

672A (J87811A) POWER PLANT OPERATING METHODS

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1. GENERAL

1.01 The 672A power plant provides +24 volt dc output for loads of 0 to 24 amperes maximum or 0 to 48 amperes maximum, depending upon which power stage is used in the converters and the number of converters installed in the plant. The power plant is designed for use with the TD3 Radio System, L4 Carrier System, and other systems where its characteristics and design apply.

1.02 This issue does affect the Equipment Test List.

1.03 The power plant produces a +24 volt regulated dc output by stepping up the -24 volt dc input with from one to four J87338A converters connected in parallel through isolation diodes. Each of the converters in the plant can produce from 0 to 8 amperes or 0 to 16 amperes, depending upon which power stage is used in the

converters. The plant will use either 8-ampere or 16-ampere converters, but not a combination of both. The plant may be equipped with a redundant converter. The redundant converter will normally share the load and in the event of a failure of any converter in the plant, the capacity of the plant will not be reduced.

1.04 Each converter in the power plant is regulated within itself to provide a well regulated output voltage from the plant. Each converter has a current-limiting circuit, a low-voltage alarm circuit, and a high output voltage-shutdown circuit.

1.05 The power plant alarm circuit provides a major alarm when either a plant load fuse blows or the plant bus voltage falls below 21 ± 0.1 volts. A minor alarm is provided when a converter either shuts down, its output voltage falls below 21 ± 0.2 volts, or when one of the plant capacitor fuses CAP () ALM blows.

1.06 Routine checks should be made during a period when they will not interfere with service.

1.07 These instructions are based on circuit schematic drawing SD-81963-01. For a detailed description of circuit operation, refer to the corresponding circuit description.

1.08 For more detailed information on operation and maintenance of individual converters, refer to Section 161-265-301.

1.09 The abbreviations cw and ccw refer to clockwise and counterclockwise, respectively.

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2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
265C	Contact Burnisher Holder (Includes No. 266C Tool)
—	3-Inch C Screwdriver
TEST APPARATUS	
KS-8039	DC Volt-Milliammeter

3. OPERATION

Preparing to Start

3.01 Before putting the power plant into service, check the following.

- (a) All CONVR INPUT (CB1) circuit breakers are in the OFF position.
- (b) All external connections are made in accordance with the schematic drawings covering the circuits associated with the plant.

Caution: *The converters may be damaged if they are connected to a battery plant that includes a common discharge L-C filter. If a discharge filter is furnished, the converter inputs will be taken from the battery side of the filter choke.*

- (c) The OUTPUT VOLT ADJ (R8) potentiometer on each converter is rotated fully ccw.
- (d) The CHG CAP SELECTOR switch is in the OFF position.
- (e) All CAP () and CAP () ALM fuses are in their respective fuse holders.
- (f) The CONVERTER OUTPUT DISCONNECT fuses are **not** in their respective fuse holders.
- (g) All fuses except those in 3.01(f) are installed in their respective fuse holders.

Starting

3.02 To place the power plant in service, proceed as follows.

- (1) Connect the KS-8039 meter, set on the 30 VOLTS DC scale, to the 24V INPUT test

jacks - (TP1) and GRD (TP2) on the first converter.

- (2) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the ON position.

Requirement: The KS-8039 meter indicates between -22 and -26 volts.

- (3) Disconnect the KS-8039 meter.
- (4) Connect the KS-8039 meter, set on the 30 VOLTS DC scale, to the 24V OUTPUT test jacks + (TP1) and GRD (TP2) on the first converter.
- (5) Rotate the OUTPUT VOLT ADJ (R8) potentiometer on the first converter cw until the KS-8039 meter indicates 25.50 volts.
- (6) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the OFF position.
- (7) Disconnect the KS-8039 meter from the first converter.
- (8) Install the associated CONVERTER OUTPUT disconnect fuse for the first converter in the power plant.
- (9) Repeat (1) through (8) for each remaining converter.
- (10) Operate the CONVR INPUT (CB1) circuit breaker on the converter(s) to the ON position.
- (11) Connect the KS-8039 meter, set on the 30 VOLTS DC scale, to the power plant OUTPUT VOLTAGE test jacks + (TP1) and GRD (TP2).

Requirement: The KS-8039 meter indicates the output voltage ± 0.2 volt per given load specified in Fig. 1 and if more than one converter is provided in the power plant, the converters are adjusted for equal current sharing.

Note 1: The plant load is equal to the sum of the individual converter loads. When referring to Fig. 1 for the output voltage per

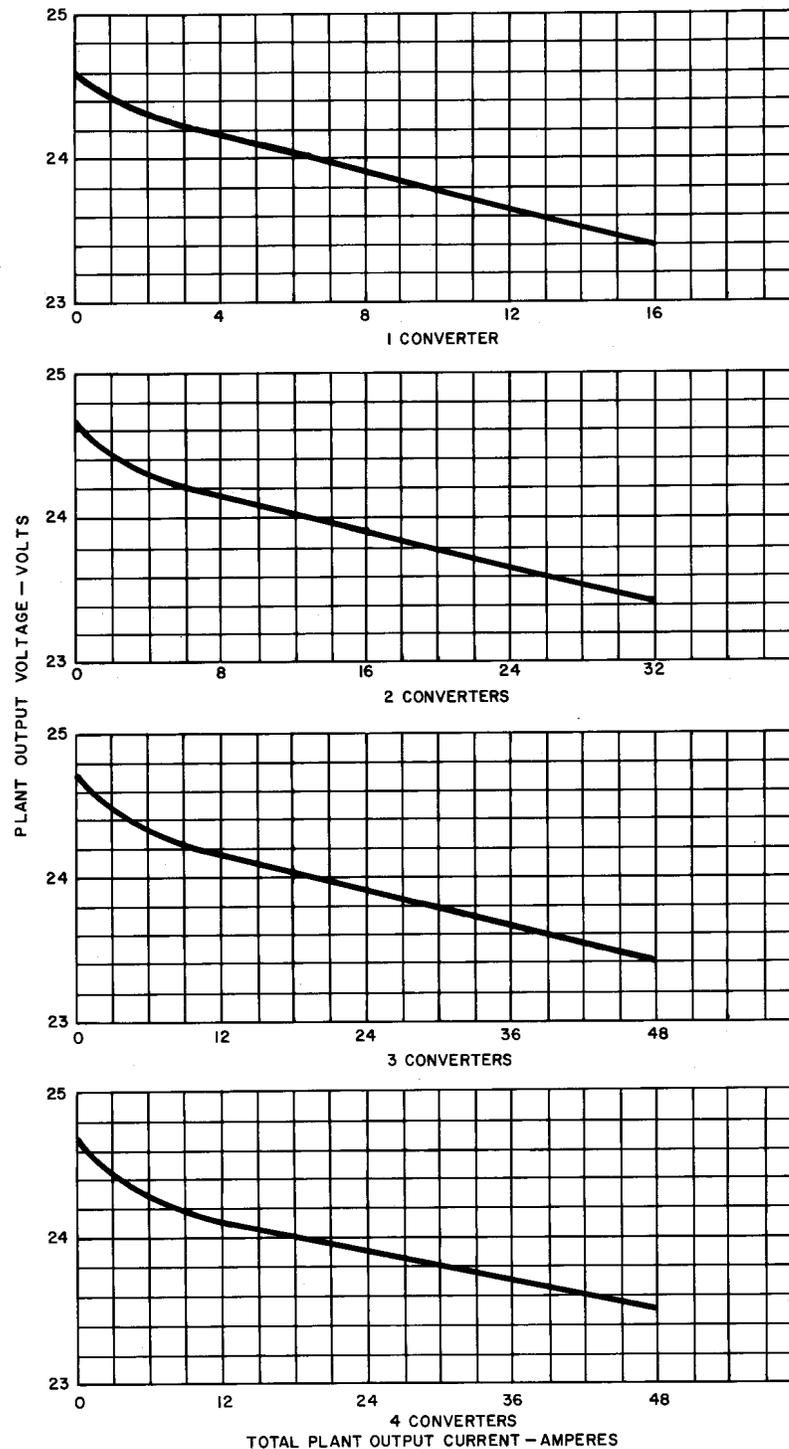


Fig. 1—Output Voltage Requirement

given load, the load current values are to be divided by 2 when the 8-ampere power stage is used in the converter(s).

Note 2: If the requirement in (11) is met, proceed to (14). If the requirement is not met and the plant is equipped with only one

converter, follow the instructions in (12) and proceed to (14). If the requirement is not met and the plant is equipped with more than one converter, proceed to (13).

(12) If the power plant has only one converter, proceed as follows.

(a) If the power plant output voltage is high, rotate the OUTPUT VOLT ADJ (R8) potentiometer ccw until the KS-8039 meter indicates the output voltage per given load specified in Fig. 1.

(b) If the power plant output voltage is low, rotate the OUTPUT VOLT ADJ (R8) potentiometer cw until the KS-8039 meter indicates the output voltage per given load specified in Fig. 1.

Note: When referring to Fig. 1 for the output voltage per given load, the load current values are to be divided by 2 when the 8-ampere power stage is used in the converter.

(13) If the power plant is equipped with more than one converter, proceed as follows.

(a) If the power plant output voltage is high, start with the converter giving the greatest output [as indicated by the CONVERTER OUTPUT (M1) ammeter] and rotate the OUTPUT VOLT ADJ (R8) potentiometer slightly ccw. Similarly adjust the other converters, starting the adjustment each time with the converter indicating the greatest output, until the KS-8039 meter indicates the output voltage per given load specified in Fig. 1 with the difference between any two CONVERTER OUTPUT (M1) ammeters being no greater than 1 ampere if the 8-ampere power stage is used in the converters or 2 amperes if the 16-ampere power stage is used in the converters.

(b) If the power plant output voltage is low, start with the converter giving the least output [as indicated by the CONVERTER OUTPUT (M1) ammeter] and rotate the OUTPUT VOLT ADJ (R8) potentiometer slightly cw. Similarly adjust the other converters, starting the adjustment each time with the converter indicating the least output, until the KS-8039 meter indicates the output voltage per given load specified in Fig. 1, with the difference between any two CONVERTER OUTPUT (M1) ammeters being no greater than 1 ampere if the 8-ampere power stage is used in the converters, or 2 amperes if the 16-ampere power stage is used in the converters.

Note: The plant load is equal to the sum of the individual converter loads. When referring to Fig. 1 for the output voltage per given load, the load current values are to be divided by 2 when the 8-ampere power stage is used in the converter.

(14) Disconnect the KS-8039 meter.

Operation of the Plant

3.03 To remove the power plant from service, proceed as follows.

(1) Operate the CONVR INPUT (CB1) circuit breaker on each of the converters to the OFF position.

(2) Remove all of the CONVERTER OUTPUT DISCONNECT fuses from the power plant.

Note: If the power plant is to be left out of service for an extended period of time, remove all fuses in the power plant from their respective fuse holders.

3.04 To take an individual converter in the power plant out of service, proceed as follows.

(1) Operate the CONVR INPUT (CB1) circuit breaker on the converter to the OFF position.

(2) Remove the associated CONVERTER OUTPUT DISCONNECT fuse from the power plant.

Note: If the converter is to be left out of service for an extended period of time, remove all associated fuses from their respective fuse holders.

3.05 To restore an individual converter in the power plant to service, proceed as follows.

(1) Verify that the CONVR INPUT (CB1) circuit breaker is in the OFF position.

(2) Verify that all associated fuses except the CONVERTER OUTPUT DISCONNECT fuse are located in their respective fuse holders.

(3) Rotate the OUTPUT VOLT ADJ (R8) potentiometer fully ccw.

- (4) Follow the instructions in 3.02(1) through (8), (10), (11), and (14).

Note 1: If the requirement in (11) is not met, it will be necessary to follow the instructions in 3.02(12) or (13).

Note 2: Whenever the instructions call for a procedure to be followed on the first converter, the procedure is to be followed on the converter to be restored and not necessarily the first converter.

3.06 To restart the power plant in the event of a complete plant shutdown, proceed as follows.

- (1) Operate the CONVR INPUT (CB1) circuit breaker on each of the converters to the OFF position.
- (2) Remove the CONVERTER OUTPUT DISCONNECT fuse for each converter from the power plant.
- (3) Repeat the procedures in 3.02.

4. ROUTINE CHECKS

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

4.02 Power Plant Output: Check the power plant output as follows.

- (1) Connect the KS-8039 volt-milliammeter, set on the 30 VOLTS DC scale, to the power plant OUTPUT VOLTAGE test jacks + (TP1) and GRD (TP2).

Requirement: The KS-8039 meter indicates the output voltage per given load specified in Fig. 1 and if the plant contains more than one converter, the converters are adjusted for equal current sharing.

Note 1: The plant load is equal to the sum of the individual converter loads. When referring to Fig. 1 for the output voltage per given load, the load current values are to be divided by two when the 8-ampere power stage is used in the converter(s).

Note 2: If the requirement is met, continue with (2). If the requirement is not met and the plant is equipped with only one converter, follow the instructions in 3.02(12) and continue with (2). If the requirement is not met and the plant is equipped with more than one converter, follow the instructions in 3.02(13) and continue with (2).

- (2) Disconnect the KS-8039 meter.

4.03 Power Plant Voltmeter Accuracy: Check the accuracy of the power plant OUTPUT VOLTAGE (M1) voltmeter as follows.

- (1) Connect the KS-8039 meter, set on the 30 VOLTS DC scale, to the power plant OUTPUT VOLTAGE test jacks + (TP1) and GRD (TP2).

Requirement: The power plant OUTPUT VOLTAGE (M1) voltmeter indicates the same voltage as the KS-8039 meter.

Note: The OUTPUT VOLTAGE (M1) voltmeter is factory adjusted and does not generally require field adjustment. If the requirement in (1) is met, proceed to (3). If the requirement is not met, continue with (2).

- (2) Adjust the adjustment screw of the OUTPUT VOLTAGE (M1) voltmeter until its indication agrees with the indication on the KS-8039 meter.

- (3) Place a small strip of masking tape, with the date of calibration written on it, across the adjustment screw of the OUTPUT VOLTAGE (M1) voltmeter.

- (4) Disconnect the KS-8039 meter from the power plant.

4.04 +24 Volt Bus Low-Voltage Alarm: To check the low-voltage alarm circuit, proceed as follows.

- (1) Verify that the power plant is giving the required output (see 4.02).

- (2) Connect the KS-8039 meter, set on the 30 VOLTS DC scale, to the ALM VOLTS test jacks + (TP4) and GRD (TP3).

- (3) Depress and hold the NO ALM (S1) key.

Requirement: The KS-8039 meter indicates 21.1 volts and the LV ALM lamp is not lighted.

Note: If the KS-8039 meter does not indicate 21.1 volts, adjust the CAL (R9) potentiometer until the meter indicates 21.1 volts. If the LV ALM lamp is lighted, slowly rotate the ADJ (R7) potentiometer ccw until the LV ALM lamp just goes out.

- (4) Release the NO ALM (S1) key.
- (5) Depress and hold the ALM (S2) key.

Requirement: The KS-8039 meter indicates 20.8 ± 0.1 volts; the LV ALM and ACO lamps are lighted; and the major alarm is activated.

Note: If the LV ALM lamp is not lighted, slowly rotate the ADJ (R7) potentiometer cw until the LV ALM lamp just lights.

- (6) Release the ALM (S2) key.

Requirement: The LV ALM and ACO lamps are extinguished and the major alarm is retired.

- (7) Repeat (3) through (6).
- (8) Disconnect the KS-8039 meter.

4.05 Load Distribution Fuse Alarm: Check the alarms associated with the load fuses as follows.

- (1) Locate the first load fuse to be checked.
- (2) Using a No. 266C tool held in a No. 265C tool holder, insert the No. 266C tool through the aperture in the front of the fuse holder through which the colored fuse bead protrudes. Insert the tool far enough to short the brass collar in the fuse holder cap to the fuse body, thus causing an alarm.

Requirement: A major alarm is given and the FUSE ALM and ACO lamps light.

- (3) Depress the ACO key.

Requirement: The audible alarm is silenced.

- (4) Remove the 266C tool from the fuse holder.

Requirement: The FUSE ALM and ACO lamps are extinguished and all alarm indications cease.

4.06 Plant Capacitor Fuse Alarm: Check the plant capacitor fuse alarm as follows.

- (1) Choose one of the CAP () ALM fuses to perform the fuse alarm check.
- (2) Using a No. 266C tool held in a No. 265C tool holder, insert the No. 266C tool through the aperture in the front of the fuse holder through which the colored fuse bead protrudes. Insert the tool far enough to short the brass collar in the fuse holder cap to the fuse body, thus causing an alarm.

Requirement: A minor alarm is given and the FUSE ALM and ACO lamps light.

- (3) Depress the ACO key.

Requirement: The audible alarm is silenced.

- (4) Remove the 266C tool from the fuse holder.

Requirement: The FUSE ALM and ACO lamps are extinguished and the minor alarm indications cease.

4.07 Converter Failure Alarms: The LV TEST and HV TEST pushbuttons are used as rough checks to verify that the converter failure alarms are functioning. It should be noted that the alarm circuits may or may not be operating at the proper voltage values. If the following requirements are not met, refer to Section 161-265-301 for the adjusting procedures. Check the converter failure alarms as follows.

- (1) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the OFF position.

Requirement: A minor alarm is activated and the FAIL lamp on the converter lights.

- (2) Remove the associated CONVERTER OUTPUT DISCONNECT fuse from the power plant.
- (3) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the ON position.

Requirement: The minor alarm is retired and the FAIL lamp on the converter extinguishes.

- (4) Depress and hold the LV TEST pushbutton on the first converter.

Requirement: The FAIL lamp on the converter lights; the ACO lamp on the power plant lights; and a minor alarm is activated.

- (5) Depress the ACO key on the power plant.

Requirement: The audible alarm is silenced.

- (6) Release the LV TEST pushbutton.

Requirement: The FAIL lamp on the converter and the ACO lamp on the power plant are extinguished and the minor alarm is retired.

- (7) Depress and hold the HV TEST pushbutton on the first converter.

Requirement: The CONVR INPUT (CB1) circuit breaker on the converter operates and the FAIL lamp lights. A minor alarm is activated and the ACO lamp on the power plant lights.

- (8) Depress the ACO key on the power plant.

Requirement: The audible alarm is silenced.

- (9) Release the HV TEST pushbutton.

- (10) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the ON position.

Requirement: The FAIL lamp on the converter is extinguished; the ACO lamp on the power plant is extinguished; and the minor alarm is retired.

- (11) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the OFF position.

Requirement: A minor alarm is activated and the FAIL lamp on the converter lights.

- (12) Install the associated CONVERTER OUTPUT DISCONNECT fuse in the power plant.

- (13) Operate the CONVR INPUT (CB1) circuit breaker on the first converter to the ON position.

Requirement: The minor alarm is retired and the FAIL lamp on the converter extinguishes.

- (14) Repeat (1) through (13) for each remaining converter.

5. TROUBLES

Caution: Remove the CAP () ALM fuse before the associated CAP () fuse. Install the CAP () fuse before the associated CAP () ALM fuse. Follow these procedures to prevent the CAP () ALM from operating and activating the plant capacitor fuse alarm.

5.01 After replacing any of the C1 through C8 electrolytic capacitors in the plant, it is necessary to charge the replaced capacitor. To charge the replaced capacitor, remove the associated CAP () ALM fuse and then the CAP () fuse. Operate the CHG CAP SELECTOR switch to the appropriate number of the capacitor to be charged and allow 20 seconds for the capacitor to charge. Operate the CHG CAP SELECTOR switch to the OFF position. Replace the associated CAP () fuse and then the CAP () ALM fuse in their respective fuse holders.

5.02 The following troubles pertain to the plant circuit. If the trouble is not found, check for loose or open connections or short circuits due to foreign matter lying across wiring terminals. For troubles in the converter units, refer to Section 161-265-301.

SECTION 167-688-301

TROUBLE	POSSIBLE CAUSE	TROUBLE	POSSIBLE CAUSE
(a) No output voltage	High-voltage shutdown circuits in the converters operated. CONVERTER OUTPUT DISCONNECT fuses open. 45-ampere battery distribution fuses blown. Plant diodes open. Defective wiring.	(e) Major and minor alarms activated but no lamps lighted	CP1 circuit pack defective. LV ALM lamp defective. Defective CR6 diode. -24V ALM (F5) fuse open. 45-ampere battery distribution fuse open.
(b) Low output voltage	Converter shutdown. CONVERTER OUTPUT DISCONNECT fuse open. 45-ampere battery distribution fuse blown. Converters out of adjustment. Converter(s) overloaded. Plant diode open. Defective wiring.	(f) Major alarm troubles	MJ relay defective. MJ diode shorted. Defective wiring. R5 resistor open.
(c) High output voltage	Converter out of adjustment. Defective high-voltage shutdown circuit in the converter(s).	(g) Minor alarm troubles	MN relay defective. MN diode shorted. Defective wiring. R1 resistor open.
(d) Bus low-voltage alarm not working properly	CAL (R9) or ADJ (R7) potentiometers out of adjustment. LVA fuse open. -24V ALM fuse open. NO ALM (S1) and/or ALM (S2) keys defective. LV relay defective. LV diode defective. R7, R8, R9, or R10 resistors defective.	(h) ACO feature not functioning	ACO key (S3) defective. ACR relay defective. ACR diode shorted. R6 resistor open. Defective wiring. ACO lamp defective.
		(i) FUSE ALM (major)	FA relay defective. FA diode shorted. FA resistor open. Defective wiring. FUSE ALM lamp defective.
		(j) FUSE ALM (minor)	CA relay defective. CA diode shorted. R16 resistor open. Defective wiring. FUSE ALM lamp defective.