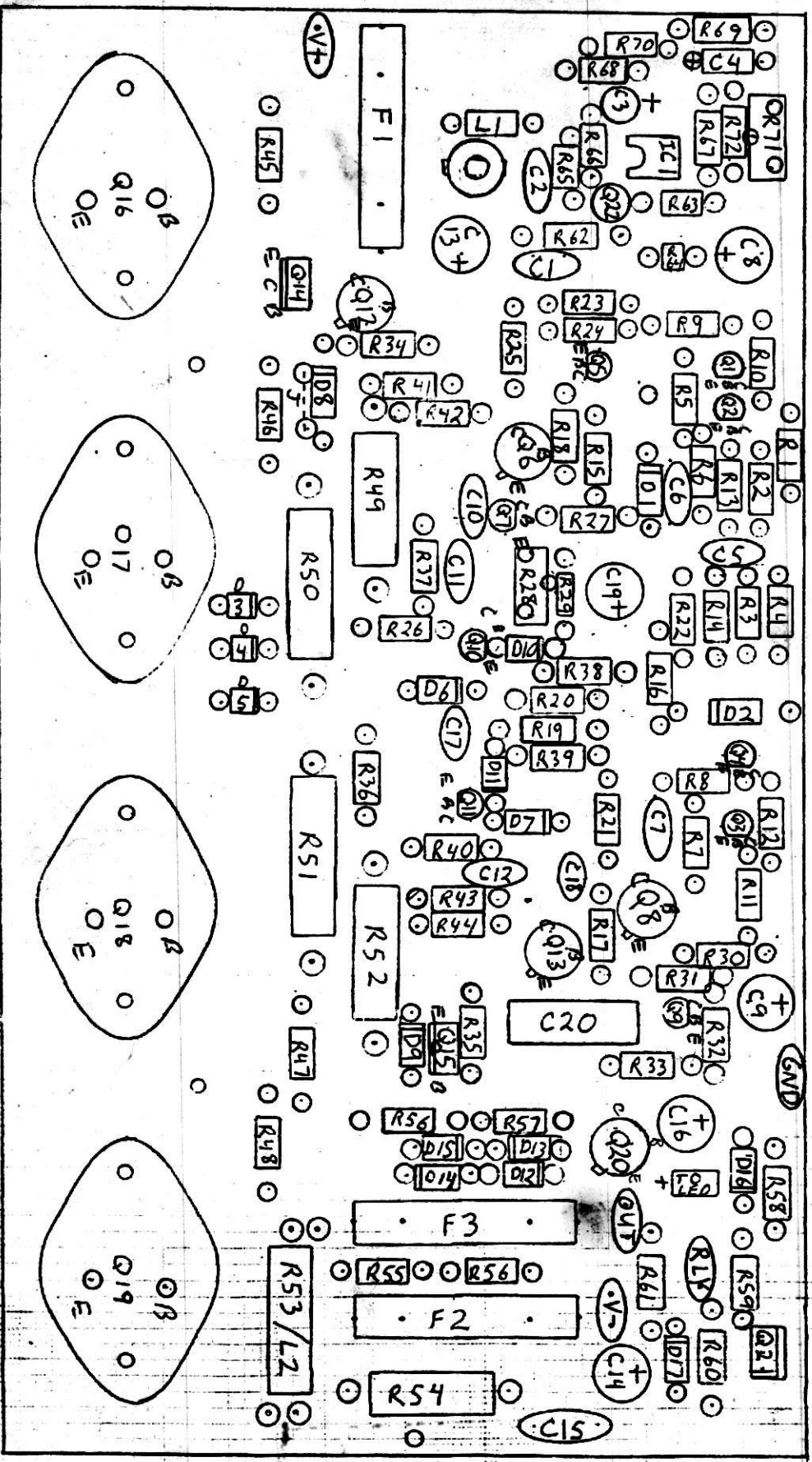
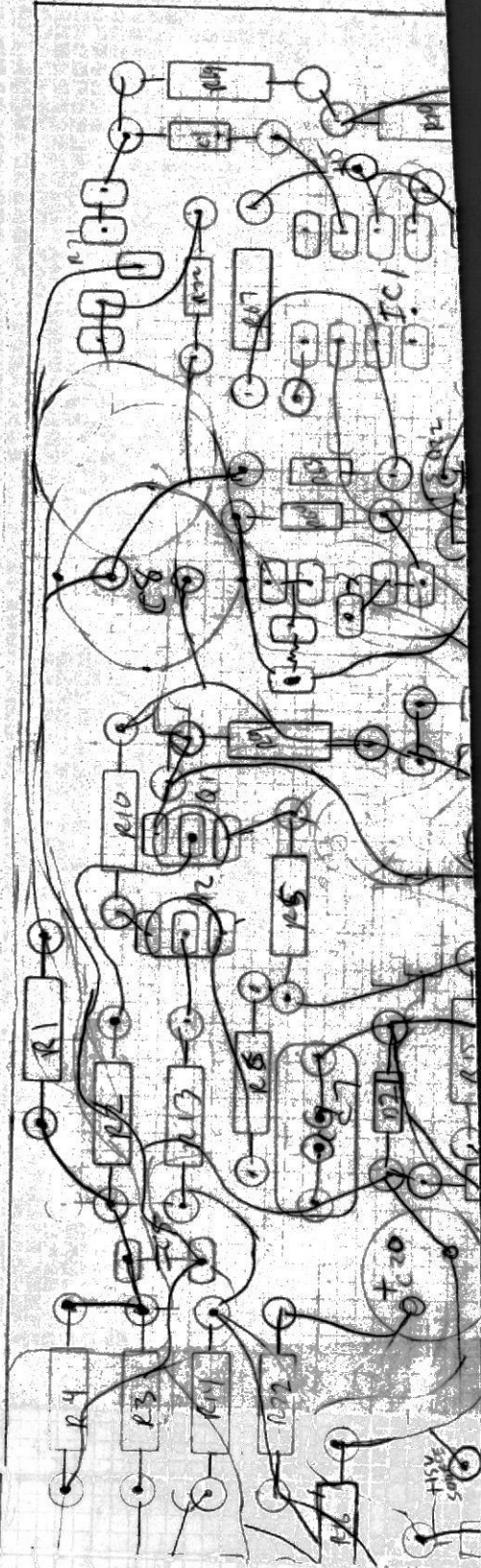
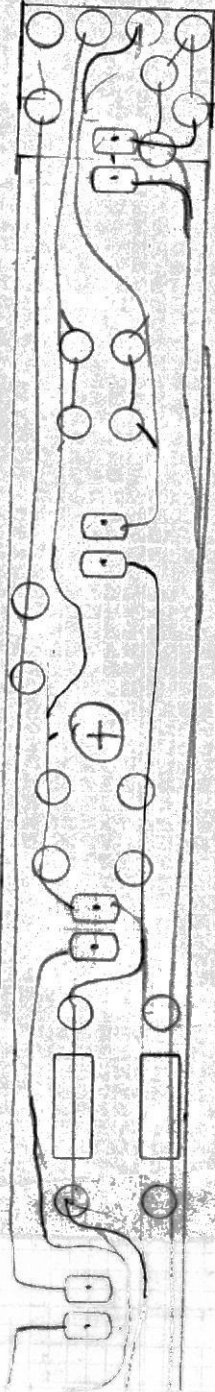
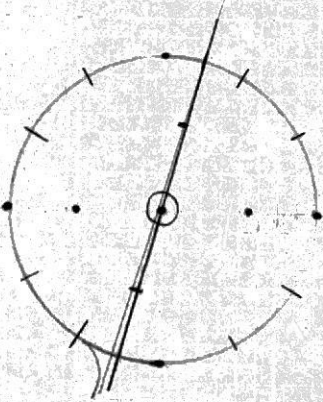


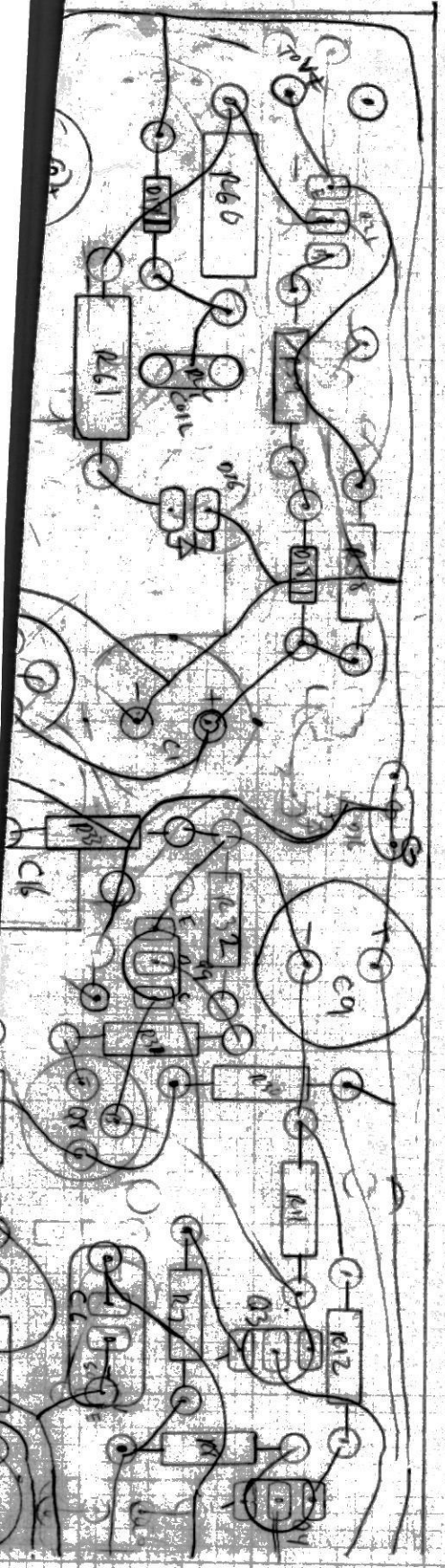
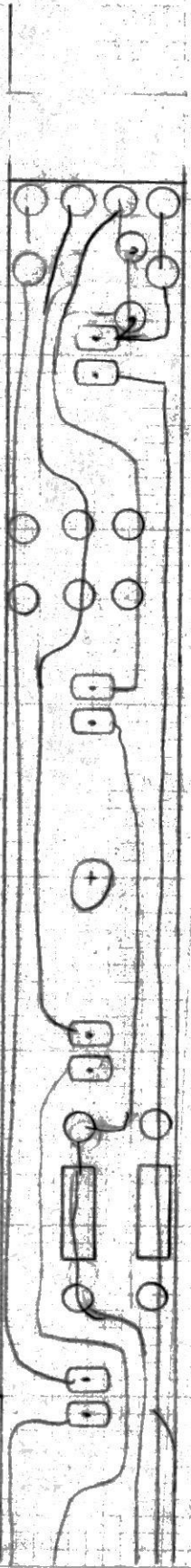
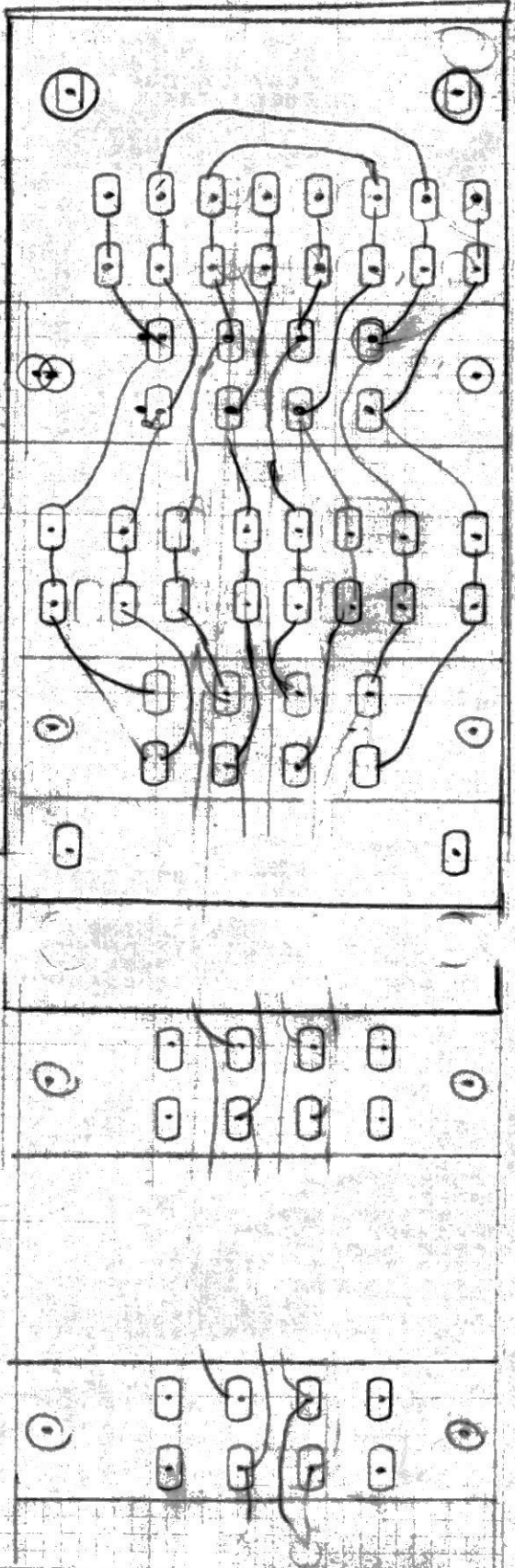
Q1, Q2 - MATCUBO T 102  
 Q3, Q4 - MATCUBO T 102

UPA-2 AMP PARTS LAYOUT

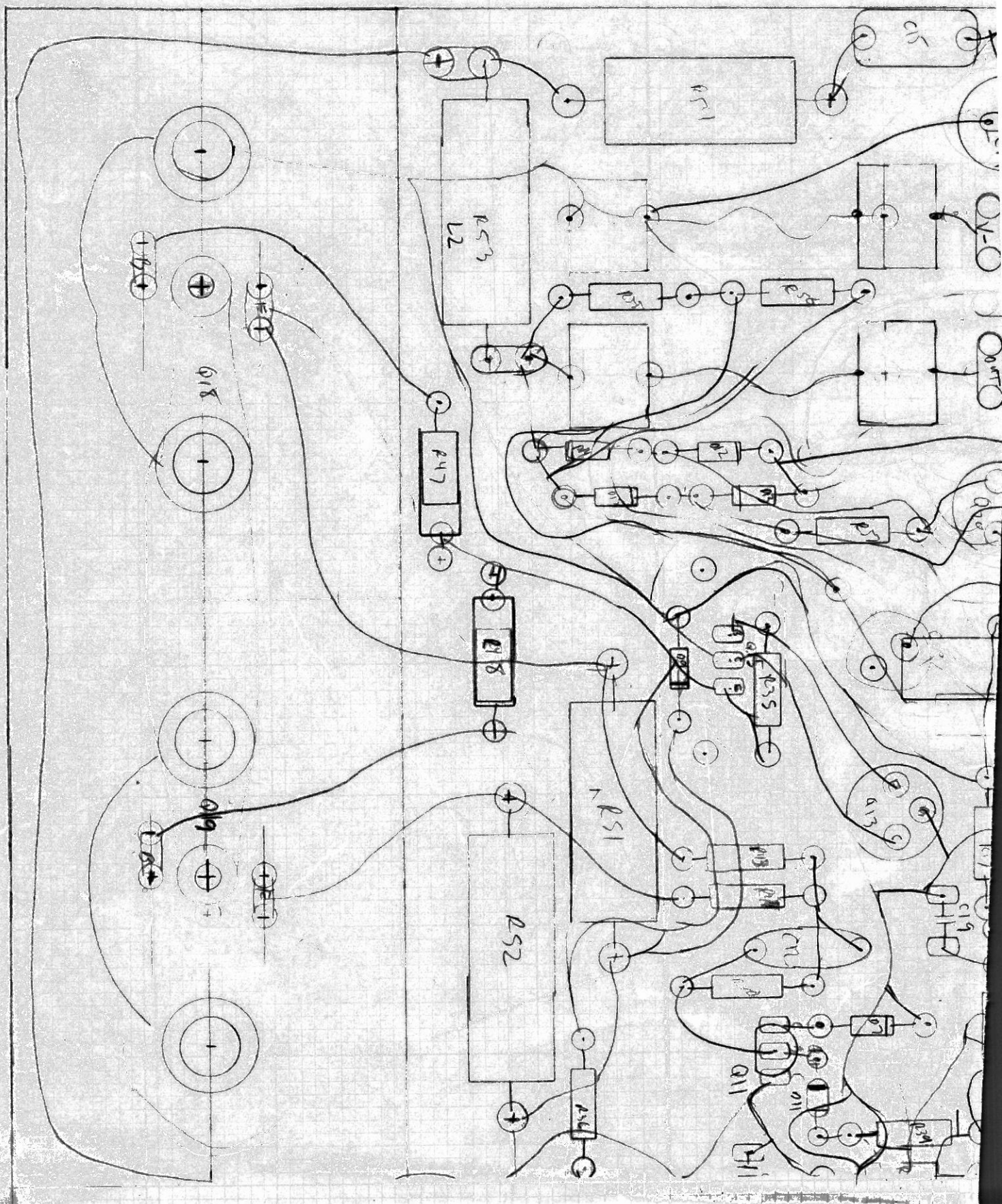




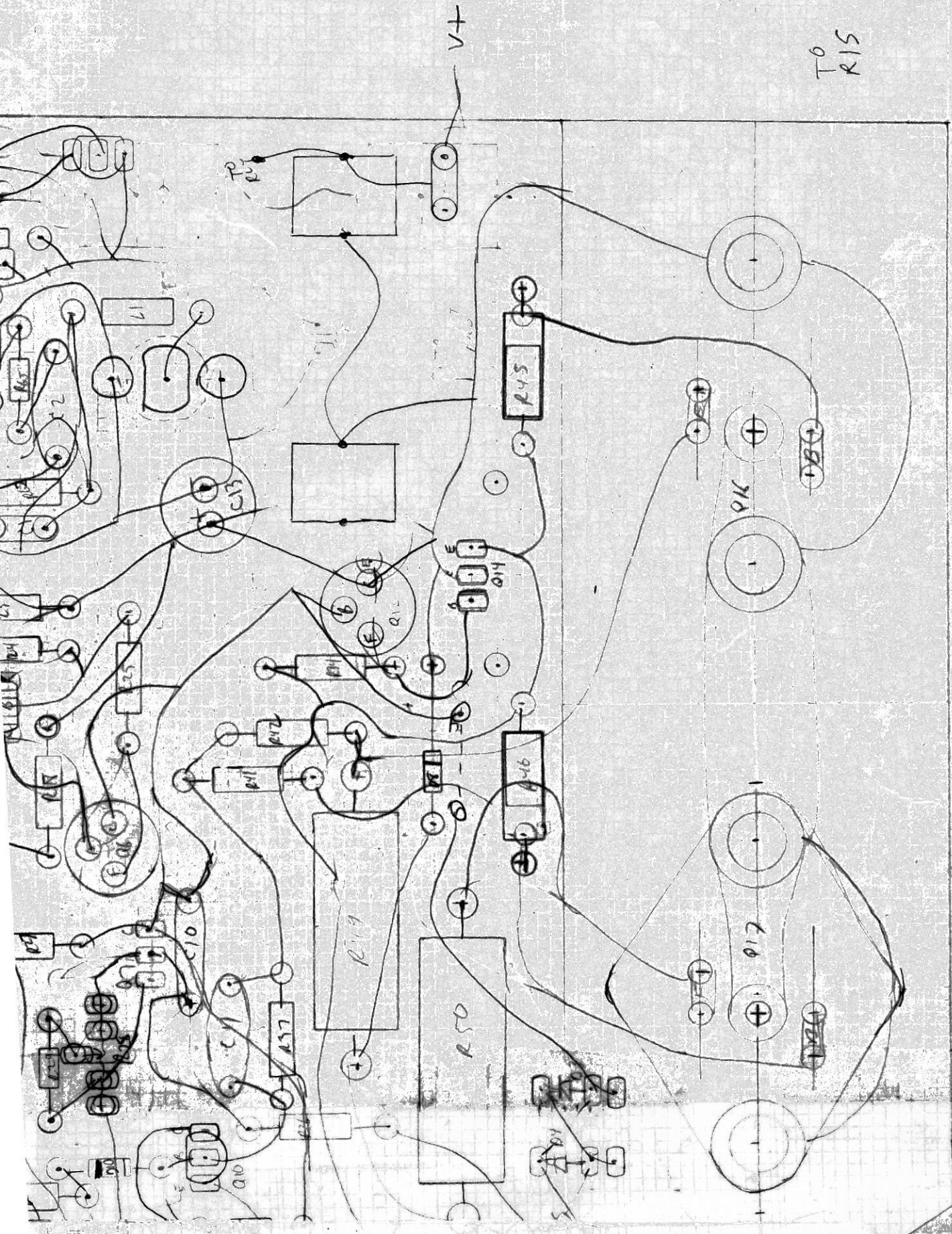
Relay PCB



14  
20V  
300V



T0  
R15



DATE	TITLE	#	NAME	MODEL	SERIAL	IN	OUT
2NS081	N.S.	.14	20V .15A .31W 2db LN AMP				
2SA443	PS	.32	AFLN AMP 50V .15A .4W 2db				
2SA777	PS	.21	L.N. PRE AMP 60V .1A .25W				
2SA929	PS	.28	L.N. 55V 50mA 200mW $\beta = 960 \text{ mK}$				
2SC458	NS	.13	30V .1A .2W 230MHZ				
2SC536	NS	.15	40V .1A .2W 100MHZ				
2SC644	NS	.19	LN AMP 30V 50mA .15W 160MHZ				
2SC732	NS	.27	LN .60V 150mA .3W $\beta = 70 \text{ T}$				
2SC879	NS	.15	LN 50V 50mA .25W N.F. = 2.5db				
2SC869	NS	.26	160V .03A .2W 280mS				
2SC930	NS	.16	30V .03A .25W 300MHZ				
2SC945	NS	.15	L.N. HE B 60V .1A .25W				
2SC115	NS	.17	L.N. 50V .15A .4W N.F. 10db				
2SC184	NS	.33	L.N. 120V .05A .5W				
2SC2362	NS	.23	LN 120V .05A .4W $\beta = 575$				
2SC2458	N.S.	.31	LN. 50V .15A .2W N.F. = 1db 90MHZ				
MPSA06	N.S.	.30	80V .15A .6W 100MHZ				
MPSA55	PS	.28	60V .15A .625W $\beta = 50$				
MPSA56	PS	.32	80V .15A .625W $\beta = 50$				
2N3645	PS	.16	60V .15A .3W				
2N4444	NS	.20	80V .15A .2W 200MHZ				
2SA561	PS	.33	70V .15A .3W $\beta = 70 \text{ T}$				
2SA1015	PS	.120	LN 50V .15A .4W N.F. 10db				
2SA1016	PS	.128	LN. 120V .05A .4W				
2SE1344	NS	.19	LN AMP 30V .1A .2W 1db				

## OFFSET RELAY OPTION

## Resistors

OR	1	R60	.6"
5K6 $\frac{1}{2}$ W	1	R55	.5"
10K $\frac{1}{2}$ W	2	R56,57	.5"
30K $\frac{1}{2}$ W	1	R59	.5"
91-100K $\frac{1}{2}$ W	1	R58	.5"

## Capacitors

22C50	1	C16	.2"
47C50NP	1	C20	.25" or 1.1"

## Diodes

1N4148	4	D12,13,14,15	.4"
6.2V .4W Zener	1	D16	.4"
1N4002	1	D17	.4"

## Transistors

2N3568	1	Q20	MPSA06
2N3645	1	Q21	MPSA56

## Hardware

Tabs	4	Keystone 1287	
Relay Board	1	Custom	
Relay	2	Stock	
Relay Socket	2	Stock	

## LIMITER OPTION

## Resistors

1K2 $\frac{1}{2}$ W	1	R63	.4"
3K9 $\frac{1}{2}$ W	1	R64	.4"
6K8 $\frac{1}{2}$ W	1	R72	.4"
10K $\frac{1}{2}$ W	1	R70	.5"
10K Trimmer	1	R71	Vertical
30K $\frac{1}{2}$ W	1	R69	.5"
68K $\frac{1}{2}$ W	1	R67	.5"
120K $\frac{1}{2}$ W	1	R62	.5"
1M0 $\frac{1}{2}$ W	3	R65,66,68	.4"

## Capacitors

220p 50V	1	C1	.2"
100n	1	C2	.4"
2.2C16	1	C3	.2"
4.7C16	1	C4	.4"

## Transistors

2N3904	1	Q23	2N4401
2N4360	1	Q22	2N3820
I.C. TL071	1	I.C.1	

DATE	TIME #	NAME	MODEL	FREQUENCY	IN	OUT
2N4929	.84	150V 50mA 1W	T0-5	100MHz		
2N5401	.32	160V 600mA 350mW	T0-92			
2N5416	1.72	350V 1A 1W	T0-39	15MHz		
2SA606	1.60	100V 70mA 5W	T0-5	75MHz		
2SA794	.61	100V 500mA 5W		120MHz		
2SA814	1.07	120V 1A 15W		30MHz		
2SA815	1.00	160V 1A 15W		30MHz		
2SA850	.56	100V .5A 8W				
2SA899	.52	150V 50mA 10W				
2SA913	1.10	150V 1A 15W		120MHz		
2SA914	.74	150V 50mA 5W		200MHz		
2SA915	.66	120V 50mA 5W		80MHz		
2SA916	.69	160V 50mA 5W		80MHz		
2SA939	.72	250V 50mA 5W		100MHz		
2SA940	1.25	150V 1.5A 25W		4MHz		
2SA957	2.12	150V 2A 30W		20MHz		
2SA964A	1.16	200V 200mA 10W		100MHz		
2SA968	1.20	160V 1.5A 25W		B-70-240		
2SA1006	2.01	180V 1.5A 25W		80MHz		
2SA1011	1.01	180V 1.5A 25W		80MHz		
2SA1144	.86	150V 50mA 10W		200MHz		
2SA1145	.59	150V 50mA 5W		200MHz		
2SA1173	.40	140V 50mA 2W		80MHz		
2SB527	.71	110V 800mA 10W		B=100	MP3A06 core	
2SB528	.69	130V 800mA 10W		B=100		
2SB536	1.14	130V 1.5A 20W		40MHz		
2SB537	1.14	130V 1.5A 20W		40MHz		
2SB546A	1.53	206V 7A 25W		8MHz		
2SB548	.92	100V 800mA 10W		70MHz		
2SB549	.78	100V 800mA 10W		70MHz		
2SB560	.44	100V 700mA 5W		60MHz		
2SB568	1.25	200V 2A 30W		30MHz		
2SB628	1.25	160V 1.5A 20W		40MHz		
2SB631	.59	100V 1A 8W		B=60-320		
2SB633	1.39	100V 6A 4W		B=40-320		



2SB647A	.49	120V	1A	.9W
2SB648	.64	170V	50mA	1W
2SB649	<del>2.71</del>	180V	1.5A	10W
2SB649A	.87	180V	1.5A	20W
2SB703	.95	100V	4A	40W
2SB720	1.01	200V	2A	25W
MJE350	1.10	300V	.5A	
MPS457	1.10	100V	2A	10W

140MHz

$\beta = 60-320$

140MHz

240MHz  $\beta = 60-90$

18MHz

100MHz

10MHz

50MHz

DATE	TIME	NAME	MODEL	POWER
2N2243	.60	120V 250mA 800mW		
2N3440	1.18	300V 1A 10W	TO-39	15MHZ
2N5320	1.68	100V 2A 10W	TO-5	50MHZ
2N5681	1.48	100V 1A 1W	TO-39	30MHZ
2N6474	.95	130V 4A 40W		4MHZ
2N6558	1.40	300V 500mA 10W		75MHZ
25C489	1.65	100V 3A 16W		10MHZ
25C960	1.14	120V 70mA 5W		100MHZ
25C1124	1.14	140V 1A 10W		120MHZ
✓ 25C1226A	<del>.89</del>	300V 150mA 20W		
25C1475	.93	100V 1A 5W		80MHZ
25C1505	.71	300V .2A 15W		80MHZ TO-220
25C1507	.86	300V .2A 15W		80MHZ
25E1514	.86	300V .1A 10W		80MHZ
25C1520	.88	250V .2A 10W		
25C1566	.91	250V .1A 4W		100MHZ
✓ 25C1567	.47	100V .3A 10W		120MHZ TO126
25C1569	.64	300V 150mA 12.5W		160MHZ
25C1624	.86	120V 1A 15W		30MHZ
25C1625	.95	100V 1A 15W		30MHZ
25C1669	1.14	150V 1.5A 25W		6MHZ
25C1722	1.20	330V .2A 13W		80MHZ
25C1728	<del>1.98</del>	100V 1A .45W		80MHZ
25C1735	.46	100V .5A .8W		130MHZ
25C1755	.95	300V .2A 15W		80MHZ
25C1756	.88	300V .2A 15W		80MHZ
25C1760	1.11	100V 1A .95W		80MHZ
25C1819	<del>1.98</del>	300V .1A 15W		
25C1827	1.25	100V 4A 30W		β = 100 10MHZ
25C1904	.73	150V 50mA 5W		130MHZ
25C1913	.98	150V 1A 15W		120MHZ
25C1929	1.39	300V .4A 25W		80MHZ
25C1946	.61	120V 50mA 5W		120MHZ
25C1941	.64	160V 50mA 5W		120MHZ
25C1953	.64	150V .1A 5W		β450 30MHZ

25C2224A	.98	200V	1.2A	10W	100MHz	
25C2235	.70	120V	.8A	5W	120MHz	
25C2238	1.16	160V	1.5A	25W	$\beta = 70$	
25C2271	<del>.46</del> .43	300V	1A	5W	90MHz	
25C2344	1.07	180V	1.5A	25W	100MHz	
25C2456	.83	300V	.1A	10W	75MHz	
25C2482	.51	300V	.1A	5W	75MHz	
✓ 25C2590	.63 <del>.68</del>	120V	.5A	15W	250MHz	T0126 ←
25D357	.86	110V	.8A	10W	$\beta = 100$	
25D358	.91	130V	.8A	10W	$\beta = 100$	
25D386	1.11	200V	2A	25W	$\beta = 320$	
25D414	.78	120V	.8A	10W	$\beta = 90$	<del>45</del> MHz
25D438	.42	100V	1.7A	5W	80MHz	
25D560	1.48	150V	5A	30W		
25D600	.117 <del>.51</del>	100V	1A	8W	$\beta = 60-320$	← T0126
25D666A	.27	120V	50mA	.9W	$\beta = 60-320$	
25D667A	.46	120V	1A	.9W	140MHz	
25D669A	.86	180V	1.5A	20W	140MHz	$\beta = 90$
25D781	.66 <del>.72</del>	150V	2A	10W		← T0220
25D974	.57	120V	1A	.9W		

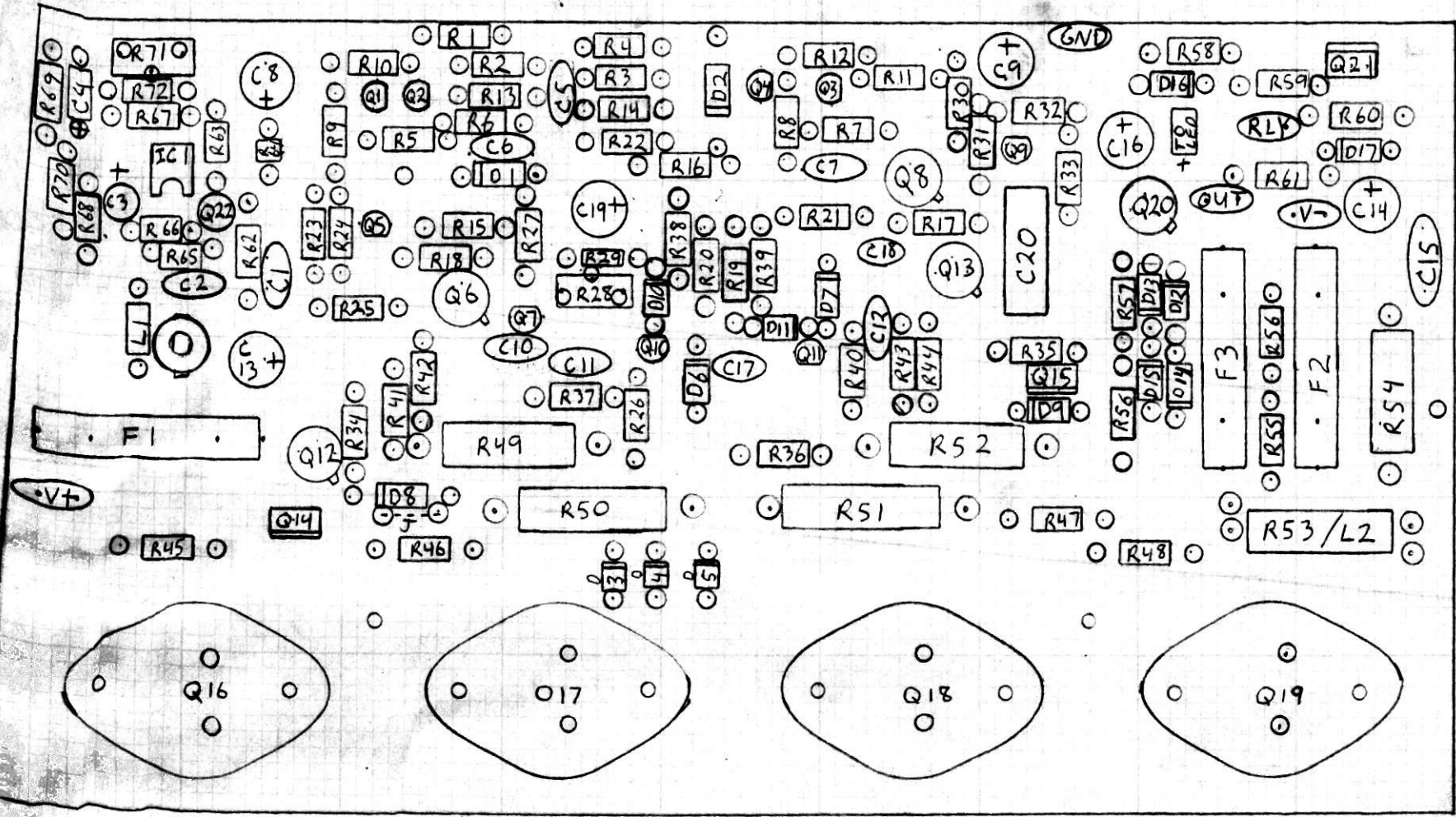
PNP OUTPUT.

DATE	TIME #	NAME	MODEL	SPECIF
2/16/287	5.02	100V 20A 100W	TO-3	PARL, $\beta=750-1500$
2SA679	3.00	120V 12A 100W		6MHz
2SA747A	7.25	120V 10A 100W		15MHz $\beta=60$
2SA753	4.10	140V 10A 100W		20MHz
2SA908	11.39	150V 15A 150W		10MHz $\beta=80$
2SA909	12.66	200V 15A 150W		10MHz $\beta=80$
2SA1075	3.39	120V 12A 120W		HFE=110
2SA1094	4.24	140V 12A 120W		HFE=150 70MHz
2SA1095	4.74	160V 15A 150W		HFE=120
2SA1106	3.19	140V 10A 100W		HFE=80 20MHz
2SA1116	6.24	200V 15A 150W		20MHz
2SA1146	2.88	140V 10A 100W		70MHz
2SB530C	4.63	160V 10A 100W		$\beta=75$ 5MHz
2SB554	4.34	180V 15A 150W		$\beta=70$
2SB555	4.63	140V 12A 100W		6MHz
2SB600	8.00	250V 15A 200W		8MHz
2SB655A	3.44	160V 12A 100W		$\beta=60$ MIN
2SB681	4.50	150V 12A 100W		13MHz
2SB697	3.62	160V 12A 100W		5MHz
2SB817	3.05	160V 12A 100W		15MHz
MJ4502	6.16	160V 30A 200W		2MHz
<del>10010001</del>	<del>8.51</del>	<del>400V 20A 175W</del>		<del>14MHz</del>

## NPN OUTPUT

DATE	TIME	NAME	MODEL	FREQUENCY
2N6254	3.50	100V 15A 150W	70-3	10MHz
25C1115A	5.82	140V 10A 100W		$\beta = 60$ 20MHz
25C1116A	6.24	180V 10A 200W		$\beta = 60$ 10MHz
25C1585	6.83	200V 15A 150W		10MHz
25C1586	7.12	250V 15A 150W		10MHz
25C2525	3.23	120V 12A 120W		$\beta = 110$
25C2544	3.92	140V 12A 120W		$\beta = 200$ 90MHz
25C2565	4.16	160V 15A 250W		$\beta = 120$
25C2581	2.84	140V 10A 100W		$\beta = 80$ 20MHz
25C2607	5.93	200V 15A 150W		20MHz
25C2706	3.05	140V 10A 100W		$\beta = 120$ 90MHz
250287C	3.00	160V 10A 100W		$\beta = 75$ 5MHz
250375	3.55	150V 10A 100W		
250424	4.22	180V 15A 150W		$\beta = 70$
250425	4.10	140V 12A 100W		5MHz
250675A	2.81	160V 12A 100W		$\beta = 60$
250733	3.20	160V 12A 100W		15MHz $\beta = 320$
BD911	1.86	100V 15A 90W		$\beta = 15$
BD457	5.26	120V 30A 150W		10MHz
MJ802	5.28	100V 30A 200W		2MHz
MJ403T	4.91	100V 16A 150W		$\beta = 1000$ (PAR)
MJ10001	8.51	400V 20A 175W		10MHz
MJ15003	4.56	140V 20A 160W		2MHz
MJ15024	7.52	250V 25A 250W		$\beta = 60$ 5MHz

# UPA-2 AMP PARTS LAYOUT



## UPA-2 Amplifier Parts List

## RESISTORS

		Spacing
0 Ohm 18 Ga.	1 R53	1.15"
.47 or .51/5W	2 R49,52	1.15"
.47 or .51/5W	2 R50,51	1.25"
10R 1W	1 R54	1.00"
22 or 33R 1/2W	4 R45,46,47,48	.6"
33R 1/2W	2 R24,32	.5"
33R 1/2W	4 R41,42,43,44	.5"
100R 1/2W	4 R21,23,33,36	.5"
100R 1/4W	4 R5,6,7,8	.5"
300R 1/4W	1 R26	.5"
330R 1/2W	2 R37,38	.5"
390R 1/4W	2 R25,31	.5"
390R 1/4W	1 R29	.4"
1K0 Trimmer	1 R28	Vertical
1K0 1/4W	4 R2,3,13,14	.5"
1K5 1/4W	1 R22	.5"
3K9 1/4W	4 R9,10,11,12	.5"
4K7 1/4W	1 R1	.5"
4K7 1/2W	2 R39,40	.5"
5K6 1/2W	2 R17,18	.5"
12K 1/4W	1 R15	.5"
12K 1/4W	1 R16	.6"
33K 1/4W	3 R4,27,30	.5"
33K 1/4W	2 R19,20	.6"
Open	2 R34,35	

## CAPACITORS

12p 100V	1 C18	.2"
47p 100V	1 C17	.2"
390p 100V	1 C5	.2"
10n 100V	2 C11,12	.4"
100n 50V	2 C6,7	.1" or .4"
100n 50V	1 C10	.4"
100n 100V	1 C15	.4"
10C50	2 C13,14	.15"
100C10	1 C19	.2"
100C50 or 47C50	2 C8,9	.2"
COIL		
100uH	1 L1	.5"

## DIODES

15V 1W Zener	1	D1	.4"
15V 1W Zener	1	D2	.7"
1N4001	3	D3,4,5	Vertical(Bias)
1N4002	3	D6,7,9	.4"
1N4002	1	D8	.65"
1N4148	1	D10	.4"
1N4148	1	D11	.3"

## TRANSISTORS

MPSA06	2	Q1,2	2N5210,2N5089
MPSA56	2	Q3,4	2N5087
2N3906	2	Q5,11	
2N5680	1	Q6	MPSA92 with heatsink
2N5682	1	Q8	MPSA42 with heatsink
2N3904	2	Q7,9	2SC458
2N3904	1	Q10	2N4401
TIP112 Or 122	1	Q14	
TIP117 Or 127	1	Q15	
MJ15015	2	Q16,17	
MJ15016	2	Q18,19	
Short B to E	2	Q12,13	Omitted with Darlington drivers

## HARDWARE

Tab	54	Keystone 1287	.054"
Fuse Clip	6	Keystone 3529/3514	.070
Socket	4	Keystone 4600	.100,.070,.218
Mica Washer	4	Keystone 4662	
RCA Jack	1	Keystone 572	.085,.187
6-20 X 5/8"	8	Sheet Metal Screw	
4-40 X 3/4"	2	Machine Screw	
4-40 Nut	2		
#4 Lockwasher	2	External Tooth	
Spacer	2	.3125" long with hole for #4 Screw clearance	
Printed Circuit	1	Custom	
Flange	1	1" X 2" X 1/8" Thick X 9" Long-Custom Drilled	
Fuse	3	AGC 5	
Grease		CDN Tire Red Synthetic	
Jumper	1	.35"(Resistor Lead)	



UPA2-(3)

- Q3 - 2N5087
- Q4 - 2N5087
- Q5 - 2N3906
- Q6 - 2N5680 [MPSA92]
- Q7 - 2N3904
- Q8 - 2N5682 [MPSA42]
- Q9 - 2N3904
- Q10 - 2N3904
- Q11 - 2N3906
- Q12 - OMIT
- Q13 - OMIT

Q14 - TIP112 (TIP122) 5

Q15 - TIP117 (TIP127) 5

Q16 - MJ15015 (MJ802)

Q17 - MJ15015 (MJ802)

Q18 - MJ15016 (MJ4502)

Q19 - MJ15016 (MJ4502)

o Q20 - MPSA05

o Q21 - PN2907

x Q22 - 2N3820

L.C. x - OMIT IF NO LIMITER

x L.C.1 - TIL 071

o RELAY

o RELAY P.C. BOARD

6 - QUICK CONNECT TABS - KEYSTONE -

o 4 - QUICK CONNECT TABS (RUY BD) - KEYSTONE

6 - FUSE CLIPS - KEYSTONE OR LITTLE FUSE

4 - TRANSISTOR SOCKETS - KEYSTONE

1 - RCA INPUT JACK - KEYSTONE

1 - HEATSINK FLANGE

4 - MICA WASHERS - KEYSTONE

8 - #6 PAN HEAD 1/2" SHEET METAL SCREWS

2 - #4-40 x 3/4" PAN HEAD MACHINE SCREWS.

2 - #4-40 NUTS

2 - #4 LOCK WASHERS

2 - SPACERS

1 - P.C.B.

2 - TO-220 HEATSINKS

2 - TO-92 HEATSINKS [WHEN MPSA42/A2 DRIVERS ARE USED]

UPA 2

Z

X - OMIT IF NO  
LIMITER  
O = OFFSET RELAY  
CIRCUIT

- o R59 - 30K - .5" (27-33K)
- o R60 - 0Ω - .6"
- o R61 - OMIT
- o R62 - 120K - .5" - LN
- o R63 - 1K2 - .4" - LN
- x R64 - 3K9 - .4" - LN
- x R65 - 1M0 - .4" - LN
- x R66 - 1M0 - .4" - LN
- x R67 - 68K - .5" - LN
- x R68 - 1M0 - .4"
- x R69 - 30K - .5"
- x R70 - 10K - .5"
- x R71 - 10K TRM POT
- x R72 - 6K8 - .4" LN

- C15 - 100n - .4"
- o C16 - 22μSOV - .2"
- C17 - 47p - .2"
- C18 - 12p - .2"
- C19 - 100n 10V - .2"
- o C20 - 47μSOV N.P. - .25" or 1.1"

CAPACITORS

- x C1 - 220p - .2"
- x C2 - 100n - .4"
- x C3 - 2M2 ELEC - 16V - .2"
- x C4 - 4μ7 ELEC - 16V - .4"
- C5 - 390p - .2"
- C6 - 100n - .1" or .4"
- C7 - 100n - .1" or .4"
- C8 - 100μSOV ELEC - .2"
- C9 - 100μSOV ELEC - .2"
- C10 - 100n - .4"
- C11 - 10n - .4"
- C12 - 10n - .4"
- C13 - 10μSOV - .15"
- C14 - 10μSOV - .15"

INDUCTORS

- L1 - 100mH - Mouser
- L2 - wound AROUND R53

DIODES

- D1 - 15V 1W ZENER - .4"
- D2 - 15V 1W ZENER - .4"
- D3 - 1N4001 BIAS DIODE
- D4 - 1N4001 BIAS DIODE
- D5 - 1N4001 BIAS DIODE
- D6 - 1N4002 - .4"
- D7 - 1N4002 - .4"
- D8 - <sup>1N4001</sup>~~1N4002~~ - .65"
- D9 - 1N4002 - .4"
- D10 - 1N4148 - .4"
- D11 - 1N4148 - .3"
- o D12 - 1N4148 - .4"
- o D13 - 1N4148 - .4"
- o D14 - 1M148 - .4"
- o D15 - 1N4148 - .4"
- o D16 - 6V2-8V2 - 400mW ZENER
- D17 - ~~1N4002~~

TRANSISTORS

- Q1 - 2N5089 (2N5210)
- Q2 - 2N5089

## UPA 2

L

O = OFFSET RELAY CIRCUIT

R1 - 4K7 - .5" - LN (4K7-5K1)

2 - 1K - .5" - LN (1K0-1K2)

3 - 1K - .5" - LN (1K0-1K2)

4 - 33K - .5" - LN (30-36K)

5 - 100 $\Omega$  - .5" - LN6 - 100 $\Omega$  - .5" - LN7 - 100 $\Omega$  - .5" - LN8 - 100 $\Omega$  - .5" - LN

9 - 3K9 - .5" - LN

10 - 3K9 - .5" - LN

11 - 3K9 - .5" - LN

12 - 3K9 - .5" - LN

13 - 1K - .5" - LN

14 - 1K - .5" - LN

15 - 12K - .5" - LN

16 - 12K - .6" - LN

17 - 5K6 - .5"

18 - 5K6 - .5"

19 - 33K - .6" - LN

20 - 33K - .6"

21 - 100 $\Omega$  - .5"

22 - 1K5 - .5" - LN

23 - 100 $\Omega$  - .5"24 - 33 $\Omega$  - .5"25 - 390 $\Omega$  - .5"26 - 330 $\Omega$  - .5"

27 - 18K - .5"

28 - 1K TEMPOT

29 - 390 $\Omega$  - .4"

R30 - 18K - .5" 33K

R31 - 390 - .5"

R32 - 33 $\Omega$  - .5"R33 - 100 $\Omega$  - .5"

R34 - OMIT

R35 - OMIT

R36 - 100 $\Omega$  - .5"R37 - 330 $\Omega$  - .5"R38 - 330 $\Omega$  - .5" 4K

R39 - 4K7 - .5" (4K7-5K1)

R40 - 4K7 - .5" (4K7-5K1)

R41 - 33 $\Omega$  - .5"R42 - 33 $\Omega$  - .5"R43 - 33 $\Omega$  - .5"R44 - 33 $\Omega$  - .5"R45 - 22 $\Omega$  - .6"R46 - 22 $\Omega$  - .6"R47 - 22 $\Omega$  - .6"R48 - 22 $\Omega$  - .6"R49 - .47 $\Omega$  - 5W - 1.15" 7R50 - .47 $\Omega$  - 5W - 1.25" 7R51 - .47 $\Omega$  - 5W - 1.25" 8R52 - .47 $\Omega$  - 5W - 1.15" 8R53 - 10 $\Omega$  - 1W - 1.15"R54 - 10 $\Omega$  - 1W - 1.0"

R55 - 5K6 - .5W - .5"

o R56 - 10K - .5"

o R57 - 10K - .5"

o R58 - 10K - .5"

UPA-2 AMP PARTS LAYOUT

