting, connecting the cable, and aligning the light bars can be found in the *Maintenance* chapter in the *Light Bars* section.

The beacon and horn sounding device must also be attached to the gantry head during installation. Refer to Drawing 90544 for a one-enclosure system or 90524 for a two-enclosure system for exact placement.

Purpose of Chapter

This chapter describes the procedures required before operating your equipment.

	DANGER
	**Do not attempt to start the system without a *MiTek* representative present.** **Serious injury and/or equipment damage may result.**

Checking Motor Rotation

Check the motor rotation of the brake motor to ensure it is rotating in the same direction as the arrow on its housing. If the motor is rotating in the wrong direction, switch any two lead wires to reverse the direction.

Setting Pneumatic Pressure for Gantry Lifters (End-Eject Only)

Before operating the gantry lifter, the pneumatic pressure must be correctly set. The incoming pressure source should be providing air at 100 psi. The regulators at each air bag should be set to 40 psi.

The speed control muffler controls how fast the gantry lifter will lower. Adjust the speed so that the lifter does not come down quickly enough to jar or rattle the gantry head. The lowering motion should be smooth.

The flow control upstream from the air regulator controls how quickly the lifter will go up. Adjust the speed so that the gantry head does not rattle, and the lifter goes up smoothly.

Safety Tests

Perform the safety tests in the *Safety Test* section on page 20 at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.

Purpose of Chapter

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

Before You Begin

Understanding This Chapter

Once the installation and startup procedures are complete, the equipment is ready to operate. The following sections provide instructions for everyday operation of the *RoofTracker* press. The terms defined in Table 5-1 will help you understand the instructions in the rest of this manual.

Table 5-1: Terms to Know

Term	Definition
2-enclosure system	Early *RoofTracker* presses had an electrical design that required two separate electrical enclosures on top of the gantry head. These machines had slightly different operation and maintenance requirements than later machines.
1-enclosure system	*RoofTracker* presses with only one main electrical enclosure.

Important Notes

Do not allow the gantry head to sit in one place for a long period of time after installing it on the table and parking stand assembly. This may cause flat spots to form on the polyurethane wheels.

Move the gantry head at least every three (3) days to prolong the life of the wheels.

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

	DANGER
	**Before turning on the machine, make sure that all personnel and equipment are clear.**

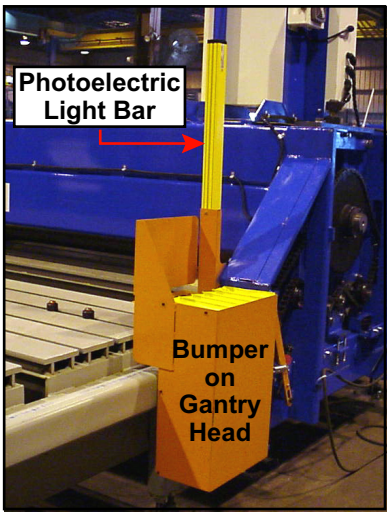
Stopping the Machine

During normal operation, the gantry head decelerates to a stop when you release the directional button. For safety reasons, the following methods can also be used to stop the machine, or the disconnect switch can be used to turn off power when the machine is not in use.

Emergency Stop

Push the red emergency stop (E-stop) button on the pendant control station (or next to the optional joystick) to cease power transmitting to the control circuit and stop motion of the gantry head. To release the E-stop, twist and release the pushbutton so it returns to its raised position. The E-stop button on the pendant control station is shown in Figure 5-8.

Figure 5-1: Light Bar and Bumper



Perimeter Access Guarding

(Photoelectric Light Bar)

Operation of the light bars is discussed later in this chapter. To stop the machine using the light bars, a solid object must pass through the light beam, interrupting the transmission of the beam between the transmitter bar and receiver bar.

Bumpers

A bumper is located on each corner of the gantry head to provide additional safety control. See Figure 5-1. If your machine has a platform attached to the gantry head for the operator to stand on, bumpers are also located on both ends of the platform. The machine will stop when something causes a bumper to retract.

The operator platform bumpers require a manual reset after they have been actuated. The gantry head bumpers automatically reset themselves when fully extended.

	WARNING
	CRUSH HAZARD. **The light bars are for detection of personnel and equipment entering a restricted area. It is not for the detection of hands and fingers only.**

Disconnect Switch

Figure 5-2: Disconnect

Turning the disconnect handle to the ON (vertical) position supplies electrical power to the entire machine. To remove power to the machine, turn the disconnect handle to the OFF (horizontal) position, as it is shown in Figure 5-2. The disconnect handle should always be turned off when the machine is not in use.

Indicators

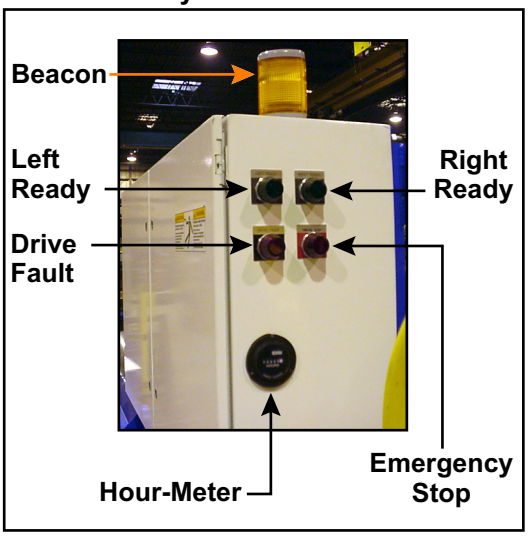
Indicator Lights

There are indicator lights on the side of the main electrical enclosure. For a 1-enclosure system, refer to Figure 5-3. For a 2-enclosure system, see Figure 5-4.

1. The E-STOP light on one-enclosure systems indicates an E-stop is active.

2. On 1-enclosure systems, the red DRIVE FAULT light indicates there is an error on the VFD.

Figure 5-3: Electrical Enclosure for a 1-Enclosure System



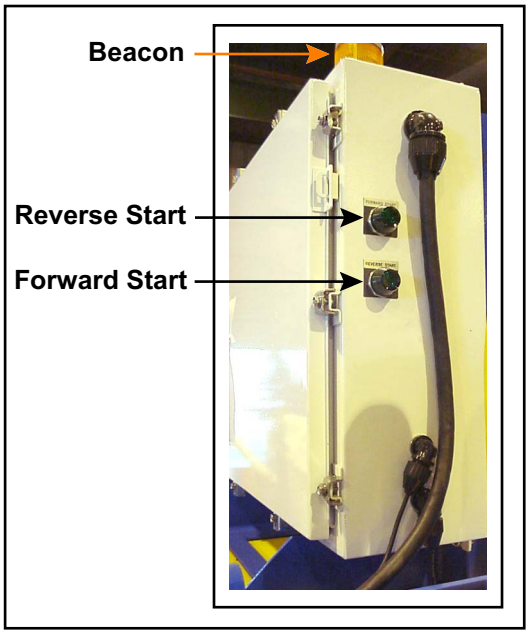
3. The green RIGHT READY/ REVERSE START light indicates reverse direction is enabled.

   On a 2-enclosure system with a standard single-pendant control station, REVERSE is toward the right when facing the disconnect switch.

4. The green LEFT READY/ FORWARD START light indicates forward direction is enabled.

   On a 2-enclosure system with a standard single-pendant control station, FORWARD is toward the left when facing the disconnect switch.

Figure 5-4: 3-Phase Electrical Enclosure for a 2-Enclosure System



Indication of Movement (Beacon)

When the FORWARD/LEFT or REVERSE/RIGHT buttons are pressed, a beacon (light) on top of each main electrical enclosure lights up and a horn sounds warning everyone in the area that movement is about to begin. When the horn stops, the gantry head will begin motion. The beacon remains blinking while the gantry head is moving.

Hour-Meter

One-enclosure presses have an hour-meter on the side of the enclosure. See Figure 5-3. It records the number of operating hours, which is the time the gantry head is in motion. Refer to this meter to determine a maintenance schedule.

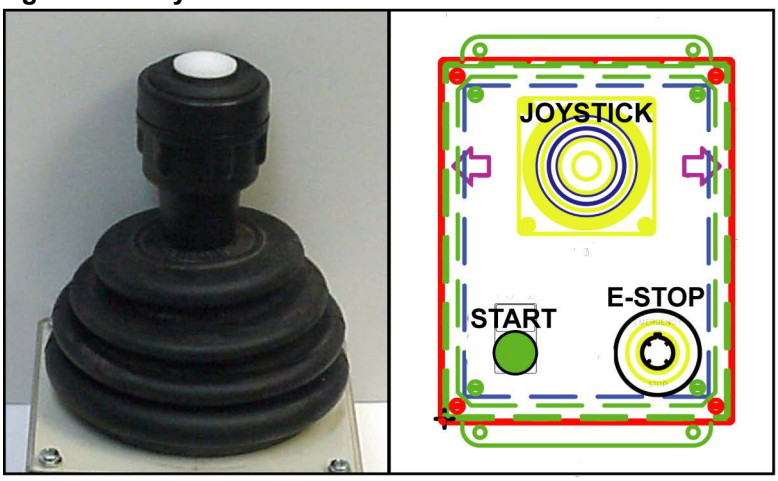
Operator Control Interface Mechanisms

Getting to Know Your Joystick Controller and Operator Platform

Your *RoofTracker* press is operated by a joystick or an optional pendant control station. The joystick is mounted on a panel attached to the gantry head. See Figure 5-5. If your machine has the optional pendant control station, it replaces the joystick and is discussed on page 18.

Most machines with a joystick operator control interface also have a platform attached to the gantry head for the operator to stand on. The standard platform is located on the bottom-chord side of the table line, but a top-chord platform is also available.

Figure 5-5: Joystick and Control Panel



Start

The green START button enables all safety monitoring devices. The operator must press START before the directional indicator lights will come on.

Joystick

To operate the equipment with a joystick, press the green START button on the operator's panel. Then, press and hold the white button on the joystick handle while pushing the handle in the direction the gantry head should move. The operator must keep the white button on the joystick depressed for movement to continue.

To stop motion, release the white button on the joystick handle. The gantry head decelerates and comes to a complete stop.

Operator Platform

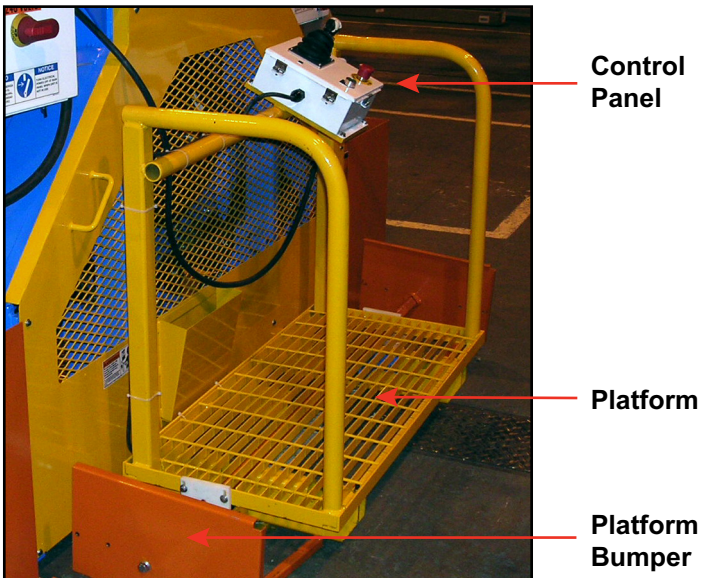
The operator platform is a standard feature with a joystick operator control interface. It is a raised platform connected to the operator end of the gantry head. The operator stands on the platform and rides along with the gantry head as it travels.

Bumpers on both ends of the operator platform cause the gantry head to stop motion if the bumper retracts. Once a platform bumper retracts, the operator must manually pull the retracted bumper back into place to allow the limit switch to return to its extended position. One (1) limit switch controls both platform bumpers, and it is located under the platform floor.

The platform bumpers do not require you to press the START button to reset them like the gantry head bumpers do.

A top-chord platform is also available.

Figure 5-6: Standard Operator Platform



Getting to Know Your Pendant Control Station

The pendant control station is an optional operator control interface that is shown in Figure 5-7 and Figure 5-8. It is a hand-held device connected to the machine by a cable. There are four (4) pushbuttons on the pendant.

Start

The green START button enables all safety monitoring devices. The operator must press START before the directional indicator lights will come on.

Directional Buttons

When the directional indicator lights on the electrical enclosure are lit, pushing and hold one of the black directional buttons on the pendant to begin movement of the gantry head.

On 1-enclosure systems, the buttons read RIGHT and LEFT.

The REVERSE and FORWARD buttons are on 2-enclosure systems. Reverse is toward the right when facing the disconnect switch and forward is to the left.

When you release a directional button, the gantry head decelerates and eventually comes to a complete stop.

Figure 5-7: Pendant Control Station

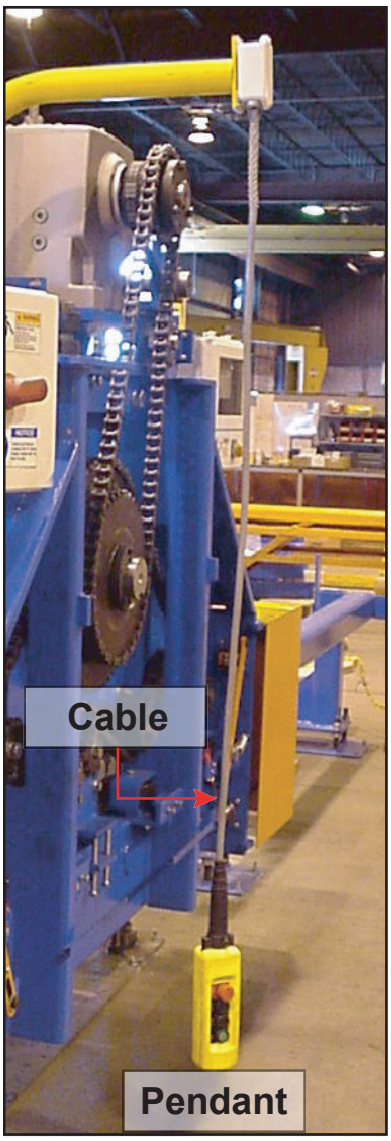


Figure 5-8: Pendant (Also Shown in Figure 5-7)

Operating Procedure

Operating Under Normal Conditions

Figure 5-9

1. Turn the disconnect handle to the ON (vertical) position.
2. Set up the truss configuration and jigging. Refer to the *Setting Up for Operation—Jigging* section.
3. Verify the following:

DANGER
Before turning on the machine, make sure that all personnel and equipment are clear.

   a) An E-stop pushbutton is not depressed. On 1-enclosure systems, the EMERGENCY STOP indicator light is off.

   b) The DRIVE FAULT indicator light is not lit.

   c) Light bar detection zones are clear and all bumpers are in normal operating condition.

   d) The brake monitor alarm is not actuated.

4. Press and release the START button. Both of the green indicator direction lights should come on.
5. Move the gantry head in the desired direction:

   a) Using a pendant control station:

      1) Press the directional button to move the gantry head.

         •On 1-enclosure systems, the directional buttons are labeled LEFT and RIGHT.

         •On 2-enclosure systems with a single-pendant control, FORWARD is toward the left when facing the disconnect switch.

      2) Release the directional button to bring the gantry head to a gradual stop.

   b) Using a joystick:

      1) Press and hold the white button on top of the joystick.
      2) Push or pull the joystick in the direction the gantry head should move.
      3) Release the white button or the joystick to bring the gantry head to a gradual stop.

6. Remove the truss from the table and place it on the Stand-Alone Conveyors.

    a) For systems **without** ejectors, manually slide the truss over onto the conveyors.

    b) For systems using pneumatic ejectors and receivers:

        1) Remove all slider pads and ensure the gantry head is not parked on top of an ejector.
        2) Turn the setup's pilot valve handle. Refer to the *Pneumatics Operation* section for more detail.

            •With side-eject and end-eject systems, manually push the truss from the ejectors to the receivers.

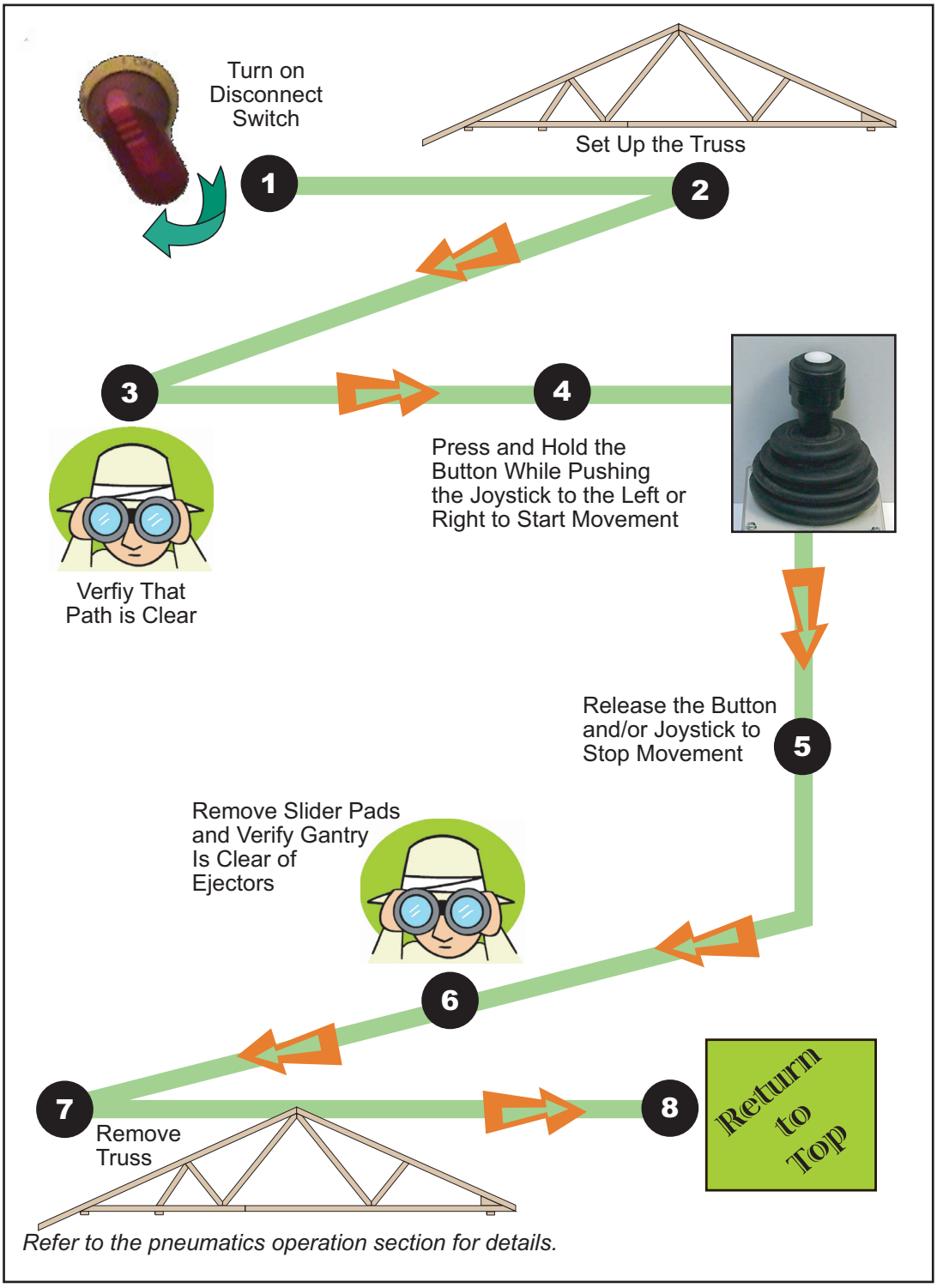
            •With an auto-eject system, the truss will be placed on the Stand-Alone Conveyors automatically.

        3) Turn the setup's pilot valve handle back to its original position.

7. Repeat the steps above for the next truss.

Move the gantry head at least every three (3) days to prolong the life of the wheels. Sitting in one place may cause flat spots to form on the polyurethane wheels.

Figure 5-9: Operating Procedure



Restarting Operation

If the machine stopped because you released the joystick or directional button, both directional indicator lights should still be on. You can continue motion in either direction by pressing and holding the joystick or a directional button again.

	WARNING
	**Moving parts can crush or cut.** **Never reset the system to continue moving the gantry head until you know what caused this safety feature to activate and the hindrance is corrected.**

If the machine stopped because a safety device was activated, remove the barrier and reset the system by following the procedure below. When the light beam or bumper experiences an interference on one side of the gantry head, the gantry head can still be operated in the opposite direction.

1. Remove the barrier that was detected by the light beam or bumper. To move the gantry head in the opposite direction:

    a) Using a joystick:

        1) Press and hold the white button on top of the joystick.
        2) Push or pull the joystick in the direction the gantry head should move.
        3) Release the white button or the joystick to stop the gantry head's travel. The deceleration stop feature is suspended until the system is reset by pressing the START button.

    b) Using a pendant control station:

        1) Press the opposite directional button to move the gantry head away from the barrier.
        2) Release the directional button and the gantry head will stop abruptly. The deceleration stop feature is suspended until the system is reset by pressing the START button.

2. Reset the system.

    a) To reset a light bar or gantry head bumper, press and release the START button.

    b) To reset an operator platform bumper, pull the retracted bumper away from the platform until the bumper pair is centered and in position with the limit switch located under the platform.

3. Resume operation as normal.

VFD

The VFD (variable frequency drive) is inside the main electrical enclosure. If it experiences a fault, one of the fault numbers listed in Table 5-2 will appear in the LED display. Refer to Table 1-3 to remedy the faults.

Table 5-2: VFD Fault Codes

Number on LED Display	Fault Description
F2	Auxiliary Input
F3	Power Loss
F4	Under Voltage
F5	Over Voltage
F7	Motor Overload
F13	Ground Fault
F38	Phase U to Ground
F39	Phase V to Ground
F40	Phase W to Ground
F41	Phase UV Short
F42	Phase UW Short
F43	Phase VW Short
F70	Power Unit
F122	I/O Board Fail

Brake Monitor

The brake monitor informs the operator when the brake is getting worn and needs to be replaced. It is located on the motor end of the gantry head. When operating the machine, the key should be in RUN (vertical) position.

After completing a stop, the stopping time is displayed in the LED display area. It is shown in seconds and milliseconds, up to a maximum of 9.99 seconds.

Two (2) time parameters were programmed into the brake monitor during manufacturing.

1. *Warning time:* Warns the operator that the brake is becoming worn and a replacement should be purchased immediately.

2. *Alarm time:* Indicates that the stopping time is at a dangerous level. The machine will shut down at the first indication that stopping time has exceeded the set alarm time.

Figure 5-10: Brake Monitor and Brake Monitor Enclosure

The brake monitor's alarm LED will light up when the braking time exceeds a safe level (the programmed alarm time), and the brake should be changed immediately. To temporarily turn the alarm off and continue operation, reset the key. The alarm will continue to light up every time the gantry head brakes to a stop until the brake is changed. To reset the key, turn it to RESET/SETUP position, and then turn it back to the RUN position. The keylock is located on the right side of the brake monitor, inside the enclosure.

Table 5-3 describes the brake monitor's indicator lights and operation. For information on specific errors or failcodes, refer to the *Troubleshooting* appendix.

Table 5-3: Brake Monitor Operation

Indicator or Button	Function
Chain Break	Indicates that the brake is released but the motor shaft is not turning. The motion detector communicates an error to the brake monitor. It is NOT an indication that a chain is broken.
Warning	Indicates that stopping time has exceeded the pre-set warning time. A light is located on the brake monitor itself and on the outside of its enclosure.
Self Check	When on continuously, indicates an internal failure within the brake monitor has occurred; will blink briefly during each press cycle to indicate the beginning of a stop time measurement.
Stop Time	Indicates that the stopping time is being shown on the display.
Reserve	Indicates that the reserve time (time remaining before a stop alarm will occur) is being shown on the LED display.
1	Press key 1 during normal operation to display stop time.
2	Press key 2 during normal operation to display the remaining reserve time.
Set 3	Not applicable; used for settings that were set at the factory.
Stop Alarm (round LED in right corner)	Indicates that stopping time exceeded the pre-set alarm time; brake monitor must be reset before operation can continue.
Fault Code Appears on LED Display	Refer to Table 1-4 on page 16 for the *Brake Monitor Failcodes*.

	DANGER
	**Do not change the chain break delay time, warning time, or alarm time.** **Do not attempt to disable any warning device or to lower the sound level of the horn.** **Modifying these settings will inhibit the safety devices in place and may result in serious personal injury and damage to the machine.**

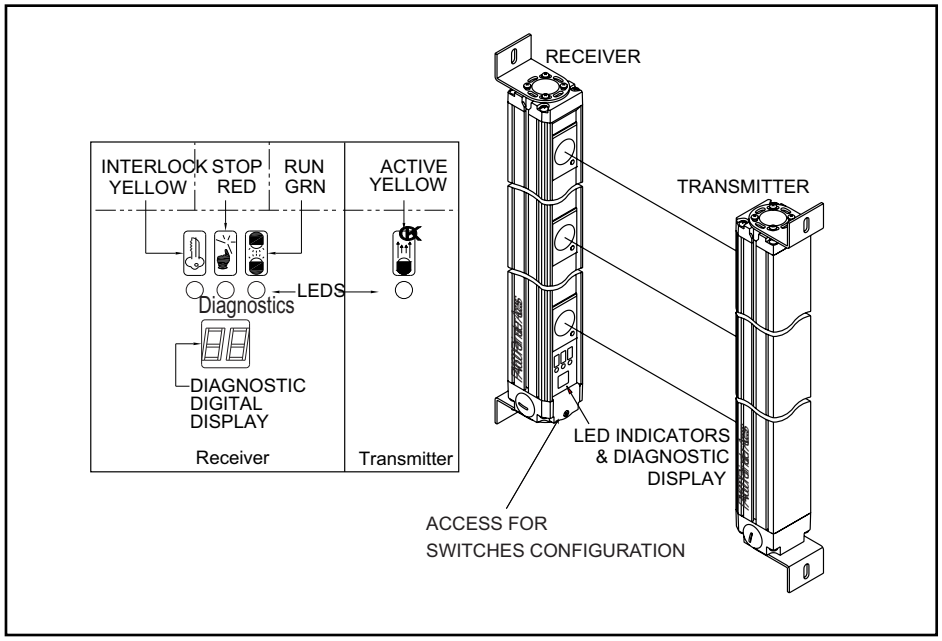
The chain break delay time, brake warning time and brake alarm time are set at the factory. Do NOT attempt to modify them.

Perimeter Access Guarding (Light Bars)

	DANGER
	This safety device is intended for detection of personnel and equipment entering a hazardous area and not for the detection of hands and fingers. **Tampering with or modifying the light bars or safety bumpers can result in property damage, serious injury, or death.**

Perimeter access guarding is a presence-sensing device designed to guard personnel working around moving machinery. *RoofTracker* presses shipped before 21 December 2006 use a three-beam light bar set on both sides of the gantry head. *RoofTracker* presses shipped on or after 22 December 2006 use a two-beam light bar set on both sides of the gantry head. Refer to Figure 5-1 for a photograph of a light bar. A light bar set consists of a receiver bar and a transmitter bar. A three-beam light bar set is shown in Figure 5-11.

Figure 5-11: Light Bar System Components and Indicators



When a beam between the two bars is broken, the machine will stop its motion in the direction associated with the interrupted light bar set. The rotation of the roller also stops at this time. Once the interruption has been removed, the operator must press the START button and the directional button to restart the machine. When a light beam interruption occurs, the gantry head is still able to move in the opposite direction.

Bumpers

A bumper located on each corner of the gantry head provides additional safety control. One is shown in Figure 5-1. When a bumper collapses, it passes in front of the light bar and causes the machine to stop its motion in the direction associated with the collapsed bumper. The rotation of the roller also stops at this time.

	DANGER
	**Tampering with or modifying the safety bumpers or light bars can result in property damage, serious injury, or death.**

Chapter 6

Purpose of Chapter

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

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

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

	DANGER
	**This equipment can crush or cut. Safety devices reduce the risk of injury.** **Do not use the equipment unless all safety features are performing correctly.**

Safety Test

The test procedure in the *Safety Test* section on page xvi **MUST** be performed by qualified personnel after ANY maintenance, adjustment, or modification. Testing ensures that the light bar, safety system, and machine control system work together to properly stop the machine.

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

Lubrication

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

CAUTION
Never mix synthetic lubricants with mineral lubricants!

Brake Motor and Gearbox

The brake motor and gearbox allow the gantry head to start and stop motion. The motor is an integral motor attached to a Nord SK63 helical gearbox with triple reduction. Power output from the gearbox is 56 rpm. A brake monitor ensures the brake is working properly and is discussed later in this chapter.

Certain preventive maintenance is required to keep the motor and gearbox in optimal working order.

Adding and Changing Oil

Check the oil in the gearbox reducer at least once a year. When additional oil is needed, use one of the oils recommended in Table 6-1 or a comparable type.

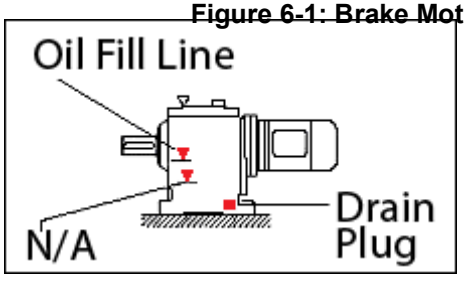
Table 6-1: Recommended Brake Motor Oil

ISO VG	Brand and Type			
	Operating Temperature of 23ºF to 104ºF (-5ºC to 40ºC)		Operating Temperature of 22ºF to 176ºF(-30ºC to 80ºC)	
220	Shell	Omala EP220	Shell	Omala HD220
	Mobil	Mobilgear 630 Mobilgear XMP220		

Drain and refill the oil in the gearbox every 10,000 working hours. Working hours is the amount of time the motor is actually running and is indicated by the hour-meter located on the side of the electrical enclosure (on 1-enclosure systems only). When refilling the oil, use one of the oils shown in Table 6-1 or a comparable type

Gearboxes on machines shipped before 15 December 2006 have a capacity of approximately 10.64 quarts. Gearboxes on machines shipped on or after 15 December 2006 have a capacity of approximately 13.64 quarts.

Figure 6-1: Brake Motor



Using the Manual Brake Lever

Release the manual brake lever if you need to manually push the gantry head to a different location along the tables. See Figure 6-2.

Replacing the Motor

Socket set (metric and English)

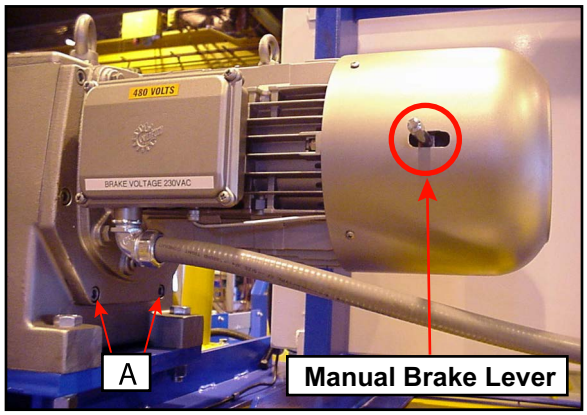
Slotted screwdriver

Phillips head screwdriver

Rubber mallet

Pry bars

Figure 6-2: Brake Motor



1. Lockout/tagout all power to the machine.
2. Verify that there is no load on the reducer so when the brake is removed, the load is not released.
3. Drain oil from the gearbox or rotate motor so oil will not leak out.
4. Remove the bolts holding the motor on the gearbox. Two (2) of the bolts are labeled “A” in Figure 6-2.
5. Remove the existing motor.
6. Remove and clean the gasket surface of the gearbox. Make sure no debris falls into the gearbox during this time.
7. Place the clean gasket back in the gearbox.
8. Slide the new motor into position, making sure the input pinion gear teeth properly mesh with the input gear teeth.
9. Rotate the motor as needed to seat the flange surface and make sure the bolt holes are properly aligned.
10. Re-install the bolts labeled “A” in Figure 6-2.
11. If needed, fill the reducer with an oil recommended inTable 6-1.
12. Reconnect power and remove lockout/tagout devices.

Replacing a Brake Pad

Slotted screwdriver

Phillips head screwdriver

External snap ring pliers

Metric wrench or pliers

Metric socket head wrench set

1. Unscrew the manual brake handle extending from the side of the brake motor, if there is one.
2. Remove the fan cover.
3. Remove the fan snap ring.
4. Pry the fan off of the motor shaft.
5. Remove the three (3) fixing screws that hold the brake onto the endbell.
6. Slide the brake off of the brake hub.
7. Slide the brake pad off of the brake hub.
8. If it is a metal inner hub, apply silicone grease to the female spline to reduce metal to metal chattering.
9. Slide the new brake pad onto the brake hub.
10. Place the brake onto the motor endbell in the same manner it was removed.
11. After the three (3) fixing screws are tightened, measure the air gap for proper distance. The procedure is described in the *Adjusting the Air Gap* section.
12. Replace the fan, snap ring and fan cover.

Figure 6-3: Steps 1 through 5

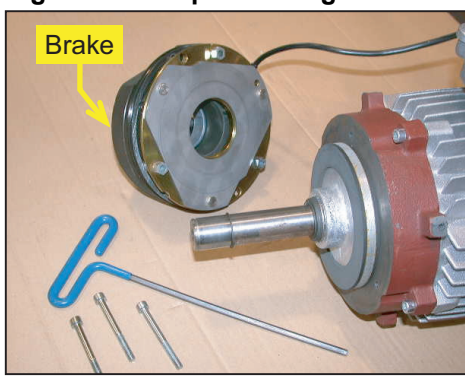


Figure 6-4: Steps 7 and 9

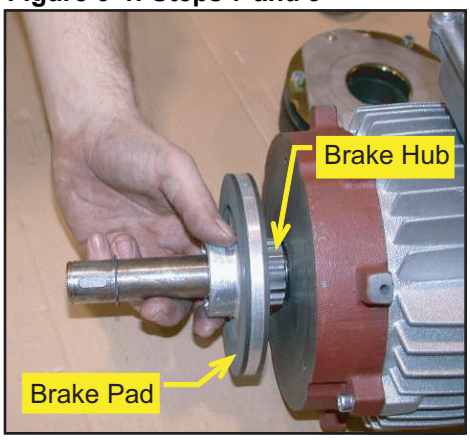
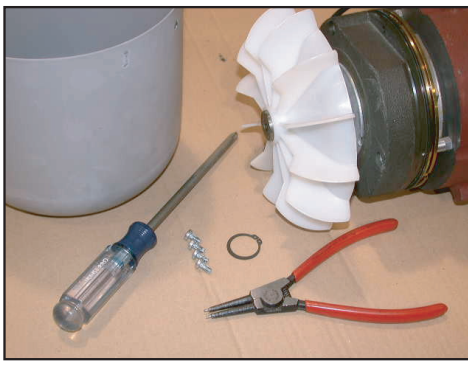


Figure 6-5: Step 12



Adjusting the Air Gap

CAUTION

Adjusting the air gap improperly may damage the motor. Do not attempt to make this adjustment unless the measured gap is outside the recommended allowance.

Slotted screwdriver

Phillips head screwdriver

External snap ring pliers

Metric wrench or pliers

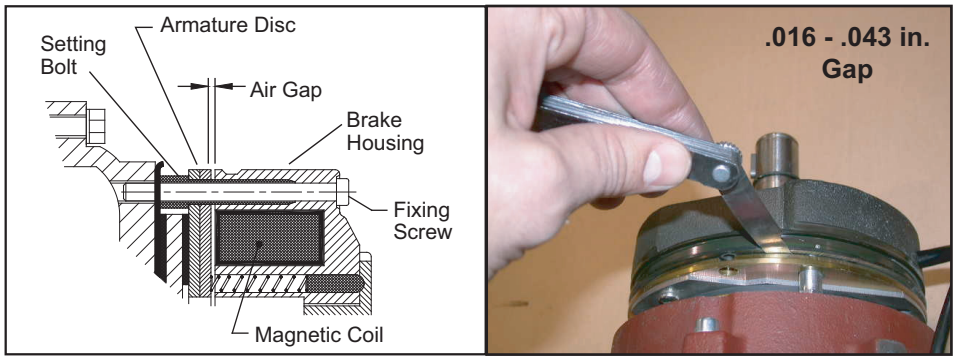
Metric socket head wrench set

If the brake monitor continually trips and other causes have been ruled out, the air gap in the brake motor may need to be adjusted. The recommended air gap allowance is between .016 in. and .043 in. To check the current air gap and to adjust it, refer to Figure 6-6 and the following procedure.

1. Unscrew the manual brake handle extending from the side of the brake motor, if there is one.

2. Using a feeler gauge, measure the gap between the armature disk and brake housing, shown in Figure 6-6. Measure completely around the brake and record any variations in the gap measurement.

Figure 6-6: Measuring the Brake Disk Air Gap



3. If the measurement is outside the allowance recommended at any point around the circumference of the brake, adjust the brake disk air gap using the following steps:

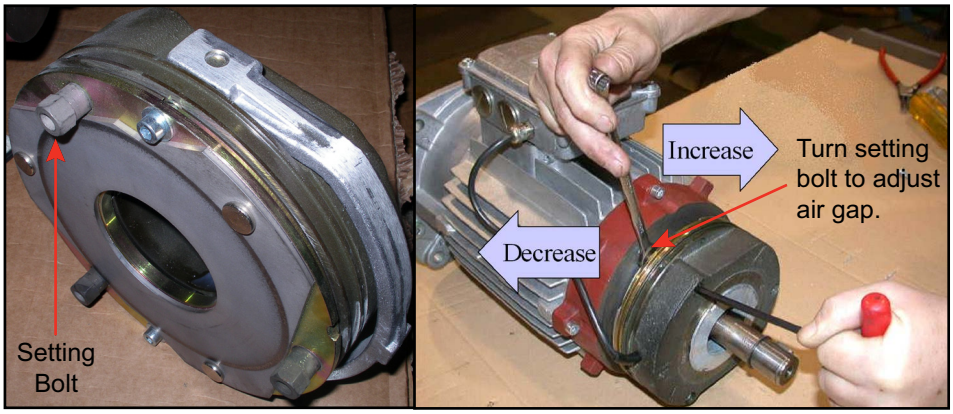
   a) Remove the fan cover.

   b) Remove the fan snap ring.

   c) Pry the fan off of the motor shaft.

d) Adjust the setting bolt as needed to reach the recommended gap. A 1/4 or 1/2 turn is usually sufficient for adjusting purposes. See Figure 6-7.

Figure 6-7: Adjusting the Setting Bolt



4. Check the air gap again to ensure it is now within the recommended range. It may be necessary to adjust a setting bolt more than once because the other setting bolts may affect it.

The air gap distance must be uniform in all three (3) places!

5. Tighten all of the fixing screws.

6. Re-attach the fan blades, snap ring, fan cover, and handle.

Drive Wheels

Graphics That Will Help...

Figure 6-9
Figure 6-10
Figure 6-26
Drawing 63735

Lubricating

Drive wheels control the movement of the gantry head. There are eight (8) drive wheels on the *RoofTracker*, four (4) on each end of the gantry head. The drive wheel bearings must be greased approximately every 300 working hours (according to the hour-meter) with a #2 lithium-based grease. Perform the procedure below to grease the drive wheels.

1. Park the gantry head in a parking area.
2. Remove power and lockout/tagout the machine.
3. Using a standard grease gun, grease the fitting on the shaft of each drive wheel from the roller side of the gantry head. Each of these eight (8) grease fittings must be greased individually. Do NOT over-grease.

Replacing a Drive Wheel (Wheel Only)

Use this procedure to replace a drive wheel inside an existing drive wheel block. If you need to replace the entire wheel block, refer to the next section.

Removing the Existing Wheel

To replace an existing wheel, you must first disassemble the wheel block. Refer to Figure 1 and Drawing 63735 to accomplish the procedure below.

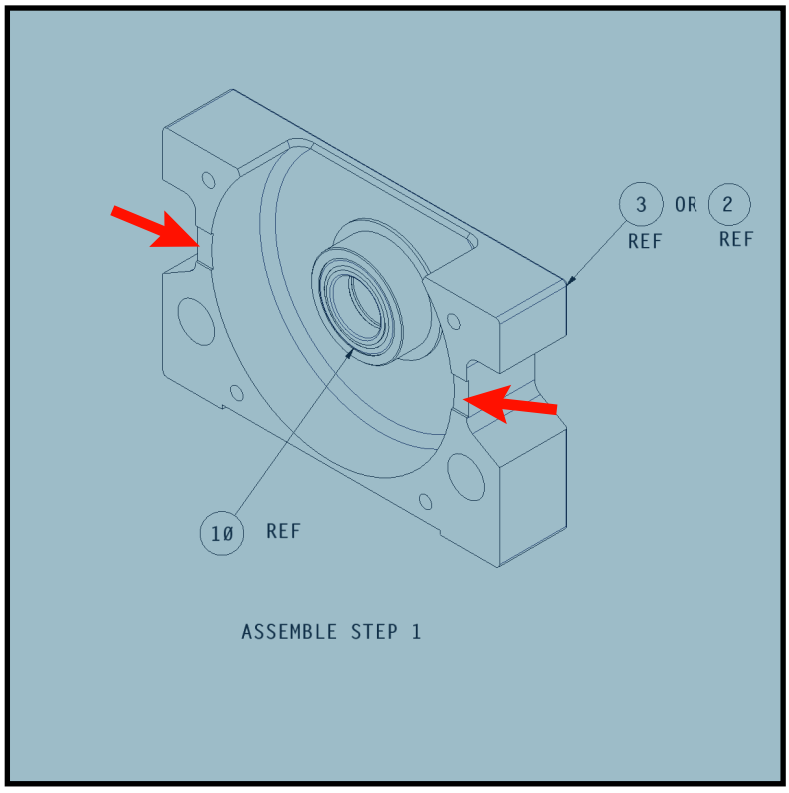
1. Remove the two (2) mounting/alignment pins (not shown in drawing) that secure the wheel block to the gantry frame and take the entire wheel block off of the gantry frame. Save the pins for re-use.
2. Remove each of the four (4) hex nuts (361605) and cap screws (326947) that secure the housing cover. Save the hardware for re-use. You can NOT remove the cover yet because it is pressed on.
3. Remove the forward snap ring (379016) from the shaft (63705-501). It is the snap ring closest to the grease fitting and is called out on Drawing 63735.
4. Remove the shaft bearing assembly (63705-501) from the wheel housing (63734) and wheel assembly (63733-501).

5. Gently pry the cover (63775-501) off of the wheel housing (63734). Figure 6-8 shows the wheel housing without a cover.

    a) Place a slotted screwdriver in the slots pointed out in Figure 6-8.

    b) Gently pry the cover off of the housing. Pry up gently and evenly on both sides to avoid damaging the housing.

Figure 6-8: Slots to Disassemble the Wheel Block Housing



6. Remove the wheel assembly (63733-501) from the wheel housing (63734). The wheel assembly was pressed into the wheel housing, so you may need to tap it from the back side to remove it from its housing.

    The spacer (63791) and/or inner ring of the bearing (415512) may come out with the shaft. Save them for re-use.

Installing a New Wheel in the Existing Wheel Block

To replace the wheel in the wheel block, follow the procedure below.

1. Install the wheel assembly (63733-501) into the wheel housing (63734). This is a press fit. Use caution. The inside hole of the wheel must be in line with the outside diameter of the wheel housing while pressing.

2. Install the square key (15000240024-1.32) into the wheel assembly (63733-501) from the open side of the housing. Ensure the key is completely seated in the keyway before continuing.

3. Install the shaft bearing assembly (63705-501) through the back of the wheel housing (63734) and into the wheel assembly (63733-501).

4. Locate the spacer (63791) that was removed during disassembly.

5. Install the spacer (63791) over the shaft bearing assembly (63705-501) from the open side of the wheel housing.

6. If the inner ring of the bearing came out during disassembly, install the inner ring of the bearing (415512) over the shaft (63705-501) from the open side of the wheel housing.

7. Place the cover (63775-501) onto the open side of the wheel housing (63734). This is a press fit. Use caution. The inside hole of the wheel must be in line with the outside diameter of the wheel housing while pressing.

8. Place the snap ring (379016) onto the shaft (63705-501) to hold the cover in place.

9. Carefully align the housing and cover before installing hardware.

    a) Locate the mounting/alignment pins (not shown on drawing) that are used to mount the wheel block assembly to the gantry frame.

    b) Place the two (2) alignment/mounting pins through the two (2) large holes in the cover and wheel housing.

    c) When the pins are straight and the cover and wheel housing are perfectly aligned, proceed to the next step.

    d) Install and tighten four (4) each of the hex nut (361605) and the cap screw (326947) to press the wheel assembly into place and secure the cover to the wheel housing.

10. Attach the wheel block to the gantry using the two (2) mounting/alignment pins.

11. Grease the bearings using the grease fitting on the wheel block and a recommended grease according to your Equipment Manual.

Replacing the Entire Drive Wheel Block

1. Park the gantry head in one of the parking areas so the wheel block is accessible from the inside of the gantry head, and the drive wheel chain master link is accessible.
2. Remove the end guard.
3. Loosen the drive wheel chain. Refer to the *Replacing a Chain* section on page 63.
4. Remove the QD bushing and the sprocket from the drive wheel being replaced.
5. Remove the bearing.
6. Remove the tie-bolt nut labeled in Figure 6-9 that is associated with the drive wheel you are replacing.
7. Position yourself at the inner side of the gantry head and remove the guard(s) that is adjacent to the wheel block you are replacing. See Figure 6-10.
8. If the wheel block you are replacing is the second or third wheel block, remove the mounting angle above the wheel block.
9. While still on the inner side of the gantry head, pull out the two (2) tie bolts and remove the drive wheel block along with the attached shaft.
10. Attach the new drive wheel block (63735-501).
    a) Insert the shaft on the new drive wheel block into the shaft hole.
    b) Place the two (2) tie bolts in place and tighten the nuts with a torque of 200 ft-lbs.
    c) Replace the mounting angle, if it was removed.
    d) Replace the guard on the inner side of the gantry head.
    e) Replace the bearing.
    f) Replace the QD bushing and tighten using 15 ft-lbs of torque.
    g) Ensure that the drive wheel sprocket is in an even plane with the other drive wheel sprockets so the chain will travel smoothly across all of them.
    h) Replace the drive wheel chain.
    i) Replace the end guard.
11. Restore power to the machine and remove all lockout/tagout equipment.

Figure 6-9: Drive Wheel Block on Outer Side of Gantry Head

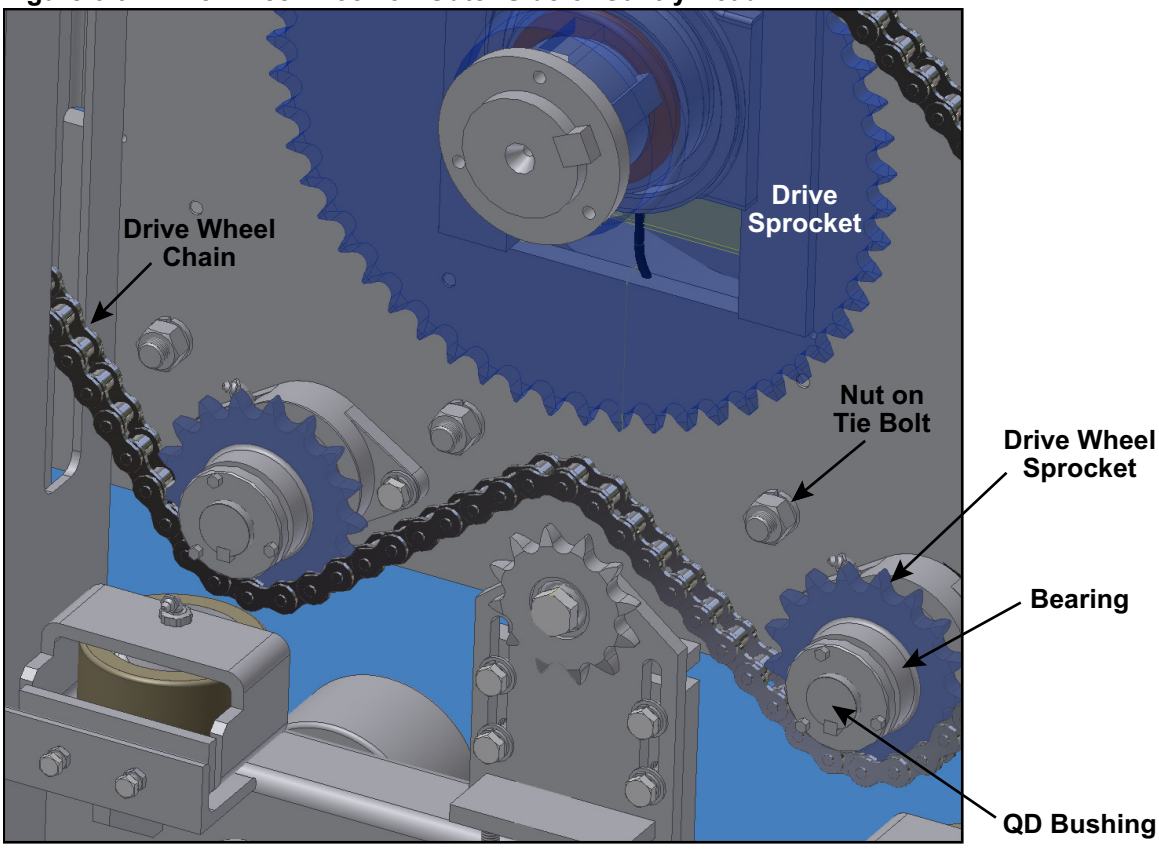
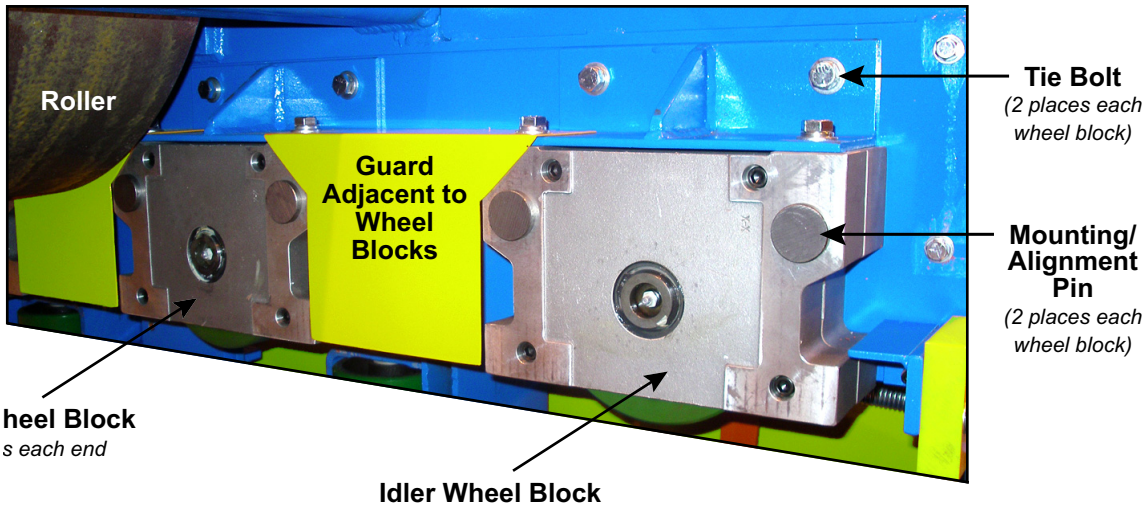


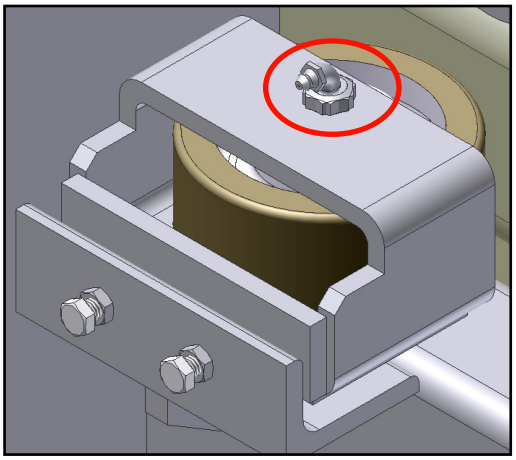
Figure 6-10: Drive Wheel Block on Inner Side of Gantry Head



Guide Wheels

Refer to Figure 6-26 at the back of this chapter for a diagram of the wheels on the gantry head.

Figure 6-11: Guide Wheel and Grease Fitting



Lubricating

Guide wheels are necessary to keep the gantry head on a straight path when it experiences a force that is not parallel to its forward motion. There are either eight (8) or twelve (12) guide wheels on the *RoofTracker*, depending on when it was built. The guide wheel bearings must be greased approximately every 300 working hours. Working hours is the amount of time the motor is actually running and is indicated by the hour-meter located on the side of the main electrical enclosure (on 1-enclosure systems only).

Use a #2 lithium-based grease. One (1) grease fitting is located in the center of each guide wheel and is circled in Figure 6-9.

Replacing Guide Wheels

To replace a guide wheel:

1. Remove the bolt in the center of the wheel.
2. Remove the old wheel.
3. Insert the new wheel.
4. Insert and tighten the bolt in the center of the wheel.

Pressure Wheels

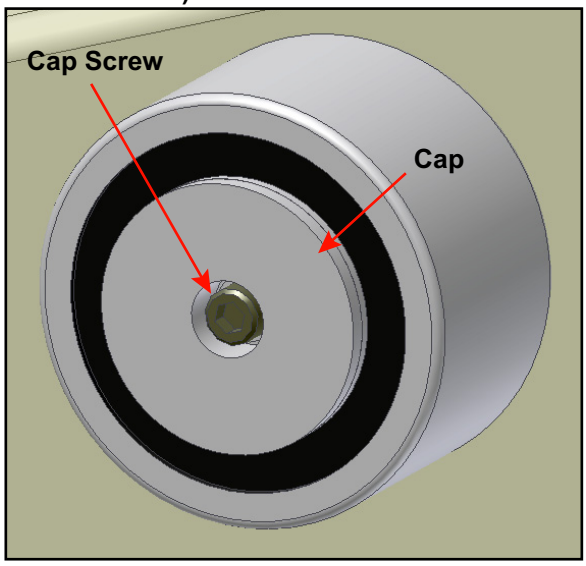
Refer to Figure 6-26 at the back of this chapter for a diagram of the wheels on the gantry head.

Lubricating

Pressure wheels keep the gantry head at a level position when it encounters the start of the truss on the tables. There are eight (8) pressure wheels on the *RoofTracker*, four (4) on each end of the gantry head. Your *RoofTracker* has either steel or Nylatron pressure wheels. The steel pressure wheels have sealed pre-lubricated bearings and should not need relubrication. The Nylatron wheels also do not require lubrication.

Replacing Pressure Wheels

Figure 6-12: Replacing Pressure Wheel (Steel Wheel Shown)



1. Remove the socket-head cap screw shown in Figure 6-12. You may need to heat it to loosen the Loctite.
2. Remove the cap.
3. Pull the wheel off the shaft and replace it with a new wheel.
4. Replace the cap.
5. It is recommended that you use red Loctite on the cap screw before securing the wheel block.
6. Replace the cap screw and tighten it to a torque of 85 ft-lbs.

Take-Up Bearing

Graphics That Will Help...

Figure 6-26
Figure 6-28
Figure 6-29

Lubricating

The take-up bearing allows the roller to turn, resulting in smooth embedment of the connector plates. It should be greased approximately every 150 working hours. Working hours is the amount of time the motor is actually running and is indicated by the hour-meter located on the side of the electrical enclosure (on 1-enclosure systems only).

Use a #2 lithium-based grease to lubricate the grease block for the take-up bearing. The general location of the grease block is shown in Figure 6-28 on page 83. There is one grease block on both ends of the gantry head.

Adjusting

The procedure for adjusting the take-up bearing to change the height of the roller is described in the section of this chapter titled *Adjusting the Roller Height*.

Chains

Three (3) chains are used to operate the gantry head. They are illustrated in Figure 6-26 on page 81. Two are drive wheel chains and one is a motor drive chain. All are #80 roller chains that require manual lubrication.

Lubricating the Chains

The drive wheel chains and the motor drive chain should be lubricated every eight (8) working hours as indicated by the hour-meter on the main electrical enclosure (on 1-enclosure systems only). See Figure 5-3 for the location of the hour-meter. The lubricant used should be a high-grade, non-detergent, petroleum-base oil. Anti-foam, anti-rust, and film-strength improving additives are often beneficial. SAE 30 grade is recommended.

To apply the oil, brush it on the inside surface of the chain as indicated in Figure 6-29. Apply it to the upper edges of the link plates in the lower span of the chain at a point close to where the chain engages a sprocket. Gravity and centrifugal force will aid in carrying the lubricant to the critical pin and bushing surfaces. Do not be concerned about surplus lubricant spilling over the link plate edges as it will lubricate the roller and bushing surfaces.

Adjusting the Chain Tension

There is one (1) motor drive chain on the motor end of the gantry and one (1) drive wheel chain on each end of the gantry head. Check the tension of all three (3) chains every week. The optimum chain tension should allow 1/2-in. play (1/4-in. movement to both sides of center).

You can adjust the chain tension on any of the chains by performing the procedure below. Refer to Figure 6-13 on page 62 for the motor drive chain and Figure 6-14 on page 62 for the drive wheel chain.

1. Remove the end guard from the gantry head.
2. Loosen the four (4) mounting bolts on the motor drive chain tension sprocket take-up mechanism.
3. Relevant to the motor drive chain only: If increasing the tension (tightening the chain), loosen the jam nuts on the two (2) tension bolts.
4. Tighten the tension bolts to push the tension sprocket forward and increase tension or back-out the tension screws to decrease the tension. Motor drive chain play should be approximately 1/2 in. (1/4 in. movement to both sides of center).
5. Re-tighten the mounting bolts on the tension sprocket take-up mechanism.
6. Check the tension of the motor drive chain on the other end of the *RoofTracker*. Repeat steps 1 through 5 if the chain tension does not match the description in the optimum chain tension described above.

Figure 6-13: Motor Drive Chain and Belt Tensioning

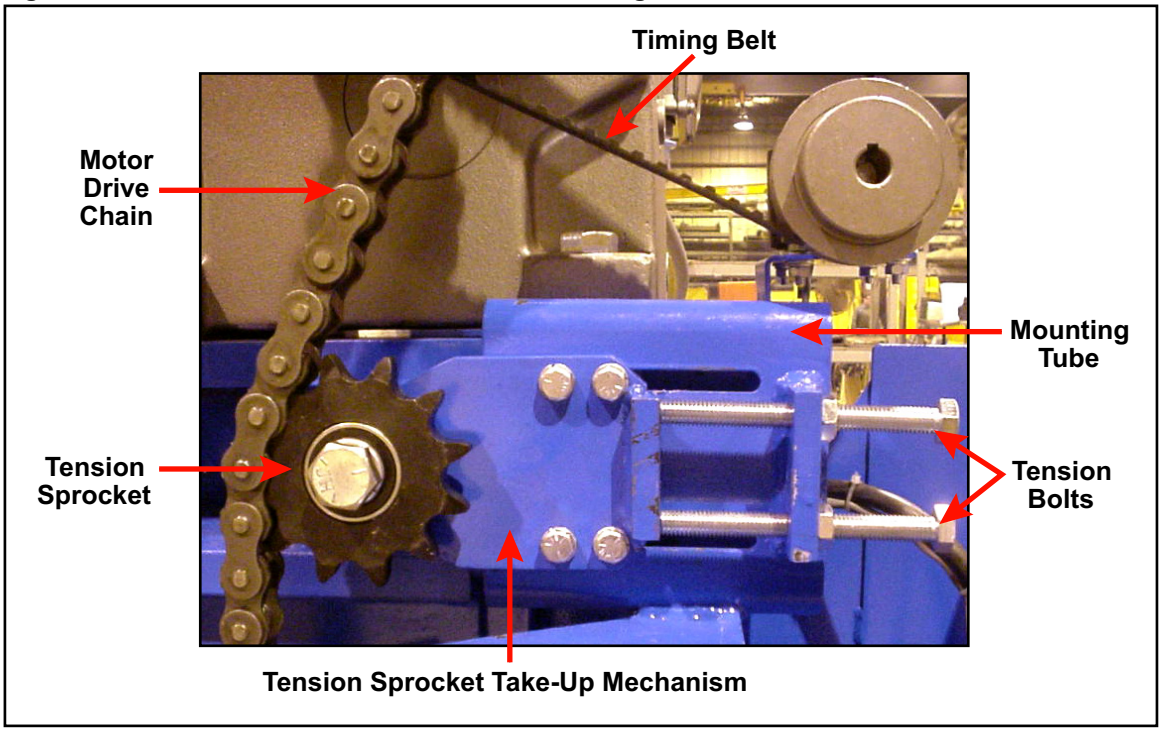
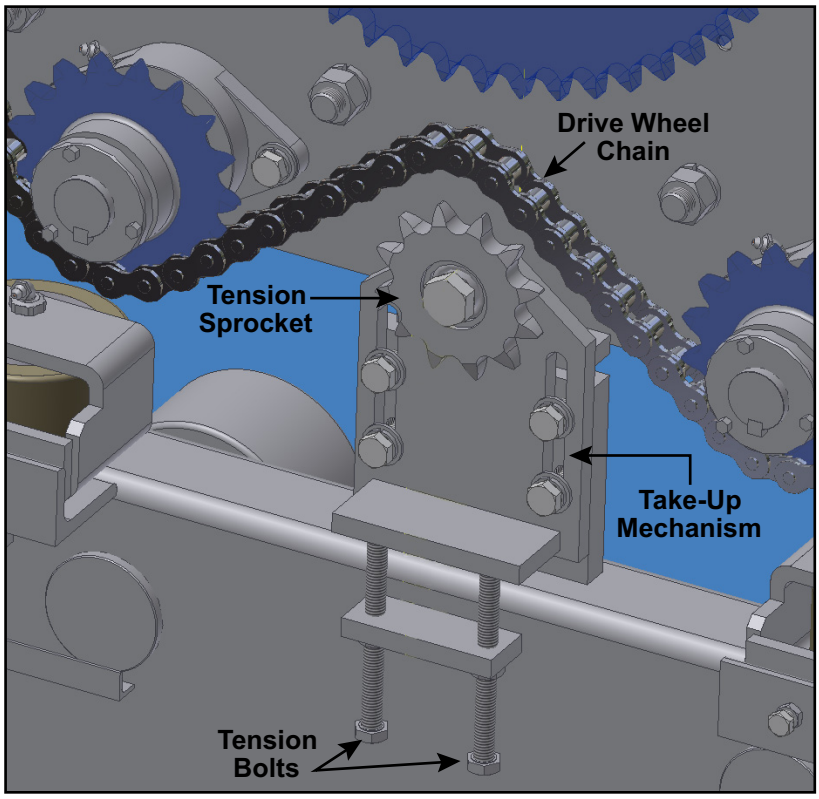


Figure 6-14: Drive Wheel Chain Tensioning

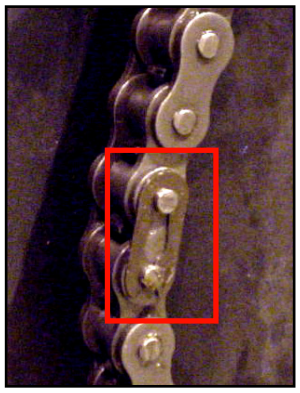


Replacing a Chain

Both of the drive wheel chains and the motor drive chain can be replaced using the following procedure. Refer to Figure 6-13 on page 62 for a close-up view of the motor drive chain and Figure 6-14 on page 62 for the drive wheel chain.

1. Move the gantry head to a position where the master link is clear of the sprockets so it can easily be reached. The master link is shown in Figure 6-15.
2. Lockout/tagout the machine.
3. Remove the end guard from the gantry head.
4. Note how the chain is threaded around the sprockets. It is diagrammed in Figure 6-26.
5. Loosen the tension sprocket per the *Adjusting the Chain Tension* section.
6. 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.
7. Thread the new chain around the sprockets. Refer to Figure 6-26 on page 81.
8. Connect the chain to itself by placing the master link between two links and pressing together with pliers.

Figure 6-15: Master Link on a Chain



9. Adjust the tension sprocket. The chain should have approximately 1/2 in. play (1/4 in. movement to both sides of center).
10. Replace the end guard and remove the lockout/tagout equipment.

Timing Belt

A timing belt tells the brake monitor if the motor is turning. It is shown in Figure 6-13 and Figure 6-26.

Maintaining the Belt

There is little resistant force on this belt so no preventive maintenance is needed. If the belt is damaged or breaks and must be replaced, the part number can be found in the *Replacement Parts* appendix.

When the brake monitor informs the operator that there is a brake malfunction, check the belt to ensure it is intact.

Replacing the Belt

To replace the belt, refer to Figure 6-13 on page 62 and follow these steps.

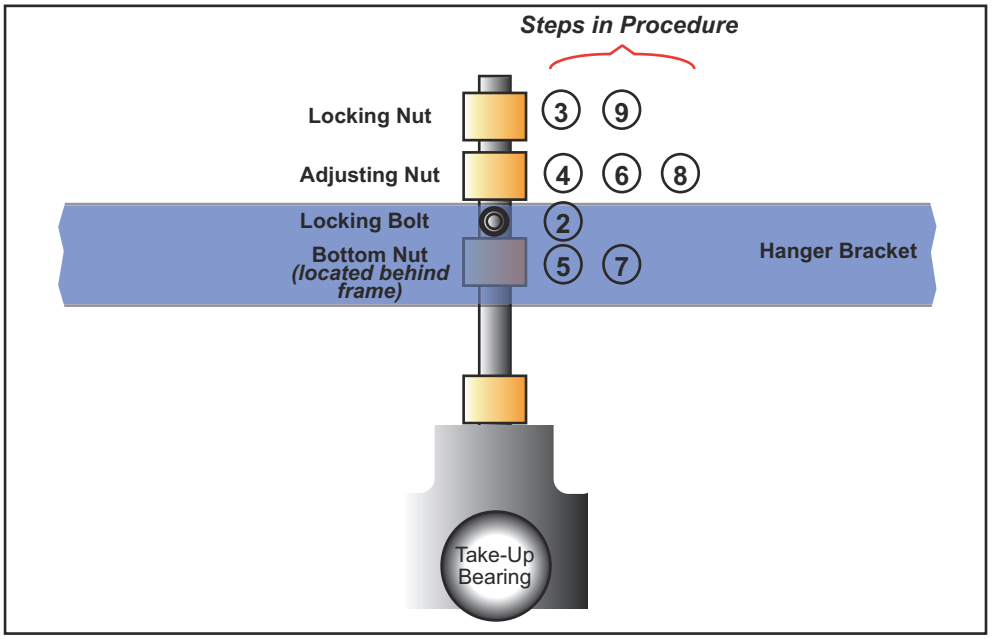
1. Remove the end guard on the motor end of the gantry head.
2. Move the gantry head so the master link on the motor drive chain is clear of the sprockets.
3. Lockout/tagout the machine.
4. Loosen the tension sprocket. Refer to the instructions in *Adjusting the Chain Tension*.
5. Remove the motor drive chain. Refer to the *Replacing a Chain* section.
6. Loosen the socket head bolts on the back of the tension sprocket take-up mechanism mounting tube. See Figure 6-13 on page 62.
7. Push the mounting tube forward until the belt is loose. Remove the old belt and put a new belt in its place.
8. Push the mounting tube back until the belt is moderately tight.
9. Tighten the socket head bolts on the back of the mounting tube to hold the belt pulley in place.
10. Replace the motor drive chain.
11. Adjust the tension sprocket to re-tension the chain.
12. Replace the end guard and remove the lockout/tagout equipment.

Adjusting the Roller Height

Check the roller setting with a standard 2x4 (1-1/2 in. thick) piece of lumber and 1/16 in. shim. The shim should slide between the bottom of the roller and the 1-1/2 in. thickness of the 2x4 at each end of the roller. If satisfactory plate embedment (75% into top and 50% into bottom of the truss) is not achieved, repeat with only the 2x4 lumber.

1. Place a truss on the table and move the gantry head over the truss. Stop the machine while the head is on the truss. Lockout/tagout all power to the machine.
2. Remove the guard on the chain drive end of the gantry head.
3. Loosen the locking bolt.
4. Loosen the locking nut.
5. Loosen the adjusting nut to make room for adjustment.
6. Back out the bottom nut located behind the hanger bracket. This nut should be loose enough to back-out by hand.
7. Tighten or loosen the adjusting nut to set the roller to the desired height. Slide a piece of 2x4 lumber under the same end of the roller that is being adjusted to check the desired height.
8. Hand-tighten the bottom nut until it is touching the hanger bracket.
9. Tighten the adjusting nut with a wrench until it is snug.
10. Tighten the locking nut against the adjusting nut to hold it in place.
11. Check the roller setting adjustment on the opposite end of the gantry head and repeat the steps.

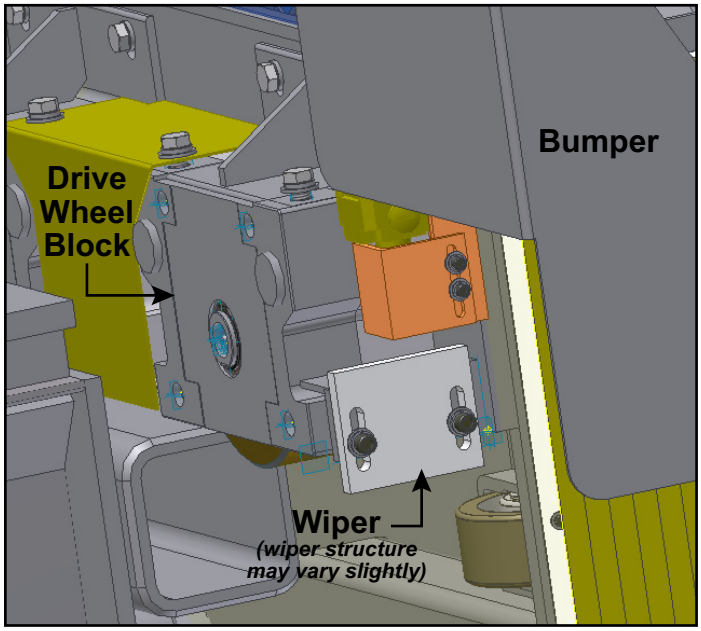
Figure 6-16: Take-Up Bearing Adjustment



Wipers

A wiper is located in four (4) locations on the gantry head: one on the first and last drive wheel blocks on both ends of the gantry head. Its purpose is to wipe debris, nail plates, and other foreign objects from the tube that the drive wheels ride on to protect the drive wheels. To prevent unnecessary replacement of drive wheels, inspect all four wipers weekly to ensure they remain in good working order.

Figure 6-17: End of the Gantry Head, View From the Table Side



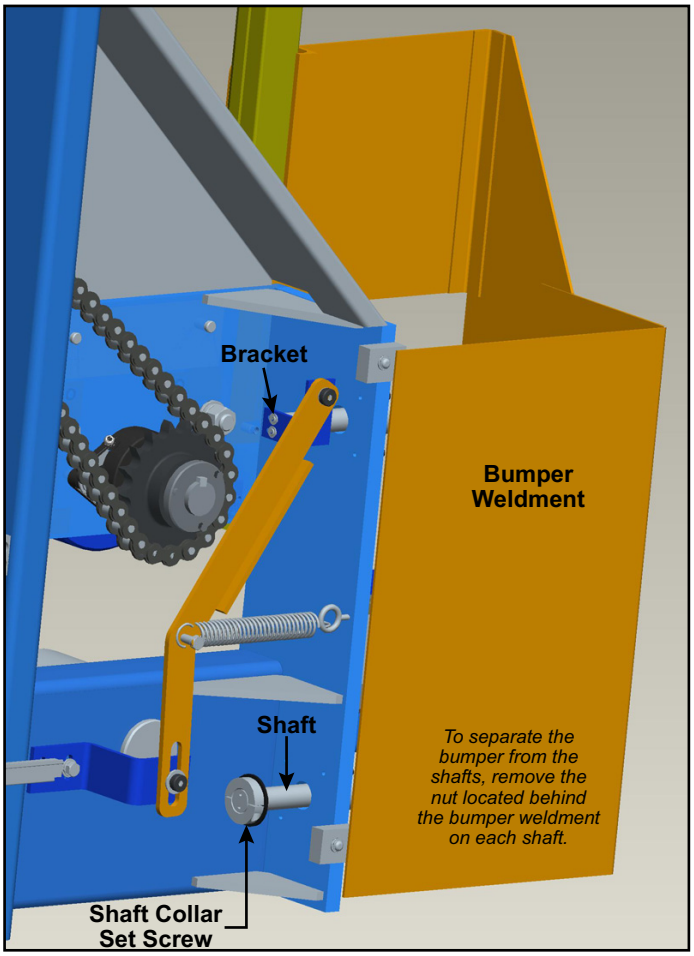
To replace a wiper, follow these steps:

1. Remove the two (2) cap screws from the wiper.
2. Remove the wiper from the wheel block.
3. Replace the wiper with a new one and replace the two (2) cap screws.

Safety Bumpers

If the entire bumper must be replaced, follow the procedure below while referring to Figure 6-18. Keep all original hardware until the replacement is complete.

Figure 6-18: Replacing the Bumper



1. Lockout/ tagout all power to the machine.
2. Remove the end guard.
3. Disassemble the bracket from the upper shaft by removing the two (2) screws shown on the bracket in Figure 6-18.
4. Remove the shaft collar on the lower shaft by removing the set screw in the collar.
5. Pull the bumper weldment and both shafts out of the gantry head.
6. Loosen the nut on the bumper end of each shaft to disassemble the bumper weldment from the shafts.
7. Screw each shaft into its hole in the new bumper weldment and secure in place with the nuts.
8. Attach the new bumper and shafts to the gantry head by sliding the shafts into their holes.
9. Replace the bracket and shaft collar.

Brake Monitor

Operating the Brake Monitor

Refer to the *Operation* chapter for an explanation of the indicator lights and LED display. Figure 5-10 on page 42 and Table 5-3 on page 43 explain the indicator lights.

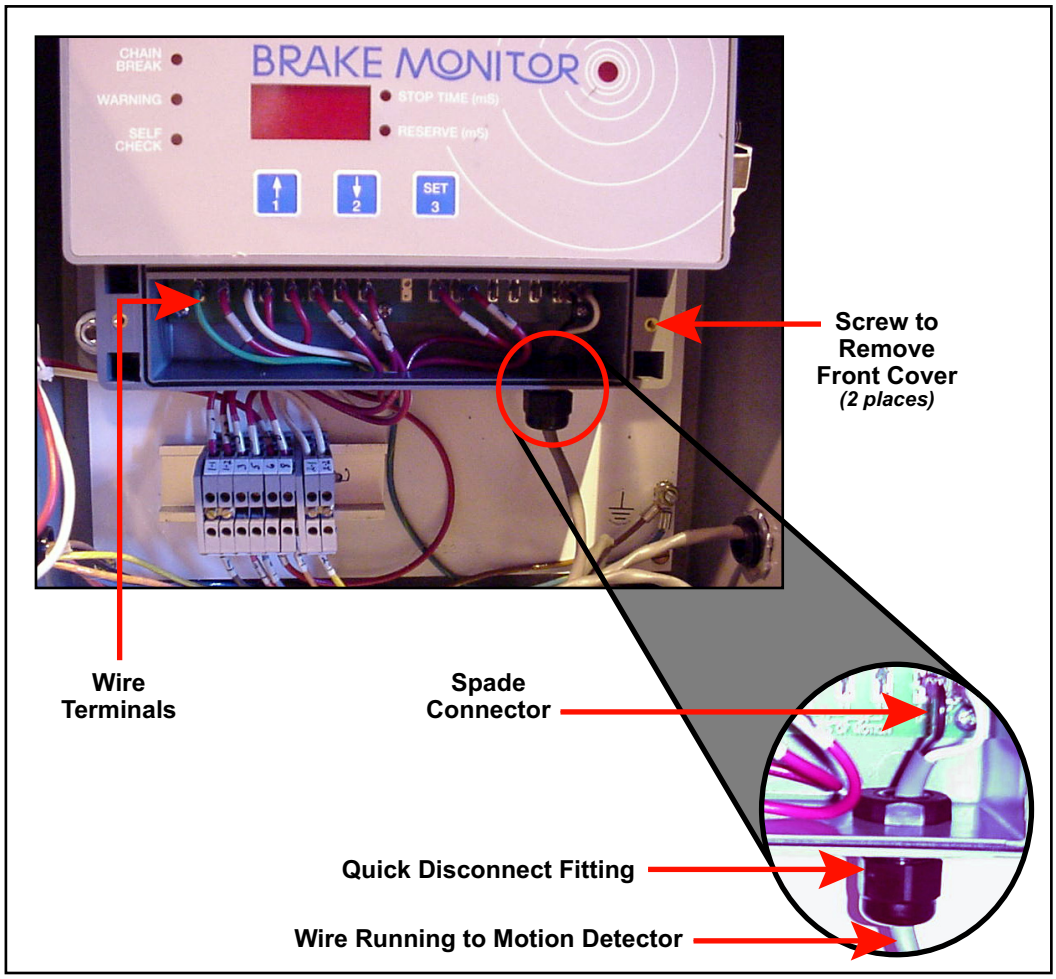
Error codes are explained in the *Troubleshooting* chapter.

Replacing the Brake Monitor

Refer to Figure 6-19 and the procedure below to replace the brake monitor.

1. Loosen the two (2) screws on the bottom half of the front cover and remove the cover.
2. Unscrew the spade connector inside the brake monitor.
3. Remove that end of the wire from its terminal inside the brake monitor. The other end of the wire is connected to the motion detector.
4. Ensure that all wires connected to the terminals labeled in Figure 6-19 on page 69 have wire labels. If not, refer to your electrical schematic and label them.
5. Remove the wires connected to the terminals labeled in Figure 6-19 on page 69 from inside the brake monitor.
6. Ensure that the brake monitor is free of all wires before removing it from the enclosure.
7. Remove the four (4) bolts that secure the brake monitor to the back of the enclosure.
8. Install a new brake monitor by reversing the above steps. Refer to your electrical schematic for assistance.

Figure 6-19: Brake Monitor



Motion Detector

A code on the brake monitor will indicate if the motion detector is malfunctioning. Refer to the *Brake Monitor* section of the *Operation* chapter for the error codes.

Follow these steps while referring to Figure 6-20 on page 72 to replace the motion detector.

1. Remove the wire from the back of the motion detector by pulling it straight out.
2. Remove the four (4) bolts in the mounting plate under the motion detector.
3. Remove the motion detector and replace it with a new one by reversing the steps above.

Pendants and Joysticks

Maintaining the Joystick

Periodic lubrication of the joystick is recommended. A light grease should be applied to active components, such as spring return arms, yokes, gear drives, and detent rollers. Periodically inspect the assembly for torn or damaged boots and loose screws/bolts. Replace or tighten them immediately.

Replacing Your User Control Interface

To replace a pendant control station with a joystick, see the electrical schematic, Drawing 90524 (for a 2-enclosure system) or 90544 (for a 1-enclosure system).

Limit Switches

The only limit switch to maintain is located under the operator platform that is attached to some gantry heads. Generally, machines with joysticks have an operator platform. For the machine to operate, the bumpers must be in the center location so the limit switch remains untouched. When an operator platform retracts, the limit switch is actuated and stops the gantry head.To reset the limit switch, manually pull the retracted bumper out to its original position.

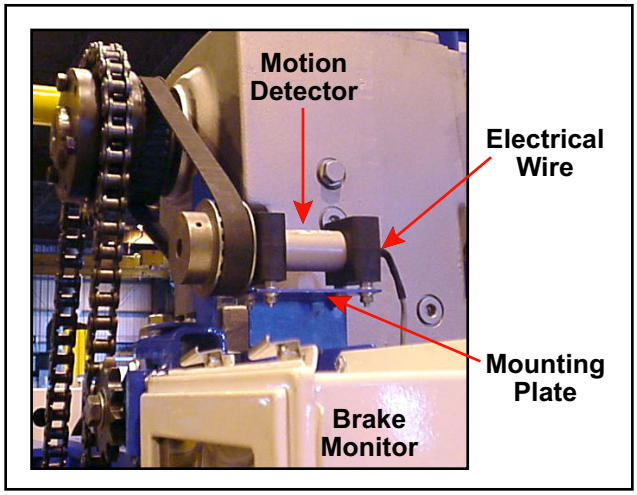
	DANGER
	**CRUSH HAZARD.** **Moving parts can crush or cut.** **Never deactivate a safety device! Death or serious injury may result.**

Light Bars

Components

The *RoofTracker* is equipped with two (2) sets of light bars, one set on each side of the gantry head. One set consists of a transmitter bar and a receiver bar. The transmitter bar transmits the signal for the light beam and the receiver bar receives the signal.

Figure 6-20: Motion Detector



Realigning and Inspecting

Inspect the light bars prior to starting the machine. An LED display area is located on the light bars to notify the operator if an error occurs. Refer to Table 6-3 for information on the error codes and indicators on the light bars.

When a set of light bars is out of alignment, the light bars assume there is an object blocking the beam. An IBI lights up and a diagnostic code of -0 displays on the receiver bar.

Each light beam mount has a slotted mounting hole to allow for adjustment. Loosen the screws, move the bar until the -0 on the receiver bar turns to a -1. Tighten the screws and press the green START button on the pendant control station or joystick panel to reset the light bars.

Light Bar Operating States

The indicators on the receiver bar tell the operator what operating state the light bar set is detecting. The different operating states are described in Table 6-2.

Table 6-2: Light Bar Operating States

Operating State	Description
Machine Run	The two receiver bar safety outputs are in the ON state, the green machine run indicator is lit, diagnostic displays “--”, and the auxiliary output is in a state consistent with its configuration. The protected machine is allowed to operate.
Machine Stop	The two receiver bar safety outputs are in the OFF state, the red machine stop indicator is lit, diagnostic displays “-0”, and the auxiliary output is in the OFF state. The protected machine is **not** allowed to operate.
Interlock	The two receiver bar safety outputs are in the OFF state, the red machine stop indicator and yellow interlock indicator are lit, diagnostic displays “-1”, and the auxiliary output is in the OFF state. The protected machine cannot operate until the detection zone is clear of obstructions and the start button is pressed and released.
Alarm	The two receiver bar safety outputs are in the OFF state, the red machine stop indicator is lit, and the yellow interlock indicator is flashing. The auxiliary output is in a state consistent with its configuration. The diagnostic displays a diagnostic code to aid in troubleshooting. The alarm state does **not** allow the protected machine to operate. The primary difference between alarm and interlock is that the light bar system will remain in the alarm state until the fault is corrected, regardless of power cycling or if the start button is pressed and released.

Light Bar Diagnostic and Test Features

	DANGER
	**ELECTROCUTION HAZARD.** **Disconnect power before opening end caps!**

Individual Beam Indicators (IBI)

The light bar system has a visible, red individual beam indicator (IBI) adjacent to each receiver bar infrared beam. An IBI will light when the infrared beam fails to meet the conditions necessary to remain in the machine-run state. When the synchronization beam is broken, all of the IBIs will light. An IBI failure will not cause an alarm condition and the light bars will continue to operate, but the gantry head will fail to move in the same direction it was moving when the safety device was activated.

Synchronization Beam

Synchronization between the transmitter bar and receiver bar is optical. The beam closest to the cable connector supplies this signal. When this beam is blocked, the system will enter a machine-stop state and all of the IBIs will light. When the beam is cleared, the system will re-synchronize itself and enter a state consistent with its operating mode.

Machine Primary Control Element (MPCE) Monitoring

MPCE monitoring is an important safety function. It monitors the light bar system interface to the guarded machine and checks to ensure that the control elements (switching devices such as contactors) are responding correctly. The MPCE function is hard-wired in the machine. Do NOT attempt to change the setting.

Diagnostic Display

The receiver unit has a two-digit numeric display that displays diagnostic codes identified by the internal control circuits. This display is visible from the front of the receiver bar. The diagnostic codes indicate normal operation, dipswitch setting faults, safety output faults, MPCE faults, and internal controller faults. See Table 6-3.

Table 6-3: Diagnostic Codes for the Light Bar System

Code Group	Code Number	Meaning of Diagnostic Code
Normal Operation	88/V#	When powered-up, all of the segments are lit and then the software version number is displayed
	--	RUN state
	-0	STOP state
	-1	In the Interlock state and waiting for Start Input
Configuration Switch Faults	21	Invalid Mode selection setting
	22	Switch settings changed during operation
	26	Invalid Code setting
Safety Output (OSSD) Faults	31	Safety Output A & B are shorted together
	32	Safety Output A shorted to Power
	33	Safety Output B shorted to Power
	34	Safety Output A shorted to Ground
	35	Safety Output B shorted to Ground
MPCE Faults	41	MPCE signal was in Wrong state BEFORE entering the Machine RUN state
	42	PCE signal was in Wrong state AFTER entering the Machine RUN state
	43	MPCE signal was in Wrong state during power-up of the PA4600
Receiver Fault	50	A fault internal to the PA4600 was detected
Setup Error	60	Receiver in view of multiple transmitters set to same scan code

Replacing Light Bars

Light bars can be replaced as a set of two, or just the transmitter or receiver may be ordered by itself. Refer to the *Replacement Parts* appendix for part numbers.

1. Determine if you need to replace a transmitter, receiver, or both. Locate the part number in the *Replacement Parts* appendix.

2. To install a new light bar or set, remove the cable from the bottom of the damaged light bar by unscrewing the quick disconnect shown in Figure 6-21.

3. Carefully hold the damaged light bar while unscrewing the two (2) socket head set screws on the light beam mount. Keep the set screws for use with the new bar.

4. Set the damaged light bar aside and hold the new bar in place.

5. Use the same two (2) set screws to attach the new bar to the light beam mount.

6. Whether replacing one or both bars in a set, the dip switches on both bars must be set to match each other. The original dip switch code is shown in Figure 6-22. It can also be found on Drawing 90524-505 for a 2-enclosure system and Drawing 90544-504 for a 1-enclosure system.

Figure 6-21: Replacing a Light Bar

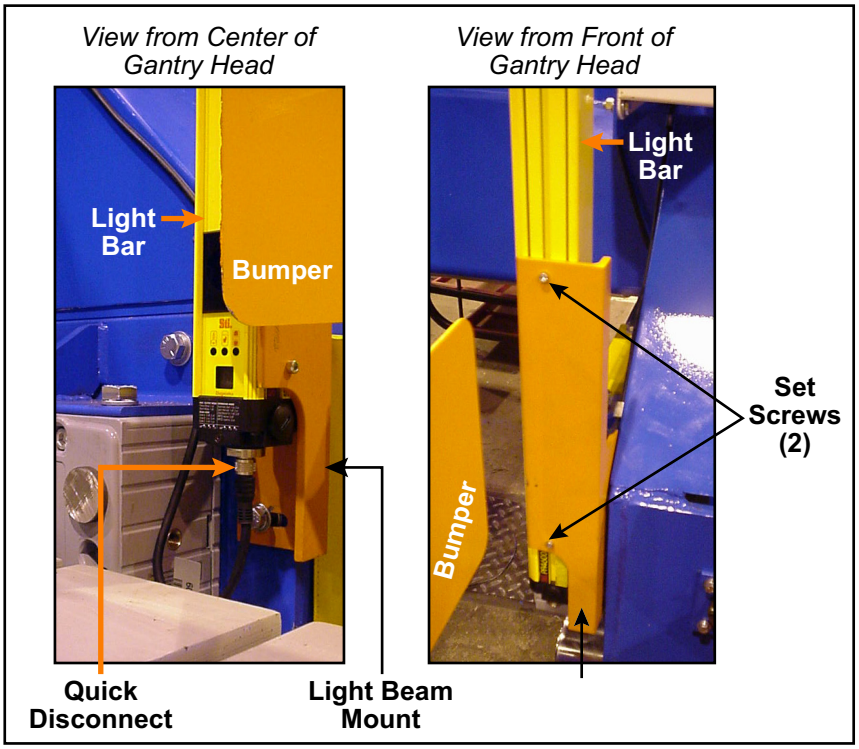


Figure 6-22: Dip Switch Settings

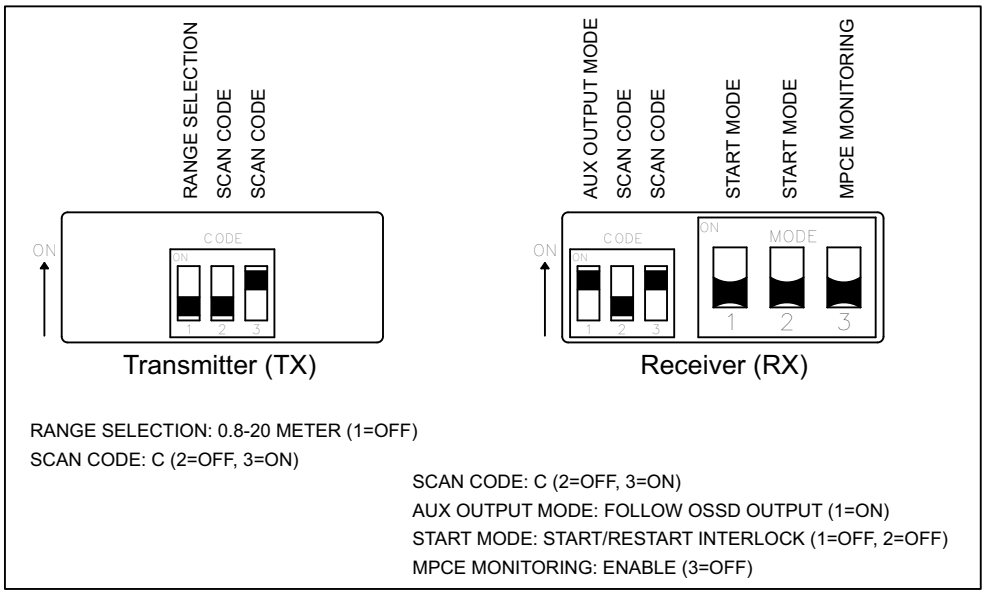
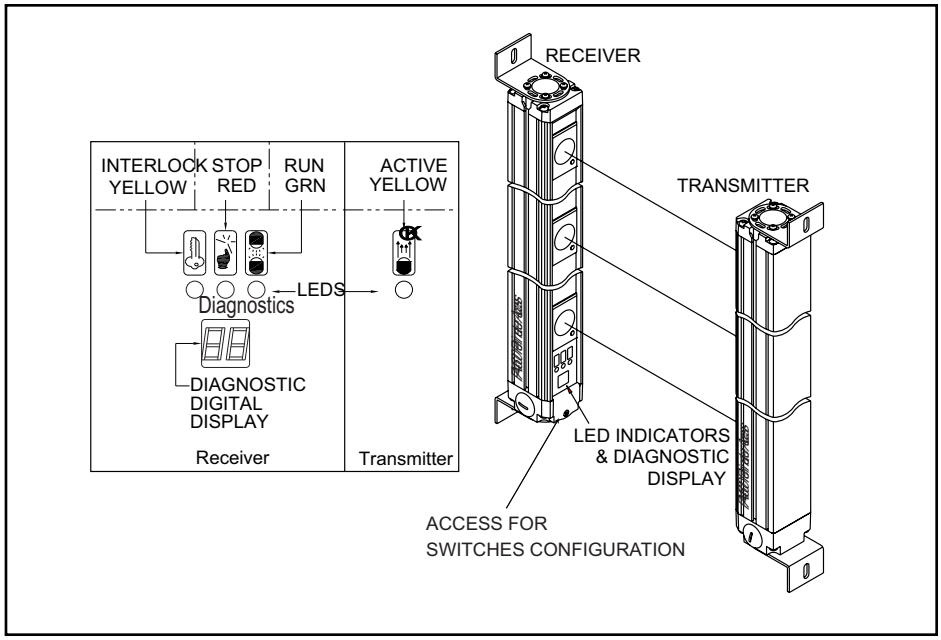


Figure 6-23: Light Bar System Components and Indicators

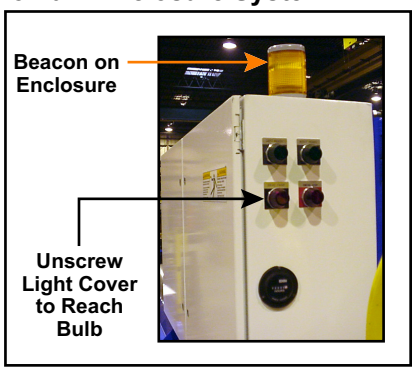


Indicator Lights and Sounding Device

Main Electrical Enclosure and Brake Monitor

To remove the light cover, simply unscrew it. To replace the light bulb under the light cover, gently push in and turn the light bulb counterclockwise. It will come loose within 1/2 turn. Refer to the *Replacement Parts* appendix for a part number.

Figure 6-24: Electrical Enclosure on a 1-Enclosure System



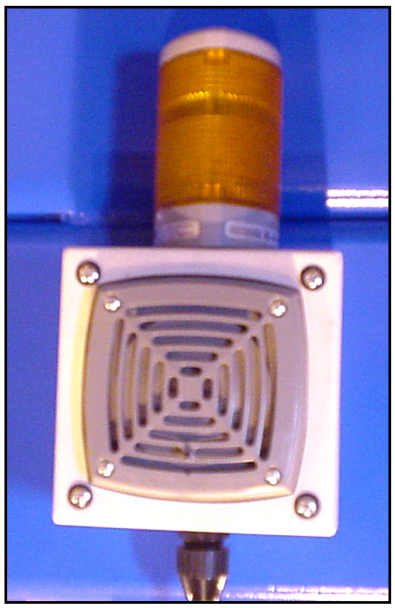
Beacon

There are two (2) beacons on top of the gantry head. To remove the light cover, unscrew the small screw on the top of the light cover. Unscrew the bulb to remove it for replacement. Refer to the *Replacement Parts* appendix for a part number.

Sounding Device

A sounding device is shown in Figure 6-25. For safety reasons, they must be kept in working order. To replace the sounding device, refer to Drawing 90544 (for a 1-enclosure system) or Drawing 90524 (for a 2-enclosure system) for part numbers and an electrical schematic.

Figure 6-25: Sounding Device



	DANGER
	**Do NOT attempt to change the time delay between the horn and movement or the volume of the horn. Without these safety features, serious injury or death could occur.**

Hour-Meter

The hour-meter on the electrical enclosure (for 1-enclosure systems) logs the amount of time that the motor is running. It is shown in Figure 5-3 on page 32. Refer to this meter to schedule preventive maintenance. The hour-meter cannot be reset, but if use exceeds the number of digits on the meter, it will roll back to 0 and continue to log time.

Gantry Lifter

The gantry lifter is available only on end-eject systems.

Adjusting the Height and Level of the Lifter

1. Lockout/tagout.
2. Level the track tube frame by adjusting the two (2) lower bolts. Refer to Drawing 83351.
3. Adjust the four (4) 1-8x3-1/2 bolts to control the angle of the lifter.

CAUTION

The bolts must be adjusted so that the lifter is exactly level. Failure to adjust the lifter properly may result in damage to the machine and to trusses.

4. Restore power to the machine.
5. Build a truss and eject it from the tables normally. The truss should pass easily under the lifter.
   - If the truss does not pass easily under the lifter, lockout/tagout and readjust the bolts.
   - If the truss is ejected properly and you are satisfied with the adjustment, continue normal operation of the machine.

Adjusting the Support Roller

1. Raise the lifter.
2. Support the lifter using a fork truck or crane.
3. Lockout/tagout.
4. Loosen the 3-8-16x1-3/4 bolts on each side of the roller.
5. Adjust the set screw on each side. The support roller should be level with the ejectors in the tables.

CAUTION

The set screws must be adjusted so that the roller is exactly level. Failure to adjust the roller properly may result in damage to the machine and to trusses.

6. Restore power to the machine.
7. Build a truss and eject it from the tables normally. The truss should pass easily under the lifter.
   - If the truss does not pass easily under the lifter, lockout/tagout and readjust the set screws.
   - If the truss is ejected properly and you are satisfied with the adjustment, continue normal operation of the machine.

Replacing the Air Bags

1. Lockout/tagout.
2. Support the frame near the air bag using a fork truck or crane.
3. Unbolt the air bag.
4. Remove the air bag.
5. Insert the new air bag.
6. Insert and tighten the bolts.

Lubricating Bearings

The gantry lifter has four (4) bearings, which should be lubricated with grease every 100 working hours.

Replacing Bearings

It is recommended that you replace all the bearings at one time.

1. Lockout/tagout.
2. Support the frame near the bearing using a fork truck or crane. See Figure 6-32 on page 87 and Drawing 83351 for bearing locations.
3. The bearings are in casings. Remove the screws that hold the casing together and lift up the top half of the casing.
4. Remove the old bearing.
5. Insert the new bearing.
6. Close the casing and tighten the screws.

Graphics

Figure 6-26: Wheels, Chains, and Belt (Machines Shipped Before 15 June 2006)

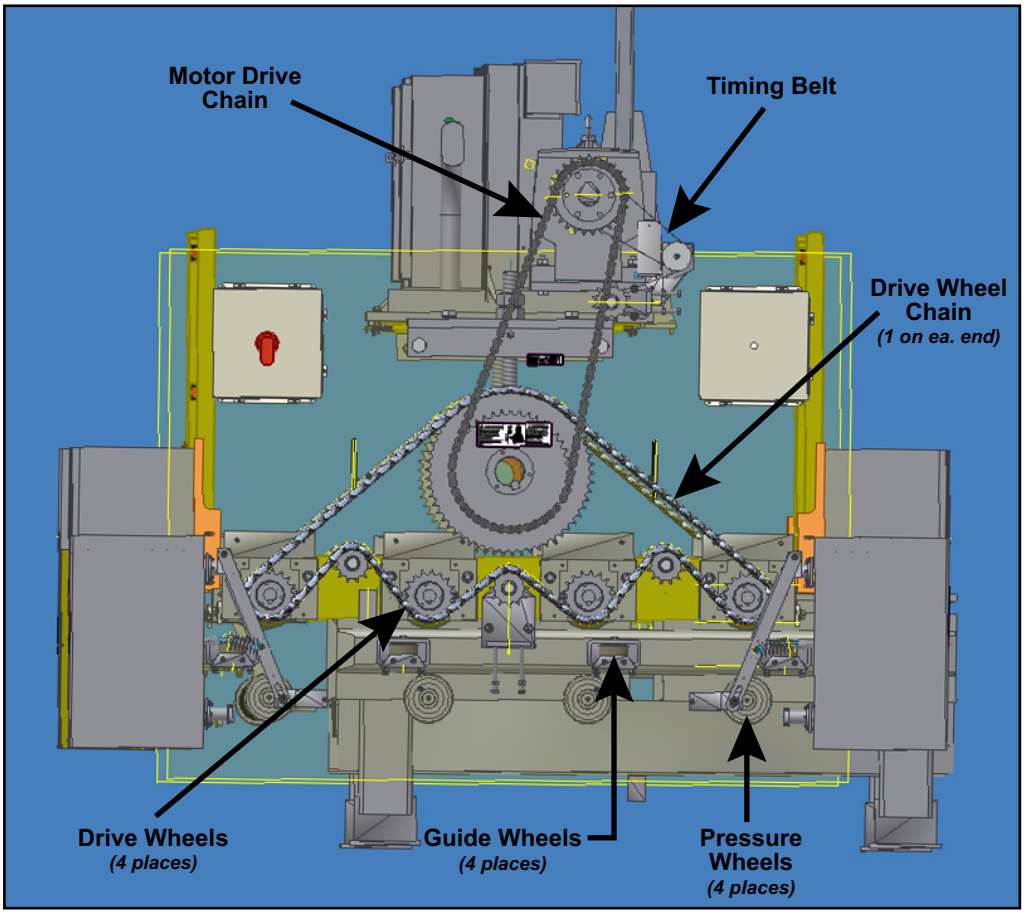


Figure 6-27: Wheels, Chains, and Belt (Machines Shipped After 15 June 2006

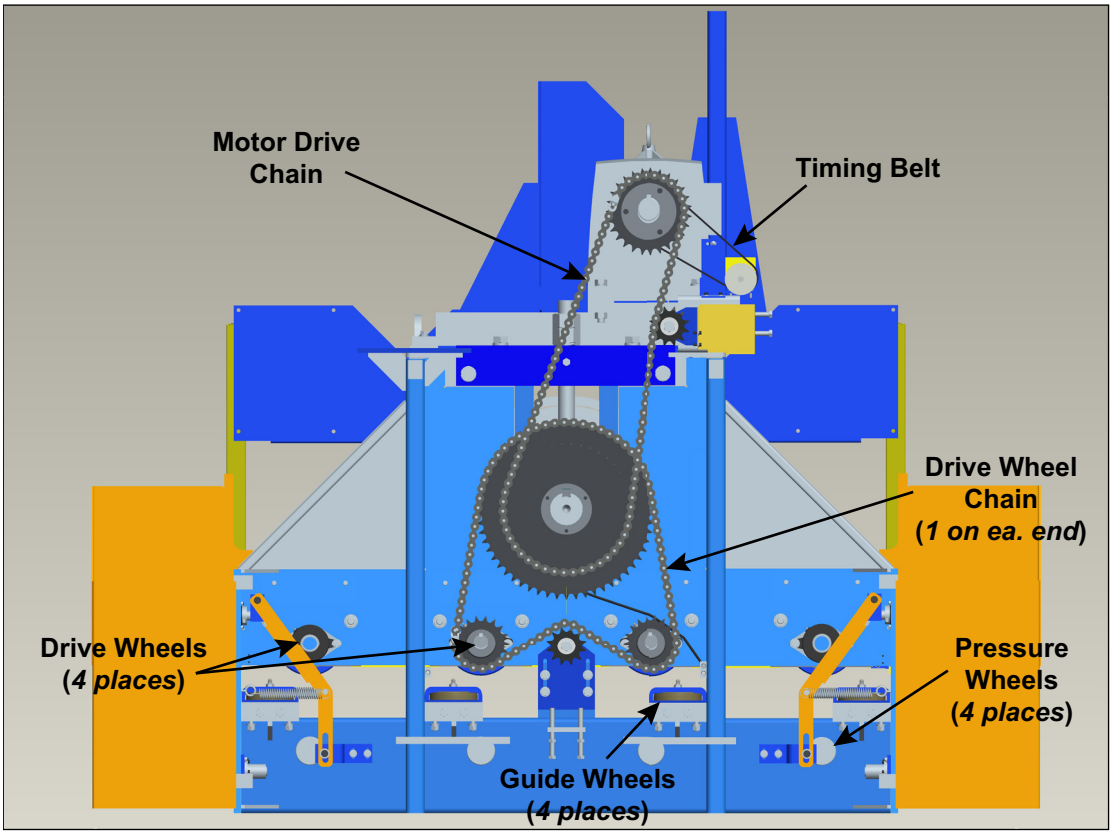
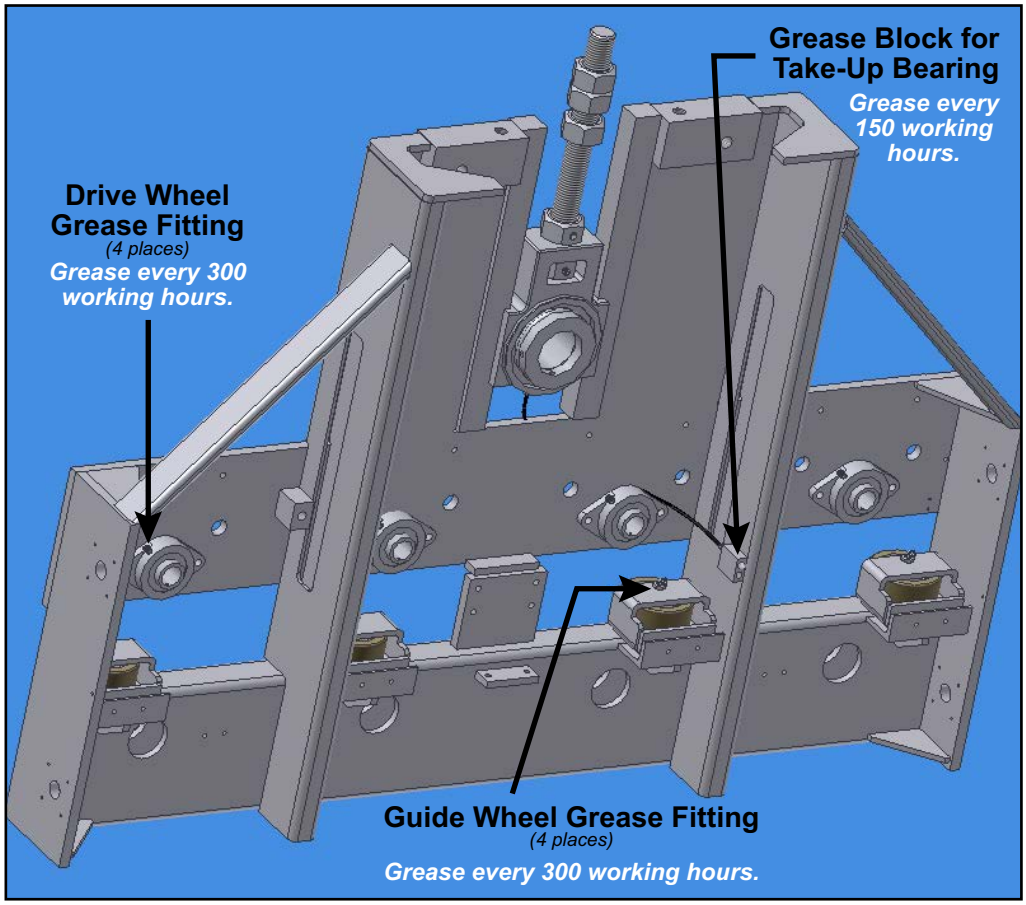
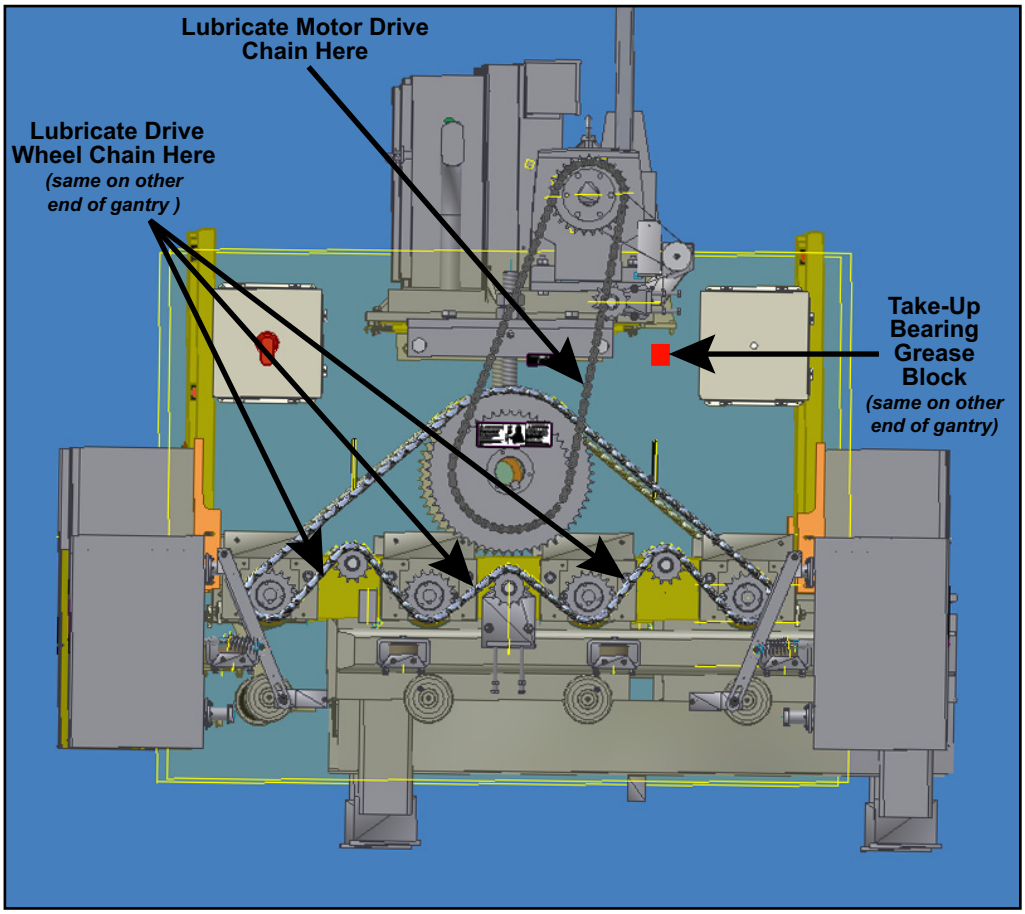


Figure 6-28: Bearing Lubrication Points, One End of Gantry Head



All lubrication points labeled can also be found on the other end of the gantry head.

Figure 6-29: Chain Lubrication Points



Run the gantry head in the forward (or left) direction after lubricating these points.

Figure 6-30: Electrical Enclosure for a 1-Enclosure System

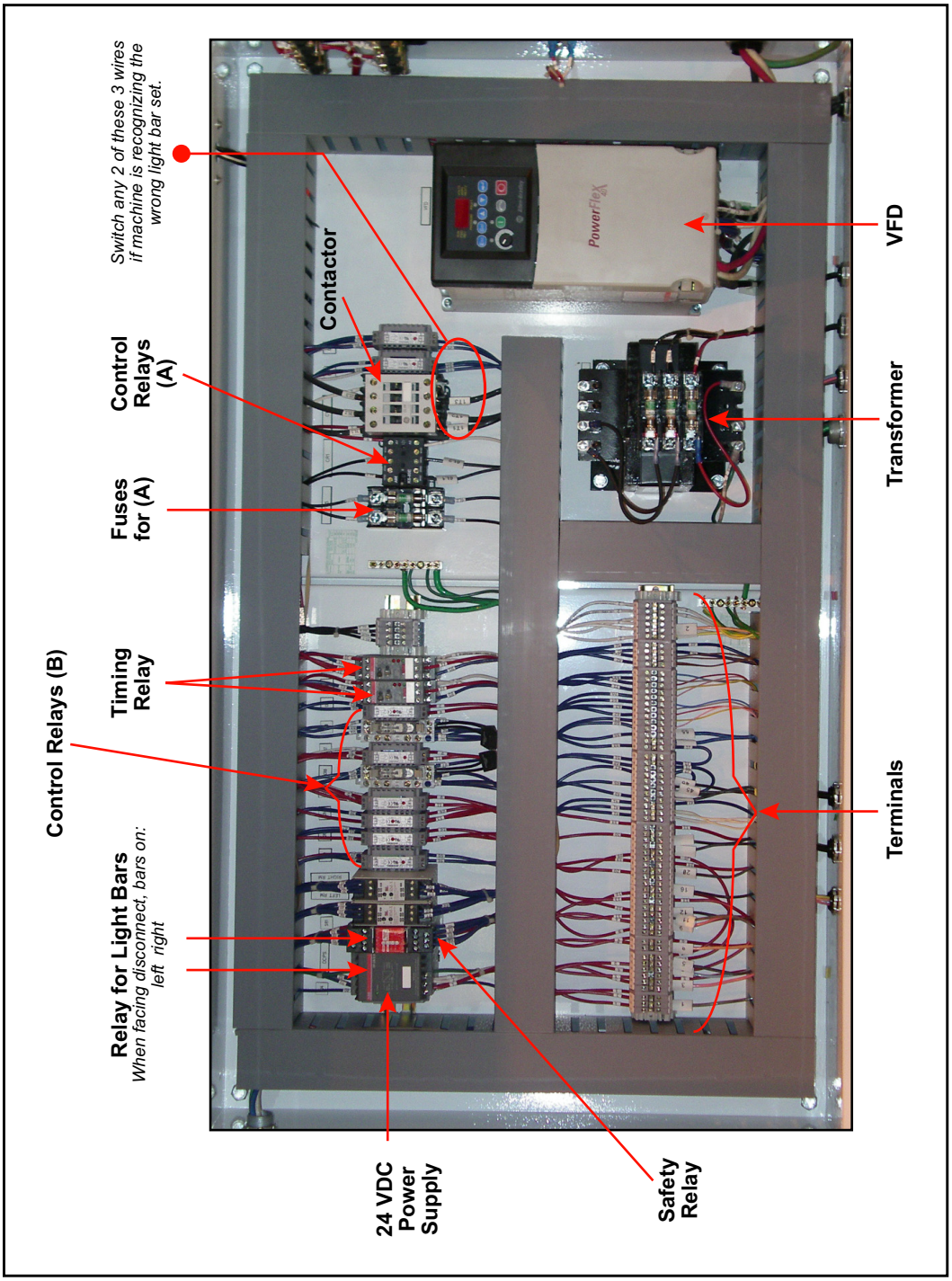
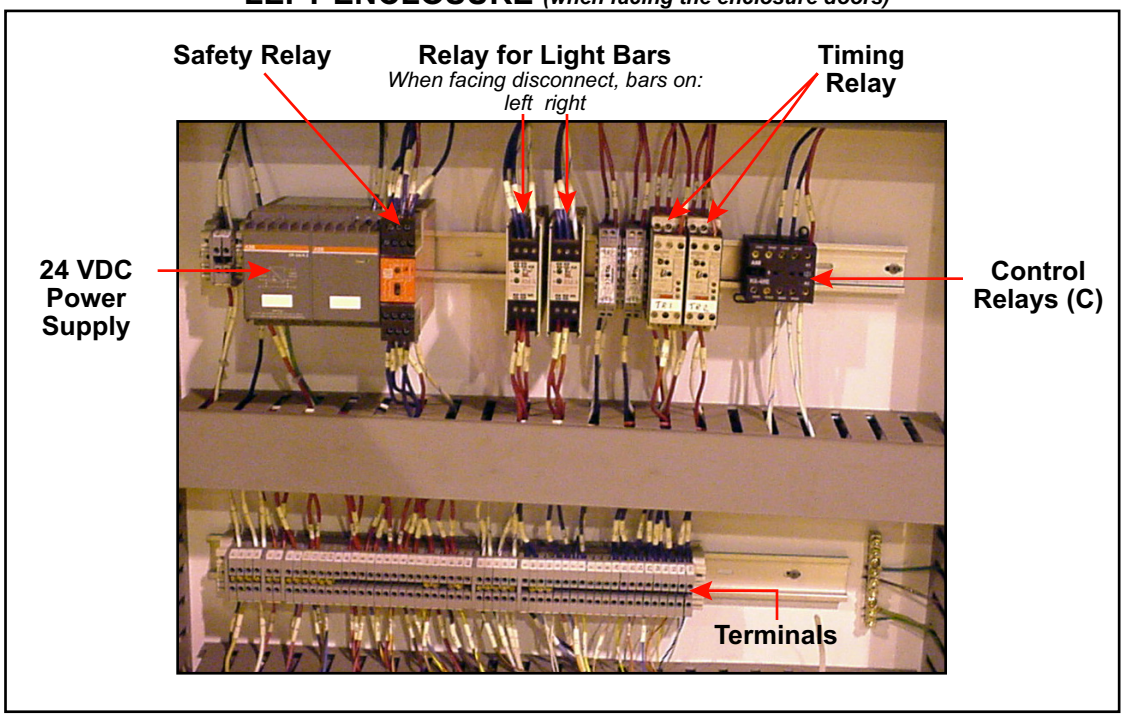


Figure 6-31: Electrical Enclosures for a 2-Enclosure System

LEFT ENCLOSURE *(when facing the enclosure doors)*



RIGHT ENCLOSURE *(when facing the enclosure doors)*

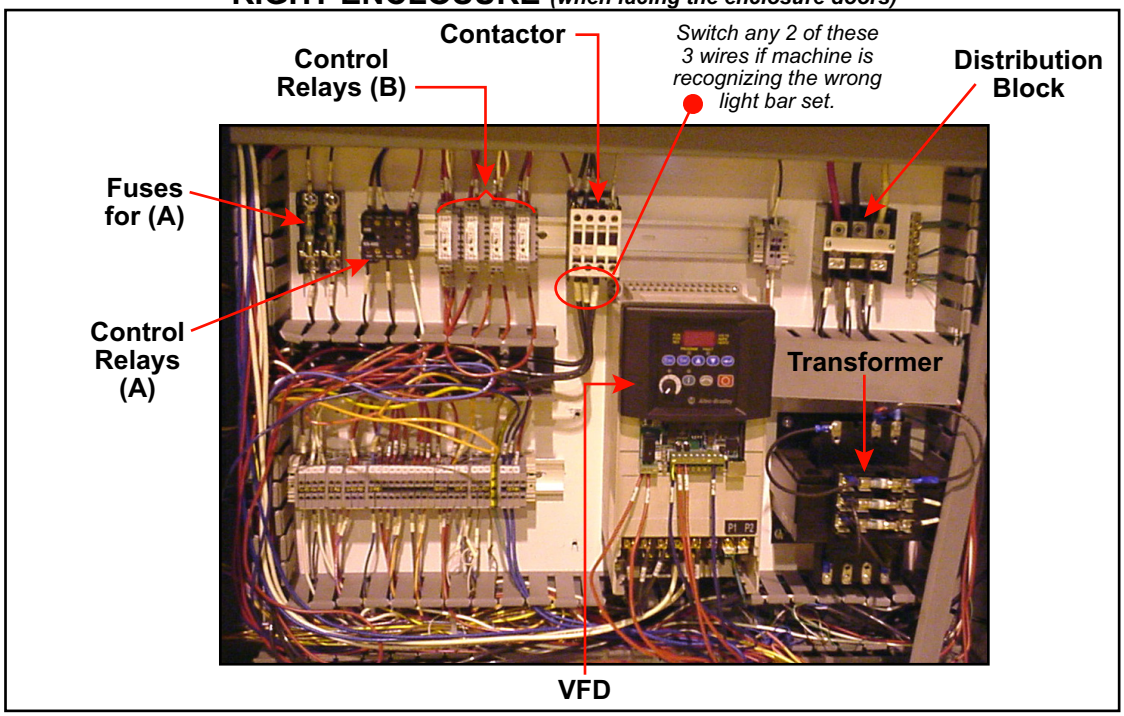
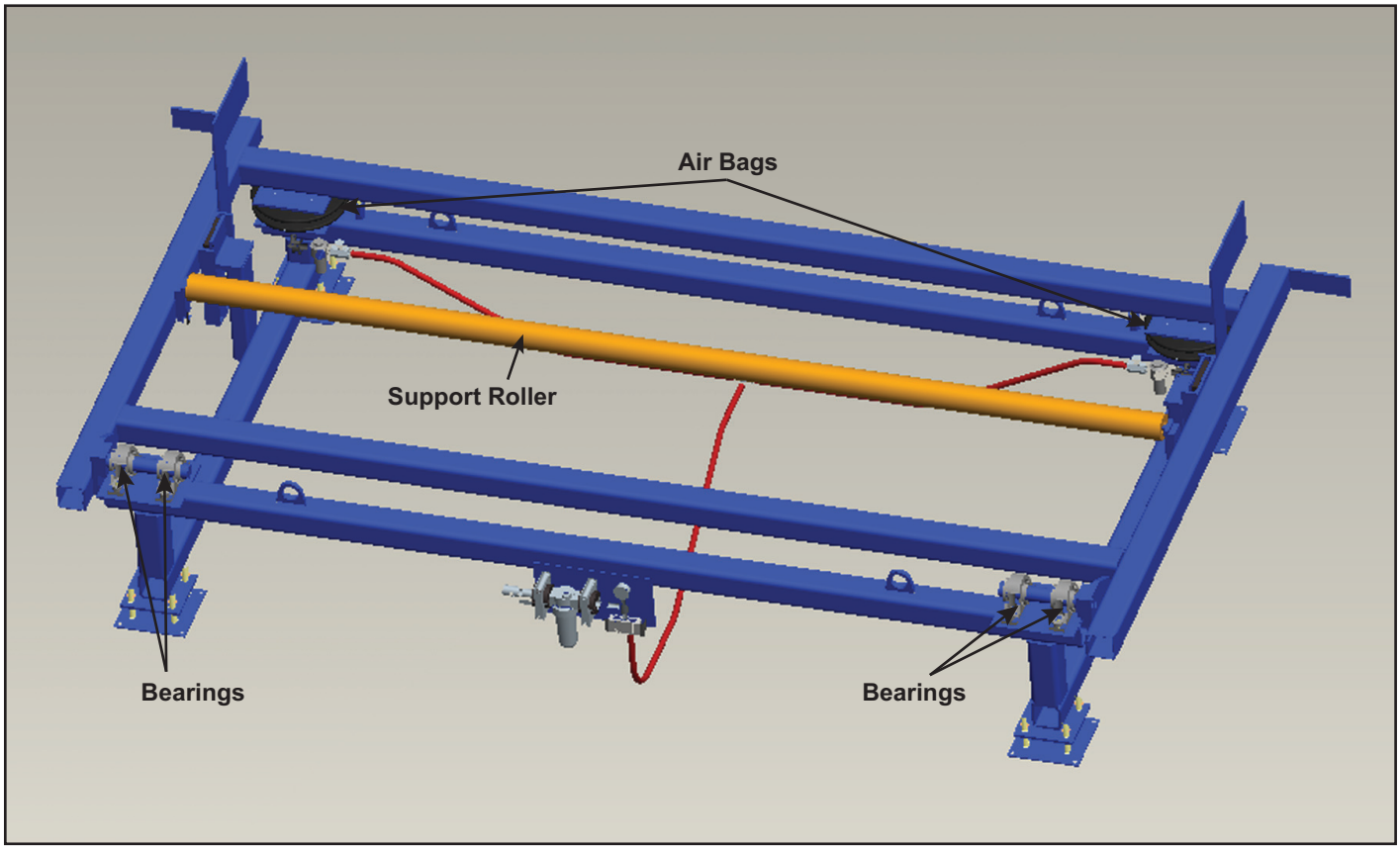


Figure 6-32: Gantry Lifter



Appendix A

Navigating the Troubleshooting Appendix

This appendix is divided into tables according to the nature of the issue that is being addressed. The tables are presented in the order listed below.

Table A-1: Troubleshooting Appendix Quick Reference Guide

Table Number	Troubleshooting Category
Table 1-1	Mechanical
Table 1-2	Electrical
Table 1-3	VFD Fault Codes
Table 1-4	Brake Monitor Failcodes

Table B-1: Troubleshooting the Mechanical System

Problem	Possible Cause	Possible Solution
Gantry head won't move at all (Refer to Table 1-2 for electrical problems.)	Motor drive chain loose or broken	Adjust the tension or replace chain
	Drive wheel chain loose or broken	Adjust the tension or replace chain
	Gantry head or a wheel is jammed with a foreign object	Check the perimeter of the gantry head and around each wheel for blockage
	All 8 wheels are not riding on table tube	Adjust wheel or align tables
	Timing belt is loose or broken	Adjust or replace timing belt
	Brake motor is broken	Repair or replace brake motor
Gantry head won't move in one direction after the machine has been stopped	Vibration of stopping causes bumper to trip safety switch temporarily	Press the START button to reset the safety switch
	Bumper spring or bearing is damaged so normal vibration of stopping causes bumper to move and block light beam	Move the bumper away from the light beam, then press the START button to reset the safety switch; to prevent from continuously happening, must replace the bumper spring or bearing
Gantry head is tracking crookedly or uneven	Guide wheel is damaged or low on lubricant	Grease guide wheels Replace guide wheel
	Drive wheel is damaged or low on lubricant	Grease drive wheels Replace drive wheel
	Tables out of alignment Tables damaged	Align tables Replace tables
	Drive wheel chain not tensioned properly	Adjust the tension
	Drive gear slipping on roller shaft	Adjust the QD bushing
Press is stopping too slowly	Brake motor is worn or damaged	Check lubricants in brake motor Adjust air gap in brake motor Replace brake motor
	Brake pad is worn	Replace brake pad
Nail plates are not properly embedded into the truss	Roller height is not correct	Adjust roller height with the take-up bearing
	Table surface is damaged	Repair tabletop
	Tables are not level	Refer to the *Installation* chapter to re-level the tables

Table B-1: Troubleshooting the Mechanical System (Continued)

Problem	Possible Cause	Possible Solution
Nail plates are not embedded evenly	Roller height on one end differs from the opposite end	Level the roller height
	Table surface is damaged	Repair tabletop
	Tables are not level	Refer to the *Installation* chapter to re-level the tables.
First nail plate pressed is not embedded correctly	Pressure wheels are worn out	Replace pressure wheels
Drive wheels are consistently damaged	Nail wiper is not sweeping away debris on the tube	Replace nail wiper Adjust the height of the nail wiper Remove heavy objects that were left on the table tube
Gantry head or roller is making extraordinary noise or vibration as it travels	Take-up bearing is not lubricated	Grease the take-up bearing Replace damaged take-up bearing
	Parts are damaged: drive wheels, guide wheels, pressure wheels, roller shaft	Inspect location of noise for parts damage
Roller is not turning smoothly	Take-up bearing is not lubricated	Grease the take-up bearing Replace damaged take-up bearing
Gantry head crashes against tables	Table is bent or damaged	Replace table
	Table is out of alignment	Align tables
	Table leg is bent or broken	Replace leveling screws in table feet
Belt between motor and motion detector turns freely, with no tension	Motion detector bracket is not adjusted to the correct location	Adjust the motion detector bracket
	The pulley and the sprocket on the motor shaft are not assembled together properly	Tighten or replace the socket head screw that is on the pulley behind the sprocket
Wipers breaking off	Guide wheels are worn	Replace guide wheels

Check all bulbs on indicator lights to ensure they are still in working order before attempting to do any troubleshooting.

Table B-2: Troubleshooting the Electrical System

Problem	Possible Cause	Possible Solution
E-stop button is depressed, but all indicator lights are not on	Main disconnect switch is in OFF position	Switch the disconnect switch handle to ON position
	Secondary or primary transformer fuses are open	Check primary and secondary transformer fuse
E-stop button is released, but indicator lights are not on	Main disconnect switch is in OFF position	Switch the disconnect switch handle to ON position
	Machine has not been started	Press and release START button
	Brake monitor alarm LED is on	Reset the brake monitor
E-stop button is released and green Start/Ready lights are on, but machine does not move	Brake monitor alarm LED is on	Reset the brake monitor
E-stop button is released, but E-stop light is on	DC output fuse is open	Check DC output fuse
Drive fault light is on	Check VFD fault code	Note fault code on VFD display (see VFD fault code); press the Stop key to clear fault
Only RIGHT READY/ REVERSE START indicator light is on	An object on the left of the machine is sensed entering the detection zone	Clear the detection zone on the left side of the machine and press and release START button
	Brake monitor alarm LED is on	Reset the brake monitor
	Left side light bar receiver has fault	Read LED display on the light bar; refer to light curtain diagnostic code for fault message; check dip switch settings
	Left side light bar transmitter has no power	
Only LEFT READY/ FORWARD START indicator light is on	An object on the right of the machine is sensed entering the detection zone	Clear the detection zone on the right side of the machine and press and release START button
	Brake monitor alarm LED is on	Reset the brake monitor
	Right side light bar receiver has fault	Read LED display on the light bar; refer to light curtain diagnostic code for fault message; check dip switch settings
	Right side light bar transmitter has no power	

Table B-2: Troubleshooting the Electrical System (Continued)

Problem	Possible Cause	Possible Solution
Either LEFT READY/ FORWARD START or RIGHT READY/ REVERSE START button is pressed, horn keeps sounding for more than 5 seconds and the machine is not moving	The timing relay has loose connections or is bad	Check timing relay for loose connections or replace the timing relay
Either LEFT READY/ FORWARD START or RIGHT READY/ REVERSE START button is pressed, the horn sounds and then stops, but the machine is not moving	The control relay has loose connections or is bad	Check control relay and VFD for loose connections or replace the control relay
Press head travels the opposite direction of the directional button pressed	The electrical wires are connected to the wrong terminals.	Swap the wires on the contactor inside the electrical enclosure The wires may be switched at the motor instead of on the contactor also

Table B-3: VFD Fault Codes

No.	Fault	Possible solution
F2	Auxiliary Input	The thermostat on the dynamic brake resistor has tripped; wait for it to cool down and reset the VFD
		Check DB resistor wiring
F3	Power Loss	Monitor the incoming AC line for low voltage or line power interruption
F4	Under Voltage	Monitor the incoming AC line for low voltage or line power interruption
F5	Over Voltage	Monitor the AC line for high line voltage or transient conditions; bus voltage can also be caused by motor regeneration
F7	Motor Overload	An excessive motor load exists
F13	Ground Fault	Check the motor and external wiring to the drive output terminals for grounded conditions
F38	Phase U to ground	Check wiring between drive and motor
F39	Phase V to ground	Check motor for grounded phase
F40	Phase W to ground	Replace drive if fault cannot be cleared
F41	Phase UV short	Check the motor and drive output terminal wiring for a shorted condition; replace drive if fault cannot be cleared
F42	Phase UW short	
F43	Phase VW short	
F70	Power Unit	Cycle power; replace drive if fault cannot be cleared
F122	I/O Board fail	Cycle power; replace drive if fault cannot be cleared

Table B-4: Brake Monitor Failcodes

Failcode	Description
1	The stop relay has failed and the safety relay had to take over. Reset the unit and operate as before. If the stop relay fails again, it must be sent to the factory for repair.
2	The self-check monitor has found a fault with the internal circuitry. Reset the unit. If self-check failure occurs again, the unit must be sent back to the factory for repair.
3	Chain break delay failure. The brake was released, and no motion occurred within the chain break delay period. Make sure the motion detector cable is connected to the motion detector.
4	While the brake is on, motion signal occurred. Motion detector cable is open. Check the motion detector connections.
5	The brake was released and motion started within the chain break delay period. Some time after this, the motion signal was lost. Check for: Broken cam drive chain Broken of loose screw behind the sprocket on the motor shaft Chain has jumped a sprocket Shorted motion detector cable Defective motion detector Electrical noise may cause this symptom
7	Stop Time Alarm Setting Exceeded. The press ran past the brake monitor's Stop Time Alarm setting and continued to free run. Before counting stopped, power was removed from the brake monitor. Reset the brake monitor to clear this fault.
8	EEPROM failure. Note the serial number of the unit and call MiTek.
11	EEPROM failure. Note the serial number of the unit and call MiTek.
12	EEPROM failure. Note the serial number of the unit and call MiTek.
13	Self-check failure, usually due to electrical noise. Unit can be reset by turning power off, then back on. If symptom persists, note serial number of unit and call the factory.
17	Self-check failure. Note serial number of unit and call the factory.

Navigating the Parts List Appendix

Finding the Part Number

The parts list provided here shows spare parts that should be kept in stock at all times. Use one of the methods shown in Table 2-1 to locate your part number.

For a complete list of replacement parts, or if you're unsure of which spare part you need and would like to see a picture, use the electronic Parts Guide for this machine. The electronic Parts Guide was included with this manual on a CD-ROM. It can also be found on our Web site.

Table C-1: How to Find Your Part Number

Using the Spare Parts List in the Manual	Using Our Web Site: www.mii.com/machinery	Using Your Parts Guide CD-Rom
If it is a part that should be kept in stock, it is listed in the Parts List in the manual and in the electronic Parts Guide. Locate the correct part name and description in the manual to find the part number. If you're unsure of which part you need, use the electronic Parts Guide instead to see a picture.	1. Click *Machinery*, then roll your cursor over *Ordering Parts*. 2. Click on *Parts Guide* to access the Quick Reference Parts Guide. 3. Choose your equipment name and browse through the pictured parts to find your part number.	1. Place the CD in your computer's CD drive. It should automatically launch a Main Menu screen. 2. Click the graphic for the machine for which you are ordering parts. 3. Browse through the pictured parts to find your part number.

Ordering the Parts With Your Part Number

There are three easy ways to order your part after you determine the part number. Each column in Table 2-2 describes one of the methods.

Table C-2: How to Order Your Part Using the Part Number

Using Our *eStore*™ (an account is required):	Using E-Mail	Using the Phone
Click the *eStore* link from the Web site, **OR** Click the *eStore* link from the Parts Guide, **OR** Type http://estore.mii.com into your web browser.	Send an e-mail to mitekparts@mii.com with all relevant information, including the part number.	Call us at 1-800-523-3380 and select “Parts Orders”.

Safety Notes for Replacing Parts

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

	WARNING
	CRUSH, CUT, AND PERSONAL INJURY HAZARD. Perform the safety tests described in the *Safety Test* section on page 20 before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.

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

	WARNING
	ELECTROCUTION HAZARD. Always turn the power off by activating an E-stop when the equipment is not in operation. 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.

Part Numbers

Mechanical Parts

Table C-3: Mechanical Replacement Parts

Part Location Category	*MiTek* Part #	Part Description	Refer to Drawing #	Keep in Stock
Drive System	554008	Drive wheel chain, #80 (Qty of 2 at 157" ea)	63750 or 63826	1
Drive System	554008	Motor drive chain (Qty of 1 at 98")	63750 or 63826	1
Nail Wiper	82692	Nail Wiper, wipes debris off rail	63750 or 63826	4
Wheels	63733-501	Drive wheel, wheel only	63750 or 63826	8
Wheels	580200	Guide wheel, 5”x2”, rubber	63750 or 63826	8

Electrical Parts

Table C-4: Electrical Replacement Parts

Part Location Category	*MiTek* Part #	Part Description	Refer to Drawing #	Keep in Stock
Fuses	208/230 V—none 460 V—516388 575 V—516383	Brake fuses (2)	90544	2
Fuses	208/230 V—516494 460 V—516491 575 V—516490	Disconnect fuses (3)	90544	3
Fuses	208 V—516389 230/460 V—516394 575 V—516384	Transformer fuses—primary side (2)	90544	2
Fuses	208/230/460 V—516387 575 V—516350	Transformer fuses—secondary side (1)	90544	1

Appendix D

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 on the copies, leaving the original in the manual for future use.

RoofTracker™ Press

Maintenance Checklist

Daily Checklist

Week of:_____ **Year:**_____

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							
Inspect light bars	Shift 1							
	Shift 2							
	Shift 3							

Notes **Date**

Maintenance Checklist

Weekly Checklist

Month: _____ **Year:** _____

Action	Week 1	Week 2	Week 3	Week 4	Week 5
Check tension of the drive wheel chain—needs 1/2” play					
Check tension of the motor drive chain—needs 1/2” play					

Notes **Date**

Maintenance Checklist

Checklist by Working Hours

Year: _____

Action	WORKING HOURS	Date					
Grease take-up bearing	100						
Grease gantry lifter bearings (end-eject systems only)	100						
Inspect and dust brake motor	100						
Grease the drive wheels	300						
Grease the guide wheels	300						
Check oil level in brake motor	300						
Drain and change gearbox oil	10,000						

Notes **Date**

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.

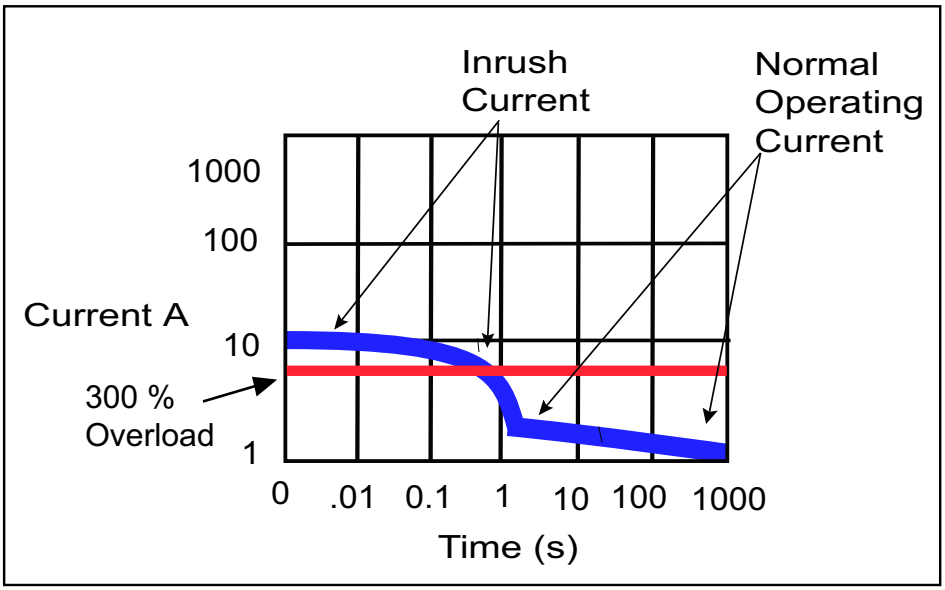
Although the running motor may not draw enough current to blow the fuses or trip circuit breakers, it can produce sufficient heat to burn up the motor. This heat, generated by excessive current in the windings, causes the insulation to fail and the motor to burn out. We use the term “locked rotor amps”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

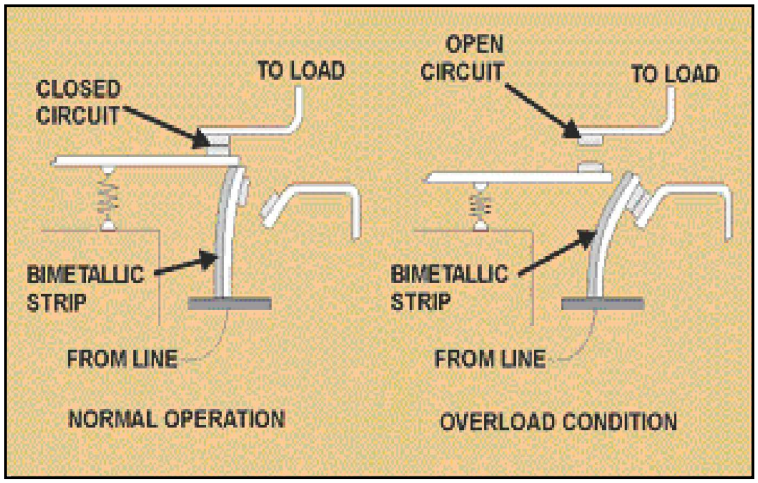
Overload protection is accomplished with the use of a bimetallic strip. This component consists of a small heater element wired in series with the motor and a bimetallic strip that can be used as a trip lever. A bimetallic strip is made of two dissimilar metals bonded together. The two metals have different 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 4-2.

Figure F-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 4-1.

Table F-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 F-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 x weight = 64 x weight. A 20" saw blade is a load of 10^2 x weight = 100 x 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.

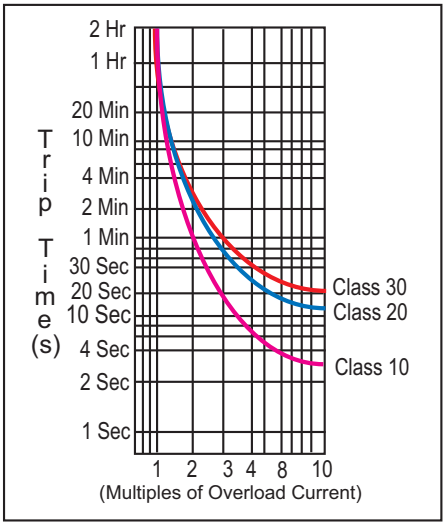
NEMA D

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.

Figure F-3: Trip Times for Trip Classes



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,

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
	**ELECTROCUTION HAZARD.** **Always turn the power off by activating an E-stop when the equipment is not in operation.** **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.** **If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.**

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.

Appendix G

Drawings are in a separate binder accompanying this manual.

Figure G-1: Attached Drawings for a *RoofTracker* System

Drawing Description	Drawing Number
Parking stand assembly	63630
Light beam mount	63718
Take-up bearing assembly	63721
Drive wheel block	63735
Top level mechanical assembly with pendant control station *(No operator platform)*	63750
Grease line scheme	63770
Operator platform	63800
Top level mechanical assembly with operator platform and joystick	63826
Top chord platform assembly	65551
Hybrid assembly	65583
Flat cable festoon, single head	69565
Gantry lift assembly	83350
Gantry lift mechanical assembly	83351
Gantry lift pneumatic assembly	83352
Electrical assembly for systems with a pendant control station *(90524 obsoleted March 2004)*	All 90544 Dwgs
Electrical assembly for systems with a joystick	90544-502 through 90544-614 All 90644 Dwgs

Document Evaluation

Appendix H

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

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

Document Evaluation Form

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

Document Identification:

RoofTracker™	Equipment Manual	001075

General Ratings:

	Poor	Fair	Good	Excellent
Content	❑	❑	❑	❑
Organization	❑	❑	❑	❑
Accuracy	❑	❑	❑	❑
Clarity	❑	❑	❑	❑
Completeness	❑	❑	❑	❑
Examples/Illustrations	❑	❑	❑	❑
Readability	❑	❑	❑	❑

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

❑ Poor ❑ Fair ❑ Good ❑ Excellent

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

Document Evaluation Form (cont'd)

Identify any inaccuracies in the document.	
What are the three best features of the document?	
What are the three worst features of the document?	
What did you like/dislike about the illustrations?	
Your Name:	Date:
Company Name:	Address:
Phone:	Email:
Please mail this form to: MiTek Industries, Inc. Machinery Operations 301 Fountain Lakes Industrial Drive St. Charles, MO 63301 Attn: Engineering Manager	***Or fax this form to:*** 636-328-9218 Attn: Engineering Manager

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

Glossary

1-enclosure system	a *RoofTracker* press that has a gantry head with only 1 main electrical enclosure; the directional buttons are labeled LEFT and RIGHT and the indicator lights are labeled RIGHT READY and LEFT READY; this system has an hour-meter on the enclosure
2-enclosure system	a *RoofTracker* press that has a gantry head with a 3-phase enclosure and a control enclosure for a total of 2 main electrical enclosures; the directional buttons are labeled REVERSE and FORWARD and the indicator lights are labeled REVERSE START and FORWARD START; this system does not have an hour-meter
actuate	to activate, put into action
aisle pad	a type of jigging used when a connector plate needs to be embedded where the table surface gives way to a walk-through aisle
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
auto-eject	a pneumatic system that raises the truss off the tables and automatically places the truss on the Stand-Alone Conveyors with the use of a transfer roller
bumper	a safety device on each corner of the gantry head (for a total of 4); when the bumper is depressed, the gantry head motion stops
bus bar	an electrical device that allows multiple gantry heads to be used simultaneously
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
ejector	also table ejector; raises the truss off of the table using pneumatic power

end-eject	a pneumatic system that raises the truss off the tables and allows the truss to be manually pushed or pulled off the end of the tables; this system requires that the gantry head rolls back over the truss or a device must be installed to raise the gantry head when it is parked
festoon	a string or garland suspended in a loop between two points; the electric cable suspended over the gantry head that is gathered in loops when not completely extended
Finish Roller	a piece of equipment separate from the *RoofTracker* but required for the connector plates to be completely embedded; the Stand-Alone Conveyors take the truss through the Finish Roller after the *RoofTracker* gantry head has rolled across the plates.
gantry head	the entire traveling weldment that houses the roller to embed the connector plates
hour-meter	a gauge on the gantry head on a 1-enclosure system that tells the amount of time the motor is actually turning and the gantry head is moving; 2-enclosure systems do not have an hour-meter
inner side	refers to the end of the gantry head housing; the side closest to the tables; both ends have an inner side—one can see the inner side of both ends when standing on or between the tables
jigging	any of several devices used to hold the truss in place on the tables
joystick	an option that replaces the pendant control station to control movement of the gantry head
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
light bar	the perimeter access guarding device that uses multiple light beams to detect when something is in the way of the gantry head and stops the machine to prevent injury or damage; the *RoofTracker* uses a set of 3-beam or 2-beam light bars on both sides of the gantry head
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
motor end	also “operator end”, used to indicate which end of the gantry head is being discussed; the end of the gantry head that houses the motor and the user control interface
operator end	also “motor end”, used to indicate which end of the gantry head is being discussed; the end of the gantry head that houses the motor and the user control interface
outer side	refers to the end of the gantry head housing; the side farthest from the tables; both ends have an outer side—one can see the outer side of the one end when standing at the pendant control station
pendant control station	where the operator stands to use the pendant that controls movement of the gantry head
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 *connector plate*
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
puck	a type of jigging that is small and round
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
receiver	also receiver stand; sits between the Stand-Alone Conveyors in a side-eject system and raises to meet the ejector so the truss can be pushed onto the receiver and lowered onto the Stand-Alone Conveyors; uses pneumatic power

receiver bar	the light bar that receives the signal from the transmitter bar; every light bar set consists of a receiver bar and a transmitter bar
regulator	a component of the pneumatic system that connects to the main air source and regulates the air pressure allowed into the system
roller	the large roller inside the gantry head that initially embeds the plates into the truss
setup valve	a component of the pneumatic system that controls the flow of air to the rest of the setup
side-eject	a pneumatic system that raises the truss off the tables and allows the truss to be manually pushed or pulled off the side of the table and onto the Stand-Alone Conveyors
slider pad	a type of jigging used when a connector plate needs to be embedded where the table surface gives way to a slot for the ejector
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
stop	a type of jigging that is long and straight
table valve	the pneumatic valve on the bottom-chord end of every table that can be closed to remove the table ejector and associated receiver from operating with the rest of the setup
take-up bearing	adjusts the height of the roller
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
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 points on a conducting wire carrying a constant current of 1 ampere when the power between the points is 1 watt

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