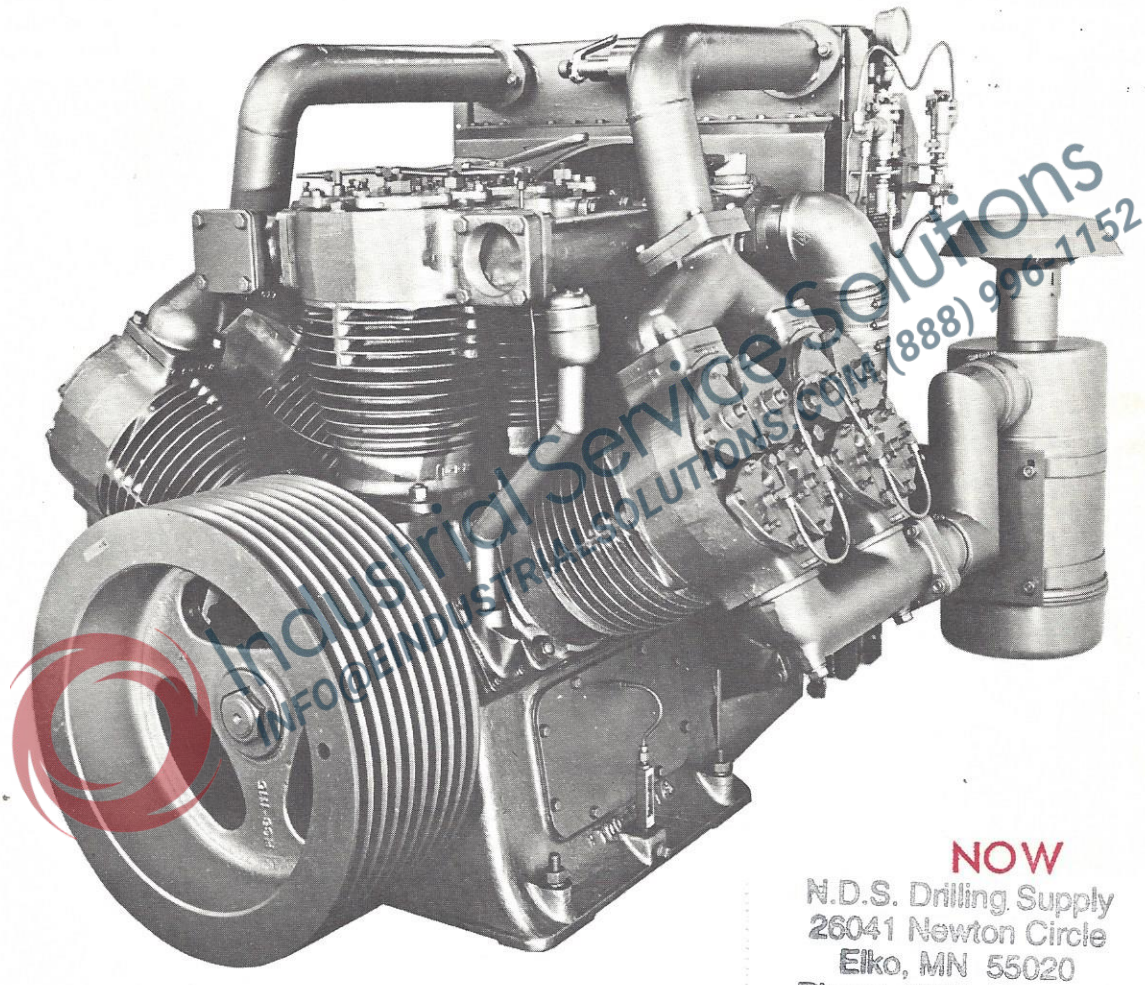
MODELS 50-100-256 SDS

STATIONARY AIR COMPRESSORS

OPERATION AND SERVICE MANUAL
WITH PARTS LIST



NOVEMBER, 1971

WABCO

An American-Standard Company

WESTINGHOUSE AIR BRAKE COMPANY
PNEUMATIC EQUIPMENT DIVISION
SIDNEY, OHIO 45365

Litho in U.S.A.

Chapter 1
COMPRESSOR — GENERAL
INTRODUCTION

1-1. The instructions and information contained in this manual will enable the operator and service personnel to provide the optimum in efficiency and long, trouble-free service from the Models 50SDS, 100SDS and 256SDS WABCO Air Cooled Air Compressors.

1-2. All three model compressors are designed to be powered by an electric motor drive or a power take-off source of driving train. Controls and all components of the units are easily accessible to the operator or service man.

1-3. Always be certain that there is sufficient oil in the crankcase, and that air filters are clean before starting. Always check condition and tension of the belts. Make certain that the compressor is properly connected to its power source.

1-4. Model 50SDS is a three cylinder air compressor while Models 100SDS and 256SDS are six cylinder machines. All three units may be operated as either single or two stage compressors. When a unit is operating as a single stage compressor, all cylinders function as low stage compressors. Dur-

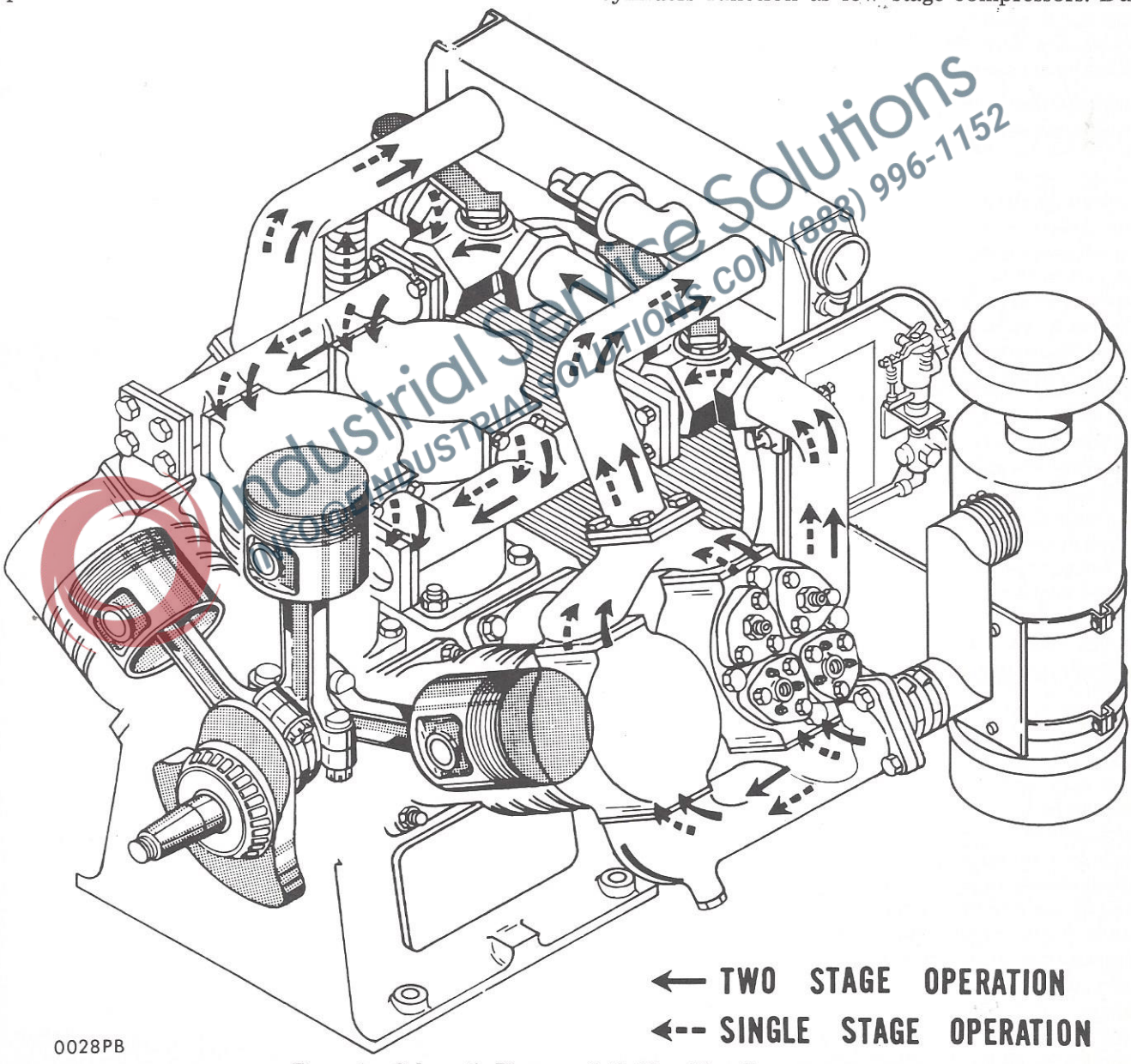


Figure 1 — Schematic Diagram of Air Flow Thru Compressor

ing two stage operation the outer banks of cylinders operate as a single stage compressor while the center bank functions as a second stage of compression. All cylinders incorporate two suction and two discharge valves each, except the center, or high pressure, cylinders of the Model 256SDS which incorporate one each suction and discharge valves.

1-5. Low pressure and high pressure pistons are made of aluminum alloy on the 50 and 100SDS while the low pressure pistons of the 256SDS are aluminum alloy, the high pressure pistons of 256SDS are cast iron. All connecting rods are either cast iron or forged steel. Connecting rod bearings are steel backed, babbit lined, shell type construction. The crankshaft is dynamically balanced, counter-weighted and rides on two tapered roller bearings. A suction fan draws air through the intercooler and provides a flow of cooling air over the entire compressor. Refer to "General Specifications" Chart for capacities and general specs of the three different models.

1-6. AIR FLOW. (See Figure 1).

1-7. Single Stage Operation. In single stage operation all cylinders draw in air through the air cleaners. The outside bank of cylinders discharge their compressed air into the intercooler (which functions as an aftercooler in this operation) while the center bank of cylinders discharges into a manifold as does air from the intercooler. Compressed air from this manifold is piped to an air receiver for storage and use.

1-8. Two Stage Operation. When the machines are used as two stage compressors, the outer banks of cylinders draw atmospheric air into them through the air cleaners and compress it. From the outer banks, or low pressure cylinders, the air is passed to the intercooler where much of the heat build-up of compression is dissipated. The air from the intercooler is then fed into the center bank, or high pressure cylinders. Here the air is compressed to the rated pressure of the machine and then piped to the air receiver tank and stored for use.

1-9. Oil Flow. Oil is stored in the crankcase sump from which it is drawn by a plunger type oil pump. This oil pump is located on the front of the compressor adjacent to the intercooler. The oil pump (Figure 2) is driven off an integral cam of the compressor crankshaft. Normal operating oil pressure is 10 to 20PSI. The oil is drawn through a screen located in the crankcase sump, through a check valve and passes through the oil pump plunger to the oil pressure chamber. From this point the oil is under pressure and is fed through drilled passages in the crankshaft to the connecting rod and main bearings. The pistons, piston rings, and cylinders are splash lubricated by throw-off from the connecting rod bearings. The oil pump body is bolted and doweled to the compressor front retainer and

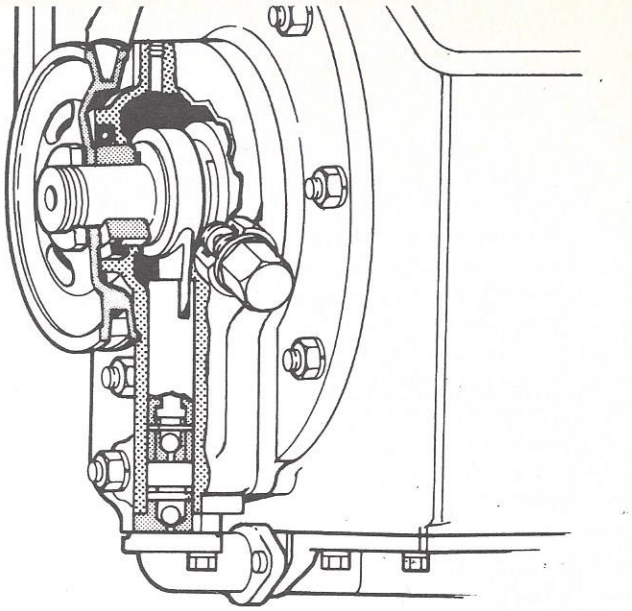


Figure 2 — Lubricating Oil Pump

carries a non-adjustable pressure relief valve that serves to by-pass excess oil to the crankcase sump.

1-10. Pressure Control System. (See Figure 3.) These "SDS" type compressors use a continuous running, load-unload pressure control. The system utilizes two unloader pilot valves. One valve is adjusted for single stage operation and the other for two stage operation. The two valves are separated by a shut-off valve and a double check valve.

1-11. When receiver air pressure reaches the unloader pilot valve pressure setting, the receiver air flows to the suction valve unloaders. When receiver pressure drops below the pressure setting of the unloader valve, the valve actuates to eliminate pressure to the unloader portion of the suction valves in the compressor cylinder heads allowing the compressor to resume its compressing function.

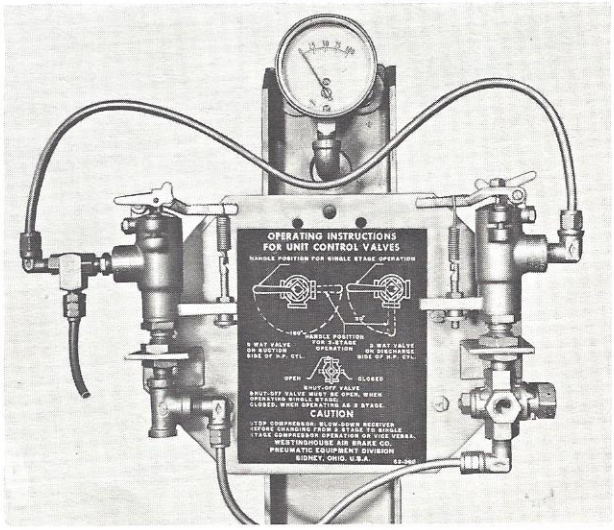


Figure 3 — Pressure Control System

Chapter 2
COMPRESSOR INSTALLATION

2-1. Location.

2-2. The compressor must be located on the rig in a position that is a minimum of two feet from any bulkhead. Since these SDS compressors are air cooled, there must be room for air to circulate around, over, and through the compressor, cylinders, and intercooler. If sufficient room for air circulation around the compressor is not provided the compressor will run too hot which in turn could cause premature valve failure within the compressor. Every effort should be made to ascertain that ambient air around the compressor does not exceed 120°F. Also, engine exhaust gases and piping should be routed away from the compressor installation.

2-3. Piping.

2-4. Piping from the compressor to the air receiver must be at least three inches in diameter. The receiver should be located as near the compressor as practicable with a maximum of a fifteen foot run from compressor discharge to receiver inlet connections. Never reduce pipe size in discharge line from compressor. Minimize bends and fittings in discharge line but do include a flexible coupling in the line and attempt to run discharge line down hill from compressor to receiver in order to drain any condensate that may occur in this line. Some bends and expansion joints are desireable in the discharge line to relieve stresses of expansion and contraction inherent in metal that is subject to temperature variations. For a typical rig installation see figure 4. As will be noted in figure 4, an auxiliary sump is often added to the intercooler on rig applications of SDS compressors. Due to moisture build-up in the bottom of the air receiver, the compressor piping should be connected to the upper end of the air receiver to prevent moisture feed back to the compressor.

2-5. Safety Valves.

2-6. The air receiver compressor must be protected by a safety valve. This valve must be sized to handle the full compressor output while maintaining the receiver pressure below the rated pressure of the receiver. The safety valve should be set to release at 10 PSI above the compressor's maximum rated operating pressure. This will provide additional protection against overloading the compressor.

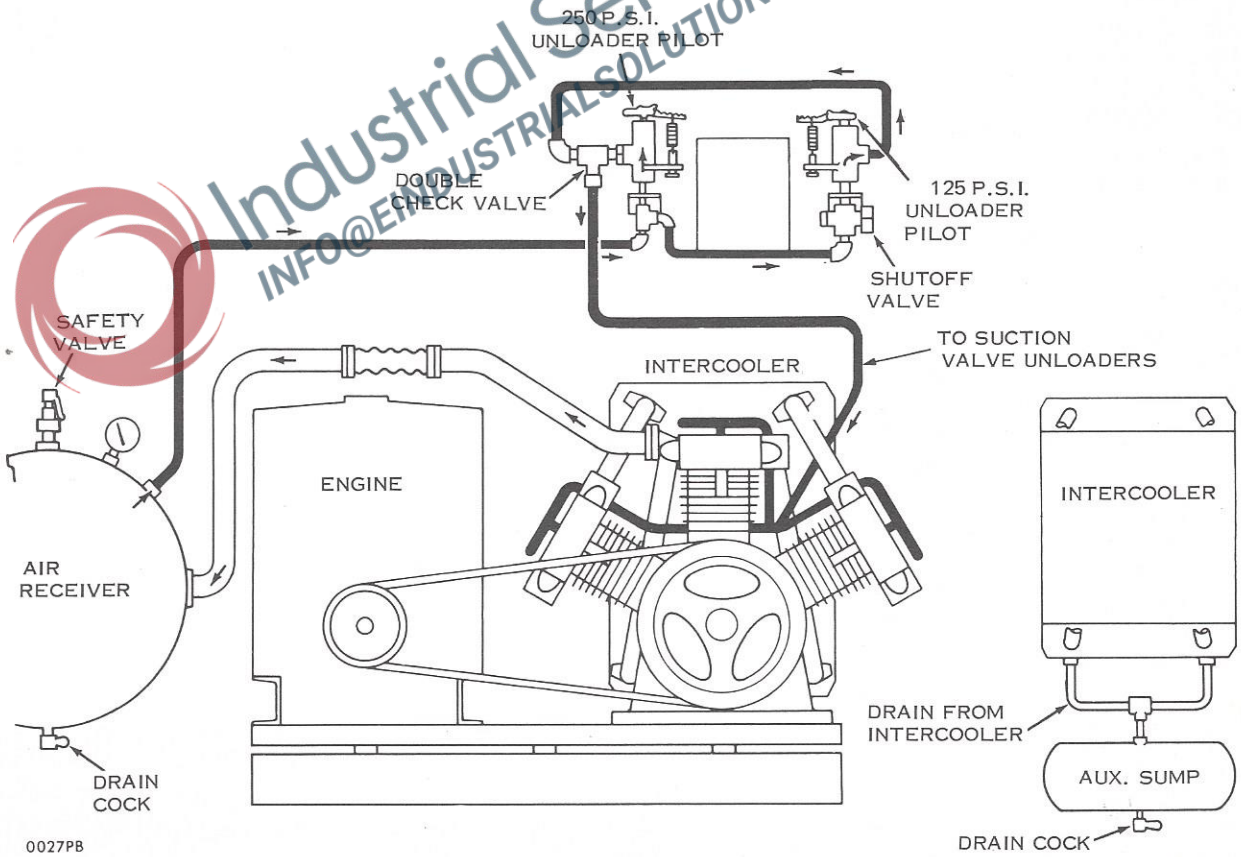


Figure 4 — Typical Piping Diagram (Engine Driven) Rig Application

Chapter 3
OPERATION

3-1. Lubrication.

3-2. Prior to initial operation, the crankcase of the compressor must be filled with a single viscosity, non-detergent, super refined oil with rust and oxidation inhibitors. Oil should be either a napthenic base or a specially compounded type to minimize carbon formation and to produce carbon residue of a soft, fluffy nature. Oils having animal fat compounding are NOT recommended. Use the following weight oils for the ambient temperature ranges indicated: above 60°F. Use SAE 30; 32 to 60°F use SAE 20; below 32°F use SAE 10W. It is important to use oil from a known, reputable source. Use of inferior quality oil will likely create service problems with valves, bearings, oil pump, etc. that will be costly to repair. The type of service required of an air compressor on rig applications is heavy duty under less than ideal conditions. Therefore, be sure to use only the proper lubricants.

3-3. Starting.

3-4. Prior to starting the compressor, perform all scheduled maintenance as outlined in Chapter IV. Always be certain that there is sufficient oil in the crankcase. If a shut-off valve has been incorporated in the compressor discharge pipe to receiver, make certain that this valve is open before starting.

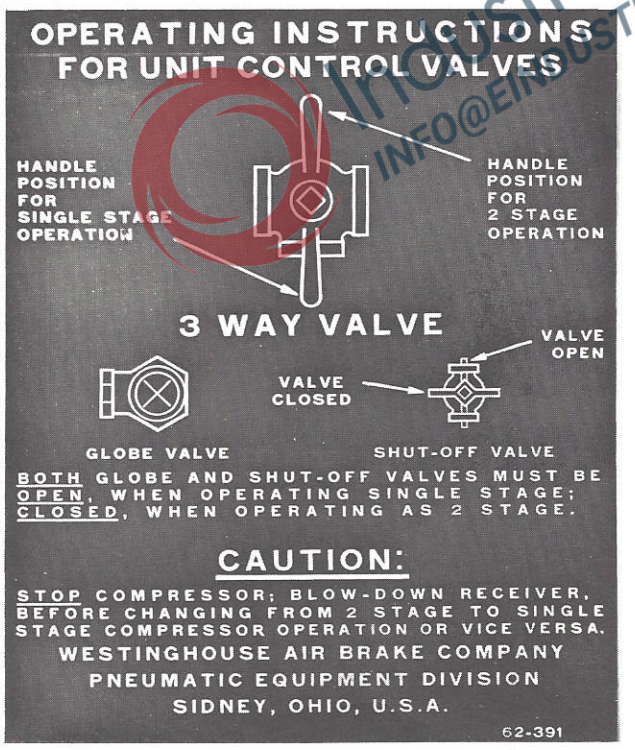


Figure 5 — Safety Valves

WARNING

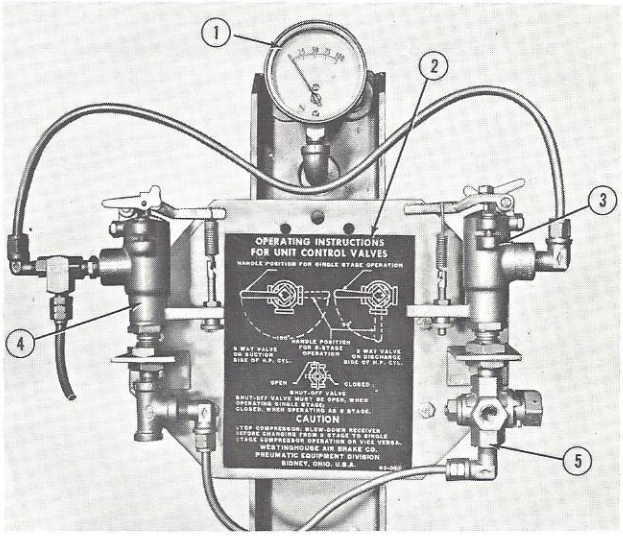
A shut-off valve should never be used in the compressor to receiver air line. However, should a shut-off valve be installed in this line, the operator should make certain that this valve is open before starting the compressor. In addition, if a shut-off valve is incorporated, a relief valve must also be included in the line between compressor and shut-off valve.

3-5. Refer to figures 5, 6, and 7 and set the controls for the mode of operation (single stage or two stage) desired. Start the power unit that drives the compressor.

3-6. Operation. After the compressor starts, check the direction of rotation. Rotation should be counterclockwise as viewed looking at the flywheel. Also check to see that the suction fan is drawing air through the intercooler and across the cylinders to provide proper heat dissipation.

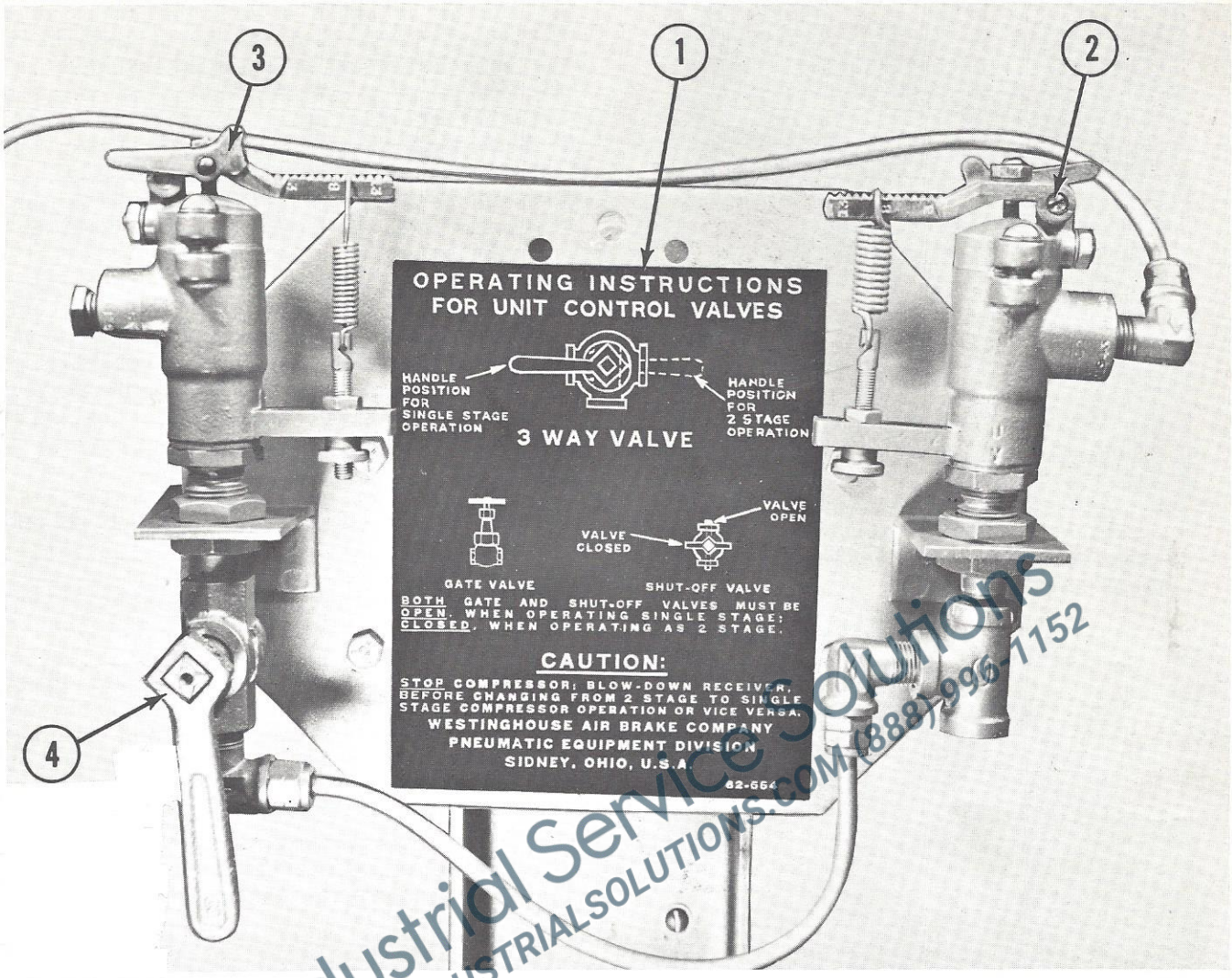
3-7. After the compressor is started, it will continue to run in the mode of operation selected until it is stopped.

3-8. Stopping. To stop the compressor, shut down the power unit. After compressor has stopped, open the receiver outlet valve to release all pressure in the receiver.



1. Gage
2. Instruction Plate
3. Pilot Valve
4. Pilot Valve
5. Shut Off Valve

Figure 6 — Pressure Control System



1. Instruction Plate
2. Pilot Valve
3. Pilot Valve
4. Shut Off Valve

Figure 7 — Pressure Control System

Chapter 4
MAINTENANCE

4-1. General. Regulate inspections along with proper corrections of any faults found will prolong the useful life of your compressor. A regular inspection and service schedule is outlined in the following paragraphs. Please bear in mind that this schedule is flexible and, depending on the type of service, location, weather condition etc., it may be changed to suit individual conditions.

4-2. Daily Inspection and Maintenance. (Before Starting.)

a. Check oil level (with rig level). Fill to full mark, if oil level is low. Oil level must be kept between high and low level marks on the oil level sight gage (See Figure 8).

b. Drain condensate from air receiver and intercooler by opening drain cocks to each. (See Figure 4).

c. Manually trip the safety valves after receiver pressure exceeds 70 PSI.

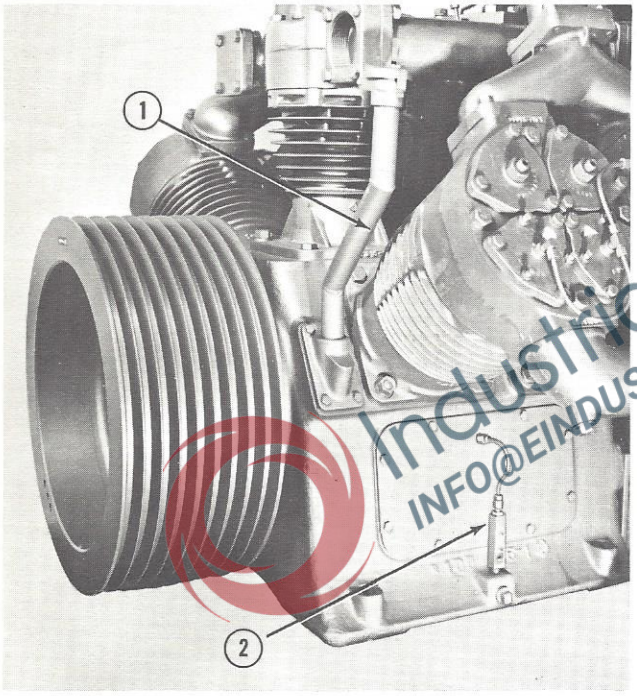
WARNING

Compressed air is very dangerous. It must be treated with respect and handled with care. Since these SDS com-

pressors are capable of delivering air compressed up to 250 PSI (when operated as a two stage machine) the utmost caution should be observed when opening any valve after the air has been compressed. Make certain that no person or object, that could be moved or damaged, is located in the path of the compressed air discharge from a valve. This air travels at an extremely high velocity and should be considered as dangerous as a gun.

NEVER PLAY WITH COMPRESSED AIR! NEVER POINT AN AIR HOSE AT SOMEONE! NEVER TREAT COMPRESSED AIR LIGHTLY!

d. The dust cups on the bottom of the air cleaners must be emptied every 4 to 12 hours. The frequency depends on operating conditions. Where conditions of extreme dust, dirt or grit are prevalent, more frequent service is essential.



1. Oil Filler Tube
2. Oil Sight Gage

Figure 8 — Oil Level Sight Gage

4-3. Weekly Inspection and Maintenance. (Before Starting).

a. Repeat all daily checks.

b. Check condition and tension of fan belt and drive belts. Any indication of excessive wear, cracking, etc., of these belts indicates that they should be replaced. See paragraphs 5-7 and 5-8 to replace belts. To check for *proper tension* of the fan belt see if belt can be slipped by hand. If belt can be *slipped, it is too loose;* if it *cannot be moved,* it is *too tight.* See paragraph 5-7, for details on fan belt tension and adjustment. Drive belt tension should equal one inch deflection at mid span with a ten pound weight. See paragraph 5-8 for drive belt adjustment and replacement.

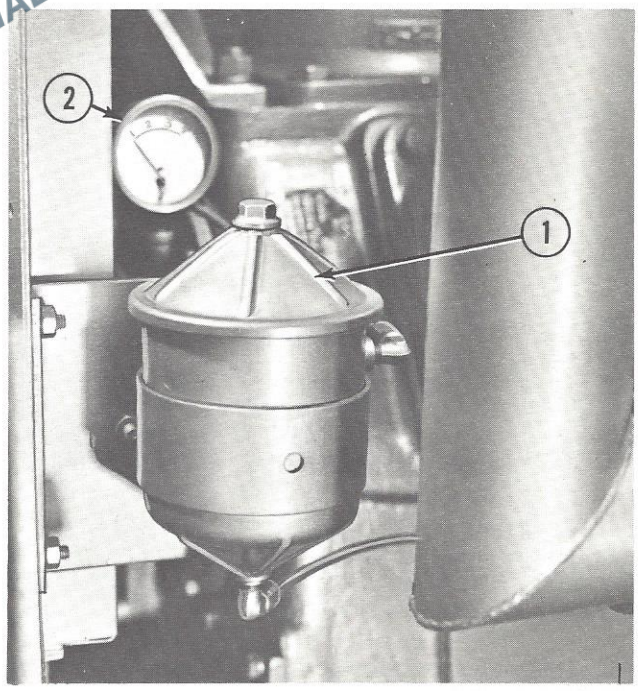
c. Clean intercooler and cylinder fins. If compressed air is used for cleaning, exercise extreme caution. Protect the eyes of all personnel in the vicinity of the compressor and make sure that the air hose is not directed at anyone or anywhere other than the area to be cleaned.

4-4. Monthly or 200 Hour Inspection and Maintenance.

a. Repeat all WEEKLY inspections and maintenance procedures.

b. While compressor is warm, drain and replace lubricating oil (See figure 9.) Remove side cover from crankcase, inspect and clean the strainer screen. Remove and replace the oil filter element.

c. Remove air cleaner dust cups and then remove air cleaner element by removing wing headed screw securing element. Follow



1. Compressor Oil Filter
2. Pressure Gage

Figure 9 — Oil Filter

the cleaning directions on the element. Either use a maximum of 100 PSI compressed air to blow dirt out of filter element from the inside or *wash in* approved solvent and allow to dry. Inspect clean element by placing a light inside element, rotating element by hand and viewing from exterior. If element indicates damage upon inspection, replace with new element.

NOTE: If paper element is used it must be dry before use or it will plug in a short time.

d. Check and make certain that all air connections are tight and secure.

e. Lubricate suction valve unloader felts and "O" ring on the unloader plungers. Refer to 5-18-E. Use new valve seat and valve cover gasket when reassembling.

4-5. 6 Month or 1,000 Hour Inspection and Maintenance. (See Figure 10.)

a. Repeat all MONTHLY inspections and maintenance procedures.

b. Refer to paragraph 5-11 and remove, clean and inspect all compressor intake and exhaust valves. Repair or replace as necessary. Refer to paragraph 5-12 for valve replacement instructions.

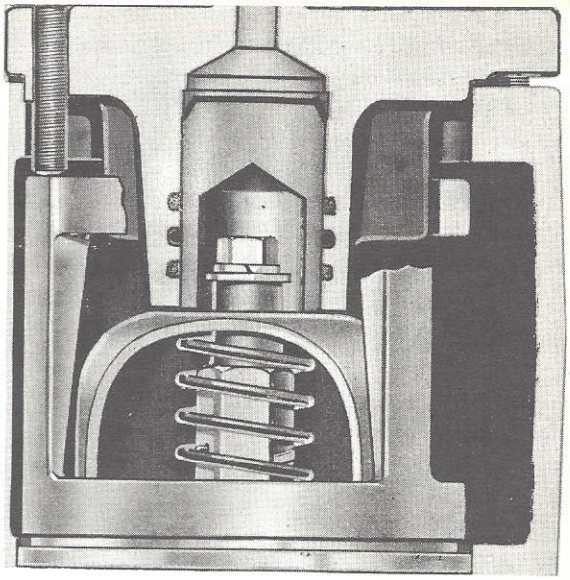


Figure 10 — Inspection and Maintenance

Chapter 5

SERVICE PROCEDURES, ADJUSTMENTS, AND REPAIR

5-1. General. This chapter is devoted to certain service procedures, adjustments, and repair or replacement instructions for the equipment involved. As noted in the previous chapter, the elapsed time between service, adjustment, and repair of the equipment is dependent upon the nature of service to which the equipment is subjected and environment in which it is working. The more severe the conditions, the more frequent will be the need for service. High concentrations of sand or dust, high humidity, extreme cold or heat all have a bearing on how frequently your compressor will need to be serviced.

5-2. Service Procedures.

5-3. Air Cleaners. To service the air cleaners refer to paragraphs 4-2,d and 4-4,c.

5-4. Lubricating Oil Change. To change lubricating oil in crankcase, refer to paragraph 4-4,b.

5-5. Adjustments.

5-6. Unloader Pilot Valve. The unloader pilot valve (See Figure 11) has a definitely set spring tension and when the air receiver pressure drops, the spring tension will close off receiver air pressure to the suction valve unloaders in the cylinder heads. Thus the suction valves operate normally so that compression occurs. If the air receiver reaches its maximum pressure, as determined by the unloader pilot valve setting, the pressure from air receiver to pilot valve will be greater than spring tension and thus cause pilot valve to open, directing pressurized air to unloaders in the intake valves of *cylinder heads.* This pressure causes the intake valves to remain

open and only breathe air in and out *to atmosphere*, thus avoiding compression. To change the pressure at which the compressor will load and unload, adjust unloader pilot valve as follows:

a. To increase the variation between load and unload, move the hooked spring position toward the lower numbered end of the notched lever.

b. To decrease the variation between load and unload, move the hooked spring position toward the higher numbered end of the notched lever.

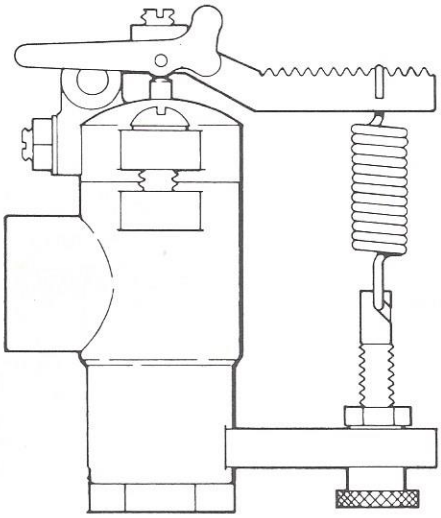


Figure 11 — Unloader Pilot Valve

5-7. Fan Belt Tension Adjustment. Adjust fan belt tension as follows:

a. Remove screws from rear pulley half. Remove key.

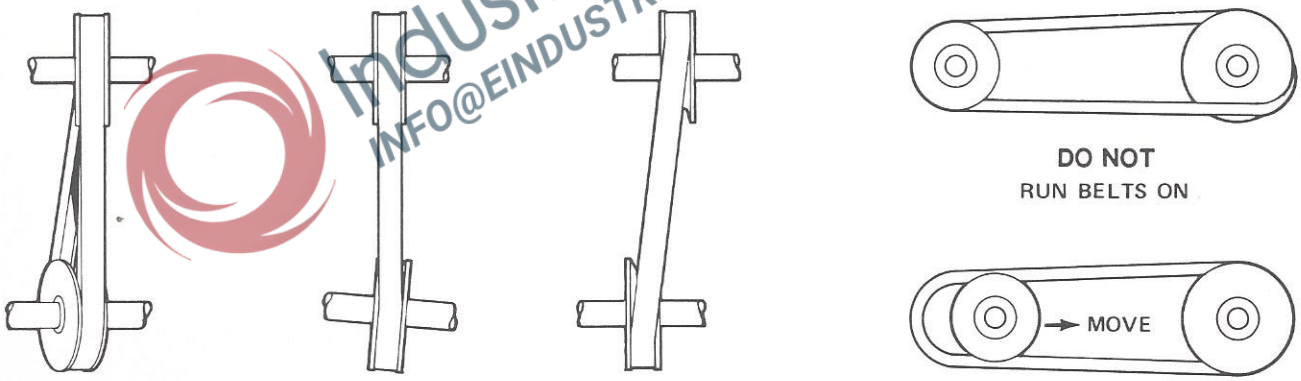
b. Turn rear pulley half clockwise to increase tension and counter-clockwise to decrease tension. Proper tension is attained when the fan belt cannot be *slipped* by hand.

c. Replace key and screw.

5-8. Drive Belt Tension and Alignment Procedure. (Refer to Figure 12.) Checking parallel shaft alignment and axial groove alignment may be done simultaneously. To obtain accurate alignment, a straight edge should be used for this measurement, or, when a straight edge is not available, a taunt line may be substituted. Perfect alignment should be obtained. However, if perfect alignment proves to be impossible, a rough rule of thumb to determine permissible limit of misalignment is 1/64 inch out of line for each 12 inches of shaft centers. Belt tension should be checked as described in paragraph 4-3,b. If drive belts are too loose, there is slippage and rapid wear of belts. Slippage is usually indicated by a squealing or howling noise. Always refer to belt manufacturer's catalog for proper tension to be applied. Adjust belt tension by moving engine in direction necessary to increase or decrease tension. Tighten flywheel nut to 1,000 lbs. ft. torque.

5-9. Repair or Replacement.

5-10. The following paragraphs are devoted to repairing compressors, mostly by replacing parts. Any parts that show excessive wear or deterioration must be replaced with new factory service parts.



Shafts must be in angular and parallel alignment and the sheave grooves axially aligned to obtain proper performance of V-belt drives. Angular alignment is obtained by levelling shafts.

Six basic steps make up V-belt installation procedure: (1) Reduce centers so belt can be slipped on sheaves; (2) Have all belts slack on same side (top of drive); (3) Tighten belts to eliminate slack; (4) Start unit and allow belts to seat in grooves; (5) Stop the unit—then retighten to make sure belts have proper tension; and (6) Recheck tension in 24 to 48 hours.

Figure 12 — Drive Belt Installation

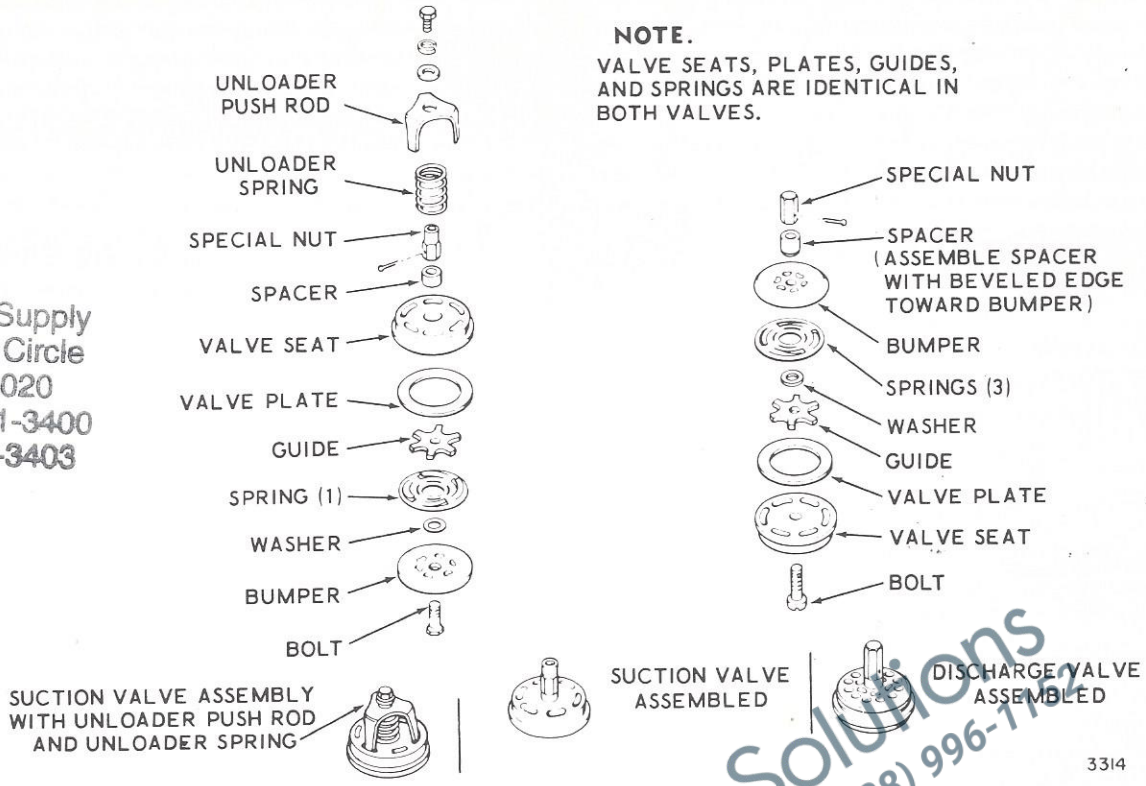


Figure 13 — Suction and Discharge Valves

5-11. Valve Repair. Both suction and discharge valves are located in the cylinder head. The suction and discharge valves are plate type and consist of a seat, plate type valve disc, circular plate type springs, valve guide, and bumper held together in an assembly with a through bolt and nut. (See Figure 13). These valve assemblies may be removed from cylinder head without removing the cylinder head.

5-12. Valve Removal. To remove valves from cylinder head, proceed as follows:

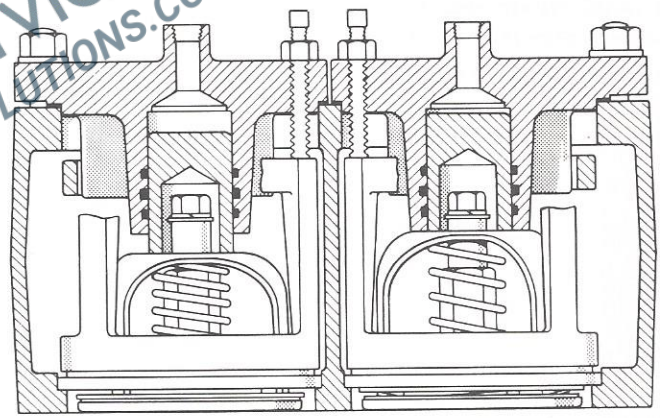
a. Disconnect the unloader tubing from the valves.

b. Loosen jamb nuts and back off set screws two turns.

c. Remove valve covers.

d. Lift out valve assemblies. (See Figure 14)

NOTE: A special tool (part no. 88-361-1) is required to disassemble or assemble valve. (See Figure 15). The tool consists of a reversible lower plate, an upper plate, and two capscrews. One side of the lower plate is designed to hold the slotted head of the discharge valve bolt and the other side to hold the hexagon head of the suction valve bolt.



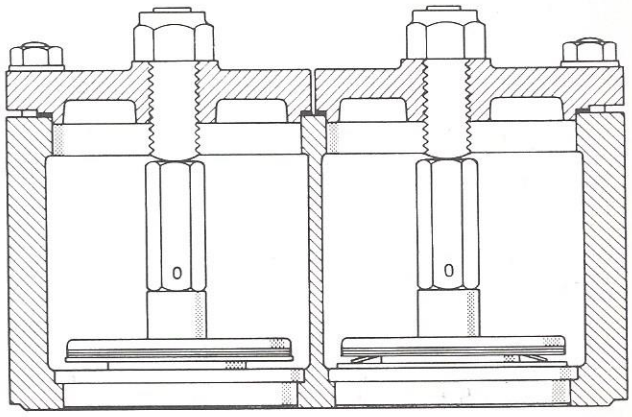


Figure 14 — Valve Assemblies