

SILVER-SWEET®

BUCKET ELEVATORS

INSTALLATION & OPERATING INSTRUCTION MANUAL

Manufactured in the U.S.A. by



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www.sweetmfg.com

THIS MANUAL IS THE PROPERTY OF:

MODEL: _____

SERIAL NUMBER: _____

DATE PURCHASED: _____

WARRANTY

All items manufactured by Sweet Manufacturing Company are warranted against defects in material and workmanship for one (1) year from the date of shipment (but not against damage caused by accident, abuse, or faulty installation). Sweet Manufacturing Company will repair or replace free of charge (F.O.B. point of supply) all such defective parts if returned to the factory, charges prepaid. No allowances will be made for repairs, alterations or changes unless specifically authorized by us. There are no other warranties expressed or implied other than title, freedom from liens, and against patent infringement. **Seller makes no warranty of merchantability or fitness for a particular purpose.**

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CHECK AND INSPECT YOUR ORDER

Each order or shipment is double-checked before leaving the factory. All parts, pieces and components are listed item by item on our packing list, which accompanies each order. The number of each item, package, container, skid, etc. is listed on the bill of lading. In signing the bill of lading, the carrier assumes full responsibility for the safe delivery of all goods to destination in the same order a carrier was tendered by the shipper. In the event of damage or shortage, have the transportation company note the same on the freight bill. You should then file claim against the carrier for such loss and/or damage.

You will find a packing list attached to one of the items in the shipment. Check each item against the list. Check by description, specification, quantity or count, etc. Should there be any discrepancies, notify us immediately. If an order or shipment includes more than one elevator, the parts for each order will be keyed or marked on the packing list for easy identification.

IMPORTANT - In addition to checking items and count included in shipments, it is also important to inspect and check shafts, bearings, pulleys and sprockets having set screws. Movement, vibrations and handling in shipment may loosen set screws and bolts.

Small parts and items, such as bolts, washers, bushings, and keys are just as important to an installation as the larger parts. Make sure these are located and checked before disposing of any containers or packing. We cannot be responsible for the loss of items that are listed and included on our packing list.

Should there be some delay between the time an order is received and ensuing installation, store parts in a protected area so they may be easily located and identified. Retain packing lists for this reason, as well as for future parts reference.

GENERAL INSTALLATION

The best equipment improperly installed cannot be expected to offer the performance intended by the manufacturer. A good installation, therefore, should be of prime concern to the customer or to the constructing firm responsible for the same. We cannot be responsible for the installation of an elevator. The suggestions and information contained herein are offered solely as a convenience, for we can assume no liability as to installation, either expressed or implied.

Unless the location of the elevator has been pre-determined by a layout drawing or print, careful consideration should be given as to the depth of the boot pit, side of boot to be fed, direction of discharge at head, possible overhead obstructions, etc. Plan ahead for the location of guy wire anchoring points (deadmen on the ground and on near-by-solid structures.) Figures 15 and 16 will give a good idea of how anchoring points should be located. Make certain that there is sufficient clearance for guying and anchoring. When the elevator is to be fed from a feeder or conveyor, provision must be made for proper clearances to allow for drives, discharges or valves on the latter equipment. Enough clearance should be provided to allow proper maintenance of equipment after it has been installed. Thought given to such matters prior to installation can well prevent later problems in the flow plan and avoid possible "bottlenecks."

It is important that a firm level foundation be provided on which to install the elevator. This footing should be ample to carry the load of the elevator and be free from water. The foundation can be at ground level or in a pit, depending upon the method of feeding. A drain or pump is usually needed to keep a pit free of water.

Before actually setting the bucket elevator in place, there are several pre-assembly steps to perform. These include assembling the drive; installing the backstop in the reducer; assembling the platform, ladder & cage, and attaching them to the casing.

INTRODUCTION

The purpose of this manual is to advise and instruct owners of Silver-Sweet® elevators and accessories in the recommended installation, operation and maintenance of the equipment.

You have purchased a product which has been manufactured with utmost care, the finest materials, and many years of engineering know-how.

Although it is now in your hands, we feel our responsibility does not end. You now have the task of installing your equipment either by yourself, under your supervision, or by hiring it done. Regardless of who does the installation, this manual is designed for you. The instructions and drawings give a step-by-step method of recommended installation procedures. Methods will vary among millwrights, but if you are not sure which is best, we suggest that you follow instructions in the manual.

In addition to installation instructions, you will also find operating, maintenance and trouble shooting guides, as well as many illustrations to help acquaint you with the equipment.

Before Beginning Installation — Read This Manual Thoroughly

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TERMS AND DEFINITIONS

General - This section of the manual provides a brief description of the elevator equipment to acquaint you with the various components and the names by which they are identified. Figure 1 illustrates an elevator assembly.

Bucket Elevator - The elevator assembly (Fig. 1) is the main assembly in the elevating system. It consists of the head (1), boot (14), casing (11), service door (12), and belt/chain and buckets.

Head - The head (Item 1, Fig. 1) is the topmost component in the elevator leg. It consists of a steel housing which supports the drive pulley/sprocket, discharge, motor and drive reducer.

Boot - The boot (Item 14, Fig. 1) is the bottom component of the elevator. It receives the material to be elevated and contains the lower belt pulley or sprocket. The take-up is normally located on the boot and is used for belt tracking and belt or chain tensioning.

Casing - Casing (Item 11, Fig.1) is manufactured in sections. It forms the structure for supporting the head, service platforms, ladder & cage, etc., while also providing a dust-tite and waterproof enclosure for the elevator belt or chain and buckets. Casing may be of single or dual design. The service door is a casing section with removable panels to allow access for servicing the belt/chain and buckets.

Discharge Transition - A transition is used to adapt a square outlet to round spouting or a distributor.

Elevator Drive - Most Silver-Sweet® elevator heads are electric motor-driven through shaft-mounted reducers (Item 4, Fig. 1). Large units use a motor-gear drive unit. Additional information may be found in a manual which is supplied with each speed reducer.

Service Platform for Head - (Item 9, Fig. 1) A work area for performing routine inspection and maintenance on the elevator head, head drive and motor.

Service Platform for Distributor - A work area for connecting spouting to the distributor and for performing inspection and maintenance of the distributor.

Intermediate Platform - A rest area platform is available to comply with OSHA requirements for offsets of the ladder every 30' in commercial facilities.

Ladder - Ladders provide access to the service platforms. Brackets are provided to install the ladders to the elevator casing frames in 5' or 10' increments.

Safety Cage - The Sweet® safety cage is of tubular construction and provides a surrounding structure around the ladder.

A Safety Climbing Device - A safety belt which is attached to a high tensile cable by means of a sliding, stainless steel clamp. This device meets OSHA requirements for ladder climbing safety and eliminates the need for safety cage, intermediate platforms and offset ladders.

Guy Bracket - Clamp around the elevator casing for the attachment of guy cables. A single bracket assembly provides attachment points for four cables - one at each corner of the elevator casing.

Hoist Assembly - An option that provides an extended arm, which pivots to aid in raising or lowering heavy head components from elevator during maintenance.

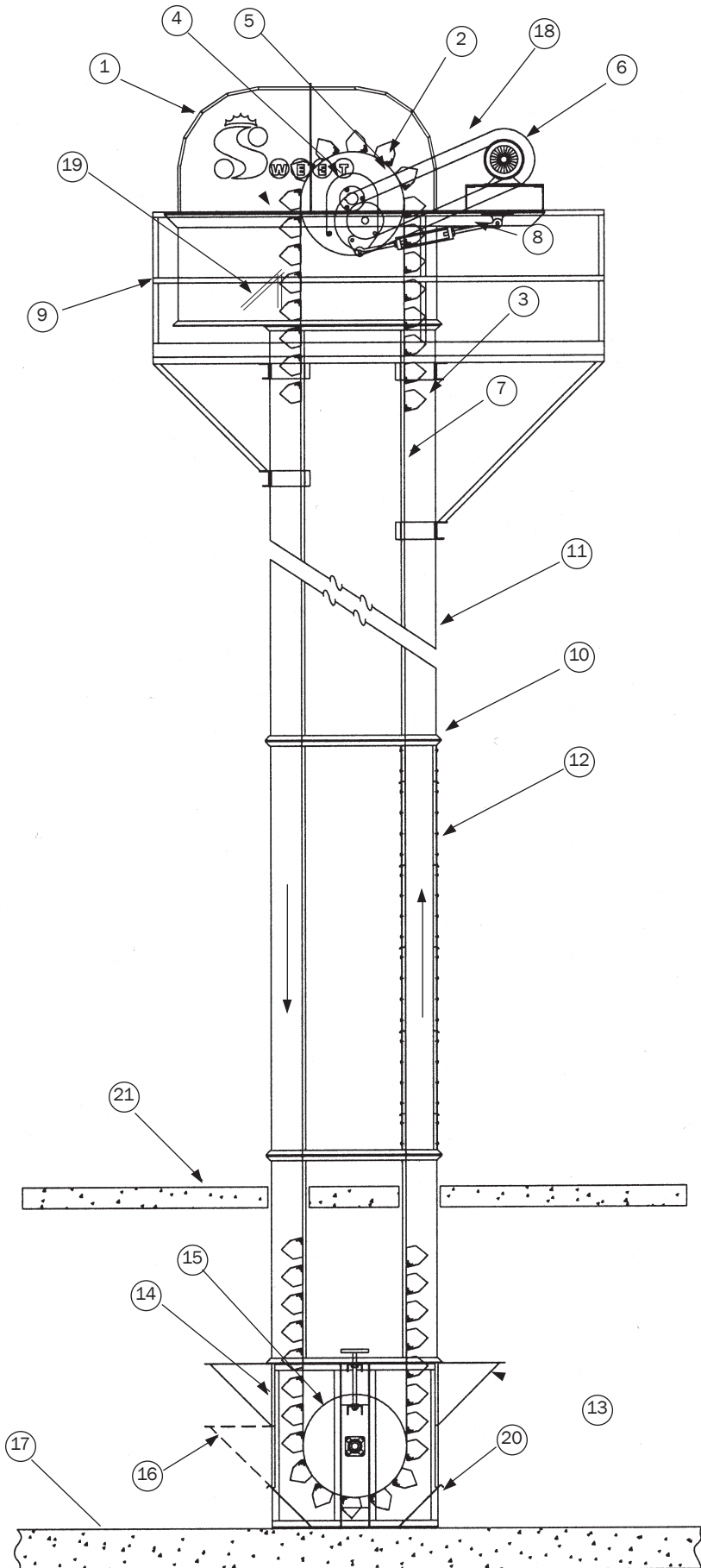
Elevator Belts and Buckets - Material is carried from the boot to the head in elevator buckets, which are bolted to the belt. (See Fig. 1) A chain may be used instead of the belt.

Sweetheart™ Elevator Buckets - Designed with proportioned body contour and high bucket ends which minimize spilling. "Wraparound ends" add extra strength for digging material and at both ends of the bucket body.

Belting/Chain - This is the component that carries the filled buckets from the boot to the head. The standard belting provides strong bolt holding ability and stretch resistance. It is resistant to oil and abrasives and has a cover compound which resists static charges.

Vent In Head - Provides an exhaust for air which may enter the elevator through the spouting. Head vents are standard and installed at the factory. Elevators can have an inspection door in lieu of head vent upon request.

Figure 1 - Typical Elevator Assembly and Components



1. HEAD
2. HEAD PULLEY
3. BUCKET
4. SPEED REDUCER
5. V-BELTS
6. MOTOR
7. ELEVATOR BELT
8. TORQUE ARM
9. SERVICE PLATFORM
10. CASING FLANGE
11. CASING
12. SERVICE DOOR
13. HOPPER (up side, top location)
14. BOOT
15. BOOT PULLEY
16. HOPPER
(down side, bottom location)
17. PIT LEVEL
18. DRIVE COVER
19. BAFFLE PLATE ADJUSTMENT
20. CLEAN-OUT DOORS
21. WORK OR GRADE LEVEL



Service Door Assembly

Explosion Relief Panel in Head (OPTIONAL) - Mounted on the head cover, it is designed to blow off, should there be an explosion within the elevator housing, reducing damage to the elevator.

Explosion Relief Panel in Legging (OPTIONAL) - This is a 5' casing section with a blow-away panel that provides protection against damage due to explosion. Panels are provided in both the up and down casing. Explosion relief sections should be installed in 50' increments.

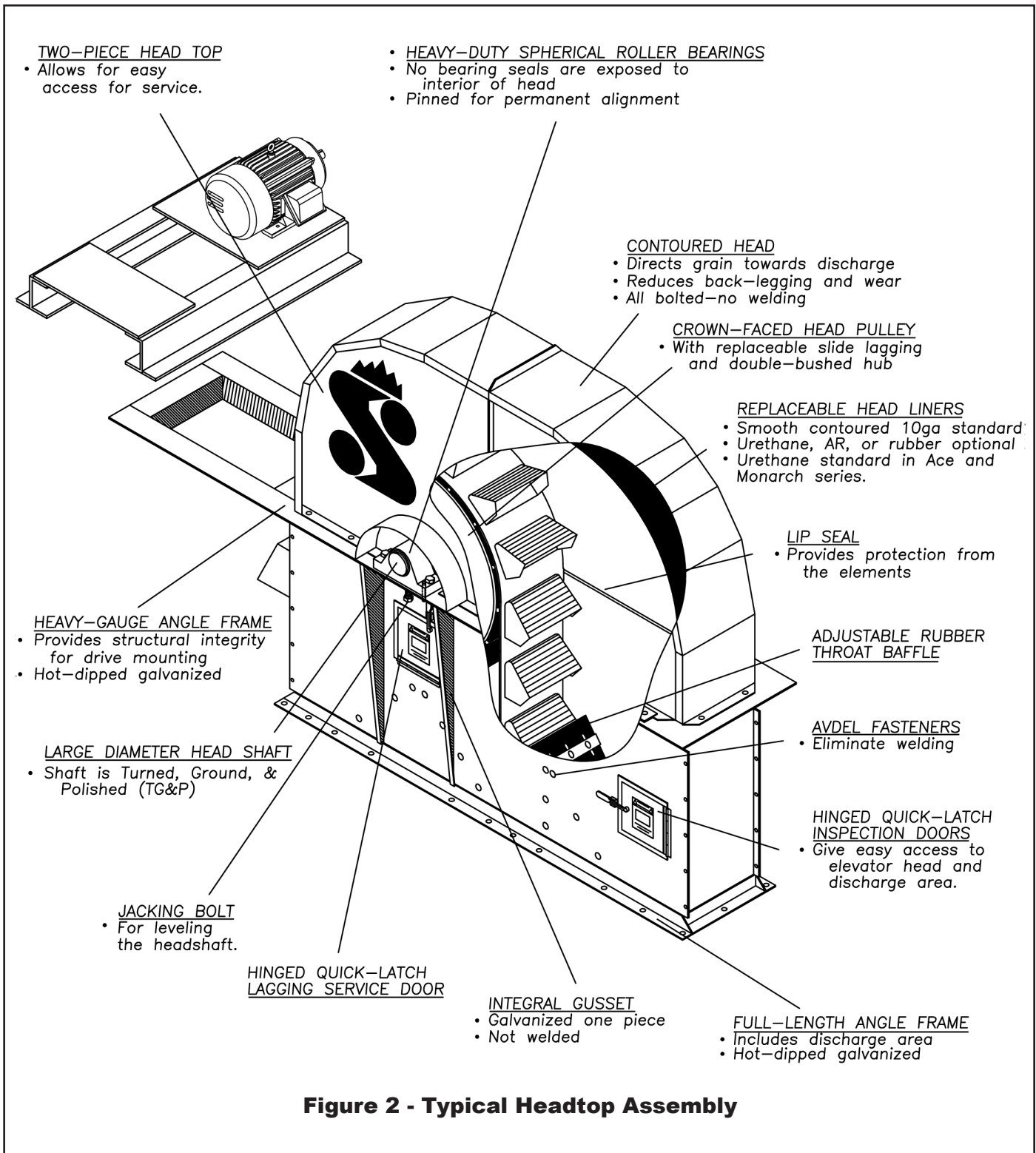
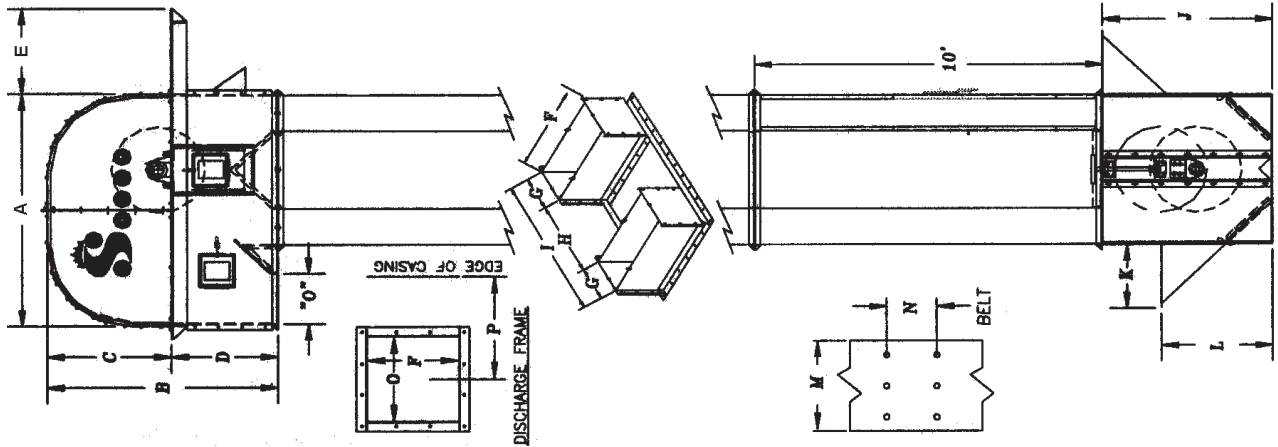


Figure 2 - Typical Headtop Assembly

SILVER-SWEET®

STANDARD SERIES BUCKET ELEVATORS



MODEL	CL	PULLEY DIA.	CASING	BOX	NOMINAL BUCKET	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
BANTAM I	A	4.5"	8 X 16	--	6 X 4	27	24	12	12	11	8	--	--	16	24	11	--	6.5	5	8	8
ATOM I	I	11"	9 X 26	9 X 8	6 X 4	44	38	24	14	20	9	8	10	26	32	12	20	7	6	9	13
ATOM II	I	11"	12 X 26	12 X 8	6 X 5	46	42	23	19	22	12	8	10	26	32	14	20	10	6	12	14
APOLLO I	I	18"	12 X 34	12 X 9	9 X 5	55	47	28	19	24	12	9	16	34	39	15	24	10	12	9	15
APOLLO II	II	18"	12 X 34	12 X 9	9 X 5	55	47	28	19	24	12	9	16	34	39	15	24	10	9	12	15
APOLLO III	III	24"	14 X 42	14 X 10	9 X 6	66	59	32	27	32	14	10	22	42	44	16	28	10	8	14	17
PRINCE QUEEN	IV	30"	14 X 48	14 X 10	9 X 6	75	69	37	32	32	14	10	28	48	48	18	30	10	8	14	20
KING	IV	30"	17 X 48	17 X 10	12 X 6	75	69	37	32	32	17	10	28	48	48	18	30	13	8	17	18
KING II	IV	30"	20 X 48	20 X 10	15 X 7	75	69	37	32	32	20	10	28	48	48	18	30	16	8	17	18
ACE	V	36"	17 X 56	17 X 11	12 X 7	87	99	52	47	32	17	11	34	56	56	20	36	13	9	17	22
ACE II	V	36"	20 X 56	20 X 11	15 X 7	87	99	52	47	32	20	11	34	56	56	20	36	16	9	17	22
MONARCH	VI	42"	20 X 68	20 X 14	14 X 9	100	102	57	45	45	20	14	40	68	76	20	54	22	10	20	22
TITAN 10	VI	42"	20 X 68	20 X 14	14 X 9	100	102	57	45	45	20	14	40	68	76	20	54	15	10	20	22
TITAN 15	VI	42"	28 X 68	28 X 14	10 X 9(2)	100	102	57	45	45	28	14	40	68	76	20	54	22	10	20	22
TITAN 20	VI	42"	34 X 68	34 X 14	13 X 9(2)	100	102	57	45	45	34	14	40	68	76	20	54	28	10	20	22
TITAN 25	VI	42"	40 X 68	40 X 14	16 X 9(2)	100	102	57	45	45	40	14	40	68	76	20	54	34	10	20	22
TITAN 30	VI	42"	52 X 68	52 X 14	14 X 9(3)	100	102	57	45	45	52	14	40	68	76	20	54	44	10	20	22
TITAN 40	VI	42"	66 X 68	66 X 14	14 X 9(4)	100	102	57	45	45	66	14	40	68	76	20	54	58	10	20	22
TITAN 50	VI	42"	80 X 68	80 X 14	14 X 9(5)	100	102	57	45	45	80	14	40	68	76	20	54	72	10	20	22

DIMENSIONS ARE TO THE NEAREST INCH. AND SUBJECT TO CHANGE WITHOUT NOTICE

BOOT INSTALLATION

SET THE BOOT - The boot of an elevator must be set on a firm and level foundation. A boot that is not level makes the elevator very difficult to plumb. It may be necessary to shim the base of the boot. After the boot is located and leveled, it must be anchored to prevent shifting. Bolts (set in concrete) and plates (overlapping the boot base flange) are recommended for anchoring. (See Fig. 4)

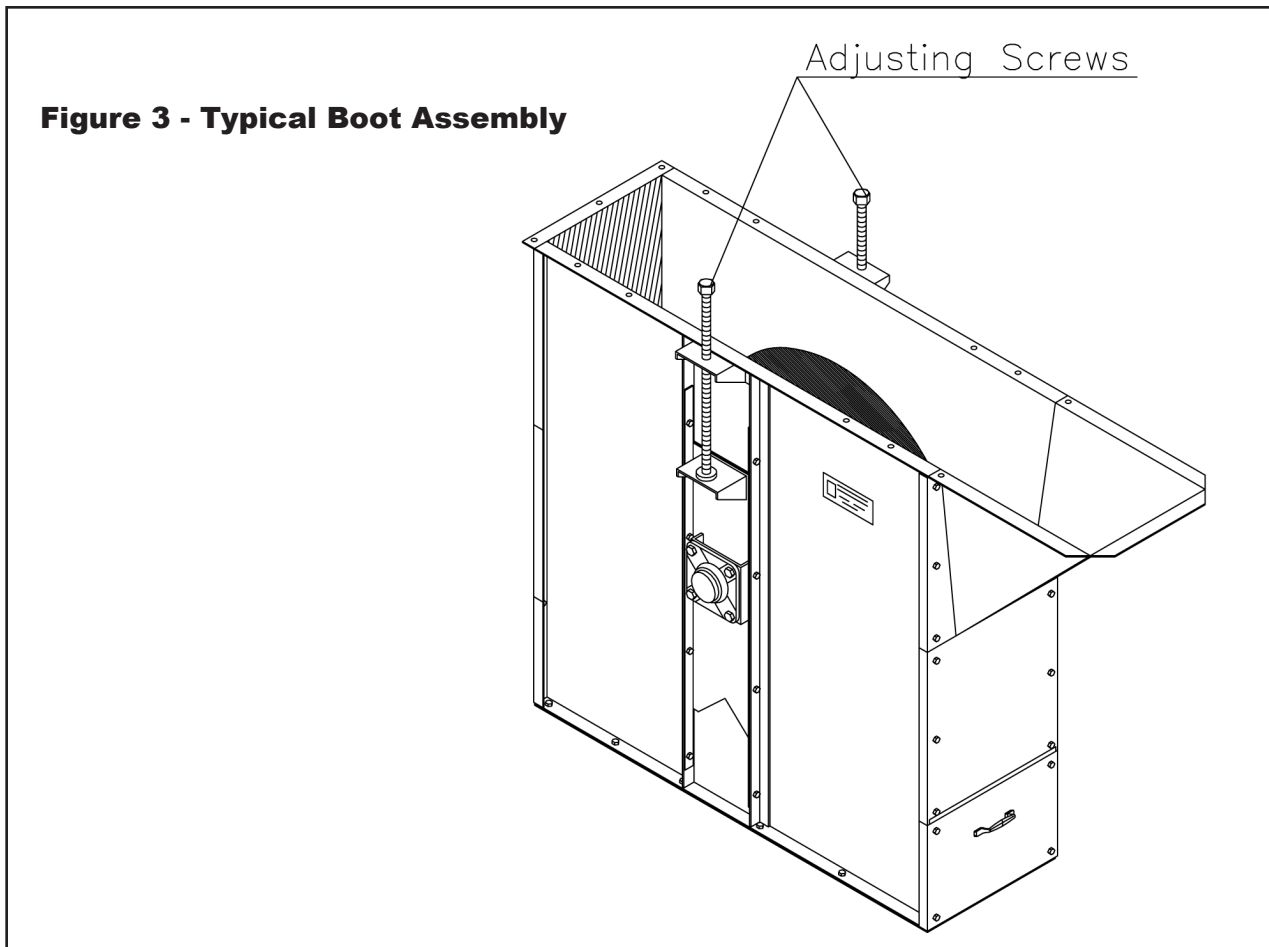
- NOTE:** (1) DO NOT use holes in the base for anchoring.
(2) Recheck boot level after tightening bolts and nuts securely.
Shim and level as required.

THE BOOT MUST BE LEVEL

A boot that is 1/16" per foot out of level will cause the 100' elevation to be 6" out of plumb!
A boot base dimension chart is provided in Fig. 4 for use in setting anchor bolts.

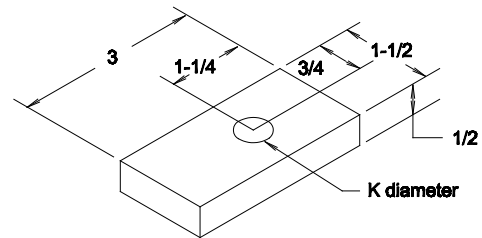
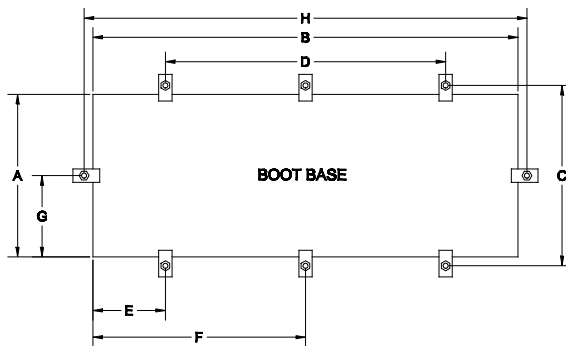
TAPERED HOPPER - The inlet hopper (or hoppers) may be mounted on the "up" side or "down" side of the boot, or on both sides. Standard size hoppers are designed for mounting in the high position on either side of the boot and in the low position on the **down** side. Sweet's tapered hopper design greatly improves the flow of the material into the buckets, resulting in higher bucket fill and elevator capacity.

LOCATION OF HOPPER - (See Fig. 4) Most free-flowing materials are fed into the boot on the upside, with the hopper in the high position. On the up side, locate the bottom of the inlet hopper no lower than the center of the boot pulley. Light materials that tend to "dust" are best fed on the down side for better filling.

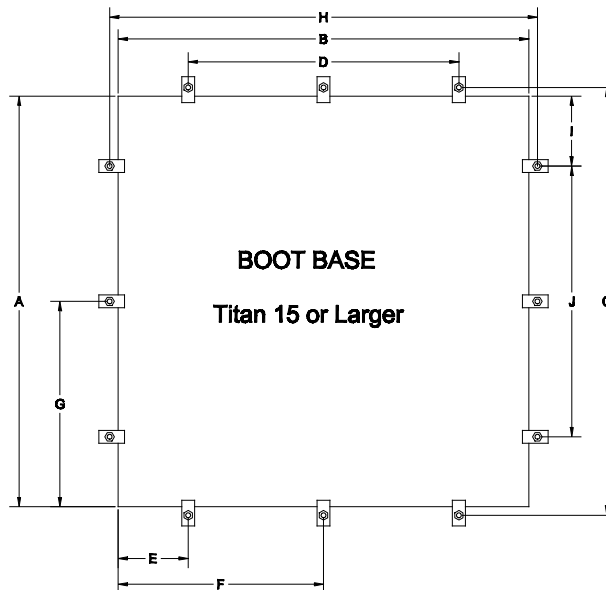


MODEL	ANCHOR INSTALLATION LOCATIONS										ANCHOR PLATES AND BOLTS		
	A	B	C	D	E	F	G	H	I	J	K	LAG Bolt Dia	Number of bolts
BANTAM I	10-1/4"	16-3/8"	12-1/4"	11-3/4"	2-5/16"						9/16"	1/2"	4
ATOM	12-3/8"	26"	14-3/8"	20"	3"						9/16"	1/2"	4
BANTAM II	15-3/8"	26"	17-3/8"	20"	3"						9/16"	1/2"	4
APOLLO	15"	34-1/8"	17"	26-1/8"	4"	17-1/16"					9/16"	1/2"	6
DUKE II	17"	42"	19"	26-1/4"	7-7/8"	21"					9/16"	1/2"	6
PRINCE	18-5/16"	42"	20-5/16"	26-1/4"	7-7/8"	21"					9/16"	1/2"	6
QUEEN	18-5/16"	48"	20-5/16"	38-3/4"	4-5/8"	24"	9-5/32"	50"			9/16"	1/2"	8
KING	21-5/16"	48"	23-5/16"	38-3/4"	4-5/8"	24"	10-21/32"	50"			9/16"	1/2"	8
KING II	24-5/16"	48"	26-5/16"	38-3/4"	4-5/8"	24"	12-5/32"	50"			9/16"	1/2"	8
ACE	21-1/4"	56"	23-1/4"	42-1/2"	6-3/4"	28"	10-5/8"	58"			9/16"	1/2"	8
ACE II	24-1/4"	56"	26-1/4"	41-1/4"	7-3/8"	28"	12-1/8"	58"			9/16"	1/2"	8
MONARCH	25-1/4"	68"	27-1/4"	45-1/4"	11-3/8"	34"	12-5/8"	70"			7/8"	3/4"	8
TITAN 10	25-1/4"	68"	27-1/4"	45-1/4"	11-3/8"	34"	12-5/8"	70"			7/8"	3/4"	8
TITAN 15	33-5/16"	68"	35-5/16"	45-1/4"	11-3/8"	34"	16-21/32"	70"	4-1/2"	24-5/16"	7/8"	3/4"	12
TITAN 20	39-5/16"	68"	41-5/16"	45-1/4"	11-3/8"	34"	19-21/32"	70"	7-1/2"	24-5/16"	7/8"	3/4"	12
TITAN 25	45-3/8"	68"	47-3/8"	45-1/4"	11-3/8"	34"	22-11/16"	70"	7-1/2"	30-3/8"	7/8"	3/4"	12
TITAN 30	57-3/8"	67-13/16"	59-3/8"	45-1/4"	11-9/32"	33-29/32"	28-11/16"	69-13/16"	10-5/8"	36-1/8"	7/8"	3/4"	12
TITAN 40	71-5/16"	68"	73-5/16"	45-1/4"	11-3/8"	34"	35-21/32"	70"	16"	39-5/16"	7/8"	3/4"	12
TITAN 50	85-5/16"	68"	87-5/16"	45-1/4"	11-3/8"	34"	42-21/32"	70"	20"	45-5/16"	7/8"	3/4"	12

Figure 4 - Boot Installation

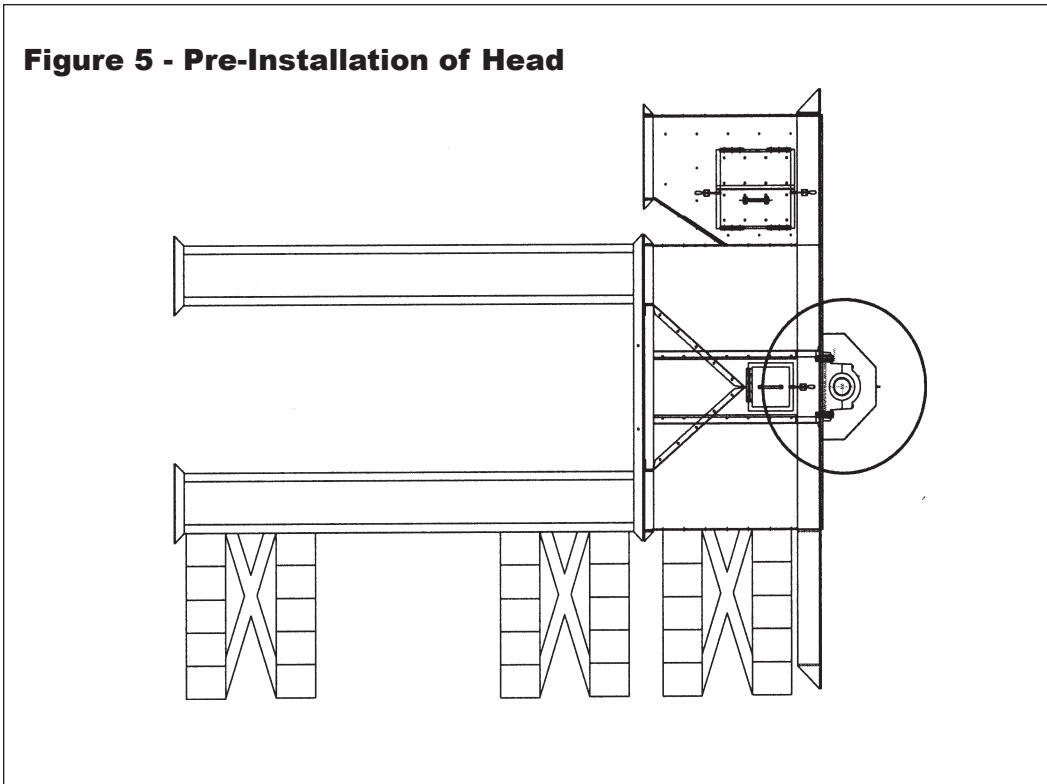


**ANCHOR PLATES & BOLTS
(BY OTHERS)**



**BOOT BASE
Titan 15 or Larger**

Figure 5 - Pre-Installation of Head



PRE-INSTALLATION OF HEAD, CASING, PLATFORMS, LADDER & CAGE

Set the head assembly on its "back" side, on blocks to allow at least 30" of ground clearance. Position so that the up side rests on blocks and the discharge side is UP (Figure 5). If a head service platform is being utilized, additional height will be required. Place one section of casing on blocks in a position to be bolted to the head. Apply caulking to the head and casing flange faces and bolt together.

NOTE: When joining companion flanges on any components, apply caulking on the mating flanges to assure weather-tite and dust-proof connections.

If a distributor platform is used, an added casing section (or sections) may be required so the platform may be installed while the head assembly is on the ground. At this time the head service and distributor platforms should be assembled to the head and casing sections. Instructions are packaged with each platform. Ladder and cage should also be attached.

MOTOR

Each elevator head is equipped with an adjustable motor mount designed to accept the proper size motor for the elevator requirements. Installation instructions are provided with each motor mount.

ELEVATOR DRIVE ASSEMBLY

Set the head assembly on a firm, level surface to assemble the drive. A standard drive supplied by Sweet Manufacturing Company includes a shaft-mounted speed reducer, electric motor, motor mount, drive sheaves, v-belts and drive/cover belt guard. Care must be taken for proper assembly to assure proper elevator performance is achieved. Sweet Manufacturing Company only provides bushed sheaves to assure maximum life and dependability.

The speed reducer OEM vendor's maintenance instructions are included with each shipment. If a backstop is being used, it must be installed in the reducer before mounting the reducer to the headshaft.

The use of a backstop is recommended by Sweet Manufacturing Company to prevent reverse rotation of the reducer and drive pulley in case of a motor shut down. This eliminates damage to the bucket elevator from the belt/chain and buckets free-wheeling backwards. Install the backstop per the OEM vendor's instructions included with the unit, or refer to the generic instructions included on page 12.

An electric motor is normally used to provide power to the elevator drive. Specific installation and maintenance instructions from the OEM vendor are included with each shipment.

Each elevator head is equipped with an adjustable motor mount designed to accept the proper size motor for the elevator requirements. Installation instructions are provided with each motor mount. Attach the motor mount to the head frame extension, but do not tighten.

Assemble the motor to the motor mount, "sandwiching" the motor-end drive cover mounting bracket between the motor and motor mount. Again, do not tighten the hardware.

At the reducer, attach the reducer-end drive cover mounting bracket. Install drive cover backing plate to the drive cover mounting brackets.

Sheaves and v-belts are used between the motor and reducer to provide the proper operating speed of the elevator. Install the sheaves and bushings onto the proper shafts. **FOR PROPER OPERATION AND V-BELT LIFE, BE CAREFUL TO ALIGN THE SHEAVES.**

Once the sheaves are aligned, install the v-belts around the sheaves. Make sure all components are square and aligned, and tighten all hardware. Tighten the v-belts by using the torque arm, which installs between the reducer to the bottom of the motor mount. The final step is to install the outer drive cover, using the bolts provided.

CAUTION: If a cleaner or any other piece of heavy equipment is added, it must be supported from the ground. Such additional weight could damage and impair operation of the elevator.

BACKSTOP

Backstops are field installed on shaft mounted speed reducers to prevent reverse rotation. This device operates on the overrunning clutch principle, automatically preventing reverse rotation of driven shaft resulting from power stoppages or other causes. Locking action occurs through an infinite number of gripping positions. On each speed reducer, provision is made for mounting a backstop. A keyway in the housing bore matches the keyseat in the outside diameter of the backstop. This backstop kit is used for single reduction and double reduction, shaft-mounted speed reducers.

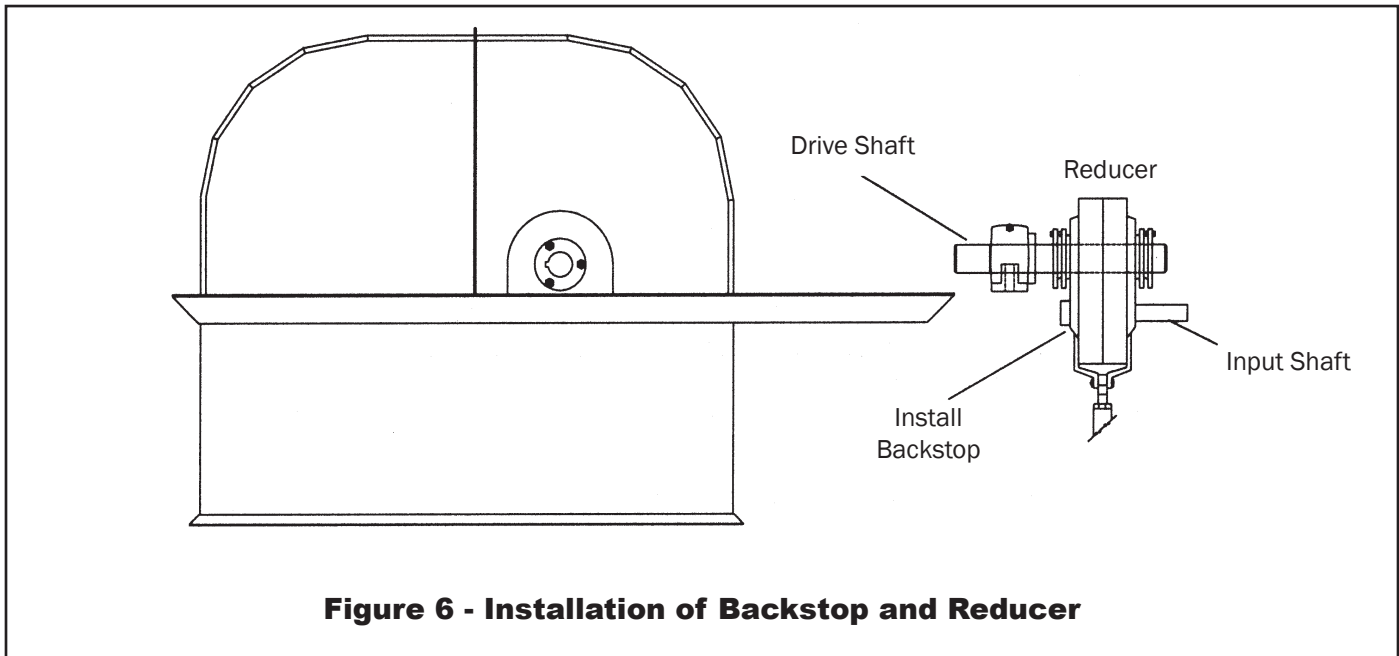


Figure 6 - Installation of Backstop and Reducer

Please refer to manufacturer's manual included with drive package.

MAINTENANCE - Retighten housing bolts and pipe plugs after operating for a few days. Tightness prevents oil leakage.

LUBRICATION - Follow vendor instruction included with reducer.

IMPORTANT NOTICE: Because of the possible danger to person(s) or property from accidents, which may result from the use of products, it is important that correct procedures be followed: Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures, as may be desirable or as may be specified in safety codes should be provided and are neither provided by OEM vendor nor are the responsibility of OEM vendor or Sweet Manufacturing Company.

CHAIN DRIVE HEADS - The larger series of elevators are direct chain drive. Use the same care in assembly and alignment of sprockets as recommend for pulley drives. Adjust the chain to remove slack, but **DO NOT OVER TIGHTEN**.

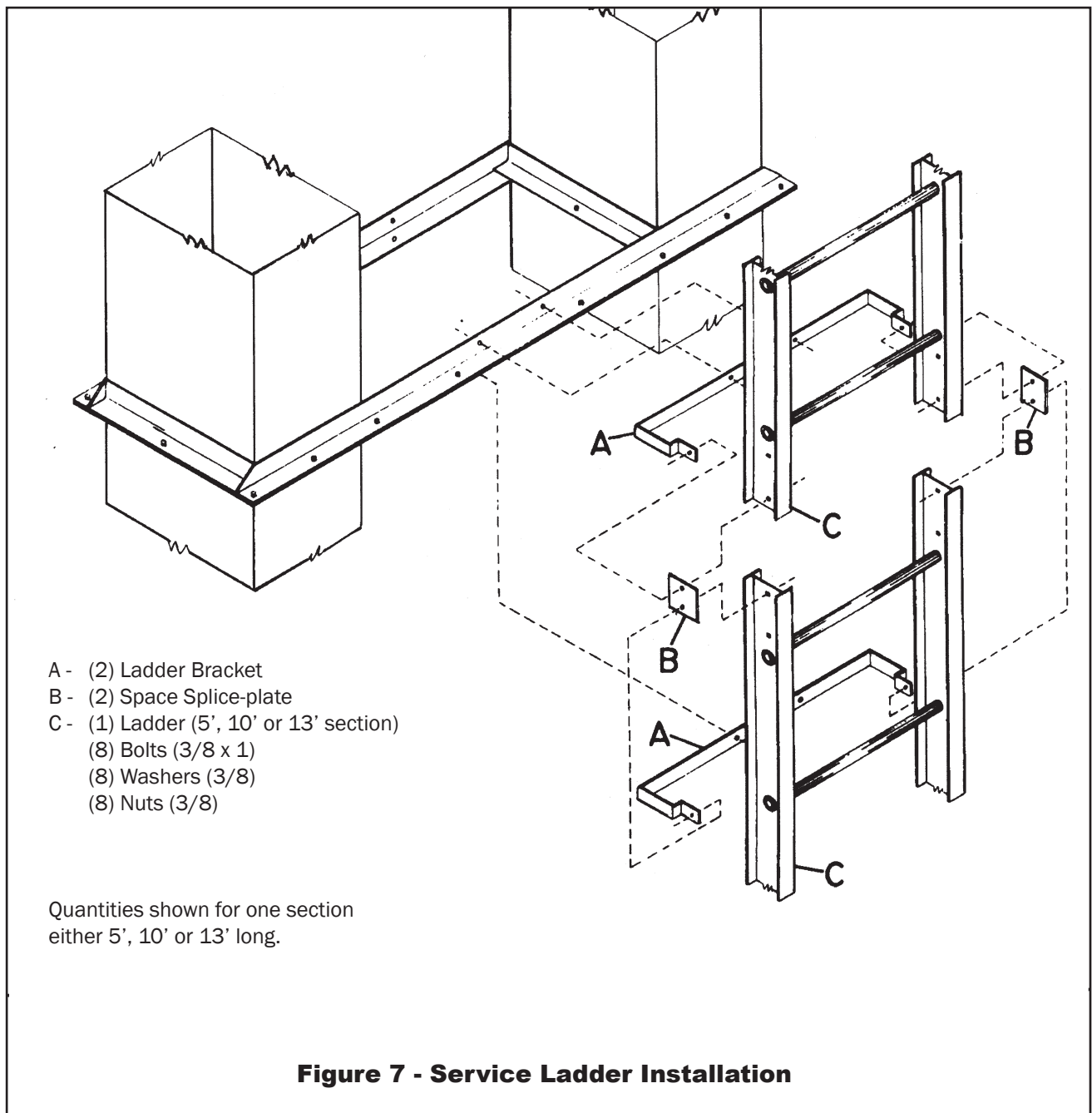
HEAD PULLEY SPEEDS - When proper sheaves and speed reducer are used, head pulley speeds should correspond to specifications on the order packing list.

SERVICE LADDER

The following instructions are for installation of 5', 10', or 13' sections of ladder. Additional sections are installed the same way. Refer to Figure 7 below for illustration.

1. Attach ladder bracket "A" to angle iron frame around casing with 3/8 x 1 inch bolts, nuts and washers.
2. Place spacer "B" between ladder bracket "A" and ladder "C". Fasten together with 3/8 x 1 inch bolts, nuts and washers
3. Repeat steps No. 1 and No. 2 for opposite end of ladder.

NOTE: Plate "B" connects two (2) sections of ladder together. Be sure to use proper mounting holes. Refer to Figure 7.



Service and Distributor Platforms - Refer to separate assembly manuals for platform installation.

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

Platform for Monarch and Titan with Chain or Direct Drive - This platform differs from the above platforms. An installation drawing is supplied with each platform.

Distributor Support - 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.

Guy Brackets - Refer to Figures 15 and 16 to determine correct location of guy brackets. These brackets can be installed while casing is on the ground. The guy bracket assembly (Fig. 8) clamps completely around elevator casing just above casing flanges to keep bracket from slipping down the casing. The guy bracket at the head section for the Bantam I, Bantam II, Atom, and Apollo is located between the casing frame and the head service platform. On the Duke II, Prince, Queen, King, Ace, and Monarch, the top set of guy cables should be attached to the holes in the head frame. Brackets should be used every thirty feet (30 ft.). Cables may be attached to all four corners of the bracket and later attached to anchors when the casing is erected.

Cable Clips - These clips MUST be attached properly to insure maximum holding power (see Fig. 9). Always apply the base of "Saddle" of the clip to the live or long end. The "U" part of the U-bolt is located against the dead or short end. The use of wire rope thimbles insure the best loop protection.

Guy Cable Anchors - Before installing the elevator, guy cable anchors should be located and installed. Refer to Figures 15 & 16 for two typical arrangements. Anchors should be made from "I" beams or other heavy material imbedded in concrete to a depth which will insure their rigidity and strength. Anchor beams should EXTEND A MINIMUM OF 14 feet above the ground, or to a height which will insure adequate clearance for vehicles to pass under guy cables. The accidental collision of a truck with a guy cable CAN CAUSE EXTENSIVE DAMAGE TO THE ELEVATOR .

DO NOT anchor the guy cables to steel bins, light poles, etc. that are not rigid. Steel grain bins will move as they are filled and emptied. Horizontal bracing should have a lateral adjustment to plumb the casing after installation. These will also allow for future adjustment as required.

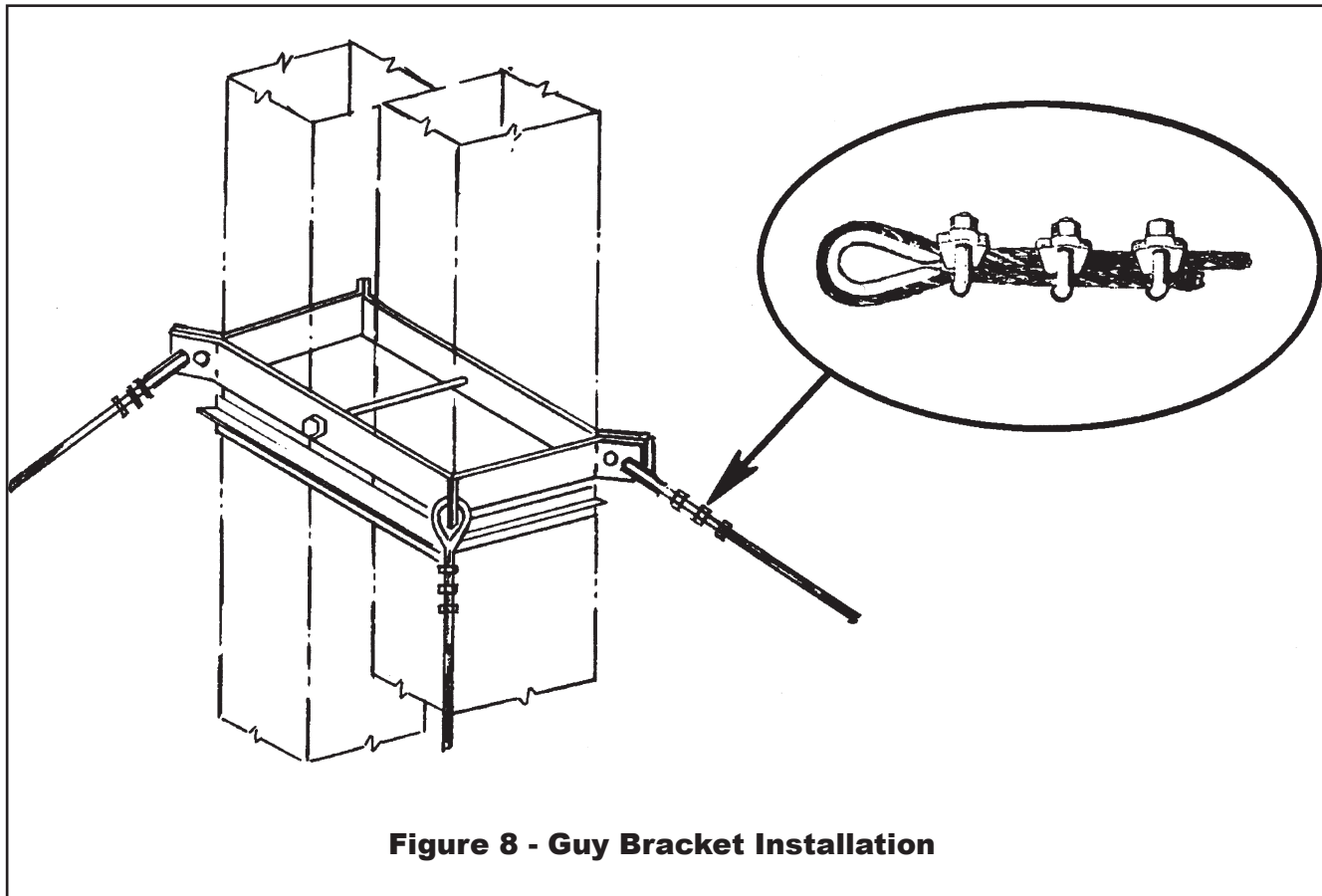


Figure 8 - Guy Bracket Installation

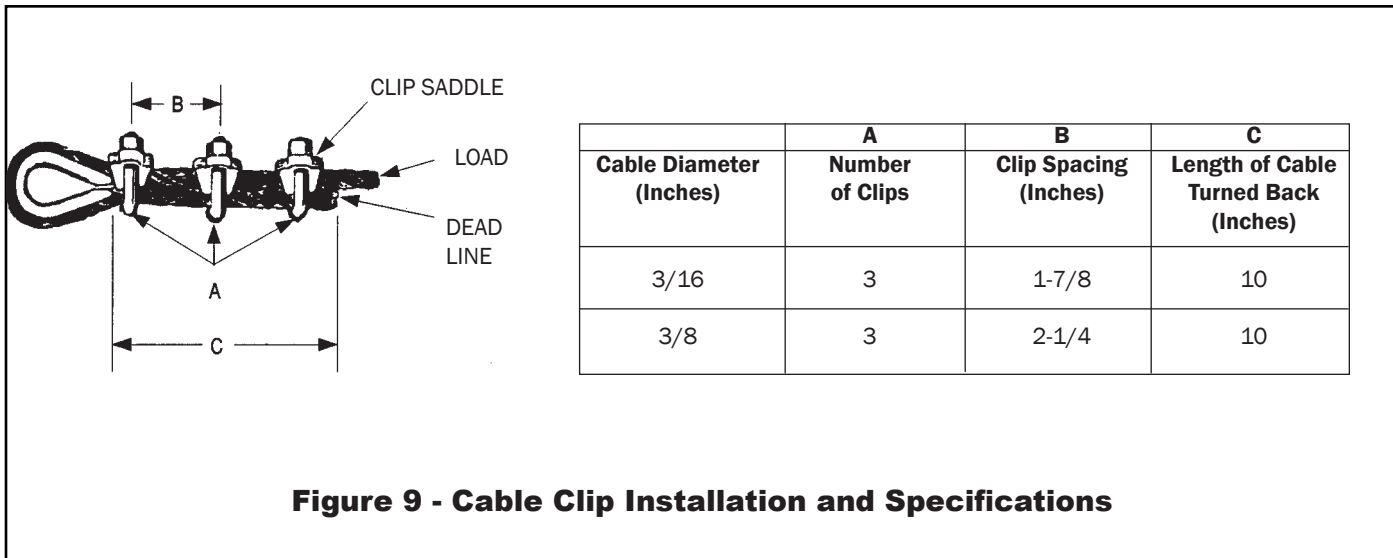


Figure 9 - Cable Clip Installation and Specifications

INSTALLATION OF HEAD ASSEMBLY AND CASING

General - At this point, the method of installation should be determined. The method may vary depending upon several factors. These include the size and height of the elevator, number and experience of personnel on the job, distance to existing structures, and extent of tools and erecting equipment available.

The common method of installation today is by crane (See Fig. 12). When using this method, most of the work of assembly is done on the ground. Two ways of assembly and installation of the assembly, when a crane is used, are described below. Using the first method, the elevator is assembled one piece at a time, and most of the work is performed on or near the ground. Using the second method, 30 or 40 feet is assembled on the ground and then lifted into position. The second method requires aerial work. In either case, assemble the head, distributor, platforms, etc. as described under PRE-INSTALLATION OF HEAD AND CASING, page 10. The boot should be installed FIRST. (See page 8).

SERVICE DOOR – One section of elevator casing contains the service door and inspection panel. Where dual casing is used, it is included in a 10 foot section. The top and bottom panels are fixed and secured with monobolts. There are four bolted panels with lips for over lapping the next section, and one section includes the inspection door and cover. The position of this section of casing will vary and depend upon the placement of the boot but should be installed so that the inspection port is approximately at chest height above grade or work floor. By unbolting these panels, they may be moved and interchanged in order to properly locate or position the inspection door. Panels on the backside of casing may also be removed for purpose of securing bolts to elevator buckets.

1st Method:

Using the first method, install eye-bolts in the four holes provided in the top head flange. Make certain that the bolts are strong enough to support the head, drive, distributor, platforms, etc. and all of casing required. Use cables or slings to attach a crane cable to the eye-bolts. Carefully lift the assembly to an upright, vertical position. Lift the assembly to a height sufficient to allow a single section of casing to be positioned under it and bolted in place. Don't forget to CAULK all flanges. Assemble ladder sections and guy brackets, with cables attached, as required. Continue lifting and adding casing until all sections are properly installed.

- NOTE:**
- Be sure to locate the inspection door section properly.
 - Always place the inspection door on the up side.
 - Lift and position the complete head and casing assembly on the boot.
 - Align mounting holes and bolt together securely.
 - Plumb the casing assembly in accordance with instructions below.
 - PLUMBING, pages 20 and 21 and Figures 13 and 14.

CAUTION: When lifting to an upright position, do not allow the casing to drag on the ground. Flanges and casing may be damaged to the extent that assembly and plumbing will be extremely difficult. When lifting any assembly, the line of lifting force should be in-line with the narrowest part of a casing section. **AVOID STANDING UP SECTIONS LONGER THAN 40 FEET IN HEIGHT.**

2nd Method:

When using the second method of installation, assemble the head, distributor, platforms, etc. the same as instructed above. Assemble all casing on the ground in sections 30 to 40 feet long. Attach ladder sections and guy brackets (with cables installed) as required.



GALVANIZED ELEVATOR LEGS

RUBBER BELTING

- Engineered to exact strength (PIW) requirements
- Static conducting, oil, and fire resistant (SCOF)
- PVC belting optional

HEAVY 14 GAUGE TRUNKING

- Ensures structural integrity at all discharge heights
- Continuous lockseam construction standard
- Bolted construction optional

GALVANIZED TRUNKING FLANGES

- Welded in a precise fixture assuring cost savings in erection
- Leg sections stack straight

SAFETY LABELS

- Appropriately applied throughout the bucket elevator.

SECTIONAL SERVICE DOORS

- Allow easy, authorized access for belt/bucket maintenance
- Four modular 2' panels, front and rear

SCREW TAKE-UPS

- For easy belt adjustment

HEAVY-DUTY FLANGE BEARINGS

- No bearing seals are exposed to interior of boot

REINFORCED BOOT SIDES

UHMW BEARING SEAL PLATE

CROWN-FACE DRUM BOOT PULLEY

- Slotted wing-style self-cleaning pulley optional

TAPERED BOOT HOPPER

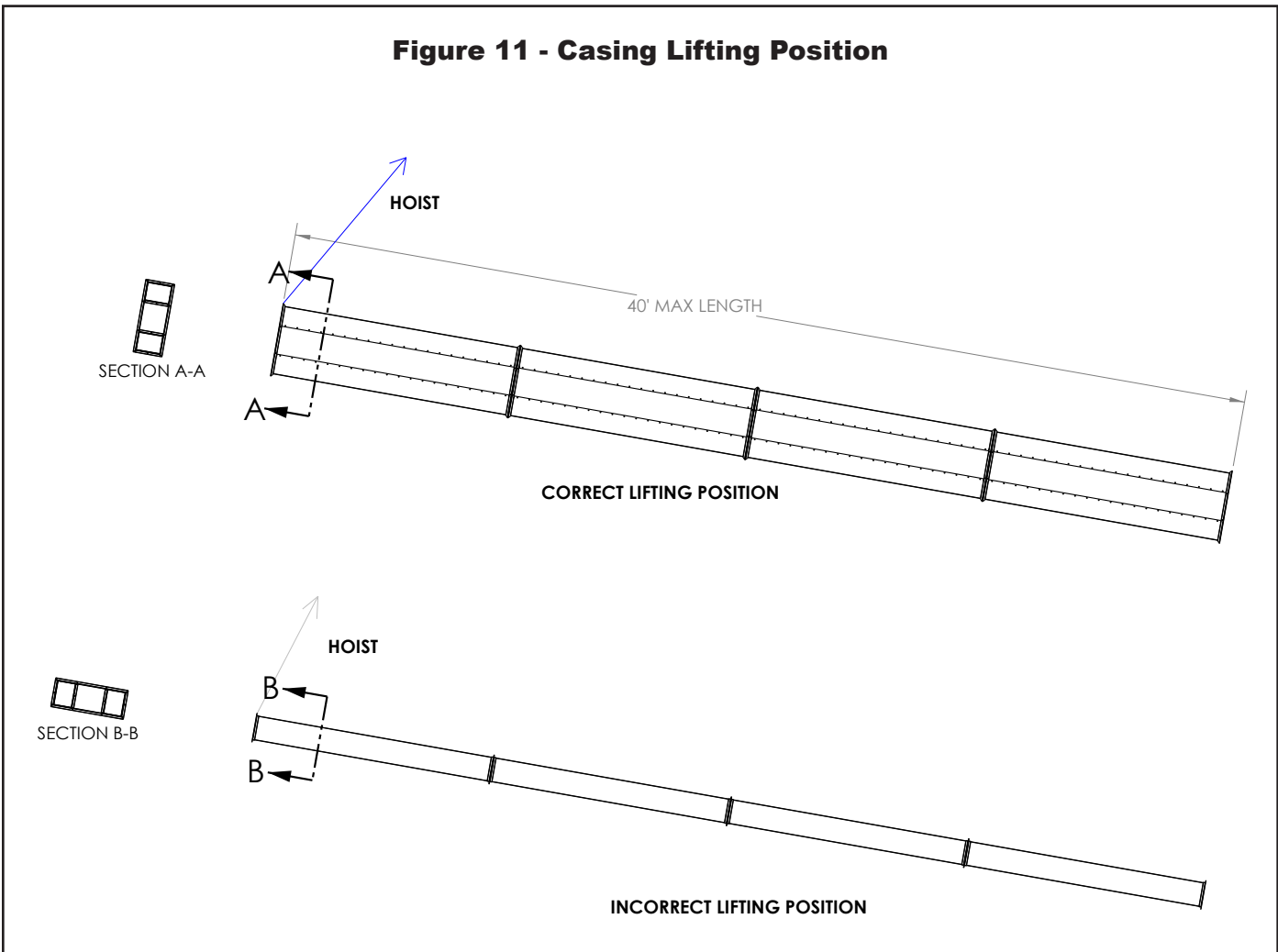
- Properly directs flow for maximum bucket fill

BOOT CLEAN-OUT PANELS

- Slide out to provide easy access and clean-out

Figure 10 - Elevator Boot and Service Door Assembly

Figure 11 - Casing Lifting Position

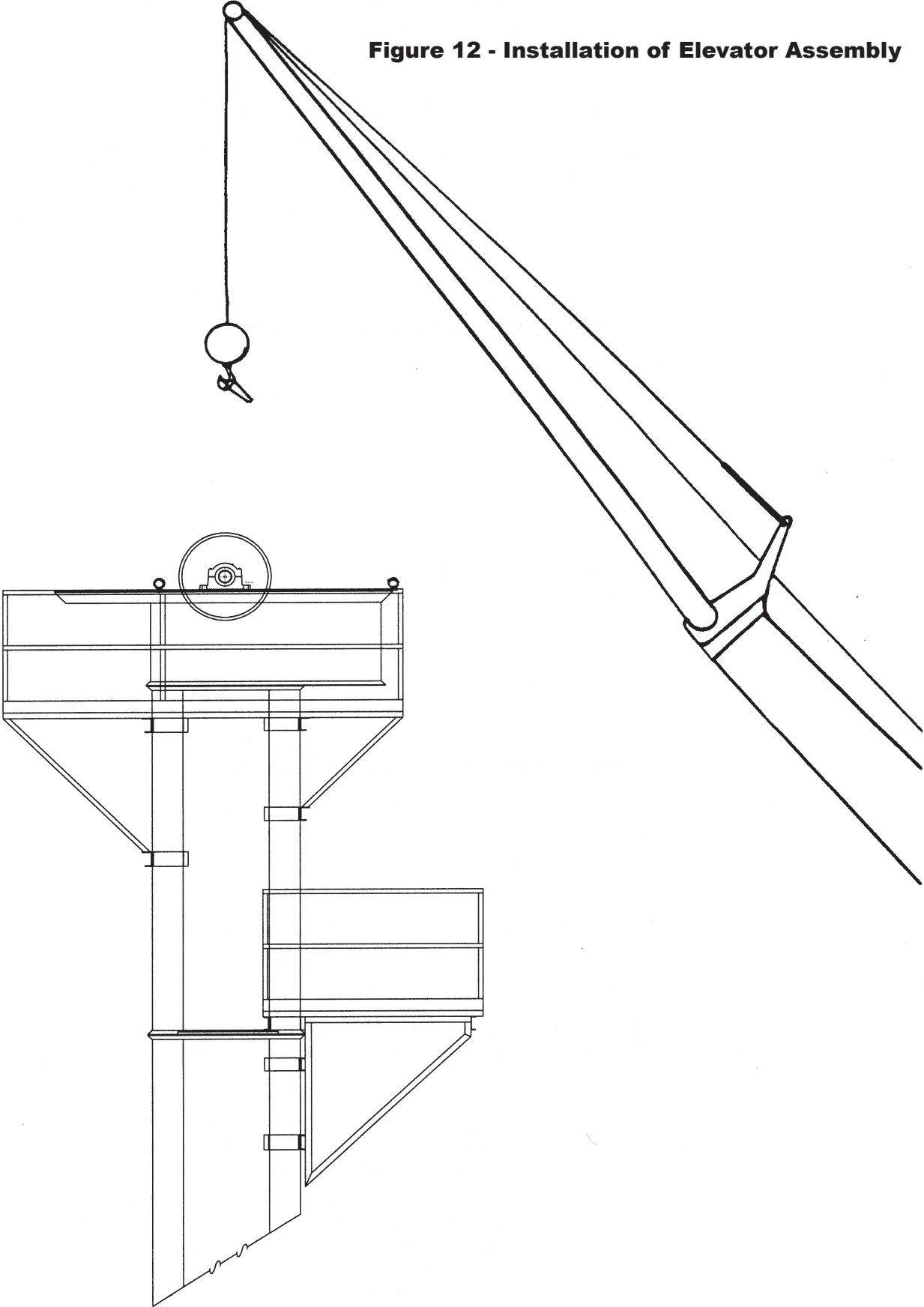


CAUTION: When lifting to an upright position, do not allow the parts to drag on the ground. Flanges and sub assemblies may be damaged to the extent that assembly and plumbing will be extremely difficult. When lifting any assembly, the line of lifting force should be in-line with the narrowest part of a leg section. Avoid standing up sections longer than 40 ft.

DO NOT assemble legging in a “flat” position. **Always assemble and lift so that weight is supported through its narrow, stronger section and not its wider “flat” section. See above illustration.**

Attach a crane to the top end of the first section assembly (be sure the inspection door is located properly), and lift it into position on the boot. When lifting a section assembly, do NOT drag the free end on the ground. Install flange bolts and tighten. Leave crane attached, and plumb the section assembly by either of the two plumbing methods described on pages 20 & 21. Attach guy cables and secure. Lift and install remaining assembled sections. Plumb and secure each section as it is assembled. It is suggested that an experienced aerial worker be available to bolt the assembled sections together. When this method is used, the worker will be operating at a considerable height. Install eye bolts in the four holes provided in head flange, and lift the head assembly into position on top of the boot. Secure and plumb. Make a final check of all guy cables to be sure that they are secure and tight.

Figure 12 - Installation of Elevator Assembly

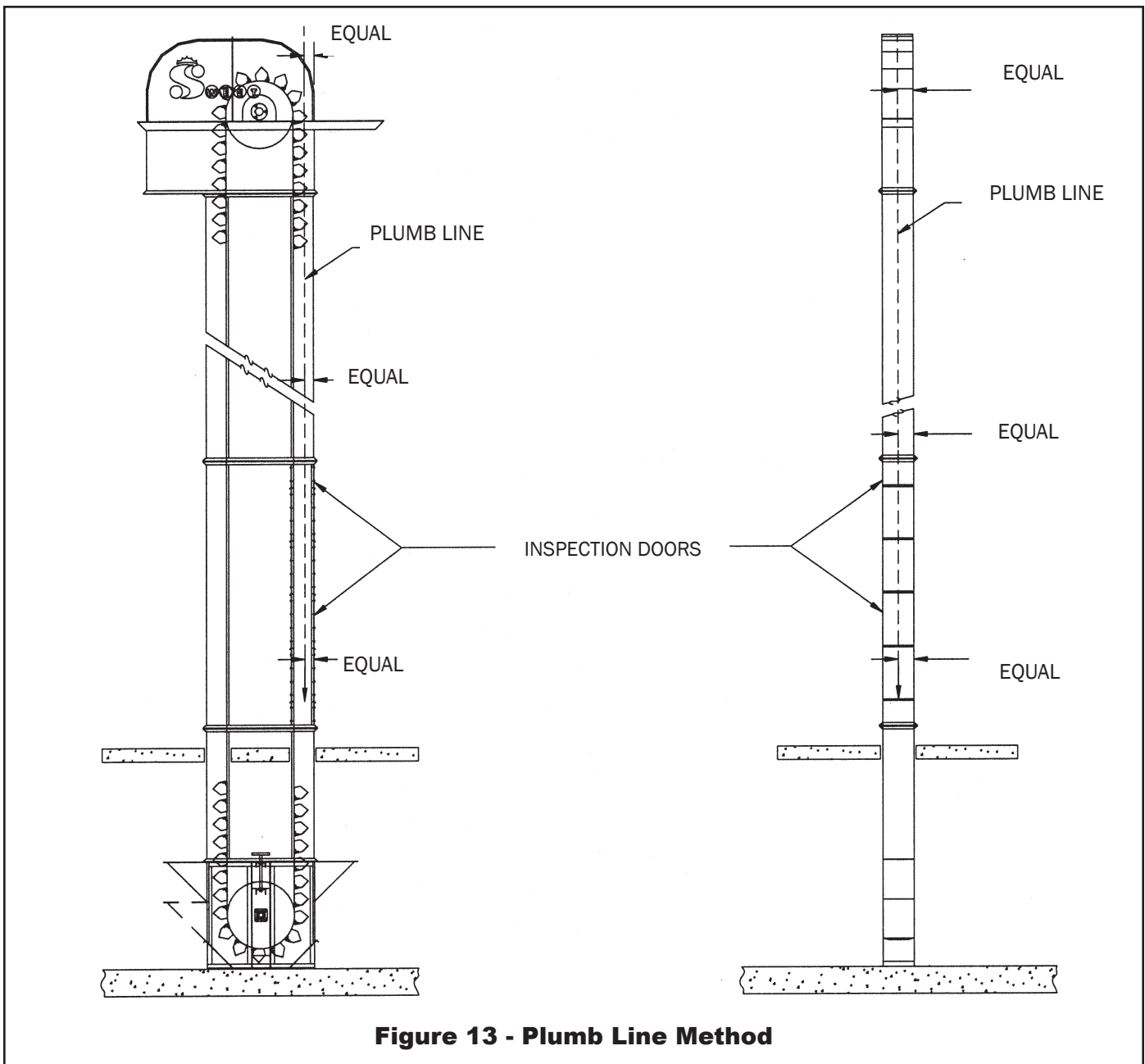


PLUMBING BUCKET ELEVATOR

With the crane still attached, plumb the elevator by one of the methods described.

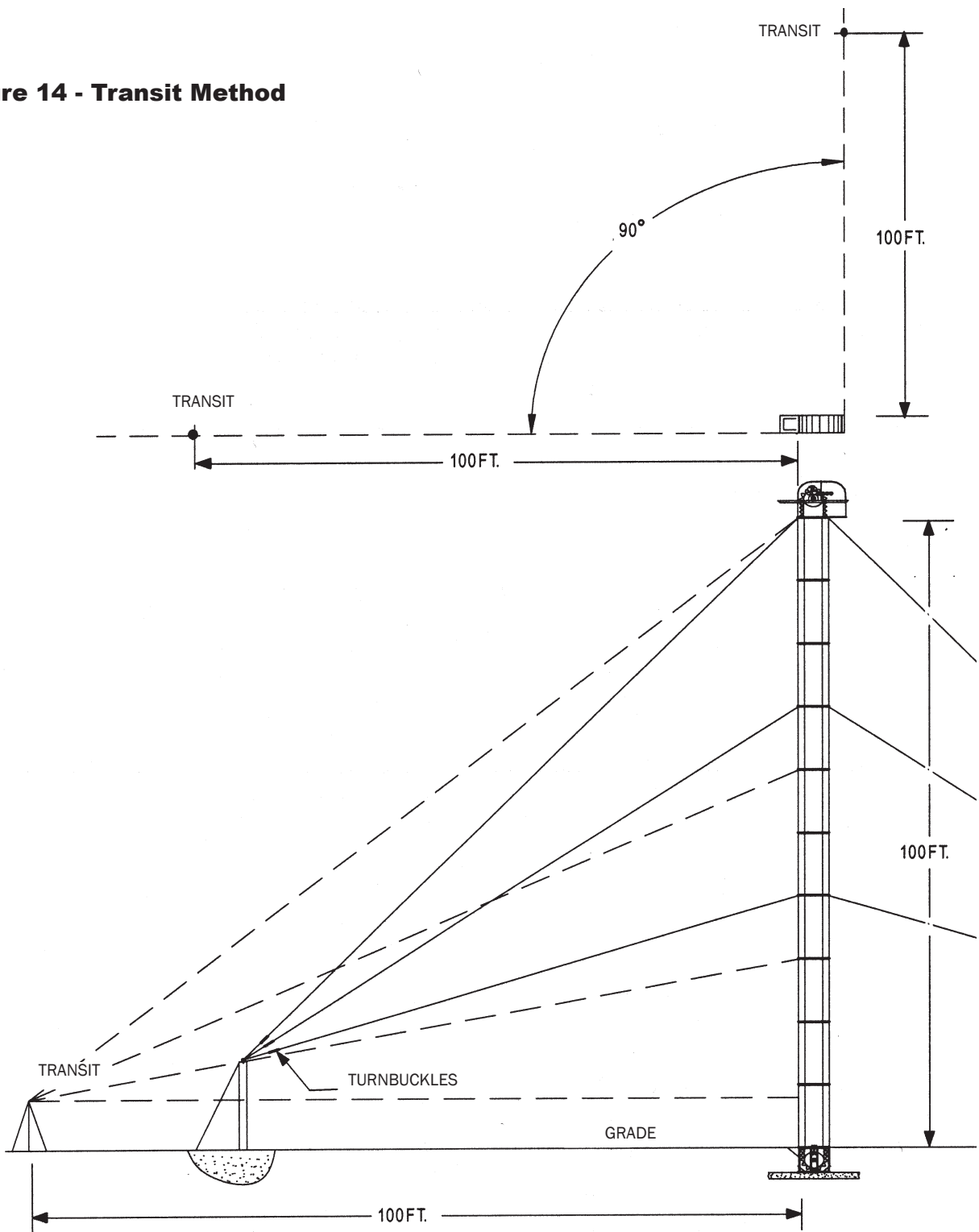
BE SURE TO LOCATE TURNBUCKLES SO THAT THEY MAY BE EASILY REACHED FOR TIGHTENING.

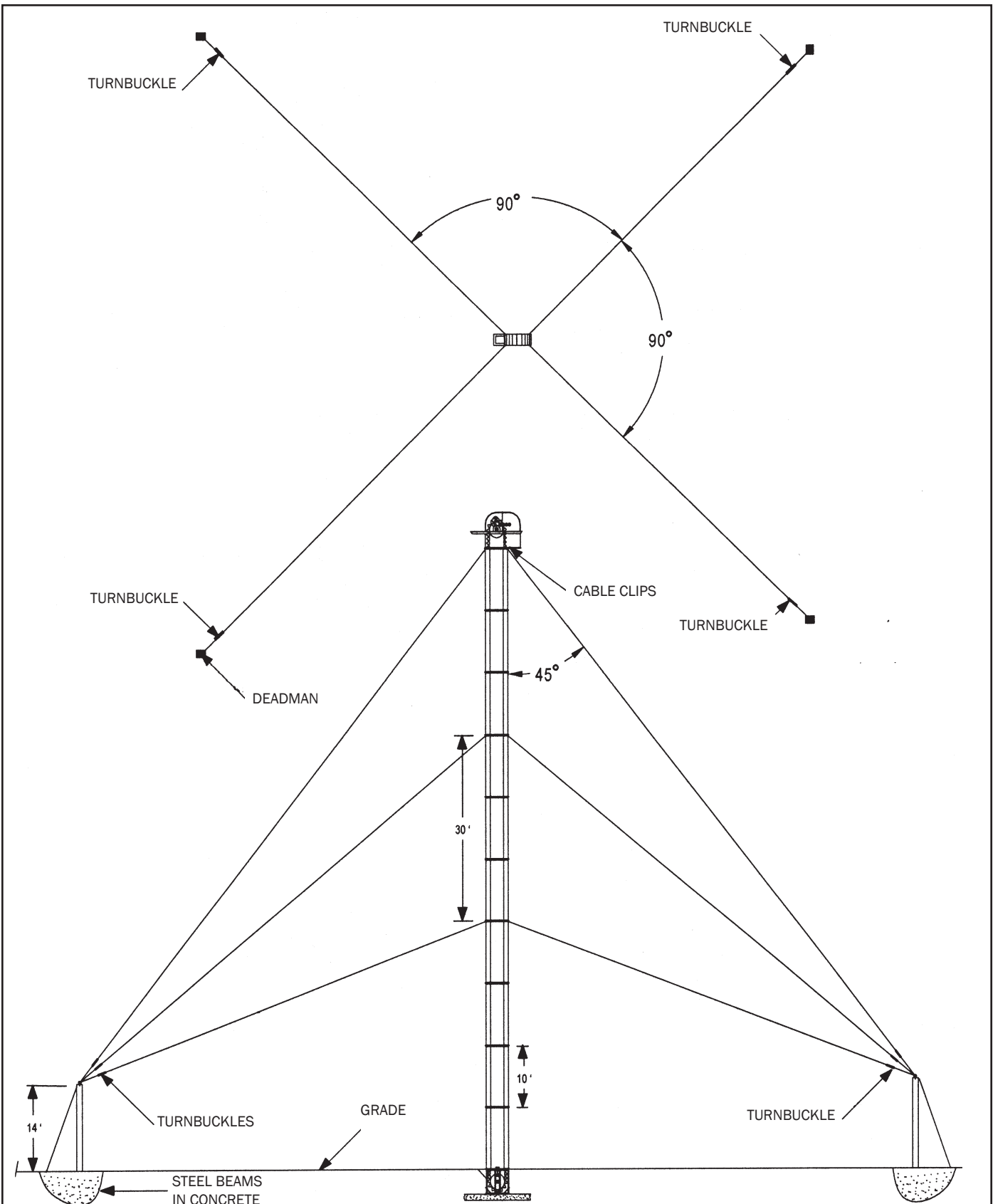
PLUMB LINE METHOD - If the plumb line is used, refer to Figure 13. With the top of the head section removed, drop a plumb line INSIDE the up-side housing to the boot. Do not allow the line weight to touch the bottom of the boot. Suspend the plumb line on a piece of wood or metal (which cannot roll) placed across the top of the head housing. Adjust guy lines as required so that the structure is plumb from side to side, as well as from front to rear. Measurement from plumb line to side and end of elevator casing, at the inspection door, must be the same measurements taken at the top of the elevator. Make all adjustments and final anchor connections before removing plumb line so that a final check may be made. Be sure all cable clips are installed correctly with the base or "saddle" on the LIVE end and the U-bolt located against the dead end (See Fig. 9).



TRANSIT METHOD – Refer to Fig. 14, if a transit is used. Plumb from side to side and from front to rear. Take as many sightings, 90 degrees apart, as necessary to plumb the structure. Make final check sighting after all guys are secure.

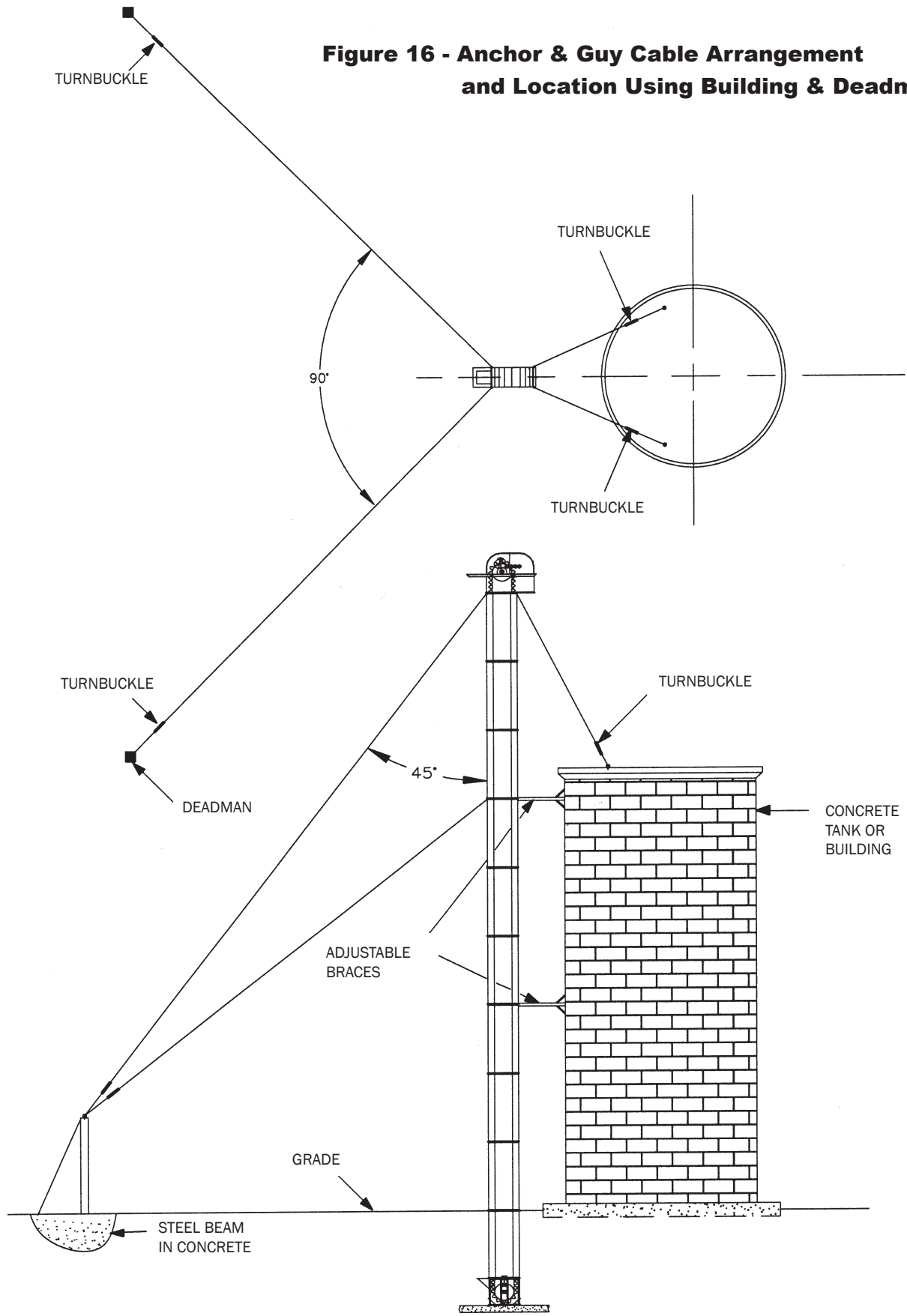
Figure 14 - Transit Method





**Figure 15 - Anchor & Guy Cable Arrangement
and Location Using Ground Anchors Only**

Figure 16 - Anchor & Guy Cable Arrangement and Location Using Building & Deadmen



BELT INSTALLATION

The belt may be installed with or without buckets attached, depending upon equipment available to lift the belt. To install a belt without buckets, proceed as follows:

1. Use adjusting screws to raise boot pulley to its highest take-up position.
2. Remove the head cover and drop a strong rope or cable down the up-side of casing until the end can be removed through the boot hopper or the service door.
3. Attach the rope or cable to the belt. Belt splice plates are supplied with each elevator to connect rope to belt, as per illustration below. Attach one plate at end of belt and attach rope or cable.
4. Use rope to pull belt up to head pulley. Secure the end of belt in this position and drop end of rope down the down casing. Use the hopper opening or clean-out door to thread the rope around the boot pulley.
5. Use rope to "thread" belt over head pulley, down the down-side of casing and around boot pulley.

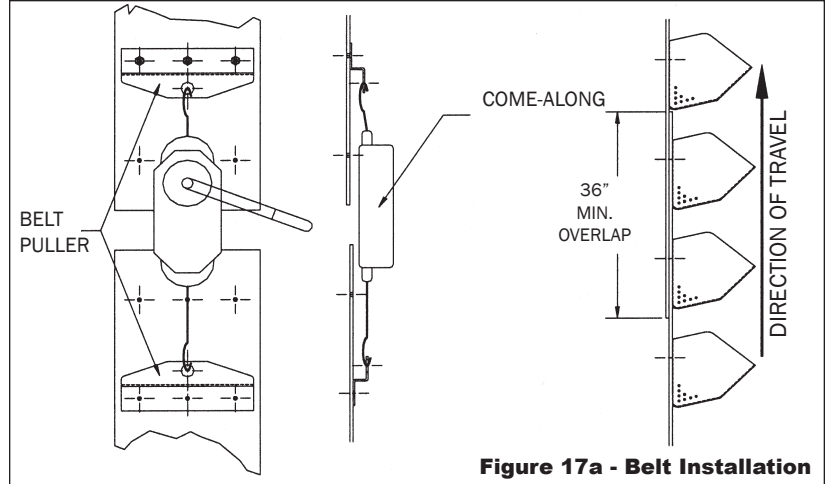
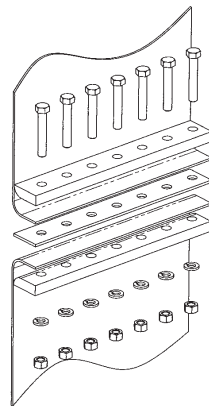


Figure 17a - Belt Installation

6. Splice belt by using either the "lap" or clamp methods (see Figs. 17a-b-c). In the lap method, the lead end of the belt (direction of travel), must OVERLAP the trailing end of the belt.
7. Use other belt splice plate to attach a "come-along" tool to pull belt ends into position. Bucket attaching holes, which are already punched, are used for bolting the belt together. Longer bucket bolts are used for splicing. These bolts also secure buckets on the spliced portion of belt. The length of overlap at the splice must cover a minimum of three feet.



ALL-STATE DURA-CLAMP ELEVATOR FASTENER

1. The ends of the belt must be cut square.
2. Draw a line across the full width of the belt 1" from the end of the belt. Both ends of the belt must be marked in this manner.
3. Clamp both the belt ends firmly together with the compression strip sandwiched between the belt ends and center the bolt holes in the Dura-Clamp fastener on the line with the beveled edge of the fastener away from the end of the belt.
4. Use a 3/8" drill bit to drill through both belts.
5. Insert the bolts into the fastener and belt with the bolt heads in the direction of belt center of the finished splice.
6. After 24 hours, re-tighten all nuts again to 25 foot pounds.
7. Your Dura-Clamp splice is finished! You have just installed a super strong elevator splice that will give you many years of service with minimum maintenance.

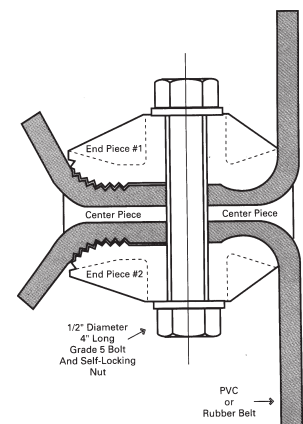
Figure 17b - Elevator Fastener

8. Pull the leading end of belt over trailing end until slack at boot pulley is removed and bolt holes are aligned (See Fig. 17a). Insert bolts from the BACK side of belt.

MAXI-SPLICE BELT FASTENING DEVICE

Figure 17c - Belt Fastening Device

1. Ensure the belt ends are square and even. If using the splice template tape, apply the tape to mark the punching. Be sure to apply the tape squarely on the belt ends; then proceed to Step 4. If you are not using the tape, go to Step 2.
2. Draw a line approximately 4-1/4" from the belt end to use as the center line for hole punching. Proper installation for even width belts will begin just inside the belt edge. Odd belt widths require installation 1/2" from the belt edge.
3. Use the Maxi-Splice as a template to mark the hole locations for punching. After marking the first hole, move over 2" and mark each consecutive hole.
4. Punch both belt ends for 1/2" diameter bolts.
5. The two end plates and center plate are used for firm belt gripping. The end plates have two gripping areas - the slotted gripping area is mounted toward the face of the belt and is followed by a series of gripping teeth. These teeth are always mounted toward the tail of the belt. The center plate is symmetrical and cannot be improperly installed.
6. IMPORTANT: We have supplied a 1/2" diameter, 4" long Grade 5 bolt and nylon locking nut. The bolts must be torqued for Maxi-Splice to effectively clamp. The torque requirement is 75 foot pounds for belts up to and including 600 PIW - belts greater than 600 PIW tensile require 100 foot pounds of torque.
7. Run the belt for thirty minutes; stop the leg and re-torque the belts.



BUCKET INSTALLATION

1. Mount buckets on front side, and secure with nuts. Tighten nuts sufficiently to “set” head of bolt in belt. Bolts are normally tightened by using a “speed” wrench. **Use of an impact wrench is not recommended.**
2. Attach the bucket using an elevator bolt with a lock washer and nut. If plastic buckets are used, a flat washer is also required. See Figures 18a, 18b, 19a and 19b.
3. Tighten the bolt assembly without distorting the belt. Do not use an impact wrench for installation.
4. Check the torque with a torque wrench on the first bucket installed and install the remaining buckets with the same torque.
5. Run the elevator with empty buckets for 4 hours and then recheck the bolt torque.

Figure 18a - Steel Bucket Installation

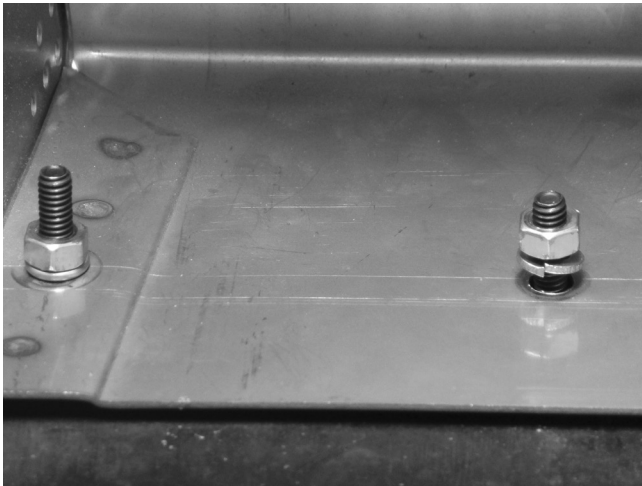


Figure 18b - Steel Bucket Detail

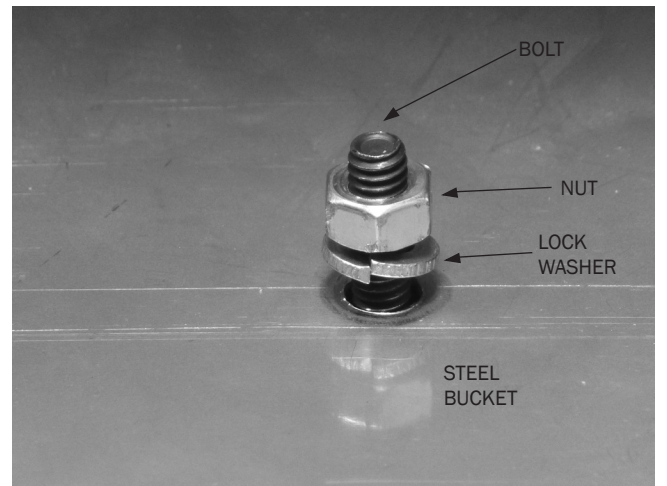
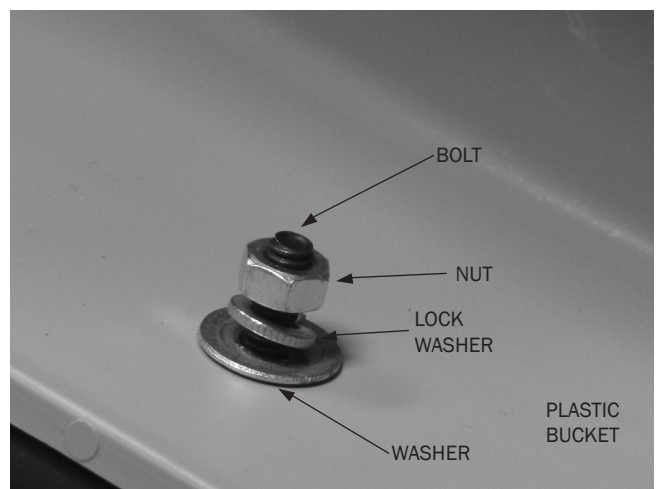


Figure 19a - Plastic Bucket Installation



Figure 19b - Plastic Bucket Detail

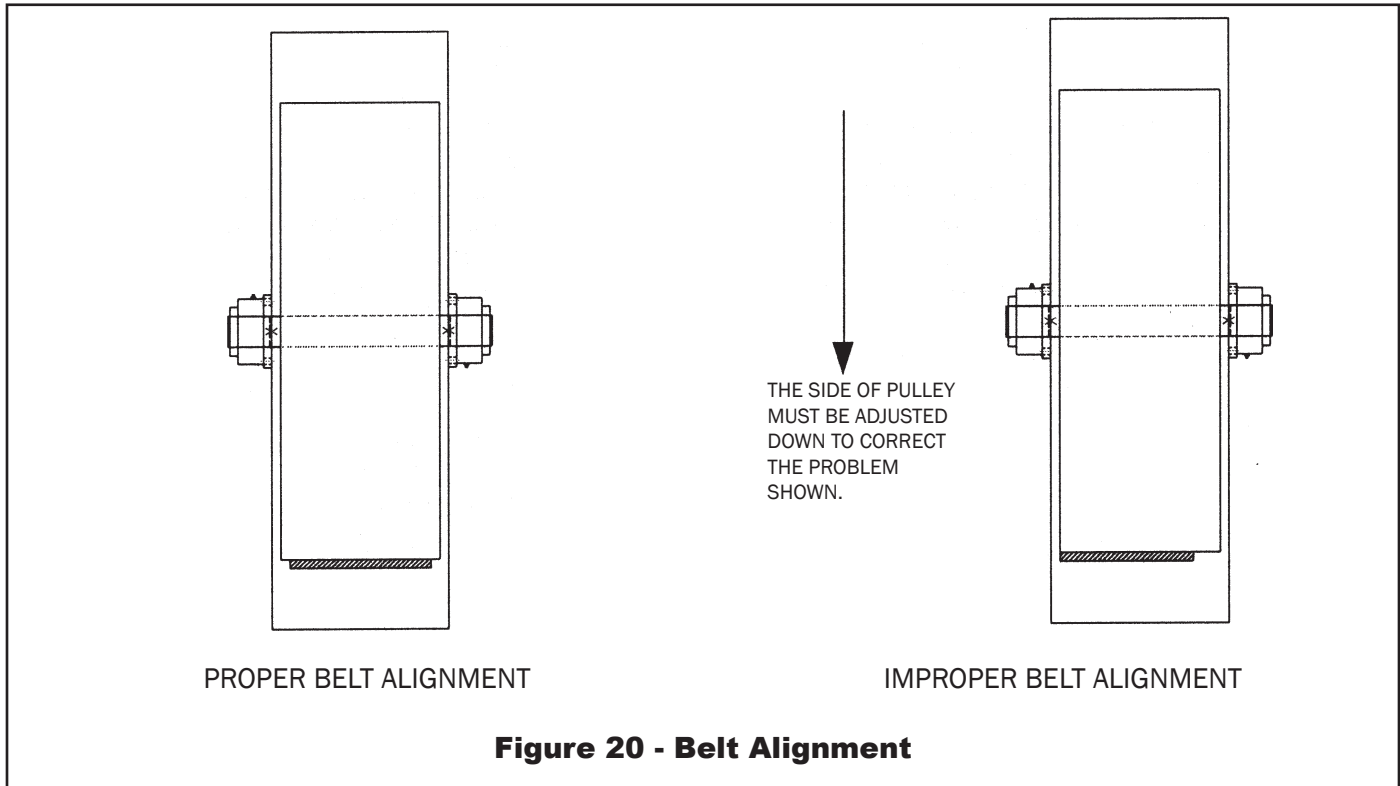


At this point, the belt has been securely spliced and 4 or more buckets have been installed in the splicing process. It is suggested that the remaining buckets not be attached at consecutive mounting holes in order to keep each leg of the belt more nearly in balance and make moving it easier. Attach one bucket at 8 to 20 bolt row intervals for the first complete belt revolution. On the second revolution, cut the interval spacing in half. Repeat this process on each revolution until all buckets are attached. This procedure helps balance the weight load during bucket installation, particularly on taller legs.

CAUTION: Check and tighten all bucket bolts after the first week of operation.

BELT TENSIONING

NOTE: The two (2) views shown below are looking at the elevator belt and pulley as viewed from the boot assembly.



Note: Before making an adjustment for the proper belt alignment be sure to check:

- The elevator casing is plumb.
- The head shaft is level.
- The boot shaft is level and parallel to the head shaft.

After the plumb and level conditions of the elevator have been established, it is time to check for proper belt alignment. The above illustrations will assist you with this operation.

To properly center a belt on the pulley when belt is running to one side, the pulley should be adjusted downward on the side opposite the direction you want to move the belt. For example, if the belt is running off center to the right, then the right threaded adjusting rod should be lowered while the belt is running. In the event the belt runs to one side or the other and fails to center on the face of the pulley, it is usually an indication that the headshaft is not level. In short, an ideal condition would be a level headshaft and level boot shaft where the belt would be self-plumbing. Frequent checking of belt alignment is important for proper operation of the elevator.

ADJUST THROAT PLATE BAFFLE - Before replacing the head cover, check the adjustment of the rubber throat plate baffle in elevator head (See Fig. 21). The baffle provides a flexible extension between the throat plate and the lip of buckets. Adjust baffle to give a clearance of 1/8 to 1/4 inch between baffle and buckets.

Figure 21 - Elevator Head Throat Plate and Baffle



CHECK LEVEL OF HEAD SHAFT - It is possible that the level condition of shaft could have been altered during shipping and handling. If shaft is not level, install shims under the pillow-block bearing on the low side. If the head shaft is not level, the belt will not “track” properly and could wear a hole in the side of the head, casing or boot.

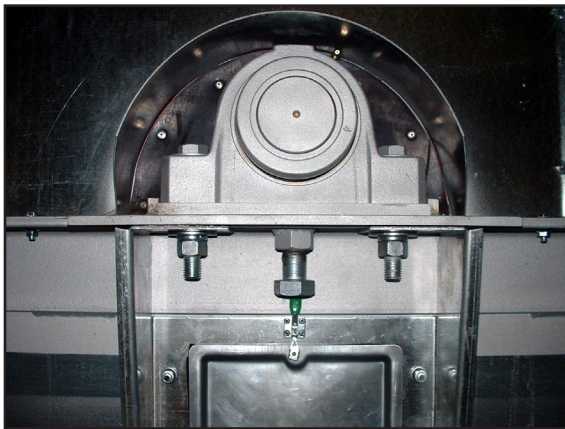


Figure 22 - Jacking Bolt Installed Under Bearing

SPOUTING, VALVES AND FITTINGS - Spouting, valves, etc., are best assembled on the ground and lifted into position with a crane. Apply caulking to all flanges to make a weatherproof joint. Use justa-joints and cushion boxes where abrasive wear is the greatest. On spouting runs of 40 to 70 feet, it is necessary to add truss support to the spouting assembly. On longer runs of 70 to 120 feet, it is necessary to use an extended truss system. Be SURE spouting “fall” is sufficient to prevent clogging and that turns (elbows, etc.) are not sharp enough to cause lodging and flow restrictions.

USE OF SPOUT JOINT BANDS - Spout joint bands are designed as an easier and stronger method of joining two pieces of spouting.

Start by laying the first section of spouting upon blocks or similar supports. Shim either end until the spout is level. Slip a spout joint band over one end. Butt the second piece of spouting, also on blocks, against the first and check the second piece for level. Slide the spout joint band over until it is centered over the joint. Use clamps (i.e. chain type vise grips) to draw the open seam of the spout joint band together. Weld all around each end of the spout joint band and along the seam to complete the joint.

INSTALLATION CHECK LIST

- _____ Boot firm and level (shim if necessary)
- _____ Determine location of inspection door
- _____ Align sections and caulk
- _____ Remove head cover; leave on ground
- _____ Check head pulley hardware
- _____ Install backstop in reducer
- _____ Install gear reducer; secure set-screws
- _____ Install motor
- _____ Discharge transition straight side forward
- _____ Bolt valve or grain distributor in place
- _____ Assemble platforms
- _____ Install ladder; install safety cage
- _____ Erect casing; install guy brackets as you go
- _____ Attach spouting
- _____ Install belt and cups
- _____ Apply tension to belt with boot pulley
- _____ Add oil to required level (check instruction sheet)
- _____ Check rotation of motor
- _____ Install v-belts; run elevator without a load
- _____ Adjust boot take-up so belt runs in center of pulleys
- _____ Adjust the head discharge or throat baffle to clear the cups, at lap splice, by 1/4 of an inch
- _____ Check entire system for obstructions
- _____ Check valve or distributor location to be sure of material flow

OPERATION

After the above items have been checked, test the elevator under power and without load. Be sure that the belt is in proper alignment and running in the center of the head and boot pulleys. If belt is not operating in the center of pulleys, adjust the boot pulley take-up screws so that the belt will “track”. It should be remembered that a belt will seek the “high” side of a pulley.

Sometimes difficulty may be experienced with a belt that does not “track”, even after adjustment of the boot pulley. It may have a tendency to work to one side or the other. This is usually an indication that the elevator has gone out of plumb, or that the head shaft is not level. Remember that the head shaft and boot shaft must operate in parallel to each other.

Belting will have a tendency to stretch slightly during initial operation. This is not unusual, and special care should be given to belt tension during the first week or two of operation. After frequent belt tightening during the first week, it may be necessary to raise the boot pulley and re-splice the belt to reduce its length. (Refer to page 24 for splicing information). It should be remembered that belting will expand and contract under varying conditions of temperature and humidity.

When the elevator has been operated satisfactorily without load, it is ready to be loaded or put into service. It is a good idea to check the flow system at this point. If a distributor or valves are in the system, make certain that they are functioning properly and that spouts are connected to the discharge point for the trial run. Should “back-legging” occur in loaded operation, it could be caused by one or more of the following conditions: the head shaft speed may be improper due to installing the wrong sheaves or reversing of sheaves on motor and reducer, a restriction at the head discharge or spouting system, which would restrict exit of material from the head, or misadjustment of the throat plate in the head. This throat plate should be adjusted to give a clearance of 1/8 to 1/4 inch between the plate and lip of buckets (See Fig. 21). Don’t overlook the possibility that material is being fed too fast and that buckets are being overfilled.

We stand ready at all times to assist customers with any problems concerning the operation of our products. Feel free to contact us at any time for information or assistance at 800-334-7254 or sales@sweetmfg.com.

MAINTENANCE

OPERATION OF SAFETY BELT (See Fig. 20)

Attach safety belt snugly around the waist with the up arrow in proper position. Position connecting plate at center of body. Remove attaching pin. Place grab arm of safety clamp in slot of connecting plate and replace pin through grab arm, turning until pin guide allows pin to go all the way in and lock itself. Proceed to climb.

For coming down, hold a slight body pressure against the clamp and descend. If cable guides are used, they are operated by pulling firmly and unhooking the cable. This allows the clamp to slide by. The cable may be re-hooked on the way up if desired. On the way down, be sure to re-clamp cable for storage.

SPOUTING

Spouting should be rotated at regular intervals to prevent excessive wear on the bottom side. The time interval can only be determined by inspection and will depend upon the amount of grain or material handled. Rotate before any holes are worn in spout. Rotate spouting 1/4 turn at a time.

BELT

Check belt frequently to make certain that it is running in the center of pulley and that the tension is properly set.

CAUTION: A belt which is running improperly can quickly wear a hole in the side of the head, casing or boot.

BUCKET BOLTS

Check and tighten all bucket bolts after first 10 hours of operation. Check every 50 hours thereafter.

INSPECTION

An inspection schedule should be established in order to insure that the equipment is in good operating condition at all times. Regular inspection will help to reveal little things such as loose bolts, damaged belts, etc., before they become serious and damaging problems. Here are some of the things which should be inspected and maintained regularly.

CAUTION: Make inspection when all operations are stopped.

1. Check belt to make certain that it is running in proper center position on pulley.
2. Inspect belt and buckets. Look for loose bolts, damaged buckets, and poor belt condition.
3. Check belt tension. Re-splice if it cannot be adjusted further.
4. Inspect v-belts for tension and condition. V-belts should be replaced with a MATCHED SET.
5. Check speed reducers regularly for sufficient oil and signs of leakage. Keep breathers CLEAN.
6. Check bearings for sufficient lubrication and evidence of overheating.
7. Check all sheave and pulley attaching parts for security.
8. Check guy cables, and adjust as required.
9. Check all hardware, and tighten as required.
10. Check all safety labels regularly. When they become illegible, contact Sweet Manufacturing Company's sales department to reorder at 800-334-7254 or sales@sweetmfg.com.

SAFETY

The importance of exercising **EXTREME CARE** when erecting and maintaining a bucket elevator cannot be over emphasized. Working at heights reached by even the smallest installations can be hazardous, unless SAFETY precautions are taken. It is suggested that a caged ladder, safety cable and belt, or an OSHA approved ladder and platform installation be used. In any case, **BE CAREFUL, DO NOT HURRY, and REMEMBER WHERE YOU ARE AT ALL TIMES.**

TROUBLESHOOTING - GENERAL

TROUBLE	POSSIBLE CAUSE	REMEDY
<p>Backlegging Material falling down the “up” or “down” leg.</p>	<p>Obstruction in head.</p> <p>Baffle in head throat is out of adjustment.</p> <p>Obstruction in distributor turnspout or spouting.</p> <p>Buckets being overfilled.</p> <p>Head shaft running too fast or too slow.</p> <p>Spouting size too small for leg capability. Spouting installed in too flat a position for good flow. Spouting has a sharp bend which restricts flow.</p> <p>Pressure build-up in bins & spouting.</p> <p>Buckets loose.</p> <p>Full bin or tank.</p>	<p>Inspect head for foreign material such as bags, papers, pieces of wood, metal scrap, etc. Check for missing bucket(s). If one or more is missing, it can usually be found in discharge transition or in distributor turnspout.</p> <p>Remove head cover and adjust baffle. Refer to Fig. 21 and page 27.</p> <p>Inspect distributor and spouting. Correct condition as required.</p> <p>Remove inspection door and use a stroboscope (strobe light) while elevator is running to see if buckets are being overfilled. Buckets should be NEAR full, but not overflowing. Check head pulley speed and conveyor speed. Check adjustment of baffle plate in conveyor.</p> <p>Check packing list to be sure correct sheaves are properly installed. Check speed reducer for correct reduction ratio.</p> <p>Correct by using proper size spouting and good design engineering.</p> <p>Add roof vents to bins.</p> <p>Tighten all bucket bolts.</p> <p>Monitor bin levels carefully.</p>
<p>Belt not tracking in center of pulleys.</p>	<p>Boot pulley improperly adjusted.</p>	<p>Adjust take-up screw on boot to level pulley and align belt in center of pulley.</p>
<p>Belt rubbing side of head, casing or boot.</p>	<p>Leg out of plumb or twisted.</p> <p>Head pulley not level.</p> <p>Material build-up on pulleys.</p> <p>Worn bearing.</p>	<p>Use a surveyor’s transit to check plumb. Correct out of plumb condition by using turnbuckles to adjust guy lines. (See Fig. 14 and page 21).</p> <p>Use jacking bolts to level. Place shim under pillow block bearings to level pulley shaft. (See Fig. 22 on page 27.)</p> <p>Inspect pulley, and clean if necessary.</p> <p>Replace bearing.</p>

TROUBLESHOOTING - GENERAL

TROUBLE	POSSIBLE CAUSE	REMEDY
<p>Excessive belt slippage or burning.</p> <p>Excessive belt looseness.</p>	<p>Head pulley lagging worn or loose.</p> <p>Drive motor too large.</p> <p>Belt has stretched.</p>	<p>Replace with factory recommended lagging.</p> <p>Use proper H.P. motor.</p> <p>Adjust belt tension with boot pulley adjusting screws. If screws have reached the end of their adjustment, it will be necessary to re-splice belt. (See Figs. 17a - 17c and page 24).</p>
<p>Bucket Elevator being overloaded.</p>	<p>Pit conveyor running too fast.</p> <p>Charging boot with several conveyors at once.</p> <p>Head pulley running too slow.</p> <p>Drive motor too small.</p> <p>Conveyor baffle misadjusted.</p> <p>Low line voltage to motor.</p> <p>Under size wiring.</p>	<p>Check conveyor speed.</p> <p>Check capacities of conveyors and compare with elevator.</p> <p>Check pulley speed. Check packing list to be sure correct sheaves are properly installed. Check speed reducer for correct reduction ratio.</p> <p>Use proper H.P. motor.</p> <p>Adjust to restrict flow of material.</p> <p>Check voltage.</p> <p>Use correct wire gauge for motor.</p>
<p>Material handling capacity low.</p>	<p>Head shaft speed too low.</p> <p>Boot pulley too high.</p> <p>Pit conveyor running too slow.</p> <p>Improper feeding of a boot.</p> <p>Baffle plate in conveyor hopper adjusted too low.</p> <p>Material too light.</p> <p>Obstruction in end of conveyor.</p>	<p>Check pulley speed. Check sheaves, speed reducer and motor to determine cause of slow speed. Correct as required.</p> <p>Lower pulley.</p> <p>Check conveyor speed. Check sheaves, speed reducer and motor to determine cause of slow speed. Correct as required.</p> <p>(See Page 8).</p> <p>Raise baffle plate.</p> <p>Lower headshaft speed.</p> <p>Clean conveyor and remove obstructions.</p>

TROUBLESHOOTING - ELECTRICAL

TROUBLE	POSSIBLE CAUSE	REMEDY
Low capacity	Low voltage in power source.	Check voltage at motor input. Voltage in power lines may be low. Consult power company.
Elevator belt and/or conveyor are operating below normal speed.	One fuse blown on three phase circuit.	Check fuses.
High amperage.	Defective motor.	Check motor for short or open circuited condition. Repair or replace motor.

TROUBLESHOOTING - SPEED REDUCER

TROUBLE	POSSIBLE CAUSE	REMEDY	
Overheating	Overloading	Load exceeds drive capacity.	Check rated capacity of drive. Replace with drive of sufficient capacity or reduce load. Check oil level. Adjust to oil level indicated. Flush and refill to indicated oil level with grade specified on drive nameplate.
	Improper Lubrication	Insufficient oil.	
		Too much oil in the drive caused churning, and excessive heat is generated by the fluid friction of the churning oil.	
Wrong grade of oil			
Noise and Vibration	Tie rod support	Improper installation	Check mounting bolts and tighten. Check clevis support for rigidity and strengthen if necessary.
	Failing bearings	Wear, evident by dullness of balls and raceways. Wear of bearings is caused by abrasives in oil.	Replace worn bearings. Clean and remedy bearing clearances, loading of drive and over-hung loads.
		Spalling or flaking out of metal in raceways usually indicates overloading.	Replace worn bearings. Clean and remedy bearing clearances, loading of drive and over-hung loads.
		Bearing cage failure	Replace worn bearings. Check loading; bearing cage failure usually indicates overloading.
Excessively Worn Gears		Overloading causes pitting of tooth face.	Determine if load exceeds nameplate rating. If overloaded, reduce load or replace with reducer of sufficient capacity.
Insufficient Oil		A low oil level reduces the muffling effect of the oil.	Check oil level. Fill to level indicated.

TROUBLESHOOTING - SPEED REDUCER

TROUBLE	POSSIBLE CAUSE		REMEDY
Loose parts		Excessive shock loads or improper connect with other machinery.	Inspect drive for broken parts, loose bolts, nuts and screws. Check all keys for proper size and fit.
Excessively high speeds			Check recommended speed range. Reduce speed, or install drive with sufficient speed range.
Reducer slipped on shaft.		Loose set screws.	Realign reducer and tighten screws.
Excessive shaft end play.	Worn bearings	Bearing exposure to an abrasive causes wear in balls & raceways.	Worn bearing balls & raceways have a dulled appearance. Replace worn bearings. Clean and flush drive and replace oil.
Excessive backlash	Worn gears or loose parts.	Worn gears and keys or loose screws cause backlash. Backlash increases with the number of gear sets; therefore, backlash is normally greater in double reducer drives.	Replace worn gears and keys. Tighten loose screws.
Oil leakage		Excessive oil.	Check oil level and drain to indicated level.
		Clogged breather.	Clean or replace breather. Clean breather hole with pipe cleaner and a suitable non-flammable solvent.
		Worn shaft seals.	Replace seals.



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***To provide innovative quality solutions that create
an extraordinary customer experience.***