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MILRAIL®

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

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1. English

Maintenance Guide - MILRAIL® System —Hard Ring and Soft Sling

MKRUUH01EN/2024036

English 1

Manual Number: MKRUUH01EN
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Maintenance Guide

MILRAIL® System — Hard Ring and Soft Sling

PELLERIN MILNOR CORPORATION **Post Office Box 400, Kenner, Louisiana 70063–0400, U.S.A.**

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1 Machine Description and Identification

1.1 About This Manual and Your Milnor® Machine

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This manual applies to two or more models that share the mechanical characteristics stated below. If you received this manual with your machine, your machine is one of the applicable models. However, before using this manual, verify that your machine does have these characteristics.

1.1.1 Description

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This product is a laundering system machine. Most such machines are fully automated. This machine is the specific type described below.

MilRAIL® Tunnel Washer Loading System A product of this type consists of an overhead rail and multiple bags that hang from the rail on trolleys. The bags move along the rail to a loading station where the bag is lowered, filled with soiled goods, and returned to the rail where the bags form a queue. Each loaded bag, in turn, moves to the discharge station above the tunnel washer load scoop and opens to release it's batch of goods into the tunnel. The rail path can be a simple loop or a series of storage rails organized by wash formula or other criteria.

1.1.2 Machine Identification

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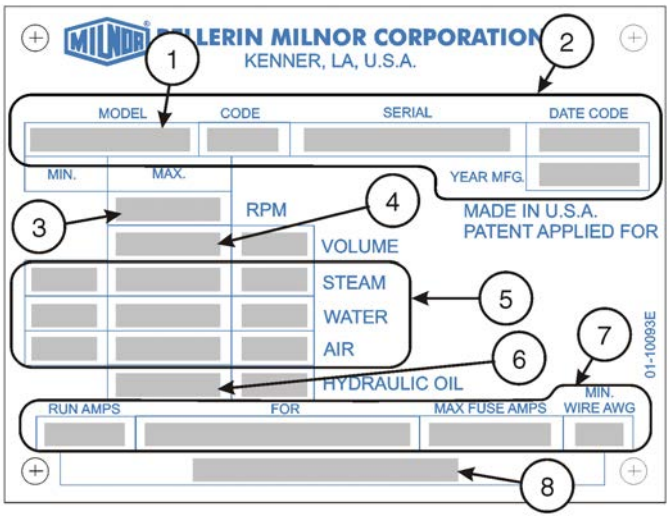
Machine Data Plate — Find the model number and other data for your machine on the machine data plate affixed to the machine and described below.

Figure 1. Machine Data Plate

View of Data Plate (English text shown)



Legend

1. Model number.
2. Data that uniquely identifies your machine
3. Cylinder maximum rotation speed in revolutions per minute, if applicable
4. Cylinder volume in the units of measure shown, if applicable
5. Piped utility requirements
6. Hydraulic oil pressure, if applicable
7. Electrical requirements
8. Part number for multi-unit machine, if applicable.

About Machines With Multiple Data Plates — Machines shipped as multiple units for assembly on site (example: CBW® tunnel washer) will have multiple data plates—one for each unit and a master plate for the complete machine, located on the primary unit. Although each unit can have a different model number, they will all share the same basic serial number. The basic serial number is usually 8 digits. Some of the units will have a two-digit suffix at the end of the serial number.

2 Safety

2.1 Safety — MilRAIL® Rail Loading System

2.1.1 Safety Alert Messages—Internal Electrical and Mechanical Hazards

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

WARNING: 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: The moving bag elevator — can strike or entrap you.

- Do not enter the bag loading enclosure unless you are qualified and authorized.
- Keep enclosure keys in a secure area, accessible only to authorized personnel.

CAUTION: A bag malfunction — can release a large quantity of soiled goods.

- Do not stand under bags, especially if protective netting is not in place.
- Do not use your hands to free drawstring tangles.

2.1.2 Safety Alert Messages—Unsafe Conditions

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2.1.2.1 Damage and Malfunction Hazards

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2.1.2.1.1 Hazards Resulting from Inoperative Safety Devices

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WARNING: 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: 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: 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.

2.1.2.1.2 Hazards Resulting from Damaged Mechanical Devices

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WARNING: 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: 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.

2.1.2.2 Careless Use Hazards

BNRUUS03.C05 0000403362 A.1 A.2 C.2 12/29/21, 2:35 PM Released

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

BNRUUS03.C06 0000403361 A.2 C.2 12/30/21, 11:27 AM Released

WARNING: 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.

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

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WARNING: 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: Rail system mechanisms such as air-operated devices — can pinch or sever fingers.

- Use extreme care with you work on, or in the vicinity of rail system mechanisms.

3 Routine Maintenance

3.1 Routine Maintenance

Do the maintenance in Section 3.1.1 : Maintenance Summary, page 9 to make sure that the machine is safe, keeps the warranty, and operates correctly. This will also decrease repair work and unwanted shutdowns. Speak to your dealer or the Milnor® Service department if repairs are necessary.

WARNING: Mechanisms — can can pull in and mutilate body parts.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Do not service the machine with power on except when explicitly called for in the service instructions. Use extreme care when working near moving components.
- Replace guards and covers that you remove for maintenance.

If you use software to keep the maintenance schedule for your plant, add the items in the following maintenance summary to that schedule. If not, you can put marks on a calendar that work with the tables in the maintenance summary. See Section 3.1.6 : How To Show the Maintenance On a Calendar, page 17

3.1.1 Maintenance Summary

Each of the following sections is for a type of maintenance. For example, the section “Guards and Related Components” says “Examine these items. If an item is damaged, missing, or has the wrong setting, correct this discrepancy immediately to prevent injury.” A table in each section identifies the applicable items and the frequency. The “More Data” column gives special instructions if necessary.

* If the machine operates more than 12 hours each day, do the “day” items two times each day. Do the other items at the given hours or on the days that you show on a calendar (see Section 1). **Do all items in all sections for the maintenance intervals that apply (for example, day, 40 to 60 hours, and 200 hours).**

TIP: The maintenance summary has many links to the sections that follow the summary. These sections give more information about the maintenance items. After you learn this information, it is only necessary to look at the summary to do the maintenance.

3.1.1.1 Guards and Related Components

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Examine these items. If an item is damaged, missing, or has the wrong setting, correct this discrepancy immediately to prevent injury.

Table 1. Guards and Related Components

Mark						Do this each	Component	More Data
1	2	3	4	5	6			
x						day*	guards, covers	Speak to your dealer or Milnor for replacement components.
x						day*	safety placards	
		x				200 hours	fasteners	Fasteners must be tight.
		x				200 hours	anchor bolts and grout	Grout must be good. Bolts must be tight.
x						day*	emergency stop mechanism	See Section 3.2.4 , page 22. Do a test of the control.
x						day*	Safety netting	Examine to confirm that the netting is in place and serviceable per standards EN 1263–1 and ANSI A10.

3.1.1.2 Filters, Screens, and Sensitive Components

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Remove contamination from these items to prevent damage and unsatisfactory performance.

Table 2. Filters, Screens, and Sensitive Components

Mark						Do this each	Component	More Data. See also Section 3.1.2 , page 12
1	2	3	4	5	6			
	x					40 to 60 hours	inverter fans, vents, filters	See Figure 3, page 19 . Keep good air flow.
			x			600 hours	motors	Keep good air flow.
					x	2400 hours	entire machine	Remove excessive dust and dirt.
x						day*	self-purging filter (and regulator) for compressed air	See Figure 5, page 20. Make sure the bowl drains automatically.
		x				200 hours	filter element for the moisture collector	Replace the filter if you cannot remove contamination.
		x				200 hours	strainer(s) for air inlet	See Figure 4, page 19
x						day*	photoeyes	See Figure 7, page 22
					x	2400 hours	proximity switches	See Figure 8, page 22

3.1.1.3 Fluid Containers

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Examine these items. Add fluid if necessary and keep components clean to prevent damage.

Table 3. Fluid Containers

Mark						Do this each	Component	More Data. See also Section 3.1.3 : Lubricant Identification, page 13
1	2	3	4	5	6			
For the next three items, see Figure 10: Hoist Elevator Gear Reducer Lubrication, page 25 and Table 9, page 14.								
						first 250 hours	speed reducer (gear reducer)	Remove used oil. Add oil UH1
				x		1200 hours		Check oil level. Add oil UH1, if necessary.

Table 3 Fluid Containers (cont'd.)

Mark						Do this each	Component	More Data. See also Section 3.1.3 : Lubricant Identification, page 13
1	2	3	4	5	6			
					x	2400 hours		Remove used oil. Add oil UH1.

3.1.1.4 Components that Become Worn

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Examine these items. Tighten or replace the item if necessary, to prevent shutdowns and unsatisfactory performance. Speak to your dealer for replacement parts.

Table 4. Components that Become Worn

Mark						Do this each	Component	More Data
1	2	3	4	5	6			
			x			600 hours	guide rollers and slides	See Figure 9, page 24and Figure 11, page 25
					x	2400 hours	Hoist elevator chains	See Figure 9, page 24. Examine the chain closely for damage, cracks, pitting, reduction in thickness of the links, increase in pitch and elongation. Replacement can be necessary for these conditions. Speak to your dealer or Milnor. This is not routine maintenance.
		x				200 hours	Bags, drawstrings, and carabiners (hard ring) or hangar straps (soft sling)	Examine the components for excessive wear. Replace as required.
			x			600 hours	Trolley assemblies–especially wheels	Examine the components for excessive wear. Replace as required.

3.1.1.5 Bearings and Bushings

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Unless the item is sealed, apply grease to prevent damage. See the next section for motors.

Table 5. Bearings and Bushings

Mark						Do this each	Component	More Data . See also Section 3.1.3 , page 13
1	2	3	4	5	6			
			x			600 hours	motor bearings	See Section 3.1.5 : Procedures for Motors, page 15
			x			600 hours	flange bearings	See Figure 9, page 24. Add 0.12 oz (3.54 mL) of grease EPLF2 at 4 places.
			x			600 hours	hoist chain	See Figure 9, page 24. Apply spray lubricant FGL (Table 9, page 14).

3.1.1.6 Motor Grease Schedule

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Use the data in Table 10: Motor Grease Intervals and Quantities, page 17 to complete this table.

Table 6. Motor Grease Schedule

Motor Identification (example: main drive)	Interval		Quantity		Dates When Grease is Added							
	Years	Hours	fl oz	mL								

Table 6 Motor Grease Schedule (cont'd.)

Motor Identification (example: main drive)	Interval		Quantity		Dates When Grease is Added							
	Years	Hours	fl oz	mL								
									.			

3.1.1.7 Mechanisms and Settings

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Make sure mechanisms are serviceable and settings are correct to prevent unsatisfactory performance.

Table 7. Mechanisms and Settings

Mark						Do this each	Component	More Data
1	2	3	4	5	6			
					x	2400 hours	controller circuitry	Examine wiring and connections in electrical boxes. Look for corrosion, loose connections. See Section 3.1.2 , page 12
		x				200 hours	air filter regulator	87 to 100 PSI (6 to 7 bar)
		x				200 hours	compressed air mechanisms	See Section 3.2.2 , page 19
The following items apply to MilRAIL® hard ring systems and are mechanical faults that interfere with automatic processing. There is no recurring preventive maintenance but only troubleshooting actions when they occur. They are listed here for convenience. See This topic can be found in Milnor document elsewhere and This topic can be found in Milnor document elsewhere								
						on occurrence	empty bag	does not fully close
						on occurrence	full bag	does not fully close
						on occurrence	hard ring	is not fully vertical when entering storage rail
						on occurrence	bag on rail	binding; does not move
						on occurrence	load (goods)	spill from bag
						on occurrence	small (partial) load in bag	causes errors in the Mentor® controller

3.1.2 How To Remove Contamination

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Table 8. Contamination Types, Cleaning Agents, and Procedures

Material or Component	Usual Contamination	Example	Cleaning Agent	More Data
machine housing	dust, dirt	—	compressed air or shop vacuum	Air—no more than 30 psi (207 kpa). Do not push dust in mechanisms.
fins and vents on electrical components	dust	motors, inverters, braking resistors	shop vacuum, soft bristle brush, canned air for electrical components	Do not push dust in mechanisms.
electric box interior	dust	all electric boxes		

Table 8 Contamination Types, Cleaning Agents, and Procedures (cont'd.)

Material or Component	Usual Contamination	Example	Cleaning Agent	More Data
electrical connections	corrosion, varnish	spade connector, molex connector, plug-in relay	spray solvent for electrical components	Disconnect then connect it again. Use solvent if the bad connection continues.
electronic sensors	dust	photoeye lens, reflector, laser, proximity switch, temperature probe	none	Use a clean, soft, dry cloth.
	dirt		warm water with soap, then water flush	Use clean, soft cloths.
stainless steel	chemical spill	shell, supply injector	water	Use a hose to flush the chemical supply from the surface fully. Do not get water on electrical components or mechanisms.
300 series stainless steel	chemical corrosive attack	shell interior, cylinder	pickling and passivation	Speak to your dealer or Milnor. This is not routine maintenance.
painted metal, unpainted aluminum	dust, dirt, grease	frame members	warm water with soap, then water to flush	Use clean cloths. Do not get water in electrical components.
rubber	dirt, oil, grease	drive belts, hoses	warm water with soap, then water to flush	Use clean cloths. Flush fully. Oil or soap must not stay on drive belts. Make sure that drive belts are serviceable.
clear plastic, acrylic	discoloration (yellowing)	compressed air filter bowl, visual flow meter	warm water with soap, then water to flush, then acrylic cleaner. Do not use ammonia.	Use only the necessary cleaning agents. Wash and rinse with clean, soft cloths. Follow instructions on acrylic cleaner.
glass	discoloration (yellowing)	door glass, site glass	ammonia and water solution and water rinse then acetone	Use clean, soft cloths. Use only the necessary cleaning agents. If necessary, soak in cleaner.
soft air filter, lint filter,	dust, lint	on inverter electric box door, in air line filter bowl, in dryers	shop vacuum	Replace the used with a new filter when the vacuum cannot remove contamination.
rigid strainers, screens for water, steam	mineral particles	in water line, y-strainer	water	Use a rigid bristle brush. Flush with a flow of water.
rigid strainers, screens for oil	metal shavings	in hydraulic line	carburetor cleaner or equivalent solvent	Soak. Use a rigid bristle brush.
steel drive components	dirt, hardened lubricant	bearings, roller chains, sprockets, gears	carburetor cleaner or equivalent solvent	Soak. Use a cloth or soft bristle brush.

3.1.3 Lubricant Identification

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The table below identifies the lubricant for each lubricant code given in the maintenance summary. Get these or equivalent lubricants from your local lubricant supplier.

When you add grease, always use the procedures given in Section 3.1.4 : Grease Gun Procedures, page 14. When you add grease to motors, also use the procedures given in Section 3.1.5 : Procedures for Motors, page 15.

CAUTION: Bad lubricant — will decrease the life of components.

- Make sure that all equipment and fittings used to apply lubricants are clean.
- Use only the given lubricants or equivalent lubricants that have the same specifications.

Table 9. Lubricant Identification

Code	Type	Trademark Name	Application Example
EM	grease	Mobil Polyrex EM or as given on the motor nameplate	motor bearings
EPLF2	grease	Shell Alvania EP (LF) Type 2	drive shaft bearings and bushings, ball joints, chain drives
FGL	spray	Lubriplate Super FGL-1. One can provided with machine.	Milnor hoist chain
UH1	oil	Klubersynth UH1 6-460 synthetic	gear reducer, MilRAIL® elevator

3.1.4 Grease Gun Procedures

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CAUTION: Hydraulic pressure — can push out seals and push grease into unwanted areas (example: motor windings).

- Use a hand grease gun. A power grease gun gives too much pressure.
- Know the quantity of grease your grease gun gives each cycle (each stroke).
- Operate the grease gun slowly (10 to 12 seconds for one cycle).
- Add only the specified quantity. Stop if new grease come out of a drain port or other opening.
- Remove spilled grease from belts and pulleys.

The tables give grease quantities in fluid ounces (fl oz) and milliliters (mL). You can also use grease gun cycles (strokes). A cycle is each time that you pull the trigger. One cycle is usually approximately 0.06 fl oz (1.8 mL). Your grease gun can give more or less than this. Measure the output of your grease gun as follows:

- Make sure that the grease gun operates correctly.
- Operate the grease gun to put grease into a small container with fluid ounce or milliliter increments. Pull the trigger fully and slowly.
- Add a sufficient quantity of grease to measure accurately. Count the number of cycles of the grease gun (the number of times that you pull the trigger).
- Calculate the quantity for each cycle of the grease gun, as in the following examples.

Example: 2 fl oz / 64 cycles = 0.031 fl oz for each cycle

Example: 59 mL / 64 cycles = 0.92 mL for each cycle

3.1.5 Procedures for Motors

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NOTICE: Motor warranties and the maintenance procedures necessary to maintain the motor warranty are given by the original manufacturer, not by Milnor®. Consult the motor nameplate and manufacturer's manual. Where the following information does not conflict with the manufacturer's instructions, you can use it to develop a lubrication schedule for motors that require lubrication.

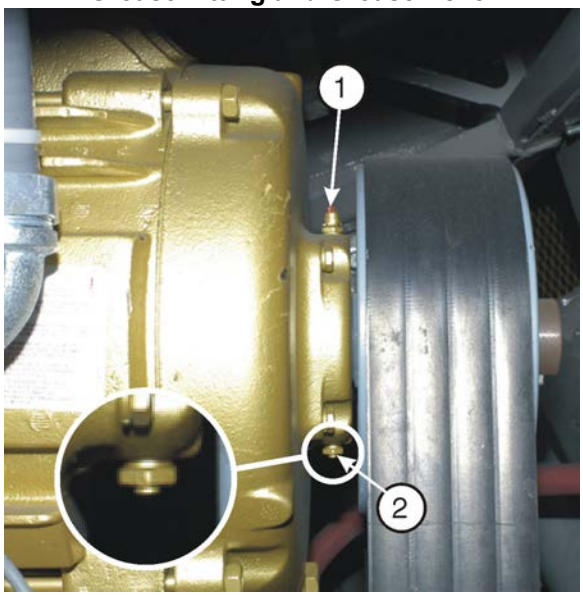
If a motor on your machine does not have grease fittings, no grease maintenance is necessary. If a motor on your machine has grease fittings, it is necessary to add grease. But the interval is usually longer than for other maintenance. Table 10: Motor Grease Intervals and Quantities, page 17 gives motor grease intervals and quantities for motors with specified frame sizes and speeds. You get this data from the motor nameplate. Use Table 6: Motor Grease Schedule, page 11 to record the data for the motors on your machine.

CAUTION: Failure to remove grease drain plugs — can cause grease to enter the windings and burn out the motor.

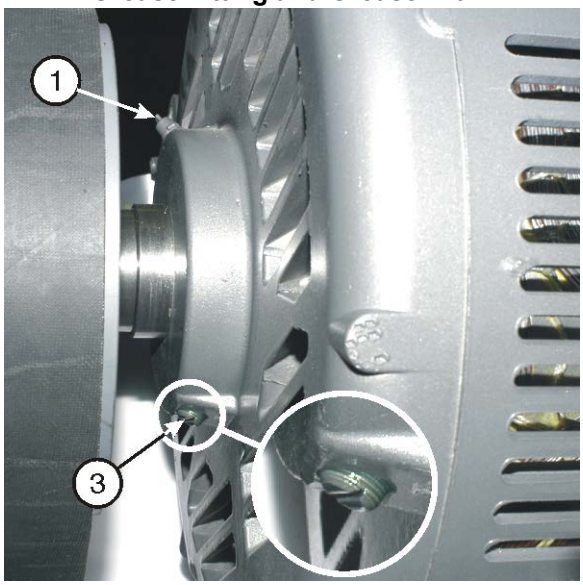
- If the motor has grease drain plugs, remove them before you add grease. If the motor has grease relief fittings, it is not necessary to remove them.

Figure 2. Motor Grease Maintenance Conditions

Grease Fitting and Grease Relief

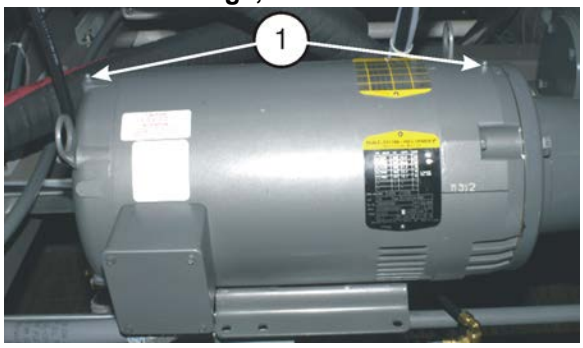


Grease Fitting and Grease Drain



Motor Nameplate

Grease Fittings, No Reliefs or Drains



Legend

1 . . . Grease fitting
2 . . . Grease relief. Do not remove.
3 . . . Grease drain plug. Remove first.
4 . . . RPM (motor speed). This example is 1465 RPM at 50 Hz and 1765 RPM at 60 Hz.
5 . . . NEMA (IEC) frame size. Example: 256T

Apply grease as follows:

1. Operate the machine or use manual functions to operate the motor until it is warm.
2. Remove power from the machine.
3. If the motor has grease drain plugs, remove them. See the caution statement above..
4. Add grease EM (Table 9: Lubricant Identification, page 14) with the motor stopped. If the motor with the nameplate in the above figure operates at 60 Hz, the specified grease quantity for each grease fitting is 0.65 fl oz (18.4 mL).

5. If the motor has a grease drain plugs, operate the machine or use manual functions to operate the motor for two hours. Replace the drain plug.

Table 10. Motor Grease Intervals and Quantities

On Motor Nameplate (see Figure 2: Motor Grease Maintenance Conditions, page 16)		Interval		Quantity	
NEMA (IEC) Frame Size	**RPM Less Than or Equal To**	**Years**	**Hours**	**Fluid Ounces**	**mL**
Up to 210 (132)	900	5.5	11000	0.34	9.5
	1200	4.5	9000		
	1800	3	6000		
	3600	1.5	3000		
>210 to 280 (132 to 180)	900	4.5	9000	0.65	18.4
	1200	3.5	7000		
	1800	2.5	5000		
	3600	1	2000		
>280 to 360 (180 to 200)	900	3.5	7000	0.87	24.6
	1200	3	6000		
	1800	2	4000		
	3600	0.5	1000		
>360 to 5000 (200 to 300)	900	2.5	5000	2.23	63.2
	1200	2	4000		
	1800	1	2000		
	3600	0.5	1000		

3.1.6 How To Show the Maintenance On a Calendar

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You can put marks on a calendar that work with the tables in Section 3.1.1 , page 9. The marks are the numbers 2, 3, 4, 5, and 6. It is not necessary to show the number 1 (items you do each day) on the calendar. The number 2 = items you do each 40 to 60 hours, 3 = each 200 hours, 4 = each 600 hours, 5 = each 1200 hours, and 6 = each 2400 hours. These are the "Mark" numbers at the top of the narrow columns on the left of each table in Section 3.1.1 , page 9.

The table below shows where to put the marks on a calendar. For example, if your machine operates between 41 and 60 hours each week, the first three marks are 2, 2, and 3. Put these marks on the first, second, and third weeks after the machine starts operation. If you do routine maintenance on a given day of the week, put the mark on that day of each week. Continue to put marks on the subsequent weeks. **It can be necessary to do the 40 to 60 hour (2) maintenance more than one time each week.** If the machine operates between 61 and 100 hours, put a 2 on two days of the week. If the machine operates 101 or more hours, put a 2 on three days of the week.

On each date with a 3, do the items with an x in the 3 or the 2 column of each table in Section 3.1.1 , page 9. On each date with a 4, do the items with an x in the 4, 3, or 2 column. Continue this pattern.

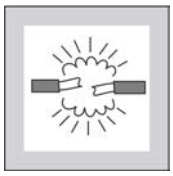
Table 11. Where to Put Marks On a Calendar

Hours / Week	Week Number																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Up to 40	2	2	2	2	3	2	2	2	2	3	2	2	2	2	4	2	2	2	2	3	2	2	2	2	3	2	2	2	2	5
41 - 60	2	2	3	2	2	2	3	2	2	4	2	2	3	2	2	2	3	2	2	5	2	2	3	2	2	2	3	2	2	4
61 - 80	2	2	3	2	3	2	4	2	2	3	2	2	3	2	5	2	3	2	2	3	2	4	2	2	3	2	2	3	2	6
81 - 100	2	3	2	3	2	4	2	3	2	3	2	5	2	3	2	3	2	4	2	3	2	3	2	6	repeat					
101 - 120	2	3	2	3	4	2	3	2	3	5	2	3	2	3	4	2	3	2	3	6	repeat									
121 - 140	2	3	2	3	4	3	2	3	5	2	3	2	3	4	3	2	3	6	repeat											

Hours / Week	Week Number, continued																													
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Up to 40	2	2	2	2	3	2	2	2	2	3	2	2	2	2	4	2	2	2	2	3	2	2	2	2	3	2	2	2	2	6
41 - 60	2	2	3	2	2	2	3	2	2	6	repeat																			

3.2 Maintenance Components—Machines and Controls Group

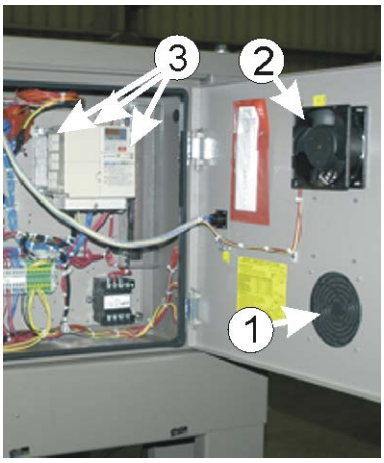
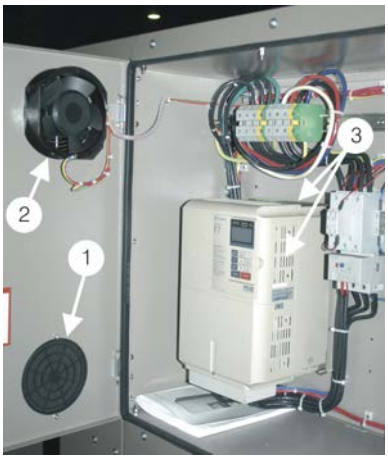
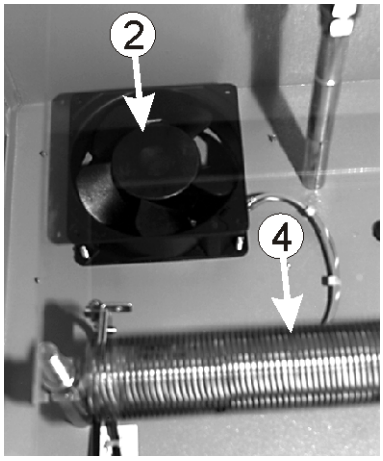
3.2.1 Inverters



CAUTION: Insufficient airflow — will cause the inverter to burn out.

- Keep fans, filter, vents, and braking resistors clean.

Figure 3. Electric Box and Inverter. These are examples. Your machine can look different.

30022X_ Washer-extractor	48040F_ Washer-extractor	76039 CBW® Tunnel Washer
		

Legend

1 . . . Air filter
2 . . . Fan on electric box door. Tip: Put streamers in front of the fan to make sure the fan operates.
3 . . . Inverter cooling vanes and vents. See caution statement below.
4 . . . Braking resistor, if applicable

3.2.2 How to Examine Compressed Air Mechanisms

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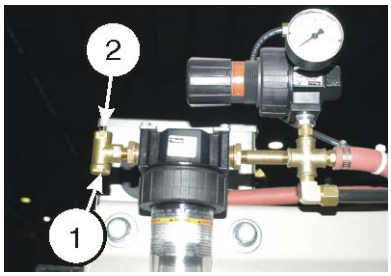
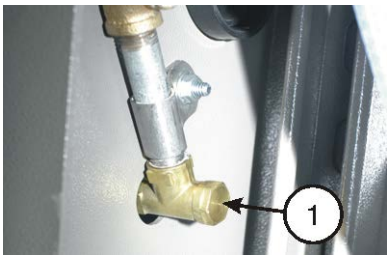
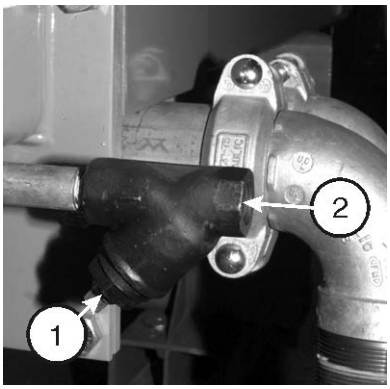
CAUTION: Compressed air pressure — can cause components to fly apart forcefully.

- Close the external shutoff valve and release remaining pressure before you do maintenance.

Figure 4. Compressed Air Inlet Strainers. These are examples. Your machine can look different.

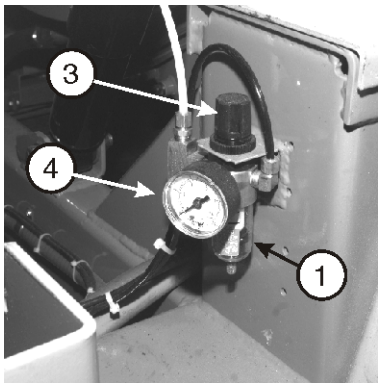
T-Strainer. Outside machine frame on some models.	T-Strainer. Inside machine frame on some models.	Y-strainer. Used on some models
		

Legend

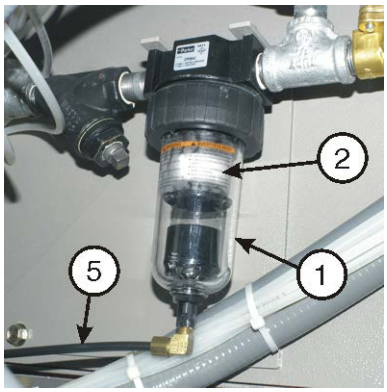
1 . . . See caution statement below. Remove plug to remove strainer.
2 . . . Compressed air in.

Figure 5. Self-purging Air Line Filter to Remove Moisture and Other Contamination. These are examples. Your machine can look different.

Filter/regulator—68036F5N Washer-extractor



Filter—5040TG2_ Dryer



Legend

1 . . . Filter bowl. See caution statement below. Do maintenance if water does not drain automatically.

2 . . . Filter element

3 . . . Pressure adjustment knob

4 . . . Air pressure gauge

5 . . . Drain tube

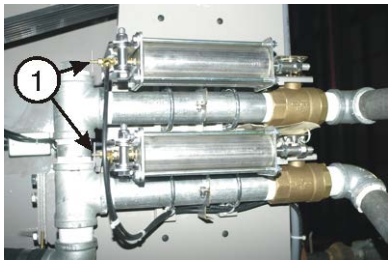
Your machine has one or more mechanisms that use compressed air for movement. Figure 6, page 21 shows some examples. To examine a compressed air mechanism, look at the mechanism and listen to it in operation. **Do not touch the mechanism or put your hand in the machine.** Usually you can see movement directly or on a position indicator. Frequently, you can hear a valve open and close. When a signal from the controller to operate the mechanism occurs, the air pressure must increase sufficiently before movement occurs. When the signal stops, the system must release the compressed air. You can usually hear the sound of the exhaust air for a short time.

When a compressed air mechanism operates correctly, its time of movement is usually less than two seconds. The movement is smooth. It does not shake, change speed, or stop in the middle of travel. A mechanism that does not operate correctly will cause unsatisfactory performance. If the mechanism does not operate correctly and you cannot repair the problem, speak to your dealer or Milnor®. Possible causes are as follows:

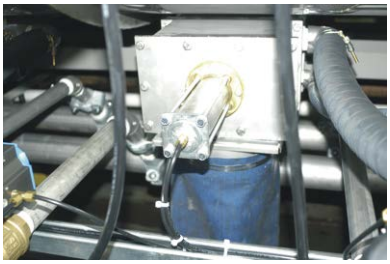
- a blockage or a leak in the air tube,
- a worn pilot air valve,
- worn components in the mechanism,
- air pressure supplied to the machine is not sufficient,
- a component used to remove contamination from the air line is clogged,
- a quick exhaust valve or muffler is clogged,
- on machines with an air line lubricator, a malfunction or incorrect adjustment prevents sufficient lubrication.

Figure 6. Compressed Air Mechanisms These are examples. Your machine can look different.

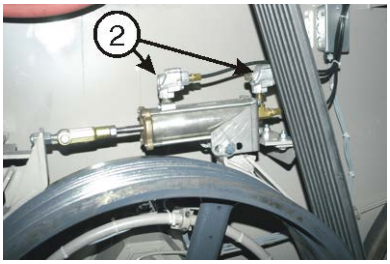
Air Operated Water Valves - Milnor® Air Cylinder Type



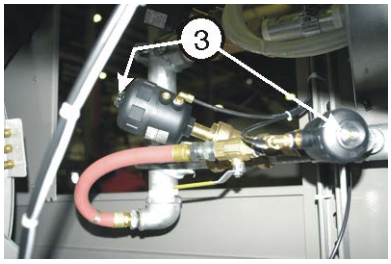
Air Operated Drain Valve - Milnor® Air Cylinder Type



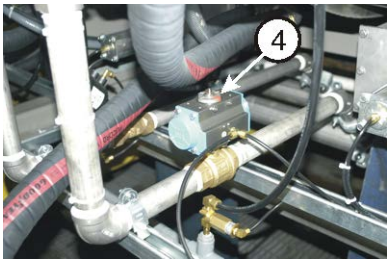
Air Operated Band Brake - Milnor® Air Cylinder Type



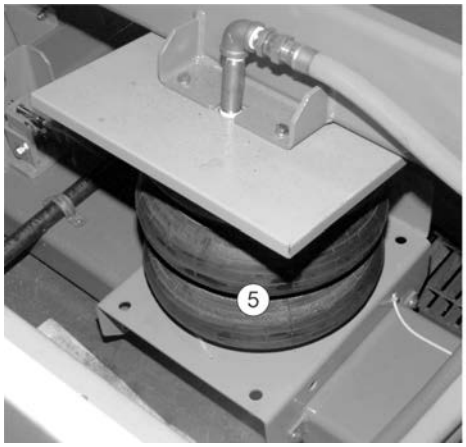
Air Operated Water and Steam Valves - Angle Type

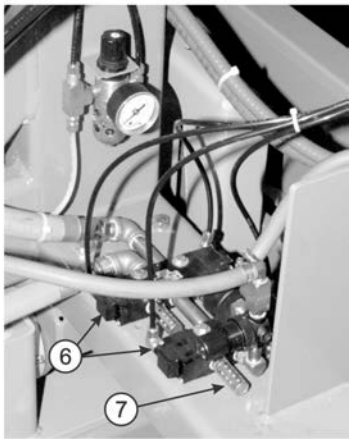


Air Operated Water Valve - Ball Valve Type



Air Tilt Components





Legend

1 . . . Factory-set needle valves to cause two air cylinders to move together. Do not adjust.

2 . . . Quick exhaust valves

3 . . . Position indicator. Yellow when valve is open.

4 . . . Arrow position indicator

5 . . . Tilt air bag

6 . . . Air valve

7 . . . muffler

3.2.3 Photoeyes and Proximity Switches

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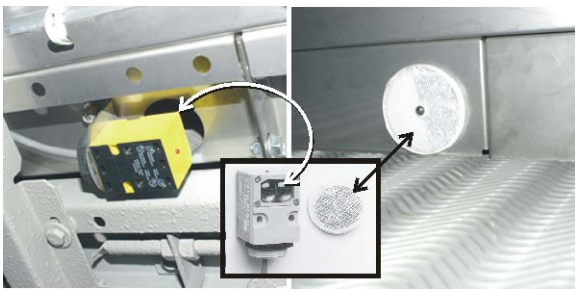
Figure 7. Photoeyes. These are examples. Your machine can look different.

Photoeye protected by a site glass, each side of the CBW® load chute	Photoeye and reflector on extractor discharge conveyor
	

Legend

→. . . Exposed surfaces that must be clean. Remove contamination with a soft cloth. If the surface is hard to reach, use a cloth on the end of a wood dowel or metal rod. If necessary, use a safe cleaning agent.

Figure 8. Proximity Switches These are examples. Your machine can look different.

1 Station Press	Centrifugal Extractor	Shuttle Conveyor
		

Typical Proximity Switch	Legend
	→. . . Area that must be clean. Remove contamination with a soft cloth. If the area is hard to reach, use a cloth on the end of a wood dowel or metal rod. If necessary, use a safe cleaning agent.

3.2.4 How to Do a Test of Emergency Stop Mechanisms

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This test applies to machines that have one or more stop mechanisms in addition to the Stop button (⓪). Do this test at the intervals given in the maintenance summary.

Definitions:

3-wire circuit a series electrical circuit on a Milnor® machine that must close before the machine can operate. If a switch in the circuit opens, machine movement stops and the operator alarm (a buzzer and a display message) comes on. When you push the start button (①), this closes the 3-wire circuit, which stops the operator alarm and lets the machine operate.

emergency stop mechanism a manual control that opens the 3-wire circuit when a person or object operates the control. Examples - emergency stop button, kick plate, pull cord.

emergency stop button a red push button on a yellow field that locks when a person pushes it (the electrical contacts stay open). It is necessary to turn the button clockwise to unlock it. A machine can have zero or more emergency stop buttons.

kick plate a metal plate on a shuttle conveyor that operates a switch when an object applies sufficient force to the plate. The kick plate is usually the first component of the shuttle to hit an object in the shuttle path. All Milnor® shuttles that go left/right on a path have kick plates on the two sides of the machine.

WARNING: — You can be killed or severely injured if a shuttle strikes you even if you come in contact with the kick plate first.

- ▶ Never do a test of the kick plate when the shuttle operates.

pull cord a wire on a conveyor that operates a switch when a person pulls the wire. All Milnor® free-stand conveyors (a conveyor that is not a component of a larger machine) have pull cords on the two sides of the conveyor.

Do a test of all emergency stop mechanisms on the machine as follows:

1. Apply power to the machine (Ⓟ).
2. Push the start button (①). **Do not cause the machine to operate.** For example, do not start a formula or operate the machine manually. It is not necessary to do the test when the machine operates.
3. Operate an emergency stop mechanism (examples - button, kick plate, pull cord). If the mechanism operates correctly, the operator alarm comes on. Did this occur?
   - Yes—Release the emergency stop mechanism if necessary. For example, if this is an emergency stop button, turn the button clockwise to unlock it. Push the start button (①). Do the test on a different emergency stop mechanism. Continue until you do the test on all emergency stop mechanisms on the machine.
   - No—An electrical component is defective. Shut down the machine. Do not let the machine operate until you correct the problem.

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3.3 Maintenance Components—MilRAIL® Group

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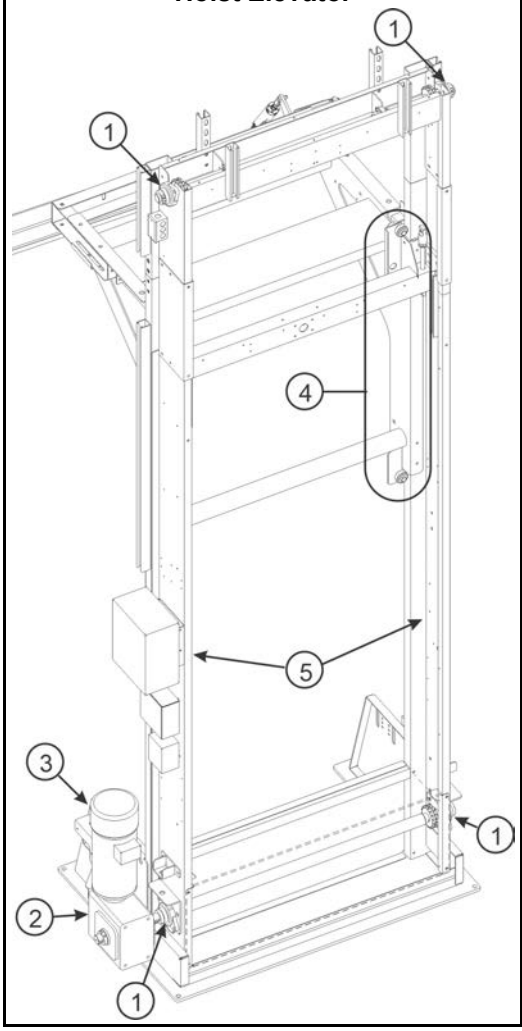
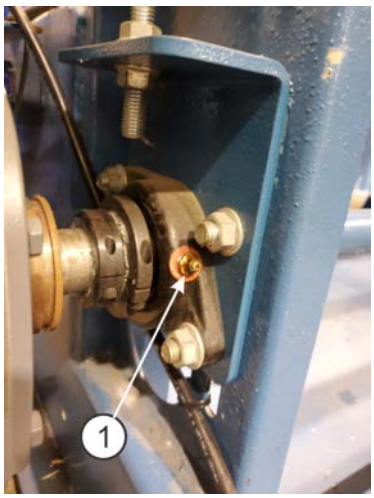
Figure 9. Hoist Elevator Maintenance Items

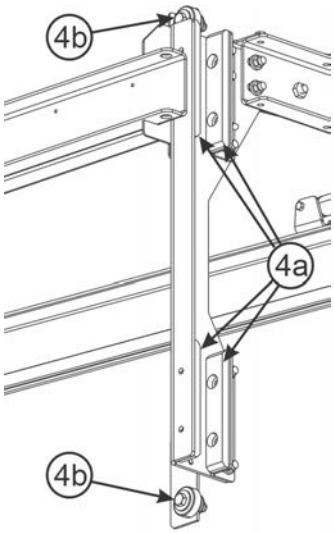
Hoist Elevator



Typical Grease Port



Guides and Slides



Legend

1 . . . Flange bearing grease ports (4 places)

2 . . . Gear reducer. **See** Figure 10: Hoist Elevator Gear Reducer Lubrication, page 25

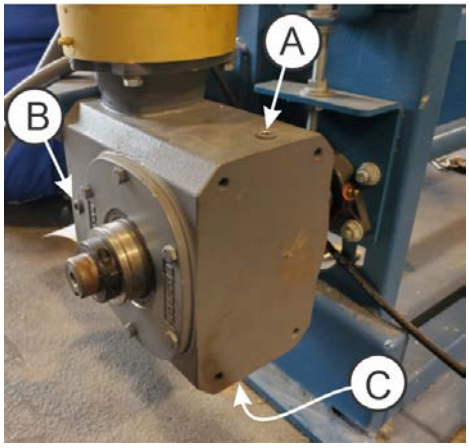
3 . . . **See** Section 3.1.5 : Procedures for Motors, page 15

4a . . Slides (4 per side)

4b . . Guide wheels (2 per side)

5 . . . Chains (not shown)

Figure 10. Hoist Elevator Gear Reducer Lubrication



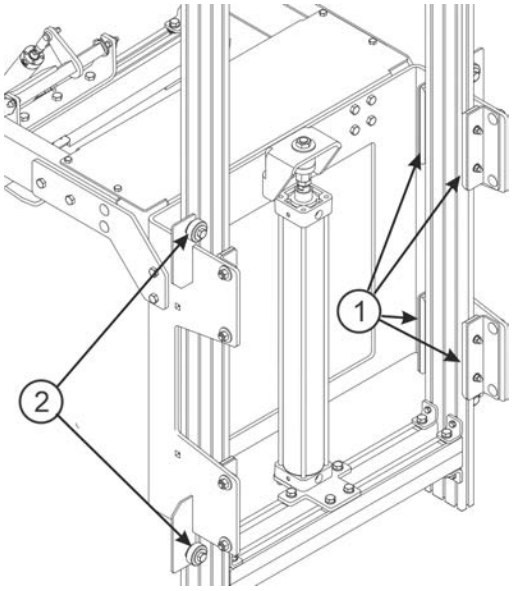
Legend

A . . . Fill port. Remove the plug to drain and fill. Replace the plug securely after fill.

B . . . Level port. Capacity: 80 oz (2.4 liters). Remove the plug to fill. Fill just until oil starts to come out of this port then replace the plug securely..

C . . . Drain port. Remove the plug to drain. Replace the plug securely to fill.

Figure 11. Pneumatic Elevator Maintenance Items



Legend

1 . . . Slides. 4 per side.

2 . . . Guide rollers. 2 per side.

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3.4 MilRAIL® Hard Ring Rail System: Mechanical Fault Conditions and How to Resolve Them

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The productivity of the MilRAIL® system depends on your ability to notice mechanical fault conditions, and to know what actions to take when you see them. Your actions can be:

- Preventive— to minimize production interruptions.
- Corrective— to resume production quickly after it has been interrupted.

Most corrective actions must be resolved by a supervisor or maintenance technician.

3.4.1 Parts of a Typical Rail System

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Use the following terms and figures to identify the different parts of your MilRAIL® hard ring rail system.

The Parts of the Rail

Load Loop — A rail loop connected to the bag elevator, where bags are loaded and lifted onto the rail.

Bag-loading area — A stop on the load loop where bags receive goods. Also called the bag-bottom former.

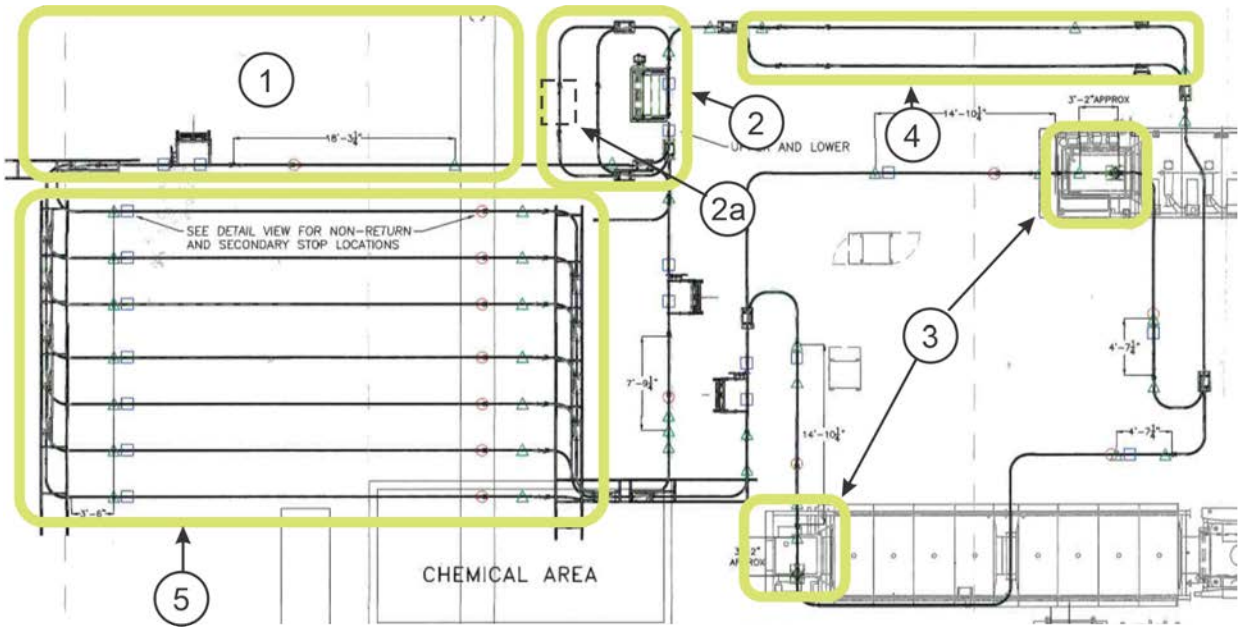
Bag discharge area — A stop on the rail above the CBW® load chute, where bags discharge (drop) goods into the tunnel. One per CBW®.

Bag stacker area — An area on the rail where empty bags are tilted, stacked, and stored.

Bag storage area — An area on the rail where full bags can be stored before they are eventually sent to the bag discharge area.

The following figure shows an example of a MilRAIL® hard ring rail system layout. Your laundry can look different.

Figure 12. Example of a Rail System Layout



Legend

1 . . . Sorting area (sort deck and belts) (see Figure 13, page 28)
2 . . . Load loop
2a . . Bag-loading area (bag-bottom former)
3 . . . **CBW®** load chutes (bag discharge areas)
4 . . . Bag stacker area
5 . . . Bag storage area

The Parts of the Sorting Area

Sort belt — One or more belts that send goods up to the sort deck.

Sort deck — A bin station where personnel sort unprocessed goods into batches. When a bin becomes full, the goods are released (one batch at a time) onto the drop belt below.

Drop belt — One or more belts that receive goods from the sort deck bins, and transfer them to the purge belt or the load belt.

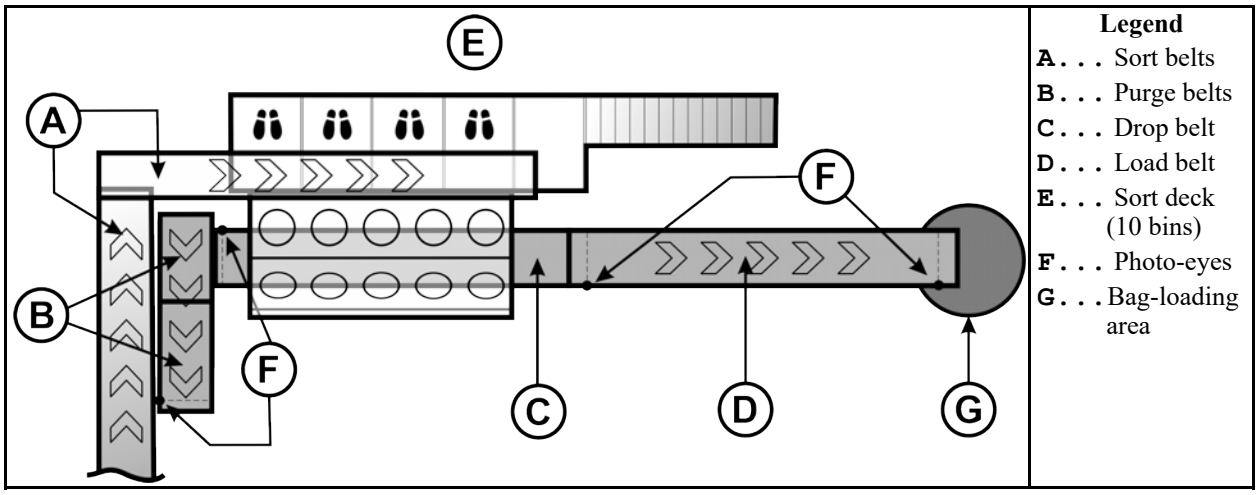
Purge belt — One or more belts that remove purged goods from the sort deck.

Load belt — One or more belts that transfer goods to the bag in the bag-loading area.

Photo-eyes — Sensors used to detect goods on belts.

The following figure shows an example of a sorting area in a rail system layout. Your laundry can look different.

Figure 13. Example of a Sorting Area Layout



3.4.2 Assumed Knowledge

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This document assumes the reader understands how to perform the following actions, which may be needed as part of resolving a fault condition:

- Put goods removed from belts, bags, or the floor in the sort area to be returned to the sort deck
- Re-code a bag as empty
- Clear a controller fault and error message, if the fault condition caused one.
- Perform actions at the Mentor® controller or other machine controllers.
- Use a lift or ladder, as appropriate to access the bag.

3.4.3 Identification, Prevention, and Correction of Common Mechanical Fault Conditions

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The three components of the MilRAIL® system that experience mechanical faults are:

- The sort deck
- The belts under the sort deck and the bag-loading area
- The bags

3.4.3.1 Sort Deck Faults

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A bin is overloaded and goods won't release.

Prevention Advise personnel to sort carefully.
Correction Purge the bin and remove excess goods from the load on the purge belt.

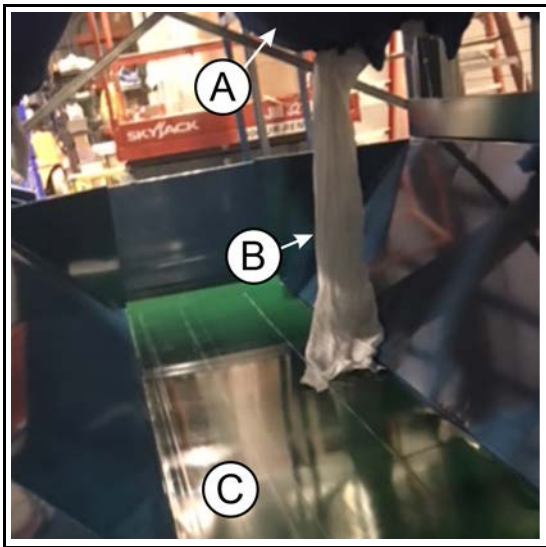
Goods were incorrectly sorted at the sort deck.

Prevention Ensure sort deck personnel are trained on all goods types.
Correction Empty erroneous bags at, or before entering the bag storage area (item 5 in Figure 12, page 27) and recode as empty.

A long piece of goods (e.g., a sheet) hangs out of a sort bag with a tail laying on the belt. — See the adjacent figure.

Prevention None.
Correction None. This fault will eventually self-correct. Attempts to dislodge it can interfere with load cell functioning. May lead to the next fault.

Figure 14. Goods Hanging on Belt



Legend

A . . . Sorting bag
B . . . Caught goods hanging on belt
C . . . Drop belt

A load of goods falls on the long piece described in the previous fault condition.

Prevention None.
Correction If this fault holds the entire load back, a controller error will occur when the goods fail to block a photo eye. Safely push the load off of the caught piece of goods with a long tool or rod and clear the error. If some of the goods separate from the rest of the load and enter the waiting bag, the remaining goods are stray goods (see Section 3.4.3.2 : Belt Faults, page 29), and the bag now has a small load (see Section 3.4.3.3 : Bag Faults, page 31).

3.4.3.2 Belt Faults

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WARNING: Sudden conveyor motion — can cause you to trip and fall.

- Do not stand, walk, or put parts of your body on the conveyor.

WARNING: Moving bag elevators — can strike or entrap you.

- Do not enter the loading loop enclosure unless qualified and authorized.
- Keep enclosure keys in a secure location, accessible only to authorized personnel.

Stray goods (goods not part of the current load) are on the drop belt or load belt.

Prevention: None.

Correction: Remove the belt motor power and remove goods, so they cannot be added to a full load or interfere with the functioning of the belt (example: block a photoeye).

The drop belt or load belt contains too many goods to fit in one bag, or a bag contains more than one load.

Prevention Remove the belt motor power and remove stray goods (goods that are not part of the current load), if present, from the belt.

Correction Enter the load loop enclosure. This will shut down the system. Remove spilled goods, empty the bag and remove the goods, then re-code the bag as empty.

The drop belt or purge belt stalled during a purge.

Prevention Typically, sort decks contain a purge bin for miscellaneous items. Purge this bin each time it becomes full.

Correction Remove belt motor power and remove excess goods from the belt.

The purge belt runs without cease during a purge.

Prevention Use care to avoid bumping a photo-eye and causing misalignment when working around them.

Correction Clear a blocked photo-eye or adjust a misaligned photo-eye/reflector.

The drop belt or load belt stalled during bag loading.

Prevention Use care to avoid overloading a bin on the sort deck.

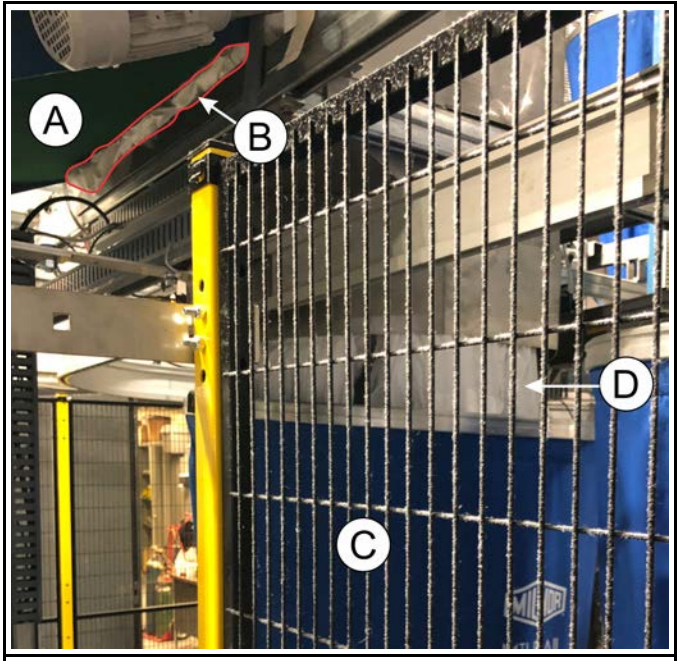
Correction Supervisor or maintenance technician—remove belt motor power. If the belt is not jammed, remove stray goods (more than 150 lbs) and reduce load size if necessary. If the belt is jammed, such as goods wrapped around a roller (as shown in the adjacent figure), clear the jam.

The sort belts stalled.

Prevention Properly separate and spread out soiled materials. Use care to avoid overloading belts.

Correction Remove belt motor power and remove excess goods from the belt.

Figure 15. Jammed Belt



Legend

A . . . Underside of load belt
B . . . Goods jammed underneath belt
C . . . Bag in the bag-loading area, receiving goods
D . . . Goods entering the bag in the bag-loading area

3.4.3.3 Bag Faults

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WARNING: Rail system mechanisms such as air-operated devices — can pinch or sever fingers.

- Use extreme care when in the vicinity of rail system mechanisms

CAUTION: Bags on the rail — can malfunction and release a large quantity of soiled goods.

- Do not stand under bags, especially if protective netting is not in place.
- Do not use your hands to free drawstring tangles.

A bag is not fully closed when empty. — See Figure 17, page 33.

Prevention None

Correction Untangle the draw string (see Figure 16, page 32) when the bag reaches the bag tilter, or the bag stacker area. Close the bag (see Section 3.4.3.3.1 : How to Close a MilRAIL® Bag, page 34).

A bag is not fully closed when loaded. — See Figure 17, page 33.

Prevention If the empty bag (before it is loaded) is not fully closed, untangle the drawstring when the bag reaches the bag tilter, or the bag stacker area. Close the bag.

Correction Monitor the bag as it is discharged to the tunnel washer.

- If the bag spills its load before it reaches the CBW® load chute, see ►**"Bag spilled some or all of its load"** later in this section.
- If the bag cannot discharge or discharges a partial load to the CBW® tunnel washer, use a tool to untangle the drawstring (see Figure 16, page 32) and open the bag. Transfer all the goods from the bag to the tunnel.
- If the bag successfully discharges a full load to the CBW® tunnel washer and the bag fully closes afterward, no action is required.

Figure 16. Examples of Drawstring Tangles

Figure 17. Bag Closing Faults

Bag Not Fully Closed when Empty

Bag Not Fully Closed when Loaded

An empty bag leans when it enters the stacker area (trolley link in incorrect position). — See Figure 18, page 34.

Prevention None.
Correction Correctly seat the trolley link (bag hanger).

A full bag binds on the rail and does not move (due to imbalance).

Prevention If the empty bag is leaning when it leaves the stacker, correctly seat the trolley link when the bag reaches the bag tilter, or the bag stacker area.
Correction If the bag is stuck because the weight of its contents is off-center (as shown in Figure 19, page 34), push the bag with a pole until it moves. It is not possible to redistribute an off-center load in a bag.

Bag spilled some or all of its load.

Prevention If you see an empty bag that is not fully closed, untangle the drawstring when the bag reaches the bag tilter, or the bag stacker area. Close the bag.
Correction Completely empty and recode the bag as empty.

Undersized load in bag, which can cause a fault in the Mentor® (CBW®) controller or press.

Prevention If you see a load on the drop belt or load belt separate, remove power to the belts and elevator. Remove stray goods from the belt, remove the partial load from the bag being loaded, and recode the bag as empty.
Correction If you have reason to believe a bag destined for a CBW® tunnel washer is only partially full, remove the goods from the bag and recode it as empty.

Figure 18. Empty Bag Leaning

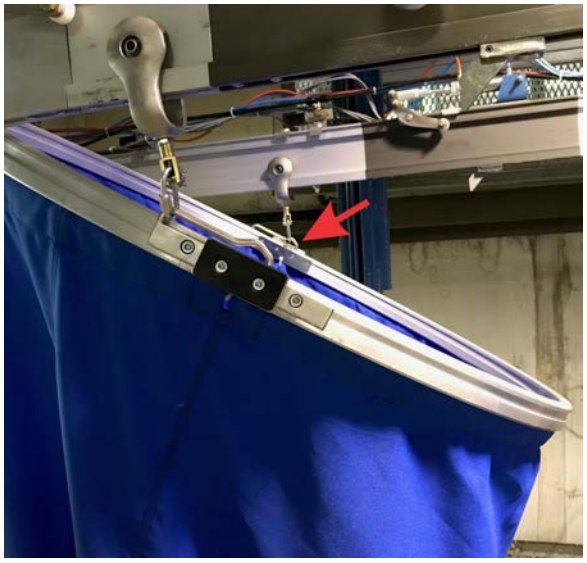

Figure 19. Full Bag Binding on Rail

3.4.3.3.1 How to Close a MilRAIL® Bag

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1. With one hand, push down the pin on the drawstring-pulley mechanism (as demonstrated in **Step 1** in Figure 20, page 35).

2. With the pin still depressed, use your other hand to pull the drawstring down. The weight on the other side of the pulley rises, as shown in **Step 2** in the figure.
3. Pull the drawstring until there is about 2 inches of rope between the weight and the pulley mechanism, as shown in **Step 3** in the figure.

Figure 20. How to Close a MilRAIL® Bag