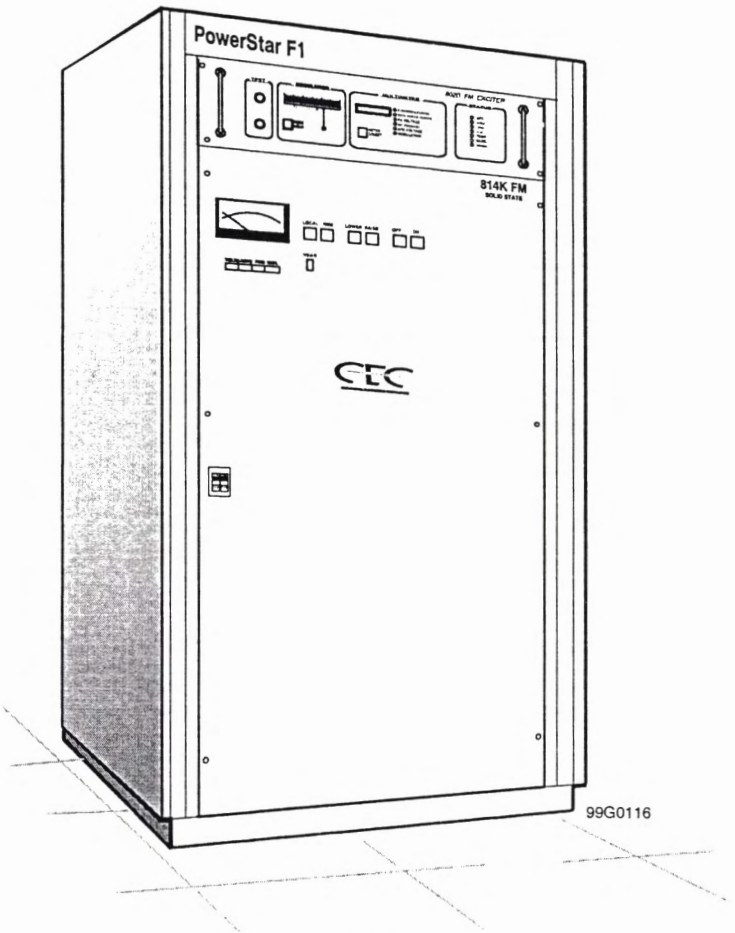
CONTINENTAL ELECTRONICS CORPORATION

TECHNICAL MANUAL
OPERATION AND MAINTENANCE

TYPE 814K
1000 Watt Solid-State
FM Transmitter



15 APRIL 1999

TECHNICAL MANUAL
OPERATION AND MAINTENANCE INSTRUCTIONS

TYPE 814K
1000 WATT, SOLID STATE
FM BROADCAST TRANSMITTER

(P/N 195031-1)

(214) 381-7161 www.contelec.com FAX: (214) 381-4949

ISSUED 17 APRIL 1999

PREFACE

This Operation and Maintenance manual gives the physical and functional description, installation, operation, theory of operation, maintenance, parts lists, and diagrams for the identified equipment. Operator and service personnel should become familiar with the manual contents before attempting to install, operate, or maintain the equipment. In addition to the Safety Summary which follows the Table of Contents, specific **WARNINGS**, **CAUTIONS** and **NOTES** are located throughout this manual where they apply. Continental Electronics Corporation (CEC) manufactured this equipment to conform with current electrical, radiation, and safety codes of the United States to the extent that they apply. **It is the user's responsibility to comply with all local and national codes during installation and operation of the equipment.**

CEC reserves the right to make any changes, without notice, to this or any of CEC's products to improve reliability, performance, function, or design.

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The information in this document has been carefully checked and is believed to be entirely reliable. While all reasonable efforts to ensure accuracy have been taken in the preparation of this manual, CEC assumes no responsibility resulting from omissions or errors in this manual, or from the use of information contained herein.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency that might be met during installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the user's purpose, the matter should be referred to CEC.

CUSTOMER SERVICE

Continental Electronics Corporation customer service is available for assistance at any time, 24 hours a day, weekends and holidays included. Call anytime day or night:

Parts Services	(214) 388-3737
Engineering Services	(214) 388-5800
Main Offices	(214) 381-7161 (8:00 am - 5:00 pm CT)

You may write to any of these services at P.O. Box 270879, Dallas, Texas 75227-0879, or FAX (214) 381-4949.

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Technical Manual - User's Guide

Section 1:
Contains the Physical and Functional description of equipment, Technical Characteristics, List of Standard Equipment, and List of Equipment Recommended but not Supplied.

Section 2:
Unpacking, Staging, and Installation Instructions.

Section 3:
Description of Controls and Indicators; Turn-On Operating, Normal Shutdown, and Emergency Shutdown Procedures.

Section 4:
Contains Functional Theory and Detail Circuit Theory for the Equipment and its Subassemblies.

Section 5:
Contains Preventive and Corrective Maintenance, Troubleshooting, Remove and Replace, and Alignment Procedures.

Section 6:
Contains maintenance significant Electrical Parts Lists for Standard Equipment.

Section 7:
Contains Schematic and Assembly Diagrams for Standard Equipment.

Section 8:
Contains Site Specific Equipment Configuration Data, Options Selected, Maintenance Significant Vendor Data, and Equipment Service Bulletins.

USER GUIDE

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SAFETY INFORMATION

I GENERAL

This safety summary is intended for trained and qualified personnel who are aware of the dangers inherent in handling potentially hazardous electrical circuits. It is not intended as a complete or authoritative medical treatment course, but should serve as a reminded of accepted emergency techniques. The equipment documentation must be reviewed for familiarization with safety markings and instructions before operation or maintenance activities are attempted. Know where and how to turn off main electrical power to the equipment. User personnel should have training in first aid and cardiopulmonary resuscitation (CPR) techniques. Emergency medical, fire, and ambulance telephone numbers should be posted in clear view adjacent to each telephone. Make a note if 911 service is available.

II ELECTRICAL SHOCK TREATMENT

In case of an electrical shock the **A-B-C**s of basic life support treatment may be used while medical assistance is being summoned.

WARNING
HIGH VOLTAGE/RF HAZARD

WHEN A VICTIM IS IN CONTACT WITH HIGH VOLTAGE OR RF, ENSURE SOURCE POTENTIAL IS REMOVED AND CIRCUIT GROUNDED BEFORE ATTEMPTING ARTIFICIAL RESPIRATION. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY OR DEATH.

1. If the victim is not responsive follow the **A-B-C**s of basic life support. Place victim face-up on a flat hard surface. Three critical areas (**A**irway, **B**reathing, and **C**irculation) need immediate attention:

WARNING
BITE HAZARD

USE CAUTION WHEN PLACING FINGERS IN VICTIM'S MOUTH, MUSCLE SPASMS CAN CAUSE THE MOUTH TO CLOSE WITH FORCE SUFFICIENT TO SEVER YOUR FINGERS. FAILURE TO COMPLY MAY RESULT IN LOSS OF FINGERS.

a. Airway - If victim is unconscious, open airway by lifting up the neck while pushing back on the victim's forehead. Refer to Figure 1A. Clear mouth of obstructions and observe for breathing.

WARNING
RESCUER KEEP CALM

EXCESSIVELY DEEP AND RAPID BREATHING BY THE RESCUER MAY RESULT IN RESCUER BECOMING FAINT, TO TINGLE, AND EVEN LOSE CONSCIOUSNESS. BREATHING SHOULD BE NORMAL IN RATE WITH ONLY MODERATE INCREASE IN VOLUME. FAILURE TO COMPLY MAY RESULT IN RESCUE BEING PREMATURELY STOPPED DUE TO FATIGUE.

b. Breathing - If victim is not breathing begin artificial breathing. Tilt head, pinch nostrils, make airtight seal with your mouth, and blow 4 quick full breaths into the victim's lungs. Refer to Figure 1B.

c. Circulation - If victim does not have a pulse, see Figure 1C, begin artificial circulation. Depress sternum 1½ to 2 inches then release. Refer to Figures 1D and 1E. WITH ONE rescuer: Perform 15 compressions and 2 quick breaths at the rate of 80 per minute. WITH TWO rescuers: Perform 5 compressions and 1 breath at the rate of 60 per minute.

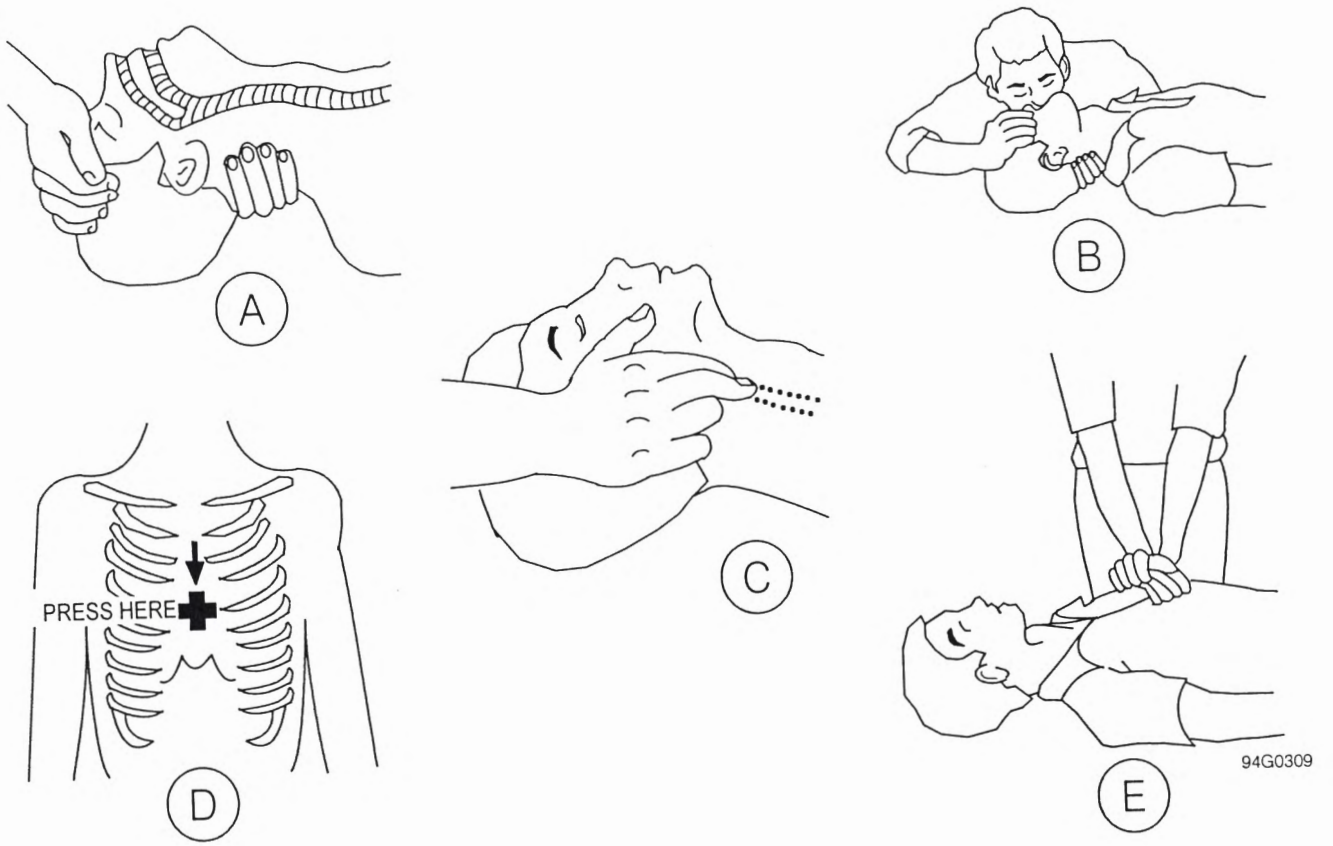

Figure 1. Artificial Breathing and Circulation.

2. If the victim is responsive treat for shock in the following way:

   a. Keep victim warm.

   b. Keep victim as quiet as possible.

   c. Loosen victim's clothing.

   d. Place victim in a reclining position if possible.

III FIRST-AID

Users of this equipment are urged to become familiar with first-aid theory and practices. The following information is intended for reference only. It is important that all personnel using this equipment be prepared to give adequate Emergency First-Aid to fellow users.

1. In case of extensive electrical burns and broken skin:

   a. Cover area with clean sheet or cloth. (Cleanest available cloth article.)

   b. Do Not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.

   c. Treat victim for shock as follows: Keep victim warm, quiet, reclined, and loosen clothing.

   d. Arrange transportation to a hospital as quickly as possible.

   e. If arms or legs are affected keep them elevated.

NOTE

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoon of salt and 1/2 level teaspoon of baking soda to each quart of water (neither hot nor cold). Allow victim to sip slowly about 4 ounces (a half glass) over a period of 15 minutes. Discontinue fluid if vomiting occurs. (Do Not give alcohol.)

2. In case of less severe electrical burns (1st. or 2nd. degree) with no broken skin:

   a. Apply cool (not ice cold) compresses using the cleanest available cloth article.

   b. Do Not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.

   c. Apply clean dry dressing if necessary.

   d. Treat victim for shock as follows: Keep victim warm, quiet, reclined, and loosen clothing.

   e. Arrange transportation to a hospital as quickly as possible.

   f. If arms or legs are affected keep them elevated.

IV SAFETY SYMBOLS

Safety symbols shown below are typical of those used in the operation and maintenance manual:

WARNING

The **WARNING** sign as shown above, denotes a personal hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, may result in personal injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

CAUTION

The **CAUTION** sign as shown above, denotes an equipment hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, may result in damage to or destruction of part or all of the equipment. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

V SAFETY PRECAUTIONS

Follow the safety precautions listed below in addition to any site safety precautions when servicing this equipment. Failure to observe these safety precautions may result in serious injury or death.

WARNING

DEATH OR SERIOUS INJURY MAY RESULT IF PERSONNEL FAIL TO OBSERVE THE FOLLOWING SAFETY PRECAUTIONS.

1. Never work on electronic equipment unless there is another person present who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the engineer or technician is aided by operators, he must warn them about dangerous areas.

2. Do not contact high voltage or current connections when power is applied to this equipment.

3. Whenever the nature of the procedure permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

V SAFETY PRECAUTIONS - Continued

4. Make sure that all rings, watches, necklaces, metallic ear-rings, and other similar items are removed before working with this equipment.

5. Whenever possible, the power supply to the equipment must be turned-off and tagged or locker before beginning work on the equipment.

6. Extremely high current, low voltage, dc is used in portions of the equipment. Do not be misled by the low voltage rating (5 to 30 V dc) of the current sources. Severe injury to personnel and damage to the equipment can occur if the voltage sources are shorted (directly connected) to ground or ground returns by tools or test equipment.

VI VOLTAGE, CURRENT, and LIGHTNING HAZARDS

The voltage, current, and lightning hazards listed in 1 through 3 below exist for the equipment. For hazards associated with vendor equipment, refer to appropriate manuals furnished with the item.

1. The dc voltage hazards consist of potentials of 5 V dc to 10 kV dc between power supply lines within the equipment.

2. High voltage, high current, 50/60 Hz ac power is supplied to the equipment.

3. Antenna systems acting as an attracting device presents a lightning hazard to personnel performing maintenance on the equipment. No maintenance should be performed on the unit when thunderstorms are imminent or in progress, while the antenna is connected.

VII RF RADIATION HAZARDS

The rf radiation hazards listed in 1 and 2 below exist for the equipment. For hazards associated with vendor equipment, refer to appropriate manuals furnished with the item.

1. RF radiation from the equipment could present a potential hazard to personnel wearing cardiac pacemakers.

2. The following rf radiation hazard precautions shall be observed when operating or performing maintenance on the equipment:

   a. Proper precautions shall be taken to protect cardiac pacemaker users.

   b. Ensure that radiation restrictions for nearby equipment or other high power rf radiation sources are observed before performing maintenance on this equipment.

   c. Prior to and during operation and maintenance, observe all radiation restrictions in effect at the site.

   d. If personnel are suspected or known to have been exposed to rf radiation in excess of rf radiation protection guidelines, consult medical personnel immediately.

VIII TOXIC MATERIAL/ENVIRONMENTAL HAZARDS

The hazards listed in 1 and 2 below may exist when performing maintenance of the equipment. For hazards associated with vendor equipment, refer to appropriate manuals furnished with the item.

1. Toxic or flammable solvents and corrosive chemicals used in cleaning operations may involve the use of caustic or acid solutions, skin irritants, and organic solvents that are flammable and/or toxic. The following precautions, as a minimum, must be observed by personnel using such materials.

   a. Work only in well ventilated areas.

   b. Wear organic vapor respirators when using organic solvents or corrosive chemicals.

   c. Wear chemical safety goggles, gloves and aprons when using corrosive chemicals.

   d. Do not use flammable chemicals near or inside the equipment while power is applied to the system.

   e. Maintain a fully stocked first aid cabinet nearby for emergency treatment of scalds, burns, etc.

   f. Flush away coolant or cleaning solvent contamination from any part of the body.

2. Benzene, Carbon Tetrachloride, Freon, and Trichloroethane based Solvents should only be used in well ventilated areas. The fumes are toxic and may be hazardous to your health or can cause death by suffocation.

IX MAJOR EMPLACEMENT AND MAINTENANCE HAZARDS

The precautions given in 1 and 2 below must be observed to prevent injury or death to personnel:

1. Installation and assembly hazards associated with the equipment are as follows:

   a. After performing maintenance ensure the doors and covers are installed prior to attempting to return the equipment to service.

   b. On all electrolytic capacitors, make sure terminal polarity markings [positive (+) and negative (-)] are observed when connecting capacitors to ± dc buses.

2. While performing maintenance on the equipment, observe the following precautions:

   a. Maintenance of equipment shall not be performed when thunderstorms and lightning are imminent or in progress.

   b. When performing maintenance on the equipment make sure all ac power to the unit is removed.

X STATIC SENSITIVE DEVICES

There are some circuits throughout the equipment using metal-oxide-semiconductor (MOS) and complementary MOS (CMOS) integrated circuits. This requires stringent attention to handling techniques due to the sensitivity to static electricity. The following paragraphs outline the procedures to use when handling MOS or CMOS devices.

1. Electrostatic discharge hazards in MOS/CMOS devices are prevalent. Such damage can be produced by Electrostatic Discharge (ESD) due to improper handling or installation. All MOS/CMOS devices are susceptible to damage by the discharge of electrostatic energy between any two pins. This sensitivity to static charge is due to the fact that gate input capacitance (5 picofarads typical) in parallel with an extremely high input resistance (10^{12} ohms typical) lends itself to a high input impedance and hence readily builds up the electrostatic charges.

2. Electrostatic handling of MOS devices is of prime importance. Static electricity is always present in any work environment. It is generated when ever two different materials are rubbed together. A person walking across the floor can generate a charge of thousands of volts. A person working at a bench, sliding around on a stool, or rubbing his arms on the work bench can develop a high static potential. For preventing damage to devices due to ESD, use the following precautions:

   a. Table tops or work areas should be covered with grounded conductive tops. Test areas should have conductive floor mats.

   b. Tools and test equipment used in protected work areas shall be properly grounded. Ensure that soldering-iron tips are grounded. If plastic handled tools must be used, they shall be treated with a topical antistat.

   c. Devices, or circuit cards with devices, should not be inserted into or removed from circuits with the power on because transient voltages may cause permanent damage.

   d. Use a conductive wrist strap when removing a circuit card containing MOS/CMOS devices from a card cage or when removing a device from a circuit card.

   e. The devices are to be stored or transported in static shielding bags, anti-static rails, or conductive foam.

3. ESD grounding is critical to safe handling of ESD sensitive devices. Earth ground rods for ESD protection shall be solid copper or copper jacketed steel and shall be driven six to eight feet into the earth beyond the work area floor slab with approximately six inches exposed for making connection. Dry soil conditions may require a copper sulfate drip. Electrical grounds shall be isolated from static grounds.

   Water pipes offer convenient grounds; however, they may not be connected to earth ground. These techniques are for minimizing the difference of potential between separate grounds, and not for reducing the ohmic resistance to earth.

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SECTION 1 - GENERAL INFORMATION

WARNING

USE CAUTION WHEN WORKING IN THE POWER SUPPLY SECTION OF THIS TRANSMITTER, DISCONNECT THE PRIMARY POWER AND SHORT THE MAIN FILTER CAPACITOR WITH A SHORTING STICK OR AN EQUIVALENT. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY OR DEATH.

1-1. INTRODUCTION

The manual is arranged in seven sections, as follows: General Information, Installation, Operation, Theory of Operation, Maintenance, Parts List, and Schematic Diagrams. Also included are Transmitter Factory Test Data Sheets.

1-1.1 Section 1 - General Information.

Section 1 (this section of the manual) contains a physical and functional description of the transmitter. Also included in section 1 is a list of technical characteristics; see Table 1-1.

1-1.2 Section 2 - Installation.

Section 2 contains instructions to be followed while removing the crate, unpacking, and installing the Type 814K Transmitter. Also included are steps necessary to prepare the transmitter for initial turn-on.

1-1.3 Section 3 - Operation.

Section 3 contains a description of controls and indicators, turn-on and turn-off procedure, operating procedure, and operation by remote control.

1-1.4 Section 4 - Theory of Operation.

Section 4 includes theory of operation for the transmitter. Including one-line and simplified block diagrams where appropriate

1-1.5 Section 5 - Maintenance.

Section 5 includes preventive and corrective maintenance procedures for the transmitter system. Also included are instructions for troubleshooting and procedures to remove, replace or readjust various items.

1-1.6 Section 6 - Parts Lists.

Section 6 includes selected parts lists for the assemblies as shown in Table 6-1 based on a maintenance philosophy consistent with this type equipment.

1-1.7 Schematic Diagrams.

Section 7 includes schematic diagrams for the transmitter and its assemblies as shown in Table 7-1.

1-1.8 Supplemental Data.

Factory test data for this specific transmitter is taken prior to its shipment and is included behind the Factory Test Data tab.

1-2. GENERAL DESCRIPTION

The Type 814K is a single-unit transmitter, see Figure 1-1, operating in the FM broadcast range (87.5-108 MHz) and delivering an RF output power of up to 1,000 watts. The modulation on the carrier is that of the associated exciter. The transmitter has been designed to meet global requirements with regard to modulation and spectral purity. The power supply has been designed to operate at 50 Hz with no modifications. This transmitter may be operated locally or by remote control.

1-3. FUNCTIONAL DESCRIPTION

The Type 814K Transmitter consists of solid state exciter and power amplifier. The exciter output is applied to a four way splitter and then to four rf amplifier modules. The amplifier outputs drive a four to one combiner. The combiner output is low pass filtered and coupled to the antenna jack. Metering circuitry monitors forward and reflected power as well as power amplifier voltage and total current. The transmitter is protected from over-current and excessive load VSWR. Refer to Figure 1-2 transmitter block diagram.

1-4. TECHNICAL CHARACTERISTICS

The mechanical, environmental, and electrical characteristics of the Type 814K Transmitter are listed in Table 1-1.

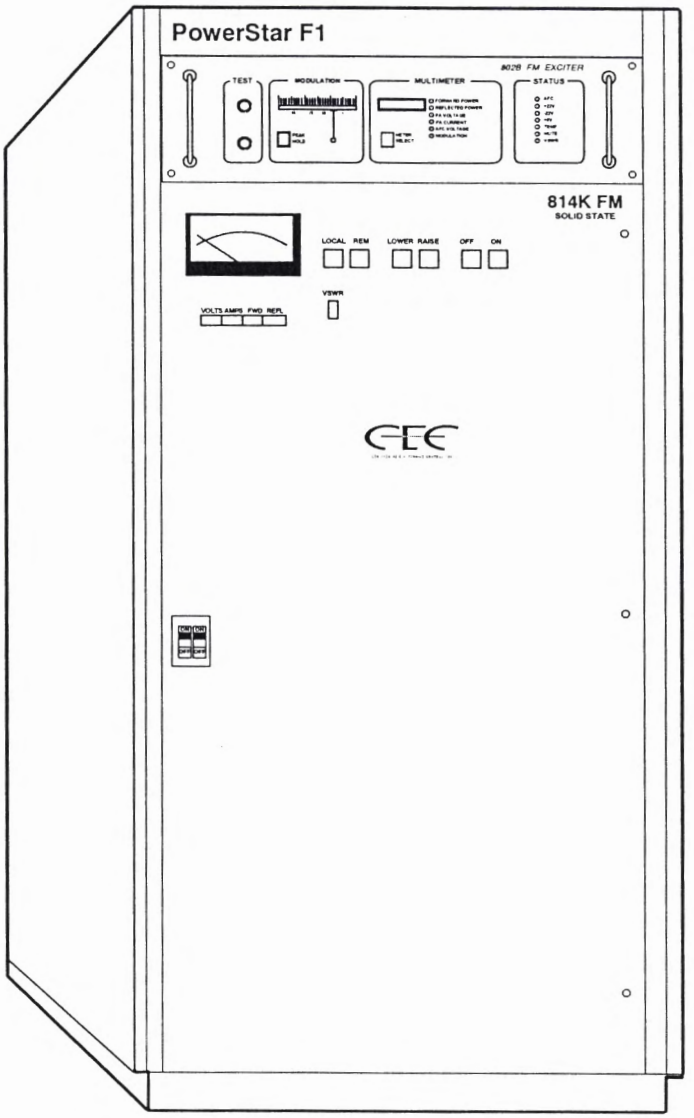


Figure 1-1. Type 814K Transmitter (Front View).

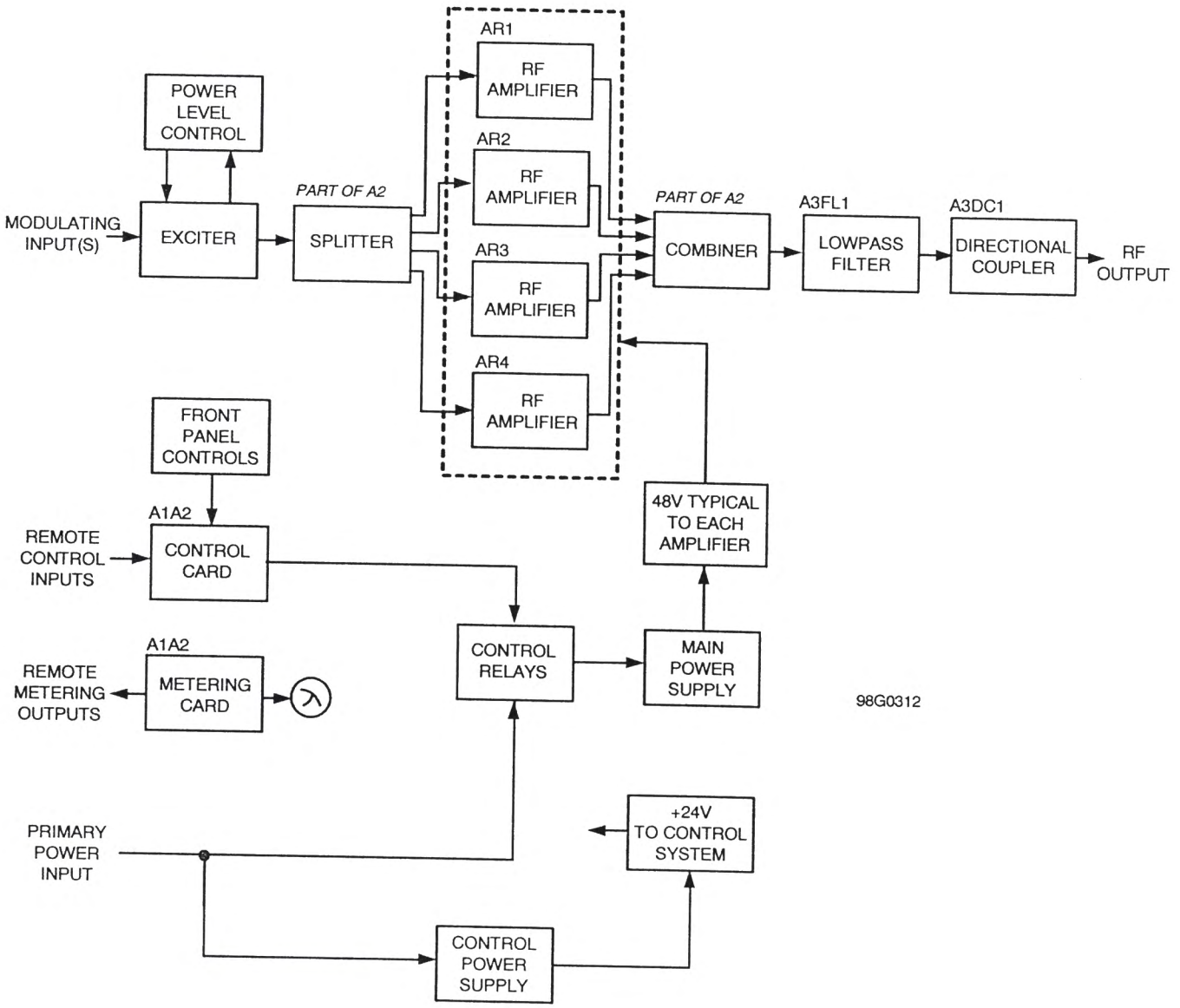


Figure 1-2. Type 814K Transmitter Block Diagram.

TABLE 1-1. Transmitter Characteristics.

Function	Characteristics
	MECHANICAL
Weight:	Approximately 400 lbs (approximately 180 kg)
Size:	Height 42 inches (107 cm), Width 21 inches (53 cm), Depth 25 inches (64 cm)
	ENVIRONMENTAL
Ventilation:	Internal blower; filtered air inlet at lower rear of transmitter. Warm air exhausted through louvered top of transmitter.
Ambient humidity:	Up to 95% relative humidity (non-condensing)
Ambient temperature range:	-4 degrees F (-20 degrees C) to 113 degrees F (45 degrees C)
Altitude:	Up to 10,000 feet (3050 meters)
Shock and Vibration:	Normal handling and transportation
	ELECTRICAL
Frequency Range:	87.5-108 MHz
Power Source:	240 Vac, 50 or 60 Hz, single phase
Standing Wave Ratio:	Not to exceed 2:1
Input Power Requirements:	2.2 kW at 0.8 power factor
	RF OUTPUT
Power Output:	250 watts minimum to 1,050 watts maximum into 50 ohms
Output Impedance:	50 ohms, unbalanced
Output Connection:	N-type female
RF Harmonic Levels:	Better than 80 dB below carrier

TABLE 1-1. Transmitter Characteristics. - Continued

Function	Characteristics
	NOTE
	The modulation-oriented specifications for the 814K, including frequency stability, are determined by the associated exciter. The following specifications assume the use of the Continental 802B FM Exciter.
	EXCITATION
Source:	Continental Electronics Corp. Type 802B or 802D FM Exciter
Stability:	Within ±250 Hz of specified carrier frequency
Modulation:	Wide band direct FM
Modulation Capability:	±200 kHz deviation
	MONAURAL OPERATION
Input Impedance:	600 ohms ±5 % balanced
Input Level:	+10 dBm, ±2 dBm
Frequency Response:	±0.5 dB referenced to 0 dB at 100 Hz, 20 Hz to 15 kHz
Pre-emphasis:	0, 25, 50 or 75 microseconds
Harmonic Distortion:	Less than 0.01% from 20 Hz to 15 kHz
Inter-modulation Distortion:	Less than 0.02%, 60/7000 Hz, 4:1 ratio
FM Noise Level:	75 dB minimum below ±75 kHz at 400 Hz with 75 microsecond de-emphasis
Asynchronous AM Noise:	62 dB below carrier; reference: 100% AM at 400 Hz with 75 microsecond de-emphasis, no FM modulation.
Synchronous AM Noise:	60 dB below carrier; reference: 100% AM at 400 Hz with 75 microsecond de-emphasis, FM modulation ±75 kHz at 400 Hz.

TABLE 1-1. Transmitter Characteristics. - Continued

Function	Characteristics
	STEREOPHONIC OPERATION
Composite Inputs:	Balanced, Unbalanced, and Test
Composite Input Impedance:	500 ohms, nominal
Composite Input Level:	1.25 volts RMS (3.53 volts peak-to-peak for 75 kHz deviation)
Composite Response:	±0.2 dB from 20 Hz to 100 kHz referenced to 0 dB at 400 Hz
	SUB-CARRIER OPERATION
SCA Inputs (three):	Unbalanced (Adjustable)
SCA Input Impedance:	15,000 ohms nominal
SCA Input Level:	1.25 volts RMS (3.54 volts peak-to-peak for 10% injection).
Sub-carrier frequency range:	20 kHz to 100 kHz; RDS/RDBS is accommodated

SECTION 2 - INSTALLATION

2-1. GENERAL

Primary AC power, RF grounding, and cooling requirements are listed in the following paragraphs. Complete unpacking, inspection, assembly, and ground connections prior to connecting primary AC power or the RF load.

2-1.1 AC Power Requirements.

The Type 814K Transmitter requires single phase 200 to 240 volts at 50 or 60 Hz primary AC power. Input terminals are available on A2TB2-3 and 4. Primary AC power wiring may be brought into transmitter through the access holes at the top or bottom of the transmitter. The size of the power wiring is determined by the local electrical code and good engineering practice. In no case should the wiring be smaller than number 10 AWG where the wire length is up to 20 feet. The facility disconnect breaker should have a 40 ampere capacity. The transmitter has an internal 30 ampere primary power disconnect breaker.

2-1.2 Grounding.

A ground connection is provided in the transmitter. This connection is located on the bottom plate near the rear of the transmitter. A hole is provided to bring in a strap of up to two inches in width. Such a strap should be used to connect the transmitter to the station common ground.

2-1.3 Modulating input connections

Modulating input connections are made directly to the associated exciter. These inputs would include program (composite, discrete left and right, AES/EBU and SCA. The type of connector involved is dependent on the type of exciter used.

2-1.4 RF Output connections

The transmitter RF output is from a Type N female coaxial connector located near the top of the transmitter. A hole is provided in the top panel to allow routing of the output coaxial cable into the transmitter.

2-1.5 Remote control connections

If the transmitter is to be remotely controlled, connections from an associated remote control unit are made to a barrier strip on the rear of the left (viewed from the front) wall of the transmitter. See Figure 2-2 for details on these connections.

2-1.6 Transmitter Cooling.

Adequate cooling of the transmitter is imperative to reduce downtime and to extend component reliability. An adequate supply of clean air not to exceed 113 degrees F (45 degrees C) is required. Consult with qualified air-conditioning personnel for recommendations to meet these requirements.

2-2. UNPACKING AND INSPECTION

2-2.1 Domestic Shipments.

The transmitter is shipped uncrated on a shipping skid via a commercial air-ride van.

CAUTION

USE CARE WHEN MOVING THIS TRANSMITTER. USE APPROPRIATE LIFTING AND MOVING EQUIPMENT WITH A 1000 POUND (450 KG) MINIMUM CAPACITY. UNIT MAY BE DAMAGED IF DROPPED OR SEVERELY JARRED. FAILURE TO COMPLY MAY RESULT IN EQUIPMENT DAMAGE.

Unpack and inspect the transmitter, as follows:

1. Carefully remove transmitter from van to a position near installation site.
2. Carefully lift transmitter from shipping skid.
3. Inspect transmitter for loose hardware, and ensure all controls operate freely. Examine cabinet and panels for dents and scratches.
4. If claim is to be filed, retain all packing material. Promptly file any damage claims with transportation company.

2-2.2 International Shipments.

The transmitter is shipped in a skid-type crate via a commercial transportation company.

CAUTION

USE CARE WHEN MOVING THIS TRANSMITTER. USE APPROPRIATE LIFTING AND MOVING EQUIPMENT WITH A 1,000 POUND (450 KG) MINIMUM CAPACITY. UNIT MAY BE DAMAGED IF DROPPED OR SEVERELY JARRED. FAILURE TO COMPLY MAY RESULT IN EQUIPMENT DAMAGE.

Unpack and inspect the transmitter, as follows:

1. Position the crated transmitter near installation site.
2. Refer to instructions stenciled on side of shipping crate and carefully uncrate the transmitter.
3. Inspect transmitter for loose hardware, and ensure all controls operate freely. Examine cabinet and panels for dents and scratches.
4. If claim is to be filed, retain all packing material. Promptly file any damage claims with transportation company.

2-3. ASSEMBLY

Plan the placement of the transmitter and its external wiring carefully before beginning installation. Allow three feet of clearance on the front and rear of the cabinet. Holes are provided in the top and bottom of the transmitter frame for primary AC power, grounding and remote control wiring.

2-3.1 AC Power Wiring.

Connect the transmitter to the station ground using a two inch copper strap. A rectangular hole in the bottom of the chassis is provided for this purpose. Connect the primary power wiring from the customer furnished facility fuse or circuit breaker panel with 40 ampere rating as follows. Connect AC ground to A3TB2-6 and the single phase 220 V AC to A3TB2-3 and -4. **DO NOT** turn on AC power at this time.

2-3.2 RF Load Connection.

CAUTION

DAMAGE MAY RESULT FROM AN IMPROPER IMPEDANCE MATCH BETWEEN THE TRANSMITTER AND THE TRANSMISSION LINE. ENSURE THAT THE TRANSMISSION LINE AND ANTENNA PRESENT A VSWR NOT GREATER THAN 2:1 TO THE TRANSMITTER AT THE OPERATING FREQUENCY.

Connect the customer-furnished 50 ohm transmission line to the transmitter's Type N RF output connector.

2-3.3 Power Transformer Tap Settings.

The power supply transformers are shipped from the factory strapped to accommodate 240 Vac mains. When the site power is not 240 Vac or when the transmitter is to be operated at less than 1,000 watts output, refer to the transformer data Figure 2-1 for proper tap settings. **The DC voltage from the power supply must never exceed 52 volts under operating conditions.** If in doubt about the actual line voltage, assume it is high and use the highest-primary voltage tap. This will result in the lowest DC voltage from the power supply. The tap can be changed later to result in an increased DC voltage. Never allow the DC voltage to rise above 52 volts under operating conditions.

The most efficient manner of operating this transmitter is to use the lowest possible DC voltage consistent with the ability to maintain the target power output. Adjust the exciter output power level only to vernier or finely adjust the transmitter output power level. Adjust the power level of the exciter upward until the transmitter output power no longer increases. Under those conditions, set the power transformer taps so that the transmitter output power is slightly over the target value. Then reduce the exciter output power level to back down the transmitter output power to the target value.

2-3.4 Remote Control Connections.

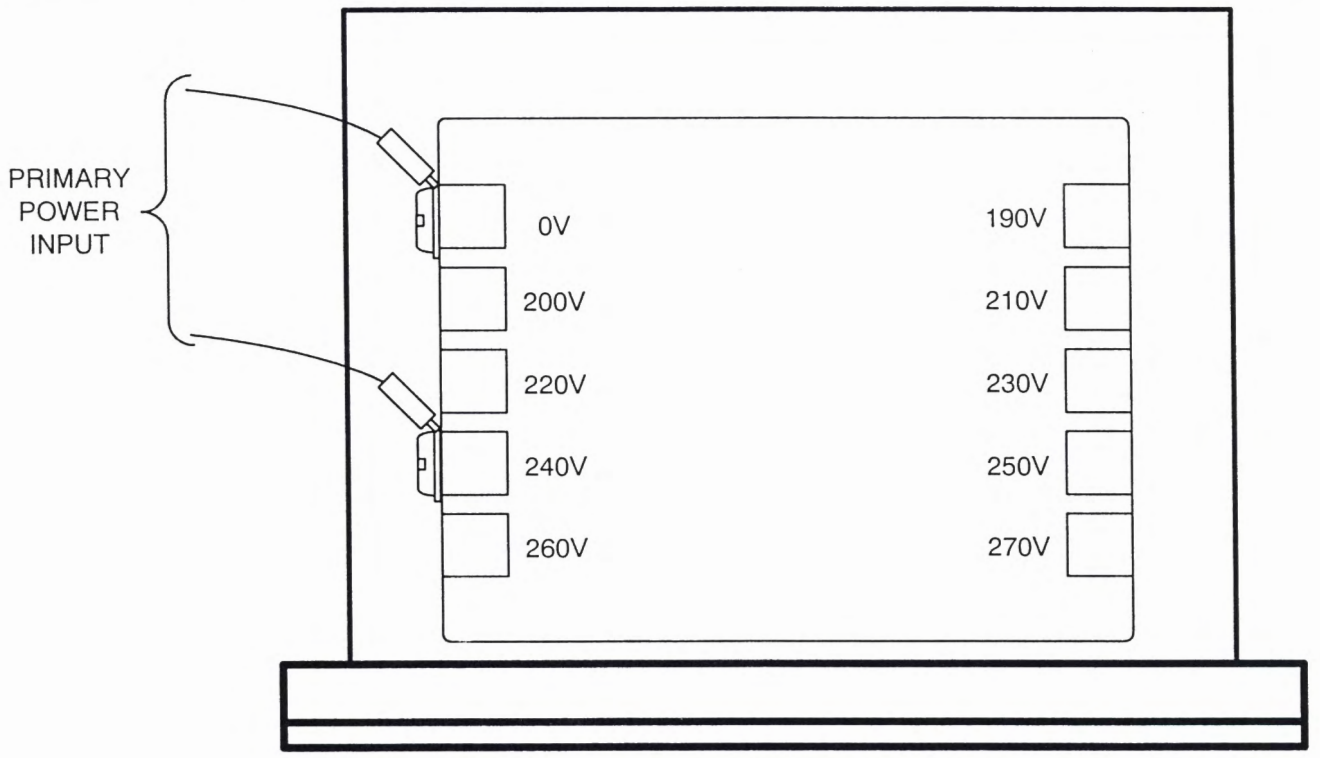
Refer to Figure 2-2 for remote control connection information. The remote control connections are made to the side wall A3TB1.

Observe that the remote control commands are momentary connections from a particular terminal to the remote control common, terminal 7. "ON", for example, is a momentary connection from A3TB1 to A3TB1 terminal 7. "OFF" is a momentary connection from A3TB1 terminal 6 to A3TB1 terminal 7. The "RAISE" command is a momentary connection from A3TB1 terminal 9 to A3TB1 terminal 7. The "LOWER" command is a momentary connection from A3TB1 terminal 10 to A3TB1 terminal 7. The remote control system normally has what is termed a Failsafe connection. This is a pair of terminals which are closed when the remote control system is operative. These two terminals should be connected to A3TB1 terminal 8 and A3TB1 terminal 7. The terminals should have continuity when the remote control system is operating correctly. They should be open when the remote control system has failed or is inoperative.

If the "ON" function must be operated by the application of a voltage (as opposed to a connection to ground as outlined in the previous paragraph), then use the alternate "ON" connections shown in Figure 2-2. When this is done, a jumper is used between A3TB1 terminal 3 and A3TB1 terminal 7. In addition, the system is commanded to the ON mode by applying +24 volts DC to A3TB1 terminal 2. This may be done as shown by using a momentary connection from A3TB1 terminal 1 (a source of +24 Vdc for this purpose) and A3TB1 terminal 2.

If an external interlock is used, then that interlock should be a normally closed connection (opened when the interlock has been tripped). These connecting should be placed between A3TB1 terminal 5 and A3TB1 terminal 4. **If an external interlock is not used, then a jumper must be placed between A3TB1 terminal 5 and A3TB1 terminal 4.**

The 814K transmitter has signals brought out for remote metering purposes. These signals consist of samples of the voltage applied to the final amplifier, the total current which the final amplifier draws, forward power and reflected power. These signals are all of a few volts against ground. Calibration of these signals must be done externally, in the remote control metering system.



TYPICAL TRANSFORMER CONNECTIONS

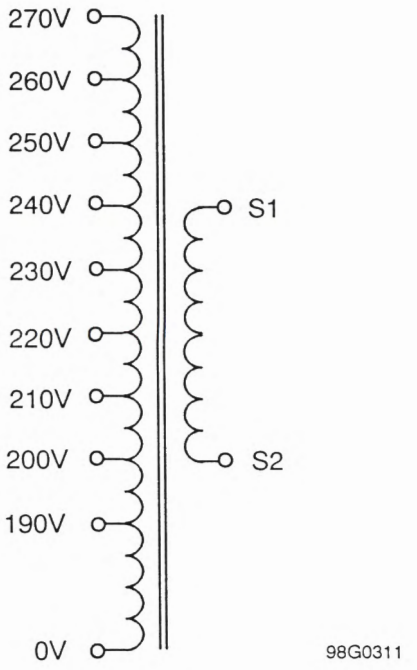


Figure 2-1. Transformer Connections.

TABLE 2-1. Remote-Control Connections (A3TB1).

Terminal:	Function:	Notes:
1	+24 Vdc	Connect with a short jumper to ON INPUT HIGH SIDE (terminal 2) if the ON function is to be achieved by a pull-down to ground at ON (LOW SIDE) (terminal 3). If the ON function is made by applying a voltage to ON (HIGH SIDE) (terminal 2), then this terminal may be used as a source of 24 volts to go to a contact in the remote control equipment, which will return it to ON (HIGH SIDE) (terminal 2) for the ON function.
2	ON (HIGH SIDE)	High side of ON input; this is to a relay in the control ladder. Connect with a short jumper to "+24 V" (terminal 1) if the ON function is to be achieved by a pull-down to ground at ON (LOW SIDE). If the ON function is to be made by applying +24 volts dc to this terminal, then this terminal will be connected to that source of 24 volts via a contact in the remote control equipment.
3	ON (LOW SIDE)	Low side of ON input; this is from the relay in the control ladder. Connect with a short jumper to COMMON (terminal 7) if the ON function is to be made by applying +24 volts dc to terminal 2. If the ON function is to be made with a closure to the COMMON terminal (terminal 7), then this terminal will be connected via a contact in the remote control equipment to the COMMON terminal.
4	GROUND	Metering and status outputs are returned to this point, which is chassis ground.
5	EXTERNAL INTLK	Must be connected to GROUND (terminal 4) with a short jumper if an external interlock is not involved. Connect to ground via a normally-closed external interlock if such an interlock is used.
6	OFF	Connect to the COMMON terminal (terminal 7) to switch off the transmitter. This should be a normally open connection, closed momentarily to switch off the transmitter.
7	COMMON	This is the connection to which all the remote control connections return. This connection is grounded only when remote operation is selected. Metering and status outputs are with respect to GROUND (terminal 4), not to this point.
8	FAILSAFE	Connects to the COMMON terminal (terminal 7) via the failsafe connection in the remote control. This connection (terminal 8 to terminal 7) must be closed when the remote control is operating normally and must be opened when the remote control system has failed or is inoperative. If a remote control system is not used then the FAILSAFE terminal (terminal 8) must be jumpered to COMMON (terminal 7).
9	RAISE POWER	Connect to the COMMON terminal (terminal 7) to raise the transmitter power. This should be a normally open connection, closed momentarily to raise the transmitter power output. This connection operates a motor-driven pot to control the exciter output level.

TABLE 2-1. Remote-Control Connections (A3TB1). - Continued

Terminal:	Function:	Notes:
10	LOWER POWER	Connect to the COMMON terminal (terminal 7) to lower the transmitter power. This should be a normally open connection, closed momentarily to lower the transmitter power output. This connection operates a motor-driven pot to control the exciter output level.
12	VOLTAGE SAMPLE	A voltage (a few volts) corresponding to the magnitude of the 48 volt supply for remote voltage metering purposes. Calibration must be accomplished in the remote control metering system.
13	CURRENT SAMPLE	A voltage (a few volts) corresponding to the magnitude of the current drawn from the 48 volt supply for remote current metering purposes. Calibration must be accomplished in the remote control metering system.
14	FORWARD POWER	A voltage (a few volts) corresponding to the magnitude of the transmitter's power output (forward) for remoter power metering purposes. Calibration must be accomplished in the remote control metering system.
15	REFLECTED POWER	A voltage (a few volts) corresponding to the magnitude of the reflected power as sensed by the directional coupler for remote reflected power metering purposes. Calibration must be accomplished in the remote control metering system.
16	REFLECTED STATUS	Transistor pull-down to ground (chassis, terminal 4) for normal operation; open if faulted. May be connected to a remote control status input.

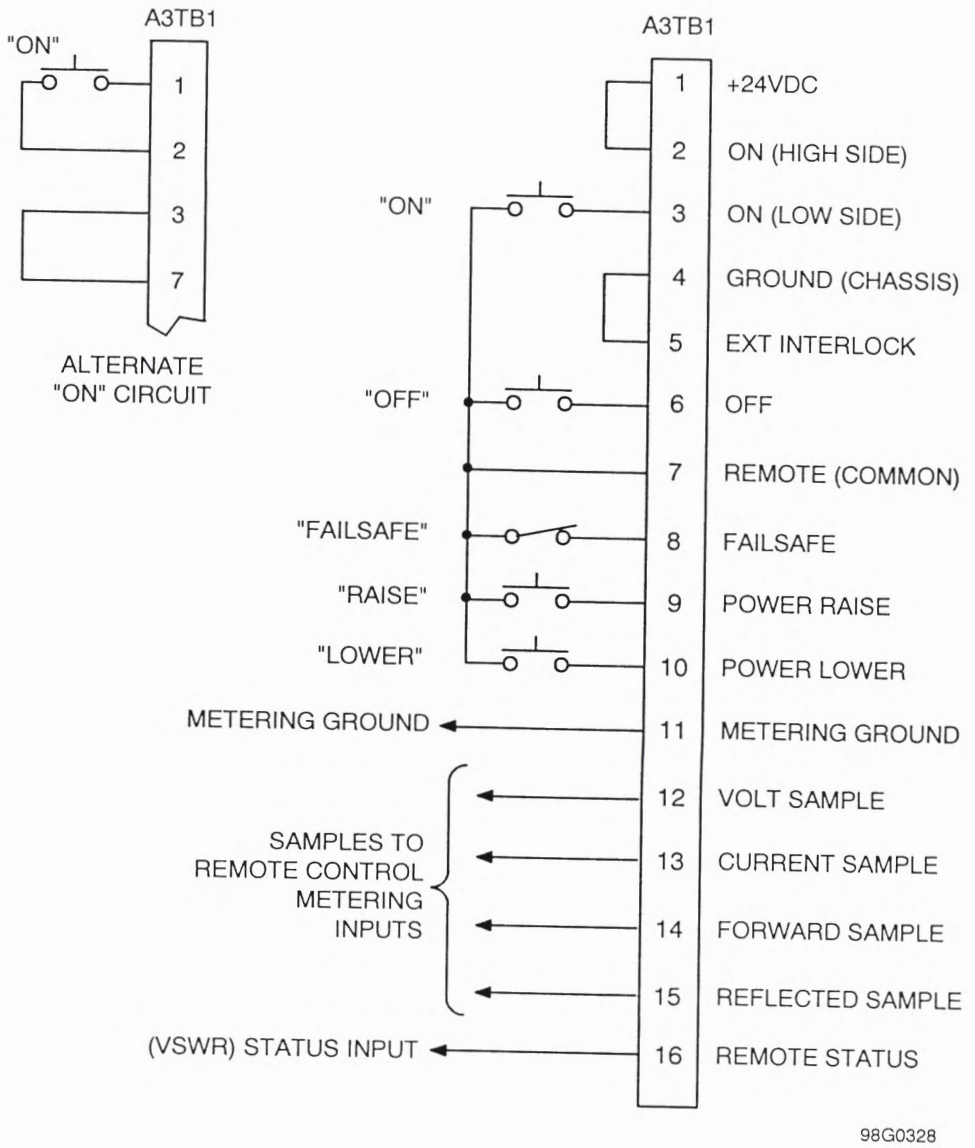


Figure 2-2. Remote Control Connections.

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SECTION 3 - OPERATION

3-1. GENERAL

This section provides identification, location, and functional descriptions of controls and indicators for the Type 814K 1,000 Watt FM Broadcast Transmitter. Procedures are provided for turn-on, turn-off, normal operation and remote control operation as well as power transformer primary tap setting.

The transmitter can be operated from the local control panel, or by remote control. After the transmitter has been installed, it is necessary only to monitor meter indications. The operating instructions for the exciter are included in its own instruction manual.

3-2. CONTROLS AND INDICATORS

Figure 3-1 shows the location of the controls and Table 3-1 delineates the function of the controls in the 814K Transmitter.

NOTE

Each operator should become thoroughly familiar with the location and function of the controls and indicators before performing any of the following operating procedures.

3-3. INITIAL TURN-ON PROCEDURE

Set transmitter controls and perform turn-on procedure as outlined in the following paragraphs.

WARNING

DO NOT APPLY PRIMARY POWER UNTIL PROCEDURES IN PARAGRAPH 2-3 ARE COMPLETED.

1. Close the transmitter doors. Switch transmitter circuit breaker CB1 to OFF.
2. Apply primary AC power to the transmitter.
3. Switch transmitter circuit breaker CB1 to ON.
4. Press the ON push-button to turn the transmitter ON.

   As soon as the ON button is pressed, that button will light and the control system relays will operate and can be heard. The fan will start. The exciter will not deliver power for several seconds (until its AFC-lock or startup routine has finished). There will be no RF output from the transmitter until the exciter is operational.

3-4. NORMAL OPERATION

After the initial transmitter turn-on has been completed, perform the following steps for normal operation.

1. Adjust the POWER RAISE/LOWER control until the desired output RF power is obtained. If there is a problem with this procedure, refer to earlier Paragraph 2-3.3 should the power transformer taps need to be reset.
2. Compare meter readings with the factory test data, located at the back of this manual. If the voltage readings are radically different from those in the final test sheet, confirm that the transformer taps are set per Paragraph 2-3.3. If the reflected power reading is much over 5% of forward, check the load and its connections.

3-5. REMOTE OPERATION

When a customer-furnished remote control is used, switch to remote control by pressing the REMOTE button. Press the LOCAL button to revert to locally-controlled operation. To be operational in the remote mode, the interlock and failsafe connections must be in place.

3-6. EMERGENCY TURN-OFF

Power may be removed from the transmitter in any of the following ways:

1. Press the OFF push-button.
2. Switch off the AC line circuit breaker (A2CB1).
3. Open the facility primary AC power disconnect switch or circuit breaker.

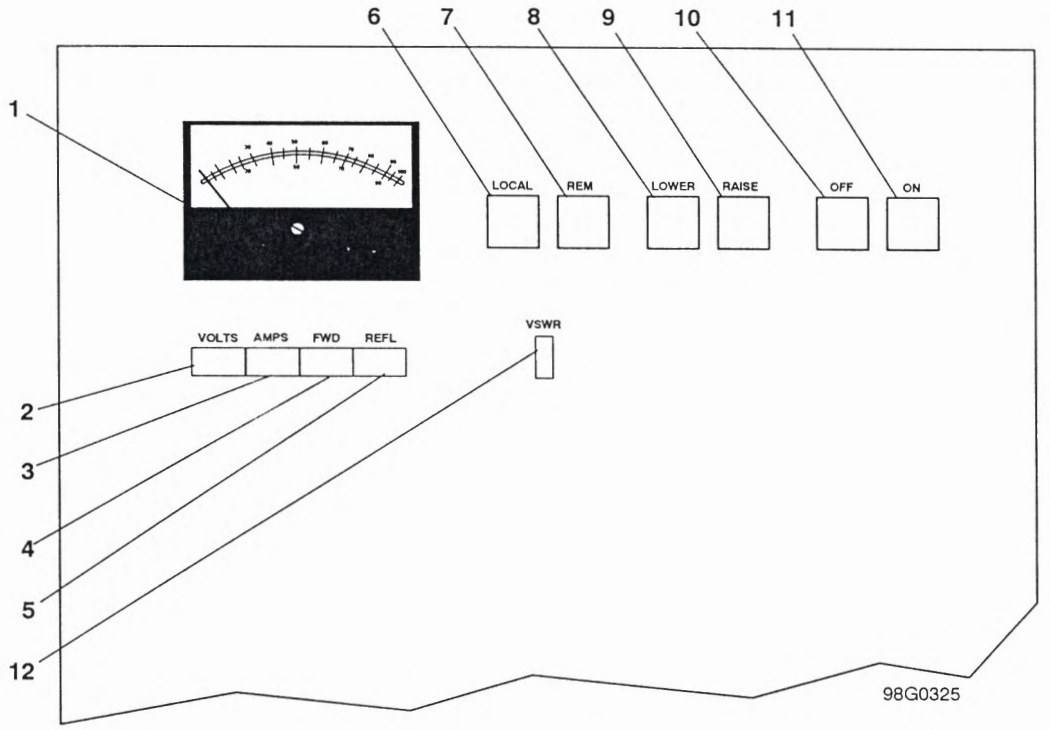

Figure 3-1. Control Panel, A1, Controls and Indicators.

Table 3-1. Control Panel, A1, Controls and Indicators.

Index No.	Control or Indicator	Function
1	Dual-scale meter	Displays the item selected by the metering switch
2	Volts button	Pressing this button selects amplifier voltage for display on the meter. Full scale reading is 80 volts, using the bottom meter scale.
3	Amps button	Pressing this button selects total amplifier current for display on the meter. Full scale reading is 80 amperes, using the bottom meter scale.
4	FWD button	Pressing this button selects forward power for display on the meter's upper scale. Meter reads 1200 watts full-scale for 1000 watt transmitters or in percent (120% full-scale) for lesser powers.
5	REFL button	Pressing this button selects reflected power for display on the meter's upper scale. Meter reads 120 watts full-scale for 1000 watt transmitters or in percent (12% full-scale) for lesser powers.
6	LOCAL button	Switch lights to indicate control system is in the local mode
7	REMOTE button	Switch lights to indicate control system is in the remote mode
8	LOWER button	Pressing this button lowers the transmitter power output. This button is not illuminated.
9	RAISE button	Pressing this button raises the transmitter power output. This button is not illuminated.
10	OFF button	Pressing this button switches off the transmitter. This button is not illuminated.
11	ON button	Pressing this button switches on the transmitter. Button is lighted to show that this has been done
12	VSWR lamp	This lamp lights when the VSWR exceeds a preset level

Table 3-2. Typical Operating Parameters vs Power Levels.

	RF Operating Power - Watts		
Parameters	250	500	1000
VOLTS	28	38	48
AMPS	23	31	40
Efficiency	40	45	52

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SECTION 4 - THEORY OF OPERATION

4-1. GENERAL

The Type 814K FM transmitter operates in the 87.5 to 108 MHz range with a rated RF power output of 1000 watts. A Continental Electronics 802B or 802D FM Exciter provides excitation. The various schematics and assembly drawings in this manual contain more detailed information. A block diagram of the transmitter is shown in Figure 4-1.

4-2. POWER SUPPLIES

There are two power supplies in the 814K Transmitter. A 24 volt supply is used to power the control ladder while a 48 volt 40 ampere supply powers the RF Amplifier modules. The 24 volt supply is on at all times; the 48 volt supply is on only when the carrier has been switched on.

4-2.1 24 Volt Supply.

The 24 V Control Power Supply uses a transformer, bridge rectifier and a filter capacitor. Circuit breaker A2CB1, a 30 ampere unit, feeds 3 ampere fuses A3F1 and A3F2. Those fuses provide protection for the small power transformer A3T1. Rectifier A3CR1 develops the 24 V dc for the various control circuits. Capacitor A3C1 filters the rectifier output.

4-2.2 48 Volt Supply.

The 48 volt supply, unlike the 24 volt supply, is keyed on only when the transmitter is operating. The output of circuit breaker A2CB1 is applied to relay A3K1, then to A3K2 and finally to transformer T1. While large filter capacitor C2 is charging up to its operating voltage, resistor A3R1 limits the inrush current and allows the secondary voltage to ramp up to its operating value. After the inrush is finished (about 250 milliseconds), K2 shorts out A3R1. The transformer secondary delivers voltage to the bridge rectifier CR3. L1 and C2 remove power supply ripple. R7 is a bleeder which improves the power supply regulation no-load to full-load.

T1 has taps on the primary for operation from voltages of 190 to 270 volts. These taps are intended primarily to coarsely adjust the transmitter power output. The most efficient method of operating this transmitter is to use the least possible amount of DC voltage on the power amplifier, adjusting the exciter power output until the RF output delivered by the transmitter starts to drop. If the power at this point is above the target value, then change the tap on the primary of T1 to get a lower value of DC voltage. If the power at this point is below the target value, change the tap on the primary of T1 to get a higher value of DC voltage. The connection to "0V" must be left intact. Change the connection point only of the other wire.

CAUTION

IN NO CASE SHOULD THE DC VOLTAGE EXCEED 52 VOLTS UNDER NORMAL OPERATING CONDITIONS. FAILURE TO COMPLY MAY RESULT IN DAMAGE TO AMPLIFIER DEVICES.

4-3. RF CIRCUITS

The complete RF chain consists of the FM Exciter, a splitter to drive the four amplifiers, the four amplifiers, a combiner to sum the amplifier outputs, a lowpass filter and a directional coupler. The four RF Power Amplifier modules are mounted on the A2 assembly.

4-3.1 FM Exciter.

Refer to the exciter's Technical Manual for its theory of operation. The exciter is required to deliver about 30 watts of RF output, modulated with the desired modulating signal(s). The exciter's RF output is applied to a splitter.

4-3.2 Splitter

The exciter's output signal is split into four equal-level signals each of which drives an RF power amplifier. The input to the splitter is the modulated carrier with a power level of about 30 watts. The input impedance seen looking into the splitter is about 50 ohms. Each of the four splitter outputs is applied to an RF power amplifier, whose input impedance is also 50 ohms.

4-3.3 Power Amplifiers, AR1 - AR4.

NOTE:

The amplifier modules are not considered to be field repairable. Defective modules should be returned to CEC for repair or replacement.

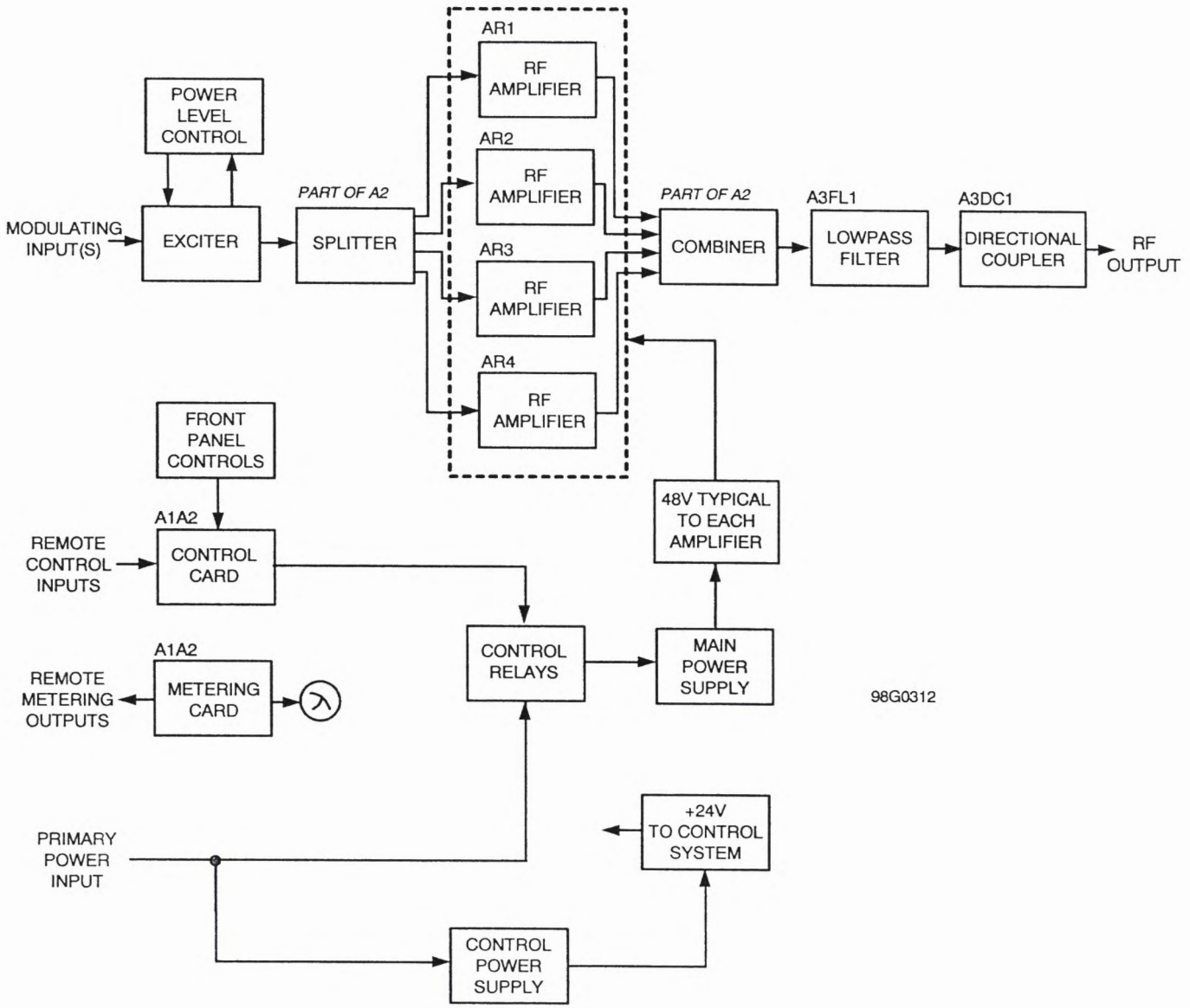

Figure 4-1. 814K Transmitter Block Diagram

4-3.3 Power Amplifiers, AR1 - AR4. - Continued

Each module is broadband and solid-state, using MOSFET devices. The modules operate from a nominal 48 volt power supply (assuming the transmitter is delivering 1000 watts of power). The RF drive requirement for each module is about 7 watts and the RF output will be about 300 watts per module. The RF output from each of the amplifiers is applied to a signal combiner for summation.

4-3.4 Combiner.

Each of the four RF power amplifiers delivers an output of slightly more than one-fourth of the total transmitter power output. These signals are summed in a combiner. Because of the nature of the combining system, should one amplifier lose output, the remaining amplifiers can continue to deliver RF output, although at a reduced power level. Should the amplifier's output see a lower than normal impedance, the internal current limiting will come into play to protect the amplifier. Should the amplifier see a higher than normal impedance, the only effect will be a reduction in transmitter output power.

4-3.5 Lowpass Filter.

The Lowpass Filter A3FL1 is driven by the output of the combiner circuit. As a result of using this filter, the transmitter output harmonic levels meet global requirements for harmonic content. The filter also has a low-level output suitable for driving a modulation monitor.

4-3.6 Directional Coupler.

The directional coupler A3DC1 follows the low pass filter and provides signals for the metering circuitry. Both the forward and reflected outputs are metered; the reflected output is also used to operate an excessive-VSWR lamp.

4-4 CONTROL / MONITOR CIRCUITS

4-4.1 Metering Circuits.

The metering panel permits measuring of the supply voltage and total current for the RF power amplifier. Forward power and reflected power readings are also available. Additionally, the panel has an excess-VSWR status lamp which lights when the load presents an excessive VSWR to the transmitter. Each of these functions has its individual calibration control.

The following more detailed description of the metering card is with reference to its schematic, drawing 195080. This circuitry is composed of a series of simple blocks. A connection is made to the main 48 volt supply at P1 pin 4. This is routed via series resistors R31 and R32 to the metering switch. When the VOLTS switch section is depressed, the front-panel meter is connected to read the supply voltage.

A small voltage is developed across the main metering shunt on the floor of the transmitter. This shunt develops 50 millivolts when the total drain on the main power supply is 50 amperes. This voltage is negative with respect to ground. This voltage is routed to the metering card at P1 pin 2. The signal is applied to inverting amplifier U2B, which amplifier has a fixed voltage gain of about 50. The output of this amplifier is connected to J1-3, connected with a jumper to J1-2 for this application. The signal is then routed via calibration control R27 to the metering switch. When the AMPS switch section is depressed, the front panel meter is connected to read the total power supply current drain.

A DC signal from the directional coupler representing forward power is applied to the metering card at P1 pin 7. This signal is applied to non-inverting amplifier U1B, whose gain is adjustable by R23. The output of this amplifier is routed via R18 to the metering switch. When the FORWARD switch section is depressed, the front panel meter will indicate forward power.

A DC signal from the directional coupler representing reflected power is applied to the metering card at P1 pin 6. This signal is applied to non-inverting amplifier U2A, whose gain is adjustable by R14. The output of this amplifier is routed via R6 to the metering switch. When the REFLECTED switch section is depressed, the front panel meter will indicate reflected power.

That sample from the directional coupler is also applied to a comparator using U1A. When the signal due to reflected power exceeds a value set by control R22, then the comparator output will drop from near positive rail to near ground. This removes excitation to transistor Q1, and allows current to flow from the +12 volt supply via R8 to the front panel VSWR indicator. In addition, excitation to Q2 is removed, removing the pulldown from the status line at P1-17. (Q2 conducts when the VSWR is satisfactorily low.)

4-4.2 Control Ladder

The following brief discussion of the control ladder refers to the Control Ladder Schematic Diagram (Figure 7-6), the simplified diagram of the step-start circuitry (Figure 4-2), the front-panel Control Card (Figure 7-2) and the Remote Control Interface Card (Figure 7-1). The overall Transmitter Schematic (195032) is located in the envelop at the rear of this manual.

On the overall schematic, the control system is shown slightly simplified.

The entire control ladder is powered by the small 24-volt power supply using A3T1, A3CR1, and A3C1. This supply must be functioning for operation of the control system.

The exciter is switched on at the same time as the DC to the power amplifiers in the transmitter proper. This is done by contactor A3K1. To operate this contact requires a pulldown to ground at its pin 1. This is done by energizing the ON relay A1A1K2. The common terminal at A1A1J2 pin 14 will then go to ground if A1A2K1 is in the Local position and if the interlock switch is closed and the external interlock is closed or jumpered.

Relay A1A1K2 is energized by pulling A1A1J2 pin 19 to ground. This is done via diode A1A2CR6. The ON relay A1A1K2 will stay pulled after the front-panel ON button is released by a latching connection which involves the back contacts of A1A1K7. If that relay is energized, the latching connection path is broken and the ON relay will go to its de-energized state.

Whenever the front-panel ON button is pressed, relay A1A1K1 is actuated to reset a set of latches in the RF power amplifiers. This relay does not stay pulled in after the ON button is released.

To operate the OFF relay A1A1K7, the front-panel OFF button is pressed. Relay A1A1K7 does not latch; it restores to its original state when the OFF button is released.

To key ON the transmitter remotely, the connection can be either a connection to ground or to the high side of relay A1A2K2. Its high side is brought out to barrier strip A3TB1 terminal 2 and its low side is brought out to A3TB1 terminal 3. This was done to satisfy certain local regulations regarding keying ON the transmitter. The output contacts of this relay simply parallel the front-panel ON button. The low side of this remote control input is to be returned to the Remote Control Common terminal (A3TB1 terminal 7).

To key OFF the transmitter remotely, a connection is made from A3TB1 terminal 6 to the Remote Control Common, A3TB1-7. This common point is at ground if A1A2K1 is in the remote position and if the interlock switch is closed and if the external interlock switch is closed or jumpered.

To switch from local to remote, relay A1A2K1 is energized or de-energized. This may be only be accomplished from the front panel of the transmitter.

If the transmitter is in the Remote mode then the Remote Control Failsafe relay A1A1K8 must be keyed for the control ladder to operate. This relay is operated by connecting A3TB1 terminal 8 to the Remote Control Common terminal (A3TB1 terminal 7). This connection will be open if the control system fails or otherwise becomes inoperative.

4-4.3 Step-Start.

To allow the RF Amplifier power supply voltage to ramp up slowly with no damaging overshoots, a step-start system is used in the 814K. When the transmitter is keyed on, contactor A3K1 provides power to the power transformer primary. But for about 200 milliseconds a resistor is placed in series with the transformer primary. This limits the current into the large filter capacitor so that it charges slowly. In this way voltage spikes which may appear at the drains of the RF power amplifier are removed. This scheme also limits the inrush current from the power mains.

Referring to Figure 4-2, observe the timing circuitry around the op-amp. The input to this circuitry monitors the voltage at the low side of contactor A3K1. When A3K1 is commanded to switch on, that sample voltage drops from +24 volts to zero. This voltage is applied to the timing circuitry and then to the inverting input of the op-amp. After the brief time delay, the op-amp output will rise, delivering a voltage to the base of the transistor. The transistor in turn keys relay A1A1K3 on the A1A1 Remote Control Interface board. This relay operates the second contactor, A3K2, shorting out the series step-start resistor. In addition, once the second contactor has pulled in, a latching contact on that contactor keeps it pulled in until the first contactor is de-energized.

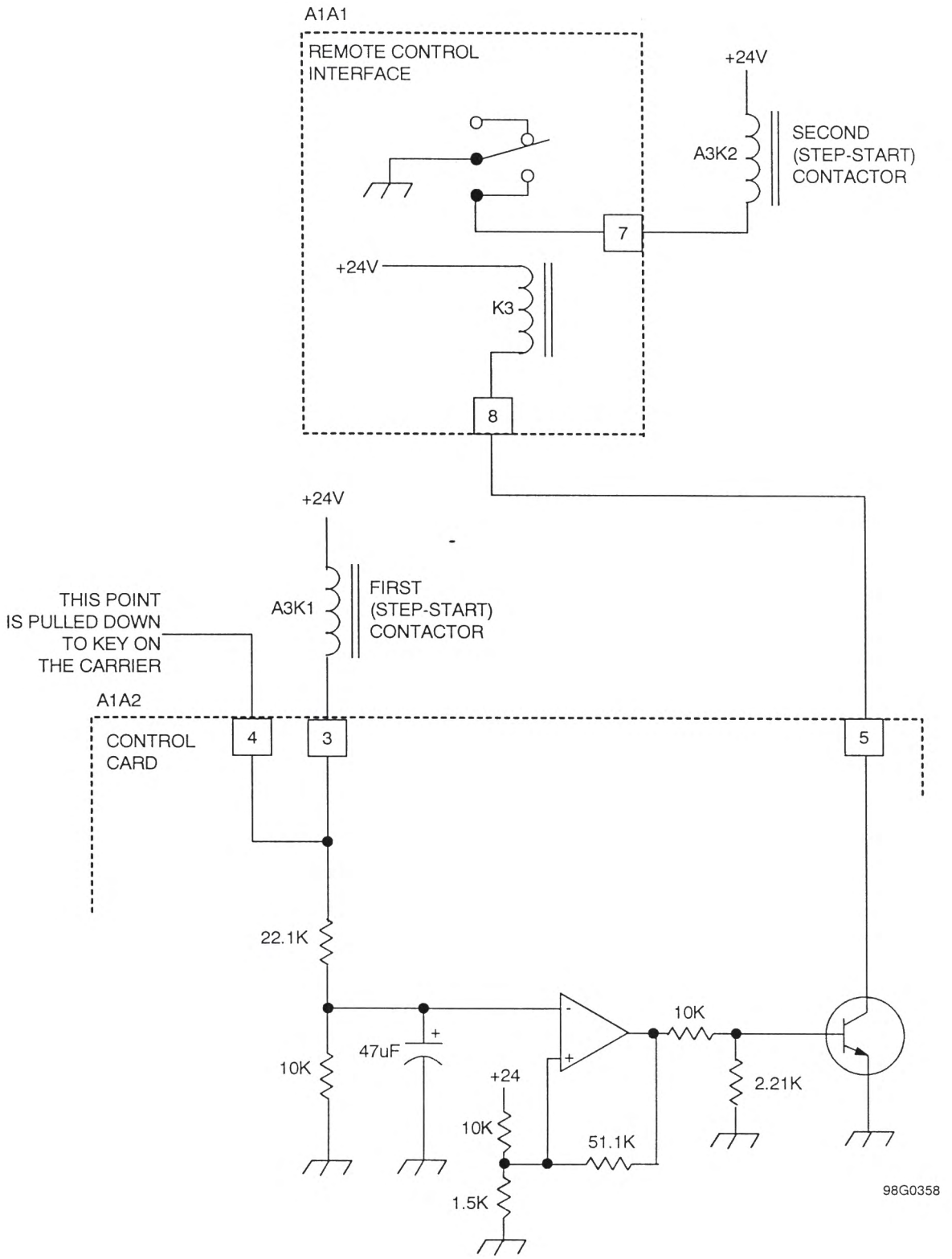

Figure 4-2 Simplified Step-Start Circuitry.

4-4.4 Power Control.

Transmitter power is adjusted by accepting a voltage from the exciter, applying it to a motor-driven potentiometer (pot) and returning the pot output back to the exciter. The pot is motor-driven; this system provides a memory of the power setting in case of a power loss. Pressing the front-panel LOWER button operates relay A1A1K4, applying 120VAC to A1A1J2 pin 10. This is routed to the motor-driven pot assembly A3A1 to operate the motor in the Lower direction. Pressing the front-panel RAISE button operates relay ASK, applying 120 VAC to A1A1J2 pin 5. This is routed to A3A1 and operates the motor in the Raise direction. Refer to Figure 4-3.

The transmitter should always operate with the lowest possible power supply voltage, using drive reduction as just outlined only for a vernier power adjustment.

4-4.5 Interlocks.

The rear-panel door interlock switch S1 is used to remove power from the transmitter when the rear door is opened. In series with the interlock switch is an external (remote) interlock connection. This is available at A3TB1-5 and A3TB1-4 (ground). Those two terminals must be connected to allow the transmitter to operate.

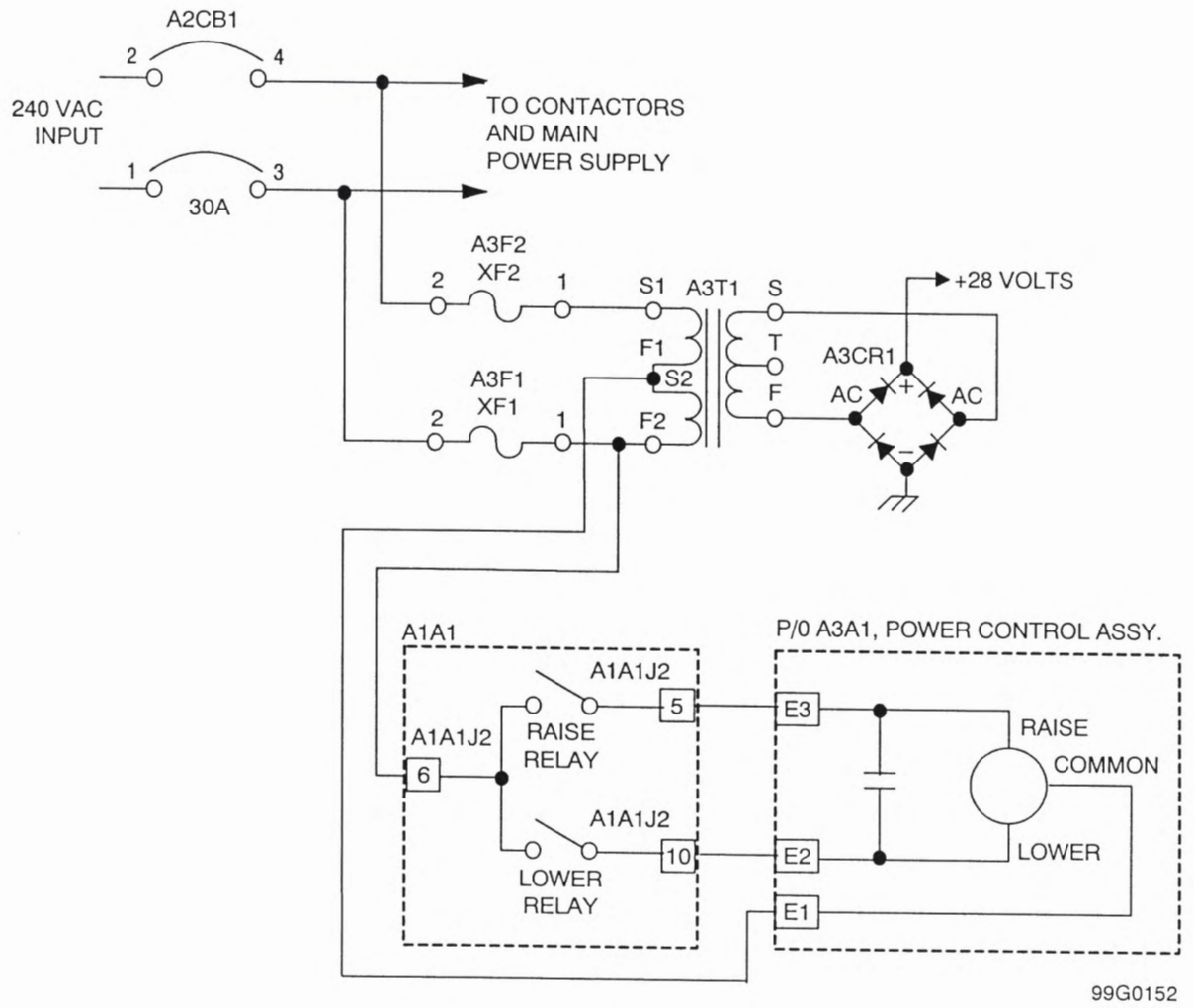

Figure 4-3. Power Control Simplified Diagram.

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SECTION 5 - MAINTENANCE

5-1. ROUTINE MAINTENANCE

The Type 814K Transmitter has been designed for a minimum of maintenance. However, to ensure continued peak performance, adherence to a regular schedule of inspection and cleaning is suggested. Refer to the parts list, Section 6, for the locations of components in the transmitter.

WARNING

UNCOMMONLY HIGH CURRENTS CAN BE GENERATED IN THIS EQUIPMENT, ALONG WITH HIGH VOLTAGES. THESE CURRENTS CAN VERY EASILY MELT RINGS, WATCHBANDS AND THE LIKE AND SO CAN SEVER FINGERS. INJURY, EVEN DEATH, MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

When working inside the equipment, be sure that all circuit breakers are off and that primary power is disabled at the wall disconnect or circuit breaker, unless otherwise directed. If a procedure requires transmitter operation with a door open, do not allow bodily contact with any electrical component, tap or terminal. Use insulated tools to adjust variable components. In addition, if working in the power supply area, be sure that the large filter capacitor has been shorted.

5-2. METER CALIBRATION

CAUTION

MAKE CERTAIN ALL METERS AND TEST EQUIPMENT ARE SWITCHED TO APPROPRIATE SCALES BEFORE CONNECTING THEM TO THE TRANSMITTER. CONNECT TEST EQUIPMENT ONLY TO THE POINTS DESIGNATED IN THE PROCEDURES. FAILURE TO DO THIS MAY RESULT IN DAMAGE TO THE TRANSMITTER OR TEST EQUIPMENT.

The following procedures outline how to check the calibration of each of the four meter readings as well as how to set the front-panel VSWR trip lamp trip-point. Each adjustment is described on a stand-alone basis.

All metering adjustments are made on the Metering Card, A1A3, located on the rear of the transmitter's front panel. Refer to Figure 5-1 for location of the components on that card.

5-2.1 Volt Meter Calibration.

Perform the following steps in the order presented to calibrate the volte meter.

1. This adjustment requires a voltmeter to measure the 48-volt power supply. The primary requirement for the meter is that it measure the supply voltage accurately. Be sure the meter used is not sensitive to RF.

2 While the transmitter is operating, press the front-panel VOLTS meter switch. For a 1,000 Watt transmitter, the meter reading should be in the vicinity of 45 to 48 on the transmitter meter's bottom (0-to-80) scale.

3. Open the front door of the transmitter.

4. While the transmitter is operating, measure the 48-volt line. This may be accessed at the rear of resistor R33 at the rear of the metering card. The measurement will be in the vicinity of 45 to 48 volts for a 1,000 Watt transmitter.

5. The control to be adjusted is the "VDC CAL" control (R32) located immediately to the front of the voltage regulator heatsink.

6. If adjustment is deemed necessary, adjust the VDC CAL control so the transmitter's front-panel metering system agrees with the externally-connected voltmeter.

7. Close the front door of the transmitter.

8. This completes the voltmeter adjustment procedure.

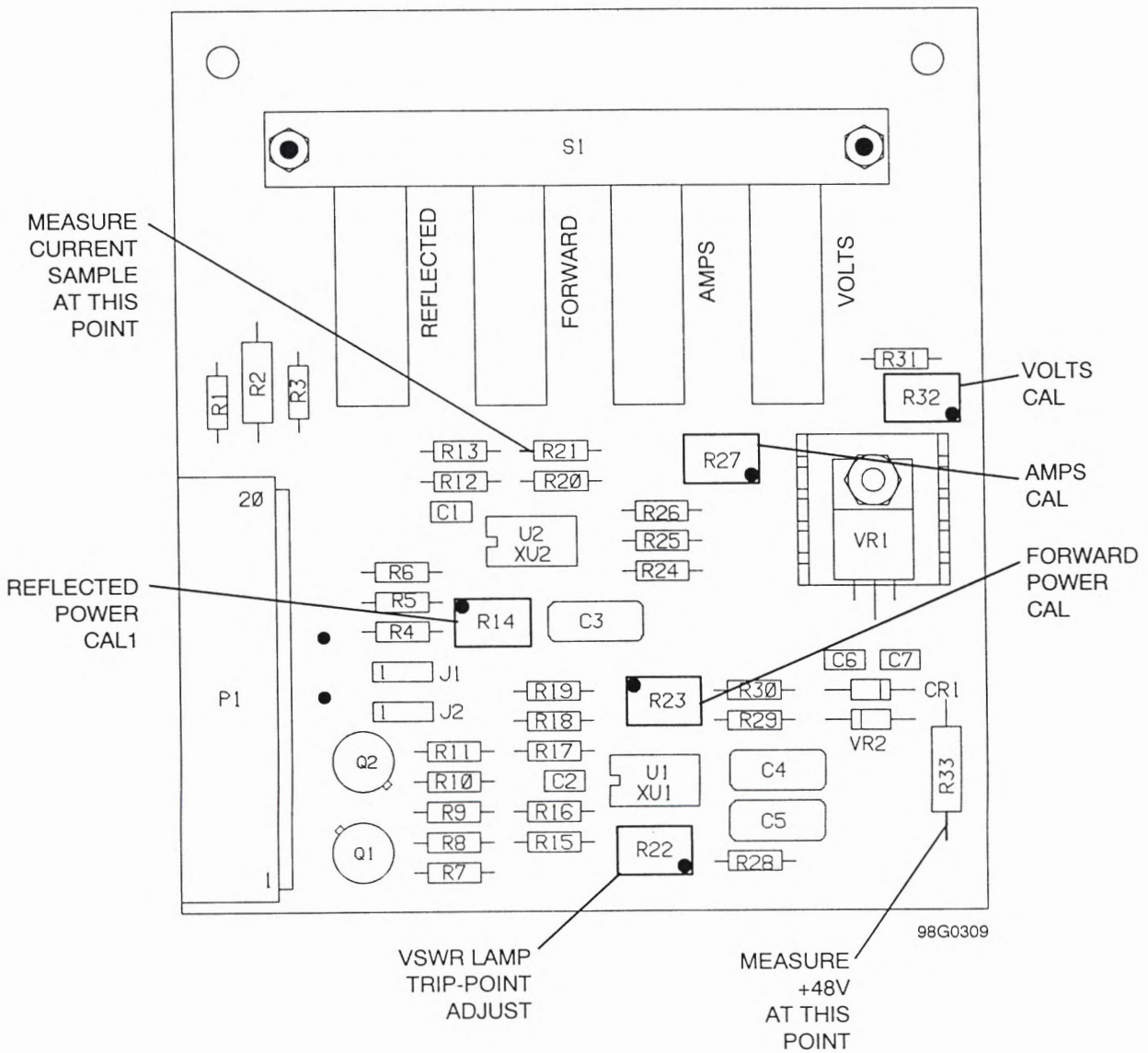

Figure 5-1. Location of Adjustments on Metering Card.

5-2.2 Amps Meter Calibration.

Perform the following steps in the order presented to calibrate the ampere meter.

1. This adjustment requires a voltmeter to measure the voltage drop across the meter shunt. This is located on the floor of the transmitter, at the rear. A digital meter might be the best type for this measurement since the voltage to be measured will be only about 40 millivolts for a 40 ampere drain. The meter must be free of sensitivity to RF.

2 While the transmitter is operating, press the front-panel AMPS meter switch. For a 1000 Watt transmitter, the meter reading should be in the vicinity of 38 to 40 on the transmitter meter's bottom (0-to-80) scale.

3. Open the front door of the transmitter.

4. While the transmitter is operating, measure the voltage from the meter shunt. This may be accessed at the connector end of R21 (the end away from the voltage regulator). The measurement from that point to ground should be in the vicinity of 38 to 40 millivolts for a 1000 Watt transmitter. Alternatively, the external meter may be temporarily attached to the meter shunt itself. The shunt (shown on the main schematic as R1) is located on the floor of the transmitter.

5. The control to be adjusted is the "AMP CAL" control (R27) on the Metering Card assembly, located immediately behind the pushbutton switch.

6. If adjustment is necessary, adjust the AMP CAL control so the transmitter's front-panel metering system agrees with the externally-connected voltmeter.

7. Close the front door of the transmitter.

8. This completes the ammeter adjustment procedure.

5-2.3 Forward Power Meter Calibration.

Perform the following steps in the order presented to calibrate the Forward Power meter.

1. This adjustment requires a properly-calibrated Wattmeter connected in-line with an associated dummy load rated to handle 1000 Watts. This assembly is to be substituted for the normal connection to the transmitting antenna's feedline.

2. Switch the transmitter off and substitute the dummy load and Wattmeter assembly for the normal feedline to the antenna. Set the Wattmeter to read forward power. Switch the transmitter on.

3. While the transmitter is operating into the dummy load at the desired power level, press the front-panel FORWARD meter switch. The meter's upper-scale reading should be 100 (corresponding to 100% of the desired power output).

4. If adjustment is necessary, open the front door of the transmitter.

5. While the transmitter is operating, set the output to the desired power level as read on the external Wattmeter.

6. The control to be adjusted is the "FWD CAL" control (R23) on the Metering Card assembly, located in the middle-rear of the card..

7. If necessary, adjust the FWD CAL control so the transmitter's front-panel metering system indicates 100%.

8. Close the front door of the transmitter.

9. Switch off the transmitter. Replace the dummy load assembly with the normal feedline to the antenna. Switch on the transmitter to resume normal operation.

10. This completes the forward-power metering adjustment procedure.

5-2.4 Reflected Power Meter Calibration and VSWR Lamp Adjustment.

Perform the following steps in the order presented to calibrate the Reflected Power Meter and adjust the VSWR lamp.

1. This adjustment requires a properly-calibrated Wattmeter connected in-line with an associated dummy load rated to handle the transmitter's normal output power. This assembly is to be substituted for the normal connection to the transmitting antenna's feed-line.

2. Switch off the transmitter and substitute the dummy load and Wattmeter assembly for the normal feed-line to the antenna. Set the Wattmeter to read forward power.

3. While the transmitter is operating into the dummy load, press the front-panel FORWARD meter switch. The meter's upper-scale reading should be 100 (corresponding to 100% of normal power).

5-2.4 Reflected Power Meter Calibration and VSWR Lamp Adjustment. - Continued

4. By reducing the power level from the exciter, reduce the transmitter's power output to 10% of normal as indicated on the external Wattmeter.

5. Switch off the transmitter.

6. Reverse the RF connections on the directional coupler (at the output of the lowpass filter, on the side wall) so that the transmitter is now applying power to the directional coupler RF output terminal and the load is connected to the directional coupler RF input terminal.

7. Switch the transmitter on.

8. Press the front-panel REFLECTED meter switch.

9. The control to be adjusted is the "REFL CAL" control (R14) on the Metering Card assembly, located near the middle of the card.

10. Adjust the REFL CAL control so the transmitter's front-panel metering system indicates 100% (corresponding to 10% because this meter position reads 12% for full-scale).

11. Adjust the control labeled "VSWR TRIP" (R22, located at far rear of the metering card) so that the front-panel VSWR lamp just switches on.

12. Close the front door of the transmitter.

13. Switch off the transmitter. Restore the RF connections to the directional coupler. Remove the Wattmeter and reconnect the transmission line directly to the transmitter's output. Switch on the transmitter, increase the exciter output back to normal for full transmitter output and resume normal operation.

14. This completes the reflected-power metering adjustment procedure.

5-3. FREQUENCY CHANGE

The Type 814K Transmitter carrier frequency change is accomplished by changing the frequency of the exciter. Refer to the exciter manual for instructions regarding frequency change. The 814K transmitter itself is broadband and there are no items requiring tuning when the carrier frequency is changed. This statement includes the splitter, amplifiers, combiner, output lowpass filter and directional coupler.

5-4. CLEANING

The Type 814K Transmitter has been designed with minimal maintenance in mind. However, periodically remove accumulated dust from the chassis, amplifier heat sinks, panels and components with a soft bristle brush. Examine wiring and components for signs of overheating. Ensure all controls operate smoothly. Inspect all connections and tighten any loose nuts, screws, or bolts. Open the front door and remove the filter for cleaning or replacement. Restore the filter. Examine the fan for proper operation. The fan used in the Type 814K Transmitter does not require lubrication.

5-5. MODULE FAILURE ISOLATION

The amplifying scheme used in the 814K transmitter allows a graceful failure should one or more RF Amplifier modules fail. Should this happen, the transmitter power output will drop clearly below its usual level rather than tripping off completely. To determine which module is at fault, use the following routine:

1. Open the front door of the transmitter and measure each of the RF Amplifier module test point voltages using an ordinary DC voltmeter.

2. The voltage at each of these points is proportional to the current drain of that individual module. It is normally +6.4 Vdc (at a module current of 10 amperes).

3. An inoperative module will show a low or very low voltage at its test point.

4. Leave the defective module in place to avoid disrupting air flow. Close the front door. Arrange with the factory for a replacement module.

5. When the replacement module arrives, be sure the power fuse for the new module is not blown. Install the new module in place of the old one.

5-6. TROUBLESHOOTING

We strongly suggest looking over the various schematics and reading the material in the Theory section of this manual at an early opportunity. The track record of the components used in this transmitter is quite good, but occasionally troubleshooting techniques might be called in to play. Armed with at least a general knowledge of the transmitter circuitry will facilitate problem diagnosis in a calm and rational manner. Should a problem surface that escapes diagnosis, or should parts or advice be needed, then call Continental Electronic's 24-hour Engineering Services at (214) 388-5800.

WARNING
VOLTAGE HAZARD

USE CARE WHEN SERVICING TRANSMITTER HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE TRANSMITTER CABINET. FAILURE TO COMPLY MAY RESULT IN SERIOUS PERSONAL INJURY.

If the transmitter fails to operate properly, check each circuit in the order that it is made operative. Refer to the Control Ladder Diagram, Figure 4-2 and use the simplified schematics and the overall schematic for reference. Refer to Section 3, Operating Instructions for a description of all controls and indicators.

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SECTION 6 - PARTS LIST

6-1. GENERAL

This section contains lists of repairable and replaceable electrical and mechanical parts for the Type 814K 1000 watt FM Broadcast Transmitter. Paragraphs 6-2 through 6-4 describe the contents of each parts list column.

6-2. REFERENCE DESIGNATOR (REF DES)

This column contains the electrical reference designators of parts that have been assigned on schematics or wiring diagrams, and/or index numbers for parts which have not been assigned reference designators. When a reference designator within a series of designators has not been assigned a part number, the unassigned reference designator will be omitted from the list.

6-3. DESCRIPTION

The second column contains the identifying noun or item name followed by a brief expansion such as size, color, rating or special characteristics. The descriptions for electrical and electronic parts include application ratings and tolerances. Consecutively listed identical parts within an assembly are shown as "Same As" in the DESCRIPTION column of subsequent listings, referencing to the first listing within the assembly.

6-4. PART NUMBER

The third column contains the Continental Electronics Corporation (CEC) specification/drawing number for each item listed.

6-5. ILLUSTRATIONS

Parts listed in the REF DES column are located on corresponding illustrations. The illustration always precedes the parts list. More than one illustration may be required to identify all items in an assembly. When a replaceable item is hidden from view by structural parts or wiring, a dotted leader line is used to show the items location on the illustration.

6-6. INDEX OF PARTS LISTS

Table 6-1 is an index of major subassemblies of the Type 814K Transmitter in reference designator order. Table 6-2 list the parts lists in ascending numeric order. The top level parts list (195031-1) will cover items not included in a specific subassembly.

Table 6-1. Index of Parts Lists (Ref. Des. Order).

REF DES	CEC Part No.	Rev.	Description	Page No.
-	195031-1	B	Transmitter, Type 814K, 1 kW	6-21
AR1-AR4	189215-1	D	Amplifier Module	6-16
AR1A1-AR4A1	189213-1	E	RF, CCA	6-12
AR1A2-AR4A2	189210-1	C	Control, CCA	6-8
A1	195073-1	A	Metering and Control Panel Assembly	6-25
A1A1	180310-3	-	Remote Control, CCA	6-6
A1A2	195076-1	-	Control Card, CCA	6-31
A1A3	195079-1	A	Metering Card, CCA	6-35
A2	195083-1	A	Amplifier Assembly	6-39
A3	195074-1	A	Side Component Panel Assembly	6-27
A3A1	172715-1	A	Power Control Assembly	6-4

Table 6-2. Index of Parts Lists (Numeric Order).

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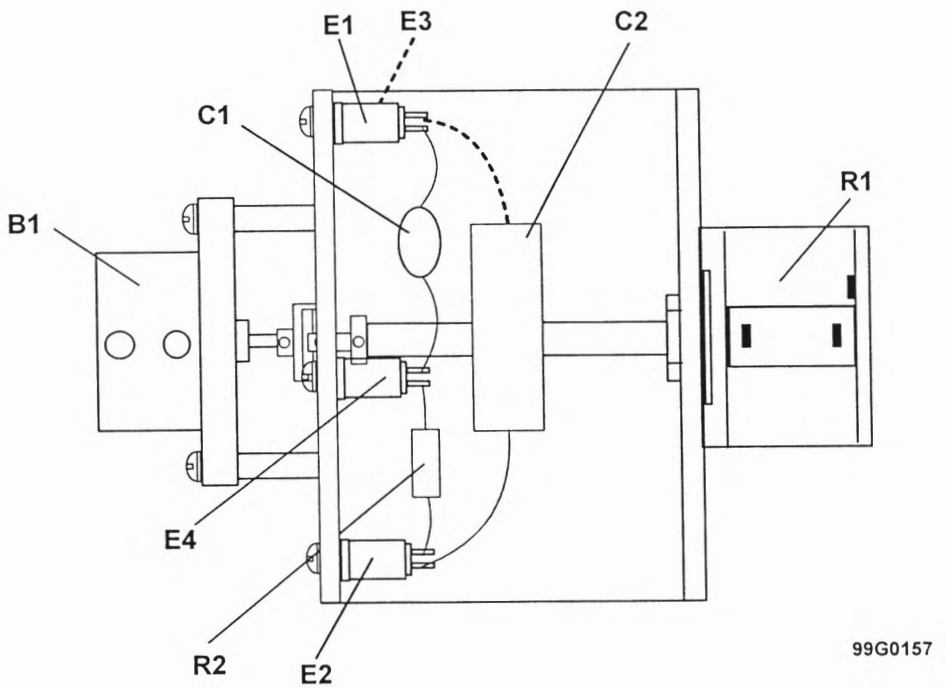


Figure 6-1. Power Control Assembly, A3A1.

PL172715-1 POWER CONTROL ASSEMBLY **Rev. A**

Ref. Des.	Part No.	Description
2	643-7486-002	BRACKET, POT
3	015-9510-010	COUPLING, INSULATED: CERAMIC OR EQUIVALENT, 1/4 TO 1/8" HUB ID, 110 IN/OZ TORQUE
4	191-0016-070	POST, ELECTRICAL-MECHANICAL EQUIPMENT: FEMALE, 1/4HEX, 4-40UNC X 1/2, ALUMINUM, GOLD IRIDITE PLATED
B1	230-5006-010	GEARCASE-MOTOR: 10RPM, 5 OZ-IN OUTPUT TORQUE, 120V 60HZ, REVERSIBLE, 30: 1 GEAR RATIO, BRASS GEARS
C1	CK63AW103M	CAPACITOR, FIXED, CERAMIC: 0.01 UF, +-20%, 500 WVDC
C2	933-5005-010	CAPACITOR, FIXED, FILM: 0.1 UF, ±10%, 600 WVDC POLYPROPYLENE FILM, RADIAL LEADS, 0.75"DIA, 1.30"LG
E1	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E2	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E3	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E4	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
R1	381-1648-020	RESISTOR, VARIABLE, WIRE WOUND: 5000 OHM, ±5%, 2 WATT LINEAR TAPER, 10 TURN, PRECISION, BUSHING MOUNT
R2	724-5054-250	RESISTOR, FIXED, FILM: 100 OHM, ±5%, 1 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED

PL180155-1 HINGE **Rev. -**

Ref. Des.	Part No.	Description
2	MS35825-13D	HINGE, BUTT, CONTINUOUS: .531"LEAF, CRES, 0.125"PIN DIA 0.060" THK, 84" STOCK LENGTH, 1.250 PITCH, UNDRILLED

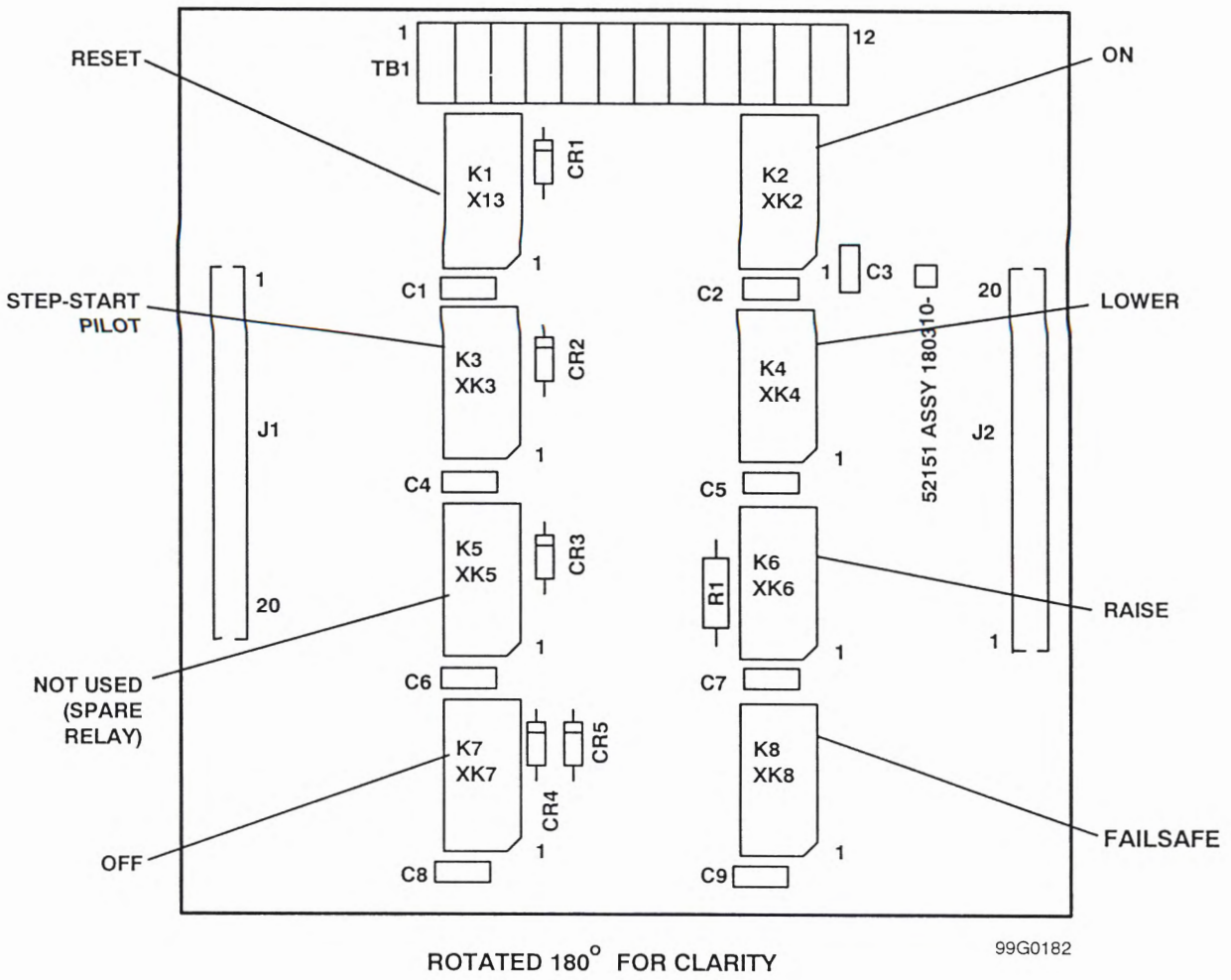
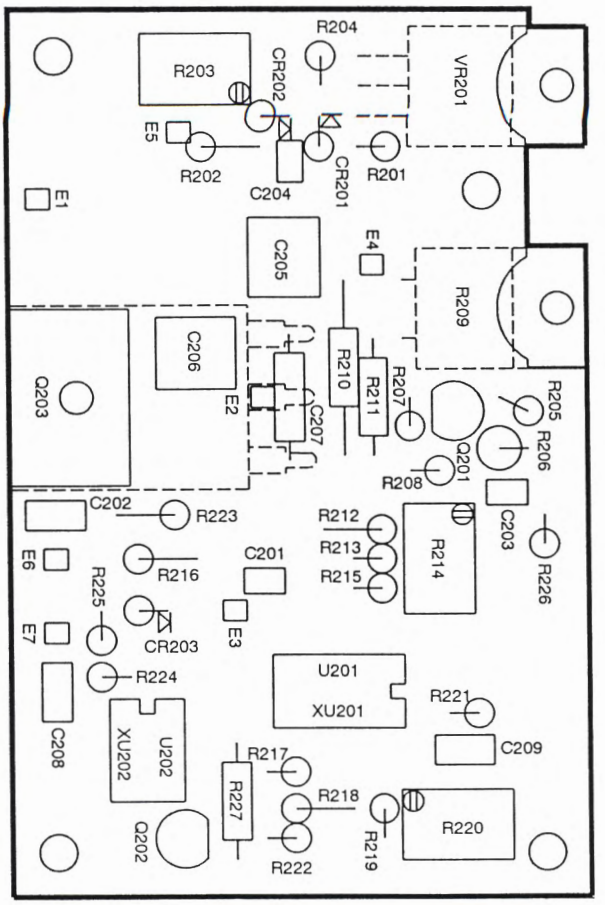


Figure 6-2. Remote Control Circuit Card Assembly, A1A1.

PL180310-3 CCA, REMOTE CONTROL Rev. -

Ref. Des.	Part No.	Description
2	180309-1	PRINTED WIRING BOARD, REMOTE CONTROL
3	180311	SCHEMATIC DIAGRAM
C1	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C2	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C3	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C4	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C5	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C6	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C7	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C8	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C9	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
CR1	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR2	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR3	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR4	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR5	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
J1	372-9765-020	CONNECTOR, RECEPTACLE, ELECTRICAL: 20 POSITIONS SINGLE ROW, SHROUDED HEADER, SQ STRAIGHT POST
J2	372-9765-020	CONNECTOR, RECEPTACLE, ELECTRICAL: 20 POSITIONS SINGLE ROW, SHROUDED HEADER, SQ STRAIGHT POST
K1	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
K2	410-6109-030	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, DUAL COIL LATCH, PLSTC ENCL, SEALED, DIL
K3	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
K4	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
K5	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
K6	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
K7	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
K8	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
R1	RCR20G330JS	RESISTOR, FIXED, COMPOSITION: 33 OHMS, ±5%, 1/2 WATT
R2	RCR20G330JS	RESISTOR, FIXED, COMPOSITION: 33 OHMS, ±5%, 1/2 WATT
TB1	367-5566-110	TERMINAL BOARD: 12 POSITIONS, 20 AMPS, 300 VOLTS, #3-48 UNC, 12-22 AWG
XK1	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK2	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK3	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK4	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK5	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK6	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK7	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS
XK8	220-0049-020	SOCKET, INTEGRATED CIRCUIT: DUAL IN-LINE, 16 POSTS



96G0311

Figure 6-3. Control Circuit Card Assembly, AR1A2-AR4A2.

PL189210-1 CCA, CONTROL Rev. C

Ref. Des.	Part No.	Description
2	189209-1	PRINTED WIRING BOARD, CONTROL
3	189211	SCHEMATIC DIAGRAM, CONTROL
C201	913-7143-770	CAPACITOR, FIXED, CERAMIC: 0.1UF, ±10%, 50WVDC, CHIP TYPE, SURF MT, X7R TEMP CHAR, WRPRND TERM, EIA SZ 1206
C202	CK05BX103K	CAPACITOR, FIXED, CERAMIC: 0.01 UF, ±10%, 100 WVDC
C203	913-7143-770	CAPACITOR, FIXED, CERAMIC: 0.1UF, ±10%, 50WVDC, CHIP TYPE, SURF MT, X7R TEMP CHAR, WRPRND TERM, EIA SZ 1206
C204	913-7145-210	CAPACITOR, FIXED, CERAMIC: .010 UF, ±10%, 100WVDC, CHIP TYPE, SURF MT, X7R TEMP CHAR, WRPRND TERM, EIA SZ 1206
C205	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C206	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C207	NOT-USED	
C208	CK05BX103K	CAPACITOR, FIXED, CERAMIC: 0.01 UF, ±10%, 100 WVDC
C209	CK05BX223K	CAPACITOR, FIXED, CERAMIC: 0.022 UF, ±10%, 50 VOLT
CR201	353-6442-040	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 400V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4004)
CR202	353-6442-040	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 400V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4004)
CR203	353-6442-040	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 400V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4004)
E1	REFERENCE	
E2	REFERENCE	
E3	REFERENCE	
E4	REFERENCE	
E5	REFERENCE	
E6	REFERENCE	
E7	REFERENCE	
Q201	352-5104-010	TRANSISTOR: SILICON, PNP, 200MADC, 40V C-E, 350 MW 250MHZ, TO-92 PLASTIC PKG
Q202	353-5356-010	SEMICONDUCTOR DEVICE, THYRISTOR: SCR, 100V PRV, 0.8AMP TO-226AA PLASTIC PKG
Q203	352-5188-010	TRANSISTOR: POWER MOSFET, P-CHANNEL, -100 VOLTS VDS RDS=0.2OHM, ID=21AMP, PD=150WATTS, TO-247AC(TO-3P)PKG
R201	724-5052-010	RESISTOR, FIXED, FILM: 10OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R202	724-5052-010	RESISTOR, FIXED, FILM: 10OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R203	382-1405-050	RESISTOR, VARIABLE, NONWIRE WOUND: 2000 OHMS, ±10% 1/2 WATT, CERMET
R204	724-5052-230	RESISTOR, FIXED, FILM: 162OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R205	724-5052-405	RESISTOR, FIXED, FILM: 1100 OHM, ±1%, 1/4 WATT @ 70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R206	724-5053-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/2WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R207	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R208	724-5052-595	RESISTOR, FIXED, FILM: 32.4KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED

PL189210-1 CCA, CONTROL - Continued Rev. C

Ref. Des.	Part No.	Description
R209	714-7059-040	RESISTOR, FIXED, FILM: 0.05 OHM, ±1%, 20 WATT @ 25C TO-220 TYPE PKG, METAL TAB, NON-INDUCTIVE
R210	724-5052-675	RESISTOR, FIXED, FILM: 24.9K OHM, ±1%, 1/4 WATT @ 70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R211	724-5052-675	RESISTOR, FIXED, FILM: 24.9K OHM, ±1%, 1/4 WATT @ 70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R212	724-5052-520	RESISTOR, FIXED, FILM: 4750OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R213	724-5052-530	RESISTOR, FIXED, FILM: 5110OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R214	382-1405-030	RESISTOR, VARIABLE, NONWIRE WOUND: 500 OHMS, ±10% 1/2 WATT, CERMET
R215	724-5052-880	RESISTOR, FIXED, FILM: 332KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R216	724-5052-240	RESISTOR, FIXED, FILM: 200OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R217	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R218	724-5052-880	RESISTOR, FIXED, FILM: 332KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R219	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R220	382-1405-060	RESISTOR, VARIABLE, NONWIRE WOUND: 5000 OHMS, ±10% 1/2 WATT, CERMET
R221	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R222	724-5052-405	RESISTOR, FIXED, FILM: 1100 OHM, ±1%, 1/4 WATT @ 70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R223	724-5052-260	RESISTOR, FIXED, FILM: 301OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R224	724-5052-310	RESISTOR, FIXED, FILM: 681OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R225	724-5052-285	RESISTOR, FIXED, FILM: 475OHM, ±15, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R226	724-5052-010	RESISTOR, FIXED, FILM: 10OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R227	724-5052-800	RESISTOR, FIXED, FILM: 100KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
U201	351-5402-010	MICROCIRCUIT, LINEAR: DUAL OP AMPS, WIDE BAND, 5 MHZ SINGLE SUPPLY, 8 PIN PLASTIC DIP PKG
U202	419-0121-010	COUPLER, OPTOELECTRONIC: SNGL CHANNEL, NPN TRANSISTOR OUT, VCE=70V MIN, LED IN, STD 6 PIN PLASTIC DIP PKG
VR201	351-5403-010	MICROCIRCUIT, LINEAR: VOLTAGE REGULATOR, ADJ, POS OUT 1.2-57V, 1.5AMP, 3 TERMINAL, TO-220 PLASTIC PKG
XU201	220-6017-020	SOCKET, PLUG-IN ELECTRONIC COMPONENT: 8 CONTACTS OPEN FRAME, 0.3" WIDE PIN SPACING
XU202	220-6017-010	SOCKET, PLUG-IN ELECTRONIC COMPONENT: 6 CONTACTS, OPEN FRAME, 0.3"WIDE PIN SPACING, 0.4"WIDE BODY

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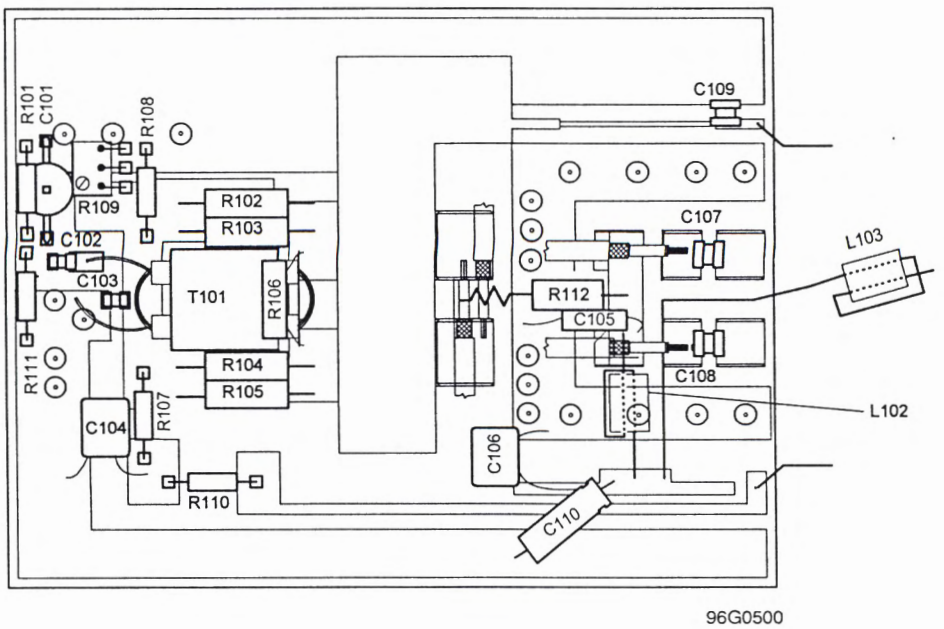

Figure 6-4. RF Circuit Card Assembly, AR1A1-AR4A1.

PL189213-1 CCA, RF Rev. E

Ref. Des.	Part No.	Description
2	189212-1	PRINTED WIRING BOARD, RF
3	189214	SCHEMATIC DIAGRAM, RF
4	423-3030-010	CABLE, SPECIAL PURPOSE, ELECTRICAL: 18AWG, 600V, 1 COND SHIELDED, 25 OHM NOM, TEFLON INSUL, TEFLON JACKET
5	QQW343S18S1T	WIRE, ELECTRICAL, UNINSULATED: 18 AWG, COPPER, TIN PLTD
6	M16878/4BEA9	WIRE, ELECTRICAL: INSULATED: 24AWG, 600V, WHITE, PTFE SOLID COND, COATED COPPER, 200 DEG C, NO JACKET
7	M16878/5BHE9	WIRE, ELECTRICAL: INSULATED, 18AWG, 1000V, WHITE, PTFE 19STR-30AWG, COATED COPPER, 200 DEG C, NO JACKET
8	*193993-1	TUBE, AMPLIFIER
9	QQW343S22S1T	WIRE, ELECTRICAL, UNINSULATED: 22 AWG, COPPER, TIN PLTD
C101	917-2006-010	CAPACITOR, VARIABLE, CERAMIC: 8-50PF, 250WVDC STRIPLINE LEADS, TC=-1500±900PPM/DEGC
C102	913-7144-510	CAPACITOR, FIXED, CERAMIC: 120 PF, ±10%, 50 WVDC, CHIP TYPE, COG TEMP CHAR, WRPRND TERM, SURF MT, EIA SZ 1206
C103	913-7143-650	CAPACITOR, FIXED, CERAMIC: 0.01 UF, ±10%, 50 WVDC, CHIP TYPE, X7R TEMP CHAR, WRPRND TERM, SURF MT, EIA SZ 1206
C104	CK06BX105K	CAPACITOR, FIXED, CERAMIC: 1 UF, ±10%, 50 WVDC
C105	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C106	CK06BX104K	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±10%, 100 WVDC
C107	913-7135-030	CAPACITOR, FIXED, CERAMIC: 1000PF, ±5%, 50WVDC, CHIP TYPE SURFACE MT, TC=P90±30PPM/DEGC, CASE SIZE B
C108	913-7135-030	CAPACITOR, FIXED, CERAMIC: 1000PF, ±5%, 50WVDC, CHIP TYPE SURFACE MT, TC=P90±30PPM/DEGC, CASE SIZE B
C109	913-7143-650	CAPACITOR, FIXED, CERAMIC: 0.01 UF, ±10%, 50 WVDC, CHIP TYPE, X7R TEMP CHAR, WRPRND TERM, SURF MT, EIA SZ 1206
C110	183-5106-040	CAPACITOR, FIXED, ELECTROLYTIC: 10UF, +75-10%, 150WVDC ALUMINUM, INSULATED, AXIAL LEADS, +105C, LONG LIFE
L102	288-4029-020	SHIELDING BEAD, ELECTRONIC: FERRITE, 5-30MHZ OPER FRE 0.385"OD, 0.193"ID, O, 410"LG, Z=80 OHM@100MHZ@25C
L103	288-4029-020	SHIELDING BEAD, ELECTRONIC: FERRITE, 5-30MHZ OPER FRE 0.385"OD, 0.193"ID, O, 410"LG, Z=80 OHM@100MHZ@25C
R101	724-5054-310	RESISTOR, FIXED, FILM: 330 OHM, ±5%, 1 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
R102	724-5055-170	RESISTOR, FIXED, FILM: 22 OHM, ±5%, 2 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
R103	724-5055-170	RESISTOR, FIXED, FILM: 22 OHM, ±5%, 2 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
R104	724-5055-170	RESISTOR, FIXED, FILM: 22 OHM, ±5%, 2 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
R105	724-5055-170	RESISTOR, FIXED, FILM: 22 OHM, ±5%, 2 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
R106	714-7059-030	RESISTOR, FIXED, FILM: 7.5 OHM, ±1%, 20 WATT @ 25C TO-220 TYPE PKG, METAL TAB, NON-INDUCTIVE
R107	724-5053-475	RESISTOR, FIXED, FILM: 3920OHM, ±1%, 1/2WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED

PL189213-1 CCA, RF - Continued Rev. E

Ref. Des.	Part No.	Description
R108	724-5053-475	RESISTOR, FIXED, FILM: 3920OHM, ±1%, 1/2WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R109	382-1405-060	RESISTOR, VARIABLE, NONWIRE WOUND: 5000 OHMS, ±10% 1/2 WATT, CERMET
R110	724-5053-420	RESISTOR, FIXED, FILM: 1500OHM, ±1%, 1/22WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R111	724-5054-310	RESISTOR, FIXED, FILM: 330 OHM, ±5%, 1 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
R112	724-5055-130	RESISTOR, FIXED, FILM: 10 OHM, ±5%, 2 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED
T101	288-4020-020	CORE, ELECTROMAGNET: BALUN, TWO HOLE, 125MHZ MAX FREQ FERRITE, 0.295"THK, 0.525"W, 0.565"LG

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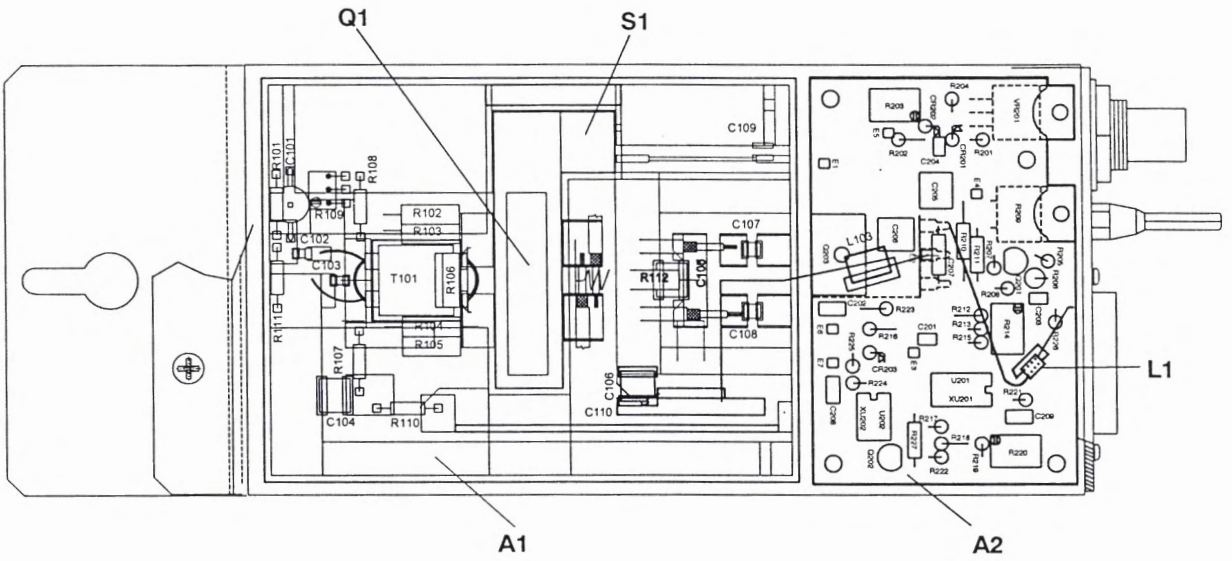

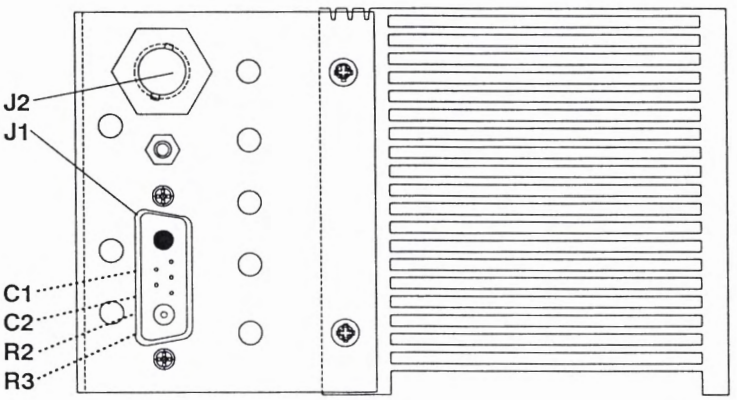

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Figure 6-5. Amplifier Module, AR1-AR4.

PL189215-1 AMPLIFIER MODULE - Continued **Rev. D**

Ref. Des.	Part No.	Description
1	MS51957-27	SCREW, MACHINE: 6-32UNC-2A X 5/16, PAN HEAD, CRES CROSS RECESSED
32	MS15795-805	WASHER, FLAT: 0.156 ID, 0.312 OD, 0.035 THK, CRES
33	MS35338-136	WASHER, LOCK: #6 NOM ID, SPRING, HELICAL, 300 CRES 0.250"OD, 0.148"ID, 0.031"TK, PASSVTD, REGULAR SERIES
34	MS35649-244	NUT, PLAIN, HEXAGON: 4-40UNC-2B, CRES, PASSIVATED
35	M23053/5-102-0	INSULATION SLEEVING, ELECTRICAL: HT SHRNK, 1/16, BLK POLYOLEFIN, FLEXIBLE, CROSSLINKED
36	M23053/5-107-0	INSULATION SLEEVING, ELECTRICAL: HT SHRNK, 3/8, BLK POLYOLEFIN, FLEXIBLE, CROSSLINKED
A1	*189213-1	CCA, RF
A2	*189210-1	CCA, CONTROL
C1	CK05BX103K	CAPACITOR, FIXED, CERAMIC: 0.01 UF, ±10%, 100 WVDC
C2	CK05BX103K	CAPACITOR, FIXED, CERAMIC: 0.01 UF, ±10%, 100 WVDC
J1	361-5028-050	CONNECTOR, RECEPTACLE, ELECTRICAL: 5 #20 PINS & 2 #8 CAVITIES, "D"SUB TYPE, 15 CONT SHELL SZ, SOLDER TERM
J2	361-5065-010	CONNECTOR, RECEPTACLE, ELECTRICAL: BNC, BULKHEAD JACK
L1	288-4029-020	SHIELDING BEAD, ELECTRONIC: FERRITE, 5-30MHZ OPER FRE 0.385"OD, 0.193"ID, O, 410"LG, Z=80 OHM@100MHZ@25C
Q1	352-5134-010	TRANSISTOR: FET, DUAL, RF, 300W, 2-175 MHZ, N CHANNEL TAB LEADS, CHASSIS MOUNT
R1	NOT-USED	
R2	724-5052-010	RESISTOR, FIXED, FILM: 10OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R3	724-5052-010	RESISTOR, FIXED, FILM: 10OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
S1	267-5022-010	SWITCH, THERMOSTATIC: 80C, ±5DEG, CLOSE ON TEMP RISE BIMETALLIC, SNAP ACTION, TO-220 TYPE PKG

PL189262-1 PLATE, CONNECTOR **Rev. -**

Ref. Des.	Part No.	Description
2	334-1476-000	NUT, PLAIN, CLINCH: 6-32UNC, 0.061-0.090 THK MATERIAL

PL193993-1 TUBE, AMPLIFIER **Rev. -**

Ref. Des.	Part No.	Description
1	820-4037-040	TUBE, METALLIC: BRASS, ROUND, 0.141"OD, 0.129"ID 0.006"WALL, 12" LONG

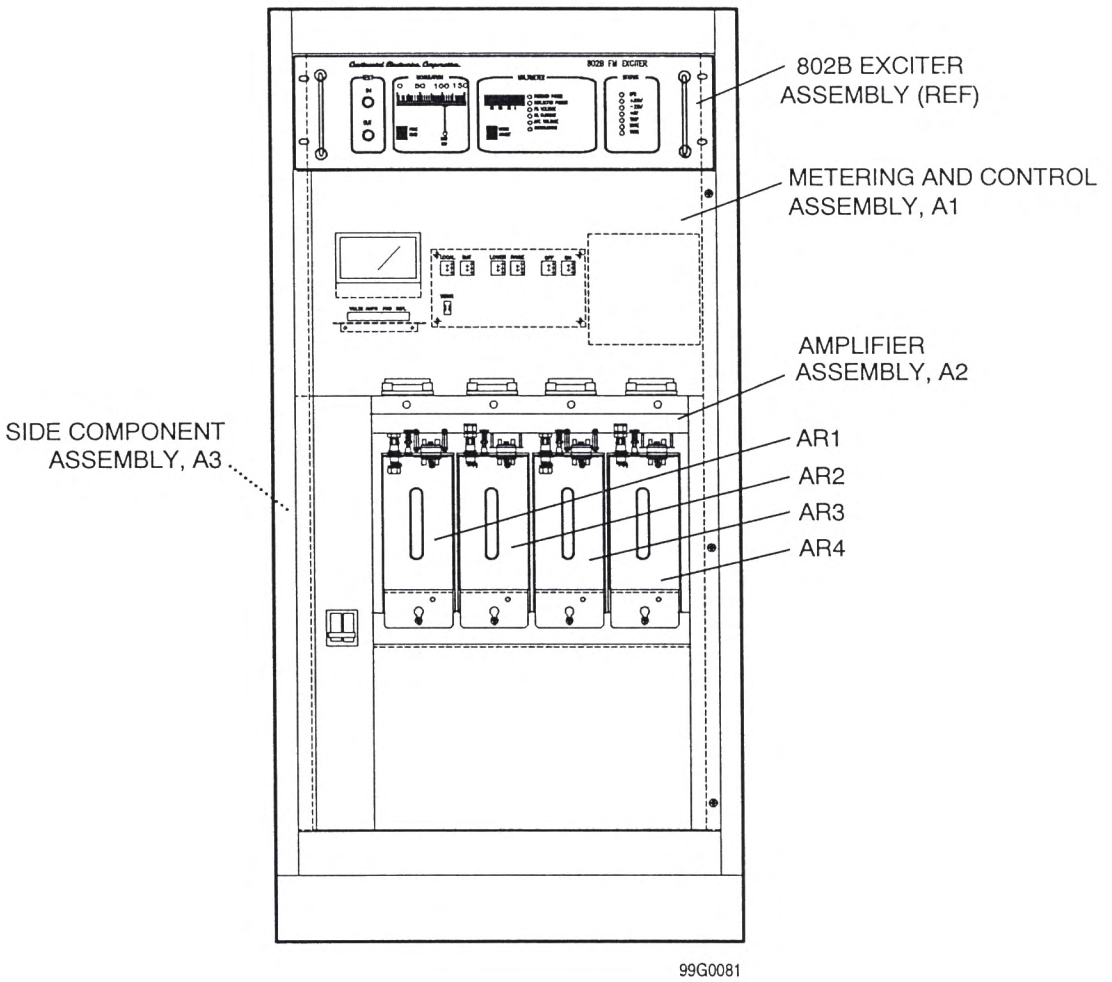

Figure 6-6. 814K FM Transmitter (Sheet 1 of 2).

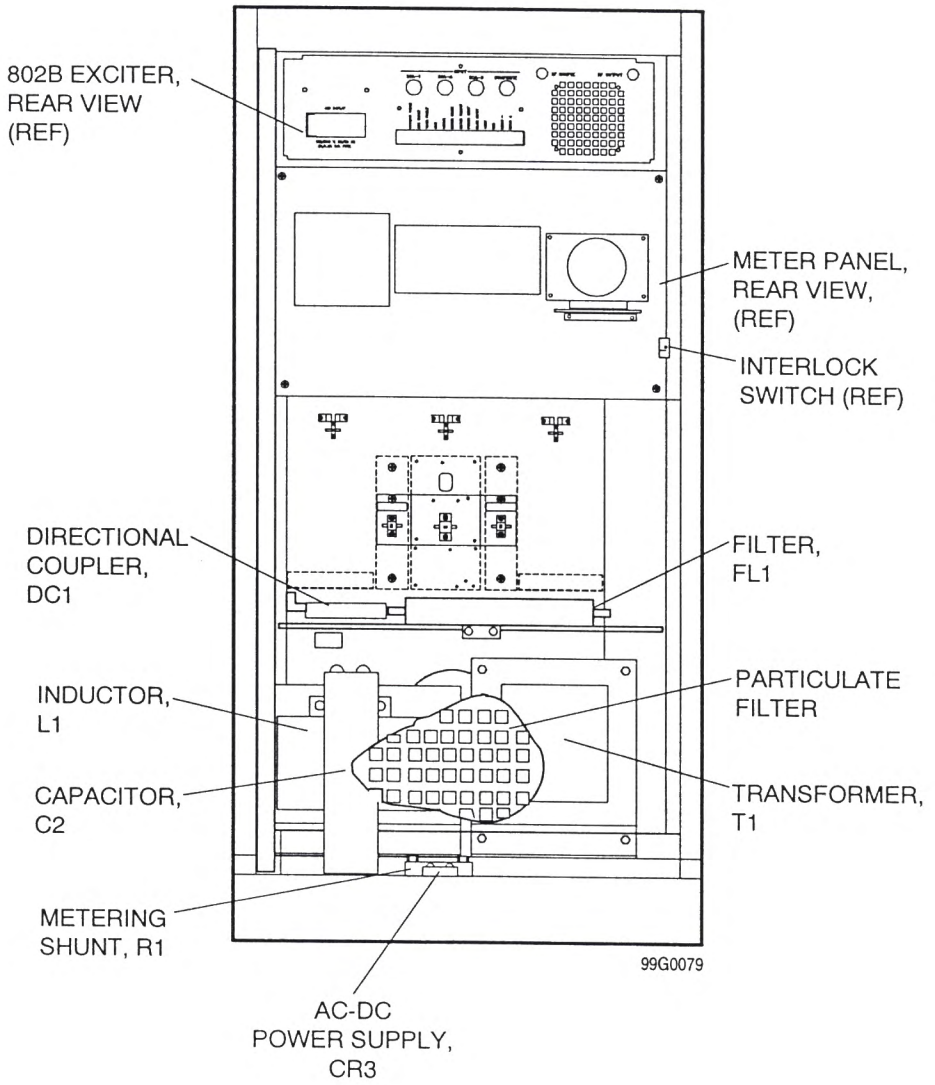

Figure 6-6. 814KH FM Transmitter (Sheet 2 of 2).

PL195031-1 TRANSMITTER, 814K, 1 kW **Rev. B**

Ref. Des.	Part No.	Description
2	195032	SCHEMATIC DIAGRAM, TRANSMITTER, 814K, 1 KW
3	012-9574-010	LATCH SET: FLUSH, KEY LOCKING, SLAM-LATCH, 3/16"MAX PNL PAWL ON RIGHT SIDE
4	021-5014-010	RACK, ELECTRICAL EQUIPMENT: FRAME, 19" X 35" PANEL SP 14GA CRS, 25-1/2"DP, 42-1/8"H, 21-1/16"W, CUSTOM PAINT
5	021-5014-020	PANEL, SIDE: PLAIN, FORMED, 25-1/2" X 42-1/8", 3/8"THK 16 GA COLD ROLLED STEEL, CUSTOM PAINTED (SSP-121A)
6	357-9293-000	ADAPTER, CONNECTOR: COAXIAL, RF, SERIES N, RT ANGLE N PLUG/N JACK, 50 OHM, DC-11 GHZ
7	*195153-1	DOOR ASSEMBLY, REAR
9	195179-1	PANEL, ROOF
10	195132-1	STRIP, COVER, HINGE
11	180086-1	STRIP, IDENT: ALUMINUM, 1-1/2"WIDE X 21"LG X 1/4"THK BLACK FINISH
12	195133-1	STRIP, SPACER, DOOR
13	195175-1	FLOOR
16	195156-1	SPACER, COUPLER
17	180158-1	BRACKET, LATCH
18	139-8004-020	RETAINER, CAPACITOR: 3" DIA
19	*643-7417-002	BRACKET, MOUNTING, NO.1, 802A EXCITER
20	643-7490-001	BRACKET, REAR MTG, SLIDE
21	426-1034-020	CABLE ASSEMBLY, POWER ELECTRICAL: 300 VAC, CABLE, 250 CONNECTOR, 10 AMPS
22	195181-1	DUCT NO.1
23	195182-1	DUCT NO.2
24	195183-1	DUCT NO.3
25	195178-1	HOLDER, FILTER
26	NOT-USED	
27	MS51958-68	SCREW, MACHINE: 10-32 UNF-2A X 1-1/4, PAN HEAD, CRES CROSS RECESSED
28	MS15795-808	WASHER, FLAT:0.219 ID, 0.438 OD, 0.049 THK, CRES
29	MS35338-138	WASHER, LOCK: #10 NOM ID, SPRING, HELICAL, 300 CRES 0.334"OD, 0.200"ID, 0.047"TK, PASSVTD, REGULAR SERIES
30	021-0474-280	NUT, SPRING MOUNTED: 10-32 THREAD
31	312-3120-000	ROD, THREADED: 8-32 X 0.625, BRASS
32	MS15795-807	WASHER, FLAT: 0.188 ID, 0.375 OD, 0.049 THK, CRES
33	MS35338-137	WASHER, LOCK: #8 NOM ID, SPRING, HELICAL, 300 CRES 0.293"OD, 0.174"ID, 0.040"TK, PASSVTD, REGULAR SERIES
34	MS35649-284	NUT, PLAIN, HEXAGON: 8-32 UNC-28, CRES, PASSIVATED
35	MS51957-30	SCREW, MACHINE: 6-32 UNC-2A X 1/2, PAN HEAD, CRES CROSS RECESSED
36	MS15795-805	WASHER, FLAT: 0.156 ID, 0.312 OD, 0.035 THK, CRES
37	MS35338-136	WASHER, LOCK:#6 NOM ID, SPRING, HELICAL, 300 CRES 0.250"OD, 0.148"ID, 0.031"TK, PASSVTD, REGULAR SERIES
38	*195185-1	BRACKET, AMP MOUNTING
39	MS51957-28	SCREW, MACHINE: 6-32 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
40	MS51957-77	SCREW, MACHINE: 1/4-20 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
41	MS15795-810	WASHER, FLAT: 0.281 ID, 0.625 OD, 0.065 THK, CRES
42	MS35338-139	WASHER, LOCK: 1/4"NOM ID, SPRING, HELICAL, 300 CRES 0.487"OD, 0.260"ID, 0.062"TK, PASSVTD, REGULAR SERIES

PL195031-1 TRANSMITTER, 814K, 1 kW - Continued Rev. B

Ref. Des.	Part No.	Description
43	MS51971-1	NUT, PLAIN, HEXAGON: 1/4-20, CRES
44	MS51957-80	SCREW, MACHINE: 1/4-20UNC-2A X 5/8, PAN HEAD, CRES CROSS RECESSED
45	MS51957-43	SCREW, MACHINE: 8-32 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
48	MS51957-45	SCREW, MACHINE: 8-32 UNC-2A X 1/2, PAN HEAD, CRES CROSS RECESSED
49	MS51957-46	SCREW, MACHINE: 8-32 UNC-2A X 5/8, PAN HEAD, CRES CROSS RECESSED
50	MS51958-61	SCREW, MACHINE: 10-32 UNF-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
51	MS51957-82	SCREW, MACHINE: 1/4-20 UNC-2A X 7/8, PAN HEAD, CRES CROSS RECESSED
52	MS51958-63	SCREW, MACHINE: 10-32 UNF-2A X 1/2, PAN HEAD, CRES CROSS RECESSED
53	MS35650-304	NUT, PLAIN, HEXAGON: 10-32 UNF-2B, CRES, PASSIVATED
54	MS51958-64	SCREW, MACHINE: 10-32 UNF-2A X 5/8, PAN HEAD, CRES CROSS RECESSED
55	195194	SCHEMATIC DIAGRAM, CONTROL LADDER
A1	*195073-1	METERING & CONTROL PANEL ASSEMBLY
A2	*195083-1	AMPLIFIER ASSEMBLY
A3	*195074-1	PANEL, SIDE COMPONENT ASSEMBLY
AR1	*189215-1	AMPLIFIER MODULE
AR2	*189215-1	AMPLIFIER MODULE
AR3	*189215-1	AMPLIFIER MODULE
AR4	*189215-1	AMPLIFIER MODULE
C2	183-1278-660	CAPACITOR, FIXED, ELECTROLYTIC: 120000 UF, +75-10%, 60 WVDC, ALUMINUM DIELECTRIC, 1/4-28 TERMINALS
CR3	353-5351-030	RECTIFIER, SEMICONDUCTOR DEVICE: 60 AMP, 600 VOLT, 1 PH FULL WAVE BRIDGE, MOLDED CASE, SCREW TERMINALS
DC1	277-3039-010	COUPLER, DIRECTIONAL: 88-108 MHZ, 1.20:1 VSWR MAX POWER 1000 WATTS MAX, DIRECTIVITY 30 DB MIN, CUSTOM
FL1	241-1013-020	FILTER, LOW PASS: 108 MHZ CUTOFF FREQUENCY, 50 OHMS 1200 W MAX, 176-1000 MHZ STOP BAND, N CONN, 30 DB SAMPLE
L1	668-6080-010	REACTOR, FILTER: 13 MILLIHENRIES @40 ADC, 1000 VRMS 50 MILLIOHMS MAX, 100 HZ, OPEN FRAME, DRY TYPE
P1	372-9766-020	CONNECTOR BODY, PLUG, ELECTRICAL: 20 POSITIONS, PLZD 1 ROW CONTACT HOUSING, 0.1"CENTERS, W/DETENT LATCH
P2	372-9766-020	CONNECTOR BODY, PLUG, ELECTRICAL: 20 POSITIONS, PLZD 1 ROW CONTACT HOUSING, 0.1"CENTERS, W/DETENT LATCH
P3	372-9766-020	CONNECTOR BODY, PLUG, ELECTRICAL: 20 POSITIONS, PLZD 1 ROW CONTACT HOUSING, 0.1"CENTERS, W/DETENT LATCH
P4	372-9761-020	CONNECTOR BODY, PLUG, ELECTRICAL: 26 CAVITY, 2 ROW DETENT LATCHING, W/O STRAIN RELIEF, .1"X.1"CENTERS
R1	450-8806-050	SHUNT, INSTRUMENT: 50 AMP, 50 MV, 6" LG X 1-1/4" WIDE
T1	662-6292-010	TRANSFORMER, POWER: STEP-DOWN, SINGLE PRI:190/270 VAC 10 V STEPS, 50/60 HZ, SEC: 52 VDC@ 40 A, OPEN FRAME, DRY

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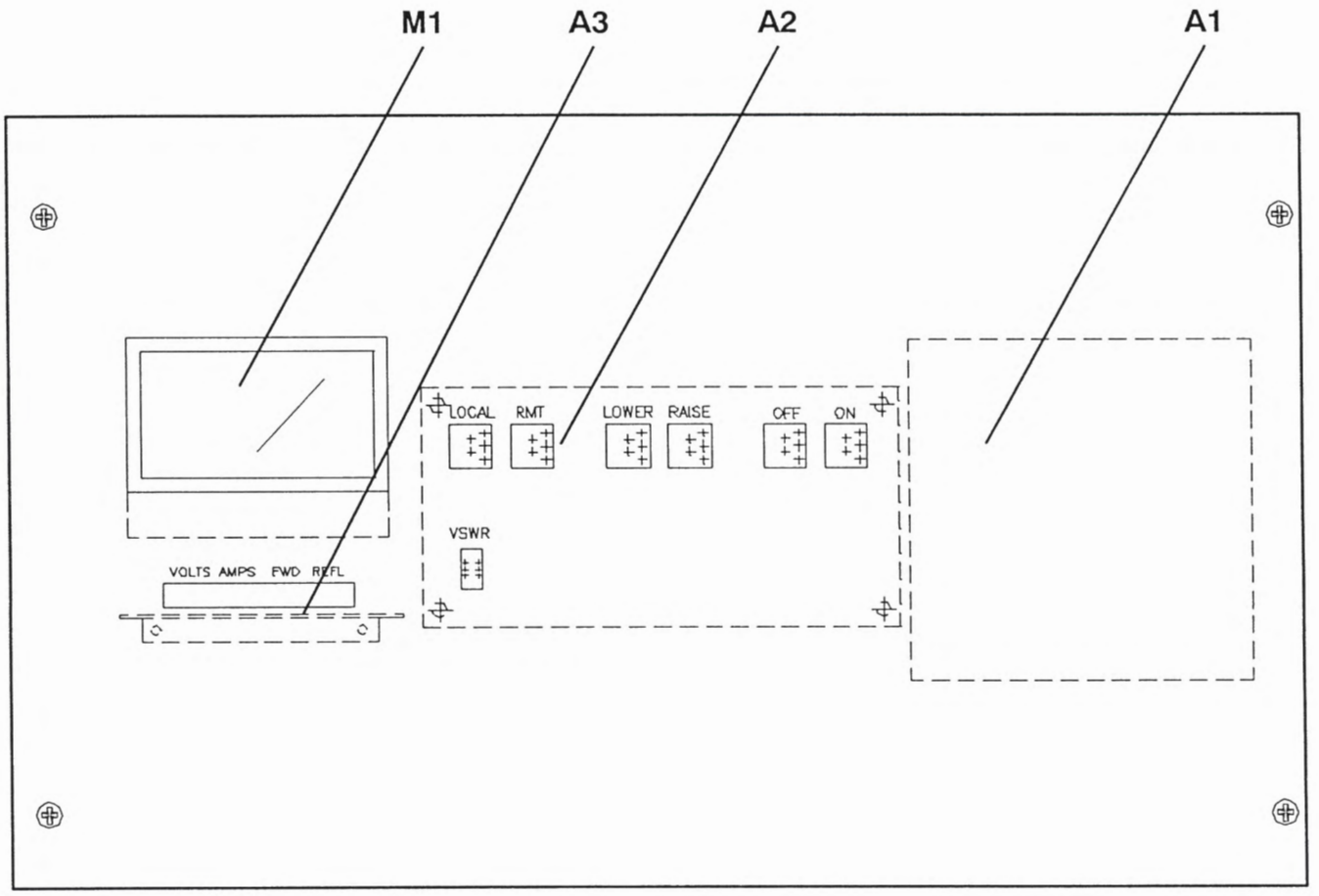

Figure 6-7. Metering and Control Panel Assembly, A1.

PL195073-1 METERING & CONTROL PANEL ASSEMBLY Rev. A

Ref. Des.	Part No.	Description
1	*195176-1	PANEL, METERING AND CONTROL
2	*195129-1	HINGE, METERING AND CONTROL
3	159582-1	SUPPORT, METERING BOARD, IPA
4	458-5005-260	BEZEL, HALF FRAME: FOR 3-1/2" METER, BLACK
5	190-5019-040	SPACER, SLEEVE: ROUND, 1/4 OD, 0.140 ID, 5/16 LG, ALUMINUM, GOLD IRIDITE PLATED
6	MS15795-805	WASHER, FLAT: 0.156 ID, 0.312 OD, 0.035 THK, CRES
7	MS35338-136	WASHER, LOCK: #6 NOM ID, SPRING, HELICAL, 300 CRES 0.250"OD, 0.148"ID, 0.031"TK, PASSVTD, REGULAR SERIES
8	MS51865-1C	NUT, CAP: SELF-LOCKING, 6-32 UNC-2B THREAD, CRES GENERAL PURPOSE, 250 DEG F
9	150-1543-000	CLAMP, LOOP: NYLON, 3/8 INCH DIAMETER
10	MS51957-15	SCREW, MACHINE: 4-40UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
11	MS15795-803	WASHER, FLAT: 0.125 ID, 0.250 OD, 0.022 THK, CRES
12	MS35338-135	WASHER, LOCK: #4 NOM ID, SPRING, HELICAL, 300 CRES 0.209"OD, 0.120"ID, 0.025"TK, PASSVTD, REGULAR SERIES
A1	*180310-3	CCA, REMOTE CONTROL
A2	*195076-1	CCA, CONTROL CARD
A3	*195079-1	CCA, METERING CARD
M1	458-5201-010	METER, ARBITRARY SCALE: 1 MILLIAMP SENSITIVITY, DUAL SCALE, 3-1/2" RECTANGULAR, PANEL MT

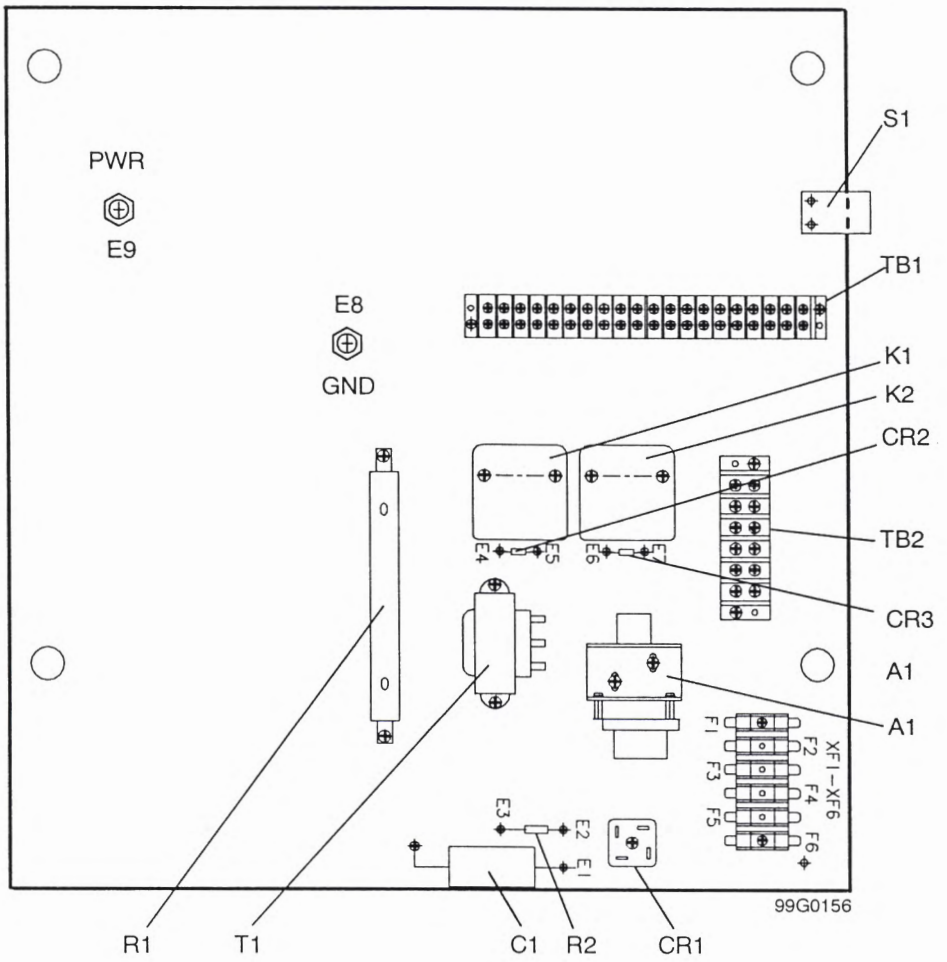

Figure 6-8. Side Component Panel Assembly, A3.

PL195074-1 PANEL, SIDE COMPONENT ASSEMBLY **Rev. A**

Ref. Des.	Part No.	Description
2	*195090-1	PANEL, COMPONENT, LEFT
3	139-1141-100	BRACKET: RESISTOR MOUNTING, SPRING-GRIP TYPE, 3/4 OD, 1/2 ID CORE SIZE, 0.196 MOUNTING HOLE
4	172696-1	BRACKET, INTERLOCK
5	MS51957-74	SCREW, MACHINE: 10-24 UNC-2A X 2-3/4, PAN HEAD, CRES CROSS RECESSED
6	MS15795-807	WASHER, FLAT: 0.188 ID, 0.375 OD, 0.049 THK, CRES
7	MS35338-137	WASHER, LOCK: #8 NOM ID, SPRING, HELICAL, 300 CRES 0.293"OD, 0.174"ID, 0.040"TK, PASSVTD, REGULAR SERIES
8	MS51957-46	SCREW, MACHINE: 8-32 UNC-2A X 5/8, PAN HEAD, CRES CROSS RECESSED
9	MS51957-45	SCREW, MACHINE: 8-32 UNC-2A X 1/2, PAN HEAD, CRES CROSS RECESSED
10	MS51957-43	SCREW, MACHINE: 8-32 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
11	MS51957-31	SCREW, MACHINE: 6-32 UNC-2A X 5/8, PAN HEAD, CRES CROSS RECESSED
12	MS15795-805	WASHER, FLAT: 0.156 ID, 0.312 OD, 0.035 THK, CRES
13	MS35338-136	WASHER, LOCK: #6 NOM ID, SPRING, HELICAL, 300 CRES 0.250"OD, 0.148"ID, 0.031"TK, PASSVTD, REGULAR SERIES
14	MS51957-28	SCREW, MACHINE: 6-32 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
15	MS51957-15	SCREW, MACHINE: 4-40 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
16	MS15795-803	WASHER, FLAT: 0.125 ID, 0.250 OD, 0.022 THK, CRES
17	MS35338-135	WASHER, LOCK: #4 NOM ID, SPRING, HELICAL, 300 CRES 0.209"OD, 0.120"ID, 0.025"TK, PASSVTD, REGULAR SERIES
A1	*172715-1	POWER CONTROL ASSEMBLY
C1	183-1282-140	CAPACITOR, FIXED, ELECTROLYTIC: 1000 UF, +75-10%, 50 WVDC
CR1	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1 AMP, 1000 V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR2	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1 AMP, 1000 V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR3	353-0417-060	SEMICONDUCTOR DEVICE, DIODE: BRIDGE RECTIFIER DIODE
E1	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E2	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E3	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E4	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E5	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E6	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
E7	306-0234-000	POST, ELECTRICAL/MECHANICAL EQUIPMENT: 4-40 THREADS, 0.625 LENGTH, 6500 VOLTS AC-RMS
F1	264-0295-000	FUSE, CARTRIDGE: 1 AMP, 250 VOLT, HIGH TIME LAG
F2	264-0295-000	FUSE, CARTRIDGE: 1 AMP, 250 VOLT, HIGH TIME LAG
F3	264-0295-000	FUSE, CARTRIDGE: 1 AMP, 250 VOLT, HIGH TIME LAG
F4	264-0295-000	FUSE, CARTRIDGE: 1 AMP, 250 VOLT, HIGH TIME LAG
F5	264-0295-000	FUSE, CARTRIDGE: 1 AMP, 250 VOLT, HIGH TIME LAG
F6	264-0295-000	FUSE, CARTRIDGE: 1 AMP, 250 VOLT, HIGH TIME LAG

PL195074-1 PANEL, SIDE COMPONENT ASSEMBLY - Continued **Rev. A**

Ref. Des.	Part No.	Description
K1	410-6231-010	RELAY, ELECTROMAGNETIC: DPST, NO, 25 AMPS @240 VAC CONT 24 VDC, 288 OHM COIL, SCREW TERMINALS, OPEN TYPE
K2	410-6231-010	RELAY, ELECTROMAGNETIC: DPST, NO, 25 AMPS @240 VAC CONT 24 VDC, 288 OHM COIL, SCREW TERMINALS, OPEN TYPE
R1	716-0060-070	RESISTOR, ADJUSTABLE, WIRE WOUND: 25 OHM, ±10%, 100 WATT, 3.16 MAX AMP
R2	724-5053-600	RESISTOR, FIXED, FILM: 10 KOHM, ±1%, ½ WATT@70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
S1	266-8000-000	SWITCH ASSEMBLY, INTERLOCK: SPDT, 5 AMP @ 28 VDC, PULL TO MAINTAIN CONNECTION
T1	662-0912-050	TRANSFORMER, POWER: STEP-DOWN, 115-230 V/24V
TB1	367-0926-000	TERMINAL BOARD: 20 TERMINALS, 20 AMP, 3000 VOLTS, #6-32 X 1/4 BRASS, NP SCREWS, 16-14 AWG, PHENOLIC
TB2	367-5552-060	TERMINAL BOARD: 6 TERMINALS, 30 AMPS, 3300 V RMS 8-32 X 5/16" SCREWS, BARRIER TYPE
XF1-XF6	265-9569-060	FUSEHOLDER, BLOCK: 6 POLE, 20 AMP MAX, PLASTIC BASE 1/2" QUICK CONNECT TERM, MANY HOLE MT, 3 AG TYPE FUSE

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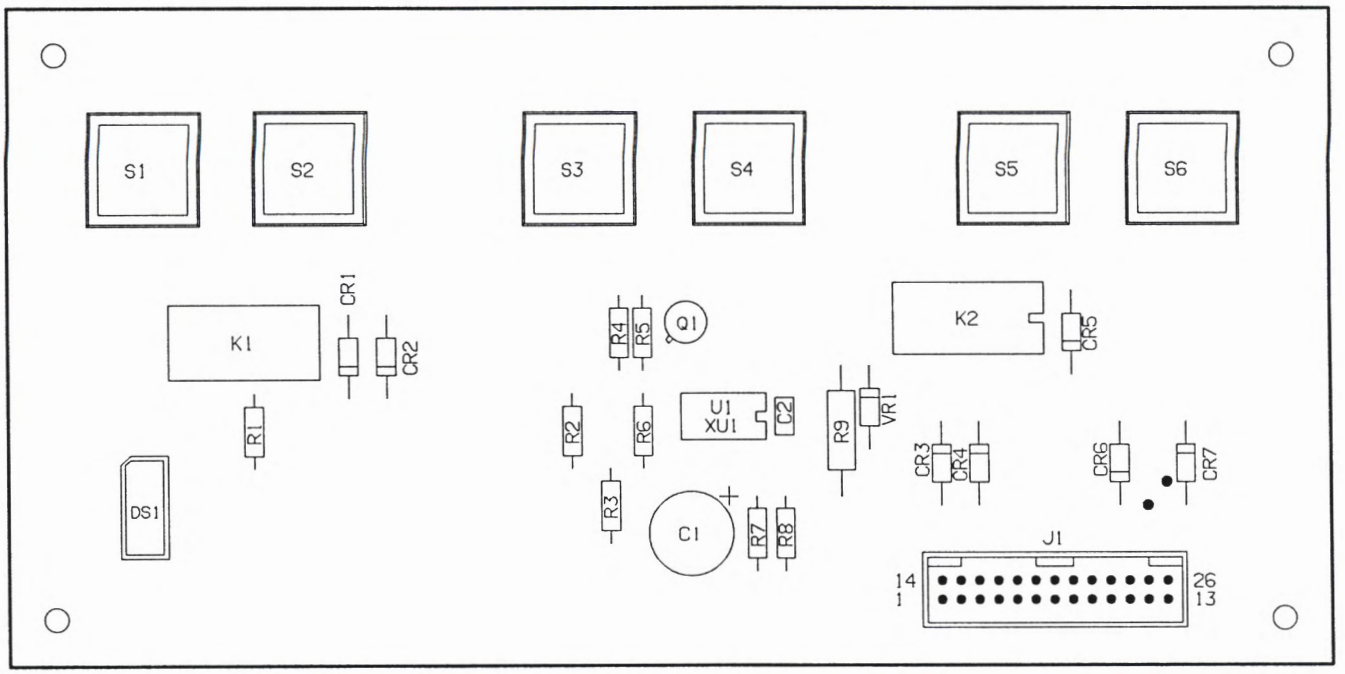

Figure 6-9. Control Card CCA, A1A2.

PL195076-1 CCA, CONTROL CARD Rev. -

Ref. Des.	Part No.	Description
2	195075-1	PRINTED WIRING BOARD, CONTROL CARD
3	195077	SCHEMATIC DIAGRAM, CONTROL CARD
C1	184-9609-010	CAPACITOR, FIXED, ELECTROLYTIC: 47 UF, ±10%, 35 WVDC DIPPED TANTALUM
C2	913-3279-200	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±20%, 50 WVDC
CR1	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR2	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR3	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR4	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR5	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR6	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR7	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
DS1	419-0089-030	DISPLAY, OPTOELECTRONIC: LED, YELLOW, .5"X.25"LIGHTED AREA, 4.5MCD INTENSITY, RECT, PC MOUNT, DUAL-IN-LINE
J1	372-9754-100	CONNECTOR, RECEPTACLE, ELECTRICAL: HEADER, 26 PINS 2 ROW, STRAIGHT, 0.1"CENTERS, SHROUDED, STD PROFILE
K1	410-6109-030	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, DUAL COIL LATCH, PLSTC ENCL, SEALED, DIL
K2	410-6098-010	RELAY, ELECTROMAGNETIC: DPDT, 2AMP@28VDC CONTACT RTG 24VDC COIL, PLSTC ENCL, SEALED, PWB MT
Q1	352-0661-020	TRANSISTOR: NPN, SILICON, 800MA, 70V, 500MW DISS TO-18 PKG (2N2222A)
R1	724-5052-510	RESISTOR, FIXED, FILM: 3920OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R2	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R3	724-5052-425	RESISTOR, FIXED, FILM: 1500OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R4	724-5052-460	RESISTOR, FIXED, FILM: 2210OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R5	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R6	724-5052-750	RESISTOR, FIXED, FILM: 51.1KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R7	724-5052-600	RESISTOR, FIXED, FILM: 10KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R8	724-5052-665	RESISTOR, FIXED, FILM: 22.1KOHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R9	724-5055-370	RESISTOR, FIXED, FILM: 1000 OHM, ±5%, 2 WATT @ 70C METAL FILM, TC=250PPM/DEGC, COLOR BANDED

PL195076-1 CCA, CONTROL CARD - Continued Rev. -

Ref. Des.	Part No.	Description
S1	266-9981-030	SWITCH, PUSH: SPDT, ON-MOM ON, 5AMP, 125/250VAC CONTACT ILLUMINATED, GREEN LED, GREEN LENS/CAP, PC MOUNT
S2	266-9981-010	SWITCH, PUSH: SPDT, ON-MOM ON, 5AMP, 125/250VAC CONTACT ILLUMINATED, RED LED, RED LENS/CAP, PC MOUNT
S3	266-9981-020	SWITCH, PUSH: SPDT, ON-MOM ON, 5AMP, 125/250VAC CONTACT ILLUMINATED, YELLOW LED, YELLOW LENS/CAP, PC MOUNT
S4	266-9981-020	SWITCH, PUSH: SPDT, ON-MOM ON, 5AMP, 125/250VAC CONTACT ILLUMINATED, YELLOW LED, YELLOW LENS/CAP, PC MOUNT
S5	266-9981-030	SWITCH, PUSH: SPDT, ON-MOM ON, 5AMP, 125/250VAC CONTACT ILLUMINATED, GREEN LED, GREEN LENS/CAP, PC MOUNT
S6	266-9981-010	SWITCH, PUSH: SPDT, ON-MOM ON, 5AMP, 125/250VAC CONTACT ILLUMINATED, RED LED, RED LENS/CAP, PC MOUNT
U1	351-1211-040	MICROCIRCUIT, LINEAR: DUAL OP-AMP 8 PIN PLASTIC DIP PKG
VR1	353-6481-330	SEMICONDUCTOR DEVICE, DIODE: ZENER, 15 VDC, 1 WATT, COMMERCIAL
XV1	220-6017-020	SOCKET, PLUG-IN ELECTRONIC COMPONENT: 8 CONTACTS OPEN FRAME, 0.3" WIDE PIN SPACING

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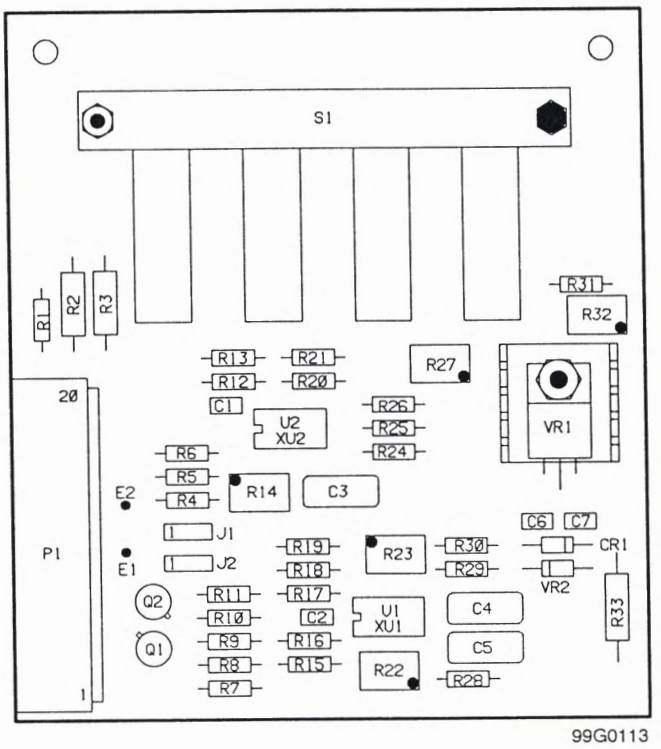

Figure 6-10. Metering Card CCA, A1A3.

PL195079-1 CCA, METERING CARD **Rev. A**

Ref. Des.	Part No.	Description
2	195078-1	PRINTED WIRING BOARD, METERING CARD
3	195080	SCHEMATIC DIAGRAM, METERING CARD
4	352-9638-110	HEAT SINK: SEMICONDUCTOR, ALUMINUM
5	MS15795-803	WASHER, FLAT: 0.125 ID, 0.250 OD, 0.022 THK, CRES
6	MS35338-135	WASHER, LOCK: #4 NOM ID, SPRING, HELICAL, 300 CRES 0.209"OD, 0.120"ID, 0.025"TK, PASSVTD, REGULAR SERIES
7	MS35649-244	NUT, PLAIN, HEXAGON: 4-40UNC-2B, CRES, PASSIVATED
8	MS51957-15	SCREW, MACHINE: 4-40 UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
9	MS15795-802	WASHER, FLAT: 0.094 ID, 0.250 OD, 0.020 THK, CRES
10	MS35338-134	WASHER, LOCK: #2 NOM ID, SPRING, HELICAL, 300 CRES 0.172"OD, 0.094"ID, 0.020"TK, PASSVTD, REGULAR SERIES
11	MS35649-224	NUT, PLAIN, HEXAGON: 2-56UNC-2B, CRES, PASSIVATED
12	MS51957-5	SCREW, MACHINE: 2-56UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
13	372-9604-150	CONNECTOR, JUMPER: 2-CIRCUIT
C1	913-3279-200	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±20%, 50 WVDC
C2	913-3279-200	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±20%, 50 WVDC
C3	CM05FD101JO3	CAPACITOR, FIXED, MICA: 100 PF, ±5%, 500 WVDC
C4	CM05FD101JO3	CAPACITOR, FIXED, MICA: 100 PF, ±5%, 500 WVDC
C5	CM05FD101JO3	CAPACITOR, FIXED, MICA: 100 PF, ±5%, 500 WVDC
C6	913-3279-200	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±20%, 50 WVDC
C7	913-3279-200	CAPACITOR, FIXED, CERAMIC: 0.1 UF, ±20%, 50 WVDC
CR1	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
J1	372-9643-040	CONNECTOR, RECEPTACLE, ELECTRICAL: PWB MOUNT, 3 PIN, SINGLE ROW, STRAIGHT, 0.100 CENTER, GOLD PLATED
J2	372-9643-040	CONNECTOR, RECEPTACLE, ELECTRICAL: PWB MOUNT, 3 PIN, SINGLE ROW, STRAIGHT, 0.100 CENTER, GOLD PLATED
P1	372-9754-260	CONNECTOR, RECEPTACLE, ELECTRICAL: HEADER, 20 PINS 1 ROW, RT ANGLE, 0.1" CENTERS, SHROUDED PROFILE
Q1	352-0661-020	TRANSISTOR: NPN, SILICON, 800MA, 70V, 500MW DISS TO-18 PKG (2N2222A)
Q2	352-0661-020	TRANSISTOR: NPN, SILICON, 800MA, 70V, 500MW DISS TO-18 PKG (2N2222A)
R1	724-5052-400	RESISTOR, FIXED, FILM: 1000OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R2	724-5053-650	RESISTOR, FIXED, FILM: 22.1KOHM, ±1%, 1/2WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R3	724-5053-510	RESISTOR, FIXED, FILM: 7500OHM, ±1%, 1/2WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R4	724-5052-400	RESISTOR, FIXED, FILM: 1000OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R5	724-5052-400	RESISTOR, FIXED, FILM: 1000OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R6	724-5052-510	RESISTOR, FIXED, FILM: 3920OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED
R7	724-5052-400	RESISTOR, FIXED, FILM: 1000OHM, ±1%, 1/4WATT@70C METAL FILM, TC=100PPM/DEGC, COLOR BANDED

PL195079-1 CCA, METERING CARD - Continued Rev. A

Ref. Des.	Part No.	Description
R8	724-5052-200	RESISTOR, FIXED, FILM: 100 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R9	724-5052-460	RESISTOR, FIXED, FILM: 2210 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R10	724-5052-460	RESISTOR, FIXED, FILM: 2210 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R11	724-5052-200	RESISTOR, FIXED, FILM: 100 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R12	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R13	724-5052-490	RESISTOR, FIXED, FILM: 3320 OHM, ±1%, 1/4 WATT@70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R14	382-1405-080	RESISTOR, VARIABLE, NONWIRE WOUND: 20 K OHMS, ±10% 1/2 WATT, CERMET
R15	724-5052-520	RESISTOR, FIXED, FILM: 4750 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R16	724-5052-520	RESISTOR, FIXED, FILM: 4750 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R17	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R18	724-5052-510	RESISTOR, FIXED, FILM: 3920 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R19	724-5052-510	RESISTOR, FIXED, FILM: 3920 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R20	724-5052-740	RESISTOR, FIXED, FILM: 47.5 KOHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R21	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R22	382-1405-080	RESISTOR, VARIABLE, NONWIRE WOUND: 20 K OHMS, ±10% 1/2 WATT, CERMET
R23	382-1405-080	RESISTOR, VARIABLE, NONWIRE WOUND: 20 K OHMS, ±10% 1/2 WATT, CERMET
R24	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R25	724-5052-800	RESISTOR, FIXED, FILM: 100 KOHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R26	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R27	382-1405-050	RESISTOR, VARIABLE, NONWIRE WOUND: 2000 OHMS, ±10% 1/2 WATT, CERMET
R28	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R29	724-5052-400	RESISTOR, FIXED, FILM: 1000 OHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R30	724-5052-800	RESISTOR, FIXED, FILM: 100 KOHM, ±1%, 1/4 WATT@ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED
R31	724-5052-735	RESISTOR, FIXED, FILM: 46.4 K OHM, ±1%, 1/4 WATT @ 70 C METAL FILM, TC=100 PPM/DEGC, COLOR BANDED

PL195079-1 CCA, METERING CARD - Continued **Rev. A**

Ref. Des.	Part No.	Description
R32	382-1405-100	RESISTOR, VARIABLE, NONWIRE WOUND: 50 K OHMS, ±10% 1/2 WATT, CERMET
R33	724-5055-370	RESISTOR, FIXED, FILM: 1000 OHM, ±5%, 2 WATT @ 70 C METAL FILM, TC=250 PPM/DEGC, COLOR BANDED
S1	266-9731-010	SWITCH ASSEMBLY, PUSHBUTTON: 4 PDT, 4 POSITION, 12 CONTACTS, INTERLOCK
U1	351-1211-040	MICROCIRCUIT, LINEAR: DUAL OP-AMP 8 PIN PLASTIC DIP PKG
U2	351-1211-040	MICROCIRCUIT, LINEAR: DUAL OP-AMP 8 PIN PLASTIC DIP PKG
VR1	351-1120-040	MICROCIRCUIT, LINEAR: +12 V @ 1 A VOLTAGE REGULATOR T0-220 PLASTIC PACKAGE
VR2	353-6481-330	SEMICONDUCTOR DEVICE, DIODE: ZENER, 15 VDC, 1 WATT, COMMERCIAL
XU1	220-6017-020	SOCKET, PLUG-IN ELECTRONIC COMPONENT: 8 CONTACTS OPEN FRAME, 0.3" WIDE PIN SPACING
XU2	220-6017-020	SOCKET, PLUG-IN ELECTRONIC COMPONENT: 8 CONTACTS OPEN FRAME, 0.3" WIDE PIN SPACING

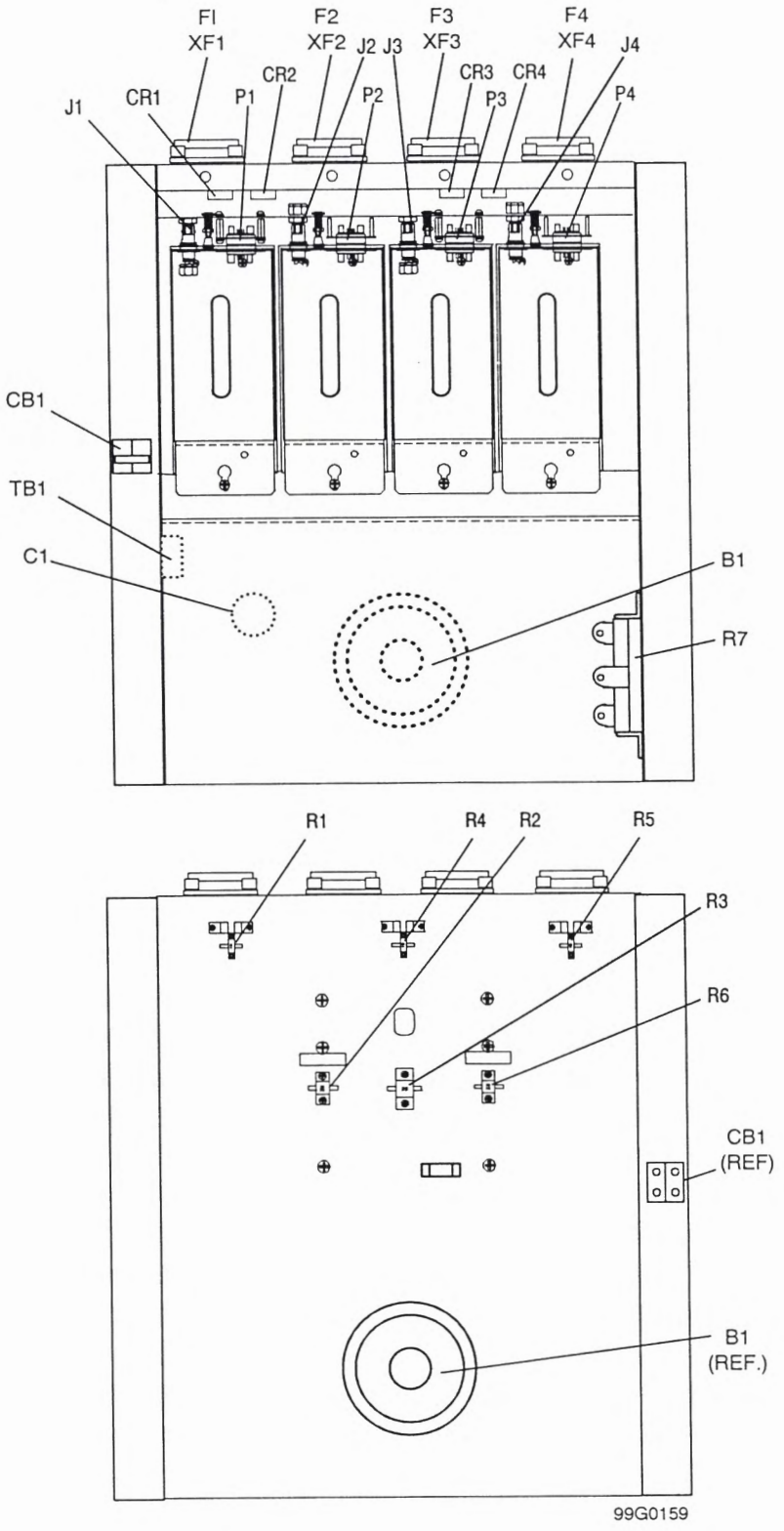

Figure 6-11. Amplifier Assembly, A2.

PL195083-1 AMPLIFIER ASSEMBLY Rev. A

Ref. Des.	Part No.	Description
2	193791-1	HEAT SINK, LOAD
3	195157-1	HEATSINK, LOAD NO.2
4	189452-1	CLAMP NO.1, COMBINER
5	193790-1	CLAMP, COAX
6	189486-1	TUBE NO.1, COAX
8	139-1141-100	BRACKET: RESISTOR MOUNTING, SPRING-GRIP TYPE, 3/4 OD, 1/2 ID CORE SIZE, 0.196 MOUNTING HOLE
9	189151-1	CLAMP, COAX
10	*195184-1	ENCLOSURE, AMPLIFIER
11	191-0016-090	POST, ELECTRICAL-MECHANICAL EQUIPMENT: FEMALE, 1/4HEX, 4-40UNC X 5/8, ALUMINUM, GOLD IRIDITE PLTD
12	360-5007-010	JACK, TIP: BANANA, HEX, BRASS, NICKEL PLATED
13	361-5028-130	CONTACT, ELECTRICAL: SKT, 40AMP RATING, 8AWG WIRE SIZE HIGH POWER RECEPTACLE CONTACT, SOLDER CUP
14	361-5028-210	CONTACT, ELECTRICAL: COAXIAL, PIN, FOR RG316 COAXIAL CABLE, SOLDER BRAID, SOLDER CENTER CONTACT
15	*195144-1	BRACKET, AMP MOUNTING, TOP
16	M17/60-RG142	CABLE, RADIO FREQUENCY: COAXIAL, FLEXIBLE, 50 OHMS TEFLON DIEL, .195"OD, DBL SHLD, FEP JKT
17	M17/94-RG179	CABLE, RADIO FREQUENCY: COAXIAL, FLEXIBLE, 75 OHMS TEFLON DIEL, .100"OD, SNGL SHLD, FEP JKT
18	M17/113-RG316	CABLE, RADIO FREQUENCY: COAXIAL, FLEXIBLE, 50 OHMS TEFLON DIEL, .098"OD, SNGL SHLD, FEP JKT, (TYPE RG316)
19	MS51972-1	NUT, PLAIN, HEXAGON: 1/4-28UNF-2B, CRES, PASSIVATED
21	M17/110-RG302	CABLE, RADIO FREQUENCY: COAXIAL, FLEXIBLE, 75 OHMS TEFLON DIEL, .282"OD, SNGL SHLD, FEP JKT
22	195148-1	BRACKET, AMP MOUNTING, TOP
23	195177-1	BRACKET, MOUNTING, FAN
25	MS51957-14	SCREW, MACHINE: 4-40UNC-2A X 5/16, PAN HEAD, CRES CROSS RECESSED
26	MS51957-15	SCREW, MACHINE: 4-40UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
27	MS35338-135	WASHER, LOCK: #4 NOM ID, SPRING, HELICAL, 300 CRES 0.209"OD, 0.120"ID, 0.025"TK, PASSVTD, REGULAR SERIES
28	MS15795-803	WASHER, FLAT: 0.125 ID, 0.250 OD, 0.022 THK, CRES
29	MS51957-27	SCREW, MACHINE: 6-32UNC-2A X 5/16, PAN HEAD, CRES CROSS RECESSED
30	MS51957-31	SCREW, MACHINE: 6-32UNC-2A X 5/8, PAN HEAD, CRES CROSS RECESSED
32	MS35338-136	WASHER, LOCK: #6 NOM ID, SPRING, HELICAL, 300 CRES 0.250"OD, 0.148"ID, 0.031"TK, PASSVTD, REGULAR SERIES
33	MS15795-805	WASHER, FLAT: 0.156 ID, 0.312 OD, 0.035 THK, CRES
34	MS51957-43	SCREW, MACHINE: 8-32UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
35	MS51958-63	SCREW, MACHINE: 10-32UNF-2A X 1/2, PAN HEAD, CRES CROSS RECESSED
36	MS51958-67	SCREW, MACHINE: 10-32UNF-2A X 1.000, PAN HEAD, CRES CROSS RECESSED
37	MS35338-138	WASHER, LOCK: #10 NOM ID, SPRING, HELICAL, 300 CRES 0.334"OD, 0.200"ID, 0.047"TK, PASSVTD, REGULAR SERIES
38	MS15795-808	WASHER, FLAT: 0.219 ID, 0.438 OD, 0.049 THK, CRES
39	MS24693-C25	SCREW, MACHINE: 6-32UNC-2A X 5/16", FLAT HEAD, CSK 100 DEG, CROSS RECESSED, CRES, PASSIVATED
40	304-7035-010	TERMINAL, LUG: #6 UNINSULATED, FLANGED

PL195083-1 AMPLIFIER ASSEMBLY - Continued Rev. A

Ref. Des.	Part No.	Description
41	009-5151-060	RING, INLET: 7.28" DIA, .67" DEEP, GALVANIZED STEEL FOR 175-SERIES IMPELLERS
42	306-3041-020	TERMINAL STRIP: 6 SOLDER LUG TERMINALS, PHENOLIC BASE, 2 MOUNTING FEET
45	195146-1	PANEL, CLOSE-OUT, LEFT
46	195147-1	PANEL, CLOSE-OUT, RIGHT
47	*195140-1	CLIP
48	195150-1	BRACKET, MOUNTING, CAPACITOR
50	MS51957-28	SCREW, MACHINE: 6-32UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
51	MS15795-807	WASHER, FLAT: 0.188 ID, 0.375 OD, 0.049 THK, CRES
52	MS35338-137	WASHER, LOCK: #8 NOM ID, SPRING, HELICAL, 300 CRES 0.293"OD, 0.174"ID, 0.040"TK, PASSVTD, REGULAR SERIES
53	MS24693-C48	SCREW, MACHINE: 8-32UNC-2A X 3/8, FLAT HEAD, CSK, 100 DEG, CROSS RECESSED, CRES
54	MS51957-45	SCREW, MACHINE: 8-32UNC-2A X 1/2, PAN HEAD, CRES CROSS RECESSED
55	MS51957-77	SCREW, MACHINE: 1/4-20UNC-2A X 3/8, PAN HEAD, CRES CROSS RECESSED
56	MS15795-810	WASHER, FLAT: 0.281 ID, 0.625 OD, 0.065 THK, CRES
57	MS35338-139	WASHER, LOCK: 1/4"NOM ID, SPRING, HELICAL, 300 CRES 0.487"OD, 0.260"ID, 0.062"TK, PASSVTD, REGULAR SERIES
58	MS51958-69	SCREW, MACHINE: 10-32UNF-2A X 1-1/2, PAN HEAD, CRES CROSS RECESSED
59	MS35489-16	GROMMET, NONMETALLIC: SYNTHETIC RUBBER, 13/16" HOLE 1/16"GROOVE, 1-1/16"OD, 9/16"ID, 5/16"THK
60	326-3020-070	SCREW, CAP, HEXAGON HEAD: METRIC, M4X0.7 THD, 10MM LG 304 STAINLESS STEEL, FULLY THREADED
61	310-0010-070	WASHER, FLAT: METRIC, M4 NOM SCREW SZ, CRES, REGULAR 9MM OD, 4.3MM ID, 0.8MM THK, STAINLESS STEEL
62	373-8508-060	WASHER, LOCK: METRIC, M4 NOM SCREW SZ, SPLIT LOCK 7.6MM OD, 4.1MM ID, 0.9MM THK, 304 CRES
B1	009-5151-070	FAN, CIRCULATING: 350CFM @ 0"S.P, 60 HZ, BACKWARD IMPELLER, 7.48"DIA
C1	933-5034-060	CAPACITOR, FIXED, PAPER: 1.5UF
CB1	260-1049-010	CIRCUIT BREAKER: 2 POLE, 30 AMP, 240 VAC, 50/60 HZ HIGH INRUSH, MEDIUM DELAY
CR1	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR2	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR3	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
CR4	353-6442-070	SEMICONDUCTOR DEVICE, DIODE: SILICON, 1AMP, 1000V PRV DO-41 EPOXY PKG, AXIAL LEADS (1N4007)
F1	264-5224-040	FUSE, CARTRIDGE: 12AMP, 60V, CERAMIC BODY, 1/4"X1-1/4" VERY FAST ACTING, SEMICONDUCTOR PROTECTION
F2	264-5224-040	FUSE, CARTRIDGE: 12AMP, 60V, CERAMIC BODY, 1/4"X1-1/4" VERY FAST ACTING, SEMICONDUCTOR PROTECTION
F3	264-5224-040	FUSE, CARTRIDGE: 12AMP, 60V, CERAMIC BODY, 1/4"X1-1/4" VERY FAST ACTING, SEMICONDUCTOR PROTECTION

PL195083-1 AMPLIFIER ASSEMBLY - Continued Rev. A

Ref. Des.	Part No.	Description
F4	264-5224-040	FUSE, CARTRIDGE: 12AMP, 60V, CERAMIC BODY, 1/4"X1-1/4" VERY FAST ACTING, SEMICONDUCTOR PROTECTION
J1	394-0013-010	CONNECTOR, PLUG, ELECTRICAL: COAXIAL, SERIES BNC PUSH-ON, TEFLON DIELECTRIC, FOR RG58/U CABLE
J2	394-0013-010	CONNECTOR, PLUG, ELECTRICAL: COAXIAL, SERIES BNC PUSH-ON, TEFLON DIELECTRIC, FOR RG58/U CABLE
J3	394-0013-010	CONNECTOR, PLUG, ELECTRICAL: COAXIAL, SERIES BNC PUSH-ON, TEFLON DIELECTRIC, FOR RG58/U CABLE
J4	394-0013-010	CONNECTOR, PLUG, ELECTRICAL: COAXIAL, SERIES BNC PUSH-ON, TEFLON DIELECTRIC, FOR RG58/U CABLE
P1	361-5028-060	CONNECTOR, PLUG, ELECTRICAL: 5 #20 SOCKET & 2 #8 CAVITIES, "D"SUB TYPE, 15 CONT SHELL SZ, SOLDER TERM
P2	361-5028-060	CONNECTOR, PLUG, ELECTRICAL: 5 #20 SOCKET & 2 #8 CAVITIES, "D"SUB TYPE, 15 CONT SHELL SZ, SOLDER TERM
P3	361-5028-060	CONNECTOR, PLUG, ELECTRICAL: 5 #20 SOCKET & 2 #8 CAVITIES, "D"SUB TYPE, 15 CONT SHELL SZ, SOLDER TERM
P4	361-5028-060	CONNECTOR, PLUG, ELECTRICAL: 5 #20 SOCKET & 2 #8 CAVITIES, "D"SUB TYPE, 15 CONT SHELL SZ, SOLDER TERM
R1	714-7039-070	RESISTOR, FIXED, FILM: 100 OHM, +-5%, 40 WATT CHIP TYPE, DOUBLE FLANGE MOUNT
R2	714-7051-020	RESISTOR, FIXED, FILM: 100 OHM, +-5%, 250 WATT CHIP TYPE, DOUBLE FLANGE MOUNT
R3	714-7039-060	RESISTOR, FIXED, FILM: 100 OHM, +-5%, 370 WATT CHIP TYPE, DOUBLE FLANGE MOUNT
R4	714-7039-070	RESISTOR, FIXED, FILM: 100 OHM, +-5%, 40 WATT CHIP TYPE, DOUBLE FLANGE MOUNT
R5	714-7039-070	RESISTOR, FIXED, FILM: 100 OHM, +-5%, 40 WATT CHIP TYPE, DOUBLE FLANGE MOUNT
R6	714-7051-020	RESISTOR, FIXED, FILM: 100 OHM, +-5%, 250 WATT CHIP TYPE, DOUBLE FLANGE MOUNT
R7	716-0060-070	RESISTOR, ADJUSTABLE, WIRE WOUND: 25 OHM, +-10%, 100 WATT, 3.16 MAX AMP
TB1	367-0910-000	TERMINAL BOARD: 4 TERMINALS, 20 AMP, 3K VRMS, #6-32 X 1/4 BRASS, NP SCREWS, 16-14 AWG, PHENOLIC
XF1	265-9534-010	FUSEHOLDER: SINGLE POLE, FOR 1/4 X 1-1/4 FUSES
XF2	265-9534-010	FUSEHOLDER: SINGLE POLE, FOR 1/4 X 1-1/4 FUSES
XF3	265-9534-010	FUSEHOLDER: SINGLE POLE, FOR 1/4 X 1-1/4 FUSES
XF4	265-9534-010	FUSEHOLDER: SINGLE POLE, FOR 1/4 X 1-1/4 FUSES

PL195090-1 PANEL, COMPONENT, LEFT **Rev. -**

Ref. Des.	Part No.	Description
2	334-1477-000	NUT, PLAIN, CLINCH: THD SZ 6-32UNC, 0.091-UP THK MATL
3	334-1479-000	NUT, PLAIN, CLINCH: THD SZ 8-32UNC, 0.091-UP THK MATL

PL195129-1 HINGE, METERING AND CONTROL **Rev. -**

Ref. Des.	Part No.	Description
2	MS35825-11C	HINGE, BUTT, CONTINUOUS: 1"LEAF, CRES, 0.125" PIN DIA 0.060" THK, 84" STOCK LENGTH, 1.250 PITCH, UNDRILLED

PL195140-1 CLIP **Rev. -**

Ref. Des.	Part No.	Description
2	195140-2	CLIP
3	334-1479-000	NUT, PLAIN, CLINCH: THD SZ 8-32UNC, 0.091-UP THK MATL

PL195144-1 BRACKET, AMP MOUNTING, TOP **Rev. -**

Ref. Des.	Part No.	Description
2	195144-2	BRACKET, AMP MOUNTING, TOP
3	334-1479-000	NUT, PLAIN, CLINCH: THD SZ 8-32UNC, 0.091-UP THK MATL

PL195153-1 DOOR ASSY, REAR **Rev. -**

Ref. Des.	Part No.	Description
2	195152-1	DOOR, REAR
3	*180155-1	HINGE
4	180156-1	SUPPORT, DOOR

PL195176-1 PANEL, METERING & CONTROL **Rev. -**

Ref. Des.	Part No.	Description
2	195176-2	PANEL, METERING & CONTROL
3	330-4926-000	STUD, CAPTIVE, SELF CLINCHING: 6-32UNC-2A X 1/2", CRES

PL195184-1 ENCLOSURE, AMPLIFIER **Rev. -**

Ref. Des.	Part No.	Description
2	334-1479-000	NUT, PLAIN, CLINCH: THD SZ 8-32UNC, 0.091-UP THK MATL
3	334-1477-000	NUT, PLAIN, CLINCH: THD SZ 6-32UNC, 0.091-UP THK MATL

PL195185-1 BRACKET, AMP MOUNTING **Rev. -**

Ref. Des.	Part No.	Description
2	334-1479-000	NUT, PLAIN, CLINCH: THD SZ 8-32UNC, 0.091-UP THK MATL

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SECTION 7 - SCHEMATIC DIAGRAMS

7-1. INTRODUCTION

This section of the Operation and Maintenance manual contains schematic diagrams for the 814K, 1 kW, FM Transmitter. Drawings have been reduced from large format engineering drawings.

Schematics are arranged in ascending reference designator number order. An index of schematics is provided in Table 7-1.

TABLE 7-1. Index of Schematic Diagrams

Schematic No.	Rev.	Description	Ref. Des.
195032	-	Transmitter 814K	-
180311	A	Remote Control, CCA	A1A1
195077	A	Control Card, CCA	A1A2
195080	D	Metering Card, CCA	A1A3
189397	A	Amplifier Module	AR1-AR4
189214	B	RF, CCA	AR1A1-AR4A1
189211	C	Control, CCA	AR1A2-AR4A2
195194	-	Control Ladder	Ref.

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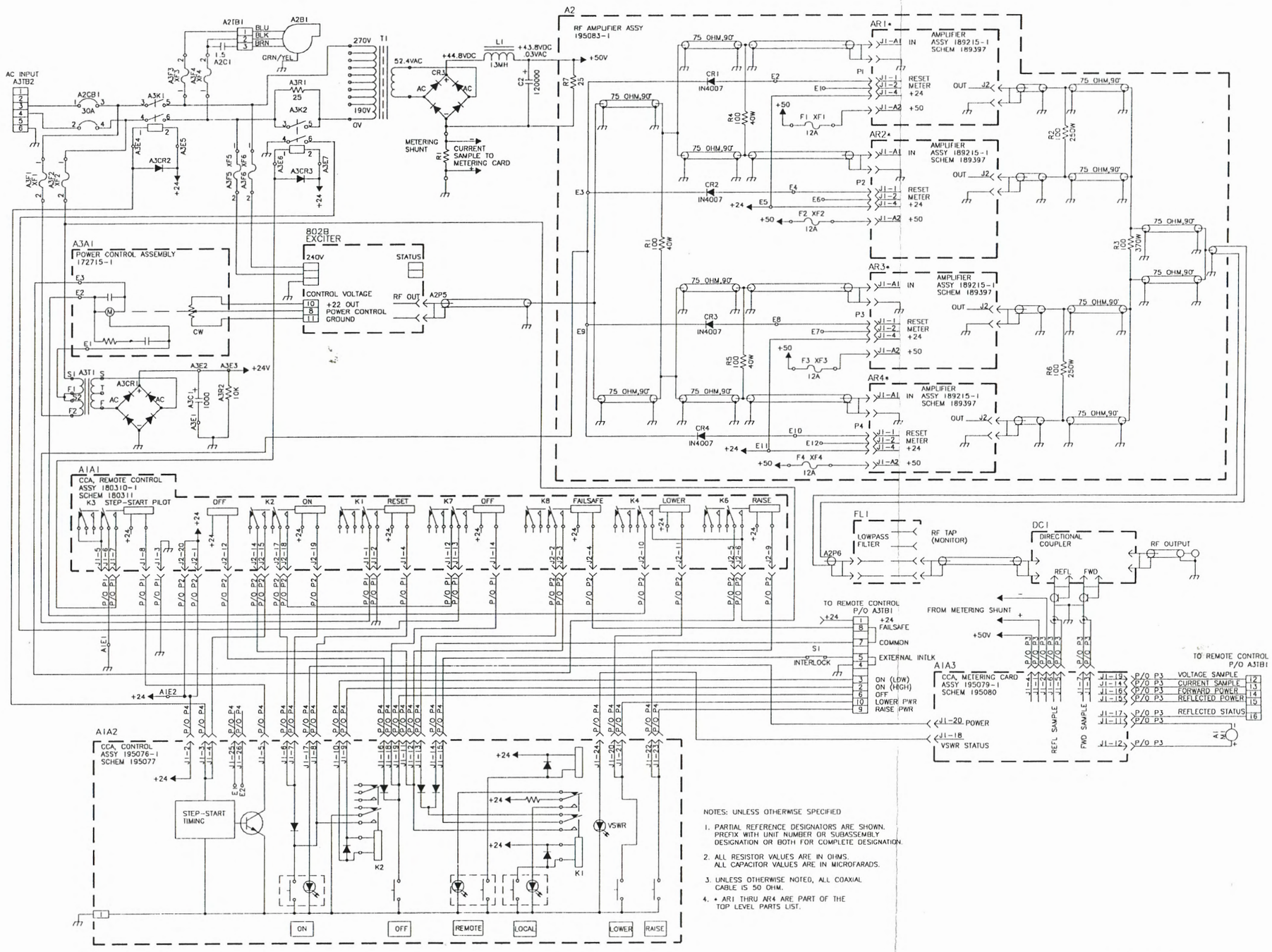
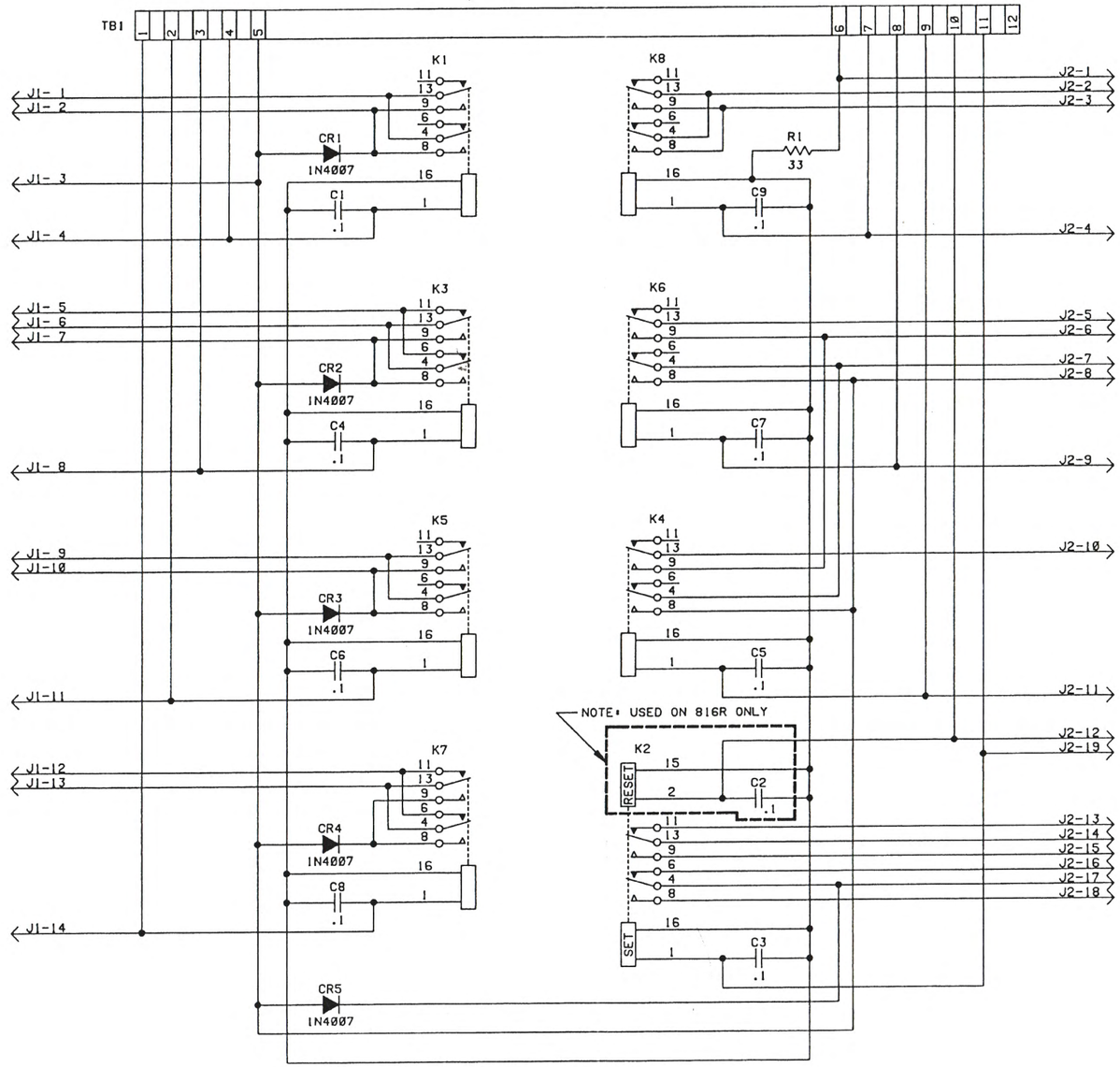


NOTES: UNLESS OTHERWISE SPECIFIED

1. PARTIAL REFERENCE DESIGNATORS ARE SHOWN. PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION OR BOTH FOR COMPLETE DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS. ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. UNLESS OTHERWISE NOTED, ALL COAXIAL CABLE IS 50 OHM.
4. * AR1 THRU AR4 ARE PART OF THE TOP LEVEL PARTS LIST.

99G0169

195032 Rev. -
Figure 7-1. 814K Transmitter



SPARE PINS

J2-20

J1-15
J1-16
J1-17
J1-18
J1-19
J1-20

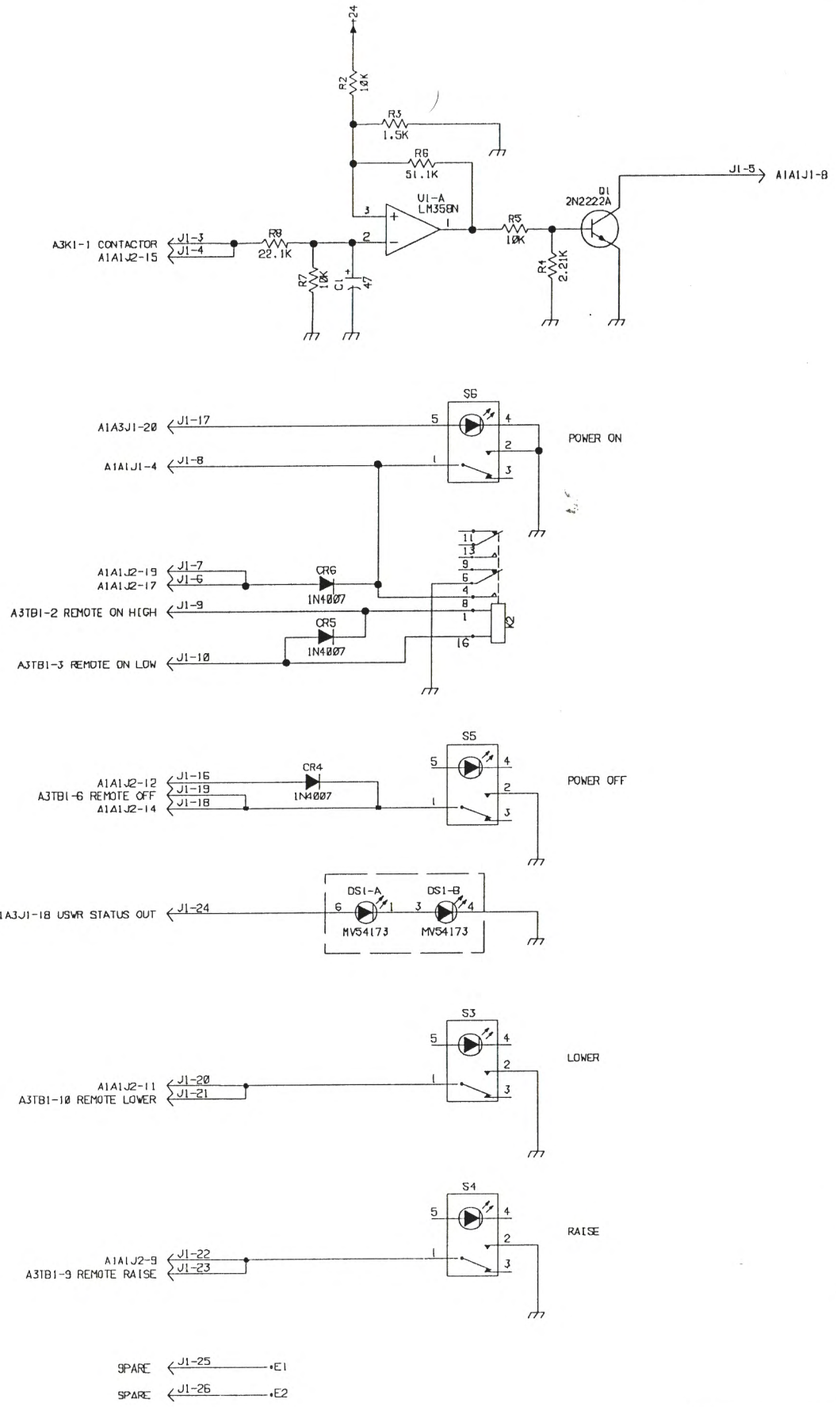
NOTES: UNLESS OTHERWISE SPECIFIED

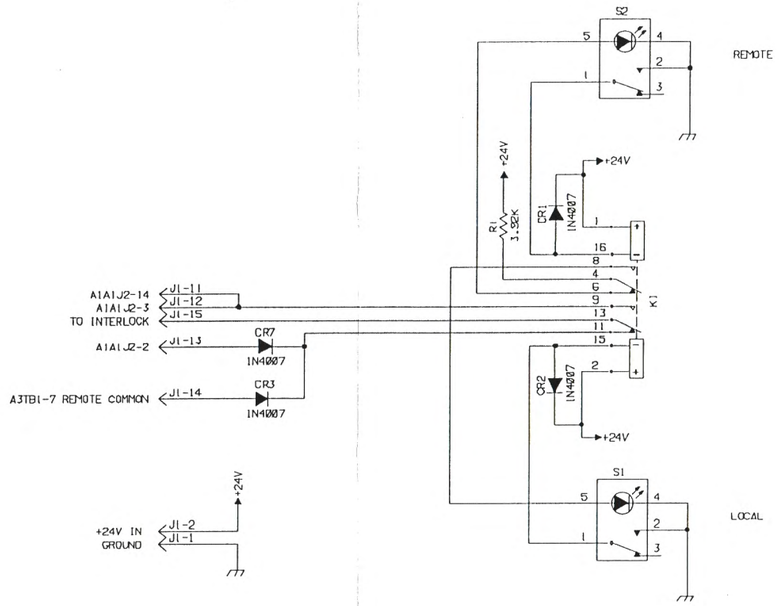
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION OR BOTH FOR COMPLETE DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, ALL CAPACITOR VALUES ARE IN MICROFARADS.

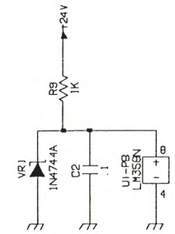
99G0181

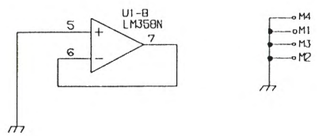
180311 Rev. A

Figure 7-2. Remote Control, CCA



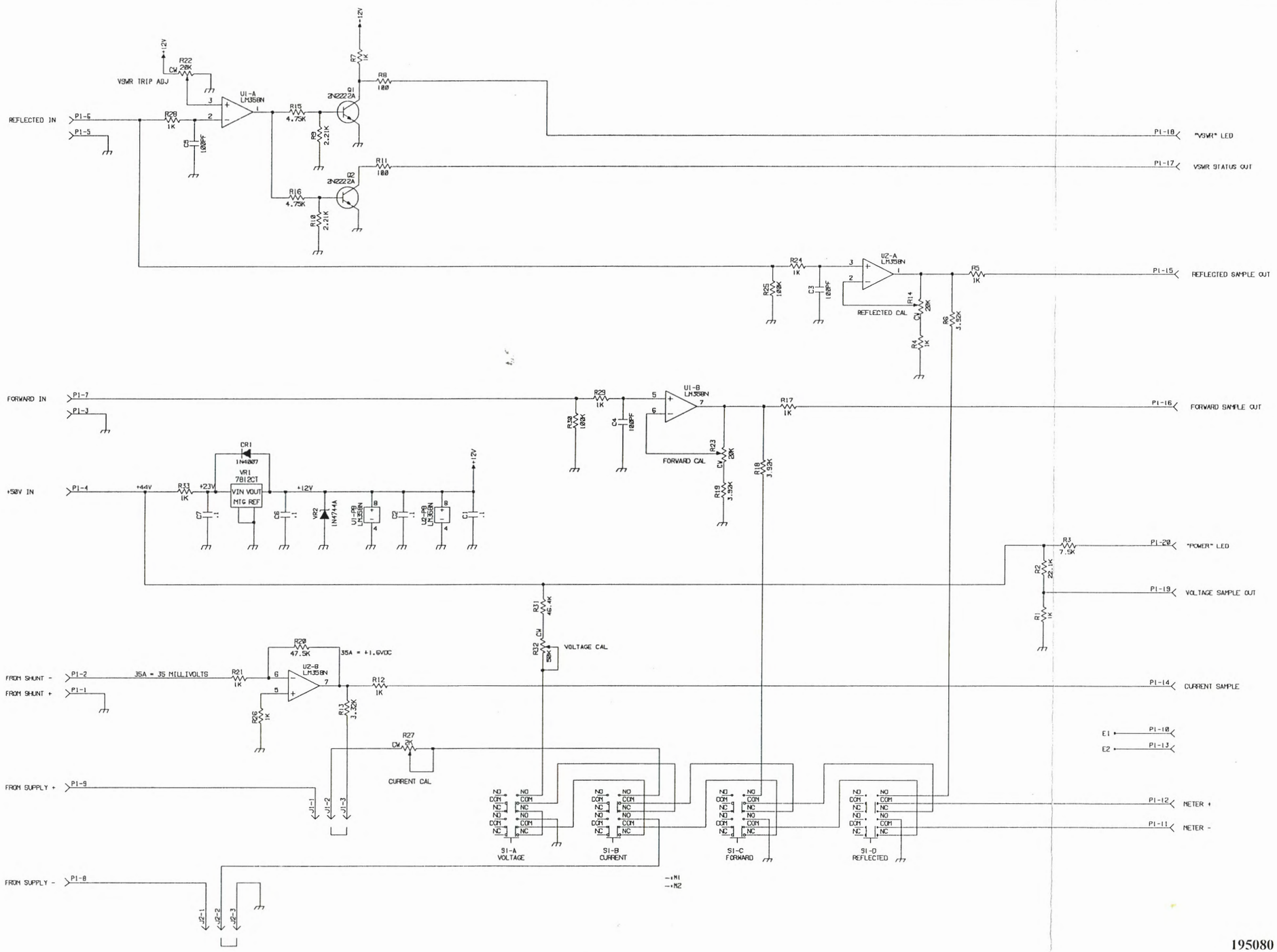






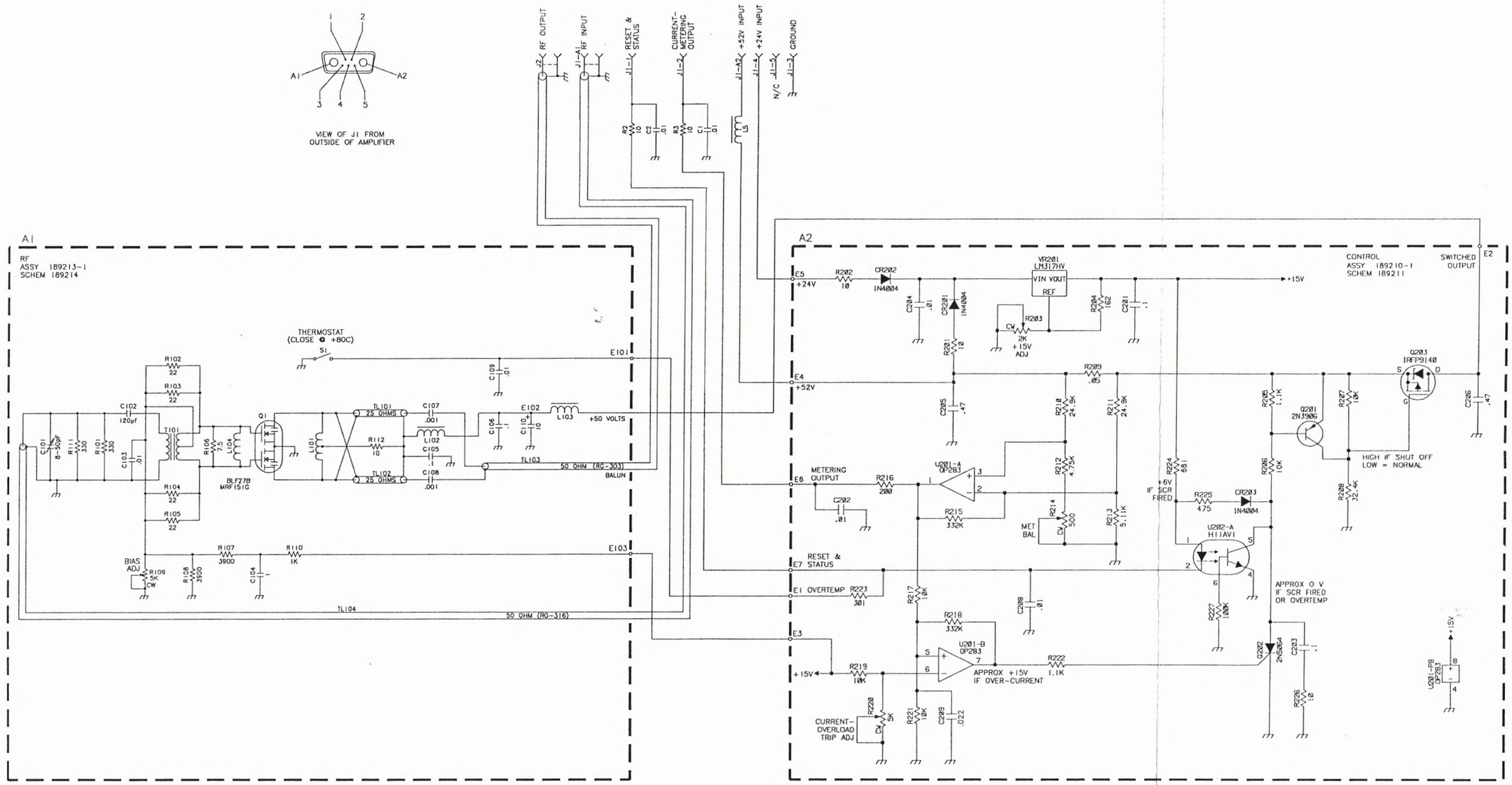
98G0174

195077 Rev. A
Figure 7-3. Control Card, CCA



195080 Rev. D
Figure 7-4. Metering Card, CCA

99G0176



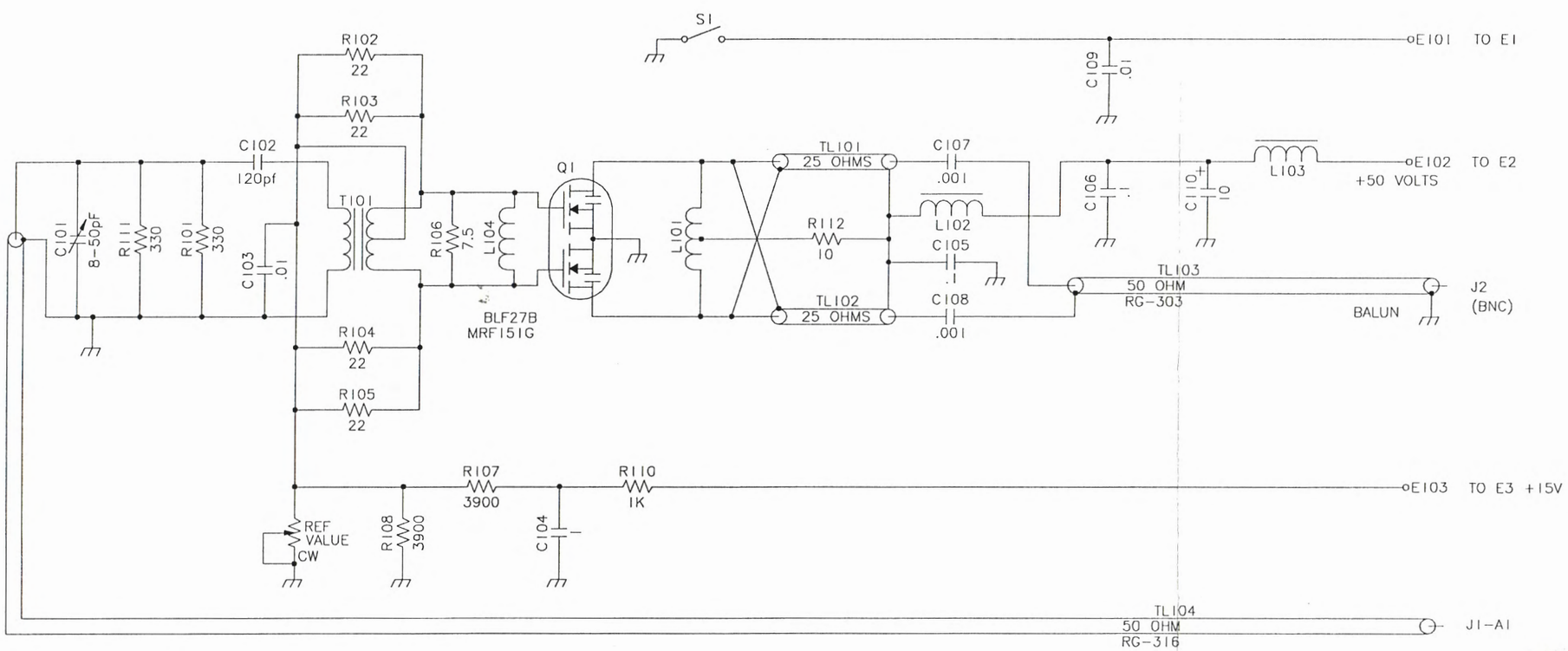
NOTES: UNLESS OTHERWISE SPECIFIED

1. PARTIAL REFERENCE DESIGNATORS ARE SHOWN. PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION OR BOTH FOR COMPLETE DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS. ALL CAPACITOR VALUES ARE IN MICROFARADS.

99G0170

189397 Rev. A

Figure 7-5. Amplifier Module

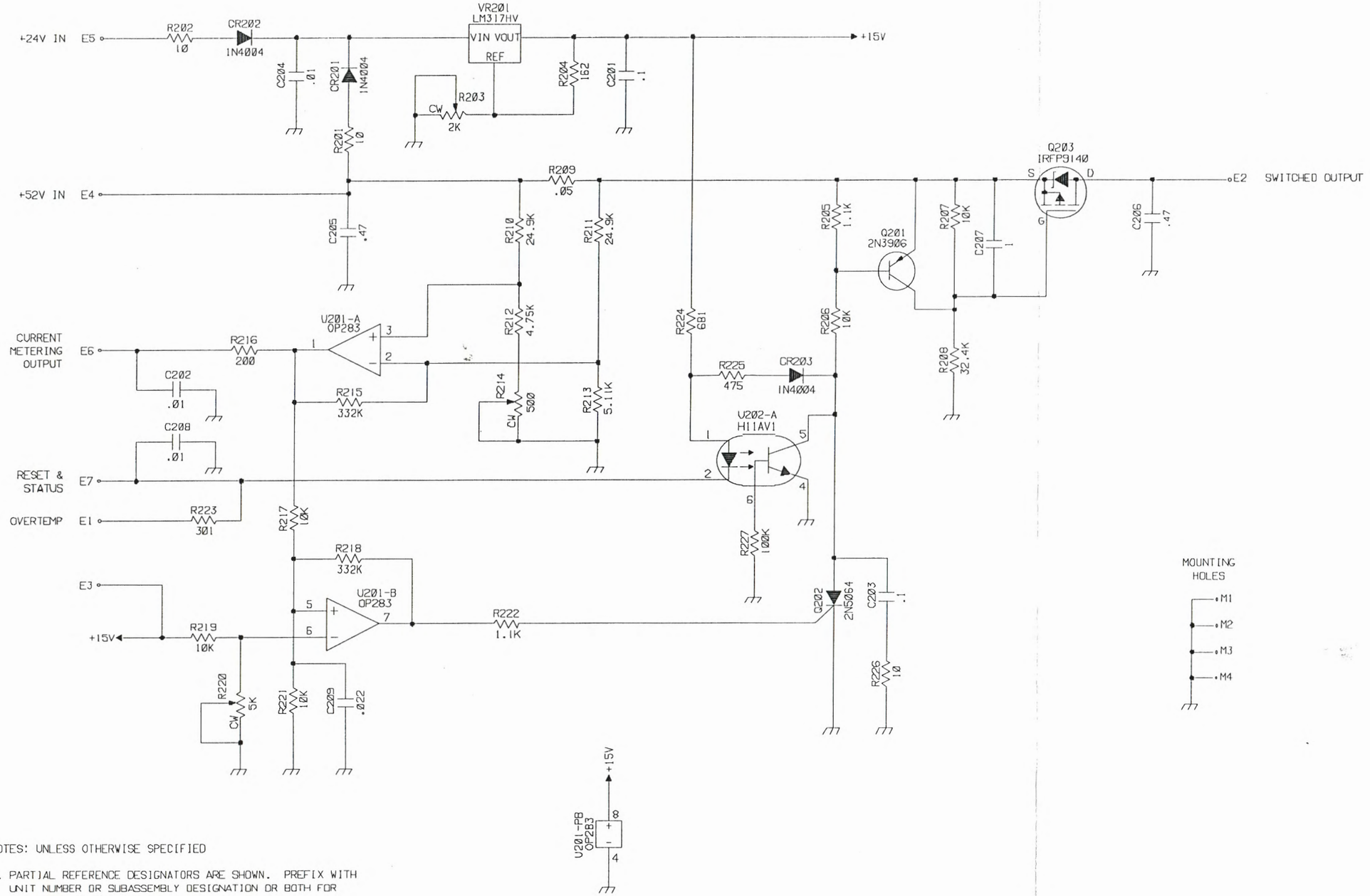


NOTES: UNLESS OTHERWISE SPECIFIED

1. PARTIAL REFERENCE DESIGNATORS ARE SHOWN. PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION OR BOTH FOR COMPLETE DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS. ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. TL104, Q1 AND S1 ARE FOR REFERENCE ONLY.

99G0172

189214 Rev. B
Figure 7-6. RF, CCA



NOTES: UNLESS OTHERWISE SPECIFIED

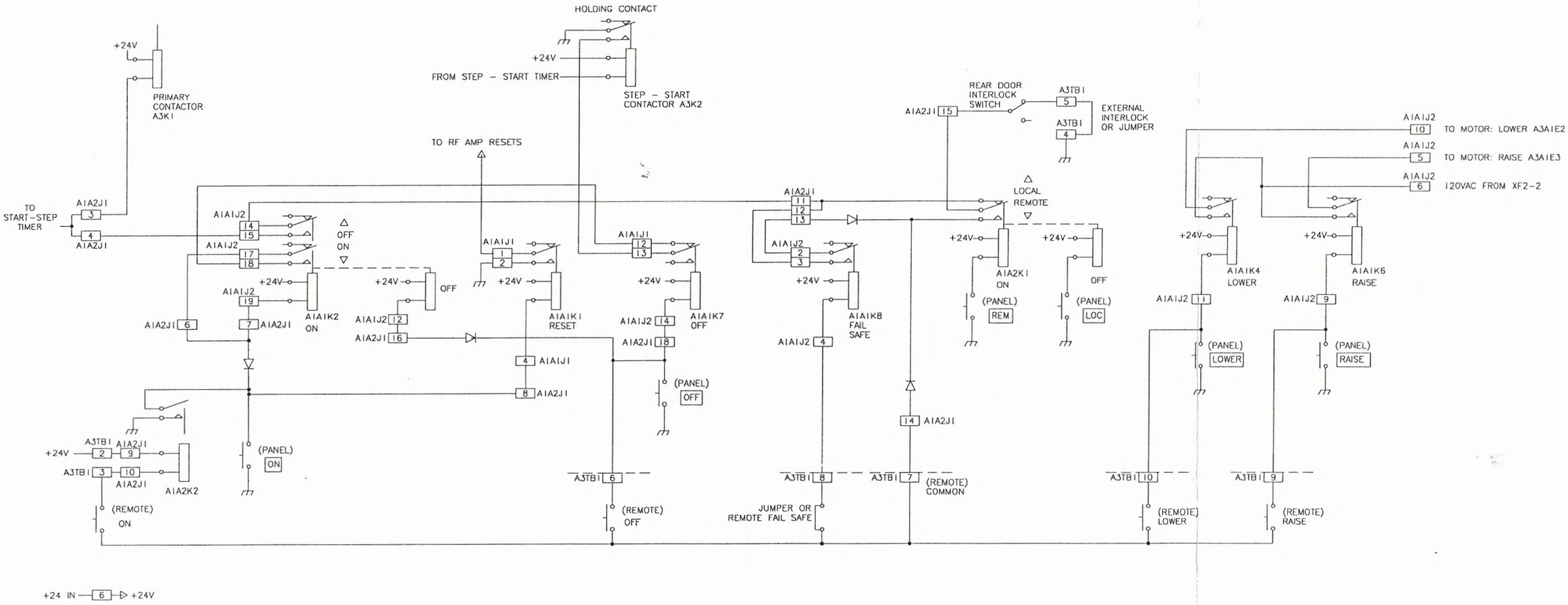
1. PARTIAL REFERENCE DESIGNATORS ARE SHOWN. PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION OR BOTH FOR COMPLETE DESIGNATION.

2. ALL RESISTOR VALUES ARE IN OHMS. ALL CAPACITOR VALUES ARE IN MICROFARADS.

3. E1 THRU E7 ARE FOR REFERENCE ONLY.

99G0175

189211 Rev. C
Figure 7-7. Control, CCA



99G0171

195194 Rev. -

Figure 7-8. Control Ladder