

POWER PLANT
663B (J86913A)
OPERATING METHODS

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5. TROUBLES	6	1.06 Alarm indications are generated by the release of normally operated relays associated with each of the converters. Failure of one converter will initiate a minor alarm indication. Failure of two or more converters, plant output failure, or plant fuse operation will initiate a major alarm indication. Removal of failed converters from their connectors will cut off the audible alarms. Removal of any converter will initiate and retain visible office alarms.
1. GENERAL		1.07 The converter panel mounts two converters and their associated alarm relays and output resistors.
1.01 This section describes the operation of the 663B power plant which provides conversion from -48 volts dc to plus or minus 130 volts dc. The plant employs pulse width controlled converters, each having an output rating of 1.6 amperes. Up to six converters may be operated in parallel in a plant configuration. The plant is intended for use in applications requiring relatively small amounts of 130-volt power as in carrier applications.		1.08 Routine checks should be performed during a period when they will cause the least service reaction.
1.02 Whenever this section is reissued, the reason for reissue will be given in this paragraph. This issue affects the Equipment Test List.		1.09 This issue of the section is based on the following drawings: SD-82464-01, Issue 1, for the 663B power plant SD-82273-01, Issue 2D1, for the 133B or C power units
1.03 The 663B power plant replaces equivalent 660 converter plants.		For a detailed description of circuit operation, refer to the corresponding circuit description (CD). If this section is to be used with equipment or
1.04 The <i>plant</i> configuration consists of a plant panel which serves up to six converters with a common distribution bus and plant alarm outputs plus an appropriate number of converter panels which mount two converters each.		

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apparatus reflecting later issues of the drawings, reference should be made to the SD and CD to determine the extent of the changes and the manner in which the section may be affected.

2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	Testing Cord (Equipped with a KS-6780 connecting clip on each end)
W1AF	Testing Cord (Equipped with a 360A tool at each end)
141	Cord Tip
411C	Test Pick
720A	Battery Pickup Tool (or one KS-6278 Connecting Clip)
TEST APPARATUS	
KS-14510	Volt-Ohm-Milliammeter
KS-20599 L4 (or equivalent with millivolt capability)	Digital Multimeter

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 circuits.
- (2) No fuses are installed in their respective fuse holders including the input fuse at the battery distribution fuse board (BDFB).

3.02 Starting: To place the plant in service proceed as follows:

- (1) Insert the converter (133B or C power unit) into its cage and assure that it is fully engaged with the connector.
- (2) Install the input fuse at the BDFB.

Requirement: ALM lamp on converter unit is lighted and associated alarm relay (A or B) is released.

- (3) Raise the latch to turn the converter on, then lower the plastic designation strip.

Requirement:

- ALM lamp on converter unit is extinguished.
- Associated alarm relay A or B on converter panel is operated.
- Plant voltage is between 125 and 135 volts, with appropriate + or - polarity.

Note: If the plant voltage is out of limits, verify the converter output using a KS-14510 volt-ohm-milliammeter, or equivalent, at the test jacks.

- (4) Perform (1) through (3) for each converter.
- (5) Install associated load fuses in their respective fuse holders.

Note: When ammeters are not provided, the plant load currents are determined by voltage measurements taken across the plant load current (+) and (-) test points located on the front of the plant panel using the relationship 10 millivolts equals 1 ampere.

3.03 Stopping: To remove the power plant from service, perform the following:

- (1) Raise the plastic designation strip and lower the latch to turn the first converter off.

Requirement: An audible/visible alarm will occur.

- (2) Unplug the converter from its connector.

Requirement: The audible alarm is silenced.

- (3) Remove the input fuse from the battery distribution fuse panel.
- (4) Perform (1) and (2) for the remaining converter.

4. ROUTINE CHECKS

4.01 Electrolytic capacitors should be maintained in accordance with Section 031-110-701.

4.02 Routine checks are made on this plant to determine whether the features, indications, and alarms are in proper operating condition. The plant should be checked periodically in accordance with the Equipment Test List. It should also be checked after any troubles have been corrected, or if the plant has been out of service.

Note: Because the converters have no provision for field adjustment, the meters to be calibrated in 4.03 and 4.04 serve only to give approximate indications of plant operation; consequently, the meters should be calibrated at their normal operating voltages rather than at zero.

4.03 Voltmeter Calibration: The PLANT VOLTAGE meter, when provided, should be calibrated periodically as follows:

- (1) Insert and turn on at least one converter per 3.02.
- (2) Connect an external voltmeter such as the KS-14510 volt-ohm-milliammeter set to the 300 volts dc range to the VM CAL (+) and (-) test jacks.
- (3) Adjust the PLANT VOLTAGE meter to agree with the indication on the KS-14510 volt-ohm-milliammeter.
- (4) Disconnect the meter leads from the VM CAL test jacks.

4.04 Ammeter Calibration: The PLANT LOAD current ammeter, when provided, should be calibrated periodically as follows:

Note: The plant should be in operation and serving a normal load when performing the ammeter calibration.

- (1) At the rear of the plant panel, connect a KS-20599 L4 digital multimeter or equivalent set to measure millivolts as follows.

For +130 volt output:

- (a) Negative lead to circular RTN terminal
- (b) Positive lead to GRD bus bar nearest RTN terminal.

For -130 volt output:

- (a) Positive lead to circular RTN terminal.
- (b) Negative lead to GRD bus bar nearest the RTN terminal.

Note: A resistor connected between RTN and GRD terminals serves as a meter shunt. Voltage measurement across the shunt determines the current.

- (2) Observe the voltage reading and interpret as follows:

METER RANGE	SHUNT	CURRENT
0-5 Amperes	1 Resistor	10 MV = 1 Ampere
0-10 Amperes	1 Resistor	10 MV = 1 Ampere

- (3) Adjust PLANT LOAD CURRENT meter to agree with current value derived from the KS-20599 L4 multimeter reading.
- (4) Disconnect multimeter leads from rear of control and discharge panel.

4.05 Output Voltage Check: To verify that the plant is supplying the required output voltage to the load, periodically check the output voltage in accordance with 3.02.

4.06 Converter Contribution Check: Perform the following check periodically on each converter in the plant configuration to determine how the load is distributed among the converters.

- (1) At the rear of the converter panel at TS1, connect a KS-20599 L4 digital multimeter or equivalent set to measure millivolts as follows:

Multimeter Leads	When Testing Converter			
	A (+130V OUTPUT)	B (+130V OUTPUT)	A (-130V OUTPUT)	B (-130V OUTPUT)
TERM. STRIP	TS1A	TS1B	TS1A	TS1B
(+) POS	Term. 1	Term. 1	Term. 4	Term. 4
(-) NEG	Term. 4	Term. 4	Term. 1	Term. 1

Note: If the load is continuously varying, a simultaneous observation of the plant ammeter, if provided, may be required to qualify the individual converters.

- (2) Repeat for each converter in each panel.
- (3) Any converter not making a contribution should be checked to determine if a malfunction exists.

4.07 Output Current Check: There is no requirement that converters in the plant configuration share the load equally. Accordingly, some converters may contribute more current than others. It is possible that, under normal operating conditions, at least one converter will contribute nothing to the load. A periodic check should be made of converters which indicate no output to be sure that a malfunction does not exist. Turning off the converter having the highest output current should cause the output current in the other to rise. Monitor the plant output as each converter is turned off. If the voltage drops below plus or minus 125 volts, promptly turn the converter on again. The drop in voltage indicates a malfunction in one of the remaining converters. Momentarily turning off each of the remaining converters in succession, while monitoring the output voltage,

will permit identification of a malfunctioning converter as the one not dropping the voltage level.

Note: During drops in voltage level, service may be impaired and alarms will be initiated.

4.08 Load Fuse Failure Alarm Check: To verify that a major alarm occurs in the event of a load fuse failure, proceed as follows:

Note: A test point is provided at the front of the fuse cap for 70-type fuses (Fig. 1). This test point should be used to test the fuse alarm.

- (1) Prepare an alarm test cord (Fig. 2) by connecting one end of a W1AF testing cord to a 141 cord tip and a 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 a 411C test tool.
- (2) Install the 720A voltage pickup tool in a spare 70-type fuse position. (If the 720A tool is not available, obtain the same magnitude voltage supply by connecting the KS-6278 connecting clip with the W1AF test cord to the fuse block bus bar.)

Danger: The tip of the 411C test pick is now at 130 volts.

Warning: Test only the fuses associated with the same magnitude and polarity voltage supply.

- (3) With the tip of the 411C test pick (attached to the battery connected W1AF cord), touch the exposed alarm test point on the fuse cap (Fig. 1) for one fuse.

Requirement: The fuse alarm relay releases, the FA alarm lamp lights, and an audible alarm is activated.

- (4) Remove the test pick from the fuse cap.

Requirement: The fuse alarm relay operates, the FA alarm lamp extinguishes, and the audible alarm is silenced.

- (5) Repeat (3) and (4) for each fuse.

TABLE A

CONVERTER NO.	1	2	3	4	5	6
	(5)	(6),(7)	(6),(7)	—	—	—
	(8)	(5)	(6),(7)	(6),(7)	—	—
TEST STEPS	—	(8)	(5)	(6),(7)	(6),(7)	—
	—	—	(8)	(5)	(6),(7)	(6),(7)
	—	—	—	(8)	(5)	(6),(7)
	—	—	—	—	(8)	(5)
	—	—	—	—	—	(8)

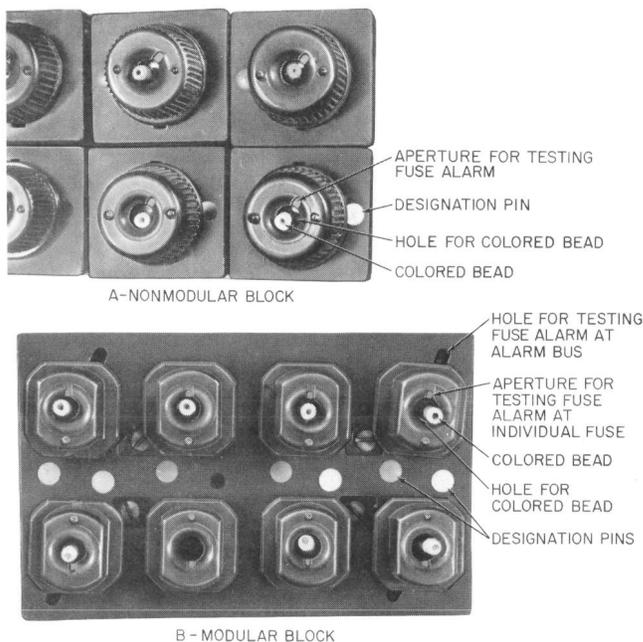


Fig. 1—70-Type Alarm Fuse With Alarm Test Point

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

4.09 Converter Failure Alarm (Plant Configuration): Perform the following check to verify that a minor alarm is activated if one converter fails and a major alarm is activated if two converters fail. Perform the testing during periods of light traffic to minimize service reaction.

- (1) Verify that when one converter is removed from service the remaining converters have the capacity to provide the bus load current.
- (2) Prepare a test cord using a 3-foot length of 20-gauge insulated wire with an alligator clip, such as the KS-6780 connecting clip, on each end.
- (3) Connect one end of the test cord to the circular RTN terminal.
- (4) Perform (5) through (8) according to Table A, proceeding from left to right and top to bottom through the table, performing the steps shown for the indicated converters.
- (5) At the indicated converter, raise the plastic designation strip and lower the latch to turn the converter off.

Requirement: The associated A or B relay releases and audible and visible minor alarms occur.

- (6) At the A or B relay associated with the indicated converter, connect the other end of the test cord to the lower winding terminal of the A or B relay.

Requirement: The associated A or B relay releases and audible and visible major alarms occur.

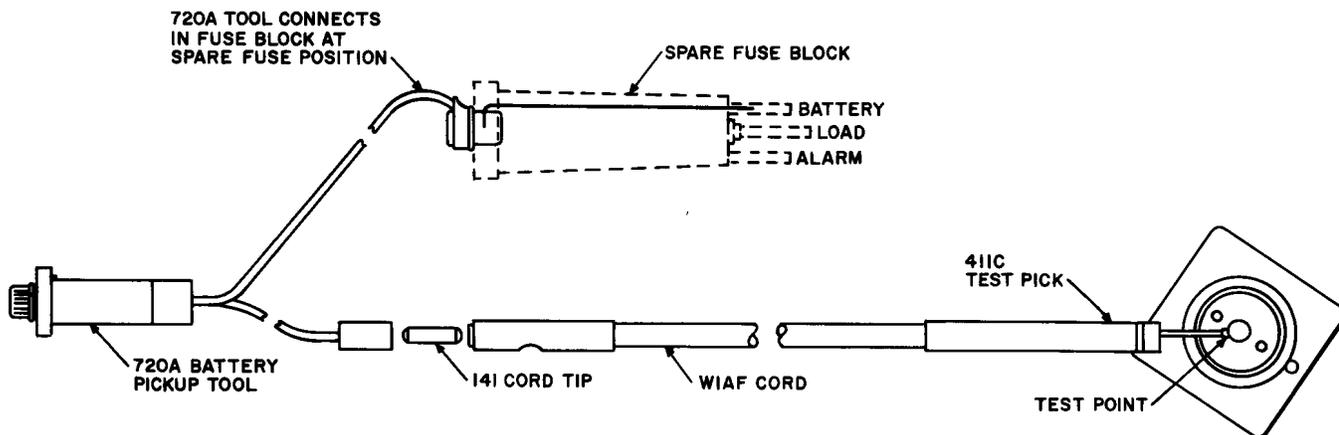


Fig. 2—Fuse Alarm Testing Cord—Tool Connection

(7) Remove the test cord from the lower winding terminal of the A or B relay. The major audible and visible alarms are extinguished.

(8) At the indicated converter, raise the latch to turn the converter on and lower the plastic designation strip.

Requirement: The associated A or B relay operates and the audible and visible minor alarms are extinguished.

(9) Remove the test cord from the RTN terminal.

5. TROUBLES

5.01 Because of the arrangement of the 663B power plant, most troubles will be caused

by the individual converters. If the plant malfunctions, determine which converter or converters are malfunctioning and perform the corrective action as outlined in the appropriate Bell System Practices and CD-SD 82273-01 covering the converter.

5.02 Various troubles which may be encountered in the power plant are given in the following list. If the trouble is not found, check for loose or open connections or short circuits due to foreign matter lying across wiring terminals. This list is not all inclusive and is meant only as an aid in locating possible trouble conditions that might occur.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Major office alarm	(1) Operated 70-type fuse	Replace defective fuse
	(2) Capacitor C1 or C2 shorted	Shut down the plant and disconnect the defective capacitor. If a replacement capacitor is not readily available, the plant can be placed in service with the defective capacitor disconnected until a replacement is available
Low plant output (major alarm occurs)	(1) Improper battery input. (Input voltage range is -42.5 to -52.5 volts.)	Check for correct battery input to unit.
	(2) Faulty converter	Replace converter
Minor office alarm	Failure of one converter in a plant configuration	Replace faulty converter
Major office alarm	<u>Plant configuration:</u> Failure of two or more converters	Replace faulty converters
	Plant fuse operation	Replace operated fuse