

TWIN (PRO-TUBE) AMP

p/n 021-5700-000 (120V)

SERVICE MANUAL



panel

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TWIN (PRO-TUBE) AMP
(This is the model name for warranty claims)

SERVICE MANUAL

JUNE 2001

IMPORTANT NOTICE:

The information contained herein is CONFIDENTIAL and PROPRIETARY to Fender Musical Instruments Corp. It is disclosed solely for use by qualified technicians for purposes of equipment maintenance and service. It is not to be disclosed to others without the expressed permission of Fender Musical Instruments Co. All specifications subject to change without notice.

For warranty repair service, only Fender specified part numbers are to be used. It is recommended they also be used for post-warranty maintenance and repair.

Parts marked with an asterisk (*) indicate the required use of that specific part. This is necessary for RELIABILITY and SAFETY requirements. **DO NOT USE A SUBSTITUTE!**

A coded naming convention is used in the description of certain parts. The codes and what they mean are as follows:

CAPACITOR CODES

CAP AE = Aluminum Electrolytic
CAP CA = Ceramic Axial
CAP CD = Ceramic Disk
CAP MPF = Metalized Polyester Film
CAP MY = Mylar
CAP PFF = Polyester Film/Foil

RESISTOR CODES

RES CC = Carbon Comp
RES CF = Carbon Film
RES FP = Flame Proof
RES MF = Metal Film
RES WW = Wire Wound

HARDWARE CODES

BLX = Black Oxide
CR = Chrome Plated
HWH = Hex Washer Head
M = Machine Screw
NI = Nickel Plated
OHP = Oval Head Phillips
PB = Particle Board
PHP = Pan Head Phillips
PHPS = Pan Head Phillips Sems
SMA = Sheet Metal "A" Point
SMB = Sheet Metal "B" Point
SS = Stainless Steel
TF = Thread Forming
ZI = Zinc Plated

TWIN (PRO-TUBE) AMP

SPECIFICATIONS

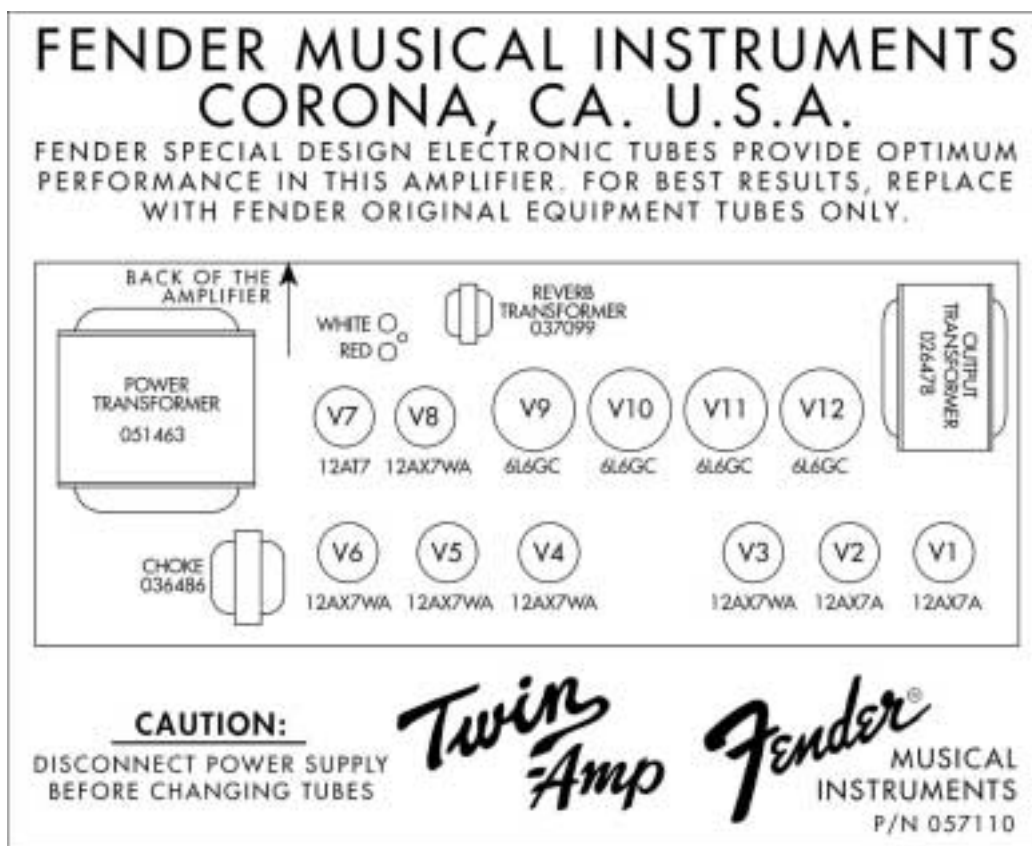
Product Release No.:	PR 449 <i>(This is not a model number)</i>
Part Number:	120V Version : 21-5700 240V Aus : 21-5730 230V UK : 21-5740 230V Eur : 21-5760 100V : 21-5770
Power Requirements:	360W
Power Amp Section:	
Power Output:	100 Watts RMS (High Output) 25 W RMS (1/4 Output) 1kHz sine wave into 4 Ω @<5% THD (Presence @ "1")
Input impedance:	1M Ω
Tubes:	Four 6L6GC (P/N 053980) Two 12AX7A (P/N 023572) Five 12AX7WA (P/N 013341) One 12AT7 (P/N 023531)
Fuses:	
F200:	T4A 250V (100V, 120V units) T2A 250V (230V, 240V units)
F201:	T5A 250V (Internal filament fuse on 230V, 240V units)
F1 & F2:	T100mA 250V (all units)
Speaker Complement:	Two 8 Ω Fender 12" (P/N 037617)
Footswitch:	Four-Button: Channel, Effects, Reverb, Tremolo (P/N 057025)
Dimensions:	Height: 19 7/8" (50.7 cm) Width: 26 3/8" (67.3 cm) Depth: 12 27/32" (32.8 cm)
Weight:	80 lbs. (36.3 kg)

Product specifications are subject to change without notice

TWIN (PRO-TUBE) AMP

SERVICE NOTES

1. **CHASSIS REMOVAL** is accomplished by first removing eight (8) screws from the top, and one (1) screw from each side of the cabinet; disconnect reverb and speaker wires, then slide the chassis toward the rear.
2. **TUBE CHART:**



3. **OUTPUT TUBE BIAS & BALANCE ADJUSTMENTS**
 - A. Warm up the amp for 2 minutes with STAND BY OFF and the OUTPUT POWER set to FULL. Set SPEED and INTENSITY TO "1" and make sure TREMOLO is OFF. Flip the STAND BY switch to the UP position.
 - B. Remove the bias controls cover box.
 - C. Set BIAS: with a DC voltmeter measure VDC between GND and V9&V10 test points. Adjust BIAS for .06 VDC (60mVDC).
 - D. Set BALANCE: measure the VDC between V9&V10, and V11&V12 test points. Adjust BALANCE for zero (0) VDC.
 - E. Replace the bias controls cover box.

TWIN (PRO-TUBE) AMP PARTS LIST

NOTE: SHADED ITEMS ARE FOR REFERENCE ONLY

PRINTED CIRCUIT BOARD ASSEMBLY – MAIN

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
REF	0057014000	SVC. DIA., COMB. PRO-TUBE AMPS	
1	0057015000	PCB FAB MAIN, PRO-TUBE AMPS	
2	0038690001	CAP AE AX 1.0uF 100V 20%	C17 C37
4	0025960001	CAP AE AX 22uF 16V 20%	C8 C29 C34 C111
3	0024819000	CAP AE AX 22uF 500V +50%-10%	C203 C206-207
1	0038693001	CAP AE AX 47uF 16V 20%	C1
4	0024820000	CAP AE AX 47uF 350V 20%	C201-202 C204-205
2	0028494000	CAP AE RDL 1000uF 35V 20%	C212-213
2	0031040000	CAP AE RDL 100uF 100V 20%	C208-209
2	0028482003	CAP AE RDL 220uF 50V 20%	C210-211
2	0036954003	CAP AE RDL 22uF 63V 20%	C33 C216
1	0020883002	CAP CD 10pF 1000V 10%	C31
2	0051408003	CAP CD 47pF 500V 5%	C7 C101
1	0069724002	CAP CD 100pF 1000V 10%	C105
1	0051405003	CAP CD 120pF 500V 5%	C19
2	0020917002	CAP CD 250pF 1000V 10%	C4 C22
1	0051458003	CAP CD 470pF 500V 10%	C32
3	0025951002	CAP CD 750pF 1000V 10%	C14 C16 C18
1	0025995002	CAP CD 8200pF 1000V 20%	C200
2	0034788003	CAP CD .1uF 50V 20% .15" cut	C224-225
3	0027272003	CAP MPF .047uF 63V 10%	C218 C220 C223
1	0027280003	CAP MPF .15uF 63V 10%	C217
2	0027281003	CAP MPF .22uF 63V 10%	C215 C221
2	0027286003	CAP MPF .47uF 63V 10%	C219 C222
1	0033477003	CAP MPF .68uF 63V 10%	C11
3	0024823000	CAP MPF RDL .01uF 400V 10%	C23 C103 C110
6	0024833000	CAP MPF RDL .022uF 400V 10%	C3 C9 C12 C21 C108-109
10	0024845000	CAP MPF RDL .047uF 400V 10%	C2 C6 C10 C13 C15 C24-25 C30 C116-117
3	0024853000	CAP MPF RDL .1uF 250V 10%	C100 C102 C104
7	0024854000	CAP MPF RDL .1uF 400V 10%	C5 C20 C36 C112-115
2	0024855000	CAP MPF RDL .1uF 630V 10%	C106-107
1	0024876000	CAP MPF RDL .68uF 250V 10%	C27
1	0037040002	CAP PFF .0033uF 400V 10%	C35
1	0037600000	CONTROL SNAPIN 100k B TAPER	R73 Reverb
2	0041507000	CONTROL SNAPIN 1M 10A TAPER	R12 R37 Ch1volume Ch2volume
3	0047540000	CONTROL SNAPIN 250k 15A TAPER	R10 R17 R35 Ch1bass Gain Ch2bass
2	0037597000	CONTROL SNAPIN 250k 30A TAPER	R9 R34 Ch1treble Ch2treble
1	0041511000	CONTROL SNAPIN 250k B DUAL	R148 Intensity
1	0047031000	CONTROL SNAPIN 25k 30C TAPER	R109 Presence
2	0041510000	CONTROL SNAPIN 25k B TAPER	R11 R36 Ch1mid Ch2mid
1	0037601000	CONTROL SNAPIN 3M 10C TAPER	R141 Speed
16	0026730001	DIODE 1N4006 800V 1A	D100-101 D200-207 D210-215

TWIN (PRO-TUBE) AMP PRINTED CIRCUIT BOARD ASSEMBLY – MAIN (cont)

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
18	0006260001	DIODE 1N4448 SIGNAL	D1 D4 D6-7 D114 D223 D226 D228-229 D231-237 D239-240
2	0029690001	DIODE HV 3kV 200mA	D102-103
1	0031017001	DIODE ZEN 1N5223B 2.7V 5% LL	D224
3	0031635001	DIODE ZEN 1N5240B 10V 5% LL	D5 D227 D238
6	0031019001	DIODE ZEN 1N5245B 15V 5% LL	D2-3 D8-9 D112-113
2	0028119060	DIODE ZEN 1N5353B 16V 5W 5%	D216-217
2	0041811060	DIODE ZEN 1N5368B 47V 5W 5%	D208-209
6	0026000001	FSTN TAB MALE PCB MT .187X.032	P2-5 P216-217
20	0025802000	FSTN TAB MALE .250x.032 PCB MT	P100-101 P200-215 P218-219
4	0031611000	IC OP-AMP DUAL PC4560	U1-4
2	0041261000	IC VOLT REF LM4040DIZ-10.0	U5-6
1	0037117000	JACK PCB MONO CLOSED CKT	J1 Input
1	0025933000	JACK PHONO DUAL PC MTG	J2 Reverb
1	0028039000	LED RED 5x5mm SLB-55VR3	D225
1	0030754000	LED RED T-1 3mm DIFFUSED	D230
1	0036178000	SPACER LED .5x.1 BRN	@D230
3	0036613000	RELAY DPDT DIP 24 VOLT 8.3mA	K1-3
9	0025116001	RES CF 1/2W 5% 100k LL	R3 R13 R20 R31 R52 R61 R71 R77 R111
2	0026368001	RES CF 1/2W 5% 100ohm LL	R211-212
1	0025117001	RES CF 1/2W 5% 220k LL	R202
1	0025113001	RES CF 1/2W 5% 10k LL	R104
1	0025834001	RES CF 1/2W 5% 150k LL	R146
2	0036957001	RES CF 1/2W 5% 470k LL	R26 R144
1	0025115001	RES CF 1/2W 5% 82k LL	R110
12	0024969001	RES CF 1/4W 5% 1.5k LL	R4 R14 R21 R43 R51 R62 R68-69 R114-115 R215 R238
8	0024997001	RES CF 1/4W 5% 100k LL	R8 R147 R208 R220 R226 R230 R243 R249
11	0024981001	RES CF 1/4W 5% 10k LL	R19 R25 R30 R41 R50 R60 R143 R207 R231-233
1	0024937001	RES CF 1/4W 5% 10ohm LL	R250
1	0024999001	RES CF 1/4W 5% 150k LL	R100
5	0024985001	RES CF 1/4W 5% 15k LL	R101 R155 R224 R229 R248
1	0024955001	RES CF 1/4W 5% 180ohm LL	R227
1	0024986001	RES CF 1/4W 5% 18k LL	R27
1	0024965001	RES CF 1/4W 5% 1k LL	R81
15	0025069001	RES CF 1/4W 5% 1M LL	R1 R6 R15 R18 R38 R40 R46 R49 R63 R78 R82 R103 R106 R142 R153
8	0025059001	RES CF 1/4W 5% 220k LL	R5 R16 R24 R53 R67 R75 R112-113
2	0024987001	RES CF 1/4W 5% 22k LL	R39 R79
1	0025077001	RES CF 1/4W 5% 3.3M LL	R76
4	0024989001	RES CF 1/4W 5% 33k LL	R2 R33 R45 R102
2	0024977001	RES CF 1/4W 5% 4.7k LL	R107 R145
1	0025079001	RES CF 1/4W 5% 4.7M LL	R70
12	0025065001	RES CF 1/4W 5% 470k LL	R7 R23 R28-29 R64-65 R74 R214 R223 R234 R236 R246
1	0024961001	RES CF 1/4W 5% 470ohm LL	R105
3	0024993001	RES CF 1/4W 5% 47k LL	R22 R42 R44
1	0024962001	RES CF 1/4W 5% 560ohm LL	R237
2	0028948001	RES CF 1/4W 5% 6.2k LL	R80 R235
4	0024979001	RES CF 1/4W 5% 6.8k LL	R154 R225 R228 R247
2	0025068001	RES CF 1/4W 5% 820k LL	R222 R245
2	0024964001	RES CF 1/4W 5% 820ohm LL	R32 R72
2	0029613001	RES CF 1/4W 5% 91k LL	R108 R140

**TWIN (PRO-TUBE) AMP
PRINTED CIRCUIT BOARD ASSEMBLY – MAIN (cont)**

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
4	0027354001	RES FILM 1W 5% 220k LL	R200-201 R203-204
2	0016979001	RES MF 1/4W 1% 215k LL	R217 R240
2	0016971001	RES MF 1/4W 1% 33.2k LL	R219 R242
2	0017191001	RES MF 1/4W 1% 36.5k LL	R221 R244
4	0017372001	RES MF 1/4W 1% 51.1k LL	R216 R218 R239 R241
1	0057221000	RES MOX FP 1W 5% 2.2k	R66
1	0057222000	RES MOX FP 2W 5% 10k	R205
1	0041268001	RES MOX 2W 5% 10k LL	R206
2	0041256000	RES WW 5W 10% 470ohm	R118-119
2	0029047000	RES WW BT 7W 10% 270ohm	R209-210
2	0028091000	SWITCH PUSH SLFLK	S1-2 Bright ChSelect
2	0048451000	BUTTON PUSH OFF WHITE	@S1-2
1	0028503000	THERMISTOR 10 ohm 5A C60-11	RT1
2	0014689003	XSTR N-CH JFET J111 TO-92	Q2-3
3	0041465003	XSTR N-CH JFET J113 TO-92	Q1 Q5 Q102
2	0016739003	XSTR NPN 2N4401 TO-92	Q4 Q200
1	0016742003	XSTR PNP 2N4403 TO-92	Q201
8	0051442000	SOCKET TUBE 9 PIN PCB MOUNT	@V1-8
4	0057238000	TUBE SOCKET 8 PIN PCB MOUNT	@V9 V12
1	0049976000	SWITCH TOGGLE DPST DC W/NUTS	S203 OutputPower
6	0016440000	STNDOFF RND AL 6-32x1x1/4	@V9 V11 V12 (V12 hardware for PCB mtg)
6	0039367000	SCRW M6-32X3/8 PHP SS INTLWSHR	@V9 V11 V12 (V12 hardware for PCB mtg)
4	9904101500	SCRW M 6-32x3/8 PHPS BLX ITLW	@V9 V11
2	0026459000	WASHER FLAT 6x3/8 ZI	@ V12 (V12 hardware for PCB mtg)
1	0037805000	CABLE RIBBON 6 CKT 2-1/4"	PW1

PRINTED CIRCUIT BOARD ASSEMBLY – REAR PANEL

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
REF	0057014000	SVC. DIA., COMB. PRO-TUBE AMPS	
1	0057017000	PCB FAB REAR PANEL, PRO-TUBE AMPS	
2	0036954003	CAP AE RDL 22uF 63V 20%	C118-119
1	0027286003	CAP MPF .47uF 63V 10%	C214
1	0024823000	CAP MPF RDL .01uF 400V 10%	C26
1	0024853000	CAP MPF RDL .1uF 250V 10%	C28
2	0047540000	CONTROL SNAPIN 250k 15A TAPER	R47 R58 Send Return
2	0026133000	CONTROL TRIM 25k LIN	R149-150 Balance Bias
3	0026730001	DIODE 1N4006 800V 1A	D104-106
2	0006260001	DIODE 1N4448 SIGNAL	D218-219
1	0031017001	DIODE ZEN 1N5223B 2.7V 5% LL	D221
1	0026000001	FSTN TAB MALE PCB MT .187X.032	P109

**TWIN (PRO-TUBE) AMP
PRINTED CIRCUIT BOARD ASSEMBLY – REAR PANEL (cont)**

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
11	0025802000	FSTN TAB MALE .250x.032 PCB MT	P102-107 P110-111 P220-222
1	0022546000	FUSE HOLDER PCB MTG UNIVERSAL	F1
1	0022548000	FUSE CARRIER 5mm	@F1
1	0013004000	FUSE TD 20mm X 5mm 250V 100mA	@F1
1	0027413000	HDR .1 CTR 6 CKT SQ PIN	P1
5	0051658000	JACK MONO R/A	J3-6 J10 Send Return Preamp out Pwr amp in Footswitch
3	0026481000	JACK TIP	J7-9 V11 Gnd V9
2	0028039000	LED RED 5x5mm SLB-55VR3	D220 D222
1	0033177000	LED RED/GREEN 5x5mm BI-COLOR	D107
1	0036178000	SPACER LED .5x.1 BRN	@ D107
1	0025941001	RES CF 1/2W 5% 560ohm LL	R123
1	0024997001	RES CF 1/4W 5% 100k LL	R57
4	0024937001	RES CF 1/4W 5% 10ohm LL	R56 R83 R251-252
1	0024965001	RES CF 1/4W 5% 1k LL	R55
1	0025059001	RES CF 1/4W 5% 220k LL	R54
2	0024987001	RES CF 1/4W 5% 22k LL	R122 R127
1	0024961001	RES CF 1/4W 5% 470ohm LL	R124
2	0028153001	RES CF 1/4W 5% 75k LL	R151-152
2	0024980001	RES CF 1/4W 5% 8.2k LL	R48 R59
1	0028029001	RES FILM 1W 5% 1.5k LL	R213
4	0027354001	RES FILM 1W 5% 220k LL	R120-121 R125-126
2	0033095001	RES MOX FP 1W 5% 1ohm LL	R116-117
1	0028091000	SWITCH PUSH SLFLK	S3 FX Loop
1	0048451000	BUTTON PUSH OFF WHITE	@S3
2	0016739003	XSTR NPN 2N4401 TO-92	Q100-101

CHASSIS ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
2	0028069000	BUSHING SNAP 3/4x1-1/8 WHT	@ PWR XFMR
2	0018022000	BUSHING SNAP 5/16x17/32 BLK	@ CHOKE & REV. XFMR
2	0012560000	BUSHING SNAP 5/8x27/32 BLK	@ OUTPUT XFMR
1	0036486000	CHOKE	
1	0026478000	XFMR OUTPUT 100W 4,8,16 OHMS	OUTPUT XFMR TWIN
1	0051463000	XFMR SUNN MODEL T	PWR. XFMR TWIN
1	0037099000	XFMR REVERB VIBROVERB/65 DLX	REVERB XFMR
4	0026501000	SCRW C 1/4-20x1/2" HH BLX	@ PWR XFMR
4	0028272000	NUT KEP 1/4x20 FOJ	@ PWR XFMR
8	0022319000	WSHR FLT 1/4x9/16 NI	@ PWR XFMR
REF	0047163000	TUBING SHRINK 1" BLACK	@ PWR XFMR PRI. LEADS & V1 V2
4	0026553000	SCRW M 8-32 x 3/8" PHP BLX	@ OUTPUT XFMR
4	0022004000	NUT KEPS #8-32 ZINC	@ OUTPUT XFMR
2	0036570000	SWITCH TOGGLE DPST W/NUTS	PWR SW, STNDBY

TWIN (PRO-TUBE) AMP CHASSIS ASSEMBLY (cont)

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
3	0022293000	WSHR FLAT .473x.750 NI	@ PWR SW, HIGH/LOW SW,STNDBY
1	0021741000	HOLDER DIAL LITE ASSY PILOT	@ PILOT LIGHT
1	0031625000	NUT HOLDER PILOT LIGHT 1/16-27	@ PILOT LIGHT
1	0032219000	COLLAR-PILOT LIGHT	@ PILOT LIGHT
1	0021642000	PILOT LIGHT #T47	@ PILOT LIGHT
1	0025718000	JEWEL PILOT LITE RED #20	@ PILOT LIGHT
1	0047213000	CONNECTOR AC LINE MALE IEC	IEC PWR JACK
2	0097360000	NUT HEX 4-40 EX LOCK	@ IEC PWR JACK
2	0014172000	SCREW M 4-40 x 1/4" PHP BLX	@ IEC PWR JACK
1	0036702000	FUSE HOLDER 3AG FINGER GRIP	@ LINE FUSE F1
1	0013737000	FUSE TD 1-1/4x1/4 250v 4A	LINE FUSE F1 (120V/100V UNITS)
REF	0036703000	FUSE HOLDER 5MM FINGER GRIP	@ LINE FUSE F1 (Export only)
REF	0013115000	FUSE TD 20mmx5mm 250v 2A	LINE FUSE F1 (230V/240V UNITS)
1	0021550000	JACK PHONE TIP SHUNT 12A	MAIN SPKR JACK J11
1	0021956000	JACK PHONE OPEN CIRCUIT 11	EXT. SPKR JACK J12
2	0031153000	WSHR FLAT 3/8 x .614" NI	@ SPKR JACKS J11 J12
2	0016436000	WSHR LCK INTL 3/8 x .687 x .035 NI	@ SPKR JACKS J11 J12
2	0016352000	NUT HEX 3/8-32 x 3/32 TK NI	@ SPKR JACKS J11 J12
1	0056891000	CHASSIS TWIN-AMP	
1	0057032000	COVER BOX BIAS CONTROLS PRO-TUBE AMPS	
1	0057012000	PANEL, FRONT TWIN-AMP	
1	0057013000	PANEL, REAR TWIN-AMP	
2	0023572000	TUBE 7025/12AX7A CHINESE	V1-2
5	0013341000	TUBE 7025/12AX7WA RUSSIAN MADE	V3-6 V8
1	0023531000	TUBE 12AT7 HIGH MU TWIN TRIODE	V7
8	0053893000	TUBE SHIELD SUNN MODEL T	V1-8
4	0053980000	TUBE VACUUM 6L6GC/5881 SVTLNA	V9-12
4	0020424000	TUBE RING UNIVERSAL (277H-2)	@V9-12
15	0024604000	KNOB BLACK W/WHITE STAMP 1-10	@ ALL CONTROLS
5	0053480000	WASHER FLAT .442 X.692 NI	@ FX BOARD JACKS
5	0053479000	NUT HEX 7/16 20X1/8 NI	@ FX BOARD JACKS
6	0038900000	SCRW TF 6-32x1/4 PHP ZI	@ CHASSIS GNDS, CHOKE, REV. XFMR, TUBE CAGE
26	0031184000	SCRW M6-32x1/4 PHPS BLX ITLW	@ STANDOFFS
1	0057016000	PCB ASSY TWIN-AMP MAIN	MAIN PCB ASSY'S
1	0057018000	PCB ASSY TWIN-AMP REAR PANEL	FX PCB ASSY'S
REF	0012398000	TUBING, SHRINK 3/16 BLK	@ PILOT LIGHT WIRES
1	0051155000	SCRW SMB #4 x 3/8 PHP BLX	@ REVERB RCA JACKS J2
2	0032806000	SCRW TF 6-32x1/4 PHP BLX	@ COVER BOX
0	0057106000	TUBE CAGE PRO-TUBE AMPS	230V ONLY

TWIN (PRO-TUBE) AMP CABINET ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
4	0026566000	CORNER 2 HOLE w/ TAB NI	
4	0019276000	GLIDE CAB 1.24 X .335 NI	
4	0019275000	INSERT GLIDE CUSHION 1.27 DIA	
4	0056482000	MOUNTING PLATE EL COM	
1	0027846000	HANDLE 9.25" NO LOGO	
1	0032524000	INSERT HANDLE	
2	0019279000	HANDLE CAP 2 HOLE NICKEL	
REF	0029086000	VELCRO STRIP HOOK 1.5" wd BLK	
REF	0029085000	VELCRO STRIP LOOP 1.5" wd BLK	
16	0027199000	SCRW SMAB 10 X 3/4 PHP NI	
12	0021972000	NUT T 10-32x3/4 STR 3 PRNG BLX	
4	0022244000	SCRW M10-32 x 1 1/8 OHP NI	
4	0026571000	SCRW SMAB 8x5/8 THP NI	
4	0026625000	SCRW WOOD 8x1 FH	
REF	0037788000	CLOTH GRILLE BLACK/SILVER	
REF	0026570000	TOLEX "BRAVURA BLACK"	
REF	0037350000	TAPE ALUM 8"X60YDS	

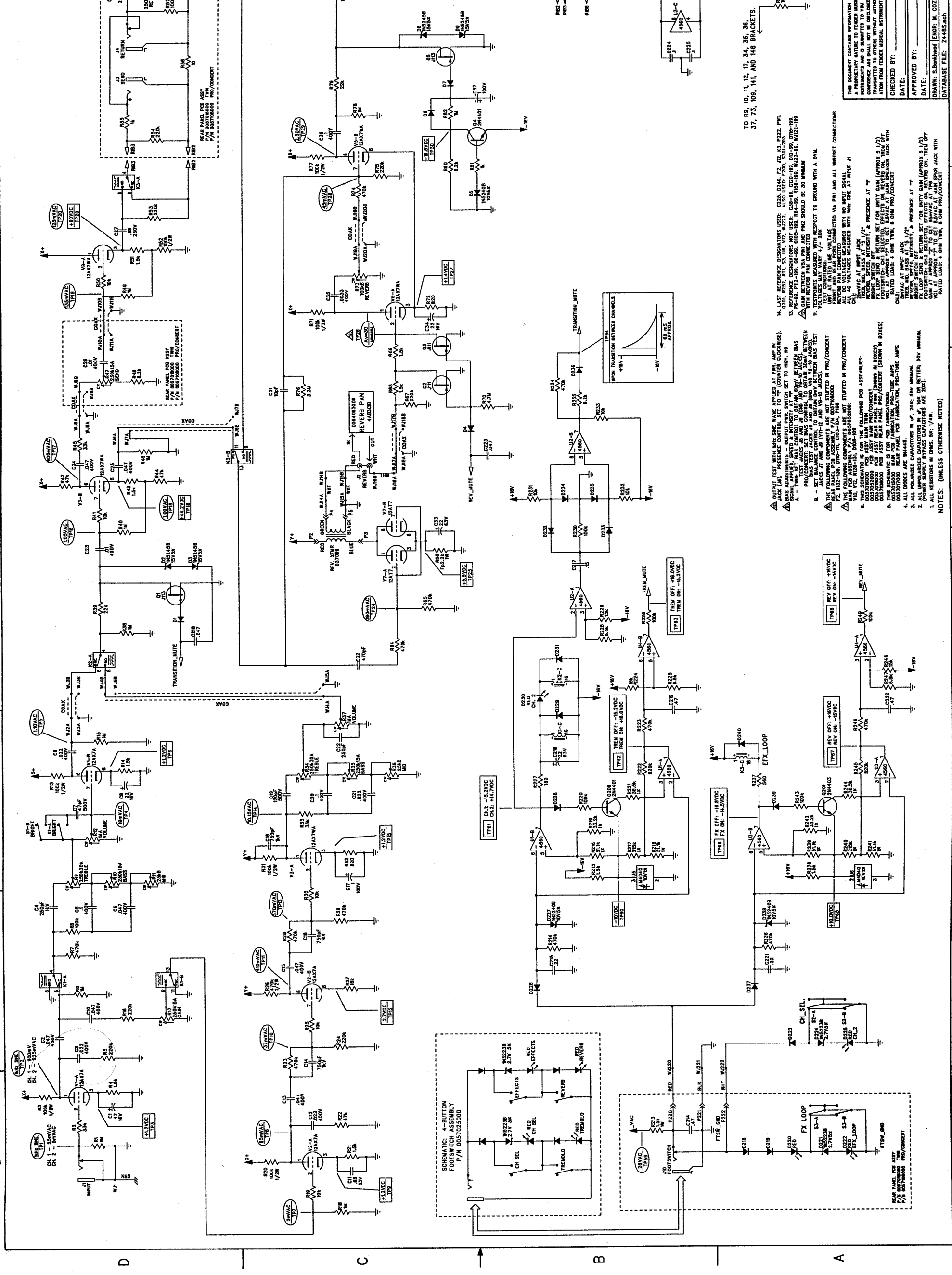
END ITEM ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0056524000	CABINET ASSY TWIN-AMP	
1	0057027000	CHASSIS ASSY. TWIN-AMP 120V DOM	
REF	0057028000	CHASSIS ASSY. TWIN-AMP 230V	
REF	0057030000	CHASSIS ASSY. TWIN-AMP 240V AUS	
REF	0057031000	CHASSIS ASSY. TWIN-AMP 100V JPN	
1	0047248000	CORD PWR W/IEC CONN DOM	
REF	0047251000	CORD PWR W/IEC CONN 230V EUR	
REF	0047249000	CORD PWR W/IEC CONN 230V UK	
REF	0047250000	CORD PWR W/IEC CONN 240V AUS	
REF	0053997000	CORD PWR W/IEC CONN 100V JPN	
2	0024828000	LEG AMP TILT 16"	@ CAB SIDES
2	0021998000	NUT FLEX LOCK 10-32 W/NYLON IN	@ TILTBACK LEGS
2	0022277000	SCRW M 10-32x1-1/2 OHP NI	@ TILTBACK LEGS
2	0022285000	WSHR SP LOCK 1/4x.493 ZI	@ TILTBACK LEGS
6	0022319000	WSHR FLAT 1/4x9/16 NI	@ TILTBACK LEGS
2	0031344000	SCRW SMA 10x3/4 OHP NI	@ TILTBACK LEG STOPS
2	0024646000	WASHER LEG STOP TN	@ CAB SIDES
2	0024752000	STRAP CHASSIS 4-1/2" NICKEL	CHASSIS TO CAB
4	0057105000	SCRW M 8-32x1-3/16 OHP NI CP	
6	0029527000	WSHR FNSH 8-5/8 FLNGD BLX WX	CHASSIS TO CAB
6	0036199000	SCRW M 8-32x1-3/16 OHP BLX CP	CHASSIS TO CAB
1	0023192000	NAMEPLATE FNDR 65 TWIN	@ GRILLE FRAME
3	0037985000	SCRW SMA 2x3/8 PHP BLX	@ LOGO
1	0057025000	FOOTSWITCH ASSY 4 BUTTON	
REF	0057014000	SVC DIA COMB PRO-TUBE AMPS	
REF	0057023000	MANUAL OWNERS TWIN-AMP	
4	0029828000	SCRW PB 8x3/4 PHP ZI	@ REV. BAG & CABLE CLAMPS
2	0022327000	WSHR FLAT 8x7/16 NI	@ REV. BAG SCREWS

**TWIN (PRO-TUBE) AMP
END ITEM ASSEMBLY (cont)**

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0031849000	REVERB BAG	@ CAB BOTTOM
1	0028453000	PAD CARDBOARD REVERB	INSIDE REV. BAG
1	9906900590	CLAMP CABLE NYL ADHESIVE	@ REV. UNIT
1	0012582000	CLAMP CABLE NYL SCRW MNT 1/4	@ REV. CABLE
1	0025722000	CABLE REVERB 1100mm	CHASSIS TO REV. UNIT
1	0064063000	REVERB UNIT 4 SPRING 4AB3C1B	INSIDE REV. BAG
1	0028044000	CABLE ASSY SPKR RT ANG 33"	@ SPKR TO MAIN SPKR JACK
1	0022491000	CLAMP CABLE NYL SCRW MNT 5/16	@ SPKR CABLE
2	0037617000	SPKR 12" 8M 50W (099-4812-002)	@ BAFFLE
8	0026577000	SCRW M 10-32x1 PHP BLX	@ SPEAKERS
4	0056483000	CASTER SWIVEL EL COM 2-12 CABS	
8	0037215000	WSHR C'SNK #6 NI	@ CAB REAR PANELS
8	0037952000	SCRW SMA #6x1 OHP Ni	@ CAB REAR PANELS

REV.	DESCRIPTION	DATE	APPROVED
A	PR448	16-OCT-00	S.M.B.
B	EC 2606	23-FEB-01	S.M.B.



MUSICAL INSTRUMENTS
Corona, CA USA

TITLE: SERVICE DIAGRAM, COMBINED (+channel)
PRE-AMP

REV. B

SIZE D

DRAWING NUMBER 005701400

DATE: 16-OCT-00

RELEASE DATE: 16-OCT-00

SHEET: 1 OF 4

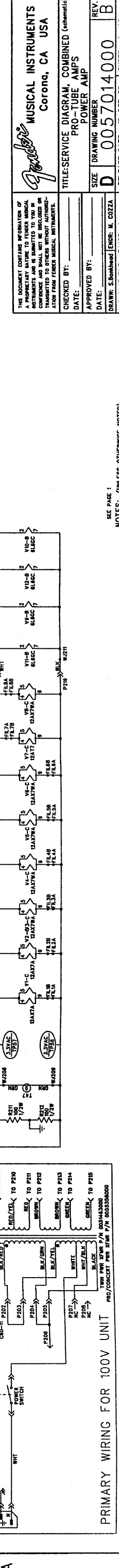
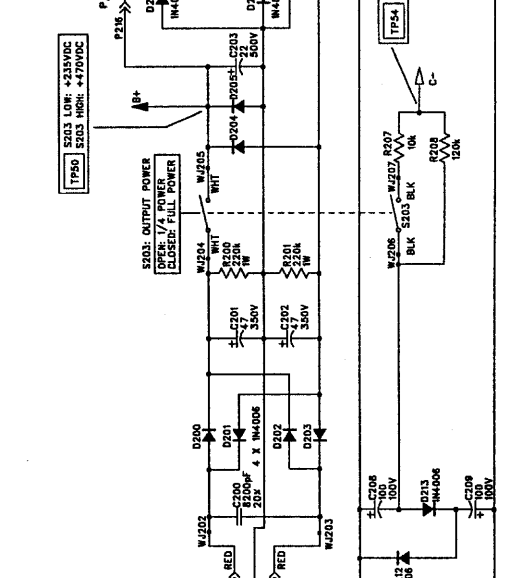
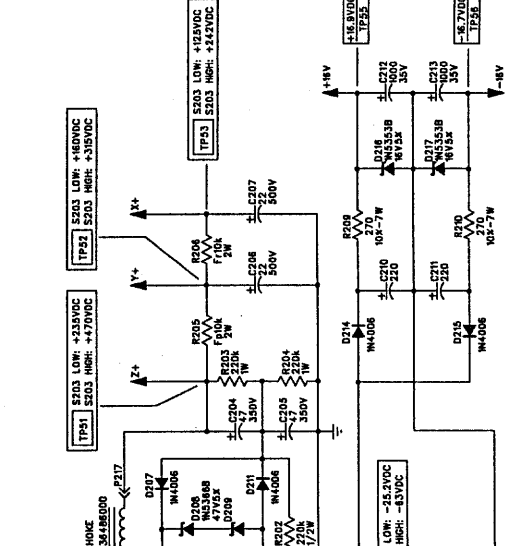
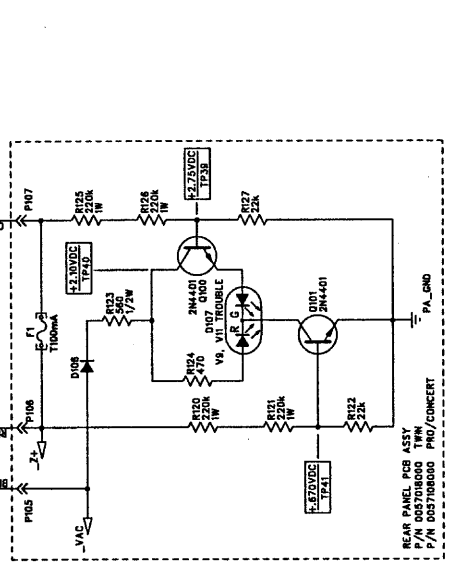
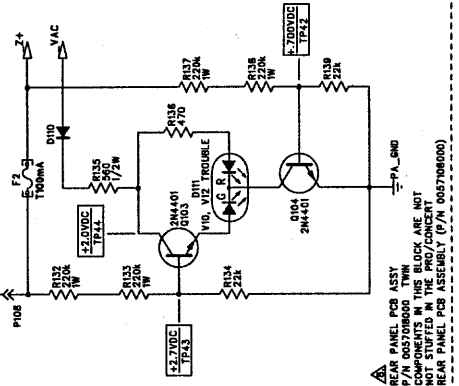
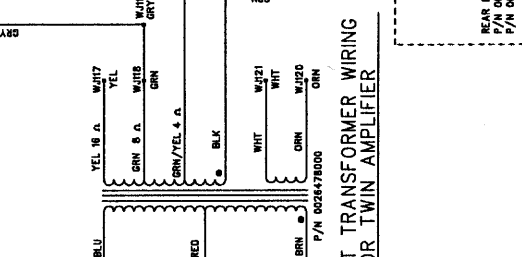
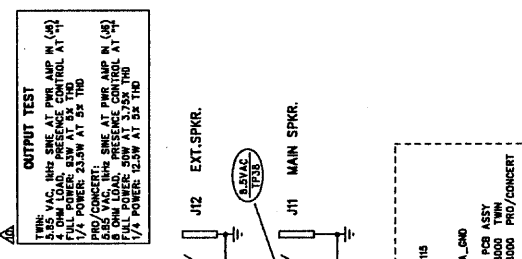
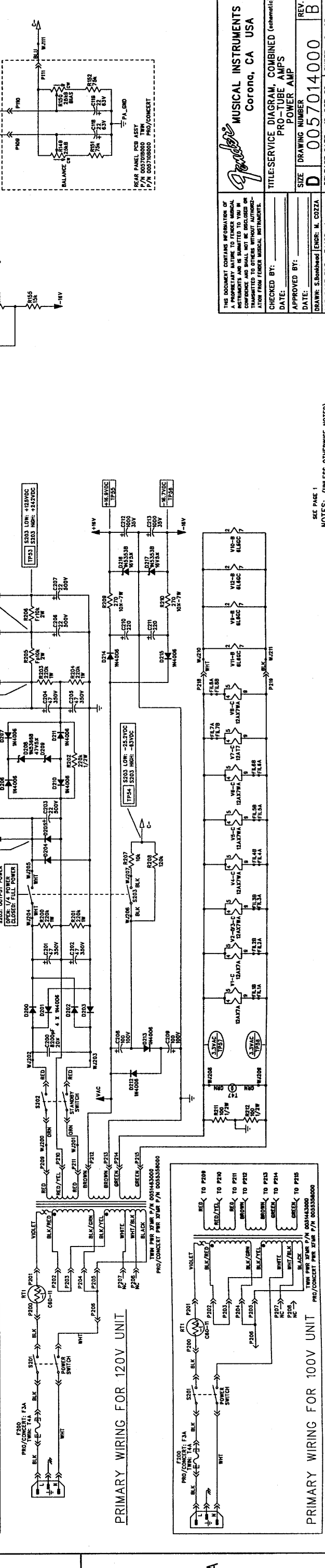
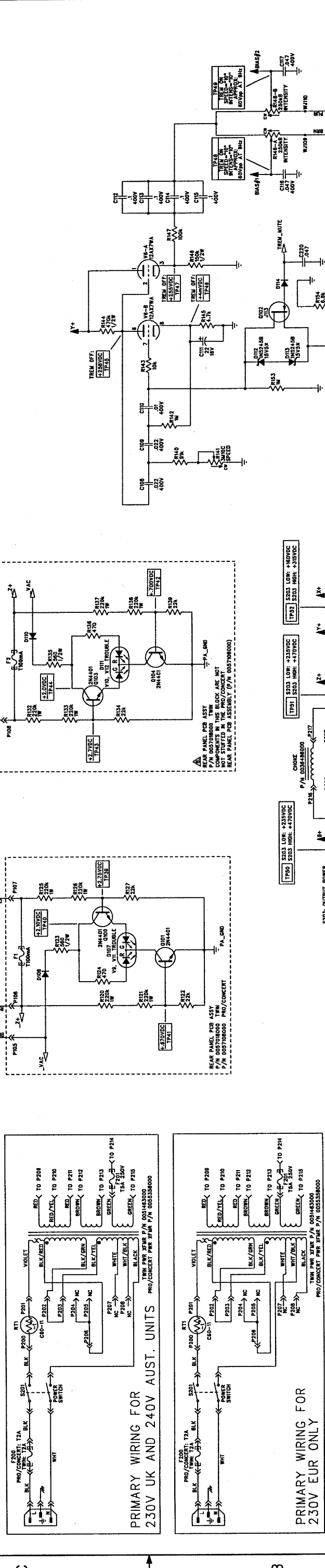
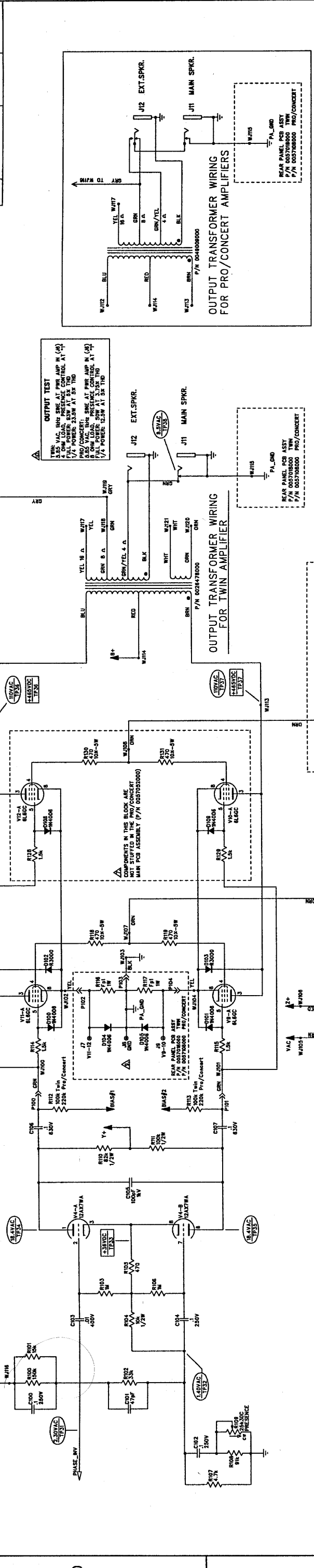
1. VOLTAGES MEASURED WITH RESPECT TO GROUND WITH A DVM.
2. VOLTAGES MAY VARY +/- 20%
3. ALL PIPES ARE 1/8" DIA.
4. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
5. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
6. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
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9. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
10. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

11. VOLTAGES MEASURED WITH RESPECT TO GROUND WITH A DVM.
12. VOLTAGES MAY VARY +/- 20%
13. ALL PIPES ARE 1/8" DIA.
14. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
15. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
16. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
17. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
18. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
19. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
20. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

TO R9, 10, 11, 12, 17, 34, 35, 36, 37, 73, 109, 141, AND 146 BRACKETS.

REV.	DESCRIPTION	DATE	APPROVED
A	PR448	16-OCT-00	S.M.B.
B	EC 2606	23-FEB-01	S.M.B.

1 2 3 4 5 6 7 8



THIS DOCUMENT CONTAINS INFORMATION OF A CONFIDENTIAL NATURE AND IS LOANED TO YOU IN CONFIDENCE AND SHALL NOT BE DISCLOSED OR TRANSMITTED TO OTHERS WITHOUT AUTHORIZATION FROM FOMER MUSICAL INSTRUMENTS.

CHECKED BY: _____
DATE: _____

APPROVED BY: _____
DATE: _____

DRAWN: S. Boshard LEHR: M. COZZA
DATABASE FILE: 24485.rch

REV. B
SIZE D
DRAWING NUMBER 005701400
TITLE: SERVICE DIAGRAM, COMBINED (continued) PRO-TUBE AMPS POWER AMP

MUSICAL INSTRUMENTS
Corona, CA USA

RELEASE DATE: 16-OCT-00 SHEET: 2 OF 4

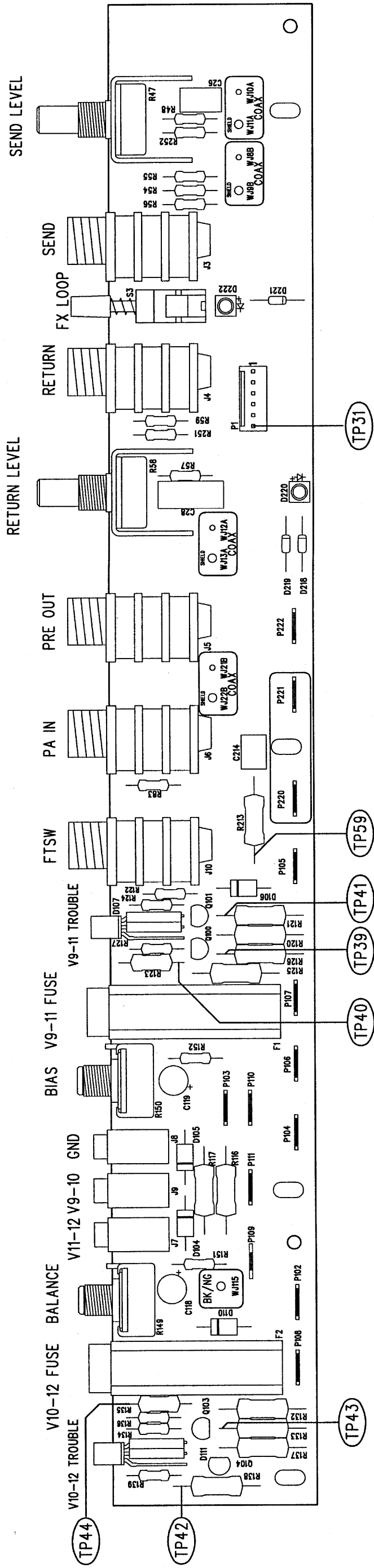
NOTES: (UNLESS OTHERWISE NOTED)

2

2

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	PR 448	16-OCT-00	S.M.B.
B	EC 2606	23-FEB-01	S.M.B.



FILM/DWG: SERVICE DIAGRAM
 DATABASE: Z448P2.PCB DATE: 16-OCT-00

THIS DOCUMENT CONTAINS INFORMATION OF A PROPRIETARY NATURE TO FENDER MUSICAL INSTRUMENTS AND IS SUBMITTED TO YOU IN CONFIDENCE AND SHALL NOT BE DISCLOSED OR TRANSMITTED TO OTHERS WITHOUT AUTHORIZATION FROM FENDER MUSICAL INSTRUMENTS.

CHECKED BY: _____
 DATE: _____
 APPROVED BY: _____
 DATE: _____
 DRAWN: S.Bankhead ENGR: S.Bankhead
 DATABASE FILE: Z448P2.PCB

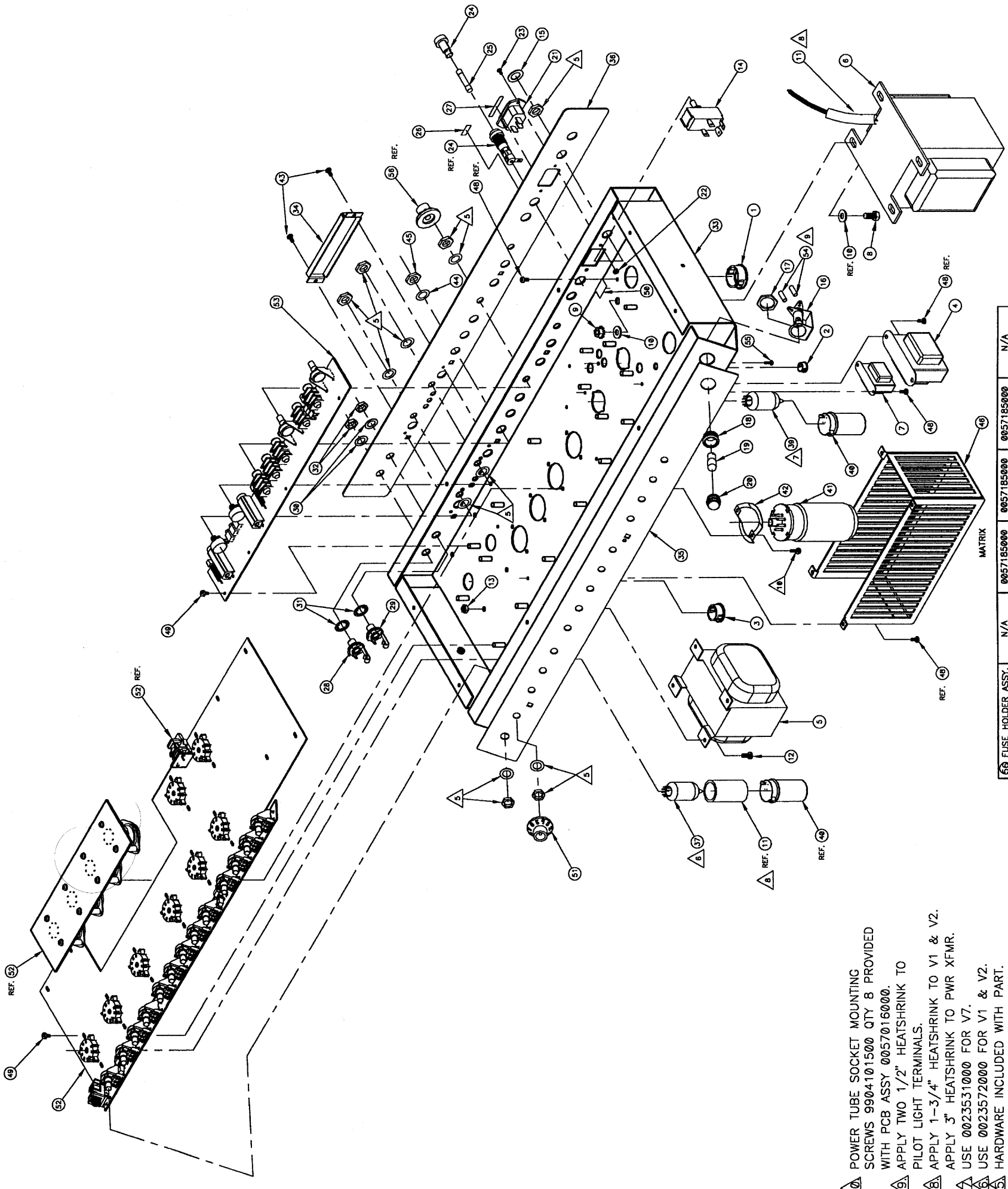
Fender
 MUSICAL INSTRUMENTS
 Corona, CA U.S.A.

TITLE: SERVICE DIAGRAM, COMBINED (PCB assy)
 PRO-TUBE AMPS
 REAR PANEL PCB

SIZE: B DRAWING NUMBER: 0057014000 REV. B
 RELEASE DATE: 16-OCT-00 SHEET 4 OF 4

2. SEE PAGE 1 FOR NOTES AND TEST CONDITIONS
 1. WIRES NOT SHOWN FOR CLARITY
 NOTES: (UNLESS OTHERWISE NOTED)

THIS DOCUMENT CONTAINS INFORMATION OF A PROPRIETARY NATURE TO FENDER MUSICAL INSTRUMENTS AND IS SUBMITTED TO YOU IN CONFIDENCE AND SHALL BE KEPT CONFIDENTIAL AND NOT DISCLOSED OR REPRODUCED OR TRANSMITTED TO OTHERS WITHOUT AUTHORIZATION FROM FENDER MUSICAL INSTRUMENTS CORP.



ITEM #	DESCRIPTION	QTY	QTY	QTY	QTY	QTY	QTY
55	FUSE HOLDER ASSY.	N/A	0057185000	0057185000	N/A	N/A	N/A
49	SCREW	QTY: 6	0057051000	0057051000	0057051000	0057051000	QTY: 6
47	WIRE SET	N/A	0057051000	0057051000	N/A	N/A	N/A
46	TUBE CAGE	N/A	0057105000	0057105000	N/A	N/A	N/A
45	VOLTAGE LABEL	N/A	0050505000	0050505000	0050505000	0050505000	N/A
44	LABEL FUSE	N/A	0047580000	0047580000	0047580000	0047580000	N/A
43	FUSE HOLDER	QTY: 6	0013737000	0013737000	0013737000	0013737000	QTY: 6
42	FUSE HOLDER	QTY: 6	0036703000	0036703000	0036703000	0036703000	QTY: 6
41	CHASSIS ASSY.	QTY: 1	0021022000	0021022000	0021022000	0021022000	QTY: 1

- 1. POWER TUBE SOCKET MOUNTING SCREWS 9904101500 QTY 8 PROVIDED WITH PCB ASSY 0057016000.
- 2. APPLY TWO 1/2" HEATSHRINK TO PILOT LIGHT TERMINALS.
- 3. APPLY 1-3/4" HEATSHRINK TO V1 & V2. APPLY 3" HEATSHRINK TO PWR XFMR.
- 4. USE 0023531000 FOR V7.
- 5. USE 0023572000 FOR V1 & V2.
- 6. HARDWARE INCLUDED WITH PART.
- 7. COPYRIGHT - 2001 - FENDER MUSICAL INSTRUMENTS CORP.
- 8. - 3 - SAMPLES OF FIRST PARTS MUST BE APPROVED BY FENDER R&D BEFORE STARTING PRODUCTION.
- 9. ALL DIMENSIONS ARE IN INCHES.
- 10. 1. DO NOT SCALE DRAWING.
- 11. NOTES: UNLESS OTHERWISE NOTED

ITEM #	DESCRIPTION	QTY	QTY	QTY	QTY	QTY	QTY
52	1	0057016000	PCB ASSY MAIN TWIN-AMP				
51	15	0024604000	KNOB BLACK W/WHITE STAMP 1-10				
50	1	0013020000	LABEL GROUNDING SEMKO				
49	26	0031184000	SCRW M6-32x1/4 PHPS BLX ITLW				
48	SM	0038900000	SCRW TF 6-32x1/4 PHP ZI				
47	1	SEE MATRIX	WIRE SET CHASS. ASSY PRO-TUBE AMPS (N.S.)				
46	1	SEE MATRIX	TUBE CAGE PRO-TUBE AMPS				
45	5	0053479000	NUT HEX 7/16 20X1/8 NI				
44	5	0053480000	WASHER FLAT .442 X.692 NI				
43	2	0032806000	SCRW TF 6-32x1/4 PHP BLX				
42	4	0020424000	TUBE RING UNIVERSAL (277H-2)				
41	4	0053390000	TUBE VACUUM 6L6GC/5881 SVTLNA				
40	8	00533893000	TUBE SHIELD SUNN MODEL T				
39	1	0023531000	TUBE 12AT7 HIGH MU TWIN TRIODE/A				
38	5	0013341000	TUBE 7025/12AX7WA RUSSIAN MADE (N.S.)				
37	2	0023572000	TUBE 7025/12AX7A CHINESE /A				
36	1	0057013000	PANEL, REAR TWIN-AMP				
35	1	0057012000	PANEL, FRONT TWIN-AMP				
34	1	0057032000	COVER BOX BIAS CONTROLS PRO-TUBE AMPS				
33	1	0056891000	CHASSIS TWIN-AMP				
32	2	0016352000	NUT HEX 3/8-32x3/32 TK NI				
31	2	0016436000	WSHR LCK INTL 3/8x.687x.035 NI				
30	2	0031153000	WSHR FLAT 3/8x.614 NI				
29	1	0021956000	JACK PHONE OPEN CIRCUIT 11				
28	1	0021550000	JACK PHONE TIP SHUNT 12A				
27	1	SEE MATRIX	LABEL VOLTAGE (N.S.)				
26	1	SEE MATRIX	LABEL FUSE (N.S.)				
25	1	SEE MATRIX	FUSE				
24	1	SEE MATRIX	FUSE HOLDER FINGER GRIP				
23	2	0014172000	SCREW M 4-40x1/4 PHP BLX				
22	2	0097360000	NUT HEX 4-40 EX LOCK				
21	1	0047213000	CONNECTOR AC LINE MALE IEC				
20	1	0025718000	JEWEL PILOT LITE RED #20				
19	1	0021642000	PILOT LIGHT #T47				
18	1	0032219000	COLLAR-PILOT LIGHT				
17	1	0031625000	NUT HOLDER PILOT LIGHT 1/16-27				
16	1	0021741000	HOLDER IDAL LITE ASSY PILOT				
15	3	0022293000	WSHR FLAT .473x.750 NI				
14	2	0036570000	SWITCH TOGGLE DPST W/NUTS				
13	4	0022204000	NUT KEPS #8-32 ZINC				
12	4	0026553000	SCRW M 8-32x3/8 PHP BLX				
11	5417	0047163000	TUBING SHRINK 1" BLACK (N.S.) /A				
10	8	0022319000	WSHR FLAT 1/4x9/16 NI				
9	4	0028272000	NUT KEP 1/4x20 FOJ				
8	4	0026501000	SCRW C 1/4-20x1/2 HH BLK				
7	1	0037099000	XFMR REVERB VIBROVERB/65 DLX				
6	1	0051463000	XFMR PWR SUNN MODEL T				
5	1	0026478000	XFMR OUTPUT 100W 4.8,16 OHMS				
4	1	0036486000	CHOKE				
3	2	0012560000	BUSHING SNAP 5/8x27/32 BLK				
2	2	0018022000	BUSHING SNAP 5/16x17/32 BLK				
1	2	0028069000	BUSHING SNAP 3/4x1-1/8 WHT				

DRAWN: COZZA
 CHECKED: RICHARDS
 DATE: 09/13/2000
 TITLE: CHASSIS ASSEMBLY TWIN-AMP
 FENDER MUSICAL INSTRUMENTS CORP. CORONA, CALIFORNIA U.S.A.

ENG: MS
 DATE: 10/21/03
 APPROVED: [Signature]
 DATE: 2-27-01

SHEET: 1/1
 SCALE: N/A
 DRAWING NUMBER: 0057027000
 REV: B
 MASTER/ASSEMBLY

