

AIR STARTING SYSTEMS FOR DIESEL ENGINE-ALTERNATORS

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1. GENERAL

1.1 Scope

1.11 This section covers installation and test of air starting equipment used with KS-15777, KS-15899 and KS-15954 diesel engine-alternators. The information will also be useful when installing and testing other air starting systems.

1.12 Coordinate information in this section with test of the engine-alternator covered in another section of this Handbook.

1.2 Associated Information

1.21 Section 132 in this Handbook includes information on piping for the air starting system and tells how to make up the joints.

1.22 Section 2 in this Handbook covers information on paints. The piping is not painted as a normal installing routine but will be painted at the customer's request.

1.3 Precautions

1.31 Never do any work on the compressor without first shutting off the power to the compressor by opening the disconnect switch and closing valves such as A or B in Figure 1 to isolate the machine from the rest of the system.

1.32 Compressor cylinders reach temperatures well over 200°F. Do not touch the compressor until it has cooled sufficiently or a severe burn will result. Also, use extreme care when operating any valve close to the compressor.

1.33 The V-belts used on the compressor should be kept free of oil and grease and should not be run under excessive tension.

1.34 Provide adequate ventilation for the compressor.

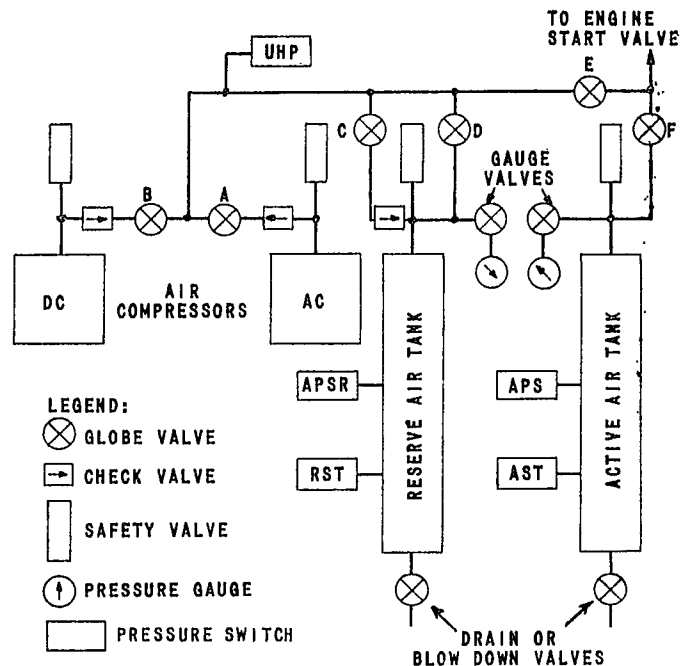


FIG. 1 TYPICAL AIR STARTING SYSTEM SCHEMATIC (PAR. 5,6.7)

2. TOOLS AND TEST SETS

2.1 The 267 Pipe Threading Kit will be required for the piping. In addition, two R-1541 24" Pipe Wrenches will be required to make up the joints as indicated in Section 132.

2.2 For installing work other than piping no special tools are required and these should already be available on the job.

2.3 ITE-4137 AC Continuity Test Set will be required.

3. GENERAL INSTALLING INFORMATION

3.1 The unit should be bolted to a substantial foundation. The top of the base should be level and all four feet

should be equally supported. Shim the feet as necessary for level and for adequate support so that the base is not warped when it is bolted down.

3.2 Screw joints in the discharge line should be made as tight as possible to minimize leaks. Refer to Section 132 for the method of making up joints.

3.3 Air tanks are normally supported by wall brackets. These will be installed as shown on job drawings.

3.4 Crane Co. check valves have to be mounted horizontally or they will not operate properly.

4. LUBRICATION

4.1 Motor lubrication should be covered by an Instruction Tag attached to the motor.

4.2 Check the compressor crankcase for oil by removing the dipstick which will be found on the side of the compressor toward the motor. If oil is not up to the full mark on the dipstick, or if there is no oil indicated, add sufficient oil, same type as used for the diesel engine, until oil level reaches the high mark. Add oil through the dipstick opening. Capacity of the crankcase is three pints.

5. CHARGING AIR STORAGE TANKS

NOTE: The CF alarm will come in during the period that tank pressure is in the range 145-155 psi and below. To prevent the CF alarm from coming in, have the OPERATION SELECTOR SWITCH in OFF position for an automatic set, or, remove the control fuse in the - lead for a manual set.

5.1 Open the blowdown valves on the bottom of each tank and allow a few minutes for any residue to drain out. Close the blowdown valves.

5.2 Start the charge using the dc compressor. Open Valves B, C, E and F in Figure 1 and close Valves A and D. Install the fuse in the 48 volt dc line to the compressor and close the dc disconnect switch. Operate START button for the dc compressor.

5.21 If compressor fails to start operate RESET button on the starter and again push START button.

5.3 Allow the dc compressor to run about 15 minutes. Pressure gauges on each tank should indicate some pressure. (Open gauge valves) Stop the dc compressor by operating STOP button and open the dc compressor disconnect switch.

NOTE: The lube oil pressure gauge on the compressor should show a pressure of 7-15 psi. This range is shown as a white band on the gauge. If the pressure is outside this band and crankcase has been filled pressure can be adjusted within this range by the pressure adjusting screw found on the bearing opposite the flywheel end. Loosen the locknut and then turn the

bolt slowly inward to increase pressure or outward to decrease pressure. When pressure is satisfactory, tighten the locknut.

5.4 Turn the switch OFF on the ac compressor control. Install the fuses in the ac line to the compressor. Close Valve B and open Valve A. Close the ac compressor disconnect switch. Operate the control switch to HAND position to start the compressor.

5.41 If compressor fails to start operate RESET button on the control. If it still fails to start, open the disconnect switch and check overload heaters and make certain that connections are secure.

5.5 Check direction of rotation when the ac compressor starts. An arrow on the flywheel shows correct direction of rotation. If rotation is incorrect, open the disconnect switch and interchange any two motor leads at some convenient point between the disconnect switch and the motor.

5.6 After the ac compressor runs a few minutes operate the control switch to AUTO. The compressor is now under control of the AST and RST pressure switches on the storage tanks. The compressor should continue to operate until pressure in both tanks reaches 245-255 psi where AST and RST open to stop the compressor. It may be necessary to adjust the switch setting.

ADJUSTMENT: On the Square D switch, the screw or knob adjustment at the top sets the indicator on the range scale. Set the indicator at 200. The 245-255 psi point is then set by adjusting the screw inside the cover. Turn the screw CW to raise operating point, or, CCW to lower the operating point. The Detroit Controls switch is set by turning the screw at the right side of the switch CCW to raise the operating point, or, CW to lower the operating point.

5.7 Observe lube oil pressure on the compressor while it is operating. This should be in the white band on the gauge. If not, adjust pressure as shown under Paragraph 5.3.

5.8 It will take about twenty minutes to charge one tank from 0 to full pressure. During this time the APS and APSR alarm switches may be checked as in Paragraph 6.

5.9 The system will normally operate with Valves B and D closed and the others open. The ac compressor automatically keeps both tanks charged. The Active Air Tank is used first to start an engine. If pressure is too low in this tank close Valve F and open Valve D to connect the Reserve Air Tank. If the ac compressor fails, the dc compressor can be connected by closing Valve A, and opening Valve B. The dc compressor is controlled manually.

6. CHECK OF APS AND APSR SWITCHES

6.1 These switches close when pressure in the tank drops somewhere in the range of 145-155 psi for KS-15777 sets and 120-130

psi for KS-15899 and KS-15954 sets. This brings in the CF alarm, lighting the alarm lamp and sounding the horn. The switch will open and remove the alarm when pressure rises high enough.

6.2 These switches can be checked during the initial charging period in Paragraph 5 although they can be checked anytime tank pressure is about 175 psi or higher.

6.3 Because the switches are in parallel they have to be disconnected for test. Remove the cover, disconnect the lead from one of the terminals and connect Continuity Test Set prods across the switch terminals. The switch should be open.

6.4 Isolate the storage tank from the air compressor by operating the proper valves. Open the blowdown valve on the tank a small amount so that pressure falls slowly. The switch should close when tank pressure is as follows:

KS-15777	145-155 psi
KS-15899	120-130 psi
KS-15954	120-130 psi

Once closed, the switch should stay closed at any lower pressure. Close the blowdown valve.

6.5 Operate the valves so that the compressor is charging the tank and check that the switch opens on rising pressure. Then remove the Test Set, reconnect the lead and replace the cover.

6.6 Check the operating point of the other pressure switch by following operations in Paragraphs 6.3 through 6.5.

6.7 If switch operating point is not in the correct range, adjust as below and retest. If switch fails to operate properly after a readjustment replace the switch.

ADJUSTMENT: To adjust the United Electric Control switch, remove the face plate. Loosen the top locknut on the adjusting screw and turn the screw CW to raise the switch operating point, or CCW to lower the operating point. Tighten locknut after the adjustment. To adjust the Detroit Controls switch, turn the screw at the right side of the switch CCW to raise operating point, or, CW to lower the operating point.

7. CHECK OF UHP SWITCH

7.1 This switch closes its contacts if system pressure rises to somewhere in the range of 265-270 psi. This brings in the CF alarm, lighting the alarm lamp and sounding the horn. The switch will open and remove the alarm when pressure drops low enough.

7.2 The switch can be tested by raising system pressure high enough to bring in the CF alarm on a manual set. In order to have this alarm operate on a manual set replace the 15 ampere fuse removed earlier from the control circuit. The automatic set with OPERATION SELECTOR SWITCH at OFF has this alarm disconnected.

7.3 On an automatic set, remove the switch cover and connect the Continuity Test Set across the switch terminals.

7.4 After the ac compressor has been cut off by the AST and RST switches, operate the ac compressor control switch to HAND. The ac compressor should start. Observe one of the tank pressure gauges. The UHP switch should close when the gauge indicates pressure in the range 265-270 psi, which brings in the CF alarm on the manual set. If the switch does not operate in this range adjust as below and retest.

ADJUSTMENT: To adjust the Square D switch, turn the screw found at the top of the case. The screw may be under a sealing cap, if so, remove the cap. Turn the adjusting screw CW to lower operating point and CCW to raise operating point.

7.5 Stop the ac compressor by operating its control switch to OFF. Open the blowdown valve on one of the tanks. Let the pressure fall slowly. Observe that the switch opens on falling pressure, removing the CF alarm on the manual set. Close the blowdown valve and turn the ac compressor control switch to AUTO position. Remove the test set, reconnect the switch and replace the cover.

8. SAFETY VALVES

8.1 Safety valves set to pop at 275 psi are provided on each storage tank and on each air compressor. They must open at a gauge pressure not exceeding 275 psi.

8.2 Each tank safety valve should be operated once manually when air pressure is above 230 psi. Loop a piece of wire through the hole in the safety valve lever, taking care not to touch the valve. Pull the wire to open the valve and then release. Take care to avoid the blast. The compressor safety valves should be checked in this way when charging the tanks.

8.3 Check these in combinations. That is, first the ac compressor feeding the active tank only, then the reserve tank only, and then with the dc compressor feeding the active tank only, and next, feeding the reserve tank only. Referring to Figure 1 operate the valves necessary to provide these charging combinations. To use the ac compressor above 250 psi, place it on Manual operation (HAND) so that it will run to this pressure.

8.4 One safety valve must operate in each of the above combinations. When it does, shut off the compressor and set up the next combination, then start the compressor on HAND. The dc compressor has no automatic control and can be run at 275 psi.

9. SYSTEM LEAKAGE

9.1 Leakage of air from a fully charged system should not exceed about 10 psi an hour. Make periodic gauge readings to determine if leakage exceeds this amount.