AM–500A 500 WATT
AM–1A 1 KILOWATT
AM BROADCAST
TRANSMITTERS

October, 1999 **IM No. 597–1112**

IMPORTANT INFORMATION

EQUIPMENT LOST OR DAMAGED IN TRANSIT.

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have: 1) inspected the containers for visible signs of damage and 2) counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

RF PRODUCT TECHNICAL ASSISTANCE – REPAIR SERVICE – REPLACEMENT PARTS.

Technical assistance is available from Broadcast Electronics by letter, prepaid telephone, fax, or E–mail. Equipment requiring repair or overhaul should be sent by common carrier, prepaid, insured, and well protected. If proper shipping materials are not available, contact the Customer Service Department for a shipping container. Do not the mail equipment. We can assume no liability for inbound damage, and necessary repairs become the obligation of the shipper. Prior arrangement is necessary. Contact the Customer Service Department for a Return Authorization.

Emergency and warranty replacement parts may be ordered from the following address. Be sure to include the equipment model number, serial number, part description, and part number. Non–emergency replacement parts may be ordered directly from the Broadcast Electronics stock room by fax at the number shown below.

FACILITY CONTACTS –

Broadcast Electronics, Inc. – Quincy Facility
4100 N. 24th St. P.O. BOX 3606
Quincy, Illinois 62305
Telephone: (217) 224–9600
Fax: (217) 224–9607
E–Mail: General – bdcast@bdcast.com
Web Site: www.bdcast.com

RF PRODUCT TECHNICAL ASSISTANCE – REPAIR – EMERGENCY/WARRANTY REPLACEMENT PARTS –

Telephone: (217) 224–9600
E–Mail: rfservice@bdcast.com
Fax: (217) 224–9607

NON–EMERGENCY REPLACEMENT PARTS –

Fax: (217) 224–9609

RETURN, REPAIR, AND EXCHANGES.

Do not return any merchandise without our written approval and Return Authorization. We will provide special shipping instructions and a code number that will assure proper handling and prompt issuance of credit. Please furnish complete details as to circumstances and reasons when requesting return of merchandise. All returned merchandise must be sent freight prepaid and properly insured by the customer.

WARRANTY ADJUSTMENT.

Broadcast Electronics, Inc. warranty is included in the Terms and Conditions of Sale. In the event of a warranty claim, replacement or repair parts will be supplied F.O.B. factory. At the discretion of Broadcast Electronics, the customer may be required to return the defective part or equipment to Broadcast Electronics, Inc. F.O.B. Quincy, Illinois. Warranty replacements of defective merchandise will be billed to your account. This billing will be cleared by a credit issued upon return of the defective item.

PROPRIETARY NOTICE.

MODIFICATIONS.

Broadcast Electronics, Inc. reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

WARNING

OPERATING HAZARDS

READ THIS SHEET AND OBSERVE ALL SAFETY PRECAUTIONS

ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TRANSISTORS MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. EXERCISE EXTREME CARE AROUND SUCH PRODUCTS. UNINFORMED OR CARELESS OPERATION OF THESE DEVICES CAN RESULT IN POOR PERFORMANCE, DAMAGE TO THE DEVICE OR PROPERTY, SERIOUS BODILY INJURY, AND POSSIBLY DEATH.

DANGEROUS HAZARDS EXIST IN THE OPERATION OF POWER TRANSISTORS

The operation of power tubes and power transistors involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

A. HIGH VOLTAGE – Normal operating voltages can be deadly. Additional information follows.

B. RF RADIATION – Exposure to RF radiation may cause serious bodily injury possibly resulting in blindness or death. Cardiac pacemakers may be affected. Additional information follows.

C. BERYLLIUM – OXIDE POISONING – Dust or fumes from BeO ceramics used as thermal links with power transistors are highly toxic and can cause serious injury or death. Additional information follows.

D. HOT SURFACES – Surfaces of air–cooled heat sinks radiators can reach temperatures of 100 degrees centigrade and cause burns if touched. Additional information follows.

E. RF BURNS – Circuit boards with RF power transistors contain high RF potentials. Do not operate an RF power module with the cover removed.

HIGH VOLTAGE

The transmitter operates at voltages high enough to kill through electrocution. Personnel should always break the primary circuits when access to the transmitter is required.

RADIO FREQUENCY RADIATION

Exposure of personnel to RF radiation should be minimized, personnel should not be permitted in the vicinity of open energized RF generating circuits, or RF transmission systems (waveguides, cables, connectors, etc.), or energized antennas. It is generally accepted that exposure to “high levels” of radiation can result in severe bodily injury including blindness. Cardiac pacemakers may be affected.

The effect of prolonged exposure to “low level” RF radiation continues to be a subject of investigation and controversy. It is generally agreed that prolonged exposure of personnel to RF radiation should be limited to an absolute minimum. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. A 10 mW/cm^2 per one tenth hour average level has been adopted by several U.S. Government agencies including the Occupational Safety and Health Administration (OSHA) as the standard protection guide for employee work environments. An even stricter standard is recommended by the American National Standards Institute which recommends a 1.0 mW/cm^2 per one tenth hour average level exposure between 30 Hz and 300 MHz as the standard employee protection guide (ANSI C95.1–1982).

RF energy must be contained properly by shielding and transmission lines. All input and output RF connections, such as cables, flanges and gaskets must be RF leakproof. Never operate a power tube without a properly matched RF energy absorbing load attached. Never look into or expose any part of the body to an antenna, open RF generating circuit, or RF transmission system while energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

DANGER — BERYLLIUM OXIDE CERAMICS (BeO) – AVOID BREATHING DUST OR FUMES

BeO ceramic material is used as a thermal link to carry heat from a transistor to the heat sink. Do not perform any operation on any BeO ceramic which might produce dust or fumes, such as grinding, grit blasting, or acid cleaning. Beryllium oxide dust or fumes are highly toxic and breathing them can result in serious personal injury or death. BeO ceramics must be disposed of only in a manner prescribed by the device manufacturer.

HOT SURFACES

Heat sinks and reject loads are air–cooled or conduction–cooled. The air–cooled external surface can operate at a high temperature (up to 100° C). All hot surfaces may remain hot for an extended time after the transmitter is operated to off. To prevent serious burns, take care to prevent and avoid any bodily contact with these surfaces both during and for a reasonable cooling down period after operation.

BROADCAST ELECTRONICS, INC.

TRANSMITTER WARRANTY VOID NOTICE

THE PRODUCT WARRANTY WILL BE VOID IF THE TRANSMITTER IS INSTALLED AT A SITE WITH INADEQUATE LIGHTNING PROTECTION AND A DEFECTIVE TRANSMISSION LINE SYSTEM.

The transmitter is covered by a two year limited product warranty from Broadcast Electronics. However, the transmitter must be properly installed at a site with adequate lightning protection and transmission line systems. ***TO ENSURE THE TRANSMITTER WARRANTY IS VALID***, the transmitter must be installed: 1) as described by the INSTALLATION procedures presented in SECTION II of this manual, 2) at a transmitter site with a lightning protection system described in TRANSMITTER SITE LIGHTNING PROTECTION SYSTEM CHECKOUT (refer to SECTION II of this manual), and 3) at a transmitter site with a transmission line system described in TRANSMISSION LINE AND ANTENNA CHECKOUT (refer to SECTION II of this manual). ***FAILURE TO PROPERLY INSTALL THE TRANSMITTER, PROVIDE AN ADEQUATE LIGHTNING PROTECTION SYSTEM, OR PROVIDE AN ADEQUATE TRANSMISSION LINE SYSTEM WILL VOID THE WARRANTY ON THE TRANSMITTER.*** If any questions develop concerning the transmitter warranty and installation site systems, contact the Broadcast Electronics Customer Service Department.

BROADCAST ELECTRONICS, INC.

NOTICE TO THE EQUIPMENT USER

FCC Rule 73.1590 mandates the licensee of each AM station to make measurements for spurious and harmonic emissions to show compliance with the transmission system requirements of Section 73.44 of the Commission's Rules. It is the broadcast station's responsibility to ensure that the audio signal input to the Broadcast Electronics A–Series transmitters conforms to the audio standard NRSC–1 (published as ANSI/EIA–549–1988). This is a mandatory requirement to ensure that the equipment complies to Section 73.44 and Section 73.128(C) of the Commission's Rules.

WARNING *WARNING*

OPERATING HAZARDS

WARNING

WARNING

THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CABINET WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER OUTPUT NETWORK, RF POWER MODULE, RF COMBINER, OR POWER SUPPLY COMPONENTS.

The Broadcast Electronics AM transmitters contain high voltages and currents. If safety precautions are not practiced, contact with the high voltages and currents could cause serious injury or death. The transmitter is equipped with many built–in safety features, however good judgement, care, and common sense must be practiced to prevent accidents.

In addition to high voltages and currents, the AM transmitters contain multiple circuit grounds with high ac and dc potentials with respect to the cabinet which is at earth potential. The potentials could cause serious injury or death if maintenance personnel simultaneously touch a circuit ground and the cabinet. As a result, operation of the transmitter with test equipment connected to transmitter output network, RF power module, RF combiner, or power supply components is extremely dangerous and must not be attempted. Therefore, never energize the transmitter with test equipment connected to the transmitter output network, RF power module, RF combiner, or power supply components. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized if required.

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SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. Information presented by this section provides a general description of the Broadcast Electronics AM-1A/AM-500A transmitters and lists equipment specifications.

1-3. EQUIPMENT DESCRIPTION.

1-4. GENERAL.

1-5. The AM-1A transmitter is a 1 kW solid-state C-QUAM™ stereo 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 C-QUAM™ 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 a: 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. 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.

1-6. **EXCITER/CONTROL 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.

1-7. **Stereo Circuit Board.** The ECU stereo circuit board is a modular plug-in assembly containing C-QUAM™ AM stereo circuitry. The C-QUAM™ stereo system is a mode of AM stereo transmission utilizing amplitude modulated monaural (L+R) information and independently quadrature modulated stereo (L-R) information. The results produce a stereo transmission system compatible with mono receivers.

1-8. The stereo circuit board is designed with remote/local controlled mono left, mono right, mono L+R, and stereo modes of operation. Two equalization circuits are provided to allow the transmitter to be configured for operation into two different antennas.

C-QUAM™ is a registered trademark of Motorola Inc.

AM-1A TRANSMITTER

597-1112-1

FIGURE 1-1. AM-1A TRANSMITTER

1-9. **Exciter Circuit Board.** 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.

1-10. **Controller Circuit Board.** 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 such as the Broadcast Electronics VMC-16 voice remote control system.

1-11. 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.

1–12. **OUTPUT NETWORK CHASSIS.** 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. The bandpass filter is provided to attenuate all harmonic frequencies to FCC, DOC, and CCIR levels.

1–13. **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.

1–14. 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.

1–15. **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.

1–16. TRANSMITTER CONFIGURATIONS.

1–17. The transmitters can be ordered in the following configurations:

P/N	DESCRIPTION
907–1000–001	AM–1A 1 kW AM Transmitter for operation in the 522 kHz to 1705 kHz broadcast band, 196V – 252V ac 50/60 Hz single phase supply.
907–0500–001	AM–500A 500W AM Transmitter for operation in the 522 kHz to 1705 kHz broadcast band, 196V – 252V ac 50/60 Hz single phase supply.

1–18. ACCESSORIES AND SPARE PARTS KITS.

1–19. The following text presents accessories and spare parts kits available for use with the AM–1A/AM–500A transmitters.

P/N	DESCRIPTION
977–0027	Recommended semiconductor kit.
977–0028	100% semiconductor kit.
977–0029	Recommended spare parts kit. Includes selected meters, switches, fuses, filters, etc. Does not include semiconductors.
977–0037	Basic semiconductor kit for AM–A series, AM–1A, AM–6A, AM–10A.

1–20. EQUIPMENT SPECIFICATIONS.

1–21. Refer to Table 1–1 for electrical specifications or Table 1–2 for physical specifications of the AM–1A/AM–500A transmitter.

TABLE 1-1. ELECTRICAL CHARACTERISTICS
(Sheet 1 of 3)

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	±3ppm, 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 integrated C-QUAM AM stereo. An RF input connector is also provided for an external stereo exciter.
OPERATING MODES	Stereo, mono L+R, 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, ±1 dB, L+R (or mono) to produce 100% L+R envelope modulation. Other input levels can be accommodated.

TABLE 1-1. ELECTRICAL CHARACTERISTICS
(Sheet 2 of 3)

PARAMETER	SPECIFICATION
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	±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	±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.

TABLE 1-1. ELECTRICAL CHARACTERISTICS
(Sheet 3 of 3)

PARAMETER	SPECIFICATION
INCIDENTAL PHASE MODULATION (STEREOPHONIC)	30 dB below equivalent 100% L–R C–QUAM modulation 50 Hz 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).
STEREO SEPARATION	
AM–1A	–30 dB or greater, 50 Hz to 10 kHz. Measured with 50% single channel modulation into a 50 ohm resistive load at rated power.
AM–500A	–25 dB or greater, 50 Hz to 10 kHz. Measured with 50% single channel modulation into a 50 ohm resistive load at rated power.
SQUAREWAVE OVERSHOOT	
Mono	0.1% or less at 400 Hz, 90% modulation with high frequency boost disabled.
Stereo	1% or less at 400 Hz, 50% single channel modulation with high frequency boost disabled.
SQUAREWAVE TILT	Less than 1% at 40 Hz. Less than 1.5% at 20 Hz. Measured with 90% negative modulation.
NOISE	
Mono	Greater than 65 dB below a reference level equivalent to 100% negative modulation in a 22 Hz to 30 kHz bandwidth, unweighed.
Stereo	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.
AC INPUT VOLTAGE	196V to 252V ac, 50/60 Hz, single phase. Includes built–in MOVs for surge suppression.
AC POWER CONSUMPTION	
AM–1A	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 220V ac.
AM–500A	830 watts, no modulation of 500 watt carrier. 1.25 kW, 100% sinusodial modulation of 500 Watt carrier. Measured at 500 watts into a 50 Ohm resistive load at 220V ac.

TABLE 1-2. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS
(Sheet 1 of 2)

PARAMETER	SPECIFICATION
OVERALL EFFICIENCY	
AM-1A	73% or greater, 100% sinusoidal modulation of carrier, ac line to RF output. Measured at 1 kW into a 50 Ohm resistive load at 220V ac.
AM-500A	60% or greater, 100% sinusodial modulation of carrier, ac line to RF output. Measured at 500 Watts into a 50 Ohm resistive load at 220V ac.
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	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.
AM-500A	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	Width: 19.0 Inches (48.3 cm). Height: 10.5 Inches (26.7 cm). Depth: 14.4 Inches (36.6 cm).
Output Network Chassis	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.

TABLE 1-2. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS
(Sheet 2 of 2)

PARAMETER	SPECIFICATION
CUBAGE	7.3 Ft^3(0.21 m^3).
ENVIRONMENTAL	
COOLING	Low velocity air with cleanable filters. 250 Cubic Feet Per Minute (7.08 m^3/min).
OPERATING TEMPERATURE	0° to 50° C (+32° to +122° F).
OPERATING HUMIDITY	0 to 95% (non-condensing).
MAXIMUM ALTITUDE	
60 Hz Models	0 to 10,000 feet above sea level (0 to 3048 Meters).
50 Hz Models	0 to 7,500 feet above sea level (0 to 2286 Meters).

NOTE – AM-500A – All specifications measured at 500 watts into a 50 ohm resistive load using Broadcast Electronics AS-10 modulation monitor.

AM-1A – All specifications measured at 1100 watts into a 50 ohm resistive load using Broadcast Electronics AS-10 modulation monitor.

SECTION II
INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information required for the installation and preliminary checkout of the Broadcast Electronics AM-1A/AM-500A transmitters.

2-3. UNPACKING.

2-4. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the transmitter. Perform a visual inspection to determine that no apparent damage has been incurred during shipment. All shipping materials should be retained until it is determined that the unit has not been damaged. Claims for damaged equipment must be promptly filed with the carrier or the carrier may not accept the claim.

2-5. The contents of the shipment should be as indicated on the packing list. If the contents are incomplete, or if the unit is damaged electrically or mechanically, notify both the carrier and Broadcast Electronics.

2-6. ENVIRONMENTAL REQUIREMENTS.

2-7. Table 1-2 provides environmental conditions which must be considered prior to transmitter installation. Refer to Table 1-2 in SECTION I, INTRODUCTION and ensure the transmitter is to be installed in an acceptable environment.

2-8. INSTALLATION.

2-9. Each transmitter is wired, operated, tested, and inspected at the factory prior to shipment and is ready for installation when received. Prior to installation, this publication should be studied to obtain an understanding of the operation, circuitry, nomenclature, and installation requirements. Installation is accomplished as follows: 1) placement, 2) component installation, 3) circuit board programming, 4) remote control connections, 5) wiring, 6) transmitter site lightning protection system checkout, 7) initial checkout, and 8) preliminary operation and adjustment.

2-10. EQUIPMENT PLACEMENT.

2-11. The AM-1A/AM-500A transmitter is designed for placement in a 19 inch EIA rack assembly (refer to Figure 2-1). The transmitter requires approximately 24.5 inches (62.2 cm) of a universal or military EIA rack (refer to Figure 2-2). To install the transmitter in a rack, refer to Figure 2-2 and perform the following procedures.

2-12. **RACK PREPARATION.** The transmitter can be mounted in any universal or military rack assembly. Refer to Figure 2-2 and determine type of rack for transmitter installation. A universal rack is identified by the location of mounting holes at regular rack spacings. A military rack is identified by a missing mounting hole at regular rack spacings. Each type of rack may be equipped with untapped or tapped mounting holes. To prepare the rack for the transmitter, refer to Figure 2-2 and perform the following procedure.

2-13. Prepare a universal or military rack for transmitter installation as follows:

1. Refer to Figure 2-2 and locate the transmitter mounting holes on the rack assembly. Ensure the top of the transmitter is located at the beginning of a rack unit.

2. Evaluate the rack and determine if the rack is equipped with tapped or untapped mounting holes.

3. Prepare the rack for installation as follows:

   A. For racks with tapped holes, mark the transmitter mounting hole locations.

   B. For racks with untapped holes, locate the transmitter clip-nuts in the transmitter accessory kit. Refer to Figure 2-2 and install the clip-nuts in each transmitter mounting hole location.

WARNING ***ENSURE NO PRIMARY POWER IS CONNECTED TO THE TRANSMITTER BEFORE PROCEEDING.***

WARNING

2-14. **EQUIPMENT INSTALLATION.**

2-15. **TRANSMITTER MOUNTING.** Once the transmitter rack is prepared, refer to Figure 2-2 and mount the transmitter in the rack by performing the following procedures.

2-16. The transmitter accessory kit contains #10 x 3/4 and #12 x 3/4 mounting hardware. The type of hardware used to install the transmitter is determined by the rack assembly. Refer to Figure 2-2 and determine the mounting hardware required to mount the transmitter in the rack.

2-17. Install the ECU chassis and the output network chassis in rack as follows:

1. Insert the ECU chassis in the rack and install the appropriate hardware in two mounting locations to secure the chassis in the rack.

WARNING ***ENSURE THE GROUND STRAP IS CONNECTED BETWEEN THE ECU CHASSIS AND THE OUTPUT NETWORK CHASSIS.***

WARNING

2. Install the ground straps between the ECU and the output network chassis as shown. The straps are to be placed just in front of the rack P-rail and secured using the front panel mounting hardware.

3. Insert the output network chassis in the rack and install the appropriate hardware in two mounting locations to secure the chassis in the rack.

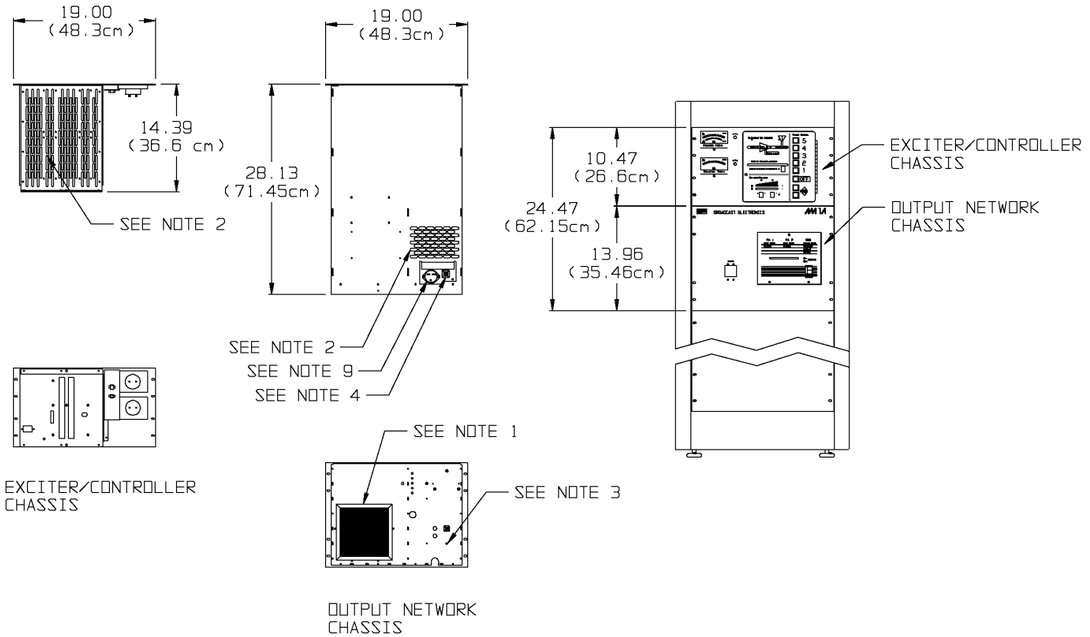
4. Using the appropriate hardware, install the remaining hardware to secure the chassis units in the rack.

2-18. Connect the ECU control cables as follows:

1. Attach connector J4 to P4 on the ECU chassis.

2. Attach connector J5 to P5 on the ECU chassis.

3. Attach connector J501 to P501 on the meter circuit board.



NOTES:

1. AIR INLET AT REAR OF OUTPUT NETWORK CHASSIS.
   250 CFM (7.08 M^3/MIN)

2. AIR OUTLET:
   A. EXCITER/CONTROLLER CHASSIS, 9.5" x 14",(24.1cm x 35.6cm)
   B. OUTPUT NETWORK CHASSIS, 6.5" x 4.0",(16.5cm x 10.2cm)

3. GROUND LUG.

4. OUTPUT RF CONNECTION IS TYPE "N".

5. HEAT DISSIPATION:
   AM-1A 850 WATTS MAXIMUM (2900 BTU/HR) FOR 1.1 KW RF OUTPUT @ 125% AUDIO TONE MODULATION.
   AM-500A 600 WATTS MAXIMUM (2000 BTU/HR) FOR 500 W RF OUTPUT @ 125% AUDIO TONE MODULATION.

6. WEIGHT:
   90.6 LBS (41.1 KGS) UNPACKED.

7. PACKED CUBAGE: DOMESTIC 7.3 FT^3 (0.21 m^3)
   INTERNATIONAL 20.2 FT^3 (0.57 m^3)

8. AC POWER CONSUMPTION:
   AM-1A 2.05 KW AT 100% SINUSOIDAL MODULATION OF A 1 KW CARRIER.
   AM-500A 1.25 KW AT 100% SINUSOIDAL MODULATION OF A 500 WATT CARRIER.

9. AC POWER INPUT: AM-1A - 196-252 VAC SINGLE PHASE AT 18.0 AMPS MAXIMUM, 50/60 Hz. FUSED DISCONNECT SWITCH RECOMMENDED. FOR PROPER SIZING OF FUSES, REFER TO INSTRUCTION MANUAL AND NATIONAL ELECTRICAL CODE OR LOCAL CODES.
   AM-500A - 196-252 VAC SINGLE PHASE AT 9.5 AMPS MAXIMUM, 50/60 Hz. FUSE DISCONNECT SWITCH RECOMMENDED. FOR PROPER SIZING OF FUSES, REFER TO INSTRUCTION MANUAL AND NATIONAL ELECTRICAL CODE OR LOCAL CODES.

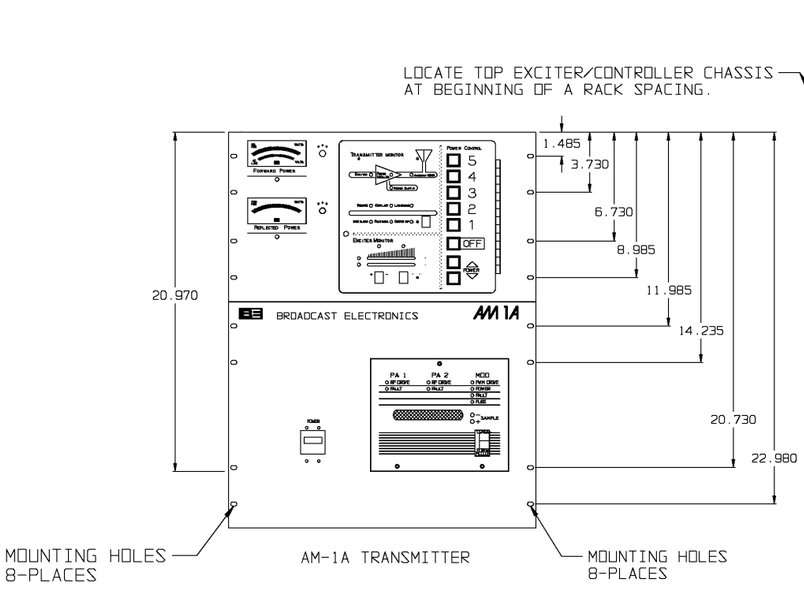
10. PRIMARY FUSE DISCONNECT:
    FUSE SIZE: 20A
    WIRE SIZE: #12 COPPER THHN OR EQUAL

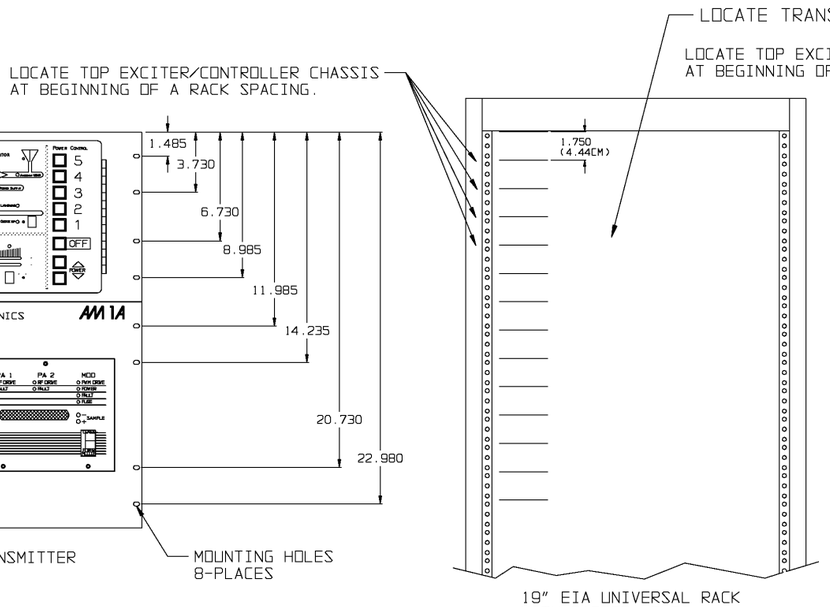
11. AM-1A SHOWN. AM-500A IS IDENTICAL.

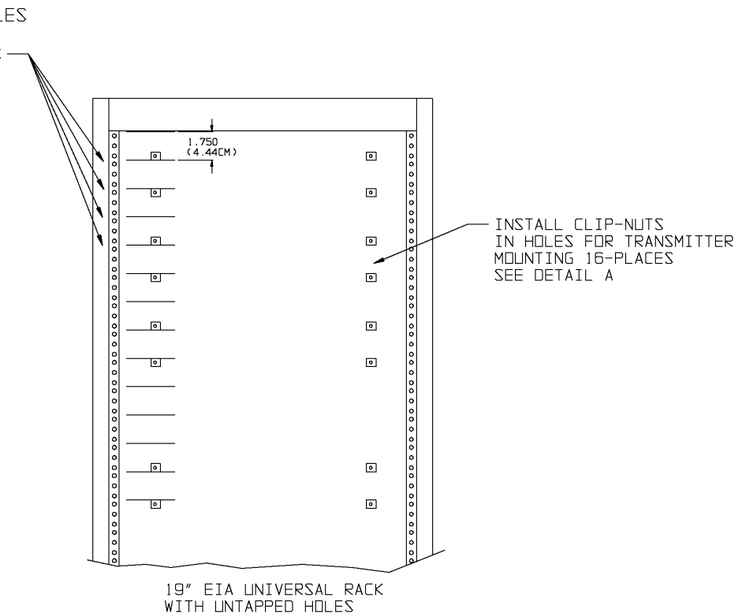
597-1112-2

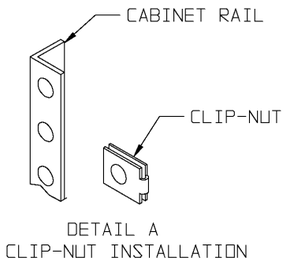
FIGURE 2-1. AM-1A/AM-500A TRANSMITTER INSTALLATION
(2-3/2-4)

BROADCAST ELECTRONICS INC

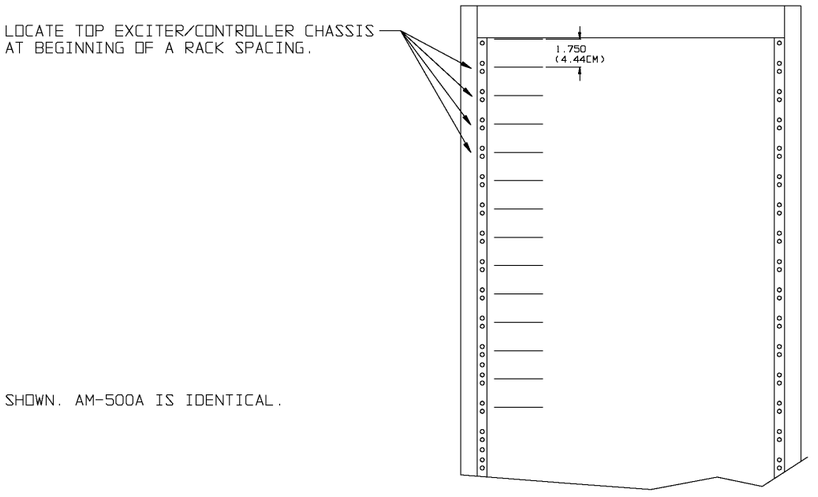


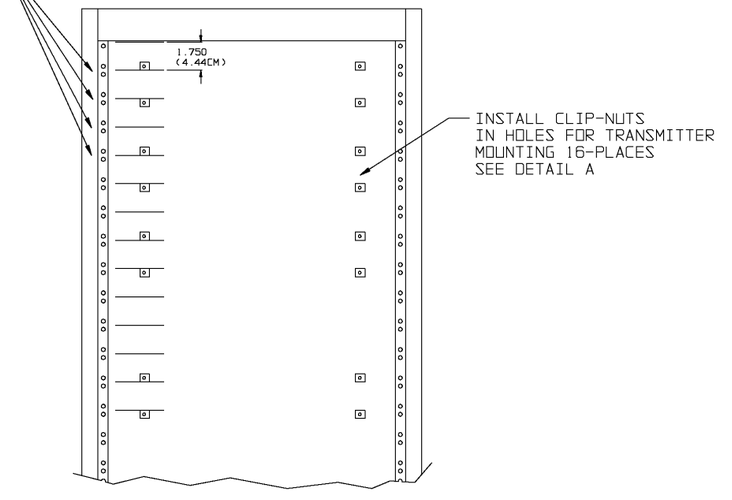






NOTE:
AM-1A IS SHOWN. AM-500A IS IDENTICAL.



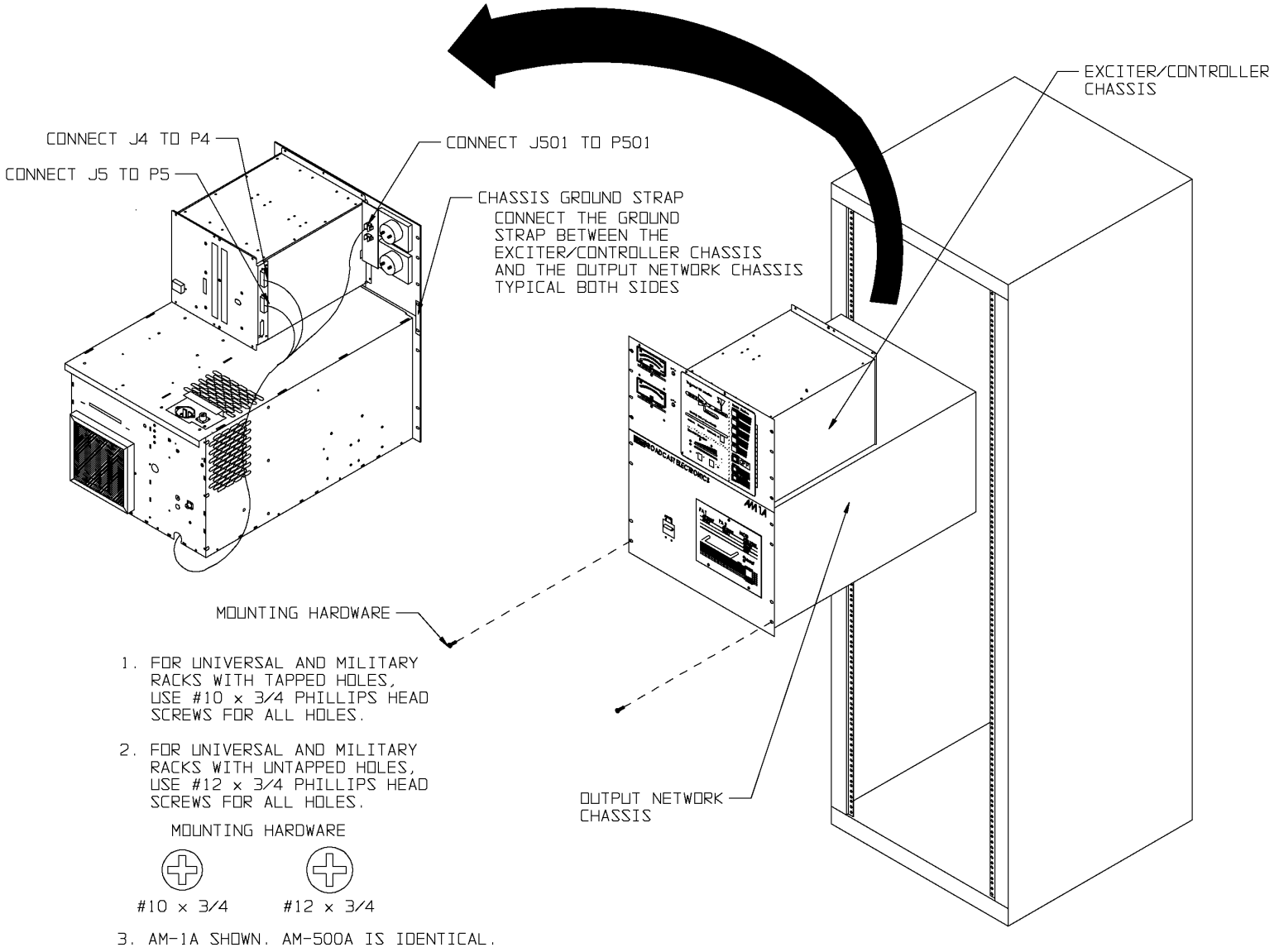


597-1112-3A

FIGURE 2-2. AM-1A/AM-500A TRANSMITTER RACK INSTALLATION (SHEET 1 OF 2)

(2-5/2-6)

BROADCAST ELECTRONICS INC



597-1112-3B

FIGURE 2-2. AM-1A/AM-500A RACK INSTALLATION (SHEET 2 OF 2)

2-19. **COMPONENT INSTALLATION.**

WARNING ***ENSURE NO PRIMARY POWER IS CONNECTED TO THE TRANSMITTER BEFORE PROCEEDING.***

WARNING

2-20. Selected transmitter components have been removed to prevent damage during shipment. The components removed from the transmitter are shipped in separate containers.

2-21. Remove all tape, wire ties, string, and packing material used for shipment. In addition, locate the component containers. To install the components, perform the following procedures.

2-22. **ECU CIRCUIT BOARDS.** The ECU circuit boards are removed for shipment. Locate the shipping container with the ECU circuit boards. To re-install the circuit boards, proceed as follows:

CAUTION ***THE TRANSMITTER MAY BE DAMAGED IF THE ECU CIRCUIT BOARDS ARE NOT SECURELY SEATED INTO THE CONNECTORS.***

CAUTION

1. Refer to Figure 2-3 to determine the circuit board location.
2. Insert the circuit board in the appropriate location.
3. Firmly press the circuit board into the connector to engage the connector housing.
4. Firmly press the circuit board into the connector again to engage the connector pins.
5. Repeat the procedure for each ECU circuit board.

CAUTION ***REMOVING OR INSTALLING THE RF POWER MODULE WITH THE TRANSMITTER ENERGIZED MAY RESULT IN DAMAGE TO THE MODULE.***

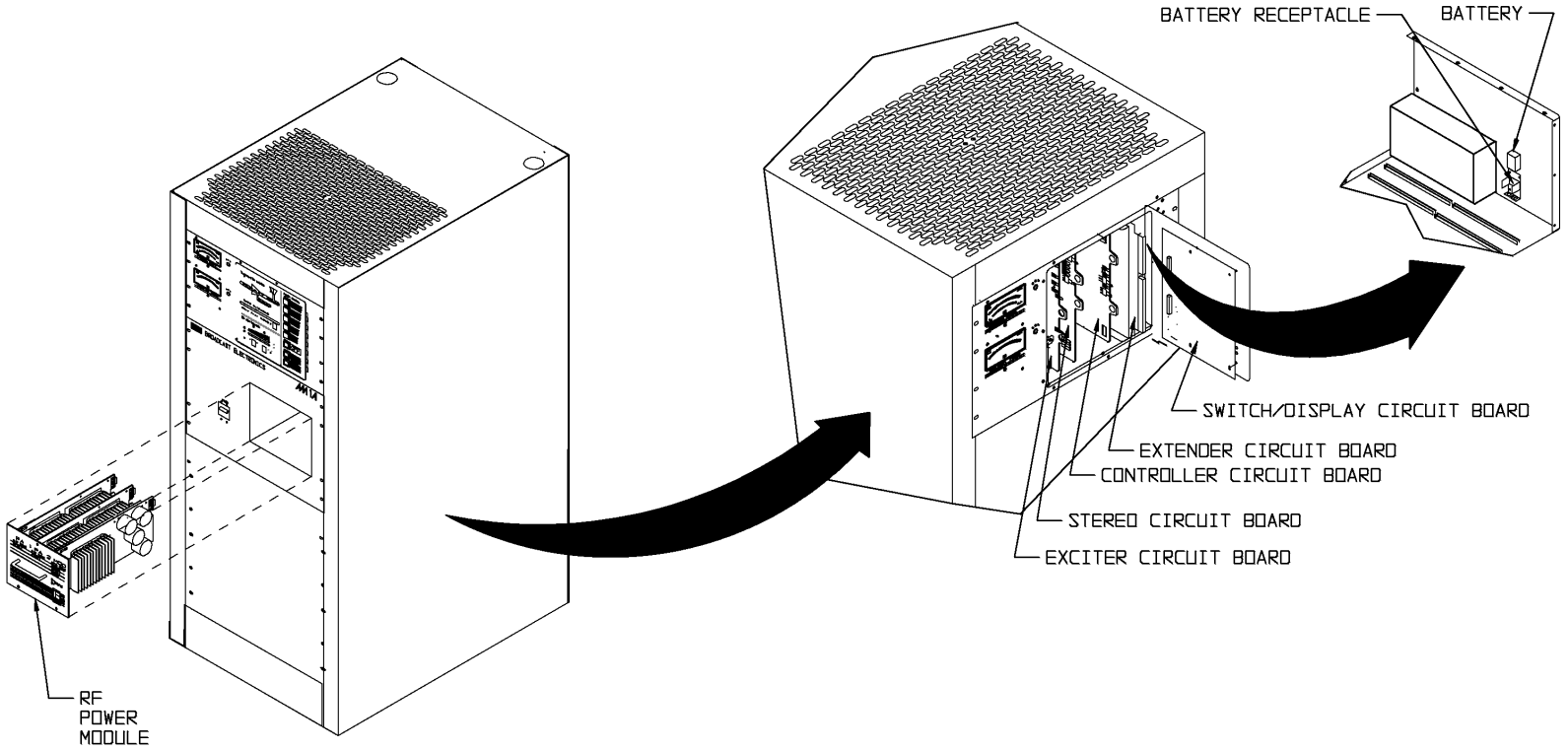
CAUTION

2-23. **RF POWER MODULE.** The RF power module is removed for shipment. Locate the RF power module shipping container. Refer to Figure 2-3 and re-install the module.

2-24. **BATTERY INSTALLATION.** The ECU is equipped with a battery system. Refer to Figure 2-3 and install the battery in the battery receptacle.

2-25. **CIRCUIT BOARD PROGRAMMING.**

2-26. The AM-1A/AM-500A transmitters are designed with programmable transmitter operating characteristics. The operating characteristics are determined by the programmable circuitry on the ECU circuit boards. Refer to the following text and program the circuitry for the desired operating characteristics.



597-1112-4

FIGURE 2-3. COMPONENT INSTALLATION

2-27. **EXCITER CIRCUIT BOARD.** Exciter circuit board programming is presented in Figure 2-4. Refer to Figure 2-4 and program the circuit board as required.

2-28. **External Stereo Generator Select.** Programmable header J7 programs the circuitry if: 1) an external stereo generator is to be used with the transmitter or 2) the internal stereo circuit board is to be used with the transmitter. The transmitter is shipped with the circuit programmed for internal stereo circuit board operation.

2-29. **Carrier Frequency Programming.** Eight position switch S2 programs the exciter carrier frequency. The switch is programmed for the station frequency at the factory. Refer to the factory test data sheets to check the programming of the switch. If the switch programming is not identical to programming recorded in the factory test data sheets, contact the Broadcast Electronics Customer Service Department.

2-30. **PWM Frequency Programming.** Four position switch S1 programs the PWM frequency. Refer to the factory test data sheets to check the programming of the switch.

2-31. **Frequency Synthesizer Programming.** Programmable header J6 determines the frequency synthesizer band of operation. Refer to the factory test data sheets to check the programming of the header.

2-32. **Pilot Tone Programming.** Programmable header J5 establishes the pilot tone frequency for 10 kHz carrier frequency operation and 9 kHz carrier frequency operation. Refer to the factory test data sheets to check the programming of the header.

2-33. **High-Pass Filter Defeat.** Left channel programmable header J12 and right channel programmable header J13 control an exciter second order 10 Hz high-pass filter. The high-pass filter is provided to remove low frequency residual products from specific audio processing units. The filter is shipped from the factory in the enabled position. Evaluate the audio processor and determine if low frequency residual products are present at the output of the audio processing unit. If no low frequency residual products are present, refer to Figure 2-4 and disable the high pass filter.

2-34. **High Frequency Boost Defeat.** Left channel programmable header J2 and right channel programmable header J3 control an exciter high frequency boost circuit. The high frequency boost circuit provides increased high frequency response to compensate for a Bessel filter in the PWM modulator. If the high frequency boost circuit is enabled to compensate for the filter, the circuit will result in a compromise between the frequency and transient response performance. If the high frequency boost circuit is enabled, the transmitter frequency response will increase approximately 2 dB at 10 kHz and the transient response will degrade. If the high frequency boost circuit is disabled, the transmitter frequency response will decrease approximately 2 dB at 10 kHz and the transient response will improve. The high frequency boost circuit is shipped from the factory in the disabled position.

2-35. **Monophonic Transmitter Operation Channel Select.** Programmable header J4 selects either the left or right audio channel when the transmitter is operating in the monophonic mode with the stereo circuit board removed. The transmitter is shipped with the left channel audio selected for monophonic operations.

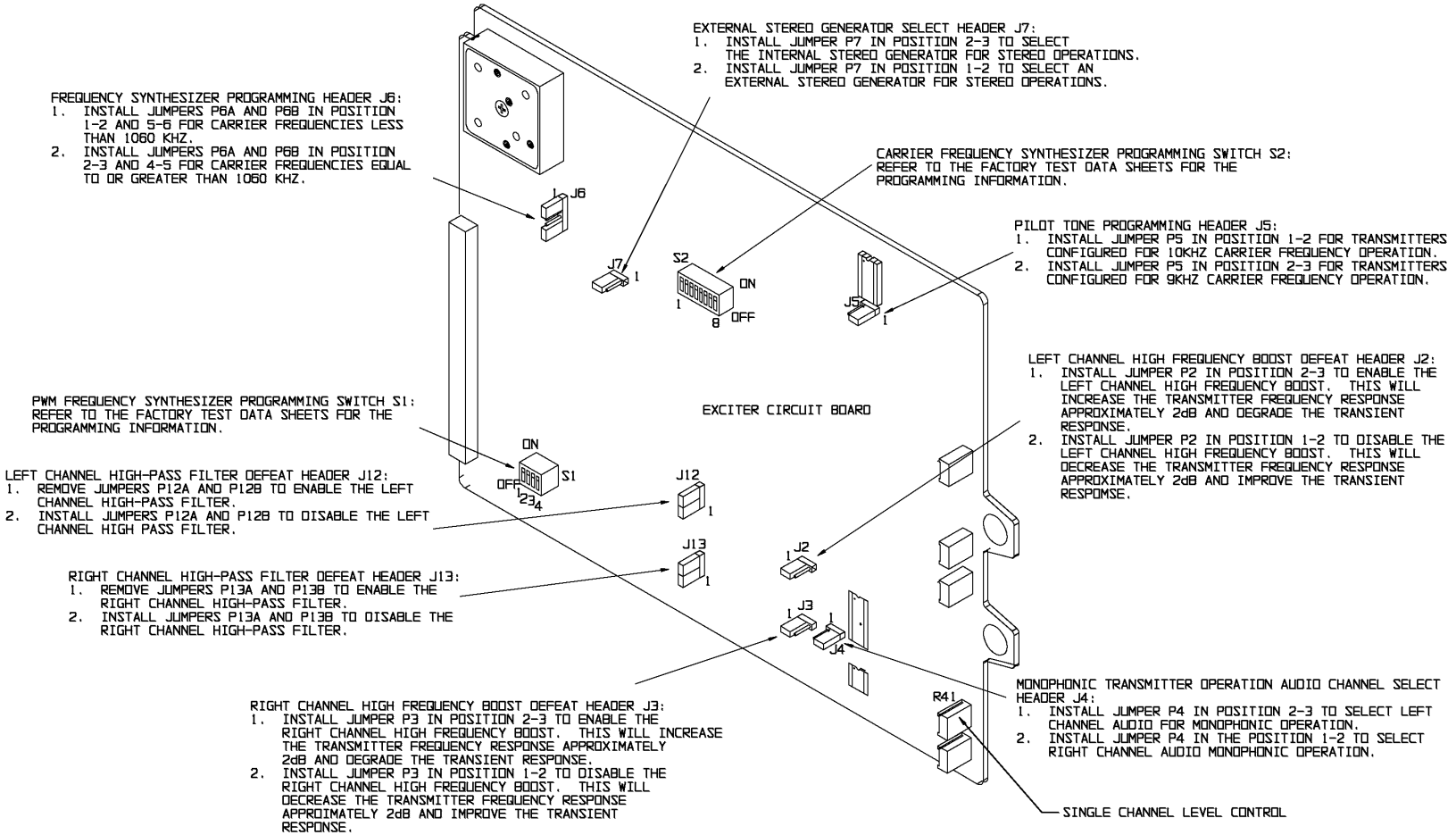
2-36. **STEREO CIRCUIT BOARD.** Stereo circuit board programming is presented in Figure 2-5. Refer to Figure 2-5 and program the circuit board as required.

2-37. **Antenna C Equalization Select.** Programmable header J6 selects equalization circuit 1 or equalization circuit 2 for operation with antenna C. The transmitter is shipped with equalization circuit 2 configured for operation with antenna C.

2-38. **Bandpass Filter Alignment.** Programmable header J5 configures the bandpass filter for alignment. The jumper must be installed in position 1-2.

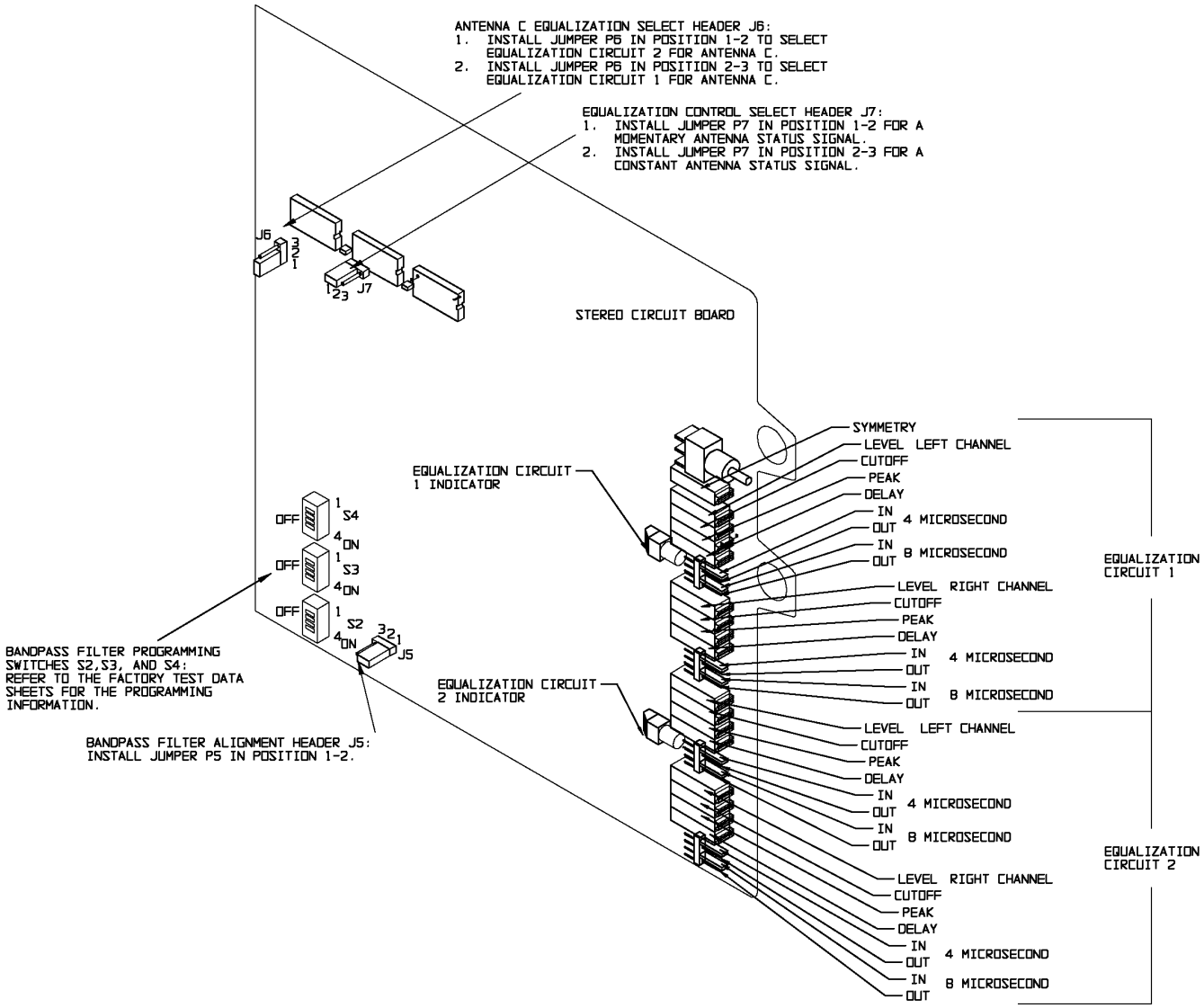
2-39. **Bandpass Filter Programming.** Four position switches S2 through S4 program the bandpass filter. Refer to the factory test data sheets to check the programming of the switches.

2-40. **Equalization Control Select.** Programmable header J7 configures the equalization circuitry for either a momentary or constant antenna status signal. The transmitter is shipped with the equalization control circuitry configured for a constant status signal.



597-1111-11

FIGURE 2-4. EXCITER CIRCUIT BOARD PROGRAMMING



597-1111-6

FIGURE 2-5. STEREO CIRCUIT BOARD PROGRAMMING

2-41. **CONTROLLER CIRCUIT BOARD.** Controller circuit board programming is presented in Figure 2-6. Refer to Figure 2-6 and program the circuit board as required.

2-42. **Power Level Trim Reset Select.** Programmable header J12 determines if the power level control circuit is to reset when a power level switch/indicator is depressed. If the circuit is programmed to reset, the previous raise/lower information will be deleted and the transmitter will operate at the selected power level. If the circuit is programmed to retain the previous raise/lower information, the transmitter will operate above or below the selected power level as determined by previous raise/lower operations. For example, the transmitter is operating at power level 4 with the power level raised 5% by the raise/lower circuit. When power level 5 switch/indicator is depressed, the transmitter will operate at 5% above the power level 5 output due to the previously retained raise/lower information. The transmitter is shipped with power level trim reset circuit configured to reset.

2-43. **Antenna Power Level Programming.** Switches S1, S2, and S3 assign power levels to a specific antenna. This programs the antenna interlock circuit to the station antenna system to prevent the transmitter from operating into an antenna at an incorrect power level. Switch S1 programs the power levels for antenna A. Switch S2 programs the power levels for antenna B. Switch S3 programs the power levels for antenna C. Power level 2 is assigned to an antenna by switch 1 on S1, S2, and S3. Power level 3 is assigned to an antenna by switch 2 on S1, S2, and S3. Power level 4 is assigned to an antenna by switch 3 on S1, S2, and S3. Power level 5 is assigned to an antenna by switch 4 on S1, S2, and S3. Power level 1 is assigned to each antenna. Evaluate the antenna system and program the circuit as required.

2-44. **AC Power Failure Automatic Transmitter Shutdown Time.** Programmable headers J4, J5, J6, and J7 program the transmitter ac power failure automatic transmitter shutdown timer circuit. The circuit is designed to automatically operate the transmitter to off during a power failure after a specific time delay programmed by headers J4, J5, J6, and J7. J4 programs the circuit for a 1 minute shutdown time. J5 programs the circuit for a 4.5 minute shutdown time. J6 programs the circuit for a 17 minute shutdown time. J7 programs the circuit for a 68 minute shutdown time. The transmitter is shipped from the factory for a 1 minute shutdown time.

2-45. **Antenna Interlock Control Select.** Programmable header J1 controls the antenna interlock circuit. The circuit can be disabled if the transmitter is to operate into only one antenna. The transmitter is shipped from the factory with the antenna interlock circuit disabled.

2-46. **Power Level Reference.** Programmable headers J10 and J19 provide a reference for the power level circuit. For AM-1A models, ensure jumpers P10 and P19 are removed. For AM-500A models, ensure jumper P10 is installed and P19 is removed.

2-47. **Power Level 3 Assignment.** Programmable headers J8 and J9 control the power level assignment for the power level 3 switch/indicator. For AM-1A transmitters, the power level 3 switch/indicator can be programmed to control power from: 1) 100 watts to 500 watts or 2) 300 watts to 1100 watts. The power level 3 switch/indicator is shipped from the factory to control power from 100 watts to 500 watts. Program jumpers P8 and P9 as required. For AM-500A transmitters, the power level 3 switch/indicator can be programmed to control power from: 1) 5 watts to 250 watts or 2) 150 watts to 500 watts. The power level 3 switch/indicator is shipped from the factory to control power from 150 watts to 500 watts. Program jumpers P8 and P9 as required.

2-48. **Remote Reflected Power Sample Voltage Programming.** Programmable header J3 controls the remote reflected power meter sample voltage. The remote reflected power sample can be programmed for +5.0 volt dc or +2.5 volt dc full-scale meter indications. The transmitter is shipped from the factory programmed for +5.0 volt dc full-scale remote reflected power meter indications.

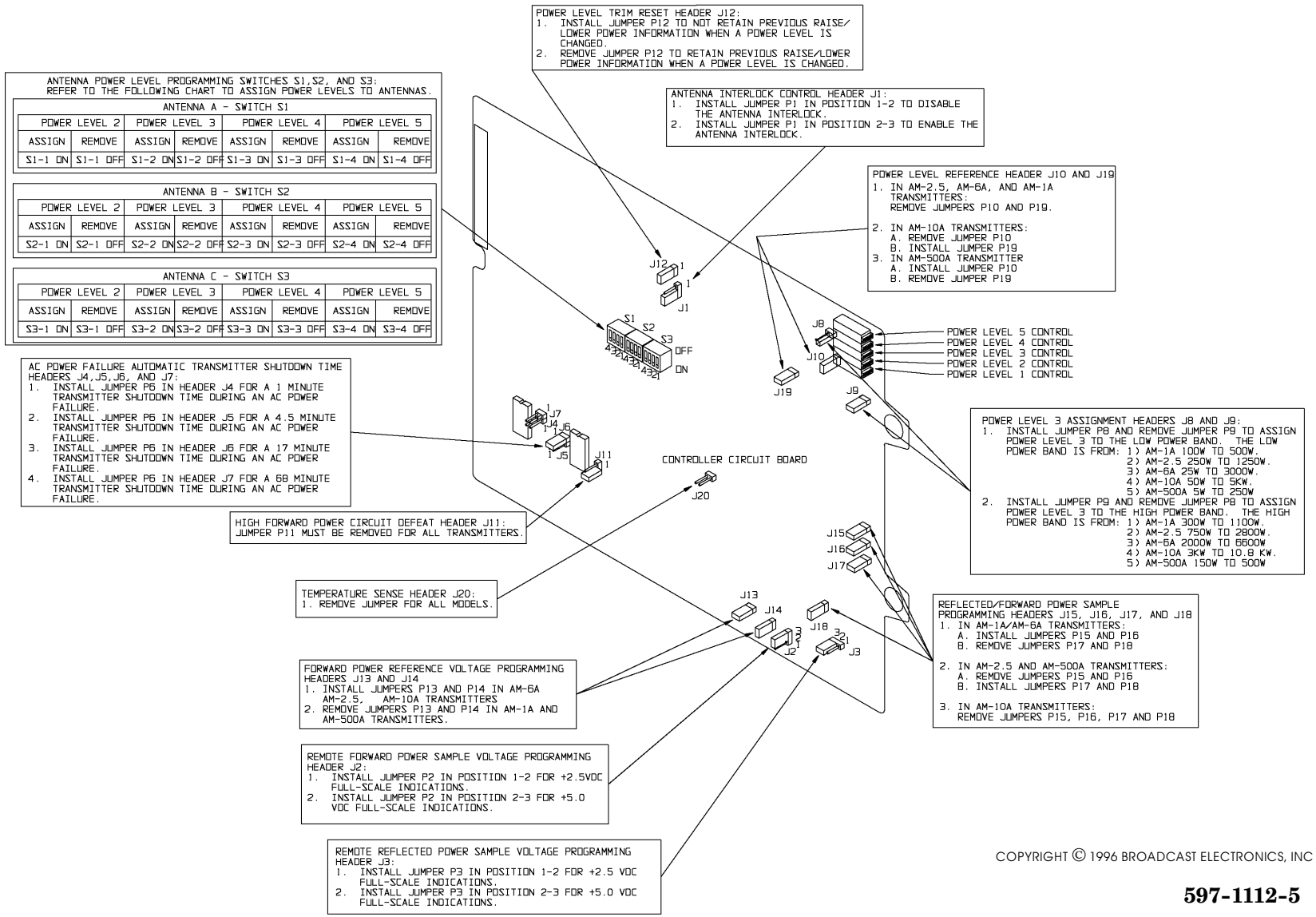


FIGURE 2-6. CONTROLLER CIRCUIT BOARD PROGRAMMING

2-49. **Remote Forward Power Sample Voltage Programming.** Programmable header J2 controls the remote forward power meter sample voltage. The remote forward power sample can be programmed for +5.0 volt dc or +2.5 volt dc full-scale meter indications. The transmitter is shipped from the factory programmed for +5.0 volt dc full-scale remote forward power meter indications.

2-50. **High Forward Power Defeat.** Programmable header J11 controls the high forward power detector circuit. Ensure jumper P11 is removed.

2-51. **Reflected/Forward Power Sample Programming.** Programmable headers J15, J16, J17, and J18 control the reflected and forward power sample levels. Headers J15 and J17 control the forward power sample. Headers J16 and J18 control the reflected power sample. For AM-1A models, ensure: 1) jumpers P15 and P16 are installed and 2) jumpers P17 and P18 are removed. For AM-500A models, ensure: 1) jumpers P15 and P16 are removed and 2) jumpers P17 and P18 are installed.

2-52. **Forward Power Reference Voltage Programming.** Programmable headers J13 and J14 establish the forward power reference level for a comparator circuit. Ensure jumpers P13 and P14 are removed.

2-53. **Temperature Sense.** Header J20 controls the temperature sense sample voltage. Ensure P20 is removed for all models.

2-54. **POWER SUPPLY CIRCUIT BOARD.** The power supply circuit board programming is presented in the following text. Refer to the following text to check the power supply circuit board programming.

2-55. **Future Corrector Circuit.** Programmable headers J9 and J10 establish parameters for a future corrector circuit. Ensure jumpers P9 is removed and P10 is installed.

2-56. **Model Programming.** Programmable headers J5 through J8 establish parameters for different AM A-Series transmitters. Refer to the following text for the programming information.

TRANSMITTER	*J5*	*J6*	*J7*	*J8*
AM-1A	Install	Remove	Remove	Install
AM-500A	Install	Remove	Install	Install

2-57. **REMOTE CONTROL CONNECTIONS.**

WARNING ***ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.***

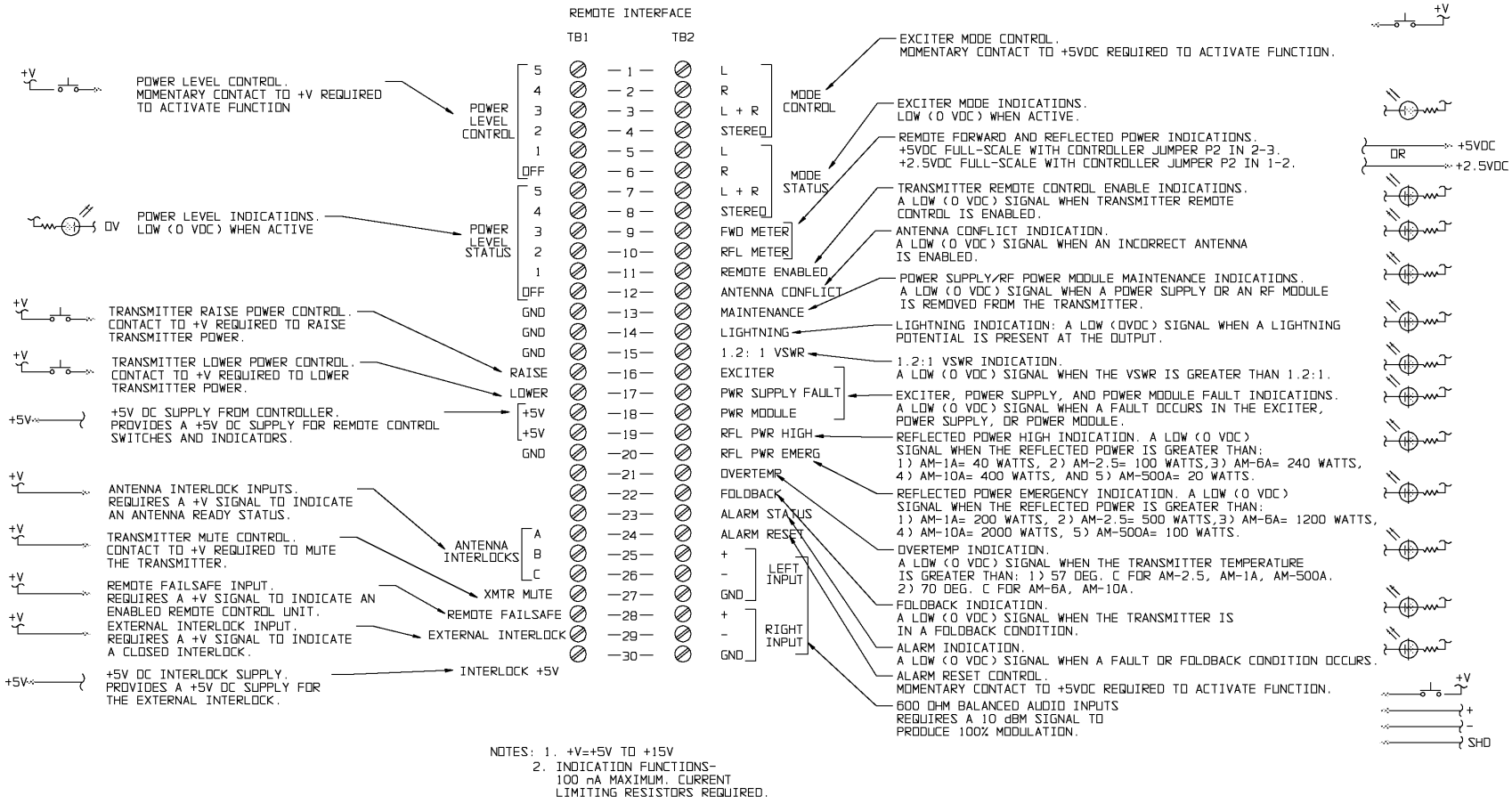
WARNING

2-58. **GENERAL.** The AM-1A/AM-500A transmitters are designed for complete remote control operation (refer to Figure 2-7). The transmitter will interface with almost any remote control unit such as the Broadcast Electronics model VMC-16 voice remote control system. The following text presents a description of the transmitter remote control functions and indications. The remote control functions are activated using a +5 to +15 volt dc signal. The remote indication functions: 1) require current limiting resistors and 2) provide up to 100 mA for indicators. A +5 volt supply is provided on the ECU rear-panel for remote control operations. The remote control connections are located on the rear-panel of the ECU.

2-59. **Power Level Controls/Indicators.** The transmitter is designed with five customer adjustable operating power controls. The controls are located at TB1-1 through TB1-5. A +5 to +15 volt dc signal is required to activate the desired function.

2-60. Indications of power level control operations are located at TB1-7 through TB1-11. The power level status indicators will go LOW (0 volts dc) when activated.

2-61. **Transmitter Off Control/Indicator.** The transmitter off control is located at TB1-6. A +5 to +15 volt dc signal is required to operate the transmitter to off. The transmitter off control indicator is located at TB1-12. The off indicator will go LOW (0 volts dc) when activated.



597-1112-3

FIGURE 2-7. REMOTE CONTROL AND AUDIO CONNECTIONS

2-62. **Power Level Raise/Lower Controls.** The transmitter is designed with raise and lower controls to adjust the transmitter output power level. The controls are equipped with the ability to raise/lower power from 10% to 15% of the selected output power level. The controls are located at TB1-16 and TB1-17. A +5 to +15 volt dc signal is required to activate the desired function.

2-63. **Antenna Interlock Input.** The antenna interlock inputs are designed for the connection of the status signals from antenna A, B, and C. The inputs are located at TB1-24 through TB1-26. The inputs require a +5 to +15 volt dc signal to indicate an antenna ready status.

2-64. **Transmitter Mute Input.** The transmitter mute input is designed to mute the transmitter when activated. The input is located at TB1-27. The input requires a +5 to +15 volt dc signal to mute the transmitter.

2-65. **Remote Failsafe Input.** The remote failsafe input is designed for the remote control unit failsafe control line. The input is located at TB1-28. The input requires a +5 to +15 volt dc signal to indicate an enabled remote control unit.

2-66. **External Interlock Input.** The external interlock input is for the connection of an interlock external to the transmitter. The input is located at TB1-29. The input requires a +5 to +15 volt dc signal to indicate a closed interlock.

2-67. **Interlock +5V.** The interlock +5 volt supply is provided for the external interlock. The +5 volt supply is located at TB1-30.

2-68. **Exciter Mode Controls/Indicators.** The transmitter exciter is designed to be configured to mono left, mono right, mono L+R, or stereo modes of operation. The controls are located at TB2-1 through TB2-4. A +5 to +15 volt dc signal is required to activate the desired function.

2-69. Indications of exciter modes of operation are located at TB2-5 though TB2-8. The exciter mode indicators will go LOW when activated.

2-70. **Remote Forward/Reflected Power Meter Indications.** Remote reflected/forward power meter indications are located at TB2-9 and TB2-10. The indications are designed to be programmed for +5 volt dc full-scale meter indications or +2.5 volt dc full-scale meter indications.

2-71. **Remote Enabled Indications.** The remote enabled indicator provides a signal to indicate the status of transmitter remote control operations. The remote enabled indicator is located at TB2-11. The indicator will go LOW to indicate when remote control operations are enabled.

2-72. **Antenna Conflict Indications.** The antenna conflict indicator provides a signal to indicate when the transmitter is configured to operate into an incorrect antenna. The antenna conflict indicator is located at TB2-12. The indicator will go LOW (0 volts dc) to indicate when the transmitter is configured for operation into an incorrect antenna.

2-73. **Maintenance Indications.** The maintenance indicator provides a signal to indicate when the transmitter power supply or RF power module is removed from the transmitter for maintenance. The maintenance indicator is located at TB2-13. The indicator will go LOW (0 volts dc) to indicate when the power supply/RF power module is removed for maintenance.

2-74. **Lightning Indications.** For AM-1A models, the lightning indicator provides a signal to indicate when a greater than 900 volt potential is present at the output. For AM-500A models, the lightning indicator provides a signal to indicate when a greater than 650 volt potential is present at the output. The lightning indicator is located at TB2-14. The indicator will go LOW (0 volts dc) to indicate when a lightning potential is present at the transmitter output.

2-75. **1.2 : 1 VSWR Indications.** The 1.2 : 1 VSWR indicator provides a signal to indicate when a greater than 1.2 : 1 VSWR condition is present at the transmitter output. When this condition occurs, the front-panel VSWR indicator will change from green to yellow. The 1.2 : 1 indicator is located at TB2-15. The indicator will go LOW (0 volts dc) to indicate when a 1.2 : 1 VSWR condition is present at the transmitter output.

2–76. **Exciter/PWR Supply/PWR Module Fault Indications.** The exciter, power supply, and power module fault indicators provide signals to indicate when an exciter, power supply, or a power module fault has occurred. The exciter, power supply, and power module fault indicators are located at TB2–16 through TB2–18. The indicators will go LOW (0 volts dc) to indicate when an exciter, power supply, or a power module fault has occurred.

2–77. **RFL PWR High Indications.** For AM–1A models, the reflected power high indicator provides a signal to indicate when 40 watts of reflected power is present at the transmitter output. For AM–500A models, the reflected power high indicator provides a signal to indicate when 20 watts of reflected power is present at the transmitter output. When this condition occurs, the front–panel VSWR indicator will change to red. The high reflected power indicator is located at TB2–19. The indicator will go LOW (0 volts dc) to indicate when a reflected power high condition is present at the transmitter output.

2–78. **RFL PWR Emergency Indications.** For AM–1A models, the reflected power emergency indicator provides a signal to indicate when greater than 200 watts of reflected power is present at the output of the transmitter. For AM–500A models, the reflected power emergency indicator provides a signal to indicate when greater than 100 watts of reflected power is present at the output of the transmitter. When this condition occurs, the front–panel VSWR indicator will flash. The reflected power emergency indicator is located at TB2–20. The indicator will go LOW (0 volts dc) to indicate when a reflected power emergency condition is present at the transmitter output.

2–79. **Overtemp Indications.** The overtemp indicator provides a signal to indicate when the transmitter temperature is greater than 57°C. The overtemp indicator is located at TB2–21. The indicator will go LOW (0 volts dc) to indicate when transmitter temperature is greater than 57°C.

2–80. **Foldback Indications.** The transmitter is designed to automatically reduce power when one of the following fault condition occurs: 1) high reflected power, 2) high forward power, 3) high temperature, or 4) detection of a high voltage by the lightning circuit. The foldback indicator is located at TB2–22. The indicator will go LOW (0 volts dc) to indicate when the transmitter is in a foldback condition.

2–81. **Alarm Status Indications.** The alarm status provides a signal to indicate when a fault or foldback condition occurs. The alarm status indicator is located at TB2–23. The indicator will go LOW (0 volts dc) to indicate when the transmitter is in a fault or foldback condition.

2–82. **Alarm Reset Control.** The alarm reset control is designed to reset the fault detection circuitry. The alarm reset control is located at TB2–24. A +5 to +15 volt dc signal is required to activate the function.

2–83. **WIRING.**

2–84. Wiring consists of connecting audio, the RF transmission line, external interlocks, modulation monitor, ground, and ac power to the transmitter. Refer to the following text and connect the wiring to the transmitter.

2–85. **AUDIO INPUT CONNECTION.** The transmitter is equipped with electronically balanced 600 Ohm left and right channel audio inputs. The audio inputs are located on the ECU rear–panel (refer to Figure 2–7). The inputs are designed to accept a +10 dBm signal at 600 Ohms.

WARNING ***ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.***

WARNING

2–86. Audio is interfaced to the transmitter by: 1) selecting the appropriate cable and 2) connecting the cable to the terminals on the ECU rear–panel. To interface audio to the transmitter: 1) use Belden 8760 cable or equivalent and 2) refer to Figure 2–7 and connect the audio to the transmitter as follows:

1. Connect the plus signal line to the + terminal.
2. Connect the minus signal line to the – terminal.
3. Connect the shield to ground.

2–87. **EXTERNAL STEREO RF INPUT.** The transmitter is equipped with an external stereo RF input on the ECU rear–panel. The input is designed for the connection of an external stereo generator or reference oscillator with a signal level from 5 to 15 volts peak–to–peak. If an external stereo signal/reference is to be applied to the transmitter, connect the signal to the **J1 EXTERNAL STEREO RF INPUT** connector on the ECU rear–panel and program jumper P7 on the exciter circuit board in position 1–2.

2–88. **RF TRANSMISSION LINE CONNECTION.** The transmitter RF output receptacle is located on the transmitter top–panel (refer to Figure 2–8). The connection requires a Type N connector. Locate the RF output transmission line and attach the Type N connector to the RF OUT receptacle on the transmitter.

2–89. **EXTERNAL INTERLOCK.** The AM–1A/AM–500A transmitter is equipped with an external interlock such as for a test load. The interlock will operate the transmitter to off when opened. The interlock is located at TB1–29 and TB1–30 on the rear–panel of the ECU unit. Refer to **External Interlock Input** and **Interlock +5V** in the REMOTE CONTROL CONNECTIONS section of the preceding text and perform the procedures to connect equipment to the transmitter external interlock.

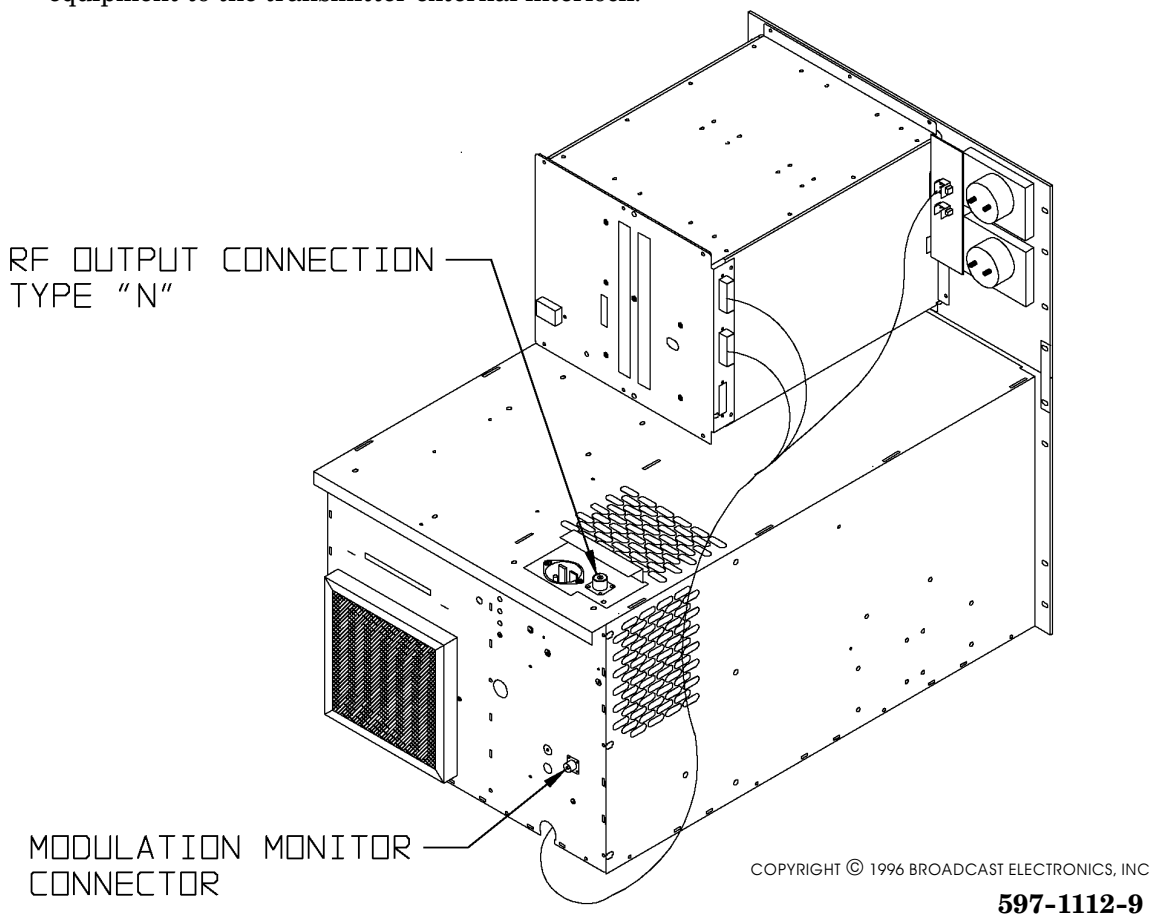


FIGURE 2–8. AM–1A/AM–500A RF OUTPUT AND MODULATION MONITOR CONNECTORS

2–90. **MODULATION MONITOR.** The transmitter is equipped with a modulation monitor receptacle. The receptacle is located on the transmitter rear–panel. Refer to Figure 2–8 and connect the modulation monitor to the MOD MONITOR receptacle.

2–91. **AC POWER CONNECTIONS.** The AM–1A/AM–500A transmitter requires a single–phase source of 196V to 252V ac, 50 Hz or 60 Hz at 20 Amperes. AC power is applied to the transmitter through an ac line cord and modular connector. The transmitter ac power source must be protected by a 20 Ampere fused disconnect or circuit breaker (refer to Figure 2–9).

WARNING ***ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.***

WARNING

2–92. **Transmitter AC Line Cord Assembly.** AC power is applied to the transmitter using an ac line cord and connector. The connector must be assembled to the line cord. To assemble the modular connector to an ac line cord, proceed as follows:

1. Refer to local electrical codes and select a line cord material for the transmitter ac line cord assembly. The ac line cord material must contain: 1) minimum 12 gauge copper conductors and 2) the appropriate insulation type such as S or SO (refer to Figure 2–9). Determine the length of the cord required to route power to the transmitter and select the ac line cord material.
2. Locate the modular ac line cord connector in the accessory parts kit.
3. Assemble the ac line cord connector to the ac line cord by following the instructions contained in the ac line cord connector.
4. Connect the ac line cord to a 196V to 252V ac 50/60 Hz power source protected by a 20 Ampere fused disconnect or circuit breaker.

2–93. **Main AC Input.** Ensure the transmitter ac line cord is connected to an appropriate power source. Refer to Figure 2–9 and connect the transmitter ac line cord to the ac input receptacle on the top–panel of the output network chassis as shown. Route the line cord through the strain relief as shown.

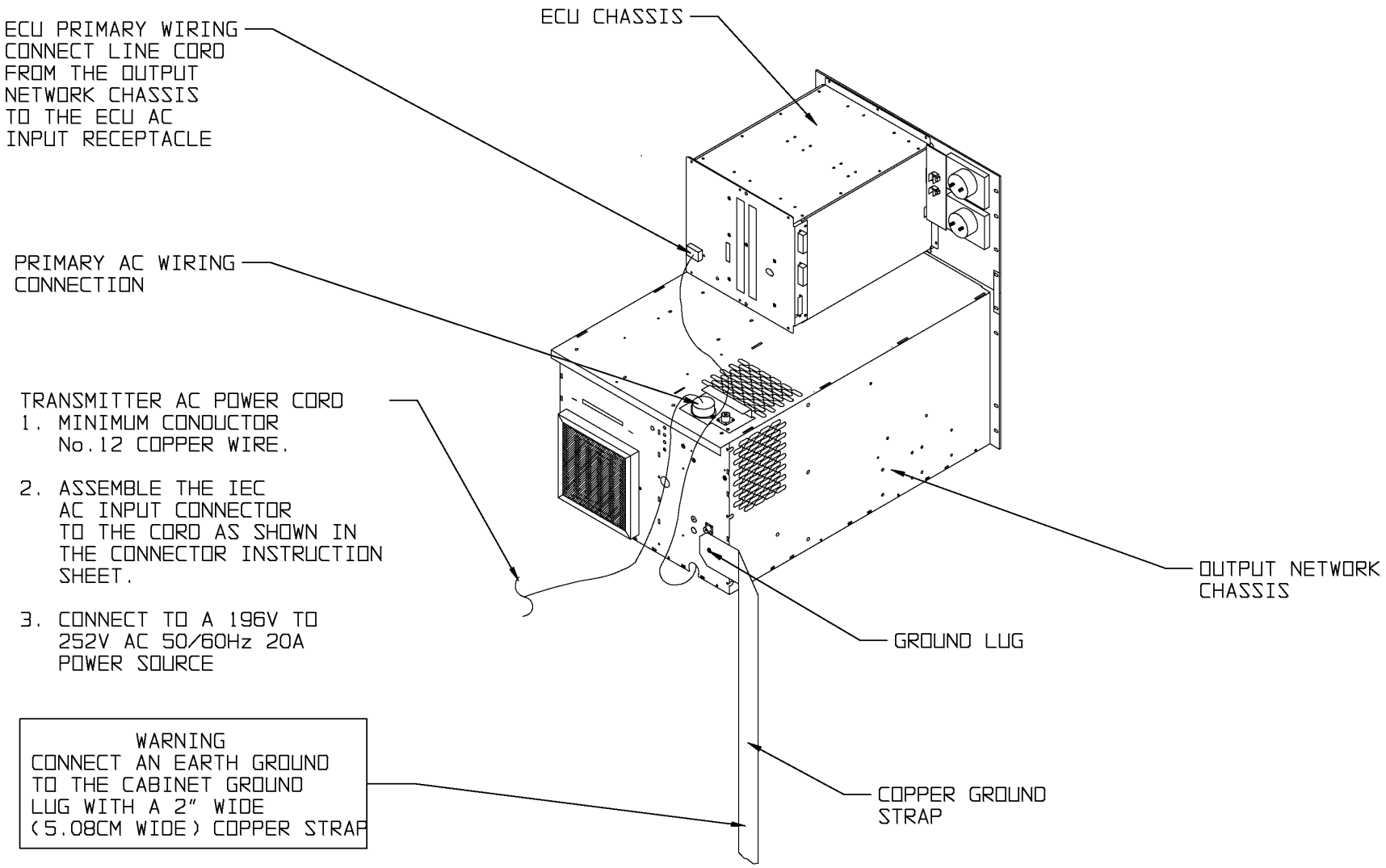
WARNING ***ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.***

WARNING

WARNING ***ENSURE AN EARTH GROUND CONDUCTOR IS SECURELY CONNECTED TO THE TRANSMITTER GROUND LUG.***

WARNING

2–94. **GROUND.** The transmitter is equipped with a chassis ground system for operating safety. The ground system requires the connection of an earth ground. Refer to Figure 2–9 and connect an earth ground to the cabinet ground lug as shown using a 2 inch (5.08 cm) wide copper strap.



597-1112-14

FIGURE 2-9. AM-1A/AM-500A PRIMARY AC WIRING

2–95. **TRANSMITTER SITE LIGHTNING PROTECTION SYSTEM CHECKOUT.**

CAUTION

CAUTION

THE TRANSMITTER SITE LIGHTNING PROTECTION SYSTEM MUST BE INSPECTED AND IN PROPER WORKING CONDITION FOR RELIABLE TRANSMITTER OPERATION.

2–96. For reliable transmitter operation, the transmitter site lightning protection system must be inspected and in proper working condition. Due to the solid–state design of the transmitter, high voltage potentials from lightning activity can cause severe damage to the transmitter circuitry. Therefore, perform the following procedures to inspect and improve the lightning protection system at the transmitter site. Refer to the NAB Radio Handbook for additional transmitter site lightning protection system information.

2–97. **ANTENNA BALL-GAP LIGHTNING ARRESTOR.** Each tower in the antenna system must be equipped with a ball–gap lightning arrestor (refer to Figure 2–10). The ball–gap arrestor is designed to safely conduct lightning potentials to ground. Inspect the ball–gap arrestors by performing the following procedures.

2–98. **Ball-Gap Position.** The antenna ball–gap lightning arrestor must be aligned horizontally. Do not align the ball–gaps vertically. Vertical alignment allows rain water to collect on the balls. This reduces the gap separation and results in arcing during rain activity.

2–99. **Ball-Gap Separation.** The antenna ball–gap lightning arrestor must be adjusted for the proper separation. If the ball–gap separation is too wide, the arrestor will not function. If the ball–gap separation is too narrow, the arrestor will arc during normal transmitter operation. As a general rule: 1) a separation of approximately 0.020 in. for each peak kilovolt at the transmitter tower is required or 2) 0.125 inch for each 9.4 peak kilovolt at the transmitter tower is required.

2–100. The recommended method for ball–gap separation adjustment is to adjust the gap to prevent arcing during peak modulation activity. To adjust the separation, proceed as follows:

1. Adjust the ball–gap separation using the general rule presented in the preceding text.
2. Operate the transmitter at peak modulation and check the ball–gap for arcing activity.

WARNING

WARNING

DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.

3. Operate the transmitter to off.
4. Adjust the ball–gap separation as follows:
   A. If no arcing activity is detected, reduce the ball–gap separation.
   B. If arcing activity is detected, increase the ball–gap separation.
5. Repeat the procedure until the ball–gap separation is adjusted for the smallest gap possible without arcing during peak modulation activity.

2–101. **ANTENNA-TUNING-UNIT SPARK-GAP LIGHTNING ARRESTOR.** The antenna–tuning–unit (ATU) must be equipped with a spark–gap lightning arrestor (refer to Figure 2–10). The spark–gap arrestor can be: 1) a ball–gap type, or 2) a horn type. Adjust the spark–gap for the smallest possible gap without arcing during peak modulation activity.

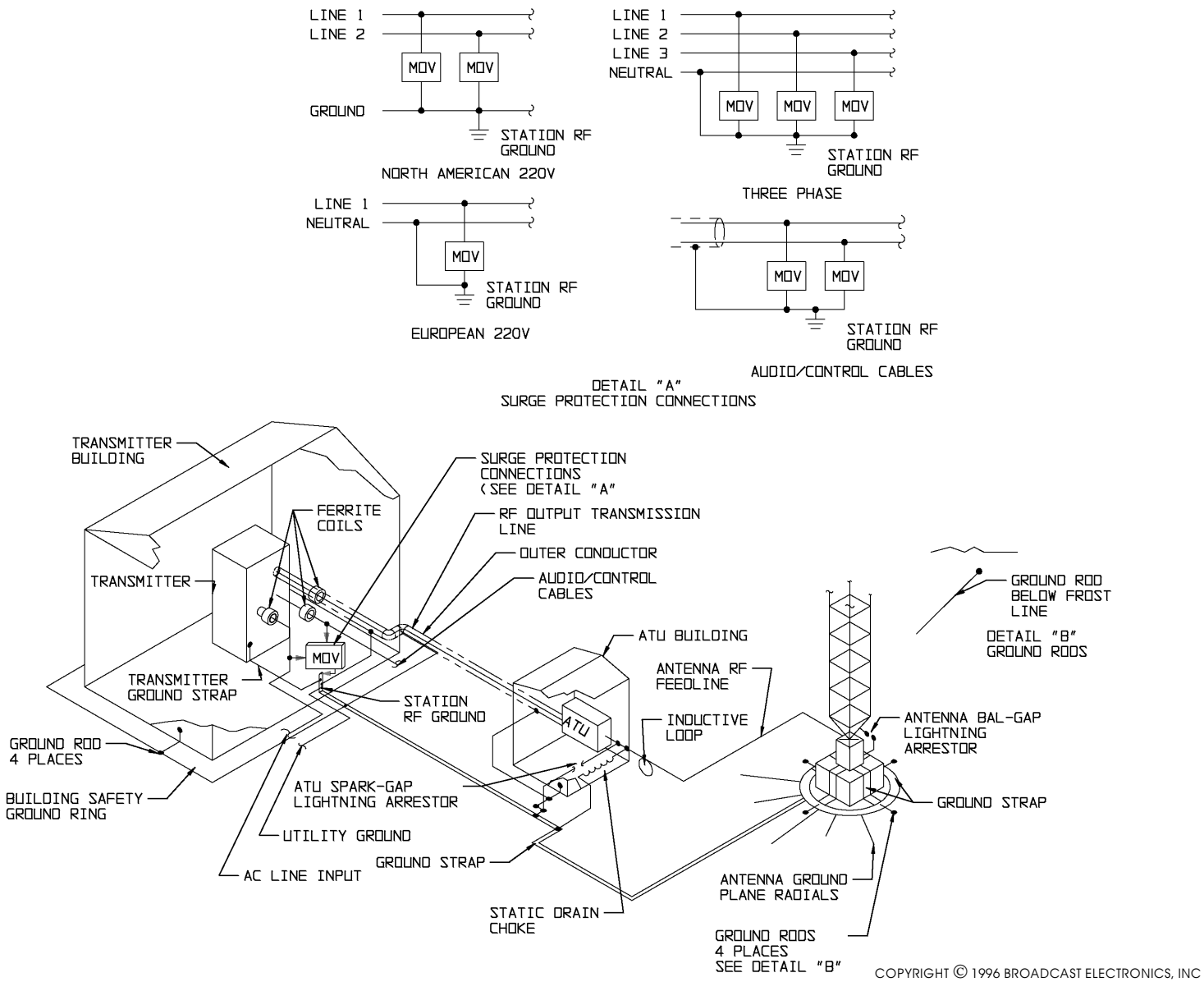


FIGURE 2-10. ANTENNA LIGHTNING PROTECTION SYSTEM

2-102. **TRANSMITTER SITE GROUNDING SYSTEM.** The transmitter site grounding system must be properly connected for reliable transmitter operation. A typical transmitter site grounding system is shown in Figure 2-10. Perform the following procedures to ensure the grounding system connections are secure.

1. Ensure the antenna base ground strap is securely connected to the antenna ground plane radials.

2. Ensure the antenna ball-gap lightning arrestor is securely connected to the lightning ground rod system and to the antenna ground plane radials.

3. Ensure the ATU ground and the station RF ground is securely connected to the antenna ground plane radials.

2-103. **CABLE PROTECTION.** The ac line cable, audio/control cables, and the RF output transmission line require a combination of MOV and ferrite core protection to prevent the entry of lightning potentials (refer to Figure 2-10). Refer to the following text to install MOVs and ferrite cores to prevent the conductance of lightning potentials.

2-104. **Mov.** Refer to Figure 2-10 and ensure MOVs are connected from the ac line and audio/control cable conductors to the station RF ground as shown. The MOVs should be rated for 20,000 Ampere surges (BE P/N 140-0021).

2-105. **Ferrite Core.** The ac line cable, the audio/control cables, and the RF output transmission line also require the placement of ferrite cores. The cores are designed to create a high impedance for undesired current paths such as lightning. Ferrite cores for placement on ac line, audio/control, and output transmission line cables are located in the accessory parts kit. Locate the ferrite cores in the accessory kit. Refer to Figure 2-10 and install the cores by performing the following procedures.

2-106. **Modulation Monitor Core.** One 375-0009-001 ferrite core is designed to be installed on the modulation monitor cable. Install the core on the modulation monitor cable by: 1) routing the cable through the core and 2) wrapping the cable to create one cable loop around the core. The core can be installed at any location on the cable.

2-107. **Audio/Remote Control/Status Core.** A second 375-0009-001 ferrite core is designed to be installed on the audio and remote control/status cables. Install the core on the audio and remote control/status cables by: 1) routing the cables through the core and 2) if possible, wrapping the cables to create one cable loop cable around the core. The core can be installed at any location on the cables.

2-108. **AC Input Core.** A 375-0007-001 ferrite core is designed to be installed on the transmitter ac input cable. Install the core by routing: 1) both ac line phase cables through the core or 2) both ac line phase cables and ground cable through the core. Place the core at any location between the wall mounted fused disconnect and the transmitter ac input.

2-109. **RF Output Core.** A 375-0007-001 ferrite core is designed to be installed on the transmitter RF output transmission line cable. Install the core by routing the RF output cable through the core. Place the core at any location between the transmitter RF output connector and the next equipment connection in the RF output system such as the antenna phasing system. It is recommended the core be placed outside the transmitter cabinet if a cabinet is supplied.

2-110. **ANTENNA RF FEED LINE.** Check the antenna RF feed line between the ATU and the tower. Ensure the line contains one or more one foot diameter loops. The loops function as a series inductance and increase the impedance of the line.

2-111. **TRANSMISSION LINE AND ANTENNA CHECKOUT.**

CAUTION ***THE TRANSMISSION LINE AND ANTENNA MUST BE INSPECTED AND IN PROPER WORKING CONDITION FOR RELIABLE TRANSMITTER OPERATION.***

CAUTION

2-112. The transmission line and antenna must be inspected and in proper working condition for reliable transmitter operation. Perform the following procedures to inspect the transmission line and antenna.

2-113. **ANTENNA VSWR.** The transmitter is designed to operate into an antenna with a maximum 1.30 : 1 VSWR. Check the antenna VSWR. If the VSWR is greater than 1.30 : 1, contact the Broadcast Electronics Customer Service Department. Typically, the antenna will require the installation of an additional tuning unit to reduce the antenna VSWR to less than 1.30 : 1. If an additional tuning unit is required, the transmitter may be equipped with the optional tuning unit (refer to APPENDIX A for tuning unit information).

2-114. **COAXIAL SWITCH CONTROLLER.** To prevent damage to the transmitter, the transmitter must be muted during any antenna change sequence. Inspect the motorized coaxial switch controller and ensure the unit outputs a +5 volt to +15 volt mute signal. Ensure the mute signal is applied to the transmitter.

2-115. **ATU AND PHASOR CHECKOUT.** Inspect the ATU and the antenna phasor unit (if installed in the system) for arcing activity during peak modulation periods. Repair or replace any devices to prevent arcing during peak modulation periods.

2-116. **INITIAL CHECKOUT.**

WARNING ***ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.***

WARNING

2-117. Prior to performing the preliminary operating procedures, the transmitter should be checked to ensure all installation and connection procedures have been performed. To check the transmitter, proceed as follows:

A. Ensure all ECU circuit boards and the RF power module are installed.

B. Ensure the RF output transmission line is connected to the transmitter output network.

C. Ensure the station earth ground is connected to the transmitter ground terminal.

D. Ensure all audio and control cables are connected to the transmitter.

E. Ensure the modulation monitor is connected to the transmitter.

F. Ensure all ac power connections are secure.

G. Ensure the station RF output transmission line system and antenna are in proper working condition.

H. Ensure the antenna lightning protection system is in proper working condition.

2–118. **PRELIMINARY OPERATION AND ADJUSTMENT.**

WARNING

WARNING

THE TRANSMITTER POWER SUPPLY CONTAINS MULTIPLE GROUND CIRCUITS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CABINET WHICH IS AT EARTH POTENTIAL. NEVER OPERATE THE TRANSMITTER WITH THE TOP-PANELS REMOVED.

2–119. Operate the **POWER** circuit breaker to ON. The ECU and the power module front–panel indicators will illuminate.

2–120. Depress the power level 1 switch/indicator to illuminate the switch/indicator.

2–121. Operate the **FORWARD POWER** meter switch to **LOW** and observe the forward power indication.

2–122. Operate the **REFLECTED POWER** meter switch to **LOW** and observe the reflected power indication.

2–123. **POWER LEVEL AND MODULATION MONITOR CALIBRATION ADJUSTMENTS.** The transmitter power levels are adjusted to the levels specified in the sales order at the factory. If no power levels are specified, the levels are adjusted as follows:

AM–1A
Power level 1 = 100 watts
Power level 2 = 250 watts
Power level 3 = 500 watts
Power level 4 = 750 watts
Power level 5 = 1000 watts

AM–500A
Power level 1 = 50 watts
Power level 2 = 125 watts
Power level 3 = 250 watts
Power level 4 = 375 watts
Power level 5 = 500 watts

2–124. If desired, the transmitter power levels can be changed at any time. If the transmitter power levels are adjusted, the modulation monitor output must also be re–calibrated. To change the power level and re–calibrate the modulation monitor output, proceed as follows:

WARNING

WARNING

DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.

2–125. Operate the front panel **POWER** circuit breaker to OFF.

2-126. Refer to Figure 2-11 and connect the test equipment to the transmitter modulation connector as shown.

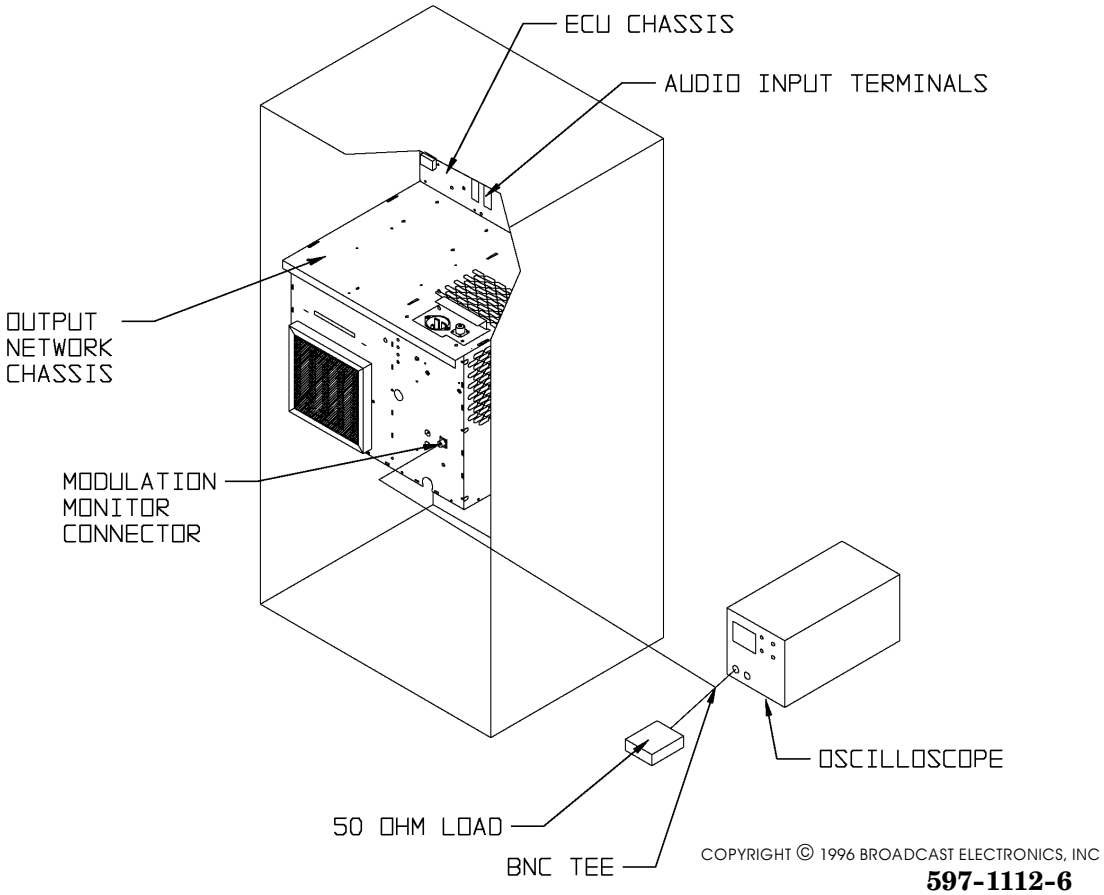


FIGURE 2-11. TEST EQUIPMENT CONNECTIONS, POWER LEVEL CALIBRATION

2-127. Operate the transmitter front panel **POWER** switch to ON.

2-128. Depress power level control 1 switch/indicator to illuminate the switch/indicator.

2-129. Operate the **FORWARD POWER** meter switch to **LOW** or **HIGH** as required and observe the forward power indication.

2-130. Refer to Figure 2-6 and adjust the power level 1 control on the controller circuit board to obtain the desired indication on the **FORWARD POWER** meter. For AM-1A models, the control range is from 5 watts to 500 watts. For AM-500A models, the control range is from 5 watts to 250 watts.

2-131. Refer to Figure 3-1 in SECTION III, OPERATION and adjust the power level 1 modulation monitor calibration control for a 5.7 volt peak-to-peak signal on the oscilloscope.

2-132. Repeat the procedure for power levels 2 through 5. The power level control ranges are as follows:

AM-1A

1. Power level 2 - 5 watts to 500 watts.
2. Power level 3 - 5 watts to 500 watts or 300 watts to 1100 watts as programmed by a jumper on the controller circuit board.
3. Power level 4 - 300 watts to 1100 watts.
4. Power level 5 - 300 watts to 1100 watts.

1. Power level 2 – 5 watts to 250 watts.
2. Power level 3 – 5 watts to 250 watts or 150 watts to 500 watts as programmed by a jumper on the controller circuit board.
3. Power level 4 – 150 watts to 500 watts.
4. Power level 5 – 150 watts to 500 watts.

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

2-133. Operate the front-panel **POWER** switch to OFF.

2-134. Disconnect the cable from the transmitter modulation monitor connector.

2-135. **STEREO ADJUSTMENT.** If the transmitter is operated in the stereo mode, the transmitter stereo circuitry must be adjusted to compensate for antenna system variances. The primary objective in the adjustment of the transmitter is to configure the stereo circuitry to minimize distortion and maximize separation across the entire audio band. A proof of performance sheet is provided at the end of this section to record performance measurements. To adjust the stereo circuitry, perform the following procedures and record the measurements on the proof of performance sheet at the end of this section.

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

2-136. Operate the front-panel **POWER** switch to OFF.

2-137. Refer to Figure 2-12 and connect the test equipment as shown.

2-138. Operate the oscilloscope for: 1) 200 mV/div sensitivity and 2) dc coupled.

2-139. Refer to Figure 2-7 and connect an audio generator to the audio input terminals on the ECU rear-panel.

2-140. Operate the front-panel **POWER** switch to ON.

2-141. Select the antenna which is configured for equalization circuit 1 operation (refer to STEREO CIRCUIT BOARD PROGRAMMING in the preceding text if required) and determine a power level.

2-142. Depress the desired power level switch/indicator to illuminate the switch/indicator.

2-143. Refer to SECTION III, OPERATION and perform the following:

1. Operate the stereo circuit board mode control switch to illuminate the stereo indicator. When power is applied to the transmitter, the stereo circuit board will automatically be configured to the stereo mode.
2. Operate the stereo circuit board pilot switch to off.
3. Ensure the equalization circuit 1 indicator on the stereo circuit board is illuminated.

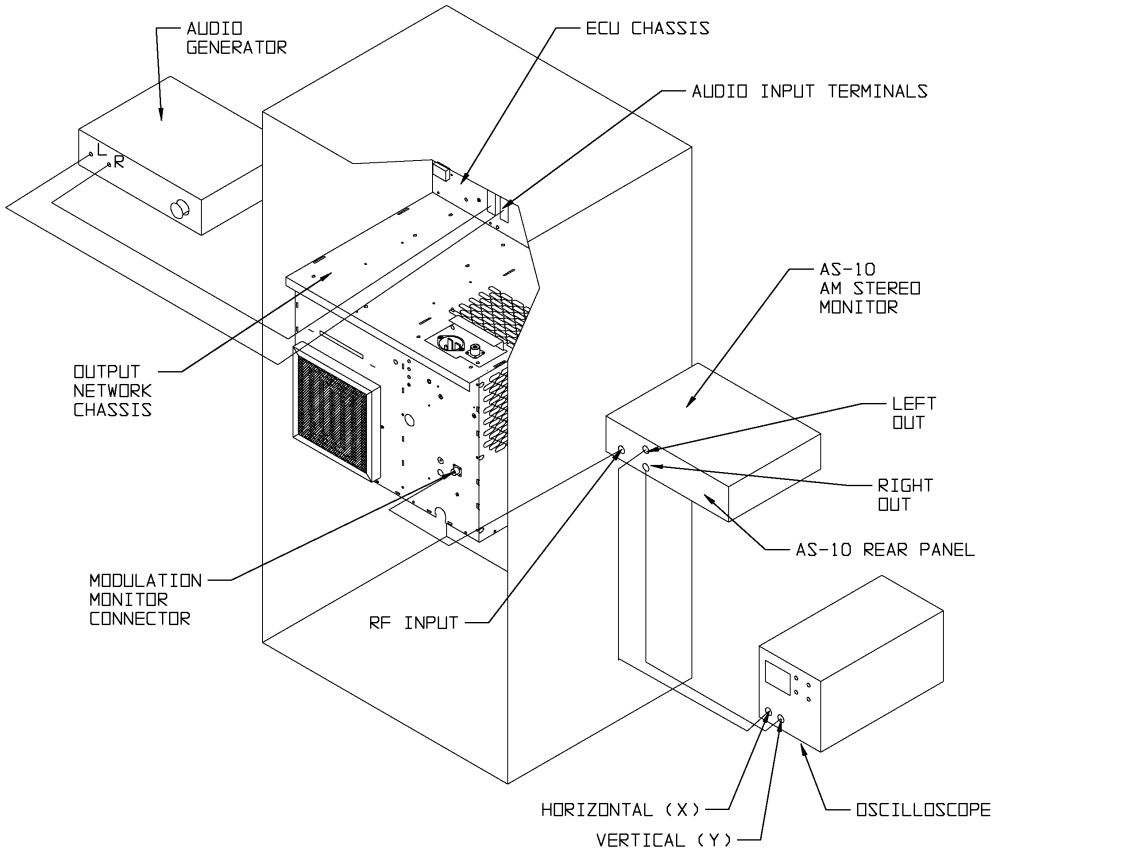


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FIGURE 2-12. TEST EQUIPMENT CONNECTIONS, SEPARATION

2-144. Adjust equalization circuit 1 as follows:

1. Adjust the audio generator for a 1 kHz left channel output at +10 dBm and observe the lissajous pattern displayed on the oscilloscope.
2. Refer to Figure 2-5 and adjust the left channel level control to obtain a horizontal lissajous pattern (refer to Figure 2-13).
3. Adjust the group delay as follows:
   A. Configure the group delay circuitry for adjustment as follows:
      1. Refer to Figure 2-5 and configure the left channel 4 microsecond and 8 microsecond sections to in.
      2. Refer to Figure 2-5 and operate the left channel delay control fully counter-clockwise.
   B. Refer to Figure 2-5 and adjust the left channel delay control to close the oscilloscope display and obtain a straight-line lissajous display as shown in the maximum left channel separation lissajous pattern (refer to Figure 2-13). If the display will not close, proceed as follows:
      1. Refer to Figure 2-5 and: 1) configure only the 8 microsecond delay section to in and 2) adjust the left channel delay control to close the oscilloscope display. If the display will not close, refer to Figure 2-5 and: 1) configure only the 4 microsecond delay section to in and 2) adjust the left channel delay control to close the oscilloscope display.

4. Adjust the separation at 7 kHz as follows:

   A. Adjust the audio generator for a 7 kHz left channel output at +10 dBm.

   B. Refer to Figure 2–5 and adjust the left channel cutoff and peak controls to obtain a maximum left channel separation lissajous pattern as shown in Figure 2–13.

   C. If a maximum left channel lissajous pattern can not be obtained, refer to Figure 2–5 and adjust the left channel delay control to close the oscilloscope display and obtain a straight–line lissajous pattern (refer to Figure 2–13).

5. Repeat the entire procedure for the right channel. Adjust the right channel level, cutoff, peak, and delay controls as required to obtain optimum separation and distortion from the right channel.

6. Repeat the entire procedure for equalization circuit 2. Adjust the equalization circuit 2 using the equalization 2 left/right channel level, cutoff, peak, delay, controls and the equalization 2 group delay sections to obtain optimum separation and distortion.

2–145. Once the stereo adjustment is complete: 1) refer to SECTION III, OPERATION and operate the pilot switch on the stereo circuit board to ON and 2) remove the test equipment.

2–146. **SINGLE CHANNEL LEVEL.** The transmitter is equipped with a single channel level control. When the transmitter is operating in the stereo mode, the level control is designed to boost a remaining audio channel level in the event of a failure in one channel. For transmitters operating in the stereo mode, adjust the single channel level control as follows:

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

2–147. Operate the front–panel **POWER** switch to OFF.

2–148. If an audio processor is used with the transmitter, ensure the processor is connected as follows:

1. Ensure normal program audio is connected to the processor input.

2. Ensure the audio processor output is connected to the transmitter audio input.

2–149. Operate the front–panel **POWER** switch to ON.

2–150. Depress a desired power level switch/indicator to illuminate the switch/indicator.

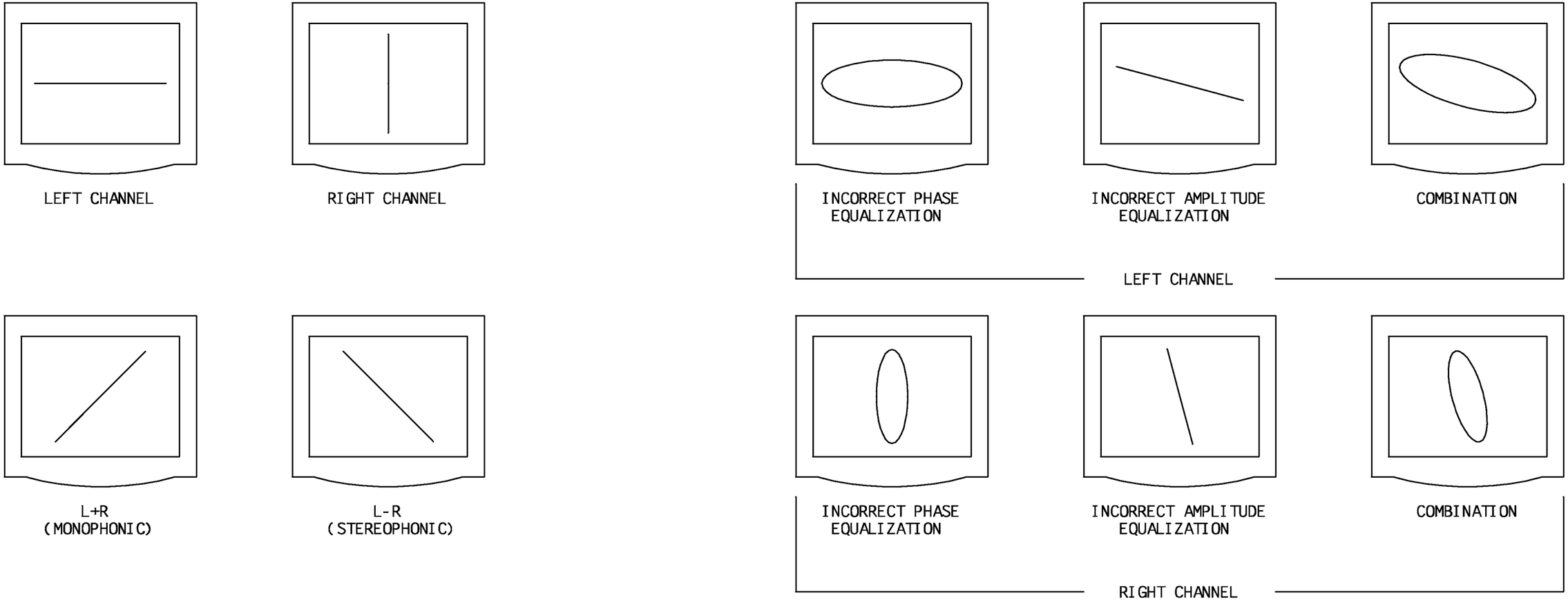
2–151. Refer to SECTION III, OPERATION and operate the stereo circuit board mode control switch to illuminate the stereo indicator.

2–152. Disable one channel applied to the transmitter.

2–153. If an audio processor is used with the transmitter, refer to the audio processor manual and adjust the processor single channel limiter as described in the procedure.

2–154. Refer to SECTION III, OPERATION and operate the stereo circuit board mode control switch to illuminate the mono left or mono right indicator as determined by the remaining operating audio channel applied to the transmitter.

2–155. Refer to Figure 2–4 and adjust the single channel level control on the exciter circuit board as required to obtain an approximate 100% modulation indication on the modulation monitor.



MAXIMUM SEPARATION LISSAJOUS PATTERNS

POOR SEPARATION LISSAJOUS PATTERNS

597-0095-19

FIGURE 2-13. EQUALIZATION LISSAJOUS PATTERNS
(2-31/2-32)

SECTION III
OPERATION

3-1. INTRODUCTION.

3-2. This section identifies all controls and indicators associated with the AM-1A/AM-500A transmitters and provides standard operating procedures.

3-3. CONTROLS AND INDICATORS.

3-4. Figures 3-1 through 3-3 present the location of all controls and indicators associated with normal operation of the AM-1A/AM-500A transmitters. Tables 3-1 through 3-3 present the functions of each control or indicator. Refer to Figures 3-1 through 3-3 and Tables 3-1 through 3-3 for a description of the controls and indicators associated with the transmitter.

TABLE 3-1. AM-1A/AM-500A CONTROLS AND INDICATORS
(Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	**FORWARD POWER** Meter	Displays the transmitter forward power output in watts as selected by the **FORWARD POWER** Meter **LOW/HIGH/OFF** switch.
2	**FORWARD POWER** Meter **HIGH/LOW/OFF** Switch	Configures the **FORWARD POWER** meter: 1) to display forward power information on the HIGH scale, 2) to display forward power information on the LOW scale, or 3) to off. In the AM-1A, the HIGH scale is from 0 to 1200 watts and 2) LOW scale is from 0 to 300 watts. In the AM-500A, the HIGH scale is from 0 to 600 watts and 2) LOW scale is from 0 to 150 watts.
3	**REFLECTED POWER** Meter	Displays the transmitter reflected power output in watts or the ac input voltage in volts as selected by the **REFLECTED POWER HIGH/LOW/VAC** Switch.
4	**REFLECTED POWER** Meter **HIGH/LOW/VAC** Switch	Configures the **REFLECTED POWER** Meter to display: 1) reflected power information on the HIGH scale, 2) reflected power information on the LOW scale, or 3) the ac input voltage. In the AM-1A, the HIGH scale is from 0 to 120 watts and 2) LOW scale is from 0 to 30 watts. The ac volts scale is from 150 to 300 volts. In the AM-500A, The HIGH scale is from 0 to 60 watts and 2) LOW scale is from 0 to 12 watts. The ac volts scale is from 150 to 300 volts.
5	**POWER** Switch	Controls the application of ac power to the transmitter.

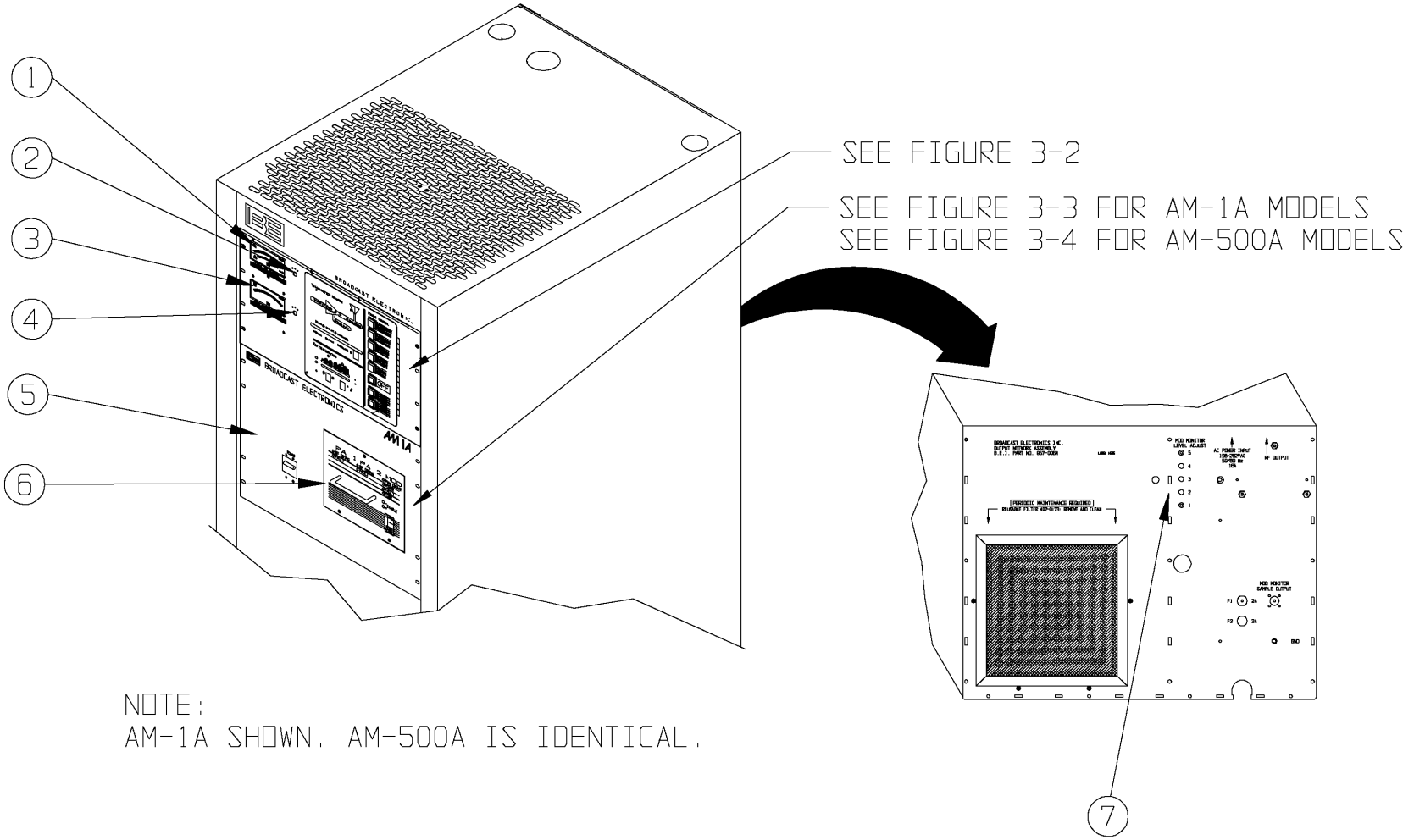


FIGURE 3-1. AM-1A
CONTROLS AND INDICATORS
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597-1112-8

FIGURE 3-1. AM-1A/AM-500A CONTROLS AND INDICATORS

TABLE 3-1. AM-1A/AM-500A CONTROLS AND INDICATORS
(Sheet 2 of 2)

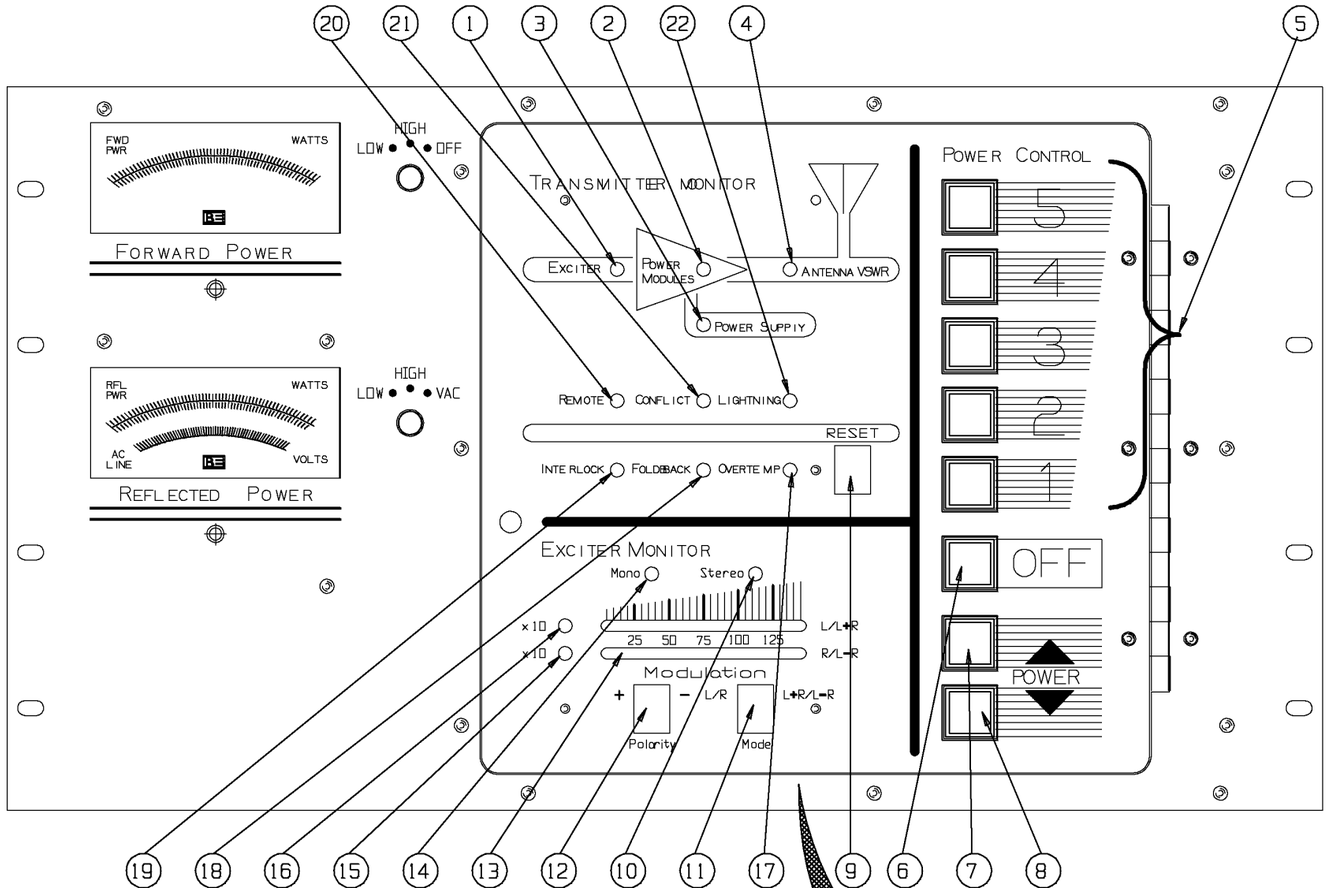
INDEX NO.	NOMENCLATURE	FUNCTION
6	**RF POWER MODULE**	A modular plug–in assembly containing two RF power amplifier circuit boards and one modulator circuit board. In the AM–1A, the power module is designed to output 1100 watts of RF power. In the AM–500A, the power module is designed to output 550 watts of RF power.
7	Modulation Monitor Calibration Controls	Calibrates the modulation monitor sample to power levels 1 through 5.

TABLE 3-2. ECU CONTROLS AND INDICATORS
(Sheet 1 of 6)

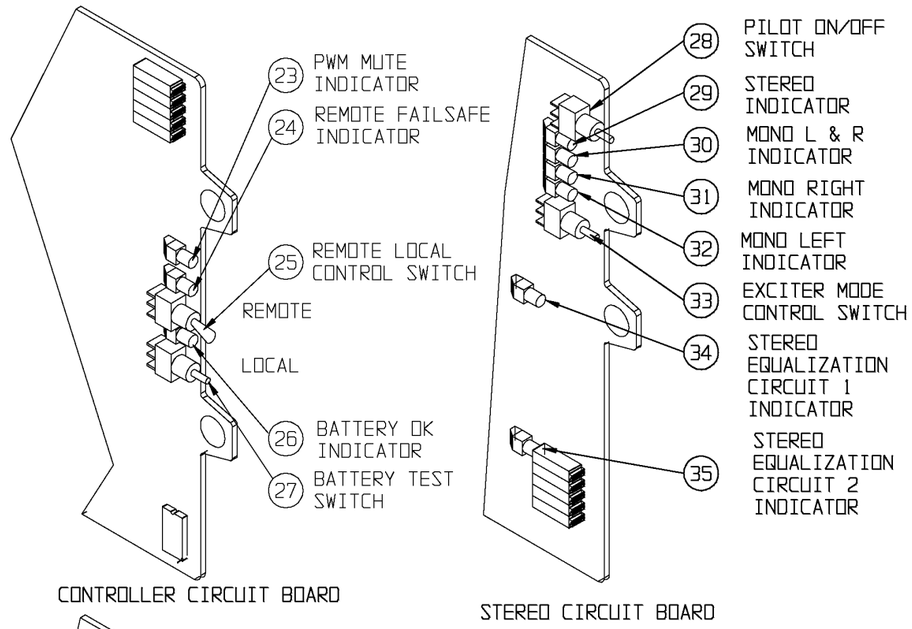
INDEX NO.	NOMENCLATURE	FUNCTION
1	**EXCITER** Indicator	Displays the operating status of the exciter. GREEN Display – Indicates normal exciter operation. RED Display – Indicates an exciter fault.
2	**POWER MODULES** Indicator	Displays the operating status of the transmitter RF power module. GREEN Display – Indicates the RF power module is operating normally. YELLOW Display – Indicates the RF power module is removed from the transmitter. RED Display – Indicates a fault in the RF power module.
3	**POWER SUPPLY** Indicator	Displays the operating status of the transmitter power supply system. GREEN Display – Indicates normal power supply system operation. YELLOW Display – Indicates the power supply is removed from the transmitter. RED Display – Indicates a power supply system fault.

TABLE 3-2. ECU CONTROLS AND INDICATORS
(Sheet 2 of 6)

INDEX NO.	NOMENCLATURE	FUNCTION
4	**ANTENNA VSWR** Indicator	Displays the condition of the antenna system. GREEN Display – Indicates a normal antenna load. YELLOW Display – Indicates a VSWR condition of 1.2 : 1. RED Display – For AM–1A models, indicates a 40 watt reflected power condition or a condition which results in a high forward power indication of greater than 20%. For AM–500A models, indicates a 20 watt reflected power condition or a condition which results in a high forward power indication of greater than 20%. When this condition occurs, the transmitter output power will foldback. FLASHING RED Display – For AM–1A models, indicates a 200 watt reflected power condition. For AM–500A models, indicates a 100 watt reflected power condition. When this condition occurs, the transmitter will operate to off.
5	**POWER CONTROL** Switch/Indicators	SWITCHES – A group of five switches designed to select five customer adjustable transmitter operating output power levels. For AM–1A models, switches 1 and 2 can be adjusted to obtain output power levels from 5 watts to 500 watts. Switches 4 and 5 can be adjusted to obtain output power levels from 300 watts to 1100 watts. Switch 3 is designed to be customer assigned to control power in the 5 to 500 watt range or the 300 to 1100 watt range. For AM–500A models, switches 1 and 2 can be adjusted to obtain output power levels from 5 watts to 250 watts. Switches 4 and 5 can be adjusted to obtain output power levels from 150 watts to 500 watts. Switch 3 is designed to be customer assigned to control power in the 5 to 250 watt range or the 150 to 500 watt range. INDICATORS – Illuminates to indicate an associated power control switch has been selected.

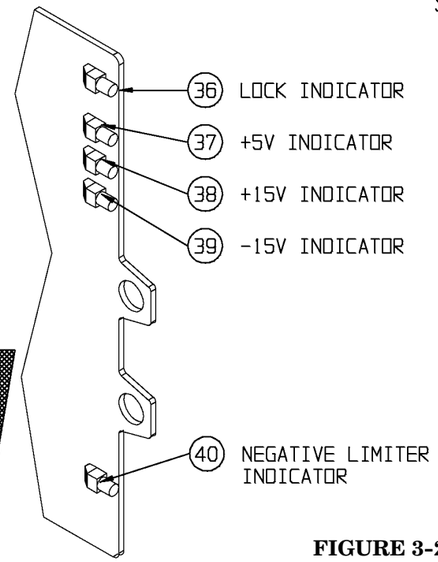


EXCITER CONTROL UNIT



CONTROLLER CIRCUIT BOARD

STEREO CIRCUIT BOARD



EXCITER CIRCUIT BOARD

597-1111-9

FIGURE 3-2. ECU CONTROLS AND INDICATORS
(3-5/3-6)

TABLE 3-2. ECU CONTROLS AND INDICATORS
(Sheet 3 of 6)

INDEX NO.	NOMENCLATURE	FUNCTION
6	**OFF** Switch/Indicator	SWITCH – Deenergizes the transmitter RF output power and configures the unit to off. INDICATOR – Illuminates to indicate the **OFF** switch has been selected.
7	**POWER** ▲ Switch/ Indicator	SWITCH – Instructs the system controller to raise the transmitter output power. The switch is designed with the ability to raise power from 10% to 15% of the selected output power level. INDICATOR – During manual operating conditions, illuminates to indicate the **POWER** ▲ switch is selected. During automatic raise conditions, the indicator will illuminate to indicate the rate of automatic power increase.
8	**POWER** ▼ Switch/ Indicator	SWITCH – Instructs the system controller to lower the transmitter output power. The switch is designed with the ability to lower power from 10% to 15% of the selected output power level. INDICATOR – During manual operating conditions, illuminates to indicate the **POWER** ▼ switch is selected. During automatic lower conditions, the indicator will illuminate to indicate the rate of automatic power decrease.
9	**RESET** Switch/ Indicator	SWITCH – Clears the transmitter fault circuitry when: 1) the switch is depressed and 2) if the fault condition is removed. INDICATOR – Illuminates to indicate a fault has been encountered.
10	**EXCITER MONITOR STEREO** Indicator	Illuminates to indicate the exciter is configured to the stereo mode.
11	**EXCITER MONITOR MODE** Switch/ Indicator	SWITCH – Selects either left/right channel or L–R/L+R information for presentation on the **EXCITER MONITOR** LED bar–graph display. INDICATOR – Indicates the type of information selected for display on the exciter monitor. The **L/R** indicator will illuminate to indicate the display of left/right channel information. The **L+R/L-R** indicator will illuminate to indicate the display of L+R/ L–R information.

TABLE 3-2. ECU CONTROLS AND INDICATORS
(Sheet 4 of 6)

INDEX NO.	NOMENCLATURE	FUNCTION
12	**EXCITER MONITOR +/- POLARITY** Switch/Indicator	SWITCH – Selects either positive or negative peak audio for application to the **EXCITER MONITOR** LED bar–graph display. INDICATOR – Indicates the signal polarity selected for display on the exciter monitor. The + indicator will illuminate to indicate the display of positive information. The – indicator will illuminate to indicate the display of negative information.
13	**EXCITER MONITOR** LED Bar–Graph Display	Displays left, right, L+R, or L–R audio channel peak levels as selected by the **EXCITER MONITOR MODE** and **POLARITY** switches. Each indicator will illuminate at the level indicated on the display. In addition, the display is equipped with an autorange feature to allow the monitoring of signals in the 0.5% to 14.5% range. Indications of autorange operation are provided by the **R/L–R** and **L/L+R X10** indicators.
14	**EXCITER MONITOR MONO** Indicator	Illuminates to indicate the exciter is configured to the mono L, mono R, or mono L+R mode of operation.
15	**R/L–R** Display **X10** Indicator	Illuminates to indicate the autorange feature is enabled to expand the **R/L–R** display by 10 to provide the resolution required for low level audio monitoring.
16	**L/L+R** Display **X10** Indicator	Illuminates to indicate the autorange feature is enabled to expand the **L/L+R** display by 10 to provide the resolution required for low level audio monitoring.
17	**OVERTEMP** Indicator	Illuminates to indicate when the transmitter operating temperature exceeds 57° C (134° F).
18	**FOLDBACK** Indicator	Illuminates to indicate when the transmitter is in a foldback condition. Foldback is when the transmitter output power is automatically reduced in response to one of the following fault conditions: 1) high reflected power, 2) high forward power, 3) high temperature, or 4) detection of a lightning potential.
19	**INTERLOCK** Indicator	Illuminates to indicate the internal interlock, external interlock, and remote control fail-safe are closed. The remote control fail-safe must be closed only when the transmitter is configured for remote control operation.
20	**REMOTE** Indicator	Illuminates to indicate transmitter remote control operations are enabled.

TABLE 3-2. ECU CONTROLS AND INDICATORS
(Sheet 5 of 6)

INDEX NO.	NOMENCLATURE	FUNCTION
21	**CONFLICT** Indicator	Illuminates to indicate an incorrect power level is selected for operation into the antenna connected to the transmitter.
22	**LIGHTNING** Indicator	For AM–1A models, illuminates to indicate a 900 volt or greater potential is present at the transmitter output. For AM–500A models, illuminates to indicate a 650 volt or greater potential is present at the transmitter output. Extinguishes to indicate the presence of normal output voltages.
23	**PWM** Mute Indicator	Illuminates to indicate the power control PWM signal is muted in response to a fault such as lightning, an exciter fault, a reflected power emergency, an open remote control fail-safe, or an external transmitter mute.
24	Remote Fail-safe Indicator	Illuminates to indicate the remote control unit is enabled.
25	Remote/Local Switch	Controls the transmitter remote control operations. When the switch is operated to remote, remote control operations are enabled. When the switch is operated to local, remote control operations are disabled.
26	Battery OK Indicator	When the battery test switch is depressed, the indicator will: 1) illuminate to indicate the battery is operational or 2) not illuminate to indicate the battery is to be replaced.
27	Battery Test Switch	When depressed, evaluates the controller battery status. The status is displayed by the battery OK indicator.
28	Pilot On/Off Switch	Enables and disables the stereo pilot signal.
29	Stereo Indicator	Illuminates to indicate the exciter is configured to the stereo mode.
30	Mono L+R Indicator	Illuminates to indicate the exciter is configured to the mono L+R mode.
31	Mono Right Indicator	Illuminates to indicate the exciter is configured to the mono right mode.
32	Mono Left Indicator	Illuminates to indicate the exciter is configured to the mono left mode.

TABLE 3-2. ECU CONTROLS AND INDICATORS
(Sheet 6 of 6)

INDEX NO.	NOMENCLATURE	FUNCTION
33	Exciter Mode Control Switch	Configures the exciter for stereo, mono L+R, mono left, or mono right operation. The switch is designed to configure the exciter to a different mode of operation each time the switch is depressed. The switch will advance to a mode of operation in the following order: 1) mono left, 2) mono right, 3) mono L+R, and 4) stereo.
34	Stereo Equalization 1 Indicator	Illuminates to indicate the stereo equalization 1 circuit is active.
35	Stereo Equalization 2 Indicator	Illuminates to indicate the stereo equalization 2 circuit is active.
36	Lock Indicator	Illuminates to indicate the exciter is locked to the programmed carrier frequency.
37	Exciter +5V Indicator	Illuminates to indicate the ECU +5V supply is operational.
38	Exciter +15V Indicator	Illuminates to indicate the ECU +15V supply is operational.
39	Exciter –15V Indicator	Illuminates to indicate the ECU –15V supply is operational.
40	Negative Limiter Indicator	Illuminates to indicate the negative limiter circuit is enabled. Factory adjusted to illuminate at approximately 94% negative modulation.

TABLE 3-3. POWER MODULE CONTROLS AND INDICATORS
(Sheet 1 of 3)

INDEX NO.	NOMENCLATURE	FUNCTION
1	**PA 1 RF DRIVE** Indicator	Illuminates to indicate RF drive is present at power amplifier 1.
2	**PA 1 FAULT** Indicator	Illuminates to indicate a fault has occurred in power amplifier 1.
3	**PA 2 RF DRIVE** Indicator	Illuminates to indicate RF drive is present at power amplifier 2.
4	**PA 2 FAULT** Indicator	Illuminates to indicate a fault has occurred in power amplifier 2.

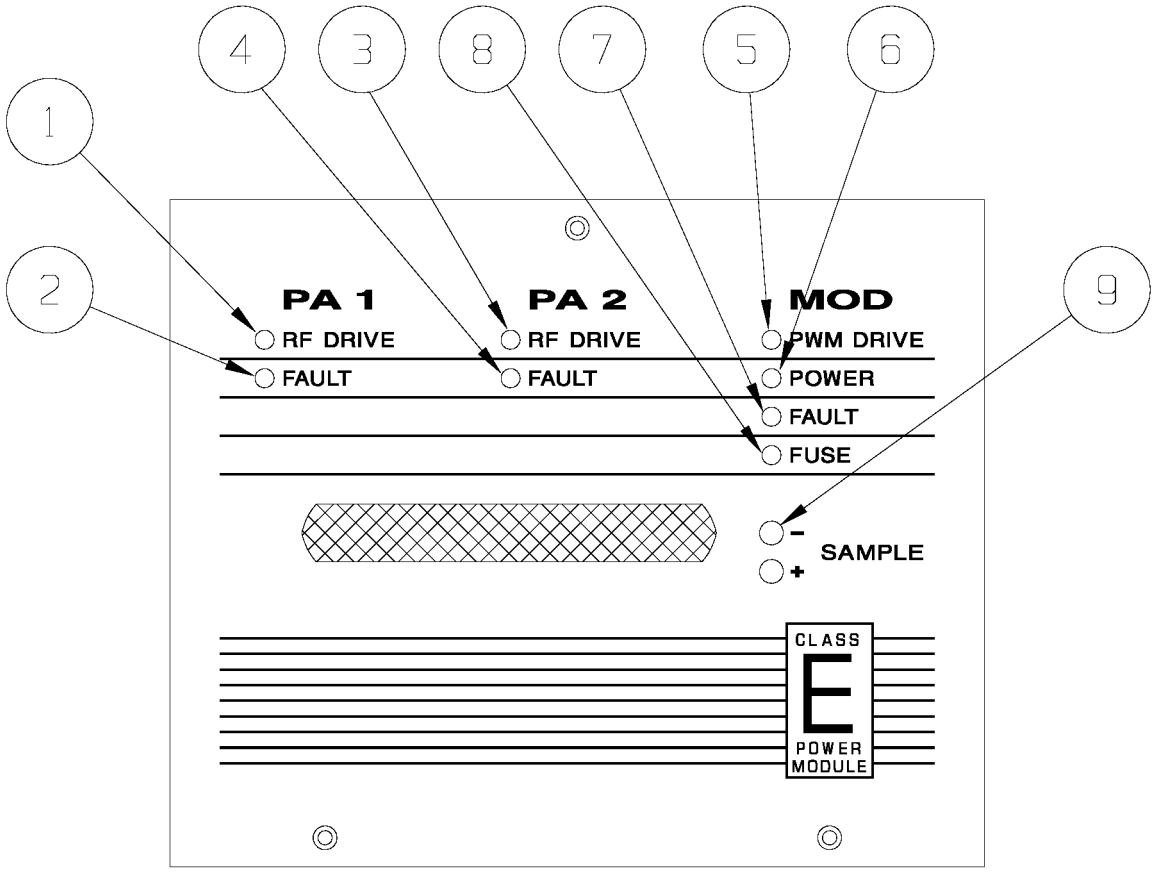


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FIGURE 3-3. AM-1A POWER MODULE CONTROLS AND INDICATORS

TABLE 3-3. POWER MODULE CONTROLS AND INDICATORS
(Sheet 2 of 3)

INDEX NO.	NOMENCLATURE	FUNCTION
5	**MOD PWM DRIVE** Indicator	Illuminates to indicate the exciter PWM drive is present at the modulator circuit board.
6	**MOD POWER** Indicator	Illuminates to indicate dc power is present at the modulator circuit board.
7	**MOD FAULT** Indicator	Illuminates to indicate a fault has occurred in the modulator circuit board.
8	**MOD FUSE** Indicator	Illuminates to indicate the modulator circuit board fuse has blown.

TABLE 3-3. POWER MODULE CONTROLS AND INDICATORS
(Sheet 3 of 3)

INDEX NO.	NOMENCLATURE	FUNCTION
9	**MOD SAMPLE**	Provides a dc voltage sample of the modulator circuit board output. For AM–1A models, the sample will be equal to approximately 6 volts dc at 1100 watts. For AM–500A models, the sample will be equal to approximately 4.2 volts dc at 500 watts. Refer to the factory test data sheets for the exact value.

3–5. OPERATION.

NOTE ***ENSURE THE TRANSMITTER IS COMPLETELY INSTALLED PRIOR TO PERFORMING THE FOLLOWING PROCEDURES.***

NOTE

3–6. **TURN-ON.**

3–7. **OPERATION.** Operate the transmitter to ON by performing the following procedure.

3–8. Ensure the front–panel **POWER** switch is operated to ON. The ECU and RF power module indicators will illuminate.

3–9. Observe the ECU and RF power module indicators. Ensure normal operating conditions are displayed by all indicators. If an indicator displays a fault condition, operate the ac power switch to off and locate the problem.

3–10. Select an output power level by depressing the desired power level switch/indicator. The following events will occur:

1. The power level switch indicator will illuminate.
2. The transmitter flushing fan will begin operation.
3. The transmitter output power will be displayed on the **FORWARD** and **REFLECTED** power meters.

3–11. Operate the **FORWARD** and **REFLECTED** power meters by performing the METERING procedures in the following text to observe the transmitter forward and reflected power indications.

3–12. Adjust the transmitter output power if required by performing the POWER ADJUST procedure presented in the following text.

3–13. If remote control operation is desired, operate the local/remote switch on the controller circuit board to remote. This will enable both local and remote operation.

3–14. **TURN OFF.**

3–15. Operate the transmitter to OFF by depressing the OFF switch/indicator to illuminate the switch/indicator. The transmitter will operate to off.

3-16. **METERING.**

3-17. **FORWARD POWER.** The forward power meter presents forward power indications. To operate the meter, proceed as follows:

1. To monitor low forward power levels, operate the **FORWARD POWER** meter switch to **LOW**. For AM-1A models, the **LOW** scale is from 0 to 300 watts. For AM-500A models, the **LOW** scale is from 0 to 150 watts.
2. To monitor high forward power levels, operate the **FORWARD POWER** meter switch to **HIGH**. For AM-1A models, the **HIGH** scale is from 0 to 1200 watts. For AM-500A models, the **HIGH** scale is from 0 to 600 watts.
3. To configure the **FORWARD POWER** meter to off, operate the **FORWARD POWER** meter switch to **OFF**.

3-18. **REFLECTED POWER.** The reflected power meter presents reflected power and ac input indications. To operate the meter, proceed as follows:

1. To monitor low reflected power levels, operate the **REFLECTED POWER** meter switch to **LOW**. For AM-1A models, the **LOW** scale is from 0 to 30 watts. For AM-500A models, the **LOW** scale is from 0 to 12 watts.
2. To monitor high reflected power levels, operate the **REFLECTED POWER** meter switch to **HIGH**. For AM-1A models, the **HIGH** scale is from 0 to 120 watts. For AM-500A models, the **HIGH** scale is from 0 to 60 watts.
3. To monitor the ac input voltage, operate the **REFLECTED POWER** meter switch to **VAC**.

3-19. **POWER ADJUST.**

3-20. The POWER ▲ and ▼ switches adjust the transmitter output power. To adjust the transmitter power, proceed as follows:

1. Depress the **POWER ▲** switch to increase the transmitter output power. Observe the transmitter output power indications on the **FORWARD** and **REFLECTED** power meters.

   The switch will increase power from 10% to 15% of the selected power level.

   OR

2. Depress the **POWER ▼** switch to decrease the transmitter output power. Observe the transmitter output power indications on the **FORWARD** and **REFLECTED** power meters.

   The switch will decrease power from 10% to 15% of the selected power level.

3-21. **MONO/STEREO OPERATION.**

3-22. To configure the transmitter for monophonic or stereophonic operation, perform the following procedures.

3-23. **STEREO OPERATION.** To configure the transmitter for stereo operations, depress the exciter mode control switch to illuminate the stereo indicator on the stereo circuit board. In addition, the ECU front-panel stereo indicator will illuminate.

3-24. **MONO OPERATION.** The transmitter can be configured to the monophonic mode by: 1) manually selecting the desired mono mode using the stereo circuit board or 2) automatically configuring the transmitter by removing the stereo circuit board. To configure the transmitter for mono operations, proceed as follows:

3–25. **Mono Operation - Stereo Circuit Board.** To configure the transmitter for mono operation using the stereo circuit board, depress the exciter mode control switch to illuminate the mono L+R, mono left, or mono right indicators on the stereo circuit board. In addition, the ECU front–panel **MONO** indicator will illuminate.

3–26. **Mono Operation - No Stereo Circuit Board.** In the event of a stereo circuit board failure, the transmitter will automatically configure to the monophonic mode when the stereo circuit board is removed from the ECU. To remove the stereo circuit board and configure the transmitter for monophonic operation, proceed as follows:

CAUTION

CAUTION TO PREVENT DAMAGE TO THE TRANSMITTER, ENSURE THE TRANSMITTER PRIMARY POWER IS OPERATED TO OFF BEFORE REMOVING THE STEREO CIRCUIT BOARD.

1. Operate the transmitter primary power to off.
2. Completely remove the stereo circuit board from the ECU. Do not leave the circuit board in the ECU chassis.
3. Refer to Figure 2–5 in SECTION II, INSTALLATION and ensure the monophonic audio channel select jumper is configured for the desired audio channel.
4. If required, adjust the single channel level by referring to SECTION II, INSTALLATION and performing the SINGLE CHANNEL LEVEL procedure.

3–27. **PILOT CONTROL.**

3–28. The pilot switch on the stereo circuit board controls the pilot tone. Operate the pilot switch to on to enable the pilot tone. Operate the pilot switch to off to disable the pilot tone.

3–29. **EXCITER MONITOR OPERATION.**

3–30. The following text presents procedures for specific exciter monitoring functions. Perform the appropriate procedure for the type of monitor function desired.

3–31. **MONO/STEREO INDICATIONS.** The **MONO** and **STEREO** indicators display the operating mode of the exciter. The **MONO** indicator will illuminate to indicate when the exciter is configured for mono L+R, mono left, or mono right operation. The **STEREO** indicator will illuminate to indicate when the exciter is configured for stereo operation.

3–32. **INPUT SELECTION.** Depress the **L/R/L+R/L–R MODE** switch/indicator to: 1) illuminate the **L/R** indicator to select left and right channel information or 2) illuminate the **L+R/L–R** indicator to select **L+R** and **L–R** information. The selected parameter will appear on the **EXCITER MONITOR** display.

3–33. **POLARITY SELECTION.** Depress the **POLARITY** switch/indicator to: 1) illuminate the + indicator to select positive peak audio or 2) illuminate the – indicator to select negative peak audio. The selected parameter will appear on the **EXCITER MONITOR** display.

3–34. **X10 AUTORANGE INDICATIONS.** The **EXCITER MONITOR** display is designed with an autorange function to provide the appropriate resolution for the applied signal level. The **L/L+R** display **X10** indicator will illuminate to indicate the display is expanded by 10. The **R/L–R** display **X10** indicator will illuminate to indicate the display is expanded by 10.

3–35. **FAULT RESET.**

3–36. The transmitter monitors several parameters for fault conditions. The **RESET** indicator will illuminate to indicate a fault when one of the following conditions occur: 1) over–temperature, 2) exciter fault, 3) power supply fault, 4) RF power module fault, 5) high reflected/forward power, 6) reflected power emergency, or 7) lightning. If a power supply fault is encountered, the transmitter ac power must be disconnected to remove the fault condition (refer to **POWER SUPPLY FAULT RESET** in the following text). Once the fault condition is removed, the fault circuitry must be reset. To reset the fault circuitry, depress the **RESET** switch. The fault circuitry will be reset.

3–37. **POWER SUPPLY FAULT RESET.**

3–38. If a power supply fault is encountered, ac power must be disconnected from the transmitter to clear the fault. To reset a power supply fault, proceed as follows:

1. Operate the front–panel **POWER** switch to OFF.
2. Operate the front–panel **POWER** switch to ON.
3. Depress the **RESET** switch.

3–39. **OVER-CYCLE OFF.**

3–40. The transmitter controller is equipped with an on/off cycle counter circuit. The circuit is designed to monitor transmitter on/off cycles. If the transmitter is operated on/off seven times within 15 seconds, the transmitter will automatically operate to OFF. The power level or OFF switch/indicators will not respond. To operate the transmitter to ON, proceed as follows:

1. Do not depress any power level switch/indicators or the **OFF** switch/indicator for approximately 30 seconds. This allows the circuit to reset.
2. Depress the desired power level switch/indicator.

3–41. **OVER-MODULATION PWM MUTE.**

3–42. The transmitter is protected from modulation levels above 150% by an over–modulation circuit. If the transmitter modulation increases to a level above 150%, the PWM signal will be muted. This will mute the output power and prevent damage to the transmitter power supply modules.

3–43. **TRANSMITTER MONITOR.**

3–44. The **TRANSMITTER MONITOR** is designed to present the operating status of: 1) the exciter, 2) the RF power module, 3) the power supply, 4) the antenna, 5) the remote control, 6) antenna conflict conditions, 7) lightning conditions, 8) interlocks, 9) foldback conditions, and 10) over–temperature conditions. Use the information presented in Table 3–2 to determine the status of the transmitter components and operating conditions.

3–45. **BATTERY TEST.**

3–46. The battery test and battery OK indicator check the ECU battery backup system. To check the ECU battery, depress the battery test switch. The battery OK indicator will illuminate to indicate an acceptable battery voltage. If the battery OK indicator does not illuminate, replace the battery.

3–47. **CONTROLLER PWM MUTE INDICATOR.**

3–48. The PWM mute indicator illuminates to indicate when the power control PWM signal is muted. The power control PWM signal is muted during: 1) lightning conditions, 2) an exciter fault, 3) reflected power emergency conditions, 4) an open remote control fail-safe, or 5) a transmitter mute control signal.

3–49. **CONTROLLER REMOTE FAILSAFE INDICATOR.**

3–50. The controller remote fail-safe indicator illuminates to indicate the remote control unit is enabled. The indicator will extinguish when the remote control unit is disabled.

3–51. **EXCITER LOCK INDICATOR.**

3–52. The exciter circuit board lock indicator illuminates to indicate when the exciter is locked to the programmed carrier frequency. The indicator will extinguish when the exciter is unlocked from the programmed carrier frequency.

3–53. **EXCITER +5V/+15V/-15V INDICATORS.**

3–54. The exciter circuit board +5V, +15V, and –15V indicators display the status of the operating potentials from the ECU power supply. The +5V, +15V, and –15V indicators will illuminate to indicate the +5 volt, +15 volt, and –15 volt supplies are operational.

3–55. **STEREO EQUALIZATION INDICATORS.**

3–56. The stereo circuit board equalization 1 indicator illuminates to indicate when equalization circuit 1 is selected. The stereo circuit board equalization 2 indicator illuminates to indicate when equalization circuit 2 is selected.

3–57. **RF POWER MODULE INDICATORS.**

3–58. The RF power module indicators are designed to present the operating status of the power amplifier circuit boards and the modulator circuit board. Use the information presented in Table 3–3 to determine the status of the power amplifier circuit board(s) and the modulator circuit board.

3–59. **HIGH AC LINE CONDITIONS.**

3–60. The transmitter is equipped with a feature to mute the transmitter output power in the event the ac power line increases above 270 volts. If this occurs: 1) the transmitter output power will be muted and 2) no fault or emergency condition will be generated by the transmitter. The transmitter will unmute when the high ac line condition is removed.

SECTION IV
THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section presents the theory of operation for the Broadcast Electronics AM-1A/AM-500A transmitters.

4-3. OVERALL OPERATION.

4-4. Information on overall AM-1A/AM-500A transmitter operation is presented in Figure 4-1. Refer to Figure 4-1 for information on overall transmitter operation.

4-5. POWER SUPPLY CIRCUITRY OPERATION.

4-6. A description of the AM-1A/AM-500A transmitter power supply circuitry is presented in Figure 4-2. Refer to Figure 4-2 for power supply circuitry information.

4-7. POWER SUPPLY CIRCUIT BOARD OPERATION.

4-8. A description of the power supply circuit board is presented in Figure 4-3. Refer to Figure 4-3 for power supply circuit board information.

4-9. RF CIRCUITRY OPERATION.

4-10. A description of the AM-1A/AM-500A transmitter RF circuitry is presented in Figure 4-4. Refer to Figure 4-4 for transmitter RF circuitry information.

4-11. RF POWER MODULE MODULATOR CIRCUIT BOARD OPERATION.

4-12. A description of the RF power module modulator circuit board is presented in Figure 4-5. Refer to Figure 4-5 for modulator circuit board information.

4-13. RF POWER MODULE AMPLIFIER CIRCUIT BOARD OPERATION.

4-14. A description of the RF power module amplifier circuit board is presented in Figure 4-6. Refer to Figure 4-6 for amplifier circuit board information.

4-15. CONTROLLER CIRCUIT BOARD OPERATION.

4-16. A description of the controller circuit board is presented in Figure 4-7. Refer to Figure 4-7 for controller circuit board information.

4-17. EXCITER CIRCUIT BOARD OPERATION.

4-18. A description of the exciter circuit board is presented in Figure 4-8. Refer to Figure 4-8 for exciter circuit board information.

4-19. STEREO CIRCUIT BOARD OPERATION.

4-20. A description of the stereo circuit board is presented in Figure 4-9. Refer to Figure 4-9 for stereo circuit board information.

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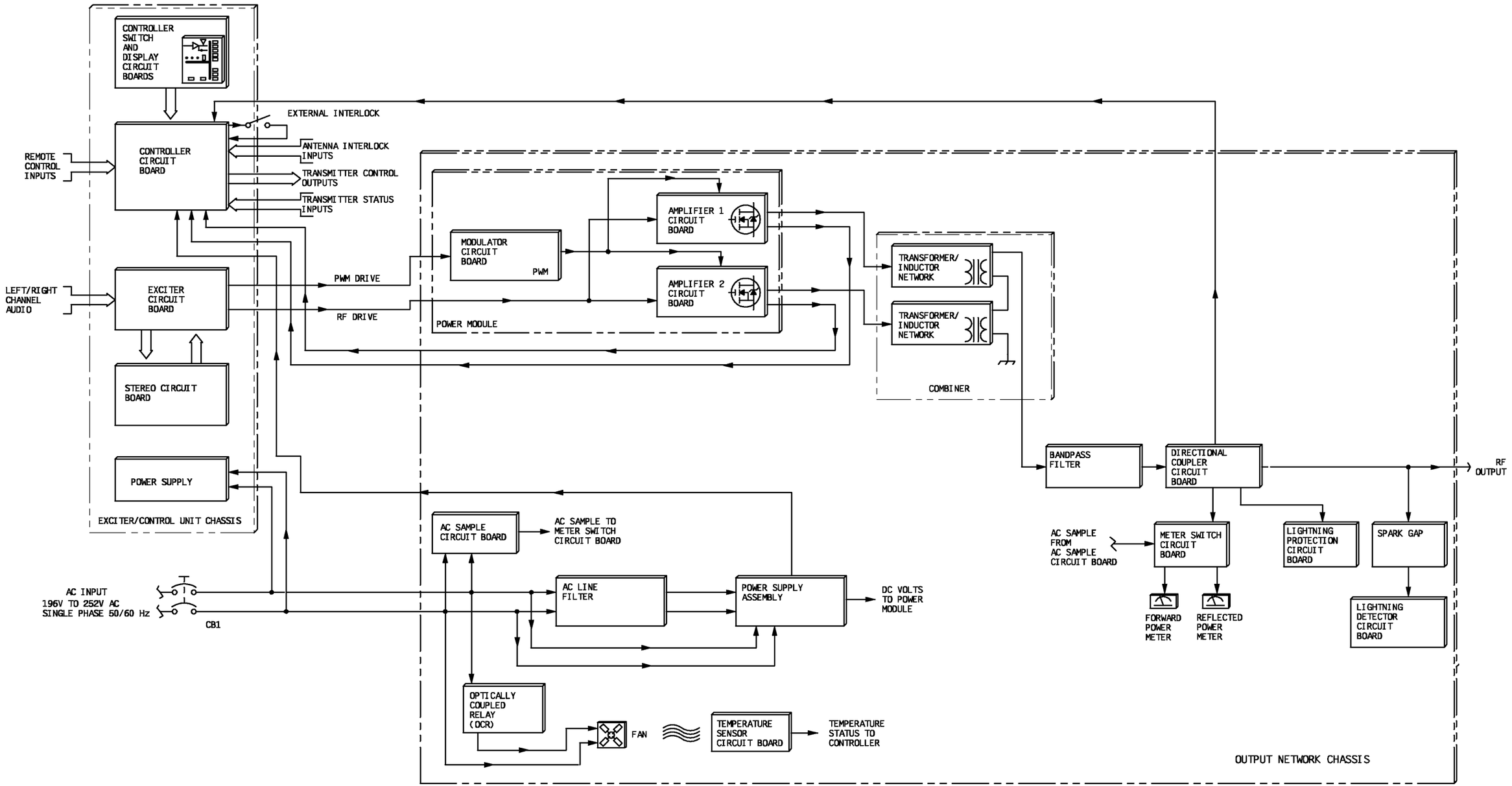

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FIGURE 4-1. AM-1A/AM-500A TRANSMITTER BLOCK DIAGRAM
(4-3/4-4)

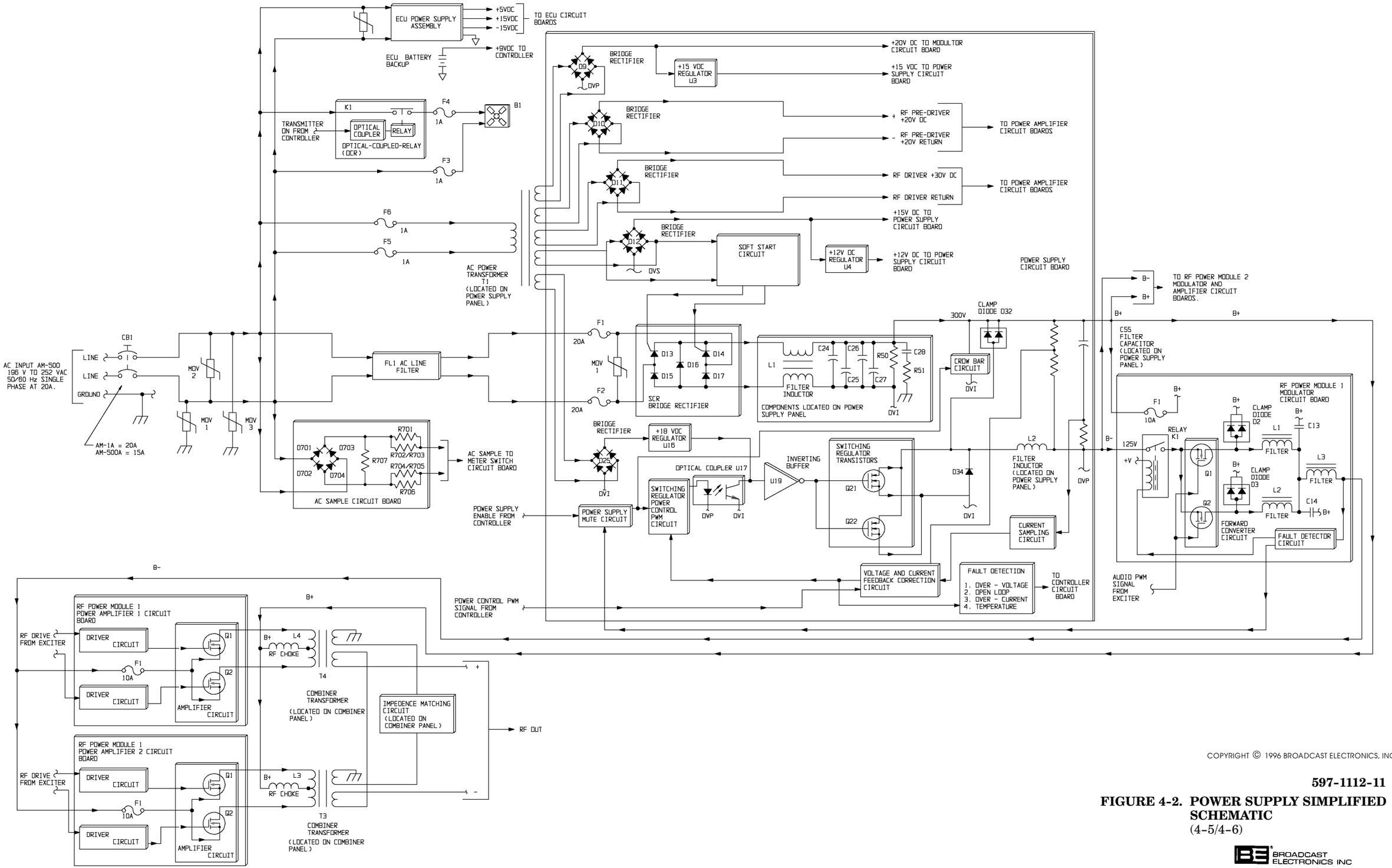

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FIGURE 4-2. POWER SUPPLY SIMPLIFIED SCHEMATIC
(4-5/4-6)

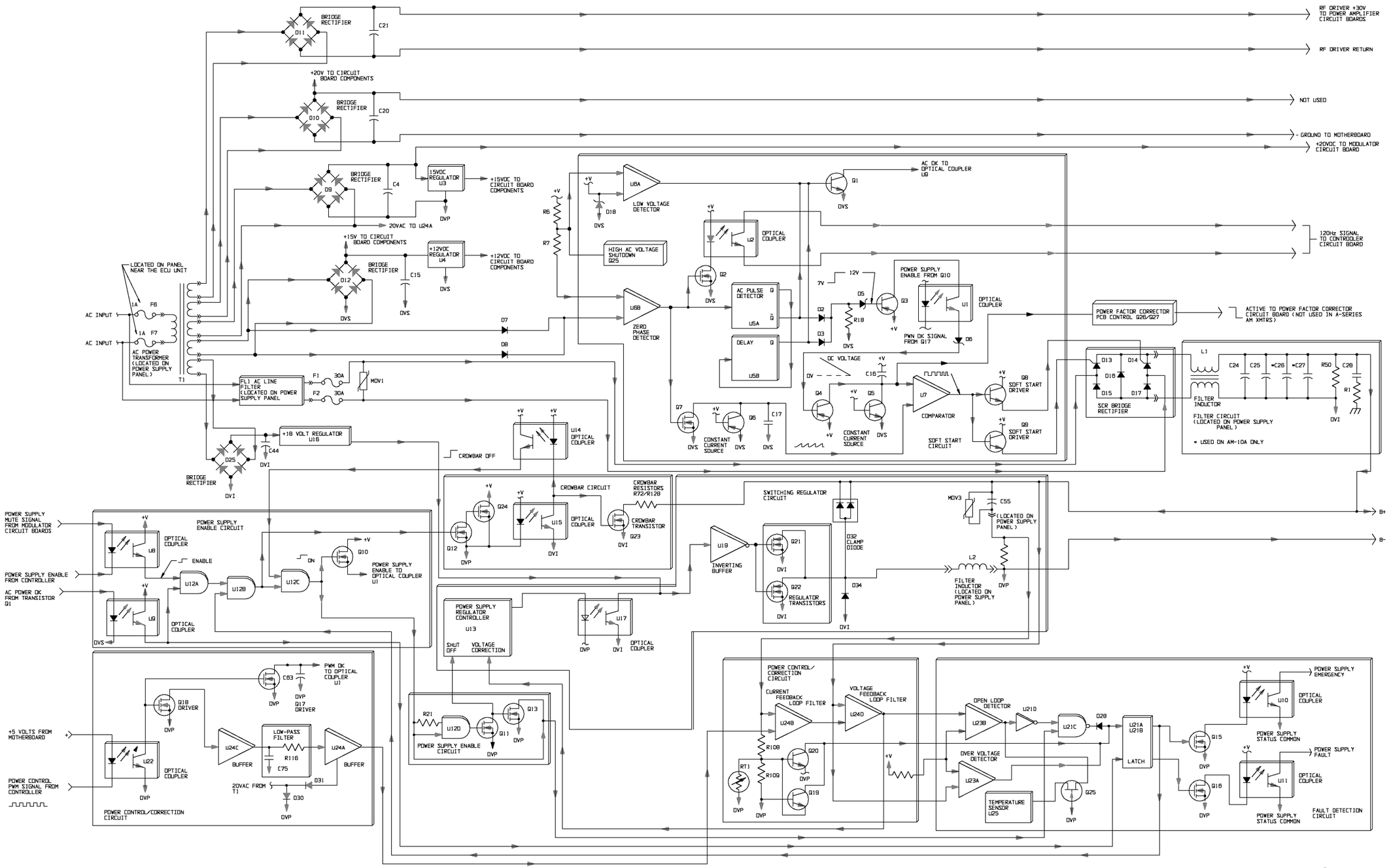

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FIGURE 1-1. POWER SUPPLY CIRCUIT BOARD SIMPLIFIED SCHEMATIC
(4-7/4-8)

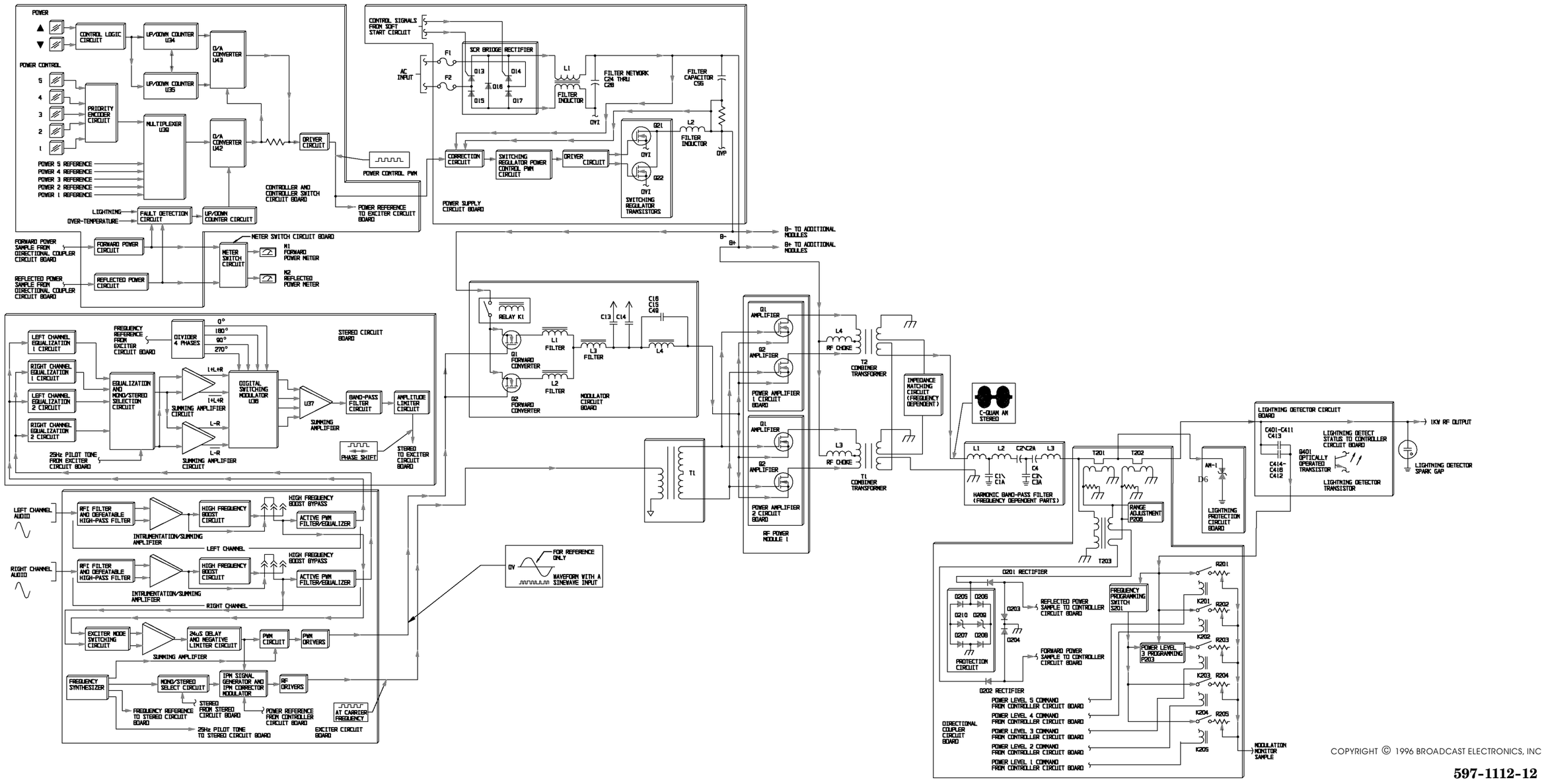

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FIGURE 4-4. RF CIRCUITRY SIMPLIFIED SCHEMATIC
(4-9/4-10)

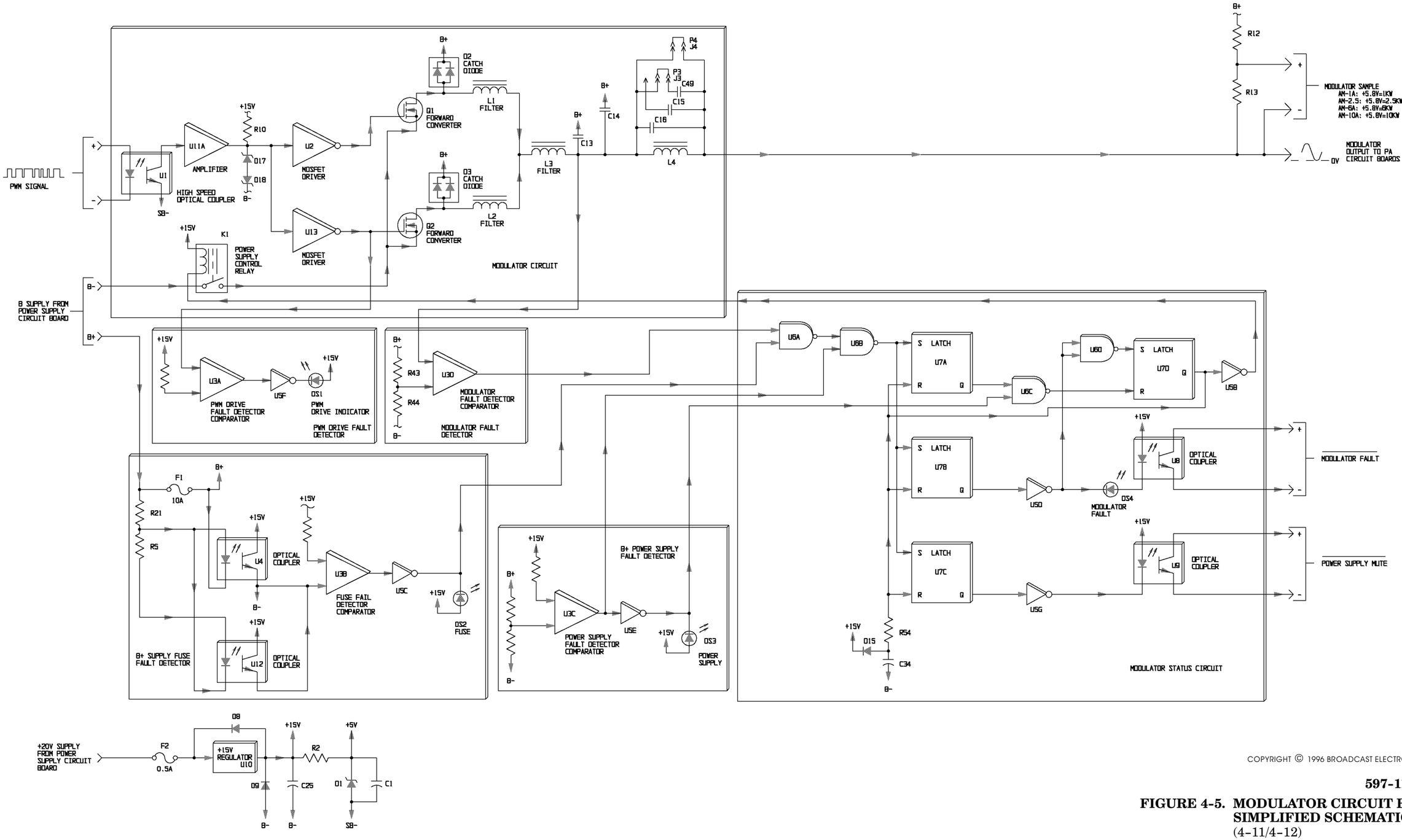

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FIGURE 4-5. MODULATOR CIRCUIT BOARD SIMPLIFIED SCHEMATIC
(4-11/4-12)

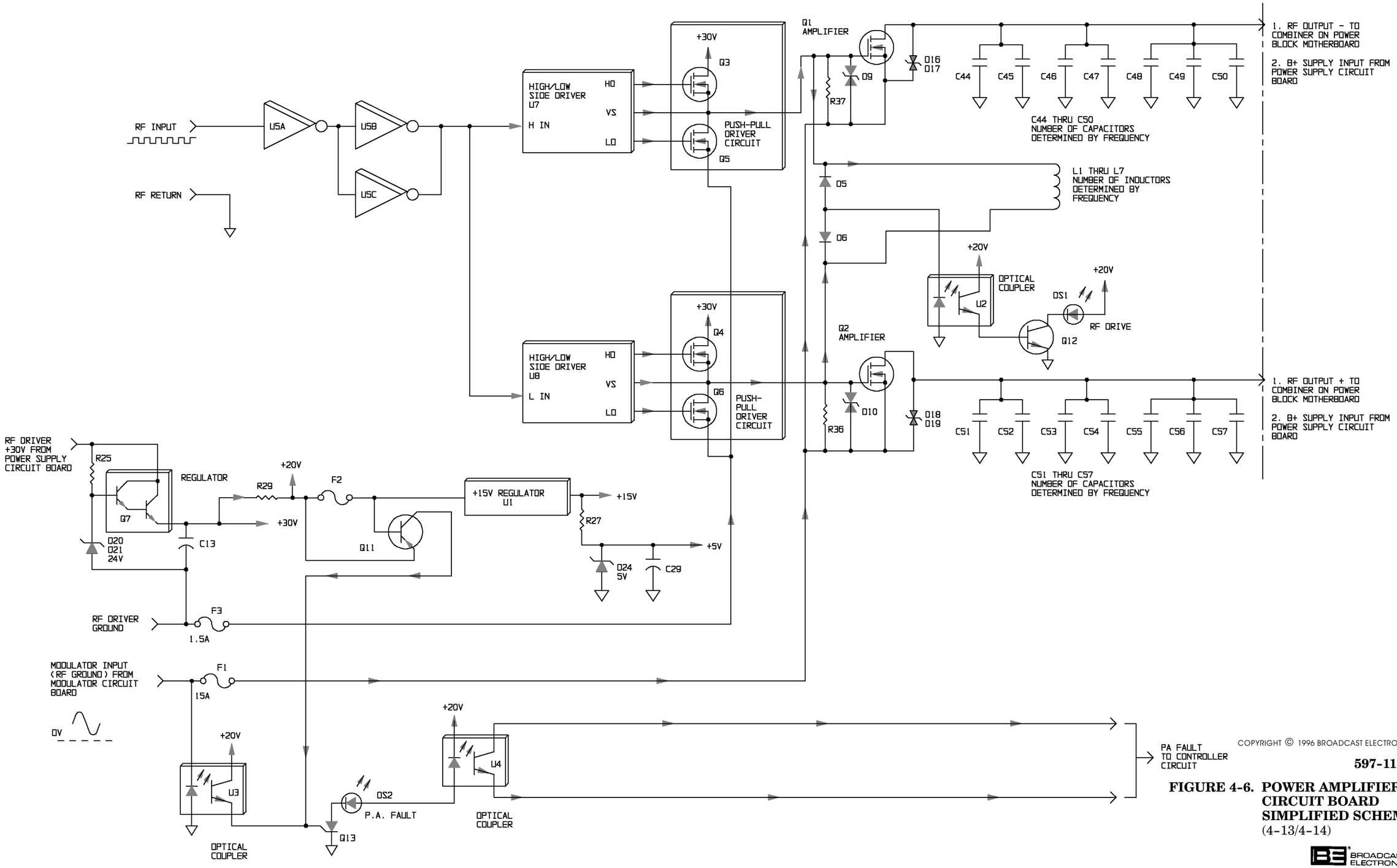

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FIGURE 4-6. POWER AMPLIFIER CIRCUIT BOARD SIMPLIFIED SCHEMATIC
(4-13/4-14)

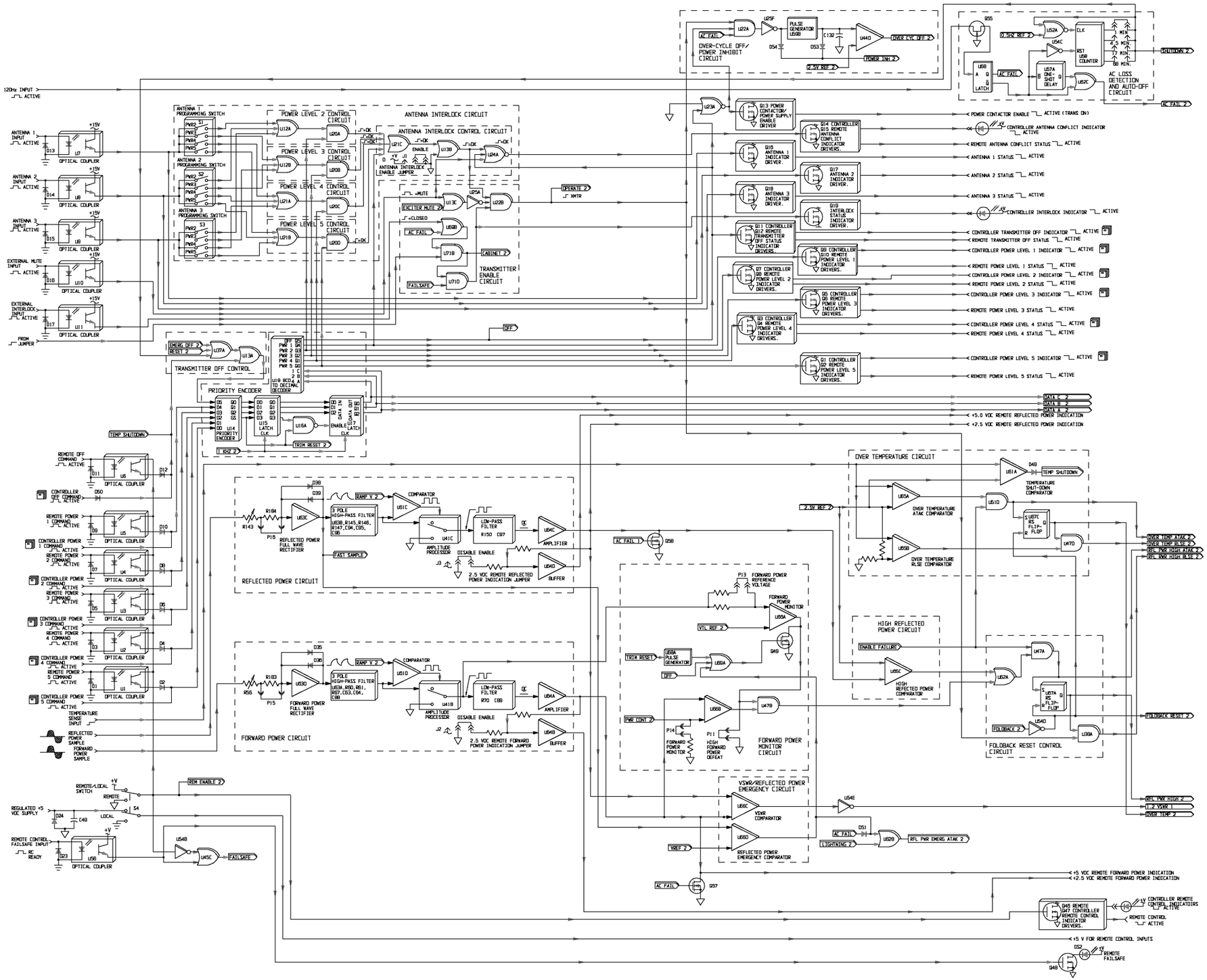

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FIGURE 4-7. CONTROLLER CIRCUIT BOARD SIMPLIFIED SCHEMATIC (SHEET 1 OF 2)
(4-15/4-16)

BROADCAST ELECTRONICS INC

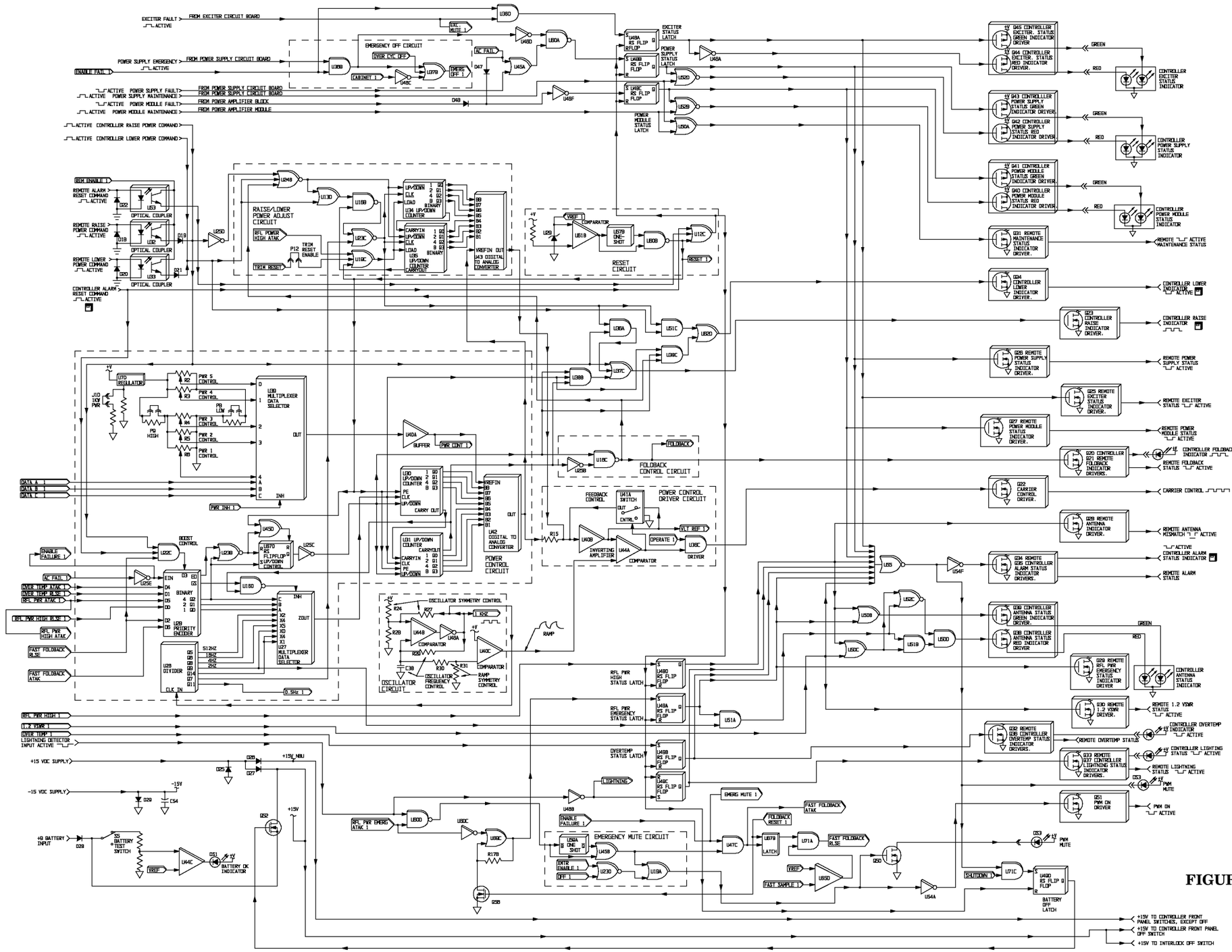

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FIGURE 4-7. CONTROLLER CIRCUIT BOARD SIMPLIFIED SCHEMATIC (SHEET 2 OF 2)
(4-17/4-18)

BROADCAST ELECTRONICS INC

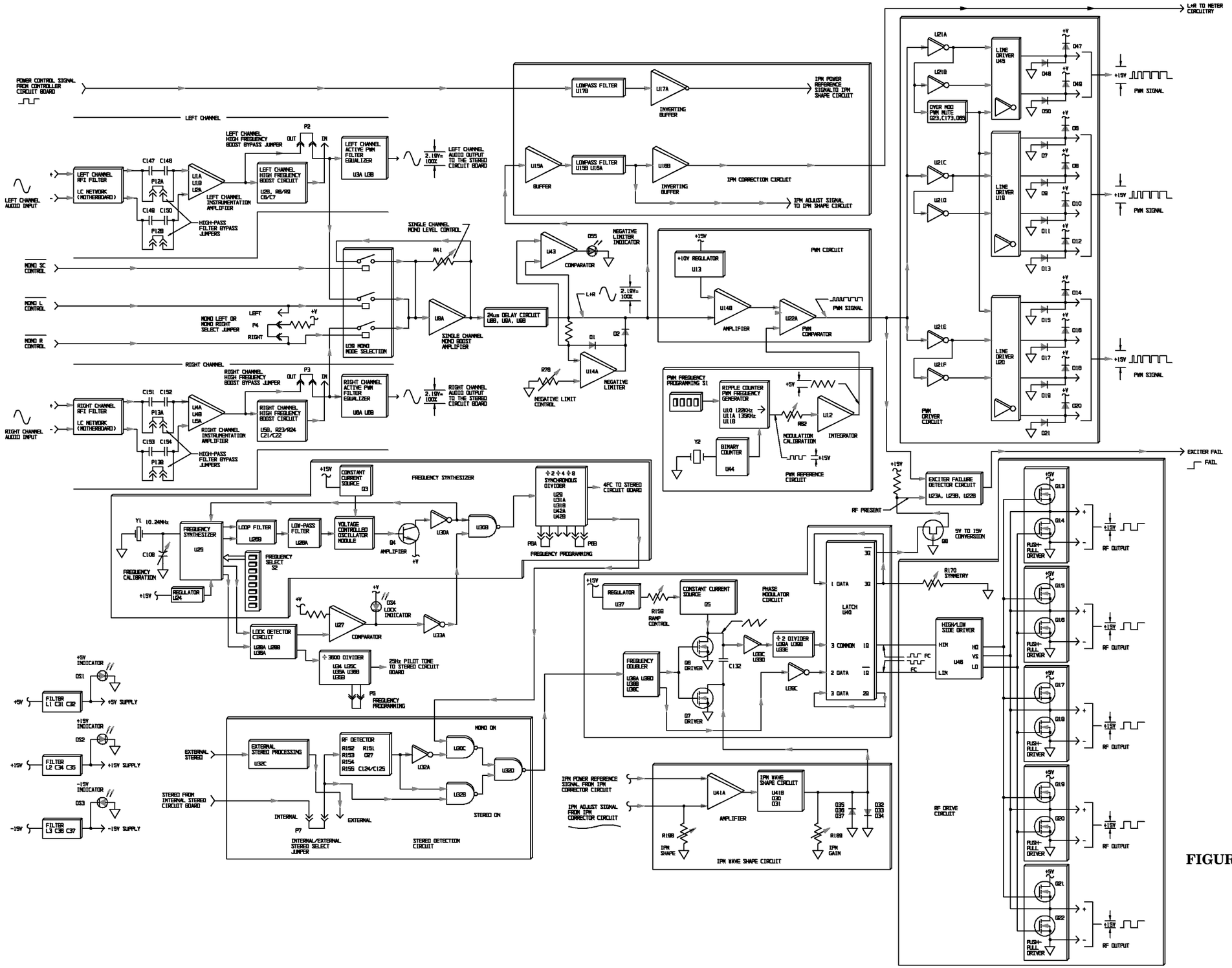

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FIGURE 4-8. EXCITER CIRCUIT BOARD SIMPLIFIED SCHEMATIC
(4-19/4-20)

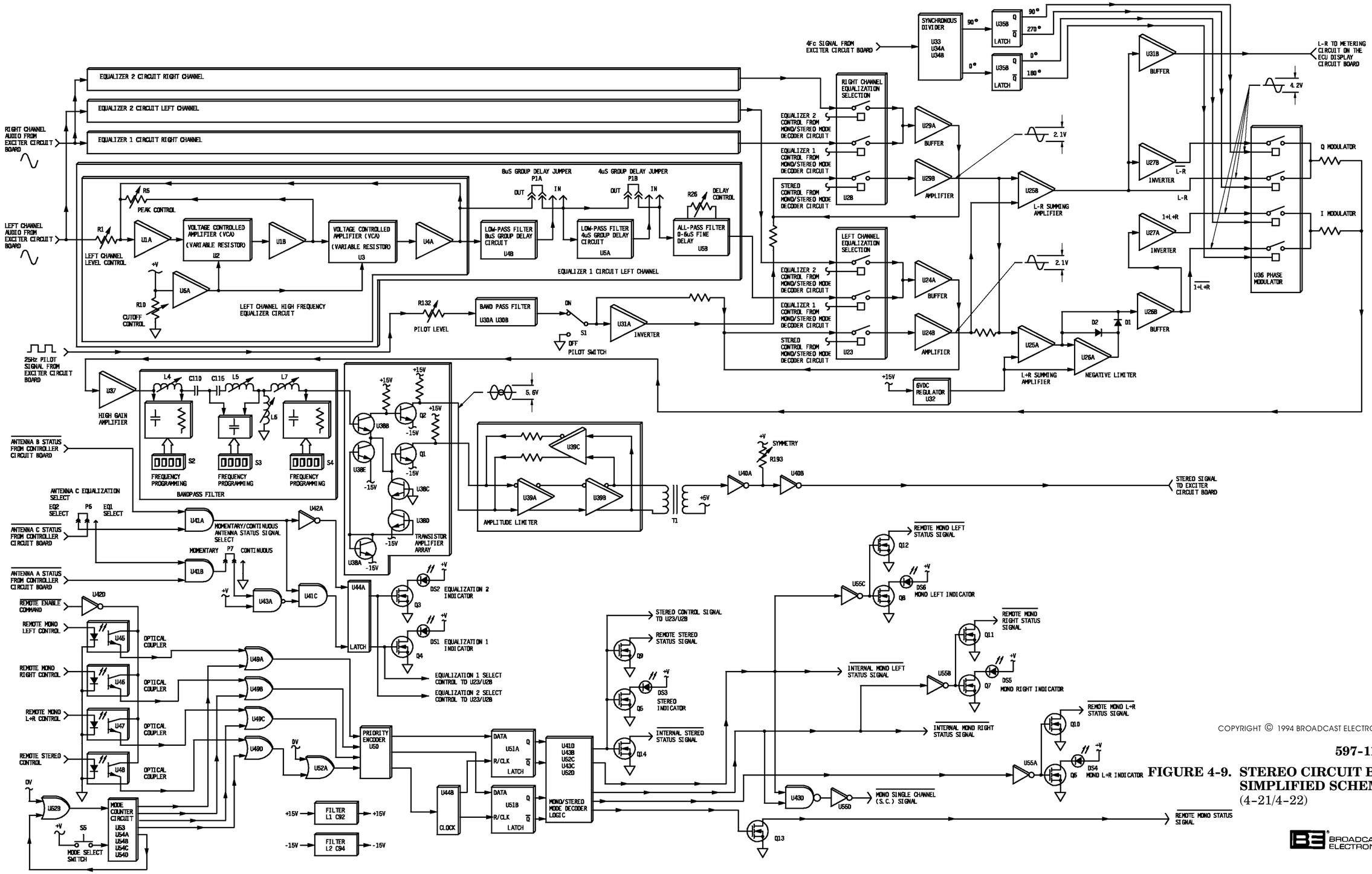

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FIGURE 4-9. STEREO CIRCUIT BOARD SIMPLIFIED SCHEMATIC
(4-21/4-22)

SECTION V
MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides maintenance information, electrical adjustment procedures, and troubleshooting information for the Broadcast Electronics AM-1A/AM-500A transmitters.

5-3. SAFETY CONSIDERATIONS.

WARNING ***THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER OUTPUT NETWORK, RF POWER MODULE, RF COMBINER, OR POWER SUPPLY COMPONENTS.***

WARNING

WARNING

WARNING

5-4. The AM-1A/AM-500A transmitters contain high voltages and currents. If safety precautions are not practiced, contact with the high voltages and currents could cause serious injury or death. The transmitter is equipped with many built-in safety features, however good judgement, care, and common sense must be practiced to prevent accidents.

5-5. In addition to high voltages and currents, the transmitter contain multiple circuit grounds with high ac and dc potentials with respect to the chassis which is at earth potential. The potentials could cause serious injury or death if maintenance personnel simultaneously touch a circuit ground and the chassis. As a result, operation of the transmitter with test equipment connected to transmitter RF power module, bandpass filter, combiner, or power supply components is extremely dangerous and must not be attempted. Therefore, never energize the transmitter with test equipment connected to the transmitter RF power module, bandpass filter, combiner, or power supply components. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

5-6. The transmitter output network chassis design will not allow access to the components without the disconnection of the ac input and the RF output. Never re-connect the AC input or the RF output with the top-panel removed.

5-7. FIRST LEVEL MAINTENANCE.

5-8. First level maintenance consists of procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a maintenance log. Preventive maintenance of the transmitter consists of good housekeeping and checking performance levels using the meters and various indicators built into the equipment.

5–9. **ROUTINE MAINTENANCE.**

WARNING ***NEVER OPEN THE EQUIPMENT UNLESS ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED. ENSURE ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED BEFORE ATTEMPTING MAINTENANCE ON ANY AREA WITHIN THE TRANSMITTER.***

WARNING

5–10. **INSPECTION AND CLEANING.** On a regular basis, clean the equipment of accumulated dust using a brush and vacuum cleaner. Inspect the modulator circuit board, RF amplifier circuit boards, and the power supply circuit board for damage caused by components overheating. Overheated components are identified by circuit board discoloration near the component leads. Inspect the circuit boards for loose hardware as required.

5–11. **CONTROLLER BATTERY.** Periodically, the controller battery in the ECU assembly should be checked by depressing the battery test switch on the controller circuit board. The battery test indicator will illuminate to indicate the battery is operational. If the battery test indicator fails to illuminate, the battery must be replaced. A good–quality Alkaline battery is recommended for replacement. Typically, it is recommended the controller battery be replaced annually.

5–12. **AIR FILTER.** The transmitter is equipped with a screen type air filter. The screen filter is designed to be removed and cleaned using a brush and vacuum. Check the filter approximately once a week. Remove dirt from the filter as–required by: 1) removing the filter from the chassis and 2) cleaning the filter using a brush and vacuum.

5–13. **FLUSHING FAN.** Inspect the transmitter flushing fan for dust accumulation and periodically clean the fan using a brush and vacuum cleaner. Do not use compressed air and an air gun. The fan is cooled by air passing around the motor. If dust is allowed to accumulate on the motor, the ambient air temperature will increase due to restricted air flow. When the ambient air temperature increases, the fan motor bearing lubricant will gradually vaporize and bearing failure will occur.

5–14. It is recommended the flushing fan mounting hardware be periodically checked. The flushing fan is equipped with sealed bearings which do not permit lubrication. If a bearing fails, the motor must be replaced.

5–15. **SPARK GAP.** The output network chassis is equipped with a spark gap. The spark gap is provided to safely conduct lightning potentials appearing at the transmitter output to ground. Inspect the spark gap annually to ensure the gap is operational.

5–16. SECOND LEVEL MAINTENANCE.

5–17. Second level maintenance consists of procedures required to adjust the transmitter circuitry or restore the transmitter to operation after a fault has occurred. The procedures consists of electrical adjustments, troubleshooting, and component replacement procedures.

WARNING ***NEVER OPEN THE EQUIPMENT UNLESS ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED. ENSURE ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED BEFORE ATTEMPTING MAINTENANCE ON ANY AREA WITHIN THE TRANSMITTER.***

WARNING ***NEVER OPEN THE EQUIPMENT UNLESS ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED. ENSURE ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED BEFORE ATTEMPTING MAINTENANCE ON ANY AREA WITHIN THE TRANSMITTER.***

5-18. The maintenance philosophy for the transmitter consists of isolating a problem to a specific area. Once the specific area is located, subsequent troubleshooting using the information in the following text will assist in problem isolation to a replaceable assembly or component. If required, the assembly may be: 1) returned to the factory for repair or exchange or 2) repaired locally.

5-19. OVERALL TRANSMITTER.

5-20. ELECTRICAL ADJUSTMENTS.

WARNING ***NEVER OPEN THE EQUIPMENT UNLESS ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED. ENSURE ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED BEFORE ATTEMPTING MAINTENANCE ON ANY AREA WITHIN THE TRANSMITTER.***

5-21. TRANSMITTER FREQUENCY RE-PROGRAMMING.

5-22. The AM-1A/AM-500A transmitters are configured for a specific frequency when shipped from the factory. The transmitter is equipped with several frequency dependent parts and circuits. Due to the frequency dependent parts, frequency dependent circuits, and specialized procedures, the transmitter can not be reprogrammed for a different frequency in the field. If the transmitter is required to be programmed for a different frequency, contact the Broadcast Electronics Customer Service department.

5-23. TROUBLESHOOTING.

WARNING ***THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.***

WARNING ***THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.***

5-24. The AM-1A/AM-500A transmitters are equipped with extensive indicator and meter circuitry to allow the operator to isolate problems to a specific area within the transmitter. Due to the hazardous voltages and currents contained in the equipment, operation of the transmitter with test equipment connected to the transmitter RF power module, bandpass filter, combiner, or power supply components is extremely dangerous and must not be attempted. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized. Therefore, the transmitter indicators and meters must be used to isolate a problem to a specific area.

5–25. **TRANSMITTER INDICATORS.** The following text presents a description of the transmitter indicators and typical meter indications. Refer to the following text as required to determine the function of a specific indicator.

TABLE 5-1. AM-1A/AM-500A INDICATORS
(Sheet 1 of 3)

ASSEMBLY	INDICATOR FUNCTION
ECU ASSEMBLY TRANSMITTER MONITOR	
EXCITER	GREEN DISPLAY – Indicates normal exciter operation. RED DISPLAY – Indicates no exciter RF drive or PWM output.
POWER MODULES	GREEN DISPLAY – Indicates the RF power module is operating normally. YELLOW DISPLAY – Indicates the RF power modules are removed from the transmitter for maintenance. RED DISPLAY – Indicates a modulator or power amplifier circuit board fault in the RF power module.
POWER SUPPLY	GREEN DISPLAY – Indicates normal power supply operation. RED DISPLAY – Indicates an open loop or over–voltage fault in the power supply module. YELLOW DISPLAY – Indicates the power supply is removed from the transmitter.
ANTENNA VSWR	GREEN DISPLAY – Indicates a normal antenna load. YELLOW DISPLAY – Indicates a VSWR condition of 1.2:1. RED DISPLAY – Indicates a high reflected/forward power condition. For AM–1A models, a high reflected power condition is equal to 40 watts of reflected power. For AM–500A models, a high reflected power condition is equal to 20 watts of reflected power. For both models, a high forward power condition is equal to a forward RF output power greater than 20% of the nominal RF output. When this condition occurs, the transmitter output power will foldback. FLASHING RED DISPLAY – Indicates a reflected power emergency condition. For AM–1A models, a reflected power emergency condition is equal to 200 watts of reflected power. For AM–500A models, a reflected power emergency condition is equal to 100 watts of reflected power. When this condition occurs, the transmitter will operate to off.
REMOTE	Illuminates to indicate transmitter remote control operations are enabled. Extinguishes to indicate transmitter remote control operations are disabled: 1) using the remote/local switch on the controller circuit board or 2) due to a fault in the remote control unit.

TABLE 5-1. AM-1A/AM-500A INDICATORS
(Sheet 2 of 3)

ASSEMBLY	INDICATOR FUNCTION
CONFLICT	Illuminates to indicate an incorrect power level is selected for operation into the antenna connected to the transmitter.
LIGHTNING	For AM–1A models, illuminates to indicate a 900 volt or greater potential is present at the transmitter output. For AM–500A models, illuminates to indicate a 650 volt or greater potential is present at the transmitter output.
INTERLOCK	Illuminates to indicate all internal and external interlocks are closed.
FOLDBACK	Illuminates to indicate when the transmitter is in a foldback condition. Foldback is when the transmitter output power is automatically reduced in response to one of the following fault conditions: 1) high reflected power, 2) high forward power, 3) high temperature, or 4) detection of a lightning potential.
OVERTEMP	Illuminates to indicate when the transmitter operating temperature exceeds 57 °C (134 °F).
RESET	Illuminates to indicate one or more of the following transmitter faults have occurred: 1) over–temperature, 2) exciter fault, 3) power supply fault, 4) RF power module fault, 5) high reflected power, 6) reflected power emergency, or 7) lightning. Once the fault condition is removed, the fault circuitry must be reset.
CONTROLLER CIRCUIT BOARD	
PWM Mute	Illuminates to indicate the power control PWM signal is muted in response to a fault such as lightning, an exciter fault, a reflected power emergency, an open remote control fail-safe, an external transmitter mute, lightning, or high reflected or forward power.
Remote Fail-safe	Illuminates to indicate the remote control unit is enabled.
Battery OK	When the battery test switch is depressed, the indicator will: 1) illuminate to indicate the battery is operational or 2) not illuminate to indicate the battery is to be replaced.
STEREO CIRCUIT BOARD	
Stereo Equalization 1	Illuminates to indicate stereo equalization circuit 1 is active.
Stereo Equalization 2	Illuminates to indicate stereo equalization circuit 2 is active.

TABLE 5-1. AM-1A/AM-500A INDICATORS
(Sheet 3 of 3)

ASSEMBLY	INDICATOR FUNCTION
EXCITER CIRCUIT BOARD	
Exciter Lock	Illuminates to indicate the exciter is locked to the programmed carrier frequency.
Exciter +5V	Illuminates to indicate the ECU +5V supply is operational.
Exciter +15V	Illuminates to indicate the ECU +15V supply is operational.
Exciter -15V	Illuminates to indicate the ECU -15V supply is operational.
RF POWER MODULE	
PA 1 RF DRIVE	Illuminates to indicate RF drive from the exciter circuit board is present at power amplifier 1.
PA 1 FAULT	Illuminates to indicate a fault has occurred in power amplifier 1.
PA 2 RF DRIVE	Illuminates to indicate RF drive from the exciter circuit board is present at power amplifier 2.
PA 2 FAULT	Illuminates to indicate a fault has occurred in power amplifier 2.
MOD PWM DRIVE	Illuminates to indicate the PWM drive signal from the exciter is present at the modulator circuit board.
MOD POWER	Illuminates to indicate dc power from the power supply circuit board is present at the modulator circuit board.
MOD FAULT	Illuminates to indicate a modulator, fuse, or power supply fault has occurred in the modulator circuit board.
MOD FUSE	Illuminates to indicate the modulator circuit board fuse has blown.

5-26. **TRANSMITTER TROUBLESHOOTING PROCEDURES.** Table 5-2 presents overall troubleshooting information for the AM-1A/AM-500A transmitters. Refer to Table 5-2 to isolate the problem to a specific assembly. Once the trouble is isolated, refer to the applicable modular section of this manual for the theory of operation and schematic diagrams to assist in problem resolution.

5-27. **TRANSMITTER COMPONENT LOCATIONS.** Figures 5-1 and 5-2 present transmitter component locations. Refer to Figures 5-1 and 5-2 as required during the troubleshooting procedures to locate components within the transmitter.

TABLE 5-2. AM-1A/AM-500A TROUBLESHOOTING
(Sheet 1 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. NO OUTPUT POWER 2. NO NORMAL/FAULT INDICATIONS	1. Check the ac line voltage using the reflected power/ac voltage meter. If no line voltage is present, check circuit breaker CB1. 2. Check the ±15 volt and +5 volt indicators on the exciter circuit board. If no indicators are illuminated, check the ECU power supply.
1. NO OUTPUT POWER 2. NORMAL INDICATIONS 3. NO CONTROL OPERATIONS	1. Transmitter operated to off due to 7 on/off cycles within 15 seconds. Operate the transmitter to on as follows: 1) do not depress any controller switch/indicators for approximately 30 seconds and 2) depress the desired power level switch/indicator. 2. Refer to POWER SUPPLY troubleshooting and troubleshoot the power supply circuit board for no 120 Hz signal output.
1. RED TRANSMITTER MONITOR EXCITER INDICATION	1. Check the lock indicator on the exciter circuit board. If the lock indicator is not illuminated, refer to ECU troubleshooting and troubleshoot the exciter circuit board for lock indicator extinguished. 2. Remove the stereo circuit board and perform the following: 1) depress the RESET switch and 2) initiate transmitter operation. If the transmitter will not operate, refer to ECU troubleshooting and troubleshoot the exciter circuit board. If the transmitter operates, refer to ECU troubleshooting and troubleshoot the stereo circuit board.
1. YELLOW TRANSMITTER MONITOR POWER MODULE INDICATION	1. Indicates the RF power module is removed from the transmitter.
1. RED TRANSMITTER MONITOR POWER MODULE FAULT INDICATION 2. RED RF POWER MODULE FAULT INDICATION	1. Refer to RF POWER MODULE troubleshooting and troubleshoot the RF power module. 2. Visually inspect the RF power module combiner for discolored components.
1. YELLOW TRANSMITTER MONITOR POWER SUPPLY INDICATION	1. Indicates the power supply module is removed from transmitter.
1. RED TRANSMITTER MONITOR POWER SUPPLY INDICATION	1. Check for an over-temperature condition by inspecting the fan and the filter. 2. Refer to POWER SUPPLY MODULE troubleshooting and troubleshoot the power supply module.

TABLE 5-2. AM-1A/AM-500A TROUBLESHOOTING
(Sheet 2 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. YELLOW TRANSMITTER MONITOR ANTENNA INDICATION	1. Check the antenna and phasor equipment. 2. Refer to DIRECTIONAL COUPLER/LIGHTNING DETECTION/LIGHTNING PROTECTION CIRCUIT BOARD troubleshooting and troubleshoot the directional coupler circuit board.
1. RED TRANSMITTER MONITOR ANTENNA INDICATION	1. Check the antenna and phasor equipment. 2. Refer to DIRECTIONAL COUPLER/LIGHTNING DETECTION/LIGHTNING PROTECTION CIRCUIT BOARD troubleshooting and troubleshoot the directional coupler circuit board.
1. FLASHING RED TRANSMITTER MONITOR ANTENNA INDICATION	1. Check the antenna and phasor equipment. 2. Visually inspect the spark gap for a short circuit condition. 3. Check the lightning protection circuit board for a short circuit condition.
1. INTERLOCK INDICATOR EXTINGUISHED WHEN IN THE REMOTE CONTROL MODE	1. Operate remote/local switch to local. A. If the interlock indicator illuminates, ensure a +5 volt signal is applied to remote fail-safe input TB1–28 on the ECU rear–panel when the remote control unit is enabled. 1. If the +5 volt signal is not present, troubleshoot the remote control unit. 2. If the +5 volt signal is present, check Q48 and U56 on the controller circuit board. B. If the interlock indicator is extinguished, check the cabinet and the external interlocks.
1. CONFLICT INDICATION	1. Ensure a +5 volt status signal from the selected antenna is applied to the antenna A, B, or C input on the ECU rear–panel. 2. Ensure the correct transmitter power level is selected for operation into the antenna. 3. Check the antenna interlock circuit programming on the controller circuit board. 4. Refer to ECU troubleshooting and troubleshoot the controller circuit board for a conflict indication.
1. NO OUTPUT POWER 2. LIGHTNING INDICATOR ILLUMINATED	1. Transmitter operated to off due to 7 on/off cycles within 15 seconds. Operate the transmitter to on as follows: 1) do not depress any controller switch/indicators for approximately 30 seconds and 2) depress the desired power level switch/indicator. 2. Check Q401 on the lightning detection circuit board.

TABLE 5-2. AM-1A/AM-500A TROUBLESHOOTING
(Sheet 3 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. RF DRIVE INDICATORS EXTINGUISHED ON THE POWER MODULE	1. Check for RF drive output on the ECU motherboard at P101–7. If no RF drive is present, refer to ECU troubleshooting and troubleshoot the exciter circuit board. 2. Check bridge rectifiers D7 and D9 on the power supply module for the power block. 3. Refer to RF POWER MODULE troubleshooting and troubleshoot the RF power module.
1. NORMAL OUTPUT POWER 2. LIGHTNING INDICATOR ILLUMINATED	1. Indicates the presence of lightning at the output of transmitter. Depress the RESET switch to reset the indicator.
1. INTERLOCK INDICATOR EXTINGUISHED	1. Ensure a +5 volt signal is applied to external interlock input TB1–29 on the ECU rear panel.
1. OVERTEMP INDICATOR ILLUMINATED	1. Ensure the transmitter air filter is clean. 2. Check the transmitter fan. 3. Ensure the transmitter exhaust area is clear of obstructions.
1. MISSING NORMAL/FAULT INDICATIONS FOR THE POWER MODULE	1. Check fuses F1 and F2. 2. Check power transformer T1.
1. NO L+R MODULATION ACTIVITY DURING MONO OPERATION	1. Ensure audio is present at TB2–25 through TB2–30 on the ECU rear panel. 2. Check for audio at J101–29 through J101–31 and J101–36/J101–37 on the ECU motherboard. If no audio is present, check the filter components on the ECU motherboard. 3. Refer to ECU troubleshooting and troubleshoot the exciter circuit board.
1. NO L+R MODULATION ACTIVITY DURING STEREO OPERATION	1. Ensure audio is present at TB2–25 through TB2–30 on the ECU rear panel. 2. Check for audio at J101–29 through J101–31 and J101–36/J101–37 on the ECU motherboard. If no audio is present, check the filter components on the ECU motherboard. 3. Refer to ECU troubleshooting and troubleshoot the exciter circuit board.
1. LOW DEMODULATOR LEFT CHANNEL MODULATION LEVEL WITH LOW EXCITER MONITOR LEFT CHANNEL MODULATION LEVEL	1. Refer to ECU troubleshooting and troubleshoot the exciter circuit board.

TABLE 5-2. AM-1A/AM-500A TROUBLESHOOTING
(Sheet 4 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. LOW DEMODULATOR RIGHT CHANNEL MODULATION LEVEL WITH LOW EXCITER MONITOR RIGHT CHANNEL MODULATION LEVEL	1. Refer to ECU troubleshooting and troubleshoot the exciter circuit board.
1. LOW DEMODULATOR LEFT CHANNEL MODULATION LEVEL WITH NORMAL EXCITER MONITOR LEFT CHANNEL MODULATION LEVEL	1. Refer to ECU troubleshooting and troubleshoot the stereo circuit board.
1. LOW DEMODULATOR RIGHT CHANNEL MODULATION LEVEL WITH NORMAL EXCITER MONITOR RIGHT CHANNEL MODULATION LEVEL	1. Refer to ECU troubleshooting and troubleshoot the stereo circuit board.
1. PWM DRIVE INDICATOR EXTINGUISHED ON THE RF POWER MODULE	1. Check for a 0V to 15V PWM output at the anode of D6, D8, D10, D12, D14, D16, D18, D20, D47, and D49 on the exciter circuit board. A. If the PWM output is not present, refer to ECU troubleshooting and troubleshoot the exciter circuit board. B. If the PWM output is present, refer to RF POWER MODULE troubleshooting and troubleshoot the RF power module.
1. MOD PWR INDICATORS EXTINGUISHED ON THE POWER AMPLIFIER MODULE	1. Check for a power control PWM signal at the drain of Q22 on the controller circuit board. A. If the PWM signal is not present, refer to the ECU section and troubleshoot the controller circuit board for no power control PWM signal. B. If the PWM output is present, check for a LOW at Q13 on the controller circuit board. 1. If the LOW at Q13 is not present, refer to the ECU section and troubleshoot the controller circuit board for no transmitter on signal. 2. If the LOW at Q13 is present, refer to POWER SUPPLY troubleshooting and troubleshoot the power supply for no MOD POWER indicator.
1. REFLECTED POWER METER FLUCTUATES WITH MODULATION	1. Narrow-band antenna. Contact the Broadcast Electronics Customer Service Department.
1. FORWARD POWER METER FLUCTUATES WITH MODULATION	1. Enable the high-pass filter on the exciter circuit board.

5-28. POWER SUPPLY CIRCUIT BOARD.

WARNING ***THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.***

WARNING

WARNING

WARNING ***NEVER RE-CONNECT AC POWER OR THE RF OUTPUT TO THE OUTPUT NETWORK CHASSIS WITH THE TOP-PANEL REMOVED.***

WARNING

5-29. SAFETY CONSIDERATIONS.

5-30. The AM-1A/AM-500A transmitters are equipped with extensive indicator and meter circuitry to allow the operator to isolate problems to a specific area within the transmitter. Due to the hazardous voltages and currents contained in the equipment, operation of the transmitter with test equipment connected to the transmitter RF power module, bandpass filter, combiner, or power supply components is extremely dangerous and must not be attempted. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized. Therefore, the transmitter indicators and meters must be used to isolate a problem to a specific area.

5-31. REMOVING/INSTALLING A POWER SUPPLY CIRCUIT BOARD.

5-32. The power supply circuit board is removed by disconnecting three connectors, loosening the mounting hardware, and sliding the circuit board from the mounting pins. To remove or install the power supply circuit board, proceed as follows:

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

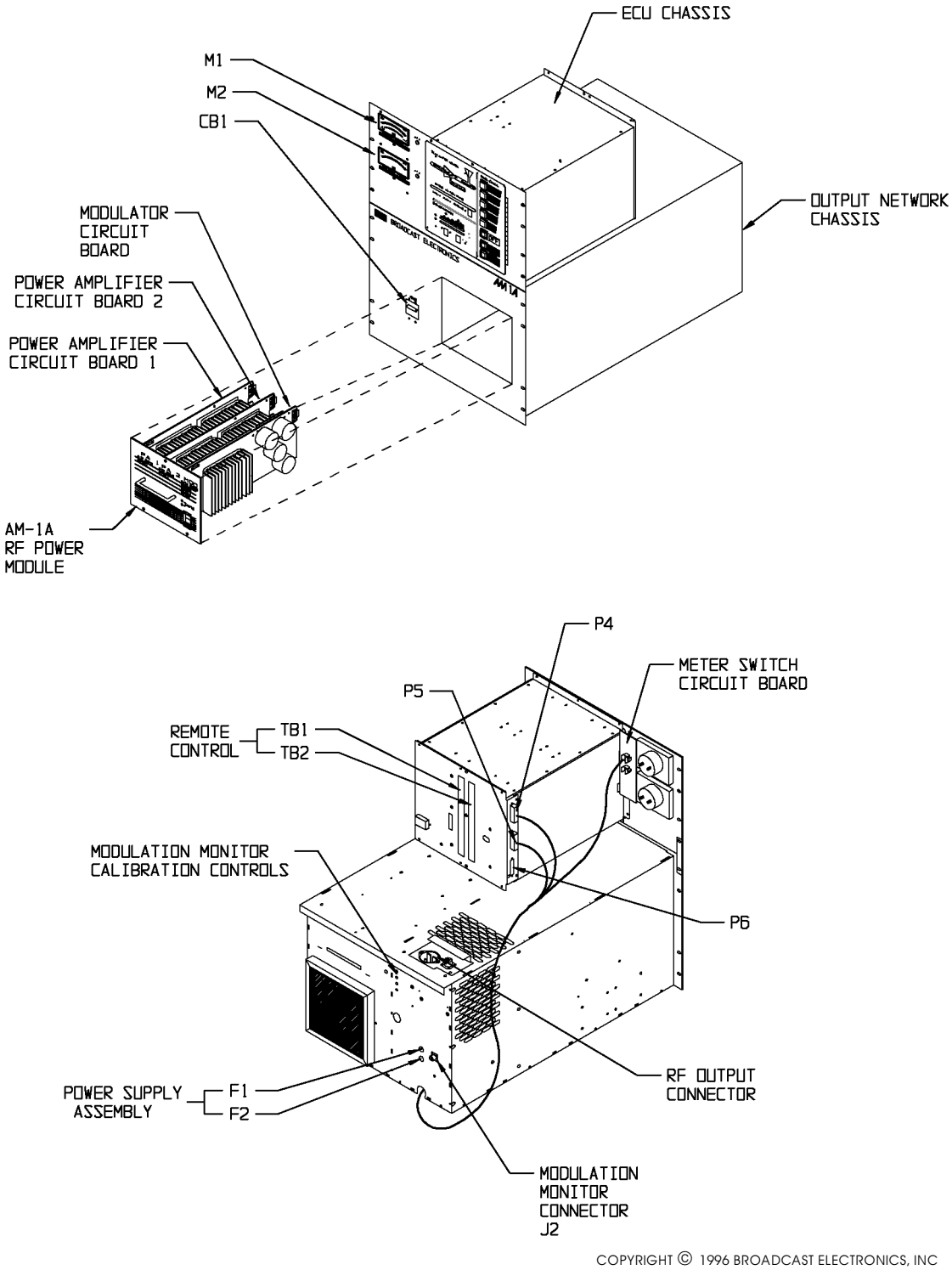
5-33. Disconnect all transmitter primary power.

5-34. To remove the power supply circuit board, proceed as follows:

1. Refer to Figure 5-1 and locate the power supply circuit board.
2. Disconnect connectors P1, P2, and P3 on the circuit board assembly.
3. Loosen the power supply circuit board mounting hardware.
4. Lift the circuit board from the mounting pins and remove the circuit board from the chassis.

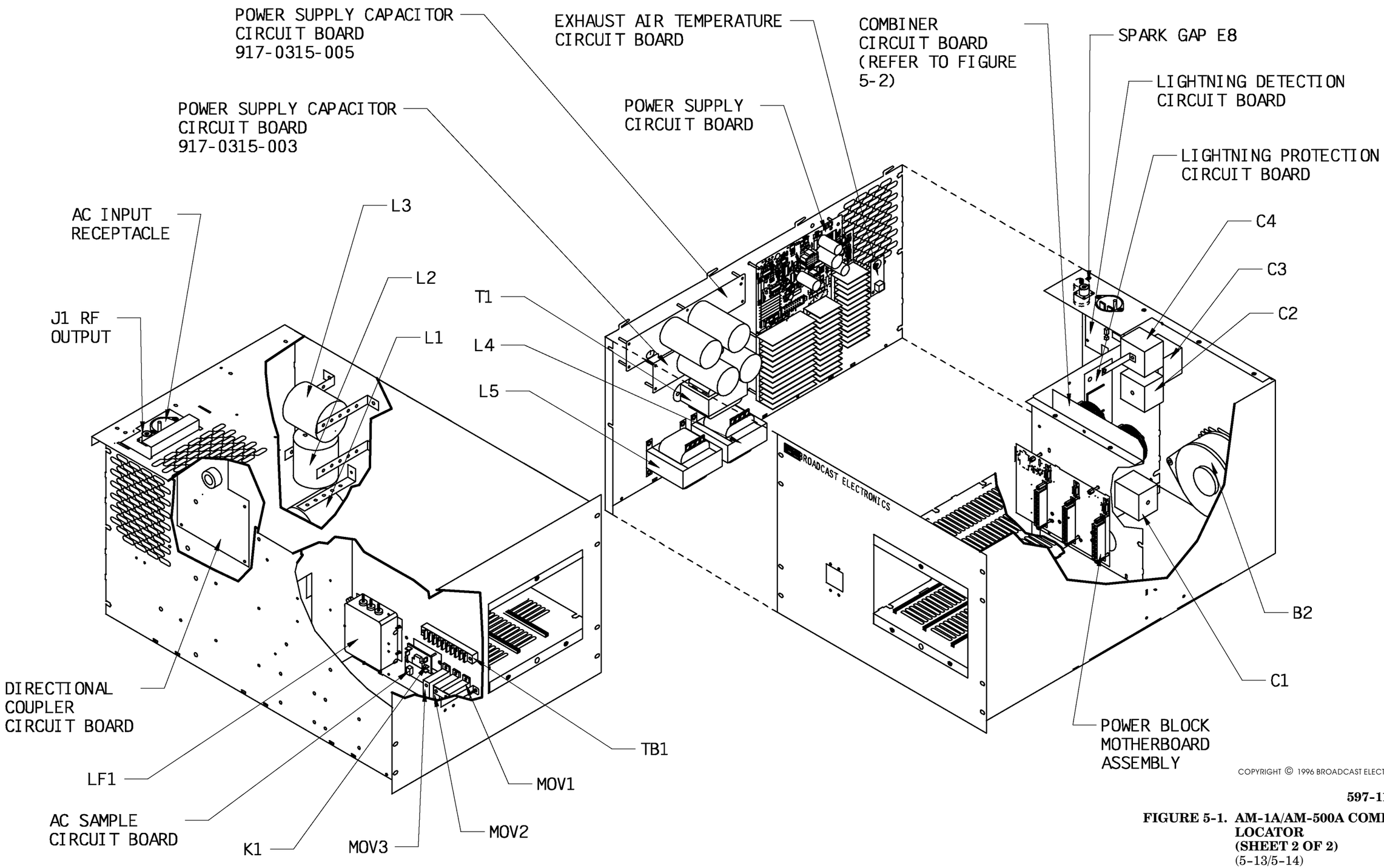
5-35. TROUBLESHOOTING PROCEDURES.

5-36. The power supply module troubleshooting procedures are presented in Table 5-3. During the execution of the troubleshooting information, perform all the procedures for a symptom. The symptom may contain multiple component failures. Once the trouble is isolated, refer to the circuit board theory of operation in SECTION IV and the schematic diagrams to assist in problem resolution.



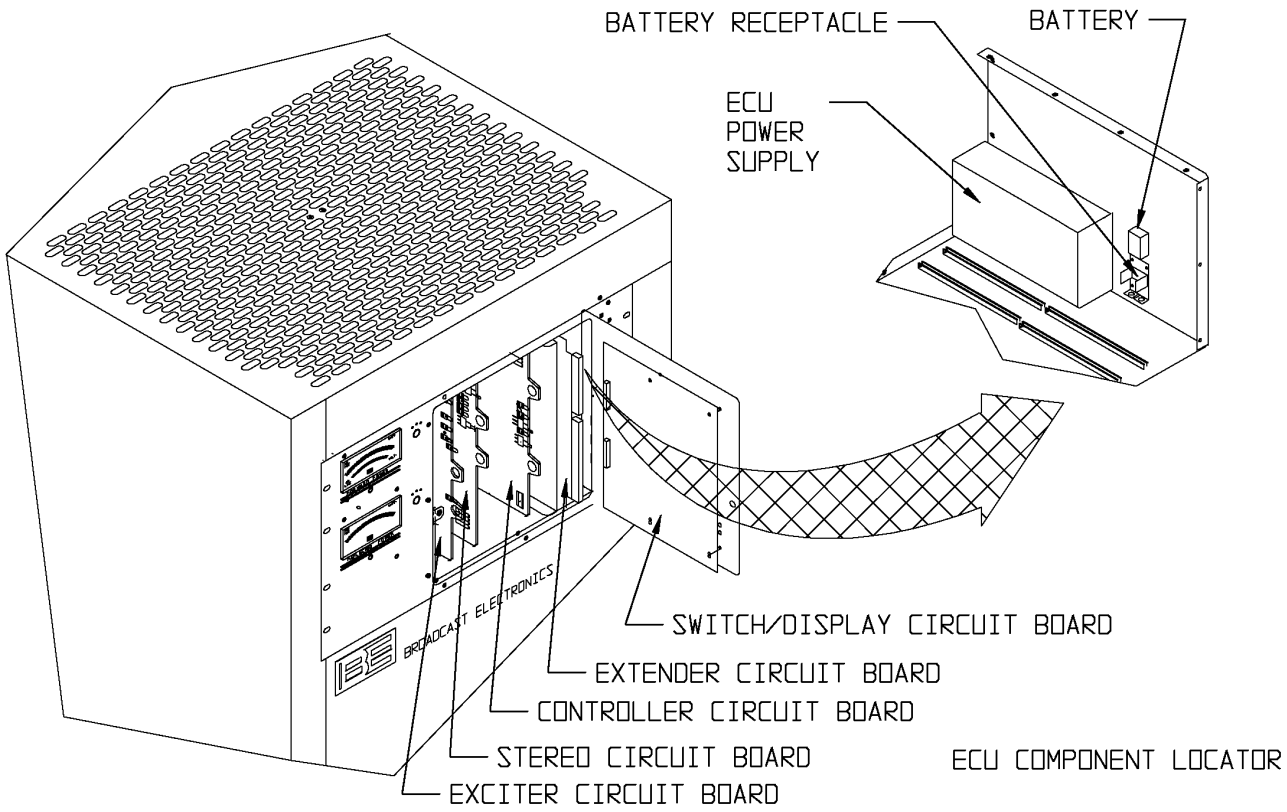
597-1112-15

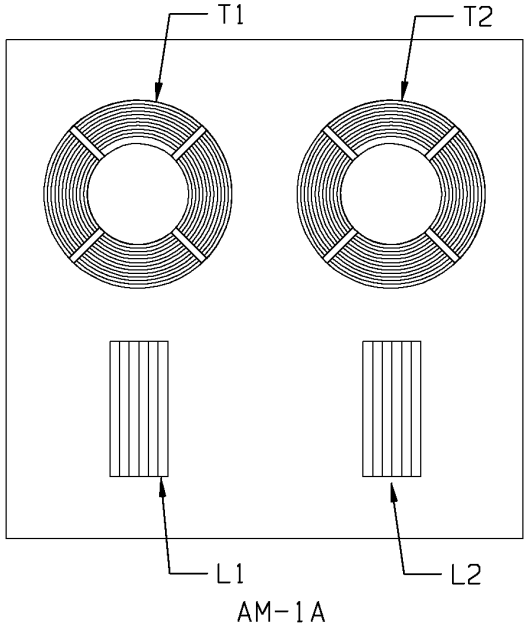
FIGURE 5-1. AM-1A/AM-500A COMPONENT LOCATOR (SHEET 1 OF 2)



597-1112-15A

FIGURE 5-1. AM-1A/AM-500A COMPONENT LOCATOR (SHEET 2 OF 2)
(5-13/5-14)





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POWER MODULE COMBINER COMPONENT LOCATOR

FIGURE 5-2. ECU/COMBINER COMPONENT LOCATOR

TABLE 5-3. POWER SUPPLY MODULE TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
1. RED POWER SUPPLY INDICATION	1. Check transistors Q21 and Q22 as follows: A. Using a digital voltmeter, operate the voltmeter to diode check. On Q21, place the negative lead on the drain (center pin) and the positive lead on the source. 1. If the voltmeter indicates a non-shorted condition, check transistor Q23. 2. If the voltmeter indicates a shorted condition, proceed as follows: a. On Q21, place the negative lead on the drain (center pin) and the positive lead on the gate and record the voltmeter indication. b. On Q22, place the negative lead on the drain and the positive lead on the gate and record the voltmeter indication. c. The transistor with the lowest voltage is defective. 2. Check transistor Q23 as follows: A. Using a digital voltmeter, operate the voltmeter to diode check and troubleshoot transistor Q23 as follows: 1. Place the negative lead on the drain and the positive lead on the gate and determine if a short circuit condition is present. 2. Place the negative lead on the drain and the positive lead on the source and determine if a short circuit condition is present. 3. If a short circuit condition is present, defective Q23. 3. Visually inspect crowbar resistor R72. 4. Check SCRs D13/D14 and diodes D15, D16, and D17 for a short circuit condition. 5. Replace all blown fuses on the circuit board.
1. NO 120 Hz SIGNAL OUTPUT	1. Check for a 120 Hz square-wave pulse at the source of transistor Q55 on the controller circuit board. A. If a 120 Hz signal is present, defective Q55 on the controller circuit board. B. If a 120 Hz signal is not present, defective U2 on the power supply circuit board. 2. Re-install the power supply circuit board and operate the transmitter. If the circuit board remains defective, contact the Broadcast Electronics Customer Service Department.
1. MOD PWR INDICATOR EXTINGUISHED	1. Check U7, U9A, U9B, U9C, U9D, Q9 and Q21.

5-37. RF POWER MODULE.

WARNING ***THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.***

WARNING

WARNING

WARNING ***NEVER RE-CONNECT AC POWER OR THE RF OUTPUT TO THE OUTPUT NETWORK CHASSIS WITH THE TOP-PANEL REMOVED.***

WARNING

5-38. SAFETY CONSIDERATIONS.

5-39. The AM-1A/AM-500A transmitters are equipped with extensive indicator and meter circuitry to allow the operator to isolate problems to a specific area within the transmitter. Due to the hazardous voltages and currents contained in the equipment, operation of the transmitter with test equipment connected to the transmitter RF power module, bandpass filter, combiner, or power supply components is extremely dangerous and must not be attempted. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized. Therefore, the transmitter indicators and meters must be used to isolate a problem to a specific area.

5-40. RF POWER MODULE ASSEMBLY PROCEDURE.

5-41. In the event of a failure in an RF power module, the module will be required to be disassembled. The module must be properly re-assembled to prevent circuit board and connector mis-alignment. To re-assemble an RF power module, proceed as follows:

1. Locate the PA 2 circuit board and install the hex standoffs in the four locations at the rear of the circuit board.
2. Locate the PA 1 circuit board and install the front panel mounting bracket using the four Phillips-head screws. Do not secure the screws at this time. Repeat the procedure for the PA2 circuit board and the modulator circuit board.
3. Install the PA 1 circuit board in the PA 1 location on the RF power module front panel. Secure the circuit board bracket to the front panel using the hex nuts. Repeat the procedure for the PA 2 and modulator circuit boards.
4. Place the RF power module on a square and flat surface such as a table with the top of the module facing up.
5. Place the module front panel flush with the edge of the table and align the circuit boards as follows:
   A. Move the PA 1 circuit board until the front of the circuit board is flush with the RF module front panel and the top edge of the circuit board is straight.
   B. Secure the two Phillips-head screws which mount the circuit board to the bracket.
   C. Repeat the procedure for the PA 2 and modulator circuit boards.

6. Rotate the module and repeat the alignment procedure for the bottom circuit board bracket screws. Secure the two Phillips-head screws mounting the circuit board to the bracket when each circuit board is properly aligned.

7. Install the hardware securing the PA 1 circuit board and the modulator circuit board to the standoffs.

5-42. RF POWER MODULE EXCHANGE PROGRAM.

5-43. If an RF power module is determined to be defective, Broadcast Electronics has established an RF power module exchange program. The program allows the customer to exchange a defective module for a re-conditioned module. Terms of the program are available from the Broadcast Electronics RF Customer Service Department. If an RF power module is determined to be defective, troubleshoot the module or contact the Broadcast Electronics RF Customer Service department for terms of the module exchange program.

5-44. TROUBLESHOOTING PROCEDURES.

5-45. The RF power module troubleshooting procedures are presented in Table 5-4. During the execution of the procedures, perform all troubleshooting procedures for a symptom. The symptom may contain multiple component failures. Once the trouble is isolated, refer to the circuit board theory of operation in SECTION IV and the schematic diagrams to assist in problem resolution.

TABLE 5-4. RF POWER MODULE TROUBLESHOOTING
(Sheet 1 of 3)

SYMPTOM	CIRCUITRY TO CHECK
1. RF DRIVE INDICATOR EXTINGUISHED OR FLICKERING OR FAULT INDICATOR ILLUMINATED	1. Using a digital voltmeter, operate the voltmeter to diode check and determine a reference voltage for the transistors on the non-defective power amplifier circuit board as follows: A. Place the negative lead on the drain of Q1 (center pin) and the positive lead on the gate and determine the voltage. The voltage using a Fluke 77 meter = .45. B. Place the negative lead on the drain of Q1 and the positive lead on the source and determine the voltage. The voltage using a Fluke 77 meter = .45. 2. Using the voltmeter as described in the preceding step, measure the drain-to-gate and drain-to-source voltage of transistor Q1 on the defective power amplifier circuit board. A. If the voltage is greater than ±0.1 volt of the reference, defective Q1, Q3, and Q5. B. If the voltage is equal to the reference, repeat the preceding step for transistor Q2 on the defective power amplifier circuit board.

TABLE 5-4. RF POWER MODULE TROUBLESHOOTING
(Sheet 2 of 3)

SYMPTOM	CIRCUITRY TO CHECK
RF DRIVE INDICATOR EXTINGUISHED OR FLICKERING OR FAULT INDICATOR ILLUMINATED (Cont'd)	3. Using a digital voltmeter, operate the voltmeter to diode check and troubleshoot transistor Q3 as follows: A. Place the negative lead on the drain of Q3 (center pin) and the positive lead on the gate and determine if a short circuit condition is present. B. Place the negative lead on the drain of Q3 and the positive lead on the source and determine if a short circuit condition is present. C. If a short circuit condition is present, defective Q3. 4. Repeat the procedure for transistors Q4, Q5, and Q6. 5. Visually inspect regulator U1 for broken leads. 6. Check and replace all blown fuses on the circuit board.
1. MOD PWM DRIVE INDICATOR EXTINGUISHED AND FAULT OR FUSE INDICATOR ILLUMINATED	1. Refer to RF DRIVE INDICATOR EXTINGUISHED OR FLICKERING OR FAULT INDICATOR ILLUMINATED in the preceding text and troubleshoot the power amplifier circuit board. 2. If no defective circuitry is located on the power amplifier circuit board, refer to FAULT OR FUSE INDICATOR ILLUMINATED in the following text and troubleshoot the modulator circuit board.
1. FAULT OR FUSE INDICATOR ILLUMINATED	1. Visually inspect regulator U10 on the modulator circuit board for broken leads. 2. Using a digital voltmeter, operate the voltmeter to diode check and determine a reference voltage for the transistors on a non–defective modulator circuit board as follows: A. Place the negative lead on the drain of Q1 (center pin) and the positive lead on the gate and determine the voltage. The voltage using a Fluke 77 meter = 1.2V. B. Place the negative lead on the drain of Q1 and the positive lead on the source and determine the voltage. The voltage using a Fluke 77 meter = 0.46V.

TABLE 5-4. RF POWER MODULE TROUBLESHOOTING
(Sheet 3 of 3)

SYMPTOM	CIRCUITRY TO CHECK
FAULT OR FUSE INDICATOR ILLUMINATED (Cont'd)	3. Using the voltmeter as described in the preceding step, measure the drain-to-gate and drain-to-source voltage of transistor Q1 on the defective modulator circuit board. A. If the voltage is greater than ±0.1 volt of the reference, proceed as follows: 1. Remove the wire from terminal E1. 2. Using the voltmeter as described in the preceding text, measure the drain-to-gate and drain-to-source voltage of transistor Q1 on the defective modulator circuit board. B. If the voltage at Q1 is greater than ± 0.1V of the reference, defective Q1. C. If the voltage at Q1 is equal to the reference, defective Q2. 4. Replace all blown fuses on the circuit board. 5. Re-install the modulator circuit board and install the RF module in the transmitter. If the modulator remains defective, replace U2 and U13. 6. If the modulator remains defective, contact the Broadcast Electronics Customer Service Department.

5-46. DIRECTIONAL COUPLER/LIGHTNING DETECTION/LIGHTNING PROTECTION CIRCUIT BOARDS.

WARNING ***THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.***

WARNING ***NEVER RE-CONNECT AC POWER OR THE RF OUTPUT TO THE OUTPUT NETWORK CHASSIS WITH THE TOP-PANEL REMOVED.***

5-47. SAFETY CONSIDERATIONS.

5–48. The AM–1A/AM–500A transmitters are equipped with extensive indicator and meter circuitry to allow the operator to isolate problems to a specific area within the transmitter. Due to the hazardous voltages and currents contained in the equipment, operation of the transmitter with test equipment connected to the transmitter RF power module, bandpass filter, combiner, or power supply components is extremely dangerous and must not be attempted. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized. Therefore, the transmitter indicators and meters must be used to isolate a problem to a specific area.

5–49. **ELECTRICAL ADJUSTMENTS.**

5–50. **MODULATION CALIBRATION CONTROLS.** Modulation calibration controls R201 through R205 calibrate the modulation sample for each power level. A complete description of the procedure to adjust the power level controls is presented in SECTION II, INSTALLATION. Refer to POWER LEVEL AND MODULATION CALIBRATION ADJUSTMENT in SECTION II for the adjustment procedure.

5–51. **DIRECTIONAL COUPLER NULL CONTROLS.** Directional coupler null controls R223, R224, R234, and R235 null the directional coupler sampling circuit. Due to the critical nature of the directional coupler null controls, the controls are not considered field adjustable. If the controls are required to be adjusted, contact the Broadcast Electronics Customer Service Department for information and instructions to adjust the directional coupler null controls.

5–52. **TROUBLESHOOTING PROCEDURES.**

5–53. The output network assembly troubleshooting procedures are presented in Tables 5–5 through 5–7. Table 5–5 presents the directional coupler circuit board troubleshooting. Table 5–6 presents the lightning detection circuit board and spark gap troubleshooting. Table 5–7 presents the lightning protection circuit board troubleshooting. Refer to Tables 5–5 through 5–7 to isolate the problem to a specific circuit. Once the trouble is isolated, refer to the circuit board theory of operation presented in SECTION IV and the schematic diagrams to assist in problem resolution.

5–54. Component locations for the directional coupler, lightning detection, and lightning protection circuit boards are presented in Figure 5–1. Refer to Figure 5–1 to locate the components.

TABLE 5-5. DIRECTIONAL COUPLER CIRCUIT BOARD TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
1. HIGH REFLECTED POWER METER INDICATION WHEN ACTUAL REFLECTED POWER IS LOW	1. Check diode D201 through D210.

TABLE 5-6. LIGHTNING DETECTION CIRCUIT BOARD/SPARK GAP TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
1. HIGH REFLECTED POWER CONDITION	1. Check the lightning detection circuit board for a short circuit condition.
1. NO LIGHTNING DETECTION OPERATION	1. Check the spark gap. 2. Check optically operated transistor Q401 on the lightning detection circuit board.

TABLE 5-7. LIGHTNING PROTECTION CIRCUIT BOARD TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
1. HIGH REFLECTED POWER OR SHORTED OUTPUT CONDITION	1. Check the circuit board for a short circuit condition.

5-55. ECU.

WARNING WARNING WARNING WARNING

THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.

5-56. SAFETY CONSIDERATIONS.

5-57. The AM-1A/AM-500A transmitters are equipped with extensive indicator and meter circuitry to allow the operator to isolate problems to a specific area within the transmitter. Due to the hazardous voltages and currents contained in the equipment, operation of the transmitter with test equipment connected to the transmitter RF power module, bandpass filter, combiner, or power supply components is extremely dangerous and must not be attempted. Test equipment may be connected to the ECU circuit boards from the front of the transmitter using the supplied extender circuit board with power energized. Therefore, the transmitter indicators and meters must be used to isolate a problem to a specific area.

5-58. ECU CIRCUIT BOARD INSTALLATION/REMOVAL.

5-59. The transmitter ECU is equipped with three circuit boards: 1) exciter, 2) stereo, and 3) controller. Each circuit board is equipped with finger holes for the ease of removal and installation. To remove a circuit board, grasp the board using the finger holes and firmly pull the circuit board out of the ECU.

CAUTION ***THE TRANSMITTER MAY BE DAMAGED IF THE ECU CIRCUIT BOARDS ARE NOT SECURELY SEATED INTO***

CAUTION ***THE CONNECTORS.***

5-60. To install the circuit boards: 1) the boards must be inserted into the proper location in the ECU and 2) the boards must be firmly seated into the ECU motherboard. To install a circuit board, proceed as follows:

1. Refer to Figure 5-2 to determine the circuit board location.
2. Insert the circuit board in the appropriate location.
3. Firmly press the circuit board into the connector to engage the connector housing.
4. Firmly press the circuit board into the connector again to engage the connector pins.
5. Repeat the procedure for each ECU circuit board.

5-61. **ELECTRICAL ADJUSTMENTS.**

5-62. The following text provides electrical adjustment procedures for the transmitter ECU. The procedures are presented in the following order.

1. ECU Extender Circuit Board Operation.
2. Controller Circuit Board Adjustments.
3. ECU Meter Switch Circuit Board Adjustments.
4. Stereo Circuit Board Adjustments.
5. Exciter Circuit Board Adjustments.
6. Display Circuit Board Adjustments.

5-63. **ECU EXTENDER CIRCUIT BOARD OPERATION.**

5-64. The transmitter ECU chassis is equipped with an extender circuit board. The circuit board is designed to allow access to the ECU circuit board components for maintenance procedures. To use the circuit board for maintenance procedures, proceed as follows:

1. Refer to Figure 5-2 and locate the extender circuit board assembly in the ECU.
2. Remove the extender circuit board from the ECU.
3. Loosen the extender circuit board locking nut.
4. Completely extend the circuit board.
5. Tighten the extender circuit board locking nut.
6. Remove the circuit board required for maintenance and place the extender circuit board in the location in the ECU.
7. Place the desired circuit board onto the extender circuit board.
8. Firmly press the circuit board into the extender circuit board connectors.

5-65. **CONTROLLER CIRCUIT BOARD ADJUSTMENTS.**

5-66. **P1 SET - P5 SET CONTROLS.** The P1 SET through P5 SET controls adjust the ECU POWER CONTROL 1 through 5 controls to desired levels. A complete description of the procedure to adjust the power level controls is presented in SECTION II, INSTALLATION. Refer to POWER LEVEL AND MODULATION CALIBRATION ADJUSTMENT in SECTION II for the adjustment procedure.

5-67. **FWD AND RFL CALIBRATIONS.** FWD CAL control R56 and RFL CAL control R143 calibrate the transmitter forward and reflected power samples. Due to the critical nature of the FWD CAL and RFL CAL controls, the controls are not considered field adjustable. If the controls are required to be adjusted, contact the Broadcast Electronics Customer Service Department for information and instructions to adjust the FWD and RFL CAL controls.

5-68. **ECU METER SWITCH CIRCUIT BOARD ADJUSTMENTS.**

5-69. **FORWARD POWER METER LOW AND HIGH SCALE CALIBRATIONS.** Low scale control R501 and high scale control R504 calibrate the forward power meter. Due to the critical nature of the low scale and high scale meter calibrate controls, the controls are not considered field adjustable. If the controls are required to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the low and high scale forward power meter controls.

5-70. **REFLECTED POWER METER LOW AND HIGH SCALE CALIBRATIONS.** Low scale control R505, high scale control R506, and ac sample control R511 calibrate the reflected power meter. Due to the critical nature of the low scale, high scale, and ac sample meter calibrate controls, the controls are not considered field adjustable. If the controls are required to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the low scale, high scale, and ac sample reflected power meter controls.

5-71. **FWD AND RFL CALIBRATIONS.** FWD CAL control R56 and RFL CAL control R143 calibrate the transmitter forward and reflected power samples. Due to the critical nature of the FWD CAL and RFL CAL controls, the controls are not considered field adjustable. If the controls are required to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the FWD and RFL CAL controls.

5-72. **STEREO CIRCUIT BOARD ADJUSTMENTS.**

5-73. **STEREO ADJUSTMENT.** The stereo adjustment consists of configuring the equalization circuitry on the stereo circuit board to obtain the optimum stereo performance. The equalization circuitry consists of the equalization circuit 1 and equalization circuit 2 controls. A complete description of the procedure to adjust the equalization controls is presented in SECTION II, INSTALLATION. Refer to STEREO ADJUSTMENT in SECTION II for the adjustment procedure.

5-74. **EXCITER CIRCUIT BOARD ADJUSTMENTS.**

5-75. **MODULATION CALIBRATION.** Modulation calibration control R62 calibrates the exciter modulation circuit. Due to the critical nature of the modulation calibration control, the control is not considered field adjustable. If the control is to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the modulation calibration control.

5-76. **PHASE MODULATOR CALIBRATION.** Phase modulator calibration control R159 calibrates the exciter phase modulator circuit. Due to the critical nature of the phase modulator calibration control, the control is not considered field adjustable. If the control is to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the phase modulator calibration control.

5-77. **SYMMETRY CONTROL.** Symmetry calibration control R170 adjusts the exciter RF output square-wave signal. Due to the critical nature of the symmetry control, the control is not considered field adjustable. If the control is to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the symmetry control.

5-78. **IPM CORRECTION CIRCUIT CONTROLS.** IPM GAIN control R189, IPM TRACK control R104, IPM SHAPE CONTROL R198, and IPM ZERO SET control R191 calibrate the IPM correction circuit. Due to the critical nature of the IPM correction circuit controls, the controls are not considered field adjustable. If the controls are to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the IPM correction circuit controls.

5-79. **SINGLE CHAN MONO LEVEL CONTROL.** SINGLE CHAN MONO LEVEL control R41 is designed to boost a remaining audio channel level in the event of a failure in one channel. A complete description of the procedure to adjust the SINGLE CHAN MONO LEVEL control is presented in SECTION II, INSTALLATION. Refer to SINGLE CHANNEL LEVEL in SECTION II for the adjustment procedure.

5-80. **AVERAGE MODULATION LIMIT CONTROL.** Average modulation limit control R217 limits the average tone modulation. The control is adjusted to limit at 110% tone modulation. Due to the critical nature of the modulation calibration control, the control is not considered field adjustable. If the control is to be adjusted, contact the Broadcast Electronics Customer Service Department for information and instructions to adjust the average modulation limit control.

5-81. **NEG LIMIT CONTROL.** NEG LIMIT control R76 limits the negative L+R information to prevent excessive modulation when the L+R signal is summed with the pilot tone. The NEG LIMIT control is adjusted in the following procedure.

5-82. **Procedure.** To adjust NEG LIMIT control R76, proceed as follows:

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

5-83. Disconnect all transmitter primary power.

5-84. Connect the audio generator to the TB2 LEFT INPUT and RIGHT INPUT audio terminals on the ECU rear-panel.

5-85. Refer to Figure 5-3 and adjust NEG LIMIT control R76 fully counterclockwise.

5-86. Adjust the audio generator for a L=R 1 kHz output at +10 dBm.

5-87. Adjust the AM stereo modulation monitor to indicate positive L+R modulation.

5-88. Energize the transmitter primary power and operate the transmitter.

5-89. Observe the modulation monitor and ensure the monitor indicates 100% positive L+R modulation. If the monitor does not indicate 100% L+R modulation, adjust the audio generator level slightly for a +100% L+R modulation indication on the monitor.

5-90. Adjust the AM stereo modulation monitor to indicate negative L+R modulation.

5-91. Refer to Figure 5-3 and adjust NEG LIMIT control R76 until the AM stereo Modulation monitor indicates -95% L+R modulation.

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

5-92. Disconnect all transmitter primary power.

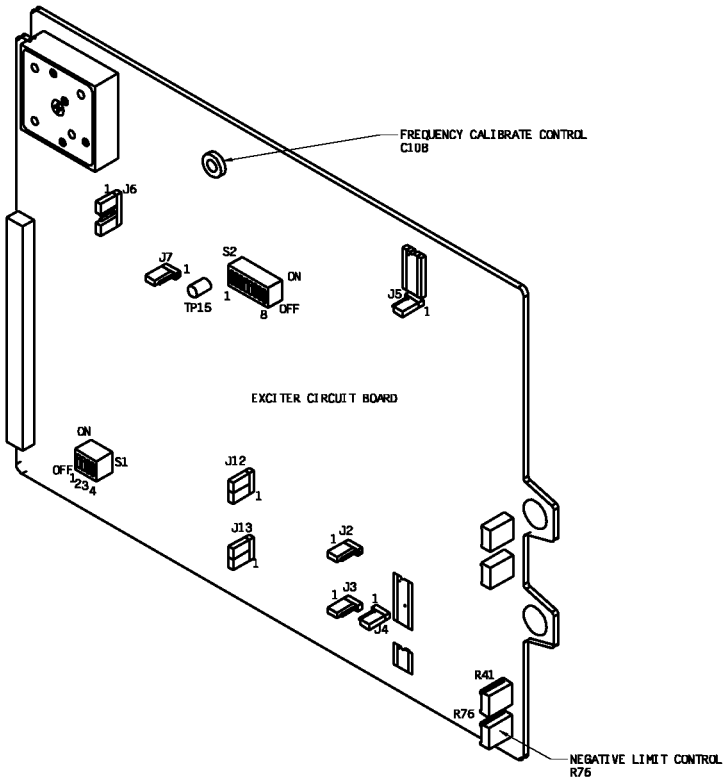

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FIGURE 5-3. EXCITER CIRCUIT BOARD ADJUSTMENT CONTROLS

5-93. Remove all test equipment.

5-94. **FREQUENCY CALIBRATION CONTROL.** Frequency calibration control C108 calibrates the exciter frequency synthesizer. The frequency calibration control is adjusted in the following procedure.

5-95. **Procedure.** To adjust frequency calibration control C108, proceed as follows:

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

5-96. Disconnect all transmitter primary power.

5-97. Remove the exciter circuit board and install the ECU extender circuit board in the exciter circuit board location.

5-98. Install the exciter circuit board on the extender circuit board.

5-99. Refer to Figure 5-3 and connect a frequency counter to test point TP15.

5-100. Energize the transmitter primary power and operate the transmitter.

5-101. Refer to Figure 5-3 and adjust frequency calibration control C108 for the carrier frequency.

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

5–102. Disconnect all transmitter primary power.

5–103. Remove all test equipment and replace the exciter circuit board.

5–104. **DISPLAY CIRCUIT BOARD ADJUSTMENTS.**

5–105. **L/L+R AND R/L-R DISPLAY CALIBRATION CONTROL.** L/L+R calibration control R41 and R/L–R calibration control R47 calibrate the L/L+R and R/L–R displays. The L/L+R and R/L–R calibration controls are adjusted in the following procedure.

5–106. **Procedure.** To adjust L/L+R calibration control R41 and R/L–R calibration control R47, proceed as follows:

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

5–107. Disconnect all transmitter primary power.

5–108. Connect the audio generator to the TB2 LEFT INPUT and RIGHT INPUT audio terminals on the ECU rear–panel.

5–109. Operate the transmitter at a normal output power.

5–110. Adjust the audio generator for an in–phase L=R 1 kHz output at a level to generate 100% L+R modulation as indicated by the modulation monitor.

5–111. Operate the EXCITER MONITOR for L+R/L–R indications.

5–112. Adjust L/L+R calibration control R41 on the display circuit board until the EXCITER MONITOR just indicates 100% L+R modulation.

5–113. Adjust the audio generator for an out–of–phase L=R 1 kHz output at a level to generate 100% L–R modulation as indicated by the modulation monitor.

5–114. Adjust R/L–R calibration control R47 on the display circuit board until the EXCITER MONITOR just indicates 100% L–R modulation.

WARNING ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

WARNING

5–115. Disconnect all transmitter primary power.

5–116. Remove all test equipment.

5–117. **TROUBLESHOOTING PROCEDURES.**

5–118. The ECU assembly troubleshooting procedures are presented in Tables 5–8 through 5–11. Table 5–8 presents the exciter circuit board troubleshooting. Table 5–9 presents the stereo circuit board troubleshooting. Table 5–10 presents the controller circuit board troubleshooting. Table 5–11 presents the ECU power supply troubleshooting. Refer to Tables 5–8 through 5–11 to isolate the problem to a specific circuit. Once the trouble is isolated, refer to the circuit board theory of operation in SECTION IV and the schematic diagrams to assist in problem resolution.

TABLE 5-8. EXCITER CIRCUIT BOARD TROUBLESHOOTING
(Sheet 1 of 3)

SYMPTOM	CIRCUITRY TO CHECK
1. LOCK INDICATOR EXTINGUISHED	1. Refer to the factory test data sheets and ensure the exciter circuit board frequency synthesizer (S1, S2, and J6) is programmed for the correct operating frequency. 2. Check U25 pin 1 for a 0V to 5V square-wave signal at FcX4 (carrier frequency times four) or FcX8 (carrier frequency times eight). A. If the square-wave signal at U25 is not present, check for a greater than 13 volt dc signal at the anode of D23. 1. If the dc voltage is present, defective VCO, Q4, or U30A. 2. If the dc voltage is not present, defective Q3 or C106. B. If the square wave signal at U25 is below FcX4 or FcX8, measure the dc voltage at J8 of the VCO assembly. 1. If the dc voltage at TP7 is greater than 13 volts, defective VCO. 2. If the dc voltage at TP7 is less than 2 volts, defective U25, U26A, U26B, Y1, or U24. C. If the square wave signal at U25 is above FcX4 or FcX8, measure the dc voltage at TP7 of the VCO assembly. 1. If the dc voltage at TP7 is greater than 13 volts, defective U25, U26B, U26A, Y1, or U24. 2. If the dc voltage at J8 is less than 2 volts, defective VCO.
1. NO L+R MODULATION OF CARRIER DURING MONO-PHONIC OPERATION	1. Remove the stereo circuit board if present and place J4 in the left or right channel position as determined by the channel with applied audio. 2. Insert a +10 dBm 1 kHz signal in the appropriate audio channel and check for audio at U39 pins 3 and 6. A. If the audio is not present, defective: 1) left channel – U39, U2A, U2B, U1A, or U1B 2) right channel – U39, U4A, U4B, U5A, or U5B. B. If the audio is present, defective U8A, U8B, U9A, U9B, U14B, or U13.

TABLE 5-8. EXCITER CIRCUIT BOARD TROUBLESHOOTING
(Sheet 2 of 3)

SYMPTOM	CIRCUITRY TO CHECK
1. NO L+R MODULATION DURING STEREO OPERATION	1. Defective U39, U8A, U8B, U9A, U9B, U14B, or U13.
PWM DRIVE INDICATOR EXTINGUISHED ON A POWER MODULE	1. Defective U21A through U21F, U19, U20, U45, D6 through D21, or D47 through D50.
1. RF DRIVE INDICATOR EXTINGUISHED ON THE POWER MODULE	1. Check for a square-wave carrier frequency signal at U46 Pin 1 and 7. A. If the carrier frequency signal is present, defective Q13 thru Q22, D38 through D45, or D51, D52. B. If the carrier frequency signal is not present, check for a 0V-5V p-p square-wave carrier frequency signal present at U40 pins 1 and 16. 1. If the carrier frequency signal is present, defective U46. 2. If the carrier frequency signal is not present, defective U40.
1. RED EXCITER INDICATOR ILLUMINATED ON TRANSMITTER MONITOR	1. Check the frequency synthesizer programming at S1, S2, and J6. 2. Check for a square-wave carrier frequency signal at U23 pin 12. A. If the carrier frequency signal is present, check for a 4V p-p 125 kHz to 133 kHz PWM triangle-wave at TP-5. 1. If the PWM signal is present, defective U22A or U23A. 2. If the PWM signal is not present, defective U10, U11, U12, U44. B. If the carrier frequency signal at U23 pin 12 is not present, check for a 2XFC (two times carrier frequency) at TP-9. 1. If the carrier frequency signal is present, defective U33C or U33D, U39A, U39B, U39C U40 or Q8. 2. If the carrier frequency signal is not present, check for a carrier frequency signal at TP-15. a. If the signal is present, defective Q5, Q6, Q7, U37, U38A, U38B, U38C, or U38D. b. If the signal is not present, check for a 0V-5V p-p carrier frequency signal at U29 pin 12. 1. If the carrier frequency signal is present, defective U31B, U42B, U32A, U32B, U32C, U32D, U30C or P7. 2. If the carrier frequency signal is not present, defective U33A, U30B, or U29.

TABLE 5-8. EXCITER CIRCUIT BOARD TROUBLESHOOTING
(Sheet 3 of 3)

SYMPTOM	CIRCUITRY TO CHECK
1. LOW DEMODULATOR LEFT CHANNEL MODULATION LEVEL WITH LOW EXCITER MONITOR LEFT CHANNEL MODULATION LEVEL	1. Defective U2A, U2B, U1A, U1B, U3A, U3B or P2 programming.
1. LOW DEMODULATOR RIGHT CHANNEL MODULATION LEVEL WITH LOW EXCITER MONITOR RIGHT CHANNEL MODULATION LEVEL	1. Defective U5A, U5B, U4A, U4B, U6A, U6B or P3 programming.

TABLE 5-9. STEREO CIRCUIT BOARD TROUBLESHOOTING
(Sheet 1 of 2)

SYMPTOM	CIRCUITRY TO CHECK
1. RED EXCITER INDICATOR ILLUMINATED ON TRANSMITTER MONITOR	1. Insert a 1 kHz audio signal at +10 dBm into the left channel and operate the stereo circuit board to stereo. Check for a 3V p-p quadrature AM signal at TP-7. A. If the signal is present, defective U40A, U40B, T1, U39A, U39B, or U39C. B. If the signal is not present, check for a quadrature AM signal at U38 pin 3. 1. If the signal is present, defective U38A, U38B, U38C, U38D, U38E, Q1, or Q2. 2. If the signal is not present, check for a quadrature AM signal at U37 pin 1. a. If the signal is present, defective U37, L4, L5, L6, L7, D3, D4, or the S2, S3, or S4 programming. b. If the signal is not present, defective U36, U35A, U35B, U34A, U34B, U33, U32, or U26.
1. NO L-R MODULATION PRESENT AT THE EXCITER MONITOR METER	1. Defective U25B, U27B, or U31B.
1. LOW DEMODULATOR LEFT CHANNEL MODULATION LEVEL WITH NORMAL EXCITER MONITOR LEFT CHANNEL MODULATION LEVEL	1. Insert a +10 dBm 1 kHz signal into the left channel. Check for a 2V p-p 1 kHz signal at U4 pin 1. A. If the signal is present, defective U4B, U5A, U5B, or J1. B. If the signal is not present, defective U1A, U2, U1B, U3, or U4A .

TABLE 5-9. STEREO CIRCUIT BOARD TROUBLESHOOTING
(Sheet 2 of 2)

SYMPTOM	CIRCUITRY TO CHECK
1. LOW DEMODULATOR RIGHT CHANNEL MODULATION LEVEL WITH NORMAL EXCITER MONITOR RIGHT CHANNEL MODULATION LEVEL	1. Insert a +10 dBm 1 kHz signal into the right channel. Check for a 2V p-p 1 kHz signal at U10 pin 1. A. If the signal is present, defective U10B, U11A, U11B, or J2. B. If the signal is not present, defective U7A, U8, U7B, U9, or U10A.

TABLE 5-10. CONTROLLER CIRCUIT BOARD TROUBLESHOOTING
(Sheet 1 of 2)

SYMPTOM	CIRCUITRY TO CHECK
1. NO POWER CONTROL PWM SIGNAL	1. Check for a 1 kHz 15V p-p square-wave signal at TP-7. A. If the square-wave signal is present, defective Q22. B. If the square-wave signal is not present, check for a 1 kHz 50% duty-cycle square-wave signal at TP8. 1. If the square-wave signal is not present, defective U44B, U40C, or U46E. C. If the square-wave signal is not present, check for a dc voltage proportional to power at TP11. 1. If the dc voltage is present, defective U44A, U40B, U41A, U42, or U43. 2. If the dc voltage is not present, contact the Broadcast Electronics Customer Service Department. 2. Check for a HIGH at U36C pin 8. A. If the HIGH is present, defective U36C. B. If the HIGH is not present, contact the Broadcast Electronics Customer Service Department.
1. NO TRANSMITTER ON SIGNAL OUTPUT	1. Check for a HIGH at U23A pin 3. A. If the HIGH is present, defective Q13. B. If the HIGH is not present, check for a LOW at U23A pin 2. 1. If the LOW is present, defective U23A. 2. If a HIGH is present, contact the Broadcast Electronics Customer Service Department.

TABLE 5-10. CONTROLLER CIRCUIT BOARD TROUBLESHOOTING
(Sheet 2 of 2)

SYMPTOM	CIRCUITRY TO CHECK
1. CONFLICT INDICATOR ILLUMINATED	1. Check U7, U8, U9, S1, S2, S3, U12A, U12B, U21A, U21B, U21C, U20A, U20B, U20C, U20D, U19, and U13.

TABLE 5-11. ECU POWER SUPPLY TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
1. NO OUTPUT POWER NO NORMAL/FAULT ECU INDICATIONS	1. Check the ECU power supply fuse. 2. Check the ECU power supply assembly.

5-119. **COMPONENT REPLACEMENT PROCEDURE.** Component replacement on printed circuit boards requires extreme care to avoid damage to the circuit board traces. The following text describes the procedure to replace components on the circuit boards.

5-120. On all circuit boards, the adhesive securing the copper trace to the board melts at almost the same temperature at which solder melts. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. Use of a small iron with steady pressure is required for circuit board repairs.

5-121. To remove a component from a circuit board, cut the leads from the body of the defective component while the device is still soldered to the board.

5-122. Grip each component lead, one at a time, with long-nose pliers. Rotate the circuit board and touch a soldering iron to the lead at the solder connection. When the solder begins to melt, push the lead through the back side of the board. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared of solder by carefully re-heating each hole with a low wattage iron and removing the residual solder with a soldering vacuum tool.

WARNING
WARNING
WARNING
WARNING

MOST SOLVENTS WHICH WILL REMOVE ROSIN FLUX ARE VOLATILE AND TOXIC BY THEIR NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL VENTILATED AREA, AWAY FROM FLAME SUCH AS FROM A SOLDERING IRON OR SMOKING MATERIALS. OBSERVE THE MANUFACTURER'S CAUTIONARY INSTRUCTIONS.

5-123. Install the new component and apply solder from the bottom side of the circuit board. After soldering, remove flux with a cotton swab moistened with a suitable solvent. Rubbing alcohol is highly diluted and is not effective.

5-124. The board should be checked to ensure the flux has been removed and not just smeared. Rosin flux is not normally corrosive, but rosin will absorb enough moisture in time to become conductive and cause problems.

5–125. **INTEGRATED CIRCUITS.** Special care should be exercised with integrated circuits. Each integrated circuit must be installed by matching the integrated circuit notch with the notch on the socket. Do not attempt to remove an integrated circuit from a socket with your fingers. Use an integrated circuit puller to lightly pry the component from the socket.

SECTION VI
PARTS LIST

6-1. INTRODUCTION.

6-2. This section provides parts lists for the AM-1A/AM-500A transmitters. The parts lists provide descriptions and part numbers of electrical components, assemblies, and selected mechanical parts required for maintenance. Each parts list entry in this section is indexed by reference designators appearing on the applicable schematic diagrams.

TABLE 6-1. AM-1A/AM-500A REPLACEABLE PARTS LIST INDEX
(Sheet 1 of 2)

TABLE 6-1. AM-1A/AM-500A REPLACEABLE PARTS LIST INDEX
(Sheet 2 of 2)

TABLE 6-2. AM-1A TRANSMITTER - 907-1000-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Reflected Power Meter, 3.5 Inch (8.89 cm), Taut Band Type, FS=1 mA dc, 35 Ohm Resistance	310-0062	1
----	Forward Power Meter, 3.5 Inch (8.89 cm), Taut Band Type, FS=1 mA dc, 35 Ohm Resistance	310-0063	1
----	Exciter/Controller Assembly	957-0009-011	1
----	Power Module Assembly	957-0010-001	1
----	Output Network Assembly	957-0064	1
----	Customer Service Parts Kit	957-0065	1

TABLE 6-3. AM-500A TRANSMITTER - 907-0500-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	AM-1A Transmitter, 220V ac 50/60 Hz Operation	907-1000-001	1
	DELETE COMPONENTS		
CB1	Circuit Breaker, 20 Amperes, 2-Pole, 250V ac	341-0063	1
----	Reflected Power Meter, 3.5 Inch (8.89 cm), Taut Band Type, FS=1 mA dc, 35 Ohm Resistance	310-0062	1
----	Forward Power Meter, 3.5 Inch (8.89 cm), Taut Band Type, FS=1 mA dc, 35 Ohm Resistance	310-0063	1
----	Spark Gap, 900V	140-0020	1
----	Lightning Protection Circuit Board Assembly	917-0316	1
----	Output Network Assembly	957-0064	1
	ADD COMPONENTS		
CB1	Circuit Breaker, 2-Pole, 250V, 15 Amperes	341-0032	1
----	Reflected Power Meter, 3.5 Inch (8.89 cm), Taut Band Type, FS=1 mA dc, 35 Ohm Resistance	310-0072	1
----	Forward Power Meter, 3.5 Inch (8.89 cm), Taut Band Type, FS=1 mA dc, 35 Ohm Resistance	310-0073	1
----	Spark Gap, 650V	140-0034	1
----	Lighting Protection Circuit Board Assembly	917-0216	1
----	Output Network Assembly	957-0064-500	1

TABLE 6-4. EXCITER/CONTROLLER ASSEMBLY - 957-0009-011
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Varistor, V275LA20A GE, 275V ac RMS, 75 Joules	140-0036	1
----	Filter, RFI, 3A, 250V ac, 50/60 Hz	339-0008	1
----	Knob, RB-67-1-Md Black	482-0030	2
----	Power Supply, Computer Products, NFN 40-7610, -15V±5%, ±5V ±2%, ±15V ±10%/-3%, 85V to 264 V Operation, 40V	540-0006	1
----	ECU Controller Circuit Board Assembly	917-0205	1
----	ECU Extender Circuit Board Assembly	917-0208	1

TABLE 6-4. EXCITER/CONTROLLER ASSEMBLY - 957-0009-011
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Stereo Circuit Board Assembly	917–0209	1
----	ECU Exciter Circuit Board Assembly	917–0300	1
----	ECU Motherboard Circuit Board Assembly	917–0301	1
----	ECU Display/Controller Switch Circuit Board Assembly	917–0306–001	1
----	Meter Switch Circuit Board Assembly	917–0306–005	1
----	ECU Wire Harness	947–0153	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 1 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 thru C33	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	33
C34, C35	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	2
C36, C37	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C38	Capacitor, Mylar, 0.033 uF, 50V	038–1049	1
C39 thru C48	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	10
C49	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1
C50	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C51, C52	Capacitor, Electrolytic, 10 uF, 25V, Non–Polarized	023–1075	2
C53	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C54 thru C56	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	3
C57	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C58	Capacitor, Electrolytic, 2.2 uF, 25V dc	013–2064	1
C59	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C60	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C61, C62	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C63	Capacitor, Electrolytic, 2.2 uF, 25V dc	013–2064	1
C64	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1
C65, C66	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C67	Capacitor, Electrolytic, 1 uF, 50V	024–1064	1
C68 thru C71	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C72, C73	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	2
C74	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C75 thru C87	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	13
C88	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C89	Capacitor, Electrolytic, 2.2 uF, 25V dc	013–2064	1
C90, C91	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C92	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C93	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C94	Capacitor, Electrolytic, 2.2 uF, 25V dc	013–2064	1
C95	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 2 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C96	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C97	Capacitor, Electrolytic, 2.2 uF, 25V dc	013–2064	1
C98, C99	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	2
C100	Capacitor, Mylar Film, 0.1 uF ±10%, 50V	003–1066	1
C101	Capacitor, Monolythic Ceramic, .47 uF ±20%, 50V	003–4743	1
C102	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C103	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C104, C105	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C106	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C107	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C108	Capacitor, Electrolytic, 1 uF, 50V	024–1064	1
C109	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C110	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1
C111 thru C114	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C115	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C116	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1
C117, C118	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C121	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1
C122 thru C125	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C126 thru C128	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C129	Capacitor, Mylar Film, 0.01 uF ±10%, 200V	030–1043	1
C130	Capacitor, Electrolytic, 10 uF, 35V, Non–Polarized	023–1075	1
C131	Capacitor, Electrolytic, 1 uF, 50V	024–1064	1
C132	Capacitor, Electrolytic, 33 uF, 35V	024–3374	1
C133, C134	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C135	Capacitor, Mica, 270 pF ±5%, 300V	041–2722	1
C136, C137	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	2
D1	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D3	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D4	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D5	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D6	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D7	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D8	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D9	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D10	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D11	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D12	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D13 thru D18	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	6
D19	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D20	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D21	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D22 thru D29	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	8

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 3 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
D30, D31	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	2
D32	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D33	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	1
D34, D35	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D36, D37	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	2
D38	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D39, D40	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	2
D41	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D42	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	1
D44 thru D45	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
D49 thru D51	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	3
DS1, DS2	Indicator, LED, Green, 521–9175, 3V @ 40 mA Maximum	323–9224	2
DS3	Indicator, LED, Yellow, 521–9176, 3V @ 40 mA Maximum	323–9225	1
E10	Terminal, Turret, Double Shoulder	413–1597	1
J1 thru J3	Receptacle, Male, 3–Pin In–line	417–0003	3
J4 thru J20	Receptacle, Male, 2–Pin In–line	417–4004	17
P1 thru P3	Jumper, Programmable, 2–Pin	340–0004	3
P6	Jumper, Programmable, 2–Pin	340–0004	1
P8 thru P19	Jumper, Programmable, 2–Pin	340–0004	12
P301	Receptacle, 50–Pin Dual In–line	417–0147	1
P302	Connector, Female, 80–Pin, Dual In–Line Printed Circuit Board Mount	417–0188	1
Q1 thru Q37	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	37
Q38 thru Q45	Transistor, VP0106N3, FET, P–Channel, TO–92 Case	210–0106	8
Q46 thru Q51	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	6
Q52	Transistor, VP0106N3, FET, P–Channel, TO–92 Case	210–0106	1
Q53, Q54	Transistor, 2N3906, PNP, Silicon, TO–92 Case	210–3906	2
Q55	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	1
Q56 thru Q59	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	4
R1	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R2 thru R6	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	5
R7	Resistor, 301 k Ohm ±1%, 1/4W	103–3061	1
R8	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R9	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 4 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R10	Resistor, 4.42 k Ohm ±1%, 1/4W	103–4441	1
R11, R12	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	2
R13	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R14	Resistor, 43.2 k Ohm ±1%, 1/4W	103–4325	1
R15	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R16	Resistor, 20.0 k Ohm ±1%, 1/4W	103–2051	1
R17	Resistor, 2.32 k Ohm ± 1%, 1/4W	103–2341	1
R18	Resistor, 1.74 k Ohm ± 1%, 1/4W	103–1744	1
R19, R20	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R21	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R22	Resistor, 1.47 k Ohm, ±1%, 1/4W	103–1474	1
R23	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R24	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R25	Resistor, 301 k Ohm ±1%, 1/4W	103–3061	1
R26 thru R28	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	3
R29	Resistor, 20.0 k Ohm ±1%, 1/4W	103–2051	1
R30	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R31	Resistor, 301 k Ohm ±1%, 1/4W	103–3061	1
R32	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R33 thru R35	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	3
R36	Resistor, 392 Ohm ±1%, 1/4W	103–3923	1
R37, R38	Resistor, 240 Ohm ±1%, 1/4W	103–2431	2
R39	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R40	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R41	Resistor, 240 Ohm ±1%, 1/4W	103–2431	1
R42	Resistor, 392 Ohm ±1%, 1/4W	103–3923	1
R43	Resistor, 182 Ohm, ±1%, 1/4W	103–1823	1
R44	Resistor, 392 Ohm ±1%, 1/4W	103–3923	1
R45	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R46	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R47	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R48	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R49	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R50	Resistor, 47.5 k Ohm ±1%, 1/4W	103–4755	1
R51	Resistor, 121 k Ohm ±1%, 1/4W	103–1261	1
R52	Resistor, 301 k Ohm ±1%, 1/4W	103–3061	1
R53, R54	Resistor, 10 Ohm, ±1%, 1/4W	103–1021	2
R55	Resistor, 392 Ohm ±1%, 1/4W	103–3923	1
R56	Potentiometer, 500 Ohm ±10%, 1 1/4W	178–5001	1
R57	Resistor, 750 Ohm ±1%, 1/4W	103–7503	1
R58	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R59	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R60, R61	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	2
R62	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R63, R64	Resistor, 392 Ohm ±1%, 1/4W	103–3923	2
R65, R66	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 5 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R67	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R68 thru R70	Resistor, 47.5 k Ohm, ±1%, 1/4W	103–4755	3
R71	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R72	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R73	Resistor, 4.7 Meg Ohm ±5%, 1/4W	100–4773	1
R74	Resistor, 150 Ohm ±1%, 1/4W	100–1531	1
R75	Resistor, 61.9 k Ohm ±1%, 1/4W	103–6195	1
R76	Resistor, 3.92 k Ohm ±1%, 1/4W	103–3924	1
R77	Resistor, 1.47 k Ohm, ±1%, 1/4W	103–1474	1
R78	Resistor, 4.7 Meg Ohm ±5%, 1/4W	100–4773	1
R79, R80	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R81, R82	Resistor, 20.0 k Ohm ±1%, 1/4W	103–2051	2
R83	Resistor, 4.7 Meg Ohm ±5%, 1/4W	100–4773	1
R84	Resistor, 47.5 k Ohm ±1%, 1/4W	103–4755	1
R85	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R86	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R87	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R88	Resistor, 150 k Ohm ±1%, 1/4W	103–1561	1
R89	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R90	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R91	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R92	Resistor, 25.5 k Ohm ±1%, 1/4W	103–2551	1
R93	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R94	Resistor, 10 Ohm, ±1%, 1/4W	103–1021	1
R95	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R96	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R97	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R98	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R99	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R100	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R101	Resistor, 240 Ohm ±1%, 1/4W	103–2431	1
R102	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R103	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R104	Resistor, 16.9 k Ohm ±1%, 1/4W	103–1695	1
R105	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R106	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R107	Resistor, 1.47 k Ohm, ±1%, 1/4W	103–1474	1
R108	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R109	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R110 thru R122	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	13
R123	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R124	Resistor, 6.34 k Ohm ±1%, 1/4W	103–6344	1
R125	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R126 thru R130	Resistor, 240 Ohm ±1%, 1/4W	103–2431	5
R131 thru R133	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	3

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 6 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R134	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R135	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R136	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R137	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R138	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R139, R140	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R141	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R142	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R143	Potentiometer, 500 Ohm ±10%, 1 1/4W	178–5001	1
R144	Resistor, 750 Ohm ±1%, 1/4W	103–7503	1
R145 thru R147	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	3
R148 thru R150	Resistor, 47.5 k Ohm, ±1%, 1/4W	103–4755	3
R151	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R152	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R153	Resistor, 499 Ohm ±1%, 1/4W	103–4993	1
R154, R155	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R156	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R157	Resistor, 90.9 k Ohm ±1%, 1/4W	103–9095	1
R158	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R159	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R160	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R161	Resistor, 301 k Ohm ±1%, 1/4W	103–3061	1
R162	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R163	Resistor, 499 Ohm ±1%, 1/4W	103–4993	1
R164, R165	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R166	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R167	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R168	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R169	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R170	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R171	Resistor, 26.1 k Ohm, ±1%, 1/4W	103–2615	1
R172, R173	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R174 thru R176	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R177	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R179, R181	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R183, R184	Resistor, 392 Ohm ±1%, 1/4W	103–3923	2
R187, R188	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R189	Resistor, 20.0 k Ohm ±1%, 1/4W	103–2051	1
R190	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R191	Resistor, 4.7 Meg Ohm ±5%, 1/4W	100–4773	1
R192 thru R194	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R195	Resistor, 26.1 k Oh ±1%, 1/4W	103–2615	1
R196	Resistor, 121 k Ohm ±1%, 1/4W	103–1261	1
R197	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 7 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R198	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R199	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R200	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100–2273	1
R201 thru R205	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	5
R206	Resistor, 475 k Ohm ±1%, 1/4W	103–4731	1
R207, R208	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R209	Resistor, 1.47 k Ohm, ±1%, 1/4W	103–1474	1
R210	Resistor, 499 Ohm ±1%, 1/4W	103–4993	1
RN1, RN2	Resistor Network, 10 k Ohm ±2%, 1W Resistors, 8–Pin Single In–Line Package	226–1051	2
RN3, RN4	Resistor Network, 9–100 k Ohm, ±2%, .17W Resistors, 10–Pin Single In–Line Package	226–1060	2
RN5	Resistor Network, 10 k Ohm ±2%, 1W Resistors, 8–Pin Single In–Line Package	226–1051	1
RN6, RN7	Resistor Network, 9–100 k Ohm, ±2%, 2.7W Resistors, 10–Pin Single In–Line Package	226–1060	2
RN8	Resistor Network, 10 k Ohm ±2%, 1W Resistors, 8–Pin Single In–Line Package	226–1051	1
S1 thru S3	Switch, SPST, 4–Position, 8–Pin DIP Dual In–Line	340–0002	3
S4	Switch, Miniature Toggle, DPDT, 0.4 vA Maximum at 20V ac or dc	340–0060	1
S5	Switch, Push, N.O. Momentary Contact, Miniature, 1A @ 120V Maximum	343–6330	1
TP1 thru TP6	Test, Jack, Right Angle PC Mounting	417–0004	6
TP7 thru TP12	Terminal, Turret, Double Shoulder	413–1597	6
U1 thru U11	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	11
U12	Integrated Circuit, CD4075BE, RCA	225–0006	1
U13	Integrated Circuit, CD4071B, OR Gate, CMOS, 14–Pin DIP	225–0005	1
U14	Integrated Circuit, MC14532B, 8–Bit Priority Encoder, CMOS, 16–Pin DIP	228–4532	1
U15	Integrated Circuit, MC14076, Quad D Register, CMOS, 16–Pin DIP	228–4076	1
U16	Integrated Circuit, MC14011BCP, Quad 2–Input NAND Gate, CMOS, 14–Pin DIP	228–4011	1
U17	Integrated Circuit, MC14076, Quad D Register, CMOS, 16–Pin DIP	228–4076	1
U18	Integrated Circuit, MC14028BCP, BCD–to–Decimal Decoder, CMOS	228–4028	1
U19	Integrated Circuit, CD4075BE, RCA	225–0006	1
U20	Integrated Circuit, CD4081B, Quad 2–Input AND Gate, CMOS, 14–Pin DIP	225–0008	1
U21	Integrated Circuit, CD4075BE, RCA	225–0006	1
U22	Integrated Circuit, MC14073B, Tripple 3–Input AND Gate, CMOS, 14–Pin DIP	228–4073	1
U23	Integrated Circuit, MC14001, CMOS, Quad 2–Input NOR Gate, 14–Pin DIP	228–4001	1
U24	Integrated Circuit, Triple 3 Input NOR Gates, CMOS, 14–Pin DIP	220–4025	1
U25	Integrated Circuit, CD4069CN, Hex Inverter, CMOS, 14–Pin DIP	228–4069	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 8 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U26	Integrated Circuit, 14 Stage Counter, CMOS, 16-Pin DIP	228-4020	1
U27	Integrated Circuit, MC14512B, 8 Channel Data Selector, CMOS	228-4512	1
U28	Integrated Circuit, MC14532B, 8-Bit Priority Encoder, CMOS, 16-Pin DIP	228-4532	1
U29	Integrated Circuit, LM3362Z-2.5, Precision Voltage Reference, 2.5V ±4%, -0 to ±70°C, TO-92 Case	229-0336	1
U30, U31	Integrated Circuit, MC14516B, Binary Up/Down Counter, CMOS, 16-Pin DIP	228-4516	2
U32, U33	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	2
U34, U35	Integrated Circuit, MC14516B, Binary Up/Down Counter, CMOS, 16-Pin DIP	228-4516	2
U36	Integrated Circuit, CD4081B, Quad 2-Input AND Gate, CMOS, 14-Pin DIP	225-0008	1
U37	Integrated Circuit, CD4075BE, RCA	225-0006	1
U38	Integrated Circuit, MC14073B, Tripple 3-Input AND Gate, CMOS, 14-Pin DIP	228-4073	1
U39	Integrated Circuit, MC14051, 8-Bit Analog Multiplexer, CMOS, 16-Pin DIP	220-4051	1
U40	Integrated Circuit, TLO74CN, Quad JFET-Input Operational Amplifier, 14-Pin DIP	221-0074	1
U41	Integrated Circuit, MC14053B, Analog Multiplexers/Demultiplexers, CMOS MSI, 16-Pin DIP	220-4053	1
U42, U43	Integrated Circuit, DAC-08CP, D-A Converter, 8-Bit, 16-Pin DIP	220-0801	2
U44	Integrated Circuit, LM339AN, Quad Comparator, 14-Pin DIP	221-0339	1
U45	Integrated Circuit, CD4071B, OR Gate, CMOS, 14-Pin DIP	225-0005	1
U46	Integrated Circuit, CD4069CN, Hex Inverter, CMOS, 14-Pin DIP	228-4069	1
U47	Integrated Circuit, CD4081B, Quad 2-Input AND Gate, CMOS, 14-Pin DIP	225-0008	1
U48, U49	Integrated Circuit, MC14043BP, CMOS, Quad NOR Gate, 16-Pin DIP	220-4043	2
U50	Integrated Circuit, CD4071B, OR Gate, CMOS, 14-Pin DIP	225-0005	1
U51	Integrated Circuit, CD4081B, Quad 2-Input AND Gate, CMOS, 14-Pin DIP	225-0008	1
U52	Integrated Circuit, MC14001, CMOS, Quad 2-Input NOR Gate, 14-Pin DIP	228-4001	1
U53	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	1
U54	Integrated Circuit, CD4069CN, Hex Inverter, CMOS, 14-Pin DIP	228-4069	1
U55	Integrated Circuit, CD4078BE, RCA	225-0007	1
U56	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	1
U57	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1
U58	Integrated Circuit, 14 Stage Counter, CMOS, 16-Pin DIP	228-4020	1
U59	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 9 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U60	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U61	Integrated Circuit, LM339AN, Quad Comparator, 14-Pin DIP	221-0339	1
U62	Integrated Circuit, CD4071B, OR Gate, CMOS, 14-Pin DIP	225-0005	1
U63, U64	Integrated Circuit, TLO74CN, Quad JFET-Input Operational Amplifier, 14-Pin DIP	221-0074	2
U65, U66	Integrated Circuit, LM339AN, Quad Comparator, 14-Pin DIP	221-0339	2
U67	Integrated Circuit, MC14043BP, CMOS, Quad NOR Gate, 16-Pin DIP	220-4043	1
U68	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1
U69	Integrated Circuit, CD4075BE, RCA	225-0006	1
U70	Integrated Circuit, LM317LZ, Adjustable Positive Voltage Regulator, 1.2 to 37V @ 0.1 Ampere, TO-92 Case	220-0317	1
U71	Integrated Circuit, CD4081B, Quad 2-Input AND Gate, CMOS, 14-Pin DIP	225-0008	1
XS5	Switch Cap, Red	343-6331	1
XU1 thru XU11	Socket, 6-Pin DIP	417-0600	11
XU12, XU13	Socket, 14-Pin DIP	417-1404	2
XU14, XU15	Socket, 16-Pin DIP	417-1604	2
XU16	Socket, 14-Pin DIP	417-1404	1
XU17, XU18	Socket, 16-Pin DIP	417-1604	2
XU19 thru XU25	Socket, 14-Pin DIP	417-1404	7
XU26 thru XU28	Socket, 16-Pin DIP	417-1604	3
XU30, XU31	Socket, 16-Pin DIP	417-1604	3
XU32, XU33	Socket, 6-Pin DIP	417-0600	2
XU34, XU35	Socket, 16-Pin DIP	417-1604	2
XU36 thru XU38	Socket, 14-Pin DIP	417-1404	3
XU39	Socket, 16-Pin DIP	417-1604	1
XU40	Socket, 14-Pin DIP	417-1404	1
XU41 thru XU43	Socket, 16-Pin DIP	417-1604	3
XU44 thru XU47	Socket, 14-Pin DIP	417-1404	4
XU48, XU49	Socket, 16-Pin DIP	417-1604	2
XU50 thru XU52	Socket, 14-Pin DIP	417-1404	3
XU53	Socket, 6-Pin DIP	417-0600	1
XU54, XU55	Socket, 14-Pin DIP	417-1404	2
XU56	Socket, 6-Pin DIP	417-0600	1
XU57 thru XU59	Socket, 16-Pin DIP	417-1604	3
XU60 thru XU66	Socket, 14-Pin DIP	417-1404	7
XU67, XU68	Socket, 16-Pin DIP	417-1604	2
XU69	Socket, 14-Pin DIP	417-1404	1

TABLE 6-5. ECU CONTROLLER CIRCUIT BOARD ASSEMBLY - 917-0205
(Sheet 10 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
XU71	Socket, 14–Pin DIP	417–1404	1
XU71	Socket, 16–Pin DIP	417–1604	1
----	Blank, ECU Controller Circuit Board, AM–1	517–0205	1

TABLE 6-6. ECU EXTENDER CIRCUIT BOARD ASSEMBLY - 917-0208

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector, Female, 80–Pin, Dual In–Line, Printed Circuit Board Mount	417–0188	1
----	Header, Right Angle, 50–Pin	417–0152	1
----	ECU Extender Card Support, AM Transmitter	471–0849	1
----	Header, Right Angle, 80–Pin	417–8001	1
----	Receptacle, 50–Pin Dual In–line	417–0147	1
----	Blank, ECU Extender Circuit Board, AM–1	517–0208	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 1 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1, C2	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C3, C4	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	2
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C6	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C7	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C8	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C9	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C10	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C11	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C12	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C13	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C14	Capacitor, Mica, 330 pF ±5%, 500V	042–3322	1
C15 thru C18	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C19, C20	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	2
C21	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C22	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C23	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C24	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C25	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C26	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C27	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C28	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C29	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 2 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C30	Capacitor, Mica, 330 pF ±5%, 500V	042–3322	1
C31 thru C34	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C35, C36	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	2
C37	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C38	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C39	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C40	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C41	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C42	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C43	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C44	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C45	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C46	Capacitor, Mica, 330 pF ±5%, 500V	042–3322	1
C47 thru C50	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C51, C52	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	2
C53	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C54	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C55	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C56	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C57	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C58	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C59	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C60	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C61	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C62	Capacitor, Mica, 330 pF ±5%, 500V	042–3322	1
C63 thru C80	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	18
C81, C82	Capacitor, Electrolytic, 100 uF, 50V	020–1085	2
C83, C84	Capacitor, Mylar Film, 0.47 uF ±2%, 100V	030–4753	2
C85	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C86, C87	Capacitor, Mylar Film, 0.47 uF ±2%, 100V	030–4753	2
C88 thru C90	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C91	Capacitor, Electrolytic, 10 uF, 25V, Non–Polarized	023–1075	1
C92	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C93	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C94	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C95 thru C98	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C99 thru C102	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	4
C103, C104	Capacitor, Electrolytic, 10 uF, 25V, Non–Polarized	023–1075	2
C105	Capacitor, Ceramic Disc, 3.3 pF, 1000V	000–3302	1
C106, C107	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C108	Capacitor, Mica, 620 pF ±5%, 300V	040–6223	1
C109	Capacitor, Mica, 33 pF ±5%, 500V	042–3312	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 3 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C110	Capacitor, Mica, 180 pF ±5%, 500V	042-1822	1
C111	Capacitor, Mica, 620 pF ±5%, 300V	040-6223	1
C112	Capacitor, Mica, 220 pF ±5%, 500V	040-2223	1
C113	Capacitor, Monolythic Ceramic, 0.0015 uF ±5%, 100V	003-1523	1
C114	Capacitor, Monolythic Ceramic, .0027 uF ±5%, 100V	003-2723	1
C115	Capacitor, Mica, 750 pF ±5%, 500V	042-7522	1
C116	Capacitor, Mica, 560 pF ±5%, 500V	040-5623	1
C117	Capacitor, Monolythic Ceramic, 0.0015 uF ±5%, 100V	003-1523	1
C118	Capacitor, Mica, 820 pF ±5%, 300V	042-8222	1
C119	Capacitor, Mica, 270 pF ±5%, 300V	041-2722	1
C120	Capacitor, Mica, 180 pF ±5%, 500V	042-1822	1
C121	Capacitor, Mica, 620 pF ±5%, 300V	040-6223	1
C122 thru C128	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	7
C129, C130	Capacitor, Electrolytic, 10 uF, 35V, Non-Polarized	023-1075	2
C131 thru C133	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	3
C134	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C135, C136	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	2
C137	Capacitor, Electrolytic, 10 uF, 35V, Non-Polarized	023-1075	1
C138 thru C144	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	1
C145	Capacitor, Electrolytic, 10 uF, 35V, Non-Polarized	023-1075	1
C146, C147	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	2
C148 thru C151	Capacitor, Monolythic Ceramic, 470 pF ±5%, 200V	003-4713	4
C152 thru C164	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	13
C165 thru C168	Capacitor, Mylar Film, 0.01 uF ±10%, 200V	030-1043	4
C169, C170	Capacitor, Mica, 180 pF ±5%, 500V	042-1822	2
C171, C172	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	2
C173, C174	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	2
C175	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003-1066	1
D1, D2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
D3, D4	Diode, 1N4737, Zener, 7.5V ±10%, 1W	200-4737	2
D5 thru D9	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	5
DS1 thru DS3	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	3
DS4 thru DS6	Indicator, LED, Yellow, 521-9176, 3V @ 30 mA Maximum	323-9225	3
E1 thru E4	Terminal, Turret, Double Shoulder	413-1597	4
J1 thru J4	Connector, Header, Right Angle, 8-Pin	417-0807	4
J5 thru J7	Receptacle, Male, 3-Pin In-line	417-0003	3
L1 thru L3	Coil, Toroid, 22 uH ±10%, 34 Turns of No. 30 Enameled Copper Wire on B.E. No. 360-0023 Form	360-0049	3

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 4 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
L4	Shielded Adjustable Coil, 64–163 uH, 155 mA Maximum, 9.98 Ohms DC Resistance	360–0077	1
L5, L6	Shielded Adjustable Coil, 26–71 uH, 185 mA Maximum, 6.97 Ohms DC Resistance	360–0062	2
L7	Shielded Adjustable Coil, 12–29 uH, 225 mA Maximum, 4.72 Ohms DC Resistance	360–0078	1
P1, P2	Jumper, Programmable, 2–Pin	340–0004	2
P3 thru P7	Jumper, Programmable, 2–Pin	340–0004	5
P1A	Jumper, Programmable, 2–Pin	340–0004	1
P2B	Jumper, Programmable, 2–Pin	340–0004	1
P31	Jumper, Programmable, 2–Pin	340–0004	1
P201	Receptacle, 50–Pin Dual In–line	417–0147	1
Q1, Q2	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	2
Q3 thru Q14	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	12
R1	Potentiometer, 5 k Ohm ±10%, 1W	179–5043	1
R2	Resistor, 8.25 k Ohm ±1%, 1/4W	103–8254	1
R3	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R4	Resistor, 6.04 k Ohm, ±1%, 1/4W	103–6044	1
R5	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R6	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R7	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R8	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R9	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R10	Potentiometer, 500 Ohm ±10%, 1 1/4W	178–5001	1
R11	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R12	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R13	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R14	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R15	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R16	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R17 thru R19	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R20 thru R22	Resistor, 4.99 k Ohm ±1%, 1/4W	100–5041	3
R23, R24	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R25	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R26	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R27	Potentiometer, 5 k Ohm ±10%, 1W	179–5043	1
R28	Resistor, 8.25 k Ohm ±1%, 1/4W	103–8254	1
R29	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R30	Resistor, 6.04K Ohm, ±1%, 1/4W	103–6044	1
R31	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R32	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R33	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R34	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R35	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R36	Potentiometer, 500 Ohm ±10%, 1 1/4W	178–5001	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 5 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R37	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R38	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R39	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R40	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R41	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R42	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R43 thru R45	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R46 thru R48	Resistor, 4.99 k Ohm ±1%, 1/4W	100–5041	3
R49, R50	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R51	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R52	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R53	Potentiometer, 5 k Ohm ±10%, 1W	179–5043	1
R54	Resistor, 8.25 k Ohm ±1%, 1/4W	103–8254	1
R55	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R56	Resistor, 6.04K Ohm ±1%, 1/4W	103–6044	1
R57	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R58	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R59	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R60	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R61	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R62	Potentiometer, 500 Ohm ±10%, 1 1/4W	178–5001	1
R63	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R64	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R65	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R67	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R68	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R69 thru R71	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R72 thru R74	Resistor, 4.99 k Ohm ±1%, 1/4W	100–5041	3
R75, R76	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R77	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R78	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R79	Potentiometer, 5 k Ohm ±10%, 1W	179–5043	1
R80	Resistor, 8.25 k Ohm ±1%, 1/4W	103–8254	1
R81	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R82	Resistor, 6.04 k Ohm ±1%, 1/4W	103–6044	1
R83	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R84	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R85	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R86	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R87	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R88	Potentiometer, 500 Ohm ±10%, 1 1/4W	178–5001	1
R89	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R90	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R91	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 6 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R92	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R93	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R94	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R95 thru R97	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R98 thru R100	Resistor, 4.99 k Ohm ±1%, 1/4W	100–5041	3
R101, R102	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R103	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R104	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R105 thru R109	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	5
R110	Resistor, 178 k Ohm ±1%, 1/4W	103–1761	1
R111	Resistor Network, 10–10 k Ohm 0.5% Resistors, 0.7W Total Dissipation, 16–Pin DIP	226–0392	1
R112	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	1
R113	Resistor, 6.04 k Ohm ±1%, 1/4W	103–6044	1
R114	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R115	Resistor, 442 Ohm ±1%, 1/4W	103–4423	1
R116	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R117	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R118	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R119	Resistor, 499 k Ohm ±1%, 1/4W	103–4996	1
R120 thru R126	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	7
R127	Resistor, 178 k Ohm ±1%, 1/4W	103–1761	1
R128	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R129, R130	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R131	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R132	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R133	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R134	Resistor, 82.5 k Ohm ±1%, 1/4W	103–8255	1
R135	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R136	Resistor, 205 k Ohm, ±1%, 1/4W	103–2056	1
R137	Resistor, 71.5 k Ohm ±1%, 1/4W	103–7155	1
R138	Resistor, 909 Ohm ±1%, 1/4W	103–9031	1
R139	Resistor, 178 k Ohm ±1%, 1/4W	103–1761	1
R140, R141	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R142	Resistor, 5.23 k Ohm, ±1%, 1/4W	103–5251	1
R143	Resistor, 5.49 k Ohm, ±1%, 1/4W	103–5494	1
R144	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R145	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R146, R147	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R148 thru R151	Resistor, 100 Ohm ±1%, 1/4W	100–1031	4
R152, R153	Resistor, 22.1 Ohm ±1%, 1/4W	103–2212	2
R154, R155	Resistor, 2 k Ohm ±1%, 1/4W	100–2041	2
R156	Resistor, 88.7 Ohm, ±1%, 1/4W	103–8872	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 7 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R157, R158	Resistor, 182 Ohm ±1%, 1/4W	103–1823	2
R159	Resistor, 442 Ohm ±1%, 1/4W	103–4423	1
R160	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R161	Resistor, 182 Ohm ±1%, 1/4W	103–1823	1
R162, R163	Resistor, 221 Ohm ±1%, 1/4W	103–2213	2
R164	Resistor, 182 Ohm, ±1%, 1/4W	103–1823	1
R165, R166	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R167	Resistor, 182 Ohm, ±1%, 1/4W	103–1823	1
R168	Resistor, 240 Ohm ±1%, 1/4W	103–2431	1
R169	Resistor, 5.23 k Ohm, ±1%, 1/4W	103–5251	1
R170 thru R172	Resistor, 442 Ohm, ±1%, 1/4W	103–4423	3
R173	Resistor, 240 Ohm ±1%, 1/4W	103–2431	1
R174	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R175	Resistor, 240 Ohm ±1%, 1/4W	103–2431	1
R176	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R177	Resistor, 22.1 Ohm ±1%, 1/4W	103–2212	1
R178	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R179	Resistor, 22.1 Ohm ±1%, 1/4W	103–2212	1
R180	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R181, R182	Resistor, 1.5 k Ohm ±1%, 1/4W	103–1504	2
R183 thru R188	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	6
R189	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R190	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R191	Resistor, 2 k Ohm ±1%, 1/4W	100–2041	1
R192	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R193	Potentiometer, 10 k Ohm ±10%, 1 1/4W	179–1053	1
R194	Resistor, 24.9 k Ohm ±1%, 1/4W	103–2495	1
R195	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R196	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R197 thru R200	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	4
R201, R202	Resistor, 240 Ohm ±1%, 1/4W	103–2431	2
R203	Resistor, 82.5 k Ohm ±1%, 1/4W	103–8255	1
R204	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R205	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R206	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R207	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R208	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R209	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R210	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R211	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R212	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R213	Resistor, 49.9 k Ohm ±1%, 1/4W	103–4951	1
R214	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R215	Resistor, 2 k Ohm ±1%, 1/4W	100–2041	1
R216	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 8 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R217	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R218 thru R221	Resistor, 240 Ohm ±1%, 1/4W	103–2431	4
R222 thru R225	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	4
R226	Resistor, 5.23 k Ohm, ±1%, 1/4W	103–5251	1
R227	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R228	Resistor, 22.1 Ohm ±1%, 1/4W	103–2212	1
S1	Switch, Toggle, SPDT, 5A @ 125V ac & 28V dc	348–0123	1
S2 thru S4	Switch, SPST, 4–Position, 8–Pin DIP Dual In–Line	340–0002	3
S5	Switch, Push, N.O. Momentary Contact, Miniature, 1A @ 120V Maximum	343–6330	1
T1	Transformer, RF DRIVE	370–0046	1
TP1 thru TP10	Terminal, Turret, Double Shoulder	413–1597	10
U1	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	1
U2, U3	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8–Pin DIP	220–2150	2
U4 thru U7	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	4
U8, U9	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8–Pin DIP	220–2150	2
U10 thru U12	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	3
U13, U14	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8–Pin DIP	220–2150	2
U15 thru U18	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	4
U19, U20	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8–Pin DIP	220–2150	2
U21, U22	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	2
U23	Integrated Circuit, DG212CJ, QUAD SPST Switch, CMOS, 16–Pin DIP	220–0212	1
U24 thru U27	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	4
U28	Integrated Circuit, DG212CJ, QUAD SPST Switch, CMOS, 16–Pin DIP	220–0212	1
U29 thru U31	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	3
U32	Integrated Circuit, LM317LZ, Adjustable Positive Voltage Regulator, 1.2 to 37V @ 0.1 Ampere, TO–92 Case	220–0317	1
U33	Integrated Circuit, 74HC4022, Octal Counter/Divider, CMOS, 16–Pin DIP	221–4022	1
U34	Integrated Circuit, 74HC4002N, Dual 4 Input NOR Gate 14–Pin DIP	221–4002	1
U35	Integrated Circuit, 74HC74N, Dual D–Type Flip Flop, 14–Pin DIP	221–7474	1
U36	Integrated Circuit, DG–271, 201HS, CMOS SPST Analog Switch 16–Pin DIP	220–0017	1
U37	Integrated Circuit, NE5539N, UHF Operational Amplifier, 14–Pin DIP	220–5539	1
U38	Integrated Circuit, CA3183E, Five Transistor Array, NPN, 16–Pin DIP	220–3183	1

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 9 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U39	Integrated Circuit, MC10116P, Triple Differential Amplifier, 16–Pin DIP	220–0116	1
U40	Integrated Circuit, 74HC132N, Quad NAND Gate, Schmitt Trigger,		221–
4132	1		
	14–Pin DIP		
U41	Integrated Circuit, CD4081B, Quad 2–Input AND Gate, CMOS, 14–Pin DIP	225–0008	1
U42	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14–Pin DIP	228–4584	1
U43	Integrated Circuit, MC14093B, Quad 2–Input NAND Schmitt Trigger CMOS, 14–Pin DIP	220–4093	1
U44	Integrated Circuit, MC14013BCP, Dual D–Type Flip–Flop, CMOS, 14–Pin DIP	228–4013	1
U45 thru U48	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	4
U49	Integrated Circuit, CD4071B, OR Gate, CMOS, 14–Pin DIP	225–0005	1
U50	Integrated Circuit, MC14532B, CMOS, 8–Bit Priority Encoder	228–4532	1
U51	Integrated Circuit, MC14013BCP, Dual D–Type Flip–Flop, CMOS, 14–Pin DIP	228–4013	1
U52	Integrated Circuit, CD4071B, OR Gate, CMOS, 14–Pin DIP	225–0005	1
U53	Integrated Circuit, CD4017B, 10–Output Counter/Divider, CMOS, 16–Pin DIP	220–4017	1
U54	Integrated Circuit, CD4081B, Quad 2–Input AND Gate, CMOS, 14–Pin DIP	225–0008	1
U55	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14–Pin DIP	228–4584	1
XU1	Socket, 8–Pin DIP	417–0804	1
XU4 thru XU7	Socket, 8–Pin DIP	417–0804	4
XU10 thru XU12	Socket, 8–Pin DIP	417–0804	3
XU15 thru XU18	Socket, 8–Pin DIP	417–0804	4
XU21, XU22	Socket, 8–Pin DIP	417–0804	2
XU23	Socket, 16–Pin DIP	417–1604	1
XU24 thru XU27	Socket, 8–Pin DIP	417–0804	4
XU28	Socket, 16–Pin DIP	417–1604	1
XU29 thru XU31	Socket, 8–Pin DIP	417–0804	3
XU33	Socket, 16–Pin DIP	417–1604	1
XU34, XU35	Socket, 14–Pin DIP	417–1404	2
XU36	Socket, 16–Pin DIP	417–1604	1
XU37	Socket, 14–Pin DIP	417–1404	1
XU38, XU39	Socket, 16–Pin DIP	417–1604	2
XU40 thru XU44	Socket, 14–Pin DIP	417–1404	5
XU45 thru XU48	Socket, 6–Pin DIP	417–0600	4

TABLE 6-7. STEREO CIRCUIT BOARD ASSEMBLY - 917-0209
(Sheet 10 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
XU49	Socket, 14–Pin DIP	417–1404	1
XU50	Socket, 16–Pin DIP	417–1604	1
XU51, XU52	Socket, 14–Pin DIP	417–1404	2
XU53	Socket, 16–Pin DIP	417–1604	1
XU54, XU55	Socket, 14–Pin DIP	417–1404	2
----	Socket/Spacer, LED	407–0074	1
----	Switch Cap, Red	343–6331	1
----	Blank, Stereo Circuit Board, AM1, AM5	517–0209	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 1 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1, C2	Capacitor, Electrolytic, 10 uF, 35V	023–1075	2
C3 thru C5	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C6	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C7	Capacitor, Mica, 150 pF ±5%, 500V	040–1522	1
C8	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C9	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C10	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C11	Capacitor, Mica, 150 pF ±5%, 500V	040–1522	1
C12	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C14	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C15	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C16, C17	Capacitor, Electrolytic, 10 uF, 35V	023–1075	2
C18 thru C20	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C21	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C22	Capacitor, Mica, 150 pF ±5%, 500V	040–1522	1
C23	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C24	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C25	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C26	Capacitor, Mica, 150 pF ±5%, 500V	040–1522	1
C27	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C29	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C30, C31	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C32	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C33	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C34	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C35	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C36	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C37 thru C39	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C40	Capacitor, Mica, 33 pF ±5%, 500V	042–3312	1
C41	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 2 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C42	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C43	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C44	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C45	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C46	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C47	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C48	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C49	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C50	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C51	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C52	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C53	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C54	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C55, C56	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C57, C58	Capacitor, Polyester, 0.0022 uF ±10%, 100V	031–2033	2
C59	Capacitor, Mica, 150 pF ±5%, 500V	040–1522	1
C60	Capacitor, Polyester, 0.0022 uF ±10%, 100V	031–2033	1
C61, C62	Capacitor, Electrolytic, 10 uF, 50V	023–1076	2
C63 thru C67	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	5
C68	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C69, C70	Capacitor, Electrolytic, 10 uF, 50V	023–1076	2
C71, C72	Capacitor, Electrolytic, 100 uF, 35V	023–1084	2
C73, C74	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	2
C75	Capacitor, Mica, 390 pF ±5%, 100V	042–3922	1
C76	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C77	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C78	Capacitor, Mica, 250 pF ±1%, 500V	042–2521	1
C79 thru C81	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C82	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C83	Capacitor, Electrolytic, 1 uF, 50V, Non–Polarized	020–1064	1
C84	Capacitor, Mylar Film, 0.047 uF ±10%, 100V	030–4743	1
C85, C88	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C89	Capacitor, Electrolytic, 1 uF, 50V, Non–Polarized	020–1064	1
C90	Capacitor, Mica, 390 pF ±5%, 100V	042–3922	1
C91 thru C93	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C93	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C94	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C96, C97	Capacitor, Polycarbonate, 0.10 uF ±1%, 100V	030–1051	2
C98	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	1
C99	Capacitor, Mylar, 0.01 uF ±10%, 100V	031–1043	1
C100	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C101, C102	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C103	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	1
C104	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C106	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C107	Capacitor, Monolythic Ceramic, 56 pF ±10%, 200V	001–5613	1
C108	Capacitor, Variable, Polycarbonate, 2–27 pF	096–0009	1
C109	Capacitor, Mica, 150 pF ±5%, 500V	040–1522	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 3 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C110	Capacitor, Ceramic Disc, 68 pF ±5%, N1500, 63V dc	000–6814	1
C111	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C112, C113	Capacitor, Monolythic Ceramic, 0.0015 uF ±5%, 100V	003–1523	2
C114	Capacitor, Mylar, 0.01 uF ±10%, 100V	031–1043	1
C115 thru C117	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C118	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C119, C120	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C121	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C122 thru C124	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C125	Capacitor, Electrolytic, 1 uF, 50V, Non–Polarized	020–1064	1
C126 thru C129	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C130	Capacitor, Mica, 68 pF ±5%, 500V	040–6813	1
C131	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C132	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C133, C134	Capacitor, Mica, 33 pF ±5%, 500V	042–3312	2
C135, C136	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C137	Capacitor, Mica, 33 pF ±5%, 500V	042–3312	1
C138	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C140	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C141	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C143, C144	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C145	Capacitor, Mica, 33 pF ±5%, 500V	042–3312	1
C146	Capacitor, Electrolytic, 33 uF, 25V	020–3374	1
C147 thru C152	Capacitor, Polycarbonate, 0.10 uF ±1%, 100V	030–1051	6
C154	Capacitor, Polycarbonate, 0.10 uF ±1%, 100V	030–1051	1
C155	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C156	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	1
C157	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C158, C159	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	2
C160	Capacitor, Mica, 22 pF ±5%, 500V	040–2213	1
C162	Capacitor, Mica, 22 pF ±5%, 500V	040–2213	1
C163 thru C165	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C166	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C167	Capacitor, Electrolytic, 1 uF, 50V, Non–Polarized	020–1064	1
C168 thru C170	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C171, C172	Capacitor, Electrolytic, 1 uF, 50V, Non–Polarized	020–1064	2
C173	Capacitor, Monolythic Ceramic, 0.0015 uF ±5%, 100V	003–1523	1
C174	Capacitor, Electrolytic, 2.2 uF ±30%, 50V, Non–Polarized	020–2264	1
C175, C176	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C183	Capacitor, Polycarbonate, 0.10 uF ±1%, 100V	030–1051	1
C405	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
D1, D2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 4 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
D4 thru D21	Diode, HP5082-2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201-2800	18
D22	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	1
D23	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1
D24 thru D27	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D29 thru D46	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	18
D47 thru D50	Diode, HP5082-2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201-2800	4
D51 thru D67	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	17
D68	Diode, Zener, 1N4739A, 9.1V ±5%, 1W	200-0009	1
D69	Diode, Zener, 1N4732A, 4.7V ±5%, 1W	200-4732	1
DS1 thru DS5	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	5
E1 thru E4	Terminal Test Point, Oval Red	413-0106	4
J2 thru J5	Receptacle, Male, 3-Pin In-line	417-0003	4
J6	Receptacle, Male, 20-Pin In-Line	417-0200	1
J7	Receptacle, Male, 3-Pin In-line	417-0003	1
J8 thru J11	Receptacle, Single Pin	417-0071-001	4
J12, J13	Receptacle, Male, 20-Pin In-Line	417-0200	2
L1 thru L4	Coil, Toroid, 22 uH ±10%, 34 Turns of No. 30 Enameled Copper Wire on B.E. No. 360-0023 Form	360-0049	4
L5	Coil, Molded, Shielded, 56 uH	360-0093	1
L6	Coil, Molded, 2.2 uH	364-2200	1
P2 thru P5	Jumper, Programmable, 2-Pin	340-0004	4
P6A, P6B	Jumper, Programmable, 2-Pin	340-0004	2
P7	Jumper, Programmable, 2-Pin	340-0004	1
P12A	Jumper, Programmable, 2-Pin	340-0004	1
P12B	Jumper, Programmable, 2-Pin	340-0004	1
P13A	Jumper, Programmable, 2-Pin	340-0004	1
P13B	Jumper, Programmable, 2-Pin	340-0004	1
P101	Connector, Female, 80-Pin, Dual In-Line, PCB Mount	417-0188	1
Q3, Q4	Transistor, 2N3904, NPN, Silicon, TO-92 Case	211-3904	2
Q5	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	1
Q6, Q7	Transistor, 2N7000, FET, N-Channel, TO-92 Case	210-7000	2
Q8	Field Effect Transistor, J3100, RF, N-Channel, TO-92 Case	212-0310	1
Q13 thru Q22	Field Effect Transistor, VN88AD, Metal-Oxide/Silicon, N-Channel Enhancement Type, TO-220-AB Case	210-0088	10
Q23	Transistor, 2N7000, N-Channel, TO-92 Case	210-7000	1
R1	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R2	Resistor, 221 k Ohm ±1%, 1/4W	103-2216	1
R3	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R4	Resistor, 221 k Ohm ±1%, 1/4W	103-2216	1
R8, R9	Resistor, 26.7 k Ohm ±1%, 1/4W	103-2675	2

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 5 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R10 thru R12	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R14	Resistor, 15 k Ohm ±5%, 1/4W	100–1551	1
R15	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R16	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R17	Resistor, 221 k Ohm ±1%, 1/4W	103–2216	1
R18	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R18	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R19	Resistor, 221 k Ohm ±1%, 1/4W	103–2216	1
R23, R24	Resistor, 26.7 k Ohm ±1%, 1/4W	103–2675	2
R25 thru R27	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R29	Resistor, 15 k Ohm ±5%, 1/4W	100–1551	1
R30	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R31	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R32, R33	Resistor, 1.24 k Ohm ±1%, 1/4W	103–1244	2
R34	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R35	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R36, R37	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R38, R39	Resistor, 39.2 k Ohm ±1%, 1/4W	100–3951	2
R40	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R41	Resistor, 3.83 k Ohm ±1%, 1/4W	103–3841	1
R41	Potentiometer, 20 k Ohm ±10%, 1/2W	178–2054	1
R42	Resistor, 20.0 k Ohm ±1%, 1/4W	103–2051	1
R43 thru R54	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	12
R55	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R58 thru R61	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	4
R62	Potentiometer, 10 k Ohm ±10%, 1/2W	177–1054	1
R63	Resistor, 34 k Ohm ±1%, 1/4W	103–3405	1
R64	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100–2273	1
R65	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R66	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100–2273	1
R67	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R68	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R69	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R70	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R71	Resistor, 845 Ohm ±1%, 1/4W	103–8453	1
R72	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R73	Resistor, 47.5 k Ohm ±1%, 1/4W	103–4755	1
R74	Resistor, 453 k Ohm ±1%, 1/4W	100–4561	1
R75	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R76	Potentiometer, 1 k Ohm ±10%, 1/2W	178–1044	1
R77	Resistor, 34 k Ohm ±1%, 1/4W	103–3405	1
R78	Resistor, 22.1 k Ohm ±1%, 1/4W	103–2211	1
R79	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R80, R81	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 6 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R82, R83	Resistor, 10 Ohm ±1%, 1/4W	103–1021	2
R84	Resistor, 845 Ohm ±1%, 1/4W	103–8453	1
R85	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R86 thru R88	Resistor, 9.09 k Ohm ±1%, 1/4W	103–9041	3
R89, R90	Resistor, 8.45 k Ohm ±1%, 1/4W	103–8454	2
R91	Resistor, 5.6 Meg Ohm ±5%, 1/4W	100–5673	1
R92, R93	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R94	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R99	Resistor, 34 k Ohm ±1%, 1/4W	103–3405	1
R100	Resistor, 66.5 k Ohm ±1%, 1/4W	103–6655	1
R101, R102	Resistor, 26.7 k Ohm ±1%, 1/4W	103–2675	2
R112	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R113, R114	Resistor, 10 Ohm ±1%, 1/4W	103–1021	2
R115	Resistor, 34 k Ohm ±1%, 1/4W	103–3405	1
R116, R117	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R118	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R119	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R120	Resistor, 365 Ohm ±1%, 1/4W	103–3631	1
R121	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R122 thru R125	Resistor, 9.53 k Ohm ±1%, 1/4W	103–9534	4
R126 thru R128	Resistor, 7.50 k Ohm ±1%, 1/4W	103–7541	3
R129	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R130	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R131	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R132	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R133	Resistor, 26.7 k Ohm ±1%, 1/4W	103–2675	1
R134	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R135	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R136	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100–2273	1
R137	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R138 thru R140	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3
R142	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100–2273	1
R143	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R144	Resistor, 3.83 k Ohm ±1%, 1/4W	103–3841	1
R145	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R146	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R147	Resistor, 24.9 Ohm ±1%, 1/4W	103–2490	1
R148	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R149, R150	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	2
R151	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R152	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R153	Resistor, 3.83 k Ohm ±1%, 1/4W	103–3841	1
R154	Resistor, 453 k Ohm ±1%, 1/4W	100–4561	1
R155	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 7 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R156	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R157	Resistor, 845 Ohm ±1%, 1/4W	103–8453	1
R158	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R159	Potentiometer, 2 k Ohm ±10%, 1/2W	177–2044	1
R160	Resistor, 1.24 k Ohm ±1%, 1/4W	103–1244	1
R161	Resistor, 3.83 k Ohm ±1%, 1/4W	103–3841	1
R162	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R163	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R164	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R165	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R166	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R167	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R168	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R169	Resistor, 15 k Ohm ±5%, 1/4W	100–1551	1
R170	Potentiometer, 20 k Ohm ±10%, 1/2W	178–2054	1
R171	Resistor, 15 k Ohm ±5%, 1/4W	100–1551	1
R172 thru R179	Resistor, 22.1 Ohm ±1%, 1/4W	103–2212	8
R181	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R182	Resistor, 68.1 k Ohm ±1%, 1/4W	103–6815	1
R183	Resistor, 7.50 k Ohm ±1%, 1/4W	103–7541	1
R184	Resistor, 46.4 k Ohm ±1%, 1/4W	103–4645	1
R185	Resistor, 113 k Ohm ±5%, 1/4W	103–1136	1
R186	Resistor, 4.75 k Ohm ±1%, 1/4W	103–4741	1
R187	Resistor, 18.2 k Ohm ±1%, 1/4W	103–1825	1
R188	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R189	Potentiometer, 1 k Ohm ±10%, 1/2W	178–1044	1
R190	Resistor, 2.10 k Ohm ±1%, 1/4W	103–2104	1
R191	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R192 thru R194	Resistor, 113 k Ohm ±5%, 1/4W	103–1136	3
R195	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R196	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R197	Resistor, 2.94 k Ohm ±1%, 1/4W	103–2941	1
R198	Potentiometer, 1 k Ohm ±10%, 1/2W	178–1044	1
R199	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R200	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R201	Resistor, 10 Meg Ohm ±5%, 1/4W	100–1083	1
R202	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R203 thru R209	Resistor, 22.1 Ohm ±1%, 1/4W	103–2212	7
R210, R211	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R212	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R213, R214	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R215	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R216	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R217	Potentiometer, 2 k Ohm ±10%, 1/2W	178–2044	1
R218	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 8 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
S1	Switch, SPST, 4-Position, 8-Pin DIP Dual In-line	340-0002	1
S2	Switch, SPST, 8-Segment, 16-Pin DIP	340-0003	1
TP1 thru TP19	Terminal Test Point, Oval Red	413-0106	19
U1, U2	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	2
U3	Amplifier, Dual Operational, RC4227GNB, Raytheon, 8-Pin DIP	221-4227	1
U4, U5	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	2
U5	Resistor Network, 10-10 k Ohm 0.5% Resistors, 0.7W Total Dissipation, 16-Pin DIP	226-0392	1
U6	Amplifier, Dual Operational, RC4227GNB Raytheon, 8-Pin DIP	221-4227	1
U7	Integrated Circuit, DG212CJ, Quad, SPST Switch, 16-Pin DIP	220-0212	1
U8, U9	Amplifier, Dual Operational, RC4227GNB Raytheon, 8-Pin DIP	221-4227	2
U10	Integrated Circuit, MC14526BCP, Programmable Divide-by-N 4-Bit Counter, CMOS, 16-Pin DIP	220-4526	1
U11	Integrated Circuit, MC14013BCP, Dual D-Type Flip-Flop, CMOS, 14-Pin DIP	228-4013	1
U12	Integrated Circuit, NE5534AN, Low Noise Operational Amplifier, 8-Pin DIP	221-5534	1
U13	Integrated Circuit, LM317LZ, Adjustable Positive Voltage Regulator, 1.2 to 37V @ 0.1 Ampere, TO-92 Case	220-0317	1
U14 thru U17	Amplifier, Dual Operational, RC4227GNB, Raytheon, 8-Pin DIP	221-4227	4
U19, U20	Integrated Circuit, 74C24ON, Inverting Tri State, 20-Pin DIP	220-4240	2
U20	Resistor Network, 10-10 k Ohm 0.5% Resistors, 0.7W Total Dissipation, 16-Pin DIP	226-0392	1
U21	Integrated Circuit, CD4069CN, Hex Inverter, CMOS, 14-Pin DIP	228-4069	1
U22	Integrated Circuit, LM319N, Dual Comparator, 14-Pin DIP	221-0319	1
U23	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1
U24	Integrated Circuit, LM317LZ, Adjustable Positive Voltage Regulator, 1.2 to 37V @ 0.1 Ampere, TO-92 Case	220-0317	1
U26	Amplifier, Dual Operational, RC4227GNB, Raytheon, 8-Pin DIP	221-4227	1
U27	Integrated Circuit, TL311P, JFET-Input Differential Comparator, 8-Pin DIP	220-0311	1
U28	Integrated Circuit, 74LS123, Schottky Dual Monostable Multivibrator, 16-Pin DIP	220-2123	1
U29	Integrated Circuit, 74HC4022, Octal Counter/Divider, 16-Pin DIP	221-4022	1
U30	Integrated Circuit, 74HC132N, Quad Schmitt Nand Gates	221-4132	1
U31	Integrated Circuit, 74HC4002N, Dual 4 Input NOR Gate 14-Pin DIP	221-4002	1
U32	Integrated Circuit, 74HC132N, Quad Schmitt Nand Gates	221-4132	1
U33	Integrated Circuit, MC74HC14, Hex Schmitt Trigger Inverter,	220-4106	1
U34	Integrated Circuit, MC14040B, CMOS MSI, 12-Bit Binary Counter, 16-Pin DIP	220-4040	1
U35	Integrated Circuit, MC14073B, Tripple 3-Input AND Gate, CMOS, 14-Pin DIP	228-4073	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 9 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U36	Integrated Circuit, MC14013BCP, Dual D-Type Flip-Flop, CMOS, 14-Pin DIP	228-4013	1
U37	Integrated Circuit, LM317LZ, Adjustable Positive Voltage Regulator, 1.2 to 37V @ 0.1 Ampere, TO-92 Case	220-0317	1
U38, U39	Integrated Circuit, 74HC132N QUAD Schmitt Nand Gates	221-4132	2
U40	Integrated Circuit, 74HC75N, Quad D Latch	221-7475	1
U41	Amplifier, Dual Operational, RC4227GNB, Raytheon, 8-Pin DIP	221-4227	1
U42	Integrated Circuit, 74HC74N Dual D Flip Flop	221-7474	1
U43	Integrated Circuit, TL311P, JFET-Input Differential Comparator, 8-Pin DIP	220-0311	1
U44	Integrated Circuit, MC14060B, 14-Bit Binary Counter and Oscillator, CMOS MSI, 16-Pin DIP	220-4060	1
U45	Integrated Circuit, 74C24ON, Inverting Tri State, 20-Pin DIP	220-4240	1
U46	Driver, High and Low Side, IR2112, 14-Pin DIP	227-2112	1
U47	Integrated Circuit, LM319N, Dual Comparator, 14-Pin DIP	221-0319	1
XU1 thru XU6	Socket, 8-Pin DIP	417-0804	6
XU4	Socket, 14-Pin DIP	417-1404	1
XU7	Socket, 16-Pin DIP	417-1604	1
XU8, XU9	Socket, 8-Pin DIP	417-0804	2
XU10	Socket, 16-Pin DIP	417-1604	1
XU11	Socket, 14-Pin DIP	417-1404	1
XU12	Socket, 8-Pin DIP	417-0804	1
XU14 thru XU17	Socket, 8-Pin DIP	417-0804	4
XU19, XU20	Socket, 20-Pin DIP	417-2004	2
XU21, XU22	Socket, 14-Pin DIP	417-1404	2
XU23	Socket, 16-Pin DIP	417-1604	1
XU25	Receptacle, 28-Pin DIP	417-2804	1
XU26, XU27	Socket, 8-Pin DIP	417-0804	2
XU28	Socket, 16-Pin DIP	417-1604	1
XU29	Socket, 16-Pin DIP	417-1604	1
XU30 thru XU33	Socket, 14-Pin DIP	417-1404	4
XU34	Socket, 16-Pin DIP	417-1604	1
XU35, XU36	Socket, 14-Pin DIP	417-1404	2
XU38, XU39	Socket, 14-Pin DIP	417-1404	2
XU40	Socket, 16-Pin DIP	417-1604	1
XU41	Socket, 8-Pin DIP	417-0804	1
XU42	Socket, 14-Pin DIP	417-1404	1
XU43	Socket, 8-Pin DIP	417-0804	1
XU44	Socket, 16-Pin DIP	417-1604	1
XU45	Socket, 20-Pin DIP	417-2004	1
XU46, XU47	Socket, 14-Pin DIP	417-1404	2
	10 kHz SPACING		
Y1	Crystal, 48PD1002, 10.24 MHz, HC-18 Cinox	390-0013	1

TABLE 6-8. ECU EXCITER CIRCUIT BOARD ASSEMBLY - 917-0300
(Sheet 10 of 10)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	9 kHz SPACING		
Y1	Crystal, 9.216 MHz, HC–18 Cinox	390–0017	1
----	Integrated Circuit, MC145151P, Parallel Input, PLL Frequency Synthesizer, CMOS, 28–Pin DIP	220–5151	1
----	Blank, ECU Exciter Circuit Board	517–0300	1
----	VCO Module Circuit Board Assembly	917–0069	1

TABLE 6-9. VCO MODULE CIRCUIT BOARD ASSEMBLY - 917-0069

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1, C2	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	2
C3	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	1
C4	Capacitor, Mica, 50 pF ±5%, 500V	040–5013	1
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	1
D1	Diode, Varactor, MVAM115, 500 pF at 1 VR, 25 pF at 15 VR, Motorola Case 182–03	200–0115	1
D2, D3	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
P32 thru P35	Plug, Male, Single Pin	417–0119	4
Q1, Q2	Field Effect Transistor, J3100, RF, N–Channel, TO–92 Case	212–0310	2
R1	Resistor, 619 Ohm ±1%, 1/4W	103–6193	1
R2	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R3	Resistor, 475 Ohm ±1%, 1/4W	103–4753	1
R4	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R5	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R6	Resistor, 475 Ohm ±1%, 1/4W	103–4753	1
----	Ferrite Toroid, OD = 0.375 IN, ID = 0.188 IN, W = 0.125 IN	360–0023	1
----	Blank, VCO Module Circuit Board	517–0069	1

TABLE 6-10. ECU MOTHERBOARD CIRCUIT BOARD ASSEMBLY - 917-0301
(Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1, C2	Capacitor, Polyester, 0.0022 uF ±10%, 100V	031–2033	2
C3, C4	Capacitor, Polyester, 0.015 uF ±10%, 100V	030–1532	2
C5, C6	Capacitor, Polyester, 0.0022 uF ±10%, 100V	031–2033	2
C7, C8	Capacitor, Polyester, 0.015 uF ±10%, 100V	030–1532	2
C9 thru C59	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	51
C61 thru C65	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	5

TABLE 6-10. ECU MOTHERBOARD CIRCUIT BOARD ASSEMBLY - 917-0301
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C66	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C67 thru C84	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	18
C85	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C86, C87	Capacitor, Mica, 680 pF ±5%, 300V	040–6824	2
C88 thru C90	Capacitor, Polyester, 0.015 uF ±10%, 100V	030–1532	3
C91 thru C110	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	20
D1	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
J7	Receptacle, 6–Pin	417–0677	1
J8	Connector, AMP 1–87502–8, Header Straight Post Double Row, 40–Pin	417–4040	1
J9, J10	Receptacle, Male, 13–Pin Dual In–Line	417–2600	2
J11	Receptacle, BNC	417–0203	1
J12	Connector, Male, 2–Pin In–Line	417–4004	1
J101	Connector Header, 80–Pin, Dual In–Line	417–0254	1
J201	Connector, AMP 102567–6, Header Straight Post Double Row, 50–Pin	417–0255	1
J301	Connector, AMP 102567–6, Header Straight Post Double Row, 50–Pin	417–0255	1
J302	Connector Header, 80–Pin, Dual In–Line	417–0254	1
L1 thru L4	Coil, Shielded, 560 uH ±10%, Molded	360–0072	4
L5, L6	RF Choke, 910 uH ±5%, 79 mA Maximum, 15.8 Ohms DC Resistance	360–0047	2
P4 thru P6	Connector, 25–Pin D–Type	418–2500	3
P12	Switch, Jumper Programmable	340–0004	1
R1	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	1
R2, R3	Resistor, 442 Ohm ±1%, 1/4W	103–4423	2
R4	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	1
R5	Resistor, 604 Ohm ±1%, 1/4W	100–6031	1
R6	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	1
R7, R8	Resistor, 442 Ohm ±1%, 1/4W	103–4423	2
R9	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	1
R10	Resistor, 604 Ohm ±1%, 1/4W	100–6031	1
R11	Resistor, 47 Ohm ±5%, 1W	120–4723	1
R15 thru R18	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	4
R19 thru R22	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	4
R23 thru R28	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	6
R29 thru R34	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	6
R35 thru R40	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	6
R41 thru R45	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	5
R47 thru R51	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	5
R53, R54	Resistor, 442 Ohm ±1%, 1/4W	103–4423	2
R55	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R56, R57	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	2
R56	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R58	Resistor, 200 Ohm ±1%, 1/4W	103–2003	1
R59	Resistor, 442 Ohm ±1%, 1/4W	103–4423	1

TABLE 6-10. ECU MOTHERBOARD CIRCUIT BOARD ASSEMBLY - 917-0301
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R60 thru R62	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	3
R63, R64	Resistor, 3.92 k Ohm ±1%, 1/4W	103–3924	2
R65	Resistor, 47 Ohm ±5%, 1W	120–4723	1
R66 thru R72	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	7
R73	Resistor, 47 Ohm ±5%, 1W	120–4723	1
R74	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R75	Resistor, 442 Ohm ±1%, 1/4W	103–4423	1
R76	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R77	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R78 thru R84	Resistor, 1.15 k Ohm ±1%, 1/4W	103–1156	7
R84	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R86 thru R95	Resistor, 10 Ohm ±1%, 1/4W	103–1021	10
R96	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
TB1, TB2	Barrier Strip, 30–Position	412–3000	2
----	Blank, ECU Motherboard Circuit Board	517–0301	1

TABLE 6-11. ECU DISPLAY/CONTROL SWITCH CIRCUIT BOARD - 917-0306-001
(Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 thru C11	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	11
C12	Capacitor, Electrolytic, 1 uF, 50V	024–1064	1
C13 thru C23	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	11
C24, C25	Capacitor, Electrolytic, 10 uF, 50V	023–1076	2
C26, C27	Capacitor, Electrolytic, 33 uF, 35V	024–3335	2
C28	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C29	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C30 thru C32	Capacitor, Electrolytic, 100 uF, 35V	023–1084	3
C33	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C34	Capacitor, Electrolytic, 33 uF, 35V	024–3335	1
C35	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C36	Capacitor, Electrolytic, 33 uF, 35V	024–3335	1
C37	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C38, C39	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C40 thru C43	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	4
D1 thru D9	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	9
D10, D11	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2
D12 thru D14	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200–4733	3
D15, D16	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2
D17 thru D19	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200–4733	3
D20, D21	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
DS1, DS2	Indicator, LED, Yellow, 521–9176, 3V @ 30 mA Maximum	323–9225	2
DS7	LED, MV57164, Red, High Efficiency 10–Segment Bar Graph Array	320–7164	1
DS8, DS9	LED, MV54164, Green, High Efficiency 10–Segment Bar Graph Array	320–4164	2

TABLE 6-11. ECU DISPLAY/CONTROL SWITCH CIRCUIT BOARD - 917-0306-001
(Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
DS10	LED, MV57164, Red, High Efficiency 10-Segment Bar Graph Array	320-7164	1
DS11, DS12	LED, MV54164, Green, High Efficiency 10-Segment Bar Graph Array	320-4164	2
DS13, DS14	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	2
DS15, DS16	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	2
DS17, DS18	Indicator, LED, Yellow, 521-9176, 3V @ 30 mA Maximum	323-9225	2
DS19, DS20	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	2
DS22 thru DS25	LED, Tri-Color Common Cathode	320-0031	4
J1	Receptacle, Male, 13-Pin Dual In-Line	417-2600	1
J2	Connector, AMP 1-87502-8, Header Straight Post Double Row, 40-Pin	417-4040	1
Q1, Q2	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	2
Q3 thru Q6	Transistor, 2N27000, FET, N-Channel, TO-92 Case	210-7000	4
Q7	Transistor, 2N3904, NPN, Silicon, TO-92 Case	211-3904	1
R1 thru R3	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R4	Resistor, 11.0 k Ohm ±1%, 1/4W	103-1105	1
R5, R6	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R7	Resistor, 11.0 k Ohm ±1%, 1/4W	103-1105	1
R8	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R9	Resistor, 24.3 k Ohm ±1%, 1/4W	103-2435	1
R10	Resistor, 825 Ohm ±1%, 1/4W	103-8253	1
R11	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R12	Resistor, 22 Meg Ohm ±5%,1/4W	100-2283	1
R13	Resistor, 22.1 k Ohm ±1%, 1/4W	103-2211	1
R14	Resistor, 221 k Ohm ±1%, 1/4W	103-2216	1
R15	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R16	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R17	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R18	Resistor, 24.3 k Ohm ±1%, 1/4W	103-2435	1
R19	Resistor, 825 Ohm ±1%, 1/4W	103-8253	1
R20	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R21	Resistor, 22 Meg Ohm ±5%,1/4W	100-2283	1
R22	Resistor, 22.1 k Ohm ±1%, 1/4W	103-2211	1
R23	Resistor, 221 k Ohm ±1%, 1/4W	103-2216	1
R24	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R25	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R26	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R27	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R28	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R29	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R30	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R31	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R32	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R33 thru R36	Resistor, 240 Ohm ±1%, 1/4W	103-2431	4
R37	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R38	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R39	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R40	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1

TABLE 6-11. ECU DISPLAY/CONTROL SWITCH CIRCUIT BOARD - 917-0306-001
(Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R41	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R42	Potentiometer, 1 k Ohm ±10%, 1/2W	175-1034	1
R43	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R44	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R45	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R46	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R47	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R48	Potentiometer, 1 k Ohm ±10%, 1/2W	175-1034	1
R49	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R50, R51	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R52, R53	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	2
R54, R55	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R56	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R57	Resistor, 499 Ohm ±1%, 1/4W	103-4993	1
R58	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R59 thru R61	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	3
R62	Resistor, 499 Ohm ±1%, 1/4W	103-4993	1
R63	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R64	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R65	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R66	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R67	Resistor, 499 Ohm ±1%, 1/4W	103-4993	1
R68	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R69 thru R71	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	3
R72	Resistor, 82.5 k Ohm ±1%, 1/4W	103-8255	1
R73	Resistor, 15 k Ohm ±5%, 1/4W	100-1551	1
R74	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R75	Resistor, 604 Ohm ±1%, 1/4W	100-6031	1
R76, R77	Resistor, 240 Ohm ±1%, 1/4W	103-2431	2
R78	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R79	Resistor, 82.5 k Ohm ±1%, 1/4W	103-8255	1
R80	Resistor, 15 k Ohm ±5%, 1/4W	100-1551	1
R81	Resistor, 499 Ohm ±1%, 1/4W	103-4993	1
R82	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R83 thru R85	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	3
R86	Resistor, 499 Ohm ±1%, 1/4W	103-4993	1
R87	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R88 thru R90	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	3
R91	Resistor, 499 Ohm ±1%, 1/4W	103-4993	1
R92	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R93 thru R95	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	3
R96 thru R102	Resistor, 240 Ohm ±1%, 1/4W	103-2431	7
R103	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R104, R105	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R106 thru R112	Resistor, 240 Ohm ±1%, 1/4W	103-2431	7
R113	Resistor, 174 Ohm ±1%, 1/4W	100-1731	1
R114	Resistor, 825 Ohm ±1%, 1/4W	103-8253	1
S1, S2	Switch, SPDT, Momentary MP Series, 2 Green, C&K MP01R2266 CBE	340-0130	2

TABLE 6-11. ECU DISPLAY/CONTROL SWITCH CIRCUIT BOARD - 917-0306-001
(Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
S3	Switch, SPDT, Momentary MP Series, 1 Red, C&K MP01R123 CBE	340-0030	1
S4, S5	Switch, SPDT, Momentary MP Series, 1 Yellow, C&K MP01R125 CBE	340-0162	2
S6 thru S10	Switch, SPDT, Momentary MP Series, 1 Green, C&K MP01R126 CBE	340-0161	5
S11	Switch, SPDT, Momentary MP Series, 1 Red, C&K MP01R123 CBE	340-0030	1
U1	Integrated Circuit, DG212CJ, QUAD SPST Switch, CMOS, 16-Pin DIP	220-0212	1
U2	Amplifier, Dual OP, RC4227GNB Raytheon, 8-Pin DIP	221-4227	1
U3	Integrated Circuit, TLO74CN, Quad JFET-Input Operational Amplifier, 14-Pin DIP	221-0074	1
U4	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U5	Integrated Circuit, MC14013BCP, Dual D-Type Flip-Flop, CMOS, 14-Pin DIP	228-4013	1
U6	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U7	Integrated Circuit, DG212CJ, QUAD SPST Switch, CMOS, 16-Pin DIP	220-0212	1
U8	Integrated Circuit, TLO74CN, Quad JFET-Input Operational Amplifier, 14-Pin DIP	221-0074	1
U9 thru U11	Integrated Circuit, LM3914N, Dot/Bar Display Driver, 18-Pin DIP	229-3914	3
U12, U13	Integrated Circuit, NE555N, Timer, 8-Pin DIP	229-0555	2
U14	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U15 thru U17	Integrated Circuit, LM3914N, Dot/Bar Display Driver, 18-Pin DIP	229-3914	3
XU1	Socket, 16-Pin DIP	417-1604	1
XU2	Socket, 8-Pin DIP	417-0804	1
XU3 thru XU5	Socket, 14-Pin DIP	417-1404	3
XU6	Socket, 8-Pin DIP	417-0804	1
XU7	Socket, 16-Pin DIP	417-1604	1
XU8	Socket, 14-Pin DIP	417-1404	1
XU9 thru XU11	Socket, 18-Pin DIP	417-1804	3
XU12, XU13	Socket, 8-Pin DIP	417-0804	2
XU15 thru XU17	Socket, 18-Pin DIP	417-1804	3
----	Blank, ECU Display/Control Switch Circuit Board	517-0306-001	1

TABLE 6-12. METER SWITCH CIRCUIT BOARD ASSEMBLY - 917-0306-005
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C501	Capacitor, Monolythic Ceramic, 0.1 Ohm ±10%, 50V	003-1066	1
D501	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1

TABLE 6-12. METER SWITCH CIRCUIT BOARD ASSEMBLY - 917-0306-005
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
J501	Receptacle, 6-Pin	417-0677	1
J502	Socket, 4-Pin	418-0255	1
R501	Potentiometer, 500 Ohm, 1/2W	178-5030	1
R503	Potentiometer, 2 k Ohm ±10%, 1/2W	178-2044	1
R504	Resistor, 3.01 k Ohm ±1%, 1/4W	103-3014	1
R505	Potentiometer, 500 Ohm, 1/2W	178-5030	1
R506	Potentiometer, 2 k Ohm ±10%, 1/2W	178-2044	1
R507	Resistor, 3.01 k Ohm ±1%, 1/4W	103-3014	1
R508	Resistor, 2.74 k Ohm ±1%, 1/4W	103-2744	1
R509, R510	Resistor, 1.62 k Ohm ±1%, 1/4W	103-1624	2
R511	Potentiometer, 50 k Ohm ±10%, 1/2W	178-5054	1
S501, S502	Switch, Rotary, 3 Position 2 Pole	340-0134	2
----	Blank, Meter Switch Circuit Board	517-0306-005	1

TABLE 6-13. ECU WIRE HARNESS - 947-0153

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Housing, SL-156, 3 Position	417-0306	1
P1	Plug, Ribbon Cable, 26-Pin Dual In-line	418-2600	1
P2	Plug, 40-Pin, Dual In-line	417-0118	1
P2	Housing, SL-156, 6 Position	417-0606	1
P3	Plug, Ribbon Cable, 26-Pin Dual In-Line	418-2600	1
P7	Connector Housing, 6-Pin	418-0670	1
P8	Plug, 40-Pin, Dual In-line	417-0118	1
P10	Plug, Ribbon Cable, 26-Pin Dual In-line	418-2600	1
P502	Plug, Housing, 4-Pin	418-0240	1
P801	Plug, Ribbon Cable, 26-Pin Dual In-Line	418-2600	1
----	Pins, Connector	417-0053	10

TABLE 6-14. POWER MODULE ASSEMBLY - 957-0010-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Modulator Circuit Board Assembly	917-0302	1
----	Power Amplifier Circuit Board Assembly	917-0304	2

TABLE 6-15. MODULATOR CIRCUIT BOARD ASSEMBLY- 917-0302
(Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C2	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	1
C3	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C4	Capacitor, Monolythic Ceramic 1 uF ±10%, 100V	003–1041	1
C5	Capacitor, Electrolytic, 330 uF, 200V dc	013–3385–001	1
C6	Capacitor, Polypropylene Film, .47 uF, 250V, Oval	033–4743	1
C7	Capacitor, Mica, 1000 pF ±10%, 350V	046–0002	1
C8	Capacitor, Electrolytic, 330 uF, 200V dc	013–3385–001	1
C9	Capacitor, Polypropylene Film, .47 uF, 250V, Oval	033–4743	1
C10	Capacitor, Mica, 1000 pF ±10%, 350V	046–0002	1
C11, C12	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	2
C13, C14	Capacitor, Polypropylene Film, 2.2 uF, 400V	030–2256	2
C15, C16	Capacitor, Metallized Polypropylene Film, .068 uF ±10%, 250V	030–6843	2
C17	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	1
C18, C19	Capacitor, Electrolytic, 10 uF, 50V	023–1076	2
C20	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	1
C21	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C22	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C23	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C24	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C25	Capacitor, Electrolytic, 22 uF, 50V	024–2274	1
C26, C27	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	2
C28 thru C32	Capacitor, Electrolytic, 10 uF, 50V	023–1076	5
C33	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	1
C34	Capacitor, Electrolytic, 47 uF, 35V	020–4773	1
C35	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C36, C37	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	2
C38, C39	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	2
C40	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C41	Capacitor, Electrolytic, 33 uF, 25V	020–3374	1
C42	Capacitor, Polypropylene Film, 2.2 uF, 400V	030–2256	1
C43	Capacitor, Polypropylene Film, .47 uF, 250V, Oval	033–4743	1
C44	Capacitor, Polypropylene Film, .033 uF, ±10%, 200V	030–3353	1
C45	Capacitor, Mica, 820 pF ±5%, 300V	042–8222	1
C46, C47	Capacitor, Monolythic Ceramic, .1 uF ±10%, 100V	003–1041	2
C48	Capacitor, Metallized Polypropylene Film, .068 uF ±10%, 250V	030–6843	1
C49	Capacitor, Polypropylene Film, .033 uF ±10%, 200V	030–3353	1
C50	Capacitor, Mylar, 0.01 uF ±10%, 100V	031–1043	1
D1	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200–4733	1
D2, D3	Diode, Fast Recovery, 16JPF20	200–1620	2
D4	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D5	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D6	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D7	Diode, Zener, 1N4739A, 9.1V ±5%, 1W	200–0009	1
D8, D9	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2

TABLE 6-15. MODULATOR CIRCUIT BOARD ASSEMBLY - 917-0302
(Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
D10	Diode, 1N6276A, Silicon, Transient Voltage Suppressor, 16V ±0.05% Breakdown	206-6276	1
D11	Switchmode Power Rectifier, MUR460	230-0014	1
D12, D13	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
D14, D15	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	2
D16	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	1
D17	Diode, Zener, 1N4739A, 9.1V ±5%, 1W	200-0009	1
D18	Diode, Zener, 1N4728, 3.3V ±5%, 1W	201-4728	1
D19	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1
D20 thru D23	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D24, D25	Diode, 1N5817, Schottky, 20V, 1 Ampere	200-0019	2
DS1	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	1
DS2	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	1
DS3	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	1
DS4	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	1
F1	Fuse, 3AG, 20 Amperes, 250V	330-2000	1
F2	Fuse, MDL, 1 Ampere, 250V, Slow-Blow	334-0100	1
J3, J4	Jumper, Programmable, 2-Pin	340-0004	2
K1	Relay, SPST, 30 Amperes	270-1213	1
P2	Connector, 15-Pin, SUB-D, Male, Right Angle	417-0374	1
P3	Receptacle, Male, 3-Pin In-line	417-0003	1
P4	Receptacle, Male, 2-Pin In-line	417-4004	1
Q1, Q2	Modulator, FET MTY55N20E, 200V, 55 Amperes	210-0550	2
R1	Resistor, 1.33 k Ohm ±1%, 1/4W	103-1331	1
R2	Resistor, 470 Ohm ±5%, 1/2W	110-4733	1
R3	Resistor, 332 Ohm ±1%, 1/4W	103-3323	1
R4	Resistor, 1 Ohm ±5%, 1/4W	100-1013	1
R5	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R7	Resistor, 12k Ohm, 2W, ±5%	130-1253	1
R8	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100-3373	1
R9	Resistor, 1 Ohm ±5%, 1/4W	100-1021	1
R10	Resistor, 3.65 k Ohm ±1%, 1/4W	103-3641	1
R11	Resistor, 1 Ohm ±5%, 1/4W	100-1021	1
R12	Resistor, 453 k Ohm ±1%, 1/4W	100-4561	1
R13	Resistor, 130 k Ohm ±1%, 1/4W	103-1306	1
R14	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R15	Resistor, 332 k Ohm ±1%, 1/4W	103-3326	1
R16	Resistor, 69.8 k Ohm ±1%, 1/4W	103-6985	1
R17	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R18	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R19	Resistor, 3.65 k Ohm ±1%, 1/4W	103-3641	1
R20	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R21	Resistor, 27 k Ohm ±5%, 1W	120-2753	1
R22	Resistor, 22.1 k Ohm ±1%, 1/4W	103-2211	1
R23	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R24	Resistor, 332 k Ohm ±1%, 1/4W	103-3326	1

TABLE 6-15. MODULATOR CIRCUIT BOARD ASSEMBLY - 917-0302
(Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R25	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R26	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R27	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R28	Resistor, 69.8 k Ohm ±1%, 1/4W	103-6985	1
R29	Resistor, 3.65 k Ohm ±1%, 1/4W	103-3641	1
R30	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R31	Resistor, 332 k Ohm ±1%, 1/4W	103-3326	1
R32	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R33	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R34	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R35	Resistor, 1.33 k Ohm ±1%, 1/4W	103-1331	1
R38	Resistor, 47.5 k Ohm ±1%, 1/4W	103-4755	1
R39	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R40	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R41	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R42	Resistor, 8.66 k Ohm ±1%, 1/4W	100-8641	1
R43	Resistor, 499 k Ohm ±1%, 1/4W	103-4996	1
R44	Resistor, 8.25 k Ohm ±1%, 1/4W	103-8254	1
R45	Resistor, 1 k Ohm ±1%, 1/4W	100-1041	1
R46	Resistor, 1 Meg Ohm ±1%, 1/4W	103-1007	1
R47 thru R49	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	3
R51	Resistor, 15.4 k Ohm ±1%, 1/4W	103-1551	1
R52	Resistor, 39 Ohm ±5%, 1/2W	110-3923	1
R53	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100-3373	1
R54, R55	Resistor, 100 Ohm ±1%, 1/4W	100-1031	2
R56, R57	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100-3373	2
R58	Resistor, 453 k Ohm ±1%, 1/4W	100-4561	1
TP1 thru TP4	Terminal, Test Point, Oval, Red	413-0106	4
TP5, TP6	Jack, Test, Right Angle Printed Circuit Board Mount	417-0004	2
U1	Integrated Circuit, Opto-Isolator, 6N137	220-6137	1
U2	Driver, TC4421CAT, 2 Ampere, 5-Pin, TO-220 Case	220-4421	1
U3	Integrated Circuit, LM339AN, Quad Comparator, 14-Pin DIP	221-0339	1
U4	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	1
U5	Integrated Circuit, ULN2004, 7 NPN Darlington Driver Pack, 16-Pin DIP	226-2004	1
U6	Integrated Circuit, MC14093B, Quad 2-Input NAND Schmitt Trigger, CMOS, 14-Pin DIP	220-4093	1
U7	Integrated Circuit, MC14044BP, Quad NAND R-S Latch, CMOS, 16-Pin DIP	228-4044	1
U8, U9	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	2
U10	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1

TABLE 6-15. MODULATOR CIRCUIT BOARD ASSEMBLY - 917-0302
(Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U11	Integrated Circuit, 14505, Hex Level Shifter, TTL to CMOS, 16–Pin DIP	228–4504	1
U12	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	1
U13	Driver, TC4421CAT, 2 Ampere, 5–Pin, TO–220 Case	220–4421	1
XF1, XF2	Fuse Clips, AGC	415–2068	2
XU1	Socket, 8–Pin DIP	417–0804	1
XU3	Socket, 14–Pin DIP	417–1404	1
XU4	Socket, 6–Pin DIP	417–0600	1
XU5	Socket, 16–Pin DIP	417–1604	1
XU6	Socket, 14–Pin DIP	417–1404	1
XU7	Socket, 16–Pin DIP	417–1604	1
XU8, XU9	Socket, 6–Pin DIP	417–0600	2
XU11	Socket, 16–Pin DIP	417–1604	1
XU13	Socket, 6–Pin DIP	417–0600	1
----	Coil, 36 uH, MOD PWM	360–0108	2
----	Coil, 9.2 uH, MOD PWM	360–0109	1
----	Coil, 14 uH, MOD PWM	360–0110	1
----	Blank, Modulator Circuit Board	517–0302	1

TABLE 6-16. POWER AMPLIFIER CIRCUIT BOARD ASSEMBLY - 917-0304
(Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C2	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C3 thru C6	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 100V	003–1041	4
C8	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C10	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C11	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C12	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 100V	003–1041	1
C13	Capacitor, Electrolytic, 100 uF, 63V	015–1084	1
C15	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C16 thru C18	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	3
C19 thru C21	Capacitor, Monolytic Ceramic, 0.1 uF ±10%, 50V	003–1066	3
C23	Capacitor, Mylar Film, 0.01 uF ±10%, 200V	030–1043	1
C24	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C25	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C26	Capacitor, Ceramic, 0.001 uF, 1 kV	002–1034	1
C27, C28	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 200V	003–1065	2
C29 thru C32	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 100V	003–1041	4
C33	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1

TABLE 6-16. POWER AMPLIFIER CIRCUIT BOARD ASSEMBLY - 917-0304
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C34	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 100V	003–1041	1
C36 ,C37	Capacitor, Mica, 39 pF ±5%, 500V	042–3912	2
C38, C39	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	2
C40 thru C43	Capacitor, Electrolytic, 1 uF, 50V	024–1064	4
C45 thru C55	Refer to Frequency Dependant Parts – Power Amplifier Table at the end of this section.		
C58	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C59	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
D1 thru D6	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	6
D9, D10	Transzorb Diode, 27 Volt, 1.5KE27CA	206–0027	2
D11	Diode, Zener 1N5229, 4.3V, 0.5W	201–0035	1
D16	Diode, Transzorb, Diode, 300BV, 1.5FE300CA	206–0300	1
D17	Transzorb Diode, 250BV, 1.5KE250CA	206–0250	1
D18	Diode, Transzorb, Diode, 300BV, 1.5FE300CA	206–0300	1
D19	Transzorb Diode, 250BV, 1.5KE250CA	206–0250	1
D20, D21	Diode, Zener, 1N4749, 24V, 10.5 Amperes	200–0024	2
D22, D23	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2
D25 thru D28	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	4
D29, D30	Diode, Zener, 1N4742A, 12V ±5%, 1W	200–4742	2
D31	Diode, Zener, 1N4737A, 7.5V, 1W, 34 mA	200–4737	1
D32 thru D35	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	4
DS1	Indicator, LED, Green, 521–9175, 3V @ 40 mA Maximum	323–9224	1
DS2	Indicator, LED, Red, 521–9212, 1.7V @ 50 mA Maximum	323–9217	1
F1	Fuse, 3AB, 15 Amperes, 65V, Very Fast	330–1502	1
F2, F3	Fuse, 5 X 20MM, 1.5 Ampere, Slow–Blow	334–1150	2
FC1, FC2	Fuse Clips, AGC	415–2068	2
FC3 thru FC6	Fuse Clips, Littlefuse, 111501	415–2069	4
L1, L2	Coil, 4uH	360–0112	2
L3 thru L7	Refer to Frequency Dependant Parts – Power Amplifier Table at the end of this section.		
P2	Connector, 15–Pin Sub–D, Male, Right Angle	417–0374	1
Q1, Q2	RF FET, APT6018, 600V	210–6018	2
Q3 thru Q6	Hexfet Power Mosfet, IRFI520G, TO–220 Fullpak	210–0520	4
Q7	Transistor, TIP120, NPN Darlington–Connected Silicon Power, 65W @ 25#C Case	210–0120	1
Q11	Transistor, 2N3906, PNP, Silicon, TO–92 Case	210–3906	1
Q12	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	1
Q13	Silicon Controlled Rectifier, GE6CA, 100V @ 1.6 Ampere	237–0006	1
R1	Resistor, 1 k Ohm ±5%,1W	120–1043	1
R2, R3	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R4	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R5	Resistor, 1.10 k Ohm ±1%, 1/4W	103–1104	1
R6, R7	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R8 thru R11	Resistor, 27 Ohm ±5%, 1/4W	100–2723	4
R12	Resistor, 15k Ohm ±5%, 2W	130–1553	1
R13	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R14	Resistor, 1.10 k Ohm ±1%, 1/4W	103–1104	1

TABLE 6-16. POWER AMPLIFIER CIRCUIT BOARD ASSEMBLY - 917-0304
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R15	Resistor, 1 k Ohm ±5%, 1W	120–1043	1
R16	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R18	Resistor, 1.10 k Ohm ±1%, 1/4W	103–1104	1
R20	Resistor, 1.96 k Ohm ±1%, 1/4W	103–1964	1
R21, R22	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R23	Resistor, 10 Meg Ohm ±5%, 1/4W	100–1083	1
R24	Resistor, 1.96 k Ohm ±1%, 1/4W	103–1964	1
R25	Resistor, 680 Ohm ±5%, 1/2W	110–6833	1
R26	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R27, R28	Resistor, 332 Ohm ±1%, 1/4W	103–3323	1
R29	Resistor, 300 Ohm ±5%, 2W, W/W	130–3004	1
R30, R31	Resistor, 2.67 k Ohm ±1%, 1/4W	103–2674	2
R32, R33	Resistor, 100 Ohm ±1%, 1/4W	100–1031	2
R34, R35	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R36, R37	Resistor, 300 Ohm ±5%, 2W, W/W	130–3004	2
R38	Resistor, 562 Ohm ±1%, 1/4W	103–5623	1
R39, R40	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
U1	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO–220 Case	227–0317	1
U2 thru U4	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	3
U5	Integrated Circuit, MC14584, 14–Pin Schmitt	228–4584	1
U7, U8	Driver High and Low Side, IR2110	227–2110	2
XU2 thru XU4	Socket, 6–Pin DIP	417–0600	3
XU5, XU7, XU8	Socket, 14–Pin DIP	417–1404	3
----	Blank, Power Amplifier Circuit Board Assembly	517–0304	1

TABLE 6-17. OUTPUT NETWORK ASSEMBLY, AM-1A - 957-0064
OUTPUT NETWORK ASSEMBLY, AM-500A - 957-0064-500
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 thru C4	Refer to the Frequency Dependant Parts – Output Network Table at the end of this section.		
F1, F2	Fuse, 3AG, 250V, 2 Amperes	330–0200	2
L1 thru L3	Refer to the Frequency Dependant Parts – Output Network Table at the end of this section.		
	For 957-0064 ASSEMBLY		
----	Spark Gap, 900V	140–0020	1
	For 957-0064-500 ASSEMBLY		
	DELETE PARTS		
----	Spark Gap, 900V	140–0020	1

TABLE 6-17. OUTPUT NETWORK ASSEMBLY, AM-1A - 957-0064
OUTPUT NETWORK ASSEMBLY, AM-500A - 957-0064-500
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	For 957-0064-500 ASSEMBLY		
	ADD PARTS		
----	Spark Gap, 650V	140-0034	1
----	Circuit Breaker, 15 Amperes, 2-Pole, 250V ac	341-0032	1
----	Choke, 3.6 mH, AM Transmitter	370-2363	1
----	Metal-Oxide Varistor, B40K275, 275V, 1680 Joules	140-0021	3
----	RFI Filter, 30VB6	339-0024	1
----	Circuit Breaker, 20 Amperes, 2-Pole, 250V ac	341-0063	1
----	Choke, 1.04 mH, AM Transmitter	370-2364	1
----	Transformer, AM Transmitter Power Supply	376-0047	1
----	Fan, 7 inch (17.78 cm) 114/235 ft3/min 110/220V ac, 50/60 Hz	380-9001	1
----	Air Filter, FXA 7.50"x7.50" x .86"	407-0173	1
----	Barrier Strip, 9 Terminal	412-0090	1
----	Fuse Holder, AGC	415-2012	2
----	Pin Connector	417-0036	2
----	Pins, Connector	417-0053	10
----	Receptacle, BNC	417-0203	1
----	Receptacle, Type N	417-0204	1
----	Connector, 2 Pole 3 Wire, 15A, 250V	418-0320	1
----	Connector Housing, 2-Pin, Male	418-0702	1
----	Plug, Connector Housing, 12-Pin	418-1271	1
----	Power Block Motherboard Circuit Board Assembly	917-0303-001	1
----	Directional Coupler Circuit Board Assembly	917-0306-002	1
----	AC Sample Circuit Board Assembly	917-0306-007	1
----	Temperature Sensor Circuit Board Assembly	917-0306-009	1
----	Lightning Detection Circuit Board Assembly	917-0306-014	1
----	Power Supply Circuit Board Assembly	917-0315-001	1
----	Power Supply Bulk Capacitor Circuit Board Assembly	917-0315-003	1
----	Power Supply Capacitor Circuit Board Assembly	917-0315-005	1
----	Wiring Harness, Fan Assembly	947-0209	1
	For 957-0064 ASSEMBLY		
----	Lightning Protection Circuit Board Assembly	917-0316	1
	For 957-0064-500 ASSEMBLY		
----	Lightning Protection Circuit Board Assembly	917-0216	1
----	Combiner Circuit Board Assembly	917-0321-001	1
----	Optically Coupled Relay Circuit Board Assembly	919-0096-001	1
----	Wire Harness	947-0179	1

TABLE 6-18. POWER BLOCK MOTHERBOARD CIRCUIT BOARD ASSEMBLY - 917-0303-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
C2	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C4	Capacitor, Polyester, 2.2 uF ±10%, 400V	030–2256	1
J3	Connector, Male, 24–Pin	417–2401	1
J1D	Socket, Card Edge, AMP 531353–6	417–0300	1
J1E	Socket, Card Edge, AMP 531353–6	417–0300	1
J1F	Socket, Card Edge, AMP 531353–6	417–0300	1
J2D	Connector, 15–Pin SUB–D, Female	417–0375	1
J2E	Connector, 15–Pin SUB–D, Female	417–0375	1
J2F	Connector, 15–Pin SUB–D, Female	417–0375	1
T1	Transformer, P.A. Driver	370–0037	1
----	Blank, Power Block Motherboard Circuit Board	517–0303–001	1

TABLE 6-19. DIRECTIONAL COUPLER CIRCUIT BOARD ASSEMBLY - 917-0306-002 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C201	Capacitor, Mylar Film, 0.01 uF ±10%, 200V	030–1043	1
C202 thru C217	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	16
C218	Capacitor, Mica, 500 pF ±1%, 500V	042–5021	1
C219, C220	Capacitor, Polyester, 0.0022 uF ±10%, 100V	031–2033	2
D201 thru D204	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 470V, 15 mA	201–2800	4
D205 thru D208	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	4
D209, D210	Diode, Zener, 1N4749, 24V, 10.5 Amperes	200–0024	2
D211, D212	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
D213, D214	Diode, Zener, 1N4749, 24V, 10.5 Amperes	200–0024	2
D215, D216	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
E202 thru E208	Turret, Double Shoulder	413–0025	7
E209 thru E211	Terminal, Male Disconnect	410–0025	3
E212 thru E217	Turret, Double Shoulder	413–0025	6
E219 thru E221	Turret, Double Shoulder	413–0025	3
J201	Receptacle, Male, 20–Pin In–Line	417–0200	1
J202, J203	Receptacle, Male, 8–Pin In–Line, Right Angle	417–0080–001	2
J204 thru J206	Receptacle, Male, 20–Pin In–Line	417–0200	3
K201 thru K205	Relay, SPST, 5V dc, 500 Ohm , Dry Reed	270–0062	5

TABLE 6-19. DIRECTIONAL COUPLER CIRCUIT BOARD ASSEMBLY - 917-0306-002
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
L201	Coil, Molded, Shielded, 5.6 uH	364–0056	1
L202	Coil, Molded, Shielded, 56 uH	360–0093	1
L203, L204	RF Choke, 10 mH ±10%, 6.3 Ohms DC Resistance, 220 mA Maximum	364–0670	2
P203	Jumper, Programmable, 2–Pin	340–0004	1
P204A, P205A	Jumper, Programmable, 2–Pin	340–0004	2
P204B, P205B	Jumper, Programmable, 2–Pin	340–0004	2
P206	Jumper, Programmable, 2–Pin	340–0004	1
R201 thru R205	Potentiometer, 250 Ohm ±10%, 2W	192–2533	5
R206	Resistor, 30.1 Ohm ±1%, 1/4W	103–3011	1
R207 thru R209	Resistor, 18 Ohm ±1%, 3W	130–1821	3
R210 thru R214	Resistor, 30.1 Ohm ±1%, 1/4W	103–3011	5
R215 thru R222	Resistor 200 Ohm ±1%, 1W, MIL 1/2W	120–2031	8
R223, R224	Potentiometer, 20 K Ohm ±10%, 1W	178–2056	2
R226 thru R229	Resistor, 10 Ohm ±1%, 1/4W	103–1021	4
R230 thru R233	Resistor, 150 Ohm ±1%, 1W, MIL 1/2W	120–1531	4
R234, R235	Potentiometer, 20 K Ohm ±10%, 1W	178–2056	2
R236 thru R239	Resistor, 200 Ohm ±1%, 1W, MIL 1/2W	120–2031	4
S201	Switch, SPST, 4– Position, 8–Pin DIP Dual In–line	340–0002	1
T201, T202	Transformer, Current AM–1/5	370–0040	2
T203	Transformer, Voltage, AM–1/5	370–0041	1
----	Blank, Directional Coupler Circuit Board	517–0306–002	1

TABLE 6-20. AC SAMPLE CIRCUIT BOARD ASSEMBLY - 917-0306-007

REF. DES.	DESCRIPTION	PART NO.	QTY.
C701	Capacitor, Polypropylene Film, .47 uF ±10%, 600V	033–4763	1
D701 thru D704	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	4
E701, E702	Terminal, Male Disconnect	410–0025	2
J701	Connector, 2–Pin	417–0700	1
R701 thru R706	Resistor, 150 k Ohm±1%, 1/4W	103–1561	6
R707	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
----	Blank, AC Sample Circuit Board	517–0306–007	1

TABLE 6-21. TEMPERATURE SENSOR CIRCUIT BOARD ASSEMBLY - 917-0306-009

REF. DES.	DESCRIPTION	PART NO.	QTY.
C902	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C906	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C907	Capacitor, Ceramic, 0.001 uF, 1 kV	002–1034	1
J901	Socket, 4–Pin	418–0255	1
R901	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R902	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R903	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
TP901, TP902	Terminal, Turret, Double Shoulder	413–1597	2
U901	Integrated Circuit, LM35DZ, Celsius Temperature Sensor, TO–92 Case	220–0035	1
----	Blank, Temperature Sensor, Circuit Board	517–0306–009	1

TABLE 6-22. LIGHTNING DETECTOR CIRCUIT BOARD ASSEMBLY - 917-0306-014

REF. DES.	DESCRIPTION	PART NO.	QTY.
C401 thru C420	Capacitor, Mica, 1000 pF ±5%, 500V	042–3913	20
E201 thru E203	Terminal, Male Disconnect	410–0025	3
J401, J402	Receptacle, Male, 20–Pin In–Line	417–0200	2
J403 thru J405	Receptacle, Male, 2–Pin In–line	417–4004	1
P403 thru P405	Jumper, Programmable, 2–Pin	340–0004	3
Q401	Phototransistor, 1.8 mA IC AT 5V	215–0001	1
----	Blank, Lightning Detector Circuit Board	517–0306–004	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 1 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C2	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	1
C3	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C4	Capacitor, Electrolytic, 2200 uF, 35V	014–2293	1
C5, C6	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C7, C8	Capacitor, Monolythic Ceramic, 0.1 uF, ±10%, 50V	003–1066	2
C9	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C10	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	1
C11	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C12	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 2 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C13, C14	Capacitor, Electrolytic, 10 uF, 50V	023–1076	2
C15	Capacitor, Electrolytic, 470 uF, 50V	024–4783	1
C16	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C17	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C18, C19	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C20	Capacitor, Electrolytic, 2200 uF, 35V	014–2293	1
C21	Capacitor, Electrolytic, 27000 uF ±20%, 50V	020–2795–500	1
C22	Capacitor, Polyester, .15 uF ±10%, 600WV dc	030–1523	1
C23	Capacitor, Polypropylene Film, .47 uF ±10%, 600V	033–4763	1
C29	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C30, C31	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	2
C32	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C33	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C34	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C35	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C36	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C37	Capacitor, Monolythic Ceramic, .0027 uF ±5%, 100V	003–2723	1
C38	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C39	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C40	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C41	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C42	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	1
C43	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C44	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C45	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C46	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C47	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C49	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C50	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C52	Capacitor, Polyester, 2.2 uF, 400V	030–2256	1
C56, C57	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	2
C58	Capacitor, Monolythic Ceramic, 0.1 uF, ±10%, 50V	003–1066	1
C59, C60	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	2
C61	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C62	Capacitor, Electrolytic, 10 uF, 35V	023–1075	1
C63	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C64	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	1
C65, C66	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	2
C67	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C68	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C69	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C70	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C71	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C72	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040–1022	1
C73	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 3 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C74	Capacitor, Monolythic Ceramic, 0.01 uF ±5%, 100V	003–1013	1
C75 thru C77	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	3
C78	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C79	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	1
C80	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C81	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C82	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C83	Capacitor, Monolythic Ceramic, .47 uF ±10% 50V	003–4743	1
C84	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030–1033	1
C85	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C86	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C91 thru C94	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	4
C95	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
C96	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	1
C98	Capacitor, Monolythic Ceramic, 0.1 uF ±10%, 50V	003–1066	1
C99	Capacitor, Electrolytic, 10 uF, 50V	023–1076	1
D1	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	1
D2, D3	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
D4	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	1
D5 ,D6	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200–4733	2
D7, D8	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2
D9	Bridge Rectifier, NAE 3060A, 1 Amp, 200V	239–0001	1
D10	Bridge Rectifier, MDA970A3, 4 Amps, 50–200V	239–0003	1
D11	Bridge Rectifier, MDA970A3, 4 Amps, 50–200V	239–0003	1
D12	Bridge Rectifier, NAE 3060A, 1 Amp, 200V	239–0001	1
D13, D14	Silicon Controlled Rectifiers, 2N6508, 25 Amperes, 600V	237–6508	2
D15	Rectifier, MR2406, 24 Amperes, 600V	230–0015	1
D16	Power Rectifier, Switchmode, MUR4100E, 4 Amperes, 1000V	230–0017	1
D17	Rectifier, MR2406, 24 Amperes, 600V	230–0015	1
D18	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200–4733	1
D19	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D20 thru D22	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	3
D23	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D24	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D25	Bridge Rectifier, NAE 3060A, 1 Amp, 200V	239–0001	1
D26	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200–4733	1
D27	Diode, Zener, 1N4746, 18V ±10%, 1W	200–4746	1
D28	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D29	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D30, D31	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2
D32	Rectifier, Fast Recovery, FEN30JP, 30 Amperes, 600V	230–0013	1
D34	Power Rectifier, Switchmode, MUR4100E, 4 Amperes, 1000V	230–0017	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 4 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
D37	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D39	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D40	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D41, D42	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
D43, D44	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	2
D45	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
F1, F2	Fuse, 30 Amperes, 125V, 1/4x1–1/4, Lead Type	334–0030–001	2
J1	Connector, Male, Printed Circuit Board Mount, PLB16M3N0A1	417–0376	1
J2	Receptacle, 12–Pin	417–1276	1
J3	Connector, AMP 6405051–1, MR Printed Circuit Board, Male 24–Pin	417–2401	1
J4	Receptacle, Male, 8–Pin In–Line, Right Angle	417–0080–001	1
J5 thru J7	Connector, Header, 2–Pin	417–4004	3
J9, J10	Receptacle, Male, 2–Pin In–line	417–4004	2
MOV1	Varistor, V320LA40B	140–0039	1
MOV2	Varistor, V320LA20AGE	140–0038	1
P4 thru P7	Jumper, Programmable, 2–Pin	340–0004	4
Q1	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	1
Q2	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	1
Q3, Q4	Transistor, 2N3906, PNP, Silicon, TO–92 Case	210–3906	2
Q5	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	1
Q6	Transistor, 2N3906, PNP, Silicon, TO–92 Case	210–3906	1
Q7	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	1
Q8, Q9	Transistor, 2N2222A, TO–18 Case	210–2222	2
Q10 thru Q13	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	4
Q14	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	1
Q15 thru Q18	Transistor, 2N7000, FET, N–Channel, TO–92 Case	210–7000	4
Q19, Q20	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	2
Q21, Q22	Transistor, Insulated Gate Bipolar, IRGPC50U, TO–247 Case	210–4060	2
Q23	RF FET APT6018, 600V	210–6018	1
Q24	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	1
Q25	Field Effect Transistor, J3100, RF, N–Channel, TO–92 Case	212–0310	1
Q26, Q27	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	2
Q28	Transistor, 2N3904, NPN, Silicon, TO–92 Case	211–3904	1
R1	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R2	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R3, R4	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
R5	Resistor, 150 k Ohm ±1%, 1/4W	103–1561	1
R6	Resistor, 21 k Ohm ±1%, 1/4W	103–2105	1
R7	Resistor, 6.34 k Ohm ±1%, 1/4W	103–6344	1
R8	Resistor, 499 k Ohm ±1%, 1/4W	103–4996	1
R9	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R10 thru R12	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	3

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 5 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R13	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R14	Resistor, 20.0 k Ohm ±1%, 1/4W	103–2051	1
R15	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R16	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R17	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R18	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R19	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R20	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R21	Resistor, 866 Ohm ±1%, 1/4W	103–8663	1
R22, R23	Resistor, 1.10 k Ohm ±1%, 1/4W	103–1104	2
R24	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R25	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R26	Resistor, 5.11 k Ohm ±1%, 1/4W	103–5141	1
R27	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R28	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R29, R30	Resistor, 3.32 k Ohm ±1%, 1/4W	103–3324	2
R31	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R32	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R33	Resistor, 665 Ohm ±1%, 1/4W	103–6653	1
R34	Resistor, 499 k Ohm ±1%, 1/4W	103–4996	1
R35	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R36	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R37, R38	Resistor, 82 Ohm ±5%, 2W	130–8223	2
R39, R40	Resistor, 270 Ohm ±5%, 1/2W	110–2733	2
R41, R42	Resistor, 47 Ohm ±5%, 2W	130–4723	2
R41, R42	Resistor, 68 Ohm ±5%, 2W	132–6832	2
R43	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R44	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R45	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R46	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R47	Resistor, 1.10 k Ohm ±1%, 1/4W	103–1104	1
R48, R49	Resistor, 47 Ohm ±5%, 2W	130–4723	2
R52	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R53	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R54	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R55	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R56	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R57	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R58	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R59	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R60, R61	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R62	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R63	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R64	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R65	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 6 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R66	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R67, R68	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R69	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R70	Resistor, 866 Ohm ±1%, 1/4W	103–8663	1
R71	Resistor, 100k Ohm ±5%, 2W	130–1062	1
R72	Resistor, 12 Ohm ±20%, 30W	130–1225	1
R73	Resistor, 34.8 k Ohm ±1%, 1/4W	103–3485	1
R74	Resistor, 39.2 k Ohm ±1%, 1/4W	100–3951	1
R75	Resistor, 39.2 k Ohm ±1%, 1/4W	100–3951	1
R76	Resistor, 1.10 k Ohm ±1%, 1/4W	103–1104	1
R77 thru R79	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	3
R80	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R81	Resistor, 393 Ohm ±5%, 1/2W	110–3933	1
R82, R83	Resistor, 100 Ohm ±1%, 1/4W	100–1031	2
R84	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R85	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R86	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R87	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R88	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R89	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R90	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R91	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R92	Resistor, 88.7 Ohm ±1%, 1/4W	103–8872	1
R93, R94	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R95	Resistor, 13 k Ohm ±1%, 1/4W	103–1305	1
R96	Resistor, 3.32 k Ohm ±1%, 1/4W	103–3324	1
R97	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R98	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R99	Resistor, 33.2 k Ohm ±1%, 1/4W	103–3325	1
R100	Resistor, 5.11 k Ohm ±1%, 1/4W	103–5141	1
R101	Resistor, 5.11 k Ohm ±1%, 1/4W	103–5141	1
R102, R103	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
R104	Resistor, 3.32 k Ohm ±1%, 1/4W	103–3324	1
R105 thru R107	Resistor, 0.1 Ohm ±1%, 10W, WW	130–1010	3
R108	Resistor, 475 Ohm ±1%, 1/4W	103–4753	1
R109	Resistor, 162 Ohm ±1%, 1/4W	100–1631	1
R110	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R111 thru R117	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	7
R118	Resistor, 39.2 k Ohm ±1%, 1/4W	100–3951	1
R119	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R120, R121	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	2
R122	Resistor, 150 Ohm ±1%, 1/4W	100–1531	1
R123	Resistor, 82.5 Ohm ±1%, 1/4W	103–8251	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 7 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R124	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R125	Resistor, 249 k Ohm ±1%, 1/4W	103–2496	1
R126	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R127	Resistor, 1.33 k Ohm ±1%, 1/4W	103–1331	1
R130	Resistor, 6.8 k Ohm ±5%, 1/2W,	110–6843	1
R134, R135	Resistor, 0.1 Ohm ±1%, 10W, WW	130–1010	2
R137, R138	Resistor, 82 Ohm ±5%, 2W	130–8223	2
R140	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	1
R141	Resistor, 48.7 k Ohm ±1%, 1/4W	103–4875	1
R143	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R144	Resistor, 5.11 k Ohm ±1%, 1/4W	103–5141	1
R146	Resistor, 39.2 k Ohm ±1%, 1/4W	100–3951	1
R147	Resistor, 150 k Ohm ±1%, 1/4W	103–1561	1
R148	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R149, R150	Resistor, 1 k Ohm ±1%, 1/4W,	100–1041	2
R151	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R152	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R153	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R154	Resistor, 249 Ohm ±1%, 1/4W	103–2493	1
RT1	Thermistor, 100 Ohms ±20%	140–0030	1
TP1 thru TP12, TP14	Terminal, Test Point, Oval, Red	413–0106	13
U1, U2	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	2
U3, U4	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO–220 Case	227–0317	2
U5	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16–Pin DIP	228–4538	1
U6	Voltage Comparator, LM393N, 8–Pin DIP	221–0393	1
U7	Integrated Circuit, TL311P, JFET–Input Differential Comparator, 8–Pin DIP	220–0311	1
U8 thru U11	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	4
U12	Integrated Circuit, CD4081B, Quad 2–Input AND Gate, CMOS, 14–Pin DIP	225–0008	1
U13	Integrated Circuit, SG3525AN, PWM Control	228–3525	1
U14, U15	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	2
U16	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO–220 Case	227–0317	1
U17	Integrated Circuit, Opto–Isolator, 6N137, 8–Pin DIP	220–6137	1
U19	Integrated Circuit, Driver, Mosfet, TSC4429CAT, 5–Pin, TO–220 Case, Inverting	220–4429	1

TABLE 6-23. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 917-0315-001
(Sheet 8 of 8)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U21	Integrated Circuit, MC14093B, Quad 2–Input NAND Schmitt Trigger, CMOS, 14–Pin DIP	220–4093	1
U22	Integrated Circuit, Opto–Isolator, 6N137, 8–Pin DIP	220–6137	1
U23	Voltage Comparator, LM393N, 8–Pin DIP	221–0393	1
U24	Integrated Circuit, TLO74CN, Quad JFET–Input Operational Amplifier, 14–Pin DIP	221–0074	1
U25	Temperature Sensor Chip, TMP01FP, 8–Pin DIP	229–1750	1
XU1, XU2	Socket, 6–Pin DIP	417–0600	2
XU5	Socket, 16–Pin DIP	417–1604	1
XU6, XU7	Socket, 8–Pin DIP	417–0804	2
XU8 thru XU11	Socket, 6–Pin DIP	417–0600	4
XU12	Socket, 14–Pin DIP	417–1404	1
XU13	Socket, 16–Pin DIP	417–1604	1
XU14, XU15	Socket, 6–Pin DIP	417–0600	2
XU17	Socket, 8–Pin DIP	417–0804	1
XU21	Socket, 14–Pin DIP	417–1404	1
XU22, XU23	Socket, 8–Pin DIP	417–0804	2
XU24	Socket, 14–Pin DIP	417–1404	1
XU25	Socket, 8–Pin DIP	417–0804	1
----	Fuse Clips, AGC	415–2068	4
----	Blank, Power Supply Circuit Board	517–0315–001	1

TABLE 6-24. POWER SUPPLY BULK CAPACITOR CIRCUIT BOARD ASSEMBLY - 917-0315-003

REF. DES.	DESCRIPTION	PART NO.	QTY.
C24, C25	Capacitor, Electrolytic, 1500 uF, 400V dc – 450V dc	013–1500	2
C28	Capacitor, Polypropylene Film, .47 uF ±10%, 600V	033–4763	1
R50	Resistor, 100 k Ohm ±5%, 2W	130–1062	1
R51	Resistor, 36 Ohm ±5%, 2W	130–3623	1
R129	Resistor, 470 k Ohm ±5%, 1/2W	110–4763	1
----	Blank, Power Supply Bulk Capacitor Circuit Board	517–0315–002	1

TABLE 6-25. POWER SUPPLY CAPACITOR CIRCUIT BOARD ASSEMBLY - 917-0315-005

REF. DES.	DESCRIPTION	PART NO.	QTY.
C88, C89	Capacitor, Electrolytic, 7200 uF, 200WV dc	014–7200	2
MOV3	Metal Oxide Varistor, V130LA10A, 130V ac RMS, 10 Joules	140–0006	1
----	Blank, Power Supply Capacitor Circuit Board	517–0315–004	1

TABLE 6-26. LIGHTNING PROTECTION CIRCUIT BOARD ASSEMBLY-AM-1A - 917-0316

REF. DES.	DESCRIPTION	PART NO.	QTY.
D1 thru D5	Transzorb, 250BV, 1.5KE250CA	206–0250	5
D6	Transzorb, 300BV, 1.5KE300CA	206–0300	1
----	Blank, Lightning Protection Circuit Board	517–0216	1

TABLE 6-27. LIGHTNING PROTECTION CIRCUIT BOARD ASSEMBLY AM-500A - 917-0216

REF. DES.	DESCRIPTION	PART NO.	QTY.
D1	Transzorb, 1.5KE400CA, 400BV	206–0400	1
D2	Transzorb, 1.5KE300CA, 300BV	206–0300	1
D3	Transzorb, 1.5KE400CA, 400BV	206–0400	1
----	Blank Lightning Protection Circuit Board	517–0216	1

TABLE 6-28. COMBINER CIRCUIT BOARD ASSEMBLY- 917-0321-001/-501

REF. DES.	DESCRIPTION	PART NO.	QTY.
L1, L2	RF Choke Assembly	360–0107	2
T1, T2	AM–1A Combiner Transformer Assembly	370–0055	2
TP1 thru TP5	Terminal Test Point, Oval, Red	413–0106	5
----	Blank, Combiner Circuit Board	517–0321–001	1

TABLE 6-29. OPTICALLY COUPLED RELAY CIRCUIT BOARD ASSEMBLY - 919-0096-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Optically Coupled Relay Circuit Board Assembly	919–0096	1
	DELETE PARTS		
C3	Capacitor, Ceramic Disc, 0.1 uF, 600V	000–1051	1
R2	Resistor, 560 Ohm ±5%, 1/2W	110–5633	1

TABLE 6-30. OPTICALLY COUPLED RELAY CIRCUIT BOARD ASSEMBLY - 919-0096 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Ceramic, 0.001 uF, 1 kV	002–1034	1
C2	Capacitor, Electrolytic, 47 uF, 35V	020–4773	1

TABLE 6-30. OPTICALLY COUPLED RELAY CIRCUIT BOARD ASSEMBLY - 919-0096
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C3	Capacitor, Ceramic Disc, 0.1 uF, 600V	000–1051	1
C4	Capacitor, Ceramic, 0.001 uF, 1 kV	002–1034	1
D1	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D2	Diode, Zener, 1N5359, 24V ±10%, 5W	200–5359	1
D4	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D5	Bridge Rectifier, MDA970A3, 4 Amps, 50–200V	239–0003	1
E1 thru E5	Terminal, Male Disconnect	410–0025	5
F1, F2	Fuse, 3 Amperes, 250V, Printed Circuit Board Mount	330–0055	2
K1	Relay, Printed Circuit Board Mount Coil: 24V dc, 660 Ohm ±10% Contacts: SPST–NO, 0.5 to 15A @ 12 to 240V ac Resistance	270–0054	1
MOV1	Varistor, 27V, V27ZA60	140–0023	1
R1	Resistor, 2 k Ohm ±3%, 10W, W/W	130–2032	1
R2	Resistor, 560 Ohm ±5%, 1/2W	110–5633	1
R3	Resistor, 820 Ohm ±5%, 1/2W	110–8233	1
R4	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R5	Resistor, 2 k Ohm ±3%, 10W, W/W	130–2032	1
U1	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	1
XU1	Socket, 6–Pin DIP	417–0600	1
----	Blank, Optically Coupled Relay Circuit Board	519–0096	1

TABLE 6-31. WIRE HARNESS - 947-0179

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Pins, Connector	417–0053	43
----	Contact Housing, 4–Pin In–line	417–0138	1
----	Pins, Connector	417–0142	40
----	Connector Plug, 25–Pin	417–0251	2
----	Connector, FC112N2, Crimp Contact	417–0372	9
----	Connector, Female, PLB16F0000, Positronic	417–0377	1
----	Plug, Housing, 14–Pin	417–1401	1
----	Housing, Wire, MR, female, 24–Pin, Amp	417–2402	2
----	Kit, Housing, 25–Pin	417–2510	2
----	Pins, Crimp Type	417–8766	15
----	Plug, Housing, 4–Pin	418–0240	1
----	Connector Housing, 6–Pin	418–0670	1
----	Connector Housing, 2–Pin, Female	418–0701	3
----	AC Line Cord, N.E.M.A. 3–Wire North American Plug	682–0001	1

TABLE 6-32. CUSTOMER SERVICE PARTS KIT - 957-0065

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Fuse, 3AG, 250V, 2 Amperes	330–0200	5
----	Fuse, 3AB, 20 Amperes, 250V	330–2000	1
----	Fuse, 3AB, 15 Amperes, 65V, Very Fast	330–1502	2
----	Fuse, 20 Amperes, 125V, 1/4x1–1/4, Lead Type	334–0020–001	4
----	Fuse, MDL, 1A, 250V, Slow–Blow	334–0100	1
----	Fuse, 5 X 20MM, 1.5 Ampere, Slow–Blow	334–1150	4
----	Battery, 9 Volt, Alkaline	350–0002	1
----	Ferrite Core, Large AM Transmitter	375–0007–001	2
----	Ferrite Core, 1.102 OD x .63 ID x .512 THK	375–0009	2
----	Adjustment Tool, extended and recessed flat blades	407–0186	1
----	Connector, 2–Pole 3 Wire, 15 Amperes, 250V, Female	417–0320	1
----	Instruction Manual, AM–1A	597–1112	1

TABLE 6-33. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 522 - 650 KHZ - 957-1035-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 5100 pF, 3 kV, 8.2 Amperes	044–5123–272	1
C2	Capacitor, Mica, 3300 pF, 3 kV, 6.8 Amperes	044–3323–272	1
C3	Capacitor, Mica, 5100 pF, 3 kV, 8.2 Amperes	044–5123–272	1
C4	Capacitor, Mica, 8200 pF, 2 kV, 10 Amperes	044–8223–272	1
L1	Coil, All Frequency	360–1101–XXX	1
L2	Coil, All Frequency	360–1102–XXX	1
L3	Coil, All Frequency	360–1103–XXX	1

TABLE 6-34. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 651 - 770 KHZ - 957-1035-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 4300 pF, 3 kV 7.5 Amperes	044–4323–272	1
C2	Capacitor, Mica, 2700 pF, 3 kV, 6.8 Amperes	044–2723–272	1
C3	Capacitor, Mica, 4300 pF, 3 kV 7.5 Amperes	044–4323–272	1
C4	Capacitor, Mica, 6800 pF, 3 kV, 9.1 Amperes	044–6823–272	1
L1	Coil, All Frequency	360–1101–XXX	1
L2	Coil, All Frequency	360–1102–XXX	1
L3	Coil, All Frequency	360–1103–XXX	1

TABLE 6-35. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 771 - 920 KHZ - 957-1035-003

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 3600 pF, 3 kV, 7.5 Amperes	044-3623-272	1
C2	Capacitor, Mica, 2200 pF, 5kV, 6.2 Amperes	044-2223-272	1
C3	Capacitor, Mica, 3600 pF, 3 kV, 7.5 Amperes	044-3623-272	1
C4	Capacitor, Mica, 5600 pF, 3 kV, 9.1 Amperes	044-5623-272	1
L1	Coil, All Frequency	360-1101-XXX	1
L2	Coil, All Frequency	360-1102-XXX	1
L3	Coil, All Frequency	360-1103-XXX	1

TABLE 6-36. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 921 - 1080 KHZ - 957-1035-004

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 3300 pF, 3 kV, 6.8 Amperes	044-3323-272	1
C2	Capacitor, Mica, 1800 pF, 5 kV, 5.6 Amperes	044-1823-272	1
C3	Capacitor, Mica, 3300 pF, 3 kV, 6.8 Amperes	044-3323-272	1
C4	Capacitor, Mica, 4700 pF, 3 kV, 8.2 Amperes	044-4723-272	1
L1	Coil, All Frequency	360-1101-XXX	1
L2	Coil, All Frequency	360-1102-XXX	1
L3	Coil, All Frequency	360-1103-XXX	1

TABLE 6-37. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 1081 - 1300 KHZ - 957-1035-005

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 2700 pF, 3 kV, 6.8 Amperes	044-2723-272	1
C2	Capacitor, Mica, 1600 pF, 5 kV, 5.6 Amperes	044-1623-272	1
C3	Capacitor, Mica, 2700 pF, 3 kV, 6.8 Amperes	044-2723-272	1
C4	Capacitor, Mica, 3900 pF, 3 kV, 7.5 Amperes	044-3923-272	1
L1	Coil, All Frequency	360-1101-XXX	1
L2	Coil, All Frequency	360-1102-XXX	1
L3	Coil, All Frequency	360-1103-XXX	1

TABLE 6-38. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 1301 - 1580 KHZ - 957-1035-006

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 2200 pF, 5 kV, 6.2 Amperes,	044-2223-272	1
C2	Capacitor, Mica, 1300 pF, 5 kV, 5.1 Amperes	044-1323-272	1
C3	Capacitor, Mica, 2200 pF, 5 kV, 6.2 Amperes	044-2223-272	1
C4	Capacitor, Mica, 3300 pF, 3 kV, 6.8 Amperes	044-3323-272	1
L1	Coil, All Frequency	360-1101-XXX	1
L2	Coil, All Frequency	360-1102-XXX	1
L3	Coil, All Frequency	360-1103-XXX	1

TABLE 6-39. OUTPUT NETWORK FREQUENCY DEPENDANT KIT - 1581 - 1700 KHZ - 957-1035-007

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 1800 pF, 5 kV, 5.6 Amperes	044–1823–272	1
C2	Capacitor, Mica, 1100 pF, 5 kV, 4.7 Amperes	044–1123–272	1
C3	Capacitor, Mica, 1800 pF, 5 kV, 5.6 Amperes	044–1823–272	1
C4	Capacitor, Mica, 2700 pF, 3 kV, 6.8 Amperes	044–2723–272	1
L1	Coil, All Frequency	360–1101–XXX	1
L2	Coil, All Frequency	360–1102–XXX	1
L3	Coil, All Frequency	360–1103–XXX	1

TABLE 6-40. POWER MODULE FREQUENCY DEPENDANT KIT, 522 - 650 KHZ - 957-1015-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
C45, C56	Capacitor, Mica, 1600 pF, 1 kV	042–1622	4
C46 thru C55	Capacitor, Mica, 1800 pF, 1 kV	042–1832	20
L3, L4	Inductor, PA Drive	360–0113–XXX	4
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-41. POWER MODULE FREQUENCY DEPENDANT KIT, 651 - 770 KHZ - 957-1015-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
C46, C55	Capacitor, Mica, 1600 pF, 1 kV	042–1622	4
C47 thru C54	Capacitor, Mica, 1800 pF, 1 kV	042–1832	16
L3, L4	Inductor, PA Drive	360–0113–XXX	4
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-42. POWER MODULE FREQUENCY DEPENDANT KIT, 771 - 920 KHZ - 957-1015-003

REF. DES.	DESCRIPTION	PART NO.	QTY.
C47 thru C54	Capacitor, Mica, 1800 pF, 1 kV	042–1832	16
L3, L4	Inductor, PA Drive	360–0113–XXX	4
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-43. POWER MODULE FREQUENCY DEPENDANT KIT, 921 - 1080 KHZ - 957-1015-004

REF. DES.	DESCRIPTION	PART NO.	QTY.
C48, C53	Capacitor, Mica, 1600 pF, 1 kV	042–1622	4
C49 thru C52	Capacitor, Mica, 1800 pF, 1 kV	042–1832	8
C47, C54	Capacitor, Mica, 910 pF, 1 kV	042–9122	4
L5, L7	Inductor, PA Drive	360–0113–XXX	4
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-44. POWER MODULE FREQUENCY DEPENDANT KIT, 1081 - 1300 KHZ - 957-1015-005

REF. DES.	DESCRIPTION	PART NO.	QTY.
C48, C53	Capacitor, Mica, 1600 pF, 1 kV	042–1622	4
C49 thru C52	Capacitor, Mica, 1800 pF, 1 kV	042–1832	8
L5, L7	Inductor, PA Drive	360–0113–XXX	4
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-45. POWER MODULE FREQUENCY DEPENDANT KIT, 1301 - 1580 KHZ - 957-1015-006

REF. DES.	DESCRIPTION	PART NO.	QTY.
C48, C53	Capacitor, Mica, 910 pF, 1 kV	042–9122	4
C49 thru C52	Capacitor, Mica, 1600 pF, 1 kV	042–1622	8
L5, L6, L7	Inductor, PA Drive	360–0113–XXX	6
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-46. POWER MODULE FREQUENCY DEPENDANT KIT, 1581 - 1700 KHZ - 957-1015-007

REF. DES.	DESCRIPTION	PART NO.	QTY.
C49, C52	Capacitor, Mica, 1600 pF, 1 kV	042–1622	4
C50, C51	Capacitor, Mica, 1800 pF, 1 kV	042–1832	4
L5, L6, L7	Inductor, PA Drive	360–0113–XXX	6
----	Blank, PA Capacitor Board Circuit Board	517–0318–001	2
----	Blank, PA Inductor Board Circuit Board	517–0319–001	2

TABLE 6-47. WIRING HARNESS, FAN ASSEMBLY - 947-0209

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Pin Connector	417-0036	2
----	Connector Housing, 2-Pin, Male	418-0702	1

SECTION VII
DRAWINGS

7-1. INTRODUCTION.

7-2. This section provides schematic diagrams and assembly diagrams as indexed below for the Broadcast Electronics AM-1A transmitter.

FIGURE	TITLE	NUMBER
7-1	OVERALL SCHEMATIC DIAGRAM, AM-1A/AM-500A TRANSMITTER	SB907-1000-001/ 907-0500-001
7-2	SCHEMATIC DIAGRAM, POWER AMPLIFIER MOTHERBOARD AND COMBINER	SB917-0303/-001 /-501
7-3	ASSEMBLY DIAGRAM, POWER AMPLIFIER MOTHERBOARD AND COMBINER	AC917-0303/-001 /-501
7-4	SCHEMATIC DIAGRAM, OPTICALLY COUPLED RELAY	SB919-0096-001
7-5	ASSEMBLY DIAGRAM, OPTICALLY COUPLED RELAY (OCR)	AB919-0096-001
7-6	SCHEMATIC DIAGRAM, POWER SUPPLY CIRCUIT BOARD	SB917-0315-001 /-002/-003/-004 /-005
7-7	ASSEMBLY DIAGRAM, POWER SUPPLY CIRCUIT BOARD	AC917-0315-001 /-002/-003/-004 /-005
7-8	SCHEMATIC DIAGRAM, MODULATOR CIRCUIT BOARD	SB917-0302/-001 /-500
7-9	ASSEMBLY DIAGRAM, MODULATOR CIRCUIT BOARD	AD917-0302/-001 /-500
7-10	SCHEMATIC DIAGRAM, POWER AMPLIFIER CIRCUIT BOARD	SB917-0304
7-11	ASSEMBLY DIAGRAM, POWER AMPLIFIER CIRCUIT BOARD	AD917-0304
7-12	SCHEMATIC DIAGRAM, AC SAMPLE CIRCUIT BOARD	SA917-0306-007
7-13	SCHEMATIC DIAGRAM, TEMPERATURE SENSOR	SA917-0306-009
7-14	SCHEMATIC DIAGRAM, DIRECTIONAL COUPLER CIRCUIT BOARD	SB917-0306-002
7-15	SCHEMATIC DIAGRAM, LIGHTNING DETECTOR CIRCUIT BOARD	SB917-0306-004 /-014
7-16	SCHEMATIC DIAGRAM, ECU DISPLAY/CONTROLLER SWITCH CIRCUIT BOARD	SB917-0306-001
7-17	SCHEMATIC DIAGRAM, ECU METER SWITCH CIRCUIT BOARD	SB917-0306-005
7-18	ASSEMBLY DIAGRAM, ECU BREAK-AWAY CIRCUIT BOARD	AD917-0306-001 /-002/-003/-004 /-005/-006/-007 /-009/-014

APPENDIX A

A–1. INTRODUCTION.

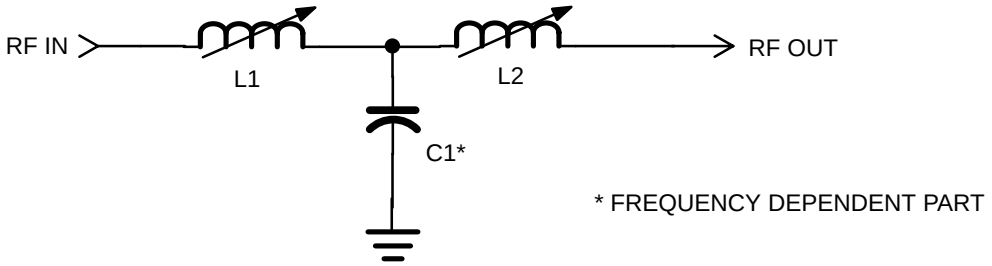
A–2. This appendix provides information for the AM matching network. The information contained in this appendix is presented in the following order.

A. AM matching network.

AM MATCHING NETWORK

A–3. INTRODUCTION.

A–4. This addendum provides information for the AM matching network. The AM matching network provides antenna matching for AM transmitters not equipped with an output tuning system (refer to Figure A–1). The matching network consists of 2 adjustable inductors and a capacitor. The inductors are used to tune the antenna impedance to the transmitter.



597-0501-17

FIGURE A-1. SCHEMATIC DIAGRAM, AM MATCHING NETWORK

A–5. INSTALLATION.

A–6. The matching network is housed in a chassis designed for installation in a 19 inch rack. The chassis requires 8.75 inches of rack space. Mount the unit in the rack as follows:

1. Mount the unit in the rack directly below the transmitter.
2. Connect the Type N elbow to the transmitter RF OUT receptacle.
3. Connect the Type–N cable located in the accessory kit between the transmitter RF OUT receptacle and the RF IN connector on the matching network.
4. Connect the Type–N connector antenna cable to the RF OUT on the matching network.

A–7. OPERATION.

A–8. The matching network is equipped with TUNE and LOAD controls. The controls are adjusted at the factory for a 50 Ohm load. To adjust the TUNE and LOAD controls, operate the transmitter at the normal output power and adjust the controls for a minimum reflected power indication on the transmitter reflected power meter.

A–9. PARTS LIST.

A–10. The following text presents the parts required for maintenance of the AM matching network.

TABLE A-1. AM MATCHING NETWORK - 907-1000-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Frequency Dependent, Refer To Frequency Dependent Parts In The Following Text		
L1, L2	Coil, Variable, 16 uH, 20A	360-0088	2
----	Bulkhead Receptacle, Type N	417-0204	2
----	Knob, RB-67-5-M, Black	482-0031	2
----	RF Cable, Type-N Connectors	947-0180	1
----	90 Degree Elbow, Type-N	417-0105	1

TABLE A-2. FREQUENCY DEPENDENT PARTS - 957-0015-001 THRU -007

REF. DES.	DESCRIPTION	PART NO.	QTY.
	FOR ASSEMBLY 957-0015-001		
C1	Capacitor, Mica, 3900 pF ±5%, 3kV, 7.5 A, 530 kHz to 650 kHz	044-3923-272	1
	FOR ASSEMBLY 957-0015-002		
C1	Capacitor, Mica, 3300 pF ±5%, 3kV, 6.8 A, 651 kHz to 770 kHz	044-3323-272	1
	FOR ASSEMBLY 957-0015-003		
C1	Capacitor, Mica, 2700 pF ±5%, 3kV, 6.8 A, 771 kHz to 920 kHz	044-2723-272	1
	FOR ASSEMBLY 957-0015-004		
C1	Capacitor, Mica, 2200 pF ±5%, 3kV, 6.2 A, 921 kHz to 1080 kHz	044-2223-272	1
	FOR ASSEMBLY 957-0015-005		
C1	Capacitor, Mica, 1800 pF ±5%, 5kV, 5.6 A, 1081 kHz to 1300 kHz	044-1823-272	1
	FOR ASSEMBLY 957-0015-006		
C1	Capacitor, Mica, 1600 pF ±5%, 5kV, 5.6 A, 1301 kHz to 1580 kHz	044-1623-272	1
	FOR ASSEMBLY 957-0015-007		
C1	Capacitor, Mica, 1300 pF ±5%, 5kV, 5.1 A, 1581 kHz to 1705 kHz	044-1323-272	1