

AIR-STARTING EQUIPMENT FOR DIESEL ENGINE-ALTERNATORS REPLACEMENT PARTS AND PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of the KS-15777, L51 and L52 and the KS-15899, L51 and L52 air-starting equipments used with manually and automatically started KS-15777 and KS-15899 diesel engine-alternators. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to cover the KS-15899, L51 and L52 air-starting equipments, to revise the ordering information, and to change the title of the section. Detailed reasons for reissue will be found at the end of the section.

1.03 Part 2 of this section covers the names of parts which it is practicable to replace in the field in the maintenance of this equipment. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts. This information is called Replacement Parts.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts covered in Part 2. This information is called Replacement Procedures.

1.05 Before replacing parts, make sure that at least one tank is charged to 250-psi air pressure.

Caution: Before replacing parts, open the disconnect switch in the ac motor starter circuit to prevent automatic starting of the ac

motor compressor and to remove the voltage from the tank pressure control switches (RST and AST).

2. REPLACEMENT PARTS

2.01 The figures included in this part of the section show various parts in their proper relation to other parts of the equipment together with the names and numbers of the parts which it is practicable to replace in the field. If the part names differ from those in general use in the field, the latter names in some instances are shown in parentheses ().

2.02 Information enclosed by parentheses () is not ordering information. This information may be references to notes, parts referred to in other parts of the section and not considered replaceable, or part names in general use in the field if these names differ from those assigned by the manufacturer.

2.03 When ordering replacement parts, give the part name, the KS and list numbers of the air-starting equipment and the name, model and serial numbers of the diesel engine with which the air-starting equipment is associated. When ordering an air compressor or motor or parts thereof, give the complete nameplate data for the compressor or motor in addition to the KS and list numbers of the air-starting equipment. For example — Safety valve for KS-15777, L51 air-starting equipment, White Motor Co. Diesel engine model 40-SX-8 serial No. 16627; oil pressure gauge for Quincy Compressor Co. air compressor model 310, Serial No. 310 14 176777-L for KS-15899, L52 air-starting equipment.

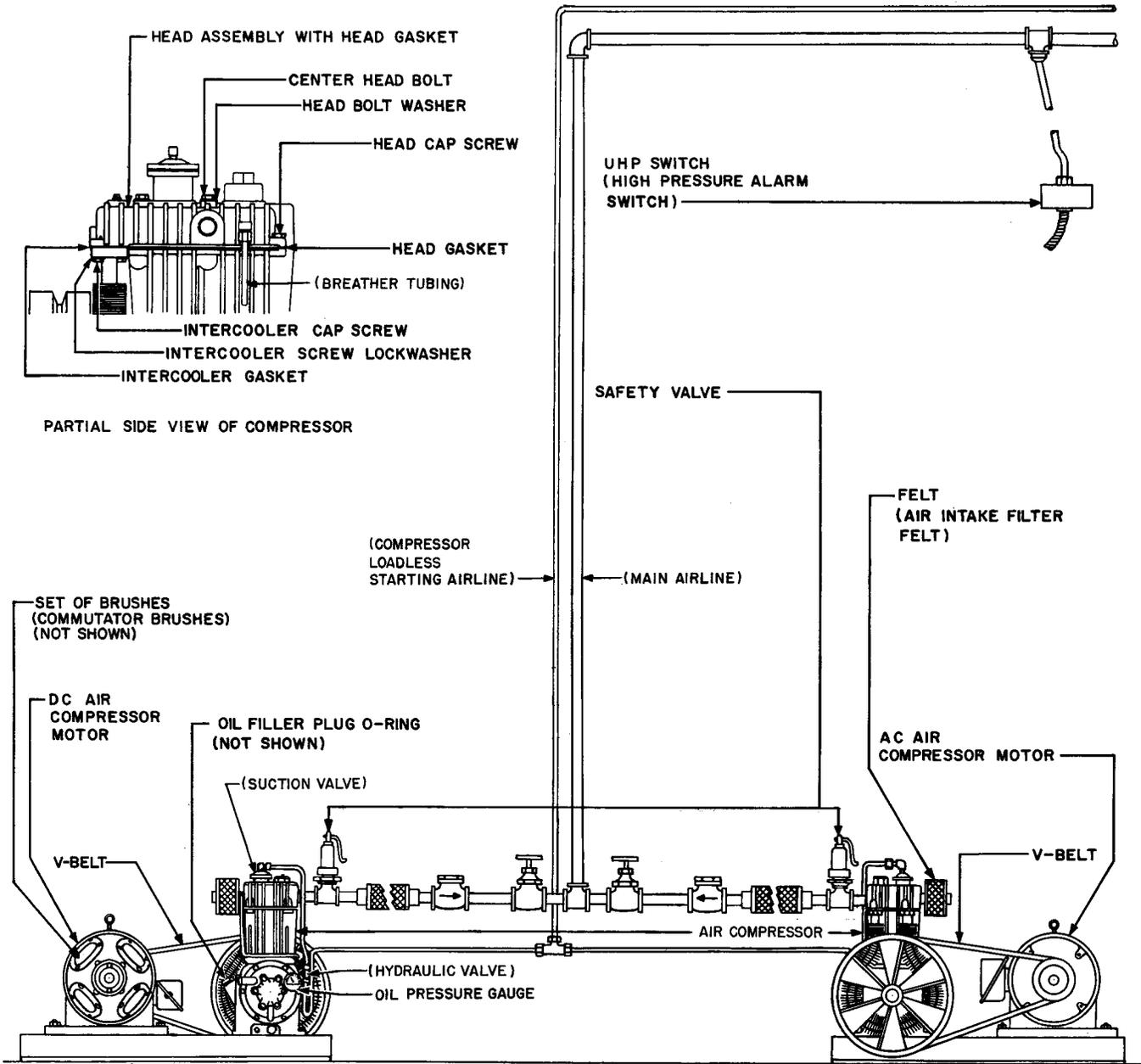


Fig. 1 – Typical Air-Starting Equipment — AC and DC Motor Air Compressors and High Pressure Alarm Switch (KS-15777, L51 Air-Starting Equipment Shown)

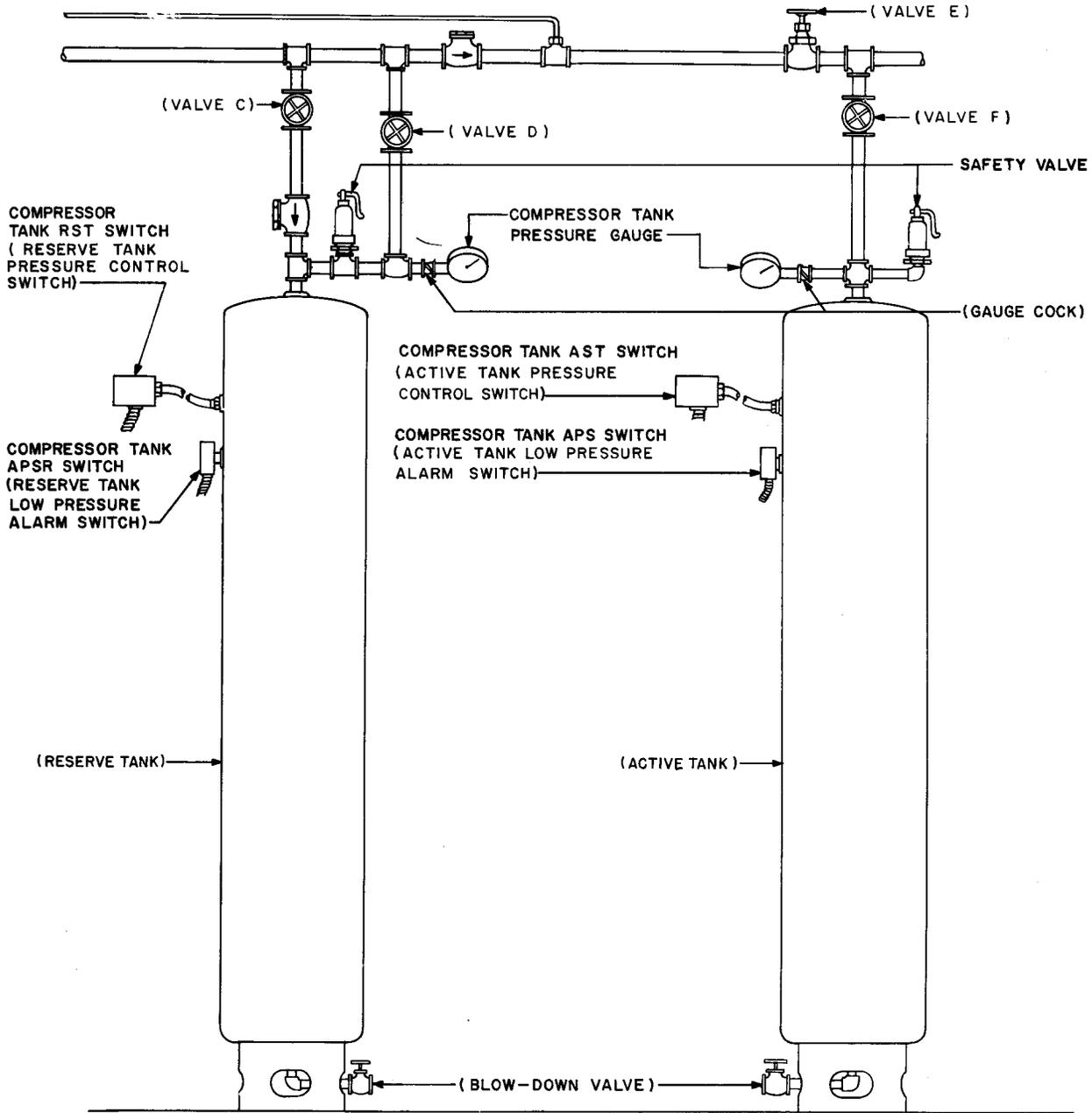


Fig. 2 - Typical Air-Starting Equipment - Active and Reserve Air Tanks and Associated Equipment (KS-15777, L51 Air-Starting Equipment Shown)

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3. REPLACEMENT PROCEDURES

3.01 *List of Tools, Gauges, and Materials*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
R-1289	1-5/8 Inch Open Single-End Flat Wrench
R-1539	18-Inch Pipe Wrench
R-1770	1/2- and 9/16-Inch Open Double-End Flat Wrench
R-2512	8-Inch Adjustable Wrench
R-2652	9-Inch Thin Monkey Wrench
R-2671	1/8-Inch Allen Socket-Screw Wrench
R-2698	1/2- and 9/16-Inch Hex. Box Wrench .
R-2966	Flat, Stiff Artists Brush, No. 5
—	1/2- and 7/16-Inch 12-Point Offset Box Wrench, J. H. Williams & Co, No. 8725
—	15-Inch Monkey Wrench, Billings & Spencer Co, No. 90
—	Combination Pliers
—	Long-Nose Pliers
—	9-Inch Side Cutting Pliers
—	V-Notch Diagonal Pliers
—	4-Inch E Screwdriver
—	Bearing Puller, Owatonna Tool Co, No. 1002 Equipped With No. 1002-L1 Single-End Arms
—	Receptacles for Oil and Moisture
GAUGES	
R-8550	6-Inch Steel Scale

CODE OR SPEC NO.	DESCRIPTION
MATERIALS	
KS-7860	Petroleum Spirits
KS-14666	Cloths
—	High Temperature Thread Compound Crane Co, Formula No. 425A
—	Electricians Tape
3.02	After making any replacement of parts, the part or parts replaced shall meet the requirements involved as specified in Section 026-392-701. Other parts whose adjustment may have been directly disturbed by the replacement operation shall be checked to applicable requirements.
3.03	Care should be taken when using petroleum spirits in the vicinity of dc machines as the fumes may affect commutation adversely by softening commutator film. To avoid need for burnishing commutators of dc machines after doing any cleaning operation called for in this section, provide adequate ventilation, use the absolute minimum of petroleum spirits required for the cleaning operation, and keep the container closed when not in use.
3.04	No replacement procedures are specified for screws or parts where the replacement procedure consists of a simple operation.
3.05	To remove the ac motor compressor from service, turn the HAND-OFF-AUTO switch on the motor starter to OFF and open the associated disconnect switch. To restore the ac motor compressor to service, make sure that the valve associated with the compressor is open, then close the disconnect switch and turn the HAND-OFF-AUTO switch to HAND for manual control or to AUTO for automatic operation. To remove the dc motor compressor from service, press the STOP button on the START-STOP switch and open the associated disconnect switch. To restore the dc motor compressor to manual operation, make sure that the valve associated with the compressor is open, then close the disconnect switch and press the START button.

Caution: When air is being compressed, the compressor cylinder head, the air line, and

the valves become hot. Take care to avoid contact with these parts until they have cooled to a safe temperature.

3.06 To release the air pressure in the reserve tank or from the main air line between the compressors and the reserve tank, remove both compressors from service as covered in 3.05 and open the reserve tank blow-down valve. To release the air pressure from the active tank, remove both compressors from service as covered in 3.05. Close F valve and open the active tank blow-down valve (Fig. 2). To silence the audible alarm which will operate upon release of air pressure in either tank, press the AUDIBLE ALARM SILENCING SWITCH button on the diesel engine main control cabinet.

3.07 Before connecting pipe-threaded fittings (except those mounting the compressor air intake filter), apply a small amount of high temperature thread compound to the male threads using the R-2966 brush. Take care to keep the compound away from the end of the pipe or fitting to avoid getting compound into the air system.

Compressors and Motors

3.08 Air Intake Filter Felt: Fig. 1

- (1) Remove the air compressor from service as covered in 3.05.
- (2) Remove the mounting screw in the center of the filter cap using the Williams No. 8725 wrench, and then remove the cap and screen. Hold the outer screen and pull the baffles out from inside the inner screen with the long-nose pliers. Remove the inner screen and then the filter felt with the pliers. Discard the felt and separate the baffles. Clean the screens, baffles, cap, and base of the filter using a KS-14666 cloth moistened with KS-7860 petroleum spirits and then a dry cloth.
- (3) Mount the new filter felt inside of the outer screen with the ends butting against each other. Mount the inner screen against the felt with the ends overlapping. Place the larger corrugated baffle against the inner screen. Then place the plain baffle inside the corrugated baffle with the cutout portion at the opposite end from the cutout portion of the corrugated baffle. Similarly mount the re-

maintaining corrugated baffle with the cutout portion opposite to that of the plain baffle. Place the assembly and the cap on the filter base; insert and tighten the screw on the cap.

3.09 Compressor Drive Belts: Fig. 1

- (1) Remove the compressor from service as covered in 3.05.
- (2) Remove the belt guard with the 4-inch E screwdriver.
- (3) If one belt requires replacement, replace both belts.
- (4) To replace the belts, slightly loosen the motor mounting bolts with the R-2698 wrench. Slide the motor toward the compressor sufficiently to permit manual removal of the belts. Substitute new belts and tension them to meet the tension of drive belts requirement. Mount the belt guard.

3.10 Compressor Oil Pressure Gauge: Fig. 1

- (1) Remove the compressor from service as covered in 3.05.
- (2) Remove the gauge from the crankcase using the R-1770 wrench. Mount the new gauge with the wrench. Do not apply force to the gauge case as this may damage the mechanism. Wipe off any oil on the surfaces adjacent to the gauge using a KS-14666 cloth.

3.11 Compressor Head Assembly, Gaskets, and Mounting Screws: Fig. 1

- (1) Remove both compressors from service as covered in 3.05. Close E valve and make sure that D valve is closed (Fig. 2).
- (2) Close the valve associated with the compressor and release the air pressure in the discharge pipe by manually operating the safety valve.
- (3) Using the R-2512 wrench, slowly loosen the nut connecting the tubing to the compressor suction valve. This will release the air pressure in the compressor loadless starting air line. When the pressure is released, disconnect the tubing from the suction valve. Loosen the nut at the top of the hydraulic valve and swing the tubing above the hydraulic valve away from the compressor cylinder head. ↴

- Γ (4) Unscrew and remove the air intake filter. Disconnect the breather tubing from the side of the cylinder head (Fig. 1 – Partial Side View of Compressor).
- (5) Separate the union in the discharge pipe using the 15-inch monkey wrench and the R-1289 wrench. Remove the discharge pipe from the cylinder head with the R-1539 wrench.
- (6) Using the R-2698 wrench, remove the intercooler cap screws from one end of the cylinder head, the head cap screws from the other end of the head, and the four center head bolts from the top of the head. Carefully separate the intercooler flanges from the head and the head from the cylinder block using the 4-inch E screwdriver to pry them apart if necessary. Remove the head assembly, head gasket, and intercooler gaskets. If the head assembly is to be replaced, transfer the tubing fittings from the old to the new head.
- (7) Clean all surfaces between which gaskets will be mounted using a KS-14666 cloth moistened with KS-7860 petroleum spirits and then a dry cloth. Take care not to get dirt into the cylinders and intercooler tubing.
- (8) Place new gaskets on the compressor cylinder block and intercooler flanges. Mount the head on the block, tighten the head bolts and screws and intercooler screws in successive steps.
- (9) Mount the discharge pipe in the cylinder head and reconnect the union. Connect the tubing to the suction valve and tighten the nut at the top of the hydraulic valve. Connect the breather tubing to the side of the cylinder head. Remount the air intake filter after replacing the filter felt as covered in 3.08.
- (10) Open E valve (Fig. 2) and the valve associated with the compressor. Reduce the air pressure in the reserve tank to at least 195 psi by opening the blow-down valve. This will permit running the compressor long enough to heat up the cylinder head for final tightening of the bolts and screws. Restore the compressor to service as covered in 3.05 and recharge the tank to 250 psi. When the compressor head is hot, further tighten the cylinder head bolts and screws if necessary.

Γ3.12 Compressor: Fig. 1

- (1) Remove both compressors from service as covered in 3.05. Close E valve and make sure that D valve is closed (Fig. 2).
- (2) Close the valve associated with the compressor to be replaced and release the pressure in the discharge pipe by manually operating the safety valve. Unscrew and remove the air intake filter.
- (3) Using the R-2512 wrench, slowly loosen the nut connecting the compressor loadless starting air line to the bottom of the hydraulic valve mounted on the compressor crankcase. This will release the air pressure from the line. When the pressure is released, disconnect the tubing from the bottom of the valve.
- (4) Separate the union in the discharge pipe using the 15-inch monkey wrench and the R-1289 wrench. Remove the discharge pipe from the cylinder head with the R-1539 wrench.
- (5) Remove the compressor drive belts as covered in 3.09.
- (6) Remove the compressor mounting screws with the R-2698 wrench and remove the compressor.
- (7) Mount the new compressor and tighten the mounting screws. Fill the crankcase with oil in accordance with the lubrication requirement.
- (8) Mount the discharge pipe in the cylinder head and connect the union. Connect the loadless starting air line to the hydraulic valve on the crankcase. Mount the air intake filter after replacing the filter felt as covered in 3.08. Mount the drive belts as covered in 3.09(4).
- (9) Open E valve (Fig. 2) and the valve associated with the compressor. Reduce the air pressure in the reserve tank to at least 195 psi by opening the blow-down valve. This will permit running the compressor long enough to heat up the oil in the crankcase in preparation for adjusting the oil pressure. Restore the compressor to service as covered in 3.05 and charge the tank to 250 psi. Adjust the oil pressure as covered in the lubrication requirements.

3.13 DC Motor Brushes: Fig. 1

- (1) Remove the dc motor compressor from service as covered in 3.05.
- (2) Remove the commutator handhole covers with the R-2512 wrench.
- (3) Loosen the brush pigtail terminal screw using the 4-inch E screwdriver and remove the pigtail terminal from under the screw. Raise the brush finger and remove the brush from the holder.
- (4) Mount the new brush in the holder. Fit the brush to the commutator to meet the requirement covering brush fit in the section dealing with this apparatus. Position the pigtail terminal under the terminal screw and securely tighten the screw. Mount the commutator handhole covers.

3.14 Motor: Fig. 1

- (1) Remove the compressor from service as covered in 3.05.
- (2) Remove the drive belts as covered in 3.09.
- (3) Using the 4-inch E screwdriver, remove the motor conduit box cover. Remove the tape from the external lead connections to the motor leads with the diagonal pliers. Disconnect the external leads from the motor leads using the screwdriver and the combination pliers. Remove the BX connector and leads from the conduit box.
- (4) Measure the distance from the end of the motor shaft to the hub of the motor pulley with the R-8550 scale. Use this measurement to position the pulley when mounting it on the new motor. Loosen the pulley setscrews with the R-2671 wrench and remove the pulley using the bearing puller if necessary. If the new motor was furnished without a key, remove the key from the motor shaft using the 9-inch side cutting pliers. Remove the motor mounting bolts and remove the motor.
- (5) Mount the new motor; slide it toward the compressor, and slightly tighten the mounting bolts. Mount the key and then the pulley on the motor shaft. Use the measurement obtained in (4) to position the pulley on the shaft. Check that the key is under a setscrew, and then tighten the setscrews.

- (6) Remove the motor conduit box cover; insert the external leads and attach the BX connector to the conduit box. Connect the external leads to the motor leads in accordance with the instructions on the inside of the conduit box cover or on the motor nameplate. Make sure that the ac motor leads are connected properly for the ac voltage on which the motor is to operate. Make sure that the dc motor leads are connected to give rotation in the direction of the arrow on the compressor pulley. Tape the connections in the approved manner, and mount the conduit box cover.
- (7) Mount the drive belts and tension them to meet the tension of drive belts requirement. Mount the belt guard.
- (8) Operate the motor and check direction of rotation. If the ac motor rotates in the wrong direction, open the disconnect switch and interchange connections of two of the three leads at the motor starter.

3.15 Safety Valves

- (1) **Compressor Safety Valve:** Fig. 1 – Remove the compressor associated with the safety valve from service as covered in 3.05. Close the valve associated with the compressor and release the air pressure by operating the safety valve manually. Using the R-2652 wrench, remove the valve and substitute the new valve. Check the valve in accordance with the requirement covering operation of safety valves.
- (2) **Tank Safety Valve:** Fig. 2 – Release the air pressure in the tank associated with the safety valve as covered in 3.06. Using the R-2652 wrench, remove the valve and substitute the new valve. Close the tank blow-down valve and in the case of the active tank, open F valve (Fig. 2). Recharge the tank using the ac motor compressor on automatic control. Check the valve in accordance with the requirement covering operation of safety valves.

3.16 Tank Pressure Control Switch (RST or AST): Fig. 2

- (1) Release the air pressure from the tank associated with the control switch to be replaced as covered in 3.06. Make sure that the disconnect switch in the circuit to the ac motor

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starter is open in order to remove the ac line voltage from the tank pressure control switch.

- Γ (2) Remove the control switch cover using the 4-inch E screwdriver. Disconnect the leads from the switch terminals. If the switch has four terminals, note the terminals to which the leads were connected. These terminals are associated with the contacts which close on decreasing pressure. Remove the BX connector and the leads from the switch housing. Mount the BX connector in the new control switch.

(3) If the switch is mounted on the wall, disconnect the air tubing at the switch using the R-2512 wrench. Transfer the tubing connector to the new switch. Remove the switch mounting screws with the 4-inch E screwdriver and remove the switch.

(4) If the switch is mounted on a tank, remove it using the R-2512 wrench. Do not put any strain on the switch housing while removing the switch.

(5) Mount the new control switch in the reverse order of removal and connect the leads. If the switch has four terminals, make sure that the leads are connected to the proper terminals [see (2)]. Do not mount the switch cover at this time.

(6) Close the tank blow-down valve and open F tank valve if it was closed. Using the dc motor compressor, increase the tank pressure to about 220 psi and then stop the compressor. Adjust the control switch to the specified operate pressures as covered under adjusting procedures for setting of tank pressure control

L switch (RST and AST).

3.17 Tank Low-Pressure Alarm Switch (APSR or APS): Fig. 2

(1) Release the air pressure from the tank associated with the alarm switch to be replaced as covered in 3.06.

- Γ (2) Remove the alarm switch cover using the 4-inch E screwdriver. Disconnect the leads from the switch terminals. Remove the BX connector and the leads from the switch housing. Mount the BX connector in the new alarm

L switch.

- Γ (3) Remove the alarm switch from the tank using the R-2512 wrench. Do not put any strain on the switch housing while removing the switch.

(4) Mount the new alarm switch on the tank and remove the switch cover. If the switch has a differential adjusting screw, turn the screw all the way counterclockwise to obtain the minimum differential.

(5) Close the tank blow-down valve and open F valve if it was closed. Using the dc motor compressor, increase the tank pressure to about 20 psi above the specified operate pressure for the alarm switch and then stop the compressor.

- L (6) Connect the leads to the switch terminals and adjust the switch to the specified operate pressure as covered under adjusting procedures for setting tank low-pressure alarm switches (APSR and APS).

3.18 High-Pressure Alarm Switch (UHP): Fig. 1

(1) Release the air pressure from the air line by opening the reserve tank blow-down valve as covered in 3.06.

- Γ (2) Remove the alarm switch cover using the 4-inch E screwdriver. Disconnect the leads from the switch terminals. If the switch has four terminals, note the terminals to which the leads were connected. These terminals are associated with the contacts which close on increasing pressure. Remove the BX connector and the leads from the switch housing. Mount the BX connector in the new alarm switch.

(3) If the switch is mounted on the wall, disconnect the air tubing at the switch using the R-2512 wrench. Transfer the tubing connector to the new switch. Remove the switch mounting screws with the 4-inch E screwdriver and remove the switch from the wall.

(4) If the switch is mounted on the air line, remove it using the R-2512 wrench. Do not put any strain on the switch housing while removing the switch.

- L (5) Mount the new alarm switch in the reverse order of removal and connect the leads. If the switch has four terminals, make

sure that the leads are connected to the proper terminals [see (2).] Turn the switch differential adjusting screw all the way counterclockwise to obtain the minimum differential. Mount the switch cover.

(6) Close the reserve tank blow-down valve and recharge the tank using the ac motor compressor on automatic operation. Adjust the alarm switch to the specified operate pressure as covered under the adjusting procedures for setting air-line high-pressure alarm switch (UHP).

3.19 Compressor Tank Pressure Gauge: Fig. 2

(1) Close the cock on which the gauge is mounted. Remove the gauge from the cock using the R-1770 wrench. Turn the gauge slowly to permit air pressure to escape before the gauge is completely unscrewed. Mount the new gauge. Do not apply any force to the case,

as this may damage the gauge mechanism. Open the gauge cock.

REASONS FOR REISSUE

1. To revise the ordering information (2.03, Fig. 1 and 2).
2. To revise the list of tools, gauges, and materials (3.01).
3. To omit procedure for replacing compressor oil filter screen, gaskets, and O-ring.
4. To revise the procedure for replacing a compressor cylinder head and for replacing a compressor (3.11 and 3.12).
5. To revise procedure for replacing the tank pressure control switch (3.16).
6. To revise procedure for replacing tank low-pressure alarm switch (3.17).
7. To revise procedures for replacing air-line high-pressure alarm switch (3.18).