



The AM-1A transmitter is a 1 kW solid-state AM transmitter designed for continuous operation in the 522 kHz to 1705 kHz broadcast band (refer to Figure 1-1). The AM-500A transmitter is a 500 Watt solid-state stereo AM transmitter designed for continuous operation in the 522 kHz to 1705 kHz broadcast band. The transmitters consist of modular components assembled in two individual units. The exciter/control unit chassis (ECU) contains: 1) the exciter circuit board, 2) the controller circuit board, 3) the stereo circuit board, and 4) the controller switch and display circuit board. The output network chassis contains: 1) power amplifier module, 2) power supply module, 3) bandpass filter assembly, 4) directional coupler circuit board, 5) lightning protection circuit board, and 6) lightning detection circuit board. Specific transmitter features include:

1. Optional built-in C-QUAM™ AM stereo circuitry.
2. A high efficiency Class E solid-state RF power amplifier module.
3. A high efficiency switching power supply.
4. A CMOS digital controller with extensive VSWR detection and foldback circuitry which reduces carrier interruptions caused by weather disturbances.

1.2.1 Exciter/Controller Unit

The transmitter exciter/control unit (ECU) is a modular assembly containing plug-in stereo, exciter, and controller circuit boards. In addition to the circuit boards, the ECU is equipped with forward and reflected power meters to provide transmitter output power status indications.

The ECU exciter circuit board is a modular plug-in exciter assembly. Instrumentation amplifiers provide balanced left and right channel transformerless audio inputs. The exciter carrier frequency is established by a digital frequency synthesizer. The synthesizer is a phase-locked-loop circuit which provides extremely accurate and reliable carrier frequency operation. A PWM (pulse-width-modulation) circuit is used to generate an RF drive signal for application to a modulator circuit board in an RF power module. If a stereo circuit board failure is encountered or when the stereo circuit board is removed from the ECU chassis, the exciter circuitry is designed to automatically configure to monophonic operation.

All transmitter control operations are directed by the ECU controller circuit board. The controller circuit board consists of CMOS logic control and monitoring circuitry. The circuitry is designed to interface to all popular remote control systems.

The transmitter power is controlled by a power control circuit. The circuit allows the transmitter to be operated at five power levels. A power trim circuit allows the transmitter output power to be adjusted to a precise level. An antenna interlock circuit is provided to prevent the transmitter from operating into an incorrect antenna. A reflected power detection circuit operates in association with the power control circuit to foldback the transmitter power during high VSWR conditions. In addition to the reflected power detector, a lightning detector circuit is provided to mute the transmitter when high voltage is present at the transmitter output during a lightning storm.

The output network chassis contains: 1) a bandpass filter, 2) an RF power module, 3) a power supply circuit board, 4) a lightning detection circuit board, 5) a lightning protection circuit board, and 6) a

directional coupler assembly.

1. Bandpass Filter

The bandpass filter is provided to attenuate all harmonic frequencies to FCC, DOC, and CCIR levels.

2. RF Power Module

Each transmitter is equipped with a single RF power module. The power module is a modular plug-in assembly containing two RF power amplifier circuit boards and one modulator circuit board. The AM-1A power module will produce 1100 watts of RF power. The AM-500A power module will produce 550 watts of RF power.

The RF power module is designed using Class E amplifier technology. A Class E amplifier exhibits high efficiency and provides superior audio performance. In addition to the superior efficiency and audio performance, the power module is designed to be removed from the chassis for maintenance.

3. Power Supply

A modular switching power supply provides dc operating potentials for the transmitter. The power supply design uses an SCR controlled bridge to rectify the ac line voltage into a dc potential. The supply is filtered and routed to the RF power module for control and regulation. A fault detection circuit monitors power supply activity for failure conditions. A separate modular switching power supply provides operating potentials for the ECU circuitry.

PARAMETER	SPECIFICATION
RF POWER OUTPUT AM-1A	5 watts to 1100 watts. Five preset power levels available by local or remote control.
AM-500A	5 watts to 550 watts. Five preset power levels available by local or remote control.
RF CARRIER FREQUENCY RANGE	522 kHz to 1705 kHz (as ordered). Accommodates 9 kHz or 10 kHz channel spacing (9 kHz spacing requires an optional crystal).
RF OUTPUT IMPEDANCE	50 Ohms, unbalanced.
OUTPUT CONNECTOR	Type N Connector.
LOAD VSWR	1.30 : 1 at full carrier power. Will operate into a higher VSWR with automatic power reduction. Open and short circuit protected. Load VSWRs higher than 1.30 : 1 are accommodated with an optional matching network.
HARMONIC AND SPURIOUS SUPPRESSION	Meets or exceeds FCC, DOC, and CCIR requirements when preceded by external NRSC-1 compatible audio low-pass filters.
CARRIER FREQUENCY STABILITY	± 3 ppm, 0° to 50° C (+32° to +122° F).
CARRIER SHIFT	Less than 1% at 95% negative modulation at 1 kHz.
TYPE OF MODULATION	Pulse Width Modulation of L+R envelope with optional integrated C-QUAM AM stereo. An RF input connector is also provided for an external stereo exciter.
OPERATING MODES	Mono L+R. With optional stereo card: Stereo, mono L, mono R, by local or remote control.
MODULATION CAPABILITY AM-1A	Greater than 145% peak positive capability at 1100 watts. 130% into a 1.5 : 1 VSWR.
AM-500A	Greater than 145% peak positive capability at 500 watts. 130% into a 1.3 : 1 VSWR.

MODULATION INPUT INDICATION	Peak reading, color coded, LED bar graph display with an autorange feature for monitoring positive or negative input levels of four different audio channels (L/R or L+R/L-R).
AUDIO INPUT LEVEL	+10 dBm, \pm dB, L+R (or mono) to produce 100% L+R envelope modulation. Other input levels can be accommodated.
AUDIO INPUT IMPEDANCE	600 Ohms. Inputs are balanced, transformerless, and resistive with passive RFI filtering. Other impedances can be accommodated.
AUDIO FREQUENCY RESPONSE (MONOPHONIC)	
AM-1A	\pm 0.5 dB, 20 Hz to 10 kHz at 90% negative modulation (linear phase mode). +0.1 dB -3 dB, 20 Hz to 10 kHz at 90% negative modulation, standard configuration. 90% negative modulation referenced at 1 kHz (9 dBm).
AM-500A	\pm 1.0 dB, 20 Hz to 10 kHz at 90% negative modulation (linear phase mode). +0.1 dB -3 dB, 20 Hz to 10 kHz at 90% negative modulation, standard configuration. 90% negative modulation referenced at 1 kHz (9 dBm).
AUDIO HARMONIC DISTORTION	
AM-1A Mono	Less than 0.8%, 20 Hz to 10 kHz at 1 kW. Less than 1.5%, 20 Hz to 10 kHz at 500 W. Less than 2.0%, 20 Hz to 10 kHz at 250 W. Less than 3.0%, 20 Hz to 10 kHz at 100 W. The mono audio harmonic distortion specifications are referenced to an audio input level which generates 90% modulation at 1 kHz (9 dBm).
AM-1A Stereo	Less than 1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power.
AM-500A Mono	Less than 1.2%, 20 Hz to 10 kHz at 500 Watts. The mono audio harmonic distortion specifications are referenced to an audio input level which generates 90% modulation at 1 kHz (9 dBm).
AM-500A Stereo	Less than 2.0% at 50% single channel modulation, 50 Hz to 10 kHz at rated power.
INTERMODULATION DISTORTION (MONO)	1.2% or less at 1:1 ratio. 1.7% or less at 4:1 ratio. 60/7000 Hz SMPTE standards with 85% modulation at rated power.
CCIF INTERMODULATION DISTORTION (MONO)	1.0% or less at 1:1 ratio. 4 kHz/5 kHz with 85% modulation at rated power.
TRANSIENT INTERMODULATION DISTORTION (MONO)	1.0% or less at 4:1 ratio. 2.96 kHz square wave 8 kHz sinewave with 85% modulation at rated power.
INCIDENTAL PHASE MODULATION (STEREOPHONIC)	30 dB below equivalent 100% L-R C-QUAM modulation 50 Hz

<p>STEREO SEPARATION AM-1A</p> <p>AM-500A</p>	<p>to 10 kHz at rated power. Measured with an audio input level which generates 95% negative L+R envelope modulation at 1 kHz (9.5 dBm).</p> <p>-30 dB or greater, 50 Hz to 10 kHz. Measured with 50% single channel modulation into a 50 ohm resistive load at rated power.</p> <p>-25 dB or greater, 50 Hz to 10 kHz. Measured with 50% single channel modulation into a 50 ohm resistive load at rated power.</p>
<p>SQUAREWAVE OVERSHOOT Mono</p> <p>Stereo</p>	<p>0.1% or less at 400 Hz, 90% modulation with high frequency boost disabled.</p> <p>1% or less at 400 Hz, 50% single channel modulation with high frequency boost disabled.</p>
<p>SQUAREWAVE TILT</p>	<p>Less than 1% at 40 Hz. Less than 1.5% at 20 Hz. Measured with 90% negative modulation.</p>
<p>NOISE Mono</p> <p>Stereo</p>	<p>Greater than 65 dB below a reference level equivalent to 100% negative modulation in a 22 Hz to 30 kHz bandwidth, unweighed.</p> <p>Greater than 55 dB below a reference level equivalent to 100% negative modulation of either left or right channel in a 22 Hz to 30 kHz bandwidth, unweighed.</p>
<p>AC INPUT VOLTAGE</p>	<p>196V to 252V AC, 50/60 Hz, single phase. Includes built-in MOVs for surge suppression.</p>
<p>AC POWER CONSUMPTION AM-1A</p> <p>AM-500A</p>	<p>1.37 kW, no modulation of 1 kW carrier. 2.05 kW, 100% sinusoidal modulation of 1 kW carrier. Measured at 1 kW into a 50 Ohm resistive load at 220 VAC.</p> <p>830 watts, no modulation of 500 watt carrier. 1.25 kW, 100% sinusoidal modulation of 500 Watt carrier. Measured at 500 watts into a 50 Ohm resistive load at 220VAC.</p>

PARAMETER	SPECIFICATION
OVERALL EFFICIENCY AM-1A AM-500A	73% or greater, 100% sinusoidal modulation of carrier, AC line to RF output. Measured at 1 kW into a 50 Ohm resistive load at 220VAC. 60% or greater, 100% sinusoidal modulation of carrier, AC line to RF output. Measured at 500 Watts into a 50 Ohm resistive load at 220VAC.
SAFETY	Meets IEC 215 specifications.
OUTPUT POWER	Less than 1% change in output power with variation of AC line voltage from 196-252 volts.
METERING AM-1A AM-500A	Output Forward Power: 1) High scale – 0 to 1200 watts and 2) Low scale – 0 to 300 watts. Output Reflected Power: 1) High scale – 0 to 120 watts and 2) Low scale – 0 to 30 watts. AC Line Voltage: Scale – 150 to 300 volts. AM-1A forward power meter complies with FCC rule 73.1215 (a) within the 60 watt to 1100 watt range. Output Forward Power: 1) High scale – 0 to 600 watts and 2) Low scale – 0 to 150 watts. Output Reflected Power: 1) High scale – 0 to 60 watts and 2) Low scale – 0 to 12 watts. AC Line Voltage: Scale – 150 to 300 volts. AM-500A forward power meter complies with FCC rule 73.1215 (a) within the 30 watt to 500 watt range.
RF MONITORING PROVISIONS	2 volts RMS nominal RF output sample into a 50 Ohm input. Adjustable from the output network chassis rear panel for each of the five preset power levels.
REMOTE INTERFACE	Built-in interface for most control and monitoring systems.
PHYSICAL DIMENSIONS ECU Chassis Output Network Chassis	Width: 19.0 Inches (48.3 cm) Height: 10.5 Inches (26.7 cm) Depth: 14.4 Inches (36.6 cm) Width: 19.0 Inches (48.3 cm) Height: 14 Inches (35.6 cm) Depth: 27.1 Inches (68.8 cm)
WEIGHT	90.6 Pounds (41.1 kg), unpacked
CUBAGE	7.3 Ft ³ (0.21 m ³)

PARAMETER	SPECIFICATION
<p>ENVIRONMENTAL COOLING</p> <p>OPERATING TEMPERATURE</p> <p>OPERATING HUMIDITY</p> <p>MAXIMUM ALTITUDE 60 Hz Models</p> <p>50 Hz Models</p>	<p>Low velocity air with cleanable filters. 250 Cubic Feet per Minute (7.08 m³/min).</p> <p>0° to 50° C (+32° to 122° F)</p> <p>0 TO 95% (non-condensing)</p> <p>0 to 10,000 feet above sea level (0 to 3048 Meters)</p> <p>0 to 7,500 feet above sea level (0 to 2286 Meters)</p>
<p>NOTE: AM-500A – All specifications measured at 500 watts into a 50 ohm resistive load using Broadcast Electronics AS-10 modulation monitor.</p> <p>AM-1A – All specifications measured at 1100 watts into a 50 ohm resistive load using Broadcast electronics AS-10 modulation monitor.</p>	