CLEMCO BUCKET ELEVATOR
O. M. 21822

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⚠ WARNING

**Do not proceed with these instructions until you have READ the orange cover of this MANUAL and YOU UNDERSTAND its contents. *
These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity.**

***If you are using a Clemco Distributor Maintenance and Part Guide, refer to the orange warnings insert preceding the Index before continuing with the enclosed instructions.**

Electronic files include a Preface containing the same important information as the orange cover.

One Cable Car Dr.
Washington, MO 63090
Phone (636) 239-4300
Fax (800) 726-7559
Email: info@clemcoindustries.com
www.clemcoindustries.com

1.0 INTRODUCTION

1.1 Scope

1.1.1 This manual covers installation, operation, maintenance, troubleshooting, and replacement parts for Clemco end-feed and side-feed bucket elevators. Specific drawings are supplied with the elevator. After assembly, keep them with this manual for reference and replacement parts. Read the entire manual before attempting installation or operation of the elevator. Instructions on use of equipment in combination with the bucket elevator are given in separate manuals. These include the integrated underspeed monitor, abrasive cleaner, recovery system, blast machine, etc., available upon request from Clemco Industries Corp, or at our web site at www.clemcoindustries.com.

1.2 Safety Alerts

1.2.1 Clemco uses safety alert signal words, based on ANSI Z535.4-1998, to alert the user of a potentially hazardous situation that may be encountered while operating this equipment. ANSI's definitions of the signal words are as follows:

This is the safety alert symbol. It is used to alert the user of this equipment of potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

CAUTION

Caution used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

⚠ CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠ WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ DANGER

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

1.3 Description

1.3.1 Components of the bucket elevator are shown in Figure 1; their functions are explained in Paragraphs 1.4 through 1.7.1.

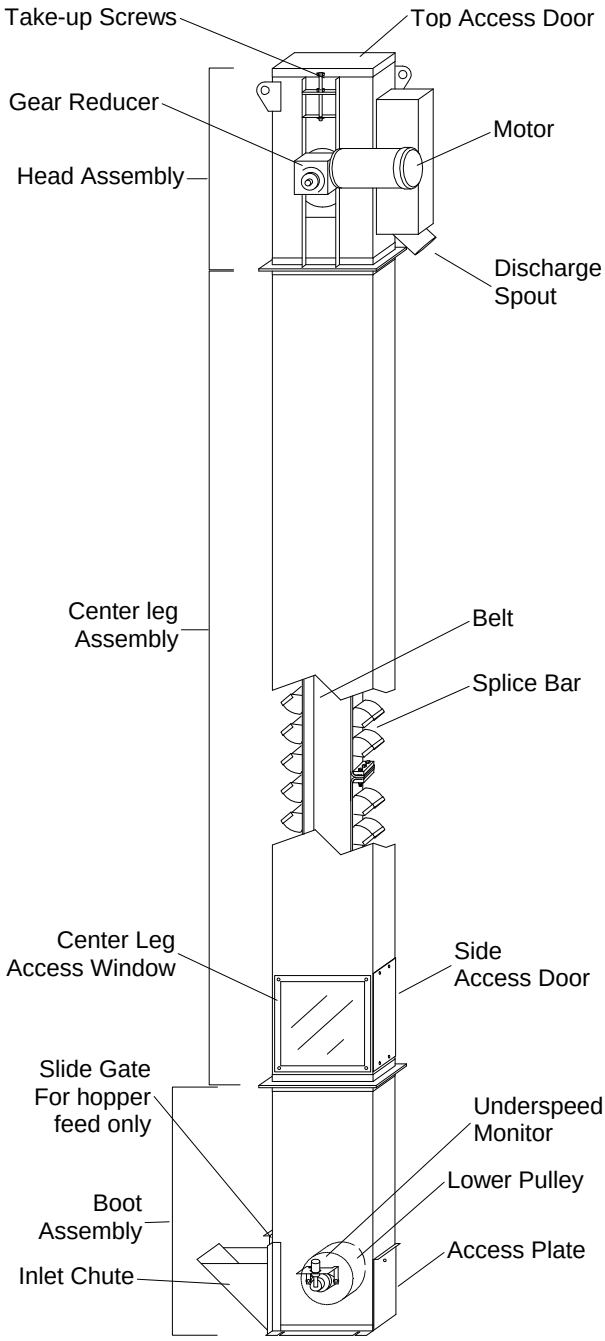
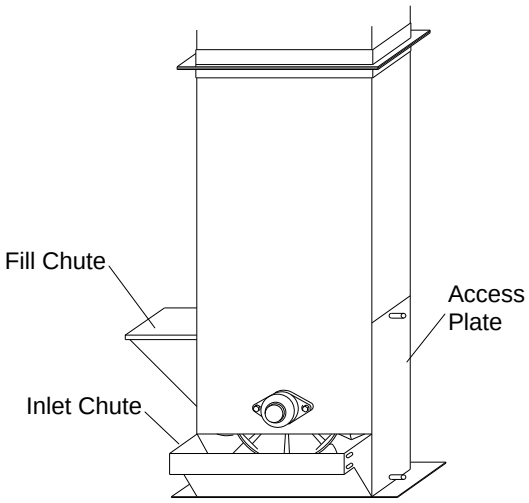


Figure 1

1.4 Boot Assembly
With inlet chute, flow control slide gate, lower (idler) pulley, and underspeed monitor. **NOTE: Slide gates are not used with screw or belt conveyors.**

1.4.1 The inlet chute: is the abrasive entry point. The illustration in Figure 1 shows an end-feed elevator, which are used with belt conveyors, screw conveyors, and hopper recovery systems.

1.4.2 The illustration in Figure 2 shows a side-feed elevator boot used with Flat-Trak recovery systems. The side-feed boot has a separate inlet chute and media fill chute. The illustration shows a left hand set-up. Side-feed boots may be converted for right hand by switching the fill chute and access plate, but the fill chute must always be on the opposite side of the discharge spout, located on the elevator head.



Side-feed inlet chute is usually shipped loose or mounted on the cross conveyor

Figure 2

1.4.3 The flow control slide gate: meters abrasive into the elevator boot. The gate compensates for the angle of repose of different abrasives, and prevents overloading and jamming from slug-loading abrasive.

1.4.4 The underspeed monitor: shuts off the bucket elevator motor (and other recovery equipment) in the event the speed of the lower pulley drops below the monitor's set rpm. It prevents belt slippage burn through and component damage, in the event of an obstruction jam or a loose belt.

1.5 Center leg with access window

1.5.1 The center leg gives the elevator its height. The clear access window permits visual monitoring of the belt movement. The access window is used when adjusting and installing the belt.

1.6 Drive head

1.6.1 The drive head includes the motor, gear reducer, belt take-up adjusting screws for adjusting the belt tension, and discharge spout.

1.7 Belt assembly with buckets.

1.7.1 Buckets, attached to the belt, lift abrasive from the floor-level recovery point to the discharge spout.

2.0 INSPECTION

2.1 Inspect for missing or damaged parts.

2.2 Locate the integrated underspeed monitor owners manual. It is required for assembly and adjustment.

2.3 Check bolts on all buckets to insure that none has loosened during shipment.

2.4 Check the lower corners of the inlet chute for openings. Caulk if necessary.

2.5 Remove paint on the underspeed monitor rotation indicator tab. Paint may prevent detection from the underspeed proximity switch. Refer to the underspeed monitor manual for additional information.

2.6 Remove the maintenance sheet supplied with the gear reducer. File it with this manual for future maintenance reference.

3.0 INSTALLATION

NOTE: These instructions are for the assembly of the recovery hopper and elevator only. Use these instructions in conjunction with facility drawings and other manuals provided with the recovery system. Pay particular attention to the foundation pit, and placement of the elevator with that of the blast machine and abrasive cleaner. For proper abrasive flow from the elevator discharge to the abrasive cleaner inlet, make sure the placement allows a 45^{o} maximum (from vertical) flow-angle between the elevator discharge and abrasive cleaner inlet, as shown in Figure 3.

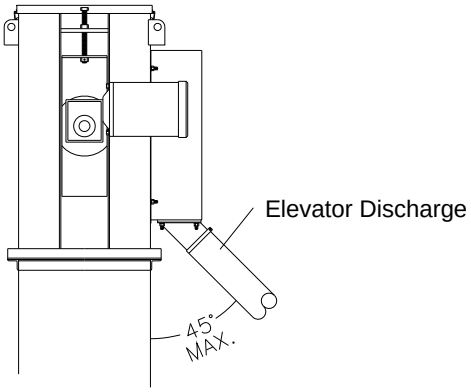


Figure 3

⚠ WARNING

Weight of an assembled bucket elevator varies with height. A 19' elevator weighs approximately 900 lbs. Erection should be performed by experienced personnel that are familiar with safety hazards associated with handling steel material of this sort, using only approved tools and hoists that are required for safe erection of this product.

NOTE: The following instructions explain in-place assembly of the elevator assembly. If space allows, it may be easier to assemble the elevator on its side then raise the assembled unit into position.

3.1 Boot Assembly

3.1.1 Place the elevator boot assembly onto a firm level foundation. If anchor bolts are used, lower the boot over the anchor bolts. Otherwise, be certain there is enough room around the boot to drill and install concrete inserts after the elevator is in place, or that there is enough room to mark the location for the inserts, move the elevator aside to drill the concrete and install inserts. Do not bolt assembly down at this time.

3.1.2 Check alignment of the inlet chute with that of the mating equipment such as screw conveyor or hopper. The height and distance from the discharge of the conveyor to the elevator inlet chute must be close enough, so the abrasive angle of repose will not overflow the chute.

3.1.3 Make sure the abrasive flow control slide gate (used with hopper feed system only) is in place and has enough clearance to be fully raised or lowered. **The initial setting should be at mid point of opening.**

3.1.4 If grating is supplied, make sure it fits the foundation pit and that cutouts for the elevator are correct.

3.1.5 Bolt down the elevator boot: snug-up bolts but do not tighten yet. The elevator may require shims between the boot and foundation.

3.1.6 Install mastic sealant on the elevator boot and center leg mating flange.

3.2 Center Leg Assembly

3.2.1 Install center leg (with see-through access window down and facing the most accessible side) to boot, bolting through mating flanges.

3.3 Head Assembly

⚠ WARNING

To prevent damage or injury from the elevator falling, tie the elevator leg and head sections to a brace that gives them upright support until the completed elevator assembly is bolted down and braced.

3.3.1 Lower both take-up adjusting screws to their lowest position.

3.3.2 Install mastic sealant on the elevator center leg and head assembly mating flange.

3.3.3 Place the head assembly onto the center leg, with the discharge facing the inlet of the next segment. i.e. abrasive cleaner. This should place the discharge chute on the opposite side of the inlet chute, or fill chute. Bolt the pieces together.

3.4 Plumb the elevator by putting shims under the elevator boot.

3.5 Apply caulking, forcing it between the boot and foundation.

3.6 Tighten the boot anchor bolts.

3.7 The elevator may require bracing to stabilize it. One method would be to attach diagonal braces from the elevator to the blast room, as shown in Figure 4.

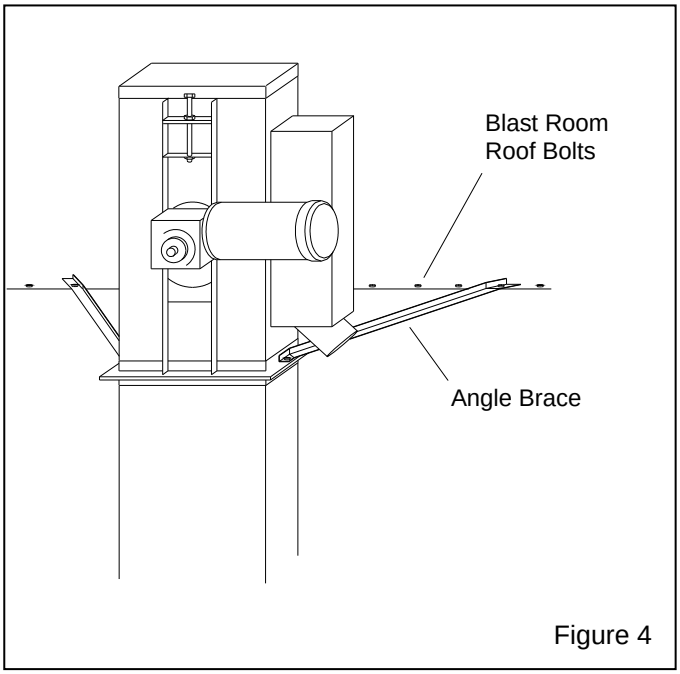


Figure 4

3.8 Belt Installation

3.8.1 There are two methods of installing the elevator belt assembly, from the top, through the access door in the elevator head or from the side through the access window in the center leg. Choose the method best suited to the conditions.

⚠ WARNING

Due to the weight and pull of the elevator belt, the more the belt is fed into the elevator, the heavier it becomes. Care must be used when installing or removing the belt assembly. Anyone working at the top access opening must wear a safety belt and work from a safe platform.

3.8.2 Side Installation

3.8.2.1 Use this method when there is ample working space around the center leg opening and the opening is above floor level.

3.8.2.2 Remove access doors on elevator head, center leg section and boot section.

3.8.2.3 From the top access opening, lower a rope down both sides of the upper pulley until both ends reach the center leg access window. The belt should be looped over the top pulley.

3.8.2.4 Tie the end of the rope on the discharge side of the elevator to the end of the belt so that when the belt is raised, the buckets on the discharge side face down.

3.8.2.5 With the help of a second person at the access opening in the elevator head, feed the belt through the center leg access opening while using the rope to pull the belt up through the elevator.

3.8.2.6 Continue feeding the belt in until it is fed over the top pulley and down the other side.

3.8.2.7 Remove the rope from the belt when it is visible again at the access opening.

3.8.2.8 Continue feeding the belt until the end reaches the bottom of the boot.

3.8.2.9 Working through the boot access door, make sure the belt is not twisted, and route it under the lower pulley.

3.8.2.10 Lower a rope from the center leg access window and attach it to the end of the belt. Pull the rope to bring the end of the belt to the center leg access window. Tie the rope to prevent the belt from falling into the boot.

3.8.2.11 Proceed to Section 3.9.

3.8.3 Top Installation

3.8.3.1 Use this method when there is limited space around the center leg opening and a platform or lift is accessible to the top.

3.8.3.2 Remove access door on elevator head, center leg section and boot section.

3.8.3.3 Working through the top opening; lower the end of the belt with the buckets facing down, into the discharge side of the top pulley, until the end is visible at the center leg access window. Tie belt off.

3.8.3.4 Make sure that the buckets will dump toward the discharge spout.

3.8.3.5 Lower the other end of the belt (buckets facing up) down the other side of the pulley until it reaches the bottom of the boot.

3.8.3.6 Working through the boot access door, make sure the belt is not twisted, and route it under the lower pulley.

3.8.3.7 Lower a rope from the center leg access window and attach it to the end of the belt. Pull the rope to bring

the end of the belt to the center leg access window. Tie the rope to prevent the belt from falling into the boot.

3.9 Belt Splicing

3.9.1 Draw the two free ends of the belt together to determine the overall length and placement of the splice bar.

3.9.2 Place the splice bars 90 degrees (perpendicular) to the belt. Clamp the splice bars in place and match-drill 3/8" through both ends of the belt. It is important to align the belt as shown in Figure 5. If the splice is misaligned, from not having the splice bar perpendicular to the belt, the belt may tend to drift off the pulley.

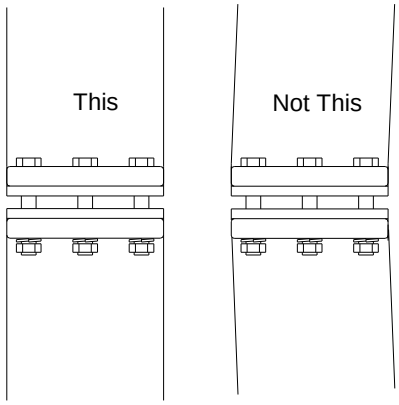


Figure 5

3.9.3 Install the splice bar as shown in Figure 6. Remove the threading rope. Make sure the splice bar bolts are evenly tightened, and the two ends of the belt are aligned properly, as the splice bar is tightened.

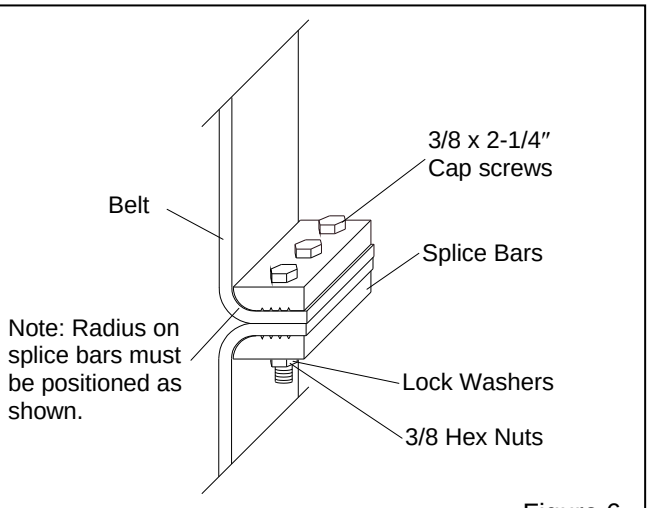


Figure 6

3.9.4 Trim off excess belting at splice bar.

3.9.5 Make sure all ropes, and other tools used during assembly are removed.

3.10 Raise the belt take-up adjusting screws until the belt is barely taut. It is important that both drive and idle sides are taken up uniformly and that the pulley is level. This will insure the belt tracks in the center of the pulley.

3.11 Check oil level in gear reducer. If any has leaked during shipment, replace it per instructions supplied with the gear reducer.

3.12 Make sure that all elevator companion equipment (abrasive cleaner, blast machine etc.) is installed. Installation instructions are contained in the manual for each component.

3.13 The discharge spout may be positioned to face one of three directions. Install it to allow the fewest bends as possible in the discharge hose.

3.14 Connect the discharge hose to the discharge spout. **The angle of the discharge hose must be at least 45 degrees.** If the hose sags, or if there is a possibility of it sagging when abrasive is it, put a stiffener on it to prevent it from forming a low spot were abrasive will build-up and cause a blockage.

3.15 Underspeed Monitor

3.15.1 Install the underspeed monitor per instructions in the underspeed monitor manual.

3.16 Wiring

NOTE: all wiring is done by the purchaser. Unless an optional control panel was purchased, all motor controls are also provided by the purchaser.

3.16.1 All components in the system should be wired so they start in series. The last segment in the system should start first. In a complete blast and recovery facility, normally the dust collector starts first, followed by the abrasive cleaner, bucket elevator, and floor recovery. This prevents overloading of any component.

3.16.2 Have a qualified electrician connect wiring as shown on the motor plate. Motor is 1 HP, 3 PH, 60 HZ.

3.16.3 Jog the motor and check motor rotation. The belt should move over the top pulley toward the discharge.

3.17 Belt Tracking

3.17.1 Two people are needed during the initial belt tracking adjustment. While the person making the adjustment observes the belt through the access opening in the bucket elevator head, the other jogs the elevator drive motor.

⚠ DANGER

S Tracking is checked visually through the upper access opening while adjustments are being made. The elevator must be running to insure proper tracking. Extreme care must be taken to keep hands, tools, clothing, etc., away from the opening while the elevator is running. Any limbs, loose clothing, tools or any other articles, catching on a bucket or caught between the belt and pulley will cause severe injury.

3.17.2 Adjust the take-up screws evenly until slack has been taken out of the belt, and the upper pulley is level. During the tightening process, make sure the belt is in the center of both the upper and lower pulley.

3.17.3 After all slack has been removed from the belt, and it has been determined that the belt will run without coming off the upper pulley, the motor can be kept running and belt tension can be adjusted per section 4.1.

NOTE: If the elevator runs for several seconds and shuts off, adjust the underspeed monitor as instructed in the underspeed monitor manual.

3.18 Once the elevator is running, adjust the underspeed monitor as instructed in the underspeed monitor manual.

3.19 Run the elevator without abrasive for eight hours. This provides suitable belt break-in, so that initial stretching of the belt can take place.

4.0 ADJUSTMENTS

4.1 Belt Tension and Tracking

4.1.1 While the elevator is running, tighten the belt by alternately adjusting the take-up screws, keeping it centered on the upper pulley. The pulley is slightly crowned so the belt will run in the center as long as the take-up screws are moved in unison.

4.1.2 Shut off the elevator, and lockout and tagout the electrical power.

⚠ WARNING

Lockout and tagout electrical power before checking tension. Unanticipated starting of the elevator could trap limbs, and cause severe injury.

4.1.3 Remove the center leg access cover.

4.1.4 Working through the access opening, use both hands to draw the two sides of the elevator belt together. If the belt is tightened correctly, it cannot be drawn any closer together than between 1-1/2" to 2". See Figure 7.

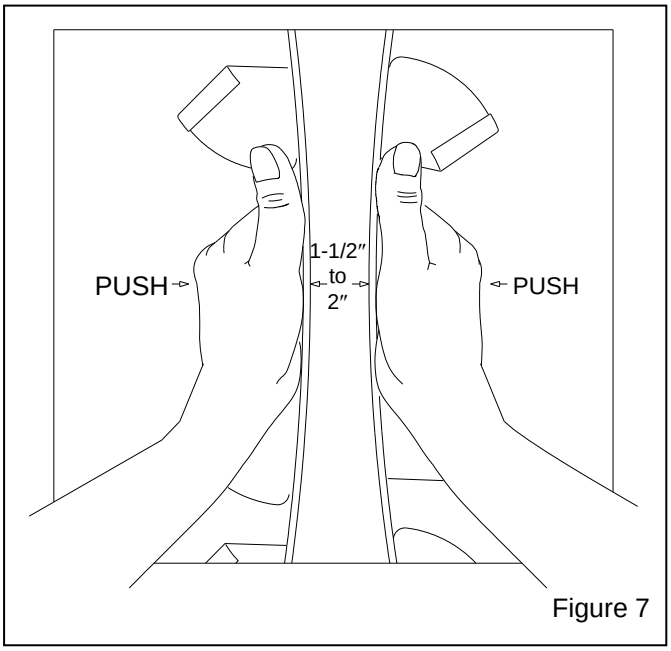


Figure 7

4.1.5 Check belt tension and adjust as required to obtain correct tension. Be certain to inspect for proper tracking after each adjustment. Once this tension has been established, reactivate the system.

4.1.6 After the final adjustment is made, belt tracking should be observed for several minutes to ensure there

is no long-term drift of the belt on either side of the pulley.

4.1.7 After the bucket elevator has run for several hours with no load, shut down the system and recheck belt tension.

4.2 Underspeed Monitor

4.2.1 Adjust the underspeed monitor as instructed in the underspeed monitor manual.

4.3 Slide Gate

4.3.1 If abrasive flow is either too great (more abrasive enters the elevator boot than the buckets can carry) or insufficient (abrasive build-up in the conveyor or inlet chute while buckets are nearly empty), the flow control slide gate should be adjusted.

4.3.2 When the slide gate is correctly positioned, the buckets pick up a small amount of abrasive on the upward swing at the bottom pulley. Binding at start-up indicates the slide gate is too high.

4.3.3 Lowering the slide gate reduces flow, raising it increases flow. Always tighten the locking bolt after adjusting the slide gate.

5.0 OPERATION

⚠ DANGER

Extreme care must be taken to keep hands, tools, clothing, etc., away from moving parts when loading abrasive and checking the operation of the elevator and companion equipment, especially around open cover plates and access doors.

5.1 Charge the system with abrasive while all components are running. Care should be used to ensure the system is not overfilled. Refer to manuals supplied with all companion equipment for abrasive capacity.

5.2 Check each segment to ensure abrasive is moving correctly, and that there are no abrasive leaks or spills.

6.0 MAINTENANCE

⚠ WARNING

Lockout and tagout electrical power to prevent activation of the elevator during service. Unanticipated starting of the elevator could cause severe injury.

6.1 Belt Tension and Tracking

6.1.1 During the first week of operation, check belt tension and tracking daily.

6.1.2 **T**hrough the first month, check belt tension and tracking weekly.

6.1.3 After the initial one-month break-in period, the elevator belt should be inspected monthly for wear and stretching. Adjust for stretch as covered in Section 4.1.

6.2 Belt Replacement

6.2.1 Shut off the elevator, and lockout and tagout the electrical power.

6.2.2 Remove the center leg access window.

6.2.3 Rotate the bucket elevator belt until the splice is visible through the access opening.

6.2.4 Adjust the take-up screws so that the top pulley is at its lowest position.

6.2.5 Attach a rope through the leg access opening, to the belt on the lower side of the splice. Tie the rope to prevent the belt from falling into the boot when the splice is removed.

6.2.6 Remove the splice bar assembly from the belt.

6.2.7 Enlist the aid of another person to work at the top access opening to help feed the belt over the top pulley, and prevent the belt from falling into the elevator.

6.2.8 Pull the upper end of the belt downward and out through the access window. Doing so will feed the rope under the lower pulley and up and over the top pulley while the old belt is being removed. Use the rope to prevent the old belt from falling as it is removed.

6.2.9 When the old belt is entirely clear of the elevator, attach the rope to the end of the new belt to facilitate installation per Section 3.8. NOTE! Check the direction of the buckets to be certain the belt is installed correctly. When the belt is installed, the open end of the buckets must face toward the discharge.

6.3 Pulleys

6.3.1 Every six months, inspect the upper and lower belt pulleys for wear. Replace the pulleys as needed.

6.4 Gear Reducer

6.4.1 Inspect lubricant level monthly.

6.4.2 Unless stated otherwise in the instructions supplied with the gear reducer, the lubricant should be changed after the first 100 hours of operation. Thereafter, lubricant should be changed every 6 months.

6.4.3 Recommended Lubricant

6.4.3.1 Follow the instructions supplied with the gear reducer.

6.4.4 Changing Lubricant

6.4.4.1 Drain oil and flush the gear case with an approved non-flammable, non-toxic solvent, and refill with an approved lubricant.

6.5 Bearing Lubrication

6.5.1 Lubricate the three idler bearings (one upper and two lower) with a good quality general purpose bearing grease every 6 months.

7.0 TROUBLESHOOTING

DANGER

S Some troubleshooting requires the elevator to be running. Extreme care must be taken to keep hands, tools, clothing, etc., away from the opening while the elevator is running. Any limbs, loose clothing, tools or any other articles, catching on a bucket or caught between the belt and pulley will cause severe injury. When elevator operation is not required, make sure an approved electrical lockout and tagout procedure is done to prevent activation of the elevator during service. Unanticipated starting of the elevator could cause severe injury.

7.1 Elevator Starts, But Shuts Down After Several Seconds.

7.1.1 Malfunctioning underspeed monitor. Check the adjustment and function of the underspeed monitor as instructed in the underspeed monitor manual.

7.1.2 Belt may be slipping. Check belt tension.

7.1.3 Check for obstructions at the inlet chute, discharge spout, or discharge hose.

7.1.4 Hardened abrasive in elevator boot. Clumps of hardened abrasive causes buckets to bind.

7.1.5 Motor overload or breaker tripped. Check the motor and electric circuit for malfunction.

7.1.6 Slide gate open too far. Too much abrasive entering the boot causes the buckets to bind.

7.2 Elevator Does Not Lift Abrasive.

7.2.1 Belt may be slipping. Check belt tension.

7.2.2 Check for blockage in discharge spout and discharge hose.

7.2.3 Flow control slide gate too low. Adjust per Section 4.3.

7.3 Elevator Making Excessive Noise.

7.3.1 Check for foreign object in elevator boot.

7.3.2 Check for loose buckets on belt.

7.3.3 Belt too loose. Check belt tension.

7.3.4 Belt may be off-center. Check belt tracking.

7.3.5 Check for worn pulley bearings.

7.4 Cannot Get Belt to Track

7.4.1 Belt is not spliced correctly. Refer to Section 3.9, Figure 5.

7.4.2 Rubber worn on top lagged pulley. Make sure rubber is in place and is in good condition.

7.5. Cannot Tension Belt (too much slack)

7.5.1 Belt too long. Lower take-up adjusting screws, separate the splice connection and remove excess belt. Re-splice belt ends.

8.0 REPLACEMENT PARTS

8.1 Bucket Elevator Assembly, Figure 8

Item	Description	Stock No.
1.	Motor, 1 HP 1725 RPM TEFC	02981
2.	Gear reducer 20:1	25473
3.	Pulley, top lagged 6" diameter x 4"	06386
4.	Drive shaft	05827
5.	Bearing, flange cartridge	06057
6.	Latch (each)	10290
7.	Hose, 4" bulk duct, specify length required in feet	00716
8.	Clamp, 4-1/2"	02806
9.	Belting, 4" wide, bulk, specify length required n feet	06414
10.	Splice bar assembly	06418
11.	Bucket, polyethylene, each.	06486
12.	Washer, 1/4" internal tooth lock	03118
13.	Bolt and nut, bucket	03119
14.	Gasket, adhesive backed, 5/16" x 3/4" specify length required in feet	00189
15.	Pulley, bottom wing, 8" diameter x 6"	06385
16.	Idler shaft	06409
17.	Door, center access	05854
18	Door, side access, 18 x 8	25256
19.	Underspeed monitor assembly	20217
	Refer to the underspeed monitor manual for individual replacement parts.	

Items without numbered called-outs are not normal replacement parts. Refer to the drawings supplied with the elevator for part numbers and descriptions of parts not listed.

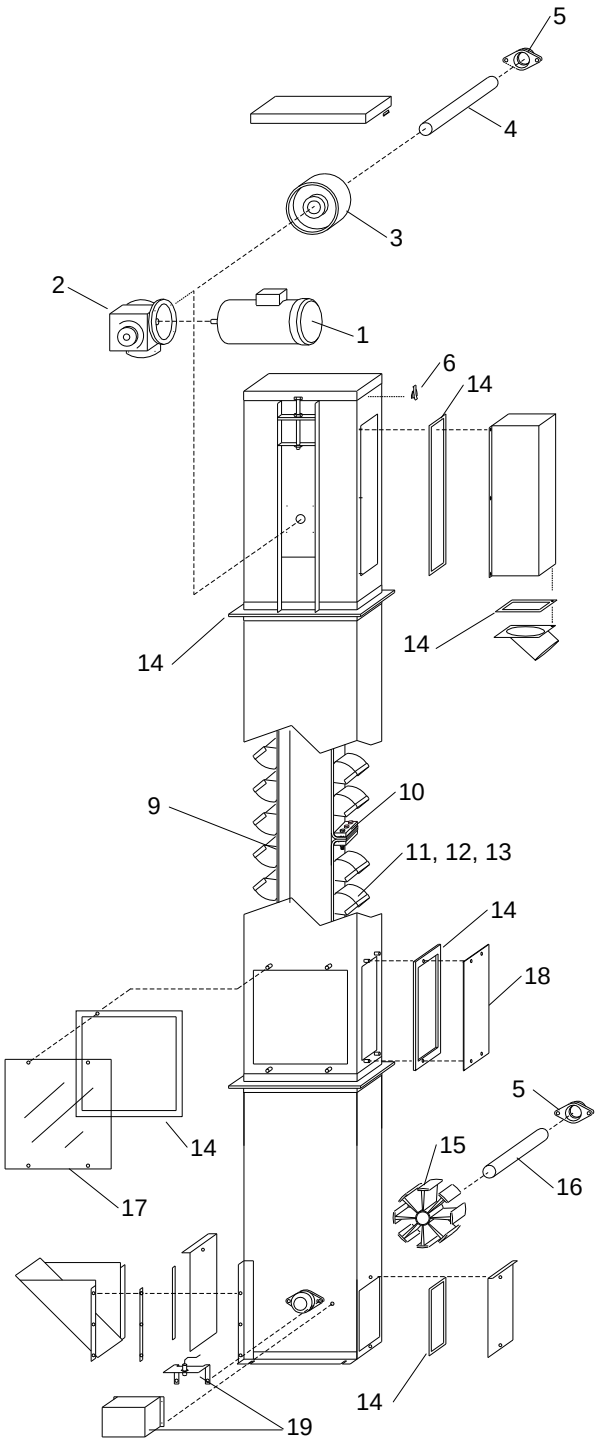


Figure 8