IMPORTANT INSTRUCTIONS

FD151 GAS COMPRESSOR

Solutions beyond products...

CORKEN®

IDEX

Warning: (1) Periodic inspection and maintenance of Corken products is essential. (2) Inspection, maintenance and installation of Corken products must be made only by experienced, trained and qualified personnel. (3) Maintenance, use and installation of Corken products must comply with Corken instructions, applicable laws and safety standards (such as NFPA Pamphlet 58 for LP-Gas and ANSI K61. 1-1972 for Anhydrous Ammonia). (4) Transfer of toxic, dangerous, flammable or explosive substances using Corken products is at user's risk and equipment should be operated only by qualified personnel according to applicable laws and safety standards.

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CHAPTER ONE
HOW YOUR COMPRESSOR WORKS

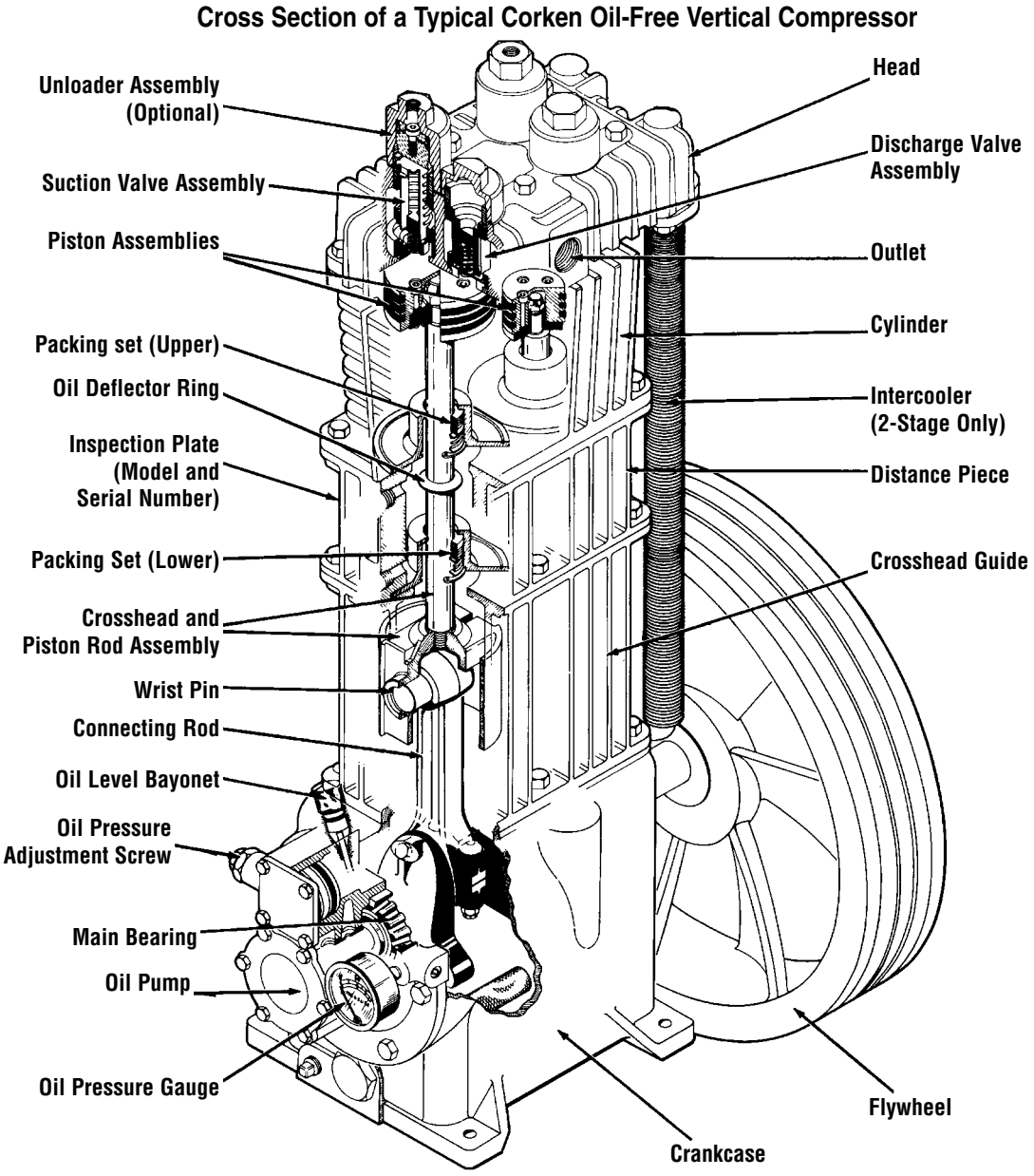


Figure 1.1A

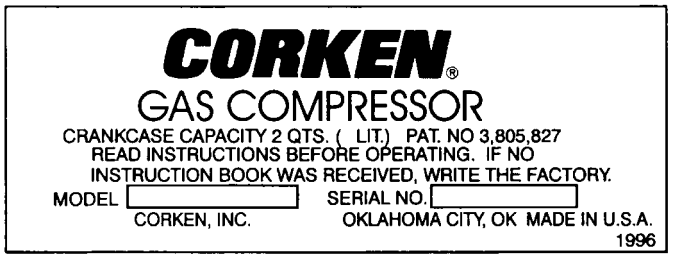
1.1 WHY CORKEN COMPRESSORS ARE SPECIAL

Corken industrial gas compressors are unique among compressors their size. Unlike ordinary lubricated gas compressors, Corken compressors completely isolate the pressurized gas in the compression chamber from the crankcase. While piston rings seal the piston tightly enough for it to do compression work, they do not provide enough sealing to isolate the compression chamber from the crankcase. To further seal the compression chamber, a crosshead/piston rod design with seals around the piston rod is required (see Figure 1.1A).

By utilizing specialized piston-rod sealing systems, Corken compressors can compress pressurized, flammable and toxic gases. It is also used to compress harmless gases where oil-free compression or elevated suction pressures are required. With a numerous selection of design options available, Corken offers the most versatile line of small gas compressors in the world.

1.2 RUNNING GEAR

Corken gas compressors are mounted on sturdy oil-lubricated crankcases. Crankshafts are supported by heavy-duty roller bearings. The connecting rods ride the crankshaft on journal bearings. All compressor crankcases are pressure lubricated. An automatically reversible gear-type oil pump circulates oil through passages drilled in the crankshaft and connecting rod to lubricate journal bearings and wrist pins (see Figure 1.2A). Sturdy iron crossheads transmit reciprocating motion to the piston.



Corken's automatically reversible oil pump design allows the machine to function smoothly in either direction of rotation. A replaceable 10-micron spin-on oil filter ensures long life.

1.3 PISTON ROD PACKING / DISTANCE PIECES

Piston rod packing is used to seal gas in the compression chamber and prevent seepage of oil out of the crankcase into the compressor cylinder. The packing consists of several PTFE V-rings sandwiched between a male and female ring (see Figure 1.3A). The packing rings are spring loaded to allow a small amount of “float” to alleviate cyclic stresses, reduce wear, and assure a positive seal.

Pressure Lubrication System

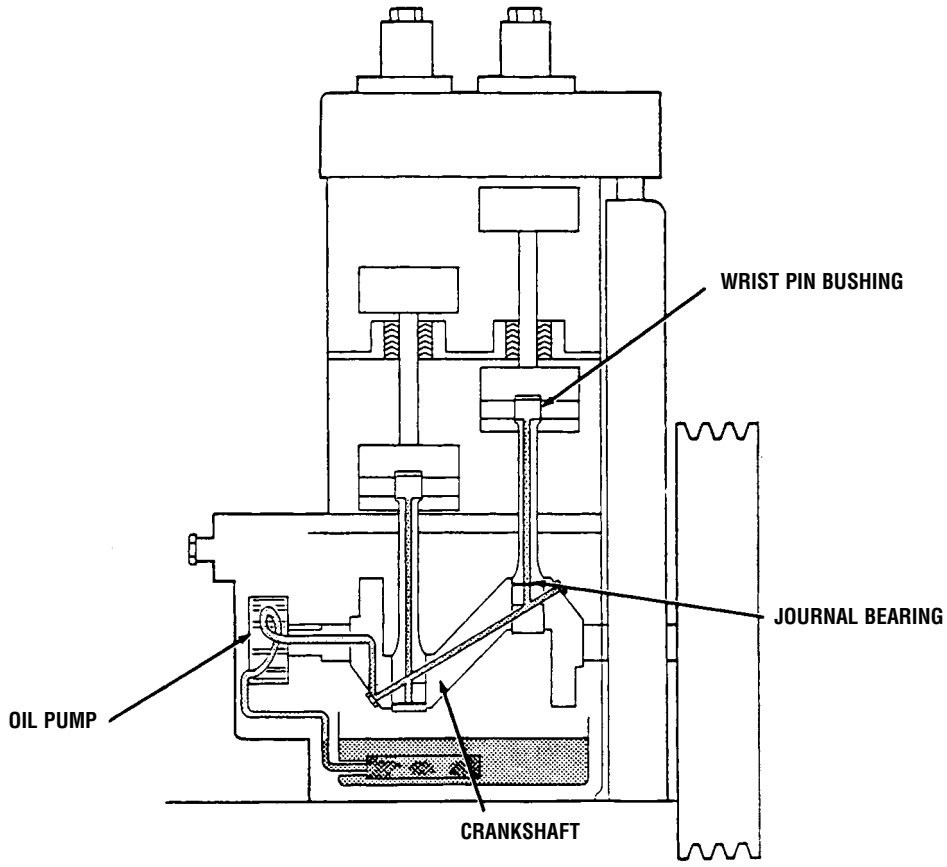


Figure 1.2A

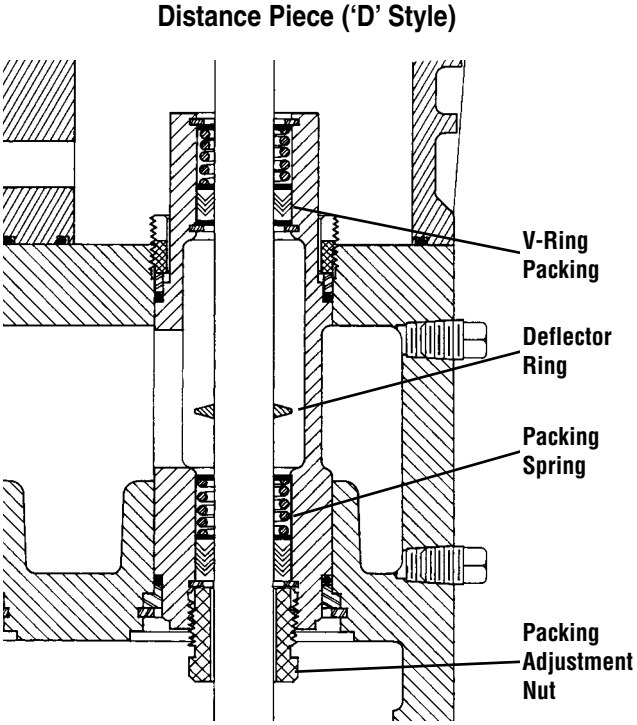


Figure 1.3A

Corken manufactures compressors with one, two, or three packing sets. Standard-style units contain one packing set. For completely oil-free compression, two packing sets are used (see Figure 1.3A). Oil-free compressors are designated by the prefix "D". Oil that seeps past the first packing set is prevented from reaching the second by an oil deflector ring. Three packing sets and two distance pieces are available on special machines for compressing highly corrosive gases. Units with three packing sets are designated by the prefix "T". The construction of the "D"- and "T"-style units ensures that no part of the rod which travels into the crankcase enters the cylinder.

The distance pieces may be vented or purged with an inert gas. The orientation of the packing varies with the application. See Sec. 2.10 and Appendix F for more details.

1.4 PISTON/PISTON RINGS

Corken compressors use iron pistons that are locked to the piston rod. The standard piston ring material is a glass-filled PTFE polymer specially formulated for non-lubricated service. Piston ring expanders are placed behind the rings to insure that the piston rings seal against the cylinder wall (see Figure 1.4A).

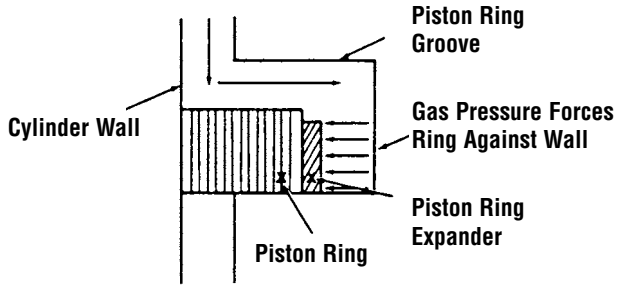


Figure 1.4A

1.5 VALVES

The typical Corken compressor valve consists of a seat, bumper, spring and valve disk, as shown in Figure 1.5A. Special heat-treated alloys are utilized to prolong the life of the valve in punishing non-lubricated services. The valve opens whenever the pressure on the seat side exceeds the pressure on the spring side. The discharge valve is an inverted version of the suction valve.

1.6 COOLING

Your Corken compressor model FD151 is air-cooled. It is important to maintain good air flow around your compressor. Keep this in mind as you select the location where the compressor will operate.

1.7 SUCTION VALVE UNLOADERS (OPTIONAL)

Some Corken compressors are equipped with suction valve Unloaders. Check your model number against Appendix A to determine the valve/unloader

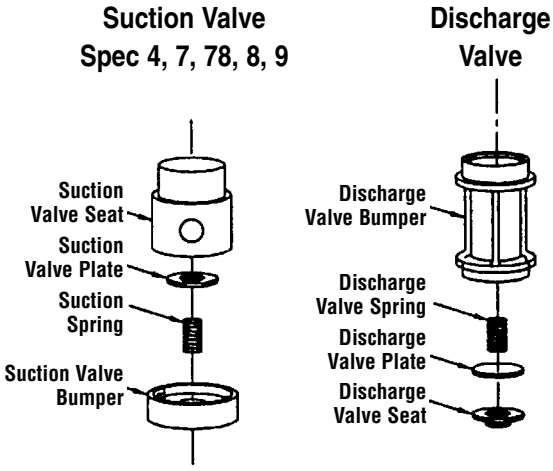


Figure 1.5A

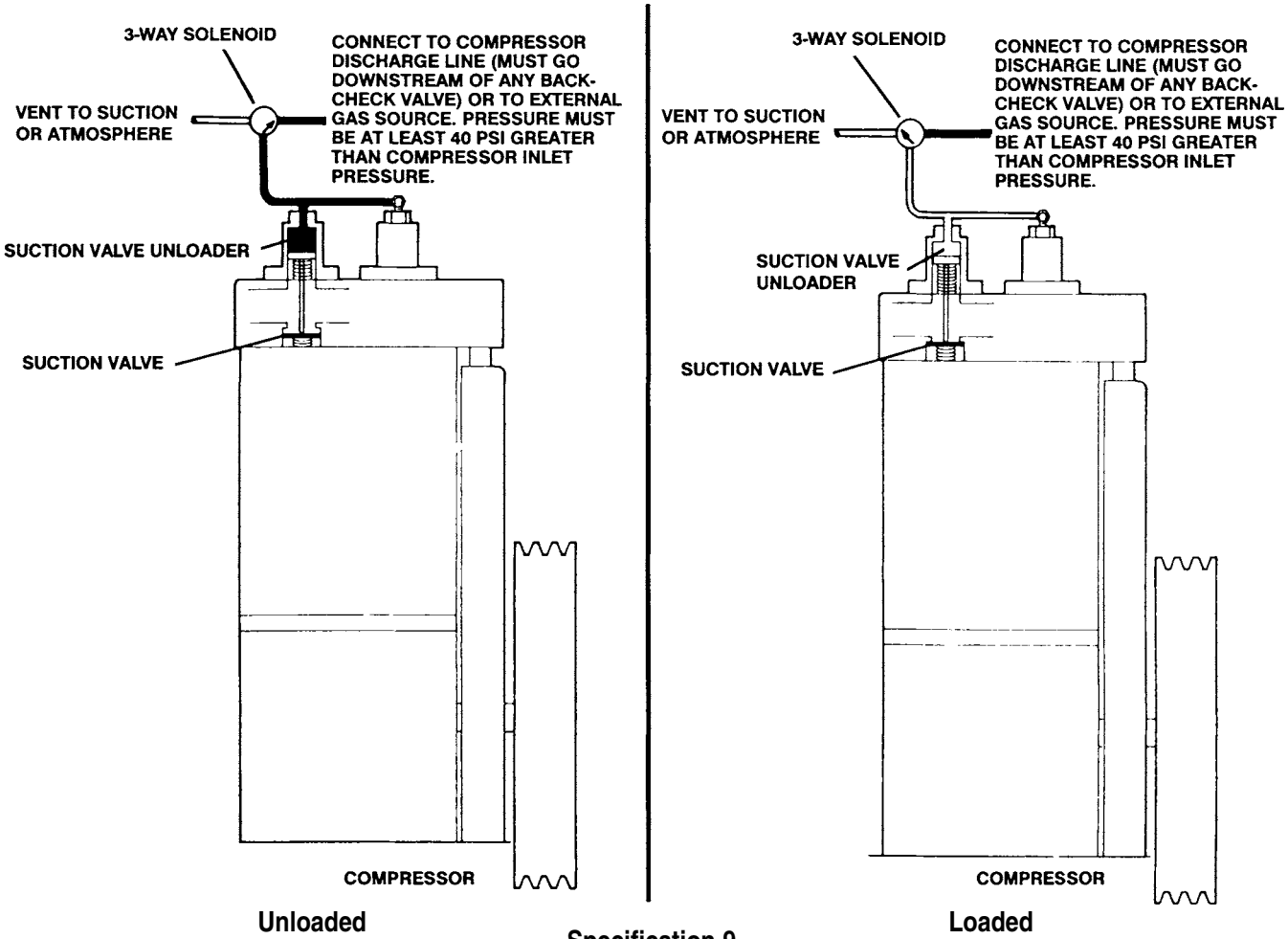
arrangement for your machine. If the valve/unloader number for your machine is 3 or 4, proceed to chapter 2 (your machine has no unloaders).

The suction valve unloader is a small piston and cylinder assembly that is installed over the suction valve (see Figure 1.1A). The small piston is connected to a rod that extends into the suction valve assembly. The unloader piston is depressed when gas pressurized to 40 psi or more above suction pressure is injected into the unloader cylinder.

In the depressed position, the piston pushes the rod against the suction valve disk to hold the suction valve in an open position. In this position, no compression will occur, even though the pistons are still moving up and down.

The unloaders are controlled by devices which control the flow of gas into and out of the unloader cylinder. The different types of unloader controls may be summarized as follows:

SPECIFICATION 9 - When the gas being compressed cannot be vented to the atmosphere, electronic controls should be used as shown in Figure 1.7D. The use of an optional three-way solenoid valve allows gas from the unloader to be vented back to the compressor suction instead of to atmosphere. A time delay may be used to achieve loadless start and a pressure switch may be used to achieve constant-speed unloading.



Specification 9

Figure 1.7D

CHAPTER TWO
INSTALLING YOUR CORKEN COMPRESSOR

2.1 LOCATION

Corken compressors are designed and manufactured for outdoor duty. For applications in which the compressor will be subjected to extreme conditions for extended periods, such as hot boiler rooms, corrosive environments, arctic or desert conditions, etc., consult Corken. Check local safety regulations and building codes to assure installation will meet local safety standards.

Corken recommends that machines compressing toxic or flammable gases be placed outdoors. If such units are placed indoors, make sure the area is well ventilated. Vent the distance piece to the outdoors or purge the distance piece with an inert gas and vent to a safe disposal area.

2.2 FOUNDATION

Proper foundations are essential for a smooth running compression system. Corken recommends the compressor be attached to a concrete slab at least 8" thick, with a 2" skirt around the circumference of the baseplate. The baseplate should be securely anchored into the foundation by 1/2"diameter "J" bolts 12" long. The total mass of the foundation should be approximately twice the weight of the compressor system (compressor, baseplate, motor, etc.). After leveling and bolting down the baseplate, the volume beneath the channel must be grouted iron baseplate to prevent flexing of the top portion of the "J" bolt that extends beyond the foundation. The grout also improves the dampening capabilities of the foundation by creating a solid interface between the compressor and foundation.

On models mounted on a longer baseplate a hole can be cut in the baseplate for filling the middle section of the channel-iron base with grout. See additional foundation design aids in appendix H.

2.3 PIPING

Proper piping design and installation is as important as the foundation is for smooth operation of the compressor. Improper piping installation will result in undesirable transmission of compressor vibration to the piping.

Recommended Foundation Details for Corken Compressors

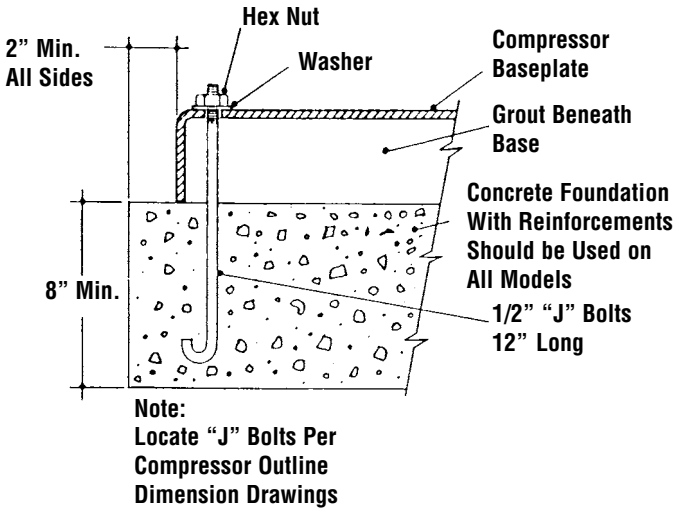


Figure 2.2A

DO NOT SUPPORT PIPING WITH THE COMPRESSOR.

Unsupported piping is the most frequent cause of pipe vibration. The best method to assure transmission of vibration from the compressor to the piping is minimized by using flexible connectors (see Figure 2.3A).

Pipe must be adequately sized to prevent excessive pressure drop between the suction source and the compressor, as well as between the compressor and the final discharge point. In most cases, piping should be at least the same diameter as the suction nozzle on the compressor.

Care must be taken if a restriction device such as a valve, pressure regulator, or back-check valve is to be installed in the compressor's suction line. The suction line volume between the restrictive device and the compressor suction nozzle must be at least ten times the swept cylinder volume.

Piping must be installed to prevent condensate from draining into the compressor. This is especially important on applications where gas is being handled at or near its saturation point.

Piping Details

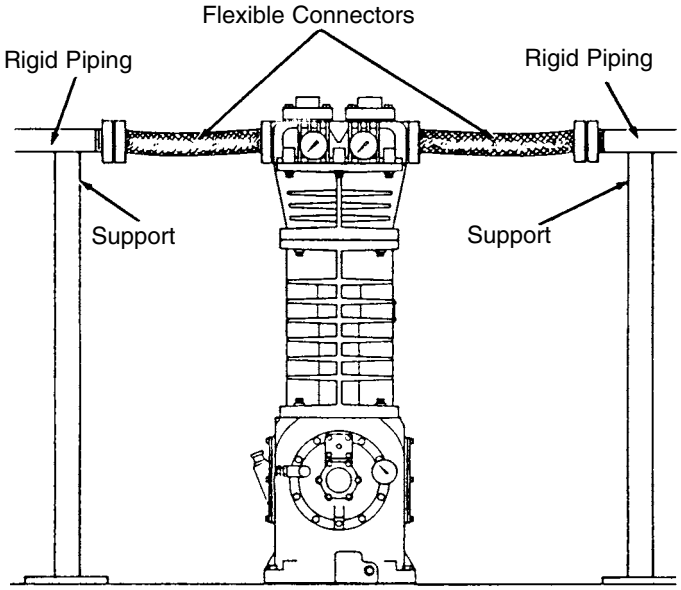


Figure 2.3A

Mechanical Trap

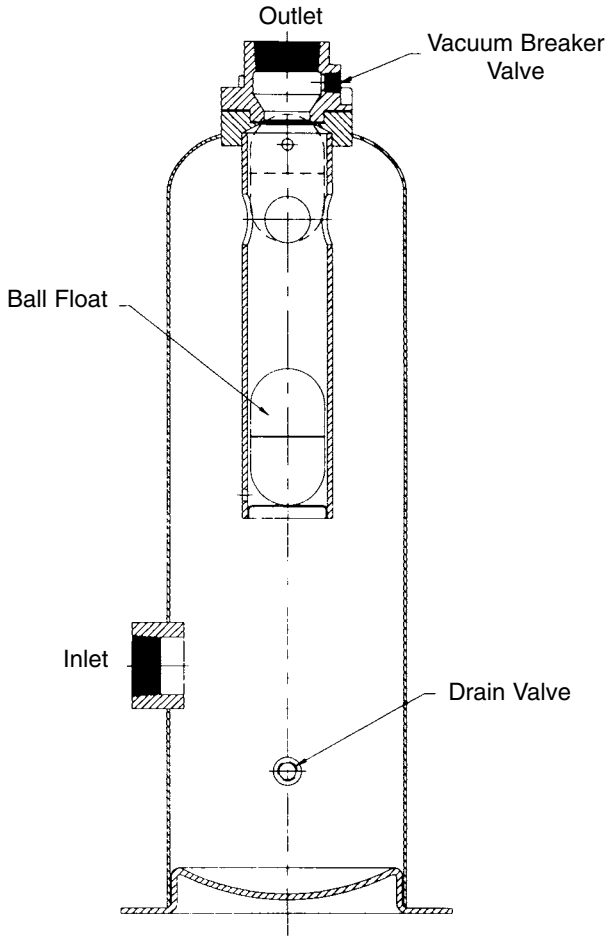


Figure 2.4A

On oil-field gas compressors, "heavy ends" such as pentane, hexane, heptane, etc., may accumulate beneath the piston over a period of time. For this reason, lubricated compressors are equipped with a drain cock to allow draining of the volume beneath the piston before start-up.

2.4 LIQUID TRAPS

Compressors are designed to pressurize gas, not to pump liquids. Since liquids are incompressible, the entry of even a small amount of liquid into the compressor can result in a highly undesirable phenomenon called "liquid slugging". Since the compressor attempts to compress a non-compressible fluid in this situation, high-impact stresses are created that will result in serious damage to the compressor.

On applications where the presence of entrained liquids in the suction gas is a possibility, a liquid trap **must** be used to prevent the entry of liquid into the compressor.

Corken offers three types of liquid traps for removal of entrained liquids. The simplest is a mechanical float trap (see Figure 2.4A). As the liquid enters the trap, the gas velocity is greatly reduced, allowing the entrained liquid to drop out. If the liquid level

Automatic Liquid Trap

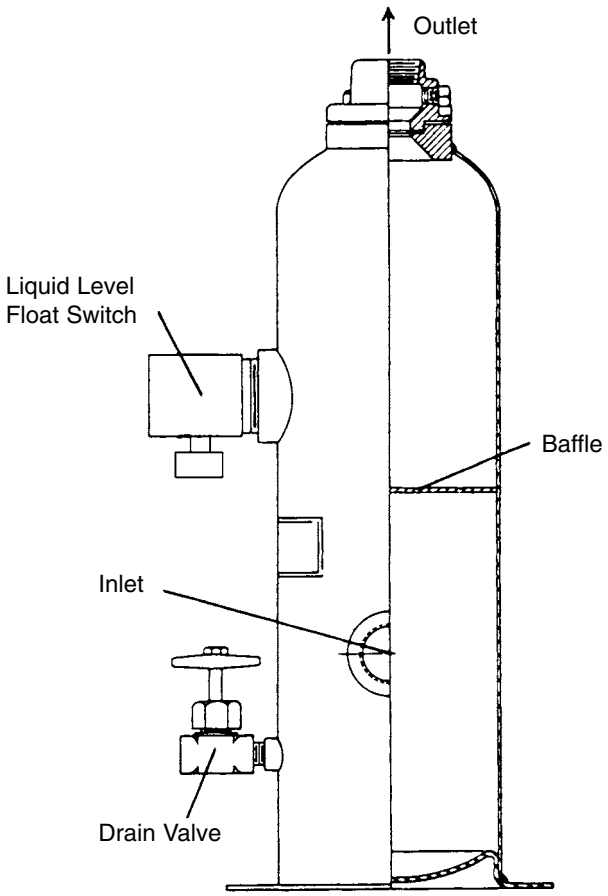


Figure 2.4B

ASME Automatic Trap

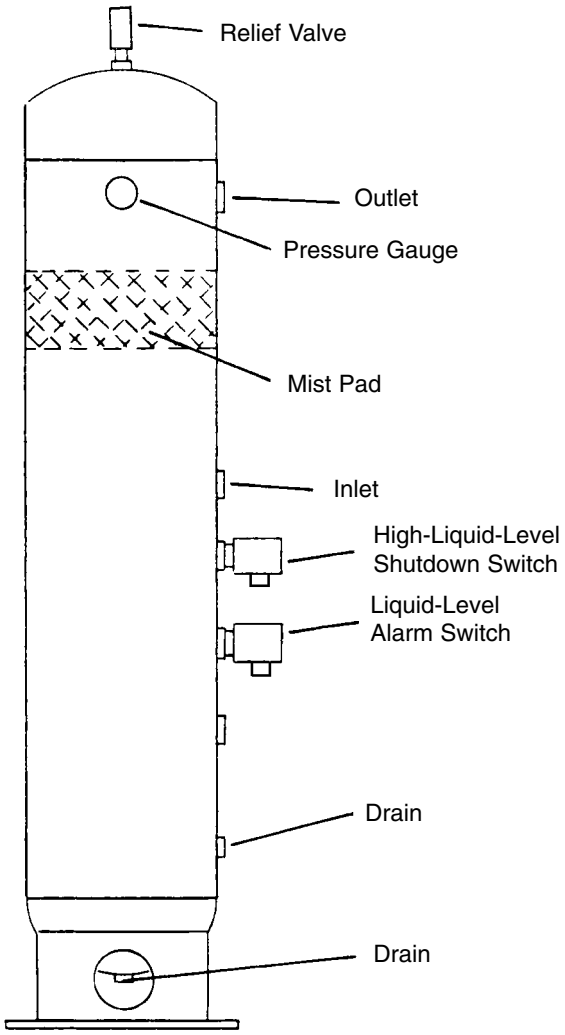


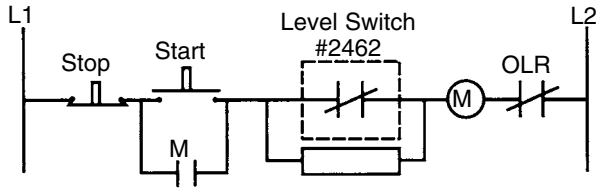
Figure 2.4C

rises above the inlet, the float will plug the compressor suction. The compressor creates a vacuum in the inlet piping and continues to operate until it is manually shut down by the operator. Before restarting the compressor, drain the trap and open the vacuum-breaker valve to allow the float to drop back to the bottom of its holder. This type of trap is only appropriate for use where the compressor is kept under fairly close observation by the operator.

For continuous-duty operation applications such as those found in the chemical industry, an automatic trap should be used (see Figure 2.4B). The automatic trap replaces the mechanical float with electrical float switches. If the liquid level should rise too high, the level switch will open and disconnect the power to the motor starter, stopping the compressor. This design ensures the machine will be protected even when it is not under close observation.

Corken's most sophisticated trap provides the most thorough liquid separation (see Figure 2.4C). This trap is larger and is ASME-code stamped. It contains two level switches, one for alarm and one for shutdown. In some cases, the alarm switch can activate a dump valve (not included with trap) or sound an alarm. A drain valve is included to manually drain the trap. This trap also contains a mist pad (a mesh of interwoven wire to disentrain fine-liquid mists). The ASME-code trap is an available option on most models.

Wiring Diagram



Protective Thyrector
110VAC CORKEN #3848 or G.E. #V150-LA1
220VAC CORKEN #3849 or G.E. #V300-LA2

Figure 2.4D

A typical wiring diagram for the liquid level switch is shown in Figure 2.4D. The switches can be set for either normally open or normally closed operation. Some level switches vary in operation. follow manufacturers instructions for operating mode you have selected.

NOTE: The level switch MUST be removed from the trap before grounding any welding devices to the trap or associated piping! Failure to do so will damage the switch contacts.

If your compressor is equipped with a liquid trap of other than Corken manufacture, make sure it is of a size adequate to thoroughly remove any liquid entrained in the suction stream.

2.5 DRIVER INSTALLATION / FLYWHEELS

Corken vertical compressors may be driven either by electric motors or combustion engine (gasoline, diesel, natural gas, etc.). Corken compressors are usually V-belt driven, but they are suitable for direct-drive applications as well. Direct-drive applications require an extended crankshaft to allow the attachment of a rigid metal coupling. NOTE: FLEXIBLE COUPLINGS ARE NOT SUITABLE FOR RECIPROCATING COMPRESSORS. NEVER OPERATE A RECIPROCATING COMPRESSOR WITHOUT A FLYWHEEL.

Select drivers so that the compressor operates between 350 to 825 RPM. Do not operate the unit without the flywheel; severe torsional imbalances will result that could cause vibration and high horsepower requirement. The flywheel should never be replaced by another pulley unless it has a higher wk^2 value than the flywheel.

A humid climate can cause problems, particularly in explosion-proof motors. The normal breathing of the motor, as well as alternating between being warm when running and cool when stopped, can draw moist air into the motor. This moist air will condense, and may eventually add enough water inside the motor to cause it to fail. To prevent this, make a practice of running the motor at least once a week on a bright, dry day for an hour or so without the V-belts. In this period of time, the motor will heat up and vaporize the condensed moisture, driving it from the motor. No motor manufacturer will guarantee explosion-proof or totally enclosed (TEFC) motors against damage from moisture. For installation with engine drivers, thoroughly review instructions from the engine manufacturer to assure the unit is properly installed.

ACCEPTABLE CRANKCASE OIL PRODUCTS FOR CORKEN COMPRESSORS

CONSTANT WEIGHT - NON-DETERGENT - R&O INHIBITED

OIL PRODUCT	ISO	VI	SAE	AMBIENT TEMP
Exxon®				
TERESSTIC	100	95	30	65° - 100° F
	68	95	20+	45° - 70° F
	46	95	20	35° - 50° F
Mobil®				
RARUS 427 Reciprocating Compressor Oil	100	95	30	65° - 100° F
DTE Oil Heavy Medium	64	95	20+	45° - 100° F
Dectol R&O Oil	44	95	20	35° - 50° F
Conoco®				
Dectol R&O Oil	100	98	30	35° - 50° F
	68	97	20+	45° - 70° F
	46	99	20	35° - 50° F
Texaco®				
Regal R&O Oil	100	92	30	65° - 100° F
	68	97	20+	45° - 70° F
	46	102	20	35° - 50° F
Sun®				
SunVis 900 Oil	100	100	30	65° - 100° F
	68	100	20+	45° - 70° F
	46	100	20	35° - 50° F

Figure 2.6A

Compressor Model	Approximate Quarts	Capacity Liters
FD151	1.5	1.4

Figure 2.6B

2.6 CRANKCASE LUBRICATION

Non-detergent oil is recommended for Corken compressors. Detergent oils tend to keep wear particles and debris suspended in the oil, whereas non-detergent oils let them settle to the bottom of the crankcase. When non-detergent oils are not available, detergent oils usually may be substituted successfully, although compressors handling ammonia, amine, or imine gases are notable exceptions. These gases react with the detergent and cause the crankcase oil to become corrosive and contaminated. Figures 2.6A & B show recommended oil viscosities and crankcase capacities.

New or rebuilt units should be filled with oil through the opening behind the compressor nameplate. This provides excellent lubrication for the crossheads on initial startup (see Figure 2.6C). Synthetic lubricants are generally not necessary. Please consult the factory if you are considering the use of a synthetic oil.

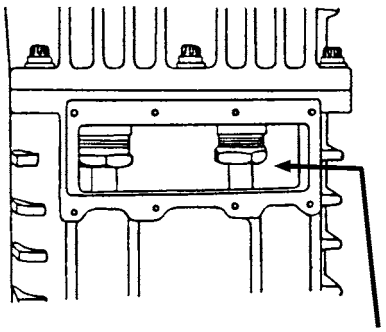
2.7 PURGING AND DRAINING OF DISTANCE PIECES

The key to leakage control and oil-free operation of Corken compressors is the distance piece. Distance pieces are equipped with tapped holes to purge, vent and drain. Proper connections to and from these tapped holes are essential for optimum compressor performance.

Since some oil will pass the bottom packing set, regular draining of the distance piece is essential to maintain oil-free operation (See Figure 2.7). Corken recommends checking and draining the distance piece once a week for units in continuous-duty operation. Installing a drain cock to the distance piece drain will help simplify draining of the distance piece.

Compressors with "A"-Style packing arrangements are shipped with all connections plugged. The distance piece will pressurize in this type application.

Corrosive gases should be prevented from entering the crankcase, since even minute amounts of leakage into the crankcase can seriously contaminate the crankcase oil. To prevent this contamination, the distance piece may be purged, buffered, or both purged and buffered by a dry, clean, non-corrosive gas like air or nitrogen.



Note: Fill crankcase with oil through this opening

Figure 2.6C

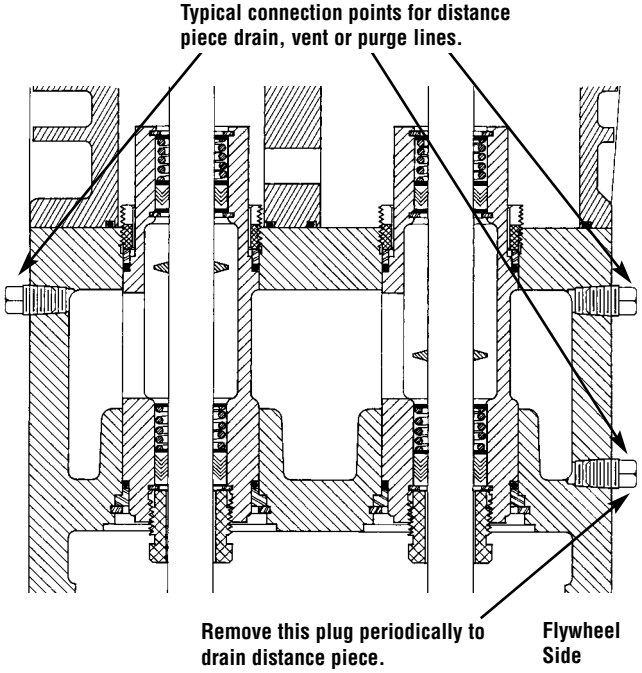


Figure 2.7

PURGING. Purging without buffering can only be performed on units with “A”-Style packing arrangements. Purge gas at a lower pressure than the suction pressure fed into the distance piece through the purge connection and discharged from the vent. Moisture and condensate can be removed from the distance piece with the purge gas by opening the vent connection at the bottom of the distance piece. By purging the distance piece, leakage into the distance piece is quickly diluted by the purge gas and swept away. The purge gas should be vented to a safe release area, flare, or treatment facility, depending on the gas and local regulations.

PURGE & BUFFER. For applications with vacuum inlet pressures and/or low operating pressure (200 psig or less), buffering offers advantages over purge-only systems. For buffered systems, the distance piece is pressurized ABOVE discharge pressure with a clean, dry, inert gas (usually dry air or nitrogen). The top packing set is inverted to point up. For “B” & “E”-Style packing arrangements, disconnect and plug lines running to the discharge of the compressor (first or second stage). Otherwise, the purge gas will tend to leak into the compression chamber. Purging and buffering can be accomplished by venting the distance piece to a safe release area. A backpressure valve may be used to maintain proper distance piece pressure.

VENT ONLY. Compressors used for flammable but non-toxic, non-corrosive gases or for indoor applications require the distance piece to be vented to an appropriate release area, flare, or treatment facility.

HIGHLY CORROSIVE GASES. The compressor should be blocked from the system via valves on the suction and discharge piping, then purged with dry inert gas before being shut down. Experience has proven this significantly lowers possible corrosion damage to the machine.

2.8 RELIEF VALVES

Any line leading to or from the compressor that can be blocked by a valve or other restrictive device **must** be equipped with a relief valve. The relief valve should be able to relieve a volume of gas higher than the piston displacement of the compressor. Relief valves should be made of materials compatible with the gas being compressed. For compressors handling toxic or flammable gases, the relief valves should be piped to an area where it is safe to release gas.

CHAPTER THREE
STARTING UP YOUR CORKEN COMPRESSOR

NOTE: Read entire chapter before going to start-up checklist.

3.1 INSPECTION AFTER EXTENDED STORAGE

If your compressor has been out of service for a long period of time, verify that the cylinder bore and valve areas are free of rust and other debris (see the maintenance section of this manual for valve and/or cylinder head removal instructions).

Drain the oil from the crankcase and remove the nameplate and crankcase inspection plate. Inspect the running gear for signs of rust and clean or replace parts as necessary. Replace the crankcase inspection plate and fill the crankcase with the appropriate lubricant. Squirt oil on the cross-heads and rotate the crank by hand to ensure that all bearing surfaces are coated with oil.

Rotate the unit manually to ensure that the running gear functions properly. Replace the nameplate and proceed with start-up.

3.2 FLYWHEEL AND V-BELT ALIGNMENT

Before working on the drive assembly, be sure that the electric power is disconnected. When mounting new belts, always make sure the driver and compressor are close enough together to avoid forcing the belts on.

Normal rotation is counterclockwise, facing the flywheel. This is important for two-stage units with intercoolers.

Improper belt tension and sheave alignment can cause vibration, excessive belt wear and premature bearing failures. Before operating your compressor, check the alignment of the V-grooves of the compressor and drive sheaves, visual inspection will often indicate if the belts are properly aligned, but use of a square is the best method.

Bushing Size	Diameter In.	(cm)	Bolt Torque ft.-lb.	(kg-meter)
SF	4.625	(11.7)	30	(4.1)
E	6.0	(15.2)	60	(8.3)

The flywheel is mounted on the shaft via a split, tapered bushing and three bolts (Figure 3.2A). These bolts should be tightened in an even and progressive manner until torqued as specified below. There must be a gap between the bushing flange and the sheave when installation is complete. Always check the flywheel runout before start-up and readjust if it exceeds the value listed in Appendix D.

FLYWHEEL INSTALLATION

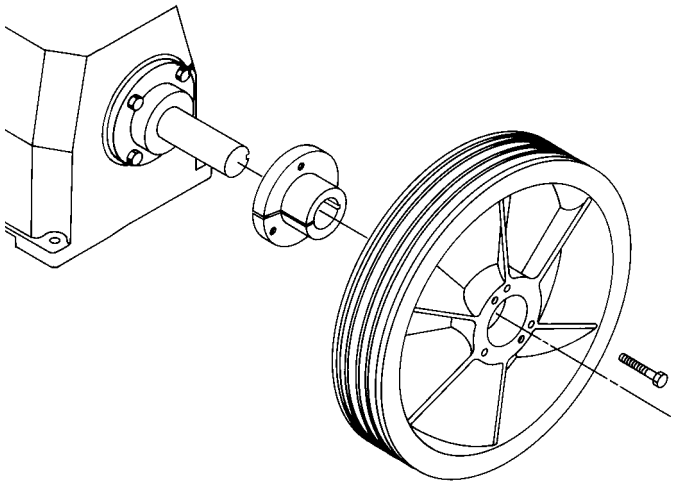


Figure 3.2a

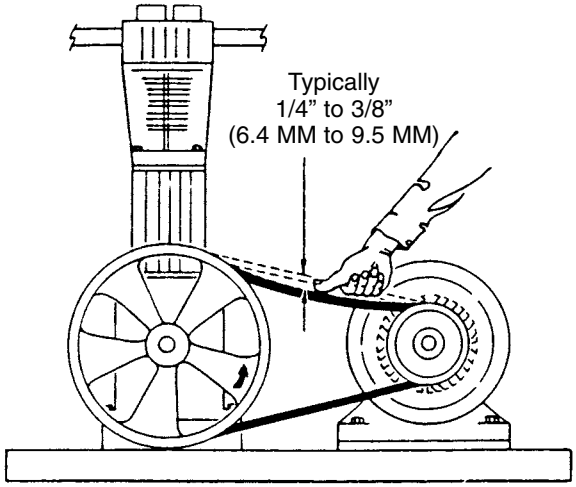


Figure 3.2b

Tighten the belts so that they are taut but not extremely tight. Consult your V-belt supplier for specific tension recommendations. Belts that are too tight may cause premature bearing failure.

3.3 CRANKCASE OIL PRESSURE ADJUSTMENT

Your Corken compressor Model FD151 is equipped with an automatically reversible geartype oil pump. Ensure that the pumping system is primed and the oil pressure is properly adjusted to assure smooth operation.

Oil Pressure Adjustment

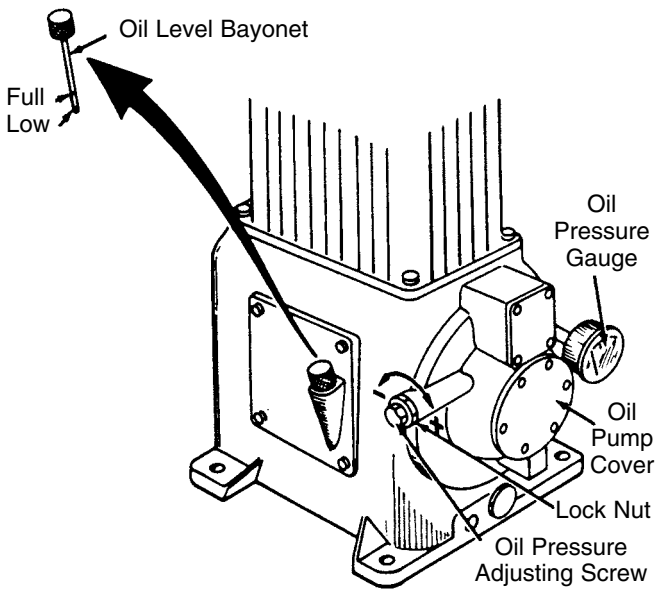


Figure 3.3a

Before starting your compressor, check and fill the compressor crankcase with the proper quantity of lubricating oil.

To assure critical lubrication of crossheads and crosshead guide during the initial start-up period:

- Remove inspection plate from crosshead guide.
- Fill crankcase with lubricating oil through the inspection plate opening (Figure 2.6C).
- Allow the oil to lubricate the crossheads and guide as it fills into the crankcase.
- Check crankcase oil level at the oil bayonet. (Re-install the inspection plate and gasket.)
- Follow any other pre-start-up procedures that may be necessary in your application.
- Double-check the crankcase oil level.
- Start compressor, observing the crankcase oil pressure gauge. If oil-pressure gauge does not register 20 - 30 PSIG after 30 seconds, stop the unit. Refer to Trouble-Shooting Guide in Appendix J. Consult the Factory if condition cannot be corrected. **DO NOT continue to run the compressor without the correct oil pressure.**

The oil pressure should be about 20 psi (2.4 Bars) minimum for normal service. If the discharge pressure is above 200 psi (14.8 Bars) or if the compressor is equipped with a hydraulic unloader (Specification 7 or 78; see Figure 3.4A), the oil pressure must be maintained at a minimum of 25 psi (2.7 Bars). The oil pressure is regulated by a spring-loaded relief valve mounted on the bearing housing opposite the flywheel. As shown in Figure 3.3A, turn the adjusting screw clockwise to increase the oil pressure, counterclockwise to lower it. Be sure to loosen the adjusting-screw lock nut before making any adjustments. Tighten locknut back after any adjustments.

3.4 ADJUSTMENT OF MECHANICAL UNLOADER CONTROLS

NOTE: If your compressor is not equipped with mechanical unloader control (valve/ unloader Spec. 7, 78, and 8; see Appendix A to determine if this applies to your machine), proceed to Section 3.5. See Section 1.7 for explanation on how suction valve unloaders work.

3.5 STARTUP CHECK LIST

Please verify all of the items on this list before starting your compressor! Failure to do so may result in a costly (or dangerous) mistake.

BEFORE STARTING THE COMPRESSOR:

1. Become familiar with the function of all piping associated with the compressor. Know each line's use!

2. Verify that actual operating conditions will match anticipated conditions.

3. Ensure that line pressures are within cylinder-pressure ratings.

4. Clean out all piping.

5. Check that distance piece vents are tubed or plugged as desired.

6. Check all mounting shims, cylinder and piping supports to ensure that no undue twisting forces exist on the compressor.

7. Verify that strainer elements are in place and clean.

8. Verify that cylinder bore and valve areas are clean.

9. Check V-belt tension and alignment. Check drive alignment on direct-drive units.

10. Rotate unit by hand. Check flywheel for wobble or play.

11. **Check crankcase oil level and all other fluid levels (lubricator, radiator, oil reservoirs, etc.).**

12. Drain all liquid traps, separators, etc.

13. Verify proper electrical supply to motor and panel.

14. Check that all gauges are at zero-level reading.

15. Test piping system for leaks.

16. Purge unit with air before pressurizing with gas.

17. Carefully check for any loose connections or bolts.

18. Remove all stray objects (rags, tools, etc.) from vicinity of unit.

19. Verify that all valves are open or closed as required.

20. Double-check all of the above.

AFTER STARTING THE COMPRESSOR:

1. Verify and note proper oil pressure. Shut down and correct any problem immediately.

2. Observe noise and vibration levels. Correct immediately
   if excessive.

3. Verify proper compressor speed.

4. Examine entire system for gas, oil or water leaks.

5. Note rotation direction.

6. Check start-up voltage drop, running amperage and voltage at motor junction box (not at the starter).

7. Verify proper lube rate (lubed units only).

8. Test each shut-down device and record set points.

9. Test all dump valves, relief valves and unloaders.

10. Check and record all temperatures, pressures and volumes after 30 minutes and 1 hour.

11. After 2-5 hour of running time, check, retorque all head bolts, valve hold-down screws, and baseplate anchor bolts.

CHAPTER FOUR
ROUTINE MAINTENANCE CHART

ITEM TO CHECK	First Week Only	Daily	Weekly	250 Hours	1000 Hours	2000 Hours	6000 Hours
Crankcase oil pressure		X					
Compressor suction pressure		X					
Compressor discharge pressure		X					
Compressor discharge temperature		X					
Crankcase oil level			X				
Drain liquid from system accumulation points			X				
Drain / check distance piece			X				
Check V-belts for correct tension	X						
Retorque valve holddown screws	X(c)					X	
Complete preventative maintanence						X(d)	
Replace valve assemblies						X	
Replace piston rings						X(a)	
Replace packing rings						X	
Change crankcase oil				X(b)			
Complete Rebuild							X(e)

a. Piston ring life varies greatly, depending on application, gas, and operating pressures. Consult factory for additional recommendations for your specific applications and operating pressures. The initial set of piston rings may wear faster than replacement rings. Piston ring life tends to get better as the ring material transfers into the cylinder wall surfaces. On units with coated cylinders it is recommended to replace the initial piston rings after 1,000 hours.

b. Change oil and filter every 250 hours of operation or every 45 days, whichever occurs first.

c. Holddown screws must be checked at least once in the first 200 hours of operation.

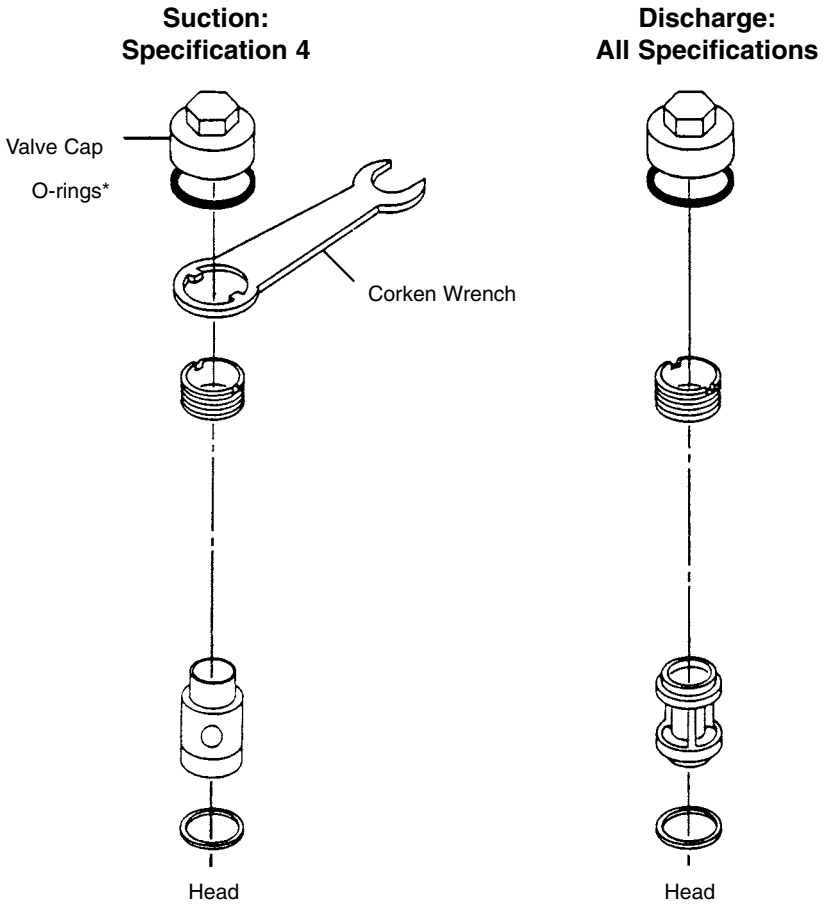
d. Includes rings, valves, packing and gaskets.

e. All bearings, crossheads, rings, valves, packing and gaskets.

* Recommended maintenance as suggested above are general guidelines only. Your specific maintenance requirements may vary depending on the operating conditions and duty cycle.

CHAPTER FIVE
ROUTINE SERVICE AND REPAIR PROCEDURES

Compressor Model FD151



*** Older Units may have a metal gasket instead of the o-ring.**

Figure 5.1A

5.1 VALVES

CAUTION: Always relieve pressure in the unit before attempting any repairs.

Low capacity, overheating, noise and vibration are all indications of possible valve failure. Because valve problems can manifest themselves in so many different forms, valve inspection is frequently the best first step in troubleshooting poor performance.

To remove and inspect valves, **begin by depressurizing and purging** (if necessary) the unit. Next, remove the valve cap or unloader assembly and then remove the valve holddown screw (see Figure 5.1 A) with the special wrench supplied with the compressor. Valves may then be removed.

Inspect valves for breakage, corrosion, scratches on the valve disk and debris. In many cases, valves may simply be cleaned and reinstalled. If valves show any damage, they should be repaired or replaced. Replacement is usually preferable, although repair parts are available. If valve disks are replaced, seats should also be lapped until they are perfectly smooth. If more than .005" must be removed to achieve a smooth surface, the valve should be discarded. If disks are replaced without relapping the seat, rapid wear and leakage will occur.

The metal valve gasket should always be replaced when the valve is reinstalled. Make sure suction and discharge valves are in the right slots, as shown in the illustrations. Reinstall cages, spacers or unloader parts and then tighten the valve hold down screw to 40 ft./lb. to ensure the valve gasket is properly seated. Replace O-rings sealing the valve cover and valve cap if they show any signs of wear or damage. Reinstall valve caps sealed by flat metal gaskets with new gaskets. Refer to Appendix C for torque values.

5.2 CYLINDERS AND HEAD

Cylinders and heads very seldom require replacement if the compressor is properly maintained. The primary causes of damage to cylinders and heads are corrosion and the entry of solid debris or liquid into the compression chamber. Improper storage can also result in corrosion damage to the head and cylinder (for proper storage instructions see Section 5.8).

If the cylinder does become damaged or corroded, use a hone to smooth the cylinder bore, and then polish it to the value shown in Appendix D. If more than .005" must be removed to smooth the bore, replace the cylinder. Cylinder liners and oversized rings are not available. Overboring the cylinder will result in greatly reduced ring life. Note: Honing of the cylinder is not normally recommended unless it becomes heavily scored.

Many compressor repair operations require removal of the head and cylinder. While the compressor is disassembled, take special care to avoid damage or corrosion to the head and cylinder. If the compressor will be left open for more than a few hours, coat bare metal surfaces with rust preventative.

Model FD151 - First Stage Only

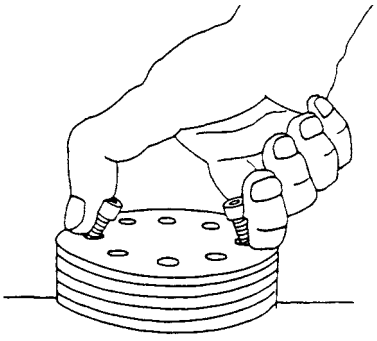


Figure 5.3A

When reassembling the compressor, make sure the bolts are retightened as shown in Appendix C.

5.3 PISTON RINGS AND PISTON RING EXPANDERS

Piston ring life will vary considerably from application to application. Ring life will improve dramatically at lower speeds and temperatures.

Do not hone your cylinder bores unless they become badly scratched. The piston rings will produce a mirror-like surface which will enhance piston ring life.

To replace the piston rings: Depressurize the compressor and purge if necessary. Remove the head to gain access to the compressor cylinder. Loosen the piston head bolts. Remove the piston as shown in Figure 5.3A, by pinching two loose bolts together. Piston rings and expanders may then be easily removed and replaced. Corken recommends replacing expanders whenever rings are replaced.

To determine if rings should be replaced, measure the radial thickness and compare it to the chart in Appendix D. Rings should be replaced if they are near the minimum listed.

5.4 PISTONS

To replace the pistons: **Depressurize the compressor and purge if necessary.** Remove the compressor cylinder and head (see Section 5.2). Remove the piston head by loosening and removing the socket head bolts holding the piston head to the piston platform (see Figure

Piston Cross-Section
sizes FD151 (First Stage Only)

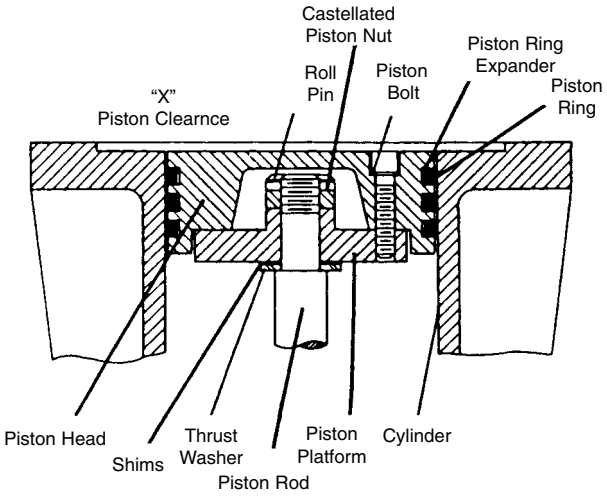


Figure 5.4A

Piston Cross-Section
Model FD151 (Second Stage)

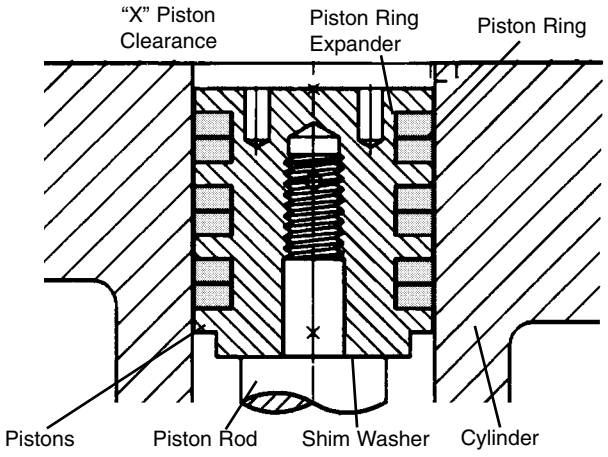


Figure 5.4B

Packing-Adjusting Nuts

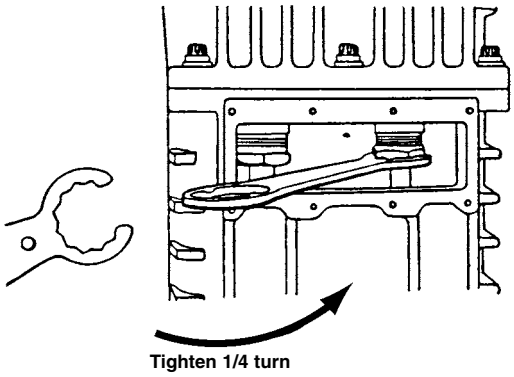


Figure 5.5A

5.3A). Next, remove the roll pin with needle nose pliers. The castellated nut may now be removed and the piston platform lifted off the end of the piston rod. Check the thrust washer and shims for damage and replace if necessary. (FD151 Stage 1 only). See Figure 5.4A Below.

Remove the piston head by using spanner tool Pt. No. 5207-X. Turn piston counterclockwise to remove from piston rod. Replace piston as noted below. On Model FD151 (second stage) a roll pin and lock nut are not used. A small amount of LOCTITE NO. 272 should be applied to the threads on the piston rod prior to final assembly of piston. Adjust piston clearance and torque as noted in Appendix C and D.

Reinstall the piston platform with the same thickness of shims as before, BUT DO NOT REINSTALL THE ROLL PIN. Replace the cylinder and install the piston heads with new piston rings and expanders. Now measure dimension "X", shown in the illustration. If this measurement does not fall within the tolerances shown in Appendix D, remove the piston, adjust the shims as necessary and remeasure the "X" dimension. When the piston is properly shimmed, tighten the castellated nut, as shown in Appendix C. Now install a new roll pin to lock the castellated piston nut in place. Install the piston head and tighten the socket head bolts in an alternating sequence. Reinstall the head and follow standard start-up procedure.

5.5 PISTON ROD PACKING ADJUSTMENT

Piston-rod packing should be replaced whenever leakage approaches an unacceptable level. "Acceptable leakage" should be determined by the customers according to safety and environmental regulations for their area. Typically, it is a good idea to replace piston-rod packing and piston rings at the same time. Instructions for packing replacement are included with each set of packing.

Inspection of the rod packing is generally not productive, since packing that cannot be adjusted to an "acceptable leakage" rate should be replaced.

To adjust the packing, remove the compressor nameplate, tighten the packing-adjusting nut(s) 1/4 turn with the wrench supplied, then run the compressor a few minutes to reseat the packing. If the leakage is still unacceptable, tighten the adjusting nut as necessary, 1/4 turn at a time; do not over tighten! If the adjusting nut is tightened until the packing spring is solid, the packing should be replaced. If packing will not seal, carefully inspect piston rods for possible scoring. Replace if needed.

Reattach the compressor nameplate after adjustments or repairs are made.

5.6 BEARING REPLACEMENT

To replace the crankcase roller bearings, wrist-pin bushing and connecting-rod bearings, begin by removing the head, cylinder, piston, crosshead guide and crosshead. Drain the crankcase and remove the inspection plates. Loosen and remove the connecting-rod bolts in order to remove the crosshead/connecting-rod assembly.

5.6.1 WRIST-PIN BUSHING REPLACEMENT

To replace the wrist-pin bushing, remove the retainer rings that position the wrist pin in the crosshead. **Press** out the wrist pin so the crosshead and connecting rod may be separated. Inspect the wrist pin for wear and damage and replace if necessary.

Press out the old wrist-pin bushing and press a new bushing into the connecting rod. DO NOT MACHINE THE O.D. OR I.D. OF THE BUSHING BEFORE PRESSING INTO CONNECTING ROD. Make sure the lubrication hole in the bushing matches the oil passage in the connecting rod. If the holes do not align, drill out the bushing through the connecting-rod lubricant passage with a long drill. Bore the wrist-pin bushing I.D. as indicated in Appendix D. Overboring the bushing can lead to premature failure of the wrist-pin bushing. Inspect the oil passage for debris; clean thoroughly before proceeding. **Press** the wrist pin back into the crosshead and reinstall retainer rings. NOTE: The fit between the wrist pin and bushing is tighter than on ordinary lubricated air compressors or combustion engines.

5.6.2 CONNECTING-ROD BEARINGS

Connecting-rod bearings are easily replaced after removing the semicircular inserts. Make sure the indentations in the connecting-rod bearing and connecting rod line up when installing the new bearings.

Before reinstalling the crosshead/connecting-rod assembly, make sure the crankshaft throw and bearing surface are clean and lubricated. Tighten the connecting-rod bolts to the torques listed in Appendix C.

5.6.3 ROLLER BEARINGS

To inspect the roller bearings, remove the flywheel from the crankshaft, then remove the bearing carrier and crankshaft from the crankcase. If corrosion or pitting is present, replace the roller bearing. When replacing roller bearings, always replace the entire bearing, not just the cup or the cone.

To replace the bearings, press the cups out of the crankcase and bearing carrier and press the cones off the crankshaft. Press the new bearings into position and reassemble the crankshaft and bearing carrier to the crankcase. When reinstalling the bearing carrier, make sure the oil-pump shaft slot is aligned with the pin in the crankshaft. **Make sure to install the bearing-carrier gasket so the oil passage hole is not blocked (see Figure 5.6.3A).**

Bearing - Carrier Replacement

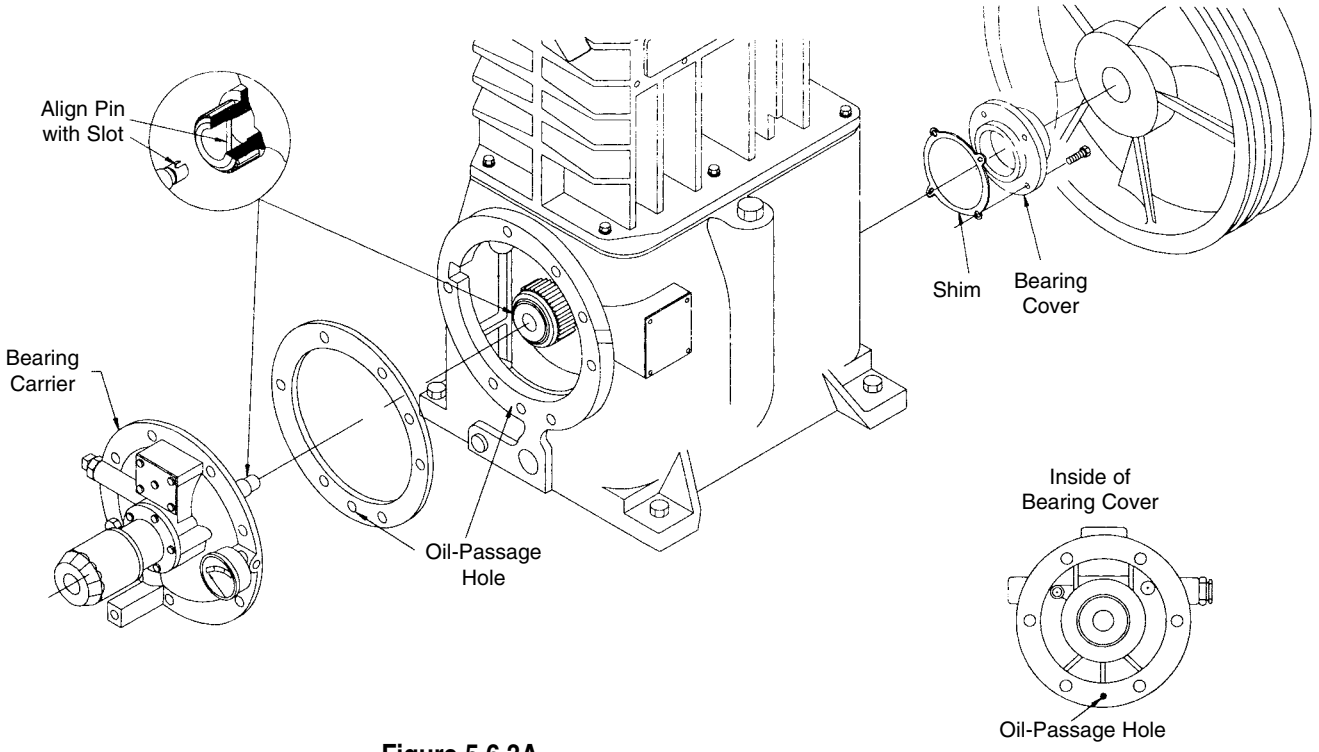


Figure 5.6.3A

To check the crankshaft end play, first remove the oil pump (see Section 5.7). Press the end of shaft towards the crankcase; if a clicking noise or motion is detected, the crankshaft has too much end play. To reduce end play, remove the bearing cover and remove a thin shim. Recheck the end play after replacing the bearing cover. When there is no detectable end play, the shaft must still be able to rotate freely. If the shaft sticks, binds or becomes abnormally warm, the crankshaft bearings are too tight. If the shaft is too tight, add more shims but make sure not to over-shim. (Appendix E lists the proper crankshaft end play.)

When the shaft can be rotated freely by hand and no end play is present, the rest of the compressor may be reassembled. If the crankshaft roller bearings are too tight or too loose, premature bearing failure will result.

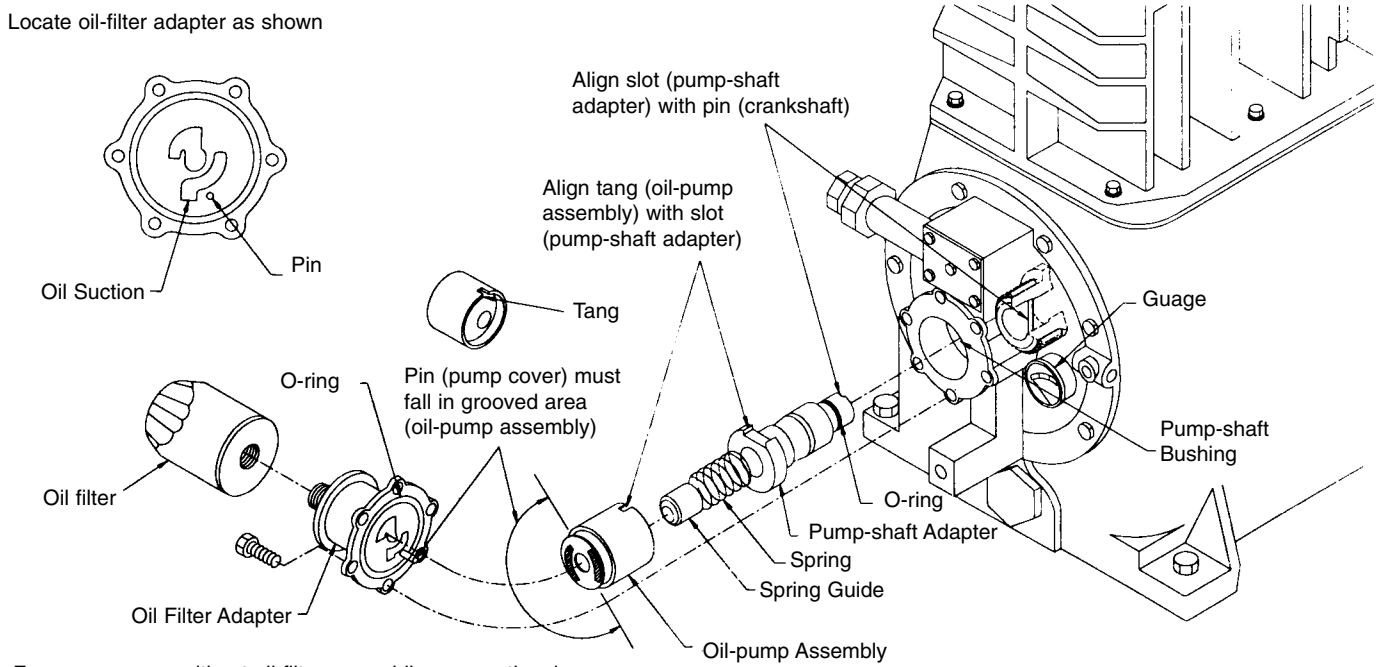
Reinstall the flywheel on the crankshaft and check the runout as shown in Appendix E.

5.7 OIL PUMP INSPECTION

Damage to the oil pump may result if the compressor operates for a prolonged period with dirty or contaminated crankcase oil. To check the oil pump, unbolt the pump cover and remove the oil pump, spring guide, spring and oil-pump shaft, as shown in Figure 5.7A. Inspect the gears in the oil pump for corrosion or pitting and replace if necessary. Check the oil-pump-shaft bushing in the bearing carrier. If the bushing is corroded, pitted or worn, the oil-pump-shaft bushing should be replaced.

Before reassembling the oil-pump mechanism, replace the O-rings in the oil-pump cover and in the oil pump adapter shaft (see Figure 5.7A). Rotate the drive pin in the crankshaft to a vertical position for easiest reassembly. Insert the shaft adapter so it engages the drive pin. Next, insert the spring guide and oil-pump assembly. The tang on the oil pump must align with the slot in the shaft adapter. Install the pump cover so the pin on the case is in the opening on the oil-pump assembly as shown in Figure 5.7A. When you are sure the pin is properly aligned, install the cover bolts **finger tight**. Rotate the crankshaft by hand to ensure smooth operation. Then rotate it in opposite directions, listening for a click which indicates proper alignment of the oil pump's pins and slots. Finally, tighten the bolts in an alternating sequence. See Section 3.3 for directions on oil pressure adjustment.

Bearing - Carrier Replacement



For compressors without oil-filter assemblies use optional pump cover. Assembly instructions are the same as above.

Figure 5.7A

CHAPTER SIX
EXTENDED STORAGE PROCEDURES

Following a few simple procedures will greatly minimize the risk of the unit becoming corroded and damaged. Corken recommends the following precautions to protect the compressor during storage:

1. Drain the crankcase oil and refill with rust-inhibiting oil.

2. Operate for a few minutes while fogging oil into the compressor suction.

3. Relieve V-belt tension.

4. Plug all openings to prevent entry of insects and moisture. (The cylinders may also be protected with a vapor phase inhibitor, silica gel, or dry nitrogen gas. If silica gel is used, hang a tag on the unit indicating that it must be removed before a start-up.)

5. Store in a dry area, off the ground if possible.

6. Rotate the flywheel every two weeks if possible.

APPENDIX A

MATERIAL SPECIFICATIONS

	STANDARD		OPTIONAL	
PART	**SIZE**	**MATERIAL**	**SIZE**	**MATERIAL**
HEAD, CYLINDER	FD151	DUCTILE IRON ASTM A536		MC1002 COATED
DISTANCE PIECE, CROSSHEAD GUIDE	ALL	DUCTILE IRON ASTM A536		NONE
CRANKCASE, FLYWHEEL BEARING CARRIER				
VALVE SEAT AND BUMPER	FD151	17-4 PH STAINLESS STEEL		NONE
VALVE PLATE	FD151	410 STAINLESS STEEL		
VALVE SPRING	FD151	17-7 PH STAINLESS STEEL		NONE
VALVE GASKETS	ALL	SOFT ALUMINUM	ALL	COPPER, IRON-LEAD
PISTON/PLATFORM FD151	(1ST STAGE)	GRAY IRON ASTM A48, CLASS 30		MC1002 COATED
PISTON FD151	(2ND STAGE)	17-7 PH STAINLESS STEEL		
PISTON ROD	ALL	C1050 STEEL, NITROTEC, ROCKWELL 60C	ALL D & T STYLE MODELS EXCEPT D791,	CHROME OXIDE COATING
CROSSHEAD	ALL	GRAY IRON ASTM A48, CLASS 30		NONE
PISTON RINGS	FD151 STAGE 1	PTFE, GLASS AND MOLY FILLED		ALLOY 50
	FD151 STAGE 2	PEEK		
PISTON RING EXPANDERS	ALL	302 STAINLESS STEEL		NONE
HEAD GASKET	FD151	H. D. VITON		PTFE, VITON*, NEOPRENE*
ADAPTER PLATE, PACKING CARTRIDGE, CONNECTING ROD	ALL	DUCTILE IRON ASTM A536		NONE
PACKING RINGS	ALL	PTFE, GLASS AND MOLY FILLED OR ALLOY 50		SPECIAL ORDER MATERIALS AVAILABLE
CRANKSHAFT	ALL	DUCTILE IRON ASTM A536		NONE
CONNECTING ROD BEARING	ALL	BIMETAL D-2 BABBIT		NONE
WRIST PIN	ALL	C1018 STEEL, ROCKWELL 62C		NONE
WRIST PIN BUSHING	ALL	BRONZE		NONE
MAIN BEARING	ALL	TAPERED ROLLER		NONE
INSPECTION PLATE	ALL	ALUMINUM		NONE
O-RINGS	FD151	H. D. VITON	ALL	PTFE, VITON*, NEOPRENE*
RETAINER RINGS	ALL	STEEL		NONE
MISCELLANEOUS GASKETS	ALL	COROPRENE		NONE

* VITON AND NEOPRENE ARE REGISTERED TRADEMARKS OF DUPONT.

APPENDIX B

MECHANICAL SPECIFICATIONS

Model	Cylinder Bore Inches (cm) Stroke		Inches (cm)	Piston Displacement CFM (lit/min)	
	First Stage	Second Stage		Min. at 400 RPM	Max at 825 RPM
FD151	2-1/2" (6.35)	1-1/4" (3.17)	2.5 (6.35)	2.8 (79)	5.8 (164)

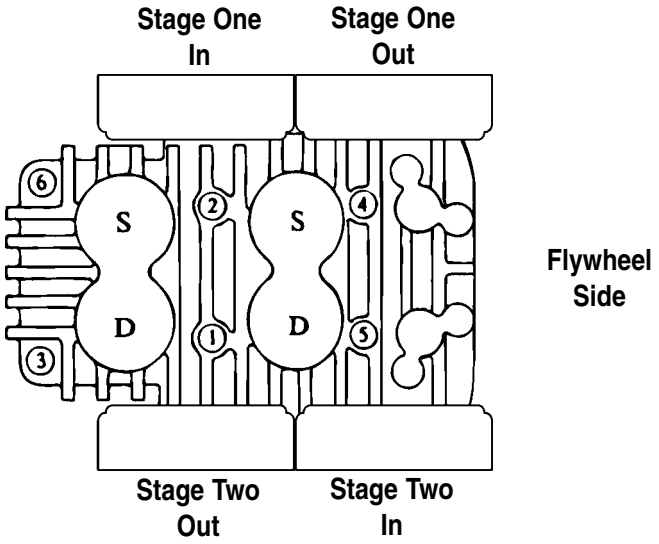
Model	Max Allow Rod Loads LB (Kg)	Min Inlet Pressure psia (Bars)	Max Pressure psia (Bars)	Max. Motor Size Hp	Max Outlet Temp °F (°C)
FD151	3600 (1632.96)	3 (.21)	1200 (83.8)	15	350 (177)

BOLT TORQUE VALUES

Size	Conn. Rod Bolt Ft-Lb	Bearing Carrier Ft-Lb	Bearing Cover Ft-Lb	Crankcase Inspection Plate Ft-Lb	X-head Guide & Distance Piece Ft-Lb	Cylinder to Head (2, 3) Ft-Lb
FD151	30	30	30	15	30	60

Size	Valve Holddown Screw (3) Ft-Lb	Piston Nut Torque Ft-Lb	Piston Screw Torque In-Lb	Valve / Unloader Cap Torque (w/ O-Rings) Ft-Lb
FD151	100	60 (ST1)	36 (ST1) In. Lb. 15 (ST2) Ft. Lb.	25

NOTE: Torque head bolts in sequence shown below.



Model FD151

APPENDIX C

CLEARANCES AND DIMENSIONS

Dimensions in inches.

Model FD151	Clearance: Conrod Bearing to Crankshaft Journal	Clearance: Wrist Pin to Wrist Pin Bushing* (Max)	Cylinder Bore Diameter (Max)	Cylinder Finish (RMS)	Piston Ring Radial Thickness (Min)
Stage 1	0.0005 0.0025	0.0009	2.504	16 • 32	0.082
Stage 2	0.0005 0.0025	0.0009	1.254	16 • 32	0.086

Model	Clearance: Oil Pump Adapter Shaft to Bushing* (Max)	Crankshaft End Play (Cold)	Flywheel Runout at O.D. (Max)	Clearance: Crosshead to Crosshead Guide Bore (Max)	Crosshead Guide Bore Finish (Max)
FD151	0.0050	0.002 0.003	0.020	0.011	32 RMS (Limited number of small pits and scratches are acceptable)

*Dimensions for honing are included with new bushings (which must be installed, then honed).

PISTON CLEARANCE 'X' (COLD)

(See Figures 5.4A and 5.4B)

Model	"X" Inches (Millimeter)	
	Minimum	Maximum
FD151	0.025 (0.64)	0.049 (1.24)

Caution: Always relieve pressure in the units before attempting any repairs.

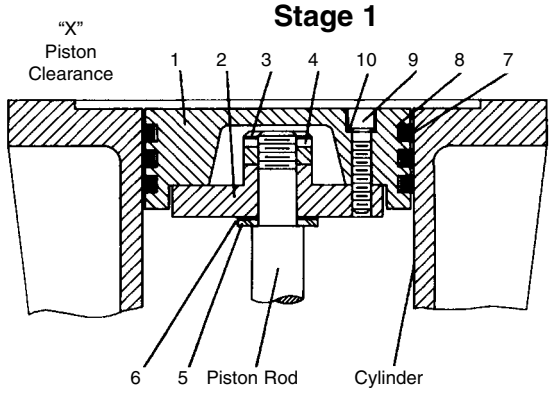
PURGING AND DRAINING OF DISTANCE PIECE AND PISTON ROD PACKING ORIENTATION

MODEL	CONDITIONS	SERVICE	DISTANCE PIECE OPENING, 1/4 INCH NPT		V-RINGS POINT	
			UPPER	LOWER	UPPER	LOWER
FD151	Inlet pressure: Above 15 psia	1) General gas transfer	Plugged to allow the distance piece pressure to reach its own level.	Pipe to drain or vent with a shut-off valve. Distance piece must be drained weekly to prevent an accumulation of oil or condensate.	SPRING 	SPRING 
		2) Highly toxic gases	Pressurized via an external gas source to a pressure below suction pressure and above atmospheric pressure. Or, vented to atmospheric pressure (at a suitable location) or to a low-pressure flare.			

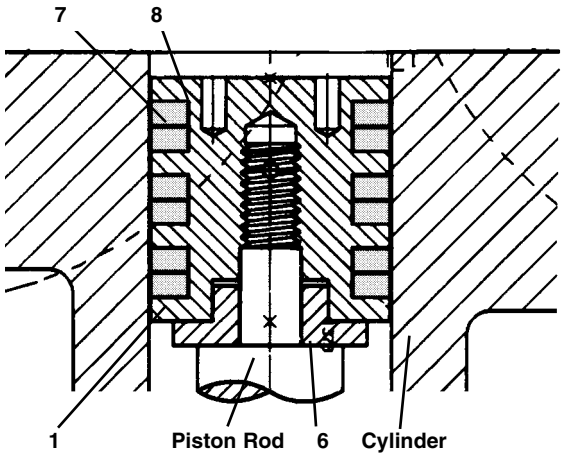
APPENDIX D

PISTON ASSEMBLIES

Model FD151
Stage 1



Stage 2



TWO-STAGE		MODEL FD151			
Piston Assembly No.		1981-1X		5201-XC	
Piston Diameter		2-1/2" (6.35 cm)	Stage 1	1-1/4" (3.17 cm)	Stage 2
Ref. No.	Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston
1.	Head, Iron	1981-1	1	5201	1
2.	Piston Platform	1982-1	1		
3.	Locknut	1482	1 -Torque to		
4.	Lock Pin	1483	1 60 Ft. Lbs.		
5.	Thrust Washer	1527	1		
6.	Shim Washer, Thick	1528	As	1378	As
	Shim Washer, Thin	1528-1	Req.		Req.
7.	Piston Ring	1771	3	3572	3
8.	Ring Expander	1774	3	4209	3
9.	Screw, Sco. Hd.	7002-008 NC125A	6 -Torque to	*	
10.	Lock Washer	7207-008A	6 36 In. Lbs.		

INSTRUCTIONS

Piston must not touch cylinder! To check this clearance, assembly personnel will need to check clearance with feeler gauges.

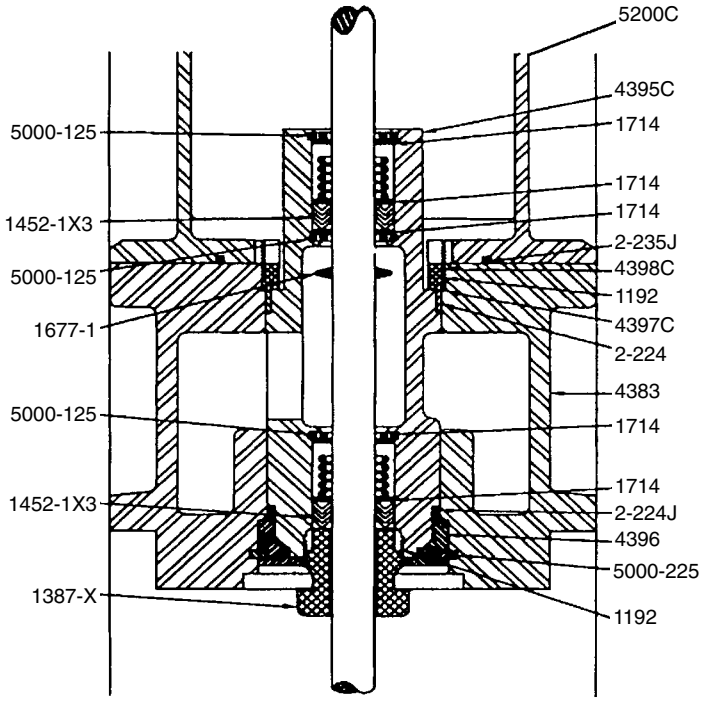
An assembly tool must be used to line up the cylinder before it is tightened down.

1. Set cylinder on crosshead guide and start the 6-3/8-16 bolts.
2. Insert 1st Stage piston and tighten piston bolts.
3. Insert alignment tool (5276-X) on 2nd Stage piston rod (hand tight).
4. Rotate crank to align cylinder all the way through the stroke.
5. Tighten 3/8-16 bolts per torque specification in "Important Instructions: starting in the center and working out.
6. Rotate crank to make sure the tool does not bind against the cylinder.
7. Remove tool, install piston and check clearance with feeler gauges.
8. If there is interference, repeat steps 1-7 until clearance is obtained.
9. When the clearance has been obtained, remove 2nd Stage piston. Torque to appropriate torque specification in "Important Instructions".

APPENDIX E

DISTANCE PIECE DETAILS MODEL FD151 COMPRESSOR

Packing Spec. A



PART NO.	PART NAME
1192	Locking Device TFE 1/8" dia. x 1/4" long
1387	Adjustment Screw
1452-1	Female Packing Ring
1453-1	Male Packing Ring
1454	Packing Ring
1628	Packing Spring
1677-1	Oil Deflector Ring
1714	Packing Box Washer
4383	Crosshead Guide
4395	Packing Cartridge – Coated
4396	Cartridge Plate
4397	Spacer – Coated
4398	Cartridge Holddown Screw – Coated
5200	Cylinder (FD151) - Coated
1183-6	Adapter Plate
5000-125	Retainer Ring
5000-225	Retainer Ring
2-224J	O-Ring – H.D. Viton
2-235J	O-Ring – H.D. Viton
4005	Packing Inst. Tool - Not Shown

ASSEMBLY NO.	PART NAME
1132-X	Crosshead-Piston Rod Assembly
1132-X3	Quantity 1 (FD151)
1132-X4	Quantity 1 (FD151 – 2nd Stage)
1452-1X3	Packing Set with 1452-1, 1453-1, 1454 (5), 1628, 1714
1452-2X3	Packing Set – Alloy – (Optional)
4383-X	Crosshead Guide Assembly with 4383, 4396, 5000-225

Use cone 4005 for installation of packing.

The quantity of 1454 packing rings required will vary due to tolerances.

Caution: Always relieve pressure in the unit before attempting any repairs.

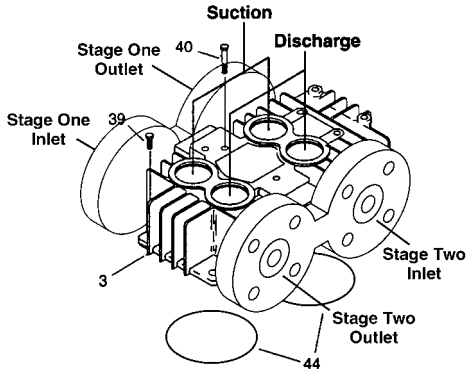
Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example: 3713C).

APPENDIX F

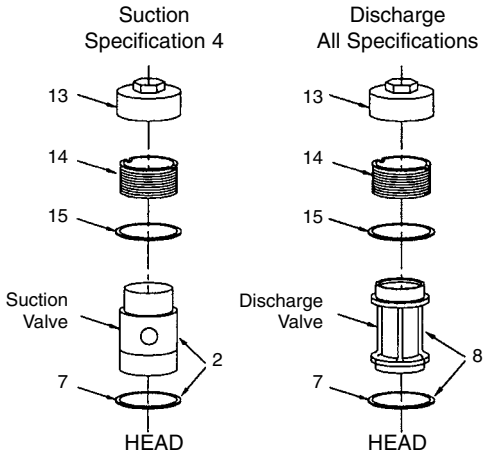
HEAD ASSEMBLY DETAILS
FD151 ALL MODELS

FD151

HEAD

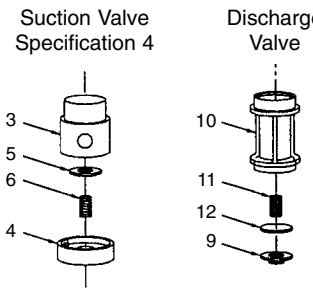


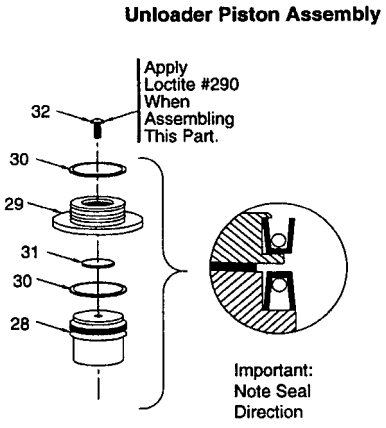
VALVE REMOVAL



IDENTIFICATION OF VALVE UNLOADER SPEC.			
Example:	Model No. FD151M	4	FBA
	FD151M	78	FBAB
	FD151M	9	FBA
Valve Unloader Spec.			

VALVE DETAILS





Appendix F

Refer to diagram on previous page.

REF NO.	PART NO.	DESCRIPTION
3.	4371-3	Head Model FD151 (ANSI Flange) Coated
5.	3483-X	Suction Valve Assy, Spec 4,7,78,8,9
(b)	3483-X1	Same as above but with Copper Gaskets
(b)	3483-X2	Same as above but with Iron-Lead Gaskets
6.	3483	Suction Valve Seat
7.	3484	Suction Valve Bumper
8.	3972	Suction Valve Plate
9.	4009	Suction Spring
10.	2717	Valve Gasket, Alum.
(b)	2717-1	Valve Gasket, Copper
(b)	2717-2	Valve Gasket, Iron-Lead
11.	3483-4X	Suction Valve Assy, Spec 3
13.	3484	Suction Valve Bumper
14.	3972	Suction Valve Plate
15.	4009	Suction Spring
16.	3977	Suction Valve Relief Housing
17.	1411	Spring
18.	1410	Ball
19.	5000-77	Retainer Ring
21.	3485-X	Discharge Valve Assy
(b)	3485-X1	Same as above but with Copper Gaskets
(b)	3485-X2	Same as above but with Iron-Lead Gaskets
22.	3485	Discharge Valve Seat
23.	3486	Discharge Valve Bumper
24.	4008	Discharge Spring
25.	3973	Discharge Valve Plate
27.	3919-X	Unloader Assy
28.	3919	Unloader Piston
29.	2857	Piston Cap
30.	2619-X	Piston Seat Assy
31.	2858	Unloader Piston Cap Gasket
32.	1910	Bolt 1/4-20 x 1/2 Soc. Button Hd.
33.	3975	Unloader Actuator
34.	3976	Unloader Spring
35.	2598-1	Unloader Cap
36.	2714-1	Valve Cap – Coated
37.	2715	Holddown Screw – Coated
38.(c)	2-031J	O-ring (H.D. Viton)
39.	7001-050 NC100A	Bolt, 1/2" x 13 x 1" Gr. 5 Hex Hd.
40.	7001-050 NC300A	Center Head Bolt (4)
41.	2732	Gasket
44.(c)	2-236J	O-ring (H.D. Viton)

Note: When ordering parts use "PART NO." not "REF NO."

NOTES:
(a) Not Shown.
(b) Optional.
(c) For O-ring material coding see page A500

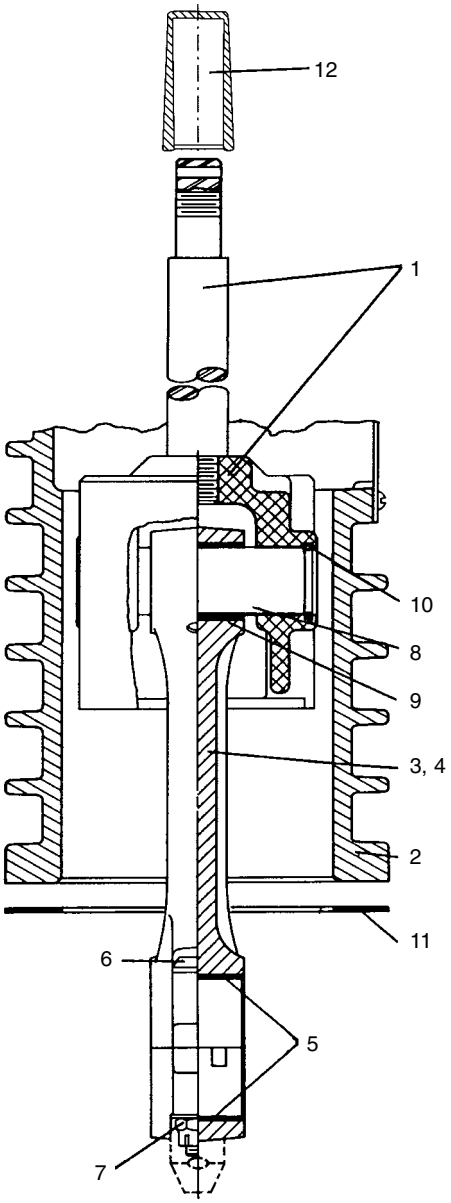
Caution: Always relieve pressure in the unit before attempting any repairs.

Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example: 3713C).

Appendix G

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS

All Specifications
Model FD151



Model	1. Crosshead Assembly	2. Crosshead Guide	3. Conn. Rod Assembly	4. Connecting Rod	5. Conn. Rod Bearings	6. Bolt
FD151	1132-X3 1132-X4 (c)	4383	1889-X	1889	1367	1599

Model	7. Nut	8. Wrist Pin	9. Wrist Pin Bushing	10. Retainer Ring	11. Crankcase Gasket	12. Assembly Tool
FD151	1600 (b)	2505	1846-X (a)	1498	2702	Stage 1- 4005 Stage 2 - 5268

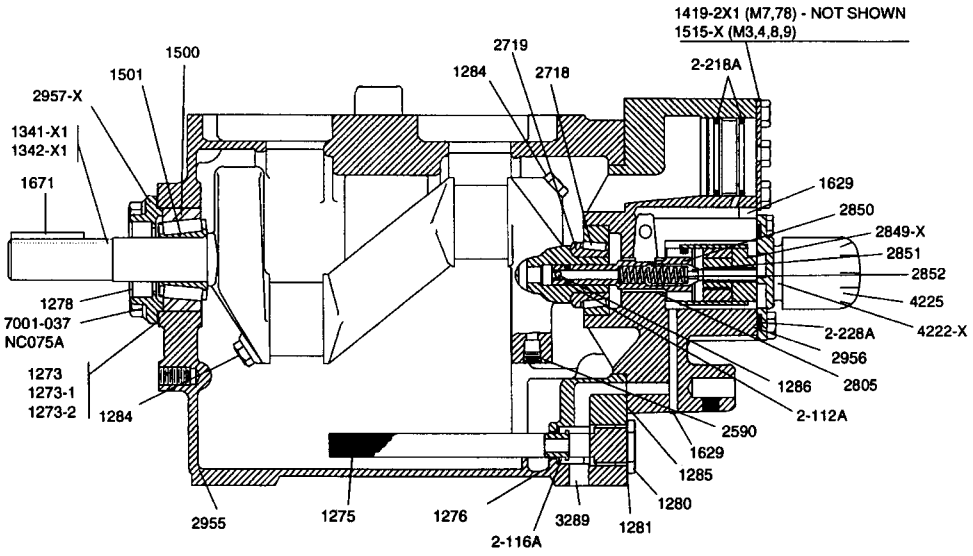
NOTES:
(a) Must be rebored after replacing (0.8754/0.8751 Dia.)
(b) Torque connecting rod nut to 30 ft. lbs.
(c) Second stage (smaller piston)
Never attempt to separate the piston rod and crosshead. When repair becomes necessary the entire crosshead assembly must be replaced.

Caution: Always relieve pressure in the unit before attempting any repairs.

Appendix H

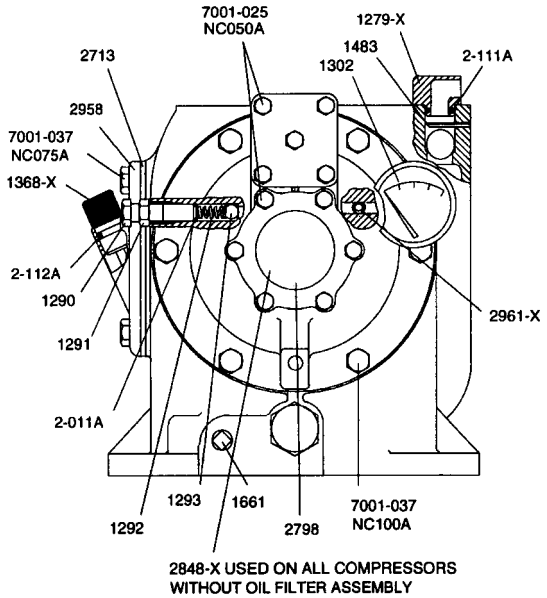
CRANKCASE DETAILS – FD151

IDENTIFICATION OF VALVE/UNLOADER SPEC.
Example: Model No. FD151AM [4] FBA
Valve/Unloader Spec.



Crankcase Assembly No. 2955-X1 (M3, 4, 8, 9)

2549-X1 Flywheel Assembly Not Shown (16")
Optional Flywheel Assembly 3271-X1 Not Shown (14")



Caution: Always relieve pressure in the units before attempting any repairs.

PART NO.	PART NAME
1273	Bearing Adjustment Shim (0.005")
1273-1	Bearing Adjustment Shim (0.007")
1273-2	Bearing Adjustment Shim (0.020")
1275	Oil Filter Screen
1276	Filter Screen Washer
1278	Oil Seal
1279	Breather Cap
1280	Filter Screw
1281	Filter Screen Screw Gasket
1284	Crankshaft Orifice (2)
1285	Bearing Carrier Gasket
1286	Pump Shaft Drive Pin
1290	Relief Valve Adjusting Screw
1291	Adjusting Screw Locknut
1292	Relief Valve Spring
1293	Relief Valve Ball
1302	Oil Pressure Gauge
1368-X	Oil Bayonet
1483	Piston Lock Pin - 1/8 x 1"
1500	Bearing Cup
1501	Bearing Cone
1629	Pipe Plug - 1/16 NPT, Flush Seal
1661	Pipe Plug - 3/8 NPT
1671	Flywheel Key
2590	Pipe Plug - 1/8 NPT, Flush Seal
2713	Crankcase Inspection Plate Gasket
2718	Bearing Cup
2719	Bearing Cone
2796	Breather Ball
2798	Pump Cover Pin
2805	Pump Shaft Bushing
2848-X	Pump Cover (Includes Pin)
2849-X	Oil Pump Assembly (Individual pump parts not available)
2850	Pump Shaft Adapter
2851	Spring Guide
2852	Oil Pump Spring
2955	Crankcase
2956	Bearing Carrier
2957	Bearing Cover
2958	Crankcase Inspection Plate
3289	Pipe Plug - 1/4 NPT, Flush Seal
4222-X	Oil Filter Assembly
4225	Filter
2-011A	O-Ring (Relief Valve Adj. Screw)
2-111A	O-Ring (Breather Cap)
2-112A	O-Ring (Oil Bayonet)
2-112A	O-Ring (Pump Shaft)
2-116A	O-Ring (Filter Screen)
2-218A	O-Ring (Closure Body) (2 Required) (Spec 3, 4, 8, 9 Only)
2-228A	O-Ring (Pump Cover)
7001-025 NC050A	Bolt, 1/4-20 x 1/2, Hex Head
7001-037 NC075A	Bolt, 3/8-16 x 3/4, Hex Head
7001-037 NC100A	Bolt, 3/8-16 x 1, Hex Head

ASSEMBLY NO.	ASSEMBLY NAME
1279-X	Breather Cap Assembly with 1279, 2-111A
1341 -X1	Crankshaft Assembly with 1284 (2),1286,1341, 1501,2590,2719
(a) 1342-Xl	Extended Crankshaft Assembly with 1284 (2),1286, 1342,1501, 2590, 2719
1368-Xl	Oil Bayonet Assembly with 1368-X, 2-112A
1419-2X1	Hydraulic Unloader Assembly (Up to 200 psi) (Spec 7, 78 Only)
(a) 1419-2X2	Hydraulic Unloader Assembly (200 psi & Above) (Spec 7, 78 Only)
1515-X	Closure Cap Assembly including 2-218A (2) (Spec 3, 4, 8, 9 Only)
2549-X1	Flywheel Assembly, 16" O.D. 3 Groove with 2549 and 3218 (Not part of Crankcase Assembly) (Not Shown)
2956-X	Bearing Carrier Assembly with 1285, 1290,1291, 1292,1293,1515-X, 2718, 2805, 2806 (2), 2848-X, 2849-X, 2850, 2851, 2852, 2956, 2961 -X, 2-011A, 2-112A, 2-228A.
2957-X	Bearing Cover Assembly with 2957 and 1278
2961 -X	Air Release Valve Assembly with 2961, 2962, 2963
(a) 3271-X1	Flywheel Assembly, 14" O.D. 2 Groove with 3218 and 3271 (Not part of Crankcase Assembly) (Not Shown)
4222-X	Oil Filter Assembly with 4222, 4225, 2798 (Standard on All Models Starting January 1, 1993)

NOTES:
(a) Optional Equipment

Crankcase Capacity: 1.5 Quarts (1.4 Liters)

Caution: Always relieve pressure in the unit before attempting any repairs.

Appendix I

MODEL FD151 PARTS LIST
GAS COMPRESSOR - FLANGED - DUCTILE IRON

DESCRIPTION	SPECIFICATION
Packing: 'D' Style	**A** - Inlet Pressure >0 psig (V-V)
Crankcase: 191-491	**M** - Std Pressure Lube
Valves	**4** - Standard Valves
Piston Ring/Packing Material	**F** - Teflon / Teflon
Gasket Material	**B** - Aluminum Gaskets

DESCRIPTION	SPECIFICATION
O-ring Material	**J** - H.D. Viton
Intercooler - ANSI Two Stage	**F** - No Intercooler
Flywheel - 191-491	**S** - Standard
Protective Coating	**N** - None
Piston Rod Coating	**N** - Nitrotec

Important Note: Parts list below is for the FD151 model specified above. If you have a model FD151 with different specifications and would like a detailed parts list, contact the factory.

Component Number	Description	Quantity Required
H SF-1.250	Hub	1
1132-X3	Crosshead Assy - A/D	1
1132-X4	Crosshead Assy - A/D	1
1273	Bearing Adj Shim (0.005)	2
1273-1	Bearing Adj Shim (0.007)	2
1273-2	Bearing Adj Shim (0.020)	2
1275	Oil Filter Screen	1
1276	Filter-Screen Washer	1
1278	Oil Seal	1
1279	Breather Cap	1
1280	Filter Screw	1
1281	Filter Screen Screw	1
1284	Crankshaft Orifice	2
1285	Bearing Carrier Gask	1
1286	Pump Shaft Drive Pin	1
1290	Relief Valve Adjusti	1
1291	Adjusting Screw Lock	1
1292	Relief Valve Spring	1
1293	Relief Valve Ball	1
1302	Oil Pressure Gage	1
1341	Crankshaft	1
1367	Conn Rod-Bearing (Pair)	2
1368	Oil Bayonet Rod	1
1378	Shim Washer - Thick	1
1387	Adjusting-Screw - St	2
1452-1	Female Packing Ring	4
1453-1	Male Packing Ring	4
1454	Packing Ring - Teflon	20
1482	Locknut	1
1483	Piston Lock Pin	2
1498	Wrist-Pin Retainer R	4
1500	Bearing Cup	1
1501	Bearing Cone	1
1509	Oil Bayonet Knob	1
1515	Closure Cap	1
1516	Closure Body	1
1527	Piston Thrust Washer	1
1528	Shim Washer, Thick	1
1528-1	Shim Washer, Thin	1
1575	Compressor Wrench	1
1600	Conn Rod Nut	4
1628	Packing Spring	4
1629	Pipe Plug 1/16 NPT	2

Component Number	Description	Quantity Required
1650	Inspection Plate, Gas	1
1651	Inspection Plate Gas	1
1661	Pipe Plug 3/8 NPT	1
1671	Flywheel Key - 191/2	1
1677-1	Oil Deflector Ring	2
1714	Packing Washer	6
1714	Packing Washer	4
1771	Piston Ring-Teflon	3
1774	Ring Expander	3
1889	Conn Rod	2
1981-1	Piston Head, Iron	1
1982-1	Piston Platform	1
1991	Tube Elbow - 3/8T X	2
2-011A	O-Ring, Buna N	1
2-031J	O-Ring, H. D. Viton	4
2-111A	O-Ring, Buna N	1
2-112A	O-Ring, Buna N	1
2-112A	O-Ring, Buna N	1
2-116A	O-Ring, Buna N	1
2-218A	O-Ring, Buna N	2
2-224J	O-Ring, H.D. Viton	4
2-228A	O-Ring, Buna N	1
2-235J	O-Ring, H.D. Viton	2
2-236J	O-Ring, H.D. Viton	2
2505	Wrist Pin	2
2549	Flywheel 16", A-B,	1
2590	Pipe Plug 1/8 NPT	1
2590	Pipe Plug 1/8 NPT	1
2702	Crankcase Gasket	1
2713	Crankcase Inspection	1
2714-1	Valve Cap	4
2715	Valve Holddown Screw	4
2718	Bearing Cup	1
2719	Bearing Cone	1
2731	Center Headbolt	4
2796	Breather Ball	1
2798	Pump Cover Pin	1
2849-X	Oil Pump Assy	1
2850	Pump Shaft Adapter	1
2851	Spring Guide	1
2852	Oil Pump Spring	1
2854	Plastic Nozzle Plug	1
2955	Crankcase	1

Appendix I

Component Number	Description	Quantity Required
2956	Bearing Carrier - 19	1
2957	Bearing Cover	1
2958	Crankcase Inspection	1
2961	Air Release Valve Body	1
2962	Air Release Valve Ball	1
2963	Air Release Valve Cap	1
3229	Dowel Pin - 1/8	2
3255	Warning Tag	1
3289	Pipe Plug 1/4 NPT	1
3289	Pipe Plug 1/4 NPT	1
3354	Oil Warning Tag	1
3442	Pipe Plug 1/4 NPT	4
3442	Pipe Plug 1/4 NPT	1
3442	Pipe Plug 1/4 NPT	3
3483-4X	Suction Valve Assy	2
3485-X	Discharge Valve Assy	2
3572	Piston Ring-Peek - 1-1/4”	3
4209	Ring Expander - 1-1/4”	3
4222	Oil Filter Adapter	1
4225	Oil Filter Canister	1
4367	Flange Protector - 3	4
4371-3	Head - F/FD/FT151	1

Component Number	Description	Quantity Required
4383-X	Crosshead Guide Assy	1
4395	Packing Cartridge	2
4397	Cartridge Spacer	2
4398	Cartridge Holddown Screw	2
4943	Crankcase Vent Tag	1
5000-125	Retainer Ring	6
5200	Cylinder - FD151	1
5201	Piston Head, Iron	1
5206	Piston Platform	1
5207-X	Compressor Wrench	1
7001-025NC050A	Hex Rd 1/4-20 X 1/2”	10
7001-025NC050A	Hex Hd 1/4-20 X 1/2”	1
7001-031NC100A	Hex Hd 5/16-18 X 1”,	2
7001-037NC075A	Hex Hd 3/8-16 X 3/4”	8
7001-037NC100A	Hex Rd 3/8-16 X 1”,	20
7002-O08NC125A	Soc Rd 8-32 X 1-1/4”	6
7003-025NC037E	Round Hd Phillip 1/4	1
7012-010NC025B	Pan Hd Phillip 10-24	8
7206-037A	Regular Lockwasher	14
7207-008A	Hi-Collar Lockwasher	6
99-CP CP107	Instruction Envelope	1
99-INB EF102	Instruction Book IF102	1

APPENDIX J

GENERAL COMPRESSOR TROUBLESHOOTING

GENERAL

In most cases problems with your Corken Gas Compressor can be solved quite simply. This chart lists some of the more frequent problems that occur with reciprocating compressors along with a list of possible causes. If you are having a problem which is not listed or if you cannot find the source of problem, consult the Factory.

PROBLEM	POSSIBLE CAUSES
Low Capacity	1, 2, 3, 4, 17
Overheating	1, 2, 3, 5, 6, 11, 16
Knocks, Rattles and Noise	1, 7, 9, 10, 11, 15
Oil in Cylinder	8, 12, 15
Abnormal Piston Ring Wear	1, 3, 5, 6, 11, 15, 16
Product Leaking Through Crankcase Breather	8, 15
Product Leakage	4, 8, 15, 17
Oil Leakage Around Compressor Base	18, 19
No Oil Pressure	20, 21
Excessive Vibration	1, 7, 9, 10, 11, 13, 14, 29
Motor Overheating or Starter Tripping Out	22, 23, 24, 25, 26, 27, 28, 29

REF.	POSSIBLE CAUSES	SOLUTIONS
1.	Valves broken, stuck or leaking	Inspect and clean or repair
2.	Piston ring worn	Inspect and replace as necessary
3.	Inlet strainer clogged	Clean or replace screen as necessary
4.	Leaks in piping	Inspect and repair
5.	Inlet or ambient temperature too high	Consult Factory
6.	Compression ratio too high	Check Application and consult Factory
7.	Loose flywheel or belt	Tighten
8.	Worn piston rod packing	Replace
9.	Worn wrist pin or wrist pin bushing	Replace
10.	Worn connecting rod bearing	Replace
11.	Unbalanced load	Inspect valve or consult Factor
12.	Oil in distance piece	Tighten packing nut - drain weekly
13.	Inadequate compressor base	Strengthen, replace or grout
14.	Improper foundation or mounting	Tighten mounting or rebuild foundation
15.	Loose valve, piston or packing	Tighten or replace as necessary
16.	Dirty cooling fins	Clean weekly
17.	Leaking gas blowing oil from crankcase	Tighten packing
18.	Bad oil seal	Replace
19.	No oil in crankcase	Add oil
20.	Oil pump malfunction	See oil pressure adjustment
21.	Low voltage	Check line voltage with motor nameplate. Consult Power Company
22.	Motor wired wrong	Check wiring diagram
23.	Wire size too small for length of run	Replace with correct size
24.	Wrong power characteristics	Voltage, phase and frequency must coincide with motor nameplate. Consult with Power Company.
25.	Wrong size of heaters in starter	Check and replace according to manufacturer's instructions
26.	Compressor Overloading	Reduce speed
27.	Motor shorted out	See driver installation
28.	Bad motor bearing	Lubricate according to manufacturer's instructions

TWO-STAGE COMPRESSOR TROUBLESHOOTING

Two-Stage Compressors can have problems that never occur with single-stage machines. Interstage pressure is an important indicator of the condition of a two-stage Compressor.

Interstage pressure is too high:

1. Second stage valves may be broken or leaking.
2. Second stage piston rings may be worn.

Interstage pressure is too low:

1. First stage valves may be broken or leaking.
2. First stage piston rings may be worn.

Another cause for high interstage pressure is a low compression ratio. Two-Stage machines should not be used in applications where the compression ratio is below 5. To use Two-Stage Compressor in this kind of situation results in rapid ring wear, machine imbalance and excessive horsepower. If you think you have a problem in this area, consult Factory.

APPENDIX K

CORKEN COMPRESSOR LOG SHEET

Compressor Model No._____ Serial No._____
RPM _____ Package No._____
Motor BHP_____, Frame _____, RPM _____, F.L. Amps_____, Manuf._____
Installation Date_____ Startup Date _____
Customer_____
Location _____
Field Contact _____ Telephone No. _____
Make and Grade of Oil_____

Pressure Switch Settings	Stage 1	Stage 2
Suction Pressure	_____	_____
Discharge Pressure	_____	_____

Cylinder Lube Pump Rate*_____

Date_____ Time_____ Outside Temperature_____ Hour Meter _____

Readings:	Stage 1	Stage 2
Suction Pressure	_____	_____
Discharge Pressure	_____	_____
Suction Temperatures	_____	_____
Discharge Temperature	_____	_____

Check List:

_____	Oil Level	_____	Belt Tension
_____	Change Oil	_____	Gauges (Zero Position)
_____	Flywheel Bolts	_____	Packing Vents
_____	Mounting Bolts	_____	Drain Seperators
_____	Motor Amperage	_____	Unloaders
_____	Strainers	_____	Cyl. Lube Pump Oil Level*
_____	Valve Positions	_____	Cyl. Lube Pump Supply Level*
_____	Dump Valves	_____	Cyl. Lube Pump Feed Rate*

Additional Notes:_____
_____
_____

Checked By:_____

*Lubricated Units Only

Solutions beyond products...

CORKEN®

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