PREDATOR
50W AND 250W
DIGITAL FM
EXCITER/TRANSMITTER

September, 1999 **IM No. 597–8000**

IMPORTANT INFORMATION

EQUIPMENT LOST OR DAMAGED IN TRANSIT.

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

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

RF PRODUCT TECHNICAL ASSISTANCE – REPAIR SERVICE – REPLACEMENT PARTS.

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

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

FACILITY CONTACTS –

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

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

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

NON–EMERGENCY REPLACEMENT PARTS –

Fax: (217) 224–9609

RETURN, REPAIR, AND EXCHANGES.

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

WARRANTY ADJUSTMENT.

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

PROPRIETARY NOTICE.

MODIFICATIONS.

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

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SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. Information presented by this section provides a description of the PREDATOR digital FM exciter features and lists equipment specifications.

1-3. EQUIPMENT DESCRIPTION.

1-4. GENERAL.

1-5. The Broadcast Electronics PREDATOR is a solid-state wideband FM digital exciter providing a continuously variable RF output at any frequency within the 87.5 to 108 MHz FM broadcast band in 100 kHz increments (see Figure 1-1). The PREDATOR circuitry is divided into several modular assemblies. The exciter modules include: 1) a digital exciter module, 2) a controller module, 3) a 50 watt power supply/RF power amplifier module, 4) a 250 watt power supply/RF power amplifier module, 5) a digital stereo generator module, and 6) an analog interface module.

1-6. The modular design allows the exciter to be purchased in several configurations. A 50 or 250 watt power supply/RF amplifier module allows the PREDATOR to provide the appropriate RF level for the transmitter. Each power supply module features a continuously variable RF amplifier stage. The analog interface input module allows a composite analog signal to be applied to the digital exciter circuitry. Digital AES/EBU audio is applied to the digital exciter circuitry using the digital stereo generator module. The digital exciter module features an RF circuit with a numerically-controlled-oscillator (NCO) and a two-stage up-converter. Control and monitoring of the PREDATOR circuitry is performed by the controller module. The modules are housed in a chassis requiring 7 inches of a 19 inch rack cabinet.

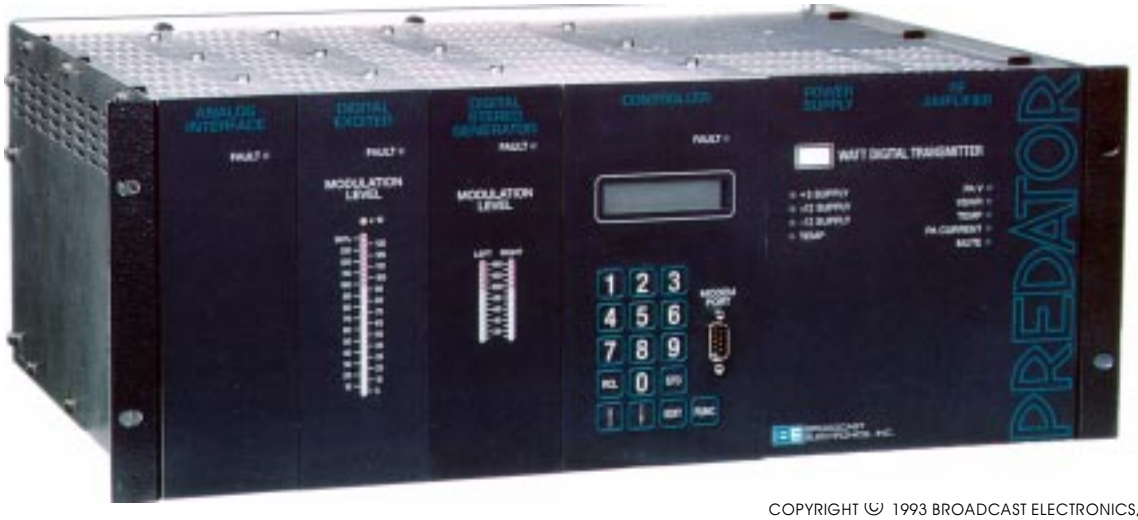

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FIGURE 1-1. PREDATOR DIGITAL EXCITER

1–7. **DIGITAL EXCITER MODULE.**

1–8. The digital exciter module generates a modulated RF carrier signal for application to the power supply/RF amplifier module using a two–stage up–converter. An IF frequency is generated by a numerically–controlled–oscillator (NCO). The NCO produces an extremely accurate and stable digitally modulated 5.2 MHz IF signal. A digital–to–analog–converter (DAC) converts the digital signal to an analog signal for application to a two–stage up–converter. The up–converter uses two mixers. Each mixer is equipped with a phase–locked–loop (PLL) voltage–controlled–oscillator.

1–9. The exciter carrier frequency is selected by the controller module. The controller module outputs a carrier frequency number to a PLL circuit on the digital exciter module. The controller also monitors the operation of the exciter module. Samples from the exciter such as power supply voltages and VCO lock information are routed to a multiplexer circuit. The multiplexer circuit is controlled by a serial interface circuit. The serial interface circuit is used to transmit exciter data to the controller when requested.

1–10. Audio is applied to the exciter module using a 608 ksps (kilo–samples–per–second) digital composite signal. The signal is applied to a 4:1 interpolater. The interpolater increases the sampling rate to 2.432 MHz to allow the use of precision surface–acoustic–wave (SAW) filters. The SAW filters provide sharp attenuation and a flat group delay response.

1–11. The module is equipped with a front–panel color coded moving bar LED modulation display. The display allows the monitoring of modulation levels in 5% increments.

1–12. **POWER SUPPLY/RF AMPLIFIER MODULE.**

1–13. The power supply/RF amplifier module is equipped with two modular switching power supply assemblies and an RF amplifier assembly. A low–voltage switching power supply assembly provides +5V and ±12V supplies to each module. A second switching power supply assembly provides operating potentials to the PA circuitry.

1–14. The module is available in two configurations and designed to output a continuously variable RF output level. The configurations include a 50 watt module and a 250 watt module. Samples of the module forward and reflected power are generated by a directional coupler circuit and routed to the power supply circuit board for processing.

1–15. The RF output power level is controlled by the controller module. Samples such as PA voltage, PA current, forward power, reflected power, and temperature are routed to the controller module over a control circuit. The circuit automatically adjusts the output power level in response to high PA current, reflected power, and temperature conditions.

1–16. **DIGITAL STEREO GENERATOR MODULE.**

1–17. The digital stereo generator module is designed to accept digital AES/EBU audio from a digital STL receiver. The signal: 1) can consist of any sample rate from 32 kHz to 56 kHz and 2) must be uncompressed. The digital audio can be applied to the unit using: 1) an XLR connector or 2) a Toshiba optical connector. Selection of the digital connectors is performed using the controller module.

1–18. AES/EBU is a serial digital audio data format standard used for the transfer of digital data between audio sources, consoles, and transmitting equipment (refer to Figure 1–2). The signal can be transmitted using RS–422 circuitry and a twisted pair conductor or an optical interface.

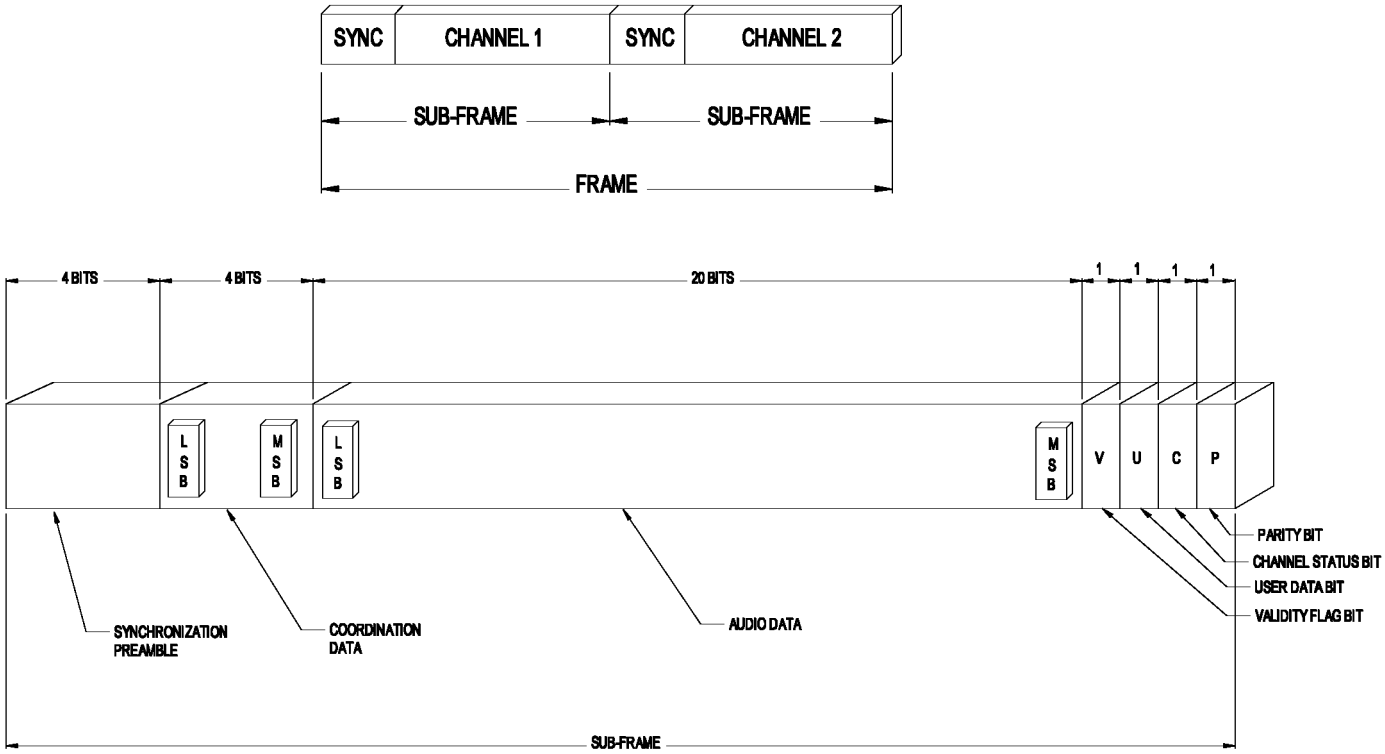

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FIGURE 1-2. AES/EBU SIGNAL FORMAT

1-19. An AES/EBU signal is divided into two formats: 1) AES/EBU and 2) AES/EBU consumer. The digital stereo generator module is designed with the normal AES/EBU format. The AES/EBU signal is constructed using a frame. Each frame consists of two sub-frames. The sub-frames contain digital information for 2 channels. Each sub-frame consists of: 1) a 4-bit synchronization preamble, 2) 4-bits of auxiliary data, 3) 20 bits of audio data, 4) a parity bit, 5) a validity bit, 6) a user bit, and 7) a channel status bit.

1-20. The AES/EBU signal must be uncompressed and can consist of several different sample rates. The rates range from 32 kHz to 56 kHz. A typical sample rate is 32 kHz. If compression such as MPEG is used at any location in the audio chain from the cut recording to the input to the module, over-shoots will occur when the signal is uncompressed and will remain in the digital format. To remove the overshoots, the module is equipped with a limiter circuit. The limiter removes the overshoots to maintain optimum audio signal quality.

1-21. The digital stereo generator module is also equipped with: 1) 2 SCA input connectors, 2) an RBDS input connector, and 3) a 19 kHz output connector. The SCA connectors provide the interfacing for analog SCA units. The RBDS input is provided for the data output of an RBDS encoder. The 19 kHz output is provided as a reference for the RBDS encoder unit.

1-22. CONTROLLER MODULE.

1-23. All PREDATOR control and monitoring functions are performed by the controller module. The controller module performs the following functions:

1. Selects the exciter operating frequency, frequency deviation, and output power.
2. Monitors and displays the status of module operating parameters consisting of module voltages, operating configurations, and power indications. The parameters can be displayed locally using the front-panel LCD display or a computer.
3. Performs automatic power control operations. The controller will automatically foldback power in response to high PA current, reflected power, and temperature conditions.
4. Mutes the exciter RF output.

1-24. The module is equipped with an 80C320 microprocessor, 2 modem ports, a front-panel keypad. The controller is designed for local and remote control operation. Local operation is accomplished using a: 1) front-panel keypad or 2) a computer connected to one of the modem ports. Remote operation is accomplished using any modern remote control device. An optional N+1 circuit board allows the exciter to be automatically programmed for any one of 10 different frequencies. This allows a solid-state transmitter to be used as a back-up for any one of ten transmitters at a site.

1-25. **ANALOG INTERFACE MODULE.**

1-26. Analog audio sources are interfaced to the digital exciter circuitry by the analog interface module. The module is equipped with: 1) a balanced analog monophonic input, 2) an analog composite input, 3) two analog SCA inputs, and 4) an RBDS input. The monophonic and composite inputs provide interfacing for analog audio. The SCA connectors provide the interfacing for analog SCA units. The RBDS input is provided for the data output of an RBDS encoder.

1-27. An analog-to-digital converter circuit converts the analog signal to a digital signal for application to the exciter circuit board. Monitoring of module parameters such as operating voltages is provided by a monitoring circuit. The circuit is controlled by the controller module.

1-28. **PHYSICAL DESCRIPTION.**

1-29. The PREDATOR is a modular device. All the exciter circuitry is housed in five modules. Access to the circuitry is provided by removing the modules. A motherboard provides communication between the modules. Input and output connections are provided by BNC connectors, Type N connectors, and D-type connectors.

1-30. APPLICATIONS.

1-31. The PREDATOR is primarily used as an exciter in an FM transmitter. The PREDATOR can also be used as a low power transmitter. However, the PREDATOR is extremely versatile and can be used in a variety of other applications. The following text presents some typical PREDATOR applications.

1-32. **GPS SYNCHRONIZATION - BOOSTER SITES.**

1-33. The PREDATOR can be synchronized to an external reference such as the GPS (global position system) for booster sites. This allows a booster site to simulcast audio from the main transmitter on the same frequency. A jumper on the exciter circuit board allows the unit to be synchronized to the internal 10 MHz reference or an external 10 MHz reference.

1-34. **AUTOMATIC ANALOG BACKUP OPERATION.**

1-35. With the installation of a digital stereo generator module and an analog interface module, the PREDATOR can provide automatic analog backup operation. In the event of a failure in the digital AES/EBU audio signal, the PREDATOR will automatically switch to an analog input applied to the analog interface module. When the failure in the digital AES/EBU signal clears, the PREDATOR will automatically switch to the digital input.

1–36. **N+1 OPERATION.**

1–37. N+1 operation is the ability of an exciter or other device to switch to a number of pre–defined frequencies (refer to Figure 1–3). When the exciter is installed in a frequency agile transmitter, the transmitter can function as a backup to any one of several transmitters at a site.

1–38. This powerful function is provided by the PREDATOR N+1 option. The option consists of a circuit board which plugs directly into the controller module. When installed in a system with a Broadcast Electronics Solid–State C–Series transmitter, the transmitter can be configured to any one of 10 different frequencies to provide emergency operation in the event of a failure in a main transmitter.

1–39. EXCITER CONFIGURATIONS, OPTIONS, AND ACCESSORIES.

1–40. The PREDATOR digital FM exciter is available in several configurations. Refer to the following list for various digital exciter models, spare parts kits, and available options.

PART NO.	DESCRIPTION
909–8050	PREDATOR 50 Watt FM Digital Exciter And Digital AES/EBU Input, 100V to 240V 50/60 Hz ac Operation.
909–8250	PREDATOR 250 Watt FM Digital Exciter And Digital AES/EBU Input, 100V to 240V 50/60 Hz ac Operation.
909–8051	PREDATOR 50 Watt FM Digital Exciter And Analog Composite Input, 100V to 240V 50/60 Hz ac Operation.
909–8251	PREDATOR 250 Watt FM Digital Exciter And Analog Composite Input, 100V to 240V 50/60 Hz ac Operation.
909–8053	PREDATOR 50 Watt FM Digital Exciter, Analog Composite Input, And Digital AES/EBU Input 100V to 240V 50/60 Hz ac Operation.
909–8253	PREDATOR 250 Watt FM Digital Exciter, Analog Composite Input, And Digital AES/EBU Input 100V to 240V 50/60 Hz ac Operation.
959–0361	PREDATOR Controller Module With N+1 Option.
979–8050	Spare Parts Kit, PREDATOR 50W Power Supply/RF Amplifier Module.
979–8250	Spare Parts Kit, PREDATOR 250W Power Supply/RF Amplifier Module.
979–8052	Spare Parts Kit, PREDATOR Analog Interface Module.
979–8053	Spare Parts Kit, PREDATOR Digital Stereo Generator Module.
979–8055	Spare Parts Kit, PREDATOR Controller Module.

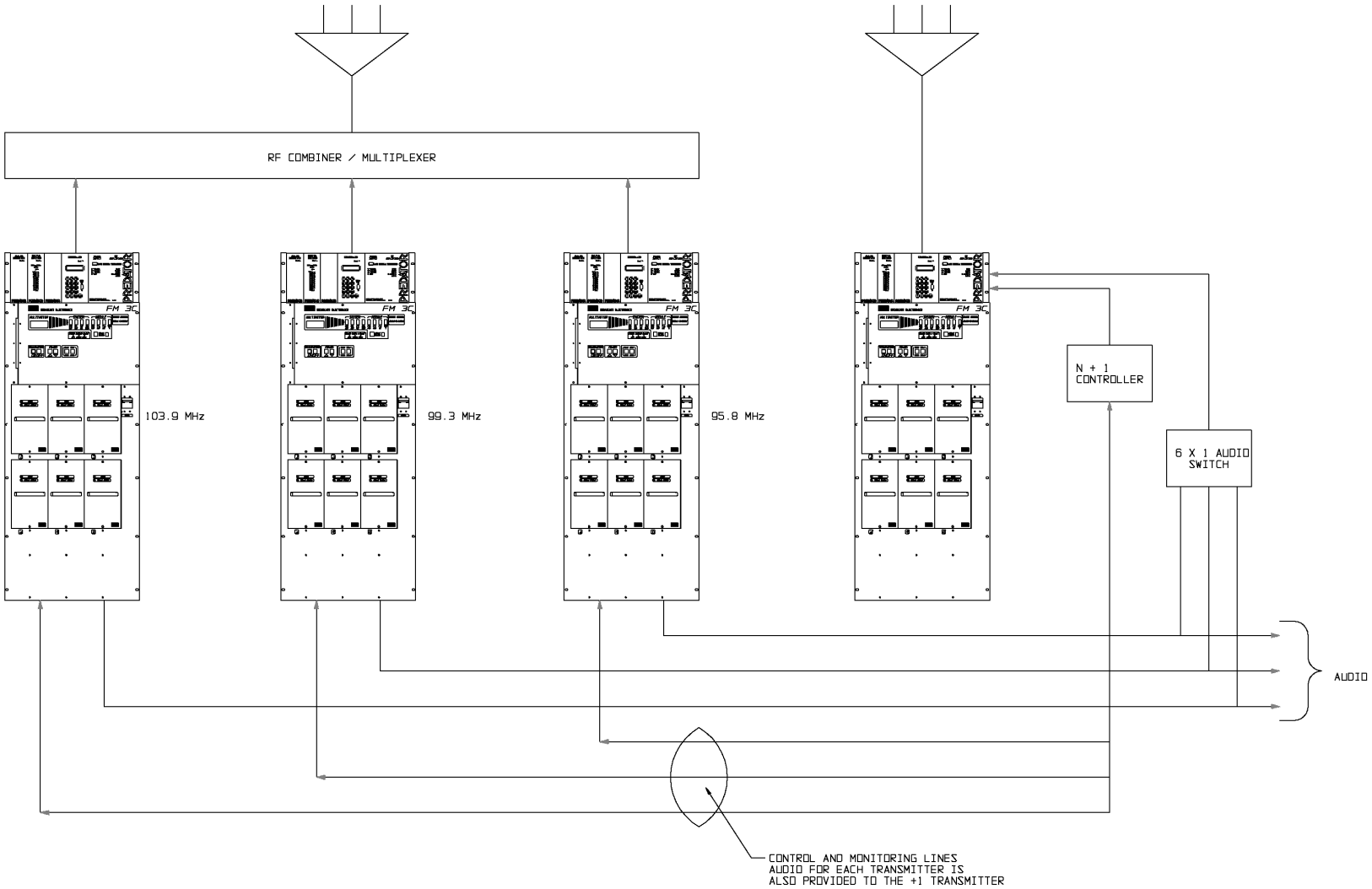

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FIGURE 1-3. N+1 TRANSMITTER SYSTEM

1-41. EQUIPMENT SPECIFICATIONS.

1-42. Refer to Table 1-1 for electrical specifications and Table 1-2 for physical and environmental specifications of the PREDATOR digital FM exciter.

TABLE 1-1. PREDATOR DIGITAL EXCITER SPECIFICATIONS
(Sheet 1 of 4)

PARAMETER	SPECIFICATIONS
AC INPUT POWER REQUIREMENTS	100V to 240V ac 50/60 Hz, single phase.
RF OUTPUT IMPEDANCE	50 Ohms.
POWER OUTPUT	
50 Watt Module	5 Watts to 50 Watts, continuously variable. Type "N" female connector.
250 Watt Module	25 Watts to 250 Watts, continuously variable. Type "N" female connector.
R.F. HARMONIC AND SPURIOUS SUPPRESSION (CONDUCTED)	Meets or exceeds all FCC, DOC, and CCIR standards. Low-pass filter included in transmitter models.
FREQUENCY RANGE	87.5 MHz to 108 MHz digitally programmable in 100 kHz increments.
FREQUENCY STABILITY	±150 Hz, +32°F to +122°F (0°C to +50°C). Can be locked to an external reference source such as GPS (global positioning system).
MODULATION TYPE	FM, generated digitally using a 32-Bit numerically controlled oscillator.
MODULATION CAPABILITY	±399 kHz maximum.
MODULATION INDICATION	Digital peak reading, color-coded, LED display with baseband over-modulation indicator. Accuracy to 0.25%.
ASYNCHRONOUS AM SIGNAL-TO-NOISE RATIO	70 dB below an equivalent reference carrier with 100% amplitude modulation @ 400 Hz and 75 microsecond deemphasis (no FM modulation present).
SYNCHRONOUS AM SIGNAL-TO-NOISE RATIO	60 dB below an equivalent reference carrier with 100% amplitude modulation @ 1 kHz (FM modulation: ±75 kHz @ 400 Hz).
VSWR	Rated power into 1.5:1 maximum without output matching. Capable of operating into higher VSWR with automatic power reduction. Open and short circuit protected at all phase angles.

TABLE 1-1. PREDATOR DIGITAL EXCITER SPECIFICATIONS
(Sheet 2 of 4)

PARAMETER	SPECIFICATIONS
PRE-EMPHASIS	
Analog Interface Module	FCC 75 uS, CCIR 50 uS, Dolby 25 uS, or flat response, selectable.
Digital Stereo Generator Module	FCC 75 uS, CCIR 50 uS, Or flat response, selectable.
OVERALL EFFICIENCY	
50 Watt Models	25% at 50 Watts. 27% typical at 50 Watts.
250 Watt Models	40% at 250 Watts. 46% typical at 250 Watts.
WIDEBAND COMPOSITE OPERATION - Analog Interface Module	
COMPOSITE INPUT	Balanced, BNC connector.
COMPOSITE INPUT IMPEDANCE	10 k Ohm or 50 Ohm, nominal, resistive, selectable.
COMPOSITE INPUT LEVEL	3.5V p-p nominal, for ±75 kHz deviation.
COMPOSITE FM SIGNAL-TO-NOISE RATIO	
50 Watt Models	93 dB below ±75 kHz deviation @ 400 Hz. Measured within a 20 Hz to 80 kHz bandwidth with 75 microsecond deemphasis, A weighted.
250 Watt Models	90 dB below ±75 kHz deviation @ 400 Hz. Measured within a 20 Hz to 80 kHz bandwidth with 75 microsecond deemphasis, A weighted.
COMPOSITE HARMONIC DISTORTION PLUS NOISE	0.005% or less at 400 Hz.
COMPOSITE SMPTE INTER-MODULATION DISTORTION	0.007% or less, 60 Hz/7 kHz, 1:1 ratio.
COMPOSITE CCIF INTERMODULATION DISTORTION	0.005% or less, 15 kHz/14 kHz, 1:1 ratio.
COMPOSITE AMPLITUDE RESPONSE	±0.05 dB, 30 Hz to 53 kHz.
COMPOSITE PHASE RESPONSE	±0.1° from linear phase, 30 Hz to 53 kHz.
COMPOSITE GROUP DELAY VARIATION	±40 nanoseconds, 30 Hz to 100 kHz.
STEREO SEPARATION	65 dB or better from 30 to 15,000 Hz (sine wave).
STEREO OPERATION - Digital Stereo Generator Module	
DIGITAL AUDIO INPUT	
Format	AES/EBU.
Connectors	XLR and Toshiba optical connectors.

TABLE 1-1. PREDATOR DIGITAL EXCITER SPECIFICATIONS
(Sheet 3 of 4)

PARAMETER	SPECIFICATIONS
STEREO OPERATION - **Digital Stereo Generator Module (Con't)**	
Impedance	100 Ohms, resistive.
Level	-2 dBfs nominal for 100% modulation.
FREQUENCY RESPONSE	±0.5 dB, 20 to 15,000 Hz, 75 uS pre-emphasis (Flat or 50 uS pre-emphasis selectable).
TOTAL HARMONIC DISTORTION	0.03% or less from 30 to 15,000 Hz.
SMPTE INTERMODULATION DISTORTION.	0.03%, 60 Hz/7 kHz; 4:1 ratio
COMPOSITE CCIF INTERMODULATION DISTORTION	0.03% or less, 15 kHz/14 kHz; 1:1 ratio.
STEREO SEPARATION	65 dB or better from 20 to 15,000 Hz (Sine Wave).
LINEAR CROSSTALK	Main to Sub (L+R to L-R), 20 to 15,000 Hz, 60 dB minimum below 100% modulation. Sub to Main, 20 to 15,000 Hz. 60 dB minimum below 100% modulation.
FM NOISE	83 dB or better below 100% modulation at 400 Hz, 75 uS deemphasis, A weighted.
PILOT STABILITY	±0.3 Hz, +32°F to +122°F (0°C to +50°C).
DYNAMIC STEREO SEPARATION	60 dB or better from 20 to 15,000 Hz (normal program content).
38 kHz SUPPRESSION	80 dB minimum below 100% modulation.
57 kHz, 76 kHz, and 95 kHz SUPPRESSION	80 dB minimum below 100% modulation.
SPURIOUS AND SIDEBAND SUPPRESSION beyond 95 kHz	75 dB minimum below 100% modulation.
MODES OF OPERATION	Stereo, Mono L+R, Mono L, and Mono R. Remote control accessible.
MONAURAL OPERATION - **Audio Input Module**	
AUDIO INPUT IMPEDANCE	10 k or 600 Ohms selectable, balanced, resistive, 60 dB common mode suppression.
AUDIO INPUT LEVEL	+10 dBm nominal for ±75 kHz deviation @ 400 Hz, adaptable to other levels.
AUDIO FREQUENCY RESPONSE	±0.5 dB, 30 Hz to 15 kHz, selectable flat, 25, 50 or 75 microsecond pre-emphasis.

TABLE 1-1. PREDATOR DIGITAL EXCITER SPECIFICATIONS
(Sheet 4 of 4)

PARAMETER	SPECIFICATIONS
MONAURAL OPERATION - Audio Input Module (Con't)	
HARMONIC DISTORTION PLUS NOISE	0.03% or less at 400 Hz.
SMPTE INTERMODULATION DISTORTION	0.03% or less, 60 Hz To 7 kHz, 4:1 ratio.
CCIF INTERMODULATION DISTORTION	0.03% or less, 15 kHz/14 kHz 1:1 ratio.
FM SIGNAL-TO-NOISE RATIO	93 dB below ±75 kHz deviation @ 400 Hz measured in a 20 Hz to 22 kHz bandwidth with 75 microsecond de-emphasis, A weighted.
SCA OPERATION - Analog Interface Or Digital Stereo Generator Module	
INPUT	2 Total, BNC connectors. SCA INPUT 2 Configurable for SCA or wideband audio input.
INPUT IMPEDANCE	10 k Ohms, unbalanced.
INPUT LEVEL	3.5V p-p nominal for 10% deviation.
SCA AMPLITUDE RESPONSE	±0.2 dB, 40 kHz to 100 kHz.
RBDS OPERATION - Analog Interface Or Digital Stereo Generator Module	
INPUT	1, BNC connector.
INPUT IMPEDANCE	10 k Ohms, unbalanced.
19 kHz REFERENCE OUTPUT (Digital Stereo Generator Module Only)	
Level	2.5V p-p sine wave.
Impedance	50 Ohms, resistive.
Phase Adjustment Range	-10° to +70°, referenced to the pilot.

NOTE All specifications measured using the Broadcast Electronics PREDATOR analog input module, PREDATOR digital stereo generator module, a Belar FMSA-1 Precision Digital FM stereo modulation analyzer, a Belar FMM-2 FM Demodulator, and Audio Precision APWin software version 1.4.

TABLE 1-2. PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS

PARAMETER	SPECIFICATION
PHYSICAL	
WEIGHT (UNPACKED)	26 Pounds (11.8 kg).
DIMENSIONS:	
HEIGHT	7 Inches (17.78 cm).
WIDTH	19.00 Inches (48.3 cm).
DEPTH	16.00 Inches (40.64 cm).
ENVIRONMENTAL	
AMBIENT OPERATING TEMPERATURE	+32°F to +122°F (0°C to +50°C)
HUMIDITY	95% Maximum, Non–Condensing.
ALTITUDE	
50 Hz	0 to 7500 Feet (2286 m) Above Sea Level.
60 Hz	0 to 10,000 Feet (3048 m) Above Sea Level.

SECTION II
INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information required for installation and preliminary checkout of the Broadcast Electronics PREDATOR digital FM exciter.

2-3. UNPACKING.

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

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

2-6. INSTALLATION.

2-7. Each exciter is assembled, operated, tested, and inspected at the factory prior to shipment and is ready for installation when received. Prior to installation, this publication should be studied to obtain a thorough understanding of the operation, circuitry, nomenclature, and installation requirements.

2-8. ENVIRONMENTAL CONSIDERATIONS.

2-9. Table 1-2 (SECTION I, GENERAL INFORMATION) provides physical and environmental conditions which should be considered prior to PREDATOR digital FM exciter installation.

2-10. PLACEMENT.

2-11. The PREDATOR may be installed in any convenient location in a 19 inch (48.3 cm) rack within reach of signal and power cables (refer to Figure 2-1). The unit requires 7 inches (17.78 cm) of vertical space in a 19 inch rack. The exciter should not be installed directly above or below heat generating equipment. Allow a minimum of one rack unit of vertical space above the PREDATOR for exhaust air flow. Once a rack location is determined, mount the chassis in the rack using 4 screws.

2-12. REMOVING/INSTALLING A MODULE.

2-13. The digital stereo generator, digital exciter, analog interface, and controller modules are secured to the chassis by two rear-panel retaining screws (refer to Figure 2-2). The power supply/RF amplifier module is secured by two rear-panel Phillips-head screws. The following text presents the procedure to remove or install a PREDATOR module.

1. To remove or install a digital stereo generator, digital exciter, analog interface, or controller module, proceed as follows:

   A. To remove a module, proceed as follows:

      1. Ensure all exciter primary power is disconnected and locate the module to be removed (refer to Figure 2-1).
      2. Refer to Figure 2-2 and loosen the two retaining screws for a module.
      3. Gently pull the module from the chassis. For a digital exciter module, the coaxial cable must be disconnected from J201 prior to removing the module from the chassis.

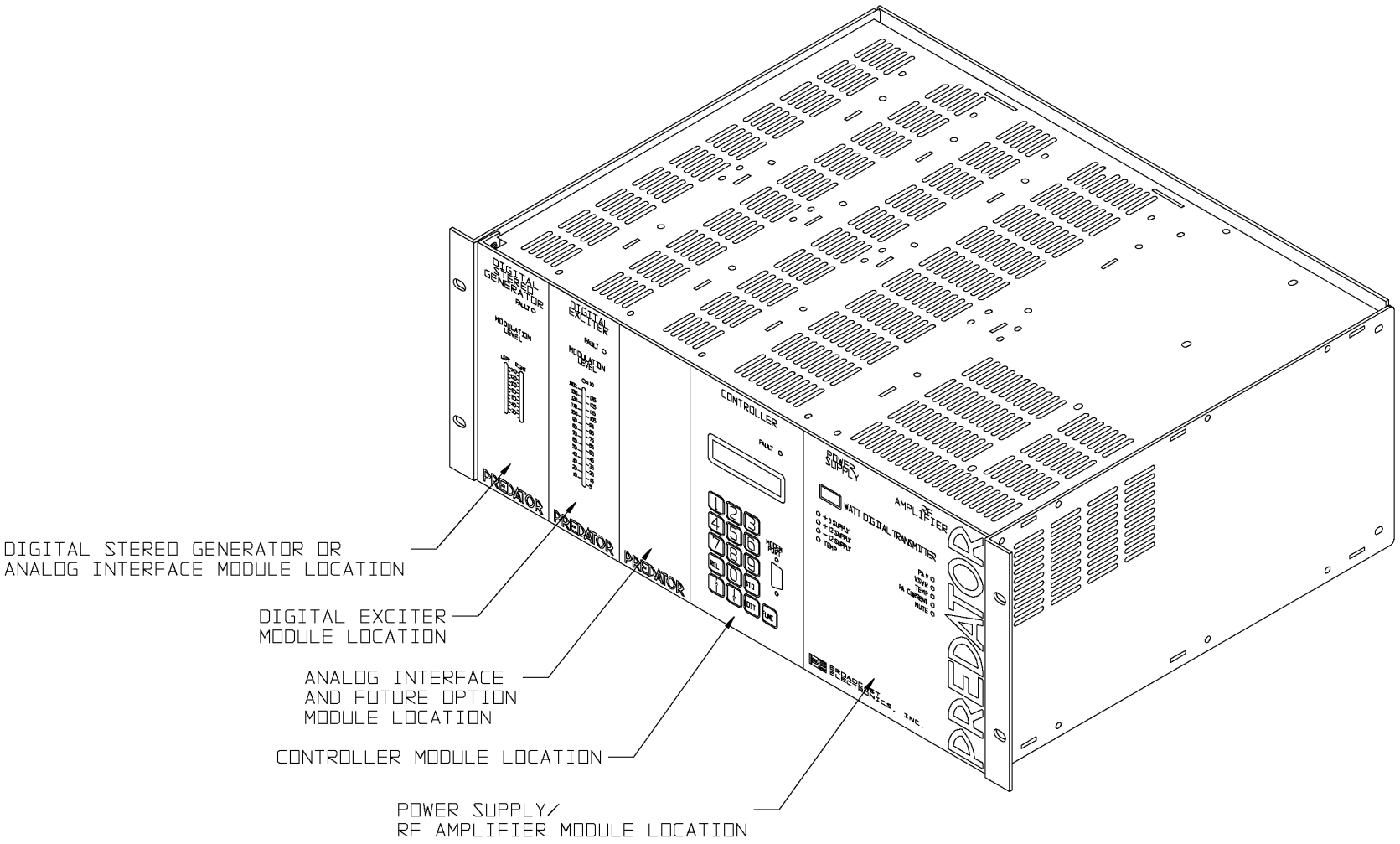

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FIGURE 2-1. PREDATOR MODULE LOCATIONS

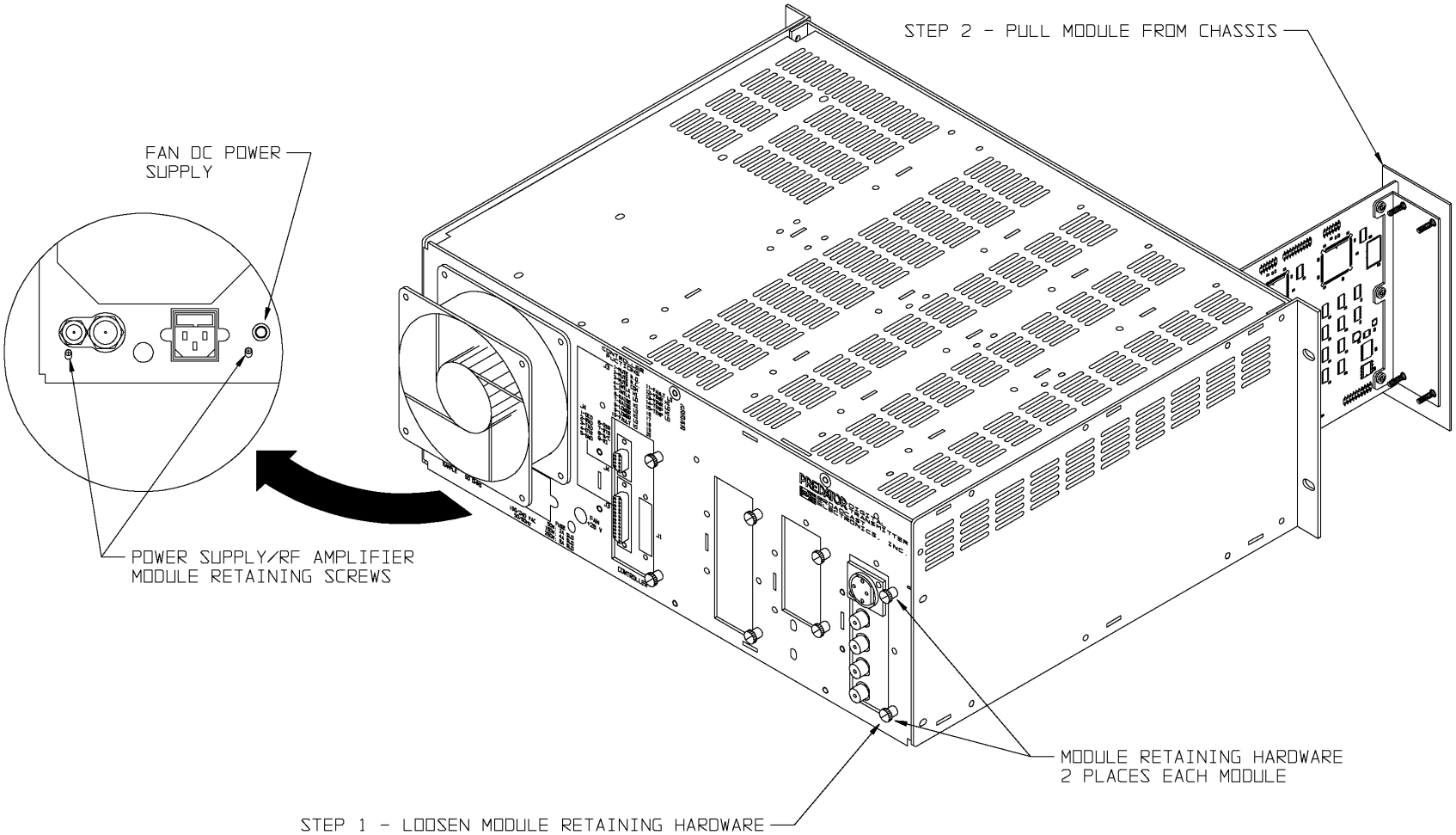

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FIGURE 2-2. REMOVING/INSTALLING A MODULE

B. To install a module, proceed as follows:

1. Refer to Figure 2–1 and locate the appropriate location in the exciter chassis for the module to be installed.
2. Align the module with the guides and slide the module into the chassis. For a digital exciter module, connect the coaxial cable to J201.
3. Firmly push the module into the motherboard.
4. Refer to Figure 2–2 and secure the module rear–panel retaining screws.

2. To remove or install the power supply/RF amplifier module, proceed as follows:

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES. DISCONNECT AC POWER BEFORE REMOVING THE UNIT FROM THE CHASSIS.***

WARNING

A. To remove the module, proceed as follows:

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

WARNING

1. Ensure all exciter primary power is disconnected and locate the power supply/RF amplifier module (refer to Figure 2–1).
2. Refer to Figure 2–2 and loosen the two retaining screws using a Phillips screwdriver.
3. Refer to Figure 2–2 and unplug the fan dc power supply cable.
4. If connected, disconnect the coaxial cables from the RF OUT and RF SAMPLE receptacles.
5. Firmly push on the RF OUT and RF SAMPLE connectors to slide the module from the chassis.
6. Disconnect the coaxial cable from the RF input connector on the RF amplifier module housing front–panel and remove the module from the chassis.

B. To install the module, proceed as follows:

1. Refer to Figure 2–1 and locate the power supply/RF amplifier location in the exciter chassis.
2. Align the module with the guides and slide the module into the chassis.
3. Connect the coaxial cable to the RF input connector on the RF amplifier module housing front–panel.
4. Firmly push the module into the motherboard.
5. Refer to Figure 2–2 and re–connect the fan dc power supply, RF output, and RF sample cables.
6. Refer to Figure 2–2 and secure the module rear–panel retaining screws.
7. Re–connect primary ac power.

2-14. **OPTION PROGRAMMING.**

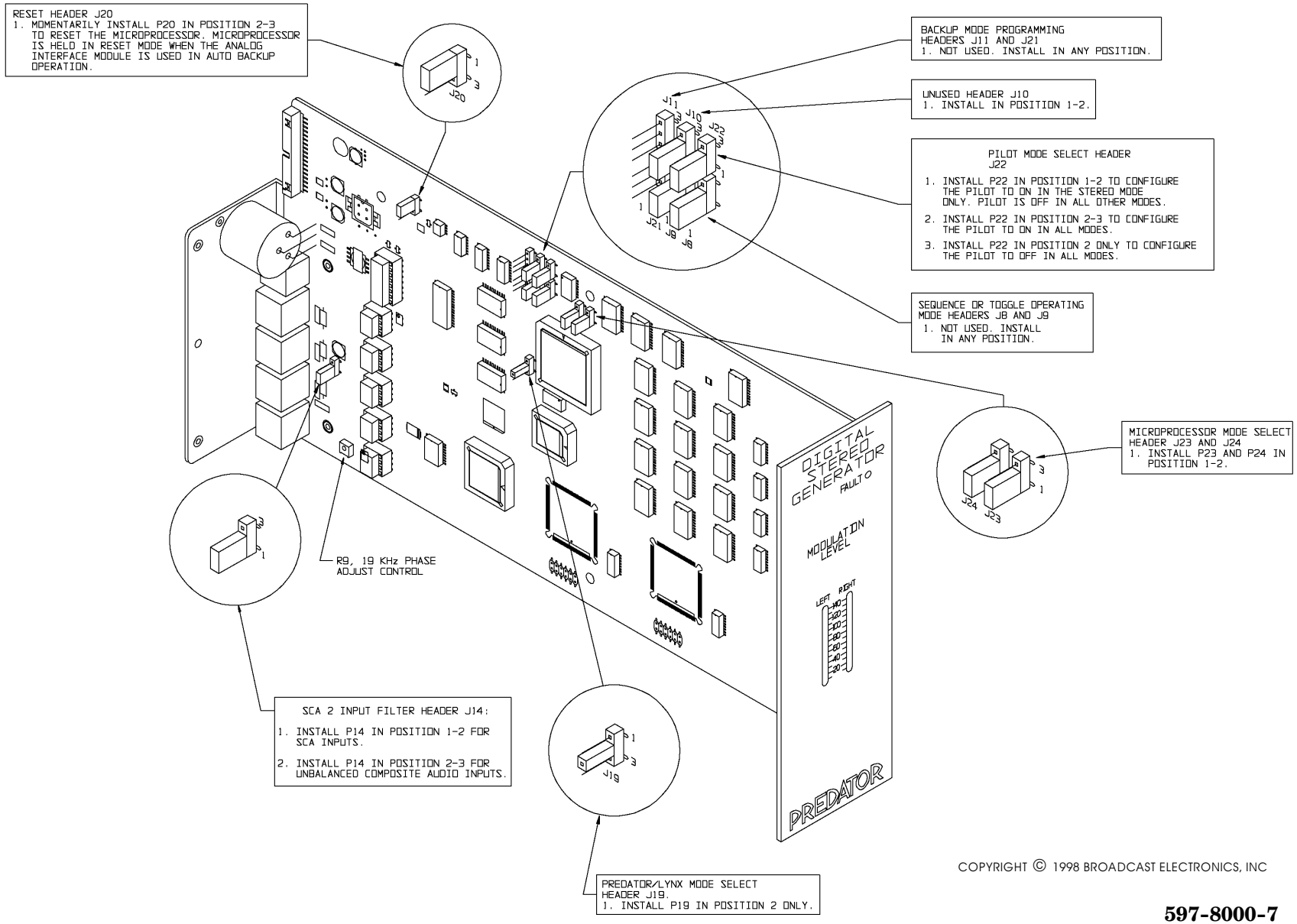
2-15. The PREDATOR digital FM exciter is equipped with several programmable options. Refer to the following text to program the options as desired.

2-16. **DIGITAL STEREO GENERATOR MODULE.** Figure 2-3 presents the digital stereo generator module option programming. Program the module as follows:

1. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to remove a module from the chassis.
2. The sequence or toggle operation programming jumpers are not used. Refer to Figure 2-3 and place the jumpers in any position.
3. The pilot tone can be programmed to be: 1) enabled in the stereo mode only, 2) enabled in all operating modes, or 3) disabled in all operating modes. Pilot tone operation is programmed by header J22. To program the unit, refer to Figure 2-3 and program the header for the desired operation. The unit is shipped from the factory configured with the pilot tone enabled in the stereo mode only.
4. The SCA 2 input can be configured for an SCA input or unbalanced composite audio. The module is shipped from the factory for SCA operation. If unbalanced composite audio operation is required, refer to Figure 2-3 and install jumper P14 in position 2-3.
5. The PREDATOR/LYNX jumper must be in the PREDATOR position. Refer to Figure 2-3 and ensure jumper P19 is in the pin 2 position only.
6. The microprocessor mode select jumpers must be in position 1-2. Refer to Figure 2-3 and ensure jumpers P23 and P24 are in position 1-2.
7. The backup mode programming jumpers are not used. Refer to Figure 2-3 and place jumpers P11 and P21 in any position.
8. The microprocessor can be reset if required. To reset the microprocessor, refer to Figure 2-3 and momentarily install jumper P20 in position 2-3. When the reset process has finished, place the jumper in position 1-2. The microprocessor is held in the reset mode when the analog interface module is used during auto backup operation.
9. Header J10 is not used. Place P10 in position 1-2.
10. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to re-install the module in the chassis.

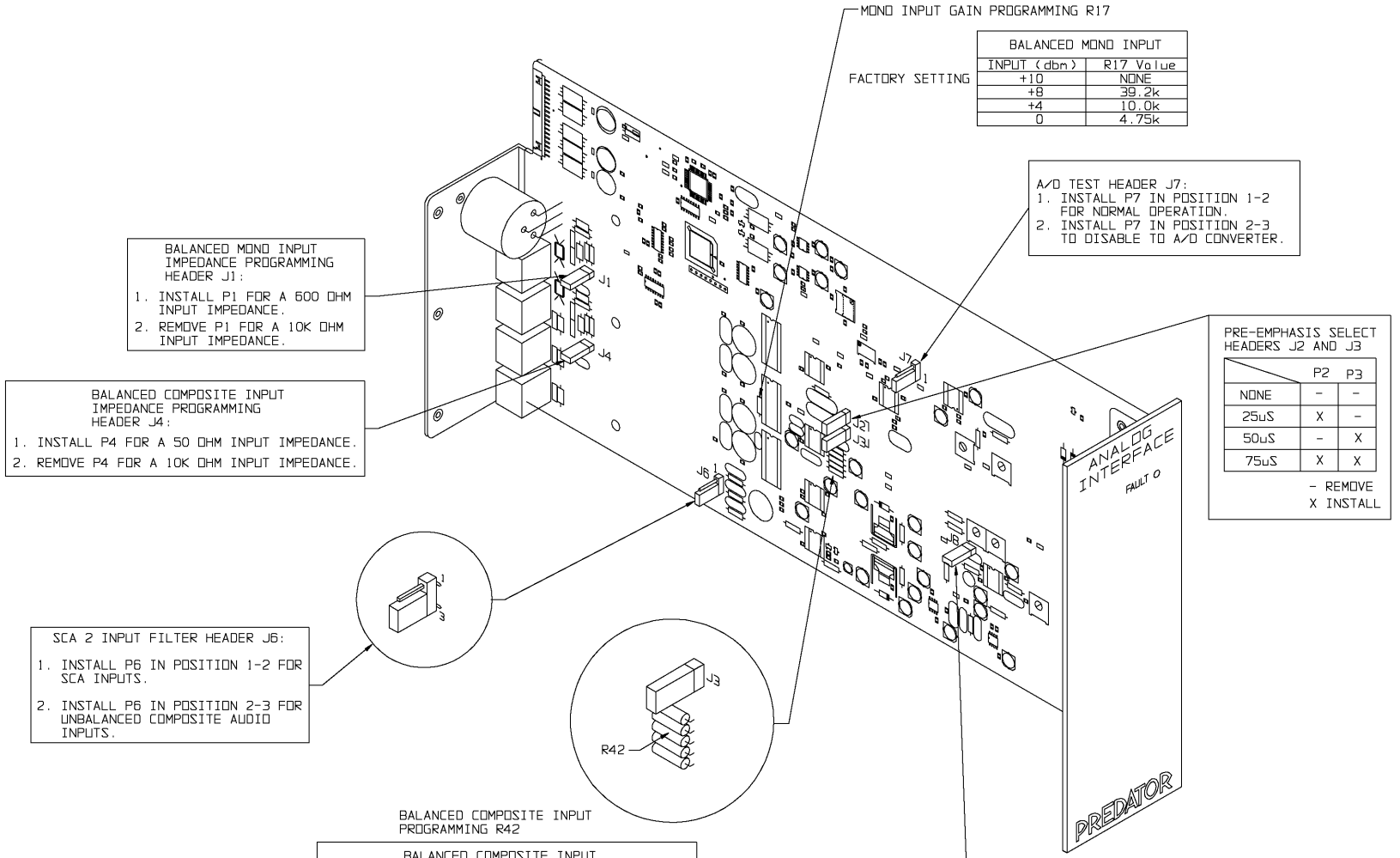
2-17. **ANALOG INTERFACE MODULE.** Figure 2-4 presents the analog interface module option programming. Program the module as follows:

1. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to remove a module from the chassis.
2. The gain of the balanced monophonic audio input processing circuit can be programmed for input levels ranging from 0.0 dBm to +10 dBm. The module is shipped from the factory for an input level of +10 dBm. If an alternate level is required, refer to Figure 2-4 and install the appropriate resistor at location R17 as shown.
3. The gain of the composite audio input processing circuit can be programmed for input levels ranging from 1.1 Vp-p to 11.0 Vp-p. The module is shipped from the factory for an input level of 3.5 Vp-p. If an alternate level is required, refer to Figure 2-4 and install the appropriate resistor at location R42 as shown.



597-8000-7

FIGURE 2-3. DIGITAL STEREO GENERATOR MODULE OPTION PROGRAMMING



BALANCED COMPOSITE INPUT PROGRAMMING R42

FACTORY SETTING

BALANCED COMPOSITE INPUT			
INPUT Vp-p	INPUT dBV*	AMP GAIN	R42 VALUE
11.07	+14.06	+10 dB	NONE
8.79	+12.06	+8 dB	12.1k
7.00	+10.06	+6 dB	5.36k
5.55	+8.06	+4 dB	3.16k
4.41	+6.06	+2 dB	2.10k
3.50	+4.06	0 dB	1.47k
2.78	+2.06	-2 dB	1.05k
2.21	+0.06	-4 dB	787
1.75	-1.94	-6 dB	590
1.39	-3.94	-8 dB	433
1.11	-5.94	-10 dB	348
* 0 dBV = 0.7746V			

597-8000-4

FIGURE 2-4. ANALOG INTERFACE MODULE OPTION PROGRAMMING

4. The monophonic audio input impedance can be configured for 10 k Ohms or 600 Ohms. The module is shipped from the factory for an input impedance of 10 k Ohms. If 600 Ohms is required, refer to Figure 2–4 and install jumper P1.
5. The composite audio input impedance can be configured for 10 k Ohms or 50 Ohms. The module is shipped from the factory for an input impedance of 50 Ohms. If 10 k Ohms is required, refer to Figure 2–4 and install jumper P4.
6. The SCA 2 input can be configured for an SCA input or unbalanced composite audio. The module is shipped from the factory for SCA operation. If unbalanced composite audio operation is required, refer to Figure 2–4 and install jumper P6 in position 2–3.
7. If the SCA or RBDS inputs are to be used, the inputs must be enabled. The module is shipped from the factory with the SCA/RBDS inputs disabled. If the inputs are to be enabled, refer to Figure 2–4 and install jumper P8.
8. The monophonic audio input can be configured for 25 uS, 50 uS,75 uS or no preemphasis. The module is shipped from the factory for 75 uS preemphasis. If a different preemphasis is required, refer to Figure 2–4 and program jumper P2 and P3 as required.
9. The A/D test/operate jumper must be in the operate position. Refer to Figure 2–4 and ensure jumper P7 is in the operate position.
10. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to re–install the module in the chassis.

2–18. **POWER SUPPLY/RF AMPLIFIER MODULE.** Figure 2–5 presents the power supply/RF amplifier module option programming. Header J8 allows the amplifier circuitry to be tested. Ensure jumper P8 is installed in position 1–2.

2–19. **DIGITAL EXCITER MODULE.** Figure 2–6 presents the digital exciter module option programming. Program the module as follows:

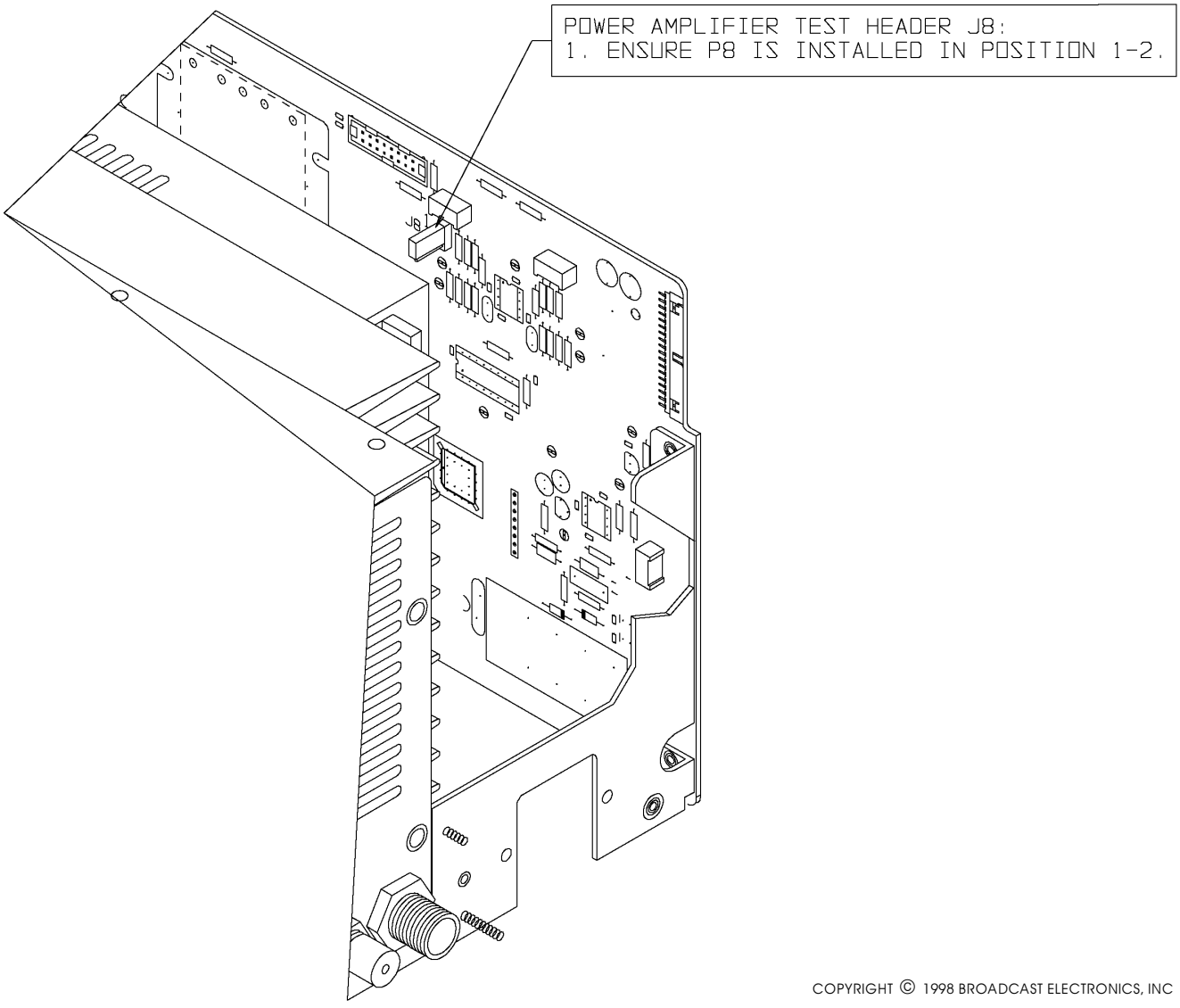
1. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to remove a module from the chassis.
2. The exciter can be programmed to use the internal 10 MHz reference or an external 10 MHz reference such as from a GPS (global positioning system) receiver. The module is shipped from the factory for internal reference operation. If external reference operation is required, refer to Figure 2–6 and install jumper P11 in the EXT position (3–5 4–6).
3. Header J1 configures the exciter for test or normal operation. Ensure jumper P1 is in position 1–2.
4. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to re–install the module in the chassis.

2–20. **CONTROLLER MODULE.** Figure 2–7 presents the controller module option programming. Program the module as follows:

1. Refer to REMOVING/INSTALLING A MODULE in the preceding text and perform the procedure to remove a module from the chassis.
2. The exciter frequency programming feature can be disabled. The module is shipped from the factory to allow frequency programming. If the exciter frequency is to be locked to the current frequency, refer to Figure 2–7 and install jumper P6 as shown.
3. Header J8 resets the microprocessor. If the microprocessor needs to be reset, momentarily install jumper P8.

4. Header J9 selects the LCD contrast voltage. Ensure jumper P9 is installed in position 2–3.

5. The remote mute input can be configured for positive or negative control logic. Positive control requires the use of a momentary contact to a +5 volt to +15 volt dc signal to activate the function. Negative control requires the use of a momentary contact to ground to active the function. For positive control logic, refer to Figure 2–7 and install jumper P10 in position 2–3. For negative control logic, refer to Figure 2–7 and install jumper P10 in position 1–2.



597-8000-39

FIGURE 2-5. 50W/250W POWER SUPPLY/RF AMPLIFIER MODULE OPTION PROGRAMMING

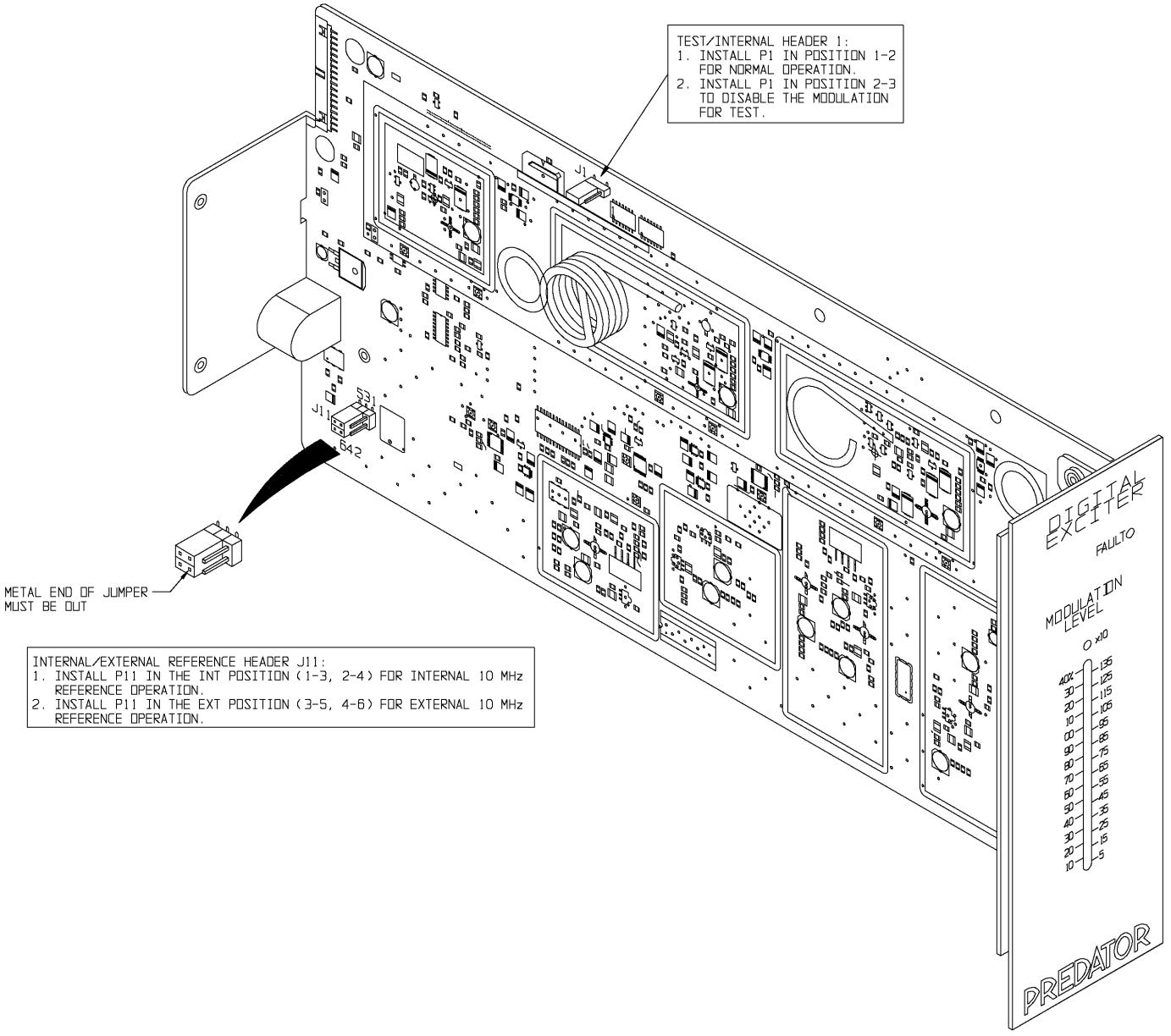


FIGURE 2-6. DIGITAL EXCITER MODULE OPTION PROGRAMMING **597-8000-12A**

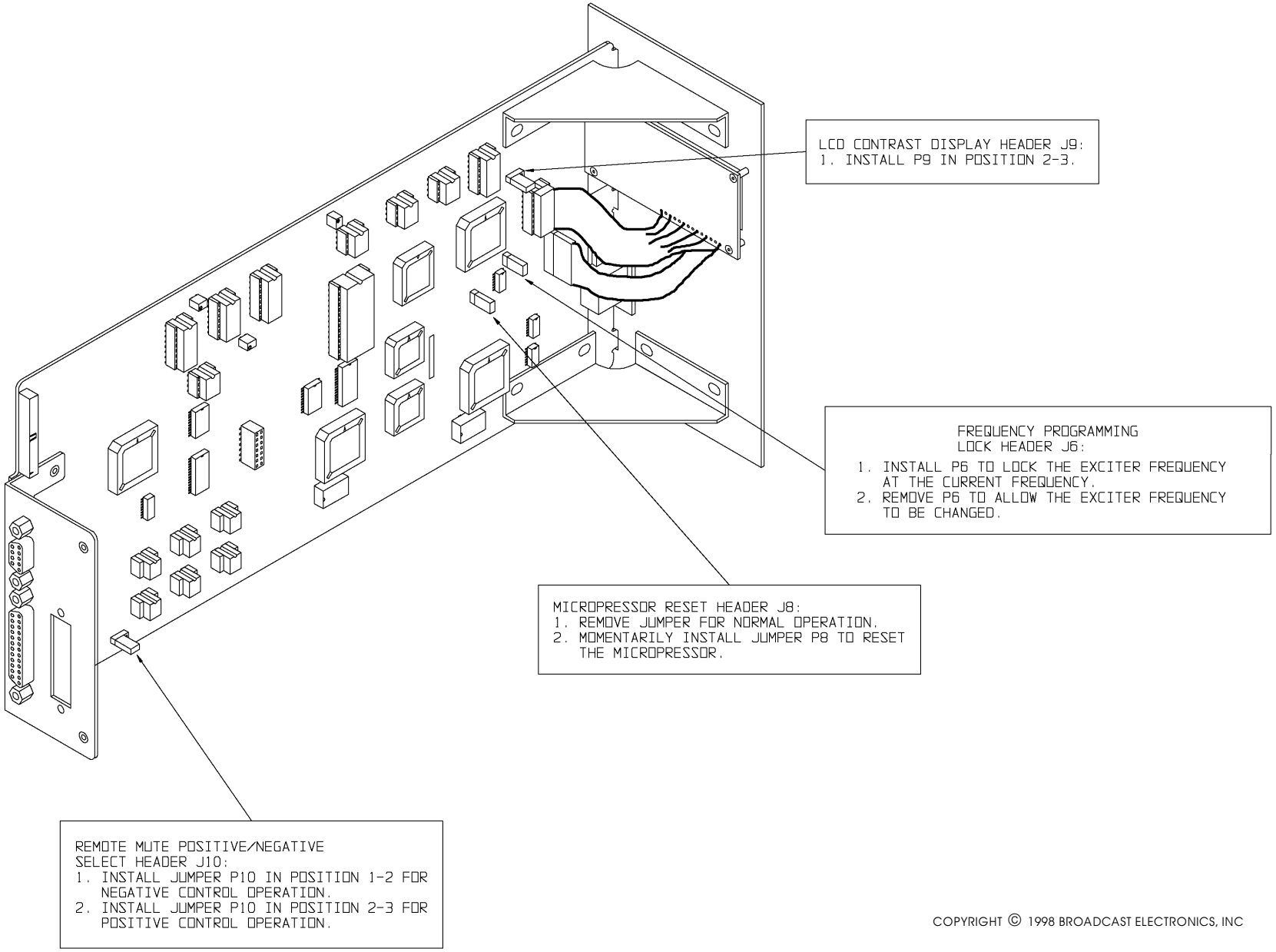


FIGURE 2-7. CONTROLLER MODULE OPTION PROGRAMMING

597-8000-6

WARNING ***ENSURE ALL TRANSMITTER POWER IS DISCONNECTED BEFORE PROCEEDING.***

WARNING

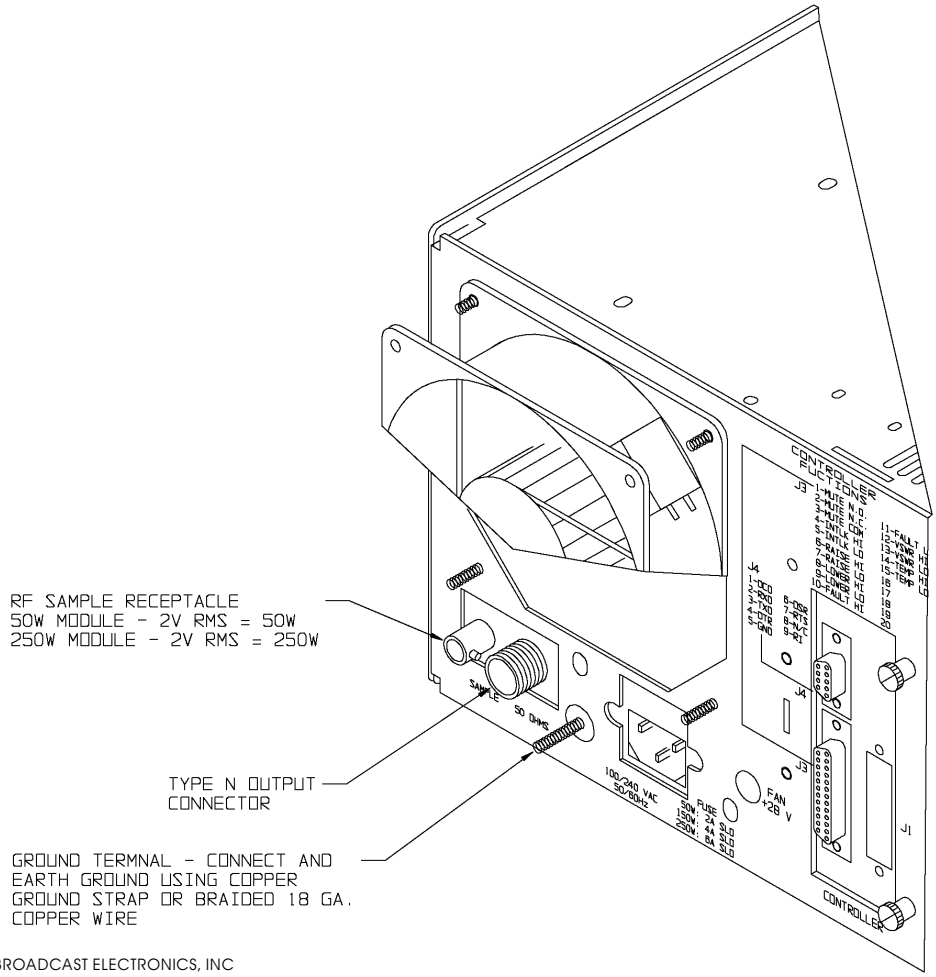
2-21. **CONNECTIONS.**

2-22. **RF OUTPUT.** The PREDATOR is equipped with a Type - N RF output connector. Refer to Figure 2-8 and connect a coaxial cable between the RF OUTPUT connector on the exciter rear-panel and the transmitter RF input. For initial operation, connect the output of the exciter to a 50 Ohm load capable of dissipating the output of the exciter.

WARNING ***ENSURE THE EXCITER CHASSIS IS CONNECTED TO EARTH GROUND.***

WARNING

2-23. **GROUND.** The PREDATOR is equipped with a chassis ground terminal (refer to Figure 2-8). Connect the terminal to earth ground using braided 18 gauge wire or a copper strap.



597-8000-11

FIGURE 2-8. RF OUTPUT CONNECTIONS

2-24. **RF SAMPLE RECEPTACLE.** Figure 2-8 presents the location of the RF sample receptacle. The receptacle is designed for the connection of a modulation monitor or test equipment. The receptacle will provide 2V RMS at 50 watts for 50 watt modules and 2V RMS at 250 watts for 250 watt modules. Connect the desired equipment to the receptacle as required.

2-25. **REMOTE CONTROL AND INDICATIONS.** The PREDATOR is designed for remote control/indication operation (refer to Figure 2-9). The exciter will interface with almost any remote control unit or panel. The following text presents a description of the remote control and indicator functions.

2-26. **AFC Relay.** An AFC (automatic frequency control) relay is provided to connect to a transmitter AFC input or control equipment external to the unit. When the PREDATOR is used as an exciter in a transmitter system, the relay connects to the transmitter controller AFC input. When the PREDATOR is operating as an independent unit, the relay can be used to control an external alarm. The relay contacts are rated at 125V @ .5 Amps and are located at J3-1 through J3-3. When an AFC fault occurs, the relay will close. For Broadcast Electronics C-Series and T-Series transmitters, connect the AFC control line to the normally closed terminal. Connect a ground to the common terminal. The relay will operate when any of the following conditions occur.

1. When the exciter RF output is missing.
2. When any digital exciter module VCO becomes unlocked.
3. When the air inlet temperature is above 60 °C. The PREDATOR will automatically unmute when the temperature falls below 50 °C.
4. When the digital exciter module +8.5V dc supply is not within +8.5V ±0.5V.
5. When the digital exciter module +12.0V dc supply is not within +12V ±1.0V.
6. When the digital exciter module +5.0V dc supply is not within +5V ±0.5V.

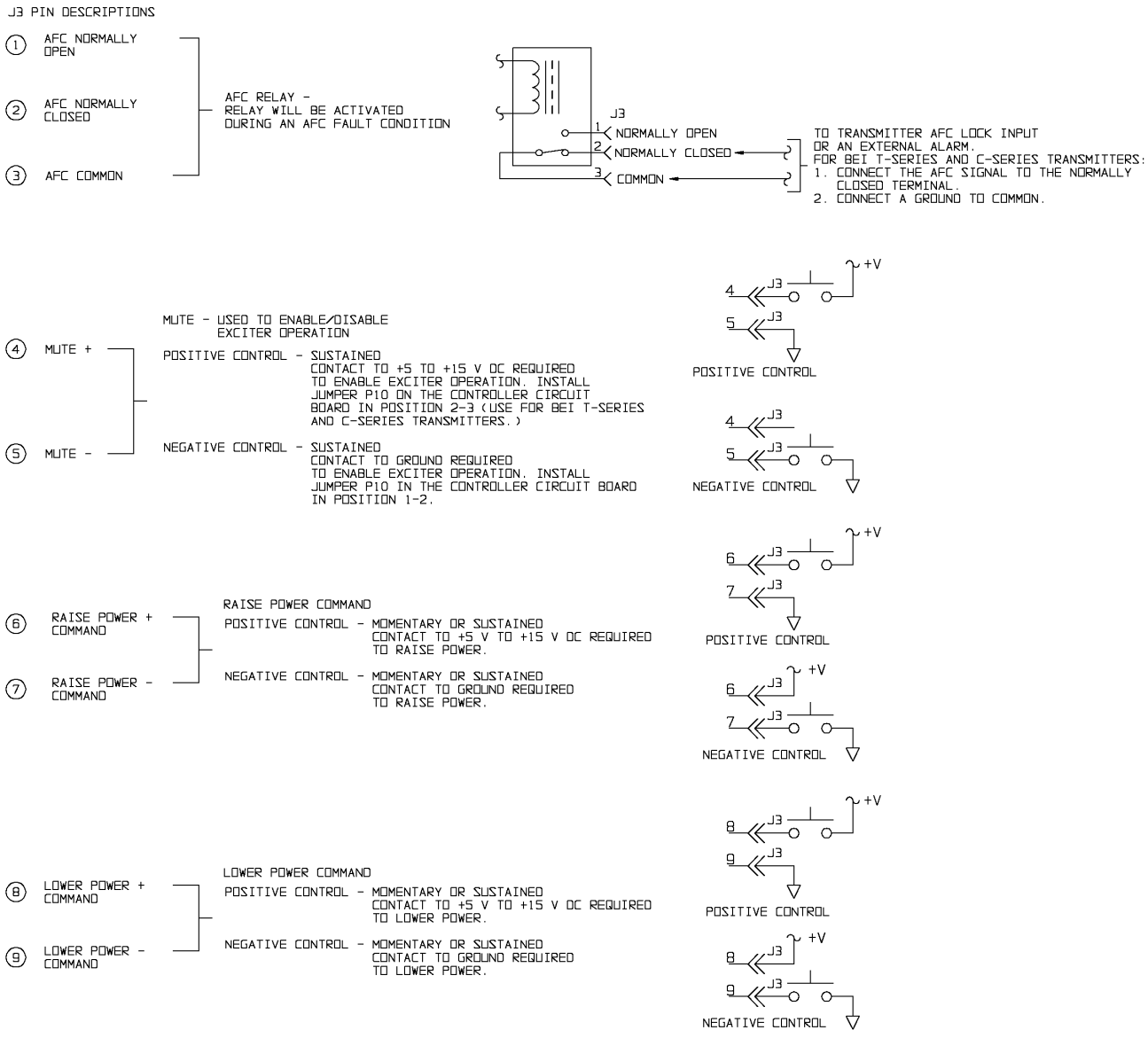
2-27. **Mute.** The mute control input is used to enable/disable exciter operation. The control is located at J3-4 and J3-5. The control can be activated using positive or negative control. Positive control requires: 1) the use of a sustained contact to a +5 volt to +15 volt dc signal to enable exciter operation and 2) the placement of jumper P10 on the controller circuit board in position 2-3 (use for Broadcast Electronics C-Series and T-Series transmitters). Negative control requires: 1) the use of a sustained contact to ground to enable exciter operation and 2) the placement of jumper P10 on the controller circuit board in position 1-2.

2-28. **Raise Power Level Control.** The raise power level control is located at J3-6 and J3-7. The function can be activated using positive or negative control. Positive control requires the use of a momentary or sustained contact to a +5 volt to +15 volt dc signal to raise the PREDATOR power level. Negative control requires the use of a momentary or sustained contact to ground to raise the PREDATOR power level.

2-29. **Lower Power Level Control.** The lower power level control is located at J3-8 and J3-9. The function can be activated using positive or negative control. Positive control requires the use of a momentary or sustained contact to a +5 volt to +15 volt dc signal to lower the PREDATOR power level. Negative control requires the use of a momentary or sustained contact to ground to lower the PREDATOR power level.

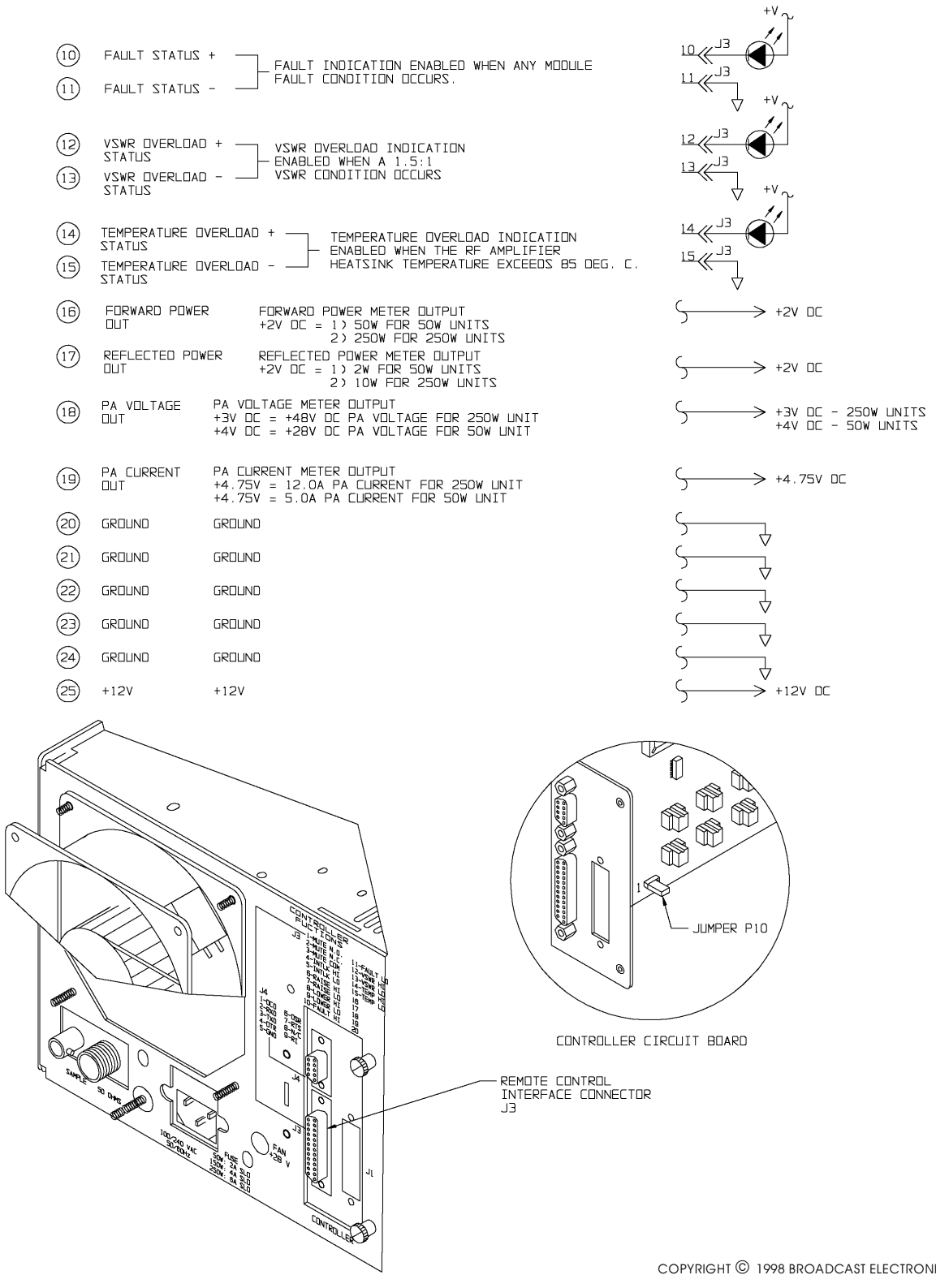
2-30. **Fault Indicator.** The remote fault indicator provides a signal to indicate when a fault occurs in any module. The fault indicator is located at J3-10 and J3-11. The indicator will be enabled to indicate the presence of any module fault condition.

2-31. **VSWR Overload Indicator.** The remote VSWR overload indicator provides a signal to indicate when a 1.5 : 1 or greater VSWR condition is present at the PREDATOR RF power output. The VSWR overload indicator is located at J3-12 and J3-13. The indicator will be enabled to indicate the presence of a VSWR overload condition.



597-8000-14

FIGURE 2-9. REMOTE CONTROL INTERFACING (SHEET 1 OF 2)



597-8000-14A

FIGURE 2-9. REMOTE CONTROL INTERFACING (SHEET 2 OF 2)

2–32. **Temperature Overload Indicator.** The remote temperature overload indicator provides a signal to indicate when the RF amplifier heatsink temperature exceeds 85 degrees C. The temperature overload indicator is located at J3–14 and J3–15. The indicator will be enabled to indicate the presence of an RF amplifier heatsink temperature overload condition.

2–33. **Remote Forward Power Meter Indications.** The remote forward power meter indications are located at J3–16. The forward power meter indication will output a +2 volt dc signal when the forward power output is 50 watts for 50 watt units or 250 watts for 250 watt units.

2–34. **Remote Reflected Power Meter Indications.** The remote reflected power meter indications are located at J3–17. The reflected power meter indication will output a +2 volt dc signal when the reflected power is 2 watts for 50 watt units or 10 watts for 250 watt units.

2–35. **PA Voltage Meter Indications.** The PA voltage meter indications are located at J3–18. The PA voltage meter will output a +3 volt dc signal when the PA voltage is +48 volts dc for 250W models or a +4 volt dc signal when the PA voltage is +28 volts dc for 50W models.

2–36. **PA Current Meter Indications.** The PA current meter indications are located at J3–19. The PA current meter will output a +4.75 volt dc signal when the PA current is +12 Amperes for 250W models or 5 Amperes for 50W models.

2–37. **Ground.** Circuit ground located at J3–20 through J3–24. The ground is used for remote control and indicator connections.

2–38. **+12V.** +12V dc is located at J3–25. The +12V dc is used for remote control and indicator connections.

2–39. **COMPUTER CONNECTIONS.**

2–40. The PREDATOR can be operated using a PC. The PC allows the operator to control and monitor the status of many critical operating parameters without using the controller module keypad and display. PC communication is provided by a 9 pin D–type connector on the controller module front panel (refer to Figure 2–10). The connector provides: 1) a status screen and 2) debugging information.

2–41. A standard null modem cable is required to connect the PREDATOR to a lap–top PC. The data from the connector can be viewed using any modem communication program such as Windows 95 HyperTerm or Procom. If the use of a PC is desired to control the unit, refer to Figure 2–10 and connect the cable between the controller module front panel MODEM receptacle and a COM port on the computer. Typically, this is COM1 or COM2.

2–42. **MODEM CONNECTIONS.**

2–43. The PREDATOR status parameter and operating modes displayed by the controller module and locally connected PC can be accessed remotely using a modem. In addition to accessing the status and operating parameters, the modem port can be used to upgrade the PREDATOR software using the telephone line.

2–44. The PREDATOR modem port is located on the controller module rear–panel (refer to Figure 2–11). If remote access to the PREDATOR status parameter and operating modes is desired, refer to Figure 2–11 and proceed as follows:

1. Connect a modem cable between the controller module rear–panel modem connector and the modem.
2. Connect a telephone line to the modem as shown.
3. Connect the appropriate power source to the modem.
4. To communicate with the controller module, refer to SECTION III, OPERATION and perform the PREDATOR REMOTE OPERATION USING A MODEM AND PC procedure.

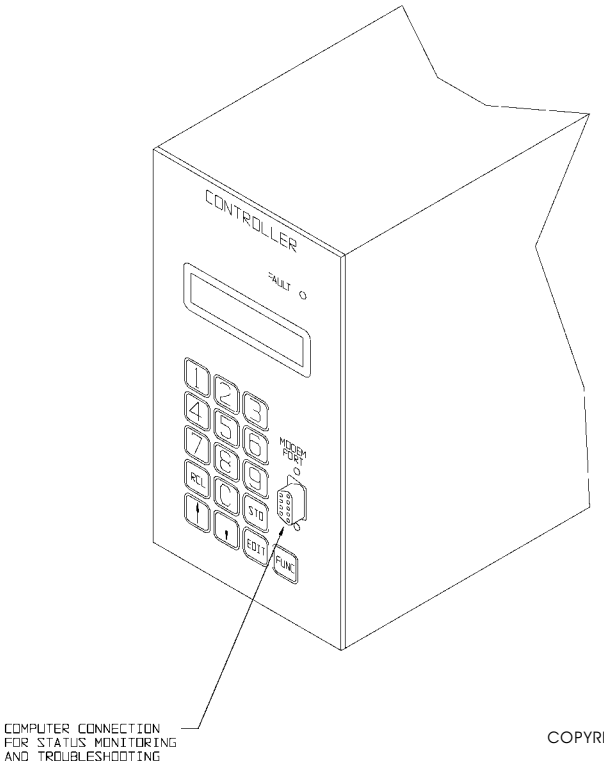


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FIGURE 2-10. COMPUTER CONNECTIONS

2-45. **DIGITAL STEREO GENERATOR MODULE - AUDIO/SCA/RBDS/19 kHz INTERFACING.**

2-46. **DIGITAL AUDIO INPUT.** The PREDATOR digital stereo generator module accepts an AES/EBU format digital audio signal (refer to Figure 2-12). Typically, the AES/EBU signal is from a digital audio processor, a digital STL decoder, or a fiber optic/T1 decoder. The input signal must: 1) contain a sample rate of 32.0 kHz, 44.1 kHz, 48.0 kHz, or 56 kHz and 2) be uncompressed. Typically, a 32.0 kHz sample rate is recommended due to the 15 kHz stereo FM transmission bandwidth. The AES/EBU format signal can be applied to the unit using: 1) an XLR connector or 2) a Toshiba fiber optic connector. Connect the digital audio input to the digital stereo generator module as follows:

1. To connect digital audio to the module using the XLR connector, proceed as follows:
   A. Refer to Figure 2-13 and construct an interface cable using two conductor shielded cable and the mating connector located in the accessory kit. The AES/EBU signal is polarity independent. Therefore, the signal cables can be connected to pins 2 and 3 in any combination.
   B. Refer to Figure 2-12 and connect the cable to the AES/EBU IN XLR receptacle on the rear-panel.
   C. Refer to SECTION III, OPERATION and operate the controller to configure the digital stereo generator module digital input to WIRE.
2. To connect digital audio to the module using the Toshiba fiber optic connector, refer to Figure 2-12 and proceed as follows:
   A. Connect the fiber optic cable to AES/EBU IN fiber optic receptacle J102.
   B. Refer to SECTION III, OPERATION and operate the controller to configure the digital stereo generator module digital input to OPTICAL.

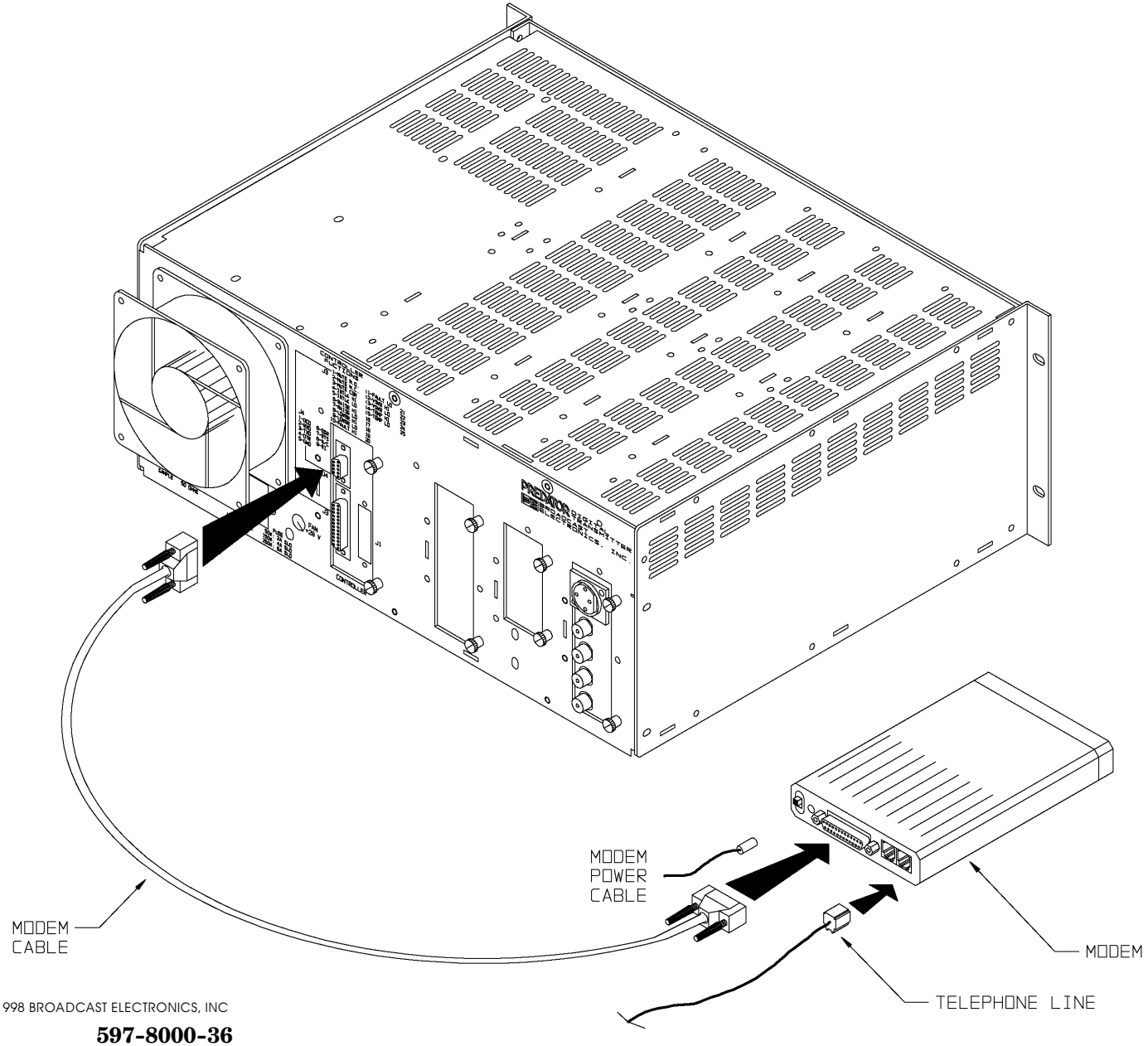

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FIGURE 2-11. PREDATOR TO MODEM CONNECTIONS

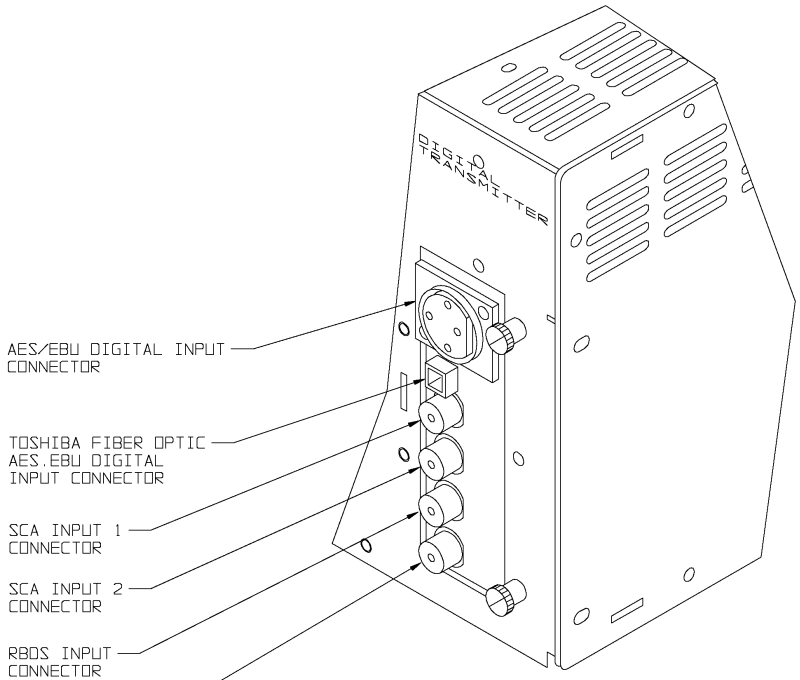

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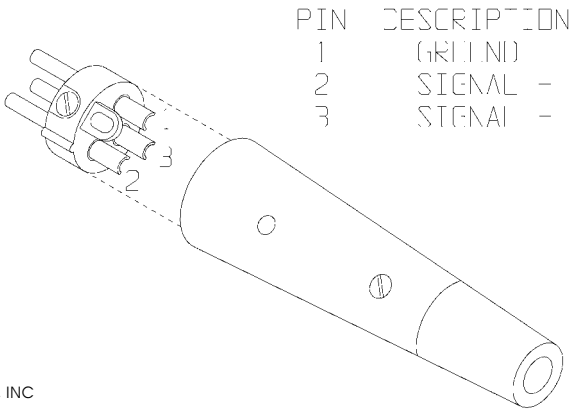
FIGURE 2-12. DIGITAL STEREO GENERATOR MODULE CONNECTIONS

2-47. **SCA CONNECTIONS.** The digital stereo generator module is equipped with unbalanced SCA input receptacles SCA 1 UNBAL and SCA 2 UNBAL (refer to Figure 2-12). Each input is ac coupled and accepts frequencies from 40 kHz to 100 kHz. An input level of 3.5V P-P (1.24 VRMS) will modulate the FM carrier 10% at ±7.5 kHz. If SCA operation is required, connect the SCA output to the SCA 1 UNBAL or SCA 2 UNBAL receptacle. If SCA 2 is used, jumper P14 must be in position 1-2. Refer to Figure 2-3 and place SCA 2 input filter jumper P14 in position 1-2.

2-48. For SCA operation, the output level of the source must be adjusted to obtain the desired peak modulation as indicated by the exciter module MODULATION display. Also, each input is compatible with any SCA generator using a dc coupled input for the transmission of data.



597-9900-3

FIGURE 2-13. DIGITAL AES/EBU XLR CONNECTOR WIRING

2–49. **RBDS CONNECTIONS.** The digital stereo generator module is equipped with unbalanced RBDS input receptacle RBDS INPUT UNBAL (refer to Figure 2–12). The input is ac coupled and accepts an input level of 3.5V P–P (1.24 VRMS) to modulate the FM carrier 10% at ±7.5 kHz. If RBDS operation is required, connect the RBDS output to the RBDS INPUT UNBAL receptacle. When using the RBDS input, the output level of the source must be adjusted to obtain the desired peak modulation as indicated by the exciter module MODULATION display.

2–50. **19 kHz OUTPUT CONNECTIONS.** The digital stereo generator module is equipped with a 3.5 volt peak–to–peak 19 kHz reference signal (refer to Figure 2–12). The signal is designed to be used as the reference for an RBDS encoder unit. If the reference is desired, connect a cable between the 19 kHz OUT receptacle and the reference input to the RBDS encoder.

2–51. **ANALOG COMPOSITE AUDIO INPUT - EMERGENCY OPERATION.** In the event of a failure in the audio path such as a digital STL link failure, audio from a composite backup analog STL link can be applied directly to the SCA 2 UNBAL connector (refer to Figure 2–12). The input is designed for a 3.5 volt peak–to–peak signal for a ±75 kHz deviation. If analog composite audio is to be applied to the SCA 2 UNBAL connector, perform the following:

1. Refer to Figure 2–3 and place jumper P14 in position 2–3.
2. Refer to Figure 2–12 and connect the composite audio to the SCA 2 UNBAL connector.

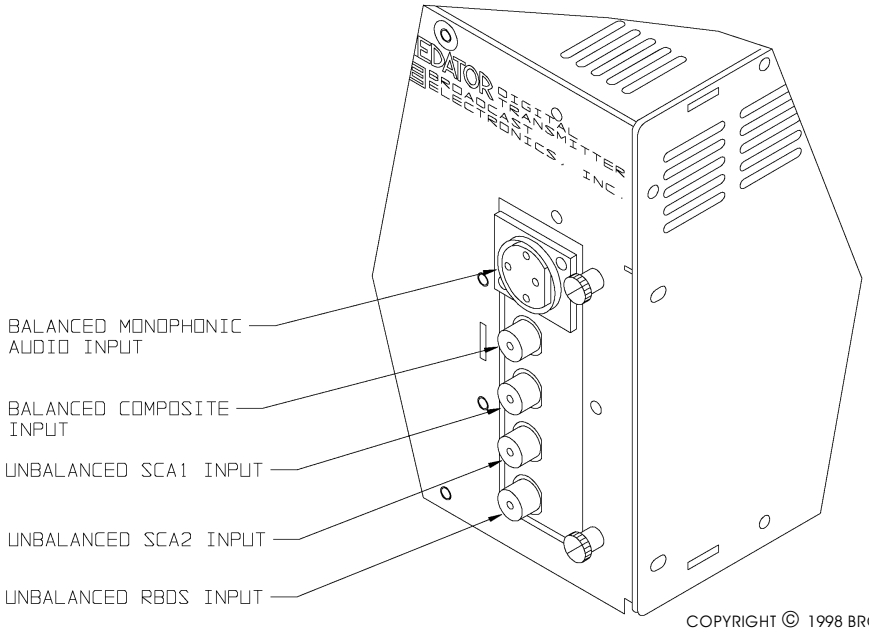
2–52. **ANALOG INTERFACE MODULE - AUDIO/SCA/RBDS/COMPOSITE INTERFACING.**

2–53. **MONOPHONIC AUDIO INPUT.** The PREDATOR analog interface module accepts an analog balanced monophonic signal (refer to Figure 2–14). The balanced monophonic input is an XLR connector. The input is designed for a +10 dBm level at 10 k Ohms or 600 Ohms. The input can also accept other input levels from 0 to +10 dBm by installing the appropriate R17 resistor. Connect the monophonic audio input to the analog interface module as follows:

1. Refer to Figure 2–15 and construct an interface cable using two conductor shielded cable and the mating connector located in the accessory kit.
2. Determine the signal input level. If the level is not +10 dBm, refer to Figure 2–4 and install the appropriate resistor value in R17.
3. Refer to Figure 2–14 and connect the cable to the BAL MONO IN receptacle on the rear–panel.

2–54. **COMPOSITE AUDIO INPUT.** The PREDATOR analog interface module accepts a balanced or unbalanced composite input from an analog stereo generator (refer to Figure 2–14). The inputs are designed for a 3.5 volt peak–to–peak signal for a ±75 kHz deviation. The balanced input can also accept other input levels from 1.11 volts peak–to–peak to 11.07 volts peak–to–peak by installing the appropriate R42 resistor. If a balanced composite signal is to be connected to the module, refer to Figure 2–14 and connect the stereo generator output to the BAL COMP IN receptacle on the rear–panel.

2–55. An unbalanced composite input can be applied to the SCA 2 UNBAL receptacle. If an unbalanced composite input is to be applied to the module: 1) refer to Figure 2–4 and place SCA 2 input filter jumper P6 in position 2–3, 2) refer to Figure 2–4 and install SCA/RBDS input enable jumper P8, and 3) refer to Figure 2–14 and connect the input to the SCA 2 UNBAL receptacle.

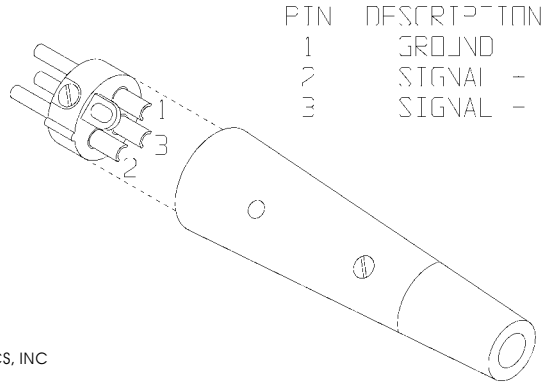


597-8000-20

FIGURE 2-14. ANALOG INTERFACE MODULE CONNECTIONS

2-56. **SCA CONNECTIONS.** The analog interface module is equipped with unbalanced SCA input receptacles SCA 1 UNBAL and SCA 2 UNBAL (refer to Figure 2-14). Each input is ac coupled and accepts frequencies from 40 kHz to 100 kHz. An input level of 3.5V P-P (1.24 VRMS) will modulate the FM carrier 10% at ±7.5 kHz. If SCA operation is required: 1) connect the SCA output to the SCA 1 UNBAL or SCA 2 UNBAL receptacle and 2) refer to Figure 2-4 and install SCA/RBDS input enable jumper P8. If the SCA 2 input is used, jumper P6 must be in position 1-2. Refer to Figure 2-4 and place SCA 2 input filter jumper P6 in position 1-2. Ensure SCA/RBDS input enable jumper P8 is installed.

2-57. The output level of the source must be adjusted to obtain the desired peak modulation as indicated by the exciter module MODULATION display. Also, each input is compatible with any SCA generator using a dc coupled input for the transmission of data.



597-8000-17

FIGURE 2-15. ANALOG INTERFACE XLR CONNECTOR WIRING

2-58. **RBDS CONNECTIONS.** The analog interface module is equipped with unbalanced RBDS input receptacle RBDS INPUT UNBAL (refer to Figure 2-14). The input is ac coupled and accepts an input level of 3.5V P-P (1.24 VRMS) to modulate the FM carrier 10% at ±7.5 kHz. If RBDS operation is required: 1) connect the RBDS output to the RBDS INPUT UNBAL receptacle and 2) refer to Figure 2-4 and install SCA/RBDS input enable jumper P8. When using the RBDS input, the output level of the source must be adjusted to obtain the desired peak modulation as indicated by the exciter module MODULATION display.

2-59. **OPTIONAL N+1 CIRCUIT BOARD CONTROL INTERFACING.**

2-60. **GENERAL.** The PREDATOR controller module can be equipped with an optional N+1 circuit board. The circuit board allows the PREDATOR to operate as part of an N+1 transmitter in an automatic transmitter backup system. The N+1 circuit board provides the PREDATOR with the ability to operate at one of ten pre-programmed operating frequencies for automatic backup transmitter operation.

2-61. The circuit board is equipped with a control interface connector (refer to Figure 2-16). The following text presents a description of the control connector functions. Refer to the following text and Figure 2-16 to interface the N+1 circuit board to the N+1 system controller.

2-62. **Transmitter 0 Select.** The transmitter 0 select function is located at J1-1. A momentary or sustained contact to ground is required to enable transmitter 0 operation.

2-63. **Transmitter 1 Select.** The transmitter 1 select function is located at J1-2. A momentary or sustained contact to ground is required to enable transmitter 1 operation.

2-64. **Transmitter 2 Select.** The transmitter 2 select function is located at J1-3. A momentary or sustained contact to ground is required to enable transmitter 2 operation.

2-65. **Transmitter 3 Select.** The transmitter 3 select function is located at J1-4. A momentary or sustained contact to ground is required to enable transmitter 3 operation.

2-66. **Transmitter 4 Select.** The transmitter 4 select function is located at J1-5. A momentary or sustained contact to ground is required to enable transmitter 4 operation.

2-67. **Transmitter 5 Select.** The transmitter 5 select function is located at J1-6. A momentary or sustained contact to ground is required to enable transmitter 5 operation.

2-68. **Transmitter 6 Select.** The transmitter 6 select function is located at J1-7. A momentary or sustained contact to ground is required to enable transmitter 6 operation.

2-69. **Transmitter 7 Select.** The transmitter 7 select function is located at J1-8. A momentary or sustained contact to ground is required to enable transmitter 7 operation.

2-70. **Transmitter 8 Select.** The transmitter 8 select function is located at J1-9. A momentary or sustained contact to ground is required to enable transmitter 8 operation.

2-71. **Transmitter 9 Select.** The transmitter 9 select function is located at J1-10. A momentary or sustained contact to ground is required to enable transmitter 9 operation.

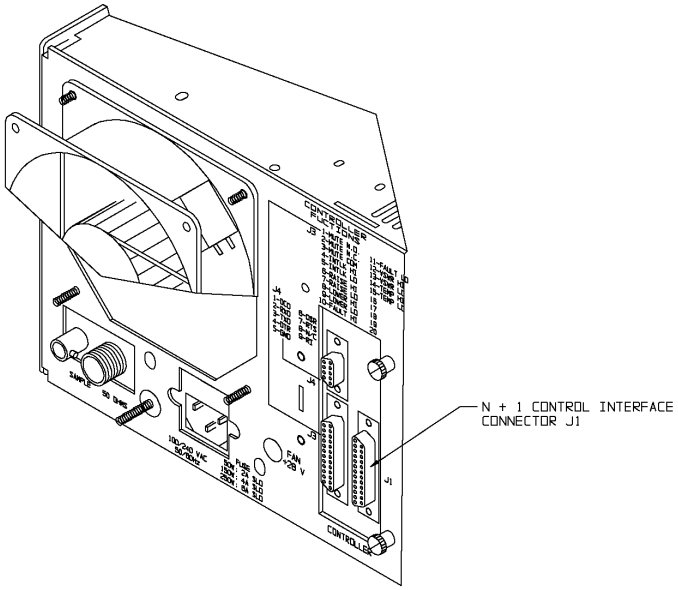
2-72. **Mute.** The transmitter mute function is located at J1-11. A contact to ground is required to mute the selected transmitter. The transmitter will be muted for the duration of the applied signal.

2-73. **Transmitter 0 On Indication.** The transmitter 0 on indicator is located at J1-14. The indicator will go HIGH (+5 VDC) when transmitter 0 is selected.

2-74. **Transmitterr 1 On Indication.** The transmitter 1 on indicator is located at J1-15. The indicator will go HIGH (+5 VDC) when transmitter 1 is selected.

2-75. **Transmitter 2 On Indication.** The transmitter 2 on indicator is located at J1-16. The indicator will go HIGH (+5 VDC) when transmitter 2 is selected.

2-76. **Transmitter 3 On Indication.** The transmitter 3 on indicator is located at J1-17. The indicator will go HIGH (+5 VDC) when transmitter 3 is selected.



J1 PIN DESCRIPTIONS

1. TRANSMITTER 0 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 0 OPERATION.
2. TRANSMITTER 1 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 1 OPERATION.
3. TRANSMITTER 2 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 2 OPERATION.
4. TRANSMITTER 3 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 3 OPERATION.
5. TRANSMITTER 4 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 4 OPERATION.
6. TRANSMITTER 5 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 5 OPERATION.
7. TRANSMITTER 6 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 6 OPERATION.
8. TRANSMITTER 7 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 7 OPERATION.
9. TRANSMITTER 8 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 8 OPERATION.
10. TRANSMITTER 9 SELECT. A MOMENTARY OR SUSTAINED CONTACT TO GROUND REQUIRED TO SELECT TRANSMITTER 9 OPERATION.
11. MUTE CONTROL. CONTACT TO GROUND REQUIRED TO MUTE THE SELECTED TRANSMITTER. TRANSMITTER WILL BE MUTED FOR THE DURATION OF THE APPLIED SIGNAL.

J1

13. GROUND
14. TRANSMITTER 0 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
15. TRANSMITTER 1 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
16. TRANSMITTER 2 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
17. TRANSMITTER 3 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
18. TRANSMITTER 4 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
19. TRANSMITTER 5 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
20. TRANSMITTER 6 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
21. TRANSMITTER 7 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
22. TRANSMITTER 8 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
23. TRANSMITTER 9 ON INDICATOR. HIGH (+5VDC) WHEN ACTIVE.
25. +5V OUT.15MA MAXIMUM

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FIGURE 2-16. OPTIONAL N+1 CIRCUIT BOARD CONTROL INTERFACING

2–77. **Transmitter 4 On Indication.** The transmitter 4 on indicator is located at J1–18. The indicator will go HIGH (+5 VDC) when transmitter 4 is selected.

2–78. **Transmitter 5 On Indication.** The transmitter 5 on indicator is located at J1–19. The indicator will go HIGH (+5 VDC) when transmitter 5 is selected.

2–79. **Transmitter 6 On Indication.** The transmitter 6 on indicator is located at J1–20. The indicator will go HIGH (+5 VDC) when transmitter 6 is selected.

2–80. **Transmitter 7 On Indication.** The transmitter 7 on indicator is located at J1–21. The indicator will go HIGH (+5 VDC) when transmitter 7 is selected.

2–81. **Transmitter 8 On Indication.** The transmitter 8 on indicator is located at J1–22. The indicator will go HIGH (+5 VDC) when transmitter 8 is selected.

2–82. **Transmitter 9 On Indication.** The transmitter 9 on indicator is located at J1–23. The indicator will go HIGH (+5 VDC) when transmitter 9 is selected.

2–83. **+5VDC.** +5VDC is located at J1–25. The voltage is provided for the connection of remote switches and indicators.

2–84. **Ground.** Ground is located at J1–13. The ground terminal is provided for the connection of remote switches and indicators.

2–85. **TRANSMITTER RETROFIT INSTALLATION PROCEDURES.**

2–86. The PREDATOR can be field installed in an existing transmitter. The retrofit installation instructions are presented in APPENDIX A (located at the end of this manual). The information is organized by transmitter model. Select the appropriate transmitter model to locate the applicable information.

2–87. **AC POWER CONNECTIONS.**

2–88. The PREDATOR is equipped with a switching power supply assembly. The power supply automatically switches between 117V and 220V operation.

2–89. The power supply is equipped with ac line fuses. For 50W power supply/RF amplifier modules, a 3 A slow–blow fuse is required. For 250 watt power supply/RF amplifier modules, a 7 A slow–blow fuse is required. Ensure the appropriate fuse is installed in the unit. When the ac line fuses have been checked, connect the PREDATOR to any 100V to 240V 50/60 Hz ac power source.

2–90. INITIAL OPERATION.

2–91. Before proceeding, check the following:

1. Ensure all PREDATOR modules are secure.
2. Ensure the unit is connected to an approved power supply source.
3. Ensure the chassis ground connection is secure.
4. Ensure all signal inputs are secure.
5. Ensure the RF output is connected to a test load.
6. Ensure all external cabling is properly dressed and secured.

To initially operate the exciter, perform the following procedure.

2–92. Apply ac power to the unit. With the unit programmed with the factory set operating modes, the following events will occur when ac power is applied to the unit.

A. The fan will begin to operate.

B. The CONTROLLER LCD display will illuminate.

C. The power supply/RF amplifier module POWER SUPPLY +5V SUPPLY, POWER SUPPLY +15V SUPPLY, and POWER SUPPLY -15 V SUPPLY indicators will illuminate.

D. The RF AMPLIFIER PAV indicator will illuminate.

2-93. INITIAL PROGRAMMING.

2-94. Once the PREDATOR is operational, the operating frequency, RF power output, and the frequency deviation must be selected. Refer to SECTION III, OPERATION and perform the following procedures.

1. CARRIER FREQUENCY PROGRAMMING.
2. RF POWER OUTPUT SELECTION.
3. FREQUENCY DEVIATION SELECTION.

2-95. INSTALLATION ADJUSTMENTS.

2-96. The following text presents the PREDATOR installation adjustments. Perform the procedures as required for the modules contained in the unit.

2-97. DIGITAL STEREO GENERATOR MODULE.

2-98. **PRE-EMPHASIS SELECTION.** The digital stereo generator module pre-emphasis operation is selected using the controller module keypad and controls. To select the pre-emphasis, proceed as follows:

1. Determine the audio processor pre-emphasis. Most broadcast FM processors can provide pre-emphasized or flat audio outputs. The pre-emphasis is typically either 75 uS or 50 uS.
2. Refer to SECTION III, OPERATION and perform the PREEMPHASIS procedure in the DIGITAL STEREO GENERATOR MODULE - OPERATION section to access the pre-emphasis function.
3. Ensure the digital stereo generator pre-emphasis is configured to complement the audio processor. If the processor is providing a 50 uS or 75 uS pre-emphasized audio output, use the controller module keypad to select NONE. If the processor provides a flat audio output and 50 uS pre-emphasis is required, use the controller module keypad to select 50 uS. If the processor provides a flat audio output and 75 uS pre-emphasis is required, use the controller module keypad to select 75 uS. Distorted audio can result if the pre-emphasis is not correctly selected.

2-99. **DIGITAL INPUT LEVEL ADJUSTMENTS - WITH LIMITER ENABLED.** The AES/EBU input level and the digital limiting are adjusted using the CONTROLLER module keypad. To adjust the input level and limiting, proceed as follows:

1. Refer to the preceding text and ensure the appropriate pre-emphasis is selected.
2. Connect an AES/EBU signal to the wire or optical **AES/EBU IN** receptacle. Refer to SECTION III, OPERATION and perform the DIGITAL INPUT OPTICAL/WIRE procedure in the DIGITAL STEREO GENERATOR MODULE - OPERATION section to ensure the module is configured for the type of digital input receptacle used. Apply normal program audio and adjust the audio processor for normal activity. If the audio processor is equipped with a digital output control, adjust the control for approximately -2.0 dB below full scale (-2 dBfs).
3. Refer to SECTION III, OPERATION and perform the DIGITAL LIMITER procedure in the DIGITAL STEREO GENERATOR MODULE - OPERATION section to select LIMITER operation.

4. Refer to SECTION III, OPERATION and perform the MODE OF OPERATION procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to select STEREO operation.

5. Refer to SECTION III, OPERATION and perform the DIGITAL LIMITER LEVEL procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to select the highest LIMITING level.

NOTE ***THE DIGITAL STEREO GENERATOR MODULE WILL CLIP AT LEVELS ABOVE 140%. ENSURE THE MODULE IS ADJUSTED FOR LEVELS BELOW 140% AS INDICATED ON THE MODULATION LEVEL METER.***

NOTE

6. Refer to SECTION III, OPERATION and perform the DIGITAL INPUT LEVEL procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to adjust the digital input level for 100% peaks on the digital stereo generator module **MODULATION LEVEL** meter. With a –2.0 dBfs audio signal from the audio processor, the input level control will provide an operating range from 60% to 130%. If the audio processor level is extremely high as indicated by a greater than 140% indication on the **MODULATION LEVEL** display, the display will flash.

7. Refer to SECTION III, OPERATION and perform the DIGITAL LIMITER LEVEL procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to adjust the digital limiting for 100% peak modulation as indicated by the digital exciter module MODULATION display. This calibrates the module for a 0.5 – 1.0 dB of limiter activity.

2–100. **DIGITAL INPUT LEVEL ADJUSTMENTS - WITH LIMITER DISABLED.** The AES/EBU input level is adjusted using the CONTROLLER module keypad. To adjust the input level, proceed as follows:

1. Refer to the preceding text and ensure the appropriate pre–emphasis is selected.

2. Connect an AES/EBU signal to the wire or optical **AES/EBU IN** receptacle. Refer to SECTION III, OPERATION and perform the DIGITAL INPUT OPTICAL/WIRE procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to ensure the module is configured for the type of digital input receptacle used. Apply normal program audio and adjust the audio processor for normal activity. If the audio processor is equipped with a digital output control, adjust the control for approximately –2.0 dB below full scale (–2 dBfs).

3. Refer to SECTION III, OPERATION and perform the MODE OF OPERATION procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to select STEREO operation.

NOTE ***THE DIGITAL STEREO GENERATOR MODULE WILL CLIP AT LEVELS ABOVE 140%. ENSURE THE MODULE IS ADJUSTED FOR LEVELS BELOW 140% AS INDICATED ON THE MODULATION LEVEL METER.***

NOTE

4. Refer to SECTION III, OPERATION and perform the DIGITAL INPUT LEVEL procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to adjust the digital input level for 100% peaks on the digital stereo generator module **MODULATION LEVEL** meter. With a –2.0 dBfs audio signal from the audio processor, the input level control will provide an operating range from 60% to 130%. If the audio processor level is extremely high as indicated by a greater than 140% indication on the **MODULATION LEVEL** display, the display will flash.

2–101. **PILOT INJECTION LEVEL CONTROL ADJUSTMENT.** The exciter module MODULATION display is used to adjust the pilot level. To adjust the pilot level, proceed as follows:

1. Header J22 on the module enables/disables pilot operation. Ensure P22 is in position 1–2 or 2–3.
2. Refer to SECTION III, OPERATION and perform the MODE OF OPERATION procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to select STEREO operation.
3. Refer to SECTION III, OPERATION and perform the PILOT LEVEL procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION procedures to adjust the pilot level until the exciter MODULATION display indicates between 8% and 10%. The control range is from 6% to 14%.

2–102. **19 kHz OUTPUT PHASE ADJUSTMENT.** 19 kHz phase adjust control R9 on the digital stereo generator module allows the 19 kHz output signal phase to be matched to the pilot tone phase. The control range is from –10° to +70°. The 19 kHz output signal is in–phase with the pilot signal when shipped from the factory. This adjustment is required only if another phase alignment is required. To adjust the control, proceed as follows:

1. Refer to REMOVING/INSTALLING A MODULE in the preceding text to remove the digital stereo generator module. Insert the optional extender circuit board and insert the digital stereo generator module into the extender circuit board.
2. Connect a test cable between the digital exciter module RF SAMPLE receptacle and the INPUT connector on a Belar FMM–2 modulation monitor.
3. Connect a test cable between the OUTPUT connector on the FMM–2 to the INPUT connector on a Belar FMSA–1 digital FM stereo modulation monitor.
4. Connect an oscilloscope to the units as follows: 1) connect channel A to 19 kHz OUT on the digital stereo generator module rear–panel and 2) connect channel B to the PILOT OUT connector on the FMSA–1 rear–panel.
5. Refer to SECTION III, OPERATION and perform the MODE OF OPERATION procedure in the DIGITAL STEREO GENERATOR MODULE – OPERATION section to select STEREO operation.
6. Adjust the oscilloscope to observe the signals.
7. Refer to Figure 2–3 and adjust 19 kHz output signal phase adjust control R9 for the desired phase relationship to the pilot signal.
8. Remove the test equipment, remove the extender circuit board, and re–insert the digital stereo generator module.

2–103. **ANALOG INTERFACE MODULE.**

2–104. **MONOPHONIC INPUT AND MODULATION LEVEL ADJUSTMENTS.** The BAL MONO IN receptacle is calibrated at the factory for a +10 dBm input level to produce 100% modulation with no SCA or RBDS inputs. If SCA or RBDS inputs are to be used with monophonic audio, the mono level control must be adjusted. If available, it is recommended the level be adjusted at the audio processor.

2–105. The monophonic level control adjusts the monophonic audio input level applied to the unit. The modulation control adjusts the modulation level applied to the digital exciter module. To adjust the monophonic input and modulation levels, proceed as follows:

1. Refer to REMOVING/INSTALLING A MODULE in the preceding text to remove the analog interface module. Insert the optional extender circuit board and insert the analog interface module into the extender circuit board.
2. Refer to Figure 2–4 and ensure the appropriate pre–emphasis is selected.
3. Connect an in–phase 400 Hz audio signal at +10 dBm to the analog interface module **BAL MONO IN** receptacle on the rear panel.
4. Adjust monophonic input level control R21 for a 90% digital exciter module **MODULATION** display indication.
5. Adjust the SCA or RBDS generator output for 100% modulation on the digital exciter module **MODULATION** display. The input level will be approximately 3.5 volts peak–to–peak.
6. Remove the test equipment, remove the extender circuit board, and re–insert the analog interface module.

2–106. **COMPOSITE INPUT AND MODULATION LEVEL ADJUSTMENTS.** The BAL COMP IN receptacle is calibrated at the factory for a 3.5 volt peak–to–peak input level to produce 100% modulation with no SCA or RBDS inputs. If SCA or RBDS inputs are to be used with composite audio, the composite level control must be adjusted. If available, it is recommended the level be adjusted at the audio processor.

2–107. The composite level control adjusts the composite audio input level applied to the unit. The modulation control adjusts the modulation level applied to the digital exciter module. To adjust the composite input and modulation levels, proceed as follows:

1. Refer to REMOVING/INSTALLING A MODULE in the preceding text to remove the analog interface module. Insert the optional extender circuit board and insert the analog interface module into the extender circuit board.
2. Refer to Figure 2–4 and ensure the appropriate pre–emphasis is selected.
3. Connect a composite audio signal at 3.5 volts peak–to–peak to the analog interface module **BAL COMP IN** receptacle on the rear panel.
4. Refer to analog interface module circuit board assembly diagram AC919–0355 in SECTION VII, DRAWINGS and adjust composite input level control R46 for a 90% digital exciter module **MODULATION** display indication.
5. Adjust the SCA or RBDS generator output for 100% modulation on the digital exciter module **MODULATION** display. The input level will be approximately 3.5 volts peak–to–peak.
6. Remove the test equipment, remove the extender circuit board, and re–insert the analog interface module.

SECTION III
OPERATION

3-1. INTRODUCTION.

3-2. This section identifies all controls and indicators associated with the PREDATOR digital FM exciter and provides standard operating procedures.

3-3. CONTROLS AND INDICATORS.

3-4. Refer to Figure 3-1 for the location of all controls and indicators associated with normal operation of the PREDATOR. The function of each control or indicator is described in Table 3-1.

TABLE 3-1. PREDATOR CONTROLS AND INDICATORS
(Sheet 1 of 4)

ITEM NO.	NOMENCLATURE	FUNCTION
1	**ANALOG INTERFACE** Module **FAULT** Indicator	Illuminates to indicate a fault condition in the analog interface module. The indicator will illuminate when any of the following conditions are present: 1. No audio input to the A/D circuit. 2. The +5V supply is not within +5V ±0.25V. 3. The +12V supply is not within +12V ±0.75V. 4. The -12V supply is not within -12V ±0.75V. 5. The digital +5V supply is not within +5V ±0.25V. 6. The digital -2.5V supply is not within -2.5V ±0.25V. 7. The digital +2.5V supply is not within +2.5V ±0.25V.
2	**DIGITAL EXCITER MODULE MODULATION LEVEL** Display	A 30-segment multi-color LED peak reading LED bar-graph display. The display presents the peak composite baseband modulation level. The meter scale is calibrated to indicate 100% modulation at ±75 kHz deviation. The display will flash when the level is greater than 140%.
3	**DIGITAL EXCITER** Module **FAULT** Indicator	Illuminates to indicate a fault in the digital exciter module. The indicator will illuminate when any of the following conditions are present: 1. Any VCO not locked to the reference. 2. No RF output is present from the circuit board. 3. The digital +5V supply is not within +5V ±0.5V. 4. The digital -5V supply is not within -5V ±0.5V 5. The analog +8.5V supply is not within +8.5V ±0.5V. 6. The +12V supply is not within +12V ±1.0V. 7. The -12V supply is not within -12V ±1.0V

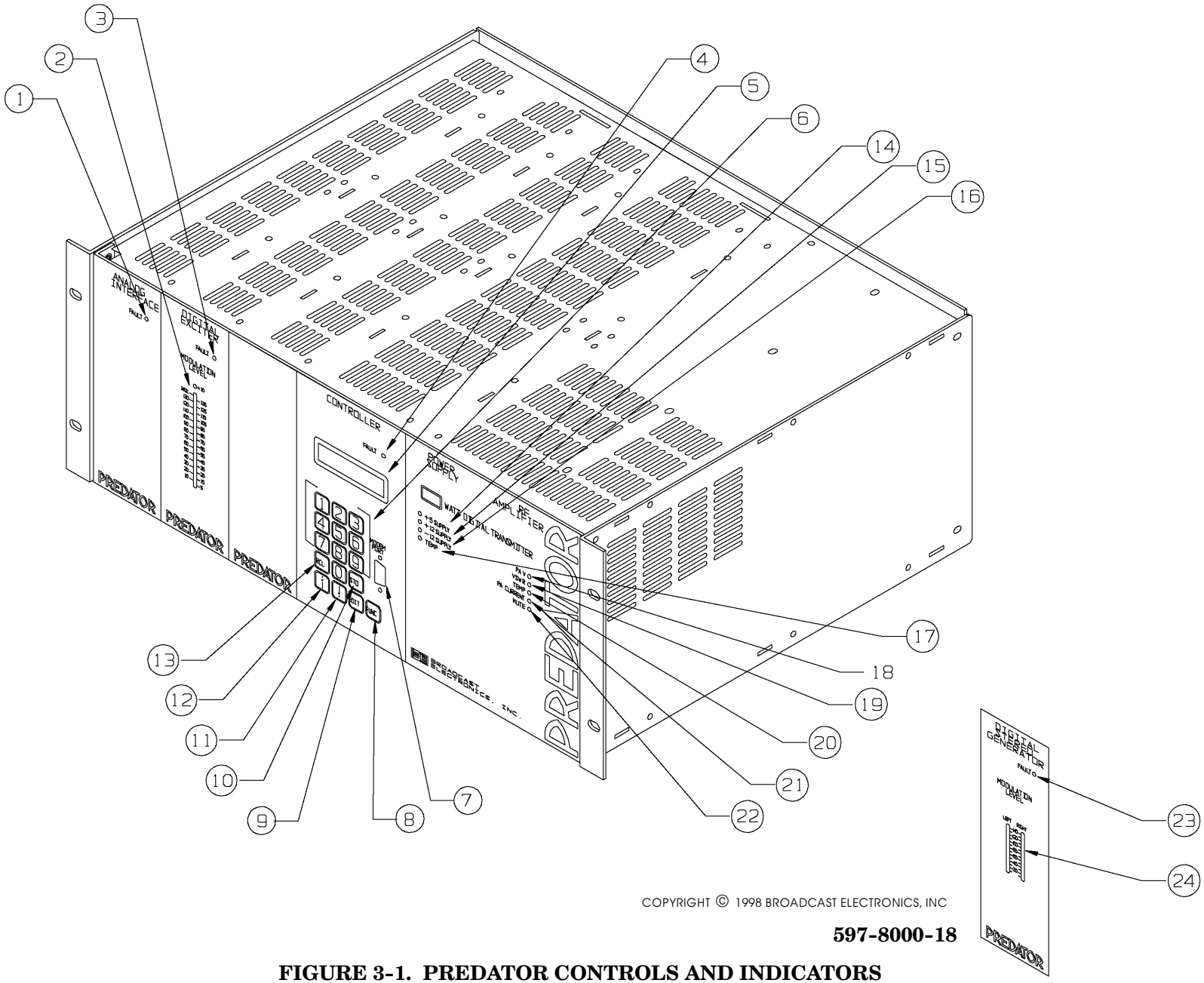

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FIGURE 3-1. PREDATOR CONTROLS AND INDICATORS

TABLE 3-1. PREDATOR CONTROLS AND INDICATORS
(Sheet 2 of 4)

ITEM NO.	NOMENCLATURE	FUNCTION
4	**CONTROLLER** Module **FAULT** Indicator	Illuminates to indicate a fault in the controller module. The indicator will illuminate when any of the following conditions are present: 1. The +5V supply is not within +5V ±0.25V. 2. The –5V supply is not within –5V ±0.25V. 3. The +12V supply is not within +12V ±0.75V. 4. The –12V supply is not within –12V ±0.75V
5	**CONTROLLER** Module **LCD Display**	Displays the PREDATOR status channels. The status channels present the PREDATOR major operating functions and parameter assignments. Some status indications displayed include: 1) exciter VCO, 2) exciter +12 V, and 3) input level. Some operating parameter assignments include: 1) frequency programming, 2) forward power output selection, 3) deviation selection, 4) pre–emphasis, 5) digital limiting, and 6) digital stereo generator operating mode.
6	**CONTROLLER** Module Keypad	Used to access the PREDATOR status channels and select operating parameter assignments.
7	**CONTROLLER** Module **MODEM PORT**	A port designed for the connection of a lap–top PC during troubleshooting or operating procedures. The computer can be used to operate the exciter without using the controller module front panel key–pad and display.
8	**CONTROLLER** Module **FUNC** Key	Configures the controller module to the function mode. The function mode allows the operator to access the PREDATOR status channels.
9	**CONTROLLER** Module **EDIT** Key	Allows the PREDATOR operating parameters to be changed. Some of the operating parameters include: 1) frequency programming, 2) forward power output selection, and 3) deviation assignment.
10	**CONTROLLER** Module **STO** Key	Used to save a PREDATOR operating parameter assignment.
11	**CONTROLLER** Module ↓ Key	Allows the operator to move forward through the PREDATOR status channels and function assignments. Also allows the user to view and select a function option.
12	**CONTROLLER** Module ↑ Key	Allows the operator to move backward through the PREDATOR status channels and function assignments. Also allows the user to view and select a function option.

TABLE 3-1. PREDATOR CONTROLS AND INDICATORS
(Sheet 3 of 4)

ITEM NO.	NOMENCLATURE	FUNCTION
13	**CONTROLLER** Module **RCL** Key	Recalls a saved PREDATOR operating parameter assignment.
14	**POWER SUPPLY/RF AMPLIFIER** Module **POWER SUPPLY +5 SUPPLY** Indicator	Illuminates to indicate the low voltage power supply module +5 supply is operational.
15	**POWER SUPPLY/RF AMPLIFIER** Module **POWER SUPPLY +12 SUPPLY** Indicator	Illuminates to indicate the low voltage power supply module +12 volt supply is operational.
16	**POWER SUPPLY/RF AMPLIFIER** Module **POWER SUPPLY -12 SUPPLY** Indicator	Illuminates to indicate the low voltage power supply module –12 volt supply is operational.
17	**POWER SUPPLY/RF AMPLIFIER** Module **POWER SUPPLY TEMP** Indicator	Illuminates to indicate an air inlet temperature of greater than 60 Degrees C.
18	**POWER SUPPLY/RF AMPLIFIER** Module **RF AMPLIFIER PAV** Indicator	Illuminates to indicate the PA voltage is present on the RF amplifier module.
19	**POWER SUPPLY/RF AMPLIFIER** Module **RF AMPLIFIER VSWR** Indicator	Illuminates to indicate a VSWR of 1.5 : 1 or greater at the output of the RF amplifier module.
20	**POWER SUPPLY/RF AMPLIFIER** Module **RF AMPLIFIER TEMP** Indicator	Illuminates to indicate an RF amplifier heatsink temperature of greater than 85 Degrees C.
21	**POWER SUPPLY/RF AMPLIFIER** Module **RF AMPLIFIER PA CURRENT** Indicator	Illuminates to indicate a current of greater than 5 Amperes on the 50W RF amplifier module or 12 Amperes on the 250W RF amplifier module.

TABLE 3-1. PREDATOR CONTROLS AND INDICATORS
(Sheet 4 of 4)

ITEM NO.	NOMENCLATURE	FUNCTION
22	**POWER SUPPLY/RF AMPLIFIER** Module **RF AMPLIFIER MUTE** Indicator	Illuminates to indicate the RF amplifier circuit board RF output is muted. The RF output is muted when: 1) the remote mute is enabled, 2) the N+1 module mute input is enabled, 3) no exciter RF output, 4) any exciter VCO is unlocked, 5) inlet air temperature above 60 Degrees C, 6) exciter +12V out-of-tolerance, 7) exciter +8.5V out-of-tolerance, or 8) exciter +5V out-of-tolerance.
23	**DIGITAL STEREO GENERATOR** Module **FAULT** Indicator	Illuminates to indicate a fault has occurred in the AES/EBU digital input.
24	**DIGITAL STEREO GENERATOR** Module **MODULATION LEVEL** Display	A color-coded LED bar-graph display designed to present left and right channel modulation levels. Each indicator will illuminate at the level indicated on the display. The display is calibrated to equal 100% when the input is +10 dBm and will flash when the level is greater than 140%. The display range is from 0 to 140%.

3-5. OPERATION.

NOTE

NOTE

THE FOLLOWING PROCEDURE ASSUMES THAT THE EXCITER IS COMPLETELY INSTALLED AND IS FREE OF ANY DISCREPANCIES.

3-6. TURN ON.

3-7. Apply ac power to the unit. The following events will occur:

A. The CONTROLLER LCD display will illuminate.

B. The **POWER SUPPLY +5V, +12V, -12V,** and **TEMP** indicators will illuminate.

C. The **RF AMPLIFIER VSWR** and **MUTE** indicators will illuminate.

D. The **RF AMPLIFIER VSWR** and the **POWER SUPPLY TEMP** indicators will extinguish.

E. The **RF AMPLIFIER MUTE** indicator will extinguish.

F. The **RF AMPLIFIER PAV** indicator will illuminate.

G. The flushing fan will operate.

3-8. Refer to CARRIER FREQUENCY PROGRAMMING in the following text and perform the procedure to ensure the exciter is programmed for the correct carrier frequency.

3-9. Refer to FREQUENCY DEVIATION PROGRAMMING in the following text and perform the procedure to ensure the PREDATOR is programmed for the desired frequency deviation.

3–10. Refer to FORWARD POWER OUTPUT PROGRAMMING in the following text and perform the procedure to check the PREDATOR forward power output. The forward and reflected power indications may be converted to a VSWR ratio using Table 3–2. To use the table, divide the reflected power indication by the forward power indication. Locate the quotient in the POWER RATIO column. The VSWR is listed across from the POWER RATIO entry.

3–11. Observe the DIGITAL EXCITER module **MODULATION LEVEL** display to ensure programming is applied to the exciter.

TABLE 3-2. POWER/VSWR CONVERSION

$\frac{\text{Reflected Power in Watts}}{\text{Forward Power in Watts}}$ = POWER RATIO	VSWR
0.000	1.0:1
0.002	1.1:1
0.008	1.2:1
0.017	1.3:1
0.028	1.4:1
0.040	1.5:1
0.053	1.6:1
0.074	1.75:1
0.111	2.0:1
0.183	2.5:1
0.250	3.0:1
0.360	4.0:1

3–12. INITIAL PREDATOR PROGRAMMING.

3–13. PREDATOR programming and status monitoring is performed using the controller module keypad and display. A complete description on the use of the controller module is presented in CONTROLLER MODULE – OPERATION in the following text. Refer to CONTROLLER MODULE – OPERATION and obtain a thorough understanding of the module functions and nomenclature before performing the following procedures.

3–14. The programming and status monitoring can also be performed using a PC. Refer to PREDATOR OPERATION – USING A COMPUTER in the following text for the procedures to use a PC for PREDATOR programming. The following text presents the procedures using the controller module.

NOTE ***THE PREDATOR FUNCTION CHANNEL NUMBERS WILL VARY AS DETERMINED BY THE TYPE OF MODULES AND OPTIONS INSTALLED IN THE UNIT.***

NOTE

3–15. The PREDATOR is a modular device and can be configured with several different modules. As a result of this modular design, the function channel numbers vary in response to the type modules and options installed in the unit. The following text presents the channel numbers associated with a PREDATOR configured with: 1) a digital stereo generator module, 2) an analog interface module, 3) a controller module, 4) a digital exciter module, and 5) a 250W power supply/RF amplifier module.

3–16. CARRIER FREQUENCY PROGRAMMING.

3–17. The PREDATOR carrier frequency is programmed using the 1 TRANS. FREQ. function. To program the PREDATOR carrier frequency, proceed as follows:

1. Access the 1 TRANS. FREQ. function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
1. Trans. Freq.
    99.9 MHz
```

2. Depress the [EDIT] key.

   The following display will appear.

```
1. Trans. Freq.
↑↓  99.9 MHz
```

3. Use the keypad numeral keys to enter the desired frequency.

   The operating frequency will be saved.

```
1. Trans. Freq.
↑↓  102.9 MHz
```

```
1. Trans. Freq.
   102.9 MHz
```

3–18. FREQUENCY DEVIATION PROGRAMMING.

3–19. The PREDATOR can be programmed for ±75 kHz, ±150 kHz, and ±300 kHz deviation using the 9 DEVIATION function. To program the PREDATOR deviation, proceed as follows:

1. Access the 9 DEVIATION function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
9. Deviation
   150 kHz
```

2. Depress the [EDIT] key.

   The following display will appear.

```
9. Deviation
↑↓  150 kHz
```

3. Use the [↓] [↑] keys to select 75 kHz, 150 kHz, or 300 kHz deviation.

```
9. Deviation
↑↓  75 kHz
```

4. Depress the [STO] key.

   The frequency deviation will be saved.

```
9. Deviation
   75 kHz
```

3–20. FORWARD POWER PROGRAMMING.

3–21. The PREDATOR forward power can be set from: 1) 5 watts to 50 watts in 0.1 watt increments for 50 watt units and 2) 25 watts to 250 watts in 1 watt increments for 250 watt units. The forward power programming is performed using the 35 PA FWD PWR function. To program the PREDATOR forward power, proceed as follows:

1. Access the 35 PA FWD PWR function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number.

```
35. PA fwd pwr
      0 W
```

2. Depress the [EDIT] key.

   The following display will appear.

```
35. PA fwd pwr
↑↓      0 W
```

3. Use the [↓] [↑] keys to select the desired forward power output. When the [↓] [↑] keys are momentarily depressed, the power will change slowly for small power adjustments. When the [↓] [↑] keys are depressed and held, the power will change rapidly for large power change adjustments.

```
35. PA fwd pwr
↑↓     50.0 W
```

4. Depress the [STO] key.
   The forward power output will be saved.

```
35. PA fwd pwr
     50.0 W
```

3-22. **PA REFLECTED POWER.**

3-23. Check the PREDATOR reflected power. The reflected power is displayed by the 36 PA RFL PWR function. To display the reflected power, proceed as follows:

1. Access the 36 PA RFL PWR function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number.

```
36. PA ref. pwr
     2.0 W
```

2. The display will present the PREDATOR reflected power in watts.

3-24. CONTROLLER MODULE - OPERATION.

NOTE ***THE PREDATOR FUNCTION CHANNEL NUMBERS WILL VARY AS DETERMINED BY THE TYPE OF MODULES AND OPTIONS INSTALLED IN THE UNIT.***

NOTE

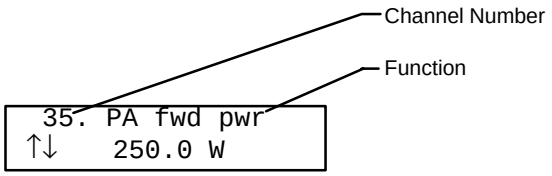
3-25. The PREDATOR is controlled and monitored for proper operation by the controller module. Control of the module is provided by a front panel keypad and display. The following text presents the controller module standard operating procedures. This discussion includes a description of the controller module indicators.

3-26. Control, programming, and status monitoring can also be performed using a PC connected to the front or rear panel MODEM ports. Refer to PREDATOR OPERATION USING A COMPUTER in the following text for the procedure to use a computer for PREDATOR programming. The following text presents the procedures using the controller module keypad and display.

3-27. **DESCRIPTION - FUNCTIONS AND CHANNEL NUMBERS.**

3-28. The PREDATOR is controlled using the controller module keypad and LCD display. The keypad and display allow the operator to establish the operating parameters and monitor many status conditions.

3-29. The PREDATOR operating and status functions are accessed by selecting the desired channel (refer to Figure 3-2). Each channel is assigned one function.



597-8000-19

FIGURE 3-2. CONTROLLER DISPLAY

3-30. Table 3-3 presents the channel assignments for a PREDATOR equipped with: 1) an analog interface module, 2) a digital exciter module, 3) a controller module, 4) a digital stereo generator module, and 5) a 250W power supply/RF amplifier module. Refer to Table 3-3 for a brief description of the status channels.

TABLE 3-3. PREDATOR STATUS CHANNELS

CHAN	DISPLAY	DESCRIPTION
1	Trans. Freq.	Digital Exciter module frequency change function. Used to change the exciter carrier frequency.
2	Ex RF Out	Monitors the digital exciter module RF output status. The function will display on or off.
3	Exciter VCO	Monitors the digital exciter module VCOs. The function will display unlocked or locked. Presents locked when all the VCOs are locked. Presents unlocked when any VCO is unlocked.
4	Ex +12 V	Displays the digital exciter module +12 power supply voltage.
5	Ex -12 V	Displays the digital exciter module -12 power supply voltage.
6	Ex Anlg 8.5 V	Displays the digital exciter module analog +8.5 power supply voltage.
7	Ex Dig -5 V	Displays the digital exciter module digital -5 power supply voltage.
8	Ex Dig +5 V	Displays the digital exciter module digital +5 power supply voltage.
9	Deviation	Digital Exciter module frequency deviation function. Used to select ±75 kHz, ±150 kHz, or ±300 kHz operation.
10	Inp +5 V	Displays the analog interface module +5 power supply voltage.
11	Inp +12 V	Displays the analog interface module +12 power supply voltage.
12	Inp -12 V	Displays the analog interface module -12 power supply voltage.

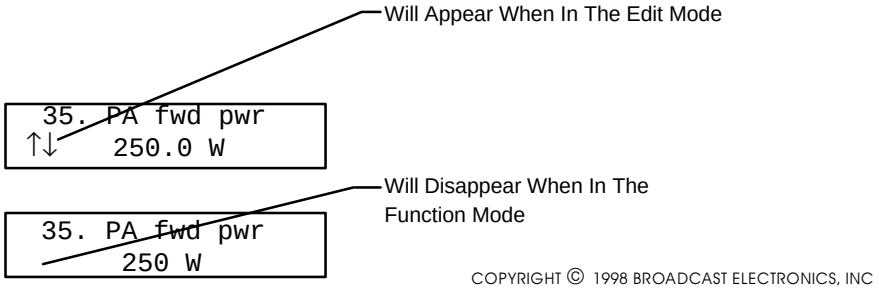
TABLE 3-3. PREDATOR STATUS CHANNELS (Con't)		
CHAN	**DISPLAY**	**DESCRIPTION**
13	Inp –5 V	Displays the analog interface module –5 power supply voltage.
14	Inp +5 V Digital	Displays the analog interface module digital +5 power supply voltage.
15	Inp 2.5 V	Displays the analog interface module +2.5 power supply voltage.
16	Inp –2.5 V	Displays the analog interface module –2.5 power supply voltage.
17	Input Audio	Displays the status of the audio applied to the unit. The function will display present or missing.
18	St Gen mode	Digital stereo generator module operating mode function. Used to select stereo, L+R, mono L, or mono R operation.
19	Preemphasis	Digital stereo generator module preemphasis mode function. Used to select none, 50 uS, or 75 uS preemphasis operation.
20	St Gen pilot	Displays the status of the digital stereo generator module pilot. The function will display on or off.
21	Pilot level	Displays the digital stereo generator module pilot level. The level is presented in % modulation.
22	Audio input	Digital stereo generator module audio input select function. Used to select the digital AES/EBU input or the analog interface module analog input.
23	Input level	Displays the digital stereo generator module input level in dBfs.
24	Dig. Source	Digital stereo generator module digital audio input select function. Used to select Optical for the Toshiba optical connector or XLR–Cable for the XLR connector.
25	Limiter	Digital stereo generator module limiter on/off function. Used to enable or disable limiter operation.
26	Limiter level	Displays the digital stereo generator module limiter level. The level is displayed using a range of numbers from 0 to 255. 0 represents no limiting. 255 represents maximum limiting.
27	Inlet Amb Tmp	Displays the exciter inlet air temperature in degress C. The temperature is measured on the power supply/RF amplifier module.
28	Pwr Sup +5 V	Displays the power supply/RF amplifier module power supply circuit +5 power supply voltage.
29	Pwr Sup +12 V	Displays the power supply/RF amplifier module power supply circuit +12 power supply voltage.
30	Pwr Sup –12 V	Displays the power supply/RF amplifier module power supply circuit –12 power supply voltage.
31	IPA +5 V	Displays the power supply/RF amplifier module RF amplifier circuit board IPA stage +5 power supply voltage.
32	IPA +15 V	Displays the power supply/RF amplifier module RF amplifier circuit board IPA stage +15 power supply voltage.
33	IPA +28 V	Displays the power supply/RF amplifier module RF amplifier circuit board IPA stage +28 power supply voltage.
34	PA Temp	Displays the power supply/RF amplifier module RF amplifier circuit board PA heatsink temperature in degrees C.

TABLE 3-3. PREDATOR STATUS CHANNELS (Con't)		
CHAN	**DISPLAY**	**DESCRIPTION**
35	PA fwd. pwr	The exciter forward power programming function. Used to change the exciter forward power output. Displays the forward power in Watts.
36	PA ref. pwr	Displays the exciter reflected power in watts.
37	PA final V	Displays the power supply/RF amplifier module RF amplifier circuit board final PA stage voltage.
38	PA Current	Displays the power supply/RF amplifier module RF amplifier circuit board PA stage current.
39	Cont +5 V	Displays the controller module +5 power supply voltage.
40	Cont –5 V	Displays the controller module –5 power supply voltage.
41	Cont +12 V	Displays the controller module +12 power supply voltage.
42	Cont –12 V	Displays the controller module –12 power supply voltage.

3–31. CONTROLLER EDIT AND FUNCTION MODES.

3–32. The controller module is designed with two modes of operation: 1) function and 2) edit (refer to Figure 3–3). The edit mode selects and configures operating parameters such as frequency programming and is enabled when the controller EDIT key is depressed. When the controller is in the edit mode, up/down arrows will appear on the display as shown in Figure 3–3.

3–33. The function mode allows the selection of the channels and is enabled when the FUNC key is depressed. When the controller is in the function mode, the up/down arrows on the display will disappear as shown in Figure 3–3. The FUNC key is also used to escape from the edit mode.



597-8000-22

FIGURE 3-3. EDIT AND FUNCTION MODES

3–34. HOW TO ACCESS AND CHANGE A FUNCTION.

3–35. The controller module keypad is equipped with several buttons to allow the operator to program the PREDATOR operating parameters. The following text presents a general procedure to access and program a function. The procedure presents the steps required to change the forward power output.

1. Access the 35 PA FWD PWR function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
35. PA fwd pwr
      0 W
```

2. Depress the [EDIT] key.

   The following display will appear.

```
35. PA fwd pwr
↑↓     0 W
```

3. Use the [↓] [↑] keys to select the desired forward power output.

```
35. PA fwd pwr
↑↓   250.0 W
```

4. Depress the [STO] key.

   The forward power output will be saved and the ↑↓ will disappear.

```
35. PA fwd pwr
     250.0 W
```

3-36. **HOW TO ACCESS A STATUS FUNCTION.**

3-37. A function with a status only display is accessed in a manner identical to a function with options to be selected. With a status only function, the edit mode can not be enabled. The following text presents a general procedure to access the controller module +5 volt supply status function.

1. Access the 39 CONT +5 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
39. Cont +5V
     +4.9
```

2. The display will present the +5 V supply voltage.

3-38. **±5 VOLT STATUS.**

3-39. The status of the controller module +5 volt supply is displayed by the 39 CONT +5V function. The status of the controller module –5 volt supply is displayed by the 40 CONT –5V function. To display the module +5 volt power supply status, perform the HOW TO ACCESS A STATUS FUNCTION procedure in the preceding text. To display the module –5 volt power supply status, perform the procedure to access the 40 CONT –5 V function.

3-40. **±12 VOLT STATUS.**

3-41. The status of the controller module +12 volt supply is displayed by the 39 CONT +12V function. The status of the controller module –12 volt supply is displayed by the 40 CONT –12V function. To display the module +12 volt power supply status, perform the following procedure. To display the module –12 volt power supply status, perform the following procedure to access the 40 CONT –12 V function.

1. Access the 41 CONT +12 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number.

2. The display will present the +12 V supply voltage.

```
41. Cont +12V
    +11.9
```

3-42. **FAULT INDICATOR.**

3-43. The controller module fault conditions are displayed by the **FAULT** indicator. The indicator will illuminate when any of the following events occur:

1. The +5V supply is not within +5V ±0.25V.
2. The -5V supply is not within -5V ±0.25V.
3. The +12V supply is not within +12V ±0.75V.
4. The -12V supply is not within -12V ±0.75V

3-44. **AUTOMATIC POWER CONTROL OPERATION.**

3-45. The controller module is designed with the ability to automatically control the exciter output power in response to changing load conditions. The controller will automatically foldback the RF output power during high PA current, reflected power, and temperature conditions.

3-46. **AUTOMATIC ANALOG AUDIO INPUT BACKUP SWITCHING.**

3-47. When the PREDATOR is equipped with an analog interface module and a digital stereo generator module, the controller module will provide automatic backup audio input switching. In the event of a failure in the AES/EBU digital input or the digital stereo generator module, the controller will automatically switch to the analog input module. When the digital stereo generator module or the AES/EBU input returns to operation, the controller will automatically switch back to the digital stereo generator module.

3-48. **LCD DISPLAY TIMEOUT SWITCHING.**

3-49. The controller module is equipped with an LCD display timeout function. This function automatically switches the controller module LCD display to the 35 PA FWD. PWR= function after a period when the controller module experiences no control/status monitoring activity. The time period default is 30 seconds and is controlled by an option in the setup menu. Refer to PREDATOR OPERATION USING A PC – SETUP MENU in the following text to change the LCD display timeout if desired.

3-50. **AFC RELAY OPERATION.**

3-51. The controller module is equipped with an AFC relay. The relay is typically connected to the transmitter control circuitry such as the AFC lock input to indicate the exciter is operational. The relay is closed when the exciter is operating normally. The following text presents the conditions when the relay will open.

1. When the exciter RF output is missing.
2. When any digital exciter module VCO becomes unlocked.

3. When the air inlet temperature is above 60 °C. The PREDATOR will automatically unmute when the temperature falls below 50 °C.
4. When the digital exciter module +8.5V dc supply is not within +8.5V ±0.5V.
5. When the digital exciter module +12.0V dc supply is not within +12V ±1.0V.
6. When the digital exciter module +5.0V dc supply is not within +5V ±0.5V.

3-52. DIGITAL STEREO GENERATOR MODULE - OPERATION.

NOTE ***THE PREDATOR FUNCTION CHANNEL NUMBERS WILL VARY AS DETERMINED BY THE TYPE OF MODULES AND OPTIONS INSTALLED IN THE UNIT.***

NOTE

3-53. The digital stereo generator module contains several programmable functions. The functions can be used to configure the module for the desired operation. Refer to the following text to configure the digital stereo generator module for the desired operation.

3-54. PRE-EMPHASIS.

3-55. The digital stereo generator module can be configured for none, 50 uS, or 75 uS pre-emphasis using the 19 PREEMPHASIS function. Select the preemphasis as follows:

1. Access the 9 PREEMPHASIS function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
19. Preemphasis
     None
```

2. Depress the [EDIT] key.
   The following display will appear.

```
19. Preemphasis
↑↓    None
```

3. Use the [↓] [↑] keys to select none, 75 us, or 50 us.

```
19. Preemphasis
↑↓    75 us
```

4. Depress the [STO] key.
   The preemphasis will be saved.

```
19. Premphasis
     75 us
```

3-56. MODE OF OPERATION.

3-57. The digital stereo generator module can be configured for stereo, L+R, mono L, or mono R operation using the 18 ST GEN MODE function. Select the module operating mode as follows:

1. Access the 8 ST GEN MODE function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
18. St Gen mode
     L+R
```

2. Depress the [EDIT] key.

   The following display will appear.

```
 18. St Gen mode
↑↓    L+R
```

3. Use the [↓] [↑] keys to select Stereo, Mono L, Mono R, or L+R.

```
 18. St Gen mode
↑↓    Stereo
```

4. Depress the [STO] key.

   The operating mode will be saved.

```
 18. St Gen mode
      Stereo
```

3-58. **PILOT.**

3-59. The status of the digital stereo generator module pilot is presented by the 20 ST GEN PILOT function. To display the pilot status, proceed as follows:

1. Access the 20 ST GEN PILOT function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
 20. St Gen pilot
       On
```

2. The display will present the status of the digital stereo generator pilot.

3-60. **PILOT LEVEL.**

3-61. The digital stereo generator module pilot level can be adjusted from 6% to 14% using the 21 PILOT LEVEL function. Adjust the pilot level as follows:

1. Access the 21 PILOT LEVEL function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
 21. Pilot level
       150
```

2. Depress the [EDIT] key.

   The following display will appear.

```
 21. Pilot level
↑↓     150
```

3. Use the [↓] [↑] keys to select the level.

```
 21. Pilot level
↑↓     175
```

4. Depress the [STO] key.

   The pilot level will be saved.

```
 21. Pilot level
       175
```

3-62. **AUDIO INPUT.**

3-63. If the PREDATOR is equipped with a digital stereo generator module and an analog interface module, the input audio can be selected from: 1) the digital AES/EBU input, 2) the analog interface module analog input, or 3) an auto mode. The auto mode allows the unit to automatically switch from the digital input on the digital stereo generator module to the analog input on the analog interface module in the event of a failure in the AES/EBU digital input or the digital stereo generator. When the digital stereo generator module or the AES/EBU input returns to operation, the controller will automatically switch back to the digital stereo generator module. The audio input is selected using the 22 AUDIO INPUT function. Select the audio input as follows:

1. Access the 22 AUDIO INPUT function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
22. Audio input
     Analog
```

2. Depress the [EDIT] key.
   The following display will appear.

```
22. Audio input
↑↓    Analog
```

3. Use the [↓] [↑] keys to select: 1) AES/EBU for a digital input, 2) ANALOG for an analog input, or 3) AUTO to allow the unit to switch between the AES/EBU digital input and the analog input.

```
22. Audio input
↑↓    AES/EBU
```

4. Depress the [STO] key.
   The audio input selection will be saved.

```
22. Audio input
     AES/EBU
```

3-64. **DIGITAL INPUT LEVEL.**

3-65. The digital stereo generator module input level is controlled by the 23 INPUT LEVEL function. The function will not adjust the analog input level on the ANALOG INTERFACE module. Adjust the digital input level as follows:

1. Access the 23 INPUT LEVEL function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
23. Input level
     10 dBfs
```

2. Depress the [EDIT] key.
   The following display will appear.

```
23. Input level
↑↓    10 dBfs
```

3. Use the [↓] [↑] keys to adjust the digital input level.

```
23. Input level
↑↓    12 dBfs
```

4. Depress the STO key.

   The audio input level will be saved.

```
23. Input level
     12 dBfs
```

3–66. **DIGITAL SOURCE.**

3–67. The digital stereo generator module digital input source is selected by the 24 DIG. SOURCE function. The function allows the user to select the Toshiba optical connector input or the XLR–cable input. To select the input, proceed as follows:

1. Access the 24 DIG. SOURCE function using one of the following methods:
   A. The ↓ ↑ keys.
   B. If the edit mode is enabled, depress the FUNC key and then use the ↓ ↑ keys.
   C. Depress the FUNC key and enter the channel number.

```
24. Dig. Source
    XLR–CABLE
```

2. Depress the EDIT key.

   The following display will appear.

```
24. Dig. Source
↑↓  XLR–CABLE
```

3. Use the ↓ ↑ keys to select OPTICAL for the Toshiba optical connector or XLR–Cable for the XLR connector.

```
24. Dig. Source
↑↓   OPTICAL
```

4. Depress the STO key.

   The digital input source will be saved.

```
24. Dig. Source
    OPTICAL
```

3–68. **DIGITAL LIMITER.**

3–69. The digital stereo generator module limiter is controlled by the 25 LIMITER function. Enable or disable limiter operation as follows:

1. Access the 25 LIMITER function using one of the following methods:
   A. The ↓ ↑ keys.
   B. If the edit mode is enabled, depress the FUNC key and then use the ↓ ↑ keys.
   C. Depress the FUNC key and enter the channel number.

```
25. Limiter
     On
```

2. Depress the EDIT key.

   The following display will appear.

```
25. Limiter
↑↓   On
```

3. Use the ↓ ↑ keys to enable or disable limiter operation.

```
25. Limiter
↑↓   Off
```

4. Depress the STO key.

   The limiter configuration will be saved.

```
25. Limiter
     Off
```

3–70. **DIGITAL LIMITER LEVEL.**

3–71. The digital stereo generator module limiter level is controlled by the 26 LIMITER LEVEL function. The level is displayed using a range of numbers from 0 to 255. 0 represents no limiting. 255 represents maximum limiting. The limiter level is determined by the audio source compression. The more compression used in the audio source, the more limiting will be required. Adjust the digital limiter level as follows:

1. Access the 26 LIMITER LEVEL function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
26. Limiter level
      90%
```

2. Depress the [EDIT] key.
   The following display will appear.

```
26. Limiter level
↑↓    90%
```

3. Use the [↓] [↑] keys to adjust the limiter to the desired level.

```
26. Limiter level
↑↓    110%
```

4. Depress the [STO] key.
   The limiter level will be saved.

```
26. Limiter level
      110%
```

3–72. **FAULT INDICATOR.**

3–73. The digital stereo generator module fault conditions are displayed by the **FAULT** indicator. The indicator will illuminate when a fault occurs in the AES/EBU digital input.

3–74. **MODULATION LEVEL DISPLAY OPERATION.**

3–75. The digital stereo generator module **MODULATION LEVEL** display presents left and right channel modulation levels. Each indicator will illuminate at the level indicated. The display is calibrated to equal 100% when the input is +10 dBm and will flash when the level is greater than 140%. The display range is from 0 to 140%.

3–76. ANALOG INTERFACE MODULE - OPERATION.

NOTE ***THE PREDATOR FUNCTION CHANNEL NUMBERS WILL VARY AS DETERMINED BY THE TYPE OF MODULES AND OPTIONS INSTALLED IN THE UNIT.***

3–77. **INPUT AUDIO.**

3–78. The status of the analog interface module audio input is displayed by the 17 INPUT AUDIO function. If audio is applied to the module, present will appear on the display. If audio is not present, missing will appear on the display. To display the status of the module audio input, proceed as follows:

1. Access the 17 INPUT AUDIO function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

```
17. Input Audio
     Present
```

C. Depress the FUNC key and enter the channel number.

2. The display will present the input audio status.

3-79. **±12 VOLT STATUS.**

3-80. The status of the analog interface module +12 volt supply is displayed by the 11 INP +12V function. The status of the analog interface module -12 volt supply is displayed by the 12 INP -12V function. To display the module +12 volt power supply status, perform the following procedure. To display the module -12 volt power supply status, perform the following procedure to access the 12 INP -12 V function.

1. Access the 11 INP +12 V function using one of the following methods:

```
11. Inp +12V
     +11.9
```

   A. The ↓ ↑ keys.

   B. If the edit mode is enabled, depress the FUNC key and then use the ↓ ↑ keys.

   C. Depress the FUNC key and enter the channel number.

2. The display will present the +12 V supply voltage.

3-81. **±5 VOLT STATUS.**

3-82. The status of the analog interface module +5 volt supply is displayed by the 10 INP +5 V function. The status of the analog interface module -5 volt supply is displayed by the 13 INP -5V function. To display the module +5 volt power supply status, perform the following procedure. To display the module -5 volt power supply status, perform the following procedure to access the 13 INP -5 V function.

1. Access the 10 INP +5 V function using one of the following methods:

```
10. Inp +5V
     +4.9
```

   A. The ↓ ↑ keys.

   B. If the edit mode is enabled, depress the FUNC key and then use the ↓ ↑ keys.

   C. Depress the FUNC key and enter the channel number.

2. The display will present the +5 V supply voltage.

3-83. **DIGITAL +5 VOLT STATUS.**

3-84. The status of the analog interface module digital +5 volt supply is displayed by the 14 INP +5V DIGITAL function. To display the module digital +5 volt power supply status, proceed as follows:

1. Access the 14 INP +5 V DIGITAL function using one of the following methods:

```
14. Inp +5V Digital
     +4.9
```

   A. The ↓ ↑ keys.

   B. If the edit mode is enabled, depress the FUNC key and then use the ↓ ↑ keys.

   C. Depress the FUNC key and enter the channel number.

2. The display will present the digital +5V supply voltage.

3-85. **±2.5 VOLT STATUS.**

3-86. The status of the analog interface module +2.5 volt supply is displayed by the 15 INP 2.5V function. The status of the analog interface module -2.5 volt supply is displayed by the 16 INP -2.5V function. To display the module +2.5 volt power supply status, perform the following procedure. To display the module -2.5 volt power supply status, perform the following procedure to access the 16 INP -2.5V function. The functions will indicate approximately 0 when the digital stereo generator module is enabled and the analog interface module is disabled.

1. Access the 15 INP +2.5 V function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.

```
15. Inp 2.5V
     2.5
```

2. The display will present the +2.5 V supply voltage.

3-87. **FAULT INDICATOR.**

3-88. The analog interface module fault conditions are displayed by the **FAULT** indicator. The indicator will illuminate when any of the following events occur:

1. No audio input to the A/D circuit.
2. The +5V supply is not within +5V ±0.25V.
3. The +12V supply is not within +12V ±0.75V.
4. The -12V supply is not within -12V ±0.75V.

3-89. ## DIGITAL EXCITER MODULE - OPERATION.

NOTE ***THE PREDATOR FUNCTION CHANNEL NUMBERS WILL VARY AS DETERMINED BY THE TYPE OF MODULES AND OPTIONS INSTALLED IN THE UNIT.***

NOTE

3-90. **CARRIER FREQUENCY PROGRAMMING.**

3-91. The PREDATOR carrier frequency is programmed using the 1 TRANS. FREQ. function. Refer to INITIAL PREDATOR PROGRAMMING in the preceding text and perform the CARRIER FREQUENCY PROGRAMMING procedure.

3-92. **FREQUENCY DEVIATION PROGRAMMING.**

3-93. The PREDATOR can be programmed for ±75 kHz, ±150 kHz, and ±300 kHz deviation using the 9 DEVIATION function. Refer to INITIAL PREDATOR PROGRAMMING in the preceding text and perform the FREQUENCY DEVIATION PROGRAMMING procedure.

3-94. **VCO STATUS.**

3-95. The status of the digital exciter module VCOs is displayed by the 3 EXCITER VCO function. The display presents locked when all the VCOs are locked or unlocked when any VCO becomes unlocked. To display the VCO status, proceed as follows:

1. Access the 3 VCO function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

2. The display will present LOCKED when all the VCOs are locked or UNLOCKED when any VCO becomes unlocked.

```
3. Exciter VCO
     Locked
```

3-96. **EXCITER RF OUT STATUS.**

3-97. The digital exciter module RF output status is displayed by the 2 EX RF OUT function. The function will display present if the exciter is generating an RF signal. The function will display missing if no RF signal is present. To display the exciter RF output status, proceed as follows:

1. Access the 2 EX RF OUT function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

2. If the exciter is generating an RF signal, PRESENT will be displayed. If the RF signal is not present, MISSING will be displayed.

```
2. Ex RF Out
    present
```

3-98. **±12 VOLT STATUS.**

3-99. The status of the digital exciter module +12 volt supply is displayed by the 4 EX +12V function. The status of the digital exciter module –12 volt supply is displayed by the 5 EX –12V function. To display the +12 volt exciter power supply status, perform the following procedure. To display the –12 volt exciter power supply status, perform the following procedure to access the 5 EX –12 V function.

1. Access the 4 EX +12 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
4.  Ex +12V
     +11.9
```

2. The display will present the +12 V supply voltage.

3–100. **+8.5 VOLT STATUS.**

3–101. The status of the digital exciter module +8.5 volt supply is displayed by the 6 EX ANLG 8.5 V function. To display the +8.5 volt exciter power supply status, proceed as follows:

1. Access the 6 EX ANLG 8.5 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
6. Ex Anlg 8.5V
     8.5
```

2. The display will present the +8.5 V supply voltage.

3–102. **DIGITAL ±5 VOLT STATUS.**

3–103. The status of the digital exciter module digital +5 volt supply is displayed by the 8 EX DIG +5V function. The status of the digital exciter module digital –5 volt supply is displayed by the 7 EX DIG –5V function. To display the +5 volt exciter power supply status, perform the following procedure. To display the –5 volt exciter power supply status, perform the following procedure to access the 7 EX DIG –5 V function.

1. Access the 8 EX DIG +5 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number. Channels 1 through 9 must contain a 0 (Example – 01).

```
8. Ex Dig +5V
     +4.9
```

2. The display will present the +5 V supply voltage.

3–104. **FAULT INDICATOR.**

3–105. The digital exciter module fault conditions are displayed by the **FAULT** indicator. The indicator will illuminate when any of the following events occur:

1. Any unlocked VCO.
2. No RF output is present from the circuit board.
3. The digital +5V supply is not within +5V ±0.5V.
4. The digital –5V supply is not within –5V ±0.5V.
5. The analog +8.5V supply is not within +8.5V ±0.5V.
6. The +12V supply is not within +12V ±1.0V.
7. The –12V supply is not within –12V ±1.0V.

3-106. **MODULATION LEVEL DISPLAY OPERATION.**

3-107. The digital exciter module **MODULATION LEVEL** display presents the composite base-band modulation level. The meter scale is calibrated to indicate 100% modulation at ±75 kHz deviation.

3-108. POWER SUPPLY/RF AMPLIFIER MODULE - OPERATION.

NOTE ***THE PREDATOR FUNCTION CHANNEL NUMBERS WILL VARY AS DETERMINED BY THE TYPE OF MODULES AND OPTIONS INSTALLED IN THE UNIT.***

NOTE

3-109. **CHASSIS INLET AIR TEMPERATURE.**

3-110. The chassis inlet air temperature is displayed by the 27 INLET AMB TMP function. To display the air temperature, proceed as follows:

1. Access the 27 INLET AMB TMP function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.
2. The display will present the chassis inlet air temperature in °C.

```
27. Inlet Amb Tmp
      24° C
```

3-111. **POWER SUPPLY +5V STATUS.**

3-112. The status of the power supply/RF amplifier module +5 volt supply is displayed by the 28 PWR SUP +5V function. To display the module +5 volt power supply status, proceed as follows:

1. Access the 28 PWR SUP +5 V function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.
2. The display will present the +5 V supply voltage.

```
28. Pwr Sup +5V
      +4.9
```

3-113. **±12 VOLT STATUS.**

3-114. The status of the power supply/RF amplifier module +12 volt supply is displayed by the 29 PWR SUP +12V function. The status of the power supply/RF amplifier module –12 volt supply is displayed by the 30 PWR SUP –12V function. To display the module +12 volt power supply status, perform the following procedure. To display the module –12 volt power supply status, perform the following procedure to access the 30 PWR SUP –12 V function.

1. Access the 29 PWR SUP +12 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number.

```
29.  Pwr Sup +12V
     +11.9
```

2. The display will present the +12 V supply voltage.

3-115. **IPA +5, +15, AND +28 VOLT STATUS.**

3-116. The status of the RF amplifier driver circuit board IPA +5 volt supply is displayed by the 31 IPA +5V function. The status of the RF amplifier driver circuit board IPA +15 volt supply is displayed by the 32 IPA +15V function. The status of the RF amplifier driver circuit board IPA +28 volt supply is displayed by the 33 IPA +28V function. To display the IPA +5 volt power supply status, perform the following procedure. To display the IPA +15 volt power supply status, perform the following procedure to access the 32 IPA +15 V function. To display the IPA +28 volt power supply status, perform the following procedure to access the 33 IPA +28V function.

1. Access the 31 IPA +5 V function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number.

```
31.  IPA +5V
     +4.9
```

2. The display will present the +5 V supply voltage.

3-117. **PA AIR TEMPERATURE.**

3-118. The RF amplifier circuit board heatsink temperature is displayed by the 34 PA TEMP function. To display the heatsink temperature, proceed as follows:

1. Access the 34 PA TEMP function using one of the following methods:

   A. The [↓] [↑] keys.

   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.

   C. Depress the [FUNC] key and enter the channel number.

```
34. PA Temp
    60° C
```

2. The display will present the RF amplifier circuit board heatsink temperature in °C.

3-119. **PA FORWARD POWER.**

3-120. The PREDATOR forward power can be set from: 1) 5 watts to 50 watts in 1 watt increments for 50 watt units and 2) 25 watts to 250 watts in 1 watt increments for 250 watt units. The forward power is changed using the 35 PA FWD. PWR function. Refer to INITIAL PREDATOR PROGRAMMING in the preceding text and perform the FORWARD POWER PROGRAMMING procedure to change or access the PREDATOR forward power function.

3-121. **PA REFLECTED POWER.**

3-122. The PREDATOR reflected power is displayed by the 36 PA RFL PWR function. Refer to INITIAL PREDATOR PROGRAMMING in the preceding text and perform the PA REFLECTED POWER procedure to access the PA reflected power value.

3-123. **PA FINAL VOLTAGE AND CURRENT.**

3-124. The RF amplifier circuit board PA final voltage is displayed by the 37 PA FINAL V function. The RF amplifier circuit board PA final current is displayed by the 38 PA FINAL CUR function. To display the PA final voltage, perform the following procedure. To display the PA final current, perform the following procedure to access the 38 PA FINAL CUR function.

1. Access the 37 PA FINAL V function using one of the following methods:
   A. The [↓] [↑] keys.
   B. If the edit mode is enabled, depress the [FUNC] key and then use the [↓] [↑] keys.
   C. Depress the [FUNC] key and enter the channel number.
2. The display will present the RF amplifier circuit board PA final voltage.

```
37. PA final V
     48 V
```

3-125. **POWER SUPPLY MODULE +5 SUPPLY INDICATOR.**

3-126. The status of the low-voltage power supply module +5 V supply is presented by the power supply/RF amplifier module **POWER SUPPLY +5** indicator. The indicator will illuminate to indicate the module +5V supply is operational.

3-127. **POWER SUPPLY MODULE +12 SUPPLY INDICATOR.**

3-128. The status of the low-voltage power supply module +12 V supply is presented by the power supply/RF amplifier module **POWER SUPPLY +12** indicator. The indicator will illuminate to indicate the module +12V supply is operational.

3-129. **POWER SUPPLY MODULE -12 SUPPLY INDICATOR.**

3-130. The status of the low-voltage power supply module -12 V supply is presented by the power supply/RF amplifier module **POWER SUPPLY -12** indicator. The indicator will illuminate to indicate the module -12V supply is operational.

3-131. **POWER SUPPLY MODULE TEMP INDICATOR.**

3-132. High air inlet temperature conditions are displayed by the power supply/RF amplifier module **POWER SUPPLY TEMP** indicator. The indicator will illuminate when the air inlet temperature is greater than 60 Degrees C.

3–133. **RF AMPLIFIER MODULE PAV SUPPLY INDICATOR.**

3–134. The status of the PAV supply is presented by the power supply/RF amplifier module **RF AMPLIFIER PAV** indicator. The indicator will illuminate to indicate the PAV supply is present.

3–135. **RF AMPLIFIER MODULE VSWR INDICATOR.**

3–136. High VSWR conditions are displayed by the power supply/RF amplifier module **RF AMPLIFIER VSWR** indicator. The indicator will illuminate when the VSWR at the RF output is 1.5 : 1 or greater.

3–137. **RF AMPLIFIER MODULE TEMP INDICATOR.**

3–138. High RF amplifier circuit board heatsink temperature conditions are displayed by the power supply/RF amplifier module **RF AMPLIFIER TEMP** indicator. The indicator will illuminate when the RF amplifier circuit board heatsink temperature is greater than 85 Degrees C.

3–139. **RF AMPLIFIER MODULE PA CURRENT INDICATOR.**

3–140. High PA current conditions are displayed by the power supply/RF amplifier module **RF AMPLIFIER PA CURRENT** indicator. The indicator will illuminate when the current at the PA stage is greater than 5 Amperes for 50W models or 12 Amperes for 250W models.

3–141. **RF AMPLIFIER MODULE MUTE INDICATOR.**

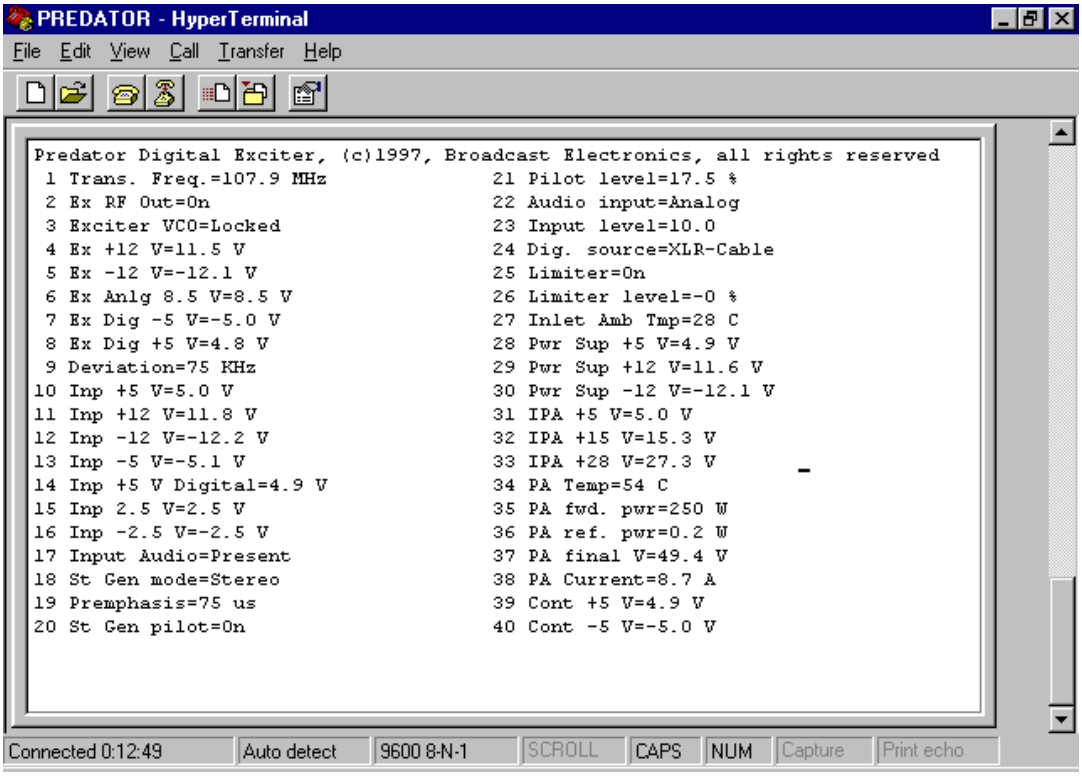
3–142. The RF output mute status is presented by the power supply/RF amplifier module **RF AMPLIFIER MUTE** indicator. The indicator will illuminate to indicate an RF output mute condition. The RF output will be muted when one or more of the following conditions occur:

1. When the remote control mute input is enabled.
2. When the N+1 mute input is enabled.
3. When the exciter RF output is missing.
4. When any digital exciter module VCO becomes unlocked.
5. When the air inlet temperature is above 60 °C. The PREDATOR will automatically unmute when the temperature falls below 50 °C.
6. When the digital exciter module +8.5V dc supply is not within +8.5V ±0.5V.
7. When the digital exciter module +12.0V dc supply is not within +12V ±1.0V.
8. When the digital exciter module +5.0V dc supply is not within +5V ±0.5V.

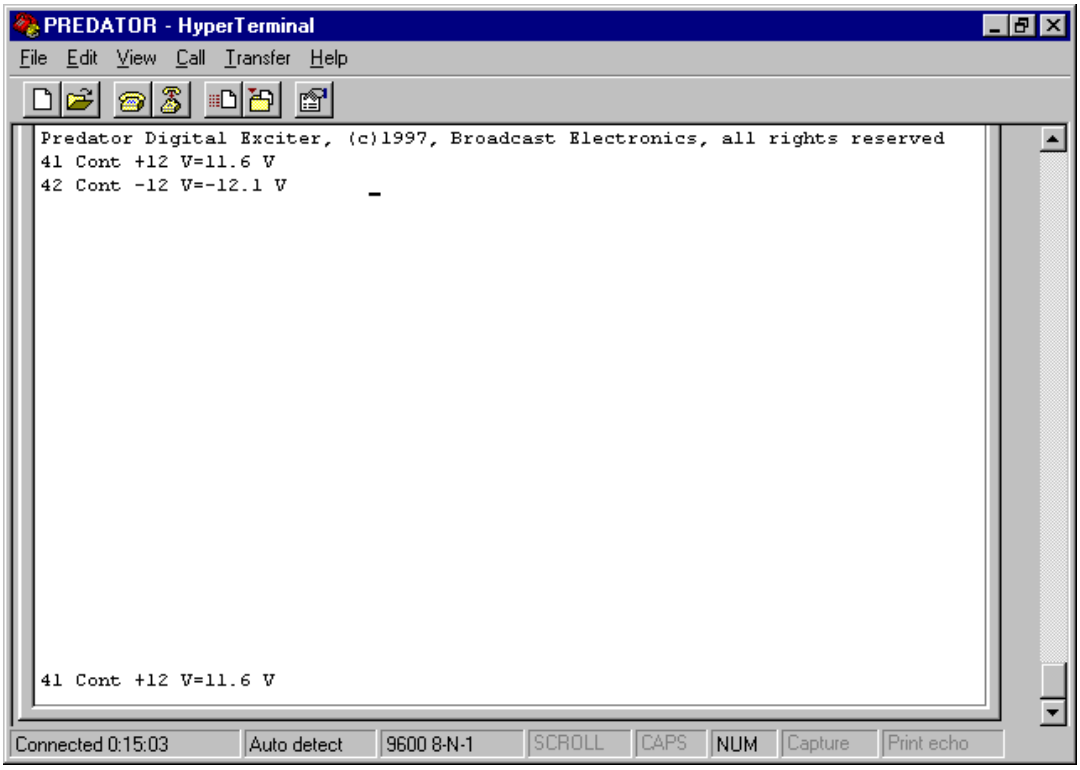
3–143. PREDATOR OPERATION - USING A COMPUTER.

3–144. The PREDATOR can be operated using a PC. The PC allows the operator to control and monitor the status of many critical operating parameters without using the controller module keypad and display. A typical PREDATOR display is presented in Figure 3–4.

3–145. The PC can be connected to the PREDATOR locally or remotely. A local connection is provided by the front–panel modem port. A remote connection is accomplished using a modem and the rear–panel modem port. The following text presents the procedures required to use a PC to control and monitor a PREDATOR digital exciter.



PARAMETER DISPLAY – PAGE 1



PARAMETER DISPLAY – PAGE 2

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FIGURE 3-4. TYPICAL PREDATOR PARAMETER DISPLAY

3–146. # LOCAL OPERATION.

3–147. ## COMMUNICATION PROGRAM SETUP.

3–148. Computer control of the PREDATOR is performed using almost any standard communication program such as Windows 95 HyperTerminal or ProCom. Once a standard null modem cable (BE P/N 849–9091) is connected between the front–panel MODEM port and a COM port on the PC, the communication program parameters must be configured. The following text presents the procedure to configure the program parameters using Windows 95 HyperTerminal. If a different communication program is used, refer to the program instruction manual to configure the communication parameters.

1. Move the cursor to the Start button on the Windows 95 desktop and click the mouse.
2. Move the cursor to PROGRAMS→ACCESSORIES→HYPERTERMINAL and click the mouse.
3. Move the cursor to the HYPERTERMINAL shortcut and double–click the mouse.

   The HYPERTERMINAL program will appear.
4. In the CONNECTION DESCRIPTION dialog box, enter the name of the shortcut to be created such as PREDATOR.
5. Use the mouse to select the desired icon.
6. Move the cursor to OK and click the mouse.

   The CONNECT TO dialog box will appear.
7. In the CONNECT USING dialog box, ensure the correct COM port is selected. Typically, COM1 is used.
8. Move the cursor to OK and click the mouse.

   The COM1 PROPERTIES dialog box will appear.
9. Move the cursor to the BITS PER SECOND dialog box and select 9600.
10. Move the cursor to the DATA BITS dialog box and select 8.
11. Move the cursor to the PARITY dialog box and select NONE.
12. Move the cursor to the STOP BITS dialog box and select 1.
13. Move the cursor to the FLOW CONTROL dialog box and select NONE.
14. Move the cursor to OK and click the mouse.

3–149. ## CONNECTION PROCEDURE.

3–150. Once the communication program is configured, the program can be used to control the PREDATOR. The following text presents the procedure to connect to the PREDATOR using a PC attached to the front–panel modem port. The PREDATOR can also be controlled by the front panel keypad and display when connected.

1. Use the mouse to start the communication program PREDATOR shortcut created in the preceding text.

   The PREDATOR parameter display will appear (refer to Figure 3–4).

3–151. # REMOTE OPERATION.

3–152. The PREDATOR operating and status display shown in Figure 3–4 can be accessed from a remote location using a PC and modem. This allows an operator to perform the same control and monitoring functions locally or from a remote location. Control of the PREDATOR is performed using almost any standard communication program such as Windows 95 HyperTerminal or Windows 3.11 Terminal.

3–153. **COMMUNICATION PROGRAM SETUP.**

1. Move the cursor to the Start button on the Windows 95 desktop and click the mouse.
2. Move the cursor to PROGRAMS→ACCESSORIES→HYPERTERMINAL and click the mouse.
3. Move the cursor to the HYPERTERMINAL shortcut and double–click the mouse.

   The HYPERTERMINAL program will appear.
4. In the CONNECTION DESCRIPTION dialog box, enter the name of the shortcut to be created such as PREDATOR.
5. Use the mouse to select the desired icon.
6. Move the cursor to OK and click the mouse.

   The CONNECT dialog box will appear.
7. In the COUNTRY CODE dialog box, enter the country.
8. In the AREA CODE dialog box, enter the PREDATOR site telephone number area code.
9. In the PHONE NUMBER dialog box, enter the PREDATOR site telephone number.
10. In the CONNECT USING dialog box, select the modem installed in the PC.
11. Move the cursor to OK and click the mouse.

    The CONNECT dialog box will appear.
12. Enter the CONNECT dialog box information as follows:
    A. Move the cursor to the DIALING PROPERTIES and click the mouse.
    B. Enter a location if desired as follows:
       1. Move the cursor to the NEW dialog box arrow and click the mouse.
       2. Enter a name for the location.
       3. Move the cursor to OK and click the mouse.
    C. Move the cursor to THE AREA CODE IS dialog box and ensure the area code of the PREDATOR site telephone number is correct.
    D. Move the cursor to the I AM IN dialog box and select the correct country.
    E. Move the cursor to the ACCESS OUTSIDE LINE, DIAL USING CALLING CARD, and THIS LOCATION HAS CALL WAITING, TO DISABLE IT DIAL dialog boxes and enter the appropriate information.
13. Move the cursor to the CONFIGURE button and click the mouse.

    The MODEM dialog box will appear.
14. Move the cursor to the PORT dialog box and select the port connected to the modem.
15. Move the cursor to the MAXIMUM CONNECTION SPEED dialog box and select 9600.
16. Move the cursor to the CONNECTION tab and click the mouse.
17. Move the cursor to the DATA BITS dialog box and select 8.

18. Move the cursor to the PARITY dialog box and select NONE.
19. Move the cursor to the STOP BITS dialog box and select 1.
20. Move the cursor to the ADVANCED button and click the mouse.
21. Move the cursor to the FLOW CONTROL dialog box and select RTS/CTS.
22. Move the cursor to OK and click the mouse.

3–154. **MODEM SETUP (WINDOWS 3.11 TERMINAL ONLY).**

3–155. To communicate with the PREDATOR, the modem must be assigned the correct initialization string for Windows 3.11 Terminal program users. If Windows 95 HyperTerminal is used, no initialization string assignment will be required. To setup the modem initialization string for Windows 3.11 Terminal, proceed as follows:

1. Move the cursor to the TERMINAL icon in the ACCESSORIES program group and click the mouse.
2. Move the cursor to FILE→OPEN and click the mouse.
3. Use the OPEN dialog box to select the PREDATOR terminal program file.
4. Assign the initialization string as follows:
   A. Move the cursor to SETTINGS→MODEM and click the mouse.
   B. Move the cursor to the ORIGINATE box and enter an initialization string. A typical string is: ATQ0V1E1S0=0

      Q0 = Enable response codes.
      V1 = Enable verbose response codes.
      E1 = Enable echo in command mode.
      S0=0 Disable autoanswer on the first ring.

3–156. **CONNECTION PROCEDURE.**

3–157. Once the communication program is configured, the program can be used to control the PREDATOR. The following text presents the procedure to connect to the PREDATOR using a PC from a remote location.

1. Use the mouse to start the communication program PREDATOR shortcut created in the preceding text.

   The DIAL dialog box will appear.

2. Move the cursor to DIAL and click the mouse.

   When the unit connects, PASSWORD: will appear.

3. Enter the PREDATOR remote connect password. The password prevents access to the unit by unauthorized personnel. Use the keyboard to enter the remote connect password. The password: 1) is case sensitive, 2) can be up to 16 characters in length, 3) can be any printable character. If a password has not been previously entered into the unit, use the following factory default password. A password can be assigned by performing the password assignment procedure (refer to SETUP MENU in the following text).

   Factory Default Password – password (all lower case).

4. Depress: [↵Enter].

   When the correct password is entered, the PREDATOR parameter display will appear (refer to Figure 3–4).

5. When remote operation is to be terminated, move the cursor to the disconnect icon and click the mouse.

   The terminal program will disconnect.

3–158. COMPUTER OPERATION.

3–159. Several keyboard keys allow the user to move within and change parameters in the display. The following text presents the keyboard keys to be used in the parameter display.

KEY	DESCRIPTION
U	Allows the user to move forward through the PREDATOR status channels and function assignments. Also allows the user to view and select a function option.
D	Allows the user to move backward through the PREDATOR status channels and function assignments. Also allows the user to view and select a function option. In the setup menu, used to edit the LCD display timeout. The timeout is used to change the LCD display to the 35 PA FWD. PWR= function after a period when the controller module experiences no control/status monitoring activity.
E	Allows the PREDATOR operating parameters to be changed.
S	Used to save a PREDATOR operating parameter assignment.
Ctrl + S	Accesses the PREDATOR setup menu.
Space Bar	Toggles the PREDATOR parameter display between page 1 and page 2.
I	In the setup menu, used to view the modem initialization string. In the upgrade menu, used for user identification.
M	In the setup menu, used to edit the modem initialization string.
V	In the setup menu, used to view the current password.
P	In the setup menu, used to edit the password. In the upgrade menu, used to download the new program from the PC.
F	In the setup menu, used to edit the number of parameter functions in a column on the PREDATOR parameter display. In the upgrade menu, used to test and execute the FLASH code.
Ctrl + R	Accesses the PREDATOR upgrade menu.

3–160. To change a PREDATOR function such as the forward power, proceed as follows:

1. Access function 35 using one of the following methods:

   A. Use the keyboard [U] or [D] keys to display the 35 PA FWD. PWR function at the bottom of the PREDATOR parameter screen (refer to Figure 3–5).

   OR

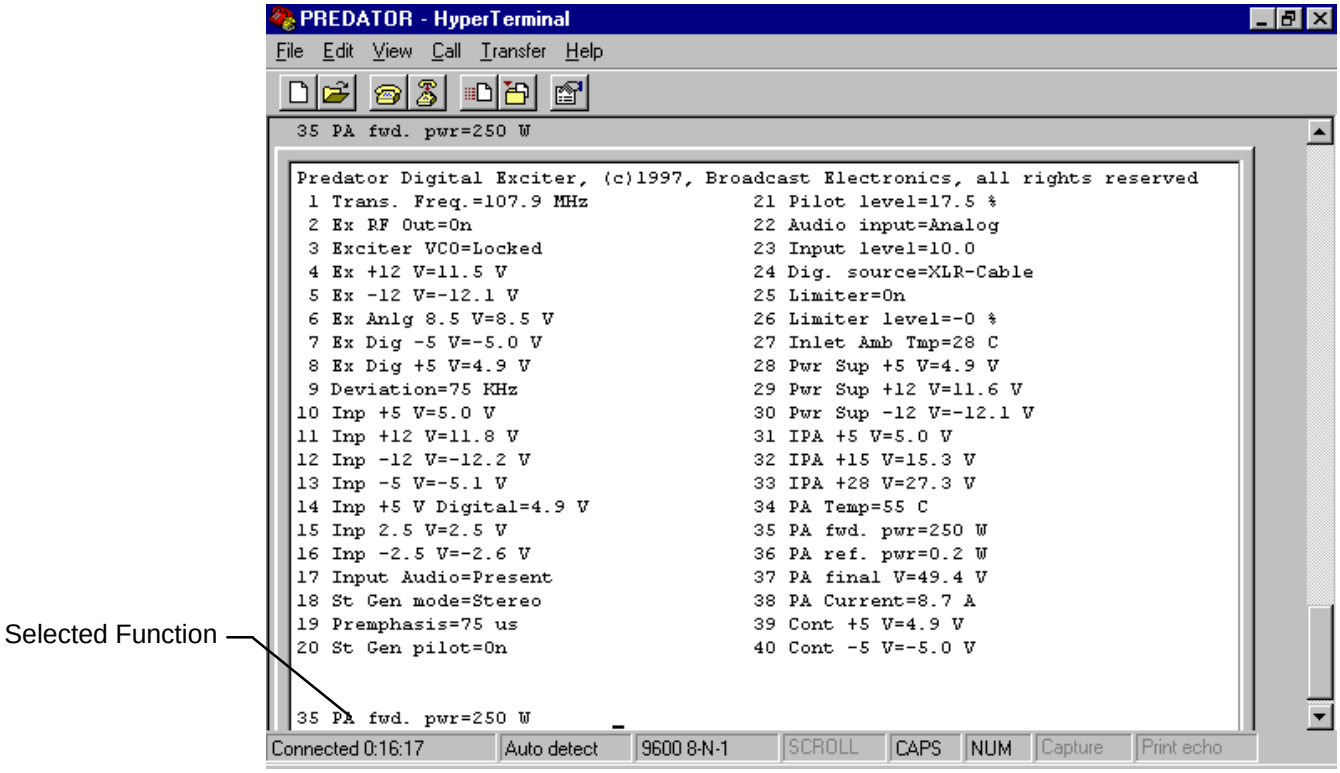
   B. Use the keyboard to enter: 35.

   The function will appear as shown in Figure 3–5.

2. To edit the function, depress: [E].

   A. Use the keyboard [U] or [D] keys to enter the desired value.

   B. To store the function value, depress: [S].



597-8000-40

FIGURE 3-5. PREDATOR PARAMETER DISPLAY - SELECTED FUNCTION

3–161. **SETUP MENU.**

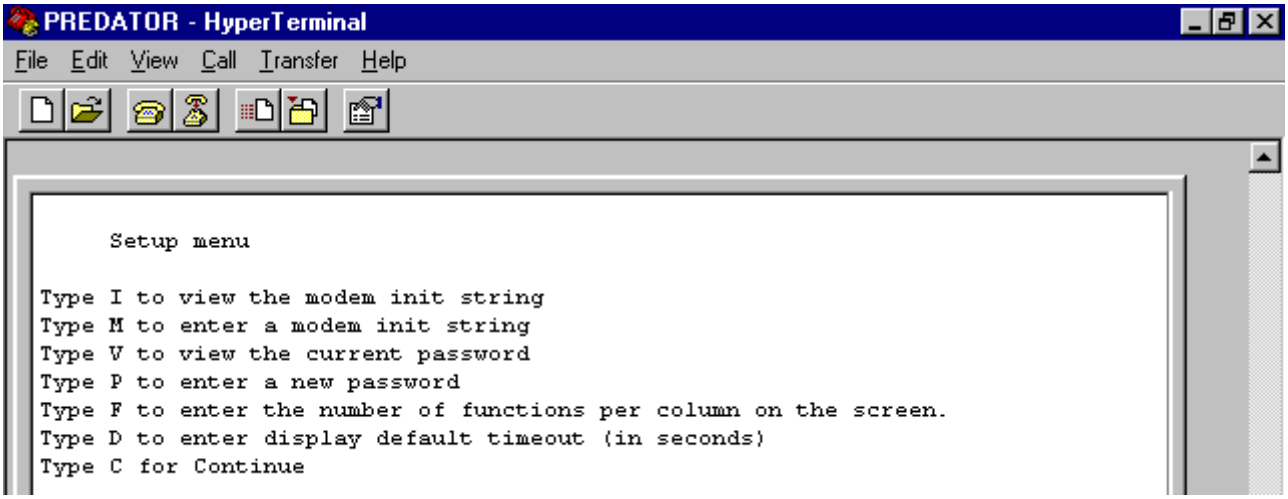
3–162. When the PREDATOR is controlled using a PC, a setup menu allows several parameters to be configured. The setup menu: 1) assigns the modem initialization string for remote communication, 2) assigns the remote connection password for remote communication, 3) assigns the number of functions per column on the PREDATOR parameter display, and 4) a display timeout function. To access the setup menu, proceed as follows:

1. Start and connect to the PREDATOR using the desired communication program (refer to PROCEDURE – CONTROLLING THE PREDATOR USING A COMPUTER in the preceding text if required).

   The PREDATOR parameter display will appear.

2. Depress: Ctrl + S.

   The SETUP MENU will appear (refer to Figure 3–6).



597-8000-42

FIGURE 3-6. SETUP MENU

3. The setup menu is equipped with a factory default modem initialization string. The string can be re–assigned by performing the following procedure. It is recommended the factory default string be used unless specific modem operations are required such as disabling the modem speaker.

   A. To view the current modem initialization string, depress: I.

      The current modem initialization string will appear.

   B. To edit the modem initialization string, proceed as follows:

      1. Depress: M.
      2. Use the keyboard to enter the new initialization string. The default string is: ATQ0V1E1M0S0=1

         Q0 = Enable response codes.
         V1 = Enable verbose response codes.
         E1 = Enable echo in command mode.
         M0 = Turn off modem speaker.
         S0=1 Autoanswer on the first ring.

      3. Depress: ↵Enter.

4. Assign the remote connection password by performing the following procedure. The password prevents unauthorized personnel from accessing the PREDATOR.

A. To view the current password, depress: V.

The current password will appear.

B. To edit the password, proceed as follows:

1. Depress: P.
2. Use the keyboard to enter the new password. The password: 1) can consist of any character on the keyboard, 2) can be assigned a maximum of 16 characters, and 3) is case sensitive.
3. Depress: ↵Enter.

5. The number of functions per column presented on the PREDATOR parameter display screen can be changed if desired. To change the number of functions, perform the following procedure.

1. Depress: F.
2. Use the keyboard to enter the number of functions per column on the PREDATOR parameter display screen. The number must be between 5 and 21.
3. Depress: ↵Enter.
4. When the number of functions per column is above the assigned value, the remaining functions will be continued onto another page. To display the next page, depress the space bar.

6. Assign the controller module LCD timeout by performing the following procedure. The timeout is used to change the LCD display to the 35 PA FWD. PWR= function after a period when the controller module experiences no control/status monitoring activity.

1. Depress: D.
2. Use the keyboard to enter the timeout in seconds. For example, if 1000 seconds is entered, the display will present the forward power function after 16.6 minutes if no control/status monitoring activity is performed. The factory default is 30 seconds. The timeout function can be disabled by entering 5000.
3. Depress: ↵Enter.

3-163. **STATUS PARAMETER ERROR DISPLAY.**

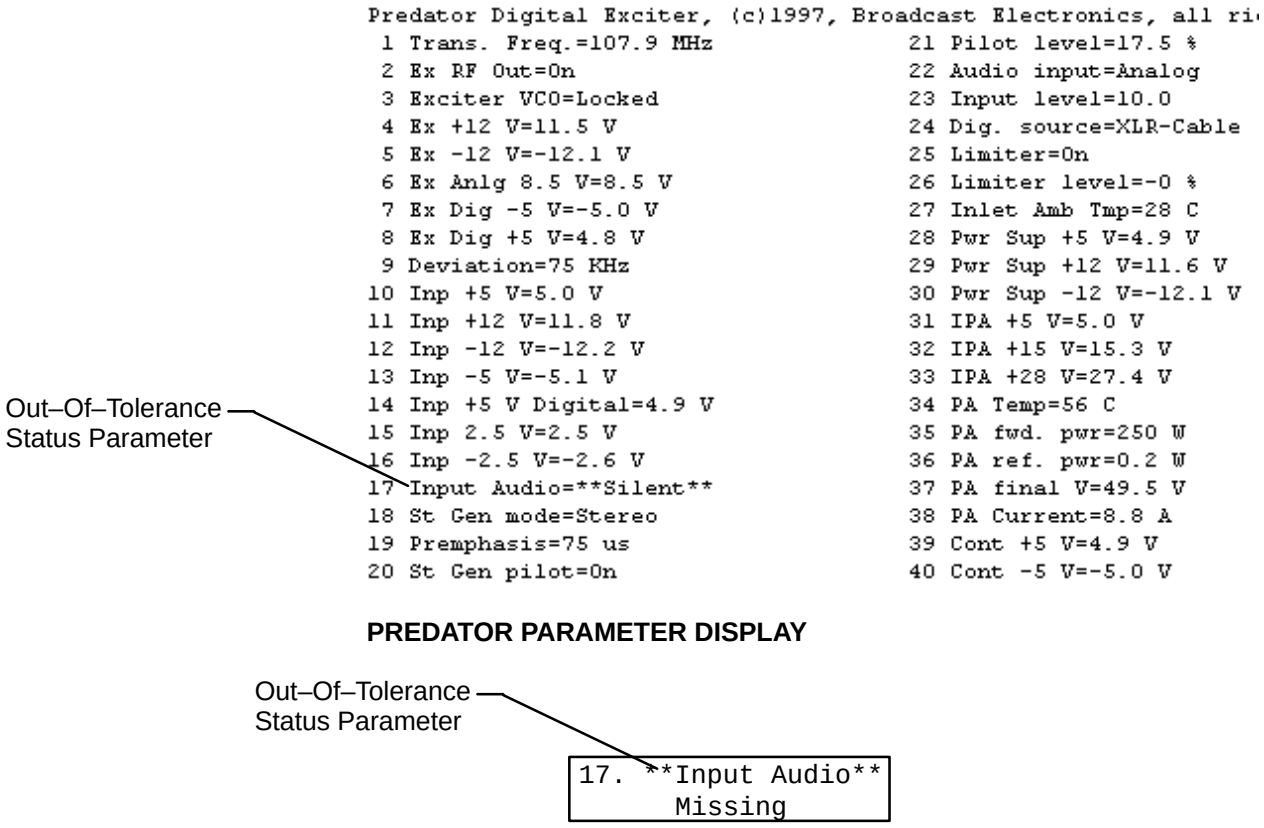
3-164. If a PREDATOR status parameter becomes out-of-tolerance, the parameter display and the controller LCD display will appear with asterisks (*) (refer to Figure 3-7). For example, the analog interface module audio input has failed. As a result, the 17 INPUT AUDIO function will contain asterisks (*) to identify the parameter as being an out-of-tolerance.

3-165. **MUTE CONDITION DISPLAY.**

3-166. If the PREDATOR power supply/RF amplifier module **RF AMPLIFIER MUTE** indicator illuminates, the mute condition can be identified using the status parameter display (refer to Figure 3-8). The display presents a description of the mute condition.

3-167. N+1 OPERATION.

3-168. The PREDATOR can be equipped with the N+1 circuit board option. If the unit is configured for N+1 operation, the parameter display and the controller LCD display will present the frequencies for transmitters 0 through 9 (refer to Figure 3-9). Program the transmitter 0 through 9 frequencies by performing the CARRIER FREQUENCY PROGRAMMING procedure in the preceding text. Program/check the remaining functions using the procedures presented throughout this section.

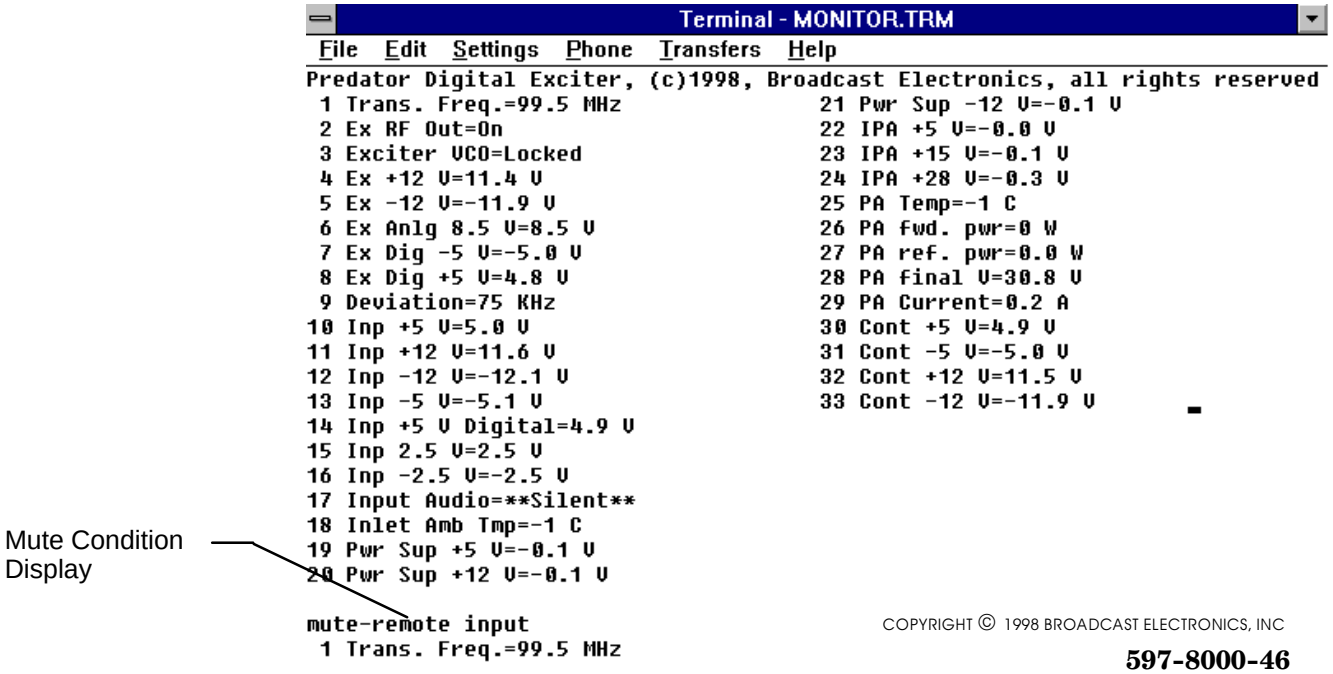


PREDATOR PARAMETER DISPLAY

CONTROLLER LCD DISPLAY

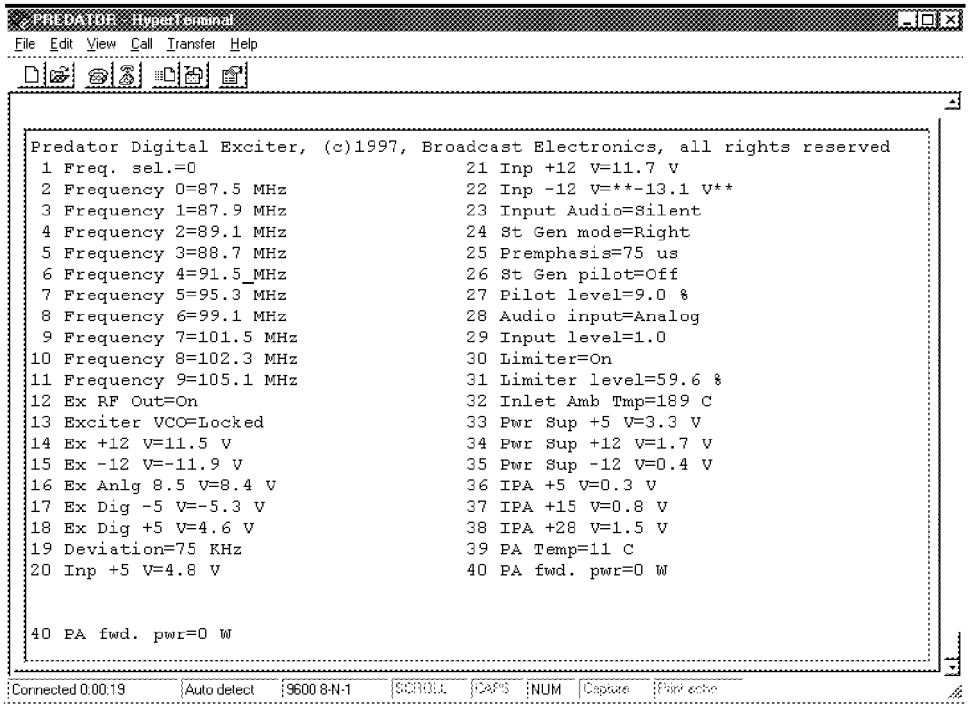
597-8000-41

FIGURE 3-7. PREDATOR ERROR DISPLAY

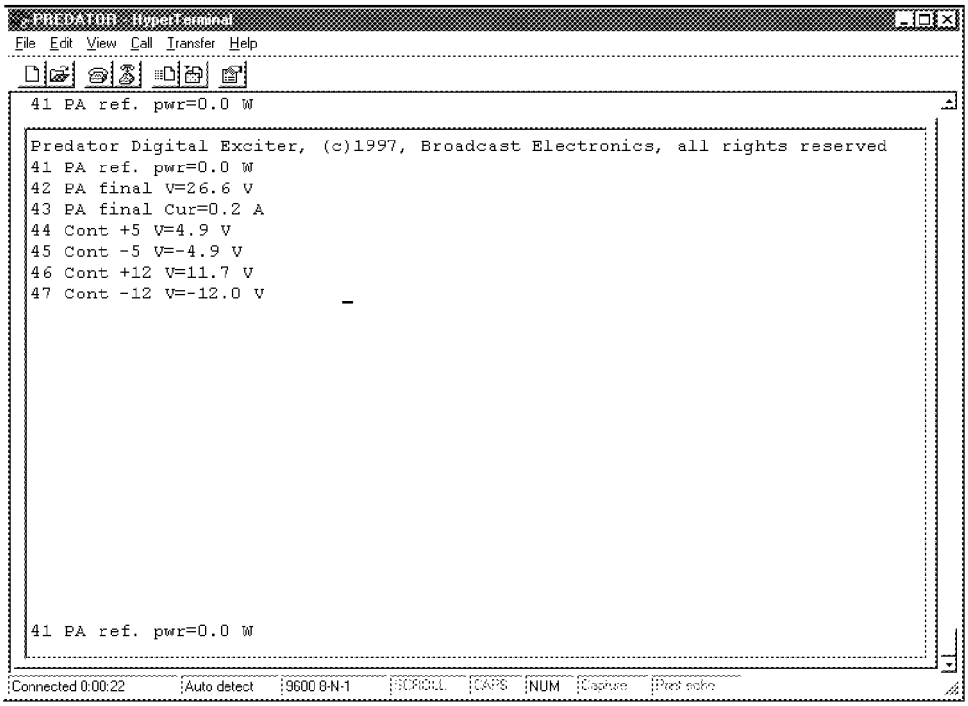


597-8000-46

FIGURE 3-8. PARAMETER DISPLAY - MUTE CONDITION



PARAMETER DISPLAY – PAGE 1



PARAMETER DISPLAY – PAGE 2

597-8000-47

FIGURE 3-9. PARAMETER DISPLAY WITH N+1 OPTION

SECTION IV
THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section presents the theory of operation for the PREDATOR digital FM exciter.

4-3. OVERALL OPERATION.

4-4. Information on overall PREDATOR operation is presented in Figure 4-1. Refer to Figure 4-1 for information on the overall operation of the exciter.

4-5. DIGITAL STEREO GENERATOR MODULE.

4-6. A description of the digital stereo generator module circuitry is presented in Figure 4-2. Refer to Figure 4-2 for information on the digital stereo generator module circuitry.

4-7. ANALOG INTERFACE MODULE.

4-8. A description of the analog interface module circuitry is presented in Figure 4-3. Refer to Figure 4-3 for information on the analog interface module circuitry.

4-9. CONTROLLER MODULE.

4-10. A description of the controller module circuitry is presented in Figure 4-4. Refer to Figure 4-4 for information on the controller module circuitry.

4-11. POWER SUPPLY/RF AMPLIFIER MODULE.

4-12. A description of the power supply/RF amplifier module circuitry is presented in Figures 4-5 and 4-6. Figure 4-5 presents the 50 watt power supply/RF amplifier module circuitry. Figure 4-6 presents the 250 watt power supply/RF amplifier module circuitry.

4-13. DIGITAL EXCITER MODULE.

4-14. A description of the digital exciter module circuitry is presented in Figures 4-7. Refer to Figure 4-7 for information on the digital exciter module.

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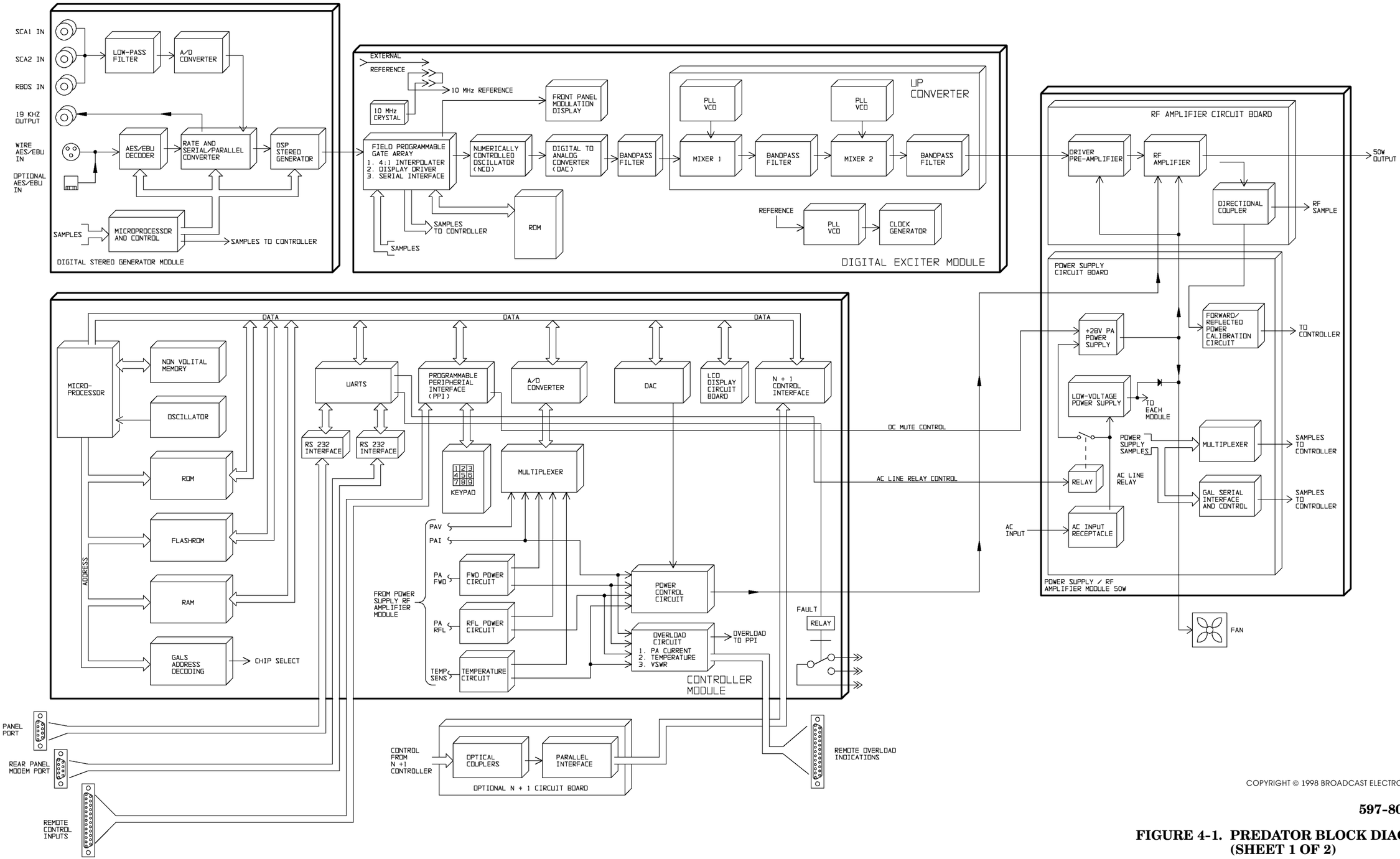
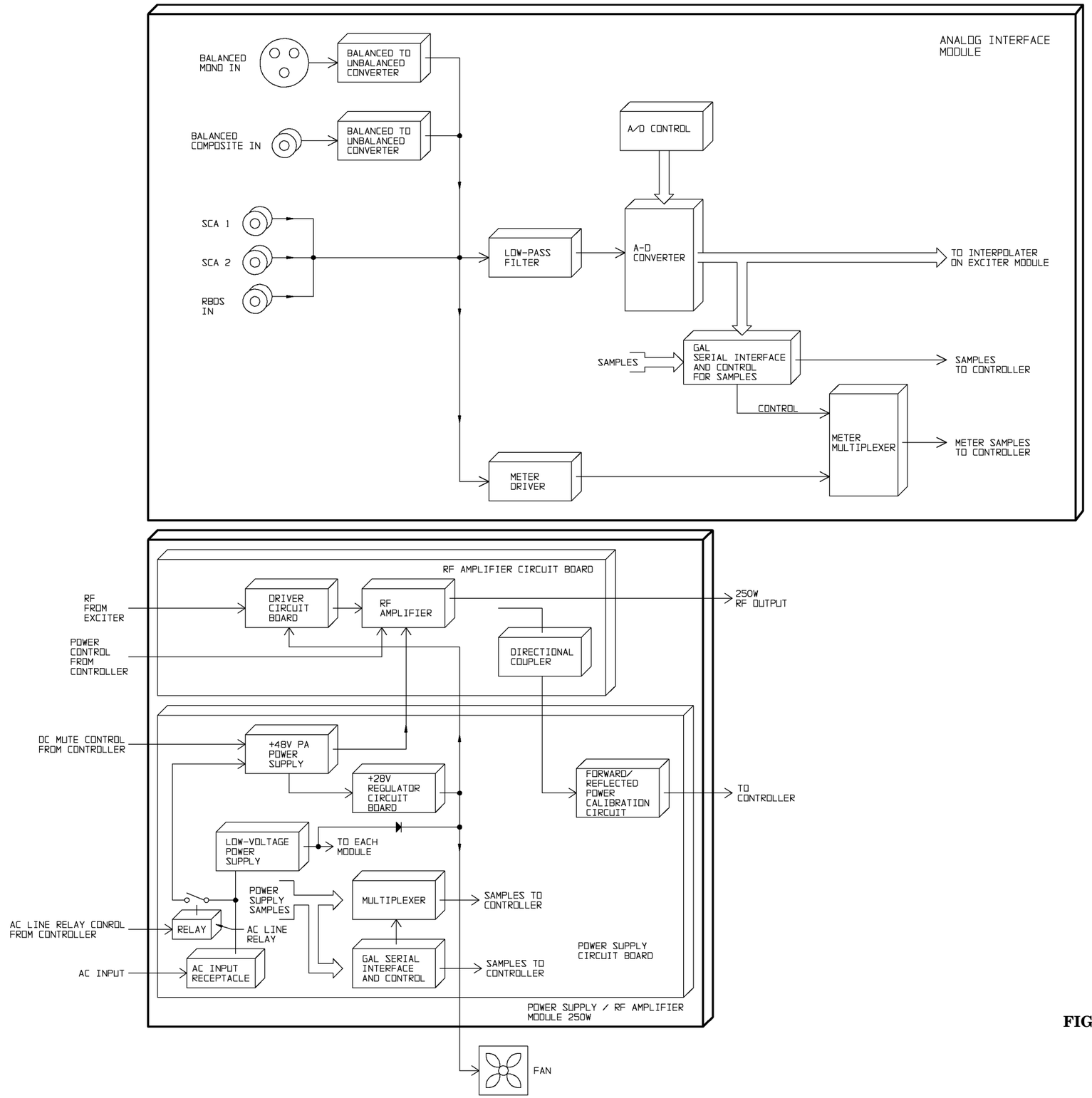


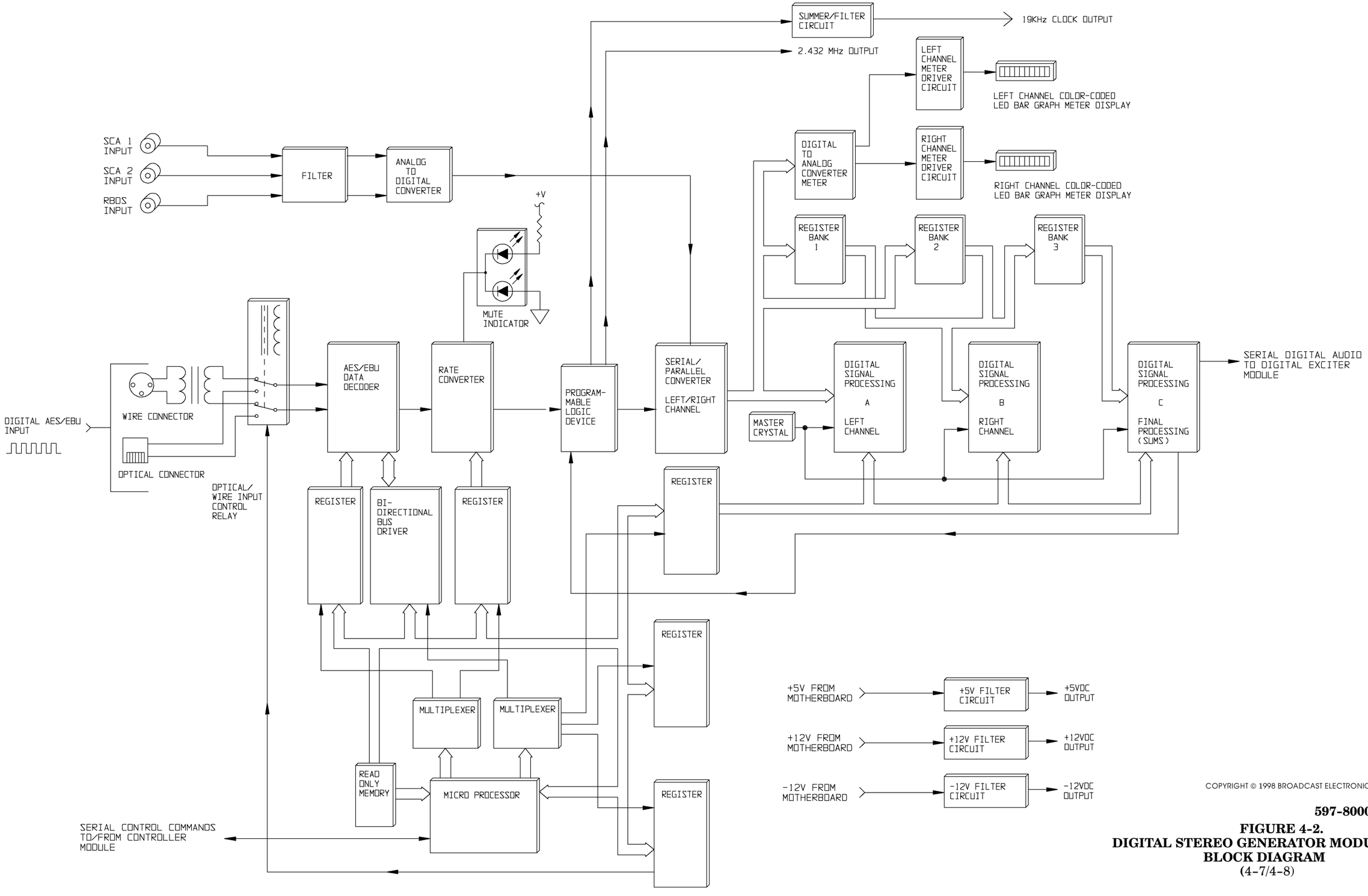
597-8000-13

FIGURE 4-1. PREDATOR BLOCK DIAGRAM (SHEET 1 OF 2)



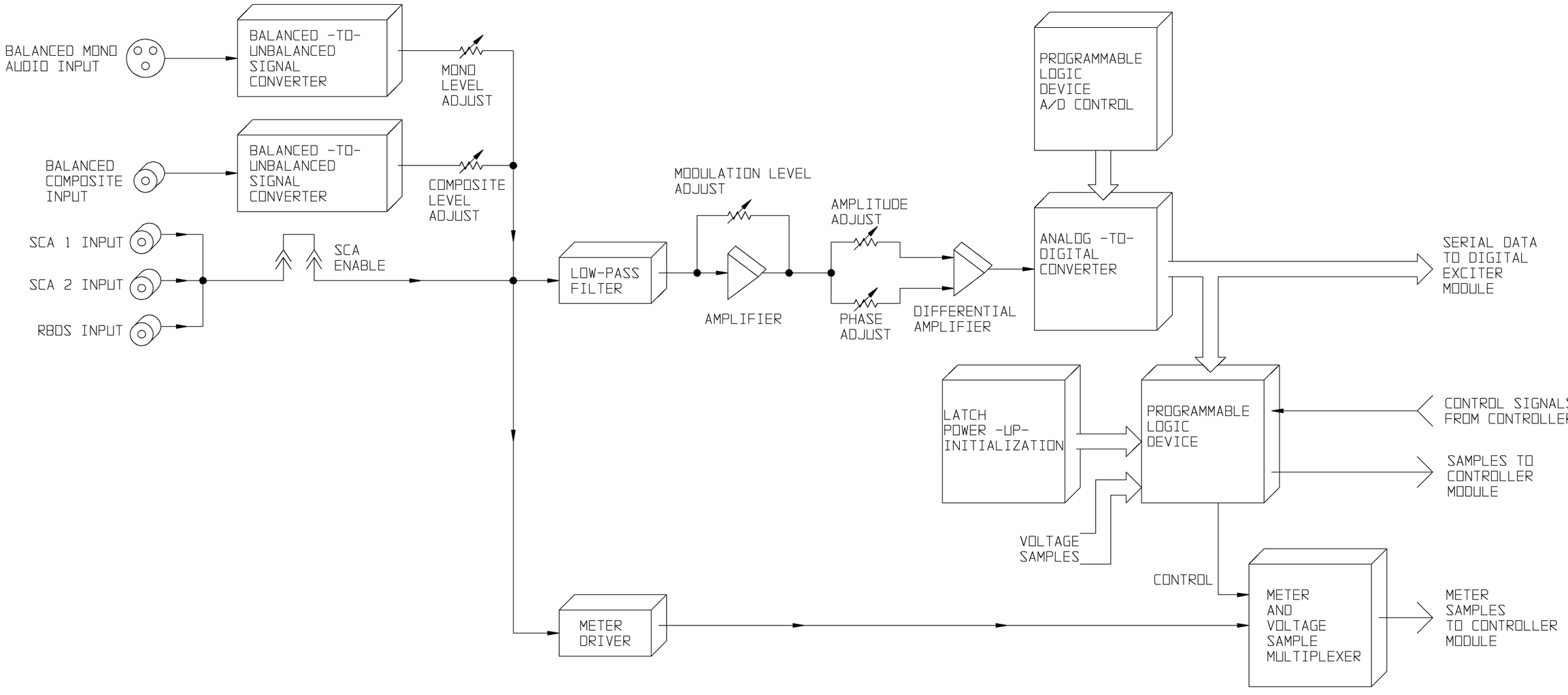
597-8000-13A

FIGURE 4-1. PREDATOR BLOCK DIAGRAM (SHEET 2 OF 2)



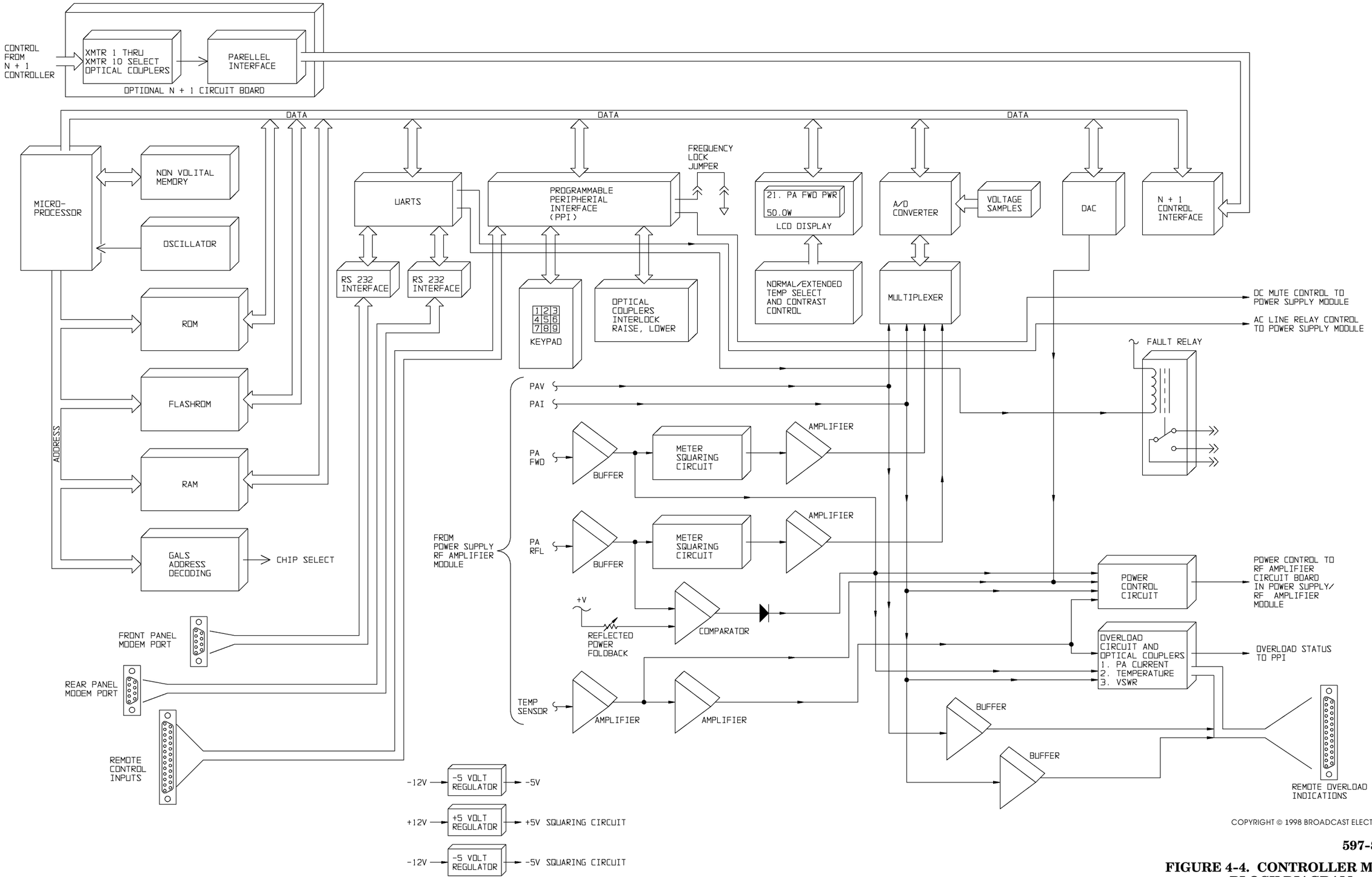
597-8000-29

FIGURE 4-2.
DIGITAL STEREO GENERATOR MODULE BLOCK DIAGRAM
(4-7/4-8)



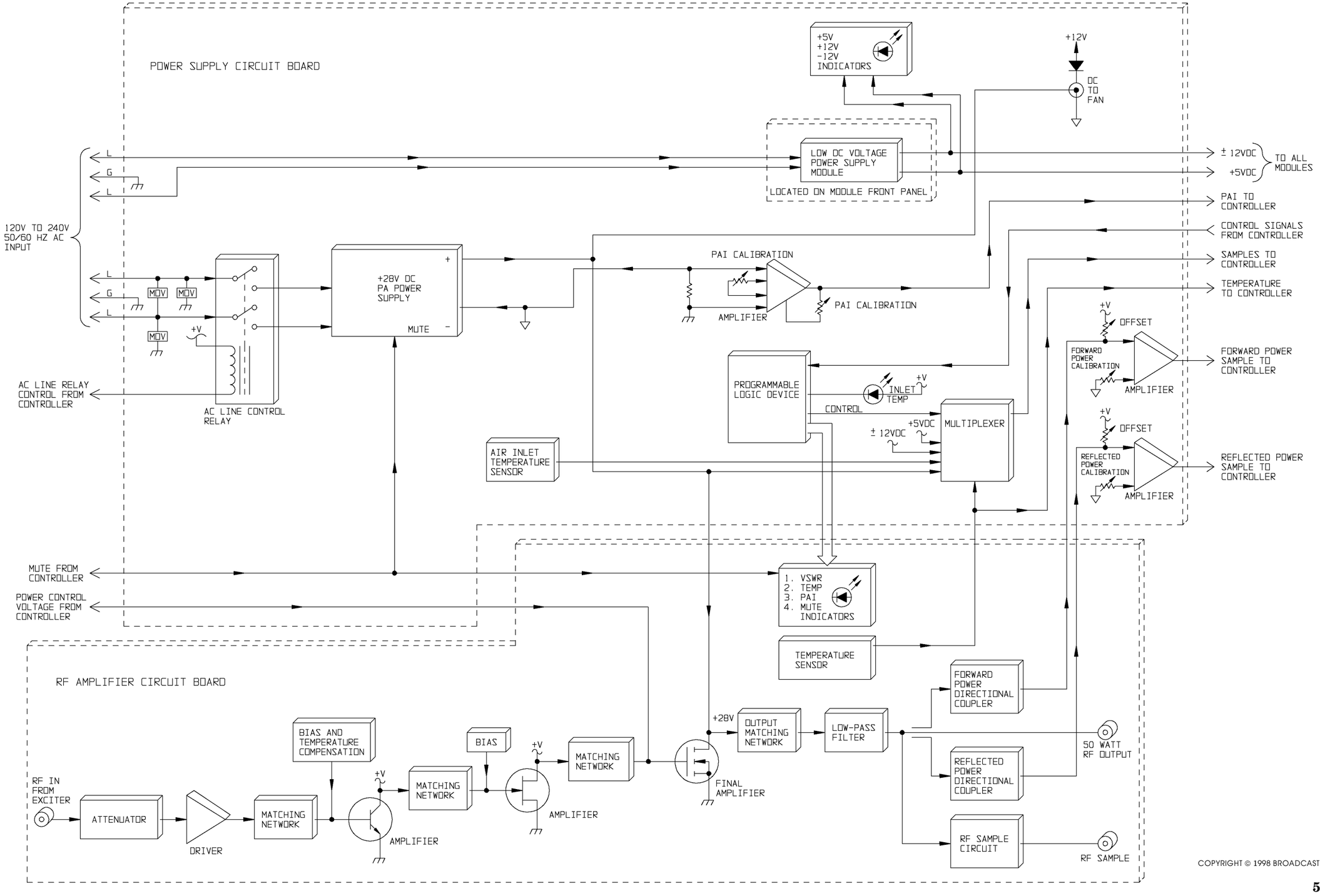
597-8000-30

FIGURE 4-3. ANALOG INTERFACE MODULE BLOCK DIAGRAM
(4-9/4-10)



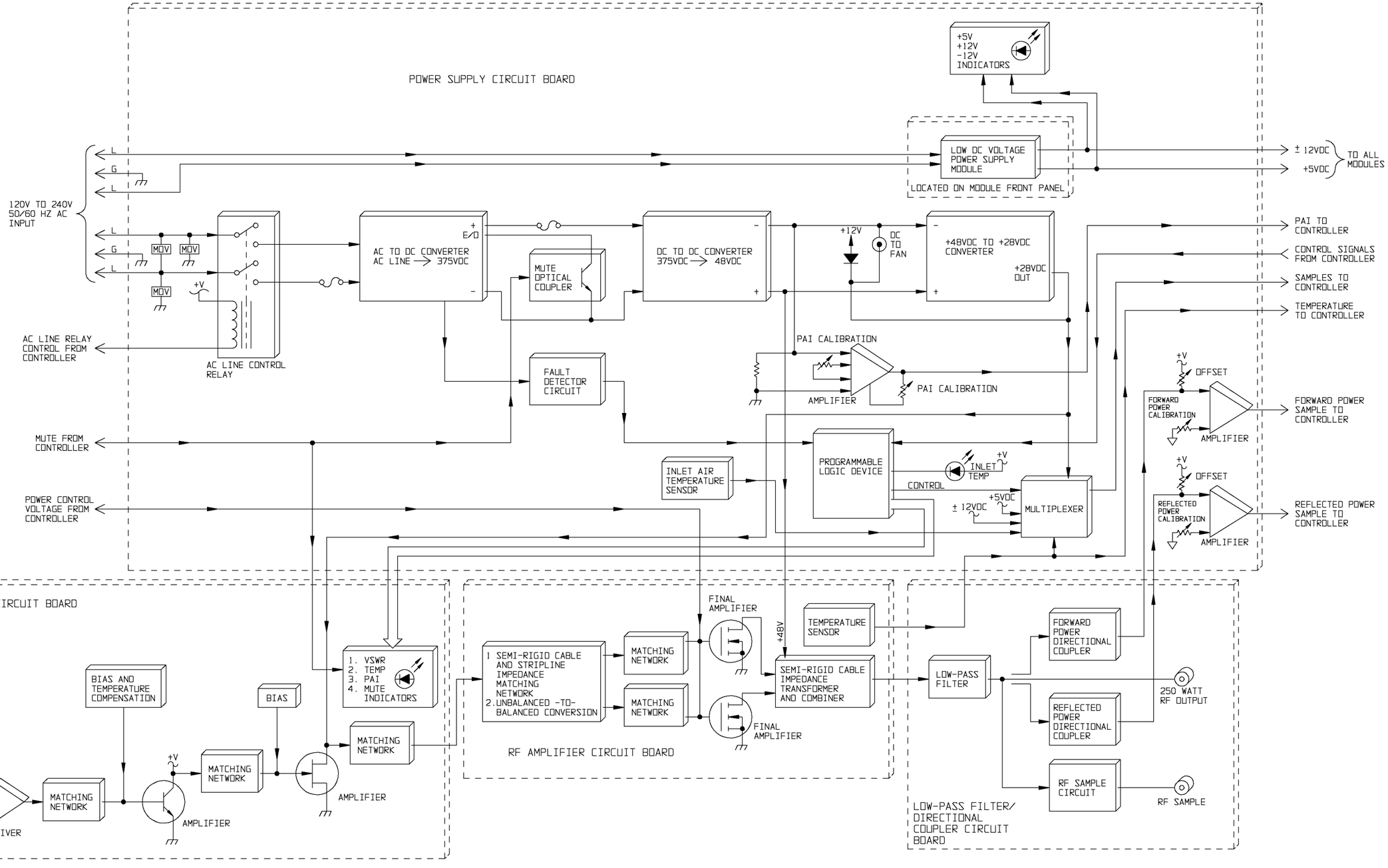
597-8000-31

FIGURE 4-4. CONTROLLER MODULE BLOCK DIAGRAM
(4-11/4-12)



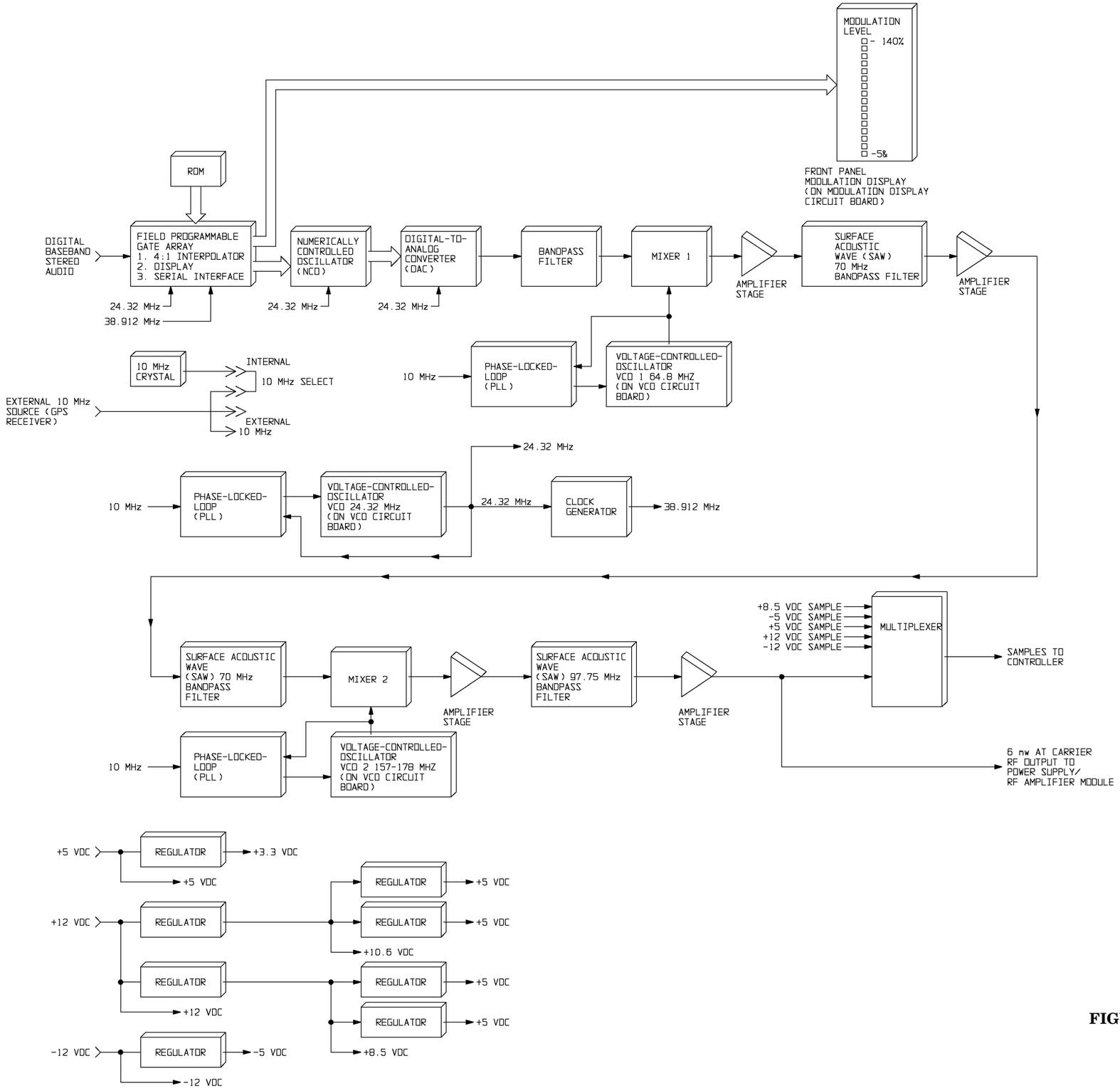
597-8000-32

FIGURE 4-5. 50 WATT POWER SUPPLY/RF AMPLIFIER MODULE BLOCK DIAGRAM
(4-13/4-14)



597-8000-34

FIGURE 4-6. 250 WATT POWER SUPPLY/RF AMPLIFIER MODULE BLOCK DIAGRAM
(4-15/4-16)



597-8000-35

FIGURE 4-7. DIGITAL EXCITER MODULE BLOCK DIAGRAM
(4-17/4-18)

SECTION V
MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the PREDATOR digital FM exciter.

5-3. SAFETY CONSIDERATIONS.

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES.***

WARNING ***NEVER REMOVE A POWER SUPPLY/RF AMPLIFIER MODULE FROM THE CHASSIS AND APPLY AC POWER.***

5-4. Low voltages are used throughout the transmitter circuitry with the exception of the power supply/RF amplifier modules. Both the 50 and 250 Watt power supply/RF amplifier modules contain hazardous voltages. Never remove a power supply/RF amplifier module from the chassis and apply ac power. Maintenance with power energized is always considered hazardous and caution should be observed.

WARNING ***ENSURE ALL PRIMARY POWER IS DISCONNECTED FROM THE EXCITER BEFORE ATTEMPTING EQUIPMENT MAINTENANCE.***

WARNING

5-5. FIRST LEVEL MAINTENANCE.

5-6. First level maintenance consists of precautionary procedures applied to equipment to prevent future failures. These procedures are performed on a regular basis and the results recorded in a performance log.

5-7. ROUTINE MAINTENANCE.

5-8. **INSPECTION AND CLEANING.** On a regular basis, clean the exciter of accumulated dust using a brush and vacuum cleaner. Inspect the modules for damage caused by component overheating. Overheated components are identified by circuit board discoloration near the component leads. Also, inspect the modules for loose hardware as required.

5-9. **AIR FILTER.** The exciter is equipped with a screen-type air filter. The filter is designed to be removed and cleaned using a brush and vacuum. A dirty filter results in restricted air flow and increased operating temperatures for the transmitter solid-state components. Check the filter approximately once a week.

5-10. SECOND LEVEL MAINTENANCE.

5-11. Second level maintenance consists of procedures required to restore the exciter to operation after a fault has occurred. The maintenance philosophy of the exciter consists of problem isolation to a specific module. Due to the surface mount technology used to construct the modules, the modules can not be repaired in the field without specialized soldering equipment. When a defective module is located, the module can be exchanged using the Broadcast Electronics PREDATOR module exchange program (refer to PREDATOR MODULE EXCHANGE PROGRAM in the following text).

5–12. PREDATOR SOFTWARE UPGRADES.

5–13. When new PREDATOR software is developed, units in the field can be easily upgraded. The upgrade process consists of down–loading new code to the PREDATOR. The code can be down–loaded: 1) remotely using a telephone line, modem, and PC or 2) locally using a PC connected to the front–panel modem port. The new code can be obtained: 1) from the Broadcast Electronics RF Customer Service Department or 2) the Broadcast Electronics web page (*www.bdcast.com*). If desired, the software upgrade process can be performed over the telephone by a Broadcast Electronics RF Customer Service Department engineer. The following text presents the information required to upgrade the PREDATOR software in the field.

5–14. PREDATOR SOFTWARE UPGRADES - PROCEDURE.

5–15. Once the latest PREDATOR code has been obtained, the code can be loaded into the PREDATOR. To load the new code, proceed as follows:

CAUTION ***ENSURE THE NEW CODE FILE IS OBTAINED PRIOR TO PERFORMING THE FOLLOWING PROCEDURE.***

CAUTION ***THE PROCEDURE WILL ERASE THE CURRENT CODE FILE.***

1. For remote software upgrades, proceed as follows:

   A. Move the cursor to the Start button on the Windows 95 desktop and click the mouse.

   B. Move the cursor to PROGRAMS→ACCESSORIES→HYPERTERMINAL and click the mouse.

   C. Move the cursor to the PREDATOR HYPERTERMINAL shortcut created in the preceding text and double–click the mouse.

      The CONNECT dialog box will appear.

   D. Move the cursor to DIAL and click the mouse.

      When the unit connects, PASSWORD: will appear.

   E. Enter the PREDATOR remote connect password. The password prevents access to the unit by unauthorized personnel. Use the keyboard to enter the remote connect password. The password: 1) is case sensitive, 2) can be up to 16 characters in length, 3) can be any printable character. If a password has not been previously entered into the unit, use the following factory default password. A password can be assigned by performing the password assignment procedure (refer to SETUP MENU in SECTION III, OPERATION).

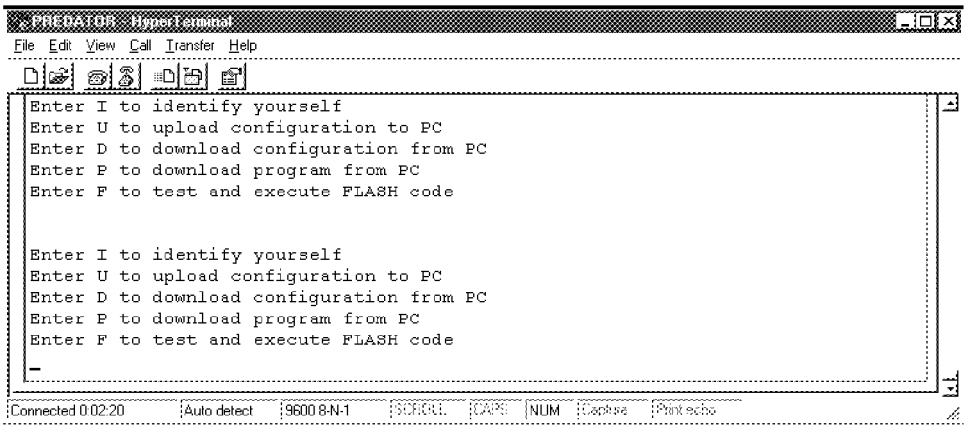
      Factory Default Password – password (all lower case).

   F. Depress: ↵Enter.

      When the correct password is entered, the PREDATOR parameter display will appear.

2. Depress Ctrl + R.

   The UPGRADE MENU will appear (refer to Figure 5–1).



597-8000-43

FIGURE 5-1. UPGRADE MENU

3. Depress: [P].

   After a delay, an ERASE COMPLETE, BEGIN DOWNLOAD NOW message will appear.

4. Move the cursor to TRANSFER→SEND FILE and click the mouse.

   The SEND FILE dialog box will appear.

5. The *DXF.BIN* file contains the software to be down–loaded to the PREDATOR . Down–load the file as follows:

   A. Use the BROWSE button to locate and select the DXF.BIN file.

   B. Move the cursor to the SEND button and click the mouse.

      The send file process will begin. Use the HYPERTERMINAL status bar to monitor the file down–load progress.

6. When the file has been down–loaded, return to the PREDATOR parameter display by depressing: [F].

5–16. ADJUSTMENTS.

5–17. USING THE OPTIONAL EXTENDER CIRCUIT BOARD.

5–18. The PREDATOR can be equipped with an optional extender circuit board (refer to Figure 5–2). The extender circuit board allows a module to be operational when removed from the chassis for maintenance procedures. The extender circuit board can not be used with the power supply/RF amplifier modules.

5–19. The extender circuit board is equipped with connectors on each end of the board (refer to Figure 5–2). One end of the circuit board is used for the digital stereo generator, analog interface, digital exciter, and controller modules. The extender circuit board is labeled to ensure the board is properly inserted into the chassis for the desired module.

5–20. The extender circuit board is also equipped with a test coaxial cable. The coaxial cable is used for the digital exciter module. To use the extender circuit board, refer to Figure 5–2 and proceed as follows:

WARNING ***DISCONNECT THE AC LINE CORD BEFORE PROCEEDING.***

WARNING

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES. NEVER REMOVE THE POWER SUPPLY/RF AMPLIFIER MODULE FROM THE CHASSIS AND APPLY AC POWER.***

WARNING

1. Disconnect all exciter primary power before proceeding and remove the module from the chassis in which maintenance or troubleshooting is to be performed (refer to REMOVING/INSTALLING A MODULE in SECTION II, INSTALLATION if required).
2. For digital stereo generator, analog interface, digital exciter, and controller modules, proceed as follows:
    1. Orient the extender circuit board as shown and insert the extender circuit board in the chassis.
    2. Insert the module on the extender circuit board.
    3. For digital exciter modules, connect the test coaxial cable between the chassis coaxial cable and the exciter RF out receptacle as shown.

5-21. **DIGITAL EXCITER MODULE.**

5-22. The following text presents the digital exciter module adjustments. Adjustments in the field will not be required unless a problem is detected. Therefore, adjust the controls only when directed by the Broadcast Electronics RF Customer Service Department.

5-23. **10 MHz REFERENCE OSCILLATOR ADJUSTMENT.** 10 MHz crystal Y2 is equipped with a built-in calibration adjustment. The adjustment is used to adjust the crystal to provide a precision 10 MHz output. To calibrate the oscillator, proceed as follows:

5-24. **Required Equipment.** The following equipment is required to adjust the 10 MHz reference oscillator calibration control.

1. Plastic 1/16 inch jewelers screw-driver, flat-tip.
2. Frequency counter (HP 5315B or equivalent).

5-25. **Procedure.** To adjust the 10 MHz reference oscillator calibration control, proceed as follows:

1. Disconnect all exciter primary power before proceeding.
2. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect digital exciter module to the extender circuit board.
3. Refer to Figure 5-3 and connect the frequency counter to J11-1. Jumper P11 must remain in the 1-3/2-4 position. Connect the frequency counter to J11-1 by attaching the probe to the metal end of P11-1.
4. Apply primary power to the exciter.
5. Refer to Figure 5-3 and adjust the Y2 built-in calibration control until the frequency counter indicates 10 MHz.
6. Remove the test equipment and replace the digital exciter module.

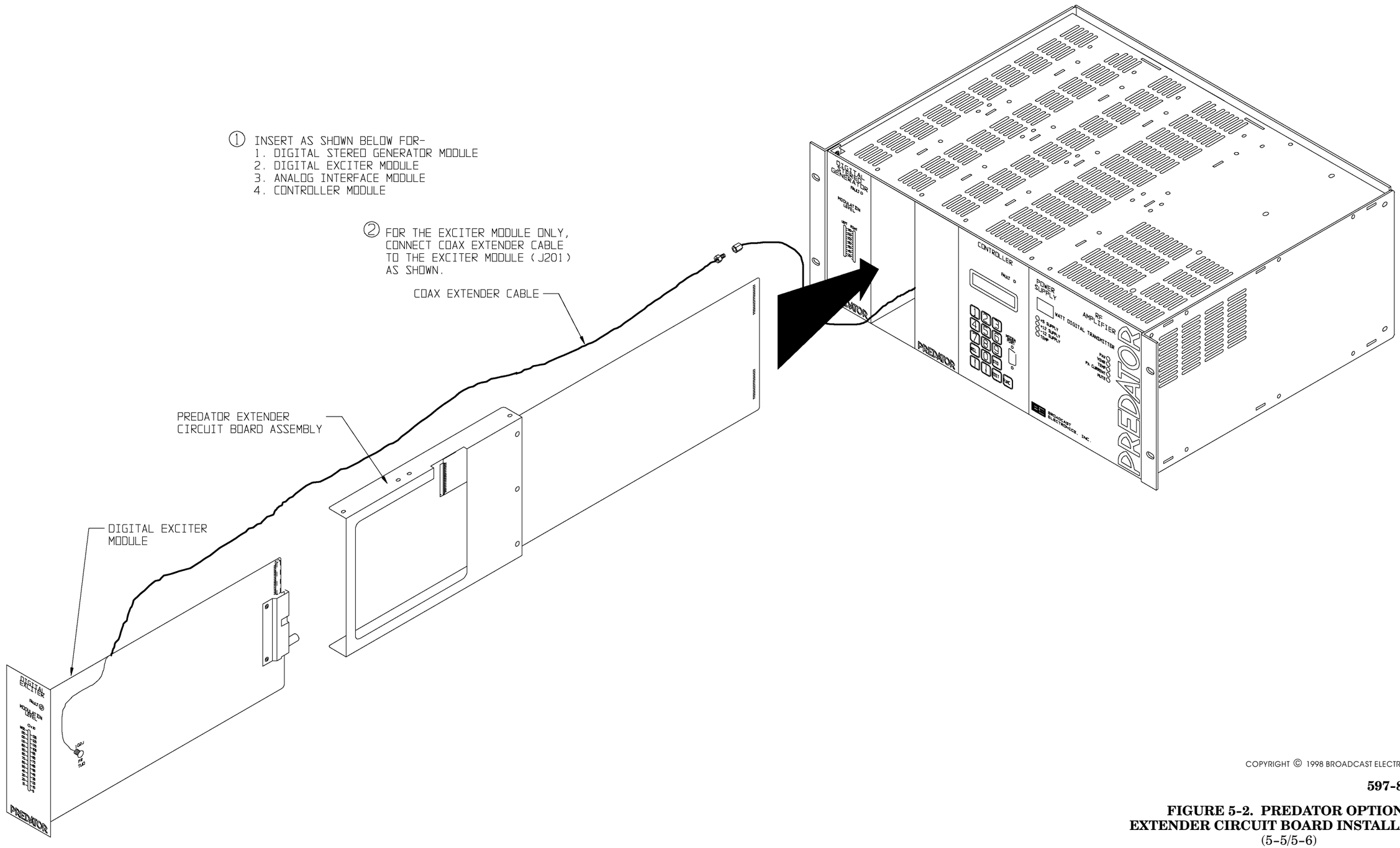


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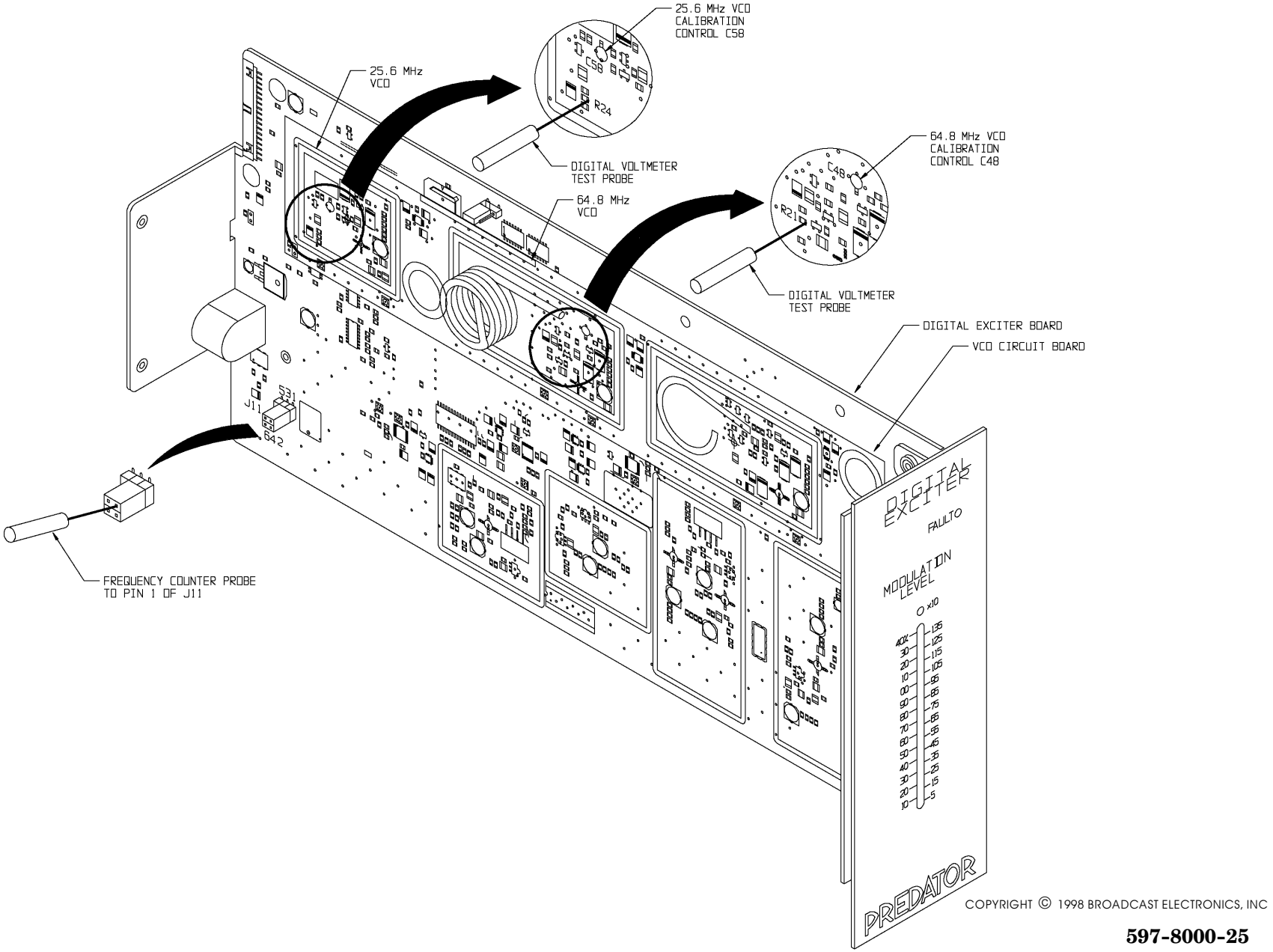
FIGURE 5-2. PREDATOR OPTIONAL EXTENDER CIRCUIT BOARD INSTALLATION
(5-5/5-6)



597-8000-25

FIGURE 5-3. DIGITAL EXCITER MODULE CONTROL LOCATIONS

5-26. **64.8 MHz VCO CALIBRATION.** The 64.8 MHz VCO on the digital exciter module VCO circuit board is calibrated by adjusting 64.8 MHz VCO calibration control C48. To calibrate the 64.8 MHz VCO, proceed as follows:

5-27. **Required Equipment.** The following equipment is required to adjust the 64.8 MHz calibration control.

1. Plastic 1/16 inch jewelers screw-driver, flat-tip.
2. Digital multimeter (Fluke 77 or equivalent).

5-28. **Procedure.** To adjust the 64.8 MHz VCO calibration control, proceed as follows:

1. Disconnect all exciter primary power before proceeding.
2. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect digital exciter module to the extender circuit board.
3. Refer to Figure 5-3 and remove the shield from the 64.8 MHz VCO.
4. Refer to Figure 5-3 and connect the digital multimeter test probe to resistor R21 as shown.
5. Apply primary power to the exciter. Operate the unit at normal room temperature.
6. Refer to Figure 5-3 and adjust 64.8 MHz VCO calibration control C48 until the multimeter indicates approximately 2.5 V dc.
7. Remove the test equipment, replace the shield, and replace the digital exciter module.

5-29. **25.6 MHz VCO CALIBRATION.** The 25.6 MHz VCO on the digital exciter module VCO circuit board is calibrated by 25.6 MHz VCO calibration control C58. To calibrate the 25.6 MHz VCO, proceed as follows:

5-30. **Required Equipment.** The following equipment is required to adjust the 25.6 MHz VCO calibration control.

1. Plastic 1/16 inch jewelers screw-driver, flat-tip.
2. Digital multimeter (Fluke 77 or equivalent).

5-31. **Procedure.** To adjust the 25.6 MHz VCO calibration control, proceed as follows:

1. Disconnect all exciter primary power before proceeding.
2. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect digital exciter module to the extender circuit board.
3. Refer to Figure 5-3 and remove the shield from the 25.6 MHz VCO.
4. Refer to Figure 5-3 and connect the digital multimeter test probe to resistor R24 as shown.
5. Apply primary power to the exciter. Operate the unit at normal room temperature.
6. Refer to Figure 5-3 and adjust 25.6 MHz VCO calibration control C58 until the multimeter indicates 2.5 V dc.
7. Remove the test equipment, replace the shield, and replace the digital exciter module.

5-32. **DIGITAL STEREO GENERATOR MODULE.**

5-33. The digital stereo generator module is equipped with 19 kHz output phase adjustment control R9. The procedure to adjust R9 is presented in SECTION II, INSTALLATION. If the 19 kHz output phase is to be adjusted, perform the 19 kHz OUTPUT PHASE ADJUSTMENT procedure in SECTION II.

5-34. **ANALOG INTERFACE MODULE.**

5-35. The analog interface module is equipped with monophonic input level control R21, composite input level control R46, and modulation level control R37. The procedures to these controls are presented in SECTION II, INSTALLATION. If the controls require adjustment, perform the MONOPHONIC AND MODULATION LEVEL ADJUSTMENTS and COMPOSITE INPUT AND MODULATION LEVEL ADJUSTMENTS procedures in SECTION II.

5-36. **FILTER AMPLITUDE ADJUST.** Filter amplitude control R66 adjusts the A/D input filter amplitude. Due to the critical nature of the amplitude control, the control is not considered field adjustable. If the control is required to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the filter amplitude control.

5-37. **FILTER PHASE ADJUST.** Filter phase control R65 adjusts the A/D input filter phase. Due to the critical nature of the phase control, the control is not considered field adjustable. If the control is required to be adjusted, contact the Broadcast Electronics RF Customer Service Department for information and instructions to adjust the filter amplitude control.

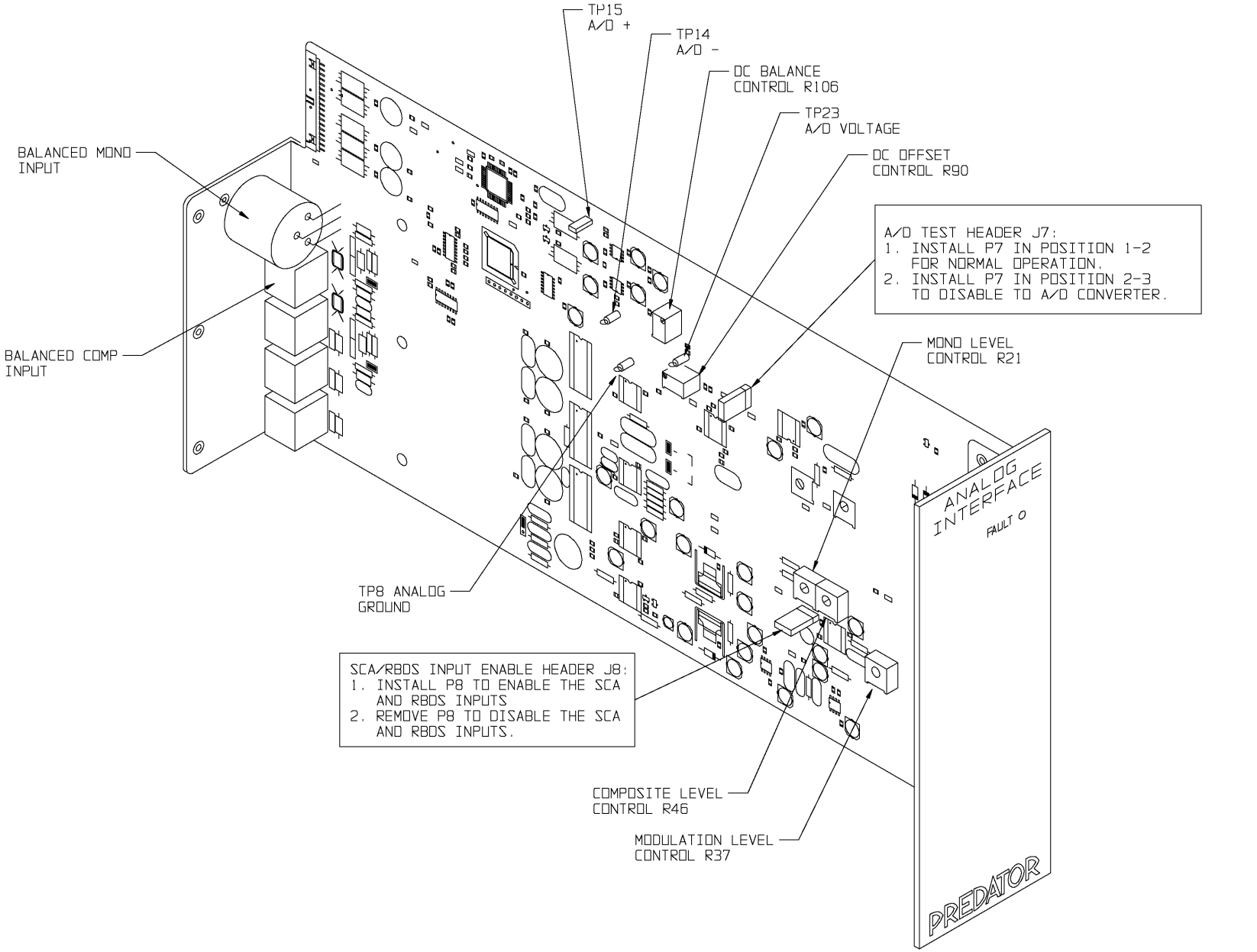
5-38. **DC OFFSET AND DC BALANCE ADJUST.** DC balance control R106 adjusts the A/D dc input voltage balance. DC offset control R90 adjusts the A/D input voltage dc offset. The controls are required to be adjusted only if any operational amplifier on the module is replaced. To adjust the controls, proceed as follows:

5-39. **Required Equipment.** The following equipment is required to adjust the dc offset and dc balance controls.

1. Plastic 1/16 inch jewelers screw-driver, flat-tip.
2. Digital multimeter (Fluke 77 or equivalent).

5-40. **Procedure.** To adjust the dc offset and dc balance controls, proceed as follows:

1. Disconnect all exciter primary power before proceeding.
2. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect the analog interface module to the extender circuit board.
3. Refer to Figure 5-4 and place jumper P7 in the test position.
4. Refer to Figure 5-4 and connect the multimeter between TP23 and TP8 (ground).
5. Apply primary power to the exciter.
6. Refer to Figure 5-4 and adjust dc offset control R90 until the multimeter indicates 0.000V ± 0.0001V dc.
7. Refer to Figure 5-4 and connect the multimeter between TP14 (A/D -) and TP15 (A/D +).
8. Refer to Figure 5-4 and adjust dc balance control R106 until the multimeter indicates 0.000V ± 0.0001V dc.



597-8000-44

FIGURE 5-4. ANALOG INTERFACE MODULE CONTROL LOCATIONS

9. Refer to Figure 5–4 and terminate the BAL MONO IN receptacle with a 600 Ohm resistor.
10. Refer to Figure 5–4 and terminate the BAL COMP IN receptacle with a 50 Ohm resistor.
11. Refer to Figure 5–4 and place jumper P7 in the operate position.
12. Refer to Figure 5–4 and remove jumper P8.
13. Refer to Figure 5–4 and adjust dc offset control R90 until the multimeter indicates 0.000V ± 0.0001V dc.
14. Remove the test equipment, ensure P7 is in the operate position, place P8 in the position prior to the adjustment procedure, and replace the analog interface module.

5–41. **CONTROLLER MODULE.**

5–42. The following text presents the controller module adjustments. Adjustments in the field will not be required unless a problem is detected. The module is equipped with an LCD contrast control which can be adjusted at any time. Therefore, adjust all the controls with the exception of the contrast control only when directed by the Broadcast Electronics RF Customer Service Department.

5–43. **LCD CONTRAST CONTROL ADJUSTMENT.** The controller module LCD contrast is controlled by R19. To adjust the LCD contrast, proceed as follows:

5–44. **Required Equipment.** The following equipment is required to adjust the LCD contrast control.

1. Plastic 1/16 inch jewelers screw–driver, flat–tip.

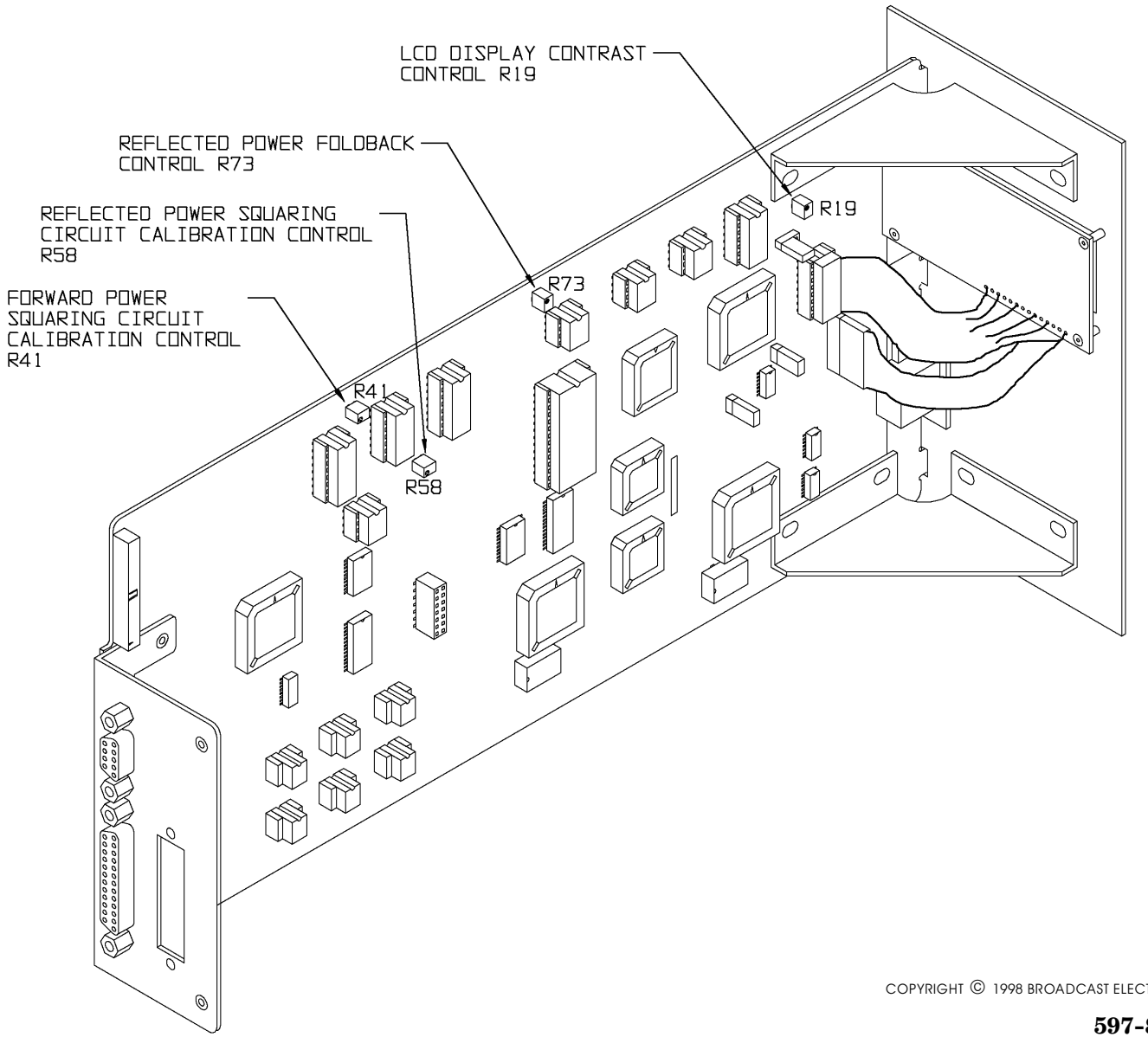
5–45. **Procedure.** To adjust the LCD contrast control, proceed as follows:

1. Disconnect all exciter primary power before proceeding.
2. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect the controller module to the extender circuit board.
3. Apply primary power to the exciter.
4. Refer to Figure 5–5 and adjust LCD contrast control R19 to obtain the desired controller LCD display intensity.
5. Replace the controller module.

5–46. **SQUARING CIRCUIT ADJUSTMENTS.** The controller module is equipped with a squaring circuit. The circuit contains controls consisting of: 1) forward power squaring circuit calibrate control R41 and 2) reflected power squaring circuit calibrate control R58. Due to the critical nature and specialized test equipment required to adjust the controls, the controls are not considered field adjustable. If the controls are to be adjusted, contact the Broadcast Electronics RF Customer Service Department.

5–47. **REFLECTED POWER FOLDBACK ADJUSTMENT.** The controller module is equipped with a circuit designed to foldback the forward power output in response to high reflected power conditions. The point at which the exciter begins this foldback operation is controlled by reflected power foldback control R73.

5–48. The reflected power foldback control can be adjusted using two methods: 1) a 2:1 VSWR created by connecting two 50 Ohm test loads in parallel or 2) a dc voltage generated by a 9V battery. The following text presents procedures to adjust the control using both methods.



597-8000-26

FIGURE 5-5. CONTROLLER MODULE CONTROL LOCATIONS

5–49. **Procedure - Parallel Test Loads.** To adjust the reflected power foldback control using two test loads connected in parallel, proceed as follows:

1. The following equipment is required to adjust the reflected power foldback control using two test loads connected in parallel.

   A. Plastic 1/16 inch jewelers screw–driver, flat–tip.

   B. Digital multimeter (Fluke 77 or equivalent).

   C. Two non–inductive 50 watt 50 Ohm test loads for 50 watt models or 250 watt 50 Ohm test loads for 250 watt models.

   D. Coaxial Accessory Cable.

   E. Coaxial Test Cables.

   F. Type N Tee.

   G. Calibrated 50 Ohm in–line wattmeter.

2. Disconnect all exciter primary power before proceeding.

3. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect the controller module to the extender circuit board.

4. Refer to Figure 5–6 and connect: 1) two 250 watt 50 Ohm test loads in parallel for 250 watt models or two 50 watt 50 Ohm test loads in parallel for 50 watt models and 2) the in–line wattmeter to the **RF OUTPUT** receptacle as shown. Configure the wattmeter for forward power measurements.

5. Refer to Figure 5–5 and connect the digital multimeter between test point TP5 and ground.

6. Apply primary power to the exciter.

7. Adjust the exciter output power until the wattmeter indicates the following reflected power values:

   50 watt units – 2 watts.

   250 watt units – 10 watts.

8. Refer to Figure 5–5 and adjust reflected power foldback control R73 until the multimeter indicates 4.3V.

9. Remove the test equipment and replace the controller module.

5–50. **Procedure - DC Voltage.** To adjust the reflected power foldback control using a dc voltage, proceed as follows:

1. The following equipment is required to adjust the reflected power foldback control using a dc voltage.

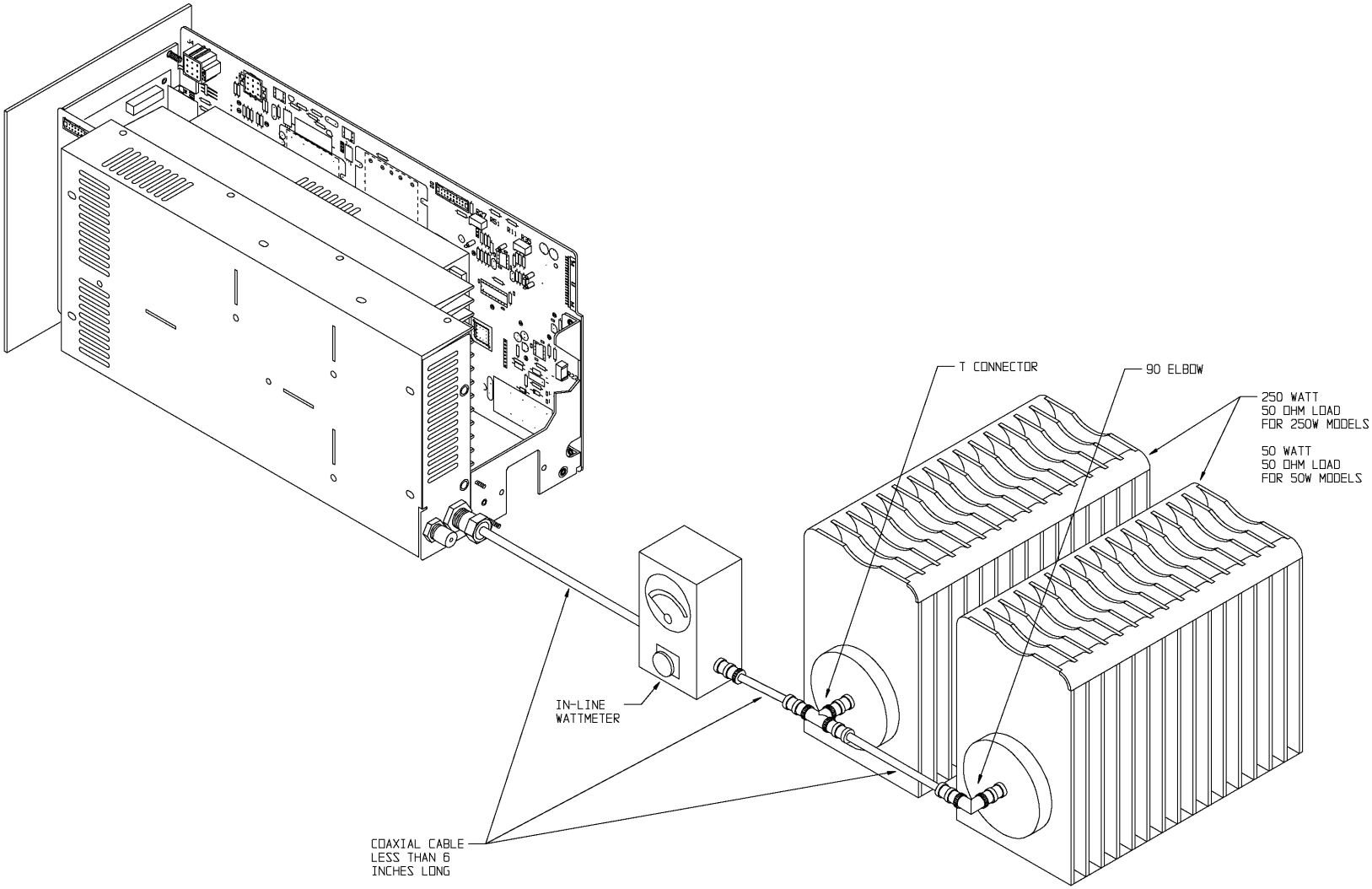
   A. Plastic 1/16 inch jewelers screw–driver, flat–tip.

   B. Digital multimeter (Fluke 77 or equivalent).

   C. 9V battery.

   D. 10K Ohm ±10%, 1/4W 10 turn potentiometer.

   E. Integrated circuit lead clip.



597-8000-45

FIGURE 5-6. PARALLEL LOAD CONNECTION

2. Disconnect all exciter primary power before proceeding.
3. Refer to USING THE OPTIONAL EXTENDER CIRCUIT BOARD in the preceding text and perform the procedure to connect the controller module to the extender circuit board.
4. Refer to Figure 5–7 and construct a dc voltage source as shown. Adjust the source for a 4.00 V dc output.
5. Refer to Figure 5–5 and connect the voltage source between U21 pin 3 and ground.
6. Refer to Figure 5–5 and connect the digital multimeter between test point TP5 and ground.
7. Apply primary power to the exciter.
8. Refer to Figure 5–5 and adjust reflected power foldback control R73 until the multimeter indicates 4.3V.
9. Remove the test equipment and replace the controller module.

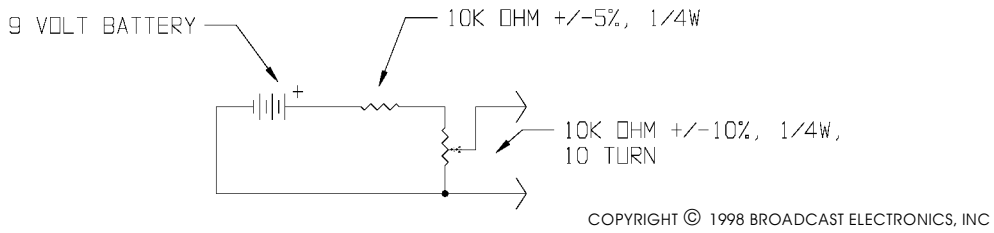


FIGURE 5-7. ADJUSTABLE VOLTAGE SOURCE **597-3002-21**

5–51. **POWER SUPPLY/RF AMPLIFIER MODULE.**

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES. NEVER REMOVE A POWER SUPPLY/RF AMPLIFIER MODULE FROM THE CHASSIS AND APPLY AC POWER.***

5–52. The 50 and 250 Watt power supply/RF amplifier modules contain hazardous voltages. Never remove the module from the chassis and apply ac power. As a result of the hazardous voltages, the power supply/RF amplifier modules can not be adjusted in the field. If it is certain that the module requires adjustment, contact the Broadcast Electronics RF Customer Service Department.

5–53. TROUBLESHOOTING.

5–54. The PREDATOR troubleshooting philosophy consists of isolating a problem to a specific module. The various module indicators and the controller module should be used to isolate a problem to a specific module. Typical parameter indications are presented in Table 5–1.

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES.***

WARNING ***NEVER REMOVE A POWER SUPPLY/RF AMPLIFIER MODULE FROM THE CHASSIS AND APPLY AC POWER.***

5–55. Table 5–2 presents the PREDATOR troubleshooting information. Use the information to isolate the problem to a specific module. When a defective module is located, the module may be returned to the factory for repair (refer to PREDATOR MODULE EXCHANGE PROGRAM). The PREDATOR component locations are presented in Figures 5–8 through 5–13. Due to the hazardous voltages on the 50 and 250 Watt power supply/RF amplifier modules, isolate problems with the ac power removed and resistance checks using a digital multimeter.

TABLE 5-1. TYPICAL PARAMETER INDICATIONS (Sheet 1 of 2)

CONTROLLER	+5V – +4.7 to +5.2 V	–5V – –4.7 to –5.2 V	+12V – +11.2 to +12.7 V	–12V – –11.2 to –12.7 V
ANALOG INTERFACE				
Power Supply	+12V – +11.2 to +12.7 V Dig +5V – +4.7 to +5.2 V	–12V – –11.2 to –12.7 V +2.5V – +2.2 to +2.7 V	+5V – +4.7 to +5.2 V –2.5V – –2.2 to –2.7 V	–5V – –4.7 to –5.2 V
Input Audio	Present			
DIGITAL EXCITER				
Exciter VCO	Locked			
Deviation	75, 150, 300			
Power Supply	+12V – +11.0 to +13.0 V	–12V – –11.0 to –13.0 V	Anlg +8.5V – +8.0 to +9.0 V	Dig +5V – +4.5 to +5.5 V
Power Supply	Dig –5V – –4.5 to –5.5 V			
Trans. Freq.	87.5 to 108 MHz			
RF Out	On			
PS/RF AMPLIFIER				
Pwr Sup IPA	+5V – +4.8 to +5.2 V +5V – +4.2V to +5.7 V	+12V – +11.2 to +12.8 V +15V – +14.2 to +15.7 V	–12V – –11.2 to –12.8 V +28V – +27.3 to +28.3 V	
Inlet Temp	Apprx. 22 to 28 °C			
PA Temp	50W Units – 37 to 45 °C 250W Units – 53 to 57 °C			
PA Fwd Pwr	50W Units – 5W to 50W 250W Units – 25W to 250W			
PA Rfl Pwr	0 to 1 W			
PA Final V	50W Units – 27 to 28.5 V dc 250W Units – 47 to 49 V dc			
PA Final I	50W Units –3.4 to 3.8 A 250W Units – 8 to 10 A			

TABLE 5-1. TYPICAL PARAMETER INDICATIONS (Sheet 2 of 2)				
DIG STEREO GEN				
Pwr Sup	+5V – +4.8 to +5.2 V	–5V – –4.8 to –5.2 V	+12V – +11.2 to +12.8 V	–12V – –11.2 to –12.8 V
Mode	Stereo, L+R, Mono L, or Mono R			
Audio Input	Analog or AES/EBU			
Input Level	Approx. 10 dBfs			
Limiter	On or Off			
Limiter Level	0 to 255 %			
Pre–Emphasis	None, 50 uS, or 75 uS			
St. Gen. Pilot	On			
Pilot Level	6% to 14%			
Digital Source	XLR Cable or Optical			

TABLE 5-2. PREDATOR TROUBLESHOOTING
(Sheet 1 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. 17 INPUT AUDIO – MISSING IS DISPLAYED ON THE CONTROLLER LCD DISPLAY	1. Check the analog interface module audio input cable. 2. Check the audio input source. Ensure the audio source such as an STL is operating properly. 3. If audio is present at the input receptacle, connect an oscilloscope to: 1) TP1 for monophonic audio inputs or 2) TP2 for composite audio inputs. Apply a 400 Hz tone and check for the presence of audio. A. If audio is present, defective analog interface module. B. If audio is not present, defective U1/U3 for monophonic inputs or U2/U3 for composite inputs.
1. DIGITAL STEREO GENERATOR MODULE FAULT INDICATOR ILLUMINATED	1. Check the audio input cable. Ensure a wire cable is connected to the XLR connector or an optical cable is connected to the Toshiba optical connector. 2. Check the 24 DIG. SOURCE parameter using the controller module or a PC. Ensure the parameter is configured for the appropriate source. 3. Check the AES/EBU digital audio source.
1. POWER SUPPLY/RF AMPLIFIER MODULE MUTE INDICATOR ILLUMINATED	1. If a PC is available, check the mute display at the bottom of the parameter screen. The display presents a description of the mute condition. The description should indicate a remote control mute condition.

TABLE 5-2. PREDATOR TROUBLESHOOTING
(Sheet 2 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. POWER SUPPLY/RF AMPLIFIER MODULE MUTE INDICATOR ILLUMINATED (CON'T)	2. Check the mute signal at J3–4 and J3–5 on the controller module. Depending on the control logic, a momentary or sustained LOW (ground) or a HIGH (+5V to +15V) is required to enable exciter operation. 3. Check the N+1 mute signal at J1–11 on the N+1 circuit board.
1. POWER SUPPLY/RF AMPLIFIER MODULE MUTE INDICATOR ILLUMINATED. 2. DIGITAL EXCITER MODULE FAULT INDICATOR ILLUMINATED	1. Ensure the digital exciter module is properly seated in the motherboard and the module retaining hardware is secure. 2. If a PC is available, check the mute display at the bottom of the parameter screen. The display presents a description of the mute condition. Troubleshoot the condition presented or perform the following procedures. 3. Check the 3 EXCITER VCO parameter using the controller module or a PC. 4. If the exciter VCO is unlocked, check for +12V at U1/U2/U3 pin 8. A. If the +12V supply is missing, defective digital exciter module. B. If the +12V supply is present, check the cables at J1, J2, J5, J8, J3, J6, and J4. C. If a cable has been disconnected, re–connect the cable. D. If the cables are secure, perform the digital exciter module 64.8 MHz VCO CALIBRATION and 25.6 MHz VCO CALIBRATION adjustment procedures. E. If a VCO can not be adjusted to approximately 2.5V, defective digital exciter module. 5. If the exciter VCO is locked, check the 2 EX RF OUT parameter using the controller module or a PC. A. If the RF output is present, defective digital exciter module. B. If the RF output is missing, check the RF output cable at J201. C. If the RF output cable is secure, defective digital exciter module.
1. NO MODULATION. 2. ALL INDICATORS ARE NORMAL	1. Place jumper J10 on the digital exciter module in the 1–2 position.

TABLE 5-2. PREDATOR TROUBLESHOOTING
(Sheet 3 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. RF AMPLIFIER PAV INDICATOR EXTINGUISHED 2. NO RF OUTPUT	1. Ensure P4 is connected to J4 on the power supply/RF amplifier module. 2. On 250W models, check fuse F1 and F2 on the power supply circuit board (F2 must be checked using a multimeter). On 50W models, check fuse F1 and the internal PA power supply assembly fuse. 3. Defective: 1) +28V PA supply on 50W models or 2) ac–to–dc converter (U1) or +48V PA supply (U4) on 250W models.
1. RF AMPLIFIER VSWR INDICATOR ILLUMINATED	1. Check the cable from the exciter RF output to the input of the next amplifier stage in the transmitter. 2. For a PREDATOR used as a transmitter, check the antenna. 3. Check U7 on the power supply/RF amplifier module power supply circuit board. 4. Check U21, U34 through U38 on the controller module.
1. RF AMPLIFIER TEMP INDICATOR ILLUMINATED	1. Check the fan filter. 2. Check the fan.
1. RF AMPLIFIER PA CURRENT INDICATOR ILLUMINATED 2. NO RF OUTPUT	1. On 50W models, check Q9 on the RF amplifier circuit board. On 250W models, check Q101 on the RF amplifier circuit board. 2. On 50W models, check C28 through C30, FL1, and the low–pass filter components on the RF amplifier circuit board. On 250W models, check T101, C110, and C111. NOTE – If a short circuit condition is present, the PA power supply assemblies may not turn on.
1. POWER SUPPLY +5V SUPPLY INDICATOR EXTINGUISHED 2. ANALOG INTERFACE, DIGITAL STEREO GENERATOR, DIGITAL EXCITER, AND CONTROLLER, FAULT INDICATORS ILLUMINATED 3. NO RF OUTPUT	1. Defective low–voltage dc power supply assembly +5V supply on the power/supply RF amplifier module.
1. POWER SUPPLY +12V SUPPLY INDICATOR EXTINGUISHED 2. ANALOG INTERFACE, DIGITAL STEREO GENERATOR, DIGITAL EXCITER, AND CONTROLLER, FAULT INDICATORS ILLUMINATED 3. NO RF OUTPUT	1. Defective low–voltage dc power supply assembly +12V supply on the power/supply RF amplifier module.

TABLE 5-2. PREDATOR TROUBLESHOOTING
(Sheet 4 of 4)

SYMPTOM	CIRCUITRY TO CHECK
1. POWER SUPPLY –12V SUPPLY INDICATOR EXTINGUISHED 2. ANALOG INTERFACE, DIGITAL STEREO GENERATOR, DIGITAL EXCITER, AND CONTROLLER, FAULT INDICATORS ILLUMINATED 3. NO RF OUTPUT	1. Defective low–voltage dc power supply assembly –12V supply on the power/supply RF amplifier module.
1. POWER SUPPLY +12V, –12V, AND +5V SUPPLY INDICATORS EXTINGUISHED 2. ANALOG INTERFACE, DIGITAL STEREO GENERATOR, DIGITAL EXCITER, AND CONTROLLER, FAULT INDICATORS ILLUMINATED 3. NO RF OUTPUT	1. Check the low–voltage dc power supply assembly fuse. 2. Defective low–voltage dc power supply assembly on the power/supply RF amplifier module.
1. POWER SUPPLY –12V SUPPLY INDICATOR EXTINGUISHED 2. CONTROLLER FAULT INDICATOR ILLUMINATED 3. NO RF OUTPUT	1. Defective controller module.
1. POWER SUPPLY +12V SUPPLY INDICATOR EXTINGUISHED 2. CONTROLLER FAULT INDICATOR ILLUMINATED 3. NO RF OUTPUT	1. Defective controller module.
1. POWER SUPPLY +5V SUPPLY INDICATOR EXTINGUISHED 2. CONTROLLER FAULT INDICATOR ILLUMINATED 3. NO RF OUTPUT	1. Defective controller module.
1. NORMAL INDICATIONS	1. Ensure the coaxial cable is connected between the digital exciter RF output receptacle and the RF input on the power supply/RF amplifier module.
1. DISTORTED AUDIO 2. DIGITAL EXCITER MODULE MODULATION MONITOR ABOVE 110%	1. Refer to SECTION II, INSTALLATION and re–adjust the modulation level by performing the INSTALLATION ADJUSTMENTS procedure for the input module(s) installed in the PREDATOR.

5–56. **PREDATOR MODULE EXCHANGE PROGRAM.**

5–57. Each PREDATOR module with the exception of the power supply/RF amplifier module is constructed using surface–mount technology. As a result, the modules can not be repaired in the field without specialized surface–mount equipment if a failure occurs.

5-58. Since none of the PREDATOR modules can be repaired locally, Broadcast Electronics has established a module exchange program. The exchange program allows the customer to: 1) exchange a defective module for a reconditioned module or 2) obtain a module on loan during the repair of the defective module. Terms of the program are available from the Broadcast Electronics RF Customer Service Department. The exchange program is simple to use, fast, and will limit the amount of down-time. The exchange program is available for all the PREDATOR modules.

5-59. **COMPONENT REPLACEMENT ON CIRCUIT BOARDS.**

5-60. The PREDATOR power supply and RF amplifier circuit boards in the power supply/RF amplifier module are double-sided boards with plated through-holes. Due to the double-sided design, the components on the circuit boards can be replaced without damage using standard soldering techniques. The circuit boards used in the PREDATOR digital stereo generator, digital exciter, analog interface, and controller modules are constructed using surface-mount technology. Therefore, components on the these circuit boards can not be re-placed without destruction of the circuit board traces unless special surface-mount soldering equipment is used.

5-61. On all double-sided circuit boards with plated through-holes, solder fills the holes by capillary action. These conditions require that defective components be removed carefully to avoid damage to the board. The adhesive securing the copper track to the boards melts at almost the same temperature as solder. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. Use of a small iron with steady pressure is required for circuit board repairs.

5-62. To remove a component from a double-sided circuit board, cut the leads from the body of the defective component while the device is still soldered to the board. Grip each component lead, one at a time, with long nose pliers. Turn the board over and touch the soldering iron to the lead at the solder connection. When the solder begins to melt, push the lead through the back side of the board and cut off the bent outer end of the lead. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared of solder by carefully re-heating with a low wattage iron and removing the residual solder with a soldering vacuum tool.

5-63. Install the new component and apply solder from the bottom side of the board. If no damage has been done to the plated through-holes, soldering of the top side is not required.

WARNING

WARNING

MOST SOLVENTS WHICH WILL REMOVE ROSIN FLUX ARE VOLATILE AND TOXIC BY THEIR NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL VENTILATED AREA, AWAY FROM FLAME, INCLUDING CIGARETTES AND A HOT SOLDERING IRON.

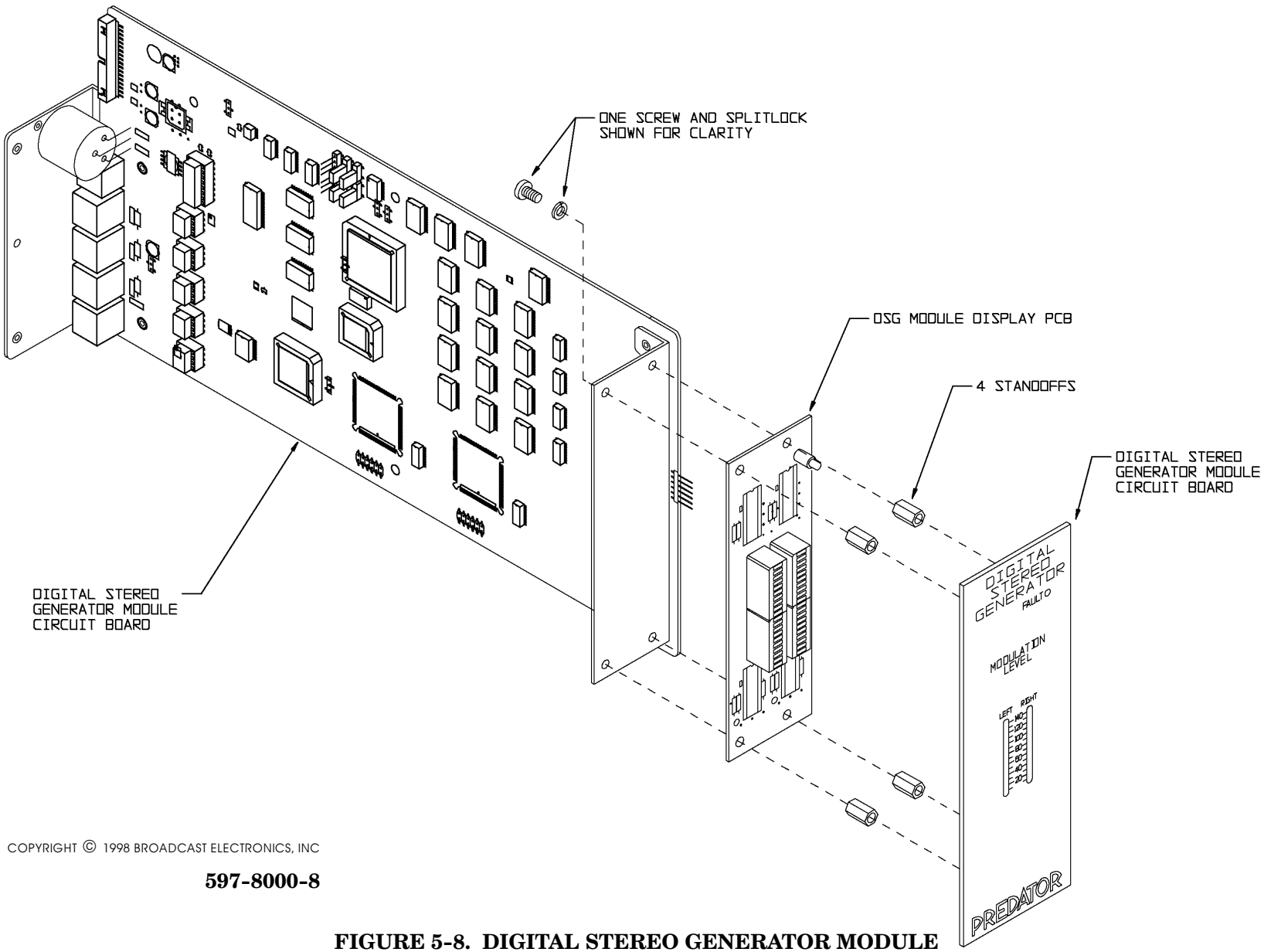
WARNING

WARNING

OBSERVE THE MANUFACTURER'S CAUTIONARY INSTRUCTIONS.

5-64. After soldering, remove flux with a cotton swab moistened with a suitable solvent. Rubbing alcohol is highly diluted and is not effective. Solvents which are useful can be obtained from electronic supply houses if desired.

5-65. The board should be checked to ensure the flux has been removed and not just smeared about. Rosin flux is not normally corrosive, but rosin will absorb enough moisture in time to become conductive and cause problems.



597-8000-8

FIGURE 5-8. DIGITAL STEREO GENERATOR MODULE COMPONENT LOCATIONS

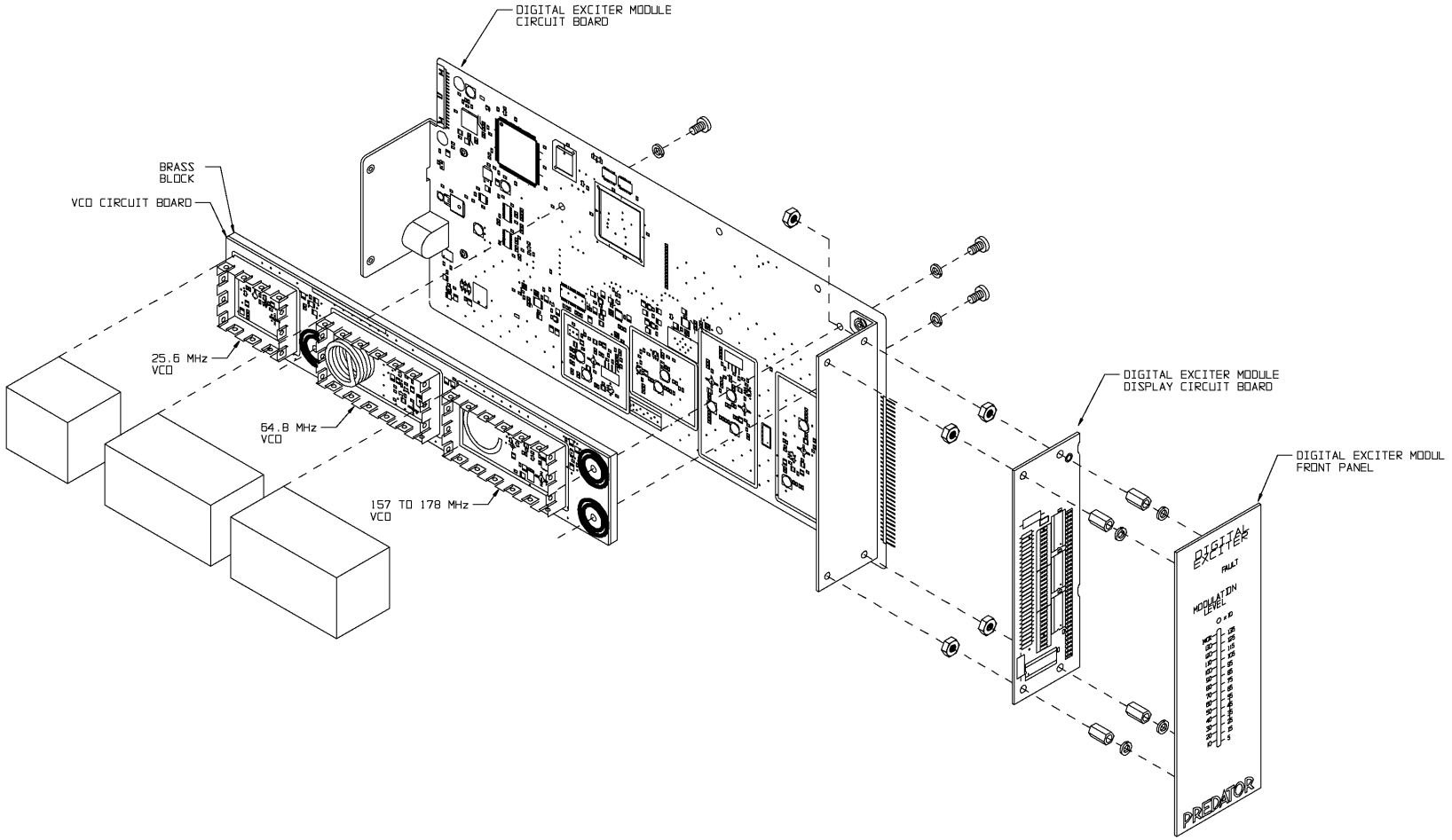


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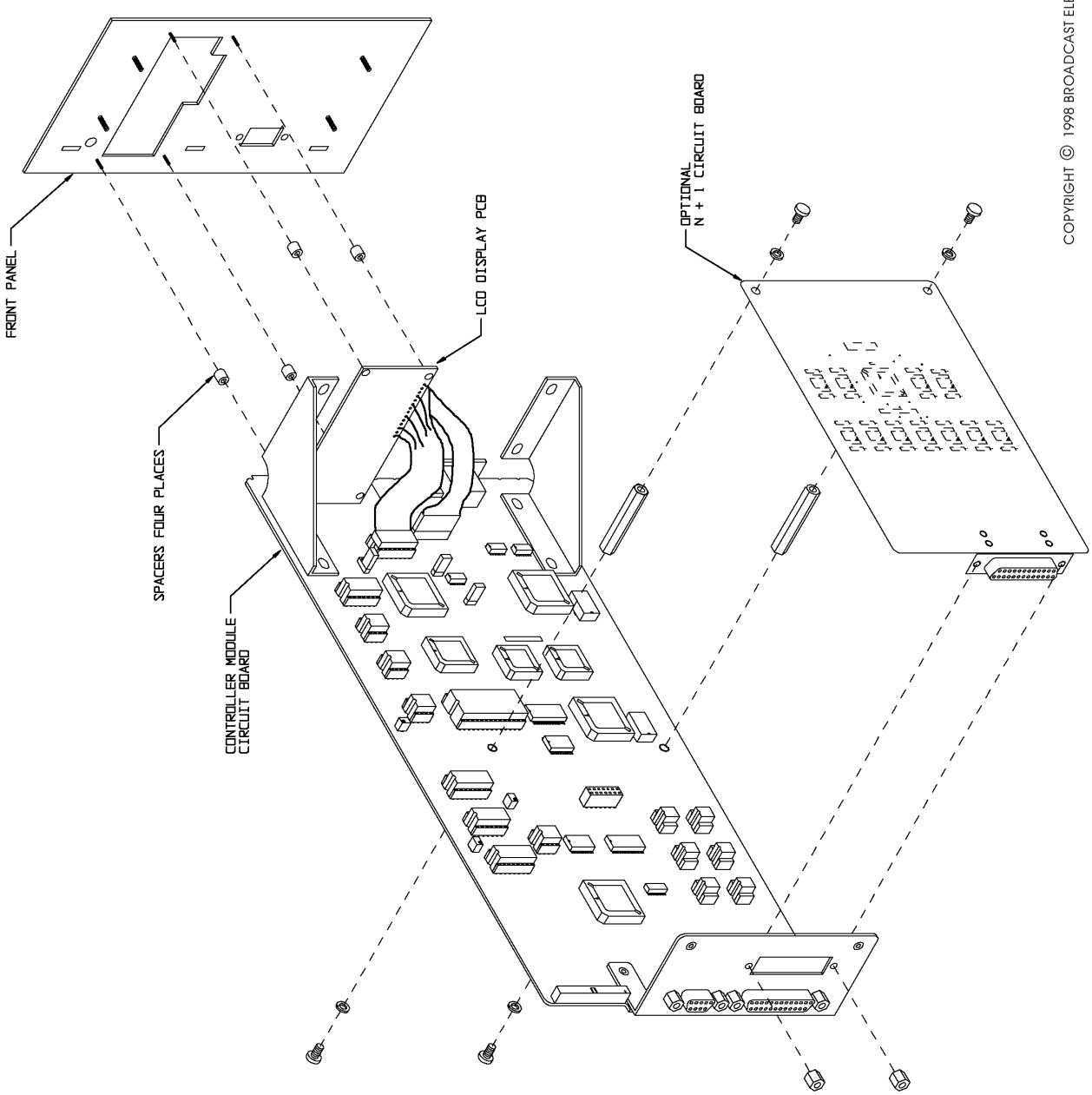
FIGURE 5-9. DIGITAL EXCITER MODULE COMPONENT LOCATIONS

597-8000-28

FIGURE 5-10. ANALOG INTERFACE MODULE COMPONENT LOCATIONS

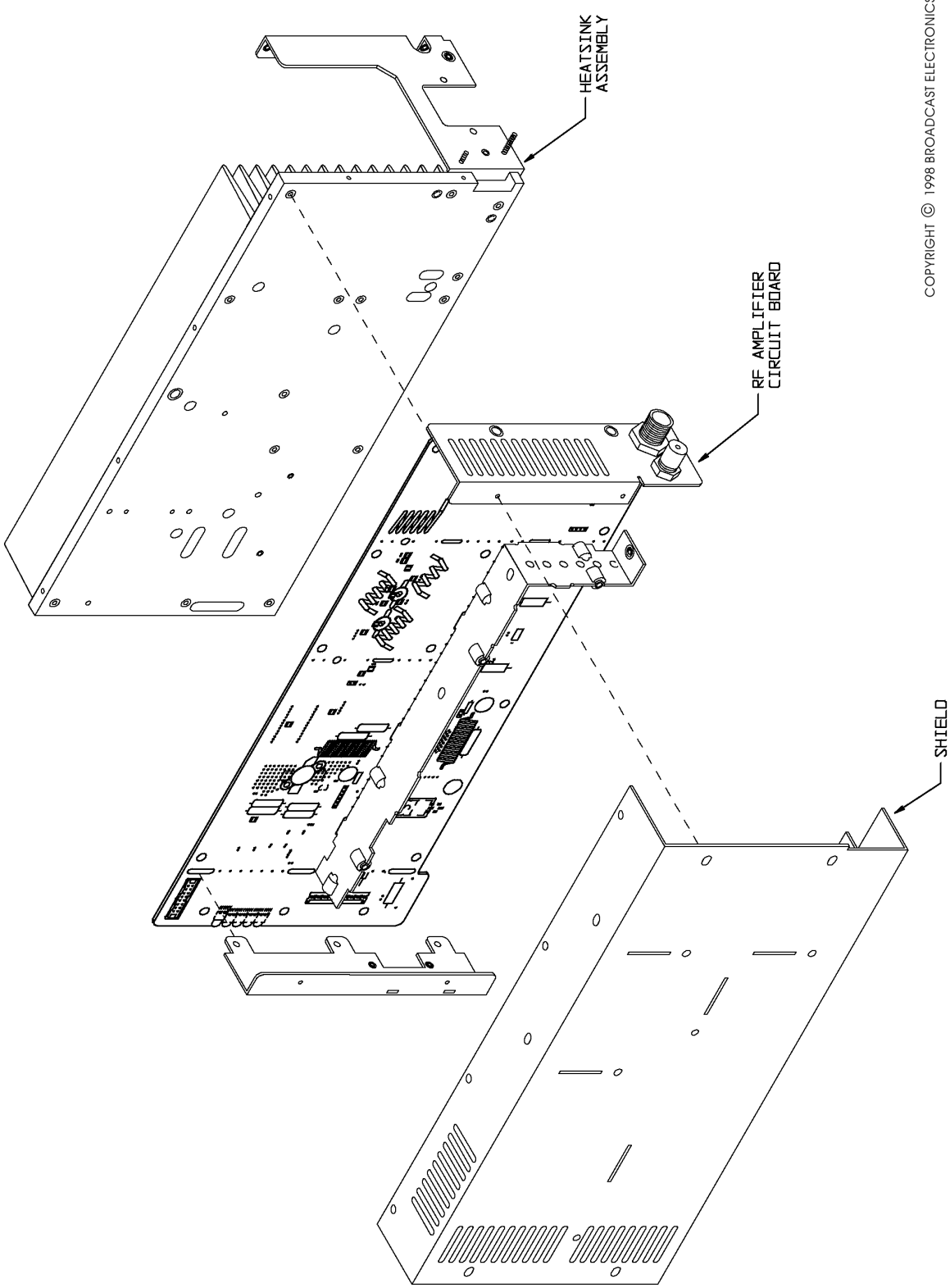


597-8000-9

FIGURE 5-11. CONTROLLER MODULE COMPONENT LOCATIONS

597-8000-5A

FIGURE 5-12. 50 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 1 OF 4)



597-8000-5B

FIGURE 5-12. WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 2 OF 4)

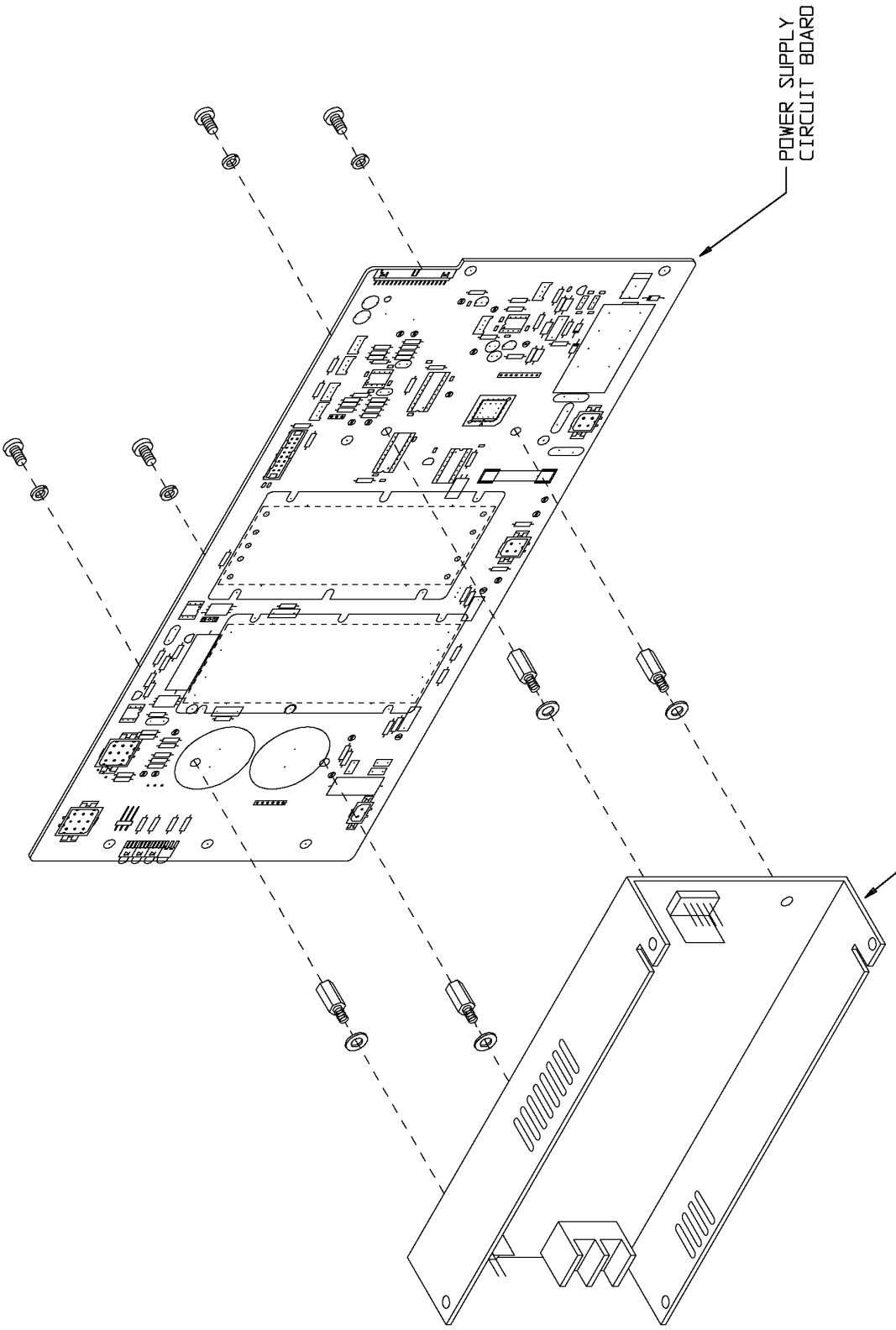


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FIGURE 5-12. 50 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 3 OF 4)

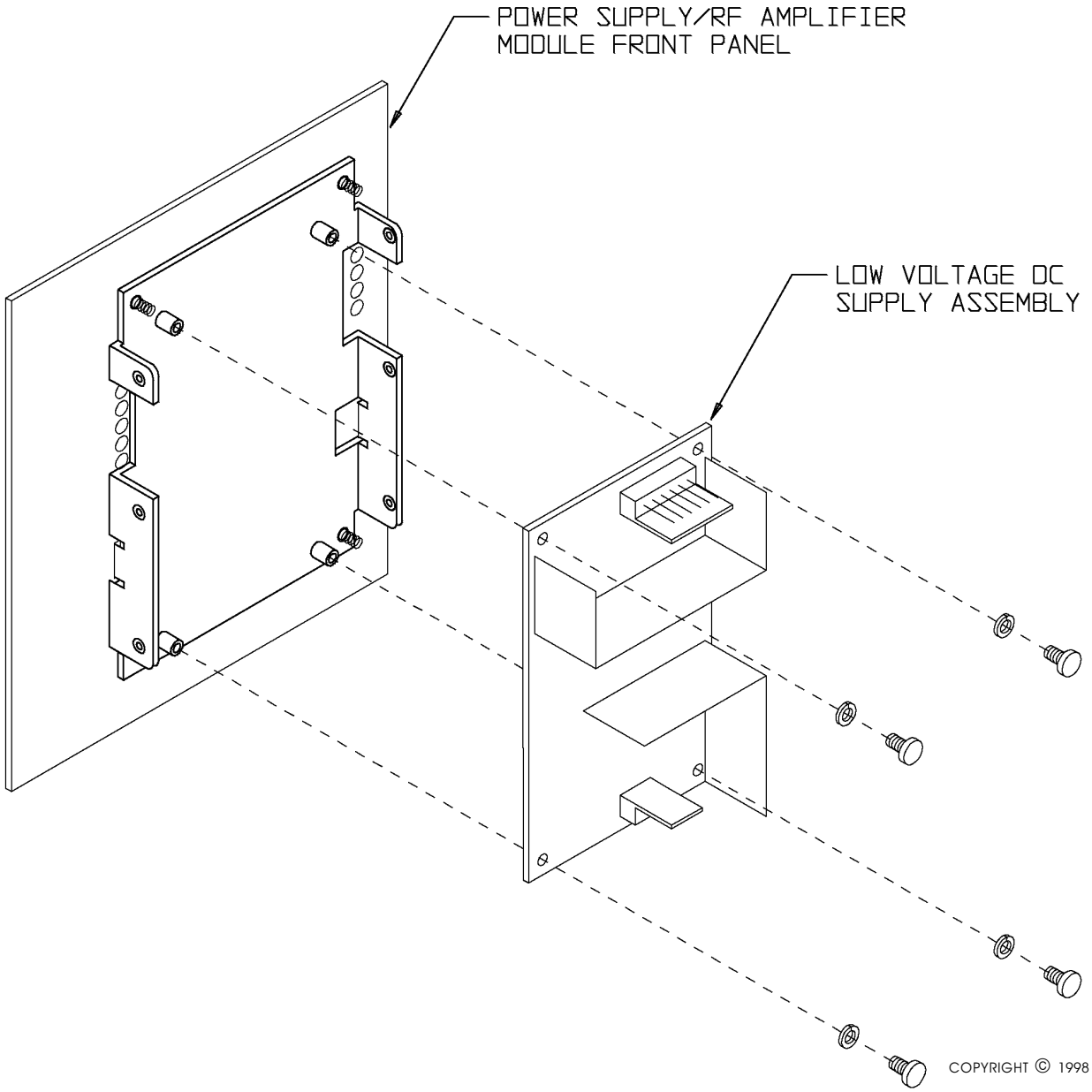

FIGURE 5-12. 50 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 4 OF 4)

597-8000-5D

597-8000-38A

FIGURE 5-13. 250 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 1 OF 4)

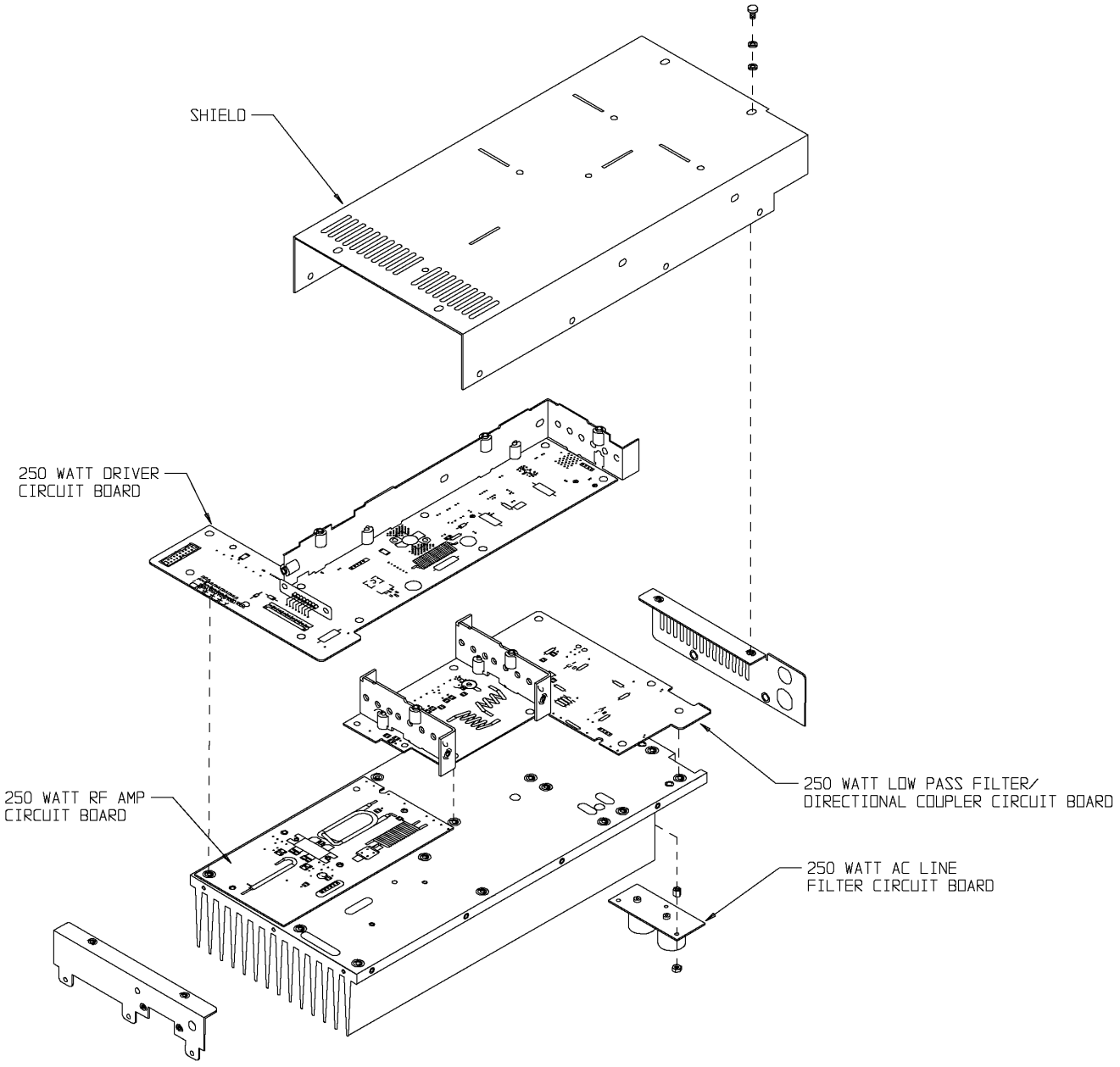

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FIGURE 5-13. 250 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 2 OF 4)

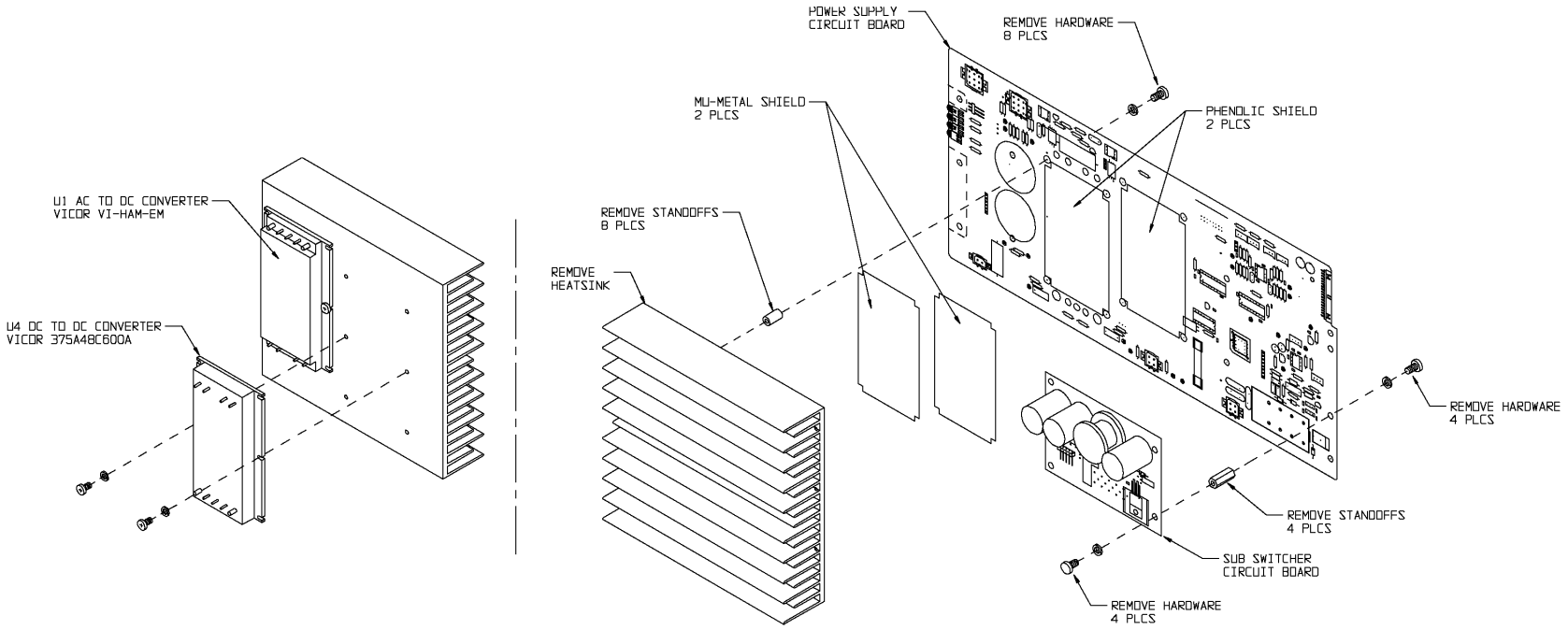

FIGURE 5-13. 250 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 3 OF 4)

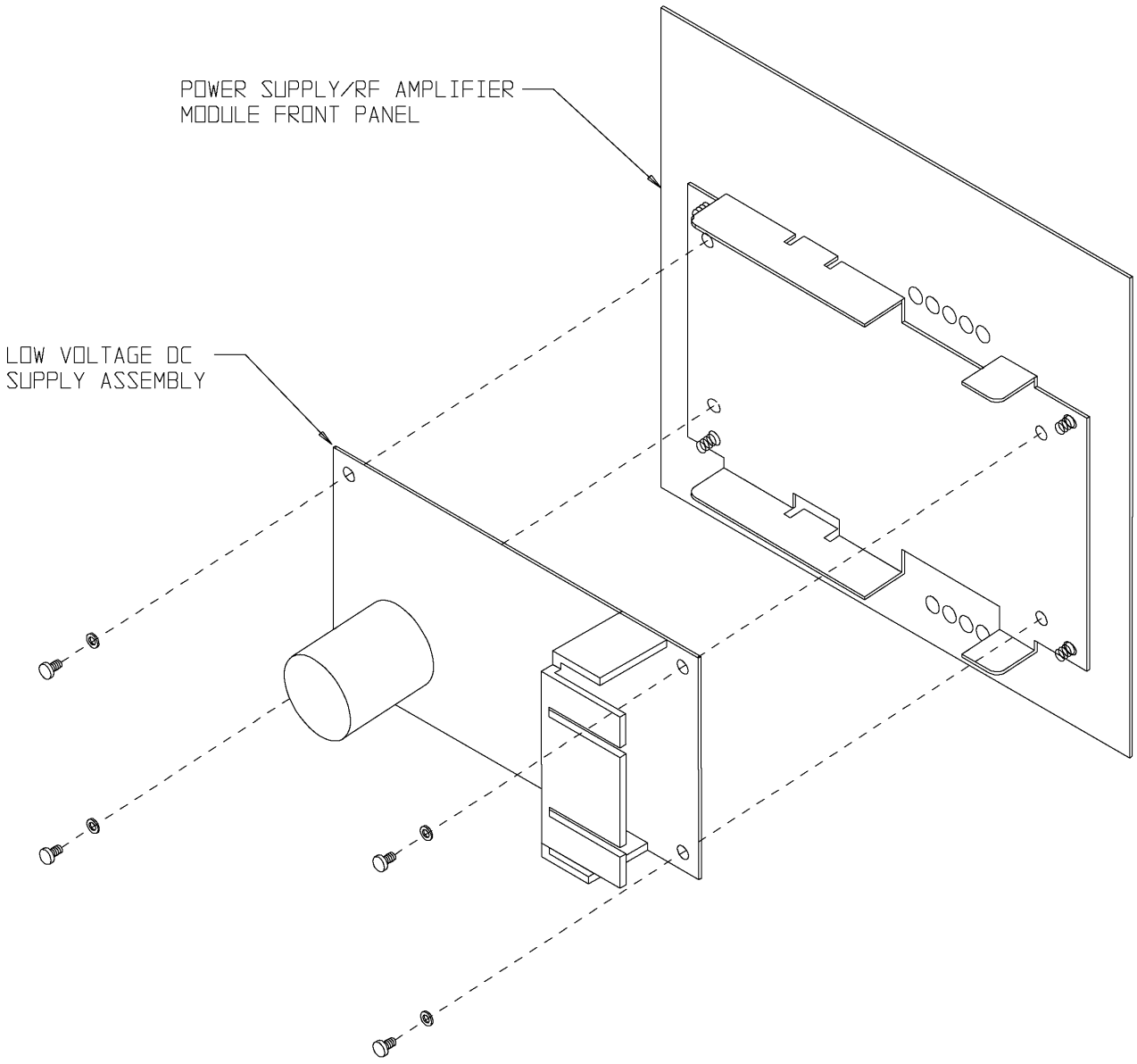

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FIGURE 5-13. 250 WATT POWER SUPPLY/RF AMPLIFIER MODULE COMPONENT LOCATIONS (SHEET 4 OF 4)

SECTION VI
PARTS LIST

6-1. INTRODUCTION.

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

6-3. The parts lists present information on thru-hole components. Information on surface mount parts is not provided.

TABLE 6-1. PREDATOR REPLACEABLE PARTS LIST INDEX
(Sheet 1 of 2)

TABLE 6-1. PREDATOR REPLACEABLE PARTS LIST INDEX
(Sheet 2 of 2)

TABLE 6-2. PREDATOR 50 WATT DIGITAL EXCITER WITH DIGITAL INPUT - 909-8050
PREDATOR 50 WATT DIGITAL EXCITER WITH ANALOG INPUT - 909-8051
PREDATOR 50 WATT DIGITAL EXCITER WITH ANALOG INPUT AND DIGITAL INPUT - 909-8053
PREDATOR 250 WATT DIGITAL EXCITER WITH DIGITAL INPUT- 909-8250
PREDATOR 250 WATT DIGITAL EXCITER WITH ANALOG INPUT - 909-8251
PREDATOR 250 WATT DIGITAL EXCITER WITH ANALOG INPUT AND DIGITAL STEREO GENERATOR MODULES - 909-8253

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Strip, Quiet Shield, 6.00 x .197	400–0600	6
----	Strip, Quiet Shield, 17.25 x .394	400–1725	2
----	Circuit Board Guide, 6 inch	409–0026	18
----	Southco Sheet Edge 6–32	421–6908	62
----	Overlay, 2.4 Modules	595–0202	.25
----	Filter, Fan, Pamotor 5502	380–5502	1
----	Digital Exciter Module	959–0356	1
----	Controller Module	959–0360	1
----	Backplane Circuit Board Assembly	919–0358	1
----	RF Amplifier–Digital Exciter Cable Assembly	947–0195	1
----	DC Fan Harness	947–0194	1
----	Installation Kit	979–8000	1
	FOR 909-8050 - 909-8053 - 909-8250 - 909-8253 ASSEMBLIES		
----	Digital Stereo Generator Module	959–0350	1
	FOR 909-8051 - 909-8053 - 909-8251 - 909-8253 ASSEMBLIES		
----	Analog Input Module	959–0355	1
	FOR 909-8050 - 909-8051 - 909-8053 ASSEMBLIES		
----	50 Watt Power Supply/Power Amplifier Module Assembly	959–0354–050	1
----	Fan, DC Muffin, 24V, 6W, 110CFM	380–6400	1
----	Adapter, Fan	471–3233	1
	FOR 909-8250 - 909-8251 - 909-8253 ASSEMBLIES		
----	250 Watt Power Supply/Power Amplifier Module Assembly	959–0354–250	1
----	Fan, DC Galaxy, 24V, 15W, 150 CFM	380–8250	1
----	Plenum, Fan	471–3234	2

TABLE 6-3. DIGITAL EXCITER MODULE - 959-0356

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Digital Exciter Circuit Board Assembly	919–0356	1
----	Digital Exciter Display Circuit Board Assembly	919–0357	1
----	Digital Exciter VCO Circuit Board Assembly	919–0377	1

TABLE 6-4. DIGITAL EXCITER CIRCUIT BOARD ASSEMBLY - 919-0356

REF. DES.	DESCRIPTION	PART NO.	QTY.
This circuit board is designed using surface mount technology. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, this table only presents any applicable thru-hole components and socketed surface mount components.			
J201	Connector, SMA Female PC Mount	417-0701	1
J202	Receptacle, Male, Right Angle, 20-Pin In-Line	417-0214	1
J203	BNC, Right Angle PC Mounting, Shielded	417-0037-001	1
P10	Jumper, Programmable, 2-Pin	340-0004	1
P11A	Jumper, Switch, 2x2, Multi-Position Shunt, .100	340-1020	1
P11B	Jumper, Switch, 2x2, Multi-Position Shunt, .100	340-1020	1
P200	Connector, Header, 36-Pin, Right Angle	417-3620	1
XU12	Socket, 84-Pin, PLCC, SMD	431-8400	1
XU15	Socket, 32-Pin, PLCC, SMD	431-3200	1
----	Blank, Digital Exciter Circuit Board	519-0356	1

TABLE 6-5. DIGITAL EXCITER DISPLAY CIRCUIT BOARD ASSEMBLY - 919-0357

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 thru C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	5
C6, C7	Capacitor, Electrolytic, 10 uF, 16V	013-1074	2
DS1	LED, Yellow, MV53124, 3V @ 20 mA Maximum	323-3124	1
DS2	LED, MV57164, Red, High Efficiency 10-Segment Bar Graph Array	320-7164	1
DS3, DS4	LED, MV54164, Green, High Efficiency 10-Segment Bar Graph Array	320-4164	2
DS5	LED,Red, T-1	320-0032	1
J1	Connector, Bottom Entry, 36 Position	417-3036	1
R1 thru R28	Resistor, 200 Ohm ±1%, 1/4W	103-2003	28
U1 thru U4	Integrated Circuit, ULN2003A, 7 Section NPN Darlington Driver, CMOS, 16-Pin DIP	229-2003	4
XDS1	Spacer, LED .25 OD X .147 ID X .22L	407-0074	1
XDS2	Socket, 20-Pin DIP	417-2004	1
XDS3	Socket, 20-Pin DIP	417-2004	1
XDS4	Socket, 20-Pin DIP	417-2004	1
XDS5	Spacer, Nylon, .12 ID X .187 X .3	441-9405	1
----	Spacer, Nylon, Tubular, .167 OD X .105 ID X .050 H	441-0185	1
----	Blank, Digital Exciter Display Circuit Board	519-0357	1

TABLE 6-6. DIGITAL EXCITER VCO CIRCUIT BOARD ASSEMBLY - 919-0377

REF. DES.	DESCRIPTION	PART NO.	QTY.
This circuit board is designed using surface mount technology. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, this table only presents any applicable thru-hole components and socketed surface mount components.			
J1, J7, J9	Receptacle, Male, 2-Pin In-line	417-4004	3
----	Blank, Digital Exciter VCO Circuit Board	519-0377-001	1

TABLE 6-7. DIGITAL STEREO GENERATOR MODULE - 959-0350

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Stereo Generator Main Circuit Board Assembly	919-0350-002	1
----	Front Panel, Digital Stereo Generator Circuit Board Assembly	919-0353	1

TABLE 6-8. STEREO GENERATOR MAIN CIRCUIT BOARD ASSEMBLY - 919-0350-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
This circuit board is designed using surface mount technology. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, this table only presents any applicable thru-hole components and socketed surface mount components.			
D2 thru D4	Zener Voltage Suppressor, +/-12V	201-0012	3
D6	Zener Voltage Suppressor, +/-13V	201-0039	1
FL1 thru FL6	Filter, EMI 10,000 pF 3-Pin	411-0001	6
J101	Connector, Audio, FEM Series, 3-Pin	418-0051	1
J102	Module, Fibre Optic Receiver, TORX173	417-6013	1
J103 thru J106	BNC, Right Angle PC Mounting, Shielded	417-0037-001	4
J107	Receptacle Header, 12-Pin In-Line	417-1203	1
K1	Relay, DPDT, 12 Vdc, DIP	270-0066	1
P8 thru P11	Jumper, Programmable, 2-Pin	340-0004	4
P14	Jumper, Programmable, 2-Pin	340-0004	1
P19 thru P24	Jumper, Programmable, 2-Pin	340-0004	6
P100	Connector, Header, 36-Pin, Right Angle	417-3620	1
U1	Kit, Software, Lynx EPLD	979-0350-004	1
U2	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U3 thru U6	Integrated Circuit, OP-275, Dual Bipolar/JFET Operational Amplifier, 8-Pin DIP	220-0275	4
U50	Kit, Software, PREDATOR DSG ROM	979-0350-005	1
XK1	Socket, 16-Pin, DIP, SMD	431-1600	1
XU1	Socket, 44-Pin, PLCC, SMD	431-4400	1
XU2 thru XU6	Socket, 8-Pin, DIP, SMD	431-0800	5
XU50	Socket, 32-Pin, PLCC, SMD	431-3200	1
XU51	Socket, 68-Pin, PLCC, SMD	431-6800	1
----	Blank, Stereo Generator Main Circuit Board	519-0350	1

TABLE 6-9. DIGITAL STEREO GENERATOR DISPLAY CIRCUIT BOARD ASSEMBLY - 919-0353 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C2	Capacitor, Tantalum, 2.2 uF, 35V	064-2263	1
C3, C4	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C5	Capacitor, Tantalum, 2.2 uF, 35V	064-2263	1
C6	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1

TABLE 6-9. DIGITAL STEREO GENERATOR DISPLAY CIRCUIT BOARD ASSEMBLY - 919-0353 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
DS1	LED, MV57164, Red, High Efficiency 10-Segment Bar Graph Array	320-7164	1
DS2	LED, MV54164, Green, High Efficiency 10-Segment Bar Graph Array	320-4164	1
DS4	LED, MV54164, Green, High Efficiency 10-Segment Bar Graph Array	320-4164	1
DS4	LED, MV57164, Red, High Efficiency 10-Segment Bar Graph Array	320-7164	1
DS5	LED, Red, T-1	320-0032	1
DSX1 thru DSX4	Socket, 20-Pin DIP	417-2004	4
DSX5	Spacer, Nylon, .12 ID X .187 X .3	441-9405	1
P107	Connector, Bottom Entry, 6 Position	417-3006	1
R1	Resistor, 2.43 k Ohm ±1%, 1/4W	103-2434	1
R2	Resistor, 2.05 k Ohm ±1%, 1/4W	103-2054	1
R3	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R4	Resistor, 1.10 k Ohm ±1%, 1/4W	103-1104	1
R6	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
R7	Resistor, 2.43 k Ohm ±1%, 1/4W	103-2434	1
R8	Resistor, 2.05 k Ohm ±1%, 1/4W	103-2054	1
R9	Resistor, 1.21 k Ohm ±1%, 1/4W	103-1214	1
R10	Resistor, 1.10 k Ohm ±1%, 1/4W	103-1104	1
R12	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
U1 thru U4	Integrated Circuit, LM3914N, Dot/Bar Display Driver, 18-Pin DIP	229-3914	4
----	Spacer, Nylon, Tubular, .167 OD X .105 ID X .050 H.	441-0185	1
----	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	2
----	Blank, Digital Stereo Generator Front Panel Circuit Board	519-0353-001	1

TABLE 6-10. ANALOG INPUT MODULE - 959-0355

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Analog Input Board Circuit Board Assembly	919-0355-001	1

TABLE 6-11. ANALOG INPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0355-001 (Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
This circuit board is designed using surface mount technology. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, this table only presents any applicable thru-hole components and socketed surface mount components.			
C3	Capacitor, Mylar, 0.22 uF ±10%, 100V	030-2253	1
C4	Capacitor, Electrolytic, 330 uF, 25V, Non-Polarized	020-3385	1
C5	Capacitor, Mica, 2500 pF ±1%, 500V	042-2531	1
C6	Capacitor, Mica, 5000 pF ±1%, 500V	042-5031	1
C9	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C11	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C12, C13	Capacitor, Mica, 390 pF ±5%, 100V	042-3922	2
C14	Capacitor, Mylar, 0.22 uF ±10%, 100V	030-2253	1
C15, C16	Capacitor, Electrolytic, 100 uF, 50V	020-1085	2

TABLE 6-11. ANALOG INPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0355-001
(Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C17	Capacitor, Mylar, 0.22 uF ±10%, 100V	030–2253	1
C20	Capacitor, Mica, 3 pF +/–0.5 pF, 500V	042–1223	1
C22	Capacitor, Mica, 3 pF +/–0.5 pF, 500V	042–1223	1
C24	Capacitor, Mica, 3 pF +/–0.5 pF, 500V	042–1223	1
C25	Capacitor, Electrolytic, 10 uF, 35V	023–1075	1
C26 thru C28	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	3
C35	Capacitor, Mica, 10 pF ±5%, 500V	042–1012	1
C36, C37	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	2
C39	Capacitor, Mica, 5000 pF ±1%, 500V	042–5031	1
C41	Capacitor, Mica, 1000 pF ±1%, 100V	041–1031	1
C54	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C56	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C58	Capacitor, Electrolytic, 100 uF, 35V	023–1084	1
C66	Capacitor, Electrolytic, 100 uF, 50V	020–1085	1
C69	Capacitor, Electrolytic, 330 uF, 25V, Non–Polarized	020–3385	1
C70	Capacitor, Mylar, 0.22 uF ±10%, 100V	030–2253	1
C73	Capacitor, Mylar, 0.22 uF ±10%, 100V	030–2253	1
C77	Capacitor, Mica, 12 pF ±5%, 500V	040–1213	1
C80	Capacitor, Mylar, 0.22 uF ±10%, 100V	030–2253	1
D1 thru D8	Zener Voltage Suppressor, +/–12V	201–0012	8
D11	Zener Voltage Suppressor, +/–12V	201–0012	1
D12	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
D17	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	1
DS1	LED, Red, 5300E1, 2.3V @ 50 mA Maximum	320–0011	1
FL1, FL2	Filter, EMI 10,000 pF 3–Pin	411–0001	2
FL3, FL4	Capacitor, Filter, EMI Suppression, 1000 pF ±20%, 3–Pin	047–1035	2
FL5 thru FL7	Filter, EMI 10,000 pF 3–Pin	411–0001	3
J1 thru J5	Receptacle, Male, 20–Pin In–Line	417–0200	5
J6, J7	Receptacle, Male, 3–Pin In–line	417–0003	2
J8	Receptacle, Male, 20–Pin In–Line	417–0200	1
J101	Connector, Audio, FEM Series, 3–Pin	418–0051	1
J102	Connector, BNC, 90° Angle	417–0037	1
J103 thru J105	BNC, Right Angle PC Mounting, Shielded	417–0037–001	3
L1	Ferrite Choke, 180 MHz, 2.5 Turns, Single Section	364–0002	1
L4, L6, L7, L9	Ferrite Choke, 180 MHz, 2.5 Turns, Single Section	364–0002	4
P1 thru P4	Jumper, Programmable, 2–Pin	340–0004	4
P6 thru P8	Jumper, Programmable, 2–Pin	340–0004	3
P100	Connector, Header, 36–Pin, Right Angle	417–3620	1
R1	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R2	Resistor, 634 Ohm ±1%, 1/4W	103–6343	1
R3	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R5	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R9	Resistor, 365 Ohm ±1%, 1/4W	103–3631	1
R10, R11	Resistor Network, 10–10 k Ohm 0.5% Resistors, 0.7W Total Dissipation, 16–Pin DIP	226–0392	2

TABLE 6-11. ANALOG INPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0355-001
(Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R12	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R15	Resistor, 6650 Ohm ±1%, 1/4W	103–6641	1
R19	Resistor, 2.32 k Ohm ±1%, 1/4W	103–2341	1
R20	Resistor, 4.02 k Ohm ±1%, 1/4W	103–4024	1
R21	Potentiometer, 2 k Ohm ±10%, 1/2W	177–2044	1
R22	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R23	Resistor, 51.1 Ohm ±1%, 1/4W	103–5112	1
R24	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R26	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R30	Resistor, 365 Ohm ±1%, 1/4W	103–3631	1
R31	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R32	Resistor Network, 10–10 k Ohm 0.5% Resistors, 0.7W Total Dissipation, 16–Pin DIP	226–0392	1
R35	Resistor, 698 Ohm ±1%, 1/4W	103–6983	1
R36	Resistor, 267 Ohm ±1%, 1/4W	103–2673	1
R37	Potentiometer, 500 Ohm ±10%, 1/2W	177–5032	1
R38	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R40, R41	Resistor, 3.16 k Ohm ±1%, 1/4W	103–3164	2
R42	Resistor, 1.47 k Ohm ±1%, 1/4W	103–1474	1
R43, R44	Resistor, 3.16 k Ohm ±1%, 1/4W	103–3164	2
R45	Resistor, 2 k Ohm ±1%, 1/4W	100–2041	1
R46	Potentiometer, 2 k Ohm ±10%, 1/2W	177–2044	1
R55	Resistor, 681 Ohm ±1%, 1/4W	103–6813	1
R60	Resistor, 365 Ohm ±1%, 1/4W	103–3631	1
R61	Resistor, 787 Ohm ±1%, 1/4W	103–7873	1
R62	Resistor, 1.82 k Ohm ±1%, 1/4W	100–1841	1
R63	Resistor, 1.21 k Ohm ±1%, 1/4W	103–1214	1
R65	Potentiometer, 50 Ohm ±10%, 1/2W	177–5020	1
R66	Potentiometer, 500 Ohm ±10%, 1/2W	177–5032	1
R90	Potentiometer, 1 k Ohm ±10%, 1/2W	177–1044	1
R106	Potentiometer, 200 Ohm ±10%, 1/2W	177–2035	1
T1, T2	Ferrite Choke, 4 Leg Each Winding 4 turns of No. 32 enameled wire wound from same direction on same side.	956–0002	2
U1	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8–Pin DIP	221–5532–001	1
U2	Integrated Circuit, OP–AMP, Dual, OPA–2134, 8–Pin DIP	221–2134	1
U3	Integrated Circuit, OP–275, Dual Bipolar/JFET Operational Amplifier, 8–Pin DIP	220–0275	1
U4	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8–Pin DIP	221–5532–001	1
U5	Integrated Circuit, OP–275, Dual Bipolar/JFET Operational Amplifier, 8–Pin DIP	220–0275	1
U6	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8–Pin DIP	221–5532–001	1
U11	Integrated Circuit, ISPGAL22V10C–7LJ, 28–Pin PLCC Package	229–2210–001	1
U13	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO–220 Case	227–0337	1

TABLE 6-11. ANALOG INPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0355-001
(Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U14	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U16	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8-Pin DIP	221-5532-001	1
XU1 thru XU6	Socket, 8-Pin DIP	417-0804	6
XU11	Socket, 28-Pin, PLCC, SMD	431-2800	1
XU16	Socket, 8-Pin DIP	417-0804	1
----	Blank, Analog Input Board Circuit Board	519-0355-001	1

TABLE 6-12. CONTROLLER MODULE - 959-0360

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Display, LCD, 16 Character X 2 Lines	320-0100	1
----	Flat Flex Cable Assembly, .100 X 16 Pos	417-1640	1
----	Overlay, Keypad	595-0201-001	1
----	Controller Module Circuit Board Assembly	919-0360	1

TABLE 6-13. CONTROLLER MODULE CIRCUIT BOARD ASSEMBLY - 919-0360
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
This circuit board is designed using surface mount technology. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, this table only presents any applicable thru-hole components and socketed surface mount components.			
C60	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C61	Capacitor, Electrolytic, 10 uF, 50V, Non-Polarized	023-1075	1
C67 thru C72	Capacitor, Ceramic, 100 pF, 100V, 2%	003-1063	6
D3, D4	Bidirectional Zener Voltage Suppressor, +/-27 V, P6KE27CA-RL	201-0027	2
D13 thru D18	Bidirectional Zener Voltage Suppressor, +/-15 V, P6KE15CA-RL	201-0015	6
DS1	LED, Red, 5300E1, 2.3V @ 50 mA Maximum	320-0011	1
FL1 thru FL21	Filter, EMI 10,000 pF, 3-Pin	411-0001	21
J2	Receptacle, Male, 20-Pin In-Line	417-0200	1
J3	Receptacle, Right Angle Printed Circuit Mount, 25-Pin D Type	417-1252	1
J4, J5	Connector, 9-Pin, Right Angle Male, D-Sub	417-2821	2
J6	Receptacle, Male, 2-Pin In-line	417-4004	1
J7	Receptacle, Male, 20-Pin In-Line	417-0200	1
J8	Receptacle, Male, 2-Pin In-line	417-4004	1
J9, J10, J13	Receptacle, Male, 3-Pin In-line	417-0003	3
J11	Receptacle, Male, 20-Pin In-Line	417-0200	1
J12	Socket, 14-Pin, 2 Row, 1", SMD	431-1401	1
P1	Connector, Header, 36-Pin, Right Angle	417-3620	1
P6	Jumper, Programmable, 2-Pin	340-0004	1
P9, P10, P13	Jumper, Programmable, 2-Pin	340-0004	3
R120	Resistor, 12.1 Ohm ±1%, 1/4W	103-1212	1

TABLE 6-13. CONTROLLER MODULE CIRCUIT BOARD ASSEMBLY - 919-0360
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R124 thru R129	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100-3373	6
TP1 thru TP8	Terminal, Test Point, Oval, Red	413-0106	8
U1, U2	Integrated Circuit, IPSGAL22V10C-7LJ, Programmable Generic Array Logic, SMD, 28-Pin PLCC Package	229-2210-001	2
U4	Integrated Circuit, DS80C320-QCG, High Performance Micro Controller, SMD, 44-Pin PLCC	229-8032-001	1
U9, U11	Integrated Circuit, TL16C 550AFN, 8250 High Speed UART (Universal Asychronous Receiver/Transmitter), SMD, 44-Pin PLCC Package	229-0550-001	2
U16 thru U18	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	3
U19	Integrated Circuit, 82C55A, Peripheral Interface, SMD, 44-Pin PLCC Package	229-8255-001	1
U21, U22	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	2
U24	Integrated Circuit, N28F512-120, 64K X 8 Flash Memory, 120 nS Access, SMD, 32-Pin PLCC Package	229-8512	1
U28, U30	Integrated Circuit, RC4559NB, Operational Amplifier, 8-Pin DIP	221-4559	2
U31 thru U33	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	3
U34	Integrated Circuit, LT1491, Quad Rail-To-Rail Operational Amplifier, 14-Pin DIP	221-1491	1
U36,U37	Integrated Circuit, CA3183E, Five Transistor Array, NPN, 16-Pin DIP	220-3183	2
U39 thru U41	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	3
U42	Integrated Circuit, LM339AN, Quad Comparator, 14-Pin DIP	221-0339	1
XK1	Socket, 16-Pin, DIP, SMD	431-1600	1
XU6	Socket, 28-Pin IC, SMD	417-2804-001	1
XU16 thru XU18	Socket, 6-Pin DIP	417-0600	3
XU21	Socket, 8-Pin, DIP, SMD	431-0800	1
XU22	Socket, 8-Pin, DIP, SMD	431-0800	1
XU24	Socket, 32-Pin, PLCC Package, SMD	431-3200	1
XU28	Socket, 8-Pin, DIP, SMD	431-0800	1
XU30	Socket, 8-Pin, DIP, SMD	431-0800	1
XU31 thru XU33	Socket, 6-Pin DIP	417-0600	3
XU34	Socket, 14-Pin, DIP, SMD	431-1400	1
XU36, XU37	Socket, 16-Pin, DIP, SMD	431-1600	2
XU39 thru XU41	Socket, 8-Pin, DIP, SMD	431-0800	3
XU42	Socket, 14-Pin, DIP, SMD	431-1400	1
----	Blank, Controller Module Circuit Board	519-0360	1

TABLE 6-14. 50 WATT POWER SUPPLY/POWER AMPLIFIER MODULE ASSEMBLY - 959-0354-050
250 WATT POWER SUPPLY/POWER AMPLIFIER MODULE ASSEMBLY - 959-0354-250

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	RFI Filter, Module, IEC Socket, 5 x 20 mm Fuse Type, 115/230 V ac 6A/3A Current Rating	417-1600	1
----	Power Supply, 65 Watt, Universal Input, Power Factor Corrected, Open Frame Type, Triple Output	540-0065	1
----	Overlay, Power Supply Front	595-0201	1
	FOR 959-0354-050 50 WATT ASSEMBLY		
----	Fuse, GMC-3A, 3.0 Amp, Time Lag	330-0302	2
----	Power Supply 50 Watt Assembly	959-0354-055	1
----	50 Watt Power Amplifier, Predator Sub Assembly	959-0363	1
----	Power Supply Cable Assembly	949-0354-050	1
	FOR 959-0354-250 250 WATT ASSEMBLY		
F100	Fuse, GMC-7A, 7 Amps, 125V, Time-Lag, 5 X 20MM	330-0700	2
----	Power Supply 250 Watt Assembly	959-0354-255	1
----	250 Watt Power Amplifier, Predator Sub Assembly	959-0365	1
----	AC Line Filter Circuit Board Assembly	919-0354-002	1
----	Power Supply Cable Assembly	949-0354-250	1

TABLE 6-15. POWER SUPPLY CABLE ASSEMBLY - 949-0354-050

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Connector, 16-Pin	417-0131	1
P1	Housing, SL-156, 3 Position	417-0306	1
P1	Plug, Housing, 4-Pin	418-0240	1
P2	Housing, 9 Position, SL-156, AMP 640250-9	417-0909	1
P3, P4	Connector Plug, 9-Pin	417-0059	2
P3	Housing, SL-156, 6 Position	417-0606	1
P7	Connector, 16-Pin	417-0131	1
----	Pins, Connector	417-0053	16
----	Cable, Flat, 16-Conductor, 28 Gage	600-0016	1
----	Wire, AWG 18 19/30 Black	601-1800	11

TABLE 6-16. 50 WATT POWER SUPPLY ASSEMBLY - 959-0354-055

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Power Supply, Astec LPS155, 150 Watt, Input – 85V –264V ac or 220 –370V dc, Output – 28V @ 6.2 A	540–0155	1
----	Power Supply 50 RF Watt Model Circuit Board Assembly	919–0354–050	1
----	50 Watt Power Supply Astec Cable Assembly	949–0354–001	1
----	50 Watt Power Supply Cable Harness	949–0354–051	1

TABLE 6-17. 250 WATT POWER SUPPLY ASSEMBLY - 959-0354-255

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Power Supply 250 RF Watt Model Circuit Board Assembly	919–0354–250	1
----	Heatsink/VICOR Modules Assembly	959–0354–002	1
----	48/28V Switcher Circuit Board Assembly	919–0354–001	1
----	48/28V Switcher Cable Assembly	949–0354–251	1

TABLE 6-18. POWER SUPPLY 50 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-050
POWER SUPPLY 250 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-250
(Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	FOR 919-0354-250 250 WATT ASSEMBLY		
C1, C2	Capacitor, Electrolytic, 470 uf ±20%, 450V	020–4715–451	2
C3	Capacitor, Metal Paper, 4700 pF ±20%, 250Vac	034–4725–251	1
C4	Capacitor, Poly Film, .47 uF, 600V	033–4763	1
C5 thru C7	Capacitor, Metal Paper, 4700 pF ±20%, 250Vac	034–4725–251	3
C8, C9	Capacitor, Electrolytic, 33 uF, 35V	064–3373	2
C10	Capacitor, Tantalum, 47 uF ±20%, 6V	061–4774	1
C11, C12	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	2
C13	Capacitor, Metalized Paper, 4700 pF ±20%, 250Vac	034–4725–251	1
C14, C15	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	2
C16	Capacitor, Mica, 390 pF ±5%, 100V	042–3922	1
C17	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	1
C18	Capacitor, Mica, 390 pF ±5%, 100V	042–3922	1
C19	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	1
C20 thru C22	Capacitor, Electrolytic, 10 uF, 50V	023–1076	3
C23 thru C28	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	6
C29	Capacitor, Electrolytic, 47 uF, 16V	013–4750	1
C30 thru C33	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	4
	FOR 919-0354-250 250 WATT ASSEMBLY		
C34, C35	Capacitor, Mica, 470 pF ±1%, 500V	040–4721	2

TABLE 6-18. POWER SUPPLY 50 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-050
POWER SUPPLY 250 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-250
(Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C36	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	1
C37 thru C39	Capacitor, Monolythic Ceramic, .47 uF ±10%, 50V	003–4743	3
C40	Capacitor, Electrolytic, 10 uF, 35V	023–1075	1
C41 thru C43	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	3
C44	Capacitor, Electrolytic, 47 uF, 16V	013–4750	1
C45	Capacitor, Mylar, 0.01 uF ±10%, 100V	031–1043	1
C46, C47	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	2
	FOR 919-0354-250 250 WATT ASSEMBLY		
C48	Capacitor, Electrolytic, 470 uF ±20%, 100V	020–4785	1
C49	Capacitor, Electrolytic, 1 uF, 50V	024–1064	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
C50, C51	Capacitor, Electrolytic, 220 uF, 25V	023–2273	2
D4 thru D7	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203–4005	4
DS1 thru DS3	LED, Green, 5300E5, 2.3V @ 50 mA Maximum	323–2206	3
DS4	LED, Red, 5300E1, 2.3V @ 50 mA Maximum	320–0011	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
F1	Fuse, MDA 10 Amperes, 250V, Slow–Blow	330–1000	1
F2	Fuse, 3 Amperes, 250V Printed Circuit Board Mount	330–0055	1
FL1, FL2	Filter, EMI 10,000 pF, 3–Pin	411–0001	2
J1	Socket, 4–Pin	418–0255	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
J2	Socket, 4–Pin	418–0255	1
J3, J4	Connector, 9–Pin	418–0900	2
J5	Connector, Header, 36–Pin, Right Angle	417–3620	1
J6	Receptacle, Male, 20–Pin In–Line	417–0200	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
J7	Connector, Header, 16–Pin, Printed Circuit Board Mount	417–1606	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
J7	Connector, Header, 16–Pin, Right Angle	417–1511–001	1
J8	Receptacle, Male, 3–Pin In–line	417–0003	1
J9	Jack, 2.5 MM Male PC Mount	417–0285	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
J10	Connector, 2–Pin	417–0700	1
J13	Receptacle Header, 12–Pin In–Line	417–1203	1
K1	Relay, 12v, 2PDT, Low Profile, PCB, Power	270–0070	1

TABLE 6-18. POWER SUPPLY 50 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-050
POWER SUPPLY 250 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-250
(Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	FOR 919-0354-250 250 WATT ASSEMBLY		
L1, L2	Ferrite Choke, 180 MHz, 2.5 Turns, Single Section	364–0002	5
L3 thru L5	Ferrite Choke, 180 MHz, 2.5 Turns, Single Section	364–0002	3
P8	Jumper, Programmable, 2–Pin	340–0004	1
Q2	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
Q3	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	1
Q4	Transistor, 2N27000, FET, N–Channel, TO–92 Case	210–7000	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
MOV1 thru MOV3	Metal Oxide Varistor, V250LA15A, 250V ac RMS, 15 Joules	140–0008	3
R1	Resistor, 18.2 k Ohm ±1%, 1/4W	103–1825	1
R2	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R3, R4	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	2
R5	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R6, R7	Resistor, 1 Ohm ±5%, 1/4W	100–1013	2
R8, R9	Resistor, 2 Meg Ohm ±5%, 1/4W	100–2073	2
R14	Resistor, .005 Ohm ±3%, 5W	139–0007	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
R14	Resistor, 0.1 Ohm ±1%, 5W, W/W	130–1000	1
R15, R16	Resistor, 100 Ohm ±1%, 1/4W	100–1031	2
R17, R18	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	2
	FOR 919-0354-050 50 WATT ASSEMBLY		
R19	Potentiometer, 2 k Ohm ±10%, 1/2W	178–2044	1
R20	Resistor, 5490 Ohm ±1%, 1/4W	103–5494	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
R19	Potentiometer, 500 Ohm, 1/2W	178–5030	1
R20	Resistor, 432 Ohm ±1%, 1/4W	103–4323	1
R21	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R22	Potentiometer, 5 k Ohm ±10%, 1/2W	178–5044	1
R23	Resistor, 9.09 k Ohm ±1%, 1/4W	103–9041	1
R24	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
R25	Resistor, 249 k Ohm ±1%, 1/4W	103–2496	1

TABLE 6-18. POWER SUPPLY 50 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-050
POWER SUPPLY 250 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-250
(Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	FOR 919-0354-250 250 WATT ASSEMBLY		
R25	Resistor, 301 k Ohm ±1%, 1/4W	103–3061	1
R26	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R27	Potentiometer, 2 k Ohm ±10%, 1/2W	178–2044	1
R28	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R29	Resistor, 2 k Ohm ±1%, 1/4W	100–2041	1
R30	Resistor, 8.06 k Ohm ±1%, 1/4W	103–8064	1
R31	Resistor, 4.02 k Ohm ±1%, 1/4W	103–4024	1
R32	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
	FOR 919-0354-050 50 WATT ASSEMBLY		
R33	Resistor, 200k Ohm ±1%, 1/4W	103–2061	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
R33	Resistor, 1 Meg Ohm ±1%, 1/4W	103–1007	1
R34	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R35	Potentiometer, 2 k Ohm ±10%, 1/2W	178–2044	1
R36	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R37	Resistor, 16.9 k Ohm ±1%, 1/4W	103–1695	1
R38	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R39	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R40	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R41	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R42	Resistor, 3.01 k Ohm ±1%, 1/4W	103–3014	1
R43	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	1
R44, R45	Resistor, 2 k Ohm ±1%, 1/4W	100–2041	2
R46	Resistor, 301 Ohm ±1%, 1/4W	100–3031	1
R47	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R48	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
R49	Resistor, 100 Ohm ±1%, 1/4W	100–1031	1
R52, R53	Resistor, 10 Ohm ±1%, 1/4W	103–1021	2
	FOR 919-0354-250 250 WATT ASSEMBLY		
R54	Resistor, 10 Ohm ±1%, 1/4W	103–1021	1
R55 thru R65	Resistor, 10 Ohm ±1%, 1/4W	103–1021	11
	FOR 919-0354-250 250 WATT ASSEMBLY		
R67	Resistor, 10 Ohm, ±1%, 1/4W	103–1021	1
R71	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R72	Resistor, 100 k Ohm ±1%, 1/4W	103–1062	1
R73 thru R75	Resistor, 1 k Ohm ±1%, 1/4W	100–1041	3

TABLE 6-18. POWER SUPPLY 50 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-050
POWER SUPPLY 250 RF WATT MODEL CIRCUIT BOARD ASSEMBLY - 919-0354-250
(Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	FOR 919-0354-250 250 WATT ASSEMBLY		
R76	Resistor, 35.7 k Ohm ±1%, 1/4W	103–3575	1
TP1 thru TP8	Terminal, Test Point, Oval, Red	413–0106	8
	FOR 919-0354-250 250 WATT ASSEMBLY		
TP9	Terminal, Test Point, Oval, Red	413–0106	1
TP10 thru TP18	Terminal, Test Point, Oval, Red	413–0106	9
	FOR 919-0354-250 250 WATT ASSEMBLY		
TP19	Terminal, Test Point, Oval, Red	413–0106	1
U2	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	1
U3	Integrated Circuit, AC Input Opto–Isolator, 7500V Isolation, 6–Pin DIP	229–0111	1
U6	Integrated Circuit, AD622, 8–Pin DIP	221–0622	1
U7	Integrated Circuit, TL072CP, Dual JFET–Input Operational Amplifier, 8–Pin DIP	221–0072	1
U8	Integrated Circuit, 74HC164 S/R, 8–Bit Serial–Input/Parallel –Output Shift Register, 14–Pin DIP	220–4164	1
U9	Integrated Circuit, ISPGAL22V10C–7LJ, 28–Pin PLCC Package	229–2210–001	1
U10, U11	Integrated Circuit, MC14052B, Dual 4–Channel Analog Multiplexers/Demultiplexers, CMOS MSI, 2P4T, 16–Pin DIP	220–4052	2
U12	Integrated Circuit, LM35DZ, Celsius Temperature Sensor, TO–92 Case	220–0035	1
U13	Integrated Circuit, Voltage Regulator, MC79L05,–5V, T0–92 Case	227–7905–A	1
W1	Fuseable Link, 22 AWG	601–0022	1
	FOR 919-0354-250 250 WATT ASSEMBLY		
XF1	Clip, Fuse, Low profile, PCB	415–0102–080	1
XU2, XU3	Socket, 6–Pin DIP	417–0600	2
XU6, XU7	Socket, 8–Pin DIP	417–0804	2
XU8	Socket, 14–Pin DIP	417–1404	1
XU9	Socket, 28–Pin PLCC	417–2801	1
XU10, XU11	Socket, 16–Pin DIP	417–1604	2
XU12	Socket, 20–Pin Single Row, SAMTEC	417–0172	1
----	Blank, Power Supply Circuit Board	519–0354–250	1

TABLE 6-19. 50 WATT POWER SUPPLY ASTEC CABLE ASSEMBLY - 949-0354-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
P13	Connector, Housing, 3-Pin	417-0003-001	1
PSK1	Housing, 8-Pin, Molex, Milli-Grid, 2.0mm	418-0851	1
----	Keying Plug MOD IV 87077 AMP	417-0224	1
----	Pin, Female, Molex, Milli-Grid, 2.0mm	417-0851	2
----	Contact, Crimp MOD V 30-26 AWG	417-8728	2
----	Wire, AWG 26, 7-34, Black	601-2600	1

TABLE 6-20. 50 WATT POWER SUPPLY CABLE HARNESS - 949-0354-051

REF. DES.	DESCRIPTION	PART NO.	QTY.
P2	Plug, Housing, 4-Pin	418-0240	1
P10	Connector Housing, 2-Pin, Female	418-0701	1
SK4	Connector Housing, 5-Pin In-Line	417-1305	1
----	Crimp Terminal, AMP 640707-1	410-2478	3
----	Pins, Connector	417-0053	5
----	Wire, AWG 16, 19/29 Yellow	601-1604	1
----	Wire, AWG 18, 19/30 Black	601-1800	2

TABLE 6-21. HEATSINK/VICOR MODULES ASSEMBLY - 959-0354-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Socket, VICOR, 600W, Small	417-0013-635	7
----	Socket, VICOR, 600W, Large	417-0013-637	2
----	Receptacle, Pin For .032-.047 Diameter	417-5640	7
----	Receptacle, Pin For .065-.082 Diameter	417-5680	2
----	Heatsink, Predator Power Supply	455-8006	1
U1	AC Line Input Module, Vicor VI-HAM-EM Universal Input , Voltage Range 85/264V AC 47/63 Hz, 600 W, Power Factor, Output - Approx. 260 to 375V dc	540-0200	1
U4	Module, DC/DC Converter, Vicor 375A48C600A, 250-475V dc to 48V dc, 600 W	540-0375	1

TABLE 6-22. 48/28V SWITCHER CIRCUIT BOARD ASSEMBLY - 919-0354-001
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 470 uF ±20%, 100V	020-4785	1
C2, C3	Capacitor, Electrolytic, 2200 uF, 35V	014-2293	2
C4, C5	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	2
C6	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
D1	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1

TABLE 6-22. 48/28V SWITCHER CIRCUIT BOARD ASSEMBLY - 919-0354-001
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
D2	Diode, Rectifier, 5 Amps, 200V PIV, MR822	202–0822	1
J1	Connector, Header, 5–Pin, Right Angle	417–4000–002	1
L1	Choke, Filter, 330 uH, 4.5 Amperes	361–2447	1
L2	Choke, Filter, 100 uH, 2 Amperes, 1HA–203	361–0004	1
R1	Resistor, 22.1 k Ohm ±1%, 1/4W	103–2211	1
R2	Resistor, 1.02 k Ohm ±1%, 1/4W	103–1024	1
U1	Voltage Regulator, LM2576HVT–ADJ, 60V, 3 Amperes, Switcher	227–2576–ADJ	1
----	Transistor Mounting Insulator, TO–220 Case	409–7403	1
----	Blank, 48/28V Switcher Circuit Board	519–0354–001	1

TABLE 6-23. 48/28V SWITCHER CABLE ASSEMBLY - 949-0354-251

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector, Housing, 5–Pin In–line	417–0165	1
----	Keying Plug MOD IV 87077 AMP	417–0224	1
----	Pins, Crimp Type	417–8766	3
----	Wire, Twisted, AWG22, Insulated, Red–Yel–Blu, UL1007	603–2200	1

TABLE 6-24. 50 WATT POWER AMPLIFIER ASSEMBLY - 959-0363
250 WATT POWER AMPLIFIER ASSEMBLY - 959-0365
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
J2	Header, 9–Pin, Friction Lock	418–0909	1
Q4	Transistor, MRF136, Mosfet	210–0136	1
	FOR 959-0363 50 WATT ASSEMBLY		
Q9	Transistor, RF Power Mosfet, MRF173, 80W	210–0173	1
U1	Voltage Regulator, 15V, 1 Amp, TO–220	227–7815–C	1
----	Capacitor, Plate, Filter, 4000 pF, 100V, +1001–0%	008–4020–101	1
	FOR 959-0363 50 WATT ASSEMBLY		
----	Integrated Circuit, LM35DZ, Celsius Temperature Sensor, TO–92 Case	220–0035	1
----	50W Output Board Circuit Board Assembly	919–0363	1
	FOR 959-0365 250 WATT ASSEMBLY		
----	Transistor, RF Power Mosfet, MRF–151G, 175 MHz, 50V, 300W	210–0151	1
----	Transformer, RF Amp Output	370–0052	1
----	Input Transformer	370–0721	1
----	Input Board Circuit Board Assembly	919–0362	1
----	RF Amplifier Circuit Board Assembly	919–0365–002	1
----	LPF/CPLR Circuit Board Assembly	919–0366–002	1

TABLE 6-24. 50 WATT POWER AMPLIFIER ASSEMBLY - 959-0363
250 WATT POWER AMPLIFIER ASSEMBLY - 959-0365
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	BNC Receptacle, Bulkhead, UG492A/U	417-0017	1
----	Connector, "N" Female Bulkhead Receptacle Rear Mount Pressurized	417-0321	1
----	50/250 Watt Power Amplifier Module Cable Assembly	949-0363	1

TABLE 6-25. 50/150/250 WATT POWER AMPLIFIER CABLE ASSEMBLY - 949-0363

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Contact Housing, 4-Pin In-Line	417-0138	2
----	Keying Plug MOD IV 87077 AMP	417-0224	4
----	Plug, Housing, 6-Pin	417-0601	2
----	Connector, Jack, Bulkhead, SMA, Hex Crimp	417-8029	1
----	Pins, Crimp Type	417-8766	16
----	Plug, BNC, Dual Crimp	418-0034	1
----	Wire, AWG 18 19/30 Black	601-1800	3
----	Coax Cable, Impedance: 50 Ohm Capacitance: 29.3 pF/ft. Nominal	621-1359	1

TABLE 6-26. 50 WATT OUTPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0363
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
The main circuit board is designed using surface mount components. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, only non-surface mount components and socketed surface mount components are presented in this table.			
C4	Capacitor, Electrolytic, 33 uF, 35V	024-3374	1
C10	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003-4723	1
C21	Capacitor, Electrolytic, 33 uF, 35V	024-3374	1
C29	Capacitor, Electrolytic, 33 uF, 35V	024-3374	1
D1	Diode, Zener, IN4740A, 10V, 7 Ohm	200-4740	1
D2	Diode, Zener, 1N4731A	200-4731	1
D3	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	1
DS1	LED, Green, 5300E5, 2.3V @ 50 mA Maximum	323-2206	1
DS2 thru DS5	LED, Red, 5300E1, 2.3V @ 50 mA Maximum	320-0011	4
FL1	Filter, EMI 10,000 pF, 3-Pin	411-0001	1
J1	Connector, Header, 16-Pin, PCB Mount	417-1606	1
J3	Receptacle, Male, 2-Pin In-line	417-4004	1
J4, J5	Receptacle, Male, 20-Pin In-Line	417-0200	2
J7	Receptacle, Male, 2-Pin In-Line	417-4004	1
R4	Resistor, 150 Ohm ±1%, 1W, MIL 1/2W	120-1531	1

TABLE 6-26. 50 WATT OUTPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0363
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R12	Resistor, 30 Ohm ±5%, 1W	120–3023	1
R16	Resistor, 60.4 Ohm ±1%, 1/4W	103–6040	1
R37	Resistor, 150 Ohm ±5%, 3W	130–1513	1
R41	Resistor, 82.5 Ohm ±1%, 1/4W	103–8251	1
R46	Resistor, 1 k Ohm ±5%, 1W	120–1043	1
R48, R49	Resistor, 150 Ohm ±5%, 3W	130–1513	2
R51, R52	Resistor, 22 Ohm ±5%, 3W	130–2243	2
R55, R56	Resistor, 22 Ohm ±5%, 3W	130–2243	2
R66	Potentiometer, 100 Ohm ±10%, 1/2W	177–1035	1
----	Blank, 50 Watt Output Board Circuit Board	519–0363	1

TABLE 6-27. 250 WATT INPUT BOARD CIRCUIT BOARD ASSEMBLY - 919-0362

REF. DES.	DESCRIPTION	PART NO.	QTY.
The main circuit board is designed using surface mount components. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, only non–surface mount components and socketed surface mount components are presented in this table.			
C4	Capacitor, Electrolytic, 33 uF, 35V	024–3374	1
C10	Capacitor, Monolythic Ceramic, 0.0047 uF ±5%, 100V	003–4723	1
C21	Capacitor, Electrolytic, 33 uF, 35V	024–3374	1
D1	Diode, Zener, IN4740A, 10V, 7 Ohm	200–4740	1
D2, D3	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	2
DS1	LED, Green, 5300E5, 2.3V @ 50 mA Maximum	323–2206	1
DS2 thru DS5	LED, Red, 5300E1, 2.3V @ 50 mA Maximum	320–0011	4
J1	Connector, Header, 16–Pin, PCB Mount	417–1606	1
J3	Receptacle, Male, 2–Pin In–line	417–4004	1
J4, J5	Receptacle, Male, 20–Pin In–Line	417–0200	2
J6	Receptacle, Male, 2–Pin In–Line	417–4004	1
R4	Resistor, 150 Ohm ±1%, 1W, (MIL 1/2W)	120–1531	1
R12	Resistor, 30 Ohm ±5%, 1W	120–3023	1
R16	Resistor, 60.4 Ohm ±1%, 1/4W	103–6040	1
R37	Resistor, 150 Ohm ±5%, 3W	130–1513	1
R41	Resistor, 82.5 Ohm ±1%, 1/4W	103–8251	1
R46	Resistor, 1 k Ohm ±5%, 1W	120–1043	1
----	Blank, Input Board, Circuit Board	519–0362	1

TABLE 6-28. 250 WATT RF AMPLIFIER CIRCUIT BOARD ASSEMBLY - 919-0365-002
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
The main circuit board is designed using surface mount components. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, only non–surface mount components and socketed surface mount components are presented in this table.			
L101	Choke, RF Amp Decoupling, FM–1C	360–0146	1

TABLE 6-28. 250 WATT RF AMPLIFIER CIRCUIT BOARD ASSEMBLY - 919-0365-002
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R108	Resistor, 10 Ohm ±5%, 2W	130–1023	1
U101	Integrated Circuit, LM35DZ, Celsius Temperature Sensor, TO–92 Case	220–0035	1
----	Receptacle, Male, 20–Pin In–Line	417–0200	1
----	Blank, RF Amplifier Circuit Board, 250W, Predator	519–0365	1

TABLE 6-29. 250 WATT LPF/CPLR CIRCUIT BOARD ASSEMBLY - 919-0366-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
The main circuit board is designed using surface mount components. As a result, the components can not be changed without the use of specialized surface mount soldering equipment. Therefore, only non–surface mount components and socketed surface mount components are presented in this table.			
C219	Capacitor, Ceramic, 33 pF ±5%, 100V	003–3312	1
C225	Capacitor, Ceramic, 33 pF ±5%, 100V	003–3312	1
D201 thru D203	Diode, HP5082–2800, High Voltage, Schottky Barrier Type, 70V, 15 mA	201–2800	3
L201, L202	Coil, 4.5 Turns, LPF	360–0148	2
L203	Coil, 3.5 Turns, LPF	360–0147	1
L204	Coil, L1, LPF	360–0145	1
R201	Resistor, 499 k Ohm ±1%, 1/4W	103–4996	1
R202	Resistor, 5.11 k Ohm ±1%, 1/4W	103–5141	1
R203	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R204	Resistor, 150 k Ohm ±1%, 1/4W	103–1561	1
R205	Resistor, 60.4 Ohm ±1%, 1/4W	103–6040	1
R206	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R207	Resistor, 121 Ohm ±1%, 1/4W	100–1231	1
R208	Potentiometer, 100 Ohm ±10%, 1/2W	177–1035	1
R209, R210	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	2
----	Receptacle, Male, 20–Pin In–Line	417–0200	1
----	Blank, LPF/CPLR Circuit Board Assembly	519–0366	1

TABLE 6-30. 250 WATT AC LINE FILTER CIRCUIT BOARD ASSEMBLY - 919-0354-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
J201	Socket, 4–Pin	418–0255	1
L201, L202	Choke, Filter, 100 uH, 9 Amperes AC	361–1256–100	2
----	Blank, AC Line Filter Circuit Board	519–0354–002	1

TABLE 6-31. BACKPLANE CIRCUIT BOARD ASSEMBLY - 919-0358

REF. DES.	DESCRIPTION	PART NO.	QTY.
J100, J200, J300, J400 J500	Connector, Receptacle, 36–Pin	417–3667	1
----	Blank, Backplane Circuit Board	519–0358–001	1

TABLE 6-32. RF AMPLIFIER DIGITAL EXCITER CABLE ASSEMBLY - 947-0195

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Plug, Right Angle, Blind Mate With Cable	417–6501	1
----	Connector, Plug, Right Angle, SMA, Hex Crimp	417–8030	1
----	Coaxial Cable, Impedance: 50 Ohm Capacitance: 29.3 pF/ft. Nominal	621–1359	4

TABLE 6-33. DC FAN HARNESS - 947-0194

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Plug, 2.5 MM Female	417–0286	1
----	Plug and Cord Set, LZ120, 610 mm (24 in) Long	417–8500	1

TABLE 6-34. INSTALLATION KIT - 979-8000

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector Plug, 25–Pin, “D” Solder Cups	417–0291	1
----	Kit, Housing, 25–Pin	417–2510	1
----	Cord, Power, Detachable With Mounting Ears	682–0004	1
----	PREDATOR Instruction Manual	597–8000	1
----	Cable BNC Access Assembly	947–0020	1
----	AC Cord, Adaptor With Ears	949–0500	1

TABLE 6-35. N+1 OPTION BOARD CIRCUIT BOARD ASSEMBLY - 919-0361
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1, C2	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	2
C3, C4	Capacitor, Electrolytic, 10 uF, 50V	023–1076	2
C5, C6	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003–1054	2
C7 thru C17	Capacitor, Ceramic, 100 pF, 100V, ±2%	003–1063	11
D1	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203–4148	1
D2 thru D23	Bidirectional Zener Voltage Suppressor, +/–15 V, P6KE15CA–RL	201–0015	22
FL1 thru FL22	Filter, EMI 10,000 pF 3–Pin	411–0001	22
J1	Receptacle, Right Angle Printed Circuit Mount, 25–Pin D Type	417–1252	1

TABLE 6-35. N+1 OPTION BOARD CIRCUIT BOARD ASSEMBLY - 919-0361
(Sheet 2 of 2)

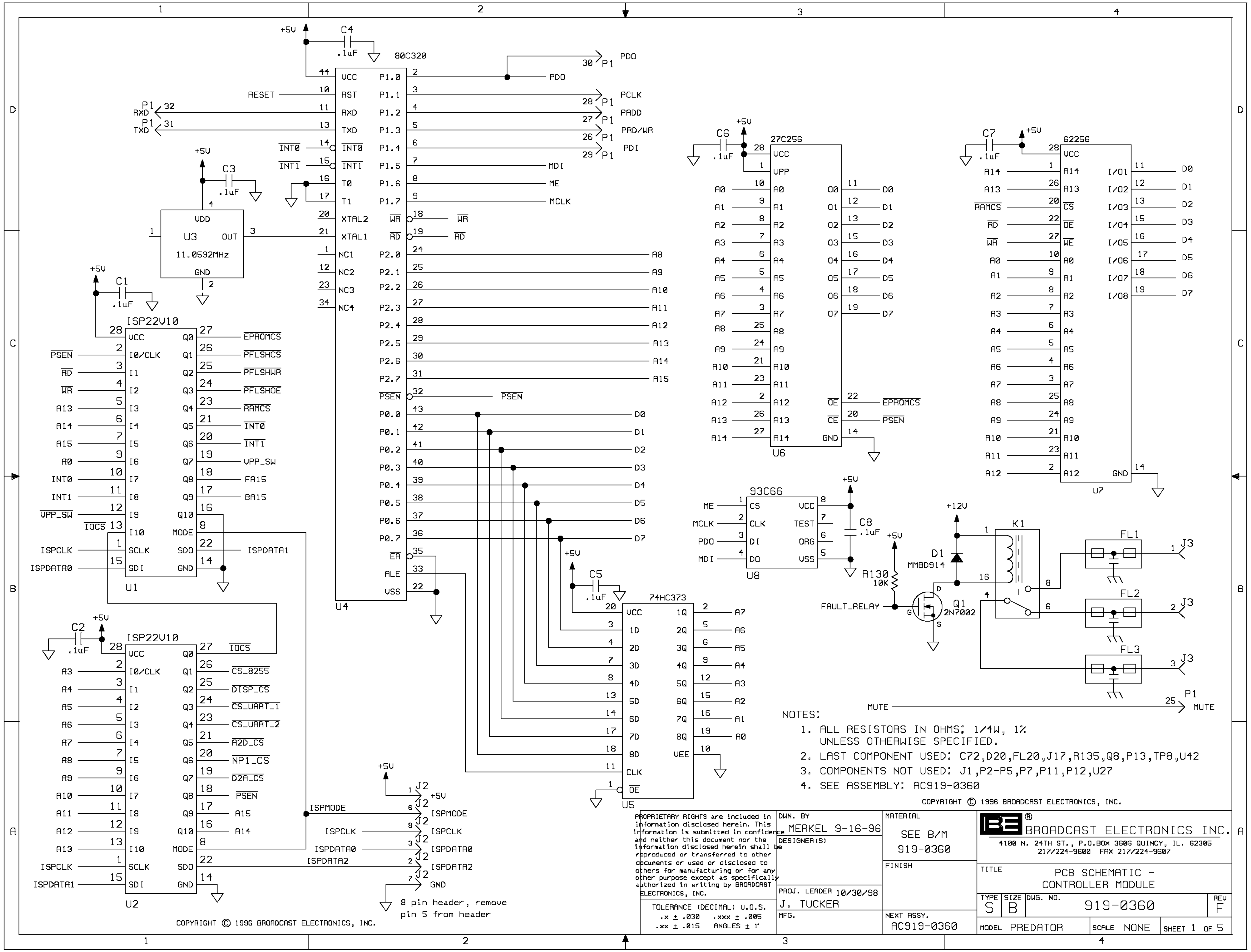
REF. DES.	DESCRIPTION	PART NO.	QTY.
J3	Receptacle, Male, 20–Pin In–Line	417–0200	1
R1 thru R11	Resistor, 221 Ohm ±1%, 1/4W	103–2213	11
R12 thru R22	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	11
R23	Resistor, 2.21 k Ohm ±1%, 1/4W	103–2241	1
R24	Resistor, 10 k Ohm ±1%, 1/4W	100–1051	1
R25 thru R35	Resistor, 3.3 Meg Ohm ±5%, 1/4W	100–3373	11
R36	Resistor, 221 Ohm ±1%, 1/4W	103–2213	1
U1, U2	Integrated Circuit, ISPGAL22V10C–7LJ, 28–Pin PLCC Package	229–2210–001	2
U3, U4	Integrated Circuit, 74HC273, 8–Bit, D–Type Latch, CMOS, 20–Pin Plastic DIP Pkg., –40 degrees C to + 85 degrees C	220–0273	2
U5 thru U7	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	3
U9 thru U16	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6–Pin DIP	229–0033	8
XU1, XU2	Socket, 28–Pin PLCC	417–2801	1
XU3, XU4	Socket, 20–Pin DIP	417–2004	2
XU5 thru XU7, XU9 thru XU16	Socket, 6–Pin DIP	417–0600	11
----	Blank, N+1 Option Board Circuit Board	519–0361	1

SECTION VII
DRAWINGS

7-1. INTRODUCTION.

7-2. This section provides assembly drawings and schematic diagrams as indexed below for the PREDATOR digital FM exciter.

FIGURE	TITLE	NUMBER
7-1	SCHEMATIC DIAGRAM, CONTROLLER MODULE	SB919-0360
7-2	ASSEMBLY DIAGRAM, CONTROLLER MODULE	AC919-0360
7-3	SCHEMATIC DIAGRAM, ANALOG INTERFACE MODULE	SB919-0355-001
7-4	ASSEMBLY DIAGRAM, ANALOG INTERFACE MODULE	AC919-0355-001
7-5	OVERALL BLOCK DIAGRAM, DIGITAL EXCITER MODULE	SD959-0356
7-6	SCHEMATIC DIAGRAM, DIGITAL EXCITER MODULE	SB919-0356
7-7	ASSEMBLY DIAGRAM, DIGITAL EXCITER MODULE	AC919-0356
7-8	SCHEMATIC DIAGRAM, DIGITAL EXCITER DISPLAY CIRCUIT BOARD	SB919-0357
7-9	ASSEMBLY DIAGRAM, DIGITAL EXCITER DISPLAY CIRCUIT BOARD	AB919-0357
7-10	SCHEMATIC DIAGRAM, DIGITAL EXCITER VCO CIRCUIT BOARD	SB919-0377
7-11	ASSEMBLY DIAGRAM, DIGITAL EXCITER VCO CIRCUIT BOARD	AC919-0377
7-12	OVERALL BLOCK DIAGRAM, DIGITAL STEREO GENERATOR MODULE	SB959-0350
7-13	SCHEMATIC DIAGRAM, DIGITAL STEREO GENERATOR MODULE	SB919-0350-001 /-002
7-14	ASSEMBLY DIAGRAM, DIGITAL STEREO GENERATOR MODULE	AC919-0350-001 /-002
7-15	SCHEMATIC DIAGRAM, DIGITAL STEREO GENERATOR DISPLAY CIRCUIT BOARD	SC919-0353
7-16	ASSEMBLY DIAGRAM, DIGITAL STEREO GENERATOR DISPLAY CIRCUIT BOARD	AB919-0353
7-17	OVERALL BLOCK DIAGRAM, POWER SUPPLY/RF AMPLIFIER MODULE, 50W	SD959-0354-050
7-18	SCHEMATIC DIAGRAM, POWER SUPPLY CIRCUIT BOARD, 50W	SB919-0354-050
7-19	ASSEMBLY DIAGRAM, POWER SUPPLY CIRCUIT BOARD, 50W	AC919-0354-050
7-20	OVERALL BLOCK DIAGRAM, 50W POWER AMPLIFIER MODULE	SB959-0363
7-21	SCHEMATIC DIAGRAM, 50W POWER AMPLIFIER CIRCUIT BOARD	SD919-0363
7-22	ASSEMBLY DIAGRAM, 50W POWER AMPLIFIER CIRCUIT BOARD	AC919-0363


80C320
U4
ISP22V10
U1
U2
U3
11.0592MHz
27C256
U6
62256
U7
93C66
U8
74HC373
U5
K1
D1
MMBD914
Q1
2N7002
R130
10K
FL1
FL2
FL3
J2
J3
P1
8 pin header, remove
pin 5 from header
NOTES:
1. ALL RESISTORS IN OHMS; 1/4W, 1%
UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C72,D20,FL20,J17,R135,Q8,P13,TP8,U42
3. COMPONENTS NOT USED: J1,P2-P5,P7,P11,P12,U27
4. SEE ASSEMBLY: AC919-0360
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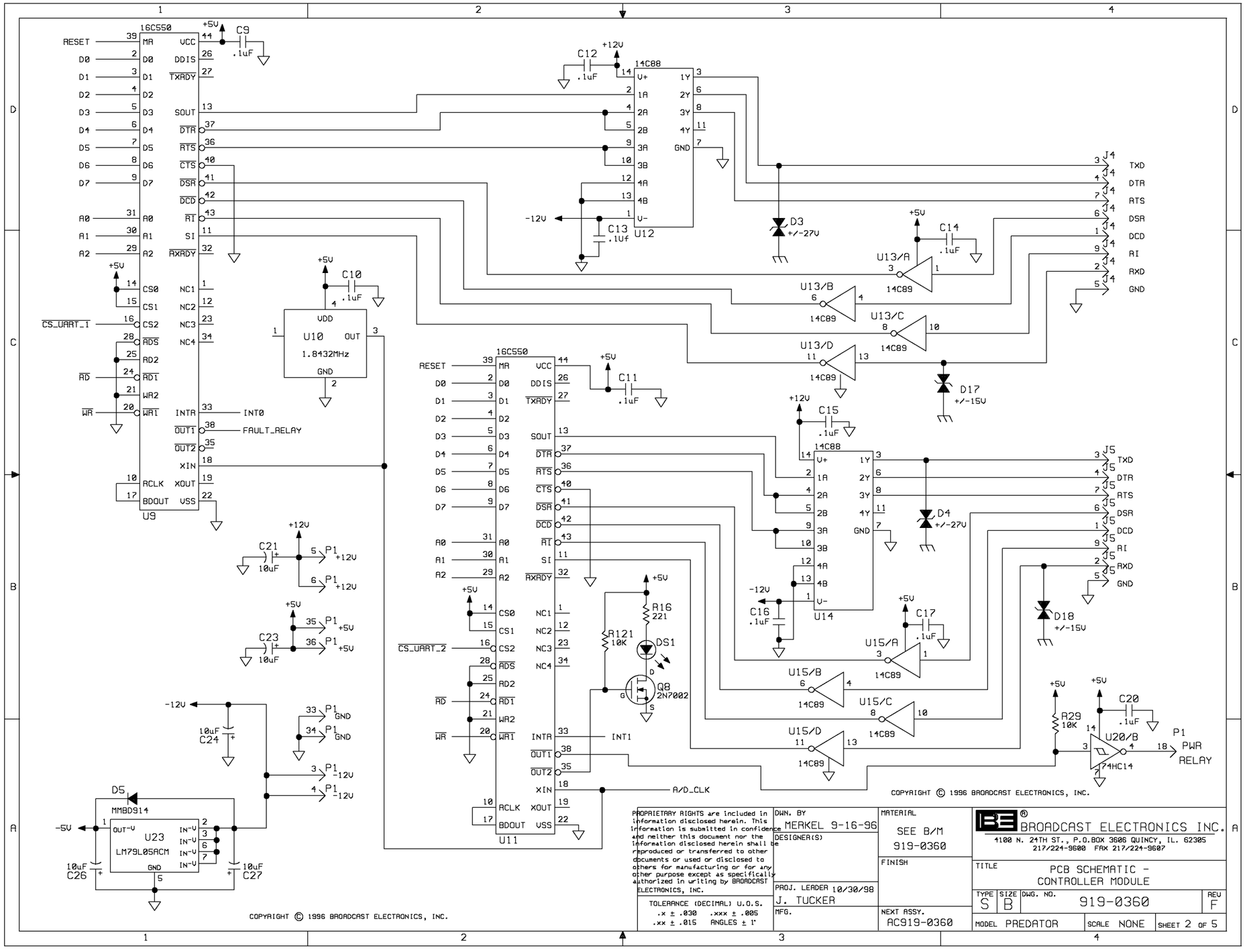
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY MERKEL 9-16-96
DESIGNER(S)
PROJ. LEADER 10/30/98
J. TUCKER
MFG.
MATERIAL
SEE B/M
919-0360
FINISH
NEXT ASSY.
AC919-0360
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE
PCB SCHEMATIC -
CONTROLLER MODULE
TYPE S SIZE B DWG. NO. 919-0360 REV F
MODEL PREDATOR SCALE NONE SHEET 1 OF 5



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

DWN. BY	MERKEL 9-16-96
DESIGNER(S)	
PROJ. LEADER	10/30/98 J. TUCKER
MFG.	
MATERIAL	SEE B/M 919-0360
FINISH	
NEXT ASSY.	AC919-0360

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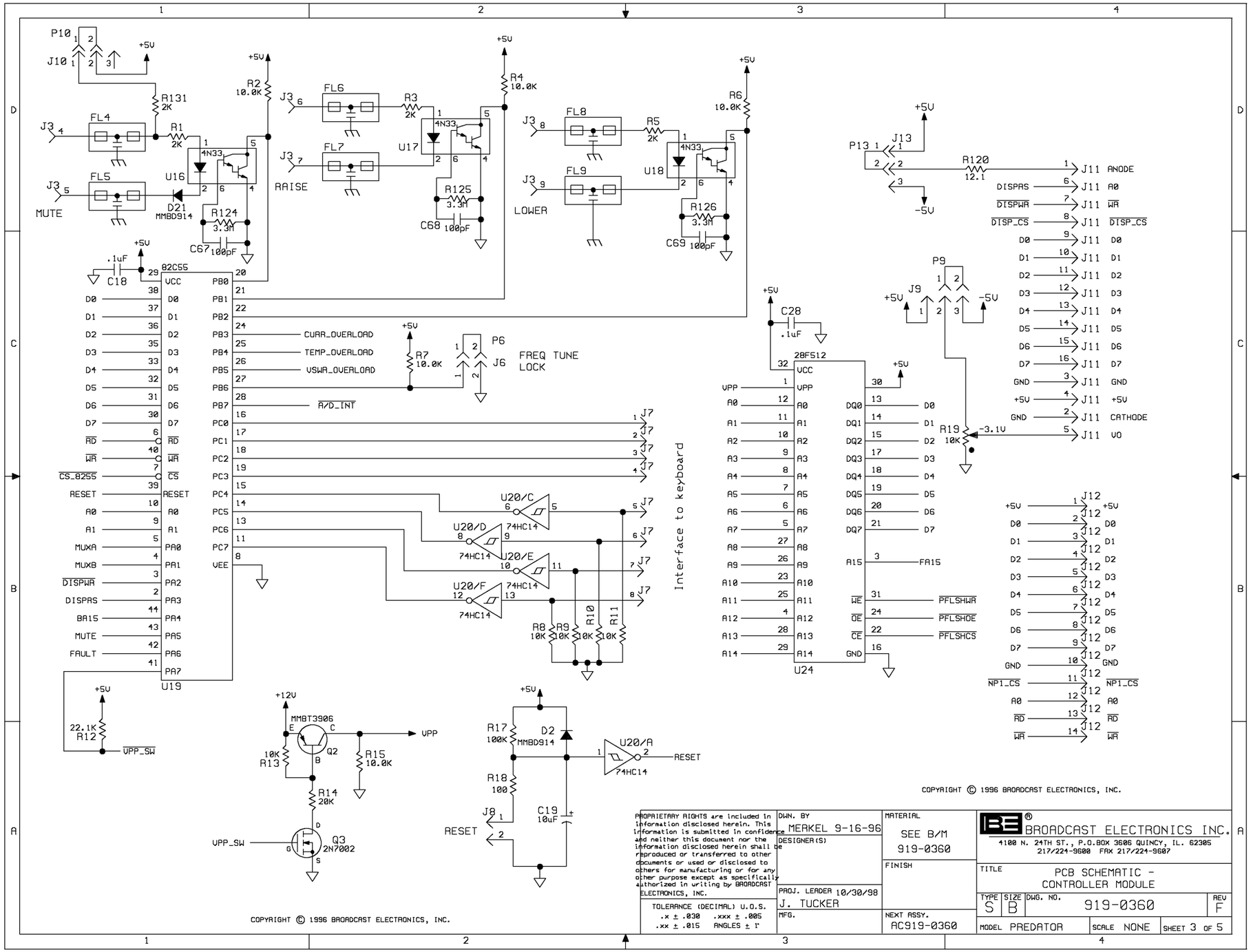
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE	PCB SCHEMATIC - CONTROLLER MODULE		
TYPE S	SIZE B	DWG. NO. 919-0360	REV F
MODEL PREDATOR	SCALE NONE	SHEET 2 OF 5	



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

DWN. BY	MERKEL 9-16-96
DESIGNER(S)	
PROJ. LEADER	10/30/98 J. TUCKER
MFG.	
MATERIAL	SEE B/M 919-0360
FINISH	
NEXT ASSY.	AC919-0360

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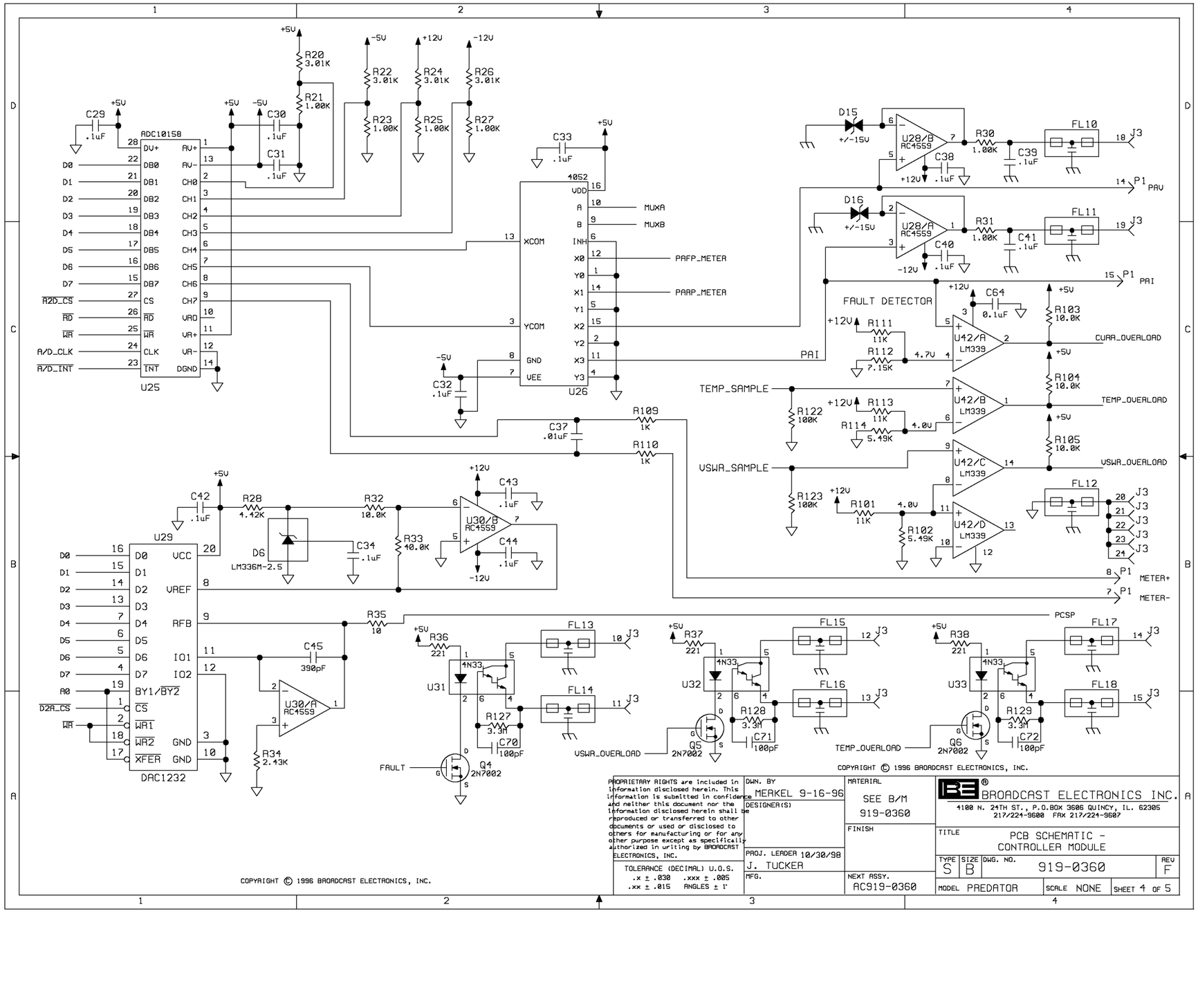
217/224-9600 FAX 217/224-9607

TITLE: PCB SCHEMATIC - CONTROLLER MODULE

TYPE	SIZE	DWG. NO.	REV
S	B	919-0360	F

MODEL PREDATOR | SCALE NONE | SHEET 3 OF 5



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

DWN. BY MERKEL 9-16-96
DESIGNER(S)
PROJ. LEADER 10/30/98 J. TUCKER
MFG.

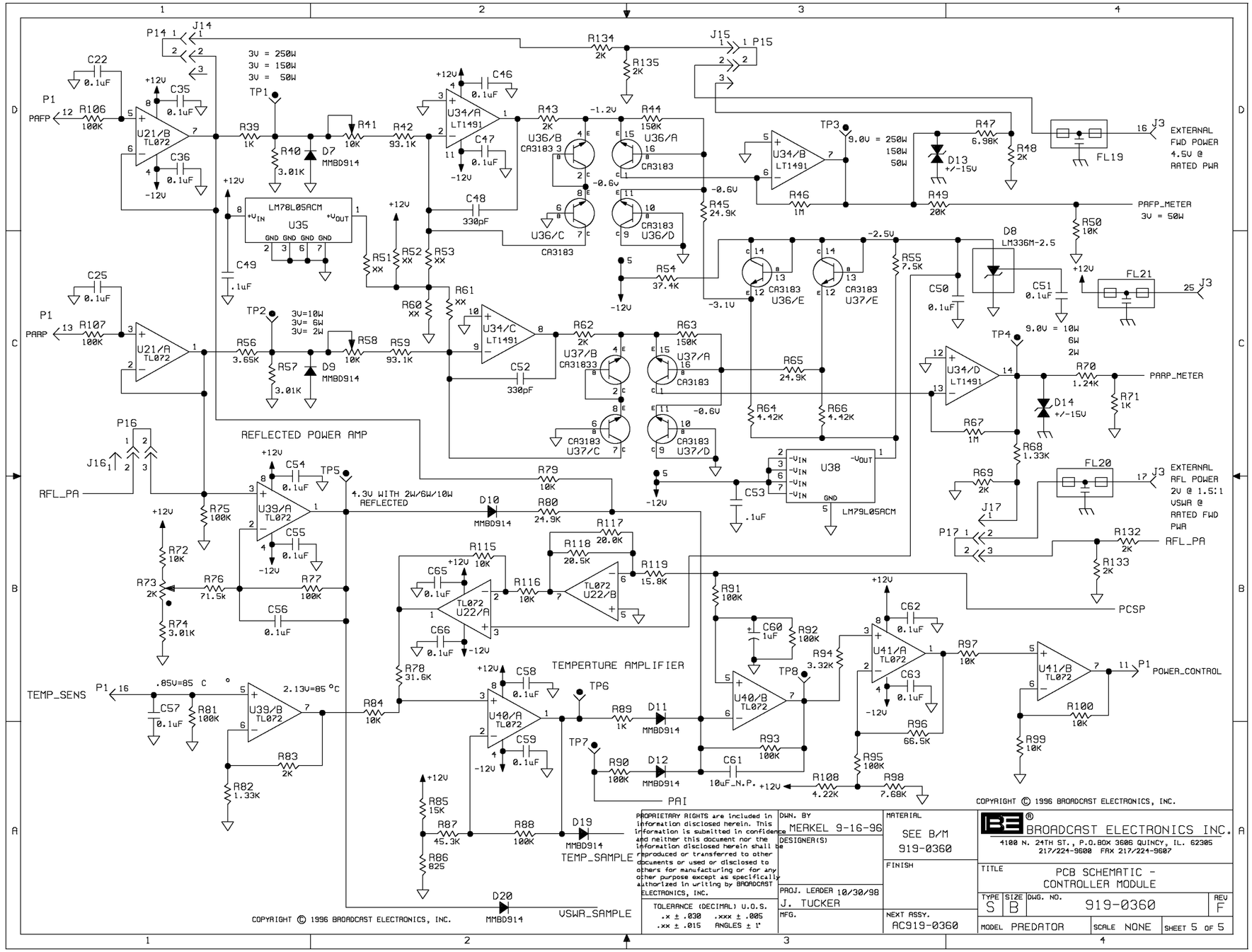
MATERIAL SEE B/M 919-0360
FINISH
NEXT ASSY. AC919-0360

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

TITLE PCB SCHEMATIC - CONTROLLER MODULE

TYPE	SIZE	DWG. NO.	REV
S	B	919-0360	F

MODEL PREDATOR SCALE NONE SHEET 4 OF 5


REFLECTED POWER AMP
TEMPERTURE AMPLIFIER
3V = 250W
3V = 150W
3V = 50W
3V=10W
3V= 6W
3V= 2W
4.3V WITH 2W/6W/10W REFLECTED
.85V=85 C °
2.13V=85 °C
9.0V = 250W
150W
50W
9.0V = 10W
6W
2W
EXTERNAL FWD POWER 4.5V @ RATED PWR
EXTERNAL RFL POWER 2V @ 1.5:1 VSWR @ RATED FWD PWR
PAFP_METER
3V = 50W
PARP_METER
RFL_PA
PCSP
POWER_CONTROL
TEMP_SENS
TEMP_SAMPLE
VSWR_SAMPLE
PAI
LM78L05ACM
LM79L05ACM
MMBD914
CA3183
TL072
LT1491
LM336M-2.5
10uF_N.P.
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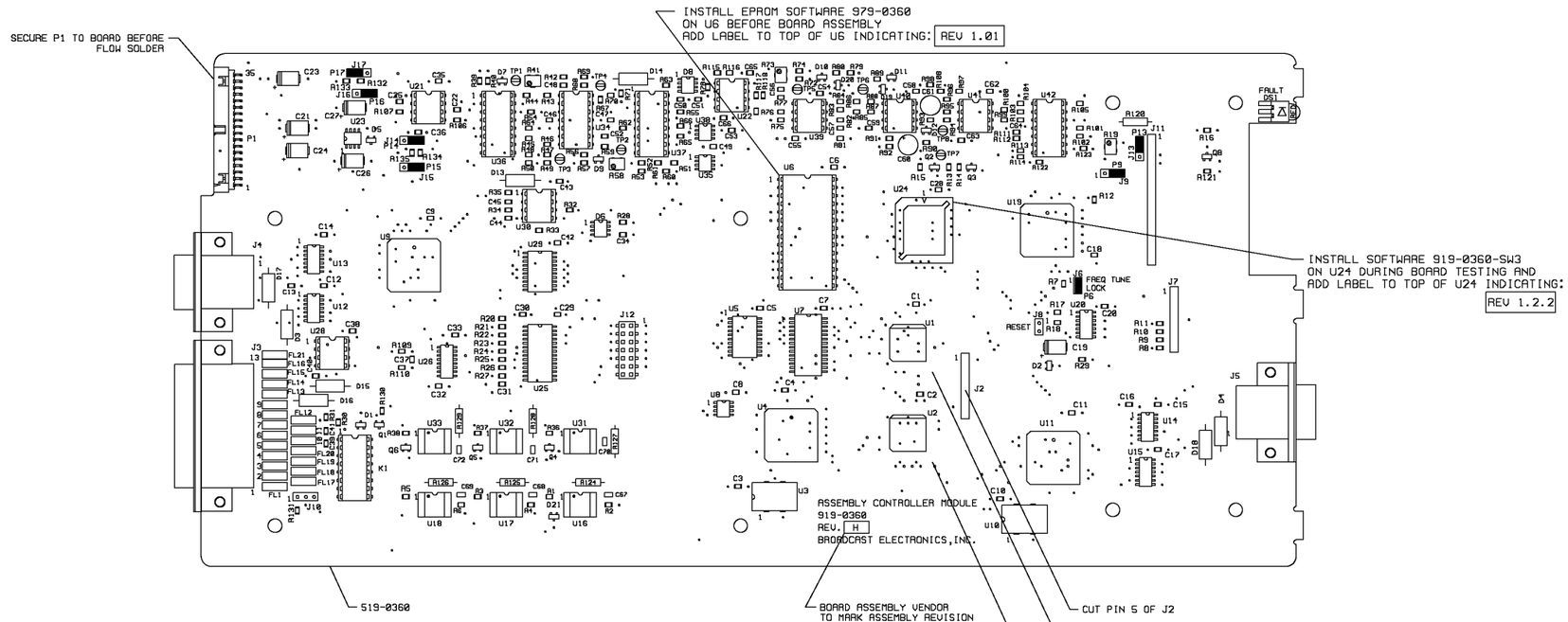
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°
DWN. BY MERKEL 9-16-96
DESIGNER(S)
PROJ. LEADER 10/30/98
J. TUCKER
MFG.
MATERIAL SEE B/M 919-0360
FINISH
NEXT ASSY. AC919-0360
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE PCB SCHEMATIC - CONTROLLER MODULE
TYPE S SIZE B DWG. NO. 919-0360 REV F
MODEL PREDATOR SCALE NONE SHEET 5 OF 5



NOTES:

1. SEE SCHEMATIC SB919-0360.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY M.MERKEL 4-4-96
DESIGNER(S)
PROJ. LEADER JIM TUCKER 5/28/98
MFG.

MATERIAL SEE B/M 919-0360
FINISH
NEXT ASSY.

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

TITLE PCB ASSEMBLY - CONTROLLER MODULE

TYPE	SIZE	DWG No.	REV
A	C	919-0360	H

MODEL PREDATOR SCALE 1/1 SHEET 1 OF 1

REVISIONS		
REV	DATE	DESCRIPTION
1	5-5-97	PROTOTYPE RELEASE.
2	6-12-98	PROTOTYPE CHANGES.
3	9-23-98	CHGD VALUE OF R20,R45 & R46: MODEL BUILD
A	11-24-98	ADDED NOTES; ENGINEERING RELEASE.
B	1-27-99	SEE SHEET 2.
C	3-29-99	SEE SHEET 2.

BALANCED MONO INPUT
+10 dBm
(SEE CHART)

3.464 VPK @ 400 HZ

PRE-EMPHASIS SELECT		
	P2	P3
NONE	-	-
25uS	X	-
50uS	-	X
75uS	X	X

3.250 VPK @ 100 HZ 2.3V RMS

MONO LEVEL ADJUST

FACTORY SETTING ->

BALANCED MONO INPUT	
INPUT (dBm)	R17 Value
+10	NONE
+8	39.2k
+4	10.0k
0	4.75k

BALANCED COMPOSITE INPUT
3.5 Vp-p
(SEE CHART)

1.75 VPK @ 400 HZ

1.75 VPK @ 100 HZ 1.24V RMS

COMPOSITE LEVEL ADJUST

FACTORY SETTING ->

BALANCED COMPOSITE INPUT			
INPUT Vp-p	INPUT dBV*	AMP GAIN	R42 Value
11.07	+14.06	+10 dB	NONE
8.79	+12.06	+8 dB	12.1k
7.00	+10.06	+6 dB	5.36k
5.55	+8.06	+4 dB	3.16k
4.41	+6.06	+2 dB	2.10k
3.50	+4.06	0 dB	1.47k
2.78	+2.06	-2 dB	1.05k
2.21	+0.06	-4 dB	787
1.75	-1.94	-6 dB	590
1.39	-3.94	-8 dB	433
1.11	-5.94	-10 dB	348
* 0 dBV = 0.7746V			

SCA 1 INPUT (UNBALANCED) 3.5Vp-p

SCA 2 INPUT (UNBALANCED) 3.5Vp-p

RBDS INPUT (UNBALANCED) 3.5Vp-p

1.75 VPK @ 63 KHZ

SCA/WB INPUT SEL

P8 *

J8

2 INPUT_SIGNALS

NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C117, D17, FL7, J105, L9, P100, Q1, R114, T2, TP23, U19
3. COMPONENTS NOT USED: C68,J9-100, P5, P8-99, R49,R51,R53,R56-R58,TP3,C115,C116,D8,D10,L5,L8
4. SEE ASSEMBLY: AC919-0355
5. * TO ENABLE SCA/RBDS INPUTS, PLACE PLUG P8 ON PINS 1 & 2 OF J8.

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

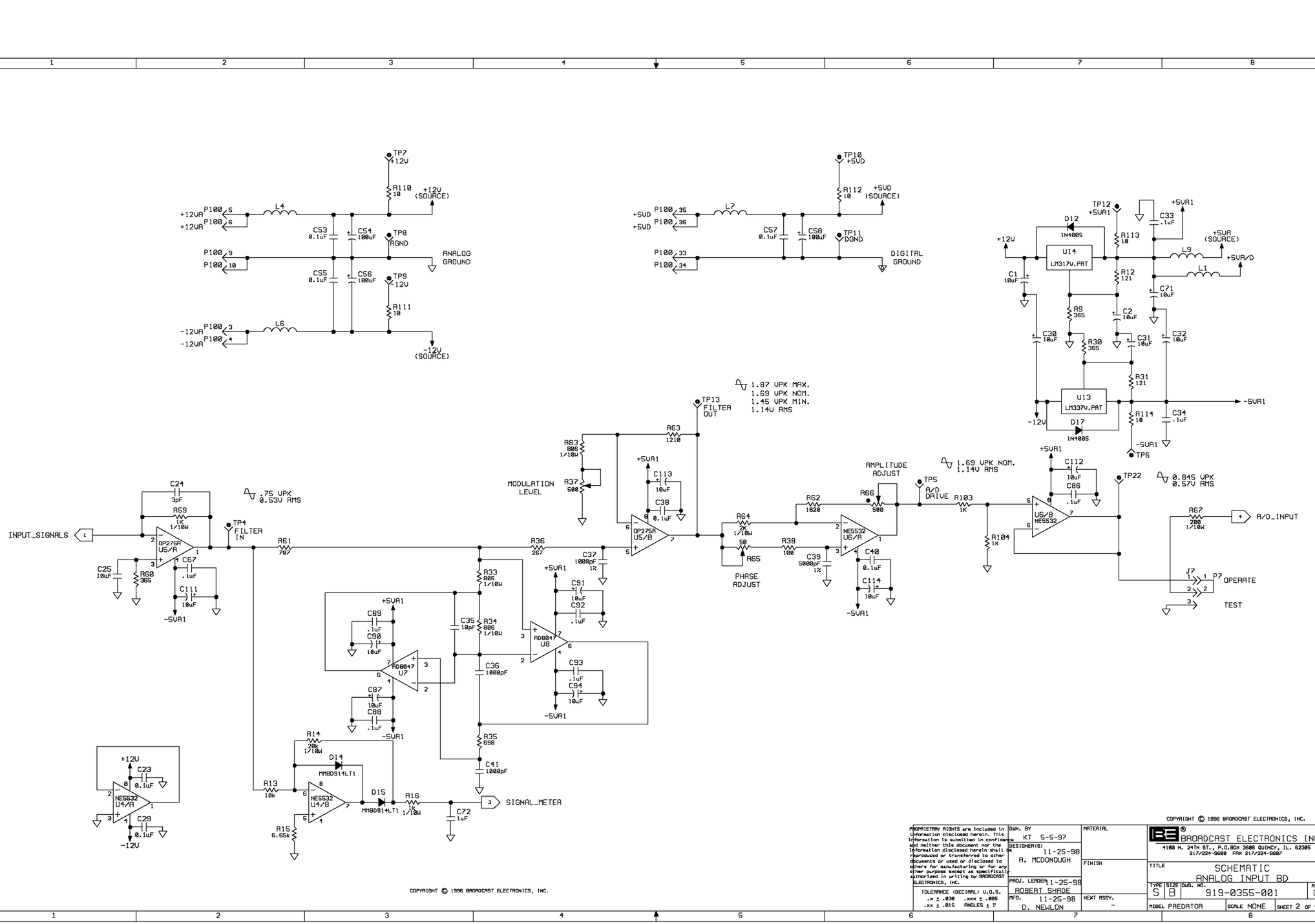
DWN. BY	KT 5-5-97
DESIGNER(S)	11-25-98 A. MCDONOUGH
PROJ. LEADER	11-25-98 ROBERT SHADE
MFG.	11-25-98 D. NEWLON
MATERIAL	
FINISH	
NEXT ASSY.	-

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

TITLE: SCHEMATIC ANALOG INPUT BD

TYPE	SIZE	DWG. NO.	REV
S	B	919-0355-001	C

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 4



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

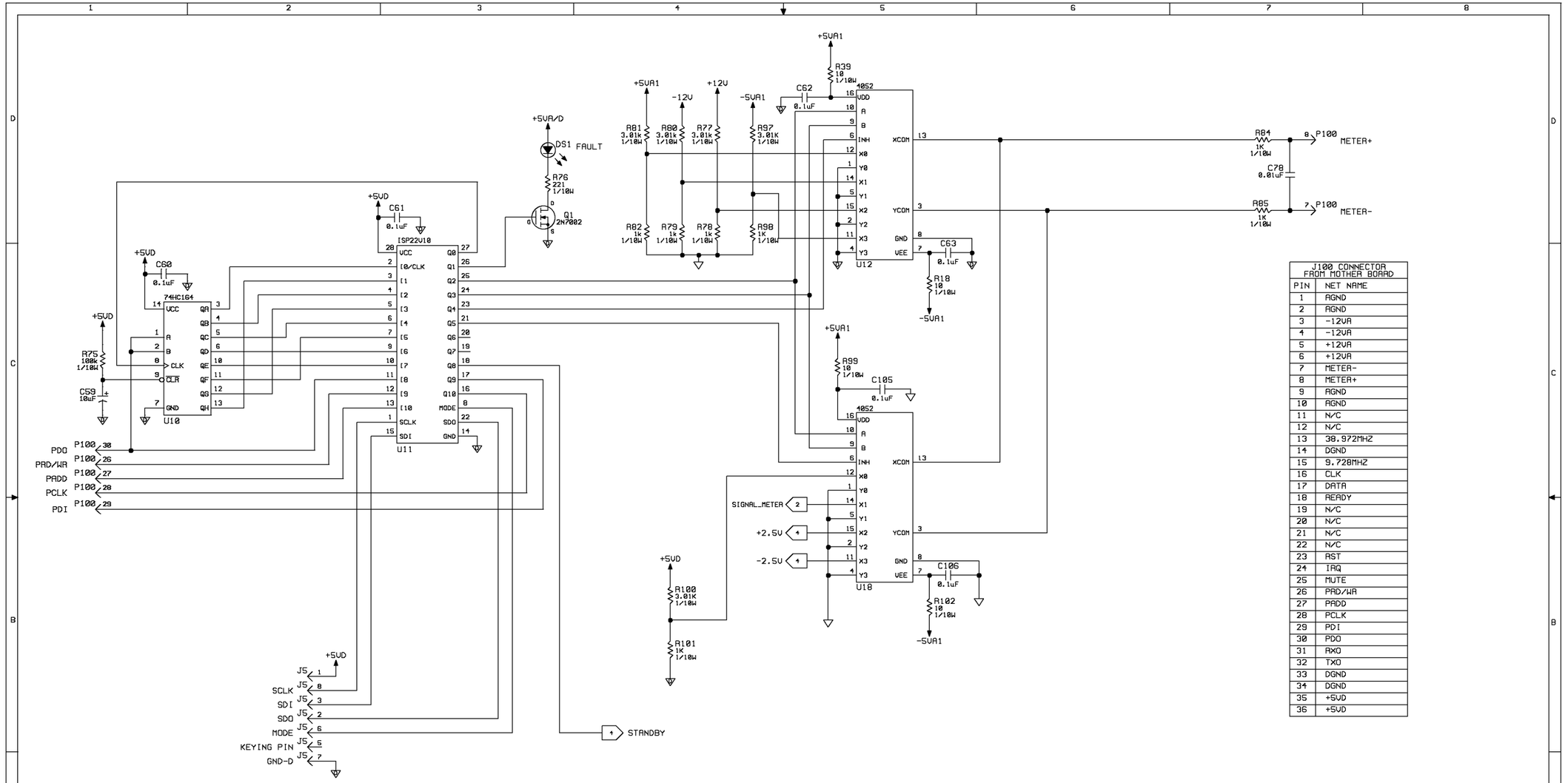
DWN. BY	KT 5-5-97
DESIGNER(S)	11-25-98 A. MCDONOUGH
PROJ. LEADER	1-25-98 ROBERT SHADE
MFG.	11-25-98 D. NEWLON
MATERIAL	
FINISH	
NEXT ASSY.	-

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

TITLE: SCHEMATIC
ANALOG INPUT BD

TYPE	SIZE	DWG. NO.	REV
S	B	919-0355-001	C

MODEL PREDATOR | SCALE NONE | SHEET 2 OF 4



J100 CONNECTOR FROM MOTHER BOARD	
PIN	NET NAME
1	AGND
2	AGND
3	-12VA
4	-12VA
5	+12VA
6	+12VA
7	METER-
8	METER+
9	AGND
10	AGND
11	N/C
12	N/C
13	38.972MHZ
14	DGND
15	9.728MHZ
16	CLK
17	DATA
18	READY
19	N/C
20	N/C
21	N/C
22	N/C
23	RST
24	IRQ
25	MUTE
26	PRD/WR
27	PADD
28	PCLK
29	PDI
30	PDO
31	RXD
32	TXD
33	DGND
34	DGND
35	+5VD
36	+5VD

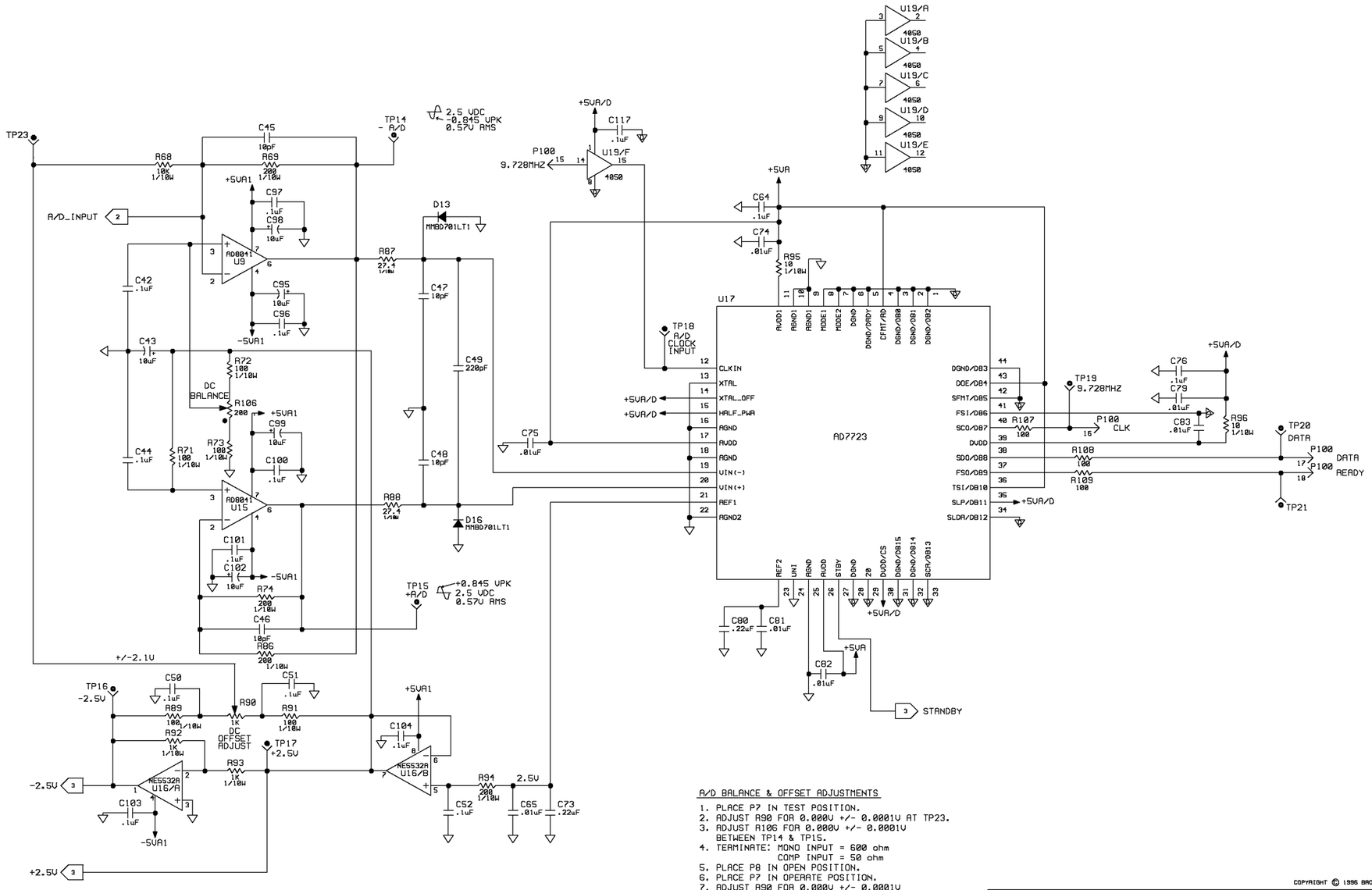
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1

DWN. BY KT 5-5-97
DESIGNER(S) 11-25-98 A. MCDONOUGH
PROJ. LEADER 11-25-98 ROBERT SHADE
MFG. 11-25-98 D. NEWLON

MATERIAL
FINISH
NEXT ASSY. -

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

TITLE SCHEMATIC ANALOG INPUT BD
TYPE S SIZE B DWG. NO. 919-0355-001 REV C
MODEL PREDATOR SCALE NONE SHEET 3 OF 4



A/D BALANCE & OFFSET ADJUSTMENTS

1. PLACE P7 IN TEST POSITION.
2. ADJUST R90 FOR 0.000V +/- 0.0001V AT TP23.
3. ADJUST R106 FOR 0.000V +/- 0.0001V BETWEEN TP14 & TP15.
4. TERMINATE: MONO INPUT = 600 ohm
   COMP INPUT = 50 ohm
5. PLACE P8 IN OPEN POSITION.
6. PLACE P7 IN OPERATE POSITION.
7. ADJUST R90 FOR 0.000V +/- 0.0001V BETWEEN TP14 & TP15.

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

DWN. BY KT 5-5-97
DESIGNER(S) 11-25-98 R. MCDONOUGH
PROJ. LEADER 11-25-98 ROBERT SHADE
MFG. 11-25-98 D. NEWLON
MATERIAL
FINISH
NEXT ASSY.

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

TITLE SCHEMATIC ANALOG INPUT BD
TYPE S SIZE B DWG. NO. 919-0355-001 REV C
MODEL PREDATOR SCALE NONE SHEET 1 OF 1

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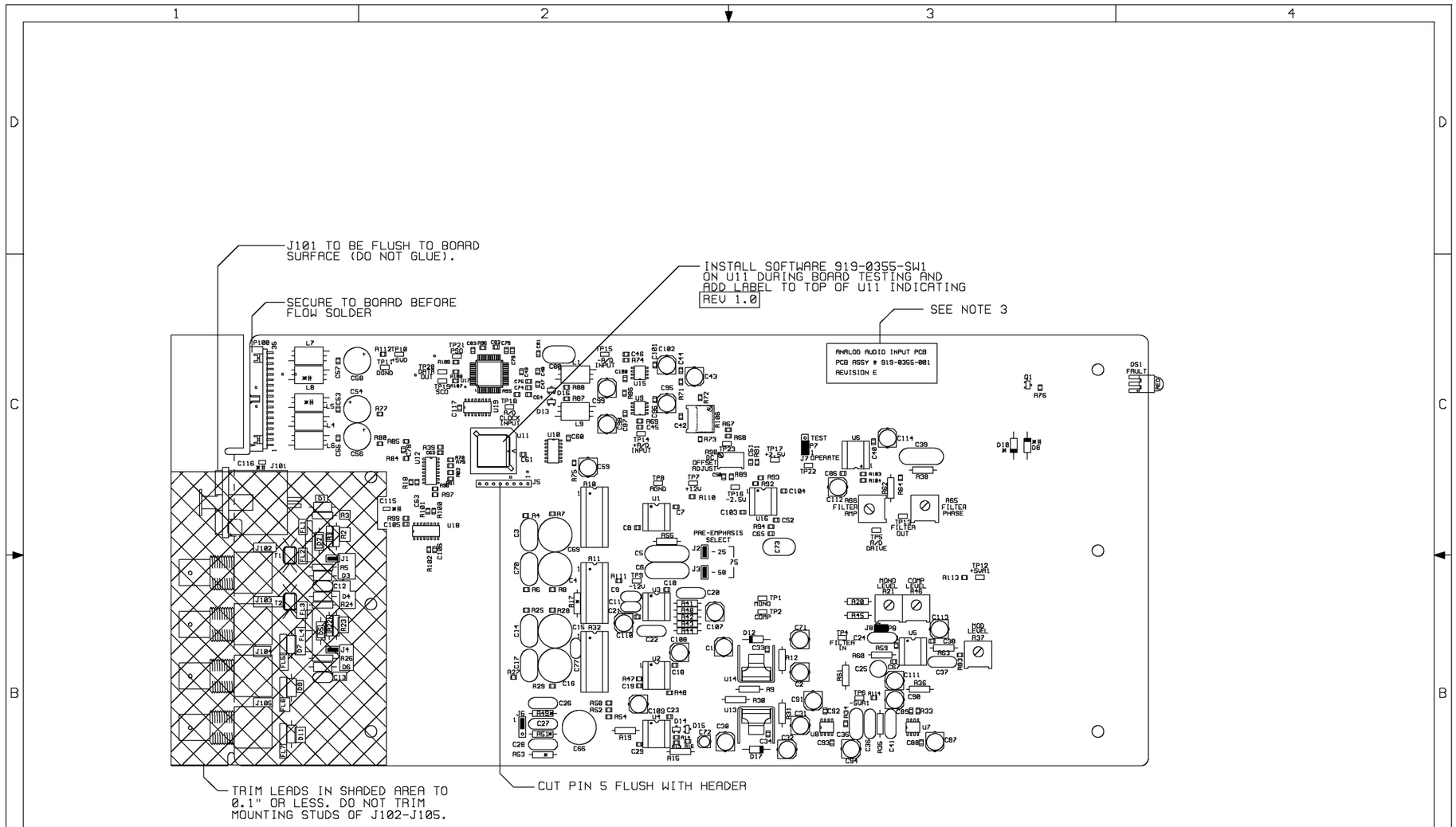


NOTES:

1) * INDICATES PARTS NOT INSTALLED: (C115,C116,D8,D10,L5,L8,R49,R51,R53)
2) SEE SCHEMATIC SB919-0355-001.
3) IN THE BLANK WHITE BOX WRITE THE REV. LETTER THAT APPEARS WITHIN THE REV. BLOCK OF THE CURRENT ASSEMBLY DWG.
4) # INDICATES TO INSTALL 22AGW BUSS WIRE IN PLACE OF COMPONENT. (C115,C116,D8,L5 & L8)

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY	KT 5-5-97
DESIGNER(S)	R. McDONOUGH 11/25/98
PROJ. LEADER	11/25/98 ROBERT J. SHADE
MFG.	11/25/98 D. NEWLON
MATERIAL	SEE BOM 919-0355-001
FINISH	
NEXT ASSY.	

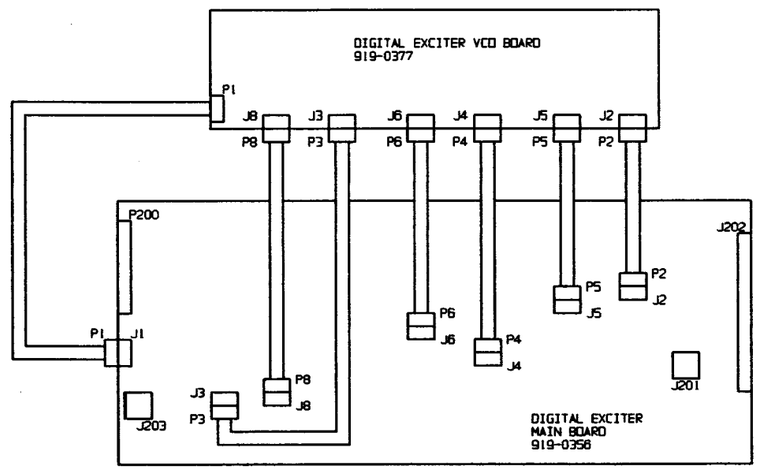
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. P.O.BOX 3606 QUINCY,IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: PCB ASSEMBLY ANALOG INPUT BD

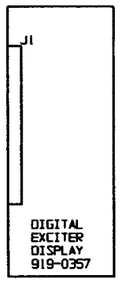
TYPE	SIZE	DWG No.	REV
A	C	919-0355-001	E

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1

WIRING OF P200	
PIN	DESCRIPTION
1	GND
2	GND
3	-12V
4	-12V
5	+12V
6	+12V
7	METER -
8	METER +
9	GND
10	GND
11	N.C.
12	N.C.
13	38.912 MHz
14	CHASSIS GND
15	9.728 MHz
16	AD CLK
17	AD DATA
18	AD RDY
19	N.C.
20	N.C.
21	N.C.
22	N.C.
23	DSG RST
24	N.C.
25	N.C.
26	PRD/WR
27	PADD
28	PCLK
29	N.C.
30	PDD
31	N.C.
32	N.C.
33	CHASSIS GND
34	CHASSIS GND
35	+5VD
36	+5VD



WIRING OF J201 RF OUT	
PIN	DESCRIPTION
1	CONDUCTOR
2	SHIELD



EXCITER BD. J202	DESCRIPTION	DISPLAY BD. J1
1	FAULT LED	1
2	OUT LED 27	2
3	OUT LED 26	3
4	OUT LED 25	4
5	OUT LED 24	5
6	OUT LED 23	6
7	OUT LED 22	7
8	OUT LED 21	8
9	CHASSIS GND	9
10	CHASSIS GND	10
11	OUT LED 19	11
12	OUT LED 18	12
13	OUT LED 17	13
14	OUT LED 16	14
15	OUT LED 15	15
16	OUT LED 14	16
17	OUT LED 13	17
18	X10 LED	18
19	CHASSIS GND	19
20	CHASSIS GND	20
21	OUT LED 9	21
22	OUT LED 8	22
23	OUT LED 7	23
24	OUT LED 6	24
25	OUT LED 5	25
26	OUT LED 4	26
27	OUT LED 3	27
28	OUT LED 1	28
29	+5VD	29
30	CHASSIS GND	30
31	OUT LED 0	31
32	OUT LED 2	32
33	OUT LED 10	33
34	OUT LED 11	34
35	OUT LED 12	35
36	OUT LED 20	36

WIRING OF J203 EXCITER BD.	
PIN	DESCRIPTION
1	EXTERNAL 10 MHz
2	SHIELD

EXCITER BD. J3	DESCRIPTION	VCO BD. J3
1	(CLK) 24.32 MHz	1
2	SHIELD	2

EXCITER BD. J4	DESCRIPTION	VCO BD. J4
1	(VCO1) LO IN	1
2	SHIELD	2

EXCITER BD. J2	DESCRIPTION	VCO BD. J2
1	(VCO2) LO IN	1
2	SHIELD	2

EXCITER BD. J1	DESCRIPTION	P1
1	+12V	1
2	+12V	2

EXCITER BD. J8	DESCRIPTION	VCO BD. J8
1	(CLK) DD	1
2	SHIELD	2

EXCITER BD. J6	DESCRIPTION	VCO BD. J6
1	(VCO1) DD	1
2	SHIELD	2

EXCITER BD. J5	DESCRIPTION	VCO BD. J5
1	(VCO2) DD	1
2	SHIELD	2

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

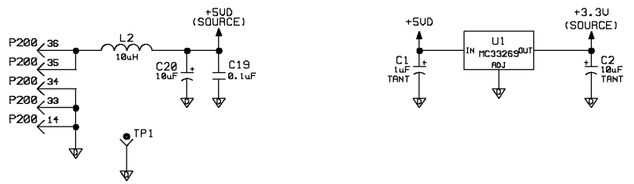
DWN. BY MSE 11-11-98
APPROVED
ENG. LEADER
MFG.
MATERIAL
FINISH
NEXT ASSY.
USED ON

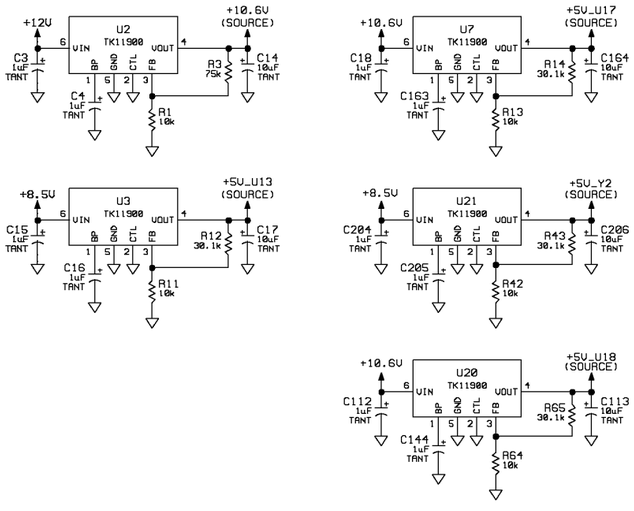
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

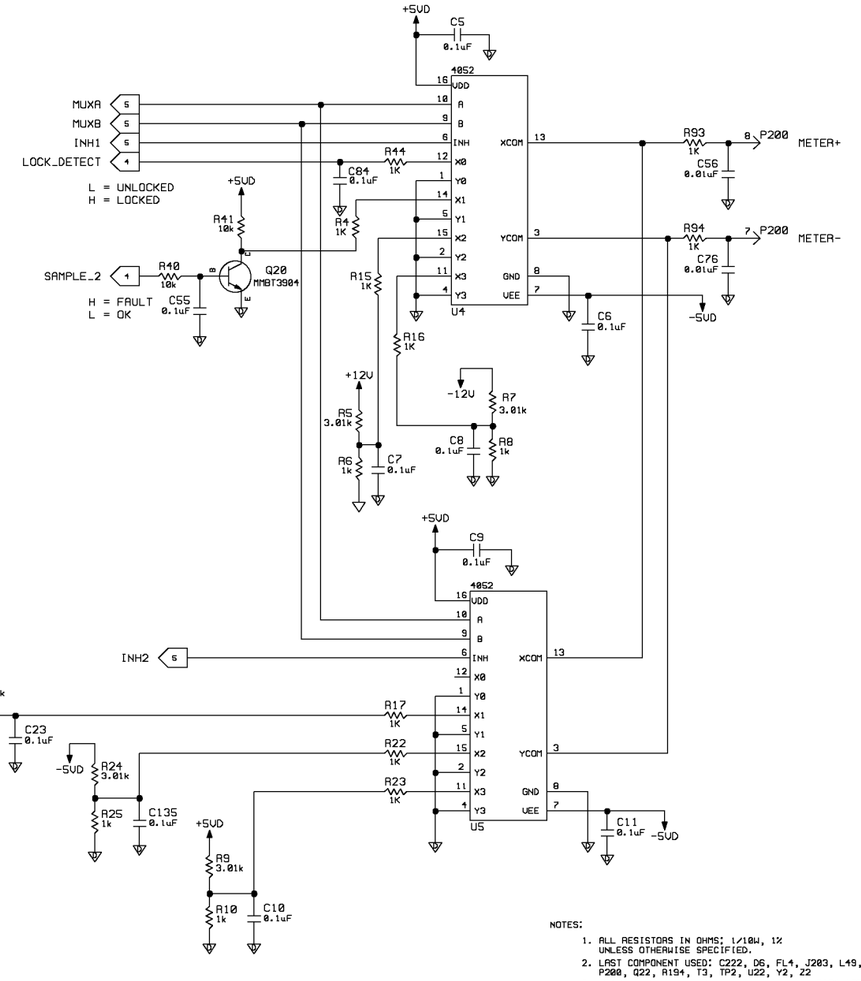
TITLE: BLOCK DIAGRAM, EXCITER, VCO, DISPLAY BOARD

TYPE	SIZE	DWG. NO.	REV
S	D	959-0356	A

MODEL PREDATOR | SCALE NTS | SHEET 1 OF 1







NOTES:

1. ALL RESISTORS IN OHMS; 1/10W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C222, D6, FL4, J203, L49, P200, Q22, R194, T3, TP2, U22, Y2, Z2
3. COMPONENTS NOT USED:C88,C91,C117,C118,C124-126,C128,C136-143,C145-149, C151-152,C159,C162,C165-170,C172-175,C177-185,C188-196,C202,D5,FL2,J7,J9, J12-200,L13,L14,L25-29,L31-33,L37-39,L41-43,P1-9,P12-199,Q2-5,Q9,Q10, Q15-18,26,R27-31,R47,R48,R66,R68,R72-74,R86-88,R125,R131-133,R135-148, R149-155,R170-172,T2,U10,U16,U18,Y1
4. SEE ASSEMBLY: RCS19-0356

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

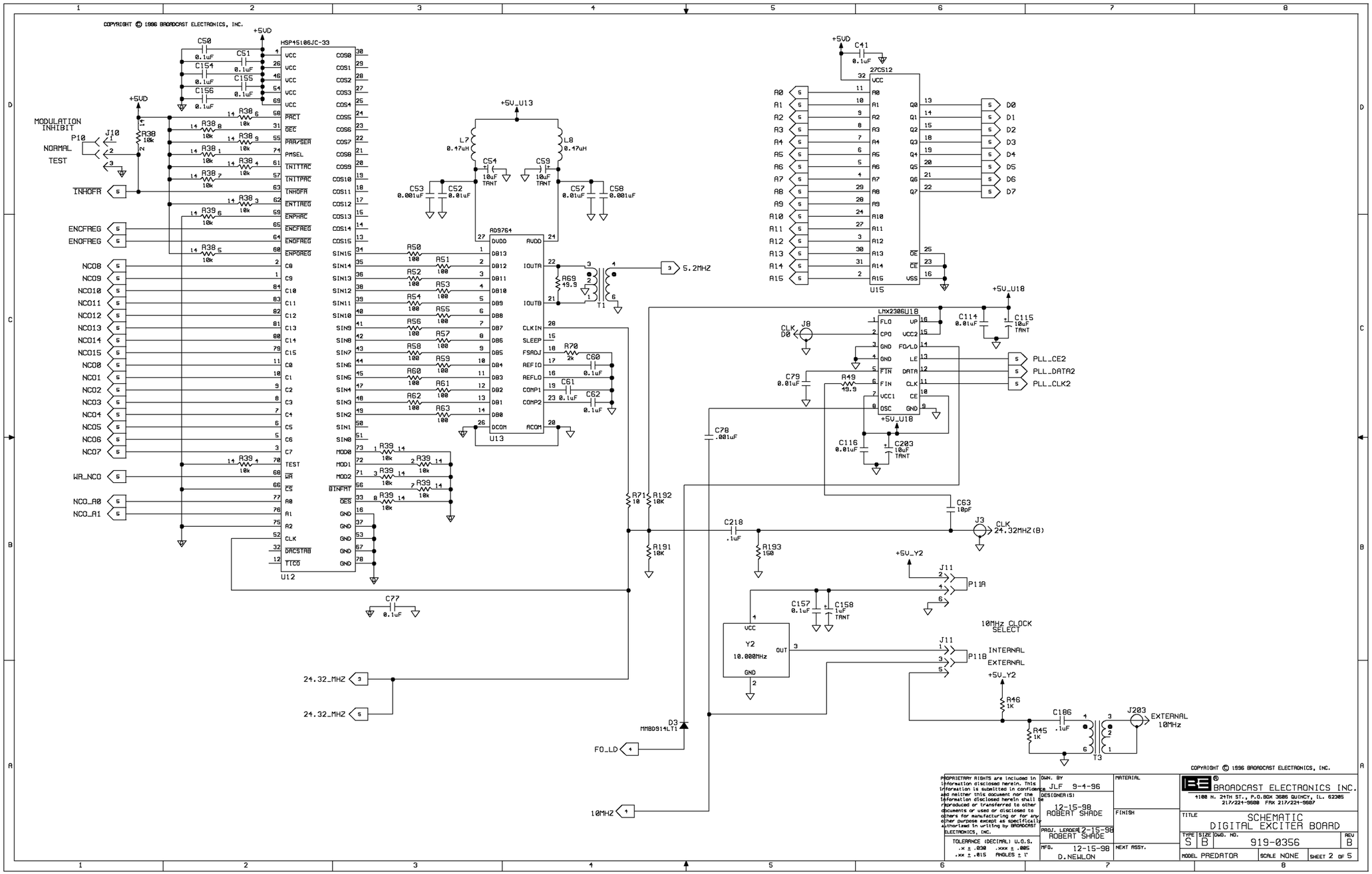
DWN. BY	JLF 9-4-96	MATERIAL
DESIGNER(S)	12-15-98 ROBERT SHADE	FINISH
PROJ. LEADER	2-15-98 ROBERT SHADE	
MFG.	12-15-98 D.NEWLON	NEXT ASSY.

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

TITLE: SCHEMATIC DIGITAL EXCITER BOARD

TYPE	SIZE	DWG. NO.	REV
S	B	919-0356	B

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 5


COPYRIGHT © 1996 BROADCAST ELECTRONICS, INC.
HSP45106JC-33
U12
AD9764
U13
27C512
U15
LMX2306U18
+5VD
+5V_U13
+5V_U18
+5V_Y2
MODULATION INHIBIT
P10
J10
NORMAL
TEST
INHOFR
ENCFREG
ENOFREG
NCO8
NCO9
NCO10
NCO11
NCO12
NCO13
NCO14
NCO15
NCO0
NCO1
NCO2
NCO3
NCO4
NCO5
NCO6
NCO7
WR_NCO
NCO_A0
NCO_A1
24.32_MHZ
FO_LD
10MHZ
5.2MHZ
CLK
D0
J8
PLL_CE2
PLL_DATA2
PLL_CLK2
J3
CLK
24.32MHZ(B)
10MHz CLOCK SELECT
INTERNAL
EXTERNAL
J11
P11A
P11B
J203
EXTERNAL
10MHz
Y2
10.000MHz
D3
MMBD914LT1
T1
T3
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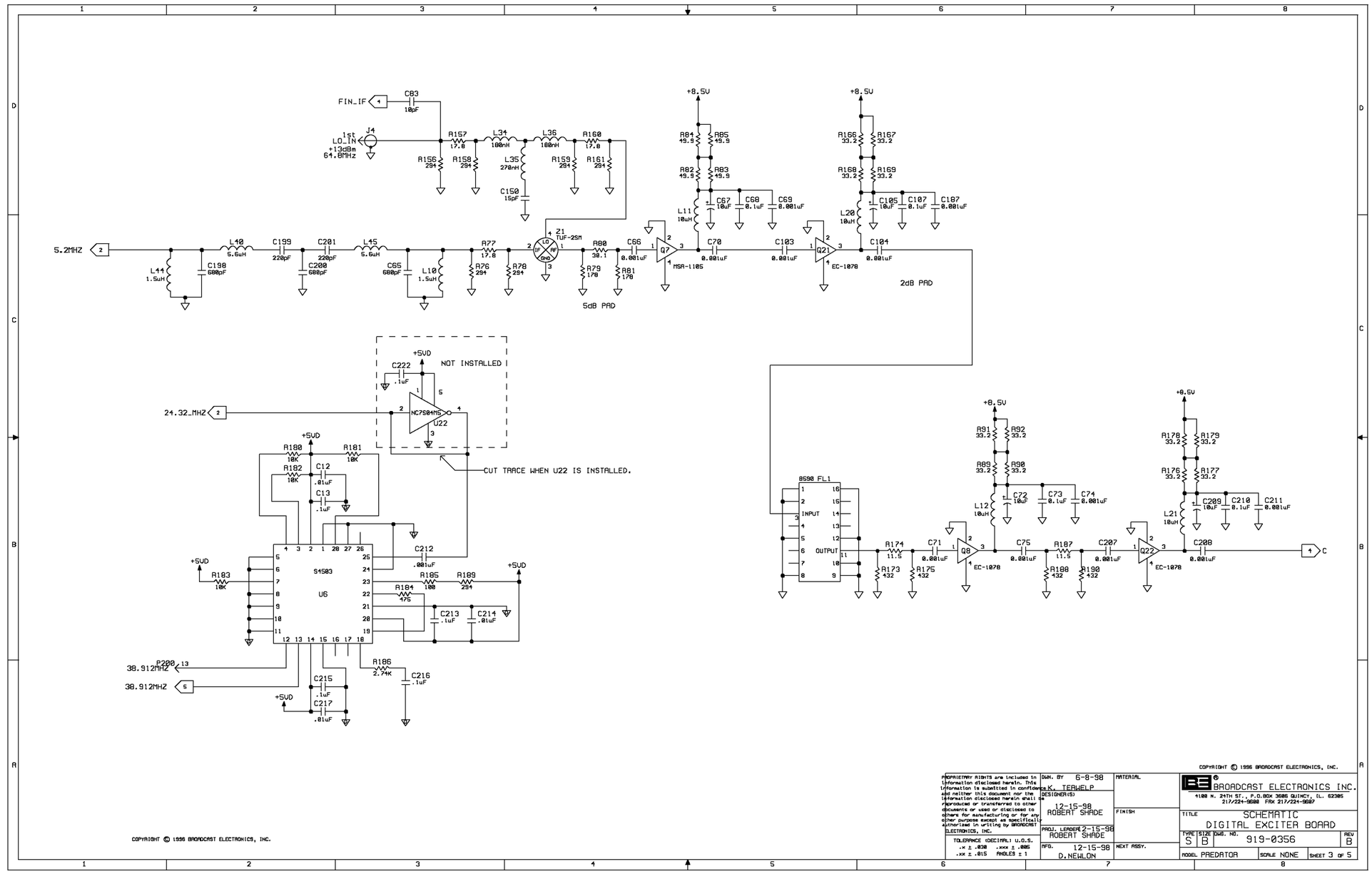
DWN. BY JLF 9-4-96
DESIGNER(S) 12-15-98 ROBERT SHADE
PROJ. LEADER 2-15-98 ROBERT SHADE
MFG. 12-15-98 D.NEWLON
MATERIAL
FINISH
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE SCHEMATIC DIGITAL EXCITER BOARD
TYPE S SIZE B DWG. NO. 919-0356 REV B
MODEL PREDATOR SCALE NONE SHEET 2 OF 5

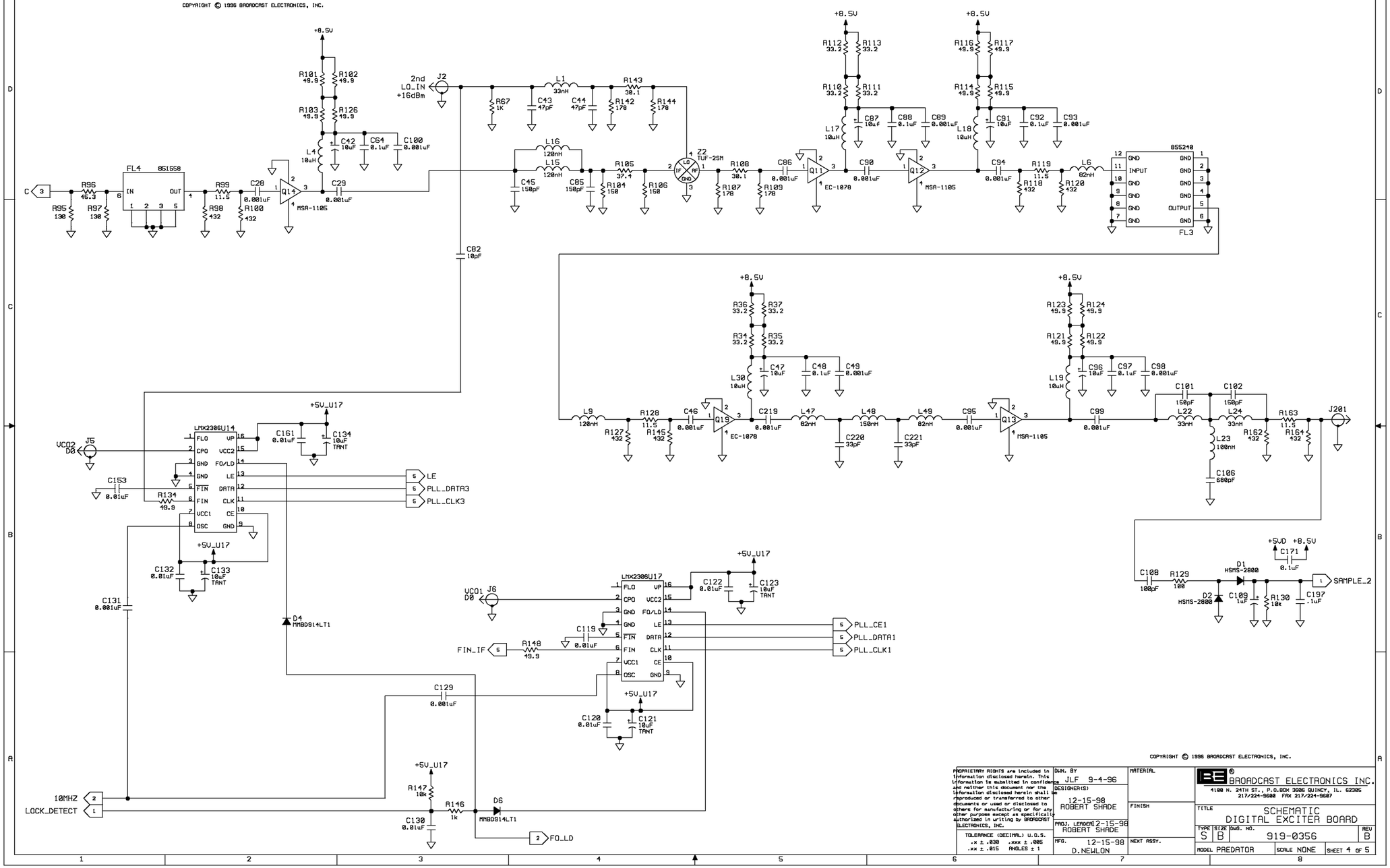


TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1

DWN. BY 6-8-98 K. TEAWELP
DESIGNER(S) 12-15-98 ROBERT SHADE
PROJ. LEADER 2-15-98 ROBERT SHADE
MFG. 12-15-98 D.NEWLON
MATERIAL
FINISH
NEXT ASSY.

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

TITLE SCHEMATIC DIGITAL EXCITER BOARD
TYPE S SIZE B DWG. NO. 919-0356 REV B
MODEL PREDATOR SCALE NONE SHEET 3 OF 5



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

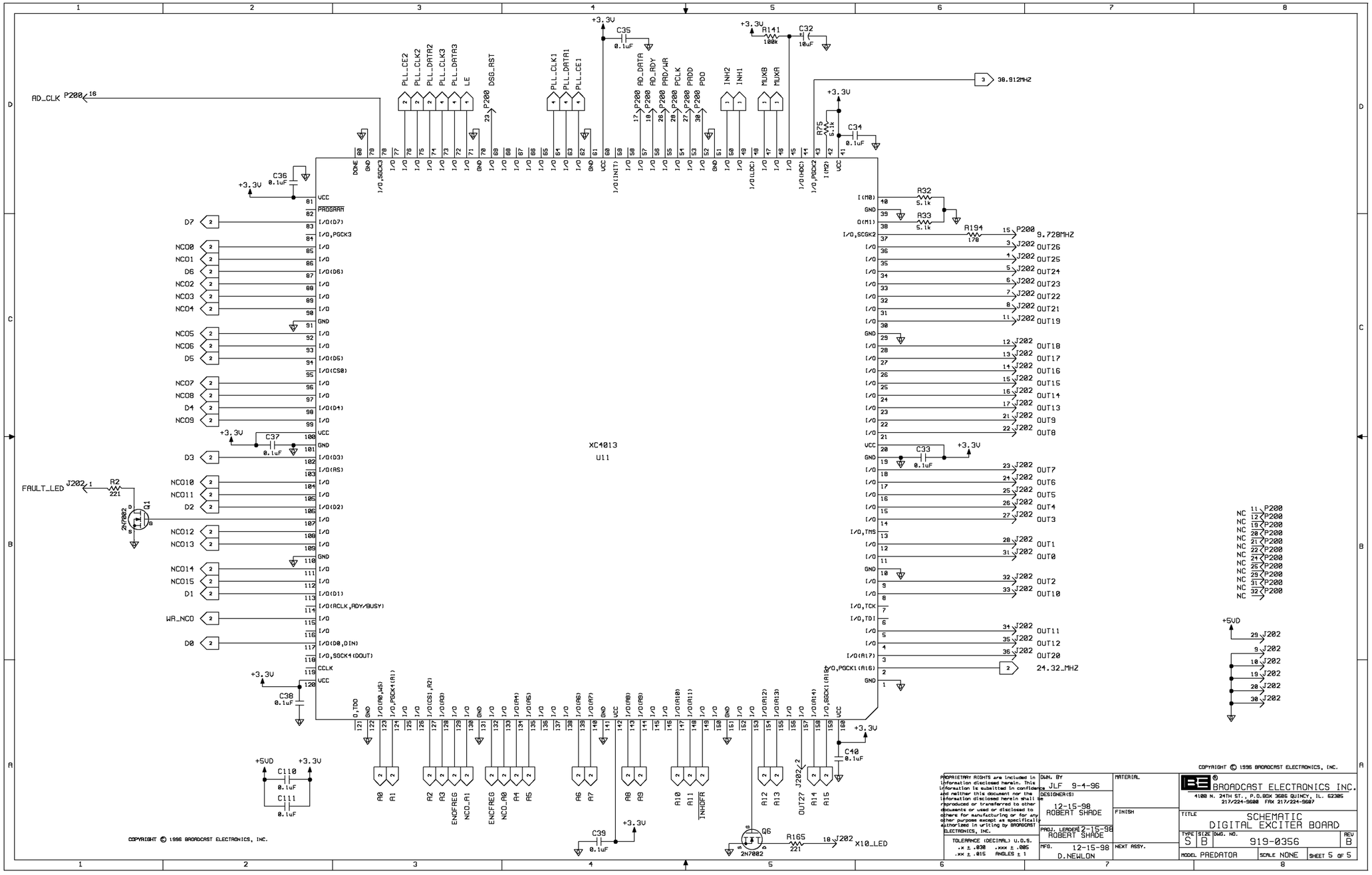
DWN. BY JLF 9-4-96
DESIGNER(S) 12-15-98 ROBERT SHADE
PROJ. LEADER 2-15-96 ROBERT SHADE
MFG. 12-15-98 D.NEWLON
MATERIAL
FINISH
NEXT ASSY.

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

TITLE SCHEMATIC DIGITAL EXCITER BOARD

TYPE	SIZE	DWG. NO.	REV
S	B	919-0356	B

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 5


XC4013
U11
AD_CLK P200 16
PLL_CE2
PLL_CLK2
PLL_DATA2
PLL_CLK3
PLL_DATA3
LE
23 P200
DSG_RST
PLL_CLK1
PLL_DATA1
PLL_CE1
17 P200 AD_DATA
18 P200 AD_RDY
20 P200 PRD/WR
28 P200 PCLK
27 P200 PRD
30 P200 PDD
INH2
INH1
MUXB
MUXA
3 30.912MHZ
+3.3V
C35 0.1uF
R141 100k
C32 10uF
R75 5.1k
C34 0.1uF
C36 0.1uF
C37 0.1uF
C38 0.1uF
C39 0.1uF
C40 0.1uF
C33 0.1uF
C110 0.1uF
C111 0.1uF
+5VD
R32 5.1k
R33 5.1k
R194 178
15 P200 9.728MHZ
J202 OUT26
J202 OUT25
J202 OUT24
J202 OUT23
J202 OUT22
J202 OUT21
J202 OUT19
J202 OUT18
J202 OUT17
J202 OUT16
J202 OUT15
J202 OUT14
J202 OUT13
J202 OUT9
J202 OUT8
J202 OUT7
J202 OUT6
J202 OUT5
J202 OUT4
J202 OUT3
J202 OUT1
J202 OUT0
J202 OUT2
J202 OUT10
J202 OUT11
J202 OUT12
J202 OUT20
2 24.32_MHZ
D7
NCO0
NCO1
D6
NCO2
NCO3
NCO4
NCO5
NCO6
D5
NCO7
NCO8
D4
NCO9
D3
NCO10
NCO11
D2
NCO12
NCO13
NCO14
NCO15
D1
WR_NCO
D0
FAULT_LED J202 1
R2 221
Q1 2N7002
Q6 2N7002
R165 221
18 J202 X10_LED
NC P200
+5VD
J202
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15
ENGFREG NCO_A1 ENGFREG NCO_A0 INHOFR OUT27
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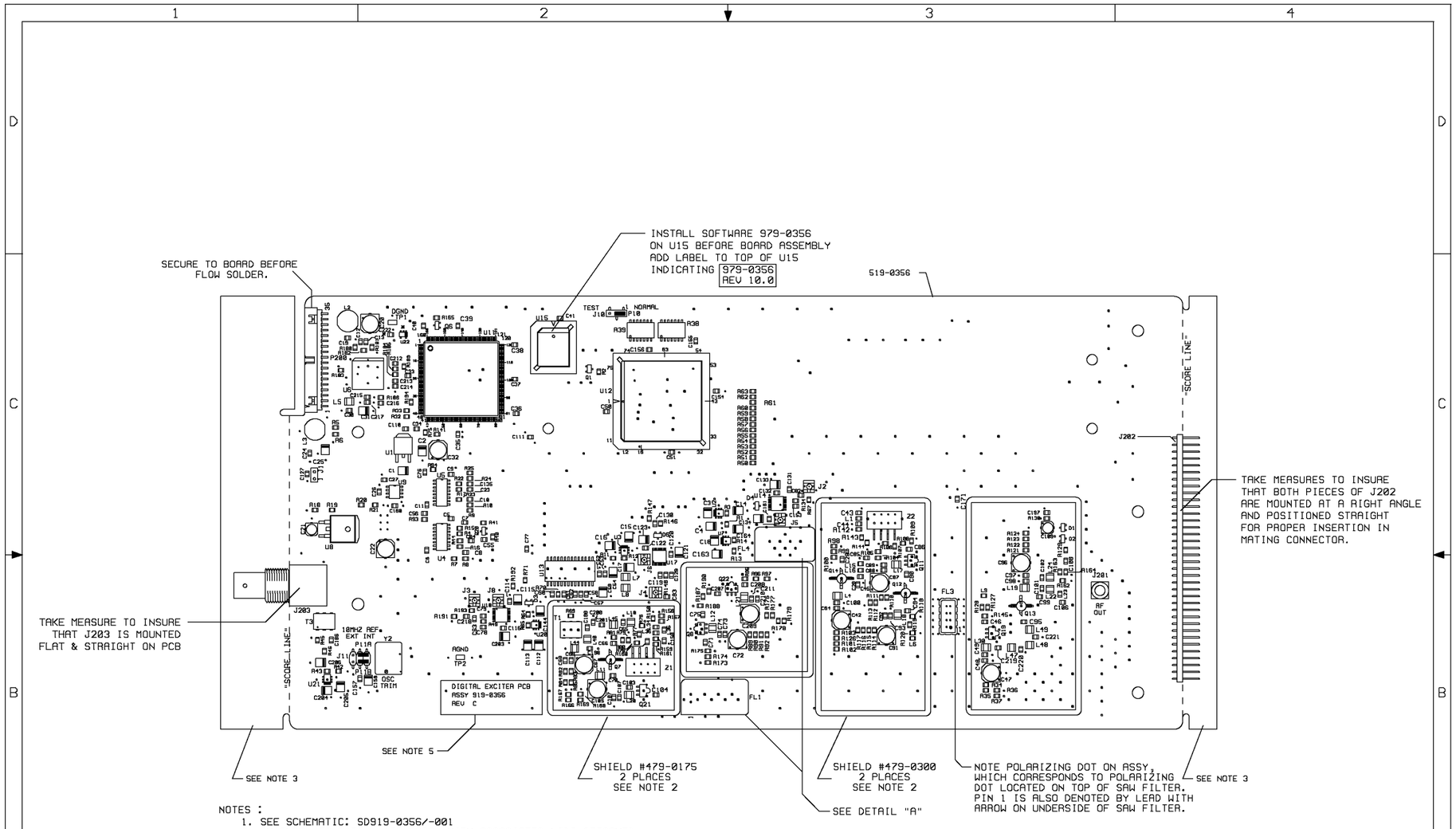
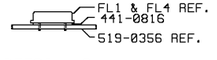
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1
DWN. BY JLF 9-4-96
DESIGNER(S) 12-15-98 ROBERT SHADE
PROJ. LEADER 12-15-98 ROBERT SHADE
MFG. 12-15-98 D.NEWLON
MATERIAL
FINISH
NEXT ASSY.
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3686 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE SCHEMATIC DIGITAL EXCITER BOARD
TYPE S SIZE B DWG. NO. 919-0356 REV B
MODEL PREDATOR SCALE NONE SHEET 5 OF 5



NOTES :

1. SEE SCHEMATIC: SD919-0356/-001
2. SHIELDS 479-0175 & 479-0300, WITH ASSOCIATED LIDS ATTACHED, ARE TO BE SOLDERED INTO PLACE AS SHOWN, AFTER ALL OTHER ASSEMBLY IS COMPLETE.
3. END PIECES WILL BE BROKEN AWAY AT "SCORE LINES" AND DISCARDED DURING FINAL MODULE ASSEMBLY.
4. * REPRESENTS COMPONENTS NOT USED ON 919-0356: (C222,U22)
5. IN THE BLANK WHITE BOX WRITE THE REV. LETTER THAT APPEARS WITHIN THE REV. BLOCK OF THE CURRENT ASSEMBLY DRAWING.



DETAIL "A"

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

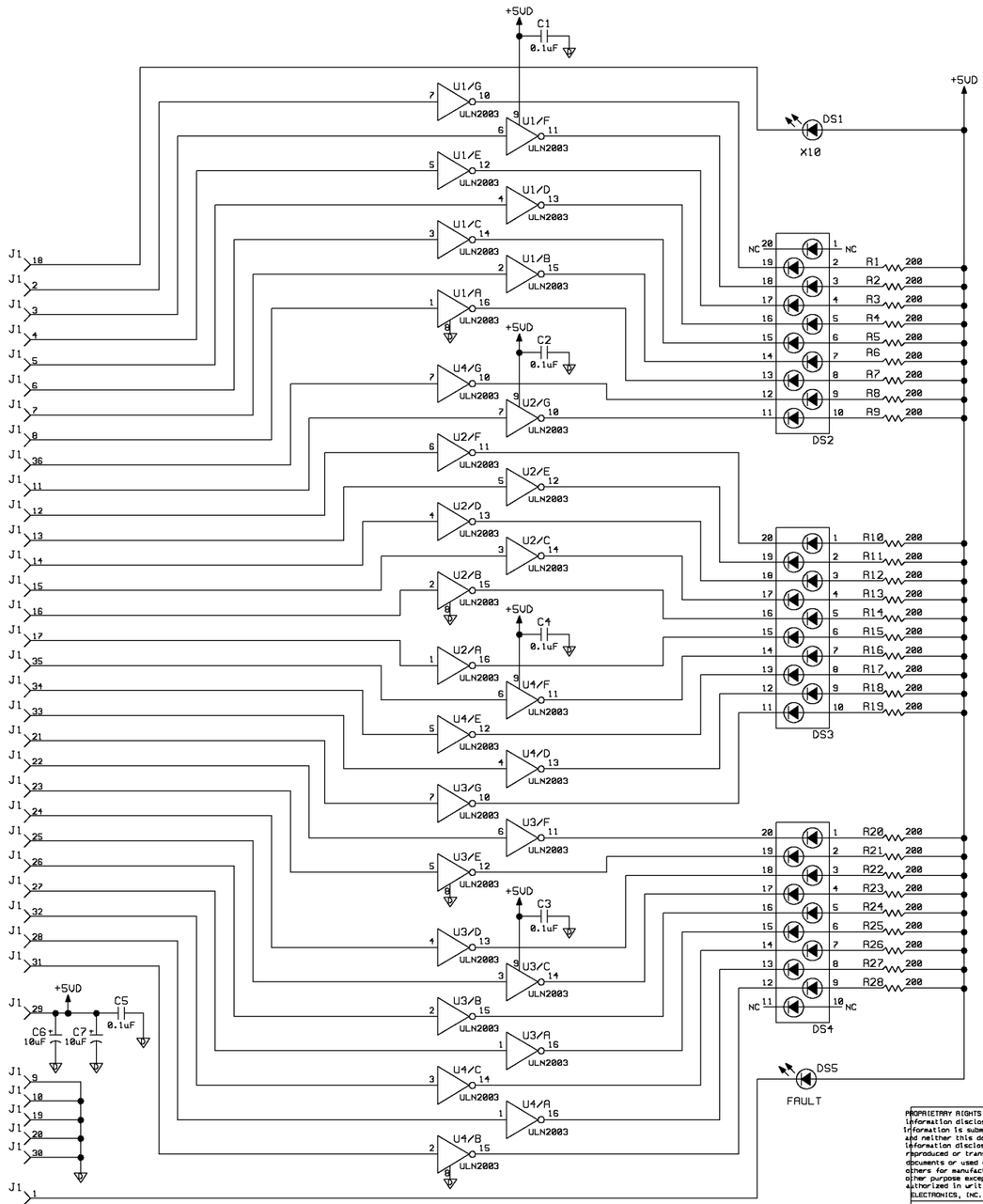
DWN. BY	JLF 9-3-96
DESIGNER(S)	EW/RJS 9-6-96
PROJ. LEADER	12-15-98 ROBERT SHADE
MFG.	12-15-98 D.NEWLON
MATERIAL	SEE BOM 919-0356
FINISH	
NEXT ASSY.	959-0356

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

TITLE: PCB ASSEMBLY
DIGITAL EXCITER MAIN BOARD

TYPE	SIZE	DWG No.	REV
A	C	919-0356	C

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1



NOTES:
1. ALL RESISTORS IN OHMS, 1/4W, 1%
   UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C7, DS5, J1, R28 & U4.
3. COMPONENTS NOT USED: ----
4. SEE ASSEMBLY: AB 919-0357

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

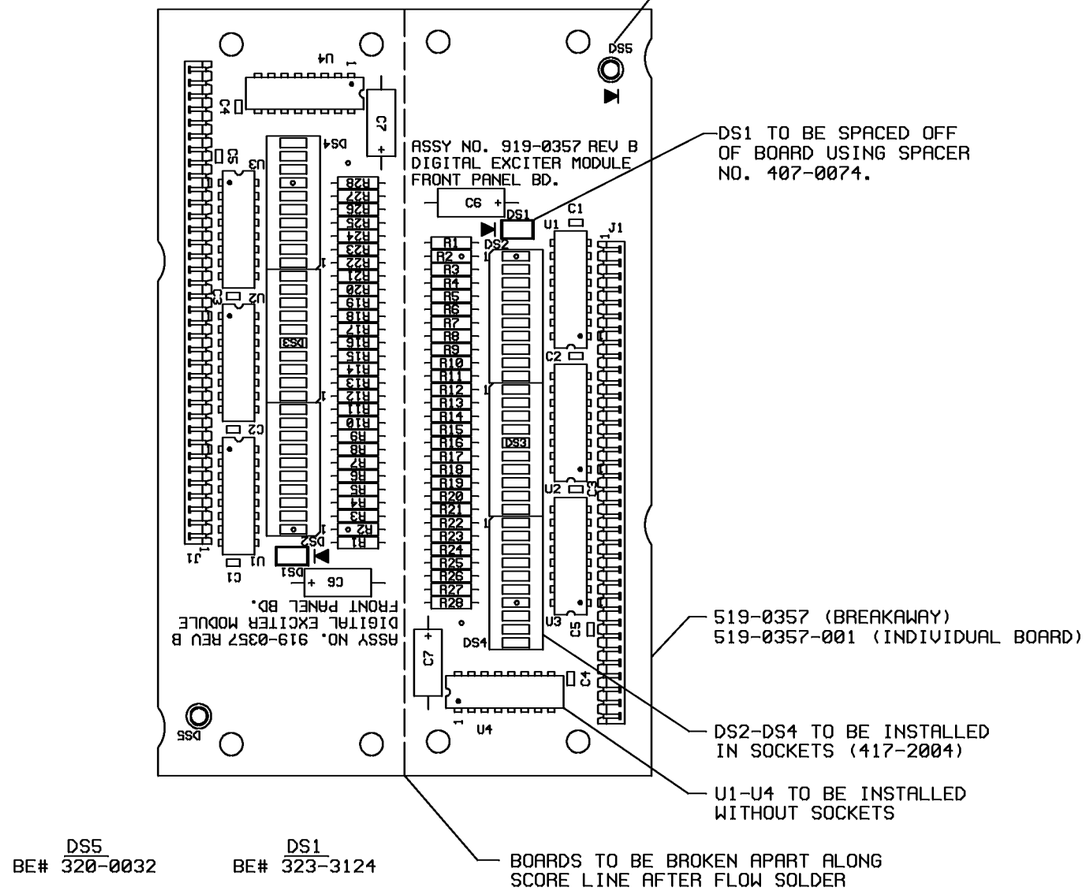
DWN. BY	7-2-96 AEB
DESIGNER(S)	
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOM 919-0357
FINISH	
NEXT ASSY.	AB 919-0357

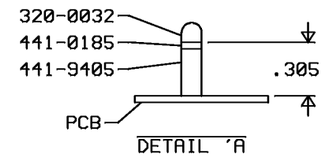
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: DIGITAL EXCITER MODULE
FRONT PANEL DISPLAY PCB

TYPE: S B | SIZE | DWG. NO. 919-0357 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 1



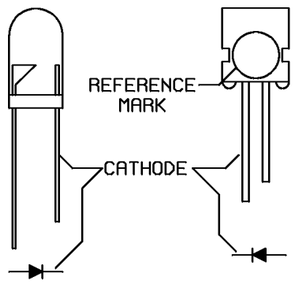


NOTES:

1. SEE SCHEMATIC SB919-0357.

DS5
BE# 320-0032

DS1
BE# 323-3124



TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY 7-26-96
M. HAYDEN
DESIGNER(S)
PROJ. LEADER
MFG.

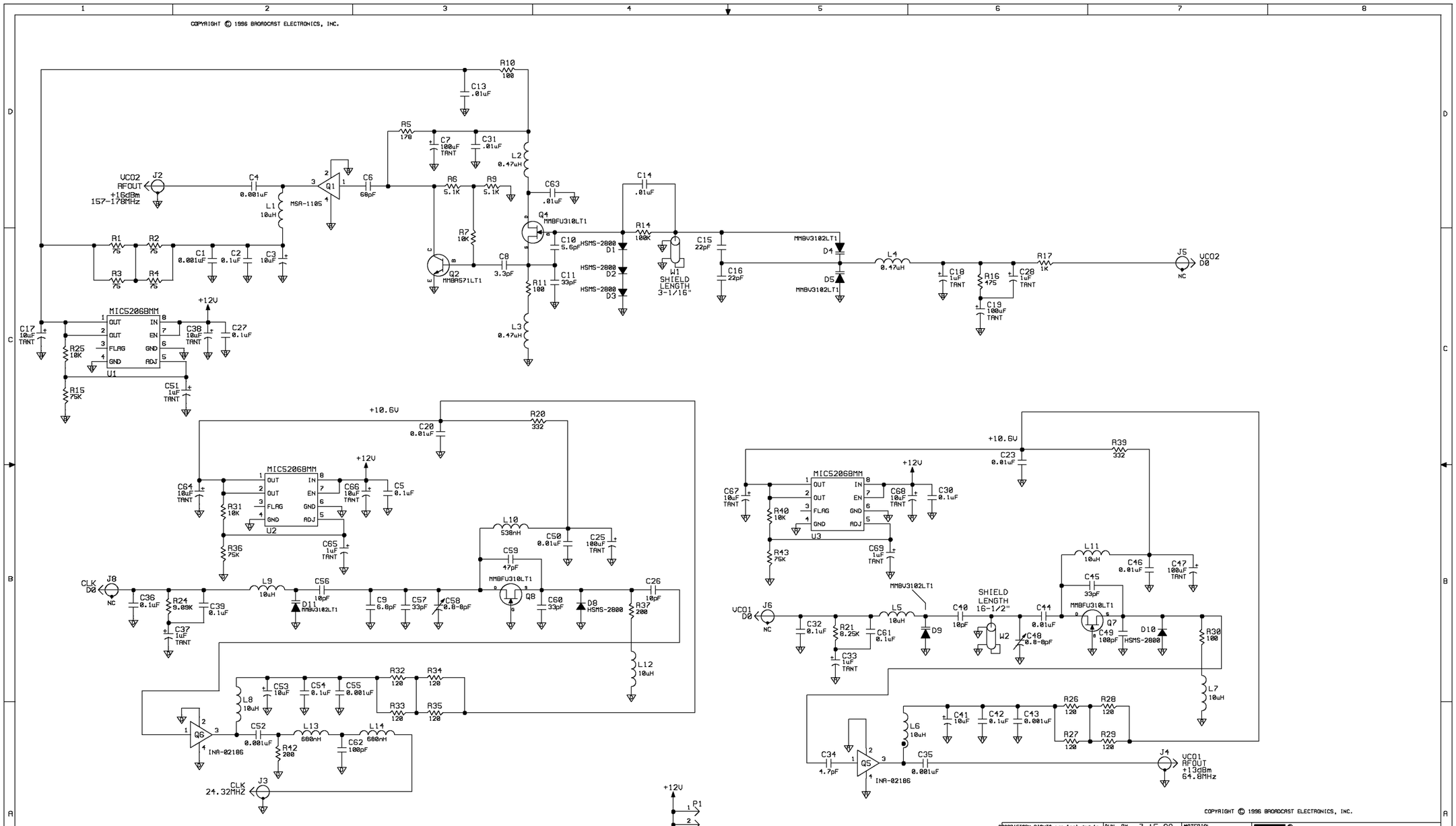
MATERIAL
SEE BOM
919-0357
FINISH
NEXT ASSY.

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

TITLE PCB MACHINING
EXCITER FRONT PANEL BD.

TYPE	SIZE	DWG No.	REV
A	B	919-0357	B

MODEL DIGITAL EXCITER | SCALE 1/1 | SHEET 1 OF 1



NOTES:
1. ALL RESISTORS IN OHMS: 1/10W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: CS9, D11, J8, L14, Q8, R43, U3, W2
3. COMPONENTS NOT USED:C12,C21,C22,C24,D6,D7, J1,J7,R8,R12,R13,R18,R19,R22,R23,R38,R41,Q3
4. SEE ASSEMBLY: AC919-0377

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

DWN. BY 7-15-98 K.TERWELP
DESIGNER(S)
ROBERT J. SHADE 12-15-98
PROJ. LEADER
MFG. 12-15-98 D.NEWLON

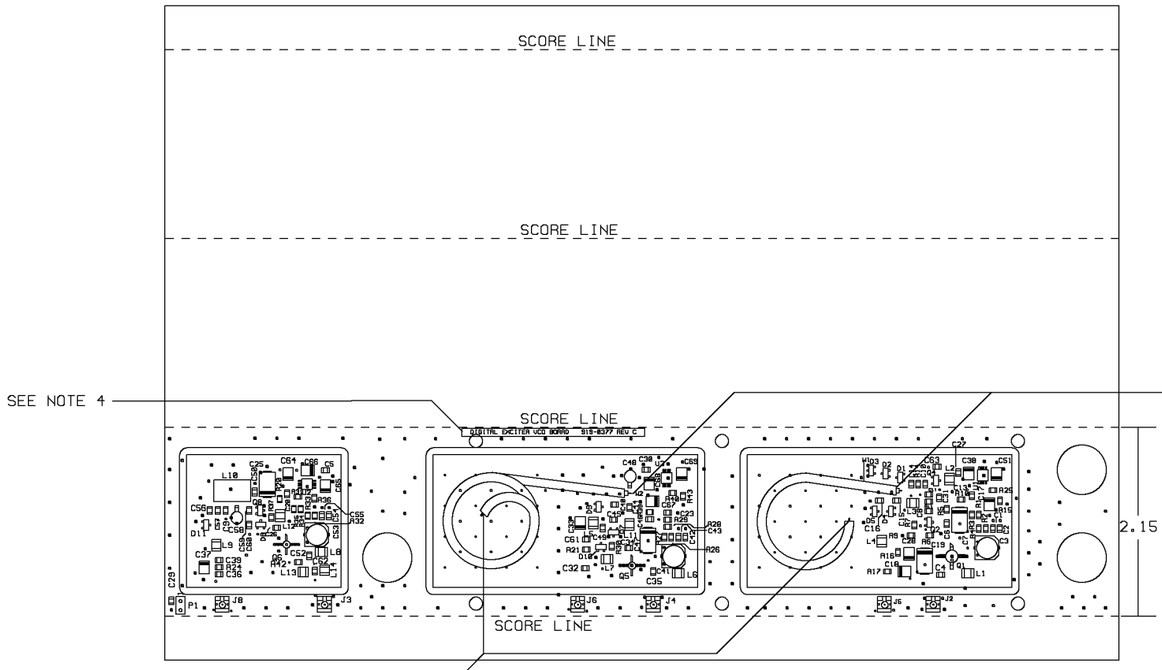
MATERIAL
FINISH
NEXT ASSY.

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

TITLE
SCHEMATIC
DIGITAL EXCITER VCO BOARD

TYPE	SIZE	DWG. NO.	REV
S	B	919-0377	B

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 1



SOLDER CENTER CONDUCTOR TO GROUND PLANE AND TO SHIELD. COVER ENTIRE CENTER CONDUCTOR WITH SOLDER. AND SOLDER COAX DOWN ALONG ENTIRE LENGTH OF SHIELD. COAX SHOULD NOT TOUCH METAL CAN.

DETAIL A

MAKE SURE COAX SHIELD END IS BROUGHT RIGHT UP TO EDGE OF GROUND PLANE. SOLDER CENTER CONDUCTOR TO PAD.

NOTES:

1) SEE SCHEMATIC SB919-0377.
2) ALL THREE BOARDS TO BE BUILT IDENTICALLY.
3) BOARDS TO BE BROKEN APART ALONG SCORE LINES AFTER FLOW SOLDER.
4) IN THE BLANK WHITE BOX WRITE THE REV. LETTER THAT APPEARS IN THE REV. BLOCK OF THE CURRENT ASSEMBLY DRAWING.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY 7-13-98 K.TERWELP
DESIGNER(S)
PROJ. LEADER 12-17-98 ROBERT J. SHADE
MFG. 12-17-98 D.NEWLON

MATERIAL SEE BOM 919-0377
FINISH
NEXT ASSY.

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

TITLE: DIGITAL EXCITER VCO BOARD

TYPE	SIZE	DWG No.	REV
A	C	919-0377	C

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1

WIRING OF P100
1 - GND
2 - GND
3 - -12V
4 - -12V
5 - +12V
6 - +12V
7 - NC
8 - NC
9 - GND
10 - GND
11 - NC
12 - NC
13 - 38.912 MHz
14 - DIGITAL GND
15 - 9.728 MHz
16 - CLK
17 - DATA
18 - RDY
19 - NC
20 - NC
21 - NC
22 - NC
23 - DSG RESET
24 - IRQ
25 - NC
26 - NC
27 - NC
28 - NC
29 - NC
30 - NC
31 - RXD
32 - TXD
33 - DIGITAL GND
34 - DIGITAL GND
35 - +5VD
36 - +5VD

WIRING OF J101
AES/EBU (WIRE)
1 - CHASSIS GND
2 - AES/EBU INPUT +
3 - AES/EBU INPUT -

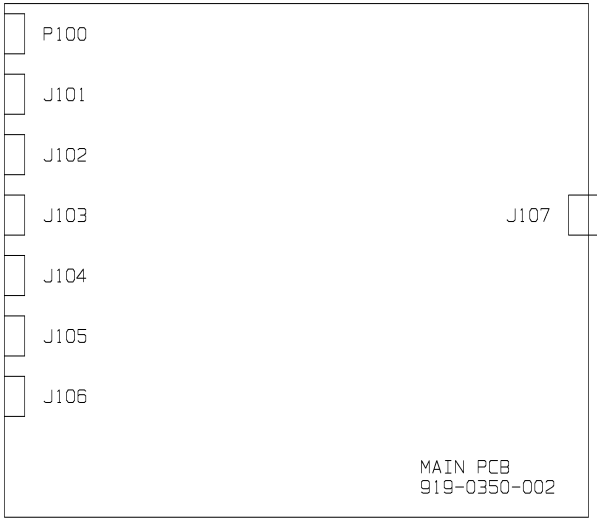
WIRING OF J102
AES/EBU (OPTICAL)

WIRING OF J103
SCA1 (BNC)

WIRING OF J104
SCA2 (BNC)

WIRING OF J105
RBDS (BNC)

WIRING OF J106
19 KHz OUTPUT (BNC)



J107 — P107

DIGITAL
STEREO
GENERATOR
MODULE DISPLAY PCB
919-0353

WIRING OF J107 TO P107
1 - +5V DC INPUT
2 - LEFT METER INPUT
3 - RIGHT METER INPUT
4 - FAULT INDICATOR INPUT
5 - NC
6 - DIGITAL GND

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

DWN. BY MSE 12-3-98

DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL SEE BOM 959-0350

FINISH

SEE DWG RA592-0000

NEXT ASSY.

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

TITLE OVERALL SCHEMATIC
DIGITAL STEREO GENERATOR MODULE

TYPE	SIZE	DWG. NO.	REV
S	B	959-0350	A

MODEL | SCALE NTS | SHEET 1 OF 1

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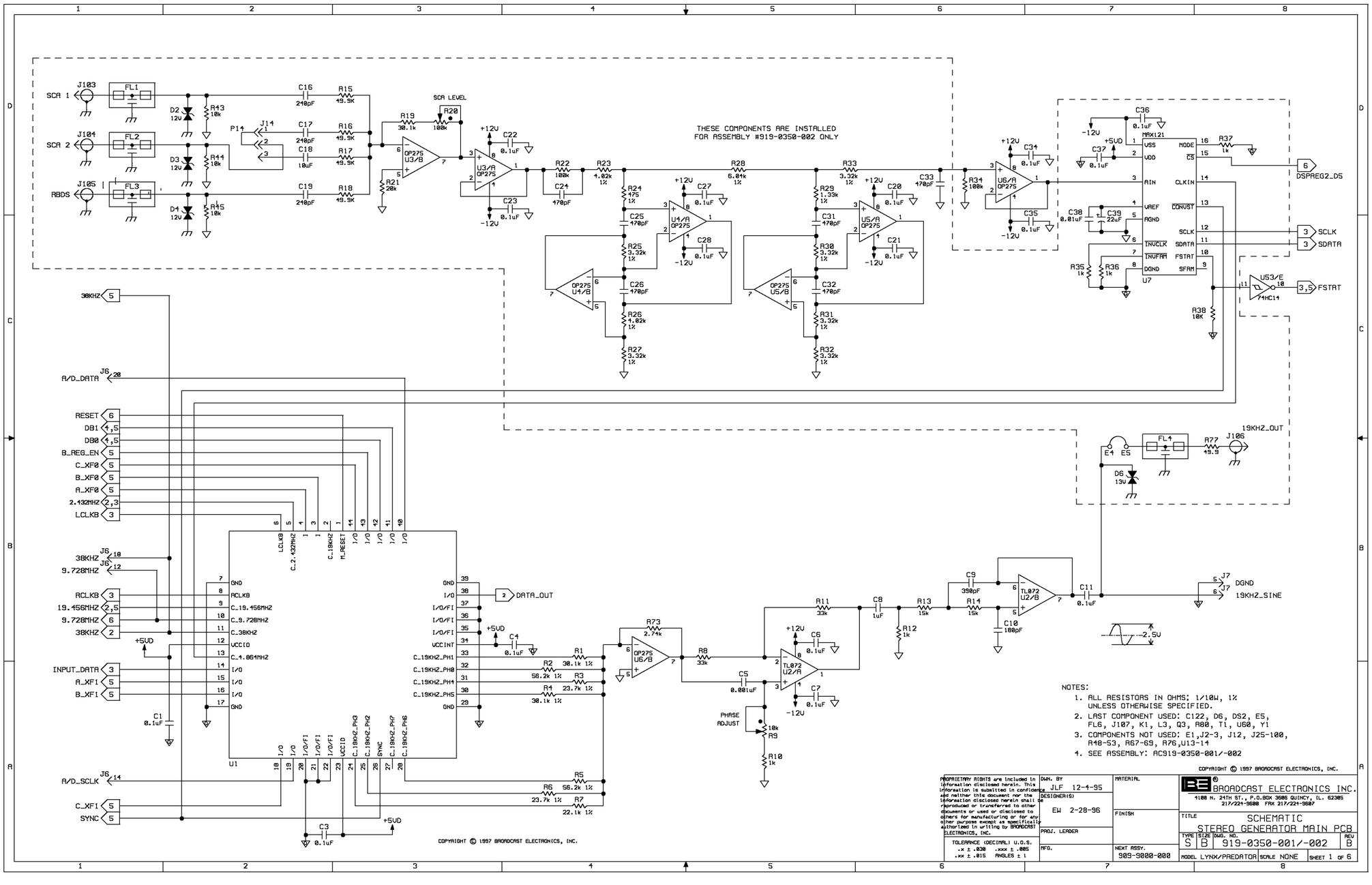


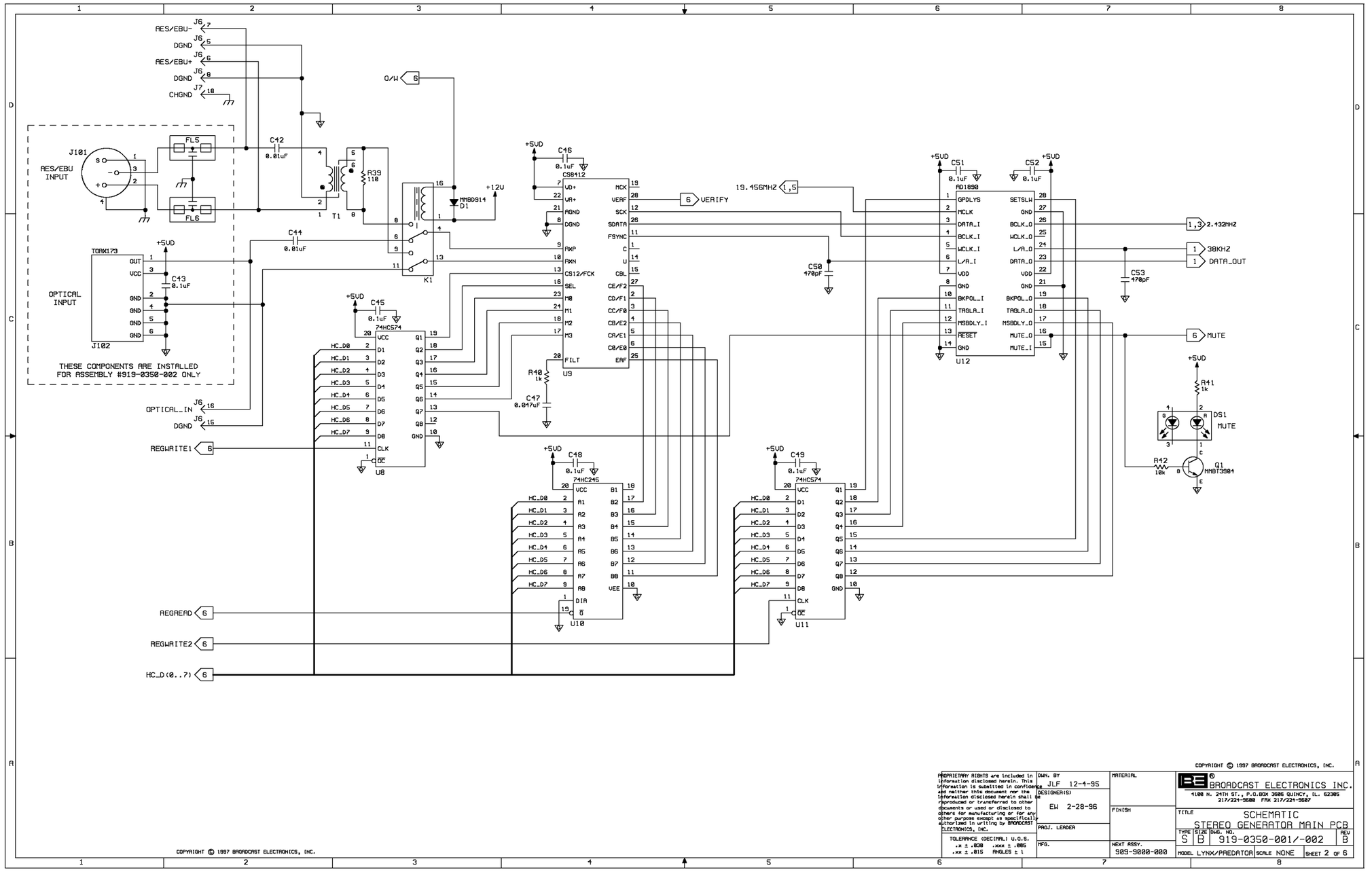
DWN. BY	JLF 12-4-95
DESIGNER(S)	EW 2-28-96
PROJ. LEADER	
MFG.	
TOLERANCE (DECIMAL) U.O.S.	.x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1
MATERIAL	
FINISH	
NEXT ASSY.	989-9000-000

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

TITLE: SCHEMATIC
STEREO GENERATOR MAIN PCB

TYPE	SIZE	DWG. NO.	REV
S	B	919-0350-001/-002	B

MODEL LYNX/PREDATOR | SCALE NONE | SHEET 1 OF 6



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

DWN. BY JLF 12-4-95
DESIGNER(S) EW 2-28-96
PROJ. LEADER
MFG.

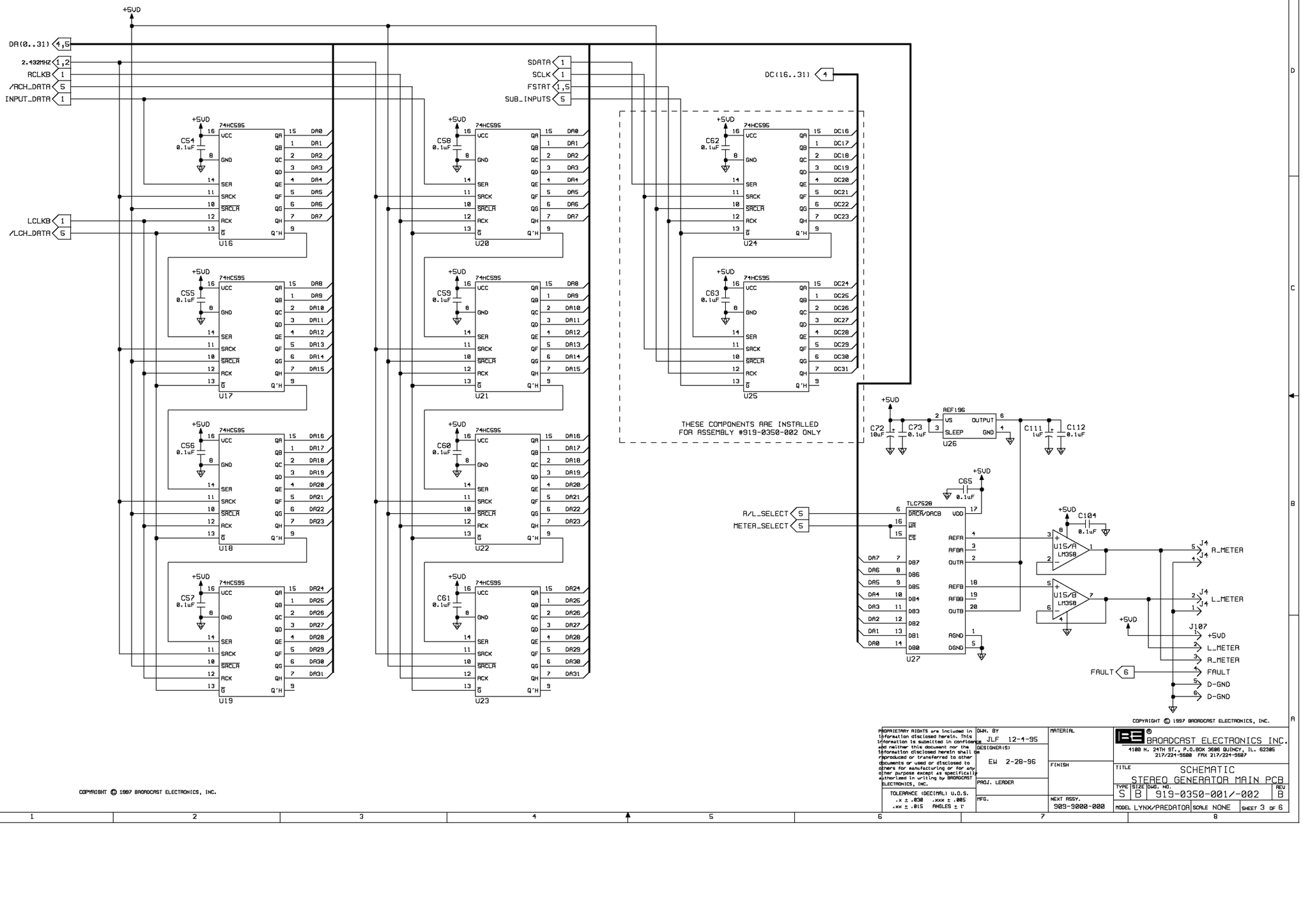
MATERIAL
FINISH
NEXT ASSY. 909-9000-000

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-3600 FAX 217/224-3607

TITLE SCHEMATIC
STEREO GENERATOR MAIN PCB

TYPE	SIZE	DWG. NO.	REV
S	B	919-0350-001/-002	B

MODEL LYNX/PREDATOR SCALE NONE SHEET 2 OF 6



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

DWN. BY JLF 12-4-95
DESIGNER(S) EW 2-28-96
PROJ. LEADER
MFG.

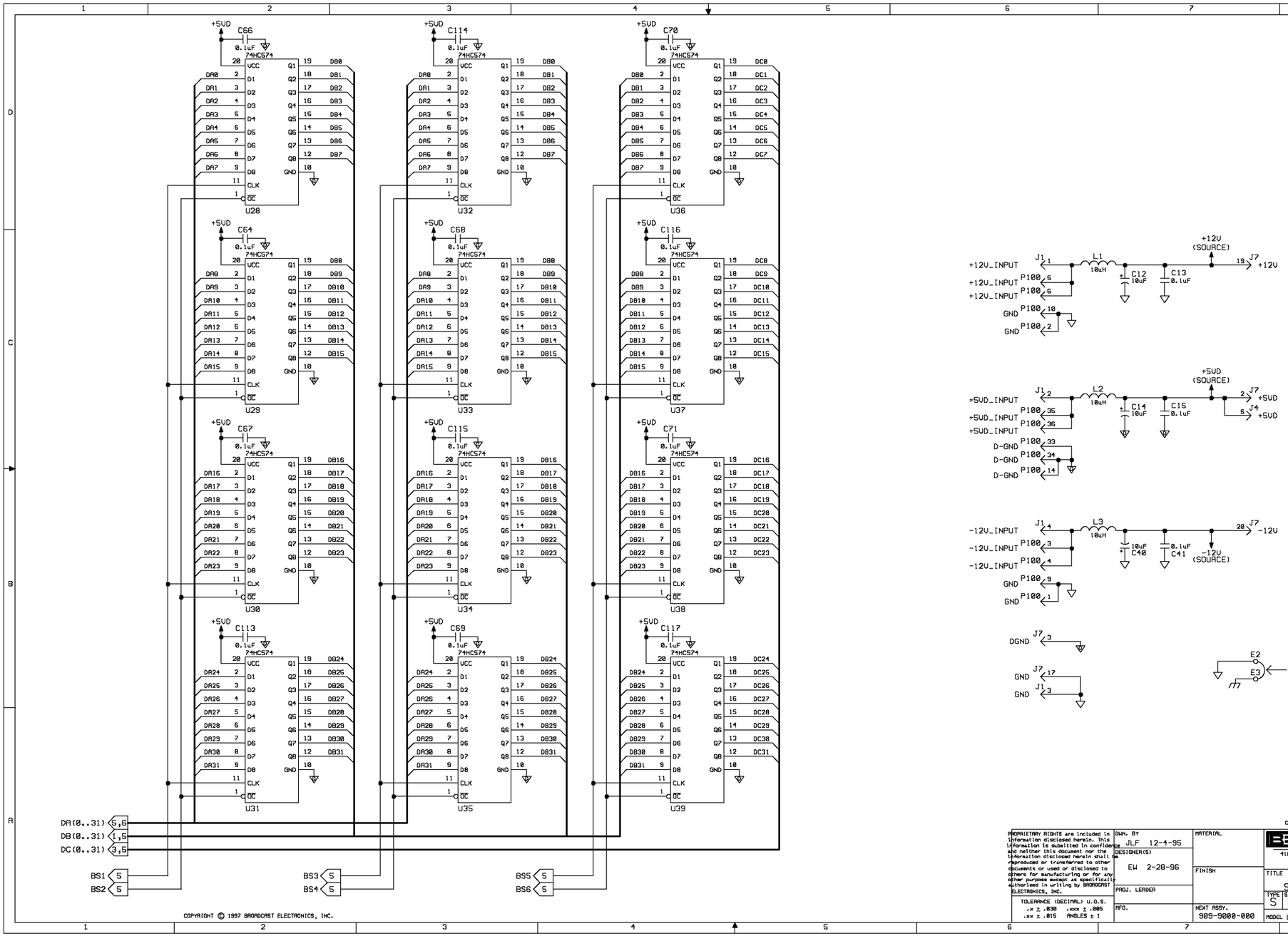
MATERIAL
FINISH
NEXT ASSY. 909-9000-000

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

TITLE SCHEMATIC
STEREO GENERATOR MAIN PCB

TYPE	SIZE	DWG. NO.	REV
S	B	919-0350-001/-002	B

MODEL LYNX/PREDATOR SCALE NONE SHEET 3 OF 6



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

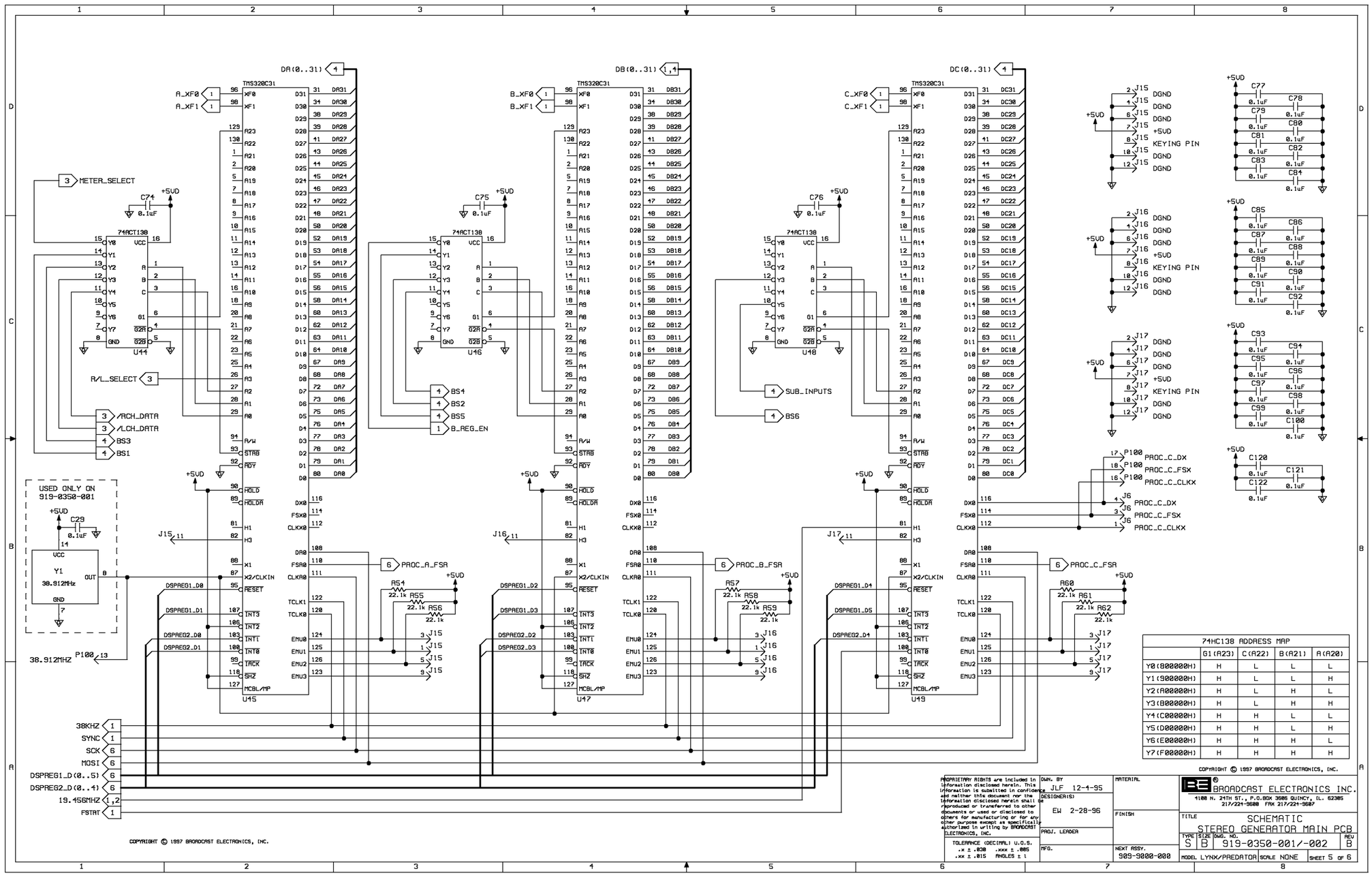
DWN. BY	JLF 12-4-95
DESIGNER(S)	EW 2-28-96
PROJ. LEADER	
MFG.	
MATERIAL	
FINISH	
NEXT ASSY.	909-9000-000

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

TITLE: SCHEMATIC
STEREO GENERATOR MAIN PCB

TYPE	SIZE	DWG. NO.	REV
S	B	919-0350-001/-002	B

MODEL LYNX/PREDATOR | SCALE NONE | SHEET 1 OF 6


DA(0..31)
DB(0..31)
DC(0..31)
TMS320C31
U45
U47
U49
U44
U46
U48
74ACT138
METER_SELECT
R/L_SELECT
/RCH_DATA
/LCH_DATA
BS3
BS1
BS4
BS2
BS5
B_REG_EN
SUB_INPUTS
BS6
A_XF0
A_XF1
B_XF0
B_XF1
C_XF0
C_XF1
+5VD
0.1uF
C74
C75
C76
PROC_A_FSR
PROC_B_FSR
PROC_C_FSR
PROC_C_DX
PROC_C_FSX
PROC_C_CLKX
KEYING PIN
DGND
J15
J16
J17
P100
J6
R54
R55
R56
R57
R58
R59
R60
R61
R62
22.1k
USED ONLY ON
919-0350-001
C29
38.912MHZ
38KHZ
SYNC
SCK
MOSI
DSPREG1_D(0..5)
DSPREG2_D(0..4)
19.456MHZ
FSTAT
74HC138 ADDRESS MAP
G1(A23) C(A22) B(A21) A(A20)
Y0(800000H) H L L L
Y1(900000H) H L L H
Y2(A00000H) H L H L
Y3(B00000H) H L H H
Y4(C00000H) H H L L
Y5(D00000H) H H L H
Y6(E00000H) H H H L
Y7(F00000H) H H H H
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TOLERANCE (DECIMAL) U.O.S.
.x ± .038 .xxx ± .005
.xx ± .015 ANGLES ± 1
DWN. BY JLF 12-4-95
DESIGNER(S) EW 2-28-96
PROJ. LEADER
MFG.
MATERIAL
FINISH
NEXT ASSY. 989-9000-000
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE SCHEMATIC
STEREO GENERATOR MAIN PCB
TYPE S SIZE B DWG. NO. 919-0350-001/-002 REV B
MODEL LYNX/PREDATOR SCALE NONE SHEET 5 OF 6

INPUT SELECT
INPUT SELECT
PRE-EMPHASIS
MODE
MODE

FOR USE ON 919-0350-002 ONLY.

REMOTE SWITCHING MODE	CONNECT J8	CONNECT J9
SEQUENCED	1-2	1-2
STEREO/L+R	1-2	2-3
STEREO/L	2-3	1-2
STEREO/R	2-3	2-3

HC_D(0..7)

J21 : TX/RX
LYNX = JUMPER PINS 1 & 2
PREDATOR = ON PIN 2 ONLY

MC68HC11F1

PROC_A_FSR
PROC_B_FSR
PROC_C_FSR

MUTE
VERIFY

DGND
DGND
DGND
LIMITING ADJUST
PILOT ADJUST
DIGITAL ADJUST

J21 : AUTO BACKUP
1-2 = LEFT/RIGHT
2-3 = ANALOG BYPASS

J11 : LIMITER BACKUP
1-2 = LIMITER REMAINS SAME
2-3 = LIMITER SWITCHES

LEFT/RIGHT
AES/EBU

ANALOG BYPASS
LEFT/RIGHT
AES/EBU

J22 : PILOT MODE SELECT
AUTO = PLACE P22 ON J22 PINS 1 & 2.
ON = PLACE P22 ON J22 PINS 2 & 3.
OFF = PLACE P22 ON J22 PIN 2 ONLY.

AES/EBU FAULT
AES/EBU FAULT

9.720MHZ

MODE A
MODE B

REGREAD

REGWRITE1
REGWRITE2

RESET

MOSI
SCK

DSPREG1_D(0..5)
DSPREG2_D(0..4)
DSPREG2_D6

MODE = STEREO
MODE = L+R
MODE = L ONLY
MODE = R ONLY
PRE-EMPH = 50uS
PRE-EMPH = 75uS
PRE-EMPH = AUTO
MODE = STEREO
MODE = L+R
MODE = L ONLY
MODE = R ONLY
PILOT ON

O/W

DIG/ANALOG
OPTICAL/WIRED
APD
DPD
LIMITER_ON
FAULT

COMPONENTS NOT USED
PROCESSOR BUSY

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

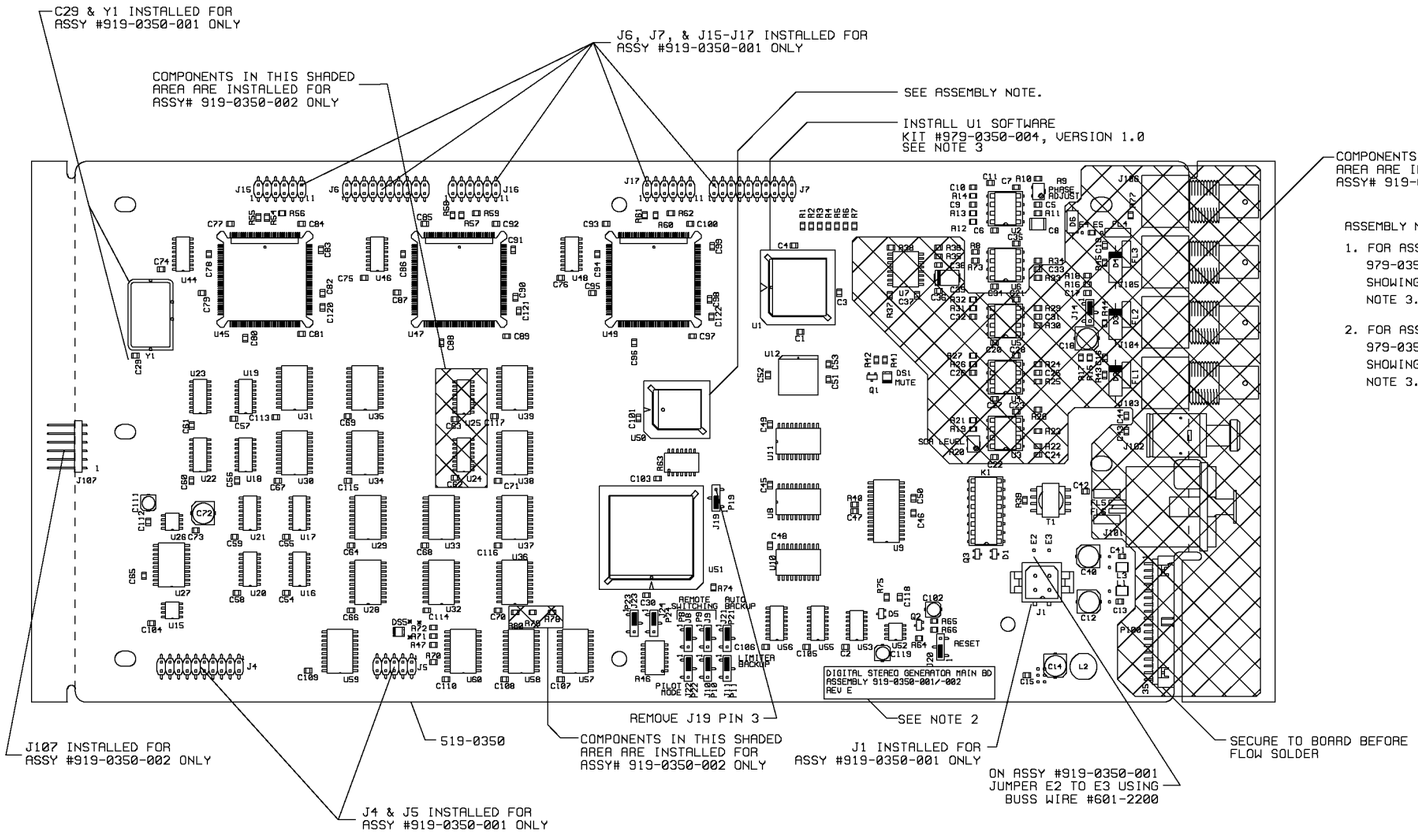
DWN. BY JLF 12-4-95
DESIGNER(S) EW 2-28-96
PROJ. LEADER
MFG.
MATERIAL
FINISH
NEXT ASSY. 909-9000-000

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

TITLE: SCHEMATIC
STEREO GENERATOR MAIN PCB

TYPE	SIZE	DWG. NO.	REV
S	B	919-0350-001/-002	B

MODEL LYNX/PREDATOR | SCALE NONE | SHEET 6 OF 6



NOTES:

1. SEE SCHEMATIC: SB919-0350-001/-002
2. IN THE BLANK WHITE BOXES MARK THE VERSION OF THE BOARD BEING BUILT IN THE TOP BOX; & THE REV. LETTER THAT APPEARS WITHIN THE REV. BLOCK OF THE CURRENT ASSEMBLY DWG IN THE BOTTOM BOX.
3. U1 & U50 MUST BE LABLED WITH SOFTWARE REV. LEVEL.
4. * INDICATES PARTS NOT USED.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY MERK 3/21/96
DESIGNER(S) EW 3/22/96
PROJ. LEADER
MFG.

MATERIAL SEE BOM 919-0350-001 919-0350-002
FINISH
NEXT ASSY. 909-9000

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

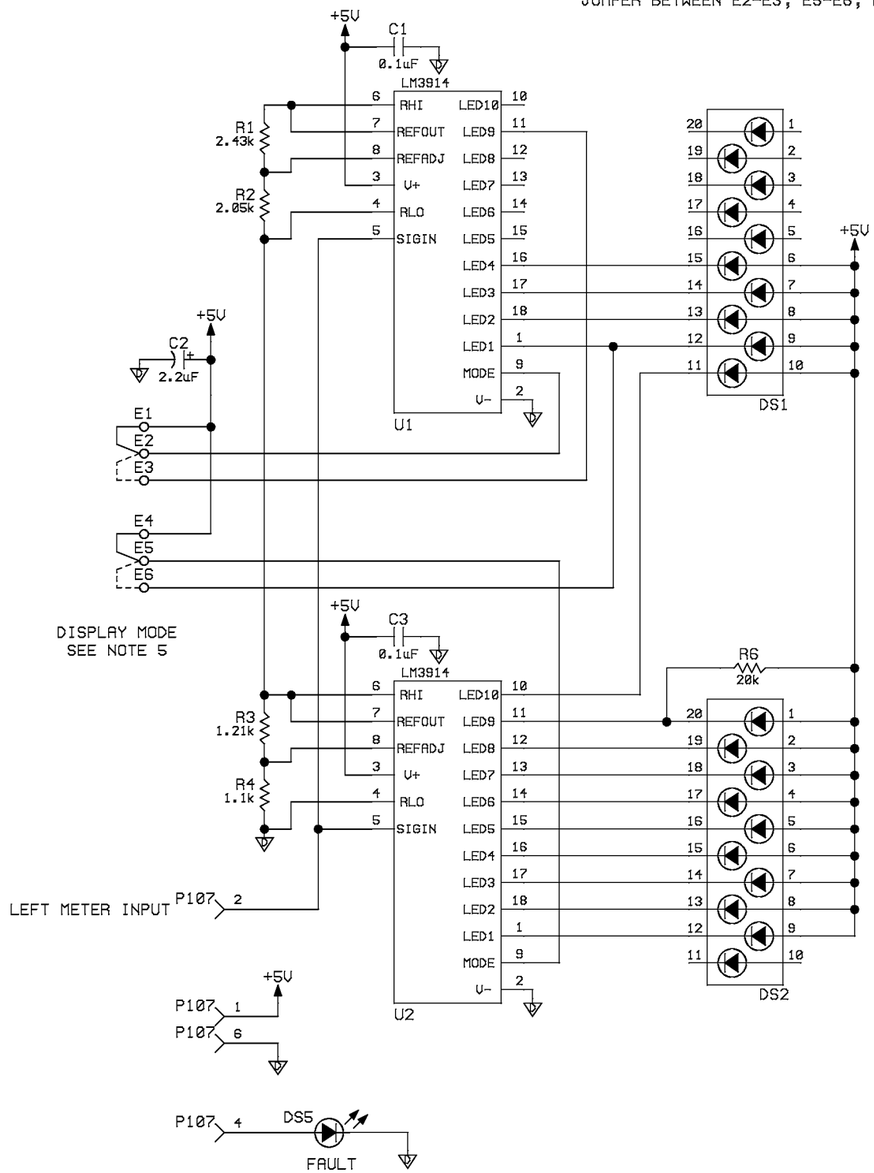
TITLE PCB ASSEMBLY STEREO GENERATOR MAIN BD

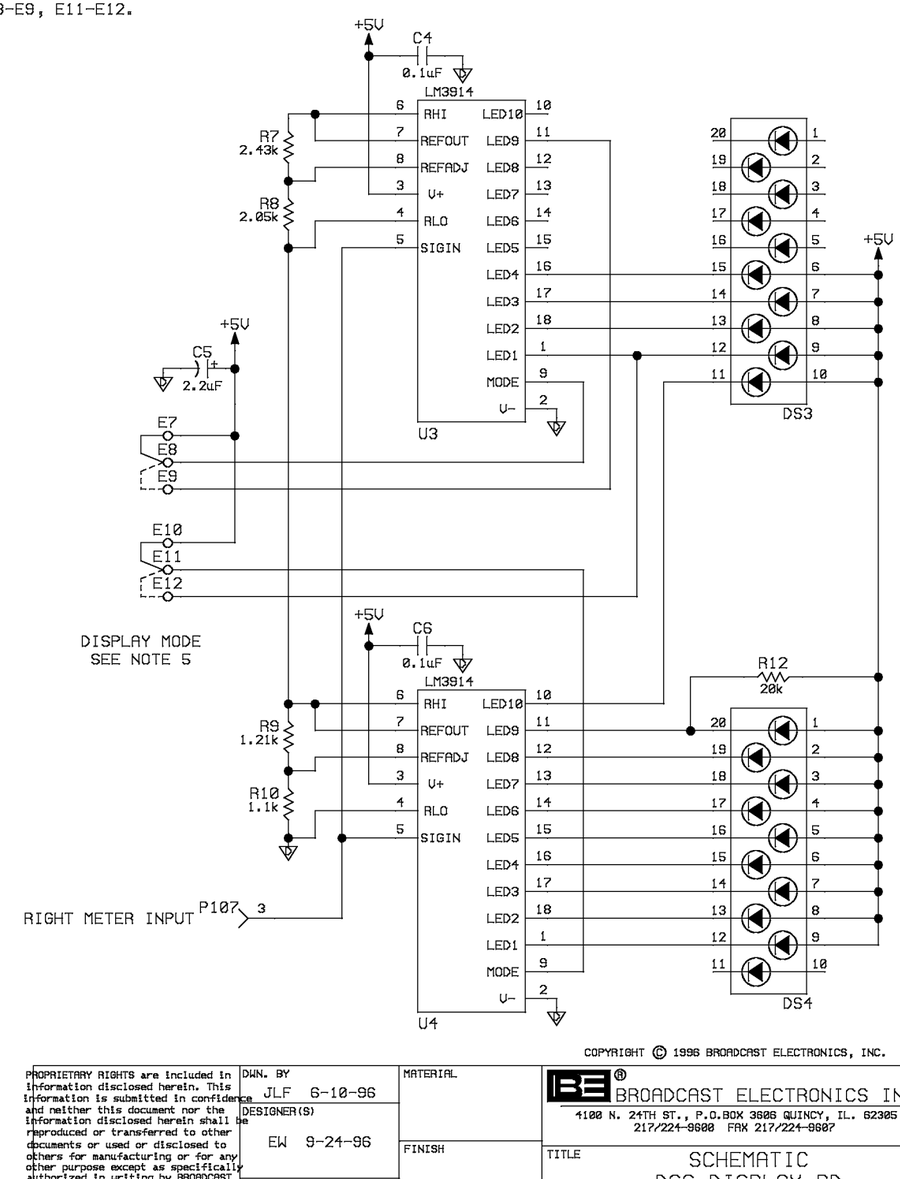
TYPE	SIZE	DWG No.	REV
A	C	919-0350-001/-002	F

MODEL PREDATOR/LYNX | SCALE 1/1 | SHEET 1 OF 1

NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C6, DS5, E12, P107, R12, U4
3. COMPONENTS NOT USED: R5, R11, P1-106
4. SEE ASSEMBLY: AB919-0353
5. SCHEMATIC SHOWN WITH DISPLAY SET FOR BAR TYPE DISPLAY MODE.
   FOR DOT TYPE DISPLAY MODE CUT TRACES BETWEEN E1-E2, E4-E5, E7-E8, E10-E11; AND SOLDER A JUMPER BETWEEN E2-E3, E5-E6, E8-E9, E11-E12.





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

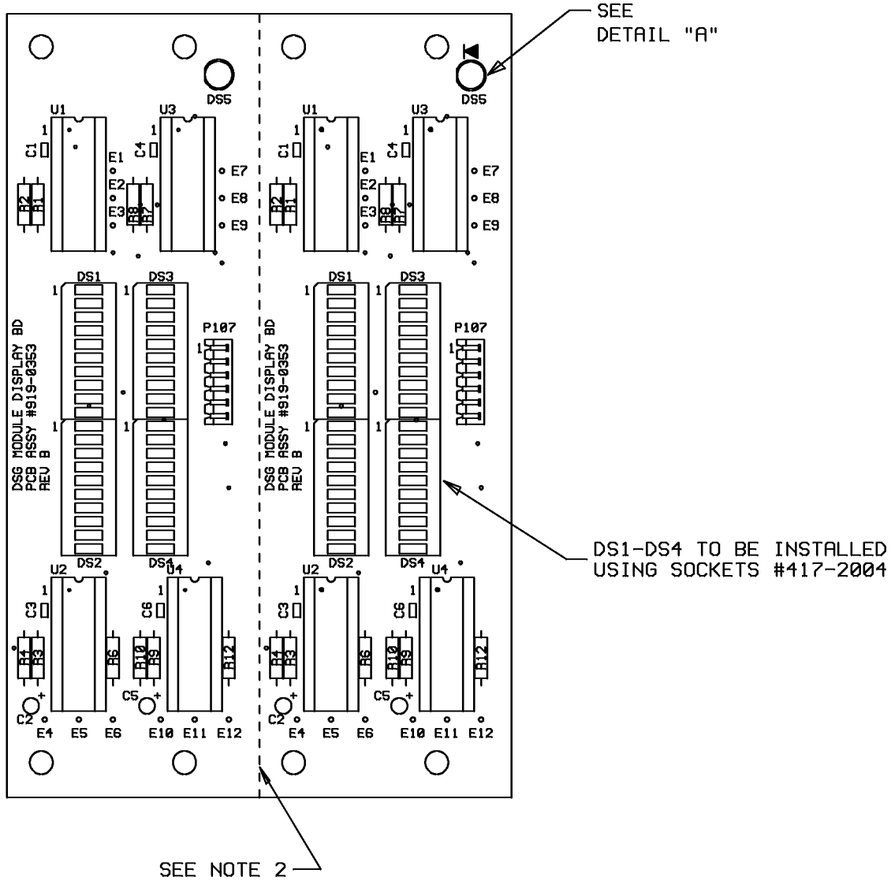
DWN. BY	JLF 6-10-96
DESIGNER(S)	EW 9-24-96
PROJ. LEADER	
MFG.	
MATERIAL	
FINISH	
NEXT ASSY.	AB919-0353

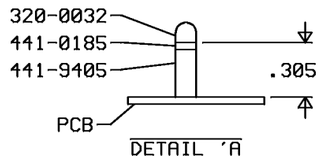
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: SCHEMATIC
DSG DISPLAY BD

TYPE	SIZE	DWG. NO.	REV
S	C	919-0353	A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 1

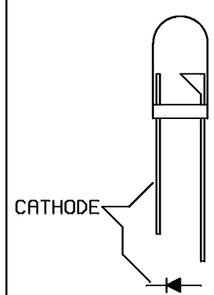




NOTES:

1. PART NUMBER & BOM 919-0353 ARE FOR ONE FINISHED PCB. BOARDS ARE TO BE ASSEMBLED IN PAIRS AS SHOWN.
2. DASHED LINE INDICATES WHERE BOARDS ARE TO BE SNAPPED APART AFTER FLOW SOLDER AND FINAL ASSEMBLY.

DS5
BE# 320-0032



TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY JLF 6-11-96
DESIGNER(S) EW 9-24-96
PROJ. LEADER
MFG.

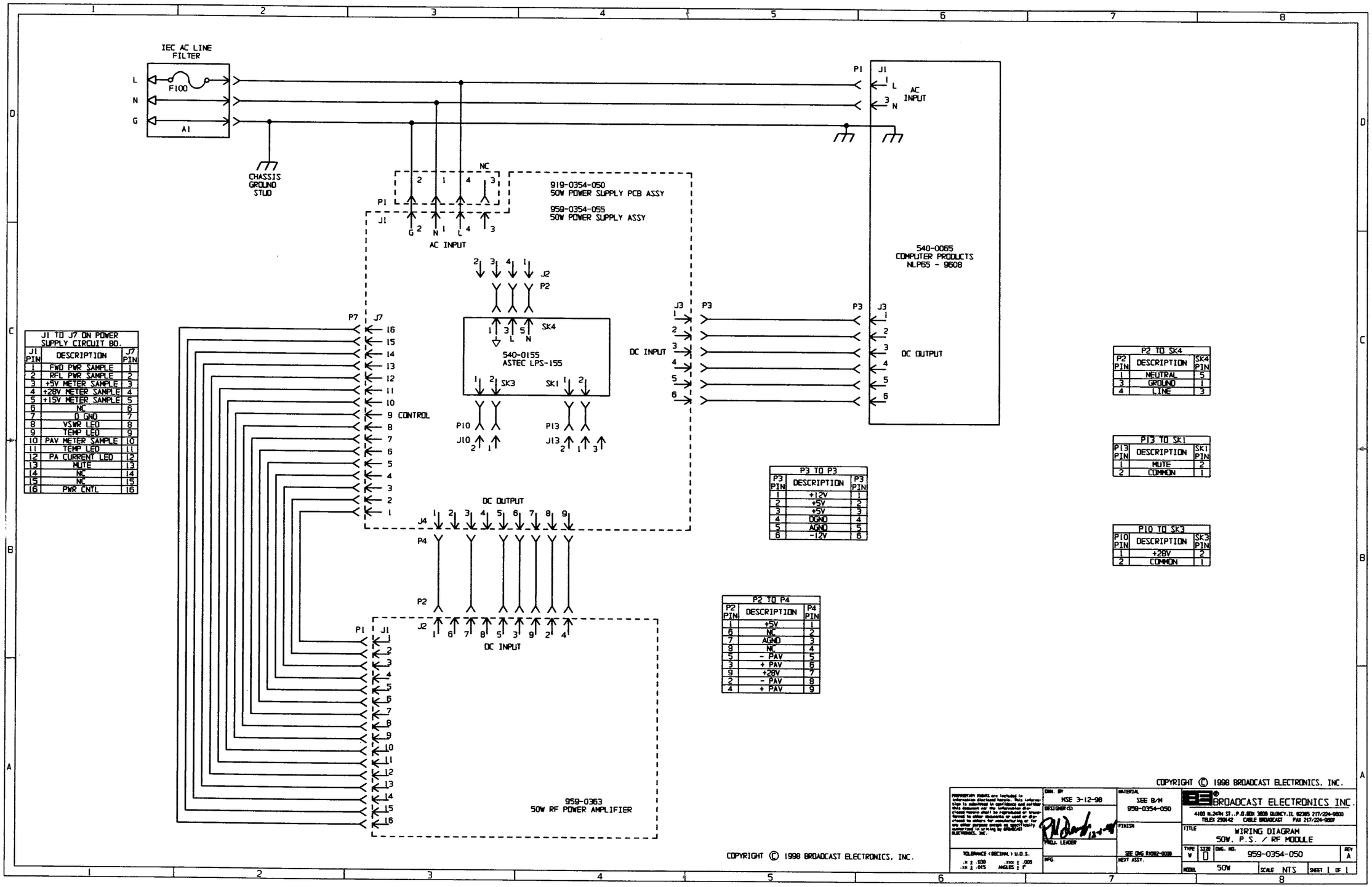
MATERIAL SEE BOM 919-0353
FINISH
NEXT ASSY. 959-0350

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

TITLE PCB ASSEMBLY
DSG MODULE DISPLAY BD

TYPE	SIZE	DWG No.	REV
A	B	919-0353	B

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1



J1 TO J7 ON POWER SUPPLY CIRCUIT BD.		
J1 PIN	DESCRIPTION	J7 PIN
1	FWD PWR SAMPLE	1
2	RFL PWR SAMPLE	2
3	+5V METER SAMPLE	3
4	+28V METER SAMPLE	4
5	+15V METER SAMPLE	5
6	NC	6
7	D GND	7
8	VSWR LED	8
9	TEMP LED	9
10	PAV METER SAMPLE	10
11	TEMP LED	11
12	PA CURRENT LED	12
13	MUTE	13
14	NC	14
15	NC	15
16	PWR CNTL	16

P3 TO P3		
P3 PIN	DESCRIPTION	P3 PIN
1	+12V	1
2	+5V	2
3	+5V	3
4	DGND	4
5	AGND	5
6	-12V	6

P2 TO P4		
P2 PIN	DESCRIPTION	P4 PIN
1	+5V	1
6	NC	2
7	AGND	3
8	NC	4
5	- PAV	5
3	+ PAV	6
9	+28V	7
2	- PAV	8
4	+ PAV	9

P2 TO SK4		
P2 PIN	DESCRIPTION	SK4 PIN
1	NEUTRAL	5
3	GROUND	1
4	LINE	3

P13 TO SK1		
P13 PIN	DESCRIPTION	SK1 PIN
1	MUTE	2
2	COMMON	1

P10 TO SK3		
P10 PIN	DESCRIPTION	SK3 PIN
1	+28V	2
2	COMMON	1

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DRN. BY MSE 3-12-98
DESIGNER(S)
PROJ. LEADER
MFG.

MATERIAL SEE B/M 959-0354-050
FINISH
SEE DWG PARTS-0008
NEXT ASSY.

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

TITLE
WIRING DIAGRAM
50W, P.S. / RF MODULE

TYPE W | SIZE D | DWG. NO. 959-0354-050 | REV A
MODEL 50W | SCALE NTS | SHEET 1 OF 1

P.S. FAULT

AC LINE/ RFI FILTER

CHASSIS GND LUG

P.A. POWER SUPPLY

AC LINE RELAY CONTROL

MUTE

+12V SAMPLE

-12V SAMPLE

+5V SAMPLE

FROM LOW VOLTAGE POWER SUPPLY

DC TO RF AMP

MOTHERBOARD

VI-HAM-EM

V375A48C600

DC TO FAN

PREDATOR 50 ONLY

KEY

#18 BUSS

1.75V @ 5 AMP

PAI

PARP

PAFP

RF AMP REFLECTED POWER 0.60V @ 2W 1.5:1 VSWR

RF AMP FORWARD POWER 2.66V @ 50W

REFLECTED POWER CALIBRATE

FORWARD POWER CALIBRATE

OPERATE

TEST

NOTES:
1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C51,D7,DS4,E2, F2,FL2,J13,K1,L5,P8,Q4,R76,TP18,U13.
3. COMPONENTS NOT USED: J1,J12,U5,D1-D3.
4. SEE ASSEMBLY: AC 919-0354-050
5. * INDICATES PARTS NOT USED

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

DWN. BY 10-17-97 K.TEAWELP
DESIGNER(S)
PROJ. LEADER
MFG.

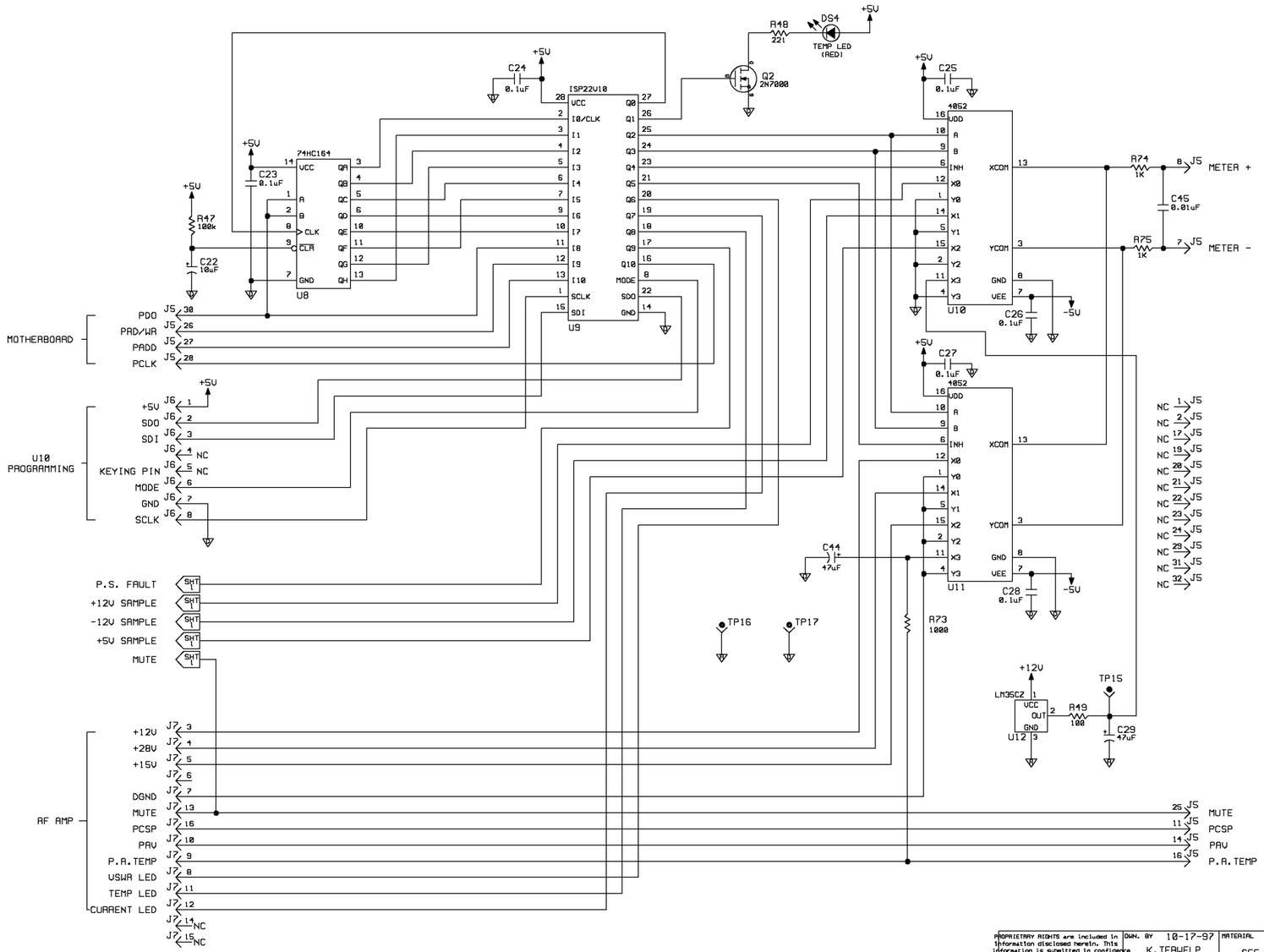
MATERIAL SEE BOM 919-0354-050
FINISH
NEXT ASSY. AC 919-0354-050

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

TITLE: POWER SUPPLY MODULE

TYPE S | SIZE B | DWG. NO. 919-0354-050 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 2



TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1

DWN. BY 10-17-97
K.TEAWELP
DESIGNER(S)
PROJ. LEADER
MFG.

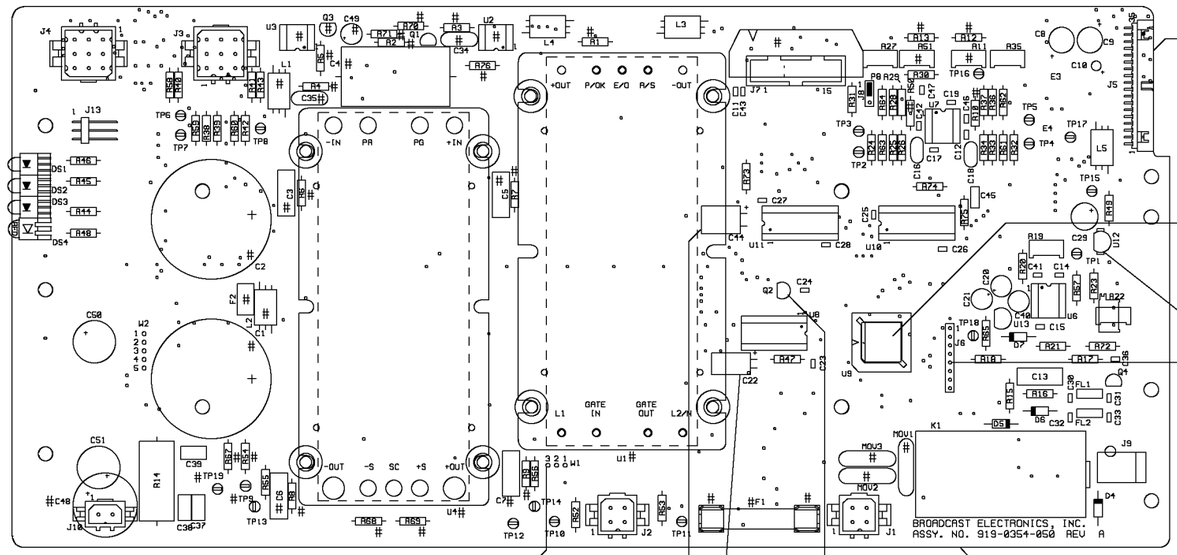
MATERIAL: SEE BOM 919-0354-050
FINISH
NEXT ASSY.: AC 919-0354-050

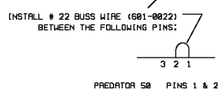
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: POWER SUPPLY MODULE

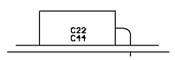
TYPE S | SIZE B | DWG. NO. 919-0354-050 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 2 OF 2

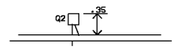




DETAIL A

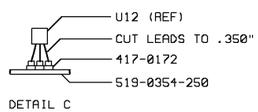


DETAIL B



DETAIL D

NOTES:
1. SEE SCHEMATIC SB919-0354-050.
2. # INDICATES PARTS NOT USED ON PREDATOR 50 (919-0354-050).



DETAIL C

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

DWN. BY	10-23-97 K.TERWELP
DESIGNER(S)	
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOM 919-0354-050
FINISH	
NEXT ASSY.	

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

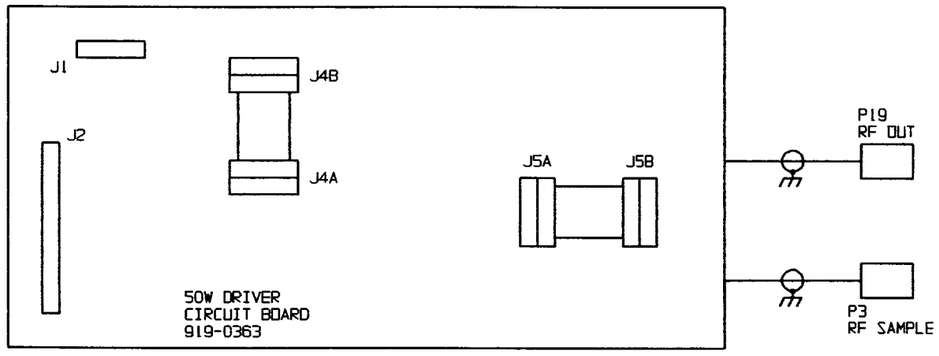
TITLE: PCB ASSEMBLY
POWER SUPPLY MODLULE (50 WATT)

TYPE	SIZE	DWG No.	REV
A	C	919-0354-050	A

MODEL PREDATOR-50 | SCALE 1/1 | SHEET 1 OF 1

J1 TO J7 ON POWER SUPPLY CIRCUIT BD.		
J1 PIN	DESCRIPTION	J7 PIN
1	FWD	1
2	RFL	2
3	+5V METER SAMPLE	3
4	+28V METER SAMPLE	4
5	+15V METER SAMPLE	5
6	NC	6
7	GND	7
8	VSWR	8
9	TEMP	9
10	PAV METER SAMPLE	10
11	TEMP	11
12	PA CURRENT	12
13	MUTE	13
14	NC	14
15	NC	15
16	PWR CNTL	16

J4A TO J4B		
J4A PIN	DESCRIPTION	J4B PIN
1	PAV	1
2	PAV	2
3	+15V	3
4	TEMP	4
5	KEYING PIN	5
6	PWR CNTL	6



J2 TO J4 ON POWER SUPPLY CIRCUIT BOARD		
J2 PIN	DESCRIPTION	J4 PIN
1	+5V	1
2	GND	2
3	PAV INPUT	3
4	PAV INPUT	4
5	GND	5
6	NC	6
7	GND	7
8	NC	8
9	+28V INPUT	9

J5A TO J5B		
J5A PIN	DESCRIPTION	J5B PIN
1	+15V	1
2	KEYING PIN	2
3	FWD PWR SAMPLE	3
4	RFL PWR SAMPLE	4

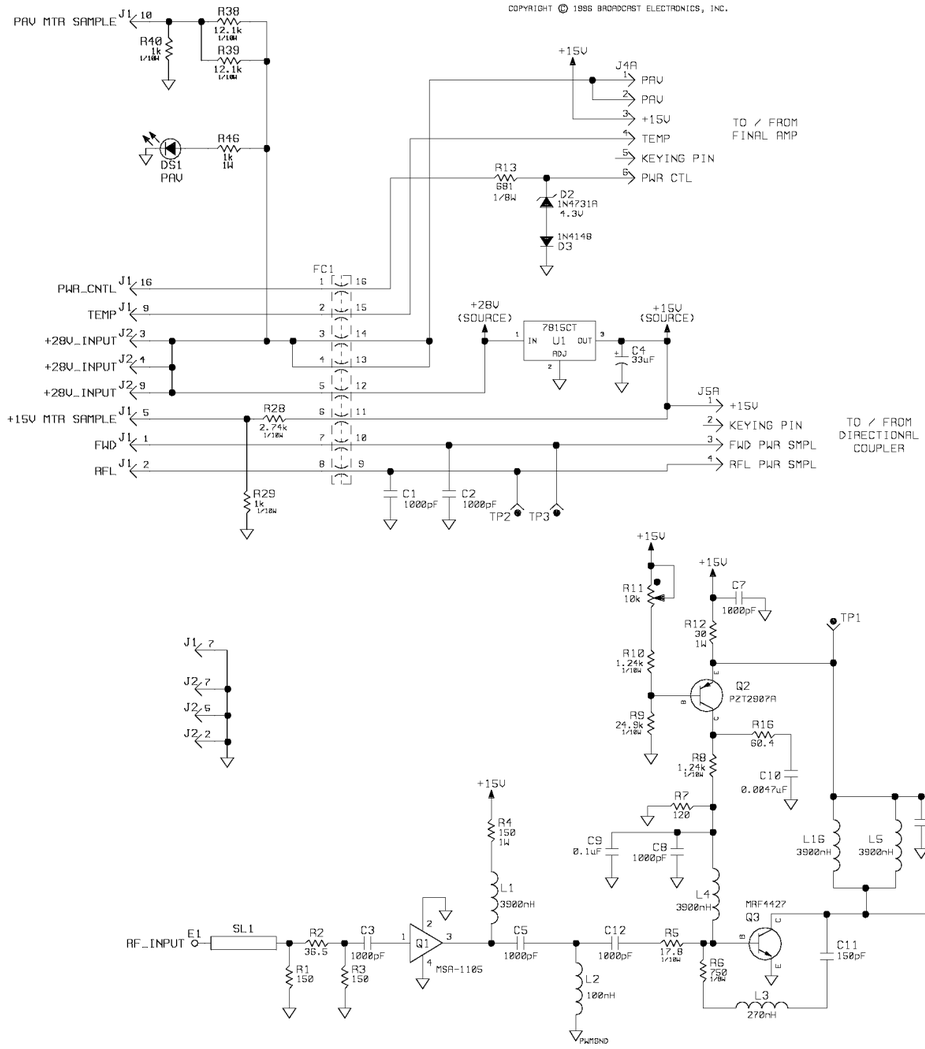
DWN. BY MSE 11-10-98
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL
FINISH
SEE DWG RA592-0000
NEXT ASSY.
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

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

TITLE: BLOCK DIAGRAM, 50W POWER AMP

TYPE	SIZE	DWG. NO.	REV
	C	959-0363	A

MODEL PREDATOR SCALE NTS SHEET 1 OF 1



NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C67, D6, DS5, E4, FC1, FL1, J7, L25, P3, Q9, R67, TP3, U2
3. COMPONENTS NOT USED: C6, L15, J6, P1, P2, R53
4. SEE ASSEMBLY: AC919-0362

DWN. BY	JLF 2-10-97
DESIGNER(S)	
PROJ. LEADER	
MFG.	
MATERIAL	
FINISH	
NEXT ASSY.	

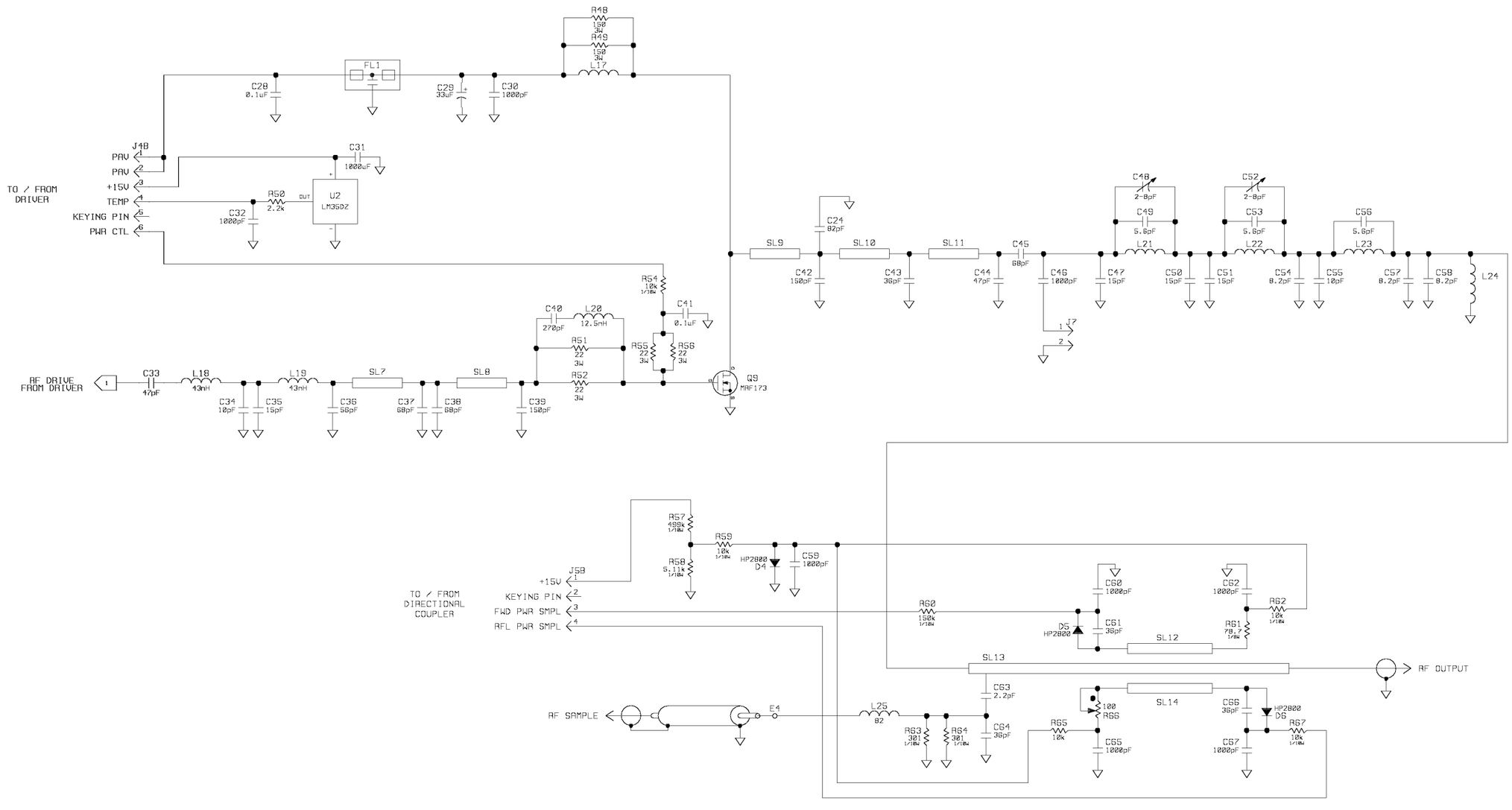
TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3088 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE: SCHEMATIC 50W RF AMP

TYPE	SIZE	DWG. NO.	REV
S	D	919-0363	A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 2



TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .010 ANGLES ± 1°

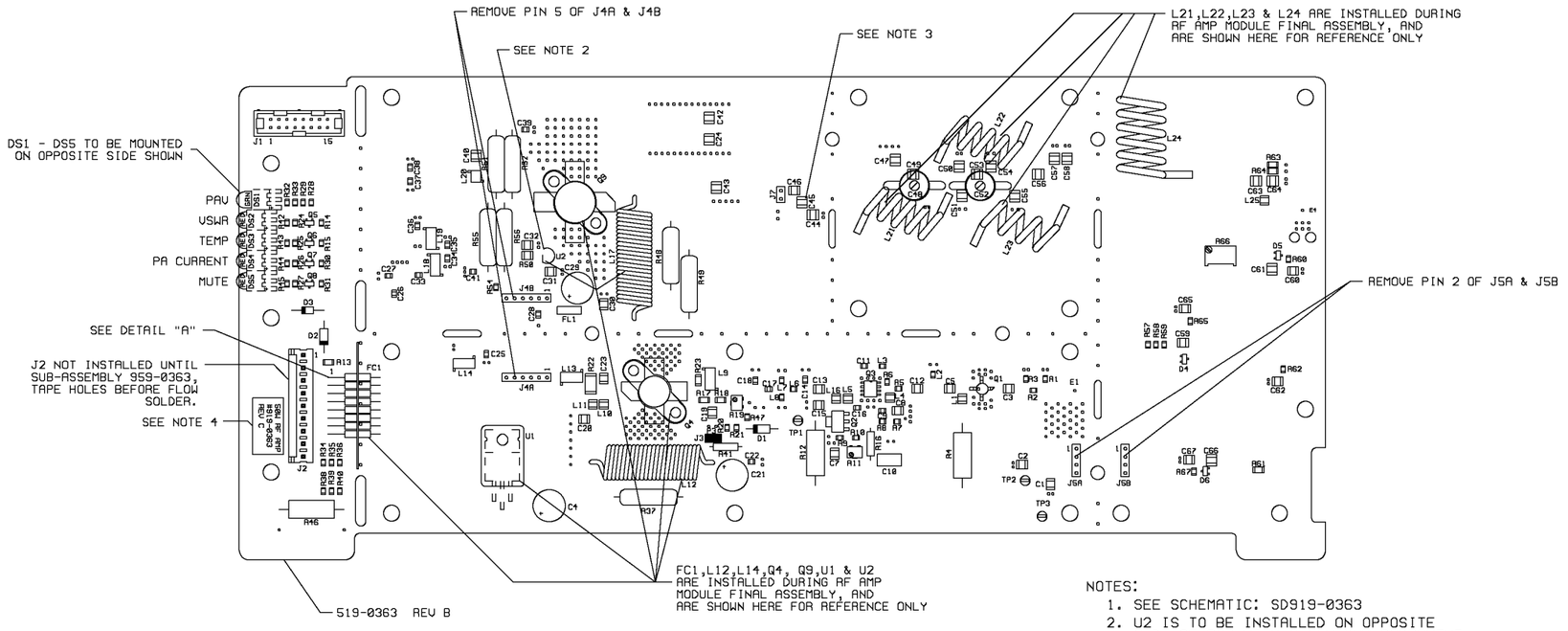
DWN. BY JLF 2-10-97
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL
FINISH
NEXT ASSY.

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

TITLE SCHEMATIC 50W RF AMP

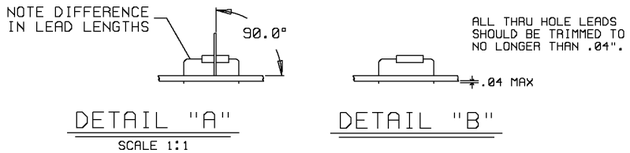
TYPE S | SIZE D | DWG. NO. 919-0363 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 2 OF 2



NOTES:

1. SEE SCHEMATIC: SD919-0363
2. U2 IS TO BE INSTALLED ON OPPOSITE SIDE OF PCB WITH A MAXIMUM COMPONENT HEIGHT OF 0.220".
3. C45 IS NOT INSTALLED UNTIL AFTER PCB TEST.
4. IN THE BLANK WHITE BOX WRITE THE REV. LETTER THAT APPEARS WITHIN THE REV. BLOCK OF THE CURRENT ASSEMBLY DRAWING.



TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

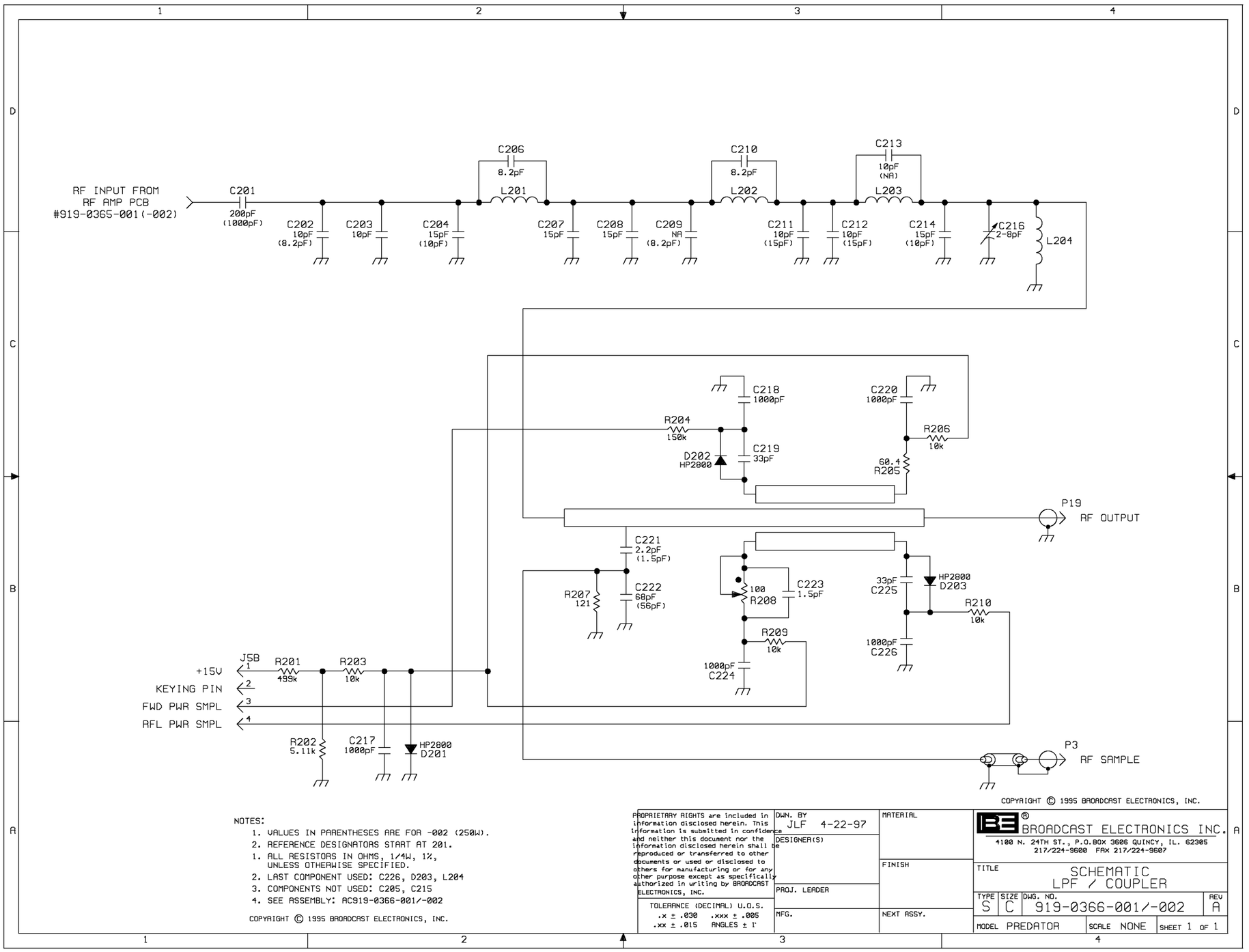
DWN. BY	JLF 3-5-97
DESIGNER(S)	DEAN LONG
PROJ. LEADER	ROBERT SHADE
MFG.	11/25/98 D. NEWLON
MATERIAL	SEE BOM 919-0363
FINISH	-
NEXT ASSY.	959-0363

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

TITLE: PCB ASSEMBLY 50W RF AMP PCB

TYPE	SIZE	DWG No.	REV
A	C	919-0363	C

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1

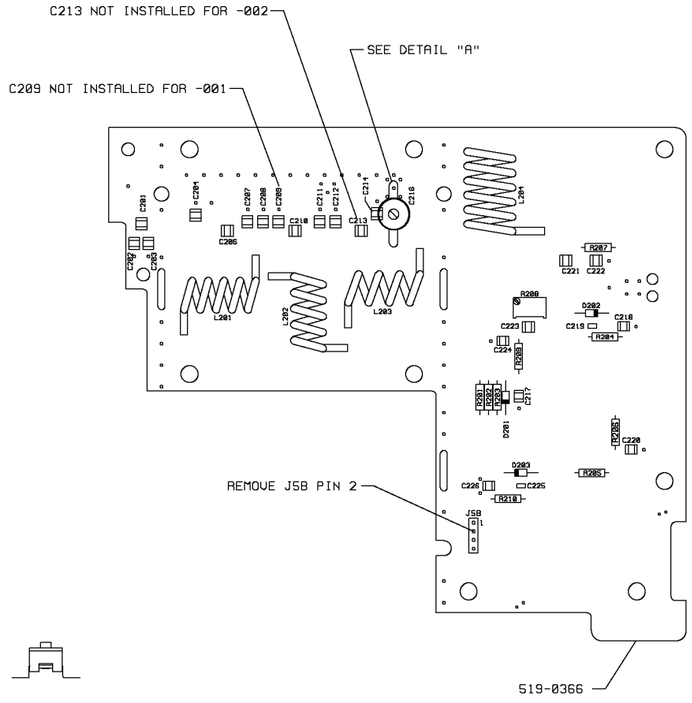


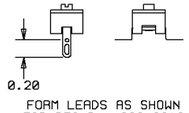
NOTES:

1. VALUES IN PARENTHESES ARE FOR -002 (250W).
2. REFERENCE DESIGNATORS START AT 201.
1. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C226, D203, L204
3. COMPONENTS NOT USED: C205, C215
4. SEE ASSEMBLY: AC919-0366-001/-002

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

DWN. BY JLF 4-22-97	MATERIAL	BROADCAST ELECTRONICS INC.
DESIGNER(S)		4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
	FINISH	217/224-9600 FAX 217/224-9607
PROJ. LEADER		TITLE: SCHEMATIC LPF / COUPLER
MFG.	NEXT ASSY.	TYPE S SIZE C DWG. NO. 919-0366-001/-002 REV A
		MODEL PREDATOR SCALE NONE SHEET 1 OF 1





FORM LEADS AS SHOWN
FOR BEI P/N 096-0010

DETAIL "A"

SCALE = 1:1

NOTES:
1. SEE SCHEMATIC: SC919-0366-001/-002

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY
JLF 5-5-97

DESIGNER(S)
WHB 5-13-97

PROJ. LEADER

MFG.

MATERIAL
SEE BOMs
919-0366-001
919-0366-002

FINISH

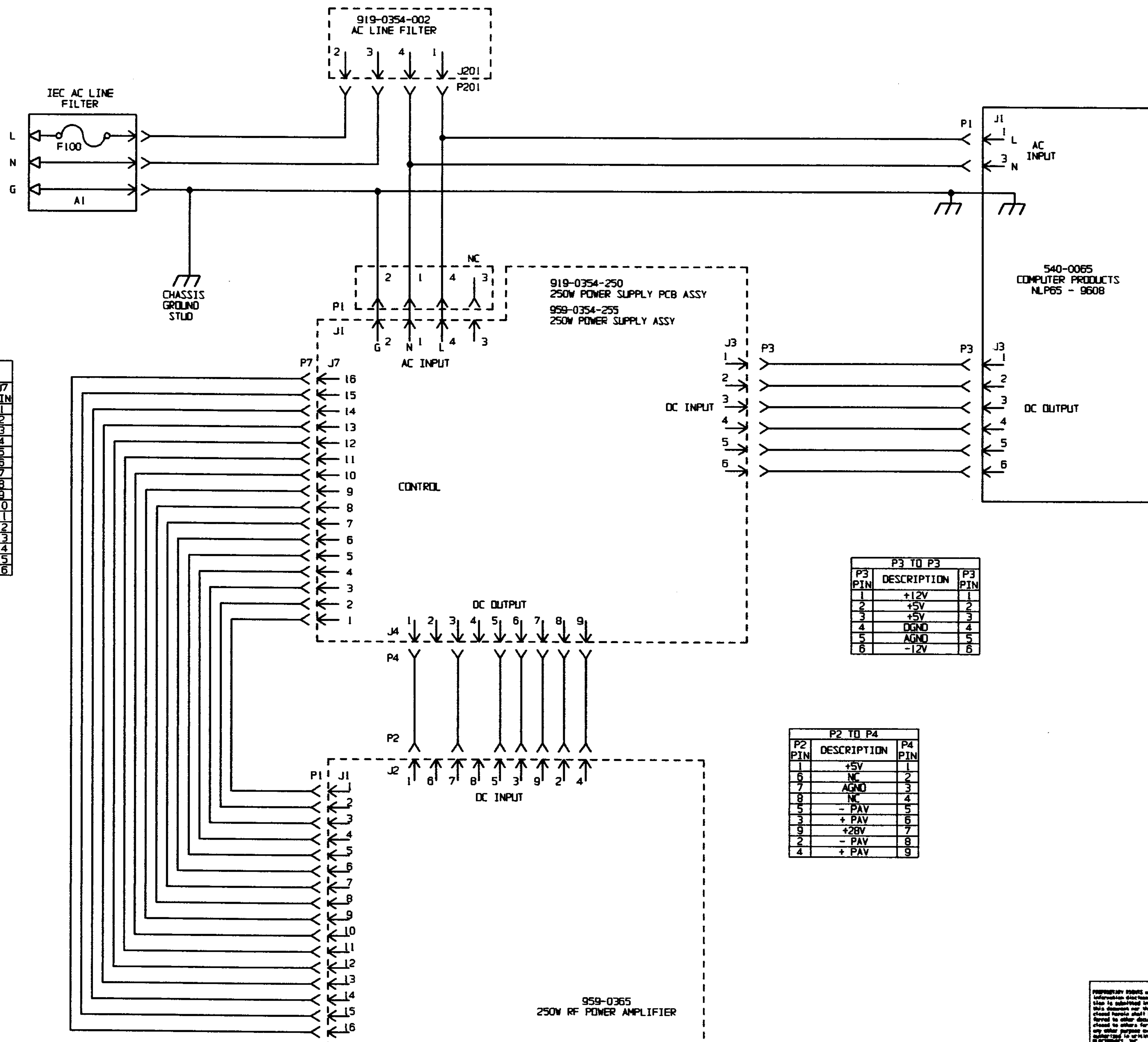
NEXT ASSY.
959-0364
959-0365

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

TITLE
PCB ASSEMBLY
LPF / COUPLER

TYPE	SIZE	DWG No.	REV
A	C	919-0366-001/-002	A

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1



J1 TO J7 ON POWER SUPPLY CIRCUIT BD.		
J1 PIN	DESCRIPTION	J7 PIN
1	FWD PWR SAMPLE	1
2	RFL PWR SAMPLE	2
3	+5V METER SAMPLE	3
4	+28V METER SAMPLE	4
5	+15V METER SAMPLE	5
6	NC	6
7	D GND	7
8	VSWR LED	8
9	TEMP LED	9
10	PAV METER SAMPLE	10
11	TEMP LED	11
12	PA CURRENT LED	12
13	MUTE	13
14	NC	14
15	NC	15
16	PWR CNTL	16

P3 TO P3		
P3 PIN	DESCRIPTION	P3 PIN
1	+12V	1
2	+5V	2
3	+5V	3
4	DGND	4
5	AGND	5
6	-12V	6

P2 TO P4		
P2 PIN	DESCRIPTION	P4 PIN
1	+5V	1
6	NC	2
7	AGND	3
8	NC	4
5	- PAV	5
3	+ PAV	6
9	+28V	7
2	- PAV	8
4	+ PAV	9

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

DWN. BY: MSE 3-9-98
DESIGNER(S):
PROJ. LEADER:
MFG.:
MATERIAL: SEE B/M 959-0354-250
FINISH:
SEE DWG RA582-0008
NEXT ASSY.:

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

TITLE: WIRING DIAGRAM
250W, P.S. / RF MODULE

TYPE: W | SIZE: D | DWG. NO.: 959-0354-250 | REV: A
MODEL: 250W | SCALE: NTS | SHEET 1 OF 1

P.S. FAULT

AC LINE/ RFI FILTER

CHASSIS GND LUG

P.A. POWER SUPPLY

AC LINE RELAY CONTROL

MUTE

+12V SAMPLE

-12V SAMPLE

+5V SAMPLE

FROM LOW VOLTAGE POWER SUPPLY

DC TO RF AMP

MOTHERBOARD

BULK SUPPLY TEST (FLOATING)

117V AC ~ 260V DC
234V AC ~ 375V DC

VI-HAM-EM

V375A48C600

RF AMP REFLECTED POWER
0.48V @ 1.5:1 VSWR
10W

RF AMP FORWARD POWER
2.66V @ 250W

REFLECTED POWER CALIBRATE

FORWARD POWER CALIBRATE

DC TO FAN

MUTE

W1 #18 BUSS

919-0354-001
18V TO 28V DC / DC CONVERTER
PREDATOR 250 ONLY

4.75V @ 12.0 AMP

PAI

PARP

PAFP

NOTES:
1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C51,D7,DS4,E2, F2,FL2,J13,K1,L5,P8,Q4,R76,TP18,U13.
3. COMPONENTS NOT USED: J1,J12,U5,D1-D3.
4. SEE ASSEMBLY: AC 919-0354-250
5. * INDICATES PARTS NOT USED.

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

DWN. BY 10-17-97 K.TERWELP
DES(GNER(S)
PROJ. LEADER
MFG.

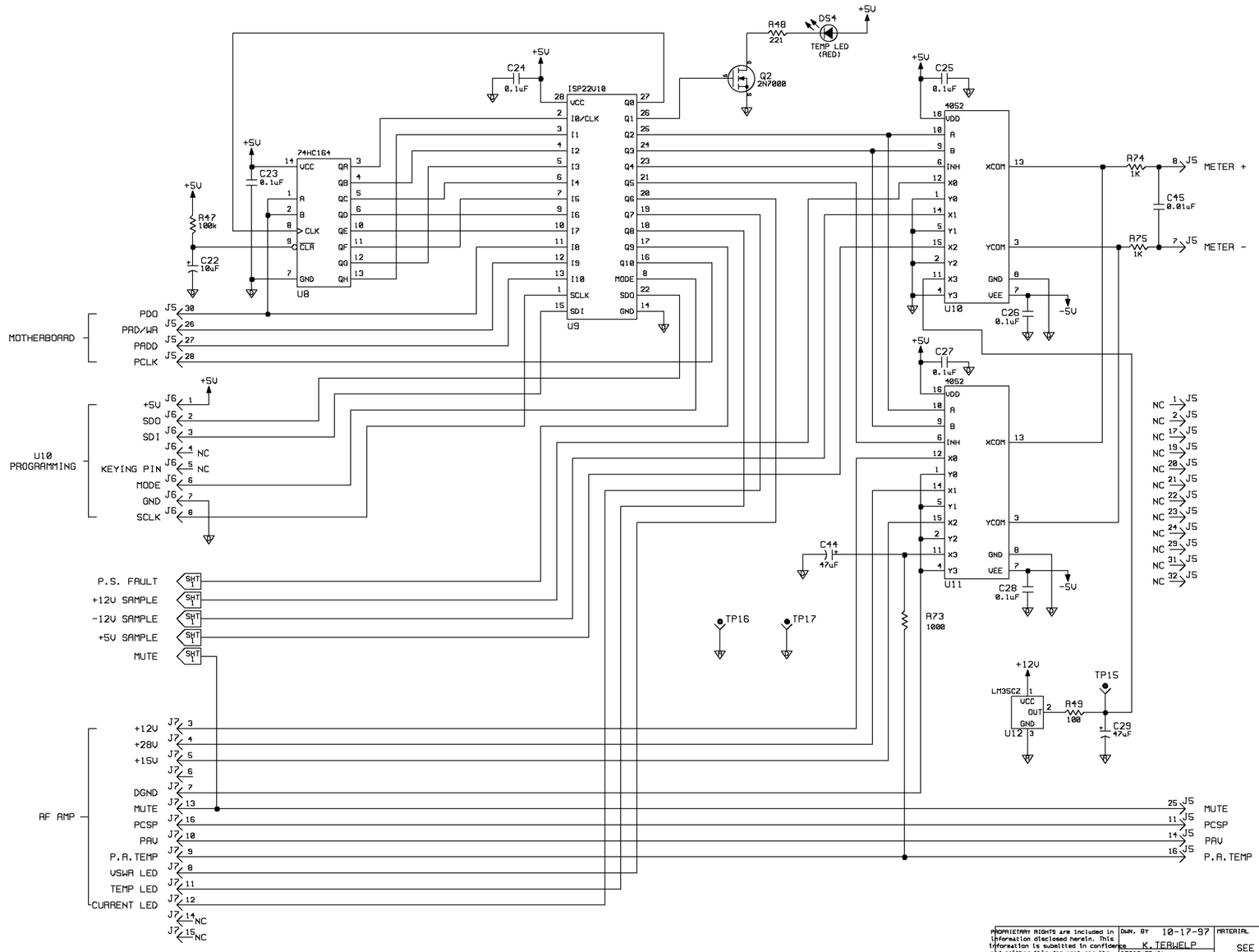
MATERIAL SEE BOM 919-0354-250
FINISH
NEXT ASSY. AC 919-0354-250

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3886 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9687

TITLE: POWER SUPPLY MODULE

TYPE S | SIZE B | DWG. NO. 919-0354-250 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 2



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

DWN. BY 10-17-97
K.TEAHELP
DESIGNER(S)
PROJ. LEADER
MFG.

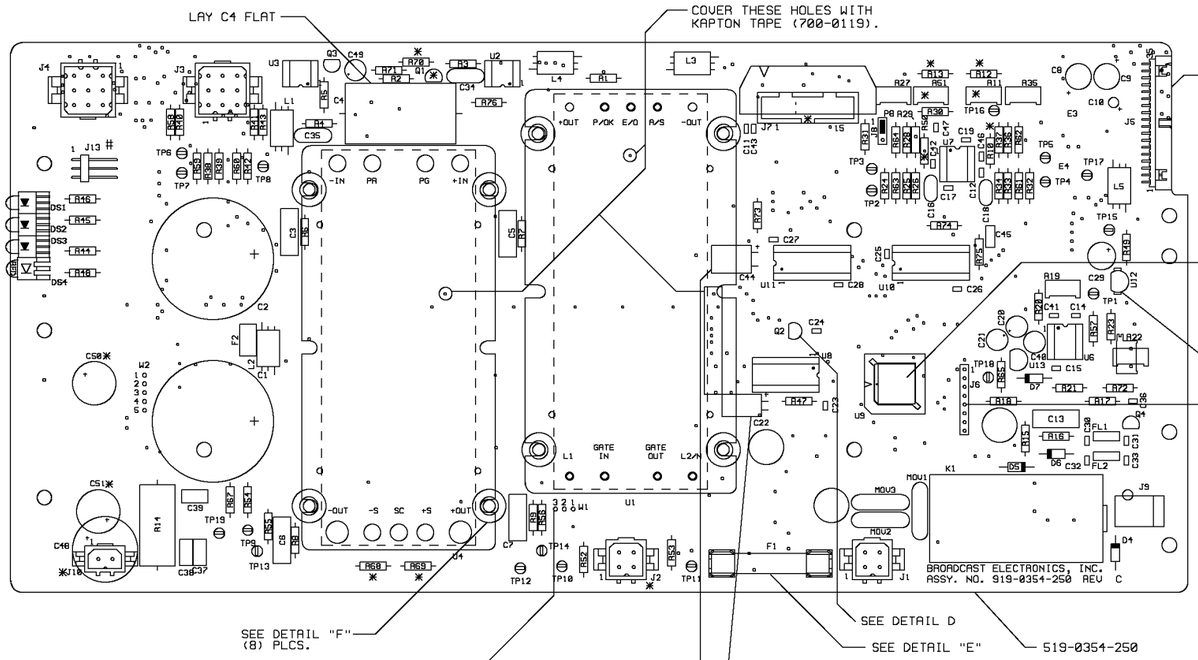
MATERIAL
SEE BOM
919-0354-250
FINISH
NEXT ASSY.
AC 919-0354-250

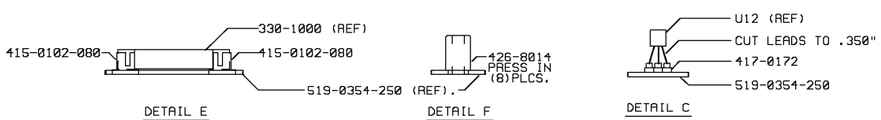
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3686 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE
POWER SUPPLY MODULE

TYPE S | SIZE B | DWG. NO. 919-0354-250 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 2 OF 2

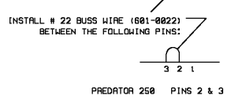




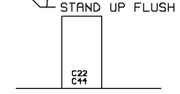
DETAIL E

DETAIL F

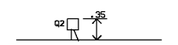
DETAIL C



DETAIL A



DETAIL B



DETAIL D

NOTES:
1. SEE SCHEMATIC SB919-0354-250.
2. ✱ INDICATES PARTS NOT USED ON PREDATOR 250 (919-0354-250).

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY	10-23-97	K. TERWELP
DESIGNER(S)	12-1-98	R. McDONOUGH
PROJ. LEADER	12-1-98	R. J. SHADE
MFG.	12-1-98	D. NEWLON

MATERIAL: SEE BOM 919-0354-250
FINISH:
NEXT ASSY.

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

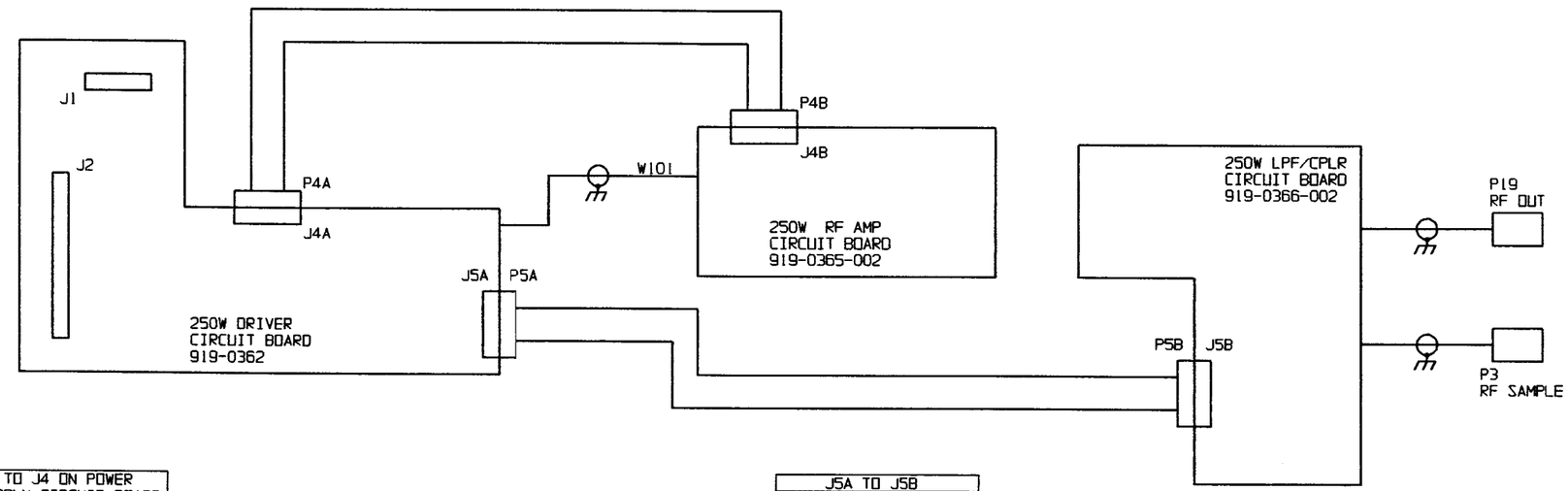
TITLE: PCB ASSEMBLY
POWER SUPPLY MODLULE (250 WATT)

TYPE	SIZE	DWG No.	REV
A	C	919-0354-250	C

MODEL PREDATOR-250 | SCALE 1/1 | SHEET 1 OF 1

J1 TO J7 ON POWER SUPPLY CIRCUIT BD.		
J1 PIN	DESCRIPTION	J7 PIN
1	FWD	1
2	RFL	2
3	+5V METER SAMPLE	3
4	+28V METER SAMPLE	4
5	+15V METER SAMPLE	5
6	NC	6
7	GND	7
8	VSWR	8
9	TEMP	9
10	PAV METER SAMPLE	10
11	TEMP	11
12	PA CURRENT	12
13	MUTE	13
14	NC	14
15	NC	15
16	PWR CNTL	16

J4A TO J4B		
J4A PIN	DESCRIPTION	J4B PIN
1	PAV	1
2	PAV	2
3	+15V	3
4	TEMP	4
5	KEYING PIN	5
6	PWR CNTL	6



J2 TO J4 ON POWER SUPPLY CIRCUIT BOARD		
J2 PIN	DESCRIPTION	J4 PIN
1	+5V	1
2	GND	2
3	PAV INPUT	3
4	PAV INPUT	4
5	GND	5
6	NC	6
7	GND	7
8	NC	8
9	+28V INPUT	9

J5A TO J5B		
J5A PIN	DESCRIPTION	J5B PIN
1	+15V	1
2	KEYING PIN	2
3	FWD PWR SAMPLE	3
4	RFL PWR SAMPLE	4

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

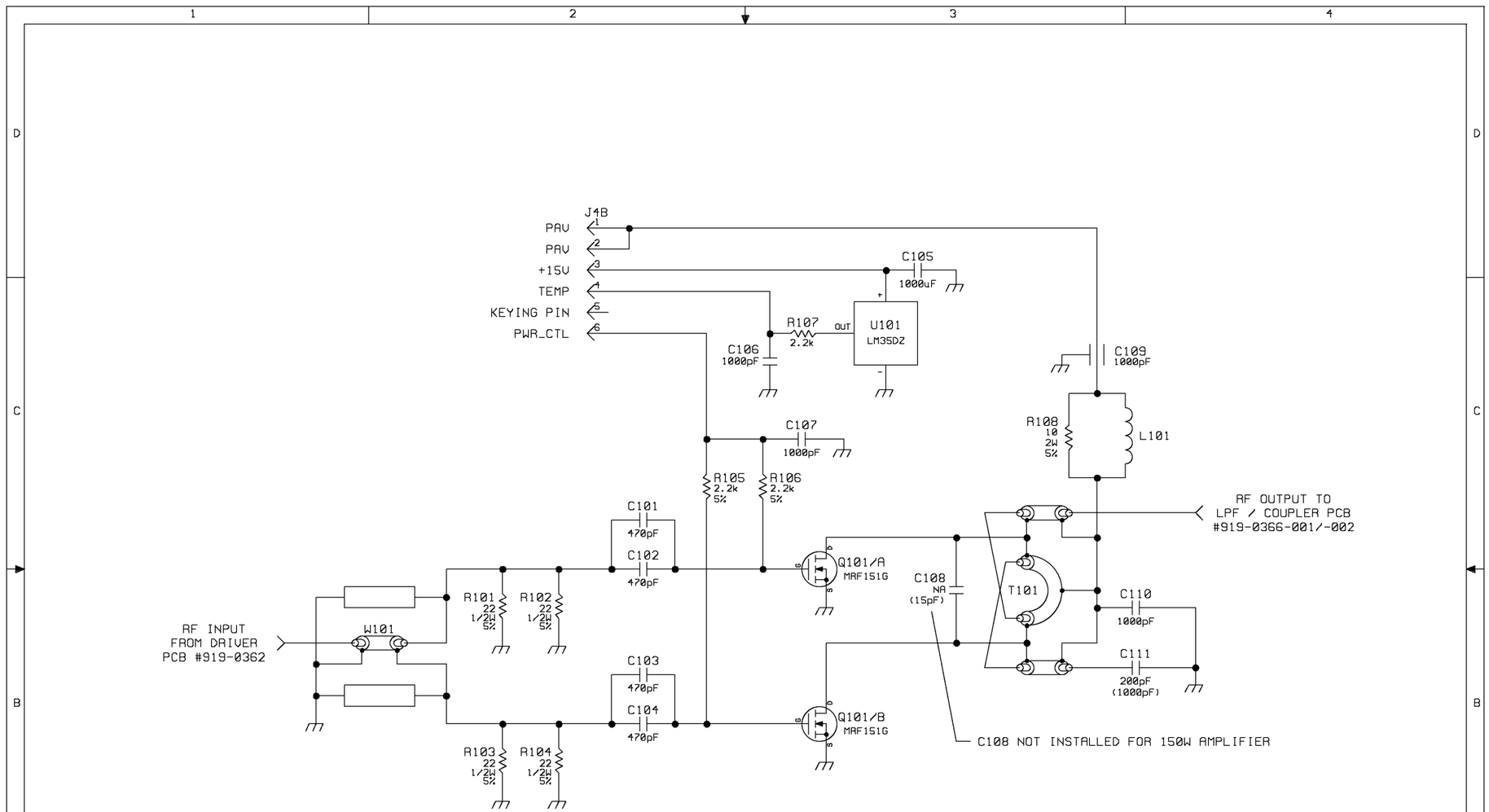
DWN. BY MSE 11-10-98
DESIGNER(S)
PROJ. LEADER
MFG.
MATERIAL
FINISH
SEE DWG RA592-0000
NEXT ASSY.

BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3808 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: BLOCK DIAGRAM, 250W POWER AMP

TYPE	SIZE	DWG. NO.	REV
	C	959-0365	A

MODEL PREDATOR SCALE NTS SHEET 1 OF 1



NOTES:

1. VALUES IN PARENTHESES ARE FOR 250W AMPLIFIER.
2. REFERENCE DESIGNATORS START AT 101.
1. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C111, L101, Q101, U101, T101, W101
3. COMPONENTS NOT USED:
4. SEE ASSEMBLY: AC919-0365-001/-002

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

DWN. BY JLF 4-22-97
DESIGNER(S)
PROJ. LEADER
MFG.

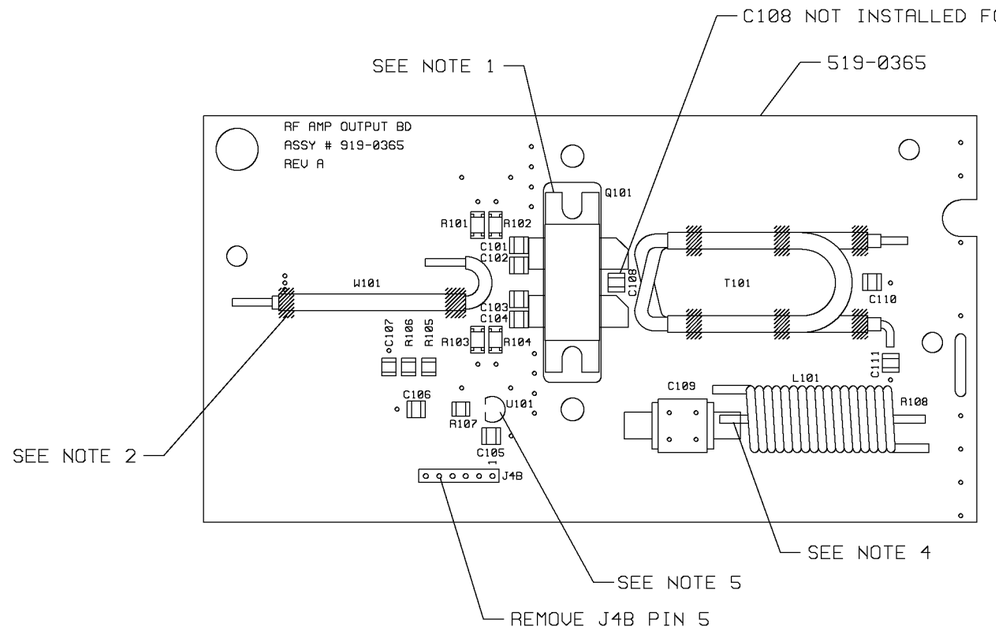
MATERIAL
FINISH
NEXT ASSY.

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

TITLE
SCHEMATIC
RF AMP OUTPUT PCB

TYPE	SIZE	DWG. NO.	REV
S	C	919-0365-001/002	A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 1



NOTES:

1. COMPONENTS SHOWN FOR REFERENCE ONLY: Q101, T101, & W101.
2. OUTER CONDUCTOR OF T101 & W101 TO BE SOLDERED TO PCB WHERE INDICATED BY SHADING DURING RF AMP (959-0364/959-0365) FINAL ASSEMBLY.
3. SEE SCHEMATIC: SD919-0365
4. R108 TO BE ROUTED THRU THE CENTER OF L101 AND SURFACE SOLDERED TO PCB AFTER INSTALLING C109.
5. U101 TO BE MOUNTED ON OPPOSITE SIDE OF PCB WITH A MAXMIMUM COMPONENT HEIGHT OF 0.220".

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

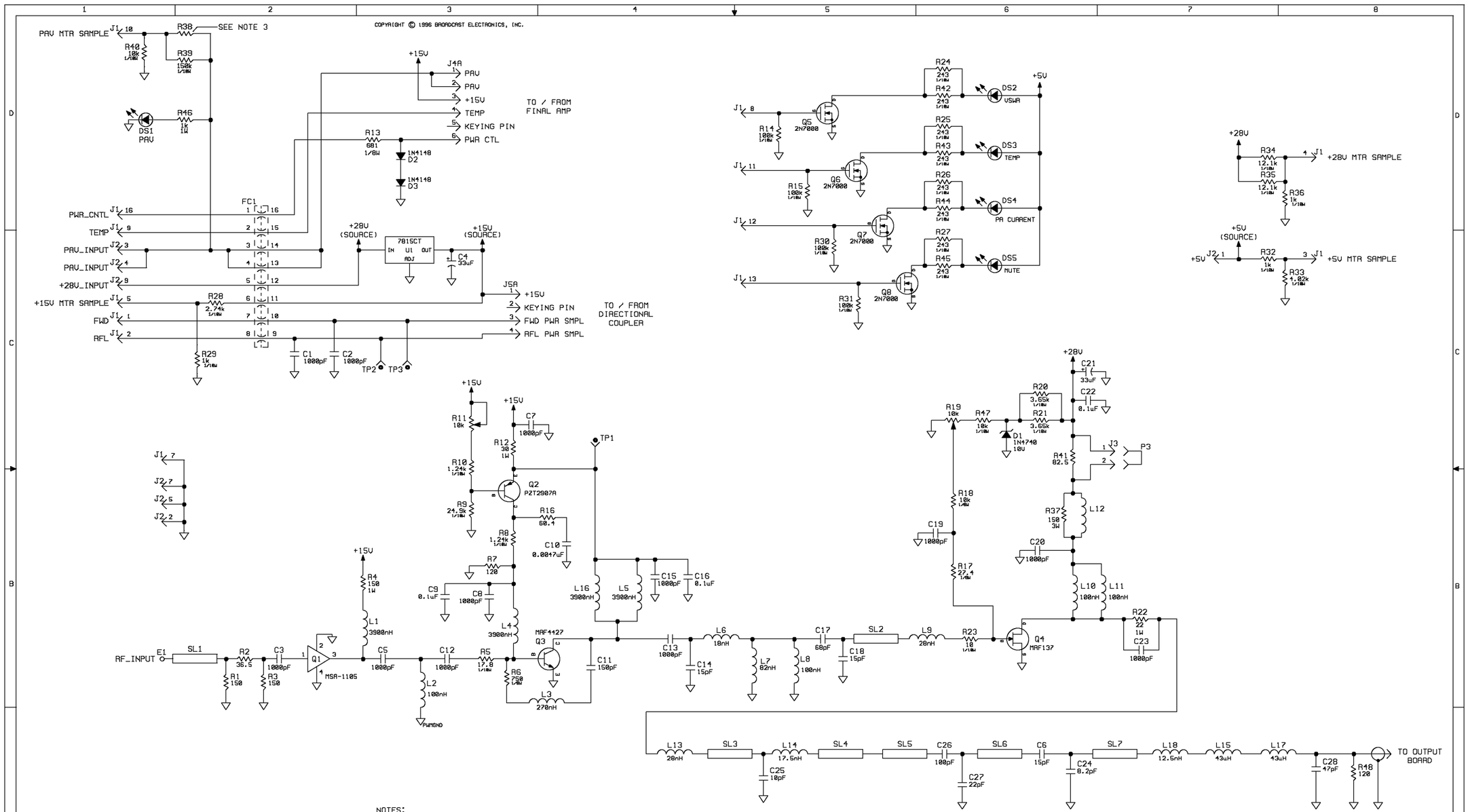
DWN. BY	JLF 5-12-97
DESIGNER(S)	WHB 5-15-97
PROJ. LEADER	
MFG.	
MATERIAL	SEE BOM 919-0365-002
FINISH	
NEXT ASSY.	959-0364 959-0365

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

TITLE: PCB ASSEMBLY RF AMP OUTPUT BD

TYPE	SIZE	DWG No.	REV
A	B	919-0365-002	B

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1


COPYRIGHT © 1996 BROADCAST ELECTRONICS, INC.
PAV MTR SAMPLE
SEE NOTE 3
TO / FROM FINAL AMP
PAV
TEMP
KEYING PIN
PWR CTL
PWR_CNTL
PAV_INPUT
+28V_INPUT
+15V MTR SAMPLE
FWD
RFL
+28V (SOURCE)
+15V (SOURCE)
7815CT
TO / FROM DIRECTIONAL COUPLER
FWD PWR SMPL
RFL PWR SMPL
+5V
VSWR
PA CURRENT
MUTE
+28V MTR SAMPLE
+5V MTR SAMPLE
RF_INPUT
MSA-1105
MRF4427
PZT2907A
MRF137
TO OUTPUT BOARD
NOTES:
1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C28, D4, DS5, E1, FC1, J5, L18, P3, Q8, R48, TP3, U2
3. COMPONENTS NOT USED: R38,P1, P2
4. SEE ASSEMBLY: AC919-0362
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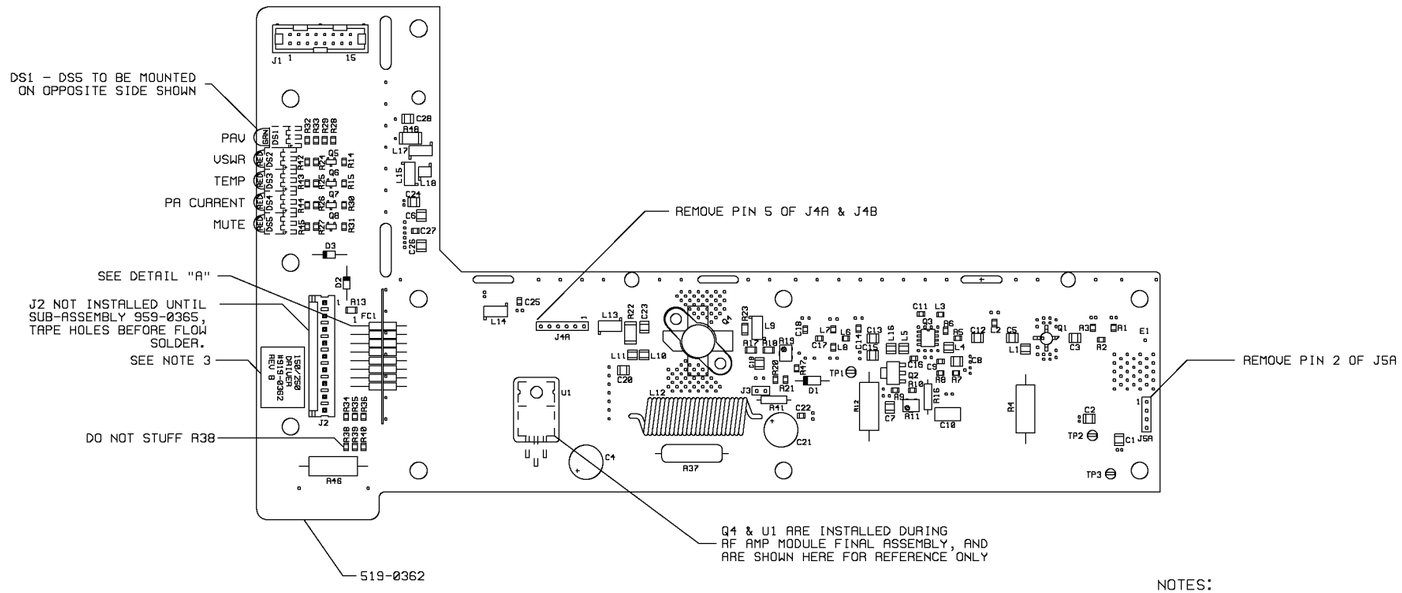
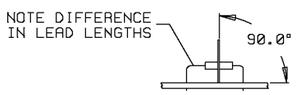
DWN. BY KT 5-23-97
DES(GNER(S)
PROJ. LEADER
MFG.
MATERIAL
FINISH
NEXT ASSY.
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607
TITLE
SCHEMATIC
150/250 DRIVER
TYPE S SIZE B DWG. NO. 919-0362 REV A
MODEL PREDATOR SCALE NONE SHEET 1 OF 1



NOTES:

1. SEE SCHEMATIC: SB919-0362
2. IN THE BLANK WHITE BOX WRITE THE REV. LETTER THAT APPEARS WITHIN THE REV. BLOCK OF THE CURRENT ASSEMBLY DRAWING.



DETAIL "A"
SCALE 1:1

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY KT 5-27-97
DESIGNER(S)
PROJ. LEADER
MFG.

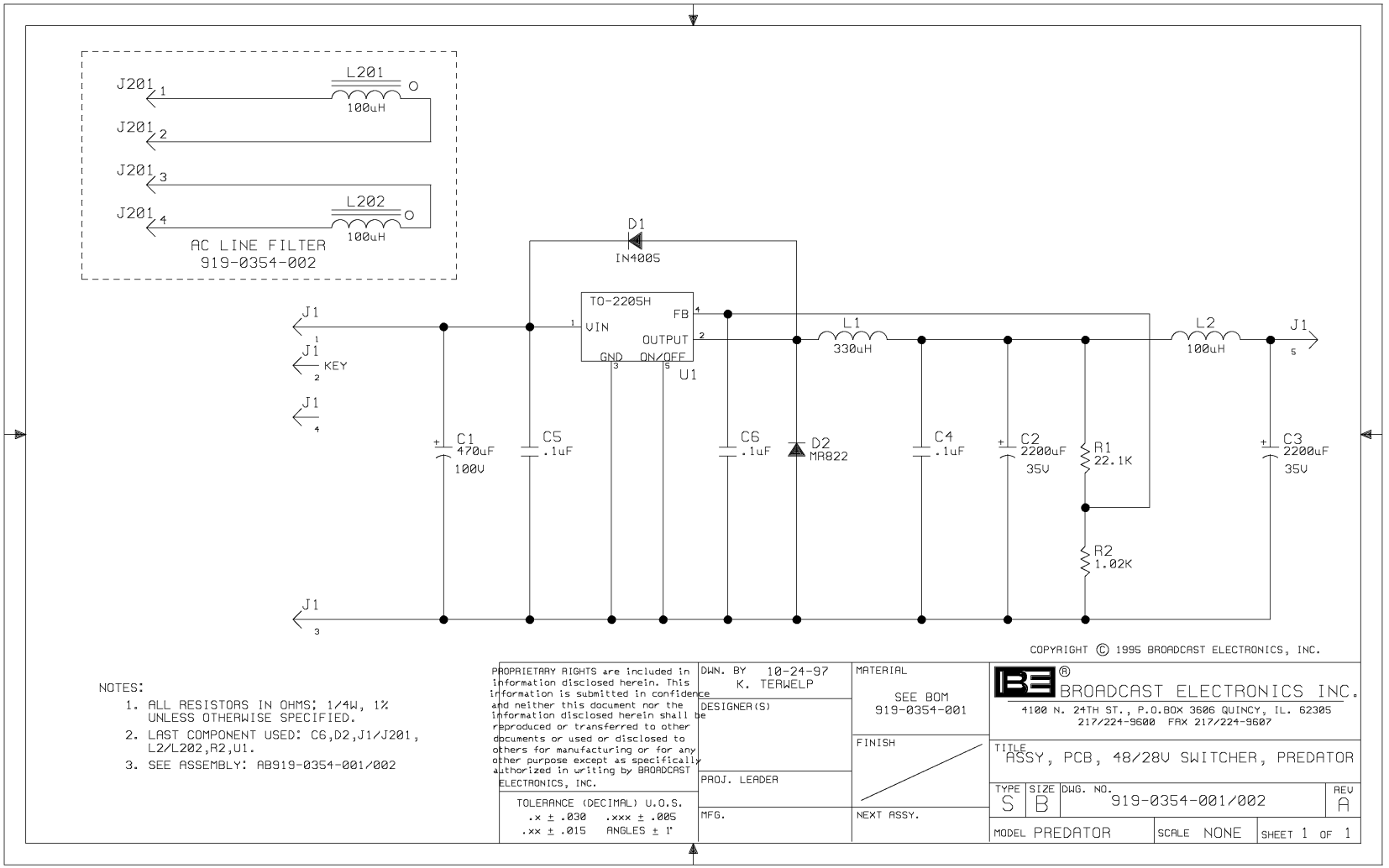
MATERIAL SEE BOM 919-0362
FINISH -
NEXT ASSY. 959-0363

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

TITLE PCB ASSEMBLY 150/250 DRIVER

TYPE	SIZE	DWG No.	REV
A	C	919-0362	B

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1



NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C6,D2,J1/J201, L2/L202,R2,U1.
3. SEE ASSEMBLY: AB919-0354-001/002

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

DWN. BY 10-24-97
K. TERWELP

DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL
SEE BOM
919-0354-001

FINISH

NEXT ASSY.

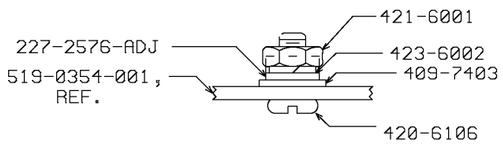
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3606 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

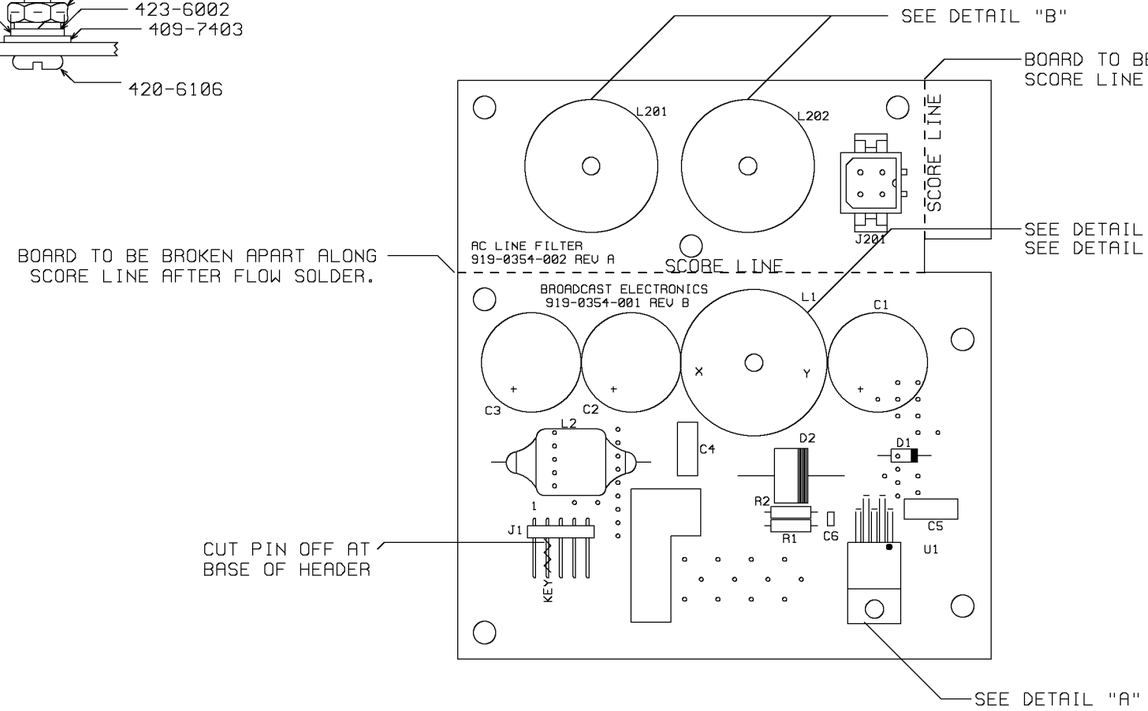
TITLE ASSY, PCB, 48/28V SWITCHER, PREDATOR

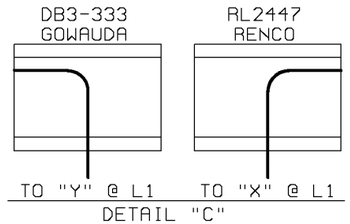
TYPE	SIZE	DWG. NO.	REV
S	B	919-0354-001/002	A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 1

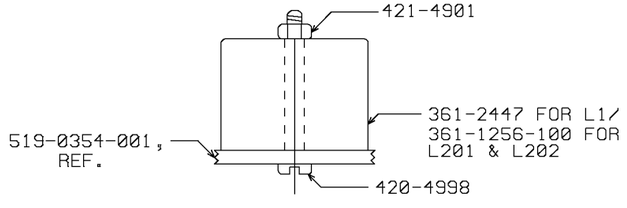
DETAIL A







DETAIL "C"



DETAIL B

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

DWN. BY 10-28-97
K.TERWELP

DESIGNER(S) 12-1-98
R. MCDONOUGH

PROJ. LEADER 12-1-98
ROBERT SHADE

MFG. 12-2-98
D. NEWLON

MATERIAL
SEE BOM
919-0354-001

FINISH

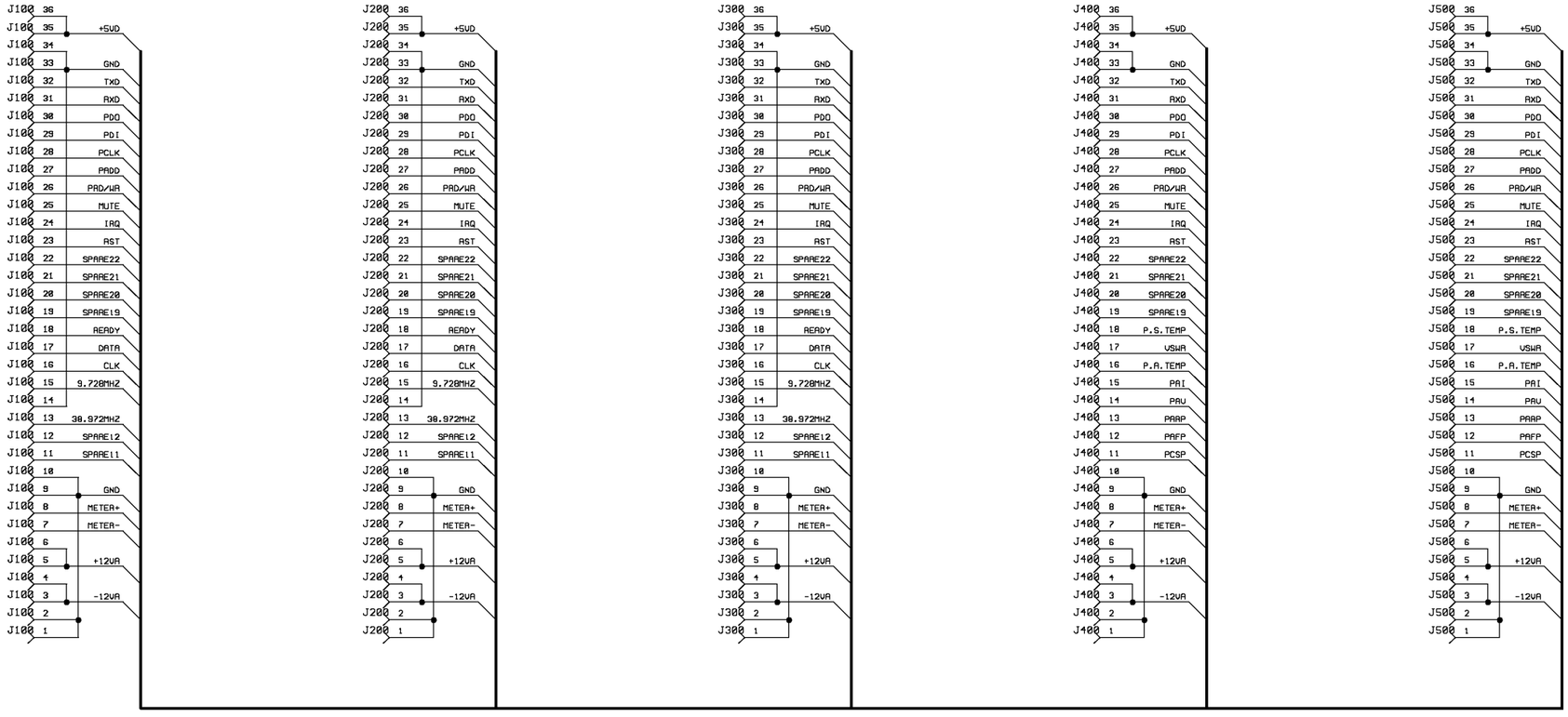
NEXT ASSY.

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

TITLE
ASSY, PCB, 48/28V SWITCHER

TYPE	SIZE	DWG No.	REV
A	B	919-0354-001/002	B

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1



TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1

DWN. BY AGB 8-13-96
DESIGNER(S)
PROJ. LEADER
MFG.

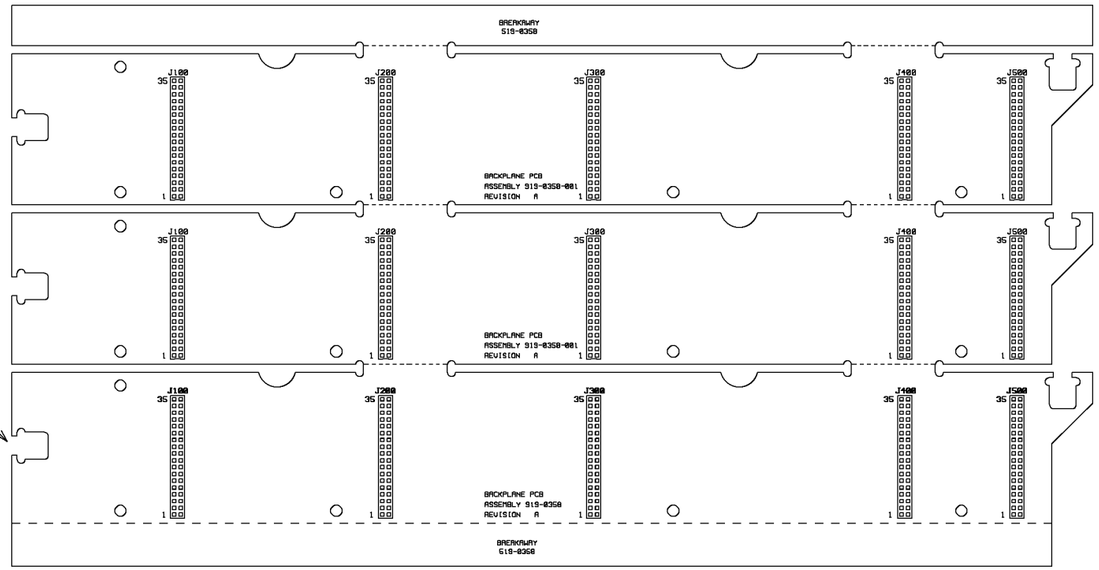
MATERIAL SEE BOM 919-0358
FINISH
NEXT ASSY. AC 919-0358

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

TITLE PCB SCHEMATIC BACKPLANE

TYPE S | SIZE D | DWG. NO. 919-0358 | REV A

MODEL PREDATOR | SCALE NONE | SHEET 1 OF 1

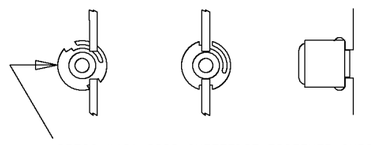


SEE DETAIL "A"

SIDE VIEW
START

SIDE VIEW
FINISH

FRONT VIEW



PRESS #421-6908 SHEETEDGE FASTENER INTO CUTOUT UNTIL SNAPPED INTO PLACE AS SHOWN

DETAIL "A"
TYP. 6 PLCS

NOTES:

1. ALL THREE BOARDS ARE TO BE BUILT IDENTICALLY.
2. BREAK BOARDS APART AT DASHED SCORE LINES AFTER FLOW SOLDER AND DISCARD TOP AND BOTTOM BREAKAWAY PIECES.

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY AEB 8-21-96
DESIGNER(S)
PROJ. LEADER BOB SHADE, 8-21-96
MFG.

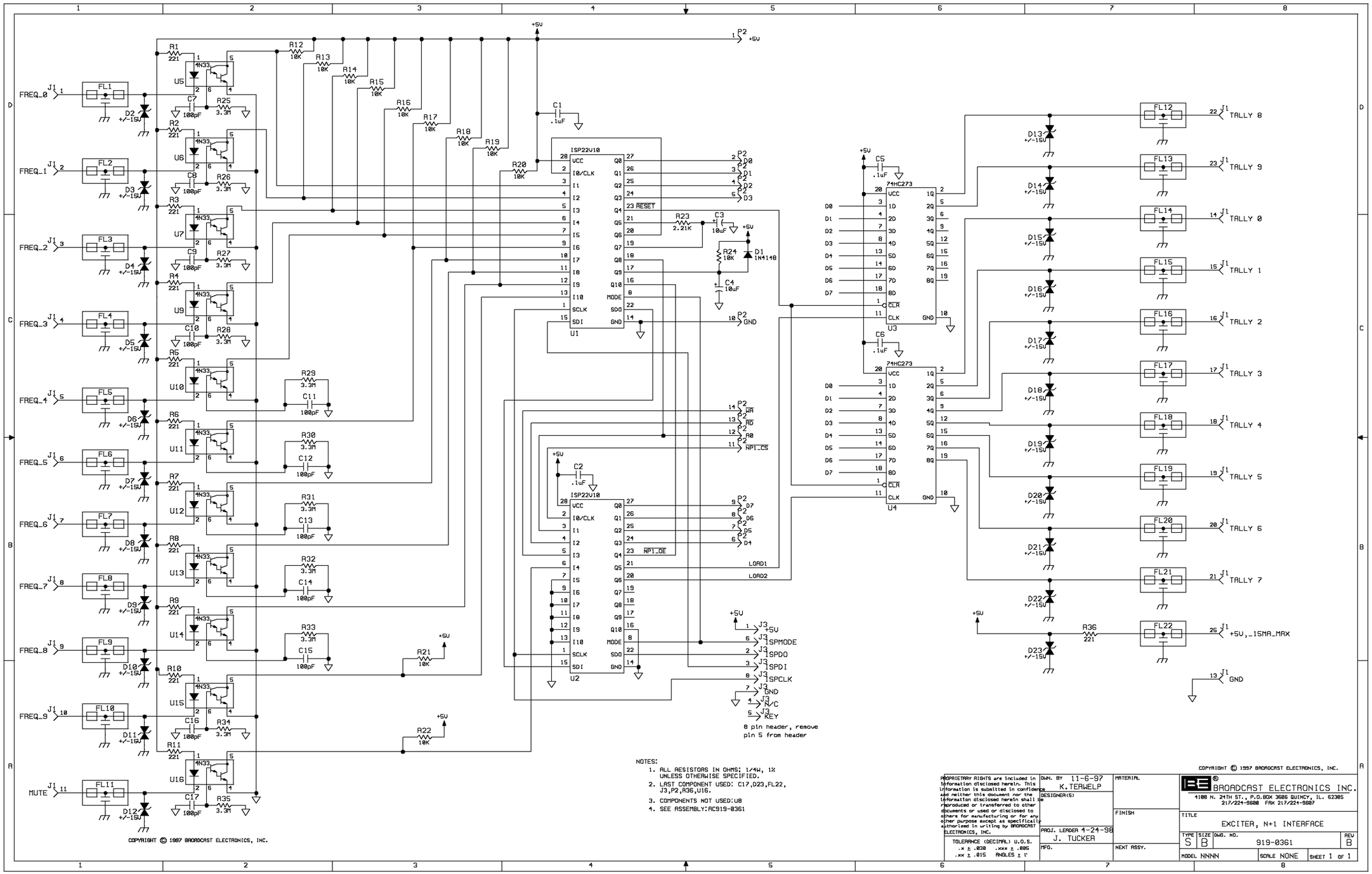
MATERIAL SEE BOM 919-0358-001
FINISH
NEXT ASSY. MC 519-0358-001

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

TITLE PCB ASSEMBLY BACKPLANE

TYPE	SIZE	DWG No.	REV
A	C	919-0358	A

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1



NOTES:

1. ALL RESISTORS IN OHMS; 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: C17,D23,FL22, J3,P2,R36,U16.
3. COMPONENTS NOT USED:U8
4. SEE ASSEMBLY:AC919-0361

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

DWN. BY 11-6-97 K.TERWELP
DESIGNER(S)
PROJ. LEADER 4-24-98 J. TUCKER
MFG.

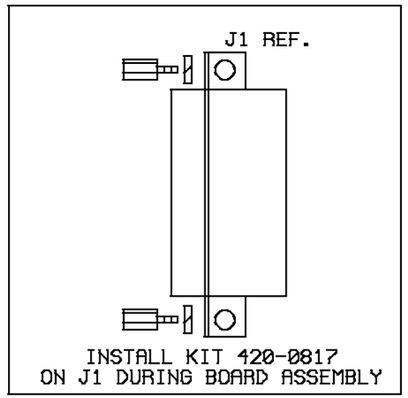
MATERIAL
FINISH
NEXT ASSY.

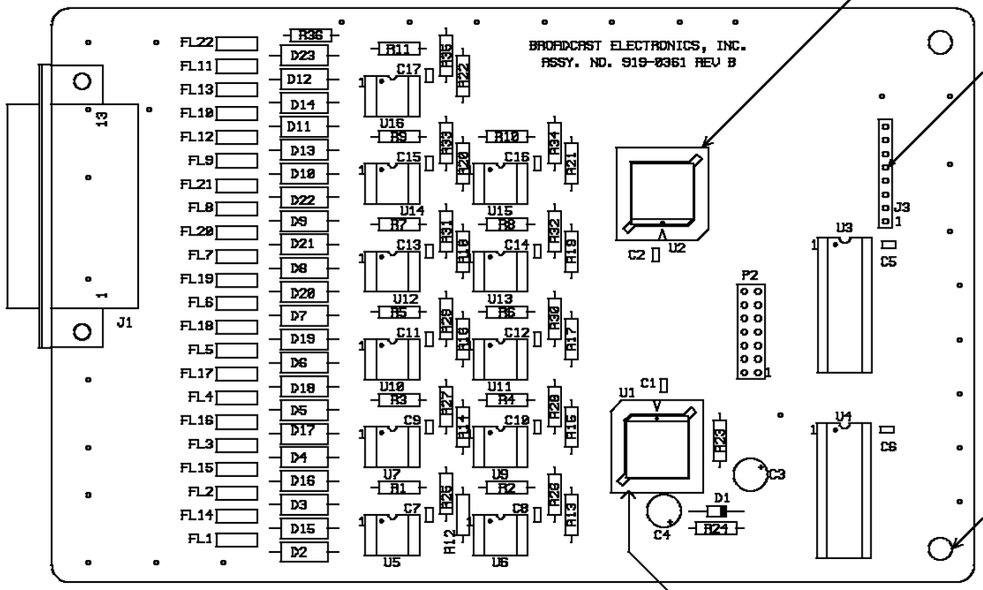
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O.BOX 3686 QUINCY, IL. 62305
217/224-9600 FAX 217/224-9607

TITLE
EXCITER, N+1 INTERFACE

TYPE	SIZE	DWG. NO.	REV
S	B	919-0361	B

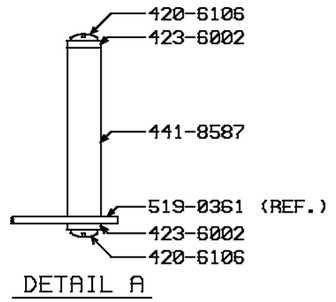
MODEL NNNN | SCALE NONE | SHEET 1 OF 1





INSTALL SOFTWARE 919-0361-SW2 ON U2
DURING BOARD TEST & ADD LABEL TO TOP
OF U2 INDICATING REV 1.0

CUT PIN 5 OFF



DETAIL A

SEE DETAIL "A"
TYP. (2) PLCS.

INSTALL SOFTWARE 919-0361-SW1 ON U1
DURING BOARD TEST & ADD LABEL TO TOP
OF U1 INDICATING REV 1.0

TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN. BY 11-11-97
K. TERWELP
DESIGNER(S)

PROJ. LEADER

MFG.

MATERIAL

FINISH

NEXT ASSY.

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

TITLE
PCB ASSY, EXCITER, N+1 INTERFACE

TYPE	SIZE	DWG No.	REV
A	B	919-0361	B

MODEL PREDATOR | SCALE 1/1 | SHEET 1 OF 1

APPENDIX A

A–1. INTRODUCTION.

A–2. This appendix provides PREDATOR schematic and installation information for exciters to be installed in the field. The information is organized by transmitter model. Select the appropriate transmitter model to locate the applicable information.

A. FM–20T/FM–30T/FM–35T and FM–20B/FM–30B/FM–35B Transmitter Models.

B. FM–5T/FM–5TS/FM–10T/FM–10TS and FM–5B/FM–5BS/FM–10B/FM–10BS Transmitter Models.

C. PREDATOR Installation Instructions For FM C–Series Transmitters.

FM-20T/FM-30T/FM-35T AND FM-20B/FM-30B/FM-35B TRANSMITTER MODELS

A–3. INSTALLATION INSTRUCTIONS.

A–4. REMOVE THE FX-50 EXCITER.

A–5. To remove the FX–50 exciter, proceed as follows:

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

WARNING

1. Disconnect all transmitter primary power.
2. Disconnect the wires connected to TB1.
3. Disconnect the cable connected to the RF OUTPUT receptacle.
4. Disconnect the ac power cable.
5. Remove the exciter from the rack.
6. Remove the slide–rails and mounting brackets.
7. Remove the 1 3/4 inch filler–panel directly below the FX–50 cabinet location.

A–6. INSTALL THE PREDATOR.

A–7. To install the PREDATOR, proceed as follows:

1. Insert the PREDATOR into the exciter location.
2. Determine the holes in the cabinet rails to be used for mounting the exciter. If the holes are not tapped, install the clip–nuts provided in the PREDATOR accessory kit. Secure the PREDATOR to the cabinet using the black Phillips–head hardware provided in the accessory kit.
3. Locate the 25–Pin D–Type remote interface mating connector in the PREDATOR accessory kit.
4. Cut three 3 to 4 inch 22 AWG wire jumpers. The jumpers will be used to connect ground and dc voltage to the appropriate pins in the remote interface mating connector.
5. Refer to Table 1 and solder the wires to the D–Type connector pins as shown. The connector pins will accept a maximum of two wires.

TABLE 1. P3 PREDATOR WIRING		
WIRE	***DESCRIPTION***	***TO***
245/269	Exciter Enable	Exciter J3–4
244	AFC Lock	Exciter J3–2
246	Temp Overload	Exciter J3–15
283	Ground	Exciter J3–20
247	Forward Power	Exciter J3–16
248	Reflected Power	Exciter J3–17
Exciter J3–21	Ground	Exciter J3–3
Exciter J3–22	Ground	Exciter J3–5
Exciter J3–25	+12V dc	Exciter J3–14

6. Locate the D–Type connector backshell in the PREDATOR accessory kit. Install the backshell on the connector.
7. Connect P3 to J3 on the exciter.
8. Connect the BNC–to–Type N adapter on the RF output cable. Attach the connector to the PREDATOR RF OUTPUT receptacle.
9. Refer to SECTION II, INSTALLATION and perform the DIGITAL STEREO GENERATOR MODULE – AUDIO/SCA/RBDS/19 kHz or ANALOG INTERFACE MODULE – AUDIO/SCA/RBDS/COMPOSITE procedures to connect audio, SCA, and RBDS signals to the exciter.

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES. THE UNIT IS EQUIPPED WITH AN AC LINE JUMPER CORD TO PREVENT EXPOSURE TO HAZARDOUS VOLTAGES WHEN THE MODULE IS REMOVED FROM THE CHASSIS. FAILURE TO USE THE NEW CORD MAY RESULT IN POSSIBLE SEVERE INJURY OR DEATH.***

10. Connect the transmitter ac line cord to the PREDATOR ac input jumper cord.

A–8. EXCITER PROGRAMMING - B-SERIES TRANSMITTERS WITH MVDS.

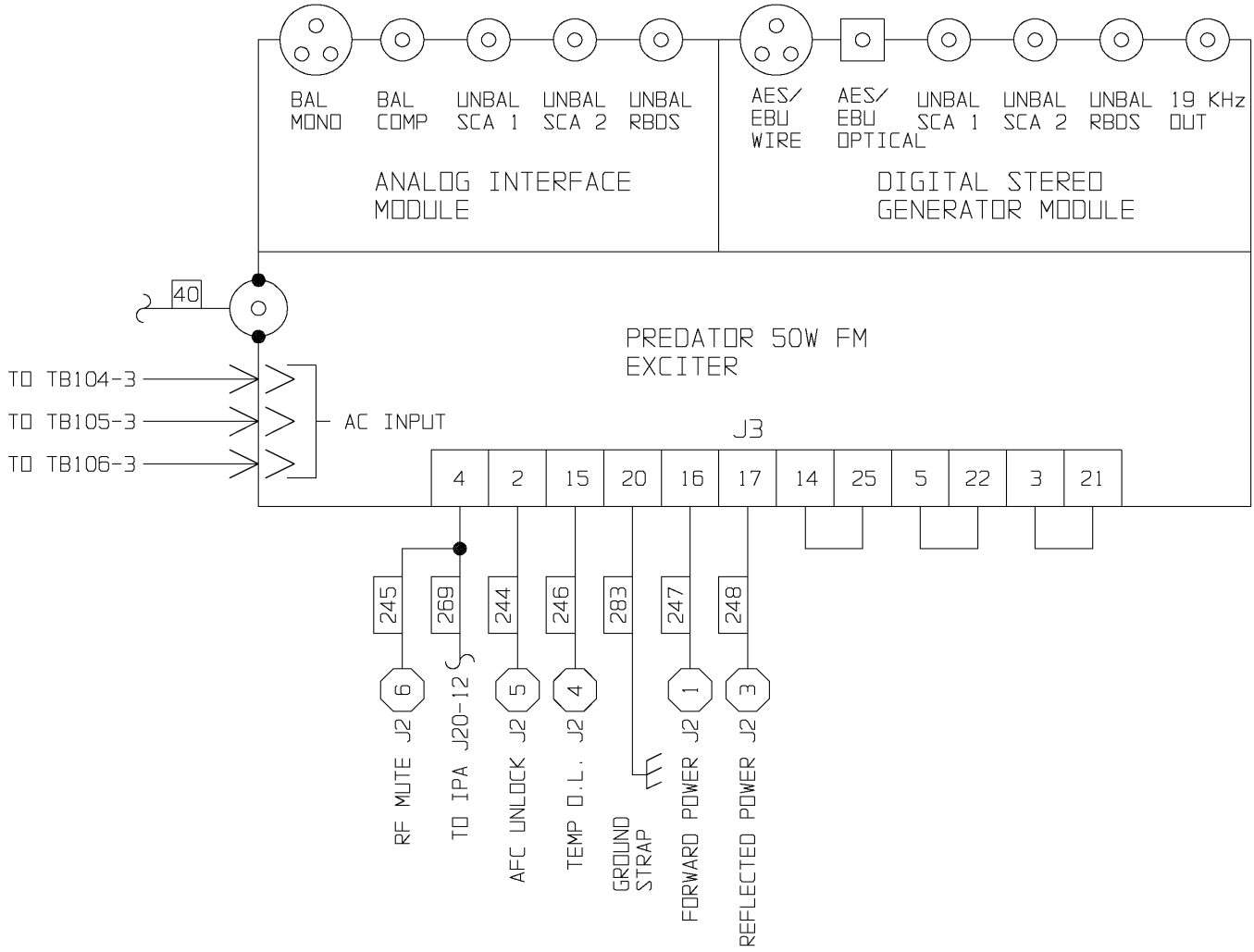
A–9. For B–Series transmitters equipped with MVDS, the MVDS exciter parameter must be changed from FX–50 to OTHER. Refer to the MVDS manual and change the exciter parameter from FX–50 to OTHER.

A–10. DRAWINGS.

A–11. The following text presents a schematic diagram for an FM–20T/FM–30T/FM–35T or FM–20B/FM–30B/FM–35B transmitter equipped with a PREDATOR exciter. The schematic diagram is to be used in association with the following overall schematic diagrams in the transmitter manual (refer to SECTION VII, DRAWINGS in the transmitter manual).

MODEL	SCHEMATIC DIAGRAM	MANUAL
FM–30T	SB909–0000–205/385	597–0096–014
FM–35T	SB909–0035–205/385	597–0096–014
FM–20T	SB909–0020–205/385	597–0220–014
FM–30B	SB909–0000–204/384	597–0096–004
FM–35B	SB909–0035–204/384	597–0096–004
FM–20B	SB909–0020–204/384	597–0220–004

FIGURE	TITLE	NUMBER
----	SCHEMATIC DIAGRAM, PREDATOR EXCITER IN AN FM–20T/FM–30T/FM–35T OR FM–20B/FM–30B/FM–35B TRANSMITTER	597–8000–100



597-8000-100

PREDATOR SCHEMATIC DIAGRAM - FM-20T/FM-30T/FM-35T AND FM-20B/FM-30B/FM-35B TRANSMITTERS

FM-5T/FM-5TS/FM-10T/FM-10TS
FM-5B/FM-5BS/FM-10B/FM-10BS
TRANSMITTER MODELS

A–12. INSTALLATION INSTRUCTIONS.

A–13. REMOVE THE EXCITER.

A–14. To remove the exciter, proceed as follows:

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

WARNING

1. Disconnect all transmitter primary power.
2. Disconnect the wires connected to TB1.
3. Disconnect the cable connected to the RF OUTPUT receptacle.
4. Disconnect the ac power cable.
5. Remove the exciter from the rack.
6. Remove the slide–rails and mounting brackets.
7. For B–Series transmitters, remove the 3.5 inch panel below the exciter location. Install a new 1 3/4 inch panel.

A–15. INSTALL THE PREDATOR.

A–16. To install the PREDATOR, proceed as follows:

1. Insert the PREDATOR chassis into the exciter location.
2. Determine the holes in the cabinet rails to be used for mounting the exciter. If the holes are not tapped, install the clip–nuts provided in the PREDATOR accessory kit. Secure the PREDATOR to the cabinet using the black Phillips–head hardware provided in the accessory kit.
3. Locate the 25–Pin D–Type remote interface mating connector in the PREDATOR accessory kit.
4. Cut three 3 to 4 inch 22 AWG wire jumpers. The jumpers will be used to connect ground and dc voltage to the appropriate pins in the remote interface mating connector.
5. Refer to Table 1 for T–Series models or Table 2 for B–Series models and solder the wires to the D–Type connector pins as shown. The connector pins will accept a maximum of two wires.

TABLE 1. P3 PREDATOR WIRING - T-SERIES TRANSMITTERS		
WIRE	***DESCRIPTION***	***TO***
5	Exciter Enable	Exciter J3–4
70/1	Forward Power	Exciter J3–16
71/2	Reflected Power	Exciter J3–17
4	AFC Lock	Exciter J3–2
3	Temp Overload	Exciter J3–15
64/30	Ground	Exciter J3–20
Exciter J3–21	Ground	Exciter J3–3
Exciter J3–22	Ground	Exciter J3–5
Exciter J3–25	+12V dc	Exciter J3–14

TABLE 2. P3 PREDATOR WIRING - B-SERIES TRANSMITTERS		
WIRE	***DESCRIPTION***	***TO***
5	Exciter Enable	Exciter J3–4
1	Forward Power	Exciter J3–16
2	Reflected Power	Exciter J3–17
4	AFC Lock	Exciter J3–2
3	Temp Overload	Exciter J3–15
64	Ground	Exciter J3–20
Exciter J3–21	Ground	Exciter J3–3
Exciter J3–22	Ground	Exciter J3–5
Exciter J3–25	+12V dc	Exciter J3–14

6. Locate the D–Type connector backshell in the PREDATOR accessory kit. Install the backshell on the connector.
7. Connect P3 to J3 on the exciter.
8. For T–Series transmitters, connect the RF output cable to the PREDATOR RF output receptacle. For B–Series transmitters, connect the BNC–to–Type N adapter on the RF output cable. Attach the connector to the PREDATOR RF OUTPUT receptacle.
9. Refer to SECTION II, INSTALLATION and perform the DIGITAL STEREO GENERATOR MODULE – AUDIO/SCA/RBDS/19 kHz or ANALOG INTERFACE MODULE – AUDIO/SCA/RBDS/COMPOSITE procedures to connect audio, SCA, and RBDS signals to the exciter.

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES. THE UNIT IS EQUIPPED WITH AN AC LINE JUMPER CORD TO PREVENT EXPOSURE TO HAZARDOUS VOLTAGES WHEN THE MODULE IS REMOVED FROM THE CHASSIS. FAILURE TO USE THE NEW CORD MAY RESULT IN POSSIBLE SEVERE INJURY OR DEATH.***

WARNING

WARNING

WARNING

10. Connect the transmitter ac line cord to the PREDATOR ac input jumper cord.

A-17. EXCITER PROGRAMMING - B-SERIES TRANSMITTERS WITH MVDS.

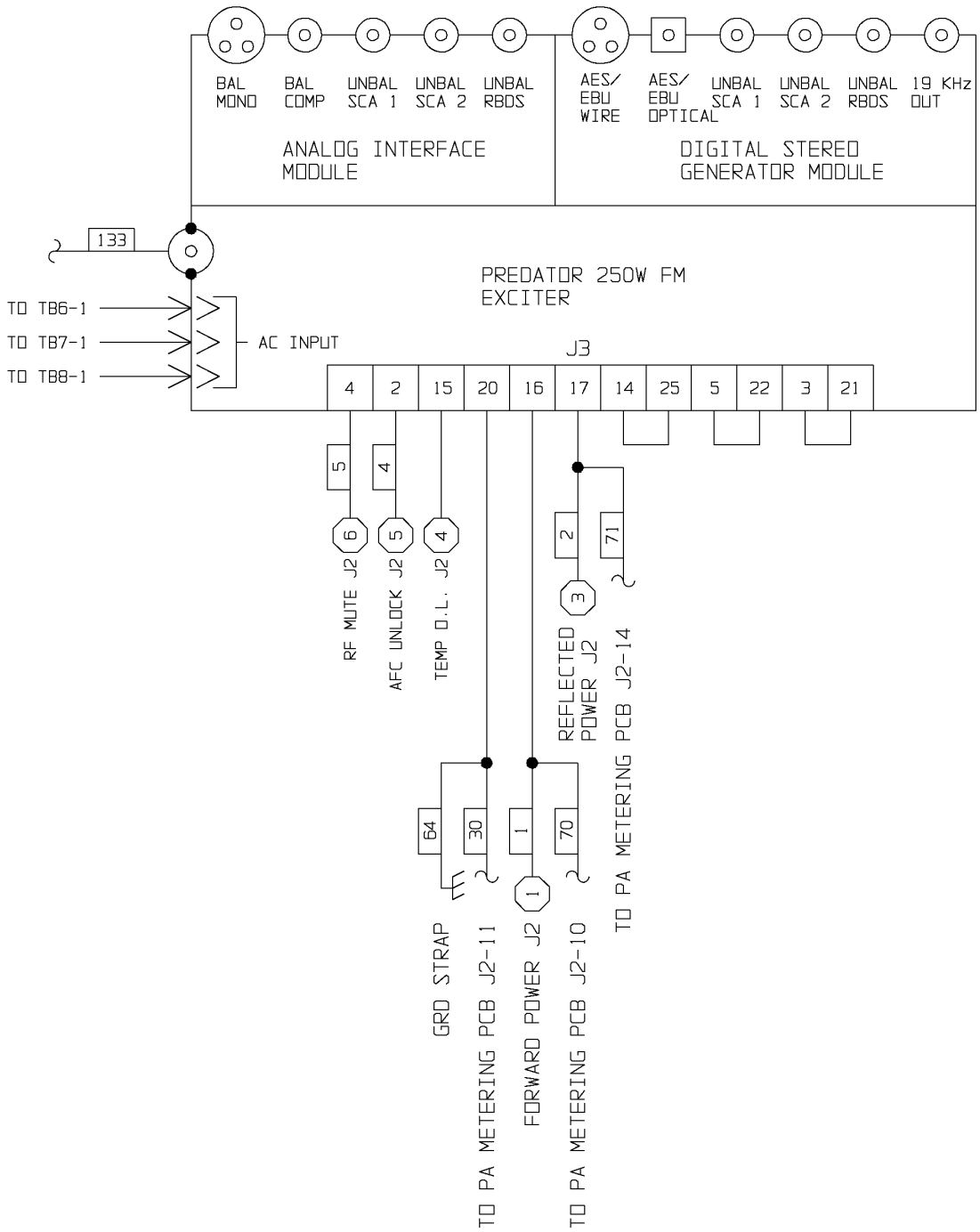
A-18. For B-Series transmitters equipped with MVDS, the MVDS exciter parameter must be changed from FX-50 to OTHER. Refer to the MVDS manual and change the exciter parameter from FX-50 to OTHER.

A-19. DRAWINGS.

A-20. The following text presents schematic diagrams for an FM-5T/FM-5TS/FM-10T/FM-10TS or FM-5B/FM-5BS /FM-10B/FM-10BS transmitter equipped with a PREDATOR exciter. The schematic diagrams are to be used in association with the following overall schematic diagrams in the transmitter manual (refer to SECTION VII, DRAWINGS in the transmitter manual).

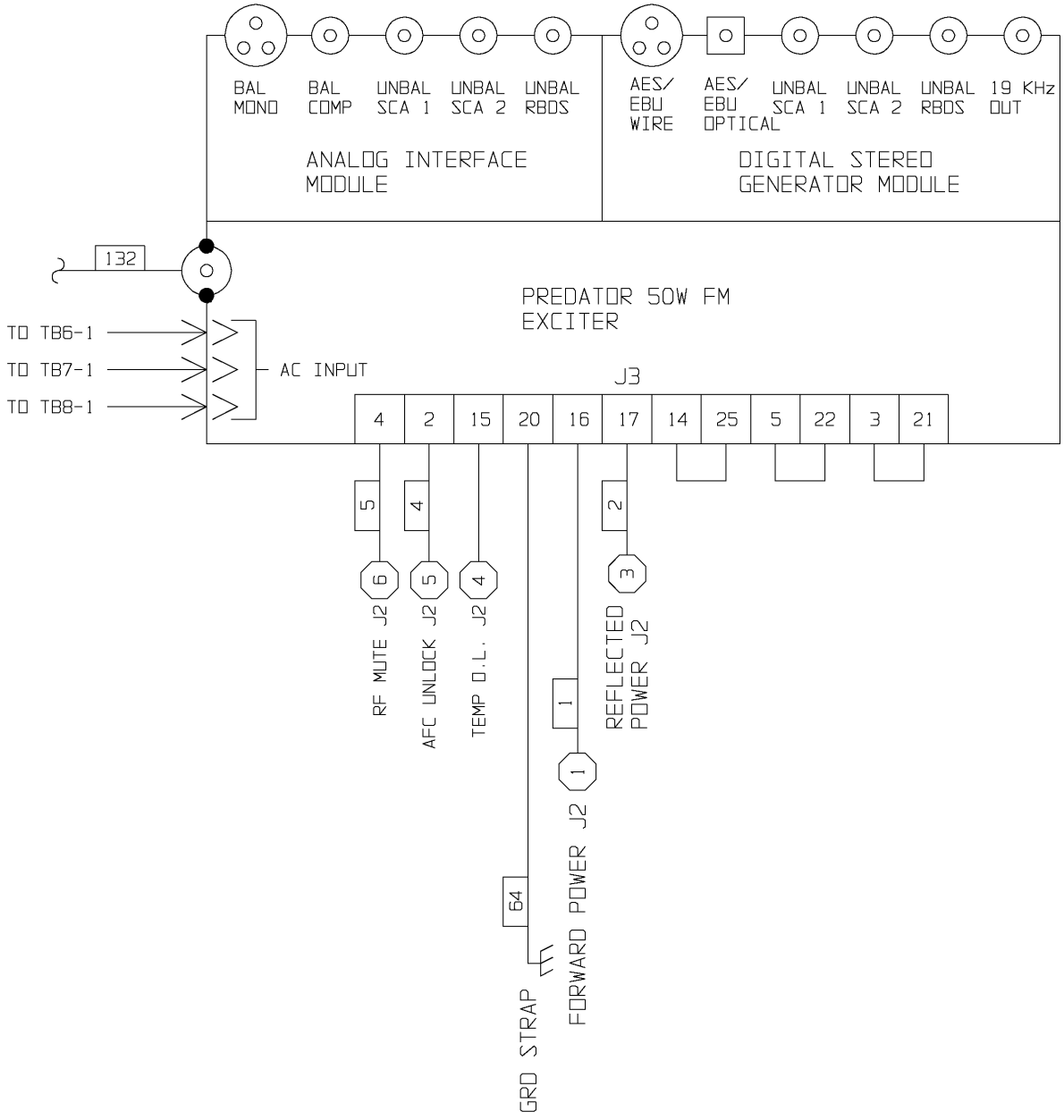
MODEL	SCHEMATIC DIAGRAM	MANUAL
FM-10T	SB909-1110-205/385	597-0098-014
FM-10TS	SB909-1110-255	597-0098-014
FM-5T	SB909-5000-215/315	597-0033-014
FM-5T	SB909-5000-385	597-0033-014
FM-5TS	SB909-5000-255/355	597-0033-014
FM-10B	SB909-1110-204/384	597-0098-004
FM-10BS	SB909-1110-254	597-0098-004
FM-5B	SB909-5000-204/304	597-0033-004
FM-5B	SB909-5000-384	597-0033-004
FM-5BS	SB909-5000-254/354	597-0033-004

FIGURE	TITLE	NUMBER
----	SCHEMATIC DIAGRAM, PREDATOR EXCITER IN AN FM-5T/FM-5TS/FM-10T/FM-10TS TRANSMITTER	597-8000-101
----	SCHEMATIC DIAGRAM, PREDATOR EXCITER IN AN FM-5B/FM-5BS /FM-10B/FM-10BS TRANSMITTER	597-8000-104



597-8000-101

PREDATOR SCHEMATIC DIAGRAM - FM-5T/FM-5TS AND FM-10T/FM-10TS TRANSMITTERS



597-8000-104

PREDATOR SCHEMATIC DIAGRAM - FM-5B/FM-5BS AND FM-10B/FM-10BS TRANSMITTERS

PREDATOR INSTALLATION INSTRUCTIONS FOR FM C-SERIES TRANSMITTERS

A-21. INSTALLATION INSTRUCTIONS.

A-22. REMOVE THE EXCITER.

A-23. To remove the existing exciter, proceed as follows:

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

WARNING

1. Disconnect all transmitter primary power.
2. Disconnect the wires connected to TB1.
3. Disconnect the cable connected to the RF OUTPUT receptacle.
4. Disconnect the ac power cable.
5. Remove the exciter from the rack.
6. Remove the slide-rails and mounting brackets.

A-24. INSTALL THE PREDATOR.

A-25. For FM-1C1/FM-500C1/FM-2C/FM-3C models, the PREDATOR must be installed in a 19 inch rack cabinet. To install the PREDATOR, proceed as follows:

1. Insert the PREDATOR chassis into the exciter location.
2. Determine the holes in the cabinet rails to be used for mounting the exciter. If the holes are not tapped, install the clip-nuts provided in the PREDATOR accessory kit. Secure the PREDATOR to the cabinet using the black Phillips-head hardware provided in the accessory kit.
3. Locate the 25-Pin D-Type remote interface mating connector in the PREDATOR accessory kit.
4. Cut two 3 to 4 inch 22 AWG wire jumpers. The jumpers will be used to connect ground to the appropriate pins in the remote interface mating connector.
5. Refer to Table 1 and solder the wires to the D-Type connector pins as shown. The connector pins will accept a maximum of two wires.

FROM	*DESCRIPTION*	*TO*	*WIRE*
J22-1	Exciter Enable	Exciter J3-4	51
J22-2	AFC Lock	Exciter J3-2	52
J22-3	Ground	Exciter J3-20	53
Exciter J3-22	Ground	Exciter J3-5	Jumper
Exciter J3-21	Ground	Exciter J3-3	Jumper

6. Locate the D-Type connector backshell in the PREDATOR accessory kit. Install the backshell on the connector.

7. Connect P3 to J3 on the exciter.
8. For FM–5C/FM–4C/FM–3C/FM–2C transmitters, connect the RF output cable to the PREDATOR RF output receptacle. For FM–1C1/FM–500C1 transmitters, connect the BNC–to–Type N adapter on the RF output cable. Attach the connector to the PREDATOR RF OUTPUT receptacle.
9. Refer to SECTION II, INSTALLATION and perform the DIGITAL STEREO GENERATOR MODULE – AUDIO/SCA/RBDS/19 kHz or ANALOG INTERFACE MODULE – AUDIO/SCA/RBDS/COMPOSITE procedures to connect audio, SCA, and RBDS signals to the exciter.

WARNING ***THE 50W AND 250W POWER SUPPLY/RF AMPLIFIER MODULES CONTAIN HAZARDOUS VOLTAGES. THE UNIT IS EQUIPPED WITH AN AC LINE JUMPER CORD TO PREVENT EXPOSURE TO HAZARDOUS VOLTAGES WHEN THE MODULE IS REMOVED FROM THE CHASSIS. FAILURE TO USE THE NEW CORD MAY RESULT IN POSSIBLE SEVERE INJURY OR DEATH.***

WARNING

WARNING

WARNING

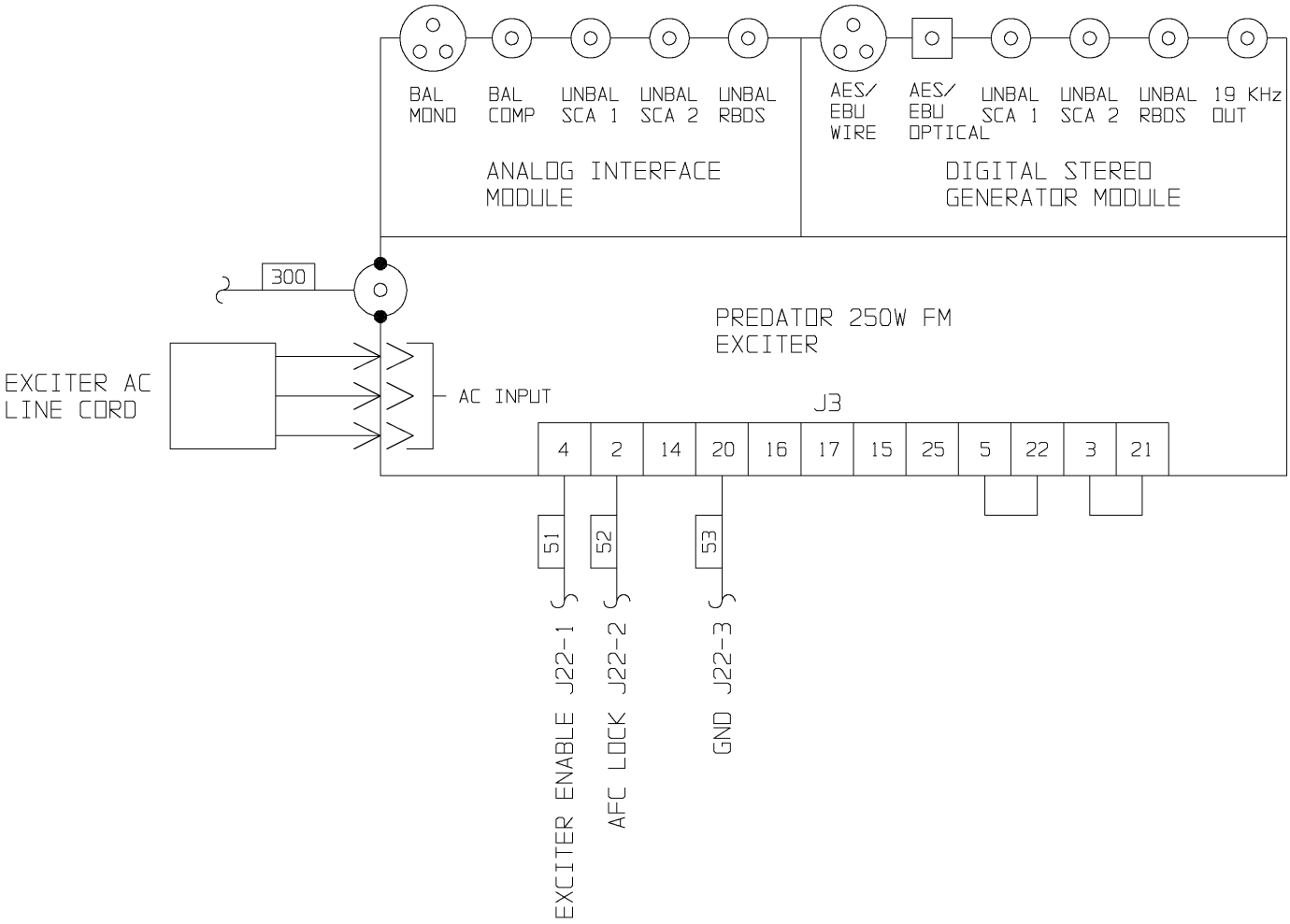
10. Connect the transmitter ac line cord to the PREDATOR ac input jumper cord.

A–26. DRAWINGS.

A–27. The following text presents schematic diagrams for an FM–5C/FM–4C, FM–3C/FM–2C, or FM–1C1/FM–500C1 transmitter equipped with a PREDATOR exciter. The schematic diagrams are to be used in association with the following overall schematic diagrams in the transmitter manual (refer to SECTION VII, DRAWINGS in the transmitter manual).

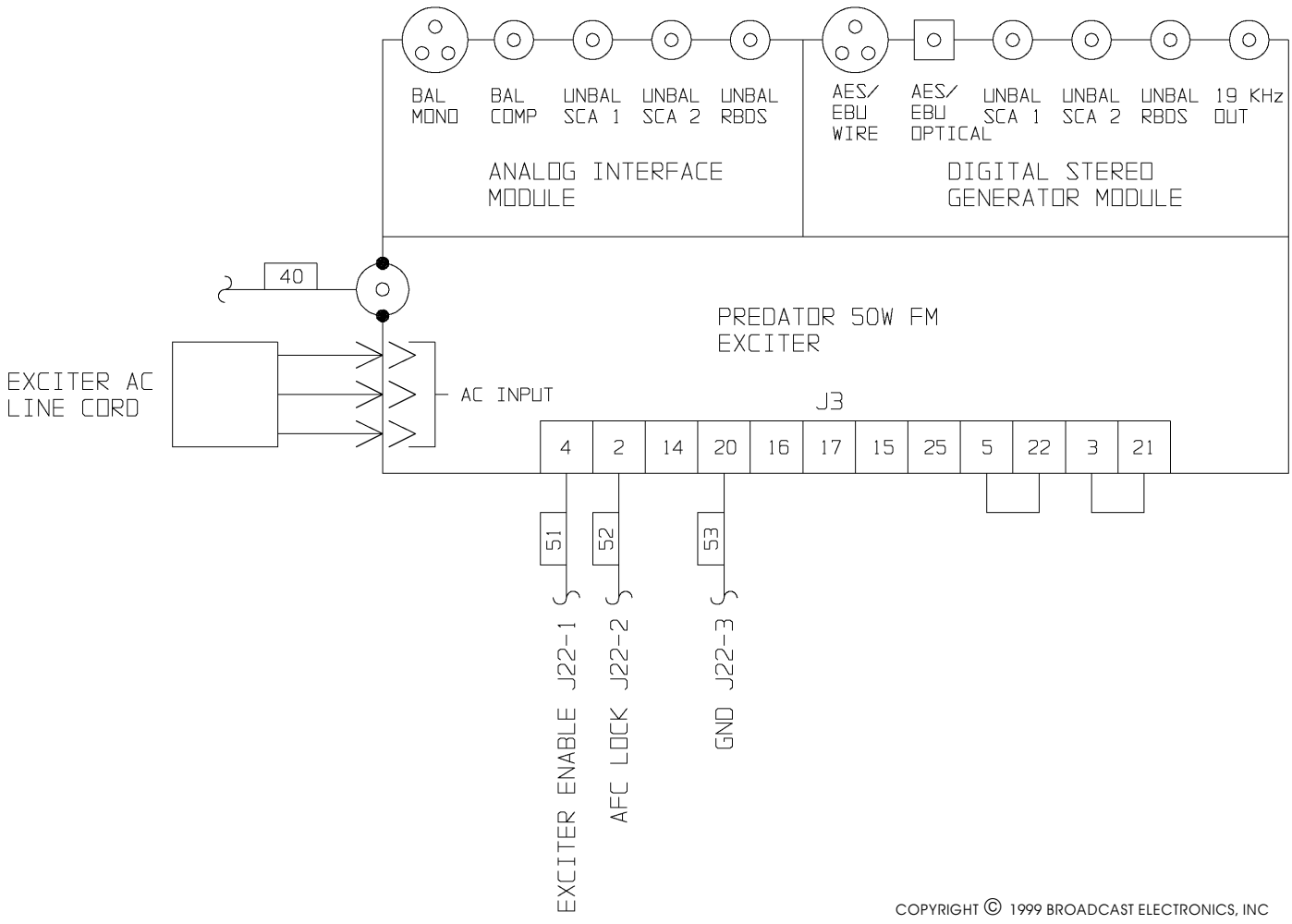
MODEL	SCHEMATIC DIAGRAM	MANUAL
FM–5C/FM–4C SINGLE PHASE	SB909–5001–204/–4001–204	597–5001
FM–5C/FM–4C THREE PHASE 220V	SB909–5001–254/–4001–254	597–5001
FM–5C/FM–4C THREE PHASE 380V	SB909–5001–384/–4001–384	597–5001
FM–3C/FM–2C	SB909–3001–204/–2001–204	597–3002
FM–1C1/FM–500C1	SB909–1001–205/–0501–205	597–1001–001

FIGURE	TITLE	NUMBER
----	SCHEMATIC DIAGRAM, PREDATOR EXCITER IN AN FM–5C/FM–4C/FM–3C/FM–2C TRANSMITTER	597–8000–102
----	SCHEMATIC DIAGRAM, PREDATOR EXCITER IN AN FM–1C1/FM–500C1 TRANSMITTER	597–8000–103



597-8000-102

PREDATOR SCHEMATIC DIAGRAM - FM-5C, FM-4C, FM-3C, AND FM-2C TRANSMITTERS



597-8000-103

PREDATOR SCHEMATIC DIAGRAM - FOR FM-1C1 AND FM-500C1 TRANSMITTERS

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