

# B. W. SINCLAIR, INC.

BULK MATERIAL HANDLING

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## LIVE BIN BOTTOM INSTALLATION AND MAINTENANCE

### *SAFETY*

**WARNING! DO NOT OPERATE THIS EQUIPMENT WITHOUT ALL SAFETY GUARDS AND PROTECTIVE DEVICES IN PLACE. LOCK OUT POWER PRIOR TO ANY MAINTENANCE.**

### *OPERATION THEORY*

A SINCLAIR Live Bin Bottom (LBB) will normally consist of multiple feeder screws operating within a common housing and powered by single or multiple drive systems. The drives can be either fixed or variable speed. As the drive transmits power, the screws turn in sequence and material in the hopper is discharged. The multiple screws provide a “live” bottom of product so that sluggish materials will discharge evenly without bridging or locking up. The variable pitch screw design likewise insures even bin unloading so that hopper sidewalls are not overstressed.

### *RECEIVING AND HANDLING*

Check all parts and assemblies with the shipping papers and inspect for any shipping damage. *If any components are found to be damaged or missing, claims should be filed immediately with the carrier.* Carefully remove the equipment from the truck or trailer, using the lifting lugs if such were provided with the equipment. In the absence of such lugs, use proper rigging procedures and equipment to insure that no damage is done to the equipment. **ALWAYS USE SAFE HANDLING METHODS.**

### *INSTALLATION*

A SINCLAIR LBB is usually shipped completely assembled or in sections that can be conveniently loaded on a truck. If the latter is the case, the attaching sections will be matchmarked for easy re-assembly. This can be confirmed in the arrangement drawings supplied. Complete assembly can be achieved by bolting the housings, screws and covers in place with the factory-supplied fasteners.

In field erection, the mounting surfaces for supporting the LBB must be level and true so that there is no distortion transmitted to the assembly. Shims and grout should be used as required. Anchor bolts that are out of line should be moved.

Do not force alignment of components and sub-assemblies. Any misalignment of components may cause operational problems, so the cause of the misalignment **MUST** be found and corrected. Tighten all fasteners when the structures are properly aligned.

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## *INITIAL OPERATION*

Before start-up of the LBB, make sure that system is empty of product and free of obstructions and debris. Lubricate all drives and bearings per service instructions found elsewhere in this manual.

Check screw rotation after electrical connections have been made but **BEFORE** any material is fed to the system. Incorrect screw rotation can cause serious damage to the system and to related equipment. If required, re-connect motor leads to change the direction of rotation and achieve proper material flow.

Operate the LBB empty for several hours as a break-in period. Observe for any problems such as unusual noises or vibrations, apparent misalignments or bearing temperature rise. Check for proper initial lubrication of all components. Correct problems before the LBB is put under load.

## *OIL GUARDS*

SINCLAIR drive and cross-drive gears often operate within enclosed Oil Bath guards. The guards will NOT be filled with oil from the factory.

**Start-up:** Add **90-weight Gear Oil** (brand per your preference) to the proper level on the sight glass BEFORE the equipment is started up. If the guard construction does not include a sight glass, fill so that the working components receive a constant “bath” of lubricant. **DO NOT OVERFILL.** To prevent leakage, do not fill up to the lowest seal levels.

**Service:** As required by your preventive Maintenance program, drain used lubricant into a proper receptacle through the drain plug. Carefully inspect oil for debris and foreign contaminants. Make any guard or service modifications to prevent entry of foreign material. Re-fill with fresh lubricant.

**NOTE:** SINCLAIR LBB systems normally operate at slow speeds, and a small amount of gear lubricant is sufficient for long service life as long as the components are otherwise properly maintained, aligned and operated.

## *ELECTRICAL SCHEMATICS AND WIRING DIAGRAMS*

Some SINCLAIR LBB systems will be fitted with Start-Stop Stations, Remote Operator’s Panels, Junction Boxes and pre-assembled conduit runs. If your unit is so equipped, wiring diagrams and connection schematics will be enclosed in the individual Junction Boxes and Control Enclosures. Copies of these documents can be found elsewhere in this manual for permanent storage and review.

## *SCREW REPLACEMENT*

**LOCK OUT POWER before starting any maintenance work:**

1. Empty Load Hopper of product.
2. Open or remove any top covers.
3. Remove discharge end plate with bearing pedestal mounts, disconnecting any instrumentation and conduit as required.

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4. Remove discharge end coupling bolts and pull shafts from screws. Inspect and replace worn or damaged bolts and shafts.
5. Remove drive end coupling bolts. Inspect and replace as required.
6. Pull screw from drive end shaft, through bin bottom and out opposite end.
7. Install new screw.
8. Re-assemble by repeating above steps in reverse.
9. Do not tighten end plate bolts until screw alignment and screw-to-trough clearance are confirmed.
10. Tighten all fasteners.
11. “Jog” conveyor drive to assure proper operation.
12. Re-install all safety devices and covers.

### ***SEAL MAINTENANCE***

SINCLAIR LBB systems will be fitted with some type of shaft seal assembly, chosen to provide the best protection for the specific application. Routine maintenance of these seals will be required to service and replace the seal elements and packing materials. This work should be performed only after power is **LOCKED OUT**.

**Waste Pack:** Remove and discard the old shredded packing material, clean the inside of the seal and repack with fresh material. Some of these materials will trap fine abrasive materials more efficiently if treated with a small amount of oil after installation.

**Packing Gland:** Remove the compression nuts from the bolts and pull the Inner Compression Ring away from the seal plate. Use a sharp hook-tip tool to “fish” the old rings of braided packing out of the seal cavity. Cut new braided packing to the proper length by using the old pieces as templates. Re-install the new packing, making sure that the packing ring splices are “staggered” around the shaft. Re-install the Inner Compression Ring and the compression nuts and tighten as required to assure good contact between the compressed packing and the rotating shaft.

### ***BEARING REPLACEMENT AND ALIGNMENT***

In the event of bearing failure at the drive end of the LBB, the following steps will be required for replacement:

1. Drain oil from drive chain guard and remove guard if it interferes with bearing(s) to be replaced.
2. Disconnect drive chain and remove.
3. Remove driven sprocket from Primary Drive Shaft
4. Remove mounting bolts from bearing bases.
5. Loosen bearing set screw collars (if so equipped)
6. Remove bearing shim pack, carefully marking each pack for re-assembly.
7. Draw bearing from end of shaft.
8. Repeat steps in reverse to install new bearings.
9. The Cross-Drive Spur Pinions will interfere with the removal and replacement of bearings inboard of that assembly. To service these bearings additional disassembly will include draining and removing the Cross-Drive Oil Guard, removal of the drive end coupling bolts and complete removal of the shaft(s) from the screw pipes. This will free the area for bearing replacement.
10. If the relative position of the Cross-Drive Spur Pinions is changed **IN ANY WAY**, re-alignment of the entire Cross-Drive assembly will be required before re-starting.

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### ***SPUR GEAR ALIGNMENT AND REPLACEMENT***

In the event of spur pinion failure or misalignment, the following procedures should be followed. **LOCK OUT POWER BEFORE ANY MAINTENANCE.**

1. Remove the spur pinion from the shaft. With some high-torque LBB systems, these pinions will be installed with a “shrink fit” and disassembly can only be accomplished by the application of both heat and leverage. **MAKE SURE THAT THE SERVICE PERSONNEL ATTEMPTING THIS PROCEDURE ARE TRAINED AND KNOWLEDGEABLE, AS ANY DAMAGE DONE TO THE ASSEMBLY OR THE TEMPER OF THE GEARS WILL BE THE RESPONSIBILITY OF THE OWNER.**
2. Re-install a new pinion as required, insuring the correct position on the shaft length.
3. Position the pinion in relation to the one(s) on either side.
4. Consult the Engineering Drawing of the unit to confirm the correct center-to-center distance of the shafts and pinions.
5. Re-align the pinions and shafts carefully and slowly. **THE CORRECT ALIGNMENT WILL OCCUR WHEN THE SHAFTS ARE PERFECTLY PARALLEL WHILE THE CENTER DISTANCES ARE EXACT.**
6. Re-install all safety guards and lubricants as required.
7. Jog the system without material load to confirm alignment. Re-torque all bolts.
8. Run the system empty for several hours to insure alignment and lubrication, correcting as required.

### ***TROUBLESHOOTING***

**EXCESSIVE NOISE OR VIBRATION: Possible Causes** a. Improper alignment of rotating components. b. Debris or obstruction in feed hopper. c. Blockage of downstream equipment. d. Incorrect drive chain tension. **What to do:** a. Locate and correct misaligned components. b. Remove obstruction. c. Clear blockage. d. Inspect and re-tension drive chain.

**MATERIAL DOES NOT FLOW TO BIN BOTTOM SCREWS: Possible Causes** a. Handling characteristics of design material have changed. b. Material “bridges” above screws. c. Obstruction in hopper. **What to do:** a. Research source of material and correct raw material problems. b. Install flow-aid devices on hopper sidewalls or re-design feed hopper. c. Remove obstruction.

**MATERIAL DOES NOT DISCHARGE FROM LBB: Possible Causes** a. All screws not turning. b. One or more screws not turning. c. Material “logging” on rotating screws. d. Obstruction in discharge spout or downstream equipment. **What to do:** a. Confirm incoming power; confirm position of Start-Stop or HOA switch; confirm operation of motor starter; confirm primary drive shaft rotation. b. Check integrity of coupling bolts; check screw failure; check spur pinion failure; check shaft failure. c. Remove hopper material load manually; prepare infeed material to combat “sticky” nature. d. Clear obstruction.