Broadcast Electronics
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Broadcast Electronics

AM-2.5E 2.5 KILOWATT
AM-5E 5 KILOWATT
AM BROADCAST TRANSMITTERS

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June 12, 2012

Broadcast Electronics

AM-2.5 E 2.5 Kilowatt
AM-5E 5 Kilowatt
AM BROADCAST TRANSMITTERS

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CE INFORMATION

INTRODUCTION

This section presents information related to CE compliance.

EQUIPMENT COMPLIANCE

The Broadcast Electronics E-Series transmitters are designed to meet the CE compliance directives presented in the DECLARATION OF CONFORMITY statement (located at the end of this section). However, to meet the directives, the transmitter must be operated with all access panels securely installed and the rear door closed and sealed. Failure to operate the transmitter in this manner will void the compliance conformity. Any problems associated with a transmitter operated in an unauthorized manner will be the sole responsibility of the user.

INTENDED USE OF THE EQUIPMENT

The E-Series transmitters are commercial RF broadcast units designed for operation in the AM broadcast band. The units must be installed and operated indoors. The indoor climate includes a temperature between 0 to 50 degrees C with a non-condensing humidity.

SYMBOLS

The E-Series transmitters use international compliant symbols for operating controls and connections. The following text presents a description of the symbols used on the transmitter.

597-1114-25

CE SYMBOL DESCRIPTIONS

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Broadcast Electronics, Inc.

Manufacturer's Address: 4100 North 24th Street
Quincy, IL 62301 USA

Declares That The Product –

Product Name: Broadcast Electronics AM Transmitter

Model Number(s): AM-2.5E

Product Options: This declaration covers all options of the above product.

Conforms To The Following Product Specifications:

Safety – EN60215 Safety Requirements for Radio Transmitting Equipment.
EN60065 Safety of Mains Operated Electronic Equipment.

EMC – ***EMISSIONS***
EN55022:1994, Conducted Power Line Emissions, Class B.
ETS 300 339, Cabinet Radiation, Class B.
IMMUNITY
EN61000-4-2: ESD, Cabinet.
EN61000-4-3: RF Electromagnetic Field, Cabinet.
EN61000-4-4: Fast Transients: Antenna Port, AC Mains, All I/O Lines.
EN61000-4-5: Surge, L/L, L/gnd, AC Mains.
EN61000-4-6: Conducted RF: Antenna Port, AC Mains, All I/O Lines.
EN61000-4-11: Voltage Dips: AC Mains, Voltage Interruptions: AC Mains.

Supplementary Information:

This product was tested in a typical configuration by a Certified member of the North American Laboratory Network using a test plan generated by an EU Competent Body. The results were subsequently approved by a Notified Body for EU Type Examination.

Therefore, the product listed above complies with the requirements of the Low Voltage Directive 73/23/EEC modified by 93/68/EEC and EMC Directive 89/336/EEC modified by 92/31/EEC and 93/68/EEC, and carries the CE-marking accordingly.

Quincy, Illinois, USA

Ross Veach

Ross Veach / Director, Manufacturing/Quality Assurance

EU Competent Body:
Technology International, LTD
41-42 Shrivenham Hundred Business Park
Shrivenham Swindon Wiltshire SNG 8TZ

Technical Construction File Data:
Low Voltage Directive: 597-1121-LVD
EMC Directive: 597-1121-EMC

EU Contact:
Cotelettron S.R.L.
Viale degli Ammiragli, 69
00136 Roma
Italy
Attn: Dr. Raoul Giuseppe Fiano
Tel: 39 6 39725839, Fax: 39 6 39746659, E-mail: cotel@tin-it

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name:	Broadcast Electronics, Inc.
Manufacturer's Address:	4100 North 24th Street Quincy, IL 62301 USA

Declares That The Product –

Product Name:	Broadcast Electronics AM Transmitter
Model Number(s):	AM-5E
Product Options:	This declaration covers all options of the above product.

Conforms To The Following Product Specifications:

Safety – EN60215 Safety Requirements for Radio Transmitting Equipment.
EN60065 Safety of Mains Operated Electronic Equipment.

EMC – ***EMISSIONS***
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Quincy, Illinois, USA

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EU Competent Body:
Technology International, LTD
41-42 Shrivenham Hundred Business Park
Shrivenham Swindon Wiltshire SNG 8TZ

Technical Construction File Data:
Low Voltage Directive: 597-1115-LVD
EMC Directive: 597-1115-EMC

EU Contact:
Cotelettron S.R.L.
Viale degli Ammiragli, 69
00136 Roma
Italy
Attn: Dr. Raoul Giuseppe Fiano
Tel: 39 6 39725839, Fax: 39 6 39746659, E-mail: cotel@tin-it

Broadcast Electronics
Product Warranty (Two-Year Limited)

BE hereby warrants all new products manufactured by BE against any defects in material or workmanship at the time of delivery thereof, or that develop under normal use within a period of two (2) years from the date of shipment.

BE reserves the right to repair equipment under warranty with new or refurbished equipment or parts. BE's sole responsibility with respect to any equipment or parts not conforming to this warranty is to replace or repair such equipment upon the return thereof F.O.B. to BE's factory in Quincy, Illinois, U.S.A. In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement.

This warranty shall exclude the following products, component parts and/or assemblies:

(a) Transmitter power output tubes shall only carry the original manufacturers' or suppliers' standard warranty in effect on their original shipment date.

(b) All computers, computer peripherals, cables, hard disk drives, etc., shall only carry the manufacturers' or supplier's standard warranty in effect on their original shipment date.

(c) "Components", defined as separate and individual parts (e.g. transistors, integrated circuits, capacitors, resistors, inductors, fans, etc), resold by BE from another manufacturer or supplier, shall only carry a 90 day warranty, effective the date of shipment. Any such 'Components' being returned for warranty claim must be (1) returned in their original packaging and (2) must be in new, unused condition.
BE is unable to process or resolve component defects or performance concerns on components that have been soldered, installed, wired or in any way altered from their new condition.

(d) "Resale Equipment", defined as equipment purchased from another manufacturer or supplier, then resold by BE, shall only carry such manufacturers' or suppliers' standard warranty in effect as of the original shipment date. All warranty claims against any and all 'resale equipment' sold by BE must be filed directly with the original equipment manufacturer. BE is unable to process or resolve equipment defects or performance concerns on products or services not manufactured by BE.

This warranty shall not extend to claims resulting from any acts of God, terrorism, war, defects or failures caused by Purchaser or user abuse or misuse, operator error, or unauthorized attempts to repair or alter the equipment in any way.

Under no circumstances shall BE be responsible for indirect, incidental or consequential damages, including, but not limited to transportation costs, non-authorized repair or service costs, downtime costs, costs for substituting equipment or loss of anticipated profits or revenue, incurred by Purchaser, whether based in contract, tort or for negligence or breach of statutory duty or otherwise.
The terms of the foregoing warranty shall be null and void if the equipment has been altered or repaired without specific written authorization from BE, or if not installed according to BE's instruction manuals, including, but not limited to, the absence of proper grounding, surge (TVSS) protection on the AC circuit panel or proper lightning protection/grounding on all output circuits, or if equipment is operated under environmental conditions or circumstances other than those specifically described in BE's product literature or instruction manual which accompany the equipment. **The warranty shall be voided if the product or subassembly is equipped with a tamper seal and that tamper seal is broken.** BE shall not be liable for any expense of any nature whatsoever

incurred by the original user without prior written consent of BE. The warranty provided herein shall terminate at the end of the period set forth above. **This warranty extends only to the original Purchaser and is not transferable.** There are no third party beneficiaries of any of the provisions of this warranty. If the equipment is described as "used" equipment, it is sold as is and where is and no warranty applies unless authorized in writing. .

EXCEPT AS SET FORTH HEREIN, AS TO TITLE AND AS SPECIFICALLY REQUIRED BY LAW, THERE ARE NO OTHER WARRANTIES, OR ANY AFFIRMATIONS OF FACT OR PROMISES BY BE, WITH REFERENCE TO THE EQUIPMENT, OR TO MERCHANTABILITY, FITNESS FOR A PARTICULAR APPLICATION, SIGNAL COVERAGE, INFRINGEMENT, OR OTHERWISE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT ON THE FACE HEREOF.

IMPORTANT INFORMATION

EQUIPMENT LOST OR DAMAGED IN TRANSIT -

When delivering the equipment to you, the truck driver or carriers' 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, PARTS -

Technical assistance is available from Broadcast Electronics by letter, prepaid telephone 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 RF Technical Services Department for a shipping container. Do not mail the equipment. We can assume no liability for inbound damage, and necessary repairs become the obligation of the shipper. Prior arrangement is necessary. Contact the RF Technical Services 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 at the number shown below.

RF TECHNICAL SERVICES -

Telephone: +1 (217) 224-9617
E-Mail: rfservice@bdcast.com
Fax: +1 (217) 224-6258

FACILITY CONTACTS -

Broadcast Electronics, - Quincy Facility
4100 N. 24th St. P.O. BOX 3606
Quincy, Illinois 62305
Telephone: +1 (217) 224-9600
Fax: +1 (217) 224-6258
General E-Mail: bdcast@bdcast.com
Web Site: www.bdcast.com

PARTS -

Telephone: +1 (217) 224-9617
E-Mail: parts@bdcast.com

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.

MODIFICATIONS -

Broadcast Electronics, 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.

SAFETY PRECAUTIONS

PLEASE READ AND OBSERVE ALL SAFETY PRECAUTIONS//

ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TUBES, POWER TRANSISTORS, OR EQUIPMENT WHICH UTILIZES SUCH DEVICES 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 TUBES AND 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. **HOT SURFACES** Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. Additional information follows.

D. **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 –

Many power circuits operate at voltages high enough to kill through electrocution. Personnel should always break the primary AC Power when accessing the inside of the transmitter.

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 leak proof. 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 or open RF generating tube or circuit or RF transmission system while energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

HOT SURFACES –

The power components in the transmitter are cooled by forced-air and natural convection. When handling any components of the transmitter after it has been in operation, caution must always be taken to ensure that the component is cool enough to handle without injury.

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1 AM-2.5E, AM-5E TRANSMITTER

1.1 INTRODUCTION.

Information presented by this section provides a general description of the Broadcast Electronics AM-2.5E and AM-5E transmitters and lists equipment specifications.

1.2 EQUIPMENT DESCRIPTION.

The Broadcast Electronics AM-2.5E transmitter is a CE compliant 2.5 kW solid-state AM transmitter designed for continuous operation in the 522 kHz to 1705 kHz broadcast band. The Broadcast Electronics AM-5E transmitter is a CE compliant 5 kW solid-state AM transmitter designed for continuous operation in the 522 kHz to 1705 kHz broadcast band (refer to Figure 1-1). The AM-2.5E and AM-5E transmitters consists of modular components assembled in a single cabinet. The modular components include: 1) an exciter/control unit, 2) an output network assembly, 3) power block assemblies containing two RF power modules and a star combiner assembly, 4) power supply panel assemblies, and 5) an AC distribution panel assembly. Specific AM-2.5E/AM-5E features include:

1. Optional built-in C-QUAM™ AM stereo circuitry.
2. A high efficiency Class E solid-state RF power amplifier module.
3. A high efficiency switching power supply.
4. Star combiner assembly. Each star combiner allows the removal of RF power modules without the use of dummy modules or bypass switches.
5. A built-in output matching network.
6. A CMOS digital controller with extensive VSWR detection and foldback circuitry which reduces carrier interruptions caused by weather conditions.

1.2.1 Exciter/Controller Unit

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

1.2.2 Stereo Circuit Board (optional)

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.

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.

Figure 1-1: AM-2.5E/AM-5E Transmitter

1.2.3 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.

1.2.4 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.

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.

1.2.5 Output Network Assembly

Matching of the transmitter impedance to the antenna is accomplished by the output network assembly. The assembly is equipped with an LC T-network to match the transmitter output to the antenna. A bandpass filter is provided to attenuate all harmonic frequencies to FCC, DOC, and CCIR levels. The assembly also contains the lightning detection circuit board, a lightning protection circuit board, and a directional coupler assembly.

1.2.6 RF Power Module

The AM-2.5E and AM-5E transmitters are equipped with RF power modules. A power module is a modular plug-in assembly containing two RF power amplifier circuit boards and one modulator circuit board. Each power module is equipped with MOSFET transistors to produce approximately 1375 watts of RF power.

The RF power modules are 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 modules are designed to be removed from the chassis for maintenance. The remaining power modules will provide full power to maintain on-air operation.

1.2.7 Power Supply

A modular switching power supply provides operating potentials for two RF power modules. 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 modules 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.

1.2.8 Combiner Assembly

The AM-2.5E and AM-5E are equipped with a star combining system. The system combines the outputs of the RF power modules to provide: 1) a 2.5 kW output in AM-2.5E models and 2) a 5 kW output in AM-5E models. If a power module is removed from the chassis, the remaining power modules will continue operation to maintain on-air operation.

1.3 TRANSMITTER CONFIGURATIONS.

The AM-2.5E and AM-5E transmitters can be ordered in the following configurations:

P/N	DESCRIPTION
907-2500-100	AM-2.5E 2.5 kW AM Transmitter for operation in the 522 kHz to 1705 kHz broadcast band, 10 kHz spacing, 196V – 256V ac single phase supply.
907-5000-100	AM-5E 5 kW AM Transmitter for operation in the 522 kHz to 1705 kHz broadcast band, 10 kHz spacing, 196V – 256V ac single phase supply.

ACCESSORIES AND SPARE PARTS KITS.

The following text presents accessories and spare parts kits available for use with the AM-2.5E and AM-5E transmitters.

P/N	DESCRIPTION
977-0038	AM-2.5E/AM-5E recommended semi-conductor kit.
977-0039	AM-2.5E 100% semi-conductor kit.
977-0040	AM-2.5E/AM-5E recommended spare parts kit. Includes selected meters, switches, fuses, filters, etc. Does not include semi-conductors.
977-0041	AM-5E 100% semi-conductor kit.
977-0037	Basic semi-conductor kit, AM-10A/AM-6A/ AM-1A/AM-2.5E/AM-5E.

EQUIPMENT SPECIFICATIONS.

Refer to Table 1-1for electrical specifications or Table 1-2 for physical specifications of the AM-2.5E and AM-5E transmitters.

Table 1-1: ELECTRICAL CHARACTERISTICS
(Sheet 1 of 3)

PARAMETER	SPECIFICATION
RF POWER OUTPUT AM-2.5E	12.5 W to 2.5 kW. Five preset power levels available by local or remote control. Will operate at a reduced power output (30-50% typical) with one-half of the power modules.
AM-5E	25 W to 5 kW. Five preset power levels available by local or remote control. Will operate at a reduced power output (30-50% typical) with one-half of the power modules.
OUTPUT POWER REGULATION	Less than 1% change in output power with variation of AC line input voltage from 196V to 252V AC.
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. Matching network to optimize VSWR of 1.5 : 1 at any phase angle and carrier frequency.
OUTPUT CONNECTOR AM-5E	Female 7/16 DIN Connector. Requires 7/8 inch RF transmission line with 7/16 male DIN connector.
AM-2.5E	Requires ½ inch RF transmission line with 7/16 male DIN connector.
LOAD VSWR	1.5 : 1 at full carrier power. Will operate into a higher VSWR with automatic power reduction. Open and short circuit protected.
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	$\pm$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 optional integrated C-QUAM AM stereo. An RF input connector is also provided for an external stereo exciter.
OPERATING MODES	Mono L+R. With optional stereo card: Stereo, mono L, mono R, by local or remote control.
MODULATION CAPABILITY AM-2.5E	Greater than 145% peak positive capability at 2.5 kW.
AM-5E	Greater than 145% peak positive capability at 5 kW.

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, ±1dB, L=R (or mono) to produce 100% L+R envelope modulation. Other input levels can be accommodated.
AUDIO INPUT IMPEDANCE	600 Ohms. Inputs are balanced, transformerless, and resistive with passive RFI filtering. Other impedances can be accommodated.
AUDIO FREQUENCY RESPONSE (MONOPHONIC)	±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.
AUDIO HARMONIC DISTORTION Mono	Less than 0.8%, 20 Hz to 10 kHz at rated power. Less than 1.5%, 20 Hz to 10 kHz at 50% power. Less than 2.0%, 20 Hz to 10 kHz at 25% power. Less than 3.0%, 20 Hz to 10 kHz at 10% power. All mono audio harmonic distortion specifications are referenced to an audio input level which generates 90% modulation at 1 kHz (9 dBm).
Stereo	Less than 1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power.
INTERMODULATION DISTORTION (MONO)	1.2% or less at 1:1 ratio. 1.7% or less at 4:1 ratio. 60/7000 Hz SMPTE standards with 85% modulation at rated power.
CCIF INTERMODULATION DISTORTION (MONO)	1.0% or less at 1:1 ratio. 4 kHz/5 kHz with 85% modulation at rated power.
TRANSIENT INTERMODULATION DISTORTION (MONO)	1.0% or less at 4:1 ratio. 2.96 kHz square wave 8 kHz sinewave with 85% modulation at rated power.
INCIDENTAL PHASE MODULATION (STEREOPHONIC)	Less than 2.0 degrees (0.035 radians) average or 30 dB (40 dB typical) 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	-30 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	1% or less at 40 Hz. 1.5% or less 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-2.5E	3.3 kW, no modulation of 2.5 kW carrier. 6.05 kW, 100% modulation of 2.5 kW carrier. Measured at 2.5 kW into a 50 Ohm resistive load at 220 VAC. 0.9 power factor, 6.7 kW, no modulation of 5 kW carrier.
AM-5E	6.7 kW, no modulation of 5 kW carrier. 10 kW, 100% modulation of 5 kW carrier. Measured at 5 kW into a 50 Ohm resistive load at 220VAC. 0.9 power factor.
OVERALL EFFICIENCY	
AM-2.5E	75% or greater, 100% sinusoidal modulation of carrier, AC line to RF output. Measured at into 2.5 kW a 50 ohm resistive load at 220 VAC.
AM-5E	75% or greater, 100% sinusoidal modulation of carrier, AC line to RF output. Measured at 5 kW into a 50 ohm resistive load at 220 VAC.
SAFETY	Meets IEC 215 specifications.
REGULATORY	Meets CE specifications.
METERING	
AM-2.5E	Output Forward Power: 1) High scale – 0 to 3000 watts and 2) Low scale – 0 to 750 watts. Output Reflected Power: 1) High scale – 0 to 300 watts and 2) Low scale – 0 to 60 watts. AC Line Voltage: Scale – 150 to 300 volts. AM-2.5 Forward Power Meter complies with FCC rule 78.1215 (a) within the 150 watt to 2800 watt range.
AM-5E	Output Forward Power: 1) High scale – 0 to 6000 watts and 2) Low scale – 0 to 1500 watts. Output Reflected Power: 1) High scale – 0 to 600 watts and 2) Low scale – 0 to 150 watts. AC Line Voltage: Scale – 150 to 300 volts. AM-5 Forward Power Meter complies with FCC rule 73.1215 (a) within the 300 watt to 5600 watt range.
RF MONITORING PROVISIONS	2 volts RMS nominal RF output sample into a 50 Ohm input. Adjustable from the transmitter front panel for each of the five power levels.
REMOTE INTERFACE	Built-in interface for most control and monitoring systems.

Table 1-2: PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS
(Sheet 1 of 1)

PARAMETER	SPECIFICATION
PHYSICAL	
DIMENSIONS	Width: 24.82 Inches (63.0 cm) Height: 71.32 Inches (181.2 cm) Depth: 31.55 Inches (80.1 cm)
WEIGHT	
AM-2.5E	410 Pounds (186 kg), unpacked.
AM-5E	525 Pounds (238 kg), unpacked.
CUBAGE	42.8 Ft^3 (1.2 m^3).
ENVIRONMENTAL	
COOLING	
Type	Low velocity air with disposable filters.
Requirements -AM2.5E/AM-5E	500 Cubic Feet per Minute (14.15 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:	For AM-2.5E – All specifications measured at 2.5 kW into a 50 ohm resistive load using Broadcast Electronics AS-10 modulation monitor. For AM-5E – All specifications measured at 5 kW into a 50 ohm resistive load using Broadcast Electronics AS-10 modulation monitor.

2 INSTALLATION

This section contains information required for the installation and preliminary checkout of the Broadcast Electronics AM-2.5E and AM-5E transmitters.

2.1 UNPACKING.

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.

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.

2.2 ENVIRONMENTAL REQUIREMENTS.

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.

2.3 COOLING AIR REQUIREMENTS.

If outside air is to be used to cool the transmitter, the air inlet duct must be sized to allow adequate air flow. The air must be dry and well filtered. If intake louvers are used, operation of the louvers must be electrically interlocked with the transmitter operation.

If the heated transmitter air is to be ducted from the room, the duct system must not introduce any back-pressure on the equipment. Proper allowances for air flow will ensure that only a limited amount of heat is dissipated into the equipment interior. The duct system must allow for a minimum air flow of: 1) 500 cubic feet of air per minute for AM-2.5E models and 2) 700 cubic feet of air per minute for AM-5E models.

As a minimum requirement, any duct work must have a cross-sectional area equal to the exhaust area of the cabinet (refer to Figure 2-1 and Figure 2-2). Sharp bends in the duct system will introduce back pressure and are not permissible. A radius bend must be used if a right angle turn is required. An exhaust fan may be used to overcome duct losses or overcome wind pressures if the duct is vented to the outside.

2.4 PRIMARY POWER.

The AM-2.5E and AM-5E transmitters are designed for operation from a 196V to 252V ac 50/60 Hz single phase power source. Consult the local electric utility company to ensure that the correct service is provided before connection of the transmitter to the primary power source.

2.5 INSTALLATION.

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) initial checkout, and 7) preliminary operation and tuning.

2.6 EQUIPMENT PLACEMENT.

The transmitter is designed with access holes in the top of the cabinet to allow for the over-head ducting of ac power, RF transmission line, and ground strap wiring (refer to Figure Figure 2-1 and Figure 2-2). The floor must be capable of supporting the total transmitter weight of approximately 90 pounds per square foot. The floor support should be more than marginal to maintain proper cabinet alignment and reduce vibration.

Evaluate the installation site and determine the location of the transmitter. Once the location is determined, refer to Figure 2-3 and use a forklift to move the transmitter to the desired location. After the transmitter is placed in the desired location, remove the shipping skid as follows:
1. Refer to Figure 2-3 and remove the 5/16 inch shipping bolts securing the transmitter to the skid.
2. Once the bolts are removed, slide the transmitter off the skid.
3. Slide the transmitter to the exact location.

2.7 COMPONENT INSTALLATION.

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

Selected components of the AM-2.5E and AM-5E transmitters have been removed to prevent damage during shipment. The components removed from the transmitter are shipped in separate containers.

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.

2.7.1 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
CAUTION SECURELY SEATED INTO THE CONNECTORS.

1. Refer to Figure 2-4 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
CAUTION MAY RESULT IN DAMAGE TO THE MODULE.

2.7.2 RF Power Module.

The RF power module is removed for shipment. Locate the RF power module shipping containers. Refer to Figure 2-4 and re-install the modules.

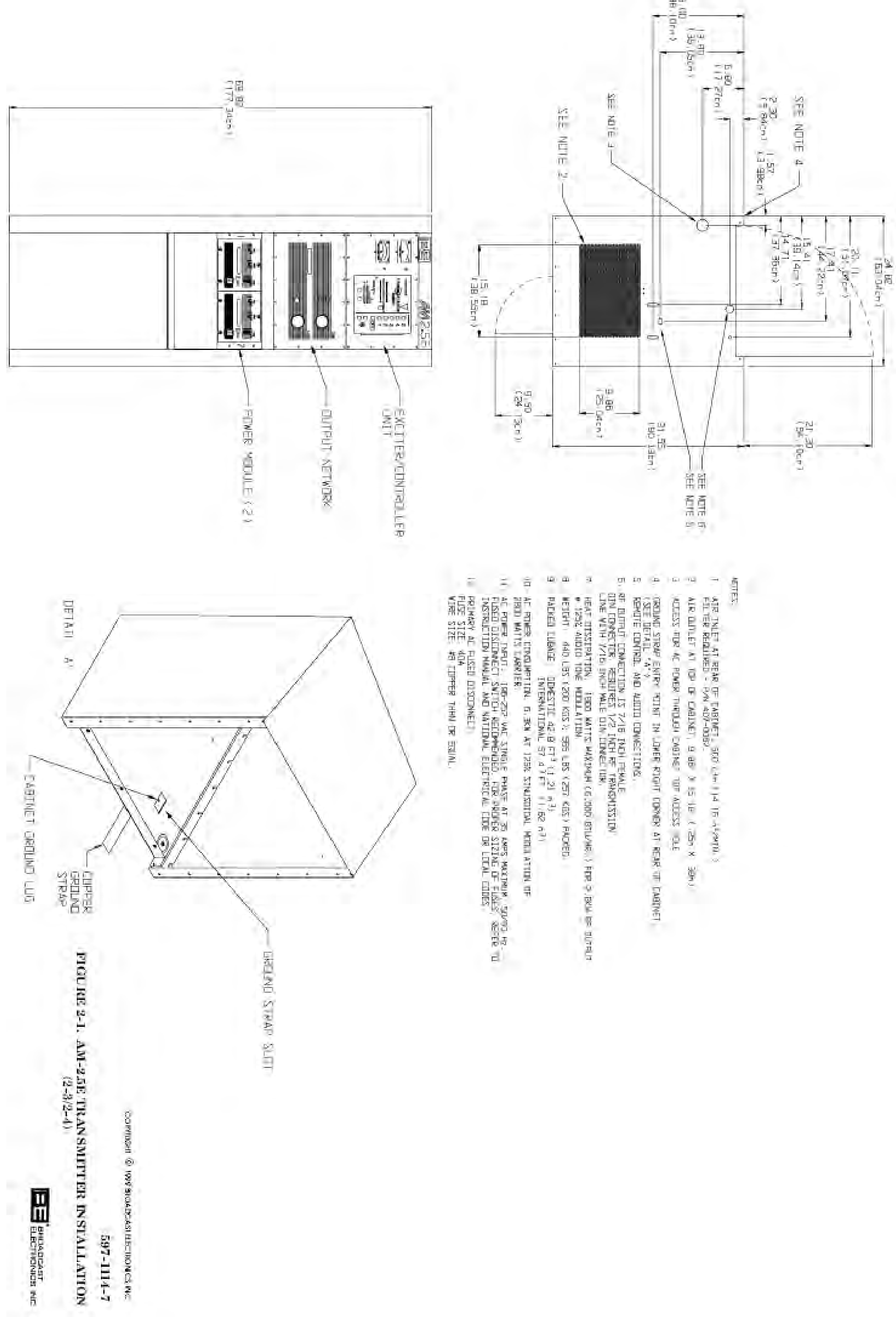

Figure 2-1: AM-2.5E Transmitter Installation

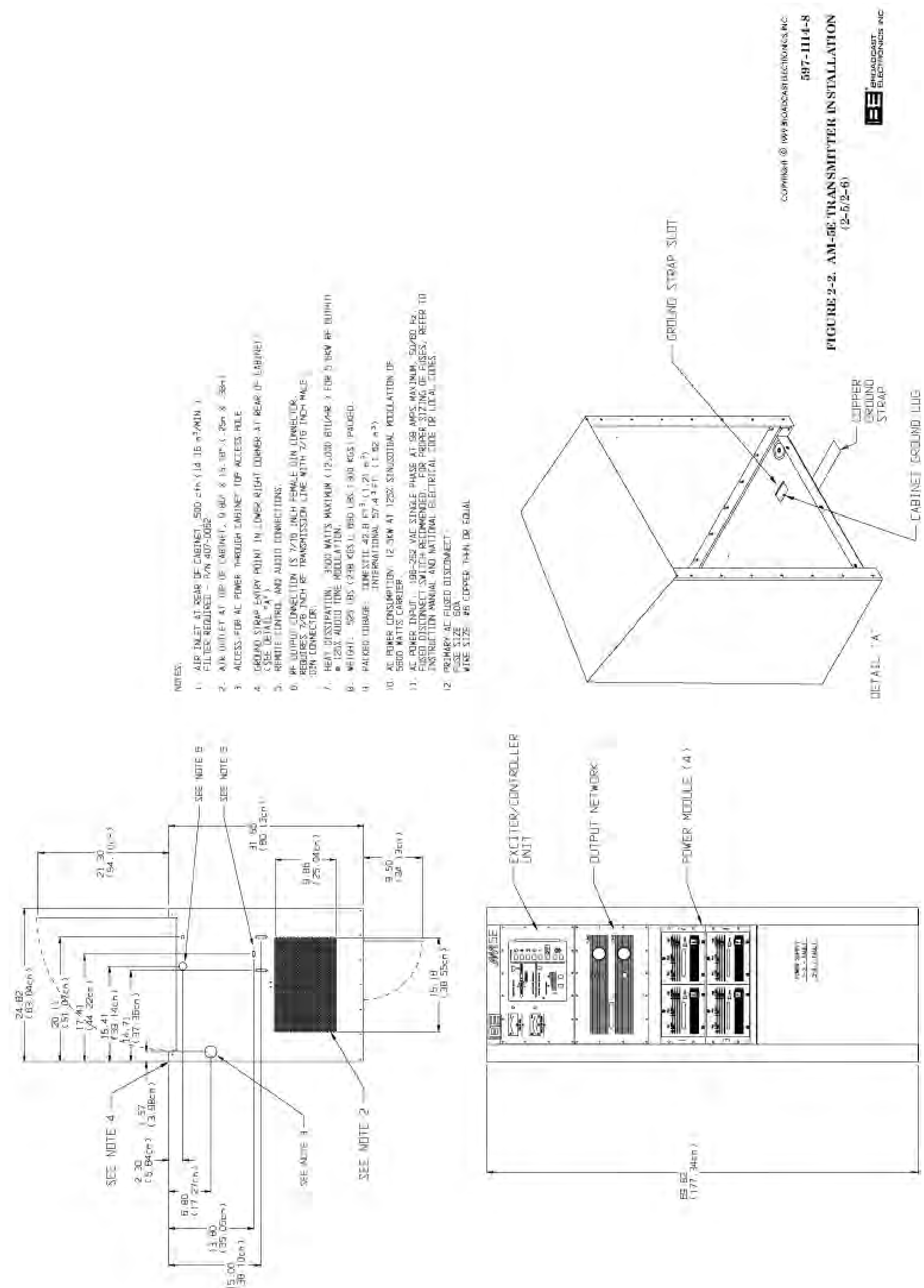

Figure 2-2: AM-5E Transmitter Installation

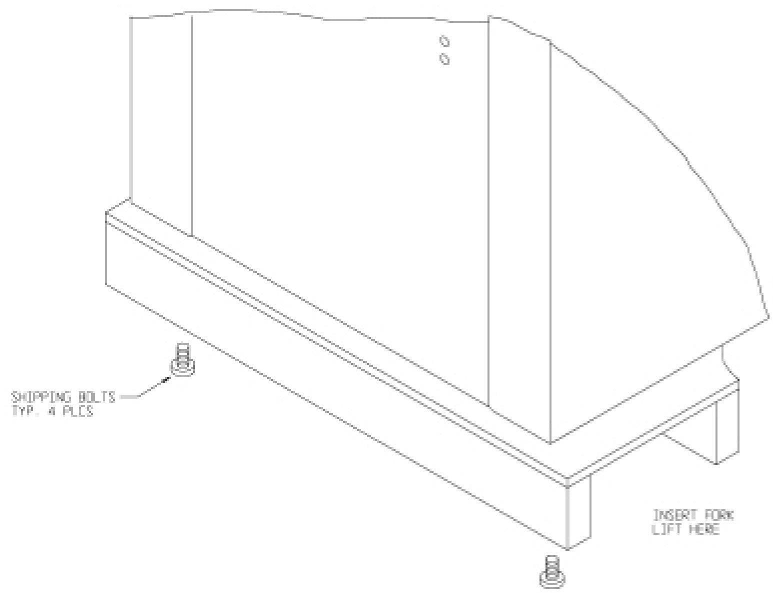

Figure 2-3: Transmitter moving

2.7.3 Power Supply.

The transmitter power supply circuit boards may be removed for shipment. If the power supply circuit boards have been removed, locate the shipping container. Install each circuit board as follows:

CAUTION
CAUTION

THE TRANSMITTER MAY BE DAMAGED IF THE POWER SUPPLY CONNECTORS ARE NOT SECURELY SEATED INTO THE POWER SUPPLY CIRCUIT BOARDS RECEPTACLES.

CAUTION
CAUTION

TO PREVENT DAMAGE TO THE POWER SUPPLY CIRCUIT BOARD, ENSURE THE CIRCUIT BOARD IS INSERTED INTO THE MOUNTING PINS AND THE CAPACITORS ON THE CIRCUIT SIDE OF THE BOARD ARE PLACED INTO THE PANEL CUTOUT PRIOR TO SLIDING THE CIRCUIT BOARD TO SEAT THE MOUNTING SLOTS INTO THE PINS.

1. Locate the mounting slots in the power supply circuit board and insert the board into the power supply mounting pins on the power supply panel. Ensure the circuit board is inserted with the capacitors on the circuit side of the board placed into the panel cutout prior to seating the circuit board in the mounting pins.
2. Slide the circuit board in a position to seat the circuit board slots in the mounting pins.
3. Secure the power supply circuit board mounting hardware.
4. Connect the power supply circuit board cables as follows:

a) Securely connect 16-pin connector P1 to J1 on the power supply circuit board.
b) Securely connect 12-pin connector P2 to J2 on the power supply circuit board.
c) Securely connect 24-pin connector P3 to J3 on the power supply circuit board.

5. Repeat the procedure for each power supply circuit board.

2.7.4 Battery Installation.

The ECU is equipped with a battery system. Refer to Figure 2-4and install the battery in the battery receptacle.

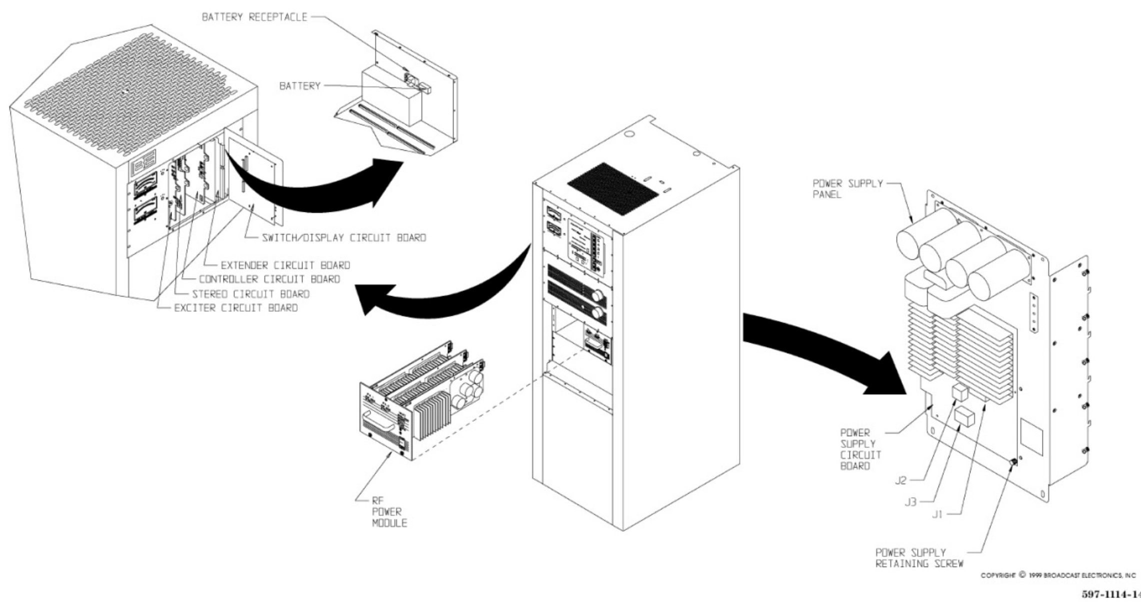

Figure 2-4: Component Installation

2.8 CIRCUIT BOARD PROGRAMMING.

The AM-2.5E and AM-5E transmitters are designed with programmable transmitter operating characteristics. The operating characteristics are determined by the programmable circuitry on the ECU circuit boards (refer to Figure 2-4). Refer to the following text and program the circuitry for the desired operating characteristics.

2.8.1 Exciter Circuit Board.

Exciter circuit board programming is presented in Figure 2-5. Refer to Figure 2-5 and program the circuit board as required.

- 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.
- 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

Technical Service Department.

- 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.
- 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.
- 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.
- 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 2-5 and disable the high pass filter.
- 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.
- 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.

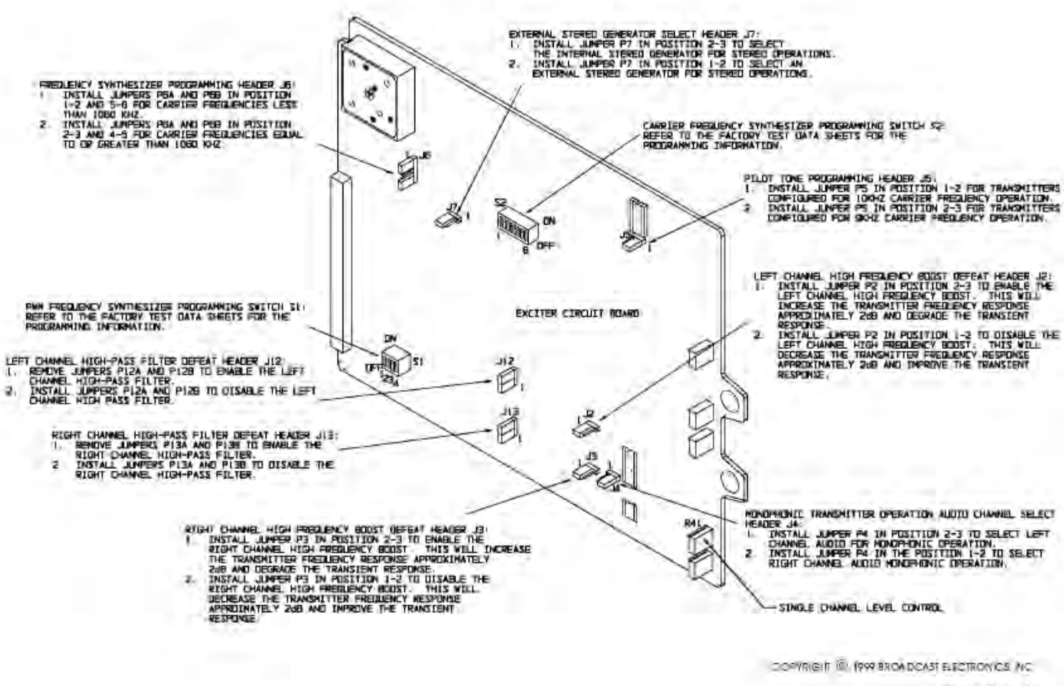

Figure 2-5: Exciter Circuit Board Programming

2.8.2 Stereo Circuit Board.

Stereo circuit board programming is presented in Figure 2-6. Refer to Figure 2-6 and program the circuit board as required.

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

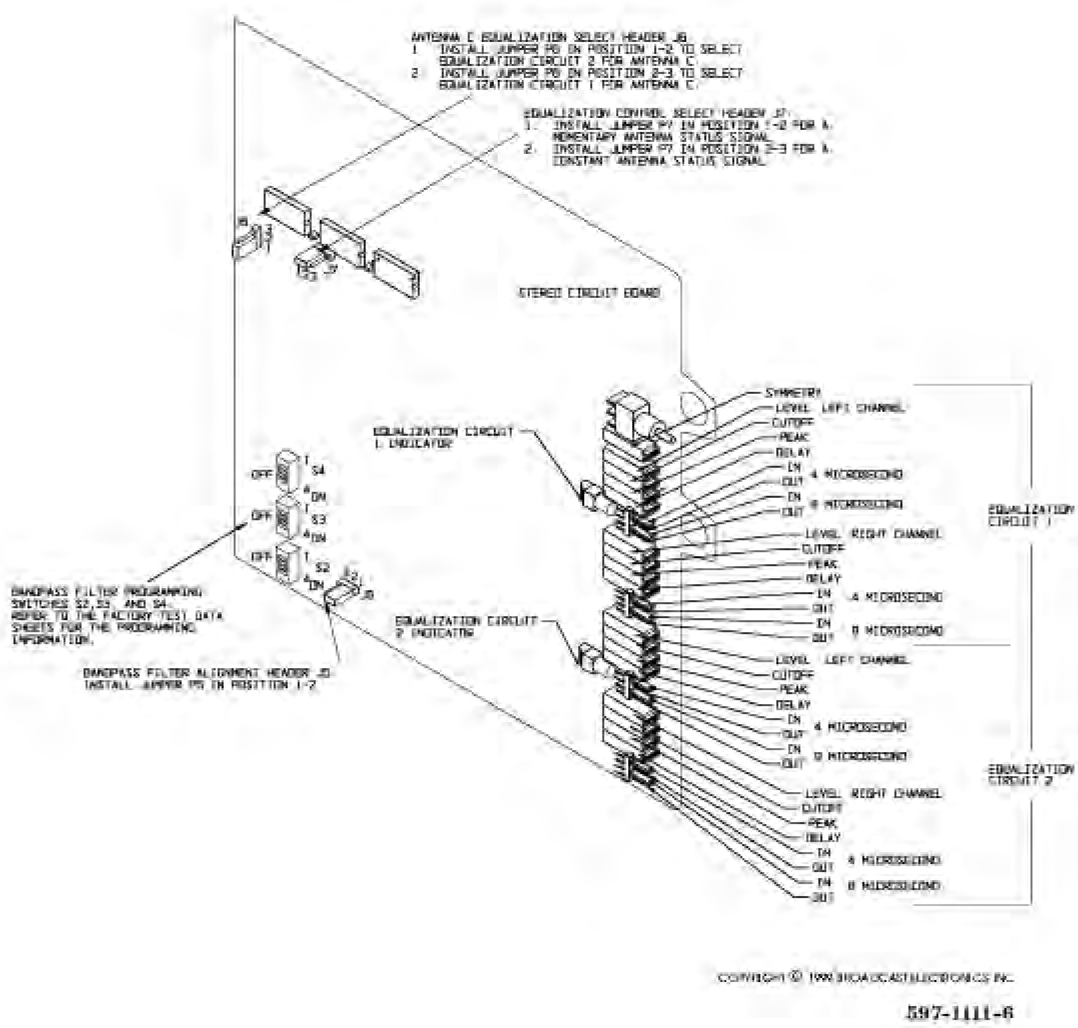

Figure 2-6: Stereo Circuit Board Programming

2.8.3 Controller Circuit Board.

Controller circuit board programming is presented in Figure 2-7. Refer to Figure 2-7 and program the circuit board as required.

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.

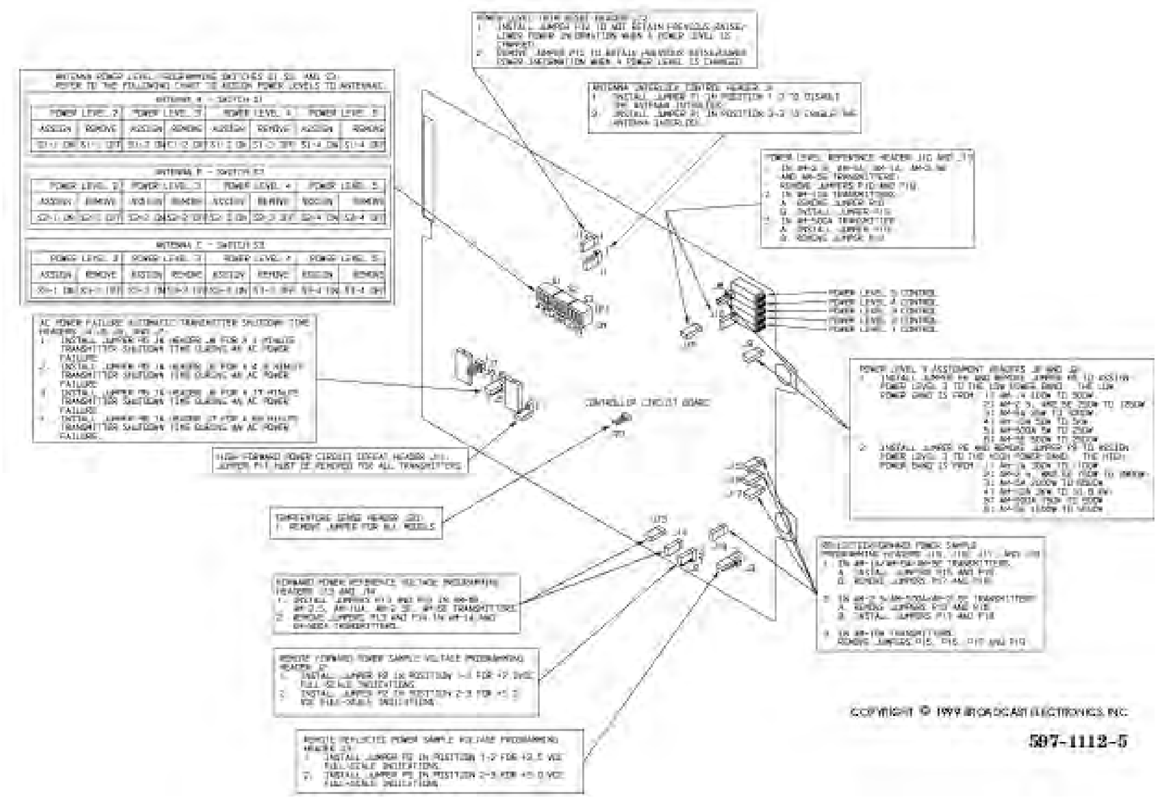

Figure 2-7: Controller Circuit Board Programming

- 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.

- 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.

- 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.

- Power Level Reference. Programmable headers J10 and J19 provide a reference for the power level circuit. For AM-2.5E/AM-5E transmitters, ensure jumpers P10 and P19 are removed.

- Power Level 3 Assignment. Programmable headers J8 and J9 control the power level assignment for the power level 3 switch/indicator. For AM-2.5E, the power level 3 switch/indicator can be programmed to control power from: 1) 250 watts to 1250 watts or 2) 750 watts to 2800 watts. For AM-5E, the power level 3 switch/indicator can be programmed to control power from: 1) 500 watts to 2500 watts or 2) 1500 watts to 5600 watts. The power level 3 switch/indicator is shipped from the factory to control power from: 1) 250 watts to 1250 watts on the AM-2.5E models and 2) 500 watts to 2500 watts on AM-5E models. Program jumpers P8 and P9 as required.

- 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.

- 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.

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

- 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-2.5E models: 1) remove jumpers P15 and P16 and 2) install jumpers P17 and P18. For AM-5E models: 1) install jumpers P15 and P16 and 2) remove jumpers P17 and P18.

- Forward Power Reference Voltage Programming. Programmable headers J13 and J14 establish the forward power reference level for a comparator circuit. For AM-2.5E/AM-5E models, ensure jumpers P13 and P14 are installed.

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

2.8.4 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.

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

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

TRANSMITTER	J5	J6	J7	J8
AM-2.5E	OUT	IN	OUT	IN
AM-5E	OUT	IN	OUT	IN

2.8.5 Modulator Circuit Board

The Modulator circuit board programming is presented in the following text. Refer to the following text to check the Modulator circuit board programming.

- Model Programming. Programmable headers J5 through J8 establish parameters for different AM Series transmitters. Refer to the following table for the programming information.

TRANSMITTER	J5	J6	J7	J8
AM-2.5E	IN	IN	IN	OUT
AM-5E	IN	IN	IN	OUT

2.8.6 Remote Control Connections

WARNING ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.

WARNING

- The AM-2.5E and AM-5E transmitters are designed for complete remote control operation (refer to Figure 2-8). The transmitter will interface with almost any remote control system. The following text presents a description of the transmitter remote control functions and indications. The remote control connections are located at 25-pin D- type connectors J1 and J2. 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 at J1 from remote control operations.

- Power Level Controls/Indicators. The transmitter is designed with five customer adjustable operating power controls. The controls are located at J1-1 through J1-5. A +5 to +15 volt dc signal is required to activate the desired function.

  Indications of power level control operations are located at J1-7 through J1-11. The power level status indicators will go LOW (0 volts dc) when activated.

- Transmitter Off Control/Indicator. The transmitter off control is located at J1-6. A +5 to +15 volt dc signal is required to operate the transmitter to off. The indicator for the transmitter off control is located at J1-14. The off indicator will go LOW (0 volts dc) when activated.

- 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 J1-15 and J1-16. A +5 to +15 volt dc signal is required to activate the desired function.

- 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 J1-19 through J1-21. The inputs require a +5 to +15 volt dc signal to indicate an antenna ready status.

- Transmitter Mute Input. The transmitter mute input is designed to mute the transmitter when activated. The input is located at J1-22. The input requires a +5 to +15 volt dc signal to mute the transmitter.

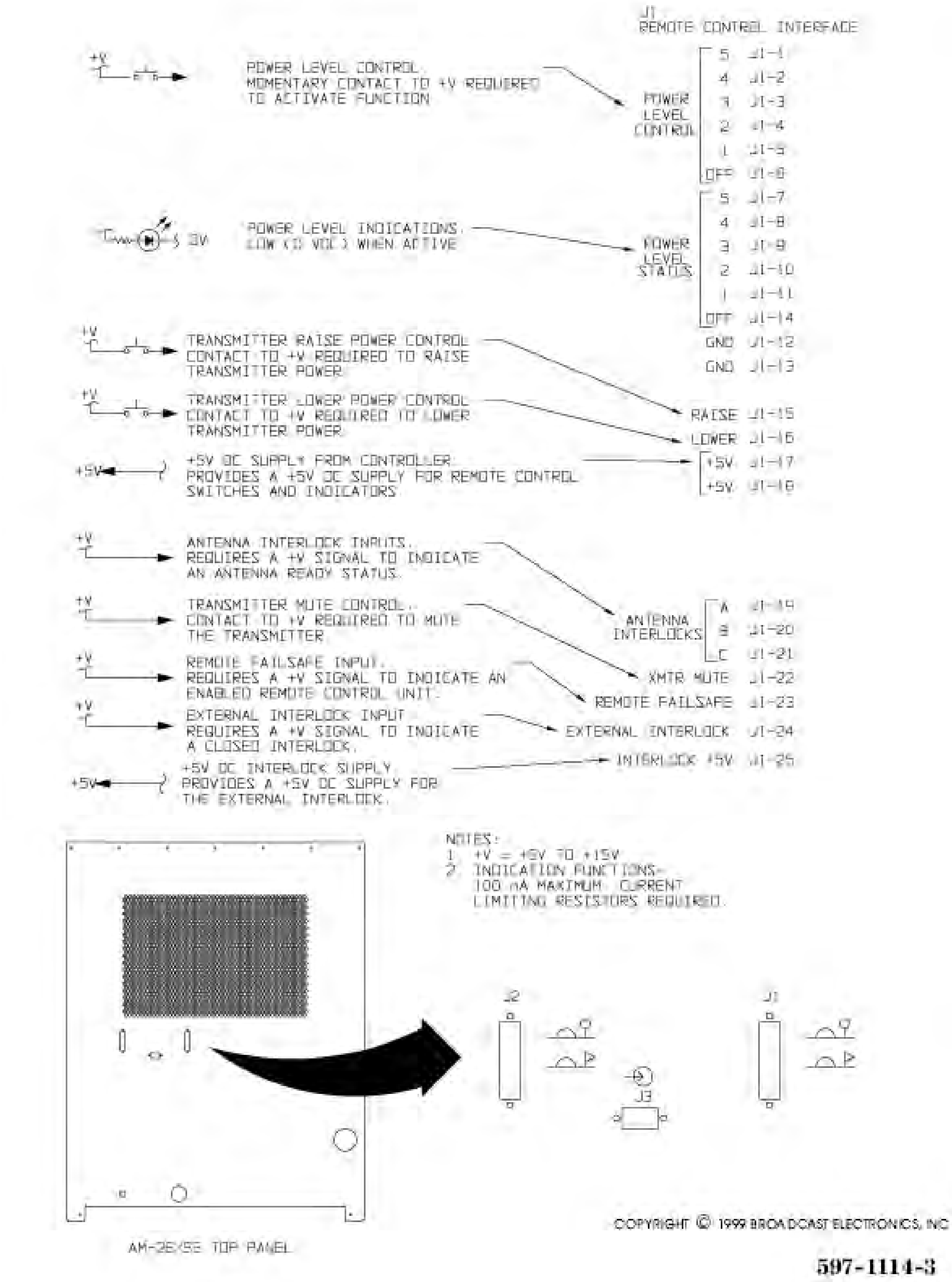

Figure 2-8: Remote Control and Audio Connections (Sheet 1 of 2)

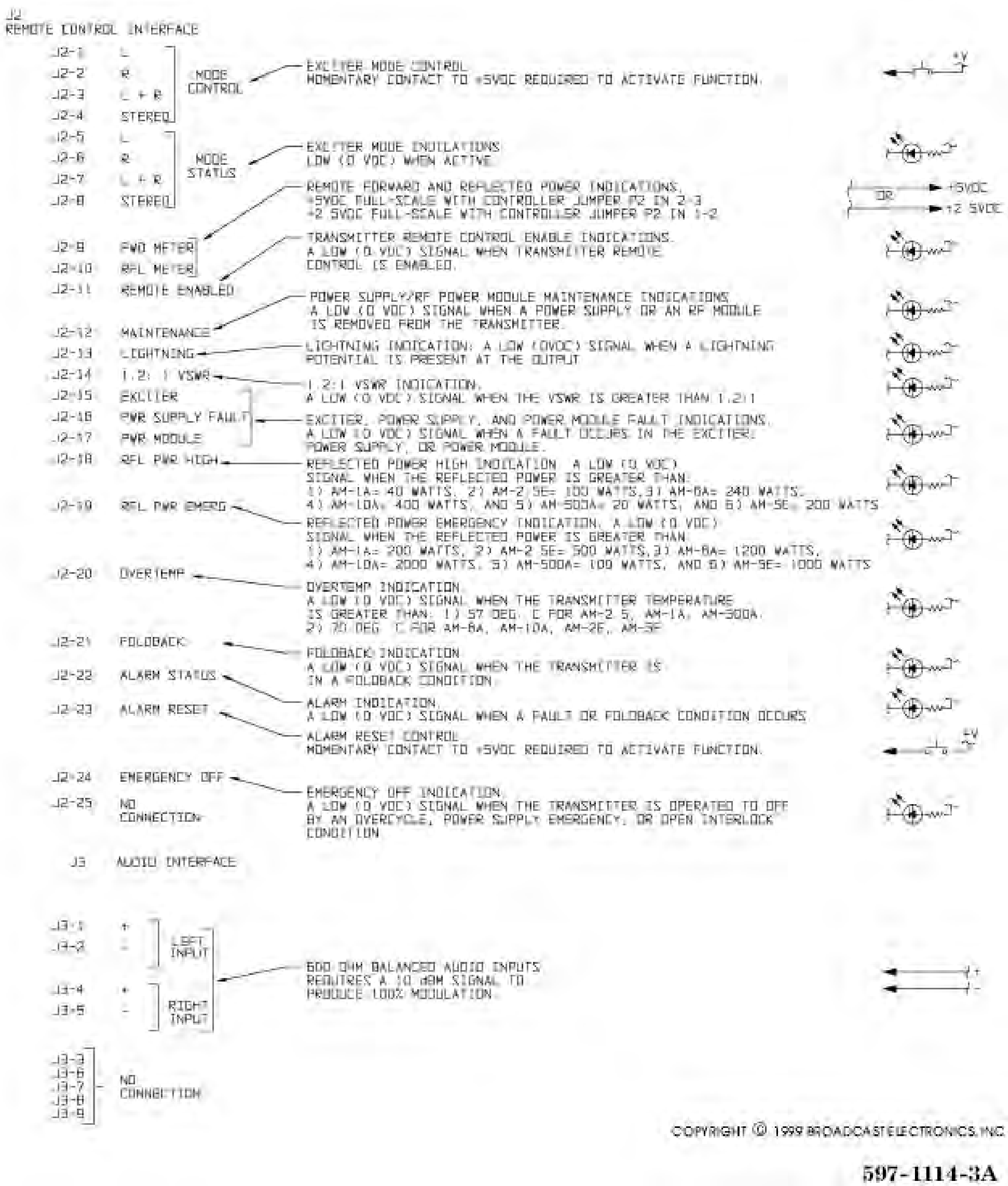

Figure 2-8. Remote Control and Audio Connections (Sheet 2 of 2)

- Remote Failsafe Input. The remote failsafe input is designed for the remote control unit failsafe control line. The input is located at J1-23. The input requires a +5 to +15 volt dc signal to indicate an enabled remote control unit.

- External Interlock Input. The external interlock input is for the connection of an interlock external to the transmitter. The input is located at J1-24. The input requires a +5 to +15 volt dc signal to indicate a closed interlock.

- Interlock +5V. The interlock +5 volt supply is provided for the external interlock. The +5 volt supply is located at J1-25.

- 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 J2-1 through J2-4. A +5 to +15 volt dc signal is required to activate the desired function.

  Indications of exciter modes of operation are located at J2-5 though J2-8. The exciter mode indicators will go LOW when activated.

- Remote Forward/Reflected Power Meter Indications. Remote reflected/forward power meter indications are located at J2-9 and J2-10. The indications are designed to be programmed for +5 volt dc full-scale meter indications or +2.5 volt dc full-scale meter indications.

- 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 J2-11. The indicator will go LOW to indicate when remote control operations are enabled.

- 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 J2-12. The indicator will go LOW (0 volts dc) to indicate when the power supply/RF power module is removed for maintenance.

- Lightning Indications. The lightning indicator provides a signal to indicate when a greater than; 1) 1500 volt potential is present at the output for AM-2.5E models or 2) 2100 volt potential is present at the output for AM-5E models. The lightning indicator is located at J2-13. The indicator will go LOW (0 volts dc) to indicate when a lightning potential is present at the transmitter output.

- 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. The 1.2 : 1 indicator is located at J2-14. The indicator will go LOW (0 volts dc) to indicate when a 1.2 : 1 VSWR condition is present at the transmitter output.

- 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 J2-15 through J2-17. The indicators will go LOW (0 volts dc) to indicate when an exciter, power supply, or a power module fault has occurred.

- RFL PWR High Indications. The reflected power high indicator provides a signal to indicate when: 1) 100 watts of reflected power is present at the transmitter output for AM-2.5E models or 2) 200 watts of reflected power is present at the transmitter output for AM-5E models. The high reflected power indicator is located at J2-18. The indicator will go LOW (0 volts dc) to indicate when a reflected power high condition is present at the transmitter output.

- RFL PWR Emergency Indications. The reflected power emergency indicator provides a signal to indicate when greater than: 500 watts of reflected power is present at the output of the AM-

2.5E transmitter or 2) 1000 watts of reflected power is present at the output of the AM-5E transmitter. The reflected power emergency indicator is located at J2-19. The indicator will go LOW (0 volts dc) to indicate when a reflected power emergency condition is present at the transmitter output.

- Overtemp Indications. The overtemp indicator provides a signal to indicate when the transmitter temperature is greater than 70°C. The overtemp indicator is located at J2-20. The indicator will go LOW (0 volts dc) to indicate when transmitter is in a foldback condition.
- 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 J2-21. The indicator will go LOW (0 volts dc) to indicate when the transmitter is in a foldback condition.
- 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 J2-22. The indicator will go LOW (0 volts dc) to indicate when the transmitter is in a fault or foldback condition.
- Alarm Reset Control. The alarm reset control is designed to reset the fault detection circuitry. The alarm reset control is located at J2-23. A +5 to +15 volt dc signal is required to activate the function.
- The emergency off indicator provides a signal to indicate when the transmitter is operated to off by any condition or event other than the use of the off switch. These conditions/events include: 1) an over cycle off condition, 2) a power supply emergency condition, or 3) an open interlock condition. A power supply emergency condition is when all the power supplies in the transmitter encounter faults. The emergency off indicator is located at J2-24. The indicator will go LOW (0 volts dc) to indicate when an emergency off condition is encountered.

2.8.7 Wiring

Wiring consists of connecting audio, the RF transmission line, and ac power to the transmitter. Refer to the following text and connect the wiring to the transmitter.

A. AUDIO INPUT CONNECTION.

The AM-2.5E and AM-5E transmitters are equipped with electronically balanced 600 Ohm left and right channel audio inputs. The audio inputs are located on the transmitter top-panel at J3 (refer to Figure 2-8). The inputs are designed to accept a +10 dBm signal at 600 Ohms.

WARNING ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.

WARNING

Audio is interfaced to the transmitter by: 1) selecting the appropriate cable and 2) connecting the cable to the terminals of 9-pin D-type connector J3. J3 is located on the transmitter top-panel. To interface audio to the transmitter: 1) use Belden 8760 cable or equivalent and 2) refer to Figure 2-8 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 at the audio source end.

B. EXTERNAL STEREO RF INPUT.

The transmitter is equipped with an external stereo RF input on the transmitter top-panel (refer to Figure 2-9). 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 EXTERNAL RF INPUT connector on the transmitter top-panel and program jumper P7 on the exciter circuit board in position 1-2.

C. AM 2.5E / AM-5E RF TRANSMISSION LINE CONNECTION.

The AM-2.5E/AM-5E transmitter RF output receptacle is located on the transmitter top-panel (refer to Figure 2-9). The AM-5E requires 7/8 inch transmission line with a 7/16 male DIN connector. The AM-2.5E requires 1./2 inch transmission line with a 7/16 male DIN connector. To connect the RF transmission line to the transmitter, refer to Figure 2-9 and connect the 7/16 male DIN type connector to the RF OUT connector on the transmitter top-panel.

D. EXTERNAL INTERLOCK.

The AM-2.5E/AM-5E is equipped with an external interlock such as for a test load. The interlock will turn off the transmitter RF output when opened. The interlock is located at J1-24 and J1-25 on the transmitter top-panel. Refer to External Interlock Input and Interlock +5V in the REMOTE CONTROL section of the preceding text and perform the procedures to connect equipment to the transmitter external interlock.

E. MODULATION MONITOR.

The modulation monitor connector is located on the transmitter top-panel. Refer to Figure 2-9 and connect the modulation monitor to the MOD MONITOR SAMPLE OUTPUT receptacle.

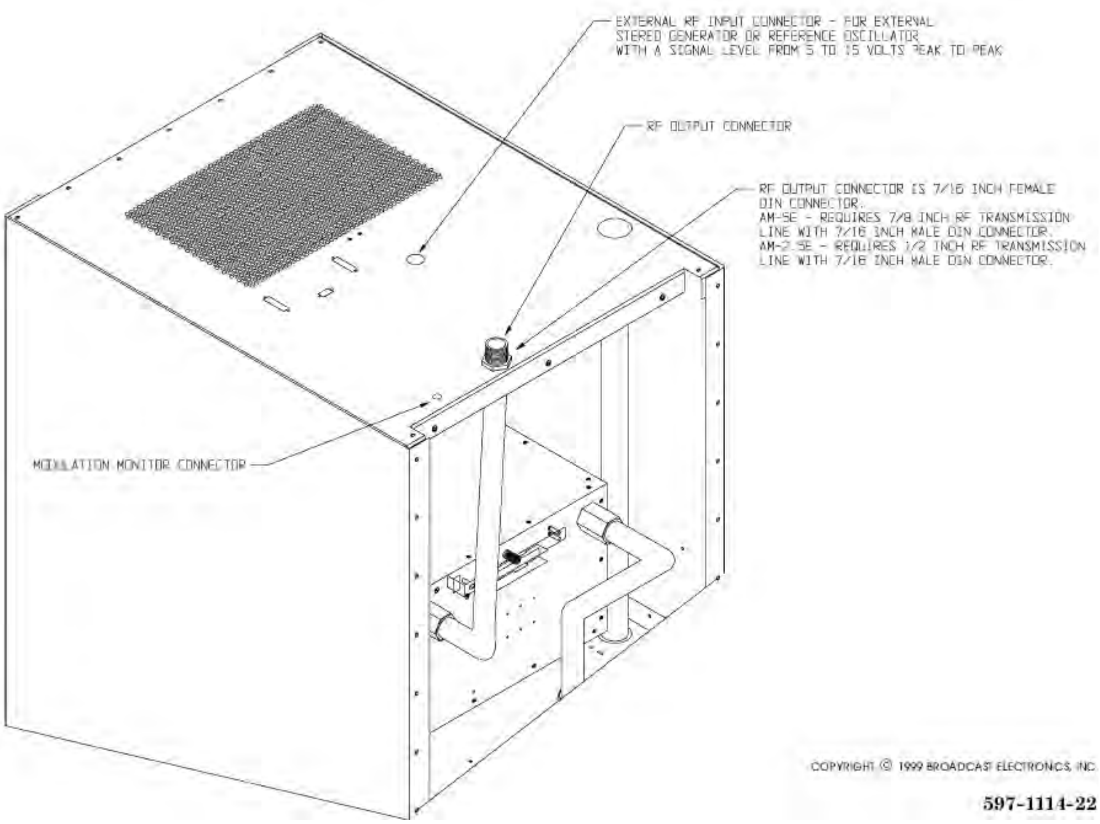

Figure 2-9: AM-2.5E/AM-5E RF OUTPUT CONNECTIONS

WARNING ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING. WARNING

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

F. AC POWER CONNECTIONS. The AM-2.5E transmitter requires a single-phase source of 196V to 252V ac, 50 Hz or 60 Hz at 40 Amperes. The AM-5E transmitter requires a single-phase source of 196V to 252V ac, 50 Hz or 60 Hz at 60 Amperes For operating safely, the power supply source must be routed to the transmitter through a fused power disconnect breaker (refer to Figure 2-10 and Figure 2-11).

WARNING ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING. WARNING

- Main AC Input – AM-2.5E. Refer to Figure 2-10 and connect the 40 Ampere service to ac input/control device S1 through a fused service disconnect as shown. Ensure a utility company ground conductor is securely connected to the transmitter common ground system and the ac service ground wire is securely connected to the ac ground lug as shown.
- Main AC Input – AM-5E. Refer to Figure 2-11 and connect the 60 Ampere service to ac input/control device S1 through a fused service disconnect as shown. Ensure a utility company ground conductor is securely connected to the transmitter common ground system and the ac service ground wire is securely connected to the ac ground lug 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

G. GROUND. The transmitter is equipped with a cabinets ground system for operating safety. The ground system requires the connection of an earth ground. Refer to Figure 2-10 and Figure 2-11 and connect an earth ground to the cabinet ground lug as shown using a 2 inch (5.08 cm) wide copper strap.

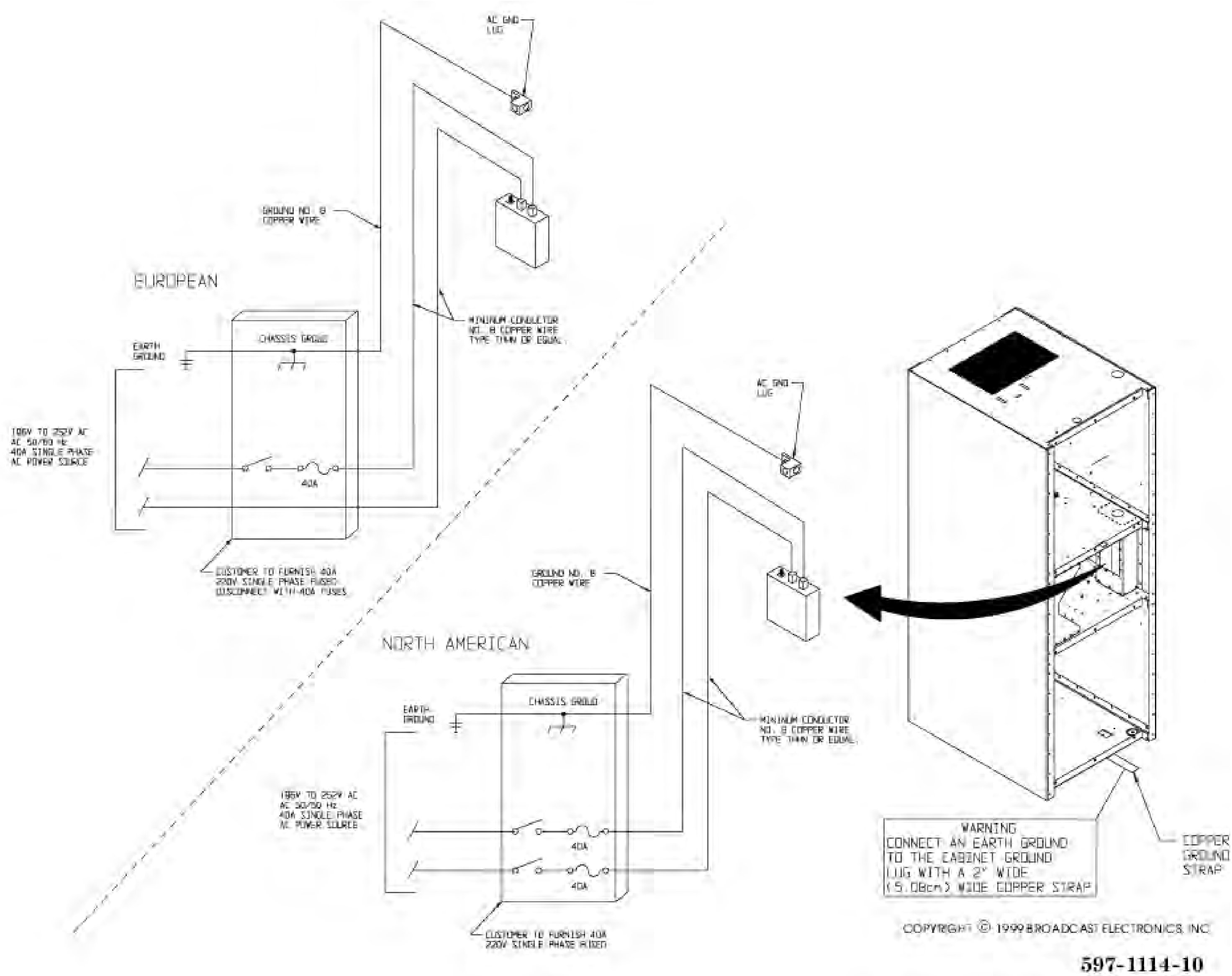

Figure 2-10: AM-2.5E PRIMARY AC WIRING

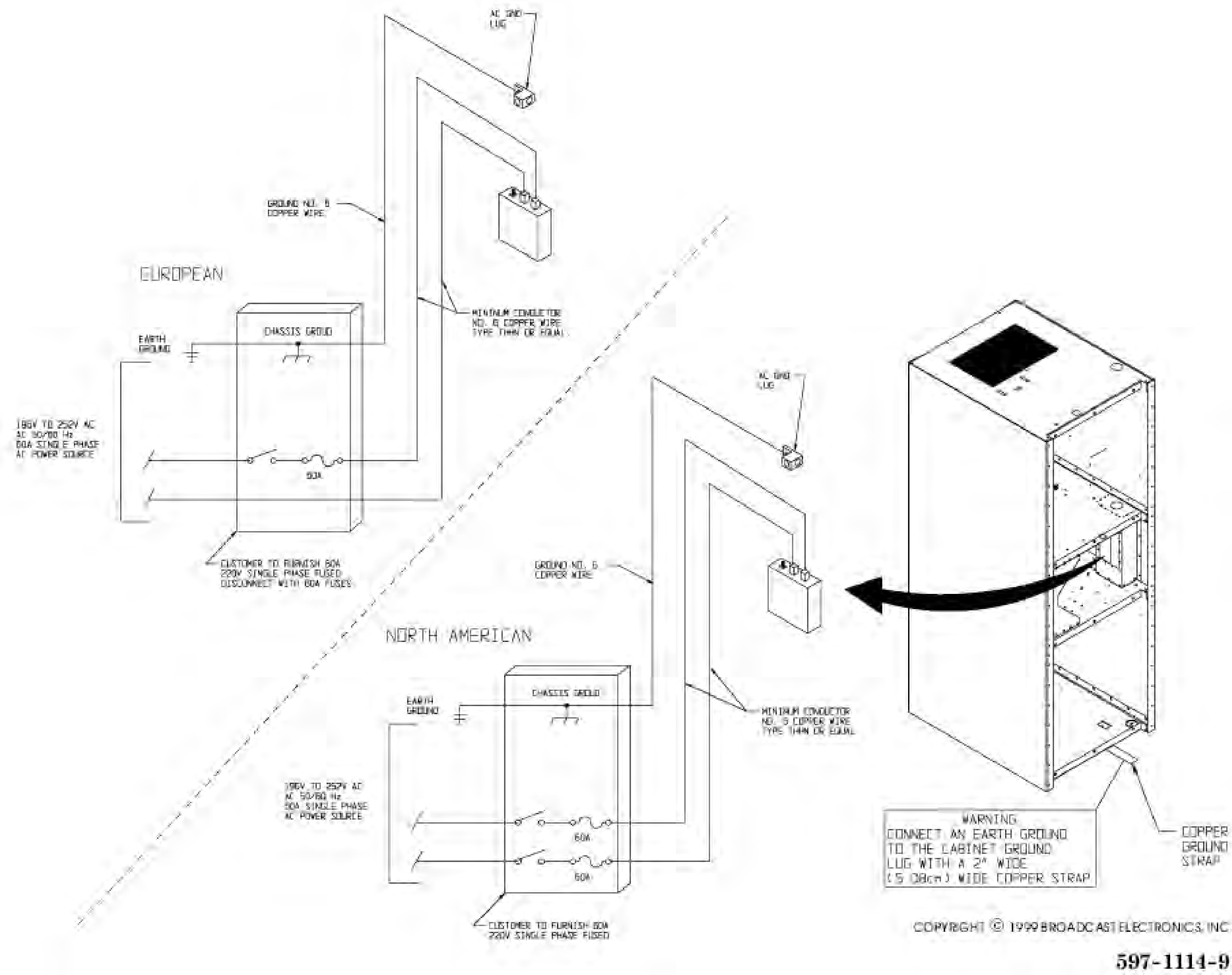

Figure 2-11: AM-5E PRIMARY AC WIRING

2.8.8 Transmitter Site Lightning Protection System Checkout

CAUTION
CAUTION

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

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.

A. **ANTENNA BALL-GAP LIGHTNING ARRESTOR.** Each tower in the antenna system must be equipped with a ball-gap lightning arrestor (refer to Figure 2-12). The ball-gap arrestor is designed to safely conduct lightning potentials to ground. Inspect the ball-gap arrestors by performing the following procedures.

- 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.
- 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.

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 DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE
WARNING 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.

B. **ANTENNA-TUNING-UNIT SPARK-GAP LIGHTNING ARRESTOR.** The antenna-tuning-unit (ATU) must be equipped with a spark-gap lightning arrestor (refer to Figure 2-12). 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.

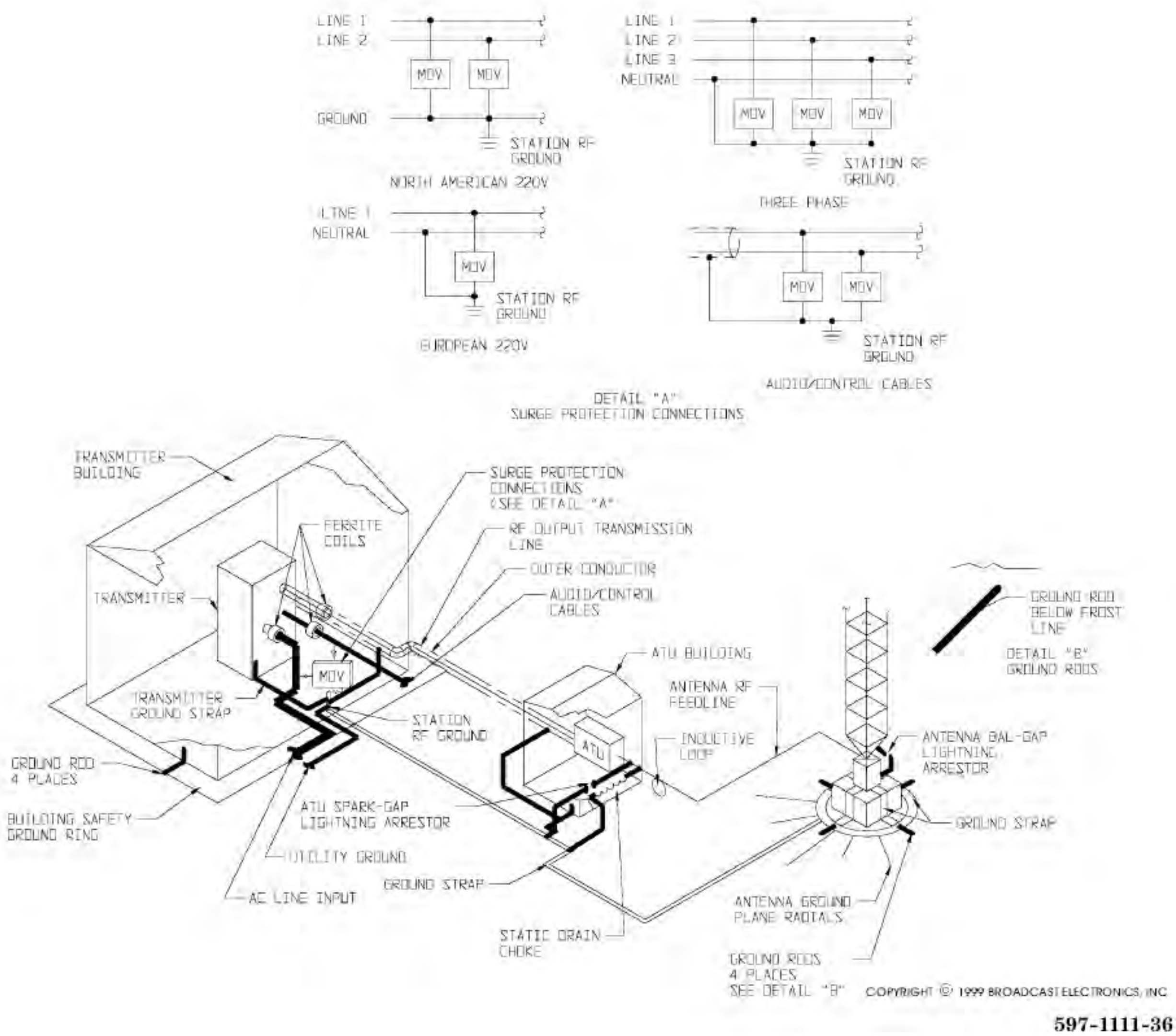

Figure 2-12: Antenna Lightning Protection System

C. **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 2-12. 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.

D. **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 2-12). Refer to the following text to install MOVs and ferrite cores to prevent the conductance of lightning potentials. Ensure MOV's 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 140-0032).

- 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 and install the cores by performing the following procedures.

- 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.

- 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) wrapping the cables to create one cable loop cable around the core. The core can be installed at any location on the cables.

- 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) all ac line phase cables through the core or 2) all 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.

- 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.

E. 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.

2.8.9 Transmission Line And Antenna Checkout

CAUTION
CAUTION

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

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.

A. ANTENNA VSWR. The AM-2.5E/AM-5E are designed to operate into an antenna with a maximum VSWR of 1.5 : 1. Check the antenna VSWR. If the VSWR is greater than 1.5:1, contact the Broadcast Electronics Technical Services Department. Typically, the antenna will require the installation of an additional tuning unit to reduce the antenna VSWR.

B. 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.

C. 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.

2.8.10 Initial Checkout

WARNING ENSURE PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.

WARNING

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, RF power modules and power supply circuit boards 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.

2.8.11 Preliminary Operation And Adjustment

WARNING THE TRANSMITTER POWER SUPPLY OPERATES FROM A HIGH FLOATING GROUND POTENTIAL.

WARNING NEVER OPERATE THE TRANSMITTER WITH THE REAR-DOOR OPEN.

TUNING. The transmitter must be adjusted to operate into the station antenna. To tune the transmitter, proceed as follows:

1. Operate the rear-door ac on/off switch to on. The ECU and power module front-

panel indicators will illuminate.

2. Depress the power level 1 switch/indicator to illuminate the switch/indicator.
3. Operate the **FORWARD POWER** meter switch to LOW and observe the forward power indication.
4. Operate the **REFLECTED POWER** meter switch to LOW and observe the reflected power indication.
5. Tune the transmitter by adjusting the **TUNING** and **LOADING** controls as required for a minimum reflected power indication on the **REFLECTED POWER** meter..

2.8.12 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-2.5E
Power level 1 = 500 watts
Power level 2 = 1000 watts
Power level 3 = 1500 watts
Power level 4 = 2000 watts
Power level 5 = 2500 watts

AM-5E
Power level 1 = 1000 watts
Power level 2 = 2000 watts
Power level 3 = 3000 watts
Power level 4 = 4000 watts
Power level 5 = 5000 watts

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 DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE
WARNING PROCEEDING.

Operate the transmitter rear-door ac on/off control switch to OFF and open the rear-door.
Refer to Figure 2-13 and connect the test equipment to the transmitter modulation connector as shown.
Operate the transmitter rear-door ac on/off control switch to ON.

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

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

Refer to Figure 2-7 and adjust the power level 1 control to obtain the desired indication on the FORWARD POWER meter. The control range is from: 1) 250 watts to 1250 watts on AM-2.5E , models, and 2) 500 watts to 2500 watts on AM-5E models.

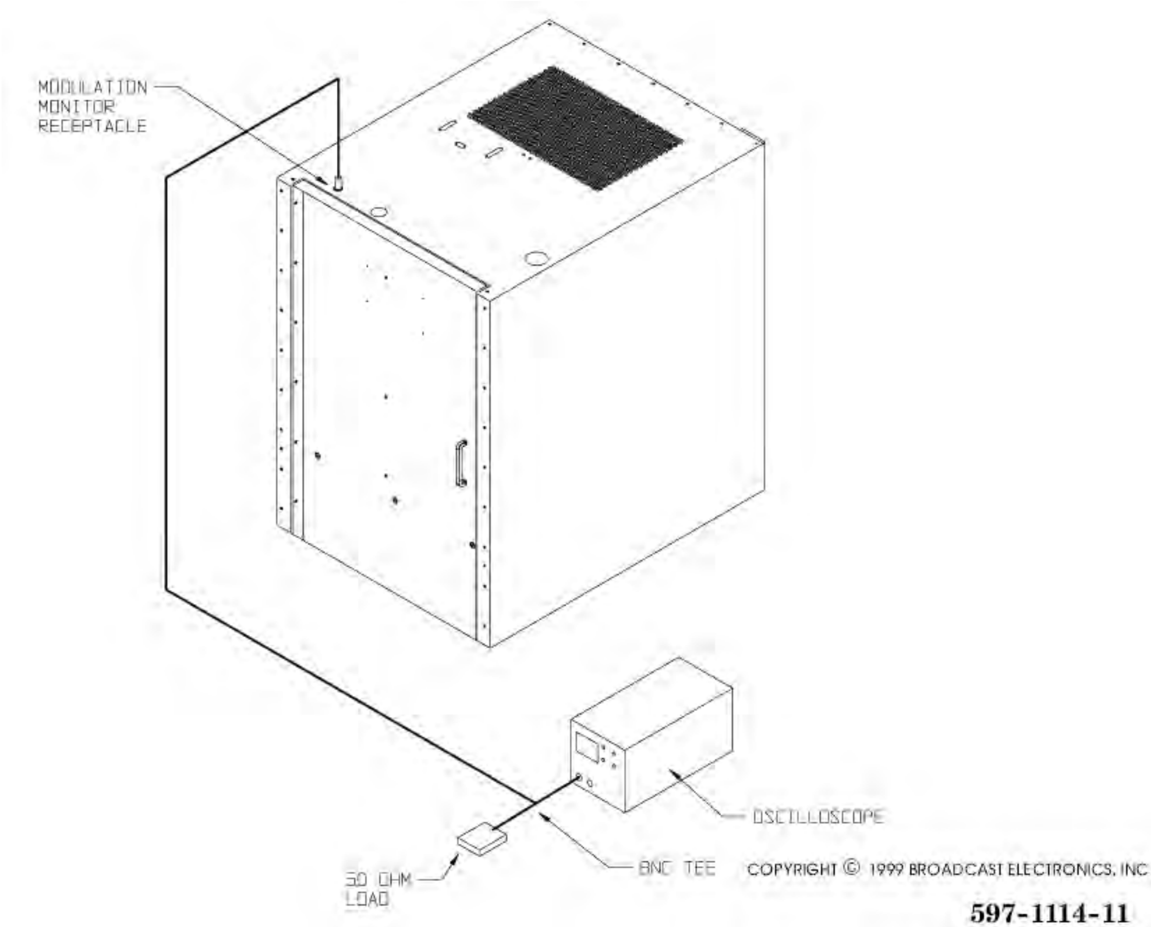

Figure 2-13: TEST EQUIPMENT CONNECTIONS, POWER LEVEL CALIBRATION

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.

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

AM-2.5E

1. Power level 2 - 250 watts to 1250 watts.
2. Power level 3 - 250 watts to 1250 watts or 750 watts to 2500 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.

AM-5E

1. Power level 2 - 500 watts to 2500 watts.
2. Power level 3 - 500 watts to 2500 watts or 1500 watts to 5000 watts as programmed by a jumper on the controller circuit board.
3. Power level 4 - 1500 watts to 5000 watts.
4. Power level 5 - 1500 watts to 5000 watts.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING
WARNING

Operate the transmitter rear-door on/off control switch to OFF.

Disconnect the cable from the transmitter modulation monitor connector.

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

Operate the transmitter rear-door on/off control switch to OFF.

Refer to Figure 2-14 and connect the test equipment as shown.

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

Refer to Figure 2-8 and connect an audio generator to the audio input terminals.

Operate the rear-door ac on/off control switch to ON.

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.

Depress the desired power level switch/indicator to illuminate the switch/indicator.

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.

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 2-6 and adjust the left channel level control to obtain a horizontal lissajous pattern (refer to Figure 2-15).
3. Adjust the group delay as follows:
    A. Configure the group delay circuitry for adjustment as follows:
        1. Refer to Figure 2-6 and configure the left channel 4 microsecond and

8 microsecond sections to in.

2. Refer to Figure 2-6 and operate the left channel delay control fully counterclockwise.

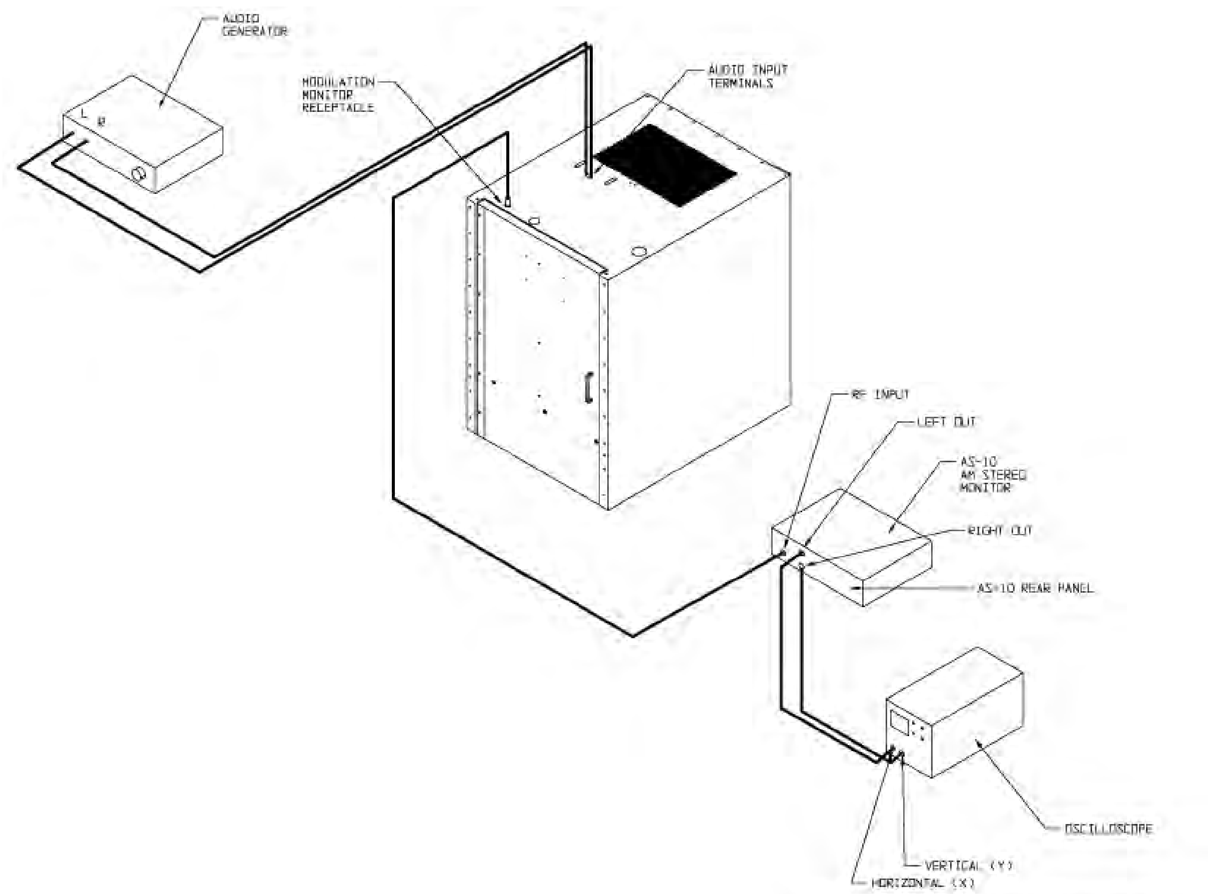

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Figure 2-14: TEST EQUIPMENT CONNECTIONS, SEPARATION

B. Refer to Figure 2-6 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 2-15). If the display will not close, proceed as follows:

1. Refer to Figure 2-6 and: 1) configure only the 8 microsecond delay section to in and 2) adjust the left channel delay control to close the oscilloscope display.

2. If the display will not close, refer to Figure 2-6 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 2-6 and adjust the left channel cutoff and peak controls to obtain a maximum left channel separation lissajous pattern as shown in Figure

2-15.

C. If a maximum left channel lissajous pattern cannot be obtained, refer to Figure 2-6 and adjust the left channel delay control to close the oscilloscope display and obtain a straight-line lissajous pattern (refer to Figure 2-15).

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.

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.

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

Operate the rear-door ac on/off switch to OFF.

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.

Operate the rear-door ac on/off switch to ON.

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

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

Disable one channel applied to the transmitter.

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.

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.

Refer to Figure 2-5 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.

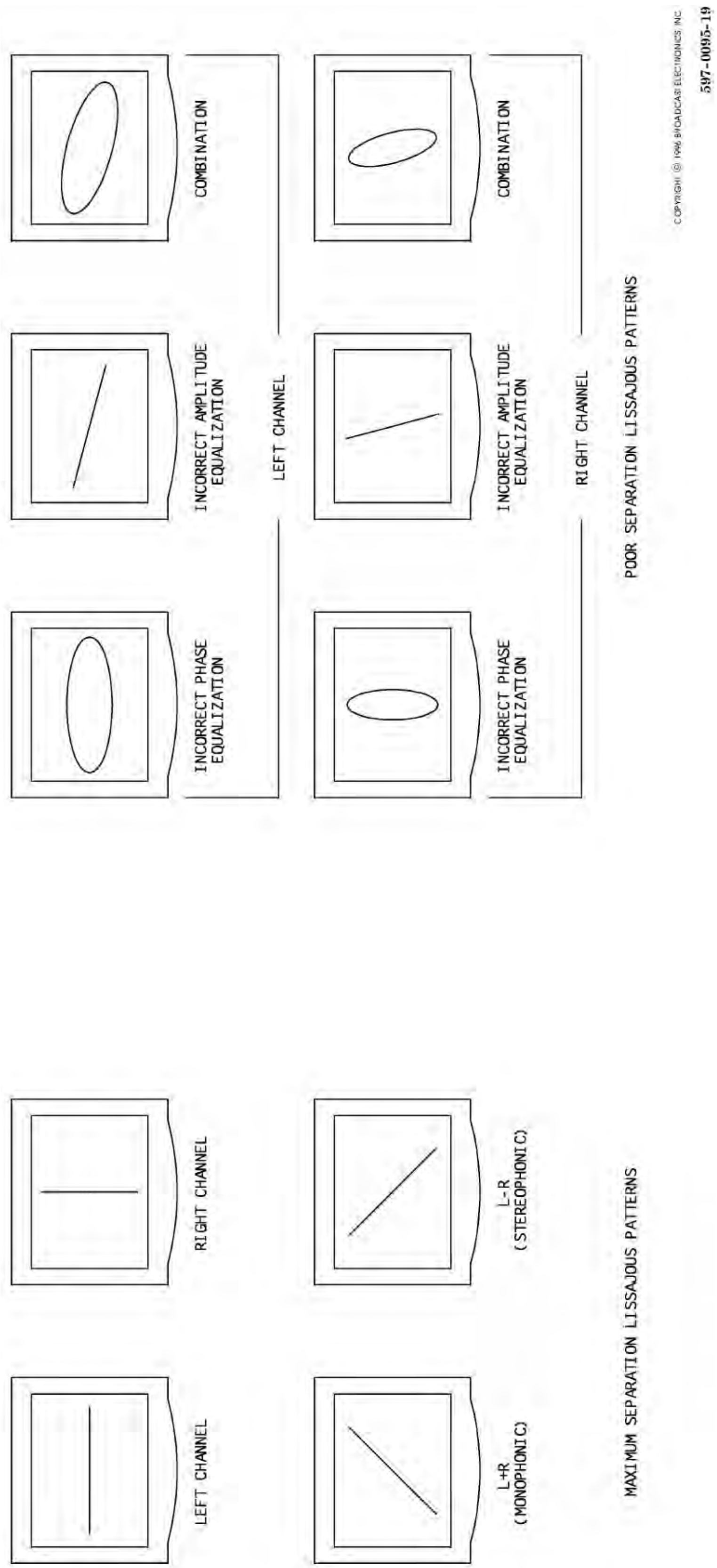


Figure 2-15: Equalization Lissajous Patterns

3 OPERATION

This section identifies all controls and indicators associated with the AM-2.5E/AM-5E transmitters and provides standard operating procedures.

3.1 CONTROLS AND INDICATORS.

Figure 3-1, Figure 3-2 and Figure 3-3 present the location of all controls and indicators associated with normal operation of the AM-2.5E/AM-5E transmitters. Table 3-1, Table 3-2 and Table 3-3 present the functions of each control or indicator. Refer to Figure 3-1 through Figure 3-1 and Table 3-1 through Table 3-3 for a description of the controls and indicators associated with the AM-2.5E/AM-5Etransmitters.

Table 3-1: AM-2.5E / AM-5E CONTROLS AND INDICATORS

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-2.5E: 1) the HIGH scale is from 0 to 3000 watts and 2) the LOW scale is from 0 to 750 watts. In the AM-5E: 1) the HIGH scale is from 0 to 6000 watts and 2) the LOW scale is from 0 to 1500 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-2.5E: 1) the HIGH scale is from 0 to 300 watts and 2) the LOW scale is from 0 to 60 watts. In the AM-5E: 1) the HIGH scale is from 0 to 600 watts and 2) LOW scale is from 0 to 150 watts. The AC volts scale is from 150 to 300 volts.
5	RF POWER MODULE	A modular plug-in assembly containing two RF power amplifier circuit boards and one modulator circuit board. The AM-2.5E is equipped with 2 power modules. The AM-5E is equipped with 4 power modules. Each power module is designed to output 1375 watts of RF power.
6	POWER BLOCK	An RF power amplifier assembly containing two RF power modules and a combiner unit.
7	LOAD Control	Operates in association with the TUNE control to match the transmitter output impedance to the antenna.
8	TUNE Control	Operates in association with the LOAD control to match the transmitter output impedance to the antenna.
9	AC ON/OFF Switch	Controls the application of AC power to the transmitter.

10	Modulation Monitor Calibration Controls	Calibrates the modulation monitor sample to power levels 1 through 5.
11	POWER SUPPLY 1-2 Fault Indicator (AM-5E Only)	Illuminates to indicate a failure in the 1-2 power supply. The supply provides power for RF power modules 1-2.
12	POWER SUPPLY 3-4 Fault Indicator (AM-5E Only)	Illuminates to indicate a failure in the 3-4 power supply. The supply provides power for RF power modules 3-4.

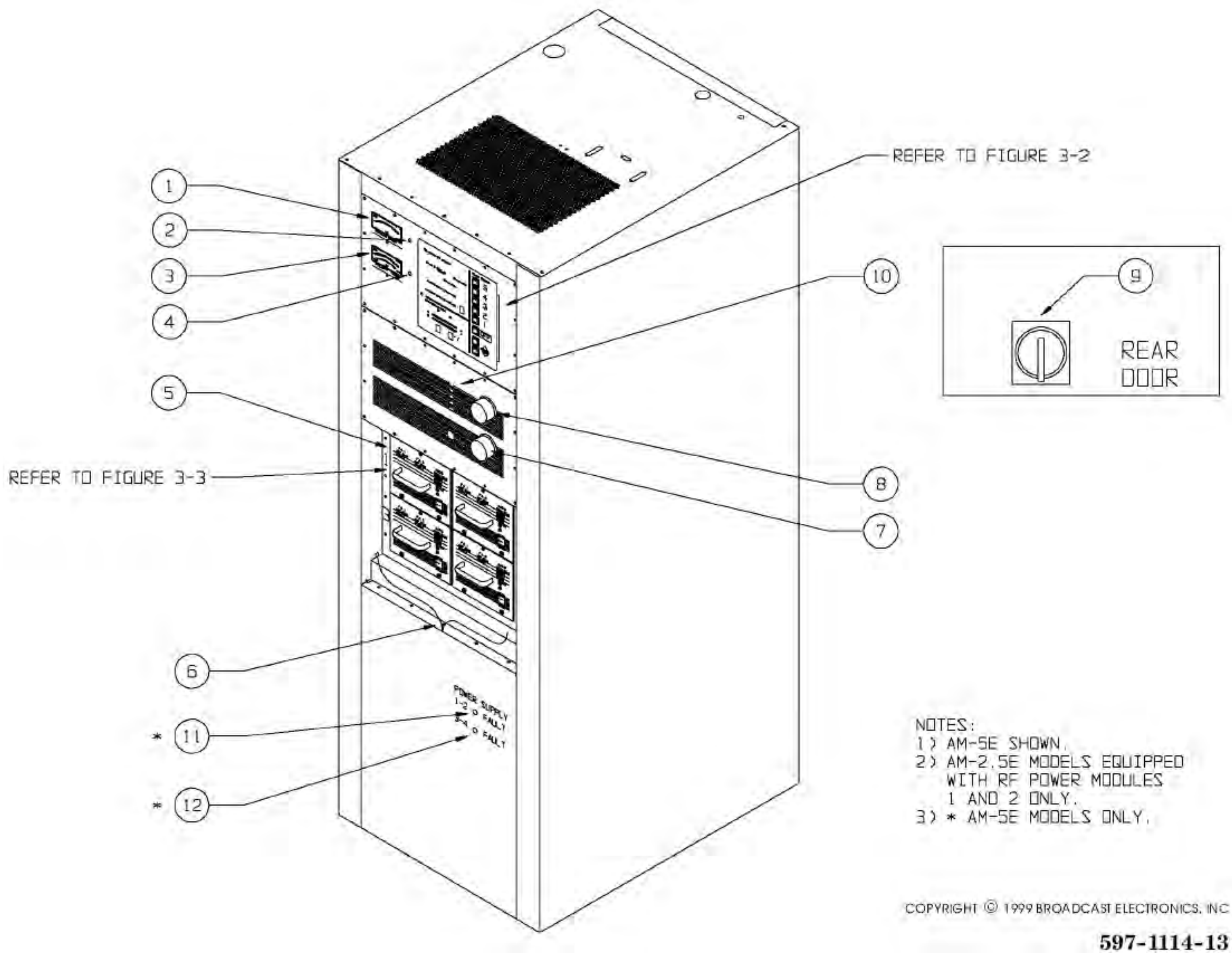


Figure 3-1: AM-2.5E/AM-5E CONTROLS AND INDICATORS

Table 3-2: ECU CONTROLS AND INDICATORS

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 power modules. GREEN Display – Indicates all power modules are operating normally. YELLOW Display – Indicates an RF power module is removed from the transmitter. RED Display – Indicates a fault in an 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 one or more power supplies are removed from the transmitter. RED Display – Indicates a power supply system fault.
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 – Indicates a high reflected/forward power indication. In the AM-2.5E, indicates a 100 watt reflected power condition or a condition which results in a high forward power indication of greater than 20%. In the AM-5E, indicates a 200 watt reflected power condition or a condition which results in a high forward power indication of greater than 20%. FLASHING RED Display – Indicates a reflected power emergency condition. In the AM-2.5E, indicates a 500 watt reflected power condition. In the AM-5E, indicates a 1000 watt reflected power condition.
5	POWER CONTROL Switch/ Indicators	SWITCHES – A group of five switches designed to select five customer adjustable transmitter operating output power levels. In the AM-2.5E, switches 1 and 2 can be adjusted to obtain output power levels from 250 watts to 1250 watts. Switches 4 and 5 can be adjusted to obtain output power levels from 750 watts to 2800 watts. Switch 3 is designed to be customer assigned to control power in the 250 to 1250 watt range or the 750 to 2800 watt range.

		In the AM-5E, switches 1 and 2 can be adjusted to obtain output power levels from 500 watts to 2500 watts. Switches 4 and 5 can be adjusted to obtain output power levels from 1500 watts to 5600 watts. Switch 3 is designed to be customer assigned to control power in the 500 to 2500 watt range or the 1500 to 5600 watt range. INDICATORS – Illuminates to indicate an associated power control switch has been selected.
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.
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 if 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 70° C (158° 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.
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-2.5E, illuminates to indicate a 1500 volt or greater potential is present at the transmitter output. For AM-5E, illuminates to indicate a 2100 volt or greater potential is present at the transmitter output.
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.
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 exciter stereo equalization 1 circuit is active.
35	Stereo Equalization 2 Indicator	Illuminates to indicate the exciter 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.

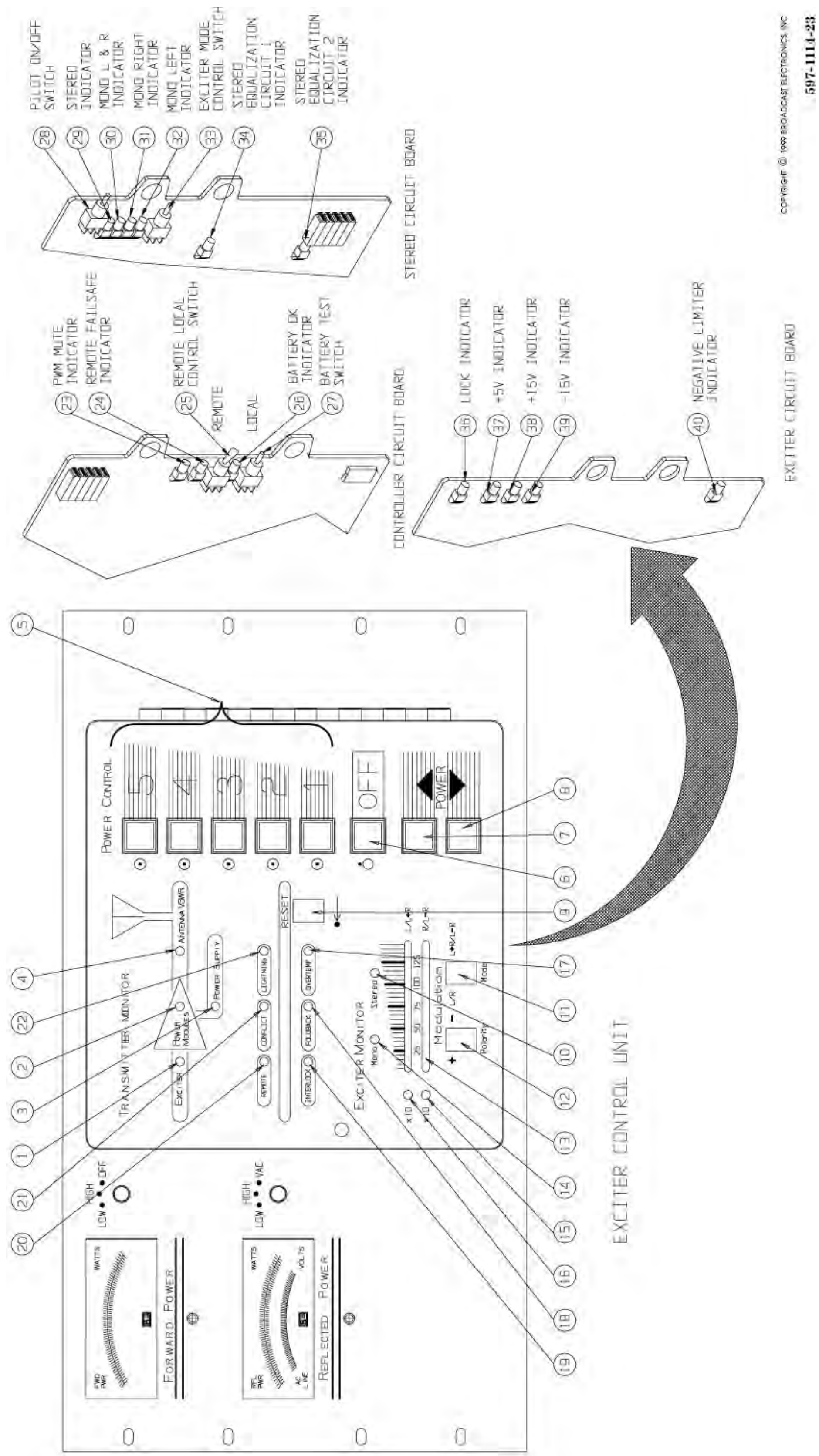


Figure 3-2: ECU CONTROLS AND INDICATORS

Table 3-3 POWER MODULE CONTROLS AND INDICATORS

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.
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.
9	MOD SAMPLE	Provides a DC voltage sample of the modulator circuit board output. In the AM-2.5E, the sample will be equal to approximately 5.6 volts DC at 2.5 kW (refer to factory test data sheets). In the AM-5E, the sample will be equal to approximately 5.6 volts DC at 5 kW (refer to factory test data sheets).

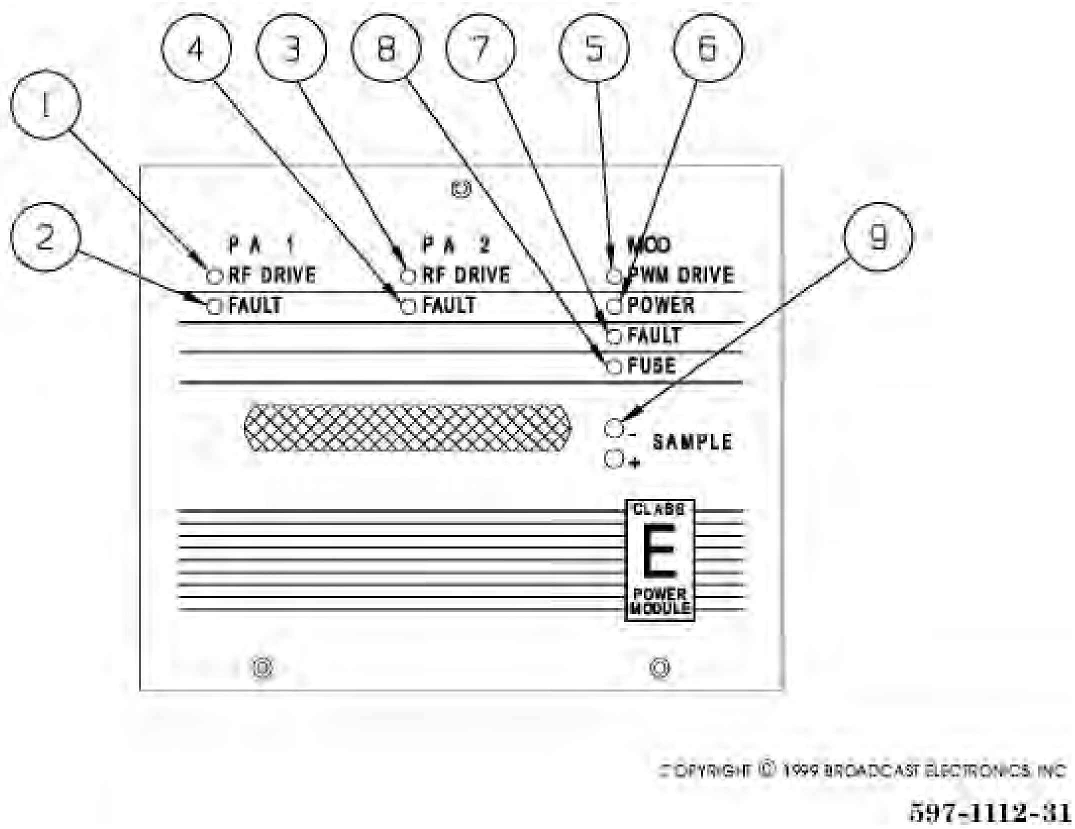


Figure 3-3: POWER MODULE CONTROLS AND INDICATORS

CAUTION
CAUTION

WHEN AC POWER IS APPLIED TO THE TRANSMITTER AND THE RF DRIVE AND PWM DRIVER INDICATORS ON RF POWER MODULES IN A POWER BLOCK ARE EXTINGUISHED, THE RF POWER MODULES MUST BE REMOVED FROM THE TRANSMITTER CHASSIS TO PREVENT DAMAGE TO THE MODLUES.

NOTE
NOTE

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

3.2 TURN ON.

Operate the transmitter to ON by performing the following procedure.

Ensure the rear-panel ac on/off switch is operated to ON. The ECU and RF power module front-panel indicators will illuminate.

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 refer to SECTION V, MAINTENANCE to locate the problem.

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.

Operate the FORWARD and REFLECTED power meters to observe the transmitter forward and reflected power indications.

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

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.

3.3 TURN OFF.

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

3.4 METERING.

3.4.1 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**. In the AM-

2.5E, the **LOW** scale is from 0 to 300 watts. In the AM-5E, the **LOW** scale is from 0 to 1500 watts.

2. To monitor high forward power levels, operate the **FORWARD POWER** meter switch to **HIGH**. In the AM-2.5E, the **HIGH** scale is from 0 to 3000 watts. In the AM-5E, the **HIGH** scale is from 0 to 6000 watts.

3. To configure the **FORWARD POWER** meter to off, operate the **FORWARD POWER** meter switch to **OFF**.

3.4.2 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**. In the AM-2.5E, the **LOW** scale is from 0 to 60 watts. In the AM-5E, the **LOW** scale is from 0 to 150 watts.

2. To monitor high reflected power levels, operate the **REFLECTED POWER** meter switch to **HIGH**. In the AM-2.5E, the **HIGH** scale is from 0 to 300 watts. In the AM-5E, the **HIGH** scale is from 0 to 600 watts.

3. To monitor the ac input voltage, operate the **REFLECTED POWER** meter switch to **VAC**.

3.4.3 Power Adjust

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 button 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.

3.4.4 Mono/Stereo Operation

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

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.

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:

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.

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 TO PREVENT DAMAGE TO THE TRANSMITTER,
CAUTION 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.

3.4.5 Pilot Control

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.

3.4.6 Exciter Monitor Operation

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

- 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.
- 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.
- 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.
- 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.

3.4.7 Fault Reset

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. Once the fault condition is removed, the fault circuitry must be reset. 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). To reset the fault circuitry, depress the **RESET** switch. The fault circuitry will be reset.

3.4.8 Power Supply Fault Reset

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 rear-door ac ON/OFF switch to OFF.
2. Operate the rear-door ac ON/OFF switch to ON.
3. Depress the **RESET** switch.

3.4.9 Over-Cycle Off

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.

3.4.10 Over-Modulation PWM Mute

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.

3.4.11 Transmitter Monitor

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.

3.4.12 Battery Test

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.

3.4.13 Controller PWM Mute Indicator

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.

3.4.14 Controller Remote Failsafe Indicator

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.

3.4.15 Exciter Lock Indicator

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.

3.4.16 Exciter +5v/+15v/-15v Indicators

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.

3.4.17 Stereo Equalization Indicators

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.

3.4.18 RF Power Module Indicators

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.

3.4.19 Power Supply Indicators

On AM-5W models, the power supply indicators on the transmitter lower front-panel are designed to present the operating status of the power supply circuit boards. The AM-5E transmitter is equipped with power supply 1-2 and 3-4. The indicators illuminate to indicate a failure in a power supply.

3.4.20 Exciter Negative Limiter Indicator

The exciter circuit board negative limiter indicator displays the status of the exciter negative limiter circuit. The indicator will illuminate to indicate the negative limiter circuit is enabled. The indicator if factory adjusted to illuminate at approximately 94% negative modulation.

3.4.21 High / Low AC Line Conditions

The transmitter is equipped with a ac line monitor. The monitor will de-energize the transmitter in the event the ac power line is below 190 Volts or above 260 Volts. If this condition occurs: 1) the transmitter output power will be disabled and 2) no fault or emergency condition will be generated. The transmitter will re-energize when the high/low ac line condition is removed.

4 OVERALL THEORY OF OPERATION

This section presents the overall theory of operation for the Broadcast Electronics AM-2.5E/AM-5E transmitters.

The following text presents the AM-2.5E/AM-5E transmitter overall theory of operation. The transmitter is divided into modular components for the discussion. The modular components consist of the: 1) exciter/control unit (ECU), 2) output network, 3) RF power module, 4) RF combiner, and 5) power supply. The ECU, RF power module, and power supply are presented in further detail by the publication sections at the end of this manual.

Figure 4-1 and Figure 4-2 present the AM-2.5E and AM-5E block diagrams. Figure 4-1 presents the AM-2.5E block diagram. Refer to Figure 4-1 and the AM-2.5E overall schematic diagram in SECTION VII as required for the following discussion. Figure 4-2 presents the AM-5E block diagram. Refer to Figure 4-2 and the AM-5E overall schematic diagram in SECTION VII as required for the following discussion.

4.1 ECU.

The transmitter ECU (exciter/control unit) is a modular assembly containing plug-in stereo, exciter, controller, and extender circuit board assemblies. A forward power meter is provided to monitor the transmitter forward output power. A reflected power/primary ac power meter provides reflected power and primary ac voltage indications. The ECU switch and display circuitry is contained on switch and display circuit boards. Power for the ECU is provided by a modular switching power supply unit.

4.1.1 Stereo Circuit Board.

The ECU stereo circuit board consists of C-QUAM AM stereo circuitry. C-QUAM AM stereo is a mode of AM stereo transmission utilizing amplitude modulated (L+R) information and independently quadrature modulated stereo (L-R) information. The results produce a stereo transmission system compatible with mono receivers.

The stereo circuit board is equipped with four modes of operation: 1) mono left, 2) mono right, 3) mono L+R, and 4) stereo. Configuring the circuit board to monophonic operation is accomplished by: 1) operating the circuit board to the mono left, mono right, or mono L+R mode or 2) removing the stereo circuit board. The circuit board is equipped with two equalization circuits. The circuits allow the transmitter to be configured for two different antenna patterns such as for a day pattern and a night pattern.

The stereo circuit board operates in association with the ECU exciter circuit board to provide RF drive to the RF power modules. The stereo circuit board receives left and right channel audio and an unmodulated TTL level RF signal at 4 times the carrier frequency from the exciter circuit board. The stereo circuit board outputs a TTL level RF signal to the exciter circuit board.

4.1.2 Exciter Circuit Board.

The ECU exciter circuit board is a modular plug-in exciter assembly. The circuit board operates in association with the stereo circuit board to produce a C-QUAM AM stereo RF output. Instrumentation amplifiers provide balanced left and right channel transformerless audio inputs..

The exciter circuit board generates: 1) a PWM (pulse-width-modulation) signal and 2) an RF carrier frequency signal. The 122 kHz to 135 kHz PWM signal is routed for application to the modulator circuit boards in the RF power modules. The RF carrier frequency signal is applied to the power amplifier circuit boards in the RF power modules. 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.

4.1.3 Controller Circuit Board.

All transmitter control operations are directed by the ECU controller circuit board. The controller circuit board is designed with CMOS control and monitoring circuitry.

The controller circuit board is designed with two interlock circuits. A transmitter external interlock is provided such as for a test load. An antenna interlock circuit is provided to prevent the transmitter from operating into an incorrect antenna.

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 power to be increased or decreased as required. A high reflected power detection circuit, a high forward power detection circuit, and a high temperature detection circuit operate in association with the power control circuit to foldback the transmitter power during high reflected power, high forward power, and high temperature conditions. In addition, a lightning detector circuit is provided to mute the transmitter when lightning is present at the antenna.

Several monitoring and display circuits provide information on transmitter operating conditions. An RF power module status circuit displays: 1) if a module is removed for maintenance or 2) if a power module fault has occurred. A power supply status circuit displays: 1) if a power supply circuit board is removed for maintenance or 2) if a power supply fault has occurred. An exciter status circuit indicates if a fault has occurred in the exciter. An antenna status circuit displays: 1) 1.2 : 1 VSWR conditions, 2) high reflected power conditions, and 3) emergency reflected power conditions. 4-17. Additional display circuits include: 1) remote, 2) conflict, 3) lightning, 4) interlock, 5) over-temperature, and 6) reset. A remote indicator displays the status of the remote control system. A conflict indicator illuminates to indicate an incorrect power level is selected for operation into an antenna. A lightning indicator illuminates to indicate the presence of lightning at the transmitter output. An interlock indicator displays the status of the internal and external interlock. An over-temperature indicator illuminates to indicate a transmitter temperature greater than 70 degrees C. A reset indicator illuminates to indicate a transmitter fault has occurred. Transmitter faults include: 1) exciter failure, 2) power supply failure, 3) RF power module failure, 4) high reflected power conditions, 5) reflected power emergency conditions, 6) over-temperature conditions, 7) lightning conditions, and 8) 1.2:1 VSWR conditions.

POWER SUPPLY. DC operating potentials for the ECU assembly is provided by a modular switching power supply unit. The unit provides +5V, +15V, and -15V dc operating potentials for the ECU circuit boards. +5V, +15V, and -15V indicators are provided on the exciter circuit board.

4.2 RF POWER MODULE.

An RF power module is a plug-in assembly containing two RF amplifier circuit boards and a modulator circuit board. Each RF power module is designed to produce 1375 watts of RF power. Two RF power modules are contained in a power block. The AM-2.5E transmitter is equipped with 1 power block. The AM-5E transmitter is equipped with 2 power blocks.

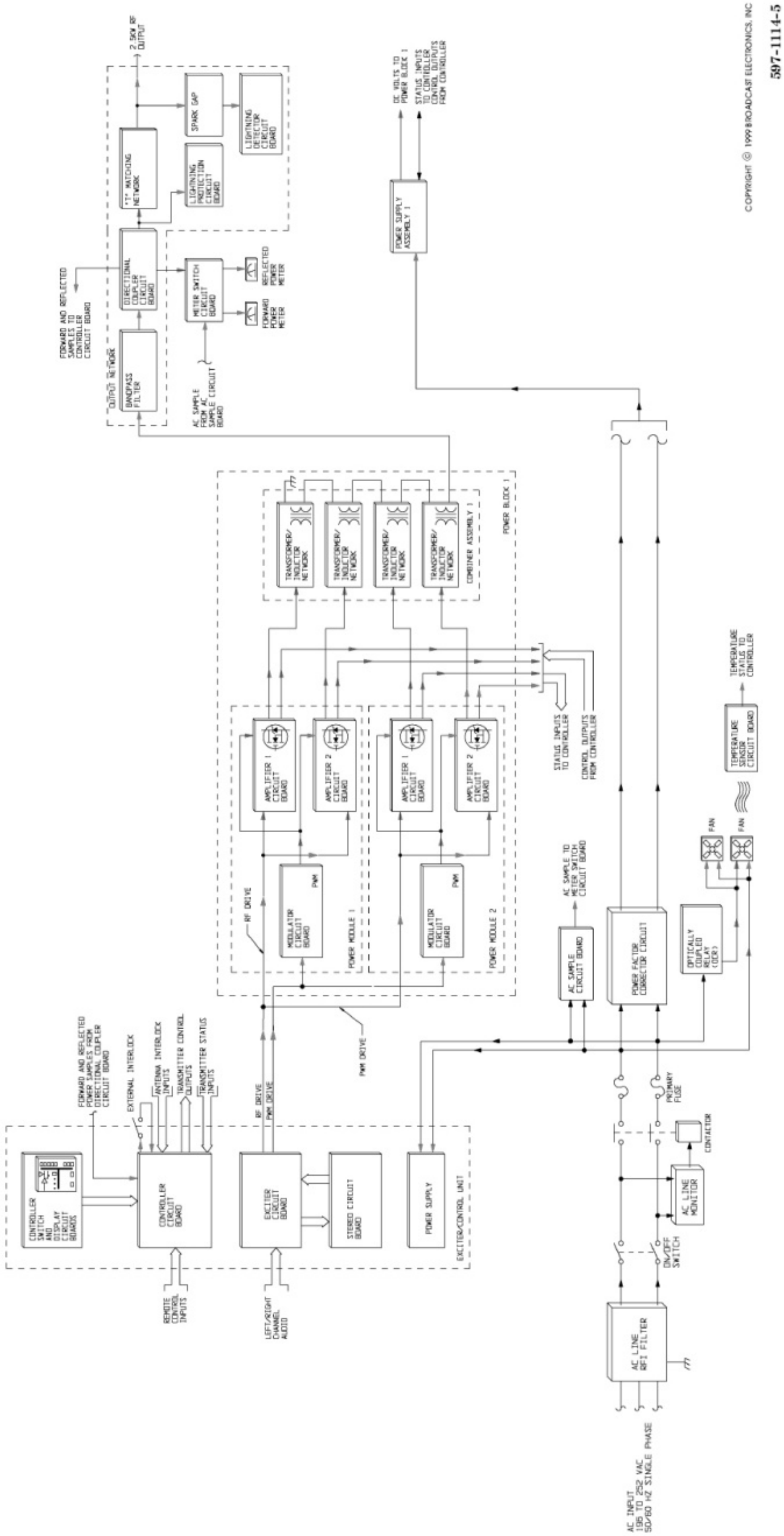


Figure 4-1: AM-2.5E BLOCK DIAGRAM

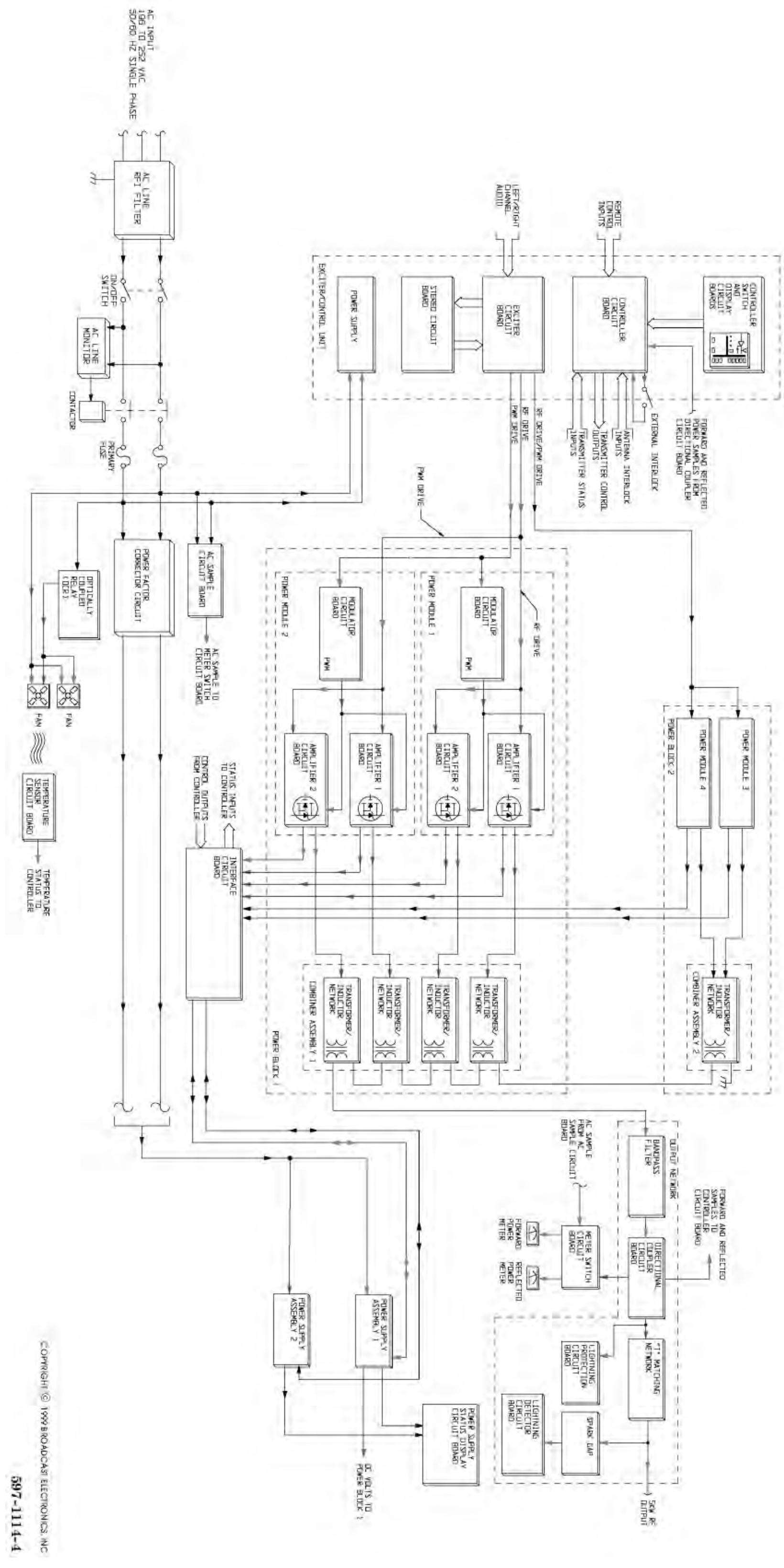


Figure 4-2: AM-5E BLOCK DIAGRAM

The modular design of the RF power modules allow the modules to be removed from the transmitter for maintenance. The remaining power modules will provide power to maintain on-air operation.

The PWM signal from the exciter circuit board is applied to the modulator circuit board. The modulator circuit board is designed to amplify and convert the PWM signal to a dc voltage which varies at an audio rate. The output of the modulator circuit board is applied to the RF amplifier circuit boards. Four indicator circuits monitor and display the status of the: 1) PWM drive signal, 2) B+ dc supply, 3) modulator fault conditions, and 4) blown fuse conditions.

The RF amplifier circuit boards are designed with Class E amplifier technology and MOSFET power transistors. The circuit board operates from: 1) the varying dc voltage from the modulator circuit board and 2) the RF drive signal from the exciter circuit board. The RF drive signal from the exciter circuit board and the varying dc voltage from the modulator are applied to a push-pull power MOSFET transistor amplifier circuit. The amplifier circuit is designed to output approximately 687.5 watts of RF power. A fault detection circuit monitors amplifier operation for fault conditions.

4.3 RF COMBINER.

Power from each RF amplifier circuit board is applied to a star combiner network. The combiner components are located on the rear panel of each power block. The star combiner network consists of individual transformer and inductor networks for each amplifier circuit board. The combiner accepts RF power from each RF power module to produce the rated RF output power.

In addition to combining the RF power from the RF power modules, the combiner design allows one or more RF power modules to be removed from the transmitter for maintenance. The remaining RF power modules will continue to operate to maintain on-air operation. This is accomplished without the use of dummy modules or bypass switches.

4.4 OUTPUT NETWORK.

The output network is a modular assembly designed to match the transmitter impedance to the antenna. The assembly consists of a: 1) bandpass filter, 2) directional coupler circuit board, 3) T-matching network, 4) lightning protection circuit board, and 5) a lightning detection circuit board.

The bandpass filter is an eight element LC filter designed to attenuate all harmonic frequencies to FCC, DOC, and CCIR levels. The directional coupler circuit board consists of a circuit designed to sample the transmitter RF output. The circuit board generates both forward and reflected power samples for application to the controller circuit board. The “T” matching network consists of an LC network. The network is designed to match the transmitter impedance to the antenna.

A lightning protection circuit board is provided to protect the transmitter circuitry from direct lightning potentials. The circuit protects the transmitter by shunting lightning potentials to ground. The lightning detector circuit board is designed to mute the transmitter RF output during the presence of a lightning potential. The lightning detector circuit board is controlled by a spark gap. The circuit will respond to potentials of 1500 volts in AM-2.5E models and 2100 volts in AM-5E models. This prevents the transmitter from muting during near-by lightning activity.

4.5 POWER SUPPLY.

A single phase source of 196 to 252 volts ac 50/60 Hz is required to operate the transmitter. The power source is routed through an RFI filter to prevent the coupling of RFI components into or out-of the transmitter. A rear-door ac on/off switch provides ac power control and disconnects all ac power to the transmitter when the door is opened. The ac line is monitored for high/low conditions by an ac line voltage monitor. The transmitter primary ac power will be interrupted if the ac line is above 260 volts or below 195 volts. Primary fuses protect the transmitter from over-current conditions. A power factor corrector circuit modifies the ac line impedance to provide a power factor of approximately 0.9.

The ac line voltage is sampled at the ac sample circuit board. The sample circuit board provides an ac line voltage sample for application to the meter switch circuit board.

4.5.1 Power Supply Circuit Board.

DC operating potentials for the RF power modules are provided by power supply circuit boards. One power supply circuit board provides dc operating potentials for one power block. The AM-2.5E transmitter is equipped with 1 power supply circuit board. The AM-5E transmitter is equipped with 2 power supply circuit boards.

The power supply circuit board consists of a: 1) switching power supply circuit, 2) conventional bridge rectifier circuit, 3) fault detection circuit. The switching power supply circuit operates directly from the ac power source. No primary ac power transformer is included in the circuit. An SCR controlled bridge rectifier circuit and a switching regulator circuit converts ac potentials to dc potentials at a desired voltage. Control of the dc output voltage is provided by a power control PWM signal from the controller.

A transformer with five secondary windings provide low-voltage ac potentials to five full-wave bridge rectifiers circuits. The circuits provide dc operating potentials for the power supply circuit board and RF power module circuitry.

The power supply design provides the RF power modules with a constant and stable dc operating supply by not responding to fluctuations or surges in the ac line voltage. The supply will produce a constant dc voltage during high/low ac line voltage or surge conditions.

The switching power supply output voltage is controlled by a power control PWM signal from the controller circuit board. Current reduction at turn-on is controlled by a soft-start circuit. The circuit is designed to generate start pulses synchronized to the ac line phase to slowly bias the SCR bridge rectifier circuit on during initial turn-on operations. The switching regulator circuitry is monitored for proper operation by an overvoltage and loss-of-PWM signal circuitry. The switching regulator operation is performed by IGBT (insulated-gate-bi-polar-transistors) transistors. The IGBTs redesigned to provide extremely reliable and efficient operation.

4.6 METERING.

The transmitter metering consists of the forward power meter, reflected power/primary ac input voltage meter, and the exciter modulation meter. Forward power information is presented on the forward power meter. Reflected power/primary ac input voltage information is presented on the reflected power/primary ac input voltage meter. The meters are controlled by three-position switches. Forward and reflected power samples for the metering circuitry are provided by the directional coupler circuit board. An ac sample for the reflected power/primary ac input voltage meter is provided by an ac sample circuit board.

Monitoring of exciter operations is provided by the exciter modulation monitor. Two 30 segment multi-color bar graph displays present L/L+R and R/L-R information. A X10 mode allows the monitoring of low level signals such as the pilot tone.

4.7 COOLING FANS.

The AM-2.5E/AM-5E transmitters are equipped with 2 cooling fans. The fans are controlled by an optically-coupled-relay. In the fans provide 500 CFM of cooling air for the transmitter. A temperature sensor circuit board monitors the transmitter air temperature and provides status information to the controller.

4.8 INTERFACE CIRCUIT BOARD (AM-5E ONLY).

On AM-5E models, communication between the controller, RF power modules, and the power supply circuit boards is provided by an interface circuit board. The circuit board: 1) routes status information from the RF power modules and power supply circuit boards to the controller and 2) routes control signals from the controller to the RF power modules and the power supply circuit boards.

4.9 OVERALL DESCRIPTION.

4.9.1 Power Supplies.

The AM-2.5E/AM-5E transmitters require a 196V to 252V ac single phase power source (refer to Figure 4-3). The following text presents ac power source required for each transmitter.

TRANSMITTER	AC POWER SOURCE
AM-2.5E	196V to 252V ac 50/60 Hz single phase at 40 Amperes.
AM-5E	196V to 252V ac 50/60 Hz single phase at 60 Amperes.

4.9.2 AC Input Circuitry.

When the transmitter fused disconnect is closed, single phase ac power is routed through an RFI filter to rear-door ac input switch S1. The filter prevents the coupling of RFI components into or out-of the transmitter. S1 is the transmitter primary ac power safety device. S1 disconnects primary ac power when the transmitter rear door is opened.

The ac line is monitored for high/low conditions by an ac line voltage monitor. The monitor controls ac power contactor K2. The transmitter primary ac power will be interrupted if the ac line is above 260 volts or below 190 volts. Overload protection for the transmitter is provided by fuses F1 and F2.

A power factor corrector circuit consisting of inductors L3/L4 and capacitor C1 modifies the ac line impedance to provide a power factor of approximately 0.9. C1 is switched into the circuit during soft-start by the power factor corrector relay circuit board. The relay circuit board is controlled by a circuit on the power supply circuit board. Metal-Oxide-Varistors MOV1, MOV2, and MOV3 protect the transmitter power supply circuitry from ac line voltage surge potentials. AC power from the MOVs is applied to the following circuits: 1) the ECU power supply assembly, 2) the transmitter flushing fans, 3) low voltage power supply transformer T1, 4) the power supply circuit board, and 5) the ac sample circuit board.

4.9.3 ECU Power Supply Assembly.

The ECU power supply is a 40W modular switching power supply unit. The power supply assembly provides regulated +5V, +15V, and -15V operating potentials for the ECU circuit boards.

The power supply for the ECU controller circuit board is backed-up by a 9V battery. During an ac power failure, the battery will maintain the transmitter operating configuration stored in the controller logic circuitry. Once power is returned to the transmitter, the transmitter will automatically resume operation in the configuration appearing prior to the ac failure. If an extended ac power failure occurs, the transmitter will be operated to off by an ac loss/auto shutdown circuit.

The battery back-up system requires a standard 9V battery. The battery will maintain the controller logic for several months. Replace the battery approximately once a year to ensure proper transmitter operation during ac power failure conditions.

4.9.4 Transmitter Flushing Fans.

Cooling air for the transmitter circuitry is provided by flushing fans B1 and B2. Control of the fans is provided by optically-coupled-relay (OCR) K1.

The flushing fans are controlled by a signal from the ECU controller circuit board. When a power level switch/indicator is depressed, the controller circuit board will enable optically-coupled relay (OCR) K1 to energize the fans. The fans will operate during transmitter operation.

4.9.5 Low-Voltage Power Supply Transformer.

Low-voltage operating potentials for the transmitter power supply circuit board and RF power modules are provided by ac power transformer T1. Transformer T1 consists of: 1) one primary winding and 2) five secondary windings. The secondary windings provide low-voltage ac potentials for application to five rectifier circuits on the power supply circuit board. The circuitry provides dc operating potentials for the power supply and the RF power modules.

4.9.6 Power Supply Circuit Board.

Low and high voltage dc operating potentials for the RF power modules are provided by the power supply circuit board. The AM-2.5E is equipped with 1 power supply circuit board. The AM-5E is equipped with 2 power supply circuit boards. Each power supply circuit board provides dc operating potentials for two RF power modules.

The power supply circuit board is equipped with: 1) a switching power supply circuit designed to produce high-voltage operating potentials and 2) conventional rectifier circuitry designed to produce low-voltage operating potentials. The following text describes the circuitry.

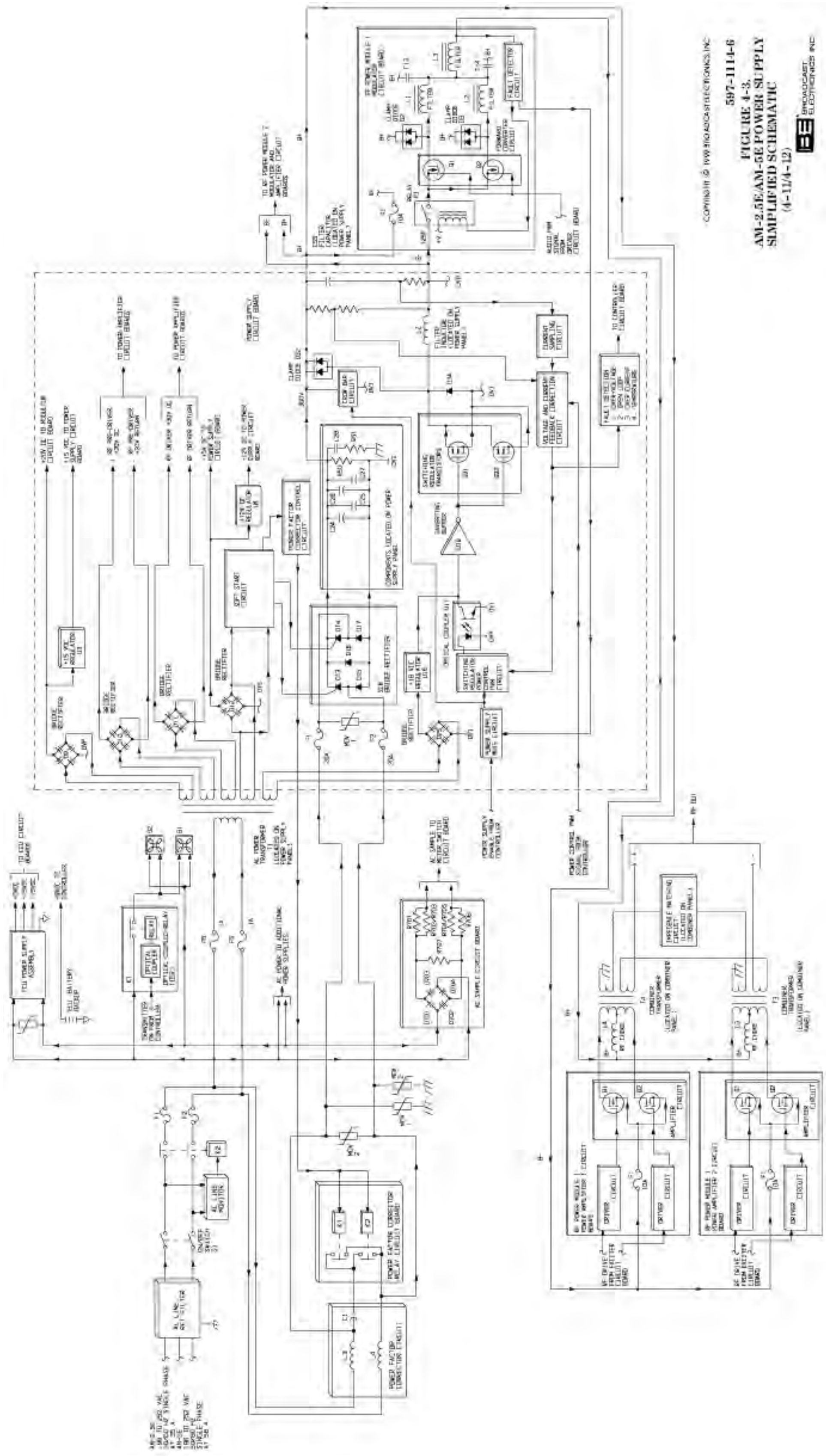


Figure 4-3: AM-2.5E/AM-5E POWER SUPPLY SIMPLIFIED SCHEMATIC

1) CONVENTIONAL RECTIFIER CIRCUITRY.
+30V and +20V dc operating potentials for the RF power modules are provided by four conventional rectifier circuits. AC power from a winding of ac power transformer T1 is applied to bridge rectifier D9. D9 rectifies the ac potential into an unregulated +20 volt ac supply for application to: 1) the modulator circuit board and 2) to regulator U3. U3 is a +15 volt dc regulator. The output of U3 routed for application to the components on the power supply circuit board.

AC power from a second winding of transformer T1 is applied to bridge rectifier D10. D10 rectifies the ac potential into an unregulated +20V dc supply for application to the RF power module power amplifier circuit boards. AC power from a third winding of power transformer T1 is applied to bridge rectifier D11. D11 rectifies the ac potential into an unregulated +30V dc supply for application to the RF power module power amplifier circuit boards. AC power from a fourth winding of power transformer T1 is applied to bridge rectifier D12. D12 rectifies the ac potential into an unregulated +15V dc supply for application to: 1) the power supply circuit board and 2) regulator U4. U4 is a +12 volt dc regulator. The output of U4 routed for application to the components on the power supply circuit board.

An ac sample from a winding of T1 is also routed to a soft-start circuit. The soft-start circuit is designed to generate control pulses synchronized with the ac line phase. A complete description of the soft-start circuit is presented in Rectifier/Soft-Start Circuit (refer to the following text).

2) SWITCHING POWER SUPPLY CIRCUIT.
AC power from the power factor corrector circuitry is applied to fuses F1 and F2 on the power supply circuit board. The fuses protects the power supply circuitry from overload conditions. Metal-Oxide-Varistor MOV1 prevents damage to the switching power supply circuit from ac line voltage surge potentials.

a) Rectifier/Soft-Start Circuit. The ac line is full-wave rectified by an isolated SCR controlled bridge rectifier circuit. The SCR bridge rectifier consists of diodes D15 through D17 and SCRs D13 and D14. The rectifier is controlled by a soft-start circuit. The soft-start circuit is designed to: 1) determine when the ac line waveform crosses the 0 volt axis and 2) generate short duration pulses in synchronization with the ac line 0 volt crossings. The pulses are amplified and applied to the gates of the rectifier circuit SCR components to slowly bias the components on during initial start operations. This operation eliminates the component stress at power-on by limiting the supply in-rush current. The rectifier will output an unregulated and unfiltered dc supply at approximately 300V to an inductor and capacitor filter network.

   The output of the rectifier circuit is applied to a filter consisting of capacitors C24 through C27. The output of the LC filter generates a 300V main operating supply for the RF power modules. The positive leg of the dc supply is the common for the dc voltages contained in the switching regulator circuitry and the RF power modules. The negative leg of the supply is regulated and controlled to generate the required operating potentials for the RF power modules.

b) Switching Regulator Circuit. The main operating supply is regulated by a buck-type switching regulator circuit. The switching regulator circuit generates the negative leg of the B supply. The regulator circuit consists of: 1) a power supply mute circuit, 2) a switching regulator power control PWM circuit, 3) optical coupler U17 4) inverting buffer U19, and 5) switching regulator transistors Q21 and Q22.

A dc operating supply for optical coupler U17 and buffer U19 is generated by bridge rectifier D25. D25 full-wave rectifies an ac potential from ac transformer T1 into an unregulated +20V supply. The supply is applied to +18V regulator U16. U16 outputs a +18V supply which is further regulated to a 5V operating potential by a resistive divider and a zener diode. The 5V supply is applied to optical couplers U17 and buffer U19.

Control of the regulator circuit is provided by the switching regulator power control PWM circuit, a current sampling circuit, and a voltage and current feedback correction circuit. Together, the circuits function in a closed-loop to control regulator operation. The switching regulator power control PWM circuit is designed to produce two out-of-phase square wave signals with varying duty cycles. The duty cycle is varied in response to the signal from the correction circuit. The output of the control circuit is applied to optical coupler U17. U17 provides isolation between two different ground circuits. The output of the coupler is applied to gate drive inverting buffer U19. The output of U19 is applied to the gates of IGBT switching regulator transistors Q21 and Q22. Q21 and Q22 are operated to on for a specific time duration to regulate the output voltage for varying load conditions.

The regulator circuit output voltage is directed by a 1 kHz power control PWM signal from the controller. The signal is applied to the correction circuit on the power supply circuit board. In addition to the 1 kHz PWM signal, a voltage and current sample from the regulator output is routed to the voltage and current feedback correction circuit. The correction circuit responds by evaluating the output samples and the power control signal and generating a correction voltage. The voltage is applied to the switching regulator power control PWM circuit to adjust the output of the regulator.

The output of the transistor switching regulator circuit is applied to filter inductor L2. Protection of the transistors from switching transients during turn on/off operation is provided by clamp diode D32. Clamp diode D32 protects the transistors by limiting positive peak voltages. The output of the regulator circuit is applied to circuitry on RF power module modulator circuit boards.

3) MODULATOR CIRCUIT BOARD.

The B- leg from the power supply circuit board is routed to circuitry on the RF power module modulator circuit board. The B- leg is applied to relay K1 on the modulator circuit board. K1 is controlled by a fault detector circuit. The relay is designed to immediately remove the supply from the forward converter circuit during a fault condition. The output of the relay is applied to the converter circuit.

Transistors Q1 and Q2 are the switching devices in the forward converter circuit. The circuit is controlled by the audio PWM signal from the driver circuit board. The circuit operates by switching the applied B- leg at a 122 kHz to 135 kHz rate. The duty cycle of the PWM signal is 40% with no modulation. The output of the forward converter circuit is applied to an LC PWM low-pass filter network. Protection of the transistors from switching transients is provided by clamp diodes D2 and D3. D2 and D3 limit the positive peak transients appearing on the output.

A sample of the modulator circuit output is routed to a fault detector circuit. The circuit will respond to a fault by: 1) routing a control signal to relay K1 to disconnect the amplifier circuit from the B-supply and 2) route a control signal to the power supply circuit board to momentarily mute the power supply. After a short delay, a control signal is routed to the power supply to enable the supply to provide power to RF module 2.

The B+ leg of the supply is also routed to the modulator circuit board. The B+ leg is applied to fuse F1 and is the common for the dc voltages contained in the power supply circuit board switching regulator circuit and the RF power modules. F1 is provided to protect clamp diodes D2 and D3 from overcurrent conditions.

4) POWER AMPLIFIER CIRCUIT BOARDS.
The power amplifier circuit board circuitry is configured in a Class E switching amplifier design. A Class E design is recognized by: 1) the application of the B+ power supply through an RF choke to combining transformers and 2) the use of only two MOSFET power transistors in a push-pull configuration per amplifier. The circuitry on each amplifier circuit board is identical, therefore only amplifier circuit board 1 will be discussed.

The dc voltage output of the modulator circuit board is routed to the power amplifier 1 circuitry through fuse F1. F1 protects the amplifier circuitry from over-current conditions. The supply is applied to a switching amplifier circuit consisting of transistors Q1 and Q2. The B+ leg of the main dc supply from the power supply circuit board is applied to Q1 and Q2 through choke L4 to a primary center tap of combiner transformer T4. RF choke L4: 1) prevents RF signals from entering the dc supply and 2) functions as the last series inductor for the PWM low-pass filter on the modulator circuit board.

The amplifier circuit is driven by the RF drive signal from the exciter circuit board. The RF drive signal consists of a square-wave signal at the carrier frequency. The signal is amplified prior to application to Q1 and Q2 by a driver circuit.

The amplifier circuit functions by switching the dc voltage from the modulator circuit board at an RF rate to produce a monophonic or a C-QUAM AM stereo signal at the programmed carrier frequency. The signal appears at the primary of combiner transformer T4. The RF signal is transferred to the secondary of T4 and routed to power amplifier 2 circuit board combiner transformer T3. The RF output signal from T4 is combined with the RF output signal from transformer T3 to generate a C-QUAM signal at approximately 1375 watts of carrier.

5) SEQUENCE OF OPERATION.
When transmitter switch S1 is closed, ac power is routed to contactor K2 and the ac line monitor. If the ac power line is between 190 and 260 volts, power from K2 is applied to: 1) the power factor corrector circuitry, 2) the ECU power supply, 3) fan control relay K1, 4) low-voltage ac power transformer T1, and 5) the ac sample circuit board. If the ac line voltage is not between 190 and 260 volts, the ac line monitor will open K2 and deenergize the transmitter. When ac power is applied to T1, a soft start circuit will detect the ac waveform. When this occurs, the power factor corrector control circuit will energize the relays on the power factor corrector circuit board to switch capacitor C1 in the circuit. This enables the power factor corrector circuitry to change the power factor to approximately 0.9. In response to the application of ac power with no error conditions, the following controller and RF power module indicators will illuminate green:

CONTROLLER INDICATORS	RF POWER MODULE INDICATORS
1. Exciter	1. PA 1 RF Drive
2. Power Modules	2. PA 2 RF Drive
3. Power Supply	3. PWM Drive
4. Antenna	
5. Mono or Stereo (depending on exciter mode of operation)	
6. Exciter Circuit Board: 1) +15V, 2) -15V 3) Lock, and 4) +5V	
7. Stereo Circuit Board: 1) Mono L+R/Stereo/ Mono L/Mono R (depending on exciter mode of operation), 2) Equalization 1 or Equalization 2 (depending on antenna configuration)	

A start sequence is initiated when a power level switch/indicator is depressed. Logic from the controller will enable optically-coupled-relay K1 to enable the flushing fans.

Logic from the controller will also enable the SCR controlled bridge rectifier circuit on the power supply circuit board. The B+ dc potential from the rectifier is applied to the inductor and capacitor filter networks on the power supply panel. Generation of the B-leg is provided by the IGBT switching regulator circuit.

Power output of the regulator is controlled by the PWM signal from the controller. The regulator will increase or decrease power as determined by the PWM signal. The output of the regulator is routed to the modulator circuit board. The modulator POWER indicator will illuminate if the B+ supply from the power supply circuit board is present. The modulated output from the modulator circuit board is routed to the power amplifier 1 and power amplifier 2 circuit board for amplification.

6) RF CIRCUITRY.
   a) EXCITER CIRCUIT BOARD. Audio for application to the AM-2.5E/AM-5E transmitter is applied to the exciter circuit board (refer to Figure 4-4). The exciter circuit board is designed to: 1) process left/right channel or monaural audio to generate a Pulse-Width-Modulated (PWM) signal at 122 kHz to 135 kHz and 2) generate an RF signal using a frequency synthesizer, a phase modulator for IPM correction, and an RF driver network.

      Left channel audio is applied to an RFI filter and a defeatable 10 Hz high-pass filter. The 10 Hz high-pass filter is provided to remove low frequency residual products from specific audio processing units. Balanced-to-unbalanced signal conversion is provided by an instrumentation amplifier. The output of the instrumentation amplifier is applied to a defeatable high frequency boost circuit. The high frequency boost circuit is provided to increase high frequency response to compensate for a Bessel filter in the PWM modulator. The output of the high frequency boost circuit is applied to an active PWM filter/equalizer and a mode switching circuit. The output of the PWM filter is routed for application to the stereo circuit board.

      The mode switching circuit is designed to select the left or right channel for mono left or mono right operation. A summing amplifier is provided as a mono support circuit to increase the gain of the circuit 6 dB during mono operations. The output of the summing amplifier is applied to a 24 μS delay and limiter circuit. The delay circuit is provided for stereo equalization. The negative limiter is provided to limit negative modulation from 90% to 100%.

      The output of the 24 μS delay and negative limiter is applied to: 1) a PWM circuit and 2) an IPM comparator and corrector circuit. The PWM circuit is designed to output a square wave signal in which the duty cycle changes in response to the applied audio level. The output of the PWM circuit is applied to a PWM driver circuit. The PWM driver circuit consists of parallel transistor drivers to lower the impedance and improve reliability.

      The transmitter carrier frequency is generated by digitally programmed frequency synthesizer circuit. The frequency synthesizer is designed to output: 1) the carrier frequency to a mono/stereo select circuit, 2) a FcX4 (carrier frequency times four) signal for application to the stereo circuit board, and 3) a 25 Hz pilot signal for application to the stereo circuit board. A mono/stereo select circuit functions as an automatic mono/stereo select switch. If a stereo signal from the internal stereo circuit board or an external stereo generator is present, the exciter will be configured for stereo operation. If the stereo signal is not present, the circuit will configure the exciter for mono operation. The output of the mono/stereo select circuit is applied to the IPM (Incidental Phase Modulation) signal generator and modulator.

The IPM signal generator is designed to produce a waveform similar to the signal produced by the RF amplifier circuitry. The IPM generator signal is out-of-phase with the signal generated by the RF power modules. The signal is applied to a modulator circuit which will generate a phase compensated RF signal at the carrier frequency. The phase compensation will effectively cancel the IPM generated in the RF circuitry.

The output of the IPM circuitry is applied to an RF driver network. The network consists of a high/low side driver and output drive transistors.

b) STEREO CIRCUIT BOARD. Left/right channel audio and an RF signal at FcX4 (carrier frequency times four) from the exciter circuit board is applied to the stereo circuit board. The stereo circuit board is designed to generate a TTL level RF signal. The circuit board contains identical left/right channel and equalization 1/2 circuitry. Therefore, only the left channel equalization 1 circuit will be discussed.

Left channel audio from the exciter circuit board is applied to the left channel equalization 1 circuit. The equalization circuit consists of 1) a state variable low-pass filter, 2) an 8 μS group delay section, and 3) a 4 μS group delay section. The circuit is designed to equalize frequencies to produce maximum separation.

The output of each equalization circuit is routed to an equalization and mono/stereo select circuit. The equalization circuit selects equalization 1 or equalization 2 as determined by the selected antenna pattern. The mono/stereo circuit selects the required signals for stereo, mono left, mono right, or mono L+R operation.

The output of the equalization and mono/stereo select circuits is applied to a summing amplifier network. The network functions as a matrix to generate the L+R and L-R stereo signals. The output of the summing amplifier network is applied to a digital switching modulator. The modulator accepts: 1) the L+R and L-R signals and 2) four RF out-of-phase signals at the carrier frequency. The modulator outputs two signals: 1) an AM modulated signal containing the L+R information and 2) a double-sideband suppressed- carrier signal referenced to a 90 degree carrier. The signals are summed and amplified at U37 to produce a quadrature signal. The output of U37 is applied to a fourth order linear phase bandpass filter. The output of the filter is applied to an amplitude limiter circuit. The limiting operation produces the phase modulation (L-R information) component of the C-QUAM signal. The output of the limiter circuit is routed to the exciter circuit board.

c) RF POWER MODULE. The PWM and RF drive signals from the exciter circuit board are routed to the RF power modules. The RF power modules consist of a modulator circuit board and two RF amplifier circuit boards.

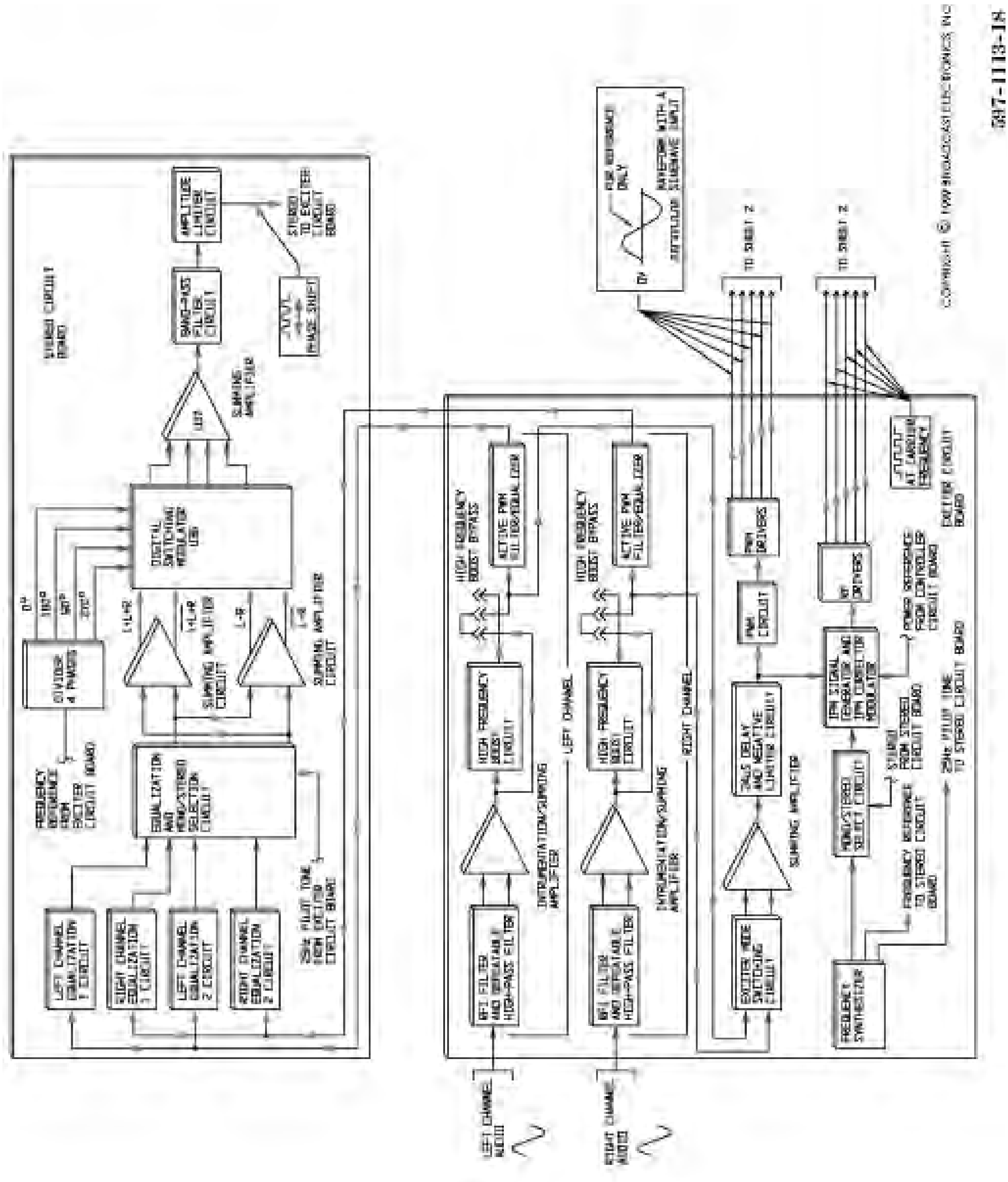


Figure 4-4: AM-2.5E/AM-5E RF CIRCUITRY SIMPLIED SCHEMATIC (SHEET 1 OF 2)

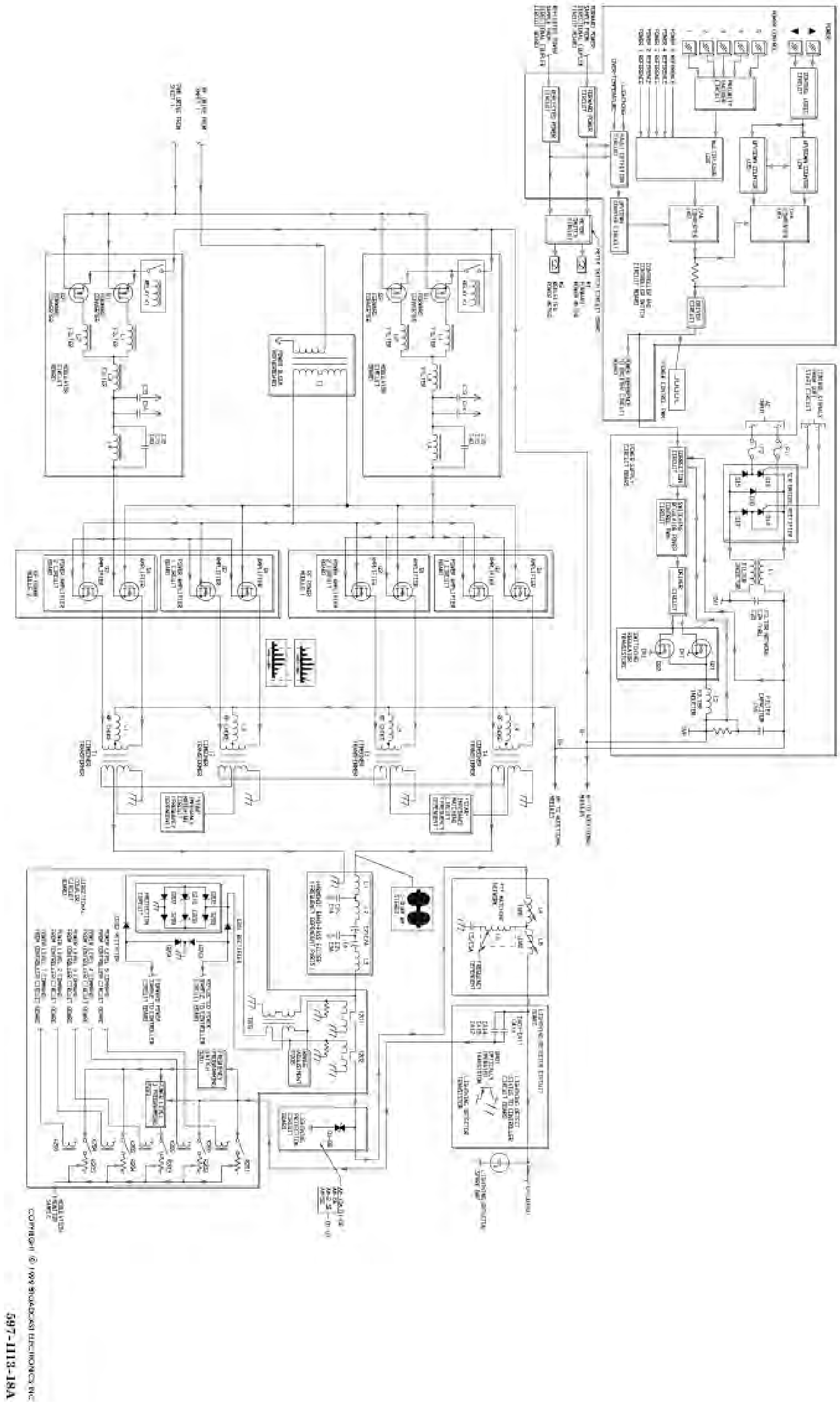


FIGURE 4-4. AM-2.5E/AM-5E RF CIRCUITRY SIMPLIED SCHEMATIC (SHEET 2 OF 2)

d) Modulator Circuit Board.
The modulator circuit board consists of a MOSFET forward converter circuit and a filter network. The forward converter circuit consists of MOSFET transistors Q1 and Q2. The filter network consists of inductors L1 through L3 and capacitors C13 through C16. A dc operating voltage for transistors Q1 and Q2 is provided by the power supply circuit board. The B- leg of the supply is routed through relay K1 to the transistors. K1 is provided to immediately terminate the supply during a modulator fault condition.

The PWM signal at a 15 volt level from the exciter circuit board is applied to the gates of MOSFET transistors Q1 and Q2. Q1/Q2 function to switch the B- leg at a 122 kHz to 135 kHz rate. The output from Q1/Q2 is applied to the LC low-pass filter network to convert the square-wave PWM signal to a dc voltage. The output from the filter will produce a 50 volt dc signal with: 1) a nominal PWM duty cycle of 40% and 2) no audio modulation. The dc voltage will vary from 0 to 125 volts with -100% to +150% modulation. The output of the filter network is applied to the drains of MOSFET amplifier transistors on the power amplifier circuit boards.

e) Power Amplifier Circuit Boards. The RF circuitry on the power amplifier circuit boards consists of a Class E MOSFET power amplifier circuit. Each power amplifier circuit board is designed to output approximately 350 watts. The power amplifier circuit boards are identical. Therefore, only power amplifier 1 will be discussed. The MOSFET amplifier circuit is designed in a push-pull design Class E configuration. Class E power amplifier characteristics consist of: 1) the transistor drain-to-source voltage must be nominally zero immediately prior to the turn-on of the transistor and 2) the time slope of the drain-to-source voltage waveform must be nominally zero prior to the turn-on of the transistor. The Class E circuit results in: 1) lower device dissipation resulting in reduced transistor operating temperature which greatly increases component life, 2) an operating efficiency of 95% or greater, and 3) increased reliability when operated into VSWR conditions.

Additional characteristics of a Class E amplifier design is the application of dc power to the amplifier transistors. The B+ leg of the B supply is applied to RF choke L1. The choke is connected to the primary center tap winding of combiner transformer T1. The transistors are connected to the primary winding of the transformers.

Two signals are applied to the power amplifier 1 circuit board: 1) an RF square-wave signal from the driver circuit board and 2) a dc voltage from the modulator circuit board which varies at an audio rate. The RF square-wave signal at the carrier frequency is applied to the gates of MOSFETs Q1 and Q2. The varying dc voltage from the modulator circuit board is applied to the source of MOSFETs Q1 and Q2. Q1/Q2 operate in a push-pull configuration to develop approximately 350 watts of RF power at combiner transformer T1. The power at transformer T1 is combined with the 687.5 watts of RF power from power amplifier circuit board 2 to generate 1375 watts of RF power from the RF power module.

7) RF COMBINER.
The RF combiner components are located on the rear-panel of each power block assembly. The combiner consists of a star combiner design. The star combiner contains an individual transformer, an RF choke, and an impedance matching circuit for each power amplifier circuit board. The impedance matching circuit consists of star inductors. The circuit presents the correct impedance when a module is removed from the chassis. This allows the transmitter to operate at an output power which is proportional to the modules removed from the power block chassis.

8) HARMONIC BAND-PASS FILTER.

The output signal harmonic and spur frequencies are reduced to FCC, DOC, and CCIR levels by a band-pass filter. The filter consists of a fourth order LC network consisting of inductors L1 through L3 and capacitors C1 through C4. The components are located in the output network assembly and are frequency dependent. The output of the filter is routed to the directional coupler circuit board.

9) DIRECTIONAL COUPLER CIRCUIT BOARD.

Transmitter forward and reflected power are sampled by a directional coupler circuit board. The directional coupler circuit board is designed to: 1) process the forward and reflected power samples for application to the controller circuit board and 2) calibrate the RF modulation monitor sample.

a) Forward And Reflected Power Sample Circuit. A voltage sample from the RF output is obtained by transformer T203. A current sample of the RF output is obtained by transformers T201 and T202. The current sample is converted to a voltage by a resistor network and applied to transformer T203. A voltage proportional to the square root of the forward power is obtained by summing the voltage from the secondary of T203 with the voltage sample from T201. A voltage proportional to the square root of the reflected power is obtained by summing the voltage from the secondary of T203 and with the voltage sample from T202. The forward power sample voltage is half-wave rectified by diode D202. The reflected power sample voltage is half-wave rectified by diode D201. Diodes D205 through D208 and zener diodes D209 and D210 protect the rectifier diodes from overvoltage conditions. The rectified forward and reflected power samples are routed for application to the controller circuit board. Programmable header J206 is provided to increase the adjustment range of the directional coupler circuitry. The header is programmed at the factory for the adjustment range required by the transmitter.

b) Modulation Monitor Calibration Circuit. A voltage sample for application to the modulation monitor calibration circuit is provided by the lightning detection circuit board. A sample from the RF output is obtained by a capacitor circuit and applied to a relay circuit on the directional coupler circuit board. The relay circuit is designed to select a voltage sample from a calibration potentiometer for application to the modulation monitor receptacle. The relays are controlled by power level 1 through 5 commands from the controller circuit board. Each relay circuit operates in an identical manner, therefore only the circuit for power level 5 will be explained.

A voltage is applied to the modulation monitor receptacle when the power level 5 command energizes relay K201. K201 applies a sample voltage to power level 5 modulation monitor calibration control R201. R201 is provided to obtain a 2 volt RMS sample to the modulation monitor receptacle. Frequency programming switch S201 is provided to compensate the RF sample for frequencies within the AM band for power levels 1 through 3. Power level programming switch P203 is provided to program the power level 3 circuit for low power range or high power range operation. The calibrated sample from potentiometer R201 is applied to the modulation monitor receptacle.

10) T-MATCHING NETWORK.

Output matching to antenna loads for up to a VSWR condition of 1.4:1 at any phase angle relative to the 50 Ohm load is provided by a T-matching network. The T-matching network consists of tune control L4, load control L6, inductor L5 and capacitor C5/C5A. Inductor L5 and capacitor C5/C5A are frequency dependent components. The tune and load controls are designed to be adjusted to present the optimum impedance for the power amplifier modules.

11) LIGHTNING PROTECTION CIRCUIT BOARD.

The transmitter is protected from lightning potentials present at the output network by the lightning protection circuit board. The circuit board consists of series connected transzorbs. The AM-2.5E transmitter is equipped with transzorbs D1 through D6. The AM-5E transmitter is equipped with transzorbs D1 through D7. The transzorbs are designed to conduct the lightning potentials to ground prior to the operation of the lightning detection circuit spark-gap.

12) LIGHTNING DETECTION CIRCUIT BOARD.

Lightning potentials present at the transmitter output are detected by the lightning detection circuit board. The circuit board is equipped with an RF sampling circuit and an optically operated transistor circuit.

The RF sampling circuit consists of a parallel capacitor circuit. The circuit is designed to provide a constant RF voltage sample for application to the directional coupler circuit board. The optically operated transistor circuit is designed to detect lightning potentials present at the transmitter output. The circuit operates in association with the lightning detector spark-gap. When lightning is present at the transmitter RF output, the spark-gap will: 1) be biased on to conduct the potential to ground and 2) emit a light pulse to optically operated transistor Q401. Q401 will be biased on to output a lightning detect signal to the controller circuit board.

13) RF OUTPUT POWER CONTROL CIRCUITRY.

The transmitter output power is controlled by circuitry on the controller and power supply circuit boards. The transmitter power level is controlled by a Pulse-Width-Modulated (PWM) signal generated by the controller circuit board. The power control PWM signal is routed for application to the power supply circuit board(s). The power supply circuit board(s) respond by routing the required dc voltage to the modulator circuit boards and the RF amplifier circuit boards. The following text presents a description of the RF power control circuitry.

a) RF Output Power Control - Controller Circuit Board. A transmitter RF output power level is selected by the power control 1 through power control 5 switch/indicators. The power control switch/indicators route a LOW control signal to a priority encoder circuit. The priority encoder circuit determines which control pulse is routed to the power control circuitry. The circuit allows transmitter off commands to be assigned a high priority. With no transmitter off commands present, the power control signal is applied to multiplexer U39. U39 selects a reference voltage from the power control potentiometers on the controller circuit board. The potentiometers are designed to establish a preset transmitter power level such as 1 kW. The voltage is used as the reference for digital-to-analog converter U42. With no fault conditions present, the voltage is applied without change to power trim digital-to-analog converter U43. With no power trim commands present, the reference voltage is applied to a driver circuit which converts the dc control voltage to a power control PWM signal. The power control PWM duty cycle responds to the changes in the voltage reference level. When the voltage reference increases, the power control PWM signal duty-cycle increases. When the voltage reference decreases, the power control PWM signal duty-cycle decreases. The power control PWM signal is routed for application to the power supply circuit board(s).

The transmitter output power level is trimmed to a precise level by the power up and down switches. The switches output a LOW control signal to a control logic circuit. The control logic circuit generates the required control signals to drive an up/down counter circuit. The circuit is designed to: 1) count up if power is required to be increased or 2) count down if power is required to be decreased. The up/down counter circuit output is converted to a dc potential by digital-to-analog converter U43. The output of U43 is summed with the dc potential from power control switch digital-to-analog converter U42 to generate a dc power control signal. The power control signal is applied to the driver circuit which converts the signal to a power control PWM signal.

b) Automatic Power Control Circuitry. The transmitter power control circuitry is equipped with several monitor circuits designed to determine if power control correction is required during adverse operating conditions. Circuitry on the controller circuit board monitors the transmitter components and the RF output for: 1) lightning, 2) high forward power, 3) high reflected power, and 4) over-temperature. If a lightning, high forward power, high reflected power, or over-temperature, condition occurs, a signal is routed to the fault detection circuit.

   The fault detection circuit: 1) processes lightning and over-temperature signals and 2) analyzes forward and reflected power signals. As determined by the fault condition, the fault detection circuit will generate a fast or slow control signal to the up/down counter circuit. The counter circuit will respond by decreasing the power control voltage at digital-to-analog converter U42. U42 will respond by decreasing the output power to an acceptable level. Once the condition which caused the fault to occur is removed, the fault detection circuitry will automatically output a control signal to increase power to a normal level.

c) Forward/Reflected Power Circuitry. Samples of the transmitter forward and reflected power are processed by forward and reflected power circuits on the controller circuit board. Forward power samples from the directional coupler circuit board are applied to the forward power circuit. The forward power circuit converts the sample into a dc signal for application to the fault detection circuitry and to the meter switch circuit board. Reflected power samples from the directional coupler circuit board are applied to the reflected power circuit. The reflected power circuit converts the sample into a dc signal for application to the fault detection circuit and the meter switch circuit board.

d) Meter Switch Circuit Board. Forward and Reflected power samples from the controller circuit board are applied to the meter switch circuit board. The circuit board allows the selection of forward power, reflected power, and ac input samples for display on forward power meter M1 and reflected power meter M2.

e) RF Output Power Control - Power Supply Circuit Board/RF Power Modules. The power control PWM signal from the controller circuit board is applied to a correction circuit on the power supply circuit board. The PWM signal is converted to a dc signal and combined with a dc feedback signal to generate a power control signal for application to the switch regulator power control PWM circuit. The circuit converts the dc signal into two PWM 180 degree out-of-phase square-wave drive signals. The square-wave drive signals are applied to a driver circuit. The driver circuit outputs the out-of-phase square-wave signals to an IGBT transistor regulator circuit. The regulator circuit transistors are operated to on for a specific time duration to generate a specific B- supply voltage. The B- supply voltage is filtered by capacitor C55 and applied to the forward power converter on the modulator circuit boards.

   The main operating supply B+ leg is created by a SCR controlled bridge rectifier circuit. AC power from an ac input filter is applied to the SCR controlled bridge rectifier. The rectifier is controlled by a soft-start circuit. The full-wave rectified dc potential is filtered by capacitors C24 through C27. The output of the filter generates the positive leg of a B supply. The B+ line of the power supply is applied to the forward power converter circuit on modulator circuit boards and the RF amplifier transistors on RF amplifier circuit boards.

To provide an example of output power control operation, a 10 kW output level is required from the transmitter. The controller power control PWM duty-cycle will be approximately 85%. The power supply will respond by generating a 120 volt B- supply for application to the forward power converter on the modulator circuit boards. The modulator circuit boards will output a dc voltage which varies at an audio rate to the amplifier circuit boards. The amplifier circuit boards will respond by using the modulator circuit board dc voltage and the B+ leg of the main supply to amplify the RF drive signal from the exciter circuit board.

5 MAINTENANCE

This section provides maintenance information, electrical adjustment procedures, and troubleshooting information for the Broadcast Electronics AM-2.5E and AM-5E transmitters.

5.1 SAFETY CONSIDERATIONS.

WARNING WARNING THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER OUTPUT NETWORK, RF POWER MODULE, RF COMBINER, OR POWER SUPPLY COMPONENTS.

The AM-2.5E and AM-5E 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 judgment, care, and common sense must be practiced to prevent accidents.

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.

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.

5.2 FIRST LEVEL MAINTENANCE.

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.

5.3 ROUTINE MAINTENANCE.

WARNING
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.

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.

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.

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.

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.

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.

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.

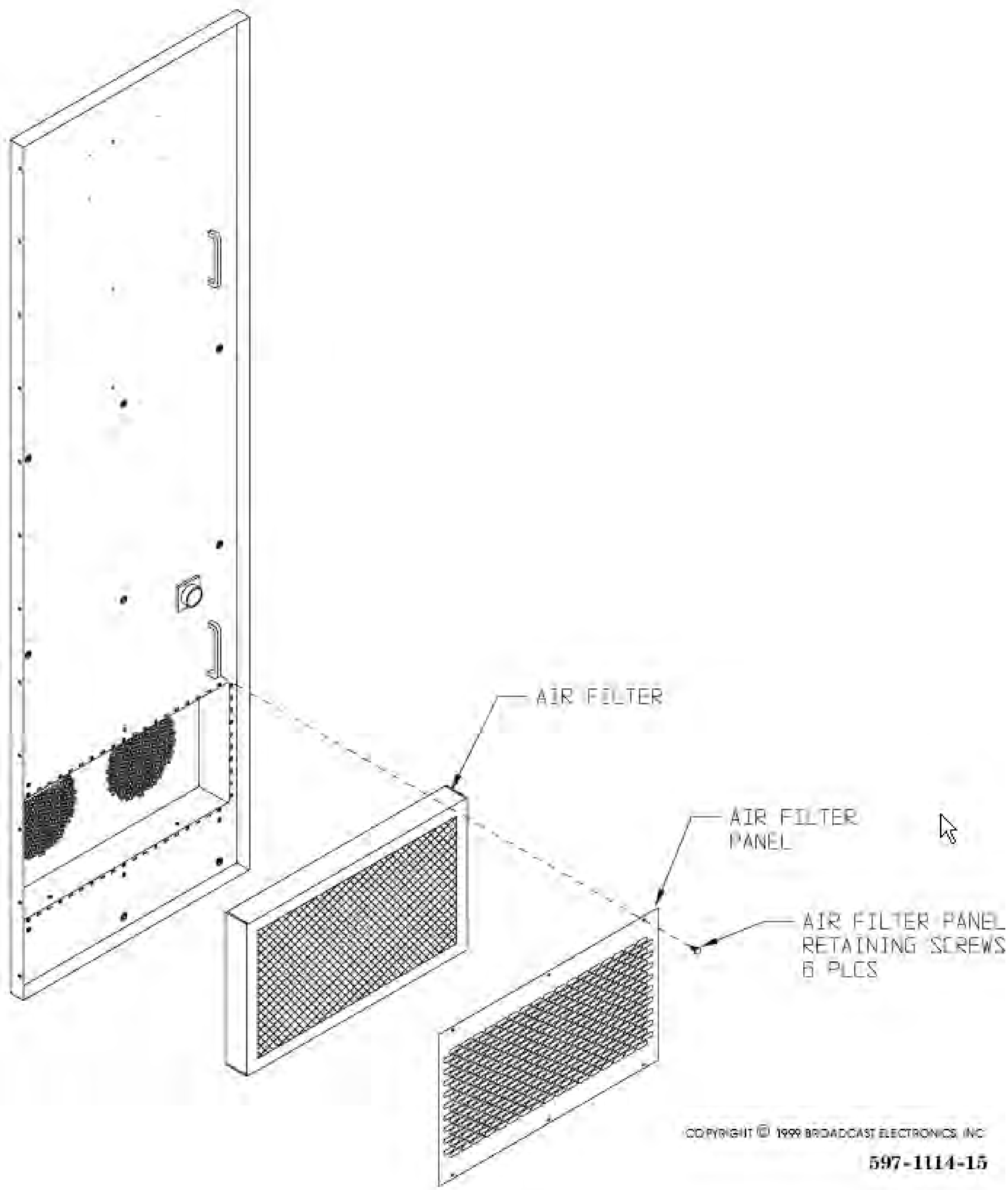


Figure 5-1: REMOVING THE AIR FILTER

5.4 SECOND LEVEL MAINTENANCE.

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
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.

The maintenance philosophy for the AM-2.5E/AM-5E transmitters consists of isolating a problem to a specific area. Once the specific area is located, subsequent troubleshooting using the information in the following text and the modular sections in PART II of this manual 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.

5.5 ELECTRICAL ADJUSTMENTS.

WARNING
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.

Adjustment procedures for controls associated with the transmitter circuitry is presented in the ECU, output network, RF power module, and power supply module sections of this manual. Determine the transmitter modular component requiring adjustment and refer to the appropriate section of this manual for the adjustment procedures.

TRANSMITTER FREQUENCY RE-PROGRAMMING.

The AM-2.5E and AM-5E 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 cannot 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 Technical Service department.

5.6 TROUBLESHOOTING.

WARNING
WARNING

THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING
WARNING

DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.

The AM-2.5E/AM-5E 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 transmitter output network, RF power module, RF 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..

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-2.5E/AM-5E 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 all RF power modules are operating normally. YELLOW DISPLAY – Indicates one or more RF power modules are removed from the transmitter for maintenance. RED DISPLAY – Indicates a modulator or power amplifier circuit board fault in one or more RF power modules.
POWER SUPPLY	GREEN DISPLAY – Indicates normal power supply operation. RED DISPLAY – Indicates an open loop or over-voltage fault in one or more power supply modules. YELLOW DISPLAY – Indicates one or more power supplies are 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. In the AM-2.5E, indicates a 100 watt reflected power condition or a condition which results in a high forward power indication of greater than 20%. In the AM-5E, indicates a 200

	watt reflected power condition or a condition which results in a high forward power indication of greater than 20%. FLASHING RED DISPLAY – Indicates a reflected power emergency condition. In the AM-2.5E, indicates a 500 watt reflected power condition. In the AM-5E, indicates a 1000 watt reflected power condition.
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.
CONFLICT	Illuminates to indicate an incorrect power level is selected for operation into the antenna connected to the transmitter.
LIGHTNING	In the AM-2.5E, illuminates to indicate a 1500 volt or greater potential is present at the transmitter output. In the AM-5E, illuminates to indicate a 2100 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 70˚C or (158˚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.
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.
POWER SUPPLY 1-2	Illuminates to indicate an open loop, over-current, or over-voltage fault in the 1-2 power supply. The supply provides power for modules 1-2.
POWER SUPPLY 3-4 (AM-5E Only)	Illuminates to indicate an open loop, over-current, or over-voltage fault in the 3-4 power supply. The supply provides power for modules 3-4.
Exciter -15V	Illuminates to indicate the ECU -15V supply is operational.

CAUTION
CAUTION

WHEN AC POWER IS APPLIED TO THE TRANSMITTER AND THE RF DRIVE AND PWM DRIVER INDICATORS ON RF POWER MODULES IN A POWER BLOCK ARE EXTINGUISHED, THE RF POWER MODULES MUST BE REMOVED FROM THE TRANSMITTER CHASSIS TO PREVENT DAMAGE TO THE MODLUES.

RF POWER MODULE REMOVAL. When ac power is applied to the transmitter, check the RF DRIVE and PWM DRIVE indicators on the RF power modules. If the RF DRIVE and PWM DRIVE indicators on RF power modules in a power block are extinguished, the RF power modules must be removed from the transmitter to prevent damage to the modules.

TRANSMITTER TROUBLESHOOTING PROCEDURES. Table 5-2 presents overall troubleshooting information for the AM-2.5E/AM-5E 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.

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

Table 5-2: AM-2.5E/AM-5E TROUBLESHOOTING (Sheet 1 of 4)

SYMPTOM	CIRCUITRY TO CHECK
NO OUTPUT POWER NO NORMAL/FAULT INDICATIONS	1. Check the AC line voltage using the reflected power/AC voltage meter. If no line voltage is present, check fuses F1 and F2. 2. Check the $\pm$15 volt and +5 volt indicators on the exciter circuit board. If no indicators are illuminated, check the ECU power supply.
NO OUTPUT POWER NORMAL INDICATIONS 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 the POWER SUPPLY section and troubleshoot the power supply circuit board for no 120 Hz signal output.
RED EXCITER INDICATION	1. Check the lock indicator on the exciter circuit board. If the lock indicator is not illuminated, refer to the ECU section 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 the ECU section and troubleshoot the exciter circuit board. If the transmitter operates, refer to the ECU section and troubleshoot the stereo circuit board.
YELLOW POWER MODULE INDICATION	1. Indicates one or more RF power modules are removed from the transmitter.
RED POWER MODULE INDICATION RED FAULT INDICATION ON A MODULE	1. Refer to the RF POWER MODULE section and troubleshoot the RF power module. 2. Visually inspect the RF power module combiner panel for discolored components.
YELLOW POWER SUPPLY INDICATION	1. Indicates one or more power supply modules are removed from the transmitter.
RED POWER SUPPLY INDICATION	1. Check for an over-temperature condition by inspecting the fans and filter. 2. If the fans and filter are normal, use the power supply fault display circuit boards in each cabinet to determine the defective power supply module. When the defective power supply is located, refer to the POWER SUPPLY MODULE section and troubleshoot the power supply module.
YELLOW ANTENNA INDICATION	1. Check the antenna and phasor equipment. 2. Visually inspect the T-matching network for discolored components. 3. Refer to the OUTPUT NETWORK section and troubleshoot the directional coupler circuit board.

RED ANTENNA INDICATION	1. Check the antenna and phasor equipment. 2. Visually inspect the T-matching network for discolored components. 3. Refer to the OUTPUT NETWORK section of this manual and troubleshoot the directional coupler circuit board.
FLASHING RED ANTENNA INDICATION	1. Check the antenna and phasor equipment. 2. Visually inspect the spark gap in the output network assembly for a short circuit condition. 3. Check the antenna shorting switch on the output network assembly. 4. Visually inspect the T-matching network capacitors in the output network assembly for a short circuit condition. 5. Check the lightning protection circuit board in the output network assembly for a short circuit condition.
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 J1-23 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.
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 the ECU section and troubleshoot the controller circuit board for a conflict indication.
NO OUTPUT POWER LIGHTNING INDICATOR ILLUMINATED	1. Transmitter operated to off due to 7 on/off cycles with 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. Ensure J1 on output network is connected. 3. Check Q401 on the lightning detection circuit board.
NORMAL OUTPUT POWER LIGHTNING INDICATOR ILLUMINATED	1. Indicates the presence of lightning at the output of transmitter. Depress the RESET switch to reset the indicator.
INTERLOCK INDICATOR EXTINGUISHED	1. Ensure a +5 volt signal is applied to external interlock input J1-23 on the ECU rear panel.
OVERTEMP INDICATOR ILLUMINATED	1. Ensure the transmitter air filter is clean. 2. Check the transmitter fans in each cabinet. If the fans are not

	operating, check optical-coupled-relay (OCR) K1. 3. Ensure the transmitter exhaust area is clear of obstructions.
MISSING NORMAL/FAULT INDICATIONS FOR A POWER BLOCK	1. Check the fuses for the power supply: 1) power supply 1-2 = F6 and F7, 2) power supply 3-4 = F8 and F9 (AM-5E only). 2. Check power transformer T1 on the power supply panel.
NO L+R MODULATION ACTIVITY DURING MONO OPERATION	1. Ensure audio is present at J3-1/J3-2/J3-4/J3-5 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 the ECU section and troubleshoot the exciter circuit board.
NO L+R MODULATION ACTIVITY DURING STEREO OPERATION	1. Ensure audio is present at J3-1/J3-2/J3-4/J3-5 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 the ECU section and troubleshoot the exciter circuit board.

RF DRIVE INDICATORS EXTINGUISHED FOR A POWER BLOCK	1. Check the RF drive output on the ECU motherboard as follows: 1) output 1-P101-7 and 2) output 2-P101-47 (AM-5E only).
	    1. If no RF drive is present, refer to the ECU section and troubleshoot the exciter circuit board.
	    2. If RF drive is present at the exciter circuit board, check bridge rectifiers D10 and D11 on the power supply module for the power block.
	2. Refer to the RF POWER MODULE section and troubleshoot the RF power module.

LOW DEMODULATOR LEFT CHANNEL MODULATION LEVEL WITH LOW EXCITER MONITOR LEFT CHANNEL MODULATION LEVEL	1. Refer to the ECU section and troubleshoot the exciter circuit board.
LOW DEMODULATOR RIGHT CHANNEL MODULATION LEVEL WITH LOW EXCITER MONITOR RIGHT CHANNEL MODULATION LEVEL	1. Refer to the ECU section and troubleshoot the exciter circuit board.
LOW DEMODULATOR LEFT CHANNEL MODULATION LEVEL WITH NORMAL EXCITER MONITOR LEFT CHANNEL MODULATION LEVEL	1. Refer to the ECU section and troubleshoot the stereo circuit board.
LOW DEMODULATOR RIGHT CHANNEL MODULATION LEVEL WITH NORMAL EXCITER MONITOR RIGHT CHANNEL	1. Refer to the ECU section and troubleshoot the stereo circuit board.

MODULATION LEVEL	
PWM DRIVE INDICATOR EXTINGUISHED ON A POWER BLOCK	1. Refer to the ECU section and troubleshoot the exciter circuit board.
PWM DRIVE AND RF DRIVE INDICATORS EXTINGUISHED ON ALL POWER BLOCKS	1. Refer to the ECU section and troubleshoot the exciter circuit board.
MOD PWR INDICATORS EXTINGUISHED ON A POWER BLOCK	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 the POWER SUPPLY section and troubleshoot the power supply for no MOD POWER indicator on a power block.
REFLECTED POWER METER FLUCTUATES WITH MODULATION	1. Narrow-band antenna. Contact the Broadcast Electronics Technical Service Department.
FORWARD POWER METER FLUCTUATES WITH MODULATION	1. Enable the high-pass filter on the exciter circuit board.

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.

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.

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.

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 RF CAUTIONARY INSTRUCTIONS.

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.

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.

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.

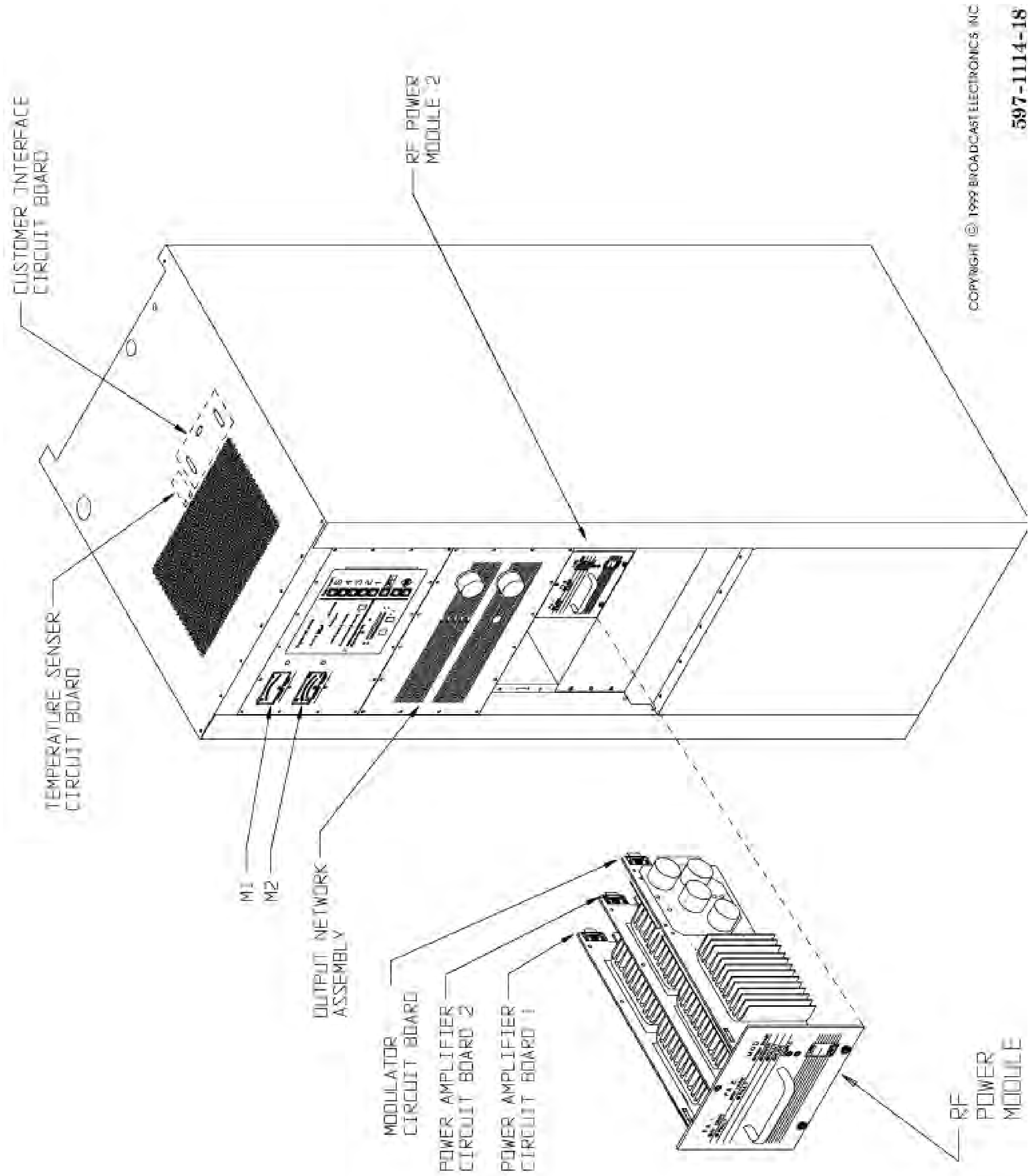
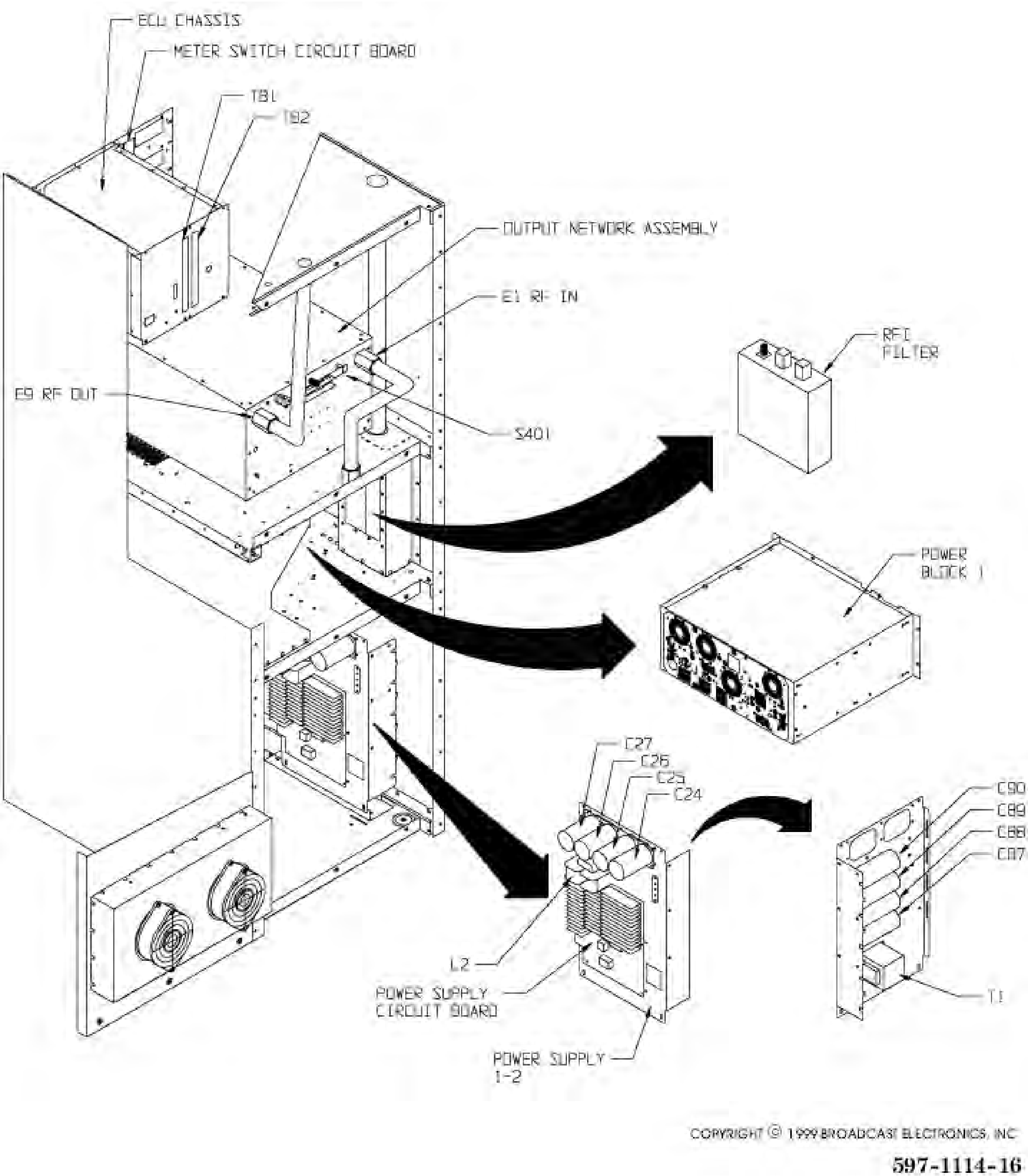
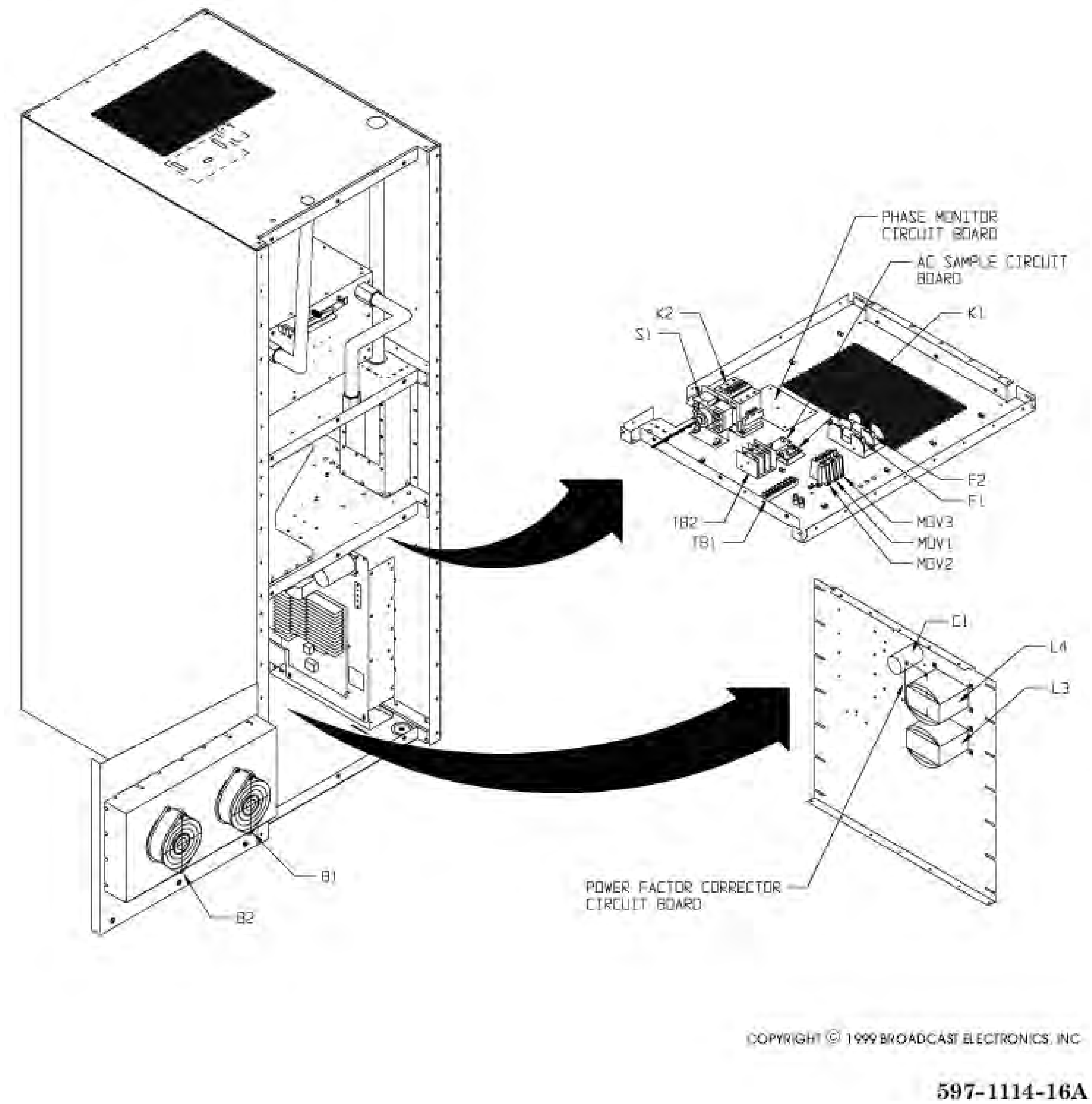


Figure 5-2: AM-2.5E COMPONENT LOCATOR (SHEET 1 OF 3)



5-2. AM-2.5E COMPONENT LOCATOR (SHEET 2 OF 3)



5-2. AM-2.5E COMPONENT LOCATOR (SHEET 3 OF 3)

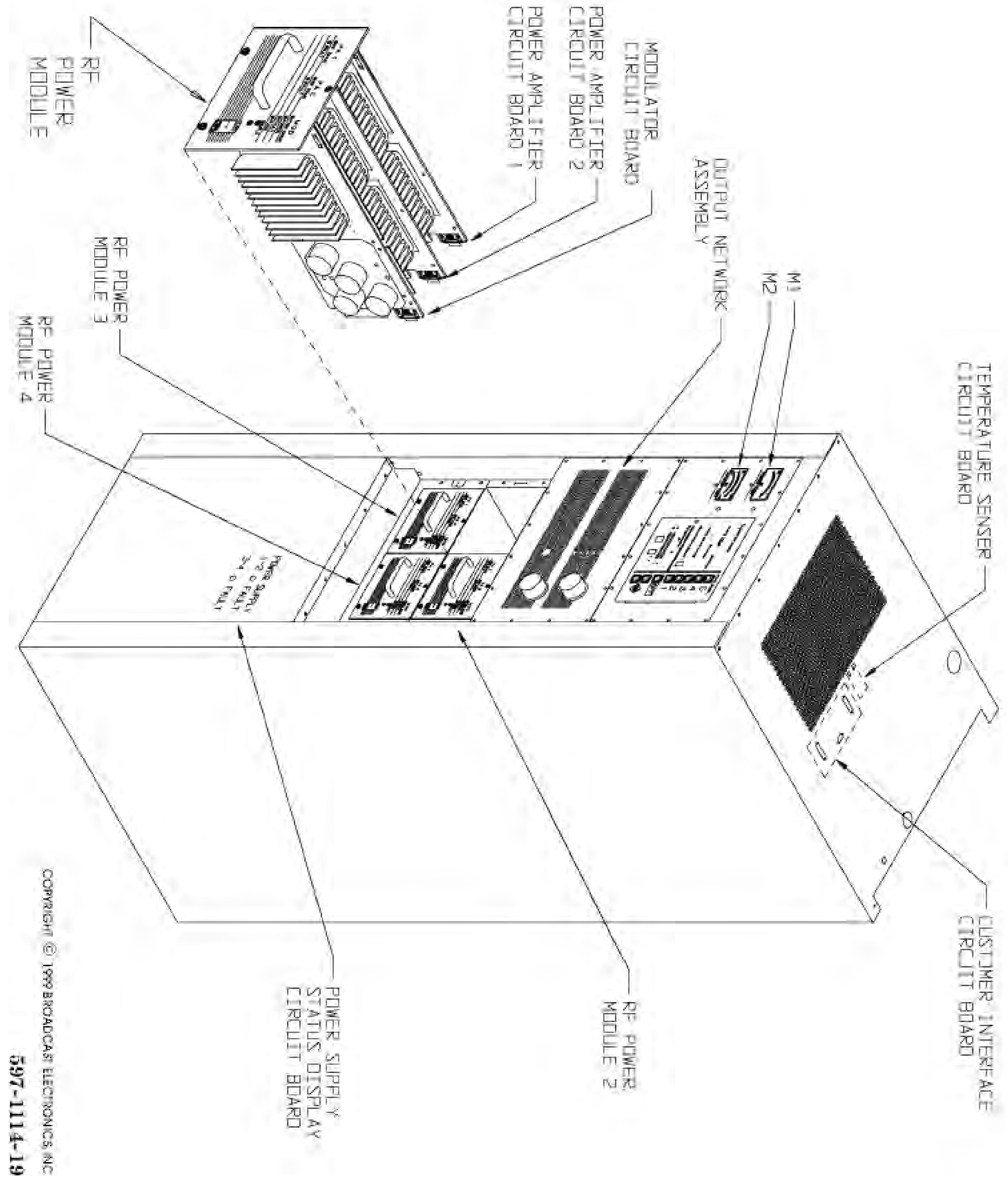


Figure 5-3: AM-5E COMPONENT LOCATOR (SHEET 1 OF 3)

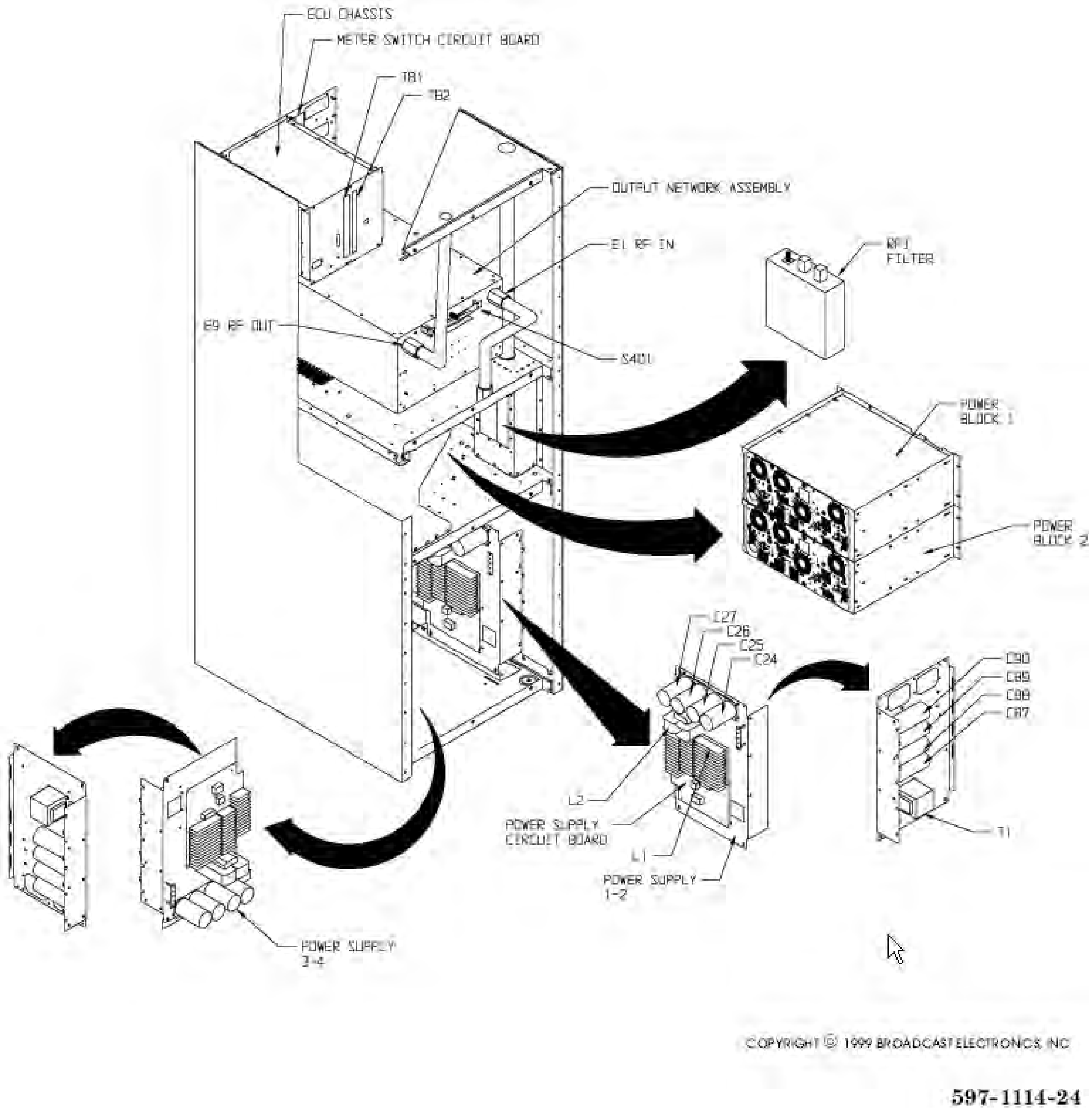


FIGURE 5-3. AM-5E COMPONENT LOCATOR (SHEET 2 OF 3)

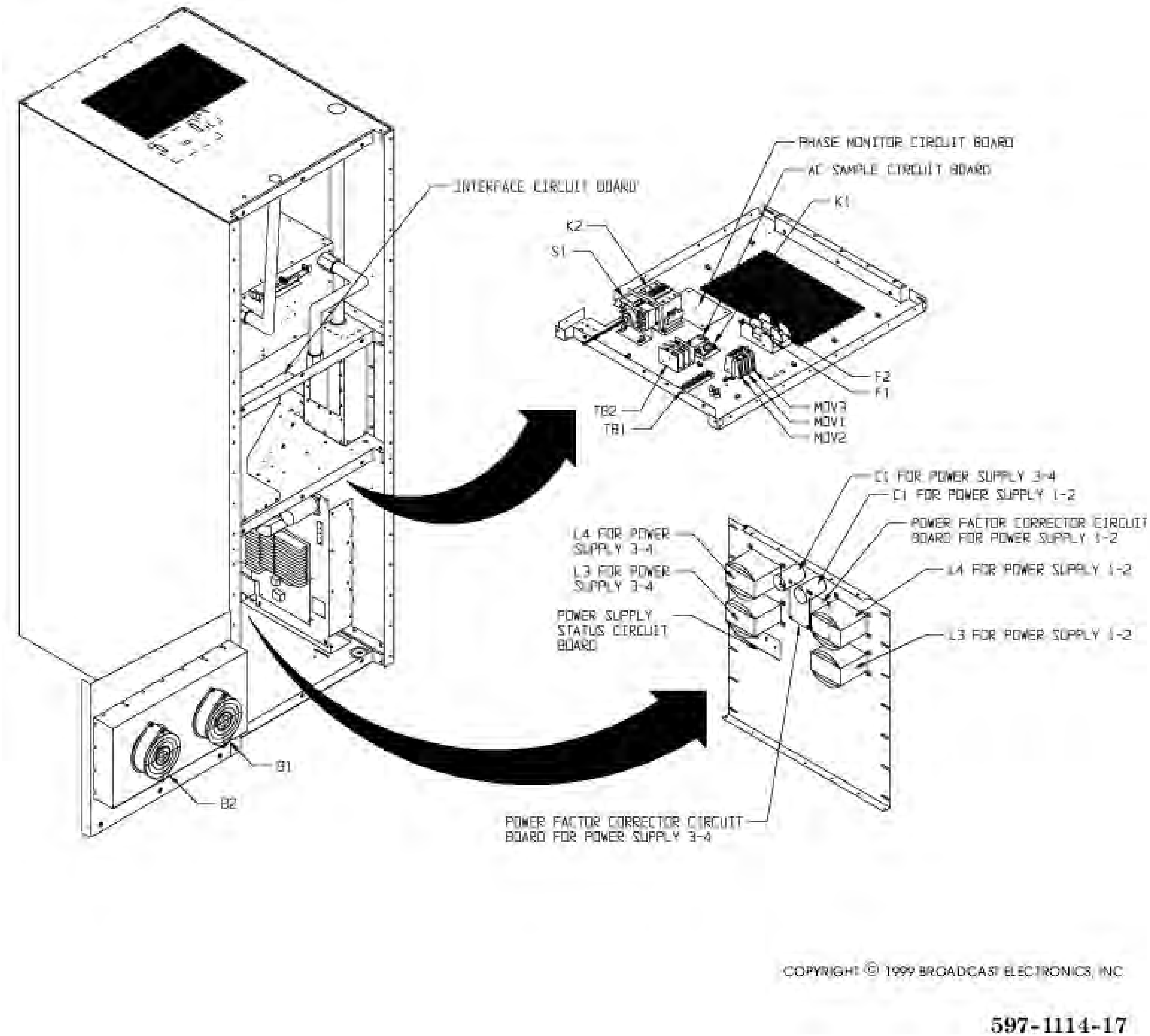
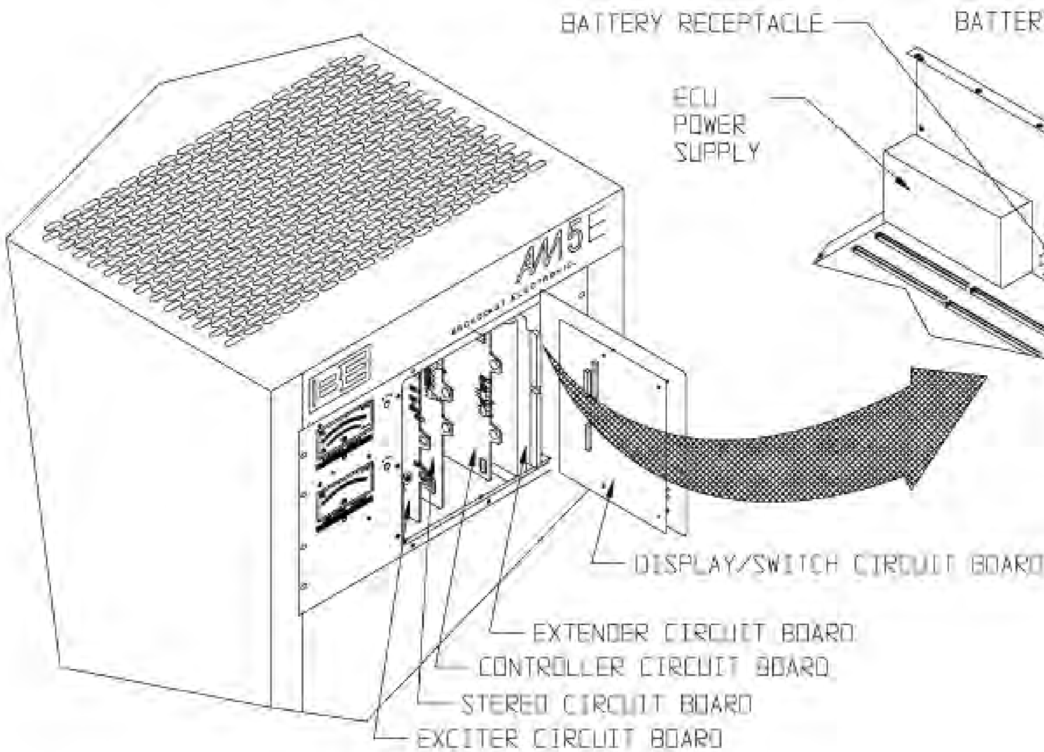
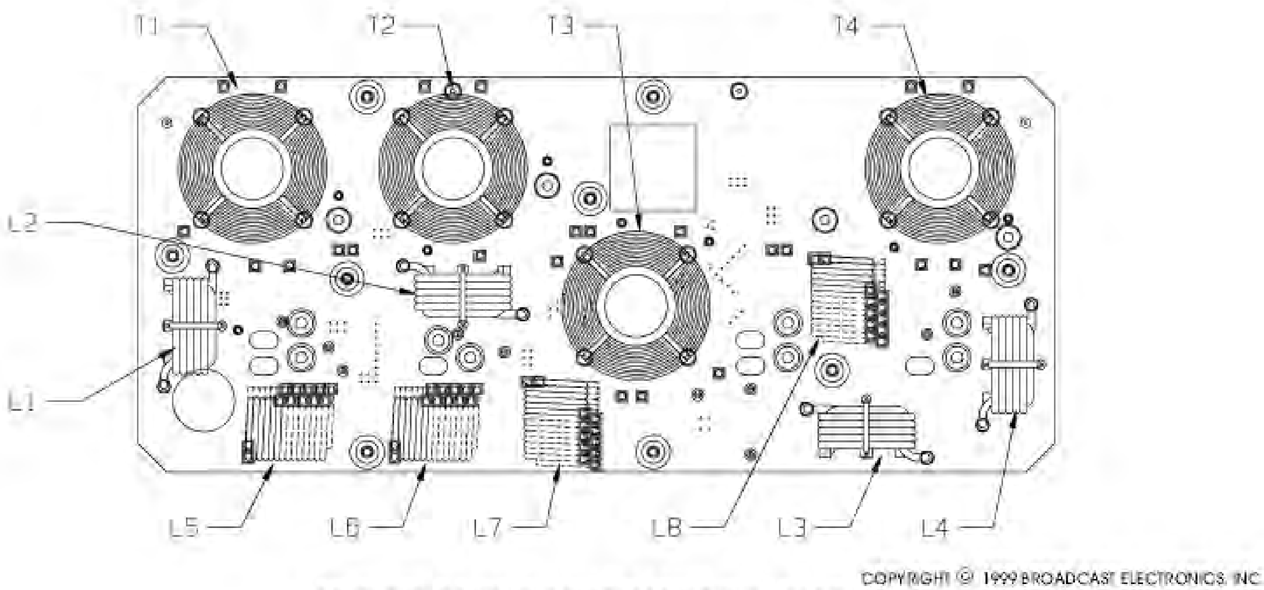


FIGURE 5-3. AM-5E COMPONENT LOCATOR (SHEET 3 OF 3)



ECU COMPONENT LOCATOR



POWER BLOCK COMPONENT LOCATOR

Figure 5-4: AM-2.5E/AM-5E ECU/POWER BLOCK/OUTPUT NETWORK
ASSEMBLY COMPONENT LOCATOR (SHT 1 OF 2)

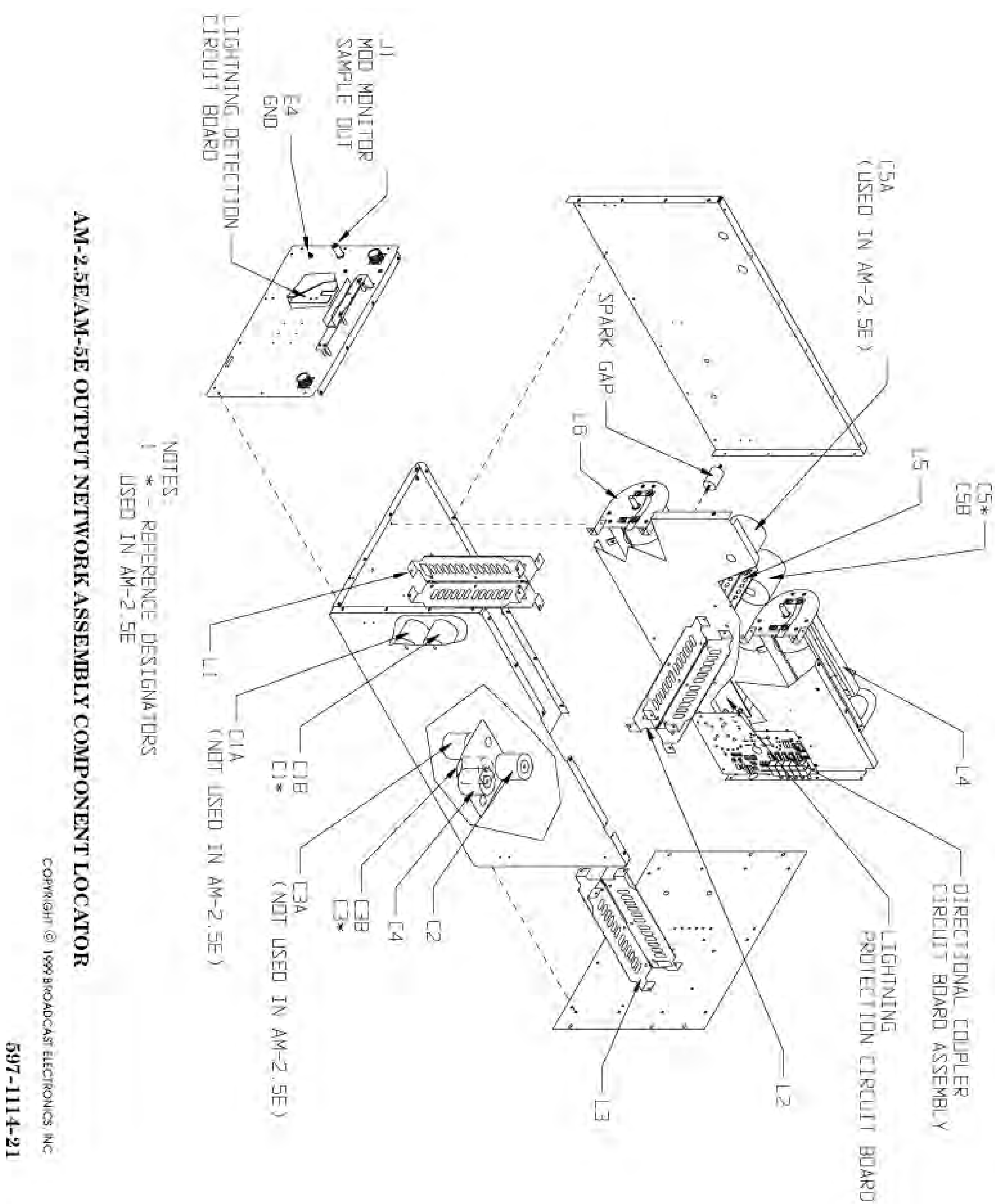


FIGURE 5-4. AM-2.5E/AM-5E ECU/POWER BLOCK/OUTPUT NETWORK ASSEMBLY COMPONENT LOCATOR (SHT 2 OF 2)

6 POWER SUPPLY THEORY OF OPERATION

This section presents a detailed description of the Broadcast Electronics AM-2.5E/AM-5E transmitter power supply assembly.

DC operating potentials for the RF power modules are provided by power supply assemblies (refer to Figure 6-1). The power supply assembly consists of: 1) a power supply circuit board and 2) filter and transformer components located on a power supply panel.

One power supply assembly provides dc operating potentials for one power block. The AM-2.5E transmitter is equipped with 1 power supply assembly. The AM-5E transmitter is equipped with 2 power supply assemblies.

The modular design of the power supply assembly allows the power supply circuit board to be removed from the transmitter for maintenance. The following text presents a description of the power supply circuit board and the components located on the power supply panel assembly.

6.1 AC INPUT.

AC power from the ac input switch is applied through fuses F6 and F7 to power transformer T1. Fuses F6 and F7 protect the circuitry from over-current conditions. Transformer T1 consists of: 1) a single primary winding and 2) five secondary windings. The transformer is designed to provide low-voltage ac samples for application to five conventional bridge rectifier circuits.

6.2 CONVENTIONAL RECTIFIER CIRCUITRY.

AC power from a winding of power transformer T1 is applied to bridge rectifier D11. D11 rectifies the ac potential into an unregulated 30V dc supply for application to the RF power module power amplifier circuit boards. Capacitor C21 provides filtering for the supply.

AC power from a second winding of transformer T1 is applied to bridge rectifier D10. D10 rectifies the ac potential into an unregulated +20V dc supply for the power supply circuit board circuitry. Capacitor C20 provides filtering for the supply. AC power from a third winding of ac power transformer T1 is applied to bridge rectifier D9. D9 rectifies the ac potential into an unregulated +20 volt dc supply for application to: 1) the modulator circuit board and 2) to regulator U3. U3 is a +15 volt dc regulator. The output of U3 routed for application to the components on the power supply circuit board. AC power from a fourth winding of power transformer T1 is applied to bridge rectifier D12. D12 rectifies the ac potential into an unregulated +15V dc supply for application to: 1) the power supply circuit board and 2) regulator U4. U4 is a +12 volt dc regulator. The output of U4 routed for application to the components on the power supply circuit board. An ac sample from the winding is routed for application to a soft-start circuit. Capacitor C15 provides filtering for the supply.

6.3 SOFT-START CIRCUIT.

An ac sample from the winding of T1 is also routed to a soft-start circuit. The soft-start circuit is designed to eliminate component stress during turn-on by limiting the current in-rush. The circuit consists of an ac line detection/synchronization and soft-start control circuits.

6.3.1 AC Line Detection/Synchronization.

An ac sample from a winding of transformer T1 is rectified by diodes D7 and D8 and applied to integrated circuit U6B. U6B functions as a zero phase detector. As the ac line phase approaches zero degrees, U6B will output a HIGH pulse. The HIGH pulse is applied to: 1) transistor Q2, 2) transistor Q7 of the soft-start circuit, and 3) ac line detector U5A/U5B. The pulse biases transistor Q2 and optical coupler U2 on. Q2 and U2 will output a pulse each time the ac line phase is zero. As a result, U2 will output a 120 Hz signal to the controller circuit board.

U5A and U5B function as an ac line voltage detector. When ac line voltage is present, U5A will output a LOW. The LOW allows transistor Q3 to be biased on. With Q3 on, a +12 volt dc signal is applied to optical coupler U1. When a power supply enable and a PWM OK signal is applied to U1, U1 will output a reference voltage to a soft-start control circuit for power supply operation. When ac line voltage is not present, U5A will output a HIGH, the HIGH biases transistor Q3 off to terminate power supply operation. When ac power is re-applied, U5B will maintain a HIGH for 100 milliseconds to allow the circuit to stabilize during turn-on operations.

In addition to the ac line voltage detection circuit, integrated circuit U6A functions as a low line voltage detector. When the dc supply is above the threshold at U6A, U6A will output a LOW to bias transistor Q1 off. As a result, a HIGH ac OK signal indicating acceptable ac line voltage is applied to optical coupler U9. When the dc supply is below 185 volts, U6A will output a HIGH to bias transistor Q1 on. As a result, a LOW ac OK signal indicating low ac line voltage is applied to optical coupler U9. When the voltage increases to approximately 190 volts, the output of U6A will go LOW to enable the power supply.

This circuit is also used to detect high ac line voltage potentials. If the ac line voltage is above approximately 270 volts, transistor Q28 will be biased on. With Q28 on, the input to U6A will be muted. When the input is muted: 1) the transmitter output power will be muted and 2) no transmitter fault or emergency condition will be generated.

6.3.2 Soft-Start Control Circuit.

The soft-start control circuit consists of: 1) transistors Q4 through Q9 and 2) integrated circuit U7. The circuit is designed to generate short duration pulses in each time the ac line waveform crosses the 0 volt axis. The pulses are applied to an SCR controlled rectifier to slowly bias the components on during initial start operations. This operation eliminates the component stress at power-on by limiting the supply in-rush current.

The circuit generates the soft-start pulses from two signals: 1) a ramp signal and 2) a triangle signal. The ramp signal is generated by transistors Q4 and Q5. When ac line voltage is detected, a +12 volt signal from U1 is applied to transistor Q4. Q4 operates in association with capacitor C16 and transistor Q5 to generate a ramp voltage. The triangle signal is generated by transistors Q6 and Q7. Pulses from U6B are applied to transistor Q7. Q7 operates in association with capacitor C17 and transistor Q6 to generate a triangle signal. The triangle signal and the ramp signal are applied to comparator U7. U7 responds by generating a square-wave signal with a short duty cycle when the ac line phase is zero. The square-wave signal from U7 is applied to soft-start driver transistors Q8 and Q9. Q8 and Q9 will slowly bias the rectifier circuit on to limit the current in-rush.

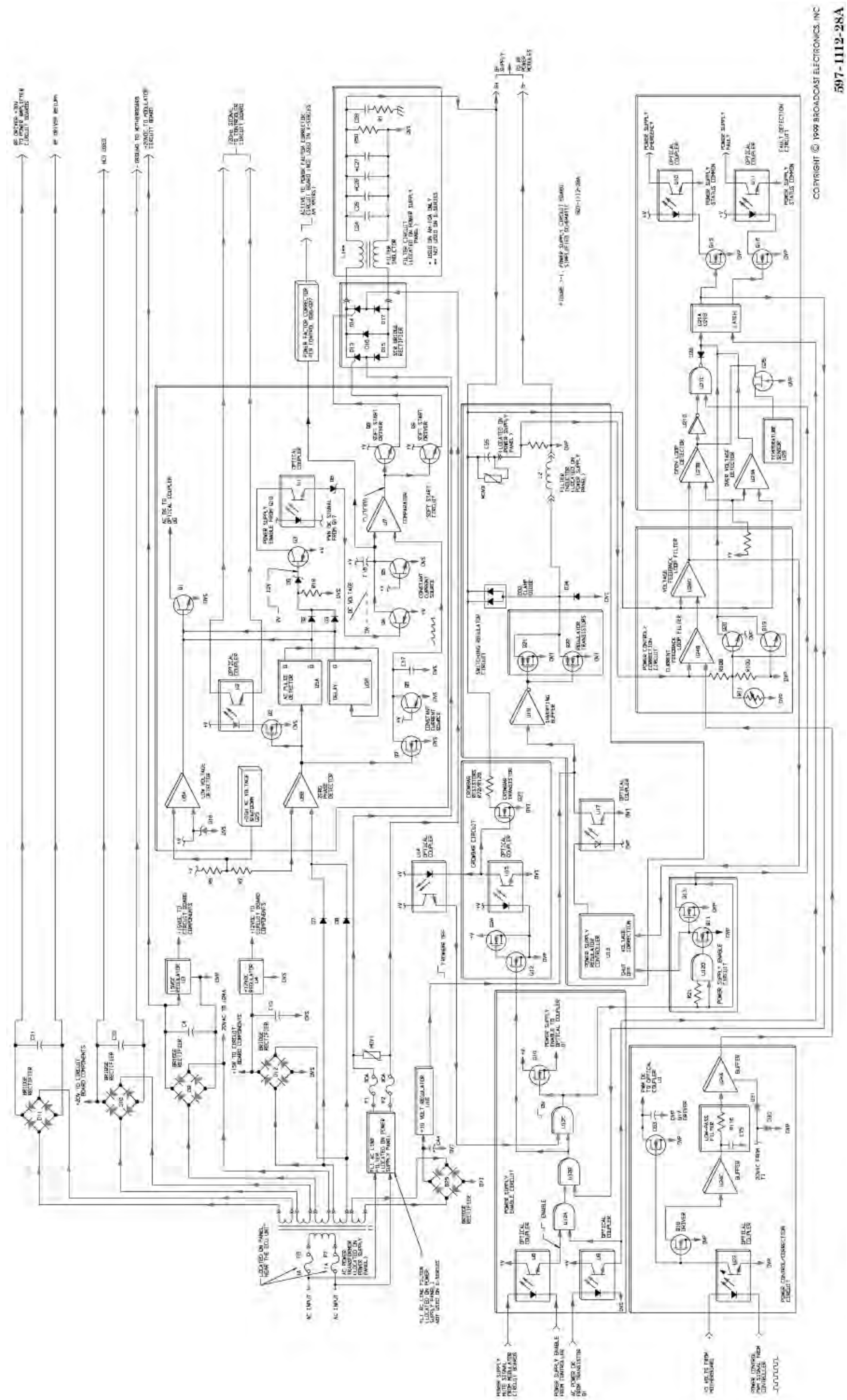


Figure 6-1: POWER SUPPLY CIRCUIT BOARD SIMPLIFIED SCHEMATIC

6.4 POWER FACTOR CORRECTOR CIRCUIT BOARD CONTROL CIRCUIT.

Transistors Q26 and Q27 control a power factor corrector circuit board. During soft-start operation, ramp voltage will drop below approximately 3V. When this occurs, the output of transistor Q26 will go LOW. This LOW biases transistor Q27 on. With Q27 on, a LOW energizes two relays on the power factor corrector circuit board. With the relays energized, a capacitor is inserted into the circuit to enable power factor correction.

6.5 SCR CONTROLLED RECTIFIER CIRCUIT.

The ac line voltage is rectified into a main dc supply for the modulator and amplifier circuitry by an SCR controlled bridge rectifier circuit. Primary ac power for the main dc supply is applied to fuses F1 and F2. The fuses protect the power supply circuitry from over-current conditions. Metal-Oxide-Varistor MOV1 prevents damage to the rectifier circuitry from ac line voltage surge potentials.

The SCR controlled rectifier circuit consists of diodes D15 through D17 and SCRs D13 and D14. The rectifier circuit is controlled by the soft-start control circuit. When power is required from the circuit, the soft-start circuit will output synchronized ac line pulses to SCRs D13 and D14. The SCRs will respond by slowly biasing the rectifier circuit on. The rectifier will output an unregulated and unfiltered dc supply at a maximum of 300V to an inductor and capacitor filter network located on the power supply panel.

6.6 FILTER CIRCUIT.

The output of the rectifier circuit is applied to a filter network consisting of capacitors C24 through C27. The filter is designed to remove the ripple in the supply. The output of the capacitor network generates the positive leg of the B supply. The B supply is the main operating supply for the RF power modules. The negative leg of the B supply is generated by a switching regulator circuit (refer to the following text).

6.7 POWER SUPPLY ENABLE CIRCUIT.

The power supply is controlled by a: 1) power supply enable signal from the controller and 2) power supply mute signal from the modulator circuit boards. When power supply operation is required, the controller will output a LOW power supply enable signal to optical coupler U8. With no mute signals present, U8 will output a HIGH to AND gate U12A.

With a HIGH ac OK signal from U9 indicating the presence of ac power and no power supply faults, U12A will output a HIGH to U12B. With a HIGH from U21A/U21B, U12B will output a HIGH to U12C and to Q12. With a HIGH from U14 indicating the crowbar circuit is off, U12C will output a HIGH after a one second delay to: 1) transistor Q10, 2) AND gate U12D, and 3) NAND gate U21C. The HIGH biases Q12 and U15 on to disable the crowbar circuit. Q10 will respond by routing a HIGH power supply enable signal to optical coupler U1. U1 will output a dc voltage to enable the power supply soft-start circuit. AND gate U12D will output a HIGH to transistor Q11. The HIGH biases Q11 on to enable regulator controller U13 and bias Q13 off.

When a power supply mute operation is required, an RF power module modulator circuit board will output a mute signal to optical coupler U8. U8 will output a LOW to AND gate U12A. With a HIGH ac OK signal from U9, U12A will output a LOW to U12B. U12B will output a LOW to U12C and to Q12. The LOW biases Q12 and U15 off to enable the crowbar circuit. U12C will output a LOW to: 1) transistor Q10, 2) AND gate U12D. Q10 will be biased off to terminate power supply operation by disabling the drive to the SCR rectifier circuit. U12D will disable Q11 which allows a HIGH to disable regulator controller U13 and bias Q13 on. Q13 will output a LOW to disable the fault detection circuit to prevent erroneous fault indications during mute conditions.

6.8 SWITCHING REGULATOR CIRCUIT.

The B supply is regulated and controlled by a switching regulator circuit. The switching regulator circuit generates the - leg of the B supply and consists of: 1) a low voltage power supply circuit, 2) a power control network, 3) optical coupler U17, 4) inverting buffer U19, and 5) switching regulator transistors Q21 and Q22.

6.8.1 Low Voltage Power Supply.

A dc operating supply for the optical couplers and the inverting buffers is generated by bridge rectifier D25. D25 full-wave rectifies an ac potential from ac transformer T1 into an unregulated +20V supply. The supply is applied to +18V regulator U16. The output of U16 is further regulated to a 5V operating potential by a resistive divider and a zener diode. The 5V supply is applied to optical coupler U17 and buffer U19.

6.8.2 Switching Regulator Control Circuit.

The switching regulator circuit is controlled by: 1) regulator controller U13 and 2) a power control/correction circuit. The circuits function in a closed-loop to control the operation of the switching regulator. As a result, the regulator outputs a precision dc operating voltage at the appropriate level for application to the RF power modules.

Integrated circuit U13 functions as the switching regulator controller. U13 is a PWM output device designed to produce two out-of-phase square wave signals with varying duty cycles. The duty cycle is varied in response to the signal from the voltage correction circuit. With a correction voltage present at U13, U13 will output a PWM square wave signal to optical coupler U17. U17 provides isolation for the transition of the signal from two different circuit ground potentials. The output of coupler U17 is inverted by inverting buffer U19.

6.8.3 Switching Regulator Circuit Operation.

The PWM output of U19 is applied to the gates of IGBT (insulated-gate-bipolar-transistor) switching regulator transistors Q21 and Q22. The transistors function to regulate the negative leg of the B supply. The output of the transistor switching regulator circuit is applied to filter inductor L2. Protection of the transistors from switching transients during turn on/off operation is provided by clamp diode D32. Capacitor C55 provides filtering for the negative leg of the B supply. The output of the regulator circuit (B- leg) is applied to circuitry on the modulator circuit board.

6.9 POWER CONTROL/CORRECTION CIRCUIT.

The switching regulator output voltage is controlled by a PWM (pulse-width-modulated) signal from the controller. The PWM signal is a 1 kHz square-wave signal with a duty cycle which varies in response to different power levels. The PWM signal from the controller is applied to optical coupler U22. With a +5 volt signal from the motherboard, U22 will output the PWM signal to transistors Q17 and Q18. Q17 will discharge capacitor C63 when a 1 kHz control signal is present. C63 will output a LOW PWM OK signal to optical coupler U1. Q18 inverts the power control PWM signal. The output of Q18 is applied through buffer U24C to a low-pass filter consisting of: 1) resistors R115, R116, and R117 and 2) capacitors C75, C76, and C77. The filter converts the power control PWM squarewave signal into a dc control voltage. The voltage is routed through buffer U24A to U24B.

U24B functions as a current feedback loop filter. U24B differentially amplifies the dc control voltage and a current sample from the switching regulator output filter capacitor. As a result, U24B produces a dc control voltage for application to U24D. 1-37. U24D functions as a voltage feedback loop filter. U24D differentially amplifies the control voltage from U24B and a voltage sample from the B+ leg of the supply. As a result, U24D produces a dc control voltage for application to: 1) switching regulator controller U13 and 2) a fault detection circuit. U13 will respond to the correction voltage by changing the duty cycle of the PWM drive signal to optical coupler U17. The switching regulator circuit will respond by changing the output voltage to a level required by the power control PWM signal.

6.10 FAULT DETECTION.

A fault detection circuit monitors the regulator for four conditions: 1) over-voltage, 2) open-loop, 3) over-current, and 4) over temperature. Over-voltage conditions are monitored by U23A. U23A compares a sample of the B+ leg to a reference voltage. When the B+ sample exceeds the reference voltage, the output of U23A will go LOW. The LOW is routed to fault detector latch U21A/U21B. Open-loop conditions are monitored by U23B. U23B compares a correction voltage sample to a reference voltage. When the correction voltage sample exceeds the reference, the output of U23B will go LOW. The LOW is inverted at U21D and applied to NAND gate U21C. With a HIGH power supply enable signal from U12C, U21C will output a LOW to fault detector latch U21A/U21B.

Over-current conditions are monitored by transistors Q19 and Q20. When an over-current condition occurs, Q19 and Q20 will output a LOW. The LOW is routed to fault detector latch U21A/U21B. Over-temperature conditions are monitored by temperature sensor U25. When the power supply temperature exceeds 72 degrees C, U25 will output a LOW through transistor Q25 to U21D. The LOW is inverted at U21D and applied to NAND gate U21C.

With a LOW from U21C or U23A, latch U21A/U21B will: 1) output a HIGH to transistor Q16 and 2) output a LOW to transistor Q15 and to U12B. Transistor Q16 will be biased on and will output a LOW to enable optical coupler U11. U11 will respond by generating a power supply fault signal. AND gate U12B will output a LOW to: 1) disable regulator controller U13, 2) disable the SCR controlled rectifier circuit, and 3) initiate a logic sequence to enable the crowbar circuit (refer to the following text). Transistor Q15 will be biased off and will disable optical coupler U10. The output of U10 will open.

The output of U10 is connected in parallel with U10 on each power supply circuit board. When the output of U10 on each power supply circuit board is open, a HIGH power supply emergency signal to be applied to the controller. The power supply emergency signal indicates all power supply modules contain fault conditions.

6.11 CROWBAR CIRCUIT.

The power supply circuit board is equipped with a crowbar circuit to discharge the B supply during power supply off, ac off, and power supply mute conditions. The crowbar circuit consists of: 1) crowbar MOSFET Q23 and 2) resistor R72. Control of the circuit is provided by logic gates which monitor power supply off, ac off, and power supply mute conditions.

During a power supply off, ac off, or power supply mute condition, AND gate U12A will output a LOW to U12B. With a HIGH from U21A/U21B, U12B will output a LOW to transistor Q12. The LOW biases Q12 and optical coupler U15 off. As a result, a HIGH is applied to the gate of crowbar

MOSFET Q23. The HIGH biases Q23 on to short the B supply and discharge capacitors C24, C25, C26, C27 and C55. Resistor R72 limits the current during shorting operations.

When U15 is biased off, optical coupler U14 will also be disabled. With U14 disabled, a LOW is applied to U12C. U12C will output a LOW to disable the PWM drive to the switching regulator circuit.

6.12 POWER SUPPLY CIRCUIT GROUNDS.

The power supply circuit board is equipped with three isolated circuit grounds: 1) 0VS, 2) 0VP, and 3) 0VI. The circuit grounds are at different potentials and are not referenced to earth ground. The 0VS ground is the circuit ground for the: 1) SCR controlled bridge rectifier circuit, 2) soft-start control circuit, 3) ac line voltage detector circuit, and 4) low voltage detection circuit. The 0VP circuit ground is used to create the negative leg of the B supply. The 0VI ground is the circuit ground for the: 1) crowbar circuit, 2) switching regulator circuit, 3) inverting drive buffers, and 4) switching regulator transistors. The circuit grounds are used in association with the circuitry to generate the operating voltages for the RF power modules.

6.13 POWER SUPPLY CIRCUIT BOARD MAINTENANCE

This section provides maintenance information for the AM-2.5E/AM-5E transmitter power supply circuit board assembly.

6.13.1 Safety Considerations.

WARNING
WARNING

THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CABINET WHICH IS AT EARTH POTENTIAL.

WARNING
WARNING

DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER OUTPUT NETWORK, RF POWER MODULE, RF COMBINER, OR POWER SUPPLY COMPONENTS.

The AM-2.5E/AM-5E 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 judgment, care, and common sense must be practiced to prevent accidents.

In addition to high voltages and currents, the 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

6.14 FIRST LEVEL MAINTENANCE.

First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

6.15 CLEANING AND INSPECTION.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE
WARNING PROCEEDING.

Ensure all transmitter primary power is disconnected and clean a circuit board of accumulated dust as required using a nylon bristle brush and vacuum cleaner. Inspect the circuit board for improperly seated semiconductors and components damage by overheating. In addition, inspect the circuit board for loose hardware. Repeat the procedure for each power supply circuit board in the transmitter.

6.16 SECOND LEVEL MAINTENANCE.

Second level maintenance is the performance of procedures required to restore a power supply circuit board to operation after a fault has occurred. The power supply circuit board contains no adjustments. Therefore, the following text presents only troubleshooting procedures.

6.17 TROUBLESHOOTING.

WARNING THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND
WARNING DC POTENTIALS WITH RESPECT TO THE CABINET WHICH IS AT EARTH POTENTIAL.

WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO
WARNING THE TRANSMITTER OUTPUT NETWORK, RF POWER MODULE, RF COMBINER, OR POWER SUPPLY COMPONENTS.

6.17.1 Safety Considerations.

The AM-2.5E/AM-5E 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 transmitter output network, RF power module, RF 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

6.17.2 Removing/Installing a Power Supply Circuit Board.

A 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 a power supply circuit board, proceed as follows:

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

Disconnect all transmitter primary power.

To remove a power supply circuit board, proceed as follows:

1. Refer to Figure 5-2 and Figure 5-3 in SECTION V, MAINTENANCE and locate the desired power supply circuit board to be removed.

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 cabinet.

6.17.3 Troubleshooting Procedures.

The power supply module troubleshooting procedures are presented in Table 6-1. 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 and schematic diagrams to assist in problem resolution.

Table 6-1: POWER SUPPLY MODULE TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
RED POWER SUPPLY INDICATION	1. Check for an over-temperature condition by inspecting the fans and filter. 2. 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. 3. Place the negative lead on the drain of Q21 and the positive lead on the source and determine if a short circuit condition is present. 4. If a short circuit condition is present, defective Q21. B. Repeat the procedure for transistor Q22. 3. 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. 4. Visually inspect crowbar resistor R72. 5. Check SCRs D13/D14 and diodes D15, D16, and D17 for a short circuit condition. 6. Replace all blown fuses on the circuit board.
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 U3 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 Technical Service Department.
MOD PWR INDICATORS EXTINGUISHED ON A POWER BLOCK	1. Check U7, U9A, U9B, U9C, U9D, Q9, and Q21.

6.17.4 Component Replacement Procedure.

Component replacement procedures for the power supply circuit board are presented in PART I SECTION V. Refer to COMPONENT REPLACEMENT in SECTION V as required for the replacement procedures.

7 RF POWER MODULE THEORY OF OPERATION

This section presents a detailed description of the Broadcast Electronics AM-2.5E/AM-5E transmitter RF power module.

An RF power module is a plug-in assembly containing two RF amplifier circuit boards and a modulator circuit board. Each RF power module is designed to produce 1375 watts of RF power. The modular design of the RF power assemblies allow the modules to be removed from the transmitter for maintenance. The remaining power modules will provide power to maintain on-air operation. The following text presents a description of the RF power modules.

7.1 MODULATOR CIRCUIT BOARD.

7.1.1 Modulator Circuit.

The modulator circuit board is designed to convert the CMOS level PWM signal from the exciter circuit board into a dc voltage which varies at the audio modulation rate (refer to Figure 1-1). The duty cycle of the 122 kHz to 135 kHz PWM signal is 40% with no audio modulation. The duty cycle varies to allow modulation of the transmitter from -100% to +150%. The PWM signal from the exciter circuit board is applied to integrated circuit U1. U1 is a high-speed optical coupler designed to provide isolation for the transition of the signal from the exciter circuit board ground system to the modulator circuit board ground system. The output of U1 is applied to level converter U11A. U11A converts the 5 volt signal to a 15 volt peak-to-peak signal. The output of U11A is applied to two MOSFET driver stages. A 9.7 volt dc bias signal is incorporated into the PWM signal by resistor R10, and zener diodes D17/D18.

Integrated circuits U2 and U13 are MOSFET driver stages. The outputs switch to: 1) a logic 1 at 2 volts and 2) a logic 0 at 0.8 volts. The output of U2 is applied to the gate of forward converter transistor Q1. The output of U13 is applied to the gate of forward converter transistor Q2. Q1 and Q2 are switched on/off by the PWM signal. The transistors convert the 125 volt B- supply to approximately 50 volts with a nominal PWM duty cycle of 40%. Catch diodes D2 and D3 clamps inductors L1 and L2 to prevent transistor damage from high switching voltages during transistor turn-off operations. A dc operating potential for Q1 and Q2 is provided by the B- supply from the power supply circuit board. Control of the B- leg is provided by relay K1. K1 immediately terminates the power supply during a power supply or modulator failure.

The output of transistors Q1 and Q2 are applied to an LC low-pass filter network consisting of: 1) inductor L1/L3 and capacitor C13 and 2) inductor L2/L3 and capacitor C14. The LC networks function with inductor L4 and capacitors C15/C16/C49 as a fifth-order Bessel low-pass filter designed to remove the 125 kHz frequency from the output signal. The output from L4/C15/C16/C49 is routed: 1) to a monitor circuit and 2) for application to the power amplifier circuit boards.

7.1.2 Modulator Fault Detection Circuits.

The modulator circuitry is monitored for proper operation by four fault detection circuits. The fault detection circuits consist of: 1) a PWM drive detector, 2) a modulator fault detector, 3) a B+ supply fuse fault detector, and 4) a +20 volt power supply fault detector.

7.1.3 PWM Drive Fault Detector.

A sample of the PWM drive signal from integrated circuit U2 is applied to comparator U3A. U3A compares the signal to a reference. When the PWM drive signal is present, the output of U3A will go HIGH. The HIGH is inverted at U5F. U5F will output a LOW to illuminate PWM drive indicator DS1. When the PWM drive signal is not present, the output of U3A will go LOW. The LOW is inverted at U5F. U5F will output a HIGH to extinguish PWM drive indicator DS1.

7.1.4 Modulator Fault Detector.

A sample of the modulator circuit output is applied to comparator U3D. U3D compares the signal to a reference generated by a divider consisting of resistors R43 and R44. When the output signal from the modulator circuit is not present, the output of U3D will go LOW. The LOW is applied to a modulator status circuit (refer to the following text).

7.1.5 B+ Supply Fuse Fault Detector.

The B+ supply is protected from over-current conditions on the modulator circuit board by fuse F1. The status of F1 is monitored by a B+ supply fuse fault detector circuit. The circuit consists of optical couplers U4/U12 and comparator U3B. When the fuse has blown, the output of couplers U4/U12 will go HIGH. The HIGH is applied to comparator U3B. U3B compares the signal to a reference. The output of U3B will go HIGH. The HIGH is inverted at U5C. U5C will output a LOW: 1) to illuminate fuse indicator DS2 and 2) to a modulator status circuit.

The status of the B+ supply is monitored by a B+ power supply fault detector circuit. The circuit consists of B+ power supply fault detector comparator U3C. U3C compares the power supply sample to a reference. When the B+ power supply sample is present, the output of U3C will be HIGH. The HIGH is applied to inverter U5E and NAND gate U6B of the modulator status circuit. U5E will output a LOW to enable power supply indicator DS3. When the B+ power supply sample is not present, the output of U3C will be LOW. The LOW is applied to inverter U5E and NAND gate U6B of the modulator status circuit. U5E will output a HIGH to disable power supply indicator DS3.

7.1.6 Modulator Status Circuit.

The modulator status circuit consists of: 1) NAND gates U6A, U6B, U6C, and U6D, 2) latches U7A, U7B, and U7C, 3) inverters U5B, U5D and U5G, and 4) optical couplers U8 and U9. When a LOW from the modulator fault detector or the B+ supply fuse fault detector is applied to NAND gate U6A, U6A will output a HIGH to U6B. With a HIGH from power supply fault detector U3C, U6B will output a LOW to latches U7B, U7C, and U7A. Latch U7C will output a HIGH to inverter U5G. U5G will output a LOW to enable power supply mute optical coupler U9. U9 will output a LOW power supply mute command to the power supply circuit board. When the supply is muted, comparator U3C will respond by routing a LOW to U5E. U5E will output a HIGH to: 1) disable power supply indicator DS3 and 2) NAND gate U6C.

Latch U7B will output a HIGH to inverter U5D. U5D will output a LOW to: 1) illuminate modulator fault indicator DS4, 2) enable modulator fault detector optical coupler U8, and 3) NAND gate U6D. U6D will output a HIGH to latch U7D. Latch U7A will output a HIGH to NAND gate U6C. With a HIGH from U5E, U6C will output a LOW to latch U7D. U7D will output a LOW to U5B. U5B will respond by routing a HIGH to bias relay K1 on. Relay K1 is provided to immediately disconnect the forward converter transistors from the power supply during a modulator fault or high B+ supply conditions.

7.1.7 Modulator Power Supply.

A +20 volt operating potential for the modulator circuit board is provided by the applicable power supply circuit board. The +20 volt supply is applied through fuse F2 to +15 volt regulator U10. Fuse F2 protects the +20 volt supply from over-current conditions.

U10 is a three-terminal adjustable positive regulator containing internal thermal overload protection and short-circuit current limiting features. Further protection for U10 is provided by diodes D8 and D9. D8 protects the regulator from a short circuit on the regulator input. D9 protects the regulator from a reverse polarity potential applied to the output. Capacitor C25 provides filtering for the +15 volt supply. A sample of the +15 supply is regulated into a +5 volt supply by zener diode D1.

7.2 RF AMPLIFIER CIRCUIT BOARD.

Each RF power module is equipped with two RF amplifier circuit boards: 1) power amplifier 1 and 2) power amplifier 2. The circuit boards are designed with Class E power amplifier circuitry. Each circuit board is designed to produce approximately 687.5 watts of RF power. Figure 7-2 presents the RF amplifier circuit board circuitry. The RF amplifier circuit boards are identical, therefore only power amplifier 1 will be explained.

7.2.1 Pre-Driver Circuit.

A +15 volt peak-to-peak square-wave signal at the carrier frequency is applied to a transformer on the power block motherboard assembly. The transformer outputs two signals to inverter U5A.

The output from U5A is applied through inverters U5B/U5C to high/low side driver U7 and U8. U7/U8 output high and low drive signals to driver circuit transistors Q3/Q5 and Q4/Q6.

7.2.2 Driver Circuit.

The driver circuit consists of: 1) transistors Q3 and Q5 and 2) Q4 and Q6. Q3/Q5 and Q4/Q6 are MOSFET transistors configured as a push-pull driver circuit. The outputs of Q3/Q5 and Q4/Q6 are applied to MOSFET power transistors Q1 and Q2. Operating potentials for the driver circuitry is provided by the RF driver +30 volt supply. The supply is protected from over-voltage conditions by a regulator Q7. The regulator limits the voltage to approximately 47 volts dc. Fuse F2 protects the +30 volt supply from over-current conditions. Fuse F3 protects the driver circuit components from over-current conditions.

7.2.3 RF Amplifier Circuit.

The RF amplifier circuit consists of switching MOSFET transistors Q1 and Q2. Q1 and Q2 are configured as a Class E switching amplifier network. Class E power amplifier characteristics consist of: 1) the transistor drain-to-source voltage must be nominally zero immediately prior to the turn-on of the transistor and 2) the time slope of the drain-to-source voltage waveform must be nominally zero prior to the turn-on of the transistor. The Class E circuit results in: 1) reduced device dissipation and lowers the transistor operating temperature which greatly increases the life of the components, 2) an operating efficiency of 95% or greater, and 3) increased reliability when operated into VSWR conditions.

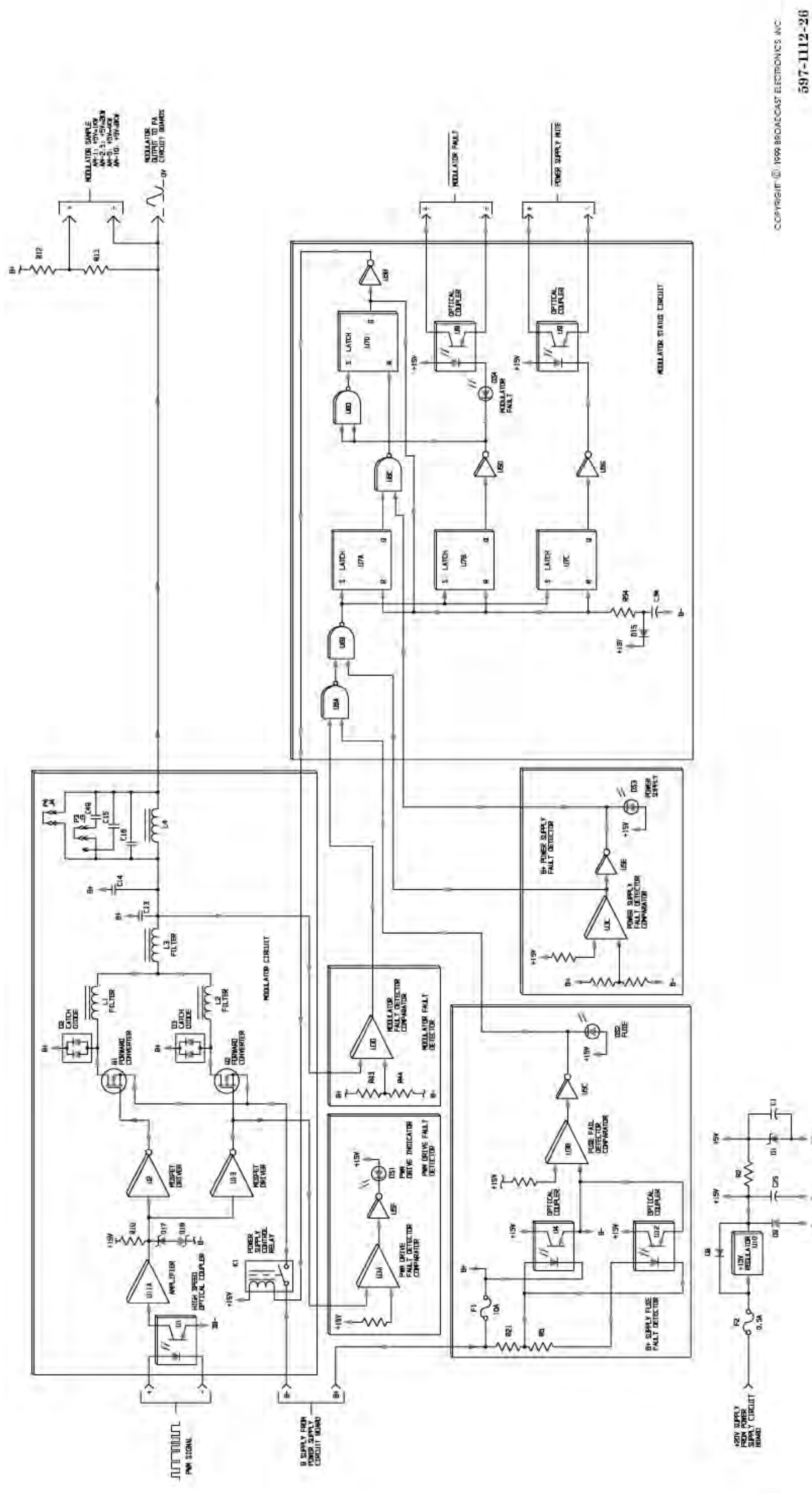


Figure 7-1: MODULATOR CIRCUIT BOARD SIMPLIFIED SCHEMATIC

Additional characteristics of a Class E amplifier design is the application of dc power to the amplifier transistors. The B+ and B- supplies are applied to RF choke L1 on the combiner assembly. The choke is connected to the primary center tap winding of combiner transformer T1. The transistors are connected to the primary winding of the transformers. The B- supply for the power amplifier is provided by the modulator circuit board. The modulator outputs a dc voltage which varies with audio modulation and functions as the RF ground for transistors Q1 and Q2. The RF ground potential will change in response to the applied audio. Fuse F1 protects the power amplifiers from over-current conditions.

Transistors Q1 and Q2 operate together to generate approximately 687.5 watts of RF power. Q1 operates 180 degrees out-of phase with transistor Q2. Inductors L1 through L7 improve the efficiency of the drive circuit by storing the energy required to charge the input capacitance of the transistors. Transzorbs D9/D10 prevent the gates of Q1/Q2 from damage by transients during power on and off. Capacitors C 44 through C50 and C51 through C57 provide shaping for the Class E waveform. The RF power from power amplifier 1 is combined with the 687.5 watts of RF power from power amplifier circuit board 2 at a combiner transformer on the power block motherboard assembly to generate 1375 watts of RF power.

7.2.4 RF Drive Status Circuit.

The RF drive signal is monitored by an RF drive status circuit. When an RF drive signal is present, a sample of the RF drive signal is rectified by diodes D5/D6. The voltage from D5/D6 is applied to optical coupler U2. The output of U2 will go HIGH and bias transistor Q12 on. The output of Q12 will go LOW to illuminate RF drive status indicator DS1.

7.2.5 Amplifier Fault Detection Circuit.

The power amplifier circuit board circuitry is monitored for fault conditions by a fault detector circuit. The circuit is designed to monitor two operations: 1) the +30 volt supply and 2) the modulator output voltage (RF ground). The modulator output is monitored by optical coupler U3. The +20 volt supply is monitored by transistor Q11. The power amplifier is protected from over-current conditions by fuse F1. The +30 volt supply is protected from over-current conditions by fuse F2.

The fault detector functions by monitoring fuses F1 and F2. When fuse F2 is blown, transistor Q11 will output +20 volts to silicon-controlled-rectifier (SCR) Q13. When fuse F1 is blown, optical coupler U3 will output +20 volts to SCR Q13. When either voltage is present, the voltage will bias Q13 on to illuminate PA fault indicator DS2 and bias optical coupler U4 on. U4 will respond by routing a PA fault signal to the controller circuit board.

7.2.6 Amplifier Power Supply Circuit.

An operating potential for the amplifier circuit board circuitry is provided by the +30 volt supply from the power supply circuit board. The supply is protected from over-current conditions by fuse F2. The +30 supply is regulated into a: 1) +15 volt supply by U1 and 2) +20 volt supply by R29. U1 is a three-terminal adjustable regulator containing internal thermal and short-circuit current limiting features. Fuse F2 protects the +30 volt supply from over-current conditions. Fuse F1 protects the power amplifier components from over-current conditions. Fuse F3 protects the driver circuit components from over-current conditions.

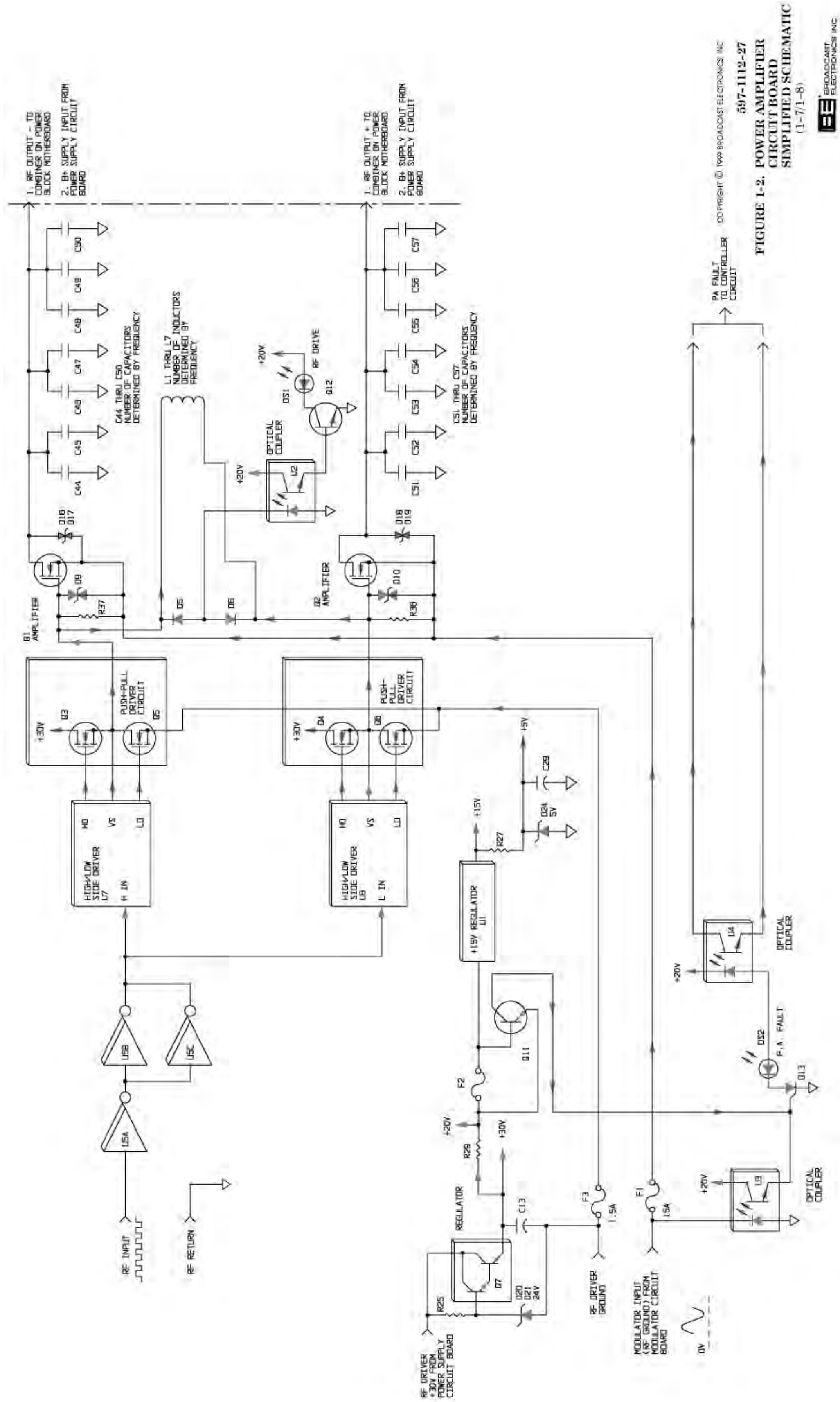


Figure 7-2: POWER AMPLIFIER CIRCUIT BOARD SIMPLIFIED SCHEMATIC

7.3 RF POWER MODULE MAINTENANCE

This section provides maintenance information for the AM-2.5E/AM-5E transmitter RF power modules.

7.3.1 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.
WARNING

WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.
WARNING

The AM-2.5E/AM-5E 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 judgment, care, and common sense must be practiced to prevent accidents.

In addition to high voltages and currents, the 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

7.4 FIRST LEVEL MAINTENANCE.

First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

7.5 CLEANING AND INSPECTION.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE ATTEMPTING ANY EQUIPMENT MAINTENANCE.
WARNING

CAUTION REMOVING OR INSTALLING AN RF MODULE WITH THE TRANSMITTER ENERGIZED MAY
CAUTION RESULT IN DAMAGE TO THE MODULE. DO NOT REMOVE THE RF POWER MODULES WITH THE TRANSMITTER ENERGIZED.

Ensure all transmitter primary power is disconnected and remove an RF power module. Clean the module of accumulated dust as required using a nylon bristle brush and vacuum cleaner. Inspect the circuit boards for improperly seated semiconductors and components damage by overheating. In addition, inspect the module for loose hardware. Repeat the procedure for each module in the transmitter.

7.6 SECOND LEVEL MAINTENANCE.

Second level maintenance is the performance of procedures required to restore an RF power module to operation after a fault has occurred. The RF power modules contain no electrical adjustments. Therefore, the following text presents only troubleshooting procedures.

7.6.1 Troubleshooting.

WARNING THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND
WARNING DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO
WARNING THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.

CAUTION REMOVING OR INSTALLING AN RF MODULE WITH THE TRANSMITTER ENERGIZED MAY
CAUTION RESULT IN DAMAGE TO THE MODULE. DO NOT REMOVE THE RF POWER MODULES WITH THE TRANSMITTER ENERGIZED.

7.6.2 Safety Considerations.

The AM-2.5E/AM-5E 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 transmitter output network, RF power module, RF 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

The RF power modules are not designed to be removed from the cabinet with the power energized. Therefore, operate the transmitter to off before removing an RF power module from the cabinet for maintenance procedures.

7.6.3 RF Power Module Assembly Procedure.

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 misalignment. 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.

7.6.4 RF Power Module Exchange Program.

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 Technical Service Department. If an RF power module is determined to be defective, troubleshoot the module or contact the Broadcast Electronics Technical Service department for terms of the module exchange program.

7.6.5 Troubleshooting Procedures.

The RF power module troubleshooting procedures are presented in Table 7-1. 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 and schematic diagrams to assist in problem resolution.

7.6.6 Component Replacement Procedure.

Component replacement procedures for the RF power modules are presented in PART I SECTION V. Refer to COMPONENT REPLACEMENT in SECTION V as required for the replacement procedures.

Table 7-1: RF POWER MODULE TROUBLESHOOTING (Sheet 1 of 2)

SYMPTOM	CIRCUITRY TO CHECK
RF DRIVE INDICATOR EXTINGUISHED OR FLICKERING OR FAULT INDICATOR ILLUMINATED	1. Determine transistor reference voltages of a power amplifier with no faults as follows: a. Remove an operational power amplifier with no faults from an RF power module. b. Using a digital voltmeter, operate the voltmeter to diode check and determine a reference voltage for the transistors on the circuit board as follows: 1. 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. 2. 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 $\pm$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. 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.
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.
MOD PWM DRIVE INDICATOR EXTINGUISED	1. Defective U2 or U13 on the modulator circuit board.

FAULT OR FUSE INDICATOR ILLUMINATED	1. Visually inspect regulator U10 for broken leads. 2. Determine transistor reference voltages of a modulator circuit board with no faults as follows: a. Remove a modulator with no faults from an RF power module. b. Using a digital voltmeter, operate the voltmeter to diode check and determine a reference voltage for the transistors on the circuit board as follows: 1. 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. 2. 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 = .46V. 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 Technical Service Department.

8 OUTPUT NETWORK THEORY OF OPERATION

This section presents the detailed theory of operation for the AM-2.5E/AM-5E output network assembly.

The output network assembly contains the: 1) harmonic band-pass filter, 2) directional coupler circuit board, 3) lightning protection circuit board, 4) T-matching network, 5) lightning detection circuit board, and 6) spark gap. The theory of operation for the output network assembly components is presented in SECTION IV, OVERALL THEORY OF OPERATION. Refer to SECTION IV as required for a description of the output network assembly components.

8.1 OUTPUT NETWORK MAINTENANCE

This section provides maintenance information for the AM-2.5E/AM-5E transmitter output network assembly.

8.2 SAFETY CONSIDERATIONS.

WARNING THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND
WARNING DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO
WARNING THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.

The AM-2.5E/AM-5E 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 judgment, care, and common sense must be practiced to prevent accidents.

In addition to high voltages and currents, the 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

8.3 FIRST LEVEL MAINTENANCE.

First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

8.3.1 Cleaning and Inspection.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE ATTEMPTING
WARNING ANY EQUIPMENT MAINTENANCE.

Ensure all transmitter primary power is disconnected and clean the output network assembly of accumulated dust using a nylon bristle brush and vacuum cleaner. Inspect the components for damage by overheating and arcing. In addition, check the components for loose hardware.

8.4 SECOND LEVEL MAINTENANCE.

Second level maintenance is the performance of procedures required to restore the ECU to operation after a fault has occurred. The procedures are divided into electrical adjustments procedures and troubleshooting.

8.5 ELECTRICAL ADJUSTMENTS.

8.5.1 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.

8.5.2 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 Technical Service Department for information and instructions to adjust the directional coupler null controls.

8.5.3 Troubleshooting.

WARNING
WARNING

THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING
WARNING

DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.

8.6 SAFETY CONSIDERATIONS.

The AM-2.5E/AM-5E 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 transmitter output network, RF power module, RF 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

8.6.1 Output Network Assembly Component Locations.

Component locations for the output network assembly are presented in SECTION V, MAINTENANCE. Refer to TRANSMITTER COMPONENT LOCATIONS in SECTION V to locate components within the output network assembly.

8.6.2 Troubleshooting Procedures.

The output network assembly troubleshooting procedures are presented in Table 8-1 through Table 8-3. Table 8-1 presents the directional coupler circuit board troubleshooting. Table 8-2 presents the lightning detection circuit board and spark gap troubleshooting. Table 8-3 presents the lightning protection circuit board troubleshooting. Refer to Table 8-1 through Table 8-3 to isolate the problem to a specific circuit. Once the trouble is isolated, refer to the circuit board theory of operation presented in PART I SECTION IV and the schematic diagrams presented in this section to assist in problem resolution.

Table 8-1: DIRECTIONAL COUPLER CIRCUIT BOARD TROUBLESHOOTING

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

Table 8-2: LIGHTNING DETECTOR CIRCUIT BOARD/SPARK GAP TROUBLESHOOTING

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

Table 8-3: DIRECTIONAL COUPLER CIRCUIT BOARD TROUBLESHOOTING

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

8.6.3 Component Replacement Procedure.

Component replacement procedures for the output network assembly are presented in PART I SECTION V. Refer to COMPONENT REPLACEMENT in SECTION V as required for the replacement procedures.

9 ECU THEORY OF OPERATION

This section presents a general description of the Broadcast Electronics AM-2.5E/AM-5E transmitter ECU (Exciter/Controller unit).

The AM-2.5E/AM-5E transmitter control, status/monitoring circuitry, audio/power PWM generation, stereo generation circuitry, and meter display circuitry is contained in the ECU (Exciter/Controller unit) assembly. The ECU is a modular control center designed for the installation of the: 1) controller circuit board assembly, 2) ECU display and switch circuit boards, 3) transmitter forward/reflected power meter displays, 4) exciter circuit board assembly, 5) stereo generator circuit board assembly, and 6) ECU power supply assembly.

9.1 ECU DISPLAY CIRCUIT BOARD.

The ECU display circuit board contains the controller status display indicators, the power control switch/indicators, and meter display circuitry (refer to schematic diagram SD917-0206-001/-008). The circuit board is equipped with the following display indicators: 1) exciter, 2) power supply, 3) power module, 4) antenna, 5) interlock, 6) remote control, 7) lightning, 8) antenna interlock, 9) foldback, and 10) over-temperature. Control switches include power level 1, power level 2, power level 3, power level 4, power level 5, raise power, and lower power switch/indicators. The meter display circuitry consists of a driver circuit and a stereo 30-segment LED bar-graph display.

The ECU display circuit board also contains left/L+R and right/L-R audio metering circuits. The left/L+R and right/L-R metering circuits are identical. Therefore, only the left/L+R metering circuit will be discussed in the following text.

9.1.1 Exciter Monitor Mode Control Circuit.

Left, right, and L+R metering samples from the exciter circuit board and an L-R meter sample from the stereo circuit board are applied to integrated circuit U1. U1 is controlled by latch U5A and mode switch S1. When S1 is depressed, a LOW is applied to inverter U4B. U4B outputs a HIGH to clock latch U5A. The Q output of U5A will respond by routing a HIGH to: 1) U1 and 2) bias Q3 on to illuminate the L+R/L-R switch LED. U1 will select L+R/L-R information for application to the autorange circuitry. When S1 is depressed again, a HIGH from U4B will clock latch U5A. The Q output of U5A will respond by routing a HIGH to: 1) U1 and 2) bias Q4 on to illuminate the left/right switch LED. U1 will select left/right channel audio for application to the autorange circuit.

9.1.2 Autorange Circuit.

The autorange circuit consists of integrated circuits U2A, U3A, and U3B. An output of U1 is routed to integrated circuit U2A and U3A. U3A is configured as an amplifier stage. U2A is configured as an amplifier/buffer stage. When audio is applied to the circuit, U3A amplifies the audio. The output of U3A is half-wave rectified by diode D1. The output of D1 is applied to integrated circuit U3B. U3B is configured as a comparator. When the audio level is above the threshold at U3B, U3B will output a HIGH to transistor Q1. The HIGH biases Q1 off to configure U2A as a buffer. When the audio level is below the threshold at U3B, U3B will output a LOW to: 1) bias Q1 on to configure U2A as an amplifier with a gain of 10 and 2) illuminate X10 indicator DS1. The output of U2A is routed for application to the polarity control circuit.

9.1.3 Polarity Control Circuit.

Positive or negative signal monitoring is controlled by polarity switch S2. Audio from the mode control circuit is applied to integrated circuit U6A and U7. U6A is configured as an inverting buffer.

When S1 is depressed, a LOW is applied to inverter U4C. U4C outputs a HIGH to clock latch U5B. The Q output of U5B will respond by routing a HIGH to: 1) U7 and 2) bias Q6 on to illuminate the negative switch LED. U7 will select inverted audio from U6A for application to a rectifier circuit. When S1 is depressed again, a HIGH from U4C will clock latch U5B. U5B will respond by routing a HIGH to: 1) U7 and 2) bias Q5 on to illuminate the positive switch LED. U7 will select non-inverted audio for application to a rectifier circuit.

9.1.4 Half-Wave Rectifier Circuit.

Integrated circuit U8A and U8B function as a half-wave rectifier circuit. Audio from integrated circuit U7 is applied to U8A/U8B. U8A/U8B half-wave rectify the audio for application to the meter display circuitry. Resistor R38 and capacitor C21 establish the meter ballistics.

9.1.5 Meter Circuitry.

The output of the half-wave rectifier circuit is applied to a meter circuit consisting of: 1) integrated circuits U9, U10, and U11, and 2) 10-segment LEDs DS7, DS8, and DS9. The output from U8B is applied to meter drivers U9, U10, and U11. U9/U10/U11 control 10-segment LED sections DS7, DS8 and DS9. Drivers U9/U10/U11 function to illuminate the required segments of DS7/DS8/DS9 to display the left/L+R levels. One-shot U12 is provided to identify short modulation peaks.

9.1.6 Indicator Circuitry.

The display circuit board is equipped with several indicators. DS22, DS23, DS24, and DS25 are bi-color LEDs providing status indications for the exciter, power supply, RF power modules, and antenna. The indicators are controlled by drivers on the controller circuit board. When activated, the drivers will output a HIGH to illuminate the indicators. A yellow display is generated when the red and green LEDs are illuminated simultaneously.

Indicators DS15 through DS20 provide status indications for over-temperature, foldback, antenna conflict, lightning, remote control, and interlock conditions. The indicators are controlled by drivers on the controller circuit board. When activated, the drivers will output a LOW to illuminate the indicators.

9.1.7 Reset Switch.

The reset of fault conditions is provided by switch S3. When S3 is depressed, a HIGH is routed to the controller circuit board to reset the fault conditions. The switch LED will illuminate when one of the following fault condition occurs: 1) over-temperature, 2) exciter, 3) power supply, 4) RF power module, 5) reflected power high, 6) reflected power emergency, 7) lightning conditions, or 8) 1.2 : 1 VSWR.

9.2 ECU SWITCH CIRCUIT BOARD.

ECU power level switches S803 through S807, raise switch S801, lower switch S802, and off switch S808 are located on the controller switch circuit board (refer to schematic diagram SD917-0206-001/-008). The switches output +15 volts to activate a function.

9.3 ECU METER SWITCH CIRCUIT BOARD.

ECU meter switches S501 and S502 are located on the ECU meter switch circuit board (refer to schematic diagram SD917-0206-005). The switches control the signals applied to the forward and reflected power meters. Low scale control R501 and high scale control R503 calibrate the forward power meter. Low scale control R505, high scale control 506, and ac sample control R511 calibrate the reflected power meter.

9.4 MOTHERBOARD.

The interfacing of transmitter status signals, audio, PWM/RF drive signals, and operating commands to/from the ECU circuit boards is provided by the ECU motherboard assembly (refer to schematic diagram SB917-0201). Connectors J4, J5, and J6 route status inputs and control commands to/from the ECU assembly. 80-pin connector J101 is provided for the exciter circuit board. 50-pin connector J201 is provided for the stereo exciter circuit board. 80-pin connector J302 and 50-pin connector J301 are provided for the controller circuit board. Connector J8 routes status signals to/from the display circuit board. Connector J10 routes control and status signals to/from the switch circuit board.

The motherboard also contains RFI filters for the ECU remote inputs and outputs. The filter circuitry consists of single PI-section low-pass RC and LC networks. The networks prevent RFI from entering the exciter and controller circuitry.

9.5 CONTROLLER CIRCUIT BOARD.

All transmitter operations are directed by the controller circuit board (refer to Figure 9-1). The controller circuit board is a digital CMOS logic assembly containing control and parameter monitoring/display circuitry. The control circuitry includes an antenna interlock circuit, a power control network, and a foldback control circuit. The monitor/display circuitry includes exciter, power supply, power module, antenna, interlock, remote control, lightning, antenna interlock, foldback, and over-temperature networks. The circuitry determines the transmitter output power control operating characteristics and responses to fault conditions such as an ac power failure, load failure, power supply failure, or remote control unit failure.

9.5.1 Cabinet/Ext. Interlock & Remote Control Fail-Safe.

The controller circuit board monitors: 1) an external interlock and 2) a remote control fail_safe interlock. The external interlock is any interlock external to the transmitter such as a test load interlock. The remote control fail_safe is an input requiring a +5 to +15 volt signal to indicate the remote control unit is operational. If the external interlock and the remote control fail_safe are closed, the ECU interlock indicator will illuminate and the transmitter may be energized. If the external interlock opens or the remote control fail_safe signal is removed, the transmitter will immediately de-energize and the interlock indicator will extinguish.

9.5.2 External Interlock.

The transmitter external interlock is an optically coupled input designed to accept the output of a series interlock switch circuit external to the transmitter. The circuit accepts a +5 volt to +15 volt output of an interlock circuit external to the transmitter such as from a test load. Optical coupling of the external interlock input to the controller circuitry is provided by U11. Diode D17 protects the circuit from a reverse polarity potential applied to the input.

A HIGH is required at the input of coupler U11 when the external interlock is closed. U11 will output a HIGH to OR gate U69B in the transmitter enable circuit. The HIGH will configure U69B to output a HIGH to AND gate U71B. U71B will output a HIGH cabinet command to allow the transmitter to be energized. U71B also outputs a HIGH to NAND gate U71D. With a HIGH fail_safe command, U71D will output a HIGH to illuminate the interlock indicator. When the external interlock is opened, a LOW is applied to U11. The output of U11 will go LOW. OR gate U69B will respond by outputting a LOW to AND gate U71B. U71B will output a LOW cabinet command. A LOW cabinet command configures a power control circuit to operate the transmitter to off. U71D will output a LOW to: 1) extinguish the interlock indicator and 2) generate a LOW operate command. A LOW operate command mutes: 1) the exciter PWM signal and 2) the power supply circuit board(s).

9.5.3 Remote Control Fail-safe.

The remote control fail_safe input is designed to accept a +5 to +15 volt output from the remote control unit fail_safe connection. The signal is optically coupled to the controller circuitry by integrated circuit U56. Diode D23 protects the circuit from a reverse polarity potential applied to the input.
A HIGH is required at the input of U56 to indicate when the remote control unit is operational. The output of coupler U56 will go HIGH. The HIGH will configure OR gate U45C to output a HIGH fail_safe signal. The fail_safe signal is applied to AND gate U71D. With a HIGH cabinet signal, U71D will output a HIGH to illuminate the interlock indicator. The HIGH will also bias driver transistor Q48 on to illuminate remote fail_safe indicator DS2. When the remote control fail_safe signal is removed, a LOW is applied to U56. The output of U56 will go LOW. The LOW generates a LOW transmitter operate command to mute: 1) the exciter PWM signal, 2) the power supply circuit board(s), and 3) extinguish remote fail_safe indicator DS2. The LOW from U56 will generate a LOW fail_safe command. The LOW is applied to U71D. U71D will output a LOW to extinguish the interlock indicator.

9.5.4 External Mute.

The controller circuit board monitors the transmitter mute signal. The external mute input is designed to accept a +5 to +15 volt output from an antenna switch controller RF mute circuit. The signal is optically coupled to the controller circuitry by U10. Diode D16 protects the circuit from a reverse polarity potential applied to the input.
A HIGH is required at the input of coupler U10 when the external mute circuit is required to mute the transmitter RF power output. U10 will output a HIGH to OR gate U13C and NOR gate U24A. U13C will output a HIGH to inverter U25A. U25A will output a LOW to U22B. The LOW will configure U22B to output a LOW operate command to mute: 1) the exciter PWM signal and 2) the power supply circuit board(s). U24A will output a LOW to disable the antenna conflict indicator operations.

9.5.5 Antenna Interlock.

The controller circuit board is equipped with an antenna interlock circuit. The circuit accepts: 1) control signals from power levels 2 through 5, and 2) status inputs from three antenna systems. The antenna interlock circuit consists of: 1) programming switches S1 through S3, 2) OR gates U12A/B and U21A/B, and 3) NAND gates U20A through U20D. The circuit analyzes the information and determines if a correct antenna system and power level is selected for operation.

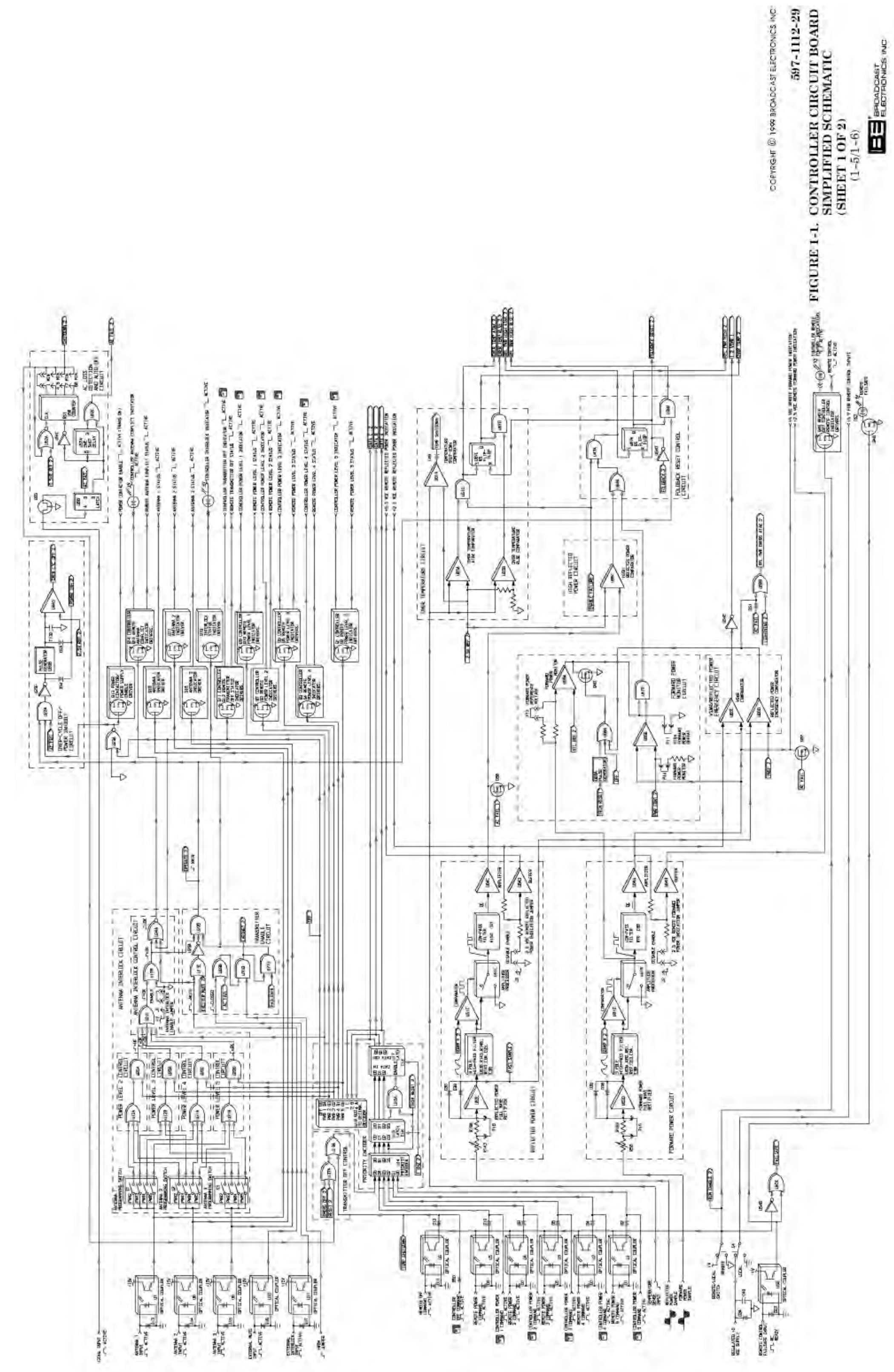


Figure 9-1: CONTROLLER CIRCUIT BOARD SIMPLIFIED SCHEMATIC (SHEET 1 OF 2)

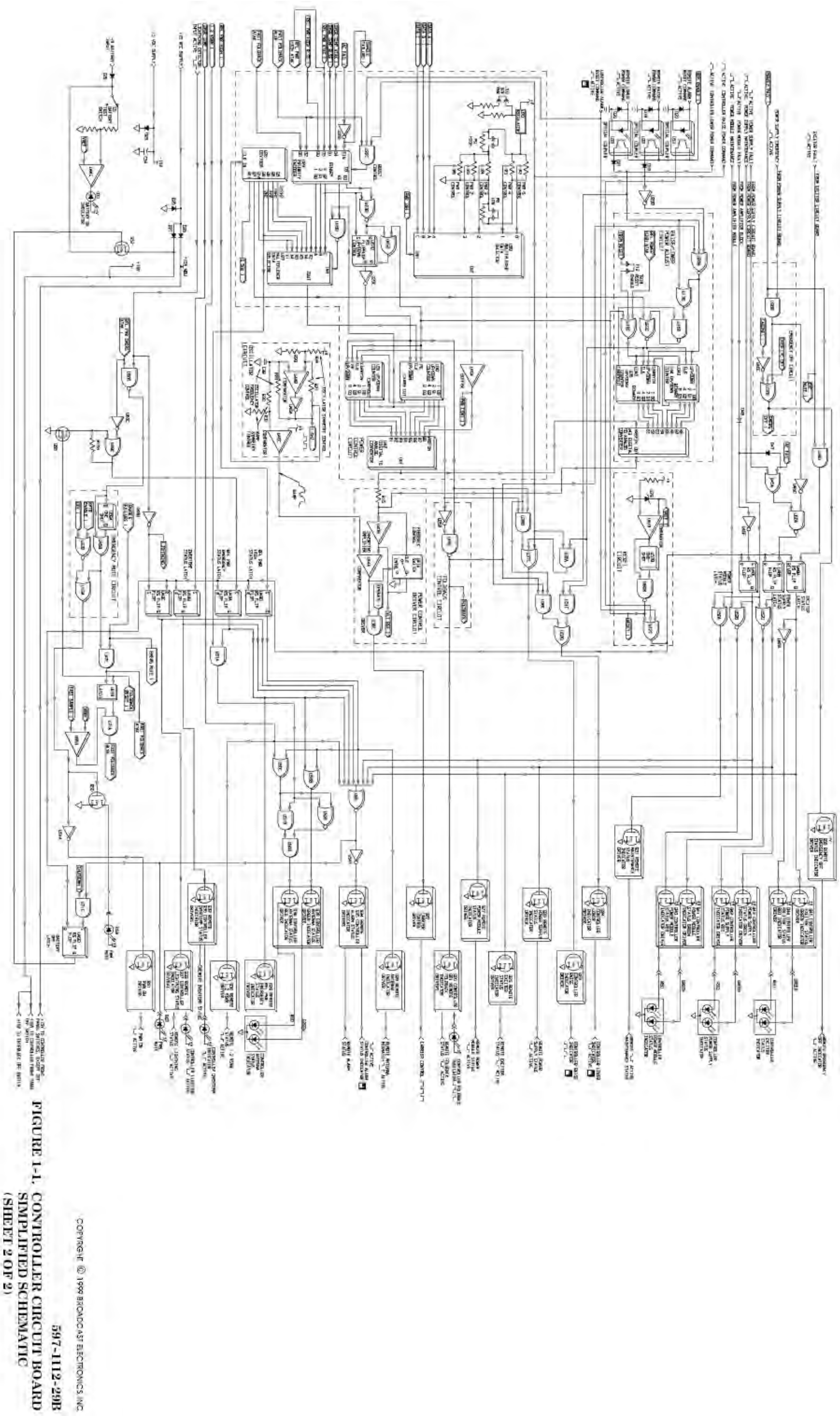


FIGURE 9-1. CONTROLLER CIRCUIT BOARD SIMPLIFIED SCHEMATIC (SHEET 2 OF 2)

To provide an operational example, antenna 1 is designed to operate with power level 2. When antenna 1 is connected to the transmitter, a HIGH status signal is applied to optical coupler U7. U7 outputs a HIGH to switch S1. S1 is a four-section SPST switch. The S1 switch sections are assigned the following power levels: 1) power level 2, 2) power level 3, 3) power level 4, and 4) power level 5. The switch is programmed by closing the switch sections for the power levels which are acceptable for the antenna 1 system. The outputs of programming switch S1 are applied to a control network consisting of: 1) a power level 2 circuit, 2) a power level 3 circuit, 3) a power level 4 circuit, and 4) a power level 5 circuit. Each power level control circuit contains an OR gate to monitor the status of the antenna systems and an AND gate to monitor the status of the selected power level.

With S1 programmed to operate with power level 2, the HIGH from U7 is applied to OR gate U12A. U12A will output a HIGH to NAND gate U20A. With power level 2 selected, a HIGH from BCD-to-decimal decoder U18 will be applied to U20A. U20A will respond by routing a HIGH to OR gate U21C. U21C will output a HIGH to OR gate U13B. Programmable jumper J1 is provided to disable the antenna interlock circuit. With the antenna interlock circuit enabled, U13B will output a HIGH to NOR gate U24A and AND gate U22B. With no mute or off commands present, U24A will output a LOW to disable antenna conflict indicator driver Q16. With a closed interlock system and no ac failures or fail_safe conditions present, U22B will output a HIGH operate command to enable the transmitter.

9.5.6 Remote Control.

The transmitter control functions, status indications, and metering signals are designed for remote operation. Control functions require a +5 volt to +15 volt dc signal to activate the function. Status indications will output a LOW (0 volts) when active. The remote meter indications can be programmed for +5 volt or +2.5 volt full-scale meter operations. The circuitry may be interfaced to any type of remote control unit.

Remote control of the transmitter is enabled or disabled by remote/local switch S4. S4 enables remote control operation by applying a positive voltage to optical couplers U1 through U6, U32/U33, and U53. S4 disables remote control operation by applying a ground to the couplers. The remote position allows both local and remote transmitter control. The local position allows only local control of the transmitter. The remote control inputs and outputs are RFI filtered on the motherboard for maximum reliability.

9.5.7 Power ON.

A transmitter power on operation initiates a sequence to determine if all the interlocks are closed and the remote control unit is operational. RF output power from the transmitter is enabled by commands from the power level 1 through power level 5 switch/indicators. Each power level switch/indicator provides a one-button power on start command and configures the transmitter for a specific power output level. Each switch/indicator will illuminate as selected to indicate the command has been received and stored by the controller power control circuit.

Transmitter power is enabled when a power level switch/indicator is activated. For example, when the ECU power level 2 switch/indicator is depressed, a HIGH is applied to priority encoder U14. When a remote power level 2 command activated, a HIGH is applied to optical coupler U4. U4 will output a HIGH to U14. U14 analyzes power level and off commands to determine priorities when two switches are operated simultaneously.

The off command is assigned the highest priority. When the power level 2 command is received, U14 will output a binary number to latch U15. U15 outputs the binary number to latch U17. U15 and U17 operate in association to provide the appropriate output timing of the binary number to the antenna interlock circuit and to the power control circuit.

The binary power level 2 command from latch U17 is routed to: 1) BCD-to-decimal decoder U18 and 2) multiplexer U39. U18 is designed to decode the binary number from U17 and output a HIGH on the appropriate control line to indicate the selected power level. With the power level 2 selected, a HIGH from BCD-to-decimal decoder U18 is applied to AND gate U20A. With antenna 1 switch S1 programmed to operate with power level 2, a HIGH from OR gate U12A is also applied to U20A. U20A will respond by routing a HIGH to OR gate U21C. U21C will output a HIGH to OR gate U13B. U13B will output a HIGH to U22B.

AND gates U69B, U71B, and U71D monitor the status of the external interlock, the remote control fail_safe input, and the external/exciter mute commands. The circuit functions to determine if all the interlocks are closed, the remote control unit is operational, and the exciter is operational. If the external interlock is closed and the remote control unit is operational, U71D will output a HIGH to U22B. If no external or exciter mute commands are present, U13C will output a LOW to inverter U25A. U25A will output a HIGH to U22B. With a HIGH antenna interlock signal from U13B indicating a proper antenna/power level selection, U22B will output a HIGH operate command to the power control circuit, an exciter/power supply mute circuit, and a high reflected power circuit.

The HIGH operate signal is routed to the power control circuit to allow the transmitter to be energized. If the remote control unit fails, or the external or exciter mute signal is activated, U22B will output a LOW operate command. The LOW operate command mutes: 1) the exciter PWM signal and 2) the power supply circuit board(s). If the cabinet or external interlock is opened, AND gate U71B will output a LOW cabinet command. A LOW cabinet command configures the power control circuit to operate the transmitter to off. U71D will output a LOW to: 1) extinguish the interlock indicator and 2) generate a LOW operate command. A LOW operate command mutes: 1) the exciter PWM signal and 2) the power supply circuit board(s).

9.5.8 Power Control Circuit.

Binary power level information from latch U17 is applied to multiplexer U39. U39 decodes the power level number and selects a reference voltage from a potentiometer network. Potentiometers R2 through R6 provide a voltage reference proportional to output power for power levels 1 through 5. For example, power level 2 selected for operation. With power level 2 selected, U39 will select a reference voltage from potentiometer R5. The voltage is routed through buffer U40B to digital-to-analog converter U42.

U42 is designed to output a reference voltage to a power control driver circuit. U42 is controlled by up/down counters U30 and U31, multiplexer U27, priority encoder U28, and divider U26. The up/down counters, multiplexer, and priority encoder function to output clock signals to U42 in response to fault conditions. U42 will respond by increasing/decreasing the power reference voltage in response to foldback and release commands from U27. With no foldback or release signals, U42 will output the power level 2 reference voltage without change to a power control driver circuit.

9.5.9 Power Control Driver Circuit.

The power control driver circuit consists of: 1) operational amplifiers U40B and U44A, 2) switch U41A, and 3) AND gate U36C. The power level reference voltage from U42 is applied to integrated circuit U40B. U40B is configured as an inverting amplifier. The output of U40B is applied to comparator U44A and switch U41A. U41A is controlled by the sample from the output of U44A. U41A is a feedback control network designed to convert the reference voltage from U40B to a voltage proportional to power. U44A compares the power level reference to a ramp signal generated by integrated circuit U40C. U44A produces a square-wave PWM (pulse-width-modulated) signal which varies in response to the power level. The signal is ANDed at U36C with the operate signal from U22B. With a HIGH operate signal from U22B, the PWM signal is routed through carrier control driver Q22 to the power supply circuit board.

9.5.10 Power Control Trim Circuit.

The transmitter RF output power level can be trimmed to a desired level by the raise/lower switch/indicators. When a raise or lower switch/indicator is depressed, a HIGH is applied to the raise/lower power adjust circuit. The circuit consists of: 1) logic gates U24B, U31D, U16B, U23C, and U19C, 2) up/down counters U34 and U35, and 3) digital-to-analog converter U43. The circuit is designed to increase or decrease RF output power by increasing/decreasing the reference voltage.

Logic gates U24B, U31D, U16B, U23C, and U19C control up/down counters U34 and U35. NOR gate U24B and OR gate U31D monitor raise, lower, and foldback signals. NOR gate U24B is designed to configure counters U34/U35 to count up or down. U24B will output a HIGH to configure U34/U35 to count up. U24B will output a LOW to configure U34/U35 to count down. For example, when the raise switch/indicator is depressed, a HIGH is applied to U34/U35. The HIGH configures U34/U35 to count up. U34/U35 will output binary numbers to digital-to-analog converter U43. U43 decodes the numbers from U34/U35 and increases the power control reference voltage generated from power control D-to-A converter U42. U42 outputs the increased reference voltage to the power control driver circuit to increase the RF output power.

Logic gates U16B, U23C, and U19C control the loading of counters U34/U35. The logic gates monitor: 1) high reflected power conditions, 2) reset conditions, and 3) trim reset operations. Trim reset is when the power control trim is reset to mid-range when a power level switch/indicator is depressed. If a trim reset condition, a reset condition, or a high reflected power condition occurs, U19C will output a HIGH to counters U34/U35. The HIGH resets counters U34/U35 to mid-range.

9.5.11 Trim Reset.

Trim reset is a function which resets the power control trim function to mid-range when a power level switch/indicator is depressed. When a power level switch is depressed, a HIGH trim reset command from U14 is applied through jumper P12 to OR gate U19C. U19C will output a HIGH to up/down counters U34/U35. The HIGH configures U34/U35 to mid-range. With U34/U35 at mid-range, the power trim circuit can be raised or lowered an equal amount. Jumper P12 allows the trim reset function to be disabled if required.

9.6 TRANSMITTER OFF.

RF output power is immediately terminated when the ECU off switch is depressed. When the off switch/indicator is depressed, a HIGH is applied to OR gate U13A. U13A will output a HIGH to priority encoder U14. U14 will output a binary number through latches U15/U17 to BCD-to-decimal decoder U18 and to multiplexer U39. U18 will output a HIGH to NOR gate U23A. U23A will output a HIGH to bias power contactor driver Q13 off to disable the fans and the power supplies. U39 will respond by terminating the power control reference voltage to terminate the power control PWM signal.

9.7 AC POWER INTERRUPTIONS.

The AM-2.5E/AM-5E transmitters are designed to respond to two different types of ac power interruptions: 1) momentary and 2) extended. The transmitter will respond to a momentary power interruption by automatically returning to on-air operation immediately after power is returned to the transmitter. Automatic return of the transmitter to on-air operation is provided by the controller circuit board battery backup circuit which maintains the transmitter configuration information. In the event of an extended ac power interruption, the controller circuit board is equipped with a programmable ac loss/auto-off circuit. The circuit is designed to output an off command once power is returned to the transmitter. The ac loss circuit may be programmed to output an off command after a 1 minute, 4.5 minute, 17 minute, or 68 minute ac power interruption. The circuit primarily designed to be used to prevent the transmitter from automatically returning to an incorrect antenna or power level after a power failure.

The ac loss detection/auto-off circuit consists of: 1) one-shots U57A/U68B, 2) divider U58, 3) OR gate U62C, 4) NOR gate U52A, and inverter U54C. When ac power is applied to the unit, 120 Hz pulses from an ac detection circuit on the power supply circuit board are applied to integrated circuit U68B. U68B will respond by routing a LOW pulse to: 1) one-shot U57A, 2) OR gate U62C, and 3) inverter U54C. One-shot U57A responds by providing a one second delay to allow the circuitry to stabilize. U54C responds by inverting the LOW to provide a HIGH reset pulse to counter U58. The HIGH disables counter U58 and prevents the counter from generating an ac fail command.

When ac power interruption is detected, U68B: 1) routes a HIGH pulse to one-shot U57A, OR gate U62C, and inverter U54C and 2) outputs a LOW ac fail command. U57A will output a HIGH to U62C. U62C will output a HIGH ac fail command. U54C inverts HIGH to output a LOW to counter U58. U58 will begin a count operation. 0.5 Hz clock pulses for U58 are provided by U52A and an battery backed-up oscillator. Programmable jumper P6 programs the counter to provide a 1, 4.5, 17, or 68 minute shutdown command. When the programmed time has elapsed, U58 will output a HIGH shutdown command to OR gate U37A. The HIGH is routed through U37A and U31A to priority encoder U14 to automatically operate the transmitter to off.

The shutdown signal is also applied to AND gate U71C. If fault conditions have occurred, U71C will AND a LOW from NOR gate U55 to output a LOW to latch U49D. U49D will output a LOW to bias transistor Q52 on to maintain the battery supply and the fault indication circuitry. If no fault conditions exist, U71C will AND a HIGH from NOR gate U55. U71C will output a HIGH to latch U49D. U49D will output a HIGH to bias transistor Q52 off to terminate battery operation.

9.8 FORWARD AND REFLECTED POWER CIRCUITRY.

Transmitter forward and reflected power voltage samples are processed by forward and reflected power monitoring circuits. The circuits are identical therefore, only the forward power circuit will be described.

A voltage sample of the forward power is applied through potentiometer R56 and resistor R183 to integrated circuit U63D. Potentiometer R56 allows the forward power circuit to be calibrated. U63D operates in association with diodes D35/D36 as a full-wave rectifier. The full-wave rectified output from U63D is applied to a third order high-pass filter consisting of U63A, R60, R61, R67, C63, C64, and C88. The dc output of the filter is applied to comparator U61D. U61D compares the forward power sample to a ramp voltage generated by integrated circuit U40C. U61D will output a square-wave signal equal to the forward power voltage sample. The output of U63D is applied to switch U41B. U41B functions as a feedback control device designed to convert the forward power voltage sample into a signal proportional to power. The square-wave output from U41B is applied to a low-pass filter consisting of resistor R70 and capacitor C89. The output of the low-pass filter generates a dc voltage which is proportional to the forward power. The voltage is amplified by operational amplifier U64A. The output of U64A is applied to: 1) the fault detection circuitry, 2) a +5 volt full-scale meter output, and 3) buffer U64B. Buffer U64B operates in association with programmable jumper P2 to provide a +2.5 volt full-scale meter output. Jumper P2 enables or disables the +2.5 volt full-scale meter output.

9.9 FOLDBACK PROTECTION.

The controller circuit board is designed to monitor several operating parameters for problem conditions. Several of the monitored conditions are routed to a foldback circuit. The foldback circuit will automatically reduce the transmitter RF output power to an acceptable operating level to prevent damage to the transmitter. The controller monitors: 1) the cabinet temperature for over-temperature conditions, 2) reflected power for a high reflected power condition, 3) forward power for high forward power conditions, and 4) lightning detector for lightning conditions. When an over-temperature, high reflected power, or a high VSWR condition occurs, the foldback indicator will illuminate to indicate the transmitter is in a foldback condition.

If the controller detects a high reflected/forward power, a high VSWR, lightning, or an over-temperature condition, the foldback circuit will automatically reduce the transmitter RF output power to an acceptable operating level to prevent damage to the transmitter. If the controller detects a high reflected power or VSWR condition, the antenna status indicator will illuminate as described below to indicate the problem.

ANTENNA STATUS INDICATOR	CONDITION
YELLOW	1.2 : 1 VSWR or greater.
RED	High reflected power condition. A reflected power condition equal to 100 watts for AM-2.5E models or 200 watts for AM-5E models.
FLASHING RED	Reflected power emergency condition. A reflected power condition equal to 500 watts for AM-2.5E models or 1000 watts for AM-5E models.

9.9.1 High Forward Power Circuitry.

High forward power conditions are monitored by a high forward power fault detection circuit. Integrated circuits U66A and U66B are configured as comparators designed to monitor forward power conditions. U66B functions as an output power monitor. Integrated circuit U66B compares a forward power sample from U64A to a power control sample. U66A compares a forward power sample from U41B to a voltage reference.

Comparators U66A/U66B operate in association to monitor high forward power conditions. U66A/U66B use the high reflected power attack circuitry to reduce the transmitter power when a high forward power condition occurs. When the transmitter power is greater than 90%, U66B will output a HIGH. When a high forward power conditions results in the forward power sample to increase above the voltage reference by approximately 20%, the output of U66A will go HIGH. The HIGH is applied to AND gate U47B. With a HIGH from U66B, U47B will output a HIGH to OR gate U62A. U62A will output a HIGH to AND gate U47A. With a HIGH enable failure signal, U47A will output: 1) a HIGH reflected power high attack signal to priority encoder U28 and 2) a HIGH to latch U67A. The HIGH reflected power attack signal is used by U28 to initiate an attack sequence to reduce the transmitter output power. The HIGH to U67A will configure U67A to output a HIGH reflected power signal to enable latch U48D. U48D will output a HIGH to bias: 1) alarm status indicator driver transistors Q34 and Q35 on and 2) antenna indicator driver Q28 on. When the transmitter power is reduced to approximately 90%, the output of U66B will go LOW. The LOW is applied to U47B. U47B will output a LOW through U62A to U47A. U47A will respond by routing a LOW to terminate the high reflected power attack signal. The indicators will remain illuminated until the alarm reset switch is depressed.

High Reflected Power Circuitry. Integrated circuit U65C monitors reflected power conditions. U65C compares a reflected power sample from U64C to a voltage reference. When the reflected power sample increases above the voltage reference, the output of U65C will go HIGH. The HIGH is applied through OR gate U62A to AND gate U47A. With a HIGH enable failure signal, U47A will output: 1) a

HIGH reflected power high attack signal to priority encoder U28 and 2) a HIGH to latch U67A. The HIGH reflected power attack signal is used by U28 to initiate an attack sequence to reduce the transmitter output power. The HIGH to U67A will configure U67A to output a HIGH reflected power signal to enable latch U48D. U48D will output a too HIGH to bias: 1) alarm status indicator driver transistors Q34 and Q35 on and 2) antenna mismatch indicator driver Q28 on.

9.9.2 Over-temperature Circuitry.

Over-temperature conditions are monitored by an over-temperature fault detection circuit. A dc voltage representing the transmitter temperature is applied to: 1) integrated circuits U65A/U65B and 2) integrated circuit U61A. When the temperature voltage increase above a reference voltage, the output of U65A will go HIGH. The HIGH is routed to AND gate U51D. With a HIGH enable failure signal, U51D will output: 1) a HIGH over-temperature attack signal to priority encoder U28 and 2) a HIGH to latch U67C. The HIGH over temperature attack signal is used by U28 to initiate an attack sequence to reduce the transmitter output power. The HIGH to U67C will configure U67C to output a HIGH: 1) over-temperature signal to latch U49B and 2) to AND gate U47D. The output of U49B will go HIGH to bias: 1) alarm status indicator driver transistors Q34 and Q35 on and 2) over-temperature indicator drivers Q32 and Q36 on. When the transmitter temperature is reduced to 70 degrees C, the output of U65A will go LOW and the output of U65B will go HIGH. The LOW is applied to U51D. U51D will output a LOW to terminate the over-temperature attack signal. The indicators will remain illuminated until the alarm reset switch is depressed. The from HIGH from U65B is also applied to U47D. With the HIGH from U67C, U47D will output a over temperature release signal to encoder U28. 1-63. U61A is configured as a comparator designed to monitor extreme temperature conditions. When the temperature voltage increases above the reference voltage, the output of U61A will go HIGH. U61A will output a HIGH temperature shutdown command to U13A of the transmitter off control circuit.

9.9.3 Reflected Power Emergency.

Reflected power emergency conditions are monitored by comparator U66D. U66D compares a reflected power sample to a fast voltage reference from U63C. When a reflected power emergency causes the sample to increase above the reference, the output of U66D will go LOW. The LOW is applied to OR gate U62B. U62B will output a LOW reflected power emergency attack signal to NAND gate U60D. With a HIGH lightning detector signal indicating no lightning activity, U60D will output a HIGH to latch U59A and OR gate U45B. U45B will output a HIGH: 1) to AND gate U47C, 2) to OR gate U19A, and 3) emergency mute command. With a HIGH enable failure signal, U47C will output a HIGH fast foldback attack signal to priority encoder U28. U19A will output a HIGH to: 1) bias driver transistor Q50 on to illuminate PWM mute indicator DS3 and 2) inverter U54A. U54A will output a LOW to bias driver transistor Q51 off to mute the PWM signal.

A LOW reflected power emergency attack signal is also applied to inverter U60C. U60C will output a HIGH to OR gate U69C. U69C is designed as a latching gate. When a reflected power emergency attack signal is present, a LOW foldback reset command will bias transistor Q56 off. This allows the output of U69C to be latched HIGH to maintain the indicator circuitry when the condition is removed.

The HIGH from U69C is applied to reflected power emergency latch U49A. The output of U49A will go HIGH. The HIGH is applied to: 1) OR gate U50B, 2) NOR gate U55, 3) AND gate U51A, and 4) transistor Q29. OR gate U50B will output a HIGH to bias Q39 off to disable the green antenna status indicator. NOR gate U55 will output a LOW which is inverted at U54F. U54F will output a HIGH to bias Q34 and Q35 on to enable the alarm indicator. U51A ANDs a 2 Hz signal with the HIGH from U49A to generate a flashing signal to OR gate U50C. U50C will output the signal through U51 and U50 to transistor Q38. The output of Q38 will flash to generate a flashing red antenna status indicator. Transistor Q29 will be biased on to provide a LOW remote reflected power emergency signal.

9.9.4 Lightning Conditions.

Lightning conditions are monitored by NAND gate U60D. When lightning is detected at the transmitter output, the lightning detector status input will go LOW. The LOW is applied to NAND gate U60D and inverter U46B. U60D will output a HIGH to latch U59A and to OR gate U45B. With a HIGH from U60D, U45B will output a HIGH: 1) to AND gate U47C, 2) to OR gate U19A, and 3) emergency mute command. With a HIGH enable failure signal, U47C will output a HIGH fast foldback attack signal to priority encoder U28. U19A will output a HIGH to: 1) bias driver transistor Q50 on to illuminate PWM mute indicator DS3 and 2) inverter U54A. U54A will output a LOW to bias driver transistor Q51 off to mute the PWM signal.

Inverter U46B will respond by routing a HIGH to latch U49C. The output of U49C will go HIGH. The HIGH is applied to NOR gate U55 and to transistors Q33 and Q37. The HIGH will bias Q33 and Q37 on to illuminate the lightning status indicators. NOR gate U55 will output a LOW which is inverted at U54F. U54F will output a HIGH to bias Q34 and Q35 on to enable the alarm indicator.

9.9.5 Foldback Indication.

Two circuit functions are monitored to indicate when the transmitter is in a foldback condition: 1) when the Q2 output of U28 is HIGH and 2) when the carryout signal of U31 is HIGH. When priority encoder U28 outputs a binary number in response to an attack signal, the Q2 output of U28 will be HIGH. The HIGH is applied to latch U67D. The Q output of U67D will go HIGH. The HIGH is inverted at U25C and applied to NAND gate U16C.

When a foldback condition, counter U31 will not be clocked to a maximum number resulting in a HIGH carryout signal. The HIGH is inverted at U25B. U25B will output a LOW to U16C. With a LOW from U25B or U25C, U16C will output a HIGH to foldback indicator driver transistors Q20 and Q21. The transistors will be biased on to indicate the transmitter is in a foldback condition.

9.10 ATTACK SIGNAL OPERATION.

During high reflected/forward power, reflected power emergency, over-temperature, or lightning conditions, an attack signal is applied to priority encoder U28. U28 is designed to determine priorities if two attack signals occur simultaneously. U28 will respond by routing a binary number to multiplexer U27. U27 will respond by selecting a clock signal from integrated circuit U26. U26 is a divider designed to generate several clock signals. The clock signals are used to drive the power control circuit up/down counters up or down as determined by the type of attack or release signal applied to U28. For example, a high reflected power condition selects a 4 Hz clock signal. An over-temperature signal will select a 1/16th Hz clock signal.

The signal from U27 is applied to up/down counters U30/U31. U30/U31 will respond by counting down and routing binary numbers to digital-to-analog converter U42. U42 will respond by routing a reduced voltage reference to U43. U43 will output a reduced reference voltage to reduce the transmitter output power.

9.11 1.2 : 1 VSWR CONDITIONS.

1.2 : 1 VSWR conditions are monitored by a VSWR detection circuit. The detection circuit consists of comparator U66C. U66C compares a forward power sample to a reflected power sample. When the reflected power sample increases above a forward power sample at approximately 1.2: 1, the output of U66C will go LOW. The LOW is inverted at U54E. U54E will output a HIGH 1.2 : 1 VSWR signal to OR gate U50C. U50C will output a HIGH to AND gate U51B and NAND gate U52C. With a LOW reflected power emergency signal from U51A, U51B will output a LOW to AND gate U50D. With a HIGH from U50C and a LOW from U51A, AND gate U52C will output a LOW to U50D. U50D will respond by routing a LOW to antenna status red indicator driver Q38. The output of Q38 will go LOW to bias the red antenna indicator on. With no reflected power conditions, the output of OR gate U50B will be LOW. The LOW biases the green antenna indicator on. This will result in a yellow antenna LED indication.

9.12 FOLDBACK RECOVERY.

When the foldback circuit is activated in response to a problem, the controller will initiate a recovery sequence. The following text describes the reflected power recovery, over temperature recovery, and reflected power emergency/lightning recovery.

9.12.1 High Reflected Power Recovery.

When the reflected power is reduced to a level below the reference at U65C, U65C will output a LOW to U62A. With a LOW from U47B, U62A will output a LOW to U47A. U47A will output a LOW reflected power high attack signal to terminate foldback operation. Once the problem which caused the high reflected power condition is removed, the transmitter will output a high reflected power release signal (refer to the following text).

9.12.2 High Forward Power Recovery.

High forward power conditions use the high reflected power circuitry to reduce/recover the transmitter output power. When the transmitter power is reduced to approximately 90%, the output of comparator U66B will go LOW. The LOW is applied to AND gate U47B. U47B will output a LOW through U62A to AND gate U47A. U47A will respond by routing a LOW to terminate the high reflected power attack signal. Once the problem which caused the high forward power condition is removed, the transmitter will output a high reflected power release signal (refer to the following text).

9.12.3 High Reflected Power Release Signal.

A reflected power release signal is controlled by AND gate U38A. When condition causing the high forward/reflected power condition is removed, a HIGH operate signal, a HIGH 1.2 : 1 VSWR signal from comparator U66C, and a HIGH from latch U67A will be ANDed at U38A. U38A will respond by routing a HIGH reflected power release signal to priority encoder U28. U28 will respond by routing a binary number to multiplexer U27. U27 will respond by selecting a clock signal from integrated circuit U26. U26 is a divider designed to generate several clock signals. The clock signals are used to drive the power control circuit up/down counters up as determined by the type of release signal applied to U28. For example, a high reflected power release condition selects a 2 Hz clock signal. The 2 Hz clock signal from U27 is applied to up/down counters U30/U31. U30/U31 will respond by counting up and routing binary numbers to digital-to-analog converter U42. U42 will respond by routing an increased voltage reference to U43. U43 will output an increased reference voltage to increase the transmitter output power.

9.12.4 Over-Temperature Recovery.

When the condition which caused the over-temperature problem is removed, the transmitter will initiate a recovery sequence. The output of comparator U65A will go LOW. The LOW is applied to AND gate U51D. With a HIGH enable failure signal, U51D will output a LOW to terminate the over-temperature attack signal.

When the temperature is reduced to approximately 55 degrees C, the output of comparator U65B will go HIGH. The HIGH is applied to AND gate U47D. With the HIGH from latch U67C, U47D will output a HIGH over-temperature release signal to priority encoder U28. U28 will respond by routing a binary number to multiplexer U27. U27 will respond by selecting a 1/16 Hz clock signal from integrated circuit U26. The 1/16 Hz clock signal from U27 is applied to up/down counters U30/U31. U30/U31 will respond by counting up and routing binary numbers to digital-to-analog converter U42. U42 will respond by routing an increased voltage reference to U43. U43 will output an increased reference voltage to increase the transmitter output power.

9.12.5 Reflected Power Emergency/Lightning Recovery.

When the condition which caused the reflected power emergency/lightning problem is removed, the transmitter will initiate a recovery sequence. The sequence is initiated by comparator U65D. U65D compares a fast reflected power voltage sample to a reference voltage. When the sample voltage is below the reference, the output of U65D will go HIGH. The HIGH is applied to AND gate U71A. With a HIGH from latch U67B, U71A will output a fast foldback release signal to priority encoder U28. U28 will respond by routing a binary number to multiplexer U27. U27 will respond by selecting a 512 Hz clock signal from integrated circuit U26. The 512 Hz clock signal from U27 is applied to up/down counters U30/U31. U30/U31 will respond by counting up and routing binary numbers to digital-to-analog converter U42. U42 will respond by routing an increased voltage reference to U43. U43 will output an increased reference voltage to increase the transmitter output power.

In addition to the sequence initiated by U65D, a HIGH foldback reset command is applied to transistor Q56. The HIGH biases Q56 on to unlatch OR gate U69C. U69C will output a LOW to latch U49A to allow the latch to be reset.

9.13 EXCITER MONITORING.

The operating condition of the exciter is monitored by a exciter status circuit. During an exciter fault condition, the exciter fault status input will go HIGH. The HIGH is applied to AND gate U36D. With a HIGH enable failure signal, U36D will output a HIGH to latch U48A. U48A will output a HIGH to: 1) bias driver transistor Q45 off to extinguish the exciter indicator green LED and 2) inverter U46A. U46A will output a LOW to bias driver transistor Q44 on. This will illuminate the exciter indicator red LED.

A HIGH exciter fault signal is also applied to OR gate U13C. U13C will output a HIGH to inverter U25A. U25A will output a LOW to AND gate U22B. U22B will output a LOW transmitter operate command to mute: 1) the exciter PWM signal and 2) the power supply circuit board(s).

9.14 POWER SUPPLY MONITORING.

The power supply(s) operating condition is monitored by a power supply status circuit. The following text presents the power supply monitoring operations.

9.14.1 Power Supply Fault.

During a power supply fault condition, the power supply fault status input will go LOW. The LOW is applied to OR gate U45A. With a LOW ac fail signal present, U45A will output a LOW to NAND gate U60A. With a HIGH power supply emergency signal present from U46D, U60A will output a HIGH to latch U48B. U48B will output a HIGH to: 1) bias driver transistor Q43 off to extinguish the power supply indicator green LED and 2) NOR gate U52D. U52D will output a LOW to bias driver transistor Q42 on. This will illuminate the power supply indicator red LED.

9.14.2 Power Supply Emergency Condition.

During a power supply emergency condition, the power supply emergency fault status input will go HIGH. The HIGH is applied to AND gate U36B. With a HIGH enable failure signal present, U36B will output a HIGH to: 1) inverter U46D and 2) OR gate U37B. U46D will output a LOW to NAND gate U60A. U60A will output a HIGH to latch U48B. U48B will output a HIGH to: 1) bias driver transistor Q43 off to extinguish the power supply indicator green LED and 2) NOR gate U52D. U52D will output a LOW to bias driver transistor Q42 on to illuminate the power supply indicator red LED. With a HIGH from U36B applied to U37B, U37B will output a HIGH emergency off signal to OR gate U37A. This configures U37A and OR gate U13A to generate a transmitter off signal.

9.14.3 Power Supply Maintenance Condition.

During a power supply maintenance condition, the power supply maintenance fault status input will go HIGH. The HIGH is applied to NOR gate U52D. U52D will output a LOW to bias transistor Q42 on. This will illuminate the power supply indicator red LED. With no power supply fault indications, the output of U48B will be LOW. The LOW bias driver transistor Q43 on to illuminate the power supply indicator green LED. The simultaneous illumination of the indicator green and red LEDs will produce a yellow maintenance indication.

9.15 RF POWER MODULE MONITORING.

The RF power module operating condition is monitored by an RF power module status circuit. The following text presents the RF power module monitoring operations.

9.15.1 RF Power Module Fault.

During an RF power module fault, the power supply fault status input will go LOW. The LOW is applied to inverter U46F. U46F will output a HIGH to latch U48C. U48C will output a HIGH to: 1) bias driver transistor Q41 off to extinguish the RF power module indicator green LED and 2) NOR gate U52B. U52B will output a LOW to bias driver transistor Q40 on. This will illuminate the RF power module indicator red LED.

9.15.2 RF Power Module Maintenance Condition.

During an RF power module maintenance condition, the RF power module maintenance fault status input will go HIGH. The HIGH is applied to NOR gate U52B. U52B will output a LOW to bias transistor Q40 on. This will illuminate the RF power module indicator red LED. With no RF power module fault indications, the output of U48C will be LOW. The LOW will bias driver transistor Q41 on to illuminate the RF power module indicator green LED. This simultaneous illumination the indicator green and red LEDs will produce a yellow maintenance indication.

9.16 FAULT CIRCUIT.

Exciter, power supply, RF power module, reflected power high, reflected power emergency, over-temperature, lightning, or a 1.2 : 1 VSWR conditions are monitored for faults by individual status circuits. In the event of a fault, the appropriate circuit will latch the fault for display by the controller circuit board indicators. If a circuit detects a fault condition, a HIGH signal will be applied to NOR gate U55. U55 will output a LOW to inverter U54F. U54F will output a HIGH to bias alarm driver transistors Q34 and Q35 on to illuminate the alarm indicator.

When a fault condition is removed, the fault circuit latch must be manually reset using the reset switch. When the reset switch is depressed, a HIGH reset command is applied to OR gate U12C. U12C will output a HIGH reset command to latches U48A, U48B, U48C, U48D, U49A, U49B, and U49C. The Q output of each latch will go LOW. The LOWs are applied to NOR gate U55. U55 will output a HIGH to inverter U54F. U54F will output a LOW to bias driver transistors Q34 and Q35 off to extinguish the alarm indicator.

9.17 OSCILLATOR CIRCUIT.

Reference frequencies for controller circuit operation are provided by an oscillator circuit. The oscillator circuit consists of: 1) comparators U40C and U44B, 2) resistors R24, R28, R27, R29, R30 and R31, 3) capacitor C38, and 4) inverter U46A. The oscillator is designed to output a 1 kHz square wave signal. Oscillator symmetry control is provided by resistors R24 and R27. The oscillator frequency is controlled by resistor R29 and capacitor C38.

Integrated circuit U40C compares a 1 kHz signal to a reference voltage. As a result, U40C will output a ramp signal to comparator U44A. U44A uses the signal to generate the power control PWM signal. The ramp symmetry is controlled by R30 and R31.

9.18 OVER-CYCLE OFF CIRCUIT.

The controller circuit board is equipped with an over-cycle circuit. The circuit is designed to prevent damage to the crowbar resistors on the power supply circuit board during 7 transmitter on/off cycles within 15 seconds. Conditions causing the transmitter to over-cycle off include ac failure and manual on/off control operation. The circuit consists of AND gate U22A, inverter U25F, pulse generator U59B, capacitor C132, and comparator U44D.

The circuit monitors the transmitter off, power supply mute, and ac fail conditions. AND gate U22B provides off signals during manual off operations. NOR gate U23A provides an off signal during power supply mute conditions. AC fail provides an off signal during ac fail conditions. During a transmitter off operation, a LOW from AND gate U22B, NOR gate U23A, or AC fail is applied to AND gate U22A. U22A will output a LOW to inverter U25F. U25F will output a HIGH: 1) to pulse generator U59B and 2) power inhibit signal. U59B will output a HIGH to capacitor C132. If the transmitter is operated to off 7 times within 15 seconds, capacitor C132 will charge and provide a HIGH to comparator U44D. When the voltage increases above the reference, U44D will output a HIGH over-cycle off command to OR gate U37B. U37B will output a HIGH emergency off command to operate the transmitter to off if one of the following conditions occur: 1) open cabinet or external interlock, 2) power supply emergency, 3) over-cycle off, or 4) the ac line is above 260 Volts. The emergency off signal is routed to the remote panel by transistor Q56.

9.19 POWER SUPPLY CIRCUIT.

The controller circuit board operates from ±15 volt dc supplies. The +15 volt supply is equipped with a battery backup system. A nine volt battery provides a dc supply to maintain the controller logic during an ac power failure. Switch S5 allows the battery to be tested. When switch S5 is depressed, the battery voltage is applied to comparator U44C. If the battery voltage is above the reference, the output of U44C will go LOW to illuminate battery ok indicator DS1.

The battery backup system is equipped with a battery save function. If no fault conditions have occurred during a power failure, NOR gate U55 will output a HIGH to AND gate U71C. With a HIGH shutdown signal, U71C will output a HIGH to latch U49D. U49D will output a HIGH to bias transistor Q52 off to terminate battery operation.

9.20 EXCITER CIRCUIT BOARD.

9.20.1 Left/Right Channel Input Circuit.

Left/right channel audio from the studio or audio processing equipment is applied to the exciter circuit board left and right channel input circuits (refer to Figure 9-2). The input circuits consist of: 1) RFI filters, 2) high-pass filter networks, 3) instrumentation amplifiers, 4) high frequency boost circuitry, and 5) active PWM filter equalizers. The left and right channel input circuits are identical. Therefore, only the left channel input circuit is discussed.

Left channel audio is applied to a balanced 600 Ohm resistive impedance network and an 80 kHz RFI filter network. The impedance and RFI filter networks are located on the motherboard assembly. The output of the circuitry on the motherboard is applied to a defeatable 10 Hz high-pass filter network consisting of capacitors C147 through C150 and jumpers P12A and P12B. The 10 Hz high-pass filter is provided to remove low frequency residual products from specific audio processing units. Jumpers P12A and P12B are provided to bypass the high-pass filter networks. The output from the high-pass filter network is applied to an instrumentation amplifier.

Integrated circuits U1A, U1B, and U2A are configured as an instrumentation amplifier circuit. The circuit is designed to provide balanced-to-unbalanced signal conversion. The output of the instrumentation amplifier is applied to a defeatable high frequency boost circuit. The high frequency boost circuit is designed to increase high frequency response to compensate for a Bessel filter in the pulse-width-modulation (PWM) modulator circuit. If the high frequency boost circuit is enabled, 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 2 dB at 10 kHz and the transient response will improve. Programmable jumper P2 is provided to bypass the left channel high frequency boost circuit if required. The output of the high frequency boost circuit is routed to an active PWM filter/equalizer and a mono mode switching circuit.

Integrated circuits U3A and U3B are configured as an active PWM filter/equalizer. The PWM filter/equalizer is a fifth order low-pass filter. The filter is incorporated into the circuit to match the characteristics of a filter contained in the pulse-width-modulation (PWM) circuitry. The filter is required to provide: 1) accurate left and right channel metering and 2) superior stereo equalization. The output from the PWM filter/equalizer is routed for application to the stereo circuit board.

9.20.2 Mono Mode Switching.

Left and right channel audio from the input circuit is applied to monophonic mode selection integrated circuit U39. U39 is controlled by: 1) mono L, mono R, and mono SC signals from the stereo circuit board and 2) mono left or mono right channel select jumper P4. If the transmitter is equipped with the stereo circuit board and monophonic operation is required, LOW control signals from the following control lines are applied to configure U39 to select the desired monophonic audio: 1) mono SC control line and 2) mono L or mono R control lines. If the transmitter is not equipped with the stereo circuit board, jumper P4 is installed in the left or right channel position to configure U39 to select left or right channel audio for monophonic operation. The output of U39 is applied to single channel monophonic boost amplifier U8A. The monophonic boost circuit is designed to provide up to 6 dB of additional gain for monophonic operations. This level allows the transmitter to operate at 100% modulation. Potentiometer R41 allows the adjustment of the monophonic boost level. A monophonic boost control in most audio processing equipment also provides additional gain for monophonic conditions. If the transmitter is configured for stereo operation, U39 sums the left and right channels to produce the stereo L+R information. The L+R information is applied through monophonic boost circuit U8A to the 24 μS delay circuit.

9.20.3 24 μS Delay Circuit.

Integrated circuits U8B, U9A, and U9B are configured as a 24 μS delay circuit. The delay circuit is incorporated into the L+R audio path to ensure all required stereo equalization will be performed in

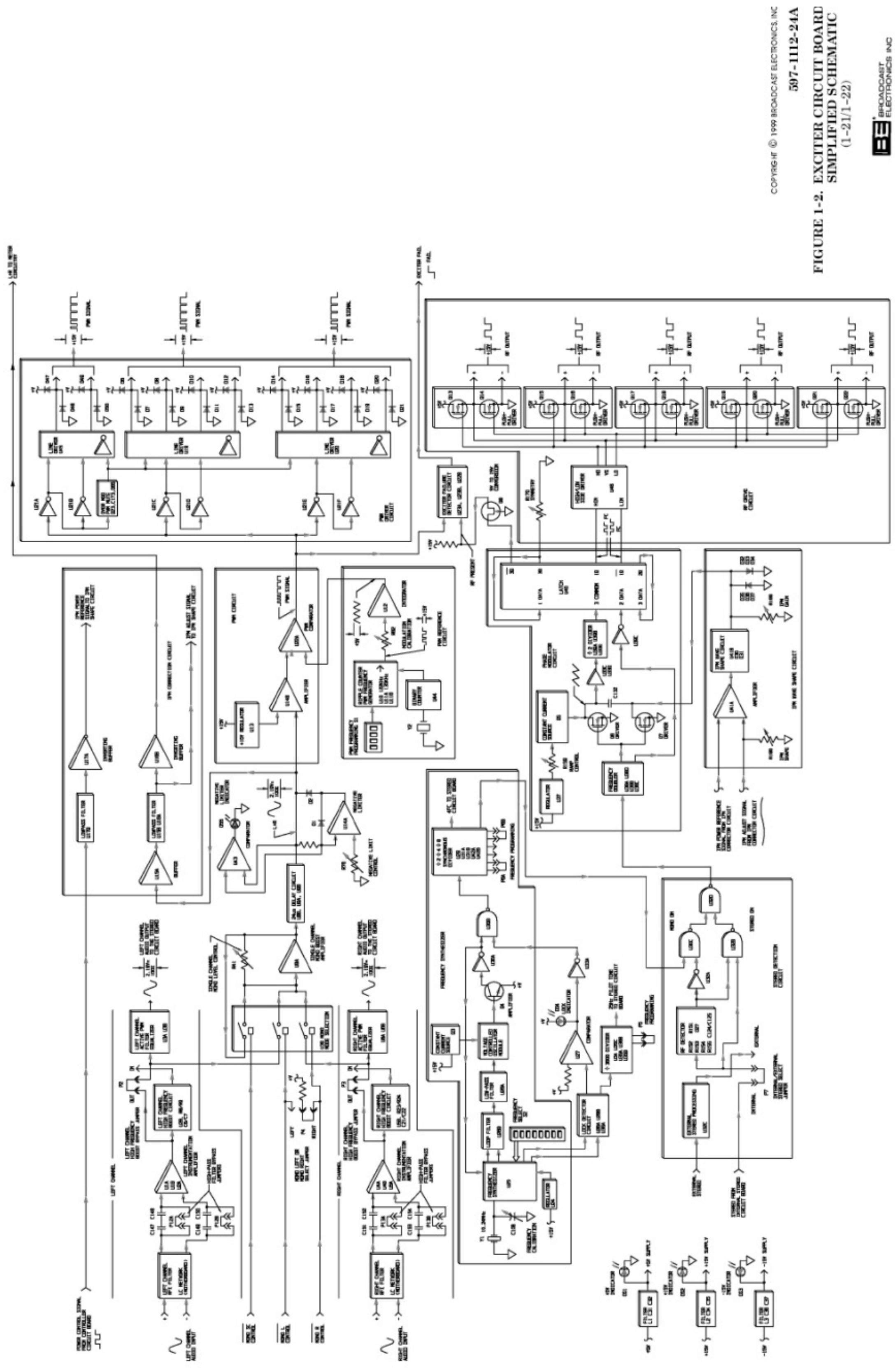


Figure 9-2: EXCITER CIRCUIT BOARD SIMPLIFIED SCHEMATIC

the L-R audio path. This eliminates the requirement for complex adjustable delay circuitry in the L+R path.

9.20.4 Negative Limiter.

The output from the delay circuit is applied to a negative limiter circuit. The circuit consists of integrated circuit U14A, diodes D1 and D2, and negative limit control R76. The circuit is designed to prevent the loss of carrier during negative modulation. Potentiometer R76 allows the circuit to be adjusted from 90% to 100%. The output of the limiter is applied a incidental-phase-modulation (IPM) correction circuit and a PWM circuit. A sample from the negative limiter circuit is applied to comparator U43. When the negative limiter circuit is enabled, the output of U43 will go high to illuminate negative limiter indicator DS5.

9.20.5 IPM Correction Circuit.

L+R audio from negative limiter U14A is applied through buffer U15A to a low-pass filter. The filter is a fifth order low-pass filter consisting of integrated circuits U15B and U16A. The filter is designed to provide: 1) the correct time delay for IPM correction and 2) the correct frequency response for L+R metering. The output from the filter: 1) is applied to inverting buffer U16B and 2) provides an IPM adjust signal to the IPM corrector circuit. Buffer U16B inverts the L+R signal and removes a dc sample introduced by the negative limiter. The output of U16B is applied to the L+R metering circuitry.

A power control PWM signal from the controller circuit board is applied to low-pass filter U17B. U17B is designed to convert the power control PWM signal to a dc control voltage. The output of U17B is applied to inverting amplifier U17A. The output of U17A provides an IPM power reference signal to the IPM wave shape circuit.

9.20.6 PWM Circuit.

L+R audio from the negative limiter circuit is applied to amplifier U14B. U14B amplifies the L+R signal to a 4 volt peak-to-peak level with a -0.5 volt dc potential. This provides a 40% nominal duty cycle at the output of a PWM comparator to allow the circuitry to modulate the transmitter from -100% to +150%. The output of U14B is applied to high-speed PWM comparator U22A. U22A compares the L+R signal with a reference signal from integrator U12 to generate a square-wave PWM control signal. The square wave duty cycle varies in response to the L+R audio level. The output of U22A is applied to the PWM driver circuit and an exciter failure detector circuit.

9.20.7 PWM Driver Circuit.

The PWM control signal from PWM comparator U22A is applied a PWM driver circuit. The circuit consists of: 1) inverters U21A through U21F, 2) line drivers U19, U20, and U45, and 3) diodes D6 through D21 and D47 through D50. The PWM control signal is applied to inverters U21A through U21F. The inverted PWM signals from U21A through U21F are applied to inverting line drivers U19, U20, and U45. U19, U20, and U45 operate in parallel to lower the output impedance. The outputs from U19, U20, and U45 are applied to each RF amplifier module modulator circuit board. Diodes D6 through D21 and D47 through D50 protect U19/U20/U45 from latch-up conditions. The PWM circuit is protected from over-modulation conditions by an over-modulation PWM mute circuit consisting of transistor Q23, capacitor C173, and diode D65. If the modulation level increases above 150%, the circuit will output a HIGH to mute line drivers U19, U20, and U45.

9.20.8 Frequency Synthesizer.

The exciter circuit board frequency synthesizer is a phase-locked-loop circuit which generates and maintains the phase and frequency of a voltage-controlled-oscillator (VCO) to a high level of precision. The circuit is designed with the ability to synthesize: 1) 119 frequencies within the 522 kHz to 1705 kHz AM broadcast band in 10 kHz increments or 2) 123 frequencies within the 522 kHz to 1705 kHz AM broadcast band in 9 kHz increments.

The synthesizer operates from binary coded carrier frequency information entered into frequency programming switch S2. The binary formatted frequency is applied to frequency synthesizer integrated circuit U25. U25 operates from 10.24 MHz reference oscillator Y1. Capacitor C108 allows the reference to be calibrated. Regulator U24 provides a stable voltage supply for frequency synthesizer U25.

Once programmed, U25 will output a series of rectangular-wave pulses to loop filter U26B and low-pass filter U26A. U26A and U26B function together to generate a stable dc control voltage for application to a voltage-controlled-oscillator (VCO) module. The control voltage is used by the VCO module to generate a precision frequency reference. A constant current source for the VCO module is provided by transistor Q3.

Precision alignment of the VCO output is maintained by the phase-locked-loop design. Feedback samples are monitored by a lock detector circuit. If the VCO frequency shifts from the programmed operating state, the output of U25 will change to adjust the control voltage and maintain a stable VCO output.

The output of the VCO module is applied through transistor amplifier Q4 to inverter U30A. The output of U30A is applied to NAND gate U30B. A sample of U30A is applied to U25 for feedback.

The output of U30B is applied to a synchronous divider consisting of integrated circuits U29, U31A, U31B, U42A, and U42B. Depending on the carrier frequency: 1) the original synthesizer frequency or a divide-by-2 frequency is used to generate a 4XFc (four times carrier frequency) signal for application to the stereo circuit board and 2) a divide-by-4 or a divide-by-8 signal is used to generate the carrier frequency. The carrier frequency is applied to NAND gate U30C. Jumpers P6A and P6B program the divider as determined by the carrier frequency.

9.20.9 PWM Reference Circuit.

The PWM frequency is generated by oscillator Y2, binary counter U44, and switch S1. The PWM frequency generator outputs a 115.4 kHz to 138.5 kHz signal to an integrator circuit. The PWM frequency is: 1) generated by one of four different crystals and 2) determined by several operating parameters. The output of U44 is applied to Integrator U12. U12 is designed to generate a precision triangle-wave signal for application to PWM comparator U22A. Programming switch S1 is used to program the PWM frequency generator circuit. The PWM frequency, crystal, and switch programming are recorded in the final test data sheets.

9.20.10 Lock Detection Circuit.

The frequency synthesizer circuit is monitored for proper operation by a lock detector circuit. Integrated circuits U28A, U28B, and U36A function as a lock detector circuit. The circuit monitors an output sample signal and a divided VCO sample signal from U25. If the VCO and the reference phases are within ±180 degrees, the VCO is locked to the correct frequency. If the phases are out of tolerance, the output of U36A will go LOW. The LOW is applied to comparator U27. The output of U27 will go HIGH to extinguish lock indicator DS4 and is inverted at U33A. U33A will output a LOW to U30B which mutes the output of the frequency synthesizer.

A sample from the lock detector circuit is applied to divide-by-3600 circuit. The circuit consists of integrated circuits U34, U35A, U35B, U35C, and U36B. The divider circuit is designed to generate a 25 Hz pilot signal for application to the stereo circuit board.

9.20.11 Stereo Detection Circuit.

The presence of a stereo signal is detected by a stereo detection circuit. This circuit allows the transmitter to be: 1) converted to monophonic operation by removing the stereo circuit board or 2) converted to stereophonic operation by inserting the stereo circuit board. The circuit will also detect the presence of an external stereo signal.

Stereo signals from the stereo circuit board are applied to programmable jumper P7. P7 selects a stereo signal from the internal stereo circuit board or from an external source. The external source is applied to a processing circuit consisting of integrated circuit U32C and the associated circuitry. The processing circuit provides ac coupling, over-voltage limiting, and square-wave generation.

Either an external or internal stereo signal from P7 is applied to an RF detector circuit. The RF detector consists of: 1) resistors R151 through R155, 2) capacitors C124 and C125, and 3) diode D27. The detector rectifies the signal for application to an automatic mono/stereo select circuit consisting of integrated circuits U32A, U30B, U32C, and U32D.

The mono/stereo select circuit will route a stereo or mono signal to an RF drive circuit in response to the presence of stereo. If a stereo signal is present, the output of U32A will be LOW. The LOW will disable mono on gate U30C and enable stereo on gate U32B. The stereo signal from U32B will be applied through NAND gate U32D to a phase modulator circuit. If a stereo signal is not present, the output of U32A will be HIGH. The HIGH will enable U30C and disable U32B to allow the monophonic RF signal to be applied to the phase modulator circuit.

9.20.12 IPM Wave Shape Circuit.

The IPM adjust and IPM power reference signals from the IPM correction circuit are applied to an IPM wave shape circuit. The signals are amplified at U41A. The output of U41A is applied to an IPM wave shape circuit consisting of integrated circuit U41B and diodes D30 and D31. The circuit is designed to output a phase modulated signal which is equal in amplitude and out-of-phase with the phase modulation component in the RF amplifier section. Potentiometer R198 controls the shape of the IPM correction signal. Potentiometer R189 controls the amplitude of the IPM correction signal. Diodes D32 through D37 provide over-voltage protection. The output of the IPM wave shape circuit is applied to the phase modulator circuit.

9.20.13 Phase Modulator Circuit.

A phase modulator circuit is incorporated into the exciter circuitry to cancel incidental-phase-modulation (IPM) in the RF amplifier section of the transmitter. The circuit is designed to insert a phase modulation component which is equal in amplitude and out of phase with the phase modulation in the RF amplifier section. This feedforward approach is designed to effectively cancel (IPM) in the transmitter.

The phase modulator circuit accepts a mono or stereo signal from NAND gate U32D. The signal is applied to a frequency doubler circuit consisting of integrated circuits U38A, U38B, U38C, and U38D. The output of the frequency doubler is applied to the gates of transistors Q6 and Q7. An IPM correction signal from the IPM wave shape circuit is applied to the drains of Q6 and Q7.

Transistors Q6 and Q7 function to produce a triangle-shaped waveform which is equal in amplitude and out-of-phase with the IPM in the RF amplifier section. The output from Q6 and Q7 is converted to a square-wave at U33C and U33D. The signal from U33C/U33D is applied to a divider circuit consisting of integrated circuits U39A, U39B, and U33E. The output of the divider is used to clock the RF carrier signal from the frequency doubler circuit at latch U40. U40 outputs a phase compensated carrier frequency to the RF drive circuit. Potentiometer R170 is provided to adjust the symmetry of the RF carrier signal.

9.20.14 RF Drive Circuit.

The RF drive circuit consists of high/low side driver U46 and transistors Q13 through Q22. Complementary phase compensated square-wave signals at the carrier frequency are applied to U46. U46 outputs high and low driver signals for application to a transistor array consisting of transistors Q13 through Q20. The transistors output a +15 volt peak-to-peak square-wave signal at the carrier frequency for application to the power block motherboard.

9.20.15 Exciter Failure Detector Circuit.

The exciter circuitry is equipped with an exciter failure detector circuit. The circuit consists of integrated circuits U22B, U23A, and U23B. Two signals are routed to the detector circuit: 1) the PWM control signal and 2) an RF present signal from transistor Q8 and latch U40. The circuit is designed to output a HIGH during the following conditions: 1) the loss of the PWM signal or 2) the loss of the RF signal. The HIGH is routed to the circuitry on the controller circuit board.

9.20.16 Power Supply Circuits.

The exciter circuit board operates from three power supplies: 1) a +5 volt supply, 2) a +15 volt supply, and 3) a -15 volt supply. Each supply is equipped with a filter network. The +5 volt supply filter consists of inductor L1 and capacitors C31/C32. The output of the filter is applied to: 1) +5 volt indicator DS1 and 2) the exciter circuit board components. The +15 volt supply filter consists of inductor L2 and capacitors C34/C35. The output of the filter is applied to: 1) +15 volt indicator DS2 and 2) the exciter circuit board components. The -15 volt supply filter consists of inductor L3 and capacitors C36/C37. The output of the filter is applied to: 1) -15 volt indicator DS3 and 2) the exciter circuit board components.

9.21 STEREO CIRCUIT BOARD.

9.21.1 Equaltization Circuitry.

The stereo circuit board is equipped with two equalization circuits: 1) equalization circuit 1 and 2) equalization circuit 2 (refer to Figure 9-3). The circuits are designed to provide equalization for two antenna patterns such as: 1) a day pattern and 2) a night pattern. The equalization circuits are identical and contain identical left and right channel circuitry. Therefore, only the left channel of equalization circuit 1 will be discussed.

Left channel audio from the exciter circuit board is applied to a left channel high frequency equalizer network in the equalization 1 circuit. The high frequency equalizer consists integrated circuits U1A, U2, U1B, U3, U4A, and U6A. The equalizer circuit is a second order state variable low-pass filter designed to compensate for high frequency and phase problems caused by antenna/phasor units. The filter is equipped with an adjustable corner frequency. The corner frequency is established by a voltage generated by potentiometer R20 and buffer U6A. The voltage is applied to voltage-controlled-amplifiers U2 and U3 which control the corner frequency of the equalizer circuit. In addition to the variable corner frequency, the filter is equipped with a variable peak level. Potentiometer R6 controls the signal peak near the corner frequency. Potentiometer R1 controls the left channel level. The output of the circuit is applied to an 8 microsecond delay circuit.

9.21.2 8 μS Delay Circuit.

Integrated circuit U4B is configured as an 8 μs delay circuit. The delay circuit is a third order low-pass filter designed to provide 8 microseconds of delay to match low and mid frequency delay equalization requirements. The output of the circuit is routed to 8 μs delay select jumper P1A. P1A allows the delay circuit to be bypassed if 8 μs of delay is not required for equalization operation.

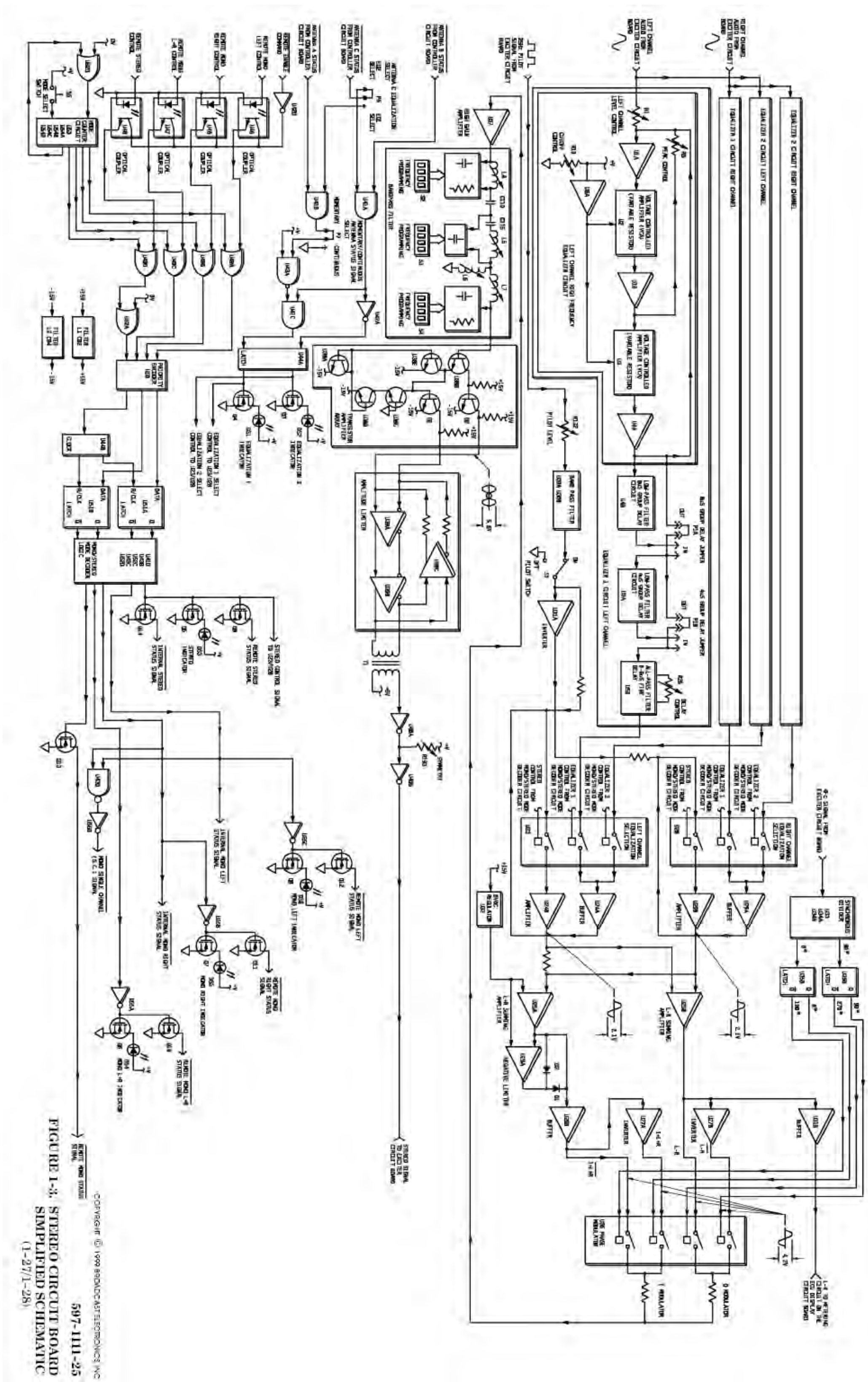


Figure 9-3: STEREO CIRCUIT BOARD SIMPLIFIED SCHEMATIC

9.21.3 4 μs Delay Circuit.

Integrated circuit U5A is configured as a 4 μs delay circuit. The delay circuit is a third order low-pass filter designed to provide 4 μs of delay to match low and mid frequency delay equalization requirements. The output of the circuit is routed to 4 μs delay select jumper J1B. J1B allows the delay circuit to be bypassed if 4 μs of delay is not required for equalization operation.

9.21.4 All-Pass Filter.

Integrated circuit U5B is configured as an all-pass filter circuit. The circuit is designed to provide a continuously adjustable 0-6 microsecond delay for equalization operation. Potentiometer R26 controls the amount of delay.

9.21.5 Equalization Selection Circuit.

The outputs of equalization circuits 1 and 2 are applied to an equalization selection circuit consisting of integrated circuits U23 and U28. U23 and U28 are single-pole switch arrays designed to select audio from the equalization 1 or equalization 2 circuit. U23 and U28 are controlled by: 1) HIGH equalization 1 and equalization 2 control signals from latch U44A and 2) a HIGH stereo signal from the mono/stereo mode decoder circuit. The circuit is designed to select audio in response to the antenna pattern and mode of operation. For example, stereo audio from equalization circuit 1 is required. A HIGH from latch U44A will enable the equalization 1 switches in U23 and U28. U23 and U28 respond by routing audio to an L+R and L-R matrix circuit.

9.21.6 L+R And L-R Matrix Circuit.

Left and right channel audio from the equalization selection circuit is applied to an L-R and L+R matrix circuit. The circuit consists of integrated circuits U24A, U24B, U25A, U26A, U26B, U27A, U29A, U29B, U25B, U31B, U27B, U27A, and U32. The circuit is designed to generate L+R and L-R audio for application to a phase modulator circuit.

To provide an example of circuit operation, stereo audio is required from equalization circuit 1. Left channel audio from the equalization circuit 1 input of U23 is applied to buffer U24A. Right channel audio from the equalization circuit 1 input of U28 is applied to buffer U29A. U24A and U29A will output audio which is summed with a pilot signal from pilot on/off switch S1. The audio/pilot signal is applied to the inputs of U23/U28. With a HIGH from the stereo control line of mono/stereo mode decoder circuit: 1) U23 will route the left channel audio/pilot signal to amplifier U24B and 2) U28 will route the right channel audio/pilot signal to amplifier U29B. U24B/U29B amplify the signal to approximately 2.1 volts peak-to-peak. The outputs of U24B/U29B are applied to L+R summing amplifier U25A and L-R summing amplifier U25B.

A dc voltage for application to L+R summing amplifier U25A is provided by regulator U32. U32 provides a bias voltage for the L+R audio to generate a 1+L+R audio signal. The output of summing amplifier U25A is applied to a negative limiter circuit consisting of integrated circuit U26A and diodes D1 and D2. The circuit is designed to limit negative modulation to -95%. This prevents the loss of carrier during negative modulation. The output of negative limiter U26A is routed through buffer U26B to a phase modulator circuit as a $\overline{1+L+R}$ signal and inverter U27B. U27B generates a 1+L+R signal for application to a phase modulator circuit.

Left and right channel are summed at U25B to produce an L-R signal. The L-R signal is applied to: 1) a phase modulator circuit as an L-R signal, 2) to inverter U27B, and 3) buffer U31B. U27B generates a $\overline{L-R}$ signal for application to a phase modulator circuit. U31B is designed to buffer the L-R signal for application to an L-R metering circuit on the ECU display circuit board.

9.21.7 Phase Modulator Circuit.

1+L+R, $\overline{1+L+R}$, L-R, and $\overline{\text{L-R}}$ signals are applied to a phase modulator circuit. The phase modulator circuit consists of: 1) phase modulator U36, 2) a synchronous divider consisting of integrated circuits U33, U34A, and U34B, and 3) latches U35A and U35B.

The phase modulator circuit operates from four phase references generated by a synchronous divider and latches U35A/U35B. A reference at four times the carrier frequency from the exciter circuit board is applied to a synchronous divider circuit. The circuit divides the signal by four and generates two outputs which are 90 degrees out-of-phase. The outputs are applied to latches U35A/U35B. U35A/U35B generate four reference signals: 1) 0 degrees, 2) 90 degrees, 3) 180 degrees, and 4) 270 degrees. The reference signals are used to drive phase modulator U36.

Integrated circuit U36 is a switch array configured as a phase modulator. The four reference signals from latches U35A/U35B are used to drive the 1+L+R, $\overline{1+L+R}$, L-R, and $\overline{\text{L-R}}$ signals at U36. The output of U36 produces two signals: 1) a normal AM modulated signal reference to a 0 degree carrier containing the L+R information (I modulator) and 2) a double side-band suppressed carrier signal referenced to a 90 degree carrier containing the L-R information (Q modulator). The signals are summed to produce a quadrature AM signal.

The quadrature AM signal is applied to integrated circuit U37. U37 is a high-speed operational amplifier designed to amplify the quadrature signal to a 1 volt peak-to-peak level with no modulation. The output of the amplifier is applied to a band-pass filter.

9.21.8 Band-Pass Filter.

The output of amplifier U37 is applied to a forth order linear phase band-pass filter. The band-pass filter consists of: 1) inductors L4, L5, L6, and L7, 2) capacitors C110 and C115, and 3) programming switches S2, S3, and S4. The filter provides proper amplitude limiting during high single channel conditions. Programming switches S2, S3, and S4 select resistor and capacitor combinations to program the filter for specific groups of frequencies within the AM broadcast band. Inductors L4, L5, L6, and L7 tune the filter for proper operation. The output of the filter is applied to a transistor amplifier array.

9.21.9 Transistor Amplifier Circuit.

The output of the band-pass filter is applied to a transistor array consisting of transistors Q1, Q2, U38B, U38C, U38D, and U38E. The signal is amplified to a 2 volt peak-to-peak level by transistors U38B, U38C, U38D, and U38E. The transistors also perform unbalanced-to-balanced signal conversion. The balanced signal from transistors U38B, U38C, U38D, and U38E are buffered by transistors Q1 and Q2 for application to the amplitude limiter circuit.

9.21.10 Amplifier Limiter Circuit.

The balanced quadrature signal from the transistor amplifier circuit is applied to an amplitude limiter circuit. The amplitude limiter circuit consists of integrated circuits U39A, U39B, and U39C. The circuit produces phase modulation containing the L-R information. The output of the limiter is applied to an output network.

9.21.11 Output Network.

The 1 volt peak-to-peak phase modulated signal from the amplitude limiter circuit is applied to transformer T1. T1 is provided to increase the voltage to a 5 volt peak-to-peak level. The output of T1 is buffered by inverters U40A and U40B. Potentiometer R193 adjusts the symmetry of the signal to null the second harmonic frequency. The output of U40B is routed for application to the exciter circuit board.

OPERATING MODE SELECTION AND INDICATION CIRCUIT.
The stereo circuit board can be configured for stereo, mono left, mono right, or mono L+R operation. The circuit board is configured for the desired mode of operation by a mode selection and indication circuit. HIGH remote mono left, mono right, mono L+R, and stereo commands are applied to optical couplers U45 through U48. The outputs of U45 through U48 are applied to OR gates U49A through U49D.

Local control operations are directed by mode select switch S5. S5 controls a mode counter circuit consisting of integrated circuits U53, U54A, U54B, U54C, and U54D. The switch operates by advancing the counter each time the switch is depressed. This results in the circuit advancing through the modes of operation in the following order: 1) stereo, 2) mono left, 3) mono right, or 4) mono L+R. The mode counter circuit selects a mode by routing a HIGH control command to the OR gates U49A through U49D. 1-152. OR gates U49A through U49D select a command from the remote control optical couplers or the local mode counter circuit. For example, the circuit board is desired to be configured for stereo operation. A HIGH from remote stereo optical coupler U48 or the local mode control circuit is applied to OR gate U49D. U49D outputs a HIGH through OR gate U52A to priority encoder U50. U50 monitors the OR gates for additional commands and determines the highest priority mode of operation. Once the mode of operation is determined, U50 will output a two bit binary code to a mono/stereo decoder circuit.

The mono/stereo mode decoder circuit consists of: 1) latches U44B, U51A, and U51B and 2) mono/stereo decoder logic U41D, U43B, U43C, U52C, and U52D. Latches U51A and U51B latch the two bit binary code and produce complementary outputs for application to the mono/stereo decoder logic. Latch U44B operates as a clock for U51A/U51B. The mono/stereo decoder logic decodes the binary code and outputs a HIGH to: 1) transistors Q5, Q9, and Q14 and 2) equalization select integrated circuits U23 and U28. Transistor Q14 will respond by generating a LOW internal stereo status signal. Transistor Q5 will output a LOW to bias stereo indicator DS3 to on. Transistor Q9 will respond by generating a LOW remote stereo status signal.

Selection and indication of the mono left, mono right, and mono L+R modes of operation are performed in an identical manner. When the mono left or mono right mode is selected, a HIGH will be routed to NAND gate U43D. The output of U43D will go HIGH. The HIGH is inverted at U55D to produce a LOW mono single channel signal for application to the exciter circuit board. When the mono left, mono right, or mono L+R mode is selected a HIGH is applied to transistor Q13. Q13 will respond by generating a LOW remote mono status signal.

9.21.12 Equalization Selection.

Equalization circuit selection is determined by the antenna connected to the transmitter. Antenna A selects equalization circuit 1. Antenna B selects equalization circuit 2. Antenna C can be programmed to select equalization circuit 1 or equalization circuit 2.

Antenna A, B, and C status signals are applied to AND gates U41A and U41B. Programmable jumper P6 selects equalization circuit 1 or equalization circuit 2 for antenna C operations.

The circuit selects equalization circuit 1 or 2 when a status signal is applied to U41A/U41B. For example, a LOW is applied to U41B when antenna A is selected. U41B will output a LOW to NAND gate U43A. Programmable jumper P7 programs the equalization selection circuit for momentary or continuous signals. With P7 programmed for momentary signals, U43A will output a HIGH to AND gate U41C. With a HIGH from U41A, U41C will output a HIGH to latch U44A. U44A will output a

HIGH to: 1) integrated circuits U23 and U28 to select equalization circuit 1 and 2) transistor Q4. Q4 will go LOW to bias equalization 1 indicator DS1 on.

9.21.13 Pilot Signal.

A 25 Hz square-wave signal from the exciter circuit board is applied through potentiometer R132 to a band-pass filter consisting of integrated circuits U30A and U30B. Potentiometer R132 is designed to provide pilot level control. The band-pass filter converts the square-wave signal to a sine-wave signal.

The output of the band-pass filter is applied through switch S1 to: 1) integrated circuit U23 and 2) inverter U31A. U31A inverts the signal for application to integrated circuit U28. Switch S1 is provided to disable the pilot signal.

9.21.14 Power Supply Filter Network.

The stereo circuit board operates from ±15 volt power supplies. Each supply is equipped with a filter network. The +15 volt supply filter consists of inductor L1 and capacitor C92. The output of the filter is applied to the stereo circuit board components. The -15 volt supply filter consists of inductor L2 and capacitor C94. The output of the filter is applied to the stereo circuit board components.

9.22 ECU POWER SUPPLY ASSEMBLY.

The ECU assembly is equipped with a modular 40W switching power supply assembly. The supply provides regulated +5V, +15V, and -15V operating potentials for the ECU circuit boards.

The power supply for the ECU controller circuit board is back-up by a 9V battery. During an ac power failure, the battery will maintain the transmitter operating configuration stored in the controller logic circuitry. Once power is returned to the transmitter, the transmitter will automatically resume operation in the configuration appearing prior to the ac failure. If an extended ac power failure occurs, the transmitter will be operated to off by an ac loss/auto shutdown circuit on the controller circuit board.

10 TRANSMITTER ECU MAINTENANCE

This section provides maintenance information for the AM-2.5E/AM-5E transmitter ECU (exciter/control unit).

10.1 SAFETY CONSIDERATIONS.

WARNING THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND
WARNING DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO
WARNING THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR

10.2 POWER SUPPLY COMPONENTS.

The AM-2.5E/AM-5E 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 judgment, care, and common sense must be practiced to prevent accidents.

In addition to high voltages and currents, the 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

10.3 ECU CIRCUIT BOARD INSTALLATION/REMOVAL.

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
CAUTION SEATED INTO THE CONNECTORS.

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 5-4 in SECTION V MAINTENANCE 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.

10.4 FIRST LEVEL MAINTENANCE.

First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

10.5 CLEANING AND INSPECTION.

WARNING NEVER OPEN THE EQUIPMENT UNLESS ALL TRANSMITTER PRIMARY POWER IS
WARNING DISCONNECTED.

WARNING ENSURE ALL TRANSMITTER PRIMARY POWER IS DISCONNECTED BEFORE ATTEMPTING MAINTENANCE
WARNING ON ANY AREA WITHIN THE TRANSMITTER.

Clean the ECU circuit boards of accumulated dust as required using a nylon bristle brush and vacuum cleaner. Inspect the circuit boards for improperly seated semiconductors and components damage by overheating. In addition, inspect the ECU for loose hardware. Ensure all ECU interconnecting cables are secure.

10.6 SECOND LEVEL MAINTENANCE.

Second level maintenance is the performance of procedures required to restore the ECU to operation after a fault has occurred. The procedures are divided into electrical adjustments procedures and troubleshooting.

10.6.1 Electrical Adjustments.

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.

10.6.2 ECU Extender Circuit Board Operation.

The ECU 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 5-4 in SECTION V MAINTENANCE 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.

10.7 CONTROLLER CIRCUIT BOARD ADJUSTMENTS.

10.7.1 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 the INSTALLATION section. Refer to POWER LEVEL AND MODULATION CALIBRATION ADJUSTMENT for the adjustment procedure.

10.7.2 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 Technical Service Department for information and instructions to adjust the FWD and RFL CAL controls.

10.8 ECU METER SWITCH CIRCUIT BOARD ADJUSTMENTS.

10.8.1 FWD Power Meter Low And High Scale Cal.

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 Technical Service Department for information and instructions to adjust the low and high scale forward power meter controls.

10.8.2 REF Power Meter Low And High Scale Cal.

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 Technical Service Department for information and instructions to adjust the low scale, high scale, and ac sample reflected power meter controls.

10.8.3 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 Technical Service Department for information and instructions to adjust the FWD and RFL CAL controls.

10.9 STEREO CIRCUIT BOARD ADJUSTMENTS.

10.9.1 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 the INSTALLATION section. Refer to STEREO ADJUSTMENT in SECTION II for the adjustment procedure.

10.10 EXCITER CIRCUIT BOARD ADJUSTMENTS.

10.10.1 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 Technical Service Department for information and instructions to adjust the modulation calibration control.

10.10.2 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 Technical Service Department for information and instructions to adjust the phase modulator calibration control.

10.10.3 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 Technical Service Department for information and instructions to adjust the symmetry control.

10.10.4 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 Technical Service Department for information and instructions to adjust the IPM correction circuit controls.

10.10.5 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 the INSTALLATION section. Refer to SINGLE CHANNEL LEVEL in SECTION II for the adjustment procedure.

10.10.6 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 Technical Service Department for information and instructions to adjust the average modulation limit control.

10.10.7 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.
To adjust NEG LIMIT control R76, proceed as follows:

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

1. Disconnect all transmitter primary power.
2. Connect the audio generator to the TB2 LEFT INPUT and RIGHT INPUT audio terminals on the ECU rear-panel.
3. Adjust NEG LIMIT control R76 on the exciter circuit board fully counterclockwise.
4. Adjust the audio generator for a L=R 1 kHz output at +10 dBm.
5. Adjust the AM stereo modulation monitor to indicate positive L+R modulation.
6. Energize the transmitter primary power and operate the transmitter.
7. 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.
8. Adjust the AM stereo modulation monitor to indicate negative L+R modulation.
9. Adjust NEG LIMIT control R76 on the exciter circuit board until the AM stereo Modulation monitor indicates -95% L+R modulation.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

10. Disconnect all transmitter primary power.
11. Remove all test equipment.

10.10.8 Frequency Calibration Control.

Frequency calibration control C108 calibrates the exciter frequency synthesizer. The frequency calibration control is adjusted in the following procedure.
To adjust frequency calibration control C108, proceed as follows:

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

1. Disconnect all transmitter primary power.
2. Remove the exciter circuit board and install the ECU extender circuit board in the exciter circuit board location.
3. Install the exciter circuit board on the extender circuit board.
4. Connect a frequency counter to test point TP15 on the exciter circuit board.
5. Energize the transmitter primary power and operate the transmitter.
6. Adjust frequency calibration control C108 on the exciter circuit board for the carrier frequency.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

7. Disconnect all transmitter primary power.
8. Remove all test equipment and replace the exciter circuit board.

10.11 DISPLAY CIRCUIT BOARD ADJUSTMENTS.

10.11.1 L/L+R And R/L-R Display Calibration Control.

L/L+R calibration control R42 and R/L-R calibration control R48 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.
To adjust L/L+R calibration control R42 and R/L-R calibration control R48, proceed as follows:

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

1. Disconnect all transmitter primary power.
2. Connect the audio generator to the TB2 LEFT INPUT and RIGHT INPUT audio terminals on the ECU rear-panel. Operate the transmitter at a normal output power and the EXCITER MONITOR for L+R/L-R indications.
3. Adjust the audio generator for an in-phase L=R 1 kHz output at a level to generate 100% modulation as indicated by the modulation monitor. Adjust L/L+R calibration control R42 until the EXCITER MONITOR just indicates 100% L+R modulation.
4. 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. Adjust R/L-R calibration control R48 until the EXCITER MONITOR just indicates 100% L-R modulation.

WARNING DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.
WARNING

5. Disconnect all transmitter primary power and remove all test equipment.

10.12 TROUBLESHOOTING.

WARNING THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND
WARNING DC POTENTIALS WITH RESPECT TO THE CHASSIS WHICH IS AT EARTH POTENTIAL.

WARNING DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO
WARNING THE TRANSMITTER BANDPASS FILTER, RF POWER MODULE, COMBINER, OR POWER SUPPLY COMPONENTS.

10.13 SAFETY CONSIDERATIONS.

The AM-2.5E/AM-5E 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 transmitter output network, RF power module, RF 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. The maintenance procedures presented in this section should be performed only by trained and experienced maintenance personnel.

10.14 TROUBLESHOOTING PROCEDURES.

The ECU assembly troubleshooting procedures are presented in Table 10-1 through Table 10-4. Table 10-1 presents the exciter circuit board troubleshooting. Table 10-2 presents the stereo circuit board troubleshooting. Table 10-3 presents the controller circuit board troubleshooting. Table 10-4 presents the ECU power supply troubleshooting. Refer to Table 10-1 through Table 10-4 to isolate the problem to a specific circuit. Once the trouble is isolated, refer to the circuit board theory of operation and schematic diagrams to assist in problem resolution.

Table 10-1: EXCITER CIRCUIT BOARD TROUBLESHOOTING
(SHEET 1 OR 2)

SYMPTOM	CIRCUITRY TO CHECK
LOCK INDICATOR EXTINGUISED	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.
NO L+R MODULATION OF CARRIER DURING MONOPHONIC 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, U13.
NO L+R MODULATION DURING STEREO OPERATION	1. Defective U39, U8A, U8B, U9A, U9B, U14B, or U13.

RF DRIVE INDICATORS EXTINGUISED ON A POWER BLOCK	1. Check for a square-wave carrier frequency signal at U46 Pins 1 and 7. A. If the carrier frequency signal is present, defective Q13 thru Q22, L4, 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.
PWM DRIVE INDICATOR EXTINGUISED ON A POWER MODULE	1. Defective U21A through U21F, U19, U20, U45, D6 through D21, or D47 through D50.
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, Q1, U42A, U31A. 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. i. If the carrier frequency signal is present, defective U31B, U42B, U32A, U32B, U32C, U32D, U30C or P7. ii. If the carrier frequency signal is not present, defective U33A, U30B, or U29. iii.
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.
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 10-2.

Table 10-2: STEREO CIRCUIT BOARD TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
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 3.0V 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.
NO L-R MODULATION PRESENT AT THE EXCITER MONITOR METER	2. Defective U25B, U27B, or U31B.
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.
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 10-3: CONTROLLER CIRCUIT BOARD TROUBLESHOOTING

SYMPTOM	CIRCUITRY TO CHECK
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, U43. 2. If the DC voltage is not present, contact the Broadcast Electronics Technical 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 Technical Service Department.
NO TRANSMITTER ON SIGNAL OUTPUT	1. Check for a HIGH at U23A pin 3. A. If the HIGH is present, defective Q13.

CONFLICT INDICATOR ILLUMINATED	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 Technical Service Department. 1. Check U7, U8, U9, S1, S2, S3, U12A, U12B, U21A, U21B, U21C, U20A, U20B, U20C, U20D, U19, and U13.

Table 10-4: ECU POWER SUPPLY TROUBLESHOOTING

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

10.15 COMPONENT REPLACEMENT PROCEDURE.

Component replacement procedures for the ECU assembly circuit boards are presented in SECTION V. Refer to COMPONENT REPLACEMENT in SECTION V as required for the replacement procedures.

11 RF TECHNICAL SERVICES CONTACT INFORMATION

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12 PARTS LIST

This section provides parts lists for the AM-2.5E/AM-5E 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.

This bill of material uses an indented structure to show relationships of parts into sub assemblies. Example; all BOM LEVEL 2 parts are contained in the BOM LEVEL 1 part immediately above it.

12.1 AM 2.5E

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	907-2500-100	AM-2.5E XMTR CE CERT		
..1	047-5063-370	CAP,50UF,370VAC,MOTOR RUN	1	C1
..1	140-0021	VARISTOR BLOCK, 275VRMS, 350VDC	3	MOV1, MOV2, MOV3
..1	310-0068	METER,RFL PWR,3.5	1	
..1	310-0069	METER,FWD PWR,3.5	1	
..1	330-0201	FUSE,MDA 2A 250V SLO-BLO	2	F7, F8
..1	334-2503	FUSE, 35A, DUAL ELEM, TIME DELAY	2	F1, F2
..1	339-0030	FILTER,RFI,30A	1	
..1	341-0061	SW,DISCONNECT,SAFETY INTLK,60A	1	S1
..1	341-0062	HANDLE&SHAFT KIT FOR 341-0061	1	
..1	341-0076	CONTACTOR,40A,220/240VAC,50/60HZ	1	K2
..1	370-2366	IND,5.8MH,30A	2	L3, L4
..1	375-0009	CORE,1.102 ODX.63 IDX.512 THK	2	
..1	380-9001	FAN,PATRIOT,230 VAC	2	B1, B2
..1	400-0014	GROMMET,3/8IDX5/8ODFOR7/16HOLE	10	
..1	401-0022	CONNECTOR, SET SCREW, 1 1/2EMT"	2	
..1	401-0025	CONDUIT,AC ENTRY,NINJA	1	
..1	402-0000	TY-RAP	9	
..1	402-0001	TY-RAP,T TY24M,1-1/4 DIA	1	
..1	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	12	
..1	402-0831	CLAMP,CBL 1/2	5	
..1	402-0833	CLAMP,CBL,1/4	6	
..1	402-0839	CLAMP,CBL,5/8	1	
..1	402-0840	CLAMP,CBL 3/4	1	
..1	407-0168	FILTER,AIR,FXA 9.75x19.75"x.86""	1	
..1	410-0071	LUG,SOLDERLESS W/SCR L70	1	
..1	412-0050	TERM BLOCK,GOULD 63133	1	TB2
..1	412-0090	BARR STP,9 POS 7/16	1	TB1
..1	415-0019	FUSEHOLDER,60A,250V,REJECT TYPE	1	
..1	415-2012	FUSEHOLDER,PANEL MOUNT, 10A (NOTE)	2	
..1	417-0017	RECP,BNC,BULKHEAD,UG-492A/U	2	
..1	417-0716	CONN,7/16 DIN,PANEL JACK,SOLDER	1	
..1	420-0000	SCREW,W/CAPT WASH 10-32X1/2BLK (NOTE	50	
..1	420-0108	SCREW,10-32X.500,S.S. PHH	8	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	420-0705	SCREW,10-32X.312,BR PH PA	1	
..1	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	3	
..1	420-1517	SCREW,1/4-20X.500,S.S. PHH	4	
..1	420-4204	SCREW,4-40X.250,PH FLH UC	2	
..1	420-6002	SCREW,6-32X.437,S.S. PH FH UC	50	
..1	420-6108	SCREW,6-32X.500,S.S. PH	4	
..1	420-6110	SCREW,6-32X.625,S.S. PH	7	
..1	420-6604	SCREW,6-32X.250,S.S. PH FH UC	12	
..1	420-6605	SCREW,6-32X.312,S.S. PH FH UC	4	
..1	421-0102	10-32 KEP NUT	173	
..1	421-1003	1/4-20 HEX NUT	3	
..1	421-1004	1/4-20 AMCO KEP NUT	12	
..1	421-1105	RIV,BLD 3/32OD X .187 GRIP,CSK	2	
..1	421-1112	RIV,DOME CLOSED .187D .126-.25	2	
..1	421-1113	RIV,CLOSED-END .125 X .316L	4	
..1	421-4008	4-40 KEP NUT	7	
..1	421-6008	6-32 KEP NUT	15	
..1	421-6908	SHEET EDGE CONNECTOR 6-32	60	
..1	421-8002	8-32 HEX NUT, BRASS	7	
..1	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	14	
..1	422-6107	SCREW,SEMS 6-32 X 7/16 PAN PH.ST."	56	
..1	423-0002	#10 LOCK SPLIT	4	
..1	423-0007	#10 LOCK INT TOOTH	1	
..1	423-1003	1/4-20 LOCK SPLIT	3	
..1	423-4101	#4 FLAT SS .315 X .127 X .030	2	
..1	423-6002	#6 LOCK SPLIT	2	
..1	423-6011	#6 FLAT .310 X .160 X .030	9	
..1	423-8005	#8 LOCK SPLIT	3	
..1	423-8006	#8 LOCK INT TOOTH	4	
..1	441-9404	STOFF,PAN-POLE	1	
..1	453-0008	BRKT,CAP MTG VR8	1	
..1	457-0045	HINGE, REAR DOOR, NINJA	1	
....2	457-0045-009	HINGE, REAR DOOR, NINJA, UNPAINTED	1	
..1	463-0116	STRAP,MOV CHASSIS GND	1	
..1	463-6802	STRAP,GND,PWR BLC,AM-2.5	1	
..1	469-0365	FINGER STOCK,1S197520A	101	
..1	469-0366	FINGER STOCK (NOTE!!!!!)	242.66	
..1	469-0366-1	STRIP,RFI SHIELD 1.25	4	
....2	469-0366	FINGER STOCK (NOTE!!!!!)	1.25	
..1	469-0375	FINGER CONTACT STRIP, 375P80-18-02	7.5	
..1	470-0353	AC HIGH/LOW LINE MONITOR WITH INDICATOR	1	
..1	471-0838-001	PLATE,TRIM,PWR BLOCK #1	1	
....2	471-0838	PLATE,TRIM,PWR BLOCK,AM XMTR	1	
..1	471-0838-002	PLATE,TRIM,PWR BLOCK #2	1	
....2	471-0838	PLATE,TRIM,PWR BLOCK,AM XMTR	1	
..1	471-0889	GUARD,AC DISTRIBUTION,AM1/AM5	1	
..1	471-5086	SUPPORT,POWER SUPPLY,A" VERSION AM"	1	
..1	471-5113	BRACKET,SAFETY SWITCH MOUNTING,AM6A	1	
..1	471-5300	SIDE,EXTERNAL,NINJA	2	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	471-5301	BRACE,REAR CORNER,NINJA	2	
..1	471-5302	TOP,EXTERNAL,NINJA	1	
..1	471-5303	PARTITION,UPPER,NINJA	1	
..1	471-5304	BOTTOM,EXTERNAL,NINJA	1	
..1	471-5305-009	PANEL,LOWER FRONT,NINJA,UNSCREENED	1	
..1	471-5306	PANEL,UPPER FRONT,NINJA	1	
..1	471-5307	BRACE,PA BAY,NINJA	2	
..1	471-5308	DOOR,PA BAY,NINJA	1	
..1	471-5309	DOOR,REAR,NINJA	1	
..1	471-5310	PLENUM,AIR FILTER,NINJA	1	
..1	471-5311	SUPPORT,PS,NINJA	1	
..1	471-5312	AIR DAM,OUTPUT NETWORK,NINJA	1	
..1	471-5315	PANEL,AIR FILTER ACCESS,NINJA	1	
..1	471-5316	SHIELD,AC FILTER,NINJA	1	
..1	471-5317	COVER,AC FILTER,NINJA	1	
..1	471-5318	PARTITION,LOWER,NINJA	1	
..1	471-5319	STRIKER,ANTENNA GROUNDING,NINJA	1	
..1	471-5320-001	COWLING,NINJA,AM2.5E	1	
....2	471-5320	COWLING,NINJA,UNSCREENED	1	
..1	471-5321	PLATE,FILLER,NINJA	1	
..1	471-5323	PLATE,AC FILTER,NINJA	1	
..1	471-5324	BRACE,RACK,NINJA	1	
..1	486-2285	HANDLE,OVAL,BLK,10-32 X 4	4	
..1	591-0001	PLATE,FCC ID	1	
..1	592-0179	PLATE,DANGER,AM XMTRS	1	
....2	592-0004-009	WARNING PLATE,UNSCREENED	1	
..1	594-0019	LABEL,DANGER HV 1X 1.5	2	
..1	594-0039	LABEL,WARNING PS CAB	1	
..1	594-0073	LABEL,WARNING ROTATING FANS	1	
..1	594-0501	LABEL,CE ELECTRICAL SYMBOLS	1	
..1	610-0009	CABLE,UPPER,17.5" 1.000 " "		
..1	610-0010	CABLE,LOWER,11.8" 1.000 " "		
..1	917-0306-007	ASSY PCB,AC SAMPLE,AM,A/E SERIES	1	
....2	033-4763	CAP,POLY FILM,.47UF,600V,OVAL	1	C701
....2	100-3373	RES,3.3MEG OHM,1/4W,5%	1	R707
....2	103-1561	RES,150K OHM,1/4W,1%,METAL	6	R701, R702, R703, R704, R705, R706
....2	203-4005	DIODE,1N4005	4	D701, D702, D703, D704
....2	410-0025	TERM,MALE DISCONNECT PC .25TAB	2	E701, E702
....2	417-0700	CONN,PCB MT,2PIN	1	J701
....2	517-0306-007	PCB MACH,AC SAMPLE,AM-1A	1	
......3	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.022	
....2	611-0060	TUB, HT SHK, 1/16	1.5	
..1	917-0306-009	ASSY PCB,TEMPERATURE SENSOR,AM,A/E SERIES	1	
....2	002-1034	CAP,CER,DISC,.001UF,1000V	1	C907
....2	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	2	C902, C906
....2	100-1051	RES,10K OHM,1/4W,1%	2	R901, R903
....2	103-2241	RES,2.21K OHM,1/4W,1%,METAL	1	R902
....2	220-0035	IC,LM35DZ CELSIUS TEMP SENSOR	1	U901

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	413-1597	TERM,TURRET,2 SHLDR,.219,GOLD FLASH	2	TP901, TP902
....2	418-0255	CONN,MALE,4PIN	1	J901
....2	517-0306-009	PCB MACH,TEMPERATURE SENSOR,AM-1A	1	
......3	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.015	
..1	917-0330	ASSY,PCB PFC RELAY BOARD	1	
....2	130-1062	RES,100K OHM,2W,5%	1	R1
....2	270-1213	REL,SPST,30A	2	K1, K2
....2	418-0255	CONN,MALE,4PIN	1	J1
....2	426-8008	STUD,PEM,KFH-832-5ET,PCB MOUNT	2	J2, J3
....2	517-0330	PCB,MACH,PFC RELAY BOARD	1	
..1	917-0410	ASSY,PCB,CUSTOMER INTERFACE (SBCM)	1	
....2	007-1044	CAP,CER,0.1uF,50V,10%,SMD note	48	C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48
....2	201-0040	ZENER VOLTAGE SUPPRESSOR,18V	4	D49, D50, D51, D52
....2	204-0030	DIODE,TRANSORB 30V,TGL41-30,SMD	48	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, 230, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48
....2	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	2	J4, J5
....2	417-2502-FER	RCPT,25 PIN D,FEMALE,FERITE FILTER	2	J1, J2
....2	417-8809	CONN, 9 PIN D, FEMALE, FILTERED	1	J3
....2	418-0255	CONN,MALE,4PIN	1	J6
....2	517-0410	PCB,MACH,CUSTOMER INTERFACE	1	
..1	919-0096-001	ASSY PCB,OPTICALLY COUPLED REL NOTE	1	
....2	000-1051	CAP,CER,DISC,.03UF,300VAC,20%	-1	REMOVE C3YOU MUST SCRAP THIS PART ON SCRAP REPORT AFTER REMOVAL!

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	110-5633	RES,560 OHM,1/2W,5%	-1	REMOVE R2YOU MUST SCRAP THIS PART ON SCRAP REPORT AFTER REMOVAL!
....2	919-0096	ASSY PCB,OPTICALLY COUPLED REL (SBCM)	1	
......3	000-1051	CAP,CER,DISC,.03UF,300VAC,20%	1	C3
......3	002-1034	CAP,CER,DISC,.001UF,1000V	2	C1, C4
......3	020-4773	CAP,LYTIC,47UF,35V,STDUP	1	C2
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	1	R4
......3	110-5633	RES,560 OHM,1/2W,5%	1	R2
......3	110-8233	RES,820 OHM,1/2W,5%	1	R3
......3	130-2032	RES,2K OHM,10W,3%,WW	2	R1, R5
......3	140-0023	VARISTOR,27V,V27ZA60	1	MOV1
......3	200-5359	DIODE,ZENER,1N5359 24V 5W	1	D2
......3	203-4005	DIODE,1N4005	2	D1, D4
......3	229-0033	IC,OPTOIS,4N33	1	U1
......3	239-0003	BRDG RECT,6PH20 EDI	1	D5
......3	270-0054	REL,PC 24V T90NID1224 P&B	1	K1
......3	270-0054-001	COVER,DUST REL 35C620 P&B	1	
......3	330-0055	FUSE,3A,250V,PCB MOUNT	2	F1, F2
......3	410-0025	TERM,MALE DISCONNECT PC .25TAB	5	E1, E2, E3, E4, E5
......3	417-0600	SKT,IC 6 PIN	1	XU1
......3	420-2504	SCREW,2-56X.250,S.S. PH FH SC	4	
......3	420-4104	SCREW,4-40X.250,S.S. PH	2	
......3	421-2001	2-56 S.S. NUT	4	
......3	423-2002	#2 LOCK SPLIT	4	
......3	423-4002	#4 LOCK S.S. SPLIT	2	
......3	474-0347	PLATE,SOLID STATE RELAY MOUNT	1	
......3	519-0096	PCB,MACH,OPTICALLY COUPLED RELAY	1	
......3	601-2209	WIRE,AWG22,7/30 WHT	0.75	
..1	947-0210	HARNESS,AM-2.5E (SBCM)	1	
....2	402-0000	TY-RAP	20	
....2	402-0051	TY-RAP, W/FLAG	15	
....2	410-0015	LUG,TERM #8 RING CRIMP 12-10	18	
....2	410-0050	LUG,TERM,10-12GA,FEMSPADE	2	
....2	410-0052-745	PARALLEL SPLICE, 12-10 AWG	2	
....2	410-0052-746	PARALLEL SPLICE, 8 AWG	2	
....2	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	2	
....2	410-0065	LUG,TERM #6 RING CRIMP #22 AWG	1	
....2	410-0067	LUG,FEM DISCONNECT 22-18 .230W	5	
....2	410-1016	TERM LUG,SOLDER TYPE#6 1/4HOLE	2	
....2	410-1421	LUG,QUICK DISCONNECT #18-22	11	
....2	410-1488	LUG,TERM #6 SPADE #10-12	1	
....2	410-1489	LUG,TERM #6 SPADE #16-22	8	
....2	410-7105	LUG,TERM 1/4	7	
....2	417-0036	PIN CONN,AMP,350967-1	4	
....2	417-0053	SKT,CONN 641294-1 AMP	103	
....2	417-0095	CONN,BNC RG/U142 31-326 AMPH	4	
....2	417-0142	PIN,.050 DIA 26-22 745254-3	42	
....2	417-0143	SKT,PIN .050 26-22 745253-3	13	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	417-0251	PLUG,25 PIN 207464-1 AMP	2	
....2	417-1504	RCPT,15 PIN STD 205205-1 AMP	1	
....2	417-1510	KIT,BACKSHELL FOR 15PIN D CONN	1	
....2	417-2402	HSNG,WIRE,MR,FEMALE,24-PIN,AMP	4	
....2	417-2510	KIT,BACKSHELL FOR 25PIN D CONN	2	
....2	417-8500	PLUG AND CORD ET,AM500 FAN	2	
....2	418-0054	3 CIRCUIT-COMMONING BAR,AMP MR	2	
....2	418-0233	HSNG,CONN, 4P,1-640509-AMP	1	
....2	418-0240	PLUG,FEM,4PIN	3	
....2	418-0670	HOUSING,CONN,6PIN FEM	1	
....2	418-0701	CONN,HOUSING,2 PIN	2	
....2	600-3400	WIRE,LITZ,3400/48,D.NY.,NYLEZE	2	
....2	601-0110	WIRE,AWG 10 65/28 BLK	3	
....2	601-0600-054	CBL,AWG 6, STRANDED, GREEN/YELLOW	0.3	
....2	601-1202	WIRE,AWG12 19/25 RED	26	
....2	601-1202-054	WIRE,AWG 12,STRANDED, GREEN/YELLOW	0.5	
....2	601-1604	WIRE,AWG16, 19/29 YEL	1	
....2	601-1800	WIRE,AWG18 19/30 BLK	22.75	
....2	601-2209	WIRE,AWG22,7/30 WHT	14.75	
....2	608-0002	CBL,8 COND,SH,AWG 24,7/32	11	
....2	610-0008	CBL, 15 COND, #24 W/SHIELD	6.12	
....2	610-8723	CBL,SH 4 COND #22 ST 8723 BELD	22.75	
....2	611-0061	TUB,HT SHK CLEAR 3/64	1	
....2	611-1250	TUB,HT SHK,1/8	0.8	
....2	611-1875	TUB,HT SHK,3/16	0.5	
....2	611-2500	TUB,HT SHK,1/4	1	
....2	621-0001	CBL,COAX TEFLON RG 142B/U BELD	3.5	
....2	621-1359	CBL,COAX,RG316/U,50 OHM	16.5	
....2	622-8451	WIRE,BELD 8451,SHIELD,1PR	28	
....2	682-0001	CORD LINE,3 COND,DETACH 7.5FT	1	
....2	693-0002	SLVG,1/4 EXPANDO FR BLACK"	3.5	
....2	693-0003	SLVG,1/2	7	
....2	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	2	
..1	957-0009-100	ASSY,EXCITER/CONTROLLER,AM-E	1	
....2	140-0036	VARISTOR,V275LA20A	1	
....2	339-0008	FILTER,RFI,3A 250VAC 50/60HZ	1	
....2	400-6700	GROMMET STRIP,.062-.090	0.212	
....2	402-0000	TY-RAP	3	
....2	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	2	
....2	407-0119	MOUNT,PUSH,CBL TIE PM-1	1	
....2	409-0026	CARD GUIDE,6	16	
....2	415-0011	HOLDER,BATTERY,9V,SOLDER LUGS	1	
....2	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	3	
....2	420-2504	SCREW,2-56X.250,S.S. PH FH SC	4	
....2	420-6114	SCREW,6-32X.875,S.S. PH	4	
....2	421-0201	10-32 S.S. HEX NUT	4	
....2	421-1113	RIV,CLOSED-END .125 X .316L	2	
....2	421-6008	6-32 KEP NUT	27	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	48	
....2	423-0002	#10 LOCK SPLIT	4	
....2	423-6002	#6 LOCK SPLIT	18	
....2	441-0068	STOFF,ALUM 1/4HEX X 1 1/2 6-32	4	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	441-8153	SPR,.25 HEX X .31LG,6-32 THD	7	
....2	441-8217	STOFF,ALUM 1/4HEX X 5/8 6-32	3	
....2	457-0039	HINGE,ECU,AM XMTR	1	
......3	457-0039-009	HINGE,ECU,AM XMTR,UNPAINTED	1	
....2	466-0094	ANGLE,METER MOUNTING	4	
....2	467-1001-1	FILTER,WINDOW,GREY	1	
....2	471-0843	CHASSIS,ECU,AM XMTR	1	
....2	471-0844	PANEL,REAR,ECU,AM XMTR	1	
......3	471-0844-009	PANEL,REAR,ECU,AM XMTR,UNSCRND	1	
....2	471-0845	COVER,TOP,ECU,AM XMTR	1	
....2	471-0848	SHIELD,P.S.,ECU,AM XMTR	1	
....2	471-5049	DOOR,ECU,A"VERSION AM"	1	
....2	471-5314	PANEL,FRONT,ECU,NINJA	1	
....2	482-0030	KNOB,RB-67-1-MD,BL MATTE,1/4 (NOTE)	2	
....2	540-0006	PWR SPLY,SMPS,3 OUTPUT,40W	1	
....2	594-0039	LABEL,WARNING PS CAB	1	
....2	701-0028	TAG,YEL,SIZE 5,4 3/4X2 3/8	1	
....2	917-0205	ASSY,PCB ECU CONTROLLER,AM,A/E SERIES (NOTE)	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	80	C1, C2, C3, C4, C5, C6, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C31, C32, C37, C39, C40, C41, C42, C43, C44, C45, C46, C47, C57, C59, C61, C62, C65, C68, C69, C70, C71, C74, C90, C91, C102, C104, C105, C36, C30, C33, C7, C50, C48, C53, C126, C66, C88
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	6	C109, C93, C115, C98, C99, C101
......3	013-2064	CAP,LYTIC,2.2uF,63V,STDUP	5	C58, C63, C89, C94, C97
......3	020-1064	CAP,LYTIC,1uF,5OV,NP,STDUP	2	C133, C134
......3	023-1075	CAP,LYTIC,10UF,50V NP STDUP	15	C34, C35, C49, C51, C52, C54, C55, C56, C64, C95, C110, C116, C130, C121, C119
......3	024-1064	CAP,LYTIC,1UF,50V,RAD	3	C67, C108, C131
......3	024-3374	CAP,LYTIC,33UF,35V,STDUP	1	C132

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	21	C60, C72, C73, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C92, C103, C106, C136, C137
......3	030-1043	CAP,CER MOLDED,.01uF,200V,RAD	1	C129,
......3	038-1049	CAP,TUB,.033MFD,80V	1	C38
......3	041-2722	CAP,MICA,270PF,300V,5%	1	C135
......3	100-1041	RES,1K OHM,1/4W,1%	18	R15, R18, R19, R20, R23, R39, R59, R98, R108, R135, R139, R140, R142, R156, R160, R170, R179, R181
......3	100-1051	RES,10K OHM,1/4W,1%	26	R8, R32, R65, R66, R72, R85, R91, R93, R95, R109, R134, R137, R152, R154, R155, R158, R164, R165, R168, R174, R175, R176, R190, R192, R193, R194
......3	100-1531	RES,150 OHM,1/4W,1%	1	R74
......3	100-2273	RES,2.2MEG OHM,1/4W,5%	1	R200
......3	100-3373	RES,3.3MEG OHM,1/4W,5%	15	R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R167, R125
......3	100-4773	RES,4.7MEG OHM,1/4W,5%	4	R83, R73, R78, R191,
......3	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	7	R47, R87, R90, R97, R100, R105, R177,
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	6	R46, R48, R53, R54, R94, R197
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	35	R1, R166, R58, R141, R27, R26, R30, R13, R24, R28, R172, R173, R138, R159, R96, R169, R188, R123, R79, R80, R131, R132, R133, R62, R162, R198, R187, R201, R202, R203, R204, R205, R208, R207, R178
......3	103-1261	RES,121K OHM,1/4W,1%,METAL	2	R51, R196
......3	103-1474	RES,1.47K OHM,1/4W,1%,METAL	4	R77, R22, R107, R209
......3	103-1561	RES,150K OHM,1/4W,1%,METAL	1	R88
......3	103-1695	RES,16.9K OHM,1/4W,1%,METAL	1	R104

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-1823	RES,182 OHM,1/4W,1%,METAL	1	R43
......3	103-2051	RES,20K OHM,1/4W,1%,METAL	4	R16, R29, R81, R82, R189
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	8	R9, R11, R103, R12, R33, R34, R35, R21,
......3	103-2341	RES,2.32K OHM,1/4W,1%,METAL	1	R17,
......3	103-2431	RES,243 OHM,1/4W,1%,METAL	8	R37, R38, R41, R101, R126, R127, R128, R129, R130,
......3	103-2551	RES,25.5K OHM,1/4W,1%,METAL	1	R92
......3	103-2615	RES,26.1K OHM,1/4W,1%,METAL	2	R171, R195
......3	103-3014	RES,3.01K OHM,1/4W,1%,METAL	3	R99, R86, R106
......3	103-3061	RES,301K OHM,1/4W,1%,METAL	5	R25, R31, R161, R7, R52,
......3	103-3923	RES,392 OHM,1/4W,1%,METAL	8	R36, R55, R44, R63, R64, R42, R183, R184
......3	103-3924	RES,3.92K OHM,1/4W,1%,METAL	1	R76
......3	103-4325	RES,43.2K OHM,1/4W,1%,METAL	1	R14
......3	103-4441	RES,4.42K OHM,1/4W,1%,METAL	1	R10
......3	103-4731	RES,475K OHM,1/4W,1%,METAL	1	R206
......3	103-4741	RES,4.75K OHM,1/4W,1%,METAL	4	R45, R40, R102, R199
......3	103-4755	RES,47.5K OHM,1/4W,1%,METAL	8	R50, R68, R69, R70, R84, R148, R149, R150
......3	103-4993	RES,499 OHM,1/4W,1%,METAL	3	R163, R153, R210
......3	103-6195	RES,61.9K OHM,1/4W,1%,METAL	1	R75
......3	103-6814	RES,6.81K OHM,1/4W,1%,METAL	1	R124
......3	103-7503	RES,750 OHM,1/4W,1%,METAL	2	R57, R144
......3	103-9095	RES,90.9K OHM,1/4W,1%,METAL	12	R49, R136, R71, R151, R157, R60, R61, R67, R145, R146, R147, R89
......3	178-5001	RES,TRMR,500 OHM,15 TURN	2	R56, R143
......3	179-1053	RES,TRMR,10K,10 TURN	5	R2, R3, R4, R5, R6
......3	201-2800	DIODE,HOT CARRIER	8	D31, D42, D33, D30, D36, D39, D40, D37
......3	203-4005	DIODE,1N4005	21	D11, D3, D9, D7, D5, D14, D15, D17, D13, D16, D1, D20, D18, D22, D24, D23, D25, D29, D26, D27, D28
......3	203-4148	DIODE,1N4148	33	D2, D4, D6, D8, D10, D12, D19, D21, D32, D34, D35, D38, D41, D44, D45, D49, D50, D51, D53, D54, D55, D56, D47, D48, D57, D58, D59, D60, D61, D62, D63, D64, D46

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	210-0106	TSTR,VP0106N3,DMOSFET	9	Q38, Q39, Q44, Q45, Q40, Q41, Q42, Q43, Q52
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	2	Q53, Q54
......3	210-7000	TSTR,2N7000,MOSFET	47	Q12, Q7, Q8, Q16, Q4, Q15, Q14, Q2, Q1, Q17, Q19, Q18, Q6, Q3, Q11, Q5, Q13, Q9, Q10, Q22, Q23, Q24, Q20, Q21, Q36, Q35, Q37, Q25, Q27, Q34, Q28, Q29, Q33, Q31, Q32, Q30, Q26, Q51, Q47, Q48, Q46, Q50, Q49, Q57, Q58, Q59, Q56
......3	211-3904	TSTR,2N3904	1	Q55
......3	220-0317	VR,LM317LZ TO92	1	U70
......3	220-0801	IC,DAC-08 D/A CONVERTER,8-BIT	2	U42, U43
......3	220-4025	IC,MC14025B TRIPLE 3-INPUT NOR	1	U24
......3	220-4043	IC,MC14043BP RS LATCH	3	U48, U49, U67
......3	220-4051	IC,4051 CMOS 8-BIT ANLG MPX	1	U39
......3	220-4053	IC,MC14053B ANLG MPX	1	U41
......3	221-0074	AMP,OP,BIFET TLO74CW	3	U40, U63, U64,
......3	221-0339	IC,LM339A,VOLT COMPARATOR	4	U44, U61, U65, U66
......3	225-0005	IC,CD4071BE,RCA	4	U13, U45, U50, U62
......3	225-0006	IC,CD4075BE,RCA	5	U37, U12, U21, U19, U69
......3	225-0007	IC,CD4078BE,RCA	1	U55
......3	225-0008	IC,CD4081BE	5	U20, U36, U51, U47, U71
......3	226-1051	RES NET,10K,8-PIN SIP	4	RN1, RN2, RN5, RN8
......3	226-1060	RES NET,100K,10-PIN SIP	4	RN3, RN4, RN6, RN7
......3	228-4001	IC, QUAD 2-INPUT NOR	2	U23, U52
......3	228-4011	IC,MC14011B CD4011 BE	2	U16, U60
......3	228-4020	IC,14 STAGE COUNTER 4020	2	U26, U58
......3	228-4028	IC,MC14028B	1	U18
......3	228-4069	IC,CD4069CN	3	U25, U46, U54
......3	228-4073	IC,MC14073B	2	U22, U38
......3	228-4076	IC,MC14076 QUAD REGISTER	2	U15, U17
......3	228-4512	IC,MC14512B	1	U27
......3	228-4516	IC,MC14516B	4	U30, U31, U34, U35
......3	228-4532	IC,MC14532B 8-BIT PRIOR ENCOD	2	U14, U28
......3	228-4538	IC,MC14538B NATL SEMICONDUCTOR	3	U57, U59, U68
......3	229-0033	IC,OPTOIS,4N33	15	U7, U6, U2, U1, U5, U4, U3, U8, U9, U10, U11, U33, U32, U53, U56
......3	229-0336	IC,VOLT REF DIODE LM336Z-2.5	1	U29
......3	320-0030	MOUNT,LED,R ANGLE,BIVAR	3	XDS1, XDS2, XDS3
......3	323-9224	IND,LED,GRN,521-9270	2	DS1, DS2

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	323-9225	IND,LED,YEL	1	DS3
......3	340-0002	SW,4 POS,SPST,8-PIN DIP	3	S1, S2, S3
......3	340-0004	SW,JUMPER PROGRAMMABLE	16	P1, P2, P3, P4, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19
......3	340-0060	SW,TGL DPDT	1	S4
......3	343-6330	SW,PB MON CK8121A 78-25	1	S5
......3	343-6331	SW CAP,MED RED	1	XS5
......3	400-2175	GROMMET,FOR 1/2	2	
......3	413-1597	TERM,TURRET,2 SHLDR,.219,GOLD FLASH	7	E10, TP7, TP8, TP9, TP10, TP11, TP12
......3	417-0003	CONN,HEADER 3 PIN	3	J1, J2, J3
......3	417-0004	JACK,TEST,RIGHT ANGLE PC MT	6	TP1, TP2, TP3, TP4, TP5, TP6
......3	417-0147	RCPT,50P 2 ROW	1	P301
......3	417-0188	CONN,80PIN FEM,DBL ROW,PCB MT	1	P302
......3	417-0600	SKT,IC 6 PIN	15	XU7, XU6, XU2, XU1, XU5, XU4, XU3, XU8, XU9, XU10, XU11, XU33, XU32, XU53, XU56
......3	417-1404	SOCKET,14-PIN DIP	32	XU13, XU45, XU50, XU60, XU22, XU38, XU24, XU37, XU12, XU21, XU19, XU25, XU46, XU54, XU16, XU62, XU20, XU36, XU51, XU47, XU23, XU52, XU44, XU61, XU65, XU66, XU40, XU63, XU64, XU55, XU69, XU71
......3	417-1604	SKT,16-PIN,DIP	22	XU15, XU17, XU14, XU28, XU18, XU30, XU31, XU34, XU35, XU39, XU42, XU43, XU26, XU48, XU49, XU67, XU41, XU27, XU57, XU58, XU59, XU68
......3	417-4004	CONN,HEADER,2 PIN	17	J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20,
......3	517-0205	PCB MACH,ECU CONTROLLER,AM-1	1	
....2	917-0208	ASSY,PCB ECU EXTENDER AM-1	1	
......3	417-0147	RCPT,50P 2 ROW	1	
......3	417-0152	HEADER,50PIN R.ANGLE	1	
......3	417-0188	CONN,80PIN FEM,DBL ROW,PCB MT	1	
......3	417-8001	HEADER,80-PIN R. ANGLE	1	
......3	420-8706	SCREW,8-32X.375,BRASS THUMB	1	
......3	471-0849	SUPPORT,EXT CARD,ECU,AM XMTR	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	517-0208	PCB MACH,ECU EXTENDER AM-1	1	
....2	917-0300	ASSY PCB,ECU EXCITER,AM,A/E SERIES	1	
......3	000-6814	CAP,DISC,68pF,5%,N1500	1	C110
......3	001-5613	CAP,MONO CER,56PF,200V,10%	1	C107
......3	003-1013	CAP,MONO CER,.01uF,100V,5%	3	C42, C46, C50
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	73	C3, C4, C5, C8, C12, C15, C18, C19, C20, C23, C27, C30, C31, C33, C35, C37, C38, C39, C41, C45, C49, C53, C55, C56, C63, C64, C65, C66, C67, C76, C79, C80, C81, C85, C88, C90, C91, C92, C101, C102, C104, C111, C115, C116, C117, C119, C120, C122, C123, C124, C126, C127, C128, C129, C131, C135, C136, C139, C157, C
......3	003-1523	CAP,MONO CER,.0015uF,100V,5%	3	C112, C113, C173
......3	003-4723	CAP,MONO CER,.0047uF,100V,5%	3	C98, C103, C156
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	4	C82, C158, C159, C166
......3	020-1064	CAP,LYTIC,1uF,5OV,NP,STDUP	6	C83, C89, C125, C167, C171, C172
......3	020-2264	CAP,LYTIC,2.2UF,50V,NP,STDUP	1	C174
......3	020-3374	CAP,LYTIC,33UF,25V,NP	2	C146, C13
......3	023-1075	CAP,LYTIC,10UF,50V NP STDUP	4	C1, C2, C16, C17
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	10	C32, C54, C61, C62, C69, C70, C93, C118, C121, C140
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	2	C71, C72
......3	024-2274	CAP,LYTIC,22UF,100V,STDUP	5	C34, C36, C94, C105, C106
......3	030-1051	CAP,POLY METAL,.1OuF,100V,1%	8	C147, C148, C149, C150, C151, C152, C153, C154
......3	030-4743	CAP,POLYESTER FILM,.047UF,100V,RAD	1	C84
......3	031-1043	CAP,MYLAR FILM,.01UF,100V,RAD	2	C99, C114
......3	031-2033	CAP,MYLAR FILM,.0022uF,100V,10%	3	C57, C58, C60
......3	038-4753	CAP,PYST,.47UF,100V	2	C96, C97
......3	040-1022	CAP,MICA,100PF,500V,RAD	4	C43, C47, C51, C132
......3	040-1522	CAP,MICA,150PF,500V,RAD	8	C7, C11, C22, C26, C59, C109, C177, C178
......3	040-2213	CAP,MICA,22PF,500V	2	C160, C162
......3	040-4713	CAP,MICA,47PF,500V,5%	3	C44, C48, C52
......3	040-6813	CAP,MICA,68PF,500V,5%	1	C130

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	041-1031	CAP,MICA,1000PF,100V,1%	10	C6, C10, C14, C21, C25, C29, C68, C73, C74, C77
......3	042-2521	CAP,MICA,250PF,500V,1%	1	C78
......3	042-3312	CAP,MICA,33PF,500V,5%	5	C40, C133, C134, C137, C145
......3	042-3922	CAP,MICA,390PF,100V,5%	1	C75
......3	042-5021	CAP,MICA,500PF,500V,1%	3	C9, C24, C100
......3	096-0009	CAP,TRMR,2-27PF	1	C108
......3	100-1031	RES,100 OHM,1/4W,1%,METAL	7	R15, R30, R94, R137, R151, R163, R195
......3	100-1041	RES,1K OHM,1/4W,1%	13	R72, R80, R81, R129, R145, R148, R155, R162, R164, R166, R180, R202, R229
......3	100-1051	RES,10K OHM,1/4W,1%	31	R35, R52, R53, R54, R68, R85, R116, R117, R135, R138, R139, R140, R152, R92, R93, R188, R10, R11, R12, R25, R26, R27, R199, R181, R191, R210, R211, R213, R214, R216, R218
......3	100-1083	RES,10MEG OHM,1/4W,5%	1	R201
......3	100-1231	RES,121 OHM,1/4W,1%	4	R70, R119, R156, R196
......3	100-1551	RES,15K OHM,1/4W,1%	4	R14, R29, R169, R171
......3	100-2273	RES,2.2MEG OHM,1/4W,5%	4	R64, R66, R136, R142
......3	100-3951	RES,39.2K OHM,1/4W,1%	2	R38, R39
......3	100-4561	RES,453K OHM,1/4W,1%	2	R74, R154
......3	100-5673	RES,5.6MEG OHM,1/4W,5%	1	R91
......3	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	1	R215
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	8	R65, R67, R82, R83, R113, R130, R114, R69
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	18	R1, R3, R16, R18, R34, R36, R37, R58, R59, R60, R61, R112, R118, R134, R168, R212, R122, R123
......3	103-1136	RES,113K OHM,1/4W,1%,METAL	4	R192, R193, R194, R185
......3	103-1244	RES,1.24K OHM,1/4W,1%,METAL	3	R32, R33, R160
......3	103-1331	RES,1.33K OHM,1/4W,1%,METAL	1	R79
......3	103-1825	RES,18.2K OHM,1/4W,1%,METAL	1	R187
......3	103-2051	RES,20K OHM,1/4W,1%,METAL	1	R42

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-2104	RES,2.10K OHM,1/4W,1%,METAL	1	R190
......3	103-2211	RES,22.1K OHM,1/4W,1%,METAL	1	R78
......3	103-2212	RES,22.1 OHM,1/4W,1%,METAL	25	R172, R173, R174, R175, R176, R177, R178, R179, R203, R204, R205, R206, R207, R208, R209, R219, R220, R221, R222, R223, R224, R225, R226, R227, R228
......3	103-2213	RES,221 OHM,1/4W,1%,METAL	6	R31, R40, R132, R146, R143, R158
......3	103-2216	RES,221K OHM,1/4W,1%,METAL	4	R2, R4, R17, R19
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	4	R75, R165, R167, R200
......3	103-2490	RES,24.9 OHM,1/4W,1%,METAL	1	R147
......3	103-2495	RES,24.9K OHM,1/4W,1%,METAL	2	R124, R125
......3	103-2675	RES,26.7K OHM,1/4W,1%,METAL	7	R8, R9, R23, R24, R101, R102, R133
......3	103-2941	RES,2.94K OHM,1/4W,1%,METAL	1	R197
......3	103-3245	RES,32.4K OHM,1/4W,1%,METAL	1	R63
......3	103-3403	RES,340 OHM,1/4W,1%	3	R43, R46, R49
......3	103-3405	RES,34K OHM,1/4W,1%,METAL	3	R77, R99, R115
......3	103-3631	RES,365 OHM,1/4W,1%,METAL	1	R120
......3	103-3841	RES,3.83K OHM,1/4W,1%,METAL	4	R141, R144, R153, R161
......3	103-4325	RES,43.2K OHM,1/4W,1%,METAL	6	R44, R45, R47, R48, R50, R51
......3	103-4645	RES,46.4K OHM,1/4W,1%,METAL	1	R184
......3	103-4741	RES,4.75K OHM,1/4W,1%,METAL	4	R149, R131, R150, R186
......3	103-4755	RES,47.5K OHM,1/4W,1%,METAL	1	R73
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	2	R55, R121
......3	103-6655	RES,66.5K OHM,1/4W,1%,METAL	2	R100, R56
......3	103-6815	RES,68.1K,1/4W,1%,METAL	1	R182
......3	103-7541	RES,7.50K OHM,1/4W,1%,METAL	4	R126, R127, R128, R183
......3	103-8453	RES,845 OHM,1/4W,1%,METAL	3	R71, R157, R84
......3	103-8454	RES,8.45K OHM,1/4W,1%,METAL	2	R89, R90
......3	103-9041	RES,9.09K OHM,1/4W,1%,METAL	3	R86, R87, R88
......3	177-1054	RES,TRMR,10K,VERT ADJ	1	R62
......3	177-2044	RES,TRMR,2K,VERT ADJ	1	R159
......3	178-1044	RES,TRMR,1K OHM	3	R76, R189, R198
......3	178-2044	RES,TRMR,2K,HORZ ADJ	1	R217
......3	178-2054	RES,TRMR,20K	2	R41, R170
......3	178-5045	RES,TRMR,5K,20T,VERT	1	R231
......3	179-2043	RES,TRMR,2K,15 TURN 3006	1	R230
......3	200-0009	DIODE,ZENER,1N 4739A	1	D68
......3	200-0012	DIODE,ZENER,1N5243,13V,5%,500mW	10	D7, D9, D11, D13, D15, D17, D19, D21, D48, D50
......3	200-4732	DIODE,ZENER,1N4732A	1	D69

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	201-2800	DIODE,HOT CARRIER	2	D4, D5
......3	203-4005	DIODE,1N4005	1	D23
......3	203-4148	DIODE,1N4148	42	D1, D2, D24, D25, D26, D27, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D22, D29, D46, D51, D52, D53, D54, D55, D56, D57, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67
......3	210-0511	TSTR,IRF511,POWER MOSFET	10	Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	1	Q5
......3	210-7000	TSTR,2N7000,MOSFET	3	Q6, Q7, Q23
......3	211-3904	TSTR,2N3904	2	Q3, Q4
......3	212-0310	TSTR,FET N CHAN RF J3100	1	Q8
......3	220-0212	IC,DG212CJ,QUAD SPST SWITCH	1	U7
......3	220-0311	IC,LT311 LINEAR	2	U27, U43
......3	220-0317	VR,LM317LZ TO92	3	U13, U24, U37
......3	220-2123	IC,74LS123 DUAL MONOSTABLE	1	U28
......3	220-4040	IC,MC14040B 12-BIT BINARY	1	U34
......3	220-4060	IC,MC14060B 14-BIT COUNTER	1	U44
......3	220-4106	IC,MC74HC14 HEX SCHMITT TRIGGR	1	U33
......3	220-4240	IC,74C24ON,INVERTING TRI STATE	3	U19, U20, U45
......3	220-4526	IC,MC14526 4-BIT COUNTER	1	U10
......3	220-5151	IC,MC145151 SYNTHESIZER	1	U25
......3	221-0072	AMP,OP,BIFET TLO72CP	13	U1, U2, U4, U5, U3, U6, U8, U9, U14, U15, U16, U17, U41
......3	221-0319	IC,LM319N,COMPARATOR	2	U22, U47
......3	221-0358	AMP,DUAL OP,LM358	1	U26
......3	221-4002	IC,74HC4002N,DUAL 4-INPUT NOR	1	U31
......3	221-4022	IC,74HC4022,OCTAL COUNTER (NOTE)	1	U29
......3	221-4132	IC,74HC132N QUAD SCHMITT NAND	4	U30, U32, U38, U39
......3	221-5534	IC,NE-5534AN	1	U12
......3	221-7474	IC,74HC74N DUAL D FLIP FLOP	1	U42
......3	221-7475	IC,74HC75N,QUAD D LATCH	1	U40
......3	226-0392	RES NETWORK, 10K	2	R5, R20
......3	227-2110	DRIVER HIGH AND LOW SIDE,IR2110	1	U46
......3	228-4013	IC,MC14013B	2	U11, U36
......3	228-4069	IC,CD4069CN	1	U21
......3	228-4073	IC,MC14073B	1	U35
......3	228-4538	IC,MC14538B NATL SEMICONDUCTOR	1	U23
......3	320-0030	MOUNT,LED,R ANGLE,BIVAR	5	
......3	323-9224	IND,LED,GRN,521-9270	5	DS1, DS2, DS3, DS4, DS5
......3	340-0002	SW,4 POS,SPST,8-PIN DIP	1	S1
......3	340-0003	SW,8 POS DIP,SPST	1	S2

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	340-0004	SW,JUMPER PROGRAMMABLE	18	P4, P5, P6A, P6B, P7, P12A, P12B, P13A, P13B, P14, P15, P16, P17, P18, P19, P20, P21, P22
......3	360-0049	COIL,22UH TORROID	4	L1, L2, L3, L4
........4	360-0023	FERRITE CORE,TOROID .375X .187	1	
........4	555-0049	LABOR ONLY 360-0049	1	
........4	640-3000	WIRE,AWG 30 EN MAGNET GRN	0.001	
......3	360-0093	COIL,MOLDED,SHIELDED,56UH	1	L5
......3	364-2200	COIL, MOLDED 2.2UH	1	L6
......3	400-2175	GROMMET,FOR 1/2	2	
......3	413-0106	TERM,TEST POINT,OVAL,RED	23	E1, E2, E3, E4, TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19
......3	417-0003	CONN,HEADER 3 PIN	5	J4, J5, J7, J21, J22
......3	417-0071-001	JACK,PC .040PIN 1414 KEYSTONE	4	J8, J9, J10, J11
......3	417-0188	CONN,80PIN FEM,DBL ROW,PCB MT	1	P101
......3	417-0200	CONN,HEADER 20 PIN	0.7	J6, J12, J13
......3	417-0804	SOCKET,8-PIN DIP,BURNDY	17	XU1, XU2, XU3, XU4, XU5, XU6, XU8, XU9, XU12, XU14, XU15, XU16, XU17, XU26, XU27, XU41, XU43
......3	417-1404	SOCKET,14-PIN DIP	14	XU11, XU21, XU22, XU30, XU31, XU32, XU33, XU35, XU36, XU38, XU39, XU42, XU46, XU47
......3	417-1604	SKT,16-PIN,DIP	8	XU7, XU10, XU23, XU28, XU34, XU40, XU29, XU44
......3	417-2004	SOCKET,20-PIN,DIP,HIGH RELIABILITY	3	XU19, XU20, XU45
......3	417-2804	SOCKET,IC 28-PIN,DIP,HI RELIABILITY	1	XU25
......3	417-4004	CONN,HEADER,2 PIN	7	J14, J15, J16, J17, J18, J19, J20
......3	421-1113	RIV,CLOSED-END .125 X .316L	4	
......3	474-0165	PLATE,SHIELD VCO	1	
......3	517-0300	PCB MACH,ECU EXCITER,AM-1A (scan)	1	
......3	917-0069	ASSY PCB.VCO MODL	1	
........4	003-1013	CAP,MONO CER,.01uF,100V,5%	2	C1, C2
........4	003-1054	CAP,CER,MNLY,.1uF,50V,20%	2	C3, C5
........4	040-5013	CAP,MICA,50PF,500V,5%	1	C4
........4	100-1031	RES,100 OHM,1/4W,1%,METAL	2	R2, R5
........4	103-1062	RES,100K OHM,1/4W,1%,METAL	1	R4
........4	103-4753	RES,475 OHM,1/4W,1%,METAL	2	R3, R6
........4	103-6193	RES,619 OHM,1/4W,1%,METAL	1	R1
........4	200-0115	DIODE,MVAM115 AM TUNING	1	D1

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	203-4148	DIODE,1N4148	2	D2, D3
........4	212-0310	TSTR,FET N CHAN RF J3100	2	Q1, Q2,
........4	360-0023	FERRITE CORE,TOROID .375X .187	1	
........4	417-0119	PIN,.040 1218 KEYSTONE	4	P32, P33, P34, P35
........4	420-6103	SCREW,6-32X.187,S.S. PH	1	
........4	420-6104	SCREW,6-32X.250,S.S. PH	1	
........4	423-6003	#6 LOCK INT TOOTH	1	
........4	441-0013	STOFF,BRASS 1/4 RNDX 35850P	1	
........4	471-0479-001	COVER,VCO MODIFIED	1	
........4	517-0069	PCB,BLANK VCO MODL	1	
........4	640-2600	WIRE,AWG 26,MAGNET,RED	0.004	
........4	700-0027	POTTING COMPOUND	0.033	
....2	917-0301	ASSY PCB,ECU MOTHERBOARD,AM,A/E SERIES	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	95	C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C61, C62, C63, C64, C65, C67, C68, C69, C70, C71, C72, C73, C74
......3	003-1523	CAP,MONO CER,.0015uF,100V,5%	4	C3, C4, C7, C8
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	1	C66
......3	030-1532	CAP,POLY FILM,.015uF,100V,10%	3	C88, C89, C90
......3	040-2223	CAP,MICA,220PF,500V,RAD	4	C1, C2, C5, C6
......3	040-6824	CAP,MICA,680PF,300V,5%	2	C86, C87
......3	100-1051	RES,10K OHM,1/4W,1%	1	R55
......3	100-6031	RES,604 OHM,1/4W,1%	2	R5, R10
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	13	R74, R76, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95
......3	103-1156	RES,1.15K OHM,1/4W,1%,METAL	37	R15, R16, R17, R18, R23, R24, R25, R26, R27, R28, R35, R36, R37, R38, R39, R40, R47, R48, R49, R50, R51, R56, R57, R60, R61, R62, R1, R4, R6, R9, R78, R79, R80, R81, R82, R83, R84
......3	103-2003	RES,200 OHM,1/4W,1%,METAL	1	R58
......3	103-3924	RES,3.92K OHM,1/4W,1%,METAL	2	R63, R64

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-4423	RES,442 OHM,1/4W,1%,METAL	8	R2, R3, R7, R8, R53, R54, R59, R75
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	25	R19, R20, R21, R22, R29, R30, R31, R32, R33, R34, R41, R42, R43, R44, R45, R46, R66, R67, R68, R69, R70, R71, R72, R77, R96
......3	120-4723	RES,47 OHM,1W,5%	2	R65, R73
......3	203-4005	DIODE,1N4005	1	D1
......3	340-0004	SW,JUMPER PROGRAMMABLE	1	P12
......3	360-0047	CHOKE, 910UH, 5%	2	L5, L6
......3	360-0093	COIL,MOLDED,SHIELDED,56UH	4	L1, L2, L3, L4
......3	412-3000	BARR STP,30 POS,BEAU61-5-30-50	2	TB1, TB2
......3	417-0203	CONN,BNC FLANGED PNL MT UG-290	1	J11
......3	417-0254	CONN,HEADER 80P 2 ROW	2	J101, J302
......3	417-0255	CONN,HEADER 50P 2 ROW 102567-6	2	J201, J301
......3	417-0677	CONN,PCB MT,6PIN MALE	1	J7
......3	417-2600	CONN,HEADER,26PIN	2	J9, J10
......3	417-4004	CONN,HEADER,2 PIN	1	J12
......3	417-4040	CONNECTOR, HEADER STRAIGHT POST	1	J8
......3	418-2500	CONN,25PIN,D TYPE TO PC,ANGLE MT	3	P4, P5, P6
......3	420-0300	SCREW,3-56X.187,S.S. PHH	4	
......3	420-4105	SCREW,4-40X.312,S.S. PH	6	
......3	420-4108	SCREW,4-40X.500,S.S. PH	4	
......3	423-3003	WASHER,#3 SPLIT,SST	4	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	10	
......3	423-4002	#4 LOCK S.S. SPLIT	10	
......3	426-4003	NUT,PEM 4-40 KFS2-440	10	
......3	426-4008	STOFF,PEM 4-40 KFSE-440-12	3	
......3	517-0301	PCB MACH,ECU MOTHERBOARD,AM-1(scan)	1	
......3	601-0022	WIRE,AWG22,BUSS	0.001	
......3	693-0220	TUB,TEFLON,TW,AWG22 NTL	0.001	
....2	917-0306-001	ASSY PCB,ECU DISPLAY/CNTL SW,AM,A/E SERIES	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	25	C1, C2, C3, C4, C5, C8, C11, C13, C16, C17, C18, C19, C20, C23, C29, C38, C39, C6, C7, C9, C10, C14, C15, C21, C22
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	4	C24, C25, C33, C37
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	3	C30, C31, C32
......3	024-1064	CAP,LYTIC,1UF,50V,RAD	1	C12
......3	024-3335	CAP,LYTIC,33UF,35V,LOW LEAK	4	C26, C27, C34, C36
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	6	C28, C35, C40, C41, C42, C43

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	100-1041	RES,1K OHM,1/4W,1%	27	R11, R20, R59, R60, R61, R65, R64, R66, R69, R70, R71, R83, R84, R85, R88, R89, R90, R93, R94, R95, R103, R49, R52, R53, R56, R30, R32
......3	100-1051	RES,10K OHM,1/4W,1%	14	R15, R24, R50, R51, R54, R55, R16, R26, R28, R40, R46, R38, R44, R78
......3	100-1083	RES,10MEG OHM,1/4W,5%	2	R39, R45
......3	100-1231	RES,121 OHM,1/4W,1%	1	R74
......3	100-1551	RES,15K OHM,1/4W,1%	2	R73, R80
......3	100-1731	RES,174 OHM,1/4W,1%	1	R113
......3	100-2283	RES,22MEG OHM,1/4W,5%	2	R12, R21
......3	100-6031	RES,604 OHM,1/4W,1%	1	R75
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	13	R1, R2, R5, R8, R27, R29, R31, R37, R43, R6, R104, R105, R3
......3	103-1105	RES,11K OHM,1/4W,1%,METAL	2	R4, R7
......3	103-1214	RES,1.21K OHM,1/4W,1%,METAL	6	R58, R63, R68, R82, R87, R92
......3	103-2211	RES,22.1K OHM,1/4W,1%,METAL	2	R13, R22
......3	103-2216	RES,221K OHM,1/4W,1%,METAL	2	R14, R23
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	4	R17, R25, R41, R47
......3	103-2431	RES,243 OHM,1/4W,1%,METAL	20	R33, R34, R35, R36, R76, R77, R96, R97, R98, R99, R100, R101, R102, R106, R107, R108, R109, R110, R111, R112
......3	103-2435	RES,24.3K OHM,1/4W,1%,METAL	2	R9, R18
......3	103-4993	RES,499 OHM,1/4W,1%,METAL	6	R57, R62, R67, R81, R86, R91
......3	103-8253	RES,825 OHM,1/4W,1%,METAL	3	R10, R19, R114
......3	103-8255	RES,82.5K OHM,1/4W,1%,METAL	2	R72, R79
......3	175-1034	RES,TRMR,1K,VERT ADJ	2	R42, R48
......3	200-4733	DIODE,ZENER,1N4733A, 5%	6	D12, D13, D14, D17, D18, D19
......3	203-4005	DIODE,1N4005	4	D10, D11, D15, D16
......3	203-4148	DIODE,1N4148	11	D1, D2, D3, D4, D5, D6, D7, D8, D9, D20, D21
......3	210-0271	TSTR,FET J271	2	Q1, Q2
......3	210-7000	TSTR,2N7000,MOSFET	4	Q3, Q4, Q5, Q6
......3	211-3904	TSTR,2N3904	1	Q7
......3	220-0212	IC,DG212CJ,QUAD SPST SWITCH	2	U1, U7
......3	221-0072	AMP,OP,BIFET TLO72CP	1	U6
......3	221-0074	AMP,OP,BIFET TLO74CW	2	U3, U8
......3	221-4227	AMP,DUAL OP	1	U2
......3	227-0317	VR,LM317T,LM317KC	1	U14
......3	228-4013	IC,MC14013B	1	U5

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	228-4584	IC,MC14584 14-PIN SCHMITT TRIG	1	U4
......3	229-0555	IC,TIMER,NE555N	2	U12, U13
......3	229-3914	DRIVER,DOT/BAR DISPLAY LM3914N	6	U9, U10, U11, U15, U16, U17
......3	320-0031	LED,TRI-COLOR COMMON CATHODE	4	DS22, DS23, DS24, DS25
......3	320-4164	LED ARRAY,GRN,10 BAR	4	DS8, DS9, DS11, DS12
......3	320-7164	LED ARRAY RED MV57164 INTEN G OR H	2	DS7, DS10
......3	323-9217	IND,LED,RED 521-9240	2	DS15, DS16
......3	323-9224	IND,LED,GRN,521-9270	4	DS13, DS14, DS19, DS20
......3	323-9225	IND,LED,YEL	4	DS1, DS2, DS17, DS18
......3	340-0030	SW,SPDT,MOM MP SER,1 RED	2	S3, S11
......3	340-0130	SW,SPDT,MOM MP SER,2 GRN,C&K	2	S1, S2
......3	340-0161	SW,SPDT,MOM MP SER,1 GREEN	5	S6, S7, S8, S9, S10
......3	340-0162	SW,SPDT,MOM MP SER,1 YELLOW	2	S4, S5
......3	407-0074	SPR,LED .25 ODX.147 1D X.22L	10	
......3	417-0804	SOCKET,8-PIN DIP,BURNDY	4	XU2, XU6, XU12, XU13
......3	417-1404	SOCKET,14-PIN DIP	4	XU3, XU4, XU5, XU8
......3	417-1604	SKT,16-PIN,DIP	2	XU1, XU7
......3	417-1804	SOCKET,18-PIN,DIP,HIGH RELIABILITY	6	XU9, XU10, XU11, XU15, XU16, XU17
......3	417-2600	CONN,HEADER,26PIN	1	J1
......3	417-4040	CONNECTOR, HEADER STRAIGHT POST	1	J2
......3	517-0306-001	PCB MACH,ECU DISPLAY/CNTL SW,(scan)	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.38	
....2	917-0306-005	ASSY PCB,METER SWITCH,AM,A/E SERIES	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	1	C501
......3	103-1624	RES,1.62K OHM,1/4W,1%,METAL	2	R509, R510
......3	103-2744	RES,2.74K OHM,1/4W,1%,METAL	1	R508
......3	103-3014	RES,3.01K OHM,1/4W,1%,METAL	2	R504, R507
......3	178-2044	RES,TRMR,2K,HORZ ADJ	2	R503, R506
......3	178-5030	RES,TRMR,500 OHM,HORZ ADJ	2	R501, R505
......3	178-5054	RES,TRMR,50K,HORZ ADJ	1	R511
......3	200-4733	DIODE,ZENER,1N4733A, 5%	1	D501
......3	340-0134	SW,ROTARY 3 POS 2 POLE	2	S501, S502
......3	417-0677	CONN,PCB MT,6PIN MALE	1	J501
......3	418-0255	CONN,MALE,4PIN	1	J502
......3	517-0306-005	PCB MACH,METER SWITCH,AM-1A	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.07	
....2	947-0153	ASSY,HRNS,ECU,AM-1 (SBCM)	1	
......3	410-1416	LUG,TERM,BENT,11/16	1	
......3	410-1553	LUG,TERM #10 RING CRIMP 16-22	4	
......3	410-2478	CRIMP TERMINAL,AMP 640707-1	6	
......3	417-0053	SKT,CONN 641294-1 AMP	10	
......3	417-0306	HSNG,3 POS,SL-156	1	P1
......3	417-0606	HSNG,6 POS,SL-156	1	P2
......3	418-0240	PLUG,FEM,4PIN	1	P502
......3	418-0670	HOUSING,CONN,6PIN FEM	1	P7

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	418-2600	CONN,26-PIN,RIBBON	4	P1, P10, P3, P801
......3	418-4001	CONN,RIBBON CBL,40COND	2	
......3	600-0026	CBL,FLAT,26-COND,28GA	2.125	
......3	600-0040	CBL,40COND,28GA,100 ANSLEY	2.125	
......3	601-1800	WIRE,AWG18 19/30 BLK	12.5	
......3	693-0002	SLVG,1/4 EXPANDO FR BLACK"	0.88	
..1	957-0010-101	ASSY, POWER MODULE, AMA'S/AME'S XMTR (note)	2	
....2	420-0108	SCREW,10-32X.500,S.S. PHH	2	
....2	420-6106	SCREW,6-32X.375,S.S. PH	20	
....2	421-6008	6-32 KEP NUT	6	
....2	421-8002	8-32 HEX NUT, BRASS	12	
....2	423-0002	#10 LOCK SPLIT	2	
....2	423-6002	#6 LOCK SPLIT	20	
....2	423-8005	#8 LOCK SPLIT	12	
....2	441-0013	STOFF,BRASS 1/4 RNDX 35850P	1	
....2	441-0062	STOFF,BRASS 1/4HEX X 25850P	4	
....2	441-0175	STOFF,#6X2.62,MF,3/8 L EXT THD	4	
....2	471-0831	SUPPORT,PCB,POWER MOD,AM XMTR	3	
....2	471-5061-100	PANEL,FRONT,POWER MOD,AM	1	
......3	471-5061-009	PANEL,FRONT,POWER MOD,(UNSCREENED)	1	
....2	486-2285	HANDLE,OVAL,BLK,10-32 X 4	1	
....2	917-0302-100	ASSY, PCB, MODULATOR, AM XMTR	1	
......3	200-1620	DIODE,FAST RECOVERY,16JPF20	2	D2, D3
......3	210-9020	FET, MODULATOR, 200V, 94A	2	Q1, Q2
......3	420-4108	SCREW,4-40X.500,S.S. PH	4	
......3	420-6104	SCREW,6-32X.250,S.S. PH	2	
......3	420-6105	SCREW,6-32X.312,S.S. PH	4	
......3	420-8121	SCREW,8-32X.375,BR PH	6	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	4	
......3	423-4002	#4 LOCK S.S. SPLIT	4	
......3	423-6002	#6 LOCK SPLIT	16	
......3	423-8005	#8 LOCK SPLIT	6	
......3	423-8006	#8 LOCK INT TOOTH	6	
......3	441-0012	STOFF,#6-32 MALE-FEMALE 1/4	6	
......3	441-0184	STOFF,6-32,MALE-FEMALE,3/8	4	
......3	441-7982	STOFF,#8x.750,.375 HEX,BRASS W ZINC	6	
......3	455-8000-001	HEATSINK,2 INCH,A" VERSION AM"	2	
......3	580-126	Buss Wire, 18AWG Solid Tinned Copper	0.4	
......3	611-3750	TUB,HT SHK,3/8	0.17	
......3	917-0302-102	ASSY, PCB, MODULATOR, COMPONENT LEVEL AM XMTR	1	
........4	003-1041	CAP,CER,MNLY,.1UF,100V,10%	13	C33, C2, C4, C11, C12, C17, C20, C26, C38, C39, C27, C46, C47
........4	020-3374	CAP,LYTIC,33UF,25V,NP	1	C41
........4	020-4773	CAP,LYTIC,47UF,35V,STDUP	1	C34
........4	023-1076	CAP,LYTIC,10uF,50V,STDUP	12	C1, C18, C19, C35, C24, C29, C30, C31, C32, C40, C22, C28

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	024-2274	CAP,LYTIC,22UF,100V,STDUP	3	C3, C23, C25
........4	030-1033	CAP,CER MOLDED,.001UF,200V,10%	3	C21, C36, C37
........4	030-1530	CAP,POLY,1.5UF,400V,10%	2	C13, C14
........4	030-2256	CAP,POLY,2.2uF,400V	1	C42
........4	030-3353	CAP,POLY FILM,.033UF,200V,10%	4	C44, C50, C51, C53
........4	030-4752	CAP., .47UF, 250V, 10%, POLY	1	C15
........4	030-6843	CAP,POLY METAL,.068uF,250V,10%	2	C48, C52
........4	031-1043	CAP,MYLAR FILM,.01UF,100V,RAD	2	C16, C54
........4	033-4743	CAP,POLY FILM,.47UF,250V,OVAL	3	C6, C9, C43
........4	042-8222	CAP,MICA,820PF,500V,5%	1	C45
........4	046-0002	CAP,MICA,1000PF,350V,10%	2	C7, C10
........4	100-1013	RES,1 OHM,1/4W,5%	1	R4
........4	100-1031	RES,100 OHM,1/4W,1%,METAL	2	R54, R55
........4	100-1041	RES,1K OHM,1/4W,1%	7	R14, R20, R26, R33, R40, R45, R39
........4	100-1051	RES,10K OHM,1/4W,1%	7	R18, R23, R30, R47, R48, R49, R5
........4	100-1231	RES,121 OHM,1/4W,1%	1	R34
........4	100-3373	RES,3.3MEG OHM,1/4W,5%	4	R8, R53, R56, R57
........4	100-4561	RES,453K OHM,1/4W,1%	2	R12, R58
........4	100-8641	RES,8.66K OHM,1/4W,1%	1	R42
........4	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	1	R46
........4	103-1021	RES,10 OHM,1/4W,1%,METAL	2	R9, R11
........4	103-1062	RES,100K OHM,1/4W,1%,METAL	2	R27, R41
........4	103-1306	RES,130K OHM,1/4W,1%,METAL	1	R13
........4	103-1331	RES,1.33K OHM,1/4W,1%,METAL	2	R1, R35
........4	103-1551	RES,15.4K OHM,1/4W,1%,METAL	1	R51
........4	103-2211	RES,22.1K OHM,1/4W,1%,METAL	1	R22
........4	103-2241	RES,2.21K OHM,1/4W,1%,METAL	3	R17, R25, R32
........4	103-3323	RES,332 OHM,1/4W,1%,METAL	1	R3
........4	103-3326	RES,332K OHM,1/4W,1%,METAL	3	R15, R24, R31
........4	103-3641	RES,3.65K OHM,1/4W,1%,METAL	3	R10, R19, R29
........4	103-4755	RES,47.5K OHM,1/4W,1%,METAL	1	R38
........4	103-4996	RES,499K OHM,1/4W,1%,METAL	1	R43
........4	103-6985	RES,69.8K OHM,1/4W,1%,METAL	2	R16, R28
........4	103-8254	RES,8.25K OHM,1/4W,1%,METAL	1	R44
........4	110-3923	RES,39 OHM,1/2W,5%	1	R52
........4	110-4733	RES,470 OHM,1/2W,5%	1	R2
........4	120-2753	RES,27K OHM,1W,5%	1	R21
........4	130-1253	RES,12K OHM,2W,5%	1	R7
........4	200-0009	DIODE,ZENER,1N 4739A	2	D7, D17
........4	200-0019	DIODE,SCHOTTKY,20V,IA,IN5817	2	D24, D25
........4	200-4733	DIODE,ZENER,1N4733A, 5%	1	D1
........4	201-4728	DIODE,ZENER,1N4728	1	D18
........4	203-4005	DIODE,1N4005	7	D4, D6, D8, D9, D14, D15, D19
........4	203-4148	DIODE,1N4148	6	D5, D12, D13, D16, D20, D21
........4	206-6276	TRANSZORB DIODE,IN6276A 15V	1	D10
........4	220-4093	IC,MC14093B SCHMITT NAND	1	U6
........4	220-4421	IC,DRIVER,TC4421CAT 2A	1	U2
........4	220-6137	IC,OPTO-ISOLATOR,6N137	1	U1

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	221-0339	IC,LM339A,VOLT COMPARATOR	1	U3
........4	226-2004	MC1416,ULN2004 7-DRLNGTNS DP16	1	U5
........4	227-0317	VR,LM317T,LM317KC	1	U10
........4	228-4044	IC, QUAD R-S LATCHES	1	U7
........4	228-4504	IC,HEX LEVEL SHIFTER,DUAL 16(NOTE)	1	U11
........4	229-0033	IC,OPTOIS,4N33	4	U4, U8, U9, U12
........4	230-0014	RECT,PWR SWITCHMODE,MUR460	1	D11
........4	270-1213	REL,SPST,30A	1	K1
........4	320-0030	MOUNT,LED,R ANGLE,BIVAR	4	
........4	323-9217	IND,LED,RED 521-9240	2	DS2, DS4
........4	323-9224	IND,LED,GRN,521-9270	2	DS1, DS3
........4	330-2000	FUSE,20A 250V	1	F1
........4	334-0100	FUSE,1A MDL SLO BLO 250V	1	F2
........4	340-0004	SW,JUMPER PROGRAMMABLE	4	P5, P6, P7, P8
........4	413-0106	TERM,TEST POINT,OVAL,RED	4	TP1, TP2, TP3, TP4
........4	415-2068	CLIP,FUSE,15AMP,LITTLEFUSE,102071	2	XF2
........4	415-2068-030	CLIP,FUSE,30AMP,LITTLEFUSE,122083	2	XF1
........4	417-0004	JACK,TEST,RIGHT ANGLE PC MT	2	TP5, TP6
........4	417-0374	CONN,15 PIN SUB-D,MALE7690	1	P2
........4	417-0600	SKT,IC 6 PIN	4	XU4, XU8, XU9, XU12
........4	417-0804	SOCKET,8-PIN DIP,BURNDY	1	XU1
........4	417-1404	SOCKET,14-PIN DIP	2	XU3, XU6
........4	417-1604	SKT,16-PIN,DIP	3	XU5, XU7, XU11
........4	417-4004	CONN,HEADER,2 PIN	4	J5, J6, J7, J8
........4	420-4104	SCREW,4-40X.250,S.S. PH	2	
........4	426-4003	NUT,PEM 4-40 KFS2-440	2	
........4	426-8008	STUD,PEM,KFH-832-5ET,PCB MOUNT	6	
........4	455-0071	HEATSINK,CLIP-ON,PCB MT,TO-220	1	
........4	517-0302-100	PCB, MACH, MODULATOR, AM1A	1	
........4	640-1001	WIRE, 10 GA, TIN PLATED	0.073	
......3	917-0302-103	ASSY, PCB, MODULATOR COIL, AM XMTR (SBCM)	1	
........4	360-0130	COIL, 18.3 UH, MOD PWM (SBCM)	2	
..........5	360-0080	BOBBIN,FERROX,4229F1D	1	
..........5	360-0081	CORE SET,Ferrite 160 (N)	1	
..........5	375-0302	TAPE,3/4W,72YD,#56 SCOTCH	1	
..........5	640-1200	WIRE,12GA,MAGNET	0.001	
..........5	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	0.083	
........4	360-0131	COIL, 2.8 UH, MOD PWM (SBCM)	1	
..........5	360-0080	BOBBIN,FERROX,4229F1D	1	
..........5	360-0081	CORE SET,Ferrite 160 (N)	1	
..........5	375-0302	TAPE,3/4W,72YD,#56 SCOTCH	1	
..........5	640-1000	WIRE,10GA,MAGNET	0.001	
..........5	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	0.083	
........4	360-0132	COIL, 7.5 UH, MOD PDWM (SBCM)	1	
..........5	360-0080	BOBBIN,FERROX,4229F1D	1	
..........5	360-0081	CORE SET,Ferrite 160 (N)	1	
..........5	375-0302	TAPE,3/4W,72YD,#56 SCOTCH	1	
..........5	640-1000	WIRE,10GA,MAGNET	0.001	
..........5	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	0.083	
........4	420-0521	SCREW,10-32X1-1/2,NYLON,RND HD	4	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	421-0901	#10 NYLON NUT	4	
........4	517-0302-103	BLANK PCB, AM COIL ASSEMBLY	1	
......3	917-0302-105	ASSY, PCB, MODULATOR CAP BOARD	2	
........4	013-3385-200	CAP,LYTIC,330UF,200V,20%,10000HRS,105° C,RAD	4	C1, C2, C3, C4
........4	111-0002	.02 OHM 3W CURRENT SENSE RES, SMT	1	R1
........4	517-0302-105	PCB, MACH, MODULATOR CAP BOARD	1	
........4	690-0221	TUB,BLK HEAT SHRINK 3/4	0.5	
....2	917-0304	ASSY PCB,POWER AMP,AM,A/E SERIES	2	
......3	002-1034	CAP,CER,DISC,.001UF,1000V	1	C26
......3	003-1041	CAP,CER,MNLY,.1UF,100V,10%	10	C29, C30, C3, C4, C5, C6, C31, C32, C12, C34
......3	003-1065	CAP,CER,MNLY,0.1UF,200V,10%	4	C1, C7, C27, C28
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	7	C11, C15, C8, C19, C20, C21, C2
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	3	C38, C39, C58
......3	015-1084	CAP,LYTIC,100UF,63V	1	C13
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	4	C25, C24, C33, C59
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	1	C10
......3	024-1064	CAP,LYTIC,1UF,50V,RAD	4	C40, C41, C42, C43
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	3	C16, C17, C18
......3	030-1043	CAP,CER MOLDED,.01uF,200V,RAD	1	C23
......3	042-3912	CAP,MICA,39PF,500V,5%	2	C36, C37
......3	100-1031	RES,100 OHM,1/4W,1%,METAL	3	R4, R32, R33
......3	100-1051	RES,10K OHM,1/4W,1%	11	R2, R3, R6, R21, R7, R26, R34, R35, R39, R40
......3	100-1083	RES,10MEG OHM,1/4W,5%	1	R23
......3	100-2723	RES,27 OHM,1/4W,5%	4	R8, R9, R10, R11
......3	100-3373	RES,3.3MEG OHM,1/4W,5%	2	R13, R16
......3	103-1104	RES,1.10K OHM,1/4W,1%,METAL	3	R5, R14, R18
......3	103-1964	RES,1.96K OHM,1/4W,1%,METAL	2	R24, R20
......3	103-2674	RES,2.67K OHM,1/4W,1%,METAL	2	R30, R31
......3	103-3323	RES,332 OHM,1/4W,1%,METAL	2	R27, R28
......3	103-5623	RES,562 OHM,1/4W,1%,METAL	1	R38
......3	110-6833	RES,680 OHM,1/2W,5%	1	R25
......3	120-0200	RES, 0.2 OHMS, 1W, METAL OXIDE	2	R17, R19
......3	120-1043	RES,1K OHM,1W,5%	2	R1, R15
......3	130-1553	RES,15K OHM,2W,5%	1	R12
......3	130-3004	RES,300 OHM,2W,5%,WW	3	R29, R36, R37
......3	200-0024	DIODE,ZENER,24V,1W,5%,1N4749A	2	D20, D21
......3	200-4742	DIODE,ZENER,1N4742A	2	D29, D30
......3	200-5343	ZENER, 7.5V, 5W	1	D31
......3	201-0035	DIODE,ZENER,1N5229 4.3V 0.5W	1	D11
......3	203-4005	DIODE,1N4005	2	D22, D23
......3	203-4148	DIODE,1N4148	12	D1, D2, D3, D4, D5, D6, D25, D26, D32, D33, D34, D35
......3	206-0027	TRANSZORB DIODE, 27 VOLT	2	D9, D10
......3	206-0250	TRANSZORB,250BV,1.5KE250CA	2	D17, D19
......3	206-0300	TRANSZORB,300V ,SMD	2	D16, D18

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	210-0120	TSTR,TIP120 NPN SILICON PWR	1	Q7
......3	210-0520	HEXFET IRFI520G	4	Q3, Q4, Q5, Q6
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	1	Q11
......3	210-6018	RF FET 150 mOHM 600V (N)	2	Q1, Q2
......3	211-3904	TSTR,2N3904	1	Q12
......3	227-0317	VR,LM317T,LM317KC	1	U1
......3	227-2110	DRIVER HIGH AND LOW SIDE,IR2110	2	U7, U8
......3	228-4584	IC,MC14584 14-PIN SCHMITT TRIG	1	U5
......3	229-0033	IC,OPTOIS,4N33	3	U2, U3, U4
......3	237-0006	SCR,100V 1.6A RMS	1	Q13
......3	320-0030	MOUNT,LED,R ANGLE,BIVAR	2	LD1, LD2
......3	323-9217	IND,LED,RED 521-9240	1	DS2
......3	323-9224	IND,LED,GRN,521-9270	1	DS1
......3	330-1502	FUSE,3AB,15A,65V,VERY FAST	1	F1
......3	334-1150	FUSE,5 X 20MM,1.5A,SLO-BLO	2	F2, F3
......3	360-0112	COIL 4UH (SBCM)	2	L1, L2
........4	360-0087	CORE,TOROID	1	
........4	555-0112	COST, LABOR, 360-0112	1	
........4	640-2200	WIRE,AWG 22,MAGNET	0.004	
......3	415-2068-030	CLIP,FUSE,30AMP,LITTLEFUSE,122083	2	FC1, FC2
......3	415-2069	CLIP,FUSE,LITTLEFUSE,111501	4	FC3, FC4, FC5, FC6
......3	417-0374	CONN,15 PIN SUB-D,MALE7690	1	P2
......3	417-0600	SKT,IC 6 PIN	3	XU2, XU3, XU4
......3	417-1404	SOCKET,14-PIN DIP	3	XU7, XU8, XU5
......3	420-4104	SCREW,4-40X.250,S.S. PH	2	
......3	420-4106	SCREW,4-40X.375,S.S. PH	4	
......3	420-4108	SCREW,4-40X.500,S.S. PH	2	
......3	420-6104	SCREW,6-32X.250,S.S. PH	6	
......3	421-8002	8-32 HEX NUT, BRASS	6	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	6	
......3	423-4002	#4 LOCK S.S. SPLIT	6	
......3	423-6002	#6 LOCK SPLIT	12	
......3	423-8013	#8 LOCK EXT TOOTH (BRONZE)	6	
......3	426-4003	NUT,PEM 4-40 KFS2-440	2	
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	4	E3, E4, E5, E6
......3	441-0012	STOFF,#6-32 MALE-FEMALE 1/4	6	
......3	455-0071	HEATSINK,CLIP-ON,PCB MT,TO-220	2	
......3	455-8001-001	HEATSINK,4 INCH,A" VERSION AM"	2	
......3	517-0304	PCB MACH,POWER AMP,AM-1A	1	
......3	700-0015	ADH,LOCTITE,242 250CC	0.001	
......3	700-0028	COMPOUND,THERM JT,TYPE 120	0.001	
..1	957-0022-021	ASSY,POWER BLOCK,AM-2.5E	1	
....2	400-6700	GROMMET STRIP,.062-.090	1.625	
....2	409-0026	CARD GUIDE,6	24	
....2	420-6002	SCREW,6-32X.437,S.S. PH FH UC	8	
....2	420-6112	SCREW,6-32X.750,S.S. PH	1	
....2	420-6124	SCREW,6-32X1.500,S.S. PH	14	
....2	420-6506	SCREW,6-32X.375,S.S. PH FH	12	
....2	421-6008	6-32 KEP NUT	2	
....2	421-6908	SHEET EDGE CONNECTOR 6-32	18	
....2	421-8002	8-32 HEX NUT, BRASS	16	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	14	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	422-6107	SCREW,SEMS 6-32 X 7/16 PAN PH.ST."	6	
....2	423-6002	#6 LOCK SPLIT	35	
....2	423-8005	#8 LOCK SPLIT	4	
....2	423-8006	#8 LOCK INT TOOTH	26	
....2	441-2114	STOFF,ALUM 1/4HEX X 1 6-32	6	
....2	441-8153	SPR,.25 HEX X .31LG,6-32 THD	2	
....2	441-8217	STOFF,ALUM 1/4HEX X 5/8 6-32	12	
....2	441-8292	STOFF,BRASS MALE-FEM 1/4HX1.75	8	
....2	441-8452	STOFF,8-32FF,2.5L,.25 HEX ALUM	2	
....2	471-0833	PNL,SIDE,PWR BLOCK,AM XMTR	2	
....2	471-0836	GUARD,FLAT,PWR BLOCK,AM XMTR	1	
....2	471-0837	GUARD,ECC,POWER BLOCK,AM XMTR	1	
....2	471-0842	SHIELD,POWER BLOCK,AM XMTR	1	
....2	471-5064	PANEL,REAR,POWER BLK,A"VERSION AM"	1	
....2	471-5083	COVER,TOP,POWER BLOCK,A"VERSION AM"	1	
....2	471-5084	COVER,BOT,POWER BLOCK,A"VERSION AM"	1	
....2	594-0019	LABEL,DANGER HV 1X 1.5	2	
....2	917-0303	ASSY PCB,PWR BLOCK MTHRBD	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	2	C1, C2
......3	030-2256	CAP,POLY,2.2uF,400V	2	C3, C4
......3	370-0037	XMFR,P.A. DRIVE,AM-1/5	2	T1, T2
........4	375-0008	CORE,RF DRIVE TRANSFORMER	1	
........4	555-0035	COST,LABOR 370-0037	1	
........4	601-2411	WIRE,AWG 24, TFE, 250V, ORANGE	2	
........4	601-2412	WIRE, AWG 24, TFE, 250V, BLUE	2	
........4	601-2419	WIRE,AWG24,TFE,250V,WHT	2	
......3	417-0300	SOCKET,CARD EDGE,AMP 531353-6	6	J1A, J1B, J1C, J1D, J1E, J1F
......3	417-0375	CONN,15 PIN SUB-D,FEMALE	6	J2A, J2B, J2C, J2D, J2E, J2F
......3	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	1	J3
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	14	E1, E2, E5, E6, E7, E8, E11, E12, E13, E14, E15, E16, E22, E23
......3	517-0303	PCB MACH,PWR BLOCK MTHRBD	1	
....2	917-0321-002	ASSY,PCB,COMBINER AM-2.5E	1	
......3	360-0107	ASSY,RF CHOKE AM-1A	4	L1, L2, L3, L4
........4	402-0000	TY-RAP	3	
........4	601-1220	WIRE,AWG12,19/25,TFE INS,BLU	5.833	
......3	370-0060	ASSY,AM-2.5B COMBINER XFMR	4	T1, T2, T3, T4
........4	375-0007-001	FERRITE CORE LARGE AM XMTR	1	
..........5	375-0007-100	CORE, RF TRANSFORMER	2	
........4	517-0317-001	PCB MACH,XFMR WIRE HOLDER,AM XMTRS	3	
..........5	517-0317	PCB MACH,XFMR WIRE HOLDER,BREAKAWAY	0.062	
........4	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	3.6	
........4	601-1220	WIRE,AWG12,19/25,TFE INS,BLU	1.042	
........4	601-1221	WIRE,AWG12,19/25,TFE INS,WHT	1.42	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	601-1893	WIRE,AWG18,19/30,TFE INS,WHT	2.583	
........4	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	3.6	
......3	402-0001	TY-RAP,T TY24M,1-1/4 DIA	4	
......3	402-0015	TIE,CBL,PANDUIT, 7 3/8 LONG"	16	
......3	413-0106	TERM,TEST POINT,OVAL,RED	10	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	9	E1, E2, E3, E4, E5, E6, E7, E8, E9
......3	471-5124	SPACER, AM-A COMBINER	4	
......3	517-0321	PCB,MACH,COMBINER,AM-1A	1	
..1	957-0068	ASSY,OUTPUT NETWORK,AM-2.5E	1	
....2	360-0088	COIL,VARIABLE,16UH,20A,AM XMTR	2	
....2	400-0014	GROMMET,3/8IDX5/8ODFOR7/16HOLE	1	
....2	400-6700	GROMMET STRIP,.062-.090	1.212	
....2	402-0000	TY-RAP	7	
....2	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	6	
....2	410-1421	LUG,QUICK DISCONNECT #18-22	2	
....2	417-0017	RECP,BNC,BULKHEAD,UG-492A/U	1	
....2	417-0716	CONN,7/16 DIN,PANEL JACK,SOLDER	2	
....2	420-0106	SCREW,10-32X.375,S.S. PHH	11	
....2	420-0108	SCREW,10-32X.500,S.S. PHH	4	
....2	420-0110	SCREW,10-32X.625,S.S. PHH	2	
....2	420-0496	SCREW,10-32X.375,BLACK SHSS	1	
....2	420-0515	SCREW,10-32X.750,BR PH	1	
....2	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	1	
....2	420-6108	SCREW,6-32X.500,S.S. PH	8	
....2	420-6110	SCREW,6-32X.625,S.S. PH	2	
....2	420-6130	SCREW,6-32X.375,NYLON SL PAN HD	1	
....2	420-6506	SCREW,6-32X.375,S.S. PH FH	8	
....2	420-9306	SCREW,1/4-28X.375,BR PH PA	10	
....2	421-0102	10-32 KEP NUT	2	
....2	421-0201	10-32 S.S. HEX NUT	1	
....2	421-0801	#10-32 BR HEX NUT	3	
....2	421-1113	RIV,CLOSED-END .125 X .316L	6	
....2	421-6008	6-32 KEP NUT	36	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	51	
....2	422-6107	SCREW,SEMS 6-32 X 7/16 PAN PH.ST."	1	
....2	423-0002	#10 LOCK SPLIT	17	
....2	423-0005	#10 LOCK SPLIT (BRONZE)	2	
....2	423-0007	#10 LOCK INT TOOTH	1	
....2	423-1003	1/4-20 LOCK SPLIT	15	
....2	423-1004	1/4-20 FLAT .687 X .260 X .050	6	
....2	423-1018	FLAT .500 X .218 X .030	1	
....2	423-6000	#6 FLAT .375 X .144 X .030	2	
....2	423-6011	#6 FLAT .310 X .160 X .030	9	
....2	430-0016	SPG,COMP .420 OD X1 LC-042F-5	1	
....2	441-0101	STOFF,ALUM 5/16HEX X 7/8 10-32	2	
....2	442-0243	BUSHING,POP-IN,FOR 3/8	2	
....2	446-0075	SHAFT,SHORT,OUTPUT NET,AM XMTR	1	
....2	446-0076	SHAFT,LONG,OUTPUT NET,AM XMTR	1	
....2	447-0032	COUPLING,FLEX,INTEGRAL CLP,3/8	2	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	459-0189	BALL,SPARK GAP	2	
....2	459-0191	BLOCK,SPARK GAP	1	
....2	459-0192	THREADED SHAFT,SPARK GAP	1	
....2	470-0340	STRAP,PCB,VARIABL COIL,AM XMTR	1	
....2	471-0856	PARTITION,OUTPUT NET,AM XMTR	1	
....2	471-0860	PLATE,CAP MTG,OUT NET,AM XMTR	1	
....2	471-0863	SHIELD,OUTPUT NETWORK,AM XMTR	1	
....2	471-0866	PANEL,BREAKAWAY,1 PER AM XMTR	1	
....2	471-5107	CHASSIS,OUTPUT NETWORK,A" VERSION"	1	
....2	471-5109	COVER,TOP,OUT NETWORK,A" VERSION A"	1	
....2	471-5313	PANEL,FRONT,OUTPUT NETWORK,NINJA	1	
....2	471-5322	PANEL,REAR,OUTPUT NETWORK,NINJA	1	
....2	471-5494	SUPPORT,SPARK GAP	1	
....2	482-0031	KNOB,RB-67-5-M,BL MATTE,3/8	2	
....2	486-2285	HANDLE,OVAL,BLK,10-32 X 4	1	
....2	500-211	Screw,SEMS 4-40x3/8 Ph Pan Head MS Black Zinc (External)	2	
....2	601-2209	WIRE,AWG22,7/30 WHT	0.167	
....2	917-0216-003	ASSY,PCB,LGHTNG PROTEC(AM-2.5 NLU-00)	1	
......3	206-0250	TRANSZORB,250BV,1.5KE250CA	3	D3, D4, D5
......3	206-0300	TRANSZORB,300V ,SMD	3	D1, D2, D6
......3	517-0216	PCB MACH,LIGHTNING PROTECTION	1	
......3	601-0018	WIRE,AWG18,BUSS	0.06	
....2	917-0306-002	ASSY PCB,DIRECTIONAL COUPLER,AM,A/E SERIES	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	16	C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217
......3	030-1043	CAP,CER MOLDED,.01uF,200V,RAD	1	C201
......3	031-2033	CAP,MYLAR FILM,.0022uF,100V,10%	2	C219, C220
......3	042-5021	CAP,MICA,500PF,500V,1%	1	C218
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	4	R226, R227, R228, R229
......3	103-3011	RES,30.1 OHM,1/4W,1%,METAL	6	R206, R210, R211, R212, R213, R214
......3	120-1531	RES,150 OHM,1W,1%,(MIL 1/2W)	4	R230, R231, R232, R233
......3	120-2031	RES,200 OHM,1W,1%,MIL 1/2W	12	R215, R216, R217, R218, R219, R220, R221, R222, R236, R237, R238, R239
......3	130-1821	RES,18 OHM,3W,1%	3	R207, R208, R209
......3	178-2056	RES,TRMR,20K,1W,HORZ,22 TURN	4	R223, R224, R234, R235
......3	192-2533	POT,250 OHM,2W,DOUBLE,1-TURN	5	R201, R202, R203, R204, R205
......3	200-0024	DIODE,ZENER,24V,1W,5%,1N4749A	4	D209, D210, D213, D214

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	201-2800	DIODE,HOT CARRIER	4	D201, D202, D203, D204
......3	203-4148	DIODE,1N4148	8	D205, D206, D207, D208, D211, D212, D215, D216
......3	270-0062	REL,SPST 5VDC 500 OHM,REED	5	K201, K202, K203, K204, K205
......3	340-0002	SW,4 POS,SPST,8-PIN DIP	1	S201
......3	340-0004	SW,JUMPER PROGRAMMABLE	6	P203, P204A, P204B.P205A, P205B, P206
......3	360-0093	COIL,MOLDED,SHIELDED,56UH	1	L202
......3	364-0056	COIL,MOLDED,SHIELDED 5.6UH	1	L201
......3	364-0670	CHOKE,10MHY	2	L203, L204
......3	370-0040	XFMR,CURRENT,AM-1/5 (SBCM)	2	R201, T202
........4	375-0009	CORE,1.102 ODX.63 IDX.512 THK	1	
........4	555-0040	COST,LABOR 370-0040	1	
........4	640-2600	WIRE,AWG 26,MAGNET,RED	0.005	
........4	640-2600-1	WIRE,AWG 26,MAGNET,GRN	0.006	
........4	700-0003	TAPE,ELECTRICAL,YEL,3/8	0.01	
......3	370-0041	XFMR,VOLTAGE,AM-1/5	1	T203
........4	375-0007-100	CORE, RF TRANSFORMER	1	
........4	555-0041	COST,LABOR 370-0041	1	
........4	601-2410	WIRE,AWG24,TFE,250V,BLK	8	
........4	601-2411	WIRE,AWG 24, TFE, 250V, ORANGE	1	
........4	601-2412	WIRE, AWG 24, TFE, 250V, BLUE	0.5	
........4	601-2419	WIRE,AWG24,TFE,250V,WHT	10	
........4	700-0103	TAPE,KAPTON 1/2" 0.010 " "		
......3	402-0001	TY-RAP,T TY24M,1-1/4 DIA	6	
......3	410-0025	TERM,MALE DISCONNECT PC .25TAB	3	E209, E210, E211
......3	413-0025	TERM,TURRET,2 SHLDR,.360,GOLD FLASH	17	E202, E203, E204, E205, E206, E207, E208, E212, E213, E214, E215, E216, E217, E219, E220, E221
......3	417-0080-001	HEADER,8 POS R.ANGLE	1	J202, J203
......3	417-0200	CONN,HEADER 20 PIN	2	J201, J204, J205, J206
......3	517-0306-002	PCB MACH,DIRECTIONAL COUPLER,(scan)	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.312	
......3	693-0220	TUB,TEFLON,TW,AWG22 NTL	0.5	
....2	917-0306-004	ASSY PCB,LIGHTNING DETECTOR,AM,A/E SERIES	1	
......3	042-3913	CAP,MICA,1000PF,500V	20	C401, C402, C403, C404, C405, C406, C407, C408, C409, C410, C411, C412, C413, C414, C415, C416, C417, C418, C419, C420
......3	215-0001	PHOTOTRANSISTOR,1.8MA IC AT 5V	1	Q401
......3	340-0004	SW,JUMPER PROGRAMMABLE	3	P403, P404, P405

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	410-0025	TERM,MALE DISCONNECT PC .25TAB	3	E201, E202, E403
......3	417-0200	CONN,HEADER 20 PIN	0.2	J402
......3	417-4004	CONN,HEADER,2 PIN	4	J403, J404, J405, J401
......3	421-1113	RIV,CLOSED-END .125 X .316L	2	
......3	469-0369	FINGER STOCK	1	S401
......3	517-0306-004	PCB MACH,LIGHTNING DETECTOR,AM-1A	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.067	
....2	947-0211	HARNESS,OUTPUT NETWORK,AM-2.5E (SBCM)	1	
......3	402-0000	TY-RAP	12	
......3	402-0051	TY-RAP, W/FLAG	6	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	3	
......3	410-0063	LUG,TERM 1/4	1	
......3	410-0065	LUG,TERM #6 RING CRIMP #22 AWG	1	
......3	410-1421	LUG,QUICK DISCONNECT #18-22	3	
......3	410-1553	LUG,TERM #10 RING CRIMP 16-22	1	
......3	410-7105	LUG,TERM 1/4	6	
......3	417-0138	HSNG,MOD IV 4 POS 87499-7 AMP	2	
......3	417-0142	PIN,.050 DIA 26-22 745254-3	13	
......3	417-0499	CONN HSNG,2POS 87499-3 AMP	1	
......3	417-1401	HOUSING,SKT,14PIN,AMP MOD IV	1	
......3	417-1500	PLUG,15 PIN	1	
......3	417-8766	CONTACT,CRIMP,MOD-IV 87809-1	21	
......3	418-0034	PLUG,BNC DUAL CRIMP 1-227079-6	1	
......3	471-0888	SHIELD,FARADAY,OUT NET,AM XMTR	1	
......3	600-3400	WIRE,LITZ,3400/48,D.NY.,NYLEZE	2.833	
......3	601-1800	WIRE,AWG18 19/30 BLK	0.312	
......3	601-2209	WIRE,AWG22,7/30 WHT	0.708	
......3	608-0002	CBL,8 COND,SH,AWG 24,7/32	1.54	
......3	610-0200	CBL,AWG18 15KV SILICONE 16/30	0.43	
......3	610-8723	CBL,SH 4 COND #22 ST 8723 BELD	5.16	
......3	611-0061	TUB,HT SHK CLEAR 3/64	0.75	
......3	611-1250	TUB,HT SHK,1/8	1.42	
......3	611-1875	TUB,HT SHK,3/16	0.167	
......3	611-5000	TUB,HT SHK 1/2	0.208	
......3	621-1359	CBL,COAX,RG316/U,50 OHM	6.5	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	2.833	
..1	957-0069	KIT,CUSTOMER SERVICE PARTS AM-2.5E	1	
....2	330-0201	FUSE,MDA 2A 250V SLO-BLO	2	
....2	330-1502	FUSE,3AB,15A,65V,VERY FAST	1	
....2	330-2000	FUSE,20A 250V	1	
....2	334-0030-001	FUSE,30A,125V,1/4x1-1/4 AXIAL LEAD	2	
....2	334-0100	FUSE,1A MDL SLO BLO 250V	1	
....2	334-1150	FUSE,5 X 20MM,1.5A,SLO-BLO	2	
....2	350-0002	BATT,ALKALINE 9V SQ	1	
....2	375-0007-001	FERRITE CORE LARGE AM XMTR	2	
......3	375-0007-100	CORE, RF TRANSFORMER	2	
....2	375-0009	CORE,1.102 ODX.63 IDX.512 THK	2	
....2	401-0015	MTG,ADH BACK,SMS-A-15-PANDUIT	5	
....2	402-0000	TY-RAP	10	
....2	402-0001	TY-RAP,T TY24M,1-1/4 DIA	10	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	402-0006	MT,ADH BACKED,FOR CBL TIES	5	
....2	402-0015	TIE,CBL,PANDUIT, 7 3/8 LONG"	10	
....2	407-0186	TOOL,ADJ 8 T000/5 SPECTROL	1	
....2	417-0291	CONN,PLUG,25-PIN,D",SOLDER CUPS"	2	
....2	417-0307	CONN,PLUG,9-PIN,D",SOLDER CUPS"	1	
....2	418-0044	SHIELD,CBL 3 POS 745173-5 AMP	2	
....2	418-0045	FERRULE,SPLIT RING 745508-3	3	
....2	418-0052	SHIELD,CBL 9 POS 745171-1 AMP	1	
....2	710-0279	TOOL,SCREWDRIVER,FLAT-SMALL HEAD	1	
....2	977-1114	KIT,INST,MAN,AM-2.5E/5E	1	
......3	597-1114	INSTRUCTION MANUAL, AM 2.5E/AM 5E TRANSMITTER	1	
........4	594-9999	PAPER,COPIER 8 1/2 X 11,20LB HI-TEC	0.001	
......3	598-0008	BINDER,2 IN, BLUE W CD POCKET (NOTE)	1	
..1	957-0315-100	PANEL,POWER SUPPLY,CE	1	
....2	370-2364	CHOKE,1.04MHY,AM XMTR	1	L2
....2	376-0048-001	XFMR ASSEMBLY, AM POWER SUPPLY	1	
......3	376-0048	XFMR,LOW VOLTAGE,AM-E POWER SUPPLY	1	
......3	402-0000	TY-RAP	4	
......3	417-0036	PIN CONN,AMP,350967-1	2	
......3	417-0053	SKT,CONN 641294-1 AMP	10	
......3	418-0702	HSNG,PIN 2 PIN 1-640507 AMP	1	
......3	418-1271	CONN,HOUSING,12PIN	1	
....2	400-0055	ISOLATOR,ADH BACKED,.063 X .75	8	
....2	400-6700	GROMMET STRIP,.062-.090	1.5	
....2	402-0000	TY-RAP	8	
....2	402-0833	CLAMP,CBL,1/4	1	
....2	420-0500	SCREW,10-32X.375,BR PH	2	
....2	420-8106	SCREW,8-32X.375,S.S. PHH	8	
....2	420-8108	SCREW,8-32X.500,S.S. PHH	6	
....2	420-8119	SCREW,8-32X.625,BR PH	2	
....2	421-0801	#10-32 BR HEX NUT	2	
....2	421-6908	SHEET EDGE CONNECTOR 6-32	5	
....2	421-8002	8-32 HEX NUT, BRASS	14	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	12	
....2	422-8108	SCREW, SEMS, 8-32 X 1/2, PAN HEAD"	1	
....2	423-0005	#10 LOCK SPLIT (BRONZE)	2	
....2	423-0007	#10 LOCK INT TOOTH	2	
....2	423-6015	#6 FLAT .320 X .145 X	1	
....2	423-8002	#8 LOCK SPLIT	6	
....2	423-8005	#8 LOCK SPLIT	14	
....2	423-8006	#8 LOCK INT TOOTH	9	
....2	423-8014	WASH,FLAT #8 X .625 OD X .042T	4	
....2	441-8292	STOFF,BRASS MALE-FEM 1/4HX1.75	4	
....2	471-5074	PANEL,POWER SUPPLY,A" VERSION AM"	1	
....2	517-0315-006	PCB MACH,PS AC INPUT BD.,AM-10A	1	
....2	594-0131	LABEL,WARNING,AM POWER SUPPLY	1	
....2	917-0315-001	ASSY PCB,POWER SUPPLY,AM XMTRS (SBCM) (NOTE)	1	
......3	003-1013	CAP,MONO CER,.01uF,100V,5%	7	C2, C10, C59, C60, C64, C74, C42

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	30	C1, C5, C7, C8, C12, C18, C19, C29, C32, C34, C36, C45, C47, C48, C50, C58, C61, C65, C66, C78, C81, C67, C70, C86, C91, C92, C93, C94, C6, C98
......3	003-2723	CAP,MONO CER,.0027uF,100V,5%	2	C11, C37
......3	003-4723	CAP,MONO CER,.0047uF,100V,5%	2	C73, C96
......3	003-4733	CAP,MONO CER,.047uF,50V,5%	1	C31
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	9	C17, C35, C41, C68, C75, C76, C77, C79, C83
......3	014-2293	CAP,LYTIC,2200UF,35V,STANDUP	2	C4, C20
......3	020-2795-500	CAP,LYTIC,27000UF,50V,20%	1	C21
......3	023-1075	CAP,LYTIC,10UF,50V NP STDUP	1	C62
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	12	C9, C13, C14, C33, C39, C46, C49, C63, C80, C43, C85, C95
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	3	C16, C44, C82
......3	024-4783	CAP,LYTIC,470UF,50V,STDUP	1	C15
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	5	C3, C30, C56, C57, C71
......3	030-1523	CAP,POLY,.15UF,600WVDC,10%	1	C22
......3	030-2242	CAP, POLY, .02 uF, 600V	2	C100, C101
......3	030-2256	CAP,POLY,2.2uF,400V	1	C52
......3	033-4763	CAP,POLY FILM,.47UF,600V,OVAL	1	C23
......3	040-1022	CAP,MICA,100PF,500V,RAD	4	C38, C40, C72, C69
......3	100-1031	RES,100 OHM,1/4W,1%,METAL	5	R20, R46, R69, R82, R83
......3	100-1041	RES,1K OHM,1/4W,1%	6	R27, R67, R68, R120, R121, R149
......3	100-1051	RES,10K OHM,1/4W,1%	28	R3, R4, R10, R11, R12, R14, R18, R25, R31, R35, R54, R56, R62, R80, R91, R98, R111, R112, R113, R114, R115, R116, R117, R119, R124, R36, R151, R140
......3	100-1083	RES,10MEG OHM,1/4W,5%	1	R156
......3	100-1531	RES,150 OHM,1/4W,1%	2	R122, R147
......3	100-1631	RES,162 OHM,1/4W,1%	1	R109
......3	100-3373	RES,3.3MEG OHM,1/4W,5%	8	R19, R45, R53, R55, R64, R85, R87, R66
......3	100-3951	RES,39.2K OHM,1/4W,1%	4	R74, R118, R75, R146
......3	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	2	R126, R148
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	14	R2, R15, R17, R60, R61, R93, R94, R97, R102, R103, R58, R89, R143, R152

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-1104	RES,1.10K OHM,1/4W,1%,METAL	4	R22, R23, R47, R76
......3	103-1305	RES,13K OHM,1/4W,1%,METAL	1	R95
......3	103-1331	RES,1.33K OHM,1/4W,1%,METAL	15	R1, R43, R57, R59, R63, R65, R77, R78, R79, R84, R86, R88, R127, R90, R28
......3	103-1561	RES,150K OHM,1/4W,1%,METAL	1	R5
......3	103-1915	RES,19.1K OHM,1/4W,1%,METAL	1	R6
......3	103-2104	RES,2.10K OHM,1/4W,1%,METAL	1	R150
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	3	R44, R52, R16
......3	103-3324	RES,3.32K OHM,1/4W,1%,METAL	5	R9, R29, R30, R104, R96
......3	103-3325	RES,33.2K OHM,1/4W,1%,METAL	1	R99
......3	103-3485	RES,34.8K OHM,1/4W,1%,METAL	1	R73
......3	103-4025	RES,40.2K OHM,1/4W,1%,METAL	1	R128
......3	103-4324	RES,4.32K OHM,1/4W,1%,METAL	1	R13
......3	103-4441	RES,4.42K OHM,1/4W,1%,METAL	1	R142
......3	103-4753	RES,475 OHM,1/4W,1%,METAL	1	R108
......3	103-4875	RES,48.7K OHM,1/4W,1%,METAL	1	R141
......3	103-4996	RES,499K OHM,1/4W,1%,METAL	3	R8, R34, R155
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	3	R24, R32, R110
......3	103-5141	RES,5.11K OHM,1/4W,1%,METAL	4	R26, R100, R101, R144
......3	103-6653	RES,665 OHM,1/4W,1%,METAL	1	R33
......3	103-7154	RES,7.15K OHM,1/4W,1%,METAL	1	R7
......3	103-7874	RES,7.87K OHM,1/4W,1%,METAL	1	R92
......3	103-8251	RES,82.5 OHM,1/4W,1%,METAL	1	R123
......3	103-8663	RES,866 OHM,1/4W,1%,METAL	2	R70, R21
......3	110-2733	RES,270 OHM,1/2W,5%	2	R39, R40
......3	110-3933	RES,390 OHM,1/2W,5%	1	R81
......3	110-6843	RES,6.8K OHM,1/2W,5%	1	R130
......3	130-1010	RES,.1 OHM,10W,1%,WW	5	R105, R106, R107, R134, R135
......3	130-1062	RES,100K OHM,2W,5%	1	R71
......3	130-1225	RES,12 OHM,30W,20%	1	R72
......3	130-4723	RES,47 OHM,2W,5%	4	R48, R49, R41, R42
......3	130-8223	RES,82 OHM,2W,5%,CARBON	4	R37, R38, R137, R138
......3	140-0030	THERMISTOR,100 OHMS,20%	1	RT1
......3	140-0038	VARISTOR,V320LA20A GE	1	MOV2
......3	140-0039	VARISTOR,V320LA40B	1	MOV1
......3	200-4733	DIODE,ZENER,1N4733A, 5%	3	D5, D6, D26
......3	200-4746	DIODE,ZENER,1N4746	1	D27
......3	201-2800	DIODE,HOT CARRIER	3	D1, D4, D49
......3	203-4005	DIODE,1N4005	9	D7, D8, D19, D23, D28, D30, D31, D40, D44
......3	203-4148	DIODE,1N4148	11	D2, D3, D21, D22, D29, D37, D24, D39, D41, D42, D45
......3	206-0250	TRANSZORB,250BV,1.5KE250CA	4	D50, D51, D52, D53
......3	210-2222	TSTR,2N2222A	2	Q8, Q9

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	3	Q3, Q4, Q6
......3	210-4060	TSTR, HGTG40N60B3 (N)	2	Q21, Q22
......3	210-6018	RF FET 150 mOHM 600V (N)	1	Q23
......3	210-7000	TSTR,2N7000,MOSFET	14	Q2, Q7, Q10, Q11, Q12, Q13, Q15, Q16, Q17, Q18, Q24, Q14, Q26, Q27
......3	211-3904	TSTR,2N3904	4	Q1, Q5, Q19, Q20
......3	212-0310	TSTR,FET N CHAN RF J3100	1	Q25
......3	220-0311	IC,LT311 LINEAR	1	U7
......3	220-4093	IC,MC14093B SCHMITT NAND	1	U21
......3	220-4429	IC,DRIVER,MOSFET,TC4429CAT (N)	1	U19
......3	220-6137	IC,OPTO-ISOLATOR,6N137	2	U17, U22
......3	221-0074	AMP,OP,BIFET TLO74CW	1	U24
......3	221-0393	IC,LM393N,VOLT COMPARATOR	2	U6, U23
......3	225-0008	IC,CD4081BE	1	U12
......3	227-0317	VR,LM317T,LM317KC	3	U3, U4, U16
......3	228-3525	IC,SG3525AN,PWM CONTROL	1	U13
......3	228-4538	IC,MC14538B NATL SEMICONDUCTOR	1	U5
......3	229-0033	IC,OPTOIS,4N33	8	U1, U2, U8, U9, U10, U11, U14, U15
......3	229-1750	TMP01FP TEMPERATURE SENSOR CHIP	1	U25
......3	230-0013	RECT,FAST RECOVERY,FEN30JP	1	D32
......3	230-0015	RECT,SILC,MR2406	2	D15, D17
......3	230-0017	RECT,PWR SWITCHMOD MUR4100E	5	D16, D34, D46, D47, D48
......3	237-2648	SCR, 40 AMP, 600 VOLT	2	D13, D14
......3	239-0001	BRDG RECT,FULL WAVE 2 AMP,200V	3	D9, D12, D25
......3	239-0003	BRDG RECT,6PH20 EDI	2	D11, D10
......3	334-0030-001	FUSE,30A,125V,1/4x1-1/4 AXIAL LEAD	2	F1, F2
......3	340-0004	SW,JUMPER PROGRAMMABLE	3	P4, P5, P8
......3	409-0121	PAD,TSTR MTG,TO18 CASE	2	Q8, Q9
......3	413-0106	TERM,TEST POINT,OVAL,RED	13	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP14
......3	417-0080-001	HEADER,8 POS R.ANGLE	0.375	J4
......3	417-0376-001	CONN, MALE, PCB MT	1	J1
......3	417-0600	SKT,IC 6 PIN	8	XU1, XU2, XU8, XU9, XU10, XU11, XU14, XU15
......3	417-0804	SOCKET,8-PIN DIP,BURNDY	6	XU6, XU7, XU17, XU22, XU23, XU25
......3	417-1276	CONN,PCB,12 PIN	1	J2
......3	417-1404	SOCKET,14-PIN DIP	3	XU12, XU21, XU24
......3	417-1604	SKT,16-PIN,DIP	2	XU5, XU13
......3	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	1	J3
......3	417-4004	CONN,HEADER,2 PIN	4	J5, J6, J7, J8
......3	420-4106	SCREW,4-40X.375,S.S. PH	4	
......3	420-4108	SCREW,4-40X.500,S.S. PH	3	
......3	420-6104	SCREW,6-32X.250,S.S. PH	9	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	7	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	423-4002	#4 LOCK S.S. SPLIT	7	
......3	423-6001	#6 FLAT .250 X .150 X .015	3	
......3	423-6002	#6 LOCK SPLIT	18	
......3	441-0012	STOFF,#6-32 MALE-FEMALE 1/4	9	
......3	455-0071	HEATSINK,CLIP-ON,PCB MT,TO-220	1	
......3	455-8000-001	HEATSINK,2 INCH,A" VERSION AM"	2	
......3	455-8001-001	HEATSINK,4 INCH,A" VERSION AM"	1	
......3	517-0315-001	PCB MACH,POWER SUPPLY,AM-1A	1	
......3	611-5000	TUB,HT SHK 1/2	0.1	
......3	690-0221	TUB,BLK HEAT SHRINK 3/4	0.125	
......3	693-0180	TUB,TEFLON,THINWALL,AWG18,NTL	0.25	
......3	700-0028	COMPOUND,THERM JT,TYPE 120	0.001	
....2	917-0315-002	ASSY PCB,PS BULK CAPACITOR,AM,A/E SERIES	1	
......3	013-1500	CAP,LYTIC,1500uF,450VDC	4	C24, C25, C26, C27
......3	033-4763	CAP,POLY FILM,.47UF,600V,OVAL	1	C28
......3	110-4763	RES,470K OHM,1/2W,5%	1	R129
......3	130-1062	RES,100K OHM,2W,5%	1	R50
......3	130-3623	RES,36 OHM,2W,5%	1	R51
......3	420-0705	SCREW,10-32X.312,BR PH PA	8	
......3	423-0007	#10 LOCK INT TOOTH	8	
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	6	E5, E6, E7, E8, E10, E11
......3	517-0315-002	PCB MACH,PS BULK CAPACITOR,AM-1A	1	
......3	611-0060	TUB, HT SHK, 1/16	0.25	
....2	917-0315-004	ASSY PCB,PS CAPACITOR,AM,A/E SERIES	1	
......3	014-7200	CAP,LYTIC,7200UF,200WVDC	4	C87, C88, C89, C90
......3	140-0006	VARISTOR,V130LA10A,GE	1	MOV3
......3	420-0705	SCREW,10-32X.312,BR PH PA	8	
......3	423-0007	#10 LOCK INT TOOTH	8	
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	3	E1, E2, E12
......3	517-0315-004	PCB MACH,PS CAPACITOR,AM-1A	1	
....2	917-0331	ASSY,PCB PS FUSE	1	
......3	334-0100	FUSE,1A MDL SLO BLO 250V	2	F2, F3
......3	334-0202	FUSE,MDL 1/10 .1 SLO BLO	2	F1, F4
......3	415-2068	CLIP,FUSE,15AMP,LITTLEFUSE,102071	8	F1, F2, F3, F4, BASE
......3	417-1276	CONN,PCB,12 PIN	2	J1, J2
......3	517-0331	MACH,PCB,PS FUSE	1	
....2	947-0208	HARNESS,PWR SUPPLY,AM-CE (SBCM)	1	
......3	402-0000	TY-RAP	20	
......3	402-0001	TY-RAP,T TY24M,1-1/4 DIA	15	
......3	402-0051	TY-RAP, W/FLAG	1	
......3	410-0015	LUG,TERM #8 RING CRIMP 12-10	27	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	3	
......3	417-0053	SKT,CONN 641294-1 AMP	20	
......3	417-0372-001	CONTACT, CONN	16	
......3	417-0377	CONN,FEM,PLB16F0000,POSITRONIC	1	
......3	418-1271	CONN,HOUSING,12PIN	2	
......3	601-1202	WIRE,AWG12 19/25 RED	39	
......3	611-2500	TUB,HT SHK,1/4	0.668	
......3	611-3750	TUB,HT SHK,3/8	0.167	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	622-8457	WIRE,12 CONDUCTOR,22 AWG	2	

12.2 AM 5E

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	907-5000-100	AM-5E XMTR CE CERT		
..1	047-5063-370	CAP,50UF,370VAC,MOTOR RUN	2	C1, C2
..1	140-0021	VARISTOR BLOCK, 275VRMS, 350VDC	3	MOV1, MOV2, MOV3
..1	310-0064	METER,RFL PWR,3.5	1	
..1	310-0065	METER,FWD PWR,3.5	1	
..1	330-0201	FUSE,MDA 2A 250V SLO-BLO	4	F7, F8, F9, F10
..1	334-2502	FUSE,60A,FLN-R60	2	F1, F2
..1	339-0055	FILTER,RFI,55A	1	
..1	341-0061	SW,DISCONNECT,SAFETY INTLK,60A	1	S1
..1	341-0062	HANDLE&SHAFT KIT FOR 341-0061	1	
..1	341-0074	CONTACTOR,80A,220/240VAC,50/60HZ	1	K2
..1	370-2366	IND,5.8MH,30A	4	L3, L4, L5, L6
..1	375-0009	CORE,1.102 ODX.63 IDX.512 THK	4	
..1	380-9001	FAN,PATRIOT,230 VAC	2	B1, B2
..1	400-0014	GROMMET,3/8IDX5/8ODFOR7/16HOLE	18	
..1	401-0022	CONNECTOR, SET SCREW, 1 1/2EMT"	2	
..1	401-0025	CONDUIT,AC ENTRY,NINJA	1	
..1	402-0001	TY-RAP,T TY24M,1-1/4 DIA	2	
..1	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	12	
..1	402-0831	CLAMP,CBL 1/2	10	
..1	402-0833	CLAMP,CBL,1/4	4	
..1	402-0839	CLAMP,CBL,5/8	1	
..1	402-0840	CLAMP,CBL 3/4	1	
..1	407-0168	FILTER,AIR,FXA 9.75x19.75"x.86""	1	
..1	410-0021	SPLICE,PARALLEL #8 34318-0 AMP	12	
..1	410-0071	LUG,SOLDERLESS W/SCR L70	1	
..1	412-0050	TERM BLOCK,GOULD 63133	1	TB2
..1	412-0090	BARR STP,9 POS 7/16	1	TB1
..1	415-0019	FUSEHOLDER,60A,250V,REJECT TYPE	1	
..1	415-2012	FUSEHOLDER,PANEL MOUNT, 10A (NOTE)	4	
..1	417-0017	RECP,BNC,BULKHEAD,UG-492A/U	2	
..1	417-0716	CONN,7/16 DIN,PANEL JACK,SOLDER	1	
..1	417-2402	HSNG,WIRE,MR,FEMALE,24-PIN,AMP	4	
..1	420-0000	SCREW,W/CAPT WASH 10-32X1/2BLK (NOTE	50	
..1	420-0108	SCREW,10-32X.500,S.S. PHH	12	
..1	420-0110	SCREW,10-32X.625,S.S. PHH	2	
..1	420-0705	SCREW,10-32X.312,BR PH PA	1	
..1	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	3	
..1	420-1517	SCREW,1/4-20X.500,S.S. PHH	8	
..1	420-6002	SCREW,6-32X.437,S.S. PH FH UC	50	
..1	420-6108	SCREW,6-32X.500,S.S. PH	4	
..1	420-6110	SCREW,6-32X.625,S.S. PH	12	
..1	420-6604	SCREW,6-32X.250,S.S. PH FH UC	12	
..1	420-8121	SCREW,8-32X.375,BR PH	4	
..1	421-0102	10-32 KEP NUT	176	
..1	421-1003	1/4-20 HEX NUT	2	
..1	421-1004	1/4-20 AMCO KEP NUT	24	
..1	421-1105	RIV,BLD 3/32OD X .187 GRIP,CSK	2	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	421-1113	RIV,CLOSED-END .125 X .316L	16	
..1	421-4008	4-40 KEP NUT	8	
..1	421-6008	6-32 KEP NUT	14	
..1	421-6908	SHEET EDGE CONNECTOR 6-32	60	
..1	421-8001	8-32 S.S. HEX NUT	2	
..1	421-8002	8-32 HEX NUT, BRASS	14	
..1	421-8003	8-32 KEP NUT	4	
..1	421-8006	8-32 ACORN HEX NUT	4	
..1	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	18	
..1	422-6107	SCREW,SEMS 6-32 X 7/16 PAN PH.ST."	56	
..1	423-0002	#10 LOCK SPLIT	4	
..1	423-0007	#10 LOCK INT TOOTH	1	
..1	423-1003	1/4-20 LOCK SPLIT	2	
..1	423-4101	#4 FLAT SS .315 X .127 X .030	2	
..1	423-6002	#6 LOCK SPLIT	9	
..1	423-6011	#6 FLAT .310 X .160 X .030	9	
..1	423-8005	#8 LOCK SPLIT	16	
..1	441-6799	STOFF,1/4 ODX 1/4L/6-32 8341	2	
..1	441-9404	STOFF,PAN-POLE	1	
..1	453-0008	BRKT,CAP MTG VR8	2	
..1	457-0045	HINGE, REAR DOOR, NINJA	1	
....2	457-0045-009	HINGE, REAR DOOR, NINJA, UNPAINTED	1	
..1	463-0116	STRAP,MOV CHASSIS GND	1	
..1	463-6802	STRAP,GND,PWR BLC,AM-2.5	1	
..1	469-0365	FINGER STOCK,1S197520A	101	
..1	469-0366	FINGER STOCK (NOTE!!!!!)	242.62	
..1	469-0366-1	STRIP,RFI SHIELD 1.25	8	
....2	469-0366	FINGER STOCK (NOTE!!!!!)	1.25	
..1	469-0375	FINGER CONTACT STRIP, 375P80-18-02	8.25	
..1	470-0353	AC HIGH/LOW LINE MONITOR WITH INDICATOR	1	
..1	471-0838-001	PLATE,TRIM,PWR BLOCK #1	1	
....2	471-0838	PLATE,TRIM,PWR BLOCK,AM XMTR	1	
..1	471-0838-002	PLATE,TRIM,PWR BLOCK #2	1	
....2	471-0838	PLATE,TRIM,PWR BLOCK,AM XMTR	1	
..1	471-0838-003	PLATE,TRIM,PWR BLOCK #3	1	
....2	471-0838	PLATE,TRIM,PWR BLOCK,AM XMTR	1	
..1	471-0838-004	PLATE,TRIM,PWR BLOCK #4	1	
....2	471-0838	PLATE,TRIM,PWR BLOCK,AM XMTR	1	
..1	471-0889	GUARD,AC DISTRIBUTION,AM1/AM5	1	
..1	471-5086	SUPPORT,POWER SUPPLY,A" VERSION AM"	2	
..1	471-5113	BRACKET,SAFETY SWITCH MOUNTING,AM6A	1	
..1	471-5300	SIDE,EXTERNAL,NINJA	2	
..1	471-5301	BRACE,REAR CORNER,NINJA	2	
..1	471-5302	TOP,EXTERNAL,NINJA	1	
..1	471-5303	PARTITION,UPPER,NINJA	1	
..1	471-5304	BOTTOM,EXTERNAL,NINJA	1	
..1	471-5305	PANEL,LOWER FRONT,NINJA	1	
....2	471-5305-009	PANEL,LOWER FRONT,NINJA,UNSCREENED	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
..1	471-5306	PANEL,UPPER FRONT,NINJA	1	
..1	471-5307	BRACE,PA BAY,NINJA	2	
..1	471-5308	DOOR,PA BAY,NINJA	1	
..1	471-5309	DOOR,REAR,NINJA	1	
..1	471-5310	PLENUM,AIR FILTER,NINJA	1	
..1	471-5311	SUPPORT,PS,NINJA	2	
..1	471-5312	AIR DAM,OUTPUT NETWORK,NINJA	1	
..1	471-5315	PANEL,AIR FILTER ACCESS,NINJA	1	
..1	471-5316	SHIELD,AC FILTER,NINJA	1	
..1	471-5317	COVER,AC FILTER,NINJA	1	
..1	471-5318	PARTITION,LOWER,NINJA	1	
..1	471-5319	STRIKER,ANTENNA GROUNDING,NINJA	1	
..1	471-5320-002	COWLING,NINJA,AM5E	1	
....2	471-5320	COWLING,NINJA,UNSCREENED	1	
..1	471-5323	PLATE,AC FILTER,NINJA	1	
..1	471-5324	BRACE,RACK,NINJA	1	
..1	486-2285	HANDLE,OVAL,BLK,10-32 X 4	4	
..1	591-0001	PLATE,FCC ID	1	
..1	592-0179	PLATE,DANGER,AM XMTRS	1	
....2	592-0004-009	WARNING PLATE,UNSCREENED	1	
..1	594-0019	LABEL,DANGER HV 1X 1.5	1	
..1	594-0039	LABEL,WARNING PS CAB	1	
..1	594-0073	LABEL,WARNING ROTATING FANS	1	
..1	594-0501	LABEL,CE ELECTRICAL SYMBOLS	1	
..1	610-0009	CABLE,UPPER,17.5" 1.000 " "		
..1	610-0010	CABLE,LOWER,11.8" 1.000 " "		
..1	700-0089	TAPE,POLYMER,3/4 (54FT ROLLS)	0.305	
..1	917-0306-003	ASSY PCB,INTERFACE,AM,A/E SERIES	1	
....2	103-4423	RES,442 OHM,1/4W,1%,METAL	5	R301, R302, R303, R304, R305
....2	203-4005	DIODE,1N4005	5	D301, D302, D303, D304, D305
....2	340-0004	SW,JUMPER PROGRAMMABLE	3	P306, P307, P309
....2	417-0003	CONN,HEADER 3 PIN	2	J306, J307
....2	417-0230	CONN,20-PIN,MR SERIES,PCB,AMP	1	J305
....2	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	1	J301
....2	417-4004	CONN,HEADER,2 PIN	1	J309
....2	418-0900	CONN,9 PIN 640501-5 AMP	4	J302, J303, J304, J308
....2	517-0306-003	PCB MACH,INTERFACE,AM-1A	1	
......3	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.096	
..1	917-0306-006	ASSY PCB,PS STATUS LED,AM,A/E SERIES	1	
....2	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	5	C601, C602, C603, C604, C605
....2	323-9217	IND,LED,RED 521-9240	5	DS601, DS602, DS603, DS604, DS605
....2	407-0074	SPR,LED .25 ODX.147 1D X.22L	5	
....2	417-1276	CONN,PCB,12 PIN	1	J601
....2	517-0306-006	PCB MACH,PS STATUS LED,AM-1A	1	
......3	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.038	
..1	917-0306-007	ASSY PCB,AC SAMPLE,AM,A/E SERIES	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	033-4763	CAP,POLY FILM,.47UF,600V,OVAL	1	C701
....2	100-3373	RES,3.3MEG OHM,1/4W,5%	1	R707
....2	103-1561	RES,150K OHM,1/4W,1%,METAL	6	R701, R702, R703, R704, R705, R706
....2	203-4005	DIODE,1N4005	4	D701, D702, D703, D704
....2	410-0025	TERM,MALE DISCONNECT PC .25TAB	2	E701, E702
....2	417-0700	CONN,PCB MT,2PIN	1	J701
....2	517-0306-007	PCB MACH,AC SAMPLE,AM-1A	1	
......3	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.022	
....2	611-0060	TUB, HT SHK, 1/16	1.5	
..1	917-0306-009	ASSY PCB,TEMPERATURE SENSOR,AM,A/E SERIES	1	
....2	002-1034	CAP,CER,DISC,.001UF,1000V	1	C907
....2	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	2	C902, C906
....2	100-1051	RES,10K OHM,1/4W,1%	2	R901, R903
....2	103-2241	RES,2.21K OHM,1/4W,1%,METAL	1	R902
....2	220-0035	IC,LM35DZ CELSIUS TEMP SENSOR	1	U901
....2	413-1597	TERM,TURRET,2 SHLDR,.219,GOLD FLASH	2	TP901, TP902
....2	418-0255	CONN,MALE,4PIN	1	J901
....2	517-0306-009	PCB MACH,TEMPERATURE SENSOR,AM-1A	1	
......3	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.015	
..1	917-0330	ASSY,PCB PFC RELAY BOARD	2	
....2	130-1062	RES,100K OHM,2W,5%	1	R1
....2	270-1213	REL,SPST,30A	2	K1, K2
....2	418-0255	CONN,MALE,4PIN	1	J1
....2	426-8008	STUD,PEM,KFH-832-5ET,PCB MOUNT	2	J2, J3
....2	517-0330	PCB,MACH,PFC RELAY BOARD	1	
..1	917-0410	ASSY,PCB,CUSTOMER INTERFACE (SBCM)	1	
....2	007-1044	CAP,CER,0.1uF,50V,10%,SMD note	48	C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48
....2	201-0040	ZENER VOLTAGE SUPPRESSOR,18V	4	D49, D50, D51, D52

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	204-0030	DIODE,TRANSORB 30V,TGL41-30,SMD	48	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, 230, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48
....2	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	2	J4, J5
....2	417-2502-FER	RCPT,25 PIN D,FEMALE,FERITE FILTER	2	J1, J2
....2	417-8809	CONN, 9 PIN D, FEMALE, FILTERED	1	J3
....2	418-0255	CONN,MALE,4PIN	1	J6
....2	517-0410	PCB,MACH,CUSTOMER INTERFACE	1	
..1	919-0096-001	ASSY PCB,OPTICALLY COUPLED REL NOTE	1	
....2	000-1051	CAP,CER,DISC,.03UF,300VAC,20%	-1	REMOVE C3YOU MUST SCRAP THIS PART ON SCRAP REPORT AFTER REMOVAL!
....2	110-5633	RES,560 OHM,1/2W,5%	-1	REMOVE R2YOU MUST SCRAP THIS PART ON SCRAP REPORT AFTER REMOVAL!
....2	919-0096	ASSY PCB,OPTICALLY COUPLED REL (SBCM)	1	
......3	000-1051	CAP,CER,DISC,.03UF,300VAC,20%	1	C3
......3	002-1034	CAP,CER,DISC,.001UF,1000V	2	C1, C4
......3	020-4773	CAP,LYTIC,47UF,35V,STDUP	1	C2
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	1	R4
......3	110-5633	RES,560 OHM,1/2W,5%	1	R2
......3	110-8233	RES,820 OHM,1/2W,5%	1	R3
......3	130-2032	RES,2K OHM,10W,3%,WW	2	R1, R5
......3	140-0023	VARISTOR,27V,V27ZA60	1	MOV1
......3	200-5359	DIODE,ZENER,1N5359 24V 5W	1	D2
......3	203-4005	DIODE,1N4005	2	D1, D4
......3	229-0033	IC,OPTOIS,4N33	1	U1
......3	239-0003	BRDG RECT,6PH20 EDI	1	D5
......3	270-0054	REL,PC 24V T90NID1224 P&B	1	K1
......3	270-0054-001	COVER,DUST REL 35C620 P&B	1	
......3	330-0055	FUSE,3A,250V,PCB MOUNT	2	F1, F2
......3	410-0025	TERM,MALE DISCONNECT PC .25TAB	5	E1, E2, E3, E4, E5
......3	417-0600	SKT,IC 6 PIN	1	XU1
......3	420-2504	SCREW,2-56X.250,S.S. PH FH SC	4	
......3	420-4104	SCREW,4-40X.250,S.S. PH	2	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	421-2001	2-56 S.S. NUT	4	
......3	423-2002	#2 LOCK SPLIT	4	
......3	423-4002	#4 LOCK S.S. SPLIT	2	
......3	474-0347	PLATE,SOLID STATE RELAY MOUNT	1	
......3	519-0096	PCB,MACH,OPTICALLY COUPLED RELAY	1	
......3	601-2209	WIRE,AWG22,7/30 WHT	0.75	
..1	947-0212	HARNESS,AM-5E (SBCM)	1	
....2	402-0000	TY-RAP	20	
....2	402-0051	TY-RAP, W/FLAG	13	
....2	410-0015	LUG,TERM #8 RING CRIMP 12-10	28	
....2	410-0017	LUG,TERM #8 RING UNINS #8 WIRE	6	
....2	410-0050	LUG,TERM,10-12GA,FEMSPADE	4	
....2	410-0052-746	PARALLEL SPLICE, 8 AWG	2	
....2	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
....2	410-0065	LUG,TERM #6 RING CRIMP #22 AWG	1	
....2	410-0067	LUG,FEM DISCONNECT 22-18 .230W	5	
....2	410-0074	SPLICE,PARALLEL #2 AMP 52748	2	
....2	410-1016	TERM LUG,SOLDER TYPE#6 1/4HOLE	2	
....2	410-1421	LUG,QUICK DISCONNECT #18-22	9	
....2	410-1488	LUG,TERM #6 SPADE #10-12	1	
....2	410-1489	LUG,TERM #6 SPADE #16-22	7	
....2	410-7105	LUG,TERM 1/4	13	
....2	417-0036	PIN CONN,AMP,350967-1	4	
....2	417-0053	SKT,CONN 641294-1 AMP	162	
....2	417-0059	CONN,9 PIN 1-640521-0 AMP	2	
....2	417-0095	CONN,BNC RG/U142 31-326 AMPH	4	
....2	417-0142	PIN,.050 DIA 26-22 745254-3	64	
....2	417-0176	CONN,20 PIN FEM,AMP 1-350245-9	1	
....2	417-0251	PLUG,25 PIN 207464-1 AMP	2	
....2	417-1504	RCPT,15 PIN STD 205205-1 AMP	1	
....2	417-1510	KIT,BACKSHELL FOR 15PIN D CONN	1	
....2	417-2402	HSNG,WIRE,MR,FEMALE,24-PIN,AMP	7	
....2	417-2510	KIT,BACKSHELL FOR 25PIN D CONN	3	
....2	417-8500	PLUG AND CORD ET,AM500 FAN	2	
....2	418-0054	3 CIRCUIT-COMMONING BAR,AMP MR	2	
....2	418-0233	HSNG,CONN, 4P,1-640509-AMP	2	
....2	418-0240	PLUG,FEM,4PIN	5	
....2	418-0670	HOUSING,CONN,6PIN FEM	1	
....2	418-0701	CONN,HOUSING,2 PIN	3	
....2	418-1271	CONN,HOUSING,12PIN	1	
....2	600-3400-001	WIRE,LITZ,3400/48,.040 TEFLON COAT"	4.5	
....2	601-0600-054	CBL,AWG 6, STRANDED, GREEN/YELLOW	0.3	
....2	601-1202	WIRE,AWG12 19/25 RED	37	
....2	601-1202-054	WIRE,AWG 12,STRANDED, GREEN/YELLOW	0.5	
....2	601-1604	WIRE,AWG16, 19/29 YEL	2	
....2	601-1800	WIRE,AWG18 19/30 BLK	25	
....2	601-2200	WIRE,AWG22,7/30,PVC INS,BLK	1.054	
....2	601-2209	WIRE,AWG22,7/30 WHT	16.5	
....2	608-0002	CBL,8 COND,SH,AWG 24,7/32	18.5	
....2	610-0008	CBL, 15 COND, #24 W/SHIELD	6.12	
....2	610-0202	CBL,AWG 8,19 STR COPPER,#21AWG	13.5	
....2	610-8723	CBL,SH 4 COND #22 ST 8723 BELD	31	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	611-0061	TUB,HT SHK CLEAR 3/64	1	
....2	611-0938	TUBE, HEAT SHINK, 3/32, BLACK"	0.2	
....2	611-1250	TUB,HT SHK,1/8	0.8	
....2	611-1875	TUB,HT SHK,3/16	0.5	
....2	611-2500	TUB,HT SHK,1/4	1	
....2	621-0001	CBL,COAX TEFLON RG 142B/U BELD	3.5	
....2	621-1359	CBL,COAX,RG316/U,50 OHM	24	
....2	622-8451	WIRE,BELD 8451,SHIELD,1PR	59.5	
....2	682-0001	CORD LINE,3 COND,DETACH 7.5FT	1	
....2	693-0002	SLVG,1/4 EXPANDO FR BLACK"	12.5	
....2	693-0003	SLVG,1/2	9	
..1	957-0009-100	ASSY,EXCITER/CONTROLLER,AM-E	1	
....2	140-0036	VARISTOR,V275LA20A	1	
....2	339-0008	FILTER,RFI,3A 250VAC 50/60HZ	1	
....2	400-6700	GROMMET STRIP,.062-.090	0.212	
....2	402-0000	TY-RAP	3	
....2	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	2	
....2	407-0119	MOUNT,PUSH,CBL TIE PM-1	1	
....2	409-0026	CARD GUIDE,6	16	
....2	415-0011	HOLDER,BATTERY,9V,SOLDER LUGS	1	
....2	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	3	
....2	420-2504	SCREW,2-56X.250,S.S. PH FH SC	4	
....2	420-6114	SCREW,6-32X.875,S.S. PH	4	
....2	421-0201	10-32 S.S. HEX NUT	4	
....2	421-1113	RIV,CLOSED-END .125 X .316L	2	
....2	421-6008	6-32 KEP NUT	27	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	48	
....2	423-0002	#10 LOCK SPLIT	4	
....2	423-6002	#6 LOCK SPLIT	18	
....2	441-0068	STOFF,ALUM 1/4HEX X 1 1/2 6-32	4	
....2	441-8153	SPR,.25 HEX X .31LG,6-32 THD	7	
....2	441-8217	STOFF,ALUM 1/4HEX X 5/8 6-32	3	
....2	457-0039	HINGE,ECU,AM XMTR	1	
......3	457-0039-009	HINGE,ECU,AM XMTR,UNPAINTED	1	
....2	466-0094	ANGLE,METER MOUNTING	4	
....2	467-1001-1	FILTER,WINDOW,GREY	1	
....2	471-0843	CHASSIS,ECU,AM XMTR	1	
....2	471-0844	PANEL,REAR,ECU,AM XMTR	1	
......3	471-0844-009	PANEL,REAR,ECU,AM XMTR,UNSCRND	1	
....2	471-0845	COVER,TOP,ECU,AM XMTR	1	
....2	471-0848	SHIELD,P.S.,ECU,AM XMTR	1	
....2	471-5049	DOOR,ECU,A"VERSION AM"	1	
....2	471-5314	PANEL,FRONT,ECU,NINJA	1	
....2	482-0030	KNOB,RB-67-1-MD,BL MATTE,1/4 (NOTE)	2	
....2	540-0006	PWR SPLY,SMPS,3 OUTPUT,40W	1	
....2	594-0039	LABEL,WARNING PS CAB	1	
....2	701-0028	TAG,YEL,SIZE 5,4 3/4X2 3/8	1	
....2	917-0205	ASSY,PCB ECU CONTROLLER,AM,A/E SERIES (NOTE)	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	80	C1, C2, C3, C4, C5, C6, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C31, C32, C37, C39, C40, C41, C42, C43, C44, C45, C46, C47, C57, C59, C61, C62, C65, C68, C69, C70, C71, C74, C90, C91, C102, C104, C105, C36, C30, C33, C7, C50, C48, C53, C126, C66, C88
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	6	C109, C93, C115, C98, C99, C101
......3	013-2064	CAP,LYTIC,2.2uF,63V,STDUP	5	C58, C63, C89, C94, C97
......3	020-1064	CAP,LYTIC,1uF,5OV,NP,STDUP	2	C133, C134
......3	023-1075	CAP,LYTIC,10UF,50V NP STDUP	15	C34, C35, C49, C51, C52, C54, C55, C56, C64, C95, C110, C116, C130, C121, C119
......3	024-1064	CAP,LYTIC,1UF,50V,RAD	3	C67, C108, C131
......3	024-3374	CAP,LYTIC,33UF,35V,STDUP	1	C132
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	21	C60, C72, C73, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C92, C103, C106, C136, C137
......3	030-1043	CAP,CER MOLDED,.01uF,200V,RAD	1	C129,
......3	038-1049	CAP,TUB,.033MFD,80V	1	C38
......3	041-2722	CAP,MICA,270PF,300V,5%	1	C135
......3	100-1041	RES,1K OHM,1/4W,1%	18	R15, R18, R19, R20, R23, R39, R59, R98, R108, R135, R139, R140, R142, R156, R160, R170, R179, R181

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	100-1051	RES,10K OHM,1/4W,1%	26	R8, R32, R65, R66, R72, R85, R91, R93, R95, R109, R134, R137, R152, R154, R155, R158, R164, R165, R168, R174, R175, R176, R190, R192, R193, R194
......3	100-1531	RES,150 OHM,1/4W,1%	1	R74
......3	100-2273	RES,2.2MEG OHM,1/4W,5%	1	R200
......3	100-3373	RES,3.3MEG OHM,1/4W,5%	15	R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R167, R125
......3	100-4773	RES,4.7MEG OHM,1/4W,5%	4	R83, R73, R78, R191,
......3	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	7	R47, R87, R90, R97, R100, R105, R177,
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	6	R46, R48, R53, R54, R94, R197
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	35	R1, R166, R58, R141, R27, R26, R30, R13, R24, R28, R172, R173, R138, R159, R96, R169, R188, R123, R79, R80, R131, R132, R133, R62, R162, R198, R187, R201, R202, R203, R204, R205, R208, R207, R178
......3	103-1261	RES,121K OHM,1/4W,1%,METAL	2	R51, R196
......3	103-1474	RES,1.47K OHM,1/4W,1%,METAL	4	R77, R22, R107, R209
......3	103-1561	RES,150K OHM,1/4W,1%,METAL	1	R88
......3	103-1695	RES,16.9K OHM,1/4W,1%,METAL	1	R104
......3	103-1823	RES,182 OHM,1/4W,1%,METAL	1	R43
......3	103-2051	RES,20K OHM,1/4W,1%,METAL	4	R16, R29, R81, R82, R189
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	8	R9, R11, R103, R12, R33, R34, R35, R21,
......3	103-2341	RES,2.32K OHM,1/4W,1%,METAL	1	R17,
......3	103-2431	RES,243 OHM,1/4W,1%,METAL	8	R37, R38, R41, R101, R126, R127, R128, R129, R130,
......3	103-2551	RES,25.5K OHM,1/4W,1%,METAL	1	R92
......3	103-2615	RES,26.1K OHM,1/4W,1%,METAL	2	R171, R195
......3	103-3014	RES,3.01K OHM,1/4W,1%,METAL	3	R99, R86, R106

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-3061	RES,301K OHM,1/4W,1%,METAL	5	R25, R31, R161, R7, R52,
......3	103-3923	RES,392 OHM,1/4W,1%,METAL	8	R36, R55, R44, R63, R64, R42, R183, R184
......3	103-3924	RES,3.92K OHM,1/4W,1%,METAL	1	R76
......3	103-4325	RES,43.2K OHM,1/4W,1%,METAL	1	R14
......3	103-4441	RES,4.42K OHM,1/4W,1%,METAL	1	R10
......3	103-4731	RES,475K OHM,1/4W,1%,METAL	1	R206
......3	103-4741	RES,4.75K OHM,1/4W,1%,METAL	4	R45, R40, R102, R199
......3	103-4755	RES,47.5K OHM,1/4W,1%,METAL	8	R50, R68, R69, R70, R84, R148, R149, R150
......3	103-4993	RES,499 OHM,1/4W,1%,METAL	3	R163, R153, R210
......3	103-6195	RES,61.9K OHM,1/4W,1%,METAL	1	R75
......3	103-6814	RES,6.81K OHM,1/4W,1%,METAL	1	R124
......3	103-7503	RES,750 OHM,1/4W,1%,METAL	2	R57, R144
......3	103-9095	RES,90.9K OHM,1/4W,1%,METAL	12	R49, R136, R71, R151, R157, R60, R61, R67, R145, R146, R147, R89
......3	178-5001	RES,TRMR,500 OHM,15 TURN	2	R56, R143
......3	179-1053	RES,TRMR,10K,10 TURN	5	R2, R3, R4, R5, R6
......3	201-2800	DIODE,HOT CARRIER	8	D31, D42, D33, D30, D36, D39, D40, D37
......3	203-4005	DIODE,1N4005	21	D11, D3, D9, D7, D5, D14, D15, D17, D13, D16, D1, D20, D18, D22, D24, D23, D25, D29, D26, D27, D28
......3	203-4148	DIODE,1N4148	33	D2, D4, D6, D8, D10, D12, D19, D21, D32, D34, D35, D38, D41, D44, D45, D49, D50, D51, D53, D54, D55, D56, D47, D48, D57, D58, D59, D60, D61, D62, D63, D64, D46
......3	210-0106	TSTR,VP0106N3,DMOSFET	9	Q38, Q39, Q44, Q45, Q40, Q41, Q42, Q43, Q52
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	2	Q53, Q54

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	210-7000	TSTR,2N7000,MOSFET	47	Q12, Q7, Q8, Q16, Q4, Q15, Q14, Q2, Q1, Q17, Q19, Q18, Q6, Q3, Q11, Q5, Q13, Q9, Q10, Q22, Q23, Q24, Q20, Q21, Q36, Q35, Q37, Q25, Q27, Q34, Q28, Q29, Q33, Q31, Q32, Q30, Q26, Q51, Q47, Q48, Q46, Q50, Q49, Q57, Q58, Q59, Q56
......3	211-3904	TSTR,2N3904	1	Q55
......3	220-0317	VR,LM317LZ TO92	1	U70
......3	220-0801	IC,DAC-08 D/A CONVERTER,8-BIT	2	U42, U43
......3	220-4025	IC,MC14025B TRIPLE 3-INPUT NOR	1	U24
......3	220-4043	IC,MC14043BP RS LATCH	3	U48, U49, U67
......3	220-4051	IC,4051 CMOS 8-BIT ANLG MPX	1	U39
......3	220-4053	IC,MC14053B ANLG MPX	1	U41
......3	221-0074	AMP,OP,BIFET TLO74CW	3	U40, U63, U64,
......3	221-0339	IC,LM339A,VOLT COMPARATOR	4	U44, U61, U65, U66
......3	225-0005	IC,CD4071BE,RCA	4	U13, U45, U50, U62
......3	225-0006	IC,CD4075BE,RCA	5	U37, U12, U21, U19, U69
......3	225-0007	IC,CD4078BE,RCA	1	U55
......3	225-0008	IC,CD4081BE	5	U20, U36, U51, U47, U71
......3	226-1051	RES NET,10K,8-PIN SIP	4	RN1, RN2, RN5, RN8
......3	226-1060	RES NET,100K,10-PIN SIP	4	RN3, RN4, RN6, RN7
......3	228-4001	IC, QUAD 2-INPUT NOR	2	U23, U52
......3	228-4011	IC,MC14011B CD4011 BE	2	U16, U60
......3	228-4020	IC,14 STAGE COUNTER 4020	2	U26, U58
......3	228-4028	IC,MC14028B	1	U18
......3	228-4069	IC,CD4069CN	3	U25, U46, U54
......3	228-4073	IC,MC14073B	2	U22, U38
......3	228-4076	IC,MC14076 QUAD REGISTER	2	U15, U17
......3	228-4512	IC,MC14512B	1	U27
......3	228-4516	IC,MC14516B	4	U30, U31, U34, U35
......3	228-4532	IC,MC14532B 8-BIT PRIOR ENCOD	2	U14, U28
......3	228-4538	IC,MC14538B NATL SEMICONDUCTOR	3	U57, U59, U68
......3	229-0033	IC,OPTOIS,4N33	15	U7, U6, U2, U1, U5, U4, U3, U8, U9, U10, U11, U33, U32, U53, U56
......3	229-0336	IC,VOLT REF DIODE LM336Z-2.5	1	U29

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	320-0030	MOUNT,LED,R ANGLE,BIVAR	3	XDS1, XDS2, XDS3
......3	323-9224	IND,LED,GRN,521-9270	2	DS1, DS2
......3	323-9225	IND,LED,YEL	1	DS3
......3	340-0002	SW,4 POS,SPST,8-PIN DIP	3	S1, S2, S3
......3	340-0004	SW,JUMPER PROGRAMMABLE	16	P1, P2, P3, P4, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19
......3	340-0060	SW,TGL DPDT	1	S4
......3	343-6330	SW,PB MON CK8121A 78-25	1	S5
......3	343-6331	SW CAP,MED RED	1	XS5
......3	400-2175	GROMMET,FOR 1/2	2	
......3	413-1597	TERM,TURRET,2 SHLDR,.219,GOLD FLASH	7	E10, TP7, TP8, TP9, TP10, TP11, TP12
......3	417-0003	CONN,HEADER 3 PIN	3	J1, J2, J3
......3	417-0004	JACK,TEST,RIGHT ANGLE PC MT	6	TP1, TP2, TP3, TP4, TP5, TP6
......3	417-0147	RCPT,50P 2 ROW	1	P301
......3	417-0188	CONN,80PIN FEM,DBL ROW,PCB MT	1	P302
......3	417-0600	SKT,IC 6 PIN	15	XU7, XU6, XU2, XU1, XU5, XU4, XU3, XU8, XU9, XU10, XU11, XU33, XU32, XU53, XU56
......3	417-1404	SOCKET,14-PIN DIP	32	XU13, XU45, XU50, XU60, XU22, XU38, XU24, XU37, XU12, XU21, XU19, XU25, XU46, XU54, XU16, XU62, XU20, XU36, XU51, XU47, XU23, XU52, XU44, XU61, XU65, XU66, XU40, XU63, XU64, XU55, XU69, XU71
......3	417-1604	SKT,16-PIN,DIP	22	XU15, XU17, XU14, XU28, XU18, XU30, XU31, XU34, XU35, XU39, XU42, XU43, XU26, XU48, XU49, XU67, XU41, XU27, XU57, XU58, XU59, XU68
......3	417-4004	CONN,HEADER,2 PIN	17	J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20,
......3	517-0205	PCB MACH,ECU CONTROLLER,AM-1	1	
....2	917-0208	ASSY,PCB ECU EXTENDER AM-1	1	
......3	417-0147	RCPT,50P 2 ROW	1	
......3	417-0152	HEADER,50PIN R.ANGLE	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	417-0188	CONN,80PIN FEM,DBL ROW,PCB MT	1	
......3	417-8001	HEADER,80-PIN R. ANGLE	1	
......3	420-8706	SCREW,8-32X.375,BRASS THUMB	1	
......3	471-0849	SUPPORT,EXT CARD,ECU,AM XMTR	1	
......3	517-0208	PCB MACH,ECU EXTENDER AM-1	1	
....2	917-0300	ASSY PCB,ECU EXCITER,AM,A/E SERIES	1	
......3	000-6814	CAP,DISC,68pF,5%,N1500	1	C110
......3	001-5613	CAP,MONO CER,56PF,200V,10%	1	C107
......3	003-1013	CAP,MONO CER,.01uF,100V,5%	3	C42, C46, C50
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	73	C3, C4, C5, C8, C12, C15, C18, C19, C20, C23, C27, C30, C31, C33, C35, C37, C38, C39, C41, C45, C49, C53, C55, C56, C63, C64, C65, C66, C67, C76, C79, C80, C81, C85, C88, C90, C91, C92, C101, C102, C104, C111, C115, C116, C117, C119, C120, C122, C123, C124, C126, C127, C128, C129, C131, C135, C136, C139, C157, C
......3	003-1523	CAP,MONO CER,.0015uF,100V,5%	3	C112, C113, C173
......3	003-4723	CAP,MONO CER,.0047uF,100V,5%	3	C98, C103, C156
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	4	C82, C158, C159, C166
......3	020-1064	CAP,LYTIC,1uF,5OV,NP,STDUP	6	C83, C89, C125, C167, C171, C172
......3	020-2264	CAP,LYTIC,2.2UF,50V,NP,STDUP	1	C174
......3	020-3374	CAP,LYTIC,33UF,25V,NP	2	C146, C13
......3	023-1075	CAP,LYTIC,10UF,50V NP STDUP	4	C1, C2, C16, C17
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	10	C32, C54, C61, C62, C69, C70, C93, C118, C121, C140
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	2	C71, C72
......3	024-2274	CAP,LYTIC,22UF,100V,STDUP	5	C34, C36, C94, C105, C106
......3	030-1051	CAP,POLY METAL,.1OuF,100V,1%	8	C147, C148, C149, C150, C151, C152, C153, C154
......3	030-4743	CAP,POLYESTER FILM,.047UF,100V,RAD	1	C84
......3	031-1043	CAP,MYLAR FILM,.01UF,100V,RAD	2	C99, C114
......3	031-2033	CAP,MYLAR FILM,.0022uF,100V,10%	3	C57, C58, C60
......3	038-4753	CAP,PYST,.47UF,100V	2	C96, C97

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	040-1022	CAP,MICA,100PF,500V,RAD	4	C43, C47, C51, C132
......3	040-1522	CAP,MICA,150PF,500V,RAD	8	C7, C11, C22, C26, C59, C109, C177, C178
......3	040-2213	CAP,MICA,22PF,500V	2	C160, C162
......3	040-4713	CAP,MICA,47PF,500V,5%	3	C44, C48, C52
......3	040-6813	CAP,MICA,68PF,500V,5%	1	C130
......3	041-1031	CAP,MICA,1000PF,100V,1%	10	C6, C10, C14, C21, C25, C29, C68, C73, C74, C77
......3	042-2521	CAP,MICA,250PF,500V,1%	1	C78
......3	042-3312	CAP,MICA,33PF,500V,5%	5	C40, C133, C134, C137, C145
......3	042-3922	CAP,MICA,390PF,100V,5%	1	C75
......3	042-5021	CAP,MICA,500PF,500V,1%	3	C9, C24, C100
......3	096-0009	CAP,TRMR,2-27PF	1	C108
......3	100-1031	RES,100 OHM,1/4W,1%,METAL	7	R15, R30, R94, R137, R151, R163, R195
......3	100-1041	RES,1K OHM,1/4W,1%	13	R72, R80, R81, R129, R145, R148, R155, R162, R164, R166, R180, R202, R229
......3	100-1051	RES,10K OHM,1/4W,1%	31	R35, R52, R53, R54, R68, R85, R116, R117, R135, R138, R139, R140, R152, R92, R93, R188, R10, R11, R12, R25, R26, R27, R199, R181, R191, R210, R211, R213, R214, R216, R218
......3	100-1083	RES,10MEG OHM,1/4W,5%	1	R201
......3	100-1231	RES,121 OHM,1/4W,1%	4	R70, R119, R156, R196
......3	100-1551	RES,15K OHM,1/4W,1%	4	R14, R29, R169, R171
......3	100-2273	RES,2.2MEG OHM,1/4W,5%	4	R64, R66, R136, R142
......3	100-3951	RES,39.2K OHM,1/4W,1%	2	R38, R39
......3	100-4561	RES,453K OHM,1/4W,1%	2	R74, R154
......3	100-5673	RES,5.6MEG OHM,1/4W,5%	1	R91
......3	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	1	R215
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	8	R65, R67, R82, R83, R113, R130, R114, R69

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	18	R1, R3, R16, R18, R34, R36, R37, R58, R59, R60, R61, R112, R118, R134, R168, R212, R122, R123
......3	103-1136	RES,113K OHM,1/4W,1%,METAL	4	R192, R193, R194, R185
......3	103-1244	RES,1.24K OHM,1/4W,1%,METAL	3	R32, R33, R160
......3	103-1331	RES,1.33K OHM,1/4W,1%,METAL	1	R79
......3	103-1825	RES,18.2K OHM,1/4W,1%,METAL	1	R187
......3	103-2051	RES,20K OHM,1/4W,1%,METAL	1	R42
......3	103-2104	RES,2.10K OHM,1/4W,1%,METAL	1	R190
......3	103-2211	RES,22.1K OHM,1/4W,1%,METAL	1	R78
......3	103-2212	RES,22.1 OHM,1/4W,1%,METAL	25	R172, R173, R174, R175, R176, R177, R178, R179, R203, R204, R205, R206, R207, R208, R209, R219, R220, R221, R222, R223, R224, R225, R226, R227, R228
......3	103-2213	RES,221 OHM,1/4W,1%,METAL	6	R31, R40, R132, R146, R143, R158
......3	103-2216	RES,221K OHM,1/4W,1%,METAL	4	R2, R4, R17, R19
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	4	R75, R165, R167, R200
......3	103-2490	RES,24.9 OHM,1/4W,1%,METAL	1	R147
......3	103-2495	RES,24.9K OHM,1/4W,1%,METAL	2	R124, R125
......3	103-2675	RES,26.7K OHM,1/4W,1%,METAL	7	R8, R9, R23, R24, R101, R102, R133
......3	103-2941	RES,2.94K OHM,1/4W,1%,METAL	1	R197
......3	103-3245	RES,32.4K OHM,1/4W,1%,METAL	1	R63
......3	103-3403	RES,340 OHM,1/4W,1%	3	R43, R46, R49
......3	103-3405	RES,34K OHM,1/4W,1%,METAL	3	R77, R99, R115
......3	103-3631	RES,365 OHM,1/4W,1%,METAL	1	R120
......3	103-3841	RES,3.83K OHM,1/4W,1%,METAL	4	R141, R144, R153, R161
......3	103-4325	RES,43.2K OHM,1/4W,1%,METAL	6	R44, R45, R47, R48, R50, R51
......3	103-4645	RES,46.4K OHM,1/4W,1%,METAL	1	R184
......3	103-4741	RES,4.75K OHM,1/4W,1%,METAL	4	R149, R131, R150, R186
......3	103-4755	RES,47.5K OHM,1/4W,1%,METAL	1	R73
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	2	R55, R121
......3	103-6655	RES,66.5K OHM,1/4W,1%,METAL	2	R100, R56
......3	103-6815	RES,68.1K,1/4W,1%,METAL	1	R182
......3	103-7541	RES,7.50K OHM,1/4W,1%,METAL	4	R126, R127, R128, R183
......3	103-8453	RES,845 OHM,1/4W,1%,METAL	3	R71, R157, R84
......3	103-8454	RES,8.45K OHM,1/4W,1%,METAL	2	R89, R90
......3	103-9041	RES,9.09K OHM,1/4W,1%,METAL	3	R86, R87, R88

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	177-1054	RES,TRMR,10K,VERT ADJ	1	R62
......3	177-2044	RES,TRMR,2K,VERT ADJ	1	R159
......3	178-1044	RES,TRMR,1K OHM	3	R76, R189, R198
......3	178-2044	RES,TRMR,2K,HORZ ADJ	1	R217
......3	178-2054	RES,TRMR,20K	2	R41, R170
......3	178-5045	RES,TRMR,5K,20T,VERT	1	R231
......3	179-2043	RES,TRMR,2K,15 TURN 3006	1	R230
......3	200-0009	DIODE,ZENER,1N 4739A	1	D68
......3	200-0012	DIODE,ZENER,1N5243,13V,5%,500mW	10	D7, D9, D11, D13, D15, D17, D19, D21, D48, D50
......3	200-4732	DIODE,ZENER,1N4732A	1	D69
......3	201-2800	DIODE,HOT CARRIER	2	D4, D5
......3	203-4005	DIODE,1N4005	1	D23
......3	203-4148	DIODE,1N4148	42	D1, D2, D24, D25, D26, D27, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D22, D29, D46, D51, D52, D53, D54, D55, D56, D57, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67
......3	210-0511	TSTR,IRF511,POWER MOSFET	10	Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	1	Q5
......3	210-7000	TSTR,2N7000,MOSFET	3	Q6, Q7, Q23
......3	211-3904	TSTR,2N3904	2	Q3, Q4
......3	212-0310	TSTR,FET N CHAN RF J3100	1	Q8
......3	220-0212	IC,DG212CJ,QUAD SPST SWITCH	1	U7
......3	220-0311	IC,LT311 LINEAR	2	U27, U43
......3	220-0317	VR,LM317LZ TO92	3	U13, U24, U37
......3	220-2123	IC,74LS123 DUAL MONOSTABLE	1	U28
......3	220-4040	IC,MC14040B 12-BIT BINARY	1	U34
......3	220-4060	IC,MC14060B 14-BIT COUNTER	1	U44
......3	220-4106	IC,MC74HC14 HEX SCHMITT TRIGGR	1	U33
......3	220-4240	IC,74C24ON,INVERTING TRI STATE	3	U19, U20, U45
......3	220-4526	IC,MC14526 4-BIT COUNTER	1	U10
......3	220-5151	IC,MC145151 SYNTHESIZER	1	U25
......3	221-0072	AMP,OP,BIFET TLO72CP	13	U1, U2, U4, U5, U3, U6, U8, U9, U14, U15, U16, U17, U41
......3	221-0319	IC,LM319N,COMPARATOR	2	U22, U47
......3	221-0358	AMP,DUAL OP,LM358	1	U26
......3	221-4002	IC,74HC4002N,DUAL 4-INPUT NOR	1	U31

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	221-4022	IC,74HC4022,OCTAL COUNTER (NOTE)	1	U29
......3	221-4132	IC,74HC132N QUAD SCHMITT NAND	4	U30, U32, U38, U39
......3	221-5534	IC,NE-5534AN	1	U12
......3	221-7474	IC,74HC74N DUAL D FLIP FLOP	1	U42
......3	221-7475	IC,74HC75N,QUAD D LATCH	1	U40
......3	226-0392	RES NETWORK, 10K	2	R5, R20
......3	227-2110	DRIVER HIGH AND LOW SIDE,IR2110	1	U46
......3	228-4013	IC,MC14013B	2	U11, U36
......3	228-4069	IC,CD4069CN	1	U21
......3	228-4073	IC,MC14073B	1	U35
......3	228-4538	IC,MC14538B NATL SEMICONDUCTOR	1	U23
......3	320-0030	MOUNT,LED,R ANGLE,BIVAR	5	
......3	323-9224	IND,LED,GRN,521-9270	5	DS1, DS2, DS3, DS4, DS5
......3	340-0002	SW,4 POS,SPST,8-PIN DIP	1	S1
......3	340-0003	SW,8 POS DIP,SPST	1	S2
......3	340-0004	SW,JUMPER PROGRAMMABLE	18	P4, P5, P6A, P6B, P7, P12A, P12B, P13A, P13B, P14, P15, P16, P17, P18, P19, P20, P21, P22
......3	360-0049	COIL,22UH TORROID	4	L1, L2, L3, L4
........4	360-0023	FERRITE CORE,TOROID .375X .187	1	
........4	555-0049	LABOR ONLY 360-0049	1	
........4	640-3000	WIRE,AWG 30 EN MAGNET GRN	0.001	
......3	360-0093	COIL,MOLDED,SHIELDED,56UH	1	L5
......3	364-2200	COIL, MOLDED 2.2UH	1	L6
......3	400-2175	GROMMET,FOR 1/2	2	
......3	413-0106	TERM,TEST POINT,OVAL,RED	23	E1, E2, E3, E4, TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19
......3	417-0003	CONN,HEADER 3 PIN	5	J4, J5, J7, J21, J22
......3	417-0071-001	JACK,PC .040PIN 1414 KEYSTONE	4	J8, J9, J10, J11
......3	417-0188	CONN,80PIN FEM,DBL ROW,PCB MT	1	P101
......3	417-0200	CONN,HEADER 20 PIN	0.7	J6, J12, J13
......3	417-0804	SOCKET,8-PIN DIP,BURNDY	17	XU1, XU2, XU3, XU4, XU5, XU6, XU8, XU9, XU12, XU14, XU15, XU16, XU17, XU26, XU27, XU41, XU43

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	417-1404	SOCKET,14-PIN DIP	14	XU11, XU21, XU22, XU30, XU31, XU32, XU33, XU35, XU36, XU38, XU39, XU42, XU46, XU47
......3	417-1604	SKT,16-PIN,DIP	8	XU7, XU10, XU23, XU28, XU34, XU40, XU29, XU44
......3	417-2004	SOCKET,20-PIN,DIP,HIGH RELIABILITY	3	XU19, XU20, XU45
......3	417-2804	SOCKET,IC 28-PIN,DIP,HI RELIABILITY	1	XU25
......3	417-4004	CONN,HEADER,2 PIN	7	J14, J15, J16, J17, J18, J19, J20
......3	421-1113	RIV,CLOSED-END .125 X .316L	4	
......3	474-0165	PLATE,SHIELD VCO	1	
......3	517-0300	PCB MACH,ECU EXCITER,AM-1A (scan)	1	
......3	917-0069	ASSY PCB.VCO MODL	1	
........4	003-1013	CAP,MONO CER,.01uF,100V,5%	2	C1, C2
........4	003-1054	CAP,CER,MNLY,.1uF,50V,20%	2	C3, C5
........4	040-5013	CAP,MICA,50PF,500V,5%	1	C4
........4	100-1031	RES,100 OHM,1/4W,1%,METAL	2	R2, R5
........4	103-1062	RES,100K OHM,1/4W,1%,METAL	1	R4
........4	103-4753	RES,475 OHM,1/4W,1%,METAL	2	R3, R6
........4	103-6193	RES,619 OHM,1/4W,1%,METAL	1	R1
........4	200-0115	DIODE,MVAM115 AM TUNING	1	D1
........4	203-4148	DIODE,1N4148	2	D2, D3
........4	212-0310	TSTR,FET N CHAN RF J3100	2	Q1, Q2,
........4	360-0023	FERRITE CORE,TOROID .375X .187	1	
........4	417-0119	PIN,.040 1218 KEYSTONE	4	P32, P33, P34, P35
........4	420-6103	SCREW,6-32X.187,S.S. PH	1	
........4	420-6104	SCREW,6-32X.250,S.S. PH	1	
........4	423-6003	#6 LOCK INT TOOTH	1	
........4	441-0013	STOFF,BRASS 1/4 RNDX 35850P	1	
........4	471-0479-001	COVER,VCO MODIFIED	1	
........4	517-0069	PCB,BLANK VCO MODL	1	
........4	640-2600	WIRE,AWG 26,MAGNET,RED	0.004	
........4	700-0027	POTTING COMPOUND	0.033	
....2	917-0301	ASSY PCB,ECU MOTHERBOARD,AM,A/E SERIES	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	95	C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C61, C62, C63, C64, C65, C67, C68, C69, C70, C71, C72, C73, C74
......3	003-1523	CAP,MONO CER,.0015uF,100V,5%	4	C3, C4, C7, C8
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	1	C66
......3	030-1532	CAP,POLY FILM,.015uF,100V,10%	3	C88, C89, C90
......3	040-2223	CAP,MICA,220PF,500V,RAD	4	C1, C2, C5, C6
......3	040-6824	CAP,MICA,680PF,300V,5%	2	C86, C87
......3	100-1051	RES,10K OHM,1/4W,1%	1	R55
......3	100-6031	RES,604 OHM,1/4W,1%	2	R5, R10
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	13	R74, R76, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95
......3	103-1156	RES,1.15K OHM,1/4W,1%,METAL	37	R15, R16, R17, R18, R23, R24, R25, R26, R27, R28, R35, R36, R37, R38, R39, R40, R47, R48, R49, R50, R51, R56, R57, R60, R61, R62, R1, R4, R6, R9, R78, R79, R80, R81, R82, R83, R84
......3	103-2003	RES,200 OHM,1/4W,1%,METAL	1	R58
......3	103-3924	RES,3.92K OHM,1/4W,1%,METAL	2	R63, R64
......3	103-4423	RES,442 OHM,1/4W,1%,METAL	8	R2, R3, R7, R8, R53, R54, R59, R75

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	25	R19, R20, R21, R22, R29, R30, R31, R32, R33, R34, R41, R42, R43, R44, R45, R46, R66, R67, R68, R69, R70, R71, R72, R77, R96
......3	120-4723	RES,47 OHM,1W,5%	2	R65, R73
......3	203-4005	DIODE,1N4005	1	D1
......3	340-0004	SW,JUMPER PROGRAMMABLE	1	P12
......3	360-0047	CHOKE, 910UH, 5%	2	L5, L6
......3	360-0093	COIL,MOLDED,SHIELDED,56UH	4	L1, L2, L3, L4
......3	412-3000	BARR STP,30 POS,BEAU61-5-30-50	2	TB1, TB2
......3	417-0203	CONN,BNC FLANGED PNL MT UG-290	1	J11
......3	417-0254	CONN,HEADER 80P 2 ROW	2	J101, J302
......3	417-0255	CONN,HEADER 50P 2 ROW 102567-6	2	J201, J301
......3	417-0677	CONN,PCB MT,6PIN MALE	1	J7
......3	417-2600	CONN,HEADER,26PIN	2	J9, J10
......3	417-4004	CONN,HEADER,2 PIN	1	J12
......3	417-4040	CONNECTOR, HEADER STRAIGHT POST	1	J8
......3	418-2500	CONN,25PIN,D TYPE TO PC,ANGLE MT	3	P4, P5, P6
......3	420-0300	SCREW,3-56X.187,S.S. PHH	4	
......3	420-4105	SCREW,4-40X.312,S.S. PH	6	
......3	420-4108	SCREW,4-40X.500,S.S. PH	4	
......3	423-3003	WASHER,#3 SPLIT,SST	4	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	10	
......3	423-4002	#4 LOCK S.S. SPLIT	10	
......3	426-4003	NUT,PEM 4-40 KFS2-440	10	
......3	426-4008	STOFF,PEM 4-40 KFSE-440-12	3	
......3	517-0301	PCB MACH,ECU MOTHERBOARD,AM-1(scan)	1	
......3	601-0022	WIRE,AWG22,BUSS	0.001	
......3	693-0220	TUB,TEFLON,TW,AWG22 NTL	0.001	
....2	917-0306-001	ASSY PCB,ECU DISPLAY/CNTL SW,AM,A/E SERIES	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	25	C1, C2, C3, C4, C5, C8, C11, C13, C16, C17, C18, C19, C20, C23, C29, C38, C39, C6, C7, C9, C10, C14, C15, C21, C22
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	4	C24, C25, C33, C37
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	3	C30, C31, C32
......3	024-1064	CAP,LYTIC,1UF,50V,RAD	1	C12
......3	024-3335	CAP,LYTIC,33UF,35V,LOW LEAK	4	C26, C27, C34, C36
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	6	C28, C35, C40, C41, C42, C43

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	100-1041	RES,1K OHM,1/4W,1%	27	R11, R20, R59, R60, R61, R65, R64, R66, R69, R70, R71, R83, R84, R85, R88, R89, R90, R93, R94, R95, R103, R49, R52, R53, R56, R30, R32
......3	100-1051	RES,10K OHM,1/4W,1%	14	R15, R24, R50, R51, R54, R55, R16, R26, R28, R40, R46, R38, R44, R78
......3	100-1083	RES,10MEG OHM,1/4W,5%	2	R39, R45
......3	100-1231	RES,121 OHM,1/4W,1%	1	R74
......3	100-1551	RES,15K OHM,1/4W,1%	2	R73, R80
......3	100-1731	RES,174 OHM,1/4W,1%	1	R113
......3	100-2283	RES,22MEG OHM,1/4W,5%	2	R12, R21
......3	100-6031	RES,604 OHM,1/4W,1%	1	R75
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	13	R1, R2, R5, R8, R27, R29, R31, R37, R43, R6, R104, R105, R3
......3	103-1105	RES,11K OHM,1/4W,1%,METAL	2	R4, R7
......3	103-1214	RES,1.21K OHM,1/4W,1%,METAL	6	R58, R63, R68, R82, R87, R92
......3	103-2211	RES,22.1K OHM,1/4W,1%,METAL	2	R13, R22
......3	103-2216	RES,221K OHM,1/4W,1%,METAL	2	R14, R23
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	4	R17, R25, R41, R47
......3	103-2431	RES,243 OHM,1/4W,1%,METAL	20	R33, R34, R35, R36, R76, R77, R96, R97, R98, R99, R100, R101, R102, R106, R107, R108, R109, R110, R111, R112
......3	103-2435	RES,24.3K OHM,1/4W,1%,METAL	2	R9, R18
......3	103-4993	RES,499 OHM,1/4W,1%,METAL	6	R57, R62, R67, R81, R86, R91
......3	103-8253	RES,825 OHM,1/4W,1%,METAL	3	R10, R19, R114
......3	103-8255	RES,82.5K OHM,1/4W,1%,METAL	2	R72, R79
......3	175-1034	RES,TRMR,1K,VERT ADJ	2	R42, R48
......3	200-4733	DIODE,ZENER,1N4733A, 5%	6	D12, D13, D14, D17, D18, D19
......3	203-4005	DIODE,1N4005	4	D10, D11, D15, D16
......3	203-4148	DIODE,1N4148	11	D1, D2, D3, D4, D5, D6, D7, D8, D9, D20, D21
......3	210-0271	TSTR,FET J271	2	Q1, Q2
......3	210-7000	TSTR,2N7000,MOSFET	4	Q3, Q4, Q5, Q6

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	211-3904	TSTR,2N3904	1	Q7
......3	220-0212	IC,DG212CJ,QUAD SPST SWITCH	2	U1, U7
......3	221-0072	AMP,OP,BIFET TLO72CP	1	U6
......3	221-0074	AMP,OP,BIFET TLO74CW	2	U3, U8
......3	221-4227	AMP,DUAL OP	1	U2
......3	227-0317	VR,LM317T,LM317KC	1	U14
......3	228-4013	IC,MC14013B	1	U5
......3	228-4584	IC,MC14584 14-PIN SCHMITT TRIG	1	U4
......3	229-0555	IC,TIMER,NE555N	2	U12, U13
......3	229-3914	DRIVER,DOT/BAR DISPLAY LM3914N	6	U9, U10, U11, U15, U16, U17
......3	320-0031	LED,TRI-COLOR COMMON CATHODE	4	DS22, DS23, DS24, DS25
......3	320-4164	LED ARRAY,GRN,10 BAR	4	DS8, DS9, DS11, DS12
......3	320-7164	LED ARRAY RED MV57164 INTEN G OR H	2	DS7, DS10
......3	323-9217	IND,LED,RED 521-9240	2	DS15, DS16
......3	323-9224	IND,LED,GRN,521-9270	4	DS13, DS14, DS19, DS20
......3	323-9225	IND,LED,YEL	4	DS1, DS2, DS17, DS18
......3	340-0030	SW,SPDT,MOM MP SER,1 RED	2	S3, S11
......3	340-0130	SW,SPDT,MOM MP SER,2 GRN,C&K	2	S1, S2
......3	340-0161	SW,SPDT,MOM MP SER,1 GREEN	5	S6, S7, S8, S9, S10
......3	340-0162	SW,SPDT,MOM MP SER,1 YELLOW	2	S4, S5
......3	407-0074	SPR,LED .25 ODX.147 1D X.22L	10	
......3	417-0804	SOCKET,8-PIN DIP,BURNDY	4	XU2, XU6, XU12, XU13
......3	417-1404	SOCKET,14-PIN DIP	4	XU3, XU4, XU5, XU8
......3	417-1604	SKT,16-PIN,DIP	2	XU1, XU7
......3	417-1804	SOCKET,18-PIN,DIP,HIGH RELIABILITY	6	XU9, XU10, XU11, XU15, XU16, XU17
......3	417-2600	CONN,HEADER,26PIN	1	J1
......3	417-4040	CONNECTOR, HEADER STRAIGHT POST	1	J2
......3	517-0306-001	PCB MACH,ECU DISPLAY/CNTL SW,(scan)	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.38	
....2	917-0306-005	ASSY PCB,METER SWITCH,AM,A/E SERIES	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	1	C501
......3	103-1624	RES,1.62K OHM,1/4W,1%,METAL	2	R509, R510
......3	103-2744	RES,2.74K OHM,1/4W,1%,METAL	1	R508
......3	103-3014	RES,3.01K OHM,1/4W,1%,METAL	2	R504, R507
......3	178-2044	RES,TRMR,2K,HORZ ADJ	2	R503, R506
......3	178-5030	RES,TRMR,500 OHM,HORZ ADJ	2	R501, R505
......3	178-5054	RES,TRMR,50K,HORZ ADJ	1	R511
......3	200-4733	DIODE,ZENER,1N4733A, 5%	1	D501
......3	340-0134	SW,ROTARY 3 POS 2 POLE	2	S501, S502
......3	417-0677	CONN,PCB MT,6PIN MALE	1	J501
......3	418-0255	CONN,MALE,4PIN	1	J502
......3	517-0306-005	PCB MACH,METER SWITCH,AM-1A	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.07	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	947-0153	ASSY,HRNS,ECU,AM-1 (SBCM)	1	
......3	410-1416	LUG,TERM,BENT,11/16	1	
......3	410-1553	LUG,TERM #10 RING CRIMP 16-22	4	
......3	410-2478	CRIMP TERMINAL,AMP 640707-1	6	
......3	417-0053	SKT,CONN 641294-1 AMP	10	
......3	417-0306	HSNG,3 POS,SL-156	1	P1
......3	417-0606	HSNG,6 POS,SL-156	1	P2
......3	418-0240	PLUG,FEM,4PIN	1	P502
......3	418-0670	HOUSING,CONN,6PIN FEM	1	P7
......3	418-2600	CONN,26-PIN,RIBBON	4	P1, P10, P3, P801
......3	418-4001	CONN,RIBBON CBL,40COND	2	
......3	600-0026	CBL,FLAT,26-COND,28GA	2.125	
......3	600-0040	CBL,40COND,28GA,100 ANSLEY	2.125	
......3	601-1800	WIRE,AWG18 19/30 BLK	12.5	
......3	693-0002	SLVG,1/4 EXPANDO FR BLACK"	0.88	
..1	957-0010-101	ASSY, POWER MODULE, AMA'S/AME'S XMTR (note)	4	
....2	420-0108	SCREW,10-32X.500,S.S. PHH	2	
....2	420-6106	SCREW,6-32X.375,S.S. PH	20	
....2	421-6008	6-32 KEP NUT	6	
....2	421-8002	8-32 HEX NUT, BRASS	12	
....2	423-0002	#10 LOCK SPLIT	2	
....2	423-6002	#6 LOCK SPLIT	20	
....2	423-8005	#8 LOCK SPLIT	12	
....2	441-0013	STOFF,BRASS 1/4 RNDX 35850P	1	
....2	441-0062	STOFF,BRASS 1/4HEX X 25850P	4	
....2	441-0175	STOFF,#6X2.62,MF,3/8 L EXT THD	4	
....2	471-0831	SUPPORT,PCB,POWER MOD,AM XMTR	3	
....2	471-5061-100	PANEL,FRONT,POWER MOD,AM	1	
......3	471-5061-009	PANEL,FRONT,POWER MOD,(UNSCREENED)	1	
....2	486-2285	HANDLE,OVAL,BLK,10-32 X 4	1	
....2	917-0302-100	ASSY, PCB, MODULATOR, AM XMTR	1	
......3	200-1620	DIODE,FAST RECOVERY,16JPF20	2	D2, D3
......3	210-9020	FET, MODULATOR, 200V, 94A	2	Q1, Q2
......3	420-4108	SCREW,4-40X.500,S.S. PH	4	
......3	420-6104	SCREW,6-32X.250,S.S. PH	2	
......3	420-6105	SCREW,6-32X.312,S.S. PH	4	
......3	420-8121	SCREW,8-32X.375,BR PH	6	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	4	
......3	423-4002	#4 LOCK S.S. SPLIT	4	
......3	423-6002	#6 LOCK SPLIT	16	
......3	423-8005	#8 LOCK SPLIT	6	
......3	423-8006	#8 LOCK INT TOOTH	6	
......3	441-0012	STOFF,#6-32 MALE-FEMALE 1/4	6	
......3	441-0184	STOFF,6-32,MALE-FEMALE,3/8	4	
......3	441-7982	STOFF,#8x.750,.375 HEX,BRASS W ZINC	6	
......3	455-8000-001	HEATSINK,2 INCH,A" VERSION AM"	2	
......3	580-126	Buss Wire, 18AWG Solid Tinned Copper	0.4	
......3	611-3750	TUB,HT SHK,3/8	0.17	
......3	917-0302-102	ASSY, PCB, MODULATOR, COMPONENT LEVEL AM XMTR	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	003-1041	CAP,CER,MNLY,.1UF,100V,10%	13	C33, C2, C4, C11, C12, C17, C20, C26, C38, C39, C27, C46, C47
........4	020-3374	CAP,LYTIC,33UF,25V,NP	1	C41
........4	020-4773	CAP,LYTIC,47UF,35V,STDUP	1	C34
........4	023-1076	CAP,LYTIC,10uF,50V,STDUP	12	C1, C18, C19, C35, C24, C29, C30, C31, C32, C40, C22, C28
........4	024-2274	CAP,LYTIC,22UF,100V,STDUP	3	C3, C23, C25
........4	030-1033	CAP,CER MOLDED,.001UF,200V,10%	3	C21, C36, C37
........4	030-1530	CAP,POLY,1.5UF,400V,10%	2	C13, C14
........4	030-2256	CAP,POLY,2.2uF,400V	1	C42
........4	030-3353	CAP,POLY FILM,.033UF,200V,10%	4	C44, C50, C51, C53
........4	030-4752	CAP., .47UF, 250V, 10%, POLY	1	C15
........4	030-6843	CAP,POLY METAL,.068uF,250V,10%	2	C48, C52
........4	031-1043	CAP,MYLAR FILM,.01UF,100V,RAD	2	C16, C54
........4	033-4743	CAP,POLY FILM,.47UF,250V,OVAL	3	C6, C9, C43
........4	042-8222	CAP,MICA,820PF,500V,5%	1	C45
........4	046-0002	CAP,MICA,1000PF,350V,10%	2	C7, C10
........4	100-1013	RES,1 OHM,1/4W,5%	1	R4
........4	100-1031	RES,100 OHM,1/4W,1%,METAL	2	R54, R55
........4	100-1041	RES,1K OHM,1/4W,1%	7	R14, R20, R26, R33, R40, R45, R39
........4	100-1051	RES,10K OHM,1/4W,1%	7	R18, R23, R30, R47, R48, R49, R5
........4	100-1231	RES,121 OHM,1/4W,1%	1	R34
........4	100-3373	RES,3.3MEG OHM,1/4W,5%	4	R8, R53, R56, R57
........4	100-4561	RES,453K OHM,1/4W,1%	2	R12, R58
........4	100-8641	RES,8.66K OHM,1/4W,1%	1	R42
........4	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	1	R46
........4	103-1021	RES,10 OHM,1/4W,1%,METAL	2	R9, R11
........4	103-1062	RES,100K OHM,1/4W,1%,METAL	2	R27, R41
........4	103-1306	RES,130K OHM,1/4W,1%,METAL	1	R13
........4	103-1331	RES,1.33K OHM,1/4W,1%,METAL	2	R1, R35
........4	103-1551	RES,15.4K OHM,1/4W,1%,METAL	1	R51
........4	103-2211	RES,22.1K OHM,1/4W,1%,METAL	1	R22
........4	103-2241	RES,2.21K OHM,1/4W,1%,METAL	3	R17, R25, R32
........4	103-3323	RES,332 OHM,1/4W,1%,METAL	1	R3
........4	103-3326	RES,332K OHM,1/4W,1%,METAL	3	R15, R24, R31
........4	103-3641	RES,3.65K OHM,1/4W,1%,METAL	3	R10, R19, R29
........4	103-4755	RES,47.5K OHM,1/4W,1%,METAL	1	R38
........4	103-4996	RES,499K OHM,1/4W,1%,METAL	1	R43
........4	103-6985	RES,69.8K OHM,1/4W,1%,METAL	2	R16, R28
........4	103-8254	RES,8.25K OHM,1/4W,1%,METAL	1	R44
........4	110-3923	RES,39 OHM,1/2W,5%	1	R52
........4	110-4733	RES,470 OHM,1/2W,5%	1	R2
........4	120-2753	RES,27K OHM,1W,5%	1	R21
........4	130-1253	RES,12K OHM,2W,5%	1	R7

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	200-0009	DIODE,ZENER,1N 4739A	2	D7, D17
........4	200-0019	DIODE,SCHOTTKY,20V,IA,IN5817	2	D24, D25
........4	200-4733	DIODE,ZENER,1N4733A, 5%	1	D1
........4	201-4728	DIODE,ZENER,1N4728	1	D18
........4	203-4005	DIODE,1N4005	7	D4, D6, D8, D9, D14, D15, D19
........4	203-4148	DIODE,1N4148	6	D5, D12, D13, D16, D20, D21
........4	206-6276	TRANSZORB DIODE,IN6276A 15V	1	D10
........4	220-4093	IC,MC14093B SCHMITT NAND	1	U6
........4	220-4421	IC,DRIVER,TC4421CAT 2A	1	U2
........4	220-6137	IC,OPTO-ISOLATOR,6N137	1	U1
........4	221-0339	IC,LM339A,VOLT COMPARATOR	1	U3
........4	226-2004	MC1416,ULN2004 7-DRLNGTNS DP16	1	U5
........4	227-0317	VR,LM317T,LM317KC	1	U10
........4	228-4044	IC, QUAD R-S LATCHES	1	U7
........4	228-4504	IC,HEX LEVEL SHIFTER,DUAL 16(NOTE)	1	U11
........4	229-0033	IC,OPTOIS,4N33	4	U4, U8, U9, U12
........4	230-0014	RECT,PWR SWITCHMODE,MUR460	1	D11
........4	270-1213	REL,SPST,30A	1	K1
........4	320-0030	MOUNT,LED,R ANGLE,BIVAR	4	
........4	323-9217	IND,LED,RED 521-9240	2	DS2, DS4
........4	323-9224	IND,LED,GRN,521-9270	2	DS1, DS3
........4	330-2000	FUSE,20A 250V	1	F1
........4	334-0100	FUSE,1A MDL SLO BLO 250V	1	F2
........4	340-0004	SW,JUMPER PROGRAMMABLE	4	P5, P6, P7, P8
........4	413-0106	TERM,TEST POINT,OVAL,RED	4	TP1, TP2, TP3, TP4
........4	415-2068	CLIP,FUSE,15AMP,LITTLEFUSE,102071	2	XF2
........4	415-2068-030	CLIP,FUSE,30AMP,LITTLEFUSE,122083	2	XF1
........4	417-0004	JACK,TEST,RIGHT ANGLE PC MT	2	TP5, TP6
........4	417-0374	CONN,15 PIN SUB-D,MALE7690	1	P2
........4	417-0600	SKT,IC 6 PIN	4	XU4, XU8, XU9, XU12
........4	417-0804	SOCKET,8-PIN DIP,BURNDY	1	XU1
........4	417-1404	SOCKET,14-PIN DIP	2	XU3, XU6
........4	417-1604	SKT,16-PIN,DIP	3	XU5, XU7, XU11
........4	417-4004	CONN,HEADER,2 PIN	4	J5, J6, J7, J8
........4	420-4104	SCREW,4-40X.250,S.S. PH	2	
........4	426-4003	NUT,PEM 4-40 KFS2-440	2	
........4	426-8008	STUD,PEM,KFH-832-5ET,PCB MOUNT	6	
........4	455-0071	HEATSINK,CLIP-ON,PCB MT,TO-220	1	
........4	517-0302-100	PCB, MACH, MODULATOR, AM1A	1	
........4	640-1001	WIRE, 10 GA, TIN PLATED	0.073	
......3	917-0302-103	ASSY, PCB, MODULATOR COIL, AM XMTR (SBCM)	1	
........4	360-0130	COIL, 18.3 UH, MOD PWM (SBCM)	2	
..........5	360-0080	BOBBIN,FERROX,4229F1D	1	
..........5	360-0081	CORE SET,Ferrite 160 (N)	1	
..........5	375-0302	TAPE,3/4W,72YD,#56 SCOTCH	1	
..........5	640-1200	WIRE,12GA,MAGNET	0.001	
..........5	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	0.083	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	360-0131	COIL, 2.8 UH, MOD PWM (SBCM)	1	
..........5	360-0080	BOBBIN,FERROX,4229F1D	1	
..........5	360-0081	CORE SET,Ferrite 160 (N)	1	
..........5	375-0302	TAPE,3/4W,72YD,#56 SCOTCH	1	
..........5	640-1000	WIRE,10GA,MAGNET	0.001	
..........5	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	0.083	
........4	360-0132	COIL, 7.5 UH, MOD PDWM (SBCM)	1	
..........5	360-0080	BOBBIN,FERROX,4229F1D	1	
..........5	360-0081	CORE SET,Ferrite 160 (N)	1	
..........5	375-0302	TAPE,3/4W,72YD,#56 SCOTCH	1	
..........5	640-1000	WIRE,10GA,MAGNET	0.001	
..........5	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	0.083	
........4	420-0521	SCREW,10-32X1-1/2,NYLON,RND HD	4	
........4	421-0901	#10 NYLON NUT	4	
........4	517-0302-103	BLANK PCB, AM COIL ASSEMBLY	1	
......3	917-0302-105	ASSY, PCB, MODULATOR CAP BOARD	2	
........4	013-3385-200	CAP,LYTIC,330UF,200V,20%,10000HRS,105° C,RAD	4	C1, C2, C3, C4
........4	111-0002	.02 OHM 3W CURRENT SENSE RES, SMT	1	R1
........4	517-0302-105	PCB, MACH, MODULATOR CAP BOARD	1	
........4	690-0221	TUB,BLK HEAT SHRINK 3/4	0.5	
....2	917-0304	ASSY PCB,POWER AMP,AM,A/E SERIES	2	
......3	002-1034	CAP,CER,DISC,.001UF,1000V	1	C26
......3	003-1041	CAP,CER,MNLY,.1UF,100V,10%	10	C29, C30, C3, C4, C5, C6, C31, C32, C12, C34
......3	003-1065	CAP,CER,MNLY,0.1UF,200V,10%	4	C1, C7, C27, C28
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	7	C11, C15, C8, C19, C20, C21, C2
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	3	C38, C39, C58
......3	015-1084	CAP,LYTIC,100UF,63V	1	C13
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	4	C25, C24, C33, C59
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	1	C10
......3	024-1064	CAP,LYTIC,1UF,50V,RAD	4	C40, C41, C42, C43
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	3	C16, C17, C18
......3	030-1043	CAP,CER MOLDED,.01uF,200V,RAD	1	C23
......3	042-3912	CAP,MICA,39PF,500V,5%	2	C36, C37
......3	100-1031	RES,100 OHM,1/4W,1%,METAL	3	R4, R32, R33
......3	100-1051	RES,10K OHM,1/4W,1%	11	R2, R3, R6, R21, R7, R26, R34, R35, R39, R40
......3	100-1083	RES,10MEG OHM,1/4W,5%	1	R23
......3	100-2723	RES,27 OHM,1/4W,5%	4	R8, R9, R10, R11
......3	100-3373	RES,3.3MEG OHM,1/4W,5%	2	R13, R16
......3	103-1104	RES,1.10K OHM,1/4W,1%,METAL	3	R5, R14, R18
......3	103-1964	RES,1.96K OHM,1/4W,1%,METAL	2	R24, R20
......3	103-2674	RES,2.67K OHM,1/4W,1%,METAL	2	R30, R31
......3	103-3323	RES,332 OHM,1/4W,1%,METAL	2	R27, R28
......3	103-5623	RES,562 OHM,1/4W,1%,METAL	1	R38
......3	110-6833	RES,680 OHM,1/2W,5%	1	R25

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	120-0200	RES, 0.2 OHMS, 1W, METAL OXIDE	2	R17, R19
......3	120-1043	RES,1K OHM,1W,5%	2	R1, R15
......3	130-1553	RES,15K OHM,2W,5%	1	R12
......3	130-3004	RES,300 OHM,2W,5%,WW	3	R29, R36, R37
......3	200-0024	DIODE,ZENER,24V,1W,5%,1N4749A	2	D20, D21
......3	200-4742	DIODE,ZENER,1N4742A	2	D29, D30
......3	200-5343	ZENER, 7.5V, 5W	1	D31
......3	201-0035	DIODE,ZENER,1N5229 4.3V 0.5W	1	D11
......3	203-4005	DIODE,1N4005	2	D22, D23
......3	203-4148	DIODE,1N4148	12	D1, D2, D3, D4, D5, D6, D25, D26, D32, D33, D34, D35
......3	206-0027	TRANSZORB DIODE, 27 VOLT	2	D9, D10
......3	206-0250	TRANSZORB,250BV,1.5KE250CA	2	D17, D19
......3	206-0300	TRANSZORB,300V ,SMD	2	D16, D18
......3	210-0120	TSTR,TIP120 NPN SILICON PWR	1	Q7
......3	210-0520	HEXFET IRFI520G	4	Q3, Q4, Q5, Q6
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	1	Q11
......3	210-6018	RF FET 150 mOHM 600V (N)	2	Q1, Q2
......3	211-3904	TSTR,2N3904	1	Q12
......3	227-0317	VR,LM317T,LM317KC	1	U1
......3	227-2110	DRIVER HIGH AND LOW SIDE,IR2110	2	U7, U8
......3	228-4584	IC,MC14584 14-PIN SCHMITT TRIG	1	U5
......3	229-0033	IC,OPTOIS,4N33	3	U2, U3, U4
......3	237-0006	SCR,100V 1.6A RMS	1	Q13
......3	320-0030	MOUNT,LED,R ANGLE,BIVAR	2	LD1, LD2
......3	323-9217	IND,LED,RED 521-9240	1	DS2
......3	323-9224	IND,LED,GRN,521-9270	1	DS1
......3	330-1502	FUSE,3AB,15A,65V,VERY FAST	1	F1
......3	334-1150	FUSE,5 X 20MM,1.5A,SLO-BLO	2	F2, F3
......3	360-0112	COIL 4UH (SBCM)	2	L1, L2
........4	360-0087	CORE,TOROID	1	
........4	555-0112	COST, LABOR, 360-0112	1	
........4	640-2200	WIRE,AWG 22,MAGNET	0.004	
......3	415-2068-030	CLIP,FUSE,30AMP,LITTLEFUSE,122083	2	FC1, FC2
......3	415-2069	CLIP,FUSE,LITTLEFUSE,111501	4	FC3, FC4, FC5, FC6
......3	417-0374	CONN,15 PIN SUB-D,MALE7690	1	P2
......3	417-0600	SKT,IC 6 PIN	3	XU2, XU3, XU4
......3	417-1404	SOCKET,14-PIN DIP	3	XU7, XU8, XU5
......3	420-4104	SCREW,4-40X.250,S.S. PH	2	
......3	420-4106	SCREW,4-40X.375,S.S. PH	4	
......3	420-4108	SCREW,4-40X.500,S.S. PH	2	
......3	420-6104	SCREW,6-32X.250,S.S. PH	6	
......3	421-8002	8-32 HEX NUT, BRASS	6	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	6	
......3	423-4002	#4 LOCK S.S. SPLIT	6	
......3	423-6002	#6 LOCK SPLIT	12	
......3	423-8013	#8 LOCK EXT TOOTH (BRONZE)	6	
......3	426-4003	NUT,PEM 4-40 KFS2-440	2	
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	4	E3, E4, E5, E6

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	441-0012	STOFF,#6-32 MALE-FEMALE 1/4	6	
......3	455-0071	HEATSINK,CLIP-ON,PCB MT,TO-220	2	
......3	455-8001-001	HEATSINK,4 INCH,A" VERSION AM"	2	
......3	517-0304	PCB MACH,POWER AMP,AM-1A	1	
......3	700-0015	ADH,LOCTITE,242 250CC	0.001	
......3	700-0028	COMPOUND,THERM JT,TYPE 120	0.001	
..1	957-0022-051	ASSY,POWER BLOCK,AM-5E	2	
....2	400-6700	GROMMET STRIP,.062-.090	1.625	
....2	409-0026	CARD GUIDE,6	24	
....2	420-6002	SCREW,6-32X.437,S.S. PH FH UC	16	
....2	420-6112	SCREW,6-32X.750,S.S. PH	1	
....2	420-6124	SCREW,6-32X1.500,S.S. PH	14	
....2	420-6506	SCREW,6-32X.375,S.S. PH FH	12	
....2	421-6008	6-32 KEP NUT	2	
....2	421-6908	SHEET EDGE CONNECTOR 6-32	18	
....2	421-8002	8-32 HEX NUT, BRASS	16	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	14	
....2	422-6107	SCREW,SEMS 6-32 X 7/16 PAN PH.ST."	6	
....2	423-6002	#6 LOCK SPLIT	36	
....2	423-8005	#8 LOCK SPLIT	16	
....2	423-8006	#8 LOCK INT TOOTH	14	
....2	441-2114	STOFF,ALUM 1/4HEX X 1 6-32	6	
....2	441-8153	SPR,.25 HEX X .31LG,6-32 THD	2	
....2	441-8217	STOFF,ALUM 1/4HEX X 5/8 6-32	12	
....2	441-8292	STOFF,BRASS MALE-FEM 1/4HX1.75	8	
....2	441-8452	STOFF,8-32FF,2.5L,.25 HEX ALUM	2	
....2	471-0833	PNL,SIDE,PWR BLOCK,AM XMTR	2	
....2	471-0836	GUARD,FLAT,PWR BLOCK,AM XMTR	1	
....2	471-0837	GUARD,ECC,POWER BLOCK,AM XMTR	1	
....2	471-0842	SHIELD,POWER BLOCK,AM XMTR	1	
....2	471-5064	PANEL,REAR,POWER BLK,A"VERSION AM"	1	
....2	471-5083	COVER,TOP,POWER BLOCK,A"VERSION AM"	1	
....2	471-5084	COVER,BOT,POWER BLOCK,A"VERSION AM"	1	
....2	594-0019	LABEL,DANGER HV 1X 1.5	2	
....2	917-0303	ASSY PCB,PWR BLOCK MTHRBD	1	
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	2	C1, C2
......3	030-2256	CAP,POLY,2.2uF,400V	2	C3, C4
......3	370-0037	XMFR,P.A. DRIVE,AM-1/5	2	T1, T2
........4	375-0008	CORE,RF DRIVE TRANSFORMER	1	
........4	555-0035	COST,LABOR 370-0037	1	
........4	601-2411	WIRE,AWG 24, TFE, 250V, ORANGE	2	
........4	601-2412	WIRE, AWG 24, TFE, 250V, BLUE	2	
........4	601-2419	WIRE,AWG24,TFE,250V,WHT	2	
......3	417-0300	SOCKET,CARD EDGE,AMP 531353-6	6	J1A, J1B, J1C, J1D, J1E, J1F
......3	417-0375	CONN,15 PIN SUB-D,FEMALE	6	J2A, J2B, J2C, J2D, J2E, J2F
......3	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	1	J3

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	14	E1, E2, E5, E6, E7, E8, E11, E12, E13, E14, E15, E16, E22, E23
......3	517-0303	PCB MACH,PWR BLOCK MTHRBD	1	
....2	917-0321-005	ASSY,PCB,COMBINER,AM-5E	1	
......3	360-0107	ASSY,RF CHOKE AM-1A	4	L1, L2, L3, L4
........4	402-0000	TY-RAP	3	
........4	601-1220	WIRE,AWG12,19/25,TFE INS,BLU	5.833	
......3	370-0061	ASSY, AM-5 COMBINER XMFR	4	T1, T2, T3, T4
........4	375-0007-001	FERRITE CORE LARGE AM XMTR	1	
..........5	375-0007-100	CORE, RF TRANSFORMER	2	
........4	517-0317-001	PCB MACH,XFMR WIRE HOLDER,AM XMTRS	5	
..........5	517-0317	PCB MACH,XFMR WIRE HOLDER,BREAKAWAY	0.062	
........4	600-3400	WIRE,LITZ,3400/48,D.NY.,NYLEZE	2.5	
........4	601-1220	WIRE,AWG12,19/25,TFE INS,BLU	1.042	
........4	601-1221	WIRE,AWG12,19/25,TFE INS,WHT	1.42	
........4	601-1893	WIRE,AWG18,19/30,TFE INS,WHT	2.583	
........4	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	2.5	
......3	402-0001	TY-RAP,T TY24M,1-1/4 DIA	4	
......3	402-0015	TIE,CBL,PANDUIT, 7 3/8 LONG"	16	
......3	413-0106	TERM,TEST POINT,OVAL,RED	10	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	9	E1, E2, E3, E4, E5, E6, E7, E8, E9
......3	471-5124	SPACER, AM-A COMBINER	4	
......3	517-0321	PCB,MACH,COMBINER,AM-1A	1	
..1	957-0070	ASSY,OUTPUT NETWORK,AM-5E	1	
....2	340-0004	SW,JUMPER PROGRAMMABLE	2	
....2	360-0088	COIL,VARIABLE,16UH,20A,AM XMTR	2	
....2	400-0014	GROMMET,3/8IDX5/8ODFOR7/16HOLE	1	
....2	400-6700	GROMMET STRIP,.062-.090	1.212	
....2	402-0000	TY-RAP	7	
....2	402-0008	MTG DEVICE,FOR #6SCR,TIE CBL	6	
....2	410-1421	LUG,QUICK DISCONNECT #18-22	2	
....2	417-0017	RECP,BNC,BULKHEAD,UG-492A/U	1	
....2	417-0716	CONN,7/16 DIN,PANEL JACK,SOLDER	2	
....2	420-0106	SCREW,10-32X.375,S.S. PHH	11	
....2	420-0108	SCREW,10-32X.500,S.S. PHH	4	
....2	420-0110	SCREW,10-32X.625,S.S. PHH	2	
....2	420-0496	SCREW,10-32X.375,BLACK SHSS	1	
....2	420-0500	SCREW,10-32X.375,BR PH	4	
....2	420-0515	SCREW,10-32X.750,BR PH	1	
....2	420-0817	ASSY,FEMALE SCREWLOCK 205817-1	1	
....2	420-6108	SCREW,6-32X.500,S.S. PH	8	
....2	420-6110	SCREW,6-32X.625,S.S. PH	2	
....2	420-6130	SCREW,6-32X.375,NYLON SL PAN HD	1	
....2	420-6506	SCREW,6-32X.375,S.S. PH FH	8	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	420-9306	SCREW,1/4-28X.375,BR PH PA	14	
....2	420-9308	SCREW,3/8-24X.500,BR PH PA	2	
....2	421-0102	10-32 KEP NUT	2	
....2	421-0201	10-32 S.S. HEX NUT	1	
....2	421-0801	#10-32 BR HEX NUT	3	
....2	421-1113	RIV,CLOSED-END .125 X .316L	6	
....2	421-6008	6-32 KEP NUT	36	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	53	
....2	423-0002	#10 LOCK SPLIT	17	
....2	423-0005	#10 LOCK SPLIT (BRONZE)	3	
....2	423-0007	#10 LOCK INT TOOTH	1	
....2	423-1003	1/4-20 LOCK SPLIT	20	
....2	423-1004	1/4-20 FLAT .687 X .260 X .050	13	
....2	423-1018	FLAT .500 X .218 X .030	1	
....2	423-5004	3/8 LOCK SPLIT (BRONZE)	2	
....2	423-5011	WASH,FLAT .391X1 OD .080 BRASS	1	
....2	423-6000	#6 FLAT .375 X .144 X .030	2	
....2	423-6011	#6 FLAT .310 X .160 X .030	9	
....2	430-0016	SPG,COMP .420 OD X1 LC-042F-5	1	
....2	441-0101	STOFF,ALUM 5/16HEX X 7/8 10-32	2	
....2	442-0243	BUSHING,POP-IN,FOR 3/8	2	
....2	446-0075	SHAFT,SHORT,OUTPUT NET,AM XMTR	1	
....2	446-0076	SHAFT,LONG,OUTPUT NET,AM XMTR	1	
....2	447-0032	COUPLING,FLEX,INTEGRAL CLP,3/8	2	
....2	459-0189	BALL,SPARK GAP	2	
....2	459-0191	BLOCK,SPARK GAP	1	
....2	459-0192	THREADED SHAFT,SPARK GAP	1	
....2	470-0340	STRAP,PCB,VARIABL COIL,AM XMTR	1	
....2	471-0856	PARTITION,OUTPUT NET,AM XMTR	1	
....2	471-0860	PLATE,CAP MTG,OUT NET,AM XMTR	1	
....2	471-0862	STRAP,SMALL,OUT NET,AM XMTR	2	
....2	471-0863	SHIELD,OUTPUT NETWORK,AM XMTR	1	
....2	471-0866	PANEL,BREAKAWAY,1 PER AM XMTR	1	
....2	471-5107	CHASSIS,OUTPUT NETWORK,A" VERSION"	1	
....2	471-5109	COVER,TOP,OUT NETWORK,A" VERSION A"	1	
....2	471-5313	PANEL,FRONT,OUTPUT NETWORK,NINJA	1	
....2	471-5322	PANEL,REAR,OUTPUT NETWORK,NINJA	1	
....2	471-5494	SUPPORT,SPARK GAP	1	
....2	482-0031	KNOB,RB-67-5-M,BL MATTE,3/8	2	
....2	486-2285	HANDLE,OVAL,BLK,10-32 X 4	1	
....2	500-211	Screw,SEMS 4-40x3/8 Ph Pan Head MS Black Zinc (External)	2	
....2	601-2209	WIRE,AWG22,7/30 WHT	0.167	
....2	917-0216-001	ASSY,PCB,LGHTNG PROTECT,AM-5	1	
......3	206-0300	TRANSZORB,300V ,SMD	5	D3, D4, D5, D2, D6
......3	206-0400	TRANSZORB,400BV,1.5KE400CA	2	D1, D7,
......3	517-0216	PCB MACH,LIGHTNING PROTECTION	1	
....2	917-0306-002	ASSY PCB,DIRECTIONAL COUPLER,AM,A/E SERIES	1	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	16	C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217
......3	030-1043	CAP,CER MOLDED,.01uF,200V,RAD	1	C201
......3	031-2033	CAP,MYLAR FILM,.0022uF,100V,10%	2	C219, C220
......3	042-5021	CAP,MICA,500PF,500V,1%	1	C218
......3	103-1021	RES,10 OHM,1/4W,1%,METAL	4	R226, R227, R228, R229
......3	103-3011	RES,30.1 OHM,1/4W,1%,METAL	6	R206, R210, R211, R212, R213, R214
......3	120-1531	RES,150 OHM,1W,1%,(MIL 1/2W)	4	R230, R231, R232, R233
......3	120-2031	RES,200 OHM,1W,1%,MIL 1/2W	12	R215, R216, R217, R218, R219, R220, R221, R222, R236, R237, R238, R239
......3	130-1821	RES,18 OHM,3W,1%	3	R207, R208, R209
......3	178-2056	RES,TRMR,20K,1W,HORZ,22 TURN	4	R223, R224, R234, R235
......3	192-2533	POT,250 OHM,2W,DOUBLE,1-TURN	5	R201, R202, R203, R204, R205
......3	200-0024	DIODE,ZENER,24V,1W,5%,1N4749A	4	D209, D210, D213, D214
......3	201-2800	DIODE,HOT CARRIER	4	D201, D202, D203, D204
......3	203-4148	DIODE,1N4148	8	D205, D206, D207, D208, D211, D212, D215, D216
......3	270-0062	REL,SPST 5VDC 500 OHM,REED	5	K201, K202, K203, K204, K205
......3	340-0002	SW,4 POS,SPST,8-PIN DIP	1	S201
......3	340-0004	SW,JUMPER PROGRAMMABLE	6	P203, P204A, P204B.P205A, P205B, P206
......3	360-0093	COIL,MOLDED,SHIELDED,56UH	1	L202
......3	364-0056	COIL,MOLDED,SHIELDED 5.6UH	1	L201
......3	364-0670	CHOKE,10MHY	2	L203, L204
......3	370-0040	XFMR,CURRENT,AM-1/5 (SBCM)	2	R201, T202
........4	375-0009	CORE,1.102 ODX.63 IDX.512 THK	1	
........4	555-0040	COST,LABOR 370-0040	1	
........4	640-2600	WIRE,AWG 26,MAGNET,RED	0.005	
........4	640-2600-1	WIRE,AWG 26,MAGNET,GRN	0.006	
........4	700-0003	TAPE,ELECTRICAL,YEL,3/8	0.01	
......3	370-0041	XFMR,VOLTAGE,AM-1/5	1	T203
........4	375-0007-100	CORE, RF TRANSFORMER	1	
........4	555-0041	COST,LABOR 370-0041	1	
........4	601-2410	WIRE,AWG24,TFE,250V,BLK	8	
........4	601-2411	WIRE,AWG 24, TFE, 250V, ORANGE	1	
........4	601-2412	WIRE, AWG 24, TFE, 250V, BLUE	0.5	
........4	601-2419	WIRE,AWG24,TFE,250V,WHT	10	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
........4	700-0103	TAPE,KAPTON 1/2" 0.010 " "		
......3	402-0001	TY-RAP,T TY24M,1-1/4 DIA	6	
......3	410-0025	TERM,MALE DISCONNECT PC .25TAB	3	E209, E210, E211
......3	413-0025	TERM,TURRET,2 SHLDR,.360,GOLD FLASH	17	E202, E203, E204, E205, E206, E207, E208, E212, E213, E214, E215, E216, E217, E219, E220, E221
......3	417-0080-001	HEADER,8 POS R.ANGLE	1	J202, J203
......3	417-0200	CONN,HEADER 20 PIN	2	J201, J204, J205, J206
......3	517-0306-002	PCB MACH,DIRECTIONAL COUPLER,(scan)	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.312	
......3	693-0220	TUB,TEFLON,TW,AWG22 NTL	0.5	
....2	917-0306-004	ASSY PCB,LIGHTNING DETECTOR,AM,A/E SERIES	1	
......3	042-3913	CAP,MICA,1000PF,500V	20	C401, C402, C403, C404, C405, C406, C407, C408, C409, C410, C411, C412, C413, C414, C415, C416, C417, C418, C419, C420
......3	215-0001	PHOTOTRANSISTOR,1.8MA IC AT 5V	1	Q401
......3	340-0004	SW,JUMPER PROGRAMMABLE	3	P403, P404, P405
......3	410-0025	TERM,MALE DISCONNECT PC .25TAB	3	E201, E202, E403
......3	417-0200	CONN,HEADER 20 PIN	0.2	J402
......3	417-4004	CONN,HEADER,2 PIN	4	J403, J404, J405, J401
......3	421-1113	RIV,CLOSED-END .125 X .316L	2	
......3	469-0369	FINGER STOCK	1	S401
......3	517-0306-004	PCB MACH,LIGHTNING DETECTOR,AM-1A	1	
........4	517-0306	PCB MACH,ECU BREAKAWAY,AM-1A	0.067	
....2	947-0211	HARNESS,OUTPUT NETWORK,AM-2.5E (SBCM)	1	
......3	402-0000	TY-RAP	12	
......3	402-0051	TY-RAP, W/FLAG	6	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	3	
......3	410-0063	LUG,TERM 1/4	1	
......3	410-0065	LUG,TERM #6 RING CRIMP #22 AWG	1	
......3	410-1421	LUG,QUICK DISCONNECT #18-22	3	
......3	410-1553	LUG,TERM #10 RING CRIMP 16-22	1	
......3	410-7105	LUG,TERM 1/4	6	
......3	417-0138	HSNG,MOD IV 4 POS 87499-7 AMP	2	
......3	417-0142	PIN,.050 DIA 26-22 745254-3	13	
......3	417-0499	CONN HSNG,2POS 87499-3 AMP	1	
......3	417-1401	HOUSING,SKT,14PIN,AMP MOD IV	1	
......3	417-1500	PLUG,15 PIN	1	
......3	417-8766	CONTACT,CRIMP,MOD-IV 87809-1	21	
......3	418-0034	PLUG,BNC DUAL CRIMP 1-227079-6	1	
......3	471-0888	SHIELD,FARADAY,OUT NET,AM XMTR	1	
......3	600-3400	WIRE,LITZ,3400/48,D.NY.,NYLEZE	2.833	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	601-1800	WIRE,AWG18 19/30 BLK	0.312	
......3	601-2209	WIRE,AWG22,7/30 WHT	0.708	
......3	608-0002	CBL,8 COND,SH,AWG 24,7/32	1.54	
......3	610-0200	CBL,AWG18 15KV SILICONE 16/30	0.43	
......3	610-8723	CBL,SH 4 COND #22 ST 8723 BELD	5.16	
......3	611-0061	TUB,HT SHK CLEAR 3/64	0.75	
......3	611-1250	TUB,HT SHK,1/8	1.42	
......3	611-1875	TUB,HT SHK,3/16	0.167	
......3	611-5000	TUB,HT SHK 1/2	0.208	
......3	621-1359	CBL,COAX,RG316/U,50 OHM	6.5	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	2.833	
..1	957-0071	KIT,CUSTOMER SERVICE PARTS,AM-5E	1	
....2	330-0201	FUSE,MDA 2A 250V SLO-BLO	4	
....2	330-1502	FUSE,3AB,15A,65V,VERY FAST	2	
....2	330-2000	FUSE,20A 250V	2	
....2	334-0030-001	FUSE,30A,125V,1/4x1-1/4 AXIAL LEAD	4	
....2	334-0100	FUSE,1A MDL SLO BLO 250V	2	
....2	334-1150	FUSE,5 X 20MM,1.5A,SLO-BLO	4	
....2	350-0002	BATT,ALKALINE 9V SQ	1	
....2	375-0007-001	FERRITE CORE LARGE AM XMTR	2	
......3	375-0007-100	CORE, RF TRANSFORMER	2	
....2	375-0009	CORE,1.102 ODX.63 IDX.512 THK	2	
....2	401-0015	MTG,ADH BACK,SMS-A-15-PANDUIT	5	
....2	402-0000	TY-RAP	10	
....2	402-0001	TY-RAP,T TY24M,1-1/4 DIA	10	
....2	402-0006	MT,ADH BACKED,FOR CBL TIES	5	
....2	402-0015	TIE,CBL,PANDUIT, 7 3/8 LONG"	10	
....2	407-0186	TOOL,ADJ 8 T000/5 SPECTROL	1	
....2	417-0291	CONN,PLUG,25-PIN,D",SOLDER CUPS"	2	
....2	417-0307	CONN,PLUG,9-PIN,D",SOLDER CUPS"	1	
....2	418-0044	SHIELD,CBL 3 POS 745173-5 AMP	2	
....2	418-0045	FERRULE,SPLIT RING 745508-3	3	
....2	418-0052	SHIELD,CBL 9 POS 745171-1 AMP	1	
....2	710-0279	TOOL,SCREWDRIVER,FLAT-SMALL HEAD	1	
....2	977-1114	KIT,INST,MAN,AM-2.5E/5E	1	
......3	597-1114	INSTRUCTION MANUAL, AM 2.5E/AM 5E TRANSMITTER	1	
........4	594-9999	PAPER,COPIER 8 1/2 X 11,20LB HI-TEC	0.001	
......3	598-0008	BINDER,2 IN, BLUE W CD POCKET (NOTE)	1	
..1	957-0315-100	PANEL,POWER SUPPLY,CE	2	
....2	370-2364	CHOKE,1.04MHY,AM XMTR	1	L2
....2	376-0048-001	XFMR ASSEMBLY, AM POWER SUPPLY	1	
......3	376-0048	XFMR,LOW VOLTAGE,AM-E POWER SUPPLY	1	
......3	402-0000	TY-RAP	4	
......3	417-0036	PIN CONN,AMP,350967-1	2	
......3	417-0053	SKT,CONN 641294-1 AMP	10	
......3	418-0702	HSNG,PIN 2 PIN 1-640507 AMP	1	
......3	418-1271	CONN,HOUSING,12PIN	1	
....2	400-0055	ISOLATOR,ADH BACKED,.063 X .75	8	
....2	400-6700	GROMMET STRIP,.062-.090	1.5	
....2	402-0000	TY-RAP	8	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	402-0833	CLAMP,CBL,1/4	1	
....2	420-0500	SCREW,10-32X.375,BR PH	2	
....2	420-8106	SCREW,8-32X.375,S.S. PHH	8	
....2	420-8108	SCREW,8-32X.500,S.S. PHH	6	
....2	420-8119	SCREW,8-32X.625,BR PH	2	
....2	421-0801	#10-32 BR HEX NUT	2	
....2	421-6908	SHEET EDGE CONNECTOR 6-32	5	
....2	421-8002	8-32 HEX NUT, BRASS	14	
....2	422-6106	SCREW,SEMS 6-32 X 3/8 PAN PH. ST."	12	
....2	422-8108	SCREW, SEMS, 8-32 X 1/2, PAN HEAD"	1	
....2	423-0005	#10 LOCK SPLIT (BRONZE)	2	
....2	423-0007	#10 LOCK INT TOOTH	2	
....2	423-6015	#6 FLAT .320 X .145 X	1	
....2	423-8002	#8 LOCK SPLIT	6	
....2	423-8005	#8 LOCK SPLIT	14	
....2	423-8006	#8 LOCK INT TOOTH	9	
....2	423-8014	WASH,FLAT #8 X .625 OD X .042T	4	
....2	441-8292	STOFF,BRASS MALE-FEM 1/4HX1.75	4	
....2	471-5074	PANEL,POWER SUPPLY,A" VERSION AM"	1	
....2	517-0315-006	PCB MACH,PS AC INPUT BD.,AM-10A	1	
....2	594-0131	LABEL,WARNING,AM POWER SUPPLY	1	
....2	917-0315-001	ASSY PCB,POWER SUPPLY,AM XMTRS (SBCM) (NOTE)	1	
......3	003-1013	CAP,MONO CER,.01uF,100V,5%	7	C2, C10, C59, C60, C64, C74, C42
......3	003-1066	CAP,CER,MNLY,.1uF,50V,10% *NOTE*	30	C1, C5, C7, C8, C12, C18, C19, C29, C32, C34, C36, C45, C47, C48, C50, C58, C61, C65, C66, C78, C81, C67, C70, C86, C91, C92, C93, C94, C6, C98
......3	003-2723	CAP,MONO CER,.0027uF,100V,5%	2	C11, C37
......3	003-4723	CAP,MONO CER,.0047uF,100V,5%	2	C73, C96
......3	003-4733	CAP,MONO CER,.047uF,50V,5%	1	C31
......3	003-4743	CAP,CER MNLY,.47uF,50V,10%	9	C17, C35, C41, C68, C75, C76, C77, C79, C83
......3	014-2293	CAP,LYTIC,2200UF,35V,STANDUP	2	C4, C20
......3	020-2795-500	CAP,LYTIC,27000UF,50V,20%	1	C21
......3	023-1075	CAP,LYTIC,10UF,50V NP STDUP	1	C62
......3	023-1076	CAP,LYTIC,10uF,50V,STDUP	12	C9, C13, C14, C33, C39, C46, C49, C63, C80, C43, C85, C95
......3	023-1084	CAP,LYTIC,100MFD,35V,STDUP,RAD	3	C16, C44, C82
......3	024-4783	CAP,LYTIC,470UF,50V,STDUP	1	C15
......3	030-1033	CAP,CER MOLDED,.001UF,200V,10%	5	C3, C30, C56, C57, C71
......3	030-1523	CAP,POLY,.15UF,600WVDC,10%	1	C22

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	030-2242	CAP, POLY, .02 uF, 600V	2	C100, C101
......3	030-2256	CAP,POLY,2.2uF,400V	1	C52
......3	033-4763	CAP,POLY FILM,.47UF,600V,OVAL	1	C23
......3	040-1022	CAP,MICA,100PF,500V,RAD	4	C38, C40, C72, C69
......3	100-1031	RES,100 OHM,1/4W,1%,METAL	5	R20, R46, R69, R82, R83
......3	100-1041	RES,1K OHM,1/4W,1%	6	R27, R67, R68, R120, R121, R149
......3	100-1051	RES,10K OHM,1/4W,1%	28	R3, R4, R10, R11, R12, R14, R18, R25, R31, R35, R54, R56, R62, R80, R91, R98, R111, R112, R113, R114, R115, R116, R117, R119, R124, R36, R151, R140
......3	100-1083	RES,10MEG OHM,1/4W,5%	1	R156
......3	100-1531	RES,150 OHM,1/4W,1%	2	R122, R147
......3	100-1631	RES,162 OHM,1/4W,1%	1	R109
......3	100-3373	RES,3.3MEG OHM,1/4W,5%	8	R19, R45, R53, R55, R64, R85, R87, R66
......3	100-3951	RES,39.2K OHM,1/4W,1%	4	R74, R118, R75, R146
......3	103-1007	RES,1 MEG OHM,1/4W,1%,METAL	2	R126, R148
......3	103-1062	RES,100K OHM,1/4W,1%,METAL	14	R2, R15, R17, R60, R61, R93, R94, R97, R102, R103, R58, R89, R143, R152
......3	103-1104	RES,1.10K OHM,1/4W,1%,METAL	4	R22, R23, R47, R76
......3	103-1305	RES,13K OHM,1/4W,1%,METAL	1	R95
......3	103-1331	RES,1.33K OHM,1/4W,1%,METAL	15	R1, R43, R57, R59, R63, R65, R77, R78, R79, R84, R86, R88, R127, R90, R28
......3	103-1561	RES,150K OHM,1/4W,1%,METAL	1	R5
......3	103-1915	RES,19.1K OHM,1/4W,1%,METAL	1	R6
......3	103-2104	RES,2.10K OHM,1/4W,1%,METAL	1	R150
......3	103-2241	RES,2.21K OHM,1/4W,1%,METAL	3	R44, R52, R16
......3	103-3324	RES,3.32K OHM,1/4W,1%,METAL	5	R9, R29, R30, R104, R96
......3	103-3325	RES,33.2K OHM,1/4W,1%,METAL	1	R99
......3	103-3485	RES,34.8K OHM,1/4W,1%,METAL	1	R73
......3	103-4025	RES,40.2K OHM,1/4W,1%,METAL	1	R128
......3	103-4324	RES,4.32K OHM,1/4W,1%,METAL	1	R13
......3	103-4441	RES,4.42K OHM,1/4W,1%,METAL	1	R142
......3	103-4753	RES,475 OHM,1/4W,1%,METAL	1	R108
......3	103-4875	RES,48.7K OHM,1/4W,1%,METAL	1	R141

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	103-4996	RES,499K OHM,1/4W,1%,METAL	3	R8, R34, R155
......3	103-5112	RES,51.1 OHM,1/4W,1%,METAL	3	R24, R32, R110
......3	103-5141	RES,5.11K OHM,1/4W,1%,METAL	4	R26, R100, R101, R144
......3	103-6653	RES,665 OHM,1/4W,1%,METAL	1	R33
......3	103-7154	RES,7.15K OHM,1/4W,1%,METAL	1	R7
......3	103-7874	RES,7.87K OHM,1/4W,1%,METAL	1	R92
......3	103-8251	RES,82.5 OHM,1/4W,1%,METAL	1	R123
......3	103-8663	RES,866 OHM,1/4W,1%,METAL	2	R70, R21
......3	110-2733	RES,270 OHM,1/2W,5%	2	R39, R40
......3	110-3933	RES,390 OHM,1/2W,5%	1	R81
......3	110-6843	RES,6.8K OHM,1/2W,5%	1	R130
......3	130-1010	RES,.1 OHM,10W,1%,WW	5	R105, R106, R107, R134, R135
......3	130-1062	RES,100K OHM,2W,5%	1	R71
......3	130-1225	RES,12 OHM,30W,20%	1	R72
......3	130-4723	RES,47 OHM,2W,5%	4	R48, R49, R41, R42
......3	130-8223	RES,82 OHM,2W,5%,CARBON	4	R37, R38, R137, R138
......3	140-0030	THERMISTOR,100 OHMS,20%	1	RT1
......3	140-0038	VARISTOR,V320LA20A GE	1	MOV2
......3	140-0039	VARISTOR,V320LA40B	1	MOV1
......3	200-4733	DIODE,ZENER,1N4733A, 5%	3	D5, D6, D26
......3	200-4746	DIODE,ZENER,1N4746	1	D27
......3	201-2800	DIODE,HOT CARRIER	3	D1, D4, D49
......3	203-4005	DIODE,1N4005	9	D7, D8, D19, D23, D28, D30, D31, D40, D44
......3	203-4148	DIODE,1N4148	11	D2, D3, D21, D22, D29, D37, D24, D39, D41, D42, D45
......3	206-0250	TRANSZORB,250BV,1.5KE250CA	4	D50, D51, D52, D53
......3	210-2222	TSTR,2N2222A	2	Q8, Q9
......3	210-3906	2N3906 PNP 40V 2A .35W 250MHZ	3	Q3, Q4, Q6
......3	210-4060	TSTR, HGTG40N60B3 (N)	2	Q21, Q22
......3	210-6018	RF FET 150 mOHM 600V (N)	1	Q23
......3	210-7000	TSTR,2N7000,MOSFET	14	Q2, Q7, Q10, Q11, Q12, Q13, Q15, Q16, Q17, Q18, Q24, Q14, Q26, Q27
......3	211-3904	TSTR,2N3904	4	Q1, Q5, Q19, Q20
......3	212-0310	TSTR,FET N CHAN RF J3100	1	Q25
......3	220-0311	IC,LT311 LINEAR	1	U7
......3	220-4093	IC,MC14093B SCHMITT NAND	1	U21
......3	220-4429	IC,DRIVER,MOSFET,TC4429CAT (N)	1	U19
......3	220-6137	IC,OPTO-ISOLATOR,6N137	2	U17, U22
......3	221-0074	AMP,OP,BIFET TLO74CW	1	U24
......3	221-0393	IC,LM393N,VOLT COMPARATOR	2	U6, U23

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
......3	225-0008	IC,CD4081BE	1	U12
......3	227-0317	VR,LM317T,LM317KC	3	U3, U4, U16
......3	228-3525	IC,SG3525AN,PWM CONTROL	1	U13
......3	228-4538	IC,MC14538B NATL SEMICONDUCTOR	1	U5
......3	229-0033	IC,OPTOIS,4N33	8	U1, U2, U8, U9, U10, U11, U14, U15
......3	229-1750	TMP01FP TEMPERATURE SENSOR CHIP	1	U25
......3	230-0013	RECT,FAST RECOVERY,FEN30JP	1	D32
......3	230-0015	RECT,SILC,MR2406	2	D15, D17
......3	230-0017	RECT,PWR SWITCHMOD MUR4100E	5	D16, D34, D46, D47, D48
......3	237-2648	SCR, 40 AMP, 600 VOLT	2	D13, D14
......3	239-0001	BRDG RECT,FULL WAVE 2 AMP,200V	3	D9, D12, D25
......3	239-0003	BRDG RECT,6PH20 EDI	2	D11, D10
......3	334-0030-001	FUSE,30A,125V,1/4x1-1/4 AXIAL LEAD	2	F1, F2
......3	340-0004	SW,JUMPER PROGRAMMABLE	3	P4, P5, P8
......3	409-0121	PAD,TSTR MTG,TO18 CASE	2	Q8, Q9
......3	413-0106	TERM,TEST POINT,OVAL,RED	13	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP14
......3	417-0080-001	HEADER,8 POS R.ANGLE	0.375	J4
......3	417-0376-001	CONN, MALE, PCB MT	1	J1
......3	417-0600	SKT,IC 6 PIN	8	XU1, XU2, XU8, XU9, XU10, XU11, XU14, XU15
......3	417-0804	SOCKET,8-PIN DIP,BURNDY	6	XU6, XU7, XU17, XU22, XU23, XU25
......3	417-1276	CONN,PCB,12 PIN	1	J2
......3	417-1404	SOCKET,14-PIN DIP	3	XU12, XU21, XU24
......3	417-1604	SKT,16-PIN,DIP	2	XU5, XU13
......3	417-2401	CONN,PCB,MR,MALE,24-PIN,AMP	1	J3
......3	417-4004	CONN,HEADER,2 PIN	4	J5, J6, J7, J8
......3	420-4106	SCREW,4-40X.375,S.S. PH	4	
......3	420-4108	SCREW,4-40X.500,S.S. PH	3	
......3	420-6104	SCREW,6-32X.250,S.S. PH	9	
......3	423-4001	#4 FLAT SS .250 X .125 X .018	7	
......3	423-4002	#4 LOCK S.S. SPLIT	7	
......3	423-6001	#6 FLAT .250 X .150 X .015	3	
......3	423-6002	#6 LOCK SPLIT	18	
......3	441-0012	STOFF,#6-32 MALE-FEMALE 1/4	9	
......3	455-0071	HEATSINK,CLIP-ON,PCB MT,TO-220	1	
......3	455-8000-001	HEATSINK,2 INCH,A" VERSION AM"	2	
......3	455-8001-001	HEATSINK,4 INCH,A" VERSION AM"	1	
......3	517-0315-001	PCB MACH,POWER SUPPLY,AM-1A	1	
......3	611-5000	TUB,HT SHK 1/2	0.1	
......3	690-0221	TUB,BLK HEAT SHRINK 3/4	0.125	
......3	693-0180	TUB,TEFLON,THINWALL,AWG18,NTL	0.25	
......3	700-0028	COMPOUND,THERM JT,TYPE 120	0.001	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
....2	917-0315-002	ASSY PCB,PS BULK CAPACITOR,AM,A/E SERIES	1	
......3	013-1500	CAP,LYTIC,1500uF,450VDC	4	C24, C25, C26, C27
......3	033-4763	CAP,POLY FILM,.47UF,600V,OVAL	1	C28
......3	110-4763	RES,470K OHM,1/2W,5%	1	R129
......3	130-1062	RES,100K OHM,2W,5%	1	R50
......3	130-3623	RES,36 OHM,2W,5%	1	R51
......3	420-0705	SCREW,10-32X.312,BR PH PA	8	
......3	423-0007	#10 LOCK INT TOOTH	8	
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	6	E5, E6, E7, E8, E10, E11
......3	517-0315-002	PCB MACH,PS BULK CAPACITOR,AM-1A	1	
......3	611-0060	TUB, HT SHK, 1/16	0.25	
....2	917-0315-004	ASSY PCB,PS CAPACITOR,AM,A/E SERIES	1	
......3	014-7200	CAP,LYTIC,7200UF,200WVDC	4	C87, C88, C89, C90
......3	140-0006	VARISTOR,V130LA10A,GE	1	MOV3
......3	420-0705	SCREW,10-32X.312,BR PH PA	8	
......3	423-0007	#10 LOCK INT TOOTH	8	
......3	426-8007	STUD,PEM,KFH-832-8ET,PCB MOUNT	3	E1, E2, E12
......3	517-0315-004	PCB MACH,PS CAPACITOR,AM-1A	1	
....2	917-0331	ASSY,PCB PS FUSE	1	
......3	334-0100	FUSE,1A MDL SLO BLO 250V	2	F2, F3
......3	334-0202	FUSE,MDL 1/10 .1 SLO BLO	2	F1, F4
......3	415-2068	CLIP,FUSE,15AMP,LITTLEFUSE,102071	8	F1, F2, F3, F4, BASE
......3	417-1276	CONN,PCB,12 PIN	2	J1, J2
......3	517-0331	MACH,PCB,PS FUSE	1	
....2	947-0208	HARNESS,PWR SUPPLY,AM-CE (SBCM)	1	
......3	402-0000	TY-RAP	20	
......3	402-0001	TY-RAP,T TY24M,1-1/4 DIA	15	
......3	402-0051	TY-RAP, W/FLAG	1	
......3	410-0015	LUG,TERM #8 RING CRIMP 12-10	27	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	3	
......3	417-0053	SKT,CONN 641294-1 AMP	20	
......3	417-0372-001	CONTACT, CONN	16	
......3	417-0377	CONN,FEM,PLB16F0000,POSITRONIC	1	
......3	418-1271	CONN,HOUSING,12PIN	2	
......3	601-1202	WIRE,AWG12 19/25 RED	39	
......3	611-2500	TUB,HT SHK,1/4	0.668	
......3	611-3750	TUB,HT SHK,3/8	0.167	
......3	622-8457	WIRE,12 CONDUCTOR,22 AWG	2	

12.3 Frequency Kits

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-121	KIT,FREQ PARTS,522-650 KHZ,AM-2.5E		
..1	957-1015-001	KIT,PWR MOD FD 522-650 KHz	2	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C45, C56
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	20	C46, C47, C48, C49, C50, C51, C52, C53, C54, C55
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L3, L4
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-061	KIT,FD,PWR BLK 522-650KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-121	KIT,FD,OUT NTW 522-650KHZ,AM-2.5E	1	
....2	044-3323-292	CAP,MICA,3300PF,8KV,16A,5%	1	C2
....2	044-3923-292	CAP,MICA,3900PF,8KV,18A,5%	1	C5
....2	044-5123-292	CAP,MICA,5100 PF,6KV,20A,5%	2	C1, C3
....2	044-8223-291	CAP,MICA,8200PF,4KV,20A,5%	1	C4
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-122	KIT,FREQ PARTS,651-770 KHZ,AM-2.5E		
..1	957-1015-002	KIT,PWR MOD FD 651-770 KHz AM-1A	2	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C46, C55
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	16	C47, C48, C49, C50, C51, C52, C53, C54
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L3, L4
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-062	KIT,FD,PWR BLK 651-770KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-122	KIT,FD,OUT NTW 651-770KHZ,AM-2.5E	1	
....2	044-2723-292	CAP,MICA,2700PF,8KV,15A,5%	1	C2
....2	044-3023-292	CAP,MICA,3000 PF,8KV,16A,5%	1	C5
....2	044-4323-292	CAP,MICA,4300 PF,8KV,18A,5%	2	C1, C3
....2	044-6823-291	CAP,MICA,6800PF,4KV,18.0A,5%	1	C4
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-123	KIT,FREQ PARTS,771-920 KHZ,AM-2.5E		
..1	957-1015-003	KIT,PWR MOD FD 771-920 KHz AM-1A	2	
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	16	C47, C48, C49, C50, C51, C52, C53, C54
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L3, L4
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-063	KIT,FD,PWR BLK 771-920KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-123	KIT,FD,OUT NTW 771-920KHZ,AM-2.5E	1	
....2	044-2223-292	CAP,MICA,2200PF,8KV,13A,5%	1	C2
....2	044-2723-292	CAP,MICA,2700PF,8KV,15A,5%	1	C5
....2	044-3623-292	CAP,MICA,3600 PF,8KV,18A,5%	2	C1, C3
....2	044-5623-291	CAP,MICA,5600PF,4KV,18A,5%	1	C4,
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-124	KIT,FREQ PARTS,921-1080 KHZ,AM-2.5E		
..1	957-1015-004	KIT,PWR MOD FD 921-1080 KHz AM-1A	2	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C48, C53
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	8	C49, C50, C51, C52
....2	042-9122	CAP,MICA,DIP,910pF,1KV	4	C47, C54
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L5, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-064	KIT,FD,PWR BLK 921-1080KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-124	KIT,FD,OUT NTW 921-1080KHZ,AM-2.5E	1	
....2	044-2023-292	CAP,MICA,2000 PF,10KV,12A,5%	1	C2
....2	044-2223-292	CAP,MICA,2200PF,8KV,13A,5%	1	C5
....2	044-3323-292	CAP,MICA,3300PF,8KV,16A,5%	2	C1, C3
....2	044-4723-291	CAP,MICA,4700PF,6KV,16A,5%	1	C4,
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-125	KIT,FREQ PARTS,1081-1300KHZ,AM-2.5E		
..1	957-1015-005	KIT,PWR MOD FD 1081-1300 KHz AM-1A	2	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C48, C53
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	8	C49, C50, C51, C52
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L5, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-065	KIT,FD,PWR BLK 1081-1300KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-125	KIT,FD,OUT NTW 1081-1300KHZ,AM-2.5E	1	
....2	044-1623-292	CAP,MICA,1600PF,10KV,12.0A,5%	1	C2
....2	044-1823-292	CAP,MICA,1800PF,10KV,13A,5%	1	C5
....2	044-2723-292	CAP,MICA,2700PF,8KV,15A,5%	2	C1, C3
....2	044-3923-291	CAP,MICA,3900PF,6KV,15A,5%	1	C4
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-126	KIT,FREQ PARTS,1301-1580KHZ,AM-2.5E		
..1	957-1015-006	KIT,PWR MOD FD 1301-1580 KHz AM-1A	2	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	8	C49, C52, C50, C51
....2	042-9122	CAP,MICA,DIP,910pF,1KV	4	C48, C53
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	6	L5, L6, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-066	KIT,FD,PWR BLK 1301-1580KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-126	KIT,FD,OUT NTW 1301-1580KHZ,AM-2.5E	1	
....2	044-1323-292	CAP,MICA,1300PF,10KV,11.0A,5%	1	C2
....2	044-1623-292	CAP,MICA,1600PF,10KV,12.0A,5%	1	C5
....2	044-2223-292	CAP,MICA,2200PF,8KV,13A,5%	2	C1, C3
....2	044-3323-291	CAP,MICA,3300PF,6KV,15A,5%	1	C4
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-127	KIT,FREQ PARTS,1581-1700KHZ,AM-2.5E		
..1	957-1015-007	KIT,PWR MOD FD 1581-1700 KHz AM-1A	2	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C49, C52
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	4	C50, C51
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	6	L5, L6, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-067	KIT,FD,PWR BLK 1581-1700KHZ AM-6A	1	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-127	KIT,FD,OUT NTW 1581-1700KHZ,AM-2.5E	1	
....2	044-1123-292	CAP,MICA,1100PF,10KV,10A,5%	1	C2
....2	044-1223-292	CAP,MICA,1200PF,10KV,11A,5%	1	C5
....2	044-1823-292	CAP,MICA,1800PF,10KV,13A,5%	2	C1, C3
....2	044-2723-291	CAP,MICA,2700PF,6KV,13A,5%	1	C4
....2	360-1251-XXX	COIL,OUT NTW,L1,ALL FREQ,AM-2.5E	1	L1,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	20.9	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1252-XXX	COIL,OUT NTW,L2,ALL FREQ,AM-2.5E	1	L2,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	33	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1253-XXX	COIL,OUT NTW,L3,ALL FREQ,AM-2.5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	17.7	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1255-XXX	COIL,OUT NTW,L5,ALL FREQ,AM-2.5E	1	L5,
......3	402-0000	TY-RAP	2	
......3	410-7105	LUG,TERM 1/4	2	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-151	FREQ,KIT 522-650 KHZ,AM-5E		
..1	957-1015-001	KIT,PWR MOD FD 522-650 KHz	4	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C45, C56
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	20	C46, C47, C48, C49, C50, C51, C52, C53, C54, C55
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L3, L4
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-161	KIT, FD, PWR BLK 522-650 KHZ AM-5E	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	3	L5, L6, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
....2	360-0122-XXX	INDUCTORS, STAR, AM-5E L7	1	L7
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-151	FRQ,KIT OUT NET,522-650 KHZ,AM-5E	1	
....2	044-1523-291	CAP,MICA,1500PF,6KV,9.1A,5%	1	C5B
....2	044-2423-291	CAP,MICA,2400PF,6KV,13.0A,5%	1	C5A
....2	044-2723-292	CAP,MICA,2700PF,8KV,15A,5%	4	C1A, C1B, C3A, C3B
....2	044-3323-293	CAP,MICA,3300PF,12KV,24A,5%	1	C2
....2	044-8223-291	CAP,MICA,8200PF,4KV,20A,5%	1	C4
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-152	FREQ,KIT 651-770 KHZ,AM-5E		
..1	957-1015-002	KIT,PWR MOD FD 651-770 KHz AM-1A	4	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C46, C55
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	16	C47, C48, C49, C50, C51, C52, C53, C54
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L3, L4
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-162	KIT, FD, PWR BLK 651-770 KHZ AM5-E	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	3	L5, L6, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
....2	360-0122-XXX	INDUCTORS, STAR, AM-5E L7	1	L7
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-152	FRQ,KIT OUT NET,651-770 KHZ,AM-5E	1	
....2	044-1523-291	CAP,MICA,1500PF,6KV,9.1A,5%	1	C5A
....2	044-1823-291	CAP,MICA,1800PF,6KV,11A,5%	1	C5B
....2	044-2223-292	CAP,MICA,2200PF,8KV,13A,5%	4	C1A, C1B, C3A, C3B
....2	044-2723-293	CAP,MICA,2700PF,12KV,22A,5%	1	C2
....2	044-6823-291	CAP,MICA,6800PF,4KV,18.0A,5%	1	C4
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-153	FREQ,KIT 771-920 KHZ,AM-5E		
..1	957-1015-003	KIT,PWR MOD FD 771-920 KHz AM-1A	4	
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	16	C47, C48, C49, C50, C51, C52, C53, C54
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L3, L4
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-063	KIT,FD,PWR BLK 771-920KHZ AM-6A	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-153	FRQ,KIT OUT NET,771-920 KHZ,AM-5E	1	
....2	044-1223-291	CAP,MICA,1200PF,6KV,8.2A,5%	1	C5B
....2	044-1523-291	CAP,MICA,1500PF,6KV,9.1A,5%	1	C5A
....2	044-1823-292	CAP,MICA,1800PF,10KV,13A,5%	4	C1A, C1B, C3A, C3B
....2	044-2223-293	CAP,MICA,2200PF,12KV,20A,5%	1	C2
....2	044-5623-291	CAP,MICA,5600PF,4KV,18A,5%	1	C4
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-154	FREQ,KIT 921-1080 KHZ,AM-5E		
..1	957-1015-004	KIT,PWR MOD FD 921-1080 KHz AM-1A	4	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C48, C53
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	8	C49, C50, C51, C52
....2	042-9122	CAP,MICA,DIP,910pF,1KV	4	C47, C54
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L5, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-064	KIT,FD,PWR BLK 921-1080KHZ AM-6A	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-154	FRQ,KIT OUT NET,921-1080 KHZ,AM-5E	1	
....2	044-1123-291	CAP,MICA,1100PF,6KV,8.2A,5%	2	C5A, C5B
....2	044-1623-292	CAP,MICA,1600PF,10KV,12.0A,5%	4	C1A, C1B, C3A, C3B
....2	044-2023-293	CAP,MICA,2000PF,15KV,20A,5%	1	C2
....2	044-4723-291	CAP,MICA,4700PF,6KV,16A,5%	1	C4
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

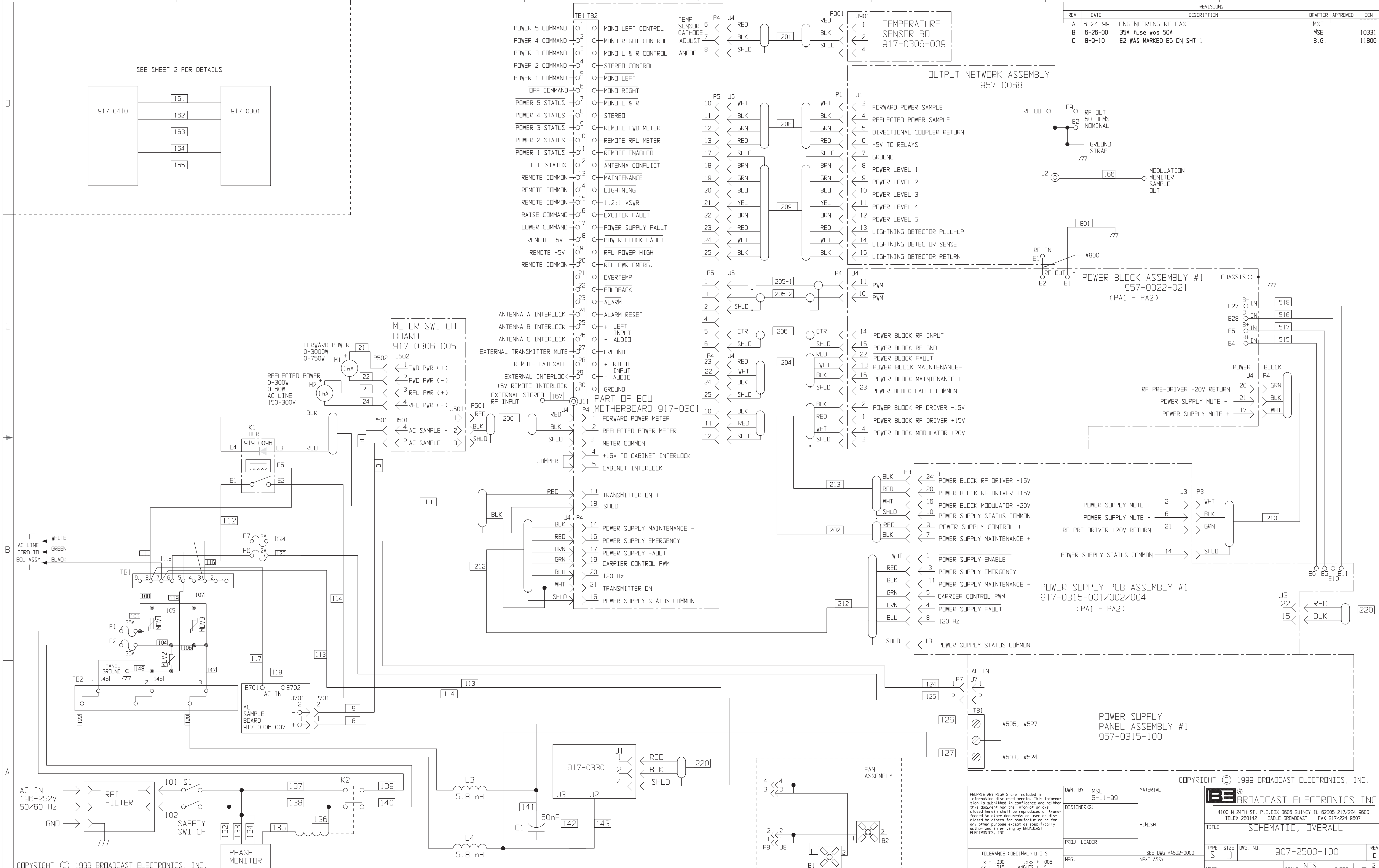
BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-155	FREQ,KIT 1081-1300 KHZ,AM-5E		
..1	957-1015-005	KIT,PWR MOD FD 1081-1300 KHz AM-1A	4	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C48, C53
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	8	C49, C50, C51, C52
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	4	L5, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-065	KIT,FD,PWR BLK 1081-1300KHZ AM-6A	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-155	FRQ,KIT OUT NET,1081-1300 KHZ,AM-5E	1	
....2	044-1323-292	CAP,MICA,1300PF,10KV,11.0A,5%	4	C1A, C1B, C3A, C3B
....2	044-1623-293	CAP,MICA,1600PF,15KV,18A,5%	1	C2
....2	044-3923-291	CAP,MICA,3900PF,6KV,15A,5%	1	C4
....2	044-9113-291	CAP,MICA,910PF,6KV,7.5A,5%	2	C5A, C5B
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-156	FREQ,KIT 1301-1580 KHZ,AM-5E		
..1	957-1015-006	KIT,PWR MOD FD 1301-1580 KHz AM-1A	4	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	8	C49, C52, C50, C51
....2	042-9122	CAP,MICA,DIP,910pF,1KV	4	C48, C53
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	6	L5, L6, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-066	KIT,FD,PWR BLK 1301-1580KHZ AM-6A	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-156	FRQ,KIT OUT NET,1301-1580 KHZ,AM-5E	1	
....2	044-1123-292	CAP,MICA,1100PF,10KV,10A,5%	4	C1A, C1B, C3A, C3B
....2	044-1223-293	CAP,MICA,1200PF,15KV,15.0A,5% (N)	1	C2
....2	044-3323-291	CAP,MICA,3300PF,6KV,15A,5%	1	C4
....2	044-8213-291	CAP,MICA,820PF,6KV,6.8A,5%	2	C5A, C5B
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

BOM LEVEL	PART NO.	DESCRIPTION	QTY	REF. DES.
0	957-0015-157	FREQ,KIT 1581-1705 KHZ,AM-5E		
..1	957-1015-007	KIT,PWR MOD FD 1581-1700 KHz AM-1A	4	
....2	042-1622	CAP,MICA,DIP,1600pF,1KV	4	C49, C52
....2	042-1832	CAP,MICA,DIP,1800pF,1KV	4	C50, C51
....2	360-0113-XXX	INDU,PA DRIVE,AM XMTR,ALL FREQ (SBCM)	6	L5, L6, L7
......3	360-0087	CORE,TOROID	1	
......3	640-2200	WIRE,AWG 22,MAGNET	0.004	
....2	517-0318-001	PCB MACH,PA CAPACITOR BD ,AM XMTR	2	
......3	517-0318	PCB MACH,PA CAP BREAKAWAY,AM XMTR	0.1	
....2	517-0319-001	PCB MACH,PA INDUCTOR BD AM XMTR	2	
......3	517-0319	PCB MACH,PA IND BREAKAWAY AM XMTRS	0.05	
..1	957-1025-067	KIT,FD,PWR BLK 1581-1700KHZ AM-6A	2	
....2	360-0114-XXX	COIL,STAR IND ALL FREQ AM-A	4	L5, L6, L7, L8
......3	640-1000	WIRE,10GA,MAGNET	0.1	
..1	957-1035-157	FRQ,KIT OUT NET,1581-1705 KHZ,AM-5E	1	
....2	044-1123-293	CAP,MICA,1100PF,20KV,15A,5%	1	C2
....2	044-2723-291	CAP,MICA,2700PF,6KV,13A,5%	1	C4
....2	044-6213-291	CAP,MICA,620PF,6KV,6.2A,5%	2	C5A, C5B
....2	044-9113-292	CAP,MICA,910PF,10KV,9.1A,5%	4	C1A, C1B, C3A, C3B
....2	360-1501-XXX	COIL,L1,ALL FREQ,AM-5E	1	L1
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	21.6	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1502-XXX	COIL,L2,ALL FREQ,AM-5E	1	L2
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7104	LUG,TERM,3/8 RING CRIMP 10-12	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	34.4	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	
....2	360-1503-XXX	COIL,L3,ALL FREQ,AM-5E	1	L3
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0853	BRKT,COIL FORM,AM XMTR	2	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	19.3	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.33	
....2	360-1505-XXX	COIL,L5,ALL FREQ,AM-5E	1	L5
......3	402-0000	TY-RAP	2	
......3	410-0060	LUG,TERM,#10 RING CRIMP 10-12G	1	
......3	410-7105	LUG,TERM 1/4	1	
......3	471-0866-001	COIL FORM,SMALL,OUT NET,AM	0.001	
......3	600-2300	WIRE,LITZ,2300/48,D.NY.,NYLEZE(NOTE	6.52	
......3	693-0090	TUB,TEFLON,STANDARD,AWG9,NTL	1.5	

13 SCHEMATICS

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	6-24-99	ENGINEERING RELEASE	MSE		
B	6-26-00	35A fuse was 50A	MSE		10331
C	8-9-10	E2 WAS MARKED E5 ON SHT 1	B.G.		11806



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MSE 5-11-99
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL
FINISH
SEE DWG RA592-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

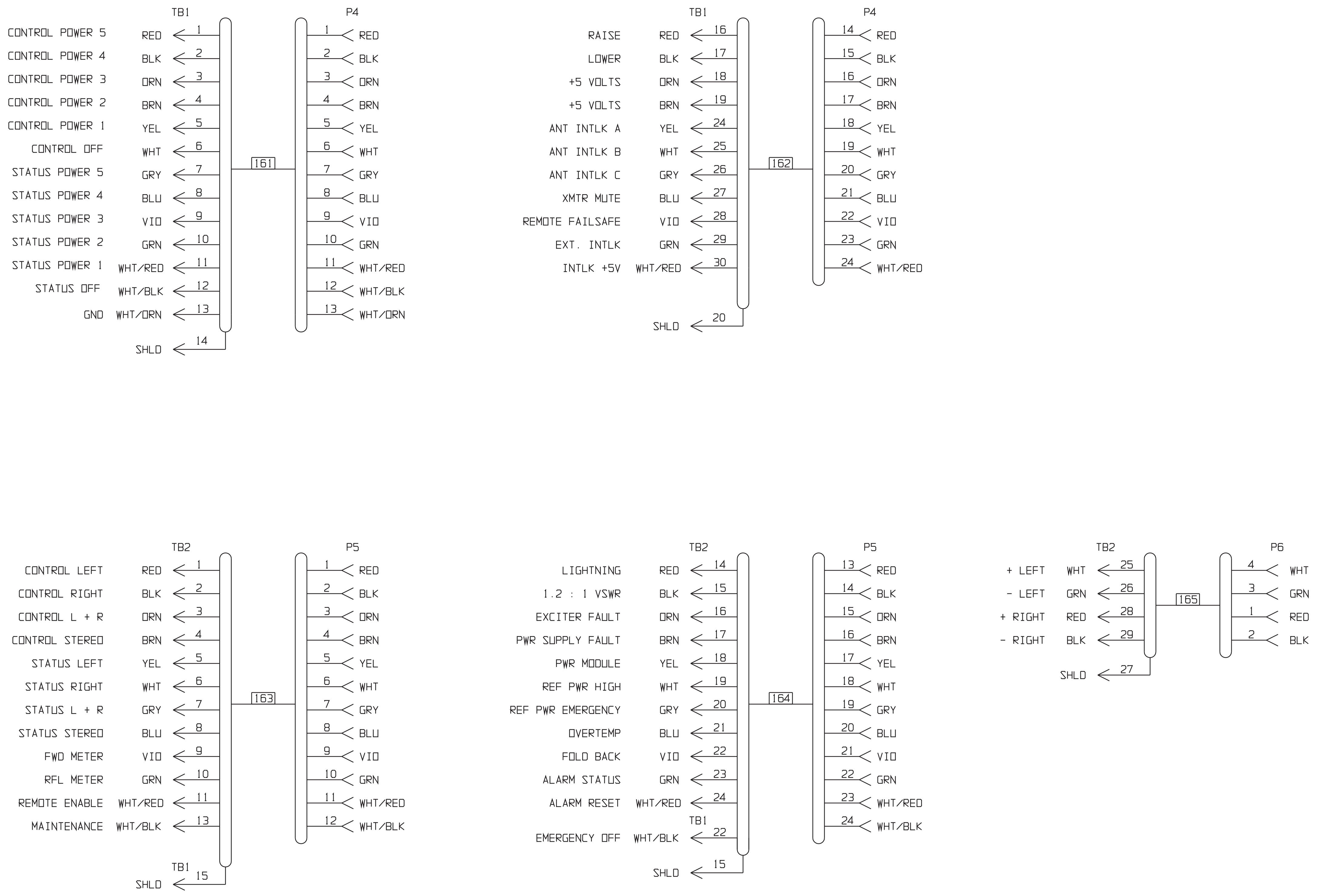
TITLE SCHEMATIC, OVERALL

TYPE S SIZE D DWG. NO. 907-2500-100 REV C

SCALE NTS SHEET 1 OF 2

REVISIONS

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	6-24-99	ENGINEERING RELEASE	MSE		
C	8-9-10	E2 WAS MARKED E5 ON SHT 1	B.G.		11806



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MSE 6-23-99
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL
FINISH
SEE DWG RA592-0000
NEXT ASSY.

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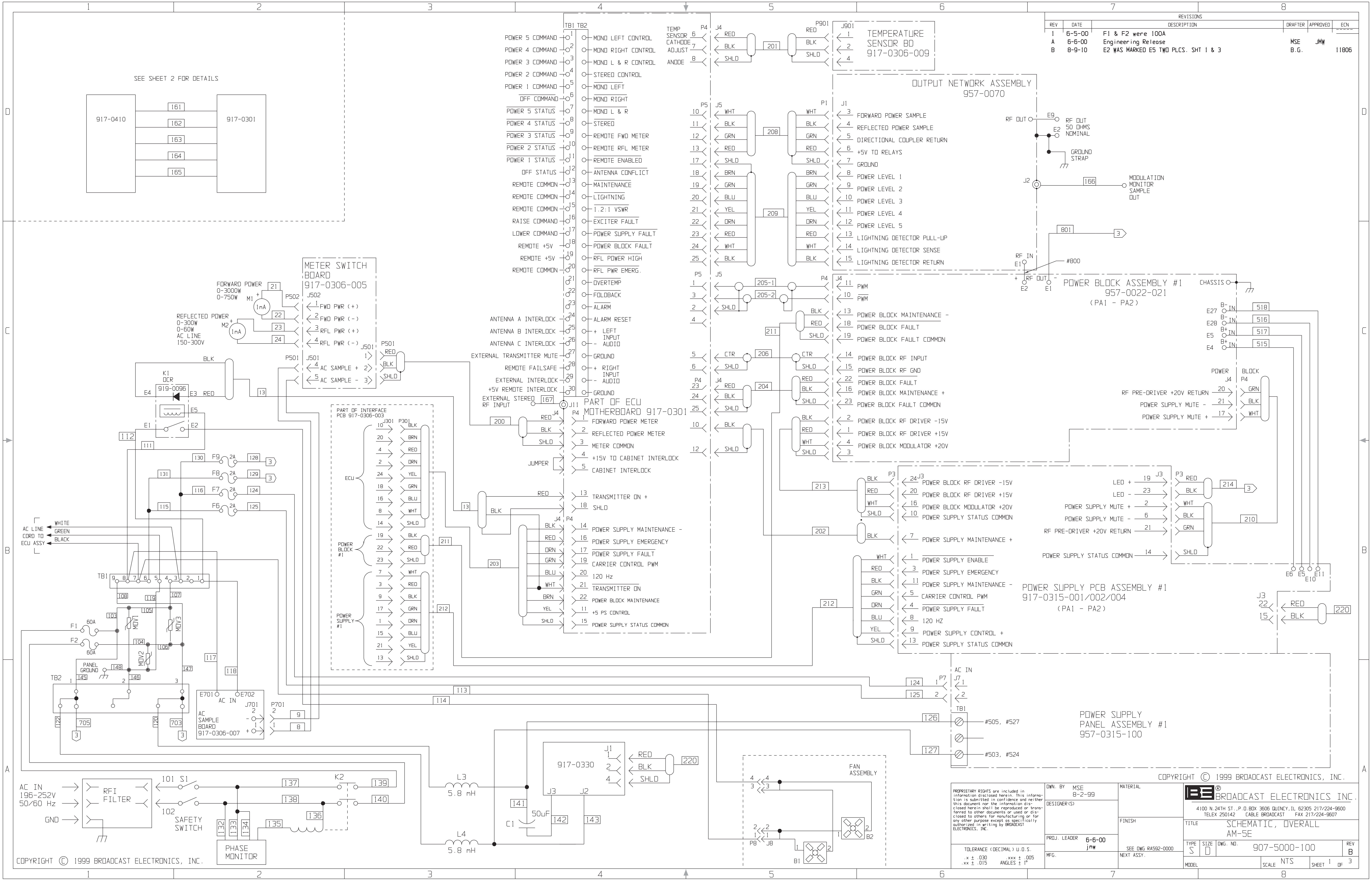
TITLE
OVERALL SCHEMATIC

TYPE S SIZE D DWG. NO. 907-2500-100 REV C
MODEL SCALE NTS SHEET 2 OF 2



REVISIONS
REV | DATE | DESCRIPTION | DRAFTER | APPROVED | ECN
1 | 6-5-00 | F1 & F2 were 100A
A | 6-6-00 | Engineering Release | MSE | JMW
B | 8-9-10 | E2 WAS MARKED E5 TWO PLCS. SHT 1 & 3 | B.G. | | 11806
SEE SHEET 2 FOR DETAILS
917-0410
917-0301
TEMPERATURE SENSOR BD 917-0306-009
OUTPUT NETWORK ASSEMBLY 957-0070
RF OUT 50 OHMS NOMINAL
GROUND STRAP
MODULATION MONITOR SAMPLE OUT
METER SWITCH BOARD 917-0306-005
FORWARD POWER 0-3000W 0-750W
REFLECTED POWER 0-300W 0-60W AC LINE 150-300V
PART OF ECU MOTHERBOARD 917-0301
PART OF INTERFACE PCB 917-0306-003
POWER BLOCK ASSEMBLY #1 957-0022-021 (PA1 - PA2)
POWER SUPPLY PCB ASSEMBLY #1 917-0315-001/002/004 (PA1 - PA2)
POWER SUPPLY PANEL ASSEMBLY #1 957-0315-100
AC SAMPLE BOARD 917-0306-007
917-0330
FAN ASSEMBLY
AC IN 196-252V 50/60 Hz
RFI FILTER
SAFETY SWITCH
PHASE MONITOR
AC LINE CORD TO ECU ASSY
L3 5.8 mH
L4 5.8 mH
C1 50uF
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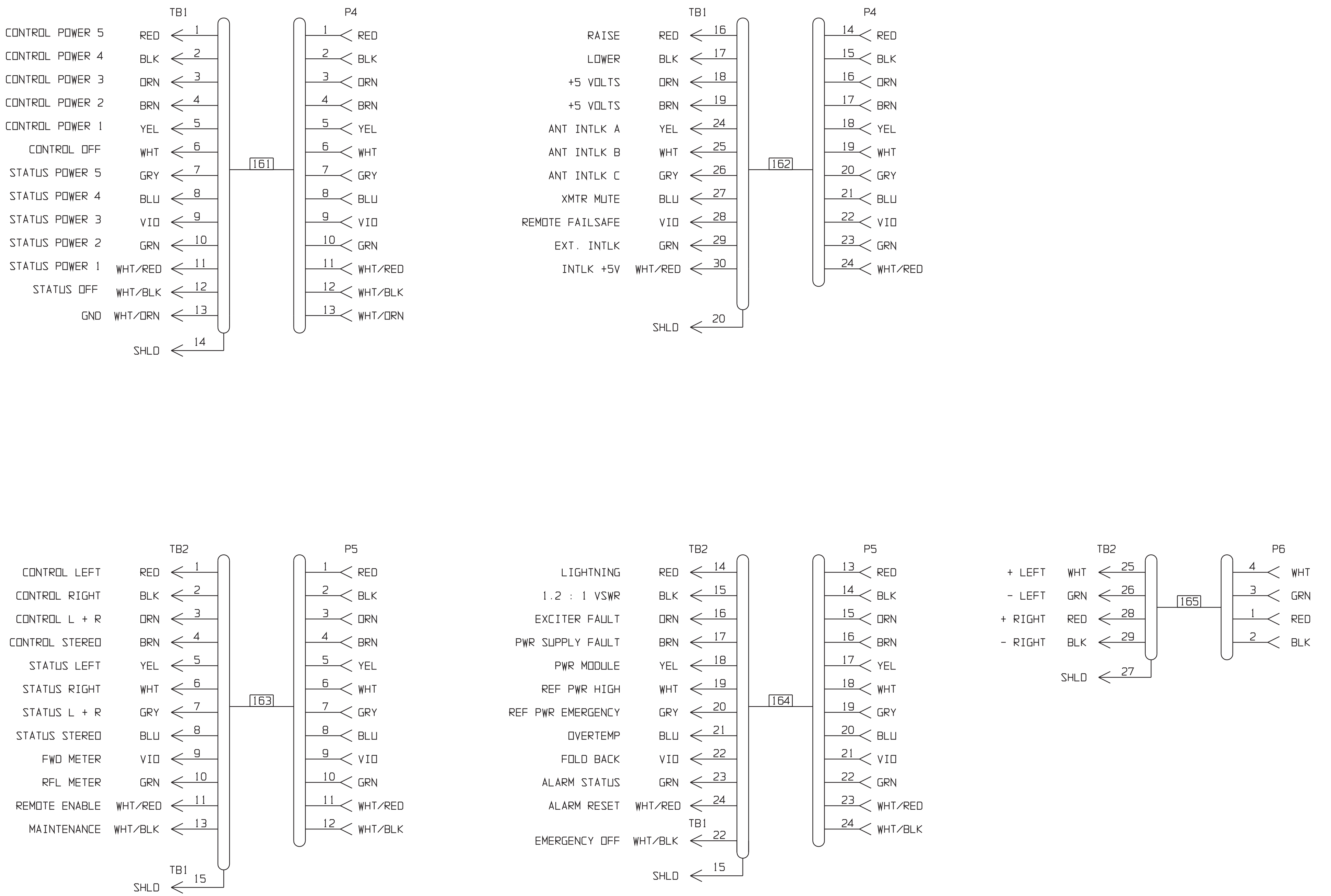
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607
TITLE SCHEMATIC, OVERALL AM-5E
DWN. BY MSE 8-2-99
PROJ. LEADER 6-6-00 jnw
SEE DWG RA592-0000
TYPE S SIZE D DWG. NO. 907-5000-100 REV B
SCALE NTS SHEET 1 OF 3

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	6-6-00	Engineering Release	MSE	JMW	———
B	8-9-10	E2 WAS MARKED E5 TWO PLCS. SHT 1 & 3	B.G.		11806



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MSE 8-3-99
DESIGNER(S)
PROJ. LEADER 6-6-00 jmw
MFG.
MATERIAL
FINISH
SEE DWG RA592-0000
NEXT ASSY.

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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

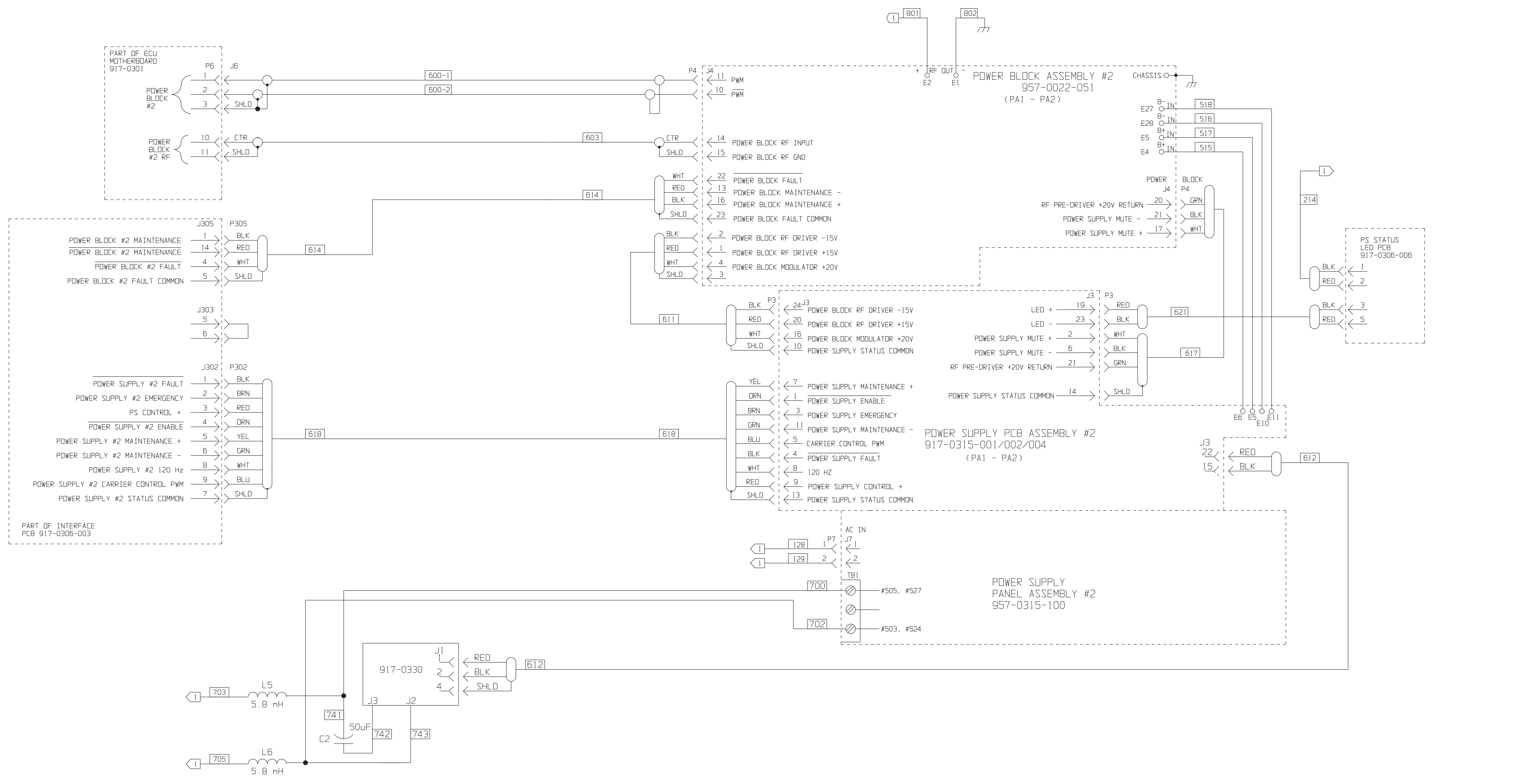
TITLE OVERALL SCHEMATIC AM-5E

TYPE S | SIZE D | DWG. NO. 907-5000-100 | REV B

MODEL AM-5E | SCALE NTS | SHEET 2 OF 3

REVISIONS

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	6-6-00	Engineering Release	MSE	JMW	
B	8-9-10	E2 WAS MARKED E5 TWO PLCS. SHT 1 & 3	B.G.		11806



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MSE 8-2-99
DESIGNER(S)
PROJ. LEADER 6-6-00 jmw
MFG.

MATERIAL
FINISH
SEE DWG RA592-0000
NEXT ASSY.

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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE OVERALL SCHEMATIC AM-5E

TYPE	SIZE	DWG. NO.	REV
S	D	907-5000-100	B

MODEL AM-5E SCALE NTS SHEET 3 OF 3

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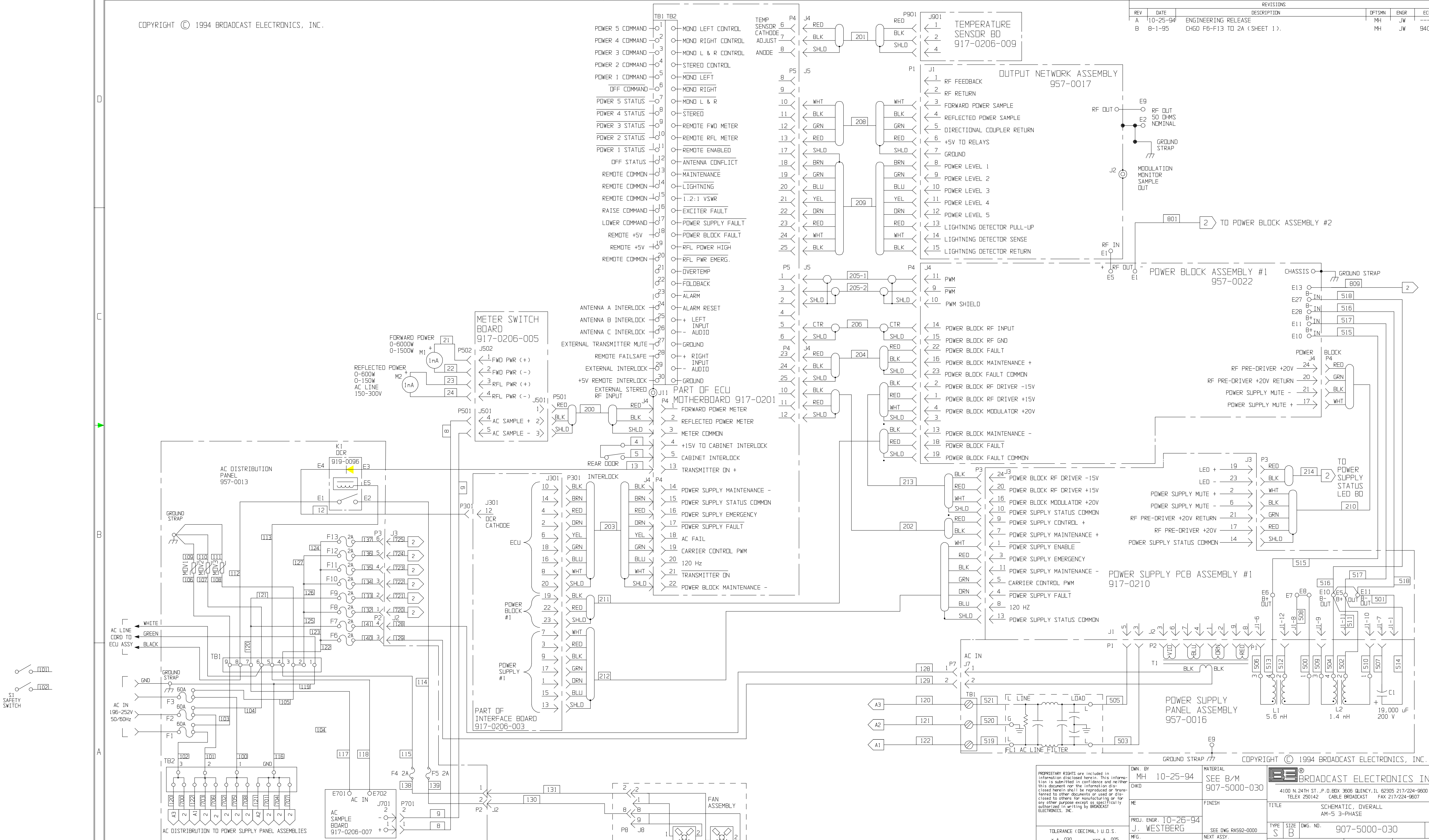
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	10-25-94	ENGINEERING RELEASE	MH	JW	-----
B	8-1-95	CHGD F6-F13 TO 2A (SHEET 1).	MH	JW	9406



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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	MH 10-25-94
CHKD	
ME	
PROJ. ENGR.	J. WESTBERG 10-26-94
MFG.	
MATERIAL	SEE B/M 907-5000-030
FINISH	
	SEE DWG RA592-0000
NEXT ASSY.	

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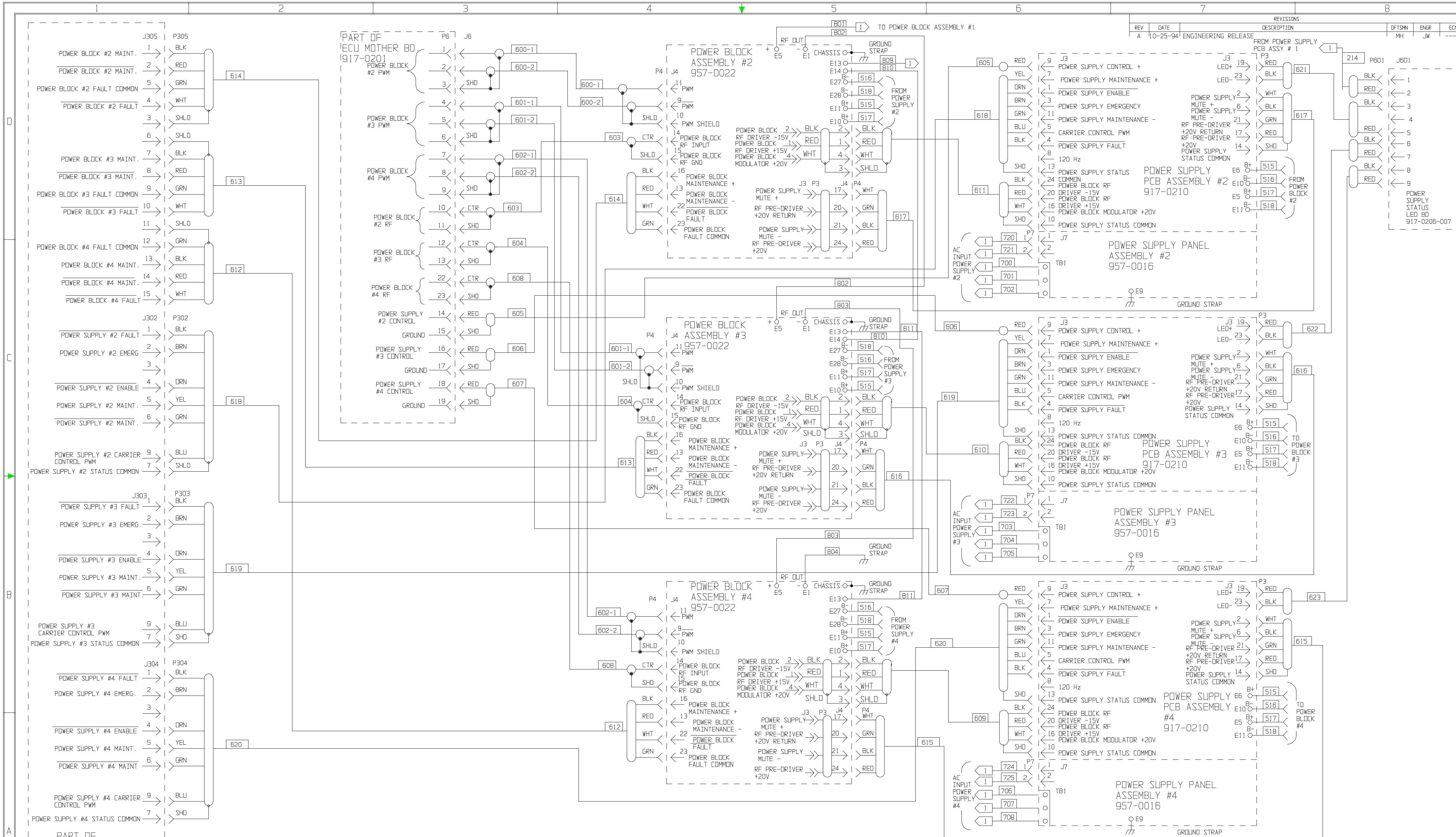
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: SCHEMATIC, OVERALL AM-5 3-PHASE

TYPE	SIZE	DWG. NO.	REV
S	B	907-5000-030	B

MODEL AM-5 SCALE NONE SHEET 1 OF 2



REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	10-25-94	ENGINEERING RELEASE	MH	JW	----

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MH 10-25-94
CHKD
ME
PROJ. ENGR. 10-26-94 J. WESTBERG
MFG.

MATERIAL SEE B/M 907-5000-030
FINISH
SEE DWG RA592-0000
NEXT ASSY.

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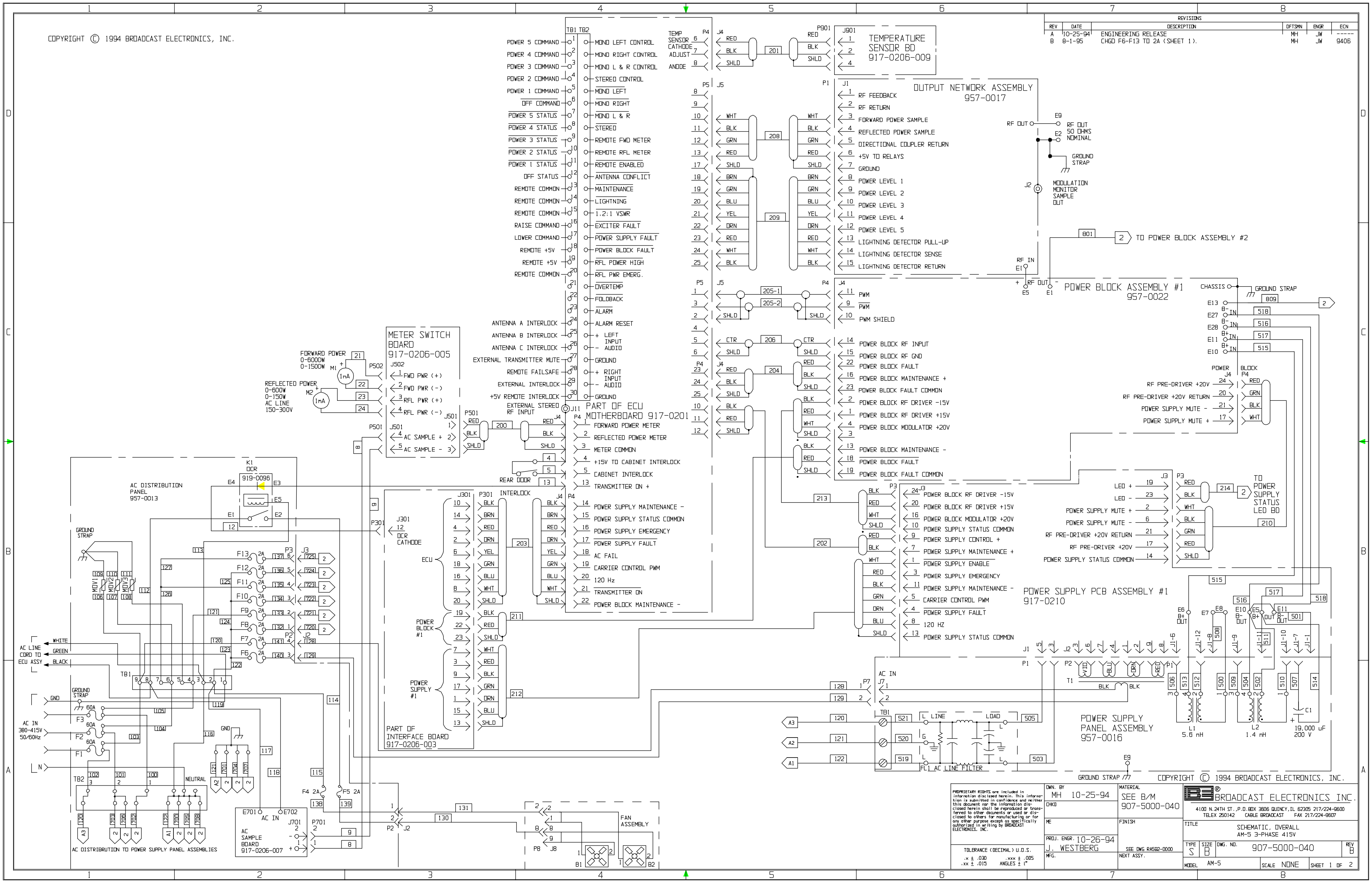
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC, OVERALL AM-5 3-PHASE

TYPE S | SIZE B | DWG. NO. 907-5000-030 | REV B
MODEL AM-5 | SCALE NONE | SHEET 2 OF 2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REVISIONS
REV | DATE | DESCRIPTION | DFTSMN | ENGR | ECN
A | 10-25-94 | ENGINEERING RELEASE | MH | JW | -----
B | 8-1-95 | CHGD F6-F13 TO 2A (SHEET 1). | MH | JW | 9406
POWER 5 COMMAND
POWER 4 COMMAND
POWER 3 COMMAND
POWER 2 COMMAND
POWER 1 COMMAND
OFF COMMAND
POWER 5 STATUS
POWER 4 STATUS
POWER 3 STATUS
POWER 2 STATUS
POWER 1 STATUS
OFF STATUS
REMOTE COMMON
RAISE COMMAND
LOWER COMMAND
REMOTE +5V
ANTENNA A INTERLOCK
ANTENNA B INTERLOCK
ANTENNA C INTERLOCK
EXTERNAL TRANSMITTER MUTE
REMOTE FAILSAFE
EXTERNAL INTERLOCK
+5V REMOTE INTERLOCK
EXTERNAL STEREO RF INPUT
TB1 TB2
MONO LEFT CONTROL
MONO RIGHT CONTROL
MONO L & R CONTROL
STEREO CONTROL
MONO LEFT
MONO RIGHT
MONO L & R
STEREO
REMOTE FWD METER
REMOTE RFL METER
REMOTE ENABLED
ANTENNA CONFLICT
MAINTENANCE
LIGHTNING
1.2:1 VSWR
EXCITER FAULT
POWER SUPPLY FAULT
POWER BLOCK FAULT
RFL POWER HIGH
RFL PWR EMERG.
OVERTEMP
FOLDBACK
ALARM
ALARM RESET
+ LEFT INPUT - AUDIO
GROUND
+ RIGHT INPUT - AUDIO
GROUND
PART OF ECU MOTHERBOARD 917-0201
TEMP SENSOR CATHODE ADJUST
ANODE
TEMPERATURE SENSOR BD 917-0206-009
OUTPUT NETWORK ASSEMBLY 957-0017
RF FEEDBACK
RF RETURN
FORWARD POWER SAMPLE
REFLECTED POWER SAMPLE
DIRECTIONAL COUPLER RETURN
+5V TO RELAYS
GROUND
POWER LEVEL 1
POWER LEVEL 2
POWER LEVEL 3
POWER LEVEL 4
POWER LEVEL 5
LIGHTNING DETECTOR PULL-UP
LIGHTNING DETECTOR SENSE
LIGHTNING DETECTOR RETURN
RF OUT 50 OHMS NOMINAL
GROUND STRAP
MODULATION MONITOR SAMPLE OUT
TO POWER BLOCK ASSEMBLY #2
POWER BLOCK ASSEMBLY #1 957-0022
PWM
PWM SHIELD
POWER BLOCK RF INPUT
POWER BLOCK RF GND
POWER BLOCK FAULT
POWER BLOCK MAINTENANCE +
POWER BLOCK FAULT COMMON
POWER BLOCK RF DRIVER -15V
POWER BLOCK RF DRIVER +15V
POWER BLOCK MODULATOR +20V
POWER BLOCK MAINTENANCE -
RF PRE-DRIVER +20V
RF PRE-DRIVER +20V RETURN
POWER SUPPLY MUTE -
POWER SUPPLY MUTE +
METER SWITCH BOARD 917-0206-005
FORWARD POWER 0-6000W 0-1500W
REFLECTED POWER 0-600W 0-150W AC LINE 150-300V
FWD PWR (+)
FWD PWR (-)
RFL PWR (+)
RFL PWR (-)
AC SAMPLE +
AC SAMPLE -
FORWARD POWER METER
REFLECTED POWER METER
METER COMMON
+15V TO CABINET INTERLOCK
CABINET INTERLOCK
TRANSMITTER ON +
REAR DOOR INTERLOCK
POWER SUPPLY MAINTENANCE -
POWER SUPPLY STATUS COMMON
POWER SUPPLY EMERGENCY
POWER SUPPLY FAULT
AC FAIL
CARRIER CONTROL PWM
120 Hz
TRANSMITTER ON
POWER BLOCK MAINTENANCE -
PART OF INTERFACE BOARD 917-0206-003
ECU
POWER BLOCK #1
POWER SUPPLY #1
OCR CATHODE
K1 OCR 919-0096
AC DISTRIBUTION PANEL 957-0013
TO POWER SUPPLY STATUS LED BD
LED +
LED -
POWER SUPPLY MUTE +
POWER SUPPLY MUTE -
POWER SUPPLY STATUS COMMON
POWER SUPPLY CONTROL +
POWER SUPPLY MAINTENANCE +
POWER SUPPLY ENABLE
POWER SUPPLY EMERGENCY
POWER SUPPLY MAINTENANCE -
POWER SUPPLY PCB ASSEMBLY #1 917-0210
AC LINE CORD TO ECU ASSY
WHITE
GREEN
BLACK
S1 SAFETY SWITCH
AC IN 380-415V 50/60Hz
AC DISTRIBUTION TO POWER SUPPLY PANEL ASSEMBLIES
NEUTRAL
AC SAMPLE BOARD 917-0206-007
FAN ASSEMBLY
AC IN
FL1 AC LINE FILTER
LINE
LOAD
POWER SUPPLY PANEL ASSEMBLY 957-0016
L1 5.6 mH
L2 1.4 mH
C1 19,000 uF 200 V
GROUND STRAP
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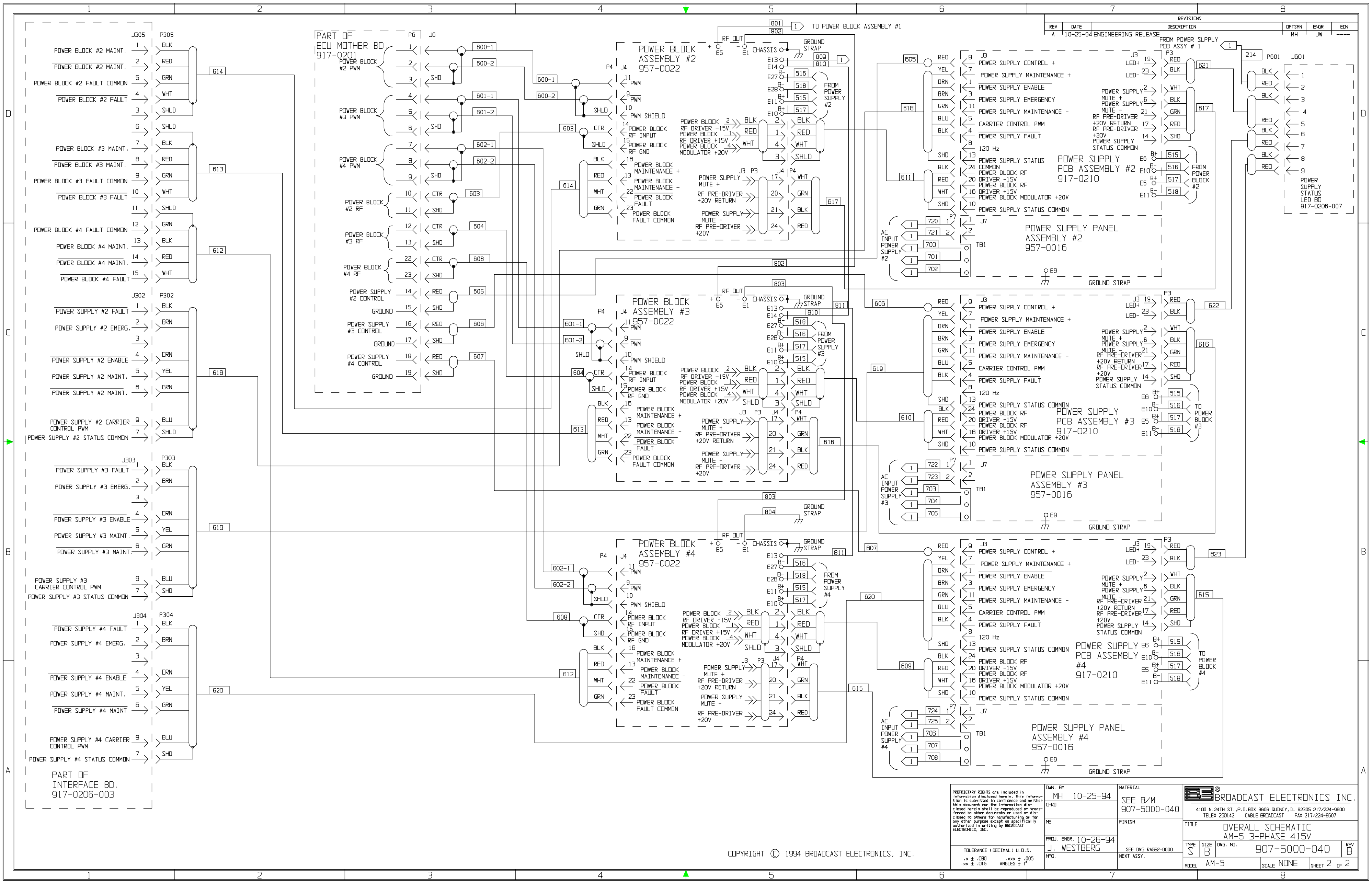
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY MH 10-25-94
CHKD
ME
PROJ. ENGR. 10-26-94 J. WESTBERG
MFG.
MATERIAL SEE B/M 907-5000-040
FINISH
SEE DWG RA5B2-0000
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607
TITLE SCHEMATIC, OVERALL AM-5 3-PHASE 415V
TYPE S SIZE B DWG. NO. 907-5000-040 REV B
MODEL AM-5 SCALE NONE SHEET 1 OF 2



PART OF INTERFACE BD. 917-0206-003
PART OF ECU MOTHER BD 917-0201
POWER BLOCK ASSEMBLY #2 957-0022
POWER BLOCK ASSEMBLY #3 957-0022
POWER BLOCK ASSEMBLY #4 957-0022
POWER SUPPLY PCB ASSEMBLY #2 917-0210
POWER SUPPLY PCB ASSEMBLY #3 917-0210
POWER SUPPLY PCB ASSEMBLY #4 917-0210
POWER SUPPLY PANEL ASSEMBLY #2 957-0016
POWER SUPPLY PANEL ASSEMBLY #3 957-0016
POWER SUPPLY PANEL ASSEMBLY #4 957-0016
POWER SUPPLY STATUS LED BD 917-0206-007
TO POWER BLOCK ASSEMBLY #1
FROM POWER SUPPLY PCB ASSY # 1
GROUND STRAP
REVISIONS
REV A 10-25-94 ENGINEERING RELEASE MH JW
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DWN. BY MH 10-25-94
MATERIAL SEE B/M 907-5000-040
PROJ. ENGR. 10-26-94 J. WESTBERG
SEE DWG RA562-0000
BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607
TITLE OVERALL SCHEMATIC AM-5 3-PHASE 415V
TYPE S SIZE B DWG. NO. 907-5000-040 REV B
MODEL AM-5 SCALE NONE SHEET 2 OF 2

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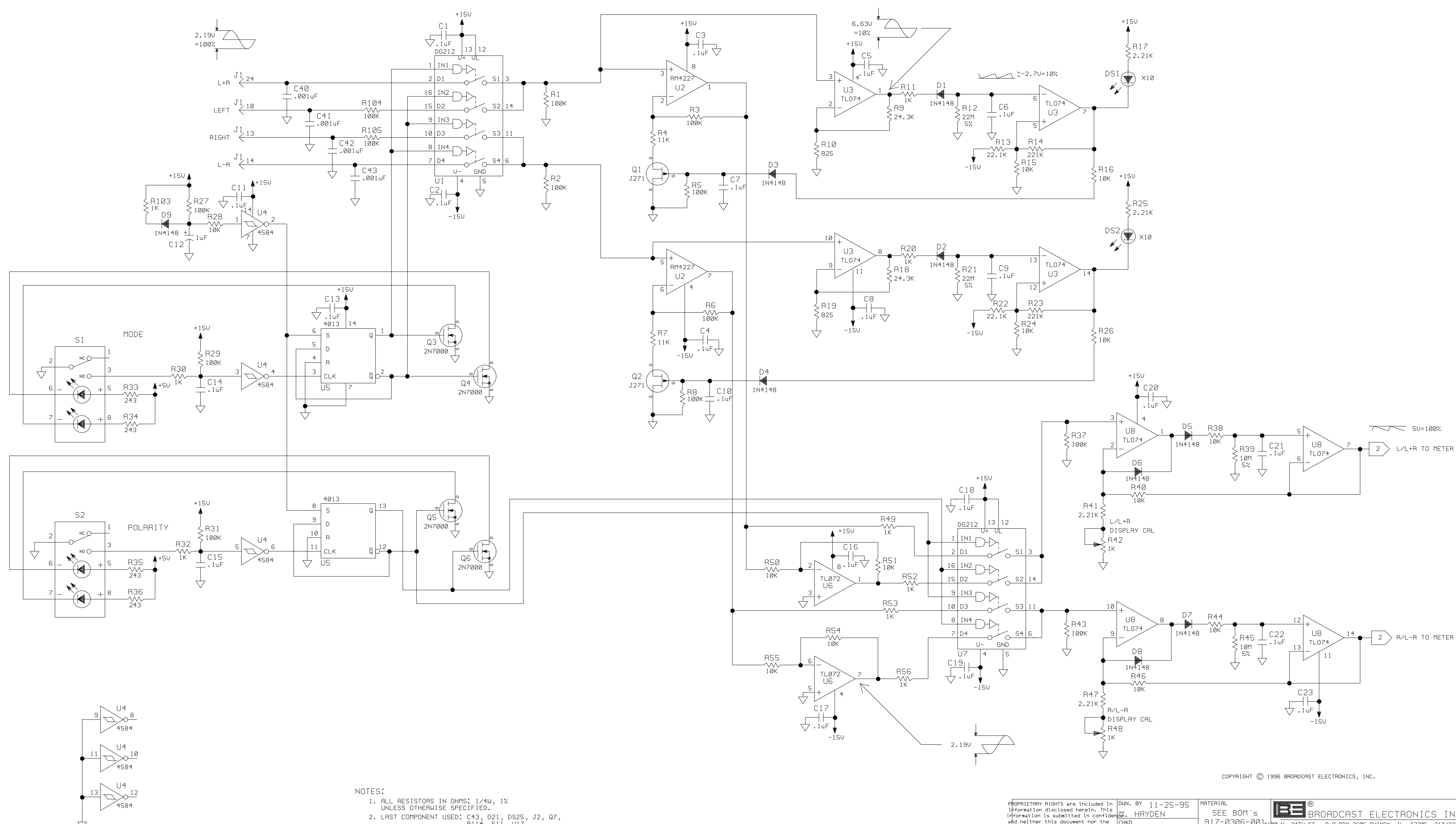
REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-25-95	PROTOTYPE RELEASE	MH	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH		----



NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C43, D21, DS25, J2, Q7, R114, S11, U17
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306-001.

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-25-95 M. HAYDEN
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE BOM's 917-0306-001
FINISH
SEE DWG AA592-0000
NEXT ASSY.

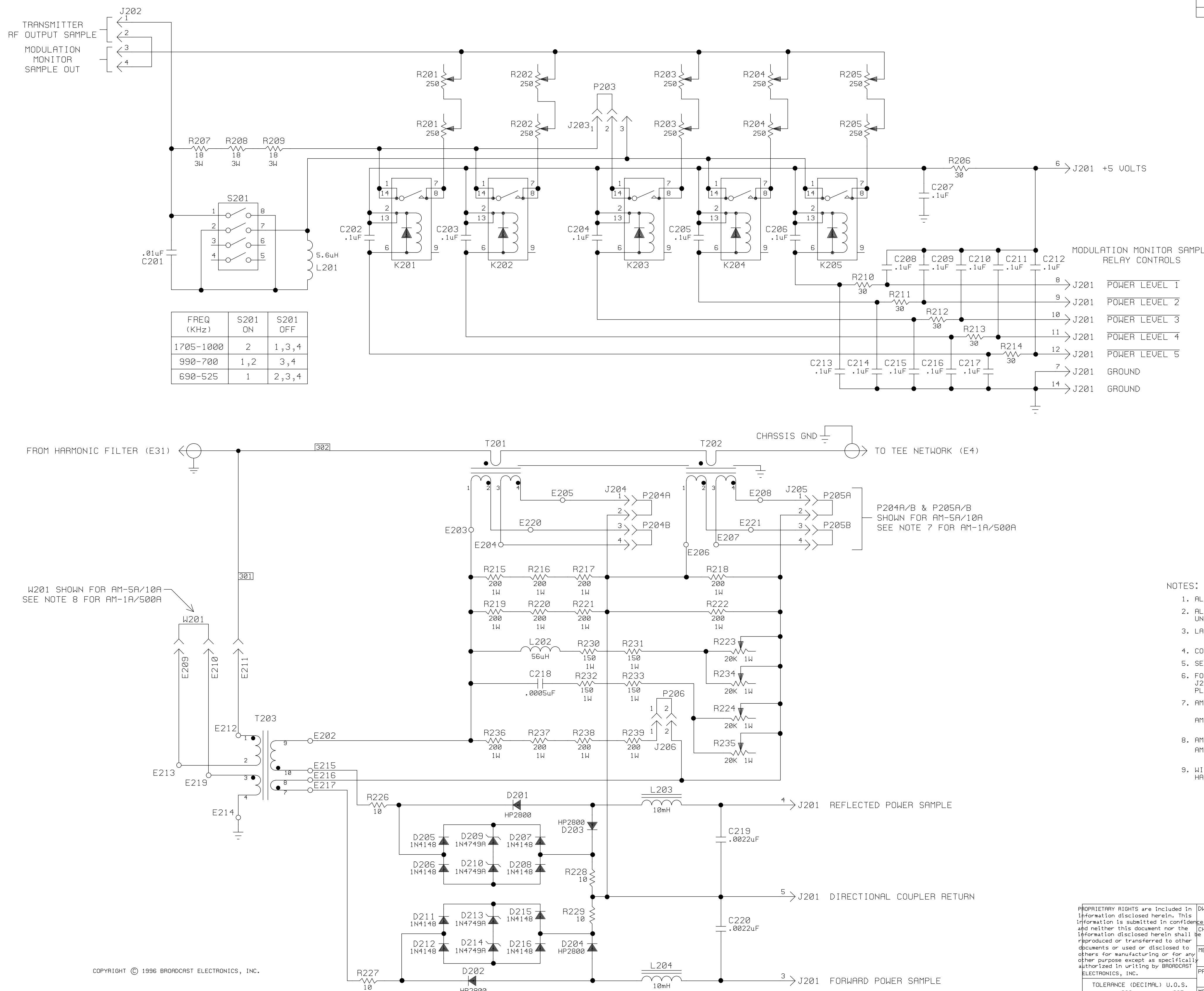
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC - ECU DISPLAY/ ECU CONTROL SWITCH BD

TYPE S SIZE B DWG. NO. 917-0306-001 REV A

MODEL AM-1A SCALE NONE SHEET 1 OF 3

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	9-15-97	MOVED DOTS ON T201-T203.	KT		9848



FREQ (KHz)	S201 ON	S201 OFF
1705-1000	2	1,3,4
990-700	1,2	3,4
690-525	1	2,3,4

NOTES:

1. ALL REFERENCE DESIGNATORS START AT 201.
2. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
3. LAST COMPONENTS USED: C220, D216, E221, J206, K205, L204, R239, S201, T203, W201
4. COMPONENTS NOT USED: E201, E218, R225
5. SEE ASSEMBLY: AD917-0306
6. FOR POWER LEVEL 3 = HIGH POWER PLACE P203 ON J203 PINS 1&2. FOR POWER LEVEL 3 = LOW POWER PLACE P203 ON J203 PINS 2&3.
7. AM-1A/AM-500A: PLACE P204A/P205A ON J204/J205 PINS 2&3; AND PLACE P204B/P205B ON J204/J205 PIN 4 ONLY.
   AM-5A/AM-10A: PLACE P204A/P205A ON J204/J205 PINS 1&2; AND PLACE P204B/P205B ON J204/J205 PINS 3&4 AS SHOWN.
8. AM-1A/AM-500A: REMOVE W201 AND CONNECT WIRE #301 TO E210.
   AM-5A/AM-10A: PLACE W201 ON E209 & E210; AND CONNECT WIRE #301 TO E211 AS SHOWN.
9. WIRE #301 & #302 ARE PART OF OUTPUT NETWORK WIRE HARNESS ASSEMBLY.

TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96 | CHKD | ME | PROJ. ENGR. | MFG.

MATERIAL SEE BOM 917-0306-002 | FINISH SEE DWG AA592-0000 | NEXT ASSY. AD917-0306

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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC DIRECTIONAL COUPLER PCB

TYPE S | SIZE B | DWG. NO. 917-0306-002 | REV B

MODEL AM-1A | SCALE NONE | SHEET 1 OF 1

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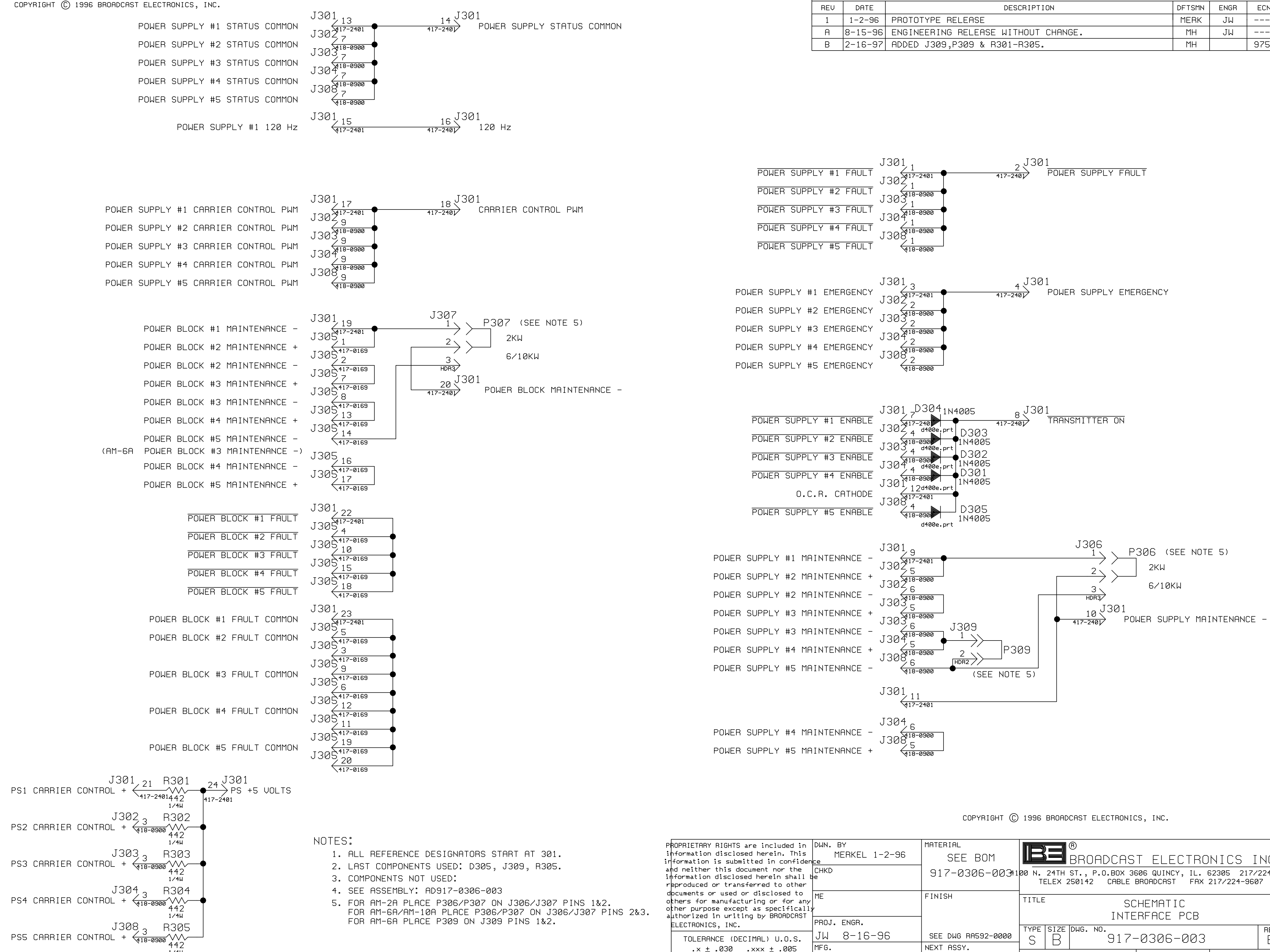
REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	2-16-97	ADDED J309,P309 & R301-R305.	MH		9757



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NOTES:

1. ALL REFERENCE DESIGNATORS START AT 301.
2. LAST COMPONENTS USED: D305, J309, R305.
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306-003
5. FOR AM-2A PLACE P306/P307 ON J306/J307 PINS 1&2.
   FOR AM-6A/AM-10A PLACE P306/P307 ON J306/J307 PINS 2&3.
   FOR AM-6A PLACE P309 ON J309 PINS 1&2.

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96
CHKD
ME
PROJ. ENGR. JW 8-16-96
MFG.

MATERIAL SEE BOM 917-0306-003
FINISH
SEE DWG AA592-0000
NEXT ASSY. AD917-0306-003

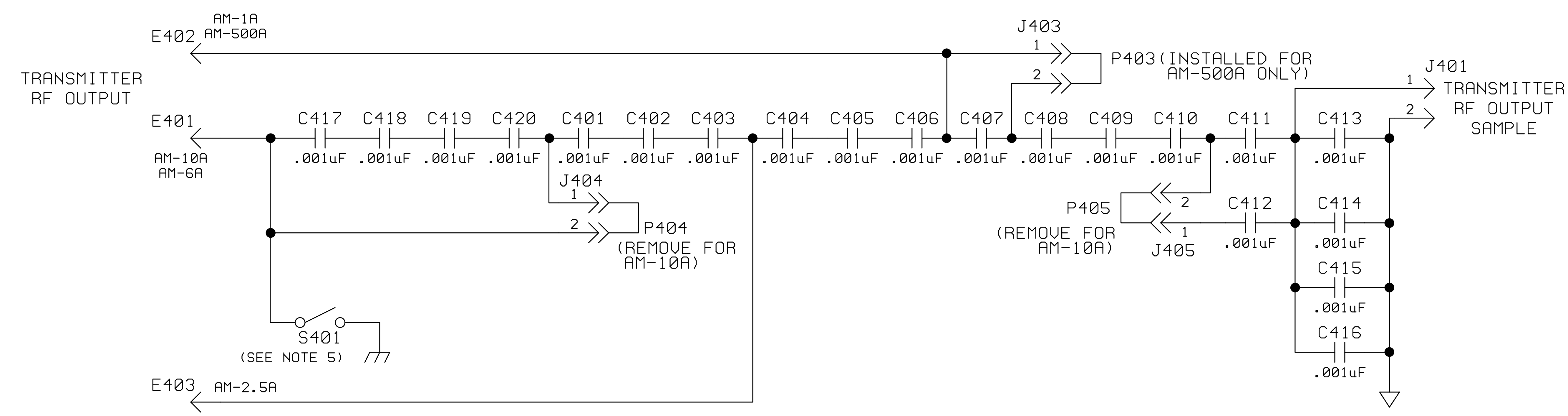
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

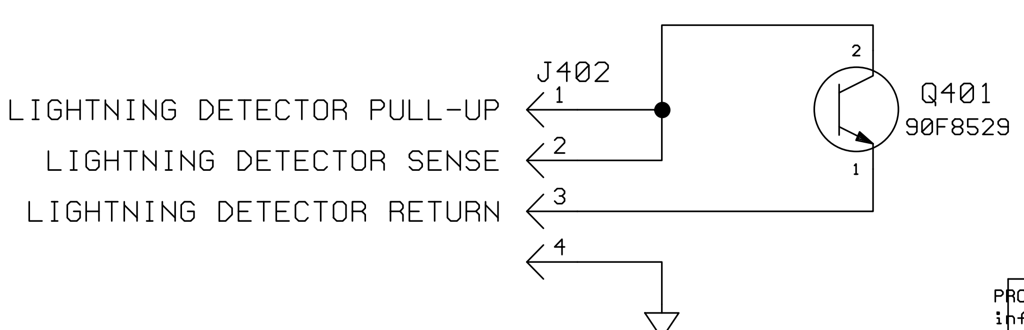
TITLE SCHEMATIC INTERFACE PCB

TYPE S | SIZE B | DWG. NO. 917-0306-003 | REV B

MODEL AM-1A,2A,6A,10A | SCALE NONE | SHEET 1 OF 1

REVISIONS						
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
2	7-22-96	ADDED INFO FOR 917-0306-014.	MH	JW	----
3	7-23-96	ADDED C417-C420,J/P404 & J/P405.	MH	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	11-25-97	ADDED AM-1A, AM-500A, AM-10A, AM-6A, AM-2.5A	MSE		9903





NOTES:

1. ALL REFERENCE DESIGNATORS START AT 401.
2. LAST COMPONENT USED: C420, E403, J405, P405, Q401, S401
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306-004/014.
5. S401 NOT USED ON 917-0306-014 (AM-1A).

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL
SEE BOM
917-0306-004
917-0306-014

FINISH
SEE DWG RA592-0000

NEXT ASSY.
957-0064

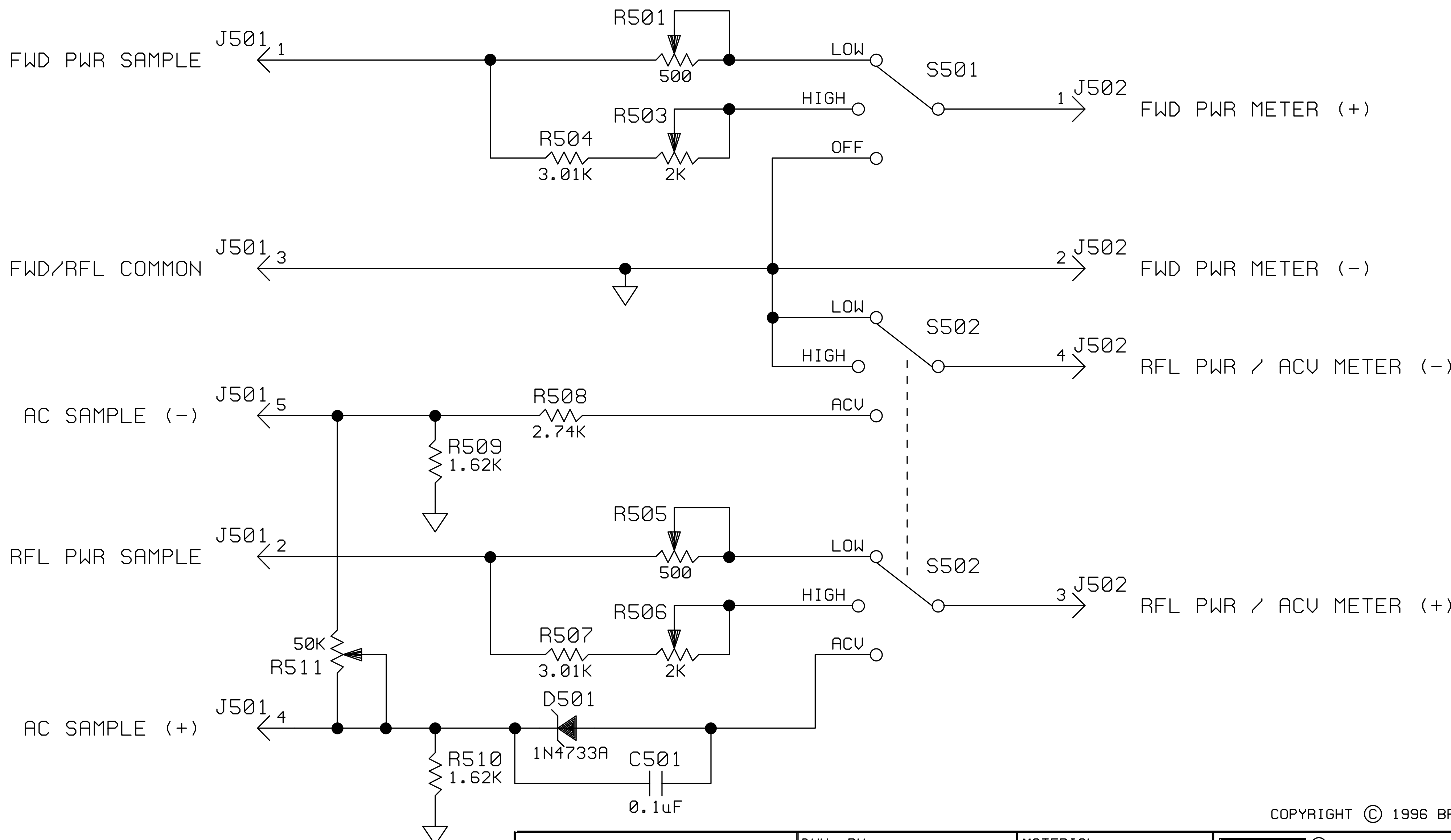
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE
SCHEMATIC
LIGHTNING DETECTOR PCB

TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-004/014	B

MODEL AM-1A | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH		----



NOTES:
1. ALL REFERENCE DESIGNATORS START AT 501.
2. ALL RESISTORS ARE IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
3. LAST COMPONENT USED: D501, J502, R511, S502
4. COMPONENTS NOT USED: R502
5. SEE ASSEMBLY: AD917-0306

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE BOM 917-0306-005
FINISH SEE DWG RA592-0000
NEXT ASSY. AD917-0306

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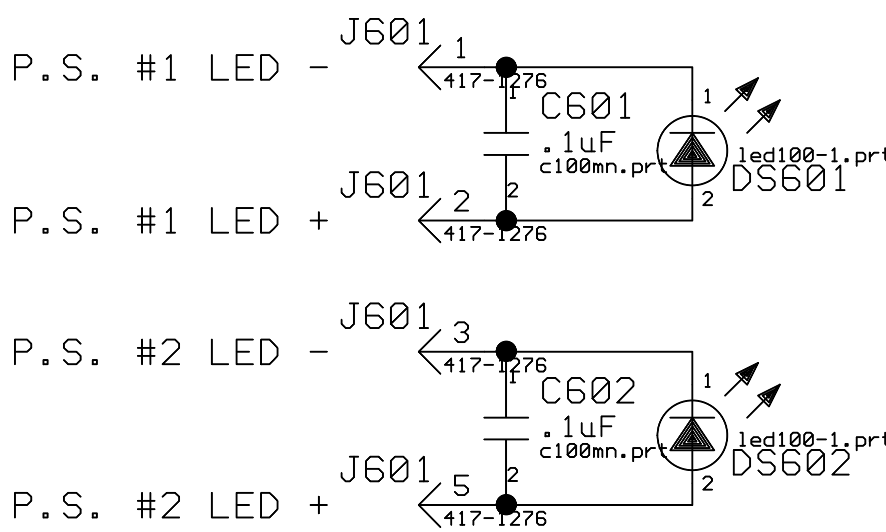
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

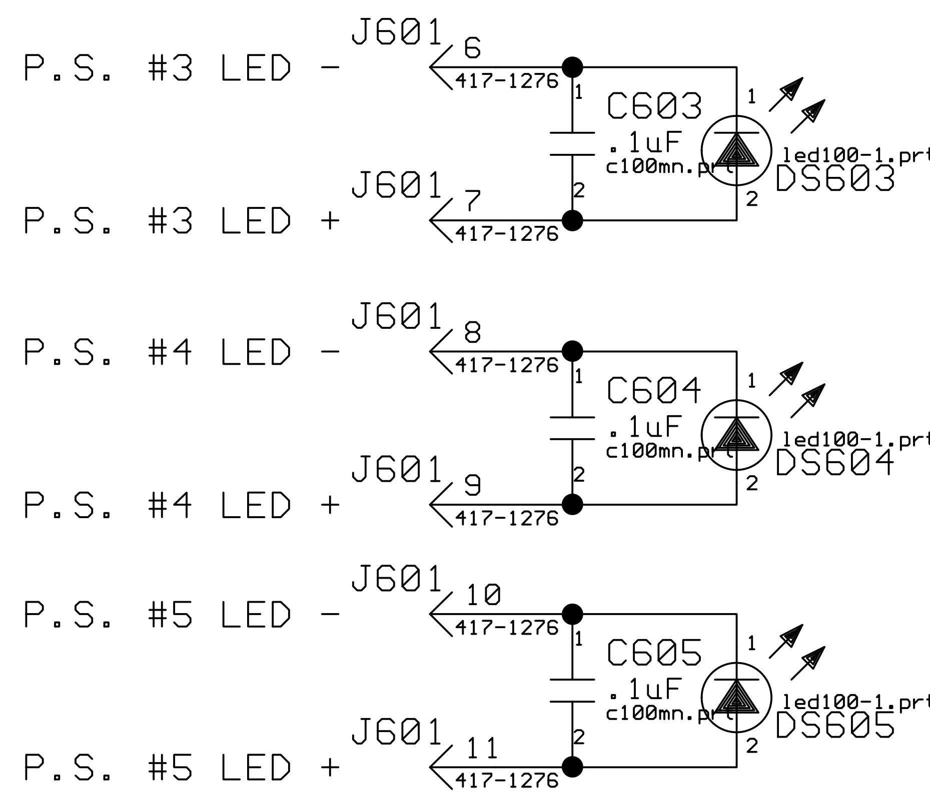
TITLE SCHEMATIC ECU METER SWITCH PCB

TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-005	A

MODEL AM-1A SCALE NONE SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH		----





NOTES:

1. ALL REFERENCE DESIGNATORS START AT 601.
2. LAST COMPONENT USED: DS605, J601,C605
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE BOM 917-0306-006
FINISH
SEE DWG RA592-0000
NEXT ASSY. AD917-0306

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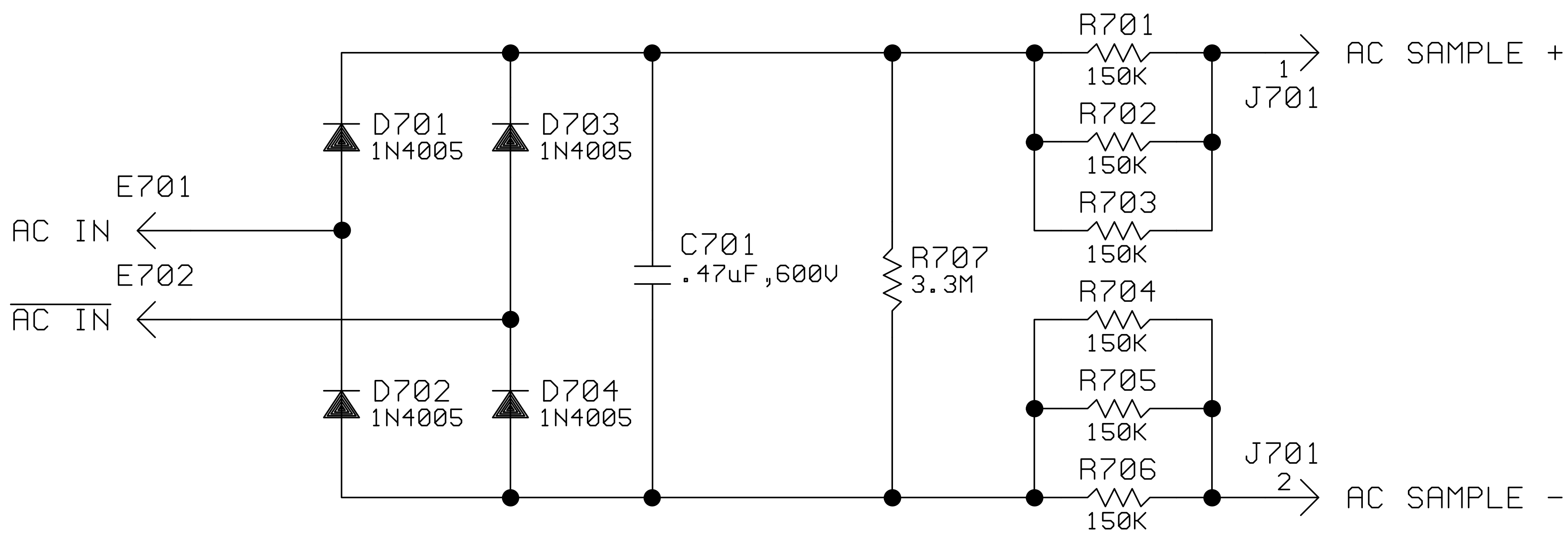
TITLE SCHEMATIC POWER SUPPLY STATUS LED PCB

TYPE	SIZE	DWG. NO.	REV
S	A	917-0306-006	A

MODEL AM-1A SCALE NONE SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH		----



NOTES:
1. ALL REFERENCE DESIGNATORS START AT 701.
2. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
3. LAST COMPONENT USED: C701, D704, E702, J701, R706
4. COMPONENTS NOT USED:
5. SEE ASSEMBLY: AD917-0306

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96

CHKD

ME

PROJ. ENGR.

MFG.

MATERIAL SEE BOM 917-0306-007

FINISH SEE DWG RA592-0000

NEXT ASSY. AD917-0306

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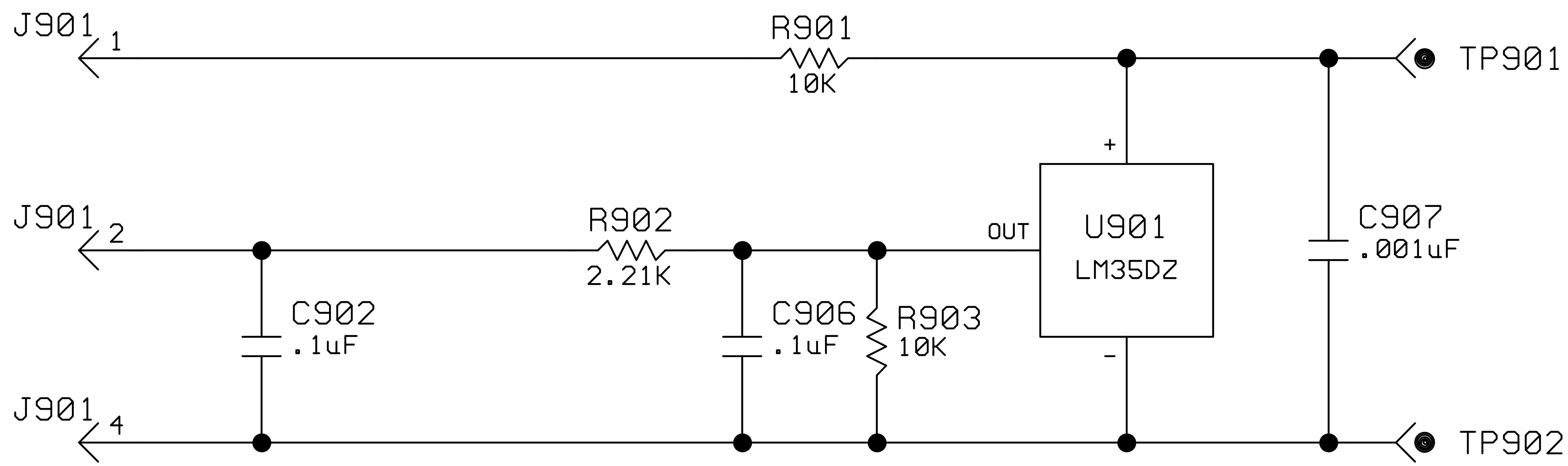
TITLE SCHEMATIC AC SAMPLE PCB

TYPE	SIZE	DWG. NO.	REV
S	A	917-0306-007	A

MODEL AM-1A | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH		----



NOTES:

1. ALL REFERENCE DESIGNATORS START AT 901.
2. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
3. LAST COMPONENT USED: C907, J901, R903, TP902, U901
4. COMPONENTS NOT USED: C901,C903-C905.
5. SEE ASSEMBLY: AD917-0306

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96

CHKD

ME

PROJ. ENGR.

MFG.

MATERIAL SEE BOM 917-0306-009

FINISH SEE DWG RA592-0000

NEXT ASSY. AD917-0306

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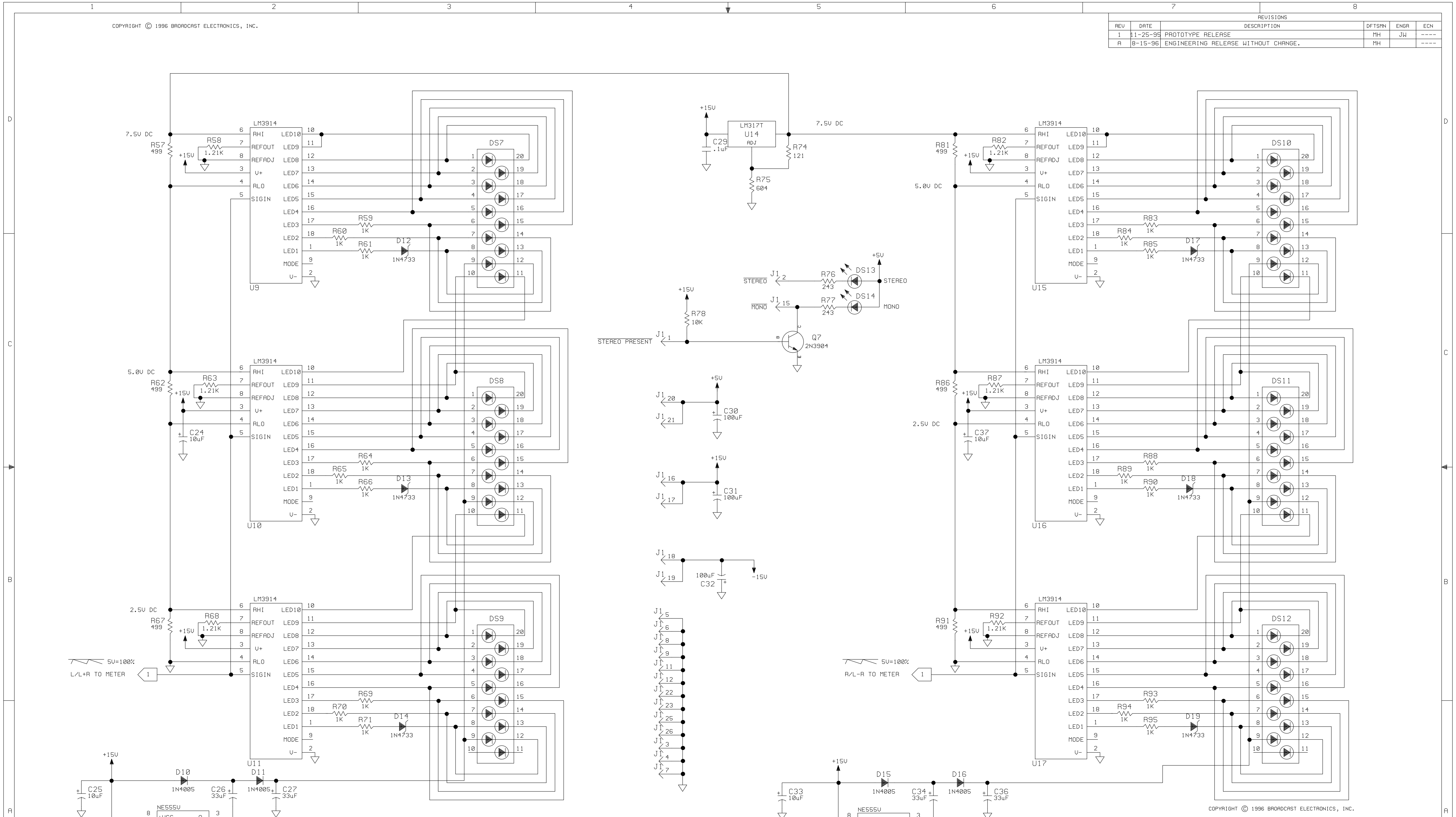
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC TEMPERATURE SENSOR PCB

TYPE	SIZE	DWG. NO.	REV
S	A	917-0306-009	A

MODEL AM-1A SCALE NONE SHEET 1 OF 1



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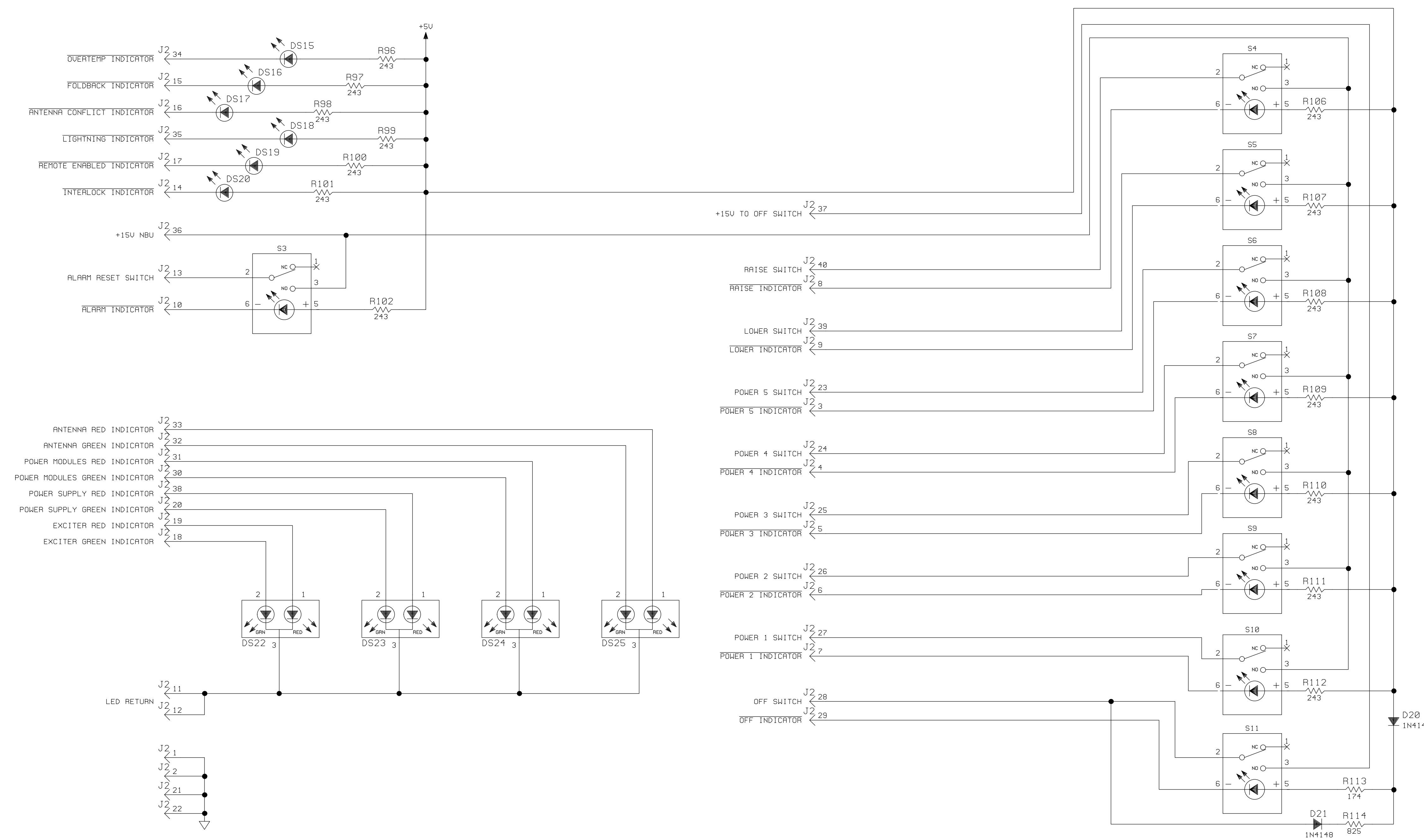
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-25-95 M. HAYDEN	MATERIAL SEE BOM's 917-0306-001	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
CHKD		
ME	FINISH	TITLE SCHEMATIC - ECU DISPLAY/ ECU CONTROL SWITCH BD
PROJ. ENGR.	SEE DWG RA592-0000	TYPE S SIZE B DWG. NO. 917-0306-001 REV A
MFG.	NEXT ASSY.	MODEL AM-1A SCALE NONE SHEET 2 OF 3

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-25-95	PROTOTYPE RELEASE	MH	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH		----



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-25-95 M. HAYDEN
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE BOM´s 917-0306-001
FINISH
SEE DWG RA592-0000
NEXT ASSY.

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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC - ECU DISPLAY/ ECU CONTROL SWITCH BD

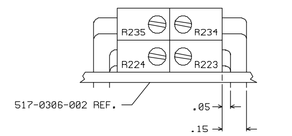
TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-001	A

MODEL AM-1A | SCALE NONE | SHEET 3 OF 3

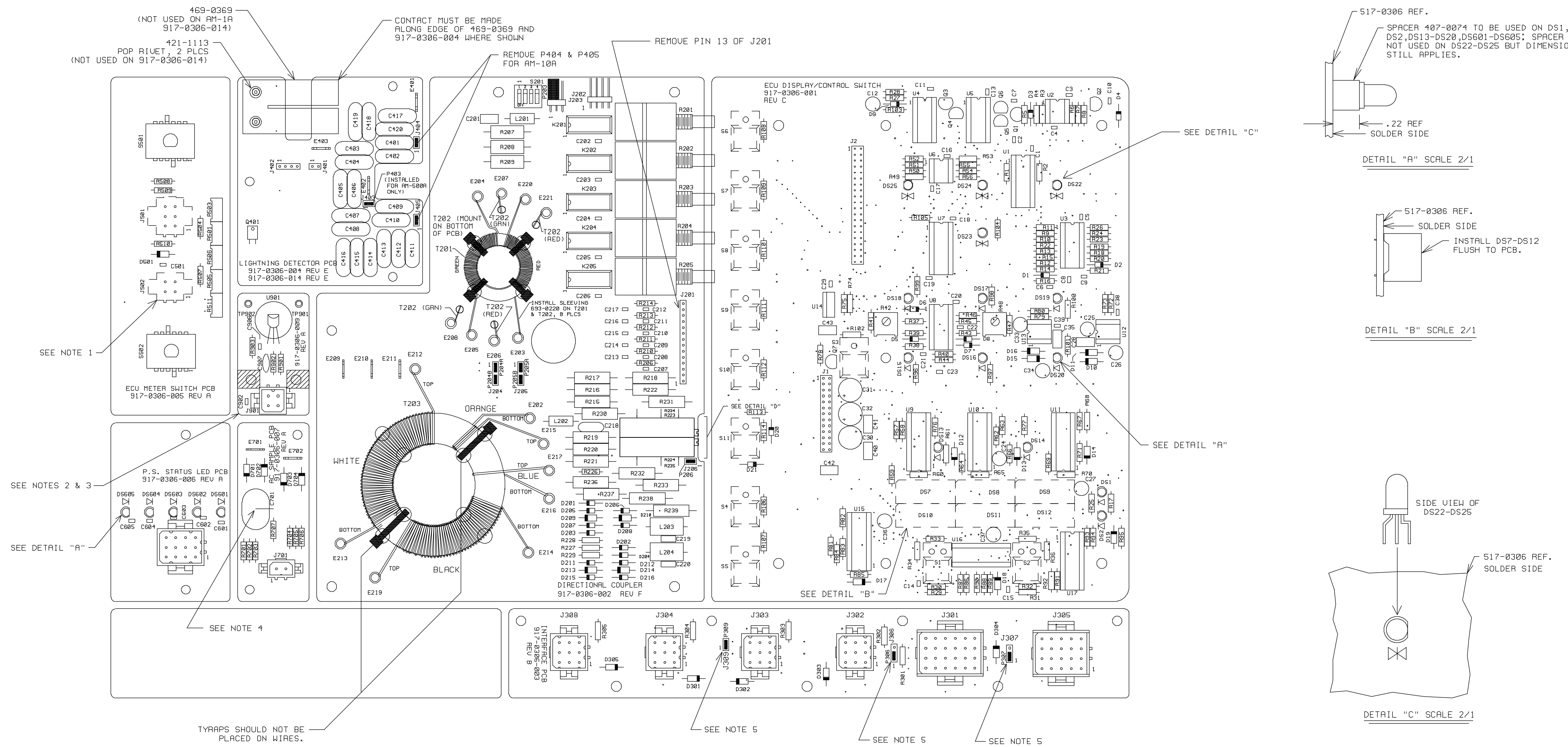
REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	1-2-96	PROTOTYPE RELEASE	MERK	JW	----
2	7-22-96	ADDED 917-0306-014 TO 917-0306-004.	MH	JW	----
3	7-24-96	ADDED C417-C420,J/P404 & J/P405 ON -004/-014.	MH	JW	----
A	8-15-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	2-18-97	ON -001:MOVED C42. ON -003 ADDED J309/P309 AND R301 THRU R305.	MH	JW	9757
C	3-25-97	C30, C31, C32 WERE 020-1083	MSE	DDL	9783
D	9-15-97	CHGD LEADS ON T201-T203.	KT	JW	9848
E	9-16-97	CHGD COMP. OUT LINE FOR C401-C420.	KT	JW	9858
F	4-13-99	DEL 2 TYRAPS AND ADDED NOTE ON -002.	KT		10125

NOTES:

1. FORM LEADS FOR R223 & R224 .05" AWAY FROM COMPONENT BODY. FORM LEADS FOR R234 & R235 .15" AWAY FROM COMPONENT BODY.
2. GLUE R223,R224,R234 & R235 TOGETHER AS SHOWN.



DETAIL "D" SCALE 2/1



COATING INSTRUCTIONS: (917-0306-009 PCB ONLY)

1. MASK BODY OF DEVICE U901 COMPLETELY. MASK TURRETS TP901 & TP902. INSERT 418-0240 DUMMY PLUG INTO J901. MASK BOTH SIDES OF PCB AT MOUNTING HOLES AS SHADED.
2. APPLY ONE COAT OF URETHANE CONFORMAL COATING (700-0126), TO BOTH SIDES OF PCB, PER VENDOR INSTRUCTIONS; THEN REMOVE MASKING.
3. ALLOW 15 MINUTES DRYING TIME.

NOTES:

1. ALL PARTS SHOWN WITH DASHED LINES TO BE MOUNTED FROM OPPOSITE SIDE.
2. U901 TO BE CENTERED IN .630 HOLE.
3. TEMP SENSOR PCB #916-0306-009 IS TO RECEIVE CONFORMAL COATING AFTER ASSEMBLY. SEE COATING INSTRUCTIONS.
4. COVER EXPOSED LEAD OF C701 WITH HEATSHRINK TUBING P/N 611-0060.
5. FOR AM-2A PLACE P306/P307 ON J306/J307 PINS 1 & 2.
FOR AM-6A/AM-10A PLACE P306/P307 ON J306/J307 PINS 2 & 3.
P309 USED ON AM-6A ONLY.

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY MERK 1-2-96	MATERIAL SEE BOM'S 917-0306-001 THRU 917-0306-007, 917-0306-009, 917-0306-014	
CHKD		
ME	FINISH	
PROJ. ENGR. JW 8-16-96	SEE DWG RA592-0000	
MFG.	NEXT ASSY.	

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TITLE: ASSEMBLY, ECU BREAK-AWAY PCB

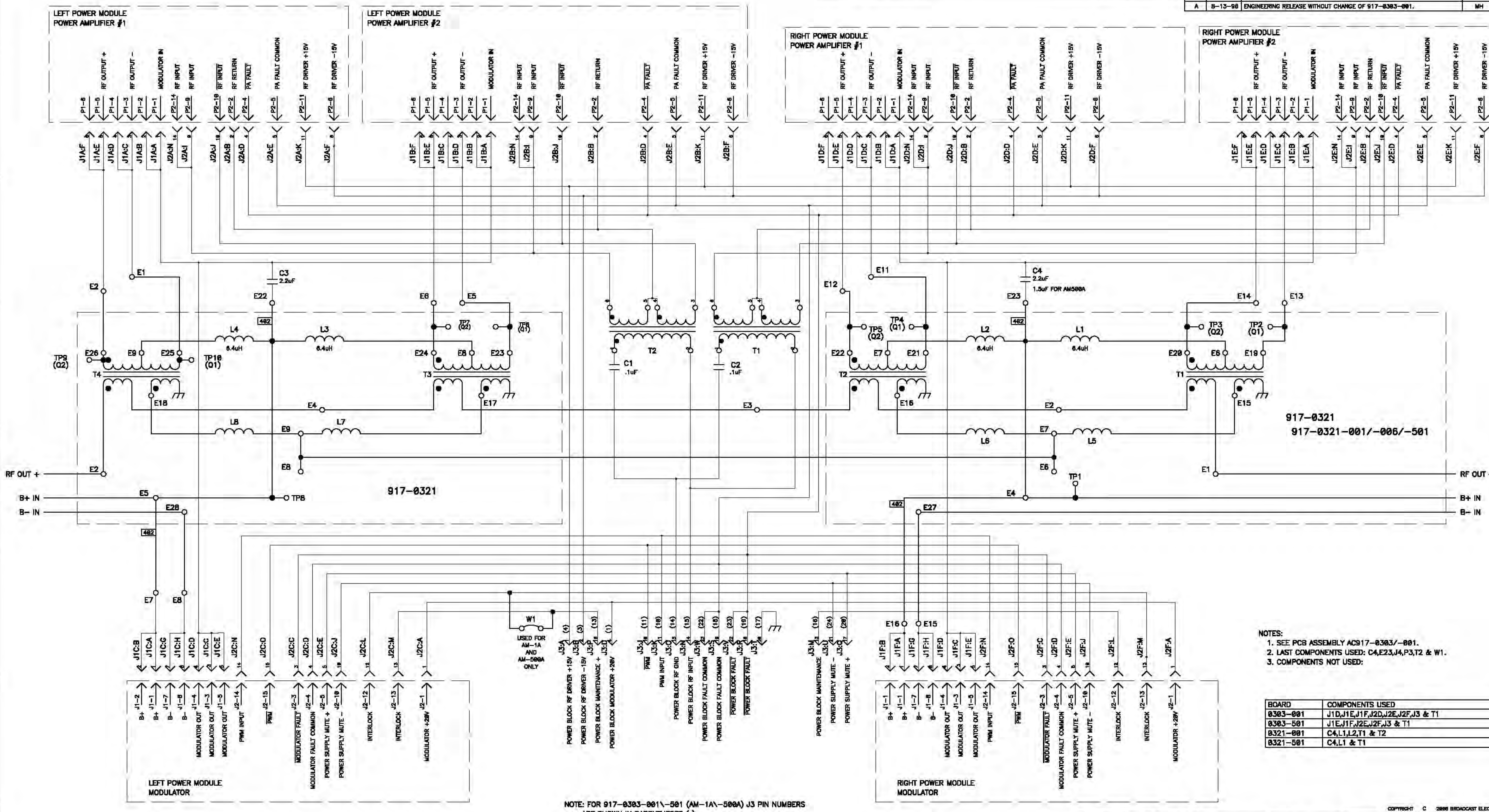
TYPE	SIZE	DWG No.	REV
A	D	917-0306-001 THRU 917-0306-007,-009&-014	F

MODEL AM-1A / AM-2A AM-6A & AM-10A | SCALE 1/1 | SHEET 1 OF 1

B	12-9-96	ADDED T2, DELETED R1 & MOVED C1.	MH	JW	9738
C	10-17-97	ADDED NOTES & CHART.	KT	JW	9876
D	12-17-97	ADDED J1C & J1F PIN 2 TO B+.	KT	JW	9915
E	4-30-98	ADDED TEST POINTS TP1-TP10.	MSE	JW	9960
F	7-31-00	CORRECTED P1 WIRING	JTB	JW	10324
G	4-4-08	ADD PIN3 ON J1C	JTB		11621

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	2-27-96	PROTOTYPE RELEASE	MH	JW	-----
2	4-12-96	ADDED CHASSIS GND (11 PLCS)TO MOTHERBOARD;CHGD E13 TO E7,E14 TO E9, ADDED E6 & E8 AND CONNECTED E8-E9 ON COMBINER BOARD.	MH	JW	-----
3	5-20-96	ADDED C1,C2,R1,T1,J2A-2,J2B-2,J2D-2,J2E-2;DELETED J1A-7/8,J1B-7/8,J1C-6,J1D-7/8,J1E-7/8 & J1F-6.	MH	JW	-----
A	8-13-96	ENGINEERING RELEASE WITHOUT CHANGE OF 917-0303-001.	MH	JW	-----



NOTE: FOR 917-0303-001\-501 (AM-1A\-500A) J3 PIN NUMBERS ARE SHOWN IN PARENTHESES ( ).

NOTES:
1. SEE PCB ASSEMBLY AC917-0303/-001.
2. LAST COMPONENTS USED: C4,E23,J4,P3,T2 & W1.
3. COMPONENTS NOT USED:

BOARD	COMPONENTS USED
0303-001	J1D,J1E,J1F,J2D,J2E,J2F,J3 & T1
0303-501	J1E,J1F,J2E,J2F,J3 & T1
0321-001	C4,L1,L2,T1 & T2
0321-501	C4,L1 & T1

TOLERANCE (DECIMAL) U.O.S.
.x + .030 .xxx + .005
.xx + .015 ANGLES + 1

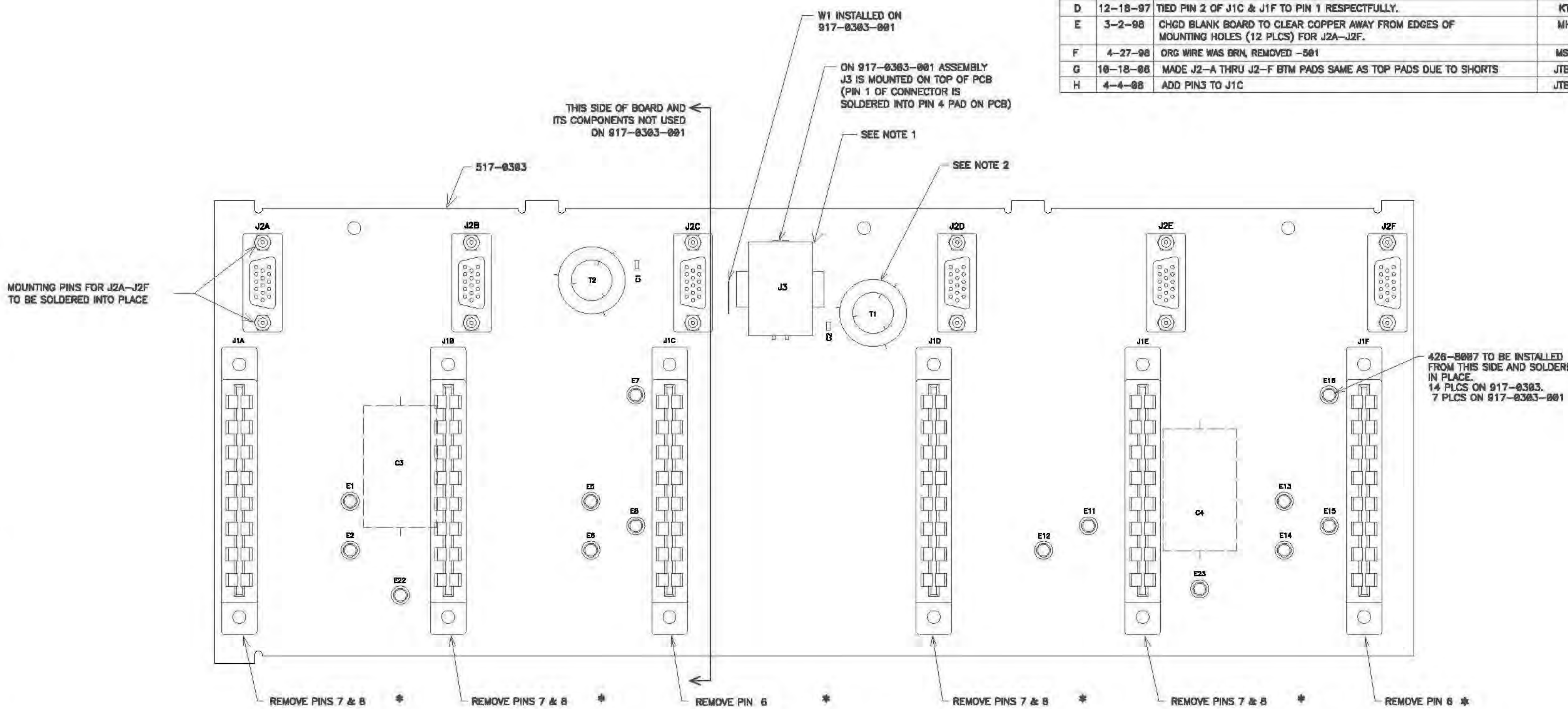
DWN. BY 2-27-96
DESIGNER(S) M. HAYDEN
DATE JW 8-16-96
MFG.
MATERIAL SEE BOM'S 917-0303 917-0303-001 917-0303-501
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL 62305
217/224-9600 FAX 217/224-9607

TITLE SCHEMATIC – POWER BLOCK MOTHERBOARD & COMBINER

TYPE S SIZE D DWG. NO. 917-0303/001/-501 REV G
MODEL AM-1A SCALE NONE SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	3-4-96	PROTOTYPE RELEASE.	MH	JW	----
2	6-27-96	ADDED C1,C2,R1 & T1.	MH	JW	----
3	7-23-96	UPDATED ASSEMBLY NOTES AND ADDED W1.	MH	JW	----
A	8-13-96	ENGINEERING RELEASE WITHOUT CHANGE OF 917-0303-001.	MH	JW	----
B	12-10-96	ADDED T2, DELETED R1 & MOVED C1.	MH	JW	9738
C	10-17-97	ADDED -501 BOARD.	KT	JW	9878
D	12-18-97	TIED PIN 2 OF J1C & J1F TO PIN 1 RESPECTFULLY.	KT	JW	9915
E	3-2-98	CHGD BLANK BOARD TO CLEAR COPPER AWAY FROM EDGES OF MOUNTING HOLES (12 PLCS) FOR J2A-J2F.	MH	JW	9945
F	4-27-98	ORG WIRE WAS BRN, REMOVED -501	MSE	JW	9966
G	10-18-06	MADE J2-A THRU J2-F BTM PADS SAME AS TOP PADS DUE TO SHORTS	JTB	JW	11474
H	4-4-08	ADD PIN3 TO J1C	JTB		11621



NOTES:

1. COMPONENTS SHOWN WITH DASHED LINES TO BE MOUNTED FROM OPPOSITE SIDE.
2. TERMINALS 1-2 ARE BLU; 3-4 ARE WHT; 5-6 ARE ORG.

* USE AMP TOOL #91118-1 TO REMOVE DESIGNATED PINS FROM J1A-J1F.

TOLERANCE (DECIMAL) U.O.S.
.X + .030 .XXX + .005
.XX + .015 ANGLES + 1°

DWN. BY 3-4-96 M. HAYDEN
CHKD
ME
PROJ. ENGR. 3-4-96 J. WESTBERG
MFG.

MATERIAL SEE B/M 917-0303 917-0303-001
FINISH
SEE DWG RA592-0000
NEXT ASSY.

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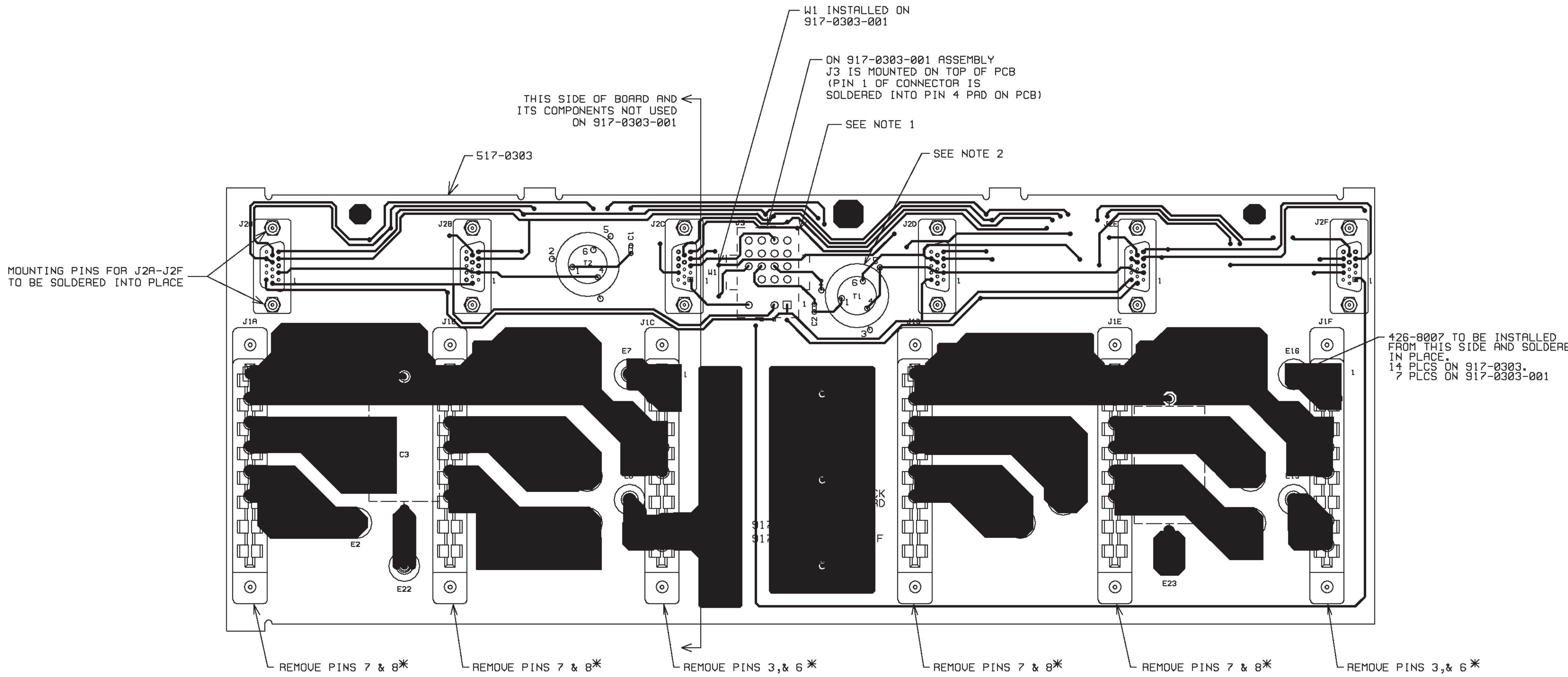
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY POWER BLOCK MOTHER BD

TYPE	SIZE	DWG No.	REV
A	C	917-0303 917-0303-001	H

MODEL AM-1A SCALE 1/1 SHEET 1 OF 1



NOTES:
1. COMPONENTS SHOWN WITH DASHED LINES TO BE MOUNTED FROM OPPOSITE SIDE.
2. TERMINALS 1-2 ARE BLU; 3-4 ARE WHT; 5-6 ARE ORG.
* USE AMP TOOL #91116-1 TO REMOVE DESIGNATED PINS FROM J1A-J1F.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY	3-4-96 M. HAYDEN
CHKD	
ME	
PROJ. ENGR.	3-4-96 J. WESTBERG
MFG.	
MATERIAL	SEE B/M 917-0303 917-0303-001
FINISH	SEE DWG AA592-0000
NEXT ASSY.	

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4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY POWER BLOCK MOTHER BD

TYPE	SIZE	DWG No.	REV
A	C	917-0303 917-0303-001	F

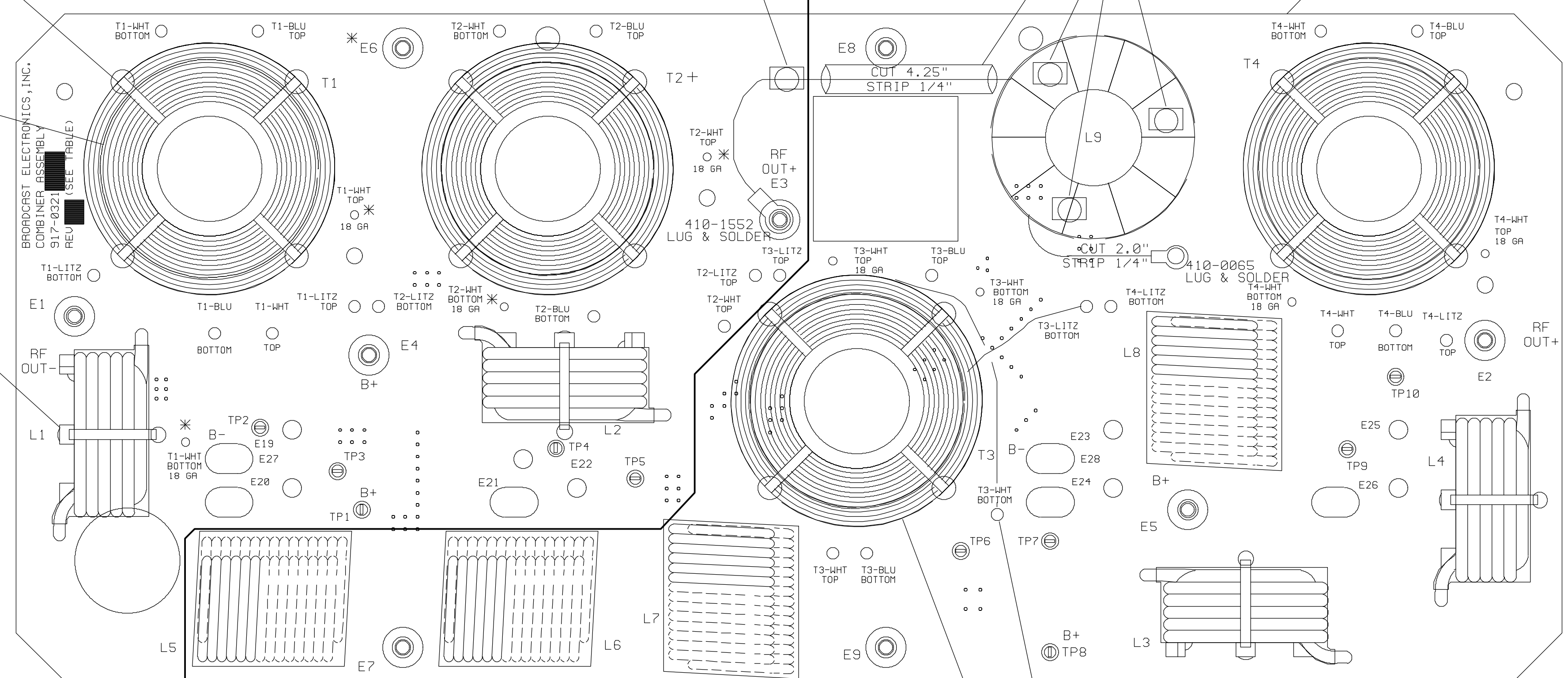
MODEL AM-1A SCALE 1/1 SHEET 1 OF 1

REVISIONS

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
E	12-17-97	ADDED 693-0090.	KT	JW	9914
F	2-19-98	ADDED 471-5124, 4 PLCS ON 0321 & 0321-006 ONLY DEL -0501	MSE	JW	9924
G	1-18-99	TOOK -006 OFF OF NOTE 2.	KT	JW	10079
H	7-16-99	ADDED -002,-005 AND NOTE 3.	KT	JW	10165
J	1-27-00	ADDED NOTE TO DRESS WHITE WIRE UNDER LITZ WIRE.	KT	JW	10256

REVISIONS

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	12-15-95	PROTOTYPE RELEASE.	MH	JW	----
A	8-15-96	UPDATED ASSY NOTES;CORRECTED WIRE LABELING FOR T3; ENGINEERING RELEASE.	MH	JW	----
B	3-7-97	ADD L6 AND (4) .25 HOLES, (4) 407-0119, (4) 402-0001	MSE	JW	9781
C	5-2-97	MOVED L9 & 3 407-0119 & 402-0001 PARTS.	KT	JW	9795
D	10-17-97	ADDED -501 AND NOTES.	KT	JW	9878



NOTES:

1. SEE SCHEMATIC SB917-0303/-001.
2. INSTALL L9 ON 1301-1580 KHz & 1581-1700KHz, AM-10A, ON 917-0321 ONLY.
3. LITZ WIRE TOP & BOTTOM REVERSED FOR 917-0321-002.

REVISION CHART

REV	PCB DRAWING NO.
J	917-0321
J	917-0321-001
J	917-0321-002
J	917-0321-005
J	917-0321-006

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY 12-15-95 M. HAYDEN
DESIGNER(S)
PROJ. LEADER JW 8-15-96
MFG.

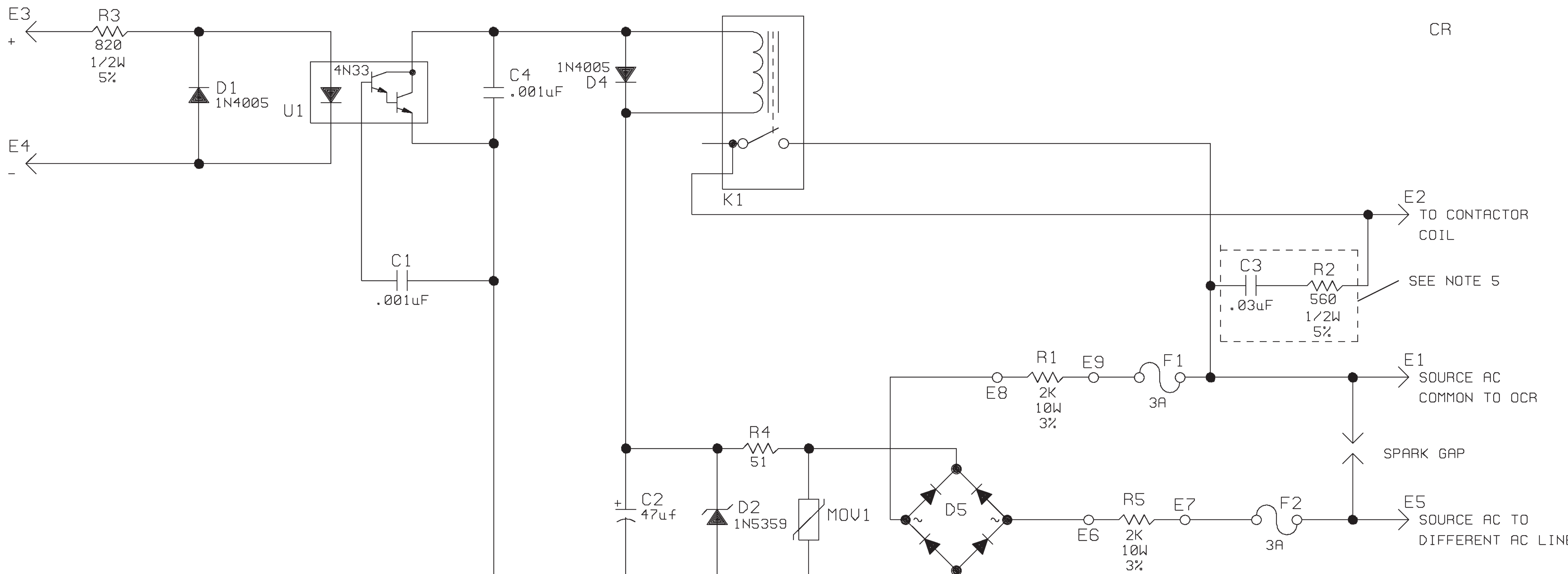
MATERIAL SEE BOM 917-0321 917-0321-001 917-0321-006
FINISH
NEXT ASSY.

BE ® BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE PCB ASSEMBLY COMBINER

TYPE A | SIZE C | DWG No. 917-0321/-006 917-0321-001/002/005 | REV J

MODEL AM-1A | SCALE 1/1 | SHEET 1 OF 1



NOTES:
1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: R5, F2, MOV1, C4, D4, U1, K1, E9
3. COMPONENTS NOT USED: D3
4. SEE ASSEMBLY: AB 919-0096
5. THESE COMPONENTS NOT USED ON 919-0096-001 C3, R2

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY JAH 11-26-91
CHKD BG 11-92
ME
PROJ. ENGR. BG 11-92
MFG.

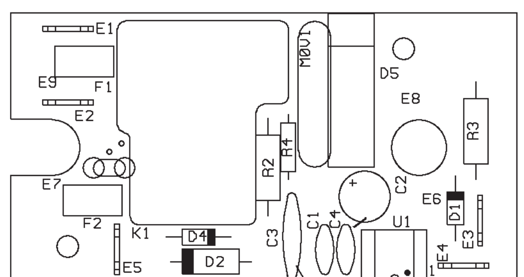
MATERIAL SEE B/M 919-0096 919-0096-001
FINISH
SEE DWG RA592-0000
NEXT ASSY.

BE® BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE OPTICALLY COUPLED RELAY

TYPE	SIZE	DWG. NO.	REV
S	B	919-0096,-001	J

MODEL FM XMTR'S | SCALE NONE | SHEET 1 OF

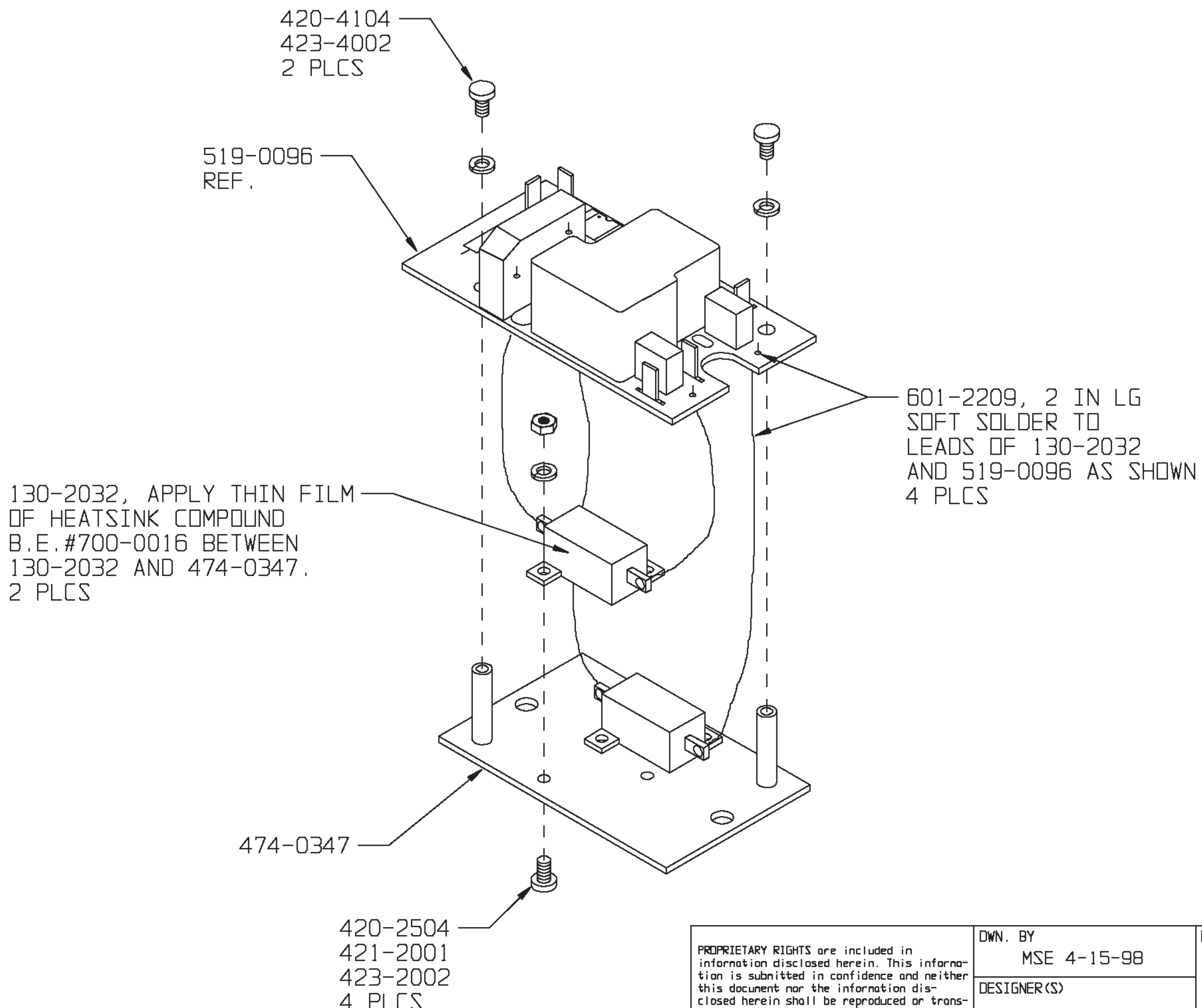


REMOVE R2 AND C3 FROM 919-0096
TO MAKE 919-0096-001

TOLERANCE (DECIMAL) U.O.S.	
.X ± .030	.XXX ± .005
.XX ± .015	ANGLES + 1°
DWN. BY	JAH 12-13-91
DESIGNER(S)	
PROJ. LEADER	J.TUCKER 7-14-86
MFG.	J.STEINKAMP 7-14-86
MATERIAL	SEE B/M 919-0096 919-0096-001
FINISH	~~SEE DWG AA592-0000~~
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE	PCB ASSEMBLY OPTICALLY COUPLED RELAY BD.		
TYPE A	SIZE B	DWG No. 919-0096, 919-0096-001	REV N
MODEL TRANSMITTERS	SCALE 1=1	SHEET 1 OF 2	



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY: MSE 4-15-98
DESIGNER(S):
PROJ. LEADER:
MFG.:

MATERIAL: SEE BOM 919-0096, -001
FINISH: SEE DWG RA592-0000
NEXT ASSY.:

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TITLE: ASSY, PCB OPTICALLY COUPLED RELAY (OCR)

TYPE	SIZE	DWG. NO.	REV
A	B	919-0096, -001	N

MODEL: XMTRS | SCALE: 1/1 | SHEET 2 OF 2

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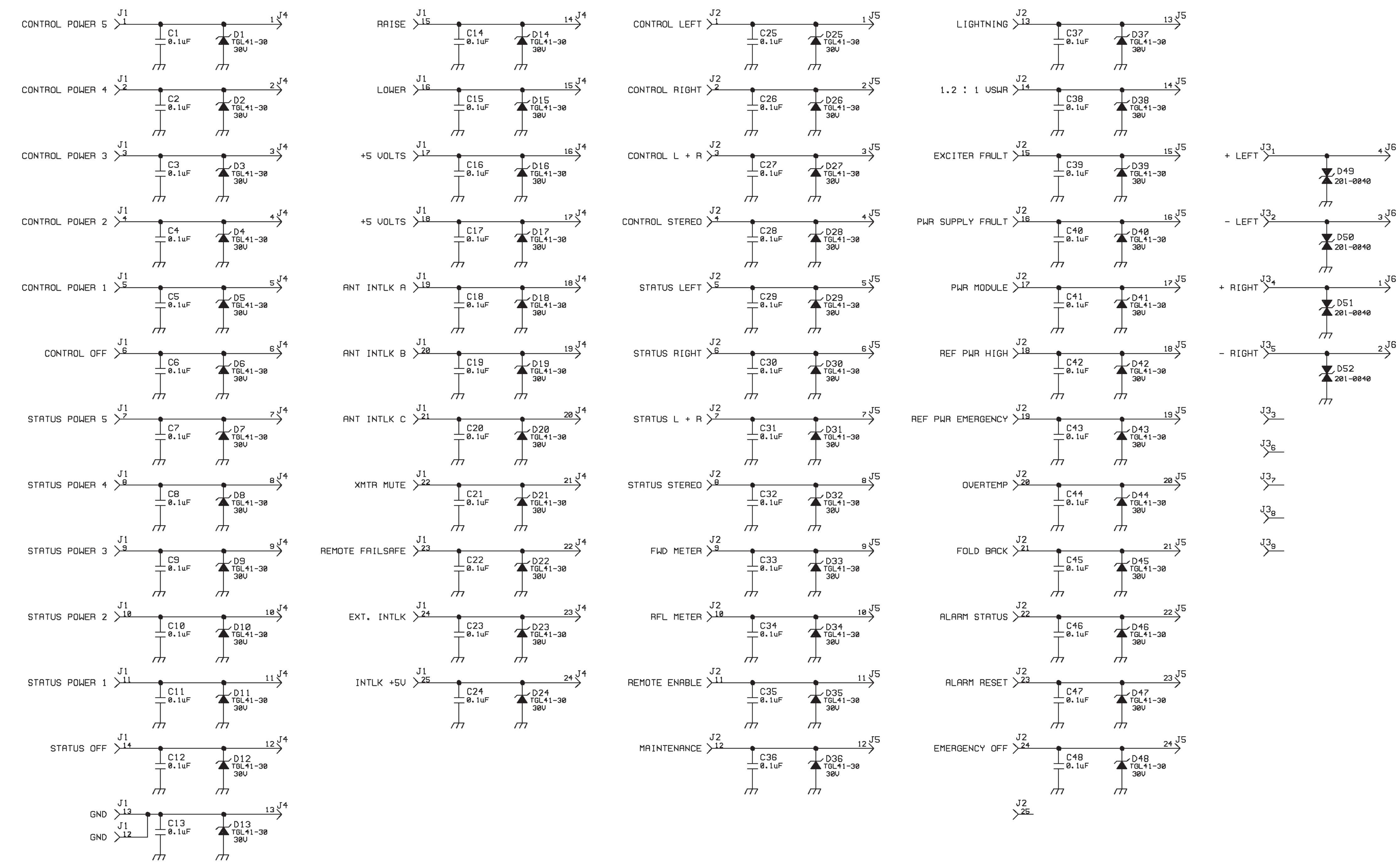

NOTES:
1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED:C48,D52,J6
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY:A8917-0410

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	KWT 5-14-99
DESIGNER(S)	
PROJ. LEADER	8-27-99 J. WESTBERG
MFG.	
MATERIAL	SEE BOM 917-0410
FINISH	
NEXT ASSY.	917-0410

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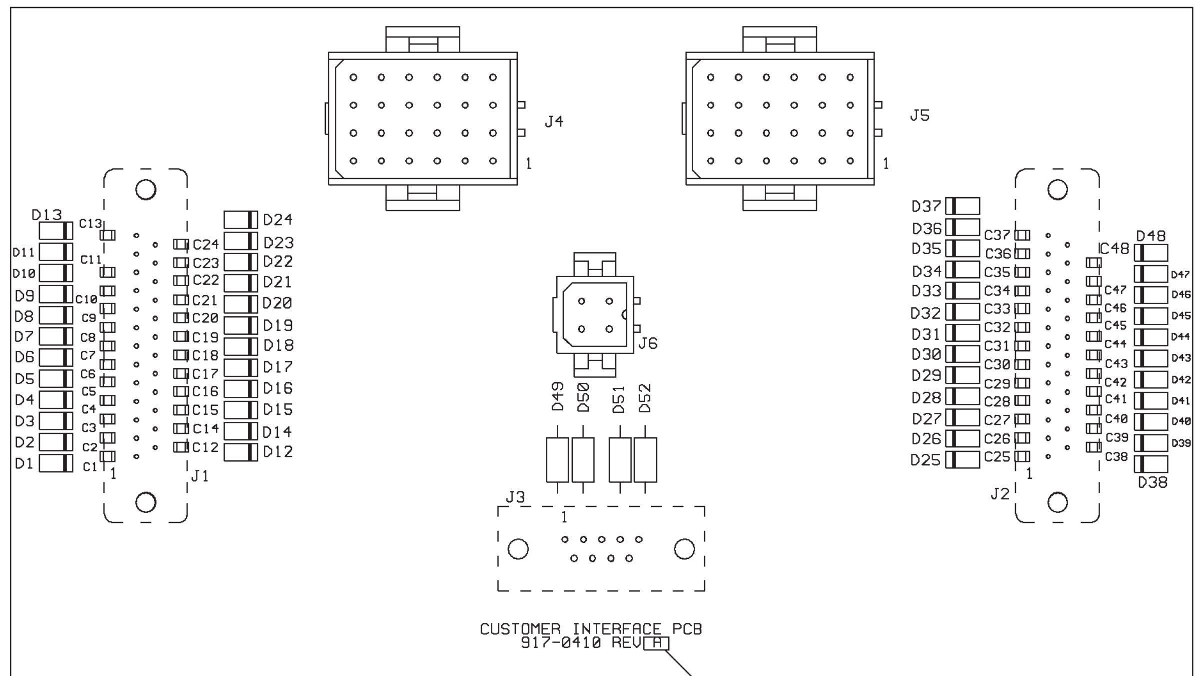
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: CUSTOMER INTERFACE PCB

TYPE	SIZE	DWG. NO.	REV
S	D	917-0410	A

MODEL NINJA | SCALE NONE | SHEET 1 OF 1



BOARD ASSEMBLY VENDOR TO MARK
ASSEMBLY REVISION LEVEL HERE.

NOTES:
1) J1,J2 & J3 ARE MOUNTED ON THE SOLDER SIDE OF PCB.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY: KWT 5-17-99
DESIGNER(S):
PROJ. LEADER 9-27-99: J. WESTBERG
MFG.:

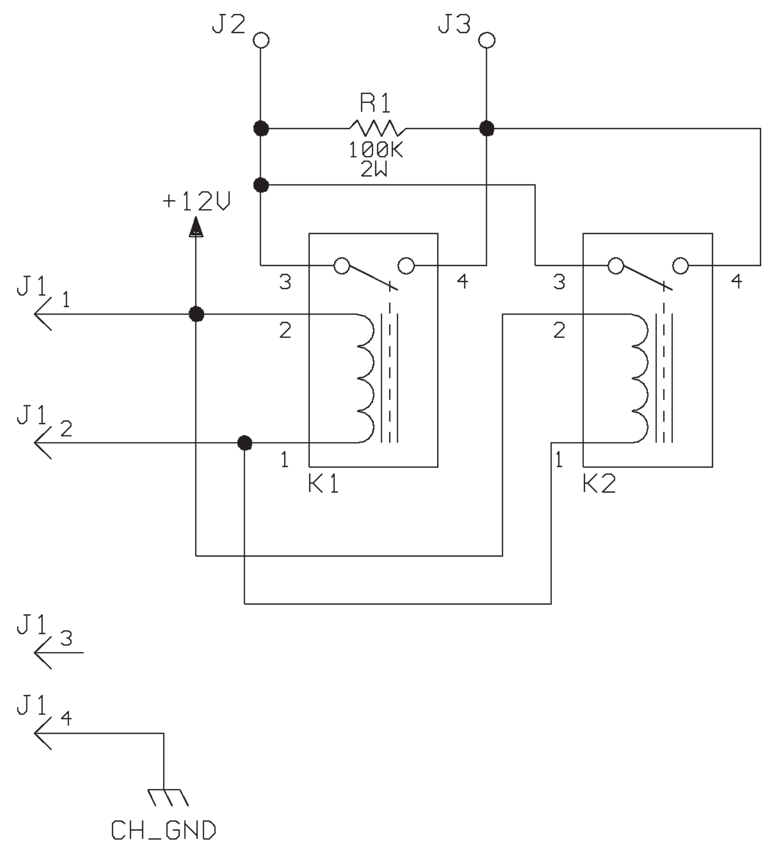
MATERIAL: SEE BOM 917-0410
FINISH:
NEXT ASSY.:

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: CUSTOMER INTERFACE PCB

TYPE	SIZE	DWG No.	REV
A	B	917-0410	A

MODEL NINJA | SCALE 1/1 | SHEET 1 OF 1



NOTES:
1. SEE ASSEMBLY AB917-0330

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MSE 6-5-98

DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL SEE BOM 917-0330

FINISH

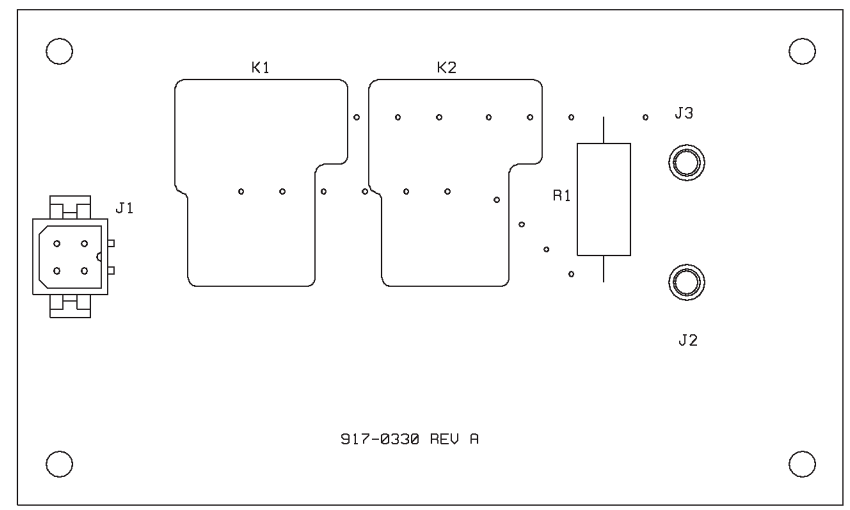
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE SCHEMATIC, PFC RELAY PCB

TYPE	SIZE	DWG. NO.	REV
S	B	917-0330	A

MODEL AM | SCALE NONE | SHEET 1 OF 1



NOTES:
1) SEE SCHEMATIC SB917-0330.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

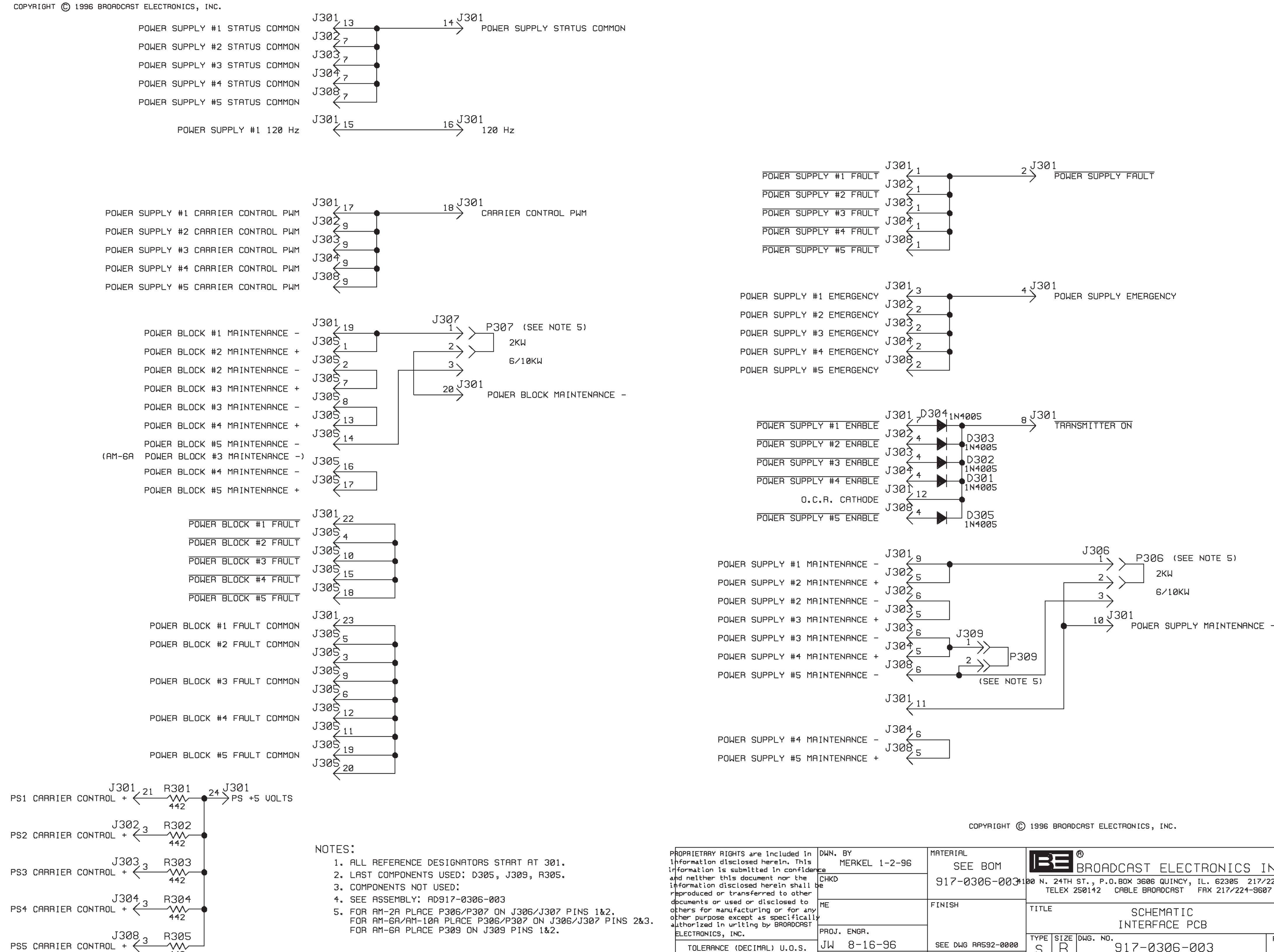
DWN. BY	MSE 6-9-98
DESIGNER(S)	
PROJ. LEADER	9-27-99 J. WESTBERG
MFG.	
MATERIAL	SEE BOM 917-0330
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE
PCB ASSY, PFC RELAY BOARD

TYPE	SIZE	DWG No.	REV
A	B	917-0330	A

MODEL AM 2.5A | SCALE 1/1 | SHEET 1 OF 1



NOTES:

1. ALL REFERENCE DESIGNATORS START AT 301.
2. LAST COMPONENTS USED: D305, J309, R305.
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306-003
5. FOR AM-2A PLACE P306/P307 ON J306/J307 PINS 1&2.
   FOR AM-6A/AM-10A PLACE P306/P307 ON J306/J307 PINS 2&3.
   FOR AM-6A PLACE P309 ON J309 PINS 1&2.

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96
CHKD
ME
PROJ. ENGR. JW 8-16-96
MFG.

MATERIAL SEE BOM 917-0306-003
FINISH
SEE DWG AA592-0000
NEXT ASSY. AD917-0306-003

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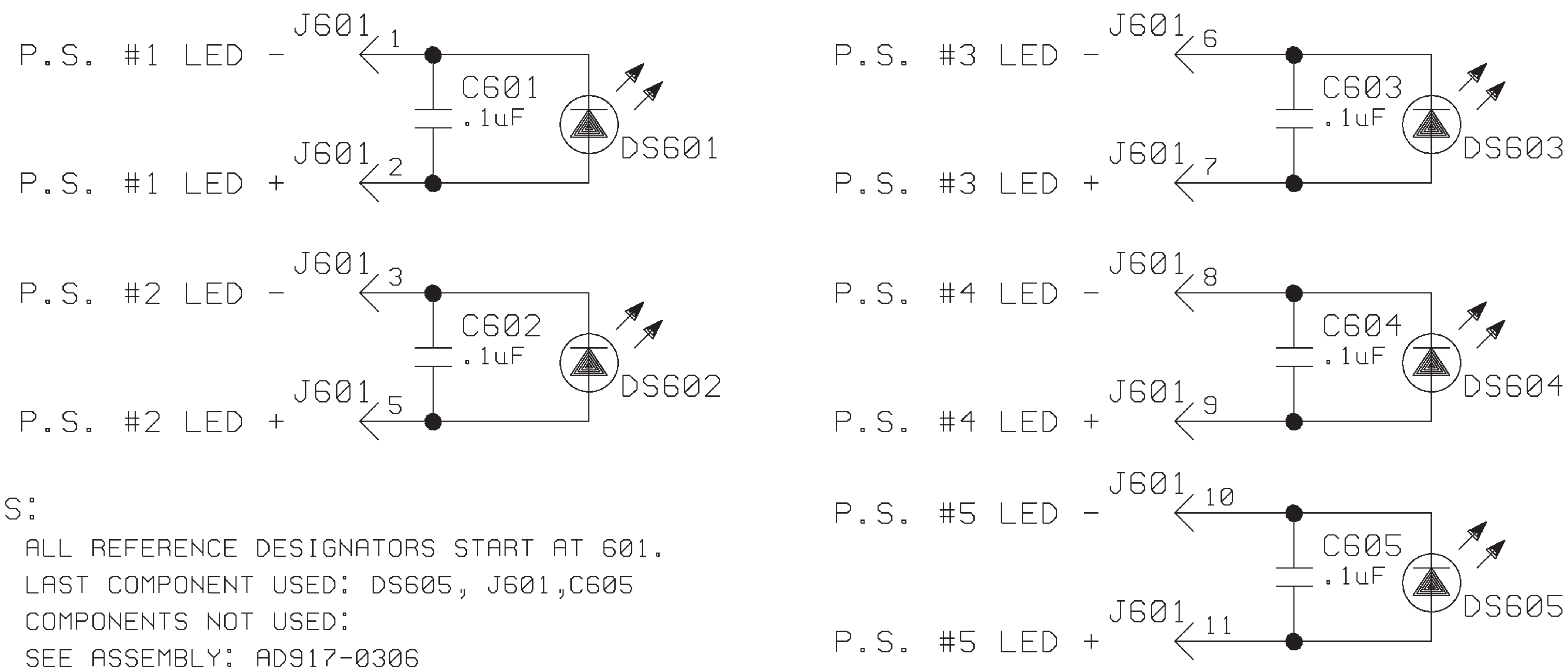
TITLE SCHEMATIC INTERFACE PCB

TYPE S | SIZE B | DWG. NO. 917-0306-003 | REV B

MODEL AM-1A,2A,6A,10A | SCALE NONE | SHEET 1 OF 1



NOTES:

1. ALL REFERENCE DESIGNATORS START AT 601.
2. LAST COMPONENT USED: DS605, J601,C605
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96	MATERIAL SEE BOM 917-0306-006
CHKD	
ME	FINISH SEE DWG RA592-0000
PROJ. ENGR.	
MFG.	NEXT ASSY. AD917-0306

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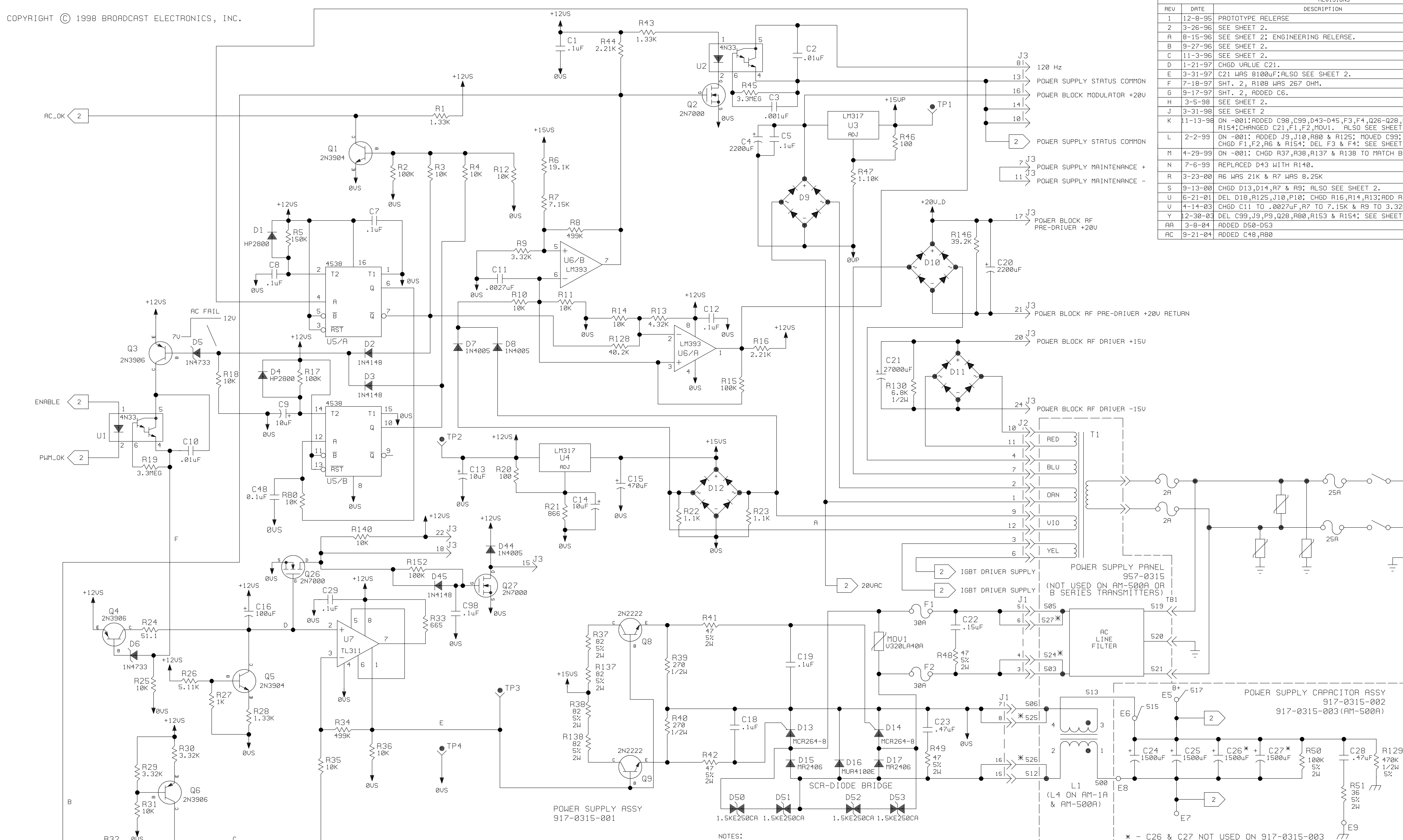
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

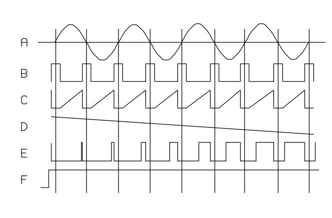
TITLE SCHEMATIC POWER SUPPLY STATUS LED PCB

TYPE	SIZE	DWG. NO.	REV
S	A	917-0306-006	A

MODEL AM-1A | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	12-8-95	PROTOTYPE RELEASE	MH	JW	----
2	3-26-96	SEE SHEET 2.	MH	JW	----
A	8-15-96	SEE SHEET 2; ENGINEERING RELEASE.	MH	JW	----
B	9-27-96	SEE SHEET 2.	MH	JW	9716
C	11-3-96	SEE SHEET 2.	MH	JW	9719
D	1-21-97	CHGD VALUE C21.	KT	JW	9760
E	3-31-97	C21 WAS 8100uF;ALSO SEE SHEET 2.	MH	JW	9760A
F	7-18-97	SHT. 2, R108 WAS 267 OHM.	MSE	JW	9833
G	9-17-97	SHT. 2, ADDED C6.	KT	JW	9856
H	3-5-98	SEE SHEET 2.	MH	JW	9944
J	3-31-98	SEE SHEET 2	MSE	JW	9960
K	11-13-98	ON -001:ADDED C98,C99,D43-D45,F3,F4,Q26-Q28,R152-R154;CHANGED C21,F1,F2,MOV1. ALSO SEE SHEET 2.	MH	JW	10030
L	2-2-99	ON -001: ADDED J9,J10,R80 & R125; MOVED C99; CHGD F1,F2,R6 & R154; DEL F3 & F4: SEE SHEET 2.	KT	JW	10087
M	4-29-99	ON -001: CHGD R37,R38,R137 & R138 TO MATCH BOM.	KT	JW	10135
N	7-6-99	REPLACED D43 WITH R140.	KT	JW	10161
R	3-23-00	R6 WAS 21K & R7 WAS 8.25K	KT	JW	10275
S	9-13-00	CHGD D13,D14,R7 & R9; ALSO SEE SHEET 2.	MH	JW	10354
U	6-21-01	DEL D18,R125,J10,P10; CHGD R16,R14,R13;ADD R128	KT	JW	10465
V	4-14-03	CHGD C11 TO .0027uF,R7 TO 7.15K & R9 TO 3.32K	KT	JW	10958
Y	12-30-03	DEL C99,J9,P9,Q28,R80,R153 & R154; SEE SHEET 2 ALSO	KT	JW	11088
AA	3-8-04	ADDED D50-D53	KT	JW	11102
AC	9-21-04	ADDED C48,R80	KT		11323



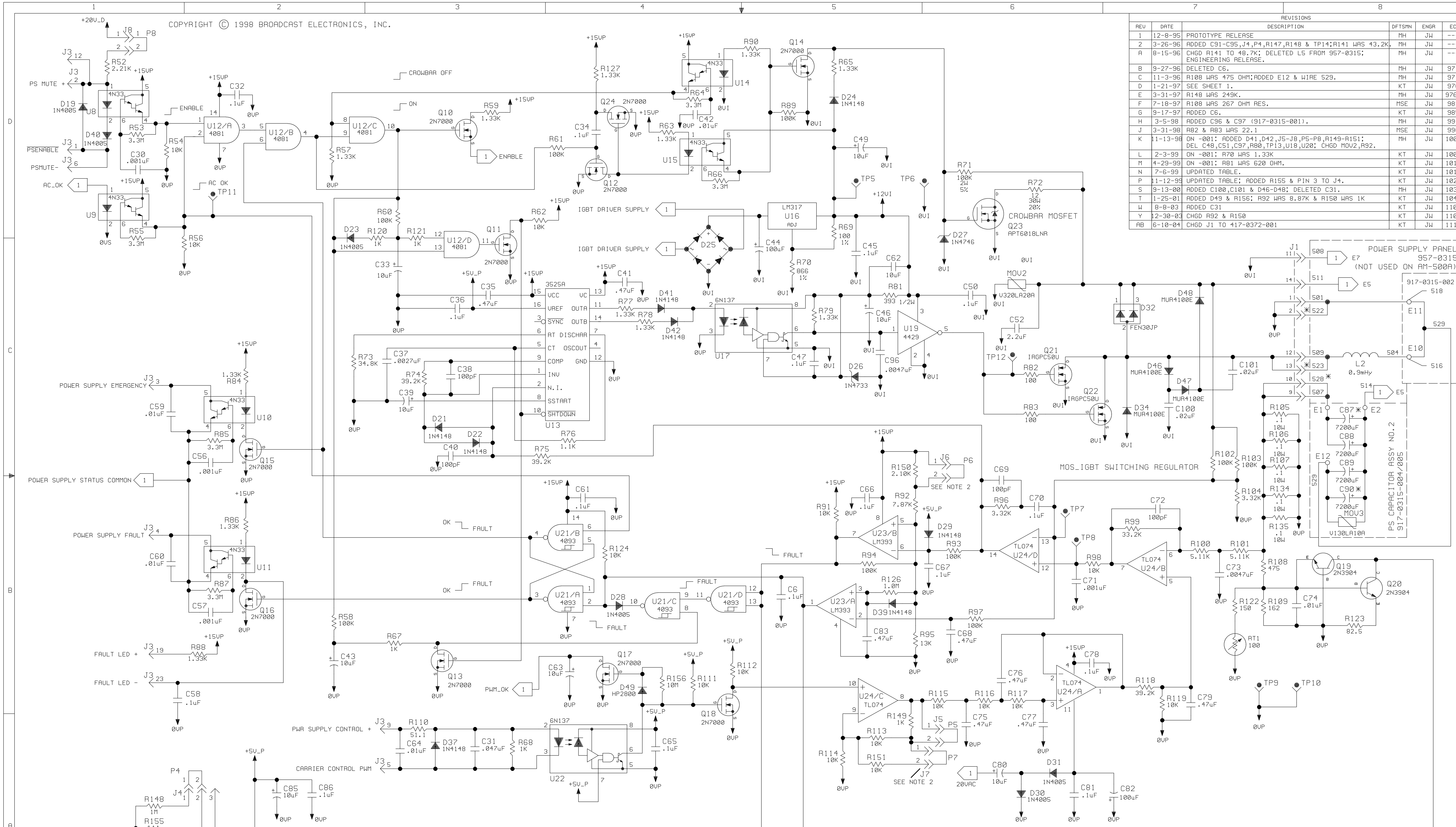


NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C101,D53,E12,F2,J8,L5, MOV3,P8,Q27,R156,RT1,T1,TP14,U25.
3. COMPONENTS NOT USED: C51,C53-C55,C84,C97,C99,D20,D33,D35,D36, D18,D38,D43,E3,E4,L3,R125,R131-R133,R136,R139,R145,R153, R154,TP13,U18,U20.
4. * - INDICATES WIRES/COMPONENTS NOT USED ON AM-1A OR AM-500A.
5. SEE ASSEMBLY: AC917-0315-001 (POWER SUPPLY BD)
   AC917-0315-002 (CAPACITOR BD)
   AC917-0315-003 (CAPACITOR BD - AM-500A)
   AC917-0315-004 (CAPACITOR BD NO. 2)

TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	DWN. BY 12-8-95 M. HAYDEN	MATERIAL SEE B/M 917-0315-001 917-0315-002/003 917-0315-004/005	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
	CHKD	FINISH ~~SEE DWG RA592-0000~~	TITLE SCHEMATIC POWER SUPPLY
	ME	NEXT ASSY.	TYPE S · SIZE B · DWG. NO. 917-0315-001 917-0315-002thru005 · REV AC
	PROJ. ENGR.		MODEL AM-500A/2.5A/1A · SCALE NONE · SHEET 1 OF 2
	MFG.		

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	12-8-95	PROTOTYPE RELEASE	MH	JW	----
2	3-26-96	ADDED C91-C95,J4,P4,R147,R148 & TP14;R141 WAS 43.2K.	MH	JW	----
A	8-15-96	CHGD R141 TO 48.7K; DELETED L5 FROM 957-0315; ENGINEERING RELEASE.	MH	JW	----
B	9-27-96	DELETED C6.	MH	JW	9716
C	11-3-96	R108 WAS 475 OHM;ADDED E12 & WIRE 529.	MH	JW	9719
D	1-21-97	SEE SHEET 1.	KT	JW	9760
E	3-31-97	R148 WAS 249K.	MH	JW	9760A
F	7-18-97	R108 WAS 267 OHM RES.	MSE	JW	9833
G	9-17-97	ADDED C6.	KT	JW	9856
H	3-5-98	ADDED C96 & C97 (917-0315-001).	MH	JW	9944
J	3-31-98	R82 & R83 WAS 22.1	MSE	JW	9960
K	11-13-98	ON -001: ADDED D41,D42,J5-J8,P5-P8,R149-R151; DEL C48,C51,C97,R80,TP13,U18,U20; CHGD MOV2,R92.	MH	JW	10030
L	2-3-99	ON -001: R70 WAS 1.33K	KT	JW	10087
M	4-29-99	ON -001: R81 WAS 620 OHM.	KT	JW	10135
N	7-6-99	UPDATED TABLE.	KT	JW	10161
P	11-12-99	UPDATED TABLE; ADDED R155 & PIN 3 TO J4.	KT	JW	10205
S	9-13-00	ADDED C100,C101 & D46-D48; DELETED C31.	MH	JW	10354
T	1-25-01	ADDED D49 & R156; R92 WAS 8.87K & R150 WAS 1K	KT	JW	10409
W	8-8-03	ADDED C31	KT	JW	11021
Y	12-30-03	CHGD R92 & R150	KT	JW	11088
AB	6-10-04	CHGD J1 TO 417-0372-001	KT	JW	11158



	AM-500A	AM-1A	AM-2.5A	AM-6A/10A	AM-2.5E/5E
P4	OPEN	OPEN	1,2	1,2	2,3
P5	SHORT	SHORT	OPEN	SHORT	OPEN
P6	OPEN	OPEN	SHORT	OPEN	SHORT
P7	SHORT	OPEN	OPEN	OPEN	OPEN
P8	SHORT	SHORT	SHORT	SHORT	SHORT
P10	OPEN	OPEN	SHORT	OPEN	SHORT

NOTES:

1. * - INDICATES WIRES/COMPONENTS NOT USED ON AM-1A OR AM-500A.
2. INSTALL P4 THRU P10 PER TABLE.

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY M. HAYDEN 12-8-95
CHKD
ME
PROJ. ENGR.
MFG.
MATERIAL
FINISH
~~SEE DWG RA592-0000~~
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC POWER SUPPLY

TYPE S | SIZE B | DWG. NO. 917-0315-001 917-0315-002thru005 | REV AC

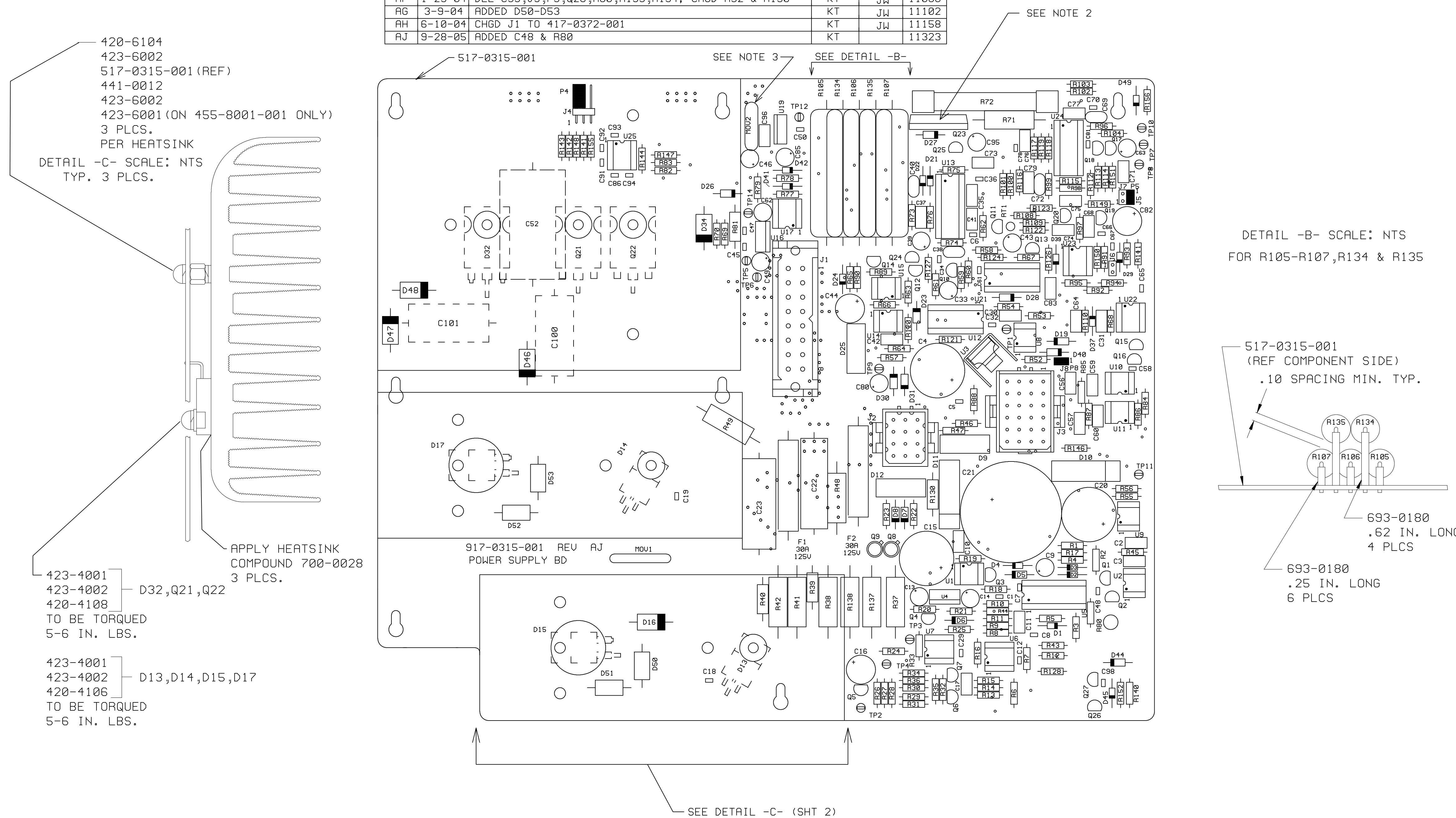
MODEL AM-500A/2.5A/1A | SCALE NONE | SHEET 2 OF 2

A	8-15-96	DELETED HARDWARE OFF OF U3; ENGINEERING RELEASE.	MH	JW	----
B	9-27-96	DELETED C6.	MH	JW	9716
C	11-3-96	CHGD VALUE OF R108(917-0315-001);ADDED E12(917-0315-005)	MH	JW	9719
D	1-21-97	CHGD VALUE OF C21:REPLACED F1 & F2.	KT	JW	9760
E	4-1-97	ON -001: CHGD VALUE OF C21 & R148; MOVED C15,C20,C21,C31,D7, D8,D10,D12,Q1,Q8,R1,R22,R23,R130 & U1.	MH	JW	9760A
F	4-2-97	ON -001: CHGD C16,C44 & C82 TO 023-1084 (SAME VALUE).	MH	JW	9784
G	7-18-97	R108 WAS 267 OHM, NOW 475 OHM.	MSE	JW	9833
H	9-17-97	ADDED C6.	KT	JW	9856
J	3-9-98	ON -001: ADDED C96,C97; MOVED C50,C51,R80,TP12,TP13 & U20	MH	JW	9944
K	3-31-98	R82 & R83 WERE 22.1 OHM.	MSE	JW	9960
L	11-13-98	ON -001: ADDED C98,C99,D41-D45,F3,F4,J5-J8,P5-P8,R149-R154, Q26-Q28; DELETED C48,C51,C97,R80,TP13,U18,U20; CHGD C21,F1, F2,MOV1,MOV2,R92; REMOVED LOWER RIGHT TAB.	MH	JW	9716

R	11-12-99	ADDED R155; CHGD J4 TO A THREE PIN HEADER.	KT	JW	10205
T	12-14-99	ADDED FUSE INFO. TO PCB.	KT	JW	10233
U	3-23-00	R6 WAS A 103-2105 & R7 WAS A 103-6344.	KT	JW	10275
V	9-22-00	ADDED C100,C101,D46-D48;DELETED C31;CHGD D13 & D14, R7 & R9; ALL ON 917-0315-001.	MH	JW	10354
W	1-25-01	ADDED D49 & R156; CHGD R92 & R150 ON -001	KT	JW	10409
Y	6-21-01	DEL R125,J10,P10,D18;ADDED R128;CHGD R13,R14,R15	KT	JW	10465
AA	8-26-02	UPDATED BOM TO MATCH ASSEMBLY	KT	JW	10718
AB	2-21-03	SEPERATED BOARDS	KT	JW	10880
AC	4-9-03	CORRECTED DETAIL "C" NOTES	KT	JW	10950
AD	4-14-03	CHGD C11,R7 & R9	KT	JW	10958
AE	8-8-03	ADD C31	KT	JW	11021
AF	1-23-04	DEL C99,J9,P9,Q28,R80,R153,R154; CHGD R92 & R150	KT	JW	11088
AG	3-9-04	ADDED D50-D53	KT	JW	11102
AH	6-10-04	CHGD J1 TO 417-0372-001	KT	JW	11158
AJ	9-28-05	ADDED C48 & R80	KT		11323

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
M	2-4-99	ADDED J9,J10,P9,P10,R80 & R125;CHGD R6,R70,R154, F1 & F2; DEL F3 & F4.	KT	JW	10087
N	4-29-99	CHGD R81 TO 110-3933;R37,R38,R137,R138 TO MATCH BOM	KT	JW	10135
P	7-6-99	REPLACED D43 WITH R140 ON -001 & UPDATED TABLE.	KT	JW	10161



NOTES:

1. DASHED COMPONENT C52 TO BE MOUNTED FROM OPPOSITE SIDE.
2. COMPONENT Q23 TO BE SLEEVED WITH HEAT SHRINK TUBING P/N 690-0221.
3. COMPONENT MOV2 TO BE SLEEVED WITH HEAT SHRINK TUBING P/N 611-5000.
4. INSTALL P4 THRU P10 PER TABLE.

	AM-500A	AM-1A	AM-2.5A	AM-6A/10A	AM-2.5E/5E
P4	OPEN	OPEN	SHORT	SHORT	SHORT
P5	SHORT	SHORT	OPEN	SHORT	OPEN
P6	OPEN	OPEN	SHORT	OPEN	SHORT
P7	SHORT	OPEN	OPEN	OPEN	OPEN
P8	OPEN	SHORT	SHORT	SHORT	SHORT

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY 12-12-95 M. HAYDEN

CHKD

ME

PROJ. ENGR.

MFG.

MATERIAL SEE B/M 917-0315-001

FINISH

~~SEE DWG RA592-0000~~

NEXT ASSY.

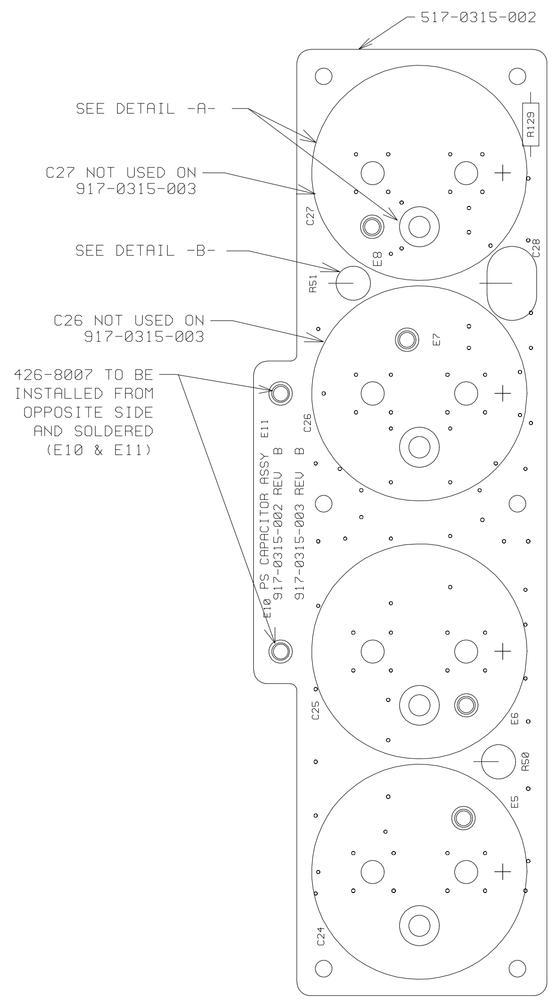
BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

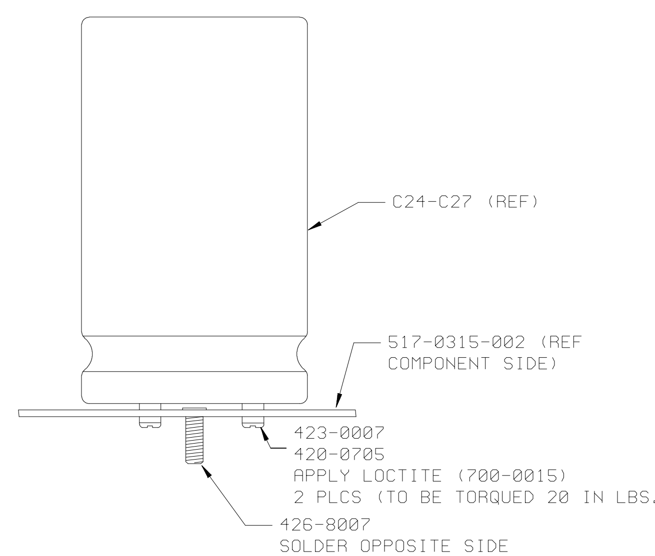
TITLE PCB ASSEMBLY POWER SUPPLY

TYPE A | SIZE C | DWG No. 917-0315-001 | REV AJ

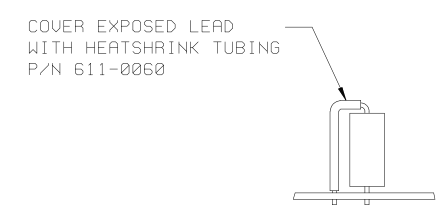
MODEL AM-1A | SCALE 1/1 | SHEET 1 OF 1

REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
A	8-15-96	DELETED HARDWARE OFF OF U3; ENGINEERING RELEASE.	MH	JW	----
B	2-21-03	SEPERATED FROM 517-0315	KT		10880





DETAIL -A- SCALE 1/1
FOR C27-E8,C26-E7,C25-E6 & C24-E5



DETAIL -B- SCALE 1/1
FOR C28,R50 & R51

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY M. HAYDEN 12-12-95
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M
917-0315-002/003
FINISH
~~SEE DWG AA592-0000~~
NEXT ASSY.

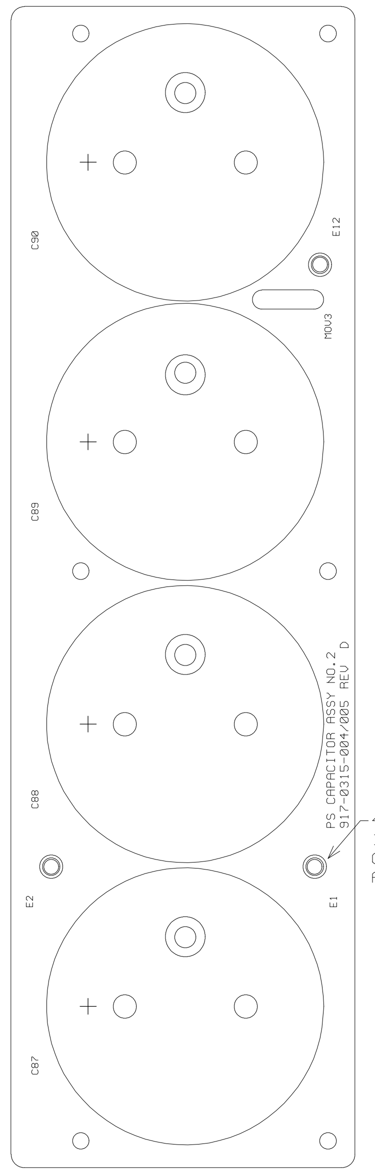
BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

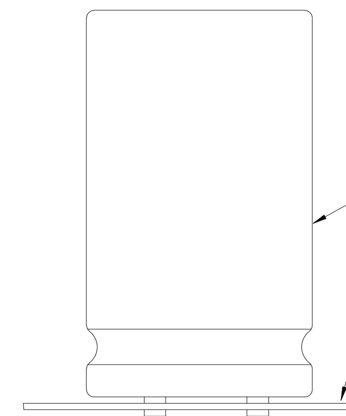
TITLE PCB ASSEMBLY CAPACITOR PCB

TYPE A | SIZE C | DWG No. 917-0315-002 | REV B

MODEL AM-1A | SCALE 1/1 | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
D	3-14-03	SEPERATED FROM 917-0315	KT		10880





DETAIL -A- SCALE: NTS

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY M. HAYDEN 12-12-95
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 917-0315-004 917-0315-005
FINISH
~~SEE DWG AA592-0000~~
NEXT ASSY.

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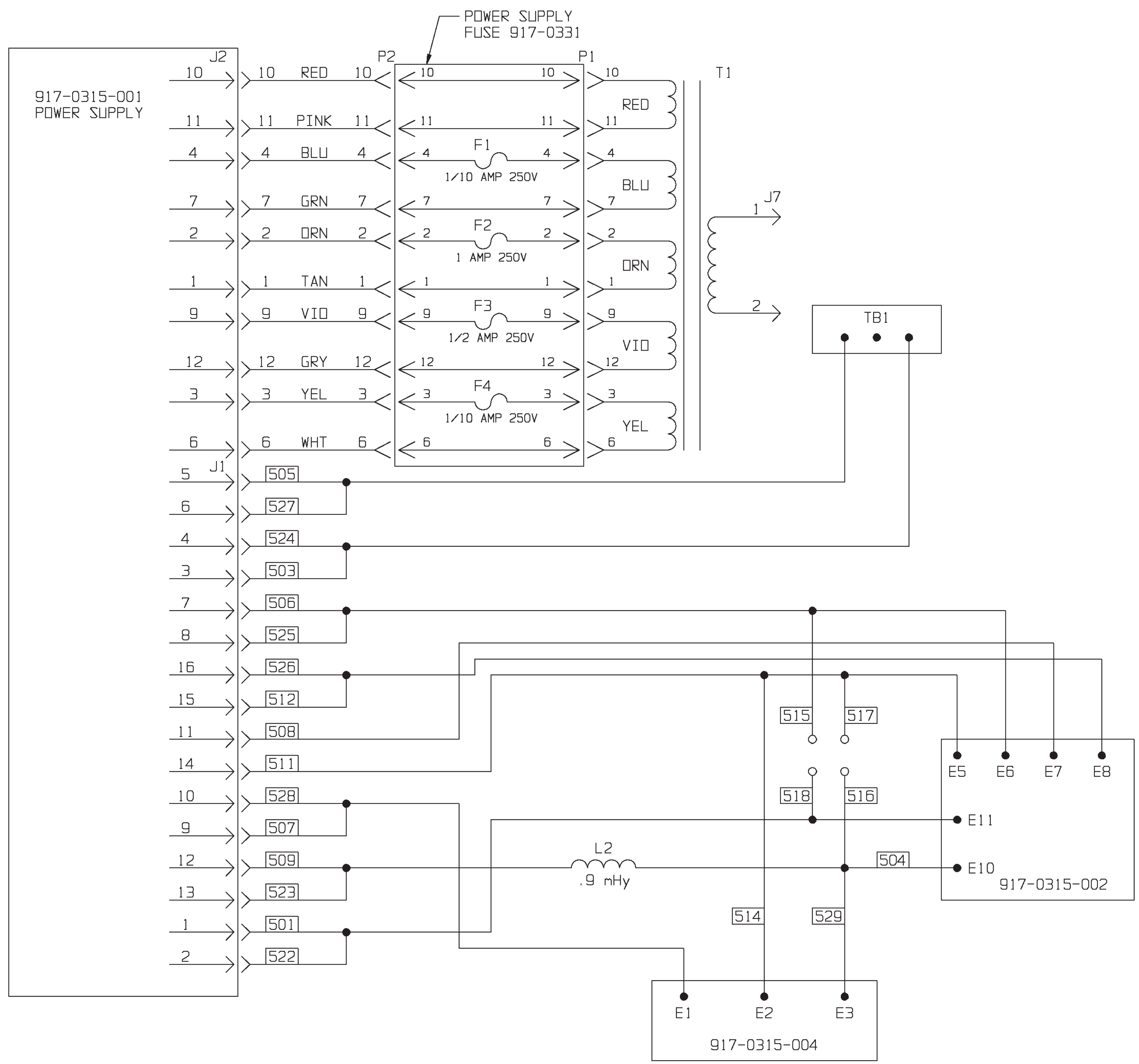
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY POWER SUPPLY/CAPACITOR BDS

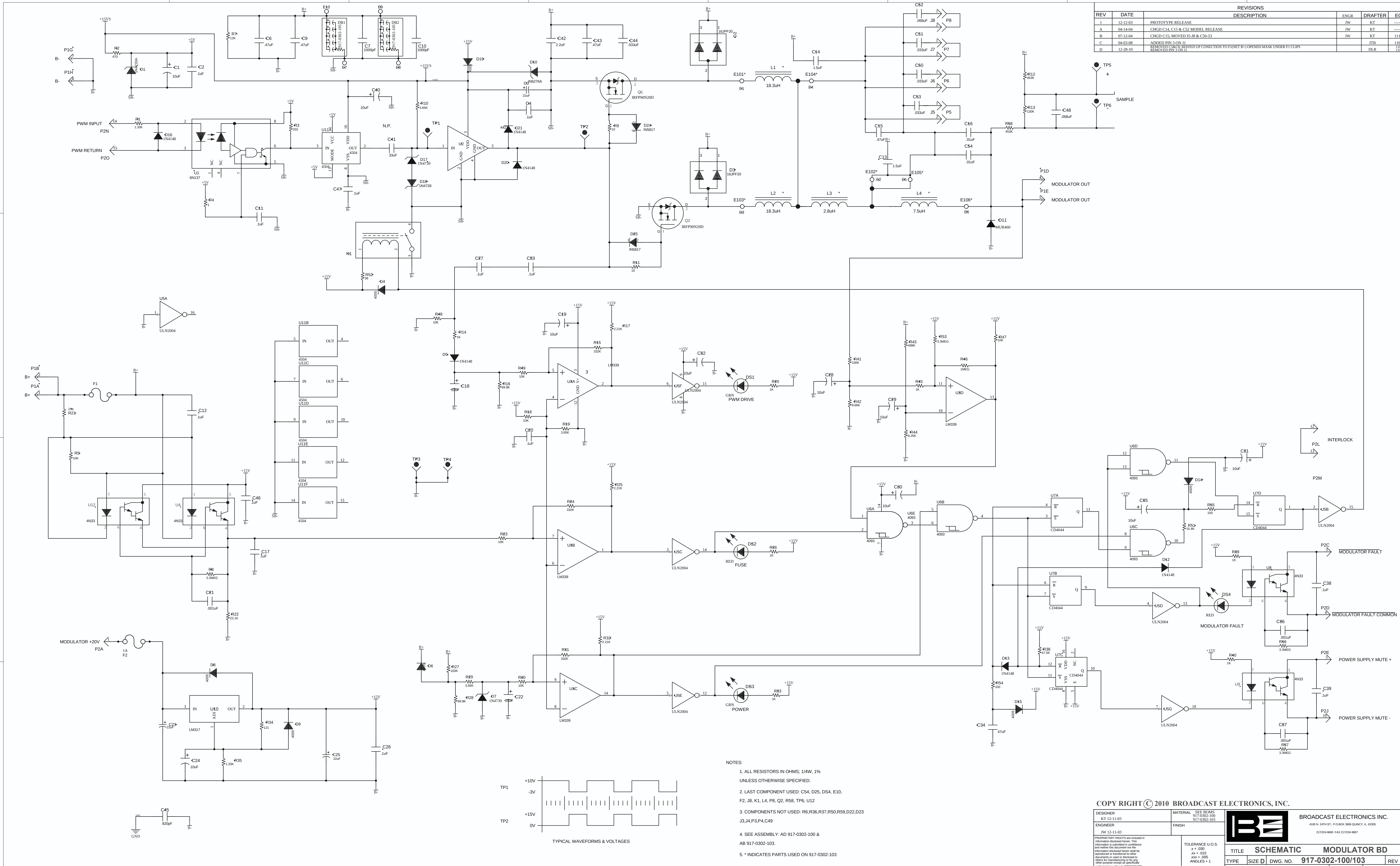
TYPE	SIZE	DWG No.	REV
A	C	917-0315-004/005	D

MODEL AM-1A SCALE 1/1 SHEET 1 OF 1



DWN. BY MSE 5-19-99	MATERIAL SEE BOM 957-0315-100	BROADCAST ELECTRONICS INC. 4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
DESIGNER(S)	FINISH	TITLE SCHEMATIC POWER SUPPLY AM-2.5E	
PROJ. LEADER	SEE DWG RA592-0000	TYPE S SIZE C DWG. NO. 957-0315-100	REV A
MFG.	NEXT ASSY.	MODEL AM-2.5E SCALE	SHEET 1 OF 1

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°



REVISIONS					
REV	DATE	DESCRIPTION	ENGR	DRAFTER	ECN
1	12-12-03	PROTOTYPE RELEASE	JW	KT	--------
A	04-14-04	CHGD C14, C15 & C52 MODEL RELEASE	JW	KT	--------
B	07-12-04	CHGD C15; MOVED J5-J8 & C50-53	JW	KT	11184
C	04-03-08	ADDED PIN 3 ON J1		JTB	11621
D	12-28-10	REMOVED C5&C8; BEEFED UP CONECTION TO F1(NET B+) OPENED MASK UNDER F1 CLIPS REMOVED PIN 3 ON J1		DLR	11801 11803

NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1%
   UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C54, D25, DS4, E10,
   F2, J8, K1, L4, P8, Q2, R58, TP6, U12
3. COMPONENTS NOT USED: R6,R36,R37,R50,R59,D22,D23
   J3,J4,P3,P4,C49
4. SEE ASSEMBLY: AD 917-0302-100 &
   AB 917-0302-103.
5. * INDICATES PARTS USED ON 917-0302-103

DESIGNER KT 12-11-03	MATERIAL SEE BOMS 917-0302-100 917-0302-103
ENGINEER JW 12-11-03	FINISH

TOLERANCE U.O.S.
.x + .030
.xx + .015
.xxx + .005
ANGLES + 1

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

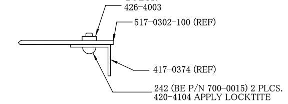
TITLE SCHEMATIC MODULATOR BD

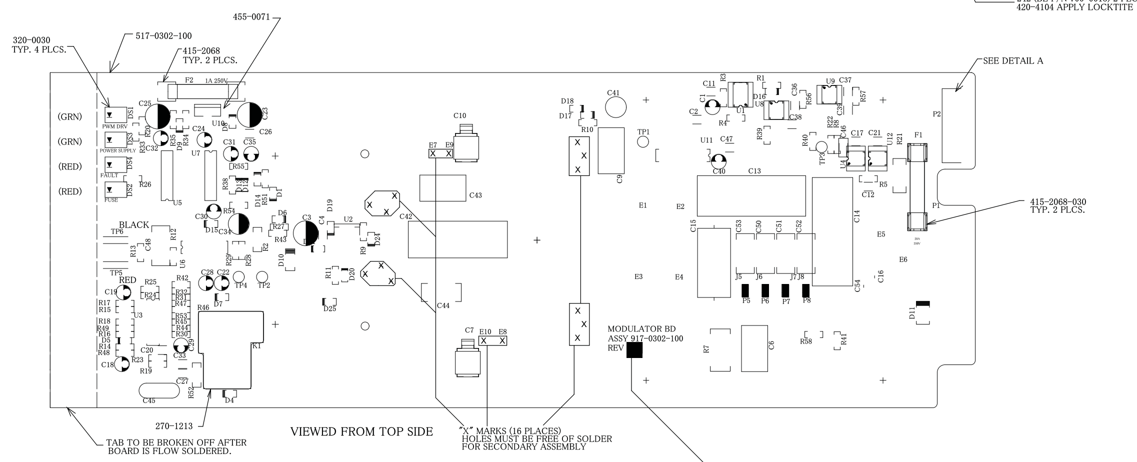
TYPE | SIZE D | DWG. NO. 917-0302-100/103 | REV D

MODEL AM-1A | SCALE | SHEET 1 OF 1

REV	DATE	DESCRTPTION	DRAFTER	APPROVED	ENC
A	03-21-11	REPLACES 917-0302-100	DLR		11801 11803

DETAIL "A" SCALE 1/1





VIEWED FROM TOP SIDE 3/23/2011

ARTWORK TOP SIDE SILKSCREEN 517-0302-100 REV D

MARK VERSION AND REV OF PCB IN BOX.

NOTES:

1) C13 & C14 MOUNT FLAT ON BOARD; C42 MOUNTS ON ITS EDGE.
2) SEE SCHEMATIC SB917-0302-100.
3) SOCKETS FOR U1,U3-U9,U11 & U12 ARE INSTALLED.
4) FUSE CLIPS ARE INSTALLED.

TOLERANCE (DECIMAL) U.O.S.
.X +/- .030 .XXX +/- .005
.XX +/- .015 ANGLES +/- 1 °

DWN. BY/DATE: KT 12-12-03
DESIGNER(S)/DATE:
PROJ. LEADER/DATE:
ME/DATE:
MFG./DATE:

MATERIAL: SEE BOM 917-0302-102
FINISH:
NEXT ASSY.:

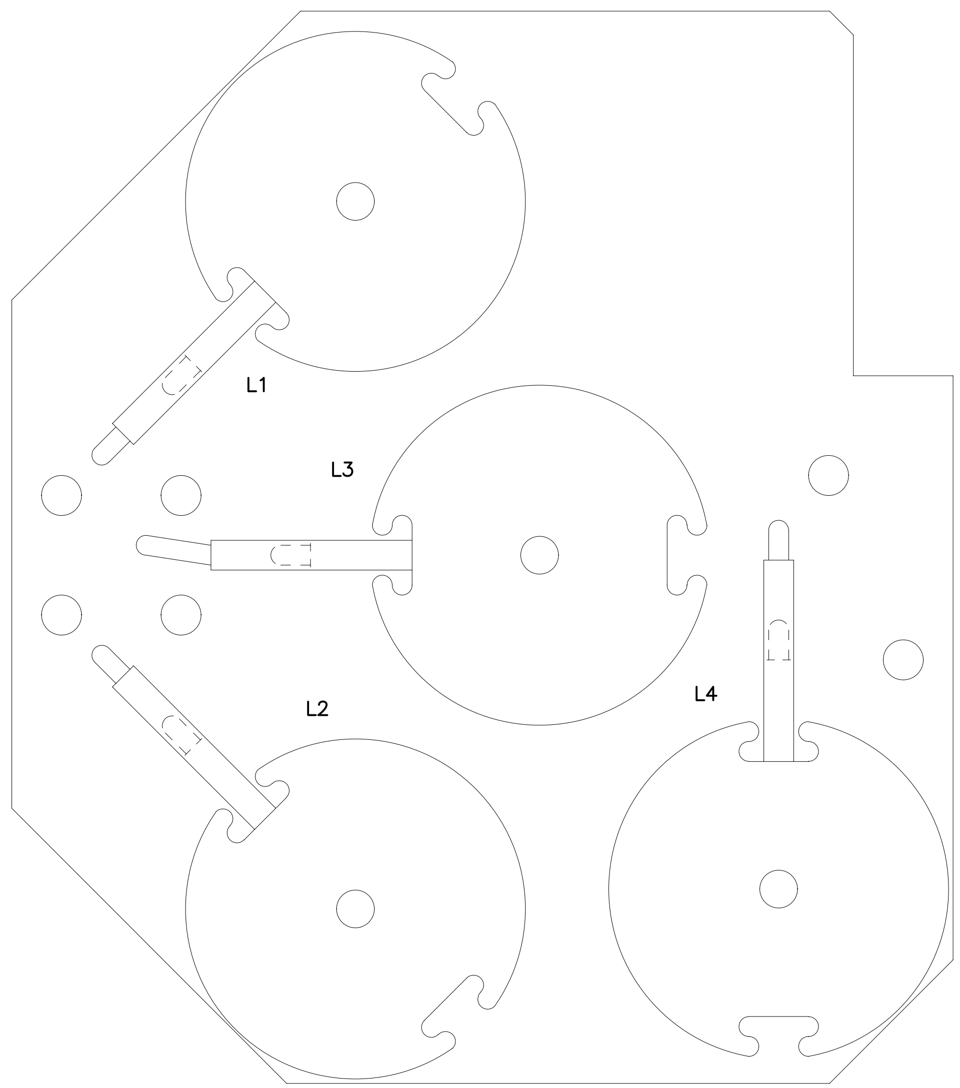
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

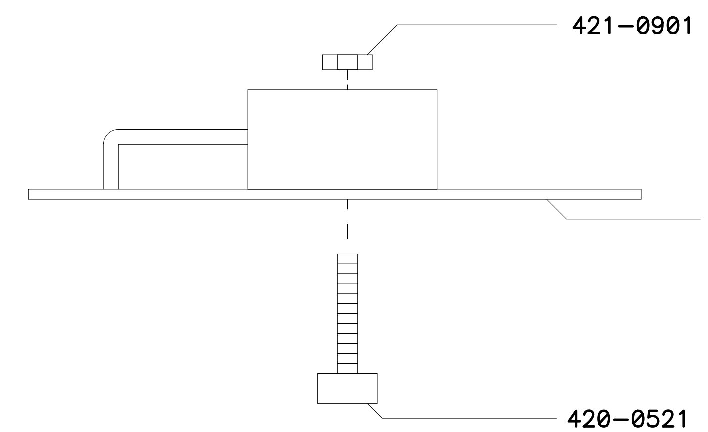
TITLE: PCB ASSEMBLY MODULATOR BD

TYPE	SIZE	DWG No.	REV
A		917-0302-102	A

MODEL: SCALE: SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	12-12-03	PROTOTYPE RELEASE	KT		----
A	4-14-04	MODEL RELEASE WITHOUT CHANGE	KT		----
B	6-16-06	MOV'D L3 LEAD	JTB		11480





TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY: KT 12-12-03
DESIGNER(S):
PROJ. LEADER:
MFG.:

MATERIAL: SEE BOMS 917-0302-103
FINISH:
NEXT ASSY.:

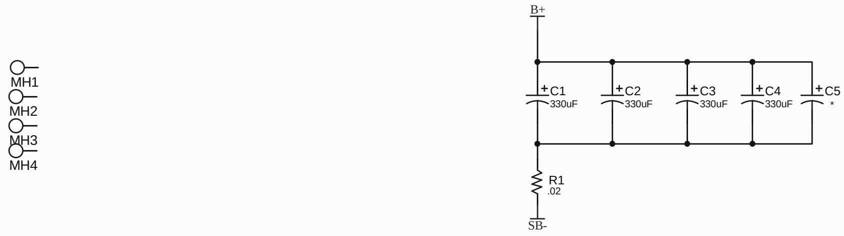
BROADCAST ELECTRONICS INC.®
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: MODULATAR COIL PCB

TYPE	SIZE	DWG No.	REV
A	B	917-0302-103	B

MODEL NNNN SCALE 1/1 SHEET 1 OF 1

REVISIONS				
REV	DATE	DESCRIPTION	DRAFTER	ECN
A	6-22-10	RELEASE TO PRODUCTION	JTB	



DESIGNER JTB 5-23-09	MATERIAL -SEE BOM	BROADCAST ELECTRONICS INC.
ENGINEER KM	FINISH 917-0302-105	4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600 FAX 217/224-9607

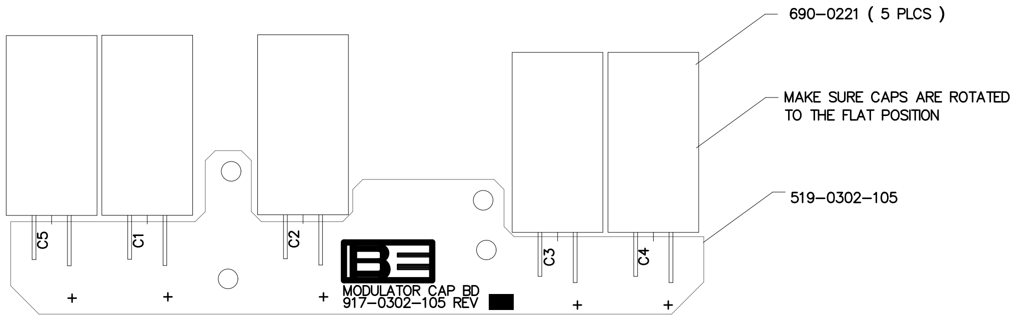
TOLERANCE U.O.S.
.x + .030
.xx + .015
.xxx + .005
ANGLES + 1

TITLE CAP BOARD

TYPE S | SIZE B | DWG. NO. 917-0302-105 | REV A

MODEL AM | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	4-10-10	PRE RELEASE	JTB	KM	----
A	6-22-10	RELEASE TO PRODUCTION	JTB		----



COMPONENT SIDE SILKSCREEN 517-0302-105 REV A

TOLERANCE (DECIMAL) U.O.S.
.X + .030 .XXX + .005
.XX + .015 ANGLES + 1 °

DWN. BY	JTB 4-8-10
DESIGNER(S)	JTB 4-8-10
PROJ. LEADER	
MFG.	
MATERIAL	
FINISH	
NEXT ASSY.	

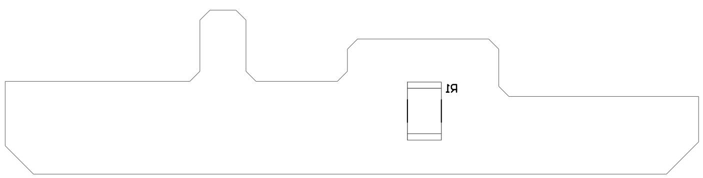
BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE
PCB ASSEMBLY
MODULATOR CAP

TYPE	SIZE	DWG No.	REV
A		917-0302-105	A

MODEL AM SCALE 1/1 SHEET 1 OF 2

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
SEE SHEET 1					



TOLERANCE (DECIMAL) U.O.S.

.X + .030 .XXX + .005

.XX + .015 ANGLES + 1 °

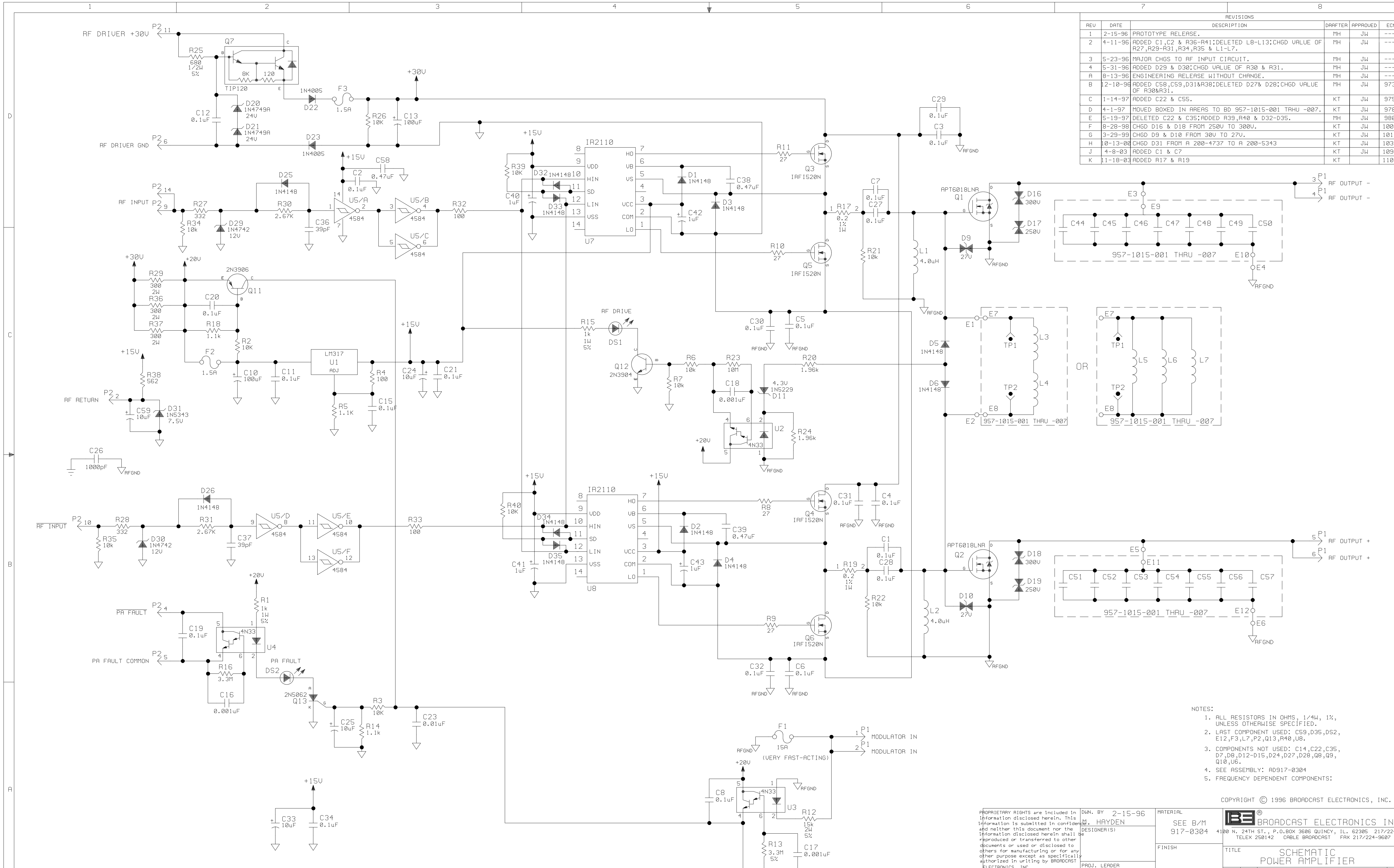
DWN. BY	JTB 4-8-10
DESIGNER(S)	JTB 4-8-10
PROJ. LEADER	
MFG.	
MATERIAL	
FINISH	
NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY MODULATOR CAP

TYPE	SIZE	DWG No.	REV
A		917-0302-105	A

MODEL AM SCALE 1/1 SHEET 2 OF 2



REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	2-15-96	PROTOTYPE RELEASE.	MH	JW	----
2	4-11-96	ADDED C1,C2 & R36-R41;DELETED L8-L13;CHGD VALUE OF R27,R29-R31,R34,R35 & L1-L7.	MH	JW	----
3	5-23-96	MAJOR CHGS TO RF INPUT CIRCUIT.	MH	JW	----
4	5-31-96	ADDED D29 & D30;CHGD VALUE OF R30 & R31.	MH	JW	----
A	8-13-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	12-10-96	ADDED C58,C59,D31&R38;DELETED D27& D28;CHGD VALUE OF R30&R31.	MH	JW	9738
C	1-14-97	ADDED C22 & C55.	KT	JW	9752
D	4-1-97	MOVED BOXED IN AREAS TO BD 957-1015-001 TRHU -007.	KT	JW	9785
E	5-19-97	DELETED C22 & C35;ADDED R39,R40 & D32-D35.	MH	JW	9803
F	8-28-98	CHGD D16 & D18 FROM 250V TO 300V.	KT	JW	10002
G	3-29-99	CHGD D9 & D10 FROM 30V TO 27V.	KT	JW	10107
H	10-13-00	CHGD D31 FROM A 200-4737 TO A 200-5343	KT	JW	10356
J	4-8-03	ADDED C1 & C7	KT	JW	10943
K	11-18-03	ADDED R17 & R19	KT		11076

NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C59,D35,DS2, E12,F3,L7,P2,Q13,R40,U8.
3. COMPONENTS NOT USED: C14,C22,C35, D7,D8,D12-D15,D24,D27,D28,Q8,Q9, Q10,U6.
4. SEE ASSEMBLY: AD917-0304
5. FREQUENCY DEPENDENT COMPONENTS:

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 2-15-96 M. HAYDEN
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE B/M 917-0304
FINISH
SEE DWG RA592-0000
NEXT ASSY.

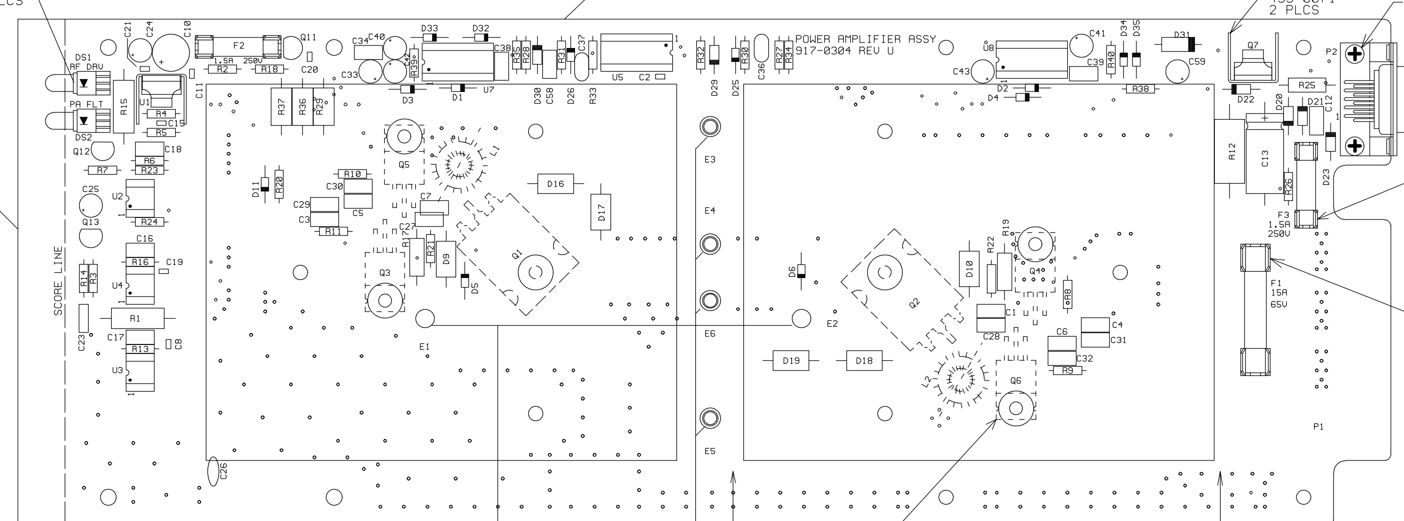
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

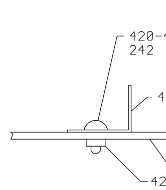
TITLE SCHEMATIC POWER AMPLIFIER

TYPE	SIZE	DWG. NO.	REV
S	B	917-0304	K

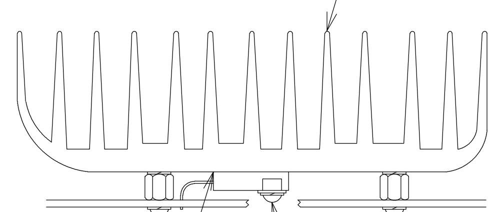
MODEL AM-1A SCALE NONE SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	3-21-96	PROTOTYPE RELEASE.	MH	JW	----
2	6-3-96	MAJOR CHANGES TO RF INPUT CIRCUIT.	MH	JW	----
3	7-21-96	MOVED C15,C36,D25,R4,R27,R30,R34 & MOUNTING HOLES ON INDUCTOR BOARD.	MH	JW	----
A	8-13-96	UPDATED ASSEMBLY NOTES; ENGINEERING RELEASE.	MH	JW	----
B	12-11-96	ADDED C58,C59,D31& R38; DELETED D27&D28; CHANGED VALUE OF R30 & R31; DELETED RIGHT BREAKAWAY TAB.	MH	JW	9738
C	1-14-97	ADDED C22 & C35; MOVED D3.	KT	JW	9752
D	3-31-97	DELETED CAPACITOR AND INDUCTOR BOARDS.	KT	JW	9785
E	5-21-97	DELETED C22 & C35;ADDED R39,R40 & D32-D35.	MH	JW	9803
F	9-19-97	ADDED NOTES & DETAILS C & D.	KT	JW	9860
G	8-28-98	CHGD D16 & D18 TO 206-0300.	KT	JW	10002
H	3-29-99	CHGD D9 & D10 TO 206-0027.	KT	JW	10107
J	12-13-99	ADDED FUSE SIZES TO PCB.	KT	JW	10233
K	10-13-00	CHGD D31 FROM A 200-4737 TO A 200-5343	KT	JW	10356
L	1-29-01	ADDED -002	KT	JW	10408
M	9-17-02	ADDED TORQUE TO DETAILS C & D	KT	JW	10775
N	4-14-03	ADDED C1 & C7	KT	JW	10943
P	11-18-03	ADDED R17 & R19	KT	JW	11076
R	2-9-05	REMOVED -002 ASSEMBLY	KT	JW	11239
T	3-2-05	ADDED 0.500 INCH BREAKAWAY TAB	KT	JW	11263
U	8-15-05	MOVED L1 & L2 TO BOTTOM OF BOARD	KT	JW	11318
W	4-19-07	CHG'D QTY 4 (420-4108) TO (420-4106)	JTB		11514



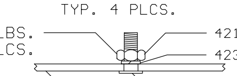


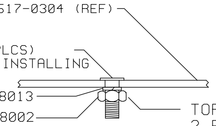
DETAIL -A- SCALE 1/1



DETAIL -B- SCALE=NTS
TYP. 2 PLCS.
(Q1)(Q2)

DETAIL -C- SCALE 1/1
TYP. 4 PLCS.





DETAIL -D- SCALE 1/1
TYP. 2 PLCS.

NOTES:

1. SEE SCHEMATIC SB917-0304.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY	M. HAYDEN 3-21-96
DESIGNER(S)	
PROJ. LEADER	JW 8-16-96
MFG.	
MATERIAL	SEE B/M 917-0304
FINISH	--------
NEXT ASSY.	

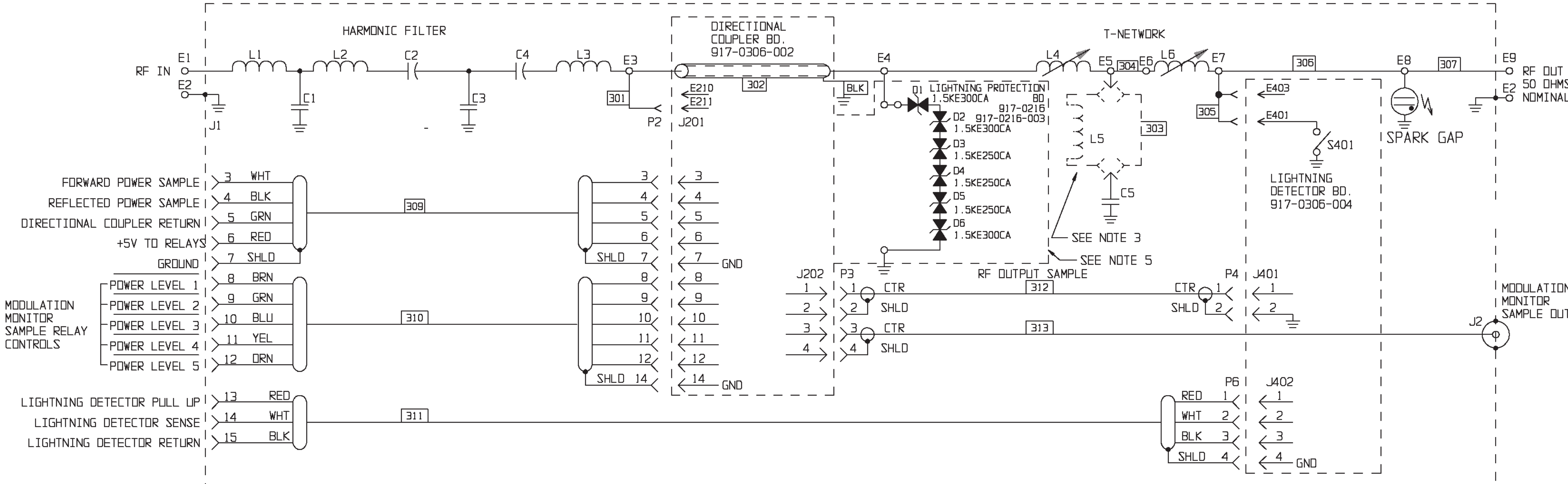
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: PCB ASSEMBLY POWER AMP BD

TYPE	SIZE	DWG No.	REV
A	D	917-0304	W

MODEL AM-1A SCALE 1/1 SHEET 1 OF 1

SCHEMATIC AM-2.5E OUTPUT NETWORK ASSEMBLY



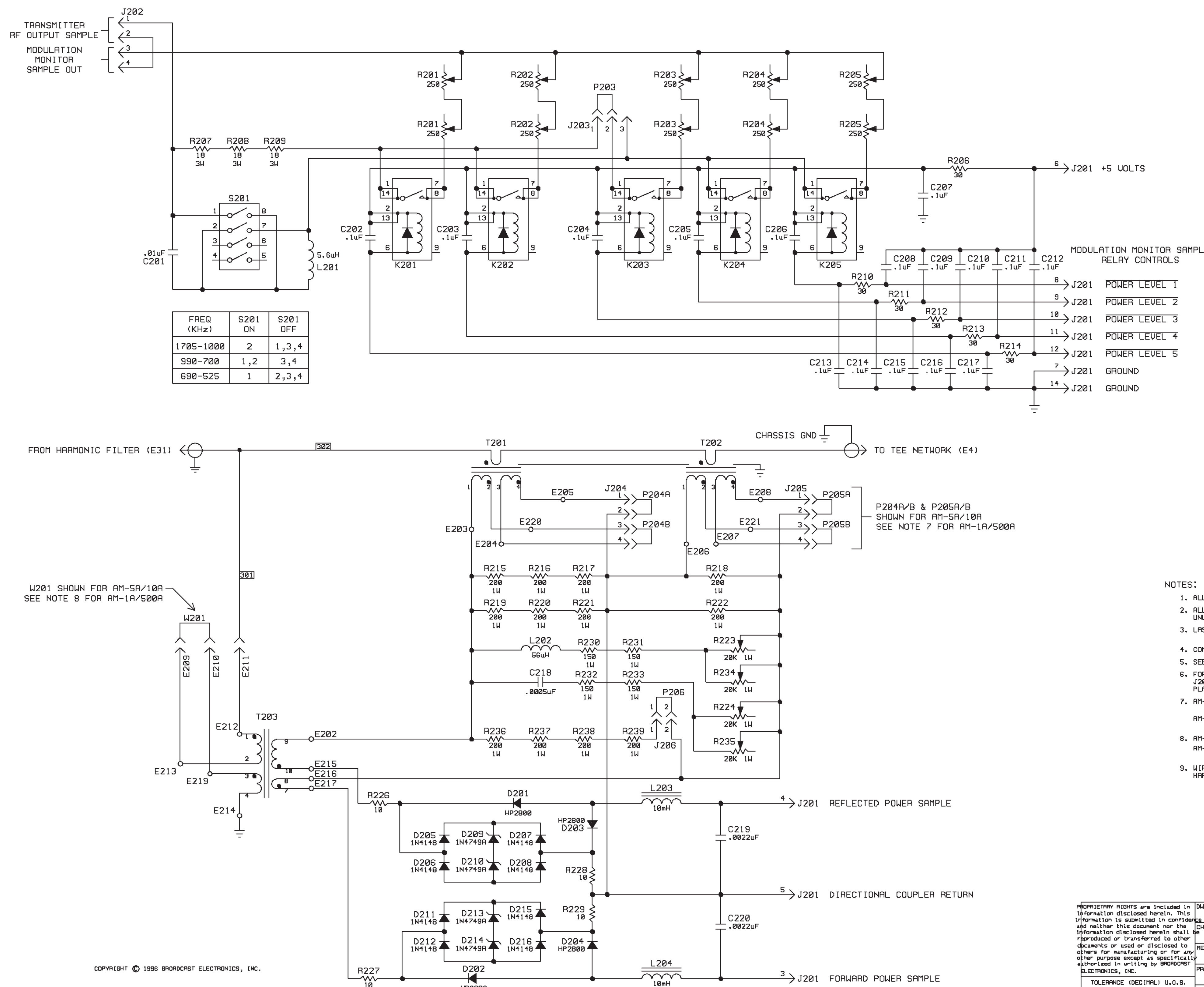
NOTES: 1. L1,L2,L3,L5,C1,C2,C3,C4,C5, ARE FREQUENCY DEPENDENT COMPONENTS.
2. WIRE 303 OR L5 WILL BE INSTALLED, BUT NOT BOTH
3. SPARK GAP - BEI PT. NO. 140-0031 (1500V).

NOTES:
1. USE LITZ WIRE BEI NO. 600-2300 FOR L1, L2, L3 AND L5.

DWN. BY	MSE 5-19-99
CHKD	
ME	
PROJ. ENGR.	
MFG.	
MATERIAL	SEE B/M 957-0068
FINISH	
NEXT ASSY.	SEE DWG RA592-0000
TOLERANCE (DECIMAL) U.O.S.	.x ± .030 .xx ± .015 .xxx ± .005 ANGLES ± 1°

BE® BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE	SCHEMATIC OUTPUT NETWORK ASSEMBLY
TYPE	S
SIZE	B
DWG. NO.	957-0068
REV	A
MODEL	AM-2.5E
SCALE	NONE
SHEET	1 OF 1



FREQ (KHz)	S201 ON	S201 OFF
1705-1000	2	1,3,4
990-700	1,2	3,4
690-525	1	2,3,4

NOTES:

1. ALL REFERENCE DESIGNATORS START AT 201.
2. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
3. LAST COMPONENTS USED: C220, D216, E221, J206, K205, L204, R239, S201, T203, W201
4. COMPONENTS NOT USED: E201, E218, R225
5. SEE ASSEMBLY: AD917-0306
6. FOR POWER LEVEL 3 = HIGH POWER PLACE P203 ON J203 PINS 1&2. FOR POWER LEVEL 3 = LOW POWER PLACE P203 ON J203 PINS 2&3.
7. AM-1A/AM-500A: PLACE P204A/P205A ON J204/J205 PINS 2&3; AND PLACE P204B/P205B ON J204/J205 PIN 4 ONLY.
   AM-5A/AM-10A: PLACE P204A/P205A ON J204/J205 PINS 1&2; AND PLACE P204B/P205B ON J204/J205 PINS 3&4 AS SHOWN.
8. AM-1A/AM-500A: REMOVE W201 AND CONNECT WIRE #301 TO E210.
   AM-5A/AM-10A: PLACE W201 ON E209 & E210; AND CONNECT WIRE #301 TO E211 AS SHOWN.
9. WIRE #301 & #302 ARE PART OF OUTPUT NETWORK WIRE HARNESS ASSEMBLY.

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERKEL 1-2-96
CHKD
ME
PROJ. ENGR.
MFG.

MATERIAL SEE BOM 917-0306-002
FINISH SEE DWG AA592-0000
NEXT ASSY. AD917-0306

BROADCAST ELECTRONICS INC.
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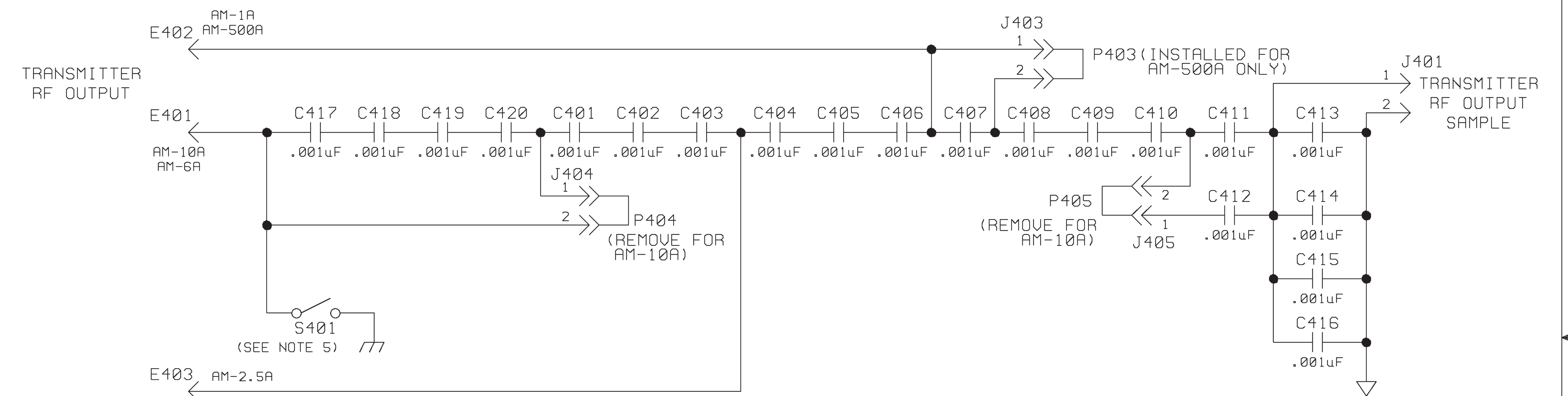
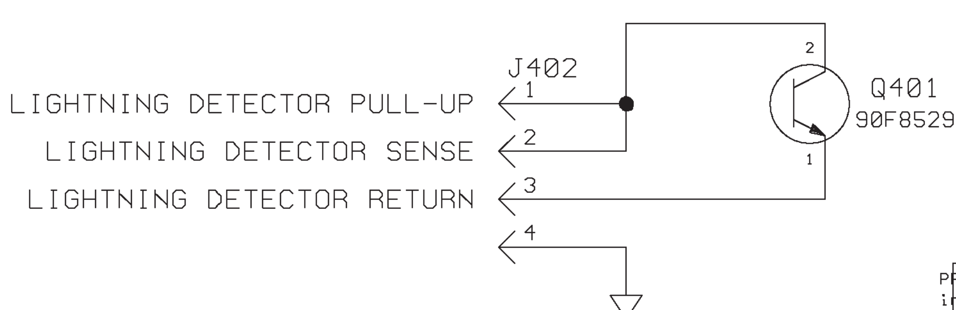
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC DIRECTIONAL COUPLER PCB

TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-002	B

MODEL AM-1A SCALE NONE SHEET 1 OF 1





NOTES:

1. ALL REFERENCE DESIGNATORS START AT 401.
2. LAST COMPONENT USED: C420, E403, J405, P405, Q401, S401
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306-004/014.
5. S401 NOT USED ON 917-0306-014 (AM-1A).

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	MERKEL 1-2-96
CHKD	
ME	
PROJ. ENGR.	
MFG.	
MATERIAL	SEE BOM 917-0306-004 917-0306-014
FINISH	SEE DWG RA592-0000
NEXT ASSY.	957-0064

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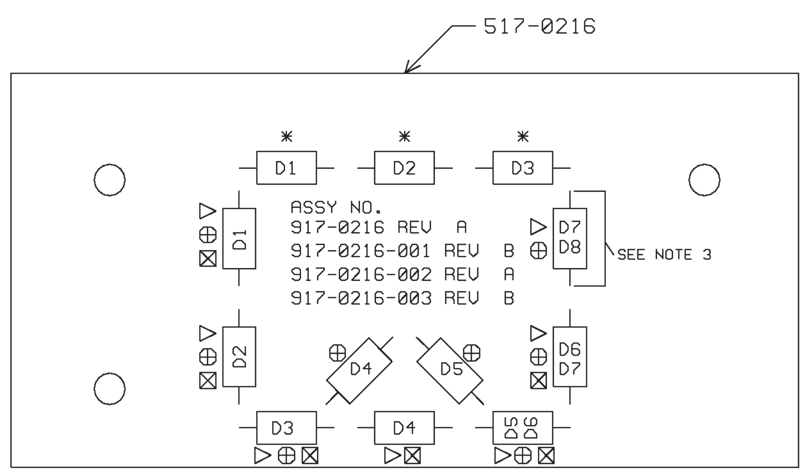
TITLE
SCHEMATIC
LIGHTNING DETECTOR PCB

TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-004/014	B

MODEL AM-1A | SCALE NONE | SHEET 1 OF 1



NOTES:

1. ✱ - INDICATES COMPONENTS USED ON 917-0216 (AM-1).
   ▷ - INDICATES COMPONENTS USED ON 917-0216-001 (AM-5).
   ⊕ - INDICATES COMPONENTS USED ON 917-0216-002 (AM-10).
   ⊠ - INDICATES COMPONENTS USED ON 917-0216-003 (AM-2.5).
2. SEE SCHEMATIC SB 957-0008 (AM-1).
   SEE SCHEMATIC SB 957-0024 (AM-2.5).
   SEE SCHEMATIC SB 957-0017 (AM-5).
   SEE SCHEMATIC SB 957-0020 (AM-10).
3. FOR 917-0216-003 A JUMPER (601-0018, 18 GAUGE BUS WIRE) REPLACES D7/D8.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY 6-30-92 M. HAYDEN
CHKD
ME
PROJ. ENGR. 12-17-92 JERRY WESTBERG
MFG.

MATERIAL
SEE B/M'S
917-0216/-001
917-0216-002
917-0216-003
FINISH
~~SEE DWG RA592-0000~~
NEXT ASSY.
957-0008/0017
957-0020/0024

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TITLE
PCB ASSEMBLY
LIGHTNING PROTECTION BD.

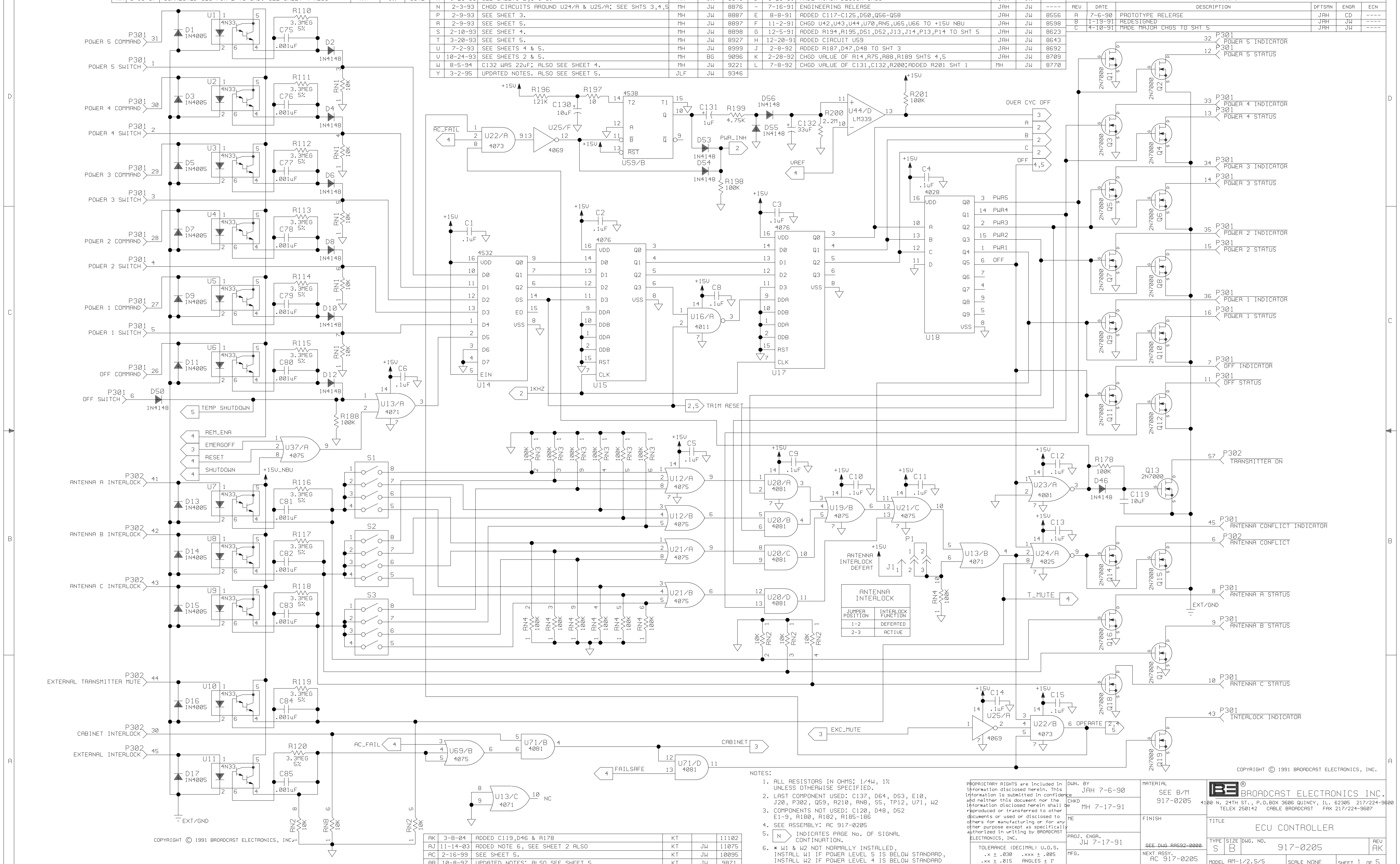
TYPE A | SIZE B | DWG No. 917-0216/-001/-002/-003 | REV C

MODEL AM-1/2.5/5/10 | SCALE 1/1 | SHEET 1 OF 1

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
AA	9-10-97	CONNECTED U23 PIN 2 TO GND: SEE SHEET 4 ALSO	KT	JW	9842
M	1-26-93	SEE SHEETS 2,3 & 5.	MH	JW	8840
N	2-3-93	CHGD CIRCUITS AROUND U24/A & U25/A; SEE SHTS 3,4,5	MH	JW	8876
P	2-9-93	SEE SHEET 3.	MH	JW	8887
R	2-9-93	SEE SHEET 5.	MH	JW	8897
S	2-10-93	SEE SHEET 4.	MH	JW	8898
T	3-20-93	SEE SHEET 5.	MH	JW	8927
U	7-2-93	SEE SHEETS 4 & 5.	MH	JW	8999
V	10-24-93	SEE SHEETS 2 & 5.	MH	BG	9096
W	8-5-94	C132 WAS 22uF; ALSO SEE SHEET 4.	MH	JW	9221
Y	3-2-95	UPDATED NOTES. ALSO SEE SHEET 5.	JLF	JW	9346
D	6-28-91	MADE MINOR DESIGN CHGS	JAH	JW	----
-	7-16-91	ENGINEERING RELEASE	JAH	JW	----
E	8-8-91	ADDED C117-C125,D50,Q56-Q58	JAH	JW	8556
F	11-2-91	CHGD U42,U43,U44,U70,RN5,U65,U66 TO +15V NBU	JAH	JW	8598
G	12-5-91	ADDED R194,R195,D51,D52,J13,J14,P13,P14 TO SHT 5	JAH	JW	8623
H	12-20-91	ADDED CIRCUIT U59	JAH	JW	8643
J	2-8-92	ADDED R187,D47,D48 TO SHT 3	JAH	JW	8692
K	2-28-92	CHGD VALUE OF R14,R75,R88,R189 SHTS 4,5	JAH	JW	8709
L	7-8-92	CHGD VALUE OF C131,C132,R200;ADDED R201 SHT 1	MH	JW	8770

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-6-90	PROTOTYPE RELEASE	JAH	CD	----
B	1-19-91	REDESIGNED	JAH	JW	----
C	4-10-91	MADE MAJOR CHGS TO SHT 5	JAH	JW	----



REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
AK	3-8-04	ADDED C119,D46 & R178	KT		11102
AJ	11-14-03	ADDED NOTE 6, SEE SHEET 2 ALSO	KT	JW	11075
AC	2-16-99	SEE SHEET 5.	KT	JW	10095
AB	10-8-97	UPDATED NOTES; ALSO SEE SHEET 5.	KT	JW	9871

NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C137, D64, DS3, E10, J20, P302, Q59, R210, RN8, S5, TP12, U71, W2
3. COMPONENTS NOT USED: C120, D48, D52 E1-9, R180, R182, R185-186
4. SEE ASSEMBLY: AC 917-0205
5. N INDICATES PAGE No. OF SIGNAL CONTINUATION.
6. * W1 & W2 NOT NORMALLY INSTALLED, INSTALL W1 IF POWER LEVEL 5 IS BELOW STANDARD, INSTALL W2 IF POWER LEVEL 4 IS BELOW STANDARD

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

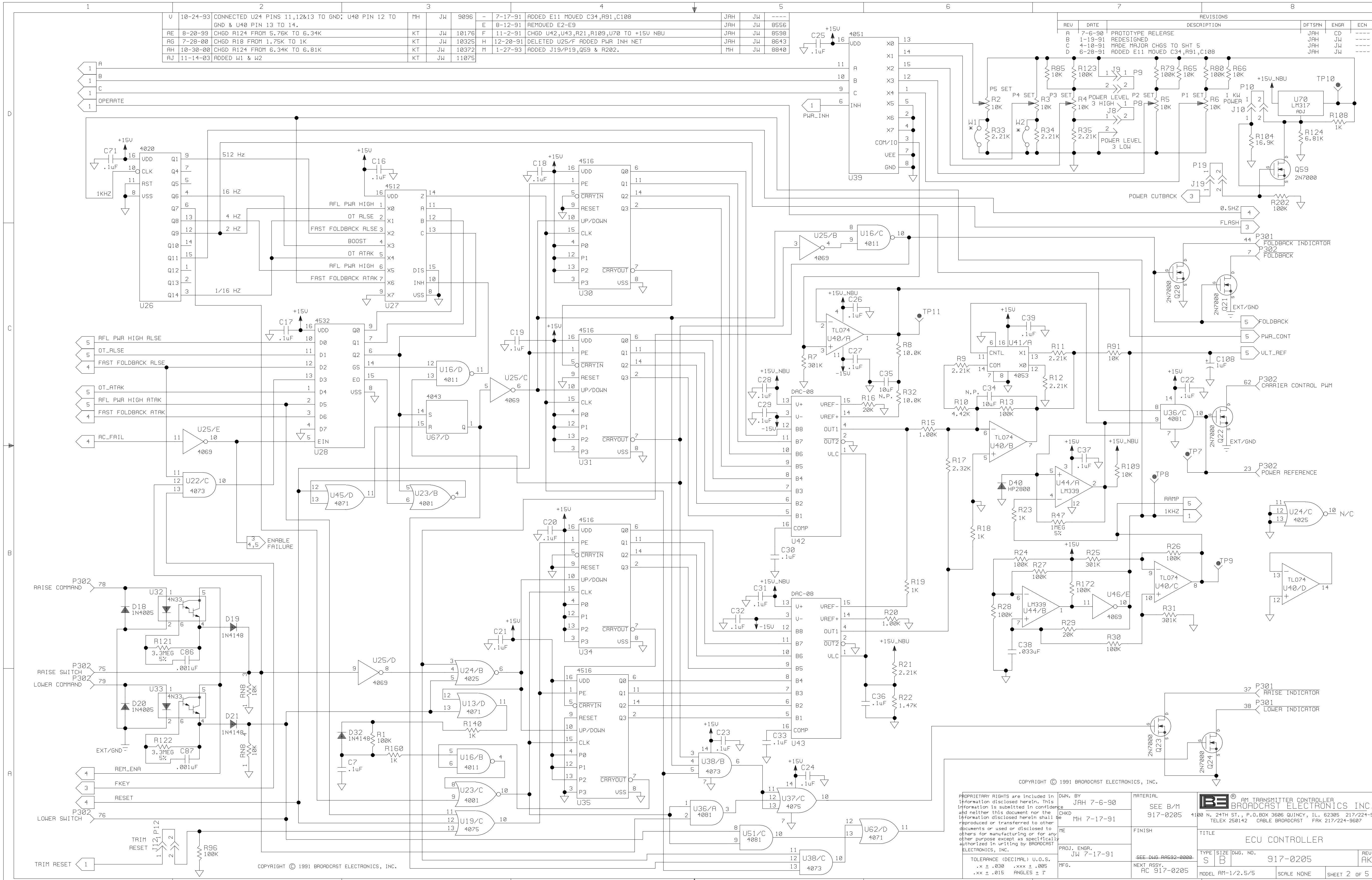
DWN. BY JAH 7-6-90	MATERIAL SEE B/M 917-0205	
CHKD MH 7-17-91		
ME	FINISH	
PROJ. ENGR. JW 7-17-91	~~SEE DWG RA592-0000~~	
MFG.	NEXT ASSY. AC 917-0205	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU CONTROLLER

TYPE S | SIZE B | DWG. NO. 917-0205 | REV AK

MODEL AM-1/2.5/5 | SCALE NONE | SHEET 1 OF 5



U	10-24-93	CONNECTED U24 PINS 11,12&13 TO GND; U40 PIN 12 TO GND & U40 PIN 13 TO 14.	MH	JW	9096
AE	8-20-99	CHGD R124 FROM 5.76K TO 6.34K	KT	JW	10176
AG	7-28-00	CHGD R18 FROM 1.75K TO 1K	KT	JW	10325
AH	10-30-00	CHGD R124 FROM 6.34K TO 6.81K	KT	JW	10372
AJ	11-14-03	ADDED W1 & W2	KT	JW	11075

-	7-17-91	ADDED E11 MOVED C34,R91,C108	JAH	JW	----
E	8-12-91	REMOVED E2-E9	JAH	JW	8556
F	11-2-91	CHGD U42,U43,R21,R109,U70 TO +15V_NBU	JAH	JW	8598
H	12-20-91	DELETED U25/F ADDED PWR INH NET	JAH	JW	8643
M	1-27-93	ADDED J19/P19,Q59 & R202.	MH	JW	8840

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-6-90	PROTOTYPE RELEASE	JAH	CD	----
B	1-19-91	REDESIGNED	JAH	JW	----
C	4-10-91	MADE MAJOR CHGS TO SHT 5	JAH	JW	----
D	6-28-91	ADDED E11 MOVED C34,R91,C108	JAH	JW	----

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY JAH 7-6-90
CHKD MH 7-17-91
ME
PROJ. ENGR. JW 7-17-91
MFG.

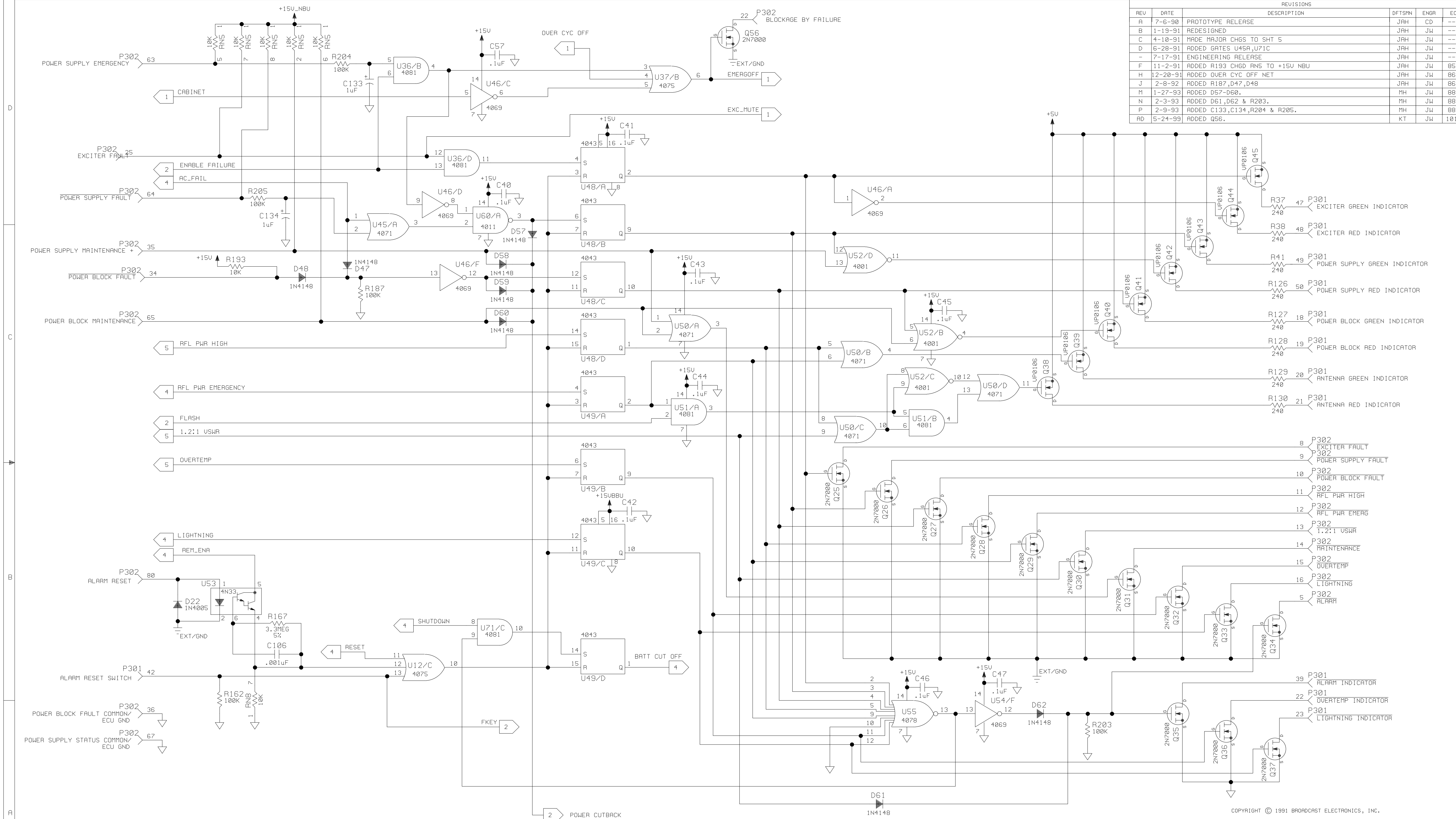
MATERIAL SEE B/M 917-0205
FINISH
SEE DWG RAS92-0000
NEXT ASSY. AC 917-0205

BE® AM TRANSMITTER CONTROLLER
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU CONTROLLER

TYPE S | SIZE B | DWG. NO. 917-0205 | REV AK

MODEL AM-1/2.5/5 | SCALE NONE | SHEET 2 OF 5



REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-6-90	PROTOTYPE RELEASE	JAH	CD	----
B	1-19-91	REDESIGNED	JAH	JW	----
C	4-10-91	MADE MAJOR CHGS TO SHT 5	JAH	JW	----
D	6-28-91	ADDED GATES U45A,U71C	JAH	JW	----
-	7-17-91	ENGINEERING RELEASE	JAH	JW	----
F	11-2-91	ADDED R193 CHGD RN5 TO +15V NBU	JAH	JW	8598
H	12-20-91	ADDED OVER CYC OFF NET	JAH	JW	8643
J	2-8-92	ADDED R187,D47,D48	JAH	JW	8692
M	1-27-93	ADDED D57-D60.	MH	JW	8840
N	2-3-93	ADDED D61,D62 & R203.	MH	JW	8876
P	2-9-93	ADDED C133,C134,R204 & R205.	MH	JW	8887
AD	5-24-99	ADDED Q56.	KT	JW	10148

AF	3-31-00	C133 & C134 WERE 003-1066	KT	JW	10292

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY JAH 7-6-90
CHKD MH 7-17-91
ME
PROJ. ENGR. JW 7-17-91
MFG.

MATERIAL SEE B/M 917-0205
FINISH
~~SEE DWG RA592-0000~~
NEXT ASSY.

BROADCAST ELECTRONICS INC.
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TITLE
ECU CONTROLLER

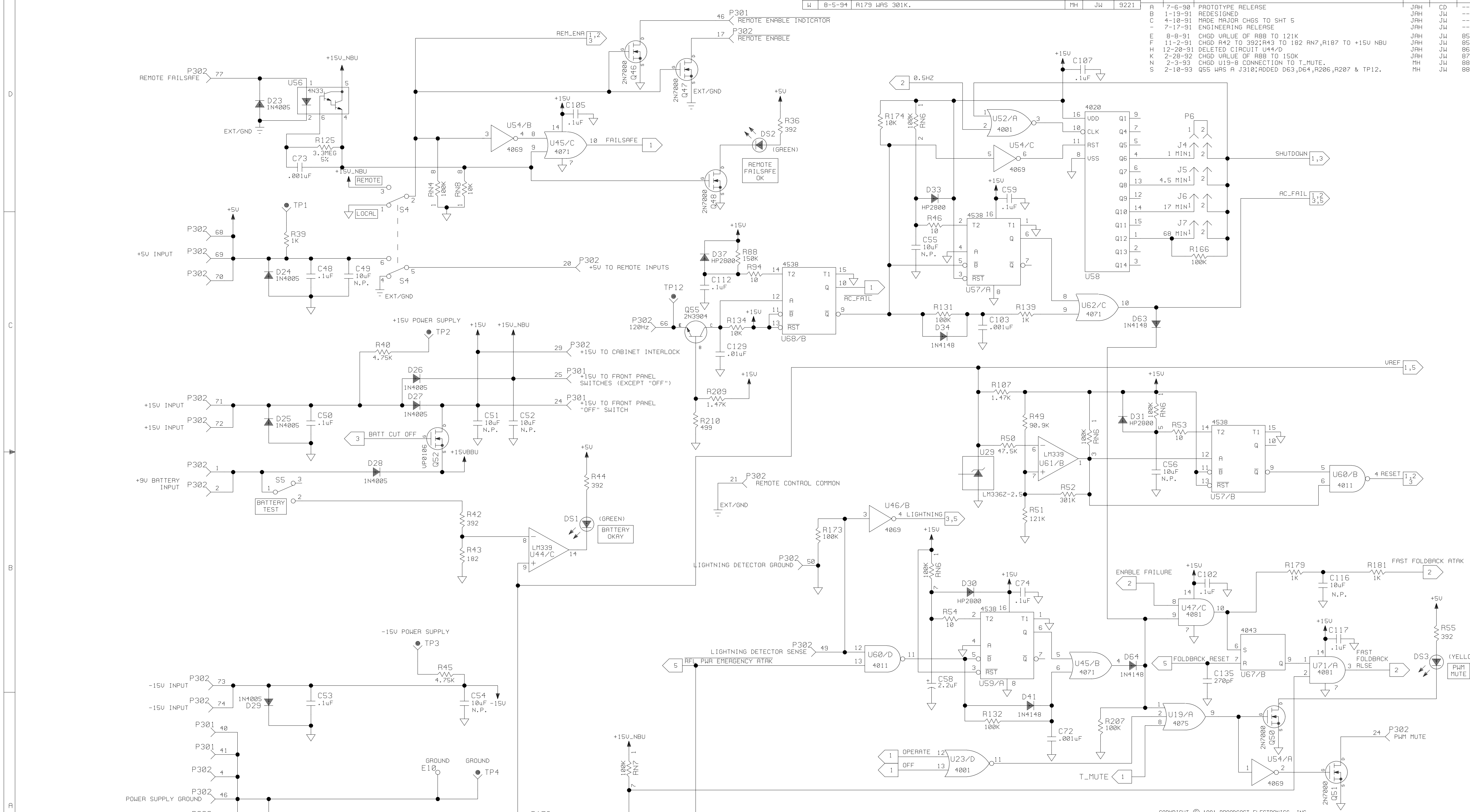
TYPE	SIZE	DWG. NO.	REV
S	B	917-0205	AK

MODEL AM-1/2.5/5 | SCALE NONE | SHEET 3 OF 5

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
AA	9-10-97	R179 WAS 100K; ADDED C135; DEL D43 & R180.	KT	JW	9842
U	7-2-93	ADDED R209 & R210; DELETED C119,D46,Q56,R178,R182 & R206.	MH	JW	8999
W	8-5-94	R179 WAS 301K.	MH	JW	9221

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-6-90	PROTOTYPE RELEASE	JAH	CD	----
B	1-19-91	REDESIGNED	JAH	JW	----
C	4-10-91	MADE MAJOR CHGS TO SHT 5	JAH	JW	----
-	7-17-91	ENGINEERING RELEASE	JAH	JW	----
E	8-8-91	CHGD VALUE OF R88 TO 121K	JAH	JW	8556
F	11-2-91	CHGD R42 TO 392; R43 TO 182 RN7,R187 TO +15V NBU	JAH	JW	8598
H	12-20-91	DELETED CIRCUIT U44/D	JAH	JW	8643
K	2-28-92	CHGD VALUE OF R88 TO 150K	JAH	JW	8709
N	2-3-93	CHGD U19-8 CONNECTION TO T_MUTE.	MH	JW	8876
S	2-10-93	Q55 WAS A J310; ADDED D63,D64,R206,R207 & TP12.	MH	JW	8898



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY JAH 7-6-90
CHKD MH 7-17-91
ME
PROJ. ENGR. JW 7-17-91
MFG.

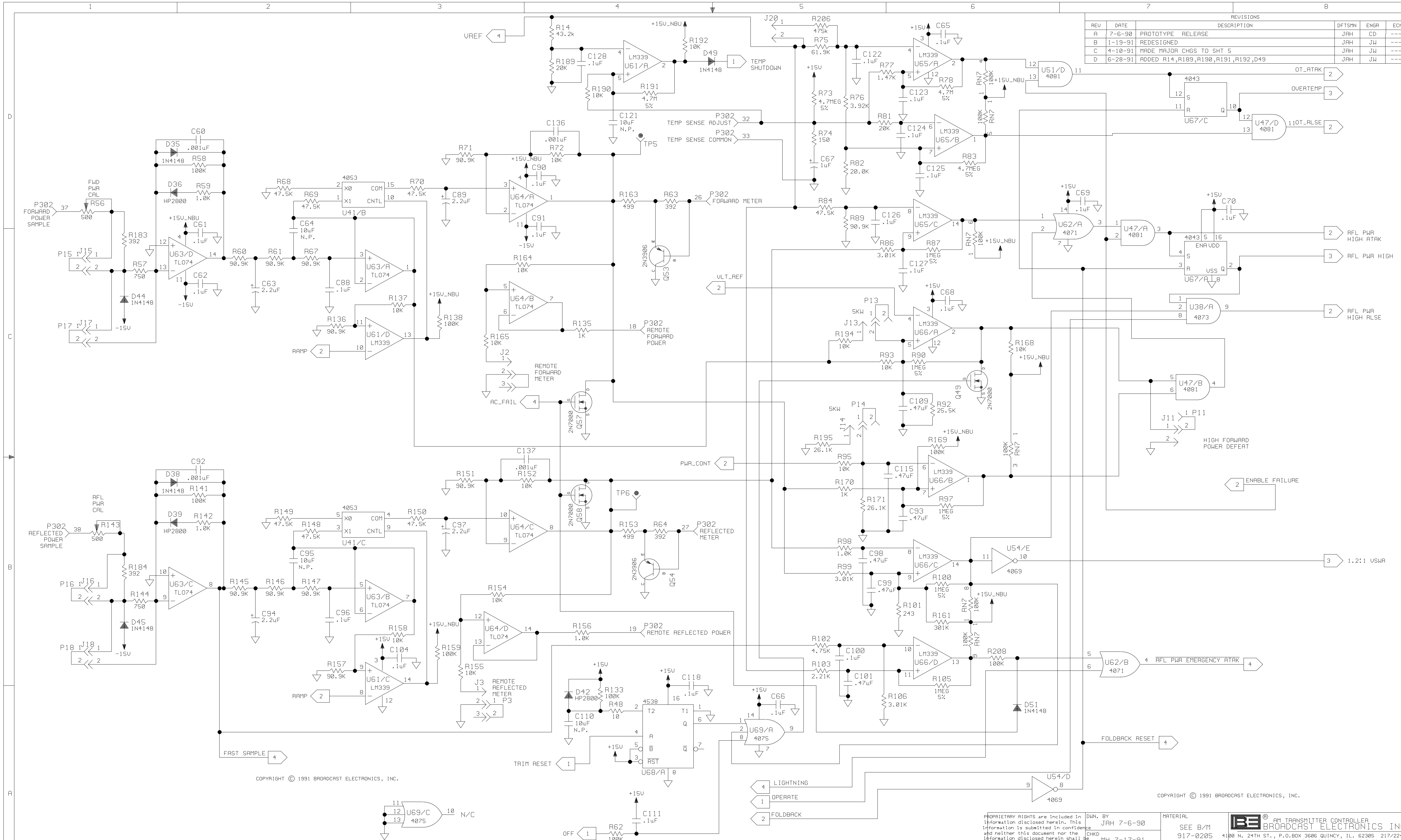
MATERIAL SEE B/M 917-0205
FINISH ~~SEE DWG RA592-0000~~
NEXT ASSY. AC 917-0205

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU CONTROLLER

TYPE S SIZE B DWG. NO. 917-0205 REV AK

MODEL AM-1/2.5/5 SCALE NONE SHEET 4 OF 5



REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-6-90	PROTOTYPE RELEASE	JAH	CD	----
B	1-19-91	REDESIGNED	JAH	JW	----
C	4-10-91	MADE MAJOR CHGS TO SHT 5	JAH	JW	----
D	6-28-91	ADDED R14,R189,R190,R191,R192,D49	JAH	JW	----

AC	2-16-99	MOVEDD C136 & C137.	KT	JW	10095
AB	10-8-97	ADDED C136 & C137.	KT	JW	9871
Y	3-2-95	R14 WAS 44.2k;R78 & R191 WERE 1M;ADDED J20 & R206.	JLF	JW	9346
V	10-24-93	C100 WAS .01uF;R106 WAS 2.32K;CONNECTED U69 PINS 11, 12 & 13 TO GND.	MH	BG	9096
U	7-2-93	C100 WAS 68pF;C121 WAS .1uF;R106 WAS 5.76K.	MH	JW	8999
T	3-20-93	C100 WAS .1uF.	MH	JW	8927
R	2-9-93	DELETED D52; ADDED R208.	MH	JW	8897
N	2-3-93	R153 & R163 WERE 604 OHMS.	MH	JW	8876
M	1-27-93	R106 WAS 3.01K;ADDED J17/P17 & J18/P18.	MH	JW	8840
K	2-28-92	CHGD VALUE OF R14,R75,R189	JAH	JW	8709
H	12-23-91	ADDED R183,R184,J15,J16,P15,P16	JAH	JW	8643
G	12-5-91	ADDED R194,R195,J13,J14,P13,P14,D51,D52	JAH	JW	8623
F	11-2-91	CHGD R159,R138,R192,RN7 TO +15V NBU	JAH	JW	8598
E	8-8-91	ADDED C120-C127,Q57,Q58	JAH	JW	8556
-	7-17-91	ENGINEERING RELEASE	JAH	JW	----

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY JAH 7-6-90
CHKD MH 7-17-91
ME
PROJ. ENGR. JW 7-17-91
MFG.

MATERIAL SEE B/M 917-0205
FINISH
SEE DWG RA592-0000
NEXT ASSY. AC 917-0205

AM TRANSMITTER CONTROLLER
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU CONTROLLER

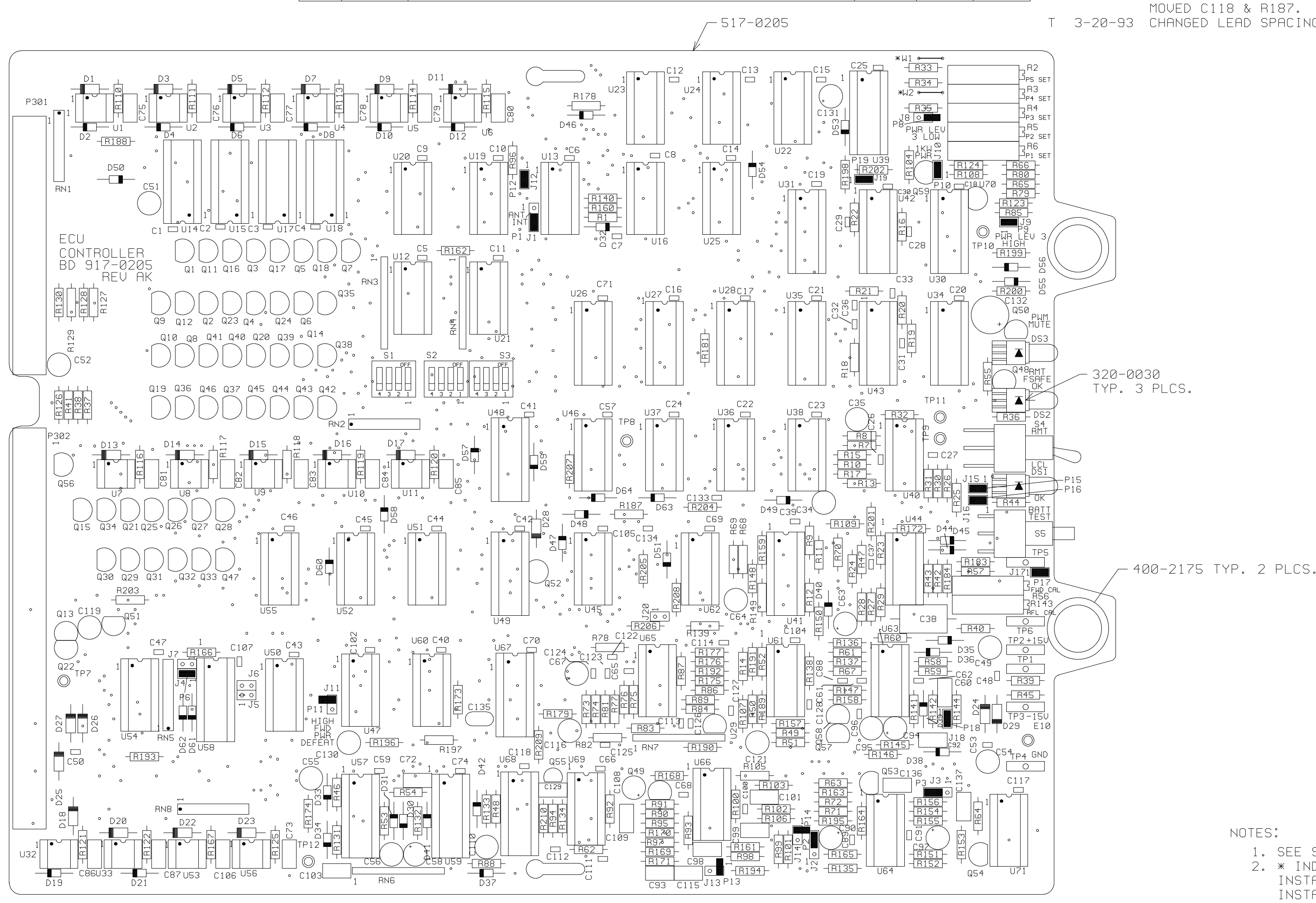
TYPE S | SIZE B | DWG. NO. 917-0205 | REV AK

MODEL AM-1/2.5/5 | SCALE NONE | SHEET 5 OF 5

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	6-7-90	PROTOTYPE RELEASE	JAH	CD	----
B	1-22-91	REDESIGNED	JAH	JW	----
C	5-18-91	MAJOR RELOCATION OF COMPONENTS	JAH	JW	----
D	6-20-91	MINOR CHGS ADD ADDITIONS	JAH	JW	----
-	7-17-91	ENGINEERING RELEASE	JAH	JW	----
E	8-12-91	ADDED C121-C129,D50	JAH	JW	8556
F	11-5-91	ADDED R193 ADD 2 400-2175	JAH	JW	8598
G	12-5-91	ADDED R194,R195,J13,J14,P13,P14,D51,D52	JAH	JW	8623
H	12-30-91	ADDED R197-R200,C130-C132,D53-D56 DEL C120,R185-R187	JAH	JW	8643
J	2-8-92	ADDED R187,D47,D48	JAH	JW	8692
K	2-28-92	CHGD VALUE OF R14,R75,R88,R189	JAH	JW	8709
L	7-9-92	CHGD VALUE OF C131,C132,R200;ADDED R201	MH	JW	8770
M	2-3-93	R106 WAS 103-3014, ADDED D57-D60,J/P17-19,Q59&R202.	MH	JW	8840
N	2-8-93	R153 & R163 WERE 100-6031;ADDED D61,D62 & R203.	MH	JW	8876
P	2-9-93	ADDED C133,C134,R204 & R205.	MH	JW	8887
R	2-9-93	DELETED D52;ADDED R208.	MH	JW	8897
S	2-11-93	Q55 WAS 212-0310;ADDED D63,D64,R206 & R207; MOVED C118 & R187.	MH	JW	8898
T	3-20-93	CHANGED LEAD SPACING OF C100.	MH	JW	8927

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
U	7-23-93	C100 WAS 000-6814,C121 WAS 003-1054,R106 WAS 103-5764; DELETED C119,D46,Q56,R178,R182 & R206; ADDED R209 & R210; MOVED R50,R52,R94,R134,R189 & R191.	MH	JW	8999
V	9-19-93	C1-C33,C36,C37,C39-C48,C50,C53,C57,C59,C61,C62,C65, C66,C68-C71,C74,C88,C90,C91,C96,C102,C104,C105,C107, C111-C114,C117,C118,C122-C128,C133 & C134 CHGD TO 003-1066.	MH	JW	9051
W	10-24-93	CHGD C100 TO 003-1066 & R106 TO 103-3014.	MH	BG	9096
X	8-5-94	CHGD C132 TO 024-3374 & R179 TO 103-1062.	MH	JW	9221
Y	3-3-95	R14 WAS 103-4425; R78 & R191 WERE 103-1007. ADDED R206 & J20.	JLF	JW	9346
AA	9-10-97	DEL D43 & R180; ADDED C135; CHGD R179 TO 100-1041.	KT	JW	9842
AB	10-9-97	ADDED C136 & C137	KT	JW	9871



NOTES:
1. SEE SCHEMATIC SB 917-0205
2. * INDICATES W1 & W2 ARE NOT NORMALLY USED, INSTALL W1 IF POWER LEVEL 5 IS BELOW STANDARD, INSTALL W2 IF POWER LEVEL 4 IS BELOW STANDARD

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AK	3-8-04	ADDED C119, D46 & R178	KT		11102
AJ	11-14-03	ADDED W1,W2 AND NOTE 2	KT	JW	11075
AH	10-30-00	CHGD R124 FROM 103-6344 TO 103-6814	KT	JW	10372
AG	7-28-00	CHGD R18 FROM A 103-1744 TO A 100-1041.	KT	JW	10325
AF	3-31-00	C133 & C134 WERE 003-1066	KT	JW	10292
AE	8-20-99	CHGD R124 FROM A 103-5764 TO A 103-6344.	KT	JW	10176
AD	5-24-99	ADDED Q56	KT	JW	10148
AC	2-16-99	CHGD NETS OF C136 & C137 PIN 2.	KT	JW	10095

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY JAH 1-22-91
CHKD MH 5-20-91
ME
PROJ. ENGR. JW 7-17-91
MFG.

MATERIAL SEE B/M 917-0205
FINISH -----
~~SEE DWG RA592-0000~~
NEXT ASSY. -----

BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY ECU CONTROLLER BD

TYPE A | SIZE C | DWG No. 917-0205 | REV AK

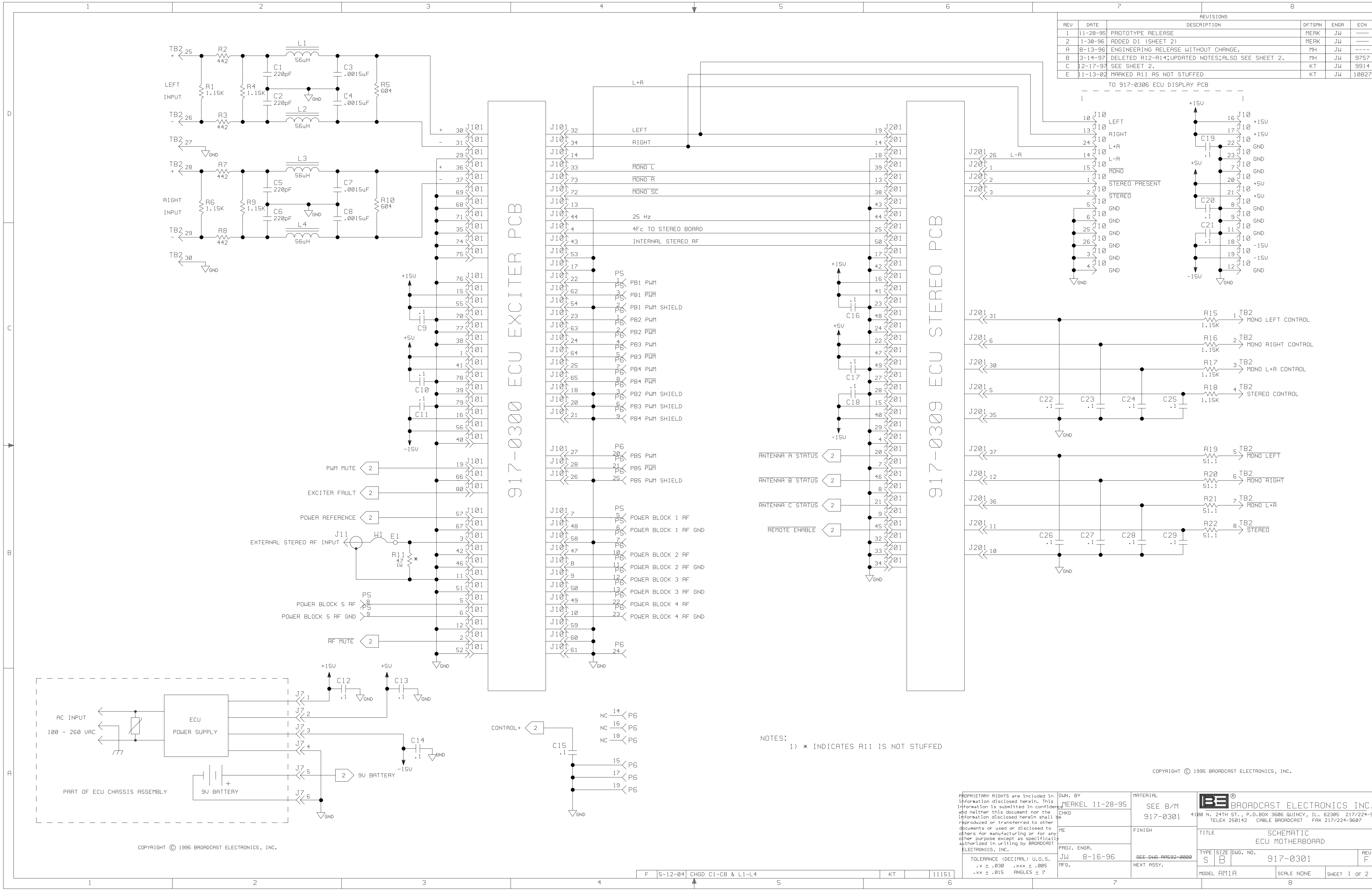
MODEL AM-1/2.5/5 SCALE 1=1 SHEET 1 OF 1

REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE
C1	C1	C60	B3	C119	B2	D49	B3	Q31	B1
C2	C1	C61	B3	C120	C3	D50	C1	Q32	B1
C3	C2	C62	B3	C121	B2	DS1	B3	Q33	B1
C4	C2	C63	B3	C122	B2	DS2	C3	Q34	B1
C5	C2	C64	B2	C123	B2	DS3	C3	Q35	C2
C6	C2	C65	B2	C124	B2	E10	B3	Q36	C1
C7	C2	C66	B2	C125	B2	J1	C2	Q37	C1
C8	C2	C67	B2	C126	B2	J2	B3	Q38	C2
C9	C2	C68	B2	C127	B2	J3	B3	Q39	C2
C10	C2	C69	B2	C128	B3	J4	B1	Q40	C1
C11	C2	C70	B2	C129	B2	J5	B1–B2	Q41	C1
C12	C2	C71	C2	D1	C1	J6	B1–B2	Q42	C2
C13	C2	C72	B2	D2	C1	J7	B1	Q43	C2
C14	C2	C73	B2	D3	C1	J8	C3	Q44	C2
C15	C3	C74	B2	D4	C1	J9	C3	Q45	C1–C2
C16	C2	C75	C1	D5	C1	J10	C3	Q46	C1
C17	C2	C76	C1	D6	C1	J11	B2	Q47	B1
C18	C3	C77	C2	D7	C2	J12	C2	Q48	C3
C19	C3	C78	C2	D8	C2	P1	C2	Q49	B2
C20	C3	C79	C2	D9	C2	P2	B3	Q50	C3
C21	C3	C80	C2	D10	C2	P3	B3	Q51	B1
C22	C2	C81	B1–C1	D11	C2	P6	B1	Q52	B2
C23	C3	C82	B1–C1	D12	C2	P8	C3	Q53	B3
C24	C2	C83	B2–C2	D13	C1	P9	C3	Q54	B3
C25	C3	C84	B2–C2	D14	C1	P10	C3	Q55	B2
C26	C3	C85	B2–C2	D15	C2	P11	B2	Q56	B2
C27	C3	C86	B1	D16	C2	P12	C2	Q57	B3
C28	C3	C87	B1	D17	C2	P301	C1	Q58	B3
C29	C3	C88	B3	D18	B1	P302	B1–C1	R1	C2
C30	C3	C89	B3	D19	A1	Q1	C1	R2	C3
C31	C3	C90	B3	D20	B1	Q2	C1	R3	C3
C32	C3	C91	B3	D21	A1	Q3	C1–C2	R4	C3
C33	C3	C92	B3	D22	B1	Q4	C1–C2	R5	C3
C34	B3	C93	A2	D23	B1–B2	Q5	C2	R6	C3
C35	C3	C94	B3	D24	B3	Q6	C2	R7	C3
C36	C3	C95	B3	D25	B1	Q7	C2	R8	C3
C37	B3	C96	B3	D26	B1	Q8	C1	R9	B3
C38	B3	C97	B3	D27	B1	Q9	C1	R10	C3
C39	B3	C98	B2	D28	B2	Q10	C1	R11	B3
C40	B2	C99	B2–B3	D29	B3	Q11	C1	R12	B3
C41	C2	C100	B2	D30	B2	Q12	C1	R13	B3
C42	B2	C101	B2–B3	D31	B2	Q13	B1	R14	B2
C43	B2	C102	B2	D32	C2	Q14	C2	R15	C3
C44	B2	C103	A2–B2	D33	B2	Q15	B1	R16	C3
C45	B2	C104	B3	D34	B2	Q16	C1	R17	C3
C46	B2	C105	B2	D35	B3	Q17	C2	R18	C3
C47	B1	C106	B1	D36	B3	Q18	C2	R19	C3
C48	B3	C107	B1	D37	A2	Q19	C1	R20	C3
C49	B3	C108	B2	D38	B3	Q20	C1–C2	R21	C3
C50	B1	C109	B2	D39	B3	Q21	B1	R22	C3
C51	C1	C110	B2	D40	B3	Q22	B1	R23	B3
C52	C1	C111	B2	D41	B2	Q23	C1	R24	B3
C53	B3	C112	B2	D42	B2	Q24	C2	R25	B3
C54	B3	C113	B2	D43	B2	Q25	B1	R26	B3–C3
C55	B2	C114	B2	D44	B3	Q26	B1	R27	B3
C56	B2	C115	A2	D45	B3	Q27	B1	R28	B3
C57	C2	C116	B2	D46	B2	Q28	B1	R29	B3
C58	B2	C117	B3	D47	C3	Q29	B1	R30	B3–C3
C59	B2	C118	B2	D48	B3	Q30	B1	R31	B3–C3

FIGURE 4–3. COMPONENT LOCATOR, ECU CONTROLLER BOARD
(Sheet 1 of 2)

REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE
R32	C3	R91	B2	R150	B3	TP3	B3	U51	B2
R33	C3	R92	B2	R151	B3	TP4	B3	U52	B2
R34	C3	R93	B2	R152	A3–B3	TP5	B3	U53	B1
R35	C3	R94	B2	R153	B3	TP6	B3	U54	B1
R36	C3	R95	B2	R154	B3	TP7	B1	U55	B2
R37	C1	R96	C2	R155	B3	TP8	C2	U56	B1–B2
R38	C1	R97	B2	R156	B3	TP9	C3	U57	B2
R39	B3	R98	B2	R157	B3	TP10	C3	U58	B1
R40	B3	R99	B2–B3	R158	B3	TP11	C3	U59	B2
R41	C1	R100	B2	R159	B2–B3	U1	C1	U60	B2
R42	B3	R101	B3	R160	C2	U2	C1	U61	B3
R43	B3	R102	B3	R161	B2	U3	C1–C2	U62	B2
R44	B3	R103	B2–B3	R162	C2	U4	C2	U63	B3
R45	B3	R104	C3	R163	B3	U5	C2	U64	B3
R46	B2	R105	B2–B3	R164	B3	U6	C2	U65	B2
R47	B3	R106	B3	R165	B3	U7	B1–C1	U66	B2
R48	B2	R107	B2	R166	B1	U8	B1–C1	U67	B2
R49	B3	R108	C3	R167	B1	U9	B2–C2	U68	B2
R50	B2	R109	B3	R168	B2	U10	B2–C2	U69	B2
R51	B3	R110	C1	R169	B2	U11	B2–C2	U70	C3
R52	B2–B3	R111	C1	R170	B2	U12	C2	U71	B3
R53	B2	R112	C2	R171	B2	U13	C2		
R54	B2	R113	C2	R172	B3	U14	C1		
R55	C3	R114	C2	R173	B2	U15	C1		
R56	B3	R115	C2	R174	B2	U16	C2		
R57	B3	R116	C1	R175	B2	U17	C2		
R58	B3	R117	C1	R176	B2	U18	C2		
R59	B3	R118	C2	R177	B2	U19	C2		
R60	B3	R119	C2	R178	A2	U20	C2		
R61	B3	R120	C2	R179	B2	U21	C2		
R62	B2	R121	B1	R180	B2	U22	C3		
R63	B3	R122	B1	R181	C2	U23	C2		
R64	B3	R123	C3	R182	B2	U24	C2		
R65	C3	R124	C3	R183	B3	U25	C2		
R66	C3	R125	B2	R184	C3	U26	C2		
R67	B3	R126	C1	R185	C3	U27	C2		
R68	B2	R127	C1	R186	C3	U28	C2		
R69	B2	R128	C1	R187	B3	U29	B2		
R70	B3	R129	C1	R188	C1	U30	C3		
R71	B3	R130	C1	R189	B2–B3	U31	C3		
R72	B3	R131	B2	R190	B2	U32	B1		
R73	B2	R132	B2	R191	B2	U33	B1		
R74	B2	R133	B2	R192	B2	U34	C3		
R75	B2	R134	B2	R193	B1	U35	C3		
R76	B2	R135	B3	RN1	C1	U36	B2–C2		
R77	B2	R136	B3	RN2	C2	U37	B2–C2		
R78	B2	R137	B3	RN3	C2	U38	B3–C3		
R79	C3	R138	B3	RN4	C2	U39	B3		
R80	C3	R139	B2	RN5	B1	U40	B3–C3		
R81	B2	R140	C2	RN6	A2	U41	B3		
R82	B2	R141	B3	RN7	B2	U42	C3		
R83	B2	R142	B3	RN8	B1	U43	C3		
R84	B2	R143	B3	S1	C2	U44	B3		
R85	C3	R144	B3	S2	C2	U45	B2		
R86	B2	R145	B3	S3	C2	U46	B2–C2		
R87	B2	R146	B3	S4	C3	U47	B2		
R88	B2	R147	B3	S5	B3	U48	B2–C2		
R89	B2	R148	B2	TP1	B3	U49	B2		
R90	B2	R149	B2–B3	TP2	B3	U50	B2		

FIGURE 4–3. COMPONENT LOCATOR, ECU CONTROLLER BOARD
(Sheet 2 of 2)



REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-28-95	PROTOTYPE RELEASE	MERK	JW	——
2	1-30-96	ADDED D1 (SHEET 2)	MERK	JW	——
A	8-13-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	3-14-97	DELETED R12-R14;UPDATED NOTES;ALSO SEE SHEET 2.	MH	JW	9757
C	12-17-97	SEE SHEET 2.	KT	JW	9914
E	11-13-02	MARKED R11 AS NOT STUFFED	KT	JW	10827
F	5-12-04	CHGD C1-C8 & L1-L4	KT		11151

NOTES:
1) * INDICATES R11 IS NOT STUFFED

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

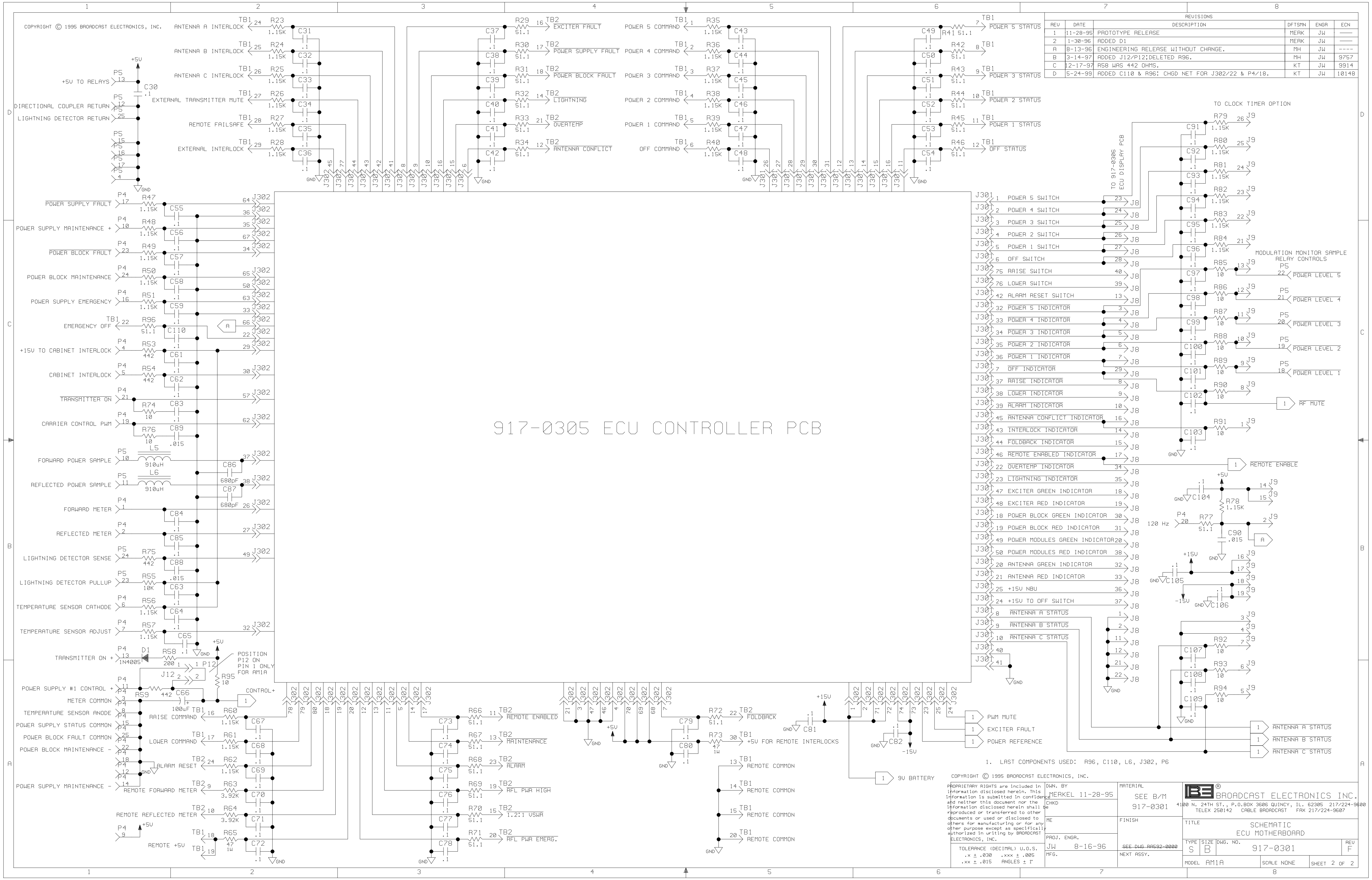
DWN. BY MERKEL 11-28-95
CHKD
ME
PROJ. ENGR. JW 8-16-96
MFG.

MATERIAL SEE B/M 917-0301
FINISH
~~SEE DWG RA592-0000~~
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC ECU MOTHERBOARD

TYPE S SIZE B DWG. NO. 917-0301 REV F
MODEL AM1A SCALE NONE SHEET 1 OF 2



REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-28-95	PROTOTYPE RELEASE	MERK	JW	——
2	1-30-96	ADDED D1	MERK	JW	——
A	8-13-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	3-14-97	ADDED J12/P12;DELETED R96.	MH	JW	9757
C	12-17-97	R58 WAS 442 OHMS.	KT	JW	9914
D	5-24-99	ADDED C110 & R96: CHGD NET FOR J302/22 & P4/18.	KT	JW	10148

1. LAST COMPONENTS USED: R96, C110, L6, J302, P6

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY: MERKEL 11-28-95
CHKD
ME
PROJ. ENGR.: JW 8-16-96
MFG.
MATERIAL: SEE B/M 917-0301
FINISH: ~~SEE DWG RA592-0000~~
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: SCHEMATIC ECU MOTHERBOARD

TYPE S | SIZE B | DWG. NO. 917-0301 | REV F
MODEL AM1A | SCALE NONE | SHEET 2 OF 2

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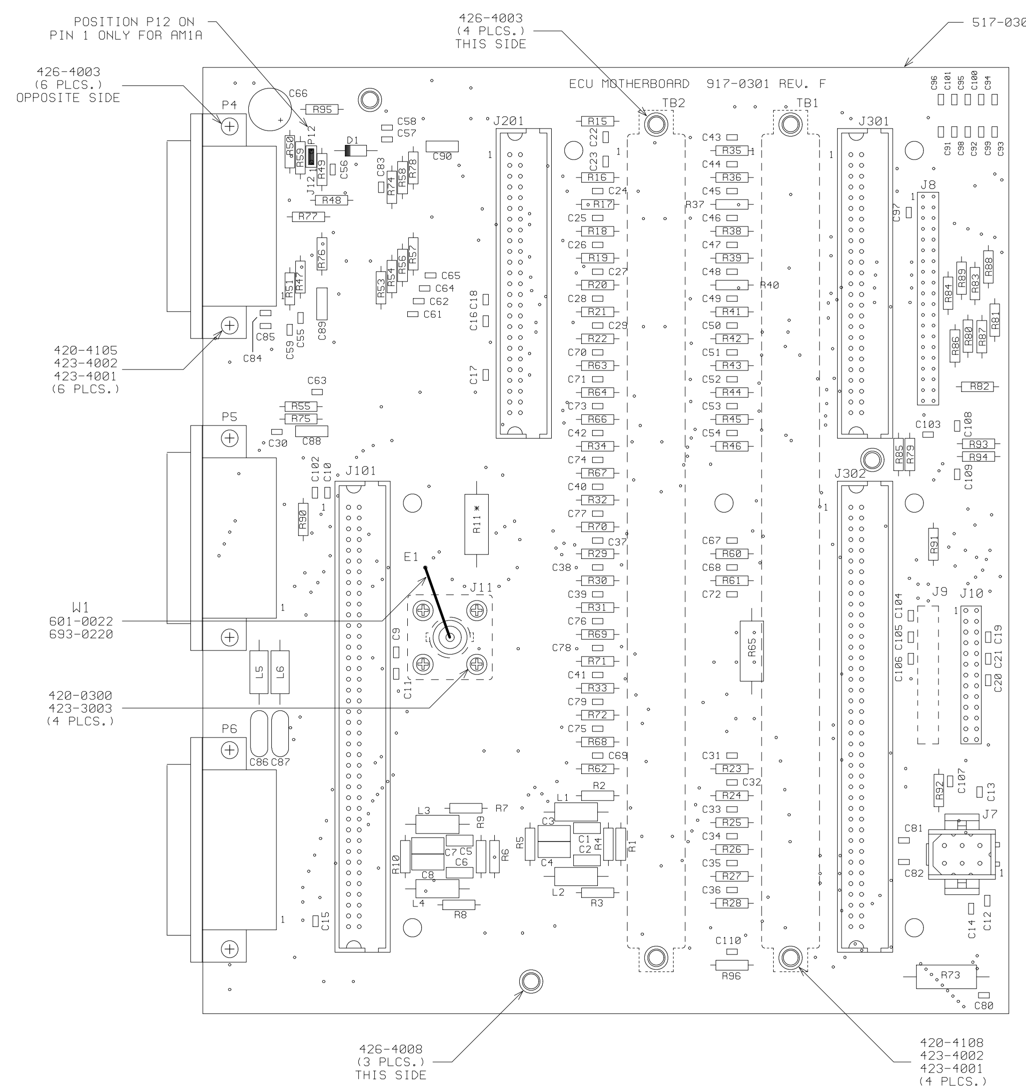
REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-28-95	PROTOTYPE RELEASE	MERK	JW	----
2	1-30-96	ADDED D1	MERK	JW	----
A	8-13-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	3-14-97	ADDED J12/P12;DELETED R12-R14 & R96;MOVED R48 & R49.	MH	JW	9757
C	3-24-97	C66 WAS 020-1083.	MSE	JW	9783
D	12-17-97	CHGD R58 TO A 103-2003.	KT	JW	9914
E	5-25-99	ADDED C110 & R96;CHGD NET FOR J302/22 & P4/18.	KT	JW	10148
F	11-13-02	MARKED R11 AS NOT STUFFED	KT	JW	10827
G	5-12-04	CHGD C1-C8 & L1-L4	KT		11151



NOTES:
1. ALL PARTS SHOWN WITH DASHED LINES TO BE MOUNTED FROM OPPOSITE SIDE.
2. TAPE TO BE PLACED OVER MOUNTING HOLES OF J9, J11, TB1, & TB2 BEFORE SOLDER REFLOW.
3. ∗ INDICATES R11 IS NOT STUFFED

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY MERKEL 11-28-95
CHKD
ME
PROJ. ENGR. JW 8-16-96
MFG.

MATERIAL SEE BOM 917-0301
FINISH
~~SEE DWG RA592-0000~~
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ASSEMBLY ECU MOTHERBOARD

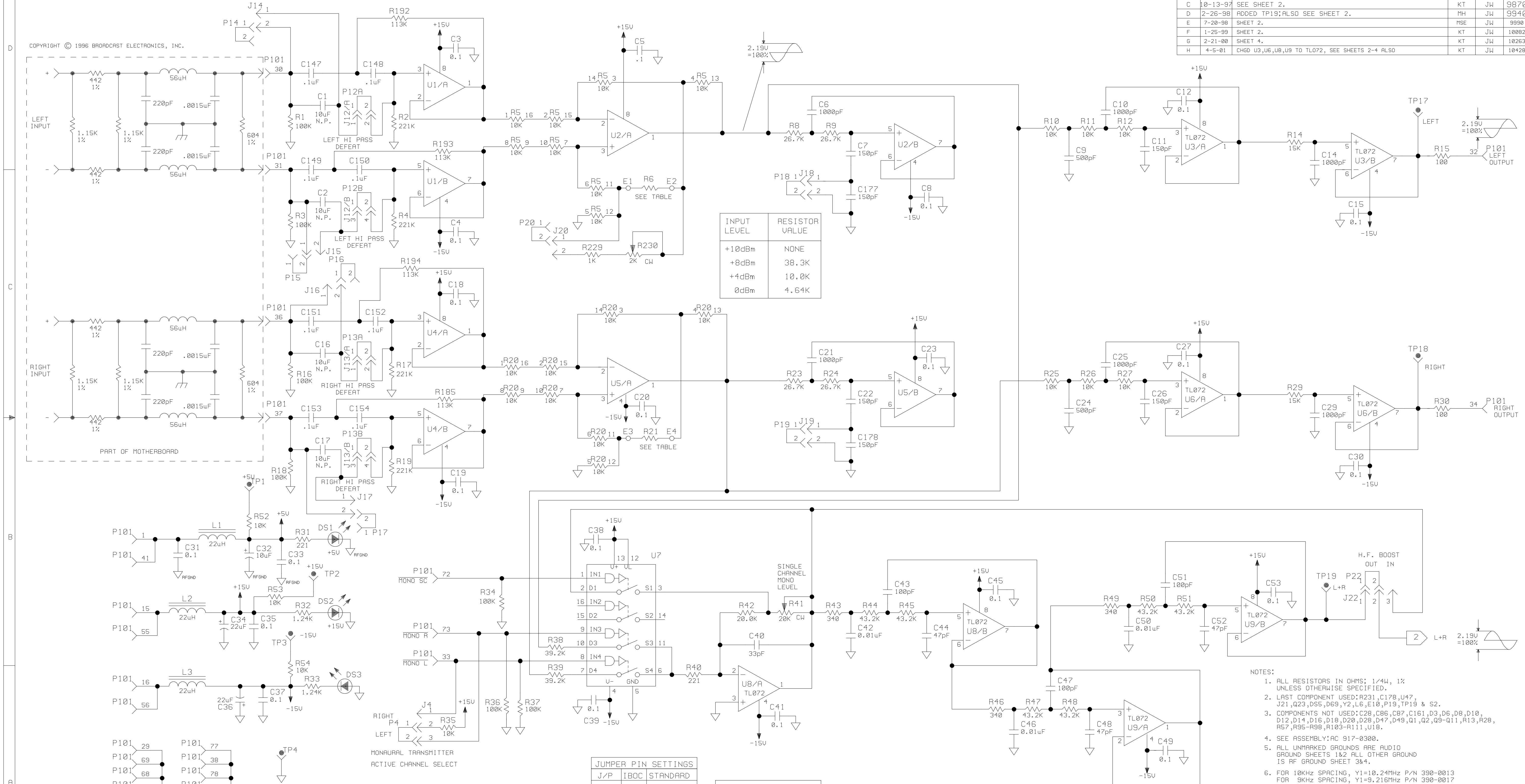
TYPE A | SIZE C | DWG No. 917-0301 | REV F

MODEL AM1A | SCALE 1:1 | SHEET 1 OF 1

M	11-13-02	ADDED J14-J19,P14-P19,C177 & C178	KT	JW	10827
N	3-12-03	ADDED J20,P20,R229 & R230; SEE SHEET 2 ALSO	KT	JW	10918
P	5-11-04	DEL JP2,JP3: ADD JP22;CHGD C42-C44,C46-C48,C50-C52,R43-R51	KT	JW	11151
R	7-14-04	TIE R8 NET TO R10 NET & R23 NET TO R25 NET	KT	JW	11185
T	1-10-05	CHGD JUMPER SETTINGS FOR JP18 & JP19	KT	JW	11232
U	3-1-05	CHGD R229 TO 1K	KT		11252
V	6-27-06	CHGD C90 TO .1uF(003-1066)	JTB		11443

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-20-95	PROTOTYPE RELEASE	MERK	JW	----
2	1-25-96	SEE SHEET 2.	MH	JW	----
3	6-26-96	SEE SHEET 4.	MH	JW	----
A	8-9-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	1-22-97	SEE SHEET 2.	KT	JW	9791
C	10-13-97	SEE SHEET 2.	KT	JW	9870
D	2-26-98	ADDED TP19;ALSO SEE SHEET 2.	MH	JW	9940
E	7-20-98	SHEET 2.	MSE	JW	9990
F	1-25-99	SHEET 2.	KT	JW	10082
G	2-21-00	SHEET 4.	KT	JW	10263
H	4-5-01	CHGD U3,U6,U8,U9 TO TL072, SEE SHEETS 2-4 ALSO	KT	JW	10428



INPUT LEVEL	RESISTOR VALUE
+10dBm	NONE
+8dBm	38.3K
+4dBm	10.0K
0dBm	4.64K

JUMPER PIN SETTINGS		
J/P	IBOC	STANDARD
JP4	2-3	2-3
JP7	1-2	2-3
JP12A	1-2	OPEN
JP12B	3-4	OPEN
JP13A	1-2	OPEN
JP13B	3-4	OPEN
JP14	1-2	OPEN
JP15	1-2	OPEN
JP16	1-2	OPEN

JUMPER PIN SETTINGS		
J/P	IBOC	STANDARD
JP17	1-2	OPEN
JP18	1-2	1-2
JP19	1-2	1-2
JP20	1-2	OPEN
JP21	1-2	2-3
JP22	2-3	1-2

NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED:R231,C178,U47, J21,Q23,DS5,D69,Y2,L6,E10,P19,TP19 & S2.
3. COMPONENTS NOT USED:C28,C86,C87,C161,D3,D6,D8,D10, D12,D14,D16,D18,D20,D28,D47,D49,Q1,Q2,Q9-Q11,R13,R28, R57,R95-R98,R103-R111,U18.
4. SEE ASSEMBLY:AC 917-0300.
5. ALL UNMARKED GROUNDS ARE AUDIO GROUND SHEETS 1&2 ALL OTHER GROUND IS RF GROUND SHEET 3&4.
6. FOR 10KHz SPACING, Y1=10.24MHz P/N 390-0013
   FOR 9KHz SPACING, Y1=9.216MHz P/N 390-0017

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-20-95 M. MERKEL
CHKD
ME
PROJ. ENGR. 8-16-96 JW
MFG.

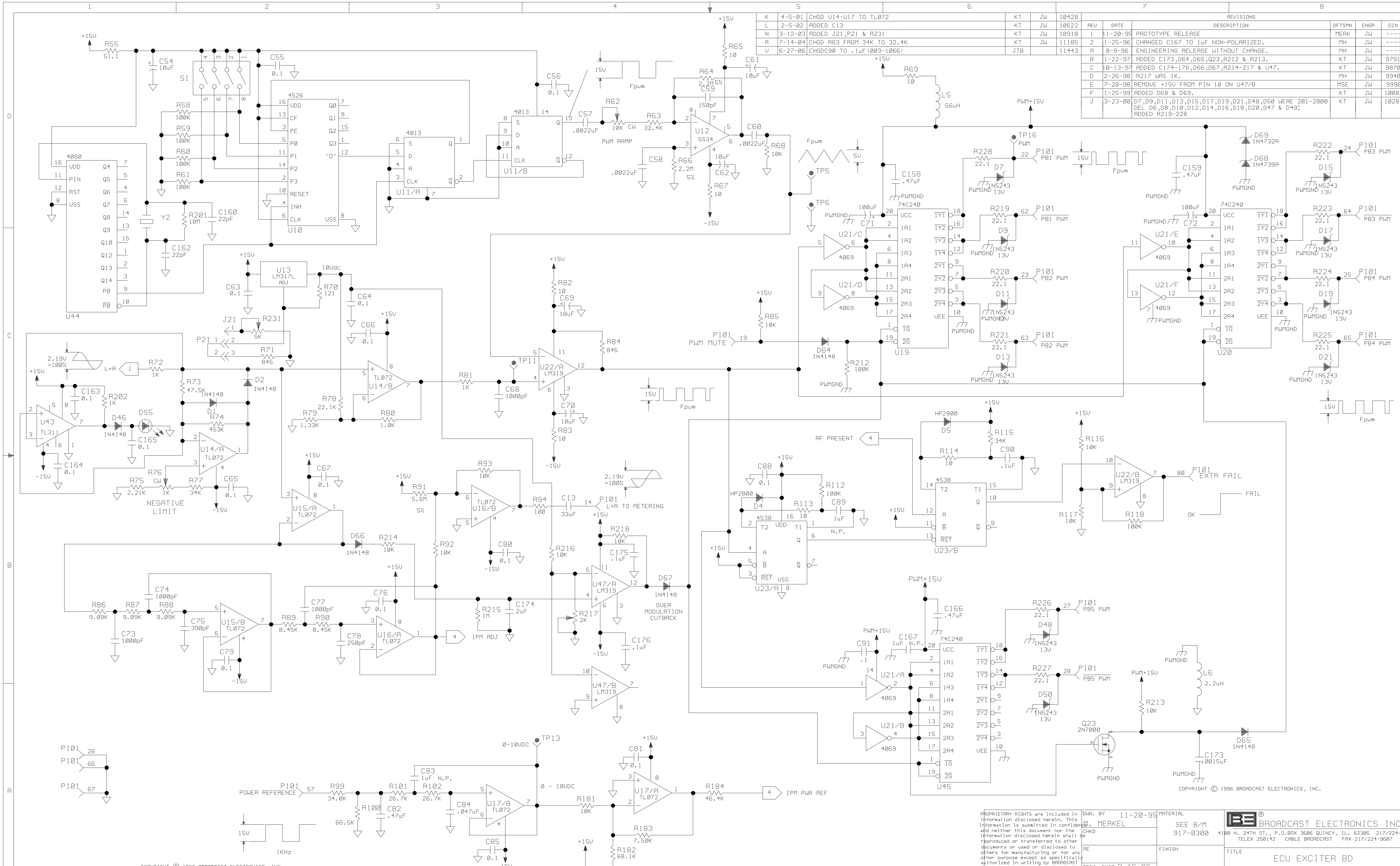
MATERIAL SEE B/M 917-0300
FINISH
SEE DWG RA592-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU EXCITER BD

TYPE S | SIZE B | DWG. NO. 917-0300 | REV V

MODEL AM-1A | SCALE NONE | SHEET 1 OF 4



K	4-5-01	CHGD U14-U17 TO TL072	KT	JW	10428
L	2-5-02	ADDED C13	KT	JW	10622
N	3-12-03	ADDED J21,P21 & R231	KT	JW	10918
R	7-14-04	CHGD R63 FROM 34K TO 32.4K	KT	JW	11185
V	6-27-06	CHGDC90 TO .1uF(003-1066)	JTB		11443

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-20-95	PROTOTYPE RELEASE	MERK	JW	----
2	1-25-96	CHANGED C167 TO 1uF NON-POLARIZED.	MH	JW	----
A	8-9-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	1-22-97	ADDED C173,D64,D65,Q23,R212 & R213.	KT	JW	9791
C	10-13-97	ADDED C174-176,D66,D67,R214-217 & U47.	KT	JW	9870
D	2-26-98	R217 WAS 1K.	MH	JW	9940
E	7-20-98	REMOVE +15V FROM PIN 10 ON U47/B	MSE	JW	9990
F	1-25-99	ADDED D68 & D69.	KT	JW	10082
J	3-23-00	D7,D9,D11,D13,D15,D17,D19,D21,D48,D50 WERE 201-2800 DEL D6,D8,D10,D12,D14,D16,D18,D20,D47 & D49; ADDED R219-228	KT	JW	10284

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-20-95 M. MERKEL
CHKD
ME
PROJ. ENGR. 8-16-96 JW
MFG.

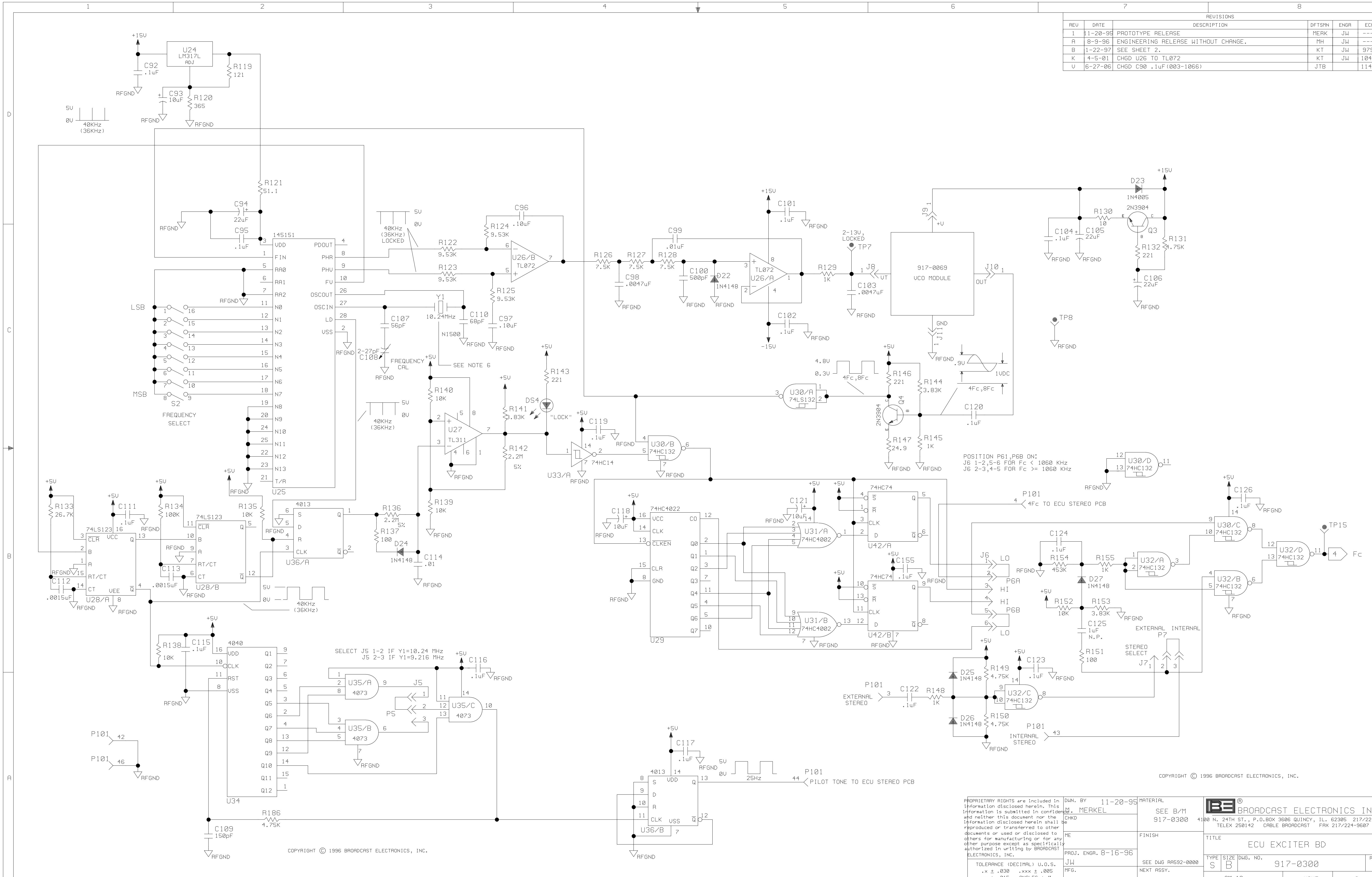
MATERIAL SEE B/M 917-0300
FINISH
SEE DWG RA592-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU EXCITER BD

TYPE S | SIZE B | DWG. NO. 917-0300 | REV V

MODEL AM-1A | SCALE NONE | SHEET 2 OF 4



REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-20-95	PROTOTYPE RELEASE	MERK	JW	----
A	8-9-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	1-22-97	SEE SHEET 2.	KT	JW	9791
K	4-5-01	CHGD U26 TO TL072	KT	JW	10428
V	6-27-06	CHGD C90 .1uF(003-1066)	JTB		11443

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY M. MERKEL 11-20-95
CHKD
ME
PROJ. ENGR. JW 8-16-96
MFG.

MATERIAL SEE B/M 917-0300
FINISH
SEE DWG AA592-0000
NEXT ASSY.

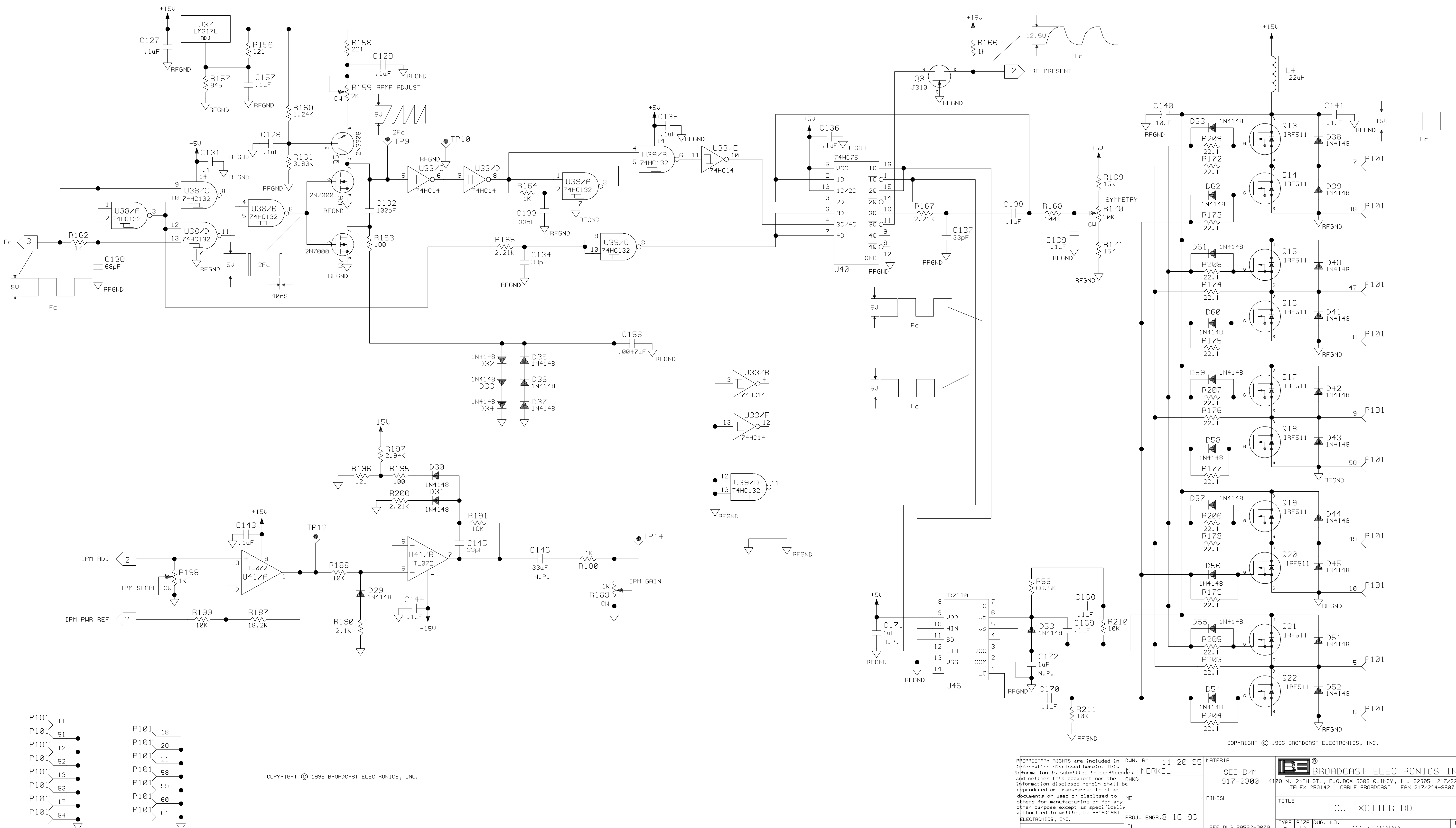
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ECU EXCITER BD

TYPE S SIZE B DWG. NO. 917-0300 REV V

MODEL AM-1A SCALE NONE SHEET 3 OF 4

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-20-95	PROTOTYPE RELEASE	MERK	JW	----
3	6-26-96	CHGD VALUE OF R195 & R200.	MH	JW	----
A	8-9-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	1-22-97	SEE SHEET 2.	KT	JW	9791
G	2-21-00	Q13-Q22 WERE 210-0088, U46 WAS A 227-2112	KT	JW	10263
H	3-23-00	ADDED R56	KT	JW	10276
K	4-5-01	CHGD U41 TO TL072	KT	JW	10428
V	6-27-06	CHGD C90 .1uF(003-1066)	JTB		11443



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-20-95 M. MERKEL
CHKD
ME
PROJ. ENGR. 8-16-96 JW
MFG.

MATERIAL SEE B/M 917-0300
FINISH
SEE DWG AA592-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

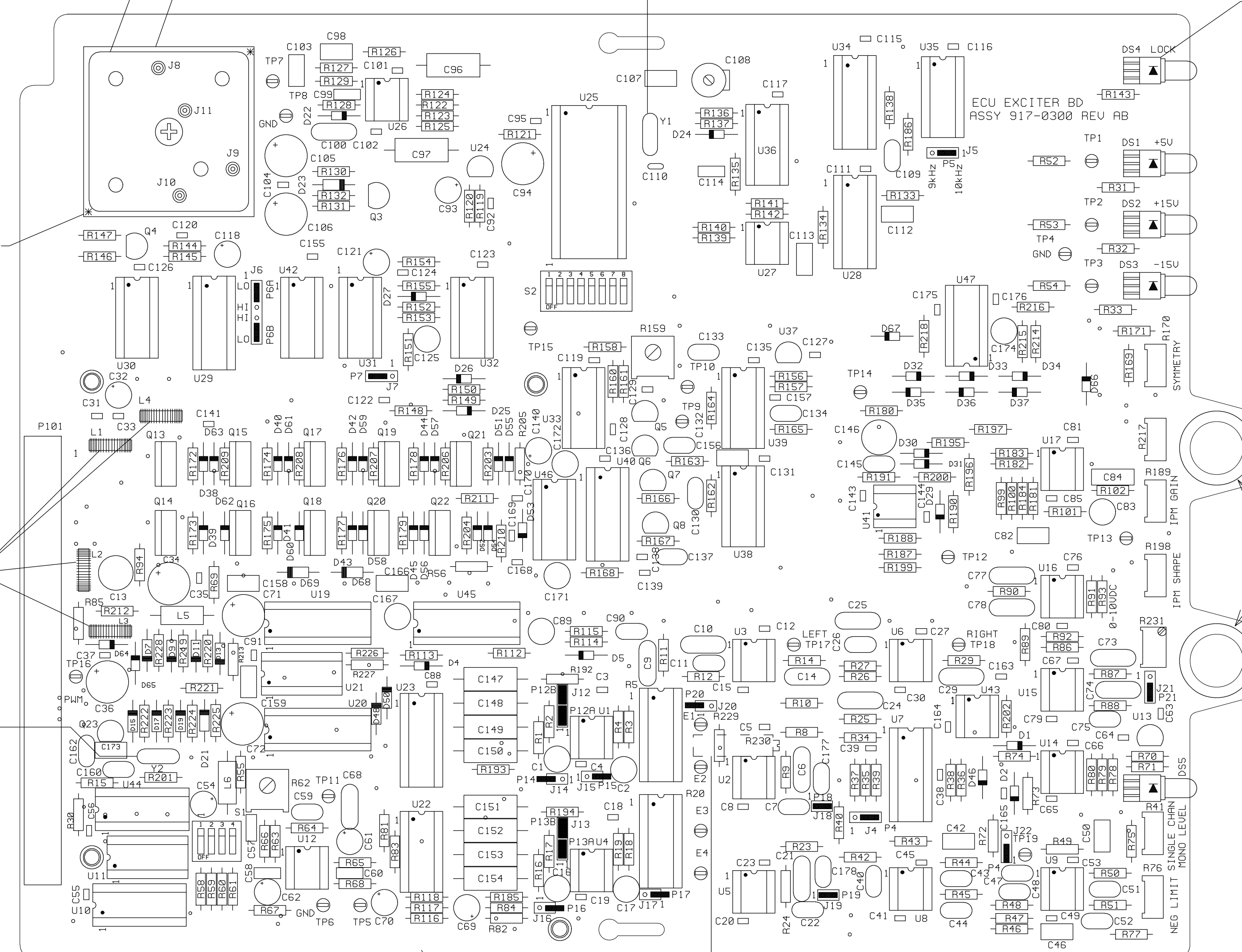
TITLE
ECU EXCITER BD

TYPE S SIZE B DWG. NO. 917-0300 REV V

MODEL AM-1A SCALE NONE SHEET 4 OF 4

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
1	11-27-95	PROTOTYPE RELEASE	MERK	JW	——
2	1-25-96	CHANGED C167 TO 1uF NON-POLARIZED.	MH	JW	----
A	8-9-96	ENGINEERING RELEASE WITHOUT CHANGE.	MH	JW	----
B	11-27-96	320-0030 WAS 4 PLCS IN ERROR	MSE	JW	9747
C	2-21-97	C71 AND C72 WERE 020-1083	MSE	JW	9783
D	3-25-97	ADDED C173,D64,D65,Q23,R212 &R213;MOVED C72,D6 & D7	KT	JW	9791
E	10-13-97	ADDED C174-176,D66,D67,R214-217 & U47.	KT	JW	9870
F	3-2-98	ADDED TP19;R217 CHGD TO 178-2044;DELETED SHIELD/HDWR	MH	JW	9940
G	4-14-98	FIXED TRACE SHORTS ABOVE U19 & U45 ON 517-0300.	MH	JW	9965
H	7-20-98	REMOVED PIN 10 OF U47 FROM +15V	MSE	JW	9990
J	1-26-99	ADDED D68 & D69.	KT	JW	10082
K	2-21-00	Q13-Q22 WERE 210-0088, U46 WAS A 227-2112	KT	JW	10263
L	3-23-00	ADDED R56	KT	JW	10276
M	3-27-00	CHGD & MOVED D7,D9,D11,D13,D15,D17,D19,D21,D48,D50; DEL D6,D8,D10,D12,D14,D16,D18,D20,D47 & D49; ADDED R219-R228; MOVED R213	KT	JW	10284
N	4-5-01	CHGD U3,U6,U8,U9,U14-U17,U26,U41 TO TL072	KT	JW	10428
P	2-5-02	ADDED C13, MOVED R94 & L2	KT	JW	10622
R	9-6-02	ADDED NOTES TO INDICATE Y1 & Y2 ARE STUFFED IN TEST	KT	JW	10747
T	11-13-02	ADDED J14-J19,P14-P19,C177 & C178.	KT	JW	10827
U	3-12-03	ADDED J20,J21,P20,P21,R229-R231	KT	JW	10918
V	5-12-04	DEL J2,J3,P2,P3: ADD J22,P22; CHGD C42-C44,C46-C48, C50-C52,R43-R51; MOVED R72,R73,TP19	KT	JW	11151
W	7-14-04	CHGD R63; TIED NETS FROM R23 TO R25 & R8 TO R10	KT	JW	11185
Y	1-10-05	CHGD JUMPER SETTINGS FOR JP18 & JP19	KT	JW	11232
AA	3-1-05	CHGD R229 TO 100-1041	KT	JW	11252
AB	6-27-06	CHGD C90 .1uF (003-1066)	JTB		11443



JUMPER PIN SETTINGS		
	IBOC	STANDARD
JP4	2-3	2-3
JP7	1-2	2-3
JP12A	1-2	OPEN
JP12B	3-4	OPEN
JP13A	1-2	OPEN
JP13B	3-4	OPEN
JP14	1-2	OPEN
JP15	1-2	OPEN
JP16	1-2	OPEN
JP17	1-2	OPEN
JP18	1-2	1-2
JP19	1-2	1-2
JP20	1-2	OPEN
JP21	1-2	2-3
JP22	2-3	1-2

NOTES:
1. SEE SCHEMATIC SB 917-0300.
2. * INDICATES WHERE 917-0069 IS TO BE SOLDERED TO 474-0165 2 PLCS.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY 11-27-95 M. MERKEL
DESIGNER(S)
PROJ. LEADER 8-16-96 JW
MFG.

MATERIAL SEE B/M 917-0300
FINISH
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE PCB ASSEMBLY ECU EXCITER BD

TYPE	SIZE	DWG No.	REV
A	A	917-0300	AB

MODEL AM-1A SCALE 1/1 SHEET 1 OF 1

REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE
C1	B3	C62	B2	C121	C2	D23	C2	P12B	B3
C2	B3	C63	B4	C122	C2	D24	C3	P13A	B3
C3	B3	C64	B3–B4	C123	C2	D25	C2	P13B	B3
C4	B3	C65	B3	C124	C2	D26	C2	P101	B2–C2
C5	B3	C66	B3	C125	C2	D27	C2	Q1	B2
C6	B3	C67	B3	C126	C2	D30	C3	Q2	C4
C7	B3	C68	B2	C127	C3	D31	C3	Q3	C2
C8	B3	C69	A2–B2	C128	C3	D32	C3	Q4	C2
C9	B3	C70	B2	C129	C3	D33	C3	Q5	C3
C10	B3	C71	B2	C130	B3	D34	C3	Q6	C3
C11	B3	C72	B2	C131	C3	D35	C3	Q7	B3–C3
C12	B3	C73	B3–B4	C132	C3	D36	C3	Q8	B3
C14	B3	C74	B3–B4	C133	C3	D37	C3	Q9	B3–C3
C15	B3	C75	B3	C134	C3	D38	C2	Q10	C3
C16	B3	C76	B3	C135	C3	D39	B2	Q11	B3
C17	B3	C77	B3	C136	C3	D40	C2	Q12	B3
C18	B3	C78	B3	C137	B3	D41	B2	Q13	B2–C2
C19	B3	C79	B3	C138	B3	D42	C2	Q14	B2
C20	A3	C80	B3	C139	B3	D43	B2	Q15	B2–C2
C21	B3	C81	C3	C140	C2	D44	C2	Q16	B2
C22	B3	C82	B3	C141	C2	D45	B2	Q17	B2–C2
C23	B3	C83	B3	C142	C2	DS1	C4	Q18	B2
C24	B3	C84	B3–C3	C143	C3	DS2	C4	Q19	B2–C2
C25	B3	C85	B3	C144	C3	DS3	C4	Q20	B2
C26	B3	C86	B3	C145	C3	DS4	C4	R1	B3
C27	B3	C87	B3	C146	C3	E1	B3	R2	B3
C29	B3	C88	B2	C147	B2	E2	B3	R3	B3
C30	B3	C89	B2	C148	B2	E3	B3	R4	B3
C31	C2	C90	B3	C149	B2	E4	B3	R5	B3
C32	C2	C91	B2	C150	B2	E5	B2	R8	B3
C33	C2	C92	C2	C151	B2	E6	B2	R9	B3
C34	B2	C93	C2	C152	B2	E7	C2	R10	B3
C35	B2	C94	C2–C3	C153	B2	E8	B2	R11	B3
C36	B2	C95	C3	C154	B2	E9	B2	R12	B3
C37	B2	C96	C2	C155	C2	E10	B2	R14	B3
C38	B3	C97	C2	C156	C3	J2	B3	R15	B2
C39	B3	C98	C2	C157	C3	J3	B3	R16	B3
C40	B3	C99	C2	D1	B3	J4	B3	R17	B3
C41	A3	C100	C2	D2	B3	J5	C3	R18	B3
C42	B3	C101	C2	D3	C3	J6	C2	R19	B3
C43	B3	C102	C2	D4	B2	J7	C2	R20	B3
C44	B3–A3	C103	C2	D5	B2	J8	C2	R23	B3
C45	B3	C104	C2	D6	B2	J9	C2	R24	B3
C46	A3	C105	C2	D7	B2	J10	C2	R25	B3
C47	B3	C106	C2	D8	B2	J11	C2	R26	B3
C48	B3	C107	C3	D9	B2	J12	B3	R27	B3
C49	A3	C108	C3	D10	B2	J13	B3	R29	B3
C50	B3	C109	C3	D11	B2	L1	C2	R30	B2
C51	B3–B4	C110	C3	D12	B2	L2	B2	R31	C3–C4
C52	A3	C111	C3	D13	B2	L3	B2	R32	C3–C4
C53	B3	C112	C3	D14	B2	L4	C2	R33	C3–C4
C54	B2	C113	C3	D15	B2	P2	B3	R34	B3
C55	B2	C114	C3	D16	B2	P3	B3	R35	B3
C56	B2	C115	C3	D17	B2	P4	B3	R36	B3
C57	B2	C116	C3	D18	B2	P5	C3	R37	B3
C58	B2	C117	C3	D19	B2	P6A	C2	R38	B3
C59	B2	C118	C2	D20	B2	P6B	C2	R39	B3
C60	B2	C119	C3	D21	B2	P7	C2	R40	B3
C61	B2	C120	C2	D22	C2	P12A	B3	R41	B4

FIGURE 4–8. COMPONENT LOCATOR, ECU EXCITER BOARD
(Sheet 1 of 2)

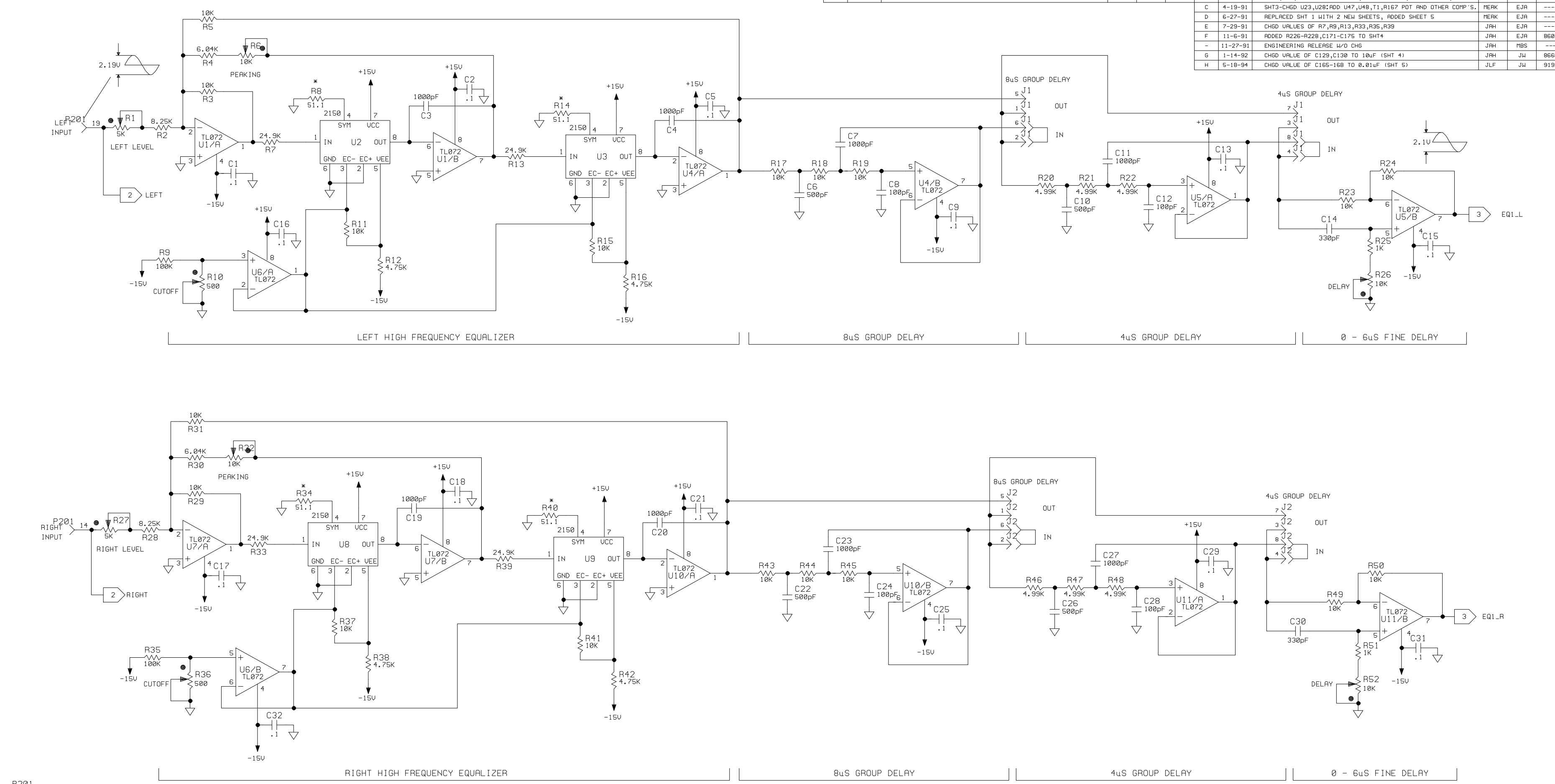
REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE
R42	B3	R101	B3	R160	C3	U7	B3		
R43	B3	R102	B3–B4	R161	C3	U8	B3		
R44	B3	R103	B3	R162	B3	U9	B3		
R45	B3	R104	B4	R163	C3	U10	B2		
R46	A3	R105	C3–C4	R164	C3	U11	B2		
R47	A3	R106	C3–C4	R165	C3	U12	B2		
R48	B3	R107	C3	R166	B3	U13	B4		
R49	B3	R108	C3–B3	R167	B3	U14	B3		
R50	B3	R109	C3–B3	R168	B3	U15	B3		
R51	B3	R110	C3–B3	R169	C4	U16	B3		
R52	C3	R111	C3–B3	R170	C4	U17	B3–C3		
R53	C3	R112	B2	R171	C3–C4	U18	B3–C3		
R54	C3	R113	B2	R172	B2–C2	U19	B2		
R55	B2	R114	B2	R173	B2	U20	B2		
R56	B2	R115	B2	R174	B2–C2	U21	B2		
R57	B2	R116	B2	R175	B2	U22	B2		
R58	B2	R117	B2	R176	B2–C2	U23	B2		
R59	B2	R118	B2	R177	B2	U24	C2		
R60	B2	R119	C2	R178	B2–C2	U25	C3		
R61	B2	R120	C2	R179	B2	U26	C2		
R62	B2	R121	C2–C3	R180	C3	U27	C3		
R63	B2	R122	C2	R181	B4	U28	C3		
R64	B2	R123	C2	R182	C3	U29	C2		
R65	B2	R124	C2	R183	C3	U30	C2		
R66	B2	R125	C2	R184	C3	U31	C2		
R67	A2–B2	R126	C2	R185	B2	U32	C2		
R68	B2	R127	C2	R186	C3	U33	C3		
R69	B2	R128	C2	R187	C3	U34	C3		
R70	B4	R129	C2	R188	C3	U35	C3		
R71	B4	R130	C2	R189	B4	U36	C3		
R72	B3	R131	C2	R190	B3	U37	C3		
R73	B3	R132	C2	R191	B4	U38	B3–C3		
R74	B3	R133	C3	R192	B3	U39	C3		
R75	B4	R134	C3	R193	B2	U40	B3–C3		
R76	B4–A4	R135	C3	R194	B3	U41	C3		
R77	A3–A4	R136	C3	S1	B2	U42	C2		
R78	B3	R137	C3	S2	C3	Y1	C3		
R79	B3	R138	C3	T1	B2				
R80	B3	R139	C3	TP1	C3				
R81	B2	R140	C3	TP2	C3				
R82	A2	R141	C3	TP3	C3				
R83	B2	R142	C3	TP4	C3				
R84	B2	R143	C3–C4	TP5	B2				
R85	B2	R144	C2	TP6	B2				
R86	B3	R145	C2	TP7	C2				
R87	B3	R146	C2	TP8	C2				
R88	B3	R147	C2	TP9	C3				
R89	B3	R148	C2	TP10	C3				
R90	B3	R149	C2	TP11	B2				
R91	B3	R150	C2	TP12	B3				
R92	B3	R151	C2	TP13	B4				
R93	B3	R152	C2	TP14	C3				
R94	B2	R153	C2	TP15	C3				
R95	C3	R154	C2	U1	B3				
R96	C3	R155	C2	U2	B3				
R97	C3	R156	C3	U3	B3				
R98	B3	R157	C3	U4	B3				
R99	B3	R158	C3	U5	B3				
R100	B3	R159	C3	U6	B3				

FIGURE 4–8. COMPONENT LOCATOR, ECU EXCITER BOARD
(Sheet 2 of 2)

J	8-31-99	SEE SHEET 4.	KT	JW	10007
K	12-13-99	SEE SHEET 5.	KT	JW	10232
L	8-7-02	SEE SHEET 5.	KT	JW	10688
M	1-27-06	ADD NOTE 5	JTB		11392

REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	12-28-90	PROTOTYPE RELEASE	MERK	EJA	----
B	1-31-91	SHT2,SH3,SH4 - CHGD VALUES, J2 TO 6 PIN, ADDED C154,R203	MERK	EJA	----
C	4-19-91	SHT3-CHGD U23,U28:ADD U47,U48,T1,R167 POT AND OTHER COMP'S.	MERK	EJA	----
D	6-27-91	REPLACED SHT 1 WITH 2 NEW SHEETS, ADDED SHEET 5	MERK	EJA	----
E	7-29-91	CHGD VALUES OF R7,R9,R13,R33,R35,R39	JAH	EJA	----
F	11-6-91	ADDED R226-R228,C171-C175 TO SHT4	JAH	EJA	8602
-	11-27-91	ENGINEERING RELEASE W/O CHG	JAH	MBS	---
G	1-14-92	CHGD VALUE OF C129,C130 TO 10uF (SHT 4)	JAH	JW	8660
H	5-18-94	CHGD VALUE OF C165-168 TO 0.01uF (SHT 5)	JLF	JW	9199



EQ1

NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: R228,C175,U55,L7,T1,D9,TP10,E4, S5,J7,P201,Q14,DS6
3. COMPONENTS NOT USED: P8 - P200
4. SEE ASSEMBLY: AC917-0209
5. * COMPONENTS NOT USED WITH (220-2181) U2,U3,U8,U9,U13,U14,U19,U20

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERK 12-28-90
CHKD MH 7-30-91
ME
PROJ. ENGR. EJA 7-30-91
MFG.
MATERIAL SEE B/M 917-0209
FINISH
SEE DWG RA592-0000
NEXT ASSY. AC917-0209

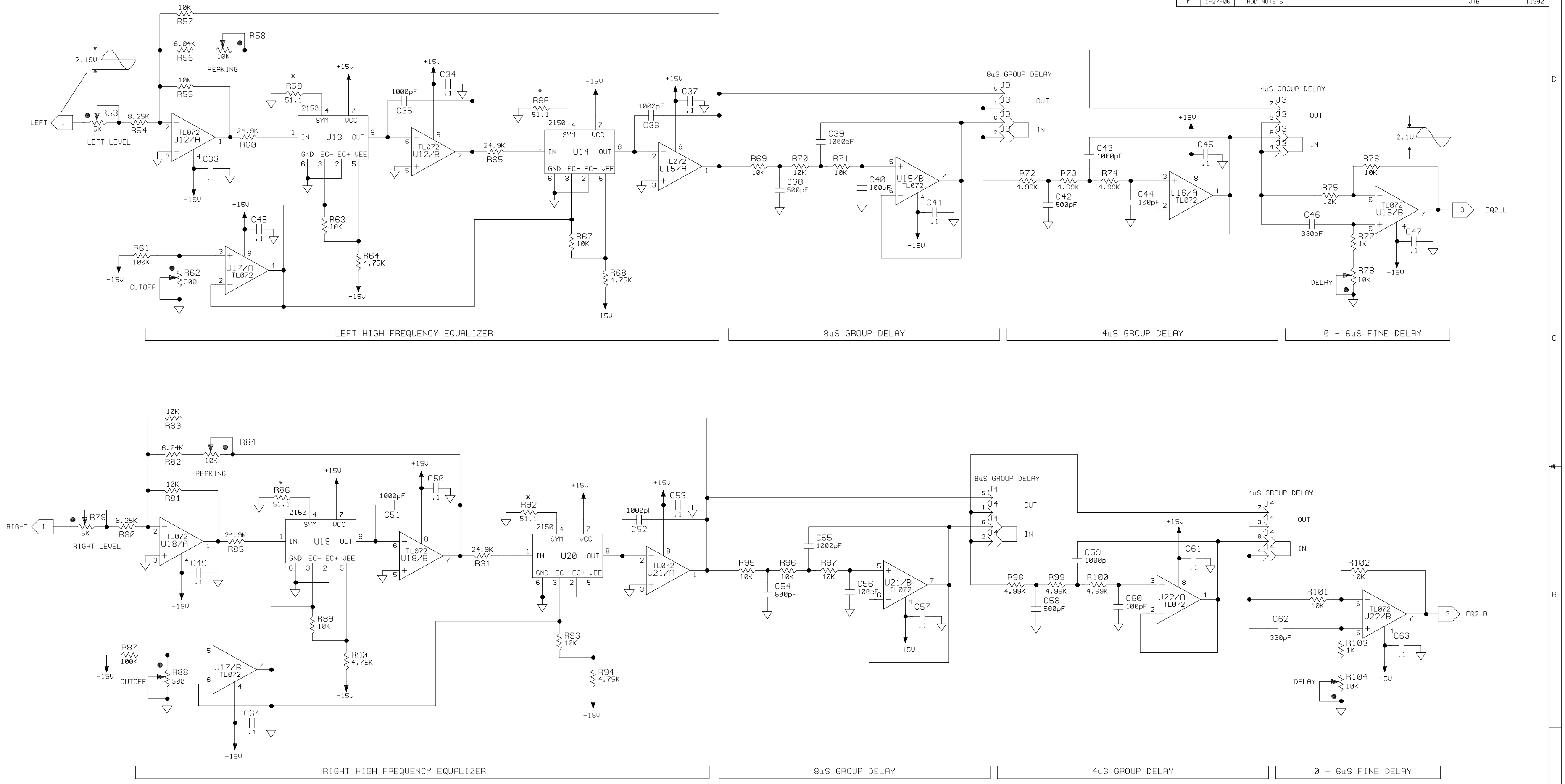
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC- ECU STEREO BOARD

TYPE S | SIZE B | DWG. NO. 917-0209 | REV M

MODEL AM-1 | SCALE NONE | SHEET 1 OF 5

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
D	6-27-91	THIS SHEET ADDED AS SHEET 2	MERK	EJA	----
E	7-29-91	CHGD VALUES OF R60,R61,R65,R85,R87,R91	JAH	EJA	----
M	1-27-06	ADD NOTE 5	JTB		11392



EQ2

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERK 12-20-90
CHKD MH 7-30-91
ME
PROJ. ENGR. EJA 7-30-91
MFG.

MATERIAL SEE B/M 917-0209
FINISH
SEE DWG AA692-0000
NEXT ASSY. AC917-0209

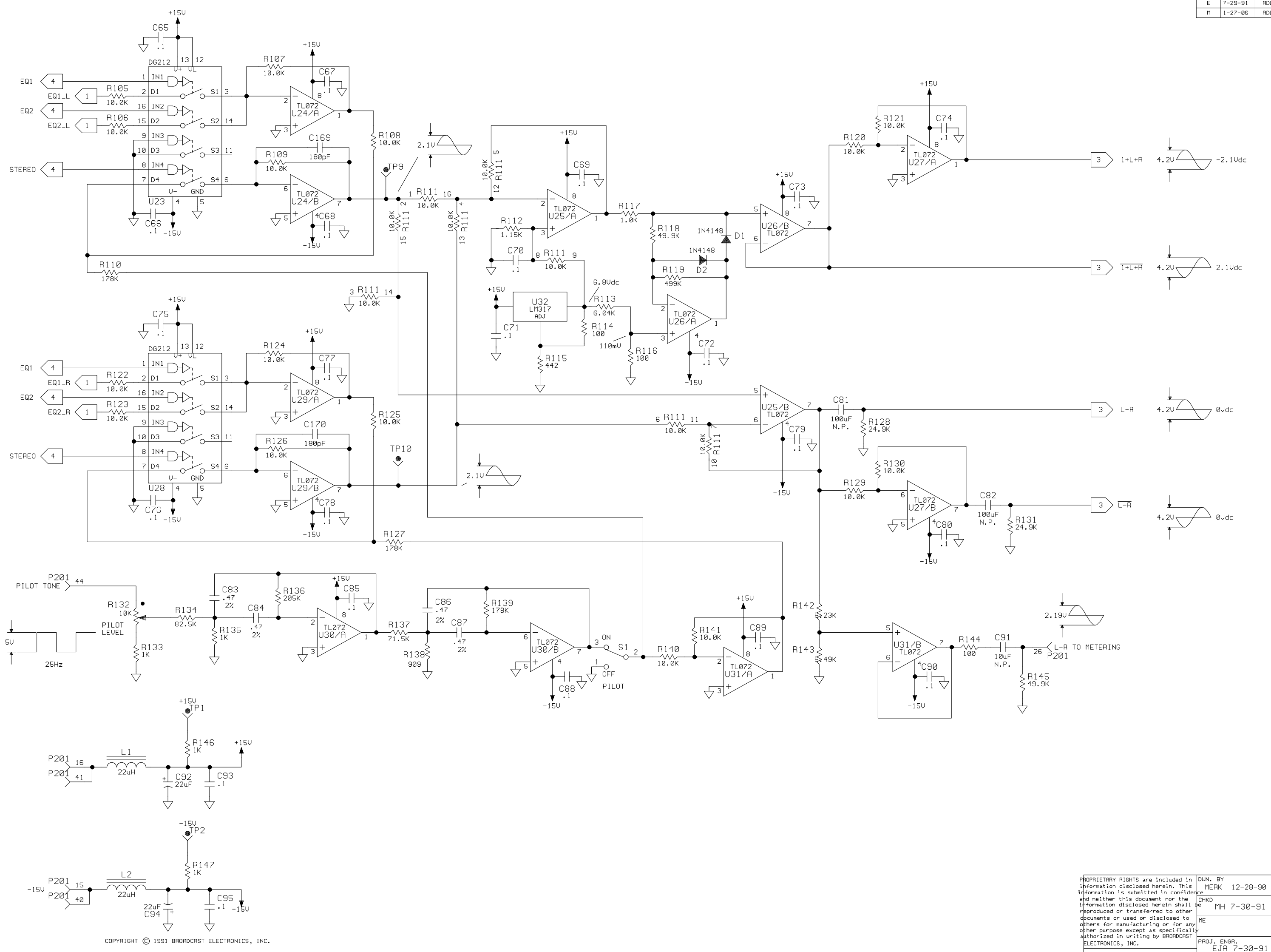
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC- ECU STEREO BOARD

TYPE S | SIZE B | DWG. NO. 917-0209 | REV M

MODEL AM-I | SCALE NONE | SHEET 2 OF 5

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	12-28-90	PROTOTYPE RELEASE	MERK	EJA	----
B	1-31-91	CHGD VALUE OF R83,R91,R107,R118; ADDED C154,R203	MERK	EJA	----
D	6-27-91	CHGD INPUTS TO U14 & U19; REMOVED R79 & R87; ADD L5 & L6	MERK	EJA	----
E	7-29-91	ADDED C169,C170 CHGD VALUE OF R128,R130	JAH	EJA	----
M	1-27-06	ADD NOTE 5	JTB		11392



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	MERK 12-28-90
CHKD	MH 7-30-91
ME	
PROJ. ENGR.	EJA 7-30-91
MFG.	
MATERIAL	SEE B/M 917-0209
FINISH	SEE DWG RA592-0000
NEXT ASSY.	AC917-0209

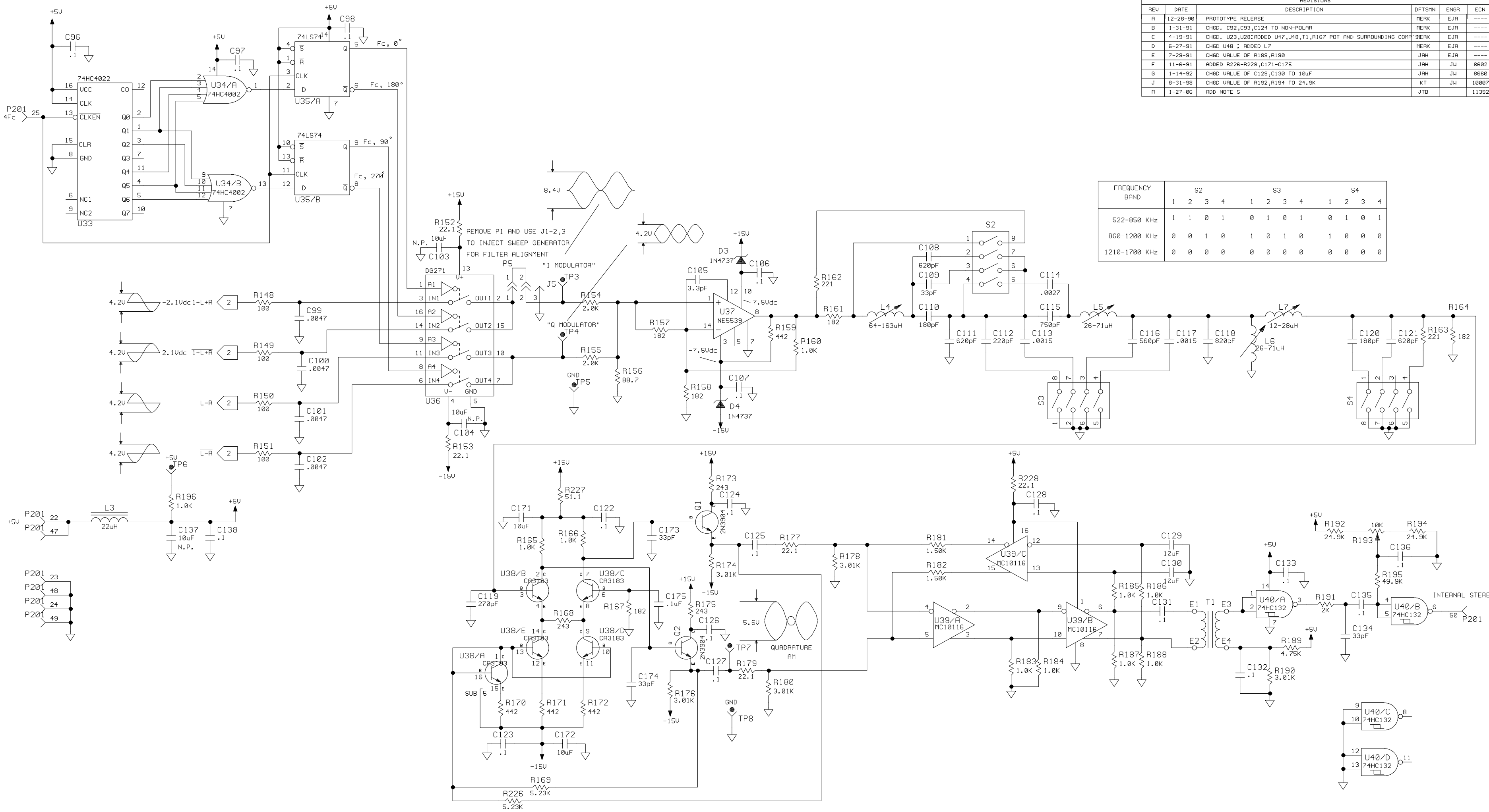
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: SCHEMATIC-
ECU STEREO BOARD

TYPE	SIZE	DWG. NO.	REV
S	B	917-0209	M

MODEL AM-1 | SCALE NONE | SHEET 3 OF 5

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	12-28-90	PROTOTYPE RELEASE	MERK	EJA	----
B	1-31-91	CHGD. C92,C93,C124 TO NON-POLAR	MERK	EJA	----
C	4-19-91	CHGD. U23,U28:ADDED U47,U48,T1,R167 POT AND SURROUNDING COMP'S	MERK	EJA	----
D	6-27-91	CHGD U48 ; ADDED L7	MERK	EJA	----
E	7-29-91	CHGD VALUE OF R189,R190	JAH	EJA	----
F	11-6-91	ADDED R226-R228,C171-C175	JAH	JW	8602
G	1-14-92	CHGD VALUE OF C129,C130 TO 10uF	JAH	JW	8660
J	8-31-98	CHGD VALUE OF R192,R194 TO 24.9K	KT	JW	10007
M	1-27-06	ADD NOTE 5	JTB		11392

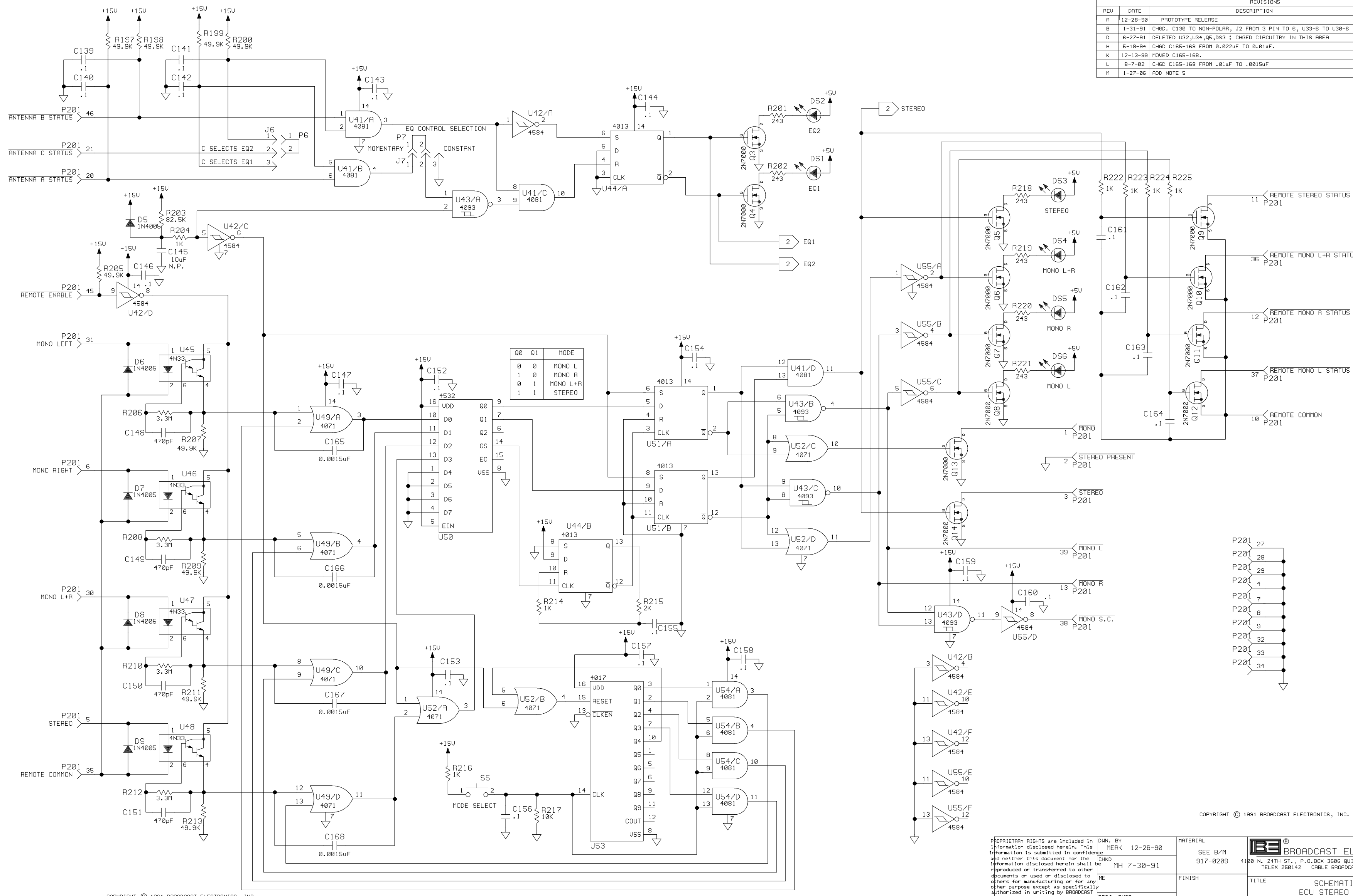


FREQUENCY BAND	S2 1	S2 2	S2 3	S2 4	S3 1	S3 2	S3 3	S3 4	S4 1	S4 2	S4 3	S4 4
522-850 KHz	1	1	0	1	0	1	0	1	0	1	0	1
860-1200 KHz	0	0	1	0	1	0	1	0	1	0	0	0
1210-1700 KHz	0	0	0	0	0	0	0	0	0	0	0	0

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MERK 12-28-90	MATERIAL SEE B/M 917-0209	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
CHKD MH 7-30-91	FINISH SEE DWG RA592-0000	TITLE SCHEMATIC- ECU STEREO BOARD
ME		TYPE S · SIZE B · DWG. NO. 917-0209 · REV M
PROJ. ENGR. EJA 7-30-91	NEXT ASSY. AC917-0209	MODEL AM-1 · SCALE NONE · SHEET 4 OF 5
MFG.		

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	12-28-90	PROTOTYPE RELEASE	MERK	EJA	----
B	1-31-91	CHGD. C130 TO NON-POLAR, J2 FROM 3 PIN TO 6, U33-6 TO U30-6	MERK	EJA	----
D	6-27-91	DELETED U32,U34,Q5,DS3 ; CHGED CIRCUITRY IN THIS AREA	MERK	EJA	----
H	5-18-94	CHGD C165-168 FROM 0.022uF TO 0.01uF.	JLF	EJA	9199
K	12-13-99	MOVED C165-168.	KT	JW	10232
L	8-7-02	CHGD C165-168 FROM .01uF TO .0015uF	KT	JW	10688
M	1-27-06	ADD NOTE 5	JTB		11392



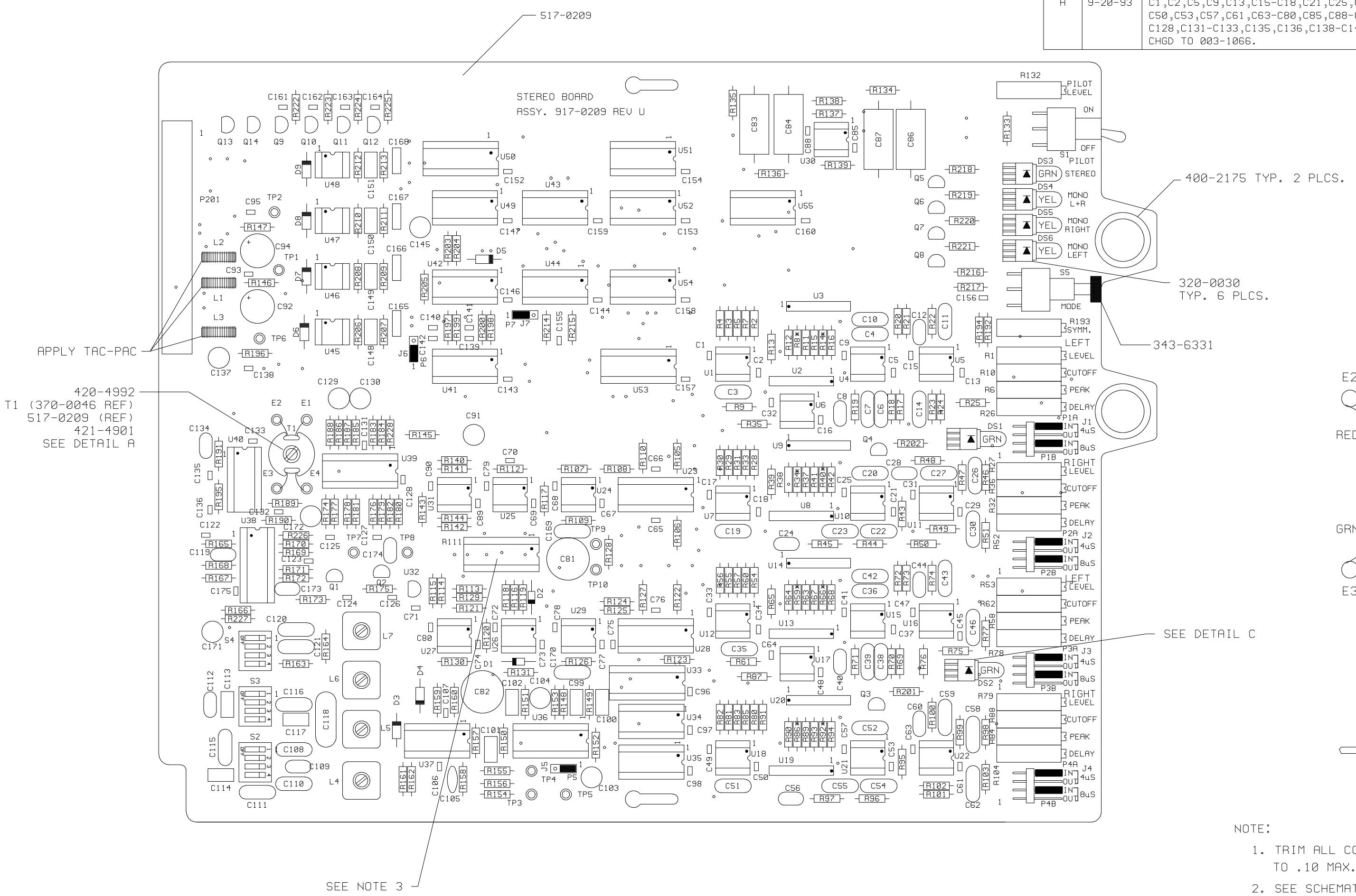
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

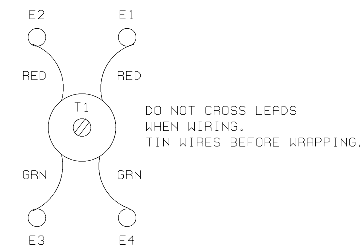
DWN. BY MERK 12-28-90	MATERIAL SEE B/M 917-0209	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
CHKD MH 7-30-91		TITLE SCHEMATIC- ECU STEREO BOARD
ME	FINISH	TYPE S · SIZE B · DWG. NO. 917-0209 · REV M
PROJ. ENGR. EJA 7-30-91	SEE DWG RA592-0000	
MFG.	NEXT ASSY. AC917-0209	MODEL AM-1 · SCALE NONE · SHEET 5 OF 5

J	5-18-94	CHGD VALUE OF C165-168 FROM 0.022uF TO 0.01uF.	JLF	JW	9199
K	8-5-94	ADDED DETAIL A.	MH	JW	9243
L	5-26-95	CHANGED T1 REFERENCE NUMBER FROM 370-0049 TO 370-0046.	AEB	JW	9290
M	3-26-97	320-0030 WAS 4 PLCS	MSE	JW	9739
N	8-31-98	CHGD R192 & R194 TO 103-2495.	KT	JW	10007
P	12-12-99	CHGD NETS FOR PIN 2 OF C165-C168.	KT	JW	10232
R	8-7-02	CHGD C165-C168 FROM 030-1043 TO 003-1523	KT	JW	10688
T	9-18-02	FIXED SILKSCREEN FOR U50	KT	JW	10780
U	1-27-06	ADD NOTE 4	JTB		11392

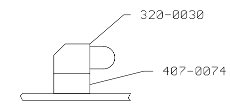
REVISIONS

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	12-28-90	PROTOTYPE RELEASE	MERK	EJA	----
B	1-31-90	ADDED R203,C154,343-6331,P2A,P2B,P1: CHGD J2:CHGD SOME VALUES	MERK	EJA	----
C	5-2-91	ADD U47,U48,T1,R167 POT & OTHER COMP'S	MERK	EJA	----
D	6-27-91	REDESIGN	MERK	EJA	----
-	7-19-91	ENGINEERING RELEASE	JAH	EJA	----
E	7-29-91	ADDED C169,C170	JAH	EJA	----
-	9-10-91	REMOVED COIL ASSEMBLIES	JAH	EJA	----
F	11-8-91	ADDED C171-C175,R226-R228,370-0049,400-2175	JAH	JW	8602
G	1-15-92	CHGD VALUE OF C129,C130 TO 10uF	JAH	JW	8660
H	9-20-93	C1,C2,C5,C9,C13,C15-C18,C21,C25,C29,C31-C34,C37,C41,C45,C47-C50,C53,C57,C61,C63-C80,C85,C88-C90,C93,C95-C98,C106,C107,C122-C128,C131-C133,C135,C136,C138-C144,C146,C147,C152-C164 & C175 CHGD TO 003-1066.	MH	MBS	9051





DETAIL A



DETAIL C
(DS1 & DS2)

NOTE:

1. TRIM ALL COMPONENT LEADS ON SOLDER SIDE TO .10 MAX.
2. SEE SCHEMATIC SD917-0209.
3. R111 TO BE MOUNTED W/O SOCKET.
4. ✱ COMPONENTS NOT USED WITH (220-2181) U2,U3,U8,U9,U13,U14,U19,U20

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY: MERK 12-28-90
CHKD: MH 7-30-91
ME
PROJ. ENGR.: EJA 7-30-91
MFG.

MATERIAL: SEE B/M 917-0209
FINISH
SEE DWG RA592-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N.24TH ST. P.O.BOX 3606 QUINCY,IL. 62305 PH. 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: PCB ASSEMBLY- ECU STEREO BOARD

TYPE	SIZE	DWG No.	REV
A	C	917-0209	U

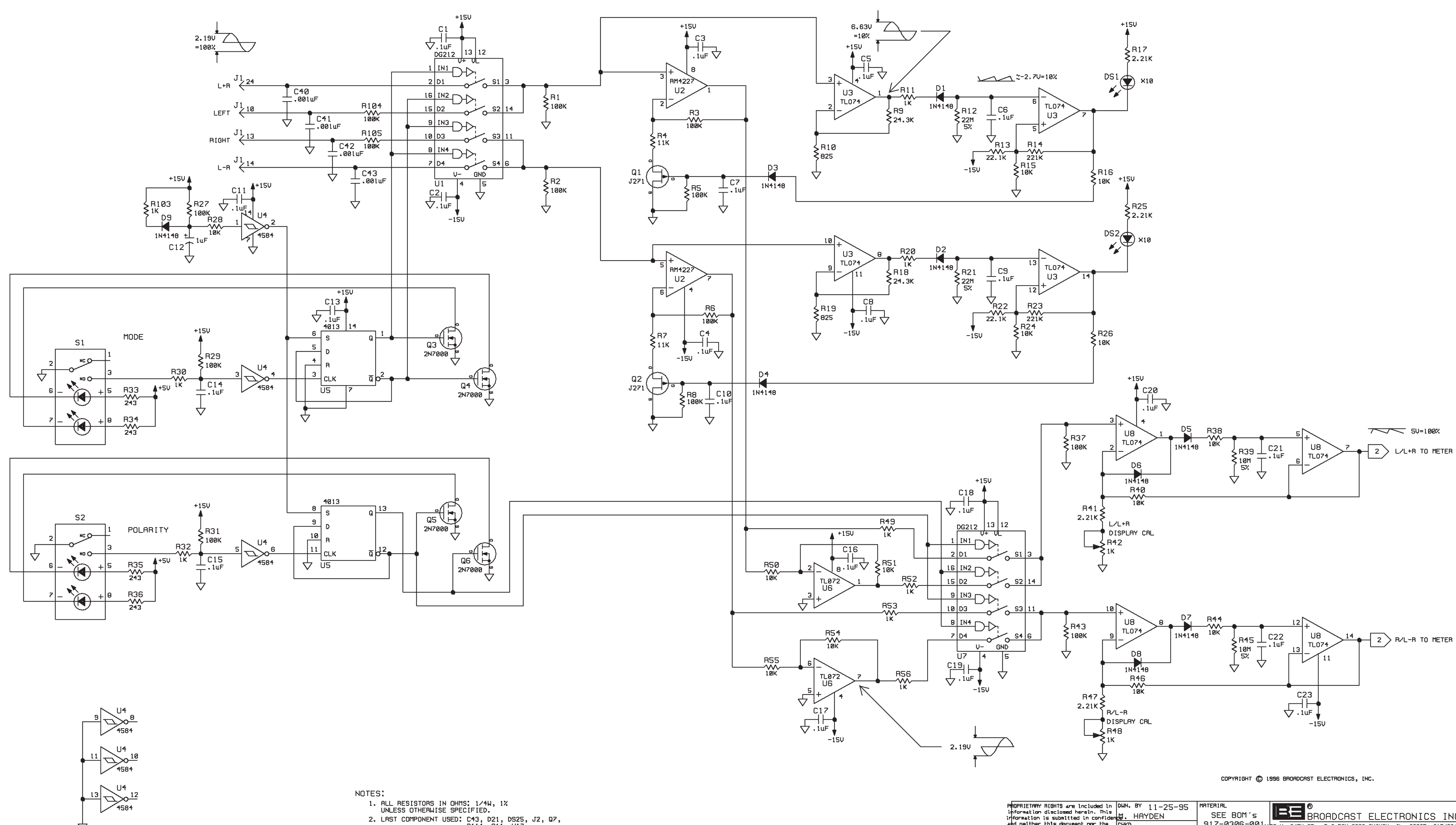
MODEL AM-1 SCALE NONE SHEET 1 OF 1

REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE
C1	C2	C60	B3	C119	B1	D3	B2	R3	C2
C2	C2	C61	B3	C120	B1	D4	B2	R4	C2
C3	C2	C62	B3	C121	B1	D5	C2	R5	C2
C4	C3	C63	B3	C122	B1	D6	C1	R6	C3
C5	C3	C64	B2	C123	B1	D7	C1	R7	C2
C6	C3	C65	B2	C124	B2	D8	C1	R8	C2
C7	C3	C66	C2	C125	B1	D9	C1	R9	C2
C8	C3	C67	C2	C126	B2	DS1	C3	R10	C3
C9	C3	C68	C2	C127	B2	DS2	B3	R11	C3
C10	C3	C69	C2	C128	C2	DS3	C3	R12	C2
C11	C3	C70	C2	C129	C1–C2	DS4	C3	R13	C2
C12	C3	C71	B2	C130	C2	DS5	C3	R14	C3
C13	C3	C72	B2	C131	C2	DS6	C3	R15	C3
C14	C3	C73	B2	C132	B1	E1	C1	R16	C3
C15	C3	C74	B2	C133	C1	E2	C1	R17	C3
C16	C3	C75	B2	C134	C1	E3	C1	R18	C3
C17	C2	C76	B2	C135	C1	E4	C1	R19	C3
C18	B2	C77	B2	C136	B1–C1	J1	C3	R20	C3
C19	B2	C78	B2	C137	C1	J2	B3	R21	C3
C20	C3	C79	C2	C138	C1	J3	B3	R22	C3
C21	B3	C80	B2	C139	C2	J4	B3	R23	C3
C22	B3	C81	B2	C140	C2	J5	B2	R24	C3
C23	B3	C82	B2	C141	C2	J6	C2	R25	C3
C24	B2	C83	C2–D2	C142	C2	J7	C2	R26	C3
C25	C3	C84	C2–D2	C143	C2	L1	C1	R27	C3
C26	C3	C85	C3	C144	C2	L2	C1	R28	C2
C27	C3	C86	C3–D3	C145	C2	L3	C1	R29	C2
C28	C3	C87	C3–D3	C146	C2	L4	B2	R30	C2
C29	B3	C88	D3	C147	C2	L5	B2	R31	C2
C30	B3	C89	C2	C148	C2	L6	B2	R32	C3–B3
C31	C3	C90	C2	C149	C2	L7	B2	R33	C2
C32	C2	C91	C2	C150	C2	P1A	C3	R34	C2
C33	B2	C92	C1	C151	C2	P1B	C3	R35	C2
C34	B2	C93	C1	C152	C2	P2A	B3	R36	C3
C35	B2	C94	C1	C153	C2	P2B	B3	R37	C3
C36	B3	C95	C1	C154	C2	P3A	B3	R38	C2
C37	B3	C96	B2	C155	C2	P3B	B3	R39	C2
C38	B3	C97	B2	C156	C3	P4A	B3	R40	C3
C39	B3	C98	B2	C157	C2	P4B	B3	R41	C3
C40	B3	C99	B2	C158	C2	P5	B2	R42	C3
C41	B3	C100	B2	C159	C2	P6	C2	R43	B3–C3
C42	B3	C101	B2	C160	C2–C3	P7	C2	R44	B3
C43	B3	C102	B2	C161	D1	P201	C1–D1	R45	B3
C44	B3	C103	B2	C162	D1	Q1	B1	R46	C3
C45	B3	C104	B2	C163	D1–D2	Q2	B2	R47	C3
C46	B3	C105	B2	C164	D2	Q3	B3	R48	C3
C47	B3	C106	B2	C165	C2	Q4	C3	R49	B3
C48	B3	C107	B2	C166	C2	Q5	C3	R50	B3
C49	B2	C108	B1	C167	C2	Q6	C3	R51	B3
C50	B2	C109	B1	C168	C2	Q7	C3	R52	B3
C51	B2	C110	B1	C169	B2	Q8	C3	R53	B3
C52	B3	C111	B1	C170	B2	Q9	D1	R54	B2
C53	B3	C112	B1	C171	B1	Q10	D1	R55	B2
C54	B3	C113	B1	C172	B1	Q11	D1–D2	R56	B2
C55	B3	C114	B1	C173	B1	Q12	D2	R57	B2
C56	B2	C115	B1	C174	B2	Q13	D1	R58	B3
C57	B3	C116	B1	C175	B1	Q14	D1	R59	B2
C58	B3	C117	B1	D1	B2	R1	C3	R60	B2
C59	B3	C118	B1	D2	B2	R2	C2	R61	B2

FIGURE 4–11. COMPONENT LOCATOR, ECU STEREO BOARD
(Sheet 1 of 2)

REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE	REF	ZONE
R62	B3	R121	B2	R180	B2–C2	TP5	B2	U54	C2
R63	B3	R122	B2	R181	B2–C2	TP6	C1	U55	C2
R64	B2	R123	B2	R182	B2–C2	TP7	B2		
R65	B2	R124	B2	R183	C2	TP8	B2		
R66	B3	R125	B2	R184	C2	TP9	B2		
R67	B3	R126	B2	R185	C2	TP10	B2		
R68	B3	R127	B2	R186	C1	U1	C2		
R69	B3	R128	B2	R187	C2	U2	C2–C3		
R70	B3	R129	B2	R188	C1	U3	C2–C3		
R71	B3	R130	B2	R189	C1	U4	C3		
R72	B3	R131	B2	R190	B1	U5	C3		
R73	B3	R132	D3	R191	C1	U6	C2–C3		
R74	B3	R133	C3–D3	R192	C3	U7	B2–C2		
R75	B3	R134	D3	R193	C3	U8	B2–B3		
R76	B3	R135	D2	R194	C3	U9	C2–C3		
R77	B3	R136	C2	R195	C1	U10	B3–C3		
R78	B3	R137	D3	R196	C1	U11	B3–C3		
R79	B3	R138	D3	R197	C2	U12	B2		
R80	B2	R139	C3	R198	C2	U13	B2–B3		
R81	B2	R140	C2	R199	C2	U14	B2–B3		
R82	B2	R141	C2	R200	C2	U15	B3		
R83	B2	R142	B2	R201	B3	U16	B3		
R84	B3	R143	C2–B2	R202	C3	U17	B2–B3		
R85	B2	R144	B2	R203	C2	U18	B2		
R86	B2	R145	C2	R204	C2	U19	B2–B3		
R87	B2	R146	C1	R205	C2	U20	B2–B3		
R88	B3	R147	C1	R206	C2	U21	B3		
R89	B2–B3	R148	B2	R207	C2	U22	B3		
R90	B2	R149	B2	R208	C2	U23	C2		
R91	B2	R150	B2	R209	C2	U24	C2		
R92	B3	R151	B2	R210	C2	U25	C2		
R93	B3	R152	B2	R211	C2	U26	B2		
R94	B3	R153	B2	R212	C2	U27	B2		
R95	B3	R154	B2	R213	C2	U28	B2		
R96	B3	R155	B2	R214	C2	U29	B2		
R97	B3	R156	B2	R215	C2	U30	C3–D3		
R98	B3	R157	B2	R216	C3	U31	C2		
R99	B3	R158	B2	R217	C3	U32	B2		
R100	B3	R159	B2	R218	C3	U33	B2		
R101	B3	R160	B2	R219	C3	U34	B2		
R102	B3	R161	B2	R220	C3	U35	B2		
R103	B3	R162	B2	R221	C3	U36	B2		
R104	B3	R163	B1	R222	D1	U37	B2		
R105	C2	R164	B1	R223	D1	U38	B1		
R106	B2	R165	B1	R224	D2	U39	C1–C2		
R107	C2	R166	B1	R225	D2	U40	C1		
R108	C2	R167	B1	R226	B1	U41	C2		
R109	B2	R168	B1	R227	B1	U42	C2		
R110	C2	R169	B1	R228	C2	U43	C2		
R111	B2	R170	B1	S1	C3–D3	U44	C2		
R112	C2	R171	B1	S2	B1	U45	C1–C2		
R113	B2	R172	B1	S3	B1	U46	C1–C2		
R114	B2	R173	B1	S4	B1	U47	C1–C2		
R115	B2	R174	B1–C1	S5	C3	U48	C1–C2		
R116	B2	R175	B2	T1	C1	U49	C2		
R117	C2–B2	R176	B2–C2	TP1	C1	U50	C2		
R118	B2	R177	B1–C1	TP2	C1	U51	C2		
R119	B2	R178	B2–C2	TP3	B2	U52	C2		
R120	B2	R179	B2–C2	TP4	B2	U53	C2		

FIGURE 4–11. COMPONENT LOCATOR, ECU STEREO BOARD
(Sheet 2 of 2)

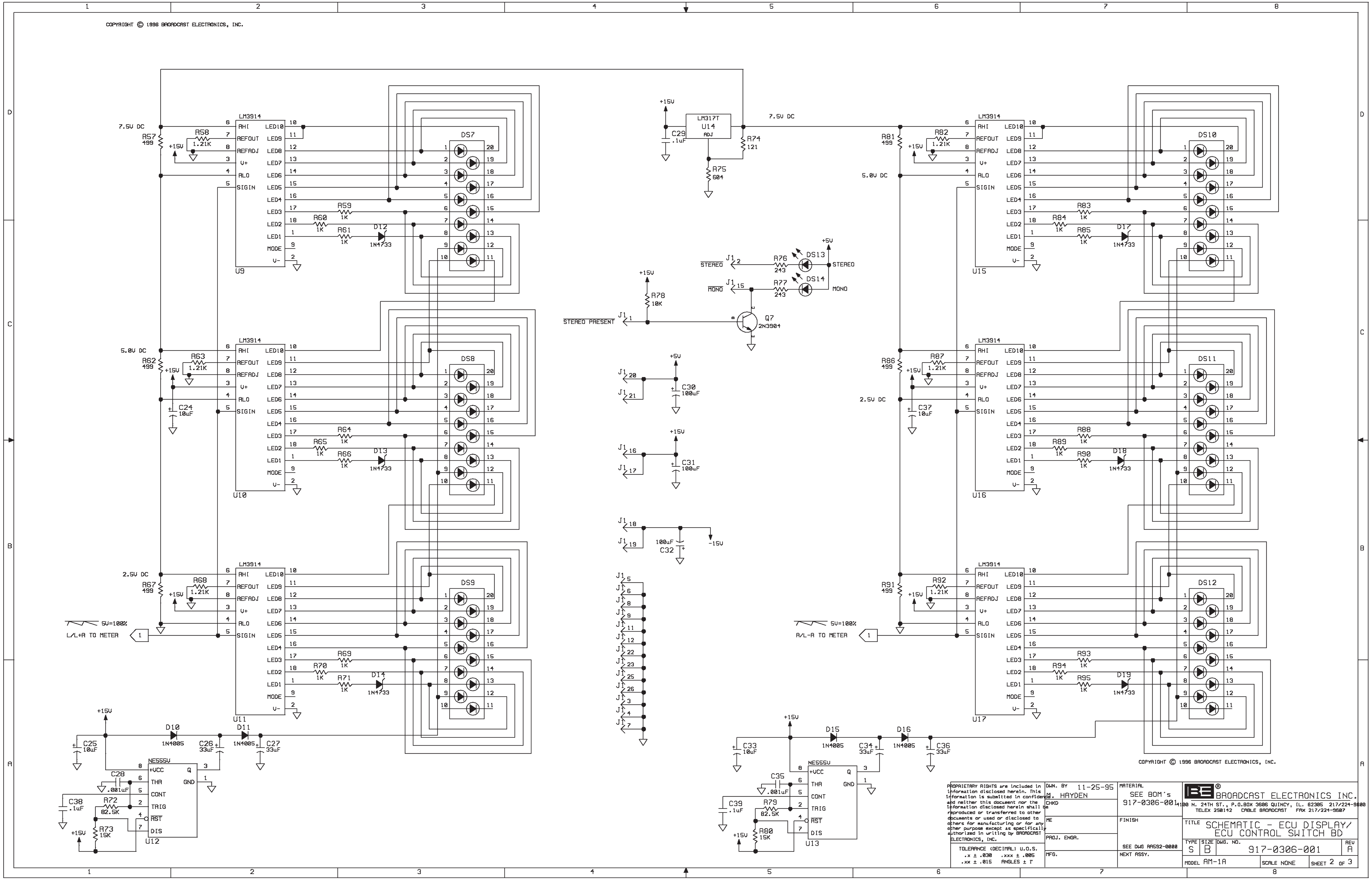


NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C43, D21, DS25, J2, Q7, R114, S11, U17
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AD917-0306-001.

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY 11-25-95 M. HAYDEN	MATERIAL SEE BOM's 917-0306-001	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
CHKD			
ME	FINISH	TITLE SCHEMATIC - ECU DISPLAY/ ECU CONTROL SWITCH BD	
PROJ. ENGR.	SEE DWG RA592-0000	TYPE S SIZE B DWG. NO. 917-0306-001	REV A
MFG.	NEXT ASSY.	MODEL AM-1A SCALE NONE	SHEET 1 OF 3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7.5V DC
5.0V DC
2.5V DC
LM3914
LM317T
U14
STEREO
MONO
STEREO PRESENT
Q7
2N3904
L/L+R TO METER
R/L-R TO METER
5V=100%
NE555V
U12
U13
DS7
DS8
DS9
DS10
DS11
DS12
DS13
DS14
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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY 11-25-95
M. HAYDEN
CHKD
ME
PROJ. ENGR.
MFG.
MATERIAL
SEE BOM's
917-0306-001
FINISH
SEE DWG AAS92-0000
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607
TITLE SCHEMATIC - ECU DISPLAY/ ECU CONTROL SWITCH BD
TYPE S
SIZE B
DWG. NO. 917-0306-001
REV A
MODEL AM-1A
SCALE NONE
SHEET 2 OF 3
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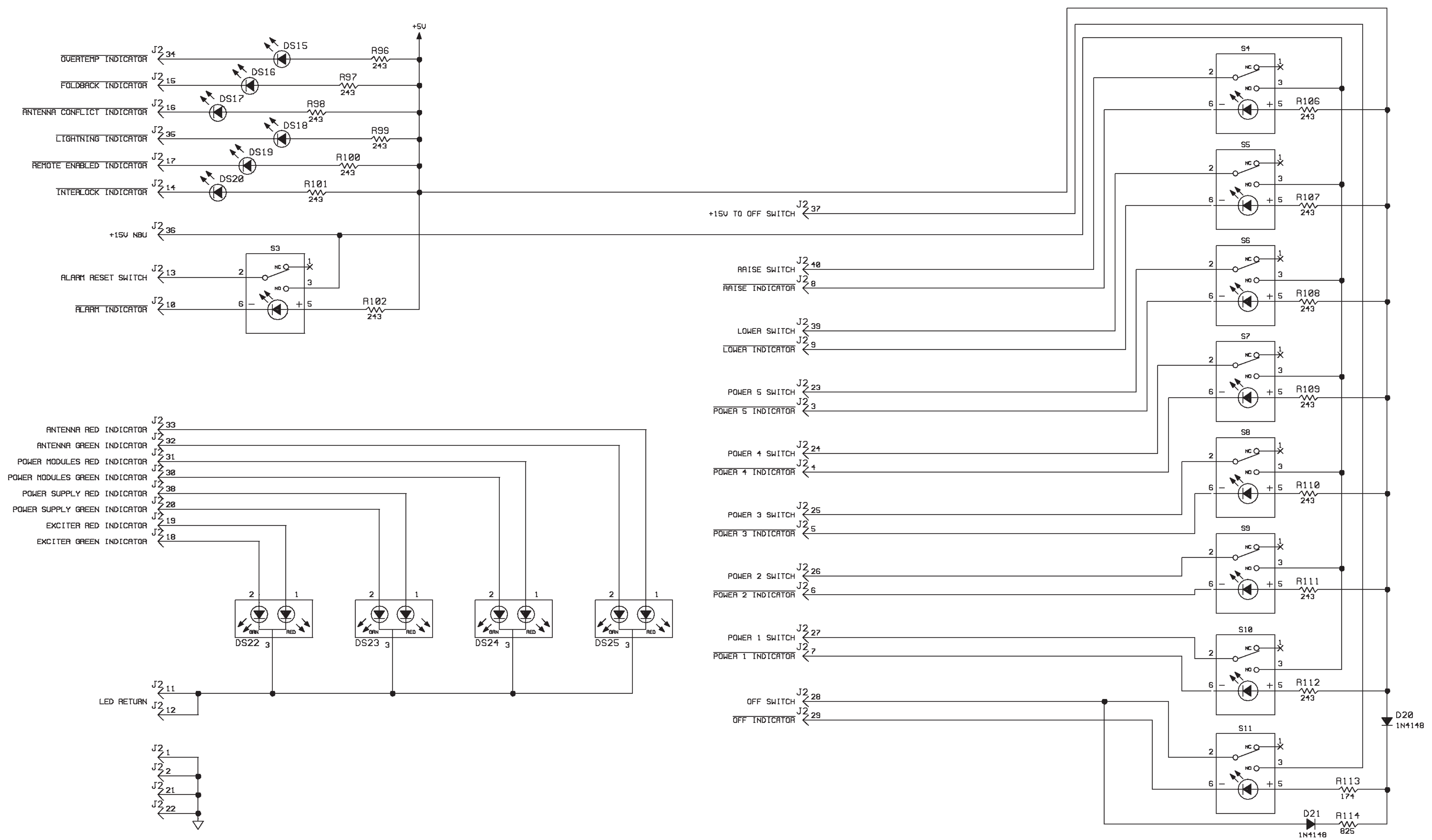

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

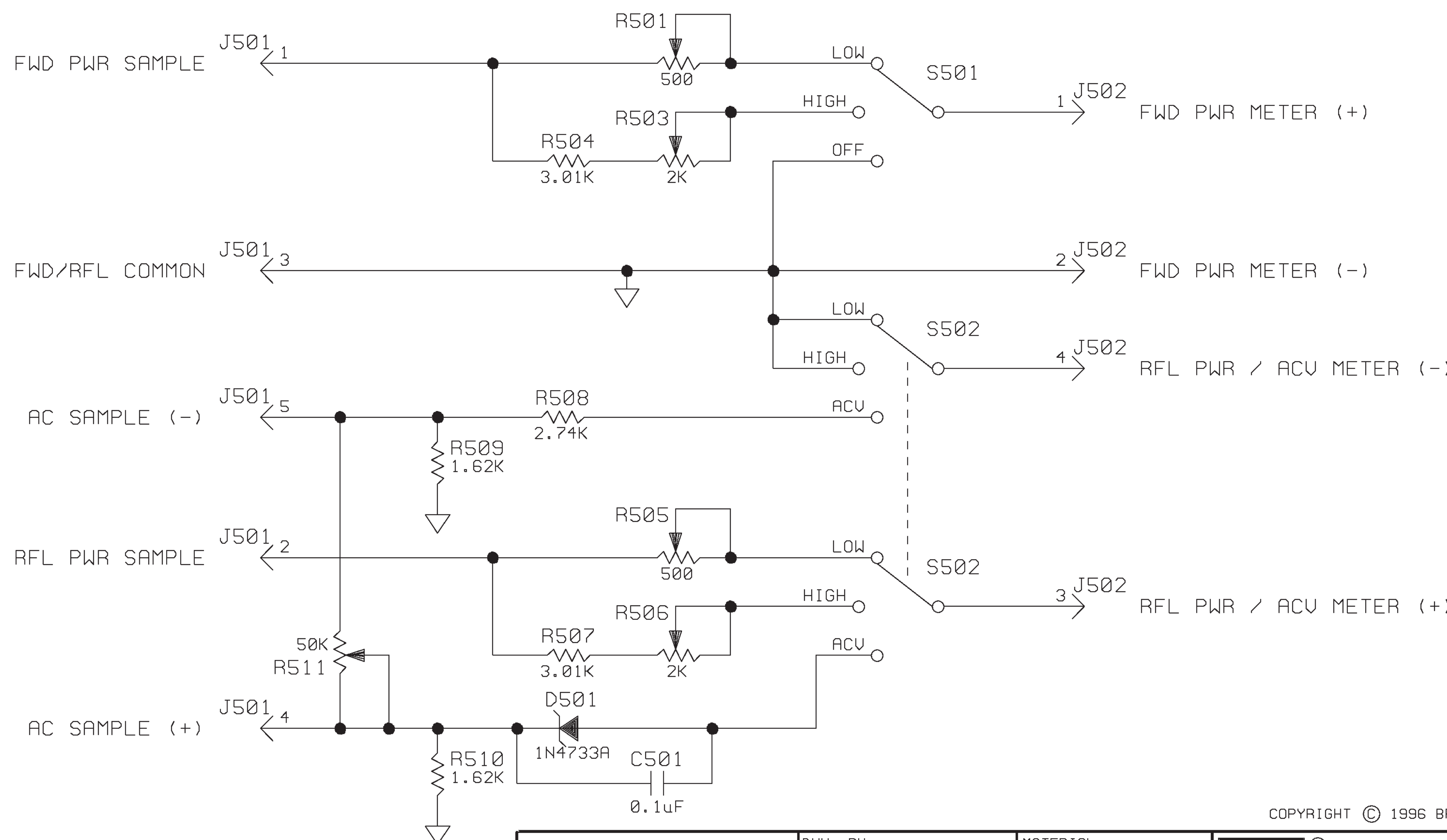
DWN. BY 11-25-95 M. HAYDEN	MATERIAL SEE BOM's 917-0306-001	
CHKD		
ME	FINISH	
PROJ. ENGR.	SEE DWG RA592-0000	
MFG.	NEXT ASSY.	

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC - ECU DISPLAY/ ECU CONTROL SWITCH BD

TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-001	A

MODEL AM-1A SCALE NONE SHEET 3 OF 3



NOTES:
1. ALL REFERENCE DESIGNATORS START AT 501.
2. ALL RESISTORS ARE IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
3. LAST COMPONENT USED: D501, J502, R511, S502
4. COMPONENTS NOT USED: R502
5. SEE ASSEMBLY: AD917-0306

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY	MERKEL 1-2-96
CHKD	
ME	
PROJ. ENGR.	
MFG.	
MATERIAL	SEE BOM 917-0306-005
FINISH	SEE DWG RA592-0000
NEXT ASSY.	AD917-0306

BE® BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC ECU METER SWITCH PCB

TYPE	SIZE	DWG. NO.	REV
S	B	917-0306-005	A

MODEL AM-1A | SCALE NONE | SHEET 1 OF 1