

DELUXE 112 PLUS

p/n 022-6702-000 (120V)

SERVICE MANUAL



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Fender Musical Instruments Corp. 7975 North Hayden Road Scottsdale, AZ 85258

DELUXE 112 PLUS

(This is the model name for warranty claims)

SERVICE MANUAL

APRIL 1995 REV A

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

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SPECIFICATIONS

Product Release No.:	PR 291 <i>(This is not a model number)</i>	
Part Number:	120V Version :	22-6702
	100V :	22-6772
	230V :	22-6762
Power Requirements:	180-120VAC, 50-60 Hz, 360W max. 230-240VAC, 50 Hz, 360w max.	
Input impedance:	Input 1: 850k Ω	
	Input 2: 66k Ω	
Power output:	94 watts RMS into 4 Ω at 5% THD	
Effects Loop:	Preamp Output Impedance: 1k Ω	
	Power Amp Input Impedance: 44k Ω	
	Power Amp Sensitivity: 1.0V for Clipping	
Dimensions:	Height: 16 1/2"	(41.9 cm)
	Width: 20 5/8"	(50.5 cm)
	Depth: 9"	(22.9 cm)
Weight:	33 lbs.	(14.9 kg)

Product specifications are subject to change without notice

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THEORY OF OPERATION

Input 1 is a high sensitivity input. Input 2 is a low sensitivity input. Inputs 1 and 2 contain series switches that connect to +16Vdc via a third series switch located within the Power Amp in jack (J5). From the input jacks, this series circuit terminates at the gate of JFET Q7. Q7 is part of a muting /turn on delay circuit for the input of the power amp. Therefore the input signal to the power amp will remain muted until a plug is inserted into either Input 1,2 or the Power Amp in jack.

The first stage (U2A) sets up the initial response of the amplifier. It provides a second order high pass filter with a 3dB down point at 60Hz, and a gain of about 3.8. The output of U2A splits to feed the clean and overdrive channel. For the clean channel, the signal feeds the Treble, Bass and Mid controls that provide boost and cut respectively. The signal then flows to U7A. U7A is a buffer for the adjustable high pass filter made up by C59, C60, R108 and R109. The inverted signal at U5A is sensed through R109 and fed back to the junction of C59 and C60. As the Volume control is turned up, the feedback from R109 provides -6dB of attenuation at 30Hz. This prevents the speaker from flapping at very low frequencies. U2B is an Auto-pad circuit. It provides excellent headroom and low noise.

The signal split from U1A feeds the overdrive channel through a special tone shaping circuit located just prior to U2A. This circuit is a third order bandpass filter with a peak boost at 2.2kHz. It provides the optimum frequency response for the following distortion circuit. U2A provides the variable gain adjustment that drives the distortion circuit. It also acts as a bandpass filter with 3dB down points at 90Hz and 4kHz. U2B is the distortion circuit. LD1 and LD2 provide diode distortion.

The Contour control adjusts the overall tone quality of the overdrive channel by emphasizing or notching the mid range frequencies. In the fully CCW position the response is fairly flat up to about 2kHz, where a gentle roll-off occurs. In the fully CW position, the circuit provides a -20db notch at about 1kHz. The signal then feeds the overdrive volume control and the treble and bass controls.

The signal from the Clean and Drive channels sum at U5A via JFETs Q4 and Q5. The output from U5A feeds the reverb drive circuit (U6A) and summing amp U5B. U6B is the reverb sensing circuit. The output of U6B drives the Reverb volume control and then sums with the dry signal at U5B. The output of U5B drives the preamp out jack, is normalled through the power amp in jack, and feeds the power amp input.

CHANNEL SWITCHING

The AC voltage from the power transformer secondary is tapped off through resistor R82, and presented to the footswitch jack (Approx 20 V RMS). By rectifying the positive or negative side of the waveform, we create a DC control voltage that is sensed by comparators U4A and U4B. Diode's CR20 and CR21 set up the reference voltages for the comparators. Therefore the control voltage must toggle between +15Vdc and -15Vdc. The comparator output controls the JFETs and the indicator LEDs. Without the footswitch connected to the footswitch jack, CR15 rectifies the negative half of the waveform. U4B senses the DC control voltage, and provides -15Vdc to the gate of Q6, allowing the reverb output to function.

POWER AMP

U1 is a high voltage op-amp that provides voltage gain for the power amplifier. CR3 and CR4 act as differential protection diodes that prevent the positive and negative inputs of U1 from becoming more than 0.6 volts apart. Bootstrap Capacitors C37 and C38 sense the output through R69. This provides more voltage swing for the opamp with respect to ground.

Diodes' CR5-CR8 (BYV26D) make up the Fixed Bias circuit for the output transistors. The Bias Diodes mount through a hole in the transistor heatsink. This ensures the Diodes will properly track the temperature of the output transistors. These Diodes were selected because they exhibit a 2mV decrease in Knee Voltage for every 1 degree (Celsius) increase in temperature. Pin 6 of U1 is at 0 Vdc. Therefore the Bias Diodes provide 2 voltage drops (+/- 1.2volts) to the Base of Darlington Transistors Q1,Q2, Q10 and Q11.

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THEORY OF OPERATION (CONT)

Diodes' CR9-CR12 make up a voltage clamp protection circuit. Q8 and Q9 make up a current limiting protection circuit. If the output is shorted, the voltage at the emitters of Q10 and Q11 will increase. This voltage is sensed through R100 and R107 and presented to the bases of Q10 and Q11. When Q10 and Q11 turn on, the drive current and bias to the output transistors is removed, which shuts down the output section of the amplifier.

The output signal feeds through the Headphone jack circuit, before driving the speaker. With headphones connected to the headphone jack the speakers are muted.

PARTS LIST

PRINTED CIRCUIT BOARD ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	048873001	PCB ASSY DELUXE 112 PLUS	(STUFFED)
1	031910	BREAKER THERMAL 15A 155/195DEG	TS1
1	048451	BUTTON PUSH OFF WHITE	@S1
1	028577	CABLE REVERB 30"	@P1-4
2	031756	CAP AE 4700uF 50v	C47,48
1	028458	CAP AE RDL 1uF 50V 20%	C53
4	028459	CAP AE RDL 2.2uF 50v 20%	C11,33,34,36
1	028460	CAP AE RDL 4.7uF 50V 20%	C35
6	028465	CAP AE RDL 22uF 50V 20%	C6,12,25,27,39,40
4	028471	CAP AE RDL 47uF 50V 20%	C37,38,49,50
2	025787	CAP AE RDL MINI 100uF 16V NP	C57,58
1	039255	CAP CA 10PF 100V	C10
1	038698	CAP CA 47PF 100V	C29
1	038873	CAP CA 22PF 100V	C26
1	038699	CAP CA 100PF 100V	C23
1	038701	CAP CA 470PF 50V	C14
1	038874	CA[CA 560PF 50V	C17
2	039263	CAP CA 100PF 100V	C3,32
2	039268	CAP CA 4700PF 100V	C1,2
4	027278	CAP MPF .1uF 63V 10%	C41,42,59,60
2	027281	CAP MPF .22uF 63V	C5,30
5	027286	CAP MPF .47uF 63V	C4,15,16,43,44
1	033579	CAP PFF RDL .0015uF 100V 10%	C21
2	033580	CAP PFF RDL .0022uF 100V 10%	C13,28
1	033581	CAP PFF RDL .0033uF 100V 10%	C20
1	036234	CAP PFF RDL .015uF 100V 10%	C31
1	033590	CAP PFF RDL .022uF 100V 10%	C19
6	033591	CAP PFF RDL .033uF 100V 10%	C7,8,9,24,45,46
5	033592	CAP PFF RDL .047uF 100V 10%	C18,22,51,52,56
2	033596	CAP PFF RDL .068uF 100V 10%	C54,55
1	024853	CAP PFF RDL .1uF 250V 10%	C61
2	027947	CONTROL SNAPIN 100K 30C TAPER	R26,35 (GAIN, TREBLE-DRIVE CH)
1	027949	CONTROL SNAPIN 250K 30C TAPER	R38 (BASS-DRIVE CHANNEL)
1	027397	CONTROL SNAPIN 2K 15A TAPER	R14 (MID)
2	027940	CONTROL SNAPIN 50K 15A TAPER	R12,13 (CLEAN CH TREBLE, BASS)
1	027943	CONTROL SNAPIN 50K 30C TAPER	R24 (CLEAN CHANNEL VOLUME)
3	027941	CONTROL SNAPIN 50K B TAPER	R33,34,56 (CONTOUR REVERB DRIVE CHANNEL VOL.)
2	064089	DIODE 1N4003	CR13,14
26	006260	DIODE 1N4448 SIGNAL	CR1-4,9,11,15-21,28-36,39-42
4	029045	DIODE 6A 400V 6A4 LEAD FORMED	CRC22,23,24,25
4	028776	DIODE BIAS BYV26D LEAD FORMED	CR5,6,7,8
2	027327	DIODE ZEN 1N5234B 6.2V 5%	CR10,12
2	028119	DIODE ZEN 1N5353B 16V 5W 5%	CR26,27
12	025802	FSTN TAB MALE .250X.032 PCB MT	CR1-5,7-11,13,14
2	026000	FSTN TAB MALE PCB MT .187X.032	CP6,12
2	025996	FUSE CLIP PCB .250&5MM FUSE	XF1
1	039982	FUSE QA 1-1/4X1/4 250V 4A	F1 (100/120V ONLY)

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PRINTED CIRCUIT BOARD ASSEMBLY (CONT)

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	020794	FUSE QA 20mmX5mm 250V 2 AMP	F1 (230/240V ONLY)
1	031725	HEATSINK PLATE	(TRANSISTOR MOUNT)
5	016795	IC DUAL OP AMP TL072	U2,3,5,6,7
1	031611	IC DUAL OP AMP PC4560	U4
1	028047	IC OP AMP MC1436/SG1436Y	U1
4	040903	INSULATOR MICA TO-218	@Q1,2,10,11
2	037036	JACK PHONE PCB MONO CA PREMIUM	J3,4 (FOOTSWITCH PREAMP OUT)
4	031570	JACK PHONE PCB STEREO PREMIUM	J1,2,5,6 (INPUTS, POWER AMP IN HEADPHONE)
5	026043	JUMPER WIRE 18GA .8X.175	JP1-5
60	020888	JUMPER WIRE 22GA	W1-60
1	028098	LED 5X5MM GREEN SLB-55MG3	LD4
1	028039	LED RED 5X5MM SLB-55VR3	LD3
2	9902202281	LED RED LUMEX CS02	LD1,2
1	048872	PCB FAB DELUXE 112 PLUS	(RAW BOARD)
3	024947	RES CF 1/4W 5% 47Ω	R4,5,45
2	024957	RES CF 1/4W 5% 270Ω	R101,106
1	029604	RES CF 1/4W 5% 300Ω	R84
7	024965	RES CF 1/4W 5% 1K	R17,30,48,52,99,100,107
3	024971	RES CF 1/4W 5% 2.2K	R23,71,72
3	024973	RES CF 1/4W 5% 3.3K	R25,27,54
2	024975	RES CF 1/4W 5% 3.9K	R61,77
1	024977	RES CF 1/4W 5% 4.7K	R44
1	028034	RES CF 1/4W 5% 5.1K	R8
1	024979	RES CF 1/4W 5% 6.8K	R9
1	024942	RES CF 1/4W 5% 7.5K	R22
1	024980	RES CF 1/4W 5% 8.2K	R20
5	024981	RES CF 1/4W 5% 10K	R53,86,87,93,94
2	024985	RES CF 1/4W 5% 15K	R10,40
2	029006	RES CF 1/4W 5% 20K	R102,104
5	024987	RES CF 1/4W 5% 22K	R11,15,18,19,37
3	024988	RES CF 1/4W 5% 27K	R60,62,66
2	024989	RES CF 1/4W 5% 33K	R2,3
5	024993	RES CF 1/4W 5% 47K	R31,32,36,39,59
1	026507	RES CF 1/4W 5% 62K	R78
2	029613	RES CF 1/4W 5% 91K	R41,50
2	024997	RES CF 1/4W 5% 100K	R47,58
1	025058	RES CF 1/4W 5% 180K	R16
6	025059	RES CF 1/4W 5% 220K	R21,29,42,43,108,109
3	025065	RES CF 1/4W 5% 470K	R28,46,55
2	028018	RES CF 1/4W 5% 510K	R6,7
1	025067	RES CF 1/4W 5% 680K	R65
2	029618	RES CF 1/4W 5% 910K	R51,57
8	025069	RES CF 1/4W 5% 1M	R1,49,85,88,91,92,95,96
1	026493	RES CF 1/2W 5% 2.7k	R83
2	036926	RES CF 1/2W 5% 4.7k	R70,73
1	028045	RES FILM 1W 5% 220Ω	R69
2	028030	RES FILM 1W 5% 680Ω	R63,67
3	028029	RES FILM 1W 5% 1.5K	R64,68,82
2	028038	RES FILM 1W 5% 3.9K	R89,90
1	028022	RES FILM 2W 5% 120Ω	R79
2	028021	RES FILM 2W 5% 470Ω	R80,81
4	039210	RES WW 5W 10% .47Ω	R74,75,103,105
2	028037	RES WW BT 5W 10% 330Ω	R97,98
1	027479	RES WW BT 10W 10% .1Ω	R76
4	027638	SCREW TF 4-40X3/8 HWHS ZI .1" HD	@Q1,2,10,11
6	032908	SCRW TF 6-32X3/8 PHP ZI	HEATSNK/BREAKER
2	9904701440	SPACER LED .7X.125 BLUE @LD3,4	@LD3,4
1	028091	SWITCH PUSH SLFLK SHORT STROKE	S1 (DRIVE SELECT)
1	028503	THERMISTOR 10 OHM 5A C60-11	TH1
4	028169	WSHR SHLDR NYL 5/32X1/4	(@Q1,2,10,11)
5	014689	XSTR N-CH JFET J111 TO-92	Q3,4,5,6,7
1	016739	XSTR NPN 2N4401 TO-92	Q8
2	028114	XSTR NPN TIP 142 TO-218AC	Q1,10

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PRINTED CIRCUIT BOARD ASSEMBLY (CONT)

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	016742	XSTR PNP 2N4403 TO-92	Q9
2	028115	XSTR PNP TIP 147 TO-218AC	Q2,11

CHASSIS ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	048879	CHS ASSY DELUXE 112 PLUS	(COMPLETE CHASSIS 120V)
1	021709	BUSHING SR .437X.062X 13/32 BLK	(@ SPEAKER CABLE)
1	026116	BUSHING SR .500X.063X7/16 BLK	(@ REVERB CABLE)
1	026038	BUSHING SR .625X.062X37/64 BLK	(@ POWER CABLE)
1	010401	BUSHING SR .625X.125X37/64 WHT	(@ POWER CABLE 230/240V)
1	026527	CABLE ASSY PWR 120V .187 TABS	(POWER CABLE 120V ONLY)
1	048465	CABLE ASSY PWR .187 TAB 100V	(POWER CABLE 100V ONLY)
1	026528	CABLE ASSY PWR 230V .187 TAB	(POWER CABLE 230V ONLY)
1	036479	CABLE ASSY PWR AUST .187 TABS	(PWR CABLE AUSTRALIA ONLY)
1	040992	CABLE ASSY PWR 5A U.K. .187 TAB	(PWR CABLE UNITED KINGDOM)
1	048874	CHS DELUE 112 PLUS	(RAW CHASSIS)
1	028560	END BELL XFMR 85W	(TRANSFORMER MOUNT)
1	031726	HEATSINK BAR M-80	(COUPLER TO CHASSIS)
10	026402	KNOB POINTER BLACK	
4	028591	NUT ACORN 8-32	(TRANSFORMER MOUNT)
1	048875	PANEL FRONT DELUXE 112 PLUS	
1	048876	PANEL REAR DELUXE 112 PLUS	
1	038900	SCRW TF 6-32X1*4 PHP ZI	(@ GROUND LUG)
2	028937	SCRW TF 6-32X5/8 PHP ZI TAPTYT	(PCB TO CHASSIS MOUNT)
5	028500	SCRW TF 8-32X3/4 HWH SLTD ZI	(HEATSINK TO CHASSIS MOUNT)
2	025936	STANDOFF NYLON PCB SNAPIN 3/8"	(PCB MOUNT)
1	025935	SWITCH DPST .187 TAB (DOM)	(POWER SWITCH)
4	030007	WSHR LCK INTL 8X.330X.02 ZI	(TRANSFORMER MOUNT)
1	027668	XFMR PWR 120V 85W	(120V DOMESTIC ONLY)
1	039357	XFMR PWR EXP DELUXE 112	(100V/115V/230V/240V)

FOOTSWITCH ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	028/122	FOOTSWITCH 2 BTN REVERB F/LOGO	(COMPLETE FOOTSWITCH)
2	006260	DIODE 1N4448/1N914B SIGNAL	CR1,2
1	037036	JACK PHONE PCB MONO CA PREMIUM	J1
2	028039	LED RED 5X5MM SLB-55VR3	LD1,2
2	028714	SWITCH PUSH SPDT	S1,2

CABINET ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	041485	CAB ASSY PERFORMER 650	(CABINET ONLY)
1	022491	CLAMP CABLE NYL SCRW MNT 5-16	(@ REVERB CABLE)
4	026566	CORNER 2 HOLE W/TAB NI	
2	026568	CORNER 3 HOLE NI	
4	019276	GLIDE CAB 1.24X.335 NI	(NO INSERT)
1	040051	GRILLE ASSY DELUXE 112	(GRILLE ONLY)
1	027846	HANDLE 9.25" NO LOGO	(RUBBER ONLY, NO INSERT)
2	019279	HANDLE CAP 2 HOLE NICKEL	(HANDLE MOUNT)
4	019275	INSERT GLIDE CUSHION 1.27 DIA	(RUBBER ONLY)
1	032524	INSERT HANDLE	(SPRING STEEL)
1	011298	NAMEPLATE FENDER SMALL	(LOGO)
8	021972	NUT T 10-32X3/4 STR 3 PRNG BLX	(SPEAKER/HANDLE MOUNT)
1	028055	REVERB UNIT 800 OHM 8EB2C1B DN	(PAN)
4	026577	SCRW M 10-32C1 PHP BLX	(SPEAKER MOUNT)
4	022244	SCRW M 10-32X1-1/8 OHP NI	(HANDLE MOUNT)
6	036199	SCRW M 8-32X1-3/16 OHP BLX CP	(CHASSIS MOUNT)
5	029828	SCRW PB 8X3/4 PHP ZI	(REVERB PAN MOUNT)
2	018113	SCRW SMA 4X1/2 OHP BLX	(LOGO MOUNT)
2	011678	SCRW SMA 8X1-1/2 OHP BLX	(GRILLE MOUNT)
10	026571	SCRW SMA 8X1/2 THP NI	(CORNER MOUNT)
4	026625	SCRW WOOD 8X1 FH	(GLIDE MOUNT)

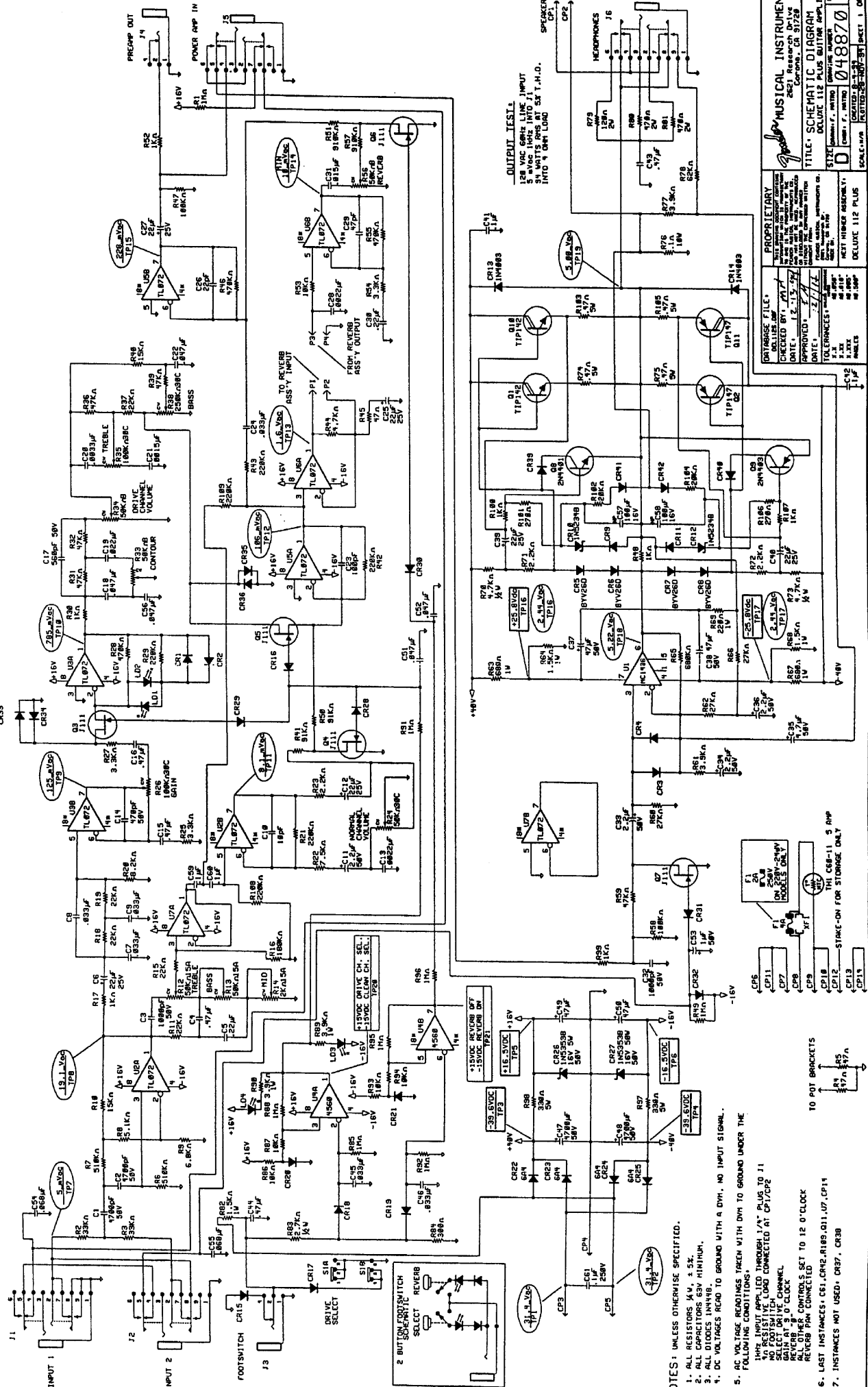
**DELUXE 112 PLUS
CABINET ASSEMBLY (CONT)**

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
6	029527	WSHR FNSH 8-5/8 FLNGD BLX WX	(CHASSIS MOUNT)

MISCELLANEOUS

QTY	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	048877	MANUAL OWNERS DLX 112 PLUS	
1	048871	SCHEM REDU DLX 112 PLUS W/ SERV	

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED PR#291	8-4-94	FM
	B	EC #1347	11-28-94	FM



NOTES: UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS $1/4W$, $\pm 5\%$.
2. ALL CAPACITORS $50V$ MINIMUM.
3. ALL DIODES $1N4001$ MINIMUM.
4. DC VOLTAGE SET TO GROUND WITH A DVM, N. N. G.
5. AC VOLTAGE READINGS TAKEN WITH DVM TO GROUND UNDER FOLLOWING CONDITIONS:
 1MHz INPUT APPLIED THROUGH $1/4W$ PLUS TO
 40 RESISTIVE LOAD CONNECTED AT CP1/CP2
 SELECTED CHANNEL
 GAIN AT $9 \text{ }^{\circ}\text{C}$ LOCK
 ALL OTHER CONTROLS SET TO $0 \text{ }^{\circ}\text{C}$ LOCK
 REVERB PAN CONNECTED
6. LAST INSTANCES: CSI, CP42, A149, Q11, U7, CP1
7. INSTANCES NOT USED: CR37, CR38

1KHZ INPUT APPROX. 100 THRESHOLD, 1/4" SCALE TO 11

NO RESISTIVE LOAD CONNECTED AT CP1/CP2
NO FOOTSWITCH

SELECT DRIVE CHANNEL
GAIN AT 9.0'CLOCK

REVERB - 0 -
ALL OTHER CONTROLS SET TO 12 O'CLOCK

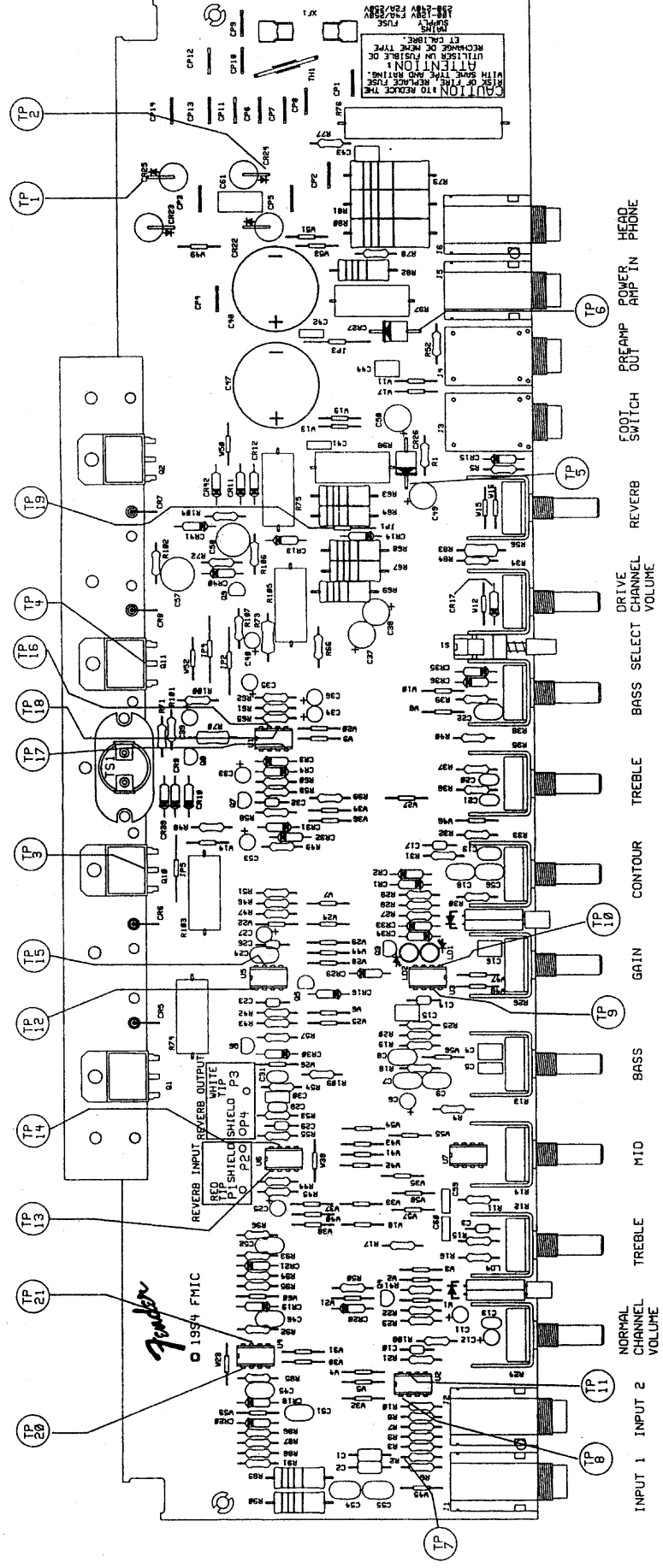
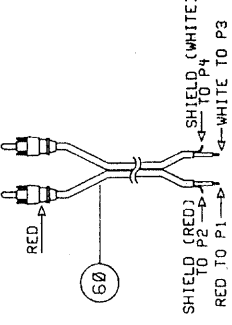
REVERØ PAN CONNECTED

INSTANCES: C61.CR42.R109.Q11.U7.CP14

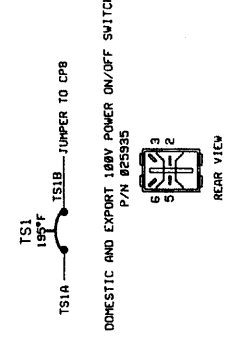
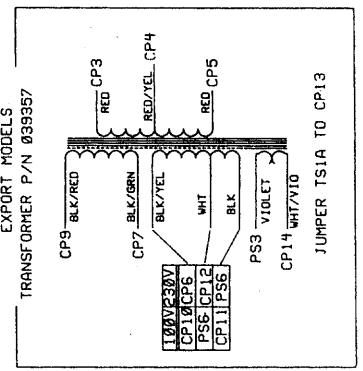
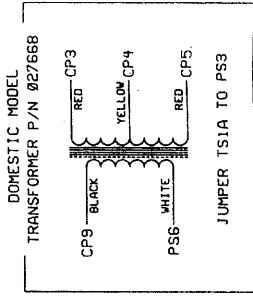
INSTANCES NOT USED: CR37, CR38

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FILM/DWG. SERVICE DIAGRAM
DATABASE: DEL112P DBF DATE: 30-NOV-94
LAYERS PLOTTED: 1 2 3 4 10
1819



REVISIONS		APPROVED	
ZONE	REV. DESCRIPTION	DATE	APPROVED
	A RELEASED PR#291	8-4-94	FM
	B EC #1347	11-28-94	FM

PROPERTY		TITLE: SERVICE DIAGRAM FOR DELUXE 112	
THIS DRAWING IS THE PROPERTY OF FENDER MUSICAL INSTRUMENTS CO. IT IS TO BE USED ONLY FOR THE PURPOSES OF THE PROJECT AND IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF FENDER MUSICAL INSTRUMENTS CO.		SIZE: D	
CHECKED BY: M11		DRAWING NUMBER: 048869	
DATE: 12-13-94		REV. B	
APPROVED: [Signature]		NEXT HIGHER ASSEMBLY: DELUXE 112 PLUS	
DATE: 12/94		SCALE: NA	
TOLERANCES: .005" .010" .015" .020" .030" .040" .050" .060" .070" .080" .090" .100"		PLOTTED: 30-NOV-94 SHEET 1 OF 1	