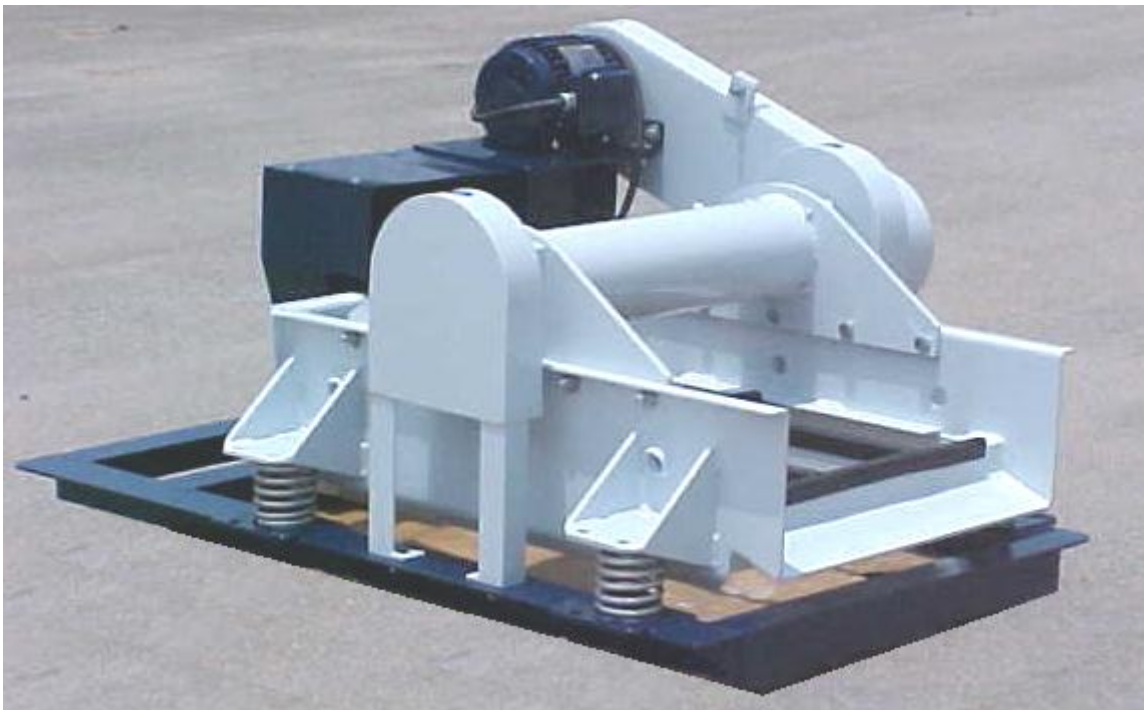


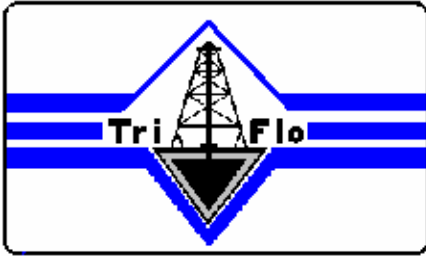
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SERVICE & OPERATING MANUAL

123 SHALE SHAKER



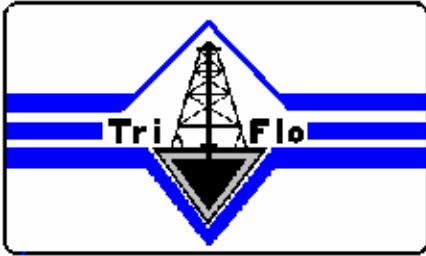


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TRI-FLO 123 SHALE SHAKER

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INTRODUCTION

GENERAL INFORMATION

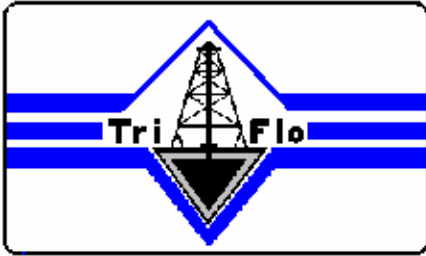
The TRI-FLO 123 SHALE SHAKER is a compact and reliable solids removal method. Most shakers are similar in design and application. TRI-FLO asserts that their high-speed shale shaker is that necessary first line of defense against large drilled solids reentering an active mud system. The TRI-FLO 123 SHALE SHAKER easily removes 74 micron, or larger size, particles for proper mud weight maintenance and efficient solids control. Balanced mud rheology leads to longer pump life, less daily fluid maintenance expense, improved desander and desilter efficiency, and better penetration rates.

TRI-FLO 123 SHALE SHAKER is mounted on a heavy-duty skid for added strength and stability. The screen box and deck are made of low alloy steel, reinforced with heavy pipe.

Vibrator amplitude may be changed to six different positions in 1/8" increments. The adjustment is made by changing the position of the unbalanced weights in relation to the eccentric shaft. IT IS IMPORTANT THAT BOTH WEIGHTS BE ON THE SAME SETTING. The vibrator assembly can be changed in the field quickly and simply.

The lower skid base contains the possum belly with the mud inlet at the bottom and the mud flume at the top.

Replacement screens are available from coarse 10-mesh variety to a 400 mesh fine screen and they are easily changed in the field.



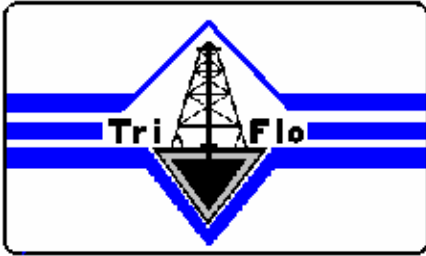
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OPERATION

The TRI-FLO 123 SHALE SHAKER is installed on the end of the mud tank and has a mud line attached to the possum belly from the rig. The drilling mud flows down the line into the possum belly, through the diverter vanes on the mud flume, onto the screens. After the mud passes through the screens it travels through the mud outlet located on the side, into the mud tank. The drill solids or cuttings remain on the screen and then fall off the back of the TRI-FLO 123 SHALE SHAKER.

The vibrator shaft is driven at 1750 RPM by a 2 HP explosion proof motor.



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INSTALLATION

LOCATION

The TRI-FLO 123 SHALE SHAKER should be mounted at the end of the tank. The TRI-FLO 123 SHALE SHAKER should be mounted with the inlet towards the flow line and the skid secured to the mud tank.

It is important that the TRI-FLO 123 SHALE SHAKER be mounted level. This will aid in an efficient operation.

After mounting remove the **four** shipping bolts. These bolts are located at each spring coil on the vibrating deck.

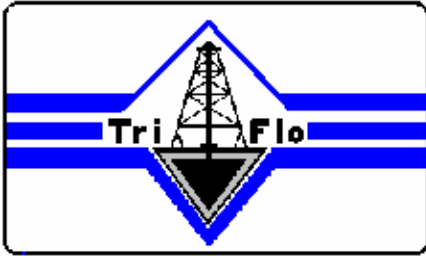
FLOWLINE

Connect a flow line between the return pump and the mud inlet of the TRI-FLO 123 SHALE SHAKER.

It is not recommended to run the flow line into the top of the possum belly, as it will reduce the volume of the mud the screens can handle.

SHALE SLIDE

If it is not desirable to permit the cuttings or solids to drop off the end of the screen, it will be necessary to construct a shale slide from the end of the TRI-FLO SHALE SHAKER to the shale pit. This slide should be as steep as possible. Water spray may be added to wash the cuttings into the shale pit.



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POWER REQUIREMENTS

Connect the power cable from the motor starter switch to the rig power supply. Connect the green insulated wire to ground.

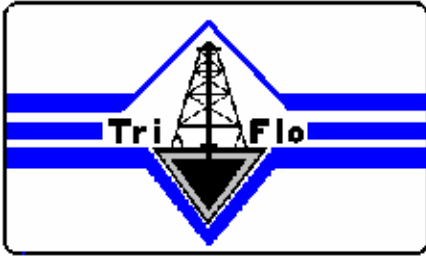
The TRI-FLO 123 SHALE SHAKER is normally wired at the factory for 460/380 V.A.C 60/50 HZ, 3 PHASE.

If 230/190 V.A.C. 60/50 HZ, 3 PHASE is needed it is necessary to:

1. Rewire the motor. (See page 19)
2. Change the motor starter. (See page 19)
3. The motor junction box must be packed with foam rubber to prevent the wires from rubbing together when the shaker is vibrating. This is necessary after the rewiring is completed.

Turn the starter switch on and check the motor rotation. The top of the belt should travel in the same direction as the flow of the mud.

If the rotation is incorrect, change any two of the red, black or white wires at the motor junction box at the rig power supply. The green wire should always be ground and would not effect the rotation of the motor.



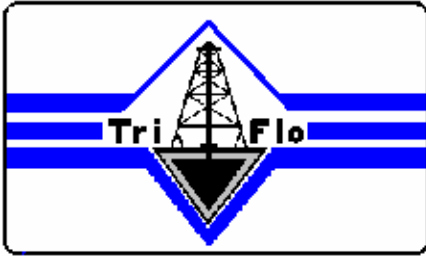
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SCREENS

The procedure to install or change the screens is as follows:

1. Remove the tension lock nuts, washers, tension springs, the tension bolts and the tension rail plates from the screen box, on the screen support bars.
2. Install decking rubber on the screen support bars.
3. Install the screen in position, leaving equal space on each side. When installing the screen be careful not to bend or crease these screens.
4. Put the tension plates in position with the bolts extending through their respective holes in the side plates of the screen box. The tension rail plates should only touch the hook strips and not the screen.
5. Install the springs, washers and lock nuts. Tighten the tension lock nuts to expose 1/8" of the threads, starting at the center tension lock nuts and working toward each end.
6. Check the screen for creases and ripples. If any appear, the hook strips are not even. Work out the wrinkles by hand by adjusting the position of the hook strips and by smoothing the screen cloth by hand.
7. Tighten the center tension lock nuts to expose 5/8" of threads, then tighten the other nuts the same amount, working from one side and the other.
8. Tighten the nuts just enough to fully compress the tension springs. Rap the tension plate and the tension bolt heads lightly with a hammer to insure that the bottom of the tension plate is parallel to the support bar. After fully compressing the springs they will maintain tension on the screens. It is recommended that after 3 hours the tension nuts should be retightened.
9. Wet the screen with water (or diesel when using oil mud) before diverting mudflow over the screen.



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LUBRICATION

TRI-FLO recommends that the grease fillings located on top of each cartridge be greased every twelve hours. Normal service requires approximately 1/2 ounce of grease in each bearing each 12 hours.

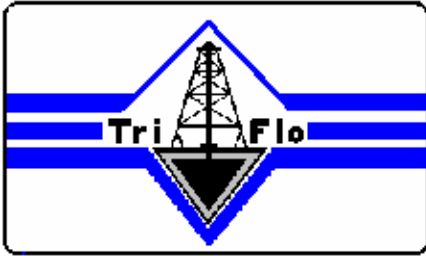
ADJUSTMENTS

The intensity of vibrations may be varied to suit conditions by changing the position of the adjustable counterweights. Position 1 gives the maximum, and each successive notch or setting reduces the motion. Position 6 gives the minimum intensity of vibrations. IT IS IMPORTANT THAT BOTH COUNTERWEIGHTS HAVE THE SAME SETTING. This is easily checked by the alignment on the notches in the counterweights.

VIBRATOR ROTATION

The direction of rotation is normally with the flow of the material. In some situations, for a different retention time, the rotation can be opposite the flow of the material (counter flow). Changing from one to the other is done by reversing the electrical leads to the motor.

Other factors such as screen incline and vibrator speed may be adjusted under some circumstances, under the guidance and direction of TRI-FLO INDUSTRIES INTERNATIONAL, INC.



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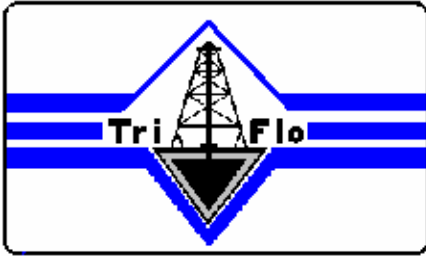
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MAINTENANCE

INSPECTION

A regular schedule of complete dismantling, inspection, and relubrication intervals assures maximum screen life and minimum downtime. The customer should keep a complete record of all such preventive maintenance plus a record of any repairs. Since the TRI-FLO SHALE SHAKER is a vibratory machine, it is important to correct all minor troubles before serious damage develops. Replace faulty support springs and any missing bolts at once. Cracks forming in the structure (usually at or near the joints) and unusual noises and motion are signs of developing failure. Drill 1/4" holes through the ends of such cracks and consult TRI-FLO at once in the event of such failures. **WARNING IF WELDING IS DONE TO NO GROUND WELDER THRU VIBRATING 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 tension periodically. On reassembly, pack the bearings with grease and also fill the adjacent cavity in the housing and retainer with grease to the bottom of the shaft.



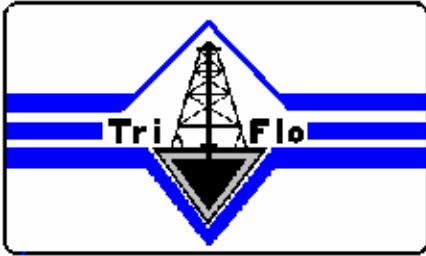
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DISASSEMBLY OF THE VIBRATOR

WARNING: DISCONNECT POWER TO THE ELECTRIC MOTOR AND LOCK THE DISCONNECT SWITCH IN THE OPEN POSITION.

1. Remove motor and drive pulley guard.
2. Remove the counterweight guard from both ends of the vibrator shaft.
3. Loosen the four motor support bolts located under the motor, loosen the V-belts and remove them.
4. Remove the V-belt sheave (Item W, Page 23), by first loosening its taper lock hub.
5. Remove the counterweights (Item R, Page 23), by removing the clamp screws and reusing the screw to open the slots in the counterweights, by tightening the screws into the tapped holes.
6. Remove the collars (Item G, Page 23) and the retainers (Item C) with the Spiro lox rings (Item D) in their grooves. Remove cartridge cap screws (Item U).
7. Remove retaining ring (Item K) from the drive side only. By striking on one end of the shaft (Item B) with a lead hammer or a hammer and a block of hardwood, it is possible to start to drive out the cartridge (Item T) on the other side.
8. Then 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.
9. The bearing remaining in the other cartridge should be removed by using 3 long 3/8" NC cap screws and pushing the bearing out. Before inserting the cap screws, the setscrews must be removed.

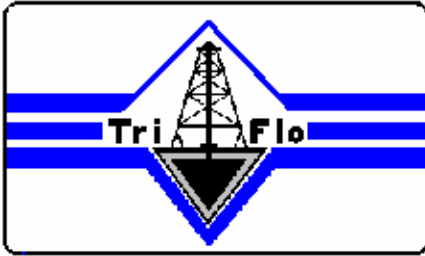


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REASSEMBLY OF THE VIBRATOR

1. Be sure the housing, cartridges, bearings, shafts, etc. are clean. Flush the bearing with (200° F) light transformer, spindle, or automotive flushing oil; DO NOT USE KEROSENE OR GASOLINE.
2. Make a sub-assembly of the bearing, cartridges, Spiro lox rings (Item E, Page 23), and the setscrews (Item L). The latter must be replaced in the cartridges as in the original assembly if they have been removed to use longer cap screws for bearing removal.
3. Position and secure on such cartridge-bearing sub-assembly in the housing end on the drive side. Slide the shaft thru the housing from the other side and slip it through the bearing bore. Rotate the shaft while installing the Spiro lox rings (Item E). Secure the shaft axially to the drive side bearing by forcing the retaining ring (Item K) into its groove in the shaft.
4. Slip the other cartridge-bearing sub-assembly over the shaft on the side opposite the drive end. 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 (Item U) and lock washers (Item V). See Page 17 for torque's of the cap screws.
5. Be sure that the shaft and bearings turn freely. Pack both bearings with recommended grease. See Page 17 for recommended grease.
6. Slip Spiro lox rings (Item D, Page 23) into the retainer grooves. Pack the retainers (Item C) with grease to the bottom of the shaft. Slip over the shaft ends, push into position, and fasten with cap screws (Item R). Torque all bolts and cap screws on the vibrator assembly to specifications listed on Page 17 entitled TIGHTENING TORQUES FOR HIGH-STRENGTH BOLTING.
7. Put indexing collars (Item G & Item H) on shafts. The notched edge of these collars should face the shaft ends. Looking down on



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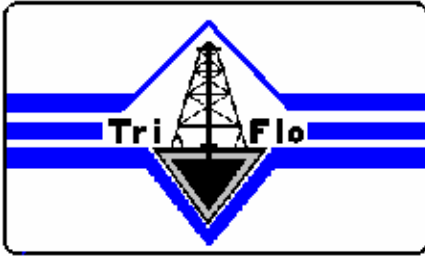
these collars, the numbers on the indexing bands will read counter clockwise on one side and clockwise on the other side. Secure the setscrew collars over the key.

8. Mount the counterweight (Item R) on the shafts using the clamp screw in the tapped hole to open the slot to facilitate mounting. Make certain that the projecting lugs of each counterweight engage with the corresponding numbered notches in the indexing collars (Item G & Item H) to produce equal unbalancing or vibrating effects at each end of the shaft.
9. Remove the clamp screw from the tapped hole and insert into the through hole in the counterweight. Secure the counterweight by tightening the clamp screws.
10. Install the V-belt sheave (Item W) and it's Taper-Lock bushing onto the shaft by tightening the screw in the Taper-Lock bushing.
11. Install the matched set of V-belts and tighten the motor support bolts after the V-belts are adjusted. Tighten only enough to prevent slippage when starting and to prevent belt whip.
12. Install the counterweight guards and the motor pulley guard.
13. Check the bolts for fastening the vibrator housing to the screen box. These bolts should be tightened to 210 ft. lbs. See Page 17 for bolt torque.

CHANGING THE SPRING COILS ON VIBRATING DECK

The Spring Coils on the vibrating deck should be checked every 6 months. When the spring shrinks or collapses to less than 4 inches they should be replaced. A new spring measures 4-1/2 inches. This is done by lifting the shaker box, removing the old springs, and installing the new ones.

ELECTRIC MOTOR



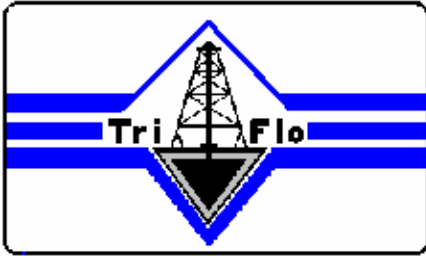
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1. Check for loose bearings.
2. Check the mounting bolts.
3. Check the belt tension.
4. Inspect the power cable for wear between the switch and the motor.

TROUBLESHOOTING

VIBRATOR MECHANISM



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Over heating of Vibrator

1. CAUSE: Too little lubricant
SOLUTION: Check seals for leakage and add lubricant.
2. CAUSE: Too much lubricant
SOLUTION: Remove lubricant until proper amount is indicated.
3. CAUSE: High ambient temperature caused by handling hot material or by surrounding condition.
SOLUTION: Ventilate area or use high temperature lubricant.

Lubricant Leakage

1. CAUSE: High temperature causes grease to become fluid and leak through the seals.
SOLUTION: Use high temperature grease.

Gritty Bearings

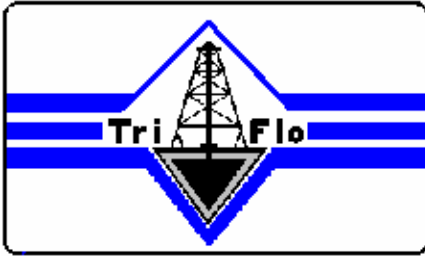
1. CAUSE: Entrance of grit while servicing or through the seals during operation.
SOLUTION: Flush bearing and cartridge and relubricate.

Noisy Bearings

1. CAUSE: Bearing failure caused by mentioned reasons.
SOLUTION: Replace bearings: take necessary precautionary steps to avoid reoccurring failure.
2. CAUSE: Normal fatigue failure associated with the vibrator service-identified by spalling or roller and inner race at the high load zone.
SOLUTION: Replace the bearings; see assembly instructions.

Erratic Vibration or Performance

1. CAUSE: Slipping of the V-belts.



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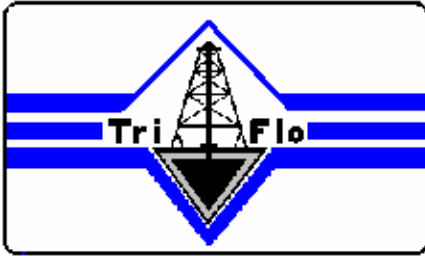
SOLUTION: Replace worn belts or tighten belts by adjusting the motor slide base.

2. **CAUSE:** Throwing of V-belts.
SOLUTION: Check belt alignment; check counter weights to insure they are on the same number.
3. **CAUSE:** Unit is not level
SOLUTION: Relevel the shaker with shims.

SHORT SCREEN LIFE

1. Careless handling and installation.
2. Failure to clean all support surfaces prior to screen installation.
3. Improper tension during installation.
4. Tension plates are not seated properly.
5. Cuttings build up under the edge of the screen.
6. Worn or dirty deck rubber.

SPARE PARTS



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Always order spare parts from TRI-FLO INDUSTRIES INTERNATIONAL. This is particularly true of bearings, which may not be available from the local bearing sources because of special internal clearance requirements.

It is advisable to stock the following parts so that breakdowns can be repaired promptly and costly delays eliminated.

Name of Part	Quantity Each Screen	TRI-FLO Part No.
Bearing	2	05-00-043
Bearing Cartridge	1	05-00-345
V-belts, Matched Set	2	05-00-372
Tension Bolt Assembly (includes bolts, nut, spring and 2 washers)	6	03-00-006
Spiro lox ring-retainer	4	03-00-008
Spiro lox ring-cartridge	4	03-00-009
Spring, Coil (Vibrating Deck)	4	03-00-005
Retaining ring	1	05-00-322

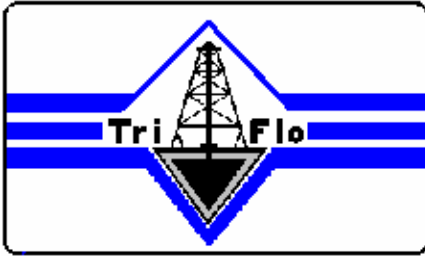
4.D SAFETY

NO PERSON SHOULD STAND, HOLD OR LEAN AGAINST THE VIBRATING FRAMES. VIBRATIONS TRANSMITTED TO THE HUMAN BODY CAN BE HARMFUL. THESE SCREENS ARE NOT THERAPEUTIC DEVICES.

BECAUSE OF THE MOTION OF THE VIBRATING SCREEN IT IS IMPOSSIBLE TO SERVICE THE SHAKER WHILE IN MOTION. NEVER LAY TOOLS OR SPARE PARTS ON THE SCREENS.

ONLY TRAINED PERSONNEL SHOULD OPERATE OR REPAIR THIS SHAKER.

TIGHTENING TORQUES FOR HIGH-STRENGTH BOLTS.



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Cap screw or bolt diameter, inches	Torque foot•pounds	
	Bolts	Cap screws
3/8"	41	47
1/2"	105	120
5/8"	210	210

FORCES

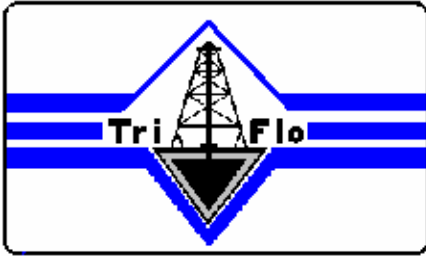
Forces generated by TRI-FLO's 113 vibration screen at various counterweight settings.

Settings (g's)	Unbalance (inch-lbs)	Stroke (inches)	Forces
1	31.0	.101	4.4
2	29.8	.097	4.2
3	26.8	.087	3.8
4	21.9	.071	3.1
5	15.4	.050	2.2
6	8.0	.026	1.1

4.G RECOMMENDED LUBRICANTS

Shell Oil Co.	Alvania No. E P-2
Texaco Inc.	Multifax No. E P-2
Gulf Oil Co.	Crown No. 2
Chevron Oil Co.	Duralith No. E P-2
Mobil Oil Corp.	Mobilux E P-0, 1,2
Universal	Mollux No. 3400
Citgo	Mystik SX-6 Extreme Temp. -65 to 350 degrees
Citgo	Mystik JT-6 High Temp.

TRI-FLO 2' X 3' STANDARD SCREEN



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TRI-FLO PART NO.

20 Mesh Screen	03-00-030
30 Mesh Screen	03-00-031
40 Mesh Screen	03-00-032
50 Mesh Screen	03-00-033
60 Mesh Screen	03-00-034
80 Mesh Screen w/backup	03-00-035
100 Mesh Screen w/backup	03-00-040
120 Mesh Screen w/backup	03-00-023
150 Mesh Screen w/backup	03-00-024
160 Mesh Screen w/backup	05-00-387
180 Mesh Screen w/backup	03-00-037
200 Mesh Screen w/backup	03-00-025
250 Mesh Screen w/backup	05-00-386
325 Mesh Screen w/backup	03-00-029
400 Mesh Screen w/backup	05-00-385

When ordering screens they should be ordered in pairs. Both screens should be replaced at the same time.

TRI-FLO 2' X 3' Layered with 2" Plastic Perforated Backing

24 Mesh	05-00-446
38 Mesh	05-00-447
50 Mesh	05-00-448
70 Mesh	05-00-449
84 Mesh	05-00-450
110 Mesh	05-00-451
175 Mesh	05-00-454
200 Mesh	05-00-452
210 Mesh	05-00-455
250 Mesh	05-00-456

LOW VOLTAGE WIRING

