

**TYPE NS40A
POWER SUPPLY
PL-19D427468G 2, 4, 6,
10-12**

DESCRIPTION

The Power Supply module provides the conversion from the DC battery voltage to the regulated +12 VDC. Different Group Numbers are used for different battery voltages:

<u>Group</u>	<u>Battery Voltage</u>
2	24 VDC
4	48
6	125
10	250
11	110
12	220 VDC

OPERATION

Refer to Schematic Diagram 19D427526 which is included in this instruction.

The input voltage is applied to the converter through a 2-pole switch S1. This switch also provides a switched battery output. The positive input is fused (F1) and the negative input includes a reverse voltage protection diode (D54). An input filter (T2, C9, C11 and C12) attenuates noise from the power source to the power supply and vice-versa.

The DC-DC converter (A1) is a fixed frequency (20 kHz) variable pulse width regulator. Integrated circuit AR3 generates a 20 kHz square-wave with a duty cycle of 90%. Flip-flop U2 alternates the power pulse between power transistors Q6 and Q11. Transistors Q2 through Q5 and Q7 through Q10 interface the CMOS gates U1-C and U1-D with the power transistors.

Secondary winding 9 and 10 of T1 provides the supply voltage for the control circuits plus the voltage control loop. These secondary voltage pulses are rectified by diodes D4 and D5, and integrated by resistor R47 and capacitor C3. Integrated circuit AR2 senses when this voltage has reached a predetermined level and switches the output pulse OFF.

Integrated circuit AR1 provides short circuit protection by sensing the emitter current of Q6 and Q11 through resistor R24, and switching the output pulse OFF when the emitter current exceeds a predetermined level. This circuit also limits the in-rush current when the power supply is first turned ON.

Transistor Q12 prevents gate U1-A from switching ON until the supply voltage for the control circuits reaches its normal level through resistor R31.

Secondary winding 4 and 5 of T1 provides the negative bias voltage to switch power transistors Q6 and Q11 OFF.

Variable resistor R8, ± 12 VDC OUTPUT LEVEL ADJ, is used for adjusting the output to ± 12 VDC.

The ± 12 VDC output is rectified by diodes D9 through D12 and filtered by inductors L1 and L2 and capacitors C14, C18 and C19.

The alarm circuit switches ON when the output voltage (3/C - 15/S) reaches 23 VDC and OFF if the output voltage drops to 17 VDC. Form C alarm contacts are provided.

NOMINAL OPERATING CHARACTERISTICS

1. Input Voltage:

- a. Group 2 21 VDC to 28 VDC at 600 mA max.
- b. Group 4 42 VDC to 56 VDC at 300 mA max.
- c. Group 6 103 VDC to 142 VDC at 125 mA max.
- d. Group 10 210 VDC to 280 VDC at 10 mA max.
- e. Group 11 96 VDC to 124 VDC at 125 mA max.
- f. Group 12 192 VDC to 248 VDC at 80 mA max.

2. Output voltage:

- a. +12 \pm 1 VDC, 500 mA max.
- b. -12 \pm 1 VDC, 500 mA max.

3. Low Voltage Alarm: form C contacts, 100 VA

- a. Pick-up 23 VDC max.
- b. Drop-out 17 VDC min.

ITEM NO.	IDENTIFICATION NUMBER	DESCRIPTION	GROUP NUMBER AND QUANTITY						
			1	2	3	5	6	7	
	19D427383G001 REV#B	DC-DC CONVERTER							
	19D427383G002 REV#C	DC-DC CONVERTER							
	19D427383G003 REV#C	DC-DC CONVERTER							
	19D427383G005 REV#C	DC-DC CONVERTER							
	19D427383G006	DC-DC CONVERTER							
	19D427383G007	DC-DC CONVERTER							
AR1	19A134379P001	LIN. OP-AMP RCA CA3130T	1	1	1	1	1	1	1
AR2	19A134379P001	LIN. OP-AMP RCA CA3130T	1	1	1	1	1	1	1
AR3	19A134379P001	LIN. OP-AMP RCA CA3130T	1	1	1	1	1	1	1
C1	5496267P003	CAPACITOR	1	1	1	1	1	1	1
C2	4029003P020	CAP.	1	1	1	1	1	1	1
C3	5493367P8200J	CAP. 8200PF 5% MICA	1	1	1	1	1	1	1
C4	5493367P1000F	CAP.	1	1	1	1	1	1	1
C5	5496267P005	CAPACITOR	1	1	1	1	1	1	1
C6	5496267P010	CAP 22MFD 15V TANT.	1	1	1	1	1	1	1
C7	5496267P010	CAP 22MFD 15V TANT.	1	1	1	1	1	1	1
C8	5490825P003	CAP 10K PFD 2000VDC	1	1	1	1	1	1	1
C9	19A115028P159	CAP 0.47MFD 400VDC 20%				1			1
C9	5493132P012	CAP 50MFD 250V	1	1	1	1	1	1	1
C11	5490825P003	CAP 10K PFD 2000VDC	1	1	1	1	1	1	1
C12	5490825P003	CAP 10K PFD 2000VDC	1	1	1	1	1	1	1
C13	0246A9006P181	CAP 180 PFD 500VDC 5%	1	1	1	1	1	1	1
C14	5493132P015	CAP 1000MFD 40V	1	1	1	1	1	1	1
C18	5496267P011	CAPACITOR	1	1	1	1	1	1	1
C19	5496267P011	CAPACITOR	1	1	1	1	1	1	1
C20	4029003P008	CAP 1000PF 500V MICA	1	1	1	1	1	1	1
D6	4037822P001	RECTIFIER - 1N4004G	1	1	1	1	1	1	1
D7	4037822P001	RECTIFIER - 1N4004G	1	1	1	1	1	1	1
D8	4037822P001	RECTIFIER - 1N4004G	1	1	1	1	1	1	1
D9	0246A9420P015J	DIODE RGP15J	1	1	1	1	1	1	1
D10	0246A9420P015J	DIODE RGP15J	1	1	1	1	1	1	1
D11	0246A9420P015J	DIODE RGP15J	1	1	1	1	1	1	1
D12	0246A9420P015J	DIODE RGP15J	1	1	1	1	1	1	1
L1	19B218975G003	COIL	1	1	1	1	1	1	1
L2	19B218975G003	COIL	1	1	1	1	1	1	1
Q1	19A116755P001	NPN TRANS 2N3947	1	1	1	1	1	1	1
Q2	19A116755P001	NPN TRANS 2N3947	1	1	1	1	1	1	1
Q3	19A115562P002	TSTR, SM5561 BI	1	1	1	1	1	1	1
Q4	19A115300P002	TSTR NPN 60V 2N3053 BI	1	1	1	1	1	1	1
Q5	19A115562P002	TSTR, SM5561 BI	1	1	1	1	1	1	1
Q6	19A115923P002	TRANSISTOR BI	1	1	1	1	1	1	1
Q6	19A134690P001	TRANS. NPN ST1-720				1			1
Q7	19A116755P001	NPN TRANS 2N3947	1	1	1	1	1	1	1
Q8	19A115562P002	TSTR, SM5561 BI	1	1	1	1	1	1	1
Q9	19A115300P002	TSTR NPN 60V 2N3053 BI	1	1	1	1	1	1	1
Q10	19A115562P002	TSTR, SM5561 BI	1	1	1	1	1	1	1
Q11	19A115923P002	TRANSISTOR BI	1	1	1	1	1	1	1
Q11	19A134690P001	TRANS. NPN ST1-720				1			1
Q12	0246A9214P3251	2N2907A TRANSISTOR BI	1	1	1	1	1	1	1
R1	0246A9105P102	RES 1K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R2	0246A9134P2212	RES 22.1KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R2	0246A9134P2742	RES 27.4KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R3	0246A9134P1213	RES 121KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R4	0246A9134P1213	RES 121KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R5	0246A9105P102	RES 1K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R6	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	1
R8	19A116559P107	POT 25K OHM 1/2W LIN	1	1	1	1	1	1	1
R9	0246A9134P3162	RES 31.6KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R11	0246A9105P622	RES 6.2K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R12	0246A9105P103	RES 10K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R13	0246A9134P6191	RES 6.19KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R14	0246A9134P3742	RES 37.4KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R15	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	1
R16	0246A9134P3571	RES 3.57KOHM 1/4W 1% MTL	1	1	1	1	1	1	1
R17	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	1
R18	0246A9105P123	RES 12K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R19	0246A9105P513	RES 51K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R20	0246A9105P103	RES 10K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R21	0246A9105P512	RES 5.1K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R22	0246A9102P101	RES 100 OHM .5W 5%	1	1	1	1	1	1	1
R23	0246A9102P201	RES 200OHM .5W 5%	1	1	1	1	1	1	1
R24	19B209022P003	RES 0.33 OHMS 5% 2W	1						
R24	19B209022P011	RES 0.68 OHMS 5% 2W		1					
R24	19B209022P021	RES 1.8 OHMS 5% 2W			1			1	
R24	19B209022P127	RES 3.3 OHMS 10% 2W				1			1
R25	0246A9105P123	RES. 12K OHM 1/4W 5% CRN	1	1	1	1	1	1	1

Figure 1 (PL-19D427383)
DC/DC Converter Parts List

ITEM NO.	IDENTIFICATION NUMBER	DESCRIPTION	GROUP NUMBER AND QUANTITY						
			1	2	3	5	6	7	
R26	0246A9105P513	RES 51K OHM 1/4W 5% CRN	1	1	1	1	1	1	
R27	0246A9105P103	RES 10K OHM 1/4W 5% CRN	1	1	1	1	1	1	
R28	0246A9105P512	RES 5.1K OHM 1/4W 5% CRN	1	1	1	1	1	1	
R29	0246A9102P101	RES 100 OHM .5W 5%	1	1	1	1	1	1	
R30	0246A9102P201	RES 200OHM .5W 5%	1	1	1	1	1	1	
R31	19A116479P2152K	RES 1.5KOHM 10% 2W FLPRF	1				1		
R31	19A116479P2153K	RES 15KOHM 10% 2W FLPRF			1		1		
R31	19A116479P2512K	RES 5.1KOHM 10% 2W FLPRF		1					
R31	19A116479P4303K	RES 30.0KOHM 10%4W FLPRF				1		1	
R32	19A116559P109	POT 250KOHM 1/2W LIN	1	1	1	1	1	1	
R42	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	
R43	0246A9105P103	RES 10K OHM 1/4W 5% CRN	1	1	1	1	1	1	
R44	19A116479P2131K	RES 1300HM 10% 2W FLPRF		1					
R44	19A116479P2331K	RES 3300HM 10% 2W FLPRF			1		1		
R44	19A116479P2680K	RES 68 OHM 2W 10%	1					1	
R44	19A116479P2681K	RES 6800HM 10% 2W FLPRF				1			
R45	19A116479P2131K	RES 1300HM 10% 2W FLPRF		1					
R45	19A116479P2331K	RES 3300HM 10% 2W FLPRF			1		1		
R45	19A116479P2680K	RES 68 OHM 2W 10%	1					1	
R45	19A116479P2681K	RES 6800HM 10% 2W FLPRF				1		1	
R46	0246A9105P103	RES 10K OHM 1/4W 5% CRN	1	1	1	1	1	1	
R47	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	
R48	0246A9134P1782	RES 17.8KOHM 1/4W 1% MTL	1	1	1	1	1	1	
R49	0246A9134P2432	RES 24.3KOHM 1/4W 1% MTL				1			
R49	0246A9134P2942	RES 29.4KOHM 1/4W 1% MTL	1				1	1	
R49	0246A9134P3242	RES 32.4KOHM 1/4W 1% MTL			1				
R49	0246A9134P3482	RES 34.8KOHM 1/4W 1% MTL		1					
R50	0246A9134P5112	RES 51.1KOHM 1/4W 1% MTL	1	1	1	1	1	1	
T1	19B229227G001	COIL	1						
T1	19B229227G002	COIL		1					
T1	19B229227G003	COIL			1				
T1	19B229227G010	COIL					1		
T1	19B229227G011	COIL						1	
T1	19B229227G014	COIL						1	
T2	19B221725G001	CHOKE	1	1	1	1	1	1	
U1	19A134097P302	INT. CKT CMOS BI	1	1	1	1	1	1	
U2	19A134097P323	INT CKT	1	1	1	1	1	1	
VR1	0246A9403P6R2	ZENER 6.2V 5% 400MW	1	1	1	1	1	1	

Figure 1 (PL-19D427383)
DC/DC Converter Parts List, continued

ITEM NO.	IDENTIFICATION NUMBER	DESCRIPTION	GROUP NUMBER AND QUANTITY						
			2	4	6	10	11	12	
	19D427468G002 REV#03	POWER SUPPLY							
	19D427468G004 REV#04	POWER SUPPLY							
	19D427468G006 REV#04	POWER SUPPLY PCB ASM							
	19D427468G010 REV#03	POWER SUPPLY							
	19D427468G011 REV#01	POWER SUPPLY PCB ASM							
	19D427468G012 REV#01	POWER SUPPLY							
A1	19D427383G001	DC-DC CONVERTER RV#B	1						
A2	19D427383G002	DC-DC CONVERTER RV#C		1					
A3	19D427383G003	DC-DC CONVERTER RV#C			1				
A3	19D427383G006	DC-DC CONVERTER						1	
A5	19D427383G005	DC-DC CONVERTER RV#C					1		
A5	19D427383G007	DC-DC CONVERTER							1
C51	0246A9028P682	CAP 6800PF CERAMIC RV#1	1	1	1	1	1	1	1
C52	0246A9028P682	CAP 6800PF CERAMIC RV#1	1	1	1	1	1	1	1
D51	0246A9418P206	LED GREEN	1	1	1	1	1	1	1
D53	0246A9427P350A	TRANSORB 300V					1		1
D53	0246A9427P5654A	TRANSORB 64V	1	1					
D53	0246A9427P5663A	TRANSORB 145V			1			1	
D54	0246A9407P5626	DIODE	1	1	1	1	1	1	1
F1	1R16P001	FUSE SIM/312.500					1		1
F1	1R16P003	FUSE SIM/312001 (1 A)			1			1	
F1	1R16P005	FUSE (2 A)		1					
F1	1R16P007	FUSE	1						
K51	19B209598P001	REL 24VDC 600 OHMS 10%	1	1	1	1	1	1	1
Q51	19A115300P002	TSTR NPN 60V 2N3053	1	1	1	1	1	1	1
R51	19A116479P2221K	RES 2200HM 10% 2W FLPRF	1	1	1	1	1	1	1
R52	0246A9103P131	RESISTOR	1	1	1	1	1	1	1
R53	0246A9105P102	RES 1K OHM 1/4W 5% CRN	1	1	1	1	1	1	1
R54	0246A9134P86R6	RES	1	1	1	1	1	1	1
R56	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	1
R57	0246A9134P1002	RES 10K OHM 1/4W 1% MTL	1	1	1	1	1	1	1
S1	0246A9987P001	SW DPST	1	1	1	1	1	1	1
VR51	0246A9403P6R2	ZENER 6.2V 5% 400MW	1	1	1	1	1	1	1

Figure 2 (PL-19D427468)
NS40A Power Supply Parts List

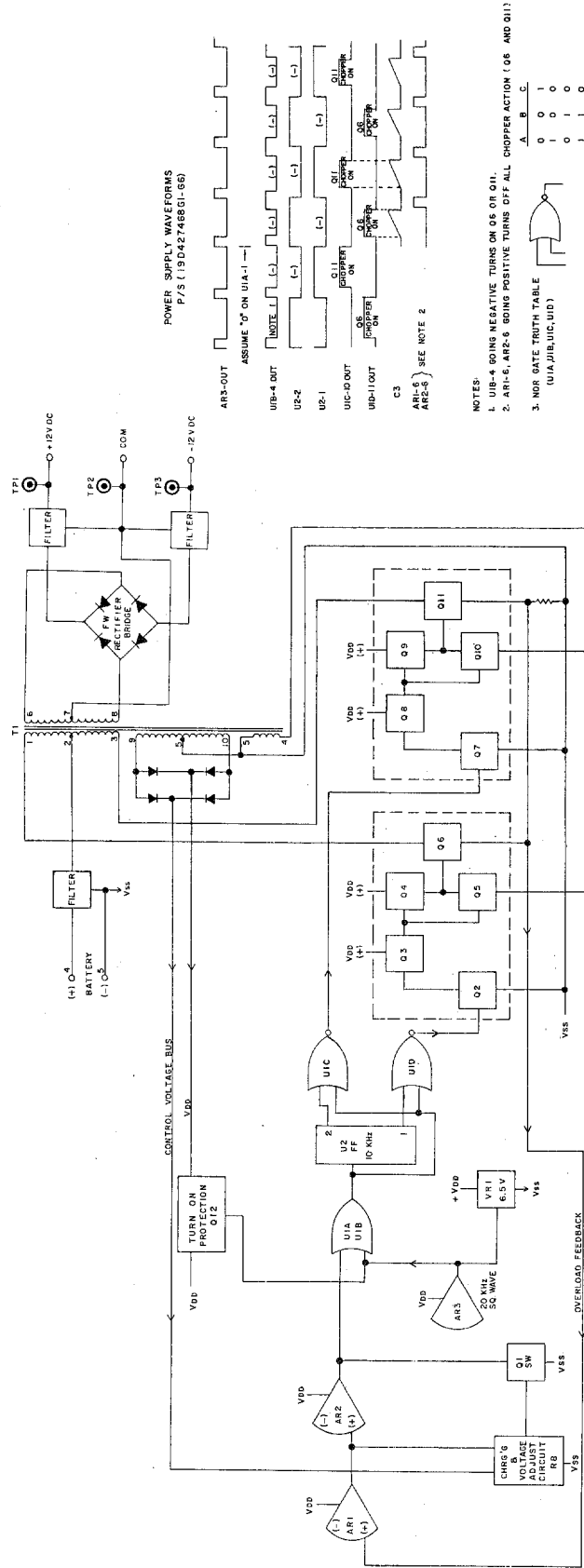
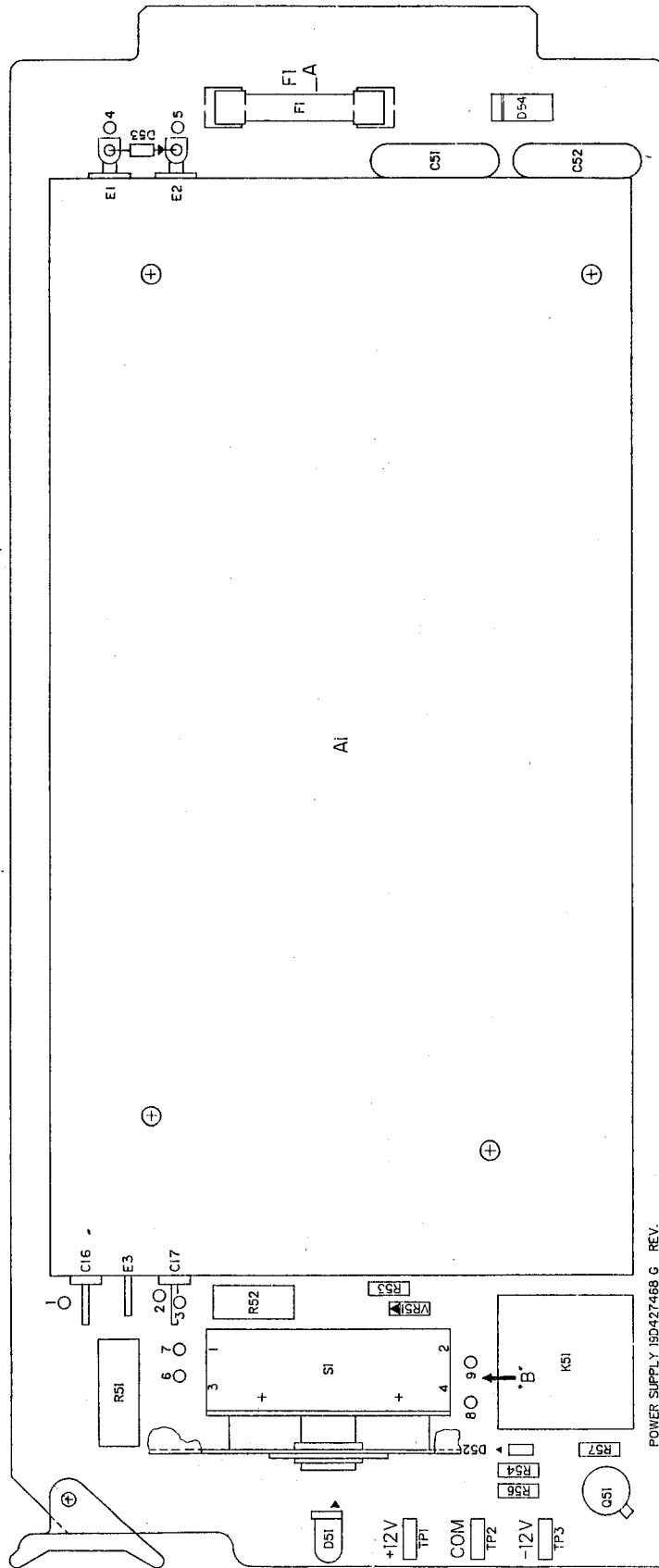


Figure 3 (19D434354 [1]) Functional Block Diagram
Type NS40A Power Supply



* Figure 4 (19D427468, Sh.2 [2]) Pictorial Diagram
Type NS40A Power Supply

* Revised since last issue

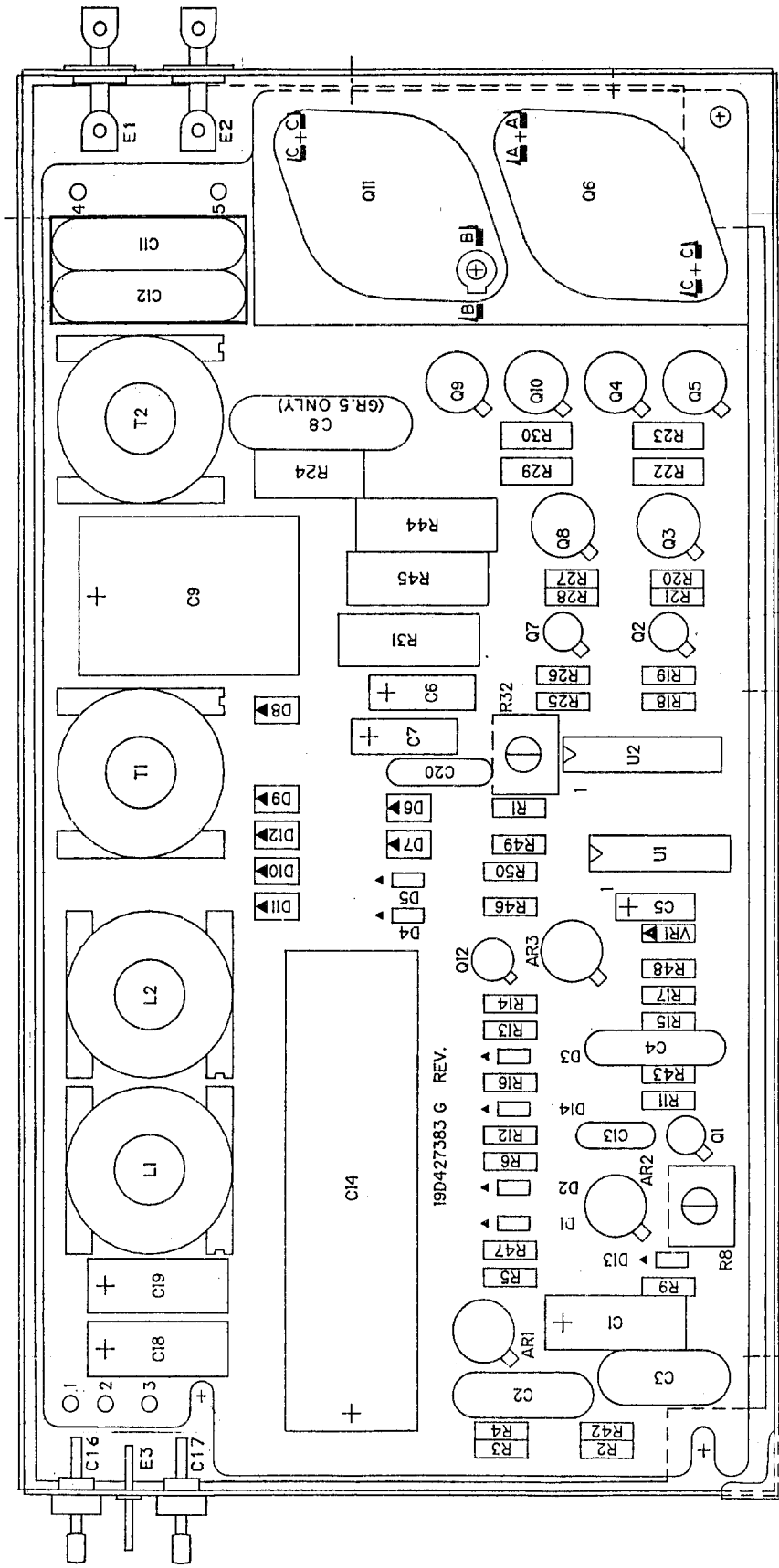
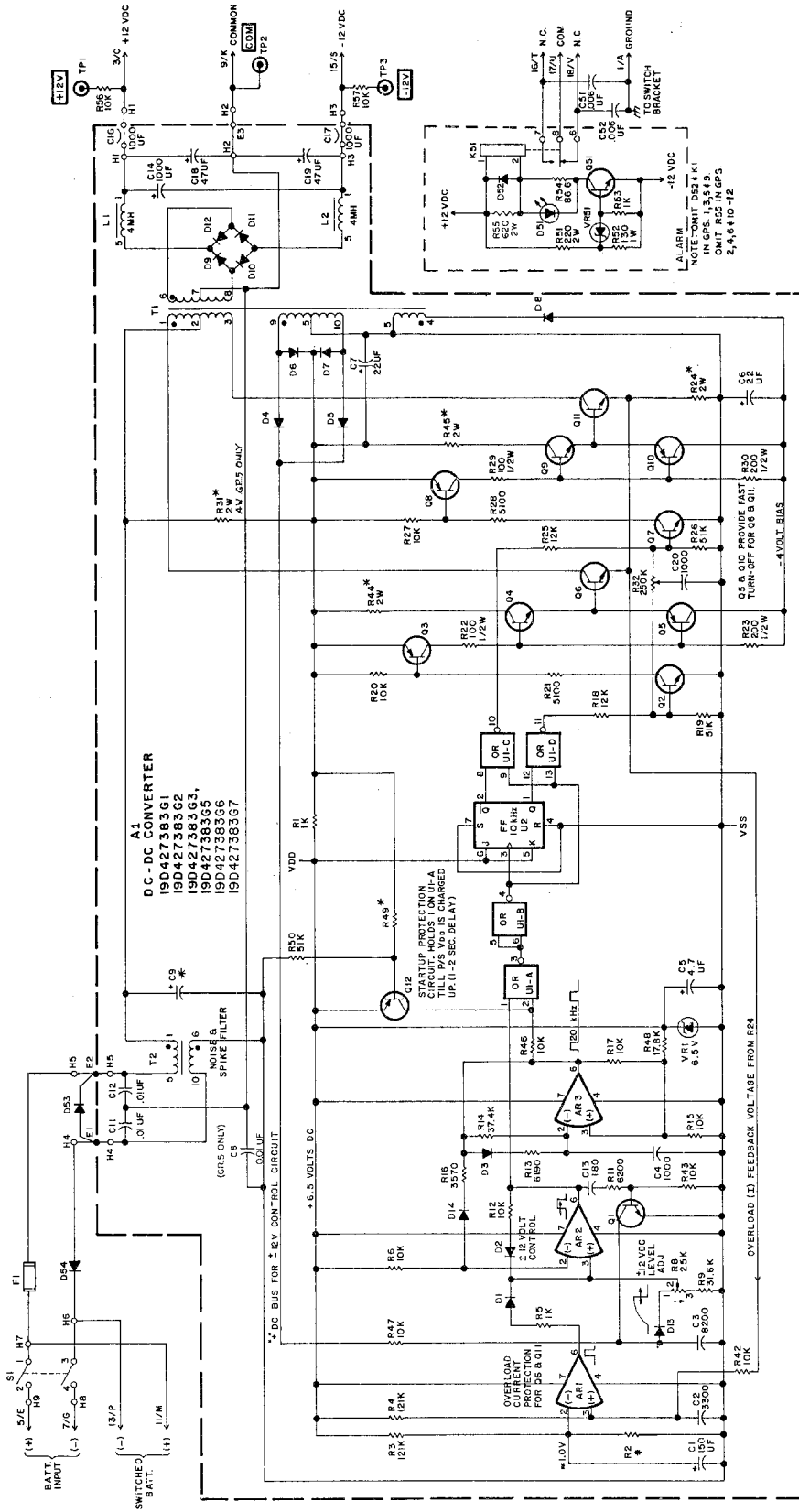


Figure 5 (19D427383 Sh.1 [13]) Pictorial Diagram
DC-DC Converter PL-19D427383G



ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED. CAPACITORS ARE IN MICROFARADS UNLESS FOLLOWED BY UF. MICROFARADS UNLESS FOLLOWED BY M. MILLIFARADS OR OTHERWISE SPECIFIED.

TYPE 40 POWER SUPPLY
 (24 VOLT) 19D427468 G1-G2,
 (48 VOLT) 19D427468 G3-G4,
 (125 VOLT) 19D427468 G5-G6,
 (100 VOLT) 19D427468 G7-G10,
 (220 VOLT) 19D427468 G11

UI PIN 7 - VSS
 UI PIN 8 - VSS
 UI PIN 9 - VDD

* A1 DC-DC CONVERTER	19D427383	R24	R31	R44	R45	R2	C3
INPUT GROUP	R45	R24	R31	R44	R45	R2	C3
24 VDC	1	29.4K	33	1500	68	221K	50UF
48 VDC	2	34.8K	68	5100	150	221K	50UF
110 VDC	3	32.4K	1.8	15K	330	221K	50UF
125 VDC	3	32.4K	1.8	15K	330	221K	50UF
220/250VDC	7/9	24.5K	33	30K	680	224K	47UF

Figure 6 (19D427526 [14]) Schematic Diagram Type 40 Power Supply PL-19D427468G