AIR-STARTING EQUIPMENT FOR DIESEL ENGINE-ALTERNATOR SETS OPERATING METHODS

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1. GENERAL

1.01 This section describes the operation of the KS-15777, L51 and L52 and KS-15899, L51 and L52 air-starting equipments for use with manually and automatically started KS-15777 and KS-15899 diesel engine-alternator sets.

1.02 This section is reissued to cover the KS-15899, L51 and L52 air-starting equipments and to change the title of the section.

1.03 For more detailed information on the maintenance of the air-starting equipment, refer to Section 026-392-701, in accordance with which the equipment should be adjusted.

Caution 1: The air-starting equipment includes an automatically controlled ac motor-compressor and care must be exercised to prevent accidental starting of this compressor when maintenance work is to be done. Before starting work, prevent automatic starting of the compressor by opening the disconnect switch in the ac motor-starter circuit. When maintenance work has been completed, make sure that the circuit has been restored to normal.

Caution 2: When air is being compressed, the compressor cylinder head, the airline, and the airline valves become hot. Use extreme care when opening or closing a valve.

2. OPERATION

Description

2.01 The KS-15777, L51 and KS-15899, L1 air-starting equipments include a 10-cfm air compressor driven by a 2-hp, 220-volt, 3-phase, 60-cycle ac motor, a stand-by air compressor of the same capacity driven by a 2-hp, 48-volt dc motor, and the associated air storage tanks. The arrangement of the equipment is shown in Fig. 1.

2.02 The KS-15777, L52 and the KS-15899, L52 air-starting equipments are the same as the corresponding L51 equipment except that the ac motor-compressor has a 440-volt motor.

2.03 When the air-starting equipments are used to start more than one diesel engine, an additional active tank is provided for each additional engine. Each additional active tank (KS-15777, L53 or KS-15899, L53 tank) has the same associated equipment as the active tank shown in Fig. 1. The same operating methods apply to the equipment associated with each active tank.

2.04 Normal operation of the air-starting equipment is fully automatic with the ac motor-compressor maintaining the air pressure in the tanks between 195 and 255 psi. Starting with 250 psi air pressure, each tank can make at least six normal engine starts without recharging. Pressure changes in the tanks control the ac motor-compressor which can also be operated manually by the HAND-OFF-AUTO switch on the ac motor-starter. The dc motor-compressor is manually operated by START and STOP buttons. Each compressor and tank has its own safety valve, check valve, and hand valve as shown in Fig. 1. Each tank also has a pressure gauge, a pressure control switch, and a low-pressure alarm switch. A high-pressure alarm switch is connected to the airline between the compressors and the tanks.

Preparation for Starting

2.05 Before starting the equipment check that:

(a) HAND-OFF-AUTO switch on ac motor-compressor starter is turned to OFF position.

(b) Disconnect switch in motor-starter circuit of each compressor is open.

(c) Correct size fuses are in place.

(d) Compressors and motors are clear of any obstruction and are free to run.

(e) Oil level in crankcase of each compressor is between the two marks on the stick oil gauge.

(f) Valves A, B, C, E, and F are open and valve D is closed (Fig. 1).

Automatic Operation (ac motor-compressor)

2.06 ***Starting Automatic Operation:*** Assuming that the items covered in 2.05 have been checked, the ac motor-compressor and associated equipment are ready for automatic operation. To place the equipment on automatic operation, close the disconnect switch in the ac motor-starter circuit, press the RESET button on the motor-starter, and turn the HAND-OFF-AUTO switch to AUTO. The ac motor-compressor will then operate automatically to keep the tanks charged to the required pressure.

2.07 ***Running:*** While the ac motor-compressor is running, make the checks covered in (a) and (b). If it is necessary to start the compressor in order to make these checks, release sufficient air through the blow-down valve of one of the tanks to reduce the pressure in the tank to 195 psi. The compressor should start within the limits of 200 ±5 psi.

(a) ***Air Pressure***

(1) Check that the tank air pressure is increasing and that the compressor stops automatically within the limits 250 ±5 psi.

(2) Check the air system for leaks.

(b) ***Compressor Oil Pressure***

(1) Read the oil pressure gauge on the compressor to check that the oil pressure is between 7 and 15 psi.

Manual Stopping of AC Motor-Compressor

2.08 Turn the HAND-OFF-AUTO switch on the ac motor-starter to OFF. If the compressor is to be removed from service, open the disconnect switch in the ac motor-starter circuit.

Manual Operation of DC Motor-Compressor

2.09 ***Starting:*** Remove the ac motor-compressor from service as covered in 2.08. If the tank air pressures are close to 250 psi, release sufficient air through the blow-down valve of one of the tanks to reduce the pressure in the tank to below 200 psi in order to avoid excess pressure while the compressor is running. Close the disconnect switch in the dc motor-starter circuit. Start the dc motor-compressor by pressing the START button on the START-STOP switch. If the motor fails to start, press the RESET button on the dc motor-starter and then press the START button.

2.10 ***Running:*** While the dc motor-compressor is running, make the checks covered in (a) and (b).

(a) ***Air Pressure***

(1) Check that the tank air pressure is increasing and stop the compressor manually before the pressure exceeds 255 psi.

(b) ***Compressor Oil Pressure***

(1) Read the oil pressure gauge on the compressor to check that the oil pressure is between 7 and 15 psi.

2.11 ***Stopping:*** When the tank pressure reaches 250 ±5 psi, press the STOP button on the START-STOP switch. If the compressor is to be removed from service, open the disconnect switch in the dc motor-starter circuit. Restore the ac motor-compressor to automatic operation as covered in 2.06.

Operation of Alarms

2.12 The high-pressure alarm switch (UHP) and the low-pressure alarm switches (APSR and APS) are connected in parallel to the alarm circuit. When the audible alarm sounds and the CF lamp lights on the diesel engine main control cabinet, it is necessary to observe the tank pressure gauge indications to determine whether the alarm was caused by too high or too low air pressure. Pressing the AUDIBLE ALARM SILENCING SWITCH button on the diesel engine main control cabinet silences the audible alarm and lights the HD lamp.

3. ROUTINE CHECKS

3.01 ***Tank Air Pressure:*** Prior to starting the diesel engine sets for routine check of the operation, the air pressure in the active and reserve tanks should be checked to determine that it is within operating limits.

3.02 ***DC Motor-Compressor:*** Once a month, the dc motor-compressor should be operated as covered in 2.09, 2.10, and 2.11. It is recommended that this check be combined with the check of the low-pressure alarms covered in 3.03(b).

3.03 ***Alarms:*** At least once a month the high and low air pressure alarms should be checked as covered in (a) and (b). When checking low-pressure alarms, take care to keep at least one tank ready for use at maximum working pressure. Operation of these alarms is indicated by audible and visual signals.

(a) ***High-Pressure Alarm (UHP):*** Turn HAND-OFF-AUTO switch on ac motor-starter to HAND. The ac motor-compressor should start. The high-pressure alarm should operate when the air pressure has increased to between 265 and 270 psi. When the alarm operates or a safety valve discharges, turn the HAND-OFF-AUTO switch to AUTO. Open the blow-down valve at the bottom of the reserve tank. Close the valve when the pressure is reduced to normal.

(b) ***Low-Pressure Alarms (APSR and APS):*** Remove the ac motor-compressor from service as covered in 2.08. Close the dc disconnect switch for the dc motor-compressor. Open the blow-down valve at the bottom of the tank associated with the alarm to be checked. The alarm should operate when the tank air pressure has decreased to the values specified below.

AIR-STARTING EQUIPMENT	PRESSURE FOR ALARM OPERATION
KS-15777 L51 & L52	150 ±5 psi
KS-15899 L51 & L52	125 ±5 psi

When the alarm operates or the tank pressure has decreased to less than the alarm operate pressure, close the blow-down valve. Press the START button on the START-STOP switch for the dc motor-compressor. When the tank pressure has increased to 250 ±5 psi, press the STOP button. After checking the low-pressure alarm in each tank, remove the dc motor-compressor from service as covered in 2.11. Restore the ac motor-compressor to service as covered in 2.06.

3.04 ***Safety Valves:*** At least once every 2 months, the safety valves should be checked by operating them manually at a minimum pressure of 230 psi. When checking a compressor safety valve, the valve (A or B) to the airline should be open and the compressor should be operating.

Caution: When manually checking a safety valve, operate the valve by means of a piece of wire looped through the hole in the valve lever or around the valve handle. Take care to avoid the air blast from the valve. When checking a compressor safety valve, avoid touching the valve, as it becomes hot when the compressor is operating.

4. TROUBLES

4.01 When the audible alarm sounds and the CF lamp is lighted, read the tank pressure gauges. The following table indicates probable causes of trouble with reference to the gauge reading.

TANK PRESSURE GAUGE READING	ACTION REQUIRED	PROBABLE CAUSE OF TROUBLE
Too high	Stop compressor by operating motor-starter control switch to OFF or STOP	Compressor operating under manual control
		Tank pressure control switch set too high
		Tank pressure control switch defective
Too low	Recharge tanks using dc motor-compressor if ac motor-compressor is disabled	AC line fuse blown
		AC disconnect switch open
		Overload relay in ac motor-starter tripped
		Control switch on ac motor-starter turned to OFF
		Compressor oil pressure too low
		Defective air compressor
		Tank pressure control switch defective
		Leak in air system
Within limits		Defective alarm switch
		Defective pressure gauge

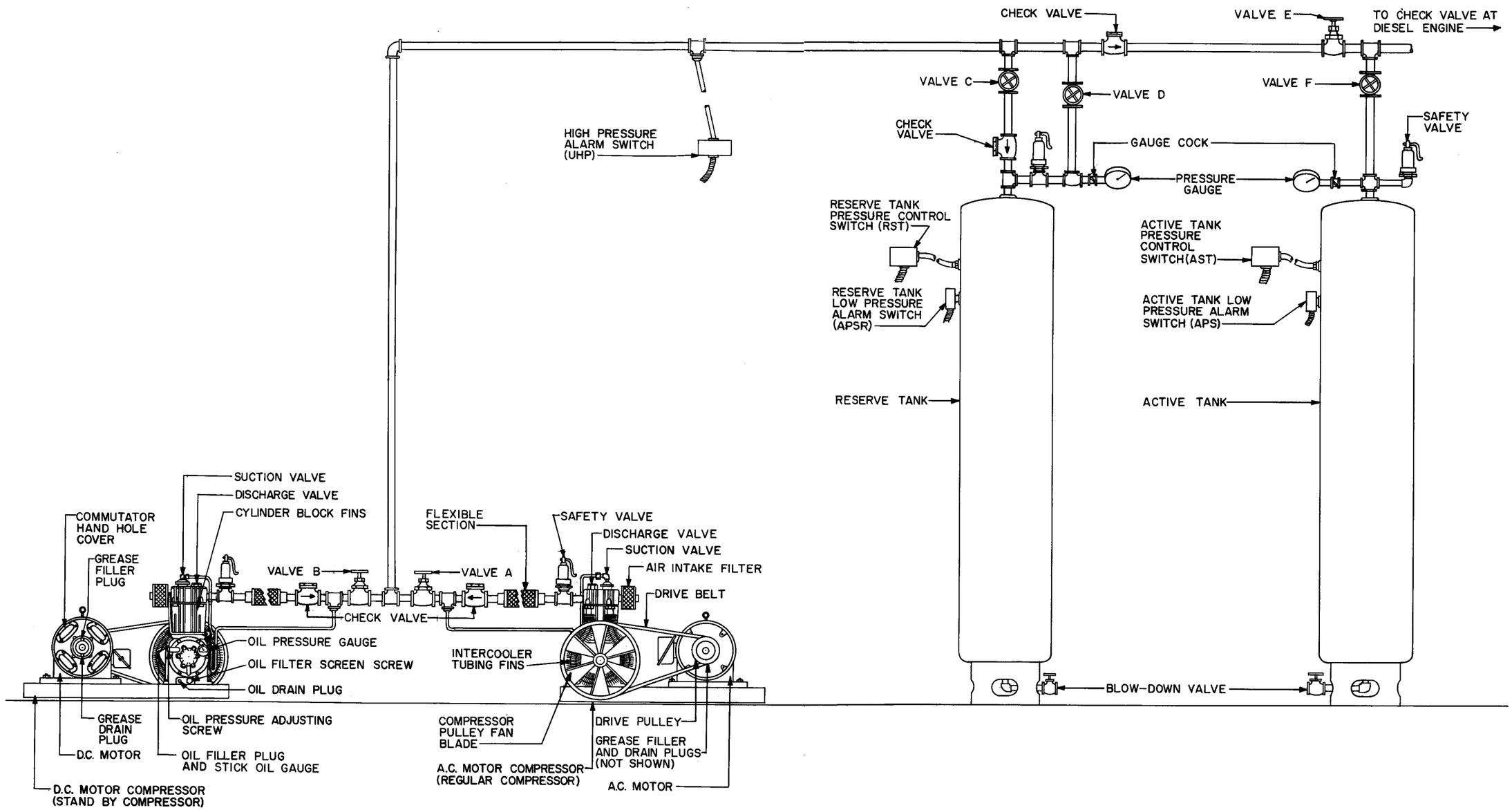

Fig. 1 – Air-Starting Equipment — AC and DC Motor Air Compressors and Associated Tanks (KS-15777, L51 air-starting equipment shown)