Form P6633
Edition 3
June, 1988

INSTALLATION AND MAINTENANCE MANUAL

for

SERIES SS175 AND SS350 STARTERS

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 common sense 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 over 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. This manual should be filed in a permanently available location.

FOR TOP PERFORMANCE AND MAXIMUM DURABILITY OF PARTS, DO NOT OPERATE THESE STARTERS AT AIR PRESSURES OVER THE PRESSURE RATING STAMPED ON THE NAMEPLATE OR LESS THAN 70 psig (4.8 bar/483 kPa). USE ADEQUATE SIZE SUPPLY LINES AS DIRECTED IN THE INSTALLATION INSTRUCTIONS IN THIS MANUAL.

⚠WARNING

Series SS175 and SS350 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 SS175 or SS350 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.

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.

Printed in U.S.A

INGERSOLL-RAND®

ENGINE STARTING SYSTEMS

LUBRICATION

For temperatures above 32° F (0° C), use a good quality SAE 10 nondetergent motor oil.

For temperatures below 32° F (0° C), use diesel fuel.

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. HDL2 Lubricator installed as shown on page 4. Use either diesel fuel or 10W **nondetergent** motor oil for lubricant.

If the cranking cycle is more than 10 seconds, we recommend the Ingersoll-Rand Lubricator No. NL-24-8 installed in the main air supply line. Use a good quality 10W **nondetergent** oil and adjust the Lubricator to flow 1 to 2 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. 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. For SS175, use 1" hose or pipe for supply lines up to 30 feet long; use 1-1/4" hose or pipe if the supply line is over 30 feet long. For SS350, use 1-1/4" hose or pipe for supply lines up to 30 feet long; use 1-1/2" hose or pipe if the supply line is over 30 feet long .
5. 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. Teflon tape is not recommended.
   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.
6. 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.
7. 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 proper outline drawing on page 10 or 11 and note that the drive housing can be located in any one of eight radial positions relative to the exhaust. 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 exhaust port. The exhaust port should be aimed downward when installed on the engine. If the drive housing has to be reoriented, remove the four drive housing cap screws and rotate the drive housing to the required position.

NOTICE

Do not separate the drive housing from the gear case.

Reinstall the drive housing cap screws and alternately tighten them to 20 ft-lb (27 N m) of torque.

3. Now that you have the drive housing properly oriented relative to the exhaust port, notice whether or not the inlet port will be favorably located for hose installation. If this must be reoriented, remove the four motor housing cover cap screws, and rotate the motor housing cover to its desired position. Reinstall the motor housing cover cap screws and alternately tighten them to 20 ft-lb (27 N m) of torque.

NOTICE

There are eight holes through the motor housing cover, four of which are not used and are plugged. If the orientation requires that the plugged holes be used to accommodate the housing cover cap screws, use a flat-end drift to carefully drive the plugs inward. Then reinstall them in the other four holes.

Mounting the Air Starter

1. Study the piping diagrams on Page 12. 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 in 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" or 1-1/4" short nipple, install the SRV100 or SRV125 Starter Relay Valve on the end of the receiver tank as shown in the piping diagram.

NOTICE

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 Solenoid.
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 live air port with 1/4" hose. Install a Tee in this line with a short feeder hose to the Pressure Gauge.

NOTICE

Make certain that the hose is connected to the "SUP" side of the Starter Control Valve.

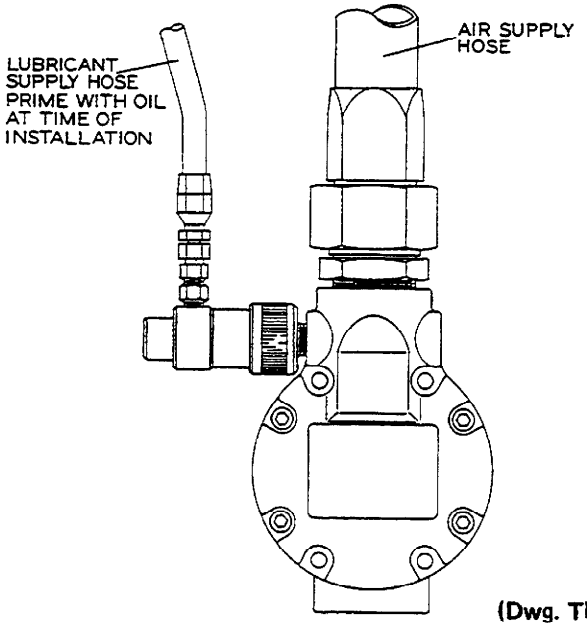
9. Measure the distance from the Relay Valve on the receiver to the starter location on the engine to determine the exact length of 1-1/4" or 1" air hose required.
10. Attach the air hose to the outlet side of the Relay Valve, and run the hose through the frame, etc. to its final position at the starter location.
11. At this point, determine whether or not it is feasible or practical to attach the hose to the Starter before or after the Starter is actually mounted. In many cases, it may be necessary to attach the hose to the Starter before mounting.
12. Liberally grease the teeth on the pinion and ring gear with a good, sticky gear grease. This will help promote the life of the ring gear and the drive pinion.
13. Mount the Starter on the flywheel housing. Tighten the mounting bolts as follows:
    (a) For 5/8" bolt, 90 ft-lb (122 N m) of torque
    (b) For 3/8" bolt, 30 ft-lb (41 N m) of torque
14. Install a 1/4" hose line from the "DEL" side of the Starter Control Valve to the "IN" port on the Starter Drive Housing.
15. Install a 1/4" hose line from the "OUT" port on the Starter Drive Housing to the small pipe tapped port on top of the Starter Relay Valve.
16. On air-operated Starters, install a Muffler or Road Splash Deflector in the exhaust port of the Starter. Use No. 150BM-A674 Muffler or No. SS175-A735 Road Splash Deflector on SS175 Starters. Use No. SS350-A674 Muffler or No. SS350-A735 Road Splash Deflector on SS350 Starters.

⚠WARNING

If the Starter is gas operated, the exhaust must be piped away to a location where it will not be ignited or inhaled.

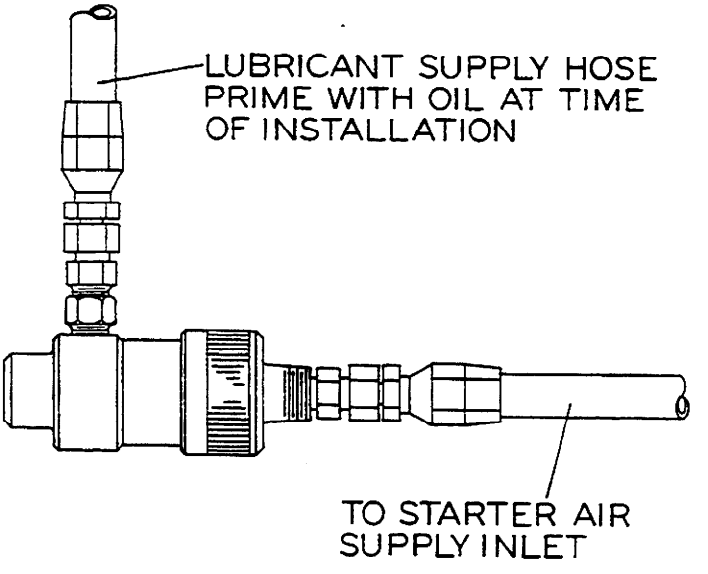
17. Mount an HDL2 Lubricator on or near the Starter as described under "Installation of HDL2 Lubricator".
18. Pressurize the complete starting system and check every connection with a soap bubble test. **There must be no leaks.**

INSTALLATION OF HDL2 LUBRICATOR



(Dwg. TPB789-1)

Mounted on Starter



(Dwg. TPC494-1)

Mounted at Remote Location

The HDL2 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 the lubricating oil lines be as short as practical.

We recommend using the unpressurized fuel return line as the source of lubricant. However, oil may be supplied from a separate reservoir or the diesel fuel tank. When the diesel fuel tank is the lubricant source, install a 10 micron to 50 micron fuel filter (Part No. HDL1-47) in the oil supply line at the fuel tank. The lubricant line should be tee'd into the fuel return line with the leg of the tee going to the lubricator directed in the down direction to insure that the lubricator does not draw air instead of oil.

Mount the HDL2 Lubricator as follows:

1. If you are going to mount the HDL2 Lubricator on the Starter, remove one of the 3/8" pipe plugs from the Motor Housing Cover on the Starter, and replace it with the HDL2. If you are going to mount the HDL2 at a remote location, use two U-bolts and base clamp available for the Lubricator.
2. If you mounted the HDL2 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 Motor Housing Cover.
3. Install a No. 6 hose from the 1/8" NPT oil inlet in the side of the HDL2 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. **Important:** This connection must be vacuum tight. The thread on the fitting must be clean; assemble it without sealing compound or Teflon®* tape. **Note:** Before initial operation, manually fill the oil supply line.
4. If a separate lubrication reservoir is used, fill it with diesel fuel or an SAE 10 or 10W light, nondetergent motor oil.

DISASSEMBLY

General Information

NOTICE

1. Always mark adjacent parts on the Motor Housing Cover (1), Cylinder Housing (9), Gear Case (23) and Drive Housing (48) 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 a 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.

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

Disassembly of the Drive Housing

1. With the Starter in a horizontal position and supported on the workbench, grasp the Drive Pinion (46) in copper-covered vise jaws.

⚠CAUTION

Do not use excessive clamping force on the Drive Pinion. Grasp it just firmly enough to hold it. Make certain the Starter is firmly supported on the workbench.

2. Using an 8 mm hexagon wrench, remove the Drive Pinion Retaining Screw (47).
3. Loosen the vise and withdraw the Drive Pinion from the Drive Shaft (41).
4. Stand the Starter on end with the Drive Shaft upward.
5. Using a 6 mm hexagon wrench, remove the four Drive Housing Cap Screws (54).

⚠CAUTION

When unscrewing the Drive Housing Cap Screws, hold the Drive Housing (48) down against the expansion of the Piston Return Spring (39).

6. Lift off the Drive Housing.

NOTICE

The Gear Case (23) might come off with the Drive Housing. Separate the two if this occurs.

7. Do not remove the Drive Housing Bearing (50) or Drive Housing Seal (49) from the Drive Housing unless it is absolutely necessary, and you have a **new** Drive Housing Bearing and Seal on hand for replacement. These members are always damaged in the removal process. If it is necessary to remove the Drive Housing Bearing or Seal, stand the Drive Housing on the workbench with the seal end up. Drive or press the Seal and Bearing from the Drive Housing.

Disassembly of the Piston and Clutch

1. With the Starter standing on end as in Step 4 of the preceding section, lift off the Return Spring Seat (40) and Piston Return Spring (39).
2. Grasp the Piston (31) and slide the Piston, Clutch Jaws (35) and Drive Shaft (41) as a unit from the Gear Case (23).
3. Using a small, thin-bladed screwdriver, remove the Piston Bearing Retaining Ring (34) from the groove inside the Piston.
4. Slide the Piston off the Piston Bearing (33).
5. Remove the Piston O-ring (32) from the Piston.
6. Using a pair of snap ring pliers, remove the Clutch Jaw Retaining Ring (36) from the rear Clutch Jaw.
7. Press the Piston Bearing from the rear Clutch Jaw.
8. Grasp the Drive Pinion in copper-covered vise jaws so that the three driving lugs are upward.
9. While engaging the lugs on the Drive Shaft with those on the Drive Pinion, use an 8 mm hexagon wrench to unscrew the Drive Shaft Cap Screw (44). Remove the Drive Shaft Cap Screw, Washer (43) and Spacer (42).
10. Pull the rear Clutch Jaw from the Drive Shaft.

NOTICE

Do not remove the needle bearing from inside the rear Clutch Jaw unless a new needle bearing is available and ready to install. This bearing will be damaged in the removal process.

11. Slide the front Clutch Jaw, Clutch Spring (37) and Clutch Spring Cap (38) from the Drive Shaft.

Disassembly of the Gear Case

1. Pull the Gear Case (23) along with the Drive Gear (25) and its associated parts, from the motor.
2. Remove the Gear Case O-ring (24).
3. Using a pair of retaining ring pliers, remove the Bearing Retaining Ring (27).
4. Slide the Drive Gear from the bore of the Drive Gear Bearings (26) and Gear Case.
   Note: It is possible that the rear Drive Gear Bearing will remain on the shaft of the Drive Gear.
5. Slide the Drive Gear Bearings from the bore of the Gear Case and/or from the shaft of the Drive Gear.
6. Do not remove the Gear Case Seal (28) from the bore of the Gear Case unless you have a new Seal on hand ready for installation. If it is necessary to remove the Gear Case Seal, use a small, thin-bladed screwdriver and remove the Gear Case Seal Retaining Ring (29) from each side of the Gear Case Seal.
7. Press the Gear Case Seal from the Gear Case.

Disassembly of the Motor

1. With the motor in a vertical position, Motor Housing Cover (1) upward, grasp the Cylinder Housing (9) in copper-covered vise jaws.

⚠CAUTION

Do not use excessive clamping force on the Cylinder Housing. Grasp it just firmly enough to support the motor.

2. Using a 6 mm hexagon wrench, remove the four Motor Housing Cover Cap Screws (5) and remove the Motor Housing Cover.
3. Lift the Retaining Nut Cover (17) from the Rear End Plate (7).
4. Using a 3 mm hexagon wrench, loosen the clamping screw in the Rear Rotor Bearing Retaining Nut (16).
5. Unscrew the Rear Rotor Bearing Retaining Nut.
6. Lay the motor on its side, and grasp the Rotor Pinion in copper-covered vise jaws.
7. Using an 8 mm hexagon wrench, unscrew the Rotor Pinion Retaining Screw (22).
8. Pull the Rotor Pinion from the Front Rotor Bearing (18).
9. Thread the Rotor Pinion Retaining Screw back into the front of the Rotor (13) about five or six turns.
10. Lay the motor on its side and, with a soft face hammer, tap the head of the Pinion Retaining Screw to drive the Rotor and Rear End Plate (7) from the opposite end of the Cylinder Housing (9).
11. Support the Rear End Plate on the table of an arbor press and press the Rotor from the Rear Rotor Bearing (7A).

⚠WARNING

The Rear Rotor Bearing (7A) is bonded to the Rear End Plate (7) with Loctite® *. Removal of the Rear Rotor Bearing requires the use of heat. Observe all normal precautions for the handling of hot material.

12. Apply enough heat to the periphery of the bearing recess to break the Loctite bond which holds the Bearing to the Rear End Plate.
13. Being careful so as to not get burned, press the Rear Rotor Bearing from the Rear End Plate.
14. Using a wooden hammer handle, or similar piece of wood, reach through the bore of the Cylinder Housing and tap the Front End Plate (11) free from the Cylinder Dowels (10).
15. Slide the Front Rotor Bearing (18) and Front Rotor Bearing Wave Washers (19) from the Front End Plate.

Cleaning the Parts

Once the Starter has been disassembled, clean all parts for inspection.

1. Wipe all dirt, grease, etc. from the sealed bearings. **Do not wash these parts in kerosene or other solvent, as this will dilute and contaminate any sealed-in lifetime lubricant.**
2. Wash all parts except the sealed bearings in clean kerosene or other solvent. Dry the parts with compressed air.

Inspection of Parts

1. Discard all O-rings and gaskets. These should not be reused.
2. Check all grease seals and replace any which are worn or distorted.

NOTICE

Discard any grease seal that was removed during disassembly of the Starter.

3. Check the needle bearing in the rear Clutch Jaw. If the bearing is worn, distorted or has loose needles, replace the two-piece Clutch Jaw.

NOTICE

The clutch jaws are a matched set and must be replaced with a matched set.

4. Check all ball bearings. These should run freely without any rough spots or binding. Discard any bearing that gives any indication of wear.
5. Check the Vanes for separation, chipping or other wear. See that they fit freely in the vane slots in the Rotor. We recommend that a complete new set of Vanes be installed whenever the Starter is disassembled.

ASSEMBLY

General Instructions

1. Always press on the inner ring of a ball bearing when pressing that bearing onto a shaft. Always press against the outer ring of a ball bearing when pressing that bearing into a bearing recess. Failure to follow these instructions may ruin the bearing.
2. When pressing a needle bearing into a bearing recess, always press against the stamped end of the bearing using a piloted arbor that contacts only the outer rim of the shell. The use of a flat arbor, or installing the bearing wrong end first, may fracture the shell or lock the needles against rotation.
3. Wipe a thin film of SAE 10 **nondetergent** oil on the Vanes, Rotor, Cylinder bore and Drive Housing Bore.
4. Lubricate all rubbing surfaces with Ingersoll-Rand Grease No. 28. Pay special attention to lubricating the gear teeth, clutch teeth, splines and related drive parts, needle bearings and sliding area of the drive shaft.

* Registered trademark of Loctite Corporation.

5. When assembling the Motor, always use new O-rings.
6. Before installing O-rings, coat liberally with O-ring lubricant. After O-ring is installed, coat O-ring again with O-ring lubricant and apply O-ring lubricant to O-ring grooves.

Assembly of the Motor

1. To install the Rear Rotor Bearing (7A) in the Rear End Plate (7), apply a small amount of Loctite RC620®* or equivalent to the outside of the outer race of the Rear Rotor Bearing.
2. Install the Bearing in the recess in the Rear End Plate and allow Loctite to cure for 8-10 hours.

NOTICE

Do not get any Loctite in the bearing; damage to the Bearing could result. Do not get any grease on the inside diameter of the Bearing; grease will prevent the Loctite from working.

3. Place the Rotor (13) on an arbor press with the three-jaw drive end down.
4. Set the Rear End Plate (7), flat side down, on the upper end of the Rotor.
5. Place two pieces of .004" (0.10 mm) thick shim stock in opposite positions on the end of the Rotor under the end plate.
6. Using a hollow arbor that seats against the inner race of the bearing, press the Rear End Plate down against the shim stock.
7. Remove the Rear End Plate from the arbor press and grasp the Rotor in copper covered vise jaws with the threaded hub upward.
8. Start the Rear Rotor Bearing Retaining Nut (16), shoulder side first, on the hub of the Rotor.
9. Adjust the Rear Rotor Bearing Retaining Nut until there is a slight drag on the shim stock. Remove the shim stock. Using a 3 mm hexagon wrench, tighten the clamping screw in the Retaining Nut to 10 in-lb (1.1 N m) torque.

NOTICE

The clearance between the Rear End Plate and the Rotor can be from .002" (0.05 mm) to .005" (0.13 mm) after tightening the clamping screw.

10. Remove the assembled Rotor and Rear End Plate from the vise and stand them upright on the workbench with the Rotor upward.
11. Take one of the End Plate O-rings (8) and coat it liberally with O-ring lubricant. Set the End Plate O-ring down over the Rotor into the groove in the Rear End Plate. Make certain the entire O-ring is in the groove and that it has sufficient O-ring lubricant on it to hold it in the groove.
12. Check the Cylinder Dowels (10) pressed into each end of the Cylinder Housing (9). If the Dowels are bent or broken, remove them and install new Cylinder Dowels.
13. Set the Cylinder Housing on end on two pieces of wood at least 3/4" (19 mm) thick, so that when the Rotor is installed there is clearance for the driving lugs on the hub to extend beyond the face of the Cylinder Housing.

NOTICE

Check the model number of the Starter to determine the direction of rotation. Model numbers having the letter "R" are right-hand rotation; model numbers having the letter "L" are left-hand rotation.

For right-hand rotation Models: Stand the Cylinder Housing on end on the two pieces of wood so that the pipe tapped exhaust port is facing you, and so that the kidney-shaped air port is on the left side of the Cylinder Housing.

For left-hand rotation Models: Stand the Cylinder Housing on end on the two pieces of wood so that the pipe tapped exhaust port is facing you, and so that the kidney-shaped air port is on the right side of the Cylinder Housing.

14. Take the assembled Rear End Plate and Rotor and insert the Rotor down through the Cylinder Housing so that the Cylinder Dowels are aligned with the dowel holes in the Rear End Plate.
15. Tap the Rear End Plate into place so that it seats against the face of the Cylinder Housing. Make certain the End Plate O-ring does not come out of the groove in the End Plate.
16. Fit the Retaining Nut Cover (17) on the hub of the Rear End Plate.
17. Coat a second End Plate O-ring (8) with O-ring lubricant and place it in the groove in the trailing face of the Rear End Plate. Make certain the entire O-ring is in the groove.
18. Place the Motor Housing Cover (1) on the Rear End Plate, making certain that it is oriented relative to the exhaust port in the Cylinder Housing, exactly the way it was prior to disassembly.
19. Using a 6 mm hexagon wrench, install the four Motor Housing Cover Cap Screws (5) and tighten them to 20 ft-lb (27 N m) of torque.
20. Install the two 3/8" Pipe Plugs (2) in the Motor Housing Cover and tighten them securely.
21. Turn the motor end-for-end so that the front hub of the Rotor is upward.
22. Wipe each Vane (20) with a film of light oil and install a Vane in each vane slot in the Rotor. Make certain the tapered edge of each Vane faces the center of the Rotor.

* Registered trademark of Loctite Corporation.

23. Coat an End Plate O-ring (12) with a liberal amount of O-ring lubricant and place it in the groove on the flat side of the Front End Plate (11). Make certain the entire O-ring is in the groove and that there is a sufficient amount of lubricant to hold it in place.
24. Place the Front End Plate, flat side first, down over the hub of the Rotor so that the Cylinder Dowels are aligned with the dowel holes in the End Plate.
25. Tap the Front End Plate with a soft face hammer until it seats against the Cylinder Housing. Make certain the End Plate O-ring does not slip out of the groove in the End Plate.
26. Place the two Front Rotor Bearing Wave Washers (19) in the bottom of the bearing recess in the Front End Plate.
27. Install the Front Rotor Bearing (18) in the bearing recess in the Front End Plate.
28. Place the Rotor Pinion (21), lug side first, in the bore of the Front Rotor Bearing so that it engages the lugs on the end of the rotor shaft.

NOTICE

Check to make sure the lugs are engaged.

29. Using an 8 mm hexagon wrench, install the Rotor Pinion Retaining Screw (22) and tighten it to 55 ft-lb (74 N m) of torque.

Assembly of the Gear Case

1. Stand the Gear Case (23), large open end up, on the workbench.
2. Install a Gear Case Seal Retaining Ring (29) in the first or upper groove in the small bore of the Gear Case.
3. Place the Gear Case on an arbor press, large end down. Press the Gear Case Seal (28), lip side first, into the small bore of the Gear Case until it seats against the Retaining Ring.
4. Install the second Gear Case Seal Retaining Ring in the second groove in the small bore of the Gear Case.
5. Slide a Drive Gear Bearing (26) on the hub of the Drive Gear (25) until it seats.
6. Wipe a thin film of O-ring lubricant on the lip of the Gear Case Seal and on the shaft of the Drive Gear.
7. Insert the shaft of the Drive Gear into the large open end of the Gear Case and through the Gear Case Grease Seal. Make certain that the lip of the Grease Seal does not turn inside out or that the garter spring does not come off. Push the Drive Gear into the Gear Case until the Drive Gear Bearing seats against the Gear Case Retaining Ring.
8. Slide the second Drive Gear Bearing into the small end of the Gear Case until it seats against the second Gear Case Seal Retaining Ring.
9. Using a pair of retaining ring pliers, install the Bearing Retaining Ring (27) in the groove on the hub of the Drive Gear.
10. Coat the Gear Case O-ring (24) with O-ring lubricant and install it in the groove on the hub of the Gear Case.

Assembly of the Piston and Drive Shaft

1. Grasp the Drive Pinion (46) in copper-covered vise jaws so that the lugs on the Drive Pinion are upward.

⚠CAUTION

Do not use excessive clamping force on the Drive Pinion. Grasp it just firmly enough to hold it.

2. Stand the Drive Shaft (41) on end so that the lugs on the large end of the Drive Shaft engage the lugs on the Drive Pinion. Install the Drive Pinion Retaining Screw (47) and tighten finger tight.
3. Lubricate the spline on the Drive Shaft with Ingersoll-Rand Grease No. 28.
4. Slide the Clutch Spring Cup (38), small end first, over the splined end of the Drive Shaft until it seats agsinst the shoulder on the Drive Shaft.
5. Slide the Clutch Spring (37) over the splined end of the Drive Shaft and into the Clutch Spring Cup.

⚠CAUTION

Make certain you install the correct Clutch Spring. Clutch Springs for Starters having the letter "L" in the Model number are color coded "red." Clutch Springs for Starters having the letter "R" in the Model number have a natural metallic finish.

6. Work some Ingersoll-Rand Grease No. 28 in the splines and teeth of the front Clutch Jaw (35), and slide the front Clutch Jaw, small diameter end first, over the splines on the Drive Shaft and against the Clutch Spring.
7. Slide the Needle Bearing (30) over the end of the Drive Shaft.
8. Press the Piston Bearing (33) on the shaft of the rear Clutch Jaw (35), and install the Clutch Jaw Retaining Ring (36).
9. Work some Ingersoll-Rand Grease No. 28 into the Needle Bearing inside the rear Clutch Jaw and on the teeth of the rear Clutch Jaw.
10. Place the rear Clutch Jaw, teeth end first, on the end of the Drive Shaft so that the teeth of both Clutch Jaws are engaged.

11. Make certain the splines on the front Clutch Jaw are engaged with the splines on the Drive Shaft by pushing the rear Clutch Jaw downward against the compression of the Clutch Spring. While holding the assembly in this position, drop the Drive Shaft Spacer (42) into the bore of the rear Clutch Jaw, followed by the Drive Shaft Washer (43).
12. Using an 8 mm hexagon wrench, install the Drive Shaft Cap Screw (44) and tighten it to 55 ft-lb (74 N m) of torque.
13. Work the rear Clutch Jaw back and forth against the compression of the Clutch Spring to make certain that it moves freely and travels 15/32" (12 mm). When the Clutch Jaw is pressed down against the Clutch Spring and released, it must return freely. Remove the Drive Pinion Retaining Screw and Drive Pinion.
14. Take the assembled Clutch Jaw and Drive Shaft and insert it, splined end first, into the large diameter bore of the Piston (31) until the Piston Bearing is seated.
15. Install the Piston Bearing Retaining Ring (34) in the groove in the Piston.
16. Coat the Piston O-ring (32) with O-ring lubricant and install it in the groove on the Piston.

Assembly of the Drive Housing

1. Stand the Drive Housing (48) on an arbor press with the large open bore upward. Press the Drive Housing Seal (49), lip side first, into the recess at the bottom of the housing bore.
2. Using a sleeve that contacts the outer race of the Drive Housing Bearing (50), press the Bearing into the bearing recess at the bottom of the housing bore until it seats.

Assembly of the Starter

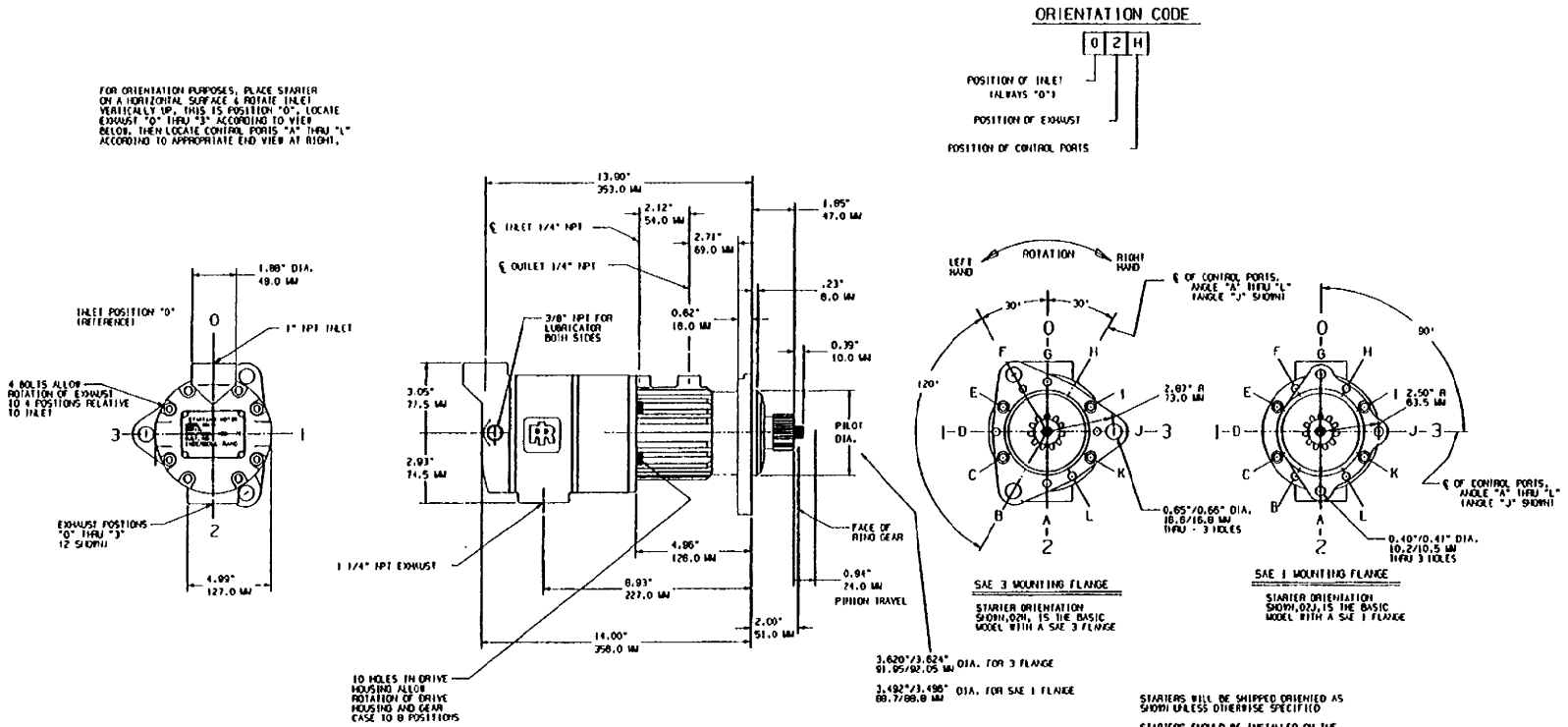
1. Grasp the assembled motor in a large vise so that the Rotor Pinion (21) is upward.

⚠CAUTION

Do not use excessive clamping force on the Drive Pinion. Grasp it just firmly enough to hold it.

2. Liberally coat an End Plate O-ring (12) with O-ring lubricant, and place it in the groove on the face of the Front End Plate (11). Make certain the entire O-ring is in the groove.
3. Work approximately 150 cc of Ingersoll-Rand Grease No. 28 into the teeth on the Drive Gear (25) and Rotor Pinion (21).
4. Orient the Gear Case (23) exactly the way it was prior to disassembly of the Starter, and place it on the face of the motor so that the Rotor Pinion meshes with the Drive Gear. Make certain the End Plate O-ring stays in the groove on the face of the Front End Plate.
5. Place the Drive Housing Gasket (53) on the face of the Gear Case, making certain all holes are properly aligned.
6. Lubricate the internal splines of the Drive Gear and the hub of the Gear Case adjacent to the Gear Case O-ring (24) with Ingersoll-Rand Grease No. 28.
7. Place the assembled Clutch Jaw (35), Drive Shaft (41) and Piston (31) over the hub of the Gear Case so that the splines on the Clutch Jaw engage the internal splines of the Drive Gear, and so that the piston skirt slides down over the hub of the Gear Case until it seats.
8. Wipe a film of Ingersoll-Rand Grease No. 28 on the exterior of the Drive Shaft, Piston and Piston Return Spring (39).
9. Place the Piston Return Spring over the end of the Drive Shaft so that it seats against the Piston Bearing Retaining Ring ((34) in the front of the Piston. Place the Return Spring Seat (40) on the end of the Piston Return Spring so that the small lip on the Seat fits inside the Return Spring.
10. Liberally coat the Drive Housing O-ring (51) with O-ring lubricant, and install the O-ring in the counterbore at the base of the Drive Housing (48).
11. Liberally coat the bore of the Drive Housing with Ingersoll-Rand Grease No. 28.
12. Making certain that the Drive Housing O-ring stays in place, place the Drive Housing down over the Piston Return Spring and Piston until it seats against the Gear Case and is oriented exactly the way it was prior to disassembly.
13. Using a 6 mm hexagon wrench, install the four Drive Housing Cap Screws (54) in the holes in the flange of the Drive Housing. Tighten the Drive Housing Cap Screws to 20 ft-lb (27 N m) of torque.
14. Place the Drive Shaft Collar (45) over the lugs on the end of the Drive Shaft. If necessary, tap it into place with a plastic hammer.
15. Place the Drive Pinion (46) on the end of the Drive Shaft so that the lugs on the Pinion engage those on the Shaft.
16. Insert the Drive Pinion Cap Screw (47) through the Drive Pinion and thread it into the Drive Shaft.
17. Place the Starter in a horizontal position so that it is supported on the workbench. Grasp the Drive Pinion in copper-covered vise jaws and, using an 8 mm hexagon wrench, tighten the Drive Pinion Retaining Screw to 55 ft-lb (74 N m) of torque.

For **TESTING THE STARTER** see Page 20.



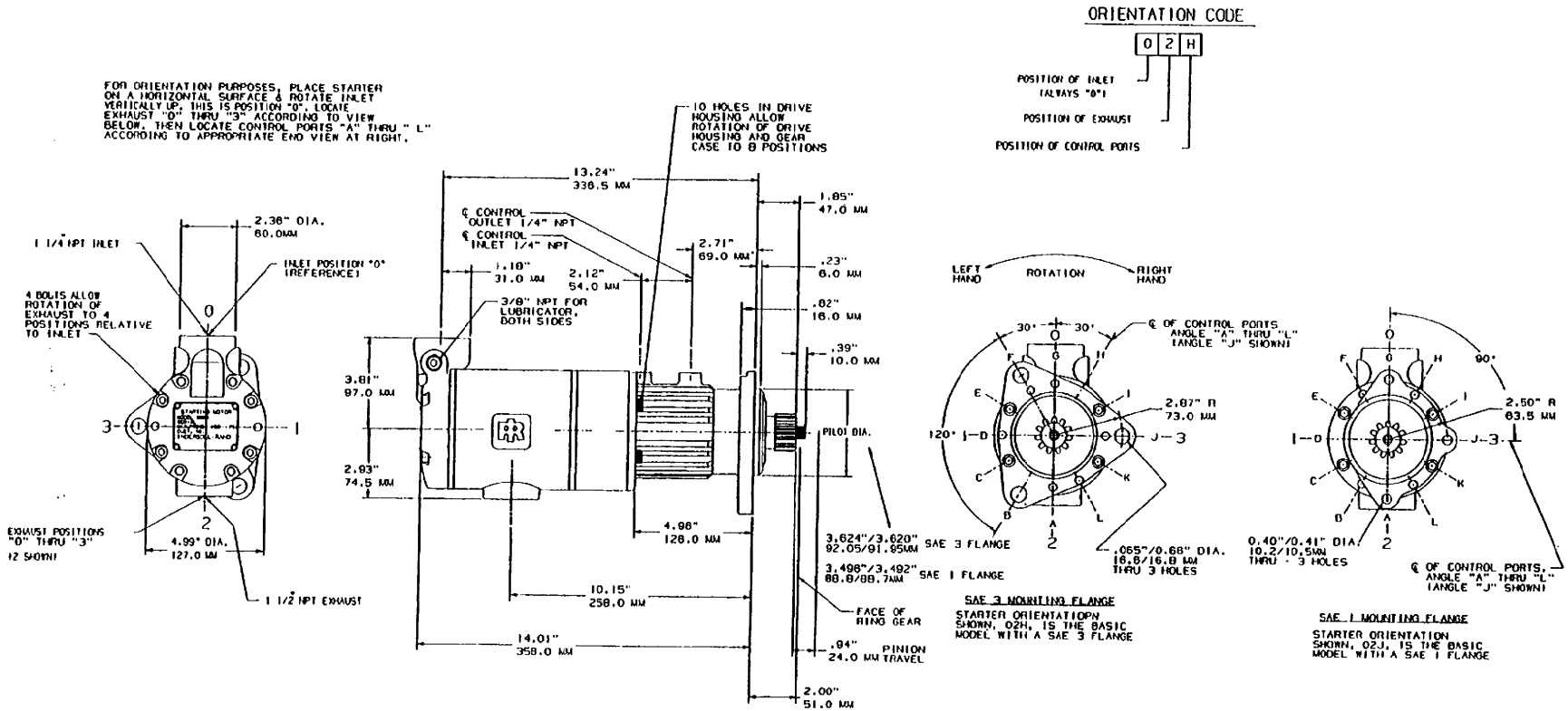
ORIENTATIONS NOT AVAILABLE

00E	01H	02E	03H
00C	01F	02C	03F
00K	01B	02K	03B
00I	01L	02I	03L

WEIGH AS SHOWN - 13 Kg 129 LBS

(Dwg. TPA929-2)

Series SS175 with Flange Mounting



ORIENTATIONS NOT AVAILABLE

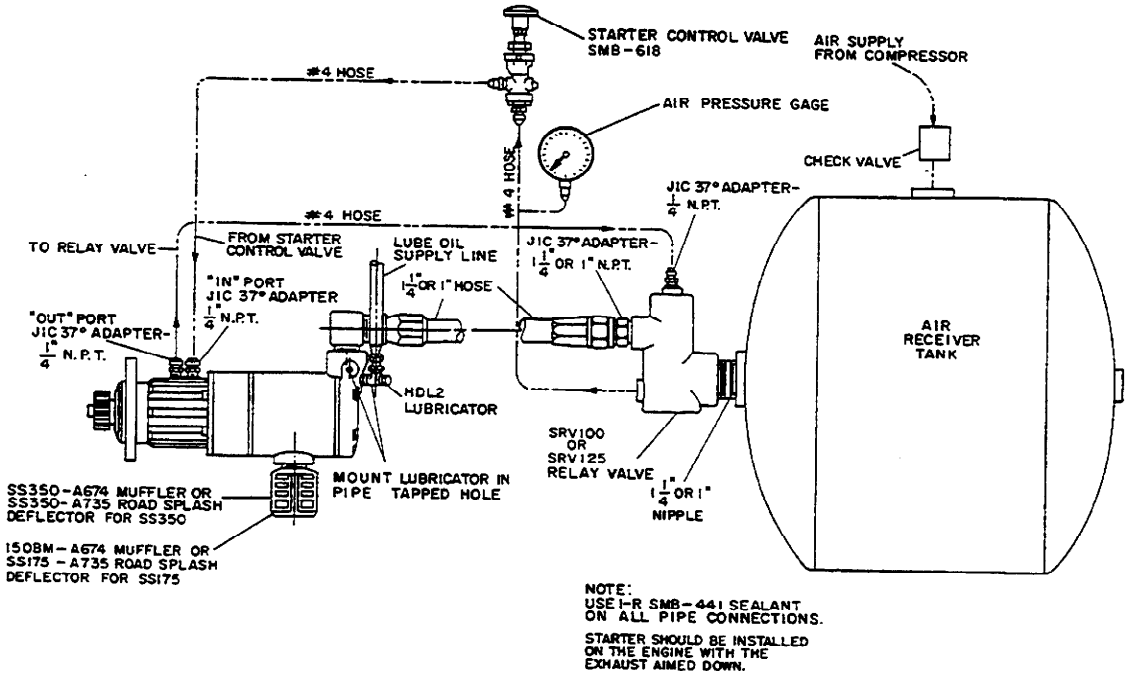
00E	01H	02E	03H
00C	01F	02C	03F
00K	01B	02K	03B
001	01L	021	03L

WEIGHT AS SHOWN - 15 Kg (33LBS)

(Dwg. TPA930-2)

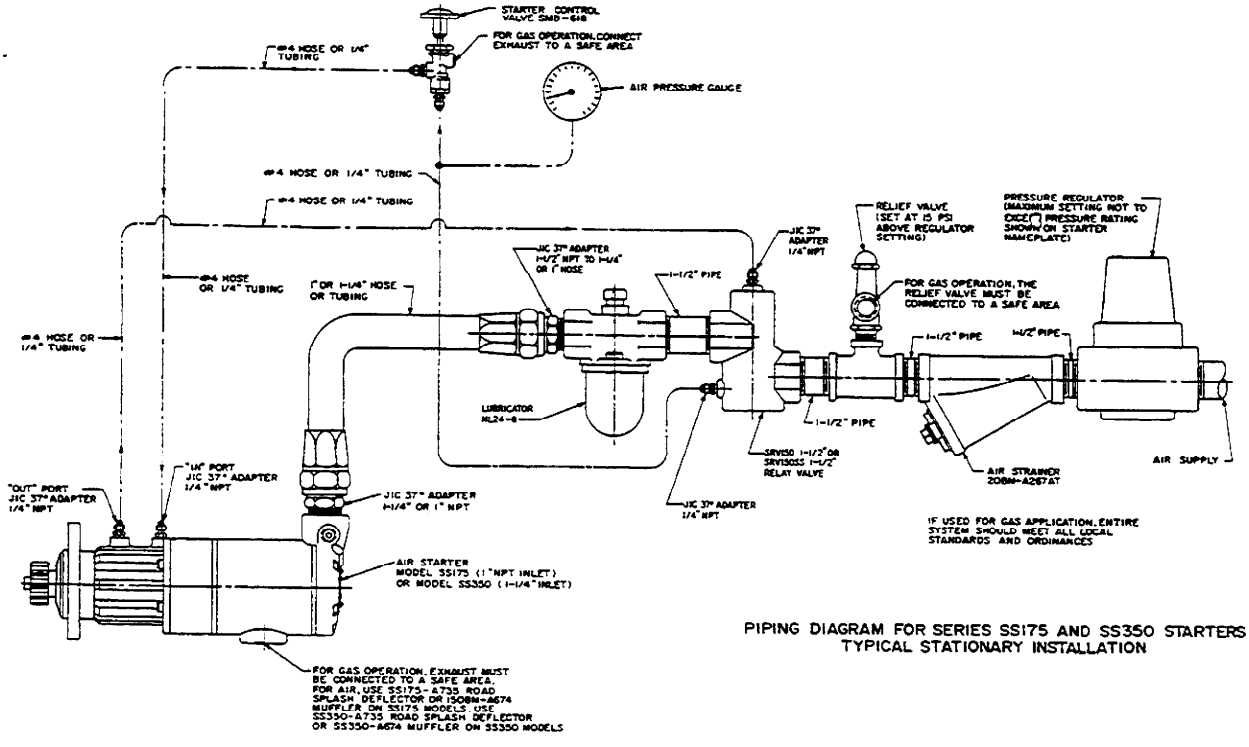
Series SS350 with Flange Mounting

PIPING DIAGRAM
FOR TYPICAL VEHICULAR INSTALLATION



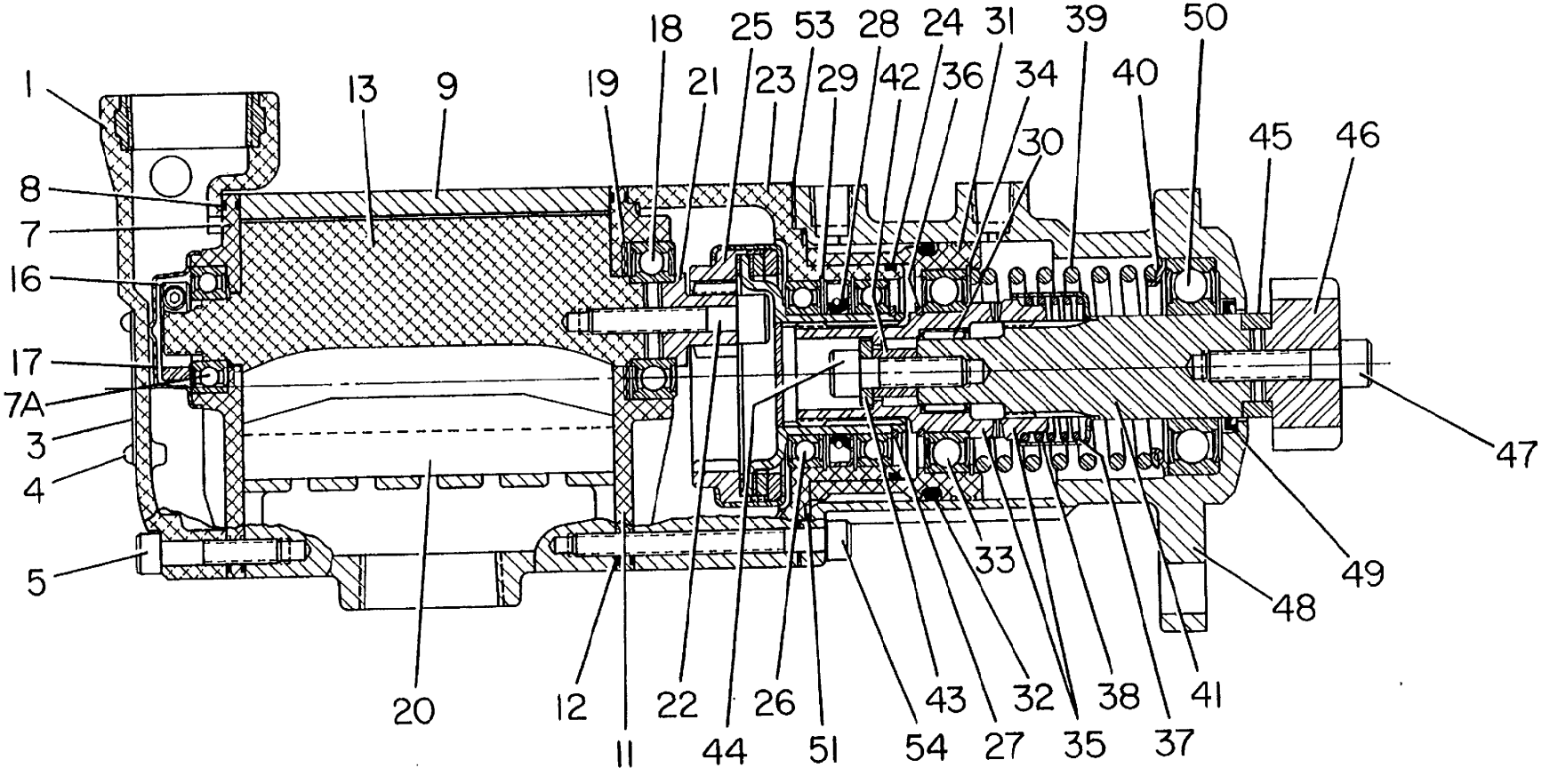
(Dwg. TPB715-1)

PIPING DIAGRAM
FOR TYPICAL STATIONARY INSTALLATION



PIPING DIAGRAM FOR SERIES SS175 AND SS350 STARTERS
TYPICAL STATIONARY INSTALLATION

(Dwg. TPA942-1)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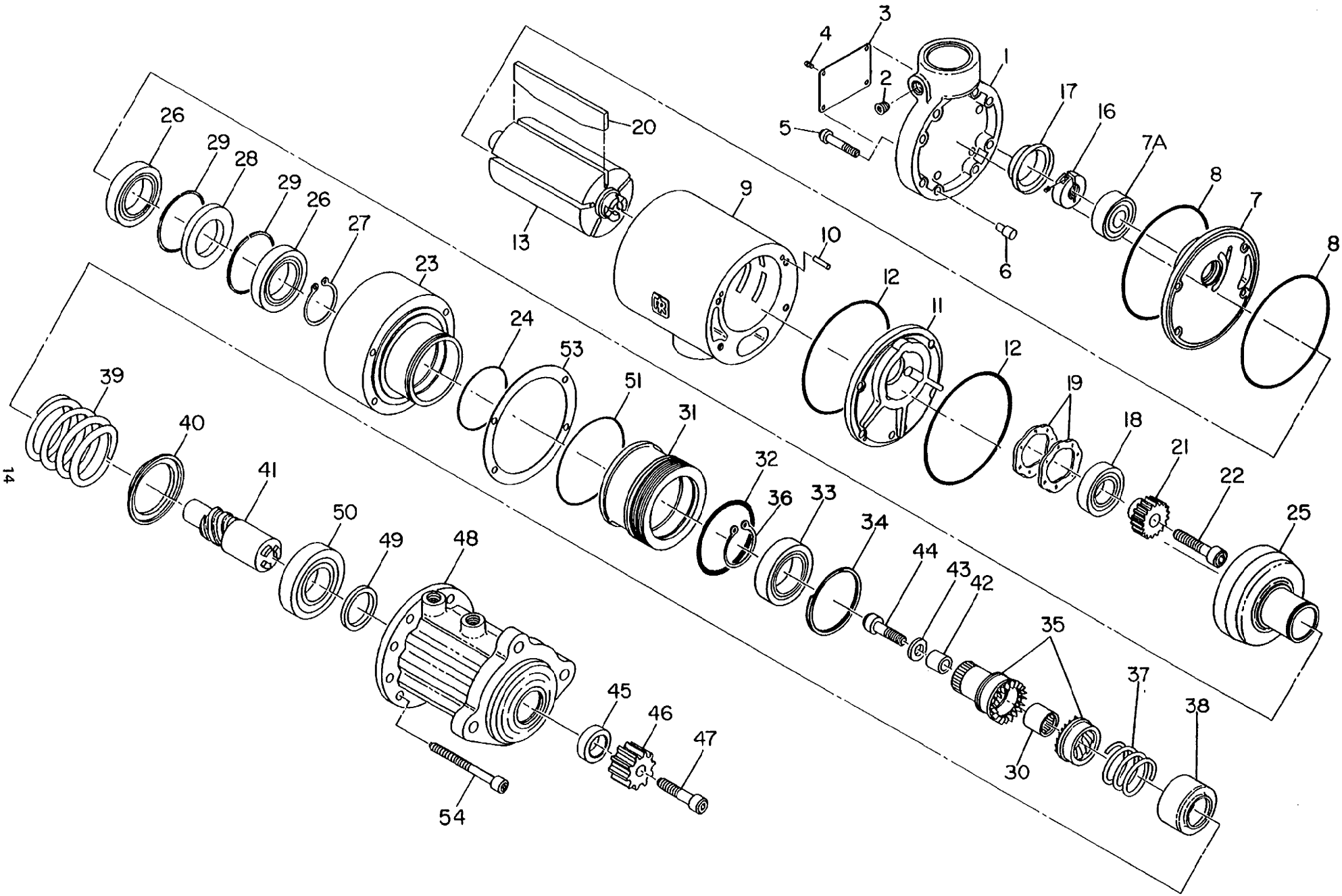
(Dwg. TPA934-1)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(Dwg. TPA931-2)

REPAIR PARTS FOR SERIES SS175

		PART NUMBER FOR ORDERING
1	Motor Housing Cover Assembly	SS175-A102
2	3/8" Pipe Plug (2)	HSPPS-3
3	Nameplate	SS800-301
4	Nameplate Screw (4)	R4K-302
5	Motor Housing Cover Cap Screw (4)	SS350-25
6	Bolt Hole Plug (4)	SS350-103
7	Rear End Plate (includes Rear Rotor Bearing)	
	for right-hand rotation Models	SS350R-12
	for left-hand rotation Models	SS350L-12
7A	Rear Rotor Bearing	SS350-24
8	End Plate O-ring (2)	SS350-67
9	Cylinder Housing Kit	SS175-K3
10	Cylinder Dowel (4)	SS350-98
11	Front End Plate	SS350-11
12	End Plate O-ring (2)	SS350-67
13	Rotor	SS175-53
16	Rear Rotor Bearing Retaining Nut	SS350-65
17	Retaining Nut Cover	SS350-64
18	Front Rotor Bearing	AM-318
19	Front Rotor Bearing Wave Washer (2)	SS350-224
20	Vane Packet (set of 5 Vanes)	SS175-42-5
21	Rotor Pinion	
	for "B" ratio Models	SS350B-17
	for "E" ratio Models	SS350E-17
22	Rotor Pinion Retaining Screw	
	for "B" ratio Models	SS350-394
	for "E" ratio Models	SS350E-732
23	Gear Case	SS350-37-03
24	Gear Case O-ring	SS350-151
25	Drive Gear	
	for "B" ratio Models	SS350B-9
	for "E" ratio Models	SS350E-9
26	Drive Gear Bearing (2)	SS350-359
27	Bearing Retaining Ring	SS350-109
28	Gear Case Seal	SS350-272
29	Gear Case Seal Retaining Ring (2)	SS350-270
30	Needle Bearing	SS350-278

		PART NUMBER FOR ORDERING
31	Piston Kit	SS350-K703
32	Piston O-ring	SS350-337
33	Piston Bearing	SS350-339
34	Piston Bearing Retaining Ring	SS350-107
35	Clutch Jaw Kit (includes both jaws and Bearing)	
	for right-hand rotation Models	SS350R-K587
	for left-hand rotation Models	SS350L-K587
36	Clutch Jaw Retaining Ring	SS350-109
37	Clutch Spring	
	for right-hand rotation Models	SS350R-583
	for left-hand rotation Models	SS350L-583
38	Clutch Spring Cup	SS350-367
39	Piston Return Spring	SS350-700
40	Return Spring Seat	SS350-191
41	Drive Shaft	
	for right-hand rotation Models	SS350R-8
	for left-hand rotation Models	SS350L-8
42	Drive Shaft Spacer	SS350-180
43	Drive Shaft Washer	SS350-177
44	Drive Shaft Cap Screw	SS350-179
45	Drive Shaft Collar	SS350-175
■ 46	Drive Pinion	— — —
47	Drive Pinion Retaining Screw	SS350-394
48	Drive Housing Kit	
	for SAE 1 flange mounting	SS350-K300-01
	for SAE 3 flange mounting	SS350-K300-03
49	Drive Housing Seal	SS350-271
50	Drive Housing Bearing	SS350-363
51	Drive Housing O-ring	SS350-243
53	Drive Housing Gasket	SS350-245
54	Drive Housing Cap Screw (4)	SS350-744
*	Tune-up Kit (includes illustrated parts 8 [2], 12 [2], 14, 18, 20, 24, 27, 28, 32, 36, 49, 51, and 53	SS175-TK2

* Not illustrated.

■ To order the proper Drive Pinion, refer to chart on page 17.

		PART NUMBER FOR ORDERING
1	Motor Housing Cover Assembly	SS350-A102
2	3/8" Pipe Plug (2)	HSPPS-3
3	Nameplate	SS800-301
4	Nameplate Screw (4)	R4K-302
5	Motor Housing Cover Cap Screw (4)	SS350-25
6	Bolt Hole Plug (4)	SS350-103
7	Rear End Plate (includes Rear Rotor Bearing)	
	for right-hand rotation Models	SS350R-12
	for left-hand rotation Models	SS350L-12
	for Model SS350GE03R31-1707	SS350R-12-1605
7A	Rear Rotor Bearing	SS350-24
8	End Plate O-ring (2)	SS350-67
9	Cylinder Housing Kit	SS350-K3
10	Cylinder Dowel (4)	SS350-98
11	Front End Plate	
	for Model SS350GE03R31-1707	SS350-11-1604
	for all other models	SS350-11
12	End Plate O-ring (2)	SS350-67
13	Rotor	SS350-53A
16	Rear Rotor Bearing Retaining Nut	SS350-65
17	Retaining Nut Cover	SS350-64
18	Front Rotor Bearing	AM-318
19	Front Rotor Bearing Wave Washer (2)	SS350-224
20	Vane Packet (set of 5 Vanes)	SS350-42-5
21	Rotor Pinion	
	for "B" ratio Models	SS350B-17
	for "E" ratio Models	SS350E-17
22	Rotor Pinion Retaining Screw	
	for "B" ratio Models	SS350-394
	for "E" ratio Models	SS350E-732
23	Gear Case	SS350-37-03
24	Gear Case O-ring	SS350-151
25	Drive Gear	
	for "B" ratio Models	SS350B-9
	for "E" ratio Models	SS350E-9
26	Drive Gear Bearing (2)	SS350-359
27	Bearing Retaining Ring	SS350-109

		PART NUMBER FOR ORDERING
28	Gear Case Seal	SS350-272
29	Gear Case Seal Retaining Ring (2)	SS350-270
30	Needle Bearing	SS350-278
31	Piston Kit	SS350-K703
32	Piston O-ring	SS350-337
33	Piston Bearing	SS350-339
34	Piston Bearing Retaining Ring	SS350-107
35	Clutch Jaw Kit (includes both jaws and Bearing)	
	for right-hand rotation Models	SS350R-K587
	for left-hand rotation Models	SS350L-K587
36	Clutch Jaw Retaining Ring	SS350-109
37	Clutch Spring	
	for right-hand rotation Models	SS350R-583
	for left-hand rotation Models	SS350L-583
38	Clutch Spring Cup	SS350-367
39	Piston Return Spring	SS350-700
40	Return Spring Seat	SS350-191
41	Drive Shaft	
	for right-hand rotation Models	SS350R-8
	for left-hand rotation Models	SS350L-8
42	Drive Shaft Spacer	SS350-180
43	Drive Shaft Washer	SS350-177
44	Drive Shaft Cap Screw	SS350-179
45	Drive Shaft Collar	SS350-175
■ 46	Drive Pinion	— — —
47	Drive Pinion Retaining Screw	SS350-394
48	Drive Housing Kit	
	for SAE 1 flange mounting	SS350-K300-01
	for SAE 3 flange mounting	SS350-K300-03
49	Drive Housing Seal	SS350-271
50	Drive Housing Bearing	SS350-363
51	Drive Housing O-ring	SS350-243
53	Drive Housing Gasket	SS350-245
54	Drive Housing Cap Screw (4)	SS350-744
*	Tune-up Kit (includes illustrated parts 8 [2], 12 [2], 14, 18, 20, 24, 27, 28, 32, 36, 49, 51 and 53)	SS350-TK2

* Not illustrated.

■ To order the proper Drive Pinion, refer to chart on page 17.

DRIVE PINION FOR SERIES SS175

PART NUMBER FOR ORDERING → PART NUMBER FOR ORDERING →

Starter Model No.	Pinion No.	Starter Model No.	Pinion No.
SS175GB01R15-02H SS175GB01R15-02J SS175GE01R15-02J SS175GE03R15-00H SS175GE03R15-02H	SS350R-13-15	SS175GE03L38-02H	SS350R-13-38
SS175GE01R21-02J	SS350R-13-21	SS175GB01R77-02J SS175GB03R77-02H SS175GE01R77-02J SS175GE03R77-02H	SS350R-13-77
SS175GE01R29-02J SS175GE03R29-02A SS175GE03R29-02H	SS350R-13-29	SS175GB01R85-02J SS175GB03R85-02J SS175GE01R85-02J SS175GE03R85-02H	SS350R-13-85
SS175GE01R31-02J SS175GE03R31-02H SS175GE03R31-02J	SS350R-13-31	SS175GB01R99-00D SS175GE01R99-00D SS175GE01R99-1369 SS175GE01R99-1389	SS350R-13-99
SS175GE03L32-00H SS175GE03L32-02H	SS350L-13-32		
SS175GE03R37-00H SS175GE03R37-02F SS175GE03R37-02H	SS350R-13-37		

DRIVE PINION FOR SERIES SS350

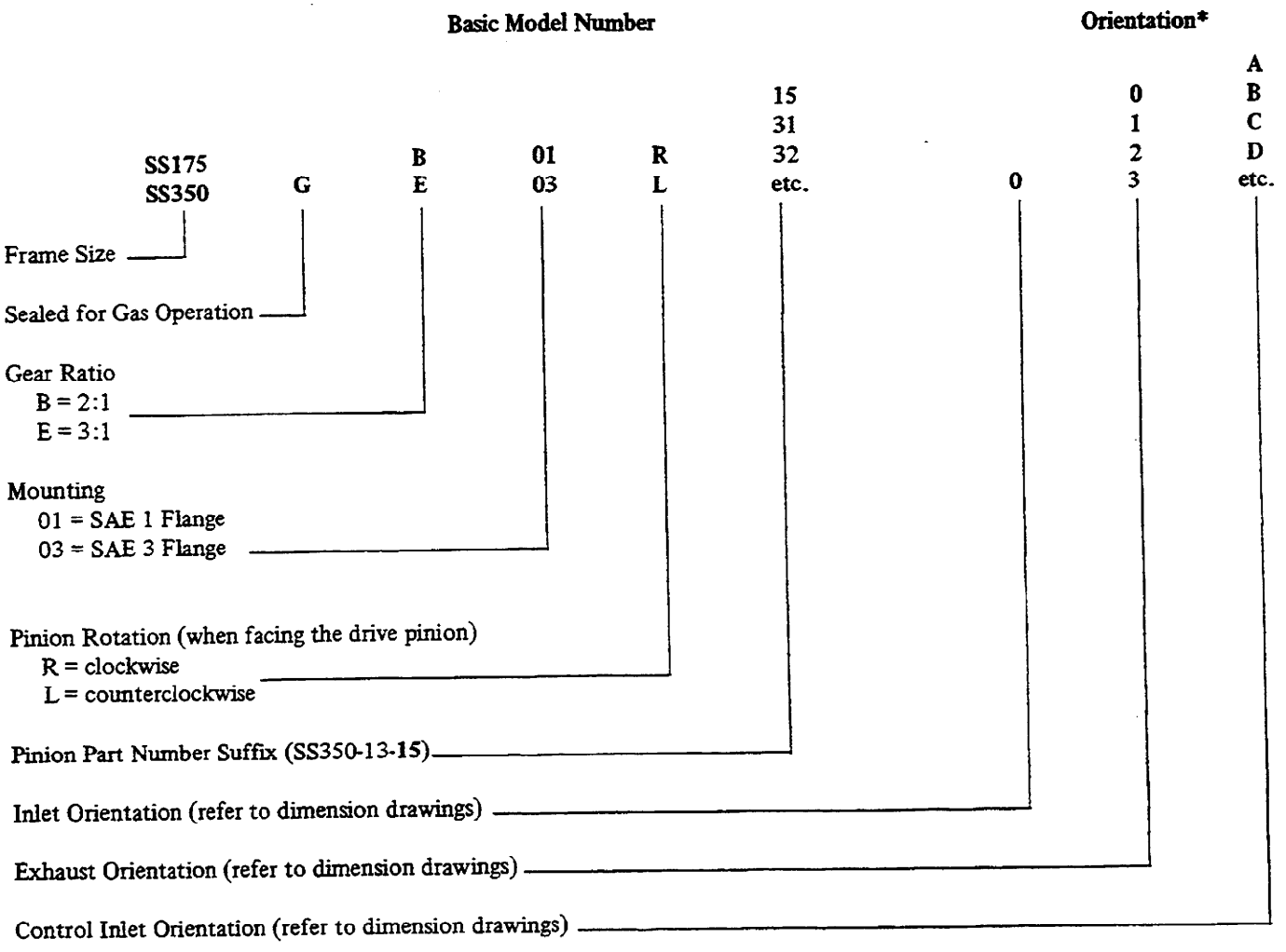
PART NUMBER FOR ORDERING → PART NUMBER FOR ORDERING →

Starter Model No.	Pinion No.	Starter Model No.	Pinion No.
SS350GE03R21-02H	SS350R-13-21	SS350GB03L32-02H SS350GE03L32-00D SS350GE03L32-00G SS350GE03L32-00H SS350GE03L32-00L SS350GE03L32-01C SS350GE03L32-01I SS350GE03L32-02F SS350GE03L32-02G SS350GE03L32-02H SS350GE03L32-03G SS350GE03L32-1513 SS350GE03L32-1550	SS350L-13-32
SS350GB01R29-02J SS350GE01R29-00L SS350GE01R29-02J SS350GE03R29-00A SS350GE03R29-00L SS350GE03R29-01J SS350GE03R29-02B SS350GE03R29-02F SS350GE03R29-02H SS350GE03R29-03J SS350GE03R29-1543 SS350GE03R29-1547 SS350GE03R29-1587	SS350R-13-29	SS350GE03R37-02H	SS350R-13-37
SS350GB03R31-00A SS350GE01R31-02J SS350GE03R31-00A SS350GE03R31-00F SS350GE03R31-00G SS350GE03R31-00H SS350GE03R31-00L SS350GB03R31-02H SS350GE03R31-01D SS350GE03R31-02A SS350GE03R31-02B SS350GE03R31-02F SS350GE03R31-02G SS350GE03R31-02H SS350GE03R31-02L SS350GE03R31-1552 SS350GE03R31-1574 SS350GE03R31-1707	SS350R-13-31	SS350GB01R77-02J SS350GB03R77-01D SS350GB03R77-02H	SS350R-13-77
		SS350GE03R83-02H	SS350R-13-83
		SS350GB01R85-00F SS350GB01R85-02H SS350GB01R85-02J SS350GB03R85-02H SS350GB03R85-1537 SS350GE01R85-02H SS350GE01R85-02J SS350GE03R85-02H	SS350R-13-85
		SS350GB01R99-00D SS350GE03R99-02H	SS350R-13-99

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Loss of Power	Worn Motor Parts	Remove the motor from the Motor Housing (9) and disassemble the motor. Examine all parts and replace any that are worn or damaged. Use the following guidelines for determining unserviceable parts: 1. **Vanes (20)** - Install a set of new vanes if any vane is separated, cracked, spalled or worn to the extent that its width is 0.67" (17 mm) or less at either end. 2. **Rotor Bearing (7A) 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 Housing (9)** - Replace if there are any cracks or deep scoring. 5. **End Plates (7 or 11)** - Clean up scoring by rubbing it with emery cloth placed on a flat surface.
	Inadequate Lubrication	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.
Air or Gas Leakage	Worn O-rings	Check the End Plate O-rings (8 or 12) and Drive Housing O-ring (51). Plug the exhaust. Apply 30 psig (2.1 bar/207 kPa) air to the inlet and immerse the unit for 30 seconds in nonflammable solvent. If bubbles appear, replace the O-ring, Gaskets or Seals.
Pinion does not engage the flywheel	Broken clutch jaws or other broken parts	Refer to Disassembly of the Piston and Clutch.
Motor runs, pinion engages but does not rotate	Broken Shafting, Gearing or Clutch Jaws	Refer to Disassembly of the Piston and Clutch.
Excessive butt engagements	Dry helical spline	Refer to Disassembly of the Piston and Clutch. Lubricate the helical spline with Ingersoll-Rand Grease No. 28.

When working with Starters, it is important that you know the model number code so that you can identify certain characteristics of the Starter relative to an application.



*The following orientation combinations are not possible because of space limitations and other considerations:

ON FLANGE MOUNT STARTERS

0-0-E	0-1-H	0-2-E	0-3-H
0-0-C	0-1-F	0-2-C	0-3-F
0-0-K	0-1-B	0-2-K	0-3-B
0-0-I	0-1-L	0-2-I	0-3-L

TESTING THE STARTER

1. Turn the Drive Pinion (46) by hand in the direction of Starter rotation. The clutch should ratchet smoothly with a slight "clicking" action.

NOTICE

Proper Starter rotation is indicated when facing the Drive Pinion. That is, a Starter having the letter "R" in the model number is designated as a right-hand rotation model, and the Drive Pinion will rotate clockwise when facing the Drive Pinion.

2. Turn the Drive Pinion in the opposite direction of Starter rotation. The gearing and motor should rotate freely with no binding.
3. Attach an air hose to the "IN" port on the Drive Housing (48), and apply 50 psig (3.4 bar/345 kPa) air pressure. The Drive Pinion should move outward and air should escape from the "OUT" port.
4. Plug the "OUT" port and apply 150 psig (10.3 bar/1034 kPa) air pressure to the "IN" port. Check to make certain no air is escaping. Measure the distance from the face of the Drive Pinion farthest from the mounting flange to the machined face of the mounting flange. It should be 2.75" (70.0 mm ± 1.5 mm). With the air pressure on and the Drive Shaft extended, push the Drive Pinion toward the Drive Housing until the Pinion rotates slightly and comes to a solid stop. While holding the Drive Pinion against the stop, measure again the distance from the face of the Drive Pinion to the machined face of the mounting flange. The difference between the two measurements must be .47" (12.0 mm ± 0.9 mm). Remove the pressure from the "IN" port and measure again the distance from the face of the Drive Pinion to the machined face of the mounting flange. It should be 1.82" (46.2 mm ± 1.5 mm).
5. Attach a 3/8" (9 mm) air hose to the inlet of the motor and apply 90 psig (6.2 bar/620 kPa) air pressure. The Starter motor should run smoothly.
6. Plug the exhaust port and apply 30 psig (2.1 bar/207 kPa) air pressure to the inlet of the motor. Immerse the Starter for thirty seconds in a nonflammable solvent. If the Starter is properly sealed, no bubbles will appear.

ACCESSORIES

The following accessories are available for use on installations involving an SS175 or SS350 Air Starter.

Part Number	Name of Part
SMB-618	Starter Control Valve
HDL2	Lubricator
HDL1-47	Lubricator Filter
NL-24-8	Air Line Lubricator
SMB-441	Sealant for Pipe Threads
150BMP-1051B	12-Volt Solenoid Valve
150BMP-2451B	24-Volt DC Solenoid Valve
150BMP-1054	Combination Pressure Relief/Check Valve
150BMP-1056	Check Valve
150BMP-1064	Pressure Gauge
K4U-A267AT	1-1/4" Air Strainer
20BM-A267AT	1-1/2" Air Strainer
150BMP-1067	Drain Valve
SRV150-SS	1-1/2" Relay Valve (Stainless Steel) (for gas applications where required)

Part Number	Name of Part	
150BM-A674	Muffler	for SS175
SS175-A735	Road Splash Deflector	for SS175
SRV100	1" Relay Valve	for SS175
SS175-HN16	1" Pipe Nipple	for SS175
SS350-A674	Muffler	for SS350
SS350-A735	Road Splash Deflector	for SS350
SRV125	1-1/4" Relay Valve	for SS350
SS350-HN20	1-1/4" Pipe Nipple	for SS350

Ingersoll-Rand Company
Engine Starting Systems
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Liberty Corner, NJ 07938
201-647-6000

SALES HEADQUARTERS