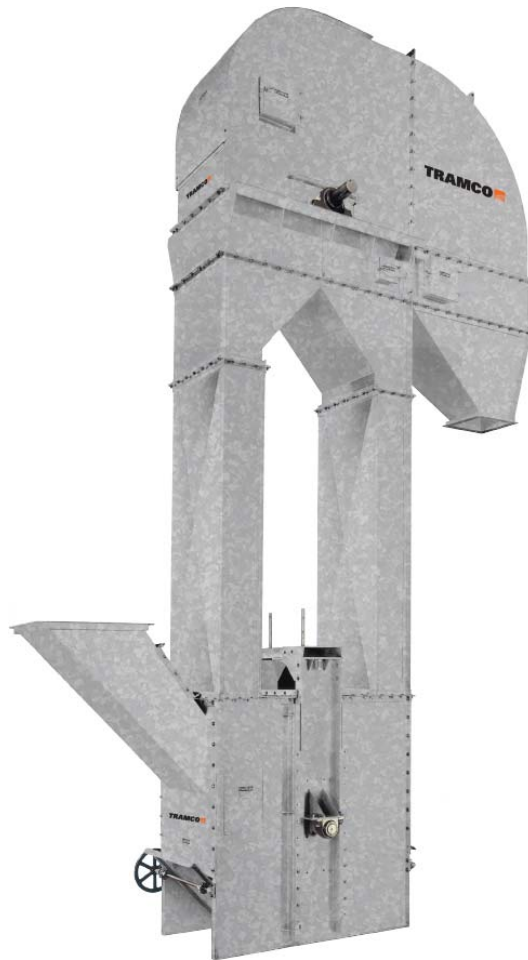




CENTRIFUGAL DISCHARGE BUCKET ELEVATOR

OPERATION, SAFETY, AND MAINTENANCE MANUAL



ORIGINAL INSTRUCTIONS



Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: TEM002 R01

Revised: Oct/15



This product has been designed and constructed according to general engineering standards. Other local regulations may apply and must be followed by the operator. We strongly recommend that all personnel associated with this equipment be trained in the correct operational and safety procedures required for this product. Periodic reviews of this manual with all employees should be standard practice. For your convenience, we include this sign-off sheet so you can record your periodic reviews.

[illegible]



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1. Introduction

Thank you for purchasing TRAMCO Centrifugal Discharge Bucket Elevator. This equipment will allow safe and efficient operation when you read and follow all of the instructions contained in this manual. With proper care, your Centrifugal Discharge Bucket Elevator will provide you with many years of trouble-free operation.

Keep this manual handy for frequent reference and to review with new personnel. A sign-off form is provided on the inside front cover for your convenience. If any information in this manual is not understood or if you need additional information, please contact your local distributor or dealer for assistance.

This manual should be regarded as part of the equipment. Suppliers of both new and second-hand equipment are advised to retain documentary evidence that this manual was provided with the equipment.

Always give your dealer the serial number on your equipment when ordering parts or requesting service or other information. The serial number is located on the head assembly. Please record this information in the table below for easy reference.

Model Number	
Serial Number	
Date Received	

1.1. Equipment Purpose

The Tramco centrifugal discharge bucket elevators are designed and engineered for the bulk-handling of free-flowing fine and loose materials with small to medium sized lumps. The materials being handled are discharged through a centrifugal action as the buckets pass over the head pulley.

1.1.1. Intended Use

This equipment is designed solely for use in customary agricultural or similar operations. Use in any other way is considered as contrary to the intended use. Compliance with and strict adherence to the conditions of operation and maintenance as specified by the manufacturer, also constitute essential elements of the intended use.

This equipment should be operated, maintained, serviced, and repaired only by persons who are familiar with its particular characteristics and who are acquainted with the relevant safety procedures.

Accident prevention regulations and all other generally recognized regulations on safety and occupational medicine must be observed at all times.

Any modifications carried out to this equipment may relieve the manufacturer of liability for any resulting damage or injury.

2. Safety

2.1. Safety Alert Symbol and Signal Words



This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury or death, carefully read the message that follows, and inform others.

SIGNAL WORDS: Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.



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



WARNING Indicates a hazardous situation that, if not avoided, could result in serious injury or death.



CAUTION Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.



NOTICE Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

2.2. General Safety



The safety information found throughout this complete Safety Section of the manual applies to all safety practices. Additional instructions specific to a certain safety practice (such as Operation Safety), can be found in the appropriate section.

YOU are responsible for the **SAFE** use and maintenance of your equipment. **YOU** must ensure that you and anyone else who is going to work around the equipment understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program. All accidents can be avoided.

- It is the equipment owner, operator, and maintenance personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when assembling, operating, or maintaining the equipment.
- Equipment owners must give instructions and review the information initially and annually with all personnel before allowing them to operate this product. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- This equipment is not intended to be used by children.
- Use this equipment for its intended purposes only.
- Do not modify the equipment in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the equipment. Any unauthorized modification of the equipment will void the warranty.



2.3. Rotating Parts Safety

WARNING

- Keep body, hair, and clothing away from rotating pulleys, belts, chains, and sprockets.
- Do not operate with any guard removed or modified. Keep guards in good working order.
- Shut off and remove key or lock out power source before inspecting or servicing machine.

2.4. Belt and Bucket Safety

WARNING

- Keep body, hair, and clothing away from moving belts and buckets.
- Lock out power before removing cover or inspection door.

2.5. Lifting the Head Assembly Safety

WARNING

- Lift only upper head section
- Lifting the entire head section may cause u-lug welds to break and head assembly to fall.

2.6. Explosion Vent Safety

WARNING

- Stay a safe distance from explosion vents during operation.
- Be aware of the location of all explosion vents for this equipment.

2.7. Guards Safety

WARNING

- Install guards to prevent contact with moving parts.
- Do not operate equipment unless all guards are in place.
- Do not walk or step on guards.
- Lock out power before removing a guard.
- Ensure all guards are replaced after performing maintenance.

2.8. Ladder Safety

WARNING

Consider the following when using a ladder for installation, operating or maintenance related duties:

- Identify possible risks before using the ladder.
- Use belts and hoists to lift material up a ladder; maintain three points of contact with the ladder at all times.
- Ensure rungs are free from ice or material build up that makes climbing difficult

2.9. Working Alone

WARNING

Working alone can be dangerous. Consider the following:

- Identify the risks for working alone in your workplace and ensure a plan is in place to mitigate them.
- Do not operate, assemble, or maintain equipment alone.
- Ensure that maintenance is performed in accordance with all workplace safety programs and be sure all workers are aware of any maintenance work being performed.

2.10. Personal Protective Equipment (Required to Be Worn)

Hard Hat

- Wear a hard hat to help protect your head.



Safety Glasses

- Wear safety glasses at all times to protect eyes from debris.



Ear Protection

- Wear ear protection to prevent hearing damage.



Coveralls

- Wear coveralls to protect skin.



Work Gloves

- Wear work gloves to protect your hands from sharp and rough edges.



Steel-Toe Boots

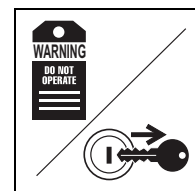
- Wear steel-toe boots to protect feet from falling debris.



2.11. Drives and Lockout/Tagout Safety

Inspect the power source(s) before using and know how to shut down in an emergency. Whenever you service or adjust your equipment, make sure you shut down your power source and follow lockout and tagout procedures to prevent inadvertent start-up and hazardous energy release. Know the procedure(s) that applies to your equipment from the following power sources. For example:

- De-energize, block, and dissipate all sources of hazardous energy.
- Lock out and tag out all forms of hazardous energy.
- Ensure that only 1 key exists for each assigned lock, and that you are the only one that holds that key.
- After verifying all energy sources are de-energized, service or maintenance may be performed.
- Ensure that all personnel are clear before turning on power to equipment.



For more information on occupational safety practices, contact your local health and safety organization.

2.11.1. Electric Motor Safety

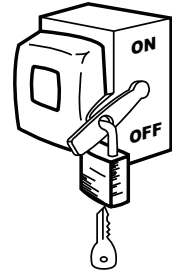
WARNING

Power Source

- Electric motors and controls shall be installed and serviced by a qualified electrician and must meet all local codes and standards.

- A magnetic starter should be used to protect your motor.
- You must have a manual reset button.
- Reset and motor starting controls must be located so that the operator has full view of the entire operation.
- Locate main power disconnect switch within reach from ground level to permit ready access in case of an emergency.
- Motor must be properly grounded.
- Guards must be in place and secure.
- Ensure electrical wiring and cords remain in good condition; replace if necessary.
- Use a totally enclosed electric motor if operating in extremely dusty conditions.

SERVICE DISCONNECT



Lockout

- The main power disconnect switch should be in the locked position during shutdown or whenever maintenance is performed.
- If reset is required, disconnect all power **before** resetting motor.

3. Assembly



Before continuing, ensure you have completely read and understood this manual's Safety chapter, in addition to the safety information in the section(s) below.

3.1. Pre-Assembly

Important: Prior to installing, a **licensed structural or civil engineer** must be consulted for the design, construction, and supervision of the complete installation including the foundation, platform and guy wires. A qualified millwright or contractor must be employed to erect the elevator and the accompanying equipment and structures.

The best bucket elevator improperly installed cannot be expected to offer the performance as designed by TRAMCO. A properly installed bucket elevator should be the primary concern. TRAMCO cannot be responsible for the assembly of a bucket elevator. The suggestions and information contained within this manual are offered solely as a convenience as we can assume no liability for installation, either expressed or implied.

3.2. Assembly Safety

WARNING

- Do not take chances with safety. The components can be large, heavy, and hard to handle. Always use the proper tools, rated lifting equipment, and lifting points for the job.
- Read and understand the assembly instructions to get to know the sub-assemblies and hardware that make up the equipment before proceeding to assemble the product.
- Carry out assembly in a large open area with a level surface.
- Always have two or more people assembling the equipment.
- Make sure you have sufficient lighting for the work area.
- Tighten all fasteners according to their specifications. Do not replace or substitute bolts, nuts, or other hardware that is of lesser quality than the hardware supplied by the manufacturer.

3.2.1. Location, Foundation and Elevator Support

- The foundation for the bucket elevator must give consideration to live loads, dead loads, wind loads, and soil bearing loads as well as proper moisture run-off on the top of the base.
- Unless the location of the elevator has been pre-determined by a layout drawing, careful consideration should be given to the depth of boot pit, side of boot to be fed, direction of discharge at head, possible overhead obstructions, etc.
- The location of guy wire anchoring points on the ground and on nearby structures must be planned for ahead of time. Bucket elevator will stand vertically, but must be supported with guy wires to protect against wind loads.
- Provide sufficient clearance for guying, anchoring, and bracing. When the bucket elevator is to be fed from a feeder or conveyor, allow for proper clearances for drives, discharges, and valves. Enough clearance should also be provided to allow

proper maintenance of the equipment after it has been installed. Thought given to such matters prior to installation can prevent later problems in the flow plan and avoid possible bottlenecks.

Important: The bucket elevator is not self-supporting, nor can it be used to support other structures such as: distributors, cleaners, spouting, etc.

3.2.2. Check Shipment

Unload the parts at the assembly site and inspect them thoroughly while comparing the packing list to the shipment. Ensure that all items have arrived and that none are damaged.

It is important to report missing or damaged parts immediately to ensure that proper credit is received from either the manufacturer or from your distributor/dealer, and to ensure that any missing parts can be shipped quickly to avoid delaying the assembly process.

Note: Do not attempt to assemble or install a damaged component.

Note: Normal shipping practice will have the head terminal and boot terminal assembled. All other parts will be shipped loose such as leg casing, belt, bucket, ladder, platform, drive components etc.

For shop-assembled elevators, units are match marked and shipped in the longest sections practical for shipment.

If more than one (1) centrifugal discharge bucket elevator is involved, some items such as flange bolts, etc. may be combined and shipped in one (1) box.

3.3. Lifting and Moving

Take extreme care to prevent damage when moving assembled elevator or components. Spreader bars with slings are the recommended support method for lifting. The unsupported span should be no longer than 10 feet.

Never lift an elevator with only one support point. When choosing support points for especially heavy items such as drives or gates, consider the weight of an item in relation to load balance and its bending effect.

3.4. Centrifugal Bucket Elevator Components

Each bucket elevator consists of the following components:

- Head discharge section with drive shaft
- Boot section with take-up assembly and inlet
- Intermediate
- Leg Casing
- Seals
- Elevator buckets and standard belt (belt options available per customer's request)

Graphical representations of the components of the Tramco centrifugal discharge bucket elevator can be found in sections 3.4.1. – 3.4.4.

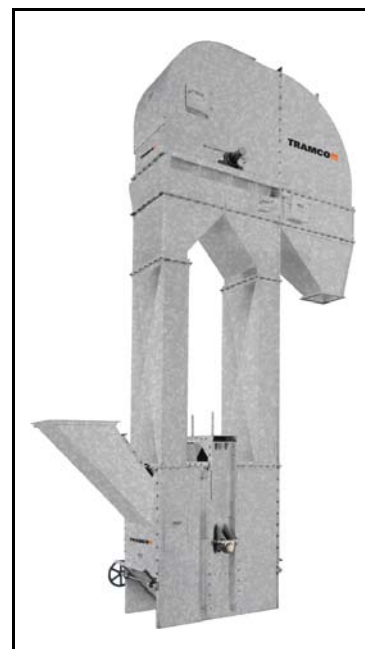


Figure 3.1

Note: Illustrations in sections 3.4.1. – 3.4.4. are representative drawings only. It is the responsibility of the purchaser to consult contract drawings for specific items on each elevator.

3.4.1. Head Discharge Section with Drive Shaft

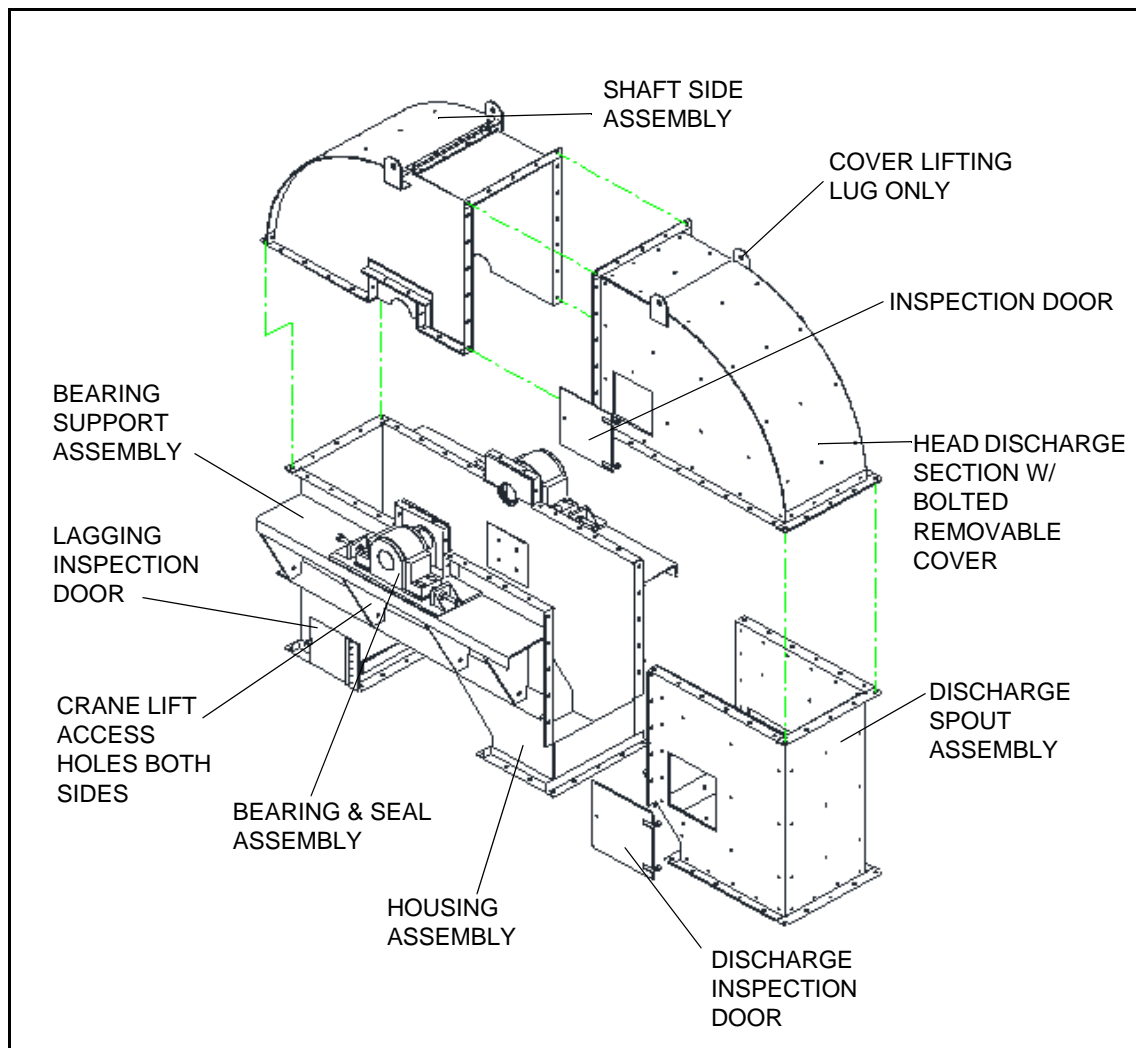


Figure 3.2

Note: There are bolts on the “Shaft side assembly” that are required to be **REMOVED PRIOR TO INSTALLATION AND OPERATION**. These bolts will have “notice” tags on them with the fore-mentioned instruction.

3.4.2. Boot Section with Take-up Assembly

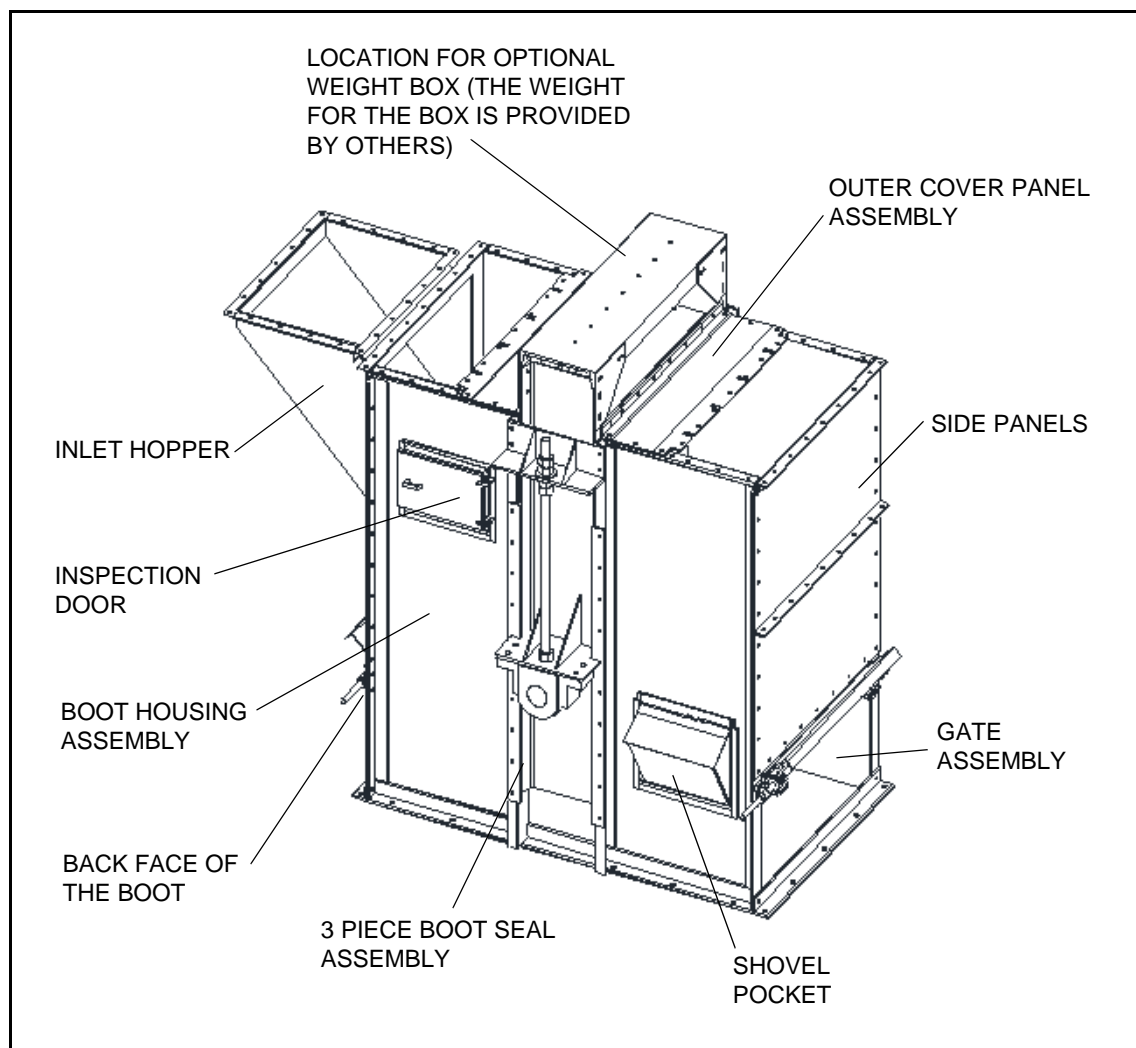


Figure 3.3

Note: The rack and pinion design of the manually operated clean out slides allows for ease of operation. The clean out slides are located on the “back face of the boot”.

3.4.3. Intermediate Leg Casing Section

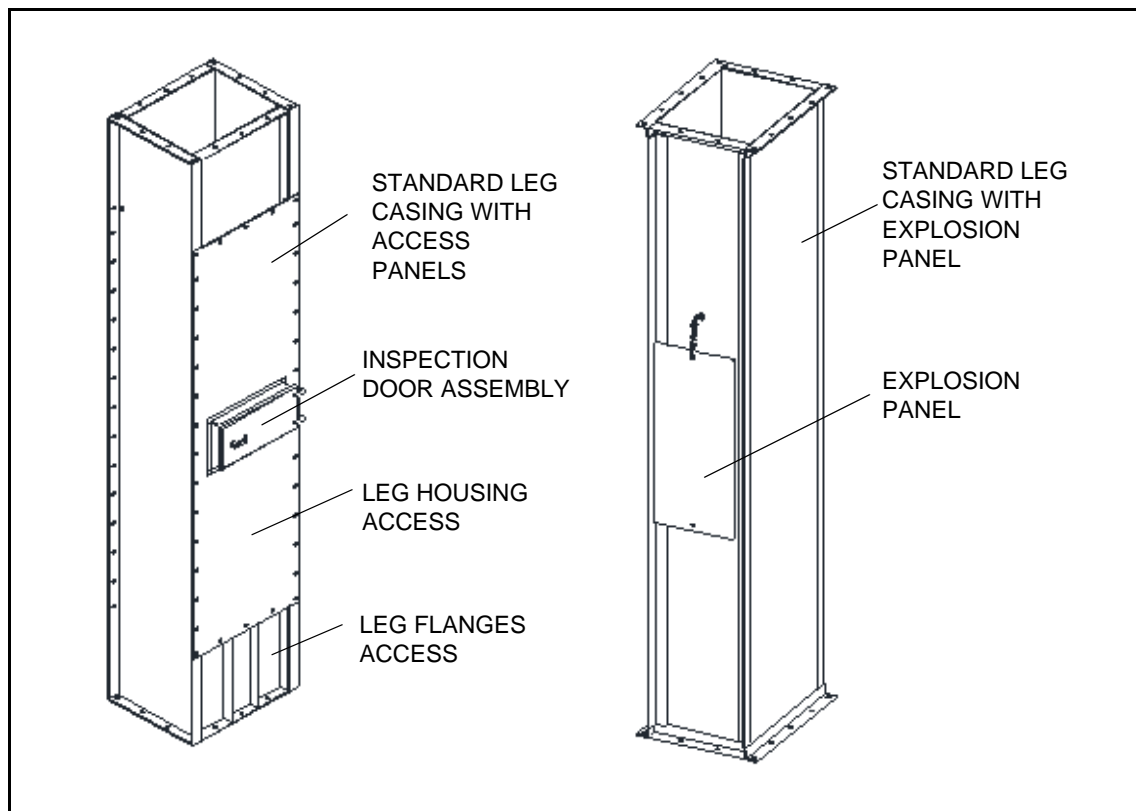


Figure 3.4

3.4.4. Seals

Head Seal

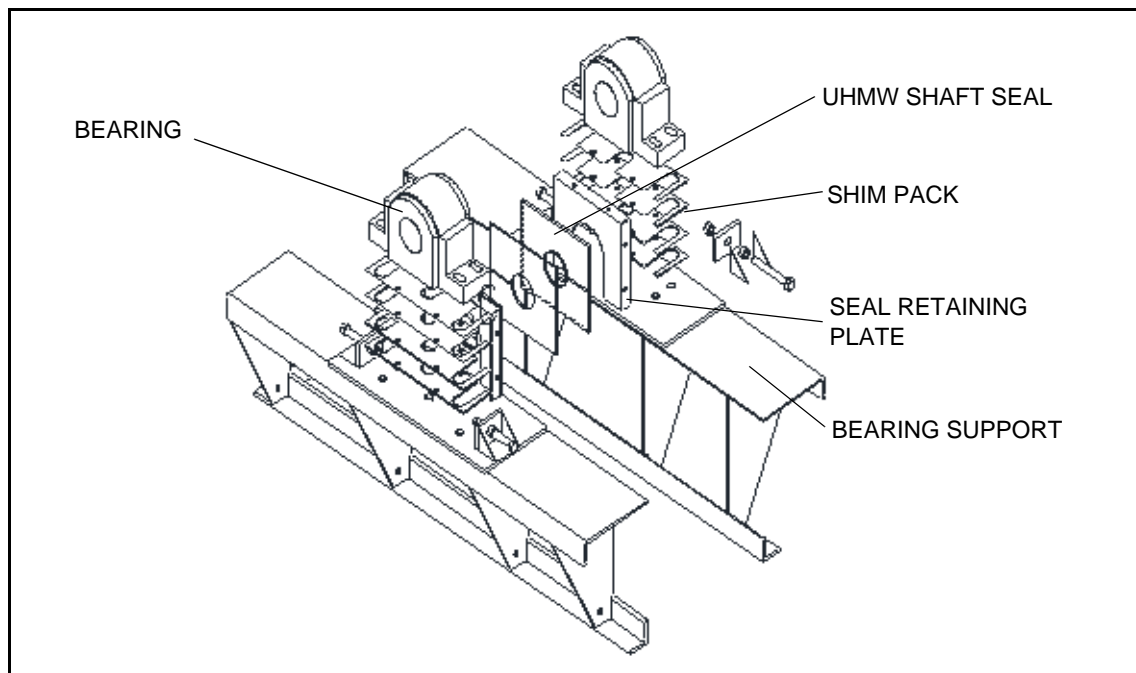


Figure 3.5

Boot Seal

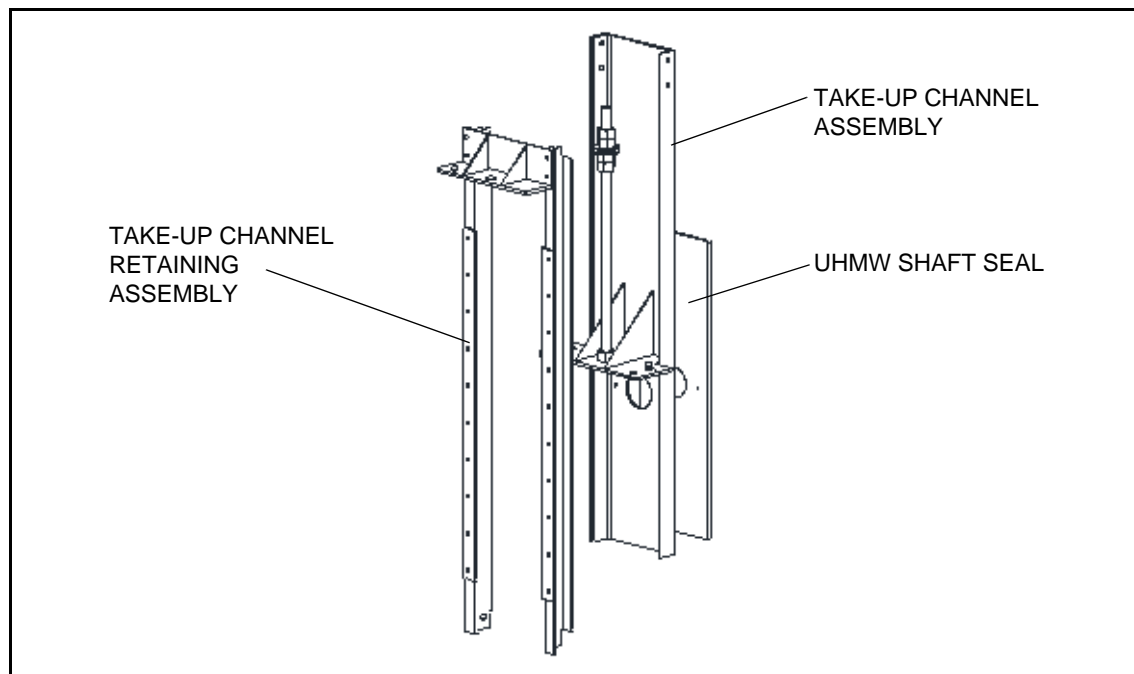


Figure 3.6

3.5. General Assembly Instructions

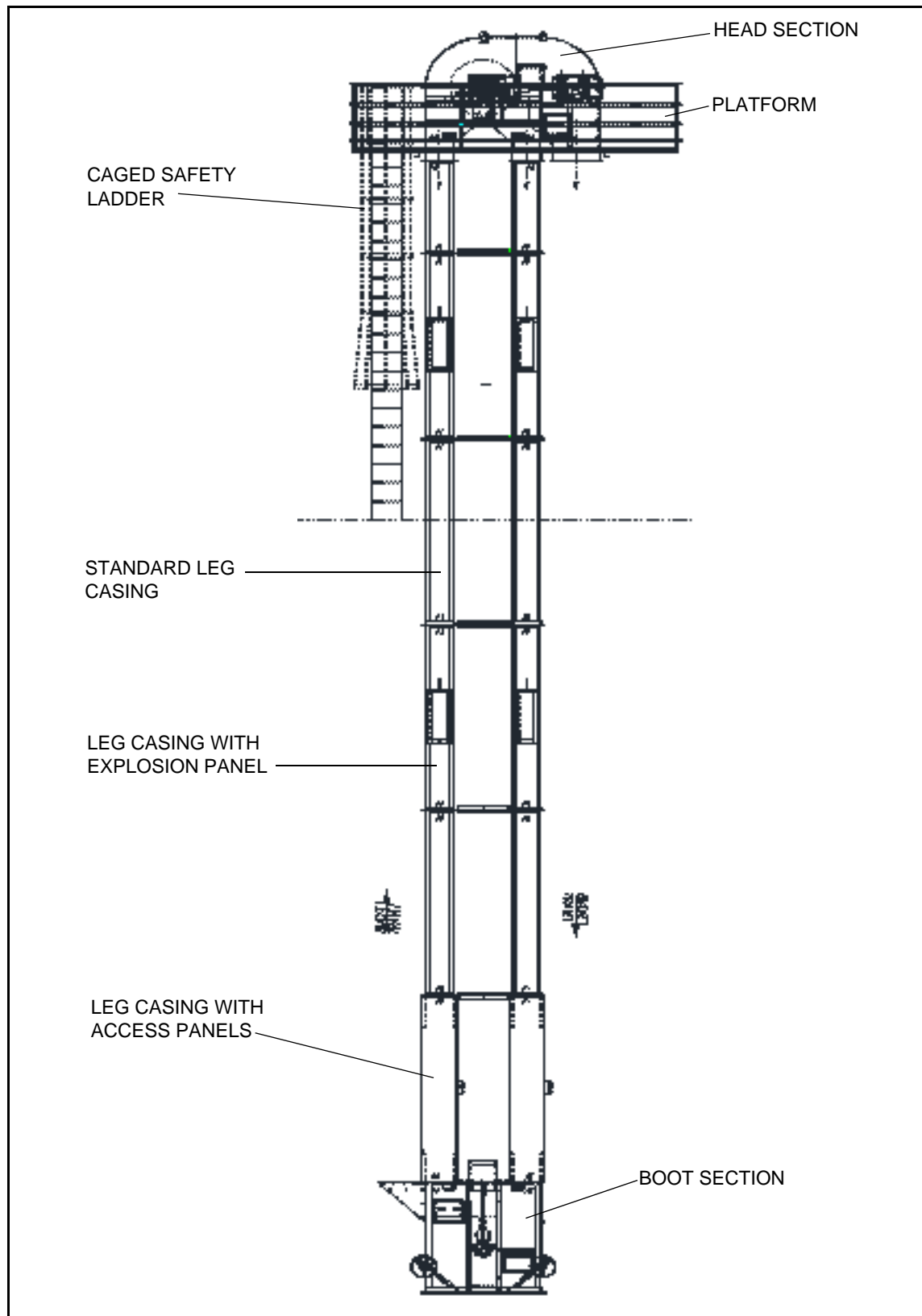


Figure 3.7

Note: Figure 3.7 is a representative drawing only. It is the responsibility of the purchaser to consult contract drawings for specific items on each elevator.

Important: Before starting the assembly, all component pieces (or elevator sections) should be placed in proper sequence as shown in the drawing provided.

3.6. Elevator: Purchased as parts

3.6.1. Boot Section

1. Set the boot on a firm and level foundation. When necessary, use shim to properly level the boot. A boot that is not level makes it very difficult to plumb the elevator.
2. After the boot is positioned and leveled in all directions, anchor it to prevent shifting. Bolts, set in concrete, and plates, overlapping the base flange, are recommended for anchoring.
3. Mount the inlet hopper(s) on the up-side or down-side of the boot, or on both sides, if required (Figure 3.8). It is always best to locate the bottom of the inlet hopper no lower than the center of the boot pulley. Elevator capacity may be reduced if the inlet hopper is located improperly.

Note: Most free-flowing materials, including whole grains, feed best into the boot on the up-leg side. Feeds for light materials that tend to dust feed best on the down-leg side for better filling of the buckets.

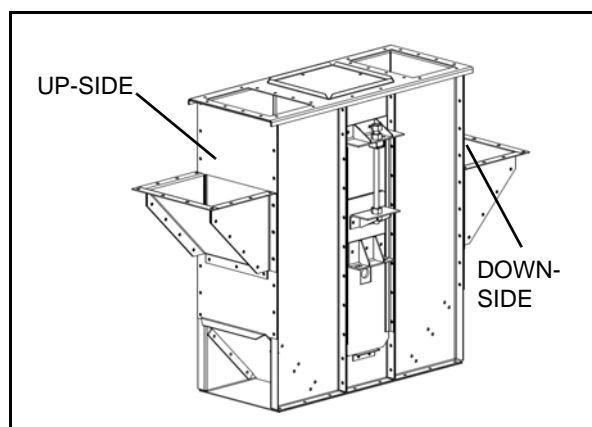


Figure 3.8

3.6.2. Head and Leg Casing

Two methods of assembling the bucket elevator are described below. They differ only in the manner of assembling and erecting the casing.



Ensure the lift equipment is safely capable of handling all loads when assembling and installing the bucket elevator.

Method 1: Assemble on Ground

1. Erect casing and assemble one piece at a time.
2. Install eyebolts or lifting lugs in the bearing/motor support frame of the head section. Make certain that the bolts or lifting lugs are strong enough to support the head, drive, platforms, ladder, safety cage, and the entire casing. Use cables or chains to attach a crane cable to the eyebolts.
3. Using a crane, 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. Caulk all flanges to ensure water and dust resistance.

NOTICE Do not allow the assembly to drag on the ground while being lifted. Damaged flanges and casing sections makes further assembly and plumbing difficult flanges and casing sections.

Important: When lifting any assembly of the bucket elevator parts i.e. the head and casing, or an assembly of casing, the line of the lifting force should be in line with the narrowest part of a casing section.

4. Assemble ladders, safety cages, platform, and guy brackets, with cables attached, as required. When ladders, safety cages and platforms are furnished by Tramco, detailed instructions are provided with the general arrangement drawing.
5. Continue lifting and adding casings until all sections are properly installed. Then, lift and position the complete head and casing assembly onto the boot. Align mounting holes and securely bolt together.

Note: Refer to the drawing provided to ensure proper location of the inspection section and leg casing with explosion panel.

6. Plumb the bucket elevator assembly in accordance with the instructions in the Section 3.8.
7. Ensure all hardware are secure and tight.

Method 2: Assemble Sections Vertically

1. Assemble the head, platforms, etc. the same with Method 1.
2. Assemble all casing on the ground in assembled sections of 9m or 12m. Caulk all flanges to ensure water and dust resistance.
3. Attach ladder and safety cage sections, platforms, and brackets, as instructed by Tramco's general arrangement drawing.
4. Attach a crane to the top end of the first section assembly and lift it into position onto the boot.
5. Install casing to boot flange bolts and tighten.
6. Attach braces and secure.
7. Lift and install remaining assembled sections of casing.

Note: Refer to the drawing provided to ensure proper location of the inspection section and leg casing with explosion panel.

8. Install eyebolts or lifting lugs on the bearing/motor support frame of the head section and lift the head assembly into position on top of the casing and secure the flange bolts.
9. Plumb the bucket elevator assembly in accordance with the instructions in the Section 3.8.
10. Ensure all hardware are secure and tight.

3.7. Elevator: Shop-Assembled

Field assembly can be accomplished by connecting marked joints in accordance with the packing list and/or drawing if applicable. Follow section 3.6.1. to install the boot. Ensure the mounting surfaces for supporting the conveyor is level and true so there is no distortion in the conveyor. Shims or grout should be used when required. Frequently check for straightness during assembly. When joining two flanges, ensure the surfaces have caulk.

3.8. General Plumbing Instructions

Leave the crane attached and plumb the Bucket Elevator by either of the two methods described below.

Note: *Be sure turnbuckles are installed in all cables and located so that they may be easily reached for tightening.*

3.8.1. Plumb Line

Refer to Figure 3.9.

1. Remove the head cap and drop a plumb line inside the up-leg casing to the boot. Do not allow the line weight to touch the bottom of the boot.
2. Suspend the plumb line on a piece of wood or metal, which will not roll, placed across the top of the head housing.
3. Measurement from the plumb line to side and end of casing housing at the inspection door must be the same measurement taken at the top of the leg. Make all adjustments and then anchor connections before removing the plumb line so that a final check may be made.

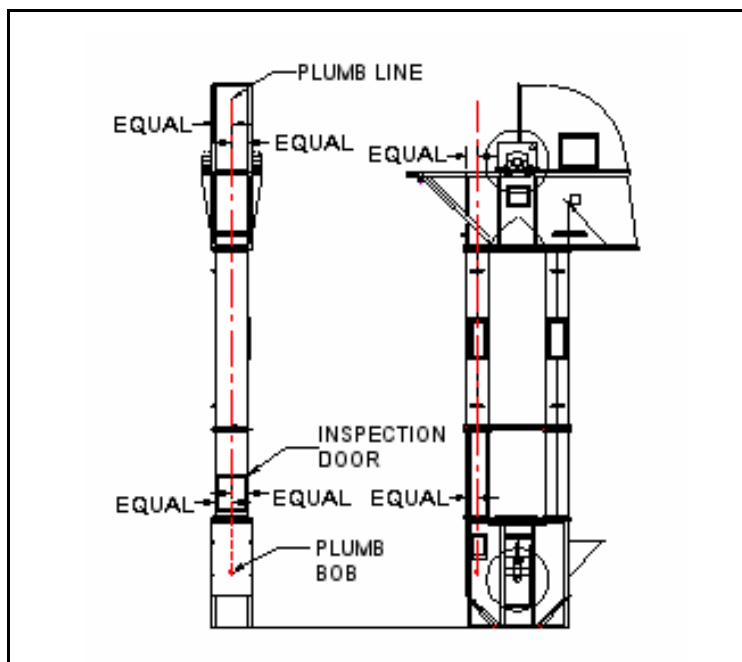


Figure 3.9

3.8.2. Transit

1. If a transit is used, plumb from side-to-side and from front-to-rear.
2. Take as many sightings as necessary (90° apart) to plumb the bucket elevator.

3.9. General Belt & Bucket Instructions

The belt can be installed with or without the buckets attached depending on the size of the bucket elevator and the equipment available. Regardless of the method used, the belt is threaded in the same manner.

1. Using the take-up adjustment screws, raise the boot pulley to its highest take-up position (Figure 3.10).
2. Remove the head cover cap and drop a strong rope or cable down the up-leg casing until the end can be removed through the boot hopper opening or the service door in the casing.
3. Attach a rope or cable to the belt. Fabricate two pieces of steel angle to connect the rope to the belt as described in the following steps:

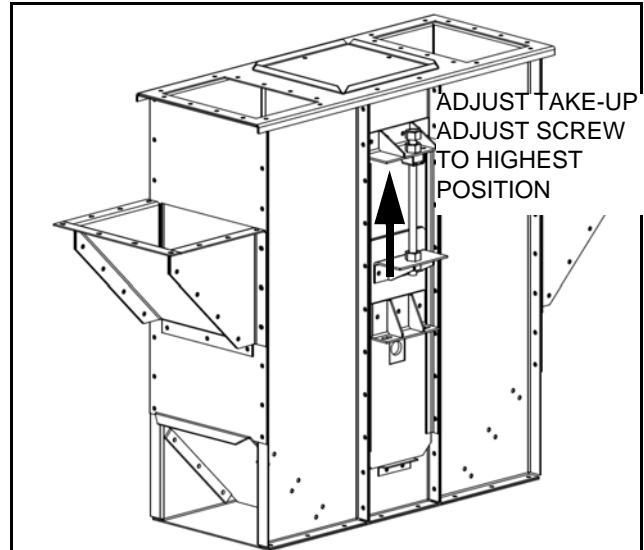


Figure 3.10

- Cut the steel angle the same length as the belt width.
 - Drill holes in one side of steel angle to match the bucket attaching holes in the belt.
 - Drill a single hole in the center of the other side of the steel angle for mounting an eyebolt.
4. Install the eyebolt, attach one steel angle to the end of the belt, and attach the rope or cable.
 5. Use a rope or cable to pull the belt to the head pulley.
 6. Secure the end of the belt in this position and drop the end of the rope or cable down the down-leg casing. Use the hopper opening or cleanout door to thread the rope or cable around the boot pulley and bring it out the hopper or service door opening.
 7. Use the rope or cable to thread the belt over the head pulley and down the down-leg casing and around the boot pulley.

Note: There are many different ways to splice the ends of the belt. The instructions in steps 8.-12. are for the lap method. The best practice is to use the splice method as recommended by the belt manufacturer. **Tramco recommends using a mechanical splice. Tramco supplies the splice template and splicing tools.**

8. Splice the belt by using the lap method. The lead end of the belt (direction of travel), as it is brought up from the boot pulley, must overlap the trailing end of the belt.
9. Using the second steel angle, attach it angle to the belt and use a come-a-long to pull the 2 ends of the belt until the slack is taken up and the bucket attaching holes in the belt are aligned. Bucket attaching holes, which are already punched, are used for bolting the belt end together. Longer bucket bolts are used for splicing. These

bolts also secure buckets on the spliced portion of the belt. The length of the overlap at the splice must cover 5 buckets (Figure 3.11). If possible, allow the belt to hang and stretch for 24 hours.

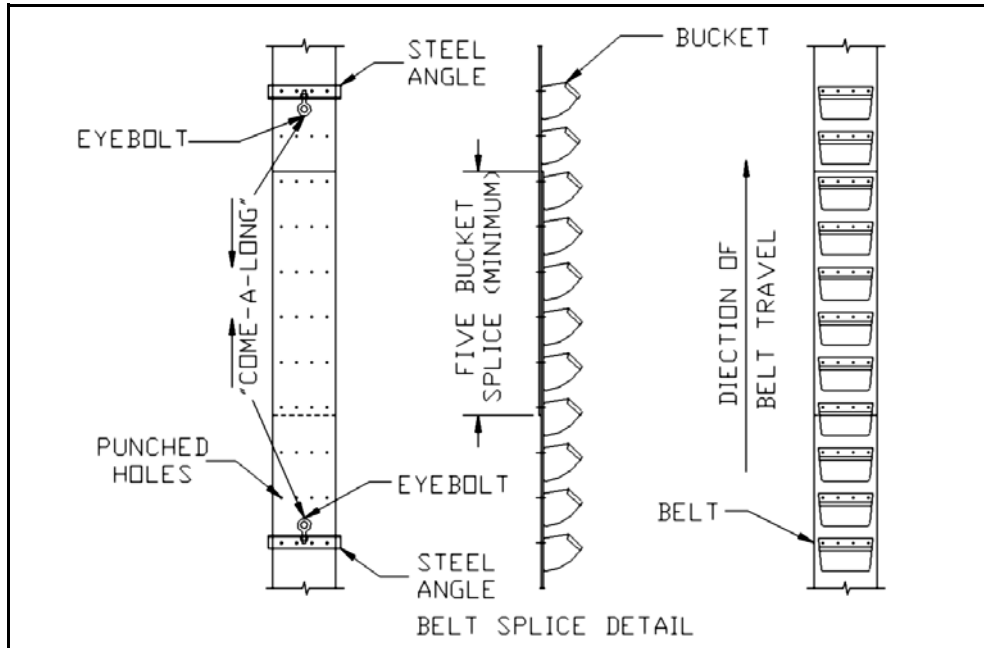


Figure 3.11

10. Pull the leading edge of the belt over the trailing end until slack at the boot pulley is removed and bolt holes are aligned.
11. Refer to manufacturers splice kit instructions to ensure belt is cut square.
12. Insert the bucket bolts from the **back** side of the belt. Mount the buckets on the front side and secure with nuts. Tighten the nuts sufficiently to set the head of the bolt in the belt. Tighten bolts with a speed wrench, or, if an impact wrench is used, exercise care to prevent tightening to the point of fracturing the bolt.

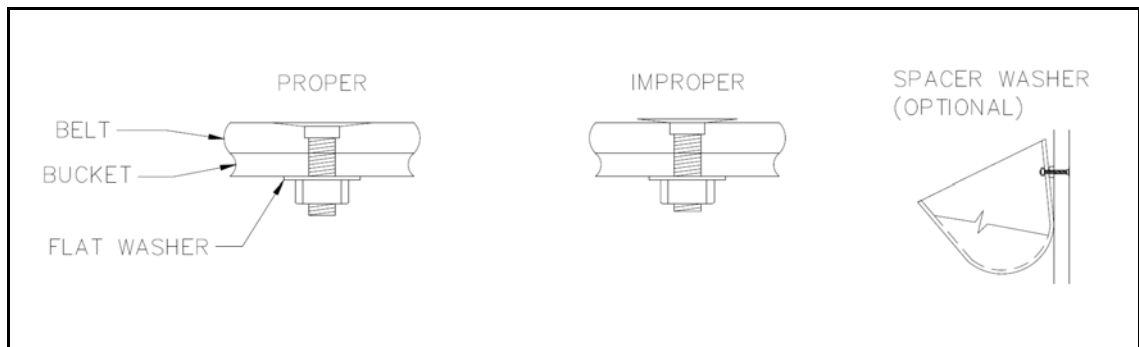


Figure 3.12

13. At this point, the belt has been securely spliced and 5 or more buckets have been installed in the splicing process. The remaining buckets should not be attached at consecutive mounting holes in order to keep each leg of the belt more in balance and to make moving it easier. Attach one bucket at 8–20 row intervals for the first complete belt revolution. On the second revolution, cut the interval spacing in half.
14. Repeat this process on each revolution until all buckets are attached. This procedure will help balance the weight load during bucket installation, particularly on taller Centrifugal Discharge Bucket Elevators.

Note: After the first week of operation, check and re-tighten all bucket bolts following the bolt manufacturer's torque specifications.

3.10. Adjusting the Throat Plate Flipper

1. Before replacing the head cover cap, check the adjustment of the rubber throat plate flipper in the elevator head section. The flipper provides a flexible extension between the throat plate and the lip of the buckets.
2. Adjust the flipper to provide a minimum clearance of 6mm to 13mm between the flipper and the buckets.

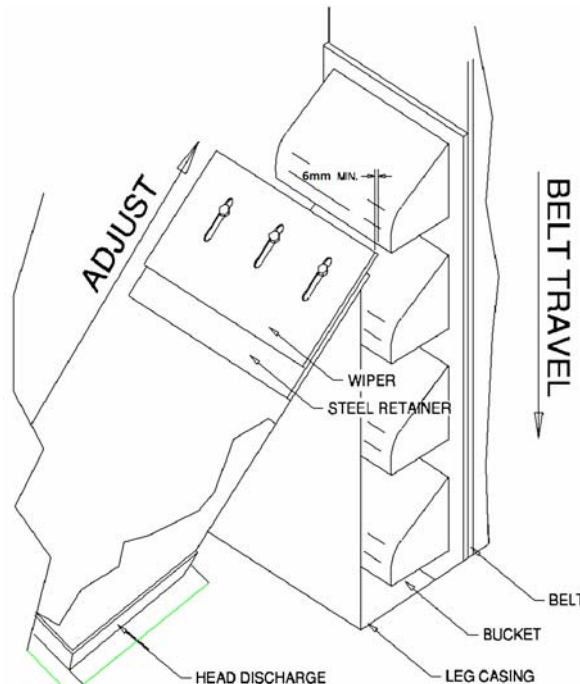


Figure 3.13

3.11. Check Head Shaft for Level

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

NOTICE

To prevent the belt from wearing a hole in the side of the head, legging, or boot, ensure the head shaft is level.

3.12. 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 weather-proof joint.

Refer to manufacturers instructions for installation.

3.13. Motor Mount, Speed Reducer and Drive Guard

Please refer to the general arrangement drawing for illustrations, HP and speed.

4. Operation



Before continuing, ensure you have completely read and understood this manual's Safety chapter, in addition to the safety information in the section(s) below.

Important: Do not operate Bucket Elevator unless the housing completely encloses the moving elements and power transmission guards are in place.

4.1. Pre-operation/Checklist

Before operating the bucket elevator, lubricate all bearings and drives per service instructions. Bearings and gear reducers are normally shipped without lubricant. Refer to bearing and gear reducer service instructions for recommended lubricant.

Then do the following:

1. Make certain the Bucket Elevator is plumb.
2. Be sure all guy cables and/or braces are fastened securely and have tension.
3. Check that all hardware (bucket bolts, casing bolts, etc.) is secure.
4. Check all set screws on pulleys, bearings, sprockets, sheaves, gear reducers, etc. Although some set screws may have been installed at the factory, shipment, handling, and installation could have loosened them. Please note that damage caused by loose set screws is not covered by warranty.
5. Check that the head shaft is level.
6. Check for proper rotation of motor and gear reducer and ensure electric motor conduit housing cover is in place. If not in place, lockout the power before replacing the housing covers.
7. Adjust boot pulley take-up so that there is no slack in the belt and so that the boot shaft is level.
8. Lubricate all bearings and drives according to service instructions. **Bearings and gear reducers are normally shipped without lubricant.** Refer to bearing and gear reducer manufacturer's service instructions for recommended lubricant.
9. Check the interior of the Centrifugal Discharge Bucket Elevator to ensure all tools, foreign materials, and other obstructions have been removed.
10. Check to ensure all covers, guards, safety devices or controls, and any interlocks to other equipment are installed and operating properly.

4.2. Start Up & Break-in

Operate the empty bucket elevator for 24 hours as a break-in period. Look for bearing heat, unusual noises, or drive misalignment. Should any of these occur, check the following and take corrective steps.


1. When anti-friction bearings are used, check for proper lubrication. Insufficient or excessive lubricant will cause high operating temperatures.

NOTICE

To prevent excessive maintenance and lowered equipment life expectancy, ensure belts are tight and leg casings and sprockets are properly aligned.

2. Check assembly and mounting bolts and set screws; tighten if necessary.

3. Be sure that the belt is properly aligned and running in the center of the head and boot pulleys.
 - If the belt is not tracking in the pulleys, adjust the boot pulley take-up screws so that the belt will track. Remember, a belt will seek the high side of a pulley.
 - You may have difficulty with a belt that does not track even after adjustment of the boot pulley. It may tend to work to one side or the other. This usually means that the bucket elevator has gone out of plumb or the head shaft is not level. Remember that the head shaft and boot shaft must operate parallel to each other.
4. Belting tends to stretch slightly during initial operation. This is not unusual, and special care should be given to belt tension during the first one to two weeks of operation to prevent slippage on the head pulley.
 - Belting manufacturers allow tolerances of 2% to 3% in initial stretch—as much as 600mm - 900mm in 30m of belting.
 - After frequent belt tightening during the first week, you may need to raise the boot pulley and re-splice the belt to reduce its length. Refer to Section 3.9. Remember, belting will expand and contract under varying conditions of temperature and humidity.
5. After running the conveyor, stop it, lock out all power, and check the inlet hopper and discharge to ensure it is clear and material flow will not be impeded in any way.

 **WARNING** To prevent serious injury lockout power before removing the cover or inspection doors

6. Restart the conveyor and gradually feed material. Gradually increase feed rate until the design capacity is reached.

Important: Do not overload bucket elevator. Do not exceed bucket elevator speed, capacity, material density, or rate of flow for which the elevator and drive were designed.

7. Cut off feed and allow the bucket elevator to empty. Lock out power supply. Check all bolts and all alignments. Re-align as necessary, tighten all bolts, and check chain adjustment.
8. Check motor amperage frequently.
9. Check belt tension periodically. It may be necessary to re-adjust belt tension after running material in the bucket elevator.
10. If “back-legging” occurs in the loaded condition, it could be caused by one or more of the following conditions:
 - The head shaft RPM may be improper if the wrong sheaves for reversing of sheaves on the motor and gear reducer were installed.
 - Restriction at the head discharge or spouting system that is restricting exit of material from the head.
 - Check for a mis-adjustment of the rubber throat flipper in the head. The flipper should have clearance of 13mm - 25mm between it and the lip of the buckets. Refer to Section 3.10.
 - Material is being fed too fast and that the buckets are being overfilled.
11. If the bucket elevator won't be operated for a prolonged period of time, operate until cleared of all material. This is particularly important when the material elevated tends to harden, become more viscous or sticky, or spoils if allowed to stand for a period of time.

4.3. General Operation

1. Run the bucket elevator empty for a few minutes periodically to check for excessive vibration, loose fasteners, security of covers and guards, noise, and bearing and drive temperature.
2. Always operate the bucket elevator with covers, guards, and safety labels in place.
3. Always practice good housekeeping and keep a clear view of the elevator loading, discharges, and all safety devices.



WARNING To prevent serious injury or death, keep body, hair, and clothing away from rotating pulleys, belts, chains, and sprockets. Keep all guards in place and in good working order. Lockout/ Tagout power before removing guard.

4.4. Shutdown/Storage

If the bucket elevator will be shutdown for more than one month, perform the following:

1. Remove all foreign material from the bucket elevator and check that the surface coatings are in good order.
2. Lubricate and protect all bearings and drives according to the manufacturer's instructions.
3. Rotate the gear reducer periodically according to the manufacturer's instructions.
4. Protect the elevator from weather, moisture, and extreme temperatures as required. Do not use plastic or other coverings that promote condensation under the covering.
5. Coat all exposed metal surfaces with rust preventative oil. Follow all the manufacturer's instructions that come with the rust preventative oil.
6. Prior to a subsequent start-up, perform the installation and operation instructions in this manual.

5. Maintenance



Before continuing, ensure you have completely read and understood this manual's Safety chapter, in addition to the safety information in the section(s) below.

Proper maintenance habits on the bin unload mean a longer life, better efficiency, and safer operation. Please follow the guidelines below.



WARNING Before performing any internal inspections or maintenance, ensure that a mechanical lockout/ tagout is in place on the motor starter.

Establish routine periodic inspections of the entire bucket elevator to help provide continuous maximum operating performance.

1. Keep the area around the bucket elevator and drive clean and free of obstacles for easy access and to avoid interference with the function of the bucket elevator and drive.
2. The shaft mounted gear reducer is lubricated by an oil reservoir in the housing. The correct amount of oil is important to the proper operation of the reducer. Too much oil may cause leakage or overheating. Too little oil may cause overheating or damage to internal parts. The gear reducer's maintenance instructions provide a list of recommended lubricants and oil change periods.
3. Check oil level.
4. Keep breather openings clear at all times to prevent pressure build-up in the reducer.
5. All bearings used on the bucket elevator are anti-friction, ball, or roller type pillow blocks. Check the bearing's maintenance instructions for the type of grease and the lubrication intervals.
6. The frequency of lubrication depends on several conditions such as hours of operation, temperature, moisture, speed, and contaminants.
7. When lubricating, the bearing manufacturer recommends that you add grease slowly and use a sufficient volume to purge the bearing of old lubricant. It is preferable to rotate the bearings during lubrication where good safety practice permits.
8. Immediately investigate any unusual noise or vibration change.
9. Check the belt frequently to make certain that is running in the center of the pulleys and properly tension to prevent slippage on the head pulley.
10. Check and tighten all bucket bolts after the first week of operation. Check on a regularly basis from here on out.
11. Establish routine periodic inspections of the entire bucket elevator to ensure continuous maximum operating performance.
12. Replacement parts can be identified from a copy of the original packing list, invoice, or drawing.

5.1. Periodic Inspection

Casing	Check for wear and alignment.
	Tighten all bolts to manufacturer's torque specifications .
Shafts	Check for wear and misalignment.
Buckets	Check for wear or damage.
Nuts & Bolts	Check for wear and tightness.
Seals	Check for leakage, adjustment, and wear.
Bearings	Check for lubrication and noise.
Pulleys	Check for wear and alignment.
Belt	Check for damage and alignment.
Take-up	Check belt tension, (If take-up is fully adjusted, a section of belting will need to be removed).
	Adjust take-up to remove excess slack from the belt. Make sure the adjustment screws have been tightened equally to prevent misalignment.
Gear Reducer(s)	Check for oil level and noise.
V-Belt/Chain Drive	Check belt/chain tension and adjust as required.
Guards	Check for oil level (if applicable). Check nuts and bolts for tightness.
Motors	Check amperage frequently. Verify it is within operating parameters.



6. Troubleshooting

In the following section, we have listed some causes and solutions to some of the problems you may encounter in the field.

If you encounter a problem that is difficult to solve, even after having read through this troubleshooting section, please contact your local dealer or distributor. Before you contact them, please have this operation manual and the serial number from your machine ready.



WARNING Fully disengage and lock out the power source before attempting any modifications or repairs.

PROBLEM	CAUSE	SOLUTION
Back legging. Material falling down the up or down side casing.	Obstruction in head	Inspect head for foreign materials. Check for missing buckets. Replace missing buckets.
	Throat flipper is out of adjustment.	Remove head cover cap and adjust flipper
	Obstruction in distributor or spouting.	Inspect distributor and spouting. Correct condition as required.
	Buckets being overfilled.	Remove inspection door and use a strobe light, while elevator is running, to see if buckets are being overfilled. Buckets should be near full, but not overflowing.
	Head shaft running too fast.	Check the drawing to be sure the correct Sheave is installed.
	Spouting size too small for elevator capacity.	Use the correct size spouting. Re-examine the engineering design.
	Spouting is installed too flat for good flow.	
	Spouting has a sharp bend that restricts the flow.	
	Bucket loose.	Tighten all bucket bolts securely.
	Damaged buckets.	Replace as required. Determine cause of damage.
	Elevating light material.	Replace buckets with perforated buckets.
	Belt loose.	Tighten take-up screws or re-splice the belt as required.
	Air locked.	Ventilation may be needed at the boot or in the load.



PROBLEM	CAUSE	SOLUTION
Elevator being overloaded	Feed conveyor running too fast.	Check conveyor speed.
	Pit hopper baffle mis-adjusted.	Adjust to restrict flow of material.
	Head pulley running too slow.	Check pulley speed.
		Check drawing to be sure the correct Sheaves are properly installed.
		Check gear reducer for correct reduction ratio.
Low capacity	Head shaft speed is too slow.	Check pulley speed.
		Check sheaves, gear reducer, and motor to determine cause of slow speed. Correct as required.
	Feed conveyor is running too slow or is obstructed.	Check conveyor speed. Correct as required. Remove any obstructions.
	Baffle plate in the pit hopper adjustment is set too low.	Raise baffle plate.
	Obstruction in the boot or the feeding boot is in the wrong location.	Clean boot and remove any obstructions. Check recommendations for locations of inlet hoppers.
	Missing buckets.	Missing buckets.
	Elevating light material.	Use perforated buckets.
	Air lock.	Install vents in the bins being loaded, the elevator head or boot.
	Spouting is too small or installed too flat for good flow.	Check recommendations for sizing and slope.
	Belt is loose.	Check for slippage. Check head pulley for lagging and replace if worn.
	Buckets are damaged or caked with material.	Visually inspect, clean, or replace damaged buckets.
Bearing failure	Material getting into the bearing.	Add or upgrade seal to keep material out of bearing.
Belt not tracking in the center of the pulleys. Belt rubbing on the sides of the head, boot, and/or casing	Boot pulley is improperly adjusted.	Adjust take-up screws on the boot to level the pulley and align belt in center of pulley.
	Elevator casing out of plumb, twisted, or bent.	Correct out of plumb condition.
		Replace or repair bent casing.
	Head pulley not level.	Place shims under pillow block bearings to level pulley.
	Head pulley is lagging down.	Replace with new lagging kit.
	Pulley has no crown.	Replace pulley.
	Failed bearings.	Replace defective bearing on head or boot shaft.
	Possible materials build up on pulley.	Clean pulleys or use slotted pulley at the boot.

PROBLEM	CAUSE	SOLUTION
Bucket bolts pull through belt or belt tears at bolt holes.	Bucket bolts not tight.	Frequently inspect and tighten the bucket bolts.
	Inadequate belt construction for bolt holding.	Replace the belt with the proper design.
	Obstruction in casing or insufficient clearance.	Remove the obstruction.
		Check the belt for proper tracking and align pulleys if required.
		Check casing for proper bucket clearance.
	Jammed boot.	Clean out boot.
	Pulleys are too small or incorrect splice strains the bolts as the belts flexes.	Install larger head pulley if possible. Check possibility of using thinner belt.
	Lump size or weight in buckets increased from original design.	Change feed design in boot to handle larger lumps.
		Change to heavier belt.
Excessive belt slippage or burning.	Head pulley lagging, worn, or loose.	Replace with factory recommended lagging.
	Belt has stretched.	Adjust belt tension with boot pulley. Adjust take up screws, or re-splice the belt.
Belt covers wearing excessively on bucket side.	Material down legging and getting between the bucket and belt.	Change speed to affect better discharge.
	Fine abrasive material between the bucket and belt.	Install rubber washers or bucket pads between the bucket and belt.
	The cover gauge is too light or improper belt quality.	Upgrade the belt.
Belt carcass breaks.	Lumps dropping between belt and boot pulley.	Use slotted boot pulley.
	The operating tension is higher than maximum allowable working tension of belt.	Replace belt with correct design.
Caking on buckets	Wet or powder type material.	Material is too wet.
Damaged buckets	Belt loose.	Tighten take-up screws or re-splice belt as required.
	Casing bowed and catching.	Re-plumb as required.
	Obstruction in the elevator.	Repair or remove.
	Buckets too large for casing.	Replace with proper size.
	Belt not running smooth.	May require special splice.
Excessive wear on pulley side of cover.	Abrasive material between belt and boot pulley.	Clean out boot.
	Belt slips at head pulley.	Replace worn lagging.
		Adjust take-up screws to increase belt tension.
	The cover gauge is too light or improper belt quality.	Upgrade belt

PROBLEM	CAUSE	SOLUTION
Build up on boot pulley.	Powder or sticky material	Slotted boot pulley required.



TERMS AND CONDITIONS OF SALE

TERMS OF SALE

All prices quoted, unless otherwise noted, are in GBP, and Ex Works. Hull, England.

PAYMENT TERMS

To be agreed upon.

SHIPMENT

[X] weeks after acceptance of the purchase order and receipt of approval drawings. To be agreed upon.

NORMAL SHIPPING PRACTICE

Head and tail sections will be bolted to their respective adjoining intermediate sections. Intermediate sections will have the chain assembled and placed inside the trough, secured and wired in place. All conveyor components are completely preassembled and 'matched marked' prior to shipment.

Other items: Limit switches, motion sensors, inlet flanges, support legs, drive components, etc., if required, are shipped loose and must be installed in the field at the owner's expense.

FREIGHT OPTIONS

Collect: The carrier will bill you directly, based on your discount. If you do not have a discount, they will apply our discount.

Prepaid & Add: The carrier will bill us, and we will then send you a bill for the freight.

PAINTING/GALVANIZING

Surface Preparation: All surfaces are adequately cleaned.

Paint Application: The Paint Application will be done over the exterior surfaces. The standard exterior finish consists of One (1) Coat 50/150 DFT Primer, One (1) coat Gloss Alkyd Enamel in a Regal Yellow Colour.

Galvanized: Conforms to EN ISO 1461.

PRICE AND ACCEPTANCE

All quotations are valid only for thirty (30) days from date of quotation. Sale of goods is not considered complete until the order is accepted by TRAMCO EUROPE LTD, HULL, ENGLAND. All orders are subject to credit approval.

TAXES

This quotation does not include excise or taxes of any kind.

WARRANTY

Goods manufactured by Seller shall conform to the description and specifications set out herein, shall be fit for the ordinary purposes for which such goods are used, and shall be free of defects in workmanship and material at time of shipment.

Providing such equipment is properly installed with competent supervision, and within the load limits for which it was sold, and provided further the equipment is free from critical speed, torsional or other type vibration, no matter how induced.

THERE ARE NO WARRANTIES OF MERCHANTABILITY OR OTHERWISE, EXCEPT OF TITLE, WHICH EXTEND BEYOND THAT STATED ABOVE.

REMEDIES

- a. Seller's liability and Buyer's remedy for breach of warranty or otherwise is expressly limited to repair or replacement of non-conforming machinery or machinery parts of Seller's manufacture when the same are returned F.O.B. Seller's factory within twelve (12) month of shipment hereunder or refund of the purchase price thereof after charging, in either instance, for the service rendered by the non-conforming product.
- b. Seller's liability with respect to any item not of Seller's manufacture shall be limited to that of the Vendor thereof.
- c. Repairs to, alterations of, or work done on equipment warranted hereunder without Seller's prior written authorisation shall void all warranties applicable thereto.
- d. In no event shall Seller's liability exceed the purchase price of the non-conforming item.

SAFETY DEVICES

The products are provided with only those safety devices identified herein. IT IS THE RESPONSIBILITY OF PURCHASER TO FURNISH APPROPRIATE GUARDS FOR MACHINERY PARTS in compliance with OSHA standards, as well as any other safety devices desired by Purchaser and/or required by law.

DELAYS

The Seller shall not be liable for loss of damage resulting from any delay or failure to make delivery of all or any part of the equipment purchased. If shipment is delayed by Purchaser, Seller reserves the right to invoice Purchaser and store the products at Purchaser's expense.

CLERICAL ERROR

Right is reserved to make any corrections in prices quoted due to stenographic or clerical errors on the part of the Seller.

ENTIRE AGREEMENT

This agreement is the entire and only agreement between Purchaser and the Seller; and, no oral statement or agreements not confirmed herein, or by a subsequent written agreement, shall be binding on either Purchaser or the Seller.

CANCELLATION

All orders are considered firm contracts and are not subject to cancellation except on terms that would indemnify Seller against loss.

APPLICABLE LAW

This quotation shall be interpreted and governed in all respects by the law of England. Any part of this agreement contrary to the law of any state shall not invalidate any other part of this agreement in such state.



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