

**HOPPER RECOVERY SYSTEMS  
MODEL 2 x 2 and MODEL 3 x 3  
O. M. 04115**

MC FILE NUMBER: 039-0474  
DATE OF ISSUE: 03/15/74  
REVISION: G, 11/09

**! WARNING**

**Do not proceed with these instructions until you have READ the orange cover of this MANUAL and YOU UNDERSTAND its contents. \***

**These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity.**

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

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

© 2009 CLEMCO INDUSTRIES CORP.  
One Cable Car Dr.  
Washington, MO 63090  
Phone (636) 239-4300  
Fax (800) 726-7559  
Email: [info@clemcoindustries.com](mailto:info@clemcoindustries.com)  
[www.clemcoindustries.com](http://www.clemcoindustries.com)



**⚠ WARNING**

- Read and follow ALL instructions before using this equipment.
- Failure to comply with ALL instructions can result in serious injury or death.
- In the event that the user, or any assistants of the user of this equipment cannot read or cannot completely understand the warnings and information contained in these instructions, the employer of the user and his assistants must thoroughly educate and train them on the proper operation and safety procedures of this equipment.

**NOTICE TO PURCHASERS AND USERS OF OUR PRODUCTS AND THIS INFORMATIONAL MATERIAL**

The products described in this material, and the information relating to those products, is intended for knowledgeable, experienced users of abrasive blasting equipment.

No representation is intended or made as to the suitability of the products described herein for any particular purpose or application. No representations are intended or made as to the efficiency, production rate, or the useful life of the products described herein. Any estimate regarding production rates or production finishes are the responsibility of the user and must be derived solely from the user's experience and expertise, and must not be based on information in this material.

The products described in this material may be combined by the user in a variety of ways for purposes determined solely by the user. No representations are intended or made as to the suitability or engineering balance of the combination of products determined by the user in his selection, nor as to the compliance with regulations or standard practice of such combinations of components or products.

Abrasive Blast Equipment is only a component of the range of equipment used in an abrasive blasting job. Other products may include an air compressor, abrasive, scaffolding, hydraulic work platforms or booms, paint spray equipment, dehumidification equipment, air filters and receivers, lights, ventilation equipment, parts handling equipment, specialized respirators, or equipment that while offered by Clemco may have been supplied by others. Each manufacturer and supplier of the other products used in the abrasive blasting job must be contacted for information, training, instruction and warnings with regard to the proper and safe use of their equipment in the particular application for which the equipment is being used. The information provided by Clemco is intended to provide instruction only on Clemco products. All operators must be trained in the proper, safe, use of this equipment. It is the responsibility of the users to familiarize themselves with, and comply with, all appropriate laws, regulations, and safe practices that apply to the use of these products. Consult with your employer about training programs and materials that are available.

Our company is proud to provide a variety of products to the abrasive blasting industry, and we have confidence that the professionals in our industry will utilize their knowledge and expertise in the safe efficient use of these products.

**GENERAL INSTRUCTIONS**

Described herein are some, **BUT NOT ALL**, of the major requirements for safe and productive use of blast machines, remote control systems, operator respirator assemblies, and related accessories. Completely read **ALL** instruction manuals prior to using equipment.

The user's work environment may include certain **HAZARDS** related to the abrasive blasting operation. Proper protection for the blaster, as well as anyone else that may be **EXPOSED** to the hazards generated by the blasting process, is the responsibility of the user and/or the employer. Operators **MUST** consult with their employer about what hazards may be present in the work environment including, but not limited to, exposure to dust that may contain **TOXIC MATERIALS** due to the presence of silica, cyanide, arsenic or other toxins in the abrasive, or materials present in the surface to be blasted such as lead or heavy metals in coatings. The environment may also include fumes that may be present from adjacent coatings application, contaminated water, engine exhaust, chemicals, and asbestos. The work area may include **PHYSICAL HAZARDS** such as an uneven work surface, poor visibility, excess noise, and electrical hazards. The operator **MUST** consult with his employer on the identification of potential hazards, and the appropriate measures that **MUST** be taken to protect the blaster and others that might be exposed to these hazards.

**ALL** machines, components and accessories **MUST** be installed, tested, operated and maintained only by trained, knowledgeable, experienced users.

**DO NOT** modify or substitute any Clemco parts with other types or brands of equipment. Unauthorized modification and parts substitution on supplied air respirators is a violation of OSHA regulations and voids the NIOSH approval.

**OPERATIONAL INSTRUCTIONS**

**OPERATOR SAFETY EQUIPMENT**

**⚠ WARNING**


- Blast operators and others working in the vicinity of abrasive blasting must always wear properly-maintained, NIOSH-approved, respiratory protection appropriate for the job site hazards.
- **DO NOT USE** abrasives containing more than one percent crystalline (free) silica. Ref. NIOSH Alert #92-102
- Inhalation of toxic dust (crystalline silica, asbestos, lead paint and other toxins) can lead to serious or fatal disease (silicosis, asbestosis, lead or other poisoning).

- ALWAYS wear NIOSH-approved supplied-air respirators as required by OSHA, in the presence of any dust including, but not limited to, handling or loading abrasive; blasting or working in the vicinity of blast jobs; and cleanup of expended abrasive. Prior to removing respirator, an air monitoring

instrument should be used to determine when surrounding atmosphere is clear of dust and safe to breathe.

- NIOSH-approved, supplied-air respirators are to be worn ONLY in atmospheres:
  - NOT IMMEDIATELY dangerous to life or health and,
  - from which a user can escape WITHOUT using the respirator.
- Clemco supplied-air respirators **DO NOT REMOVE OR PROTECT AGAINST CARBON MONOXIDE (CO) OR ANY OTHER TOXIC GAS.** Carbon monoxide and toxic gas removal and/or monitoring device must be used in conjunction with respirator to insure safe breathing air.
- Air supplied to respirator **MUST BE AT LEAST GRADE D QUALITY** as described in Compressed Gas Association Commodity Specification G-7.1, and as specified by OSHA Regulation 1910.139 (d).
- ALWAYS locate compressors to prevent contaminated air (such as CO from engine exhaust) from entering the air intake system. A suitable in-line air purifying sorbent bed and filter or CO Monitor should be installed to assure breathing air quality.
- ALWAYS use a NIOSH-approved breathing air hose to connect an appropriate air filter to the respirator. Use of a non-approved air hose can subject the operator to illness caused by the release of chemical agents used in the manufacture of non-approved breathing air hose.
- ALWAYS check to make sure air filter and respirator system hoses are NOT CONNECTED to in-plant lines that contain nitrogen, acetylene or any other non-breathable gas. NEVER use oxygen with air line respirators. NEVER modify air line connections to accommodate air filter/respirator breathing hose WITHOUT FIRST testing content of the air line. **FAILURE TO TEST THE AIR LINE MAY RESULT IN DEATH TO THE RESPIRATOR USER.**
- Respirator lenses are designed to protect against rebounding abrasive. They do not protect against flying objects, glare, liquids, radiation or high speed heavy materials. Substitute lenses from sources other than the original respirator manufacturer will void NIOSH-approval of this respirator.

**BLAST MACHINES AND REMOTE CONTROLS**

 <b>WARNING</b>
<ul style="list-style-type: none"> <li>• <b>ALWAYS equip abrasive blast machines with remote controls.</b></li> <li>• <b>Abrasive blast machine operators must wear NIOSH-approved supplied-air respirators (ref: OSHA regulations 1910.94, 1910.132, 1910.139 and 1910.244).</b></li> </ul>

- NEVER modify OR substitute remote control parts. Parts from different manufacturers are NOT compatible with Clemco

equipment. If controls are altered, involuntary activation, which may cause serious injury, can occur.

- Inspect the air control orifice DAILY for cleanliness. NEVER use welding hose in place of twinline control hose. The internal diameter and rubber composition are UNSAFE for remote control use.
- UNLESS OTHERWISE SPECIFIED, maximum working pressure of blast machines and related components MUST NOT exceed National Board approved 125 psig (8.5 BAR).
- NEVER weld on blast machine. Welding may affect dimensional integrity of steel wall and WILL VOID National Board approval.
- Point nozzle ONLY at structure being blasted. High velocity abrasive particles WILL inflict serious injury. Keep unprotected workers OUT of blast area.
- NEVER attempt to manually move blast machine when it contains abrasive. EMPTY machines, up to 6 cu. ft.(270kg) capacity, are designed to be moved:
  - on flat, smooth surfaces by AT LEAST two people;
  - with the Clemco "Mule"; or
  - with other specially designed machine moving devices.
- Larger empty blast machines or ANY blast machine containing abrasive MUST be transported by mechanical lifting equipment.

**AIR HOSE, BLAST HOSE, COUPLINGS, AND NOZZLE HOLDERS**

- Air hose, air hose fittings and connectors at compressors and blast machines MUST be FOUR times the size of the nozzle orifice. Air hose lengths MUST be kept as short as possible AND in a straight line. Inspect DAILY and repair leakage IMMEDIATELY.
- Blast hose inside diameter MUST be THREE to FOUR times the size of the nozzle orifice. AVOID sharp bends that wear out hose rapidly. Use SHORTEST hose lengths possible to reduce pressure loss. Check blast hose DAILY for soft spots. Repair or replace IMMEDIATELY.
- ALWAYS cut loose hose ends square when installing hose couplings and nozzle holders to allow uniform fit of hose to coupling shoulder. NEVER install couplings or nozzle holders that DO NOT provide a TIGHT fit on hose. ALWAYS use manufacturers recommended coupling screws.
- Replace coupling gaskets FREQUENTLY to prevent leakage. Abrasive leakage can result in dangerous coupling failure. ALL gaskets MUST be checked SEVERAL times during a working day for wear, distortion and softness.
- Install safety pins at EVERY coupling connection to prevent accidental disengagement during hose movement.
- ALWAYS attach safety cables at ALL air hose AND blast hose coupling connections. Cables relieve tension on hose and control whipping action in the event of a coupling blow-out.

**MAINTENANCE**

- ALWAYS shut off compressor and depressurize blast machine BEFORE doing ANY maintenance.
- Always check and clean ALL filters, screens and alarm systems when doing any maintenance.
- ALWAYS cage springs BEFORE disassembling valves IF spring-loaded abrasive control valves are used.
- ALWAYS completely follow owner's manual instructions and maintain equipment at RECOMMENDED intervals.

**ADDITIONAL ASSISTANCE**

- Training and Educational Programs. Clemco Industries Corp. offers a booklet, Blast-Off 2, developed to educate personnel on abrasive blast equipment function and surface preparation techniques. Readers will learn safe and productive use of machines, components and various accessories, including selection of abrasive materials for specific surface profiles and degrees of cleanliness.
- The Society for Protective Coatings (SSPC) offers a video training series on protective coatings including one entitled "Surface Preparation." For loan or purchase information, contact SSPC at the address shown below.

**TECHNICAL DATA AND RESEARCH COMMITTEES**

- The following associations offer information, materials and videos relating to abrasive blasting and safe operating practices.

**The Society for Protective Coatings (SSPC)**  
 40 24th Street, Pittsburgh PA 15222-4643  
 Phone: (412) 281-2331 • FAX (412) 281-9992  
 Email: research@sspc.org • Website: www.sspc.org

**National Association of Corrosion Engineers (NACE)**  
 1440 South Creek Drive, Houston TX 77084  
 Phone: (281) 228-6200 • FAX (281) 228-6300  
 Email: msd@mail.nace.org • Website: www.nace.org

**American Society for Testing and Materials (ASTM)**  
 100 Barr Harbor Dr., West Conshohocken, PA 19428  
 Phone (610) 832-9500 • FAX (610) 832-9555  
 Email: service@astm.org • Website: www.astm.org

**NOTICE**

This equipment is not intended to be used in an area that might be considered a hazardous location as described in the National Electric Code NFPA 70 1996, article 500.

**WARRANTY**


The following is in lieu of all warranties express, implied or statutory and in no event shall seller or its agents, successors, nominees or assignees, or either, be liable for special or consequential damage arising out of a breach of warranty. This warranty does not apply to any damage or defect resulting from negligent or improper assembly or use of any item by the buyer or its agent or from alteration or attempted repair by any person other than an authorized agent of seller. All used, repaired, modified or altered items are purchased "as is" and with all faults. In no event shall seller be liable for consequential or incidental damages. The sole and exclusive remedy of buyer for breach of warranty by seller shall be repair or replacement of defective parts or, at seller's option, refund

of the purchase price, as set forth below:

1. Seller makes no warranty with respect to products used other than in accordance hereunder.
2. On products seller manufactures, seller warrants that all products are to be free from defects in workmanship and materials for a period of one year from date of shipment to buyer, but no warranty is made that the products are fit for a particular purpose.
3. On products which seller buys and resells pursuant to this order, seller warrants that the products shall carry the then standard warranties of the manufacturers thereof, a copy of which shall be made available to customer upon request.
4. The use of any sample or model in connection with this order is for illustrative purposes only and is not to be construed as a warranty that the product will conform to the sample or model.
5. Seller makes no warranty that the products are delivered free of the rightful claim of any third party by way of patent infringement or the like.
6. This warranty is conditioned upon seller's receipt within ten (10) days after a buyer's discovery of a defect, of a written notice stating in what specific material respects the product failed to meet this warranty. If such notice is timely given, seller will, at its option, either modify the product or part to correct the defect, replace the product or part with complying products or parts, or refund the amount paid for the defective product, any one of which will constitute the sole liability of seller and a full settlement of all claims. No allowance will be made for alterations or repairs made by other than those authorized by seller without the prior written consent of seller. Buyer shall afford seller prompt and reasonable opportunity to inspect the products for which any claim is made as above stated.

Except as expressly set forth above, all warranties, express, implied or statutory, including implied warranty of merchantability, are hereby disclaimed.

**DAILY SET-UP CHECK LIST**

 <b>WARNING</b>
<ul style="list-style-type: none"> <li>• <b>ALL</b> piping, fittings and hoses <b>MUST</b> be checked DAILY for tightness and leakage.</li> <li>• <b>ALL</b> equipment and components <b>MUST</b> be thoroughly checked for wear.</li> <li>• <b>ALL</b> worn or suspicious parts <b>MUST</b> be replaced.</li> <li>• <b>ALL</b> blast operators <b>MUST</b> be properly trained to operate equipment.</li> <li>• <b>ALL</b> blast operators <b>MUST</b> be properly outfitted with abrasive resistant clothing, safety shoes, leather gloves and ear protection.</li> <li>• <b>BEFORE</b> blasting <b>ALWAYS</b> use the following check list.</li> </ul>

**1. PROPERLY MAINTAINED AIR COMPRESSOR** sized to provide sufficient volume (cfm) for nozzle and other tools PLUS a 50% reserve to allow for nozzle wear. Use large compressor outlet and large air hose (4 times the nozzle orifice size). FOLLOW MANUFACTURERS MAINTENANCE INSTRUCTIONS.

**2. BREATHING AIR COMPRESSOR** (oil-less air pump) capable of providing Grade D Quality air located in a dust free, contaminant free area. If oil-lubricated air compressor is used to supply respirator, it should have high temperature monitor and CO monitor or both. If CO monitor is not used, air **MUST** be tested FREQUENTLY to ensure proper air quality.

**3. Clean, properly maintained NIOSH-APPROVED SUPPLIED-AIR RESPIRATOR.** ALL components should ALWAYS be present. NEVER operate without inner lens in place. Thoroughly inspect ALL components DAILY for cleanliness and wear. ANY substitution of parts voids NIOSH approval i.e. cape, lenses, breathing hose, breathing air supply hose, air control valve, cool air or climate control devices.

**4. OSHA required BREATHING AIR FILTER** for removal of moisture and particulate matter from breathing air supply. THIS DEVICE DOES NOT REMOVE OR DETECT CARBON MONOXIDE (CO). ALWAYS USE CO MONITOR ALARM.

**5. ASME CODED BLAST MACHINE** sized to hold 1/2 hour abrasive supply. ALWAYS ground machine to eliminate static electricity hazard. Examine pop up valve for alignment. Blast machine MUST be fitted with a screen to keep out foreign objects and a cover to prevent entry of moisture overnight.

**6. AIR LINE FILTER** installed AS CLOSE AS POSSIBLE to machine inlet. Sized to match inlet piping or larger air supply line. Clean filter DAILY. Drain OFTEN.

**7. REMOTE CONTROLS** MUST be in PERFECT operating condition. ONLY use APPROVED spare parts, including twin-line hose. DAILY: test system operation and check button bumper and spring action of lever and lever lock. DO NOT USE WELDING HOSE.

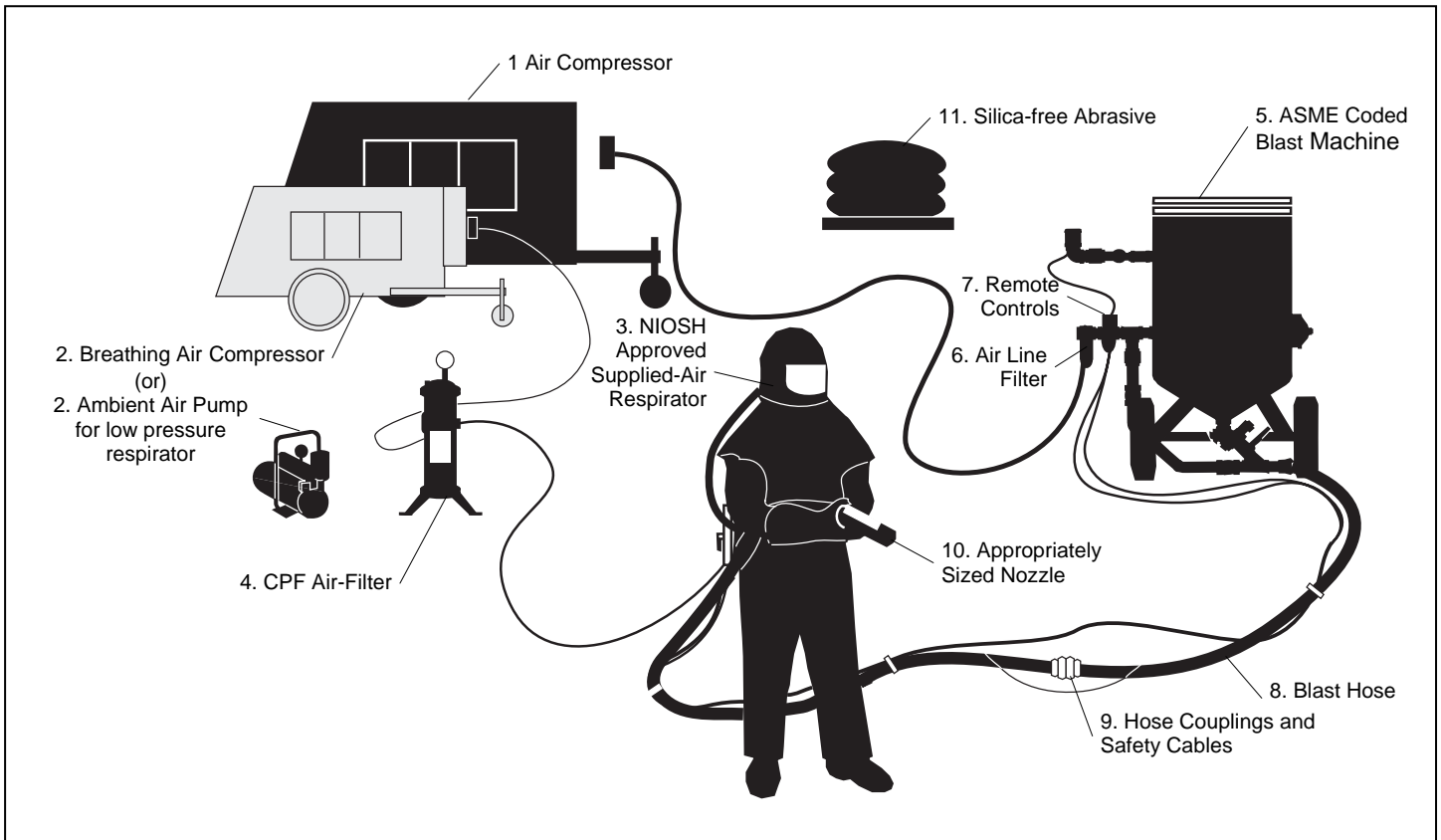
**8. BLAST HOSE** with ID 3 to 4 times the nozzle orifice. Lines MUST be run AS STRAIGHT AS POSSIBLE from machine to work area with NO sharp bends. Check DAILY for internal wear and external damage.

**9. HOSE COUPLINGS, NOZZLE HOLDERS** fitted SNUGLY to hose end and installed using PROPER coupling screws. Coupling lugs MUST be snapped FIRMLY into locking position. Gasket MUST form positive seal with safety pins inserted through pin holes. Check gaskets and replace if ANY sign of wear, softness or distortion. ALWAYS install safety cables at every connection to prevent disengagement. Check nozzle holder for worn threads. NEVER MIX DIFFERENT BRANDS OF COMPONENTS. Check each of these components DAILY.

**10. Inspect NOZZLE and GASKET DAILY** for wear. Replace nozzle when 1/16" larger than original size or if liner appears cracked. Check nozzle threads for wear.

**11. Use abrasive** that is properly sized and free of harmful substances; such as, free silica, cyanide, arsenic or lead. Check material data sheet for presence of toxic or harmful substances.

**12. Test surface** to be blasted for toxic substances. Take appropriate, and NIOSH required, protective measures for operator and bystanders which pertain to substances found on the surface to be blasted.




**1.0 INTRODUCTION**

**1.1 Scope**

1.1.1 This manual covers installation, operation, maintenance, troubleshooting, and replacement parts for Clemco 2 x 2 and 3 x 3 hopper recovery systems. Read this entire manual before attempting installation or operation of the recovery hopper. Separate manuals provide instructions on use of equipment in combination with the hoppers. These include the elevator underspeed monitor, abrasive cleaner, blast machine, etc., available upon request from Clemco Industries Corp, or at our web site at [www.clemcoindustries.com](http://www.clemcoindustries.com).

**1.2 Safety Alerts**

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

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

**CAUTION**

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

 **CAUTION**

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

 **WARNING**

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

 **DANGER**

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

**1.3 Description**

1.3.1 Hopper recovery systems include a shovel-in, surface-mount hopper (2 x 2 system) or sweep-in, floor-level (3 x 3 system) hopper, and bucket elevator. The components of the bucket elevator are shown in Figure 1; their functions are explained in Paragraphs 1.6 through 1.9. The components of the 2 x 2 and 3 x 3 hoppers are shown in Figure 2.

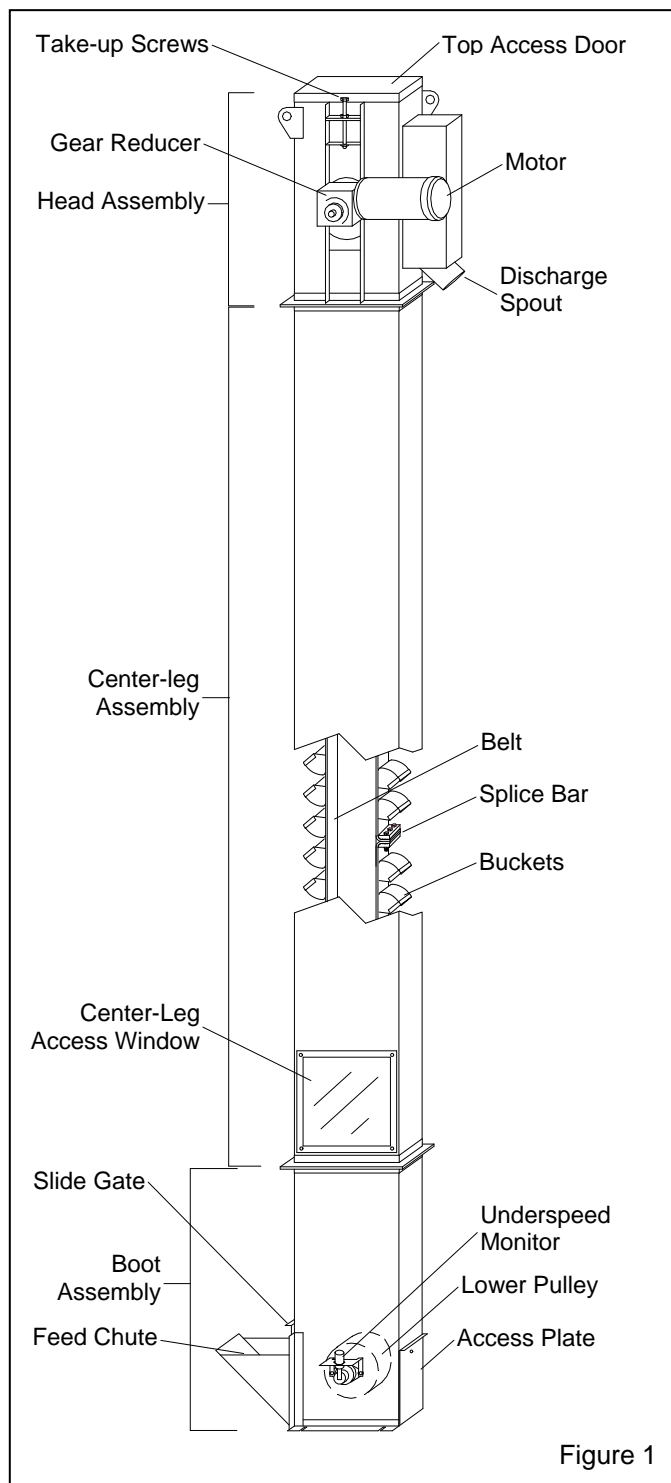
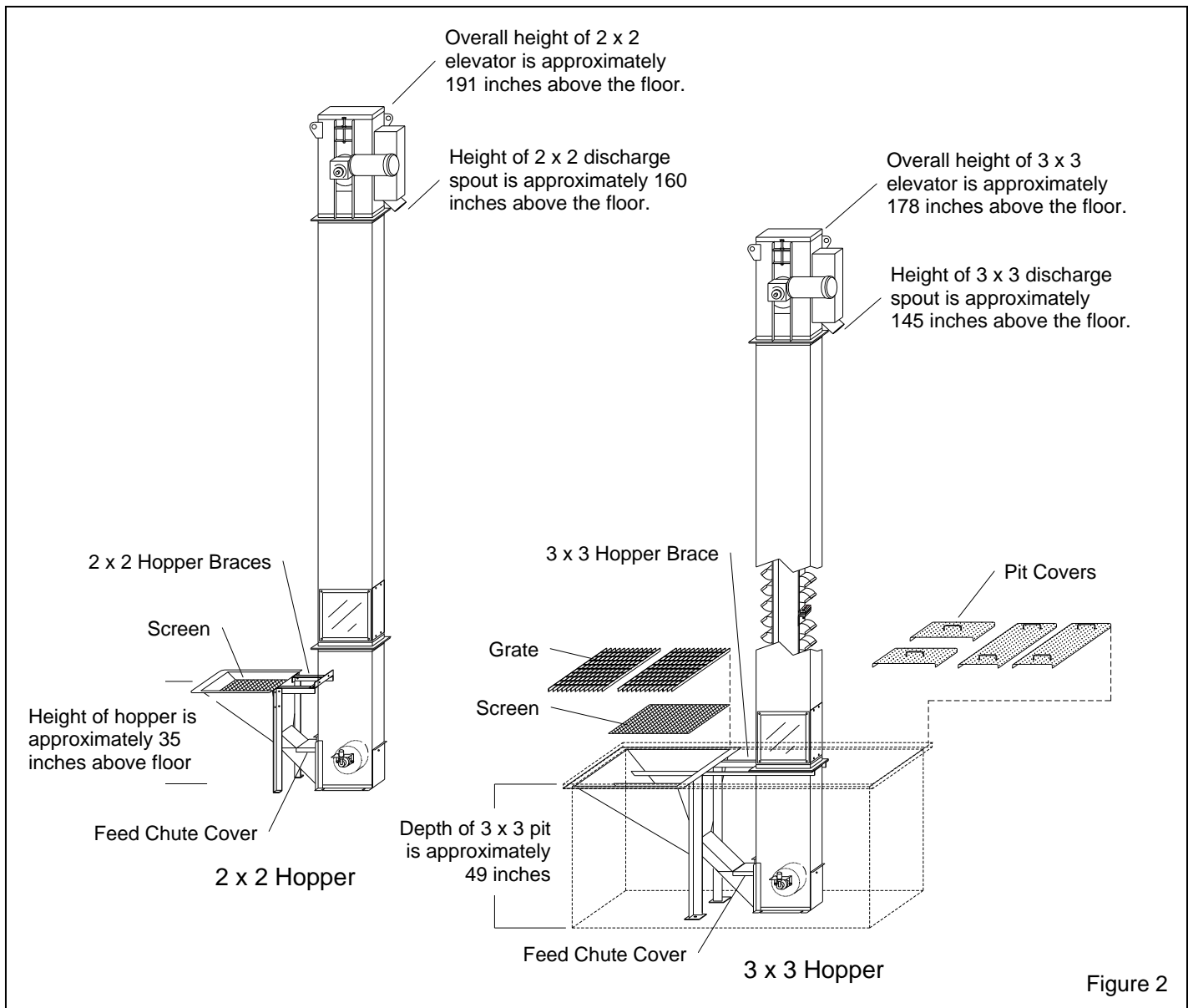


Figure 1



**1.3.2** Hopper Recovery systems are designed to pass through a blast room with maximum thickness of 12 inches. Walls of greater thickness will make elevator assembly difficult. The hopper is located inside the blast room for easy loading, while the elevator and other recovery equipment are kept outside the blast room.

**1.4 Hopper Assemblies**

**1.4.1 2 x 2 Surface Mount Hopper**

**1.4.1.1** The 2 x 2 hopper is surface mounted and does not require a pit. The operator uses a shovel or other means to load the hopper. The top of the hopper is located approximately 35 inches above the floor.

**1.4.2 3 x 3 Recessed Hopper**

**1.4.2.1** The 3 x 3 hopper is recessed into a pit, placing the top of the hopper at floor level. The operator uses a broom, shovel, loader, or similar means to push media into the hopper.

**1.5 Foundation Pit and Anchors**

**1.5.1** Prior to installation of a 3 x 3 system, a foundation pit must be poured. All foundation work is provided by the purchaser. The illustration in Figure 3 is exemplary only, and subject to change. A foundation drawing is provided with the 3 x 3 system, refer to the drawing before excavating and pouring the foundation pit. The illustration in Figure 4 shows the anchor pattern for a 2 x 2 system.

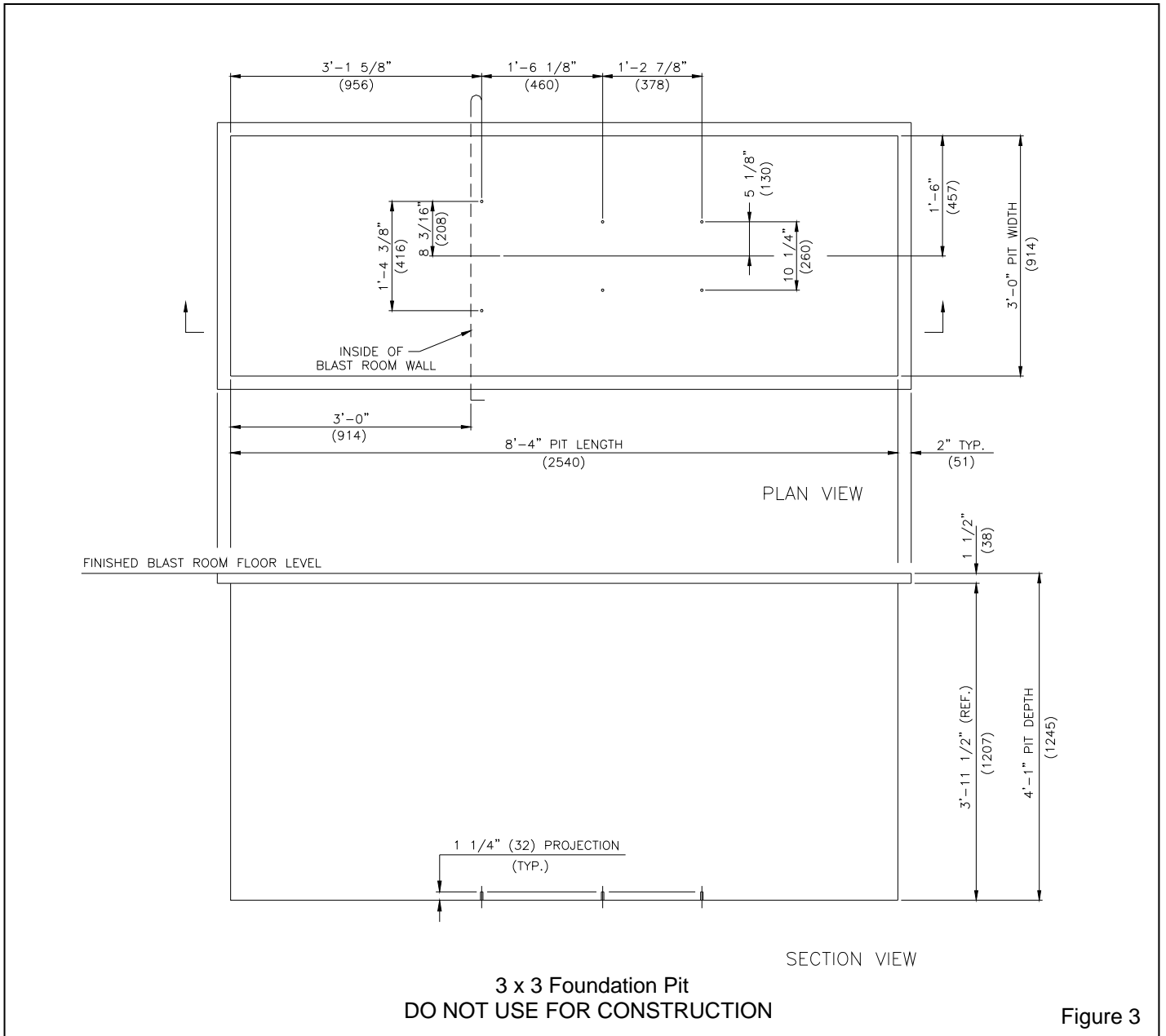


Figure 3

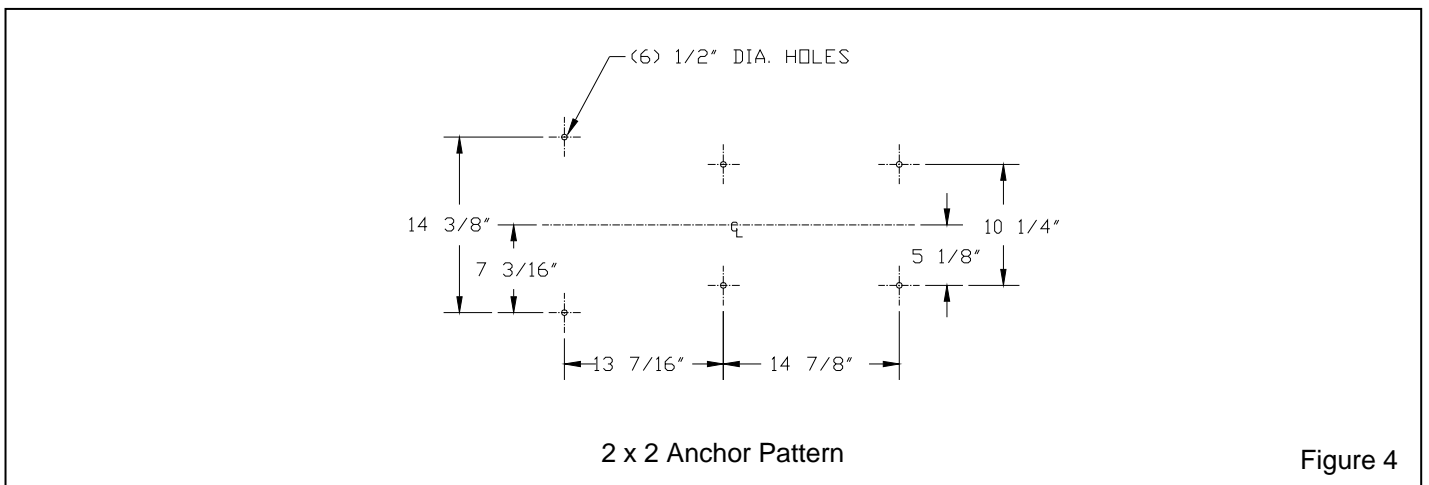


Figure 4

**1.5.2** Specifications on foundation that are included on the drawing are as follows:

- Concrete pit to be level and square to  $\pm 1/8$  inch
- Concrete pit walls to be straight and parallel to  $\pm 1/4$  inch.
- Trowel top and bottom of pit smooth to  $\pm 1/8$  inch.
- Trowel 2" and 1-1/2" shelves smooth to  $\pm 1/8$  inch.
- Hold anchor bolt location  $\pm 1/8$  inch.
- Anchor bolt projection 1-1/4 inch.

### 1.6 Elevator Boot Assembly

With inlet chute, flow control slide gate, lower (idler) pulley, and underspeed monitor.

**1.6.1 The inlet chute:** is the abrasive entry point.

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

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

### 1.7 Bucket Elevator Center-Leg

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

### 1.8 Drive Head

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

### 1.9 Belt Assembly with Buckets.

**1.9.1** Buckets, attached to the belt, lift abrasive from the floor-level recovery point, and eject it from the discharge spout.

## 2.0 INSPECTION

**2.1** Inspect for missing or damaged parts.

**2.2** Locate the integrated underspeed monitor owner's manual. It is required for assembly and adjustment.

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

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

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

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

## 3.0 INSTALLATION

**Installation Notes:** The following instructions explain the installation of a 3 x 3 system. A 2 x 2 system is assembled similarly, except a foundation pit is not required, and an opening must be made in the blast room wall, and resealed after completing the installation.

These instructions are for the assembly of the recovery hopper and elevator only. Use these instructions in conjunction with other manuals provided with the recovery system. Pay particular attention to the foundation pit, and placement of the elevator with that of the blast machine and abrasive cleaner. For proper abrasive flow from the elevator discharge to the abrasive cleaner inlet, make sure the placement allows a 45° maximum (from vertical) flow-angle between the elevator discharge and abrasive cleaner inlet, as shown in Figure 5.

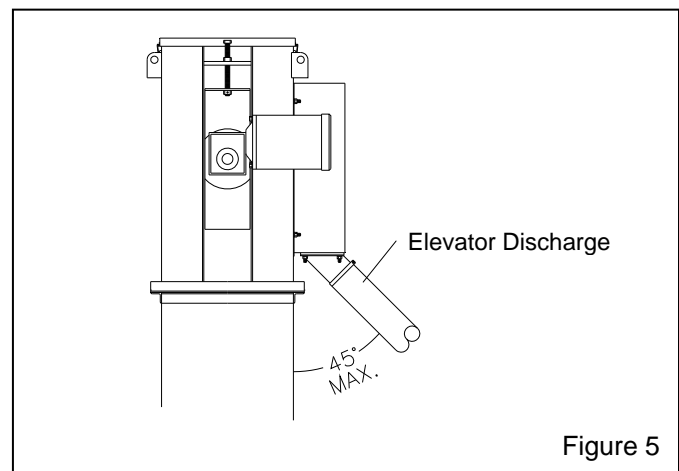


Figure 5

### 3.1 Hopper and Boot Assembly

**3.1.1** Place the elevator boot assembly into the pit from outside the blast room. Lower over the anchor bolts, but do not bolt down at this time.

**3.1.2** Install mastic sealant to the underside of the three hopper flanges that do not against the blast room wall, this assures good contact with the foundation shelf.

**3.1.3** Install the hopper from inside the room, make sure the hopper support legs fit over anchor bolts, and the hopper outlet nestles into the elevator inlet chute.

**3.1.4** The placement of the hopper outlet and elevator inlet chute must be close enough, so the abrasive angle of repose will not allow abrasive to overflow the chute.

**3.1.5** Loosely install hopper braces to the elevator boot. Position the 2 x 2 brace against the elevator, and match drill into the boot.

**Anchor Notes:** If inserts are used instead of poured-in-place anchors, make sure there is room to drill for the anchors, otherwise, mark the hole locations, move hopper and elevator aside and install the inserts.

**3.1.6** Snug-up the anchor nuts and braces but do not tighten at this time. The elevator may require shims between the boot and foundation.

## **⚠ WARNING**

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

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

**3.1.7** Make sure the abrasive flow-control slide gate (located between the inlet chute and elevator boot) is in place and has enough clearance to be fully raised or lowered. **The initial setting should place the bottom of the slide gate at mid point of the opening.**

### **3.2 Center-Leg Assembly**

**3.2.1** Apply adhesive-backed strip gasket to the elevator boot and center-leg mating flange.

**3.2.2** Install center-leg (with see-through access window down and facing the most accessible side) to boot, bolting through mating flanges (and 3 x 3 braces).

**3.2.3** Plumb the elevator by putting shims under the elevator boot.

**3.2.4** Tighten all anchors and braces.

### **3.3 Head Assembly**

## **⚠ WARNING**

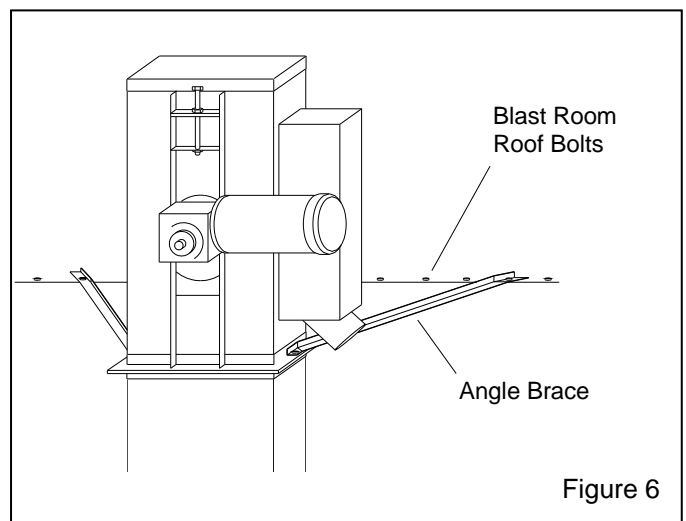
**To prevent damage or injury from the elevator falling, tie the elevator leg and head sections to a brace that gives them upright support until the completed elevator assembly is bolted down and braced.**

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

**3.3.2** Install adhesive-backed strip gasket on the elevator center-leg and head assembly mating flange.

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

**3.3.4** The elevator may require bracing to stabilize it. One method would be to attach diagonal braces from the elevator to the blast room, as shown in Figure 6.



### **3.4 Belt Installation**

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

## **⚠ WARNING**

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

### 3.4.2 Side Installation

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

**3.4.2.2** Remove access doors on elevator head, center-leg section and boot section.

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

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

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

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

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

**3.4.2.8** Continue feeding the belt until the end reaches the bottom of the boot.

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

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

**3.4.2.11** Proceed to Section 3.5.

### 3.4.3 Top Installation

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

**3.4.3.2** Remove access doors on elevator head, center-leg section and boot section.

**3.4.3.3** Working through the top opening, lower the end of the belt with the buckets facing down, into the discharge side of the top pulley until the end is visible at the center-leg access window. Tie the belt to prevent movement.

**3.4.3.4** Make sure that the buckets will dump toward the discharge spout.

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

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

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

### 3.5 Belt Splicing

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

**3.5.2** Place the splice bars 90 degrees (perpendicular) to the belt. Clamp the splice bars in place and match-drill 3/8" through both ends of the belt. It is important to align the belt as shown in Figure 7. If the splice is misaligned, from not having the splice bar perpendicular to the belt, the belt may tend to drift off the pulley.

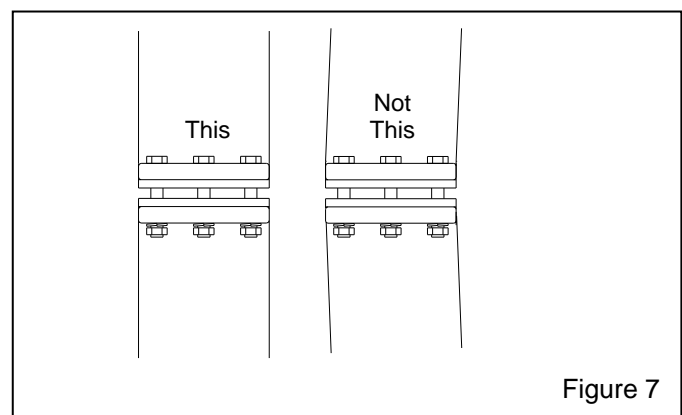


Figure 7

**3.5.3** Install the splice bar as shown in Figure 8. Remove the threading rope. Make sure the splice bar bolts are evenly tightened, and the two ends of the belt are aligned properly, as the splice bar is tightened.

### 3.5.4 Trim off excess belting at splice bar.

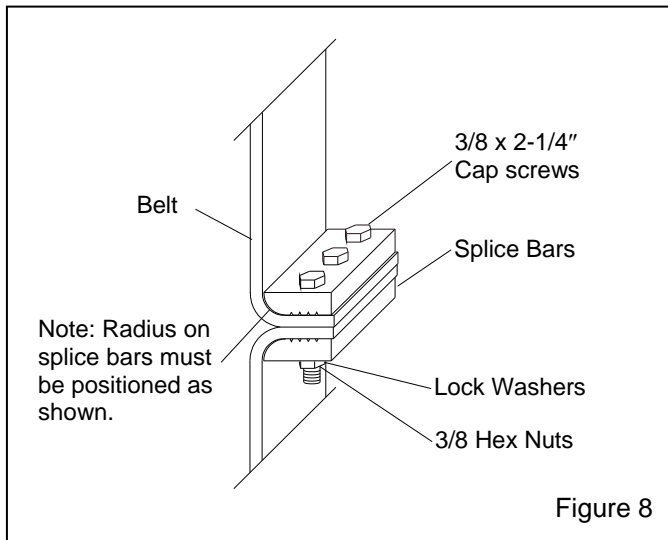


Figure 8

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

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

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

**3.8** Refer to the corresponding owner's manual and check installation of all companion equipment (abrasive cleaner, blast machine etc.)

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

**3.10** Connect the discharge hose to the discharge spout. The angle of the discharge hose must be at least 45 degrees. If the hose sags, put a stiffener on it to prevent it from further sagging under the load of abrasive.

### 3.11 Underspeed Monitor

**3.11.1** Install the underspeed monitor per instructions in the underspeed monitor manual.

**3.12** Install flashing, grout, and otherwise seal the opening between the blast room wall and hopper.

**3.13** Install hopper screen, and grate and cover plates on 3 x 3.

### 3.14 Wiring

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

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

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

**3.14.3** Jog the motor to check motor rotation. The belt should move over the top pulley toward the discharge.

### 4.0 Belt Tracking

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

## DANGER

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

**4.2** Do not run the motor until it is certain the belt tracks correctly. Jog the motor for only a second while monitoring the movement of the belt from the top access opening. Increase the run period by one second until it is certain the belt will track without drifting off the top pulley.

**4.3** After slack has been removed from the belt, and it has been determined that the belt will run without coming off the upper pulley, the motor can be kept running and belt tension can be adjusted per section 5.1.

## 5.0 ADJUSTMENTS

### 5.1 Belt Tension and Tracking

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

**5.1.2** Shut off the elevator, and lockout and tagout the electrical power.

## **⚠ WARNING**

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

**5.1.3** Working through the center-leg access opening, use both hands to draw the two sides of the belt together. If the belt is tightened correctly, it cannot be drawn any closer together than between 1-1/2" to 2". See Figure 9.

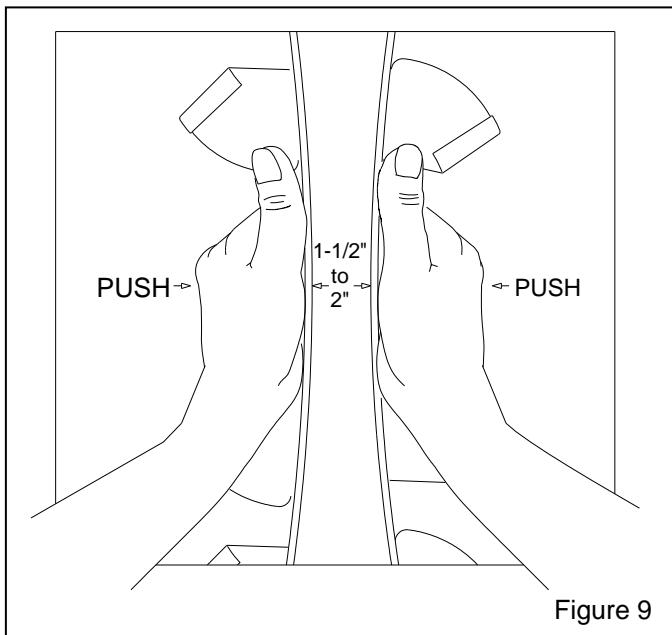


Figure 9

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

**5.1.5** After the final adjustment is made, belt tracking should be observed for several minutes to ensure there is no long-term drift of the belt on either side of the pulley.

**5.1.6** Install all access covers.

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

### 5.2 Underspeed Monitor

**5.2.1** Adjust the underspeed monitor as instructed in the underspeed monitor manual.

### 5.3 Slide Gate

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

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

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

## 6.0 OPERATION

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

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

## **⚠ DANGER**

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

**6.2** Charge the system with abrasive while all components are running. Care should be used to ensure the system is not overfilled. A standard 2 x 2 and 3 x 3 with abrasive cleaner and 6 cu. ft. blast machine hold approximately 16 cu. ft. of abrasive. When full, the abrasive level will be about 12 inches above the bottom of the abrasive cleaner.

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

**6.4** Install the cover plate onto the inlet chute.

---

## 7.0 MAINTENANCE

---

### WARNING

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

---

#### 7.1 Belt Tension and Tracking

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

**7.1.2** Through the first month, check belt tension and tracking weekly.

**7.1.3** After the initial one-month break-in period, inspect the belt monthly for wear and stretching. Adjust for stretch as covered in Section 5.1.

#### 7.2 Belt Replacement

**7.2.1** Shut off the elevator, and lockout and tagout the electrical power.

**7.2.2** Remove the center-leg access window.

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

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

**7.2.5** Through the leg access opening, attach a rope to the belt on the lower side of the splice. Tie the rope to prevent the belt from falling into the boot when the splice is removed.

**7.2.6** Remove the splice bar assembly from the belt.

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

**7.2.8** Pull the upper end of the belt downward and out through the access window. Doing so will feed the rope

under the lower pulley and up and over the top pulley while the old belt is being removed. Use the rope to prevent the old belt from falling as it is removed.

**7.2.9** When the old belt is entirely clear of the elevator, attach the rope to the end of the new belt to facilitate installation per Section 3.4. NOTE! Make sure the belt is installed correctly; when the belt is installed, the open end of the buckets must face toward the discharge.

#### 7.3 Pulleys

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

#### 7.4 Gear Reducer

**7.4.1** Check lubricant level monthly.

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

#### 7.4.3 Recommended Lubricant

**7.4.3.1** Follow the instructions supplied with the gear reducer.

#### 7.4.4 Changing Lubricant

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

#### 7.5 Bearing Lubrication

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

---

---

## 8.0 TROUBLESHOOTING

### **DANGER**

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

---

#### 8.1 Elevator Starts, But Shuts Down After Several Seconds.

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

**8.1.2** Belt may be slipping. Check belt tension.

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

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

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

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

#### 8.2 Elevator Does Not Lift Abrasive.

**8.2.1** Belt may be slipping. Check belt tension.

**8.2.2** Check for blockage in discharge spout and discharge hose.

**8.2.3** Flow control slide gate too low. Adjust per Section 5.3.

#### 8.3 Elevator Making Excessive Noise.

**8.3.1** Check for foreign object in elevator boot.

**8.3.2** Check for loose buckets on belt.

**8.3.3** Belt too loose. Check belt tension.

**8.3.4** Belt may be off-center. Check belt tracking.

**8.3.5** Check for worn pulley bearings.

#### 8.4 Cannot Get Belt to Track

**8.4.1** Belt is not spliced correctly. Refer to Section 3.9, Figure 7.

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

#### 8.5 Cannot Tension Belt (too much slack)

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

---

**9.0 REPLACEMENT PARTS**

Items without numbered called-outs are not normal replacement parts. Order parts not listed by description and location of parts.

**9.1 Bucket Elevator Assembly, Figure 10**

Item	Description	Stock No.
1.	Motor, 1 HP 1725 RPM TEFC .....	02981
2.	Gear reducer 20:1 .....	25473
3.	Pulley, top lagged 6" diameter x 4" .....	06386
4.	Drive shaft .....	05827
5.	Bearing, flange cartridge .....	06057
6.	Latch (each) .....	10290
7.	Hose, 4" bulk duct, specify length required in feet.....	00716
8.	Clamp, 4-1/2" .....	02806
9.	Belting, 4" wide, bulk, specify length required in feet .....	06414
10.	Belt assembly w/ buckets and splice bar for 2 x 2, 30 ft. ....	06492
	for 3 x 3, 36.5 ft. ....	06491
11.	Bucket, polyethylene, each. ....	06486
12.	Washer, 1/4" internal tooth lock.....	03118
13.	Bolt and nut, bucket .....	03119
14.	Gasket, adhesive backed, 5/16" x 3/4" specify length required in feet.....	00189
15.	Pulley, bottom wing, 8" diameter x 6" .....	06385
16.	Idler shaft .....	06409
17.	Door, center access.....	05854
18.	Splice bar assembly .....	06418
19.	Door, side access, 18 x 8 .....	25256
20.	Underspeed monitor assembly .....	20217
	Refer to the underspeed monitor manual for individual replacement parts.	

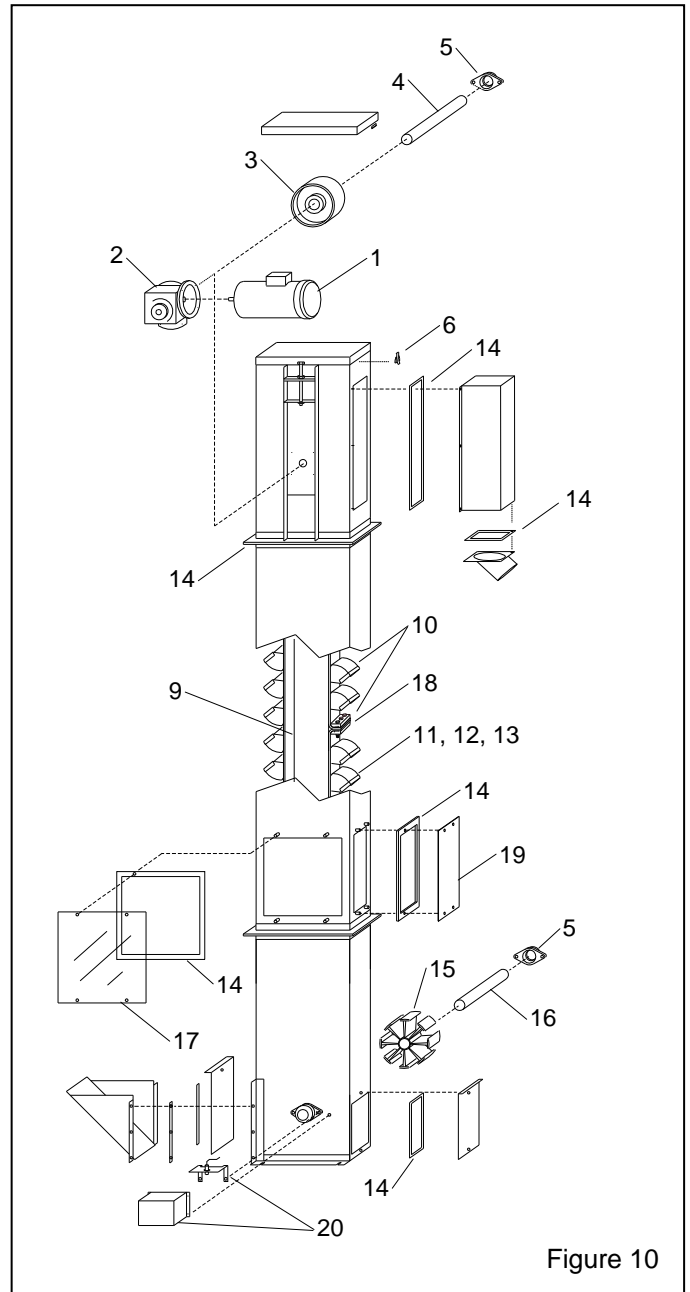


Figure 10