

INSTALLATION AND MAINTENANCE MANUAL

for

SERIES SS810 STARTER

The Ingersoll-Rand Starter is a precision piece of equipment intended to give efficient, economical performance over a long period of time. However, as with any product, performance, economy and durability are determined for the most part by a few simple commonsense procedures that can be recommended only by the manufacturer and adhered to only by the customer.

The recommendations outlined in this manual are based on 30 years of experience in the air and gas starter field. Study these recommendations and follow them. They can save you considerable time and expense.

FOR TOP PERFORMANCE AND MAXIMUM DURABILITY OF PARTS, DO NOT OPERATE SERIES SS810 STARTERS AT AIR PRESSURES OVER THE PRESSURE RATING STAMPED ON THE NAMEPLATE. USE ADEQUATE SIZE SUPPLY LINES AS DIRECTED IN THE INSTALLATION INSTRUCTIONS IN THIS MANUAL.

WARNING

Series SS810 Starters are designed for gas operation. They are not totally sealed in dynamic operation since the exhaust must be vented or piped away and there is a possibility of leakage around the output shaft when rotating.

Caution should be taken when operating these Starters on gas because of the danger of fire, explosion, or inhalation.

After reassembling an SS810 Starter, always test it in accordance with the procedures outlined in this manual. Never install a reassembled Starter that has not been tested in accordance with the procedures outlined in this manual.

(Continued on Page 5)

Notice: The use of other than genuine Ingersoll-Rand replacement parts may result in decreased Starter performance and increased maintenance, and may invalidate all warranties.

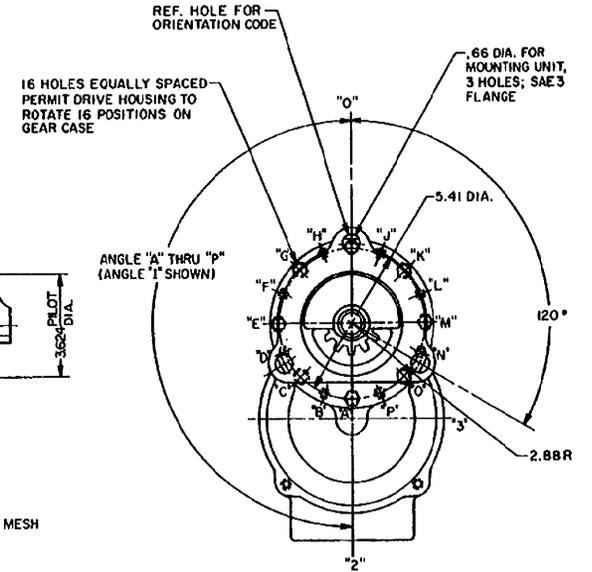
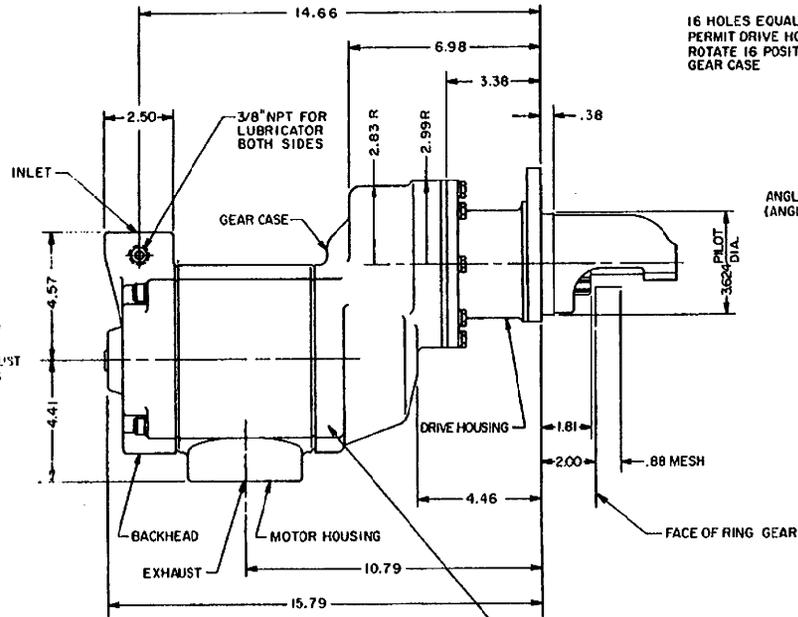
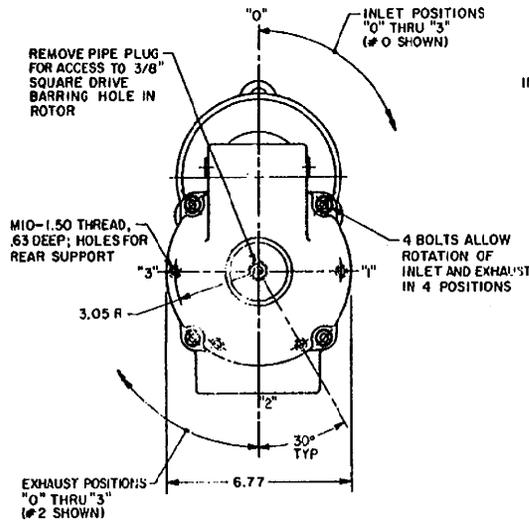
Refer All Communications to the Nearest
Ingersoll-Rand Office or Distributor.

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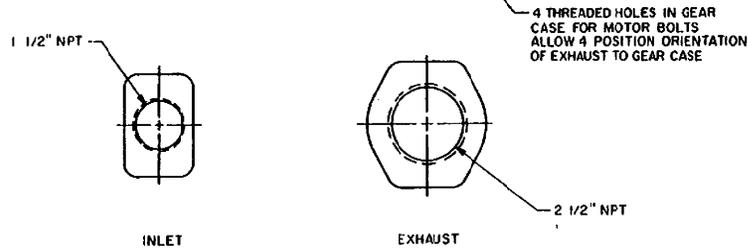
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INGERSOLL-RAND®
ENGINE STARTING SYSTEMS



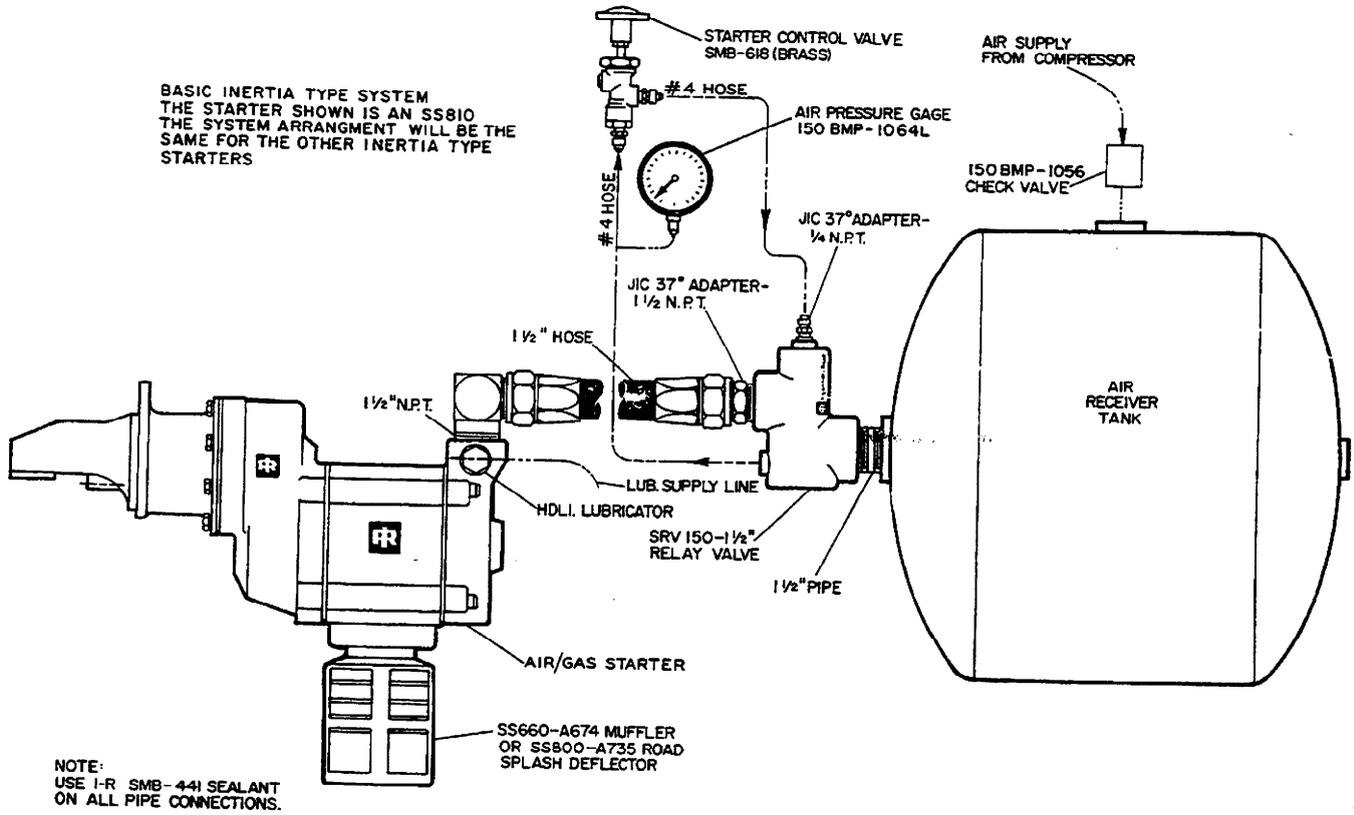


STARTER WEIGHT - 89 LB.
 STARTER ORIENTATION SHOWN IS **021**
 STANDARD ORIENTATION IS **02N**



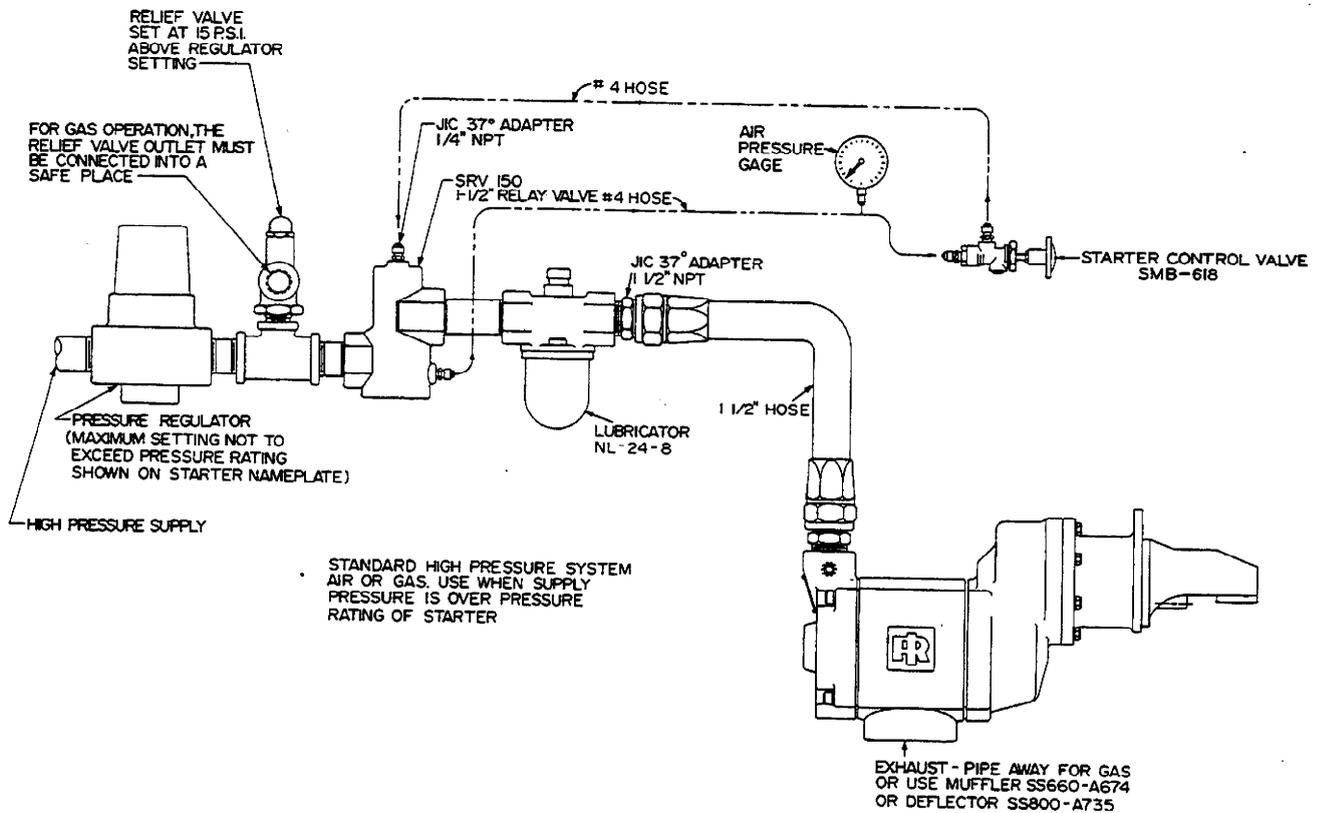
MOUNTING DIMENSIONS

PIPING DIAGRAMS



Typical Vehicular Installation

(Dwg. TPC477-2)



Typical Stationary Installation

(Dwg. TPA1001)

LUBRICATION

We cannot too strongly emphasize the importance of proper lubrication of the Starter. It is the prime requisite for top performance and maximum durability, yet requires so little time there is really no excuse for disregarding it.

Either one of two lubrication systems is recommended. For typical Starter installations where the cranking cycle is less than 10 seconds, we recommend an Ingersoll-Rand No. HDL1 Lubricator installed as shown on page 7. Use either diesel fuel or 10W non-detergent motor oil for lubricant.

Caution: When an HDL1 Lubricator is used, make certain that the oil supply line pressure is no greater than 5 psi. If there is pressure on the line, the Lubricator will continuously leak lubricant through the Starter and out the exhaust.

If the cranking cycle is more than 10 seconds, we recommend the Ingersoll-Rand Lubricator No. NL-24-8 installed as shown in the piping diagrams. Use a good quality 10W non-detergent oil and adjust the Lubricator to flow 1 to 3 drops per second.

INSTALLATION

General Information

1. Always make certain your Air Starter is properly installed. A little extra time and effort spent in doing a top quality job will contribute considerably toward a reliable starting system that does a superior job of starting your engine quickly under all conditions.
2. We strongly recommend that on all vehicular installations, and on stationary engines subject to vibration, you use hoses of the specified diameter instead of rigid pipe connections. Vehicle and engine vibration will soon loosen rigid pipe connections, whereas hoses will absorb the vibration, and connections will remain tight.
3. In the actual mounting of an Air Starter, it is best to have the hose connections already made at the receiver, and to have the Starter end of the hose handy for attaching to the Starter. Wherever possible—and many times it is necessary—attach the air hoses to the Starter before mounting the Starter on the flywheel housing. The reason for following this procedure is twofold:
 - (a) After mounting the Starter, it is often impossible to make hose connections due to space limitations.
 - (b) Once the hoses are attached, they carry some of the weight of the Starter and make it easier to complete the mounting.
4. Engine design often demands that the Starter be mounted underneath in extremely close quarters. And even though two of the mounting bolt holes are easy to get at, the third one is often quite inaccessible. When installing an Air Starter, you will usually need a regular ratchet wrench, sockets, universal joint and socket extension. Another handy tool for Starter installations is a single or double-end ratcheting box wrench.
5. The efficiency of an Air Starter can be greatly impaired by an improper hook-up. Hoses smaller than those recommended will reduce the volume of air to the motor, and the use of reducers in the exhaust port will restrict the exhaust and choke the motor. The number of tees and elbows, and the length of the supply line should be kept to a minimum. Use 1-1/2" hose or pipe for supply lines up to 15 feet long; use 2" hose or pipe if the supply line is over 15 feet long.
6. A leak in any of the connections means that the system will drain overnight and will have to be repressurized the next morning by use of another vehicle or compressor. **Make your connections right the first time to avoid unnecessary costs and delays.**

On all threaded connections throughout the system, use Ingersoll-Rand No. SMB-441 Sealant, non-hardening No. 2 Permatex or Loctite®* Pipe Sealant.

Always run your air supply line from the side or top of the receiver—never at or near the bottom. Moisture in the air collects at the bottom of the receiver and could cause corrosion in the starter motor or, worse yet, freeze solid in cold weather so that the Starter would be inoperative.

After all connections have been made, check each joint with a soap bubble test. **There must be no leaks.** The slightest leak will cause the system to lose pressure overnight.

7. Whenever a flammable gas is being used to operate the Starter, all discharges should be piped away to a safe area.
8. We recommend installation of a "glad hand" for emergency repressurizing of the system. To keep the "glad hand" clean and free of dirt, and to protect it from distortion, a second "glad hand" closed by a pipe plug can be mated to it, or a "glad hand" protector bracket can be used.
9. Whenever possible, always mount the Air Starter so that the exhaust port is downward. This will help prevent any accumulation of water in the starter motor.

Orientation of the Air Starter

If the factory orientation will not fit your engine due to radial location of the drive housing, or location of the inlet and/or exhaust ports, reorient the Starter as follows:

1. Look at the dimension illustration and note that the drive housing can be located in any one of sixteen radial positions relative to the gear case. The exhaust port (motor housing) can be located in any one of four radial positions relative to the gear case, and the air inlet (motor housing cover) can be located in any one of four radial positions relative to the exhaust port.

* Registered trademark of Loctite Corporation.

2. Study the engine mounting requirements, and determine the required orientation of the drive housing relative to the gear case. If the drive housing has to be reoriented, remove the eight drive housing cap screws and rotate the drive housing to its required position. **Note: Do not separate the drive housing from the gear case.** Reinstall the drive housing cap screws and tighten them to 28 ft-lb (38 N m) torque.
3. Now that you have the drive housing properly oriented relative to the gear case, notice whether or not the exhaust pipe will be at the bottom, and whether or not the inlet port will be favorably located for hose installation. If either or both of these members must be reoriented, remove the four motor housing cover cap screws, and rotate the motor housing and/or motor housing cover to its desired position. **Note: Do not separate these members from each other or from the gear case.** Reinstall the motor housing cover cap screws and alternately tighten them to 60 ft-lb (81.4 N m) torque.

Mounting the Air Starter

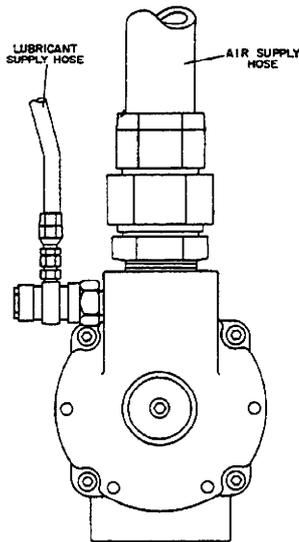
1. Study the appropriate piping diagram on page 4. We strongly recommend that the Starter be connected exactly as shown.
2. The air receiver tank for a Starter installation must have a working pressure capability equal to or greater than the maximum pressure at which the Starter will be operated.
3. If you are going to connect to a receiver tank that is already in service, bleed off the air pressure to the tank. **Warning: Bleed off the air pressure through a valve or pet cock. Do not remove a plug from the tank while the tank is still pressurized.** Drain off any water that may have accumulated in the bottom of the tank.
4. Using a 1-1/2" short nipple, install the SRV150 Starter Relay Valve on the end of the receiver tank as shown in the piping diagram. **Note: Make certain the connection is made to the inlet side of the Relay Valve indicated by the word "IN" cast on the valve body.**
5. Install the No. SMB-618 Starter Control Valve on the dash panel (for vehicular installations) or some other appropriate panel (for stationary installations).
6. Attach No. TA-STR-100 Starter Instruction Label to the control panel adjacent to the Starter Control Valve.
7. Mount the No. 150BMP-1064 Air Pressure Gauge on or adjacent to the control panel. It should be located where it is readily visible to the operator of the Control Valve.
8. Connect the Starter Control Valve to the Relay Valve with 1/4" hose. Install a Tee in this line with a short feeder hose to the Pressure Gauge. **Note: Make certain the hose is connected to the "SUP" side of the Starter Control Valve.**
9. Using a piece of heavy duty garden hose, or some other similar large diameter hose, run it from the Relay Valve on the receiver to the starter location on the engine to determine the exact length of 1-1/2" air hose required.
10. Attach the 1-1/2" air hose to the outlet side of the Relay Valve, and run the hose through the frame, etc. to its final position at the starter location.
11. At this point, determine whether or not it is feasible or practical to attach the hose to the Starter before or after Starter is actually mounted. In many cases, it may be necessary to attach the hose to the Starter before mount.
12. If it is at all practical, liberally grease the teeth on the ring gear with a good, sticky gear grease. This will help promote the life of the ring gear and the Starter Pinion.
13. Hoist or jack the Starter into position, and mount it on the flywheel bellhousing. Tighten the mounting bolts to 100 ft-lb (136 N m) torque.
14. Install a 1/4" hose line from the "DEL" side of the Starter Control Valve to the top of the Starter Relay Valve.
15. If the exhaust is not to be piped away, install a No. SS660-A674 Muffler or No. SM800-A735 Road Splash Deflector in the exhaust port on the Motor Housing of the Starter.
16. If the engine on which you have mounted the Starter did not have a bellhousing with a standard starter mounting, and you were required to manufacture a mounting, we strongly recommend that you add an additional support bracket at the motor end of the Starter. There are four holes in the Motor Housing Cover for this purpose. They are tapped M10-1.50 to a depth of 16 mm to accommodate metric cap screws.
17. Mount an HDL1 Lubricator on or near the Starter as described under "Installation of HDL1 Lubricator".
18. Pressurize the complete starting system and check every connection with a soap bubble test. **There must be no leaks.**

BARRING OVER THE STARTER

Occasionally, the Rotor may be gummed up and needs to be freed. This is very easily done with the SS810 Starter.

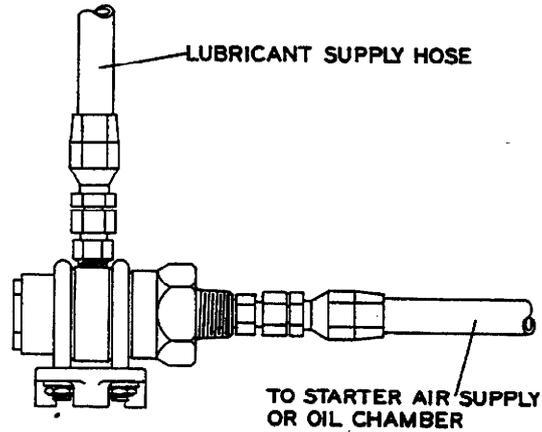
1. Remove the 3/8" pipe plug from the center of the Motor Housing Cover.
2. Insert a 3/8" square drive wrench through the hole in the Motor Housing Cover to engage the square drive recess at the rear of the Rotor.
3. Manually, rotate the Rotor until free.

INSTALLATION OF HDL1 LUBRICATOR



(Dwg. TPC508)

Mounted on Starter



(Dwg. TPC389)

Mounted at Remote Location

The HDL1 Lubricator is self-priming and may be installed directly on the Starter or remotely located. Although the Lubricator is capable of drawing lubricant from a source 4 ft (1.2 m) lower than the point of installation, we recommend installing the Lubricator as close as possible to the oil source.

We recommend using the unpressurized fuel return line as the source of lubricant. However, oil may be supplied from a separate receiver or the diesel fuel tank. When the diesel fuel tank is the lubricant source, install a 10 micron to 50 micron fuel filter in the oil supply line at the fuel tank.

Mount the HDL1 Lubricator as follows:

1. If you are going to mount the HDL1 Lubricator on the Starter, remove one of the 3/8" pipe plugs from the inlet boss on the Starter, and replace it with the HDL1. If you are going to mount the HDL1 at a remote location, use two U-bolts and base clamp available for the Lubricator.
2. If you mounted the HDL1 at a remote location, install a 1/4" hose from the end of the Lubricator having both a male and female thread to one of the 3/8" pipe tapped holes on the Starter inlet boss.
3. Install a 1/4" hose from the 1/8" NPT oil inlet in the side of the HDL1 to the unpressurized fuel line, diesel fuel tank or separate oil reservoir. Tighten the fitting at the Lubricator to 15 to 36 ft-lb (20.3 to 48.8 N m) torque. The thread on the fitting must be clean; assemble it without sealing compound or Teflon® * tape. Connection must be vacuum tight. **Note:** Before initial operation, manually fill the oil supply line.
4. If a separate lubrication reservoir is used, fill it with diesel fuel or a light non-detergent motor oil such as SAE 10 or 10W.

DISASSEMBLY OF THE STARTER

General Information

1. Always mark adjacent parts on the Motor Housing Cover (2), Motor Housing (1), Gear Case (30) and Drive Housing (23) so these members can be located in the same relative position when the Starter is reassembled.
2. Do not disassemble the Starter any further than necessary to replace a worn or damaged part.
3. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for replacement or repairs.
4. Always have a complete set of vanes, seals and O-rings on hand before starting any overhaul of an SS810 Starter. **Never reuse old seals or O-rings.**
5. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members.
6. Never wash the inertia drive in a solvent.

Drive Housing

1. Remove the eight Drive Housing Cap Screws (21) and Lock Washers (22).
2. Tap the Drive Housing (23) with a plastic hammer to help dislodge it from the Gear Case Cover (27).
3. Place the Drive Housing in an arbor press, bearing end up. Using a pressing bar remove the Drive Housing Bearing (25) from the Drive Housing.
4. Using a screwdriver remove the screw holding the Starter Drive (26) to the drive gear shaft.

* Registered trademark of E. I. DuPont de Nemours and Co., Inc.

5. Slide the Starter Drive off the drive gear shaft.
6. Remove the two Drive Gear Keys (34).
7. Remove the Gear Case Cover from the Gear Case.
8. Remove the Drive Housing O-ring (24) and the Gear Case Cover Seal (29) from the Gear Case Cover.

Motor Housing

1. Remove the Motor Housing Cover Plug (3).
2. Unscrew and remove the Motor Housing Cover Cap Screws (4).
3. Pull the Motor Housing Cover (2) from the Motor Housing (1). It may be necessary to dislodge the Motor Housing Cover by tapping it with a plastic hammer.
4. Tap the Gear Case (30) with a plastic hammer to dislodge it from the Motor Housing.
5. Grasp the Rotor Pinion (20) in a vise and using a wrench, remove the Rotor Pinion Retaining Screw (19).
6. Remove the Rotor Pinion (20) from the rotor shaft.
7. Slide the Front End Plate (16), Front Rotor Bearing (18) and Motor Wave Washers (17) off the rotor shaft.
8. Remove the Rotor (13) and Rear End Plate (9) from the Cylinder.
9. Remove and examine each Vane (15). Install a new set of Vanes if any Vane is cracked, spalled or worn to the extent that its width is 15/16" (24 mm) or less at either end.
10. Grasp the Rotor in a vise. Using a 5/32" (4 mm) hex wrench, loosen the Rotor Clamp Nut Screw (14). Unscrew and remove the Rotor Clamp Nut (12).
11. Remove the Large Rear Rotor Bearing O-ring (11).
12. Remove the Rear End Plate (9) from the rotor shaft.
13. Remove the Small Rear Rotor Bearing O-ring (10A) from the rotor shaft.
14. If the Rear Rotor Bearing (10) needs to be replaced, remove it from the Rear End Plate.
15. Push the Cylinder (5) out of the Motor Housing.
16. Remove the Cylinder O-rings (8) from the Cylinder.

Gear Case

1. Place the Gear Case (30) on a workbench.
2. Pull the Drive Gear (33) out of the Gear Case.
3. Remove the Rear Drive Gear Bearing (32) and the Front Drive Gear Bearing (31) from the Drive Gear.

ASSEMBLY OF THE STARTER

General Information

1. Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the outer ring of a ball-type bearing when pressing the bearing in a bearing recess.
3. Whenever grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members.
4. Always clean every part, and wipe every part with a thin film of oil before installation.

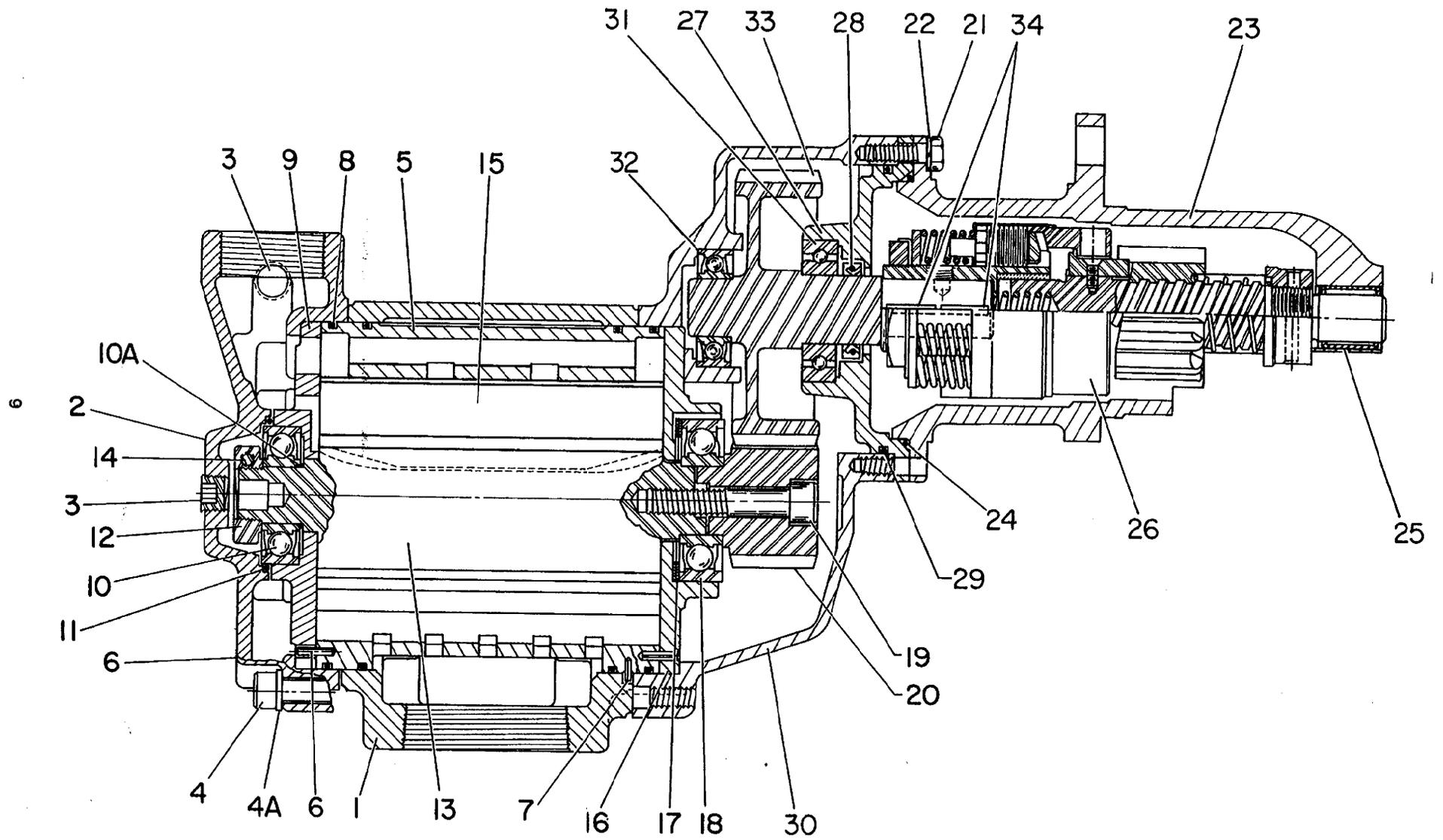
Gear Case

1. Install the Rear Drive Gear Bearing (32) and Front Drive Gear Bearing (31) onto the Drive Gear (33).
2. Position the Gear Case (30) on a workbench. Using a plastic hammer, seat the Rear Drive Gear Bearing into the Gear Case by tapping the opposite end of the Drive Gear.
3. Lubricate the Drive Gear with approximately 8 oz (240 mL) of Ingersoll-Rand No. 28 Lubricant.

Motor Housing

1. Clamp the Rotor in a vise threaded end up.
2. Install the Rear Rotor Bearing (10) into the Rear End Plate.
3. Using O-ring lubricant, lubricate and install the Small Rear Rotor Bearing O-ring (10A) onto the rotor shaft until it butts against the rotor shaft shoulder.
4. Install the Rear End Plate (9), bearing end up, onto the rotor shaft.
5. Screw the Rotor Clamp Nut (12) onto the rotor shaft with the shoulder toward the bearing. Tighten the nut until there is .001" (.02 mm) to .003" (.07 mm) clearance between the Rear End Plate and Rotor.
6. Using a 5/32" (4 mm) hex wrench, tighten the Rotor Clamp Nut Screw (14). Recheck the clearance between the Rear End Plate and Rotor, after tapping the End Plate away from the rotor face with a plastic hammer.

(Continued on Page 10.)



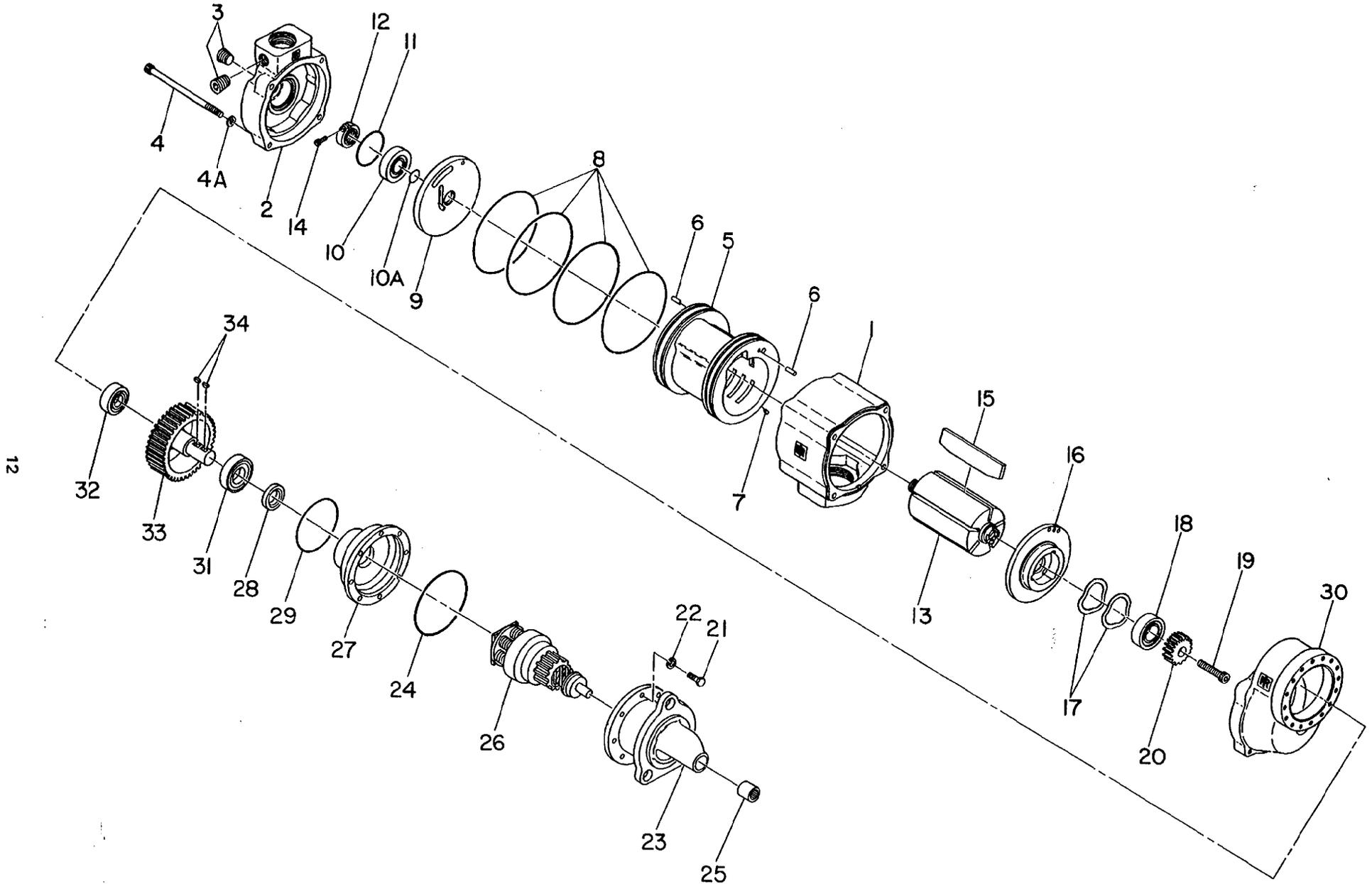
7. Check the two End Plate Alignment Pins (6). If they are bent or broken, remove them from the Cylinder and press in a new pin or pins.
8. Check the Cylinder Alignment Pin (7). If it is bent or broken, remove it from the Cylinder and press in a new pin.
9. Using O-ring lubricant, lubricate and install the two inside Cylinder O-rings (8).
10. Position the Motor Housing (1) vertically, on two blocks of wood, locating slot up.
11. Using a plastic hammer, tap the Cylinder (5) into the Motor Housing making sure the Cylinder Alignment Pin (7) seats into the slot of the Motor Housing.
12. Using O-ring lubricant, lubricate and install the two outside Cylinder O-rings (8).
13. **For Right-Hand Rotation Starter:**
Insert the Rotor (13) into the Cylinder, pinion end toward the Cylinder Alignment Pin. **Note:** Make sure the protruding End Plate Alignment Pin (6) in the Cylinder aligns with the dowel hole in the Rear End Plate (9) numbered SS800R-12. Make sure the air ports of both the Cylinder and the Rear End Plate align.
- For Left-Hand Rotation Starter:**
Insert the Rotor (13) into the Cylinder, pinion end away from the Cylinder Alignment Pin. **Note:** Make sure the protruding End Plate Alignment Pin (6) in the Cylinder aligns with the dowel hole in the Rear End Plate (9) numbered SS800L-12. Make sure the air ports of both the Cylinder and the Rear End Plate align.
14. Lightly lubricate each Vane (15) and insert one in each of the rotor vane slots.
15. Slide the Front End Plate (16) over the pinion end of the Rotor. The other protruding End Plate Alignment Pin (6) in the face of the Cylinder should align with the dowel hole in the Front End Plate.
16. Insert the two Motor Wave Washers (17) into the Front End Plate well.
17. Install the Front Rotor Bearing (18) into the Front End Plate well.
18. Install the Rotor Pinion (20) on the rotor shaft so that the lugs on the Pinion engage those on the shaft.
19. Screw the Rotor Pinion Retaining Screw (19) into the rotor shaft and tighten to 90 ft-lb (122 N m) torque.
20. Using O-ring lubricant, lubricate and install the Rear Rotor Bearing O-ring (11) onto the Rear Rotor Bearing.
21. Check freeness of the motor by turning the Rotor Pinion. If necessary, tap the Front End Plate with a soft hammer to align the motor.
22. Install the rear Housing Cover Plug (3) and tighten securely.
23. Align the punch marks on the Gear Case (30), Motor Housing (1) and Motor Housing Cover (2) and assemble as follows:
 - (a) Grasp the Gear Case in a vise by the Drive Gear Shaft.
 - (b) Insert the pinion end of the motor into the Gear Case. Using a soft hammer, tap the Motor Housing (1) until it seats.
 - (c) Position the Motor Housing Cover (2) on the Motor Housing. Using a soft hammer, tap the Motor Housing Cover until it is seated on the Motor Housing. **Note:** Screw a 12" (305 mm) piece of 1-1/2" (38 mm) pipe into the air inlet to act as a handle to help align the Motor Housing with the Motor Housing Cover and Gear Case.
 - (d) Lubricate the threads and install the Motor Housing Cover Cap Screws (4) and Lock Washers (4A), alternately tightening each a little at a time to a final torque of 60 ft-lb (81.4 N m).
24. Install two of the Housing Cover Plugs (3) into the Motor Housing Cover inlet boss and tighten securely.

Drive Housing

1. Press the Drive Gear Shaft Seal (28) down into the Gear Case Cover (27) lip facing upward.
2. Install the Gear Case Cover O-ring (29) onto the Gear Case Cover.
3. Install the Gear Case Cover into the Gear Case.
4. Install the two Drive Gear Keys (34) into the drive gear shaft.
5. Slide the Starter Drive (26) onto the drive gear shaft and tighten the Starter drive locating screw securely.
6. Press the Drive Housing Bearing (25) into the Drive Housing (23) and lubricate with the recommended lubricant.
7. Install the Drive Housing O-ring (24) onto the Drive Housing.
8. Install the Drive Housing onto the Gear Case aligning the punch marks.
9. Install the eight Drive Housing Cap Screws (21) and Drive Housing Cap Screw Lock Washers (22). Tighten to 28 ft-lb (38 N m) torque.

TEST AND INSPECTION PROCEDURE

1. **Motor and Gearing Freeness:** Turn the Drive Pinion located in the Starter Drive (26) in the direction of Starter rotation. The Drive Pinion should turn by hand.
2. **Motor Vane Action:** Apply 90 psig (6.2 bar/620 kPa) pressure using a 3/8" (9 mm) supply line to the inlet of the motor. Starter should run smoothly.
3. **Motor Seals:** Plug the exhaust and apply 30 psig (2.1 bar/207 kPa) pressure to the inlet of the motor. Immerse the Starter for 30 seconds in a nonflammable solvent. If the Starter is properly sealed, **no bubbles will appear.**



12

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

1	Motor Housing with 2-1/2" Tapped Exhaust	SS800-40	19	Rotor Pinion Retaining Screw	SS800-732
	with 2-1/2" SAEJ518C Flanged Exhaust.	SS800-140	20	Rotor Pinion	SS800B-17
2	Motor Housing Cover Assembly with 1-1/2" Tapped Inlet	SS800-A102	21	Drive Housing Cap Screw (8)	SS810-744
	with 1-1/2" SAEJ518C Flanged Inlet	SS800-A202	22	Drive Housing Cap Screw Lock Washer (8) . . .	TE223A-415
3	Housing Cover Plug (3)	GA57-95	23	Drive Housing	SS810-300
4	Motor Housing Cover Cap Screw (4)	SS800-25	● 24	Drive Housing O-ring	SS800-244
4A	Motor Housing Cover Cap Screw Lock Washer (4)	SS800-26	25	Drive Housing Bearing	SS660-363-13
5	Cylinder Kit	SS800-K3	26	Starter Drive for SS810RB	20BM-299-1
6	End Plate Alignment Pin (2)	510-669A		for SS810LB	20BM-299-3
7	Cylinder Alignment Pin	SS800-99	27	Gear Case Cover	SS810-678
● 8	Cylinder O-ring (4)	SS800-67	● 28	Drive Gear Shaft Seal	SS810-272
9	Rear End Plate for SS810RB	SS800R-12	● 29	Gear Case Cover O-ring	SS800-152
	for SS810LB	SS800L-12	30	Gear Case	SS800-37
10	Rear Rotor Bearing	SS800-24	31	Front Drive Gear Bearing	BU-359
● 10A	Rotor Shaft O-ring	C321-606	32	Rear Drive Gear Bearing	SS800-359
● 11	Rear Rotor Bearing O-ring	HRA20A-990	33	Drive Gear	SS810-9
12	Rotor Clamp Nut	SS800-65	34	Drive Gear Key (2)	20BM-610
13	Rotor	SS825-53	*	Nameplate	SS800-301
14	Rotor Clamp Nut Screw	SS800-63	*	Nameplate Screw (4)	R4K-302
● 15	Vane Packet (set of 5 Vanes)	SS800-42-5	*	Relay Valve	SRV 150
16	Front End Plate	SS800G-11	*	Muffler	SS660-A674
17	Motor Wave Washer (2)	SS800-224	*	Road Splash Deflector	SS800-A735
18	Front Rotor Bearing	SS800-22	*	Air Strainer	SM450-A267AT
			*	Lubricator	HDL1
			*	In-Line Lubricator	NL-24-8
			*	Tune-up Kit (includes illustrated parts 6 [2], 7, 8 [4], 10, 10A, 11, 15, 18, 24, 25, 28, and 29)	SS810-TK2

* Not illustrated.

● To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (●) for every four tools in service.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Loss of Power	Worn Motor Parts	<p>Remove the motor from the Motor Housing (1) and disassemble the motor. Examine all parts and replace any that are worn or damaged. Use the following guidelines for determining unserviceable parts:</p> <ol style="list-style-type: none"> 1. Vanes (15) - Install a set of new vanes if any vane is cracked, spalled or worn to the extent that its width is 15/16" (24 mm) at either end. 2. Rotor Bearings (10 or 18) - Replace if any roughness or looseness is apparent. 3. Rotor (13) - Replace if the body has deep scoring that cannot be removed by polishing with emery cloth. 4. Cylinder (5) - Replace if there are any cracks or deep scoring. 5. End Plates (9 or 16) - Clean up scoring by rubbing it with emery cloth placed on a flat surface.
	Inadequate Lubrication	<p>Check the Lubricator, inlet hose, fitting and oil supply hose to make sure they are vacuum tight and free of leaks. Tighten all joints and replace the Lubricator if necessary.</p>
Air or Gas Leakage	Worn Seals	<p>Check the Seals (8, 24, 28 and 29). Plug the exhaust. Apply 30 psig (2.7 bar/207 kPa) air to the inlet and immerse the unit for 30 seconds in nonflammable solvent. If bubbles appear, replace the Seals.</p>
Pinion does not engage the flywheel	Dirt on the threaded pinion end of the Starter Drive (26)	<p>Remove the Starter from the engine and flush the threads clean with a light oil.</p>
Motor runs, pinion engages but does not rotate	Broken Shafting or Gearing	<p>Refer to Disassembly of the Drive Housing on pages 7 and 8.</p>
Air blows through motor	Gummed up Vanes (15)	<p>Pour approximately 8 oz (237 mL) of diesel fuel into the air inlet. Reconnect the air supply line and operate the Starter.</p>



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