Turboviber®

Operating Instructions

VIBER® EXTERNAL CONCRETE PNEUMATIC TURBINE VIBRATORS

MODELS: TV-3X
TV-5X
TV-7X

Global® VIBRATORS

Viber® VIBRATORS

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I. INTRODUCTION

You have purchased a Turboviber® high-speed turbine vibrator that uses patented ***Silver Sonic Turbine®*** technology available only on products manufactured by Global Manufacturing, Inc. This technology makes these vibrators the most efficient and lightweight pneumatic rotary vibrators available today. They replace the previous Turboviber® models TV-5 and TV-7 frequently used on tunnel forms and on forms for pre-cast concrete products. While the TV-5X and TV-7X match the TV-5 and TV-7 respectively in performance output and mounting (same 8″ bolt hole separation and 3/4″ bolt size), they are up to 70% lighter, consume half as much air, and require 20% less air pressure.

Turboviber® vibrators are ideal for consolidating concrete and for assisting material flow when vibration of high frequency (10,000 to 14,000 vibrations per minute) and high force (up to 4,200 pounds of force) are required.

PRECAUTIONS !

1. Read this entire manual and follow all installation and operating instructions.
2. Do not operate the vibrator with the side cap removed or if any fasteners are missing.
3. Do not operate the vibrator on an empty structure.
4. Disconnect the airline before performing maintenance on the vibrator.
5. Persons near the vibrator should wear ear protection if the decibel levels exceed 90.

II. OPERATION / AIR REQUIREMENTS

Air Requirements: Lubricated air is NOT required for Turboviber® vibrators. Operate these vibrators on filtered (150 micron), regulated air between 20 and 80 psi (1.36-5.44 Bar). Lubrication might collect dirt that will impair proper vibrator operation.

Break-in Period: This vibrator is equipped with shielded roller bearings that are permanently lubricated at the factory with special grease for high-speed operation. Reduced speed and speed variations might occur during the first 30-60 minutes of operation until the grease is evenly distributed in the bearings.

Controlling Vibrator Speed: An air regulator can be used to control the vibrator speed. ***Operating the vibrator at pressures higher than necessary will reduce bearing life*** (a 10% increase in speed reduces the bearing life by 50%).

Material Flow Applications: Adjust the airflow until material flow occurs. More air is not always better. Cycle the vibrator on and off. The vibrator can run continuously, but this is usually not necessary. Once the material is set in motion, gravity will keep it moving.

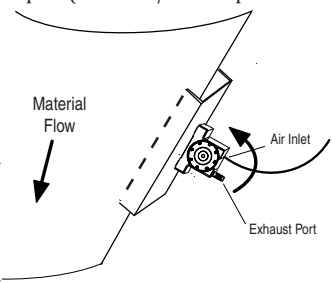
Concrete Consolidation Applications: Adjust the airflow to achieve 10,000-14,000 vibrations per minute (same as rpm of vibrator). This can be done by referring to the performance data in Section VII and adjusting the regulator to the desired air pressure. Since the speed of the vibrator can vary depending on the rigidity of the mount and the forms, a more accurate way of assuring the desired frequency of vibration is to use a Vibra-Tachometer (available from your dealer), to measure the actual operating frequency for your application. Use the air regulator to adjust the air pressure until the desired frequency is achieved.

III. MOUNTING

The key to the successful use of vibration is proper mounting of the vibrator. If the mount is not rigid enough, the vibration energy will not be adequately transferred to the material in the bin or hopper or to the concrete that needs to be consolidated. Also, with an inadequate mount the vibrator will not reach the speeds given in Section VII. A proper rigid mount will serve as a transducer of the vibration, giving maximum area of influence with minimum stress to the structure. The vibrator and the hopper or forms should appear motionless.

Material Flow Applications

Orientation of Vibrator: The vibrator should be mounted with the shaft horizontal and the turbine wheel rotating in the direction of material flow. When properly oriented, the inlet port (smaller 1/2″ NPT port with the reduced opening) will be ABOVE the exhaust port (3/4″ port with the full opening that allows the internal turbine wheel to be viewed).



Installation Procedures: Do not mount the vibrator directly to the structure wall. Use a channel iron stiffener for proper mount rigidity. The channel iron acts as a transducer and distributes the vibrational energy over a larger area. The channel iron width should be no less than the base width of the vibrator. The length should be equal to two-thirds (2/3) the length of the sloped portion of the bin or hopper. A "C" channel that is 4″ wide and either 5.4 pounds per foot with a web thickness of 0.184″ or 7.25 pounds per foot with a web thickness of 0.321″ will provide a good mount. The length of the channel should be at least 6 feet long, but no longer than 10′. If the channel iron is too short the bin wall may flex excessively and be damaged.

Included with the vibrator are two each ¾″-10 x 3-1/2″ Socket Cap Screws, ¾″ SAE flat washers, ¾″ lock washers, and ¾″ nuts. These can be used to attach the vibrator to the channel in one of the following two ways:

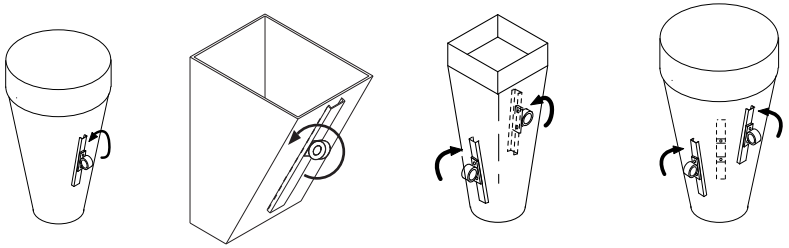
1. Drill two holes in the channel, 8″ on center, to accommodate the Socket Cap Screws. Tack weld the nuts on the backside of the channel. The locker washers will not be used.

2. Use a second channel about 12″ long. Stitch weld this short piece of channel to the main channel. Do not weld the ends or corners. Mount the vibrator to this short piece of channel using the hardware provided. All hardware provided (screws, flat washers, lock washers, and nuts) will be used.

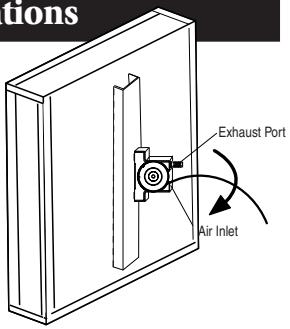
Stitch weld the channel iron VERTICALLY to the sloped portion of the bin or chute wall. Weld 3″ (75 mm), skip 1″ (25mm), weld 3″, etc. It is **VERY IMPORTANT** to leave 1″ unwelded (25 mm) on the ends and corners. This allows the vibration to dissipate out the end of the channel. **WELDING TO THE VERY ENDS OF THE CHANNEL WILL TRAP THE VIBRATION AND COULD CAUSE STRESS CRACKS TO THE STRUCTURE WALL. DO NOT MOUNT THE CHANNEL IRON HORIZONTALLY.**

Securing the Vibrator: Attach the vibrator to the channel iron with the hardware provided. The flat washers are sized to fit into the recesses machined around the mount holes located on the vibrator feet. If the nuts are used, but not tack welded in place, be sure to use a lock washer under each nut. It is also recommended that Loctite® 262 be applied to the threads. Tighten the fasteners in a sequential fashion. At least two passes are usually required. Give both fasteners the same torque value. If no Loctite® is used, retighten fasteners after the vibrator has its initial operation. Periodically check for loosening of the mount.

Mounting Locations: When using a **single vibrator**, mount the vibrator on the channel iron stiffener, one-third of the way up the sloped portion of the hopper above the discharge opening. Use more than one vibrator when the diameter or length of any wall is greater than 12 feet (3 meters). When using multiple vibrators be sure to place them on different horizontal planes and not directly across from each other. When using **two vibrators**, mount them on channel iron stiffeners on opposite walls or 180° apart. One vibrator should be 1/3 the distance above the discharge opening, and the second should be 2/3 the distance above the discharge opening. For **three vibrators**, mount them on channel iron stiffeners 120° apart. One vibrator should be ¼ the distance above the discharge opening, the second, ½ the distance above the discharge opening, and the third, ¾ the distance above the discharge opening. For **flow pipes and chutes**, use channel iron stiffeners mounted in the direction of material flow, centered along the bottom of the pipe or chute.



Concrete Consolidation Applications



Orientation of Vibrator: The vibrator should be mounted with the shaft horizontal and the turbine wheel rotating in the proper direction to encourage the air bubbles to migrate towards the surface of the concrete - towards the form wall and upward (Opposite the direction of rotation described above for bins & hoppers). When properly oriented, the inlet port (smaller port with the reduced opening) will be BELOW the exhaust port (larger port with the full opening that allows the internal turbine wheel to be viewed).

Installation Procedures: As with material flow applications, the key to the successful use of external vibrators to consolidate concrete is the correct mounting procedure. If the mount is not rigid or if the vibrator is poorly positioned, the vibration will not be transmitted properly. Proper vibration transfer will influence the air bubbles to rise to the top of the form and out of the concrete mix, the cement to migrate and surround the aggregate, and the aggregate to be minimally displaced. When using form vibration it is essential to distribute the vibration uniformly over as large a form surface as possible. For this reason, if the forms are not specially made for attaching vibrators, a channel iron stiffener is recommended as the mounting apparatus. See the channel iron recommendations and installation procedures in the Material Flow Applications section.

Specialty mount brackets are available from Global Manufacturing for attaching the Turboviber® vibrators to forms so they can be more easily moved as the pour progresses. Contact your dealer for availability.

Securing the Vibrator: The vibrator is attached to the form mount, the channel iron stiffener, or a specialty mount bracket using the hardware provided (two each ¾″-10 x 3-1/2″ Socket Cap Screws, ¾″ SAE flat washers, ¾″ lock washers, and ¾″ nuts). See detailed instructions on pages 2-3.

Mounting Locations: There is not an exact method or science when using external vibrators for concrete consolidation. Mixes vary, and therefore, consolidation procedures vary. "Experts" become experts through trial and error. What makes every application different is that the mixes will vary due to the "slump", any chemical additives, particle sizes/shape, cement content, consistency of the mixture, weather conditions, and even the type of form work used. Following these general rules is helpful in selecting the force and placement of external vibrators for consolidation of concrete.

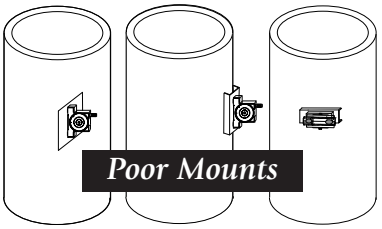
Select a vibrator producing the amount of force specified by the table below. It will often be necessary to use more than one vibrator to produce the total amount of force required.

VIBRATOR SELECTION FOR CONCRETE CONSOLIDATION

CONSISTENCY	SLUMP	VIBRATOR SELECTION
VERY STIFF CONCRETE	< 0.5"	Vibrator force output should be equal to 200-300% of the total concrete and form weight.
STIFF OR STIFF PLASTIC CONCRETE	0.5 - 2.0"	Vibrator force output should be equal to 130-150% of the total concrete and form weight.
PLASTIC OR FLOWING CONCRETE	> 2.0"	Vibrator force output should be equal to the weight of the concrete and form.

Spacing of the vibrators can be based on the consistency of the concrete.
Refer to the following table:

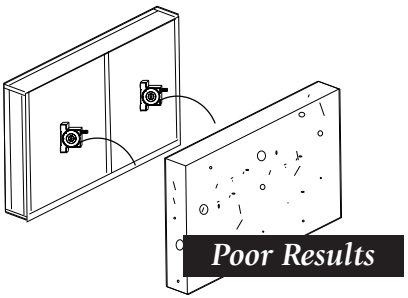
VIBRATOR SPACING FOR CONCRETE CONSOLIDATION		
CONSISTENCY	SLUMP	DISTANCE BETWEEN VIBRATORS
VERY STIFF OR STIFF CONCRETE	< 1.0"	5' Apart
STIFF PLASTIC CONCRETE	1.0 - 2.0"	6' Apart
PLASTIC CONCRETE	2.0 - 5.0"	7' Apart
FLOWING CONCRETE	> 5.0"	8' Apart

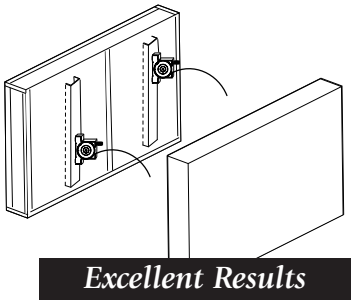


For large applications alternate vibrators on opposite form walls. For instance, the first vibrator is placed on the front wall and the next is 5′ away but on the back wall. See the illustration below:

VIBRATORS ON THE NEAR SIDE OF THE FORM ■
VIBRATORS ON THE OPPOSITE SIDE OF THE FORM □

Proper selection, placement, mounting, and orientation can mean the difference between strong, well-finished concrete, and poor quality concrete.





IV. MAINTENANCE

The Turboviber® pneumatic turbine vibrators require very little maintenance. As long as the air supply is relatively clean (150 micron filtered recommended) and the air pressure is not excessive, the vibrators will give high performance for many hours of use. These vibrators are equipped with shielded roller bearings that are PERMANENTLY lubricated at the factory. **NO LUBRICATION is REQUIRED.** Reduced speed and speed variations might occur during the first 30-60 minutes of operation until the grease is evenly distributed in the bearings. Bearing life will depend on the speed at which the vibrator is run. It is important to keep in mind that a 10% increase in speed decreases the bearing life by 50%. Because these bearings are filled with a special lubricant designed especially for high speed applications, replacement bearings should be purchased from Global Manufacturing through your Global distributor or Viber® dealer.

V. DISASSEMBLY AND ASSEMBLY

Parts Required:

1. TRK-52 TV Bearing Replacement Kit (#519052):
   Includes one set of replacement pre-lubricated bearings and two guide screws.

2. TRK-50 TV Rebuild Kit (#519050):
   Includes one set of replacement pre-lubricated bearings, two guide screws, one shaft, and two inserts.

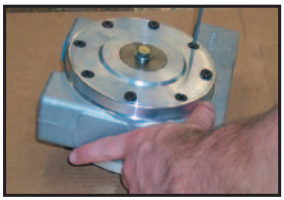
Tools Required:

1. Arbor press with minimum throat clearance of 7″.
2. 9/16″ box end wrench.
3. 5/32″ hex key wrench.
4. Press bushing that has an outside diameter of 2.000-2.030″, an inside diameter of 1.5″, a length of about 1″ and square ends.
5. Press bushing that has an outside diameter of 1.2″, and inside diameter of 1.0″, a length of about 1″ and square ends.
6. Medium internal snap ring pliers.
7. 6″ of 3/16″ thick by 1″ wide strap steel.
8. Wheel press support ring with an inside diameter of 2-3/4″ and a length of 3″.
9. Two ¼″-28 x 1-1/2″ or long bolts of any type. Used as guide bolts for installing side cap (Included with bearing replacement kit (#519052) or with rebuild kit (#519050) listed above under parts required).
10. Inner race press bushing that has an outside diameter of 1-1/4″-1-1/2″, inside diameter of 1″ and length of approximately 3″.

Disassembly:

1. Disconnect the air supply from the vibrator air inlet port.
2. Remove the muffler from the vibrator exhaust port.
3. Remove the vibrator from its mount.
4. Clean the debris from the outside of the vibrator.
   Do NOT submerge.

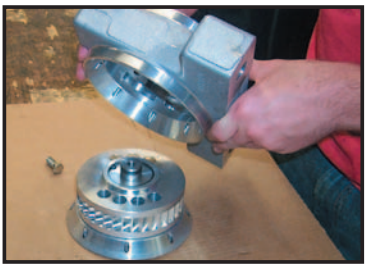
5. Remove the 8 socket head screws (1/4″-28 x 1″) from the vibrator side cap.



6. Remove the 3/8″-16 x 1″ hex bolts from each side of the vibrator. Reinsert the bolt in center hole in the side of the housing opposite the side cap and engage the threads for approximately three revolutions.

7. Block the vibrator up on the arbor press so the press will engage the reinserted hex bolt. Using the hex bolt, press out the side cap from the opposite side. Be sure the side cap will clear the support blocks.

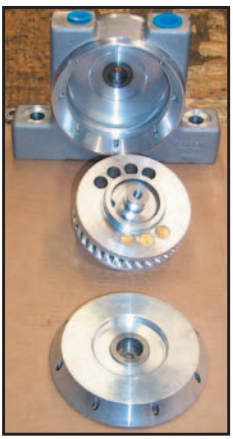
8. Continue to press on the hex bolt until the turbine wheel assembly with shaft is removed from the vibrator housing.



9. Remove the hex bolt to allow the side cap / turbine wheel assembly to come free of the housing.

10. Reinsert the hex bolt in the hole at the center of the side cap and engage the threads for approximately three revolutions.

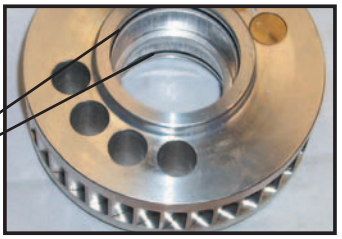
11. Block the side cap / turbine wheel assembly so the press will engage the reinserted hex bolt. Using the hex bolt press the turbine wheel assembly with shaft from the side cap.



12. Using retaining ring pliers, remove the retaining rings from both sides of the turbine wheel assembly.

13. Place the turbine wheel assembly on the wheel support ring (see #8 under tools). Using the arbor press, press the shaft with two bearing inner races in place, one bearing, and one grease shield out of the center of the turbine wheel.
14. Reverse the turbine wheel on the wheel support ring and press the shaft into the bearing that remains in the turbine wheel. Continue to press the shaft to remove the remaining bearing and grease shield from the center of the turbine wheel.

15. Remove the o-rings from the grooves at either end of the bore in the center of the turbine wheel. Inspect for damage.



16. Place the 3/16″ thick strap between the shoulders of the bearings on the shaft. Seat the ends of the strap across the appropriate opening in the arbor press. Press the shaft out of the inner race of one of the bearings.
17. Reverse the shaft in the strap supports and press the shaft from the remaining inner race.

NOTE: Inspect the shaft and steel inserts in the side cap and housing for wear. If wear is visible, they should be replaced. Remove the steel inserts from the side cap and housing by first heating them in an oven to 150-200°F or with a propane torch. Press the inserts out of the side cap and housing and immediately press the replacement inserts into the side cap and housing while they are still hot. Loctite® 609 should be applied to the replacement inserts before pressing them into the side cap and housing.

NOTE: The bearings in theTurboviber® vibrators contain a special lubricant for high-speed applications. Always use replacement bearings supplied by Global Manufacturing. They can be purchased through your Global distributor or Viber dealer. Bearings with standard lubrication may greatly reduce the performance of the vibrator and will greatly shorten the bearing life.

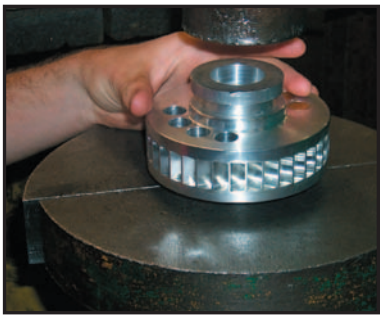
Assembly:

1. Clean the housing and all components to be reused prior to assembly.

2. Remove the outer bearings from the shaft / bearing assembly. The inner races stay on the shaft. If replacing bearings only, remove the inner races from the new bearings.

3. If replacing the bearings only, press a bearing inner race onto the shaft using the inner race press bushing (tool #10) until it seats against the ridge located at the middle of the shaft. Turn the shaft over and install the second inner race in the same fashion.

4. Place one of the pre-lubed bearings into the bore of the turbine wheel. Be sure the bearing ID # is facing the bearing spacer ring still located in the center of the turbine wheel's bearing bore. Using the arbor press and the press bushing (see #5 under tools), press on the outer race of the bearing until seats **lightly** against the spacer ring.



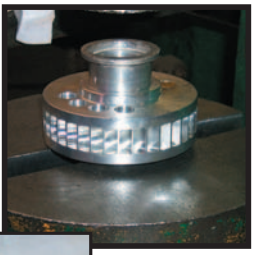
5. Install the o-ring in the groove located in the turbine wheel center bore near the bearing.

6. Press the grease shield into the turbine wheel bore with its groove towards the bearing. Press until the shield **lightly** seats against the bearing.

7. Using the retaining ring pliers, install a retaining ring into the groove adjacent to the grease shield. The retaining ring has a sharp edge on one side and a rounded edge on the other. Install the ring with the rounded edge towards the grease shield.

8. Turn the turbine wheel assembly over and place the shaft with inner races into the bearing previously installed in the bore of the turbine wheel.

9. Place the other pre-lubed bearing into the bore of the turbine wheel over the shaft. Be sure the bearing ID # is facing the bearing spacer ring still located in the center of the turbine wheel's bearing bore. Using the arbor press and the press bushing (see #5 under tools), press on the outer race of the bearing until it seats **lightly** against the spacer ring.



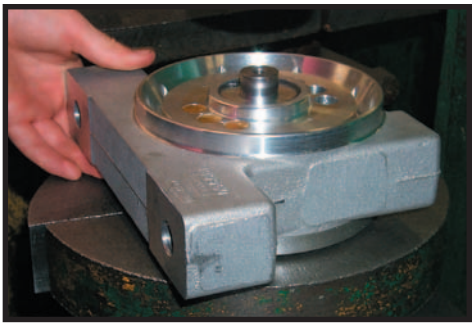
10. Install the other o-ring, grease shield, and retaining ring as described in #5-7 above.

11. Place the vibrator housing so the turbine wheel chamber is facing upward and the mounting base is towards you. The top of the vibrator will be away from you with the inlet port on the left and the exhaust port on the right.

12. Hold the turbine wheel assembly with the side having the imprinted arrows, showing the direction of rotation, facing upward (if there is no arrow, hold the wheel so it would turn counter-clock wise if water were flowing over the buckets in the turbine wheel).

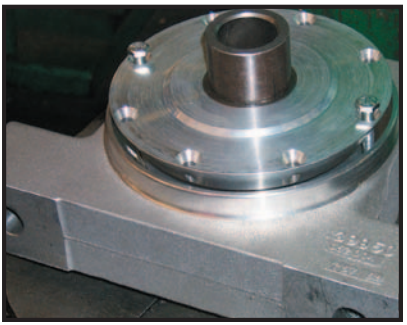
Lower the wheel into the housing so the shaft starts into the insert in the center of the housng wall.

13. Support the backside of the housing and insert. Press the shaft into the insert until it bottoms in the insert. The turbine wheel should spin freely in the housing. If it does not spin freely, locate the problem before installing the side cap.



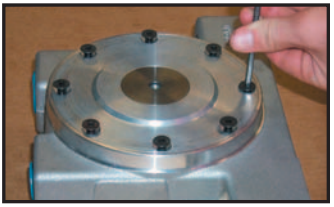
14. Install the side cap by placing the hole in the insert located in the center of the cap over the turbine wheel shaft. The beveled side of the cap goes towards the housing.

15. Place the two ¼″-28 guide bolts (tool #9) through two of the holes in the side cap and start them into the threaded holes in the housing. This will keep the holes in the side cap aligned with the threaded holes in the housing while the side cap is pressed into place.

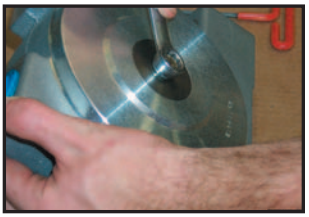


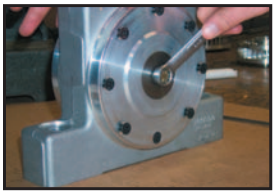
16. While supporting the backside of the housing and insert, press the cap insert and cap together until the cap seats in the housing and the insert seats on the end of the shaft.

17. Remove the two guide screws from the cap and start the eight (8) ¼″-28 x 1″ flat head screws to attach the cap to the housing. Do not tighten until after step 17.



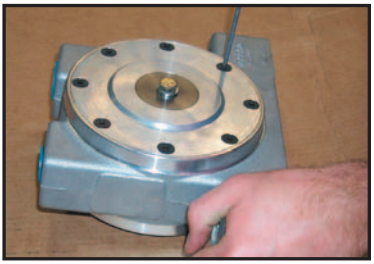
18. Install the two 3/8″-16 x 1″ hex bolts with lock washers. Install the first bolt in the housing insert. Tighten securely.



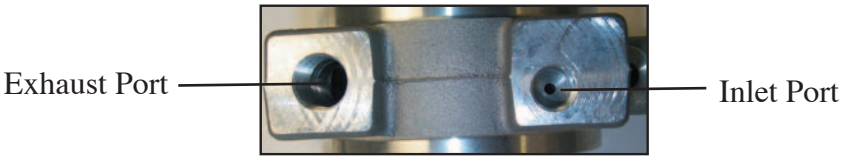


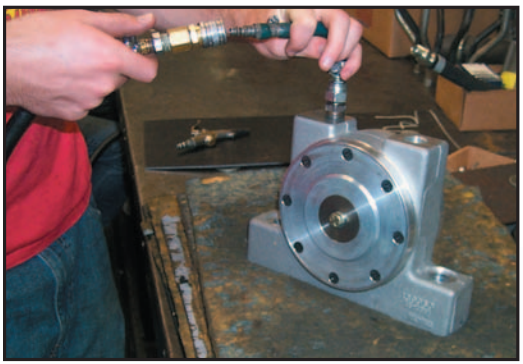
Install the remaining bolt in the cap insert. Tighten securely.

19. Tighten alternately and evenly the eight socket flat head screws started in step 16. Be sure **not to strip the threads in the aluminum housing**.

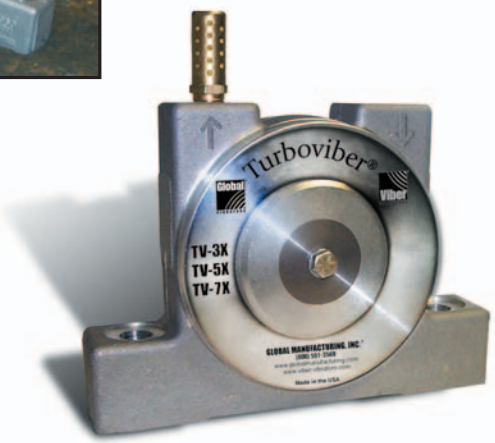


20. When re-assembly is complete, by viewing through the exhaust port, you should be able to see the turbine wheel spin freely whenever a small amount of compressed air is introduce through the inlet port. If the wheel does not spin freely, check to see if the wheel was put in backwards. If the buckets in the turbine wheel are not facing in the correct direction they will not capture the air and turn the wheel. Also, be sure the wheel turns freely on the shaft (see step 12). If the wheel does not turn freely, the bearings might be tilted slightly in the turbine wheel bore. This misalignment must be corrected.





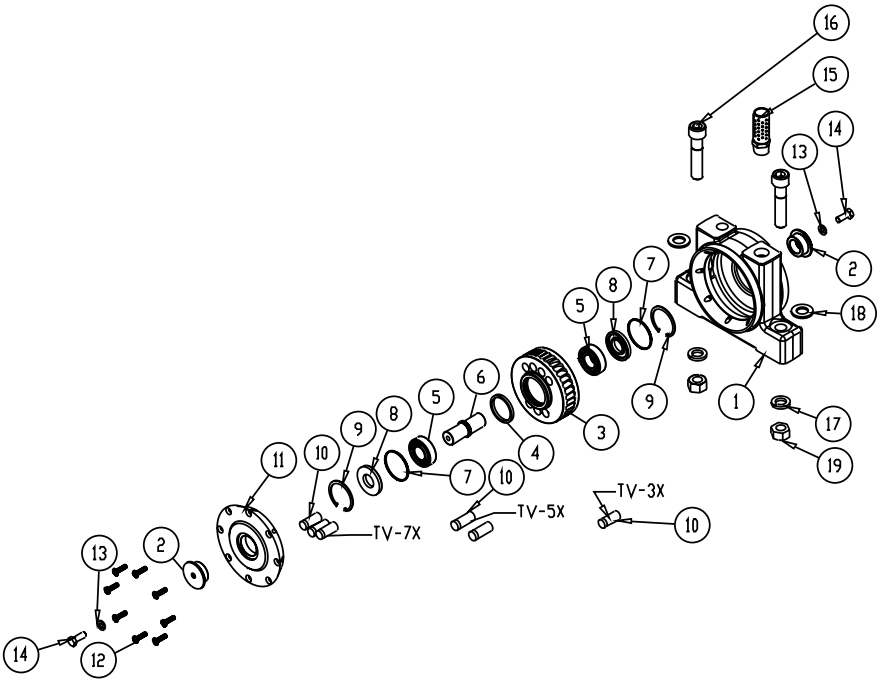
21. Remount the vibrator and reinstall the airline and muffler using Teflon tape or other sealant.



VI. PARTS LIST AND DRAWING

PARTS LIST FOR TURBOVIBER®					
ITEM NO.	PART NUMBER	DESCRIPTION	TV-7X/QTY.	TV-5/QTY.	TV-3X/QTY
1	149950	HOUSING	1	1	1
2	119957	SIDE CAP INSERT	2	2	2
3	199950	TURBINE WHEEL	1	1	1
4	387057	SPACER	1	1	1
5	383205	BEARING WITH SPECIAL GREASE	2	2	2
6	209950	SHAFT	1	1	1
7	385034	O-RING BUNA 568-034	2	2	2
8	119955	BEARING GREASE SHIELD	2	2	2
9	347212	RETAING RING 5000-212	2	2	2
10	199850	WEIGHT	3	2	1
11	119950	SIDE CAP	1	1	1
12	334909	SCREW FSH UNF 1/4"-28 X 1"	8	8	8
13	338106	LOCK WASHER 3/8"	2	2	2
14	330210	HEX BOLT UNC 3/8"-16 X 1"	2	2	2
15	270012	MUFFLER 3/4 NPT	1	1	1
16	337435	SCREW SHC UNC 3/4"-10 X 3-1/2"	2	2	2
17	338112	LOCK WASHER 3/4"	2	2	2
18	338212	FLAT WASHER 3/4" SAE OD=1-15/16	2	2	2
19	333612	NUT UNC 3/4"-10	2	2	2

	519050	REBUILD KIT: Items 2,5,6 plus guide screws
	519052	BEARING REPLACEMENT KIT: Item 5 plus guide screws



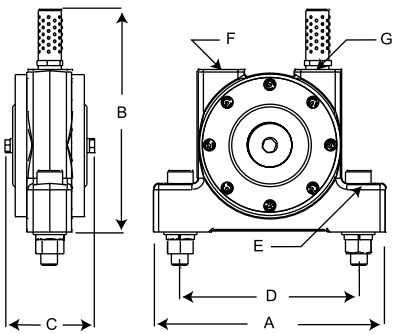
VII. TECHNICAL DATA

PERFORMANCE DATA FOR TURBOVIBER® TURBINE VIBRATORS

PRESSURE		VIBRATOR MODEL								
		TV-3X			TV-5X			TV-7X		
		SPEED	FLOW	FORCE	SPEED	FLOW	FORCE	SPEED	FLOW	FORCE
		RPM	CFM	LBS	RPM	CFM	LBS	RPM	CFM	LBS
PSI	BAR		LPM	N		LPM	N		LPM	N
20	1.38	9,000	< 10	845	9,000	< 10	1,208	9,000	< 10	1,725
			< 282	3,761		< 282	5,372		< 282	7,675
40	2.76	11,000	30	1,263	11,000	30	1,804	11,000	30	2,577
			850	5,618		850	8,025		850	11,464
60	4.14	13,000	40	1,764	13,000	40	2,520	13,000	40	3,600
			1,133	7,846		1,133	11,209		1,133	16,012
80	5.52	14,000	50	2,046	14,000	50	2,922	14,000	50	4,175
			1,416	9,100		1,416	12,999		1,416	18,570
UNBALANCE		LB-IN	0.3675		0.525			0.75		
		KG-MM	41.52		59.32			84.74		
START-UP PRESSURE		PSI	5		5			5		
		BAR	0.34		0.34			0.34		

DIMENSIONS FOR TURBOVIBER® TURBINE VIBRATOR

VIBRATOR MODEL	WEIGHT	A	B	C	D	E	F	G
		LENGTH	HEIGHT	WIDTH	BOLT CENTERS	BOLT HOLE	INLET OUTLET	EXHAUST PORT
	LBS	IN	IN	IN	IN	IN	IN	IN
	KG	MM	MM	MM	MM	MM		
TV-3X	13.3	10.5	10.4	3.5	8	13/16	1/2 NPT	3/4 NPT
	6.03	267	264	89	203	21		
TV-5X	13.4	10.5	10.4	3.5	8	13/16	1/2 NPT	3/4 NPT
	6.08	267	264	89	203	21		
TV-7X	13.5	10.5	10.4	3.5	8	13/16	1/2 NPT	3/4 NPT
	6.12	267	264	89	203	21		



VIII. TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Vibrator runs slowly. OR Vibrator does not operate.	Airline is connected to exhaust port.	Move airline to the inlet port (smaller of the two ports).
	Restricted airline.	Check for kinked or clogged airline.
	Inadequate air supply.	Check airline filter. Use airline equal to or larger than vibrator inlet port (1/2”).
	Contamination in vibrator, airline, muffler, or air filter.	Disassemble and clean vibrator. Blow out airline. Clean airline filter.
	Bearings have excessive wear.	Replace bearings. Order TRK-52 Bearing Replacement Kit (#519052) or TRK-50 TV Rebuild Kit (#519050).
	Improper assembly after cleaning or changing bearings.	Check the turbine wheel placement. The buckets in the wheel must face the inlet port.
Vibrator runs slowly. OR Vibrator speed is not constant.	Break-in period for bearings.	The shielded roller bearings are permanently lubricated at the factory. It may require 30-60 minutes of operation for the grease to become evenly distributed through the bearings.
Vibrator makes excessive noise.	Mounting is not rigid.	Check for loose bolts, broken welds, signs of separation or fatigue in structure.
	Muffler is not used.	Install the muffler in the 3/4” exhaust port.
	Structure is empty.	Turn vibrator off. Do not run when structure is empty.
	Bearings have excessive wear.	Replace bearings. Order TRK-52 Bearing Replacement Kit (#519052) or TRK-50 TV Rebuild Kit (#519050).