DC-TO-DC CONVERTER
J87334A
24.75 VOLTS, 3.5 AMPERES
OPERATING METHODS

1. GENERAL

1.01 The J87334A dc-to-dc converter provides a regulated, positive or negative 24.75 volt, 0-to 3.5-ampere output from a −24 volt dc input supply. The converter is intended for use in the L4 ▶and L5◀ Carrier Systems. The converter may be used where its voltage, capacity, noise regulation characteristics, and mechanical configuration meet the requirements of the associated equipment.

1.02 This section is reissued to include application to the L5 Carrier System, and to revise the output voltage measurement procedure by the use of a digital multimeter. This issue does affect the Equipment Test List.

1.03 ▶The converter operates from either 11-cell or 12-cell battery plants. The converter is factory wired as X option for the 11-cell plant, or as Y option for the 12-cell plant. The X-option converter (11-cell operation) input voltage requirement is within the limits of 21.6 to 23.9 volts dc and emergency voltage limits of 19 volts minimum and 28 volts maximum. The Y-option converter (12-cell operation) input voltage requirement is within the limits of 23.5 to 26 volts dc and emergency voltage limits of 20.5 volts minimum and 28 volts maximum.◀

1.04 Tests jacks, located on the front panel, are provided to measure input voltage [J4(−) and J5(+) IN], output voltage [J6(+) and J7(−) OUT], regulator input voltage [J1(+) REG and J7(−) OUT], and bias voltage [J2(+) and J3(−) BIAS]. Potentiometers are also provided on the front panel to adjust the output voltage [OUTPUT ADJ VOLTS R(17)] and the bias voltage [BIAS ADJ (R5)].

1.05 ▶This issue of the section is based on the following drawing: SD-81961-01, Issue 4. For a detailed description of the operation, see the corresponding circuit description. If this section is to be used with equipment or apparatus reflecting a later issue of the drawing, reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

1.06 The J87334A dc-to-dc converter will function with the following L5 Carrier Application Schematics.

SD-82098-01	620A Power Plant Discharge Circuit—24 Volt DC Supply
SD-51100	Toll System—Line Transmission
SD-51150	Line Protector Switching System—3
SD-51190	Jumbogroup Frequency Supply
SD-51130	Basic Jumbogroup Trunk
SD-51230	Jumbogroup Multiplex◀

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

1.08 Routine checks should be made when they will least interfere with service.

2. LIST OF TOOLS AND TEST APPARATUS

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	6-Inch C Screwdriver
TEST APPARATUS	
—	▶DC Voltmeter - - Minimum requirements: (1) The meter used for measurement of regulator input (REG IN) and for output voltage (OUT) should have

an accuracy of 0.5% and a sensitivity of 5,000 ohm/volt or greater. See Caution 1.
(2) The meter used to measure BIAS voltage must have at least 2% accuracy and a sensitivity of 20,000 ohm/volt or greater. See Caution 2.

— Ohmmeter — Minimum requirement: Range 1 M Ohm

Note 1: The following digital multimeters meet all the dc voltmeter and ohmmeter minimum requirements.

— John Fluke Model 8100A Digital Multimeter

— Weston Model 1240 Digital Multimeter

— Hickock Model 3300 Digital Multimeter

Note 2: The following meters are suitable dc voltmeters if Cautions 1 and 2 are observed.

KS-19178 (Sensitivity 1000 ohm/volt, Accuracy 0.5%)
KS-14510 (Sensitivity 20,000 ohm/volt, Accuracy 0.2%

Caution 1: Input and Output Voltage—If a meter of 5,000 ohm/volt or more sensitivity and 0.5% accuracy is used, no correction factor is necessary. If the KS-19178, 0.5%, 1000 ohm/volt meter is used, a correction factor must be applied to the meter indication due to the voltage drop across the limiting resistors in series with the pin jacks. The correction factors are given in CD-81961-01 and only apply to the 1,000 ohm/volt meter.

Caution 2: Bias Voltage—Use a meter of at least 20,000 ohm/volt sensitivity and 2% accuracy. If the KS-14510 meter is used, use the 3 volts scale. If a meter of 100,000 ohm/volt and 2% accuracy is used, use any convenient scale.

3. OPERATION

3.01 ***Preparing to Start:*** Before starting the converter, check the following.

(a) All external connections are made in accordance with the schematic drawing covering the associated circuit.

(b) The external dc input fuse (located in the bay fuse panel) is available but not installed.

(c) The external output protection fuse is installed in the fuse block.

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

(1) Install the external dc input fuse in the fuse block.

Caution: Observe dc voltmeter minimum requirements and Caution 1 given in Part 2.

(2) Connect the dc voltmeter between J6(+) and J7(−) OUT test jacks.

Requirement: The meter indicates 24.75 ±0.2 volts dc.

Note: If the requirement is met, do not adjust the output voltage. Proceed to (4). If the requirement is not met, continue with (3).

(3) Adjust the OUTPUT ADJ VOLTS (R17) potentiometer cw to increase or ccw to decrease the output voltage until the requirement in (2) is met.

(4) Disconnect the meter from J6 and J7 test jacks.

3.03 ***Stopping:*** To remove the converter from service, remove the external dc input fuse from the fuse block.

Note: If the converter is to be removed from service for an extended period of time, remove the output protection fuse and connect the electrolytic capacitors to a source of direct current of suitable voltage and polarity in accordance with Section 032-110-701.

4. ROUTINE CHECKS

4.01 The converter should be checked periodically in accordance with the Equipment Test List, after any trouble condition has been corrected, or if it has been out of service for an extended period of time.

4.02 ▶***Clean Ventilating Passages:*** Keep the ventilating passages of the converter unobstructed to ensure adequate cooling during operation.◀

4.03 ***Input Voltage Check:*** Check the converter input voltage with the converter in normal operation.

Caution: ▶Observe dc voltmeter minimum requirements and Caution 1 given in Part 2.◀

(1) Connect the dc voltmeter between J4(−) and J5(+) IN test jacks.

Requirement: ▶For a 12-cell plant, the meter indicates 23.5 to 26 volts dc. For an 11-cell plant, the meter indicates 21.6 to 23.9 volts dc.

(2) Disconnect the meter from J4 and J5 test jacks.◀

4.04 ***Output Voltage Adjustment:*** Check the converter output voltage adjustment as follows.

(1) Verify that the converter is connected to the load and operating in the normal mode of operation.

(2) Check the output voltage adjustment in accordance with 3.02 (2) through (4).

4.05 ***Regulator Input and Bias Voltage Check:*** Check the bias voltage adjustment as follows.

Note: The value of bias voltage will change with a change in regulator input voltage; therefore it will be necessary to make regulator input voltage checks in conjunction with bias voltage checks.

Caution: ▶Observe dc voltmeter minimum requirements and Cautions 1 and 2 given in Part 2.◀

(1) Connect the dc voltmeter between J1(−) REG IN and J7(+) OUT test jacks. ▶Note the meter indication and then disconnect the meter from J1 and J7 test jacks.◀

(2) Connect the dc voltmeter between J2(+) and J3(−) BIAS test jacks as follows.

(a) ▶Positive bias voltage: Connect the meter positive lead to BIAS + test jack, and the meter negative lead to −BIAS test jack.

(b) Negative bias voltage: Connect the meter positive lead to −BIAS test jack and the meter negative lead to BIAS + test jack.◀

Requirement: The meter indicates the bias voltage value ▶within the range corresponding to the regulator input ***actual*** voltage value◀given in the Bias Voltage Requirements Table located in Part 5 of CD-81961-01.

Note: If the bias voltage value is within the corresponding range, no bias voltage adjustment is necessary. Proceed to (4). If the bias voltage does not fall within the corresponding range, continue with (3).

(3) Adjust the BIAS ADJ (R5) potentiometer cw to increase or ccw to decrease the bias voltage value until the bias voltage indicated on the dc voltmeter meets the center voltage requirement.

(4) ▶Disconnect the meter from J2 and J3 BIAS test jacks.

(5) Repeat (1) and (2).◀

5. TROUBLES

5.01 If the converter fails, ▶check the possible causes listed in 5.02 trouble chart.◀ A defective converter should be replaced with a factory adjusted unit. The defective unit should be returned to the factory for repair and/or adjustment

5.02 ▶***Trouble Chart:*** Should any of the following troubles develop, it is suggested that the possible causes be checked. If the trouble is not found, look for loose or open connections or short circuits due to foreign matter lying across wiring terminals.

TROUBLE	POSSIBLE CAUSE	TEST PROCEDURE
No output voltage at J6(+) and J7(—) OUT test jacks	1. No dc input supply	Measure dc input voltage in accordance with 4.03.
	2. Blown dc input fuse	Remove the dc input fuse from the fuse block. Check the fuse with the ohmmeter portion of the test meter.
	3. Defective connector	Measure dc input voltage in accordance with 4.03. If voltage is not available at J4(—) and J5(+) IN test jacks, verify that the dc input fuse is not blown. Measure the dc voltage at the dc input fuse as follows. Connect the dc voltmeter between the battery side of the dc input fuse and ground. If voltage is available at the dc input fuse, and no voltage is available at J4 and J5 IN test jacks, the connector is probably defective.
Output protection fuse operates	1. Defective circuit pack in associated bay	Check associated equipment.
	2. Output load above maximum	Check associated equipment.
	3. Internal short circuit	Check converter circuit for shorted wiring and burned components.
High output voltage	1. Voltage regulator out of adjustment	Adjust OUTPUT VOLTS ADJ (R17) potentiometer in accordance with 4.04.
	2. High input voltage	Measure dc input voltage in accordance with 4.03.
Low output voltage	1. Voltage regulator out of adjustment	Adjust OUTPUT VOLTS ADJ (R17) potentiometer in accordance with 4.04.
	2. Low input voltage	Measure dc input voltage in accordance with 4.03.
	3. Output load above maximum	Check associated equipment.←