CONTENTS

TAPCO®

MODEL 4400
SERVICE MANUAL

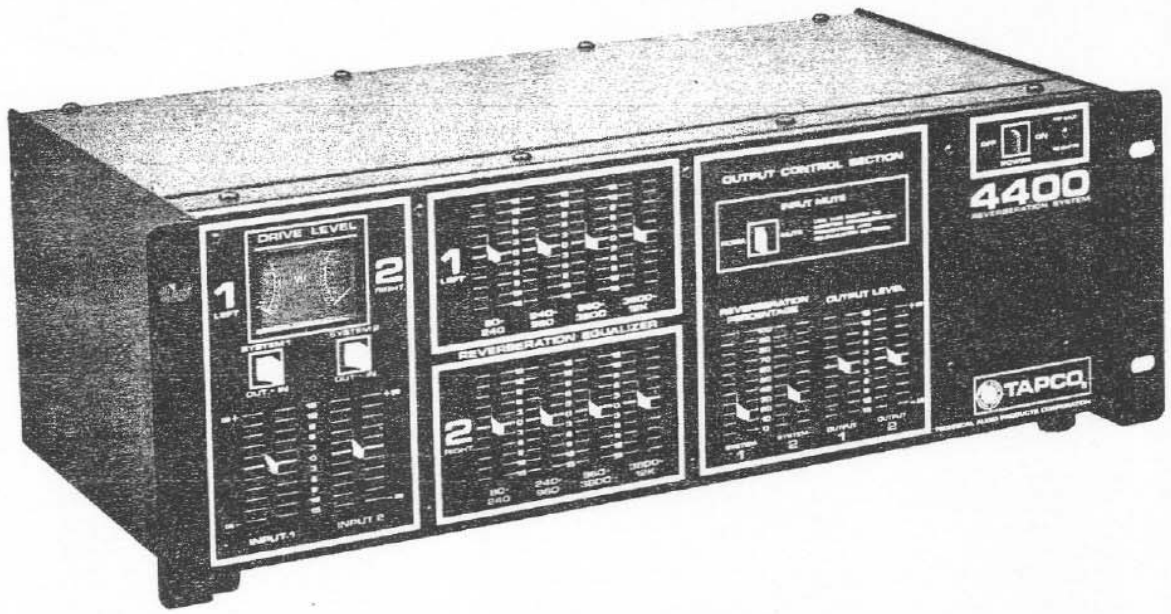
TECHNICAL AUDIO PRODUCTS CORPORATION

P/N 700206

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.

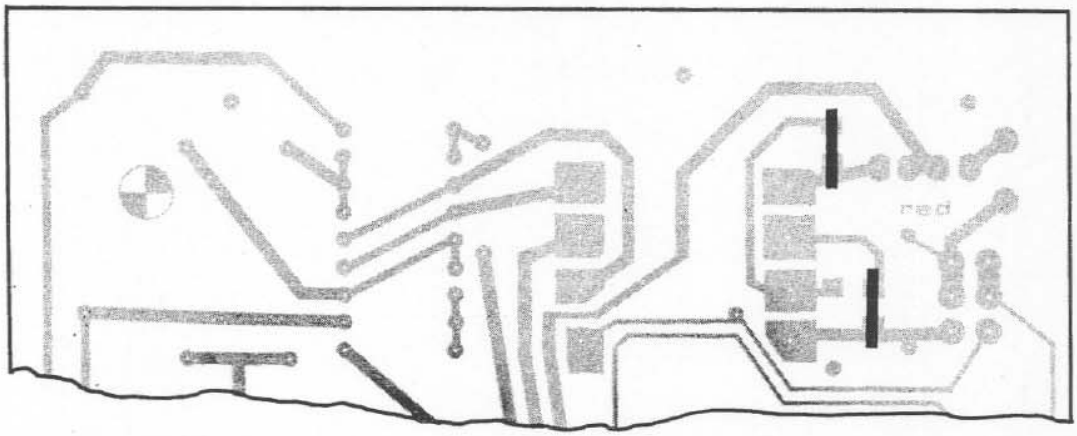
4. The reverb spring assembly can be removed, if necessary, by taking out three black screws from the bottom on the unit. This assembly can be taken out independently of the circuit board.

5. Assembly is the reverse of these steps. Take special care to replace the multi-pin connectors the right way.

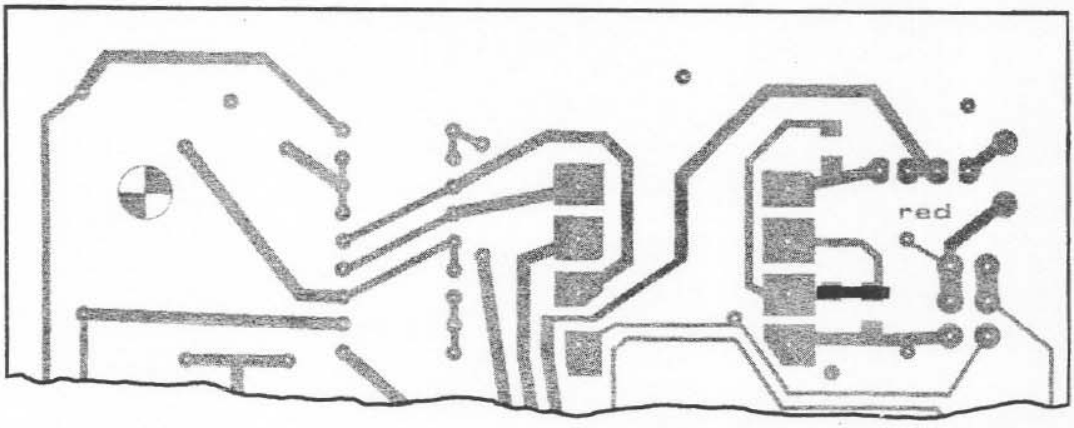
120-240 Volt Conversion

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.

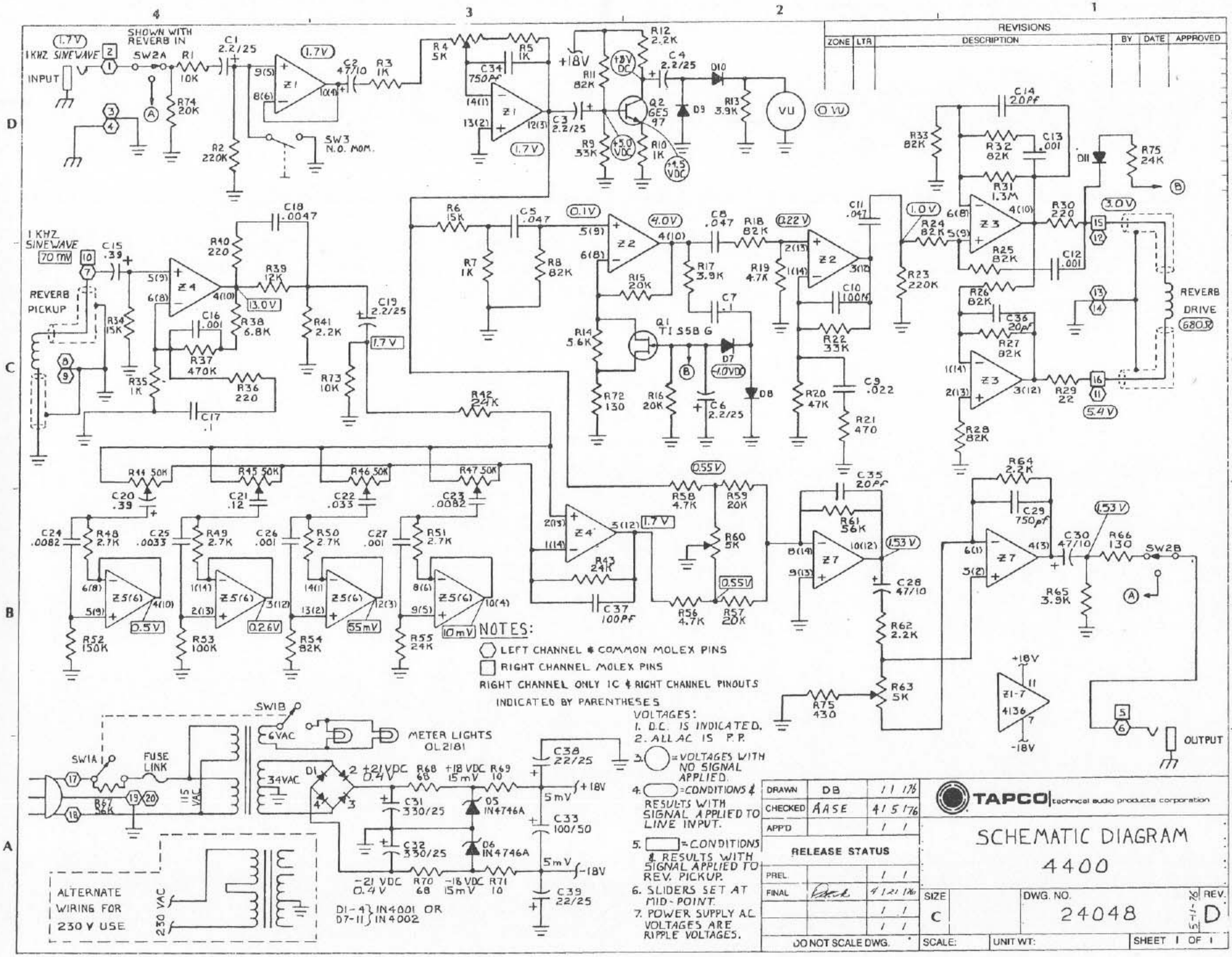
120 Volts

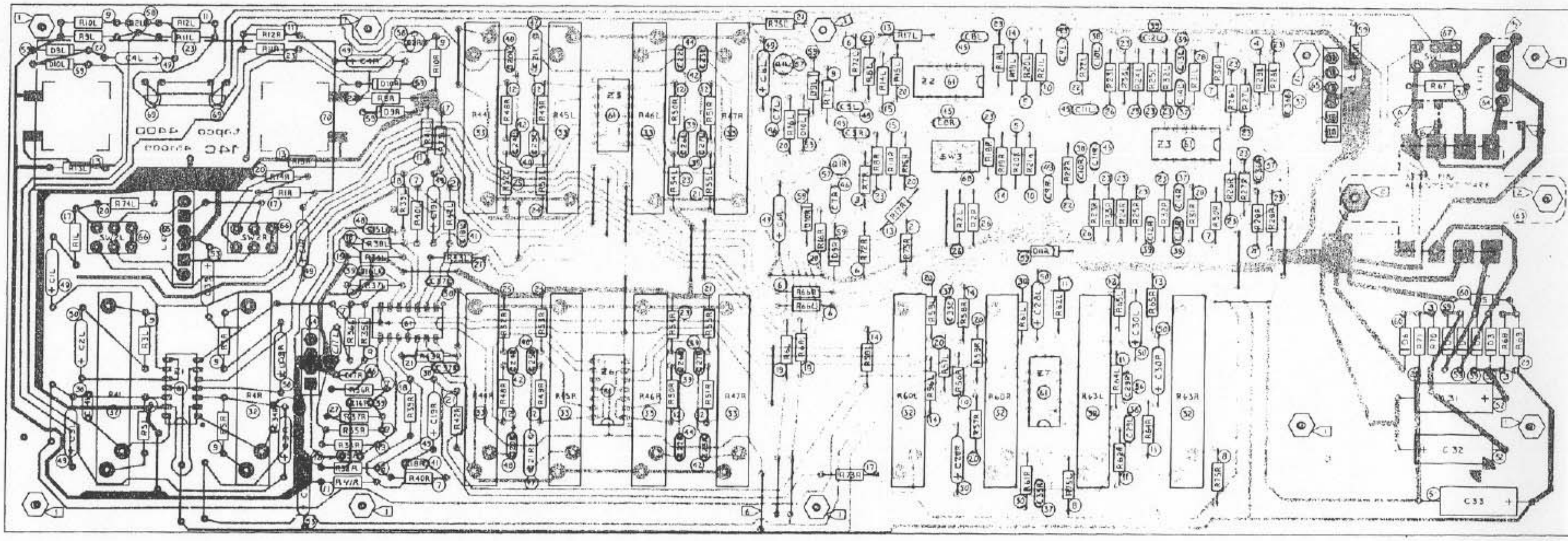


240 Volts



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

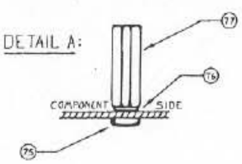

NOTES:
LEFT CHANNEL & COMMON MOLEX PINS
RIGHT CHANNEL MOLEX PINS
RIGHT CHANNEL ONLY IC & RIGHT CHANNEL PINOUTS INDICATED BY PARENTHESES
VOLTAGES:
1. D.C. IS INDICATED.
2. ALL AC IS P.P.
3. = VOLTAGES WITH NO SIGNAL APPLIED.
4. = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO LINE INPUT.
5. = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO REV. PICKUP.
6. SLIDERS SET AT MID-POINT.
7. POWER SUPPLY AC VOLTAGES ARE RIPPLE VOLTAGES.
REVISIONS
ZONE
LTR
DESCRIPTION
BY
DATE
APPROVED
1 KHZ SINEWAVE
INPUT
SHOWN WITH REVERB IN
SW3 N.O. MOM.
REVERB PICKUP
REVERB DRIVE
OUTPUT
METER LIGHTS OL2181
FUSE LINK
ALTERNATE WIRING FOR 230 V USE
D1-4 IN4001 OR D7-11 IN4002
DRAWN DB 1 1 76
CHECKED AASE 4 15 76
APP'D
RELEASE STATUS
PREL.
FINAL 4 21 76
DO NOT SCALE DWG.
TAPCO technical audio products corporation
SCHEMATIC DIAGRAM
4400
SIZE C
DWG. NO. 24048
REV. D
SCALE:
UNIT WT:
SHEET 1 OF 1



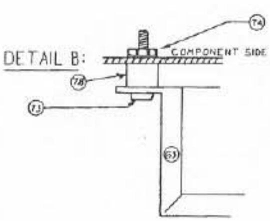
NOTES:

1. SEE DETAIL A.
2. SEE DETAIL B.
3. SINGLE STRAND OF #34 WIRE ADDED DURING REWORK (FUSE LINK).
4. 110V CONNECTION. #22 SOLID WIRE ADDED DURING REWORK.
5. 230V CONNECTION. " " " " "
6. TYPICAL OF ALL JUMPERS. (80)

DETAIL A:



DETAIL B:



UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES	DRAWN DB 2 23 76	TAPCO	
	CHECKED		
	RELEASE STATUS	ASSEMBLY PCB 14C MOTHERBOARD 4400	
		SIZE D	DWG NO 24053	REV B
	DO NOT SCALE DWG	SCALE	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.

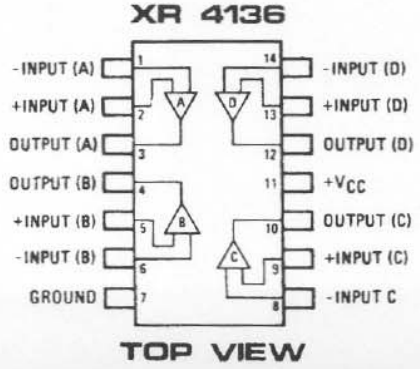
The first element of the spring drive section is limiting amp Z2(a). This simple FET compressor limits program peaks above optimum level (zero VU) to aid in the reduction of overload distortion and noise. The second section of Z2 provides the proper equalization to drive the spring unit. Z3 (upper) provides 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 ±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

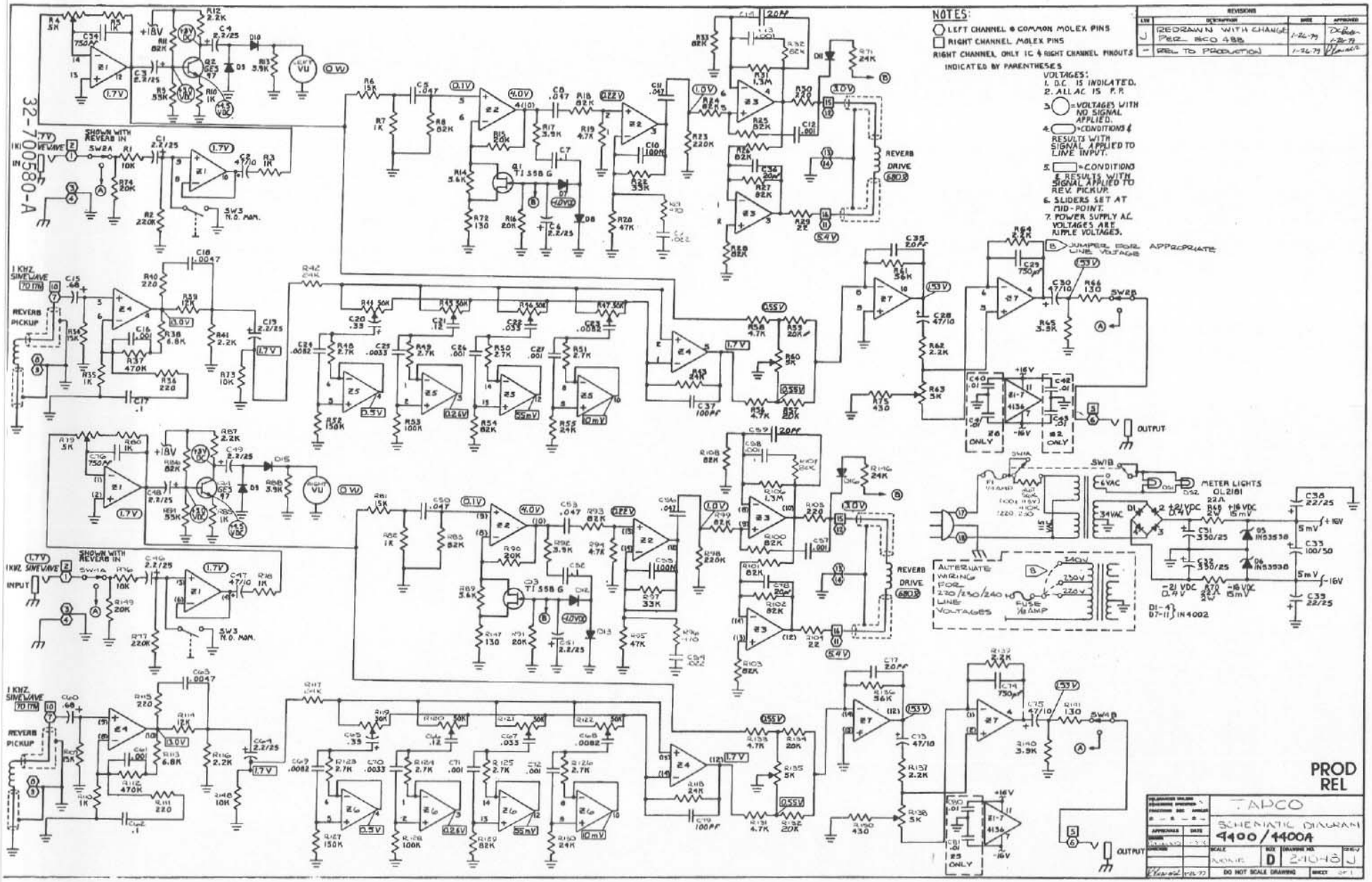
Frequency Response (straight through)	10 Hz to 25 kHz ±1Db (-3Db @ 40kHz)
Harmonic Distortion (straight through)	.05% at +10dbm out
IM Distortion (straight through)	.05% at 25 volts P-P out
S/N Ratio (straight through)	better than 80db Ref; 1 volt in/out
S/N Ratio (50% Reverb mix, equalization set flat, 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	±15db
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	12¼ pounds

Factory Assistance

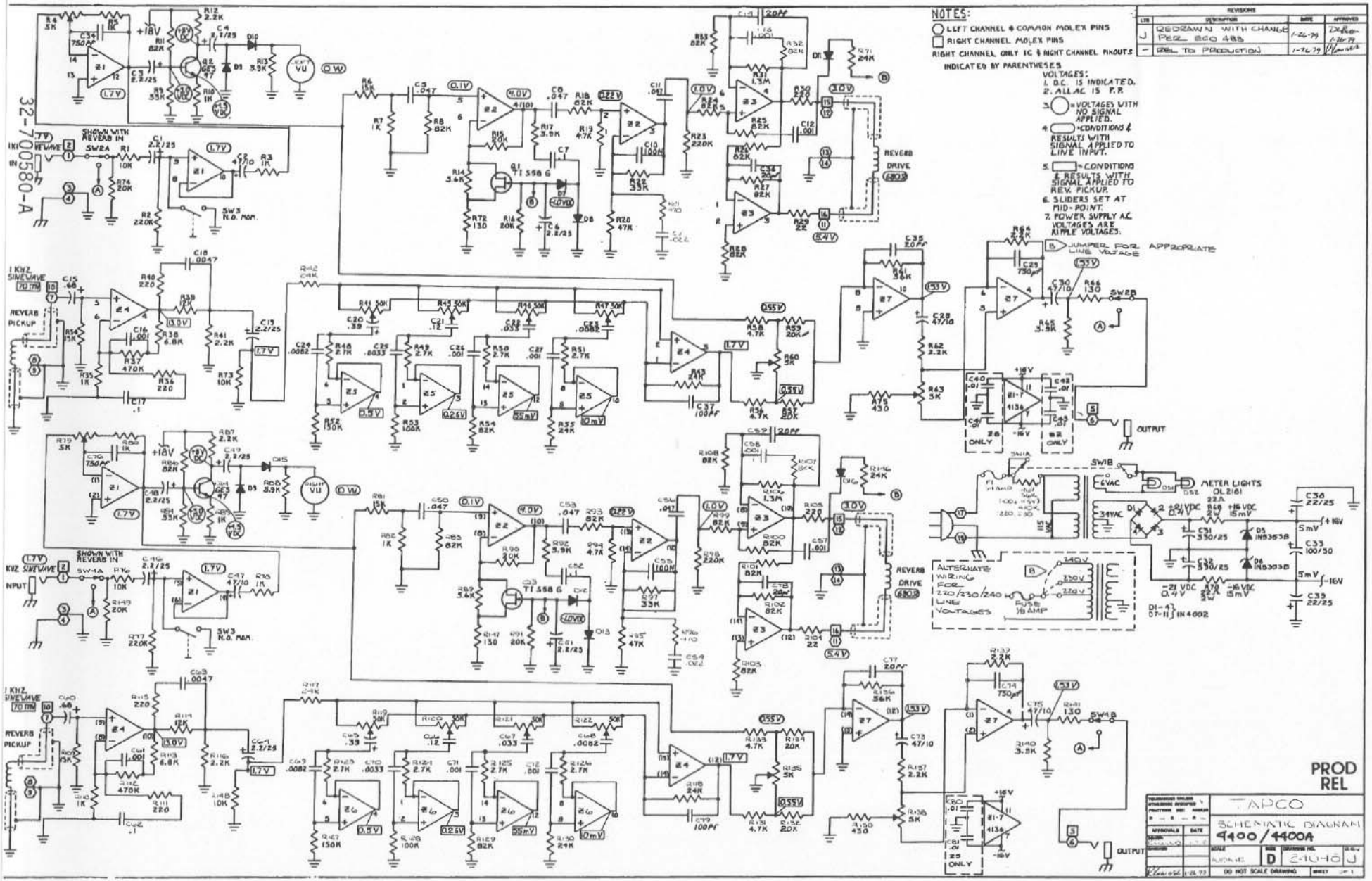
TAPCO has a staff of qualified technical service personnel who can assist with any problems which may arise in the field, and are able to answer questions concerning any aspect of the use and performance of our products. You may either call us at area code 206-775-4411, or write to TAPCO at 405 Howell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

Parts List

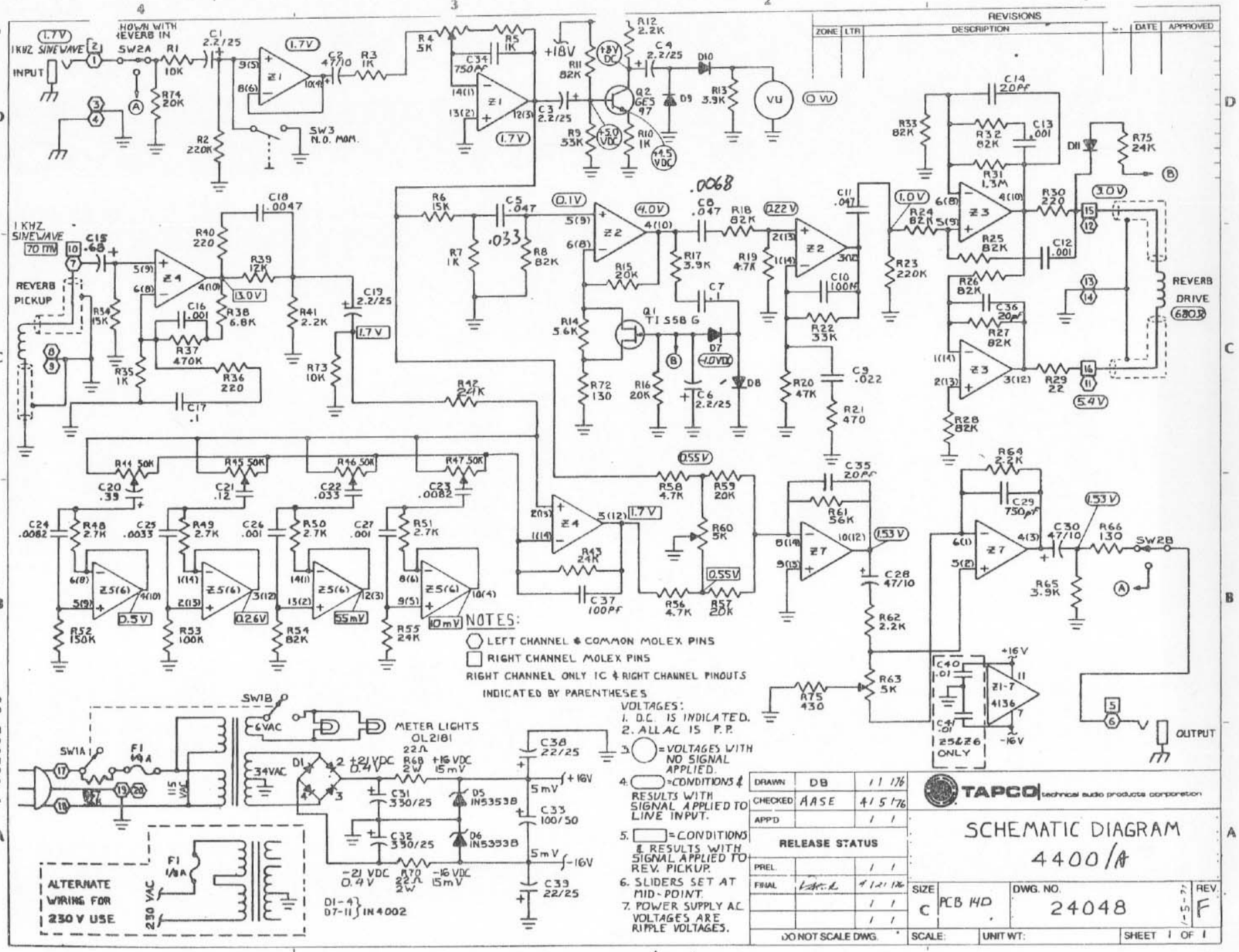
item no.	tapco part no.		
50	001211	CAPACITOR, ELECTROLYTIC	47/10V
49	001403	" "	2.2/25V
53	001408	" "	22/25V
52	001415	" "	330/25V
51	001612	" "	100/50
48	002012	CAPACITOR, TANTALUM	.39/35V
39	003001	CAPACITOR, MYLAR	.001/50V
40	003019	" "	.0033/50V
41	003025	" "	.0047/50V
42	003034	" "	.0082/50V
44	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	



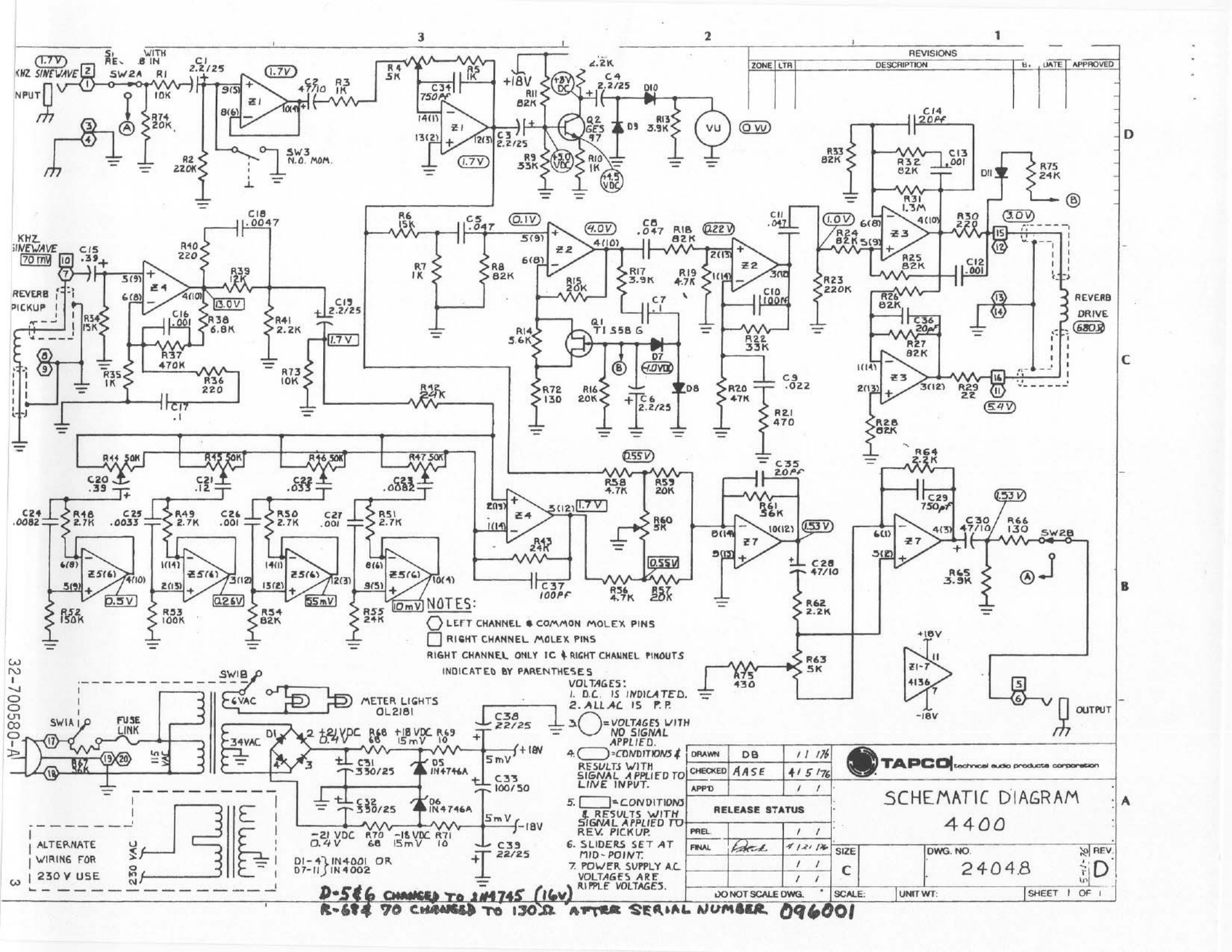
4400A--Reverb Tank p/n 303045;; C5,C50=.033mf; C8,C53=.0068mf



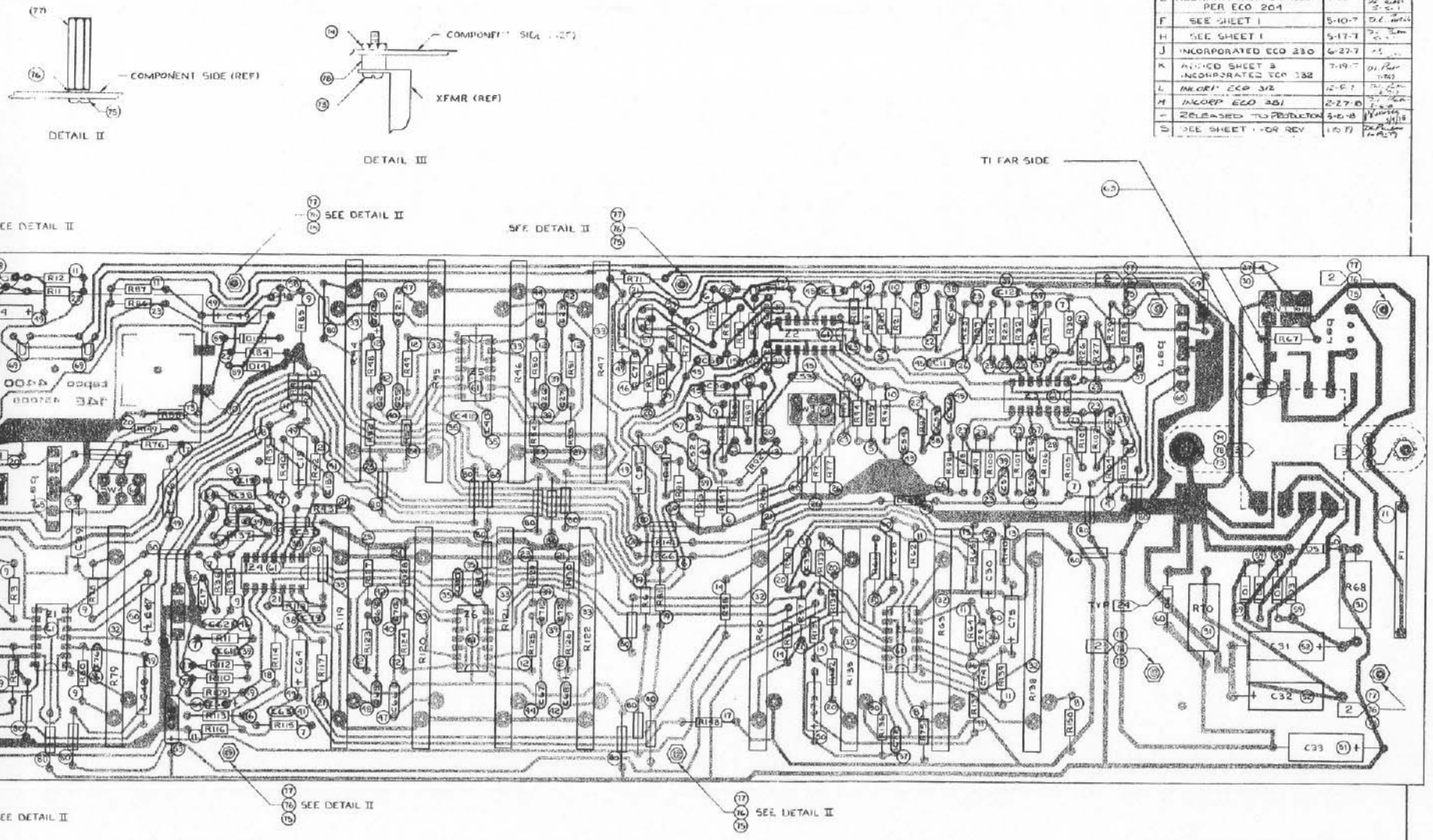
4400A--Reverb Tank p/n 303045;: C5,C50=.033mf; C8,C53=.0068mf



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


REVISIONS
ZONE | LTR | DESCRIPTION | BY | DATE | APPROVED
NOTES:
LEFT CHANNEL & COMMON MOLEX PINS
RIGHT CHANNEL MOLEX PINS
RIGHT CHANNEL ONLY IC & RIGHT CHANNEL PINOUTS INDICATED BY PARENTHESES
VOLTAGES:
1. D.C. IS INDICATED.
2. ALL AC IS P.P.
3. = VOLTAGES WITH NO SIGNAL APPLIED.
4. = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO LINE INPUT.
5. = CONDITIONS & RESULTS WITH SIGNAL APPLIED TO REV. PICKUP.
6. SLIDERS SET AT MID-POINT.
7. POWER SUPPLY A.C. VOLTAGES ARE RIPPLE VOLTAGES.
ALTERNATE WIRING FOR 230 V USE
D1-4 } IN4001 OR
D7-11 } IN4002
DRAWN DB 11/1/76
CHECKED AASE 4/5/76
APP'D
RELEASE STATUS
PREL.
FINAL 4/12/76
TAPCO technical audio products corporation
SCHEMATIC DIAGRAM
4400
SIZE C
DWG. NO. 24048
REV. D
SCALE:
UNIT WT:
SHEET 1 OF 1
DO NOT SCALE DWG.
32-700580-A
D-5 & 6 CHANGED TO 1N4745 (16V)
R-68 TO CHANGED TO 130Ω AFTER SERIAL NUMBER 096001

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
E	REDRAWN WITH CHANGE PER ECO 204	4-25-7	
F	SEE SHEET 1	5-10-7	
H	SEE SHEET 1	5-17-7	
J	INCORPORATED ECO 230	6-27-7	
K	ADDED SHEET 3 INCORPORATES ECO 332	7-19-7	
L	INCORP ECO 372	12-5-7	
M	INCORP ECO 481	2-27-8	
-	RELEASED TO PRODUCTION	3-6-8	
S	SEE SHEET 1 FOR REV	1-6-17	



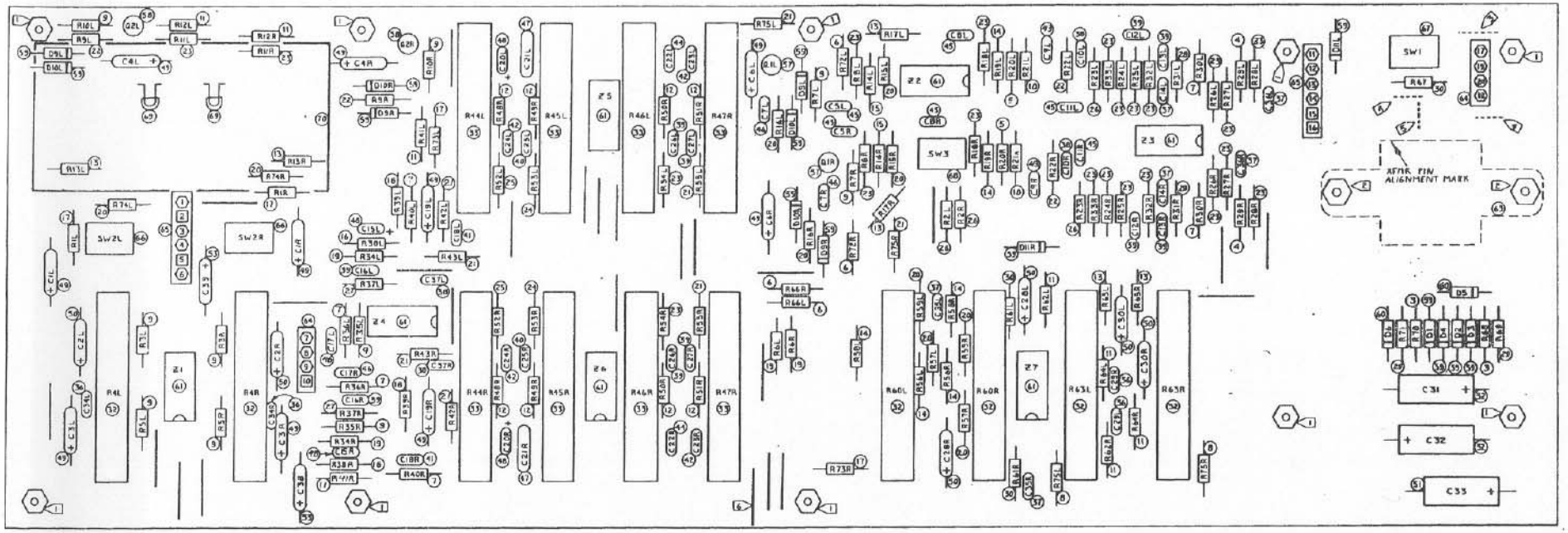
SHEET 2: 8000H ONLY

SEE SHEET 1 FOR NOTES

PCB 14 E

PROD REL

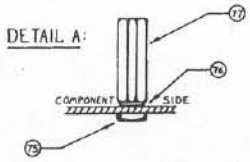
TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ± DEC ± ANGLES ±	TAPCO		
APPROVALS / DRAWN ENGLUND 4257	PCB ASSY MAIN 4400 4400A		
SCALE 2/1	SIZE D	DRAWING NO. 24053	REV S
DO NOT SCALE DRAWING	SHEET 2 OF 3		



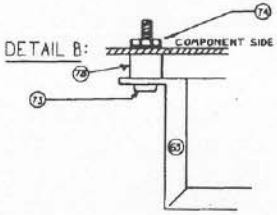
NOTES:

1. SEE DETAIL A
2. SEE DETAIL B.
3. SINGLE STRAND OF #34 WIRE ADDED DURING REWORK (FUSE LINK).
4. 110V CONNECTION. #22 SOLID WIRE ADDED DURING REWORK.
5. 230V CONNECTION. " " " " "
6. TYPICAL OF ALL JUMPERS.

DETAIL A:



DETAIL B:



UNLESS OTHERWISE SPECIFIED DIM AND TOL ARE IN INCHES AND SHALL BE INTERPRETED PER ANSI (Y 14.5-1966)
TOLERANCES ARE:
1 DEC ± 3 DEC ± .005
2 DEC ± .01 4 DEC ± .0005
ANGLES ± 0 30
REMOVE BURRS, BRK SHARP EDGES
MACH SURFACES

MAT'L
FINISH
HT TREAT

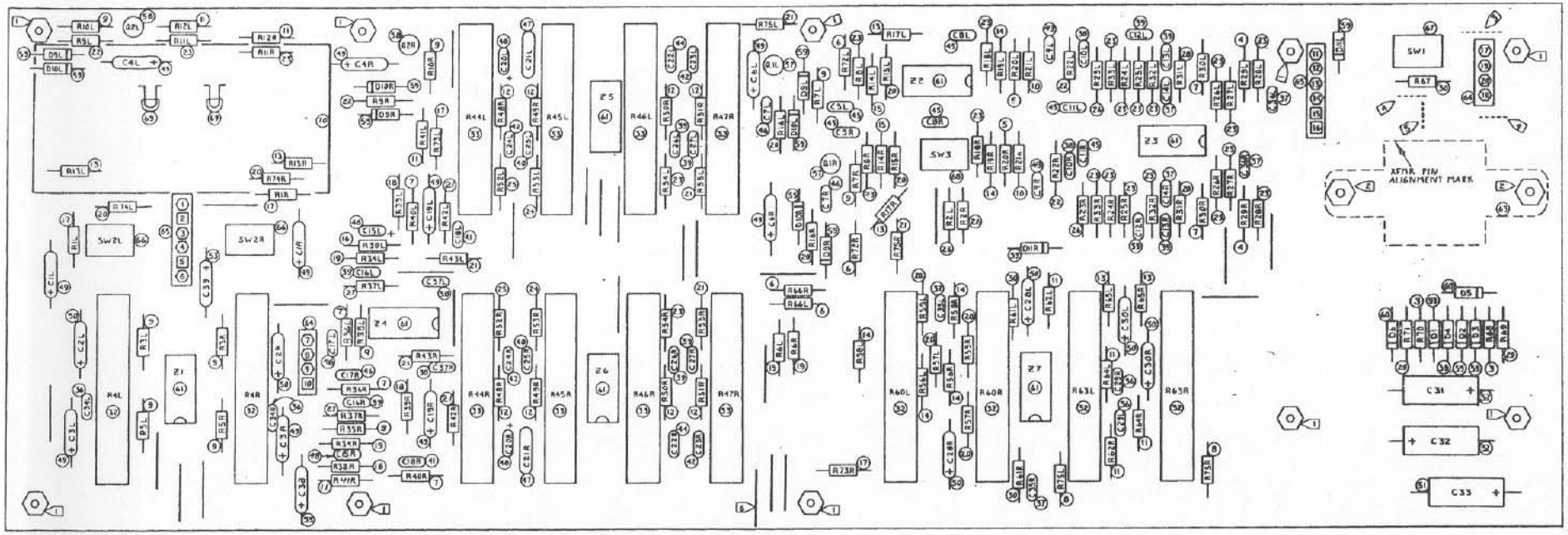
DRAWN DB 2/23/76
CHECKED AASE 4/6/76
APP'D
RELEASE STATUS
PREL
FINAL

TAPCO

ASSEMBLY PCB 14C
MOTHERBOARD 4400

SIZE D
DWG NO 24053
REV B
DO NOT SCALE DWG
SCALE
UNIT WT
SHEET 1 OF 1

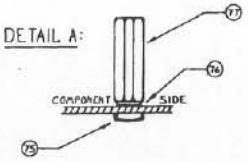
32-700580-A



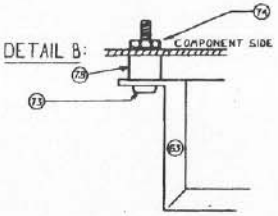
NOTES:

1. SEE DETAIL A
2. SEE DETAIL B.
3. SINGLE STRAND OF #34 WIRE ADDED DURING REWORK (FUSE LINK).
4. 110V CONNECTION. #22 SOLID WIRE ADDED DURING REWORK.
5. 230V CONNECTION. " " " " "
6. TYPICAL OF ALL JUMPERS. (20)

DETAIL A:



DETAIL B:



UNLESS OTHERWISE SPECIFIED DIM AND TOL ARE IN INCHES AND SHALL BE INTERPRETED PER ANSI (Y 14.5-1966)
TOLERANCES ARE
1 DEC ± .1 2 DEC ± .01 3 DEC ± .005 4 DEC ± .0005
ANGLES ± 0.30
REMOVE BURRS, BRK SHARP EDGES MACH SURFACES

*MATL
FINISH
HT TREAT

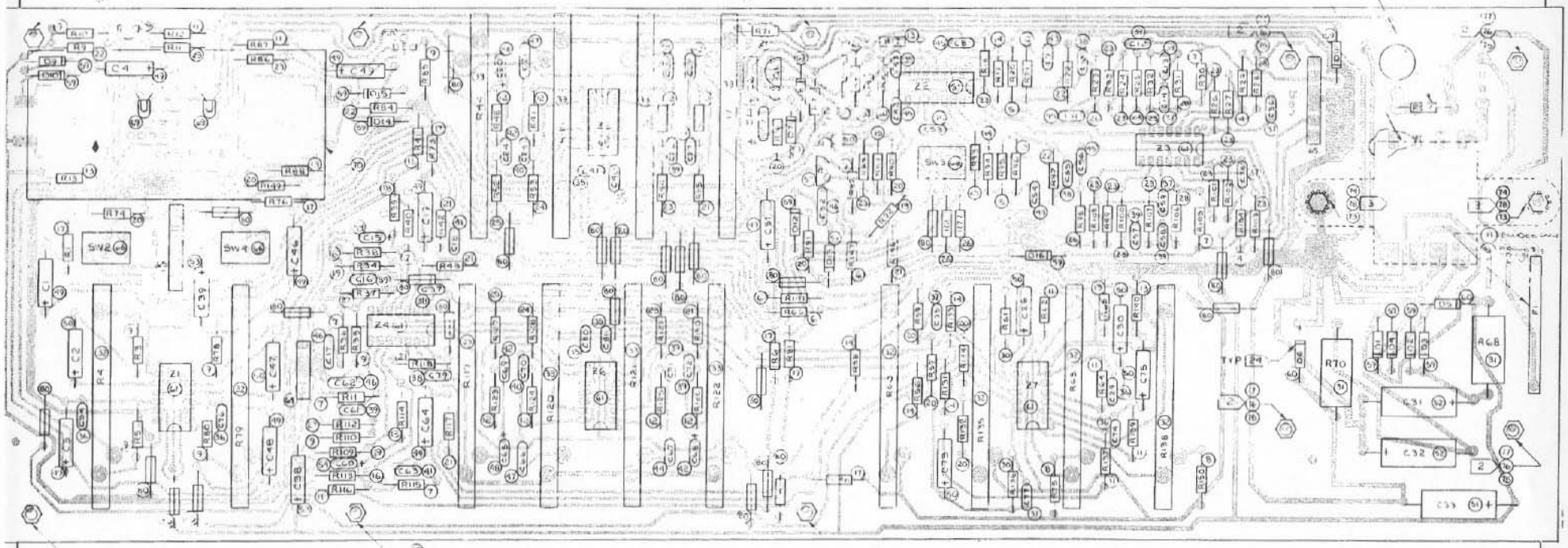
DRAWN DB 2/23/76
CHECKED AASE 4/4/76
APPD
RELEASE STATUS
PREL
FINAL

TAPCO
ASSEMBLY PCB 14C
MOTHERBOARD 4400

SIZE D
DWG NO 24053
REV B
DO NOT SCALE DWG
SCALE
UNIT WT
SHEET 1 OF 1

32-700580-A

32-700580-A



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
K	ADDED SHEET 5		

SEE SHEET 1 FOR NOTES

TAPCO

PCB ASSY MAIN 4400

APPROVALS	DATE
DRAWN	
CHECKED	

SCALE 2/1 | SIZE D | DRAWING NO. 24053 | REV S

DO NOT SCALE DRAWING | SHEET 3 OF 5

PROD REL

PCB 31 NEW

7