



Quick Start

Basic MA 4 operation is straightforward:

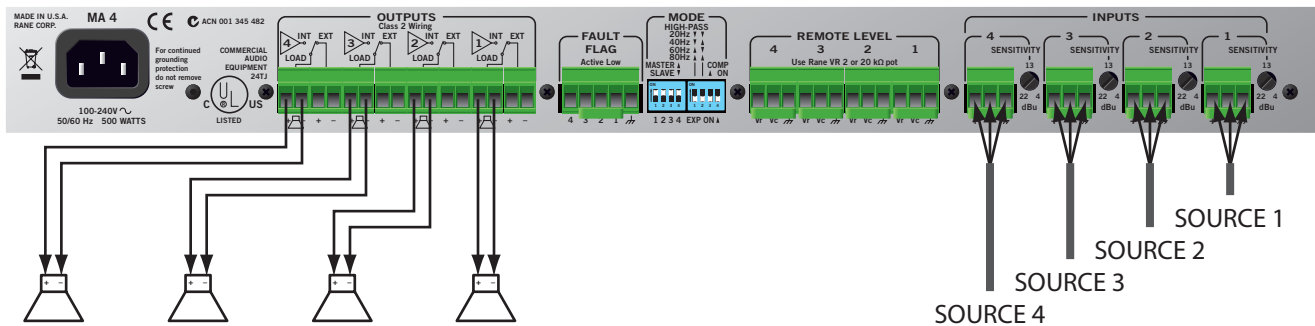
1. The universal switching power supply works with 100 to 240 VAC, 50/60 Hz.
2. Make sure the front panel power switch is *off* (the unit consumes 5 watts in standby mode).
3. Connect balanced inputs (rear panel).
4. Set SENSITIVITY controls to +22 (see why on page Manual-2) (rear panel).
5. Turn the Downward EXPander ON (rear panel).
6. Set COMPressor to 10 dB (rear panel).
7. Select the appropriate HIGH PASS filter frequency (20, 40, 60 or 80 Hz on rear panel).
8. Connect speaker loads (rear panel).
9. Make sure you have adequate ventilation around the unit – see Safety Instructions.
10. Turn ON the front panel power switch. You're good to go!

Metering shows the status of the amplifier at a glance (see page Manual-3). Headroom (with any load), dynamics control, Fault status and Load status are indicated for each channel.

Extra Credit

For remote turn-on, fault reporting and back-up amplifier operations, and remote level control wiring, see page Manual-4.

For FAULT FLAG operation (applications and reported faults), see page Manual-3.

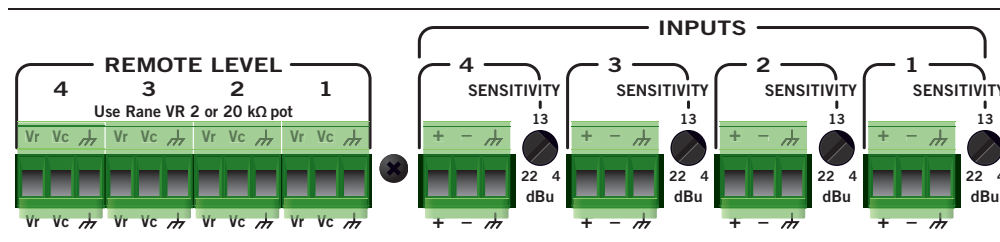
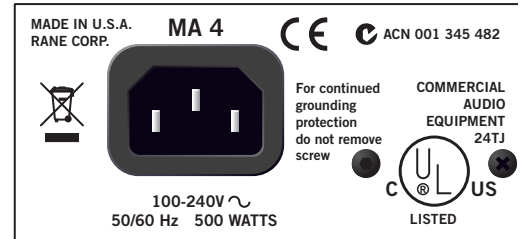


Installation

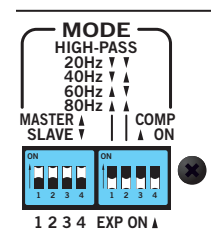
- No rear mounting hardware required.
- Allow adequate ventilation to keep ambient temperature around the amplifier below 104°F (40°C).
- Fan cooled with inset intake on left side and inset exhaust on right side (no filter)
- Amplifier heat load in Btu/hr at 100/240 VAC
 - 10.2 / 13.3 Btu/hr All amplifiers in standby
 - 112.3 / 95.5 Btu/hr All amplifiers on, no signal
 - 167 / 139 Btu/hr All amplifiers driven, pink noise, 12 watts avg. 4:1 crest
 - *Note: 1 watt x 3.413 = 1 Btu/hr.*

Description & Operation

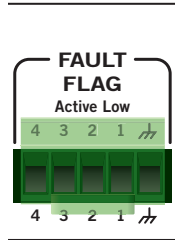
- Each channel delivers **100 watts of power** into a 4 *or* 8Ω load (constant power).
 - Average load impedance is estimated, then used to set the limiter to confine the maximum average power to 100 watts.
- Universal voltage**, power-factor-corrected power supply (see figure on data sheet).
 - Switch-mode power supply operates 100 to 240 VAC, 50 Hz or 60 Hz.
 - Under- and over-voltage protection with inrush current management.
 - The power supply features an IEC appliance inlet.
 - Must be connected to a grounded mains socket-outlet.
- Class D amplifiers** operate at up to 85% efficiency.
 - Amplifiers operate in floating Bridged configuration.
 - Channels are **not bridgeable**.
 - Balanced Inputs accept +22 dBu maximum.
- Rear panel **SENSITIVITY controls** allow continuous adjustment from +22 dBu to +4 dBu.
 - Integrated Limiter prevents clipping regardless of input level and sensitivity setting with input levels up to +22 dBu.
 - The best dynamic range is achieved when all stages in a system clip at the same time. If the signal processing in front of the amplifier clips at +22 dBu, and the amplifier sensitivity is set so that it clips at +4 dBu, you lose 18 dB of headroom.



- REMOTE DC LEVEL control inputs** are provided for each channel.
 - Audio taper attenuation with external linear pot (0 dB to -80 dB, -16 dB at center position).
 - Clickless mute with switch (use SPST switch; connect Vc to GND to mute).
 - Euroblock connector with strain relief (Vref, Vcontrol, GND).
 - One pot may control all four channels by daisy-chaining the Vc of the used port to the other three ports.
- The **Load-dependent Limiter** eliminates voltage and current clipping, ensuring signal integrity and uninterrupted service.
 - The peak signal detector for the Limiter is oversampled to insure accuracy at any frequency.
 - Instantaneous attack and 3 dB per second decay.
- Average load impedance is estimated and used to determine the **Limiter threshold** setting.
 - The front panel Load indicator (see metering) indicates the load status.
 - The normal impedance range is 2 to 16 Ω. (green Load indicator *on*).
 - Average load impedance is estimated over 180 ms and requires a minimum of 3.3 watts **averaged over 180 ms**.
- A **soft-knee COMPressor** is enabled (*down*) or disabled (*up*) for all channels using the rear panel dipswitch.
 - The rms threshold is 10 dB below the Limiter threshold.
 - Allows full uncompressed operation of typical program material while reducing continuous sine wave power.
 - Soft knee span is 10 dB; Ratio is 3:1; Attack is 1.5 seconds; Decay is 3 dB per second.
 - If the internal amplifier temperature goes above 65° C, the compressor is automatically set to the 10 dB setting until the temperature drops below 55° C. At normal operating temperatures, the threshold setting follows the dipswitch setting.
- Downward EXPander** reduces noise in the absence of signal.
 - The expander is enabled (*down*) or disabled (*up*) for all channels using the rear panel dipswitch.
 - Threshold is -70 dBFS; Ratio is 3:1; Attack time is 50 ms; Gain reduction 10 dB per second.
- 20, 40, 60 or 80 Hz HIGH-PASS filters** are selected using the rear panel dipswitch.
 - Setting affects all channels.
 - Filters are 12 dB per octave, Butterworth alignment.

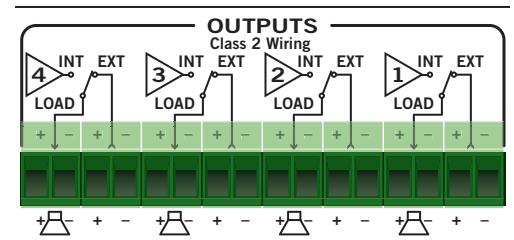


- **Individual FAULT FLAG ports** are provided for each channel.
 - When a fault is detected on power up, the channel or channels affected are not enabled, and the appropriate front panel fault indicators are lit. A detected fault is re-tested every 10 seconds.
 - When a channel develops a fault while operating, the channel shuts down and the output relay is turned OFF. A detected fault is re-tested every 10 seconds.
 - Possible faults include: supply under-voltage, over-voltage, voltage imbalance, output short to ground, output short to supply, output short to output, clock not running, over safe temperature.
 - Channels set to Master, drive the fault flag high when no fault is present. Passive pull down pulls the fault flag low when a fault occurs or power is lost. Slave channels read the status of the fault flag (see Master/Slave below).
 - The fault flag uses 5 volt logic with high-side active drive and passive pull down. No fault = +5V. Fault = 0V.

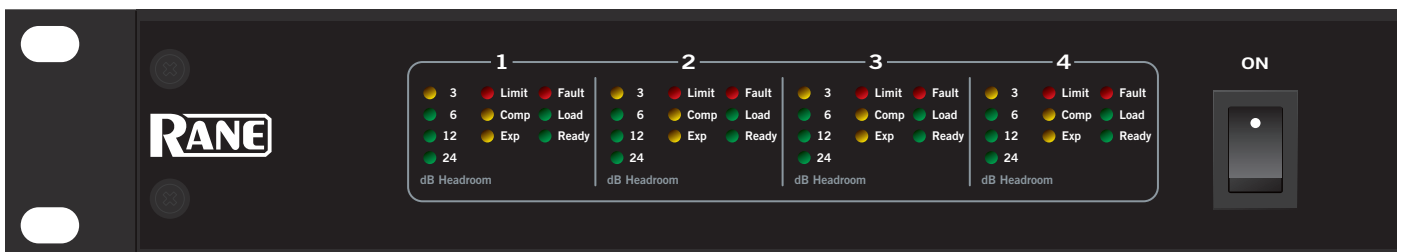


- Each channel is set for **MASTER (up) or SLAVE (down) operation** using the rear panel dipswitch.
 - Master channels write fault flag status.
 - Slave channels read fault flag status.
 - The Master setting is used for remote fault reporting and/or automatic redundancy switching control.
 - The Slave setting is used for individual channel remote power sequencing or automatic redundancy switching.

- Internal **automatic redundancy switching** is provided (see page Manual-4).
 - The primary amplifier channel is set to Master. The backup amplifier channel is set to Slave. The Master fault flag is wired to the Slave fault flag. If two different MA 4 amplifiers are involved (recommended), also wire the fault flag grounds together. Drive Master and Slave audio inputs from the same source, and set the SENSITIVITY controls the same. Master and Slave front panel power switches must be ON.
 - When a fault is detected on a Master amplifier channel, that channel is shut down, the output relay is switched to off, internally connecting the load to the EXTERNAL amplifier input. The front panel fault indicator is then lit.
 - The Slave channel remains in low-power standby (Ready indicator flashing) until a fault is detected (fault flag no longer driven high by the Master channel). When a fault is detected, the Slave channel performs a self test, switches to run mode, and closes the output relay (takes about 500 ms). The output of the Slave channel is connected to the EXTERNAL amplifier input on the Master channel.



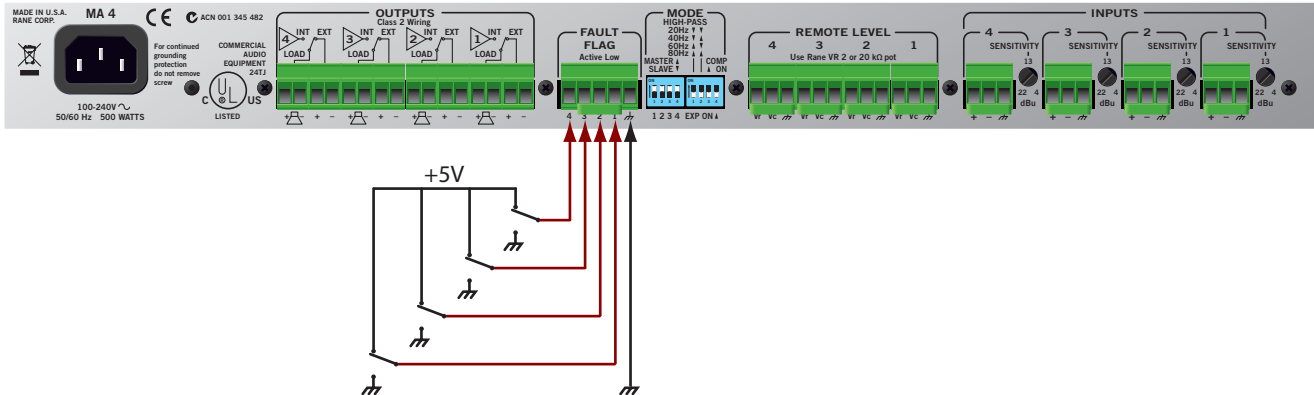
- **Comprehensive front panel metering** is included for each channel:
 - Headroom meters are four-segment. The peak signal level is compared to the limit threshold and the difference in dB is displayed as remaining headroom. The limiter threshold is adjusted to account for the average load impedance, resulting in load compensated headroom indication.
 - Red Limiter, yellow Compressor and yellow Expander indicators light when the associated dynamics control is active.
 - A red Fault indicator lights when a fault is detected
 - The green Load indicator is *off* when impedance is above 16 Ω , *on* when impedance is between 2 and 16 Ω and *flashing* when the impedance is below 2 Ω .
 - The green Ready indicator is *off* when the power switch is off, *flashing* when the power switch is on and the unit is in standby (Slave channel with high fault flag) and *on* when the channel is active.



Advanced Applications

Remote Turn-on

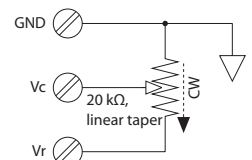
To operate an amplifier channel in low power standby with remote turn-on, set its rear panel switch to SLAVE. External +5 volts connected to the FAULT FLAG holds the amplifier in standby. Floating the FAULT FLAG or connecting it to ground turns the channel on.



Fault Reporting

To have an amplifier channel report a fault to a control system or back up amplifier, set it to Master. The Fault Flag is held high (+5 volts) during normal operation and goes low (passive pull down) when a fault occurs. For details on Fault Flag operation, see page Manual-3.

Remote Level Control inputs are provided for each channel. The Rane VR 2 or any other linear potentiometer 10k to 100k Ω may be connected to these inputs (diagram at right).



SLAVE
MA 4

