POWER PLANT
610F (J86901A, L1)
OPERATING METHODS

1. GENERAL

1.01 The 610F power plant employs two J86901B, L1 dc-to-dc converters which supply a +65-volt, 3-ampere output from a −48 volt input for message register trunks. This plant has been developed for use primarily as a replacement for the 103B power plant.

1.02 This issue does affect the Equipment Test List.

1.03 The J86901B, L1 converter employs a bridge of power transistors which periodically reverse battery connections to the primary of the T1 transformer. A current transformer T2 which has characteristics equivalent to an ideal transformer in parallel with an inductor is connected in series with the secondary of T1. Load current is transformed by T2 and applied to the transistor bases in the proper phase to cause oscillations. The output of T1 is rectified by a bridge of silicon power diodes and then filtered by using a pi-type filter to provide +65 volts dc with reduced output noise.

1.04 Two converters are connected in parallel for reliability purposes with an isolating diode in the output of each converter. This isolating diode in the converter output leads prevents a fault in either converter from disabling the entire plant.

1.05 This issue of the section is based on the following drawing SD-82192-01, Issue 1. For a more detailed description of the operation, see the corresponding circuit description.

1.06 When connection to Centralized Status Alarm and Control System (CSACS) is desired, the maintenance center should be alerted to monitor the routine maintenance operation of major and minor alarms.

2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	3-inch C Screwdriver
411C	Test Pick
720A	Battery Pick-up Tool
W1AF	Cord (equipped with a 360A tool in each end)
TEST APPARATUS	
—	John Fluke Model 8100A-01 Digital Voltmeter or Weston Model 1240 Digital Multimeter (or equivalent).

3. OPERATION

3.01 ***Preparing to Start:*** When preparing to put the power plant in service, check the following.

(1) All external connections are made in accordance with the schematic drawing which covers the associated circuitry.

(2) All associated fuses, except the OUTPUT fuse, are in their respective fuse holders.

(3) P1 and P2 connectors are disconnected.

3.02 ***Starting:*** To start the power plant, proceed as follows.

(1) Connect plug P1 to jack J1 of Converter 1.

Requirement: A minor alarm is sounded and the NV lamp on Converter 1 lights.

(2) Connect plug P2 to jack J1 of Converter 2.

Requirement: A major alarm is sounded and the NV lamp on Converter 2 lights.

(3) Install the OUTPUT fuse in Converter 1.

Requirement: The major alarm is silenced and the NV lamp on Converter 1 is extinguished.

(4) Install the OUTPUT fuse in Converter 2.

Requirement: The minor alarm is silenced and the NV lamp on Converter 2 is extinguished.

3.03 ***Stopping:*** To stop the power plant, proceed as follows.

(1) Remove OUTPUT fuse of Converter 1.

Requirement: A minor alarm sounds and the NV lamp on Converter 1 lights.

(2) Remove OUTPUT fuse of Converter 2.

Requirement: A major alarm sounds and the NV lamp on Converter 2 lights.

(3) Disconnect P1 connector.

Requirement: The major alarm is silenced and the NV lamp on Converter 1 is extinguished.

(4) Disconnect P2 connector.

Requirement: The minor alarm is silenced and the NV lamp on Converter 2 is extinguished.

4. ROUTINE CHECKS

4.01 The 610F power plant is equipped with a visible indication of fuse operation and connection to provide a minor alarm in the event of one converter failure and a major alarm in the event of the failure of both converters. The power plant should be checked periodically in accordance with the Equipment Test List, after any troubles have been corrected, or if the plant has been out of service.

4.02 Semiconductor devices should be maintained in accordance with Section 032-173-301.

4.03 Maintain electrolytic capacitors in accordance with Section 032-110-701.

4.04 ***Voltmeter Accuracy Check:*** Check the plant voltmeter accuracy as follows.

(1) Connect the John Fluke 8100A voltmeter set on the 100-volt scale to TS2-15 (−) and to TS2-1 (+) on distribution panel.

Requirement: The John Fluke meter indicates a voltage between 59 and 77 volts dc.

(2) Operate the SW switch to the CONV 1 position.

Requirement: The OUTPUT (V) voltmeter should indicate the same voltage as the John Fluke meter.

Note: If the requirement in (2) is met, proceed to (4). If the requirement is not met, continue with (3).

(3) Turn the adjustment screw on the OUTPUT (V) voltmeter with a screwdriver until both meters indicate the same voltage.

(4) Disconnect the John Fluke meter.

4.05 ***Converter Output Voltage Check:*** Check the output voltage of each converter as follows.

(1) Connect the John Fluke 8100A voltmeter set on the 100-volt scale to TS2-15 (−) and TS2-1 (+) on distribution panel.

Requirement: The John Fluke meter indicates a voltage between 59 and 77 volts dc.

(2) Disconnect the lead from TS2-1 (+) and connect it to TS2-2 (+).

Requirement: The John Fluke meter indicates a voltage between 59 and 77 volts dc.

4.06 ***Fuse Alarm Check:*** Check the 70-type fuse alarm as follows.

Note: The later design of fuse caps for 70-type fuses contain an aperture or slot adjacent to the hole for the colored bead, providing access to the alarm test point (see Fig. 1). The new P-344900 fuse cap assembly is for use on non-modular fuse block (18A, 19A, and 21A) and the P-11F667 fuse cap assembly is for use on modular fuse blocks (22 through 27-type). This style cap should be used when testing fuse alarms.

Caution: Due to possible fuse and/or equipment damage, the former procedure of testing fuse alarms by inserting a 411C tool or a 266C tool (wire burnisher) held in a 265C tool (contact burnisher holder) beside the colored bead on older fuse caps without the slot or aperture, should be discontinued.

(1) Prepare the alarm test cord by connecting one end of the W1AF testing cord to the 141 cord tip and 720A voltage pickup tool. (The KS-6278 connecting clip may be used to replace the 720A voltage pickup tool.) On the opposite end of the W1AF testing cord, connect the 411 C test tool (see Fig. 2).

(2) Install the 720A voltage pickup tool in a spare 70-type fuse position. (If the 720A tool is not available, obtain the same polarity voltage supply by connecting a KS-6278 connecting clip with the W1AF testing cord to the positive or negative bus bar.)

Caution: Test only the fuses associated with the same polarity voltage supply.

(3) With the tip of the 411C tool (attached to the battery connected W1AF cord) touch the exposed alarm test point on the fuse cap for one fuse.

Note: On tests made at the individual fuse cap, the contact between the fuse cap and the alarm bus bar is checked. On modular-type fuse blocks, there is also an aperture in the corner of the fuse block to test directly to the alarm bus bar (see Fig. 1).

Requirement: A major alarm sounds.

(4) Remove the 411C tool from the fuse cap.

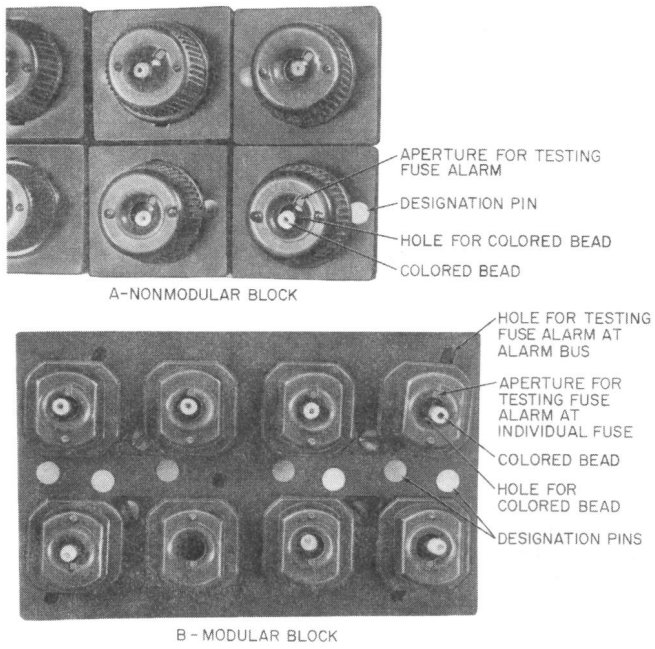

Fig. 1—Typical 70-Type Fuse Cap

Requirement: All alarms are silenced.

(5) Repeat (3) for each fuse.

(6) Remove the 720A tool from the spare fuse position. (If the KS-6278 connecting clip is used, disconnect the clip from the bus bar.)

4.07 ***Minor Alarm Check:*** Check the operation of the minor alarm as follows.

(1) Remove OUTPUT fuse of Converter 1.

Requirement: A minor alarm sounds and the NV lamp on Converter 1 lights.

(2) Replace OUTPUT fuse of Converter 1.

Requirement: The minor alarm is silenced and the NV lamp on Converter 1 is extinguished.

(3) Repeat (1) and (2) for Converter 2.

4.08 ***Major Alarm Check:*** Check the operation of the major alarm as follows.

(1) Remove OUTPUT fuse of Converter 1.

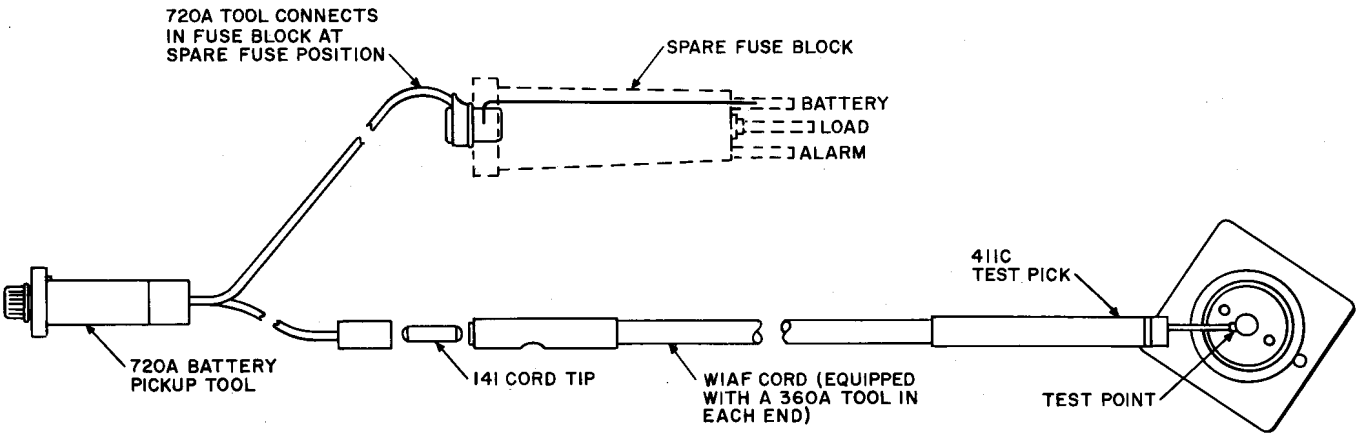

Fig. 2—Fuse Alarm Testing Cord—Tool Connection

Requirement: A minor alarm is sounded and the NV lamp on Converter 1 lights.

(2) Remove OUTPUT fuse of Converter 2.

Requirement: A major alarm sounds and the NV lamp on Converter 2 lights.

(3) Replace both OUTPUT fuses.

Requirement: All alarms are silenced and the NV lamps on both converters are extinguished.

4.09 ***Output Voltage Blocking Diode Check:*** Check the output voltage blocking diode as follows.

(1) Verify that the converter being checked is operating, and connected in parallel with the other converter.

(2) Operate SW switch to CONV 1 position.

(3) Remove OUTPUT fuse from Converter 1.

Requirement 1: A minor alarm sounds and the NV lamp on Converter 1 lights.

Requirement 2: The OUTPUT voltmeter (V) indicates zero volts. If the voltmeter does not indicate zero volts, the CR3 diode is defective. Refer to 4.02.

(4) Replace the OUTPUT fuse in Converter 1.

Requirement: The minor alarm is silenced and the NV lamp on Converter 1 is extinguished.

(5) Operate the SW switch to CONV 2 position.

(6) Remove OUTPUT fuse of Converter 2.

Requirement 1: A minor alarm sounds and the NV lamp on Converter 2 lights.

Requirement 2: The OUTPUT voltmeter (V) indicates zero volts. If the voltmeter does not indicate zero volts, the CR4 diode is defective.

(7) Replace the OUTPUT fuse of Converter 2.

Requirement: The minor alarm is silenced and the NV lamp on Converter 2 is extinguished.

5. TROUBLES

5.01 ***Trouble Chart:*** Should any of the following troubles develop, it is suggested that the possible cause be checked in the order given. If the trouble is not found, look for loose or open connections or short circuits due to foreign material lying across wiring terminals.

TROUBLE	POSSIBLE CAUSE
No Output Voltage	OUTPUT fuse operated. Short on output terminals.
No Output Current	Paralleling diode open. Defective wiring.
Input or Output ripple noise	Defective input or output filter capacitors.