POWER PLANT

J86643

OPERATING METHODS

1. GENERAL

1.01 The J86643 power plant consists of −72V dc-to-dc converters and distribution plus high-voltage ringing interruption and distribution. This equipment is to be used with No. 5 crossbar long loop range extenders.

1.02 This section is reissued to change the method of checking the interrupter output voltages at the fuse distribution circuit. This issue does not affect the Equipment Test List.

1.03 The circuit will provide three brushes of HV machine ringing which are in phase with the CODE 1 GEN brushes of the associated ringing plant. The HV ringing is 86V at 20 Hz which is superimposed on −72V for the ringing interval and −48V silent interval tripping battery. The ringing supply, ±AUD for superimposed offices or AC-DC AUD for AC-DC offices, from the office ringing plant, is fed to duplicate transformers. The low side of the secondaries of these transformers is connected to −72V to provide continuous AC-HV ringing. The AC-HV ringing is then fed to regular and reserve interrupters and then to distribution fuses which are connected to the load.

1.04 The circuit is equipped with duplicate interrupter follower relays which receive their drive from CODE 1 GEN BR1, BR2, and BR3 of the office ringing power plant. These interrupters are used to interrupt the AC-HV ringing current to provide CODE 1 HV BR1, BR2, and BR3. These signals are then fed through transfer relays to distribution fuses. Each set of brushes is continuously monitored by an interrupter monitor follow relay to see that the brushes are functioning properly. An automatic transfer feature which is controlled by the interrupter monitor will transfer the plant to the reserve interrupters in the event of failure of the regular interrupters. A minor alarm is provided if either the regular or reserve interrupter fails, and a major alarm is provided if both interrupters should fail. A major alarm is also provided should any distribution fuse fail.

1.05 The −72V is provided by J87307 dc-to-dc converters. The converters are operated in parallel, for reliability, with a minimum of two and a maximum of three paralleled together in an originating bay framework. The output of these paralleled converters is then fed to distribution fuses. Added capacity may be obtained by paralleling two or three more converters together, but not paralleled to the converters in the originating bay. Each converter is supplied by a separate −48V feeder and ground from the plant charge and discharge circuit. The supply for the alarm and transfer circuit is taken from the feed to the first two converters. Break contacts on the alarm relays in each J87307 dc-to-dc converter are connected to the alarm, transfer, and control circuit of the power plant to provide a minor alarm if one converter should fail and a major alarm if two or more converters should fail.

1.06 The following cautions should be observed when operating the power plant, performing routine checks, or performing maintenance on the converters.

Caution 1: When checking any circuits in the plant containing electrolytic capacitors, refer to Section 032-110-501.

Caution 2: Since the plant covered in this section involves automatic equipment, extreme care must be used to be sure that any part of the plant on which maintenance work is to be done is properly disconnected by removing fuses, blocking relays, opening switches, etc, and that the circuits are restored to normal when the work is completed.

Caution 3: Disconnect ac ringing circuit and dc power supply before working on converter or any part of the power plant, except as necessary to make tests. Avoid all contact with terminals as high voltages may be present. Do not allow a test pick to touch two metal parts at the same time as dangerous and destructive short circuits may occur.

1.07 Checks and adjustments other than those due to trouble conditions should be performed during a period when they will cause the least interference with service.

1.08 The instructions are based on schematic drawing SD-81857-01. For a detailed description of how the circuit operates, refer to the corresponding circuit description.

1.09 For further information on the operating procedures of the J87307 dc-to-dc converters, refer to Section 161-266-301.

2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	3-Inch C Screwdriver
TEST APPARATUS	
—	One 70-Type Fuse (blown)
KS-14510	Volt-Ohm-Milliameter
—	▶Voltmeter, AC-DC Thermo, Weston Model 622, 300/150/30/3
	or
—	True RMS Voltmeter, Greibach Model 500
	or
—	True RMS Voltmeter, Hewlett-Packard Model 3400A◀

3. OPERATION

3.01 ***Preparing to Start:*** When preparing to put the J86643 power plant into service, check that:

(a) The DC INPUT switch on each J87307 converter is in the OFF position.

(b) The DC INPUT (F1), DC OUTPUT (F2), and F3 fuses in each J87307 converter are of the correct size and type and are properly installed.

(c) All fuses in the distribution and input panels are of the correct size and type and are properly installed.

(d) That all external connections are made in accordance with the corresponding SD-drawings.

3.02 ***Starting:*** To place the power plant in service, operate the DC INPUT switch on each J87307 converter to the ON position and depress the INT RST (S2) switch.

Note: If the power plant has been out of service for an extended period of time, it may be necessary to adjust the output voltage of each J87307 converter in accordance with the operating procedures in Section 161-266-301.

3.03 ***Stopping:*** To remove the power plant from service, operate the DC INPUT switch on each J87307 converter to the OFF position.

Note: If the power plant is to be left out of service, remove the DC INPUT (F1), DC OUTPUT (F2), and F3 fuses. Disconnect each J87307 converter from the battery supply.

4. ROUTINE CHECKS

4.01 Electrolytic capacitors should be maintained in accordance with Section 032-110-701.

4.02 The J87307 converters should be periodically checked in accordance with Section 161-266-301.

4.03 ▶***Checking Output Voltages of Ringing Distribution Circuit:*** Periodically check the interrupter output voltages at fuse distribution circuit as given in Table A. When measuring the dc voltages, use the 300-volt dc scale setting on the KS-14510 volt-ohm-milliammeter. When measuring the ac voltages, use the 150-volt ac scale on the true rms voltmeter. After measuring the output voltages of the regular unit, transfer the load to the reserve unit and check its output voltages.◀

TABLE A

OUTPUT VOLTAGES AT RINGING DISTRIBUTION FUSES

TO CHECK OUTPUT VOLTAGE AT RINGING DISTRIBUTION BUS BAR:	CONNECT AC OR DC VOLTMETER BETWEEN RINGING DISTRIBUTION FUSE BUS BAR AND:	VOLTMETER SHOULD INDICATE WITHIN VOLTAGE LIMITS OF:
Code 1 HV BR1	Load Side of F33 Fuse	84 and 88 AC
	DC Ground	−45 and −50 DC (4 seconds)
		−70 and −74 DC (2 seconds)
Code 1 HV BR2	Load Side of F37 Fuse	84 and 88 AC
	DC Ground	−45 and −50 DC (4 seconds)
		−70 and −74 DC (2 seconds)
Code 1 HV BR3	Load Side of F49 Fuse	84 and 88 AC
	DC Ground	−45 and −50 DC (4 seconds)
		−70 and −74 DC (2 seconds)
AC-HV Ring	Load Side of F53 Fuse	84 and 88 AC
	DC Ground	−70 and −74 DC

4.04 ***Interrupter Failure Lamps:***

(1) Remove fuse F65. The BM1 relay will release; the IT relay will operate; the INT 1 FAIL lamp will light; and the load will be transferred to INT 2. The A relay will then operate and provide a minor alarm. Replace fuse F65 and operate the S2 INT RST switch to restore the plant to normal operation. The INT 1 FAIL lamp will extinguish.

(2) Transfer the load to INT 2 by operating the S1 INT TRFR switch. Remove fuse F66. The BM2 relay will release; the IF relay will operate; and the INT 2 FAIL lamp will light. The D relay will operate and provide a major alarm. Replace fuse F66 and operate the S2 INT RST switch to restore the plant to normal operation. The INT 2 FAIL lamp will extinguish.

(3) Repeat (1) with fuses F67 and F73, in turn.

(4) Repeat (2) with fuses F68 and F74, in turn.

Manual Interrupter Transfer

4.05 Depress the INT TRFR switch. The INT TRFR lamp will light, the IT relay will operate, and the INT 1 FAIL lamp will light, indicating that the load has been transferred to INT 2.

4.06 Depress the INT RST switch. The IT relay will release; the INT TRFR and INT 1 FAIL lamps will extinguish; and the plant will be in normal operation.

4.07 ***Fuse Failure:***

(1) Remove the F1 70-type fuse. Install a blown 70-type fuse in the socket. The FA lamp will light. Remove the blown 70-type fuse from the socket. The FA lamp will extinguish. Install the original 70-type fuse.

(2) Repeat (1) for fuses F17, F65, and F33, in turn.

5. TROUBLES

5.01 Troubles which may occur in the plant will usually be indicated by an alarm. Tabulated is a list of the alarms and their functions.

ALARM LAMP	FUNCTION
FA	Indicates fuse failure.
INT 1 FAIL	Indicates that INT 1 has failed and INT 2 has taken over the load.
INT 2 FAIL	Indicates that INT 2 has failed.
S1 INT TRFR	Indicates that the load has been manually transferred from INT 1 to INT 2.

5.02 If troubles occur in the J87307 dc-to-dc converters, refer to Section 161-266-301.

5.03 Should troubles develop in the INT 1 or INT 2 follower or monitor follow relay circuits, −48V battery supply circuit, or interruption and distribution circuit, refer to Part 6.

6. COMPONENT CHECKING PROCEDURES

6.01 The test procedures covered in 6.03 through 6.05 are given to aid in determining the defective components in a failed unit. In general, the components most likely to become defective with use are the semiconductor devices and capacitors. If, after checking the semiconductor devices and capacitors, the trouble has not been determined, it is advisable to check all the resistors in the unit, as covered in Section 100-520-101, for the resistance values specified on the schematic drawing covering the unit.

6.02 The performance of these tests should be made with the unit disconnected from the input power. Since it may be possible to locate a defective component without disconnecting it from the circuit, check each component in the unit as covered in 6.03 through 6.05 before disconnecting any leads. If the trouble cannot be determined in this manner, disconnect the leads, as specified and recheck the components. When a component is found to be defective, replace it and check the other components in the circuit to make certain that they are not defective. Unless otherwise specified, use the KS-14510 volt-ohm-milliammeter to perform the checks as follows. Before connecting the meter, set the meter to indicate on the X1000 ohms scale. Then, when making measurements, gradually decrease the ohms scale setting until the optimum setting is obtained.

Caution 1: Before unsoldering or soldering leads of diodes, reference should be made to Section 069-140-811 covering soldered connections on pigtail apparatus.

Caution 2: Before checking circuits which contain electrolytic capacitors, reference should be made to Section 032-110-501.

6.03 ***Capacitors:*** Check capacitors in accordance with Section 100-520-101. On mylar or polystyrene capacitors, check for burned spots on the capacitors.

6.04 ***Diodes:*** To check a diode, apply the meter across the diode leads. Then reverse the meter connections across the diode. The meter should indicate high resistance in one direction and low resistance in the opposite direction. Low resistance or high resistance in both directions is an indication that the diode may be defective. If the diode is suspected of being defective, disconnect one of its leads and recheck the resistances.

6.05 ***Transformers:*** If a trouble condition still exists after checking and ascertaining that the other components in the unit are in satisfactory condition, check the transformers as follows.

(a) Using the meter, check whether the resistance across each winding of the transformer is in accordance with the resistance value on the

associated circuit drawing. If a short or open is indicated, disconnect the lead from one of the winding terminals and recheck the resistance.

(b) Check for shorts between the case and each winding of the transformer by applying the meter between the case and one of the terminals of the winding. If low or zero resistance is indicated, the transformer is defective.