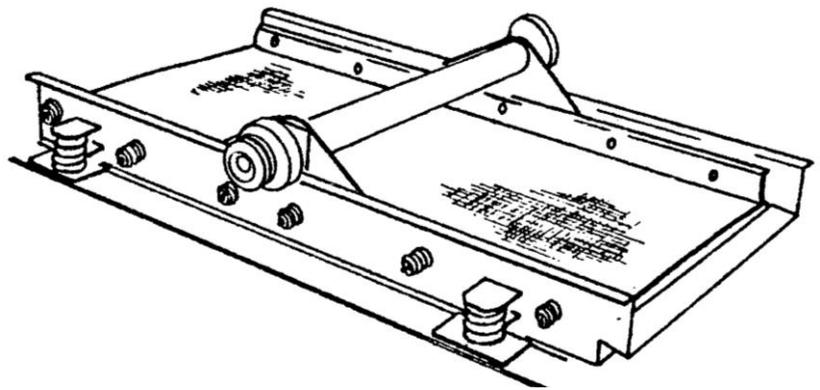


# Service Instructions

Link-Belt®  
Model 65 UP & NRM  
Vibrating Screens



# Link-Belt® Vibrating Screens

## Model: 65 UP & NRM

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### INTRODUCTION

Place these service instructions in the hands of the person responsible for installation operation and maintenance of the vibrating screen to assure maximum performance with minimum maintenance.

**WARNING:** Failure to follow these instructions may shorten the service life and performance of the equipment and may also result in serious personal injury or damage to equipment and property.

When this manual is furnished with near-standard and special screens, supplementary pages or drawings are often attached. Supplements take precedence over corresponding information printed in this manual. Modifications to these screens may offset their successful operation or destroy their carefully designed structure. No changes should be made without SYNTRON approval.

Extreme care in moving or unloading equipment is important. Do not lift unit by drive assembly. Steel cable slings should be placed around the entire screen box. Do not use chains or fiber ropes. The maximum weight of any UP/NRM complete assembly may exceed 2250 lbs. and adequate carrying and lifting equipment must be used.

Check for damage in shipment. If there is damage, contact the carrier at once; also consult SYNTRON.

## LONG TERM STORAGE

If the screen must be stored for an extended period, it is advisable to store it indoors. The V-belts and cable assembly must be protected from extreme heat, sunlight, oil, grease, or chemicals which deteriorate rubber compounds. If the screen is stored outdoors, remove motor and belts to an inside storage area. Place screen on sufficient cribbing to protect from water. Do not support the weight of the unit by the drive assembly.

\*Using the recommended lubricant, fill the cavities to capacity, this will prevent damage to the bearing and bearing adaptors caused by condensation.

Apply oil or rust preventive to hardware and completely cover the unit with a waterproof covering.

The vibrator shaft should be rotated for several turns, each week, to minimize corrosive effects of water and atmosphere on bearing parts.

## INSTALLATION PROCEDURES

Vibrating screens must be supported by rigid foundations of steel on concrete capable of withstanding vibrations. Each screen should be supported independently from other screens, from any machinery, and (if on the ground floor) from the building structure. Ideal supports consist essentially of a supporting column near each corner topped by supporting springs. These primary supports should be braced in fore and aft and side directions by a minimum quantity of secondary members.

Unless design and fabrication of the supporting structure is part of the order, SYNTRON only provides adaptive pads to seat the supporting springs and position the vibrating frame. Supports are of concern, since inadequate supports may adversely affect the motion and performance of the screen.

Some of the forces from the vibrating screen frame are transmitted through the springs into the supporting structure. Because these springs absorb vibrations efficiently, the actual forces transmitted are not greater than two times the dead weight of the vibrating screen. However, despite the low magnitude of these forces and despite damping, it is possible to excite harmonic or sympathetic vibrations of objectionable magnitude in supporting or adjacent structures.

**CAUTION:** SYNTRON cannot assume any responsibility for the supporting structures except when design and fabrication was specified on the formal order. In the supporting and adjacent structures, there is often some members in sympathetic vibration. To bring these members within tolerable motion, stress, and noise levels, it is sometimes difficult and it may be necessary to purchase special services to achieve a successful operation.

\*At initial start-up, the excessive amount of lubrication will cause the bearings to run hot, there will be some lubricant escaping from around the seals. This condition will last until the quantity of grease in the bearing cavity reaches an acceptable level, it will not cause damage to the unit. After this condition subsides do not refill the bearing cavity to capacity. The lubrication instructions must be strictly adhered to.

Structures should be designed so the natural frequencies will not be excited. To estimate the natural frequencies of structural steel members the following formula may be used:

Rectangular plate supported on all four sides:

$$F = 160 h \sqrt{\frac{L^2 + W^2}{L^2}}$$

Beams simply supported at the ends:

$$F = \frac{132}{L^2} \sqrt{I/A}$$

Where:  
 F = Nat Frequency in 1000 cycles per min.  
 h = Thickness of plate in inches  
 L = Length of steel beam or plate (feet)  
 W = Width of plate (feet)  
 A = Area of cross section of beam (inches)<sup>2</sup>  
 I = Moment of inertia of beam cross section (inches)<sup>4</sup>

The values of A and I for available shapes are given in structural steel handbooks. For primary members use maximum I values and orient the members relative to the exciting force of the rotating mechanism (the force in a vertical plane). For secondary members, struts, braces, etc., use the minimum I values given in the tables.

Structural Members	Maximum unsupported span of members in feet				
	4'	6'	8'	10'	12'
Primary	Angle 4 x 4 x 3/8	Angle 4 x 4 x 3/8	WF 6 x 4 x 12#	WF 8 x 8 x 31#	WF 12 x 8 x 43#
Secondary	Angle 2 1/2 x 2 1/2 x 1/4	Angle 4 x 4 x 3/8	WF 6 x 4 x 12#	WP 6 x 6 x 15.5#	WF 8 x 8 x 31#

Table 1 – GUIDE FOR STEEL SUPPORTS

Calculated natural frequencies of the primary members should be at least 2.5 times the operating speed. The similar ratio for secondary supports and floor panels should be between 1.5 and 1.8.

If weights such as pipes and gratings are rigidly attached to the support members then the natural frequency is lower. Consult standard text books for formulae.

Certain low frequency vibrations (beats) may be excited by several screens or other machinery at slightly different frequencies.

The sympathetic vibrations and beats can often be minimized by:

1. Stiffening supporting members
2. Installing fewer or softer support springs
3. Adding damping materials or devices
4. Changing screen speeds if performance permits

## SCREEN INSTALLATION

Because of the simplicity of design, few installation instructions are required. The following are recommendations that should be considered.

1. Disconnect power to electric motor and lock switch in open position. To check vibrator mechanism for freedom of movement, rotate by hand using the sheave.
2. When installing the screen, adjust the slide motor base to provide proper tensioning of V-belt to prevent slack for unrestricted motion of screen.

**WARNING:** Electric motor current should be grounded to foundation or building structure and not to the vibrating screen.

3. Before connecting electrical power, make certain that the power supply corresponds to the ratings specified on the name plate and the unit is properly grounded. The size of the conductor must be sufficient to carry the current and voltage as specified on the name plate.
4. Check high strength bolting of bearing cartridges and vibrator housing. See Table 3 for torques. Use a calibrated torque wrench in tightening bolts
5. Clear a 2' wide floor area or construct a solid 2' wide platform around the screen for easy access to all parts requiring attention. Install "kickplates" about 6" away from the screens on these walk areas.

**CAUTION:** Do not walk or lay tools on the screen cloth.

6. Allow sufficient space for changing screen cloth and for removal of vibrator for major servicing. Also allow room (3 1/2" vertically) for changing supporting springs.
7. There will be feed spouts, chutes, or flumes ahead of the vibrating screens, collecting hoppers and chutes to receive the products or rejects. Portions of these should be bolted so they can be removed to gain access to the screen for lifting.
8. Make sure that none of the above-mentioned stationary objects come in contact with the screen box in starting and stopping. Allow a minimum clearance of 1" horizontally and 2" vertically.
9. Operate screen empty at speed specified on name plate. If there is unusual noise or erratic motion, stop the screen and check seating springs, stiffness of supporting structure, tension of belts, etc. Do not operate screen without correcting any abnormal operating condition.
10. Consult SYNTRON if screen continues to operate in an abnormal or erratic manner.

**CAUTION:** Emergency controls for stopping the screen should be not more than 15' from screen location.

## OPERATION

All responsible personnel should know the location and operation of screen motor control devices.

**WARNING:** No person should stand, hold, or lean against the vibrating frames. Vibrations transmitted to the body can be harmful.

After approximately 8 hours of operation recheck all bolted connections per torque specifications shown on drawings and in this service instruction manual. No further attention should be required except for routine inspections.

## MAINTENANCE

Because of the motion of the vibrating screen it is impossible to service it while in motion except for bearings can be lubricated through previously installed flexible lines.

A regular schedule of complete dismantling, inspection and relubrication intervals assures maximum screen life and minimum down time. The customer should keep a complete record of all such preventive maintenance plus a record of any repairs. Since the Link-Belt UP-NRM screen is a vibratory machine, it is important to correct all minor troubles before serious damage develops. Replace faulty support springs and missing bolts at once. Cracks forming in the structure (usually at or near joints) and unusual noises and motion are signs of developing failure. Drill 1/4" holes through ends of such cracks. Consult SYNTRON at once in the event of such failures, particularly if they occur during the warranty period.

**WARNING:** If welding is needed do not ground the welder through the screen.

After 1500 to 2000 hours of operation, dismantle the vibrator mechanism and clean all parts. Flush bearings with a (200°) light transformer, or automotive flushing oil. Check screen cloth tensioning periodically.

On reassembly, pack the bearing with grease and also fill the adjacent cavity in the housing and retainer with grease only to the bottom of the shaft.

### Lubrication

A pressure type grease fitting is provided at the top face of the cartridges for individual lubrication of each bearing. Remove dust and grit from the fittings and from the gun before adding new grease.

Normal service requires approximately 1/2 oz. (.85 cu. In.) of grease at 30-hour intervals in each bearing. Surrounding conditions such as moisture, heat and abrasive dust necessitate more frequent lubrication. Excessive grease will cause overheating of the bearings; insufficient grease will not maintain a proper

lubrication film. Either of these conditions may lead to bearing failure. A temperature rise in the bearing housing up to 60° F. above ambient temperature is considered normal.

Use only a good grade of lubricant recommended or high speed roller bearings. Any of the greases in Table 2 or equivalents, may be used.

Manufacturer	Lubricant
Shell Oil Co.	Alvania EP-2
Texaco, Inc	Molytex EP-2 Multifak EP-2
Gulf Oil Co	Gulfcrown EP-1 Gulfcrown EP-2
Amoco	Amolith EP-1 Amolith EP-2
Sunoco	Prestige No. 812 EP-2
Chevron Oil Co.	Duraletth EP-2
Mobil	Mobilux EP-0 Mobilux EP-1 Mobilux EP-2

Table 2 – RECOMMENDED BEARING LUBRICANTS

The above greases are for use in ambient temperature range of 20° F. to 150° F. For bearing applications at extreme temperatures consult SYNTRON. Grease must be kept in a clean covered sealed container in a clean area.

#### Adjustments

Maintain proper V-belt tension by adjusting slide motor base. Tighten to prevent belt whip.

The intensity of vibration may be varied to suit conditions by changing the position of the adjustable counterweights. The position of the counterweights is indicated by the saw cuts in the counterweights in reference to the numbered decal located on the collar. Position 1 gives the maximum intensity of vibrations. Position 6 gives the minimum. It is important that both counterweights have the same setting. This is easily checked by the alignment of the saw cuts in the two counterweights when looking across the vibrator housing.

#### Vibrator Rotation

The direction of rotation is either with the flow of material or opposite to the flow of material (counterflow). Change from one to another by reversing the electrical leads to the motor. Rotation with the flow usually gives greater rate of material flow but with less efficiency.

Other factors such as screen incline and vibrator speed may be adjusted under some circumstances, with guidance of SYNTRON.

### Screen Cloth

Always tighten screen cloth before operating a new screen. Retighten after running 3 hours. Do not walk or lay tools on the screen cloth. Uniform tightness of screen cloth must be maintained for best cloth life and screening efficiency. Avoid whipping or secondary vibrations of the screen cloth. Make periodic checks and adjustments for proper tension. Rubber extrusions cushion the screen cloth from direct contact with the deck structure. Check extrusions periodically for proper mounting and condition; replace if damaged.

To install screen cloth, engage edge binders with lower flange of the tension plates. Then tighten the cloth uniformly by gradually tightening tension nuts alternately starting at center of each tension plate and working to the ends. The mounted cloth should be centered between side plates.

Model 65 UP-NRM screens are equipped with spring-loaded bolt assemblies for cloth tensioning. Spring loading maintains sufficient tension in the cloth without requiring frequent manual adjustment. Visual inspection is a sufficient check for correct functioning. Springs should be compressed so coils are touching. If space is visible between the center coils tighten again.

**CAUTION:** Cloth 60 mesh and finer should be tensioned with greater care. Uniform tension prevents whipping and supplements the use of springs in tensioning.

TRUBLE SHOOTING

Malfunction	Probable Cause	Corrective Action
Overheating of Vibrator	<p>Too little lubrication</p> <p>Too much lubricant</p> <p>High ambient temperature caused by handling hot material or surrounding condition</p>	<p>Check seals, etc. for leakage. Add lubricant</p> <p>Remove lubricant until proper amount is indicated. Check grease relief fitting</p> <p>Ventilate area or use high temperature lubricant. Consult SYNTRON</p>
Lubricant Leakage	High temperature causes grease to become fluid and leak through seals	Use high temperature grease. Consult SYNTRON
Gritty Bearing	<p>Entrance of grit while servicing or lubricating, or trough labyrinth seals during operation.</p> <p>Bearing failure cause by any of the above.</p>	<p>Flush bearing and cartridge. Relubricate; pack labyrinth seals with lubricating grease.</p> <p>Replace bearing, taking necessary precautionary steps to avoid recurrence of failure</p>
Noisy Bearing	Normal fatigue failure associated with vibrator service; identified by spalling of roller and inner race at the high load zone; sometimes cage failure	Replace bearings; see assembly instructions.
Erratic Vibration or Performance	<p>Slipping of V-belts</p> <p>Throwing of V-belts.</p>	<p>Replace worn belts or tighten belts by adjusting motor slide base</p> <p>Check belt tension and springing. Make sure counterweight settings are same on both sides. Belt drive should not be more than 30° from horizontal.</p>

## DISASSEMBLY OF VIBRATOR

WARNING: Disconnect power to electric motor and lock disconnect switch in open position.

1. Remove V-belt sheave (A) by first loosening its taper lock hub, and remove counterweights(B), by removing the clamp screws. Reuse the screws to open the slots in counterweights by tightening screws into tapped holes.
2. Remove collars (C,N) and retain-ers (D) with SpiraloX rings (F) in their grooves. Remove Car-tridge cap screws (R).
3. Remove retaining ring (W) from drive side only. By striking on one end of shaft (H) with a lead hammer it is now possible to start to drive out the cartridge (T) on the other side.
4. It should be easy to pry either or both cartridges loose from their bores in the housing ends . If difficulty is experienced a cartridge can be bumped from the inside by striking the shaft again at the other end. When one cartridge is removed the shaft can be slipped from the housing.
5. The bearing remaining in a cartridge can be removed by using long 3/8" NC cap screws in the tapped holes filled by the set screws (V).
6. Inspect condition of bearings, bores in cartridges, and Spirolox rings (F) in retainers and (U) in cartridges. Replace any damaged parts.

## REASSEMBLY OF VIBRATOR

WARNING: Disconnect power to electric motor and lock disconnect switch in open position.

1. Be sure housing, cartridges, bearings, shafts, etc., are clean. Flush bearings with (200° F) light transformer, spindle or automotive flushing oil; do not use kerosene or gasoline.
2. Complete a sub-assembly of the bearings (G), cartridges (T), Spirolox rings (U) and set screws (V). the set screws must be replaced in cartridges as in the original assembly if they have been removed to use longer cap screws in bearing removal.
3. Position and secure one cartridge-bearing sub-assembly in the housing end on the drive side. Slide the shaft through the vibrator housing from the other side and slip it through the bearing core. Take care not to damage Spirolox rings (U). Secure the shaft axially to the drive side bearing by forcing the retaining ring (W) into its groove in the shaft.
4. Slip the other cartridge bearing sub-assembly over the shaft on the side opposite drive. Push and tap it into position in the housing end, lifting on the shaft end to center all components properly. Secure cartridges with cap screws (R) and lockwashers (Q). See Table 3 for torques.

Cap Screw or Bolt Diameter	Torque, pound-feet high-strength bolting	
	Bolts	Cap Screws
Inches		
3/8	41	47
1/2	105	120
5/8	210	210

Example: 375 pound feet of torque = 100 pounds of force on 45-inch (3.75') lever.

Table 3 – TORQUES FOR HIGH-STRENGTH BOLTING

CAUTION: Always use H.S. bolts as replacements for original H.S.bolts.

5. Be sure the shaft and bearings turn freely. Pack both bearings with a recommended grease. See Table 2.
6. Slip Spirolox rings (F) into retainer grooves. Pack retainers (D) with grease to bottom of shaft. Slip over shaft ends, push into position, and fasten with cap screws (K) and lockwashers (M). See Table 3.
7. Place indexing collars (C) and (N) on shafts. The notched edge of these collars should face toward the shaft ends. Looking down on these collars, the numbers on the indexing bands will read counterclockwise on the drive side and clockwise on the opposite side. Secure set screw collars over key.
8. To mount counterweights (B) on the shaft use the clamp screws in tapped holes open slots. Be certain the projecting lugs of each counterweight engage with corresponding numbered notches in indexing collars (C) and (N) to produce equal unbalanced effects at the end of each shaft.
9. Remove clamp screw from tapped hole and insert into through hole in counterweight. Secure counterweights by tightening the clamp screws.
10. Mount V-belt sheave (A) and its Taper-Lock bushing onto shaft. Secure by tightening screws in Taper-Lock bushing.
11. Check bolts for fastening vibrator housing to box and tighten. See Table 3.

## PARTS LIST

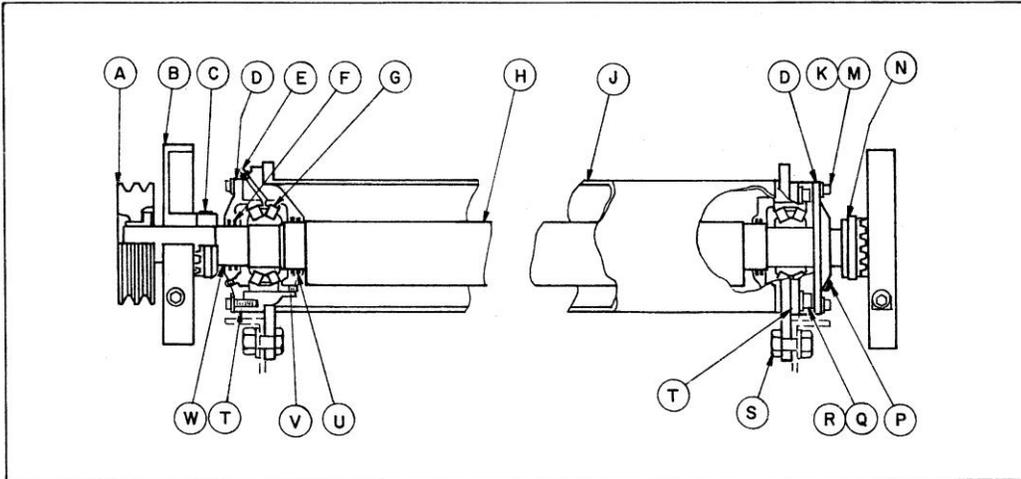
When ordering parts, consult the parts lists on pages 10 and 11. Order parts by name, locator symbol and quantity. Provide all the data from the screen nameplate.

Order all parts direct from SYNTRON. This is important. Bearings are not readily obtainable from local bearing sources because of special internal clearance requirements.

It is advisable to stock certain essential spare parts so break-downs can be repaired promptly and costly delays eliminated. See Table 4. Parts are listed in order of stocking importance.

Name of Part	Quantity for each screen
Bearing	2
Bearing cartridge	1
V-belts	1 set
Screen cloth	1 set
Tension bolt, nut washers and spring (one deck only)	1 set
Spirolox ring – retainer	4
Spirolox ring – cartridge	4
Support spring	2
Bearing retainer	2
Bearing retainer ring	1
Vibrator bolt and nut assembly	2

Table 4 – RECOMMENDED SPARE PARTS



Parts List – VIBRATOR ASSEMBLY MODEL 65, UP & NRM

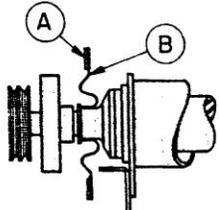
Symbol	Description	Quantity per Screen
A	* V-belt sheave	1
B	* Counterweight	2
C	Collar (drive end)	1
D	Retainer	2
E	Alemite fitting	2
F	Spirolox ring –retainer	4
G	Bearing	2
H	Vibrator shaft	1
J	Vibrator housing	1
K	Cap screw, 3/8" retainer	8
M	Lockwasher, 3/8" retainer	8
N	Collar (end opposite drive)	1
P	Grease relief fitting	2
Q	Lockwasher-cartridge	8
R	Cap screw-cartridge	8
S	Hex head H.S. bolt & nut assembly (vibrator to box)	10
T	Cartridge	2
U	Spirolox ring-cartridge	4
W	Retaining ring	1
V	Set screw	8

\* These items not included in vibrator assembly.

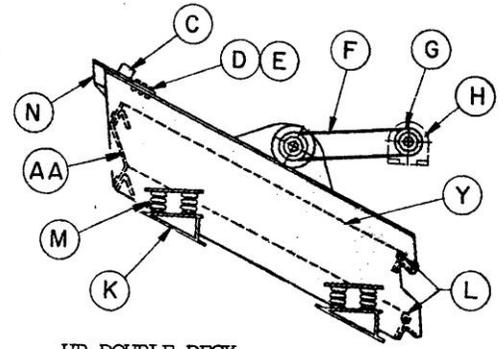
Parts List – VIBRATING SCREENS WITH HELICAL SPRING SUPPORTS

Symbol	Description	Quantity per screen	
		One deck UP or NRM	Two deck UP
A	Retaining ring for UP-E	2	2
B	Dust seal for UP-E	2	2
C	UP regulating gate assembly	1	1
D	Bolt, H.S.	7 or 8	6
E	Locknut (feed hopper)	7 or 8	6
F	V-belt	2	2
G	Motor sheave with bushing	1	1
H	Motor	1	1
K	Spring support assembly	4	4
L	Longitudinal and transverse rubber extrusion	Order by number of feet needed	
M	Spring	4 except 8 For 10-ft long	8 except for 4-ft long
N	UP feed hopper assembly	1	1
P	NRM back plate assembly	1	----
R	Screen cloth	1	2
S	Tension plate	2	4
T	Tension bolt	1 Set	2 Sets
U	Tension washer	1 Set	2 Sets
W	Tension spring	1 Set	2 Sets
X	Tension locknut	1 Set	2 Sets
Y	Screen box	1	1
AA	Back plate with bolts and locknuts	----	1

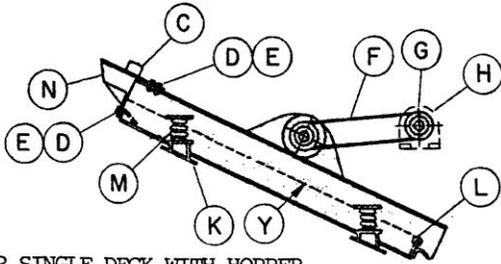
Note: For parts of vibrator assembly and bolts for fastening assembly to box, see list on page 10.



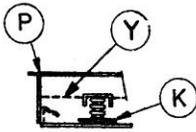
DETAIL FOR UP-E, ENCLOSED UNITS



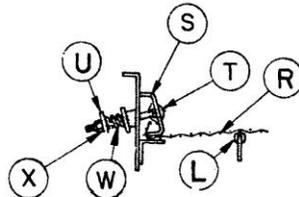
UP DOUBLE DECK



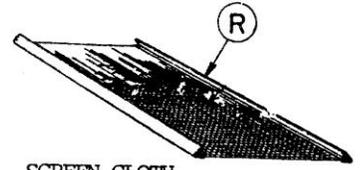
UP SINGLE DECK WITH HOPPER



NRM WITH BACKPLATE



CLOTH TENSIONING DETAIL



SCREEN CLOTH

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