

# Bucket Elevator Installation and Operations Guide



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## **Introduction**

Thank you for choosing Grain Handler, USA, Inc. as the manufacturer of your new bucket elevator. We are pleased to have you as a customer and expect that you will enjoy many years of productive service from our product. Your Grain Handler bucket elevator has been designed to perform to a predetermined capacity. It must be correctly installed, maintained and operated in order to meet that capacity. This manual is designed to assist you during the installation process and with operation procedures.

Grain Handler offers bucket elevators with a capacity range from 2,000 to 15,000 BPH.

Options may include: service and rest platforms, ladder with cage, explosion vents on trunk, drive backstop, PVC belt, double or custom inlets. This manual contains general information intended to assist in the installation, startup, and maintenance of our standard bucket elevators. Details related to options that you may have on your specific unit that are not covered in this manual may be obtained from your Dealer or by contacting Grain Handler directly.

This manual suggests an outline of how a bucket elevator can be erected, however the specific method of installing it can partially depend on its size and height as well as the proximity to other structures and obstacles. Only qualified contractors should install this equipment. Grain Handler does not take any responsibility for the installation of this equipment. The responsibility of the proper installation lies with the installing contractor or Dealer. If the installer requires further assistance or advice they should contact the Dealer or Grain Handler.

## Service Inquiries

Identifying the specific piece of equipment is important when making inquiries regarding installation, operation, maintenance, warranty or parts.

Record the following information and keep it handy if you need to contact your Dealer.

Dealer Name:	
Office / Cell Phone:	
Local Service Tech's Name:	
Office / Cell Phone:	
Sales Order #:	Purchase Date:
Installation Date:	
Model (capacity and height):	

## Inspecting and Verifying the Shipment

At the time of delivery, verify and inspect the quantity and condition of all

Grain Handler		PACKING SLIP		DATE	5/12/2017
BILL TO:		SHIP TO:			
Dealer Name Here		Dealer / Customer Name & Address Here			
ORDER DATE	SALES ORDER #	PURCHASE ORDER #	CUSTOMER CONTACT		
3/20/2017	1234		Dealer PO # Here		
42" 15,000BPH x 145H Bucket Elevator NO MOTOR 100HP 3phase RIGHT SIDE Drive					
ITEM #	DESCRIPTION	ORDE R QTY	SHIP QTY	Weight	
Leg-Head-42	Leg Head 42" Slide Lagged Pulley 4-15/16" Shaft	1			
Leg-Boot-42	42" x 24" Leg Boot	1	1	1- 4/26/17	
Leg-Trunk-42-120	120" Leg Trunk 42" Leg 12ga.	26	26	3- 4/26/17	
Leg-Trunk-42-60	60" Leg Trunk 42" Leg 12ga.	3	3	3- 4/26/17	
Leg-Inspection-42	42" Leg Inspection Section	1	1	1- 4/26/17	
GH071	42" Dia Pulley Leg Trunking Angle	30	30	30- 4/26/17	
Cleveland-CGSM9-25	Cleveland Gear Shaft Mount Reducer CGSM9 - 25 to 1 Ratio	1			
Cleveland-CGSM9-4-7/16-Bushing	Cleveland Gear CGSM9 4-7/16" Bushing	1			
Cleveland CGSM9-Bckstp	Cleveland Gear CGSM9 Back Stop	1			
6843	22" Wide 3ply 450# Black Rubber Elevator Belt Punched (6) holes on 3-1/2" C	305		sent direct	
4646	20" x 8" CC-HD "Super Capacity" Blue Poly Bucket Standard Punching	405		sent direct	
4648	5/16-18 x 1-1/2" Zinc Plated Fanged Elevator Bolts w/Hex Nuts Flat & Lock W	2,500		sent direct	
4411	689.4 SF Sheave	1			
4426	6811.0 SF Sheave	1			
4427-2	5F 2-7/16 bushing	1			
4427-6	SF 2-7/8 bushing	1			
4633	8133 belt verify mock up	6			
	42/ trunk hdwe kit	68	68	68- 4/26/17	
1 case of silicone	silicone	1	1	1- 4/26/17	
		TOTAL:		3354	

the parts. Compare items to the packing list provided with the shipment. Hardware, including bolts, nuts, screws and other small clips or brackets may be divided into smaller packages.

In case of any shortage or

damage during shipment, note detail of the shortage or damage on the 'Bill of Lading' before you sign the shipment paperwork. File a claim with the carrier and also notify your Dealer.

Parts that are short or damaged are the responsibility of the delivering carrier, not the manufacturer or dealer.

	<b>CAUTION</b>
DO NOT USE PARTS THAT ARE DAMAGED. THEY MAY NOT BE STRUCTURALLY SAFE.	

However; damaged parts, especially leg casing and boot sections, may not be safe to use. Grain Handler needs to be notified of any damage before a determination can be made if any replacement parts are needed.

### Lifting Information

The elevator head base must be lifted using the lifting brackets. Do not attempt to lift using the handles on the cover. The head will not be perfectly balanced when lifting by the brackets depending on the size of motor used and whether it is installed prior to or after the lift. A come along tool or different length straps can be used to make it level when lifting.

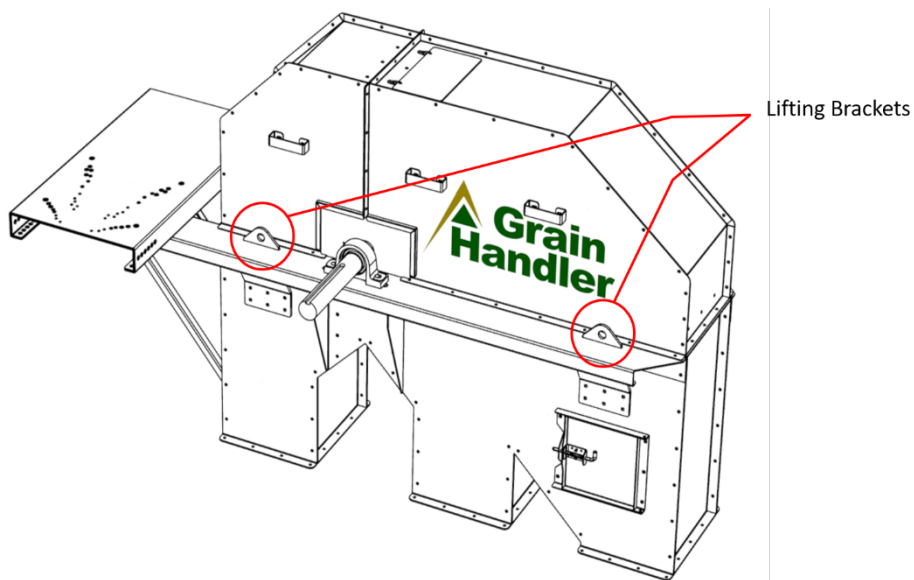


Figure 1 – Head Lifting Brackets

<b>Bucket Elevator Section</b>	<b>18" 2,000 – 3,000 BU</b>	<b>24" 3,750 – 5,500 BU</b>	<b>30" 5,500 – 7,500 BU</b>	<b>36" 8,000 – 11,000 BU</b>	<b>42" 12,500 – 15,000 BU</b>
<b>Boot Weight</b>	600 Lbs. 272 Kg	912 Lbs. 414 Kg	1,010 Lbs. 458 Kg	1,210 Lbs. 549 Kg	1,650 Lbs. 748 Kg
<b>Trunk Weight (per 10 feet)</b>	390 Lbs. 177 Kg	490 Lbs. 222 Kg	490 Lbs. 222 Kg	620 Lbs. 281 Kg	750 Lbs. 340 Kg
<b>Head Weight</b>	810 Lbs. 367 Kg	1,310 Lbs. 594 Kg	1,560 Lbs. 708 Kg	1,960 Lbs. 889 Kg	3,190 Lbs. 1,447 Kg
<b>Head Platform</b>	1,100 Lbs. 499 Kg	1,210 Lbs. 549 Kg	1,320 Lbs. 599 Kg	1,380 Lbs. 626 Kg	1,430 Lbs. 648 Kg.
<b>Distributor Platform</b>	440 Lbs. 200 Kg	440 Lbs. 200 Kg	440 Lbs. 200 Kg	550 Lbs. 250Kg	550 Lbs. 250Kg

### Motor Weights

	<b>3 – 5 Hp</b>	<b>7.5 – 10 Hp</b>	<b>15 – 20 Hp</b>	<b>25 – 30 Hp</b>
<b>Aluminum</b>	59 – 66 Lbs 27 – 30 Kg	102 – 114 Lbs 46 – 52 Kg	166 – 185 Lbs 75 – 84 Kg	NA
<b>Cast Iron</b>	88 – 94 Lbs 40 – 43 Kg	143 – 151 Lbs. 65 – 69 Kg	227 – 246 Lbs. 103 – 112 Kg	390 – 408 Lbs. 177 – 185 Kg

### Gearbox Weights

Weights below are for Cleveland units. Specific model depends on size of your bucket elevator and will be listed on the packing slip.

CGUSM4	CGUSM5	CGUSM6	CGSM7	CGSM8	CGSM9
139 Lbs. 63 Kg	207 Lbs. 94 Kg	285 Lbs. 129 Kg	462 Lbs. 210 Kg	633 Lbs. 287 Kg	760 Lbs. 345 Kg

# Bucket Elevator Components

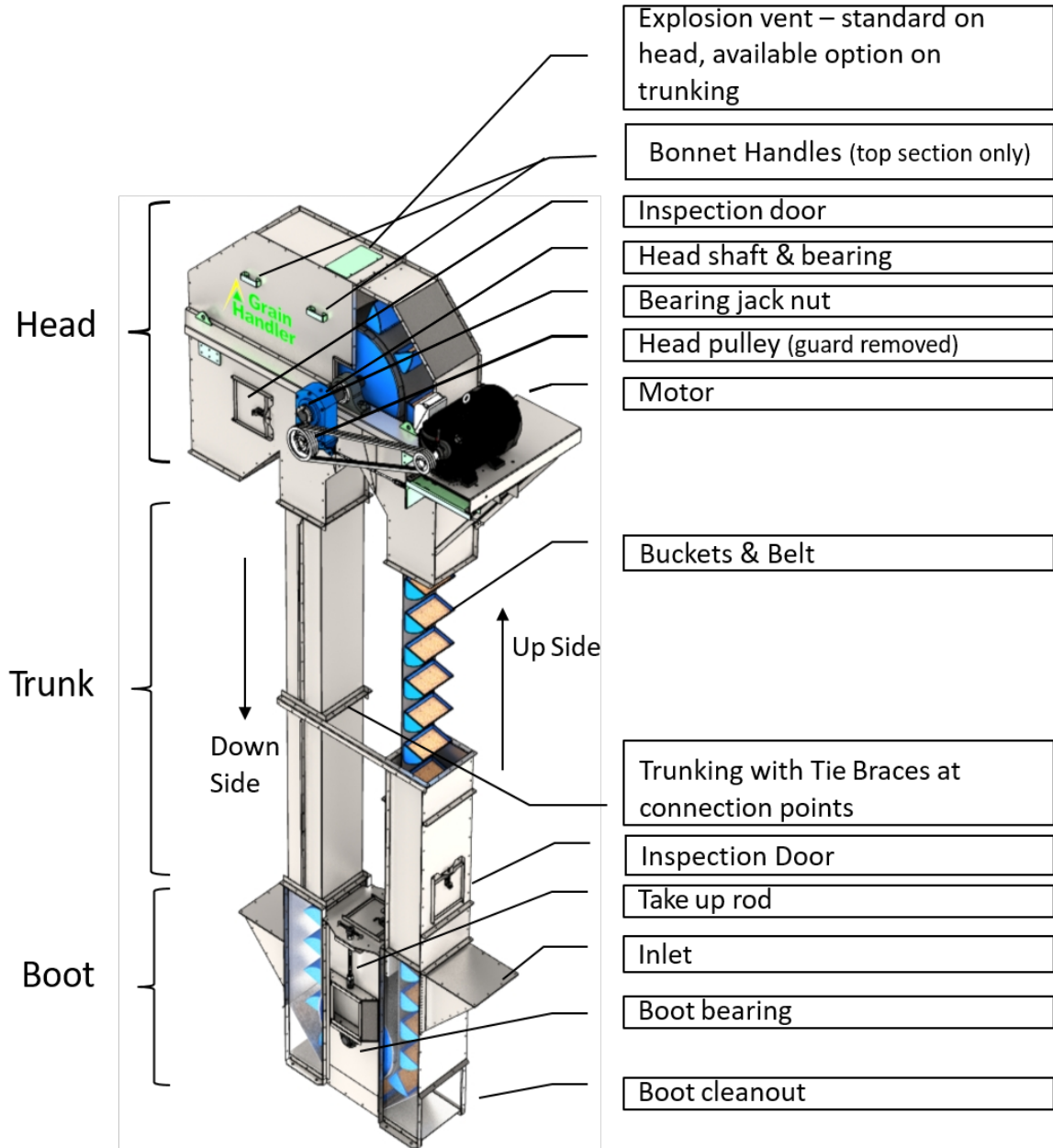


Figure 2 – Bucket Elevator Components



**Head:** Bolt Together Heavy Duty Galvanized G-90 Construction - Excellent for corrosion resistance and longevity. Shipped assembled.

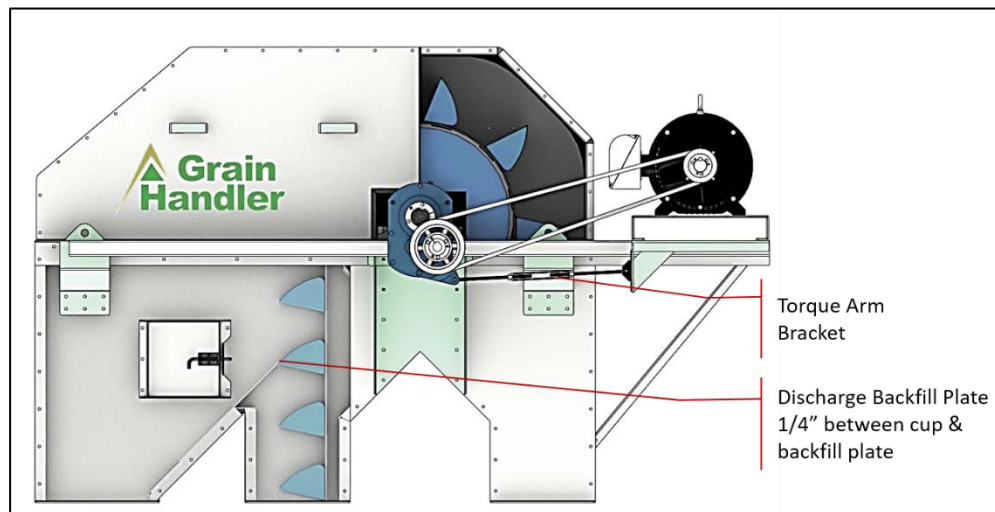
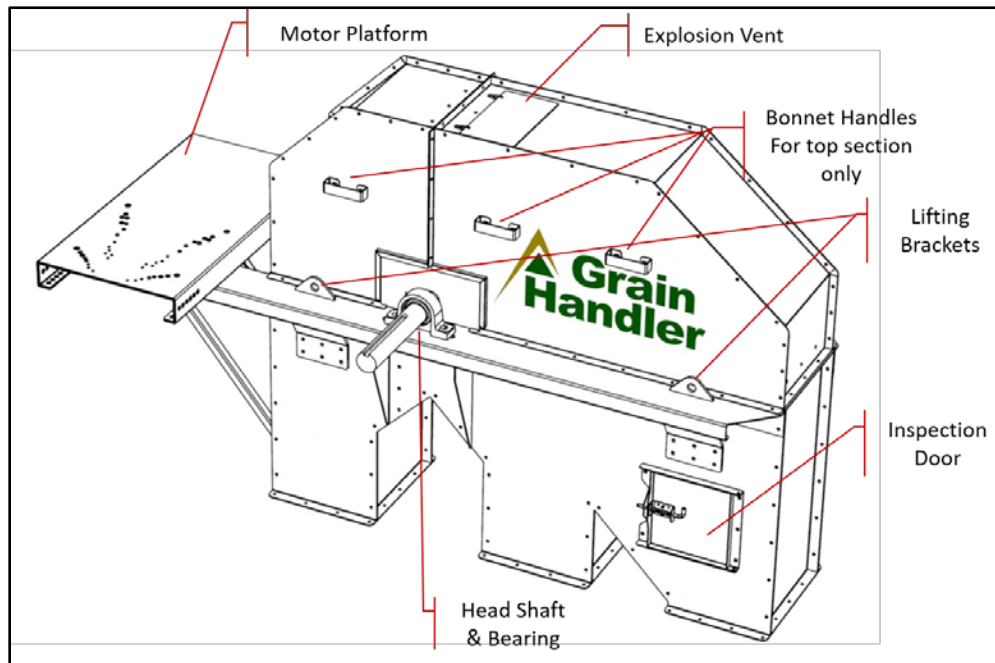


Figure 3 – Head Components

- Inspection doors standard on both sides of head section, gasketed and hinged for ease of access.
- Head Bearings - Standard Heavy Duty Dual Bearing Pillow Blocks
- Stress Proof Shafting
- Crown Faced Drum Style Head Pulley with SOF Holz Slide in lagging, for excellent traction, longer life, minimized downtime and ease of maintenance.

- Lined bonnet section with ¼" UHMW at weathertight points. Other lining options available: Urethane, or AR200
- Explosion vent on bonnet for pressure release

**Trunk:**

- Trunking – 12 ga. is standard on 42' and optional on 18', 24', 30' and 36'
- Belt – Rubber belt is standard, PVC is available upon request
- Explosion vents on trunk are available upon request

**Drive:**

- Standard is Cleveland, class 2; Dodge or other drives available upon request.
- Backstop is available upon request.

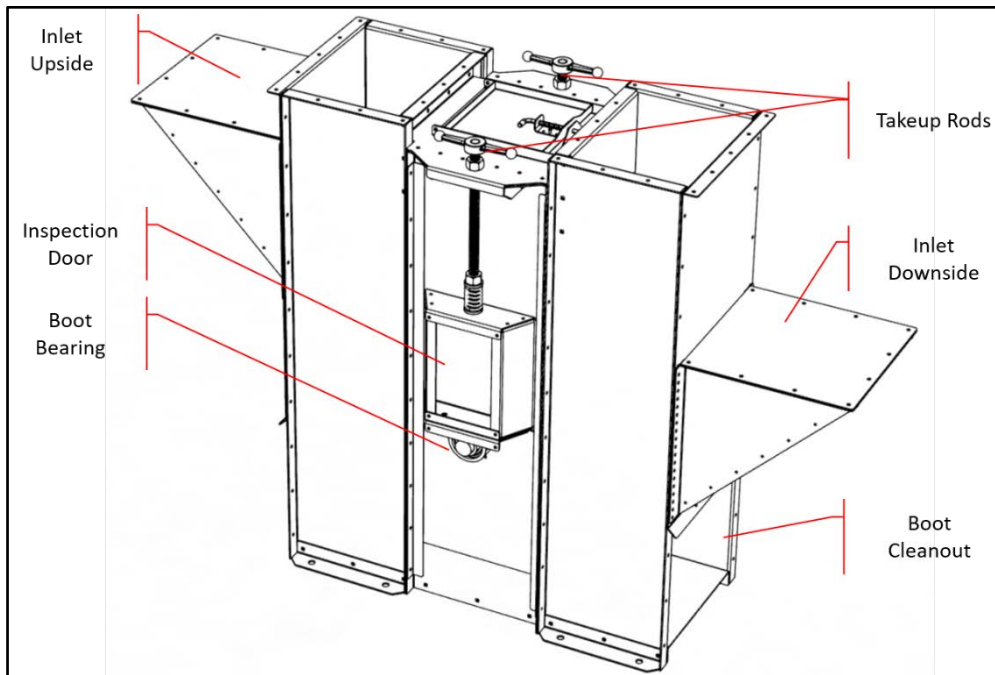


Figure 4 – Boot Components

**Boot:**

- Take up rod is 1" ACME zinc plated.
- Inlet – single is standard, double or custom are available upon request
- Wing type boot pulley is standard on all

## Safety Guidelines

It is the responsibility of the owner/operator to know what requirements precautions and specific hazards exist and make these known to all personnel working with the equipment or in the area. Failure to read this manual and follow the safety guidelines can cause misuse of the equipment and may lead to serious injury or death.



**ALERT:** This is a safety alert sign. It is used to help identify safety hazards that could injure or kill if not avoided.



**DANGER**

**DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING**

**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.






**CAUTION**

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

## Safety Responsibilities

Always operate equipment in accordance with these instructions and those contained on the caution labels affixed to the equipment.

-  The Bucket Elevator must not be operated unless all covers and/or guards for the leg and drive unit are in place.
-  If you need to open the leg for inspection, cleaning, maintenance or observation, the electric power to the motor driving the leg must be **LOCKED OUT** in such a manner that it cannot be restarted by anyone, however remote the area, until the leg covers or guards have been properly replaced.
-  All **ROTATING** equipment such as drives, gears, shafts and couplings must be guarded by the purchaser/owner as required by applicable laws, standards and good practices.

- ⚠ Do not attempt to clear a jammed piece of equipment until power has been LOCKED OUT.
- ⚠ Feed openings for shovel or front end loaders shall be constructed in such a way that the opening is covered by a grating.
- ⚠ Do not attempt any maintenance or repairs of the equipment until power has been locked out.
- ⚠ Do not place hands, feet or any part of your body in the equipment.
- ⚠ Do not use equipment for any purpose other than it is intended.
- ⚠ Keep area around equipment control station free of debris and obstacles and maintain good lighting around all equipment.
- ⚠ Eliminate all sources of stored energy (materials or devices that could cause the equipment to move without power applied) before opening the equipment.
- ⚠ Do not attempt field modification of equipment or components.
- ⚠ Do not be limited to these safety guidelines.

**Safety Decals**

Labels have been put on the bucket elevator. Do not remove, deface or paint over them. Contact Grain Handler if replacements are needed



## Warning Label Locations

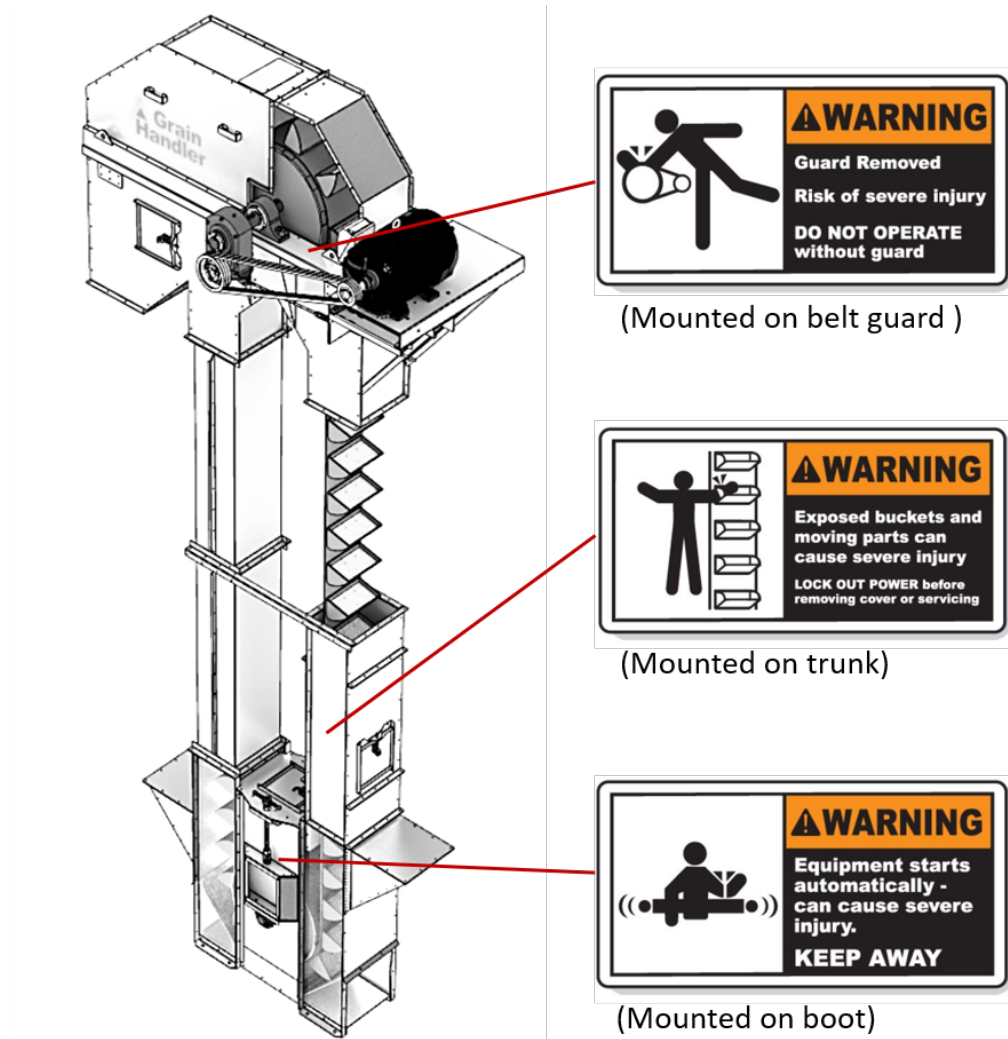


Figure 5 – Warning Label Locations

## Hardware & Tools

1/2 Impact Socket Set:	3/8 to 1-1/8
Alignment Punches:	Two – 3/16 point punches per install person
Allen Sets:	Large and small sets are necessary as there are many different sizes needed for set screws and electrical main breakers
Bits:	Ten 5/16 bits and Five 3/8 bits
Bolt & Nut Apron:	One per installer
Carpet Knife:	Or Saw for cutting the belt
Climbing:	Safety harnesses with three way lanyards
Come Along Winch:	Four, two ton
Cordless Impact Wrench:	1/2" with 1/2" socket (one per installer)
Drill:	5/16" bit (one per installer)
Extension Cords:	Two 100' and two 50'
Hammer Drill:	3/4" and 1/2" bits
Hammers:	One sledge, dead blow and assorted smaller
Impact Socket Wrench:	3/4"
Ladders:	Two 12'
Level:	One 48"
Metal Saw:	One
Nut Driver:	Three 5/16 and three 3/8
Pipe Wrenches:	Two 36"
Power Tools:	Drill, Impact Wrench, Grinder
Screw Drivers:	Phillips size #2, Flat head Small, Medium & Large; Jewelers size flat head
Tag Lines:	Two 100'
Spreader Bar:	To bolt to belt for initial installation
Square (framing):	54"
Tape Measure	One 100' and One 25'
Tool lanyards:	Two per outside and inside installer
Vice Grips:	Two regular and Two C Clamp Style
Welder:	With generator and welding clamps
Winch:	For pulling belt
Wrenches / Sockets:	1-1/8", 3/4", 9/16", 1/2" (per installer), 7/16", 3/8", 1/4", 3/16", 5/32", 1/8", 3/32 crescent

## **Preparation**

### **Electrical**

Check local codes before installation. Electrical work must be done by a qualified electrician in accordance with all applicable electrical codes.

When using this piece of equipment in conjunction with other pieces of equipment, the system needs to be interconnected. It should be designed so when any one piece of equipment shuts down or fails, the preceding equipment will also stop. This can help avoid injury and unnecessarily damaging other equipment.

- ⚠ Use lock out/ tag out whenever performing service on the equipment.
- ⚠ A disconnect switch must be provided and located as close as possible to the bucket elevator and at the top near the motor.
- ⚠ Check rotation before using.

### **Structural System**

This bucket elevator is designed to support its own vertical weight, but must be laterally supported. There are 3 common methods that are used for support:

1. A system of guy cables.
2. Brace to nearby capable structures.
3. A towersystem.

Consult a qualified structural engineer to determine how this can best be done.

Keep in mind the bucket elevator is not designed to handle the additional load of distributors or other equipment. That equipment must be independently supported.

### **Concrete Design and Construction**

Grain Handler recommends that you consult with a local Civil Engineer for concrete specifications as soil conditions, environments and regulations will change by location. Using soil borings to determine the allowable soil bearing capacity, a professional engineer will need to be consulted to design the foundation slab. Grain Handler recommends a minimum of 4,000 PSF soil. All suggested foundation designs must be approved by a licensed engineer in order to meet local governing building codes and local soil and weather conditions.

The finished floor surface must be level at the base plate location.



Low spots without adequate shimming can cause structural damage to the Grain Leg and create safety issues. Faulty concrete or missing shims will void the warranty.

### **Boot Location**

Plan the exact location of the boot. The bucket elevator will need to have enough access that it can be properly spouted and fed. Make sure there is enough room around the bucket elevator for future service.

### **Elevator Foundation**

The footing must be designed by a qualified structural engineer. The footing must be capable of supporting weight of the leg, weight of the product, and wind loads among other factors. Consideration should also be taken for rain and snow runoff.



## Assembling the Leg



### CAUTION

This equipment should be installed by skilled millwrights.

### Stage Components

Components should be staged in the order in which they will be installed. Pre-assembling some sections of leg casing can save crane time.

### Setting the Boot

The boot is shipped fully assembled. The entire weight of the leg, including accessories and the weight of the grain in transit is supported by the boot section. The boot must be fixed securely to an engineered concrete base. Mounting plates are built into the boot section.

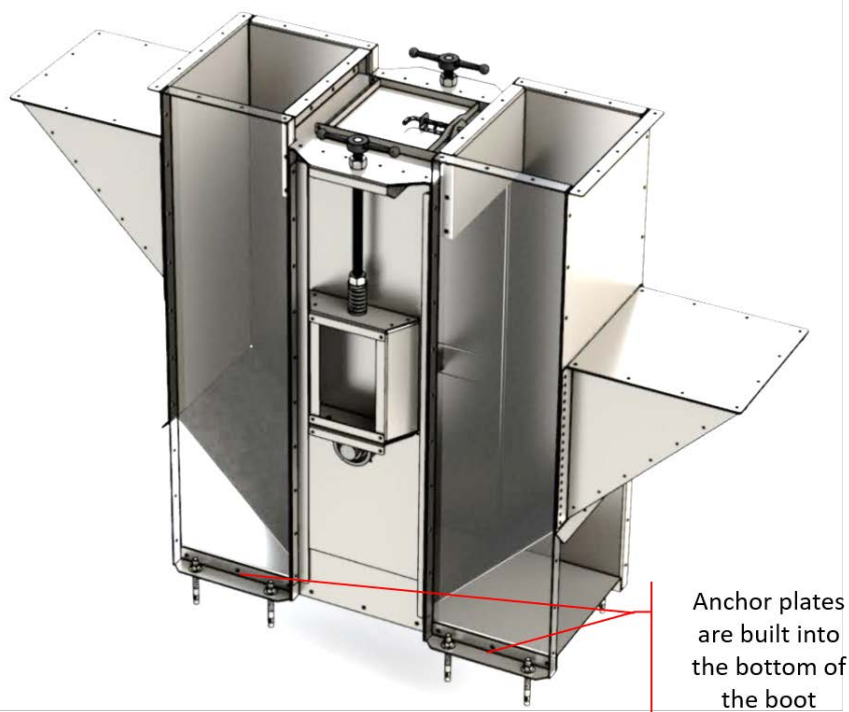


Figure 6 – Boot Anchor Plates

The preferred anchoring method is to embed a minimum of 4 anchor bolts on each side into the concrete base. Recommended bolt is a 5/8"x6" zinc-plated steel stud anchor for concrete.

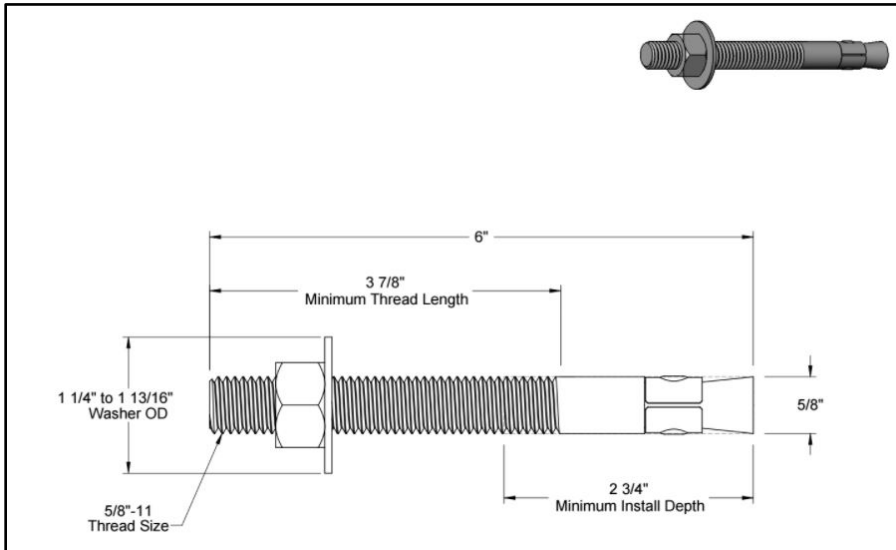


Figure 7 – Anchor Bolt

To seat properly the boot and the foundation must be free of debris.

The pulley will be shipped all the way in the down position.

Raise the pulley to its highest level by turning the take up rods.



**Before continuing make certain the boot is absolutely level.**

### **Attaching the Inlet Hopper**

The method and location of intake openings in the boot usually will have been determined when the elevator was ordered. Grain Handler bucket elevators are designed to feed on the "up" or "down" side of the leg. Free flowing materials can be fed on either the up or the down side. Light fluffy materials are best fed on the down side. When designing the feeding equipment, make every effort to ensure that the direction of the flowing material will be perpendicular to the buckets. Reduce or eliminate any side loading of the buckets. Achieving the bucket elevators rated capacity is determined by even and consistent bucket fill.

**Upside Feed:** When attaching the inlet to the upside it should be installed all the way up on the boot or at least so the bottom of the inlet is at, or above the centerline of the pulley. The device which feeds the elevator, (auger, belt conveyor, spout, hopper, etc.), must feed the material into the boot ABOVE the centerline of the pulley. The buckets must complete the turn around the pulley and be moving vertically upward, not at an angle, before encountering the material to be elevated. If the buckets ARE NOT moving vertically upward when they pick up the incoming material, material will be forced back into the infeed device or chute. Grinding and churning in the boot area will damage the product and excessive power will be required to operate the system; and capacity will be reduced.

**Downside Feed:** When attaching the inlet to the downside, it should be installed as far down on the boot as possible or just above the clean out door.

**Discharge:** Spouting to carry off the material must be sized so that its capacity equals or exceeds the maximum capacity of the elevator to prevent material plugging in the head or back legging. The bucket elevator *is NOT* designed to support the weight of any accessory equipment. Spouting, cleaners, distributors, etc. must have their own supporting structures.

*NOTE: You may choose to attach the inlet hopper toward the end of the project to avoid having to work around it as the other sections are installed.*

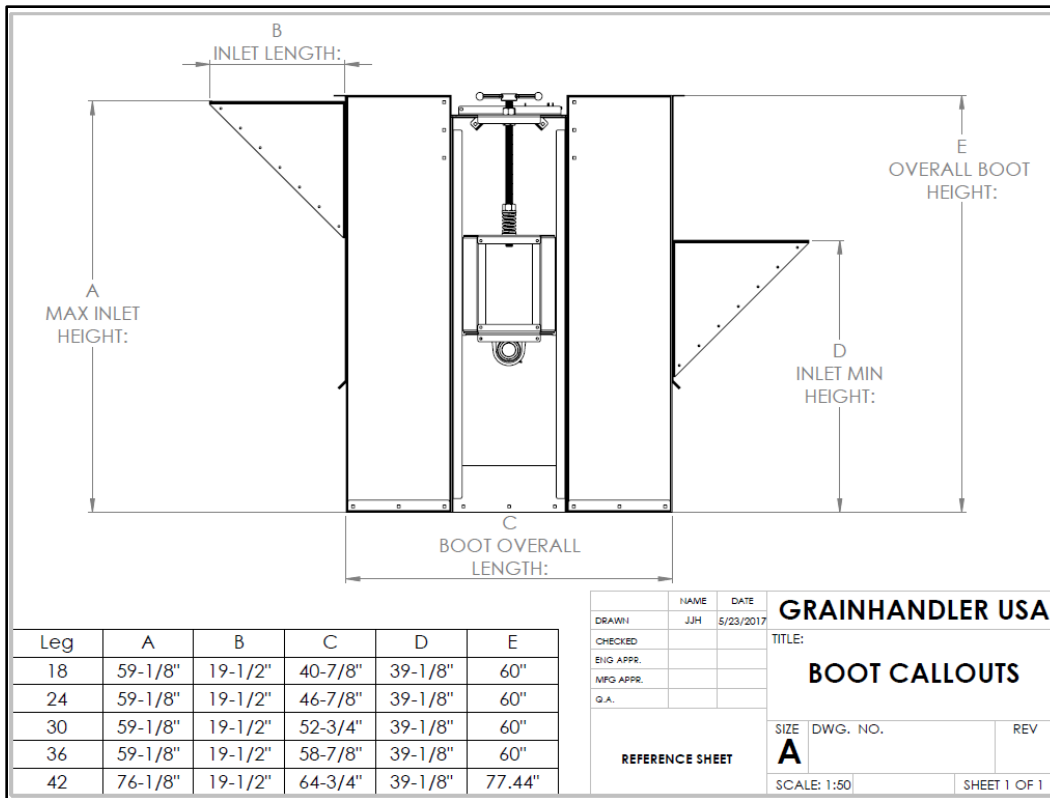


Figure 8 – Maximum and Minimum Inlet Heights



The boot must be securely fixed before any trunking can be installed.

## Installing the Trunk Sections

Check the quantity and length of each trunk section before starting. The trunk sections should be arranged in the order in which they will be installed. The trunk sections are shipped in as many ten foot sections as possible with a five foot heavy gauge inspection section at the bottom; and a custom length section depending on the finished discharge height requested.

The inspection door section should be installed in the up side of the leg and

will be located as close to eye level as possible depending on the size of the bucket elevator.

The inspection trunk section is made of 12 gauge galvanized steel. This is heavier than other trunk sections so that the large panel can be removed to pull and splice the belt.

Other trunk sections are 14 gauge on the 18, 24, 30 and 36 inch models; with the option to have 12 gauge on all sections. The 42" model has 12 gauge steel for all trunk sections as standard.

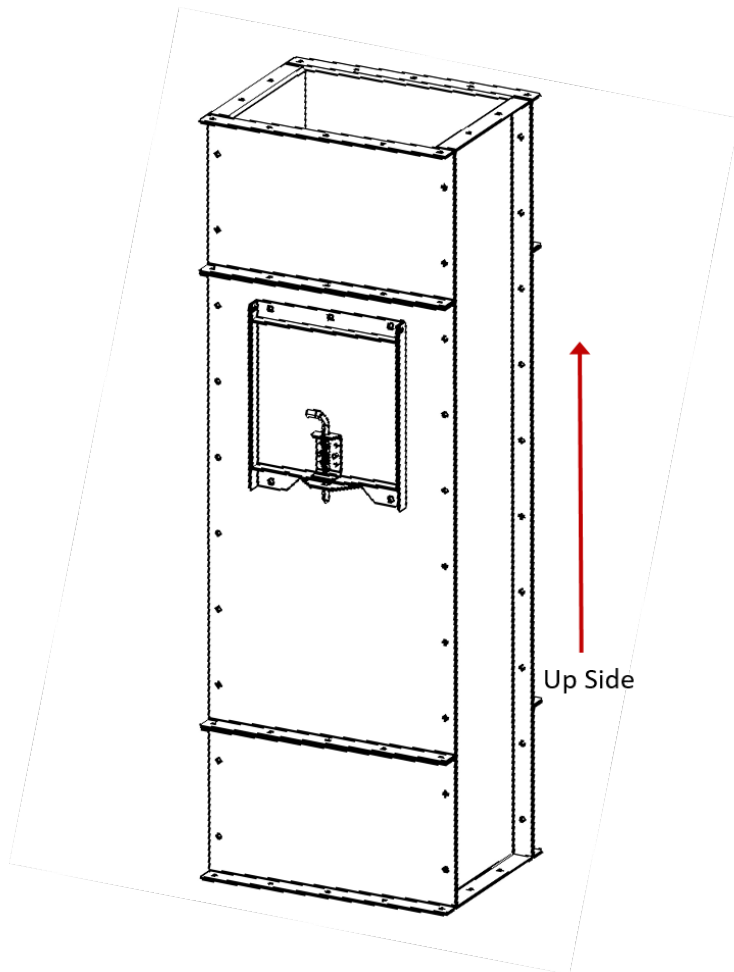
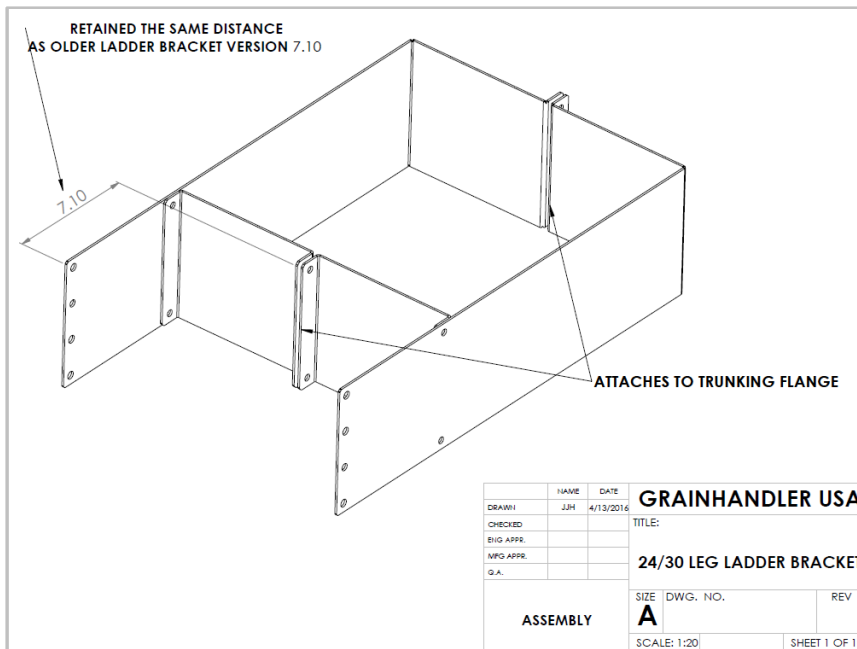


Fig 9 - Inspection Section



When installing trunks of varying gauge metal, ensure that the heaviest gauge sections are installed at the bottom.

Each section of the trunk must be plumb, level and straight as it is installed. It is common to find minor deviations in these types of fabricated assemblies. Most often they can be corrected by rotating the section 180° or turning end for end. If this does not solve an out of level or out of plumb condition it will be necessary to use metal shims and caulk the resulting gap. When a gap occurs in a corner of the casing, metal shims should be used and should extend a minimum of six inches in both directions. Insure that shims do not project inside of casing. **Each intermediate section must be plumbed to less than 1/8" deviation before proceeding to the next section.** Casings must be braced or anchored to a rigid structure every 20 feet and not more than 4 feet below the head section. If a rigid structure is not available, guy wires may be used with the same spacing. The leg needs to be laterally supported as it is assembled. Cross braces should be installed on top of the trunking flanges. The bolts should be tightened evenly making sure the trunk is not twisting. Plumb trunk sections in all directions as they are assembled and check again when the installation is complete.



Ladder brackets bolt onto the braces using pre-punched holes.

Fig 10 – GH6510 Ladder Bracket

If you have ordered trunking with the optional explosion vents, contact your Dealer or Grain Handler for correct placement of those sections.

### **Ladder and Safety Cage**

Optional ladder and safety cages bolt onto the tie braces and can be installed as the leg is erected. The configuration of your site determines whether a ladder is needed. For example, if you have two bucket elevators side by side, only one ladder is needed. If you have a tower with stairs and work platforms, no separate ladder would be needed for the bucket elevator. The ladders and cages are shipped in 10 foot sections (or custom length sections depending upon the size of your bucket elevator). Each section is attached on site.

A length of ladder will lead up to a platform and extend upward through the platform opening to the level of the platform's top rail.

The total lengths of safety cage will not equal the total lengths of ladders when rest platforms are used. The bottom edges of the hoops are spaced approximately 7 feet above the floor level of the platforms.



The bottom of the ladder, whether at ground or grade level, should be surrounded by a lockable safety cage or otherwise arranged to prohibit access to unauthorized personnel.

## Attaching the Head Section

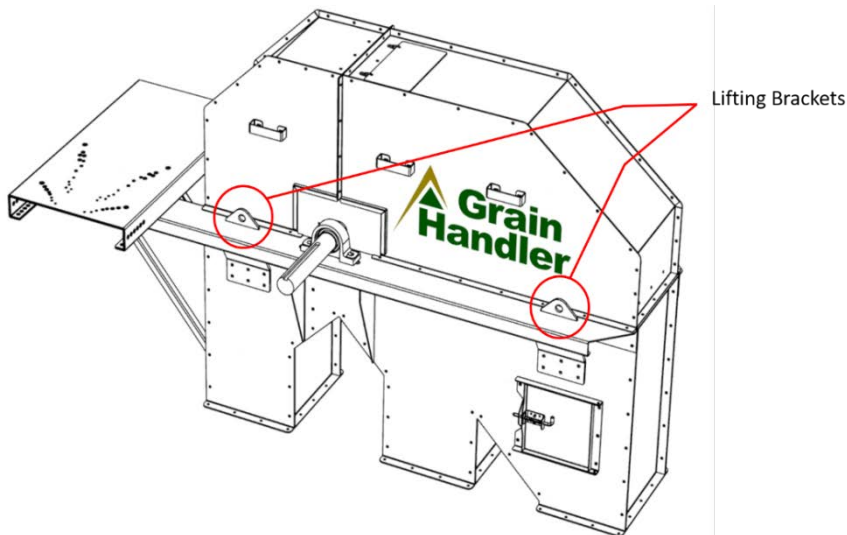
The Head section must be lifted by the head lifting brackets located at the join between the hood and base of the head. Take extra precaution when handling the head section, as it is top heavy and has the potential to tip over. The hood can be left on while lifting but will need to be unbolted and slid open to level the pulley and for installation of the belt.

After the Head section has been installed the head pulley must be leveled. Level the head pulleys with the guy cable or tower mounting angles as close as possible. Use shimming the bearings as a final “fine tuning” of the head pulley tracking. Too much misalignment of the double row bearings can cause premature bearing wear. The pulley is crowned. Level off of the shaft. If this is not possible, set level on top of equally thick spacers placed on the outer edge of the pulley.



The elevator head base must be lifted using the lifting brackets. Do not attempt to lift using the handles on the cover.

The head will not be perfectly balanced when lifting by the brackets depending on the size of motor used and whether it is installed prior to or after the lift. A come along tool or different length straps can be used to



make it level when lifting. Never lift with only one support point.



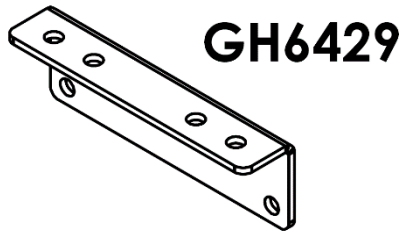
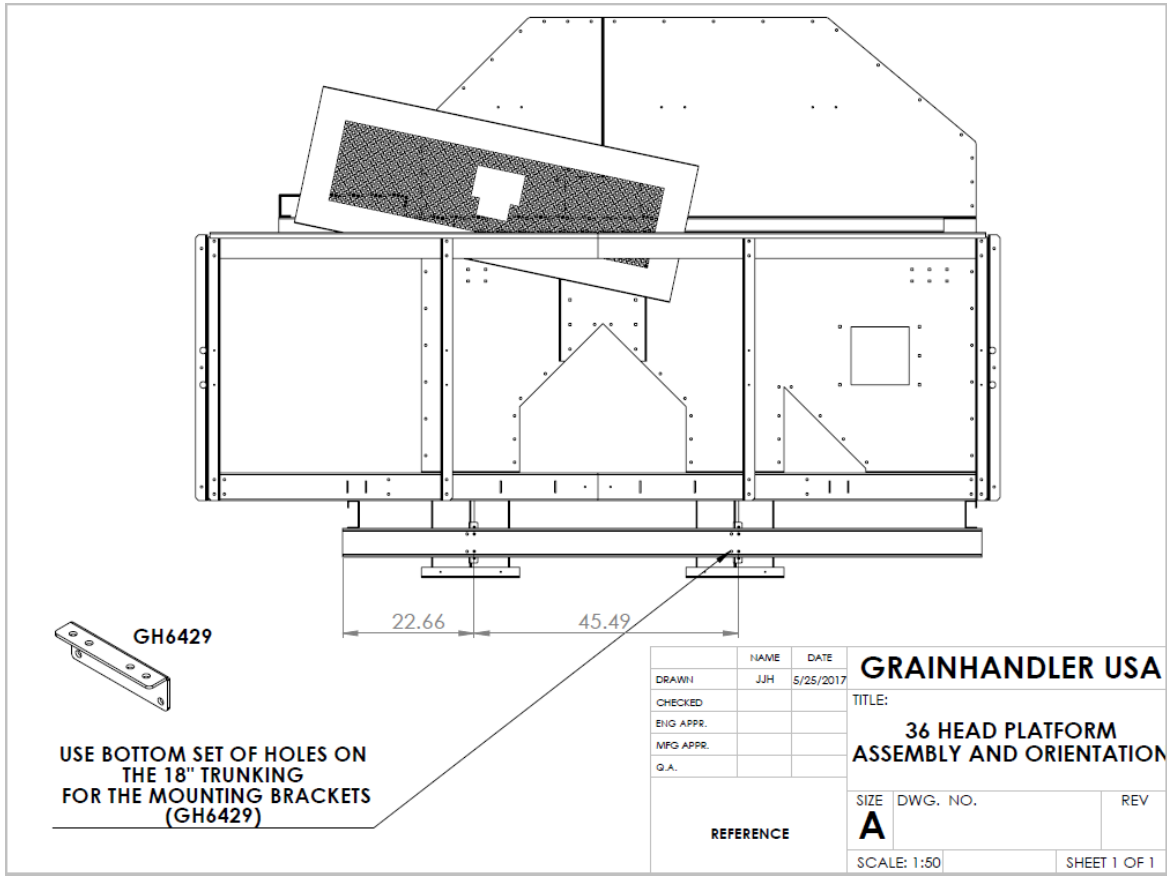


Figure 12 – Head Mounting Bracket

## Platforms

### Main platform assembly

The base is shipped already assembled. Uprights and handrails are usually attached onsite. The following drawings are for a 36' bucket elevator. Sizes of individual parts may vary depending upon the size of your specific elevator.

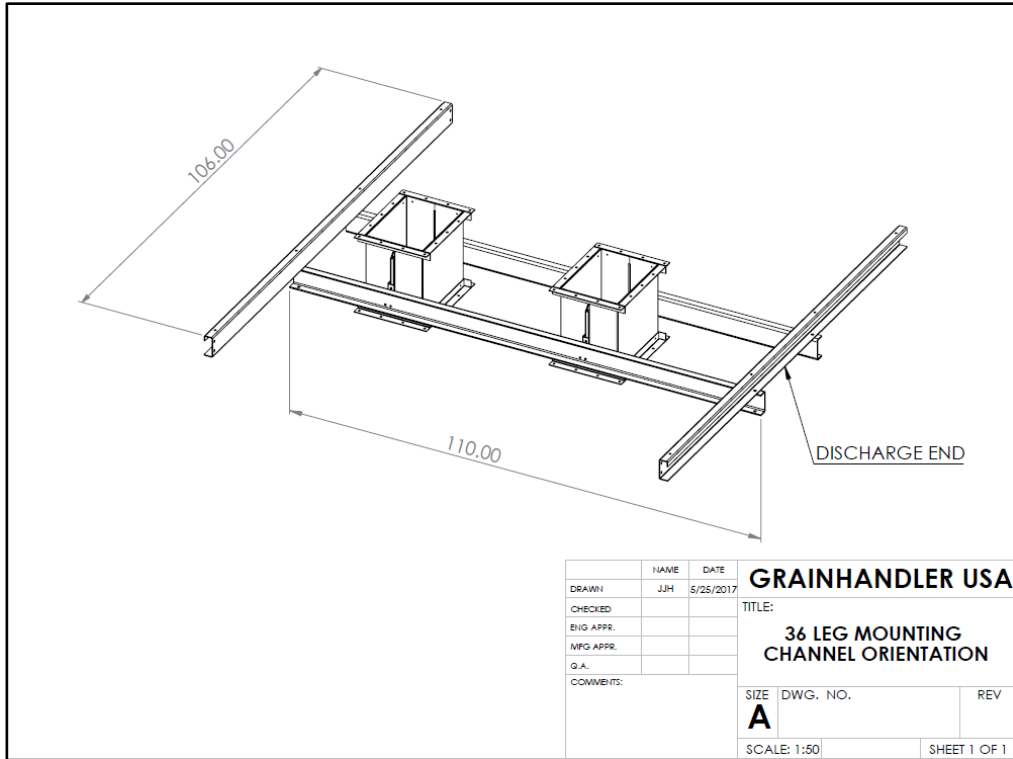
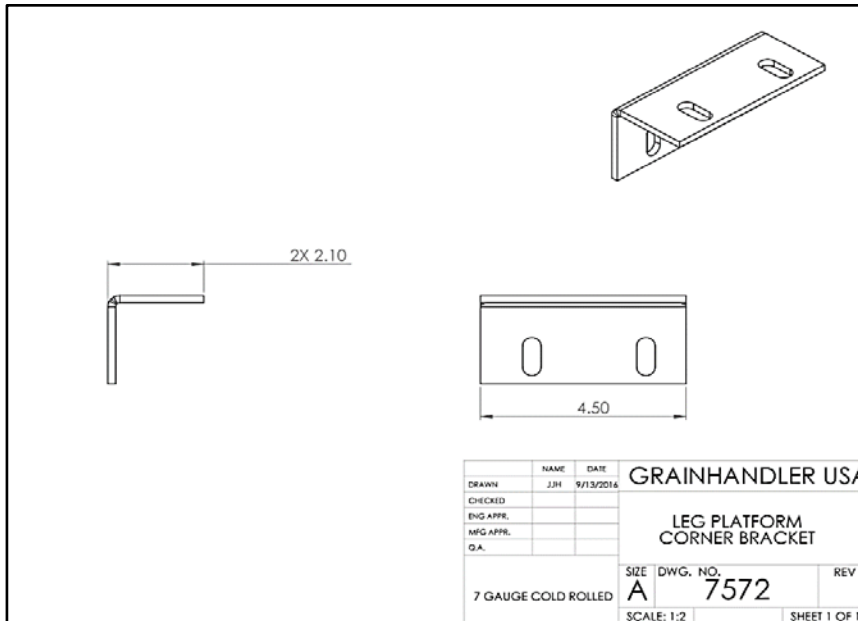
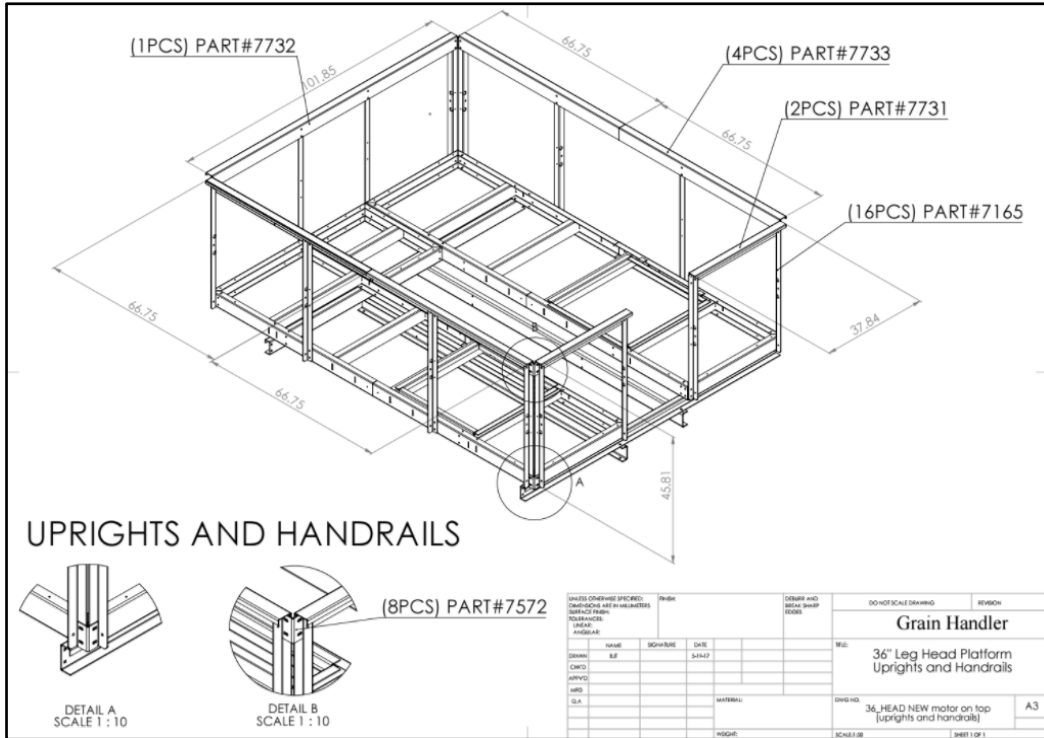
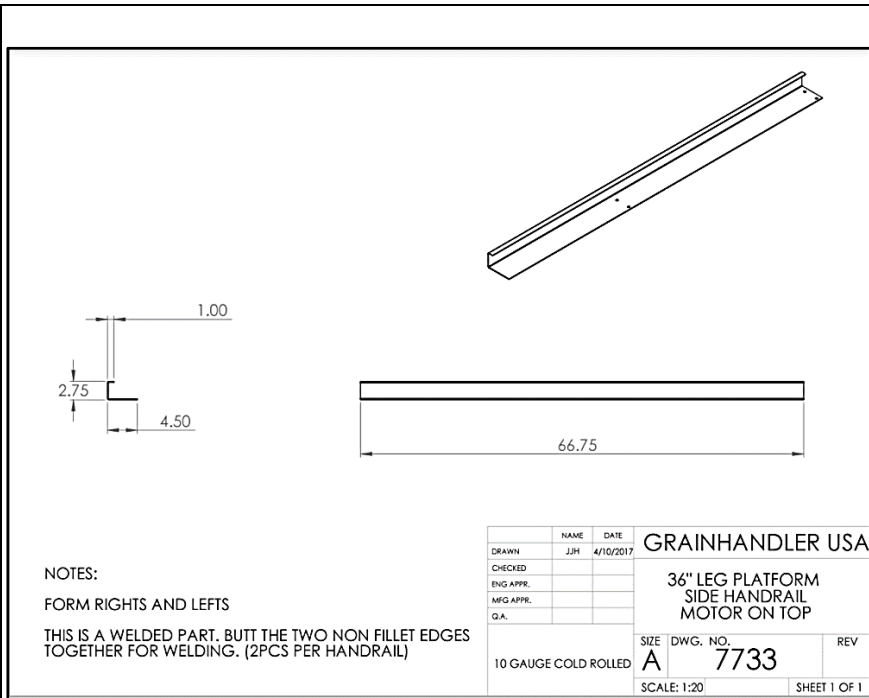


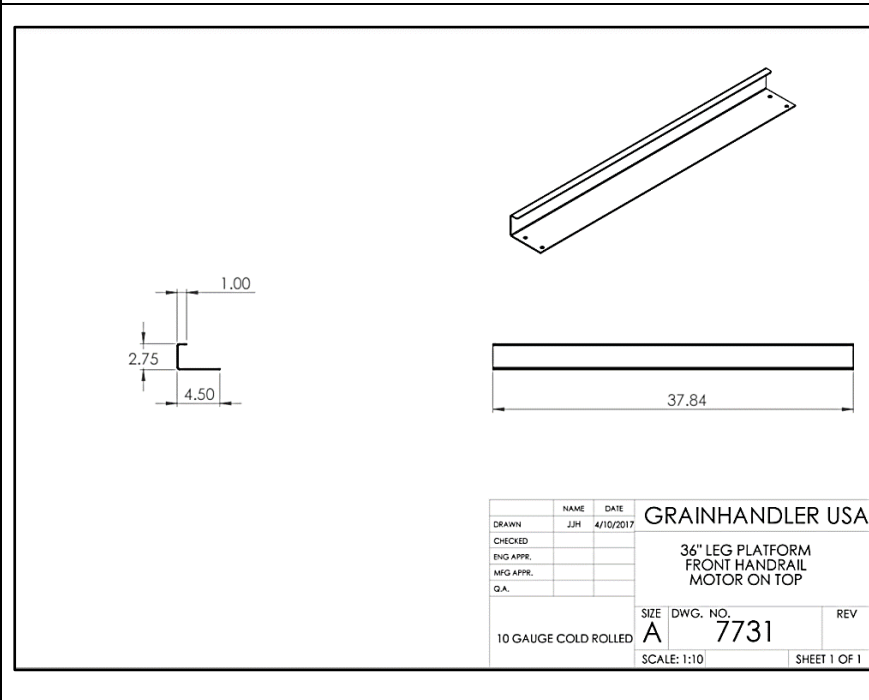
Figure 13 – Head Platform Mounting Channel

Figure 14 – Head Platform Uprights, Handrails, Corner Brackets

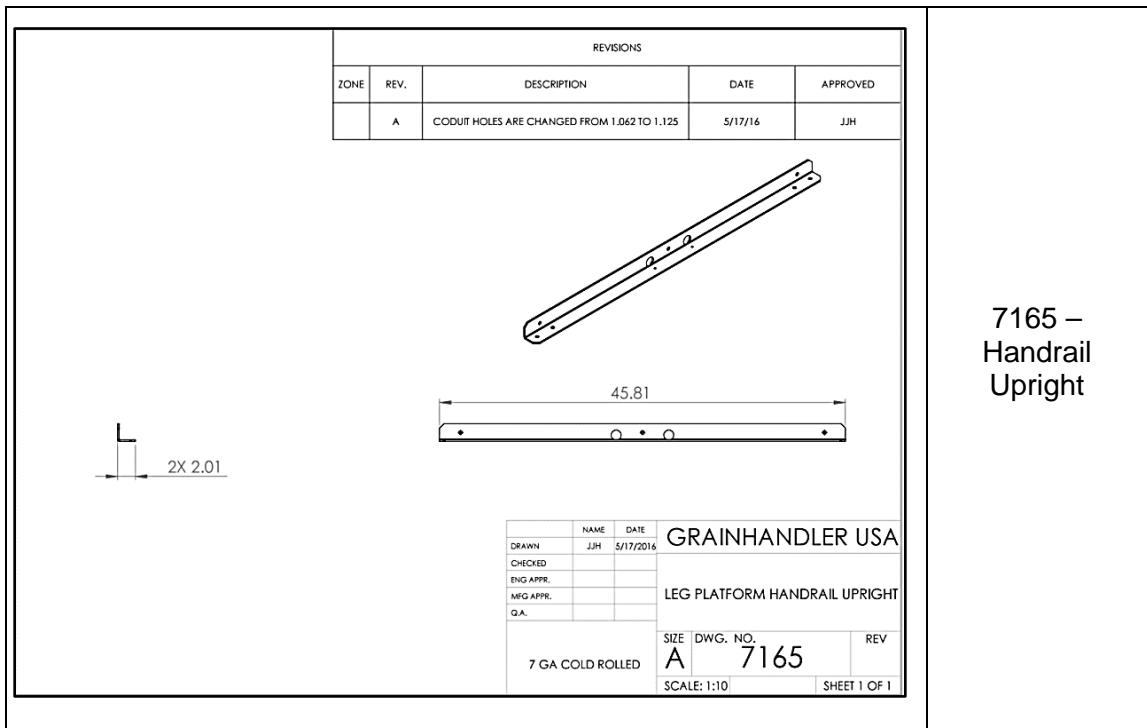




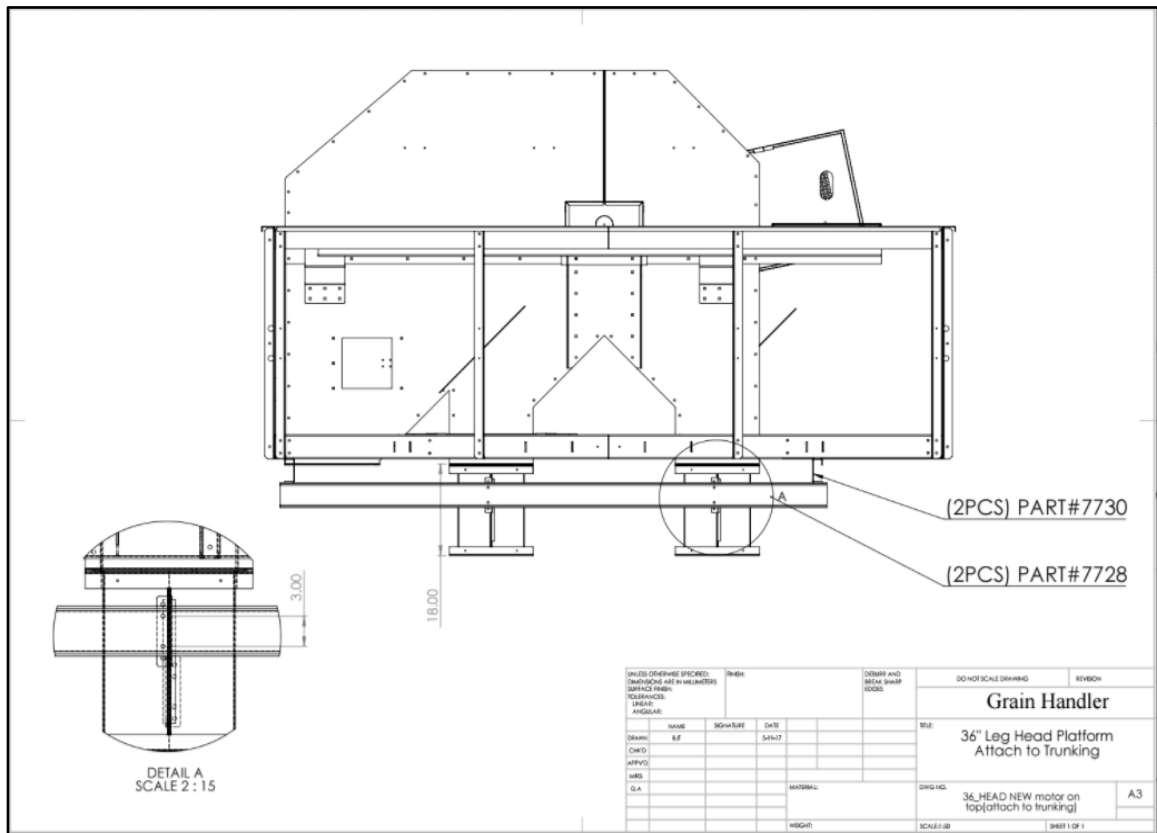
7733 – Side Handrail 36" Leg Platform



7731 – Front Handrail 36" Leg Platform



7165 –  
Handrail  
Upright



Main Platform support cross channels are bolted to the trunk and platform.

## Distributor Platform

Base will be shipped already assembled. Uprights and handrails will be assembled onsite. The following drawings are for 36' and 42' bucket elevators. Sizes of individual parts may vary depending upon the size of your specific elevator. It is important that a strong support be installed under the distributor before installing spouting, distributor controls, etc. The added weight of spouting hanging from the distributor can pull the elevator casing out of plumb and cause damage to casing if extra support under the distributor is not provided. It is suggested that a tower or similar structure be used for support. Spout arrangement should be carefully planned to avoid uneven weight distribution.

Note: Be certain to allow ample distance between the platform and the distributor to allow for easier servicing.

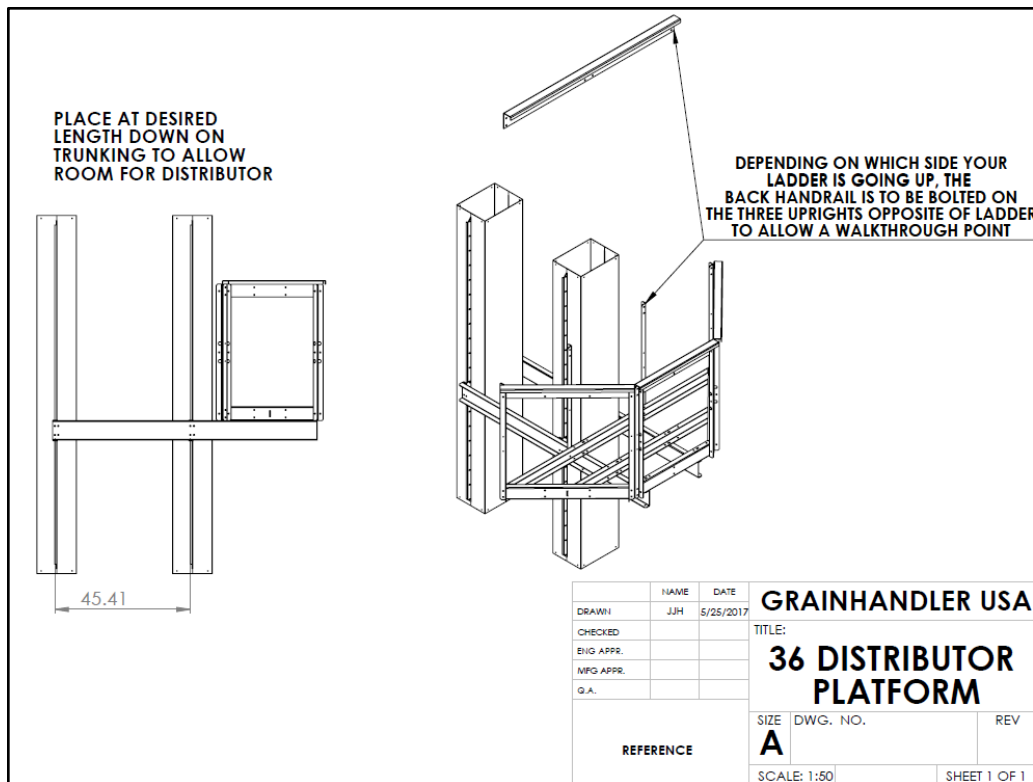
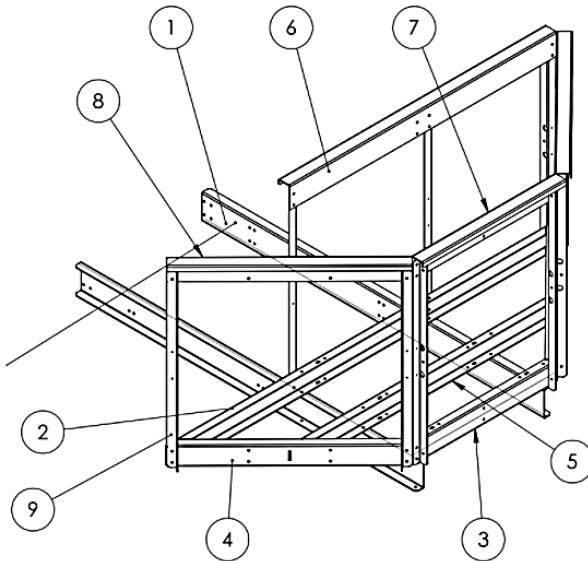


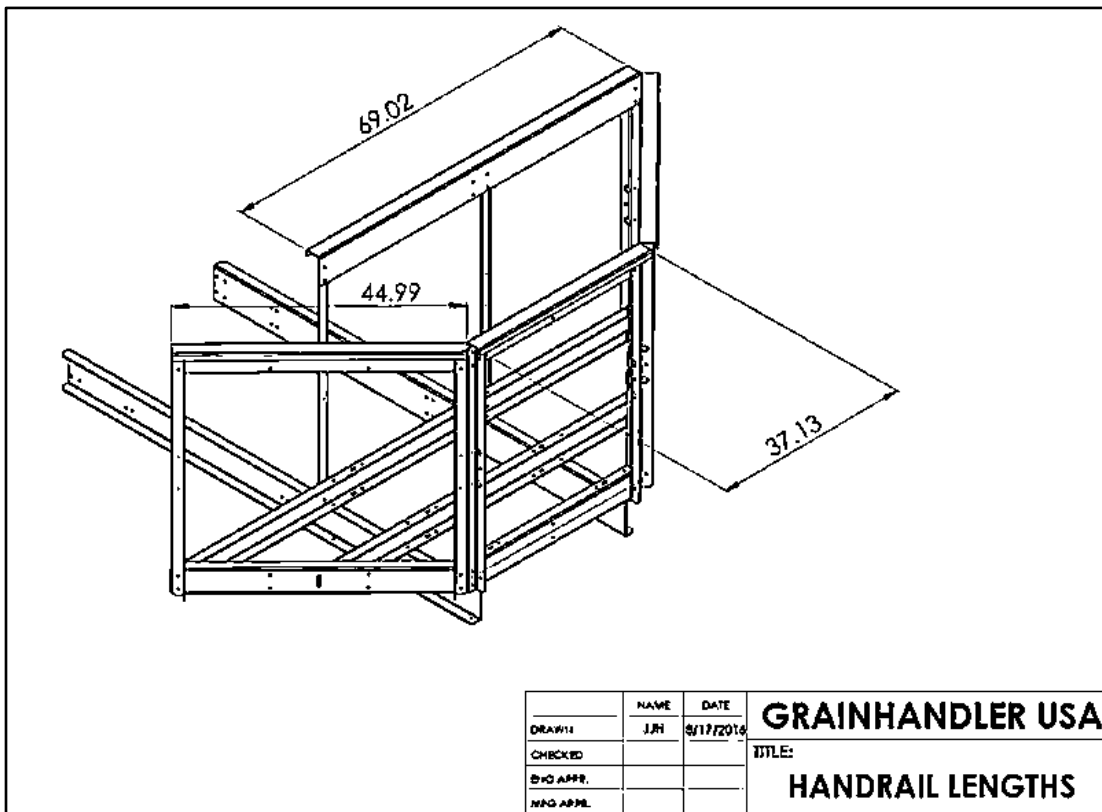
Figure 15 – Distributor Platform

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	7173		2
2	7169		1
3	7170		1
4	7171		2
5	7172		1
6	7174		1
7	7175		1
8	7176		2
9	7165		9

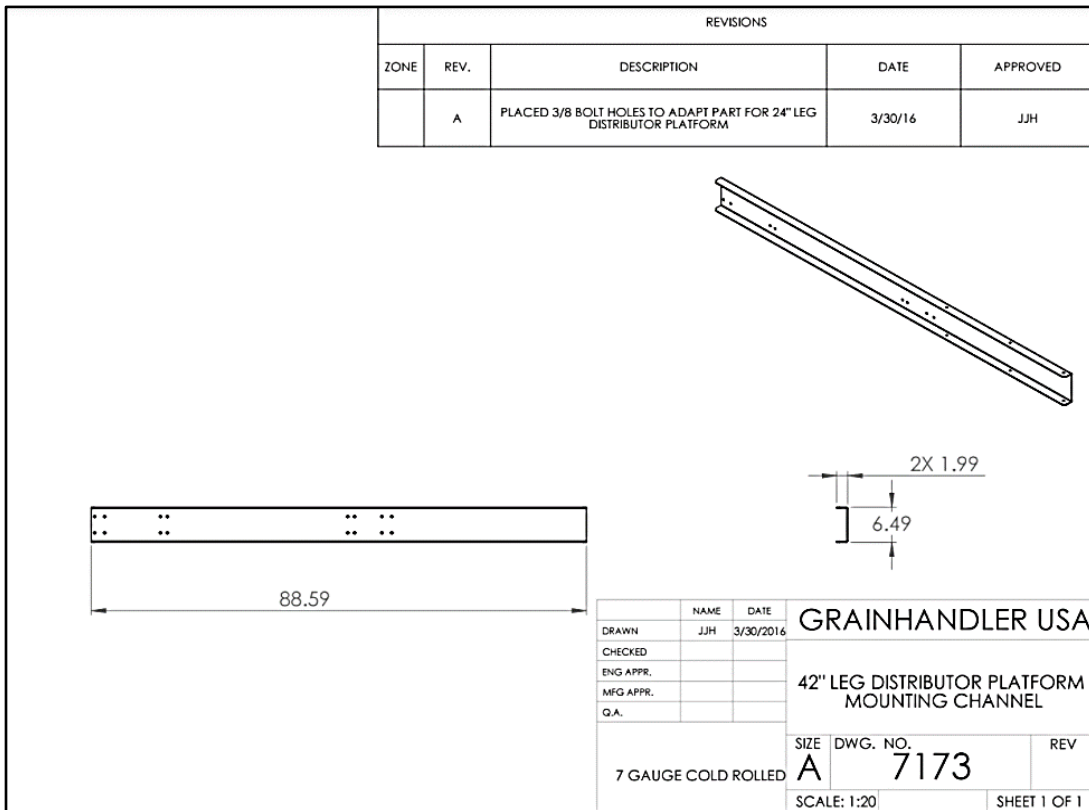
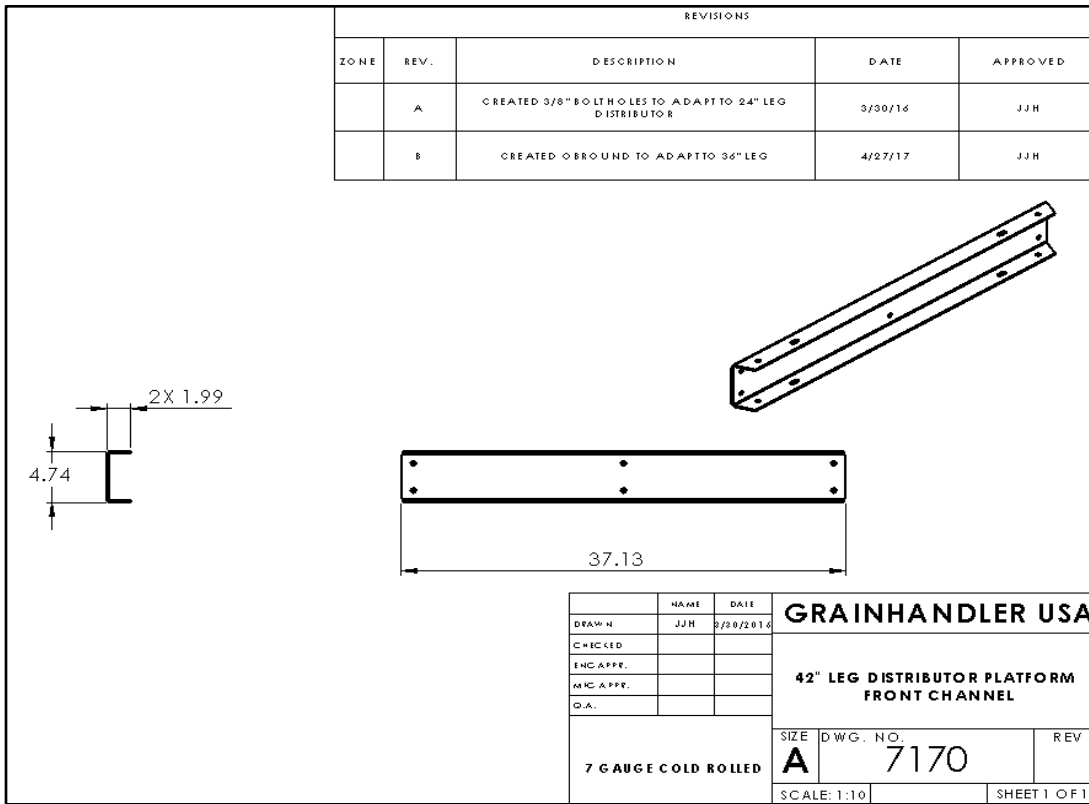
FOR 36" LEG REPLACE  
 #7173 WITH #7751 QTY 2



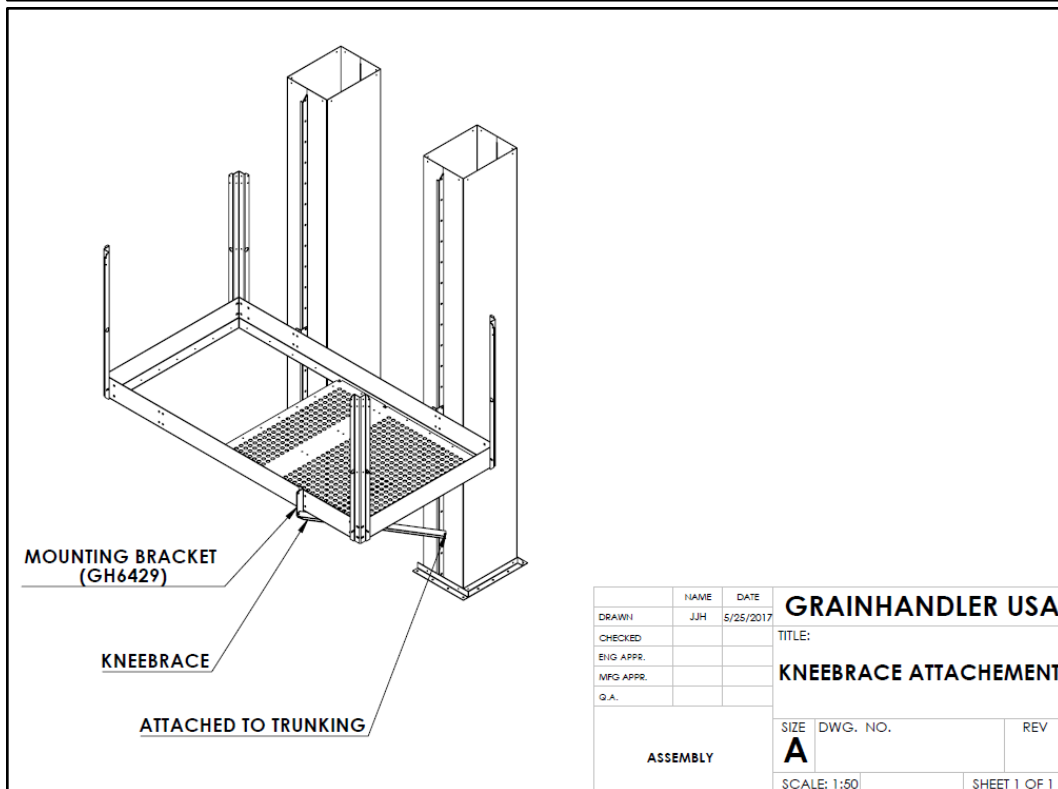
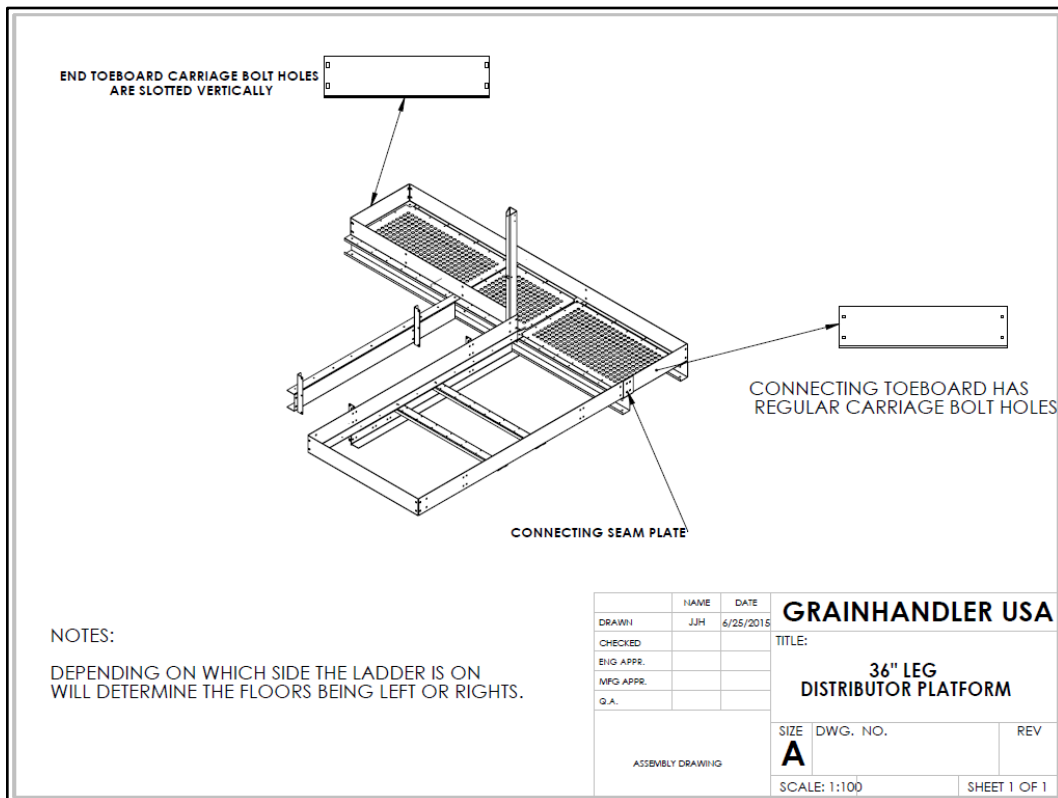
	NAME	DATE	GRAINHANDLER USA	
DRAWN	JJH	8/17/2016	TITLE:	
CHECKED			DISTRIBUTOR PLATFORM	
ENG APPR.			PICK LIST	
MFG APPR.			SIZE	DWG. NO.
G.A.			A	REV
COMMENTS:			SCALE: 1:50	SHEET 1 OF 1



	NAME	DATE	GRAINHANDLER USA	
DRAWN	JJH	8/17/2016	TITLE:	
CHECKED			HANDRAIL LENGTHS	
ENG APPR.				
MFG APPR.				







Standoff platform option

### **Installing the Buckets and Belt**

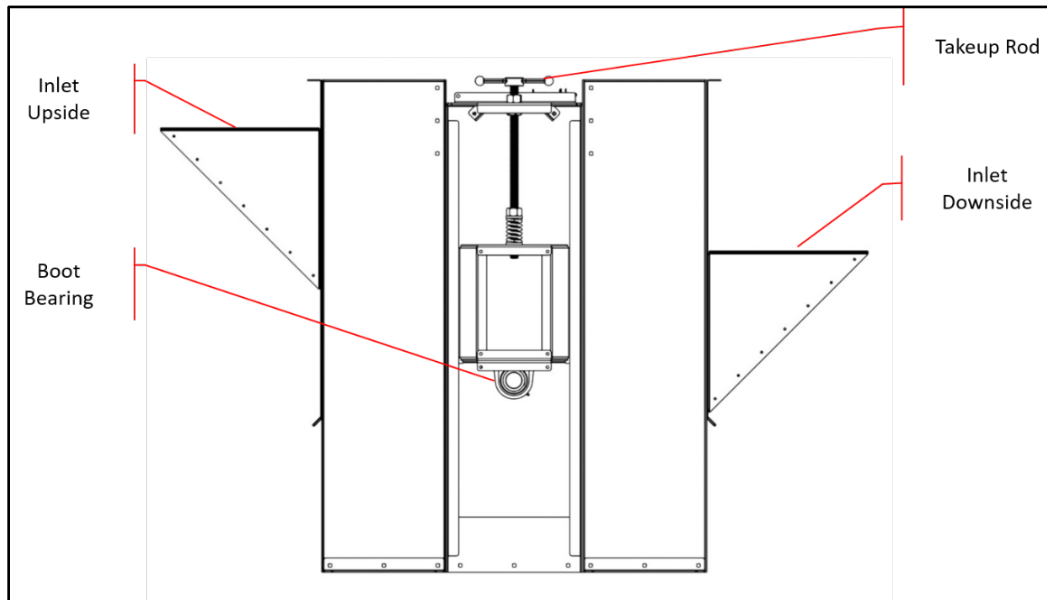
Belt option materials include 2 and 3 ply rubber or PVC. This will be specified with your order. If you have chosen to source your own belt, contact your Dealer or Grain Handler for specifications.

Buckets are made of High Density Polyethelylene. Steel or other bucket materials are available as options upon request. Holes are pre-drilled and match those on the belt. The size is specified with your order based on the size of the bucket elevator.

Choose a plan to install the belt and cups. On shorter legs (less than 100 feet) it may be easier to install the cups onto the belt prior to installing the belt, however, this will make the belt heavier and more difficult to handle. With taller legs it may become necessary to install the belt first and then bolt the cups on. This is left to the discretion of the contractor. The choice of methods used to install the belt and buckets is determined by:

- a. length and weight of belt,
- b. number, size, and weight of buckets,
- c. open area available around the base of the elevator, and
- d. available equipment.

## General Steps:



1. Adjust the boot take up rods to the raise the pulley to its highest level.
2. The installer should fabricate a spreader bar that will be used to connect a haulage line to pull the belt. A bar is recommended rather than simply punching a hole in the belt and tying or clamping the line to the belt.
3. Rig a rope or cable through the removable panel in the UP leg through which the belt; or belt with buckets attached, will be pulled into the elevator. The line is then hauled up the **UP** leg, over the head pulley, and down the **DOWN** elevator leg. Usually, the line can be passed around the boot takeup pulley and out of a cleanout panel to a winch so the belt can be pulled into the elevator.
4. Place a flat table in-line with an opening in the Up leg trunk of the elevator, usually the end panel in the boot section. Remove the boot end panel.
5. Arrange the roll of belt so it can easily be unrolled onto the worktable and then into the elevator's UP leg. Rubber belts will be the same on both sides. PVC belts have a 'glossy' side that should be facing outward where the cups are attached.
6. The belt will already have the bucket mounting holes pre-punched in the correct pattern and spacing. The heads of the elevator bolts bear against the inside surface of the belt. Buckets are to bear against the opposite or outer surface of the belt. Elevator bolts should be tightened so as to draw the heads flush with the belt surface. This prevents the bolt heads from scarring the pulleys or working loose.

7. To attach buckets, insert the bucket bolts from the back side of the belt. Then place a bucket over the bolts. Install the wide flange serrated nuts on the bolts and tighten firmly until the bolt heads becomes slightly embedded into the belt.

8. If you are installing the belt and buckets at the same time, pull the length of belt into the elevator leg as buckets are attached to each length of belt. Anchor the belt securely on the top to prevent it from rolling back down and be sure to keep a strain on the haulage line between hauls so the belt does not drop back down the elevator. As more belt is hauled into the elevator and more strain is imposed on the haulage line, make certain that the line cannot slip and is of proper strength.



Make certain the buckets are attached to the belt in the correct direction. Bucket openings facing upward in the 'up' section of the trunk.

9. As the belt begins to pass over the head pulley, keep the belt roughly centered. Proper belt tracking will be done when belt installation is complete.

10. If installing belt and buckets at the same time, omit at least three rows of buckets at each end of the belt until after it has been spliced.

a. When all buckets except those at the ends of the belt where the splice is to be made have been fastened to the belt AND the entire belt has been hauled into the elevator, splice the belt.

11. If attaching buckets after the belt has been installed, skip five or ten hole patterns. Fasten another bucket, or set of buckets, to the belt. Continue this sequence until the belt has made one complete revolution through the elevator. Then start fastening buckets or sets of buckets in the center of the gap between the previously installed buckets. This procedure uses buckets as counterweights. If buckets are fastened to the belt in consecutive continuous rows, the strand of belt in the **UP** leg will carry appreciably more weight than the strand in the **DOWN** leg. Considerable backward pull on the head pulley would result making it much more difficult to advance the belt. Continue the sequence until the full complement of buckets has been fastened to the belt.

12. Proceed with initial belt tracking.

**NOTE:** If possible, let the belt hang for 1 to 2 days before tightening the boot pulley. This will eliminate some of the initial belt stretching.

**NOTE:** Check the bucket bolts for tightness after the leg has been in operation for a short time

## **Splicing the Belt**

There are numerous types of splices. The Grain Handler standard is the "Lap Splice"

The boot pulley must be raised to its highest position by turning the take up rods. Using hand winches or come-a-longs, tighten the belt to remove slack before splicing. The lap splice should overlap by a minimum of 6 cups. The belt should be bolted together with the factory supplied longer cup bolts. Larger bolts are used to attach buckets where the belt is spliced.

After belt splicing is complete and buckets have been attached, re-connect the hood section of the head.

## **Assembling the Drive**

The installing contractor is responsible to check the drive to meet or exceed all local safety and electrical codes regardless if the drive is furnished with the leg or not. If the drive is supplied by Grain Handler, the proper Torque Arm Mount and Guard will be supplied with the bucket elevator. If it supplied by others, the contractor or owner are responsible. The Contractor must verify that all of the drive manufacturer's instructions have been followed prior to startup.

If the motor and drive are supplied by Grain Handler it will be shipped assembled on the head section and filled with the proper lubrication, there will be a tag on the gearbox stating the date and the type of lubrication. If the backstop needs to be removed from the drive prior to operation to roll the belt back or for any reason; a small amount of oil will leak out of the drive. The oil should be captured in a clean container and put back in the drive or measured and the same amount and type replaced.

Damage resulting from running the gearbox without lubrication will not be covered by the gearbox manufacturer or Grain Handler. If a



backstop is required care must be taken to assemble it in the correct rotation.

Before the belts are installed turn the gearbox input shaft by hand to verify the pulley rotation. The motor needs to be tested for proper rotation before the belts are installed. Reverse rotation can cause damage to internal bucket elevator and / or drive components.

Install and tension the belts using the motor adjustment rods located on back of the head section. Normal belt tension is 1/64" of deflection per 1" of sheave centers on one side of the belt centered between the sheave.

***Check belt tension frequently during the first 48 hours of operation.***

### **Tracking the Belt**

Initial tracking should be done when the bucket elevator is empty. The belt should center on the crowned pulleys whether empty or under load. If it isn't, check the head pulley first. When centered, adjust the boot pulley. If the condition persists, check the following list of possible causes:

1. The pulleys are not centered in the head or boot.
2. The leg is not plumb.
3. The head shaft is not level.
4. The head shaft is not square to the back of the head.
5. The belt splice is not square.
6. There is too little belt tension.
7. The pulley hubs are not properly seated causing pulley wobble.

### **Belt Adjustment**

All new belts will stretch. The amount of stretch depends on type and length of the belt. Belt tension may have to be adjusted numerous times during early operation of the leg. It may even be necessary to shorten the belt several times. If the belt stretch exceeds the take ups travel, the belt must be shortened.

### **Belt Tension**

The belt tension needs to be sufficient enough to prevent the belt from slipping at the head pulley. It also needs to be tight enough to prevent discharge of the cups in the up leg. If the belt tracks properly and does not slip when the elevator is operating at maximum capacity, then the belt is

sufficiently tensioned. Tension adjustment, however, must wait until the entire installation is complete and material (the product; grain, etc.) can be conveyed to and from the elevator.

The belt can be tensioned by comparing the Revolutions Per Minute (RPM) of the boot shaft to that of the head shaft. Check this under load and running empty. Belt slip is most often detected by observing the bearing setscrews on the head and tail shafts while counting the number of revolutions of pulley in the same period of time, typically 30 to 60 seconds.

- If the head and boot pulley are the same diameter, then the RPM of the boot shaft will be slightly greater (1-2 RPM) because the lagging on the head increases the diameter of the pulley.
- If the boot pulley is smaller in diameter than the head, then the boot shaft RPM will be substantially greater.

If the belt is slipping and all other conditions appear to be normal, adjust the takeup.

Verify that the belt continues to track the center of the head and boot takeup pulleys. If it does not, check to see if the material being fed into the elevator is entering at an angle and forcing the belt to one side of the pulley. This condition, if it occurs, must be corrected. Continual lateral pressure on the belt can cause the belt edge to rub against the elevator structure causing rapid wear on the belt. More serious than wear, a fire and/or explosion can occur if belt friction generates sufficient heat.

After the elevator has operated for a period of time, the takeup may require readjustment to compensate for initial belt stretch. Depending upon the amount of initial stretch, the belt may even have to be shortened and re-spliced.

## **Adjust the Throat Wiper**

The wiper should be adjusted at the belt splice and with the belt centered on the head pulley. Adjust the wiper with the bolts underneath to provide 1/4" - 3/8" clearance from the tip of the buckets. Ensure that the clearance accommodates the width of the spliced section of belt. Proper adjustment will minimize one cause of back legging.

## **Running Product through the Leg**

Before using the bucket elevator for the first time, lubricate all components requiring initial lubrication. This includes, but is not limited to, the drive reducer.

Run the leg empty for several minutes before feeding it. Observe the belt as it passes around the pulleys. If the belt appears to be "walking" towards the edge of the pulley, be ready to shut down the elevator drive. Several complete revolutions of the belt will be required before the belt reaches a steady-state tracking condition. If the belt steadily tracks on or near the center of both pulleys, no further action is necessary.

With the leg running, regulate the flow of material into the boot so that the leg is operating at about 50% capacity. Continue to operate at 50% capacity for several hours. After a trial run of several hours at 50% of capacity, the leg may be run under full load.

1. Ensure that the flow or distribution system from the bucket elevator is connected and open.
2. Start the leg before feeding the inlet. Starting the leg under load is not recommended.
3. Gradually increase the flow of material into the boot until the amount entering the boot is equal to the amount that the bucket can takeaway.
4. Obtain proper bucket fill, but do not overfill the boot. This will not result in greater capacity. It will only put a greater strain on the drive, belt and buckets.



### **Checking the Head Shroud**

The head shroud is factory set. The leg should reach capacity without any down legging. However, if the shroud adjustment was affected during assembling or erecting of the leg, an adjustment may have to be made. Avoid over-adjusting. Use increments of  $\frac{1}{4}$ "- $\frac{1}{2}$ " up or down from preset position until the leg is discharging without down legging.

## **General Operating information**

Starting and Stopping the bucket elevator under normal operating conditions:

- The leg should not be started under load nor should it be stopped with material still entering the boot.
- Always run the leg for a short time before feeding it. This is particularly important in cold weather. Frost may build up on pulleys, belts, bearings, etc... Running the leg empty briefly will correct this condition.
- Run the leg for a short period of time after the material flow has been shut off. The material in the buckets and boot (within reach of the buckets) should be discharged.
- If excess material remains in the boot after shut down or if the leg has been choked, the excess should be manually removed before the leg is started again.

It sometimes becomes necessary to shut off the leg before all the material is discharged. Most legs will start under "normal load". "Normal", meaning the usual amount of material in the buckets.

## Maintenance



WARNING LOCK OUT & TAG OUT THIS EQUIPMENT BEFORE REMOVING ANY COVERS OR GUARDS

A regular program of inspection and maintenance is recommended to keep the Grain Handler bucket elevator in good operating condition. If more information is needed than what is supplied in this manual, please contact your local Dealer or Grain Handler.

### Nuts and Bolts

- Check bucket bolts after a few days of operation and tighten nuts as required. On new installations, bolt heads will seat into the belt after a few days of operation thus permitting nuts to loosen.
- Inspect again after three or four weeks of operation to see if nuts have loosened. Continue this inspection at the same interval on units operated continuously.

### Leg Belt

- Check the belt tension and belt tracking daily.
- Check for wear on the sides of the belt. This can indicate misalignment or material build up on the belt or pulleys.
- Check for scuffing and wear on back of belt. This usually indicates that the belt is slipping on the head pulley.
- A misaligned belt can work over and rub on the side quickly causing damage to the leg.

### Cups

- Check the bucket bolts for tightness after the first 10 hours of operation. Most importantly, be sure to check the cups on the splice. Periodically re-check the bolts.
- Check the condition of the buckets. Replace as necessary.

### Drive Belt Tension

- The drive belt must be kept properly tensioned. Do not over tighten. Check belt frequently during first 100 hours of operation.

### **Head Pulley Lagging**

- Using the lagging inspection door on side of the head base periodically inspect the lagging for damage. Replace as necessary.

### **Head and Boot Pulleys**

- After the first 10 hours of operation, check the pulleys for proper alignment and retighten the taper lock hub bolts and bearing set screws.
- Periodically check pulleys for alignment.
- On installations that require the Elevator boot to be in direct exposure to extreme weather conditions, it is recommended that the take up bolts be liberally treated with lubricating oil or rust preventative. This will make the take-up operate more easily when necessary.

### **Throat Wiper**

- Periodically inspect the throat wiper. It should be 1/4" - 3/8" away from the bucket when checked at the belt splice.

### **Drive Setup**

- Periodically check the gearbox oil level.
- Periodically Inspect the bearing mounts, guards, taper lock hubs, bearings and sheaves to ensure that everything is in proper position.

### **Bearings**

- The bearings must be inspected on a regular basis. A bad bearing can be a very dangerous situation and must be remedied immediately.
- Lube bearings periodically. Refer to the supplemental bearing manufacturer recommendations for the most common factory used bearings.

### **Lubrication**

- Set up a regular lubrication schedule for the gearbox and motor to comply with the manufactures guidelines.

### **Audio inspection**

- Become familiar with the sound of the leg in operation. A change in sound is often an early warning sign of a potential problem.

## Troubleshooting

Issue	Possible Causes	Solution
<b>Belt not tracking on boot pulley</b>	Take ups adjusted improperly	Level boot pulley and track belt to center of pulley
	Belt too loose for pulley to guide belt	Tighten belt and track belt to center of pulley
	Bad bearing	Replace bearing
	Product buildup on pulley	Clean / may need self cleaning pulley for certain products.
	Pulley is not crowned	Replace pulley or install center lagging
<b>Belt not tracking on head pulley</b>	Head shaft not level	Shim bearings until level
	Belt splice is crooked	Re-splice
	Cups not filling evenly	Fix inlet feed so cups fill evenly
	Leg not plumb	Re-check with transit and re-plumb
	Pulley is not crowned	Replace pulley or install center lagging
	Bad bearing	Replace bearing
	Lagging worn or damaged	Replace lagging

Issue	Possible Causes	Solution
<b>Back legging and / or low capacity</b>	Throat plate not properly adjusted	Adjust to 1/4" – 3/8" from cups on splice
	Belt too loose	Tighten belt
	Shroud out of adjustment	Adjust up or down using 1/4" – 1/2" increments
	Spouting too flat	Angle should be minimum of 45 degrees with dry material. Steeper angle may be needed with wet product.
	Low cup fill	Check that the equipment feeding the leg is delivering enough capacity.
	Improper inlet location	Check inlet location
	Belt slipping	See trouble shooting belt slipping
	Material buildup on cups	Wet sticky material can build up on cups and reduce capacity.
	Shaft speed incorrect	Check RPM and contact Dealer or Grain Handler.
	Wrong style cup	Contact Dealer or Grain Handler
<b>Belt Slipping</b>	Belt too loose	Tighten belt
	Lagging worn	Check and replace lagging

<b>Issue</b>	<b>Possible Causes</b>	<b>Solution</b>
<b>Boot pulley buildup</b>	Sticky product	A self cleaning pulley may be needed.
<b>Damaged cups</b>	Obstruction in leg	Find and remove obstruction
	Belt too loose	Tighten belt
	Leg out of plumb	Re-check with transit and re-plumb
<b>Cups pull loose from belt or belt is torn at bolt hole</b>	Cups not bolted tightly	Cup bolts should be kept tight. If bolts come loose, cup may snag or be torn from belt
	Jammed boot	Controlled feed should help eliminate jams and turbulence in the boot.
<b>Motor cannot start leg</b>	Backstop is reversed	Re-install correctly
	Motor rotation is wrong	Contact electrician
	Boot is full	Leg was shut down too early, clean out
	Overfeeding	Reduce feed rate
<b>Motor over-amps</b>	Motor is incorrectly wired	Check that motor is wired for correct voltage
	Wrong size starter	Check starter size
	Motor is faulty	Check and replace
	Motor is too small	Check amps and contact Dealer or Grain Handler

<b>Issue</b>	<b>Possible Causes</b>	<b>Solution</b>
<b>Excessive noise in boot section</b>	Belt not tracking	Track belt using take-ups
	Cups striking boot bottom	Belt is too long. Re-splice belt.
	Pulley slid on shaft and is rubbing on the side of the boot housing	Find out why the pulley moved and resolve.
	Bad bearing	Replace immediately
<b>Excessive noise in head section</b>	Belt not tracking	Track belt
	Bad bearing	Replace immediately
	Pulley slid on shaft and is rubbing on the side of the head housing	Find out why the pulley moved and resolve.
	Failed drive component	Check gearbox and motor
<b>Excessive noise in trunking</b>	Obstruction in trunking	Find obstruction and remove
	Cups hitting because of loose belt	Tighten belt
	Leg not plumb	Re-check with transit and re-plumb
	Belt splice crooked	Re-splice belt



Issue	Possible Causes	Solution
<b>Vibration</b>	Foreign matter in boot	Clean out foreign material
	Excessively tight or loose chain / belt	Adjust to proper tension
	Loose or broken buckets	Replace damaged buckets
	Buckets hitting bibb plate	Ensure buckets are not loose and belt is properly tensioned
<b>Pillow blocks get hot</b>	Over or Under Lubrication	Check lubrication – too much or not enough
	Excessive chain / belt tension	Loosen
	Misalignment of head shaft pillow blocks	Adjust alignment
	Misalignment between head and boot shaft	Check level