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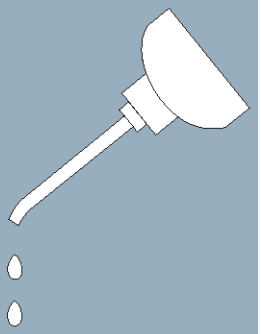
Installation and Service

COBUC-E, COBUC-T



Read the separate safety manual before installing, operating, or servicing

PELLERIN MILNOR CORPORATION POST OFFICE BOX 400, KENNER, LOUISIANA 70063-0400, U.S.A.

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PELLERIN MILNOR CORPORATION
LIMITED STANDARD WARRANTY

We warrant to the original purchaser that MILNOR machines including electronic hardware/software (hereafter referred to as "equipment"), will be free from defects in material and workmanship for a period of one year from the date of shipment (unless the time period is specifically extended for certain parts pursuant to a specific MILNOR published extended warranty) from our factory with no operating hour limitation. This warranty is contingent upon the equipment being installed, operated and serviced as specified in the operating manual supplied with the equipment, and operated under normal conditions by competent operators.

Providing we receive written notification of a warranted defect within 30 days of its discovery, we will—at our option—repair or replace the defective part or parts, EX Factory (labor and freight specifically NOT included). We retain the right to require inspection of the parts claimed defective in our factory prior to repairing or replacing same. We will not be responsible, or in any way liable, for unauthorized repairs or service to our equipment, and this warranty shall be void if the equipment is tampered with, modified, or abused, used for purposes not intended in the design and construction of the machine, or is repaired or altered in any way without MILNOR's written consent.

Parts damaged by exposure to weather, to aggressive water, or to chemical attack are not covered by this warranty. For parts which require routine replacement due to normal wear—such as gaskets, contact points, brake and clutch linings, belts, hoses, and similar parts—the warranty time period is 90 days.

We reserve the right to make changes in the design and/or construction of our equipment (including purchased components) without obligation to change any equipment previously supplied.

ANY SALE OR FURNISHING OF ANY EQUIPMENT BY MILNOR IS MADE ONLY UPON THE EXPRESS UNDERSTANDING THAT MILNOR MAKES NO EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE OR PURPOSE OR ANY OTHER WARRANTY IMPLIED BY LAW INCLUDING BUT NOT LIMITED TO REDHIBITION. MILNOR WILL NOT BE RESPONSIBLE FOR ANY COSTS OR DAMAGES ACTUALLY INCURRED OR REQUIRED AS A RESULT OF: THE FAILURE OF ANY OTHER PERSON OR ENTITY TO PERFORM ITS RESPONSIBILITIES, FIRE OR OTHER HAZARD, ACCIDENT, IMPROPER STORAGE, MIS-USE, NEGLECT, POWER OR ENVIRONMENTAL CONTROL MALFUNCTIONS, DAMAGE FROM LIQUIDS, OR ANY OTHER CAUSE BEYOND THE NORMAL RANGE OF USE. REGARDLESS OF HOW CAUSED, IN NO EVENT SHALL MILNOR BE LIABLE FOR SPECIAL, INDIRECT, PUNITIVE, LIQUIDATED, OR CONSEQUENTIAL COSTS OR DAMAGES, OR ANY COSTS OR DAMAGES WHATSOEVER WHICH EXCEED THE PRICE PAID TO MILNOR FOR THE EQUIPMENT IT SELLS OR FURNISHES.

THE PROVISIONS ON THIS PAGE REPRESENT THE ONLY WARRANTY FROM MILNOR AND NO OTHER WARRANTY OR CONDITIONS, STATUTORY OR OTHERWISE, SHALL BE IMPLIED.

WE NEITHER ASSUME, NOR AUTHORIZE ANY EMPLOYEE OR OTHER PERSON TO ASSUME FOR US, ANY OTHER RESPONSIBILITY AND/OR LIABILITY IN CONNECTION WITH THE SALE OR FURNISHING OF OUR EQUIPMENT TO ANY BUYER.

BMP720097/19036

BIUUUD19 (Published) Book specs- Dates: 20081231 / 20081231 / 20081231 Lang: ENG01 Applic: UUU

How to Get the Necessary Repair Components

This document uses Simplified Technical English.
Learn more at http://www.asd-ste100.org.

You can get components to repair your machine from the approved supplier where you got this machine. Your supplier will usually have the necessary components in stock. You can also get components from the Milnor® factory.

Tell the supplier the machine model and serial number and this data for each necessary component:

- The component number from this manual
- The component name if known
- The necessary quantity
- The necessary transportation requirements
- If the component is an electrical component, give the schematic number if known.
- If the component is a motor or an electrical control, give the nameplate data from the used component.

To write to the Milnor factory:

Pellerin Milnor Corporation
Post Office Box 400
Kenner, LA 70063-0400
UNITED STATES

Telephone: 504-467-2787
Fax: 504-469-9777
Email: parts@milnor.com

— End of BIUUUD19 —

Trademarks

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These words are trademarks of Pellerin Milnor® Corporation and other entities:

Table 1. Trademarks

AutoSpot™	GreenFlex™	MilMetrix®	PulseFlow®
CBW®	GearTrace™	MilTouch™	RAM Command™
Drynet™	GreenTurn™	MilTouch-EX™	RecircONE®
E-P Express®	Hydro-cushion™	MILRAIL™	RinSave®
E-P OneTouch®	Mentor®	Miltrac™	SmoothCoil™
E-P Plus®	Mildata®	PBW™	Staph Guard®
Gear Guardian®	Milnor®		

End of document: BNUUUU02

Safety Information 1

BIUUUS27 (Published) Book specs- Dates: 20051111 / 20051111 / 20060323 Lang: ENG01 Applic: VIP VSR VSL VSE VST VGU

Safety—Shuttle

1. General Safety Requirements—Vital Information for Management Personnel [Document BIUUUS04]

Incorrect installation, neglected preventive maintenance, abuse, and/or improper repairs, or changes to the machine can cause unsafe operation and personal injuries, such as multiple fractures, amputations, or death. The owner or his selected representative (owner/user) is responsible for understanding and ensuring the proper operation and maintenance of the machine. The owner/user must familiarize himself with the contents of all machine instruction manuals. The owner/user should direct any questions about these instructions to a Milnor® dealer or the Milnor® Service department.

Most regulatory authorities (including OSHA in the USA and CE in Europe) hold the owner/user ultimately responsible for maintaining a safe working environment. Therefore, the owner/user must do or ensure the following:

- recognize all foreseeable safety hazards within his facility and take actions to protect his personnel, equipment, and facility;
- work equipment is suitable, properly adapted, can be used without risks to health or safety, and is adequately maintained;
- where specific hazards are likely to be involved, access to the equipment is restricted to those employees given the task of using it;
- only specifically designated workers carry out repairs, modifications, maintenance, or servicing;
- information, instruction, and training is provided;
- workers and/or their representatives are consulted.

Work equipment must comply with the requirements listed below. The owner/user must verify that installation and maintenance of equipment is performed in such a way as to support these requirements:

- control devices must be visible, identifiable, and marked; be located outside dangerous zones; and not give rise to a hazard due to unintentional operation;
- control systems must be safe and breakdown/damage must not result in danger;
- work equipment is to be stabilized;
- protection against rupture or disintegration of work equipment;
- guarding, to prevent access to danger zones or to stop movements of dangerous parts before the danger zones are reached. Guards to be robust; not give rise to any additional hazards; not be easily removed or rendered inoperative; situated at a sufficient distance from the danger zone; not restrict view of operating cycle; allow fitting, replacing, or maintenance by restricting access to relevant area and without removal of guard/protection device;
- suitable lighting for working and maintenance areas;
- maintenance to be possible when work equipment is shut down. If not possible, then protection measures to be carried out outside danger zones;
- work equipment must be appropriate for preventing the risk of fire or overheating; discharges of gas, dust, liquid, vapor, other substances; explosion of the equipment or substances in it.

1.1. **Laundry Facility**—Provide a supporting floor that is strong and rigid enough to support–with a reasonable safety factor and without undue or objectionable deflection–the weight of the fully loaded machine and the forces transmitted by it during operation. Provide sufficient clearance for machine movement. Provide any safety guards, fences, restraints, devices, and verbal and/or posted restrictions necessary to prevent personnel, machines, or other moving machinery from accessing the machine or its path. Provide adequate ventilation to carry away heat and vapors. Ensure service connections to installed machines meet local and national safety standards, especially regarding the electrical disconnect (see the National Electric Code). Prominently post safety information, including signs showing the source of electrical disconnect.

WARNING 1: Collision, Crushing and Pinch Hazards—Serious bodily injury or death can result to personnel in proximity to machinery/systems that traverse, elevate, extend, pivot, and/or tilt. The following mandatory minimum safety requirements must be installed with the machinery system: • Safety fence inclosing machine movement areas, • Lockable electrical interlocks on all gates, properly interfaced as shown on machine schematics, to disable machine movement when any gate is opened, • Signs to alert personnel to these hazards, placed prominently around the fenced area. Local codes may require additional precautions.

1.2. **Personnel**—Inform personnel about hazard avoidance and the importance of care and common sense. Provide personnel with the safety and operating instructions that apply to them. Verify that personnel use proper safety and operating procedures. Verify that personnel understand and abide by the warnings on the machine and precautions in the instruction manuals.

1.3. **Safety Devices**—Ensure that no one eliminates or disables any safety device on the machine or in the facility. Do not allow machine to be used with any missing guard, cover, panel or door. Service any failing or malfunctioning device before operating the machine.

1.4. **Hazard Information**—Important information on hazards is provided on the machine safety placards, in the Safety Guide, and throughout the other machine manuals. **Placards must be kept clean so that the information is not obscured. They must be replaced immediately if lost or damaged. The Safety Guide and other machine manuals must be available at all times to the appropriate personnel.** See the machine service manual for safety placard part numbers. Contact the Milnor Parts department for replacement placards or manuals.

1.5. **Maintenance**—Ensure the machine is inspected and serviced in accordance with the norms of good practice and with the preventive maintenance schedule. Replace belts, pulleys, brake shoes/disks, clutch plates/tires, rollers, seals, alignment guides, etc. before they are severely worn. Immediately investigate any evidence of impending failure and make needed repairs (e.g., cylinder, shell, or frame cracks; drive components such as motors, gear boxes, bearings, etc., whining, grinding, smoking, or becoming abnormally hot; bending or cracking of cylinder, shell, frame, etc.; leaking seals, hoses, valves, etc.) Do not permit service or maintenance by unqualified personnel.

2. Safety Alert Messages—Internal Electrical and Mechanical Hazards [Document BIUUUS11]

The following are instructions about hazards inside the machine and in electrical enclosures.

WARNING 2: Electrocution and Electrical Burn Hazards—Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not unlock or open electric box doors.

- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.

WARNING 3: Entangle and Crush Hazards—Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.

3. Safety Alert Messages—External Mechanical Hazards [Document BIUUUS12]

The following are instructions about hazards around the front, sides, rear or top of the machine.

CAUTION 4: Strike and Crush Hazards—A traveling machine such as a shuttle can strike, crush, or entrap you if you ride on it or enter its path. Traveling machines or their components can move automatically in any direction. Placing a system machine on line by energizing the machine control may immediately summon a shuttle or other traveling machine.

- Keep yourself and others off of machine.
- Keep yourself and others clear of movement areas and paths.
- Understand the consequences of placing a system machine on line.
- Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.
- Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.

CAUTION 5: Crush and Entrap Hazards—A traveling machine such as a shuttle can crush or entrap you if the bed or bucket descends while you are under it. The bed or bucket can descend with power off or on.

- Keep yourself and others clear of movement areas and paths.

WARNING 6: Fall, Entangle, and Strike Hazards—Machine motion can cause you to fall or become entangled in or struck by nearby objects if you stand, walk, or ride on the machine. Shuttles and conveyor belts move automatically.

- Keep yourself and others off of machine.

4. Safety Alert Messages—Unsafe Conditions [Document BIUUUS14]

4.1. Damage and Malfunction Hazards

4.1.1. Hazards Resulting from Inoperative Safety Devices

WARNING 7: Multiple Hazards—Operating the machine with an inoperative safety device can kill or injure personnel, damage or destroy the machine, damage property, and/or void the warranty.

- Do not tamper with or disable any safety device or operate the machine with a malfunctioning safety device. Request authorized service.

WARNING 8: Electrocution and Electrical Burn Hazards—Electric box doors—Operating the machine with any electric box door unlocked can expose high voltage conductors inside the box.

- Do not unlock or open electric box doors.

WARNING 9: Entangle and Crush Hazards—Guards, covers, and panels—Operating the machine with any guard, cover, or panel removed exposes moving components.

- Do not remove guards, covers, or panels.

4.1.2. Hazards Resulting from Damaged Mechanical Devices

WARNING 10: Multiple Hazards—Operating a damaged machine can kill or injure personnel, further damage or destroy the machine, damage property, and/or void the warranty.

- Do not operate a damaged or malfunctioning machine. Request authorized service.

WARNING 11: Crush Hazards—Chain and hoist—A broken chain or a malfunctioning hoist can permit the belt/bucket assembly to fall or descend.

- Do not operate the machine with any evidence of damage or malfunction.

4.2. Careless Use Hazards

4.2.1. Careless Operation Hazards—Vital Information for Operator Personnel (see also operator hazards throughout manual)

WARNING 12: Multiple Hazards—Careless operator actions can kill or injure personnel, damage or destroy the machine, damage property, and/or void the warranty.

- Do not tamper with or disable any safety device or operate the machine with a malfunctioning safety device. Request authorized service.
- Do not operate a damaged or malfunctioning machine. Request authorized service.
- Do not attempt unauthorized servicing, repairs, or modification.
- Do not use the machine in any manner contrary to the factory instructions.
- Use the machine only for its customary and intended purpose.
- Understand the consequences of operating manually.

CAUTION 13: Goods Damage and Wasted Resources—Entering incorrect cake data causes improper processing, routing, and accounting of batches.

- Understand the consequences of entering cake data.

WARNING 14: Strike and Crush Hazards—Carelessly moving the machine with manual controls can cause it to strike, crush, entrap, or entangle personnel. You have total control of machine movement immediately after setting the Manual/Automatic switch to manual.

- Keep yourself and others clear of movement areas and paths.
- Understand the consequences of operating manually.

4.2.2. Careless Servicing Hazards—Vital Information for Service Personnel (see also service hazards throughout manuals)

WARNING 15: Electrocution and Electrical Burn Hazards—Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard.

WARNING 16: Entangle and Crush Hazards—Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard.

WARNING 17: Crush and Entrap Hazards—A traveling machine such as a shuttle can crush or entrap you if the bed or bucket descends while you are under it. The bed or bucket can descend with power off or on.

- Secure both red safety pins in accordance with the instructions furnished, then lock out and tag out power at the main machine disconnect before working under bed or bucket.

WARNING 18: Strike and Crush Hazards—A traveling machine such as a shuttle can strike, crush, or entrap you if you ride on it or enter its path. Traveling machines or their components can move automatically in any direction. Placing a system machine on line by energizing the machine control may immediately summon a shuttle or other traveling machine.

- Lock out and tag out power to the traveling machine at the main machine disconnect if you must work in the path of the traveling machine.

— End of BIUUUS27 —

Use the Red Safety Supports for Maintenance — COBUC_, COBUD_

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1. What Safety Supports are Provided and Why

BNSWUH01.C02 0000374312 A.8 A.6 8/18/21 9:25 AM Released

These machines are provided with a safety bar. After the bucket is tilted up, the bar is inserted between the bucket and the carrier. If the bucket and carrier elevate, the machine is also provided with two safety pins. After the bucket and carrier are raised, the pins are inserted into holes in both sides of the frame. The safety bar provides protection against the unpowered tilting down of the bucket and the safety pins provide protection against the unpowered descent of the bucket during maintenance. A mechanical problem such as an air line leak can cause the bucket to tilt down or fall quickly. Use the safety support(s) whenever the maintenance to be performed requires you to place any part of your body in or near the path of the vertically moving portion of the machine.

WARNING: **Incorrect use of the safety supports** — can cause the machine to descend and crush you.

- Never work near the path of the vertically moving portion of the machine unless the safety supports are deployed and power is removed from the machine.
- Do not use power to close a small gap between the machine and the safety supports. Use care not to lower the machine with the safety supports deployed.
- Where a pair of safety supports is provided, always use both supports.
- Maintain the safety support(s) in good condition.
- When not in use, stow the safety support(s) in the location(s) provided on the machine or in a convenient, designated location.

2. How to Deploy the Bucket Safety Bar

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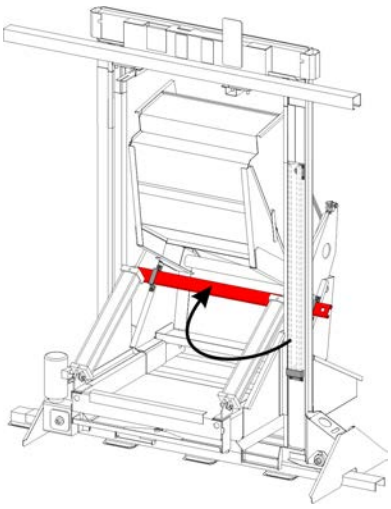
1. Use the Manual mode to raise the bucket completely.
2. See the illustration at right. Install the safety bar. Place each end of the bar in the bracket on each side of the bucket carrier.
3. Remove electric power from the machine.



3. How to Deploy the Safety Pins

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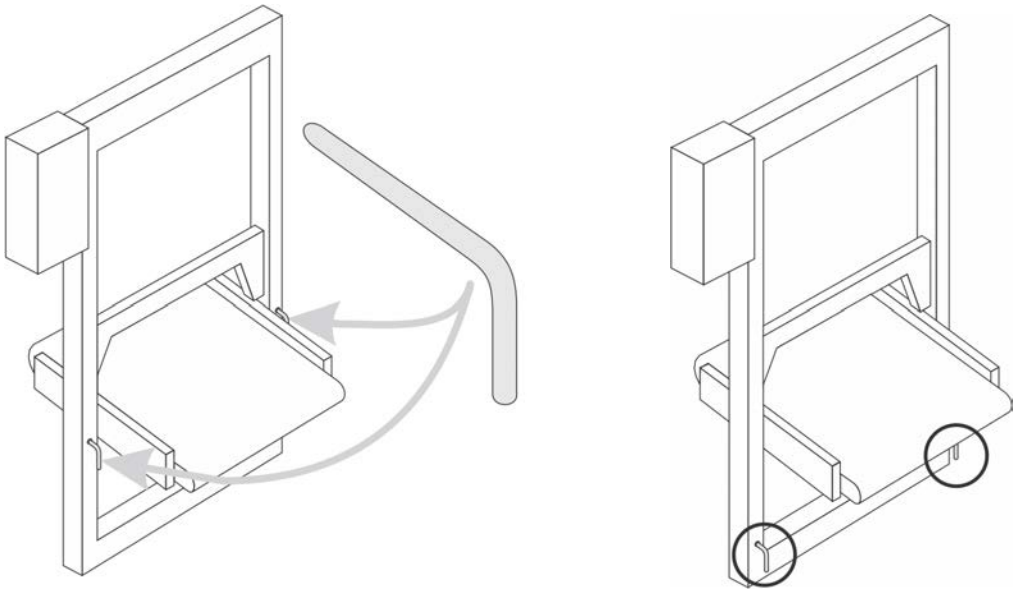
1. Use the Manual mode to raise the bed or bucket carrier only as far as needed to insert the pins at one of the receptacle holes.
2. The illustrations below show the safety pins deployed (at left) and stowed (at right). Install the safety pins into the receptacle holes in the frame.

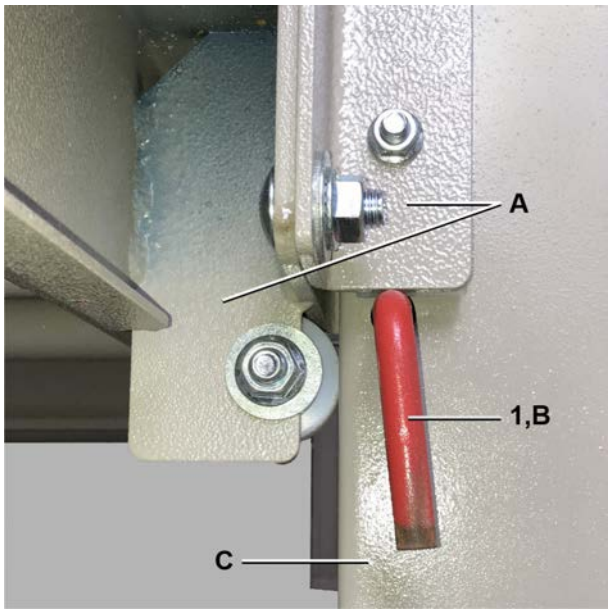


3. Remove electric power from the machine.

End of document: BNSWUH01

Safety Pin

All Elevating Shuttles and Pivoting Elevators.



Legend

A . . . Side Slider
B . . . Safety Pin, 2 instances, left and right
C . . . Vertical frame member

Table 1. Parts List—Safety Pin

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	1	04 21496	SAFETY PIN-COSHA	

Proximity Safeguarding for Automatic Shuttle Conveyors

Proximity safeguarding—a means of preventing personnel from entering the path of a machine, such as an industrial robot, that moves within a large area.

1. Applicability

This document—

applies to Milnor® automated laundering systems with shuttle conveyors that move without operator intervention (automatic operation),

does *not* apply to shuttles that require operator input continually, such as directing all shuttle movements (manual operation).

2. References for Proximity Safeguarding

ANSI Z8.1-2016 “American National Standard for Commercial Laundry and Drycleaning Equipment and Operations - Safety Requirements”

OSHA Standard 29 CFR § 1910.212 “General Requirements for All Machines”

OSHA Directive STD 01-12-002 - Pub 8-1.3 “Guidelines for Robotic Safety”

ANSI/RIA R15.06-2012 “American National Standard for Industrial Robots and Robot Systems- Safety Requirements”

ANSI/ASME B15.1-2000 “Safety Standard for Mechanical Power Transmission Apparatus”

OSHA Publication 3067 “Concepts and Techniques of Machine Safeguarding”

ISO 10472-1 “Safety Requirements for Industrial Laundry Machinery”

3. Hazards To Personnel in Proximity to Shuttle Conveyors

Milnor automated laundering systems use automatic shuttle conveyors to transport goods among the processing machines in the system. Depending on model, an automatic shuttle conveyor may move in any of the following ways, in addition to running its conveyor belt(s):

- It may travel along (traverse) a line of machines (typically dryers).
- Its conveyor bed(s) may ascend and descend (elevate) within the machine frame.
- Its conveyor bed(s) may extend and retract within the machine frame.
- The conveyor bed and frame may pivot.
- Wet goods shuttles have a bucket that elevates and tilts.

These motions pose strike, crush, sever, and entrapment hazards to personnel in proximity to the shuttle. **For the safety of personnel, owner/users must provide proximity safeguarding that protects personnel from the moving shuttle.**

A common method of proximity safeguarding is safety fencing with interlocked gates that disable the shuttle when a gate is opened. When a shuttle is disabled, this will eventually cause other machines in the system to hold (wait for action from another machine), but it will not necessarily cause them to immediately stop moving. In the case of a tunnel system, the press or centrifugal extractor can pose additional hazards to personnel in proximity to the equipment. **Hence, the safeguards must also disable any presses or extractors.** Tunnels and dryers do not pose a significant hazard to personnel merely because they are in proximity to the equipment, and need not be automatically disabled.

WARNING 1: Multiple Hazards—Proximity safeguarding provides only partial protection and only against injury resulting from entering the shuttle path. It is not a substitute for proper

lockout/tagout procedures and good safety practices.

- Always lockout/tagout any individual machine (or follow the published maintenance procedures) when performing maintenance or clearing a fault on that machine.
- Ensure that all personnel understand the safeguards and do not attempt to defeat them.
- Inspect safeguards weekly to ensure that they are not mechanically or electrically circumvented.

4. How Milnor Accommodates Proximity Safeguarding

Milnor provides connection points on shuttles, presses and centrifugal extractors for interfacing with devices such as gate interlock switches. These connection points are tagged for easy identification. When Milnor provides equipment layout drawings for an automated laundering system, it indicates on the drawing, the perimeter of the shuttle movement area that must be guarded. The following hazard statement is displayed on connection point tags as well as equipment layout drawings prepared by Milnor:

WARNING 2: Strike, Crush, Sever, and Entrapment Hazards—Serious bodily injury or death can result to personnel in proximity to machinery/systems that traverse, elevate, extend, pivot, and/or tilt. The following mandatory minimum safety requirements must be installed with the machinery system (local codes may require additional precautions):

- Safety fence enclosing machine movement areas,
- Lockable electrical interlocks on all gates, properly interfaced as shown on machine schematics, to disable machine movement when any gate is opened,
- Signs to alert personnel to these hazards, placed prominently around the fenced area.

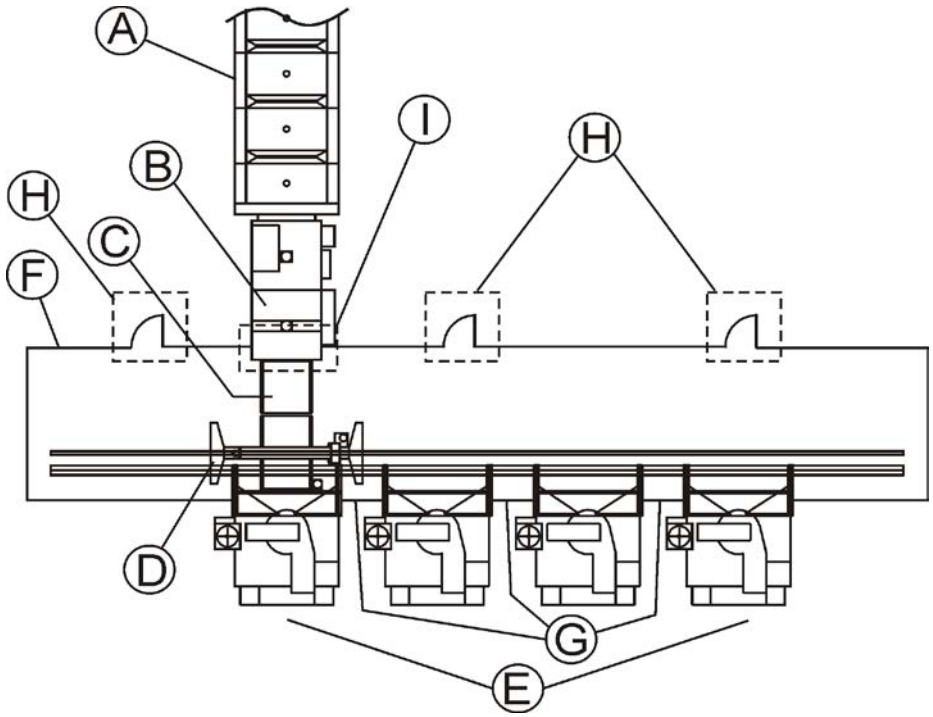
Although the objectives of proximity safeguarding are the same anywhere, design requirements vary with local codes (which occasionally change) and with the plant layout. For this reason, Milnor does not provide detailed designs or materials for proximity safeguarding. If the necessary expertise does not exist within the owner/user's organization, consult appropriate sources such as local engineers or architects specializing in industrial facility design.

5. Examples of Safety Fencing With Interlocked Gates

Fencing with interlocked gates like that depicted in Figure 1 and Figure 2, may be used to meet the proximity safeguarding requirement. Should the owner/user choose this method, the following information may be useful. However, **this information may not satisfy current or local code requirements. The owner/user must determine its suitability for his particular facility.**

Figure 1: Example Fence Layout for Automated Laundering System Where One Tunnel Serves a Bank of Dryers

Plan View of Laundering System

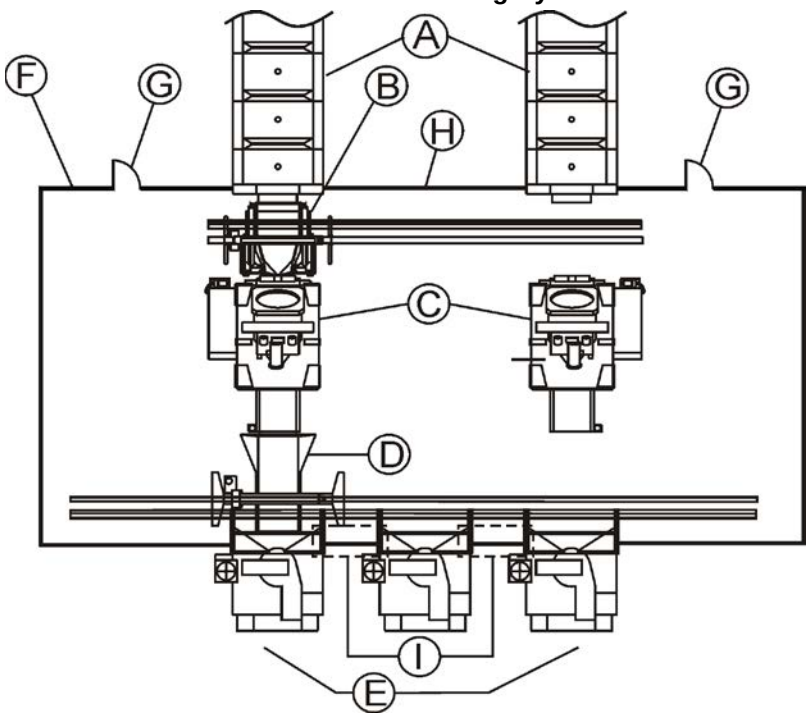


Legend

- **A.** Continuous Batch Washer (tunnel)
- **B.** Press extractor
- **C.** COINC inclined conveyor
- **D.** Traversing and elevating shuttle conveyor for pressed cakes
- **E.** Bank of dryers
- **F.** Fence enclosing path of shuttle
- **G.** Fence segments between dryers
- **H.** Electrically interlocked gates. Gates swing outward at least 90 degrees and swing area is marked on floor. Provide multiple gates for long fence runs.
- **I.** Fence restricts access to unload end of press, but does not obstruct access to press controls.

Figure 2: Example Fence Layout for Automated Laundering System Where Two Tunnels Serve a Bank of Dryers

Plan View of Laundering System



Legend

- **A.** Continuous Batch Washers (tunnels)
- **B.** Traversing and elevating shuttle conveyor for wet goods
- **C.** Centrifugal extractors
- **D.** Traversing and elevating shuttle conveyor for loose goods
- **E.** Bank of dryers
- **F.** Fence enclosing paths of both shuttles and both centrifugal extractors
- **G.** Gates interlocked with both shuttles and both centrifugal extractors.
- **H.** Fence segment between tunnels.
- **I.** Fence segments between dryers.

5.1. Fence Dimensions—The fence must discourage climbing over and prevent crawling under.

5.2. Fence Materials and Setback—The fence must be constructed of materials and located so as to prevent personnel from reaching through gaps in the fence and contacting the enclosed machinery.

5.3. Gates—Personnel gates must be held firmly closed but permit personnel to easily pass through when necessary. Gates must be equipped with a positive latching arrangement to prevent accidental opening. Adequate floor space must be provided to allow the gate to swing at least 90 degrees when fully open. Gates must open outward; that is, away from the fenced perimeter. The floor must be permanently marked to show the gate's swing area, to discourage obstructing its movement.

5.4. Control Circuitry—All gates must be electrically interlocked with any shuttle conveyors within the fenced area and with any presses or centrifugal extractors that the fence either encloses or intersects. Opening any gate must have the following effects:

1. Shuttle(s), press(es), and/or centrifugal extractor(s) stop moving immediately.
2. An audible alarm sounds.
3. Shuttle(s), press(es), and/or centrifugal extractor(s) cannot be restarted merely by closing the gate(s), but must be restarted at the machine control panel once the gate(s) are closed.

Milnor shuttles, presses and centrifugal extractors provide such functionality when properly interfaced with gate interlock switches.

5.5. System Emergency Stop Switches—The laundry must establish rules and procedures that prohibit personnel from remaining within the fenced area with machine(s) enabled, except in accordance with published maintenance procedures. System emergency stop switches (panic buttons) should be provided inside and outside the fenced perimeter. Emergency stop switches should be located so that personnel anywhere inside the fenced perimeter are only a short distance from a switch, and they should be clearly marked as to their locations and function. Connect switches in series with the gate interlocks so that pressing an emergency stop switch performs the same control function as opening a gate.

5.6. Isolating Individual Machine Controls—The interlock circuitry for each machine must be electrically isolated from that of the other machines. Hence, each gate interlock switch must provide as many pairs of dry contacts as there are machines to interface to. A pair of switch contacts must never be shared by two or more machines.

5.7. Recommended Signage—Safety placards should be posted along the fence and at each gate, alerting personnel to the hazards within. At minimum, the size of lettering and distance between placards should be such that anyone contemplating entering the fenced area will likely see and read the placard first. Wording should be provided in each native language spoken by laundry personnel.

— End of BISUUI01 —

Safety Placard Use and Placement

ALL COBUC

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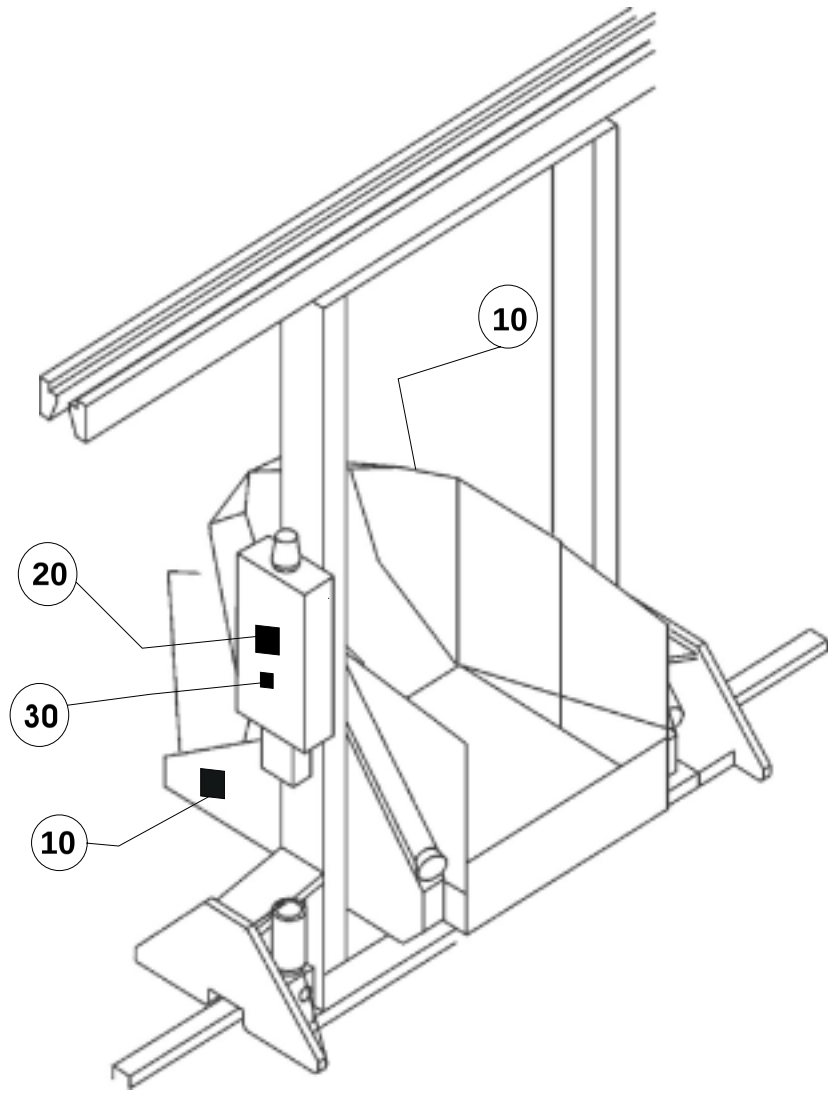
Litho in U.S.A.

Notes:

1. **Replace placard immediately, if removed or unreadable.**
2. **Approximate locations of placards are shown. Mounting holes are provided on machine. Use #8 self-tapping screws.**



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Parts List—Safety Placard Placement

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
.				
			----------ASSEMBLIES----------	
			none	
			----------COMPONENTS----------	
all	10	01 10564A	NPLT:COSHA HAZARDS-TCATA	
all	20	01 10377A	NPLT:ELEC HAZARD LG-TCATA	
all	30	01 10699A	NPLT:SERV HZRD-PLYEST-TCATA	

Safety Placard Use and Placement ISO

ALL COBUC

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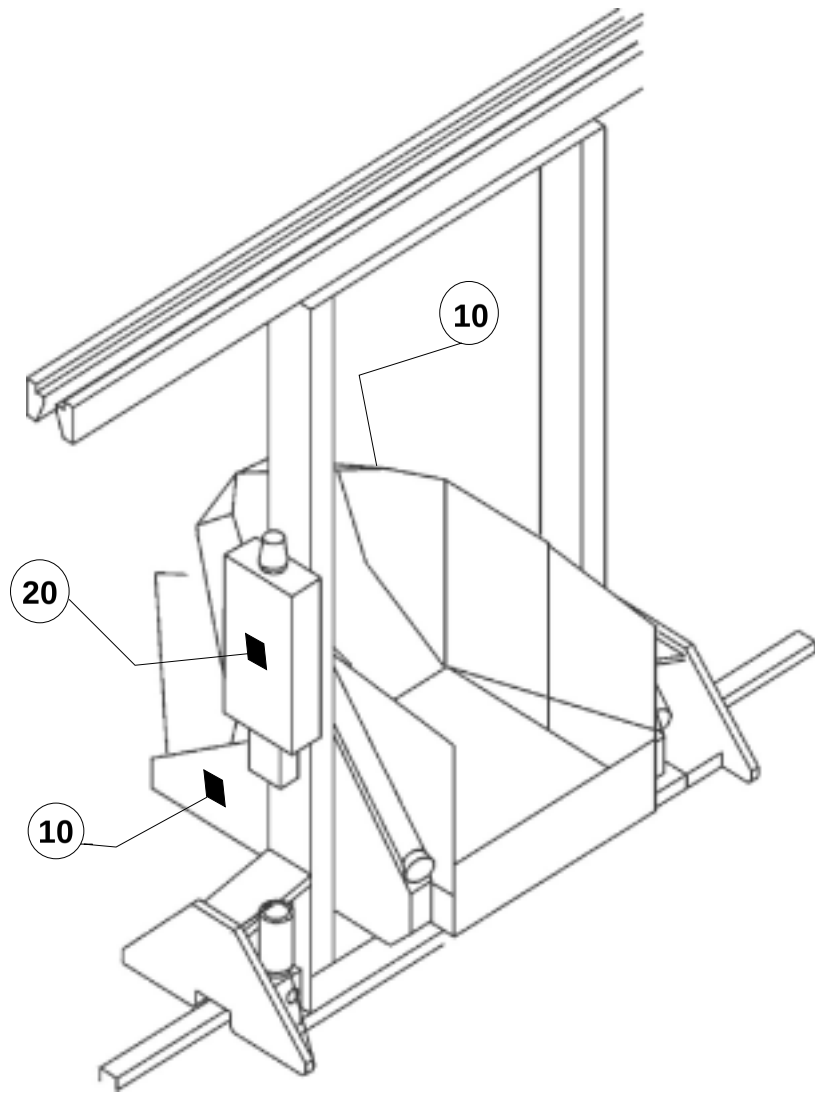
ISO Placard
shown on this page

Notes:
1. **Replace placard immediately, if removed or unreadable.**
2. **Approximate locations of placards are shown. Mounting holes are provided on machine. Use #8 self-tapping screws.**



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Parts List—Safety Placard Use and Placement

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

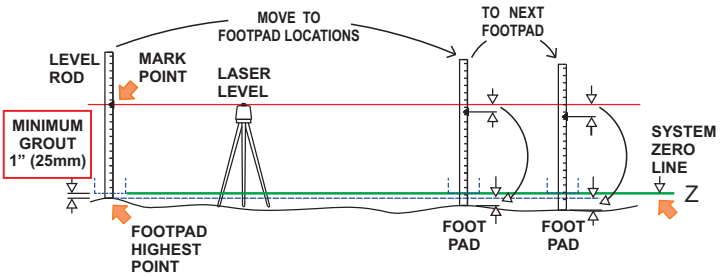
Used In	Item	Part Number	Description	Comments
----------ASSEMBLIES----------				
			none	
----------COMPONENTS----------				
all	10	01 10636X	WARNING COBUC ->ISO	
all	20	01 10377	NPLTE:"WARNING" 4X4	

Installation 2

ATTENTION INSTALLERS!

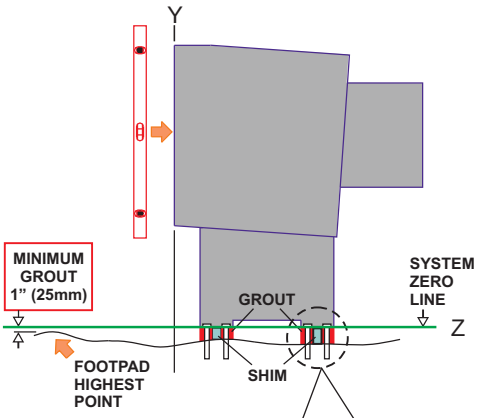
FLOOR IS UNEVEN

- Establish System Zero Line or Z.
- Find highest point in factory floor where footpads will be located.
- System Zero Line or Z is 1" above highest point.



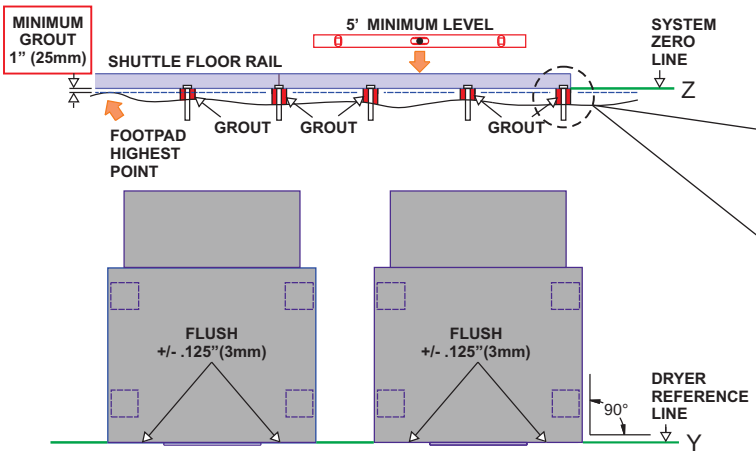
DRYER FEET MUST BE GROUTED

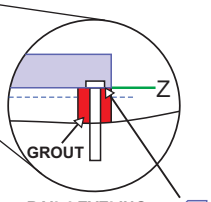
- Shim & level to System Zero Line or Z.
- Grout & anchor all brackets.

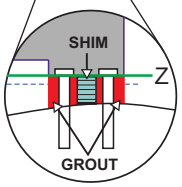


SHUTTLE RAIL BRACKETS MUST BE GROUTED TO Z

- Shim & level to System Zero Line or Z.
- Grout & anchor all brackets.

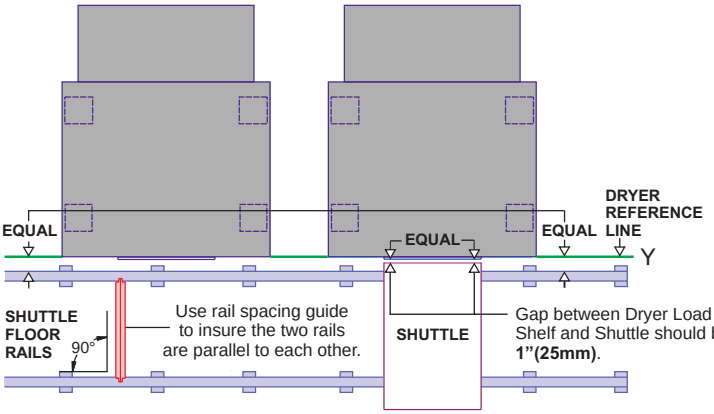


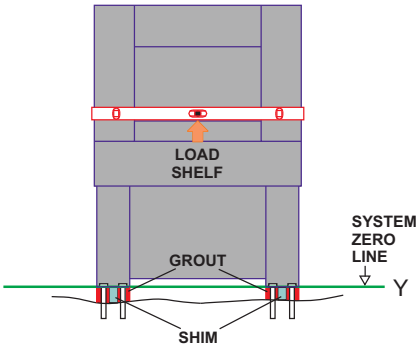




RAIL LEVELING PLATES ARE ALSO PROVIDED FOR FINE ADJUSTMENT OF RAIL.

DRYER FACES MUST BE FLUSH





DRYER MUST BE LEVEL

SHUTTLE RAILS MUST BE PERFECTLY PARALLEL TO DRYER FACES

- Floor rails must be parallel, level, and square along entire length of rail.

B2T2007003/2019193A

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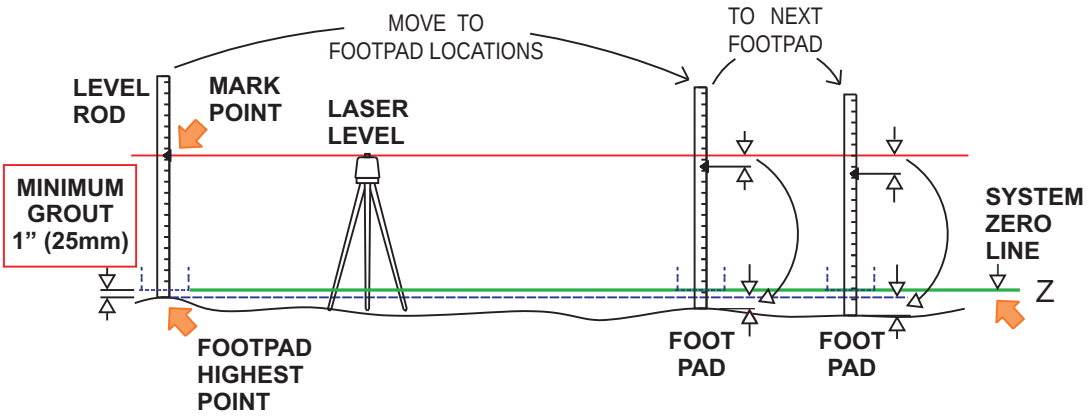
FLOOR IS UNEVEN

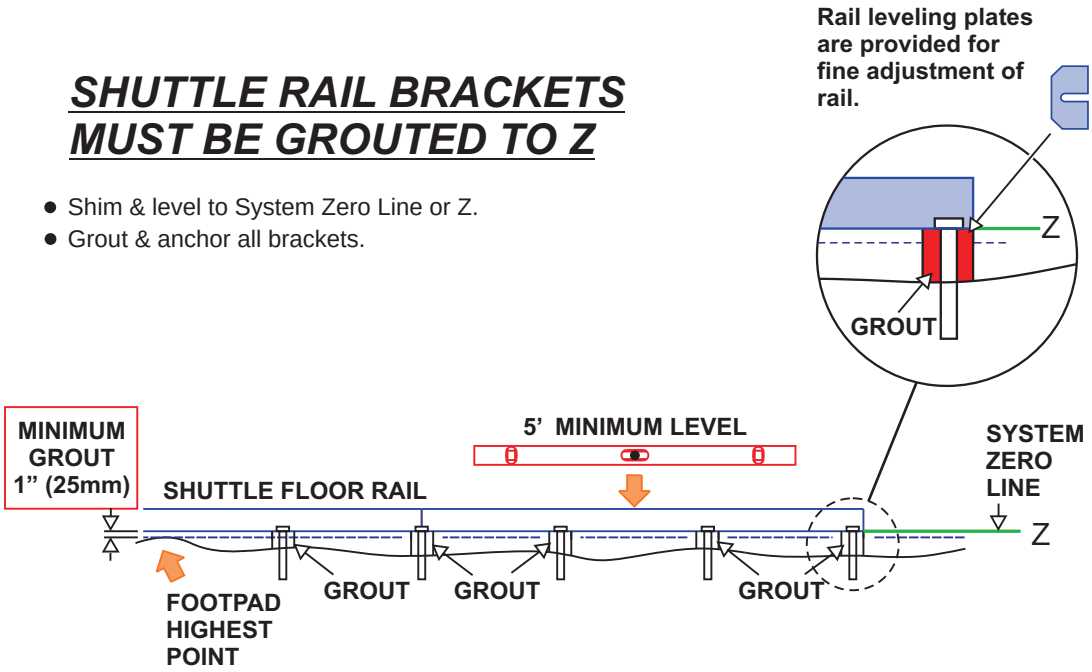
- Establish System Zero Line or Z.
- Find highest point in factory floor where footpads will be located.
- System Zero Line or Z is 1” above highest point.



Rail Installation:
Floor Rails

SHUTTLE RAIL BRACKETS MUST BE GROUTED TO Z

- Shim & level to System Zero Line or Z.
- Grout & anchor all brackets.



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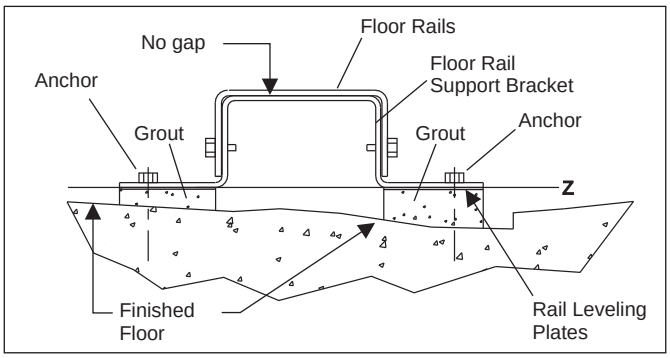
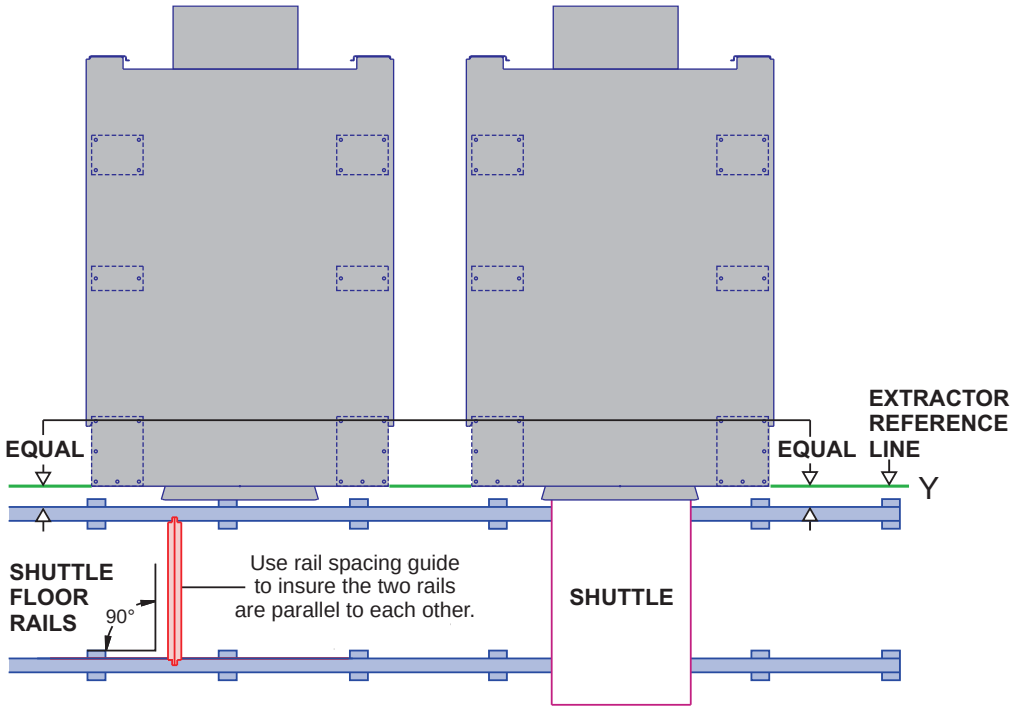
Rail Installation:

Floor Rails



- Shim & level to System Zero Line of Z.
  All floor rails must be level and square along the entire length of rail. Locate each rail support bracket and level uneven finished floor with grout, with a minimum of 1”(25MM) of grout under and around all floor rail support brackets. Use rail leveling plates to fill the gap and level the rail.
  CAUTION: Make sure there is no gap between floor rails and floor rail support brackets.
- Grout & anchor all brackets.
  Anchor the rail at all floor rail support brackets, both sides.
- See (Page 3 of 8) and Dimensional Drawing for proper placement of floor rails.



SHUTTLE RAILS MUST BE PERFECTLY PARALLEL TO EXTRACTORS

- Floor rails must be parallel, level, and square along entire length of rail.

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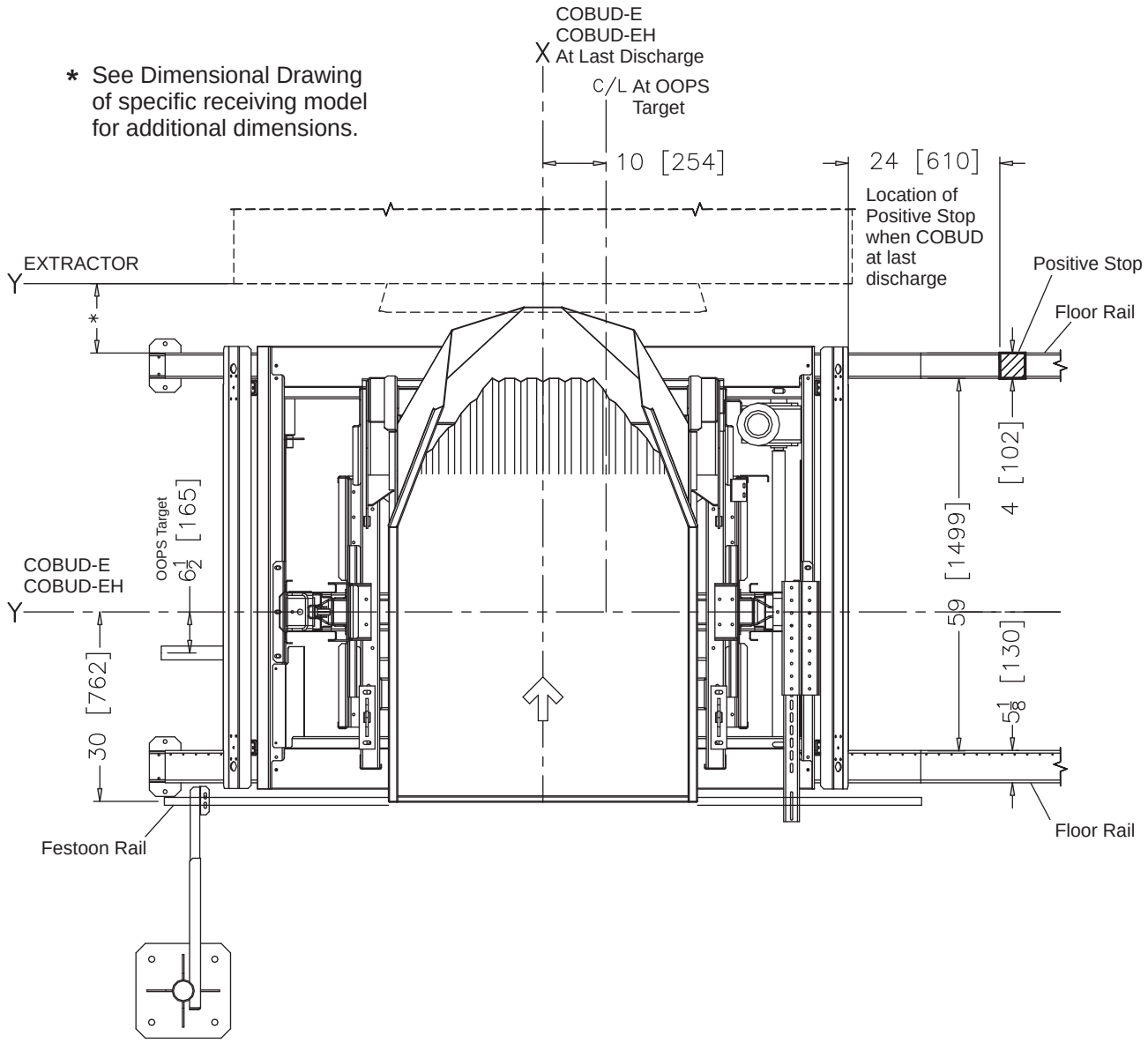
Rail Installation:
Rail **Placement**



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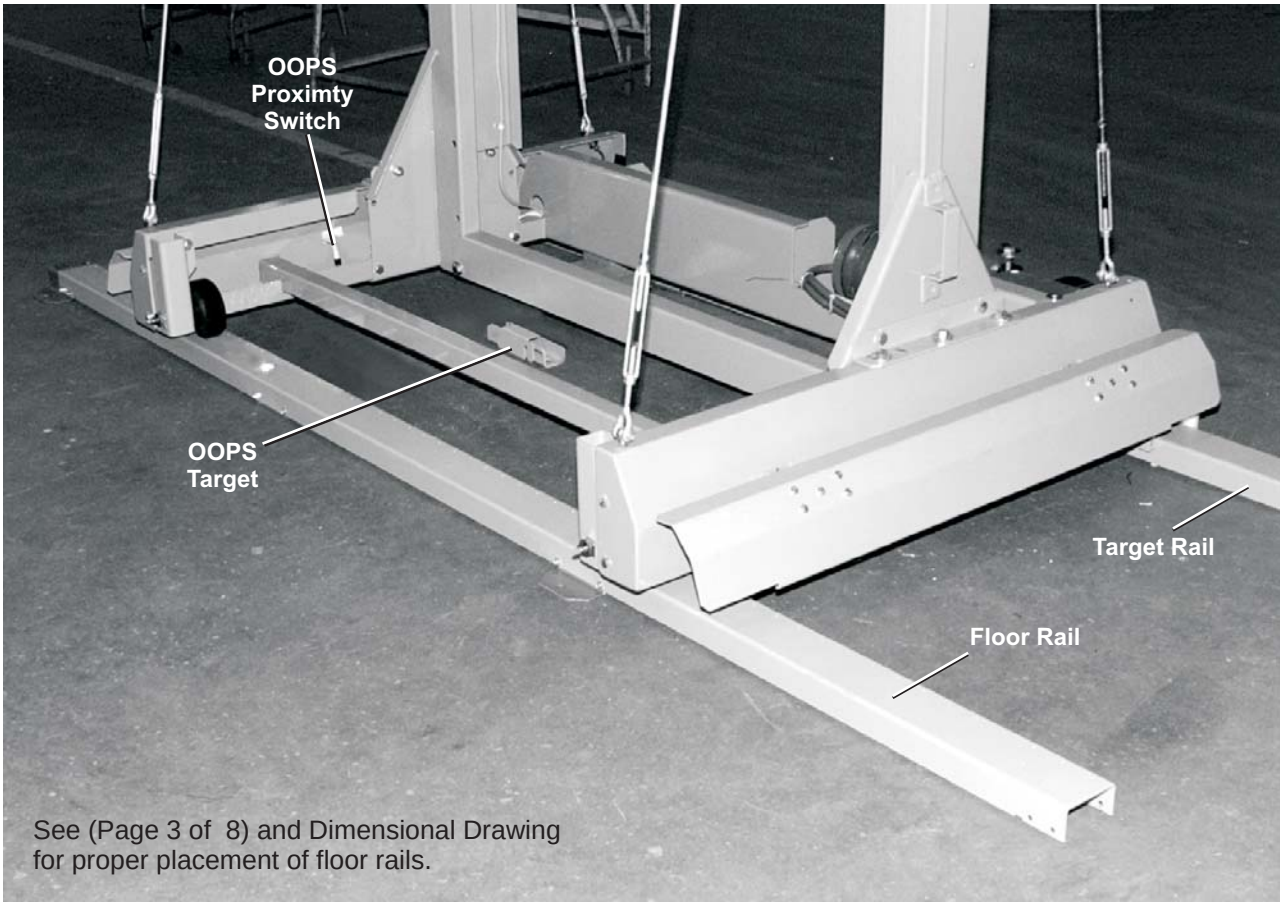
Rail Installation:
Floor Rail



See (Page 3 of 8) and Dimensional Drawing for proper placement of floor rails.

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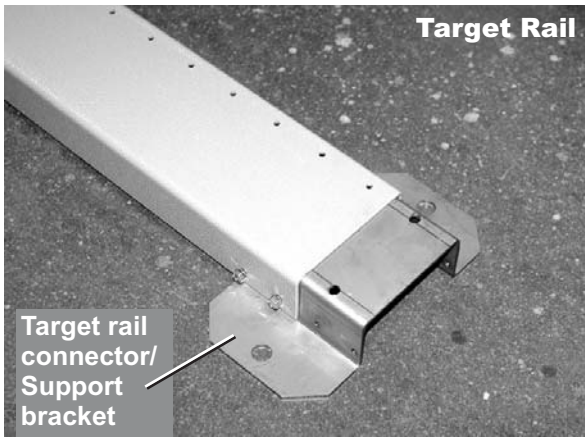
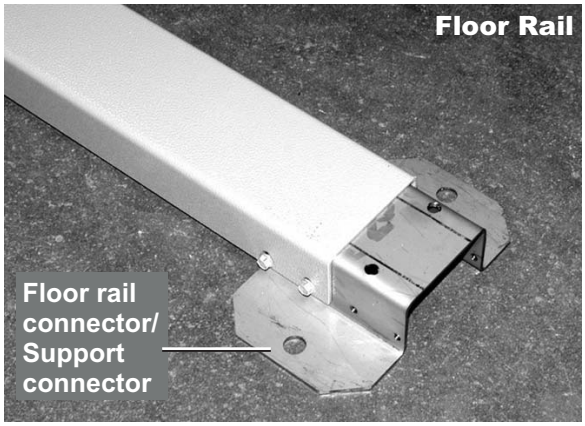
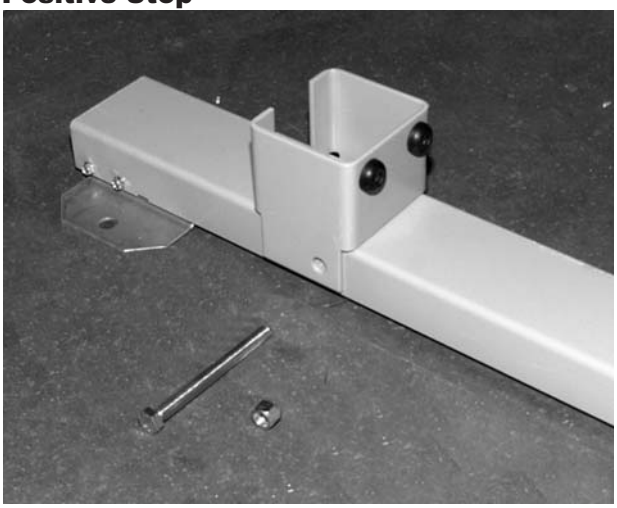
Rail Installation:





Positive Stop



Bring COBUD-E/EH to the Last Discharge. Locate Positive Stop 24” away from kickplate.
(See Page 3 of 8.)

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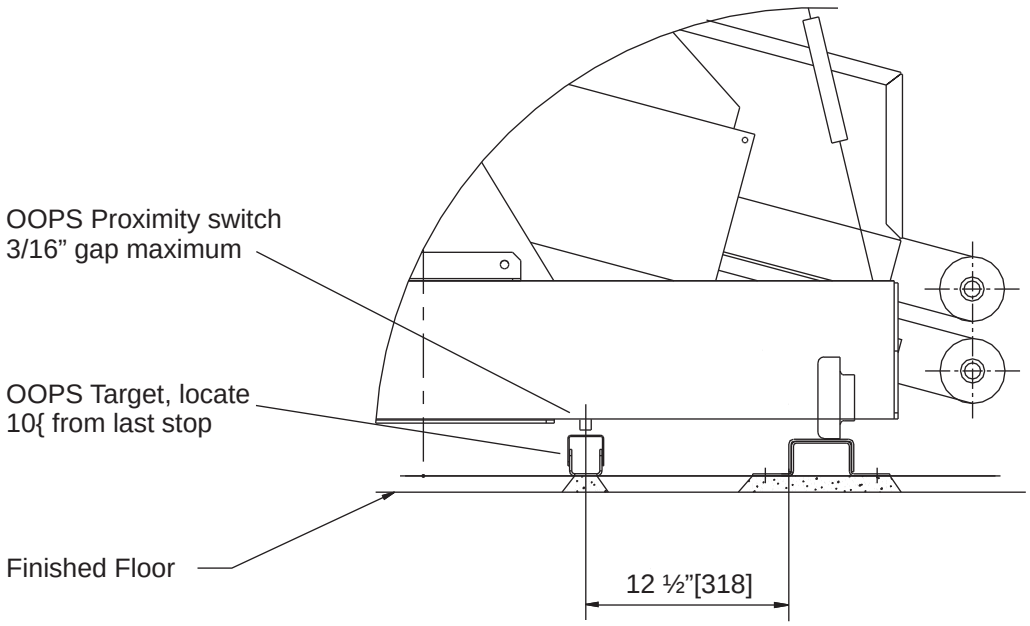
Rail Installation:

Switch &
Target Settings



Switch & Target Installation

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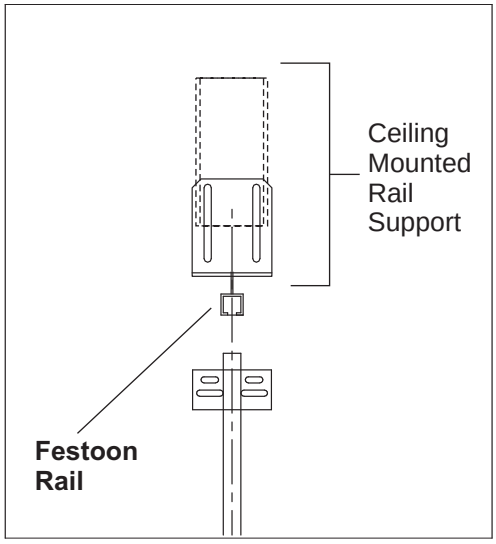
Rail Installation:

Festooning Rail

Upper Rail Hanger 12ga



Ceiling Mounted

Festoon rail connector

Supporting the festoon rail properly is the responsibility of others. Ceiling mounted rail supports are available from Milnor. Festoon rail hanger may also be used to support rail from ceiling. Field innovation is required. See Dimensional Drawing for proper location of festoon rail.

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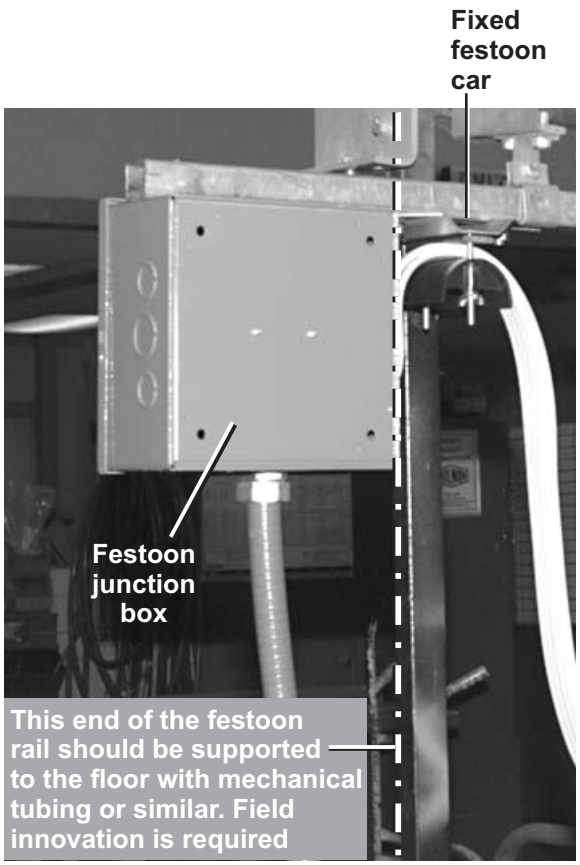
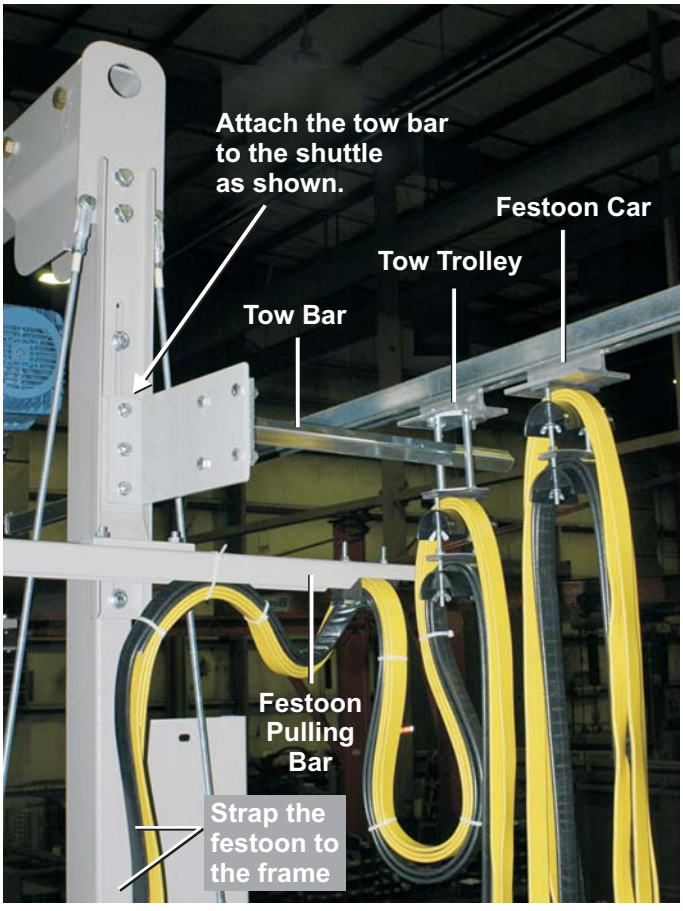
Festoon Installation:

Shuttle - Festoon Connection





Installation of the Laser Positioner for Traversing Shuttles

NOTICE P1: "Remove power from the machine" means use the necessary safety procedure for your location. In the USA, this is the OSHA lockout/tagout (LOTO) procedure. More local requirements can also apply.

Milnor traversing shuttles manufactured after December 2010 are provided with a laser system to control shuttle travel along the rail (traverse) and the positions at which the shuttle stops. An older shuttle can be retrofitted with this system if it meets the following criteria:

- The system has, or is upgraded to Dryer/Shuttle controller (Drynet) software version 21010 or later and shuttle software with a matching date code.
- The shuttle has, or is upgraded to the microprocessor board with part number 08BSPE2T (2004 to current). The 08BSPE1T (circa 2000) and 08BSPET (circa 1994) will not work.
- The shuttle manual controls are housed in a stationary cabinet, not a shuttle-mounted box.

The laser positioner replaces the switches, targets, and mounting hardware previously used for this purpose. The laser positioner system uses the Banner L-Gage LT7 Laser.

1. Hardware Installation

WARNING 1: Strike and Crush Hazards—A traveling machine such as a shuttle can strike, crush, or entrap you if you ride on it or enter its path. Traveling machines or their components can move automatically in any direction. Placing a system machine on line by energizing the machine control may immediately summon a shuttle or other traveling machine.

- Except where specified in this instruction, remove power from the machine to work in or near the shuttle path.

The laser beam must be parallel with the axis of shuttle travel. Typically the laser and target are mounted approximately 7 feet (1.8 meters) above the floor and and horizontally centered on the shuttle frame, but this can be modified to suit the individual circumstances. The beam must be unobstructed at all times. Locate the hardware with respect to the shuttle as follows:

Stationary laser support post—in proximity to the stationary shuttle control cabinet.
Reflector—on the shuttle frame. Detailed mounting instructions follow.

Install the hardware as shown in the figures below. It is necessary to install the laser on the support post but not anchor the post until the laser is aligned with the target.

CAUTION 2: Risk of Costly Damage—Until the laser support post is anchored, it can fall if it or the cable is hit by an object such as a fork lift. This will likely destroy the laser.

- Use care to keep clear of the post except to intentionally reposition it during alignment.
- Route the cable away from any interference and secure it.

Figure 1: Laser to Post

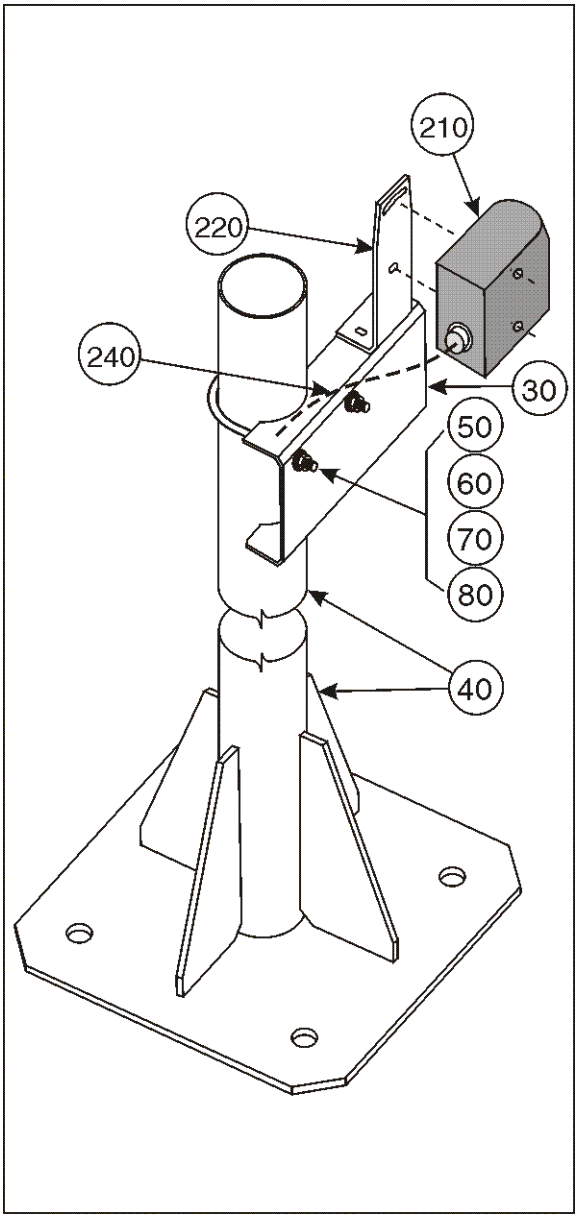


Figure 2: Reflector to Shuttle (Tube or J-rail frame)

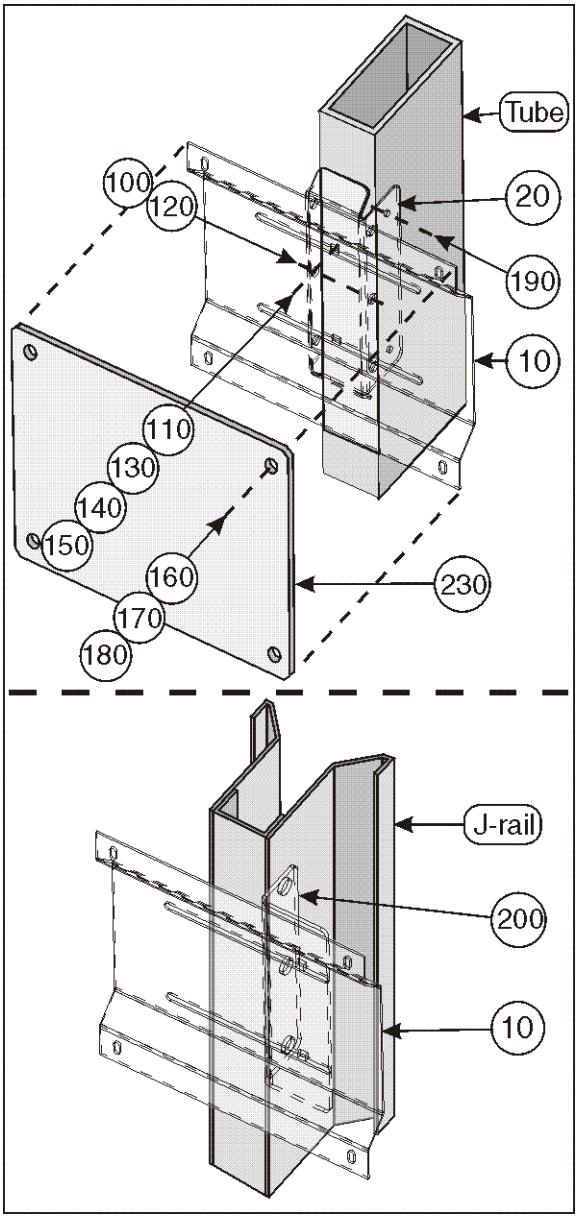


Table 1: Parts List for Figure 1 and Figure 2

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Assemblies				
all	A	ALC420223	All mounting hardware except laser manufacturer components.	
Components				
A	10	04 24176	LASER TARGET FRAME	
A	20	04 24177	LASER TARGET TUBE RAIL MTG	Use with tubing type vertical frame member.
A	30	04 24146	LASER MTG CHANNEL	
A	40	W4 24180	LASER MOUNTING POST WLMT	
A	50	27A035C	U-BOLT 3/8-16X5.36 #0127316	
A	60	15U246	FLATWASHER 1"ODX25/64IDX1/8"30	
A	70	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
A	80	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
A	100	15A002A	CARBOLT 1/4-20UNC2X3/4 ZINC GR	
A	110	15K046	HXCAPSCR 1/4-20 UNC2A X 2"GR5	
A	120	17N058	HEXRIVNUT 1/4-20 UNC-2B #2520-	
A	130	15U185	FLATWASHER(USS STD) 1/4" ZNC P	
A	140	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
A	150	15G178	1/4"-20 HEXFLANGE NUT ZINC	
A	160	15N125	RDMACSCR 10-24UNC2AX1/2 ZC GR2	
A	170	15U135	FLATWASH#10 .4370DX.203IDX.04T	
A	180	15G126SZ	HXLOCKNUT 10-24 UNC STL/ZNC	
A	190	15P011	TRDCUT-F PANHD 10-24X1/2 NIKST	
A	200	04 24178	LASER TARGET J-RAIL MTG	Use with J-rail vertical frame member.
all	210	09RLE0001	Banner L-Gage LT7 Laser and mounting bracket	
all	220	09RLE0001B	Mounting Bracket and included fasteners	
all	230	09RLE0001R	50 meter Retro Reflector	
all	240	09RLE0001C	Multi-conductor cable and connector—30 foot (7.6 meters) length	
	Tube	--	A type of frame used on certain shuttles	
	J-rail	--	A type of frame used on certain shuttles	

2. Electrical Connections

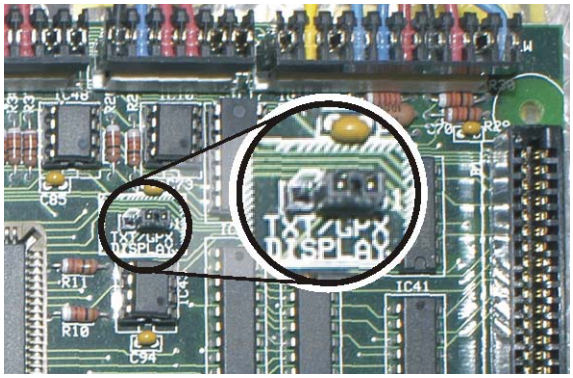
The electrical cable provided with this system has a pre-wired connector on one end that attaches to the laser. Shuttles manufactured after February 2011 have the control box end of the cable pre-wired also. The cable is secured to the control box. If the shuttle was not provided with the cable pre-wired, make connections as explained below. **Do not connect the cable to the laser until the wiring in the electric cabinet is completed.**

1. Determine the best route for the cable. Ensure that:
   - objects cannot strike the cable,
   - there is sufficient slack on each end to reach the connection points.

2. Route the cable and secure the center portion to protect against accidental movement. If not pre-wired, route the cable into the shuttle processor box through the hole in the box shown in Figure 3.
3. Set jumper J1 on the shuttle processor board to the GPX position as shown in Figure 4.

Figure 3: Hole in Shuttle Processor Box for Cable

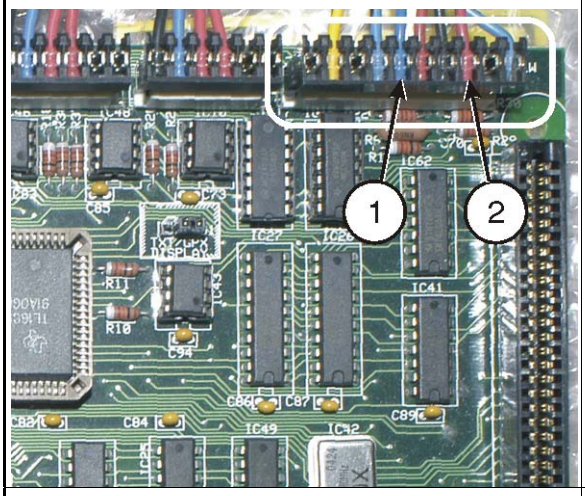
Figure 4: Jumper Position



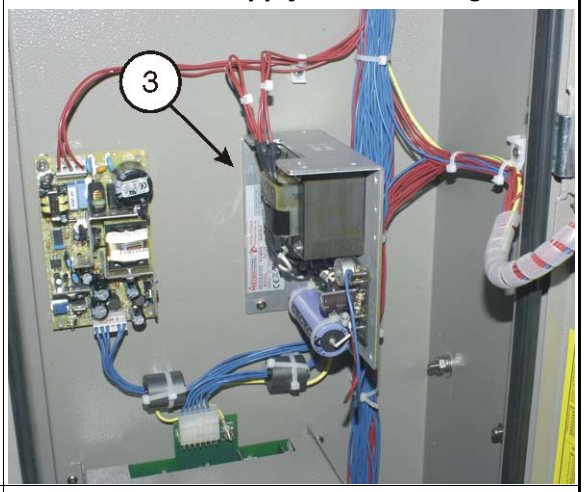
Only four of the conductors (the green, white, red, and blue wires) and the cable shield are used for this application. If the cable must be field-wired, make electrical connections as shown in Figure 5.

Figure 5: Connections—Previously Installed Shuttle

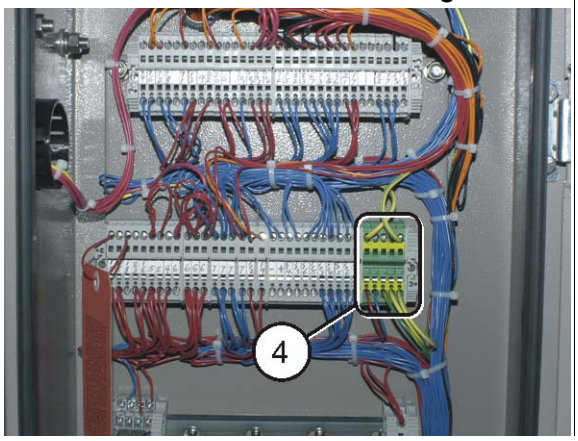
Connection Points in Processor Box



24 VDC Power Supply in Low Voltage Box



Ground Terminals in Low Voltage Box



Legend

1. MTA30, pin 5—connection point for White wire (TX+)
2. MTA30, pin 8—connection point for Gray/Pink wire (TX-)
3. 24VDC power supply—The 24VDC side is wire #102. Trace this wire to an available terminal and connect the red wire (Vcc) at this location.
4. Ground terminals—connect blue wire (Gnd) and cable shield to any available ground terminal.

3. Configure, Align, and Program

These instructions apply specifically to Banner L-Gage LT7 laser device. You received a manual with this device. **Review the safety information in this manual.** The manual provides more information than necessary to implement the laser positioner system for the shuttle. The following sections give the pertinent instructions. You can find detailed information in the Banner manual.

Display or Action	Explanation
	Energize the shuttle (at the MultiTrac or Drynet console). This will also apply power to the laser.
	Set the shuttle to the Manual mode (at the stationary shuttle control panel). This will take the shuttle off line.

Perform the procedures in this section with shuttle power on, but with the machine off line. **Use extreme care when you work in or near the shuttle path.**

3.1. Laser Configuration—Required configuration settings:

Serial interface: RS422

Baud rate: 19,200
Data Bits: 8
Stop Bits: 1
Data method: REPEAT

At the laser device:

Display or Action	Explanation
DIST mm >250000	This or a similar display indicates the laser run mode. The laser displays distance in hundredths of units.
	Accesses the laser program mode. This also activates the visible pilot laser used for alignment.
QuickSet <ENTER>	This is the first sub-menu in the Program menu.
	Scrolls the sub-menus. Select "UNIT".
UNIT <mm>	This display indicates the laser is configured for millimeter units. You can choose millimeters or inches (<inch>). If you want to change units:
	Accesses the *UNIT* field.
UNIT >mm	You can now select inch units.
	Toggles between *mm* and *inch* each time the key is pressed.
	Locks in the selected value.
UNIT <inch>	Indicates that the laser is configured for inch units. When the laser is properly aligned, the Run display will show the distance between the laser and target in hundredths of **inches**.
	Scrolls the sub-menus. Select the "SERIAL" sub-menu.
SERIAL <RS422>	This is the display you should see and indicates that the currently configured interface type is RS422. If you see any other value on the bottom line, access this field as follows.
	Accesses the field to select the type of interface.
SERIAL >RS422	You can now select another type of interface.
	Scrolls the interface types, which are: RS422, SSI 1/8, SSI1/10, and EXT.BUS. Select RS422.
	Locks in the selected value.
SERIAL <RS422>	Indicates that the laser is configured for an RS422 interface.
	Advances to the RS422 sub-menu.
RS422	Because the RS422 selection has it's own sub-menu, this display appears. This

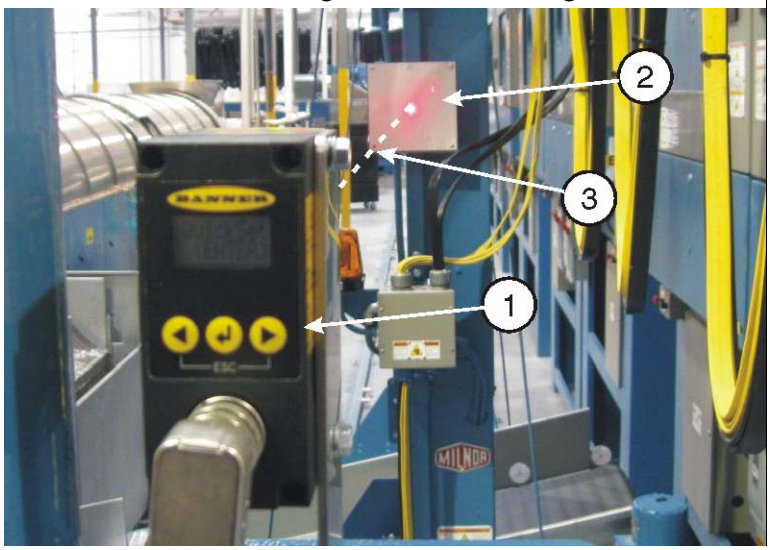
Display or Action	Explanation
<ENTER>	sub-menu has four data fields: baud rate, data bits, stop bit, and data method.
▶	Advances to the first field in the RS422 sub-menu: baud rate.
RS422 <19k2Bd>	19k2Bd is the correct value. If a different value appears on the bottom line, access this field and correct the value in the same manner as above. Otherwise, proceed to the Data Bits field.
▶	Advances to the next field in the RS422 sub-menu: data bits.
RS422 <8DATAb>	8DATAb is the correct value. If <7DATAb> appears on the bottom line, access this field and correct the value. Otherwise, proceed to the Stop Bits field.
▶	Advances to the next field: stop bits.
RS422 <1STOPb>	1STOPb is the correct value. If <2STOPb> appears on the bottom line, access this field and correct the value. Otherwise, proceed to the data method field.
▶	Advances to the next field: data method.
RS422 <REPEAT>	REPEAT is the correct value. If <SINGLE> appears on the bottom line, access this field and correct the value. Otherwise, return to the Run mode.
◀ + ▶, ◀ + ▶...	Returns to each higher-level menu, then the Run mode.

3.2. Laser and Reflector Alignment

1. At the laser device, access the program mode as previously explained. This activates the visible pilot laser used for alignment.
2. Adjust the orientation of the laser on its mounting brackets to place the beam at the center of the target.
3. Operate the shuttle in manual mode to move it along the shuttle path. Find manual operation instructions for the shuttle in the Drynet Dryer/Shuttle operator guide. As the shuttle traverses, observe the position of the beam on the target.
4. Move the laser post, and adjust the orientation of the laser and target to achieve the alignment described in Figure 6.
5. When alignment is achieved, anchor the laser post to the floor.
6. When the laser post is securely anchored, check the alignment again and make final adjustments.
7. Tighten the laser and target bracketry.

Figure 6: Laser and Reflector Alignment

View Looking from Laser to Target

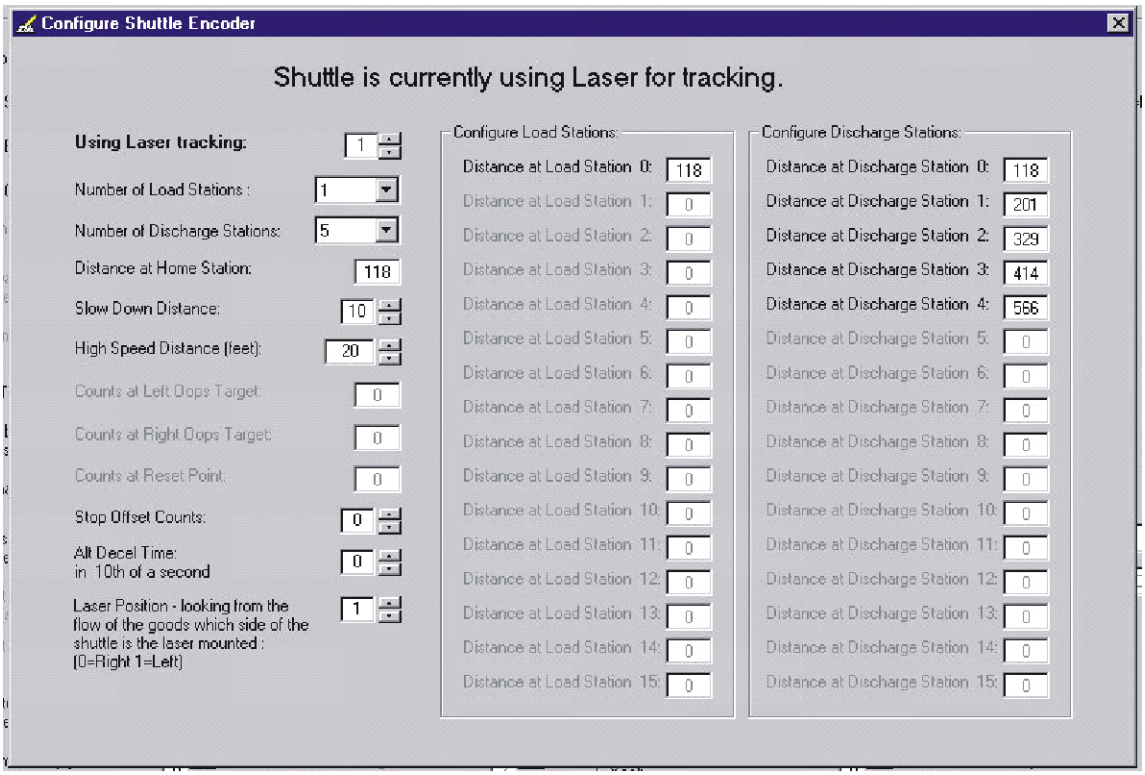


Legend

1. Laser device
2. Target
3. Laser beam. Align the laser device and the target so that the laser beam is parallel to the path of the shuttle and the beam remains centered in the target as the shuttle traverses. The reflector must be perpendicular to the laser beam and reflect the beam back to the laser. Otherwise, the laser will not register changes in distance in the run mode.

3.3. Drynet Configuration and Programming of Shuttle Stop Positions—The Drynet Dryer/Shuttle controller requires configure data to use the laser positioner. For example, it must know the distance between the laser and the target, as detected by the laser device, for each position at which the shuttle stops. Determine these values at the laser device. Enter this data at the Drynet or MultiTrac console, in the *Configure Shuttle Encoder* form (Figure 7).

Figure 7: *Configure Shuttle Encoder* **Form Configured for a Laser Device**



1. At the MultiTrac or Drynet console, access the shuttle Encoder form:
   a. In the Dryer/Shuttle Controller (DevComm Setup) window, select *Configure, Shuttles and Cobucs* on the menu. This displays one or more tabbed forms—one for each shuttle device in the system.
   b. Select the tab corresponding to the shuttle with the new laser device. This displays the main configuration form for this shuttle.
   c. Near the bottom right of the form, find the field *Shuttle has an Encoder.* Select (or re-select) the value 1. This displays the *Configure Shuttle Encoder* form (Figure 7).
2. Enter values in the fields on the left column of the encoder form in accordance with Table 2.
3. Do this procedure for each position at which the shuttle stops:
   a. At the stationary shuttle control box, manually move the shuttle to the stop position. Ensure that the shuttle is precisely aligned with the interfacing device.
   b. At the laser device, read the distance value in hundredths of units (inches or millimeters as previously configured). Hence, read the displayed value 26147 as 261 inches or millimeters.
   c. At the Drynet controller, enter this value (whole inches or millimeters) in the appropriate field:
      - Distance at Home Station
      - Distance at Load Station ___
      - Distance at Discharge Station ___

Table 2: Guidelines for Encoder Values for Laser Device

Data Field	Required Value or Guideline
Using laser tracking	1
Number of Load Stations	Per physical layout
Number of Discharge Stations	Per physical layout
Distance at Home Station	See Item 3 below.
Slow Down Distance	Between 6 and 10 inches (152 and 254 mm) recommended
High Speed Distance (feet)	Not currently implemented
Counts at Left Oops Target	Disabled and not applicable to laser device.
Counts at Right Oops Target	
Counts at Reset Point	
Stop Offset Counts	0
At Decel Time: in 10ths of a second	0
Laser Position	Face the direction that goods move as they are loaded onto the shuttle bed. If the post-mounted laser is located to the right of the shuttle, enter 0. If to the left of the shuttle, enter 1.

4. Testing

When you have entered all shuttle stop positions in the Drynet controller, test each position as explained in document BIVSRC01 "How to Test Traversing Shuttle Stop Positions."

— End of BIVSVI01 —

BIVSRC01 (Published) Book specs- Dates: 20110301 / 20110301 / 20110301 Lang: ENG01 Applic: VSR

How to Test Traversing Shuttle Stop Positions

This instruction is for technicians responsible for setup and adjustment of traversing shuttles. This procedure requires the technician to work within the shuttle travel area while operating the shuttle in manual and automatic mode. The shuttle travel area is normally guarded and off limits to personnel while the shuttle has power. This instruction assumes specially qualified and authorized personnel who fully understand the hazards. Use extreme care when you enter the shuttle travel area.

WARNING 1: Strike and Crush Hazards—A traveling machine such as a shuttle can strike, crush, or entrap you if you ride on it or enter its path. Traveling machines or their components can move automatically in any direction. Placing a system machine on line by energizing the machine control may immediately summon a shuttle or other traveling machine.

- Do not attempt this procedure unless qualified and authorized.
- Ensure that bystanders do not enter the shuttle travel area.

Every shuttle installation is unique with regard to the positions at which the shuttle stops to receive and discharge goods. Each stop position must align with the device it receives from (typically a press) or discharges to (typically a dryer). After you configure the laundering system in the Miltrac, or other system controller and you initially define each stop position, use this procedure to test and adjust each stop position.

Supplement 1

How Shuttle Stop Positions are Controlled

To initially define each stop position, you manually move the shuttle to that position, visually align it with the transferring device, then set the target. Shuttles manufactured prior to December 2010 use physical targets along the rail or shuttle path. Newer shuttles and some older, retrofitted shuttles, use a laser device that measures the distance between the stationary laser and a single target located on the moving shuttle. In the newer type, you read a distance value displayed on the laser and enter this value for that stop position in the Drynet software. The procedure described in this document applies to both the older and the newer technologies.

1. Prepare the Laundering System

This procedure involves:

- the shuttle to be tested,
- any device(s) that load(s) the shuttle, such as a:
  - » press (cake shuttle)
  - » washer-extractor (loose goods shuttle)
  - » storage belt (cake or loose goods)
  - » tunnel (wet goods shuttle)
- any device that receives goods from the shuttle, such as a:
  - » dryer (cake or loose goods conveyor)
  - » no-dry station
  - » storage belt.

For safety and to maintain the necessary control of the devices involved in the test, set the devices per Table 1.

Table 1: Initial Device Settings

Device	Initial Setting		Comments
	Symbol	Description	
Shuttle to be tested	①	Start	Manual operation enabled
		Manual mode	
Any other shuttles that share this path	⊗	Master switch off.	Shut down. Ensure no movement.
Device(s) the shuttle receives goods from	⊗		Shut down. Not needed except to test this stop position
Device(s) the shuttle discharges to	①	Start	Not allowed to receive goods from the shuttle.
	or	Load Not Allowed or Manual mode	

2. Test the Home Position and Aligned Stop Positions

Every shuttle installation has a home position. This is true regardless of how the shuttle is configured to act after it discharges goods (*Always return home*, *Homeless—return home when empty*, or *Homeless*). If there is only one position that loads the shuttle, this always coincides with the home position. The home position may also coincide with a position that receives from the shuttle. Whenever the machine (the shuttle) is stopped (⓪) in Automatic mode ( ) and you start it (①), the shuttle returns home as part of the initialization procedure. To test the home position and any stop positions that coincide with it:

1. Move the shuttle manually ( ) away from the home position, if it is at home.
2. Set the shuttle to the automatic mode ( ).
3. Stop, then start the machine (⓪, ①). The shuttle will seek the home position.
4. When the shuttle stops at the home position, set the shuttle to the manual mode ( ).
5. Check shuttle alignment and adjust as required.
6. Repeat these steps as necessary.

3. Test Stop Positions Where the Shuttle Discharges Goods

Choose a position (a device that receives goods from the shuttle) to test. The shuttle will go to this position if:

- this is the only available position to receive goods and
- the shuttle is encoded with batch codes that this position can accept.

With the shuttle at the home position, cause the shuttle to go to the test position as follows:

1. Set the device at the test position so it can receive a load (and). All other devices that can receive from the shuttle must be set so they cannot receive a load (or).
2. Set the shuttle to the automatic mode ( ), then stop the machine (⓪).
3. Place a rag or similar object large enough to block the photo eye in the center of the top bed of the shuttle.
4. Start the machine (①). The shuttle bed will run until the photo eye is blocked. The *Cake Data* prompt will appear on the Drynet display or the 2 x 20 display.

5. Enter cake data for a dry code that the device at the test position can receive. Typically, a dryer can receive all but the no-dry code and a no-dry station can only receive the no-dry code. The shuttle will move toward the test position.
6. As soon as the shuttle stops at the test position and before a transfer can occur, stop the machine (⓪).
7. Remove the object from the shuttle bed.
8. Set the shuttle to the manual mode (✍) and start the machine (①).
9. Check shuttle alignment and adjust as necessary.
10. Set the shuttle to automatic mode (⇄). The shuttle will return to the home position.
11. Repeat as necessary.

4. Test a non-Home Position Where the Shuttle Receives Goods

If an installation has two loading positions for the shuttle, at least one of these will not coincide with the home position. In such a case, the shuttle will likely be loaded by a storage device such as an elevating shuttle. To cause the traversing shuttle to move to the non-home loading position:

1. Set the traversing shuttle to the automatic mode (⇄).
2. Place a rag or similar object in the center of the top belt of the device at the test position (the non-home device that loads the traversing shuttle).
3. Energize and start this device (⊛, ①). The storage device bed will run until the photo eye is blocked. The *Cake Data* prompt will appear on the display for this device.
4. Enter cake data. This will summon the traversing shuttle.
5. As soon as the traversing shuttle stops at the test position and before a transfer can occur, stop the loading device (⓪).
6. Remove the object from the loading device bed.
7. Set the traversing shuttle to the manual mode (✍) and start the machine (①).
8. Check shuttle alignment and adjust as necessary.
9. Set both the loading device and the traversing shuttle to automatic mode (⇄). The traversing shuttle will return to the home position.
10. De-energize the loading device (⊗).
11. Repeat as necessary.

— End of BIVSRC01 —

Service and Maintenance 3

Replacing the Motor and Secondary Brake Assembly on CF40xxxx and CL40xxxx Shuttles

Document BIVSRM01
Spec Date..... 19991110
As-of Date..... 19991110

1. Required tools

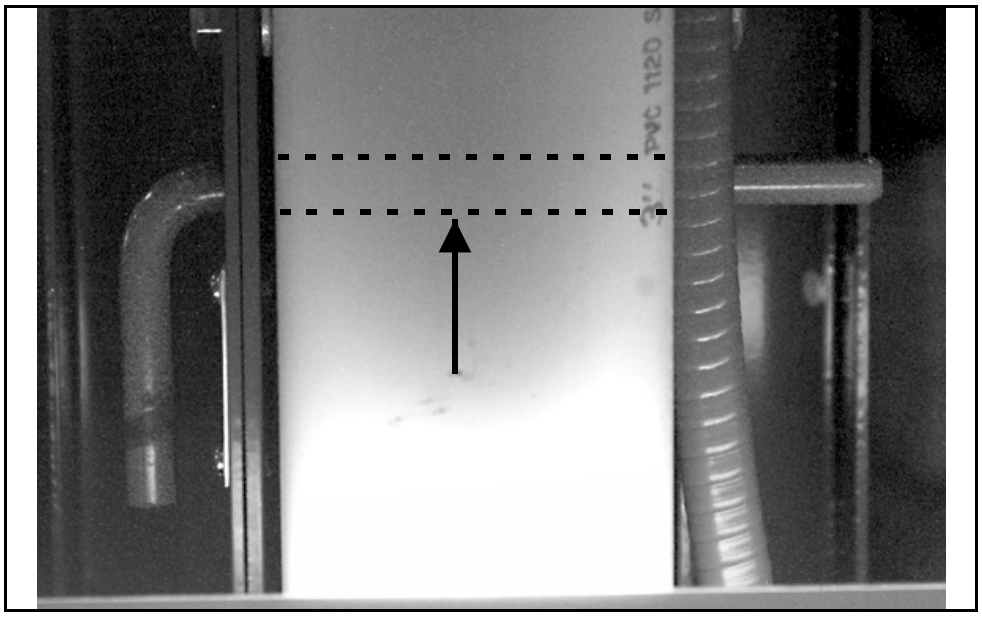
This procedure requires safety harnesses, two technicians, a forklift, and a chain hoist or other suitable lifting device capable of safely supporting the weight of the motor (approximately 65 pounds - 29.5 kilograms).

2. Removing the motor and secondary brake assembly

WARNING 1: Fall Hazard—You can lose balance and fall from a shuttle bed.

- Permit only qualified personnel to perform these procedures.
- Use safety harness while working on shuttle.
- Insert factory supplied safety pins into shuttle beds.
- Follow procedure carefully.

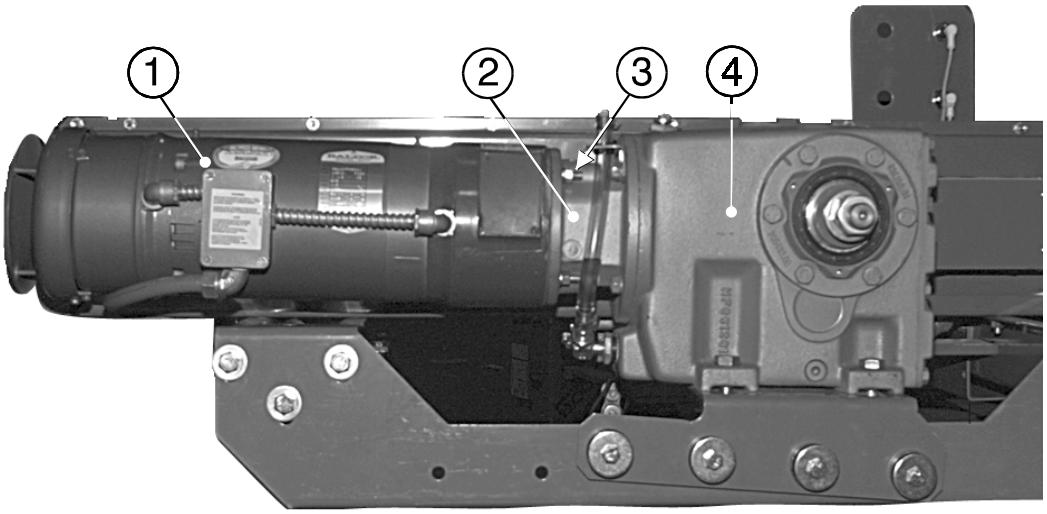
Figure 1: Pin inserted through rail



1. Using a forklift, chain hoist, or other hoisting device, lift the shuttle bed(s) as close as possible to the top beam to minimize the chain weight and provide a stable work area. Install the factory supplied safety pins. Pins must be inserted completely through the side rail as shown in Figure 1. Wear a safety harness secured to the top beam or other strong support to prevent serious injury in the event of a fall from the top of the shuttle.
2. Attach one end of a suitably sized rope to the motor/secondary brake unit and run the other end over the top of a beam or other strong structure above the shuttle. Loosen the locking collar clamp screw and key set screw (Figure 4) holding the secondary brake shaft to the gear reducer. Access these items through the access ports shown in Figure 3. Remove the four motor-to-gear reducer fasteners (Figure 2, item 3). Lower motor to ground.

Figure 2: Shuttle Components

Identifing components

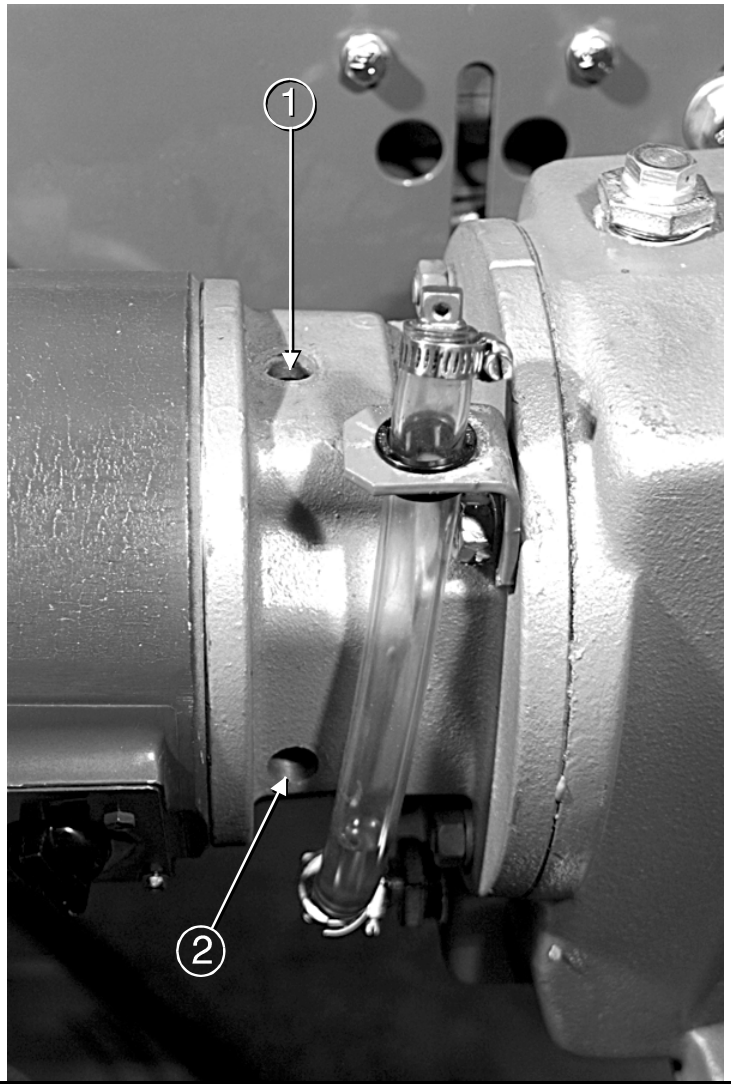


Legend

1. Shuttle hoist motor
2. Secondary brake
3. Motor to gear reducer fasteners (4)
4. Gear reducer

Figure 3: Removing or installing the secondary brake on the gear reducer

Access ports for locking collar



Legend

1. Key set screw access port
2. Clamp screw access port

3. Reinstalling Shuttle Motor/Secondary Brake Assembly

A locking collar (Figure 4) connects the motor and secondary brake assemblies (Figure 2) to the gear reducer. If this locking collar is incorrectly installed, the connection between the secondary brake shaft and the gear reducer will loosen, causing the shuttle bed(s) to not elevate and/or slip.

1. Screw key set screw in until one thread is exposed (as shown in Figure 4).
2. Manually rotate the gear reducer shaft until the keyway slot is vertical (Figure 5). Slide the locking collar on the gear reducer shaft. Check that the collar cannot be rotated on the gear reducer shaft.

Figure 4: Examining the locking collar

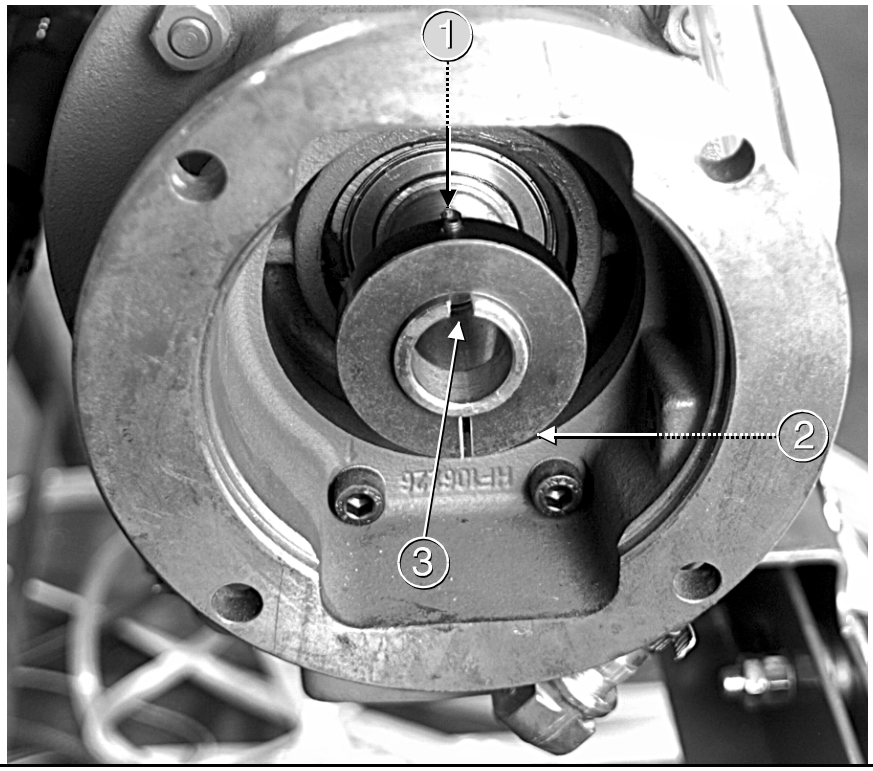
Key set screw and clamp screw

Legend

1. Key set screw
2. Clamp screw

Figure 5: Locking collar in place

Key set screw and clamp screw orientation



Legend

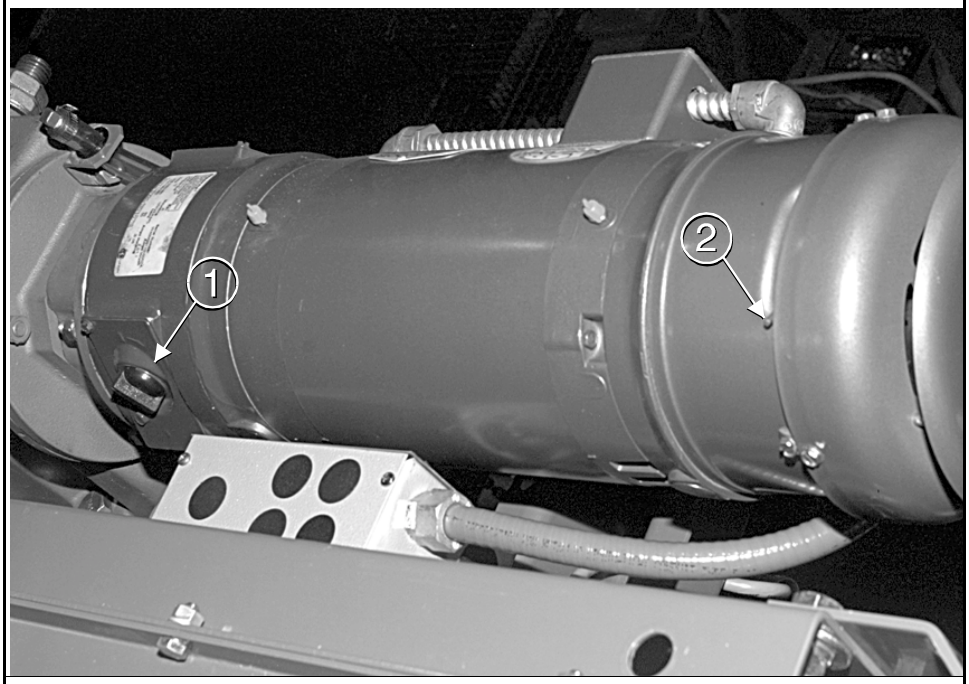
1. Key set screw
2. Clamp screw
3. Keyway slot

Note 1: Motor and secondary brakes lock as soon as control power is restored to machine.

3. Slide the secondary brake onto motor shaft. Release both the motor and secondary brake (Figure 6), if necessary, to rotate the secondary brake shaft to match the gear reducer shaft. Slide the brake shaft into gear reducer shaft (Figure 7). Lock both brakes at this time to prevent the shaft from rotating out of the correct position for tightening the locking collar.
4. Install and tighten the motor-to-gear reducer fasteners.
5. Tighten the clamp screw, then tighten the key set screw through the provided access ports (shown in Figure 3).

Figure 6: Identifing the secondary and motor brake releases

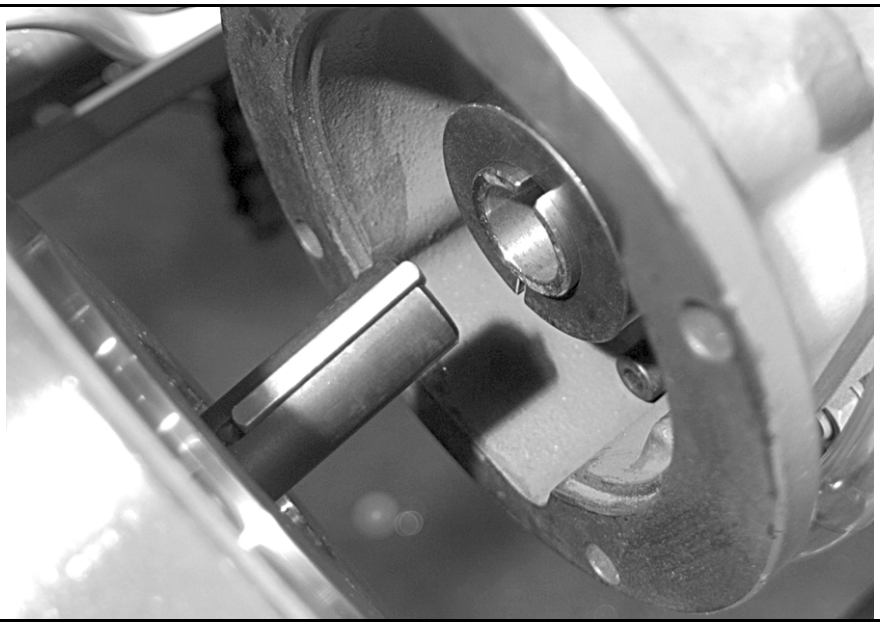
Top view



Legend

1. Secondary brake release
2. Motor brake release

Figure 7: Sliding secondary brake shaft into gear reducer



— End of BIVSRM01 —

B SETTING LIMIT SWITCHES

Limit Switches—Including Microswitches—Will Be Damaged If Over-actuated!

Any limit switch will be damaged if it bottoms out forcefully. This can bend the rotary shaft or damage internal components and may cause the switch to stick in one position either permanently or intermittently. Be aware that an intermittently sticking switch can be mistaken for a malfunctioning microprocessor!

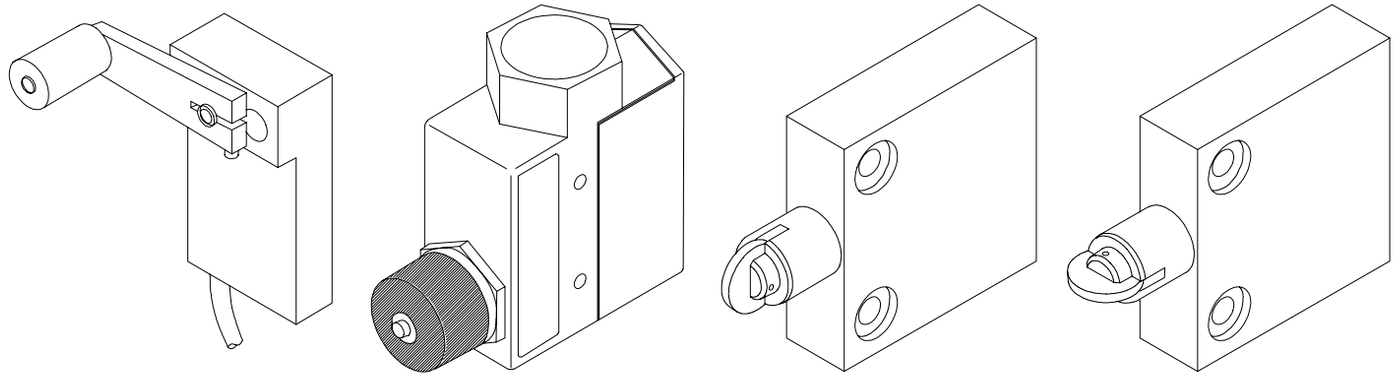


FIGURE 1a
Rotary Lever Switch

FIGURE 1b
Plunger Switch

FIGURE 1c
180° Roller Plunger

FIGURE 1d
90° Roller Plunger Switch

FIGURE 1 (MSSM0116AE)
Limit Switch Types

B

⚠ WARNING ⚠

Limit switches must function properly to ensure the safe operation of the machine.

- ☞ **Inspect switches regularly.**
- ☞ **Never operate a machine with a malfunctioning limit switch.**

Setting Switches

B

Travel of Rotary Lever or Plunger—Set switch and target so that after the switch contacts close (as determined by an ohmmeter), the lever or plunger will then move approximately half of its additional available travel (see FIGURE 2).

NOTE: It is impossible to determine by feel, sound, or experience at what point the switch contacts make. The only reliable method is to use an ohmmeter. Switches may also be bench-tested, and the plunger or rotary shaft scribed to mark this point.

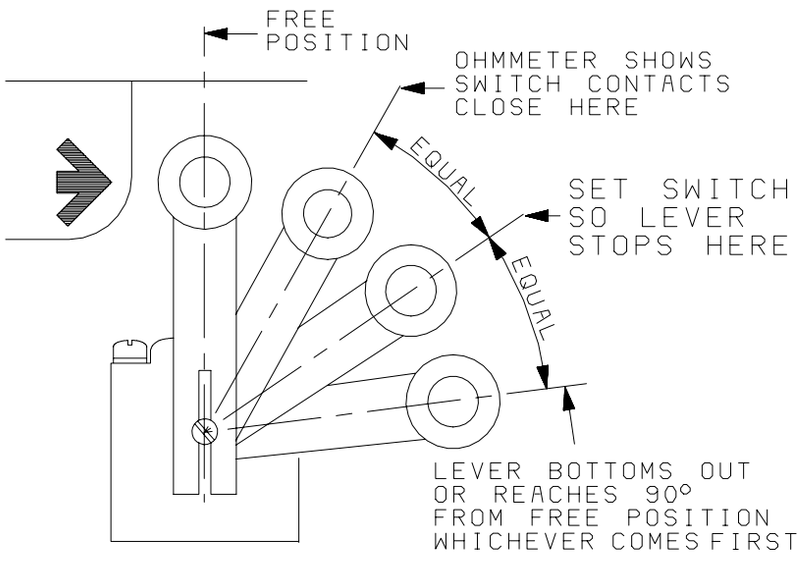


FIGURE 2a
Rotary Lever

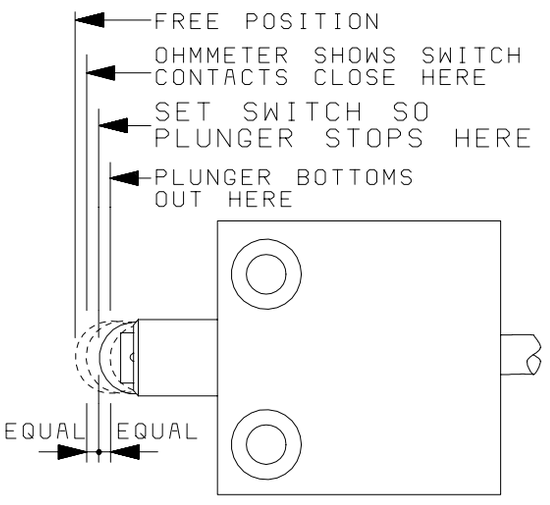


FIGURE 2b
Plunger Switches
(Roller Plunger Switch Shown)

FIGURE 2 (MSSM0116AE)
Where Lever or Plunger Should Stop

Free Position of Rotary Lever—Attach the rotary lever to the shaft so that, in the free position, the lever is at a right angle to the direction of relative movement between the switch and target (see FIGURE 3).

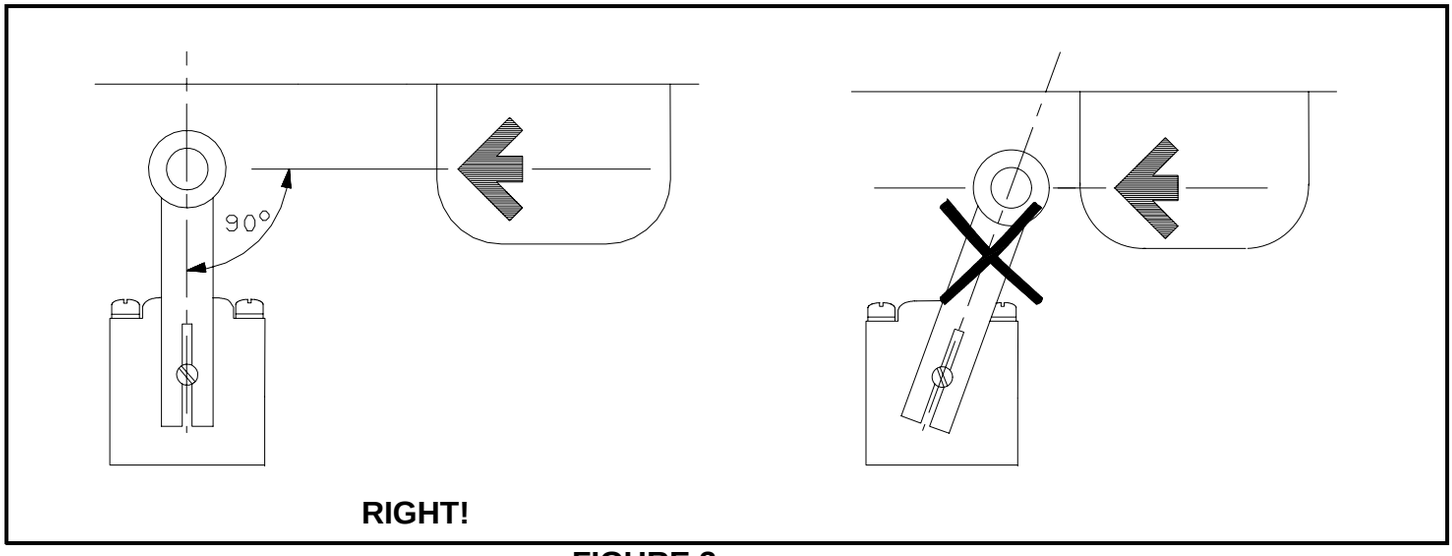


FIGURE 3 (MSSM0116AE)
Free Position of Rotary Lever

Angle of Switch—Set a plunger switch so that the target and plunger move parallel to each other. It will be approximately correct when properly installed on its mounting bracket, but may require fine adjustment.

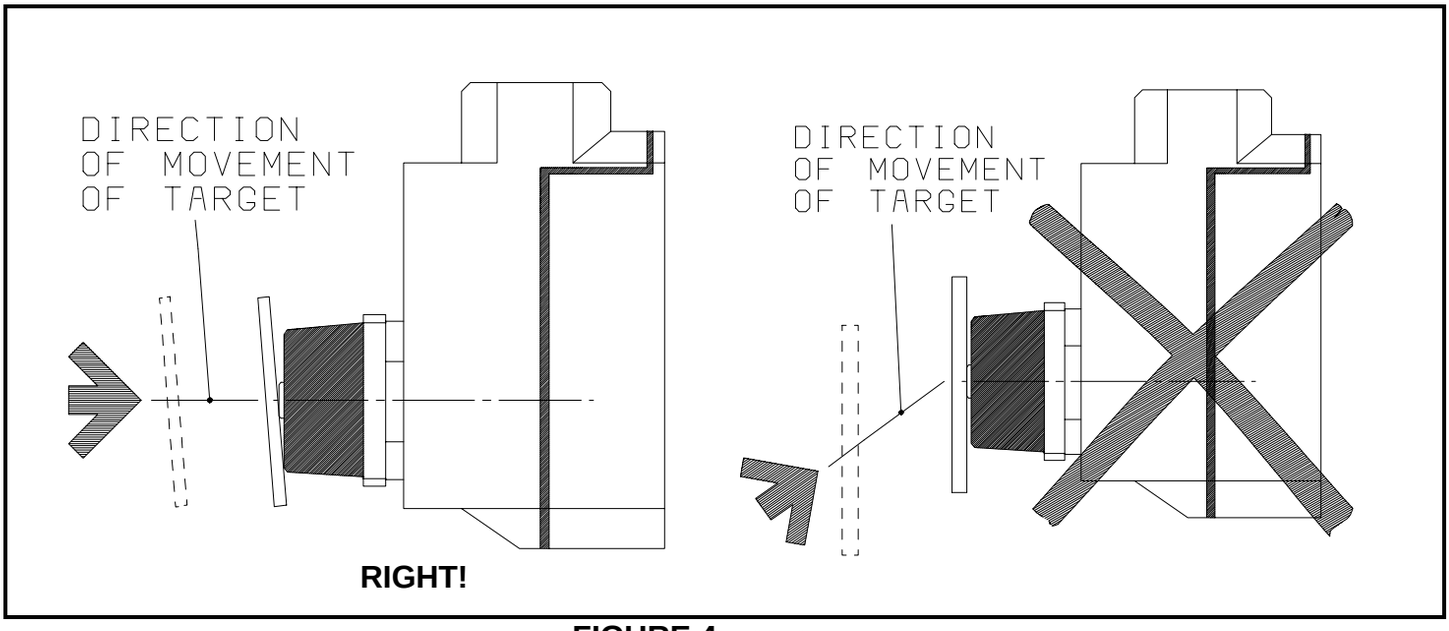


FIGURE 4 (MSSM0116AE)
Plunger Switch Angle

With a roller plunger switch, make sure that the roller rotates in the direction that will accommodate the movement of the target (not at a right angle to the target movement). Also, be sure that a replacement switch has the roller oriented the same way as the switch it replaces (see FIGURE 5).

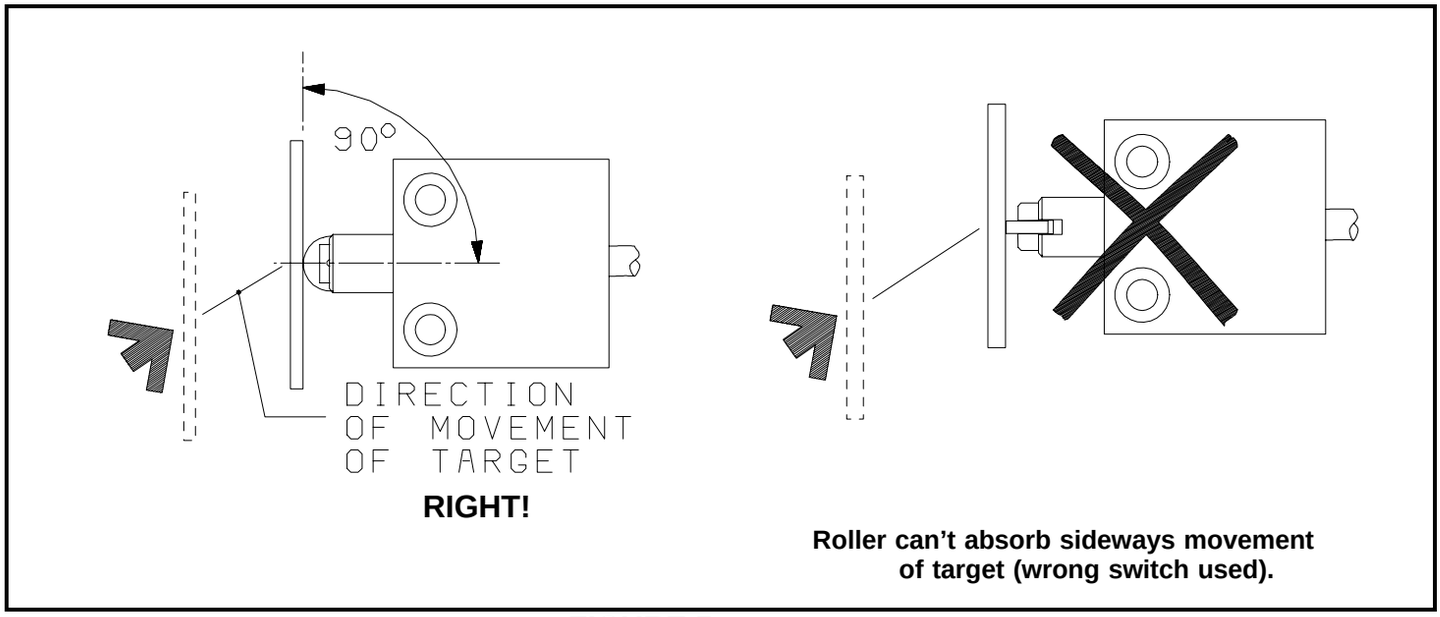


FIGURE 5 (MSSM0116AE)
Roller Plunger Switch Angle

SETTING PHOTOSENSORS

⚠ CAUTION ⚠

Excessive torque when turning potentiometers to their limits will damage them.

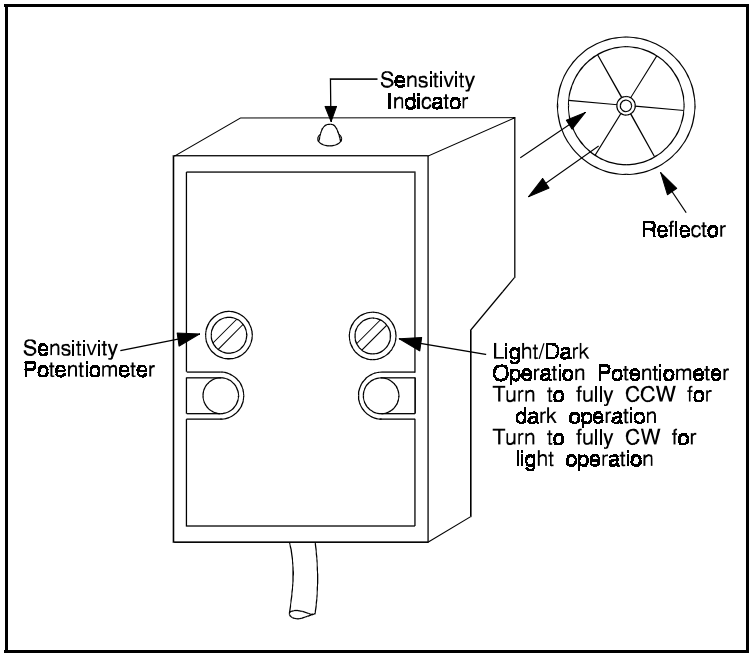


FIGURE 1 (MSSM0122AE)
Retroflective Photosensor (rear)

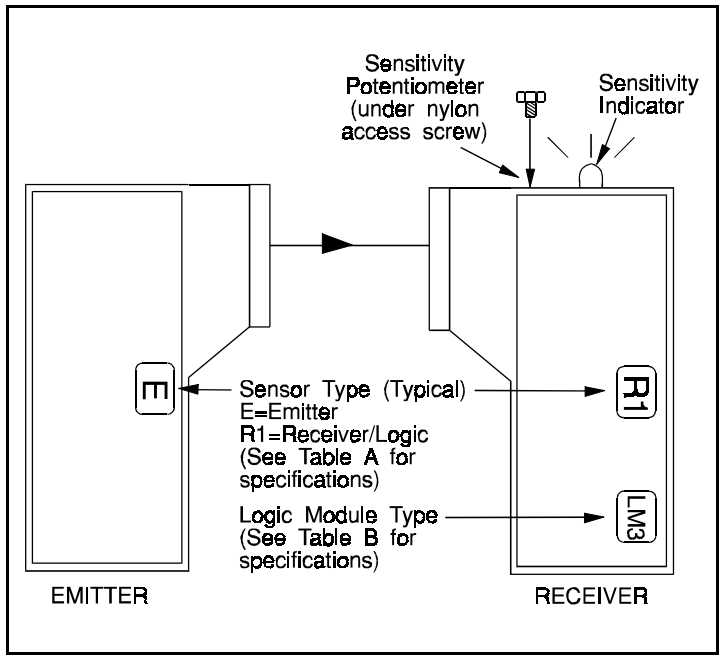


FIGURE 2 (MSSM0122AE)
Opposed-mode Photosensors

As of this writing, Milnor® uses two types of photosensors: the Banner VALU-BEAM SM-800 Retroflective and the Banner LM3 Opposed-mode models (see FIGURES 1 and 2). Both types must be properly adjusted for light or dark operation and for sensitivity. In addition, for some functions, opposed-mode photosensors have adjust-able time delays. While these devices are set at the Milnor® factory, photosensors supplied as original equipment may require adjustment to suit local conditions, and replacement units must be set initially.

NOTE: When set for dark operation, the photosensor provides an input to the Milnor® microprocessor when the beam is blocked by an object. When set for light operation, the photosensor provides an input to the microprocessor when the object normally blocking the beam is removed.

Setting Retroflective Photosensors

Retroflective photosensors use a combined receiver/emitter and separate reflector to sense when an object blocks the focused light beam. These sensors have a top-mounted sensitivity indicator that flashes faster as sensitivity is increased. Sensitivity and light/dark operation settings are made via potentiometers (see FIGURE 1). **Most Milnor® applications require dark operation.**

1. **Light/Dark Operation Potentiometer**—Adjust this single-turn potentiometer fully counterclockwise if the application calls for dark operation, or fully clockwise if it calls for light operation. When turning the potentiometer, avoid excessive torque to prevent damage.

2. **Sensitivity Potentiometer**—If this potentio-meter is turned clockwise, sensitivity increases and the sensitivity indicator flashes more rapidly. When the potentiometer is fully clockwise, the sensor is most sensitive. Adjust the sensitivity by turning the potentiometer clockwise until the indicator flashes very rapidly.

Setting Opposed-mode Photosensors

⚠ DANGER ⚠

SHOCK HAZARD—Electrical power can cause death or severe injury. Lock OFF and tag out power to the machine main bus before opening photosensor.

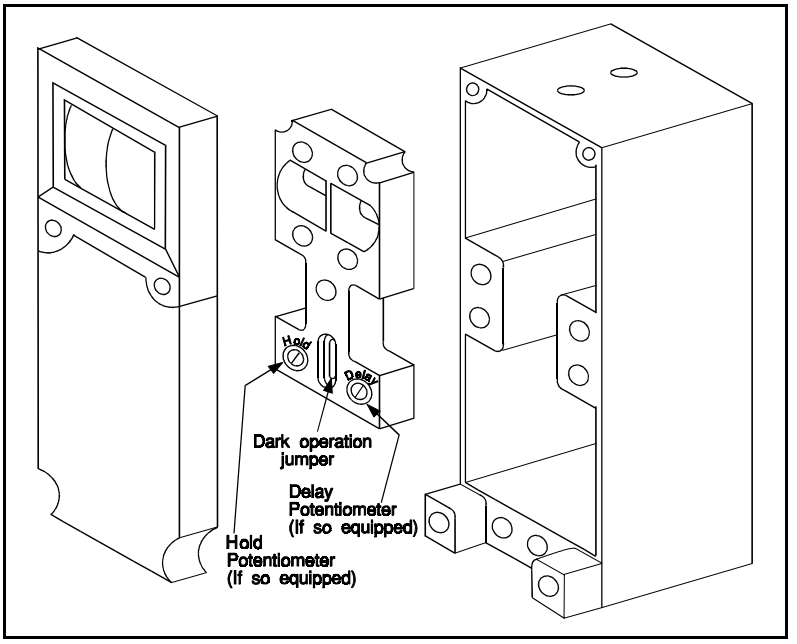


FIGURE 3 (MSSM0122AE)
Exploded View of Opposed-mode Receiver/Logic Module

Opposed-mode sensors use two units: an emitter to produce an infrared beam and a receiver/logic module to sense when objects block the beam (see FIGURE 2). The emitter-type determines the beam type and range (see Table A). The receiver/logic type determines whether the receiver reads light or dark and when it provides an input to the MILNOR microprocessor (see Table B). Receiver/logic modules are equipped with a dark operation jumper for dark operation (FIGURE 3). Removing this jumper changes the sensor to light operation. Depending on the function, the receiver/logic module may also have potentiometers for **On/Off-delay** and **Hold.** An **On-delay** potentiometer sets the amount of time the light (or dark) beam must be seen by the receiver/logic module before the input (to the MILNOR® microprocessor) makes. An **Off-delay** potentiometer sets how long the input lasts even if the beam has ceased. A **Hold** potentiometer sets the time the input will last.

Receiver/logic modules are provided with a sensitivity potentiometer (see FIGURE 2). If the potentiometer is turned fully counter-clockwise, the sensor is least sensitive, and the sensitivity indicator is extinguished. As the potentiometer is turned clockwise, sensitivity increases, and the indicator flashes more rapidly. When the potentiometer is fully clockwise, the sensor is most sensitive, and the indicator flashes so rapidly it appears steadily **ON**. Adjust the sensitivity by turning the potentiometer clockwise until the indicator begins flashing very rapidly.

Table A: Opposed-mode Sensor Types and Characteristics

Emitter/Logic Module Types	Beam	Range
E/R1	Infrared beam	150 feet (45 meters)
ED/RD1	Infrared beam	10 feet (3 meters)
EXD/RXD1	Infrared beam	30 feet (9 meters)
EV/RX1	Visible red beam	100 feet (30 meters)
EX/RX1	Infrared beam	700 feet (200 meters)

Table B: Opposed-mode Receiver/Logic Module Types and Characteristics

NOTE1: On-delay is the time delay before an input (to the MILNOR® microprocessor) is made.
NOTE 2: Hold is the length of time the input (to the MILNOR® microprocessor) is made.

Receiver/Logic Module type	The logic module provides an input to the MILNOR® microprocessor when it sees any of the following:
LM1	a light.
LM2	a change from light to dark. The input continues until the next light-to-dark change.
LM3	dark (if dark operation jumper installed) or light (if dark operation jumper removed).
LM4-2	a change from light to dark (if dark operation jumper installed) or a change from dark to light (if dark operation jumper removed).
LM4-2NR	same as LM4-2 above, but the input (to the Milnor® microprocessor) will **hold** (continue) for an adjustable time before the logic module will see the next change.
LM5	a steady light (or dark) for an adjustable **on-delay** time.
LM5R	the same as LM5 above, but the input (to the Milnor® microprocessor) will **hold** for an adjustable time.
LM5-14	a light (or dark) that lasts more than the adjustable **on-delay** time. The input (to the Milnor® microprocessor) will also **hold** for an adjustable time even if the light (or dark) ceases.
LM5T	a light (or dark). The input (to the Milnor® microprocessor) will **hold** for an adjustable time then end, even if the light (or dark) continues.
LM6-1	a light (or dark). The interval between lights (or darks) is calculated and compared to an adjustable reference time. The input (to the Milnor® microprocessor) ends if the reference time is exceeded. Alternately, the module can be adjusted so that the input ends if the interval between light (or dark) drops below the reference time.
LM8	a light (or dark) past an adjustable **on-delay** time. If the light (or dark) continues past the **on-delay** time, the input (to the Milnor® microprocessor) makes for an adjustable **hold** time. If the light (or dark) still remains at the end of the **hold** time, the input (to the Milnor® microprocessor) ends, and the **on-delay** time starts over.
LM8-1	light (or dark) past an adjustable **on-delay** time. The input to the Milnor® microprocessor makes for an adjustable **hold** time then ends.
LM8A	light (or dark) past an adjustable **on-delay** time.
LM10	five dark to light transitions. The input (to the Milnor® microprocessor) remains made for five additional light to dark transitions, then ends.

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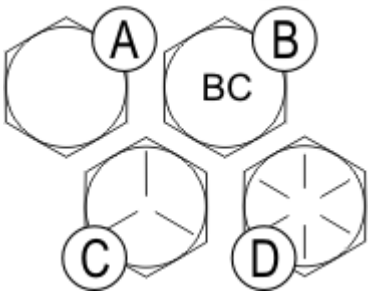
Torque Requirements for Fasteners

This document uses Simplified Technical English. Learn more at http://www.asd-ste100.org.

The document about the assembly gives the torque requirements for other fasteners. **If fastener torque specifications or threadlocker requirements in an assembly document are different from this document, use the assembly document.**

Figure 1: The Bolts in Milnor® Equipment

The Marks on Bolt Heads



Legend

A. SAE Grades 1 and 2, ASTM A307, and stainless steel
B. Grade BC, ASTM A354
C. SAE Grade 5, ASTM A449
D. SAE Grade 8 and ASTM A354 BD

1. Torque Values

These tables give the standard dimension, grade, threadlocker, and torque requirements for fasteners frequently used on Milnor® equipment.

Note 1: Data from the Pellerin Milnor® Corporation "Bolt Torque Specification" (bolt_torque_milnor.xls/2002096).

1.1. Fasteners Made of Carbon Steel

1.1.1. Without a Threadlocker

Table 1: Torque Values for Standard Fasteners with Maximum 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	66	7	101	11	143	16	126	14
1/4 x 28	76	9	116	13	163	18	--	--
5/16 x 18	136	15	209	24	295	33	258	29
5/16 x 24	150	17	232	26	325	37	--	--

Table 2: Torque Values for Standard Fasteners Larger Than 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/8 x 16	20	27	31	42	44	59	38	52
3/8 x 24	23	31	35	47	50	68	--	--
7/16 x 14	32	43	49	66	70	95	61	83
7/16 x 20	36	49	55	75	78	105	--	--
1/2 x 13	49	66	75	102	107	145	93	126
1/2 x 20	55	75	85	115	120	163	--	--
9/16 x 12	70	95	109	148	154	209	134	182
9/16 x 18	78	106	121	164	171	232	--	--
5/8 x 11	97	131	150	203	212	287	186	252
5/8 x 18	110	149	170	231	240	325	--	--
3/4 x 10	172	233	266	361	376	510	329	446
3/14 x 16	192	261	297	403	420	569	--	--
7/8 x 9	167	226	429	582	606	821	531	719
7/8 x 14	184	249	473	641	668	906	--	--
1 x 8	250	339	644	873	909	1232	796	1079
1 x 12	274	371	704	954	994	1348	--	--
1 x 14	281	381	723	980	1020	1383	--	--
1 1/8 x 7	354	480	794	1077	1287	1745	1126	1527
1 1/8 x 12	397	538	891	1208	1444	1958	--	--
1 1/4 x 7	500	678	1120	1519	1817	2464	1590	2155
1 1/4 x 12	553	750	1241	1682	2012	2728	--	--
1 3/8 x 6	655	888	1469	1992	2382	3230	2085	2827
1 3/8 x 12	746	1011	1672	2267	2712	3677	--	--
1 1/2 x 6	869	1178	1949	2642	3161	4286	2767	3751
1 1/2 x 12	979	1327	2194	2974	3557	4822	--	--

Table 3: Torque Values for Plated Fasteners with Maximum 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	49	6	76	9	107	12	95	11
1/4 x 28	56	6	88	10	122	14	--	--
5/16 x 18	102	12	156	18	222	25	193	22
5/16 x 24	113	13	174	20	245	28	--	--

Table 4: Torque Values for Plated Fasteners Larger Than 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/8 x 16	15	20	23	31	33	44	29	38
3/8 x 24	17	23	26	35	37	49	--	--
7/16 x 14	24	32	37	50	52	71	46	61
7/16 x 20	27	36	41	55	58	78	--	--
1/2 x 13	37	49	56	76	80	106	70	93
1/2 x 20	41	55	64	85	90	120	--	--
9/16 x 12	53	70	81	110	115	153	101	134
9/16 x 18	59	79	91	122	128	174	--	--
5/8 x 11	73	97	113	150	159	212	139	186
5/8 x 18	83	110	127	172	180	240	--	--
3/4 x 10	129	173	200	266	282	376	246	329
3/14 x 16	144	192	223	297	315	420	--	--
7/8 x 9	125	166	322	430	455	606	398	531
7/8 x 14	138	184	355	474	501	668	--	--
1 x 8	188	250	483	644	682	909	597	796
1 x 12	205	274	528	716	746	995	--	--
1 x 14	210	280	542	735	765	1037	--	--
1 1/8 x 7	266	354	595	807	966	1288	845	1126
1 1/8 x 12	298	404	668	890	1083	1444	--	--
1 1/4 x 7	375	500	840	1120	1363	1817	1192	1590
1 1/4 x 12	415	553	930	1261	1509	2013	--	--
1 3/8 x 6	491	655	1102	1470	1787	2382	1564	2085
1 3/8 x 12	559	758	1254	1672	2034	2712	--	--
1 1/2 x 6	652	870	1462	1982	2371	3161	2075	2767
1 1/2 x 12	733	994	1645	2194	2668	3557	--	--

1.1.2. With a Threadlocker

Table 5: Threadlocker by the Diameter of the Bolt (see Note 2)

	Dimension			
LocTite Product	1/4-inch	1/4- to 5/8-inch	5/8- to 7/8-inch	1-inch +
LocTite 222	OK			
LocTite 242		OK		
LocTite 262			OK	
LocTite 272			High temperature	
LocTite 277				OK

Note 2: The acceptable bolt size ranges for various LocTite® threadlocking products is the LocTite manufacturer's **general** recommendation. Specific applications sometime require that a LocTite product is applied to a bolt size outside the ranges shown here. For example, Milnor specifies LocTite 242 for use on certain 1" bolt applications and has confirmed this usage with the LocTite manufacturer. You may see variances such as this in the documentation for specific machine assemblies.

Table 6: Torque Values if You Apply LocTite 222

Dimension	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
	Pound-inches	N-m	Pound-inches	N-m	Pound-inches	N-m	Pound-inches	N-m
1/4 x 20	60	7	96	11	132	15	108	12
1/4 x 28	72	8	108	12	144	16	--	--

Table 7: Torque Values if You Apply LocTite 242

Dimension	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
5/16 x 18	11	15	17	23	25	34	22	30
5/16 x 24	13	18	19	26	27	37	27	37
3/8 x 16	20	27	31	42	44	60	38	52
3/8 x 24	23	31	35	47	50	68	--	--
7/16 x 14	32	43	49	66	70	95	61	83
7/16 x 20	36	49	55	75	78	106	--	--
1/2 x 13	49	66	75	102	107	145	93	126
1/2 x 20	55	75	85	115	120	163	--	--
9/16 x 12	70	95	109	148	154	209	134	182
9/16 x 18	78	106	121	164	171	232	--	--
5/8 x 11	97	132	150	203	212	287	186	252
5/8 x 18	110	149	170	230	240	325	--	--

Table 8: Torque Values if You Apply LocTite 262

Dimension	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/4 x 10	155	210	240	325	338	458	296	401
3/4 x 16	173	235	267	362	378	512	--	--
7/8 x 9	150	203	386	523	546	740	477	647
7/8 x 14	165	224	426	578	601	815	--	--

Table 9: Torque Values if You Apply LocTite 272 (High-Temperature)

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
1 x 8	350	475	901	1222	1272	1725	1114	1510
1 x 12	383	519	986	1337	1392	1887	--	--
1 x 14	393	533	1012	1372	1428	1936	--	--
1-1/8 x 7	496	672	1111	1506	1802	2443	1577	2138
1-1/8 x 12	556	754	1247	1691	2022	2741	--	--
1-1/4 x 7	700	949	1568	2126	2544	3449	2226	3018
1-1/4 x 12	774	1049	1737	2355	2816	3818	--	--
1-3/8 x 6	917	1243	2056	2788	3335	4522	2919	3958
1-3/8 x 12	1044	1415	2341	3174	3797	5148	--	--
1-1/2 x 6	1217	1650	2729	3700	4426	6001	3873	5251
1-1/2 x 12	1369	1856	3071	4164	4980	6752	--	--

Table 10: Torque Values if You Apply LocTite 277

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
1 x 8	325	441	837	1135	1181	1601	1034	1402
1 x 12	356	483	916	1242	1293	1753	--	--
1 x 14	365	495	939	1273	1326	1798	--	--
1-1/8 x 7	461	625	1032	1399	1674	2270	1464	1985
1-1/8 x 12	516	700	1158	1570	1877	2545	--	--
1-1/4 x 7	650	881	1456	1974	2362	3202	2067	2802
1-1/4 x 12	719	975	1613	2187	2615	3545	--	--
1-3/8 x 6	851	1154	1909	2588	3097	4199	2710	3674
1-3/8 x 12	970	1315	2174	2948	3526	4781	--	--
1-1/2 x 6	1130	1532	2534	3436	4110	5572	3597	4877
1-1/2 x 12	1271	1723	2852	3867	4624	6269	--	--

1.2. Stainless Steel Fasteners

Table 11: Torque Values for Stainless Steel Fasteners 5/16-inch and Smaller

	316 Stainless		18-8 Stainless		18-8 Stainless with Loctite 767	
Dimension	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	79	9	76	9	45	5
1/4 x 28	100	11	94	11	56	6
5/16 x 18	138	16	132	15	79	9
5/16 x 24	148	17	142	16	85	10

Table 12: Torque Values for Stainless Steel Fasteners Larger Than 5/16-inch

	316 Stainless		18-8 Stainless		18-8 Stainless with Loctite 767	
Dimension	**Pound-feet**	**N-m**	**Pound-feet**	**N-m**	**Pound-feet**	**N-m**
3/8 x 16	21	28	20	27	12	16
3/8 x 24	23	31	22	29	13	18
7/16 x 14	33	44	31	42	19	25
7/16 x 20	35	47	33	45	20	27
1/2 x 13	45	61	43	58	26	35
1/2 x 20	47	64	45	61	27	37
9/16 x 12	59	81	57	77	34	46
9/16 x 18	66	89	63	85	38	51
5/8 x 11	97	131	93	125	56	75
5/8 x 18	108	150	104	141	62	84
3/4 x 10	132	179	128	173	77	104
3/4 x 16	130	176	124	168	75	101
7/8 x 9	203	275	194	263	116	158
7/8 x 14	202	273	193	262	116	157
1 x 8	300	406	287	389	172	233
1 x 14	271	367	259	351	156	211
1-1/8 x 7	432	586	413	560	248	336
1-1/8 x 12	408	553	390	529	234	317
1-1/4 x 7	546	740	523	709	314	425
1-1/4 x 12	504	683	480	651	288	390
1-1/2 x 6	930	1261	888	1204	533	722
1-1/2 x 12	732	992	703	953	422	572

2. Preparation

WARNING 2: Fire Hazard—Some solvents and primers are flammable.

- Use threadlocker and primers with sufficient airflow.
- Do not use flammable material near ignition sources.

1. Clean all threads with a wire brush or a different tool.
2. Remove the grease from the fasteners and the mating threads with solvent. Make the parts dry.

   Note 3: LocTite 7649 Primer™ or standard solvents will remove grease from parts.

3. Apply a spray of LocTite 7649 Primer™ or equal on the fasteners and the mating threads. Let the primer dry for one minute minimum.

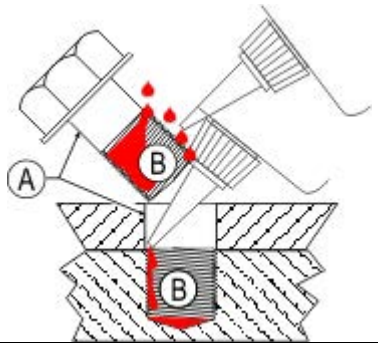
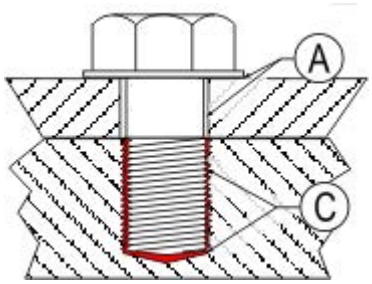
3. How to Apply a Threadlocker

CAUTION 3: Malfunction Hazard—Heat, vibration, or mechanical shocks can let the fasteners loosen if you do not apply the threadlocker correctly. Loose fasteners can cause malfunctions of the equipment.

- Read the threadlocker manufacturer's instructions and warnings. Obey these instructions.

Apply the threadlocker only to the areas where the fastener threads and the mating threads engage.

Figure 2: Blind Hole

Application	Coverage
	

Legend

A. No threadlocker here
B. Apply here
C. Fill all space with threadlocker

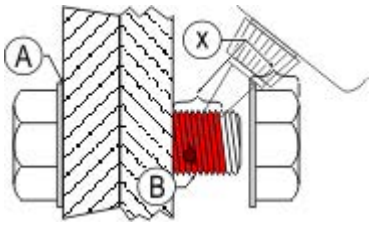
3.1. Blind Holes

1. Apply the threadlocker down the threads to the bottom of the hole.
2. Apply the threadlocker to the bolt.
3. Tighten the bolt to the value shown in the correct table (Table 5 to Table 11).

3.2. Through Holes

1. Put the bolt through the assembly.
2. Apply the threadlocker only to the bolt thread area that will engage the nut.
3. Tighten the bolt to the value shown in the correct table (Table 5 to Table 11).

Figure 3: Through Hole

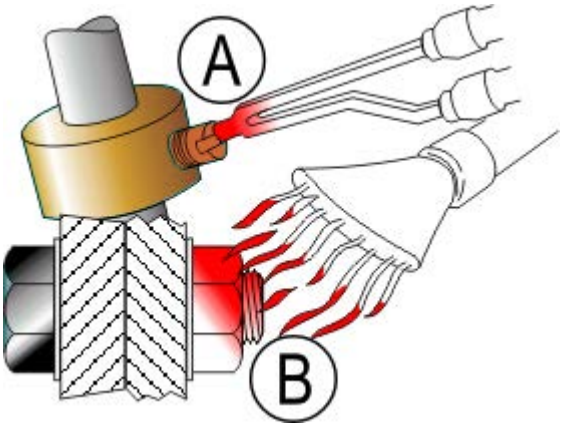
Application	Legend
	**A.** No threadlocker here **B.** Apply the threadlocker to this area **x.** Nut depth

3.3. Disassembly—For high-strength threadlocker, apply heat for five minutes. Disassemble with hand tools while the parts are hot.

For low-strength and moderate-strength threadlocker, disassemble with hand tools.

Figure 4: Disassembly

Apply Heat to a Small Area



Legend

A. How to apply heat to a small fastener
B. How to apply heat to a large fastener

— End of BIUUUM04 —

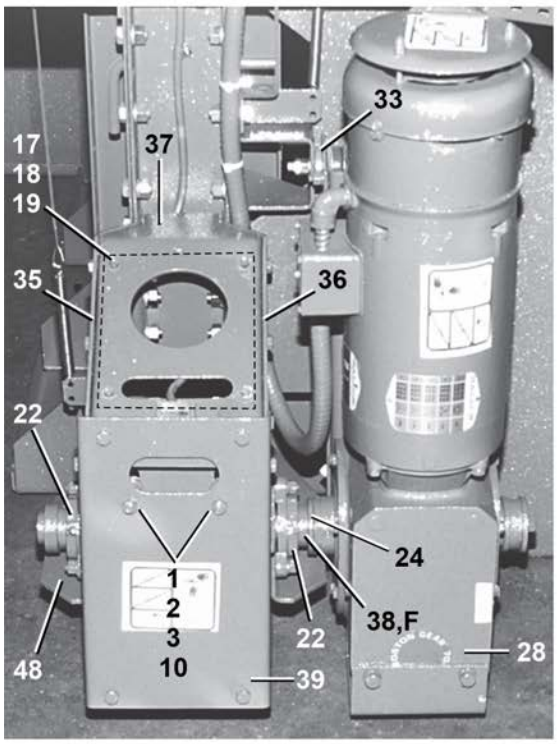
Mechanical Parts 4

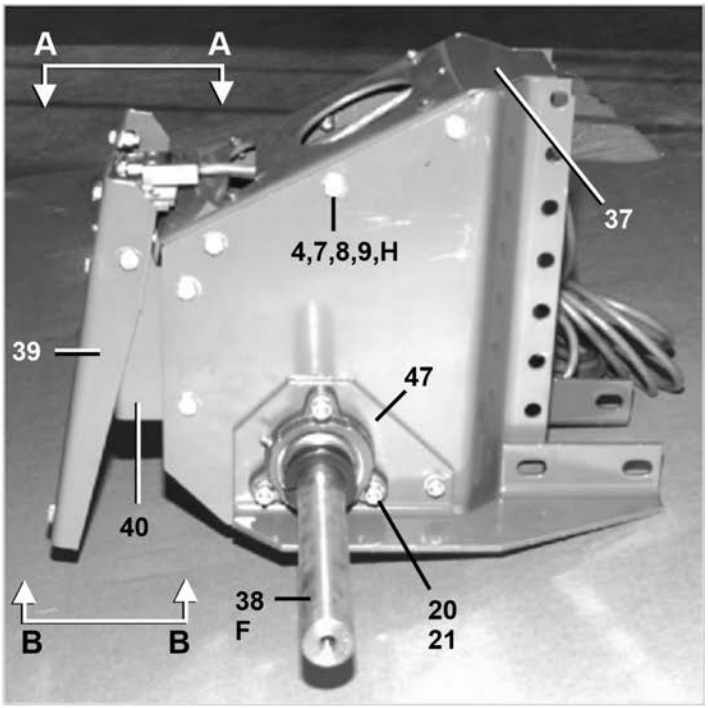
4

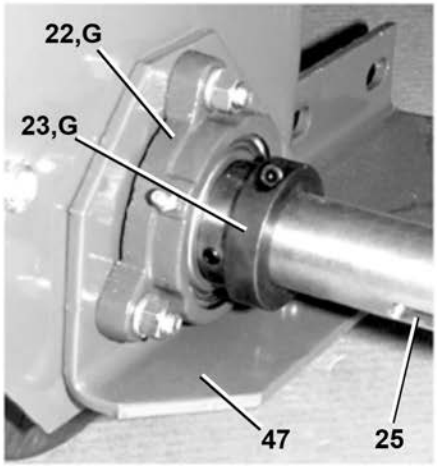
Floor Drive 4.1

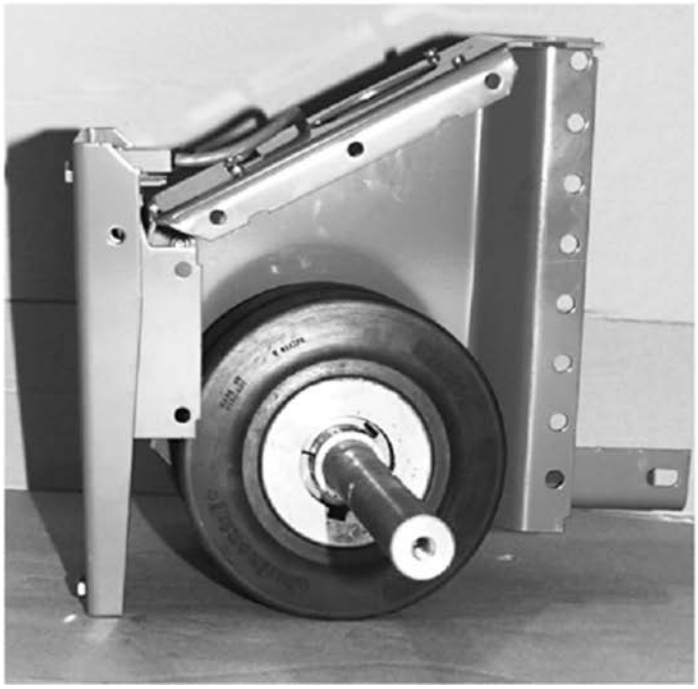
Floor Drive Tractor

COSH(A,J,K,B,X)_, COBUC(E,T), and CL(36,40,48)_







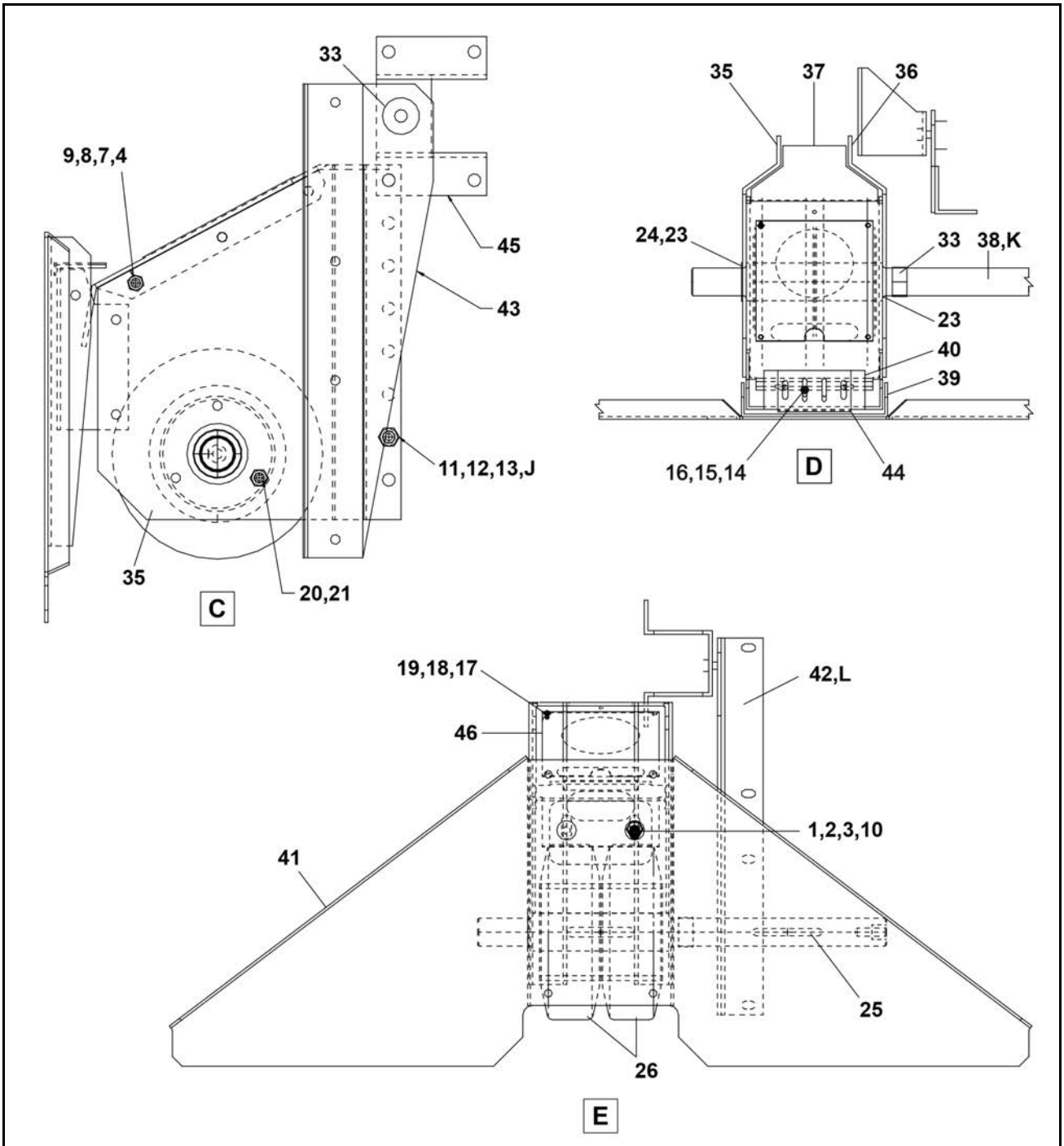


Legend

F . . . Drive shaft
G . . . Used on both sides of gear reducer
H . . . 12 instances

Floor Drive Tractor

COSH(A,J,K,B,X)_, COBUC(E,T), and CL(36,40,48)_



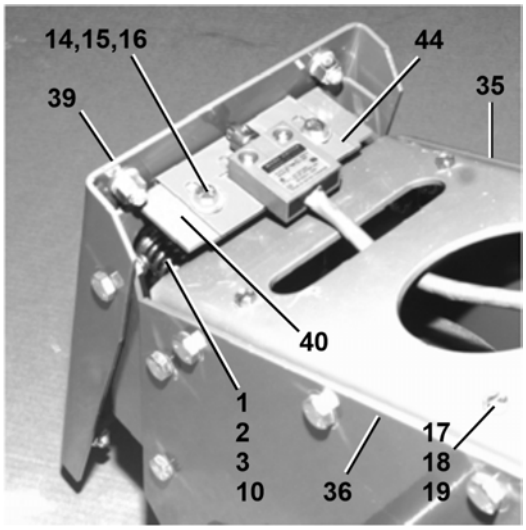
Legend

C . . . Front view
D . . . Top view
E . . . Side view
J . . . Fastens to shuttle side rail
K . . . Drive shaft shown
L . . . Torque arm

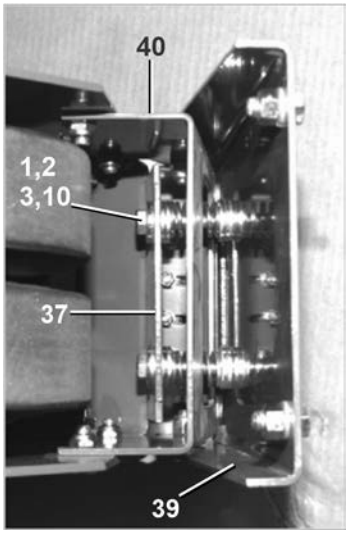
Floor Drive Tractor

COSH(A,J,K,B,X)_, COBUC(E,T), and CL(36,40,48)_

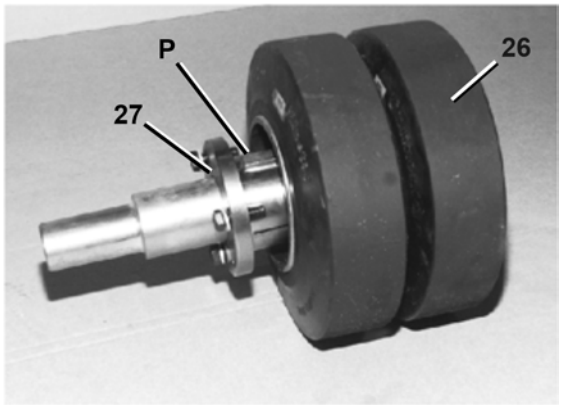
View A-A



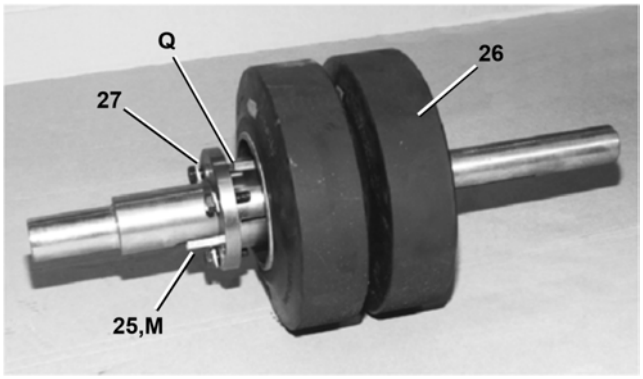
View B-B



Idler Wheels and Idler Shaft



Drive Wheels and Drive Shaft



Legend

M . . . Key
P . . . Wheel key comes with idler shaft
Q . . . Wheel key comes with drive shaft

Table 1. Parts List—Floor Drive Tractor

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	ALC420047A	FLOORDR DRIVE SIDE-9"WHEEL	Drive Side
	B	ALC420048A	FLOORDR IDLER SIDE-9"WHEEL	Idler Side
Components				
all	1	15K136	HEXCAPSCR 3/8-16UNCX3+1/2 GR5	

Floor Drive Tractor

COSH(A,J,K,B,X)_, COBUC(E,T), and CL(36,40,48)_

Parts List—Floor Drive Tractor (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	2	15U266	FLATWASHER 1"0DX7/16"IDX3/16"	
all	3	02 18187	SPRING=OUTER DOOR 60 WEHU	
all	4	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
all	5	15K110	HEXCAPSCR 3/8-16UNC2AX1.5 GR5-	
all	6	15K085	HEXCAPSCR 3/8-16UNC2AX3/4 GR5	
all	7	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	8	15U240	FLATWASHER(USS STD) 3/8" ZNC P	
all	9	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	10	15G218	HXLOKNUT NYL 3/8-16 STL/ZNC	
all	11	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 P	
all	12	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	13	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	14	15K039	HXCAPSCR 1/4-20UNC2AX3/4 GR5 Z	
all	15	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	16	15G165	HXNUT 1/4-20UNC2BSAE ZC GR2	
all	17	15N135	RDMACSCR 10-24UNC2AX5/8 ZINC G	
all	18	15U150	LOCKWASHER MEDIUM #10 ZINCPL	
all	19	15G125	HXMACHSCRNUT 10-24UNC2B ZINC G	
all	20	15K143B	HEXCAPSCR 7/16-14UNCX1"GR5 ZIN	
all	21	15U278	LOCKWASHER MEDIUM 7/16 ZINCPL	
all	22	54AF1437	FLGEBRG.HUBCITY 3-BOLT FB150URX1-7/16	
all	23	54JH11437C	SHAFTCOLLAR 1.4375 CFG #23S	
all	24	15U445	FLATWASH 1.453"X2"OD.X.060THK.	
all	25	15E235	SQMACHKEY 1/2X1/2X2"	
all	26	60C510UT	WHEEL DOUBLE 9"OD URETHANE	
all	27	56Q1TQ3S	1+15/16" SPLIT BUSHING BROWN#Q3	
all	28	54STB33260	REDUCER 60:1 SF732-60T-B7-G	
all	30	15U390P	FLATWASHER(USS STD) 1" ZNC P	
all	33	ALC420063	TORQUE ARM BUSHING ASSEMBLY	
all	35	04 21927B	WHEEL SUPP BKT LF-9"FLOORDR	
all	36	04 21927C	WHEEL SUPP BKT RT-9"FLOORDR	
all	37	04 21928A	COVER-WHEEL SUPP-9"FLOORDR	
A	38	X4 21933A	DRIVE SHAFT SF732-9"FLOORDR	
B	38	X4 21934A	IDLER SHAFT-9"FLOORDR	
all	39	04 21929A	SAFETYSTOP MTG BKT 9"FLOORDR	
all	40	04 21931A	SAFETY STOP SW MTG-9"FLOORDR	
all	41	04 21930B	SAFETY STOP PLATE-9"FLOORDR	
all	42	04 21939E	TORQARM MTG ANGLE=FLOORDR	
all	43	04 21939D	TORQUE ARM PLATE=FLOORDR	
all	44	04 21937G	KICKPL SW STOP BRKT-FLOORDR9	
all	45	04 21940	TORQUE ARM MTG BRKT-FLOORDR	
all	46	04 21928B	FLOOR DOOR-9" COVER	

Floor Drive Tractor

COSH(A,J,K,B,X)_, COBUC(E,T), and CL(36,40,48)_

Parts List—Floor Drive Tractor (cont'd.)

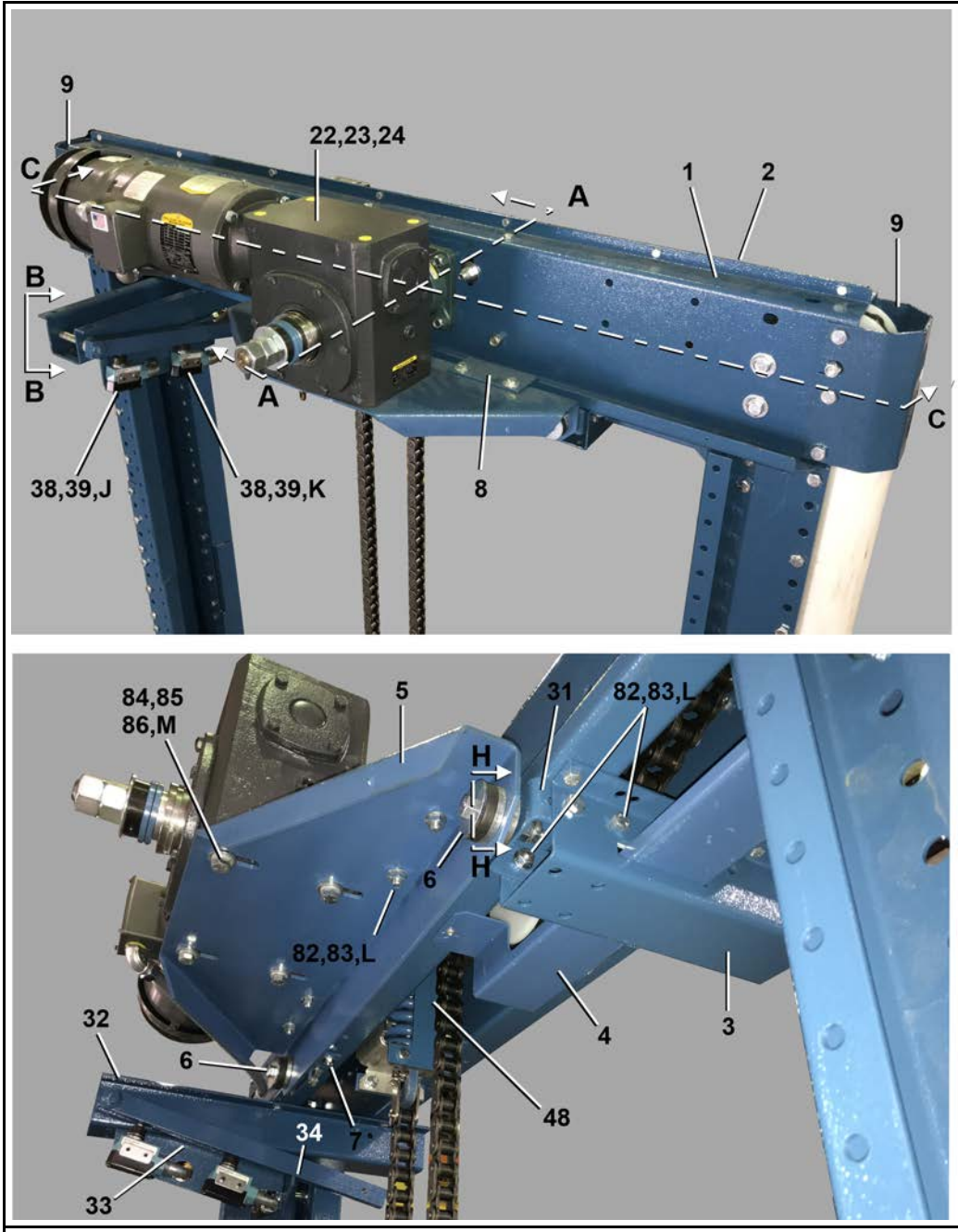
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	47	04 21928C	FLOORDR SUPP PL STIFF-RT	
all	48	04 21928D	FLOORDR SUPP PL STIFF-LF	

4 Milnor Hoist 4.2

Milnor Hoist for J-Rail Shuttles

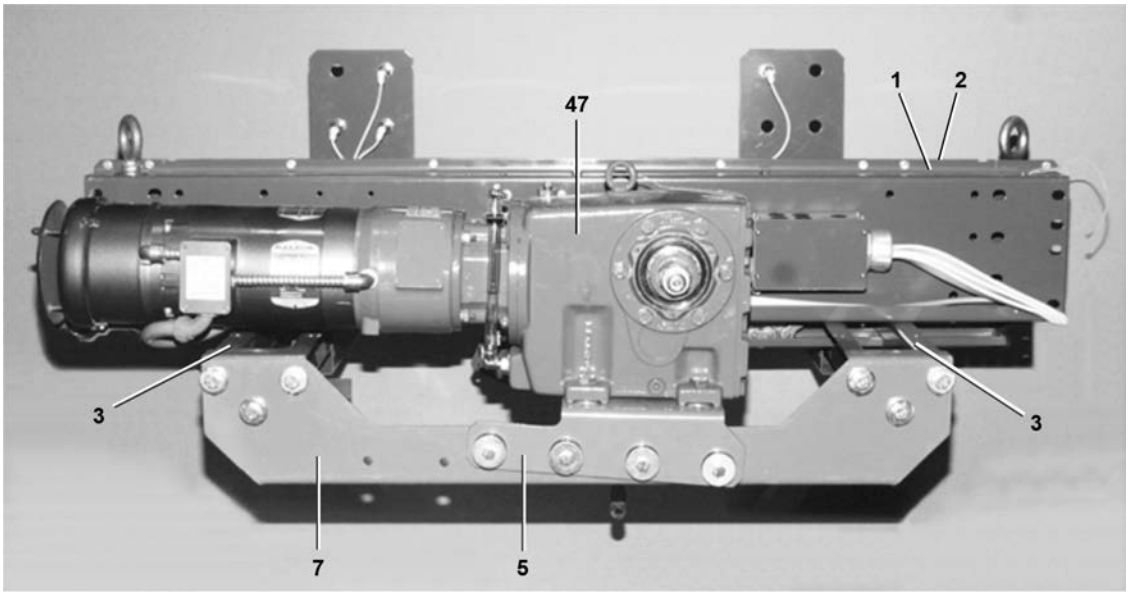
Figure 1. Milnor Hoist with Standard Gear Reducer

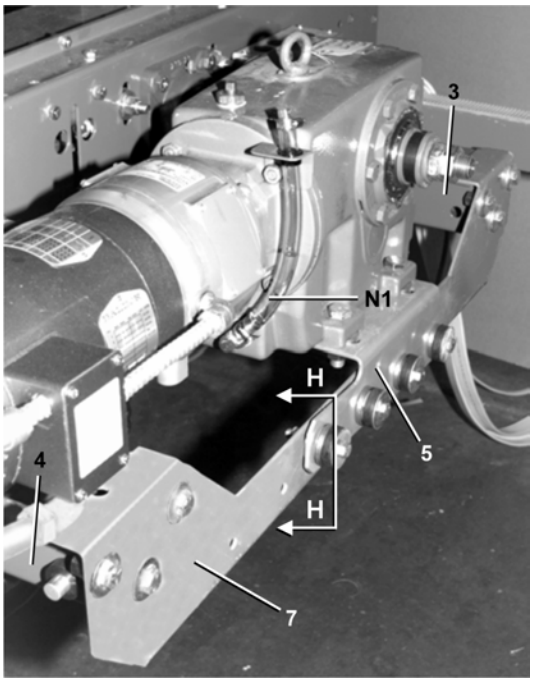


Legend

J . . . Lift Stop Safety Switch, Maximum
K . . . Lift Stop Safety Switch, Up Limit
L . . . Typical
M . . . 4 instances

Figure 2. Milnor Hoist with Helical Gear Reducer for Extra Heavy Loads

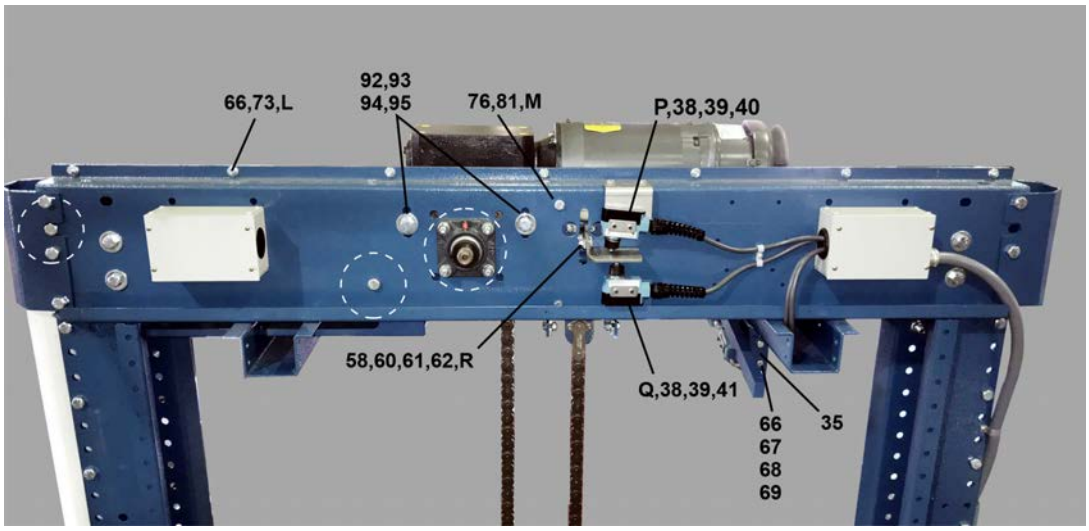


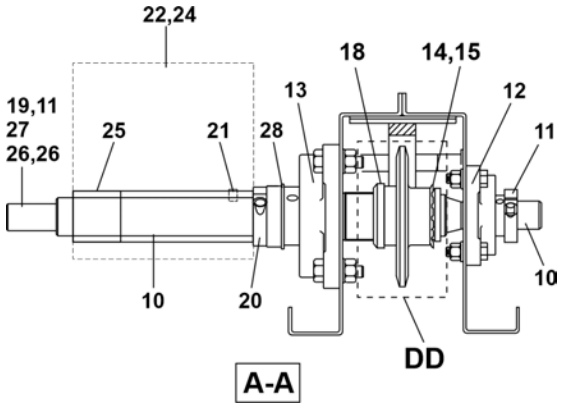


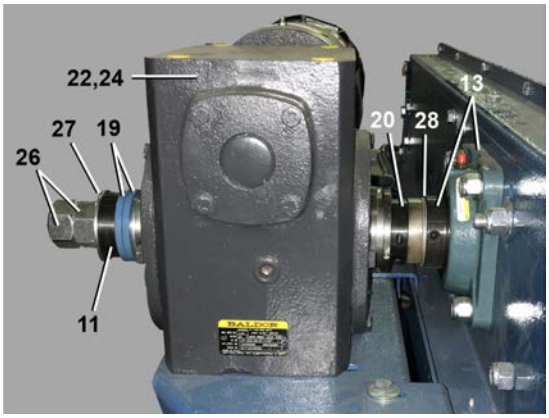
Legend

N1 . . The lubrication line is no longer used. The gear reducer does not require oil.

Milnor Hoist for J-Rail Shuttles

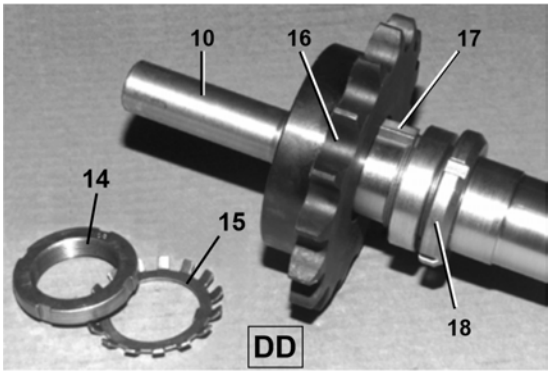




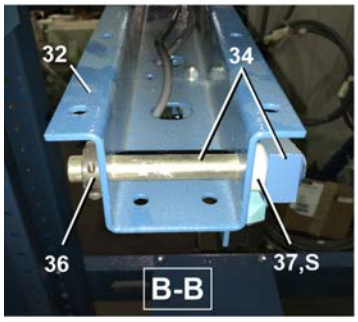


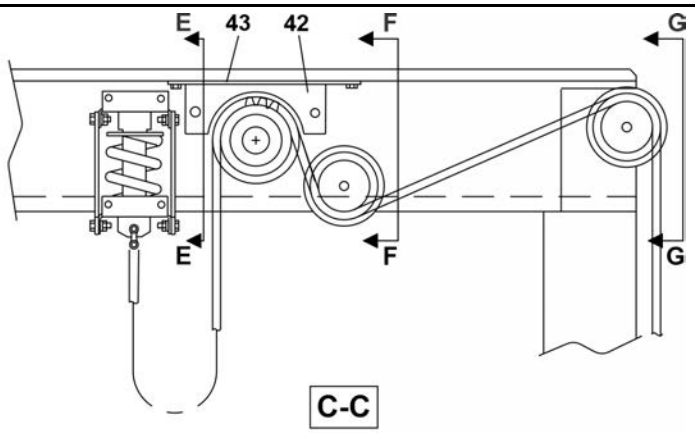
Legend

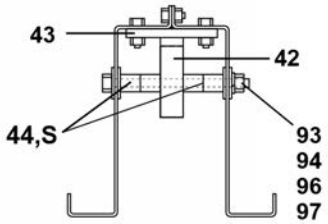
J . . . Lift Stop Safety Switch, Maximum Up
K . . . Lift Stop Safety Switch, Up Limit
L . . . Typical
M . . . 4 instances
P . . . Down limit Switch
Q . . . Taut Chain Limit Switch
R . . . 2 instances

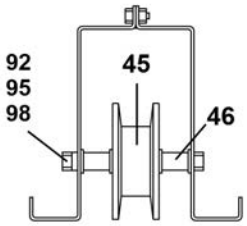


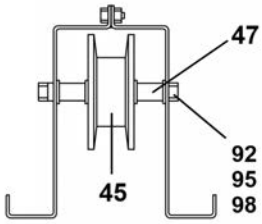
Milnor Hoist for J-Rail Shuttles

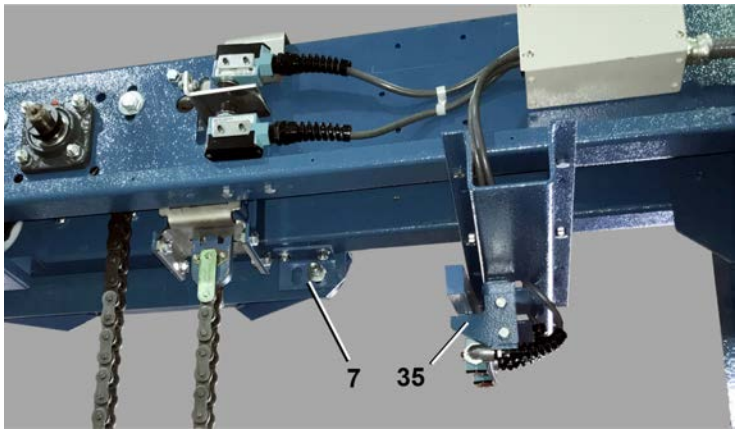






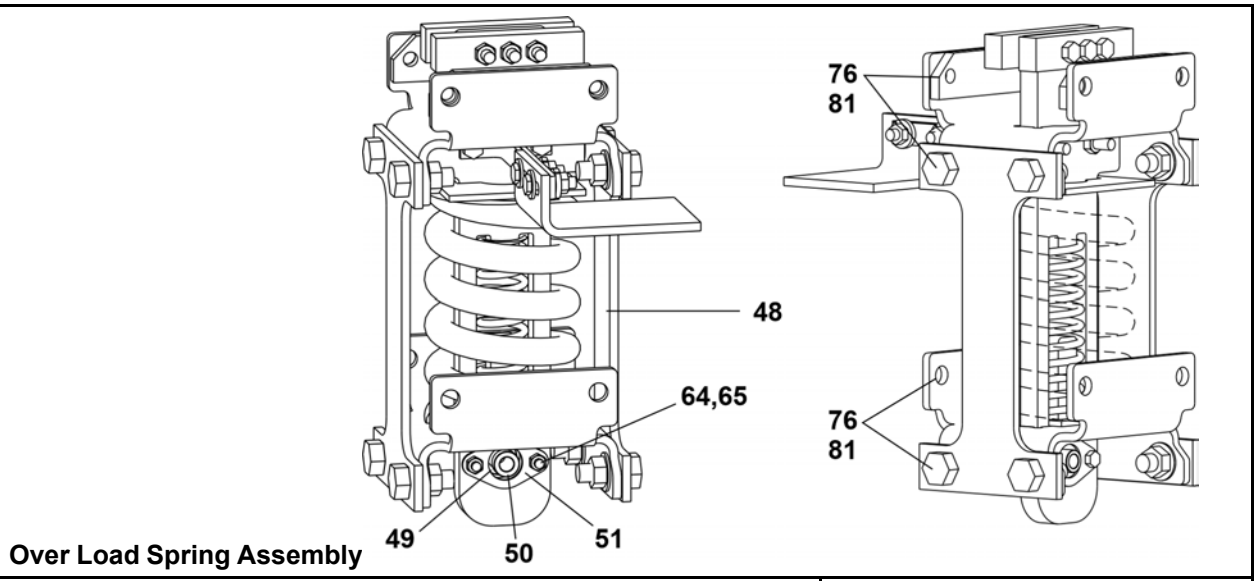






Legend

S . . . 8 instances



Legend

N2 . . A new cotter pin must be used if the connecting link is replaced or the cotter pin is removed for any reason.

Table 1. Parts List—

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Assemblies				
	D	ALC420001D	MK2 X-MEMBER+HOIST 40W-73260	36” Beds
	H	ALC420001H	MK2 X-MEMBER+HOIST 48W-73260	48” Beds
	E	ALC420001E	MK2 X-MEMBER+HOIST 40W-KA80K	36” Beds Helical
	F	ALC420001F	MK2 X-MEMBER+HOIST 42W-KA80K	42” Beds Helical
Components				
D,E	1	04 20786R	MK2 TOP BEAM-RT=36W BED	
H	1	04 21730	MK2 TOP BEAM-RT=48W BED	
F	1	04 23017	MK2 TOP BEAM-RT=42W BED	
D,E	2	04 20786L	MK2 TOP BEAM-LF=36W BED	

Parts List— (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
H	2	04 21730A	MK2 TOP BEAM-LF=48W BED	
F	2	04 23017A	MK2 TOP BEAM-LF=42W BED	
D,E	3	04 21731B	CHANN LIFT STOP 10.88"L	
E,F	3	04 21501C	CHANN LIFT STOP-HELICAL 3.81	
D,E,F	4	04 21006B	DRIP PAN-HOIST	
H	4	04 21006C	DRIP PAN-HOIST=48BED	
D,H	5	04 21419A	MK2 TORQUE ARM SF732-HOIST	
E,F	5	04 21503B	TORQARM-HELICAL GEAR HOIST	
D	6	ALC420063	TORQUE ARM BUSHING ASSEMBLY	
H	7	04 21143	MK2 HOIST TORQ ARM MTG BRKT	
E	7	04 21502	BKT-REDUCER SUPPORT-COLOSLYA	
D,H	8	04 21403A	TORQUE ARM SAFETY BRACKET-LF	
	9	04 21009A	MK2 TRACTOR CONN.BRKT./COSHA	
D,H,E,F	10	04 21418A	SHAFT=HOIST (SF653R)-COLOSLY	
D	11	54JH11000C	SHAFTCOLLAR SPLIT 1" CG#16S	
D,H,E,F	12	54AF10001A	FLG BRG 1"BORE NTN#UCF205-100T (4-BOLT)	
D,H,E,F	13	54AF1687	FLBRG 1.6875 NTN#UCF209-111T	
D,H,E,F	14	56AHN08	N08 BEARING LOCKNUT	
D,H,E,F	15	56AHW108	TW108 BEARING LOCKWASHER	
D,H,E,F	16	54N080B16	SPRKT 16T .492 IN/FT TAPER	
D,H,E,F	17	15E221	SQMACH KEY 3/8X1" C/0/8 NOHEAD	
D,H,E,F	18	56AHN09	N09 BEARING LOCKNUT	
all	19	04 21422	SPACER-SHAFT (SF732 GEAR)	D,H(2 instances); EF(4 instances)
all	20	54JH11437C	SHAFTCOLLAR 1.4375 CFG #23S	
D,H	21	15Q140	SOKSETSCR CUP 3/8-16X1/2 BLK	
D,H	22	54STB33260	REDUCER 60:1 SF732-60T-B7-G	
E,F	22	54STDKA80D	HELI-REDUCR+BUSH ASSY .9/2.0	
H	23	39RB1001AL	BRAKE DOUBLE-143TC 10FT/LB 230	
D	24	15E221	SQMACH KEY 3/8X1" C/0/8 NOHEAD	
H,E,F	24	15E228BAL	MACHKEY .375X.312X2.5 LG	
D,H	25	04 21036B	SPACER-HOIST GEAR REDUCER	
D,H	26	15U390P	FLATWASHER(USS STD) 1" ZNC P	
D,H,E,F	27	15G248C	HXFINJAMNUT 1-8UNC2B ZINC GR2	
E,F	28	15U515S	FLATWASH 2.375X1.703X16GA SS	
D,H	31	04 21668	BRKT-GROMMET MOUNTING	
DH	32	04 21731B	CHANN LIFT STOP 10.88"L	
E,F	32	04 21501C	CHANN LIFT STOP-HELICAL 3.81	
all	33	04 22857	SWITCH MTG BRKT=UPRAIL	
all	34	W4 21735	*LIFT STOP BAR WLMT-HOIST	
all	35	04 22857A	SAFETY BAR SW ADJUSTING-PLT	

Parts List— (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	36	54JH10625C	SHFTCOLLAR 5/8" CLPTYPE CFG10S	
all	37	15U345B	FLTWASH 101NYL 41/64IDX1.125OD	
all	38	09R012	MICSW SPDT PAINTED BZE6-RN 01	
all	39	02 10391	COVER STRIP=MICRO SW #6-8	
all	40	04 20993C	MICRO SW BRKT-LOOSE CHAIN	
all	41	04 20993B	MICRO SW BRKT-TOUGH CHAIN	
all	42	04 20774B	BLOCK #80 CHAIN RETAINER	
all	43	04 207742	1/4"SHIM,CHAIN HOLDER BLOCK	
all	44	27B240	SPCRROLL.5ID.813L.062T STLZNC	
all	45	04 20756	PULLEY CHAIN CARRIER	
all	46	27B2750L0T	SPC RROLL.562ID.937L.048T ZNK	
all	47	27B2400K0N	SPCRROLL.5ID.687L.062T STLZNC	
all	48	ALC420011B	OVERLOAD SPRING ASSY #80CHN	
all	49	54A701	SPHERICAL PLAIN BRG BALL BUSHING 1/2" RBC# B8-L	
all	50	X4 24527	DRILLBUSHING FOR #80 CHAIN	
all	51	04 20777C	BALL BRG RETAINER-SLACKCHAIN	
all	52	54G080C	ROLLCHAIN ANSI 80-1R 1"P (50FT REELS ONLY)	
all	53	54G080DPCN	CLNK DP CL2080HNC HVY NKL COTR	
all	54	15H031	STDCOTTERPIN 3/32X3/4 SS18-8	
all	55	60B065	RUBBER MNT CTR BONDED 40 DURO	
all	56	04 20796	SLEEVE=TORQUE ARM BUSHING	
all	57	02 18571A	PISTON ROD WASHER-.25"TK	
all	58	15K041	HXCAPSCR 1/4-2OUNC2AX1 GR 5 ZI	
all	59	15K046	HXCAPSCR 1/4-20 UNC2A X 2"GR5	
all	60	15U185	FLATWASHER(USS STD) 1/4" ZNC P	
all	61	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	62	15G165	HXNUT 1/4-20UNC2BSAE ZC GR2	
all	63	15G166A	HXLOKNUT NYL1/4-20 UNC2A STL/Z	
all	64	15N146	RDMACHSCR 10-24UNC2X1 SS18-8	
all	65	15G126	HXLOCKNUT NYLON 10-24 UNC SS N	
all	66	15K065	HEXCAPSCR 5/16-18UNC2AX1 GR5 Z	
all	67	15U200	FLATWASHER(USS STD) 5/16"ZNC P	
all	68	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
all	69	15G185	HXNUT 5/16-18UNC2B SAE ZINC GR	
all	70	15A009	CARBOLT 5/16-18NC2X3.5 FULTHD	
all	71	15G193	HEXLOKNUT 5/16-18UNC2A NYL STL	
all	72	15K060	HXCAPSCR 5/16-18UNCAX3/4 GR5 Z	
all	73	15K196	HEXCAPSCR 1/2-13UNC2X3 18-8SS	
all	75	15K085	HEXCAPSCR 3/8-16UNC2AX3/4 GR5	
all	76	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
all	77	15K105	HXCAPSCR 3/8-16UNC2A1.25 GR5 P	
all	78	15U240	FLATWASHER(USS STD) 3/8" ZNC P	

Parts List— (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	79	15U266	FLATWASHER 1"0DX7/16"IDX3/16"	
all	80	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	81	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	82	15K092Z	HEXFLGSCR 3/8-16X1 GR5 ZINC	
all	83	15G198	HXFLGNUT 3/8-16 ZINC	
all	84	15K143C	HEXCAPSCR 7/16-14 X 1.5 GR5 ZP	
all	85	15U286	FLATWASHER 2"0DX17/32"IDX1/4"	
all	86	15U278	LOCKWASHER MEDIUM 7/16 ZINCPL	
all	87	15K144C	HEXCAPSCR 7/16-14UNC X 2.5 GR	
all	88	15U271	LOKWASH INTOOTH 7/16ZN	
all	89	15G222	HXFINJAMNUT 7/16-14UNC2B ZINC	
all	90	15G222C	HEXNUT 7/16-14UNC2B ZINC GR2	
all	91	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 P	
all	92	15K203D	HEXCAPSCR 1/2-13X5.5 GR5 ZINC	
all	93	15B177	HXMACBOLT 1/2-13UNC2X6 ZINC GR	
all	94	15U280	FL+WASHER(USS STD)1/2 ZNC PL+D	
all	95	15U312	HARD FWASH 3/4ODX33/64IDX.115	
all	96	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	97	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	98	15G234N	HXLOCKNUT NYL 1/2-13UNC2 STL/Z	
all	99	15K128	HEXFLGSCR 1/2-13X1 ZN. GRD. 5	
all	100	15K129	HEXFLGSCR 1/2-13X1-1/4ZN. GR 5	
all	101	15G222B	HEXFLGNUT 1/2-13 ZINC SERRATED	
all	102	15G225H	HEXFLGNUT 1/2-13 SERRATED 18-8	
all	103	15U202	FLATWSHR.50ID1.75OD11GA ZNC	

Guide Wheels

Traversing J-Rail Shuttles

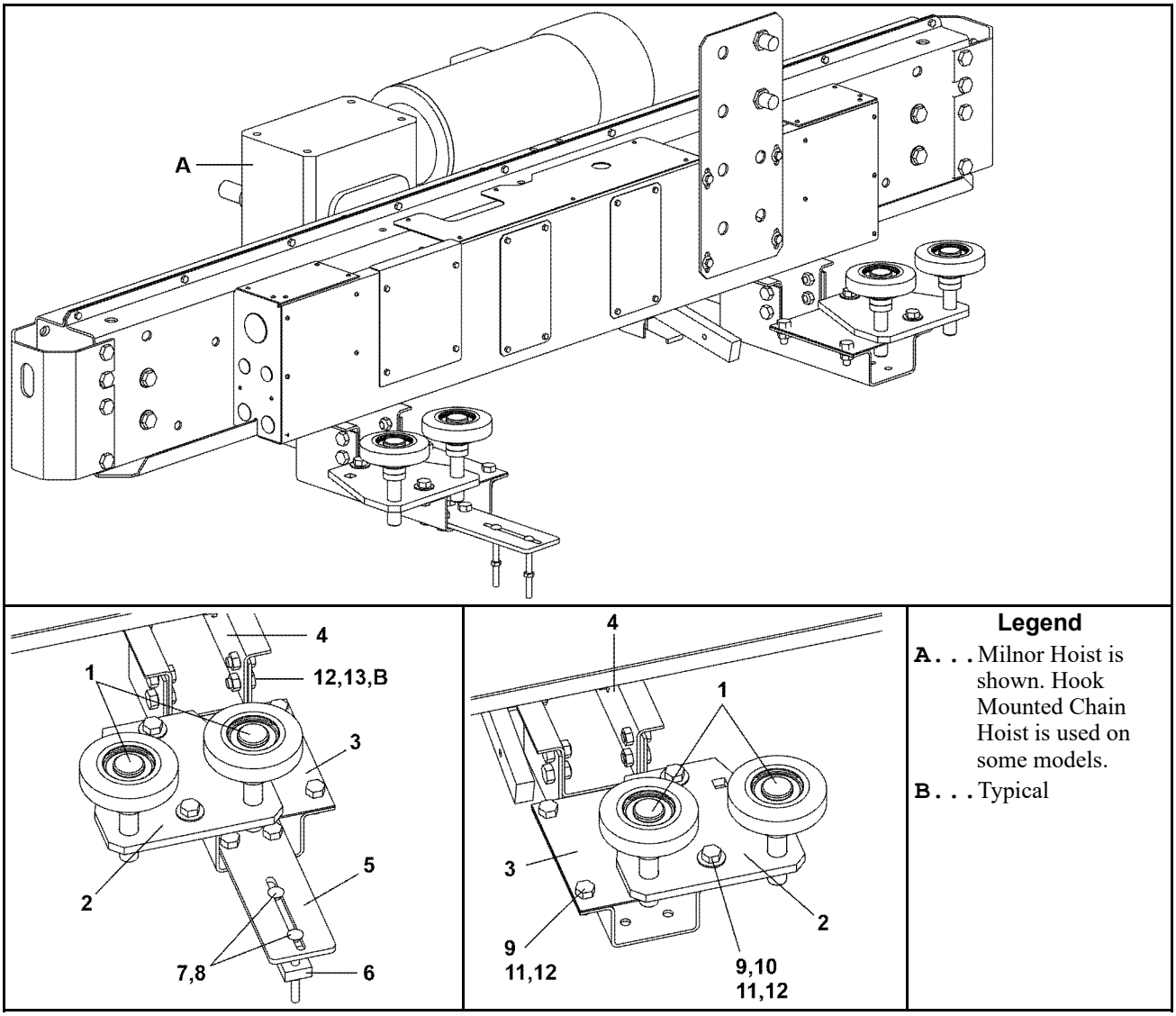


Table 1. Parts List—

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Assemblies				
	A	ALC420069B	UPPER RAIL 3.8T GUIDE WHEEL	
Components				
all	1	ALC420069C	OUTRIG WHEEL ASSY-3.8T RAIL	
all	2	04 22860	SHUTL GUIDE WHEEL MTG PL	
all	3	04 22853A	OUTRIGGER WHEEL MTG PLATE	
all	4	04 22856	FESTOON MTG CHANNEL EXT.	

Guide Wheels

Traversing J-Rail Shuttles

Parts List— (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	5	04 24158	FESTOON SUPPORT PLATE	
all	6	04 20750	PAD=FESTOON CABLE CLAMP	
all	7	15A009	CARBOLT 5/16-18NC2X3.5 FULTHD	
all	8	15G193	HEXLOKNUT 5/16-18UNC2A NYL STL	
all	9	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
all	10	15U266	FLATWASHER 1"0DX7/16"IDX3/16"	
all	11	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	12	15K092Z	HEXFLGSCR 3/8-16X1 GR5 ZINC	

4

Bucket Assemblies 4.3

Bucket Stand Assembly

Cobuc

BMP950032/2022465B
(Sheet 1 of 2)

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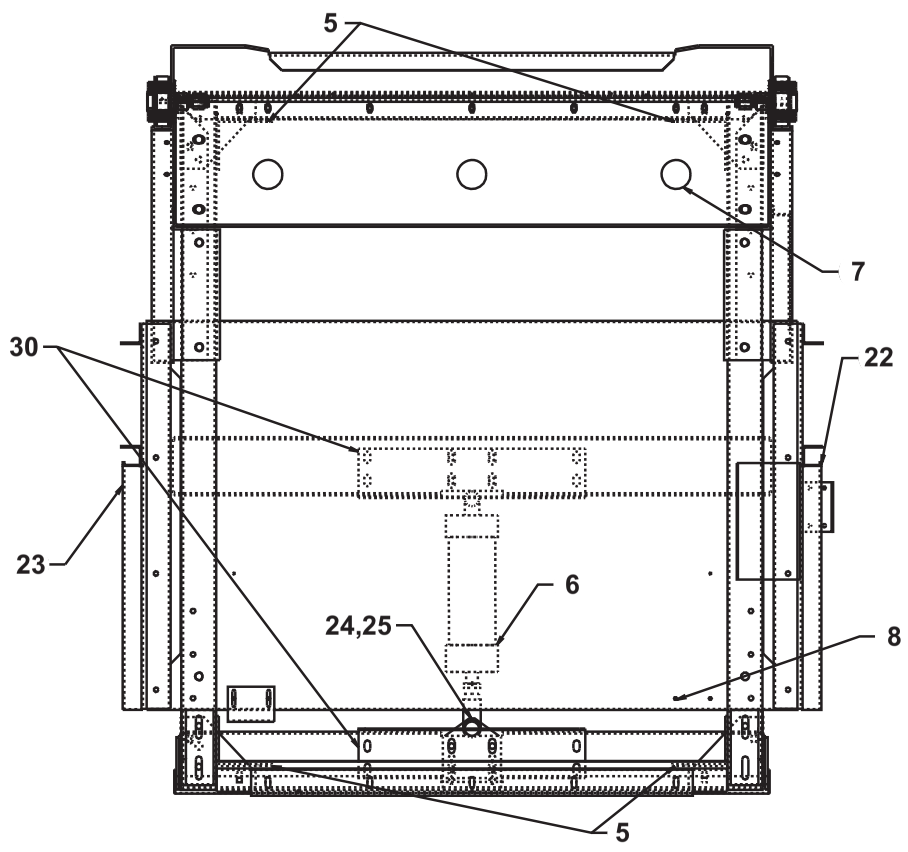
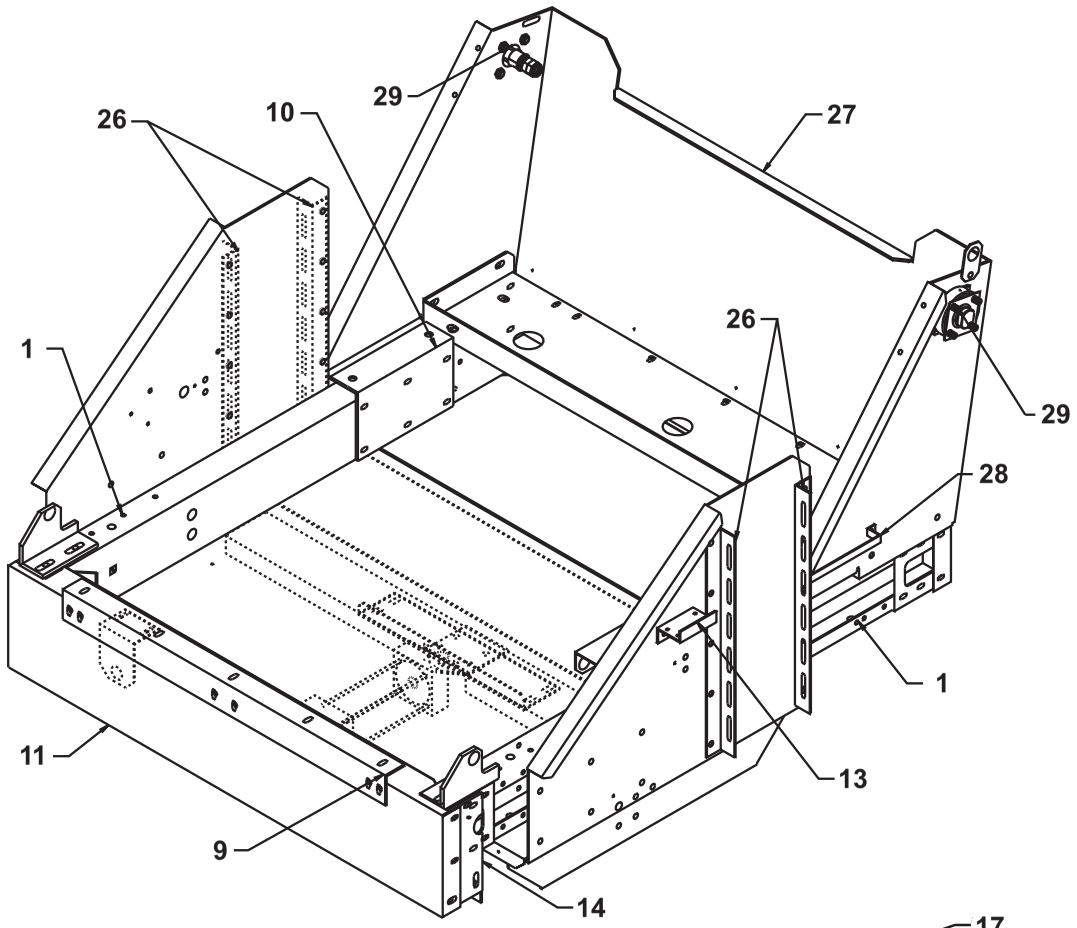
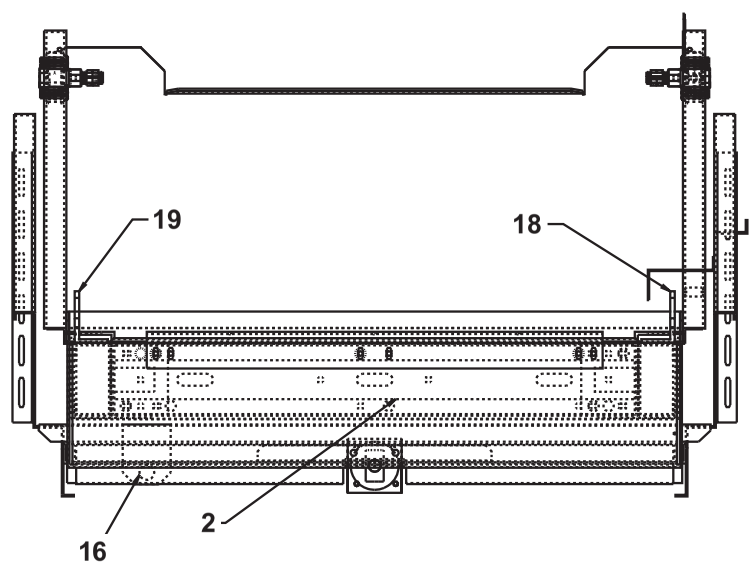
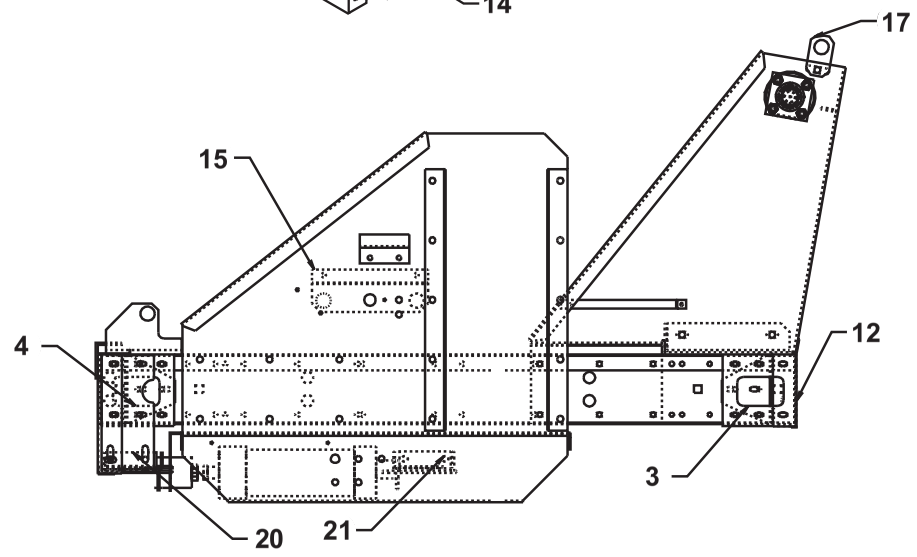
Litho in U.S.A.









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Parts List—Bucket Stand Assembly

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
all	A	ALC420053	95493E BUCKET STAND ASSEMBLY	
			----------COMPONENTS----------	
all	1	04 22053	92751D SIDE BUCKET STAND	
all	2	04 20005	96152D MCS 48"CROSS MEMBER	
all	3	04 20023A	88202# MCS MOD CONN BKT RIGHT END	
all	4	04 20023B	88202# MCS MOD CONN BKT LEFT END	
all	5	04 20024	89216C MCS CROSS MEMBER CONN BKT	
all	6	27C408	01Z AIR CYL 4"X8"X1" CLEVIS MT.	
all	7	ALC420072	95452N BUCKET SUPPORT ASSEMBLY	
all	8	04 22055	93353D BUCKET SUPPORT BOTTOM-COBUCK	
all	9	04 22050	92452D DOWN STOP BRKT-COBUCK	
all	10	04 22047C	STAND MTG BRACKET	
all	11	04 22050A	93112D FRONT COSMETIC-COBUCK	
all	13	04 22127	92742B TWO-WAY VALVE BKT	
all	14	04 21488B	92743B LEG END ROLL SPT=COBUCK	
all	15	04 22054B	92701D EXTEND/RETRACT SW CHANNEL	
all	16	04 22054D	92701C DOWN PROXIMITY SW BKT	
all	17	04 22054E	92701B UP PROXIMITY SW BKT	
all	18	W4 22101	95087C*AIR CYL BRKT=WLMT-RT	
all	19	W4 22101A	95087#*AIR CYL BRKT=WLMT-LF	
all	20	04 21448D	94041# 48"BED AIRCYL MTG-REAR	
all	21	04 21448E	94041D 48"BED AIRCYL MTG-FRONT	
all	22	04 22054	93346D BUCKET SUPPORT RT-COBUCK	
all	23	04 22054A	93346# BUCKET SUPPORT LF-COBUCK	
all	24	W4 21450	87392B*AIR CYL CLEVIS MTG WELDMENT	
all	25	04 21449	87392B AIR CYL ADJUSTING BRACKET	
all	26	04 22056	92452D VERT RAIL BUCKET MTG BRKT	
all	29	ALC420057	92801D SHAFT STAND-PIVOT=ASSY	
all	30	04 21449A	94041C AIR CYLINDER ADJ BKT-19.5"L	
all	31	04 22721	97031B COBUCK HARD STOP PLATE	
all	32	04 21681A	91096B+BKT POSITIVE STOP-COSL4808	

Bucket Assembly

Cobuc

BMP950033/95493V
(Sheet 1 of 2)

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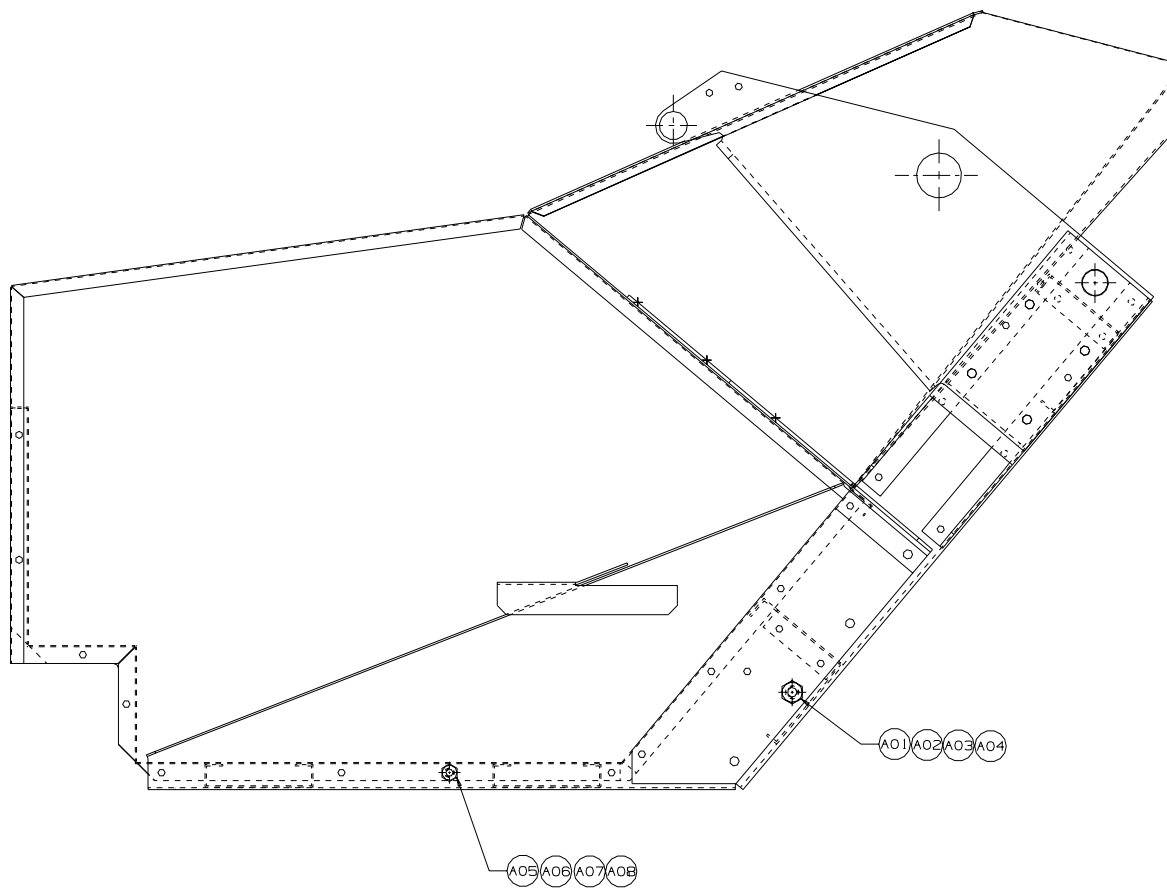
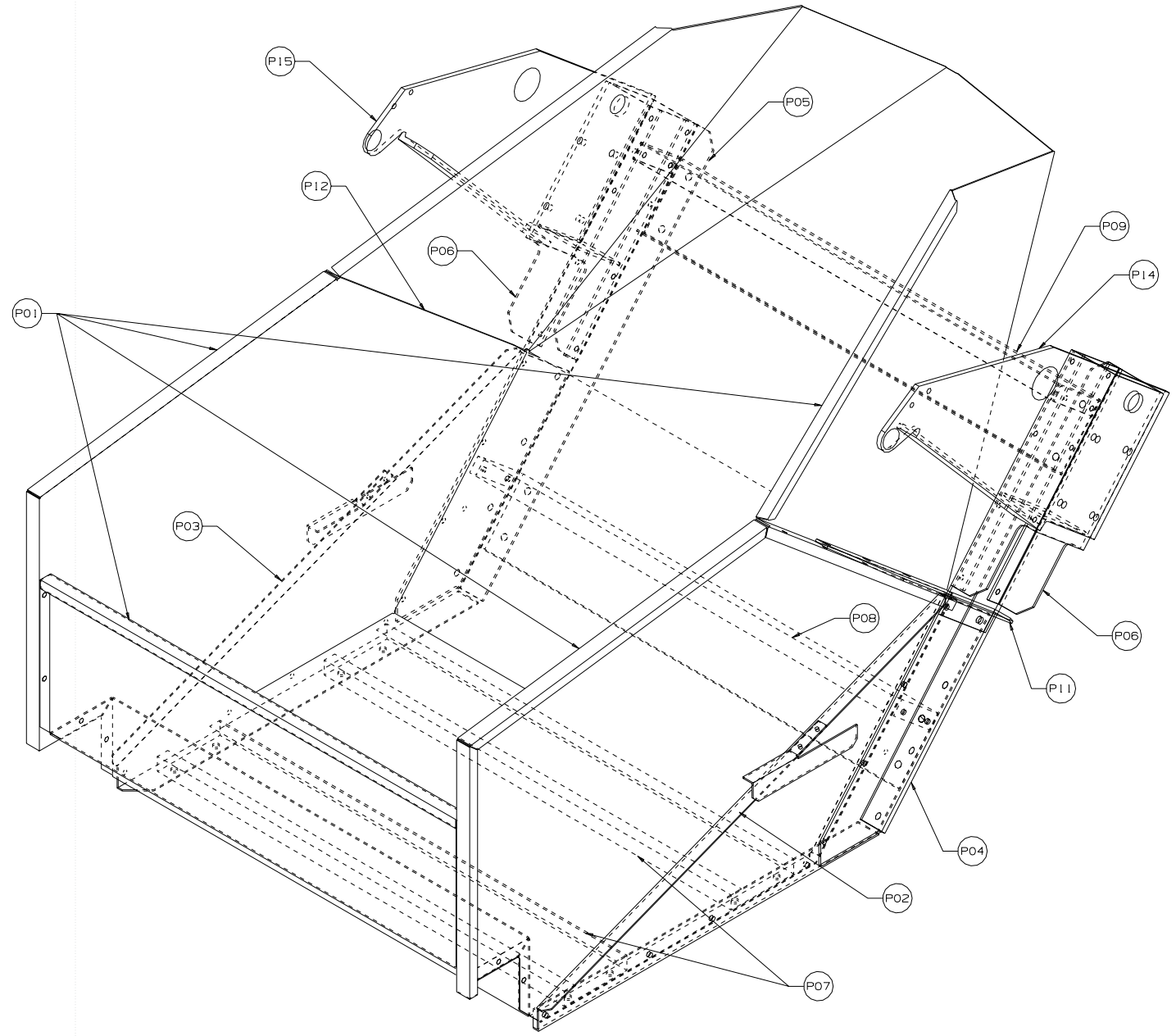
06





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Parts List—Bucket Assembly

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
all	A	ALC420054	92782E BUCKET ASSEMBLY-COBUCK	
			----------COMPONENTS----------	
all	A01	15K146	HEX CAP SCR 1/2-13 UNC2 X 1 SS18-8	
all	A02	15U285	01Z FLATWASHER 1/2 STD COMM SS18-8	
all	A03	15U310	LOKWASHER REGULAR 1/2 SS18-8	
all	A04	15G225	HEXNUT 1/2-13UNC2 SS18-8	
all	A05	15K096	HEXCAPSCR 3/8-16UNC2X1SS18-8	
all	A06	15U245	01Z FLTWASH 3/8 STD COMM 18-8 SS	
all	A07	15U260	LOCKWASHER MEDIUM 3/8 SS18-8	
all	A08	15G206	HEXNUT 3/8-16 UNC2 SS 18-8	
all	P01	W4 22035	95083E*BUCKET WELDMENT-COBUCK	
all	P02	04 22038	92577D BRKT-BUCKET LOWER SUPP-RT	
all	P03	04 22038A	92577# BRKT-BUCKET LOWER SUPP-LF	
all	P04	04 22039	92577D BRKT-BUCKET UPPER SUPP-RT	
all	P05	04 22039A	92577# BRKT-BUCKET UPPER SUPP-LF	
all	P07	04 22041	95157D BRACE-BUCKET LOWER SUPPORT	
all	P08	04 22042	92577D BRACE-BUCKET UPPER SUPPORT	
all	P09	04 22043	94086D BRACE-TRANSITION SUPPORT	
all	P11	04 22043A	92583D ANGLE TRANSITION SUPP-RT	
all	P12	04 22043B	92583# ANGLE TRANSITION SUPP-LF	
all	P14	W4 22044	95087D*LIFTING ARM WLMT RT-COBUCK	
all	P15	W4 22044A	95087#*LIFTING ARM WLMT LF-COBUCK	
all	P16	04 22054C	93151D SENSOR TARGET	
all	P17	04 22054F	93151# SENSOR TARGET-LF	

Bucket 8" Slide Assembly

Cobuc

BMP950034/95493V
(Sheet 1 of 2)

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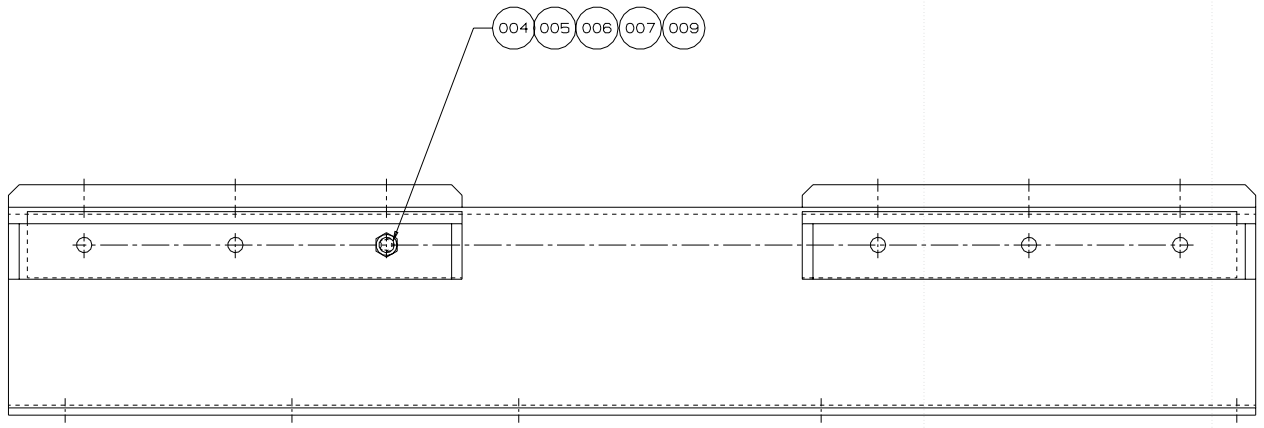
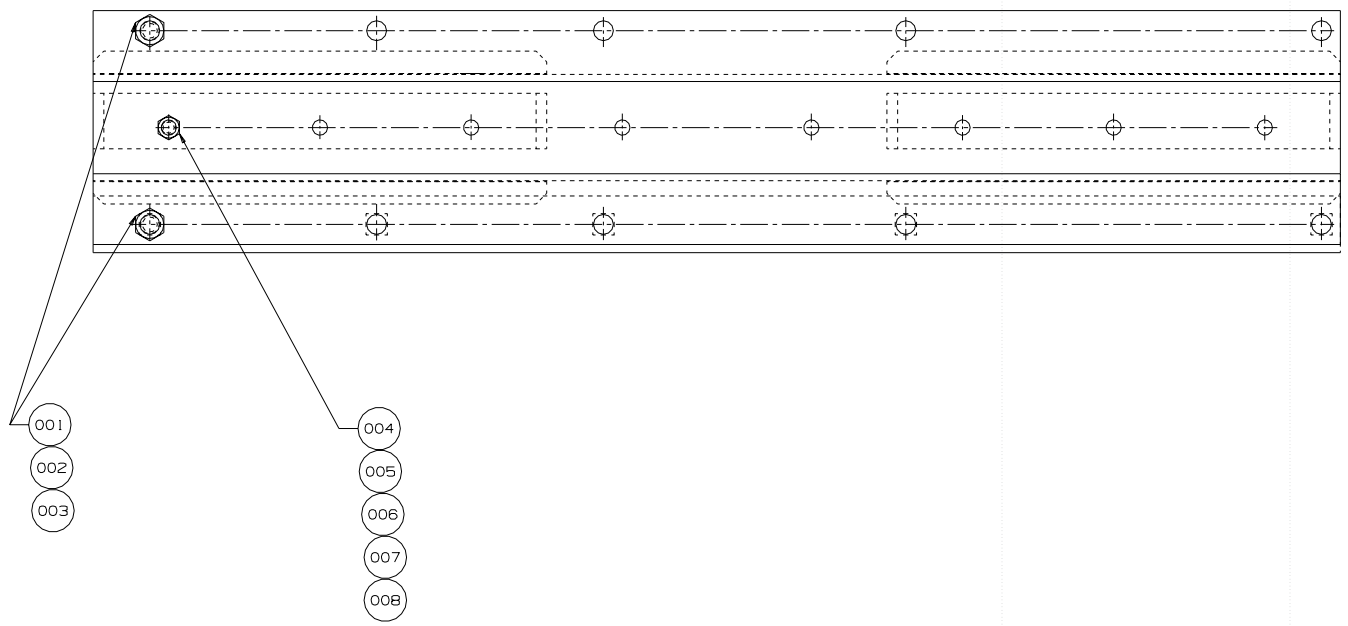
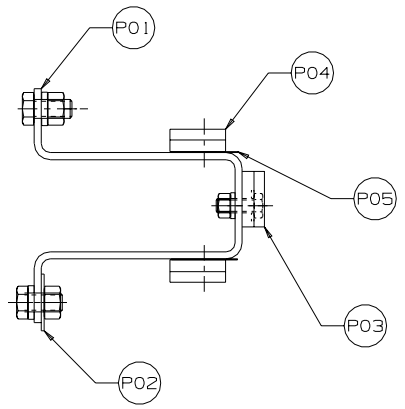
Litho in U.S.A.







92

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Litho in U.S.A.

Parts List—Bucket 8" Slide Assembly

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
----------	----------	----------	----------ASSEMBLIES----------	----------
all	A	ALC420055	92612D BUCKET 8"SLIDE ASSY-COBUCK	
----------	----------	----------	----------COMPONENTS----------	----------
all	P01	04 22052	92461D SLIDING CHANNEL-COBUCK	
all	P02	04 22052A	92461D GRIPNUT HOLDER-SLIDE CHAN	
all	P03	04 21654B	90532B BED SL PAD 1.38THK=COSL3808	
all	P04	04 20850C	89517B MK2 SLIDE PAD COSHA	
all	P05	04 21664	94187B SHIM-BED SL PAD=COEL DS05	
all	1	15K146	HEX CAP SCR 1/2-13 UNC2 X 1 SS18-8	
all	2	15U310	LOKWASHER REGULAR 1/2 SS18-8	
all	3	15G225	HEXNUT 1/2-13UNC2 SS18-8	
all	4	15K096	HEXCAPSCR 3/8-16UNC2X1SS18-8	
all	5	15U200	FLATWASHER(USS STD) 5/16"ZNC PLT	
all	6	15U260	LOCKWASHER MEDIUM 3/8 SS18-8	
all	7	15G206	HEXNUT 3/8-16 UNC2 SS 18-8	
all	8	27B25002SZ	SPACER ROLL.39ID.125L.048T STL/ZNC	
all	9	27B2100G0L	SPACER ROLL.39ID .562L.048T STL/ZNC	
all	11	17N080	1/2-13 GRIPNUT ZINC #C7968-1213-3B	

Parallel Track Outrigger Assembly

Cobuc

BMP950035/95493V
(Sheet 1 of 2)

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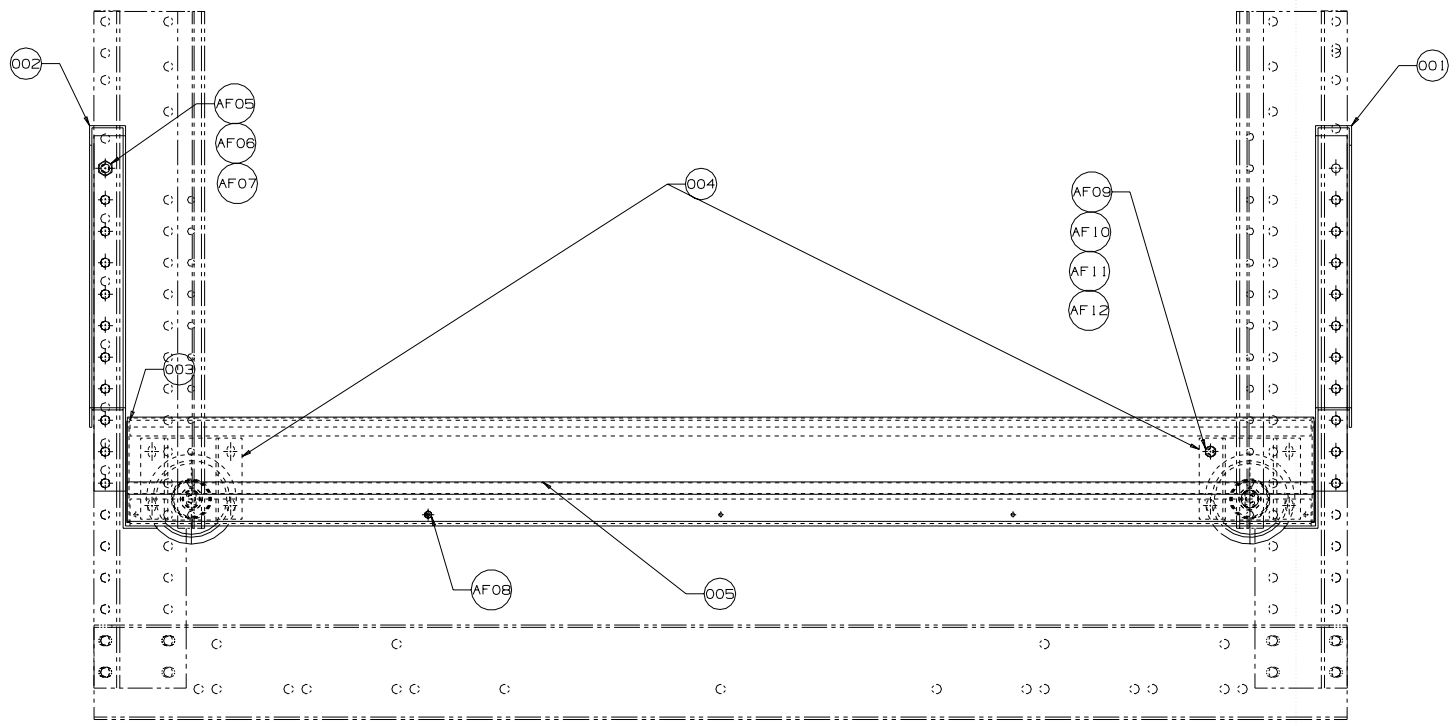

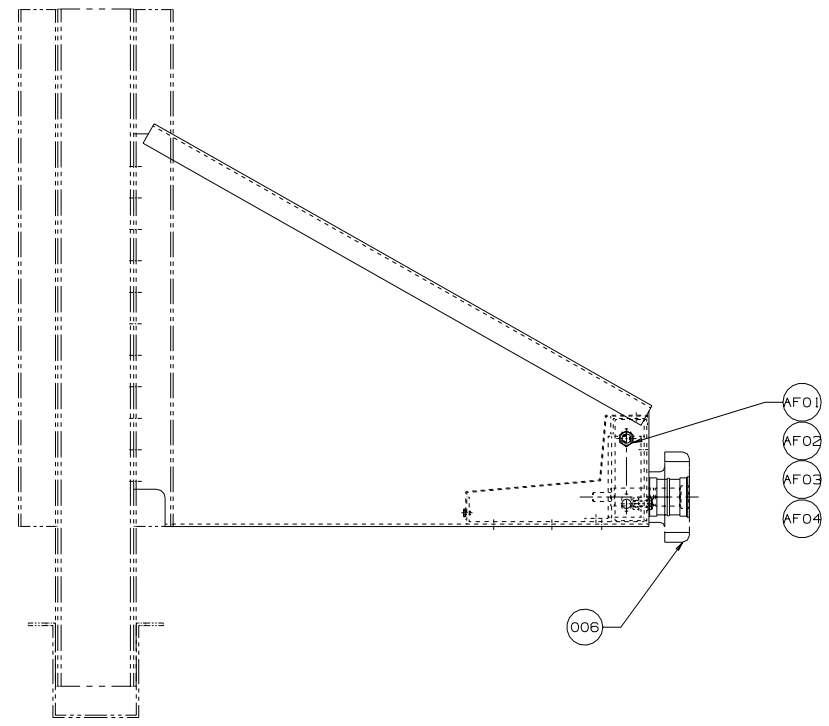

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Parts List—Parallel Track Outrigger Assembly

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
----------	----------	----------	----------ASSEMBLIES----------	----------
all	A	ALC420056	92753E OUTRIG. ASSY-PARALLEL TRACK	
----------	----------	----------	----------COMPONENTS----------	----------
all	AF01	15K146	HEX CAP SCR 1/2-13 UNC2 X 1 SS18-8	
all	AF02	15U285	01Z FLATWASHER 1/2 STD COMM SS18-8	
all	AF03	15U310	LOKWASHER REGULAR 1/2 SS18-8	
all	AF04	15G225	HEXNUT 1/2-13UNC2 SS18-8	
all	AF05	15K147	HXCAPSCR 1/2-13UNC2X1 GR5 ZINC	
all	AF06	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	AF07	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	AF08	15K041S	HEXCAPSCR 1/4-20UNC2AX1 SS18-8	
all	AF09	15K096	HEXCAPSCR 3/8-16UNC2X1SS18-8	
all	AF10	15U245	01Z FLTWASH 3/8 STD COMM 18-8 SS	
all	AF11	15U260	LOCKWASHER MEDIUM 3/8 SS18-8	
all	AF12	15G206	HEXNUT 3/8-16 UNC2 SS 18-8	
all	1	04 22094	94443D OUTRIGGER SIDE SUP RT-COBUCK	
all	2	04 22094A	94443# OUTRIGGER SIDE SUP LF-COBUCK	
all	3	04 22093	92753D OUTRIGGER CONN CHAN-COBUCK	
all	4	04 22092	92582C OUTRIGGER WHEEL BKT-COBUCK	
all	5	04 22093A	92752D OUTRIGGER WATER COVER-COBUCK	
all	6	ALC420010	92622C*5"TRACTOR SUP.ROLLER ASSY	

Shaft Clevis Assembly

Cobuc

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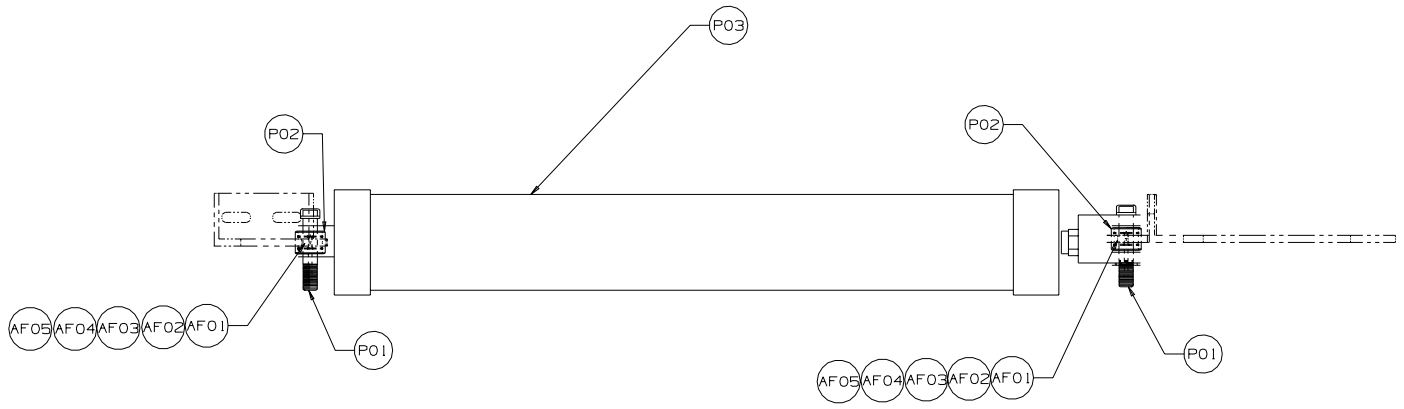
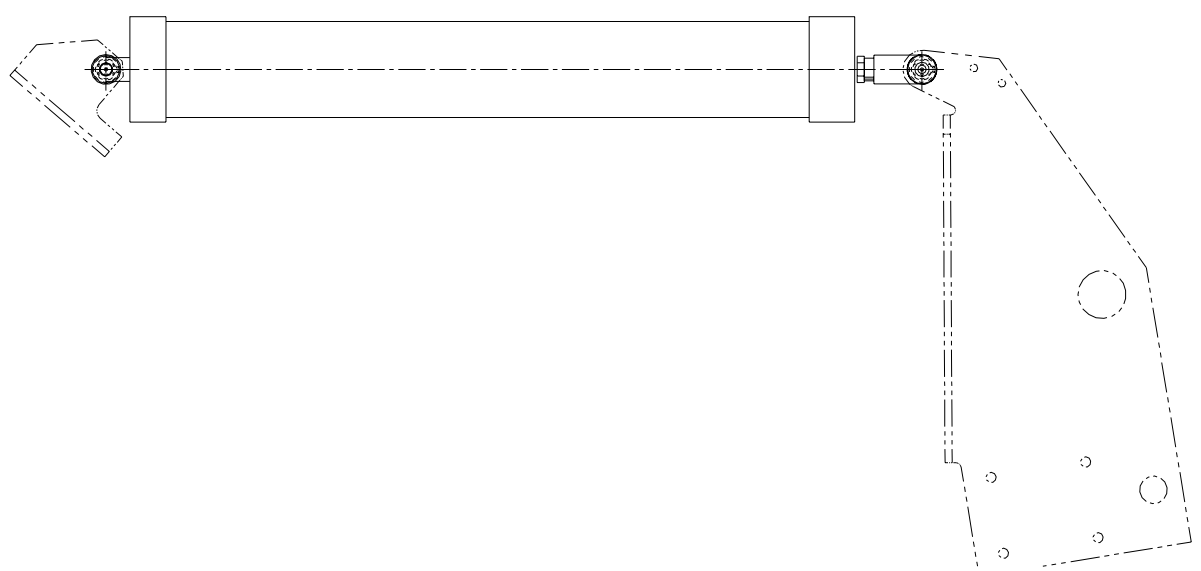
BMP950036/95493V (1 of 1)

Litho in U.S.A.





Parts List—Shaft Clevis Assembly

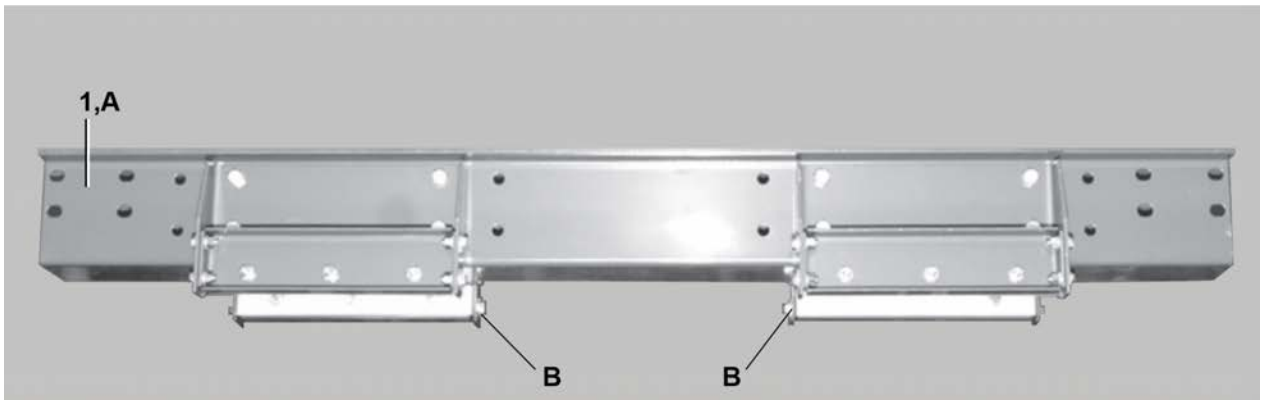
Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
all	A	ALC420058	93336D SHAFT CLEVIS-COBJCK=ASSY	
			----------COMPONENTS----------	
all	AF01	54M015	65408A GREASEFIT 60X36/60X44 1610BL	
all	AF02	15U355F	92206# 24GA ADJWASH=BRGHOUS ZINC PL	
all	AF03	15G239S	HEXJAMNUT 3/4-16UNF2 SS18-8	
all	AF04	17B132	INDUSTRIAL RETAIN.RING 4000-125 ST	
all	AF05	54AA00PBB	BUSH BALL 3/4 RBC-B12L	
all	P01	X4 22046A	92762B SHAFT=CLEVIS-COBUCK	
all	P02	X4 22046C	92743B 7/8" DIA. SPACER=COBUCK	
all	P03	27C532A	02Z AIR CYLINDER 5"BOREX32"X1+3/8"	

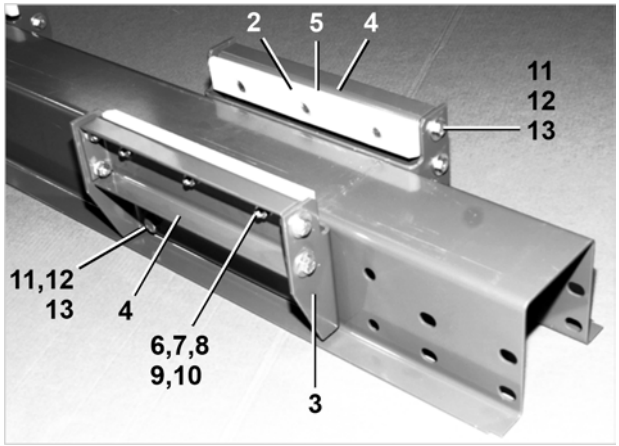
4 Bottom Beam 4.4

Shuttle Low Rail Guides

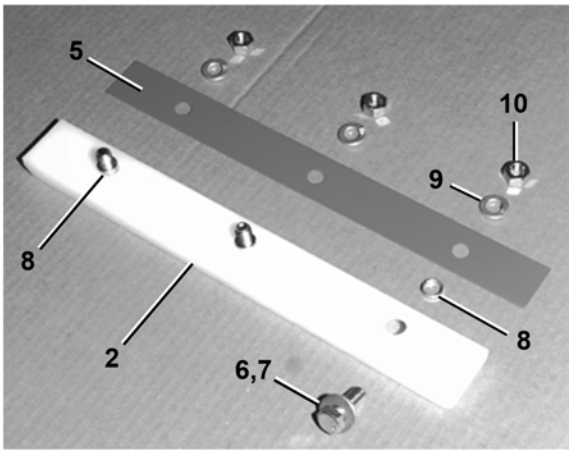
Floor Drive Translating Shuttles



Bottom view



Detail: Slider Pad and Hardware, 4 instances



Legend

A . . . Shuttle bottom beam
B . . . Lower rail guides

Table 1. Parts List—Shuttle Low Rail Guides

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Assemblies				
	A	ALC420003D	BOTTOM BEAM 36/40W FLOORDR	
	B	ALC420003E	BOTTOM BEAM 48W FLOORDRIVE	
	C	ALC420049B	FLOODR LOW TRACK GUIDE ASSY	
Components				
all	1	04 21142	MK2 COSHA BOTTOM BEAM	
all	1	04 21142B	MK2 COSHA BOTTOM BEAM-48 BED	
all	2	04 20850C	MK2 SLIDE PAD COSHA	
all	3	04 21937C	TRACK GUIDE BKT-9"FLOORDR	
all	4	04 21937B	TRACK SLIDE MTG-9"FLOORDR	

Shuttle Low Rail Guides

Floor Drive Translating Shuttles

Parts List—Shuttle Low Rail Guides (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

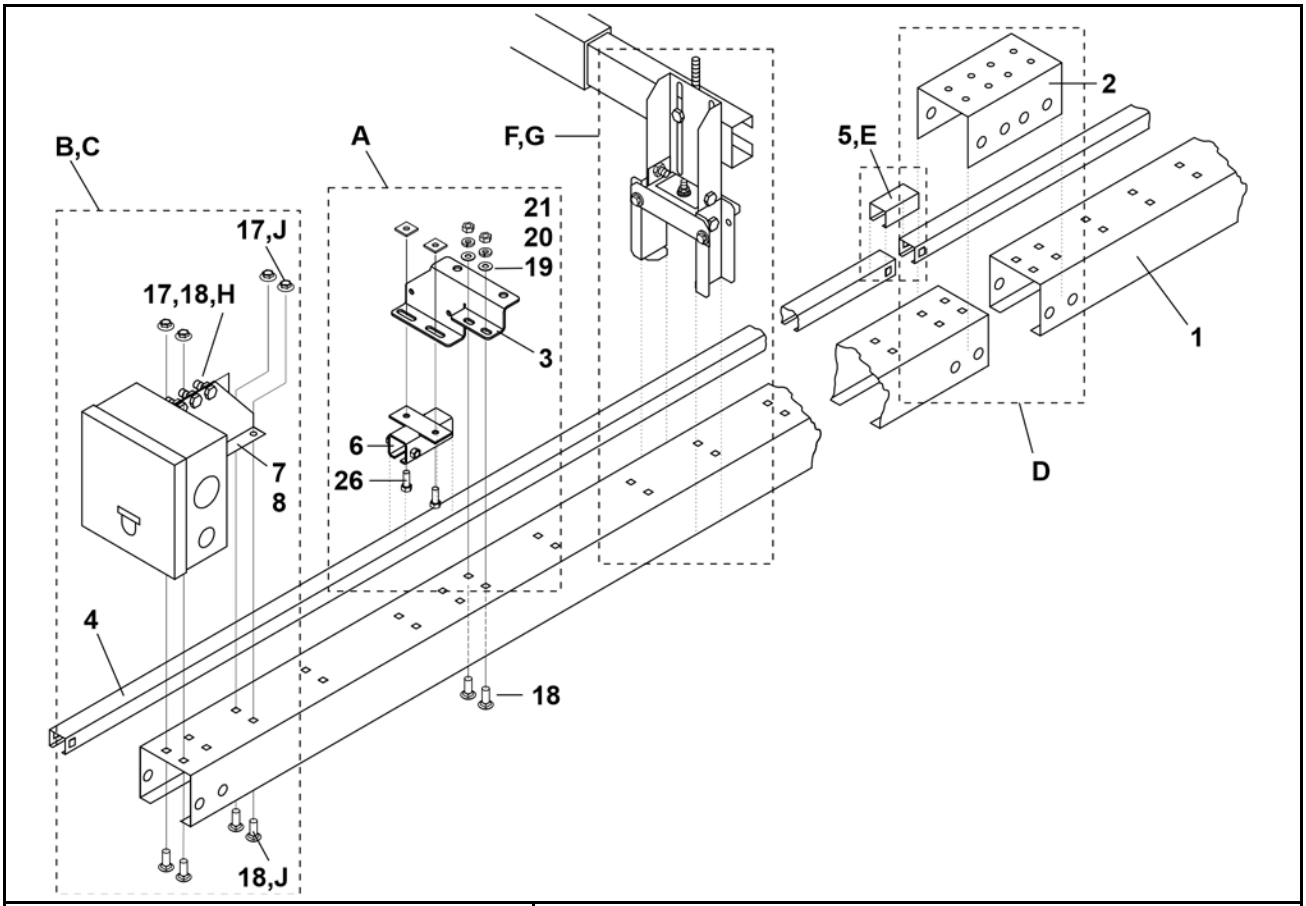
Used In	Item	Part Number	Description/Nomenclature	Comments
all	5	04 20850S	SHIM-SLIDE PAD COSHA	
all	6	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
all	7	15U200	FLATWASHER(USS STD) 5/16"ZNC P	
all	8	27B25002SZ	SPCRROLL.39ID.125L.048T STLZNC	
all	9	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	10	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	11	15K151	HXCAPSCR 1/2-13UNC2AX1.25 GR5	
all	12	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	13	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	

4

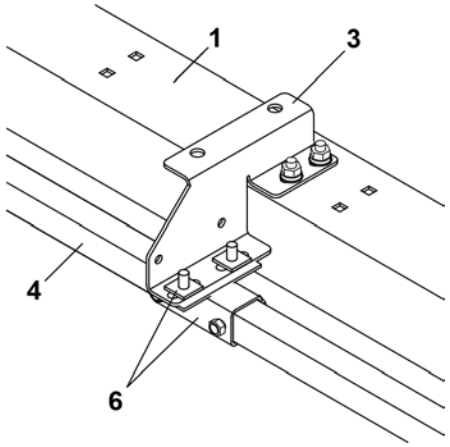
Rail Components 4.5

Upper Rail Components

COSH(A,J,K,B,X)_, CL(36,40,48)_



Detail A: Upper Rail Festoon Hanger



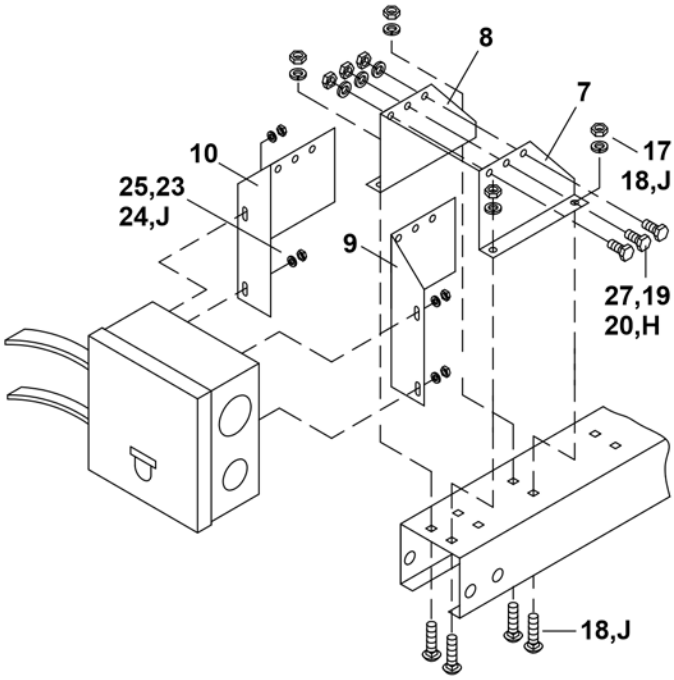
Legend

A . . . Upper Rail Festoon Hanger, see Detail A.
B . . . Rail End Electric Box, see Detail B.
C . . . Festoon Rail Electric Box, see Detail C.
D . . . Upper Rail Connection, see Detail D.
E . . . Festoon Rail Clamp, see Detail E.
F . . . Upper Rail Hanger Assembly, see BPSCAV05.
G . . . Ceiling Mounted Rail Support, see BPSCAV05.
H . . . 3 instances
J . . . 4 instances

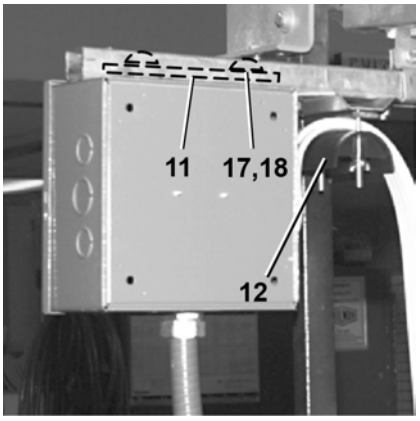
Upper Rail Components

COSH(A,J,K,B,X)_, CL(36,40,48)_

Detail B: Rail End Electric Box



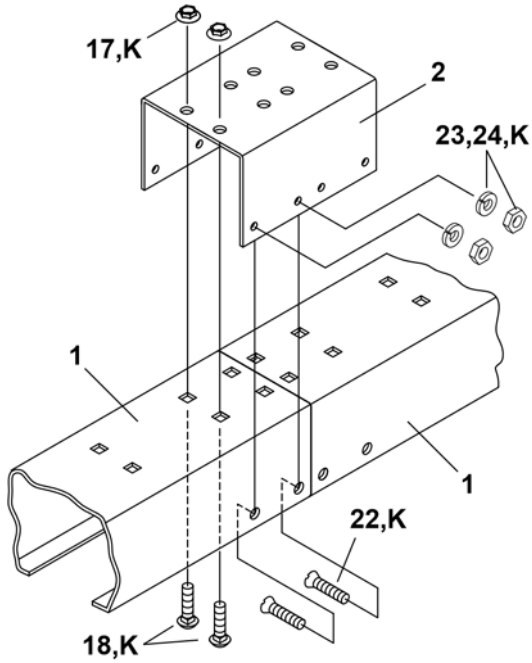
Detail C: Festoon Rail Electric Box



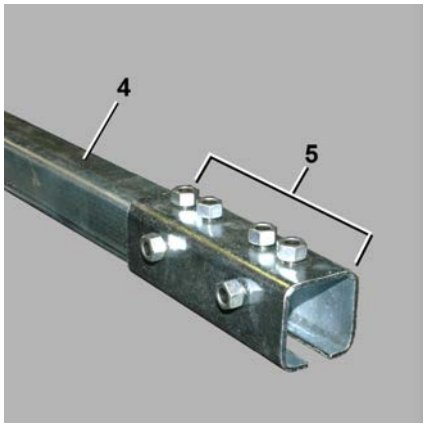
Legend

H . . . 3 instances
J . . . 4 instances
K . . . 8 instances

Detail D: Upper Rail Connection



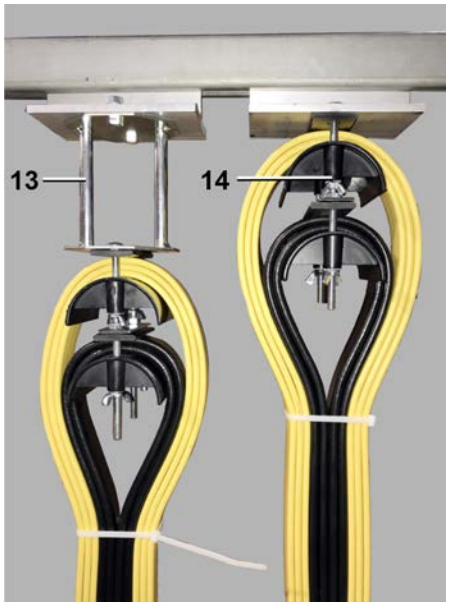
Detail E: Festoon Rail Clamp



Upper Rail Components

COSH(A,J,K,B,X)_, CL(36,40,48)_

Festoon Cars



Festoon Tow Bar

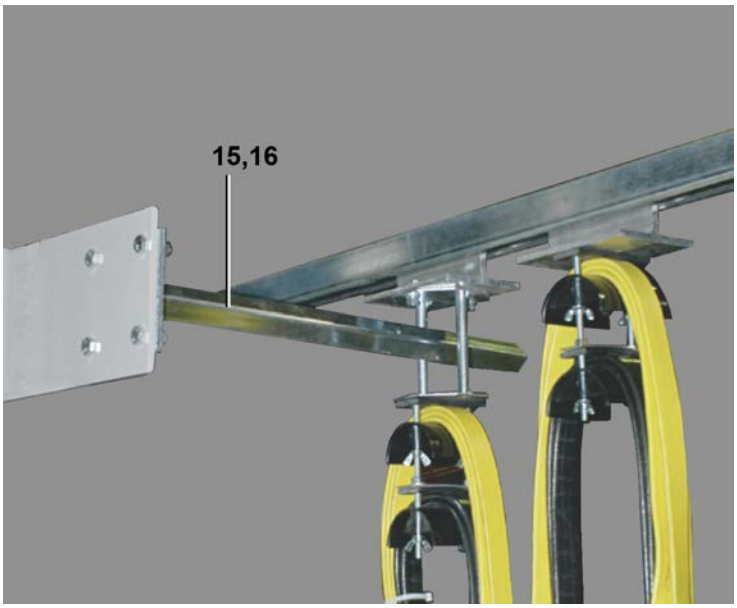


Table 1. Parts List—Upper Rail Components

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Assemblies				
	A	ALC420064B	FIRST RAILSET W/12GA FESTRAIL	Reference
	B	ALC420065B	ADD'L RAILSET W/12GA FESTRAIL	Reference
	C	ALC420015A	FESTOON RAIL ELEC BOX ASSY	Reference
Components				
all	1	04 22850	UP OUTRIG RAIL-SHTL 117.5	
all	2	04 22858	UP OUTRIG RAIL CONN-3.50"	
all	3	04 22847	FESTOON HANGER BKT-ONE RAIL	
all	4	27A765	12GA FESTOON PARA-TRACK	
all	5	27A765A	12GA PARA-TRACK JOINT CLAMP	
all	6	27A765B	TRACK HANGER CLAMP ASSY	
all	7	04 22825	FESTOON ELEC.BOX MTG-RT	
all	8	04 22825A	FESTOON ELEC.BOX MTG-LF	
all	9	04 20903A	BRKT=FEST END ELECT BOX RT	
all	10	04 20903	BRKT=FEST END ELECT BOX LF	
all	11	04 22847B	FIXED FESTOON MTG FLATBAR	
all	12	27A770	END CLAMP WITH 2 SADDLES	
all	13	27A768	12GA FESTOON TOW TROLLEY/2SADDLES	
all	14	27A767	12GA FESTOON TROLLEY/2 SADDLES	
all	15	X4 24297	FESTOON TOW BAR-TAP	
all	16	04 24298	FESTOON TOW BAR EXTENSION	
all	17	15G198	HXFLGNUT 3/8-16 ZINC	

Upper Rail Components

COSH(A,J,K,B,X)_, CL(36,40,48)_

Parts List—Upper Rail Components (cont'd.)

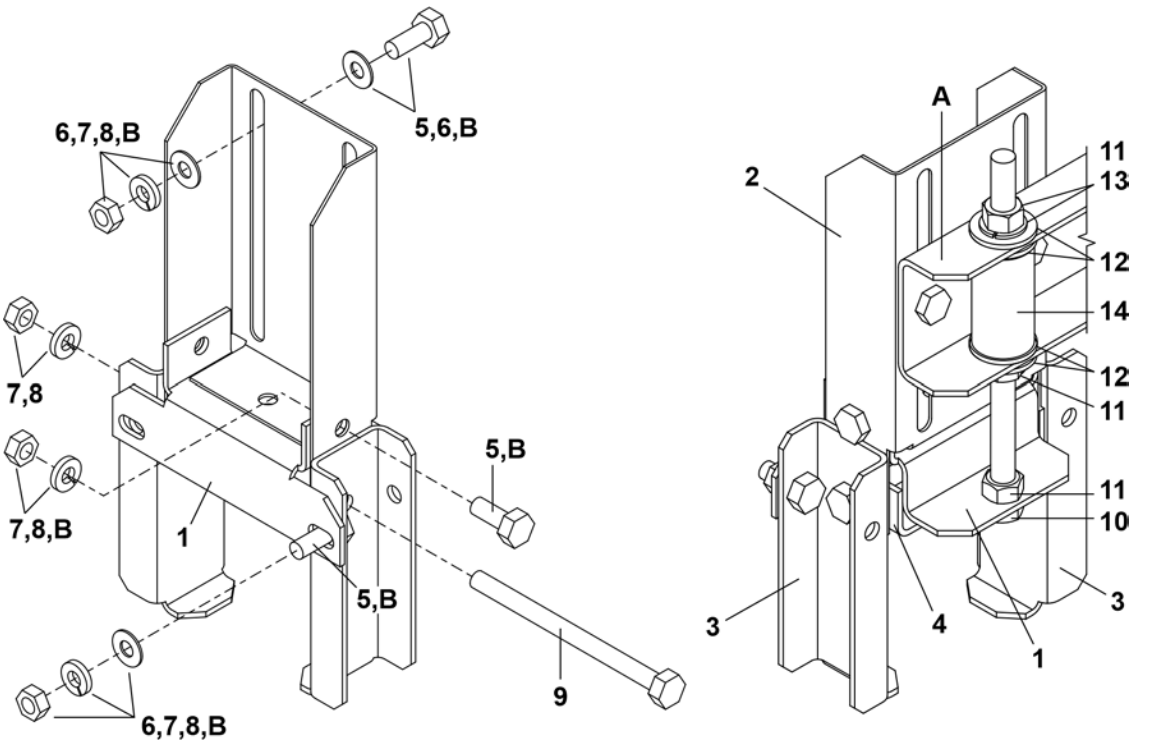
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	18	15A011	CARBOLT 3/8-16UNC2X1 ZINC GR2	
all	19	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	20	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	21	15U240	FLATWASHER(USS STD) 3/8" ZNC P	
all	22	15N173	FLATMACSCR 1/4-20NCX5/8SS18-8	
all	23	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	24	15G165	HXNUT 1/4-20UNC2BSAE ZC GR2	
all	25	15K039	HXCAPSCR 1/4-20UNC2AX3/4 GR5 Z	
all	26	15P200	TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	27	15K110	HEXCAPSCR 3/8-16UNC2AX1.5 GR5-	

Upper Rail Hanger & Ceiling Mounted Rail Support

COSH(A,J,K,B,X)_, CL(36,40,48)_

Figure 1. Upper Rail Hanger Assembly



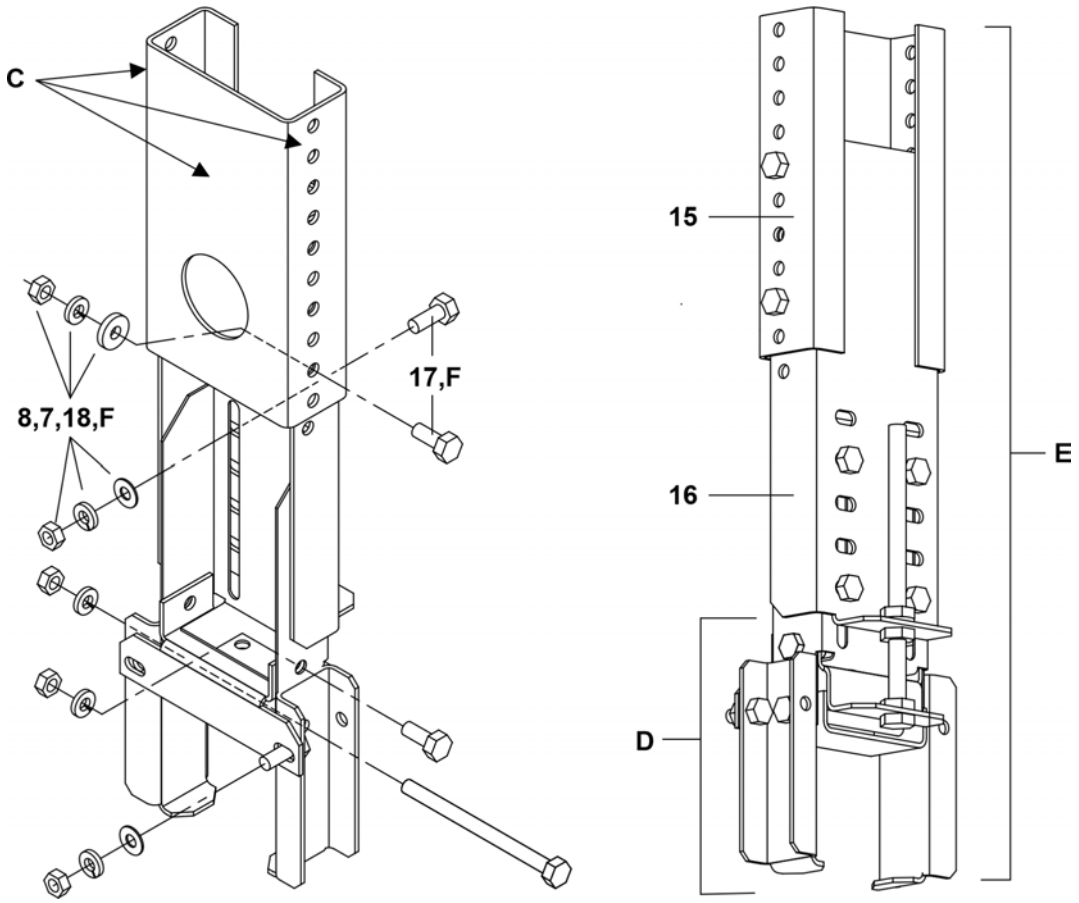
Legend

A . . . Dryer mounted rail support bracket
B . . . 2 instances

Upper Rail Hanger & Ceiling Mounted Rail Support

COSH(A,J,K,B,X)_, CL(36,40,48)_

Figure 2. Ceiling Mounted Rail Support



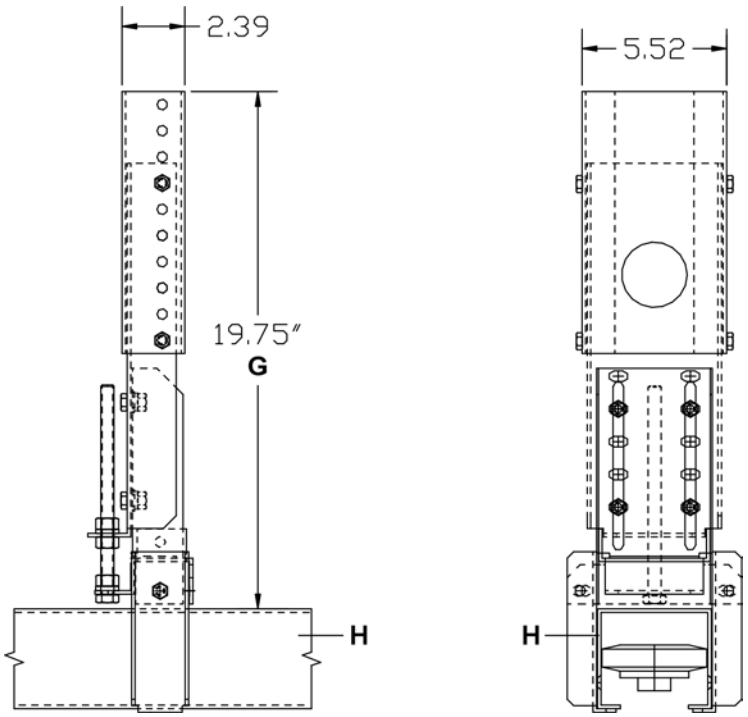
Legend

C . . . Weld to support structure
D . . . Upper rail hanger assembly
E . . . Ceiling mounted rail supports include the upper rail hanger assembly.
F . . . 4 instances

Upper Rail Hanger & Ceiling Mounted Rail Support

COSH(A,J,K,B,X)_, CL(36,40,48)_

Figure 3. Ceiling Mounted Rail Support: Dimensions required for planning



Legend

G . . . Minimum dimension of bracket assembly from top of rail

H . . . Upper rail

Table 1. Parts List—Upper Rail Hanger Ceiling Mounted Rail Support

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
Assemblies				
	A	ALC420070B	UPPER RAIL HANGER ASSY 3.8T	ASSEMBLY
	B	ALC420070C	UPPER RAIL CEILING SUPP-3.8T	ASSEMBLY
Components				
A,B	1	04 22815B	RAIL HANGER BASE	
A,B	2	04 22815C	RAIL HANGER-LIGHT RAIL	
A,B	3	04 22852	RAIL HANGER CLAMP	
A,B	4	04 22815D	RAIL HOLD DOWN BRKT	
A,B	5	15K085	HEXCAPSCR 3/8-16UNC2AX3/4 GR5	
A,B	6	15U240	FLATWASHER(USS STD) 3/8" ZNC P	
A,B	7	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
A,B	8	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
A,B	9	15K141A	HEXCAPSCR 3/8-16UNC2A X5.5" GR	
A,B	10	15D122C	HEXTAPSCR 1/2-13UNCK 8.5 FLTHD	

Upper Rail Hanger & Ceiling Mounted Rail Support

COSH(A,J,K,B,X)_, CL(36,40,48)_

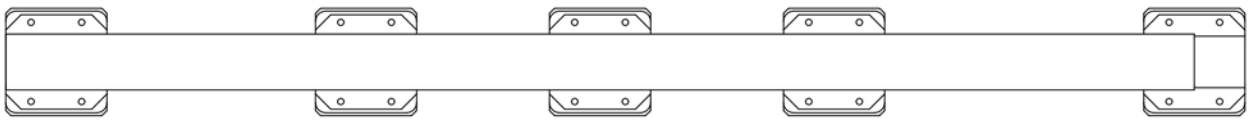
Parts List—Upper Rail Hanger Ceiling Mounted Rail Support (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

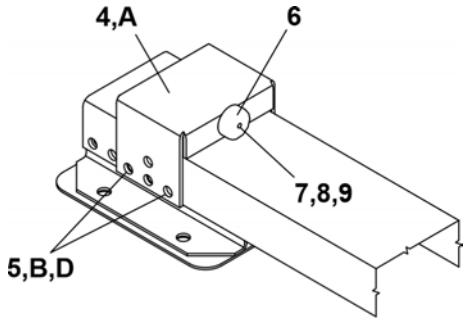
Used In	Item	Part Number	Description/Nomenclature	Comments
A,B	11	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
A,B	12	15U280	FL+WASHER(USS STD)1/2 ZNC PL+D	
A,B	13	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
A,B	14	04 20989	SLEEVE=TIE ROD BRKT HOLDER	
B	15	04 22852A	CEILING SUPPORT CHANN=10"LG	
B	16	04 22852B	CEILING SUPPORT BRKT	
B	17	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
B	18	15U266	FLATWASHER 1"0DX7/16"IDX3/16"	

Floor Drive Rail

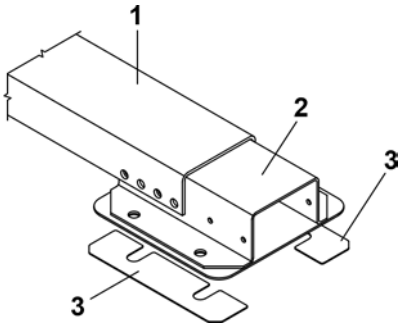
COSH(A,J,K,B,X)_, CL(36,40,48)_



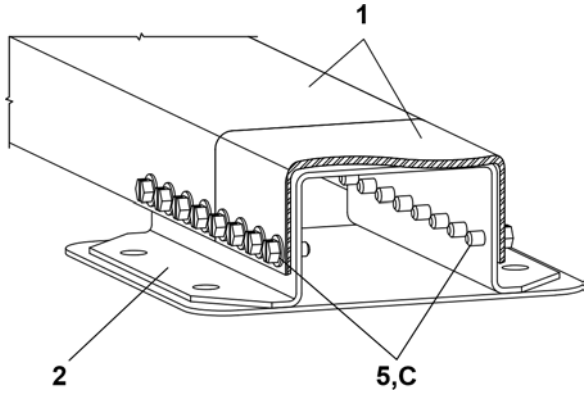
Positive Stop



Rail, Supports, and Shims



Rail to Rail Connections



Legend

A . . . 2 instances

B . . . 8 instances

C . . . 48 instances

D . . . To mount the positive stops to the rail, holes must be located and drilled into the rail with a 5/16” diameter bit.

Table 1. Parts List—Floor Drive Rail

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
Assemblies				
	A	ALC420064B	FIRST RAILSET W/12GA FESTRAIL	
	B	ALC420065B	ADD'L RAILSET W/12GA FESTRAIL	
Components				

Floor Drive Rail

COSH(A,J,K,B,X)_, CL(36,40,48)_

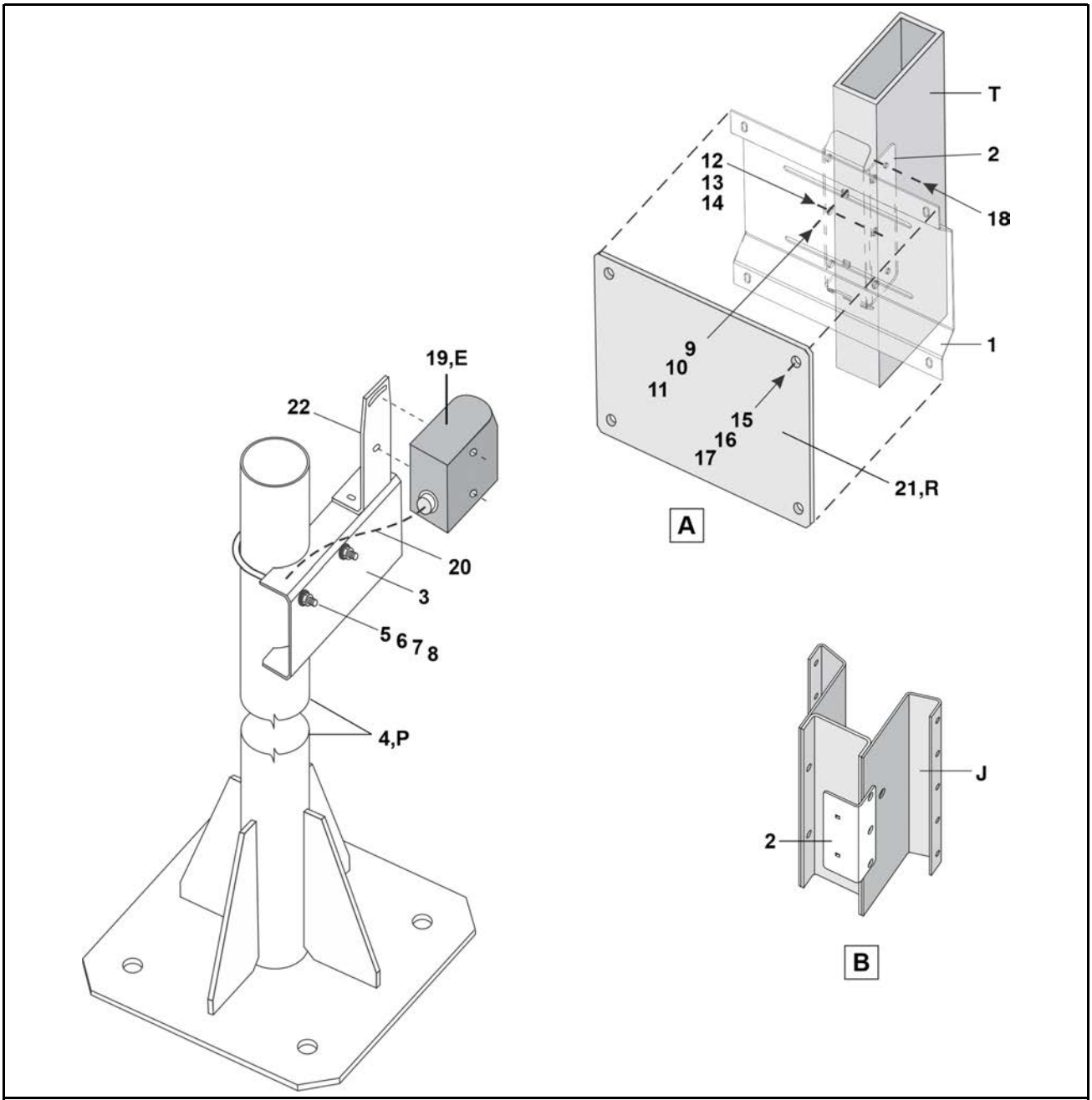
Parts List—Floor Drive Rail (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	1	04 21924D	FLOORDR TRACK CS-5.5WX117.5LG	
all	2	W4 23489	RAIL SUPPORT WLMT-FLOORDR	
all	3	04 21664E	RAIL LEVELING PLATE=7GA	
all	4	04 21924H	COSHA TRACK STOP BRKT	
all	5	15P200	TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	6	60C001	RUBBER BUMPER-BLKW/WASHER #698	
all	7	15N141	RDMACSCR 10-24NCX3/4 SLOTTED S	
all	8	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	9	15G126	HXLOCKNUT NYLON 10-24 UNC SS N	

Laser Targeting

All Traversing Shuttles



Legend

A . . . Detail A — Typical laser target mounting shown on shuttle tubular frame
B . . . Detail B — Mounting plate for shuttle J-rail frame
E . . . Emitter
J . . . J-rail frame
P . . . Laser mounting post
R . . . Reflector
T . . . Tubular frame

Laser Targeting

All Traversing Shuttles

Table 1. Parts List—Laser Targeting

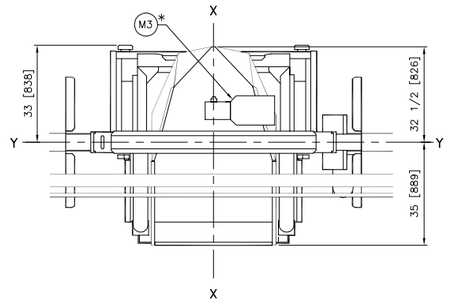
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Assemblies				
	A	ALC420223	SHUTTLE LASER TARGETING ASSY	TUBULAR FRAME
	B	ALC420224	LASER TARGETING ASSY-J RAIL	J-RAIL FRAME
Components				
all	1	04 24176	LASER TARGET FRAME	
all	2	04 24177	LASER TARGET TUBE RAIL MTG	
all	2	04 24178	LASER TARGET J-RAIL MTG	
all	3	04 24146	LASER MTG CHANNEL	
all	4	W4 24180	LASER MOUNTING POST WLMT	
all	5	27A035C	UBOLT 3/8-16X5.36 #0127316	
all	6	15U246	FLATWASHER 1"ODX25/64IDX1/8"30	
all	7	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	8	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	9	15A002A	CARBOLT 1/4-20UNC2X3/4 ZINC GR	
all	10	15U185	FLATWASHER(USS STD) 1/4" ZNC P	
all	11	15G178	1/4"-20 HEXFLANGE NUT ZINC	
all	12	15K046	HXCAPSCR 1/4-20 UNC2A X 2"GR5	
all	13	17N058	HEXRIVNUT 1/4-20 UNC-2B #2520-	
all	14	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	15	15N130	RDMACSCR 10-24UNC2A X 1/2 SS18	
all	16	15U135S	FLATWASH#10 .5620DX.203IDX.04+	
all	17	15G126	HXLOCKNUT NYLON 10-24 UNC SS N	
all	18	15P011	TRDCUT-F PANHD 10-24X1/2 NIKST	
all	19	09RLE0001	LT7PLVQ L-GAGE LT7 LONG RANGE TIME-OF-FLIGHT LASER SENSOR	
all	20	09RLE0001C	MQDC-1230RA (QUICK DISCONNECT CABLE) 30'	
all	21	09RLE0001R	BRT-250 (50 METER RETRO REFLECTOR)	
all	22	09RLE0001B	SMBLT7 (MOUNTING BRACKET)	

Dimensional Drawing 5

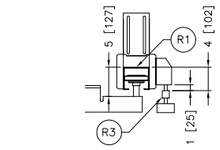
HOW TO USE OTHER SYSTEM MACHINES WITH COBUC								COBUC DIMENSIONS											
M7E42032 ON PEDESTAL		50K PRESS ON PEDESTAL		60K PRESS ON PEDESTAL		TF60 ON PEDESTAL		COBUC SIDE RAIL EXTENDER		DIMENSION "A"		DIMENSION "B"		DIMENSION "C"		DIMENSION "D"		DIMENSION "E"	
INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm
0	0	0	0	—	—	0	0	17 1/2	445	127	3226	133	3378	14 3/8	365	40 5/8	1032	39 1/16	992
								21	533	130 1/2	3315	136 1/2	3467						
								24 1/2	622	134	3404	140	3556						
9-3/8	238	9-3/8	238	0	0	9-3/8	238	28	711	137 1/2	3493	143 1/2	3645	23 1/8	587	50	1270	48 7/16	1230
								31 1/2	800	141	3581	147	3734						
								35	889	144 1/2	3670	150 1/2	3823						
								38 1/2	978	148	3759	154	3912						
								42	1067	151 1/2	3848	157 1/2	4001						
								45 1/2	1156	155	3937	161	4089						
								49	1245	158 1/2	4026	164 1/2	4178						
								52 1/2	1334	162	4115	168	4267						
								59 1/2	1511	169	4293	175	4445						
48	1219	48	1219	38 5/8	981	48	1219	66 1/2	1689	176	4470	182	4623	61 5/8	1565	88 5/8	2251	87 1/16	2211
								73 1/2	1867	183	4648	189	4801						

** FOR HEIGHTS NOT SHOWN ON CHART, CONSULT FACTORY.

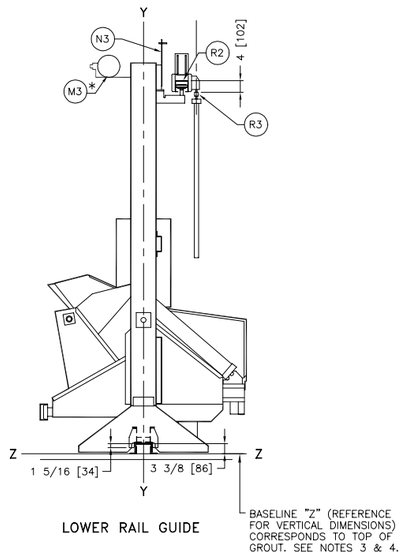
CBW MODEL NUMBER	DIMENSION "F" INCHES	mm
76028	51 1/2	1308
76032	46	1168
76039	51 1/2	1308



PLAN VIEW

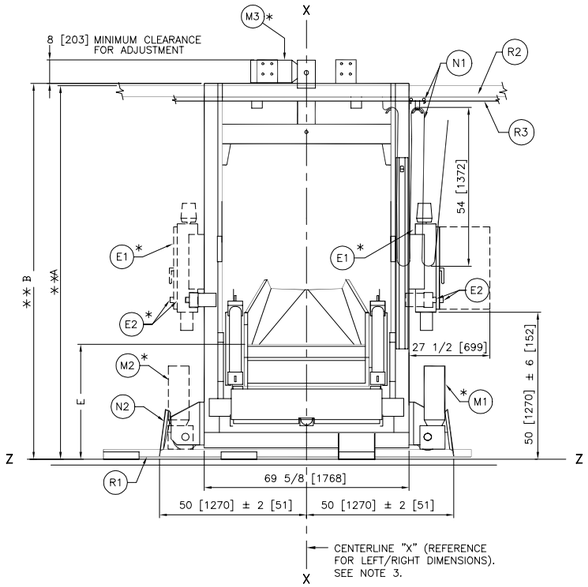


UPPER RAIL DETAIL
SEE NOTE 16.

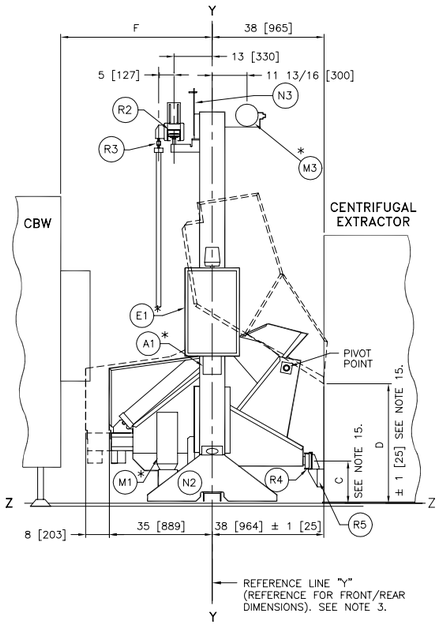


LOWER RAIL GUIDE

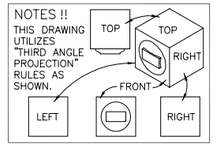
LEFT VIEW



FRONT (LOAD END) VIEW



RIGHT VIEW



ITEM	LEGEND
R5	EXTRACTOR OUTRIGGER RAIL BRACKET
R4	OUTRIGGER RAIL COBUC
R3	FESTOON RAIL. RAIL SUPPLIED BY MILNOR AND MAY BE
	PRICED SEPARATELY. SEE PRICE LIST
R2	UPPER RAIL. RAIL SUPPLIED BY MILNOR AND MAY BE
	PRICED SEPARATELY. SEE PRICE LIST
R1	BOTTOM DRIVE RAIL. RAIL SUPPLIED BY MILNOR AND MAY
	BE PRICED SEPARATELY. SEE PRICE LIST.
N3	MOUNTING BRACKET FOR STOP SWITCH
N2	SAFETY KICK PLATE, SPRING LOADED.
N1	FESTOON CABLE SUPPORT CARS. CARS ARE SUPPLIED BY
	MILNOR AND MAY BE PRICED SEPARATELY. SEE PRICE LIST
	FOR NUMBER OF CARS.
*M3	BUCKET HOIST MOTOR.
*M2	BOTTOM DRIVE MOTOR IN LEFT HAND LOCATION.
*M1	BOTTOM DRIVE MOTOR IN RIGHT HAND LOCATION.
E2	EMERGENCY STOP BUTTONS
*E1	COBUC CONTROL BOX
A2	COMPRESSED AIR, 1/2" HOSE CONNECTION, SEE NOTE 13.
*A1	AIR VALVE BOX. ALWAYS UNDER ELECTRIC BOXES.

NOTES

17 SEE BDM7EDRNAE AND BDM7EDRNAB FOR INFORMATION ON DRAIN TROUGH RECOMMENDED FOR COBUC AND EXTRACTOR.

16 DIMENSIONS IN UPPER RAIL DETAIL MUST BE HELD ± 1" [25] ALONG THE ENTIRE RAIL LENGTH.

15 LOAD CHUTE OF 60KG PRESS IS 9-3/8" (238) HIGHER THAN LOAD CHUTE OF 50KG PRESS, TP60 PRESS AND M7E42032. SEE CHART FOR HOW TO INTERFACE THESE MACHINES.

14 SAFETY FENCING MUST BE INSTALLED TO PREVENT ACCESS INTO THE PATH OF COBUC WHILE IT IS RUNNING. NOT SUPPLIED BY PMC.

13 COMPRESSED AIR IS NEEDED ON ALL COBUCS, 1/2 [13] BARBED HOSE FITTING. LOCATED AT END OF RAIL, OFF OF FESTOON JUNCTION BOX.

12 SEE BDLTRAILBE FOR DIMENSIONS OF RAILS AND SUPPORTS.

11 DIMENSION VARIES WITH HEIGHT OF EXTENDERS WHEN ADDED.

10 SEE BDLTRCLRBE FOR DIMENSIONS OF SHUTTLE AT LAST STOP PLACE TO END OF RAIL OR WALL.

9 EMERGENCY STOPS ARE REQUIRED ON BOTH LEFT AND RIGHT SIDES OF THE COBUC. ONE OF THE TWO EMERGENCY STOPS IS INSTALLED INTO THE DOOR OF THE CONTROL BOX. THE SECOND EMERGENCY STOP IS MOUNTED TO THE SIDE RAIL MEMBER OPPOSITE THE CONTROLS.

8 THE HEIGHT EXTENDERS SHOWN IN THE TABLE ARE STANDARD EXTENTIONS AND THOSE THAT SATISFY MOST FACILITY REQUIREMENTS. HOWEVER, THE COBUC MAY BE SPECIAL ORDERED IN OTHER HEIGHTS IF REQUIRED. CONSULT THE MILNOR FACTORY.

*7 THE COBUC IS AVAILABLE IN VARIOUS HEIGHTS AND COMPONENT PLACEMENT. COMPONENT LOCATIONS AND DIMENSIONS SHOWN WITH AN ASTERISK ARE THOSE EFFECTED BY MACHINE SPECIFICATIONS. IT IS NECESSARY TO REFER TO THE SPECIFICATIONS FOR YOUR MACHINE AS WELL AS THIS DRAWING FOR COMPLETE DIMENSIONAL INFORMATION.

6 AS OF THIS WRITING, THE MINIMUM CLEARANCE REQUIRED BY U.S. NATIONAL ELECTRIC CODES, FROM ELECTRIC BOX TO ANY OBJECT IS:
36 [914] IF OBJECT IS AN UNGROUNDED (INSULATED) WALL.
42 [1067] IF OBJECT IS A GROUNDED WALL (ie. BARE CONCRETE, BRICK, ETC.)
48 [1219] IF OBJECT IS ANY LIVE PART.
CHECK LOCAL ELECTRIC CODES FOR FURTHER RESTRICTIONS.

5 CUSTOMER TO SUPPLY CIRCUIT BREAKER OR FUSED BRANCH CIRCUIT DISCONNECT (SAFETY) SWITCHES WITH LAG TYPE FUSES FROM POWER SOURCE TO MACHINE. A SEPARATE GROUND WIRE MUST BE CONNECTED FROM DISCONNECT TO EQUIPMENT.

4 BASELINE "Z" IS THE SAME FOR ALL MILNOR MACHINES AND IS SHOWN ON ALL DIMENSIONAL DRAWINGS. THE DISTANCE BETWEEN BASELINE "Z" AND THE FINISHED FLOOR MAY VARY (WITH CHANGES IN FLOOR HEIGHT) AS REQUIRED TO INSURE THAT BASELINE "Z" IS HORIZONTAL AND ALL COMPONENTS REQUIRING GROUT ARE SET ON A MINIMUM 1" [25] THICK GROUT BED.

3 USE REFERENCE LINES "X", "Y", AND "Z" TO LOCATE ALL SERVICE CONNECTIONS.

2 NUMBERS IN BRACKETS [] DENOTE DIMENSIONS IN MILLIMETERS.

1 ALL DIMENSIONS SHOWN ARE APPROXIMATE, SUBJECT TO NORMAL MANUFACTURING TOLERANCES, AND TO OCCASIONAL CHANGES WITHOUT NOTICE THROUGH REDESIGN AND/OR RELOCATION OF COMPONENTS, ETC. DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED, AND IN NO EVENT PRE-PIPE CLOSER THAN FIVE FEET FROM MACHINE. FACTORY MUST BE CONSULTED FOR DIMENSIONS IF MACHINE IS TO BE MOVED THROUGH NARROW OR LOW CORRIDORS OR OPENINGS.

ATTENTION

MOST REGULATORY AUTHORITIES (INCLUDING OSHA IN THE USA) HOLD THE OWNER/USER ULTIMATELY RESPONSIBLE TO MAINTAIN A SAFE WORKING ENVIRONMENT. ACCORDINGLY, THE OWNER/USER MUST RECOGNIZE ALL FORESEEABLE SAFETY HAZARDS, FURNISH SAFETY INSTRUCTIONS AND GUIDANCE TO ALL PERSONNEL WHO MAY COME IN CONTACT WITH THE INSTALLATION, AND PROVIDE ALL NECESSARY ADDITIONAL SAFETY GUARDS, FENCES, RESTRAINTS, DEVICES, ETC., NOT FURNISHED BY THE EQUIPMENT MANUFACTURER OR VENDOR.

ATTENTION

THE FLOOR AND/OR OTHER SUPPORT COMPONENTS MUST HAVE SUFFICIENT STRENGTH (AND RIGIDITY WITH DUE CONSIDERATION FOR NATURAL OR RESONANT FREQUENCY THEREOF) TO WITHSTAND THE FULLY LOADED WEIGHT OF THE MACHINE INCLUDING THE GOODS, THE WATER, AND ANY REPEATED SINUSOIDAL (ROTATING) FORCES GENERATED DURING ITS OPERATION. WRITE THE FACTORY FOR ADDITIONAL MACHINE DATA FOR USE BY A COMPETENT SOIL AND/OR STRUCTURAL ENGINEER.

COBUC-E

DM 0 0.5M 1M
INCHES 0 12 24 36

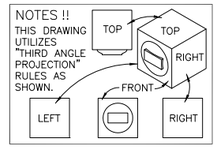
DWG# BDCOBUCEAE 2002382D

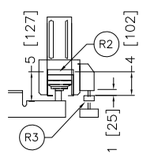
PELLERIN MILNOR CORPORATION
P.O. Box 400 Kenner, LA 70063, USA. Phone 504/467-9591,
FAX 504/469-1849, Telex ITT 460124/PELM UI, Cable PELMILNOR

CBW MODEL NUMBER	DIMENSION "F" INCHES	mm
76028	52	1321
76032	46	1168
76039	52	1321

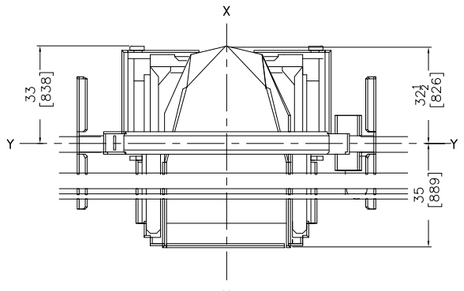
HOW TO USE OTHER SYSTEM MACHINES WITH COBUC								COBUC DIMENSIONS											
M9S42032		M9V42032 ON PEDESTAL		50K PRESS ON PEDESTAL		60K PRESS ON PEDESTAL		COBUC SIDE RAIL EXTENDER		DIMENSION "A"		DIMENSION "B"		DIMENSION "C"		DIMENSION "D"		DIMENSION "E"	
INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm
		0	0	0	0	—	—	10 1/2	267	120	3048	126	3200	14 3/8	365	40 5/8	1032	39	991
0	0							17 1/2	445	127	3226	133	3378	14 3/8	365	47 5/8	1210	46	1168
		9-3/8	238	9-3/8	238	0	0	21	533	130 1/2	3315	136 1/2	3467	23 1/8	587	50	1270	48 7/16	1230
		48	1219	48	1219	38 5/8	981	59 1/2	1511	169	4293	175	4445	14 3/8	365	88 5/8	2251	87	2210

** FOR HEIGHTS NOT SHOWN ON CHART, CONSULT FACTORY.



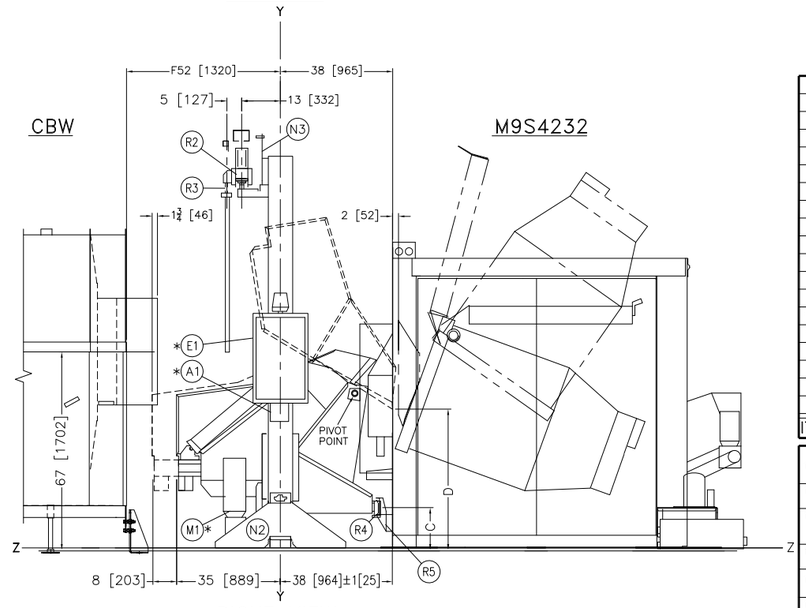


UPPER RAIL DETAIL
SEE NOTE 16.



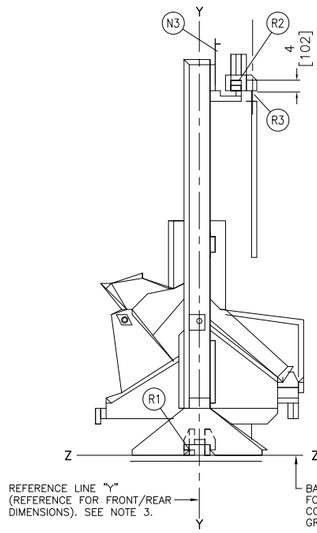
PLAN VIEW

COBUC–T



RIGHT VIEW

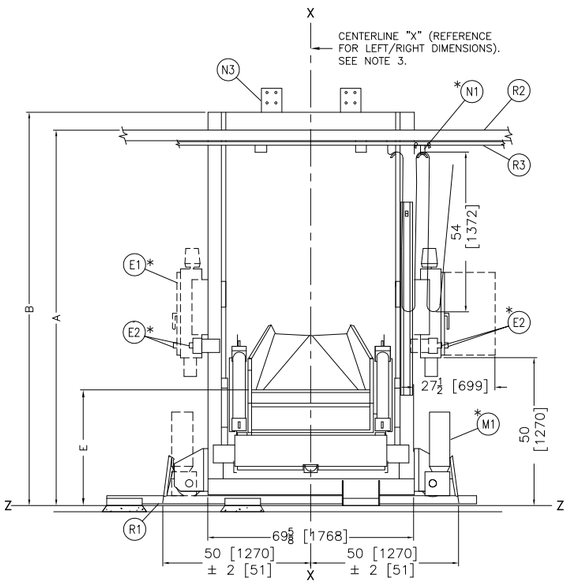
R5	EXTRACTOR OUTRIGGER RAIL BRACKET
R4	OUTRIGGER RAIL COBUC
R3	FESTOON RAIL. RAIL SUPPLIED BY MILNOR AND MAY BE PRICED SEPARATELY. SEE PRICE LIST
R2	UPPER RAIL. RAIL SUPPLIED BY MILNOR AND MAY BE PRICED SEPARATELY. SEE PRICE LIST
R1	BOTTOM DRIVE RAIL. RAIL SUPPLIED BY MILNOR AND MAY BE PRICED SEPARATELY. SEE PRICE LIST.
N3	MOUNTING BRACKET FOR STOP SWITCH
N2	SAFETY KICK PLATE, SPRING LOADED.
N1	FESTOON CABLE SUPPORT CARS. CARS ARE SUPPLIED BY MILNOR AND MAY BE PRICED SEPARATELY. SEE PRICE LIST FOR NUMBER OF CARS.
*M2	BOTTOM DRIVE MOTOR IN LEFT HAND LOCATION.
*M1	BOTTOM DRIVE MOTOR IN RIGHT HAND LOCATION.
E2	EMERGENCY STOP BUTTONS
*E1	COBUC CONTROL BOX
A2	COMPRESSED AIR, 1/2" HOSE CONNECTION, SEE NOTE 13.
*A1	AIR VALVE BOX. ALWAYS UNDER ELECTRIC BOXES.
ITEM	LEGEND



REFERENCE LINE "Y" (REFERENCE FOR FRONT/REAR DIMENSIONS). SEE NOTE 3.

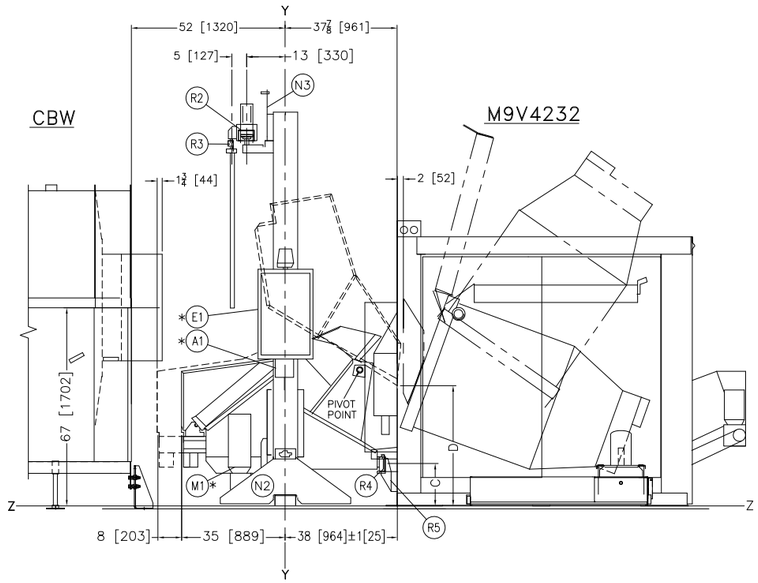
BASELINE "Z" (REFERENCE FOR VERTICAL DIMENSIONS) CORRESPONDS TO TOP OF GROUT. SEE NOTES 3 & 4.

LEFT VIEW



FRONT (LOAD END) VIEW

COBUC–T



RIGHT VIEW

NOTES

17 SEE BDM7EDRNAE AND BDM7EDRNAB FOR INFORMATION ON DRAIN TROUGH RECOMMENDED FOR COBUC AND EXTRACTOR.

16 DIMENSIONS IN UPPER RAIL DETAIL MUST BE HELD ± 1" [25] ALONG THE ENTIRE RAIL LENGTH.

15 LOAD CHUTE OF 60KG PRESS IS 9-3/8" (238) HIGHER THAN LOAD CHUTE OF 50KG PRESS, TP60 PRESS AND M7E42032. SEE CHART FOR HOW TO INTERFACE THESE MACHINES.

14 SAFETY FENCING MUST BE INSTALLED TO PREVENT ACCESS INTO THE PATH OF COBUC WHILE IT IS RUNNING. NOT SUPPLIED BY PMC.

13 COMPRESSED AIR IS NEEDED ON ALL COBUCS, 1/2 [13] BARBED HOSE FITTING. LOCATED AT END OF RAIL, OFF OF FESTOON JUNCTION BOX.

12 SEE BDLTRAILBE FOR DIMENSIONS OF RAILS AND SUPPORTS.

11 DIMENSION VARIES WITH HEIGHT OF EXTENDERS WHEN ADDED.

10 SEE BDLTRCLRBE FOR DIMENSIONS OF SHUTTLE AT LAST STOP PLACE TO END OF RAIL OR WALL.

9 EMERGENCY STOPS ARE REQUIRED ON BOTH LEFT AND RIGHT SIDES OF THE COBUC. ONE OF THE TWO EMERGENCY STOPS IS INSTALLED INTO THE DOOR OF THE CONTROL BOX. THE SECOND EMERGENCY STOP IS MOUNTED TO THE SIDE RAIL MEMBER OPPOSITE THE CONTROLS.

8 THE HEIGHT EXTENDERS SHOWN IN THE TABLE ARE STANDARD EXTENTIONS AND THOSE THAT SATISFY MOST FACILITY REQUIREMENTS. HOWEVER, THE COBUC MAY BE SPECIAL ORDERED IN OTHER HEIGHTS IF REQUIRED. CONSULT THE MILNOR FACTORY.

*7 THE COBUC IS AVAILABLE IN VARIOUS HEIGHTS AND COMPONENT PLACEMENT. COMPONENT LOCATIONS AND DIMENSIONS SHOWN WITH AN ASTERISK ARE THOSE EFFECTED BY MACHINE SPECIFICATIONS. IT IS NECESSARY TO REFER TO THE SPECIFICATIONS FOR YOUR MACHINE AS WELL AS THIS DRAWING FOR COMPLETE DIMENSIONAL INFORMATION.

6 AS OF THIS WRITING, THE MINIMUM CLEARANCE REQUIRED BY U.S. NATIONAL ELECTRIC CODES, FROM ELECTRIC BOX TO ANY OBJECT IS:
36 [914] IF OBJECT IS AN UNGROUNDED (INSULATED) WALL.
42 [1067] IF OBJECT IS A GROUNDED WALL (ie. BARE CONCRETE, BRICK, ETC.)
48 [1219] IF OBJECT IS ANY LIVE PART.
CHECK LOCAL ELECTRIC CODES FOR FURTHER RESTRICTIONS.

5 CUSTOMER TO SUPPLY CIRCUIT BREAKER OR FUSED BRANCH CIRCUIT DISCONNECT (SAFETY) SWITCHES WITH LAG TYPE FUSES FROM POWER SOURCE TO MACHINE. A SEPARATE GROUND WIRE MUST BE CONNECTED FROM DISCONNECT TO EQUIPMENT.

4 BASELINE "Z" IS THE SAME FOR ALL MILNOR MACHINES AND IS SHOWN ON ALL DIMENSIONAL DRAWINGS. THE DISTANCE BETWEEN BASELINE "Z" AND THE FINISHED FLOOR MAY VARY (WITH CHANGES IN FLOOR HEIGHT) AS REQUIRED TO INSURE THAT BASELINE "Z" IS HORIZONTAL AND ALL COMPONENTS REQUIRING GROUT ARE SET ON A MINIMUM 1" [25] THICK GROUT BED.

3 USE REFERENCE LINES "X", "Y", AND "Z" TO LOCATE ALL SERVICE CONNECTIONS.

2 NUMBERS IN BRACKETS [] DENOTE DIMENSIONS IN MILLIMETERS.

1 ALL DIMENSIONS SHOWN ARE APPROXIMATE, SUBJECT TO NORMAL MANUFACTURING TOLERANCES, AND TO OCCASIONAL CHANGES WITHOUT NOTICE THROUGH REDESIGN AND/OR CONVERSION OF COMPONENTS, ETC. DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED, AND IN NO EVENT PRE-PIPE CLOSER THAN FIVE FEET FROM MACHINE. FACTORY MUST BE CONSULTED FOR DIMENSIONS IF MACHINE IS TO BE MOVED THROUGH NARROW OR LOW CORRIDORS OR OPENINGS.

ATTENTION

MOST REGULATORY AUTHORITIES (INCLUDING OSHA IN THE USA) HOLD THE OWNER/USER ULTIMATELY RESPONSIBLE TO MAINTAIN A SAFE WORKING ENVIRONMENT. ACCORDINGLY, THE OWNER/USER MUST RECOGNIZE ALL FORESEEABLE SAFETY HAZARDS, FURNISH SAFETY INSTRUCTIONS AND GUIDANCE TO ALL PERSONNEL WHO MAY COME IN CONTACT WITH THE INSTALLATION, AND PROVIDE ALL NECESSARY ADDITIONAL SAFETY GUARDS, FENCES, RESTRAINTS, DEVICES, ETC., NOT FURNISHED BY THE EQUIPMENT MANUFACTURER OR VENDOR.

ATTENTION

THE FLOOR AND/OR OTHER SUPPORT COMPONENTS MUST HAVE SUFFICIENT STRENGTH (AND RIGIDITY WITH DUE CONSIDERATION FOR NATURAL OR RESONANT FREQUENCY THEREOF) TO WITHSTAND THE FULLY LOADED WEIGHT OF THE MACHINE INCLUDING THE GOODS, THE WATER, AND ANY REPEATED SINUSOIDAL (ROTATING) FORCES GENERATED DURING ITS OPERATION. WRITE THE FACTORY FOR ADDITIONAL MACHINE DATA FOR USE BY A COMPETENT SOIL AND/OR STRUCTURAL ENGINEER.

COBUC–T

DM 0 0.5M 1M
INCHES 0 12 24 36

DWG# BDCOBUCTAE 2016022D

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