CHAPTER 12

426T-1 POWER INVERTER

NOTE

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CHAPTER 12

426T-1 POWER INVERTER

1. General Description.

1.1 PURPOSE OF THE 426T-1.

The 426T-1 Power Inverter converts the primary line 27.5-volt d-c to a 115-volt rms, 400-cps pulsed wave. The 426T-1 provides all a-c power to the VC-102 system.

1.2 DESCRIPTION OF THE UNIT. (See figure 1.)

The 426T-1 is contained in a 3/8 ATR short case. All electrical connections to the unit are made at the rear of the 426T-1 chassis.

1.3 EQUIPMENT SPECIFICATIONS.

Input	27.5 volts, 30 amperes.
Output	630 va, single phase, 115 volts, square wave.
Frequency	400 cps.
Load	Any load including short circuit.
Temperature	-40°C to +65°C.
Cooling air	15 cubic feet of air per minute.
Size	13-1/16 inches long, 7-23/32 inches high, and 3-11/16 inches wide.
Weight	16 pounds.

2. Installation.

See figure 2 for outline and mounting drawing.

3. Principles of Operation.

A 28-volt d-c input is applied to the oscillator circuit of Q1 and Q2. The 400-cps square-wave

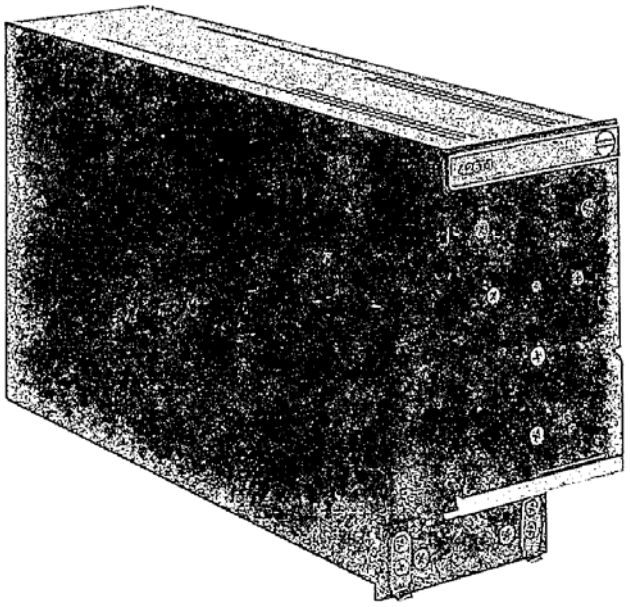

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Figure 1. 426T-1 Power Inverter

output from the oscillator is fed through transformers T2 and T3 to the amplifier stages of Q3 through Q10. The four amplifier stages are connected in a bridge as shown in the simplified schematic diagram of figure 3. The output is taken from transformer T4 and depends directly upon the difference in voltage between points B and C. If all four stages are directly in phase, the bridge is balanced and the output is zero. If stages 1 and 4 are in phase and stages 1 and 3 are 180 degrees out of phase, the output becomes maximum.

Refer to the schematic diagram, figure 10. Stages 1 and 3 receive a phase difference from the phase shift across magnetic amplifier MA1. This phase

shift across MA1 is controlled by the output current and voltage. Transformer T5 samples the output current, and transformer T6 samples the output voltage, causing current to flow in the control winding of MA1. This action provides voltage regulation.

Figure 4A shows the voltage between stages 1 and 2. Figure 4B shows the voltage between stages 3 and 4. The voltage difference between these two waveforms causes the current to flow through transformer T4. Thus, the output voltage is the difference between the two waveforms as shown in figure 4C. The amount of phase shift across MA1 determines the width of the pulse. The greater the phase shift, the wider the pulse becomes. Since the amount of phase shift is caused by the current in the control winding which, in turn, is dependent upon the output current and voltage, the magnetic amplifier provides voltage regulation.

If a short is placed on the output, current through transformer T7 increases. The increased voltage on the secondary breaks down CR14, and SCR1 fires providing a short between the amplifier stages through the bridge rectifier consisting of CR17 through CR20. This balances the bridge, and the output becomes a series of spikes of negligible width, causing the average output voltage to drop to zero. This action prevents the equipment from burning out when a short is placed on the output.

4. Maintenance.

4.1 TEST EQUIPMENT REQUIRED.

See table 1 for equipment necessary to test the 426T-1 Power Inverter.

4.2 TEST SETUP.

Refer to figure 5 for recommended test set schematic diagram. Remove the 426T-1 from its casing, and turn on the blower or fan so that air strikes the 426T-1 broadside for maximum cooling. Connect the test set to the 426T-1.

4.3 TEST PROCEDURES.

a. With S1 open, apply 25 volts, and read the input current and output voltage and frequency. Input current should be no more than 5 amperes. Output voltage should be between 110 and 130 volts. The output frequency should be 400 cps ±5 cps.

b. Repeat step a with S1 closed. The input current should not exceed 30 amperes. The output voltage and frequency should not change from step a.

c. Repeat steps a and b with 27.5 volts input. Input current should not exceed 5 amperes in the no-load position. Input current should not exceed 30 amperes in the loaded condition. Output voltage and frequency should not change.

d. Repeat steps a and b with 30 volts input. Input current should not exceed 5 amperes in the no-load condition. Input current should not exceed 30 amperes in the loaded condition. Output voltage and frequency should not change.

e. If the above tests indicate that the 426T-1 is not operating satisfactorily, connect an oscilloscope across the output of the oscillator, and observe a 400-cps pulsed wave.

f. Connect one oscilloscope lead to terminal 2 of T2 and the other to terminal 2 of T3, and observe pulsed-wave output.

TABLE 1. TEST EQUIPMENT REQUIRED

EQUIPMENT	MANUFACTURER
D-C Ammeter, 0 to 50 amperes	
Vacuum-Tube Voltmeter	Ballantine 320
D-C Voltmeter, 0 to 50 volts	Hewlett-Packard 410B
Frequency Counter	Hewlett-Packard 524A
D-C Power Supply, 25 to 30 volts, 35 amperes	
Blower or Fan	
Switch, spst, 10 amperes	
Load Resistor, 23 ohms, 700 watts	
Cannon Connector	DPXB-8-33S-0201
Oscilloscope	Tektronix 541

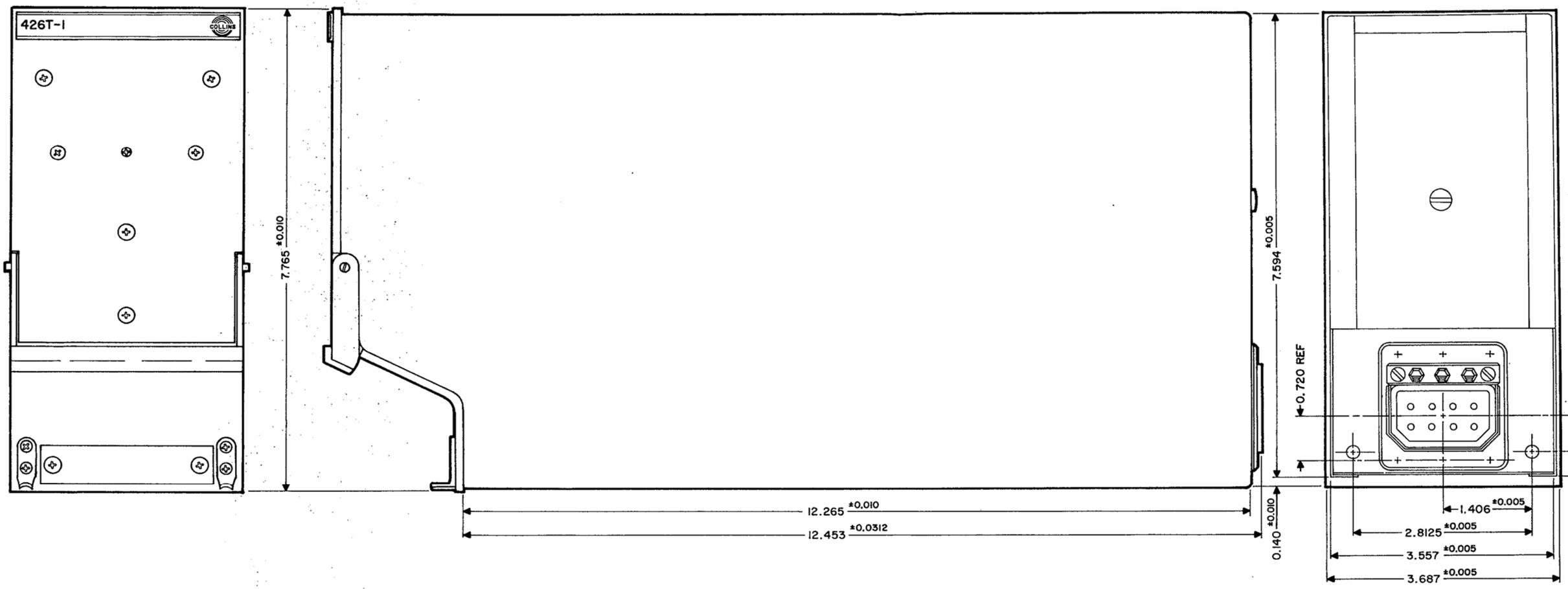

Figure 2. 426T–1 Power Inverter, Outline and Mounting Drawing.

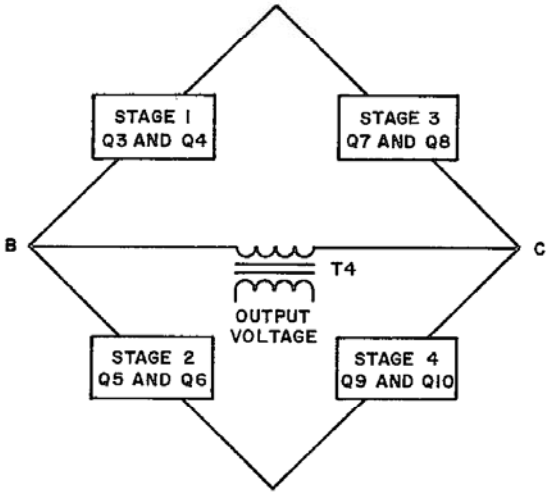

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Figure 3. Simplified Diagram of Amplifier Stages

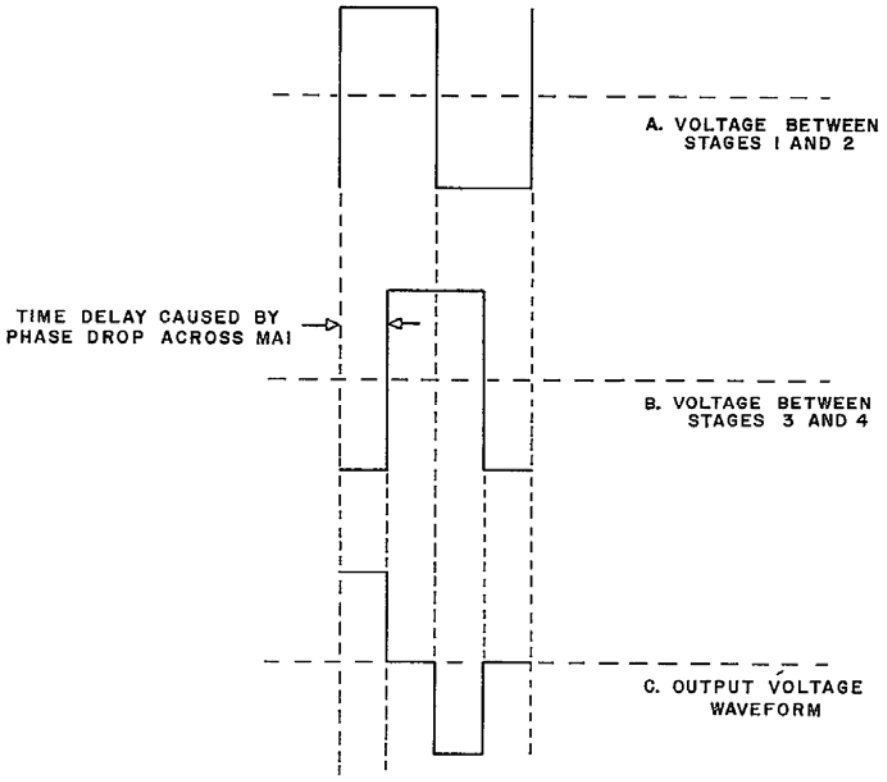

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Figure 4. 426T-1 Voltage Waveforms

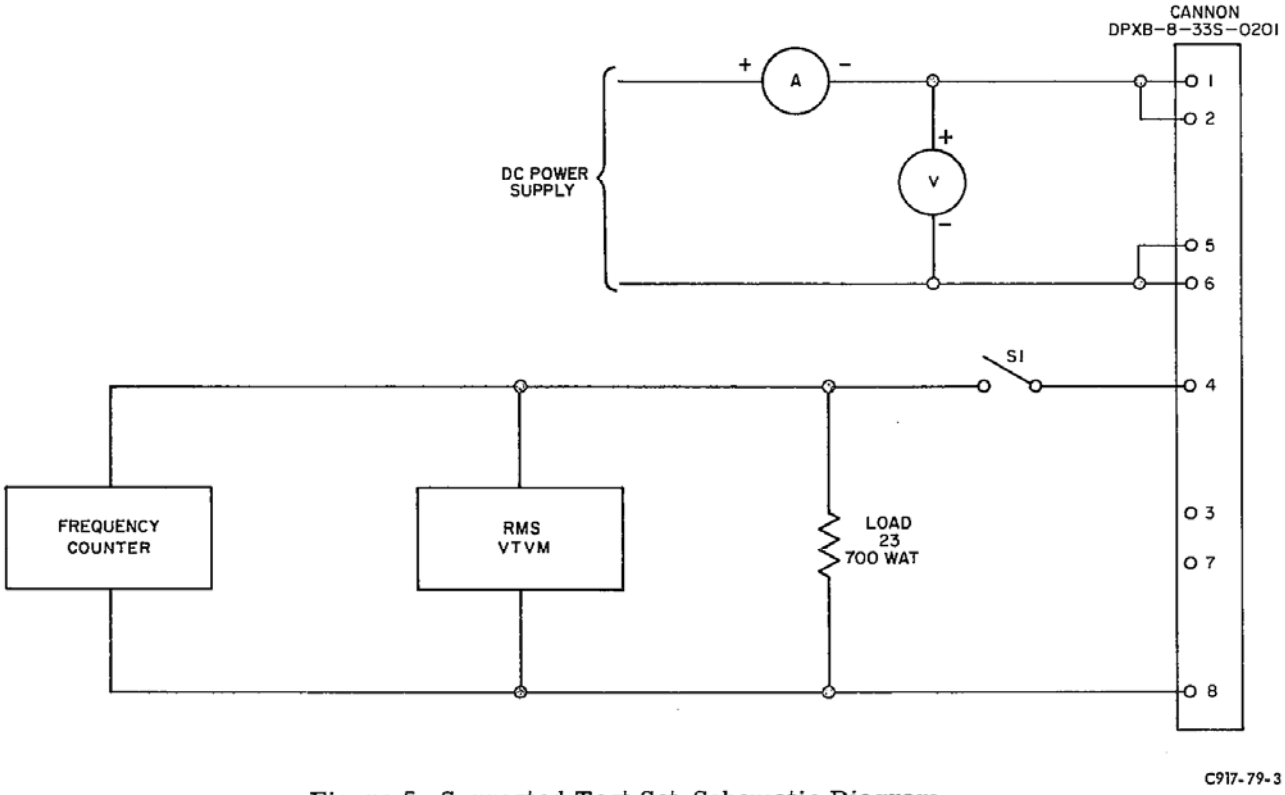

Figure 5. Suggested Test Set, Schematic Diagram

Parts List

ITEM	DESCRIPTION	DELCO PART NUMBER
	426T-1 POWER INVERTER	7284800
C1	CAPACITOR: 27000 uuf	7284852
C2	CAPACITOR: 8 uf, 200 v, ±10%	7284853
C3	CAPACITOR: 2 uf, 200 v, ±10%	7284854
C4	NOT USED	
C5	NOT USED	
C6	CAPACITOR: 5 uf, 50 v, +20% -15%	7284850
C7	CAPACITOR: 1.0 uf, 35 v, ±10%	7284851
C8	CAPACITOR: 15 uf, 15 v dc +20% -15%	7284849
C9	NOT USED	
C10	CAPACITOR: 350 uf, 45 v	7284848
C11	CAPACITOR: 5 uf, 50 v, +20% -15%	7284850
CR1	DIODE: 1N677	7284821
CR2	DIODE: 1N677	7284821
CR3	DIODE: 1N484A	7284822
CR4	DIODE: 1N484A	7284822
CR5	DIODE: 1N484A	7284822
CR6	DIODE: 1N484A	7284822
CR7	DIODE: 1N484A	7284822
CR8	DIODE: 1N484A	7284822
CR9	DIODE: 1N763	7284824
CR10	DIODE: 1N340	7284823
CR11	DIODE: 1N340	7284823
CR12	DIODE: 1N340	7284823
CR13	DIODE: 1N340	7284823
CR14	DIODE: 1N763	7284824
CR15	DIODE: 1N484A	7284822
CR16	DIODE: 1N484A	7284822
CR17	DIODE: 1N484A	7284822
CR18	DIODE: 1N484A	7284822
CR19	DIODE: 1N484A	7284822
CR20	DIODE: 1N484A	7284822
J1	CONNECTOR, RECEPTACLE:	7284685
L1	TRANSFORMER ASSEMBLY	7284764

ITEM	DESCRIPTION	DELCO PART NUMBER
MA1	MAGNETIC AMP TRANSFORMER	7284756
Q1	TRANSISTOR: 2N392 (matched pair with Q2)	7280600
Q2	TRANSISTOR: 2N392 (matched pair with Q1)	7280600
Q3	TRANSISTOR: 2N1523	7284903
Q4	TRANSISTOR: 2N1523	7284903
Q5	TRANSISTOR: 2N1523	7284903
Q6	TRANSISTOR: 2N1523	7284903
Q7	TRANSISTOR: 2N1523	7284903
Q8	TRANSISTOR: 2N1523	7284903
Q9	TRANSISTOR: 2N1523	7284903
Q10	TRANSISTOR: 2N1523	7284903
R1	RESISTOR: 25 ohm, ±1%, 10 w	7284847
R2	RESISTOR: 300 ohms, ±1%, 5 w	7284846
R3	RESISTOR: 100 ohms, ±1%, 5 w	7284845
R4	RESISTOR: 2K ohms, ±10%, 0.8 w	7284841
R5	RESISTOR: 500 ohms, ±1%, 1 w	7284844
R6	RESISTOR: 1500 ohms, ±5%, wirewound, 1 w	7284840
R7	RESISTOR: 1K ohm, ±5%, wirewound, 1 w	7284839
R8	RESISTOR: 1K ohm, ±10%, 10 w	7284843
R9	RESISTOR: 25 ohms	7284859
R10	NOT USED	
R11	NOT USED	
R12	NOT USED	
R13	NOT USED	
R14	RESISTOR: 100 ohms, ±10%, 10 w	7284842
R15	RESISTOR: 1K	
SCR1	2N1776	
T1	TRANSFORMER ASSEMBLY	7284765
T2	TRANSFORMER ASSEMBLY	7284757
T3	TRANSFORMER ASSEMBLY	7284758
T4	TRANSFORMER ASSEMBLY	7284760
T5	TRANSFORMER ASSEMBLY	7284761
T6	TRANSFORMER ASSEMBLY	7284759
T7	TRANSFORMER ASSEMBLY	7284761
TB1	PRINTED CIRCUIT BOARD	7284810
TB2	PRINTED CIRCUIT BOARD	7284813

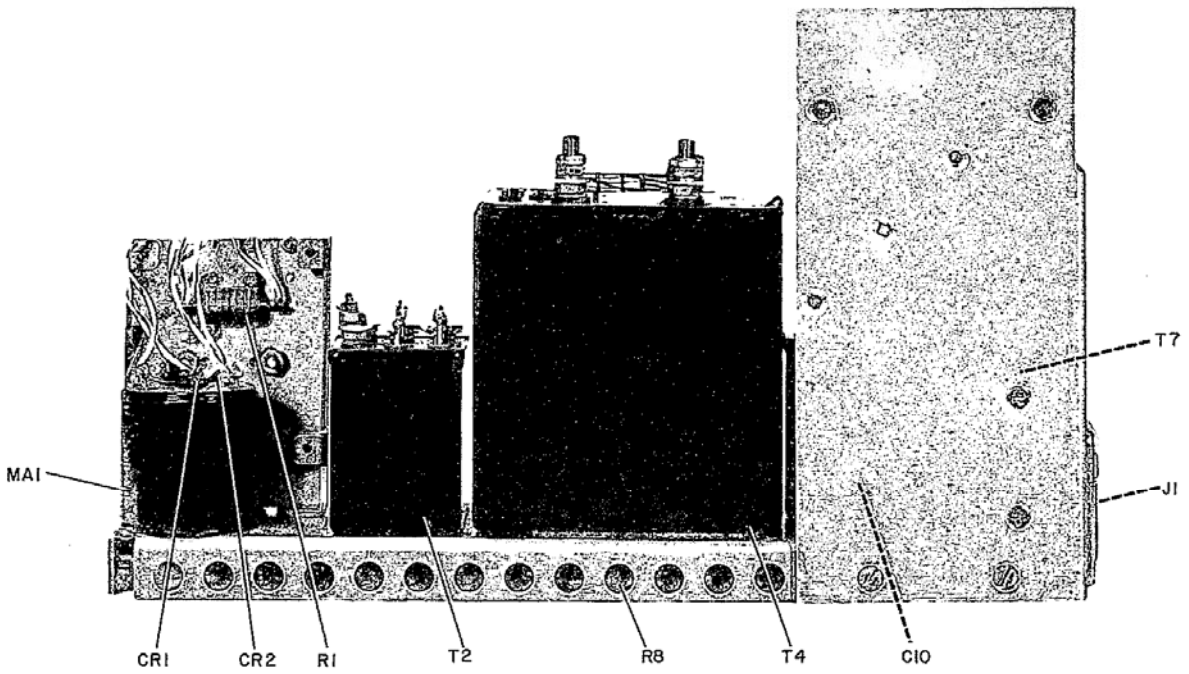

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Figure 6. 426T-1 Right Side View

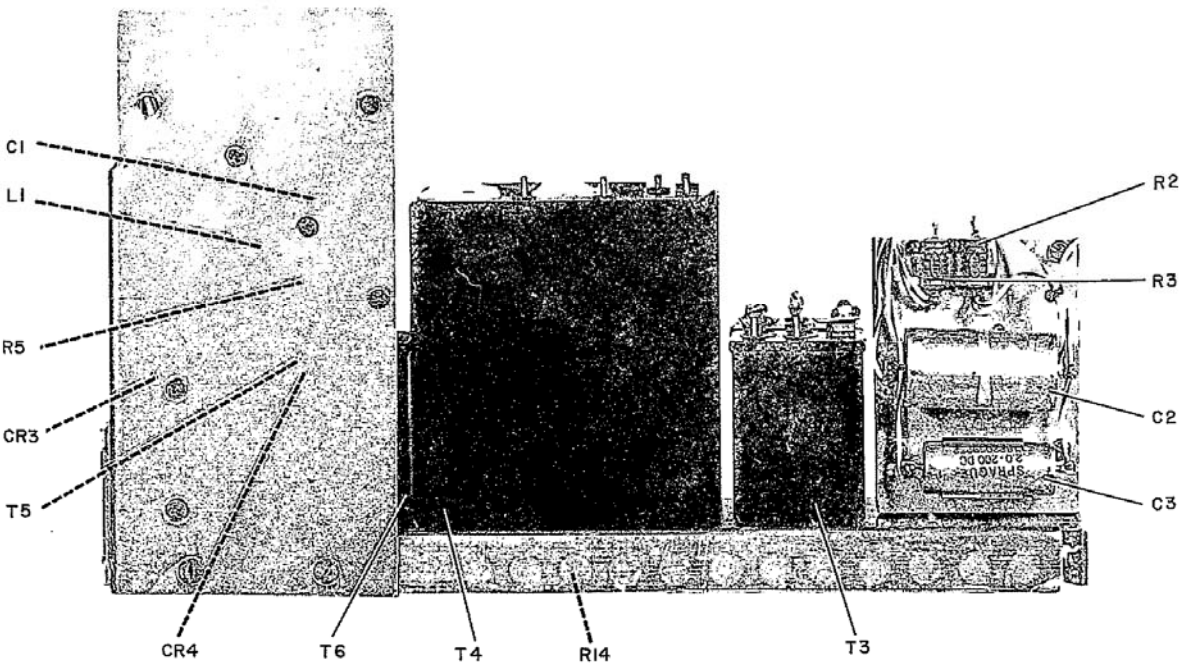

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Figure 7. 426T-1 Left Side View

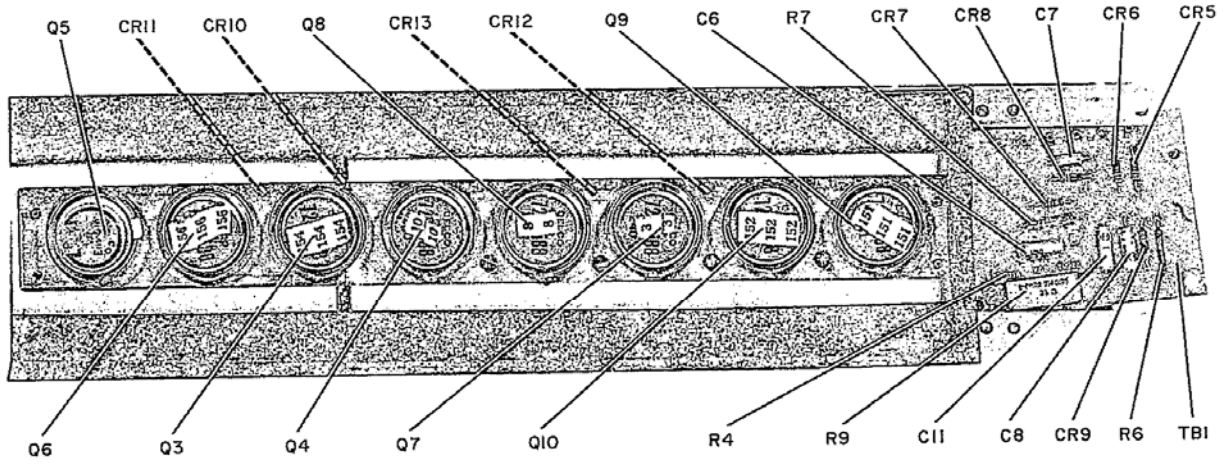

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Figure 8. 426T-1 Top View

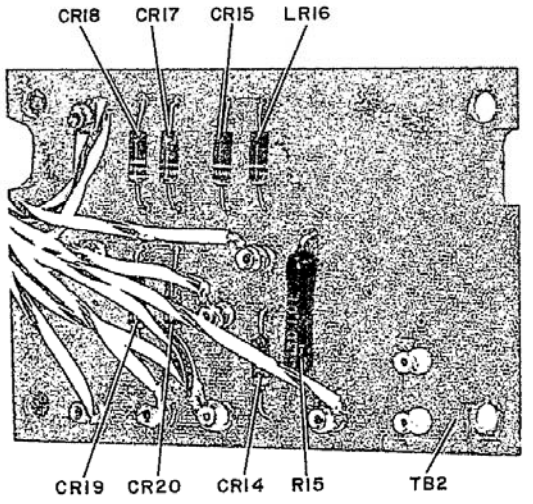

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Figure 9. 426T-1 Terminal Board

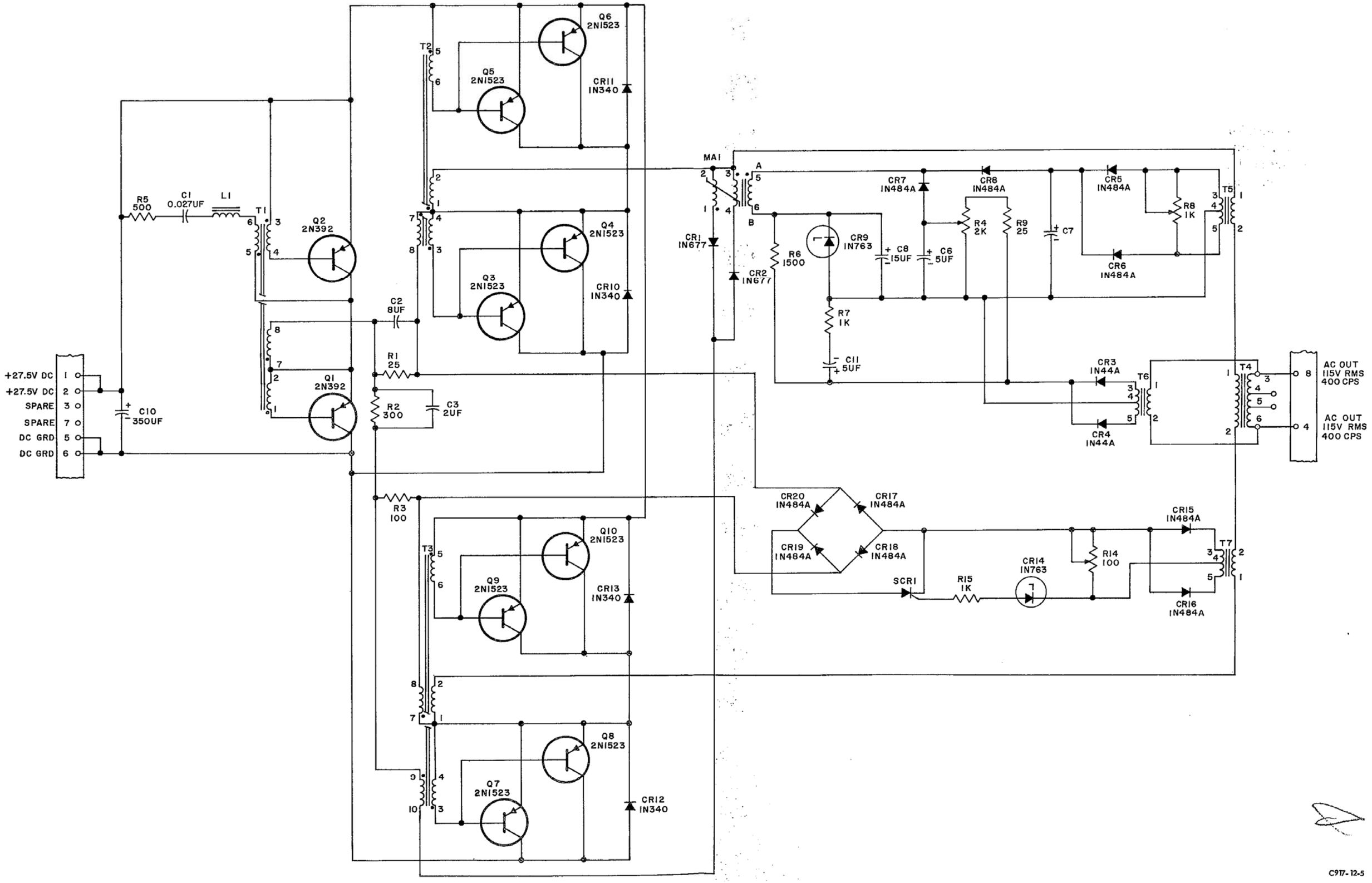

Figure 10. 426T–1 Power Inverter, Schematic Diagram.

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