

**APPENDIX D**

**POWER/MATE CORP. POWER SUPPLIES**

**PARTS LISTS AND SCHEMATIC**

**TABLE OF CONTENTS**

<b>TITLE/MODEL NO.</b>	<b>DRAWING NO.</b>	<b>REV.</b>	<b>PAGE NO.</b>
Power Supplies ES-F Series	ES-5F/ES-12F  Ampex No. 570-570 and 570-554 Ref. LM 1464325		D-1
Schematic	ES-F Ampex No. 1386294		D-5





**SPECIFICATIONS**

**AC Input:** 85-to-132 or 170-to-264VAC, at 47-440Hz.

**DC Output:** See voltage and current rating chart.

**DC Output Adjustment:**  $\pm 10$  percent.

**Regulation:** Line,  $\pm 0.1$  percent, +1mV within the specified AC limits. Load,  $\pm 0.1$  percent, +1mV from no-load to full-load conditions.

**Noise and Ripple:** 50mV peak-to-peak maximum, 20Hz to 20MHz.

**Efficiency:** 70-to-80 percent.

**Transient Response:** Recovery to 1.0 percent in 300 microseconds for a 50-to-100 percent load change.

**Remote or Local Sensing:** A provision is included for improved overall regulation.

**Overload and Short-Circuit Protection:** Solid-state short-circuit protection is a standard feature. An automatic current-limiting circuit limits the output current which provides protection for the load and supply. Units cannot be damaged by prolonged short circuits.

**Overshoot:** No voltage spikes on turn-on, turn-off, or during power failure.

**Logic Inhibit Function:** A 4.5 to 5.5. VDC command signal, referenced to the negative terminal, (I+, I-) will inhibit the DC output. It may be used for control, squencing, or maintenance.

**Over-Voltage Protection:** Built-in, fixed.

**Energy-Storage Time:** The output voltage will remain within the regulation range for a minimum of 16 ms after the loss of AC power (from nominal line voltage).

**Polarity:** Positive, negative, or floating up to 300VDC.

**Soft Start:** Provides input current limiting at turn on.

**Parallel Operation:** Units may be paralleled for increased output current. Consult the factory for the proper procedures.

**Long-Term Stability:** 0.1 percent for 8 hours after a 20 minute warm up.

**Ambient Operating Temperature:** Continuous duty from 0 to +71°C, full rating from 0 to +50°C. Derate linearly to 60 percent of full

rating at +71°C.

**Storage Temperature:** -55°C to +85°C.

**Quality Control:** In accordance with MIL-I-45208.

**OPERATING INSTRUCTIONS**

**AC INPUT**

Normally, the unit is shipped for operation at an input of 115VAC. If a 230VAC input is desired, the selection is made on the PC board with a plug-in jumper. The jumper between the three input voltage-selection terminals A, B, and C (on the interior of the board behind the AC terminals) may be removed from between terminals A and B (115VAC) and placed across terminals A and C (230VAC) as shown in Fig. 1.

**SENSING TERMINALS**

For local sensing the supply can be used as delivered. For remote sensing, connect the load to the DC output terminals. Then wire the (+) and (-) sensing terminals respectively across the load. This permits sensing directly at the load. See Fig.2.

**VOLTAGE AND CURRENT ADJUSTMENTS**

The voltage adjustment (VR2) is a precision multi-turn potentiometer which is accessible from the terminal end of the unit. The current adjustment potentiometer is factory set and no further adjustment is required.

**COVERS**

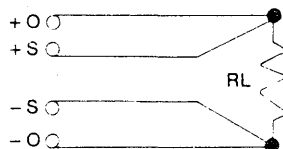
Covers for the ES units are included.

Power/Mate power supplies are designed for convection cooling, therefore, it's important not to impede the air flow across or through the power supply's case. Impeding the flow of air through your power supply may shorten its life. If there is doubt about the convection air flow through your Power/Mate supply's heat generating components, it's recommended that you use a small fan to insure satisfactory air flow.

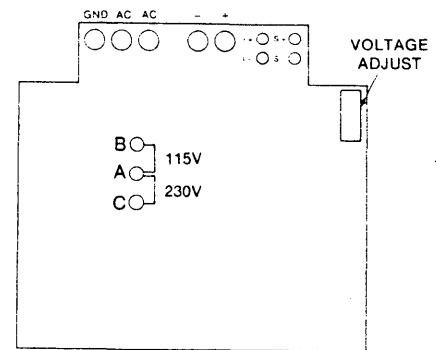
**CAUTION: High-voltage circuits present an electrical shock hazard. Do no handle the unit while it is operating.**

**ES-F Series**

MODEL	VOLTAGE	CURRENT
ES-5F	5 VOLTS	20 AMPS
ES-12F	12 VOLTS	10 AMPS
ES-15F	15 VOLTS	8 AMPS
ES-24F	24 VOLTS	5 AMPS
ES-28F	28 VOLTS	4 AMPS
ES-36F	36 VOLTS	3 AMPS



**FIG. 2**



**FIG. 1**

ELECTRICAL PARTS LIST  
ES-F-Series

SCH. REF.	PARTS #	5	12	15	24	28	36	DESCRIPTION
C1,9	CD147100	2	2	2	2	2	2	CAP. 470 PFD, 1KV
C2	CD182100	1	1	1	1	1	1	CAP. 820 PFD, 500V
C3	CT247500	1	1	1	1	1	1	CAP. 4.7 MFD, 35V
C4,13	CE211200	2	2	2	2	2	2	CAP. 210 MFD, 200V
C5,8	CD310200	2	2	2	2	2	2	CAP. 0.001 MFD, 500V
C6	CP447300	1	1	1	1	1	1	CAP. 0.047 MFD, 250V
C7	CP410300	1	1	1	1	1	1	CAP. 0.01 MFD, 250V
C10	CT915600	1	1	1	1	1	1	CAP. 15 MFD, 20V
C11,27	CP410400	2	2	2	2	2	2	CAP. 0.1 MFD, 200V
C12,14-16,18,19	CD310400	6	6	6	6	6	6	CAP. 0.01 MFD, 1KV
C17	CD133200	1	1	1	1	1	1	CAP. 0.0033 MFD, 1.6KV
C20,21	CE133263	2						CAP. 3300 MFD, 16V
C20,21	CE222025		2	2				CAP. 2200 MFD, 25V
C20,21	CE102063				2	2	2	CAP. 1000 MFD, 50V
C25	CD322500	1	1	1	1	1	1	CAP. 2.2 MFD, 25V
C26	CP247400	1	1	1	1	1	1	CAP. 0.47 MFD, 250V
C28	CE102063	1	1	1	1	1	1	CAP. 1000 MFD, 50V
CR1-6,17	DR065000	7	7	7	7	7	7	DIODE 1N4936
CR7	DR075000	1	1	1	1	1	1	BRIDGE 400
CR8,9	DR074000	2						DIODE 30A, 45V
CR8,9	DR076000		2	2	2	2	2	DIODE 1N3891
CR10-14	DR003000	5	5	5	5	5	5	DIODE 1 AMP, 200V
CR15	WI221000	1	1	1		1		22 GA BUSSBAR
CR15	DZ209000				1			DIODE 1N4744A
CR15	DZ210000						1	DIODE 1N4751A
CR16	DS064000	1	1	1	1	1	1	SCR 3A
CR19	DR042000	1	1	1	1	1	1	DIODE 1N4148
CR20	DZ203500	1						DIODE 500 MW, 5.6V
CR20	DZ238000		1					DIODE 1N4743
CR20	DZ214000			1				DIODE 1N4746A
CR20	DZ208000				1		1	DIODE 1N4743A
CR20	DZ210000					1		DIODE 1N4751A
CR21	WI221000	1	1	1	1	1	1	22 GA BUSSBAR
F1	WI341000	1	1	1	1	1	1	34 GA BUSS WIRE
L1	TA2890600	1	1	1	1	1	1	IND
L2	TA2884801	1						IND
L2	TA2884802		1					IND
L2	TA2884803			1				IND
L2	TA2884804				1			IND
L2	TA2884805					1		IND
L2	TA2884806						1	IND
Q1,2	QS048000	2	2	2	2	2	2	XTOR 2N2905A
Q3,4	QP001800	2	2	2	2	2	2	XTOR 66709
R1,2,13,28,29	RC210100	5	5	5	5	5	5	RES 100 OHMS, 1/2W, 10%
R3,4	RC206800	2	2	2	2	2	2	RES 6.8 OHMS, 1/2W, 5%
R5,6	RC222000	2	2	2	2	2	2	RES 22 OHMS, 1/2W, 10%
R7	RE210200	1	1	1	1	1	1	RES 1K OHMS, 10%
R8	RC324902	1	1	1	1	1	1	RES 24.9K OHMS, 1/2W, 1%
R9	RC346402	1	1	1	1	1	1	RES 46.4K OHMS, 1/2W, 1%
R10	RC310003	1	1	1	1	1	1	RES 100K OHMS, 1/2W, 1%
R11,14	RC210400	2	2	2	2	2	2	RES 100K OHMS, 1/2W, 10%
R12	RC315100	1						RES 150 OHMS, 1/2W, 1%
R12	RC247000		1					RES 47 OHMS, 1/2W, 10%

ELECTRICAL PARTS LIST  
ES-F-Series

SCH. REF.	PARTS #	5	12	15	24	28	36	DESCRIPTION
R12	RC215000			1	1	1		RES 15 OHMS, $\frac{1}{2}W$ , 10%
R12	RC206800						1	RES 6.8 OHMS, $\frac{1}{2}W$ , 5%
R15	RC334800	1						RES 3.48K OHMS, $\frac{1}{2}W$ , 1%
R15,27	RC315002		2					RES 15K OHMS, $\frac{1}{2}W$ , 1%
R15	RC321502			1				RES 21.5K OHMS, $\frac{1}{2}W$ , 1%
R15	RC335700				1			RES 35.7K OHMS, $\frac{1}{2}W$ , 1%
R15	RC343202					1		RES 43.2K OHMS, $\frac{1}{2}W$ , 1%
R15	RC359000						1	RES 59K OHMS, $\frac{1}{2}W$ , 1%
R16	RC351101	1	1	1	1	1	1	RES 5.11K OHMS, $\frac{1}{2}W$ , 1%
R17	RC227400	1		1	1	1	1	RES 270K OHMS, $\frac{1}{2}W$ , 1%
R17	RC247400		1					RES 470K OHMS, $\frac{1}{2}W$ , 1%
R18,19	RC310200	2	2	2	2	2	2	RES 1K OHMS, $\frac{1}{2}W$ , 1%
R20	RE222000	1						RES 22 OHMS, 5%
R20	RE212100		1					RES 120 OHMS, 10%
R20	RC247000			1				RES 47 OHMS, $\frac{1}{2}W$ , 10%
R20	RF239100				1			RES 390 OHMS, 3W, 5%
R20	RE247100					1		RES 470 OHMS, 2W, 5%
R20	RE210200						1	RES 1K OHMS, 10%
R21,22	RC212400	2	2	2	2	2	2	RES 120K OHMS, $\frac{1}{2}W$ , 1%
R23	RF247000	1	1	1	1	1	1	RES 47 OHMS, 3W, 5%
R24,25	RE203000	2						RES 3 OHMS, 5%
R24,25	RE210000		2	2				RES 10 OHMS, 10%
R24,25	RE215000				2	2		RES 15 OHMS, 5%
R24,25	RF222000						2	RES 22 OHMS, 5%
R27	RC610300	1						RES 10K OHMS, $\frac{1}{2}W$ , 1%
R27	RC335700			1				RES 35.7K OHMS, $\frac{1}{2}W$ , 1%
R27	RC327402				1		1	RES 27.4K OHMS, $\frac{1}{2}W$ , 1%
R27	RC321502					1		RES 21.5K OHMS, $\frac{1}{2}W$ , 1%
R30	RC247000	1						RES 47 OHMS, $\frac{1}{2}W$ , 10%
R30	RC220100		1	1	1	1	1	RES 200 OHMS, $\frac{1}{2}W$ , 5%
R31	RC215100	1	1	1	1	1	1	RES 150 OHMS, $\frac{1}{2}W$ , 10%
R32	RC222100	1	1	1	1	1	1	RES 220 OHMS, $\frac{1}{2}W$ , 10%
R34	RC210400	1						RES 100K OHMS, $\frac{1}{2}W$ , 1%
R34	RC222400		1					RES 220K OHMS, $\frac{1}{2}W$ , 1%
R34	RC227400			1				RES 270K OHMS, $\frac{1}{2}W$ , 1%
R34	RC247400				1			RES 470K OHMS, $\frac{1}{2}W$ , 1%
R34	RC256400					1		RES 560K OHMS, $\frac{1}{2}W$ , 1%
R34	RC268400						1	RES 680K OHMS, $\frac{1}{2}W$ , 1%
R35,36	RC220100	2	2	2	2	2	2	RES 200 OHMS, $\frac{1}{2}W$ , 5%
R38	PF705020	1						POT. 5K OHMS
R38	PF701030		1	1				POT. 10K OHMS
R38	PF702030				1	1	1	POT. 20K OHMS
R39	PF850100	1	1	1	1	1	1	POT. 500 OHMS
T1,2	TA3031000	2	2	2	2	2	2	TRANSFORMER
T3	TA2884901	1						TRANSFORMER
T3	TA2884902		1					TRANSFORMER
T3	TA2884903			1				TRANSFORMER
T3	TA2884904				1			TRANSFORMER
T3	TA2884905					1		TRANSFORMER
T3	TA2884906						1	TRANSFORMER
T4	TA2884600	1	1	1	1	1	1	TRANSFORMER
TH1	MI351700	1	1	1	1	1	1	THERMISTOR
U1	QI026600	1	1	1	1	1	1	IC UPC1042C
U2	QI026400	1	1	1	1	1	1	



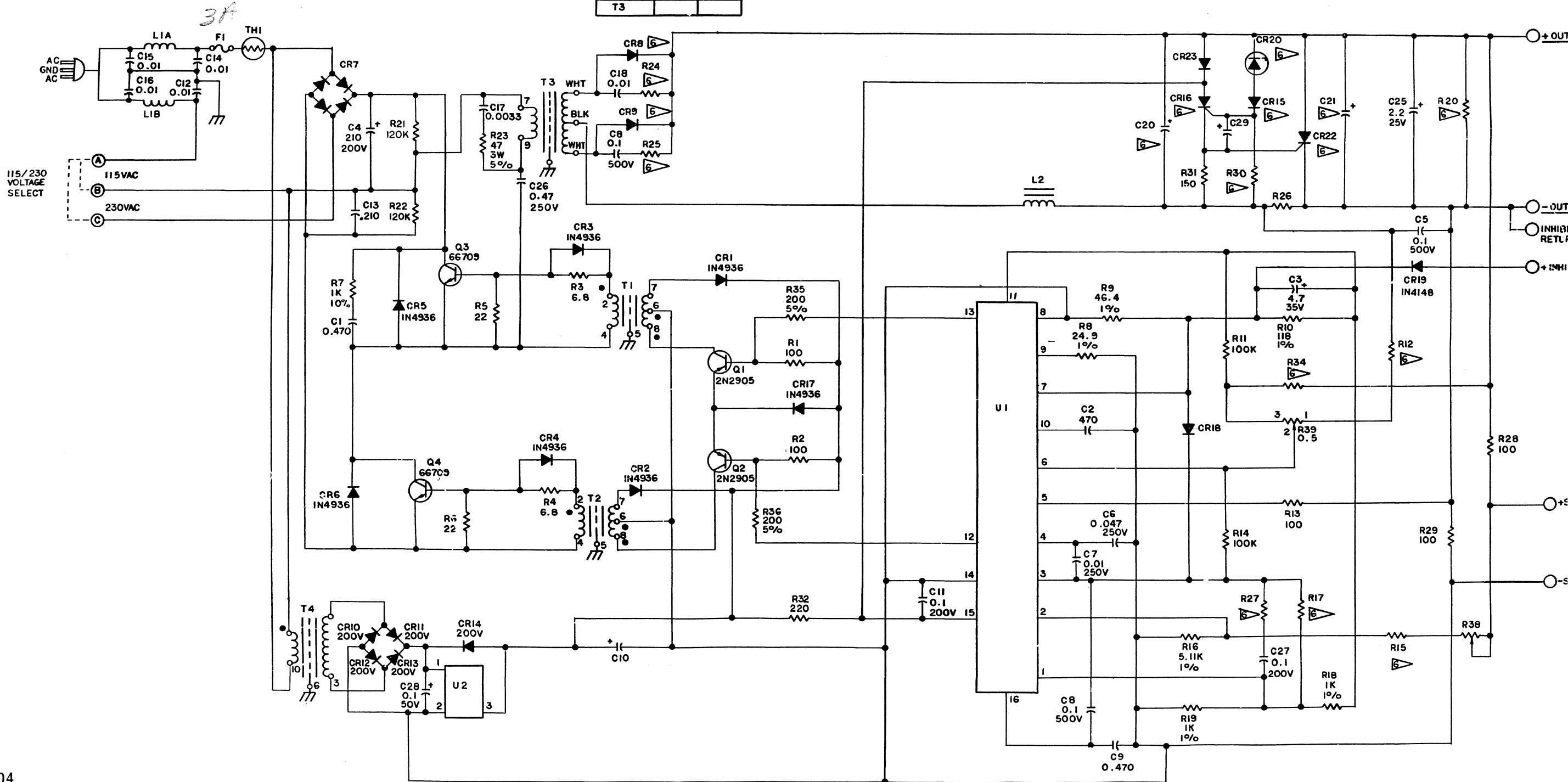
NOTES : UNLESS OTHERWISE SPECIFIED

- 1. RESISTANCE VALUES ARE IN OHMS, 1/2W, 10%.
- 2. CAPACITANCE ARE IN MICROFARADS.
- 3. INDUCTANCE VALUES ARE IN MICROHENRIES.
- 4. NPN TRANSISTORS ARE MPS6514.
- 5. PNP TRANSISTORS ARE MPS6518.
- 6. FOR VALUES SEE COMPONENT CHART.

REFERENCE DESIGNATIONS	
LAST USED	NOT USED
C28	C22,23,24
CR21	CR18,21
F1	
L2	
Q4	
R38	R26,33,37
RT1	
T4	
U2	

COMPONENT CHART		
	5V	12V
C20,21	3300	2200
CR8,9	30 A 45V	IN3891
CR15		IN758
CR20	500MW 5.6V	IN749
L2		
R12	150	47
R15	3.48K	15K
R17	270K	470K
R20	22	120
R24		
R25	3	10
R27	10K	15K
R30	47	200
R34	100K	220K
R38	5K	10K
T3		

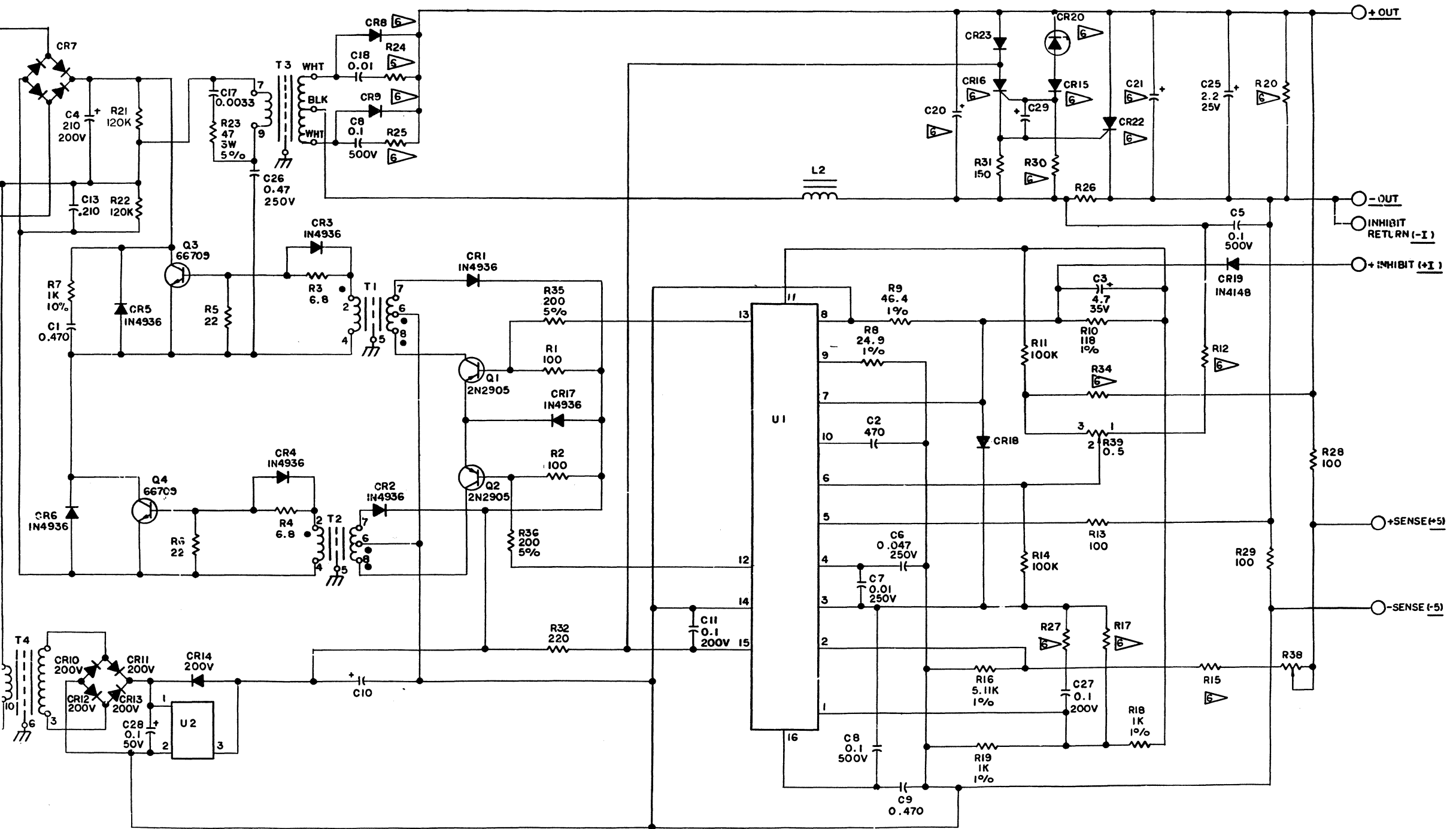
IC LIST														
REFERENC DESIGNATION	VENDOR P/N	AMPEX P/N	GND PIN			POWER PINS								
			A	D	E	+5VA	+5VD	-5V	+12VA	+12VD	-12VA	-12VD		
U1														
U2														



REFERENCE DESIGNATIONS	
LAST USED	NOT USED
C28	C22, 23, 24
CR21	CR18, 21
F1	
L2	
Q4	
R38	R26, 33, 37
RT1	
T4	
U2	

COMPONENT CHART		
	5V	12V
C20, 21	3300	2200
CR8, 9	30 A 45V	IN3891
CR15		IN758
CR20	500MW 5.6V	IN749
L2		
R12	150	47
R15	3.48K	15K
R17	270K	470K
R20	22	120
R24	3	10
R25		
R27	10K	15K
R30	47	200
R34	100K	220K
R38	5K	10K
T3		

IC LIST													
REFERENC DESIGNATION	VENDOR P/N	AMPEX P/N	GND PIN			POWER PINS							
			A	D	E	+5VA	+5VD	-5V	+12VA	+12VD	-12VA	-12VD	
U1													
U2													



Schematic No. 1386294—  
5V/12V Power Supply  
REF. 570-570/570-554