

# CONTENTS

Introduction .....	2
Disassembly Procedure 120-240 Volt Conversion .....	3
Schematic Diagram .....	4
PCB Parts Layout .....	5
Circuit Description .....	6
Specifications-Factory Assistance .....	7
Parts List .....	8



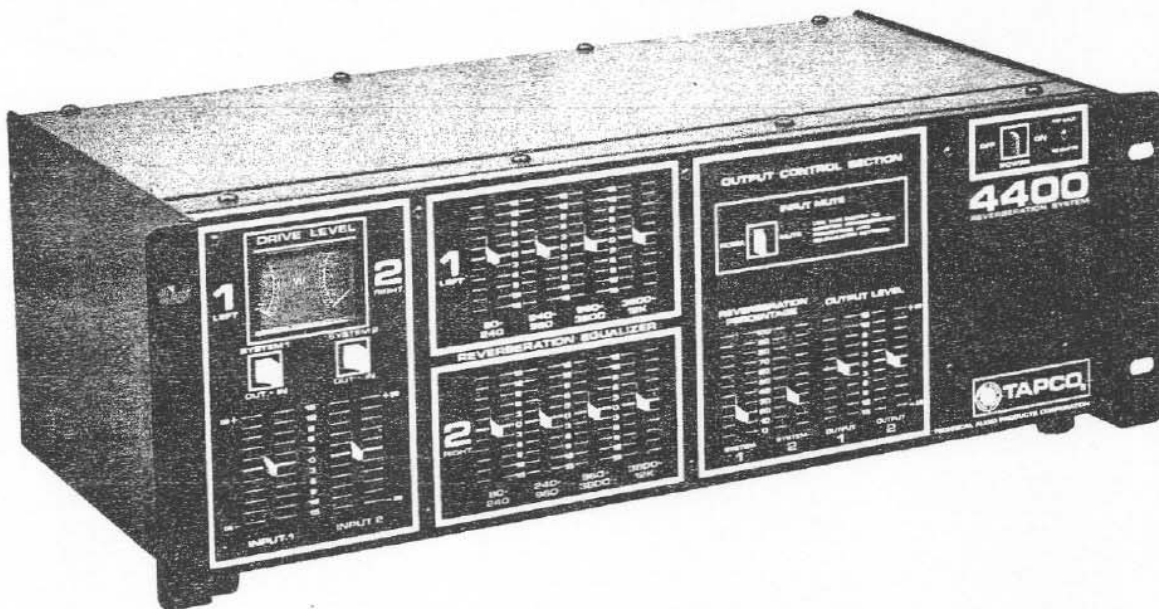
MODEL 4400  
SERVICE MANUAL

TECHNICAL AUDIO PRODUCTS CORPORATION

## Introduction

The TAPCO model 4400 is a two-channel reverberation system for semi-professional recording, studio recording, and sound reinforcement. Each channel of the 4400 has a four-section graphic equalizer to tailor the reverberated sound for a wide variety of special effects. In addition, each channel has its own in/out switch, input level control, drive level meter, percentage mix control and output level control. The VU meters are used to indicate the optimum drive level to the reverb tank, and are not adjustable.

All parts except the reverb tanks are mounted on one master printed circuit board, and all connections to the board are made with multi-pin connectors for ease in servicing. Four-section op amp integrated circuits are used throughout for maximum performance and compactness. Although the 4400 has exceptional reliability, careful attention has also been paid to maximum serviceability.



1. Remove 8 black sheet metal screws and lockwashers from the top of the 4400. Slide the top cover to the rear to remove it. Do not loosen the screws on the sides of the unit.
2. Note that four multi-pin connectors make all of the external connections to the printed circuit board. Polarization is marked by a red spot on the side of each connector, which corresponds to the printed word RED on the PCB. Carefully note the position and direction of each connector. This is important! A shock hazard can result if the connectors are replaced incorrectly. Remove the multi-pin connectors.
3. Remove the 10 small screws from the front of the unit. The circuit board may now be removed. The front surface of each linear control is coated with lubricating grease. Do not attempt to wipe it off, but try to keep the surfaces free from dirt.
4. The reverb spring assembly can be removed, if necessary, by taking out three black screws from the bottom on the unit. This assembly can be taken out independently of the circuit board.
5. Assembly is the reverse of these steps. Take special care to replace the multi-pin connectors the right way.

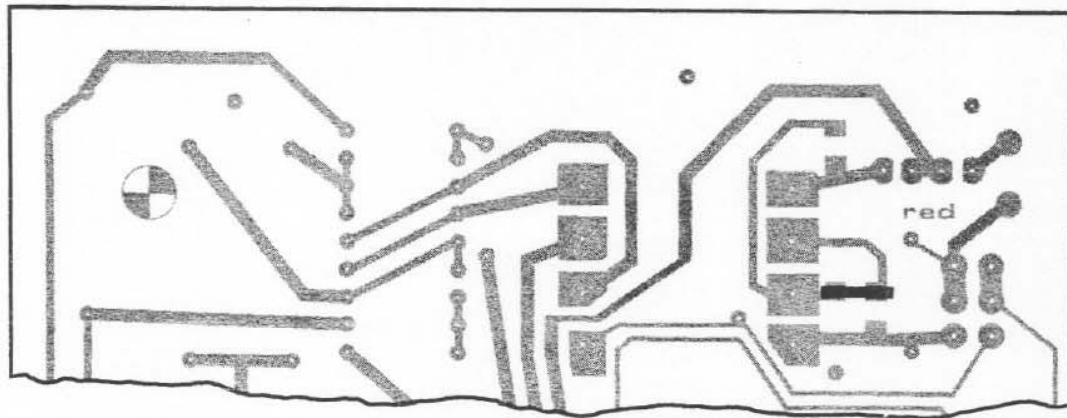
## 120-240 Volt Conversion

The unit can be wired for either 120 v.a.c. or 240 v.a.c. by means of jumpers on the foil side of the PCB, as shown below. One jumper is required for 240 volts, and two jumpers for 120 volts.

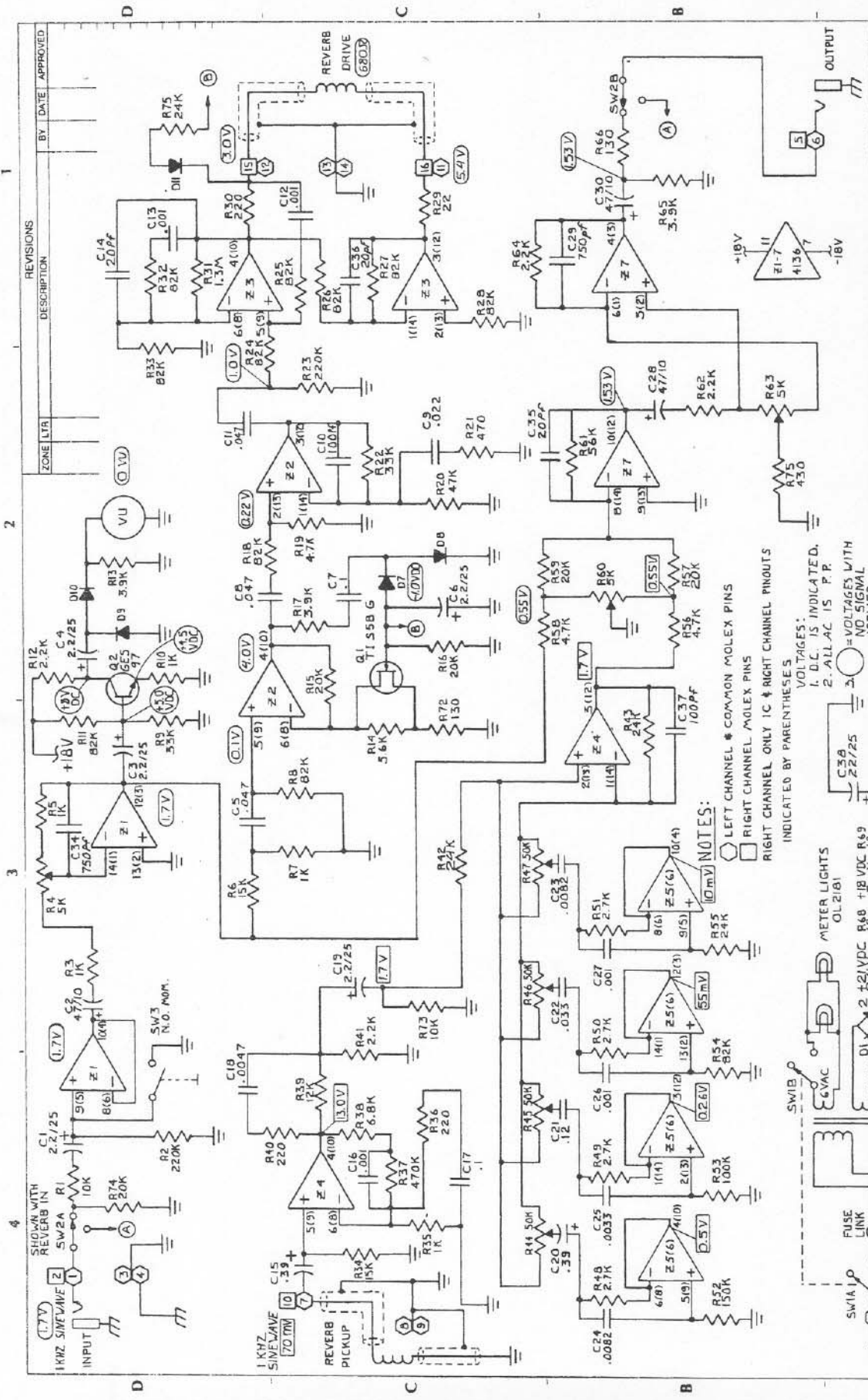
### 120 Volts



### 240 Volts



Australian units use a special transformer (TAPCO P/N 302049) for which no jumpers are required.



**REVISIONS**

NO.	DESCRIPTION	DATE	APPROVED
1			
2			
3			
4			

**TAPCO** Technical Audio Products Corporation

**SCHEMATIC DIAGRAM**

**4400**

DWG. NO. **24048**

SCALE: **C**

UNIT WT. **1**

SHEET **1** OF **1**

**RELEASE STATUS**

NO.	DATE	STATUS
1	1/17/68	DB
2	4/15/76	CHECKED AASE
3		APPD

**CONDITIONS**

- RESULTS WITH SIGNAL APPLIED TO REV. PICKUP.
- SLIDERS SET AT MID-POINT.
- POWER SUPPLY AC VOLTAGES ARE RIPPLE VOLTAGES.

**VOLTAGES:**

- D.C. IS INDICATED.
- ALL A.C. IS P.P.
- = VOLTAGES WITH NO SIGNAL APPLIED.
- = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO LINE INPUT.

**NOTES:**

- LEFT CHANNEL \* COMMON MOLEX PINS INDICATED BY PARENTHESSES
- RIGHT CHANNEL ONLY IC \* RIGHT CHANNEL PINOUTS INDICATED BY PARENTHESSES

**METER LIGHTS** OL2181

SW1A 1/0

FUSE LINK

SW2A 1/0

SW3 1/0

SW4 1/0

SW5 1/0

SW6 1/0

SW7 1/0

SW8 1/0

SW9 1/0

SW10 1/0

SW11 1/0

SW12 1/0

SW13 1/0

SW14 1/0

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SW92 1/0

SW93 1/0

SW94 1/0

SW95 1/0

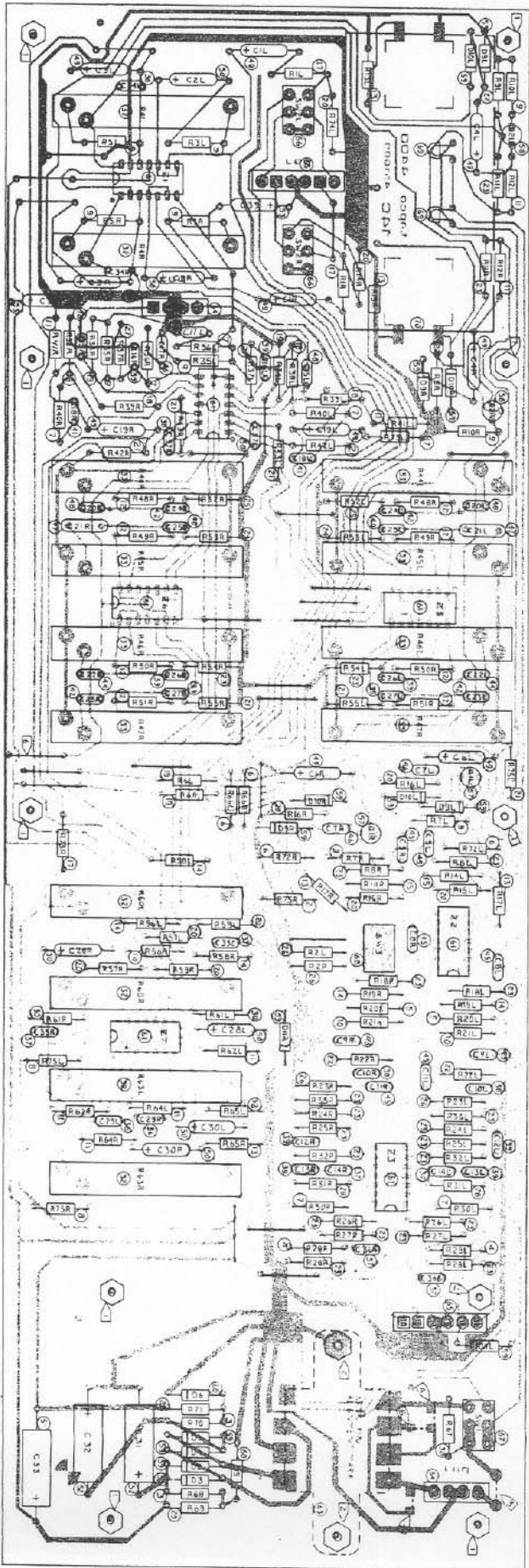
SW96 1/0

SW97 1/0

SW98 1/0

SW99 1/0

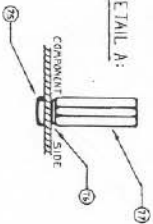
SW100 1/0



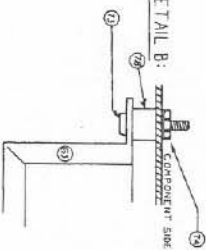
NOTES:

- 1- SEE DETAIL A.
- 2- SEE DETAIL B.
- 3- SINGLE STANDARD #24 WIRE ADDED DURING NETWORK (FLAME LITHO).
- 4- 100V CONNECTION, #22 SOLID WIRE ADDED DURING NETWORK.
- 5- 230V CONNECTION.
- 6- TYPICAL OF ALL DIMPERS.

DETAIL A:



DETAIL B:



TAPCO  
 ASSEMBLY PCB 14-C  
 MOTHERBOARD 4400  
 24053  
 D  
 2-23-78  
 RELEASE STATUS  
 DWG. NO. 24053  
 SHEET 1 OF 1

## Circuit Description

When the system is switched in, the input signal is applied first to buffer amplifier Z1 and from there to input control amplifier Z2, whose gain is determined by R4. Here the signal is metered by Q2 and its associated components. This metering circuit is calibrated to indicate optimum drive level to the reverb spring assembly, and is not adjustable. From here, the signal splits into two paths: part goes directly to the reverb mix control R60, and part to the reverb driver section.

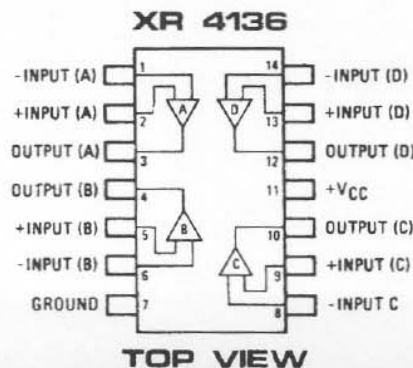
The first element of the spring drive section is limiting amp Z2(a). This simple FET compressor limits program peaks above optimum level (zero VU) to aid in the reduction of overload distortion and noise. The second section of Z2 provides the proper equalization to drive the spring unit. Z3 (upper) provides constant current drive to the inductive spring drive coil by means of sense resistor R30 and balanced feedback paths through C12-R25 and C13-R32. Z3 (lower) is a simple phase inverter. Together, they provide a substantial input to the reverb tank input.

Low level signals from the reverb tank output coil are amplified by Z4(a) which also adds some additional fixed equalization. This signal is pure reverberated sound, and its characteristics can be greatly altered by the four section graphic equalizer, which works as follows:

The four sections of Z5 form individual simulated inductors. These, in combination with capacitors C24, 25, 26, and 27 are connected as series resonant circuits from the wipers of equalizer pots R44, 45, 46, and 47 to ground. When the pot wipers are moved toward the noninverting (+) input of controlled amp Z4(b), signals within the resonant frequency band are shunted to ground, thereby causing a decrease in level for that particular frequency band. Likewise, when a wiper is moved toward the inverting (-) input, some of the negative feedback around Z4 is shunted to ground, thus increasing its gain in that frequency band.

Z7(a) is a summing amplifier which combines the dry and reverb signal mix determined by percentage control R60. Then the combined sound is amplified by op amp Z7(b) whose gain can be varied by output level control R63.

The power supply is straightforward, using a bridge rectifier and zener diodes to produce  $\pm 18$  volts DC to all op amps and the meter amplifiers. A switch pole in the lamp section reduces turn-off thump caused by the collapsing magnetic field in the power transformer. The transformer may be re-wired for 220-240 VAC operation as shown elsewhere in this manual. Primary current is fused by a single link of #34 wire mounted on the foil side of the PCB.



## Specifications

Frequency Response (straight through)	10 Hz to 25 kHz $\pm 1$ Db (-3Db @ 40kHz)
Harmonic Distortion (straight through)	.05% at +10dbm out
IM Distortion (straight through)	.05% at 25 volts P-P out
S/N Ratio (straight through)	better than 80db Ref; 1 volt in/out
S/N Ratio (50% Reverb mix, equalization set flat, level controls at unity)	70 db Ref: 1 volt in/out at 4,000 Hz
Maximum output level	+15dbm into 600 ohms 10 volts RMS into 5000 ohms or greater
Output impedance	100 ohms
Maximum input level	+15dbm average, +20dbm on program peaks
Input impedance	20K ohms
Reverberation system	Delay: 30 milliseconds Decay: -60db at 1.9 seconds
Reverb section frequency response	adjustable
Reverberation equalizer control range	$\pm 15$ db
Mix ratio	adjustable from no reverb (straight through) to 100% reverb
Power requirements	117 volts AC, 60 Hz, 10 watts nominal (may be rewired for 220 v.a.c. by internal connection)
Dimensions	6.5" high, 19" wide, 9.3" deep
Weight	12 $\frac{1}{2}$ pounds

## Factory Assistance

TAPCO has a staff of qualified technical service personnel who can assist with any problems which may arise in the field, and are able to answer questions concerning any aspect of the use and performance of our products. You may either call us at area code 206-775-4411, or write to TAPCO at 405 Howell Way, Edmonds, Washington 98020.

# Parts List

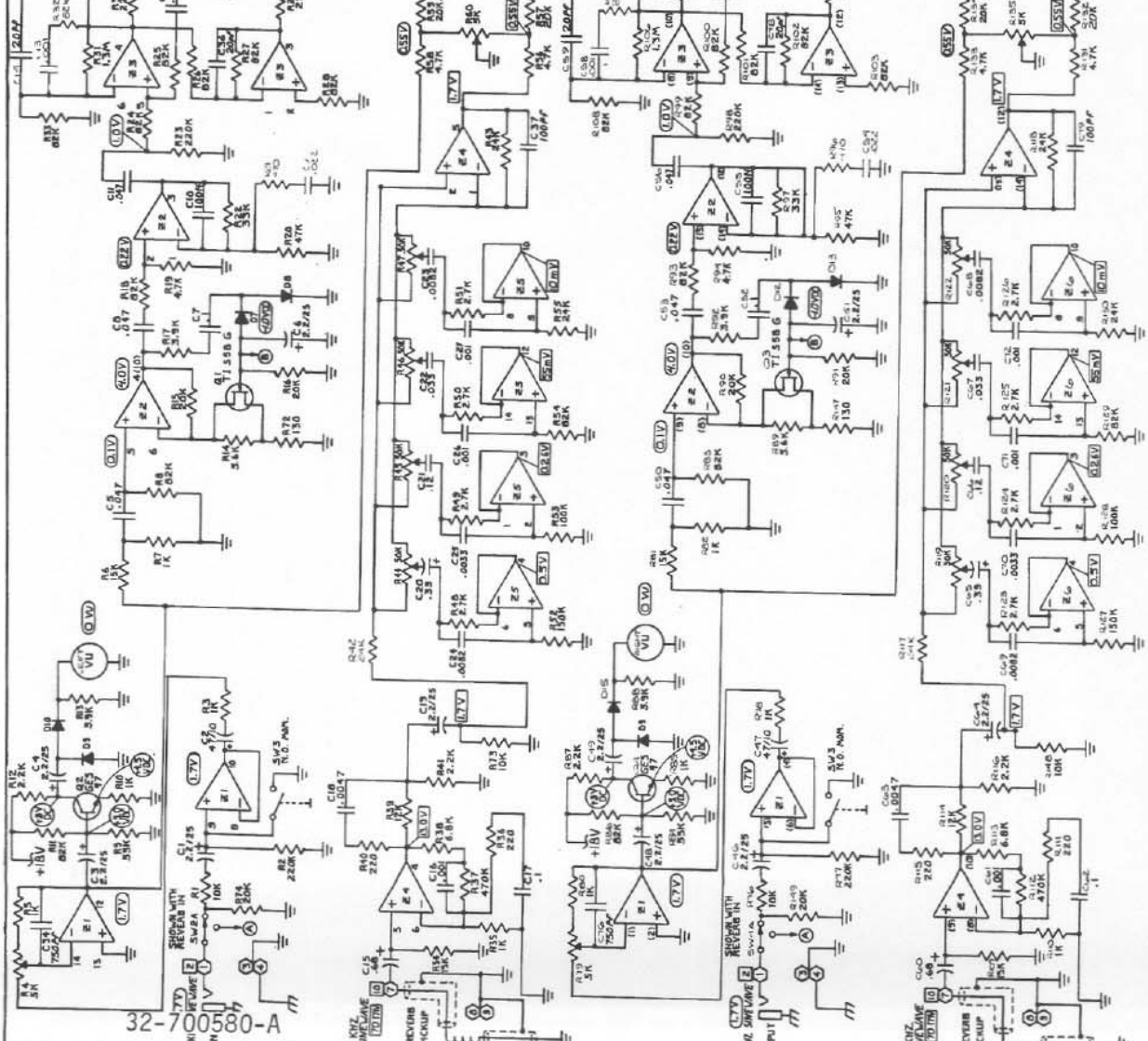
item no.	tapco part no.		
50	001211	CAPACITOR, ELECTROLYTIC	47/10V
49	001403	" "	2,2/25V
53	001408	" "	22/25V
52	001415	" "	330/25V
51	001612	" "	100/50
48	002012	CAPACITOR, TANTALUM	.39/35V
39	003001	CAPACITOR, MYLAR	.001/50V
40	003019	" "	.0033/50V
41	003025	" "	.0047/50V
42	003034	" "	.0082/50V
44	003055	" "	.033/50V
45	003061	" "	.047/50V
46	003073	" "	.1/50V
47	003075	" "	.12/50V
37	004013	CAPACITOR, CERAMIC DISC	20pf
38	004037	" " "	100pf
36	004060	" " "	750pf
32	005409	LINEAR CONTROL (level, mix)	5K ohm
33	005411	LINEAR CONTROL (equalizer)	50K ohm
58	006001	TRANSISTOR, NPN	GES97/TIS97
57	006005	F.E.T.	TIS58
61	007004	INEGRATED CIRCUIT, QUAD	XR4136
59	008021	DIODE, POWER	1N4001/1N4002
60	008046	DIODE, ZENER	1N4746A
	300001	¼" PHONE JACK	
	300005	PHONO PLUG	
65	300011	CONNECTOR, 6-PIN MALE (Molex 09-64-1061)	
	300012	CONNECTOR, 6-PIN FEMALE (Molex 09-50-3061)	
	300013	CONNECTOR INSERTS (Molex 2578)	
64	300014	CONNECTOR, 4-PIN MALE (Molex 09-64-1041)	
	300015	CONNECTOR, 4-PIN FEMALE (Molex 09-50-3041)	
66	301002	SWITCH, WHITE (in-out)	
67	301004	SWITCH, RED (power)	
68	301005	SWITCH, WHITE, MOMENTARY (mute)	
69	301043	LAMP (2181)	
63	302046	POWER TRANSFORMER (830595) 34VCT @ 55ma.,6V @ 300ma.	
	302049	POWER TRANSFORMER (830618) SPECIAL PRIMARY 260VAC, 50Hz (Australian)	
	303001	LINECORD, 18/3 SVT BLK	
	303003	STRAIN RELIEF	
	303005	REVERB ASSEMBLY	
	303007	RUBBER FOOT	
77	303011	SPACER, .75", 4-40 THREADED	
	450018	CHASSIS	
	450019	TOP PANEL	
	450020	SIDE PANEL	
	450021	BRACKET, REVERB TANK MOUNT	
70	455001	VU METER, DUAL	
75	500070	MACHINE SCREW, BLACK, PHILLIPS, 4-40X3/8	
73	500104	MACHINE SCREW, BLACK, PHILLIPS, 8-32x½	
74	500190	NUT, KEP, 6-32	
	500200	SCREW (for top panel) BLACK, No. 8x½	
	500201	MACHINE SCREW, BLACK, PHILLIPS, 8-32x½	
	500280	LOCKWASHER, BLACK, No. 8	
	500590	NUT, 3/8-32	
	500680	LOCKWASHER, 3/8	
	500681	FLAT WASHER, 3/8	



REV	DESCRIPTION	DATE
1	REVISED TO CHANGE	7-26-79
2	PRELIMINARY CIRCUIT	7-26-79
3	PRELIMINARY CIRCUIT	7-26-79
4	PRELIMINARY CIRCUIT	7-26-79

NOTES:  
 ○ LEFT CHANNEL & COMMON MUX PINS  
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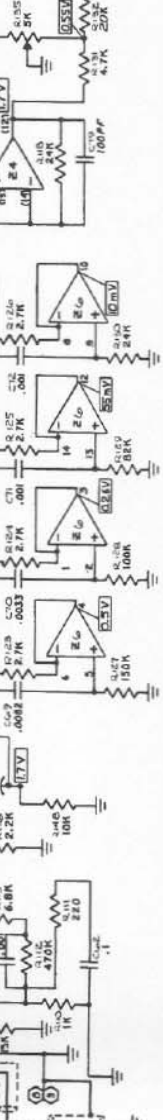
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2. ALL AC IS P.P.
3. VOLTAGES WITH NO SIGNAL
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REV	DESCRIPTION <td>DATE</td>	DATE
1	REVISED TO CHANGE	7-26-79
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3	PRELIMINARY CIRCUIT	7-26-79
4	PRELIMINARY CIRCUIT	7-26-79

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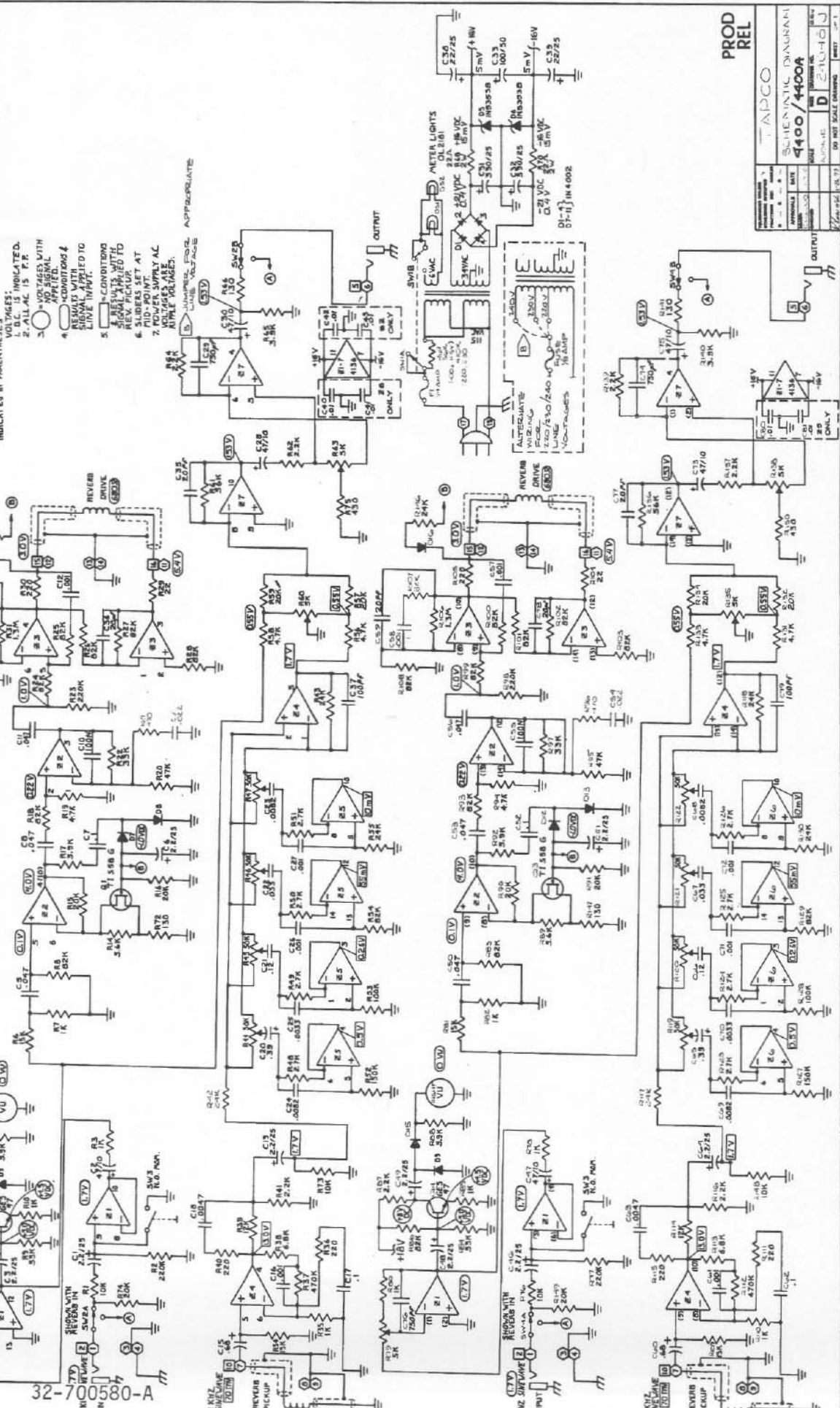


4400A--Reverb Tank p/n 303045; C5, C50 = .033mf; C8, C53 = .0068mf

REV	DESCRIPTION	DATE	APPROVED
1	DESIGN IN WITH CHANGE PEGZ, BCO, ABS	1-26-77	[Signature]
2	REL TO PRODUCTION	1-26-77	[Signature]

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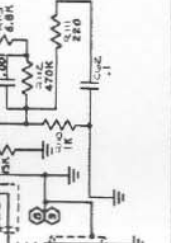
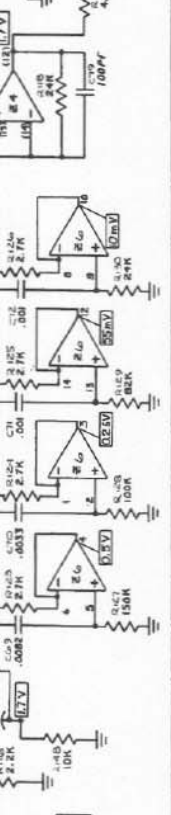
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5. CONDITIONS & SIGNALS APPLIED TO REVERSE DRIVE.
6. SLIDERS SET AT MID-POINT.
7. VOLTAGES ARE APPROXIMATE.



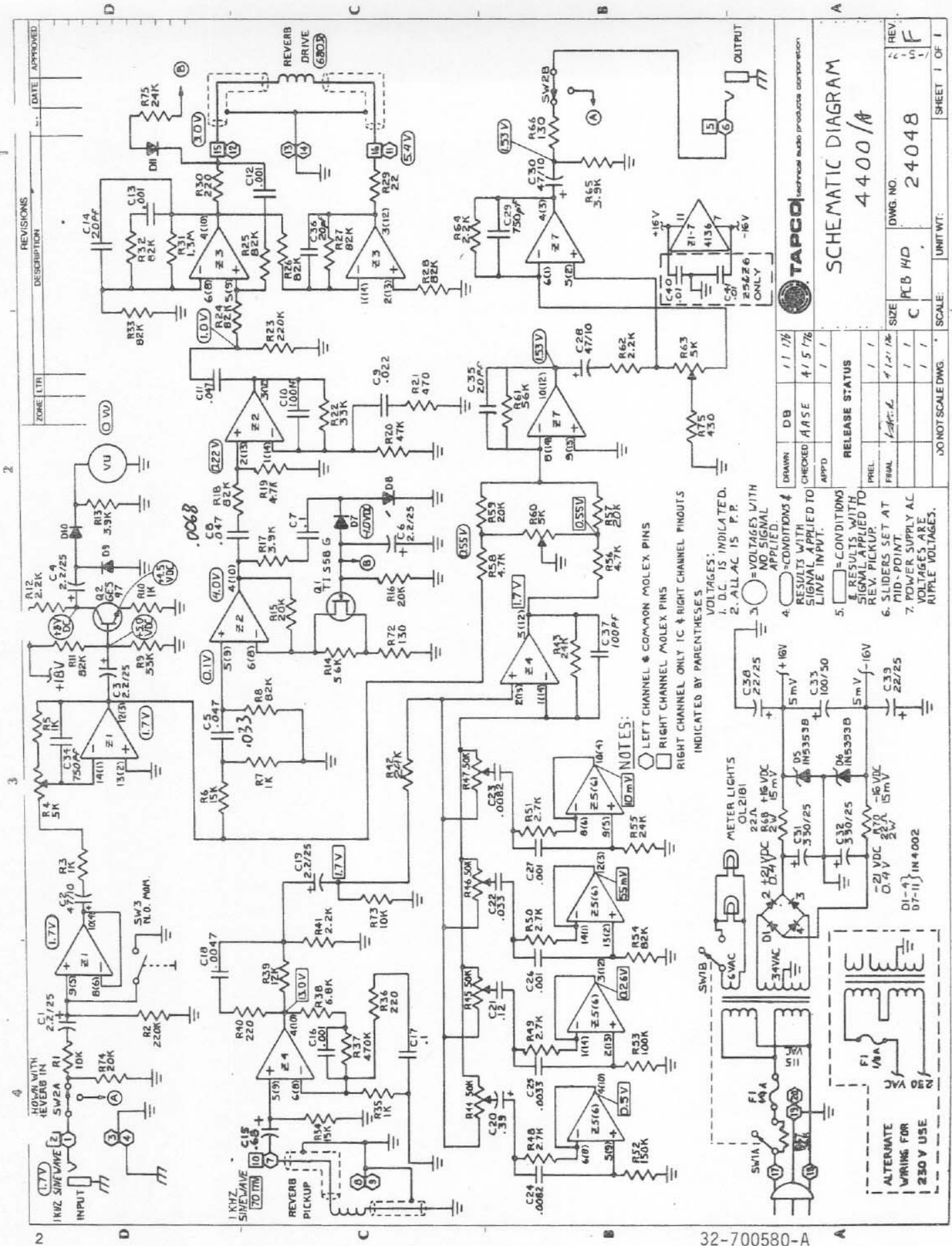
REV	DESCRIPTION	DATE	APPROVED
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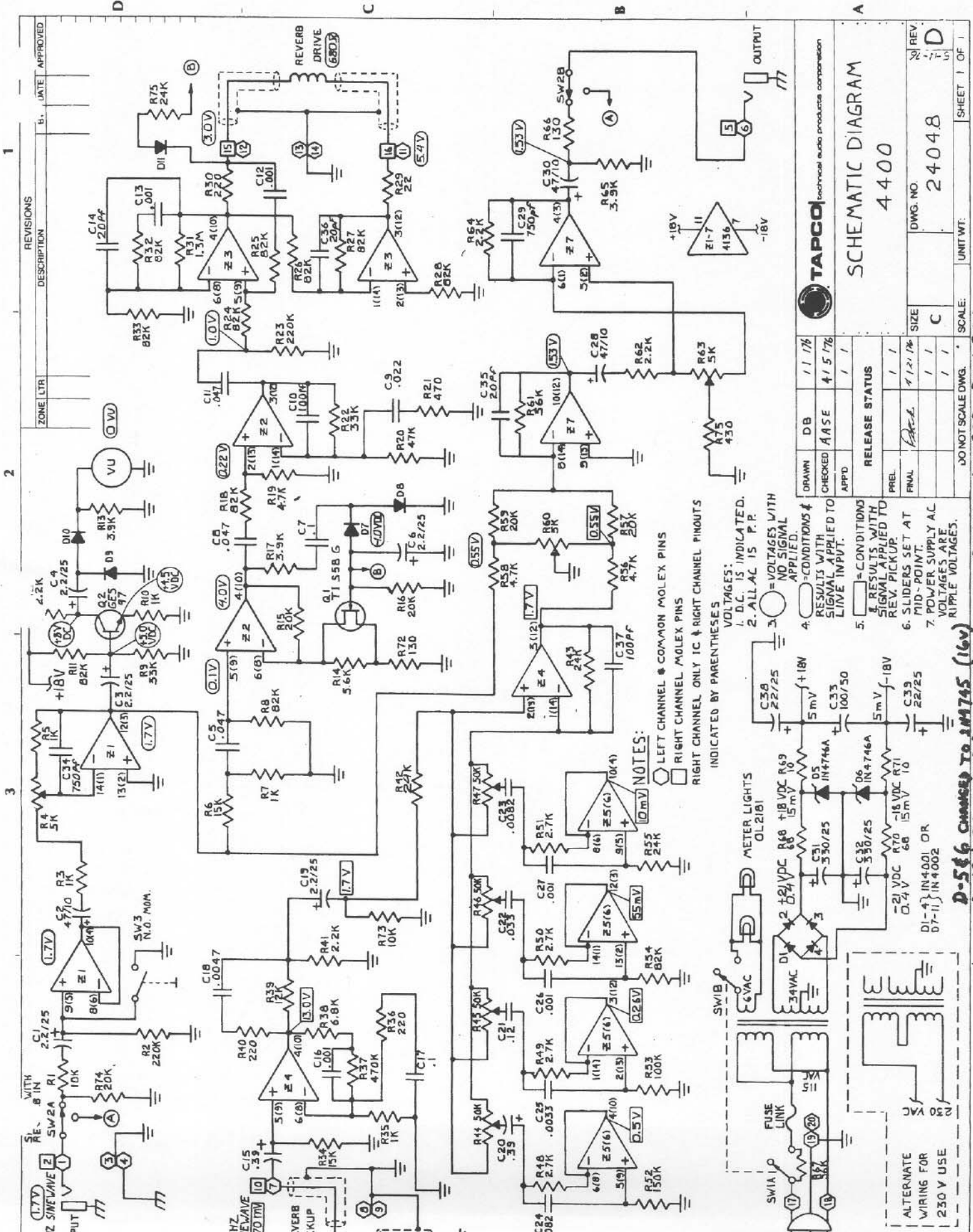
4400A--Reverb Tank p/n 303045; C5, C50=.033mf; C8, C53=.0068mf



ZONE	DATE	DESCRIPTION	APPROVED

		<b>SCHEMATIC DIAGRAM</b> 4400/A	
DRAWN: DB CHECKED: AASE APPD: / / /	1 / 176 4 / 5 7/6 / / /	RELEASE STATUS PREL: / / / FINAL: / / /	DWG. NO.: 24048 SIZE: PCB HD SCALE: UNIT WT.: DO NOT SCALE DWG.
METER LIGHTS OL2181 2 120VDC 22A 569 +16VDC 15mA 530/25 05 1M3535B 04 1M3535B 532 530/25 533 530/25 534 530/25 535 530/25 536 530/25 537 530/25 538 530/25 539 530/25 540 530/25 541 530/25 542 530/25 543 530/25 544 530/25 545 530/25 546 530/25 547 530/25 548 530/25 549 530/25 550 530/25 551 530/25 552 530/25 553 530/25 554 530/25 555 530/25 556 530/25 557 530/25 558 530/25 559 530/25 560 530/25 561 530/25 562 530/25 563 530/25 564 530/25 565 530/25 566 530/25 567 530/25 568 530/25 569 530/25 570 530/25 571 530/25 572 530/25 573 530/25 574 530/25 575 530/25 576 530/25 577 530/25 578 530/25 579 530/25 580 530/25 581 530/25 582 530/25 583 530/25 584 530/25 585 530/25 586 530/25 587 530/25 588 530/25 589 530/25 590 530/25 591 530/25 592 530/25 593 530/25 594 530/25 595 530/25 596 530/25 597 530/25 598 530/25 599 530/25 600 530/25		REV. 1 OF 1	

4400 A - Use Reverb tank 303045, Change ind. Caps



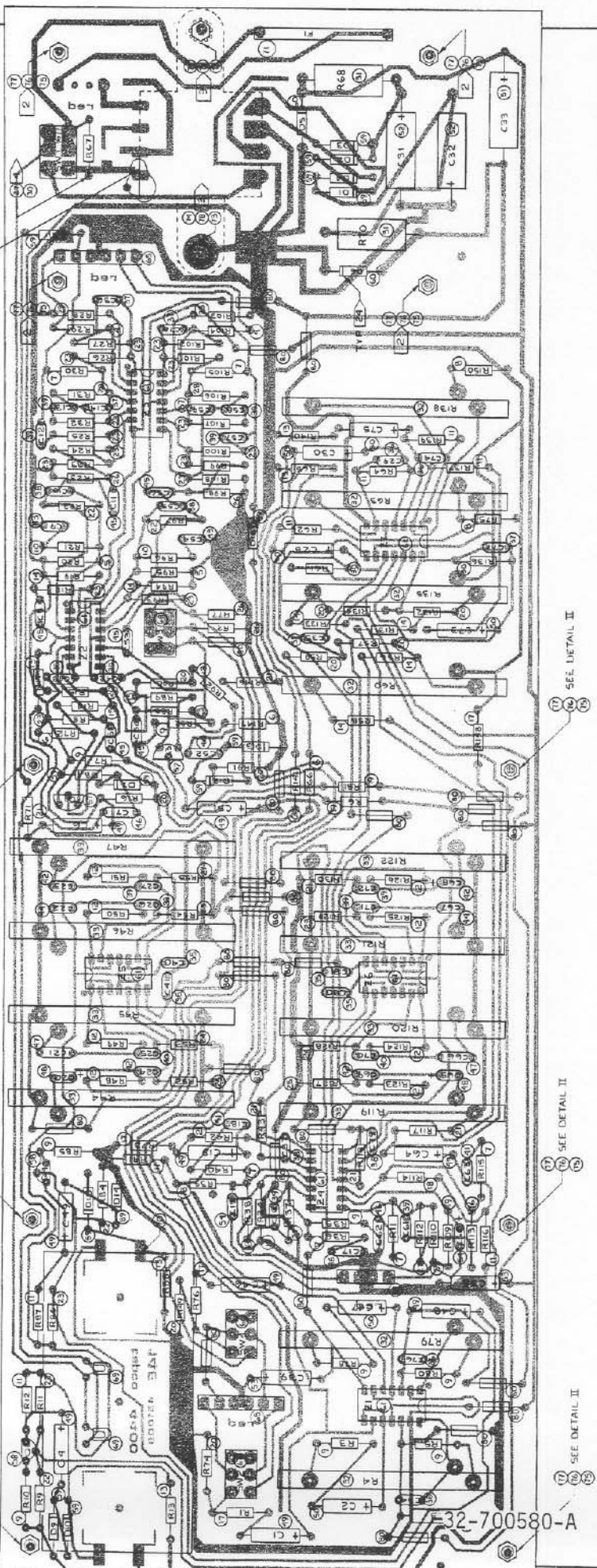
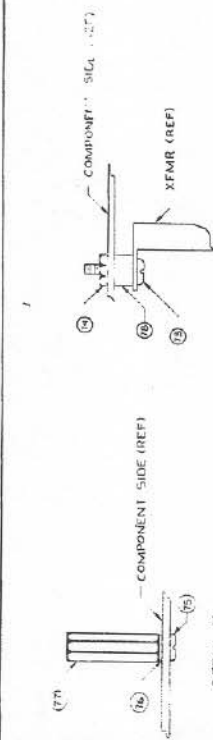
REVISIONS	DESCRIPTION	DATE	APPROVED
1			
2			
3			

DRAWN		DB	1/1/76
CHECKED		AAE	4/5/76
APPD			
RELEASE STATUS			
PREL	/	/	/
FINAL	Final	4/2/76	
SIZE		C	
DWG. NO.		24048	
REV.		D	

TAPCOI		SCHEMATIC DIAGRAM	
4400		32-700580-A	
UNIT WT.		SCALE:	
DO NOT SCALE DWG.		AFTER SERIAL NUMBER 096001	

- VOLTAGES:
- D.C. IS INDICATED.
  - ALL AC 15 P.P.
  - = VOLTAGES WITH NO SIGNAL APPLIED.
  - = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO REV. PICKUP.
  - = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO LINE INPUT.
  - SLIDERS SET AT MID-POINT.
  - POWER SUPPLY AC VOLTAGES ARE RIPLE VOLTAGES.
- NOTES:
- LEFT CHANNEL & COMMON MOLEX PINS INDICATED BY PARENTHESES
  - RIGHT CHANNEL MOLEX PINS INDICATED BY PARENTHESES

REV	DESCRIPTION	DATE	APPROVED
E	REDRAWN WITH CHANGE PER ECO 204	4-25-74	JL
F	SEE SHEET I	5-10-74	JL
H	SEE SHEET I	5-17-74	JL
J	INCORPORATED ECO 230	6-27-74	JL
K	ADDED SHEET B INCORPORATED ECO 132	7-19-74	JL
L	INCORPORATED ECO 342	12-5-74	JL
M	INCORP. ECO 351	2-27-75	JL
N	RELEASED TO PRODUCTION 342-B	3-19-75	JL
S	SEE SHEET I - 508 REV	1-2-75	JL



TI FAR SIDE

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

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SEE DETAIL II

SEE DETAIL II

TAPCO
PCB ASSY MAIN, 4400, 4460A
2/1 D 24 053 S
DO NOT SCALE DIMENSIONS

PROD REL

PCB 14 E

SEE SHEET I FOR NOTES

SHEET 2 OF 2

SHIELDING UNIT

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

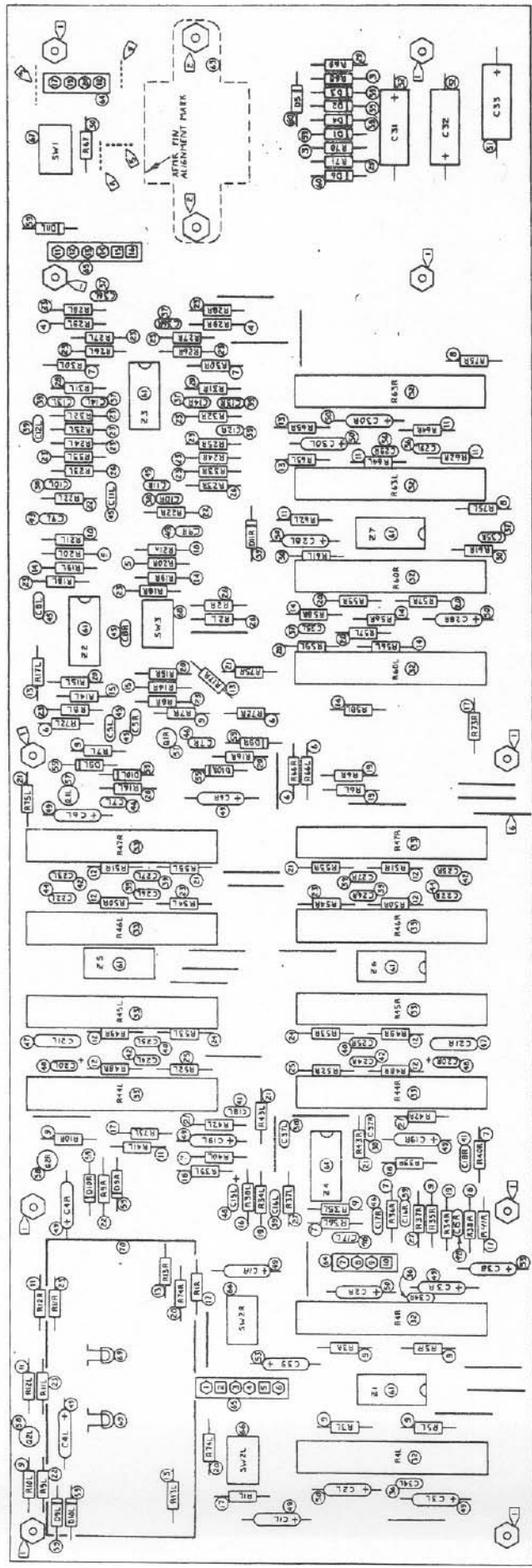
SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

SEE DETAIL II



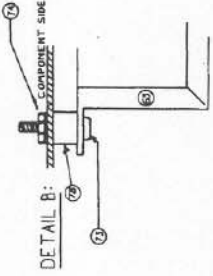
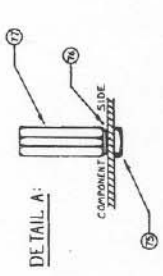
UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN INCHES  
 DIMENSIONS IN PARENTHESES ARE  
 DIMENSIONS IN MILLIMETERS

DATE: DB 2/23/76  
 CHECKED: J/ASE 4/16/76  
 J/PTD

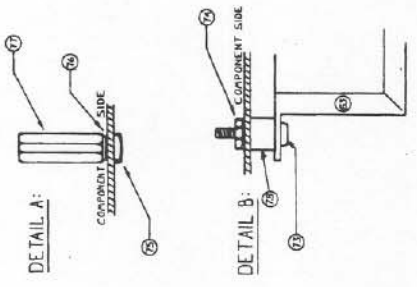
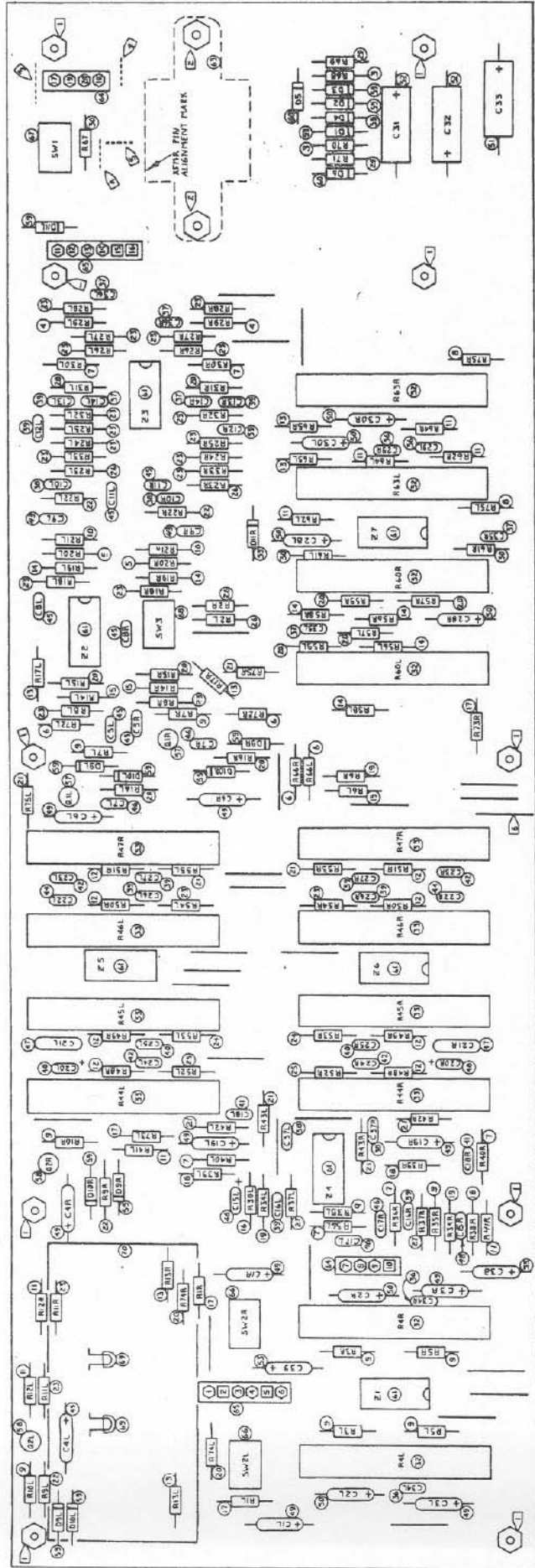
RELEASE STATUS  
 1 DEC 10 10:00 AM '76  
 2 DEC 10 10:00 AM '76  
 3 DEC 10 10:00 AM '76  
 4 DEC 10 10:00 AM '76  
 5 DEC 10 10:00 AM '76  
 6 DEC 10 10:00 AM '76  
 7 DEC 10 10:00 AM '76  
 8 DEC 10 10:00 AM '76  
 9 DEC 10 10:00 AM '76  
 10 DEC 10 10:00 AM '76

APPROVED: J/ASE 4/16/76  
 SIZE: D  
 SHEET NO: 24053  
 UNIT: WT  
 SCALE: 1:1  
 DO NOT SCALE DIMS

TAPCO  
 ASSEMBLY PCB 14C  
 MOTHERBOARD 4400



- NOTES:
- 1 - SEE DETAIL A
  - 2 - SEE DETAIL B
  - 3 - SINGLE STRAND OF #34 WIRE ADDED DURING REWORK (FUSE LINK)
  - 4 - 10V CONNECTION - #22 SOLID WIRE ADDED DURING REWORK
  - 5 - 250V CONNECTION
  - 6 - TYPICAL OF ALL JUMPERS



- NOTES:**
- 1 SEE DETAIL A
  - 2 SEE DETAIL B
  - 3 SINGLE STRAND OF #24 WIRE ADDED DURING REWORK (POUSE LINK)
  - 4 110V CONNECTION. #22 SOLID WIRE ADDED DURING REWORK.
  - 5 230V CONNECTION.
  - 6 TYPICAL OF ALL JUMPERS.

UNLESS OTHERWISE SPECIFIED  
 USE THE FOLLOWING DIMENSIONS  
 ALL DIMENSIONS IN MILLIMETERS  
 DIMENSIONS IN PARENTHESES ARE  
 DIMENSIONS IN INCHES

DATE: 2/23/76  
 DRAWN: DB  
 CHECKED: ASE  
 4/16/79

RELEASE STATUS: **ASSEMBLY PCB 14C**  
**MOTHERBOARD 44.00**

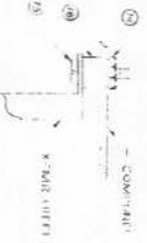
DATE: 1/11/1994  
 TIME: NO 24053  
 SIZE: D  
 SCALE: 1:1  
 SHEET: 1 OF 1

DO NOT SCALE DIMS. UNIT: INCH

32-700580-A

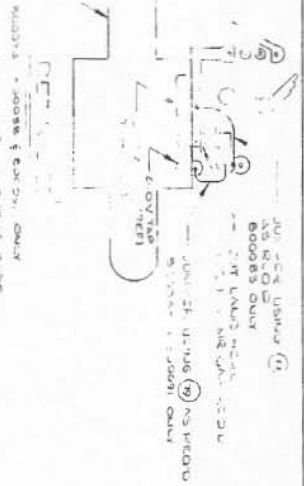


COMPONENT AND INTERCONNECT



DETAIL III

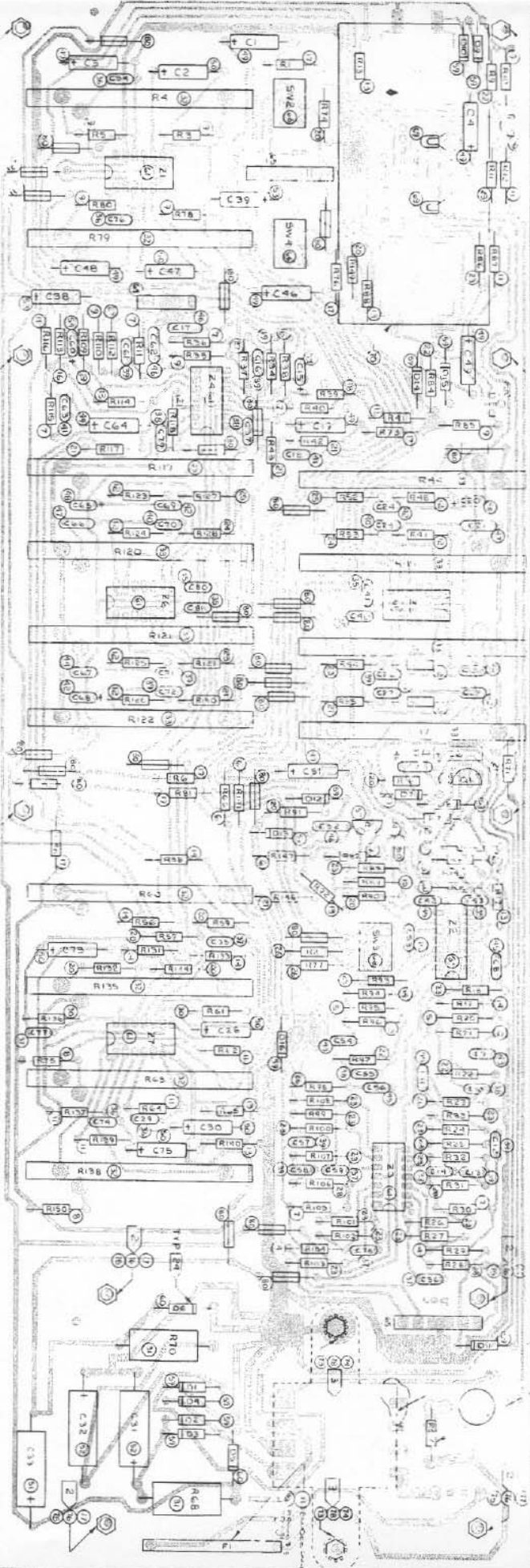
SEE DETAIL II



SEE DETAIL II

SEE DETAIL II

SEE DETAIL II



SEE DETAIL II

SEE DETAIL II

SEE DETAIL II

PCB 31 NEW

PROD REL

REV	DATE	BY	CHKD	APP'D
1	10/1/53	...	...	...
2	10/1/53	...	...	...
3	10/1/53	...	...	...
4	10/1/53	...	...	...
5	10/1/53	...	...	...

PCB 31 NEW  
TAPCO  
PCB 31 NEW  
PCB 31 NEW  
PCB 31 NEW  
PCB 31 NEW

SEE SHEET I FOR NOTES