

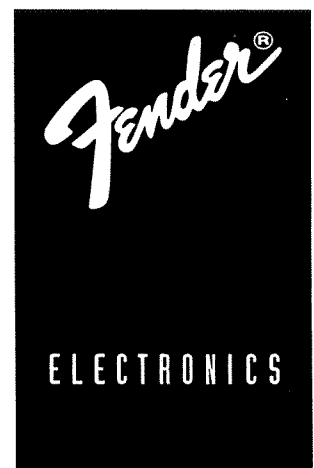
POWER AMPLIFIERS



From Fender Pro Audio

Owner's Manual for
SPA SERIES

P/N 050715





Fender Musical Instruments
7975 North Hayden Road, Scottsdale, Arizona 85258 U.S.A.

Fender knows the importance of sound reinforcement. From the simple box-top mixer to today's professional touring concert systems, the need to communicate, to make the connection between the performer and the audience is foremost in Fender's mind.

Perhaps no other single piece of gear can make or break your band's sound. You see, your sound system is more than just a combination of dials, wires and speakers. It is an integral part of the audio chain and should be treated with special care and attention to detail.

At Fender, we know what building quality musical instruments and sound reinforcement equipment is all about. In fact, many of the world's best sounding electric musical instruments and sound reinforcement equipment proudly wear the Fender name.

Whether you need a simple box top powered mixer for your Saturday afternoon jam, or a professional full-size concert system, Fender has the sound reinforcement equipment to meet your needs. Likewise, your decision to purchase Fender pro audio gear is one you will appreciate with each performance for years to come.

Wishing you years of enjoyment and a heartfelt *thank you*,

Bill Schultz
Chairman
Fender Musical Instruments Corporation

SPA SERIES POWER AMPLIFIERS

INTRODUCTION

Your new Fender SPA series amplifier is designed to provide you with years of trouble-free service for both permanent and portable applications. Utilizing our proprietary DeltaComp™ compression / speaker protection circuitry, coupled with years of power amplifier design expertise in a rugged steel chassis, this amplifier is sure to provide years of trouble-free amplification. Please take a moment to familiarize yourself with all the features and options your new power amplifier has to offer.

AMPLIFIER OPERATION

This procedure applies to stereo, mono or bridged operation into a full-range loudspeaker system which uses a passive, high-level crossover... or none at all. If you are using the SPA amplifier in a multi-amplifier system with an electronic or low-level passive crossover, the INPUT LEVEL controls on the amplifier are generally set to maximum (zero loss), and all level controlling is done at the crossover (skip step 10 in this case).

1. Turn all equipment OFF.
2. Plug the amplifier into a power source.
3. Connect the wiring from the signal source(s) to the amplifier's input jack(s).
4. Select the appropriate settings for the MODE switches (bridged mono, stereo, or dual mono operation).
5. Connect the speaker(s) to the output terminals, as appropriate for the setting of the MODE switches.
6. Adjust the INPUT LEVEL controls to their minimum (counterclockwise) setting.

7. Turn ON everything EXCEPT the power amplifier.

8. Adjust the controls on the signal source for "normal" indications on the source's meter or level indicator. If there is no metering, then turn the master control of the input source all the way down (counterclockwise).

9. Turn the power amplifier ON.

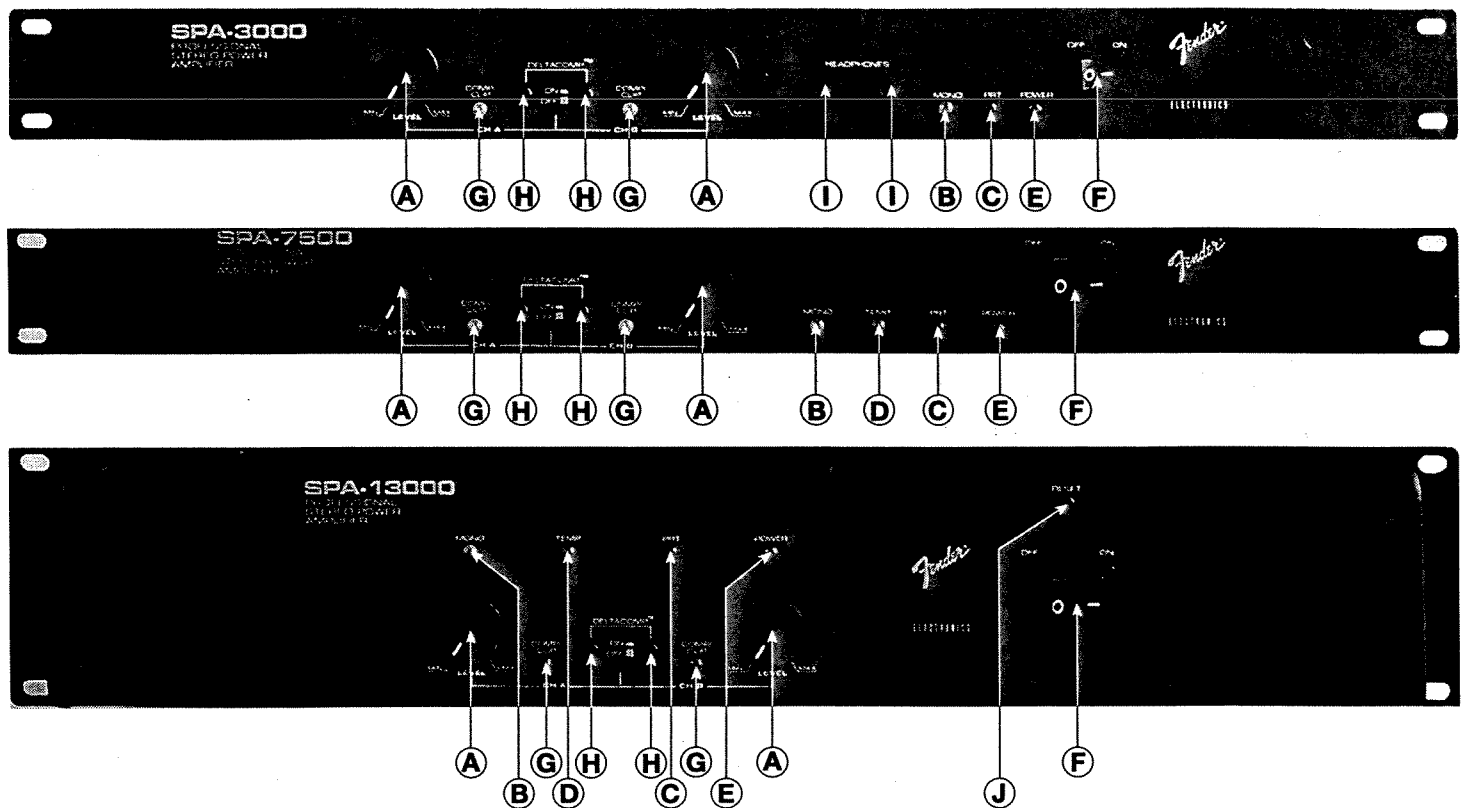
10. Adjust the INPUT LEVEL control(s) to maximum. Carefully advance the master control on your signal source until the sound level from the speaker is just past the "correct" level (just a bit too loud). Remove the input signal from the source, leaving the master control (and any input controls on the source) set as they were. If the system is noisy (hiss), reduce the setting of the INPUT LEVEL control(s) slightly and repeat this step. You must alter the source control settings until you find a combination that gives you the desired amplifier output, freedom from clipping caused by excessive output demands placed on the signal source, and poor signal-to-noise performance caused by excessive amplifier gain.

WARNING:

- To reduce the risk of fire or shock hazard, do not expose this amplifier to rain or moisture.
- No user serviceable parts inside. Refer servicing to qualified personnel only.
- This amplifier must be earth grounded.

REAR RACK SUPPORTS

If the amplifier is to be mounted in a rack, it is REQUIRED that the included stamped metal "L" shaped rear rack ears be used to support the back of the amplifier. The rear ears are adjustable to accommodate small variations in rack depth.



DESCRIPTION OF FEATURES

1. FRONT PANELS

A. LEVEL CONTROLS - Two variable attenuators control the amplifier's input sensitivity. Control settings can vary between zero attenuation (labeled 'MAX.') and infinite attenuation (labeled 'MIN.'). At the full clockwise rotation, a -1.8 dBV input signal is required for rated output. Each gain control is independent except for the Mono Bridge mode where Channel A is the active control and Channel B is inactive. Refer to the 'Amplifier Operation' section (page 1) for additional information on proper adjustment of the input level controls.

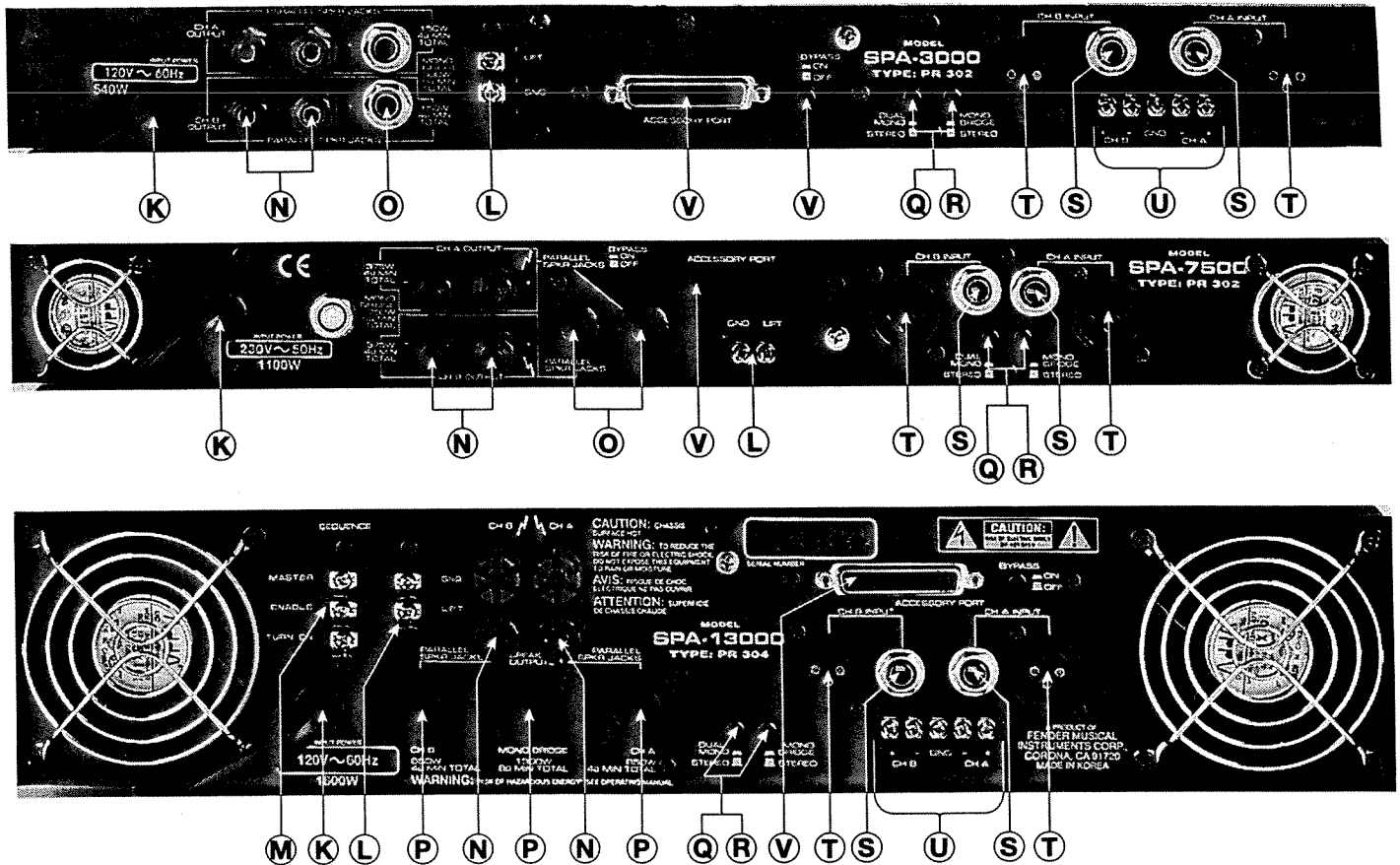
B. 'MONO' LED - When illuminated, this LED indicates bridged mono mode, based on the switch positions of sections M and N on page 4. If the LED is OFF, the amplifier is in stereo or dual mono mode.

C. 'PRT' LED - When illuminated, this LED indicates the protection circuitry has shut down the amplifier - a problem has occurred (see section J on 'RESET'). If the LED is OFF, the amplifier is functioning normally.

D. 'TEMP' LED - When illuminated, the temperature has risen too high and the amplifier has shut itself off. On the 3000 and 7500, the amplifier will turn on when the temperature returns to a safe operating level. On the 13000, allow the unit some time to cool down. See section J on RESET to turn the unit back on. If the LED is OFF, the amplifier is functioning normally.

E. 'POWER' LED - When illuminated, this LED indicates that mains voltage is present and the unit is receiving power. If the LED is OFF, the unit is not receiving power.

F. POWER SWITCH - Turns the amplifier ON and OFF. Pushing on the right side of the power switch turns the unit ON. Pushing on the left side turns the unit OFF.



FRONT PANELS (continued)

G. COMP/CLIP LED - This works in conjunction with the DeltaComp™ switch for each channel. See the chart on page 5.

H. DELTACOMP™ SWITCH - In the 'OUT' position, DeltaComp™ is inactive. With the switch pushed 'IN', the amplifier will compress or limit if the signal becomes too large. See the chart on page 5.

I. HEADPHONES (3000 only) - These parallel 1/4" phone jacks allow for 2 sets of headphones to be used simultaneously.

J. RESET (13000 only) - This button is inactive if the amplifier is functioning normally. If a problem has occurred (see sections C and D), push this button to turn the amplifier back on. If the amplifier does not turn back on, let it cool down before pushing the RESET button again.

2. REAR PANELS

K. AC SUPPLY CORD -

WARNING: This amplifier is equipped with a grounding type supply cord. To reduce the possibility of shock hazard, be sure to connect the unit to a grounded AC receptacle. **DO NOT ALTER THE AC PLUG!**

L. GROUND LIFT - The terminal labeled GND is connected directly to the chassis and the grounding pin on the supply cord. The terminal labeled LIFT is the amplifier ground and should be connected to the GND terminal whenever possible. If it becomes necessary (ground loops) to lift the ground (disconnect the terminals), be sure the entire system is properly earth grounded.

M. SEQUENCE (SPA-13000 only) - This section is used to connect multiple amplifiers together in order to have them power on one at a time. See page 5 for details.

REAR PANELS (continued)

N. OUTPUT CONNECTORS (BINDING POSTS) - Connection point for the amplifier output. These connectors are to be used for spade lugs, bare wire, or banana plugs (for 3000 and 7500 - 120V models). Spade lugs should not be plated steel as these tend to degrade the sonic integrity of the connection. For stereo or dual mono modes, use the red (+) to black (-) connections for each side. For bridged mono mode, use the red terminals only [Red Ch. A (+) & Red Ch. B (-)].

O. OUTPUT CONNECTORS (1/4" PHONE JACKS - 3000 and 7500 only) - Connection point for the amplifier output. These connectors are used to connect standard 1/4" phone plugs to the amplifier. Tip is + and sleeve is ground.

P. OUTPUT CONNECTORS (SPEAKON™ - 13000 only) - Connection point for the amplifier output. In stereo or dual mono mode, use the outside connectors labeled 'CHA' and 'CH B'. In mono bridge mode, use the center connector, labeled 'MONO BRIDGE'. Four conductor jacks have 1+ & 2+ tied together (+), 1- & 2- tied together (-).

Q-R. DUAL MONO/STEREO AND MONO BRIDGE/STEREO SWITCHES - The following chart identifies switch positions:

<u>MODE:</u>	<u>DM/ST switch</u>	<u>MB/ST switch</u>
Dual Mono:	IN	OUT
Mono Bridge:	IN or OUT	IN
Stereo:	OUT	OUT

(DM/ST: Dual Mono / Stereo)

(MB/ST: Mono Bridge / Stereo)

NOTE:

Do not operate the amplifier in the two channel (stereo) mode with a load impedance of less than 3Ω (2Ω for the 13000) connected to either channel.

Do not operate the amplifier in the mono bridge mode with a load impedance of less than 6Ω (4Ω for the 13000).

S. INPUT CONNECTORS (1/4" PHONE JACKS) - Balanced or unbalanced connection point for incoming signals. These connectors are used to connect 1/4" phone plugs to the amplifier. For balanced connections, Tip is +, ring is -, and sleeve is ground. For unbalanced connections, Tip is + and sleeve is ground.

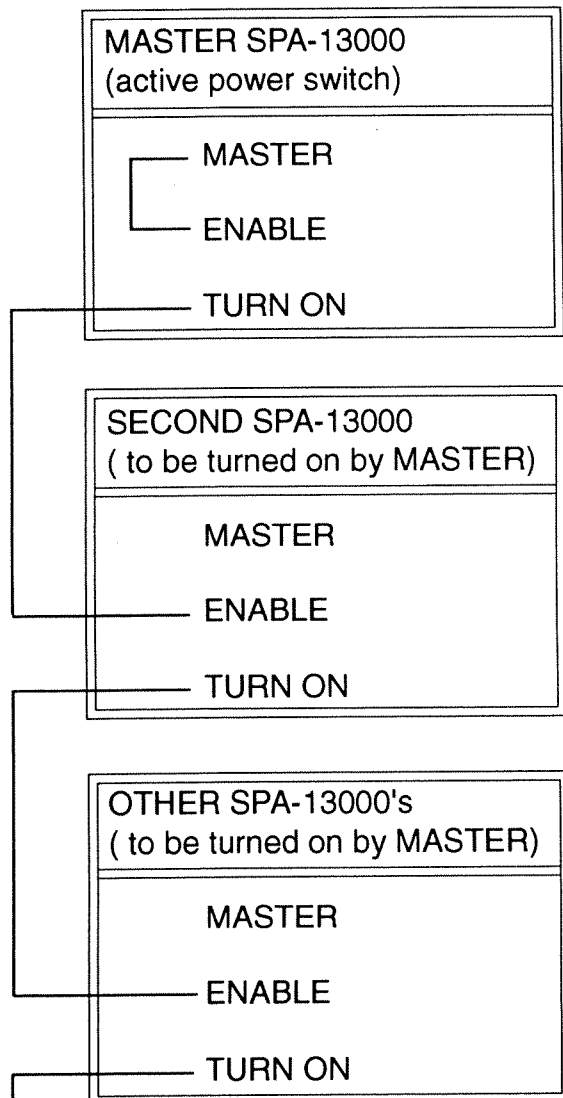
T. INPUT CONNECTORS (XLR JACKS) - Balanced connection point for incoming signals. These connectors are used to connect standard XLR's to the amplifier. Pin 1 is ground, pin 2 is +, and pin 3 is -.

U. INPUT CONNECTORS (BARRIER STRIP - 3000 and 13000 only) - Balanced or unbalanced connection point for incoming signals. This connector should be used to connect bare wire to the amplifier. Positive and negative for each channel are clearly marked on the unit. The ground pin is connected directly to the chassis. For unbalanced signals, connect the (-) terminal to ground.

V. ACCESSORY PORT WITH BYPASS SWITCH (optional) - This port allows for external computer monitoring of signals such as temperature, load status, operating mode and amplifier clipping, as well as optional computer remote control and signal processing functions.

POWER SEQUENCER (13000 only)

The power sequence section has 3 terminals: Master, Enable and Turn on. This feature should be used to turn on multiple SPA-13000's with 1 power switch. First, determine which amplifier will be the "Master" - the only power switch to be active. Connect the amplifiers together the following way:



to ENABLE of next SPA-13000

Leave the Power Switches of all units ON all the time - except the "Master". These other units will turn ON and OFF with the "Master" power switch.

STATUS INDICATORS

	STEREO	DUAL MONO	BRIDGE MONO
MONO BRIDGE / STEREO switch on rear	OUT	OUT	IN
DUAL MONO / STEREO switch on rear	OUT	IN	IN OR OUT
Level A control affects...	CH A	CH A	SUM OF CH A & B
Level B control affects...	CH B	CH B	NONE
Level A delta-comp switch affects...	CH A	CH A	CH A & B
Level B delta-comp switch affects...	CH B	CH B	NONE
Signal at Channel A input affects...	CH A	CH A & B	CH A & B
Signal at Channel B input affects...	CH B	NONE	NONE
Ch A DeltaComp™ OFF, amp not clipping, LED is...	OFF	OFF	OFF
Ch B DeltaComp™ OFF, amp not clipping, LED is...	OFF	OFF	OFF
Ch A DeltaComp™ OFF, amp is clipping, LED is...	RED	RED	RED
Ch B DeltaComp™ OFF, amp is clipping, LED is...	RED	RED	RED
Ch A DeltaComp™ ON, amp not clip, not comp, LED is...	OFF	OFF	OFF
Ch B DeltaComp™ ON, amp not clip, not comp, LED is...	OFF	OFF	OFF
Ch A DeltaComp™ ON, amp is compressing, LED is...	GREEN	GREEN	GREEN
Ch B DeltaComp™ ON, amp is compressing, LED is...	GREEN	GREEN	GREEN
Ch A DeltaComp™ ON, amp is limiting, LED is...	YELLOW	YELLOW	YELLOW
Ch B DeltaComp™ ON, amp is limiting, LED is...	YELLOW	YELLOW	YELLOW

BASIC CONNECTIONS and WIRING

Power and audio signal cables are the most common sources of sound system failure. Well-made and carefully maintained cables are essential to the reliability of the entire system. If long speaker cables are required, make sure the wire is sufficient to transfer all the available amplifier power to the speakers, rather than absorbing power itself. As a rule of thumb, the larger the wire, the better (larger wire has smaller "gauge numbers").

The following chart lists the smallest wires (the highest numbered gauges) recommended for best results. To make it simple, we'll assume you are operating under worst case conditions with 4Ω loads (8Ω operation will improve results with the same wire).

SPEAKER WIRE GAUGE			
LENGTH	4	8	16
100 ft & up (30.5m & up)	10	12	14
50 - 100 ft (15.3 - 30.5m)	12	14	16
25 - 50 ft* (7.6 - 15.25m)	14	16 *	18
10 - 25 ft (3.1 - 7.6m)	26	18	18
up to 10 ft (up to 3.1m)	18	18	18
	4	8	16
SPEAKER IMPEDANCE (Z)			

*Example: The length of the speaker wire required is between 25 and 50 feet (7.6 to 15.3 meters) and the speaker impedance is 8Ω. The minimum recommended speaker wire gauge is 16.

The following table shows equivalents for metric standards:

CROSS REFERENCE TABLE

AWG (gauge)	CROSS SECTION (mm2)
18	0.83
16	1.32
14	2.1
12	3.32
10	5.27

Larger diameter (smaller gauge number) wire is more expensive and heavier than small diameter wire. Rather than running long speaker cables, it is better to locate power amplifiers near speakers and run a line-level signal cable over the long distance to the amplifier. This approach eliminates most of the signal loss due to speaker cable resistance so the speakers are fed all the amplifier's power without the need for heavy cables. This can actually save money in many instances.

Always use stranded wire because it is more flexible and less prone to metal fatigue breakage. Also, if an end is nicked while insulation is being stripped for connection, only 1 or 2 strands will break, not the entire wire.

SPECIFICATIONS

MODEL TYPE	SPA-3000 PR302	SPA-7500 PR303	SPA-13000 PR304
PART NUMBER			
120V	071-0030-000	071-0075-000	071-0130-000
230V Euro.	071-0030-060	071-0075-060	071-0130-060
240V Aust.	071-0030-030	071-0075-030	071-0130-030
230V U.K.	071-0030-040	071-0075-040	071-0130-040
OUTPUT POWER Continuous sine wave output power, both channels driven, +/-0.5dB, 20Hz to 20kHz, THD > 0.1% with rated line voltage			
Stereo (8Ω/ch.)	110W / ch.	300W / ch.	512W / ch.
Stereo (4Ω/ch.)	150W / ch.	375W / ch.	650W / ch.
Dual Mono(8Ω/ch.)	114W / ch.	285W / ch.	510W / ch.
Dual Mono(4Ω/ch.)	150W / ch.	375W / ch.	650W / ch.
Mono Bridge (16Ω)	250W	538W	1000W
Mono Bridge (8Ω)	300W	750W	1300W
Single ch. driven			
8Ω	140W	330W	588W
4Ω	207W	525W	934W
POWER BANDWIDTH (all models)	<10Hz to 40kHz (3dB down from rated power at less than 0.1% THD): 4Ω		
FREQUENCY RESPONSE (all models)	+0, -1 dB, 10Hz to 20kHz @ 4Ω.		
TOTAL HARMONIC DISTORTION 20-20kHz, both channels driven, 4Ω load at rated supply voltage and frequency	Less than 0.05% at 150W	Less than 0.05% at 375W	Less than 0.05% at 650W
TOTAL HARMONIC DISTORTION 20-20kHz, 10W, both channels driven, 4Ω load at rated supply voltage and frequency	Less than 0.10%	Less than 0.10%	Less than 0.10%

SPECIFICATIONS (continued)

MODEL	SPA-3000	SPA-7500	SPA-13000
SMPTE INTERMODULATION DISTORTION 60Hz and 7kHz, mixed 4 to 1, both channels driven, 4Ω, at rated supply voltage and frequency	Less than 0.10% at 150W	Less than 0.10% at 375W	Less than 0.10% at 650W
SLEW RATE bridged mode, 8Ω load	> 17V / μsec.	>27V / μsec.	> 36V / μsec.
DAMPING FACTOR reference to 4Ω, 1kHz	Greater than 100	Greater than 100	Greater than 100
INPUT IMPEDANCE	10kHz	10kHz	10kHz
CHANNEL SEPARATION	-80dB	-80dB	-80dB
SENSITIVITY	0.81V -1.8dBV	0.81V -1.8dBV	0.81V -1.8dBV
SIGNAL TO NOISE RATIO	> -100db ref. 150W@4Ω	> -100dB ref. 375W@4Ω	> -100dB ref. 650W@4Ω
VOLTAGE GAIN	31dB	33dB	37dB
STATUS INDICATORS	Power Protection Mono DeltaComp™	Power Protection Mono DeltaComp™ Temperature	Power Protection Mono DeltaComp™ Temperature
POWER REQUIREMENTS	540W	1100W	1800W
WEIGHT	25 lbs. (11.5 kg)	14 lbs. (6.5 kg)	52 lbs. (23.5 kg)
DIMENSIONS			
Width (body)	23 in. (43 cm)	23 in. (43 cm)	23 in. (43 cm)
Height*	1 rack space	1 rack space	2 rack spaces
Depth	16.3 in (41.3 cm)	16.3 in (41.3 cm)	16.3 in (41.3 cm)

*: 1 rack space = 1.25 in. (3.2 cm)
2 rack spaces = 3.50 in. (6.4 cm)

A product of:
Fender Musical Instruments Corp.
Corona, CA 91720 U.S.A.