



2400L STEREO POWER AMPLIFIER

SAE

Components for the Connoisseur

Schematics Manual

2400L

SPECIFICATIONS

RMS (Min) Continuous Power Output	200 Watts @ 0.05% Total Harmonic Distortion
Per Channel 20 Hz to 20KHz (both channels driven) into 4 or 8 Ohms	
THD (Total Harmonic Distortion) from 20Hz to 20KHz at 250mW to rated power into 4 or 8 Ohms	0.05% Max.
IM (Intermodulation Distortion) from 250mW to rated power at 4 or 8 Ohms with any 2 mixed frequencies between 20Hz and 20KHz at 4:1 voltage ratio	0.05% Max.
Frequency Response at rated power	±0.25 dB, 20Hz to 20KHz
Noise	Greater than 100dB below rated power
Transient Response of any Square Wave	2.5 microseconds rise and fall time
Slew Rate	40 Volts per microsecond
Stability	Unconditionally stable with any type of load or load including full-range electrostatic loudspeakers
Damping Factor	150 Min (100Hz)
Input Sensitivity	1.5V RMS for rated output at 8 Ohms
Input Impedance	50K Ohms
Overload Protection	1. Low impedance electronic-sensing circuit limits with output current below 2 Ohms without limiting with 4 Ohms or higher (or reactive loads). 2. Thermal sensing of inadequate ventilation.
Loudspeaker Protection	Relay circuit protects loudspeakers from low frequency oscillations and plus or minus DC output. Five second turn on/off delay eliminates on/off disturbances.
Power Requirements	110-120V, 50Hz 60Hz 100 Watts @ idling to 1100 Watts @ rated output
Shipping Weight	47 pounds (21.3 Kg)
Dimensions	Front Panel: 19 in. (48.3cm) W X 7 in. (17.8cm) H Chassis: 11.50 in. (29.2cm) D (excluding handles, controls, and connections)
Cabinet	C-2 (not included)*

* Assembly required

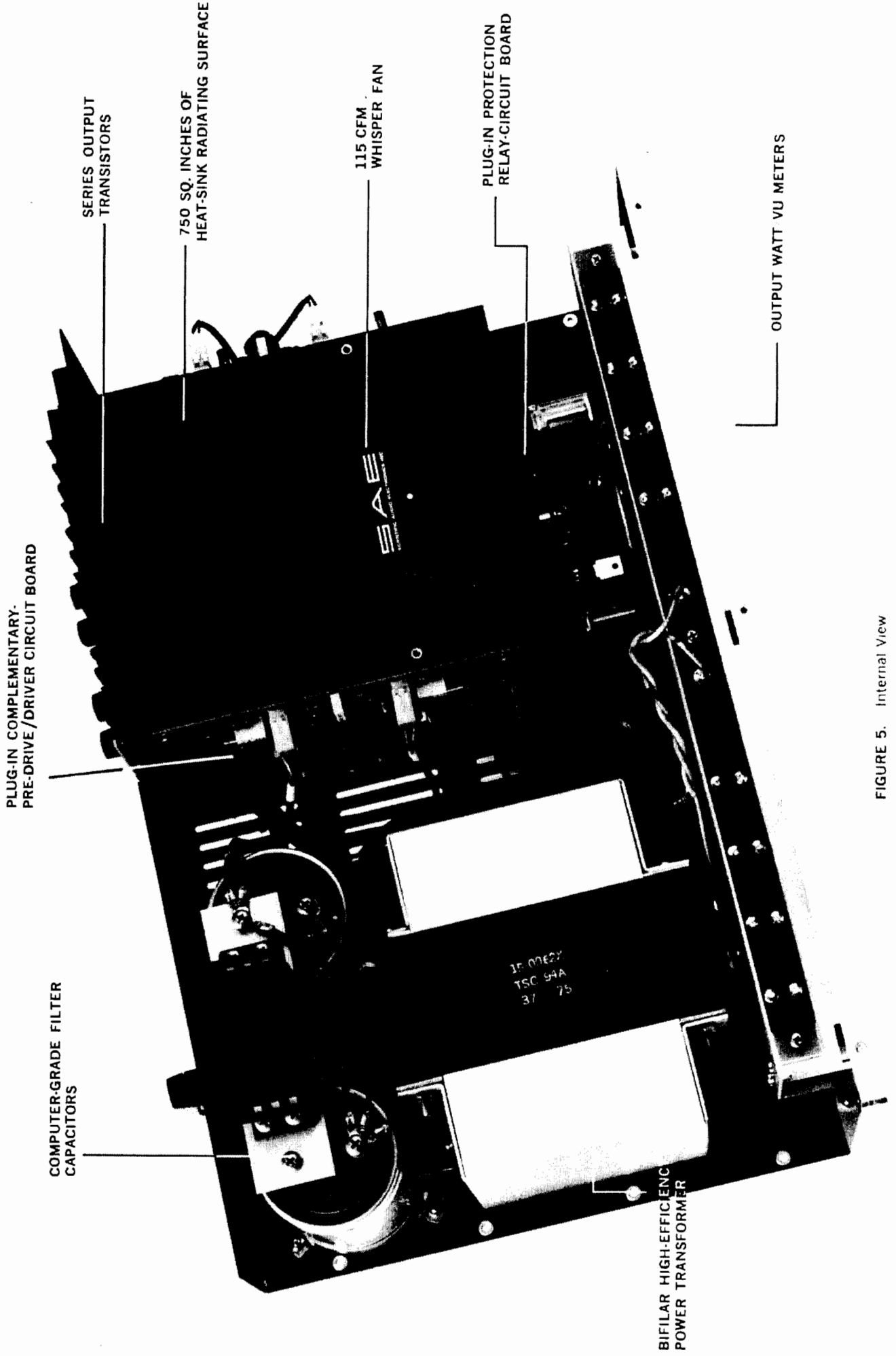


FIGURE 5. Internal View

TRIPLE-COMPLEMENTARY
STEREO POWER AMPLIFIER
(1 CHANNEL ONLY SHOWN)

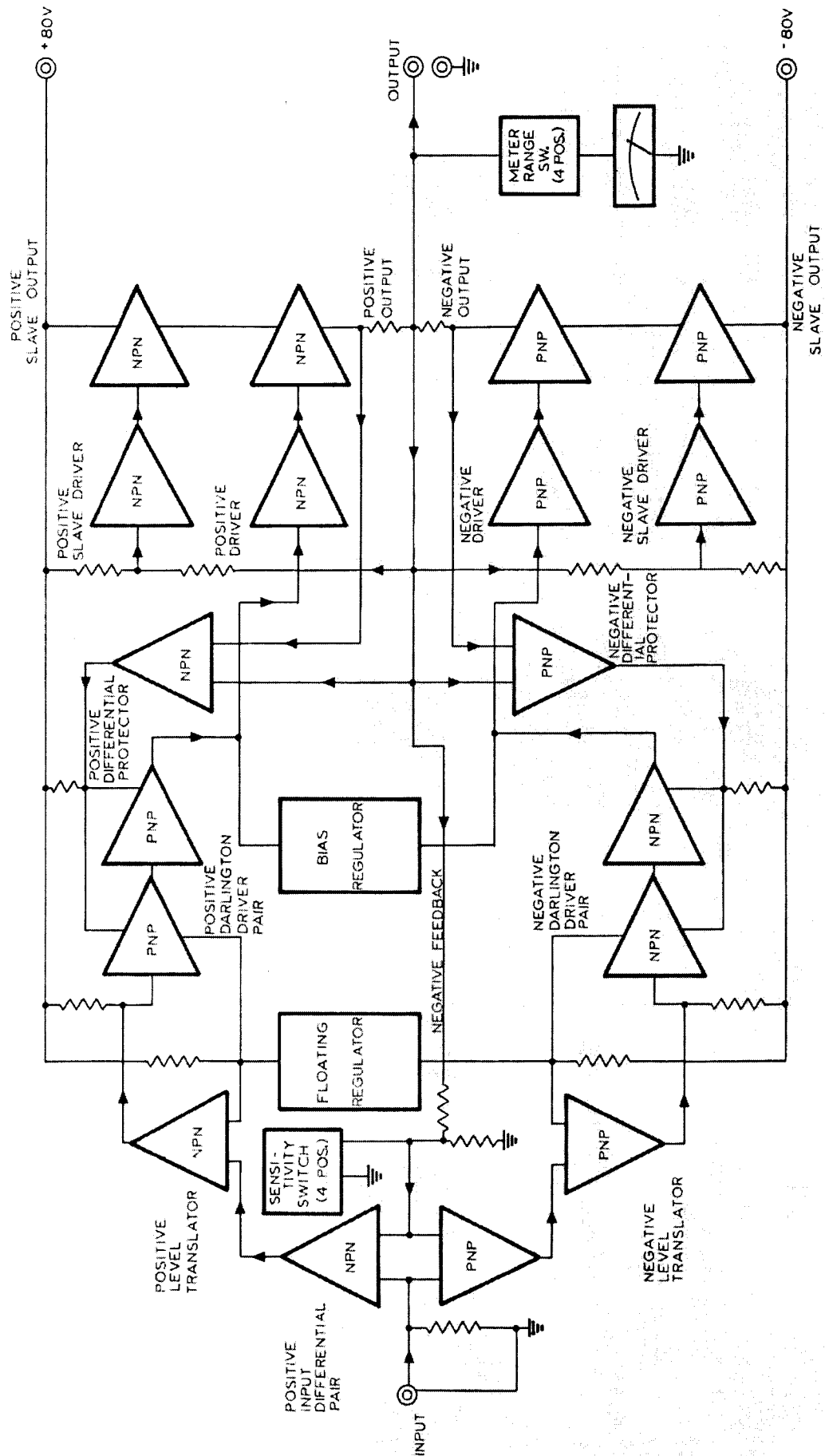


FIGURE 7. Block Diagram

MODEL 2400 -L COMPONENT PART LIST

1. 11-0175	2SC 1583 Q1 NPN	
2. 11-0174	2SA 798 Q2 PNP	
3. 11-0154	MPS A06 Q3/Q6/Q9/Q15/Q16 NPN	
4. 11-0155	MPS A56 Q4/Q5/Q10 PNP	
5. 11-0148	2SA913, 2SA839 Q7 PNP	also 2SA 968 ^{compl.}
6. 11-0149	2SC1913, 2SC1669 Q8 NPN	also 2SC 2238 ^{compl.}
7. 11-0150	2SB595, S-1236 Q13/Q14 PNP	
8. 11-0151	2SD525, S-1237 Q11/Q12 NPN	
9. 11-0068	2SD424 SAE#9 Q17/Q18/Q19/Q20 NPN	← 160V, 15A, 150W → NTE-284 (180V, 16A, 150W)
10. 11-0074	2SB554 SAE#8 Q21/Q22/Q23/Q24 PNP	→ NTE-285
11. 11-0044	BC 237 B,C Q25/Q27 NPN	
12. 11-0117	BC 307 B,C Q26 PNP	
13. 11-0080A	MPS U06, S-1375 Q28 NPN	→ NTE-285

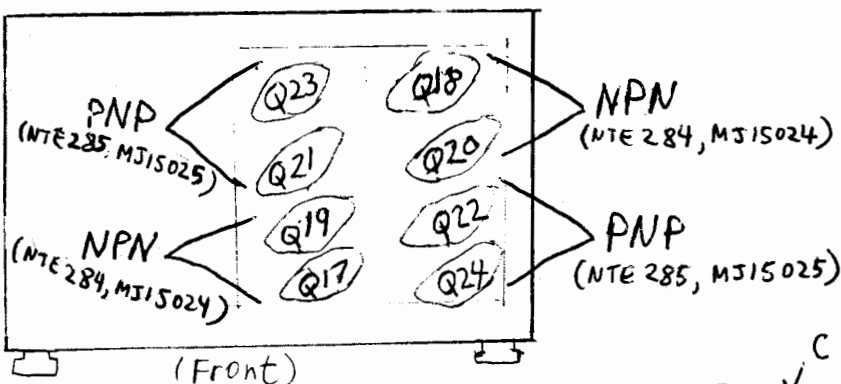
better: (NPN) NTE 388 (250V, 16A, 150W)
(PNP) NTE 68 (30A, PK)

THE DRIVE CARDS ADJUSTMENTS ARE AS FOLLOWS:

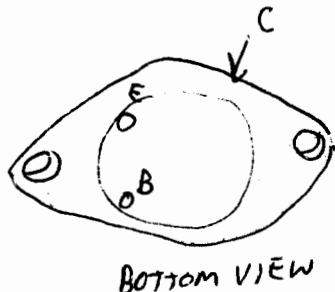
- ON THE PRE-DRIVE CARD, THE TOP POT IS FOR THE ADJUSTMENT OF THE D.C. OFFSET, WHICH CAN BE MEASURED AT THE REAR SPEAKER JACKS. THIS ADJUSTMENT SHOULD BE AS CLOSE TO (0) AS POSSIBLE WITH A MAXIMUM LEVEL OF (50) MILIVOLTS.
- THE SECOND POT ON THE PRE-DRIVE CARD IS FOR THE ADJUSTMENT OF THE QUIESCENT (NO SIGNAL) CURRENT LEVEL. THIS ADJUSTMENT IS MADE BY MEASURING THE VOLTAGE ACROSS THE (62) OHM RESISTORS ON EACH SIDE OF THE DRIVE CARD R21/R24/R121/R124. THIS LEVEL SHOULD BE SET FOR 1.6 VOLTS FOR HOME STEREO USER AND 1.7 VOLTS FOR THE PROFESSIONAL USER. THIS VOLTAGE SHOULD BE BALANCED BETWEEN THE SIDES TO BE AS CLOSE AS POSSIBLE, WITH A (+/-) OF 10 TO 25 MILIVOLTS AS THE HIGHEST AMOUNT OF DIFFERENCE ACCEPTABLE.

THE BIAS ADJUSTMENT LEVEL FOR TOTAL HARMONIC DISTORTION IS SET WITH A DISTORTION ANALYZER AND STATIC (8) OHM LOADS. THE SIGNAL SHOULD BE SET FOR (20) KHZ AT (1) WATT OF POWER. THE ADJUSTMENT IS MADE BY USING THE POTS UNDER THE OUTPUT MODULE. THE LEVEL SHOULD BE SET FOR (.05) TO (.08) DEPENDING THE TYPE OF USER. THE HIGHER SETTING BEING USED FOR THE PROFESSIONAL USER.

AFTER THESE ADJUSTMENTS HAVE BEEN MADE THE UNIT SHOULD BE DRIVEN AT A NORMAL USER LEVEL FOR ABOUT (30) MINUTES AND RECHECKED FOR STABILITY OF ADJUSTMENTS. RE-ADJUSTMENTS SHOULD BE MADE AS NEEDED.

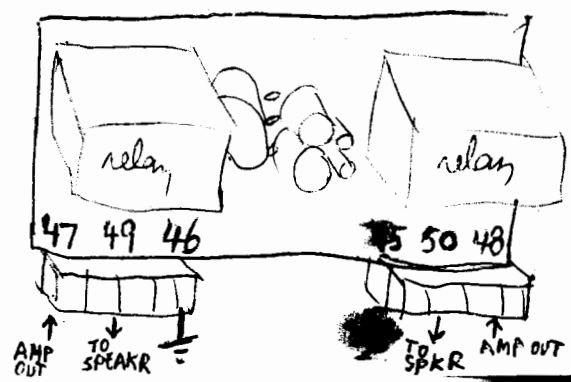


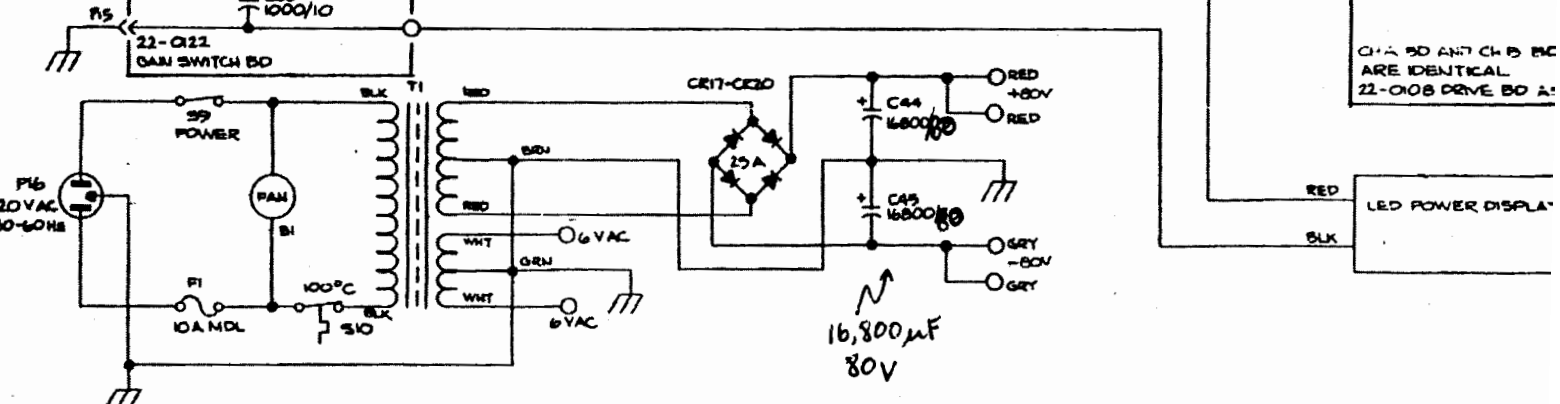
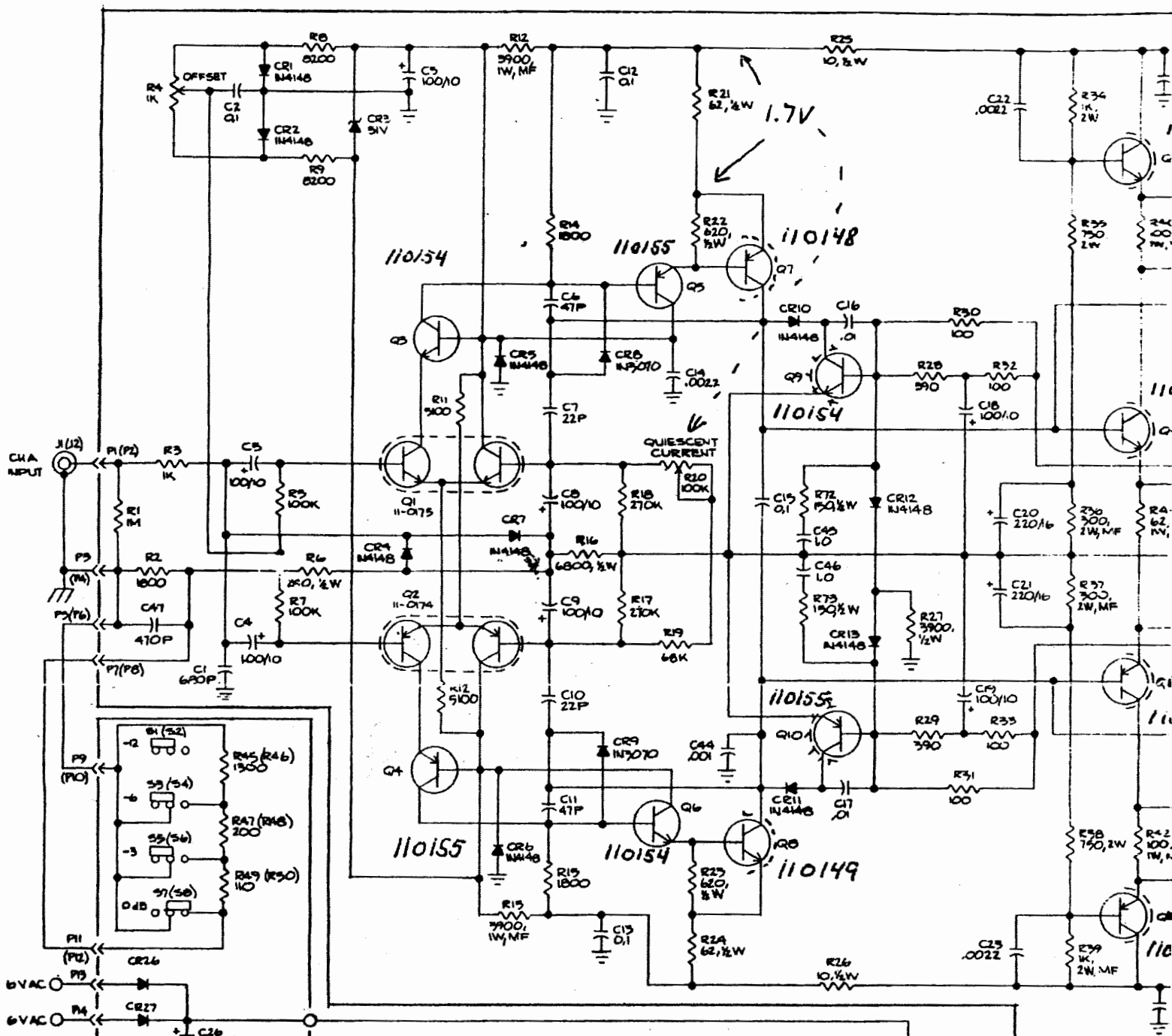
TOP VIEW



BOTTOM VIEW

MJ 15024 (NPN) 250V, 16A, 250W
MJ 15025 (PNP) " " "

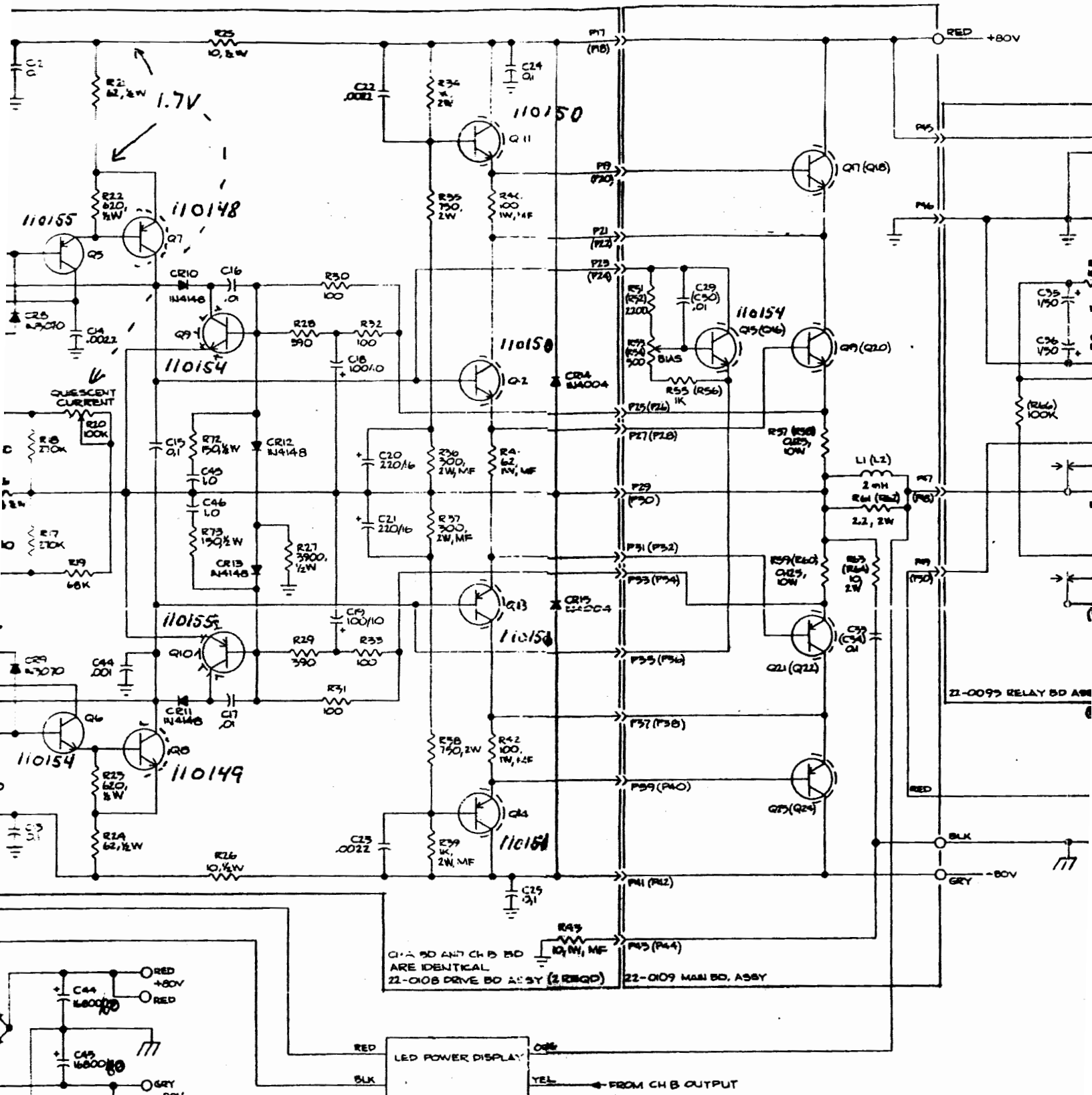




1. NUMBERS IN PARANTHESIS ARE FOR CH B.
 2. CH A SHOWN, CH B IDENTICAL.
 3. CAPACITORS IN UFD.
 4. RESISTORS IN OHMS, 1/4W, 5%
- NOTES, UNLESS SPECIFIED:

CH A 50 AN7 CH B 50
22-0108 DRIVE BO A:

LED POWER DISPLAY



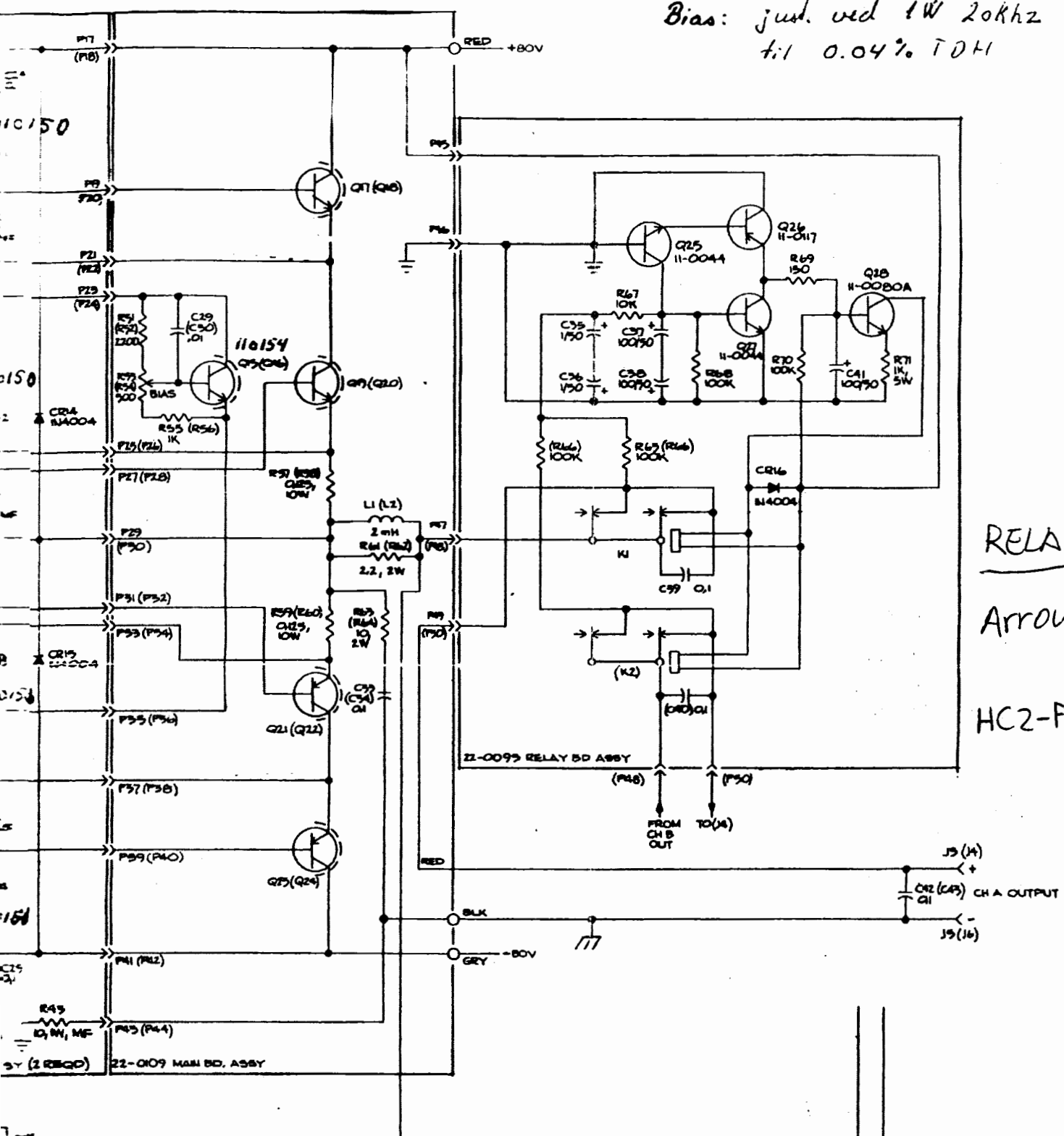
16,500µF
80V

REF DES NOT USED			
C17			
C28			
C31			
C32			

LAST REF DESIGNATION		
B1	L2	S10
F1	P50	T1
J6	Q2B	C47
K2	R73	

OUT OF SEQUENCE CHART			
C44	R75		
C45	C47		
C46			
R72			

Bias: just used 1W 20khz
t:l 0.04% TDI



RELAYS:
Arrow
HC2-P-DC48V

REF DES NOT USED	
C27	
C28	
C31	
C32	

B	DELETE C27, C28, C31, C32	1/4/78
A	REV'D, REDW/J	12/1/77
REV	DES/C	10/1/78

LAST REF DESIGNATION		
B1	L2	S10
F1	P50	T1
J6	Q28	C47
K2	R73	

OUT OF SEQUENCE CHART	
C44	R73
C45	C47
C46	
R72	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS AND DECIMALS

INTERNAL

FINISH

DO NOT SCALE DRAWING

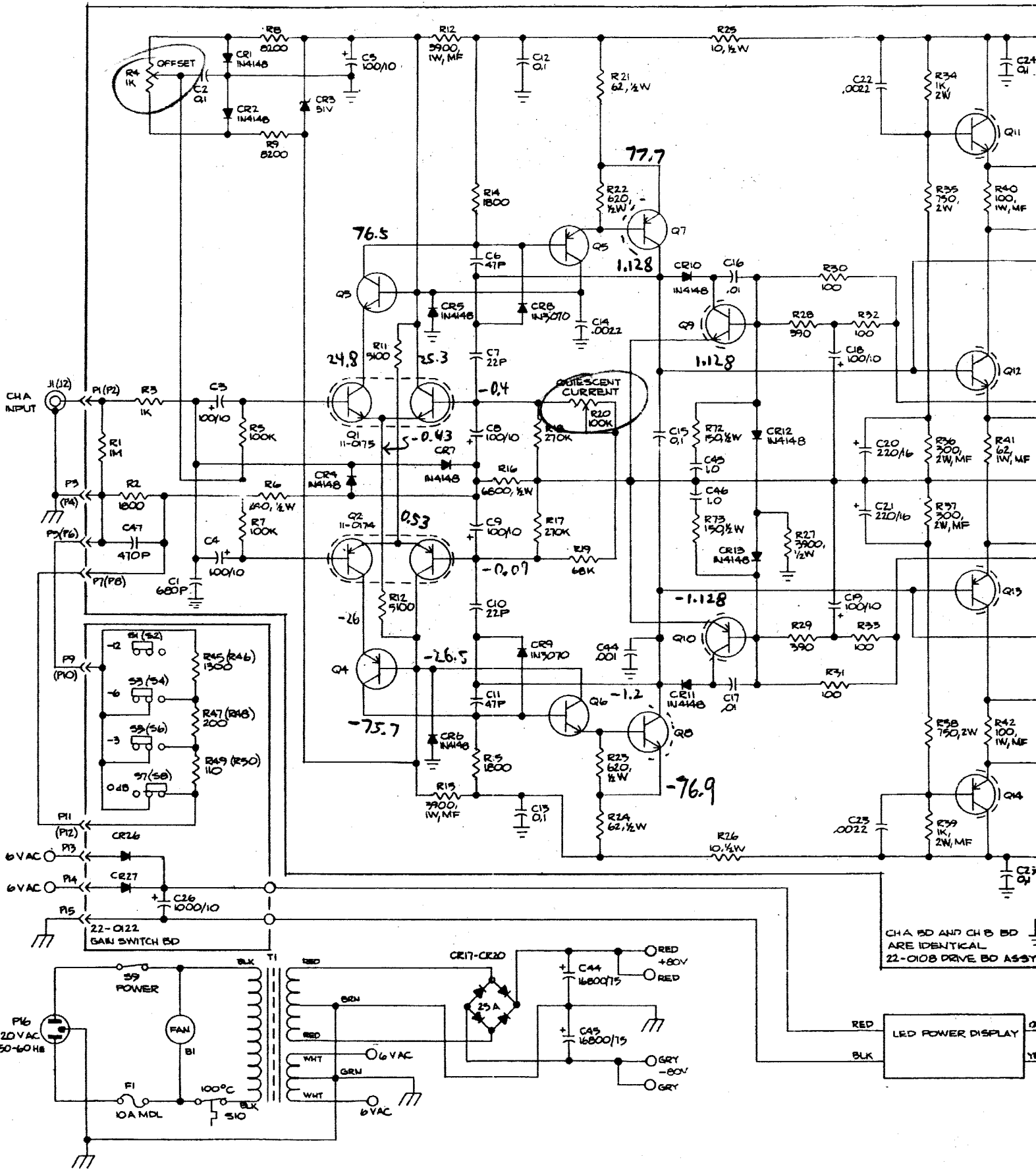
CONTRACT NO.	
APPROVALS	DATE
DRAWN: JAC	12/1/77
CHECKED	

REVISIONS

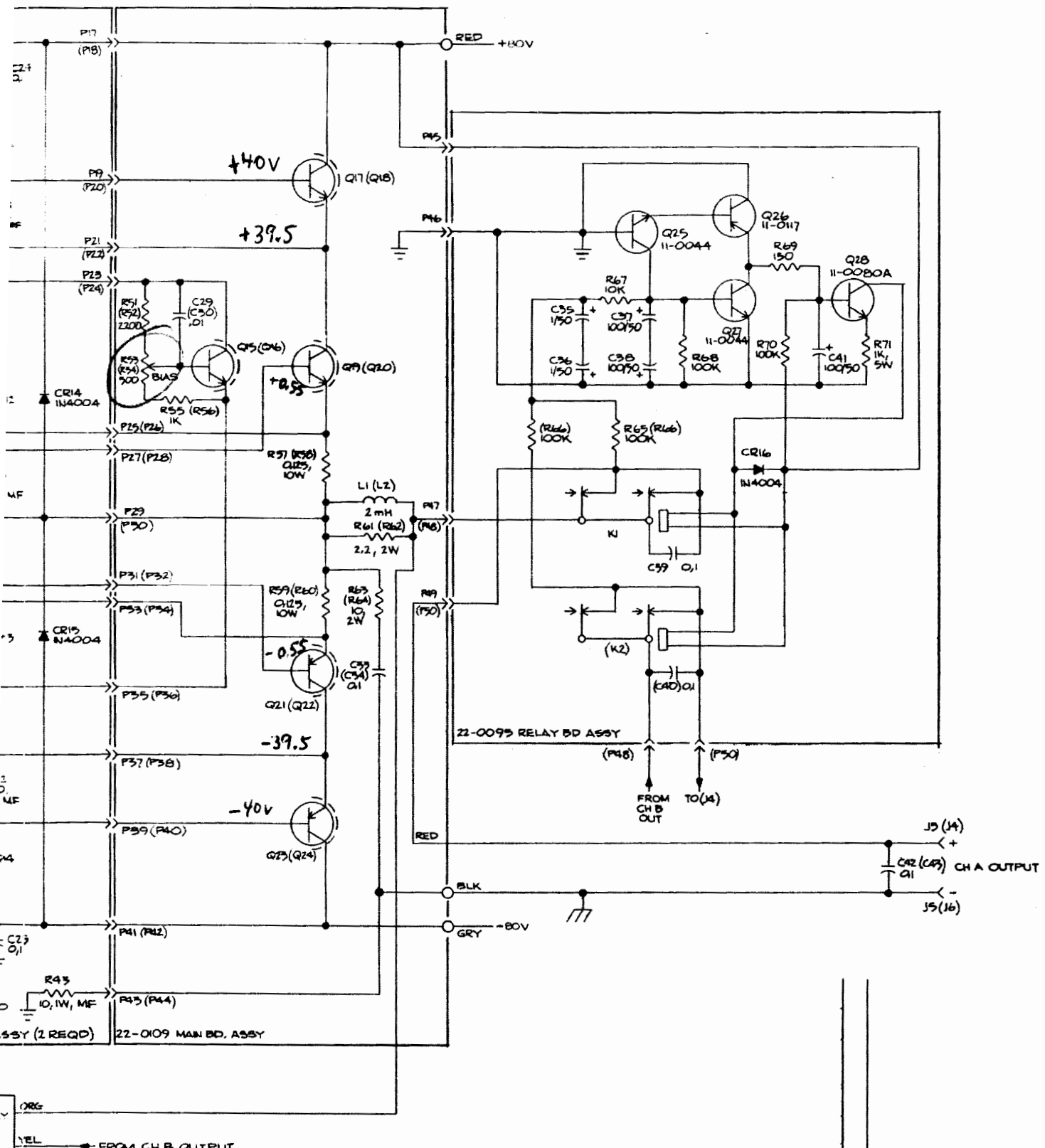
SCHEMATIC, 2A00L

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		30-014	B

SCALE: — SHEET 1 OF 1



- 4. NUMBERS IN PARANTHESIS ARE FOR CH B.
 - 3. CH A SHOWN, CH B IDENTICAL.
 - 2. CAPACITORS IN UFD.
 - 1. RESISTORS IN OHMS, 1/4W, 5%
- NOTES, UNLESS SPECIFIED:



REF DES NOT USED			
C27			
C28			
C31			
C32			

B	DELETE C27, C28, C31, C32	1/4/78
A	REV'D, REDWN	12/1/77
REV	DESC	DATE

LAST REF DESIGNATION		
B1	L2	S10
F1	P50	T1
J6	Q28	C47
K2	R73	

OUT OF SEQUENCE CHART		
CA4	R73	
CA5	C47	
CA6		
R72		

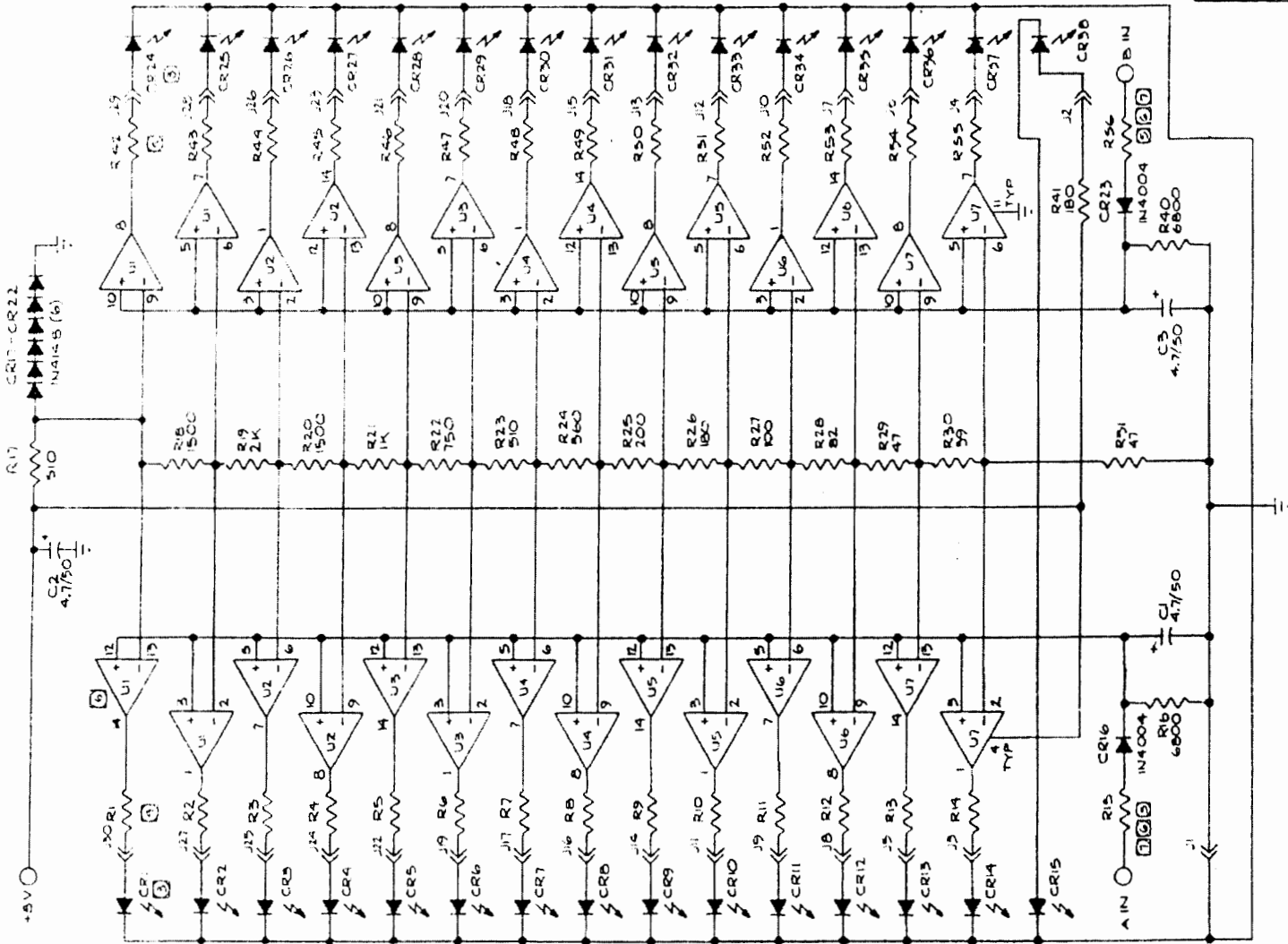
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. FRACTIONS DECIMALS AND EES. JUN 2, 1977. MATERIAL: FRESH. DO NOT SCALE DRAWING.

CONTRACT NO.		DATE	
APPROVALS			
DRAWN	ENT		
CHECKED			

SAE

SCHEMATIC, 2400L

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D		50-014	B
SCALE	SHEET 1 OF 1		

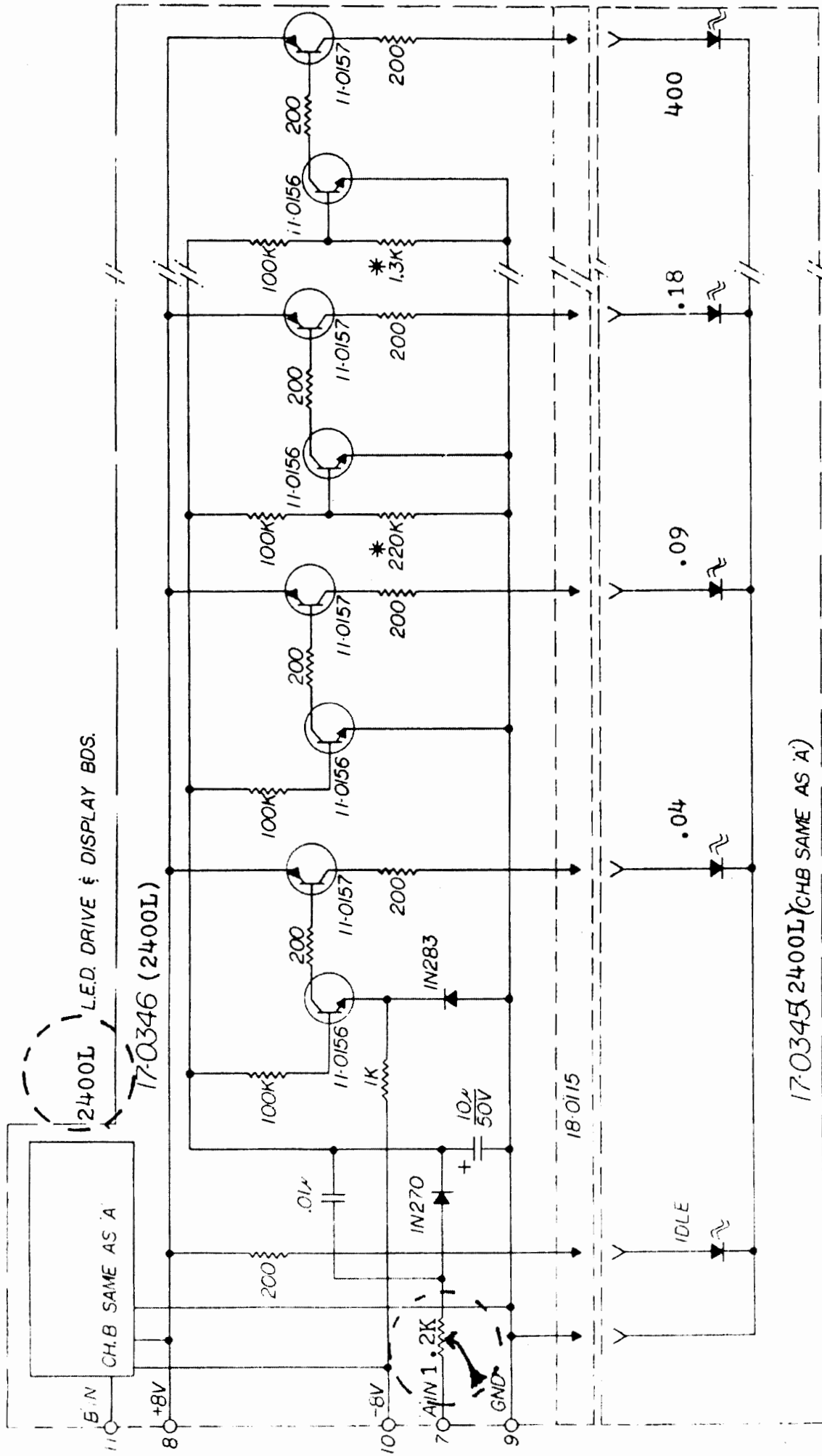


- ① U1-U7: SAE 11-0163
 - ② 33 K FOR MODEL 2400
 - ③ 27 K FOR MODEL 2300
 - ④ 22K FOR MODEL 1100
 - ⑤ R1-R14, R42-R55=100 OHMS.
 - ⑥ CR1-CR13, CR14-CR58 = SAE 16-0010
2. CAPACITORS IN MICROFARADS.
 1. RESISTORS IN OHMS, 4W, 5%.
- NOTES: UNLESS OTHERWISE SPECIFIED

CONTRACT NO.	DATE	SCALE	SHEET 1 OF 1
APPROVALS	9-21-77		
DRAWN			
CHECKED			
SIZE	CODE IDENT NO.	DRAWING NO.	
C			

**SCHEMATIC, 2200, 2300, 2400
LED POWER DISPLAY**

REV A ADDED NOTES 6, 7, 8 5-0-79



* LEVEL CAL. RESISTOR VALUES:

.18W	.220K	3.0W	18K	50W	3.9K
.37W	100K	6.0W	13K	100W	2.7K
1.2W	.56K	12W	8.2K	200W	1.8K
1.5W	.33K	25W	5.6K	400W	1.3K

IMPORTANT SERVICE INFORMATION: 2200 and 2400L LED drive and display boards are IDENTICAL with one exception: for 2400L use 1.2 K resistor in position indicated (2200 uses 200 ohm resistor)