PRINCETON RECORDING AMP®™

(This is the model name for warranty claims)

p/n 2152000000 (120V)

SERVICE MANUAL

ATTENTION:

WARRANTY SERVICE PROCEDURES

Component level field service of the TZ/FX/IO PCB Assembly is **limited** to those components marked as available in the Parts List. A failure of any component marked with a single asterisk (*) in the parts list should be handled by PCB Assembly Replacement. Please refer to the PCB Exchange Policy on page 5 of this Manual.

Fender Musical Instruments Corporation, 8860 East Chaparral Road Suite 100 Scottsdale, AZ 85250
Issued: October, 2006

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September, 2006

IMPORTANT NOTICE

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

PARTS LIST CODES

The description codes used in the itemized Parts Lists are defined below:

CAPACITOR CODES

CAP AE	=	Aluminum Electrolytic
CAP CA	=	Ceramic Axial
CAP CD	=	Ceramic Disk
CAP CR	=	Ceramic Radial
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 MOX	=	Metal Oxide
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

Model Name:		**PRINCETON RECORDING AMP**
Release Number:		PR 524
Part Numbers	**(120V, 60Hz) US:**	2152000000
	(240V, 50Hz) AUS:	2152003000
	(230V, 50Hz) UK:	2152004000
	(230V, 50Hz) EUR:	2152006000
	(100V, 50Hz) JPN:	2152007000
Power Requirement:		200 W
Power Output:		15 W RMS into 8 ohms @ 10 %THD
Power Amp Sensitivity:		10mV for 10 W into 8 ohms @ 5 %THD
Impedances	**Input (Pre-Amp):**	>1M Ohms
	Effects Send:	1 kOhm
	Effects Receive:	10 kOhm
Speaker Complement:		JENSEN C10-R, 8 ohm, 10” (P/N 0069347000)
Dimensions	**Height:**	16.50 in (41.9 cm)
	Width:	19.88 in (50.5 cm)
	Depth:	10.75 in (27.3 cm)
Weight:		45 lbs (20.4 kg)

Product specifications are subject to change without notice

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SERVICE NOTES

1. **CHASSIS REMOVAL** is accomplished by first removing the cabinet's upper back panel. Then remove the two (2) screws from the cabinet side panel and four (4) screws from the top of the cabinet that secure the chassis. Disconnect the ¼" speaker plug from the speaker jack. Remove the reverb assembly from the cabinet by 1) unscrewing its cable clamp from the baffle and 2) separating the 2 sets of Velcro restraining straps around the reverb. Then slide the chassis toward the rear of the cabinet.

2. **IO PCB REMOVAL** is accomplished by removing the nuts, washers, and screws that secure the IO PCB to the chassis' rear panel. This PCB will have to be removed in order to work on the Main Tube PCB. With cable ties removed, there is enough cabling to remove the PCB and place it behind the back of the chassis. Care must be taken to ensure that the removed PCB is insulated from any exposed metal or other hardware when power is applied.

3. **TUBE CONTROL PCB REMOVAL** is accomplished by removing the nuts, washers, and screws that secure the Tube Control PCB to the chassis' upper front panel. With cable ties removed, there is enough cabling to remove the PCB and place it in front of the chassis. Care must be taken to ensure that the removed PCB is insulated from any exposed metal or other hardware when power is applied. This PCB must be removed in order to work on the lower front panel effects circuitry found on the TZ/FX PCB below.

4. **TZ/FX PCB REMOVAL** is accomplished by first removing the IO PCB per item 2, Tube Control PCB per item 3, and then partially removing the Main Tube PCB. (Do not remove wiring from the Main Tube PCB. Remove the 12 screws securing the standoffs to the chassis. Also remove the tubes. Rotate this PCB so that the standoffs face the back panel of the chassis. Now there is enough room to remove the TZ/FX PCB.) Remove all nuts and washers from the controls at the lower front of the chassis except for the trans-impedance attenuator. This must be disconnected from the board inside the chassis at P23. Disconnect all fastons and ribbon cables from the TZ/FX PCB while cutting all necessary cable ties. Next, remove two (2) screws from underside of chassis first (these are located directly beneath the heat sink) and then the nine (9) screws around the board inside the chassis. Slide the board toward the rear of the chassis until all potentiometers are clear of the front of the chassis (wires from transformer may be tucked under the board or pulled through bottom of chassis if they obstruct this step) and finally remove the board.

5. **MAIN TUBE PCB REMOVAL** is accomplished by first removing the IO PCB per item 2. It is recommended that as much troubleshooting and rework as possible be performed with this PCB installed in the chassis with the IO PCB removed. Should you need to remove it, next, remove eight (8) screws that secure the standoffs around the preamp tubes and then the four (4) screws securing the power tube sockets. Disconnect the ribbon cables from the main PCB at P5 & P7. Numerous faston connection receptacles will need to be disconnected from their associated FASTON blade (keep notes!). Some wires and all coax will need to be unsoldered to fully remove the PCB.

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PCB EXCHANGE POLICY

Parts marked with a single asterisk (*) in the Part Lists are not field replaceable. If a failure due to one of these components is detected, please contact the FMIC Customer Service Department to order the complete PCB Assembly.

CIRCUIT DESCRIPTION

This section provides concise information about new or unusual circuitry designs incorporated into this amplifier model. The purpose is to aid the service technician by providing insight into the design areas most likely to become obstacles in troubleshooting. Information is focused for its effective use while maintaining the security of Fender® proprietary information wherever possible.

TUBE PCB

The Tube PCB contains all of the vacuum tube circuitry in 4 breakaway PCBs. These subassemblies are the Main PCB (includes the tubes & sockets), the Control PCB, the Power Supply PCB, and the Primary PCB.

The Tube PCB's wire set is extensive with signals coupling through coax. Power & ground interconnect between the Power Supply PCB through wires. The soldered ends of the power wires are generally found on the power supply PCB with FASTON connections found at their receiving end at the Main PCBs. Care must be taken to ensure good connections at the faston and soldered end.

Please refer to the service diagram & drawing – 0068621000 -Wire Set, PCB Assy, PRA, Tube. They contain the details regarding the wiring.

The input signal couples through J1 or J2 through a high-impedance op-amp buffer (U1-A & B) on the Control PCB. It exits to the compressor & overdrive circuits on the TZ/FX/IO. The signal exits out of the Control PCB through ribbon connector P26. Following these circuits, the signal couples via coax A to the tube input amplification stage (V1-B).

The amplified signal output by V1-B is fed via coax to and from the Control PCB (Coax B & C respectively) along with a supporting ground lead (T). Signal equalization (Treble & Bass) and volume can be adjusted with their respective controls. The signal level is reduced through this passive tone control circuit. With a fixed Midrange resistor, there is output when the Treble & Bass are set to minimum.

Once back on the Main PCB via Coax C, the signal is amplified using V1-A. R14 & 15 act as a voltage divider to reduce the signal to levels compatible to the solid-state effects loop found on the IO PCB. The signal to the effects loop is sent and returned via the D & E coax. V3-A boosts the signal level back up and sends it to the reverb loop and the power amp.

The reverb driver uses both sections of the 12AT7 (V2-A & B) which are plate coupled to the reverb transformer. Note the 2 grids & plates are tied together. The secondary of the reverb transformer connects to the reverb tank input through a coax terminated with the RED RCA jack.

The reverb tank output couples to the reverb recovery tube (V3-B) by a similar coax terminated with an RCA jack. Q1 & Q2 (J111 JFETs) allow the reverb signal to be switched off by footswitch control. The plate signal of V3-B is routed back and forth through the reverb level control (found on the control PCB) through coax F & G along with a supporting ground lead (U).

The reverb wet/dry mix is performed at the grid of V4-B. The cathode circuitry of this tube allows the summation of the negative feedback signal taken from the speaker output. The power amp feedback

resistor is R10. The amplified signal from V-4-B couples to the simple "concertina" phase inverter circuit (V4-A). Note the 56kOhm in the cathode and plate circuit. Both outputs are close, but not perfect 180 degree matches of each other. The bias of the phase inverter is intentionally non-ideal as per the vintage Princeton Reverb. Single sided clipping can be observed on the waveform when driven hard. This clipping causes the output power to not reach the full capability that the 6V6s can provide.

Each output phase is separately ac-coupled to the 6V6 output tubes (V5 & V6). The Green & Blue leads of the output transformer are connected to the 6V6's plates with B+ voltage applied to the RED center tap (approximately +400V). The nominal impedance of the OT's secondary is 8 ohms.

The 6V6's negative bias is set by an adjustable bias circuit found on the TZ/FX PCB. Its typical voltage drive is -36.7 VDC. This voltage is set by measuring the voltage across R20 (1 ohm) on the Main Tube PCB. The specified dc voltage across R20 is 40mV, which ideally relates to 40mA or 20mA per 6V6.

The heaters for 2 tubes (V1 & V3) are powered by a dc filament drive (using +/-16V from the TZ/FX PCB). AC filament drive is utilized on the remainder of the tubes and is derived from the green secondary of the PT. R1 & R3 act as a hum balance circuit for the AC filament drive. The pilot lamp is not energized by the AC filament supply.

TUBE POWER SUPPLY

The Tube PCB's Primary PCB subassembly interfaces between the AC line inlet, the AC power switch, and the primary of the power transformer. It provides inrush limiting with RT1 and line filtering with C19.

The red secondary of the PT energizes the Tube PCB's Power Supply PCB subassembly. D4-7 is a bridge rectifier and directly feeds the B+ filter cap (C26). The screen grid supply (A) follows, coupling through a 1k resistor. Supplies C & D are developed by subsequent RC filter sections. The C supply feeds the phase inverter & the D supply energizes the previous preamp stages.

TZ/FX/IO PCB

Only certain components found on this PCB are field serviceable. Please refer to this documents' parts list to determine its serviceability status.

The TZ/FX/IO PCB is composed of 2 PCB subassemblies. The TZ/FX PCB subassembly contains the following circuitry: the compressor circuit, the overdrive circuit, the solid-state power supplies, the Trans-Impedance (TZ) amp, the silent adapter circuit, the TZ mode selector, and miscellaneous control circuitry. On the IO PCB subassembly, one finds the footswitch interface with its supporting control circuitry, the external effect loop, the headphone interface, and the line out interface.

IO PCB

On the IO PCB subassembly, one finds the footswitch interface with its support circuitry, the external effect loop, the headphone interface, and the line out interface. This subassembly is found in its entirety on page 4 of 0069346000. Much of this subassembly is field serviceable.

The Main Tube PCB sends the IO PCB a reduced signal output, one which is suitable for the solid-state effects loop found there. The signal enters the EFFECTS LOOP SEND signal chain via coax at WJ34 (referenced to WJ31). U6 – A & B are a high input impedance differential buffer and amplifier which increase the output level at the effects loop jacks to a nominal -10dBu. At the output of U6-B, the signal takes 2 paths. The path to R72 wraps around the effects loop jacks in order to bypass it when configured in the EFFECTS LOOP KILL state. The other path is taken if the effects loop is functional. When Q3 is biased on, U2-B acts as a signal kill switch that silences J3 when the loop is killed. When Q3 is biased off, U2 - B is a simple inverter. Resistors and capacitors build out the U2-B's output to J3 providing protection & EMI filtering.

J2 is the external effects return jack. Its signal source is switched depending on whether a plug is installed in it (no plug = pass-thru). U2-A is a differential buffer acting as the FX return receiver. U7-A is 1) an attenuator to compensate for U6-B's boost and 2) the signal selector for the foot-switchable external effects on/off function. This is followed by a differen-

tial line driver (U7-B). Its output signal is returned via coax to V3-A on the Main Tube PCB (WJ33 & 30).

The line out and headphone signals arrive on the IO PCB via PW1 (POST_B & POST_GND_B). U1-A is a Sallen-Key filter to provide some added equalization and rolloff for speaker emulation.

U3 - A & B are differential LINE OUT drivers. R2 acts as its output level control. S1 is the ground lift switch for pin 1 of the XLR jack.

The headphone amp is built around U4-A. Q4 & Q5 act as output drivers. The same signal drives the tip and ring of the headphone jack (J4) with isolation provided through separate 33 ohm resistors.

The footswitch interfaces with the amp through a 5-pin DIN connector (J1). R15, R16, R28, & R29 provide the Footswitch PCB's dc bias through pins 1, 3, 4, & 5 of the connector. The switch state at the footswitch is static or non-momentary. Depressing the switch causes the dc voltage change at the DIN connector pins. These voltages are sensed by a quad comparator (U5), which determines the state to set the control signals for the analog JFET signal switching.

U5's outputs are open drains. These 4 outputs are effectively switching current on & off to control circuitry elsewhere through 22k resistors. Two outputs go a current mirror on the TZ/FX subassy – P4_OD & P1_COMP. The other 2 stay on the IO subassy – P5_FX & P3_REV.

At the top of the footswitch interface circuitry, D20 & 21 sense whether current is being drawn by the footswitch, which will happen any time it is plugged in. Q12 & Q2 acts as the switches that notify control logic elsewhere that the footswitch is connected.

Q8 is configured with the open drain of U5-p14 to provide a "wired OR" function allowing for the footswitch state. With this, the EFFECTS LOOP remains functional when no footswitch is attached. The effects loop can only be killed with the footswitch.

Q11 is a pass transistor that provides an "AND" function. This helps allow the REVERB to function normally when there is no footswitch. The reverb can only be killed with the footswitch.

REV_HI_KILL is the control signal that drives the gates of the JFET that kills the wet reverb signal on the Tube PCB. A current sensing switch circuit is built around Q1. This circuit is used several times on this PCB to create JFET switching levels in an electrically quiet manner. Note that R25 is in series with R37. When the "AND" logic allows current to flow through these 2 resistors, R26 biases Q1 into saturation and REV_HI_KILL goes high. If no current flows through R25 & R37, then Q1 is off and REV_HI_KILL is low.

Q7 and its associated circuitry form the current sensing switch that control the JFET analog switches for the EFFECTS LOOP kill function. Q6 provides its opposite polarity. D5 & D6 clamp these signals to ground to protect the resistively coupled JFETs - Q9 & Q10.

FX (COMPRESSOR & OD)

The FX subcircuits are low level effects found early in the Princeton Recording Amp's signal chain. These circuits are found in their entirety on page 3 of 0069364000. This circuitry is not field serviceable.

In end use, the amp's input signal enters the Tube Control PCB via the front panel instrument jacks, where it then passes through its high-impedance op-amp buffer (U1-A & B). Through a ribbon cable (P22), it exits to the compressor & overdrive circuits placed serially on the TZ/FX PCB. Following these circuits, the signal couples via coax from WJ35 & 32 to the tube input amplification stage.

Both effects are footswitch controllable. The design also provides for front panel switching when the footswitch is not present. The control signal FS_ACTIVE- enables and disables the front panel switches when the footswitch is attached to the amp.

TZ AMP

The transimpedance (TZ) amp is found in its entirety on page 1 of the TZ/FX/IO PCB service diagram. Most of the TZ/FX subassembly is not field serviceable.

This patented amplifier technology makes practice of voltage and current feedback in such a manner as to accurately reflect the dynamic impedance of a loudspeaker back into the output transformer of a tube amp. On the Princeton Recording Amp, this technology is configured to allow a guitarist to turn down the amplifier yet maintain all of the charm that we love about tube amps.

The TZ amp's input (at P17) is the green lead of the Tube Amp's output transformer (OT). In common with this input is one lead of an 8 ohm, 50W resistor. This resistor is mounted underneath the chassis in the final configuration.

The TZ amp feeds back a signal to the other end of the 8 ohm, 50W resistor using power amp U12. The feedback signal modulates the 8 ohm resistor in such a way that the OT's secondary appears to be loaded with the same complex impedance as the speaker that is being driven by power amp U11. So, in a nutshell, the TZ amp reflects an accurate measurement of the speaker's impedance back to the OT.

The signal path from the OT to power amp U11 is termed the TZ amp's forward path. The Line Out and Headphone functions on the IO PCB are fed via differential buffer U15-A. The circuit built around U15-B is an attenuator. The multiplying DAC at U18 (TLC7528) and the op-amp U17-A are combined into a programmable attenuator of this signal. It is followed by a solid-state chip power amp (TDA7293 – U11).

Ideally, at the maximum TZ setting, the output voltage to the speaker equals the output voltage generated by the secondary of the output transformer's white lead.

The current and voltage feedback occur at the inputs U23-A. The 0.1 ohm current sense resistor is the heart of the current feedback measurement. To maintain transimpedance amp operation, this resistor cannot be shorted out! The voltage across R109 indicates how much current is going through the speaker [0.1 ohm * I(speaker)]. R216 & R217 senses the output voltage of the speaker.

The multiplying DAC at U18 (TLC7528) and the op-amp U17-B are combined into a programmable amplifier which boosts the combined current and voltage feedback output of U23-A. It is followed by a solid-state chip power amp (TDA7293 – U12). This power amp modulates the 8 ohm 50W resistor as mentioned earlier. The signal path from R109 & U23-A to power amp U12 is termed the reverse path of the TZ amp.

The DAC communicates with the microprocessor through a serial-to-parallel shift register (74HC595 – U25). It so happens that for any given TZ amp setting the data input for DAC programmable attenuator is the same as that of the DAC programmable amplifier.

POWER SUPPLY

Three power transformer (PT) secondaries are connected to the TX/FX PCB. Reference the lower left hand side on page 2 of drawing 0069346000.

The power supply for the solid-state power amp's U11 & U12 is energized using the brown bipolar secondary of the power transformer. D24, 28, 35, & 41 are the power supply rectifiers, which feed the two 4700uF filter caps C55 & C72. This yellow center tap lead and the system's chassis connection are placed between these caps, making this the system ground star. Also, of important note, this power supply is noted as +/-42V on the schematic, it really measures +/- 32V.

The violet – violet secondary drives the low voltage solid-state supplies (regulated +/- 15.6V & +5V). D23, 26, 29, & 30 feed 1000uF filter caps C63 & C64. Its positive supply feeds a 7815 (U9 - +15V regulator) and a 7805 (U16 - +5V regulator). The negative supply feeds a 7915 (U14 - -15V regulator). The +/15V supplies feed all the op amps, JFET signal and relay switching controls (including the footswitch interface), plus the Tube PCB's dc filament bias. Note that the yellow lead mentioned above is the center tap for the violet winding, also.

The +5V supply powers the microprocessor (U24), its support registers (U25 & U29), the DAC, and the power on indicator LED.

The 6V6s on the Main Tube PCB need a negative bias to their grids. It is set by an adjustable negative

bias circuit on the TZ/FX PCB. This is fed by the orange-orange secondary. Trimpot R110 allows for this adjustment. By observing the voltage across a 1 ohm resistor on the Main Tube PCB, the bias current drawn by the 6V6 power tubes can be monitored and set. Typically, a voltage setting of -36.8VDC at TP7 will result in 20mA being drawn by each of the two 6V6s. So, 40mV is read across the 1 ohm resistor.

SILENT ADAPTOR

The SILENT adaptor circuit provides an analog modeled response that accurately mimics the PRA's Jensen C10-R speaker. This circuit is found on the upper left hand side on page 2 of drawing 0069346000. This circuit is not field serviceable.

LS_TZ_IN+ is the forward path output voltage from power amp U11. When the silent adaptor is employed, this node is disconnected from the speaker (Relay K1) and only drives the Silent adaptor circuit (Relay K4A). The Silent adaptor's output, LS_TZ_OUT, feeds the reverse path in place of U23-A (Relay K4-B).

TZ ATTENUATOR - USER INTERFACE

The Mode Selection circuitry is found on the lower portion on page 1 of drawing 0069346000. A 16-position (4-bit) encoder (S4) provides the manual interface for the guitarist to select the configuration of the TZ amp. Its state is read by four digital inputs of microprocessor U24 through a ribbon connector.

This microprocessor is especially programmed for the Princeton Recording Amp (p/n 0069439X00). It outputs a serial data stream (SER_DATA_01) and control signals to load two serial-to-parallel shift registers. One register holds data that feeds the DAC (U25 to DAC = U18); the other register controls 4 relays (U29 to relay drivers = U27 & U28). Other U24 digital outputs assist in controlling & configuring the DAC. The last microprocessor output switches a mute control circuit comprised of Q34 and Q35. MUTE_TZ switches a JFET (Q33) to kill the signal in the TZ amp's forward path.

When the encoder is fully CW, the amp is configured so the tube power amp feeds the speaker directly. Moving CCW, the next 14 selections places the TZ amp between the tube power amp and the speaker. The selection that is next to the most CW setting configures the TZ amp in its unity-gain mode (the tube amp outputs and TZ amp would ideally be the same at this setting). The speaker volume reduces with each step CCW, but the level at output transformer remains the same. (This accounts for the same level out of the Headphone and Line Out at all TZ amp settings).

The most CCW of the encoder's position configures the PRA in its SILENT mode. With this, the speaker is disconnected and replaced by the silent adaptor circuit. When this is employed, output signals are only observed at the Headphone & Line-Out in the SILENT mode.

SPECIAL NOTE FOR SERVICING THE ENCODER & MICROCONTROLLER: Two different types of Encoders (S1) & Microcontrollers (U24) can be found installed in this product. The encoder can either be a binary code type or a Gray code type. The part number of the microcontroller installed in the product (see its label) allows the service person to determine the encoder that is installed. Refer to the TZ/FX/IO PCB parts list where p/n 0073684X00 is found to determine the proper microcontroller & encoder pairings.

MISCELLANEOUS CONTROLS

There is a pair of footswitch control outputs – P4_OD & P1_COMP - that feed current from U5-A & B on the IO PCB to the TZ/FX PCB. Their mating signals on the TZ/FX PCB are OD_FS & COMP_FS (respectively). Reference the middle of page 2 on drawing 0069346000. Both of the interfacing control circuits on the TZ/FX PCB are the same.

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.PARTS LIST: TUBE – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0068617000	*PCB ASSY PRA TUBE	
6	0009512001	CAP AE AX 22uF 25V 20%	C1 C6-7 C9-10 C13
4	0051720000	**CAP AE AX 22uF 450V 20%	C23-26
2	0038703001	CAP CA .1uF 50V	C20-21
1	0020883000	CAP CD 10pF 1000V 10%	C5
1	0020917000	CAP CD 250pF 1000V 10%	C22
1	0020842000	CAP CD 500pF 1000V 10%	C3
1	0053860000	**CAP MPF .1uF 250VAC 20%	C19
2	0024823000	CAP MPF RDL .01uF 400V 10%	C8 C14
2	0024833000	CAP MPF RDL .022uF 400V 10%	C4 C16
1	0024845000	CAP MPF RDL .047uF 400V 10%	C28
2	0024854000	CAP MPF RDL .1uF 400V 10%	C2 C29
3	0024855000	CAP MPF RDL .1uF 630V 10%	C11 C18 C27
1	0037040002	CAP PFF .0033uF 400V 10%	C15
1	0037600000	CONTROL SNAPIN 100k B TAPER	R56 – REVERB
1	0037596000	CONTROL SNAPIN 1M 30A TAPER	R53 – VOLUME
1	0047540000	CONTROL SNAPIN 250k 15A TAPER	R55 – BASS
1	0037597000	CONTROL SNAPIN 250k 30A TAPER	R54 – TREBLE
1	0064089001	DIODE 1N4003	D1
4	0026730001	**DIODE 1N4006 800V 1A	D4-7
2	0006260001	DIODE 1N4448 SIGNAL	D8-9
2	0029690001	DIODE HV 3kV 200mA	D2-3
2	0025802000	FSTN TAB MALE .250x.032 PCB MT	P24-25
23	0069361000	FSTN TAB ML RTANG PCB .187x.032	P1-4 P6 P8-23 P27-28
1	0070334001	**FUSE PICO 7 AMP 125V	F1
1	0027410000	HDR .1 CTR 3 CKT SQ PIN	P7
1	0027413000	HDR .1 CTR 6 CKT SQ PIN	P26
1	0057350000	HDR .1 CTR 8x2 CKT SQ PIN	P5
1	0016795000	IC OP-AMP DUAL TL072	U1
2	0059889000	JACK STEREO R/A w/METAL BUSH	J1-2
8	REF	JUMPER WIRE 22 GA	W1-8
4	0026549001	RES CF 1/2W 5% 1.5k LL	R4 R21 R23 R29
2	0026368001	RES CF 1/2W 5% 100ohm LL	R1 R3
1	0049142001	RES FILM 1W 39k 5%	R42
2	0053869001	RES CF 1/2W 5% 1M LL	R25 R32
2	0027871001	RES CF 1/2W 5% 1k LL	R27 R34
2	0026493001	RES CF 1/2W 5% 2.7k LL	R10 R41
3	0025117001	RES CF 1/2W 5% 220k LL	R18-19 R38
3	0036957001	RES CF 1/2W 5% 470k LL	R6 R8 R30
1	0027869001	RES CF 1/2W 5% 470ohm LL	R33
1	0025109001	RES CF 1/2W 5% 47ohm LL	R7
2	0047434001	RES CF 1/2W 5% 56k LL	R17 R26
1	0036955001	RES CF 1/2W 5% 6.8k LL	R52
1	0024969001	RES CF 1/4W 5% 1.5k LL	R22
2	0024970001	RES CF 1/4W 5% 1.8k LL	R9 R11
1	0024997001	RES CF 1/4W 5% 100k LL	R14
2	0024952001	RES CF 1/4W 5% 100ohm LL	R49-50
1	0025084001	RES CF 1/4W 5% 10M LL	R24

* Non-serviceable part. Replace complete parent assembly. See PCB EXCHANGE POLICY section above.

shaded Unique Fender® part. Order directly from the FMIC Parts Department.

shaded + * Access to this part or assembly is controlled. Please contact the FMIC Customer Service Department.

** Safety Requirement part. Replacement must match Safety Agency…–*Value,* if specified –*Type,* if specified –*Approval Mark(s)* if on part.

shaded + ** Both a unique Fender® part and a Safety Requirement part as defined above.

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.PARTS LIST: TUBE – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
2	0024937001	RES CF 1/4W 5% 10ohm LL	R44-45
2	0025069001	RES CF 1/4W 5% 1M LL	R35 R48
2	0025077001	RES CF 1/4W 5% 3.3M LL	R13 R15
2	0024995001	RES CF 1/4W 5% 68k LL	R47 R51
6	0027353001	RES FILM 1W 5% 100k LL	R5 R12 R28 R36-37 R46
1	0027347001	RES FILM 1W 5% 2.2k LL	R31
2	0051417001	RES MOX 2W 5% 22ohm LL	R2 R16
2	0028021001	RES MOX 2W 5% 470ohm LL	R39-40
1	0037664001	**RES MOX FP 1W 5% 1k LL	R43
1	0033095001	**RES MOX FP 1W 5% 1ohm LL	R20
1	0028503000	**THERMISTOR 10 ohm 5A C60-11	RT1
1	0994006000	TUBE 12AT7 HIGH MU TWIN TRIODE	V2
1	0994004X02	TUBE 6V6GTA MATCHED DUET	V5-6
3	0994005000	TUBE 7025/12AX7WC RUSSIAN GT	V1 V3-4
2	0014689003	XSTR N-CH JFET J111 TO-92	Q1-2
1	REF	**WIRE SET PCB ASSY PRA TUBE	
12	0016440000	STNDOFF RND AL 6-32x1x1/4	ON MAIN PCB
12	0039367000	SCRW M6-32x3/8 PHP SS ITLWSHR	FOR STANDOFFS
1	REF	*PCB FAB PRA TUBE	NOT STUFFED
4	0014999000	SCRW M 6-32x1/4 PHP BLX	AT TOP OF POWER
4	0029167000	**TUBE SOCKET 9 PIN PCB MOUNT	AT V1-V4
2	0057238000	**TUBE SOCKET 8 PIN PCB MOUNT	AT V5-6
2	0039259001	CAP CA 220pf 100V LL	C12 C17
1	0041311000	CABLE REVERB	AT WJ20-23

PARTS LIST: TZ/FX/IO – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0069345000	*PCB ASSY PRA TZ/FX/IO	
FIELD SERVICE ON THIS ASSY. LIMITED TO THE PART NUMBERS LISTED BELOW			
1	0054261000	XLR CONNECTOR MALE RT ANGLE	J5
1	0037805000	CABLE RIBBON 6 CKT 2-1/4"	PW2
2	REF	*CAP AE AX 22uF 16V 20%	C15 C43
2	REF	*CAP AE RDL 1000uF 35V 20%	C63-64
2	REF	*CAP AE RDL 100uF 25V 20%	C108 C115
4	REF	*CAP AE RDL 100uF 50V 20%	C67-70
11	REF	*CAP AE RDL 10uF 50V 20%	C41 C44-46 C48 C90-91 C109 C116-117 C129
1	REF	*CAP AE RDL 1uF 50V 20%	C119
17	REF	*CAP AE RDL 22uF 50V 20%	C21 C23 C27 C29 C53 C83 C88 C92 C96 C106 C111 C121 C127-128 C134-136
1	REF	*CAP AE RDL 22uF 63V 20%	C54
2	REF	*CAP AE RDL 4.7uF 50V 20%	C100 C118
2	REF	*CAP AE RDL 4700uF 50V +100%-20%	C55 C72
2	REF	*CAP AE RDL 4700uF 50V +100%-20%	C55 C72
4	REF	*CAP AE RDL 47uF 50V 20%	C65 C74 C79-80
3	REF	*CAP CA .01uF 50V	C10-11 C28

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PRINCETON RECORDING AMP®™

(This is the model name for warranty claims)

PARTS LIST: TZ/FX/IO – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
37	REF	*CAP CA .1uF 50V	C1 C16 C19 C36-38 C40 C42 C49-52 C56-57 C59-60 C66 C76 C78 C81-82 C84-87 C89 C94-95 C97-98 C101 C103 C107 C130 C132-133 C137
13	REF	*CAP CA 220pF 100V LL	C2-9 C12-14 C22 C124
1	REF	*CAP CA 330pF 100V LL	C26
5	REF	*CAP CA 33pF 100V LL	C30-34
1	REF	*CAP CA 47pF 100V	C35
1	REF	*CAP CD 47pF 500V 5%	C113
1	REF	*CAP MPF .001uF 100V 10%	C120
1	REF	*CAP MPF .0039uF 100V 10%	C24
7	REF	*CAP MPF .01uF 100V 10%	C62 C71 C75 C93 C99 C102 C112
3	REF	*CAP MPF .047uF 63V 10%	C17-18 C125
2	REF	*CAP MPF .1uF 250V 10%	C58 C61
6	REF	*CAP MPF .1uF 63V 10%	C47 C73 C77 C104 C131 C138
2	REF	*CAP MPF .22uF 63V 10%	C105 C126
2	REF	*CAP MPF .33uF 63V 10%	C20 C25
5	REF	*CAP MPF .47uF 63V 10%	C39 C110 C114 C122-123
1	0051931000	CONNECTOR DIN 5 PIN FEMALE	J1
1	0027945000	CONTROL SNAPIN 100k B TAPER	R268 – OD LEVEL
1	0031087000	CONTROL SNAPIN 25k 2B DETENT	R267 – OD TONE
1	0069507000	CONTROL SNAPIN 500k 10C TAPER	R264 – COMPRESSOR SENSITIVITY
1	0069509000	CONTROL SNAPIN 500k 15A TAPER	R266 - OVERDRIVE
1	0069508000	CONTROL SNAPIN 50k 10A TAPER	R265 – COMPRESSOR LEVEL
1	0027941000	CONTROL SNAPIN 50k B TAPER	R2 – LINE OUT LEVEL
1	0072140000	CONTROL TRIM 25k LINEAR MINI	R110 – TUBE NEGATIVE BIAS
9	REF	*DIODE 1N4003	D22 D31 D33 D23 D26 D29-30 D37-38
60	REF	*DIODE 1N4448 SIGNAL	D1-4 D7-21 D25 D27 D32 D34 D36 D39-40 D42-56 D59-74 D77-79
4	REF	**DIODE 6A 400V 6A4 LEAD FORMED	D24 D28 D35 D41
2	REF	*DIODE SCHOTTKY BAT85	D5-6
2	REF	*DIODE ZEN 1N5231B 5.1V 5% LL	D57-58
1	REF	ENCODER ROTARY 4-BIT w/ END STOPS	S4 (PART OF 0073684X00 – SEE BELOW)
4	REF	*FSTN TAB MALE .187x.032 PCB MT	P8 P11 P13 P15
12	REF	*FSTN TAB MALE .250x.032 PCB MT	P3-4 P6-7 P9-10 P12 P14 P16-17 P19-20
2	REF	**FUSE PICO 7 AMP 125V	F1-2
1	REF	*HDR .1 CTR 3 CKT SQ PIN	P1
4	REF	*HDR .1 CTR 6 CKT SQ PIN	P2 P5 P22-23
3	REF	*HDR .1 CTR 8x2 CKT SQ PIN	P18 P21 PW1
2	REF	*IC 8-BIT SHIFT REG 74HC595	U25 U29
1	REF	*IC COMPARATOR QUAD LM339	U5
1	REF	*IC DAC TLC7528 PDIP	U18
1	REF	IC MICROPROCESSOR PSOC PRA	U24 (PART OF 0073684X00 – SEE BELOW)
1	REF	*IC OTA LM13700 PDIP	U19
1	REF	*IC DUAL OP-AMP 4558	U21
2	REF	*IC OP-AMP DUAL PC4560	U27-28

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PRINCETON RECORDING AMP®™

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PARTS LIST: TZ/FX/IO – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
15	REF	*IC OP-AMP DUAL TL072	U1-4 U6-8 U10 U13 U15 U17 U20 U22-23 U26
2	REF	*IC PWR AMP TDA7293V 100W	U11-12
1	REF	*IC REGULATOR +15V MC7815CT	U9
1	REF	*IC REGULATOR +5V MC7805CT	U16
1	REF	*IC REGULATOR -15V MC7915CT	U14
1	0053450000	JACK STEREO R/A	J4
2	0059889000	JACK STEREO R/A w/METAL BUSH	J2-3
19	REF	*JUMPER	W1-16 W18, JMP 1-2
2	REF	*LED RED LONG LEAD LUMEX	D75-76
1	REF	*LED TULIP LONG LEAD LUMEX	LED1
4	REF	*RELAY DPDT DIP 24VOLT 8.3mA	K1-4
4	REF	*RES CF 1/2W 5% 1.5k LL	R15-16 R28-29
1	REF	*RES CF 1/2W 5% 150ohm LL	R198
1	REF	*RES CF 1/2W 5% 22ohm LL	R112
2	REF	*RES CF 1/2W 5% 3.3k LL	R143 R156
5	REF	*RES CF 1/4W 5% 1.5k LL	R25 R79 R166 R169 R272
21	REF	*RES CF 1/4W 5% 100k LL	R1 R6-7 R12-13 R23 R66 R84-85 R93 R114-117 R120-121 R131 R136 R145 R154 R276
3	REF	*RES CF 1/4W 5% 100ohm LL	R98-99 R254
1	REF	*RES CF 1/4W 5% 10M LL	R214
34	REF	*RES CF 1/4W 5% 10k LL	R5 R27 R31 R38-41 R47-48 R59-60 R71-72 R74 R76 R83 R96-97 R104 R106 R119 R126 R167 R171 R193 R195 R211 R225 R231-232 R234 R244 R253 R273
15	REF	*RES CF 1/4W 5% 10ohm LL	R14 R56-57 R64 R78 R89 R100 R127-128 R170 R172 R189 R197 R255 R257
1	REF	*RES CF 1/4W 5% 12k LL	R42
1	REF	*RES CF 1/4W 5% 13k LL	R261
1	REF	*RES CF 1/4W 5% 150ohm LL	R49
12	REF	*RES CF 1/4W 5% 15k LL	R4 R24 R46 R53 R61 R65 R125 R129 R155 R168 R230 R274
11	REF	*RES CF 1/4W 5% 1M LL	R35 R55 R75 R192 R196 R228-229 R240-241 R246 R252
12	REF	*RES CF 1/4W 5% 1k LL	R8-11 R81-82 R87-88 R101 R243 R251 R271
5	REF	*RES CF 1/4W 5% 2.2k LL	R199-200 R223 R262 R270
7	REF	*RES CF 1/4W 5% 220ohm LL	R3 R26 R68 R164-165 R245 R275
20	REF	*RES CF 1/4W 5% 22k LL	R33-34 R36-37 R43 R69-70 R92 R102 R137 R201-206 R208 R212-213 R215
2	REF	*RES CF 1/4W 5% 22ohm LL	R62-63
1	REF	*RES CF 1/4W 5% 240k LL	R233
4	REF	*RES CF 1/4W 5% 3.3k LL	R17 R20 R73 R77
3	REF	*RES CF 1/4W 5% 330k LL	R32 R54 R191
3	REF	*RES CF 1/4W 5% 33k LL	R86 R144 R263
2	REF	*RES CF 1/4W 5% 33ohm LL	R21-22
1	REF	*RES CF 1/4W 5% 390k LL	R194
1	REF	*RES CF 1/4W 5% 39k LL	R111
2	REF	*RES CF 1/4W 5% 4.7k LL	R50 R140

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PRINCETON RECORDING AMP®™

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PARTS LIST: TZ/FX/IO – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
3	REF	*RES CF 1/4W 5% 470k LL	R18-19 R224
2	REF	*RES CF 1/4W 5% 470ohm LL	R80 R91
4	REF	*RES CF 1/4W 5% 47k LL	R51-52 R90 R239
19	REF	*RES CF 1/4W 5% 47ohm LL	R30 R58 R67 R94-95 R103 R105 R207 R209-210 R235-238 R247-250 R277
2	REF	*RES CF 1/4W 5% 5.1k LL	R107-108
1	REF	*RES CF 1/4W 5% 51k LL	R242
4	REF	*RES CF 1/4W 5% 680ohm LL	R256 R258-260
1	REF	*RES CF 1/4W 5% 68k LL	R222
1	REF	**RES METAL ELEMENT 3W 0.1 ohm	R109
4	REF	*RES FILM 1W 5% 10ohm LL	R130 R139 R142 R153
1	REF	*RES MF 1/4W 1% 2.00k LL	R217
1	REF	*RES MF 1/4W 1% 2.15k LL	R176
3	REF	*RES MF 1/4W 1% 3.16k LL	R134 R226-R227
1	REF	*RES MF 1/4W 1% 3.24k LL	R177
1	REF	*RES MF 1/4W 1% 37.4k LL	R141
1	REF	*RES MF 1/4W 1% 422k LL	R150
1	REF	*RES MF 1/4W 1% 45.3k LL	R124
1	REF	*RES MF 1/4W 1% 6.19k LL	R173
1	REF	*RES MF 1/4W 1% 7.68k LL	R175
1	REF	*RES MF 1/4W 1% 82.5k LL	R216
1	REF	*RES MF 1/4W 1% 1.00M LL	R123
2	REF	*RES MF 1/4W 1% 1.00k LL	R132 R157
2	REF	*RES MF 1/4W 1% 1.05k LL	R218 R221
2	REF	*RES MF 1/4W 1% 1.21k LL	R185 R188
6	REF	*RES MF 1/4W 1% 10.0k LL	R44-45 R181-184
1	REF	*RES MF 1/4W 1% 158k LL	R148
2	REF	*RES MF 1/4W 1% 16.5k LL	R219-220
1	REF	*RES MF 1/4W 1% 165k LL	R152
1	REF	*RES MF 1/4W 1% 2.43k LL	R163
1	REF	*RES MF 1/4W 1% 2.49k LL	R180
1	REF	*RES MF 1/4W 1% 23.7k LL	R138
4	REF	*RES MF 1/4W 1% 26.7k LL	R133 R158 R161-162
1	REF	*RES MF 1/4W 1% 33.2k LL	R187
2	REF	*RES MF 1/4W 1% 35.7k LL	R174 R178
1	REF	*RES MF 1/4W 1% 42.2k LL	R135
2	REF	*RES MF 1/4W 1% 5.11k LL	R118 R122
1	REF	*RES MF 1/4W 1% 51.1k LL	R151
1	REF	*RES MF 1/4W 1% 8.25k LL	R179
1	REF	*RES MF 1/4W 1% 97.6k LL	R149
1	REF	*RES MF 1/4W 1% 15.0k LL	R186
1	REF	*RES MF 1/4W 1% 18.2k LL	R190
5	REF	*RES MOX 2W 5% 22ohm LL	R146-147 R159-160 R269
1	REF	**RES MOX FP 1/2W 5% 47ohm LL	R113
1	REF	**INDUCTOR FERRITE CORE RADIAL 22uH	L1
3	0028091000	SWITCH PUSH SLFLK SHORT STROKE	S1-3 – COMP, OD, LINE OUT ON/OFF
1	REF	*XSTR N-CH JFET J111 TO-92	Q31

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PRINCETON RECORDING AMP®™

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PARTS LIST: TZ/FX/IO – PCB ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
8	REF	*XSTR N-CH JFET J113 TO-92	Q3 Q9-10 Q24-27 Q33
11	REF	*XSTR NPN 2N4401 TO-92	Q2 Q6 Q8 Q11 Q13-16 Q28 Q32 Q34
5	REF	*XSTR NPN 2SC2362K/2SC2389STPS	Q21-23 Q29-30
1	REF	*XSTR NPN MPSW42 TO-226AE	Q4
8	REF	*XSTR PNP 2N4403 TO-92	Q1 Q7 Q12 Q17-20 Q35
1	REF	*XSTR PNP MPSW92 TO-226AE	Q5
2	REF	*SPACER, LED, BROWN	AT D46 D47
3	0028104000	BUTTON PUSH SWITCH BLACK	AT S2-4
2	REF	*BRACKET, PCB MOUNT	AT B1 B2
2	0037985000	SCRW SMA 2x3/8 PHP BLX	AT J1
1	0062208000	**HEATSINK PLATE ACST JR DSP	AT U14-15
2	0032908000	SCRW TF 6-32X3/8 PHP ZI	AT HEATSINK PLATE
5	0027638000	SCREW 4-40x3/8 HWHS ZI .1" HD	AT U9-11 & U14-15
2	0057041000	INSULATOR MICA TDA7294	AT U14-15
5	0017746000	WASHER SHOULDER NYL 1/8x1/4	AT U9-11 & U14-15
3	REF	*HEATSINK TO-220	AT U9-11
REF	0073684100	TZ/FX CONTROL SUBASSY GRAY CODE (DO NOT ORDER)	USE WITH MICROCONTROLLER 0069439000 (GRAY CODE TYPE) – SEE TEXT
1	0073617000	ENCODER ROTARY 4BIT w/ END STOPS GRAY CODE	INSTALL AT S1 - USE WITH MICROCONTROLLER 0069439000 (GRAY CODE TYPE)
1	0069439000	IC MICROCONTROLLER PRA GRAY CODE	INSTALL AT U24 IN SOCKET
REF	0073684200	TZ/FX CONTROL SUBASSY BINARY CODE (DO NOT ORDER)	USE WITH ENCODER 0071222000 (BINARY CODE TYPE) – SEE TEXT
1	0071222000	ENCODER ROTARY 4BIT w/ END STOPS BINARY CODE	INSTALL AT S1 - USE WITH ENCODER 0071222000 (BINARY CODE TYPE)
1	0073683000	IC MICROCONTROLLER PRA BINARY CODE	INSTALL AT U24 IN SOCKET
1	REF	*SOCKET IC DIP 20-PIN	AT U24
1	REF	*PCB FAB PRA TZ/FX/IO	

PARTS LIST: CHASSIS ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	REF	*CHASSIS PRA	
1	0068614000	*PANEL FRONT PRA	UPPER BLACK FACE PANEL
1	0070096000	*PANEL EFFECTS PRA	LOWER FRONT PANEL
1	REF	**HEATSINK BAR PRA	ATTACHED TO TZ/FX/IO HEATSINK PLATE
1	0069345000	*PCB ASSY PRA TZ/FX/IO AMP	
1	0068617000	*PCB ASSY PRA TUBE	
1	0037099000	XFMR REVERB VIBROVERB/65 DLX	
4	0053893000	**TUBE SHIELD SUNN MODEL T	
2	0020424000	TUBE RING UNIVERSAL (277H-2)	
1	0069362000	XFMR OUTPUT PRA	
1	0068615000	*PANEL REAR PRA	
0	0069342000	*PANEL REAR PRA 100V JPN	
0	0069343000	*PANEL REAR PRA 220V ROK	
1	0054798000	JEWEL ASSY LED	

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PARTS LIST: CHASSIS ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0031625000	NUT HOLDER PILOT LIGHT 11/16-27	
5	0016352000	NUT HEX 3/8-32x3/32 TK NI(sell 049)	
5	0031153000	WSHR FLAT 3/8x.614 NI (049)	
1	0027520000	WSHR FLAT .380x.630 FIBER(049)	@ SPEAKER JACK
8	0028500000	SCRW TF 8-32x3/4 HWH SLTD	
1	0055838000	NUT PLASTIC BLK REAN JACK	@ HEADPHONE JACK
8	0031184000	SCRW M 6-32x1/4 PHP BLX ITLW	
8	0038900000	SCRW TF 6-32X1/4 PHP ZI	
0.002	REF	TAPE 2 SIDED 0.15" x 1/2" VHB	@ LOWER FRONT PANEL
1	0036570000	**SWITCH TOGGLE DPST W/NUTS	POWER SWITCH
4	0024604000	KNOB BLACK W/WHITE STAMP 1-10	UPPER FRONT PANEL
6	0059645000	KNOB LARGE 400 PRO	LOWER FRONT PANEL & LINE OUT LEVEL
1	0064058000	KNOB DATA WHEEL LARGE w/DIMPLE	LOWER FRONT PANEL – ATTENUATOR
1	0054642000	**CONNECTOR IEC SNAP IN	MATES W/ POWER CORD
1	0036702000	**FUSE HOLDER 3AG FINGER GRIP	DOMESTIC & JAPAN
0	0036703000	**FUSE HOLDER 5MM FINGER GRIP	220V/230V/240V EXPORT
1	REF	**LABEL GROUNDING SEMKO	
2	0027638000	SCRW TF 4-40x3/8 HWHS ZI	
1	0037588000	**FUSE QA 250v 5A 1/4x1-1/4"	DOMESTIC & JAPAN
0	0020795000	**FUSE QA 20mmx5mm 250v 2.5A	220V/230V/240V EXPORT
1	0068622000	**XFMR PWR PRA 120V	DOMESTIC
0	0068623000	**XFMR PWR PRA 230V	220V/230V/240V EXPORT
0	0068624000	**XFMR PWR PRA 100V	JAPAN
8	0059644000	SCRW CAP 6-32x3/8 HEX SKT NI	@ LOWER FRONT PANEL
5	0031263000	**BUSHING SNAP SHORT 3/4X15/16 BLK	
4	0018022000	**BUSHING SNAP 5/16x17/32 BLK	
1	0069337000	**COVER CAPACITOR PRA	UNDER CHASSIS
2	0051155000	SCRW SMB #4X3/8 PHP BLX	
2	0056586000	CABLE RIBBON ASSY 6 CKT 6"	
2	0064487000	CABLE RIBBON 2X8 15"	
1	0068810000	CABLE ASSY CRIMP 3 CKT 14" BLK	
1	0068620000	**WIRE SET CHASSIS ASSY PRA	
1	0026116000	**BUSHING SR .500x.063x7/16 BLK	
1	0026401000	**WSHR SHLDR FIBER 3/8x5/8 sell 049	@ SPEAKER JACK
1	0022012000	NUT HEX 15/32-32 X 5/8 NI	
1	9904300920	WASHER FLAT .482x.709 NI	
4	0026355000	WSHR FLAT 10x1/2 BLX	
4	0025819000	NUT KEPS 10-32 ZINC sell 049	
4	0043331000	SCRW M 10-32x5/8 HWHS BLX	
2	0031186000	SCRW M 8-32x1/4 PHP BLX w/WSHR	
21	0039367000	SCRW M6-32X3/8 PHP SS INTLWSHR	
0	REF	**LABEL FUSE 2.5A 250V	220V/230V/240V EXPORT
0	REF	**LABEL VOLTAGE 230V	220V/230V EXPORT
0	REF	**LABEL VOLTAGE 240V	240V EXPORT

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PRINCETON RECORDING AMP®™

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PARTS LIST: CHASSIS ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	REF	**LABEL FUSE REPLACEMENT	
3	0032934000	SCRW TF 4-40x1/2 HIHS ZI	@ EXTRUDED HEATSINK
1	REF	**HEATSINK EXTRUDED PRA	MOUNTS ON HEATSINK BAR

PARTS LIST: CABINET ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1.62	0026570000	TOLEX "BRAVURA BLACK" BRONCO	
0.014	REF	**ALUM TAPE 6X60YDS	
10	0011678000	SCRW SMA 8x1-1/2 OHP BLX	
4	0019275000	GLIDE CUSHION NEOPRENE BLACK (1.27 DIA)	
4	0019276000	GLIDE CUP NICKEL (1.24 x 0.335)	
6	0021972000	NUT T 10-32x3/4 STR 3 PRNG BLX sell 049	
2	0022244000	SCRW M 10-32x1-1/8 OHP NI	
2	0025395000	HANDLE CAP 1 HOLE NI(DWG17420)	
2	0026566000	CORNER 2 HOLE w/TAB NI	
8	0026571000	SCRW SMAB 8X5/8 THP NI	
4	0026625000	SCRW WOOD 8x1 FH	
1	0027846000	HANDLE VINYL BLACK MATTE 9.25" (NO LOGO)	
4	0029071000	CORNER NOTCHED NICKLE (FD	
10	0029527000	WSHR FNSH 8-5/8 FLNGD BLX WX	
1	0068607000	*CABINET ASSY. PRA	
1	0068607005	*BAFFLE ASSY	
1	0068607017	*CABINET UPPER BACK ASSY	
1	0068607015	*CABINET LOWER BACK ASSY	
0.29	0037788000	CLOTH GRILLE BALCK/SILVER	

PARTS LIST: END ITEM ASSEMBLY

QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0068607000	*CABINET ASSY PRA	
1	REF	CHS ASSY PRA 120V	
0	REF	CHS ASSY PRA 230V	
0	REF	CHS ASSY PRA 240V AUST	
0	REF	CHS ASSY PRA 100V	
0	REF	CHS ASSY PRA 220V ROK	
1	0069347000	SPKR 10" 8ohms JENSEN C10R	
4	0026577000	SCRW M 10-32x1 PHP BLX	
6	0036199000	SCRW M 8-32x1-3/16 OHP BLX CP	SECURES CHASSIS TO CABINET
1	0023192000	*NAMEPLATE FNDR 65 TWIN(994093)	
3	0037985000	SCRW SMA 2x3/8 PHP BLX	
8	0037215000	WSHR C/SUNK NICKEL #6	SECURES REAR PANELS
8	0037952000	SCRW SMA #6x1 OHP Ni	SECURES REAR PANEL
1	0064063000	REVERB UNIT 4 SPRING 4AB3C1B	
1	0028453000	PAD CARDBOARD REVERB #12FN86	UNDER REVERB UNIT
1	0031849000	REVERB BAG	COVERS REVERB UNIT & PAD

***** Non-serviceable part. Replace complete parent assembly. See PCB EXCHANGE POLICY section above.

shaded Unique Fender® part. Order directly from the FMIC Parts Department.

shaded + ***** Access to this part or assembly is controlled. Please contact the FMIC Customer Service Department.

****** Safety Requirement part. Replacement must match Safety Agency…*–Value,* if specified *–Type,* if specified *–Approval Mark(s)* if on part.

shaded + ****** Both a unique Fender® part and a Safety Requirement part as defined above.

PRINCETON RECORDING AMP®™

(This is the model name for warranty claims)

PARTS LIST:	**END ITEM ASSEMBLY**		
QTY.	**PART #**	**DESCRIPTION**	**REFERENCE DESIGNATION**
6	0029527000	WSHR FNSH 8-5/8 FLNGD BLX WX	SECURES CHASSIS TO CABINET
2	0022491000	CLAMP CABLE NYL SCRW MNT 5/16	
4	0022327000	WSHR FLAT 8x7/16 NI sell 049	
3	0029828000	SCRW PB 8x3/4 PHP ZI	
1	9906900590	CLAMP CABLE NYL ADHESIVE	ATTACHES TO REVERB UNIT
1	0047248000	**CORD PWR W/IEC CONN DOM	
0	0047251000	**CORD PWR W/IEC CONN 230V	
0	0047249000	**CORD PWR W/IEC CONN 230V UK	
0	0047250000	**CORD PWR W/IEC CONN 250V	
0	0053997000	**CORD PWR W/IEC CONN 100V JPN	
0	0016006000	SCRW M 10-32x1/2 THP NI	
0	0068312000	**TUBE CAGE PRA	EXPORT ONLY
1	REF	LABEL TUBE PRA	
1	0069511000	FTSW ASSY 4 BUTTON PRA	FOOTSWITCH W/ DIN CABLE
1	0069363000	**PLATE VENT PRA	ON TOP OF CABINET
1	0068594000	COVER PRA	
4	0024052000	SCRW SMA 6-x5/8 PHP BLX	
1	9904101110	SCRW PB 8X5/8 PHP BLX	
1	0038565000	CABLE ASSY SPKR RT ANG 24"	SPEAKER CABLE

PARTS LIST:	**FOOTSWITCH ASSY**		
QTY.	**PART #**	**DESCRIPTION**	**REFERENCE DESIGNATION**
1	0069511000	FTSW ASSY 4 BUTTON PRA	
1	0051928000	CABLE 5 PIN DIN MIDI	
1	REF	LABEL "MADE IN MEXICO"	
4	0028714000	SWITCH PUSH SPDT	
1	0051931000	CONNECTOR 5 PIN FEMALE	
1	REF	PLATE TOP FTSW 4 BUTTON PRA	
1	REF	PCB ASSY FTSW 4BTN PRA	
1	REF	END CAP FTSW DIN RIGHT SIDE	
1	REF	END CAP FTSW 2004 LEFT SIDE	

***** Non-serviceable part. Replace complete parent assembly. See PCB EXCHANGE POLICY section above.

shaded Unique Fender® part. Order directly from the FMIC Parts Department.

shaded + ***** Access to this part or assembly is controlled. Please contact the FMIC Customer Service Department.

****** Safety Requirement part. Replacement must match Safety Agency…–*Value,* if specified –*Type,* if specified –*Approval Mark(s)* if on part.

shaded + ****** Both a unique Fender® part and a Safety Requirement part as defined above.

PRINCETON RECORDING AMP®™

(This is the model name for warranty claims)

Service Diagram List

Service Diagram (Schematic) .....TZ/FX/IO PCB
Service Diagram (PCB Assembly) .....TZ/FX/IO PCB
Service Diagram (Schematic) .....TUBE PCB
Service Diagram (PCB Assembly) .....TUBE PCB
Chassis Assembly .....PRINCETON RECORDING AMP
End Item Assembly .....PRINCETON RECORDING AMP
Footswitch Assembly .....4-BUTTON FOOTSWITCH
Service Diagram (PCB Assembly) ….. .....4-BUTTON FOOTSWITCH
Wire Set (PCB Assembly) ….. .....TUBE PCB
Wire Set (Chassis Assembly) .....PRINCETON RECORDING AMP

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	11-MAY-06	S M M
B	EC 3817	21-JUN-06	S M M
C	EC 3829	22-AUG-06	S M M

TRANSIMPEDANCE AMP

P9: TO TUBE OT SEC +

P10: OT SEC – TO TUBE

TO IO PCB

DAC

VOLTAGE & CURRENT SENSING DIFF AMP

CHASSIS MOUNT INTERNAL LOAD FOR REVERSE AMP 8 OHM / 50W

SPKR +

SPKR –

K2 CONNECTS SPEAKER LOAD TO SECONDARY OF OUTPUT XFMR

K1 CONNECTS SPEAKER LOAD TO FORWARD AMP

K4: connects to silent adaptor

SPARE

RELAY CONTROLS

MICRO ENCODER (TZ MODE SELECTOR)

PWR AMP: MUTE & STDBY

1. TP21 TO BE MEASURED WITH A DVM OF 10Mohm DC INPUT IMPEDANCE. IF NOT AVAILABLE, SET COMPRESSOR OFFSET ADJUSTMENT USING TP23, ADJUST R226 TO SET TP21 TO –1.915 VDC +/–20mv WITH SENSITIVITY CONTROL SET TO MAX CW (ACROSS R223).
2. FRONT PANEL FX TESTED WITH VOLUME CONTROL SET AT MINIMUM. ALL FRONT PANEL FX CONTROLS SET AT 12 O'CLOCK.
3. TUBE NEGATIVE BIAS SUPPLY (P8 & P15) CONNECTS TO THE MAIN TUBE PCB AT WJ2 & WJ4. REFER TO THE TUBE PCB SERVICE DIAGRAM FOR ALIGNMENT DETAILS. NOMINAL VOLTAGE AT P8 IS –36.8VDC WITH RESPECT TO GROUND.
4. SILENT MODE TESTING IS PERFORMED WITH THE TRANS-IMPEDANCE POWER ATTENUATOR SELECTOR SET TO SILENT (FULLY CCW).
5. NO FOOTSWITCH CONNECTED EXCEPT WHERE NOTED COMPRESSOR SELECT SWITCH-OUT POSITION EXCEPT WHERE NOTED OVERDRIVE SELECT SWITCH-OUT POSITION EXCEPT WHERE NOTED
6. FOR TEST POINT ACCESS, TUBE PCB CONTROL (FOUND ABOVE TZ/FX PCB ASSY IN CHASSIS) MAY NEED TO BE REMOVED. LEAVE ITS INTERCONNECTIONS ATTACHED. INSULATE ANY METAL SURFACES THAT THE TUBE CONTROL PCB MAY REST AGAINST DURING TESTING.
7. LAST REFERENCE DESIGNATOR: B2, C138, D79, F2, J5, JMP2 K4, L1 LED1, P23, PW2, Q35, R277, S4, U29, W18.
6. AC AND DC VOLTAGES READ TO GROUND WITH A DVM IN THE FOLLOWING CONDITIONS:
   UNIT AT RATED LINE VOLTAGE
   TUBE PCB ASSY # 0068617000 INSTALLED IN CHASSIS WITH TZ/FX/IO PCB ASSY UNDER TEST
   TRANSIMPEDANCE POWER ATTENUATOR SET ONE CLICK AWAY FROM FROM MAXIMUM CW POSITION (MAX TZ OUTPUT)
   8 OHM RESISTIVE LOAD CONNECTED AT P12 (+) & P10 (–)
   REVERB CONTROL "0"
   ALL OTHER CONTROLS AT "10"
   NO INPUT SIGNAL ON DC TESTS (TP=SQUARE BOXES).
   ADDITIONAL NOTES FOR AC TESTS (TP = OVAL):
   INPUT TO AMPLIFIER #1 INPUT SET TO 8mV SINE WAVE AT 1kHZ.
5. THIS SCHEMATIC IS FOR PCB FABRICATION P/N 0069344000 AND PCB ASSEMBLY P/N 0069345000.
4. ALL DIODES ARE IN4448.
3. ALL POLARIZED CAPACITORS IN uF, 20%; 50V MINIMUM.
2. ALL UNPOLARIZED CAPACITORS IN uF, 10% OR BETTER; 50V MINIMUM. (POWER SUPPLY BYPASS CAPACITORS ARE 20%).
1. ALL RESISTORS IN OHMS, 5%; 1/4W.

NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____
DATE: _____
APPROVED BY: _____
DATE: _____
DRAWN: HAN LE ENGR: GIT'LO
DATABASE FILE: Z524S1.SCH

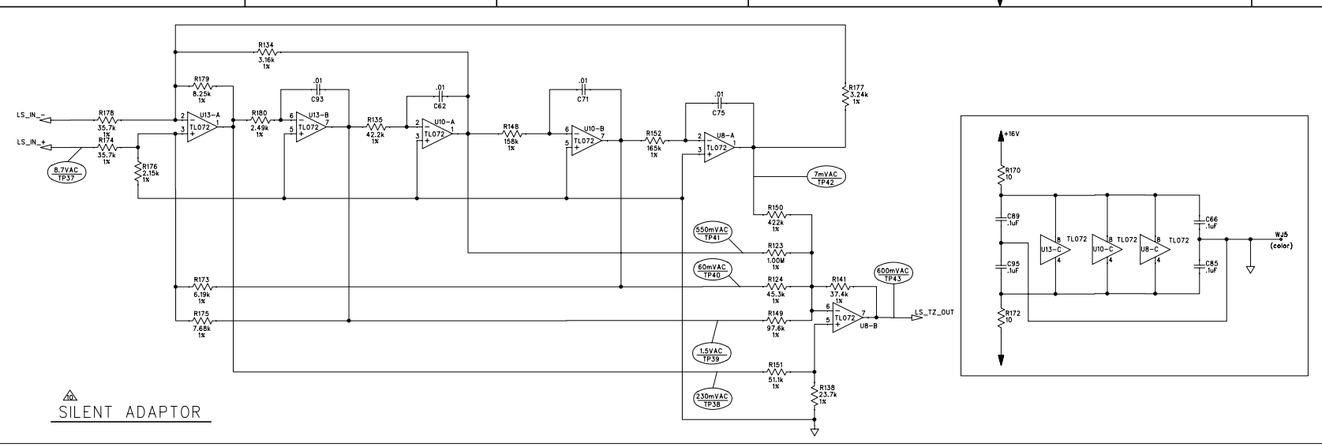
Fender® MUSICAL INSTRUMENTS
Corona, CA U.S.A.

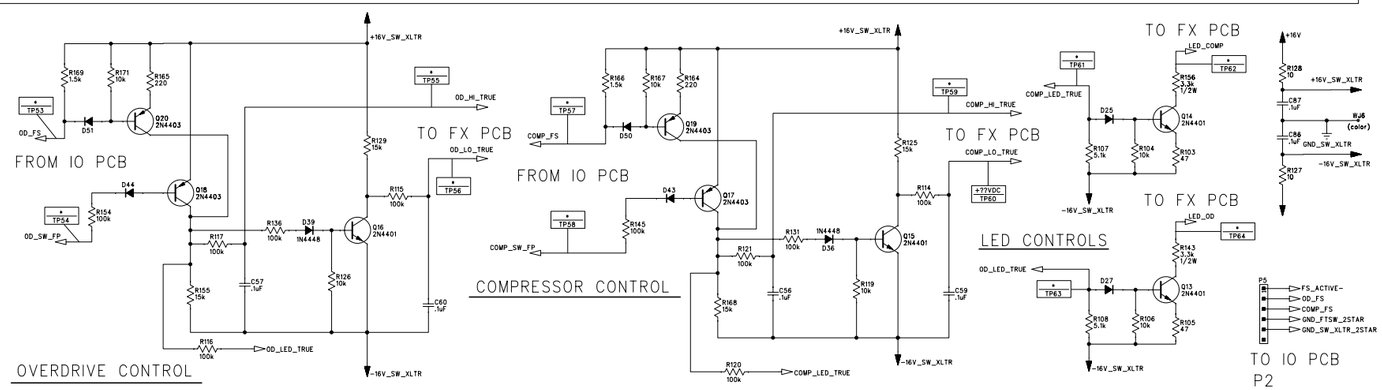
TITLE: SERVICE DIAGRAM, COMBINED (schematic)
PRINCETON RECORDING AMP
TZ/FX/IO

SIZE	DRAWING NUMBER	REV.
D	0069346000	C

RELEASE DATE: 15-JUN-06 SHEET: 1 OF 5

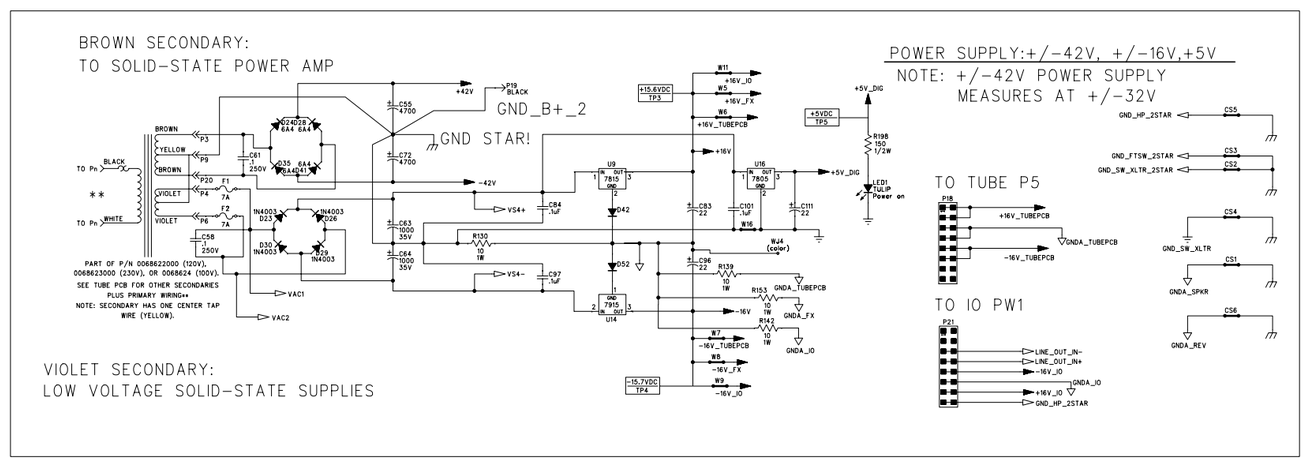
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	11-MAY-06	S M M
B	EC 3817	21-JUN-06	S M M
C	EC 3829	22-AUG-06	S M M

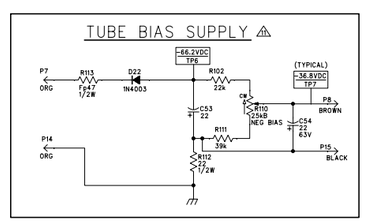




TEST POINT	WITH FOOT SWITCH		WITHOUT FOOT SWITCH		FUNCTION
	ON	OFF	ON	OFF	
TP53	+13.8	+15.6	+15.5	−15.6	OD
TP54	+14.5	+14.6	−15.7	+14.6	OD
TP55	+14.7	−15.7	+15.4	−15.7	OD
TP56	−15.7	+0.7	−15.7	+0.7	OD
TP57	+13.8	+15.6	+15.5	+15.6	COMP
TP58	+14.5	+14.6	−15.8	+14.6	COMP
TP59	+14.8	−15.8	+15.4	−15.8	COMP
TP60	−15.7	+15.5	−15.7	+15.5	COMP
TP61	−14.8	−15.9	−14.8	−15.9	COMP LED
TP62	+13.7	+14.1	+13.7	+14.1	COMP LED
TP63	−14.8	−15.9	−14.8	−15.9	OD LED
TP64	+13.7	+14.1	+13.7	+14.1	OD LED

TABLE A −
"*" CONTROL TEST POINT DATA
(ALL VDC MEASUREMENTS)





SEE PAGE 1
NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____ DATE: _____
APPROVED BY: _____ DATE: _____
DRAWN: HAN LE ENGR: GIT'LO
DATABASE FILE: Z524S1.SCH

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

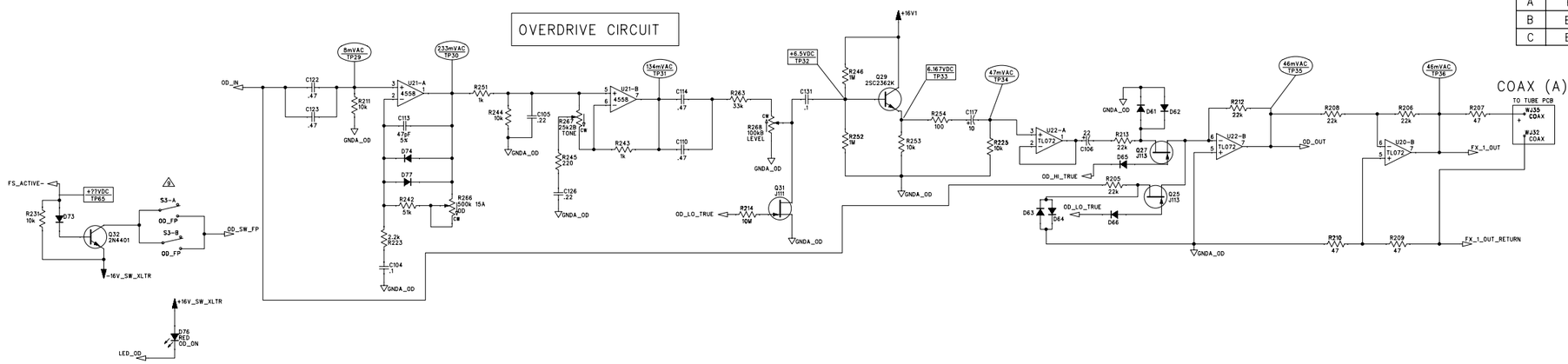
TITLE: SERVICE DIAGRAM, COMBINED (schematic)
PRINCETON RECORDING AMP
TZ/FX/IO

SIZE	DRAWING NUMBER	REV.
D	0069346000	C

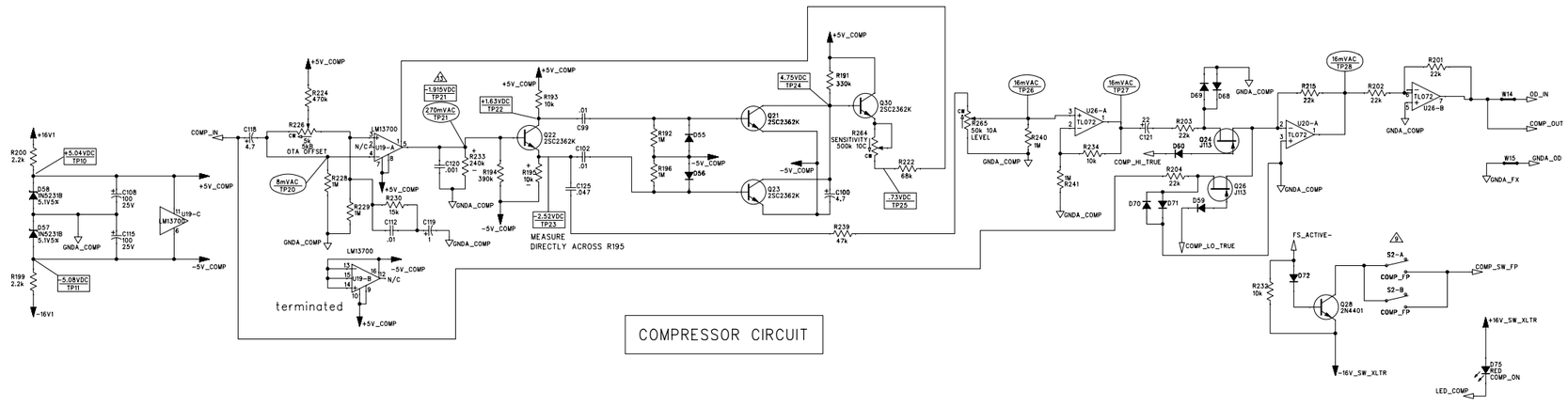
RELEASE DATE: 15-JUN-06 SHEET: 2 OF 5

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	11-MAY-06	S M M
B	EC 3817	21-JUN-06	S M M
C	EC 3829	22-AUG-06	S M M

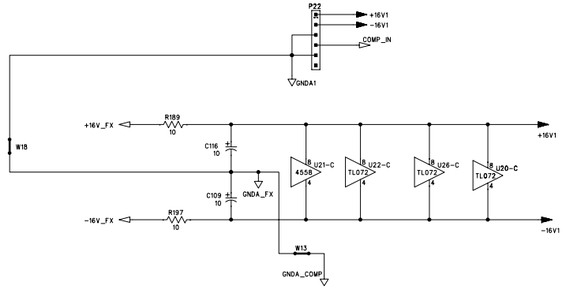
OVERDRIVE CIRCUIT



COMPRESSOR CIRCUIT



FRONT PANEL FX



SEE PAGE 1

NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____
DATE: _____
APPROVED BY: _____
DATE: _____
DRAWN: HAN LE ENGR: GIT'LO
DATABASE FILE: Z524S1.SCH

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

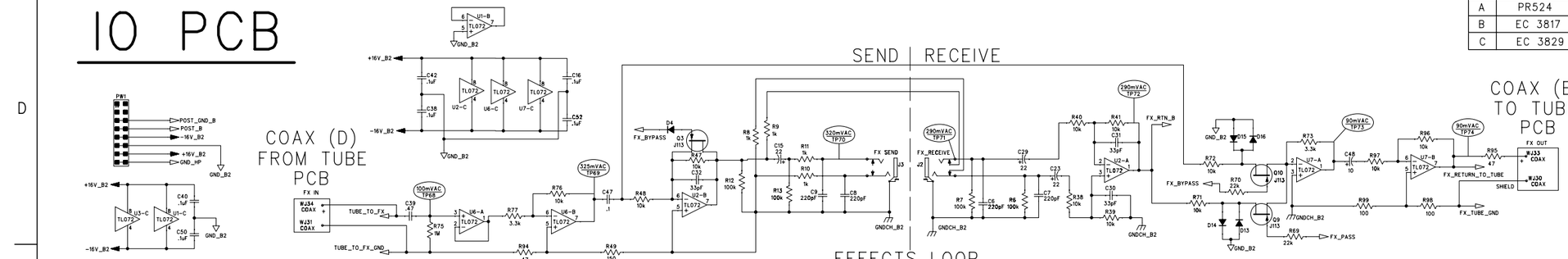
TITLE: SERVICE DIAGRAM, COMBINED (schematic)
PRINCETON RECORDING AMP
TZ/FX/IO

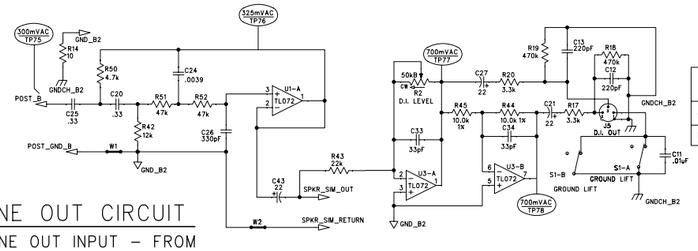
SIZE	DRAWING NUMBER	REV.
D	0069346000	C

RELEASE DATE: 15-JUN-06 SHEET: 3 OF 5

IO PCB

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	11-MAY-06	S M M
B	EC 3817	21-JUN-06	S M M
C	EC 3829	22-AUG-06	S M M





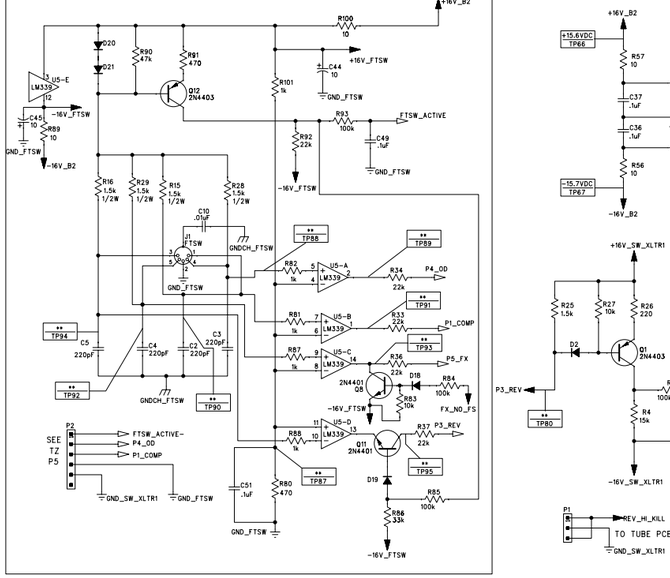
LINE OUT CIRCUIT

LINE OUT INPUT – FROM FORWARD PATH OF TZ AMP

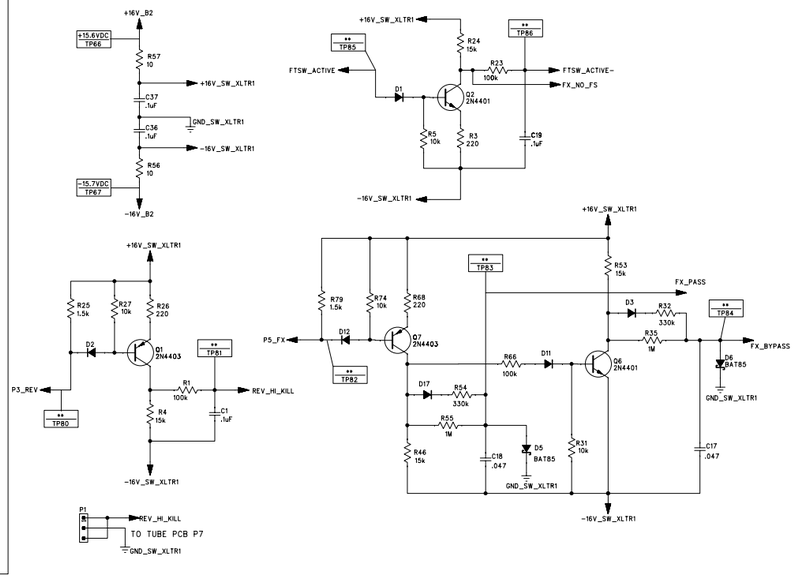
GND LIFT SWITCH CONTINUITY CHECK	
OUT	J5-P1 = SHORT TO CHASSIS
IN	J5-P1 = OPEN TO CHASSIS

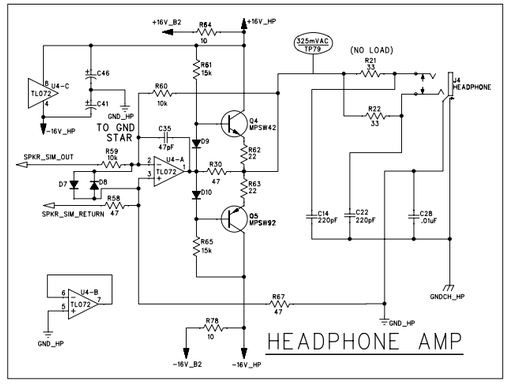
TEST POINT	WITH FOOT SWITCH		WITHOUT FOOT SWITCH		FUNCTION
	ON	OFF	ON	OFF	
TP80	+15.6	+13.9	+15.5	+15.5	REVERB
TP81	–15.7	+14.7	–15.7	–15.7	REVERB
TP82	+13.8	+15.5	+13.8	+13.8	FX LOOP
TP83	+0.1	12.9	+0.1	+0.1	FX LOOP
TP84	–13.0	+0.1	–13.0	–13.0	FX LOOP
TP85	–14.2	–14.2	–15.7	–15.7	FTSW SENSE
TP86	–15.9	–15.9	–15.0	–15.0	FTSW SENSE
TP87	+5.0	+5.0	+5.0	+5.0	COMP REF
TP88	+2.5	+7.1	+15.4	+15.4	OD
TP89	–15.8	+15.6	+15.6	+15.6	OD
TP90	+2.7	+14.1	+15.4	+15.4	COMP
TP91	–15.8	+15.6	+15.6	+15.6	COMP
TP92	+2.7	+14.1	+15.4	+15.4	FX LOOP
TP93	–15.8	+15.5	–15.8	–15.8	FX LOOP
TP94	+2.7	+14.1	+15.4	+15.4	REVERB
TP95	+15.5	–15.8	+15.5	+15.5	REVERB

TABLE B –
''**'' CONTROL TEST POINT DATA
(ALL VDC MEASUREMENTS)



FOOTSWITCH LOGIC TRANSLATOR





HEADPHONE AMP

SEE PAGE 1
NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____
DATE: _____
APPROVED BY: _____
DATE: _____
DRAWN: HAN LE ENGR: GIT'LO
DATABASE FILE: Z524S1.SCH

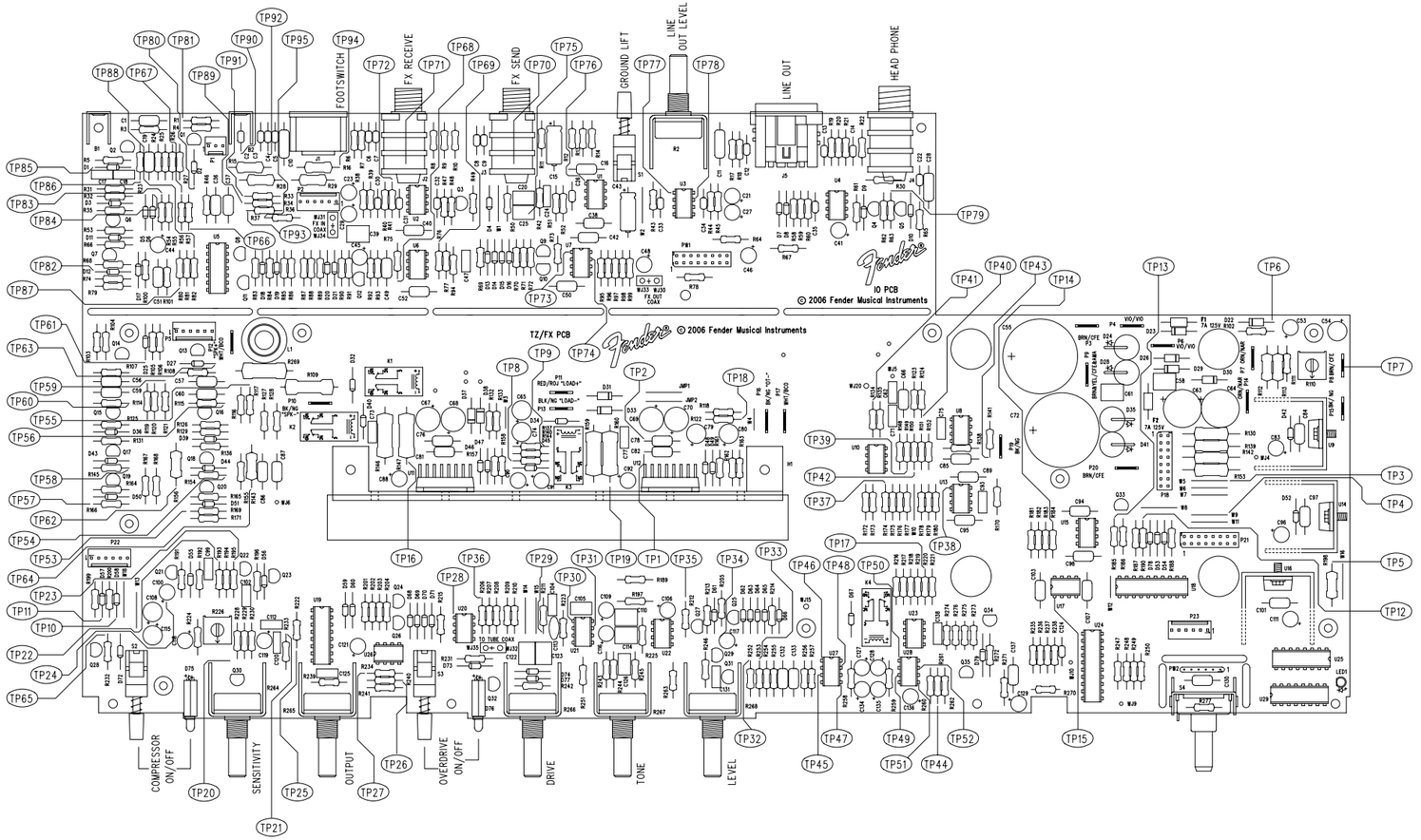
Fender® MUSICAL INSTRUMENTS
Corona, CA U.S.A.

TITLE: SERVICE DIAGRAM, COMBINED (schematic)
PRINCETON RECORDING AMP
TZ/FX/IO

SIZE	DRAWING NUMBER	REV.
D	0069346000	C

RELEASE DATE: 15-JUN-06 SHEET: 4 OF 5

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	11-MAY-06	S M M
B	EC3817	21-JUN-06	S M M
C	EC3829	22-AUG-06	S M M



FILM/DWG:	SERVICE DIAGRAM
DATABASE:	Z524P1.PCB DATE: 22-AUG-06

1. SEE SHEET 1 FOR TEST CONDITIONS AND TP VALUES.

NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____

DRAWN: HAN LE ENGR: GIT'LO

DATABASE FILE: Z524P1.PCB

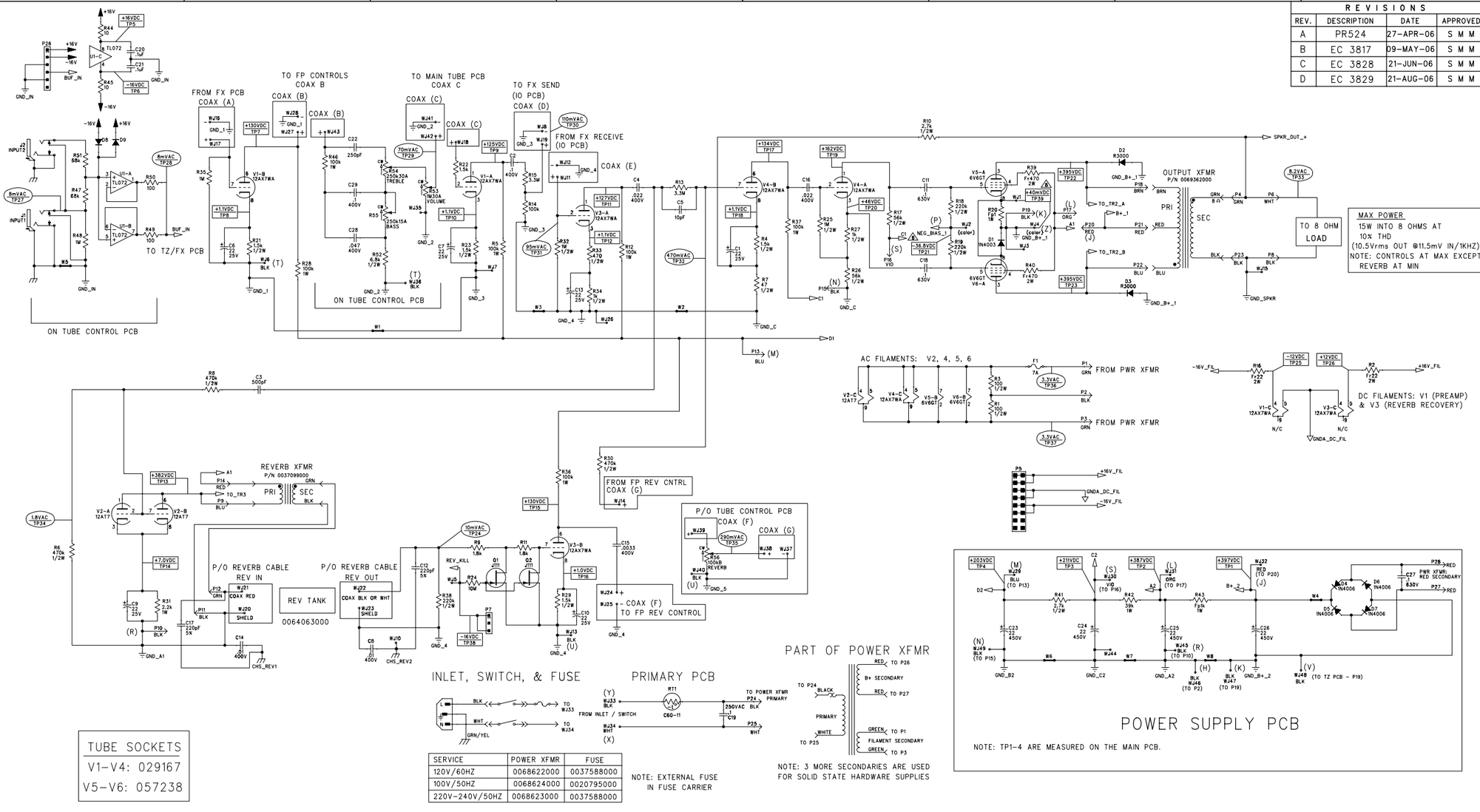
Fender MUSICAL INSTRUMENTS
Corona, CA U.S.A.

TITLE: SERVICE DIAGRAM, COMBINED (PCB assy)
PRINCETON RECORDING AMP
TZ/FX/IO

SIZE	DRAWING NUMBER	REV.
D	0069346000	C

RELEASE DATE: 11-MAY-06 SHEET 5 OF 5

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	27-APR-06	S M M
B	EC 3817	09-MAY-06	S M M
C	EC 3828	21-JUN-06	S M M
D	EC 3829	21-AUG-06	S M M



TUBE SOCKETS
V1-V4: 029167
V5-V6: 057238

SERVICE	POWER XFMR	FUSE
120V/60HZ	0068622000	0037588000
100V/50HZ	0068624000	0020795000
220V-240V/50HZ	0068623000	0037588000

NOTE: THERE ARE 4 SECTIONS (BREAKAWAY) TO THIS ASSY.
SUBASSYS ARE : 1) POWER SUPPLY PCB, 2) CONTROL PCB
3) PRIMARY PCB
ITEMS NOT MARKED AS SUBASSYS ARE PART OF MAIN TUBE PCB.

12. LAST REFERENCE DESIGNATORS: C29, D9, F1, J2, P28, Q2, R56, RT1, TP39, U1, V6, W8, WJ49.
11. FOR TEST POINT ACCESS, IO PCB (FOUND ABOVE TUBE PCB ASSY IN CHASSIS) MAY NEED TO BE REMOVED. LEAVE ITS INTERCONNECTIONS ATTACHED, INSULATE ANY METAL SURFACES THAT THE IO PCB MAY REST AGAINST DURING TESTING.
10. AC AND DC VOLTAGES READ TO GROUND WITH A DVM UNDER THE FOLLOWING CONDITIONS:
UNIT AT RATED LINE VOLTAGE
TZ/FX/IO PCB ASSY 0069345000 INSTALLED
IN CHASSIS WITH TUBE PCB ASSY UNDER TEST
TRANSMIPEDANCE POWER ATTENUATOR SET TO MAXIMUM CW POSITION (TUBE ONLY MODE)
REVERB P/N 0064063000 CONNECTED AT WJ20-23
8 OHM RESISTIVE LOAD CONNECTED AT SPEAKER JACK
NO FOOTSWITCH CONNECTED
COMPRESSOR SELECT SWITCH - OUT POSITION ALL TESTS
OVERDRIVE SELECT SWITCH - OUT POSITION ALL TESTS
REVERB CONTROL AT "0" EXCEPT TP35
(MAX CW FOR THIS TEST ONLY)
ALL OTHER CONTROLS AT "10"
NO INPUT SIGNAL ON DC TESTS (TP = SQUARE BOXES).
ADDITIONAL NOTES FOR AC TESTS (TP = OVAL):
INPUT TO J2 SET TO 8mV SINE WAVE AT 1 KHZ.
9. INTENTIONALLY LEFT BLANK.
8. BIAS IS SET BY MEASURING VOLTAGE BETWEEN WJ1 & WJ3 (WITH NO SIGNAL APPLIED & TUBES WARMED UP). SET VOLTMETER TO mV RANGE, SET 6V6 BIAS CURRENT BY ADJUSTING BIAS CONTROL POT ON TZ PCB. SPECIFIED VOLTAGE BETWEEN WJ1 & WJ3 IS 40mV (TP39). TYPICAL NEGATIVE BIAS VOLTAGE (WJ2 TO CHS) IS -36.8VDC.
7. WJ ITEMS NOTED AS (J) - (Z) ARE WIRE CONNECTIONS PER WIRESET DWG 0068620000.
6. WJ ITEMS NOTED AS (A) - (G) ARE COAX CONNECTIONS PER WIRESET DWG 0068620000.
WJ ITEMS NOTED AS "+" ARE COAX CENTER CONDUCTORS.
WJ ITEMS NOTED AS "-" ARE COAX SHIELDS.
5. THIS SCHEMATIC IS FOR PCB FABRICATION P/N 0068616000 AND PCB ASSEMBLY P/N 0068617000.
4. ALL DIODES ARE IN4448.
3. ALL POLARIZED CAPACITORS IN uF, 20%; 50V MINIMUM.
2. ALL UNPOLARIZED CAPACITORS IN uF, 10% OR BETTER; 50V MINIMUM. (POWER SUPPLY BYPASS CAPACITORS ARE 20%).
1. ALL RESISTORS IN OHMS, 5%; 1/4W.
NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____
DATE: _____
APPROVED BY: _____
DATE: _____
DRAWN: GITLO ENGR: GITLO
DATABASE FILE: Z5245 2.SCH

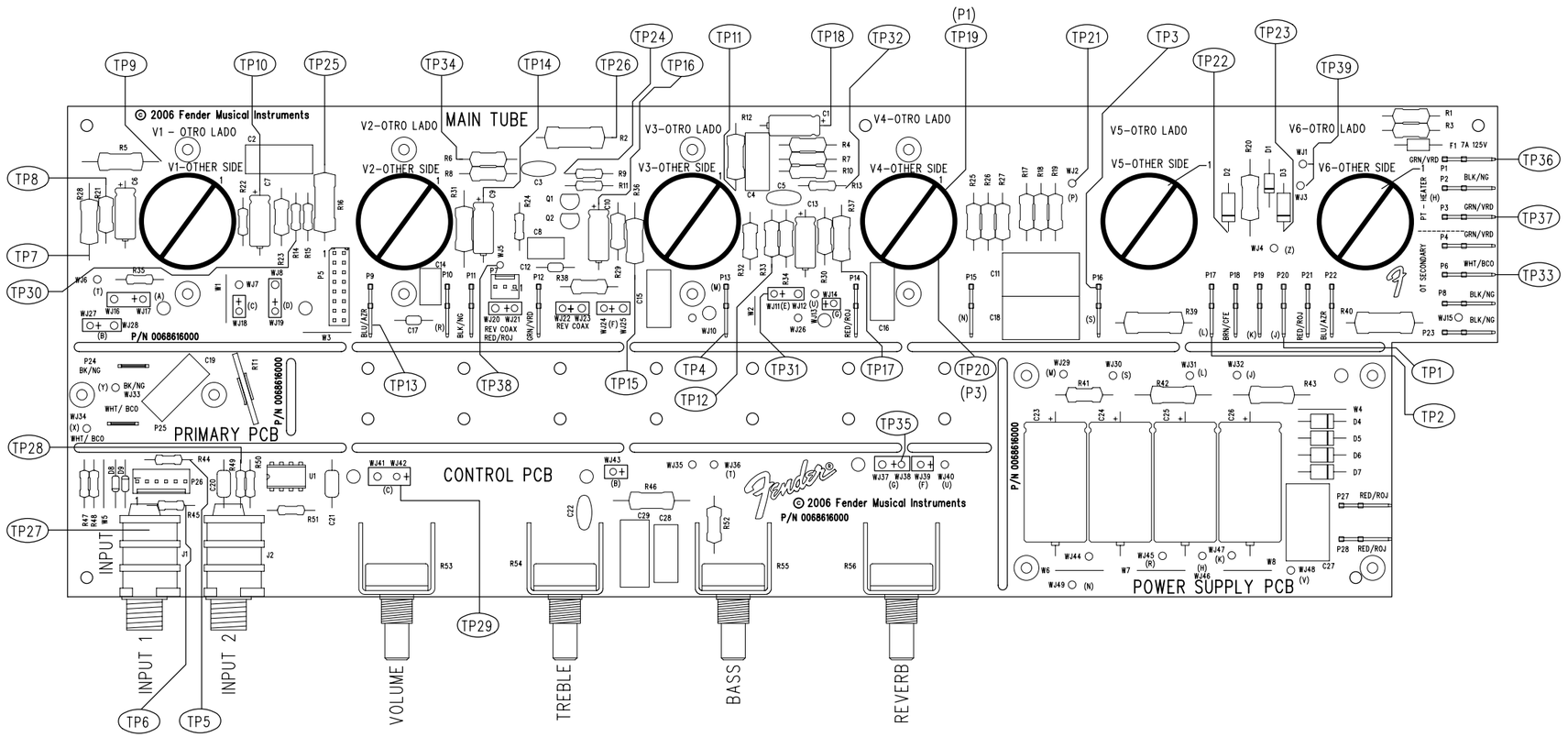
Fender® MUSICAL INSTRUMENTS
Corona, CA U.S.A.

TITLE: SERVICE DIAGRAM, COMBINED (schematic)
PRINCETON RECORDING AMP
TUBE

SIZE	DRAWING NUMBER	REV.
D	0068618000	D

RELEASE DATE: 27-APR-06 SHEET: 1 OF 2

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	27-APR-06	S M M
B	EC 3817	09-MAY-06	S M M
C	EC 3828	21-JUN-06	S M M
D	EC 3829	21-AUG-06	S M M



FILM/DWG:	SERVICE DIAGRAM
DATABASE: Z524P2.PCB	DATE: 21-JUN-06

1. SEE SHEET 1 FOR TEST CONDITIONS AND TP VALUES.

NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____
DATE: _____

APPROVED BY: _____
DATE: _____

DRAWN: HAN LE | ENGR: GIT'LO

DATABASE FILE: Z524P2.PCB

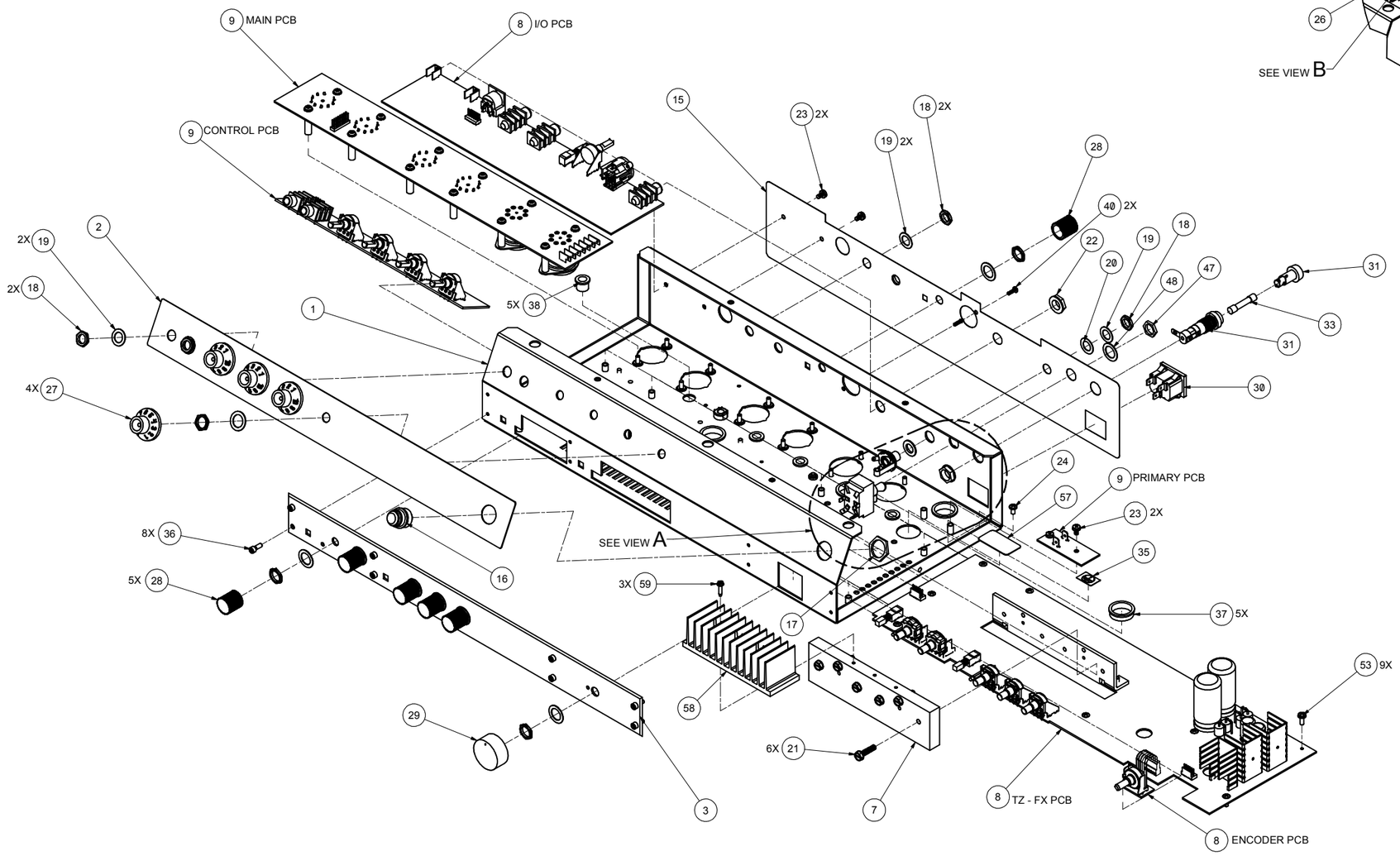
MUSICAL INSTRUMENTS
Corona, CA U.S.A.

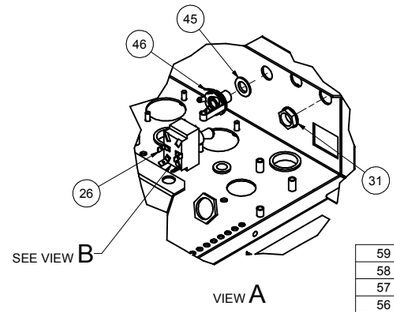
TITLE: SERVICE DIAGRAM, COMBINED (PCB assy)
PRINCETON RECORDING AMP
TUBE

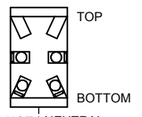
SIZE	DRAWING NUMBER	REV.
C	0068618000	D

RELEASE DATE: 27-APR-06 | SHEET 2 OF 2

REV	EC NUMBER	BY	DATE/ARCHIVE







PRIMARY POWER SWITCH
VIEW B
SCALE: 1/1

SERVICE MANUAL DOCUMENT

01/16/2007

(N.S.) = NOT SHOWN

ITEM	QTY	DESCRIPTION
59	3	SCRW TF 4-40x1/2 HIHS ZI
58	1	HEATSINK EXTRUDED PRA
57	1	LABEL FUSE REPLACEMENT
56	2	CABLE RIBBON 2X8 15" (N.S.)
55	1	CABLE RIBBON CRIMP 3 CKT 14" BLK (N.S.)
54		
53	21	SCRW M6-32X3/8 PHP SS INTLWSHR
52	2	SCRW M 8-32x1/4 PHP BLX w/WSHR
51	4	SCRW M 10-32x5/8 HWHS BLX
50	4	NUT KEPS 10-32 ZINC
49	4	WSHR FLAT 10x1/2 BLX
48	1	WASHER FLAT .482x.709 NI
47	1	NUT HEX 15/32-32 X 5/8 NI
46	1	JACK PHONE TIP SHUNT 12A
45	1	WSHR SHLDR FIBER 3/8x5/8 sell 049
44	1	BUSHING, SR .500X.063X7/16 BLK
43	1	WIRESET CHASSIS ASSEMBLY PRA (N.S.)
42	2	CABLE RIBBON ASSY 6 CKT 6" (N.S.)
41	1	LABEL VOLTAGE (N.S.)
40	2	SCRW SMB #4X3/8 PHP BLX
39	1	COVER CAPACITOR PRA
38	4	BUSHING SNAP 5/16 X 17/32 BLK
37	5	BUSHING SNAP SHORT 3/4x15/16 BLK
36	8	SCRW CAP 6-32X3/8 HEX SKT NI
35	1	LABEL GROUNDING SEMKO
34	1	XFMR PWR PRA
33	1	FUSE
32	2	SCRW TF 4-40X3/8 HWHS ZI
31	1	FUSE HOLDER
30	1	CONNECTOR IEC SNAP IN
29	1	KNOB DATA WHEEL LARGE w/DIMPLE
28	6	KNOB LARGE 400 PRO
27	4	KNOB BLACK W/WHITE STAMP 1-10
26	1	SWITCH TOGGLE DPST W/NUTS
25		
24	8	SCRW TF 6-32x1/4 PHP ZI
23	8	SCRW M 6-32x1/4 PHP BLX ITLW
22	1	NUT PLASTIC BLK REAN JACK
21	8	SCRW TF 8-32x3/4 HWH SLTD
20	1	WSHR FLAT .380x.630 FIBER(049)
19	5	WSHR FLAT 3/8x.614 NI (049)
18	5	NUT HEX 3/8-32x3/32 TK NI (049)
17	1	NUT HOLDER PILOT LIGHT 11/16-27
16	1	JEWEL ASSY LED
15	1	PANEL REAR PRA
14	1	RES PWR 50W 8ohms
13	1	XFMR OUTPUT PRA
12	2	TUBE RING UNIVERSAL (277H-2)
11	4	TUBE SHIELD SUNN MODEL T
10	1	XFMR REVERB VIBROVERB/65 DLX
9	1	PCB ASSY PRA TUBE
8	1	PCB ASSY PRA TZ/FX/IO
7	1	HEATSINK BAR PRA
6	2	TUBE 6V6GTA STR391A
5	3	TUBE 7025/12AX7WC RUSSIAN GT
4	1	TUBE 12AT7 HIGH MU TWIN TRIODE
3	1	PANEL EFFECTS PRA
2	1	PANEL FRONT PRA
1	1	CHASSIS PRA

ENGINEER		
DRAWN		
DATE		9/22/2005
DFT. DATE	ENG. DATE	ENG. DATE
APPROVED		
DATE		

FENDER MUSICAL INSTRUMENTS CORP.
CORONA CALIFORNIA U.S.A.

TITLE: CHASSIS ASSEMBLY
PRINCETON RECORDING AMP

SHEET	SIZE	DRAWING NUMBER	REV
1of2	D	0068608000 MASTER/ASSEMBLY	D

SCALE: NONE

7	6	5	4	3	2	1

D C B A

REV	EC NUMBER	BY	DATE/ARCHIVE

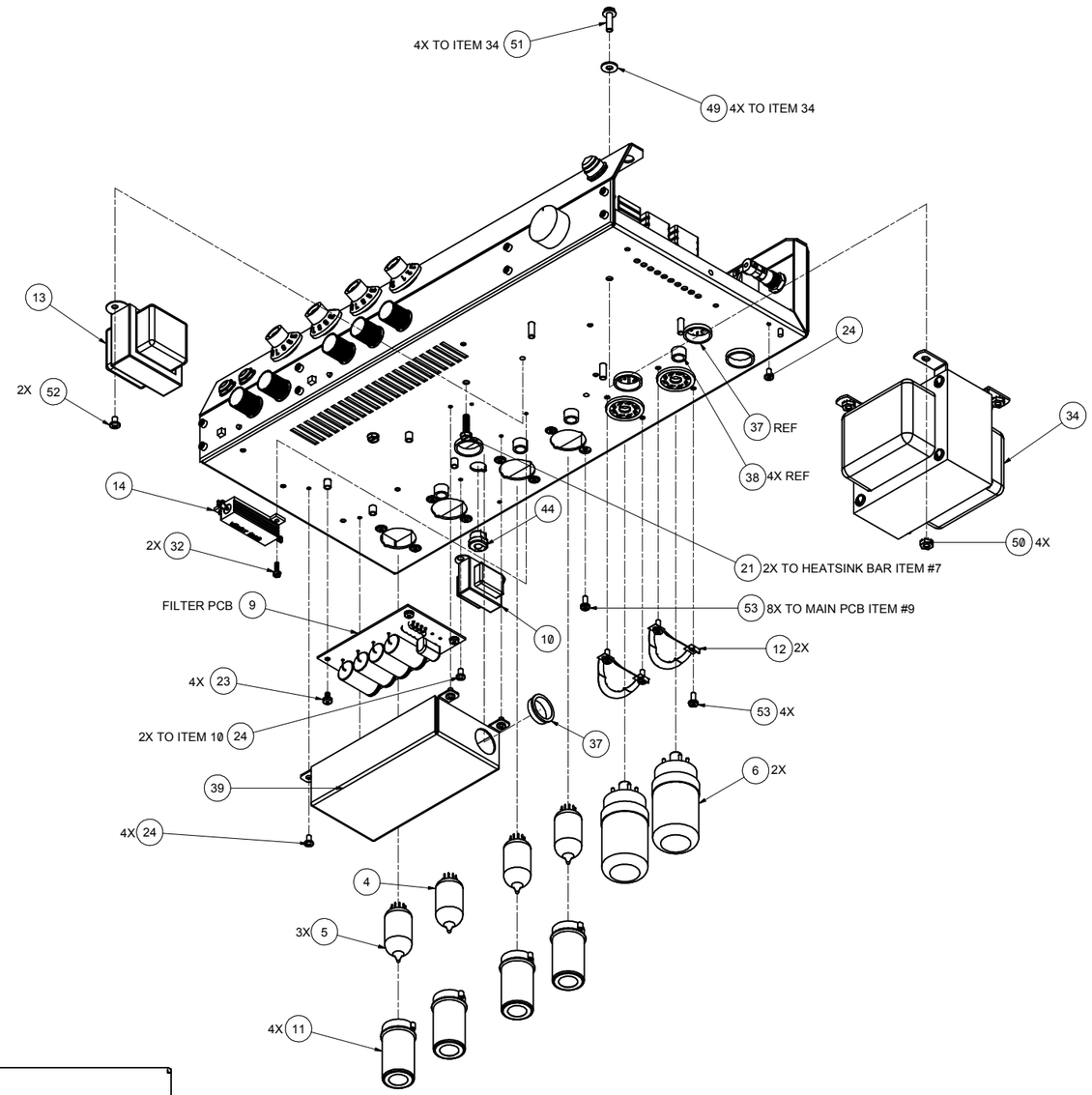
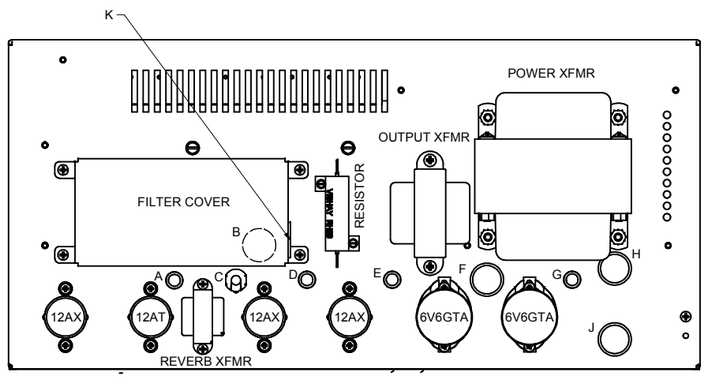


TABLE B: ACCESS HOLES FOR CHASSIS WIRE ROUTING

ACCESS HOLE	COMPONENT OR WIRESET	WIRE SET ITEM	WIRE COLOR	NOTES
A	REVERB XFMR		GREEN	
A	REVERB XFMR		BLACK	
A	REVERB XFMR		BLUE	
B	TUBE W/S	M	BLUE	
B	TUBE W/S	R	BLACK	
C	REVERB CABLE			2 LEAD COAX FROM MAIN TUBE PCB SECURE W/BUSHING
D	REVERB XFMR		RED	
D	CHASSIS W/S	E	RED/BLK TWPR	TO 8 OHM / 50W RESISTOR
E	TUBE W/S	S	VIOLET	
E	TUBE W/S	N	BLACK	
F	TUBE W/S	L	ORANGE	
F	TUBE W/S	J	RED	
F	OUTPUT XFMR		BROWN	
F	OUTPUT XFMR		RED	
F	OUTPUT XFMR		BLUE	
F	TUBE W/S	H	BLACK	
F	TUBE W/S	K	BLACK	
F	TUBE W/S	V	BLACK	
G	OUTPUT XFMR		GREEN	
G	OUTPUT XFMR		BLACK	
H	PWR XFMR		GREEN	2 LEADS
H	PWR XFMR		ORANGE	2 LEADS
H	PWR XFMR		VIOLET	2 LEADS
H	PWR XFMR		BROWN	2 LEADS
H	PWR XFMR		YELLOW	1 LEAD
J	PWR XFMR		WHITE	
J	PWR XFMR		BLACK	
J	TUBE W/S	H	BLACK	
K	TUBE W/S	J	RED	
K	TUBE W/S	L	ORANGE	
K	TUBE W/S	S	VIOLET	
K	TUBE W/S	N	BLACK	
K	TUBE W/S	K	BLACK	
K	TUBE W/S	V	BLACK	
K	PWR XFMR		RED	TO P27 IN CAP COVER
K	PWR XFMR		RED	TO P28 IN CAP COVER



BOTTOM VIEW
TUBE LOCATIONS, COMPONENTS, WIRING ACCESS HOLES

TABLE A: RIBBON CABLE INSTALLATION DETAILS

ITEM	# CKTS	CABLE LENGTH	FROM PCB	TO PCB
42	6	6	(ITEM 8) TZ-FX PCB P22	(ITEM 9) CONTROL PCB P26
42	6	6	(ITEM 8) I/O PCB P2	(ITEM 8) TZ-FX PCB P5
56	2 X 8	15	(ITEM 8) I/O PCB PW1	(ITEM 8) TZ-FX PCB P21
55	3	14	(ITEM 8) I/O PCB P1	(ITEM 9) MAIN PCB P7
56	2 X 8	15	(ITEM 8) TZ-FX PCB P18	(ITEM 9) MAIN PCB P5

ENGINEER			
DRAWN			
DATE	9/22/2005		
DFT. DATE	ENG. DATE	ENG. DATE	
APPROVED			
DATE			

FENDER MUSICAL INSTRUMENTS CORP.
CORONA CALIFORNIA U.S.A.

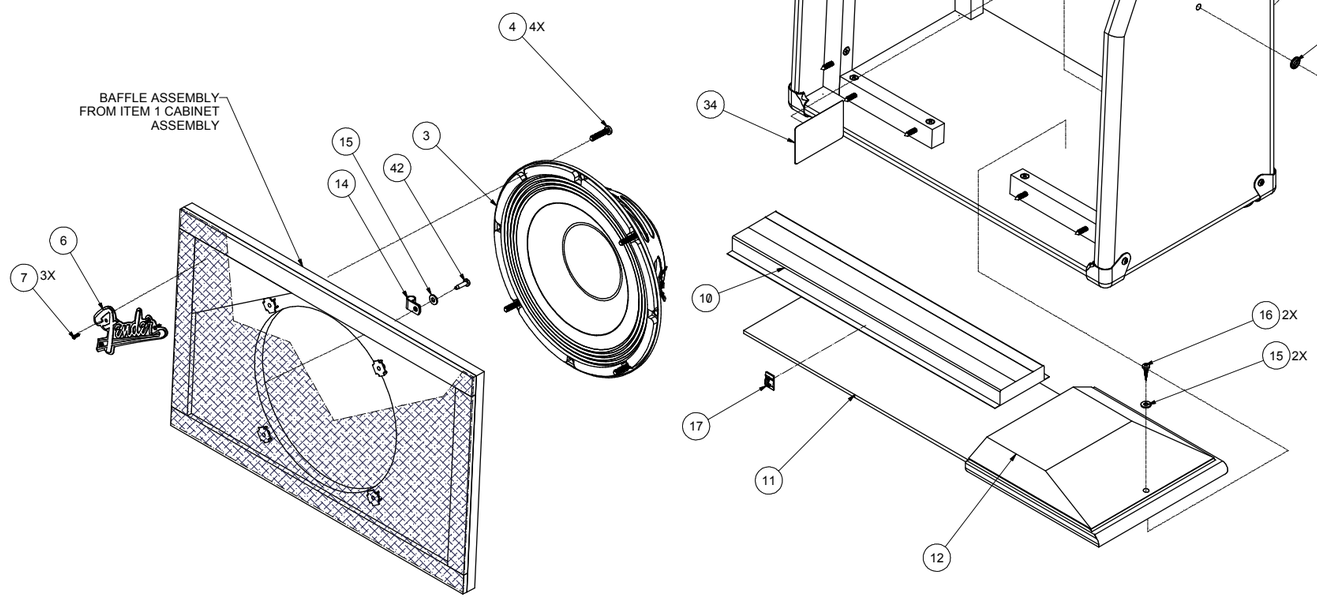
TITLE
CHASSIS ASSEMBLY
PRINCETON RECORDING AMP

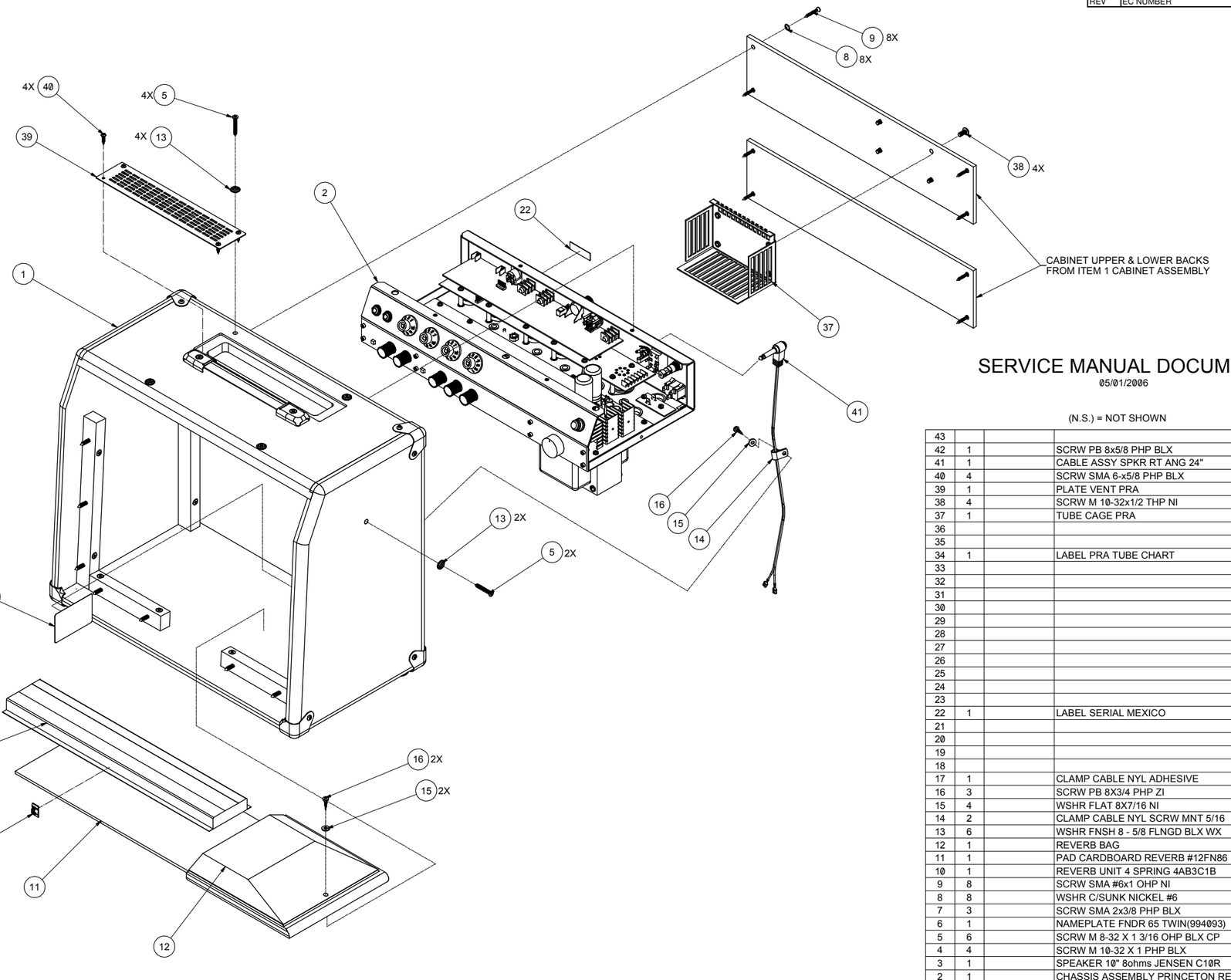
SHEET	SIZE	DRAWING NUMBER	REV
2of2	D	0068608000 MASTER/ASSEMBLY	D
SCALE NONE			

7 6 5 4 3 2 1

D C B A

REV	EC NUMBER	BY	DATE/ARCHIVE





SERVICE MANUAL DOCUMENT

05/01/2006

(N.S.) = NOT SHOWN

ITEM	QTY		DESCRIPTION
43			
42	1		SCRW PB 8x5/8 PHP BLX
41	1		CABLE ASSY SPKR RT ANG 24"
40	4		SCRW SMA 6-x5/8 PHP BLX
39	1		PLATE VENT PRA
38	4		SCRW M 10-32x1/2 THP NI
37	1		TUBE CAGE PRA
36			
35			
34	1		LABEL PRA TUBE CHART
33			
32			
31			
30			
29			
28			
27			
26			
25			
24			
23			
22	1		LABEL SERIAL MEXICO
21			
20			
19			
18			
17	1		CLAMP CABLE NYL ADHESIVE
16	3		SCRW PB 8X3/4 PHP ZI
15	4		WSHR FLAT 8X7/16 NI
14	2		CLAMP CABLE NYL SCRW MNT 5/16
13	6		WSHR FNSH 8 - 5/8 FLNGD BLX WX
12	1		REVERB BAG
11	1		PAD CARDBOARD REVERB #12FN86
10	1		REVERB UNIT 4 SPRING 4AB3C1B
9	8		SCRW SMA #6x1 OHP NI
8	8		WSHR C/SUNK NICKEL #6
7	3		SCRW SMA 2x3/8 PHP BLX
6	1		NAMEPLATE FNDR 65 TWIN(994093)
5	6		SCRW M 8-32 X 1 3/16 OHP BLX CP
4	4		SCRW M 10-32 X 1 PHP BLX
3	1		SPEAKER 10" 8ohms JENSEN C10R
2	1		CHASSIS ASSEMBLY PRINCETON RECORDING AMP
1	1		CABINET ASSEMBLY PRINCETON RECORDING AMP

ENGINEER			
DRAWN			
DATE	9/26/2005		
DFT. DATE	ENG. DATE	ENG. DATE	
APPROVED			
DATE			

FENDER MUSICAL INSTRUMENTS CORP.
CORONA CALIFORNIA U.S.A.

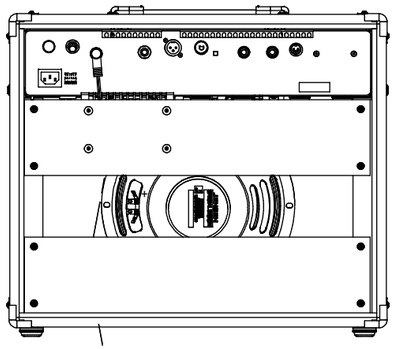
TITLE
END ITEM ASSEMBLY
PRINCETON RECORDING AMP

SHEET	SIZE	DRAWING NUMBER	REV
1of2	D	2152000000 MASTER/ASSEMBLY	A
SCALE NONE			

7 6 5 4 3 2 1

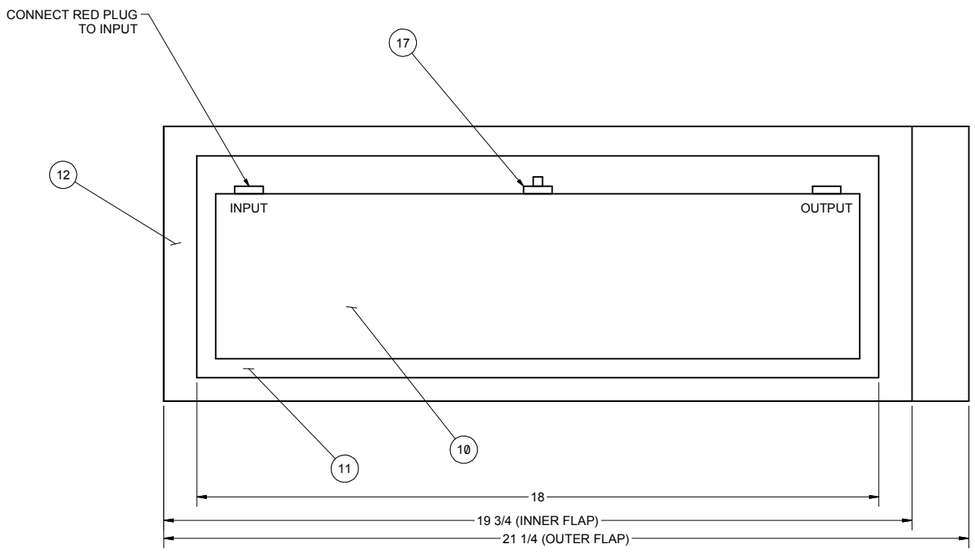
D C B A

REV	EC NUMBER	BY	DATE/ARCHIVE

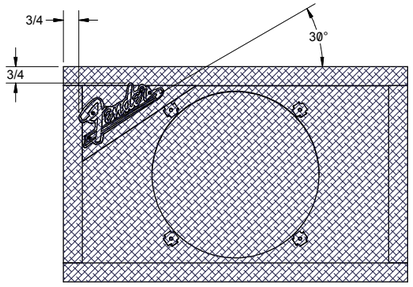


BACK PANEL AND SPEAKER DETAIL

REVERB ASSEMBLY DETAIL



NOTE: PLACE ITEMS 10 & 11 IN BAG (ITEM 12). FOLD END WITH FLAP PLACED UNDER ITEM 11. ORIENT IN CABINET WITH JACKS FACING BAFFLE.



LOGO PLACEMENT VIEW

ENGINEER			
DRAWN			
DATE	9/26/2005		
DFT.	ENG.	ENG.	
DATE	DATE	DATE	
APPROVED			
DATE			

FENDER MUSICAL INSTRUMENTS CORP.
CORONA CALIFORNIA U.S.A.

TITLE: END ITEM ASSEMBLY
PRINCETON RECORDING AMP

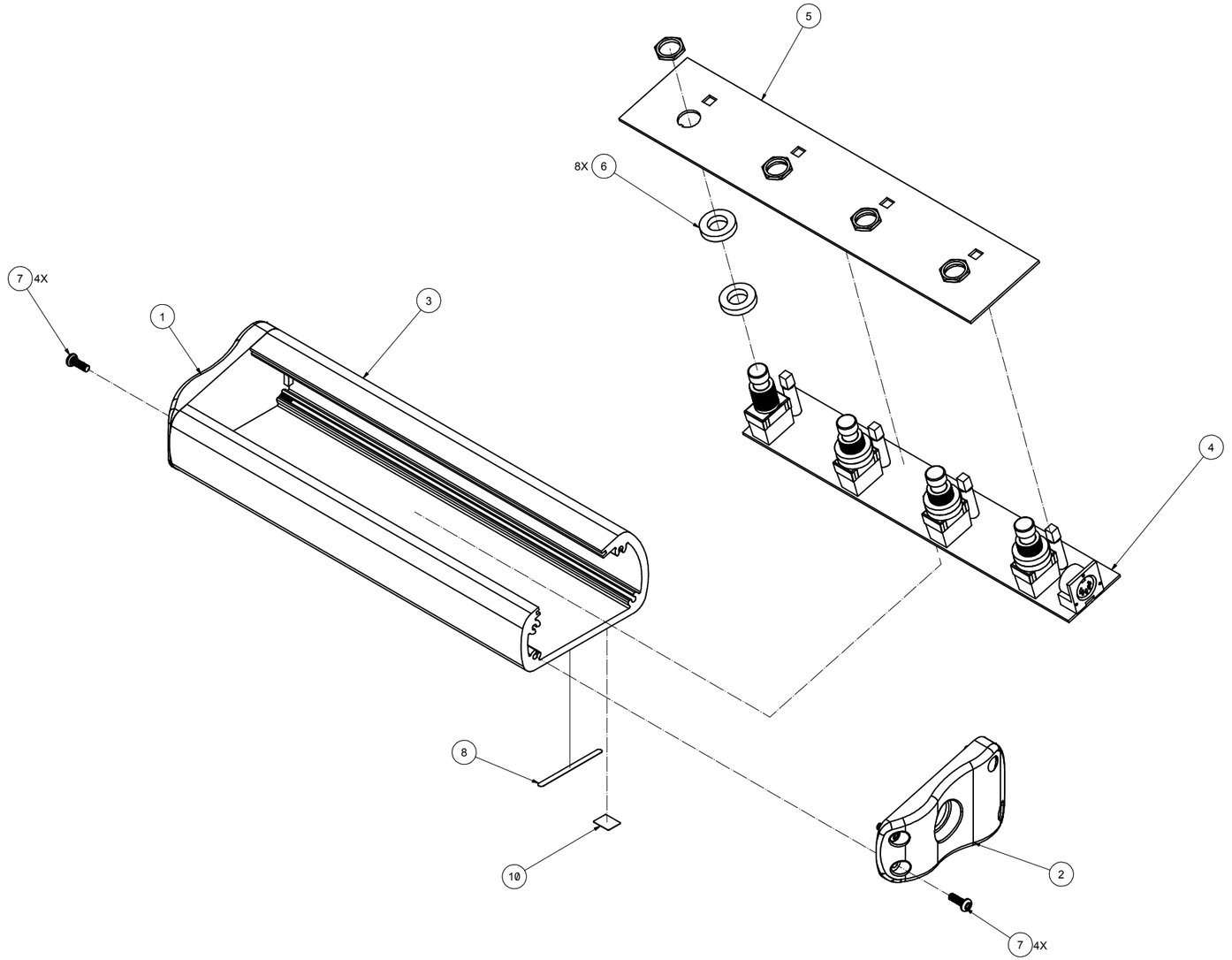
SHEET	SIZE	DRAWING NUMBER	REV
2of2	D	2152000000 MASTER/ASSEMBLY	A

SCALE: NONE

7 6 5 4 3 2 1

D C B A

REV	EC NUMBER	BY	DATE/ARCHIVE



SEVICE MANUAL DOCUMENT

01/16/2007

(N.S.) = NOT SHOWN

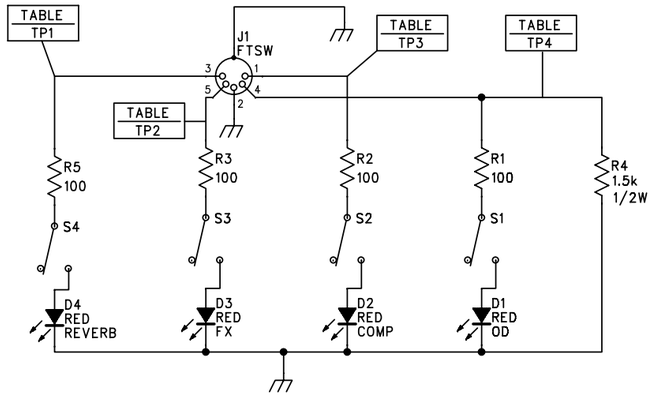
ITEM	QTY	DESCRIPTION
10	1	LABEL WEEE SYMBOL
9	1	CABLE 5 PIN DIN (N.S.)
8	1	LABEL "MADE IN MEXICO"
7	8	SCRW SMB 6X3/8 PH PHS BLX
6	8	WSHR NYL .485x.775x.150 TK
5	1	PLATE TOP FTSW 4 BTN PRA
4	1	PCB ASSY FTSW 4 BTN PRA
3	1	HOUSING FTSW 4 BUTTON 2004
2	1	END CAP FTSW DIN RIGHT SIDE
1	1	END CAP FTSW 2004 LEFT SIDE

ENGINEER			FENDER MUSICAL INSTRUMENTS CORP. CORONA CALIFORNIA U.S.A.			
DRAWN			TITLE: FTSW ASSY 4 BUTTON PRA			
DATE: 9/29/2005						
DFT. / DATE	ENG. / DATE	ENG. / DATE				
APPROVED			SHEET: 1of1	SIZE: D	DRAWING NUMBER: 0069511000 ASSEMBLY	REV: A
DATE			SCALE: NONE			

D C B A

7 6 5 4 3 2 1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	27-APR-06	SMM



TEST POINT DATA

TP#	ON	OFF
1	+14.0VDC	+2.65VDC
2	+2.60VDC	+14.0VDC
3	+2.60VDC	+14.0VDC
4	+2.45VDC	+7.0VDC

NOTES: (UNLESS OTHERWISE NOTED)

1. ALL RESISTORS IN OHMS, 5%; 1/4W.
2. ALL UNPOLARIZED CAPACITORS IN uF, 10% OR BETTER; 50V MINIMUM. (POWER SUPPLY BYPASS CAPACITORS ARE 20%).
3. ALL POLARIZED CAPACITORS IN uF, 20%; 50V MINIMUM.
4. ALL DIODES ARE 1N4448.
5. THIS SCHEMATIC IS FOR PCB FABRICATION P/N 0069513000 AND PCB ASSEMBLY P/N 0069514000.
6. DC VOLTAGES READ TO GROUND WITH A DVM
   UNDER THE FOLLOWING CONDITIONS:
   FOOTSWITCH ASSY ATTACHED TO
   CHASSIS ASSY AT RATED LINE VOLTAGE.
   ON STATE IS WHEN LED IS LIT.
7. LAST REFERENCE DESIGNATORS: D4, J1, R5.

CHECKED BY: _____
DATE: _____

APPROVED BY: _____
DATE: _____

DRAWN: HAN LE | ENGR: MARSHALL

DATABASE FILE: Z524S3.SCH

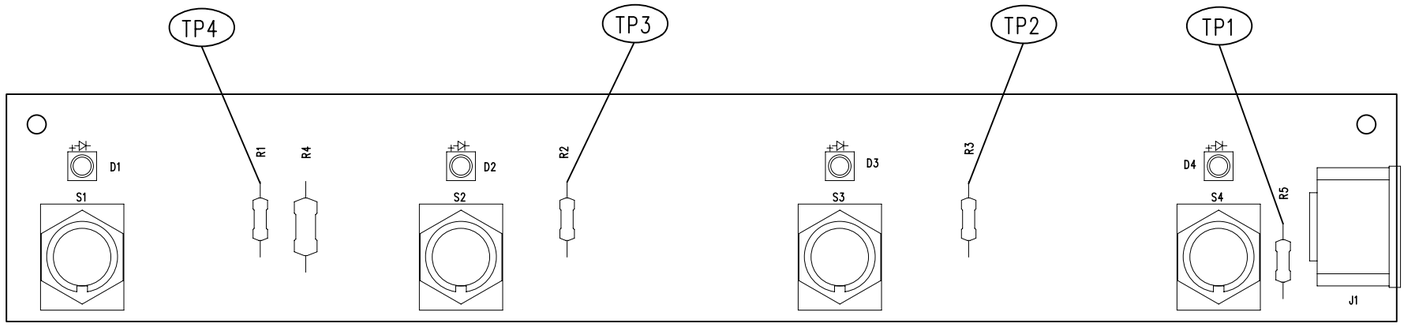
Fender® MUSICAL INSTRUMENTS
Corona, CA U.S.A.

TITLE: SERVICE DIAGRAM, COMBINED (schematic)
FOOTSWITCH 4 BUTTON
PRINCETON RECORDING AMP

SIZE	DRAWING NUMBER	REV.
B	0069516000	A

RELEASE DATE: 27-APR-06 | SHEET: 1 OF 2

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR524	27-APR-06	SMM



FILM/DWG:	SERVICE DIAGRAM	
DATABASE: Z524P3.PCB	DATE: 27-APR-06	

1. SEE SHEET 1 FOR TEST CONDITIONS AND TP VALUES.

NOTES: (UNLESS OTHERWISE NOTED)

CHECKED BY: _____
DATE: _____

APPROVED BY: _____
DATE: _____

DRAWN: HAN LE | ENGR: GIT'LO

DATABASE FILE: Z524P3.PCB

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

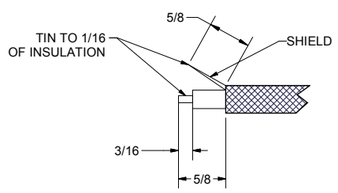
TITLE: SERVICE DIAGRAM, COMBINED (PCB assy)
FOOTSWITCH 4 BUTTON
PRINCETON RECORDING AMP

SIZE	DRAWING NUMBER	REV.
B	0069516000	A

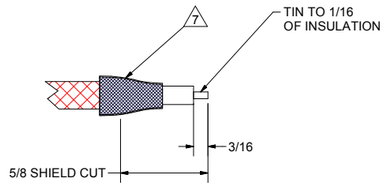
RELEASE DATE: 27-APR-06 | SHEET 2 OF 2

REV	EC NUMBER	BY	DATE/ARCHIVE

ITEM	QTY	MAT'L P/N	GAGE	COLOR	CUT LENGTH	STRIP LENGTH A	STRIP LENGTH B	TERMINATION A	TERMINATION B	REFERENCES
A	1	9907584230	COAX	GRAY	12 1/2	DETAIL A	DETAIL A	-	-	TUBE IN - WJ17,16 TO TZ/FX PCB - WJ35,32
B	1	9907584230	COAX	GRAY	11 1/2	DETAIL A	DETAIL B	-	-	EQ SEND - WJ27, 28 TO WJ43
C	1	9907584230	COAX	GRAY	10	DETAIL A	DETAIL B	-	-	EQ RCV - WJ42, 41 TO WJ18
D	1	9907584230	COAX	GRAY	7	DETAIL A	DETAIL A	-	-	FX SEND - WJ19, 8 TO IO PCB - WJ34,31
E	1	9907584230	COAX	GRAY	6	DETAIL A	DETAIL A	-	-	FX RTN - IO WJ33,30 TO WJ11, 12
F	1	9907584230	COAX	GRAY	20	DETAIL A	DETAIL B	-	-	REV LVL IN - WJ24, 25 TO WJ39
G	1	9907584230	COAX	GRAY	20	DETAIL A	DETAIL B	-	-	REV LVL OUT - WJ38, 37 TO WJ14
H	1	0027182000	18	BLACK	16	3/16	1/4	-	0069364000	HUM BALANCE GND - WJ46 TO P2
J	1	0027186000	18	RED	14	3/16	3/16	-	0026315000	B+ - FILTER PCB WJ32 TO MAIN PCB P20
K	1	0027182000	18	BLACK	14	3/16	3/16	-	0026315000	B+ GND - FILTER PCB WJ47 TO MAIN PCB P19
L	1	0027187000	18	ORANGE	14	3/16	3/16	-	0026315000	A - FILTER PCB WJ31 TO MAIN PCB P17
M	1	0027190000	18	BLUE	9	3/16	3/16	-	0026315000	D - FILTER PCB WJ29 TO MAIN PCB P13
N	1	0027182000	18	BLACK	12	3/16	3/16	-	0026315000	C/D GND - FILTER PCB WJ49 TO MAIN PCB P15
P	1	0027184000	18	BROWN	10	3/16	3/16	0026315000	-	NEG BIAS - TZ/FX P8 TO MAIN TUBE WJ2
R	1	0027182000	18	BLACK	8	3/16	3/16	-	0026315000	A GND - FILTER PCB WJ45 TO MAIN PCB P10
S	1	0027192000	18	VIOLET	12	3/16	3/16	-	0026315000	C - FILTER PCB WJ30 TO MAIN PCB P16
T	1	0027182000	18	BLACK	11	3/16	3/16	-	-	EQ GND - MAIN PCB WJ6 TO CONTROL PCB WJ36
U	1	0027182000	18	BLACK	20	3/16	3/16	-	-	REV GND - MAIN PCB WJ13 TO CONTROL PCB WJ40
V	1	0027182000	18	BLACK	14 1/2	1/4	3/16	0025737000	-	STAR - TZ/FX PCB P19 TO FILTER PCB WJ48
X	1	0027195000	18	WHITE	3 1/2	3/16	1/4	-	0025737000	PRIMARY NEUTRAL - WJ34 TO SWITCH
Y	1	0027182000	18	BLACK	3	3/16	1/4	-	0031670000	PRIMARY HOT - WJ33 TO FUSE RING
Z	1	0027182000	18	BLACK	10	3/16	3/16	0026315000	-	NEG BIAS GND - TZ P15 TO MAIN TUBE WJ4



DETAIL A



DETAIL B

SERVICE MANUAL DOCUMENT

01/16/2007

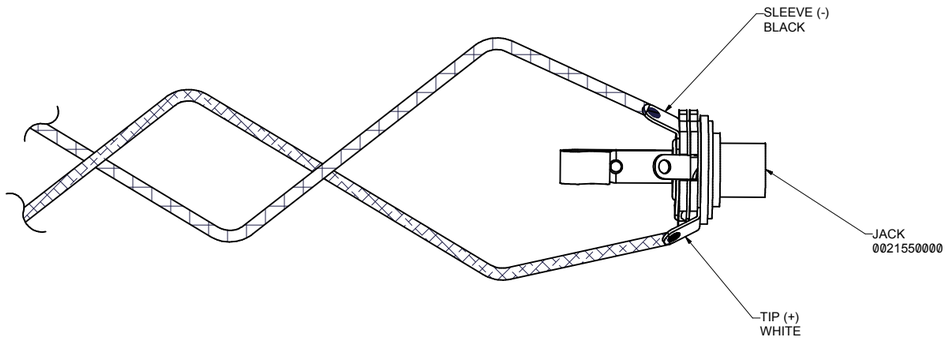
MATERIAL: N/A	ENGINEER	FENDER MUSICAL INSTRUMENTS CORP. CORONA CALIFORNIA U.S.A.	
FINISH: N/A	DRAWN	TITLE: WIRE SET PCB ASSY PRA TUBE	
TOL. UNLESS NOTED FRACT. ----------+- 1/32 .X----------+- 0.050 .XX----------+-0.015 .XXX----------+-0.010 ANGLES ----------+0.005 - 0.001 HOLE DIA. ----------+0.005 - 0.001 UNMARKED ANGLES ARE 90 DEGREES.	DATE: 11/7/2005 DFT. / ENG. / ENG. DATE / DATE / DATE APPROVED DATE	SHEET: 1of1	SIZE: D
		SCALE: NONE	DRAWING NUMBER: 0068621000 MASTER
			REV: C

7 6 5 4 3 2 1

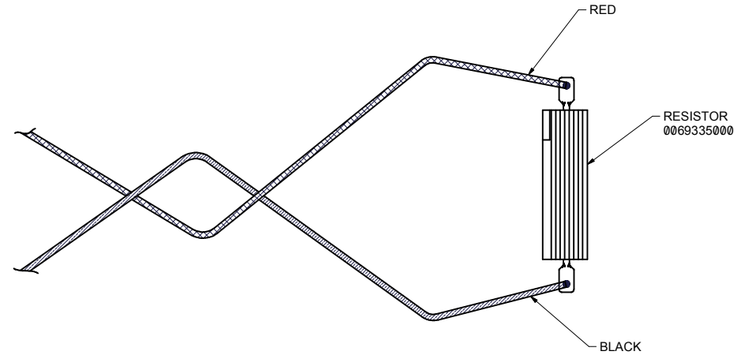
D C B A

REV	EC NUMBER	BY	DATE/ARCHIVE

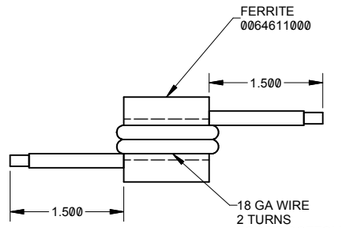
ITEM	QTY		MAT'L P/N	GAGE	COLOR	CUT LENGTH	STRIP LENGTH		TERMINATION		REFERENCE
							A	B	A	B	
	0068620000	0073404000									
A	1	1	0055811000	18	GRN/YEL	3	1/4	1/4	0025737000	0027113000	IEC E TO CHS GND
B	1	1	9907584600	18	BLK/WHT TWPR	15	1/4	1/4	0025737000	SEE DETAIL A	TZ/FX WHT P12 TO SPKR JACK TIP, BLK P10 TO SPKR JACK SLEEVE
C	1	1	0027182000	18	BLACK	3	1/4	1/4	0025737000	0031670000	SWITCH TO FUSE HOLDER TIP
D	1	1	0027195000	18	WHITE	3	1/4	1/4	0025737000	0025737000	IEC N TO SW
E	1	1	0029953000	18	BLK/RED TWPR	9	1/4	3/8	0069364000	SEE DETAIL B	TZ/FX P11, 13 TO PWR RES (SOLDER)
F	1	1	9907584600	18	BLK/WHT TWPR	10	1/4	1/4	0069364000	0025737000	TUBE AMP OUT- WHT MAIN PCB P6 TO TZ/FX PCB P17 BLK MAIN PCB P8 TO TZ/FX PCB P16
G	1	-	0027182000	18	BLACK	3	1/4	1/4	0025737000	0025737000	IEC L TO SWITCH
H	-	1	0027182000	18	BLACK	11 1/2	1/4	1/4	0025737000	0025737000	CHOKE - IEC L TO SWITCH



DETAIL A
P/O ITEM B
TERMINATION B
SCALE: 2/1



DETAIL B
P/O ITEM E
TERMINATION B



DETAIL C

SERVICE MANUAL DOCUMENT

01/16/2007

0073404000	WIRE SET CHS ASSY PRA EXP
0068620000	WIRE SET CHS ASSY PRA DOM

MATERIAL: N/A

FINISH: N/A

TOL. UNLESS NOTED
FRACT. ----------+- 1/32
.X----------+- 0.050
.XX----------+-0.015
.XXX----------+-0.010
ANGLES ----------+0.005 - 0.001
HOLE DIA. ----------+0.005 - 0.001
UNMARKED ANGLES ARE 90 DEGREES.

ENGINEER

DRAWN

DATE: 11/7/2005

DFT.	ENG.	ENG.
DATE	DATE	DATE

APPROVED

DATE

FENDER MUSICAL INSTRUMENTS CORP.
CORONA CALIFORNIA U.S.A.

TITLE: WIRE SET CHASSIS ASSY PRA

SHEET	SIZE	DRAWING NUMBER	REV
1of1	D	0068620000 MASTER	C

SCALE: 1/1

7 6 5 4 3 2 1

D C B A