663C (J86914A)
CONVERTER POWER PLANT
OPERATING METHODS

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1. GENERAL

1.01 This section describes the operation of the 663C power plant (Fig. 1) 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 5.0 amperes. ▶From two up to seven converters, one converter provided for redundancy, may be operated in parallel in a single polarity plant configuration. Two 663C plants may be mounted in the same bay to obtain both positive and negative 130 volts output. Each polarity would have its own J86914AA plant panel. The smallest plant would consist of one plant panel and two converters.◀ The plant is intended for use in applications requiring relatively small amounts of 130-volt power as in carrier applications.

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes. Equipment Test Lists are affected.

(a) To add a plant current meter, and field modification current meter kit

(b) To add the KS-20538 volt-ohm-milliammeter

(c) To change the plant preparing to start procedure

(d) To change the plant starting procedure

(e) To change the plant stopping procedure

(f) To simplify the procedure for checking the plant output voltage

(g) To update the reference to associated documents.

1.03 The 663C power plant replaces equivalent 660 converter plants.

1.04 The ***plant*** configuration consists of a plant panel which serves up to seven converters with a common distribution bus and plant alarm outputs and up to seven individually mounted converters.

1.05 The plant provides a means of observing power plant output conditions:

(a) Test jacks only—External meter is used to indicate plant voltage ▶(Option W—Mfr Disc.)

(b) Voltmeter and voltage test jacks

(c) Voltmeter, voltage test jacks, and plant current meter.◀

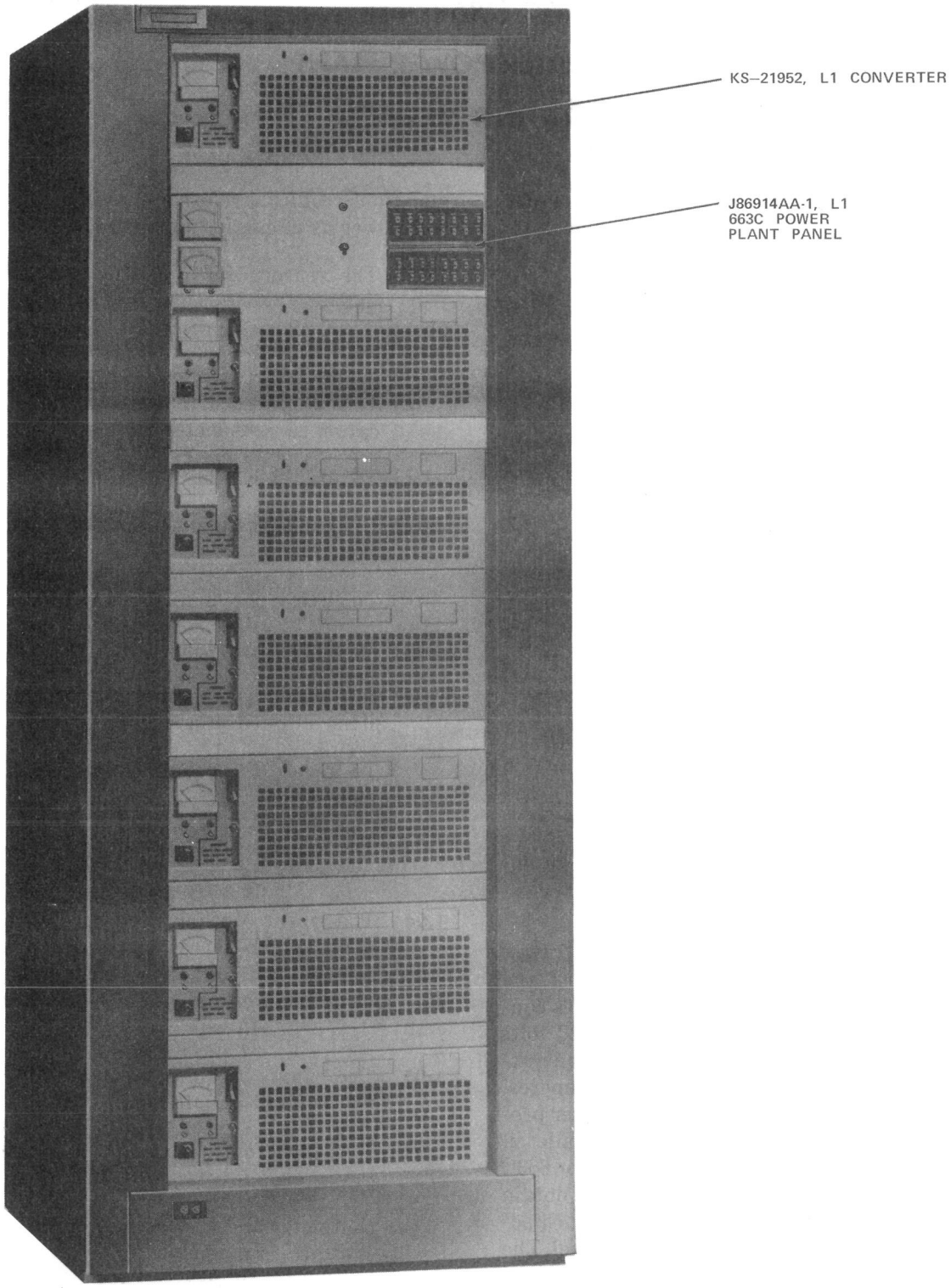

Fig. 1—663C Converter Power Plant

1.06 Alarm indications are generated by the release of normally operated relays included in each of the converters. Failure of one converter will initiate a minor alarm indication. Turning off a converter that has failed will cut off all minor alarm indications. Failure of two or more converters, plant output failure, or plant fuse operation will initiate a major alarm indication. Turning off one converter will not initiate an alarm; however, turning off ▶two or more converters, whether failed or not, will initiate a major alarm.

1.07 Routine checks should be performed during a period when they will cause the least service reaction.

1.08 This issue of the section is based on the following schematic drawings (SDs):

- SD-82465-01, Issue 2B: Power Systems, Discharge Circuit, 5 to 30 Amperes, −48 Volts DC to +130 Volts DC or −130 Volts DC, Converter Plant, 663C Plant (J86914A)

- SD-82474-01, Issue 1: Power Systems, −48 Volts DC to (+) or (−) 130 Volts DC, Converter, KS-21952, L1.◀

1.09 For a detailed description of circuit operation, refer to the corresponding circuit description (CD). If this section is to be used with equipment or 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. APPARATUS

2.01 ***List of Tools and Test Apparatus:*** The following tools and test apparatus are used in this section.

TOOLS	DESCRIPTION
—	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-20538◀	Volt-Ohm-Milliammeter
KS-20599, L4	Digital Multimeter (or equivalent with millivolt capability)

3. OPERATION

3.01 ***Preparing to Start the Plant:*** 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) ▶Verify that all fuses are of the proper size and type.

(4) Verify that converter DC OUTPUT switch (S2) is set to OFF.

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

(1) Verify that the plant is ready to start in accordance with paragraph 3.01.

(2) Install the input fuse at the battery distribution fuse board (BDFB).

Requirement: The ALM lamp on converter unit is lighted.

(3) Operate the converter PRECHARGE switch (S1) to the UP position for a period of 10 seconds.

(4) At the end of 10 seconds, while still holding the PRECHARGE switch (S1) in the UP position,

operate the converter DC INPUT switch (S2) to the ON position and release the PRECHARGE switch.

Warning: If the above sequence is not followed, the contacts of DC INPUT switch (S2) may be damaged.

Requirement 1: ALM lamp on converter unit is extinguished.

Requirement 2: Plant voltage is between 125 and 135 volts of the appropriate polarity.

Note: If the plant voltage is out of limits, verify the converter output voltage using a KS-20538 volt-ohm-milliammeter, or equivalent, at the VM CAL test jack (Fig. 2).

(5) Repeat from Step (1) for each converter being turned up.

(6) Install associated load fuses in their respective plant fuse holders.

Note 1: If option S is not provided, the total plant load current is determined by adding the current readings of the individual converter ammeters.

Note 2: If option S is provided, the total plant load current is that observed on the plant panel ammeter.

Note 3: If the plant is equipped with a J86914A, List 4, field modification, the total plant load current is that observed on the field modification kit ammeter.

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

(1) Turn the first converter off.

Requirement: An audible/visible alarm will not occur.

(2) Remove the input fuse for the individual converter from the battery distribution fuse board (BDFB).

(3) Turn the next converter off.

Requirement: A major alarm occurs.

(4) Operate the ACO key to silence the alarm.

(5) Remove the input fuse for the individual converter from the BDFB.

(6) Repeat from Step (3) for the remaining converters in the plant.

(7) Remove the associated load fuses from their respective plant fuse holders.

Note: If any converter requires replacement or removal, temporary straps should be pro-

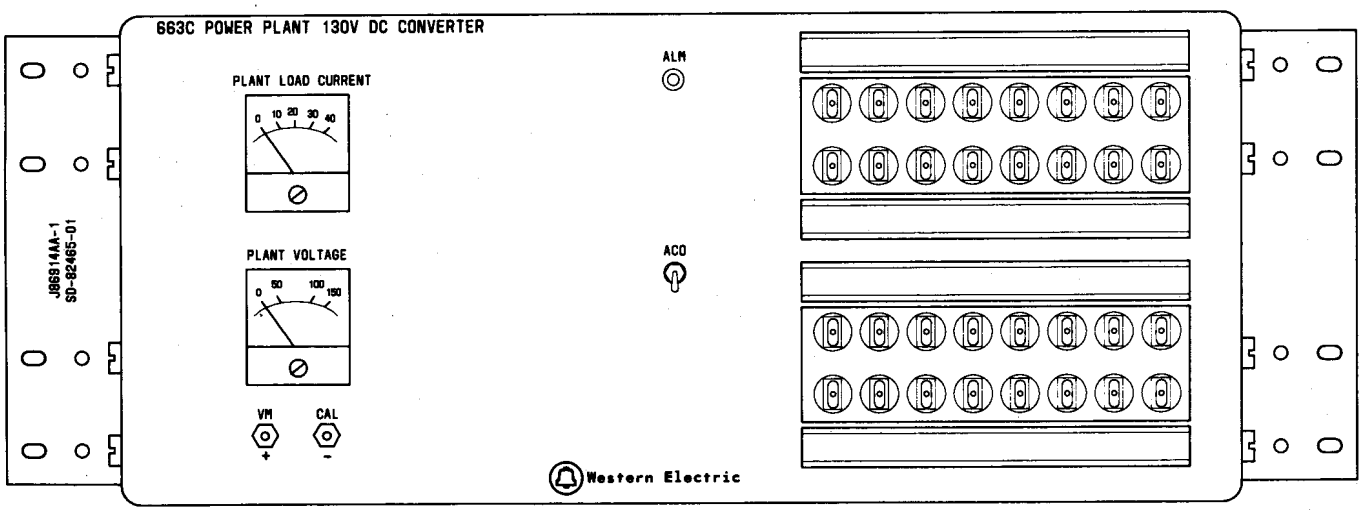

Fig. 2—663C Power Plant Panel

vided before removal. Refer to SD-82465-01 for specific details.

(8) If this equipment is to remain out of service, maintain eletrolytic capacitors in accordance with Section 032-110-701.◀

4. ROUTINE CHECKS

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

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 paragraph 4.03 serve only to give approximate indications of plant operation; consequently, the meters should be calibrated at its normal operating voltage rather than at zero.

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

(1) Insert and turn on at least one converter per paragraph 3.02.

(2) Connect an external voltmeter such as the ▶KS-20538◀ volt-ohm-milliammeter set to the 300 volts dc range to the VM CAL (+) and (−) test jacks (Fig. 2).

(3) Adjust the PLANT VOLTAGE meter to agree with the indication on the ▶KS-20538◀ volt-ohm-milliammeter.

(4) Disconnect the meter leads from the VM CAL test jacks.

4.04 ***▶Check Plant Output Voltage:*** Verify that the plant is supplying 125 to 135 volts to the load.

Note: If the plant voltage is out of limits, verify the converter output voltage using a KS-20538 volt-ohm-milliammeter, or equivalent, at the VM CAL test jacks.◀

4.05 ***Check Converter Contribution:*** Check ammeter readings periodically on each converter in the plant configuration to determine how the load is distributed among the converters.

4.06 ***Check Output Current:*** 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 highest output current should cause the output current in the others to rise. Monitor the plant output voltage as each converter is turned off. If the voltage drops below ±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.

4.07 ***Check Load Fuse Failure Alarm:*** 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. 3). This test point should be used to test the fuse alarm.

(1) Prepare an alarm test cord (Fig. 4) 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.

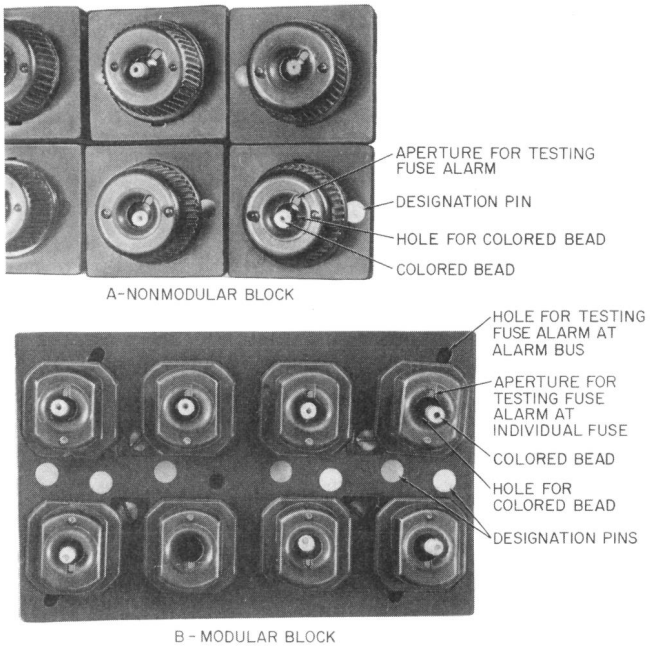

Fig. 3—70-Type Alarm Fuse With Alarm Test Point

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. 3) 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.

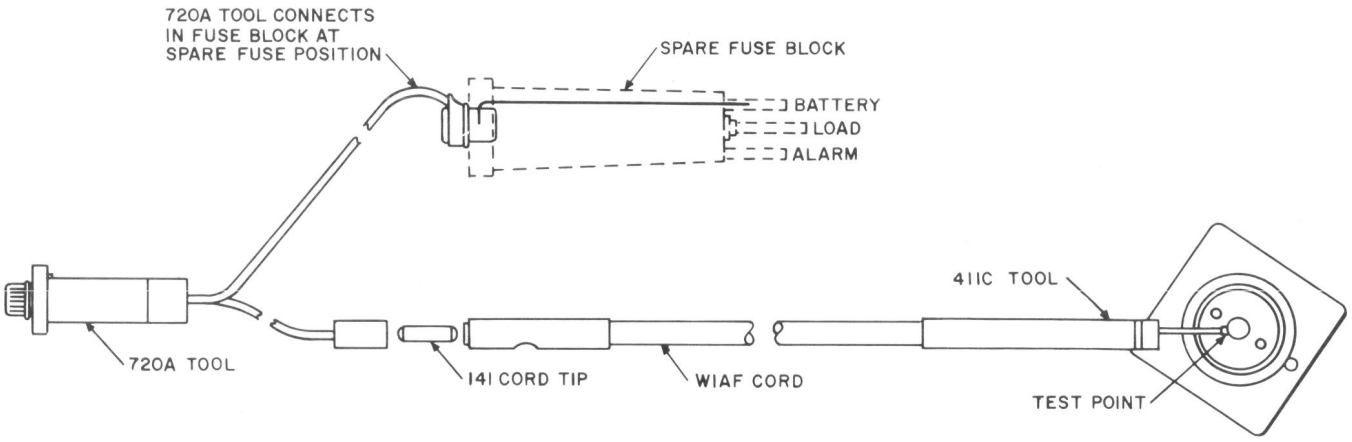

Fig. 4—Fuse Alarm Testing Cord—Tool Connection

(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.)

5. TROUBLES

5.01 Because of the arrangement of the 663C 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 ▶Section 161-299-303 and CD-SD 82474-01 covering the KS-21952, L1◀ converter.

5.02 Various troubles which may be encountered in the power plant are given in the following Trouble Chart. 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 CHART

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
FA alarm lamp lights	Operated 70-type fuse	Replace defective fuse.
Minor office alarm	Failure of one converter in a plant configuration	Replace faulty converter.
Major office alarm	Plant configuration:	
	(1) Failure of two or more converters	Replace faulty converters.
	(2) Plant fuse operation	Replace operated fuse.

6. ▶REFERENCES◀

6.01 The following list provides further information concerning the 663C converter power plant:

TITLE	DESCRIPTION
161-299-303	DC-to-DC Converter, KS-21952, L1, 130 Volts DC, 5 Amperes, Operating Methods
SD-82465-01	Power Systems, Discharge Circuit, 5 to 30 Amperes, - 48 to +130 Volts or −130 Volts, Converter Plant, 663C Plant (J86914A)
SD-82474-01	Power Systems, KS-21952, DC-to-DC Converter, −48 Volts DC to (+) or −) 130 Volts DC, 5 Amperes
802-865-164	663C Converter Power Plant, for T1 Carrier Circuits, Equipment Design Requirements, Power Systems (J86914A).◀