

CIRCUIT DESCRIPTION

This section is included to assist the service technician in understanding the operation of the Model 250M Stereo Power Amplifier. The technical data describes the basic operating principles of the Model 250M. The following circuit description will be based on the left channel only. The right channel operates identically.

A. POWER AMPLIFIER CIRCUIT

The input stage of the Power Amplifier circuit, Figure 2, is a unity gain, complementary feedback pair, (Q518 and Q519). The output of this stage is coupled through C502 and R506 to the differential amplifier (Q501, Q502), which drives an inverter (Q503) whose collector load is a current source Q504. The inverter is coupled to complementary pre-drivers (Q507, Q508). The outputs of the pre-drivers are applied to their respective drivers (Q510, Q511) which are coupled to their respective power transistors (Q802, Q804 – Q803, Q805).

Output current limiting is accomplished through a current-sensing network. Excessive current levels are sensed by resistors R531 and R532. Voltages developed across these resistors are applied to the current-sensing and level-shifting transistors Q516 and Q517.

When excessive current levels are detected, Q516 and Q517 turn on, turning on transistors Q505 and Q506. These transistors clamp the maximum drive signal to Q507 and Q508 on excessive output current peaks, thus limiting peak output current to a safe level.

Feedback for the amplifier is developed at the junction of R531 and R532. The feedback is applied across two loops. Feedback applied to R520 and C509 completes the driver-power output loop. Feedback applied to R519 and C508 completes the loop for the entire Power Amplifier circuit, and sets the voltage gain to 21v/v.

B. METER RANGE CIRCUIT

VU Meter M1 is connected to a full-wave diode bridge CR401 through CR404 with series resistor R405 supplied for proper damping the meter

movement. Meter calibration potentiometer R1 with resistors R401 through R404 comprise a three-position meter-range pad in increments of 10 dB.

C. RECTIFIER CIRCUIT

Eighty-six volts ac is applied to the full-wave bridge CR601, CR602, CR603, and CR604, which develops the +58.5 and -58.5 volt supply for the Power Amplifier Circuit. Resistors R601 and R602 serve to bleed the power supply after turn off.

D. TIME-DELAY RELAY CIRCUIT

The output of the Power Amplifier is applied to the wipers of relay K301 on the Relay Board, Figure 2. Relay K301 energizes after a minimum delay of two seconds after turn on. Power for Q301, Q302, Q303 and K301 is supplied by CR305 and CR306. The length of the delay is a factor of the time constant of R306, R309, and C302. This delay at turn-on is to prevent any transient surges from reaching the output terminals. Additionally, resistors R302 and R305 sample the audio output signals. Should a constant dc level more than +4.5 volts, or a high amplitude signal less than 10 Hz be present, Q301 will turn on, shorting the base of Q303 to ground. Q302 begins to discharge and K301 de-energizes. If a constant dc level more than -4.5 volts is present, the voltage drop across R304 bucks the voltage present at the base of Q303 and K301 de-energizes. The output from K301 is applied to the loudspeaker terminals.

TROUBLE ANALYSIS

The following partial list of possible malfunctions and causes should aid in situations where troubles may be difficult to isolate. Any field service problems that arise will be covered through service bulletins (supplementary to this manual) that will be issued to all service stations. We assume that normal trouble-shooting techniques, such as point-to-point signal tracing and oscilloscope analysis, will be used to isolate malfunctions.

NOTE: Performance Verification Tests are necessary following any repair.