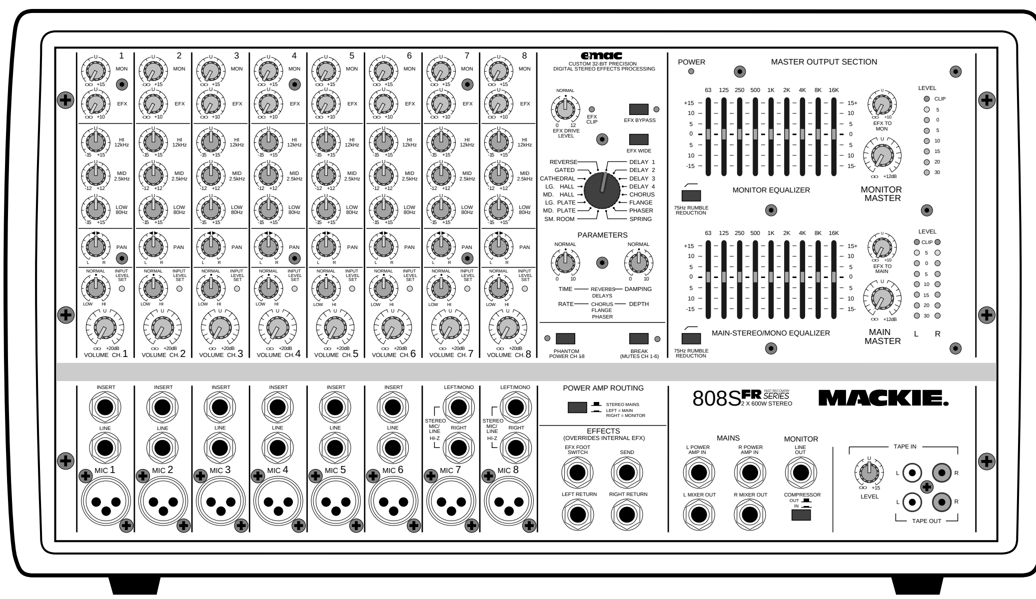
MACKIE.®

PPM series

Professional Powered Mixers:
406M, 408M, 808M, 408S and 808S



SERVICE MANUAL

820-185-00

SERVICE ON THIS EQUIPMENT IS TO BE PERFORMED BY EXPERIENCED REPAIR TECHNICIANS ONLY

CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE

CAUTION *AVIS*

RISK OF ELECTRIC SHOCK
DO NOT OPEN

RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT REMOVE THE COVER (OR BACK) NO USER SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALIFIED PERSONNEL

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE

TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS POLARIZED PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR EVITER LES RISQUES DE CHOC ELECTRIQUE, NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.

AVIS:POUR EVITER LES RISQUES D'INCENDIE OU D'ELECTROCUTION, N'EXPOSEZ PAS CET ARTICLE A LA PLUIE OU A L'HUMIDITE.

POUR PREVENIR LES CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UN PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS LAISSER AUCUNE PARTIE A DECOUVERT.

This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION :Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant las limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le réglement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio energy and, if not installed properly and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.

Le symbole éclair avec point de flèche à l'intérieur d'un triangle équilatéral est utilisé pour alerter l'utilisateur de la présence à l'intérieur du coffret de "voltage dangereux" non isolé d'ampleur suffisante pour constituer un risque d'éléctrocution.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Le point d'exclamation à l'intérieur d'un triangle équilatéral est employé pour alerter les utilisateurs de la présence d'instructions importantes pour le fonctionnement et l'entretien (service) dans le livret d'instruction accompagnant l'appareil.

CONTENTS

INTRODUCTION

SERVICE ON THIS EQUIPMENT IS TO BE PERFORMED BY
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CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE

This manual contains basic service information. It is essential that you have a copy of the user’s manual as this contains the complete operating instructions.

SERVICE TECHNICAL ASSISTANCE

Mackie Designs, Service Technical Assistance, is available 8AM - 5PM PST, Monday through Friday for Authorized Mackie Service Centers, at 1-800-258-6883. Feel free to call with any questions and speak with a carefully-calibrated technician. If one is not available, leave a detailed message and a qualified Mackoid will return your call asap.

DISCLAIMER

Overview

The powered mixer series consists of 5 models: the 406M, 408M, 408S, 808M and 808S. Each consists of five circuit boards: Effects, Amplifier, Mixer, Output and AC power.

This table shows which boards are used in each mixer. Note: Each schematic chapter is labeled with the number of the board it describes. For example, chapter 252 contains schematics and pcb layouts for circuit board number 550-252-00, chapter 193 is for circuit board 550-193-00.

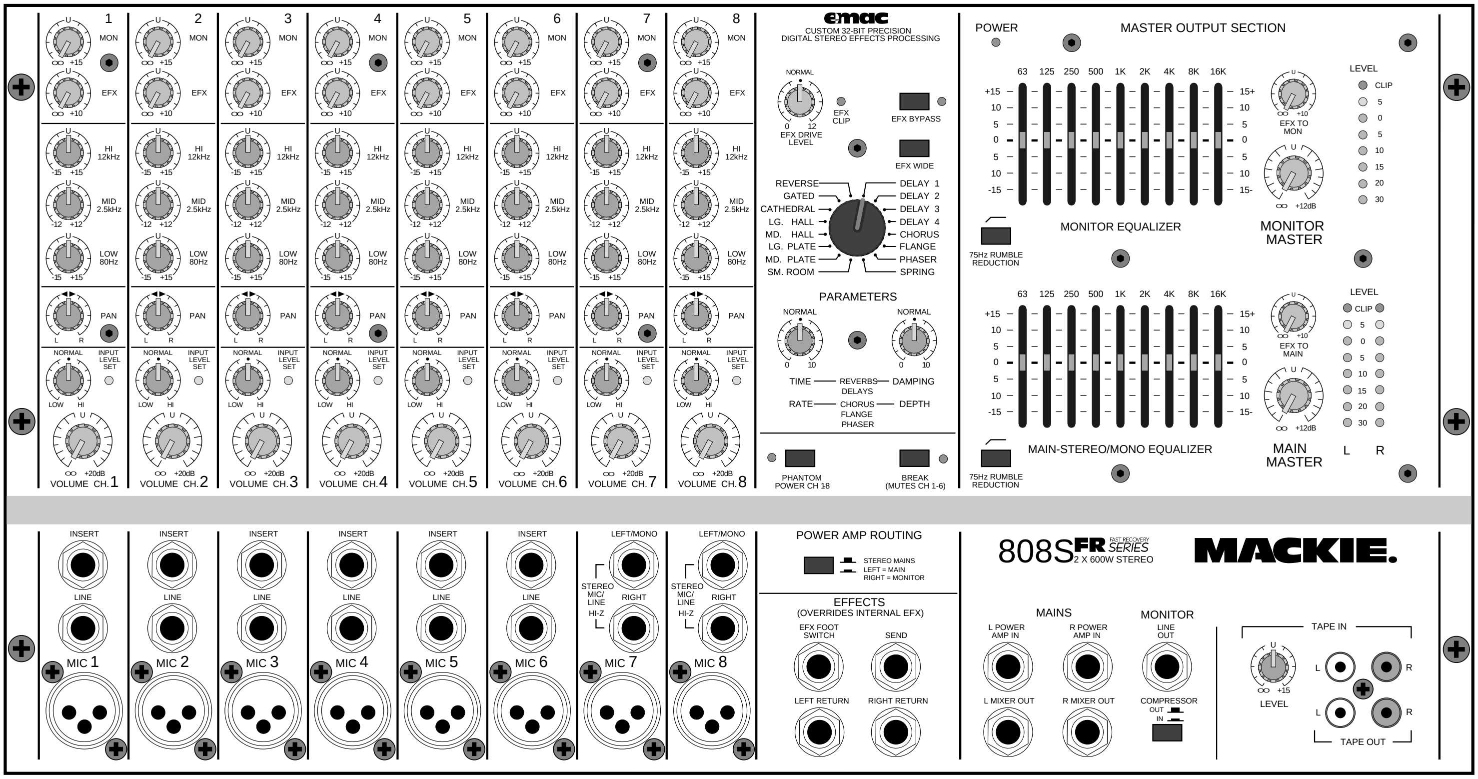
MODEL	EFFECTS	AMPLIFIER	MIXER	OUTPUT	AC POWER
406M	192	204	206	224	225
408M	192	204	205	224	225
408S	192	204	194	224	225
808M	192	193	205	224	252
808S	192	193	194	224	252

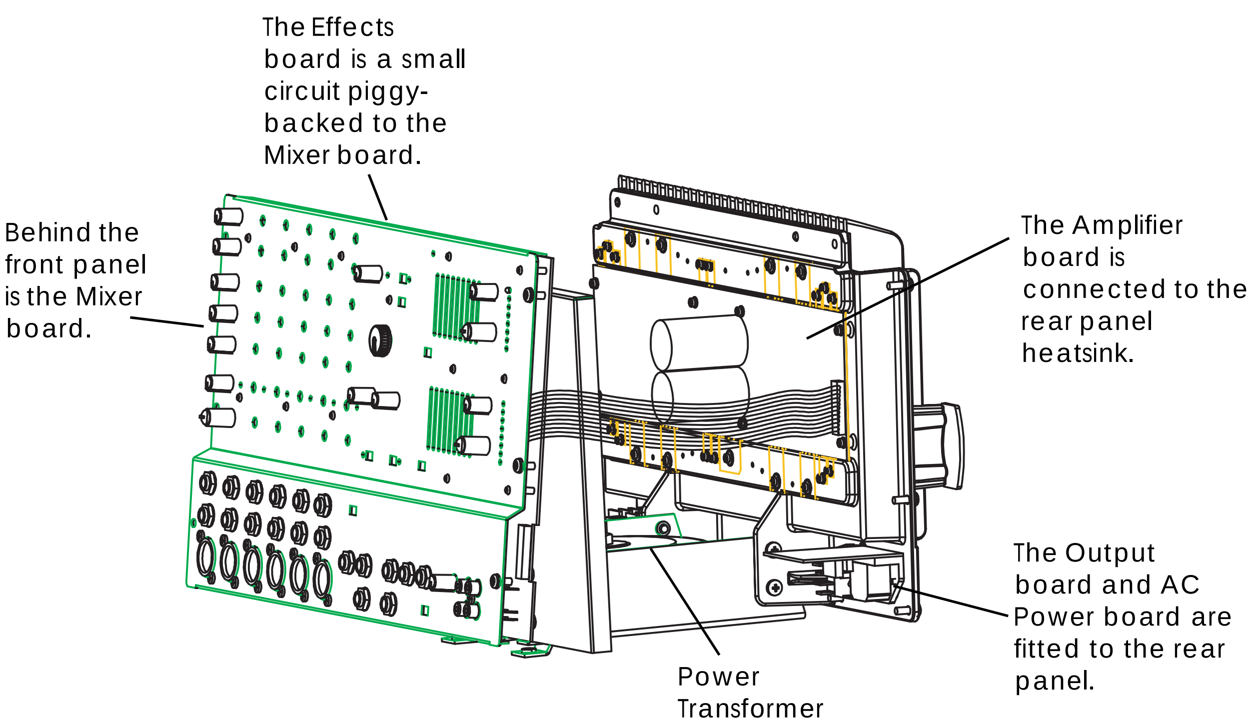
Two types of power transformer are used, one for the 406M, 408M and 408S and one for the 808M and 808S.

All models use the same effects board and output board. There are two different amplifier boards (800 watts and 400 watts), three different mixer boards (8 channel Mono, 8 channel Stereo and six channel Mono) and two types of AC power board (one for the 800 watt models, one for 400 watts).

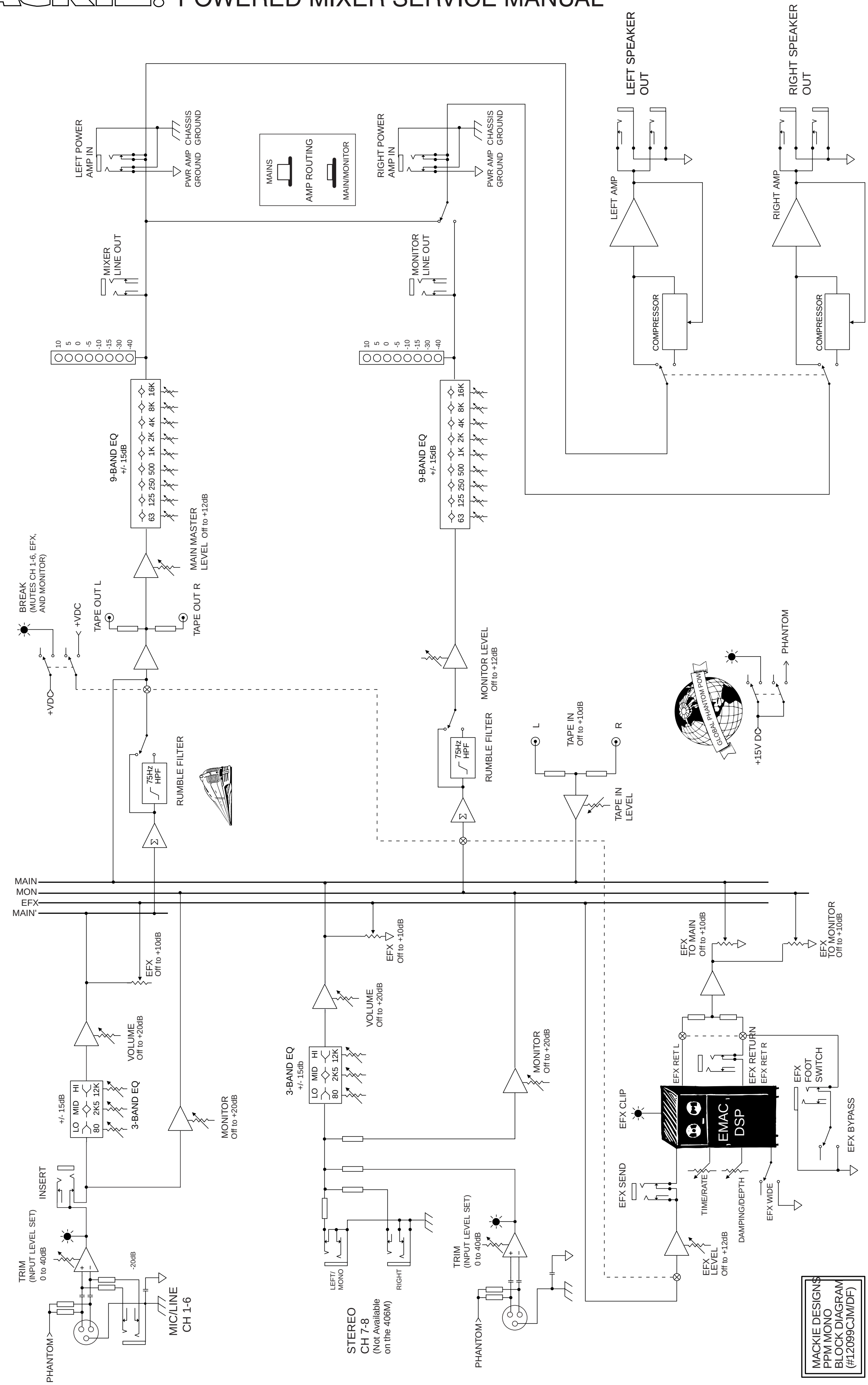
All models use the same cabinet, feet, handles, power switch, IEC power jack.

808S front panel

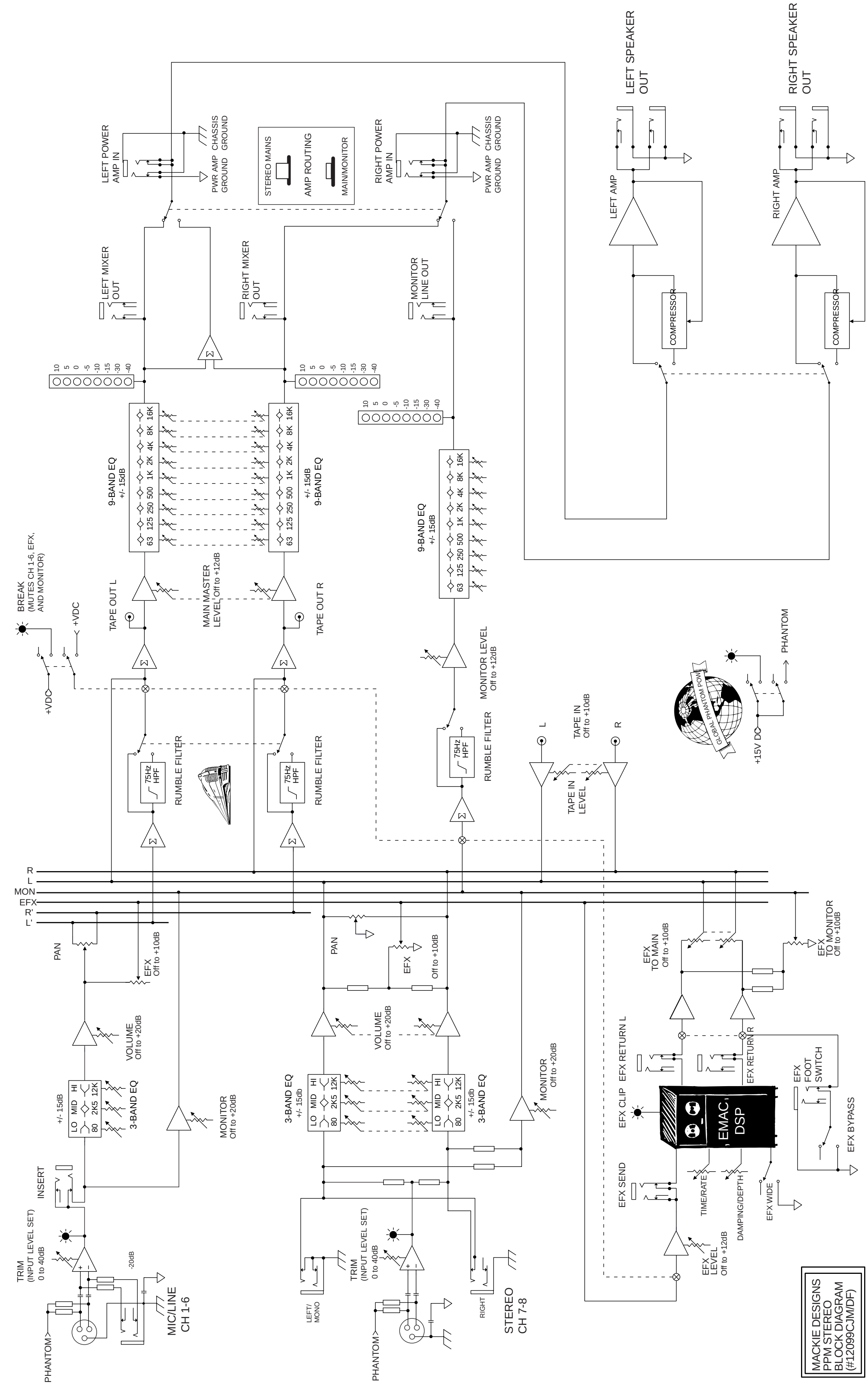




Block diagram (Mono models: 406M, 408M, 808M)



Block diagram (Stereo models: 408S, 808S)



Specifications

Frequency Response

Mic Input to Main Mixer Output (Trim at 0 dB):
- +0, –1 dB, 32Hz to 20kHz
- +0, –3 dB, 16Hz to 80kHz

Mic Input to Power Amp Output @ rated power output:
- +0, –1 dB, 32Hz to 20kHz
- +0, –3 dB, 16Hz to 55kHz

Distortion, THD and SMPTE IMD; 20Hz to 20kHz

Mic Input to Main Mixer Output:
- < 0.005% @ +4 dBu output

Mic Input to Power Amp Output:
- < 0.15%, 250mW to rated power

Common Mode Rejection Ration (CMRR)

60 dB @ 1kHz, Trim @ 0 dB

Noise, 20Hz to 20kHz (150Ω source impedance)

Equivalent Input Noise (EIN):
- –127 dBu

Residual Output Noise:
- Main Mixer, Monitor, & Effects outputs with Channel & Mas-ter levels off: –95 dBu

Main Mixer Output Noise:
- Master @ nominal (–10 dB), all channels off: –92 dBu
- Master & 1 input channel @ nominal (–10 dB & –20 dB), Trim @ 0 dB: –85 dB

Crosstalk @ 1kHz

Adjacent Inputs or Input to Output:	–90 dB
Fader Off	–90 dB
Break Switch Mute	–80 dB

Input Level Trim Control Range

0 to –40 dB

Phantom Power

+15V DC

Equalization

Rumble Reduction:
- 75Hz, –18 dB/octave

Channel EQ:

High	±15 dB @ 12kHz
Mid	±12 dB @ 2.5kHz
Low	±15 dB @ 80Hz

Graphic EQ (9 bands):
- Q = 1.414, ISO octave centers
- ±15 dB @ 63, 125, 250, 500 1k, 2k, 4k, 8k, 16k Hz

Main Mixer Section Rated Output

Main Mixer, Monitor, & Effects:	+4 dBu
Maximum Main Mixer Section Output:	+20 dBu

Maximum Input Levels

Mic Input:	
Trim @ 0 dB (HI)	–20 dBu
Trim @ –40 dB (LOW)	+20 dBu,
Line Input:	
Trim @ 0 dB (HI)	0 dBu
Trim @ –40 dB (LOW)	+40 dBu
Insert Input:	+20 dBu
Stereo Line Input:	+20 dBu
Tape Input:	+20 dBu
Effects Return:	+20 dBu
Power Amp In:	+22 dBu

Input Sensitivity

Minimum Input Level to produce +4 dBu @ Main Mixer Output

Mic Input:	–68 dBu
Insert Input:	–28 dBu
Line Input:	–48 dBu
Stereo Line Input:	–28 dBu
Tape Input:	–18 dBu
Effects Return:	–18 dBu

Maximum Voltage Gain

Mic Input to	
Insert Output:	40 dB
Tape Output:	60 dB
Main Mixer Output:	72 dB
Line Input to	
Insert Output:	20 dB
Tape Output:	20 dB
Main Mixer Output:	52 dB
Stereo Line Input to	
Tape Output:	20 dB
Main Mixer Output:	32 dB
Tape Input to	
Tape Output:	10 dB
Main Mixer Output:	22 dB
Effects Return to	
Main Mixer Output:	22 dB
Monitor Output:	22 dB

Input Impedance

Mic Input:	3kΩ, bal
Insert Input:	10kΩ, unbal
Line Input:	40kΩ, bal
Stereo Line Input:	10kΩ, unbal
Tape Input:	10kΩ, unbal
Effect Return:	10kΩ, unbal
Power Amp In:	10kΩ, unbal

Output Impedance

Main Mixer Output:	150Ω
Insert Output:	150Ω
Tape Output:	150Ω
Monitor Output:	150Ω
Effects Send:	150Ω
Power Amp Out:	0.032Ω @ 1kHz

Digital Effects

Resolution:	16-bit, 2-channel
Sample Rate:	31.25kHz
Bandwidth:	15.6kHz

VU Meters

Main and Monitor
- 8 segments: Clip, +5, 0, –5, –10, –15, –20, –30

Maximum Power at 1% THD, midband, both channels driven

406M, 408M, 408S

250 watts per channel into 2Ω
200 watts per channel into 4Ω
125 watts per channel into 8Ω

808M, 808S

600 watts per channel into 2Ω
450 watts per channel into 4Ω
300 watts per channel into 8Ω

Continuous Sine Wave Average Output Power, both channels driven (rated power)

406M, 408M, 408S

180 watts per channel into 4Ω from 40Hz to 20kHz, with no more than 0.15% THD
110 watts per channel into 8Ω from 40Hz to 20kHz, with no more than 0.10% THD

808M, 808S

340 watts per channel into 4Ω from 40Hz to 20kHz, with no more than 0.15% THD
240 watts per channel into 8Ω from 40Hz to 20kHz, with no more than 0.10% THD

Power Bandwidth

< 10Hz to 30kHz (+0, –1 dB) @ rated power into 4Ω

Frequency Response

< 10Hz to 30kHz (+0, –1 dB)
< 10Hz to 55kHz (+0, –3 dB)

Distortion

SMPTE IMD:	< 0.10% @ 8Ω
	< 0.15% @ 4Ω

Signal-to-Noise Ratio

> 105 dB below rated power, 8Ω

Channel Separation

> 75 dB @ 1kHz

Damping Factor

> 250 @ 1kHz

Amp Input Impedance

10kΩ unbal, 20kΩ bal

Input Sensitivity

406M, 408M, 408S
1.35 volts (+4.8 dBu) for rated power into 4Ω

808M, 808S
1.76 volts (+7.1 dBu) for rated power into 4Ω

Gain (Amp In to Speaker Out)

26.4 dB (21V/V)

Maximum Input Level

9.75 volts (+22 dBu)

Rise Time

406M, 408M, 408S	< 5µs
808M, 808S	< 6.2µs

Slew Rate

406M, 408M, 408S	> 40V/µs
808M, 808S	> 50V/µs

Load Angle

8(±jx) time independent at 8Ω
4(1±jx) time dependent at 4Ω

High Frequency Overload and Latching:

No latch up at any frequency or level.

High Frequency Stability:

Unconditionally stable, driving any reactive or capacitive load

Turn On Delay:

3 seconds

AC Power Requirements

United States:	120VAC, 60Hz
Europe:	240VAC, 50Hz
Japan:	100VAC, 50/60Hz
Korea:	220VAC, 60Hz

(Capable of operation from 75% to 110% of rated line voltage)

Physical

Height:	11.7 inches (297mm)
Width:	20.5 inches (521mm)
Overall Depth:	13 inches (330mm)

Weight:
406M, 408M, 408S
32 pounds (14.5 kg)
808M, 808S
36 pounds (16.3 kg)

Disclaimer

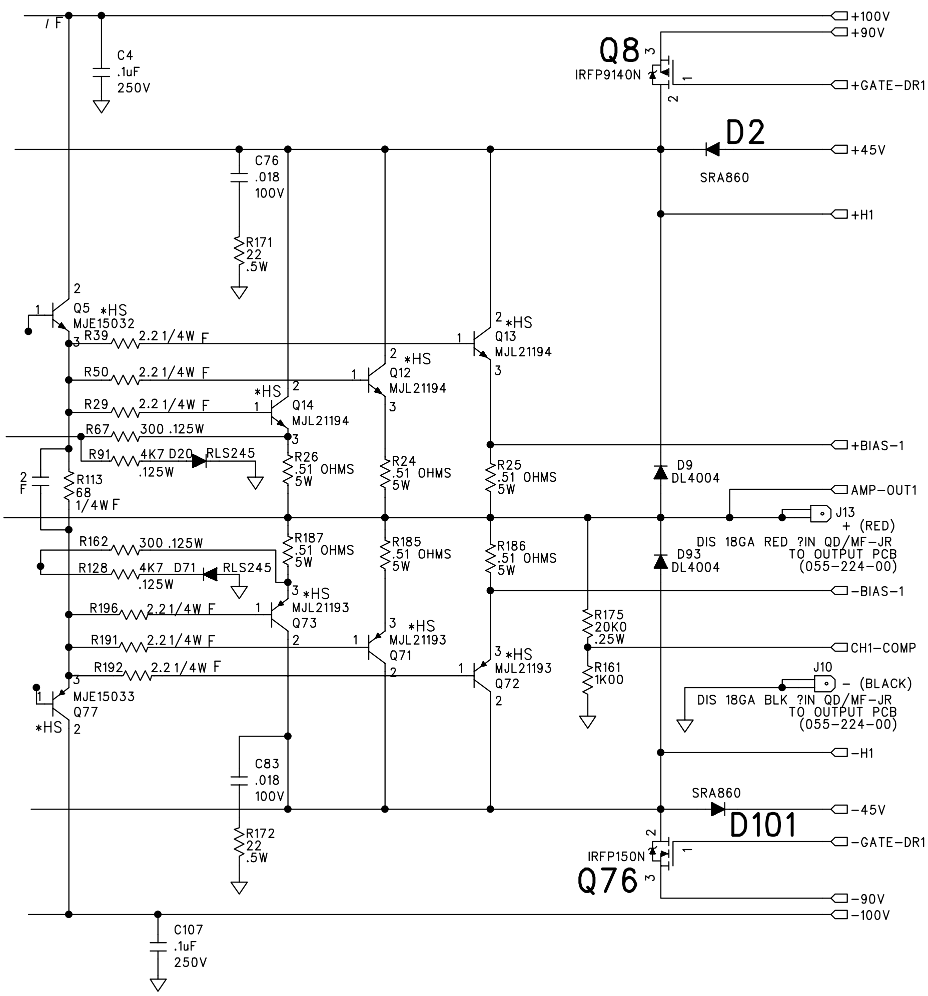
Since we are always striving to make our products better by incorporating new and improved materials, components, and manufacturing methods, we reserve the right to change these specifications at any time without notice.

808M/808S Power Amplifier Theory of Operation

The power amplifier used in the 800 series powered mixer is typically referred to as having a high efficiency output stage. It uses a Class-H topology.

When signal levels are low, one can pull power from the +/-45V supplies. Only when signal levels are high is current pulled from the +/-90V supplies. For a given output power, the output stage delivers a certain amount of output current to the load. If that current is pulled from the +45V supply rather than the +90V supply, the overall power pulled from the supply half as much. Part of this power is delivered to the load, and the rest is given off as heat in the output stage. If we pull from the +45V rather than the +90V supply in this example, there will naturally be less dissipation in the output stage, giving the output stage higher efficiency.

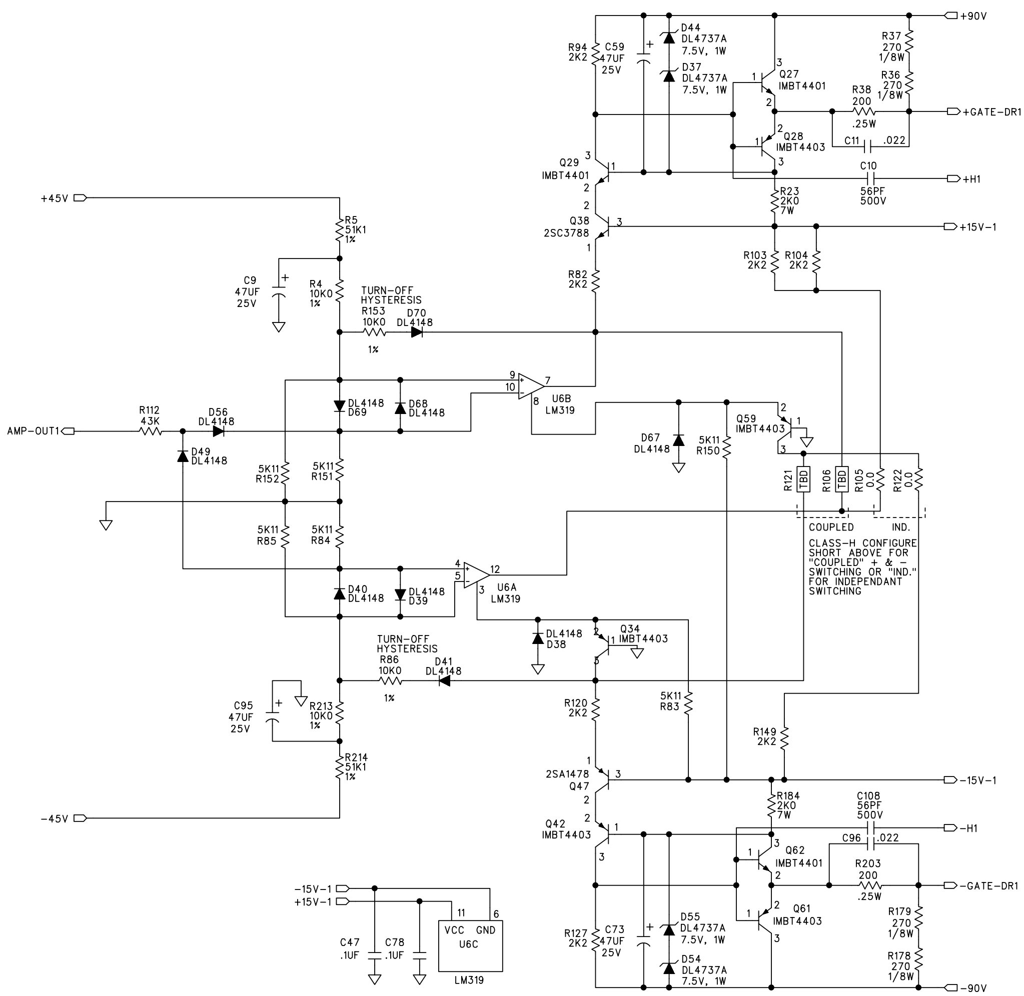
A class-H design **switches** the supply for the output transistors from the lower to the upper rail. When the peak output voltage gets close to the lower rail voltage, the rail quickly switches to the higher supply. In a class-G design (such as the SRM-450 powered speaker) as the peak amplitude of the output waveform goes above the lower supply rail, the output stage supply rail increases slightly to follow the signal. The supply **linearly** follows the output waveform, staying just slightly higher than the output signal.



Referring to schematic 193 channel 1, for the characteristics of the class-H topology. At low signal levels, power is supplied to the output stage (Q12 - Q14 and Q71 - Q73) from the 45V supplies through schottky diodes D2 and D101.

On positive going signals, when the output waveform is within about 10V of the +45V rail, the gate of Q8 is driven negative by about 15V from the +90V rail. This in turn quickly pulls the drain of Q8 and the collector's of Q12-Q14 to the +90V rail.
Action on the bottom half (Q76) operates identically.

The full schematics are shown in chapter 193, pages 193-1, 193-2, 193-3 and 193-5



Referring to the channel-1 switching circuit shown here. There are two pairs of jumper resistors. The first pair (R121, R106) allow both class-H switches to operate in tandem. When operating in tandem, if the positive switch actuates, the negative switch also does, and visa versa. By switching both halves at the same time, the charge that the switches imparts to the output line tends to cancel out, reducing high frequency distortion some. It was found that the distortion improvement was minimal, so we made both the positive and negative switches act totally independent of each other. The independent function is activated by stuffing the shorting jumpers at R105 and R122.

The positive FET's gate is driven by a little level shifting amplifier comprised of Q27, Q28, Q29 and Q38. The gate is driven through R38/C11 from the emitter follower stage Q27/Q28. This follower can swing as much as 15V below the +90V rail, limited by the local 15V supply consisting of D44, D37 and C59. Bias for this supply is provided by R23 and the +15V supply.

When the output signal voltage is low, pin-7 of U6 is open, and there is no voltage drop across R82. As signal level increases, the comparator turns on, and pin-7 is pulled to within one diode drop of ground (via pin -8 and D67). Around 14V is dropped across R82. This voltage drop causes a current to flow through the emitter of Q38, this current is also present on the connector and is coupled to the cascode stage above (Q29). Eventually this same current is available at the collector of Q29 and to R94. Since R94 and R82 are both the same values, 14V also appears across R94. This drives the Base of Q28 low and it's emitter follows. The emitter then ultimately feeds the gate of the switch. This topology allows the FET to be switched on quite fast (on the order of 100nS or less, or at a rate of greater than 450V/µS). The switch is actually slowed down by C10. The output current from Q29 is constant, so C10 breaking against this constant current allows the switch to "slowly" ramp up. We say "slowly" as the switch still transitions from +45V to +90V in less than 1µS (greater than 45V/µS). We slow the switch down to improve the high frequency distortion figures on the amplifier.

The negative half works identically with the following exceptions: When the negative half is turned on pin-12 of U6 is pulled close to ground. This drops around 15V across R103 and

The full schematics are shown in chapter 193, pages 193-1, 193-2, 193-3 and 193-5

R104 (Both 2.2K ohms) allowing around 1.4mA to flow into pin-12. This current flows out of pin-3 and approximately half of it flows through D38 / R83 and the other half to the emitter of common base amplifier Q34. The current flowing in the collector of Q34, pulls the high side of R120 to ground potential, allowing again around 14V to be dropped across R120. The current through R120 also appears at R127, as in the operation of the positive half.

What determines where things switch? On the positive half, the +45V supply is first filtered (R5/C9) and then divided down in voltage (R5, R4, R152 and R151 through D69). This divided-down supply reference is present on the-non inverting input of U6 (pin-9). With no output signal, the inverting input is always kept one diode drop below the non-inverting input, as D69 is biased via R151. With the non-inverting input higher than inverting, pin-7 is high, and the FET is still switched off. When the output swings more and more positive, the divided-down signal is presented to U6-10 via R112, D56 and R151. When Pin-10 goes above Pin-9, the switch turns-on. D69 and D68 are present to limit the voltage range to the comparator inputs to +/-0.7V: This increases the switching speed.

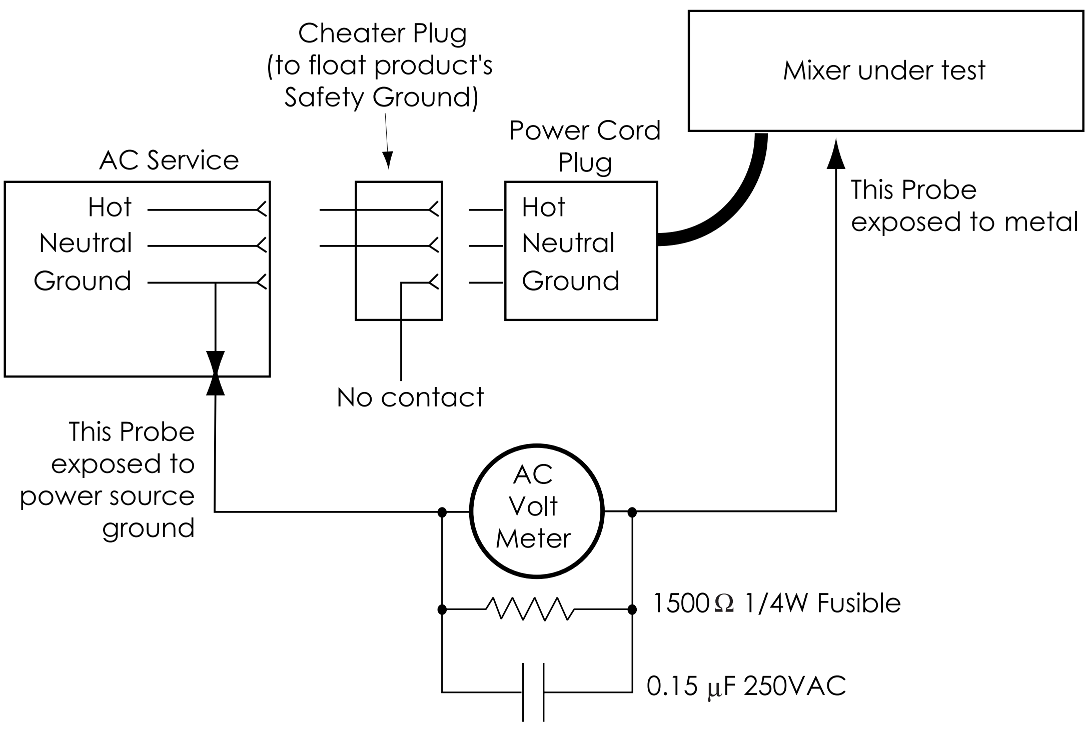
R153 and D70 are the positive switch's turn-off hysteresis network. When the switch is finally activated (about 10V below the 45V rail), D70 is forward biased and R153 drives U6-9 slightly lower. The result is that when the output signal eventually starts to decrease in level, the switch will actually switch off at an even lower level (around 12V below the +45V supply). This hysteresis is important so that the switch only turns on and off once as it follows the output signal. Picture a switch without this hysteresis: When the output was hovering around 10V below +45V the switch could continually toggle between +90V and +45V. This can cause all sorts of thermal, reliability and distortion problems.

The action of the negative detector is identical to the positive half described above.

Safety test

You must perform the following leakage test before returning the mixer to your customer. Take every safety precaution to protect yourself while doing this test.

1. Make a small loading RC circuit as shown in the diagram below, and connect the AC volt meter between the AC power source ground and any exposed metal on the unit under test.
2. Connect the mixer under test to an AC power source using a ground-lift adaptor, leaving the mixer's safety ground floating. Turn the mixer on.
3. The meter reading should be less than 750mVAC (note: this is equivalent to 0.5mA of leakage current).
4. Flip the plug over in the receptical so the hot and neutral are swapped. Verify that the reading is still less then 750mVAC.
5. If either reading is greater than 750mVAC, then you must investigate and repair the mixer before returning it to your customer.



WARNING: FUSIBLE RESISTORS MUST ONLY BE REPLACED BY THE EXACT REPLACEMENT PARTS. ALWAYS CHECK THE PARTS LISTS TO VERIFY WHICH RESISTORS ARE THE FUSIBLE TYPE BEFORE REPLACING ANY RESISTORS IN THIS AMPLIFIER.

Amplifier tests for the 808M and 808S

Power Consumption

With no signal and no load, the power consumption from the AC mains should be:

Variac	Power consumption
Up to 40vac	< 5W
Up to 60vac	< 20W
Up to 120vac	< 50W

DC supplies

Set the Variac up to 120vac (US models)

Measure the DC supplies: (see page 193-5 for the pcb layout)

+96 to +98vdc	@pcb test point +100v
–96 to –98vdc	@pcb test point -100v
+86 to +89vdc	@pcb test point +90v
–86 to –89vdc	@pcb test point -90v
+42 to +44vdc	@pcb test point +45v
–42 to –44vdc	@pcb test point -45v
+14.5 to +16.5vdc	U1 Pin 3
–14.5 to –16.5vdc	U2 Pin 3
+4.75 to +5.25vdc	U7 Pins 2 & 3

Bias Adjustment

The bias adjustment is best done when the amplifier has been warmed up. Run it with a music program into a dummy load until the heatsink is warm to the touch.

The actual adjustment is done with no signal and no load:

Channel 1

Measure the DC voltage between J23 & J24

Adjust R7 for 18 to 20mvdc,

Seal the pot with a drop of nail paint

Channel 2

Measure the DC voltage between J21 & J22

Adjust R6 for 18 to 20mvdc

Seal the pot with a drop of nail paint

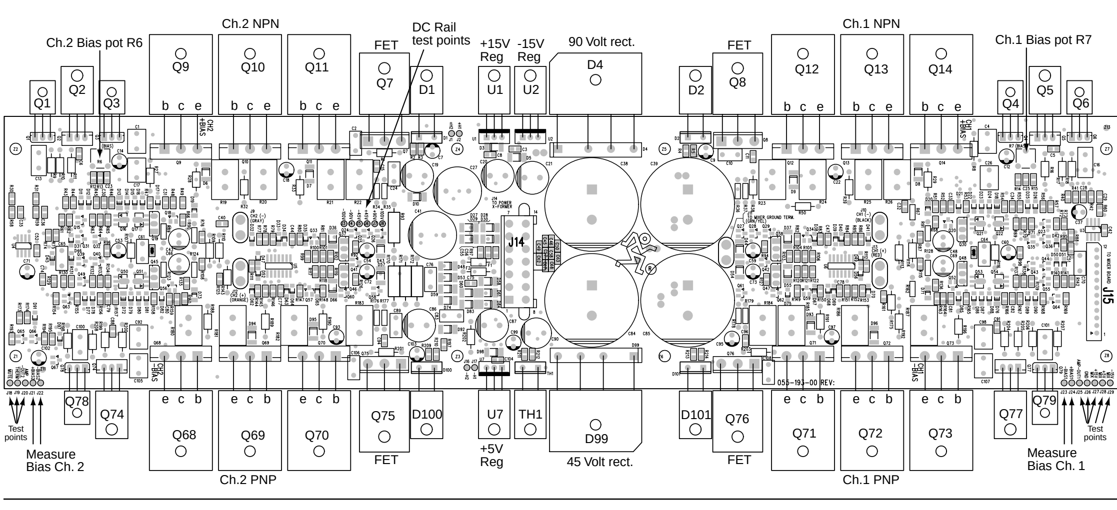
Power Tests

Continuous Sine Wave Average Output Power, both channels driven (rated power):

340 watts per channel into 4Ω from 40Hz to 20kHz, with no more than 0.15% THD

240 watts per channel into 8Ω from 40Hz to 20kHz, with no more than 0.10% THD

Check for symmetrical clipping and correct operation of the DC rail switching.



This is the 193 amplifier circuit board, see chapter 193 for more details

Amplifier tests for the 406M/408M/408S

Power Consumption

With no signal and no load, the power consumption from the AC mains should be:

Variac	Power consumption
Up to 40vac	< 3W
Up to 60vac	< 8W
Up to 120vac	< 40W

DC supplies

Set the Variac up to 120vac (US models)

Measure the DC supplies: (see page 204-4 for the pcb layout)

+69 to +71vdc	Q5 Pin 2
–69 to –71vdc	Q50 Pin 2
+59 to +61vdc	Q10 Pin 2
–59 to –61vdc	Q47 Pin 2
+14 to +15.5vdc	U1 Pin 3
–14 to –15.5vdc	U2 Pin 3
+4.75 to +5.25vdc	Across U5 Pins 2 & 3

Bias Adjustment

The bias adjustment is best done when the amplifier has been warmed up. Run it with a music program into a dummy load until the heatsink is warm to the touch.

The actual adjustment is done with no signal and no load:

Channel 1

Measure the DC voltage between the two pins of J7

Adjust R2 for 19 to 21mvdc,

Seal the pot with a drop of nail paint

Channel 2

Measure the DC voltage between the two pins of J6

Adjust R1 for 19 to 21mvdc

Seal the pot with a drop of nail paint

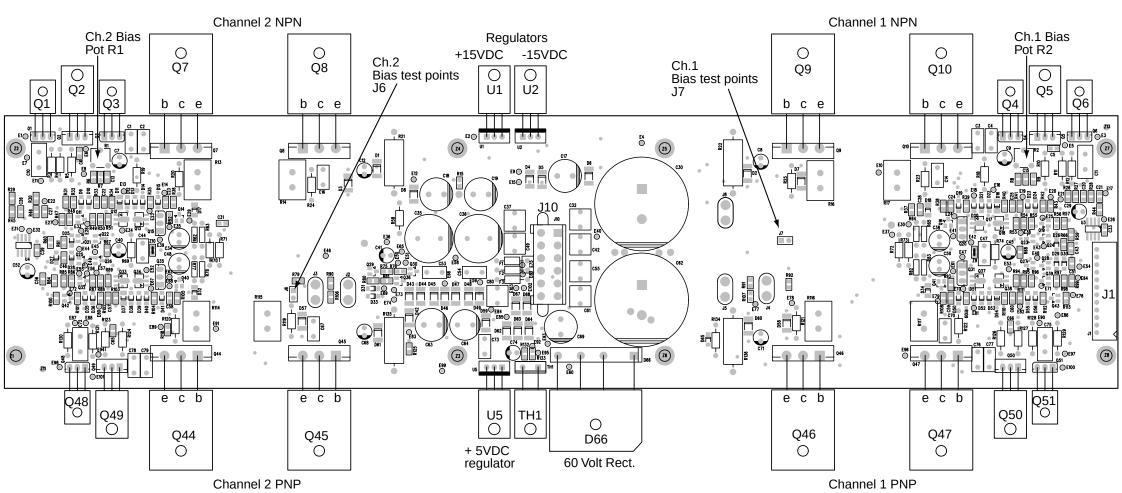
Power Tests

Continuous Sine Wave Average Output Power, both channels driven (rated power):

180 watts per channel into 4Ω from 40Hz to 20kHz, with no more than 0.15% THD

110 watts per channel into 8Ω from 40Hz to 20kHz, with no more than 0.10% THD

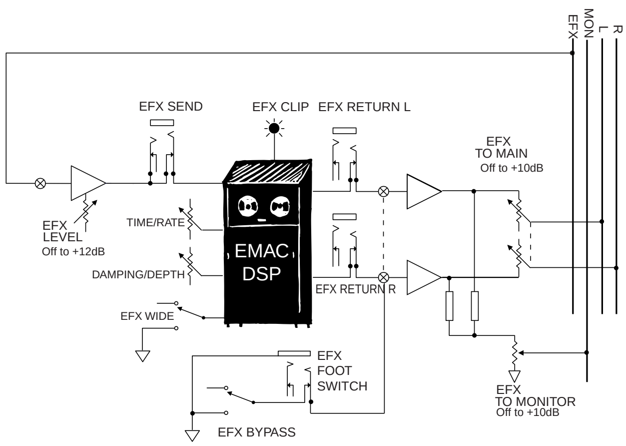
Check for symmetrical clipping.



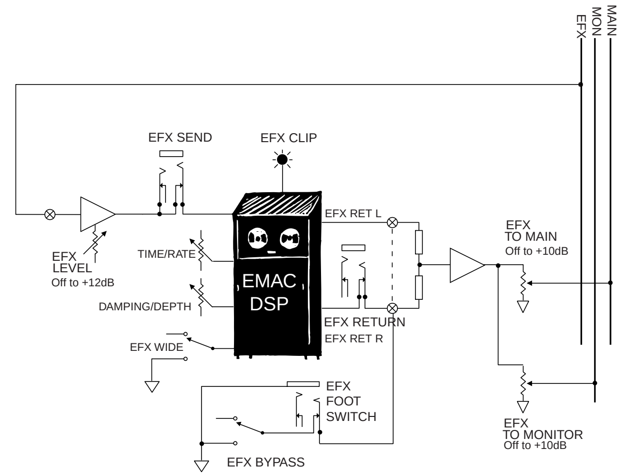
This is the 204 amplifier circuit board, see chapter 204 for more details

EFX signal flow

BLOCK DIAGRAMS



Stereo mixers

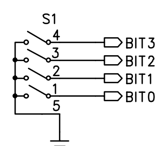


Mono mixers

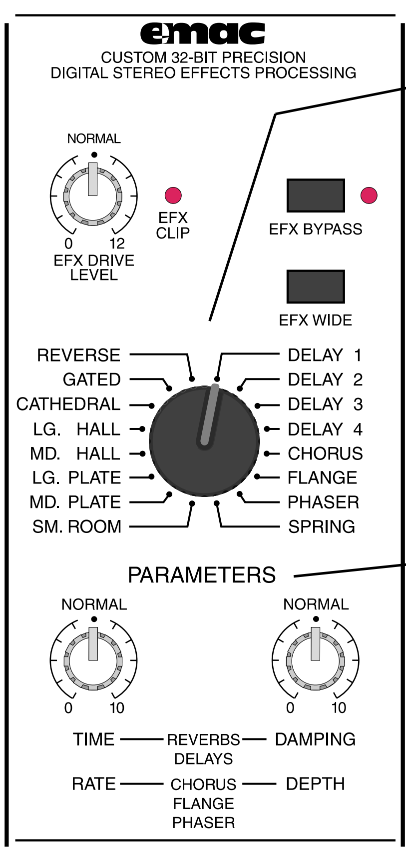
FRONT PANEL CONTROLS AND ADJUSTMENTS

NOTE: the following schematic pieces are all from the stereo mixer circuit board chapter 194, page 9, and show what happens before and after the EFX board. See also EFX circuit board chapter 192.

EFX CONTROLS (ON THE MIXER BOARD)



Rotation of the encoder S1 will vary the level of BIT 0 through to BIT 3. This will select which DSP algorithm is in effect on the DSP IC U2.



Pot = R429
LED= D10

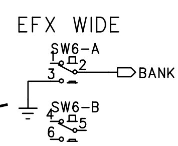
SW= SW5
LED= D11

SW= SW6

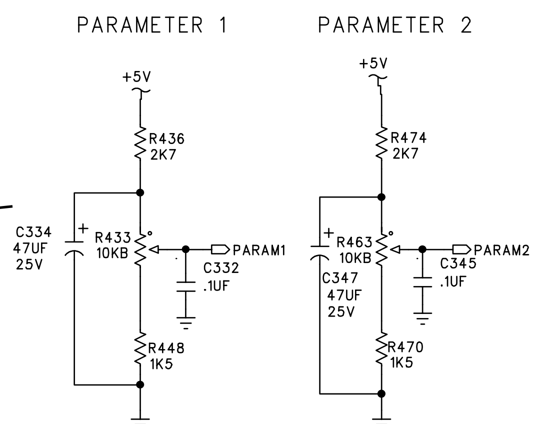
Rotary Encoder = S1

Pot = R433

Pot = R463

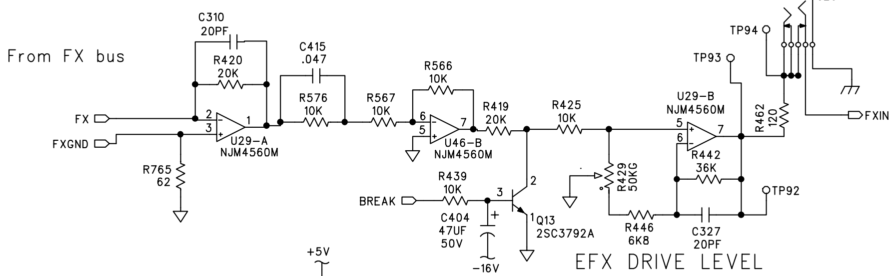


The state of BANK also affects DSP IC U2.

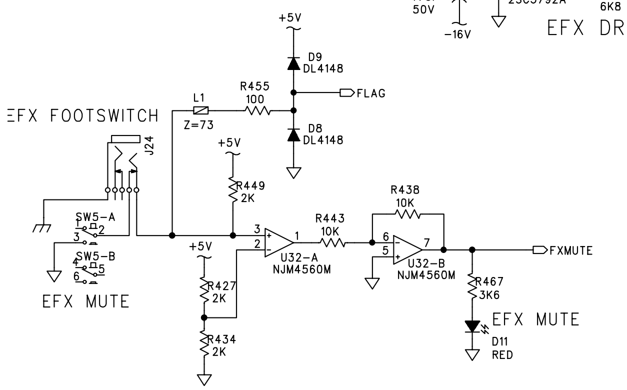


The adjustment of these two pots directly affects the CODEC IC U3. Note that Parameter 1 = POT 1, Parameter 2 = POT 2 at connector J1.

SIGNALS TO THE EFX BOARD

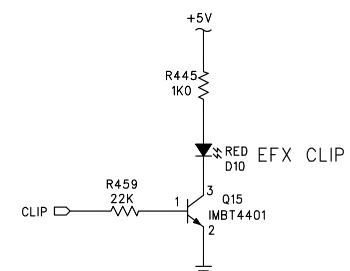


This section of the schematic shows the single analog signal going into the EFX circuit board. It also shows the EFX Drive Level pot R429.

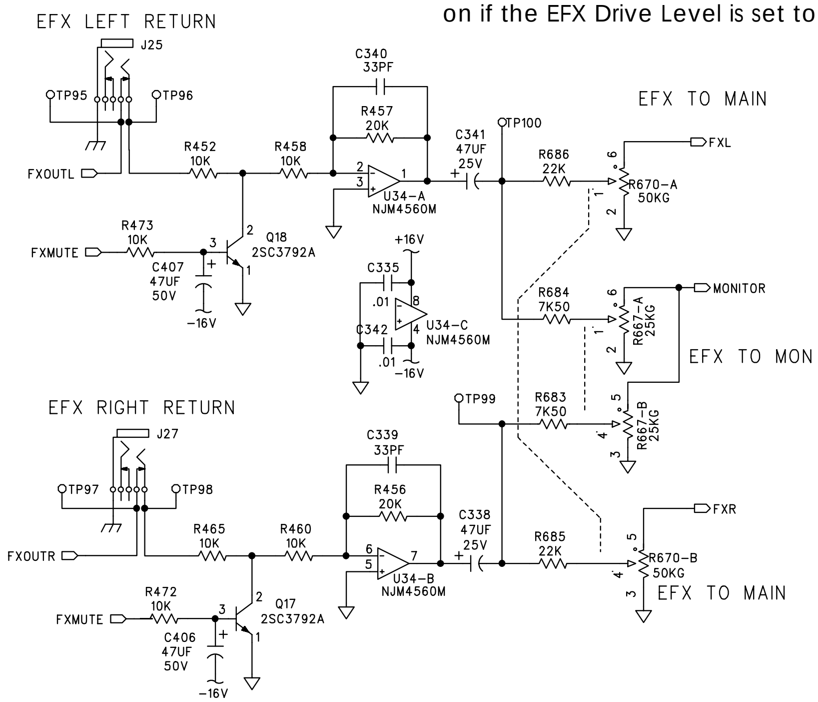


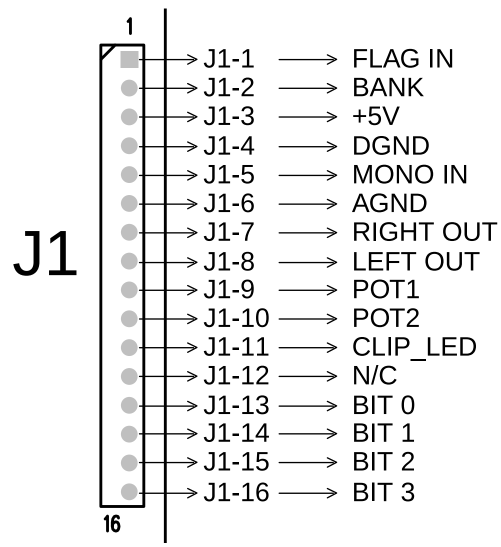
This shows the effect of the footswitch and EFX Mute (BYPASS) switch SW5. The FLAG signal goes off to the EFX board DSP IC U2. The FXMUTE signal will mute the EFX analog outputs, see below.

SIGNALS FROM THE EFX BOARD



This shows the two analog output signals coming from the EFX board, ready to take their place in society. The CLIP light will turn on if the EFX Drive Level is set too high.

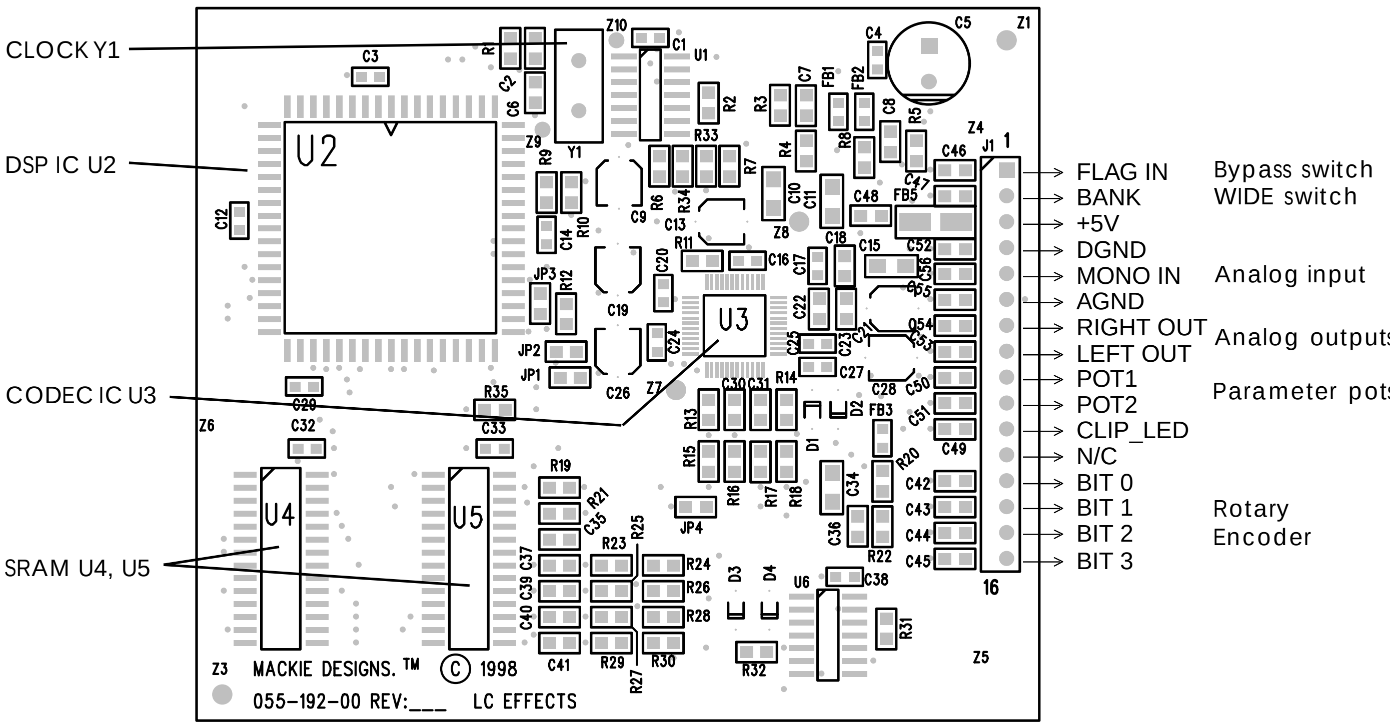




This shows the signals present on the EFX board connector J1.

EFX overview

The EFX circuit board schematics and pcb layouts are shown in chapter 192.
The circuit is made from the following main elements: Clock, CODEC, DSP and SRAM



INTEGRATED CIRCUITS

PART NO.	DESCRIPTION	VALUE	REF
080-088-00	IC, ADSP-2163		U2
315-017-00	CRYSTAL, 24.576 MHZ	24.576	Y1
325-027-03	IC, SMD, DUAL D F/F	74HC74A	U6
325-071-03	IC, HEX, INV, SMD	74HCU04	U1
329-042-03	IC, AD1819 QFP	AD1819	U3
329-047-03	IC, 32KX8 SRAM 20nS	7C256-20	U4-5

EFX OVERVIEW

The CODEC receives a mono analog input from the mixer circuit board and converts it into a digital signal. The CODEC also receives analog control signals from the two Parameter pots, converts this to digital and sends a combined digital signal to the DSP.

The DSP and the two SRAM ICs, form a powerful DSP system. The DSP receives the digital data from the CODEC as well as the direct control signals from the rotary encoder and the EFX WIDE switch. The DSP programing selects and performs the appropriate DSP function on the signal data, and sends it back to the CODEC.

The CODEC converts the incoming digital signals to two analog outputs. For DELAY and PHASER effects, these are identical signals. For other effect selections, these have subtle differences. For stereo mixers, these are sent to the main left and right mix, and also summed to the monitor mix. For mono mixers, they are summed and sent to the main and monitor mixes.

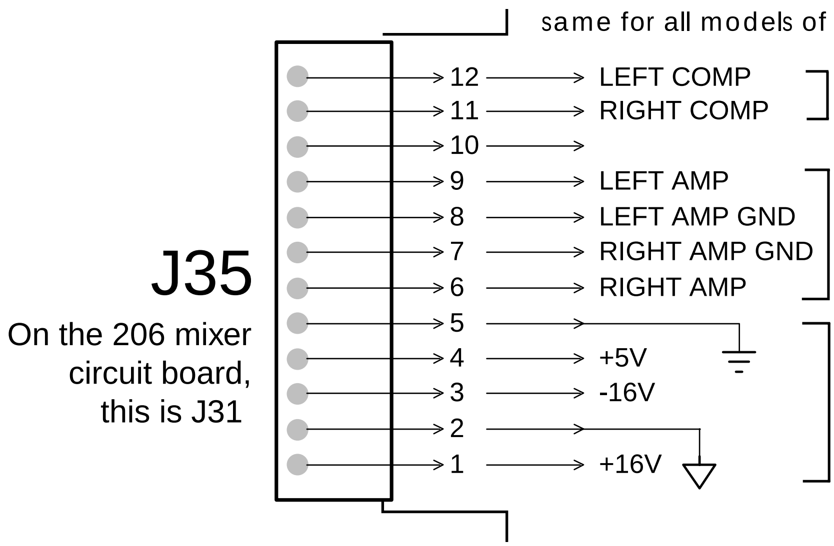
Connectors

MIXER TO EFX BOARD

The details for the mixer to EFX board connector are shown on the previous page.

MIXER TO AMPLIFIER BOARD

The connection between the mixer and amplifier boards is the same for all models of powered mixers.



These are samples of the amplifier output, used to drive the compression circuit on the mixer board.

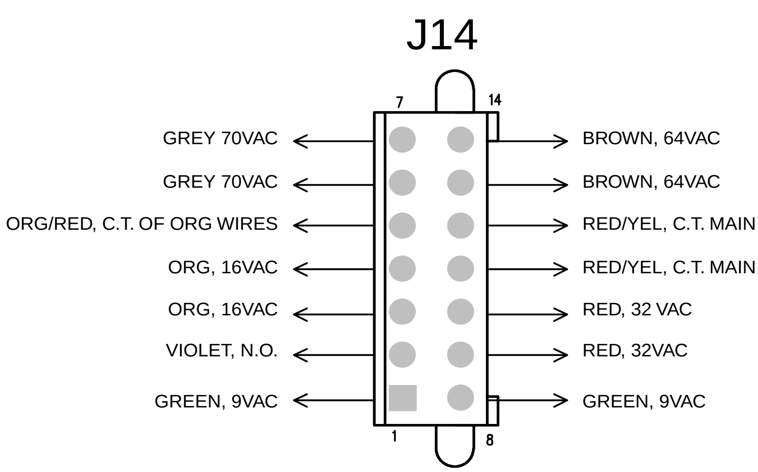
These are the line level signals coming out of the mixer into the amplifier.

The power supplies and grounds come from the amplifier circuit board.

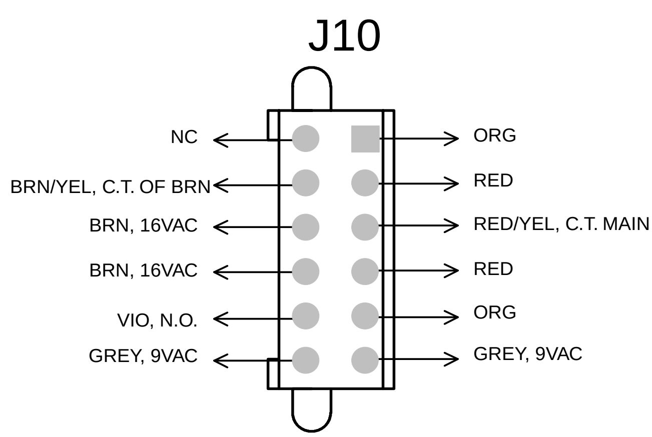
Note: there is a separate ground wire which connects the bottom of each mixer circuit board to the amplfier circuit board.

AMPLIFIER BOARD CONNECTIONS

The power transformer secondary wires connect directly to the amplifier boards, using J14 for the 193 circuit board, and J10 for the 204 circuit board. The AC voltages are rectified and the resulting DC voltages supply the amplifier DC rails and the mixer circuit board.



193 amplfier board



204 amplfier board

Single spade connections on the amp boards are used to send the speaker-level outputs to the output board 224, and there is a ground connector to the mixer board.

OUTPUT BOARD

The amplifier channel outputs connect to J3 on the output board.