

PCN 2 & PCN 4 ELECTRONIC CROSSOVER NETWORK

PCN 2 P/N 071-5510-000
PCN 4 P/N 071-5520-000

SERVICE MANUAL

PCN-2 & PCN-4

(These are the model names for warranty claims)

OCTOBER 1995

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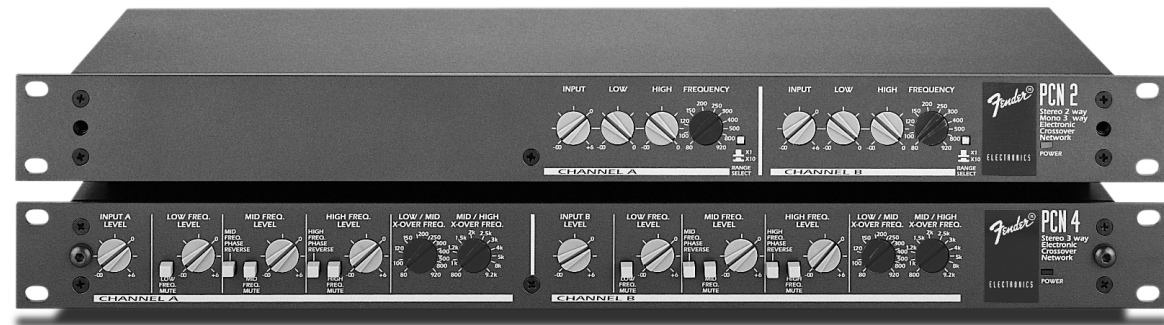
For warranty repair service, only Fender specified part numbers are to be used. It is recommended they also be used for post-warranty maintenance and repair.

Parts marked with an asterick (*) 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:

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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

Part Number:	PCN 2	071-5510-000
	PCN 4	071-5520-000
Crossover Filter Type:	4th order state variable Linkwitz-Riley 24 dB/octave slope	
Input Type:	Balanced Differential	
Input Impedance:	20 K Ω	
Output Type:	Floating and Balanced Line Drivers	
Output Impedance:	300 Ω	
Frequency Response:	10Hz to 20kHz +/- .5 dB	
Frequency Range:	Low 80 Hz to 920 Hz High 800 Hz to 9.2 kHz	
Total Harmonic Distortion: ($R_L > 2Kohms$)	< 0.005% THD 20Hz to 20kHz @ +8 dBu (1.95 volts)	
Maximum Output Level: ($R_L > 2Kohms$)	+21 dBu (6.2 volts) @ <.05% THD 20Hz - 20kHz	
Maximum Voltage Gain:	6 dB	
Constant-Directivity Correction:	+3 dB @ 3.5kHz rising at 6 dB/octave to 22.5kHz	
Hum and Noise:	< - 100 dBu	
Signal To Noise Ratio:	108 dB @ +21 dBu	
Input Power:	20 Watts (all voltages)	
Dimensions:		
Height:	1-3/4 in. (4.45 cm)	
Width:	19 in. (48.26 cm)	
Depth:	7-1/2 in. (19.05 cm)	
Weight:	8 lbs (3.6 kg)	

THEORY OF OPERATION

The PCN-2 is a professional stereo 2 way electronic crossover network, which may also be used as a mono 3 way unit. The PCN-4 is a professional stereo 3 way electronic crossover network, which may also be used as a mono 4 way unit. Both use a unique and highly accurate 24 dB per octave Linkwitz-Riley filter system. Additionally, the PCN-2&4 are among only a few units that provide a flat summed response of the low and high frequency outputs regardless of the crossover frequency chosen. This is accomplished by using precision 2% resistors, carefully selected capacitors, and the industry's only precision matched hand selected 1% four gang frequency range potentiometers.

The input stage (IC101B) will accept a Balanced or Unbalanced signal via an XLR jack with pin # 2 being Hot (Non-inverting). The input stage provides a gain of 1 and High frequency cut-off at about 75 kHz. The input level control (R105) feeds the second stage, using C104 and R110 to provide the switchable Constant Directivity Horn equalization (CD boost). This feature compensates for the high frequency rolloff inherent in Constant Directivity horns. The boost is +3 dB at 3.5 kHz, rising 6 dB per octave to 22.5 kHz.

ICs 102, 103, and 104 make up the Linkwitz-Riley 4th order State Variable filter with 24 dB per octave slopes. This filter will produce low pass and high pass transfer functions simultaneously. The precision components allow precise matching of the filter knee points.

The PCN-2 changes easily from a stereo 2 way to a mono 3 way mode by engaging the switch (S103) on the rear panel. In the mono 3 way mode, the high frequencies are available at the High Output on the "A" channel. The "A" channel frequency control sets the High crossover point. The remaining Low and Mid frequencies are tapped off IC104 on the "A" channel. They connect to the "B" channel at R111 via the mode select switch (S103). The output of IC102 pin 1 provides the "Mid frequencies" to the "High Out B" output of channel "B". The output of IC102 pin 7 sends the "Low frequencies" to the "Low Out B" output. The "B" channel frequency control sets the crossover point between the Low and Mid frequencies.

The PCN-4 does not feature a switch to change from a stereo 3 way to a mono 4 way mode. However, to operate the unit in a mono 4 way mode, connect the High output of channel "A" to the Input of channel "B". Therefore the Lows appear at "Low Out" Ch A, the Low/Mids appear at "Mid Out" Ch A, the High/Mids appear at "Mid Out" Ch B, and the Highs appear at "High Out" Ch B.

After the filter section, the signals feed the Mute Switches (PCN-4 only), level controls, buffer amps, Phase Reverse switches (PCN-4 only), and to the output circuits.

The output circuits are Balanced low impedance line drivers, ideally suited for driving long cable runs. The outputs will function properly in an unbalanced mode by grounding pin 3 of the XLR jack. However, doing so will compromise the common mode rejection capability of balanced circuits. Located just prior to the output XLR jacks are a pair of JFets. One JFet connects from pin 2 to ground. The other connects from pin 3 to ground. They mute the outputs for about 3 seconds after power-up. This prevents turn-on transients from reaching the power amplifiers during a power interruption. Upon power-up, C159 charges through R181 providing the delayed signal output. When you switch the power off, C159 discharges immediately through D101, muting the outputs.

The power supply uses adjustable regulators set up to deliver +/- 16.5 Vdc.

PARTS LIST

PRINTED CIRCUIT BOARD ASSEMBLY

QTY	PART #	DESCRIPTION	REFERENCE	DESIGNATION
1	028460	CAP AE RDL 4.7μF 50V	C159	
	028474	CAP AE RDL 100μF 25V	C103,114,115,118-121,134,135,138, 139,140,141,160,161,165,197,198, 199,214,215, 218-221, 260,265, 503-506	
2	028494	CAP AE RDL 1000μF 35V	C501,502	
	007029	CAP CD 220PF 50V 5%	C101,102,116,117,136,137,216,217	
	049351	CAP CD .1μF 25V	C150-157,252,253	
	030935	CAP PFF RDL .0018μF 50V 5%	C106,108,110,112,122,123,142,143, 222,223	
	030944	CAP PFF RDL .0082μF 50V 5%	C104	
	030947	CAP PFF RDL .015μF 50V 5%	C105,107,109,111,206,208,210,212	
	049352	CONTROL 10K PC MT RT ANG	R105,131,161,205,231,261(LEVEL)	
1 = SET OF 4	049353	CONTROL 50K PC MT RT ANG	R123-126,223-226 <u>THE FREQUENCY CONTROL USES 4 POTS GANGED TOGETHER AND MATCHED WITHIN 1%. THEY MUST BE REPLACED AS A SET</u>	
3	9902204580	DIODE 1N4148 SIGNAL	D101,503,504	
6	049354	DIODE IN4001 50PIV	D501,502,506-509	
	049355	IC DUAL OPAMP JRC NJM2068D	IC101-113	
1	9902203170	IC REGULATOR POS ADJUST LM317T		
1	049356	IC REGULATOR NEG ADJUST LM337T		
	031935	JACK XLR MALE RT ANG PCB		
	029177	JACK XLR FM RT ANG PCB		
1	025792	LED GREEN 2MMX5MM DIFFUSED	D505	
	049357	RES MF 1/4W 150Ω 1%	R147,148,177,178,247,248	
	049358	RES MF 1/4W 200Ω 1%	R503,504	
	016946	RES MF 1/4W 825Ω 1%	R110,	
	025810	RES MF 1/4W 2.49K 1%	R116,216,501,502,507,508	
	049359	RES MF 1/4W 3.57K 1%	R115,117,215,217	
	049360	RES MF 1/4W 4.99K 1%	R132,160,232	
	015582	RES MF 1/4W 10K 1%	R119-122,127-130,219-222,227-230,	
	031940	RES NET 10K 4 ISOL ELEM SIP 2%	R101-104,106-109,111-114,119-122, 127-130,139-142,143-146,169-172, 173-176,201-204,206-209,211-214, 239-242, 243-246,269-272,273-276	
	049361	RES MF 1/4W 15.4K 1%	R118,218	
	016969	RES MF 1/4W 27.4K 1%		
	015585	RES MF 1/4W 100K 1%	R149,150,179,180,249,250	
	040744	RES CF 1/4W 1M 1%	R181	

PARTS LIST

PRINTED CIRCUIT BOARD ASSEMBLY CONTINUED

QTY	PART #	DESCRIPTION	REFERENCE	DESIGNATION
1	028091	SWITCH PUSH SLFLK SHORT STROKE	S102,103,104,105,106,107,202 (MUTE, PHASE REVERSE, CD BOOST)	
2	049362	SWITCH DP4T PUSH RT ANG PC MT	S101,201(X10 SWITCH PCN2 ONLY)	
1	049363	SWITCH POWER DPDT PC MT PUSH	S501 (120V BLUE PWR SWITCH)	
1	049592	SWITCH POWER DPDT EXPORT IEC	S501 (230V GREEN)	
1	049364	XFMR PC MT 40V 300mA 115/230V	T501	
	014689	XSTR N-CH JFET J111 TO-92	T101-106,201-204	

CHASSIS ASSEMBLY

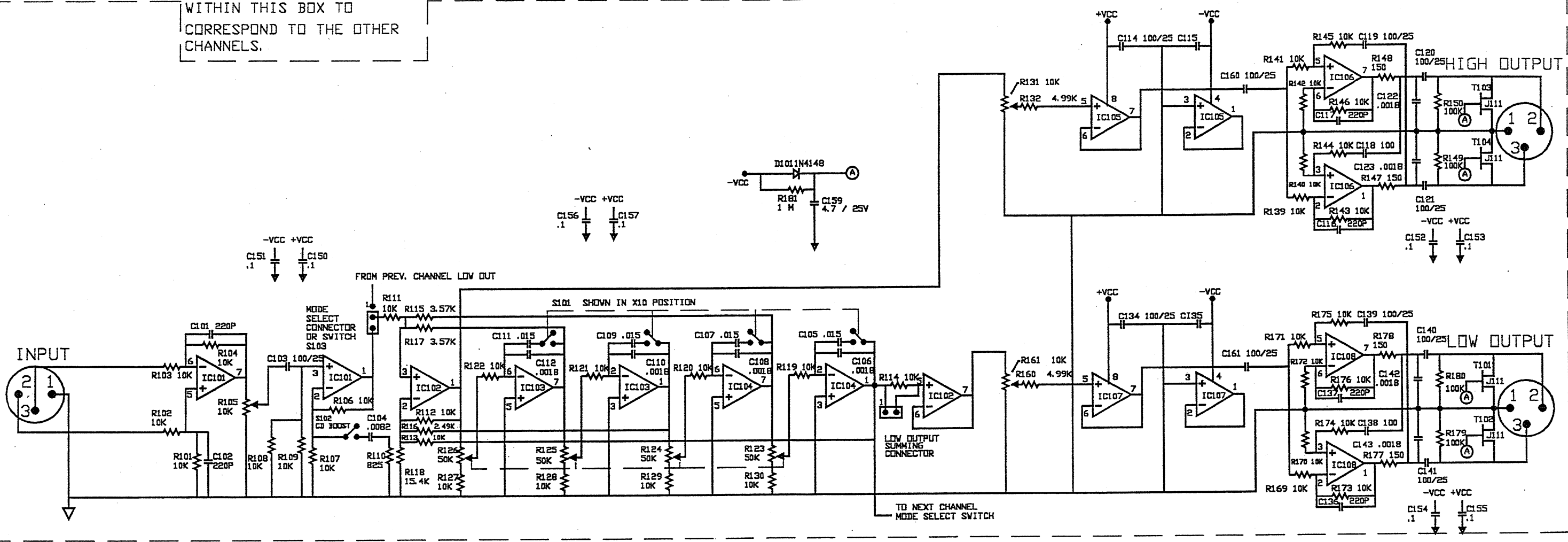
QTY	PART #	DESCRIPTION	REFERENCE	DESIGNATION
1	036702	FUSEHOLDER 3AG FINGER GRIP	(120V DOMESTIC ONLY)	
1	036703	FUSEHOLDER 5X20MM FINGER GRIP	(230V EXPORT ONLY)	
1	049365	FUSE QA 1-1/4X1/4 250V 250mA	(120V DOMESTIC ONLY)	
1	049593	FUSE QA 20MMX5MM 250V 125mA	(230V EXPORT ONLY)	
	049366	KNOB SQ. PUSH BUTTON GREY PCN		
	049367	KNOB RED W/SQ. SHAFT PCN2,4		
	049368	KNOB GREY W/SQ. SHAFT PCN2,4		
1	049369	SECURITY COVER PLASTIC SMOKE		

MISCELLANEOUS

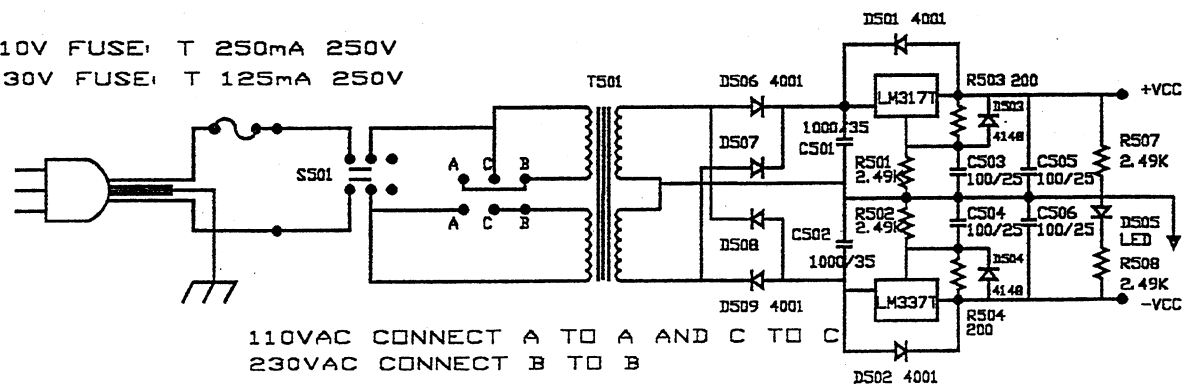
QTY	PART #	DESCRIPTION	REFERENCE	DESIGNATION
1	048905	SCHEMATIC REDU W/SVC DIA PCN2		
1	048906	SCHEMATIC REDU W/SVC DIA PCN4		

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ADD 100 TO PART NUMBERS WITHIN THIS BOX TO CORRESPOND TO THE OTHER CHANNELS.



110V FUSE: T 250mA 250V
230V FUSE: T 125mA 250V



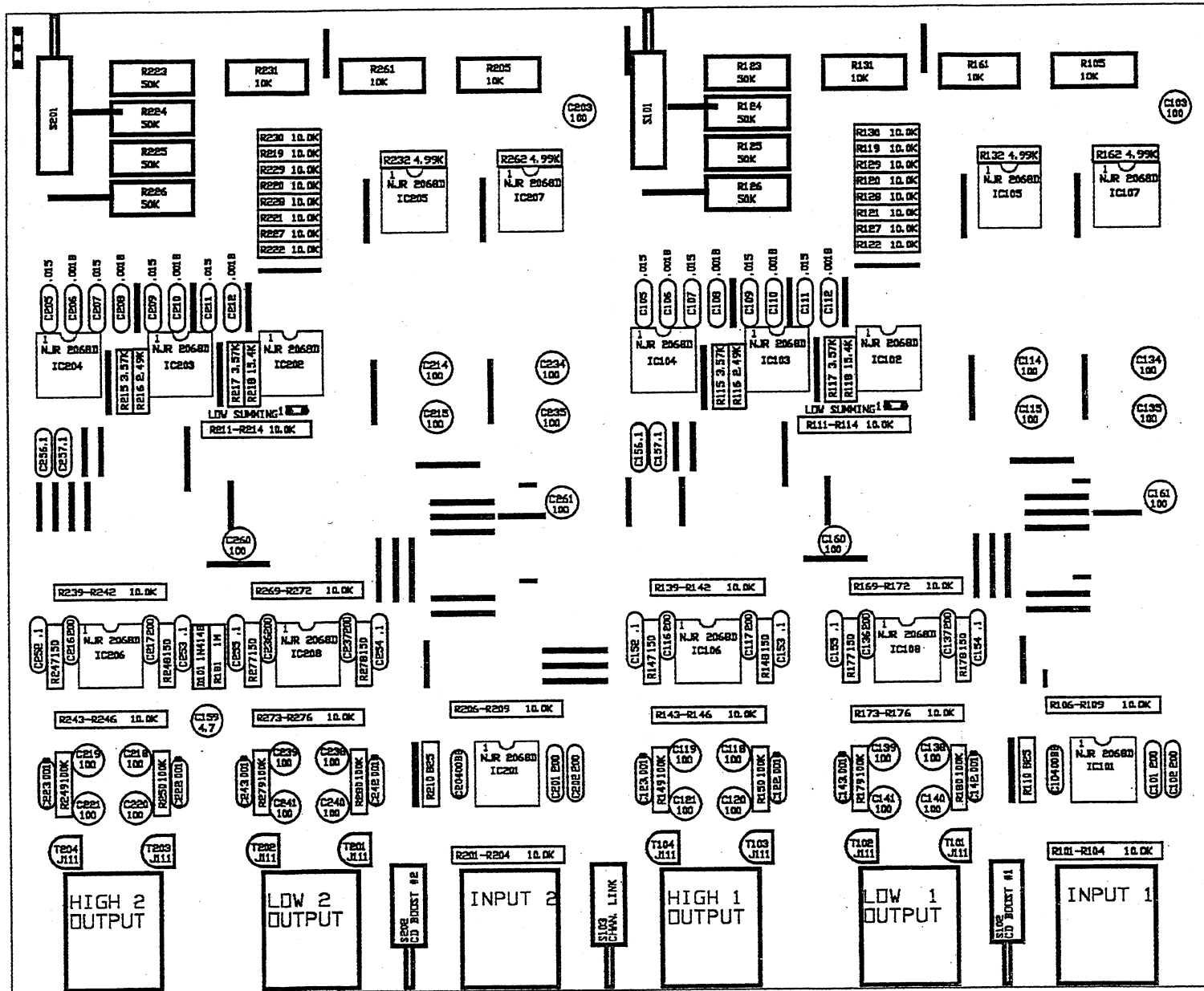
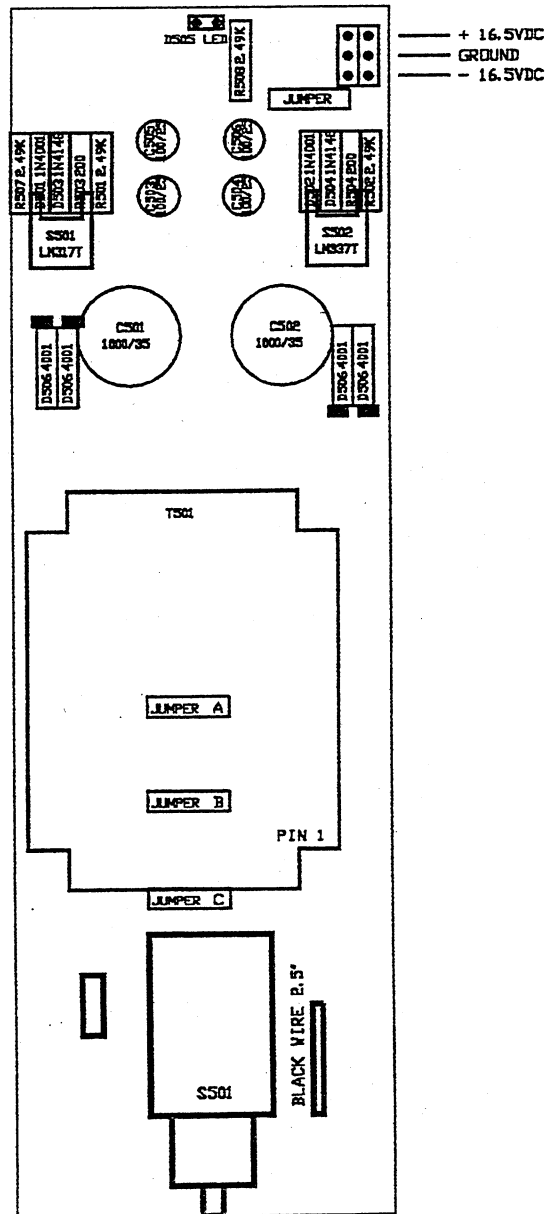
110VAC CONNECT A TO A AND C TO C
230VAC CONNECT B TO B

7. 4 INTERSECTING LINES DO NOT CONNECT UNLESS INTERSECTION IS COVERED BY A DOT
6. BYPASS CAPS ARE .1 OR SMALLER
5. ICS ARE JRC 2068D
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2. ALL DIMENSIONS ARE IN INCHES.
1. DO NOT SCALE DRAWING.

NOTES: UNLESS NOTED OTHERWISE.

MATERIAL	ENGINEER TDM	<i>Fender</i> FENDER MUSICAL INSTRUMENTS CORP. CORONA, CALIFORNIA 91720
FINISH	DRAWN TDM	
	DATE 09/13/94	TITLE PCN2 SCH.
	CHECK TDM	DISK SIZE
	DATE 09/14/94	PART/DRAWING NUMBER
	APPROVED TDM	SCALE: D 048905 A
	DATE 09/14/94	REV. A

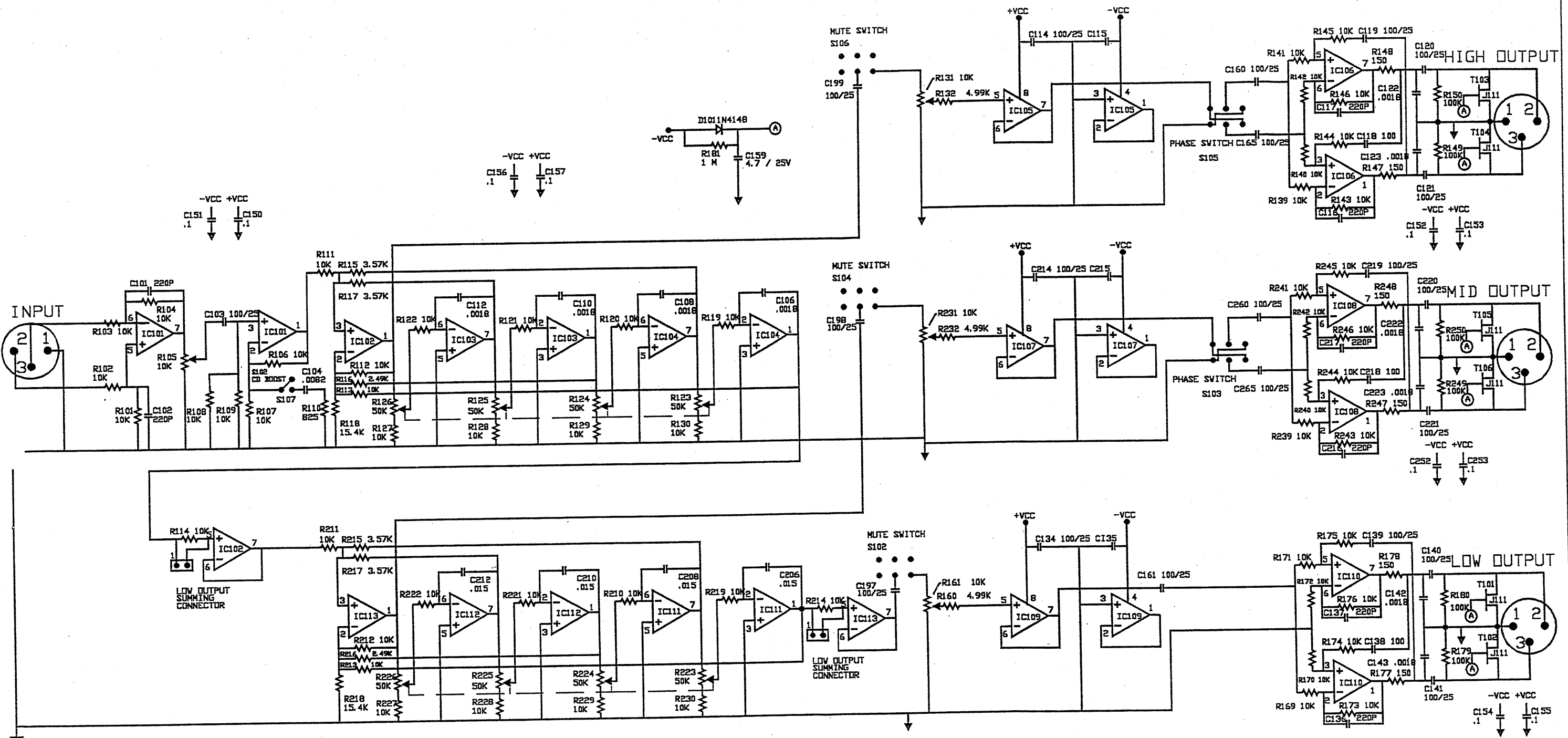
TOL. UNLESS NOTED OTHERWISE
FRACT. 1/32
.XXX 0.02
ANGLES 1/2 DEGREE
HOLE DIA.001
UNMARKED ANGLES ARE 90 DEGREE



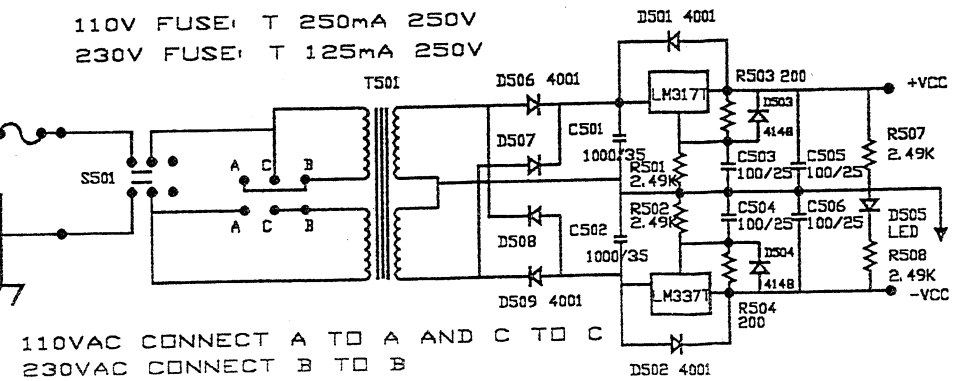
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MATERIAL	ENGINEER TDM	<i>Fender</i> FENDER MUSICAL INSTRUMENTS CORP. CORONA, CALIFORNIA 91720
FINISH	DRAWN TDM	
	DATE 09/13/94	TITLE PCN2 SERVICE DIAGRAM
	CHECK TDM	DISK SIZE PART/DRAWING NUMBER REV. D 049053 A
	DATE 09/14/94	
TOL. UNLESS NOTED OTHERWISE FRACT. ± 1/32 .XXX ± .010 ANGLES ± 1/2 DEGREE HOLE DIA. ± .005, - .001 UNMARKED ANGLES ARE 90 DEGREE	APPROVED TDM	
	DATE 09/14/94	

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- 6. BYPASS CAPS ARE .1 OR SMALLER
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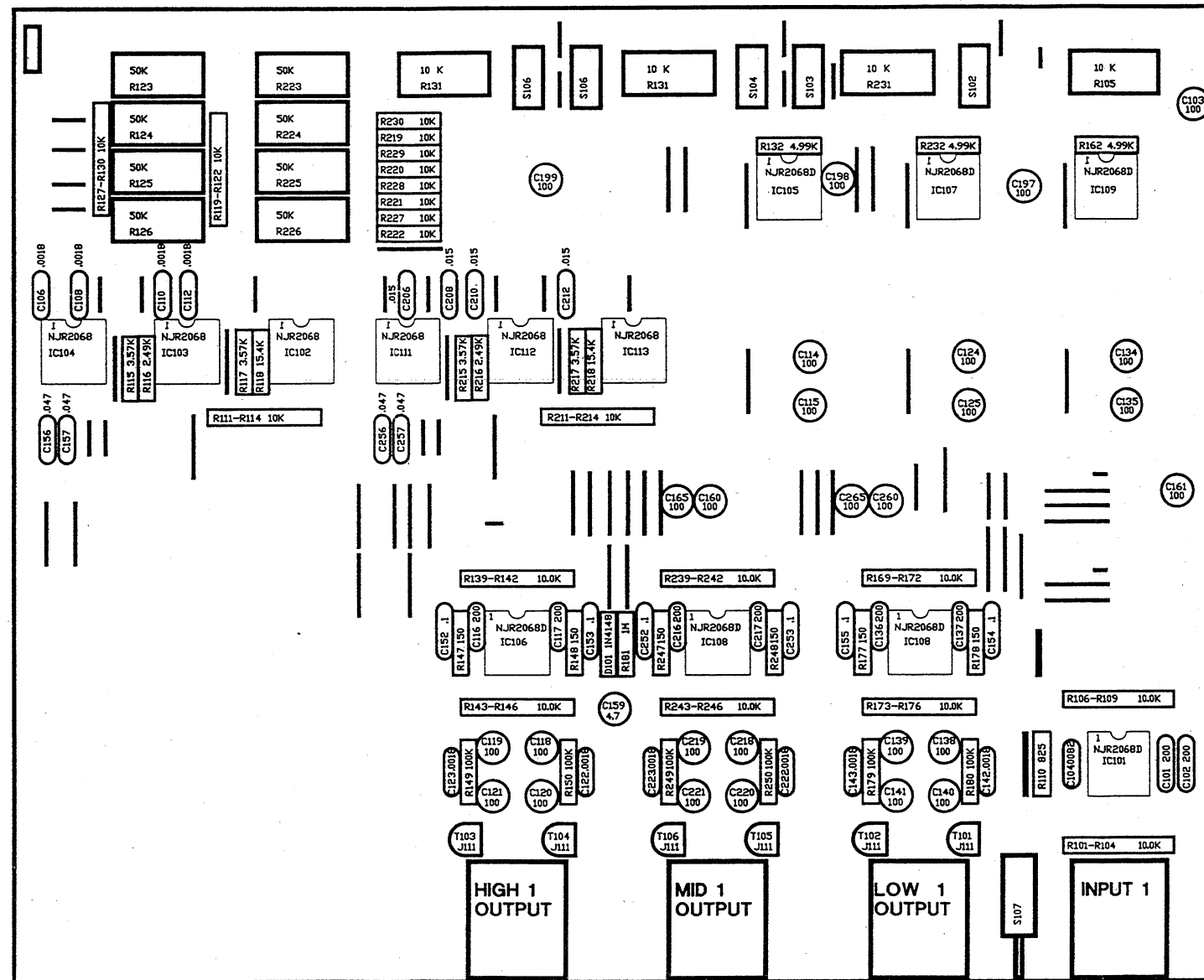
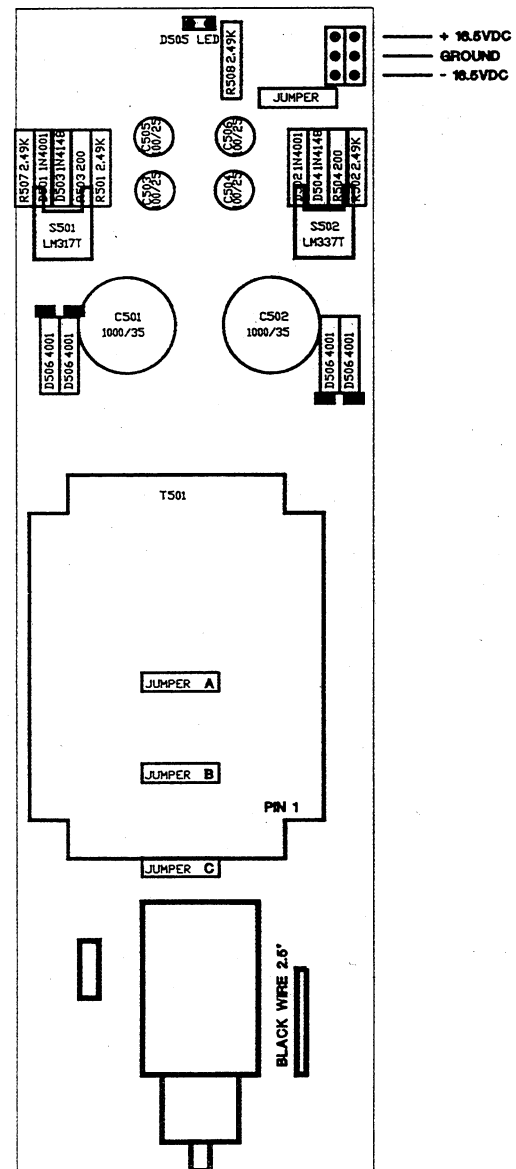


MATERIAL	ENGINEER TDM	FENDER MUSICAL INSTRUMENTS CORP. CORONA, CALIFORNIA 91720
FINISH	DRAWN TDM	
	DATE 09/13/94	TITLE PCN4 SCH
	CHECK TDM	DISK: SIZE PART/DRAWING NUMBER REV.
	DATE 09/14/94	D 048906 A
	APPROVED TDM	
	DATE 09/14/94	

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FINISH	DRAWN TDM	
	DATE 09/13/94	TITLE PCN4 LAYOUT
	CHECK TDM	
	DATE 09/14/94	DISK SIZE PART/DRAWING NUMBER REV. D 049054 A
TOL. UNLESS NOTED OTHERWISE FRACT. - 1/32 XXX010 ANGLES - 1/2 DEGREES HOLE DIA.005, .001 UNMARKED ANGLES ARE 90 DEGREES	APPROVED TDM	
	DATE 09/14/94	