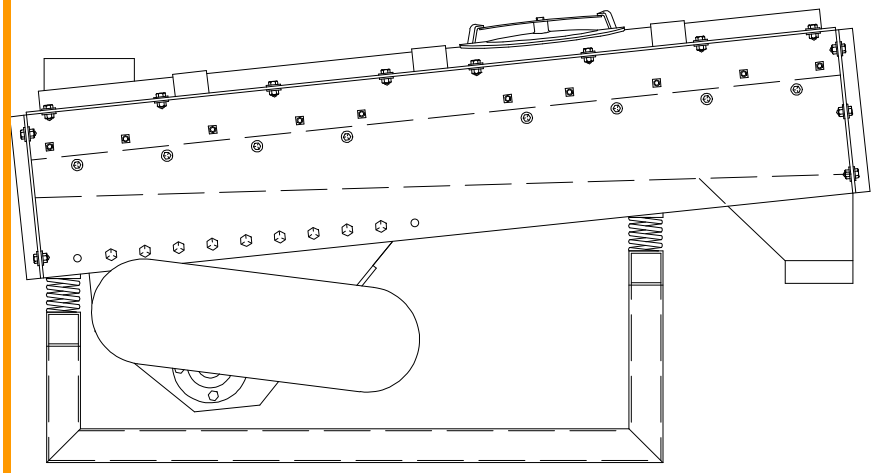
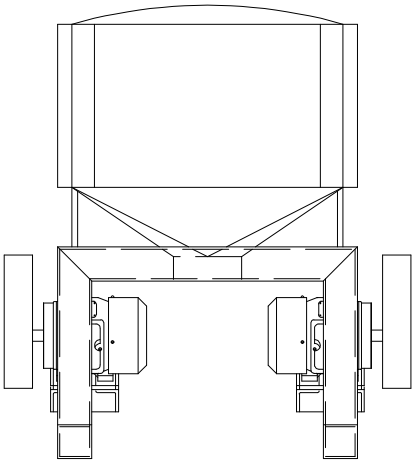
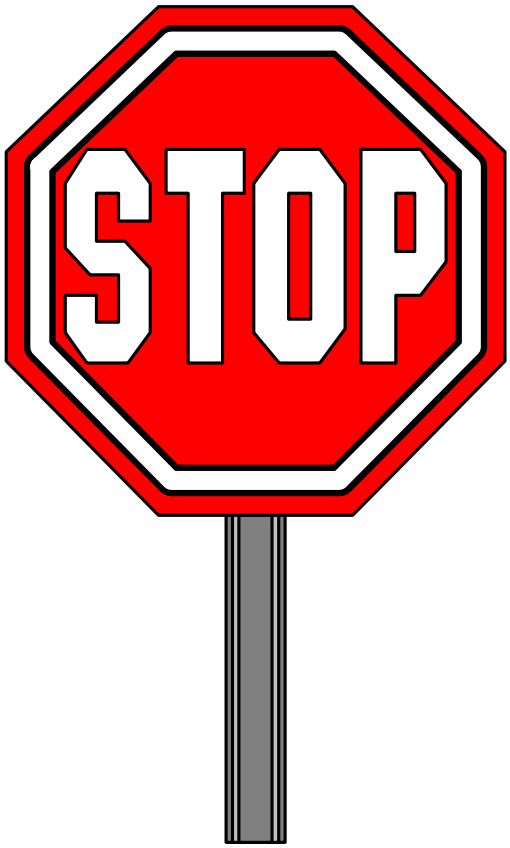
Linear

MANUAL





IMPORTANT!



SCREENER STORAGE

Long Term Storage greater than 60 days may cause damage to vibrator drive components.

Please consult SMICO Manufacturing for storage instructions.

SMICO Manufacturing Co., Inc.
Oklahoma City, Okla. 73127
405-946-1461

SMICO

IMPORTANT

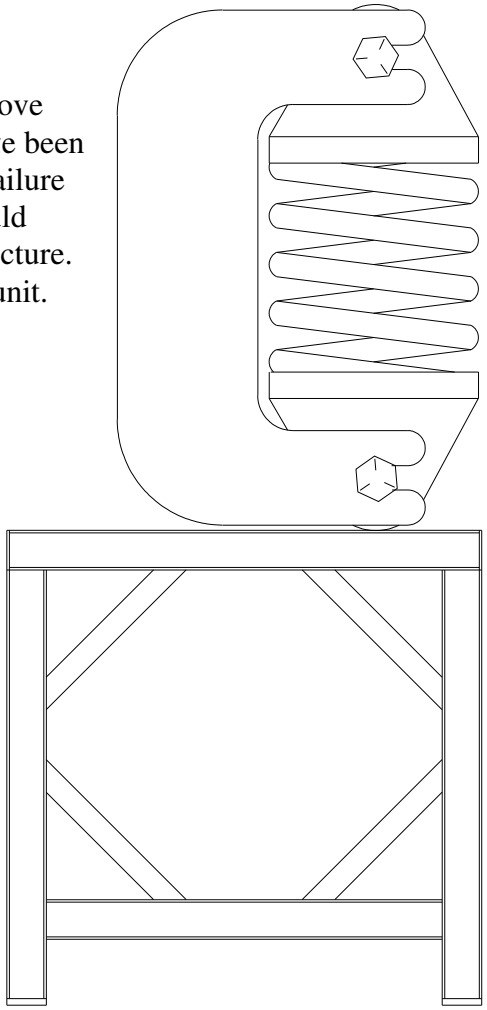
Before operating your LINEAR series screener, be sure to remove the transit bracket from the spring mounts. These brackets have been provided to minimize damage to the shaker while in transit. Failure to remove these brackets before operation of your screener could result in damage to the screener as well as the surrounding structure. Retain these brackets for use when moving or re-shipping the unit.

FOUNDATIONS

One of the most important individual items for satisfactory operation of your LINEAR series screener is the preparation of a proper foundation. The essential part of a foundation is that it is rigid and square.

Steel or concrete foundations are recommended. Wood foundations are not recommended since they are rarely rigid, and since they are subject to temperature changes and warpage, it is impossible to insure accuracy or squareness.

When selecting a steel foundation it is necessary that the beam is selected such that the natural frequency of the beam is not within the period of sympathetic vibration period of the machine.



Typical frame depicting gussets that are properly sized and located. The traditional "x" bracing is not adequate for vibrating equipment.

The spring mounts on the machine provide vibration isolation for this machine. **DO NOT** attempt to further isolate this machine by using some type of vibration isolator between the frame and the foundation. This will result in a frame that is not rigid and the machine will vibrate this frame excessively. This will usually produce more vibration transmission rather that less vibration transmission.

HOPPERS

In erecting a hopper beneath the screen, be sure the valley angles are steep enough to give a free flow of the material being screened. See that the hopper is built low enough so the live machine structure will not strike the hopper, even when the machine is set at the steepest angle. Also note the screener will have random and erratic movement during start up and shut down. Allow an extra 2" minimum around the live machine to allow for this movement.

DISCHARGE CHUTES

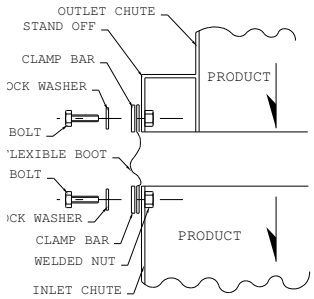
In designing discharge chutes the valley angles and clearances specified in the hoppers paragraph needs to be taken into account. In addition to that, the screens are removed from either end. This will require access to the end of the unit, and screen cloth removal will require the length of the screen panel beyond the machine.

If a dust seal is required, the use of flexible connectors is the best method of accomplishing this. This type of connector must be flexible enough to allow free movement of the live unit with out restrictions. NOTE: Flexible connectors which are stiff may cause excessive vibration transmission to the surrounding structure, damage the screener itself, and alter the screening efficiency.

FEED CHUTES

Feed chutes must also conform to the specifications specified in the hoppers paragraph. In addition to that feed chutes are an important part of the screener.

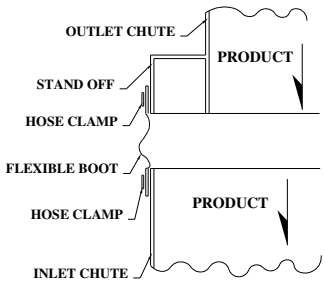
Feed chutes should provide of distribution of the material across the full width of the machine. Feed chutes should limit the fall of the material as much as possible. They should also slow up fast moving streams. These aspects will allow for efficient screening of your product. Proper feed chutes will adequately repay for the time spent constructing them by reducing screen cloth wear and increasing the efficiency.



Rectangular boot connection with clamp bars and fastener

CONNECTIONS

The connections between the LINEAR series screener and the matching chute work needs to be via a flexible connector. The distance between the two spouts needs to be 2 - 3 inches. This distance allows the machine the room necessary for start up and shut down. The connection between the two needs to be a flexible connector held in place by clamps. On a rectangular spout the boot are held on by a clamp bar with bolts and welded nuts on the inside of the spout. On a round or elliptical spout a hose clamp type fastener is all that is needed to hold the boot in place.



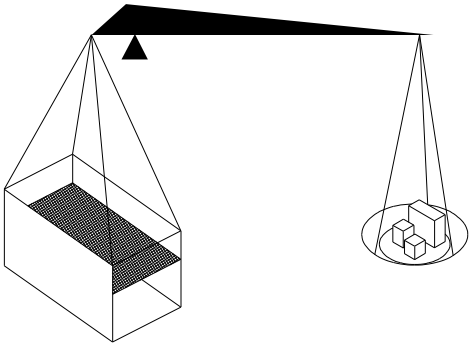
Round or elliptical boot connection with hose clamp

For abrasive applications it is necessary to have a stand off between the spouts and the boots. This stand off will insure the product does not come in contact with the boot preventing the product from prematurely wearing the boot.

CONTROL YOUR PRODUCT

Your LINEAR series screener is fully adjustable to your product; Take full advantage of these exclusive features so you may obtain the most efficient results possible. Be sure the stroke, speed, and the angle of the machine are correct for your product. Do not guess! Check it!

BALANCE



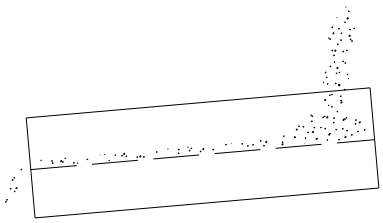
SMICO LINEAR series of screeners is dynamically balanced. Dynamically balanced means the weight of the machine is counter balanced by the rotating counter weights, on the shafts, to produce the vibrating effects that are uniform across the entire screen area. This motion is effected by the loading of the machine and dramatic surge loading of the machine could produce undesired effects.

The weight of the machine is accurately counterbalanced. These counter weights are attached to the shafts, and are not to be changed unless additional weight is added to or removed from the machine. If weight is added or removed from the machine contact the factory for assistance in adding or subtracting counterweight. NOTE: DO NOT add skirt boards, wearing plates, chutes, feeders, or any other material to the live part of the machine. These structures will be subject to extreme dynamic forces and fatigue; In addition, they will change the balance of the screen. Such unbalance could cause serious problems such as premature bearing failure, destroying the motor, and transmitting excessive vibration to the structure, and other similar undesired effects.

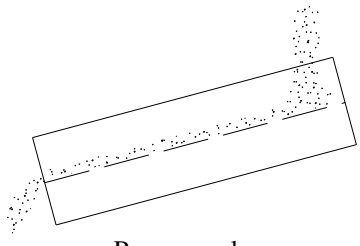
ANGLE

The inclination at which the screening surface is operated plays an important part in the screening efficiency. If the angle is too great the material will pass over too rapidly, and will not be properly graded. If the angle is too slight efficient grading may not be maintained, the capacity of the screen will be reduced, and material will tend to accumulate at the feed end of the machine, causing undue wear and breakage of the screen cloth. Proper inclination of the screen provides efficient grading and capacity. Tests have indicated on some materials, a 5^{o} difference on inclination has caused a variation in recovery as great as 90%.

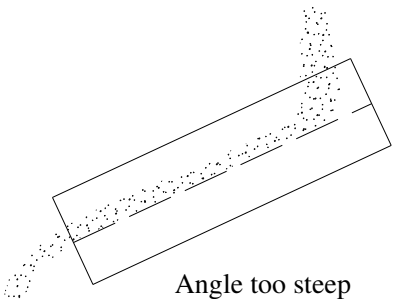
The deck construction or screen body is held in position by springs at each of the four corners of the machine. These springs should be vertical during operation. Consult the factory for more than minor changes in the inclination.



Angle too slight



Proper angle

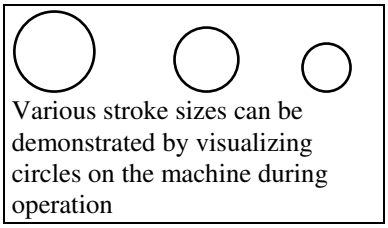


Angle too steep

STROKE

The LINEAR series of screeners vibrates in a linear pattern. The length of this line is called the stroke. The stroke can be measured in one of two ways. First, a dot can be placed on the side of the machine and the length of the line the dot makes when the machine is in operation is the stroke. Second, a stroke gauge can be used to determine the stroke.

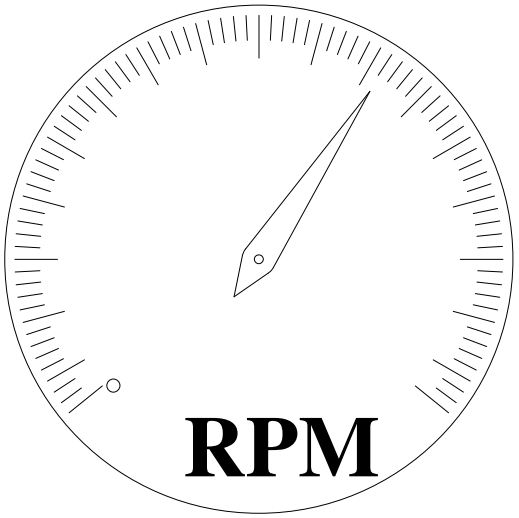
A small stroke gauge is made up of a number of circles with specific diameters. One of those diameters must correspond to the stroke of the machine. The diameter of the circles corresponds to the number below the circle. When this gauge is placed on the side of a machine the circles will blur. There will be one blurred circle where the two extreme circles come together in the middle at one point. The diameter of that circle will be the stroke.



Various stroke sizes can be demonstrated by visualizing circles on the machine during operation

The stroke of the LINEAR series of screeners can be changed by adding or removing counter weight that is laminated on the shafts. It is imperative that the two shafts must have the same amount of counter weight. NOTE: Changes in the counter weight will cause changes in the stroke; this **stroke change requires a speed change**. Please refer to the section on speed for proper speed selection. Consult the factory for any dramatic changes in the operation of the equipment. Improper changes to the stroke and speed could result in severe damage to the machine.

SPEED



The speed plays an important part in screen operation within certain ranges. Discretion must be used in the selection of the speed-stroke combination. The tests carried out by independent organizations indicate that in general, speeds in excess of 1600 RPM have little effect on the efficiency or capacity of the screen.

SMICO screens operate at speeds from 800 - 1500 RPM, and they normally operate with strokes from 1/8" - 1/4". The speed is inversely related to the stroke for energy limits. For example:

1/8" stroke	1300 - 1600 RPM
3/16" stroke	1200 - 1300 RPM
1/4" stroke	1000 - 1200 RPM
3/8" stroke	800 - 1000 RPM

These machines should not be operated outside these limits. If the speed is too slow the machine will not operate at maximum capacity; yet if the speed is too great the bearings will become overloaded, which results in premature bearing failure.

Generally a stroke of 3/16 and a speed of 1250 RPM is efficient in screening most materials. In other cases a slower speed with larger stroke works well for larger size material, and faster speed with smaller stroke works well for smaller material.

Speed on a SMICO screen may be controlled in either of two ways. First, the speed can be controlled by using a variable speed motor or motor controller. Second, the speed can be changed by sheave selection. Single speed v-type sheaves are standard on SMICO screens. These sheaves are sized to give the speed our tests and experience indicates most desirable for the job.

SCREEN CLOTH SELECTION

Screen cloth selection is very important in order to obtain proper results, to eliminate screening problems, and to avoid costly maintenance and replacement. Screen cloth should be selected by considering three aspects.

FIRST:

The first aspect is maximum open area. When the open area is maximized, the capacity and efficiency of the screen are at their peak; however, the screen life is greatly reduced, and frequent replacement will be required. The open area of a screen cloth can be increased by decreasing the wire size used in making the screen cloth.

SECOND:

The second aspect is maximum screen life. When screen life is at its maximum, the life of the screen is increased causing less frequent screen replacement, and fewer down times; however, when screen life is high the capacity of the screen is low. Increasing the wire size used in making the screen cloth can increase the life of a screen cloth.

THIRD:

The third aspect is corrosion resistance. With a high corrosion resistant screen the screen will hold up longer from chemical materials such as water or acid; Yet, a screen with a high corrosion resistance is costly, and may be hard to locate, and have a long delivery schedules.

The hooks on the outside edges of the screen cloth should vary depending upon the wire diameter of the screen cloth. For lighter than 16 GA cloth the hooks need to be double bent sheet metal shrouds, to prevent the screen cloth from pulling loose when the screen cloth is tightened. Screen cloths from 16 GA to 8 GA wires need only a single fold sheet metal shroud. Wires heavier than 8 GA are strong enough to allow tensioning without any shroud.

In addition to this, specialty screens can be furnished for your particular needs. Some of these types of screens are perforated plate, slotted screens, music wire screens, flat top screens, synthetic screens, and many others. If you need further information on screen cloth selection consult the factory.

SCREEN CLOTH REMOVAL

1. Remove feed inlet and discharge end plates.

2. Loosen the tension bolts on each side. These are the bolts holding the tension rail that stretches the screen cloth. The nuts should be backed off sufficiently to allow easy sliding of screen hooks along the tension rail. (Be sure that ALL tension bolts have been loosened.)

3. Stand at the end of the machine and slide the screen out, pulling it squarely toward you. Care should be exercised that when the screen is almost all the way out, that it is held level until it's completely out. On heavy-gauge cloth, two persons may be required.

SCREEN CLOTH INSTALLATION

1. The inside of the screen body should be thoroughly washed or wiped clean. Be sure that all surfaces are free from debris and that there are no cuttings or other foreign material caught beneath the screen when it is installed.

2. Make sure tension rails are pulled out as far as the slack in the tension bolts will allow.

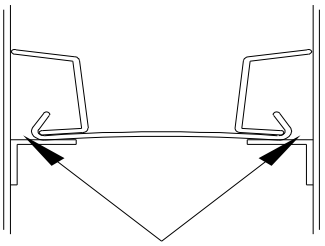
3. Now insert the new screen cloth. Start one side of the screen hook strips under the tensioning rail and slip it in slightly. Start the opposite side in the same manner and with the screen square; push it into the screener.

4. The screen is in place when the hook strips on the screen are flush with each end of the screener.

5. Hand tighten the four corner tensioning nuts so that there is an equal amount of space between the hook strips and the wall of the screener on all four corners.

6. Tighten the remaining nuts hand tight.

7. Starting with the nuts in the CENTER of the tension rail and working out to the ends, slightly tighten two bolts on one side; then move to corresponding two bolts on opposite side and tighten in equal proportions. Repeat process moving from the center to the ends until screen feels tight and even.



These distances must be equal

8. Check the cloth tightness by feeling of the cloth for loose spots. The screen cloth must be drum head tight. Life of the screen cloth and efficiency of separation depend on there being no loose areas in the cloth. Any loose spots must be removed by tightening the tension bolts in the vicinity of the loose spot. If this does not correct the problem consult the factory.

9. For lighter wire screen cloth, fold down the two ends of the screen. DO NOT CREASE. Fold the two corners of one end and bend the cloth at the corners sharply down against the end of the screener frame. Work from either side toward the center and pull the cloth as tight as possible to further tighten at ends.

10. Replace the end plates and the unit is ready for operation. Run the screener for about 30-40 minutes. Then stop the machine and re-tighten the tension bolts. This is important since the weave of the screen will allow it to take a certain set during the first few minutes of operation and will allow slack to develop in the screen.

11. Again, re-tension after running 24 hours, as this will give greatly improved screen life.

PRETENSIONED DECK (Optional)

The SMICO pretensioned deck allows the operator to remove the screen and deck as a unit. If your machine was purchased with this option, you will find installing and removal of your screen for cleaning or exchange to be a great time saver.

PRETENSIONED DECK SCREEN REMOVAL

1. Remove the feed inlet and/or discharge end plates.

2. Locate the Cam Lock assemblies on the sidesheets. These assemblies hold the pretensioned deck in place under the deck rails.

3. Loosen the Cam Lock, locking nut with the Cam Lock tool. Starting from the ends & working inward, loosen the Cam Locks by turning the Cam Lock shaft ½ turn with the Cam Lock tool.

4. The pretensioned deck can now be removed by sliding the deck out of the end of the machine.

PRETENSIONED DECK AND SCREEN INSTALLATION

1. The inside of the screen body should be thoroughly cleaned. Be sure pretensioned deck area surfaces are free from debris.

2. Verify Cam Locks are rotated to their lowest position. Insert the pretension deck between the Cam Locks and deck rails.

3. Starting from the center and working out, rotate the Cam Locks ½ turn to their closed position using the cam lock tool.

4. Check to verify the pretensioned deck is securely held against the deck rails and all Cam Locks are closed.

5. Using the lock nut end of the Cam Lock tool tighten each Cam Lock nut.

6. Replace the end plates and the unit is ready for operation. Run the screener for about 30-40 minutes. Then stop the machine and check that each Cam Lock is closed.

BOLTS

All bolts on the screener are secured with lock washers or some other type of locking mechanism. After the machine has been in operation for two weeks it is wise to re-tighten the bolts to assure they are tight. Loose bolts break.

LUBRICATION-SCHEDULE

LINEAR 410 Series Drive:

A lubrication schedule for all bearings should be determined and maintained. It is necessary to provide adequate lubricant to the bearings to keep the contacting surfaces properly coated. Too little lubrication or too much lubrication can result in premature failure of the bearings. McGill bearings have been designed with internal grease paths to allow for injection of new lubricant, and for excess lubrication to be able to leave the housing. Due to the wide number of variables, the manufacturer does not provide a precise recommended lubrication schedule, but some guidelines are available to help determine one.

A lubrication schedule for bearings is generally determined from bearing operating temperature, and then from experience. Bearing operating temperature is dependent on several factors such as ambient temperature, bearing load, and bearing speed. Bearing operating temperatures below 180 degrees F indicate a lubrication schedule of about one ounce every month. Bearing operating temperatures above 180 degrees F indicate lubrication of about one ounce every week. NOTE: Adding larger quantities of grease at a time may have adverse effects on bearing operation and life. Once the bearing has been lubricated, and after the added lubricant has been run-in, the bearing should be observed and it's operating temperature should be noted.

The recommendation for bearing lubricant is Lithium based grease, Penetration class 2, with high additives and corrosion inhibitors. This Lithium based EP-2 grease should not be blended with any other type of grease. Blending of lubricants of different alkylester bases may result in deterioration of lubricity and premature bearing failure.

BEARING REMOVAL 410 SERIES

1. Disconnect the power to the motor. Tag out or lock out the motor while servicing.

2. Remove the belt guard and belt.

3. Remove the drive sheave and bushing from the shaft

4. Remove the drive cover (not shown in schematic)

5. Remove bearing housing cover (item 4)

6. Unbolt the bearing housing (item 2) from drive weldment (item 1). Support the drive shaft (item 5) with wooden blocks and from the inside of the drive unit, tap on inner race of bearing with a brass drift, working your way around entire bearing journal of shaft until bearing and housing are removed from shaft. (If you notice that the bearing is moving inside of its housing, it will be necessary to tap the inner race of bearing and bearing housing edge alternately.)

7. The bearing can now be removed from the bearing housing. This can be done either by using a drift to tap the bearing out of the housing, or by means of a press with insert corresponding to the outer race of the bearing.

BEARING INSTALLATION

1. When purchasing a bearing please make sure the number of the bearing you are replacing matches the number of the bearing you purchased to replace it.

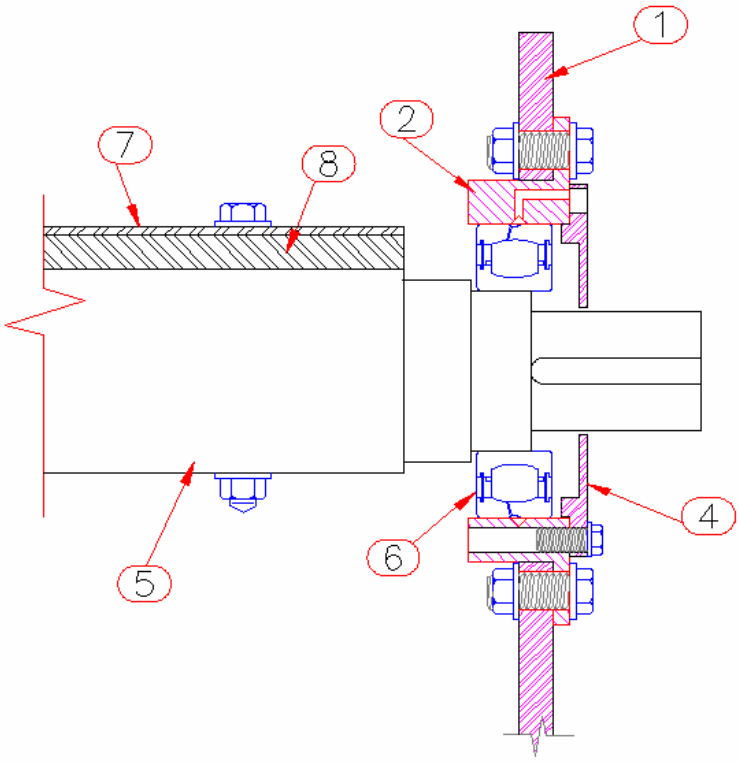
2. Install bearing into the housing as it was removed, pressing or tapping bearing towithin 3/16" of the inner or outer surface of the bearing housing. (Inner surface for the blindside; outer surface for the drive side.)

3. Slide bearing and housing up to the bearing journal on the drive shaft. Tap inner race of bearing to start bearing onto drive shaft. Continue tapping until bearing housing has entered the drive weldment and seated flushly against it. (Should be a semi-slip fit.)

4. Rotate bearing housing to position bolt holes and grease zerk to original location, and rebolt (preferable using new bolts and nuts, since factory has installed originals to 80-100ft/lbs of torque.) Remove wooden blocks holding shaft up.

5. Reattach drive cover, belt guard, sheaves, bushings, and the belt.

410 SERIES



ITEM	QTY	DESCRIPTION	DRAWING#	PART#
1	1	Drive Weldment	As Required	
2	4	Bearing Housing	22794	410-303-002
3	2	Blind Seal Retainer	22490-2	410-314-002
4	2	Seal Retainer	22490-1	410-314-001
5	2	Drive Shaft	As Required	
6	4	McGill Bearing	SB-22212	304-021
7	2	Small Counterweight	As Required	
8	2	Large Counterweight	As Required	
Not Shown	2	Motor Sheave(STD)	1A3.4	360-038
Not Shown	2	Drive Sheave(STD)	1A4.6	360-050
Not Shown	2	Motor Bushing(STD)	SH 5/8	343-063
Not Shown	2	Drive Bushing(STD)	SDS 1 ¾	341-175

LUBRICATION SCHEDULE

LINEAR 430, 450, 460 Series Drives:

The LINEAR series of screeners is a grease lubricated drive. The recommended grease is a lithium based grease, penetration class 2, with high additives and corrosion inhibitors. This lithium based EP 2 grease should not be blended with any other type of grease. The blending of greases of different saponification bases is likely to result in a marked deterioration of lubricity and possible premature bearing failure.

The bearings of vibrating screens need to be relubricated every 50 hours of operation for normal duty operations. For higher temperature applications more frequent greasing is required. If the screener is in a hostile environment, the bearings will require more frequent relubrication.

The amount of grease required at each relubrication differs for each drive.

The 430, 450, 460 series drives require approximately 2 oz. of grease per bearing.

The lubrication of a machine will directly affect the life of the bearing. Greasing too frequently will not harm the bearing; however, adding large quantities of grease at a time may have adverse effects.

BEARING REMOVAL

430 Series and 450 Series

1. Disconnect the power to the drive motors

2. remove the belt guard on the side of the drive where the bearing to be replaced is located.

3. Remove the belt and all sheaves and bushings from the motor and the drive shafts.

4. remove the belt guard mounting brackets.

5. remove the drive housing cover door. This is the flat sheet metal that is bolted across the width of the drive.

6. Block the shaft securely into place.

7. Unbolt the inner seal housing (2) from the bearing housing (1)

8. Remove outer seal housing (3) or blind cover (13) whichever applies to the bearing in question.

9. remove the housing bolt assemblies (10).

10. Install three 1/2-13nc bolts into the tapped holes in the outer ring of the bearing housing (1).

11. Tighten these bolts evenly to remove the bearing housing (1) from the drive head weldment (14).

12. Once the bearing housing (1) is free from the drive head weldment (14), remove the bearing housing and the bearing from the shaft (4).

13. Use a press to remove the old bearing from the bearing housing.

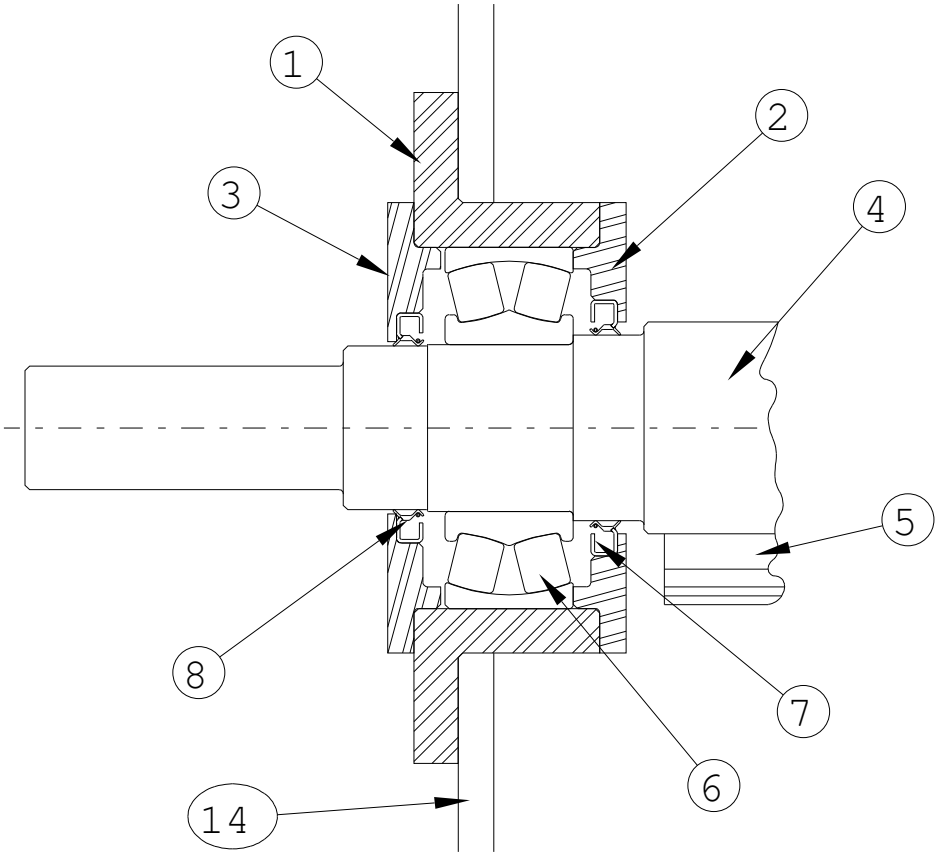
NOTE: remove all old grease from any parts that are to be reused.

BEARING INSTALLATION

1. Bolt Inner seal housing (2) to inside of bearing housing (1).

2. Using a press, press bearing into housing until the bearing seats against the inner seal housing.

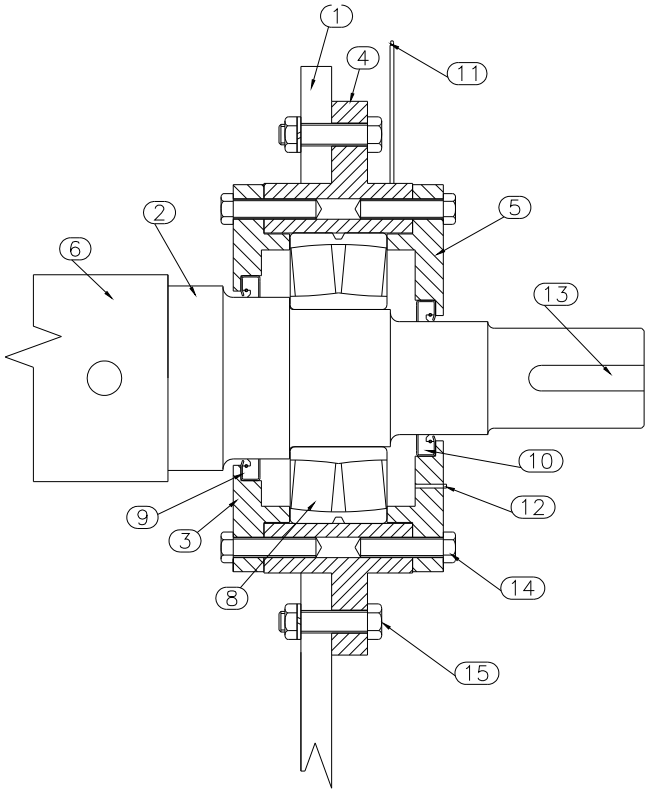
3. Reassemble the drive in the reverse order of the removal process.



PARTS LIST

ITEM	QTY	DESCRIPTION	PART NUMBER
1	4	BEARING HOUSING	16309
2	4	INNER SEAL HOUSING	19182-1
3	2	OUTER SEAL HOUSING	19182-3
4	2	SHAFT	19181
5	2 SETS	COUNTER WEIGHT	19188
6	4	BEARING	22312
7	4	INNER SEAL	413246
8	2	OUTER SEAL	411394
9	4	GREASE RELIEF	317400
10	24	HOUSING BOLT ASSEMBLY	1/2-13NC
11	48	SEAL HOUSING BOLT ASSEMBLY	3/8-16NC
12	4	GREASE ZERK (NOT SHOWN)	A-2769
13	2	BLIND COVER (NOT SHOWN)	19182-2

450 Series



ITEM	QTY	DESCRIPTION	DWG#	PART#
1	1	DRIVE PLATE	25219	REF
2	1	DRIVE SHAFT	25221	REF
3	2	INNER SEAL HOUSING	19715	530-314-001
4	2	BEARING HOUSING	19714	530-303-002
5	2	OUTER SEAL RETAINER	23636	530-314-002
6	4	COUNTERWEIGHT	25224	REF
7	2	COVERS, DRIVE, NOT SHOWN	25240	530-309-001/002
8	2	BEARING, 22317 EASK.MA.C4.F80	22317	304-090
9	2	INNER SEAL	415034	314-163
10	2	OUTER SEAL	416282	314-210
11	2	GREASE ZERK	1610 BL	REF
12	2	RELIEF FITTING, 1#	REF	REF
13	2	KEY	REF	REF
14	24	½-13 X 2 ½ HEX HEAD BOLT	REF	REF
15	12	½-13 X 3 HEX HEAD BOLT	REF	REF

BEARING REMOVAL 460 SERIES

1. Disconnect the power to the drive motors

2. Remove the belt guard on the side of the drive where the bearing to be replaced is located.

3. Remove the belt and all sheaves and bushings from the motor and the drive shaft.

4. Remove the belt guard mounting brackets.

5. Remove the drive housing covers. These are the flat and rolled sheet metal that is bolted across the width of the drive.

6. Block the shaft securely into place.

7. Unbolt the labyrinth seal inner from the bearing housing that is to be removed.

8. If the drive side is to be removed, straighten the tab on the lock washer, and remove the locknut and lock washer.
Remove the two outer labyrinth seals. Inspect and replace if necessary item 21.

9. If the blind side is to be removed simply remove the outer bearing cap.

10. Unbolt the bearing housing from the drive side sheets, and remove. The bearing is a slip fit on the shaft and pressed into the bearing housing.

11. Using a suitable press and fixture, press the bearing out of the bearing housing using pressure on the outer race of the bearing.

12. Clean all parts that are to be reused.

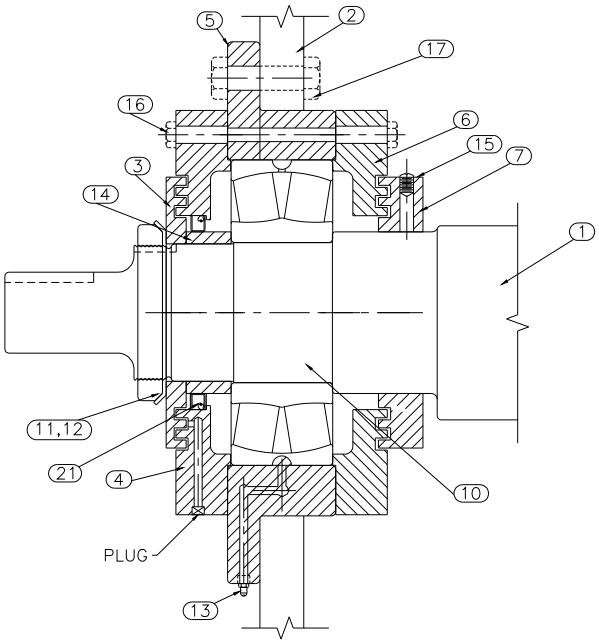
BEARING INSTALLATION

1. Bolt the outside labyrinth seal to the outside of the bearing housing.

2. Using a suitable press, press the bearing, using pressure on the outer race, into the bearing housing until against the outside labyrinth seal.

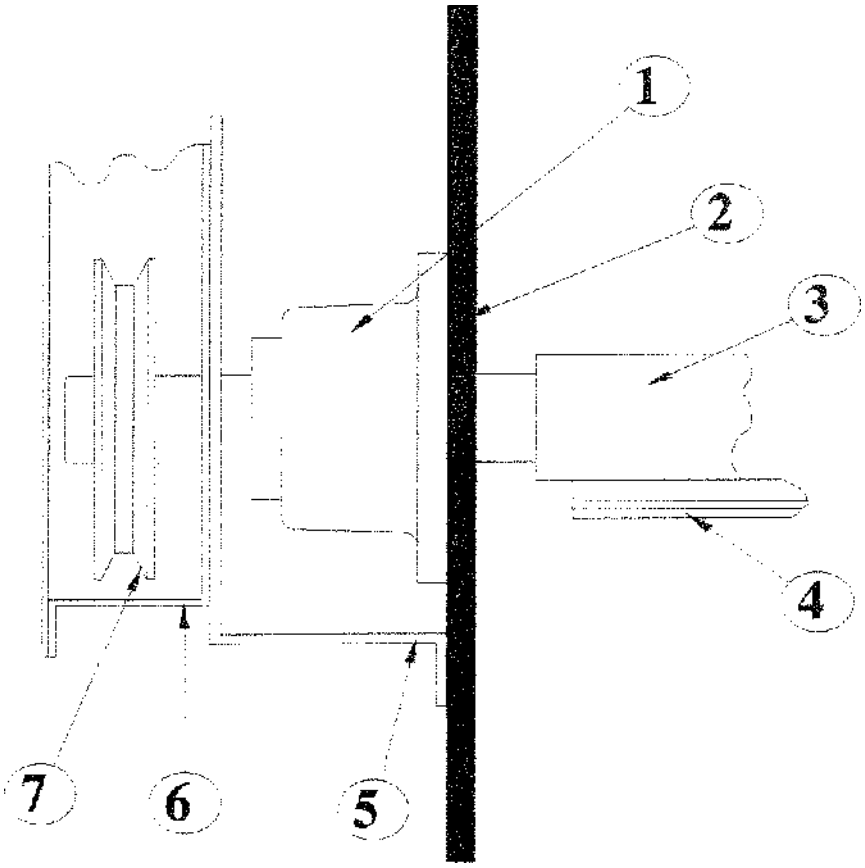
3. The rest of assembly is in reverse order of disassembly.

460 SERIES



ITEM	QTY	DESCRIPTION	DWG #	PART NUMBER
1	2	Drive Shaft, 5’ and 6”	18878	460-301-500/600
2	1	Drive Weldment, 5’ and 6”	20483	460-302-500/600
3	2	Labyrinth Seal, Outside Driv	18883	460-314-001
4	2	Labyrinth Seal, Outside	18880	460-314-002
5	4	Bearing Housing	18879	460-303-002
6	4	Labyrinth Seal, Inner	18881	460-314-003
7	4	Labyrinth Seal, Inner Drive	18882	460-314-004
8	2	Bearing Cap, Blind, (not shown)	18884	460-314-005
9	16	½-13 x 2 ½ Hex Head Bolt		Not shown
10	4	Bearing, 22322 E1A-MA-241A	22322	304-110
11	2	Lock Washer	W -21	318-221
12	2	Lock Nut	AN-21	318-121
13	8	Grease Zerk	1610 BL	
14	2	Labyrinth Seal Spacer, Outside	26376	460-314-007
15	4	½-13 Set Screw		
16	48	½-13 x 3 Hex Head Bolt		
17	48	¾-16 x 4 Hex Head Bolt		
18	96	¾ Hardened Flat Washer		Not Shown
19	48	¾-16 Nylock		Not Shown
20	2	Counterweight	18888	Not Shown
21	2	Seal	415725	314-180

S-2000 LINEAR DRIVE



Drive PARTS LIST

Item	Qty	Description	Part No.
1	4	BEARINGS	S2000-1.75
2	1	DRIVE WELDMENT	20982
3	2	SHAFT	19058
4	2	COUNTERWEIGHTS	
5	1	BELT GUARD MTG BRACKET	21229
6a	1	LONG BELT GUARD	20419
6b	1	SHORT BELT GUARD	20418
7	2	DRIVE SHEAVE	

This Wiring Diagram is **one** way to start/stop two motors at the same time.
Consult **your** local codes and professionals to select the correct method for **your** facility.