

**ELECTRICAL POWER-STATIC INVERTER -
REPLACEMENT OF SELF-LOCKING NUTS ON BRIDGE HEATSINK ASSEMBLY**

I PLANNING INFORMATION

- A. Effectivity - Static Inverter, Part Number 1-111-0102-0714, (Boeing P/N S282T004-8), Mod Level "-" thru "B" up to serial number CV001315; Part Number 1-002-0102-0714, (Boeing S282T004-7), Model 1C1000-1B, Mod Level "-" thru "D"; and Part Number 1-002-0102-0265, (Boeing S282T004-5), Model 1C1000-1A, Mod Levels "-" thru "G".
- B. Reason - Engineering Quality Analysis (EQA) conducted by Boeing Commercial Airplane Company on a model 1C1000-1B (Boeing P/N S282T004-7) static inverter has determined that a potential condition exists in which the self-locking nylon nuts on the Bridge Heatsink Assembly may loosen over time. This loosening can lead to damage or failure of one or more of the transistors (Q45, Q32, Q46, Q36, Q47, Q40, Q48, Q44) or diodes (D15, D19, D23, D27). The elimination of the self-locking nuts and replacement with a combination of split lock washer, flat washer, and nut will provide a positive locking connection ensuring a good electrical contact.
- C. Description - Replacement of the self-locking nylon nuts will require removal of inverter covers, some disassembly of the inverter, removal of the self-locking nuts, and installation of the split lock washer, flat washer, and nut.
- D. Approval - This Service Bulletin has been reviewed by the Federal Aviation Administration (FAA) and the modifications herein comply with the Federal Aviation Regulations (FAR) and are FAA approved for installation on Boeing aircraft.
- E. Manpower - The estimated manpower required to accomplish this task is 55 minutes.

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F. Material the Cost and Availability - Operators who intend to perform this change at their facility may obtain parts shown in paragraph III A by ordering Kit No. 1-001-6301-0003, as shown below. The data shows the date when the parts are available.

Part Number	Qty	Unit Price	Name	Date Available
1-001-3201-0101	36	N/C	Washer, Split/Lock, #4-40, Stainless Steel	19 April 1997
1-001-2708-0146	36	N/C	Spacer, Hex, 1/4" Dia., 1/8" Long	19 April 1997
1-001-3201-0100	36	N/C	Washer, Flat	19 April 1997
1-001-2802-0063	28	N/C	Screw, Machine, Pan Head, #4-40, 3/4" Long, Brass	19 April 1997

The parts will be available April 19, 1997 through April 19, 1998. Send parts requests to Product Support Department at the address below. Please refer to Kit number 1-001-6301-0003 and this service bulletin number.

Avionic Instruments Inc.
1414 Randolph Ave
Avenel, NJ 07001 USA
FAX: 908-382-4996

G. Tooling- - NONE

H. Weight and Balance - Net weight change \pm .01 lbs.

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- I. Electrical Load Data - Not Affected
- J. Software Accomplishment Summary - Not Applicable
- K. Reference - None
- L. Other Publications Affected - Component Maintenance Manuals, ATA No. 24-20-27, 1-001-4902-0017, and ATA No. 24-20-23, 1-001-4902-0013, will be revised to include this service bulletin.

II ACCOMPLISHMENT INSTRUCTIONS

CAUTION: DISCONNECT INPUT POWER PRIOR TO HANDLING OR REMOVAL OF THE COVER OF THE STATIC INVERTER TO PREVENT ELECTRICAL SHOCK.

Replacement of the 36 self-locking nuts requires the installer to gain access to the Bridge Heatsink Assembly shown in Figures 3 and 6.

Instructions for Part Numbers 1-111-0102-0714 (Boeing S282T004-8) (for post CV001315 serial numbers, step 34, only, is applicable) and 1-002-0102-0714 (Boeing S282T004-7) Static Inverters:

1. Remove four screws, items 55 and 55A securing front top cover, item 50, on figure 1.
2. Remove eight screws from the front and side panels securing front top cover; two of item 10A and six of item 60 on figure 1.
3. Carefully pry off front top cover, item 50 on figure 1.
4. Remove four (4) screws, item 70 securing rear top cover, item 65, on figure 1.
5. Remove six screws from the rear and side panels securing rear top cover; two of item 205 and four of item 75 on figure 1.
6. Carefully pry off rear top cover, item 65 on figure 1.
7. Remove seven screws, item 105 securing rear bottom cover, item 95, on figure 1
8. Remove six screws from the rear and side panels securing rear bottom cover; four of item 100 and two of item 45 on figure 1.
9. Carefully pry off rear bottom cover, item 95 on figure 1.
10. Remove three screws from wire connections; one item 30, one item 30A and one item 155 on figure 1.
11. Remove two screws from wire connections; item 115 and item 135 on figure 1.

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12. Cut cable tie, item 200, securing wires on figure 1.
13. Using figure 2, locate the 16 screws, item 15, securing side plates items 20 and 10.
14. Remove eight screws (15) and remove the sideplate heatsink (10).
15. Remove eight screws (15) and remove the sideplate heatsink (20).
16. Using figure 3, locate 36 positions using self-locking nuts to secure the transistors and diodes on the Bridge Power Assembly.
17. Remove the 36 self-locking nuts and the 28 associated screws.
18. Replace the 28 screws with the item (16) screws (p/n 1-001-2802-0063).
19. Replace the 36 self-locking nuts with one each split/lock washer (15) (p/n 1-001-3201-0101), flat washer (14) (p/n 1-001-3201-0100), and spacer (10) (p/n 1-001-2708-0146) as shown in figure 3. Tighten using # 1 Phillips head screwdriver and a torque of 94 to 100 oz-in.
20. Using figure 2, locate side plate item 20. Install item 20 using the eight screws, item 15.
21. Using figure 2, locate side plate item 10. Install item 10 using the eight screws, item 15.
22. Install cable tie, item 200, securing wires on figure 1.
23. Install two screws from wire connections; item 115 and item 135 on figure 1.
24. Install three screws from wire connections; one item 30, one item 30A and one item 155 on figure 1.
25. Carefully position rear bottom cover, item 95 on figure 1.
26. Install six screws from the rear and side panels securing rear bottom cover; four of item 100 and two of item 45 on figure 1.
27. Install seven screws, item 105, securing rear bottom cover, item 95, on figure 1
28. Carefully position rear top cover, item 65 on figure 1.

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29. Install six screws from the rear and side panels securing rear top cover; two of item 205 and four of item 75 on figure 1.
30. Install four screws, item 70, securing rear top cover, item 65, on figure 1.
31. Carefully position front top cover, item 50 on figure 1.
32. Install eight screws from the front and side panels securing front top cover; two of item 10A and six of item 60 on figure 1.
33. Install four screws, items 55 and 55A securing front top cover, item 50, on figure 1.
34. Re-identify the Mod Level of the Static Inverter as follows:
 - (a)- Use the "X" metal stamp to stamp over the existing mod level.
 - (b)- Use the "C" metal stamp to reidentify the MOD LEVEL by stamping a "C" in the silver area next to the existing letter for S282T004-8 static inverters or use the "E" metal stamp to reidentify the MOD LEVEL by stamping a "E" in the silver area next to the existing letter for S282T004-7 static inverters. (See figure 7).
35. Perform function test defined in Addendum 1 to verify inverter performance.
36. Return inverter to stock or installation upon successful completion of functional test.
37. Should the inverter fail the functional test, test and troubleshoot unit or return to Avionic Instruments Inc. for repair.

Instructions for Part Number 1-002-0102-0265 (Boeing S282T004-5) Static Inverter:

1. Remove four (4) screws, item 40 and 40A securing top cover, item 35, on figure 4.
2. Remove eight (8) screws from the front and side panels securing top cover, two (2) of item 10A and six (6) of item 40 on figure 4.
3. Carefully pry off top front panel, item 35 on figure 4.
4. Remove two screws (30) on top edge of rear panel (25).

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5. Remove four screws (60) securing top rear panel (50) on sides.
6. Remove four screws (55) securing top rear panel (50) on top.
7. Remove top rear panel (50).
8. Remove two screws (30) on bottom edge of rear panel (25).
9. Remove four screws (85) securing bottom rear panel (80) on sides and seven screws (90) securing bottom rear panel (80) on bottom.
10. Remove bottom rear panel (80).
11. Loosen four captive screws (135) on bridge assembly (130).
12. Separate bridge assembly (130) from flyback assembly (95).
13. Using figure 5, locate the 16 screws, items 15 and 25, securing side plates items 10 and 20.
14. Remove eight screws (15) and remove the sideplate heatsink (10).
15. Remove eight screws (25) and remove the sideplate heatsink (20).
16. Using figure 6, locate 28 positions using self-locking nuts to secure the transistors and diodes on the Bridge Power Assembly.
17. Remove the 28 self-locking nuts and the 28 associated screws.
18. Replace the 28 screws with the item (16) screws (p/n 1-001-2802-0063).
19. Replace the 28 self-locking nuts with one each split/lock washer (15) (p/n 1-001-3201-0101), flat washer (14) (p/n 1-001-3201-0100), and spacer (10) (p/n 1-001-2708-0146) as shown in figure 3. Tighten using # 1 Phillips head screwdriver and a torque of 94 to 100 oz-in.
20. Using figure 5, locate side plate item 20. Install item 20 using the eight screws, item 25.
21. Using figure 5, locate side plate item 10. Install item 10 using the eight screws, item 15.

22. Using figure 4, assemble bridge assembly (130) to flyback assembly (95) with four captive screws (135) on bridge assembly (130).
23. Position bottom rear panel (80).
24. Install four screws (85) securing bottom rear panel (80) on sides and seven screws (90) securing bottom rear panel (80) on bottom.
25. Install two screws (30) on bottom edge of rear panel (25).
26. Position top rear panel (50).
27. Install four screws (55) securing top rear panel (50) on top.
28. Install four screws (60) securing top rear panel (50) on sides.
29. Install two screws (30) on top edge of rear panel (25).
30. Carefully position top front panel, item 35 on figure 4.
31. Install eight (8) screws from the front and side panels securing top cover, two (2) of item 10A and six (6) of item 40 on figure 4.
32. Install four (4) screws, item 40 and 40A securing top cover, item 35, on figure 4.
33. Identify the Mod Level of the Static Inverter as follows:
 - (a)- Use the "X" metal stamp to stamp over the existing mod level.
 - (b)- Use the "H" metal stamp to identify the MOD LEVEL by stamping an "H" in the silver area next to the existing "G" for S282T004-5 static inverters. (See figure 8).
34. Perform function test defined in Addendum 1 to verify inverter performance.
35. Return inverter to stock or installation upon successful completion of functional test.
36. Should the inverter fail the functional test, test and troubleshoot unit or return to Avionic Instruments Inc. for repair.

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III MATERIAL INFORMATION

A. Parts Required Per Component-To get the parts listed below, refer to paragraph I.F., Material Cost and Availability.

NOTE: One kit (P/N 1-001-6301-0003) consisting of the components listed below is required for each static inverter.

Part Number	Qty	Unit List Cost	Key Word	Instruction
1-001-3201-0101	36	N/C	Washer, Split/Lock, #4-40, Stainless Steel	Install
1-001-2708-0146	36	N/C	Spacer, Hex, 1/4" Dia., 1/8" Long	Install
1-001-3201-0100	36	N/C	Washer, Flat	Install
1-001-2802-0063	28	N/C	Screw, Machine, Pan Head, #4-40, 3/4" Long, Brass	Install

In addition, the following commercially available items will be required to complete installation:

<u>Description</u>	<u>Qty</u>
3/32" Metal Stamps, Letters "C", "E", "X", "H"	1 each
Loctite Threadlocker #242 Thread-Locking Compound (or equivalent)	A/R

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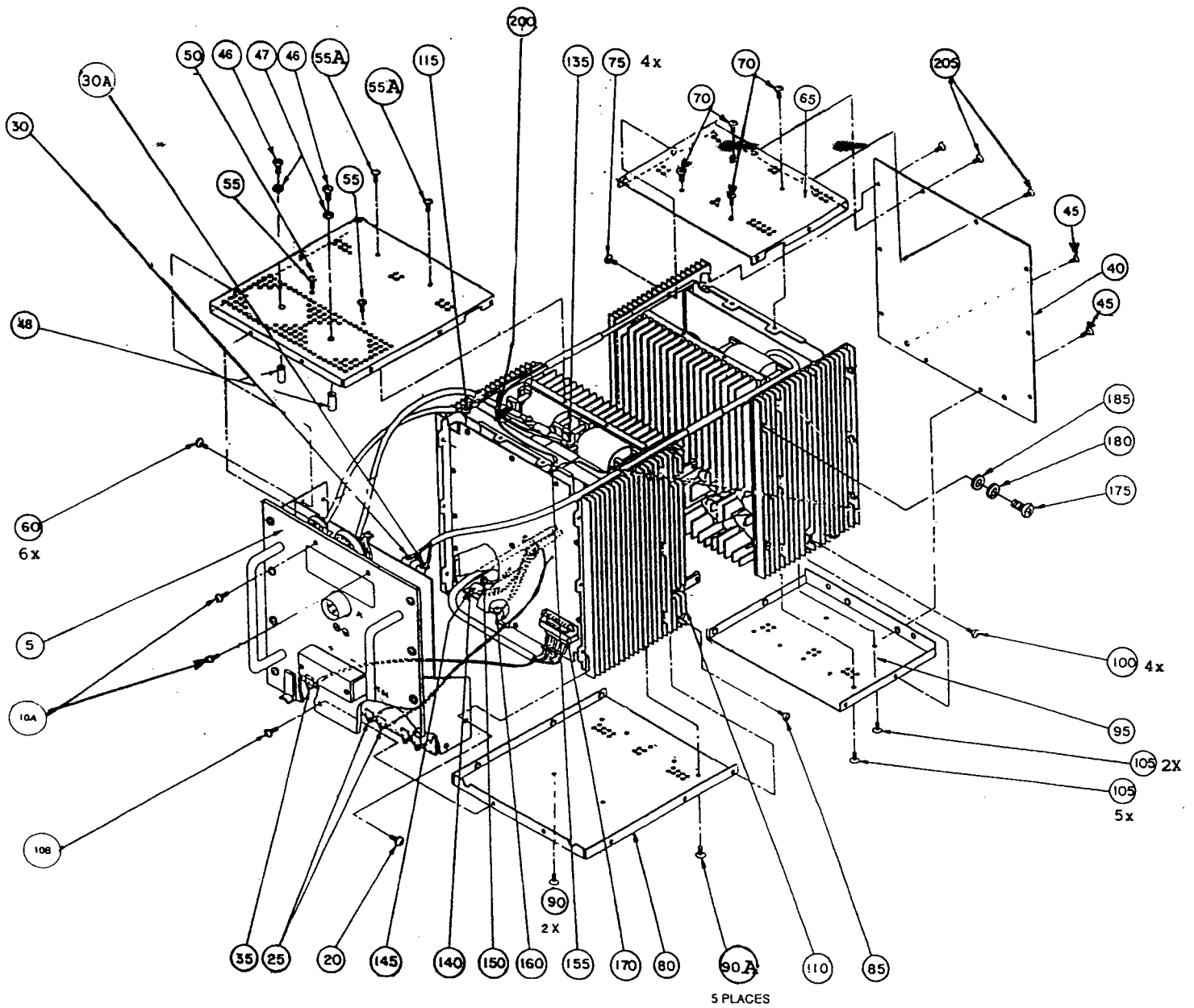


FIGURE 1

FINAL ASSEMBLY MODEL 1C1000-1B
 (S282T004-7 and S282T004-8) STATIC INVERTER

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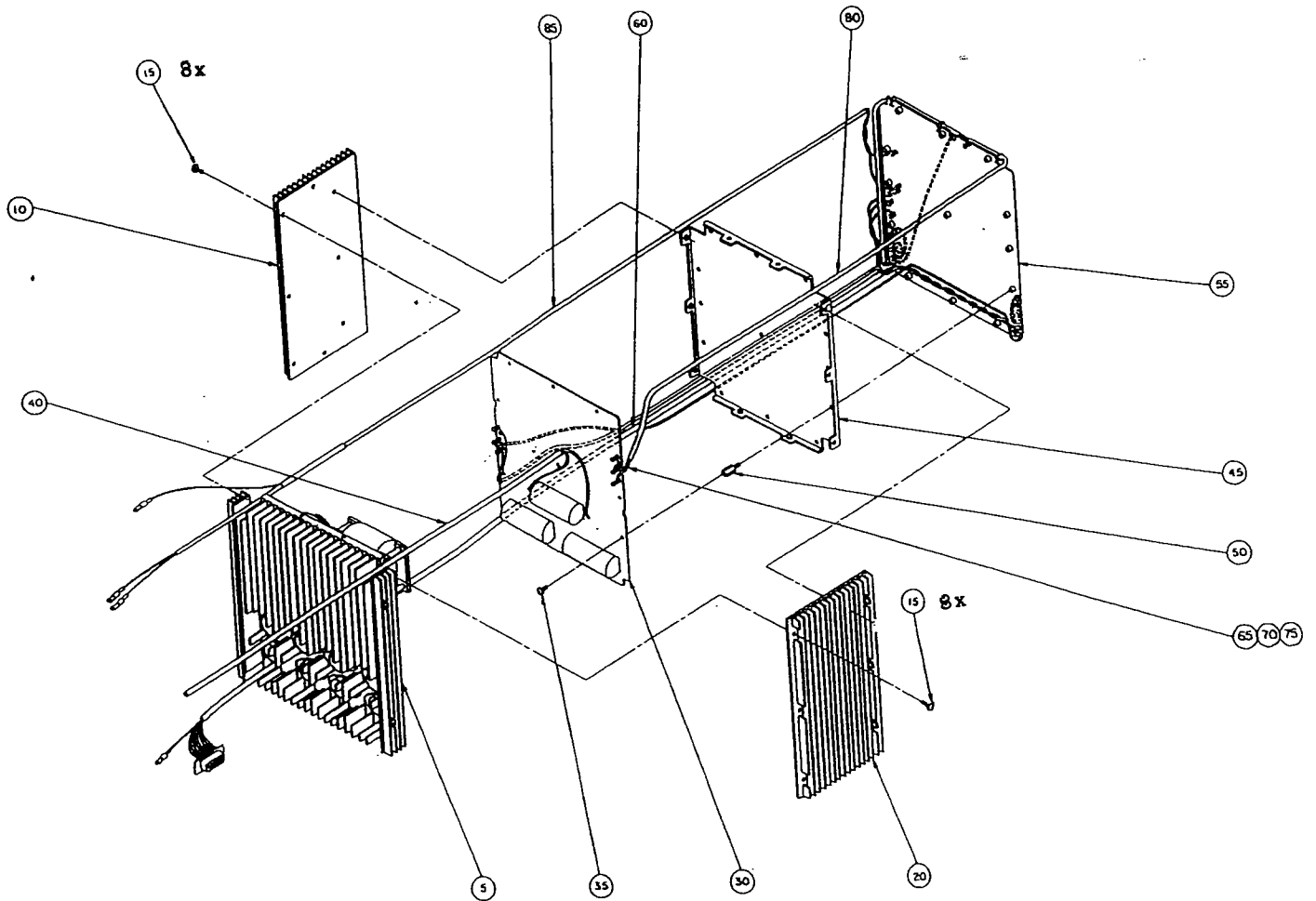


FIGURE 2

EXPLODED VIEW OF BRIDGE ASSEMBLY OF S282T004-7 and S282T004-8

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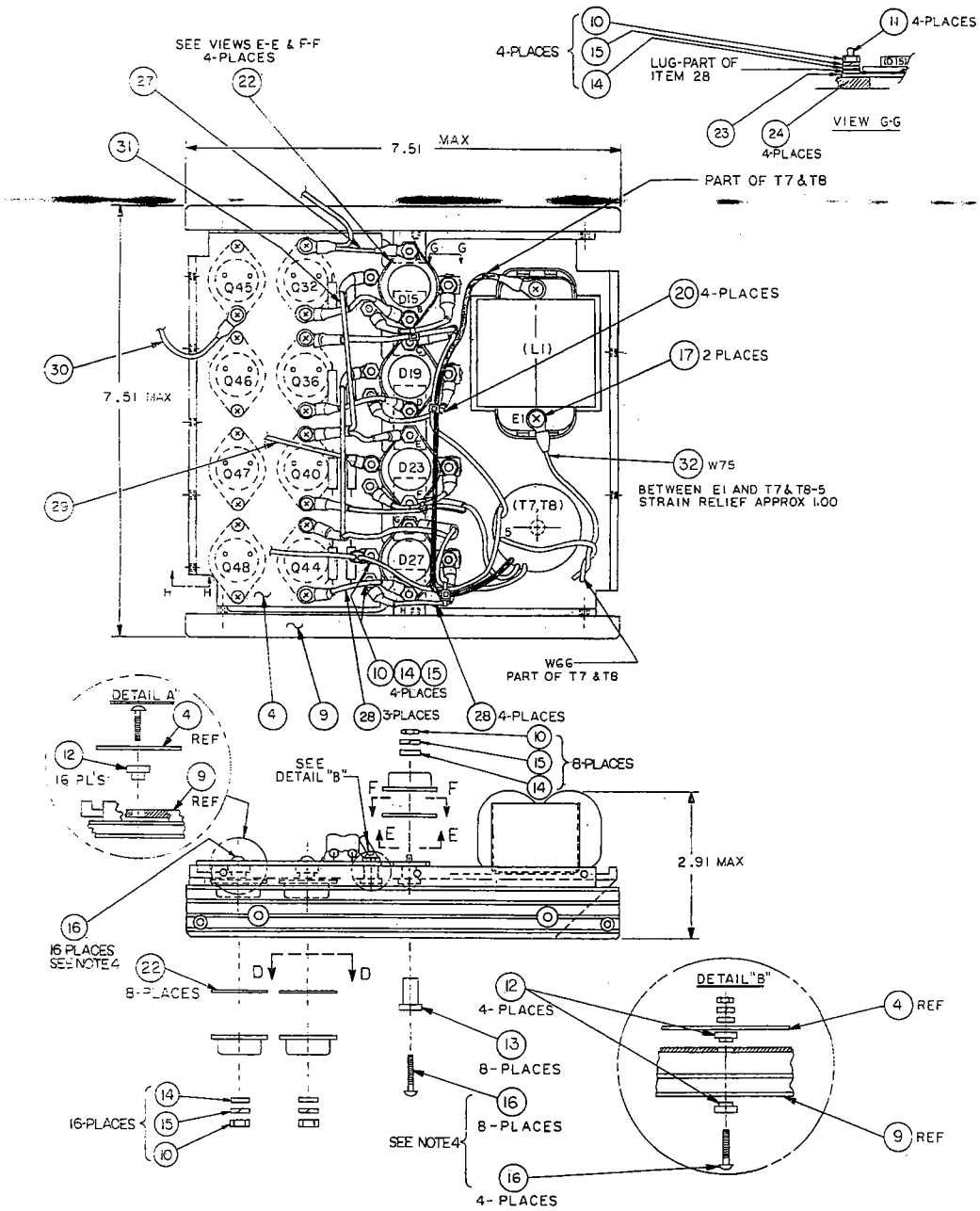


FIGURE 3

BRIDGE HEATSINK ASSEMBLY
(S282T004-7 and S282T004-8) STATIC INVERTER

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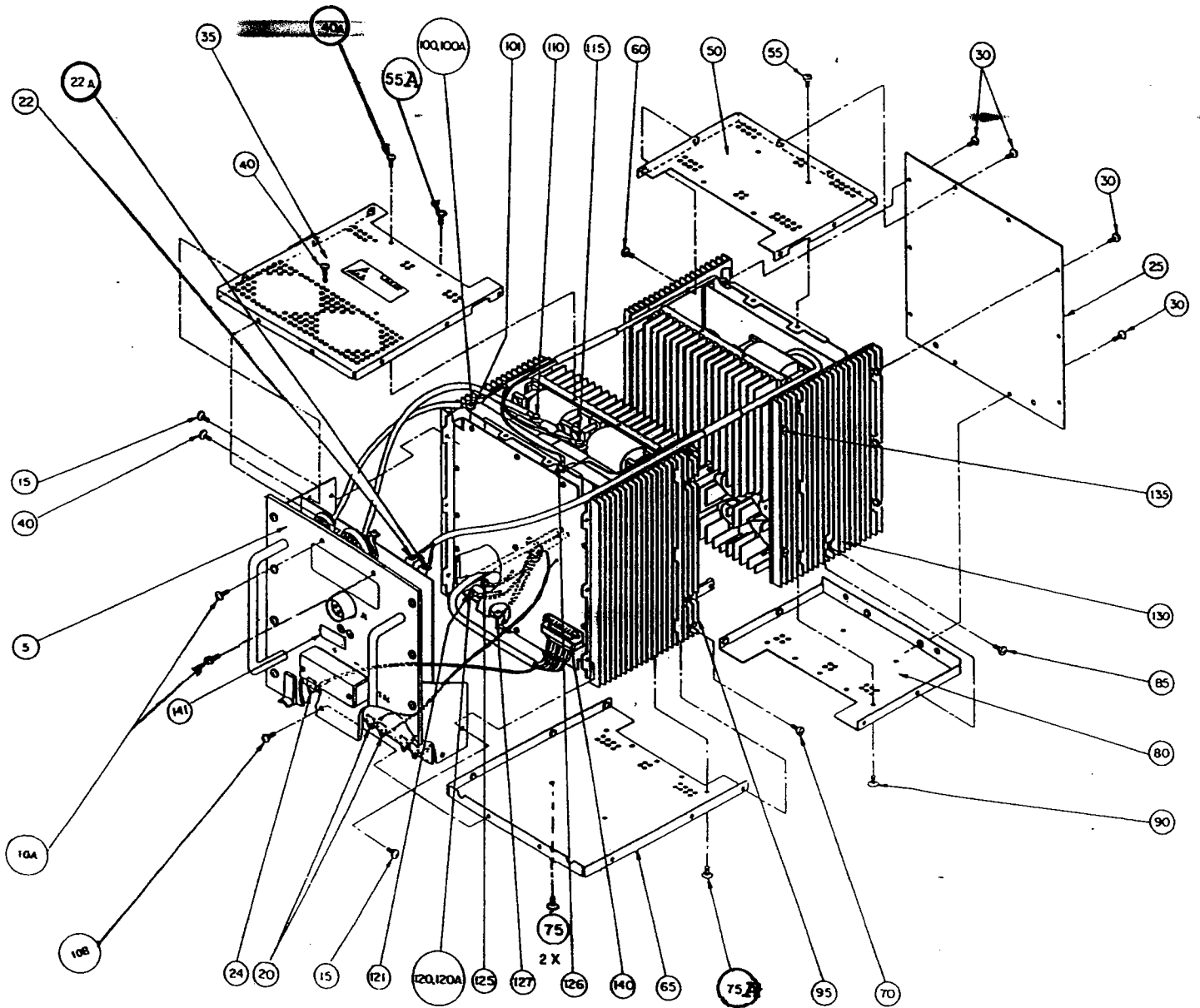


FIGURE 4

FINAL ASSEMBLY MODEL 1C1000-1A
(S282T004-5) STATIC INVERTER

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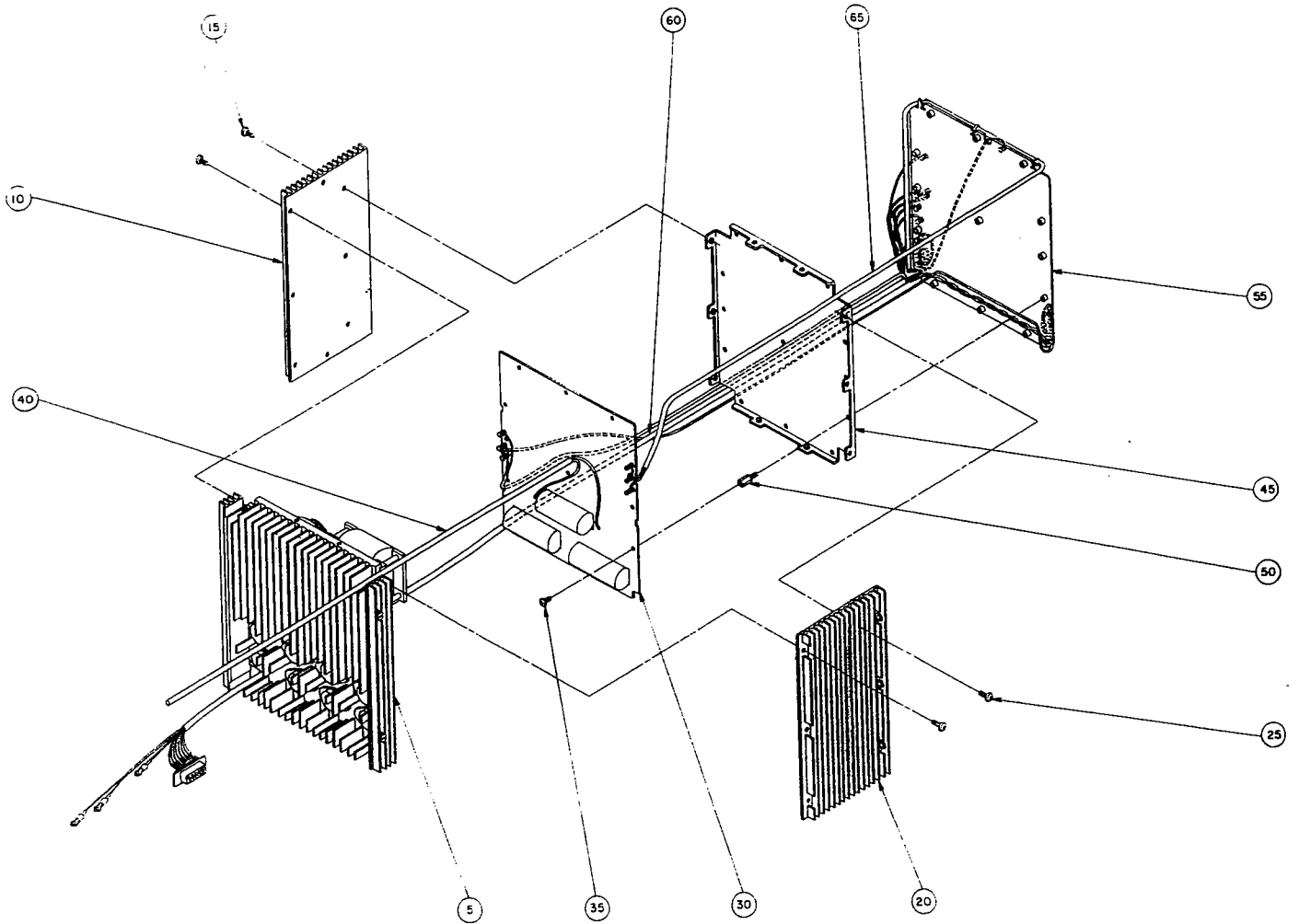


FIGURE 5

EXPLODED VIEW OF BRIDGE ASSEMBLY OF S282T004-5

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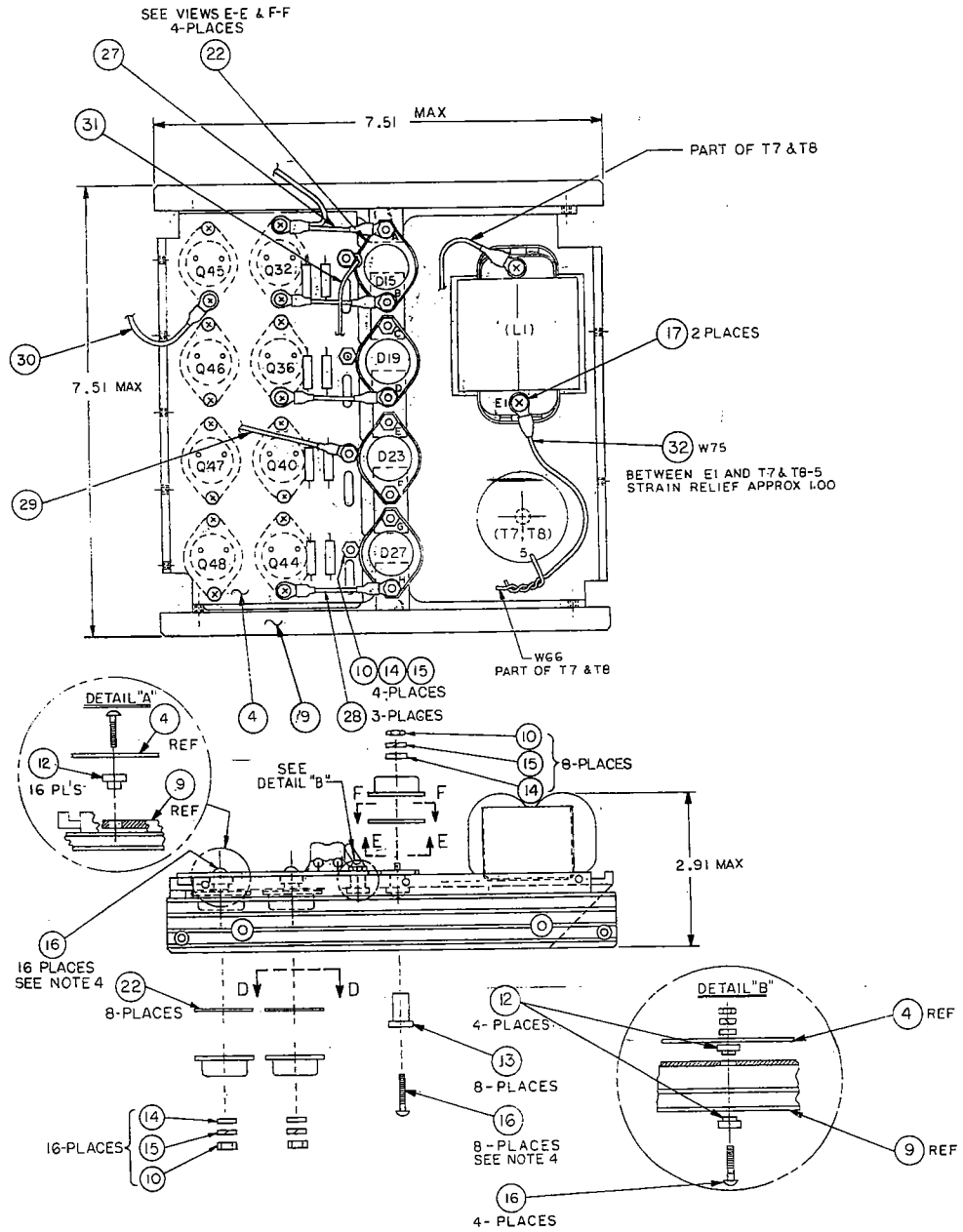


FIGURE 6

BRIDGE HEATSINK ASSEMBLY
(S282T004-5) STATIC INVERTER

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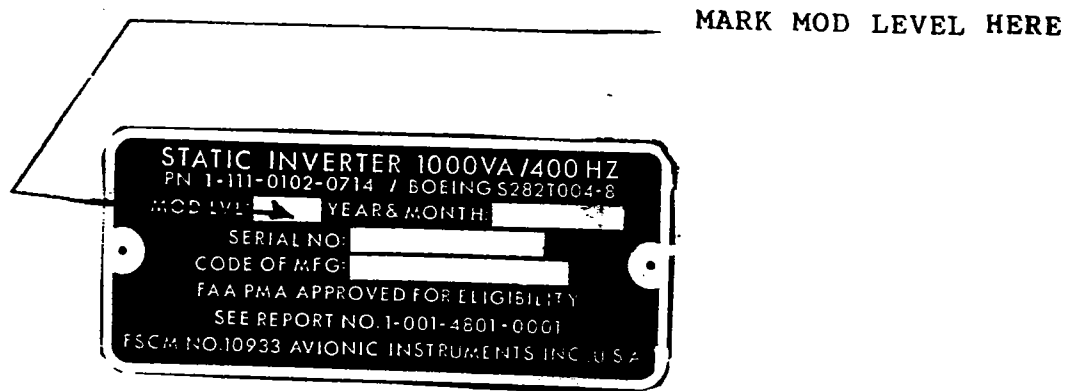


FIGURE 7

NAMEPLATE MARKING INFORMATION FOR
(S282T004-7 and S282T004-8) STATIC INVERTERS

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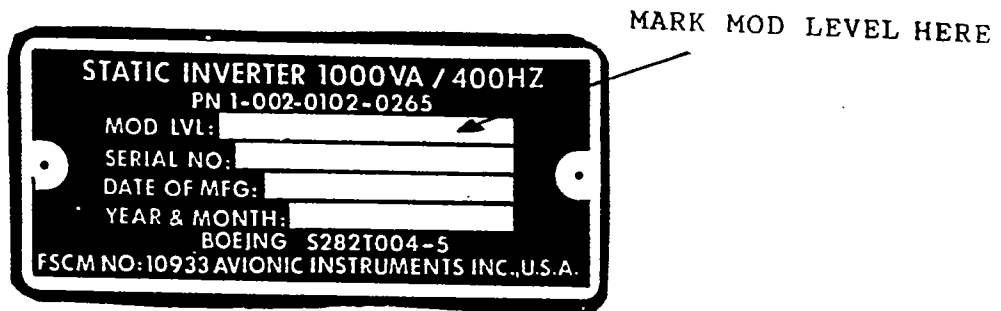


FIGURE 8

NAMEPLATE MARKING INFORMATION FOR
(S282T004-5) STATIC INVERTER

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ADDENDUM 1
FUNCTIONAL TEST REQUIREMENTS

1. General

This section contains instructions for testing the Model 1C1000-1B and 1C1000-1A Static Inverters. Testing is performed according to the procedure outlined in this section. The purpose of this test is to demonstrate that the static inverter meets all critical parameters and operates within the specified limits.

2. Test Equipment

A. Required Test Equipment

Figure 101 specifies the test equipment that is required for this test procedure. Alternate test equipment may be substituted provided its accuracy and performance are suitable for obtaining data consistent with the requirements of this procedure.

B. Test Setup

Figure 102 specifies the connections for the test setup.

3. Testing

This procedure establishes the operating conditions for the unit.

WARNING: DISCONNECT ALL POWER FROM THE STATIC INVERTER BEFORE MAKING CONNECTIONS OR PERFORMING ASSEMBLY OR DISASSEMBLY OPERATIONS.

A. Test Setup (See Figure 102)

- (1) Connect dc power supply, dc ammeter (with shunt, if required), and dc voltmeter to input of unit-under-test (UUT) -- TB1 on front panel. (Large diameter stud is positive; small diameter stud is negative.)

Equipment	Manufacturer	Model	Rating
DC Power Supply	Sorenson	DCR40-125A	0 to 40V, 0 to 125A
AC True RMS Voltmeter	Weston	433	0-150 V \pm 2%
AC Ammeter	Weston	904	0 to 50A \pm 2%
DC Voltmeter	Weston	931	0-50 V \pm 2%
DC Ammeter	Weston	931	0-100 A \pm 2%
Shunt for dc Ammeter (if required)	-	-	-
Linear Load	-	-	1000W
SPST Switch	Augat (Alco Switch)	TT13A-2T	3A, 28Vdc

NOTE: Equivalent substitutes may be used.

FIGURE 101

REQUIRED EQUIPMENT LIST FOR TEST PROCEDURE

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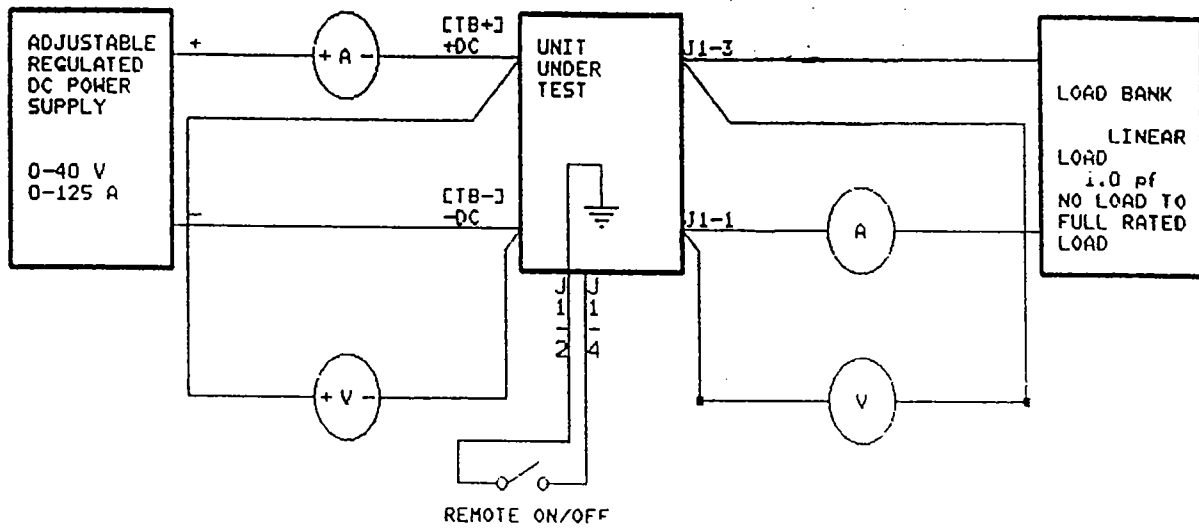


FIGURE 102

CONNECTIONS FOR TEST SETUP

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A. Test Setup (See Figure 102) (Continued)

- (2) Connect ac ammeter, ac voltmeter, and 1000 W nominal linear load to pins 1 and 3 of J1 on the front panel of the UUT.

NOTE: For regulation, power and efficiency measurements to be valid, the AC voltage measurement must be made at P1/J1 and the DC voltage measurement must be made directly at TB1.

B. Test Procedure

Perform steps of test procedure in listed order. Figure 103 specifies limits for each measured value. Testing must be stopped if any reading is out of tolerance and should be continued only after all faults have been corrected.

(1) No-Load Test

- (a) Disconnect 1000 W nominal linear load from J1 on UUT.
- (b) Adjust dc power supply to 24 $-2/+4$ Vdc.
- (c) Measure and record input current, output voltage. Record measured values and compare to limits in Figure 103.

(2) Full-Load Test

- (a) Connect 1000 W nominal linear load to J1 on UUT. Calculate the efficiency at full-rated load and at input voltages of 22 V or greater using the following equation:

$$\text{efficiency} = \frac{V_{\text{out}} * I_{\text{out}}}{V_{\text{in}} * I_{\text{in}}} * 100\%$$

The calculated efficiency at full-rated load should be at least:

82% at input voltages of 22 V or greater.

- (b) Adjust dc power supply to 24 -2/+4 Vdc.
- (c) Measure and record input current and voltage ,and output current and voltage. Record measured values and compare to limits in Figure 103.

(3) Remote On/Off Test

- (a) Adjust dc power supply to 24 -2/+4Vdc.
- (b) Close remote on/off switch for 5 seconds. This grounds Pin J1-4.
- (c) UUT output should be zero.
- (d) Open remote on/off switch. Verify that output returns.
- (e) Turn off dc power supply and disconnect load.

C. Limits, Measured Values

Check all readings against values specified in Figure 103. Repairs are required if input current, output voltage, or efficiency are not within tolerance.

<u>Input</u>		<u>Output</u>		
Voltage (Vdc)	Current (A _{dc})	Voltage (V _{rms})	Current (A)	Nominal Load (W)
22-28	3.5 (1)	110-120	0	0
22-28	70 (1)	110-120	8.7 (2)	1000

(1) Worst case input current limit for 22 V input, 1000 W load.

(2) Nominal output current, load dependent. 1000 W current equal to output voltage divided by load resistance (typically 13.2 ohms at 1000 W).

FIGURE 103

LIMITS FOR MEASURED VALUES