MIX-TRAK 90 SERIES MODULAR AUDIO CONSOLES MANUAL

597-9012
JANUARY, 1989

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 (a) inspected the containers for visible signs of damage and (b) 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.

TECHNICAL ASSISTANCE AND REPAIR SERVICE

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

FOR TECHNICAL ASSISTANCE DURING 8:00 AM TO 5:00 PM CENTRAL TIME

Digital Product Customer Service – Phone (217) 224–9600

RF/Studio Product Customer Service – Phone (217) 224–9617

FOR TECHNICAL ASSISTANCE DURING NON–BUSINESS HOURS

Phone (217) 224–9600 Customer Service

FOR DIGITAL PRODUCTS BULLETIN BOARD SERVICE

Phone (217) 224–1926

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.

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.

REPLACEMENT PARTS

Emergency and Warranty Replacement Parts may be ordered from the address below. Be sure to include equipment model and serial number and 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.

EMERGENCY AND WARRANTY REPLACEMENT PARTS
Broadcast Electronics, Inc.
4100 N. 24th St. P.O. BOX 3606
Quincy, Illinois 62305
Tel: (217) 224–9600 Digital Products (8 AM to 5 PM Central Time)
Tel: (217) 224–9617 RF/Studio Products (8 AM to 5 PM Central Time)
Tel: (217) 224–9600 (Non–Business Hours)
Telex: 25–0142
Fax: (217) 224–9607

NON–EMERGENCY REPLACEMENT PARTS
FAX (217) 224–9609

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.

BROADCAST ELECTRONICS INC.

PUBLICATION CHANGE NOTICE

EQUIPMENT AUDIO CONSOLES MODEL(S) MT-90 SERIAL N/A

PUBLICATION NUMBER 597-9012 BASIC ISSUE/REVISION JANUARY 1989

INSTRUCTIONS: Make the changes noted below as listed.

Replacement pages will be attached to this change notice as required.

This change notice should be retained with the publication.

CHANGE NO.	DATE	DESCRIPTION
1	JUNE 22, 1989	The console Mono 1 and Aux 3/Mono 2 output pin designations have changed. Replace page 2-41/2-42 with the attached revised page.

4100 N. 24TH STREET • P.O. BOX 3606 • QUINCY, ILLINOIS 62305 • TELEX 250142 • CABLE BRO/ELECTQUI • PHONE 217/224-9600

BROADCAST ELECTRONICS INC.

PUBLICATION CHANGE NOTICE

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Replacement pages will be attached to this change notice as required.

This change notice should be retained with the publication.

CHANGE NO.	DATE	DESCRIPTION
1	JULY 20, 1989	In the PARTS LIST Section, replace page 6-1/6-2 with the attached revised page.
2	JULY 20, 1989	In the SUMMING AMPLIFIER AND CUE SPEAKER/ HEADPHONE AMPLIFIER Section, replace pages 3-1/3-2, 4-1/4-2, and 4-3/4-4 with the attached revised pages.
3	JULY 20, 1989	In the SUMMING AMPLIFIER AND CUE SPEAKER/ HEADPHONE AMPLIFIER Section, replace schematic diagram SC911-0065 and assembly diagram AC911-0065 with the attached revised SC911-0065-002 and AC911-0065-002 drawings.

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INSTRUCTION MANUAL CONTENTS

This manual presents technical information for the Broadcast Electronics Mix-Trak 90 Series Audio Consoles. The manual is divided into two parts as described below.

PART I - Contains detailed information relative to the installation, operation, and maintenance applicable to the overall console.

PART II - Contains detailed theory of operation, maintenance, parts lists, and drawings for each indivdual console module.

GENERAL INFORMATION

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SECTION I

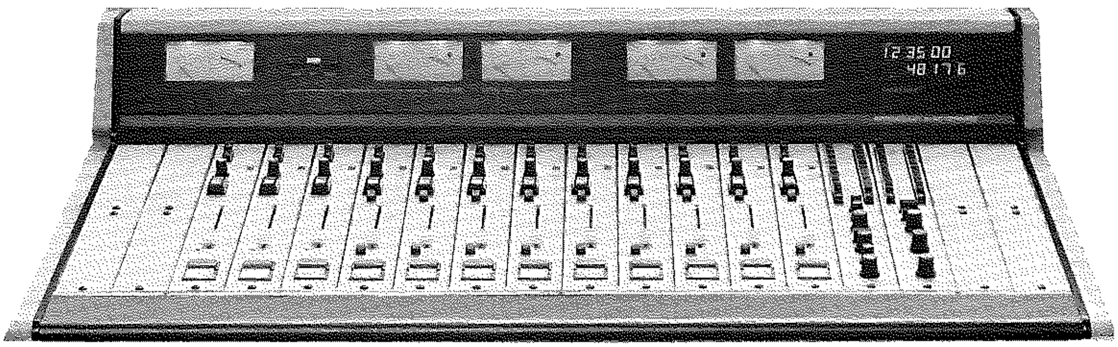
GENERAL INFORMATION

1-1. INTRODUCTION.

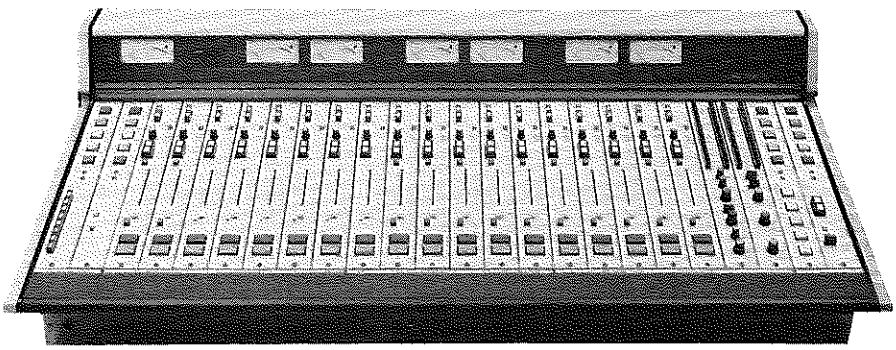
1-2. Information presented by this section provides a general description of the Broadcast Electronics Mix-Trak 90 Series Modular Audio Consoles and lists equipment specifications.

1-3. EQUIPMENT DESCRIPTION.

1-4. The Broadcast Electronics Mix-Trak 90 series audio consoles are professional state-of-the-art modular consoles designed for continuous on-air broadcast use (refer to Figure 1-1). The consoles are designed to provide the operator with advanced operating and performance features. The Mix-Trak 90 audio console series consists of several multi-channel mainframe units and a variety of modular assemblies. Standard mainframe units include 12 channel and 18 channel assemblies. The modular components of the Mix-Trak 90 system allow each console to be configured to specific installation requirements. The following text presents a description of the Mix-Trak 90 system components.



MT90-12 AUDIO CONSOLE



MT90-18 AUDIO CONSOLE

597-9012-1A

FIGURE 1-1. MIX-TRAK 90 SERIES AUDIO CONSOLES

1-5. ELECTRICAL DESCRIPTION.

1-6. LINE INPUT MODULE. All line level sources are applied to line input modules. Each line input module accepts two audio sources. An internal programmable attenuator network allows the assignment of two audio sources at different levels. Operating features include a four-position input mode switch. The switch allows the module to process either stereophonic, monophonic, monophonic right, or monophonic left channel sources. An overload indicator is provided to indicate excessive input level conditions. Output routing to the console audition or program buss system is accomplished by a two-position select switch. A cue system is incorporated into the module design for the previewing of audio source material.

1-7. Line input modules are also equipped with a source sequencing feature. When line input modules are equipped with source remote control modules, a source sequencer circuit is established for the automatic sequencing of audio sources.

1-8. Precision control of the audio source level is provided by a voltage-controlled-amplifier (VCA) and a slide-action fader. Module on/off commands are generated by hall-effect switch/indicators. An internal patch point system is provided to allow the use of external or console mounted signal processing equipment.

1-9. MICROPHONE INPUT MODULE. All microphone level sources are applied to microphone input modules. Each module accepts two microphone level inputs. Operating features include a continuously variable pan control. The control allows the operator to route the microphone source audio to either the left or right channel. An overload indicator is provided to indicate excessive audio input level conditions. Output routing to the console audition or program output buss system is accomplished by a two-position select switch.

1-10. Each microphone input module may be equipped with an optional microphone input transformer. The transformer operates in association with an internal power supply to provide a phantom operating potential for condenser type microphones.

1-11. Microphone input module electronics feature an ultra low-noise input amplifier stage. Precision control of the microphone source level is provided by a VCA and slide-action fader control network. Module on/off commands are generated by hall-effect switch/indicators. An internal patch point system is provided to allow the use of external or console mounted signal processing equipment. The module also contains the circuitry required to initiate control room and studio monitor muting.

1-12. CONTROL ROOM MONITOR MODULE. Control room monitoring operations are accomplished by a control room monitor module. The module is designed to monitor four internal audio sources and six external inputs. Input selection is accomplished by a color-coded ten-position switch. Control room monitor speaker volume control is provided by a VCA and monitor level control network. Muting of the control room monitor speakers is provided by a solid-state muting system.

1-13. A monitor dim feature is standard on all control room monitor modules. The feature automatically lowers the control room monitor speaker level during cue channel audio monitoring activities. The monitor dim volume is controlled by a continuously variable level control.

1-14. Headphone Circuitry. A headphone system is standard on all control room monitor modules. Headphone system input selection is accomplished by a color-coded ten-position switch. Bass and treble controls are provided to allow the operator to adjust the headphone audio for specific audio characteristics. Volume control is provided by a headphone level control network.

1-15. Cue Channel Circuitry. Cue channel audio monitoring is provided by a cue monitor circuit. The circuit consists of a volume control network which drives an internal power amplifier and cue speaker.

1-16. STUDIO MONITOR MODULE. Audio monitoring operations for auxiliary studio facilities are provided by the studio monitor module. The module provides monitor interfacing and intercom operation for two associated studio facilities. Muting of the studio monitor speakers is provided by solid-state muting circuitry.

1-17. The studio monitor module is designed to monitor four internal audio sources and six external input sources. Two color-coded ten-position switches select studio A and B monitor inputs. The studio monitor volume is controlled by studio A and B level control networks.

1-18. Control room/studio communication is provided by an intercom circuit. The circuit allows two-way communication between the console operator and studio A and B. The studio intercom volume is controlled by separate studio A and B monitor level control networks. Control room intercom level is controlled by the cue level control.

1-19. MONOPHONIC OUTPUT MODULE. A monaural output signal from the console stereophonic output network is generated by the monophonic output module. The module will generate a monaural signal for either the program or audition outputs. A phase reversal feature is incorporated into the circuit design to allow the operator to conveniently reverse the phase of the selected input signal. Input signal phase status is provided by two front-panel indicators.

1-20. INPUT EXPANDER MODULE. Input expansion is provided by the input expander module. The module consists of eight interlocked select switches which allow the connection of up to eight additional inputs to a microphone or line input module.

1-21. TAPE/CART SOURCE REMOTE SWITCH MODULE. Remote control of cartridge machine and reel-to-reel audio sources is accomplished by the tape and cart source remote switch modules. The tape source switch module contains five color-coded switch/indicators which provide basic operating functions such as play, stop, fast forward, record, and rewind. The cart source switch module contains five color-coded switch/indicators for record, secondary, tertiary/fast forward, start, and stop operations.

1-22. CLOCK/TIMER MODULE. The clock/timer module consists of individual clock and timer sections for convenient operator access to time related information. A crystal controlled six-digit LED clock display presents time information in 12 and 24 hour time formats. An automatic synchronization feature is also incorporated into the clock circuit design. The feature synchronizes clock operation to network audio to eliminate drift.

1-23. Elapsed time information is presented on a five-digit LED display. The display is equipped with control circuitry for automatic or manual operation. In automatic operation, the display is controlled by the operation of the program or audition output buss. In manual operation, the timer display is controlled manually by a timer control module.

1-24. TIMER CONTROL MODULE. Manual timer control operations are performed on the timer control module. The module consists of five switch indicators designed to provide stop, start, reset, and automatic/manual control operations.

1-25. STUDIO REMOTE PANEL. The studio remote panel assembly consists of four switch indicators, a volume on/off control, and a status indicator. The assembly is located in a studio facility to provide local control of the studio monitor level and studio intercom operation.

1-26. FSK DECODER MODULE. All audio source Frequency-Shift-Keying (FSK) information is applied to an FSK decoder module. The module consists of a decoding circuit and two front-panel indicators. The indicators monitor the status of the data and FSK carrier during FSK decoding operations.

1-27. METER ASSEMBLIES. The Mix-Trak 90 series consoles may be equipped from a wide range of metering configurations. Standard 12 channel console features include: 1) analog program output meters and 2) analog utility meters which monitor audition, headphone, or off-air signals. Standard 18 channel console features include: 1) analog program output meters, 2) analog audition output meters, and 3) analog utility meters which monitor auxiliary, headphone, or off-air signals. The 12 and 18 channel mainframes are also equipped with a provision for the installation of a monophonic output meter. Optional meter assemblies include LED bargraph meters with programmable meter ballistics and peak-program-meter (PPM) assemblies. Each standard or optional meter assembly is equipped with an overload indicator to indicate over-voltage output conditions.

1-28. POWER SUPPLY MODULE. All Mix-Trak 90 operating potentials are generated by a self-contained power supply module designed for installation in a 19 inch EIA rack assembly. The module contains conventional ac power conversion and dc rectification circuitry. The supply generates both regulated and unregulated potentials for application to the mainframe modular assemblies.

1-29. Automatic Power Supply Switch Panel. The Mix-Trak 90 console may be configured with a main/alternate power supply system. The system includes two self-contained power supply modules and an automatic switch panel. In the event of a power supply module failure, the panel automatically transfers dc operating potentials from the remaining operational power supply module to the console mainframe without interruption.

1-30. REMOTE CONTROL MODULE. The remote control module operates in association with a line or microphone input module to provide remote input module control. The module consists of CMOS control logic and optical coupler networks which function to provide both local and remote module on, off, and cue operations from two independent locations.

1-31. SOURCE REMOTE CONTROL MODULE. The source remote control module operates in association with a line input module to provide remote on/off control of console audio sources. A source sequential feature is incorporated into the module control circuit design for automatic audio source control. This feature allows the operator to select and program audio sources for automatic play operation. The module also contains inputs and control logic for frequency-shift-keying (FSK) information.

1-32. PROGRAM EQUALIZER MODULES. Mix-Trak 90 audio processing operations are performed by program equalizer modules. The modules are designed to be interfaced to the console audio network for microphone input, line input, or program buss audio processing applications.

1-33. OUTPUT AMPLIFIER CIRCUIT BOARD. Console program, audition, monophonic, and auxiliary audio output amplification is accomplished by stereophonic audio output amplifier modules. The amplifier modules consist of short circuit protected electronically balanced output stages. Meter driver circuits process analog signals for application to the console meter assemblies. Overload indicator circuits generate control signals for application to meter overload indicators.

1-34. SUMMING AMPLIFIER CIRCUIT BOARD. All console internal mixing operations are performed by the summing amplifier module. The module consists of individual amplifier circuits which combine internal console music and speech busses. The module also contains amplifier circuitry for auxiliary 1, 2, 3, and cue audio busses.

1-35. CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD. Cue speaker and headphone driver circuitry is housed on the cue speaker/headphone amplifier module. The module consists of individual amplifier networks which generate the required audio levels to drive a cue speaker and two headphone receptacles.

1-36. INPUT/OUTPUT MOTHERBOARD ASSEMBLIES. Console input, output, and internal communication is provided by input and output motherboard assemblies. The assemblies route information to and from the console modular assemblies and to external equipment.

1-37. UTILITY RELAY. Control of ancillary studio equipment is provided by a modular utility relay. The relay is designed to control equipment such as an on-air warning light or muting system.

1-38. MECHANICAL DESCRIPTION.

1-39. The Mix-Trak 90 series audio consoles are completely modular devices designed for the installation of associated operating modules. The design consists of: 1) multi-channel mainframe units, 2) individual operating modules, and 3) a self-contained power supply unit. The mainframe assembly is ergonomically designed for optimum operator comfort and convenience. The modular design also provides maximum flexibility to meet individual installation requirements and optimum service convenience.

1-40. CONSOLE CONFIGURATIONS.

1-41. The Mix-Trak 90 series audio consoles are modular devices designed to be configured to meet individual station installation requirements. The following text presents ordering information for the Mix-Trak 90 series console mainframe units and the modular assemblies.

MAINFRAME UNITS

MODEL NO.	PART NUMBER	DESCRIPTION
MT90-12	901-9012	Mix-Trak 90 12 channel mainframe, 117V/220V ac 50/60 Hz operation. The mainframe includes:

No.	Description	Qty.
1.	Cue Speaker/Headphone Amplifier Circuit Board Assembly.	1
2.	Power Supply Module.	1
3.	Control Room Monitor Module.	1
4.	Summing Amplifier Circuit Board.	1
5.	Output Motherboard Assembly.	1
6.	Input Motherboard Assembly.	4
7.	Extender Cable Assembly.	1
8.	Output Amplifier Circuit Board Assemblies.	2
9.	VU Meter Assemblies.	4
10.	Meter Switch Circuit Board.	1
11.	Installation Kit and Operation/ Service Manual.	1
12.	Blank Modules.	--

MT90-18	901-9018	Mix-Trak 90 18 channel mainframe, 117V/220V ac 50/60 Hz operation. The mainframe includes:

No.	Description	Qty.
1.	Cue Speaker/Headphone Amplifier Circuit Board Assembly.	1
2.	Power Supply Module.	1
3.	Control Room Monitor Module.	1
4.	Summing Amplifier Circuit Board.	1
5.	Output Motherboard Assembly.	1
6.	Input Motherboard Assembly.	6
7.	Extender Cable Assembly.	1
8.	Output Amplifier Circuit Board Assemblies.	2
9.	VU Meter Assemblies.	6
10.	Meter Switch Circuit Board.	1
11.	Installation Kit and Operation/ Service Manual.	1
12.	Blank Modules.	--

INPUT MODULES

PART NUMBER	DESCRIPTION
951-0014	Microphone Input Module, Monophonic.
951-0016	Microphone Input Module Phantom Power Supply Transformer.
951-0015	Line Input Module, Stereophonic.
911-0019	Remote Control Circuit Board Assembly (For Operation With Microphone or Line Input Modules).
911-0020	Source Remote Control Circuit Board (For Operation With Line Input Modules).

MAINFRAME ACCESSORY MODULES

PART NUMBER	DESCRIPTION
951-0028	Studio Monitor Module.
951-0024	Monophonic Output Module.
951-0017	Tape Source Remote Switch Module.
951-0019	Cart Source Remote Switch Module.
951-0018	Input Expander Module.
951-0020	FSK Decoder Module.
951-0035	Timer Control Module.
951-0026	Program Equalizer Module.
951-0021	8.5 inch (21.6 cm) Blank Panel.
951-0022	17 inch (43.2 cm) Blank Panel.

METER BRIDGE ACCESSORY MODULES

PART NUMBER	DESCRIPTION
951-0030	Clock/Timer Module.
971-0025	VU Meter Assembly.
951-0034	Peak-Program-Meter (PPM) Assembly.
951-0029	LED Bargraph Meter Assembly.

MISCELLANEOUS ACCESSORY MODULES

PART NUMBER	DESCRIPTION
901-0023	Studio Remote Panel.
911-0016	Stereophonic Line Output Circuit Board Assemblies (For Operation With Monophonic And Auxiliary Audio Outputs).
951-0036	Utility Relay.
951-0038	Accessory Module Optional Mounting Assembly.

POWER SUPPLY ACCESSORIES

PART NUMBER	DESCRIPTION
951-0032	Automatic Power Supply Switch Panel (For Operation in a Main/Alternate Power Supply Configuration).

SPARE PARTS KIT

PART NUMBER	DESCRIPTION
971-0024	Spare Parts Kit Includes Semiconductors, Regulators, Lamps, Etc.

PRE-FABRICATED WIRING

PART NUMBER	DESCRIPTION
941-0018	2-Conductor Braided Audio Cable with Shield, One End Terminated with Female Connector Pins, One End Unterminated, 5 Feet (1.5 m).
941-0019	Same as 941-0018 Except 20 Feet (6.1 m).

941-0020	25-Conductor 22 Gauge Control Cable, One End Terminated with Female Connector Pins, One End Unterminated, 10 Feet (3.05 m).
941-0021	Same as 941-0020 Except 20 Feet (6.1 m).

1-42. EQUIPMENT SPECIFICATIONS.

1-43. Refer to Table 1-1 for the electrical specifications and Table 1-2 for the physical specifications of the Broadcast Electronics Mix-Trak 90 series audio consoles.

TABLE 1-1. MIX-TRAK 90 SERIES AUDIO CONSOLE ELECTRICAL SPECIFICATIONS
(Sheet 1 of 5)

PARAMETER	SPECIFICATION
OVERALL CONSOLE SPECIFICATIONS	
MICROPHONE OR LINE INPUT TO PROGRAM OR AUDITION OUTPUT CHANNEL	
INPUT HEADROOM	Greater than 25 dB above nominal input level.
TOTAL HARMONIC DISTORTION	
Microphone	Less than 0.05%, 20 Hz to 20 kHz. -50 dBu input level. +8 dBu, +4 dBu, or Ø dBu output level. Fader at Ø position.
Line	Less than 0.05%, 20 Hz to 20 kHz. Nominal input level. +8 dBu, +4 dBu, or Ø dBu output level. Fader at Ø position.
SMPTE INTERMODULATION DISTORTION	
Microphone	Less than 0.05%, 60 Hz/7 kHz. 4:1 amplitude ratio. -50 dBu input level. +8 dBu, +4 dBu, or Ø dBu output level. Fader at Ø position.
Line	Less than 0.05%, 60 Hz/7 kHz. 4:1 amplitude ratio. Nominal input level. +8 dBu, +4 dBu, or Ø dBu output level. Fader at Ø position.

TABLE 1-1. MIX-TRAK 90 SERIES AUDIO CONSOLE ELECTRICAL SPECIFICATIONS
(Sheet 2 of 5)

PARAMETER	SPECIFICATION
FREQUENCY RESPONSE	
Microphone	+Ø.Ø dB -0.5 dB, 20 Hz to 20 kHz. 1 kHz reference. Nominal input level. Fader at Ø position. 600 Ohm source impedance. +8 dBu, +4 dBu, or Ø dBu output level.
Line	+Ø.Ø dB -0.25 dB, 20 Hz to 20 kHz. 1 kHz reference. Nominal input level. Fader at Ø position. 600 Ohm source impedance. +8 dBu, +4 dBu, or Ø dBu output level.
SIGNAL-TO-NOISE RATIO	
Microphone	Greater than 78 dB with a -50 dB input and 150 Ohm source impedance. 20 Hz to 20 kHz bandwidth. Fader at Ø position. +8 dBu, +4 dBu, or Ø dBu output level. Single channel selected to the output.
Line	Greater than 85 dB below a nominal input level. 20 Hz to 20 kHz bandwidth. Fader at Ø position. 600 Ohm source impedance. No weighting. +8 dBu, +4 dBu, or Ø dBu output level. Single channel selected to the output.
MICROPHONE MODULE SOURCE IMPEDANCE	150 Ohms.
LINE INPUT MODULE SOURCE IMPEDANCE	600 Ohms.
FADER GAIN	10 dB minimum from Ø position.
PROGRAM AND AUDITION OUTPUT SPECIFICATIONS	
NOMINAL OUTPUT LEVEL	Continuously variable from Ø dBm to +8 dBm.
OUTPUT HEADROOM	28 dB above a Ø dBu output level. 20 dB above a +8 dBu output level.

TABLE 1-1. MIX-TRAK 90 SERIES AUDIO CONSOLE ELECTRICAL SPECIFICATIONS
(Sheet 3 of 5)

PARAMETER	SPECIFICATION
MAXIMUM OUTPUT LEVEL	+28 dBu into high impedance load. +26 dBu into 600 Ohm load. +20 dBu into 150 Ohm load.
OUTPUT IMPEDANCE	100 Ohms maximum, electronically balanced, resistive or 50 Ohms maximum, unbalanced, resistive.
LOAD IMPEDANCE	150 Ohms minimum.
OUTPUT NOISE	Greater than 85 dB below a Ø dBu output level. All inputs disabled.
CROSSTALK (Program to Audition, Audition to Program, Auxiliary to Program, or Auxiliary to Audition)	Greater than 80 dB below a Ø dBu output level, 20 Hz to 20 kHz. Any input module position to selected output, all inputs enabled.
SEPARATION (Program Left Into Program Right, Program Right Into Program Left, Audition Left Into Audition Right, or Audition Right Into Audition Left)	Greater than 70 dB below a Ø dBu output level, 20 Hz to 20 kHz. Any input module position. +4 dBv nominal input for line input modules.
PATCH POINT SPECIFICATIONS (ANY MODULE)	
Output Level	-5 dBu nominal.
Gain	Ø dB.
Output Impedance	600 Ohms balanced or 300 Ohms unbalanced.
Input Impedance	20 k Ohms minimum.
Maximum Output Level	+24 dBu unloaded. +18 dBu with 600 Ohm load.
Maximum Input Level	+24 dBu.
AC POWER REQUIREMENTS	103V to 127V ac 50/60 Hz or 207V to 253V ac 50/60 Hz, 400 watts maximum.

TABLE 1-1. MIX-TRAK 90 SERIES AUDIO CONSOLE ELECTRICAL SPECIFICATIONS
(Sheet 4 of 5)

PARAMETER	SPECIFICATION
MICROPHONE INPUT MODULE SPECIFICATIONS	
NOMINAL BUSS OUTPUT LEVEL	-5 dBu.
MAXIMUM OUTPUT LEVEL BEFORE CLIPPING	+20 dBu.
NOMINAL GAIN ADJUSTMENTS	High: -55 dB to -35 dB. Low: -35 dB to -15 dB.
VERNIER GAIN RANGE	±20 dB. Single front panel control of both channels.
NOMINAL INPUT LEVEL	-60 dBu to -30 dBu.
EQUIVALENT INPUT NOISE	Greater than -128 dBu with a 150 Ohm input source. 20 Hz to 20 kHz bandwidth. No weighting. Fader at Ø position. Single channel selected to output.
COMMON MODE REJECTION RATIO	Greater than 70 dB, dc to 1 kHz.
INPUT IMPEDANCE	Greater than 1500 Ohms.
STEREO GAIN MATCHING	Within 0.5 dB, 20 Hz to 20 kHz. 1 kHz reference.
FREQUENCY RESPONSE	+Ø.Ø dB -0.25 dB, 20 Hz to 20 kHz. 1 kHz reference.
OUTPUT ASSIGNMENT AND ON/OFF SWITCH NOISE	-70 dB.
LINE INPUT MODULE SPECIFICATIONS	
NOMINAL BUSS OUTPUT LEVEL	-5 dBu.
MAXIMUM OUTPUT LEVEL BEFORE CLIPPING	+20 dBu.
VERNIER GAIN RANGE	±5 dB. Individual control of each channel.

TABLE 1-1. MIX-TRAK 90 SERIES AUDIO CONSOLE ELECTRICAL SPECIFICATIONS
(Sheet 5 of 5)

PARAMETER	SPECIFICATION
NOMINAL INPUT LEVELS	-10 dBu, -5 dBu, Ø dBu, +4 dBu, and +8 dBu.
COMMON MODE REJECTION RATIO	Greater than 70 dB, dc to 1 kHz.
INPUT IMPEDANCE	Greater than 10 k Ohms, balanced, bridging.
STEREO GAIN MATCHING	Within 0.5 dB, 20 Hz to 20 kHz. 1 kHz reference.
FREQUENCY RESPONSE	+Ø.Ø dB -0.25 dB, 20 Hz to 20 kHz. 1 kHz reference.
OUTPUT ASSIGNMENT AND ON/OFF SWITCH NOISE	-70 dB.
<u>CONTROL ROOM MONITOR MODULE AND STUDIO MONITOR MODULE SPECIFICATIONS.</u>	
OUTPUT IMPEDANCE	600 Ohms balanced or 300 Ohms unbalanced.
NOMINAL OUTPUT LEVEL	Ø dBu.
MAXIMUM OUTPUT LEVEL	+18 dBu.
MINIMUM LOAD IMPEDANCE	600 Ohms.
SIGNAL-TO-NOISE RATIO	Greater than 85 dB below nominal output level. 20 Hz to 20 kHz bandwidth. Volume control at the 12 o'clock position.
HEADPHONE SPECIFICATIONS	
Minimum Load Impedance	8 Ohms.
Output Power	2 watts per channel into an 8 Ohm load.
Output Voltage	7V RMS unloaded.
FSK MAXIMUM INPUT LEVEL	10V peak-to-peak.

TABLE 1-2. MIX-TRAK 90 SERIES AUDIO CONSOLE PHYSICAL SPECIFICATIONS

PARAMETER	SPECIFICATION
PHYSICAL SPECIFICATIONS	
DIMENSIONS	
12 Channel Mainframe	Depth: 25.1 inches (63.7 cm). Width: 38.25 inches (97.1 cm). Depth Below Table: 6.5 inches (16.5 cm). Height Above Table: 8.5 inches (21.6 cm).
18 Channel Mainframe	Depth: 25.1 inches (63.7 cm). Width: 50.25 inches (127.6 cm). Depth Below Table: 6.5 inches (16.5 cm). Height Above Table: 8.5 inches (21.6 cm).
Power Supply Module	Height: 7 inches (17.8 cm). Width: 19 inches (48.3 cm). Depth: 12 inches (30.5 cm).
WEIGHT	
12 Channel Mainframe Completely Loaded, No Power Supply Module	90 Pounds (40.8 kg).
18 Channel Mainframe Completely Loaded, No Power Supply Module	110 Pounds (49.9 kg).
Power Supply Module	25 Pounds (11.3 kg).

INSTALLATION

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION II
INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information required for the installation of the Broadcast Electronics Mix-Trak 90 series audio consoles.

2-3. UNPACKING.

2-4. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the console mainframe and the power supply module. 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 Mix-Trak 90 console is assembled, operated, tested, and inspected in the configuration specified at the factory prior to shipment and is ready for installation when received. Prior to installation, this publication should be studied to obtain an understanding of the console circuitry, nomenclature, and installation requirements. Installation is accomplished as follows: 1) equipment placement, 2) assignment of input sources, 3) module and accessory equipment installation, 4) console system wiring, and 5) installation adjustments.

2-8. EQUIPMENT PLACEMENT.

WARNING — ENSURE NO PRIMARY POWER IS CONNECTED TO CONSOLE BEFORE PROCEEDING.

2-9. CONSOLE MAINFRAME. The Mix-Trak 90 console mainframes are designed for custom installation in a studio desk or table. The selected studio furniture must be capable of supporting a minimum of 90 pounds (40.8 kg) for 12 channel consoles and 110 pounds (49.9 kg) for 18 channel consoles. To install the console mainframe, refer to Figure 2-1 and the following text. Approximately 6.5 inches (16.5 cm) of the console chassis will extend below the surface level of the furniture.

2-10. Select the furniture for console installation. As a minimum requirement, the selected furniture must be of sufficient size and capable of supporting the total weight of the console mainframe.

2-11. Evaluate operator physical comfort parameters and access to the console controls and determine a console arm-rest area (refer to Figure 2-1). The area establishes an additional operator arm-rest surface between the front edge of the studio furniture and the front edge of the console arm-rest.

2-12. With the arm-rest area established, refer to Figure 2-1 for the 12 and 18 channel console cutout dimensions. A minimum 4.5 inch (11.4 cm) area must be provided at the rear of the console for meter-bridge service clearance. After determining the console installation dimensions, scribe the selected studio furniture.

2-13. Cut the studio furniture as required with the appropriate equipment. Insert the console in the cutout area. Fasteners will not be required to secure the unit to the furniture surface.

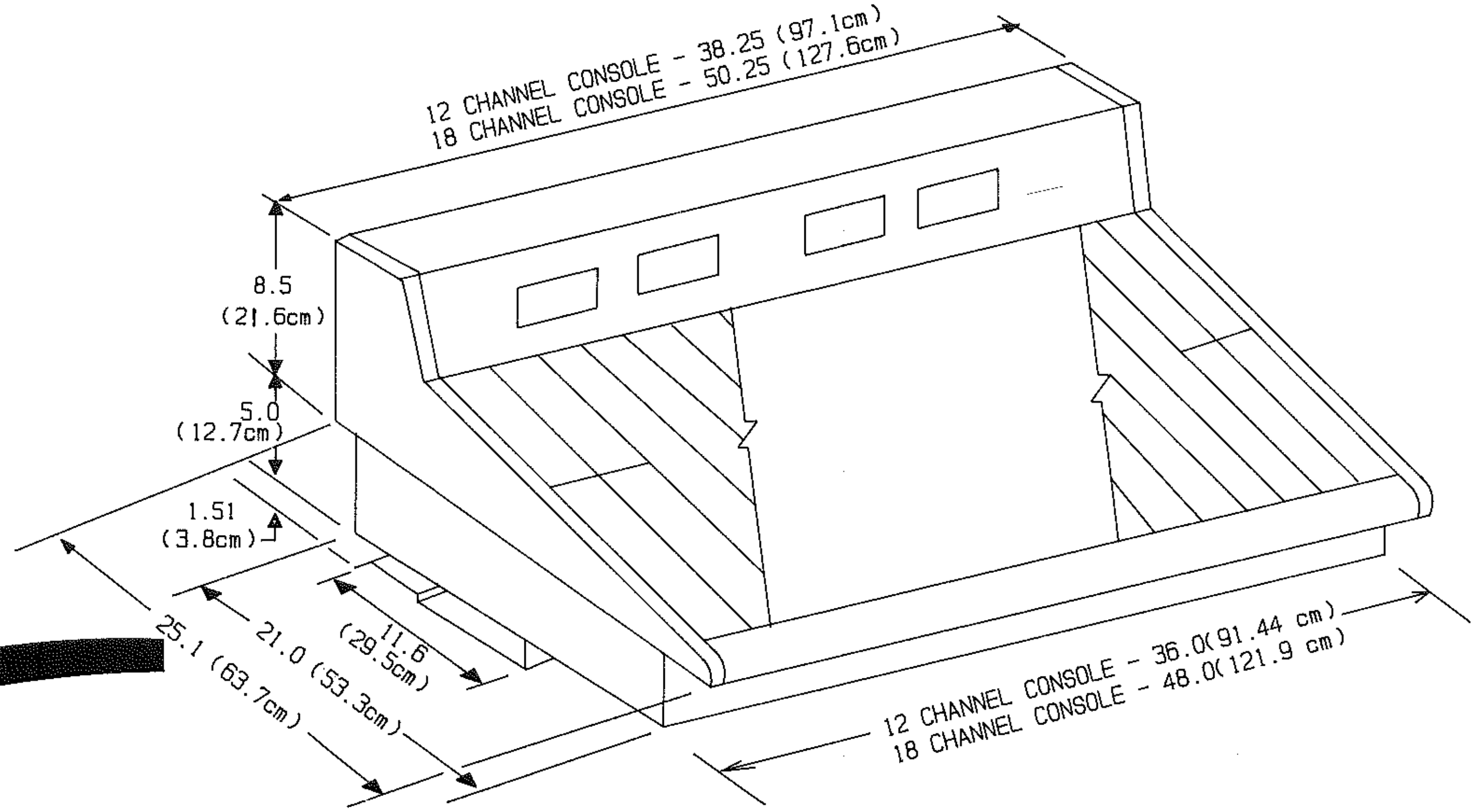
2-14. CONSOLE POWER SUPPLY MODULE. The console power supply module requires 7 inches (17.78 cm) of a 19 inch (48.3 cm) cabinet. An additional 1.75 inches (4.4 cm) of cabinet space above and below the unit is required to provide adequate cooling. Place the module in any convenient location. 10 feet (3.05 m) of power supply cable is provided with the unit. The unit may be placed up to a maximum of 20 feet (6.1 m) from the console mainframe. If a longer cable is required, construct the cable using Belden 8466 18 gauge 12 conductor cable or equivalent. The module should not be mounted directly above or below heat generating equipment, otherwise no special requirements need be observed.

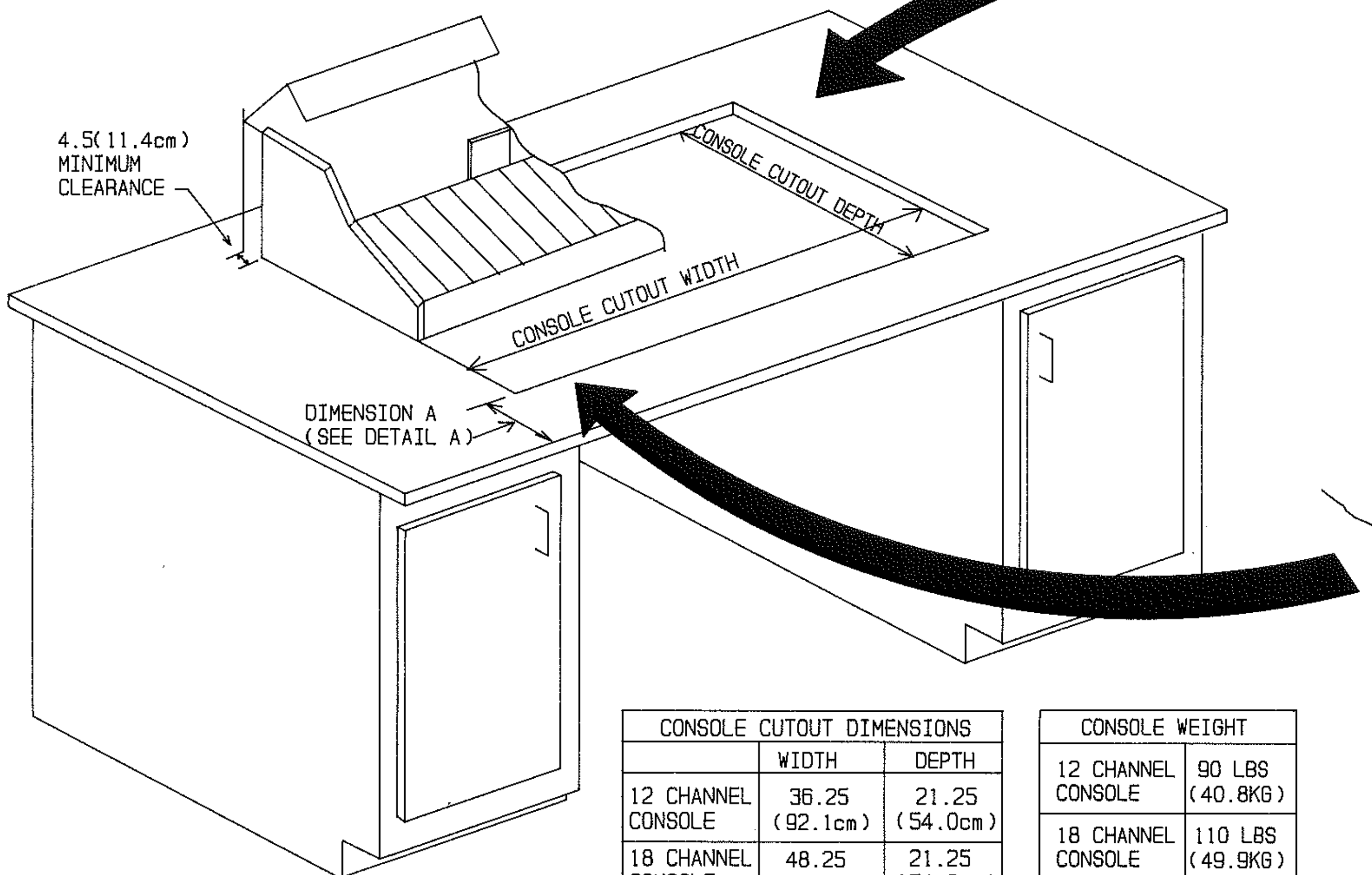
2-15. ASSIGNMENT OF INPUT SOURCES.

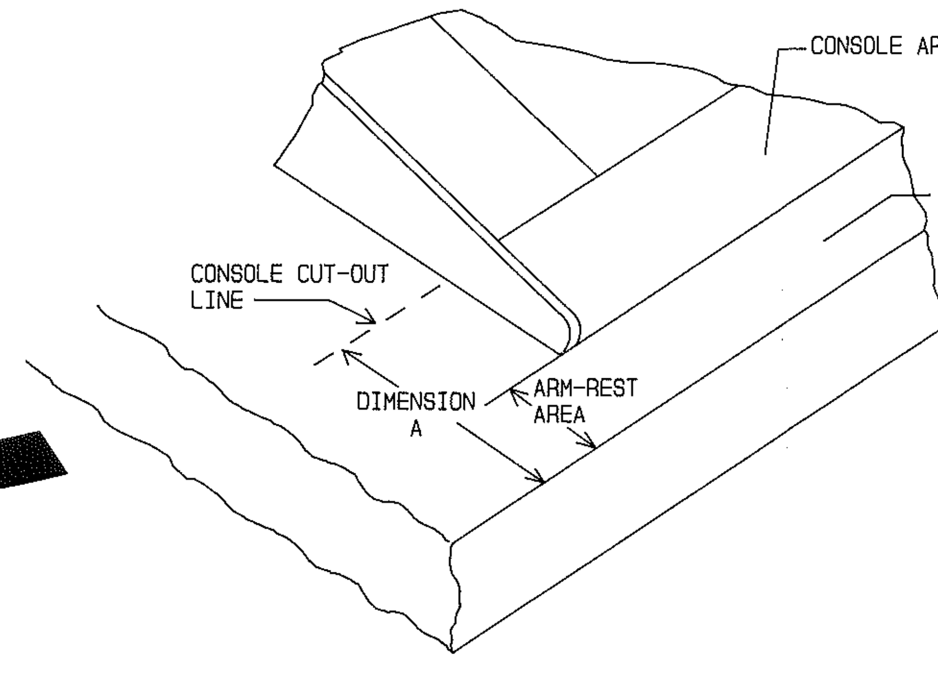
2-16. Assignment of audio input sources is controlled by the level and type of source. Microphone level sources must be assigned to microphone input modules. Line level sources must be assigned to line input modules. It is recommended that each input source assigned to a module be at the same level. However, line input modules will accept input sources at different levels with proper attenuator programming. The consoles are designed to accept either stereophonic or monophonic audio input sources. Monophonic sources assigned to stereophonic modules must be connected to both the left and right channel input terminals.

2-17. Assignment of audio input sources is also controlled by the use of each source. Normally, audio sources such as turntables, cartridge machines, and reel-to-reel machines are assigned to separate input modules so that music/commercials may be sequenced easily. A network input line and a reel-to-reel playback source are rarely used together, therefore the reel-to-reel and the network input may be assigned to the same input module. The assignment of input sources will vary depending on individual studio requirements.

NOTE: ALL DIMENSIONS IN INCHES







DETAIL A

CONSOLE CUTOUT DIMENSIONS		
	WIDTH	DEPTH
12 CHANNEL CONSOLE	36.25 (92.1cm)	21.25 (54.0cm)
18 CHANNEL CONSOLE	48.25 (122.6cm)	21.25 (54.0cm)

CONSOLE WEIGHT	
12 CHANNEL CONSOLE	90 LBS (40.8KG)
18 CHANNEL CONSOLE	110 LBS (49.9KG)

CONSOLE ARM-REST AREA	
ARM-REST AREA	DIMENSION A
0 (CONSOLE ARM-REST FLUSH WITH FRONT EDGE OF STUDIO FURNITURE)	4 (10.2cm)
1 (2.5cm)	5 (12.7cm)
2 (5.1cm)	6 (15.2cm)
3 (7.6cm)	7 (17.8cm)
4 (10.2cm)	8 (20.3cm)
5 (12.7cm)	9 (22.9cm)
6 (15.2cm)	10 (25.4cm)

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FIGURE 2-1. MIX-TRAK 90 CONSOLE INSTALLATION

2-18. MODULE AND ACCESSORY EQUIPMENT INSTALLATION.

2-19. GENERAL. The following text provides information for the installation of the Mix-Trak 90 console modules and accessory equipment. The text presents general information relative to module installation such as module locations, special module assembly mounting, and connection terminal applications. The text also presents specific installation information for each console module or accessory. The specific module information contains installation, programming, and wiring/interfacing procedures as required by each module. Several of the module wiring/interfacing procedures will not be required due to assembly and interfacing to the console mainframe at the factory. To install the console modules and accessory equipment, proceed as follows.

2-20. MIX-TRAK 90 CONSOLE MODULE AND COMPONENT LOCATIONS. The Mix-Trak 90 series audio consoles consist of a variety of modular components which are installed in a mainframe chassis. Each console is custom assembled as requested to meet the station operating requirements. Figure 2-2 presents console module and component locations. Refer to Figure 2-2 as required for the module and accessory equipment installation instructions.

2-21. ACCESSORY MODULE OPTIONAL MOUNTING ASSEMBLY. The Mix-Trak 90 console mainframe chassis is designed for the installation of up to 8 accessory modules. In the event the console mainframe is required to house greater than 8 accessory modules, a special mounting assembly is available which allows two accessory modules to be installed in a line/microphone location. To install the accessory modules and the mounting assembly, refer to Figure 2-3 and the following text.

2-22. Access the modules for optional accessory module mounting installation.

2-23. Attach the mounting block to the module support bracket as shown.

2-24. Rotate each accessory module to the component side and locate the optional mounting holes in the module extrusion.

2-25. From the face side of the module, punch a hole through the overlay to access the mounting holes.

2-26. Secure the accessory modules to the support bracket and mounting block as shown.

2-27. Insert the assembly into the desired microphone/line input module location. Secure the assembly to the mainframe with the hardware provided.

2-28. MODULE CONNECTION TERMINAL APPLICATIONS. Several Mix-Trak 90 modules contain solderless connection terminals for the installation of optional components (refer to Figure 2-4). The connection terminal assembly consists of a circuit board mounted terminal and a removable housing cap. Figure 2-4 presents connection terminal wiring and installation information. Refer to Figure 2-4 for connection terminal information as required for the module and accessory equipment installation instructions.

2-29. LINE INPUT MODULES.

2-30. INSTALLATION. Line input modules may be placed in any convenient line/microphone module position (refer to Figure 2-2). For 12 channel consoles, place the modules in line/microphone module positions 1 through 12. For 18 channel consoles, place the modules in line/microphone module positions 1 through 18. Each module is secured to the chassis mainframe with two hex button-head screws.

2-31. PROGRAMMING. Refer to the following text and program the line input module for the desired operating characteristics.

2-32. Input Amplifier Programming. The line input module input circuit consists of an attenuator network, an input selection network, and a programmable input amplifier. The input attenuator network and the amplifier must be programmed for the applied input levels. To program the input amplifier section, proceed as follows.

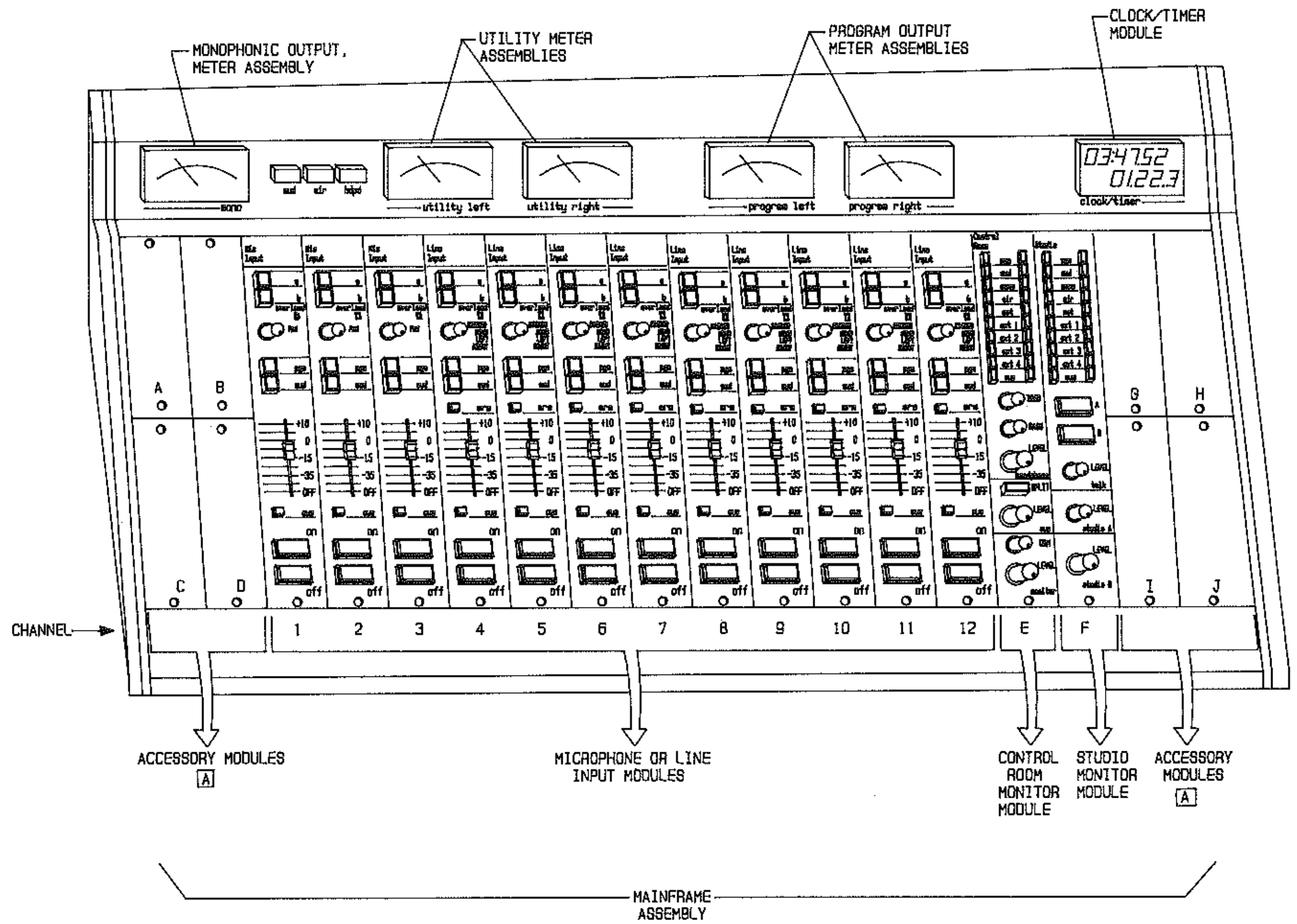
2-33. Determine the input level of the audio sources assigned to the module. If the audio sources are at different levels, determine the audio level difference.

2-34. Refer to Figure 2-5 and program the left and right channel input amplifier stages by installing jumpers J4 and J5 in the appropriate position. If the input sources are at different levels, install jumpers J4 and J5 in the appropriate position for the lowest audio input level.

2-35. If the audio input sources are at different levels, refer to Figure 2-5 and select a resistor value for the attenuator network as determined by the input level difference. Install the appropriate resistor in the attenuator network for the highest applied input source level. For optimum signal quality, ensure the attenuator is of the lowest value possible for the input level difference. Excessive attenuation will degrade the noise performance of the module.

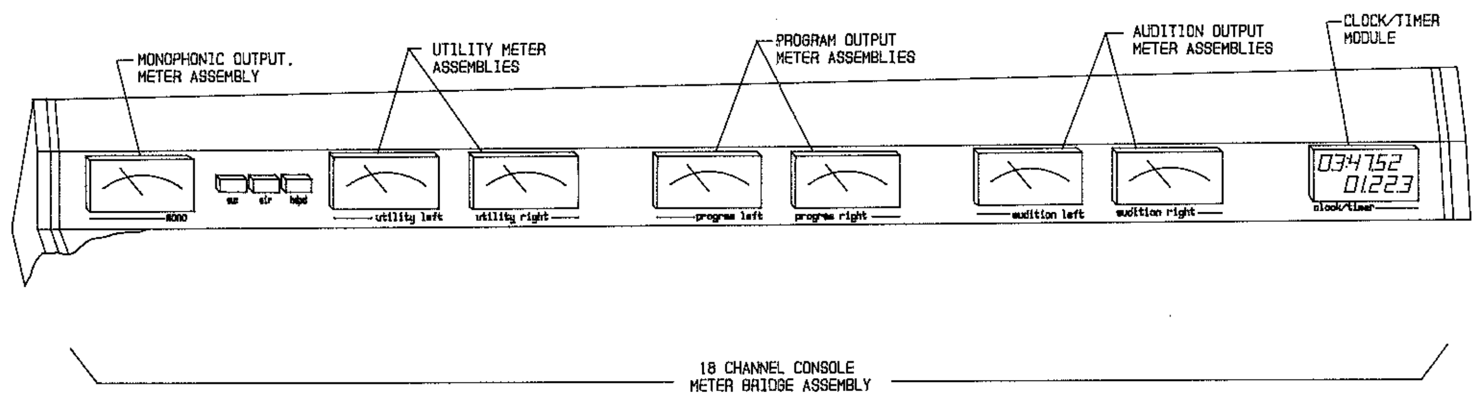
2-36. Module On/Off/Cue Control. A CMOS logic circuit controls the on, off, and cue functions of the module. The logic circuit may be programmed to: 1) enable the module when the fader is operated from the off position, 2) disable the module when the fader is operated to the off position, or 3) configure the module for cue operation when the fader is operated to the off position. The operating functions may be selected individually or in any combination. The module is shipped from the factory with the fader cue control function enabled and the fader on/off control disabled. Refer to Figure 2-5 and program jumpers J13, J14, and J15 for the desired operating functions.

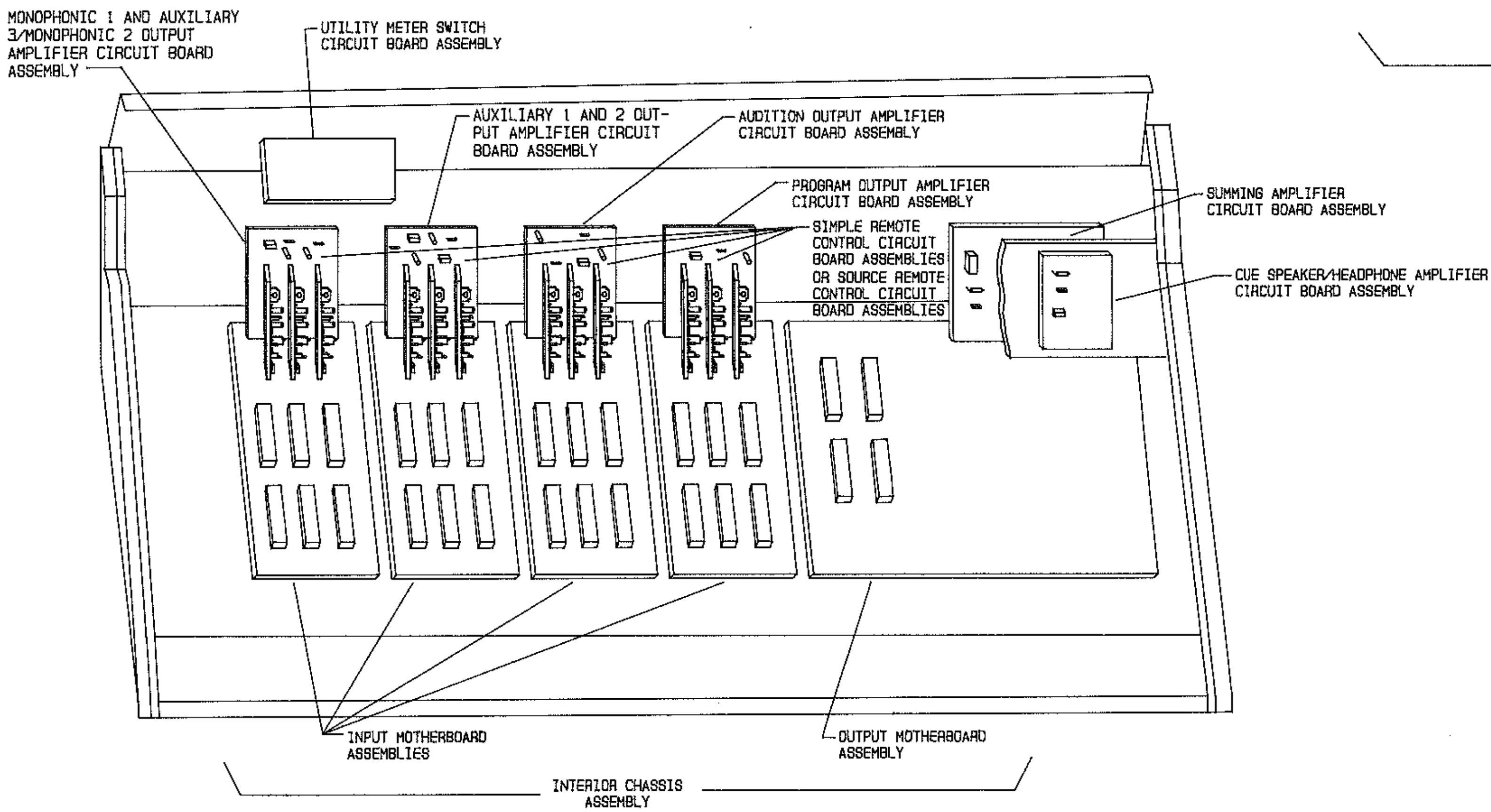
2-37. Patch Point Operation. The line input module audio circuitry contains electronically balanced patch point networks for the connection of external audio processing equipment. The patch point networks consist of transmitting and receiving stages. If patch point interfacing is desired, refer to Figure 2-5 and program jumpers J6 and J7 to enable the patch point receiving stage. The patch point transmitting stage is designed for continuous operation.



A
ACCESSORY MODULES

1. TIMER CONTROL MODULE
2. MONO OUTPUT MODULE
3. TAPE SOURCE REMOTE SWITCH MODULE
4. INPUT EXPANDER MODULE
5. FSK DECODER MODULE
6. CART SOURCE REMOTE SWITCH MODULE
7. EQUALIZER MODULE PROGRAM





NOTES:
12 CHANNEL CONSOLE MAINFRAME IS IDENTICAL TO THE 18 CHANNEL MAINFRAME WITH THE EXCEPTION OF THE METER BRIDGE ASSEMBLY AND 6 ADDITIONAL LINE/MICROPHONE MODULE LOCATIONS.

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FIGURE 2-2. MIX-TRAK 90 MODULE AND CIRCUIT BOARD LOCATIONS

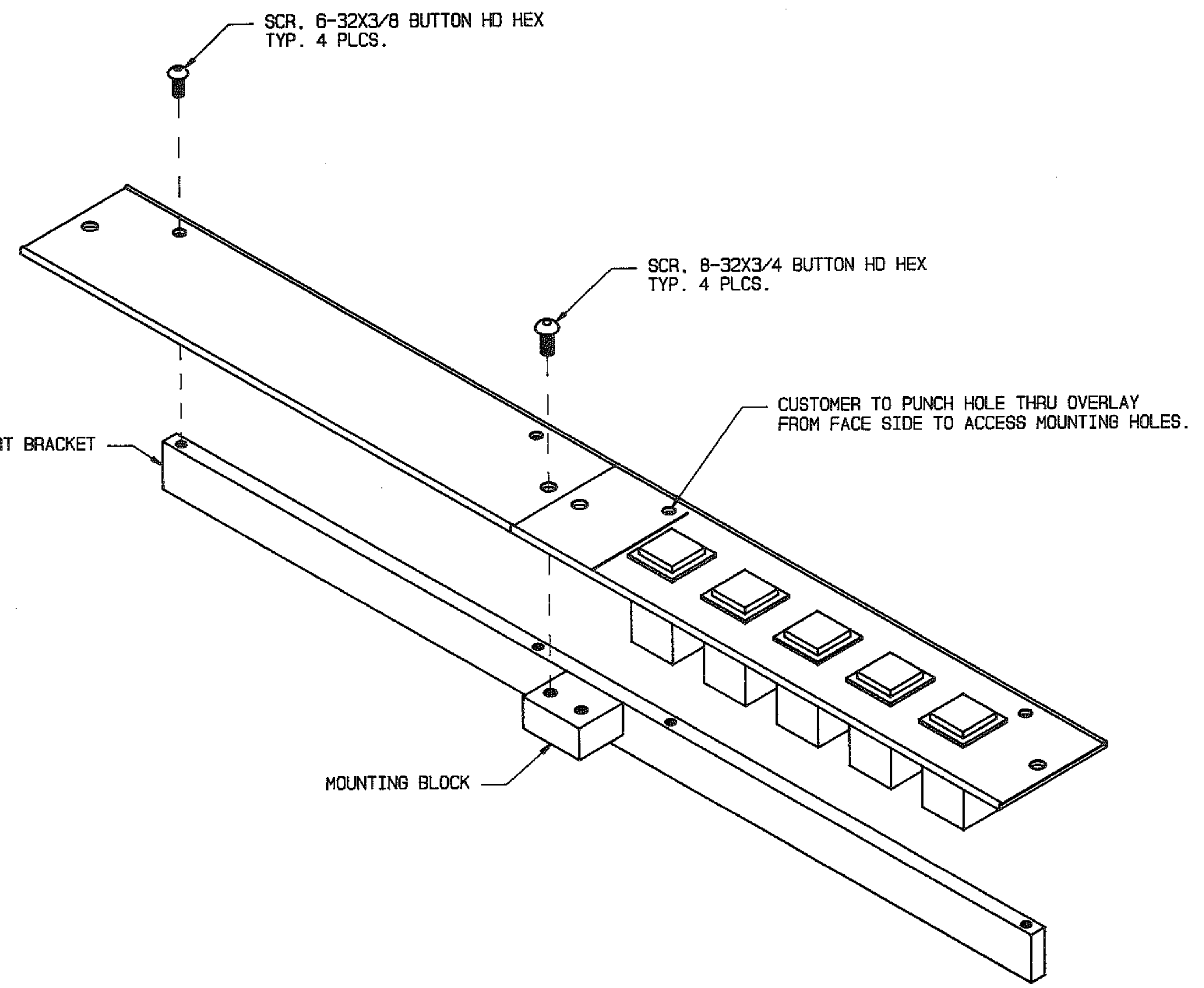
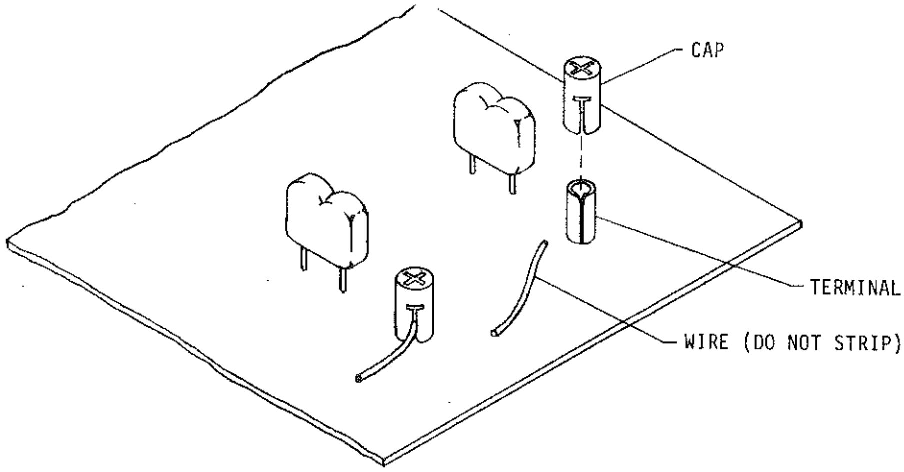


FIGURE 2-3. ACCESSORY MODULE OPTIONAL MOUNTING ASSEMBLY

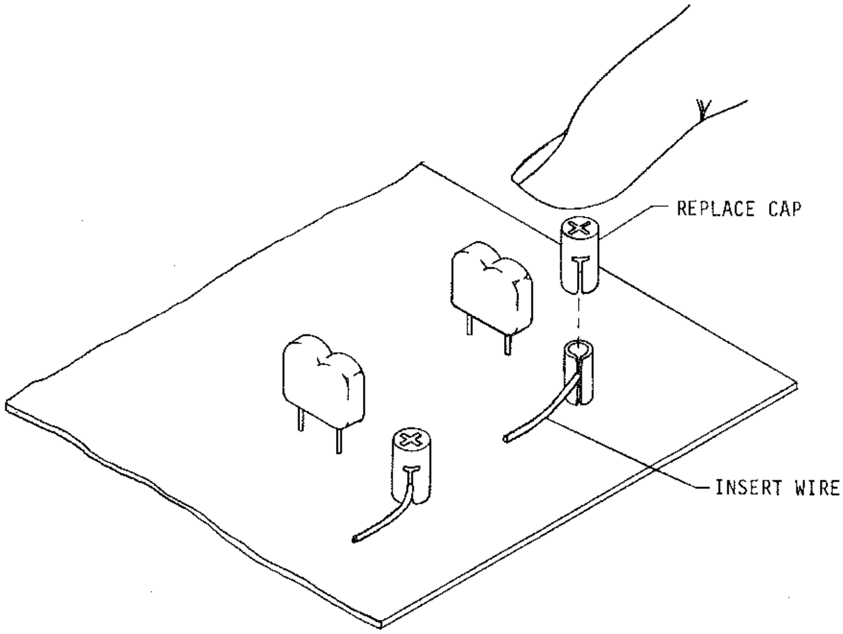
STEP 1

REMOVE CAP FROM
TERMINAL



STEP 2

INSERT WIRE INTO TERMINAL
AT NOTCH.
ALIGN CAP NOTCH WITH TERMINAL
NOTCH AND REPLACE CAP.



STEP 3

SEAT CAP INTO TERMINAL WITH
No. 2 PHILLIPS SCREWDRIVER.

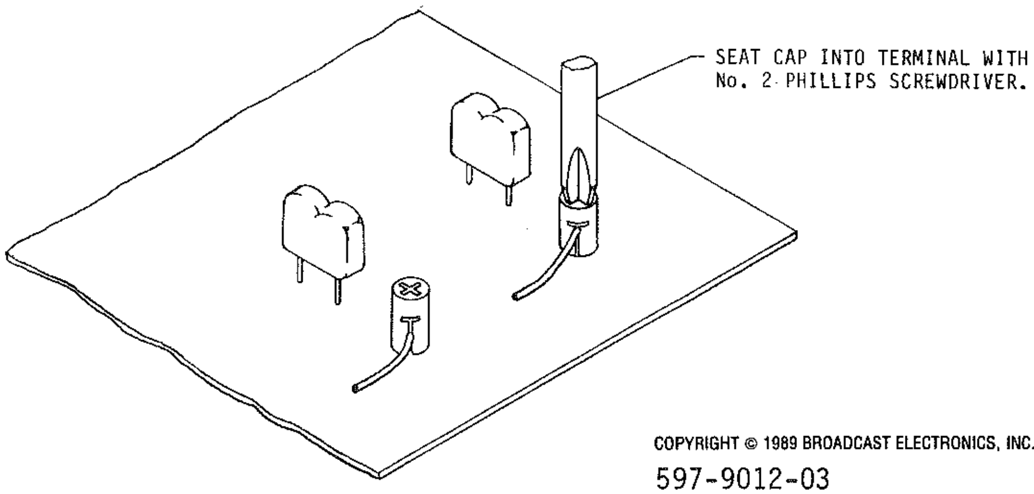


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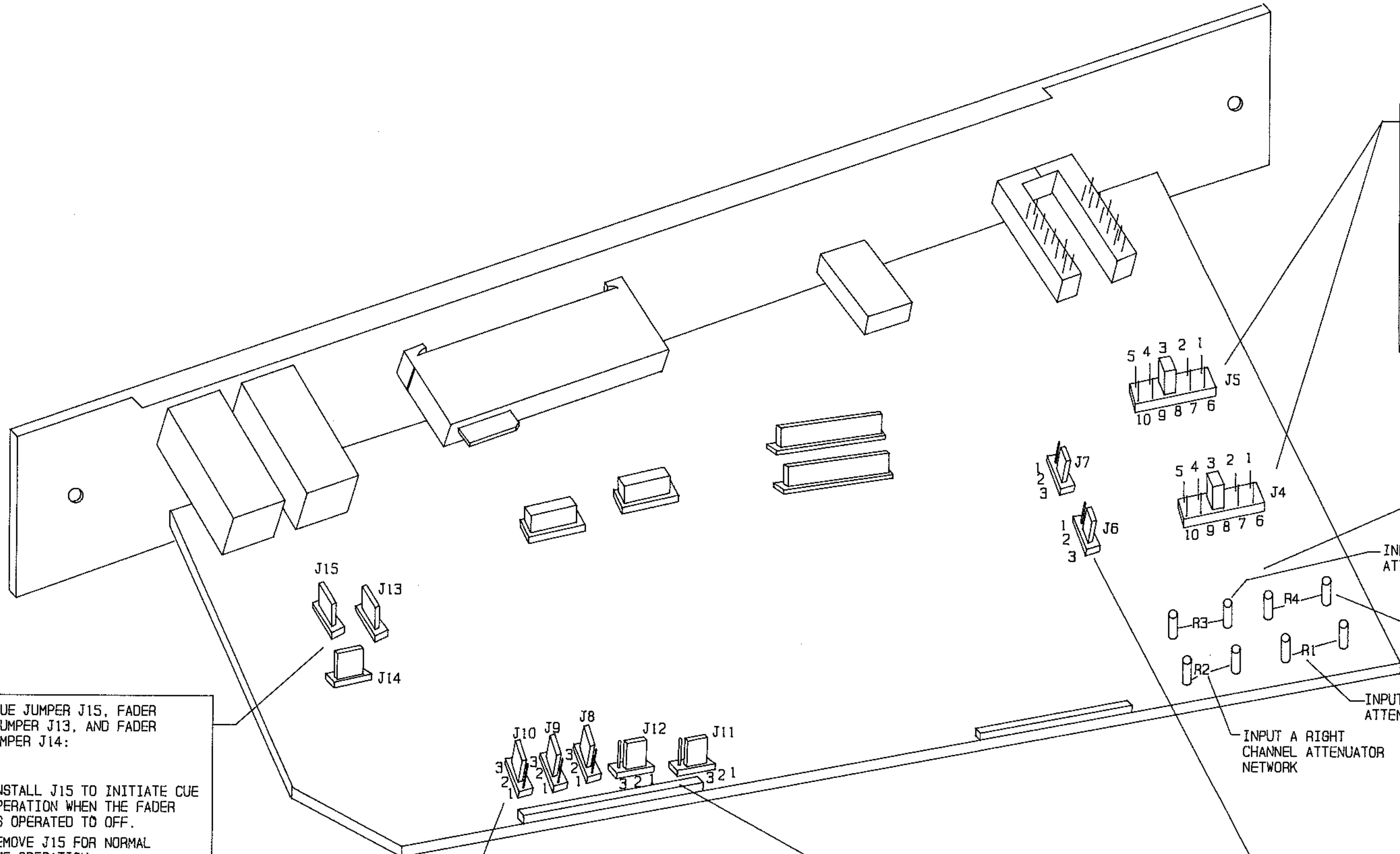
FIGURE 2-4. CONNECTION TERMINAL APPLICATIONS



LEFT CHANNEL INPUT AMPLIFIER GAIN JUMPER J4 AND RIGHT CHANNEL INPUT AMPLIFIER GAIN JUMPER J5:

1. INSTALL J4 AND J5 IN THE APPROPRIATE POSITION. IF THE INPUT SOURCES ARE AT DIFFERENT LEVELS, INSTALL J4 AND J5 IN THE APPROPRIATE POSITION FOR THE LOWEST AUDIO SOURCE INPUT LEVEL.

POSITION	AUDIO INPUT LEVEL
1-6	+8dBU
2-7	+4dBU
3-8	0dBU
4-9	-5dBU
5-10	-10dBU

INPUT ATTENUATOR NETWORK:

SELECT AN INPUT RESISTOR FROM THE FOLLOWING LIST. INSTALL THE RESISTOR IN THE ATTENUATOR NETWORK FOR THE HIGHEST AUDIO INPUT LEVEL.

INPUT LEVEL DIFFERENCE (db)	RESISTOR VALUE R 1%	R 5%
1	20.5K	20K
2	9.76K	10K
3	6.19K	6.2K
4	4.32K	4.3K
5	3.24K	3.3K
6	2.55K	2.7K
7	2.00K	2K
8	1.65K	1.6K
9	1.37K	1.3K
10	1.15K	1.2K
11	976	1K
12	845	820
13	732	750
14	619	620
15	549	560
16	475	470
17	412	430
18	365	360
19	316	330
20	280	270

FADER CUE JUMPER J15, FADER START JUMPER J13, AND FADER STOP JUMPER J14:

1.
   A. INSTALL J15 TO INITIATE CUE OPERATION WHEN THE FADER IS OPERATED TO OFF.
   B. REMOVE J15 FOR NORMAL CUE OPERATION.

2.
   A. INSTALL J13 TO ENABLE THE MODULE WHEN THE FADER IS OPERATED FROM THE OFF POSITION.
   B. REMOVE J13 FOR NORMAL MODULE ON/OFF OPERATION.

3.
   A. INSTALL J14 TO DISABLE THE MODULE WHEN THE FADER IS OPERATED TO OFF.
   B. REMOVE J14 FOR NORMAL MODULE ON/OFF OPERATION.

AUXILIARY 1 OUTPUT ASSIGNMENT JUMPER J8, AUXILIARY 2 OUTPUT ASSIGNMENT JUMPER J9, AND AUXILIARY 3 OUTPUT ASSIGNMENT JUMPER J10:

1.
   A. INSTALL J8 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE AUXILIARY 1 BUSS.
   B. INSTALL J8 IN POSITION 2-3 TO DISABLE THE AUXILIARY 1 BUSS.

2.
   A. INSTALL J9 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE AUXILIARY 2 BUSS.
   B. INSTALL J9 IN POSITION 2-3 TO DISABLE THE AUXILIARY 2 BUSS.

3.
   A. INSTALL J10 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE AUXILIARY 3 BUSS.
   B. INSTALL J10 IN POSITION 2-3 TO DISABLE THE AUXILIARY 3 BUSS.

LEFT CHANNEL PROGRAM MUSIC/SPEECH ASSIGNMENT JUMPER J11 AND RIGHT CHANNEL PROGRAM MUSIC/SPEECH ASSIGNMENT JUMPER J12:

1. INSTALL J11 AND J12 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE PROGRAM SPEECH BUSS.
2. INSTALL J11 AND J12 IN POSITION 2-3 TO ROUTE OUTPUT AUDIO TO THE PROGRAM MUSIC BUSS.

LEFT CHANNEL PATCH POINT JUMPER J6 AND RIGHT CHANNEL PATCH POINT JUMPER J7:

1. INSTALL J6 AND J7 IN POSITION 1-2 TO DISABLE PATCH POINT RECEIVING OPERATIONS.
2. INSTALL J6 AND J7 IN POSITION 2-3 TO ENABLE PATCH POINT RECEIVING OPERATIONS.

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FIGURE 2-5. LINE INPUT MODULE PROGRAMMING

2-38. Audio Output Network Assignments. The audio output network is equipped with circuitry to route audio to the internal program music, program speech, and the auxiliary output busses. The module is shipped from the factory with: 1) output audio routed to the program music buss and 2) the auxiliary output busses disabled. Refer to Figure 2-5 and program jumpers J8 through J12 as required for the desired audio output assignments. Normally, line input modules are assigned to the console music bus.

2-39. INSTALLATION ADJUSTMENTS. The line input module installation adjustments involve the fine alignment of the module operating level. The adjustment procedures are presented in INSTALLATION ADJUSTMENTS. The adjustments are to be performed only when the entire console system is completely installed.

2-40. MICROPHONE INPUT MODULES.

2-41. INSTALLATION. Microphone input modules may be placed in any convenient line/microphone module position (refer to Figure 2-2). For 12 channel consoles, place the modules in line/microphone module positions 1 through 12. For 18 channel consoles, place the modules in line/microphone module positions 1 through 18. Each module is secured to the chassis mainframe with two hex button-head screws.

2-42. PROGRAMMING. Refer to the following text and program the microphone input module for the desired operating characteristics.

2-43. Input Amplifier. The microphone module input amplifier must be programmed for the applied input levels. Refer to Figure 2-6 and program jumper J4 as required.

2-44. Module On/Off Control Operation. A CMOS logic circuit controls the on and off functions of the module. The circuit may be programmed to: 1) enable the module when the fader is operated from the off position or 2) disable the module when the fader is operated to the off position. The operational functions may be selected individually or in any combination. The module is shipped from the factory with the fader on/off control disabled. Refer to Figure 2-6 and program jumpers J6 and J7 for the desired operating conditions.

2-45. Console Timer Reset Operation. Console timer reset jumper J13 allows the timer reset command to be disabled for microphone input modules. The module is shipped from the factory with the timer reset command disabled. Refer to Figure 2-6 and program console timer reset jumper J13 for the desired operating conditions.

2-46. Microphone Phantom Power Operation. The microphone input modules may be equipped for microphone phantom power supply operation. If microphone phantom power supply operation is desired, refer to the MICROPHONE INPUT MODULE PHANTOM POWER SUPPLY TRANSFORMER information in the following text.

2-47. Audio Output Network Operation. The audio output network is equipped to route audio to the internal program music, program speech, and the auxiliary output busses. The module is shipped from the factory with: 1) output audio routed to the program speech buss and 2) the auxiliary output busses disabled. Refer to Figure 2-6 and program jumpers J8 through J12 as required for the desired audio output assignments. Normally, microphone input modules are assigned to the console speech buss.

2-48. Patch Point Operation. The microphone input module contains patch point networks for the connection of external audio processing equipment. The patch point networks consist of transmitting and receiving stages. If patch point interfacing is desired, refer to Figure 2-6 and program jumper J5 to enable the patch point receiving stage as required. The patch point transmitting stage is designed for continuous operation.

2-49. Control Room, Studio A, and Studio B Muting Operation. The microphone input modules are equipped with a muting circuit for the control room, studio A, and studio B monitor speakers. The muting circuit may be programmed to mute the control room, studio A, or studio B monitor speakers when either the A or B microphone input is selected. The module is shipped from the factory with the muting circuitry disabled. Refer to Figure 2-6 and program jumpers J14 through J19 as determined by the muting requirements.

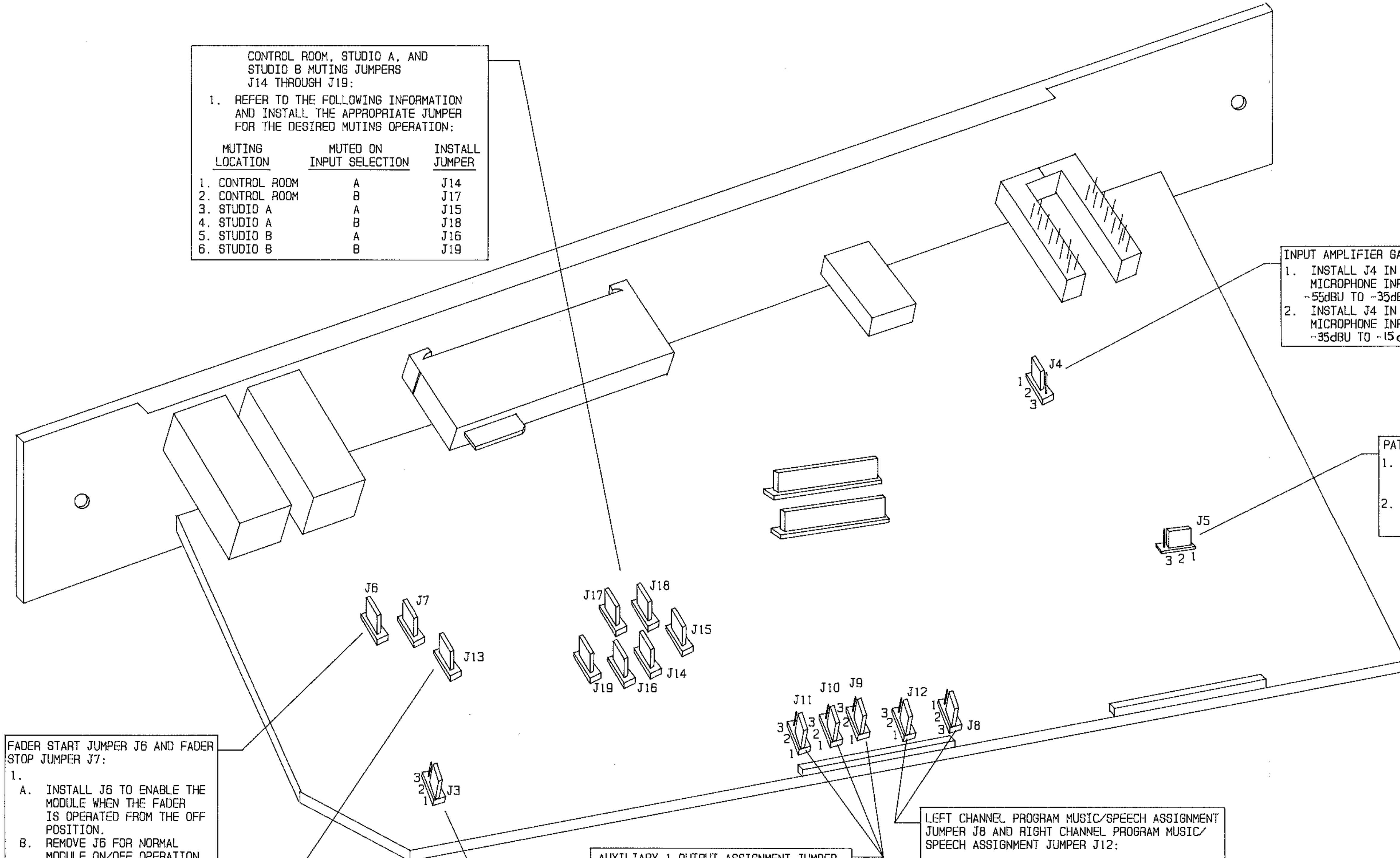
2-50. Call Operation. For microphone input modules assigned to the control room, a CALL switch function must be disabled. Refer to assembly diagram AD951-0014 in the MICROPHONE INPUT MODULE section of this manual and remove the wire from turret terminal E41 to disable the CALL switch function.

2-51. INSTALLATION ADJUSTMENTS. The microphone input module installation adjustments involve the fine alignment of the module operating level. The adjustment procedures are presented in INSTALLATION ADJUSTMENTS. The adjustments are to be performed only when the entire console system is completely installed.

2-52. MICROPHONE INPUT MODULE PHANTOM POWER SUPPLY TRANSFORMER.

2-53. INSTALLATION. Each microphone input module is designed for microphone phantom power supply operation. If microphone phantom power supply operation is desired, a transformer must be installed on the module and the associated power supply circuitry enabled.

2-54. Refer to Figure 2-7 and install the transformer assembly. Secure the assembly to the module with the hardware provided. Attach the transformer wires to the module turrets as shown. Refer to CONNECTION TERMINAL APPLICATIONS in the preceding text for turret terminal wiring operations.



CONTROL ROOM, STUDIO A, AND STUDIO B MUTING JUMPERS J14 THROUGH J19:

1. REFER TO THE FOLLOWING INFORMATION AND INSTALL THE APPROPRIATE JUMPER FOR THE DESIRED MUTING OPERATION:

MUTING LOCATION	MUTED ON INPUT SELECTION	INSTALL JUMPER
1. CONTROL ROOM	A	J14
2. CONTROL ROOM	B	J17
3. STUDIO A	A	J15
4. STUDIO A	B	J18
5. STUDIO B	A	J16
6. STUDIO B	B	J19

INPUT AMPLIFIER GAIN JUMPER J4:

1. INSTALL J4 IN POSITION 1-2 FOR MICROPHONE INPUT LEVELS FROM -55dBU TO -35dBU.
2. INSTALL J4 IN POSITION 2-3 FOR MICROPHONE INPUT LEVELS FROM -35dBU TO -15 dBU.

PATCH POINT JUMPER J5:

1. INSTALL J5 IN POSITION 1-2 TO DISABLE PATCH POINT RECEIVING OPERATIONS.
2. INSTALL J5 IN POSITION 2-3 TO ENABLE PATCH POINT RECEIVING OPERATIONS.

FADER START JUMPER J6 AND FADER STOP JUMPER J7:

1.
  - A. INSTALL J6 TO ENABLE THE MODULE WHEN THE FADER IS OPERATED FROM THE OFF POSITION.
  - B. REMOVE J6 FOR NORMAL MODULE ON/OFF OPERATION.

2.
  - A. INSTALL J7 TO DISABLE THE MODULE WHEN THE FADER IS OPERATED TO OFF.
  - B. REMOVE J7 FOR NORMAL MODULE ON/OFF OPERATION.

TIMER RESET JUMPER J13:

1. INSTALL J13 FOR TIMER RESET OPERATION ON MODULE START COMMANDS.
2. REMOVE J13 TO DISABLE TIMER RESET OPERATIONS.

MICROPHONE PHANTOM POWER JUMPER J3:

1. INSTALL J3 IN POSITION 1-2 TO ENABLE THE MICROPHONE PHANTOM POWER SUPPLY.
2. INSTALL J3 IN POSITION 2-3 TO DISABLE THE MICROPHONE PHANTOM POWER SUPPLY.

AUXILIARY 1 OUTPUT ASSIGNMENT JUMPER J9, AUXILIARY 2 OUTPUT ASSIGNMENT JUMPER J10, AND AUXILIARY 3 OUTPUT ASSIGNMENT JUMPER J11:

1.
  - A. INSTALL J9 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE AUXILIARY 1 BUSS.
  - B. INSTALL J9 IN POSITION 2-3 TO DISABLE THE AUXILIARY 1 BUSS.

2.
  - A. INSTALL J10 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE AUXILIARY 2 BUSS.
  - B. INSTALL J10 IN POSITION 2-3 TO DISABLE THE AUXILIARY 2 BUSS.

3.
  - A. INSTALL J11 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE AUXILIARY 3 BUSS.
  - B. INSTALL J11 IN POSITION 2-3 TO DISABLE THE AUXILIARY 3 BUSS.

LEFT CHANNEL PROGRAM MUSIC/SPEECH ASSIGNMENT JUMPER J8 AND RIGHT CHANNEL PROGRAM MUSIC/SPEECH ASSIGNMENT JUMPER J12:

1. INSTALL J8 AND J12 IN POSITION 1-2 TO ROUTE OUTPUT AUDIO TO THE PROGRAM SPEECH BUSS.
2. INSTALL J8 AND J12 IN POSITION 2-3 TO ROUTE OUTPUT AUDIO TO THE PROGRAM MUSIC BUSS.

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FIGURE 2-6.
MICROPHONE INPUT MODULE PROGRAMMING

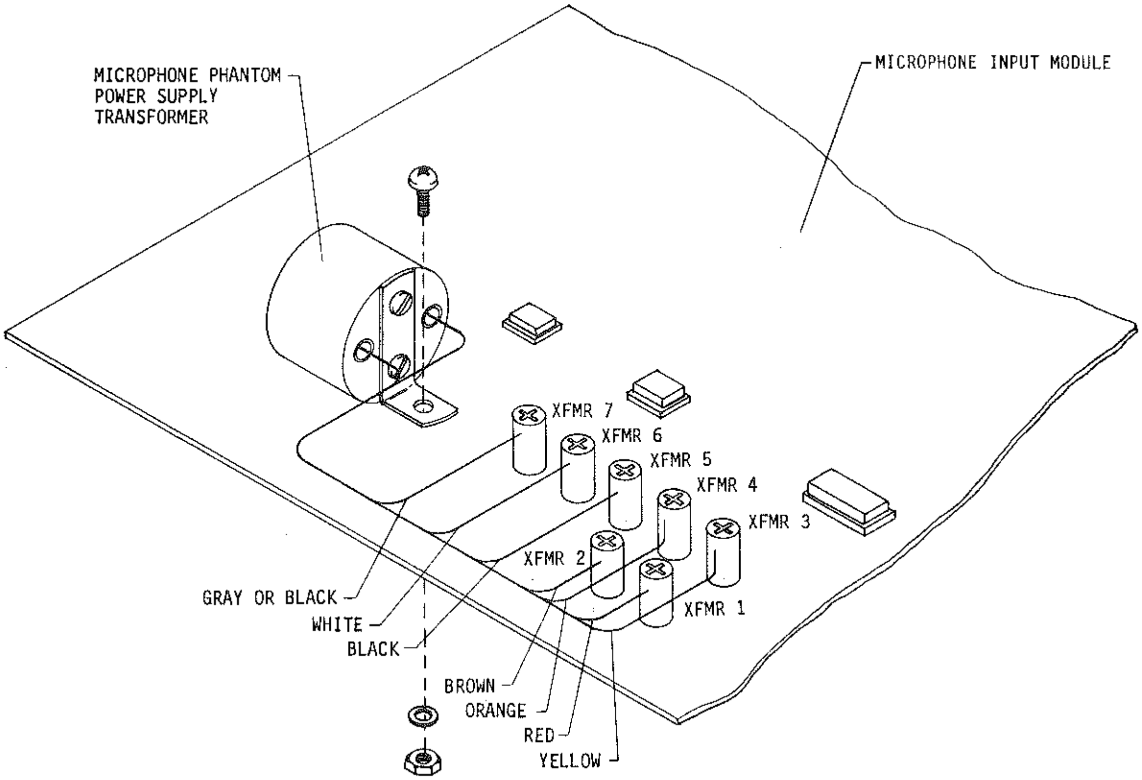

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FIGURE 2-7. MICROPHONE PHANTOM POWER SUPPLY TRANSFORMER INSTALLATION

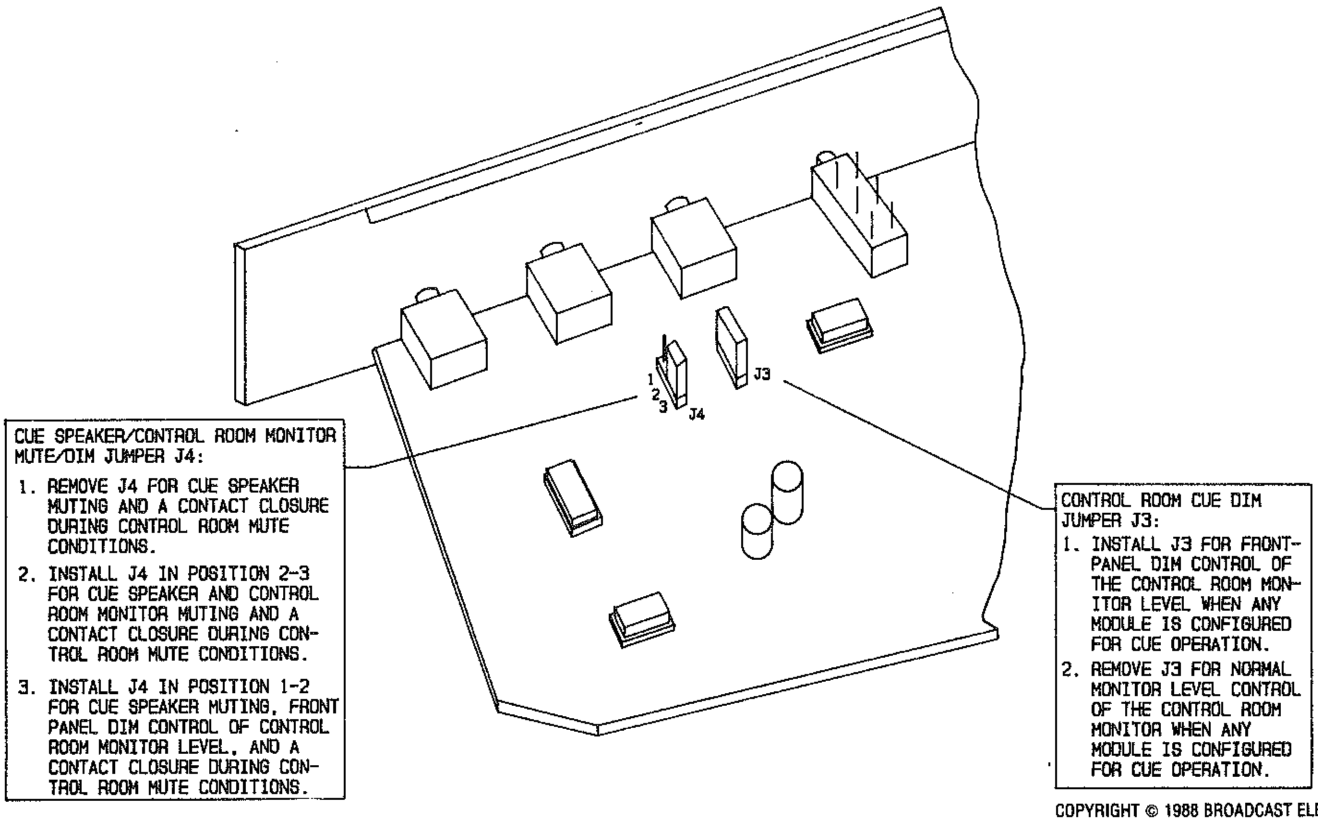

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FIGURE 2-8. CONTROL ROOM MONITOR MODULE PROGRAMMING

2-55. For proper phantom power supply circuit operation, resistors R1 through R3 on the microphone input module must be programmed for the supply voltage to be used. Refer to the following information and schematic diagram SD951-0014 in the MICROPHONE INPUT MODULE section of this manual and program the resistors as required for the supply voltage to be used.

SUPPLY VOLTAGE	RESISTOR R1	RESISTOR R2/R3
48V	1K	6.8K
24V	200	1.2K
12V	100	680

2-56. Refer to Figure 2-6 and program jumper J3 to enable the microphone phantom power supply.

2-57. Once the phantom power supply circuit is enabled, the supply must be calibrated for the proper operating potential. Refer to the MICROPHONE PHANTOM POWER SUPPLY ADJUST procedure in the POWER SUPPLY/ AUTOMATIC POWER SUPPLY SWITCH PANEL section of this manual.

2-58. CONTROL ROOM MONITOR MODULE.

2-59. INSTALLATION. Control room monitor module placement is shown in Figure 2-2. The module is secured to the chassis mainframe with two hex button-head screws.

2-60. PROGRAMMING. Refer to the following text and program the control room monitor module as required for the desired operating characteristics.

2-61. Cue Speaker/Control Room Monitor Mute/Dim Operation. The control room monitor module is equipped with programmable circuitry which controls cue speaker and monitor muting/diming operations. During control room mute conditions, the circuit will: 1) mute the cue speaker, 2) mute the cue speaker and control room monitor, or 3) mute the cue speaker and initiate front-panel dim control of the control room monitor. An additional control circuit provides front-panel dim control during any module cue operation if desired. Refer to Figure 2-8 and program jumpers J3 and J4 as required for the desired operating characteristics. The module is shipped from the factory with the muting circuitry disabled.

2-62. INTERFACING. Control room monitor module interfacing is provided by connectors on the output mother board assembly. Refer to CONTROL ROOM/STUDIO MONITOR MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for control room monitor module interfacing.

2-63. INSTALLATION ADJUSTMENTS. The control room monitor module installation adjustments involve the alignment of the maximum monitor level. The adjustment procedures are presented in INSTALLATION ADJUSTMENTS. The adjustments are to be performed only when the entire console system is completely installed.

2-64. STUDIO MONITOR MODULE.

2-65. INSTALLATION. Studio monitor module placement is shown in Figure 2-2. The module is secured to the chassis mainframe with two hex button-head screws.

2-66. INTERFACING. Studio monitor module interfacing is provided by connectors on the output mother board assembly. Refer to CONTROL ROOM/STUDIO MONITOR MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for studio monitor module interfacing.

2-67. INSTALLATION ADJUSTMENTS. The studio monitor module installation adjustments involve the alignment of the studio A and studio B maximum monitor levels. The adjustment procedures are presented in INSTALLATION ADJUSTMENTS. The adjustments are to be performed only when the entire console system is completely installed.

2-68. LINE OUTPUT AMPLIFIER CIRCUIT BOARD.

2-69. INSTALLATION. The line output amplifier circuit board assemblies are installed in receptacles on the input motherboard assemblies (refer to Figure 2-2). Insert the line output amplifier circuit board in the appropriate motherboard assembly for amplification of the desired console output.

2-70. INSTALLATION ADJUSTMENTS. The line output amplifier circuit board installation adjustments involve the calibration of the console output level. The adjustment procedure is presented in the OUTPUT AMPLIFIER section of this manual. The adjustment is to be performed only when the entire console system is completely installed.

2-71. REMOTE CONTROL MODULE.

2-72. INSTALLATION. Remote control circuit boards allow a microphone or line input module to be operated from a remote location. The remote control assemblies are installed in receptacles on the input motherboards (refer to Figure 2-2). Insert a remote control circuit board assembly in the appropriate receptacle for the desired microphone or line input module.

2-73. PROGRAMMING. The remote control circuit board assembly provides on, off, and cue control of a microphone or line input module from a remote location. Refer to Figure 2-9 and program jumpers J1 and J2 for momentary or continuous start and stop indications. The module is shipped from the factory configured for momentary indications.

2-74. INTERFACING. Remote control module interfacing is provided by connectors on the input motherboard assemblies. Refer to REMOTE CONTROL MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for remote control module interfacing procedures.

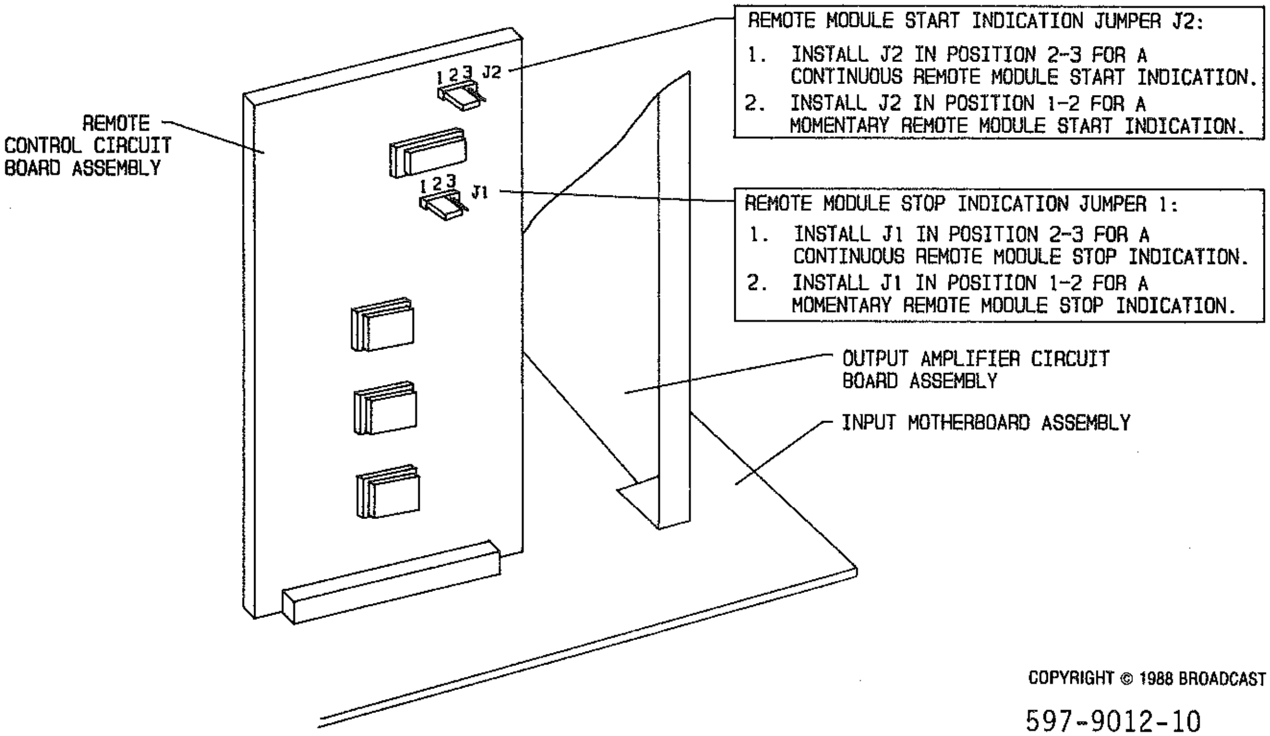

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FIGURE 2-9. REMOTE CONTROL CIRCUIT BOARD PROGRAMMING

2-75. SOURCE REMOTE CONTROL MODULE.

2-76. INSTALLATION. Source remote control circuit boards are designed for operation with line input modules. The circuit boards provide remote control and sequencing of audio sources. The source remote control assemblies are installed in receptacles on the input motherboards (refer to Figure 2-2). Insert a source remote control circuit board assembly in the appropriate receptacle for the desired line input module.

2-77. PROGRAMMING. The source remote control circuit board operates in association with line input modules to provide remote control and sequencing of audio input sources. Refer to Figure 2-10 and program the module as required for momentary or continuous start and stop commands. The module is shipped from the factory configured for momentary commands.

2-78. INTERFACING. Source remote control module interfacing is provided by connectors on the input motherboard assemblies. Refer to SOURCE REMOTE CONTROL MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for source remote control module interfacing procedures.

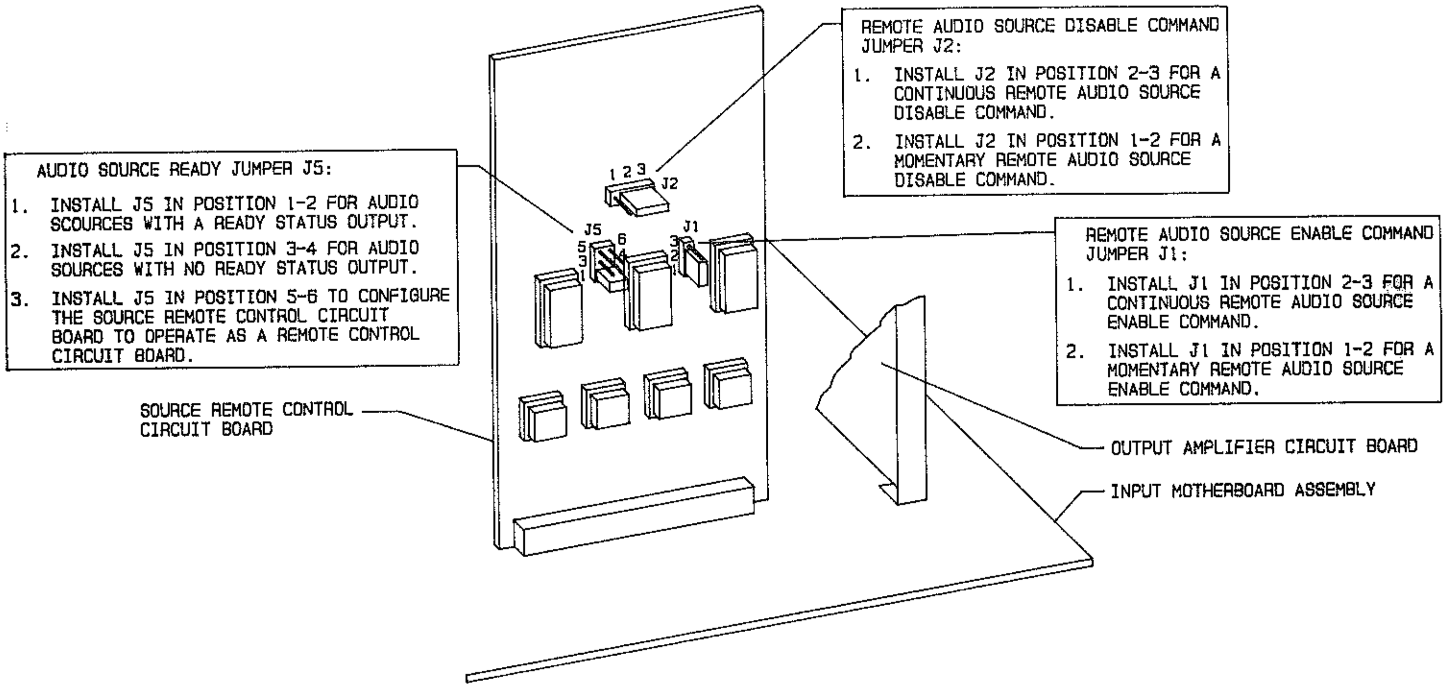

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FIGURE 2-10. SOURCE REMOTE CONTROL CIRCUIT BOARD PROGRAMMING

2-79. TIMER CONTROL MODULE.

2-80. INSTALLATION. The timer control module operates in association with the clock/timer module. The timer control module may be placed in any convenient accessory module location A through D or G through J (refer to Figure 2-2). However, due to interface cable considerations, it is recommended the timer control module be placed in accessory module locations G through J. The module is secured to the chassis mainframe with two hex button-head screws.

2-81. WIRING. The timer control module is designed to be interfaced to the clock/timer module. Refer to Figure 2-11 and connect the timer control module cable to the clock/timer module as shown.

2-82. MONOPHONIC OUTPUT MODULE.

2-83. INSTALLATION. The monophonic output module may be placed in any convenient accessory module location A through D or G through J (refer to Figure 2-2). However, due to interface cable considerations, it is recommended the monophonic output module be placed in accessory module locations G through J. The module is secured to the chassis mainframe with two hex button-head screws.

2-84. WIRING. The monophonic output module interfaces with the cue/headphone amplifier circuit board assembly to generate a monophonic output signal. Operating potentials for the module are accessed at J19 on the output motherboard. To install the monophonic output module wiring, proceed as follows.

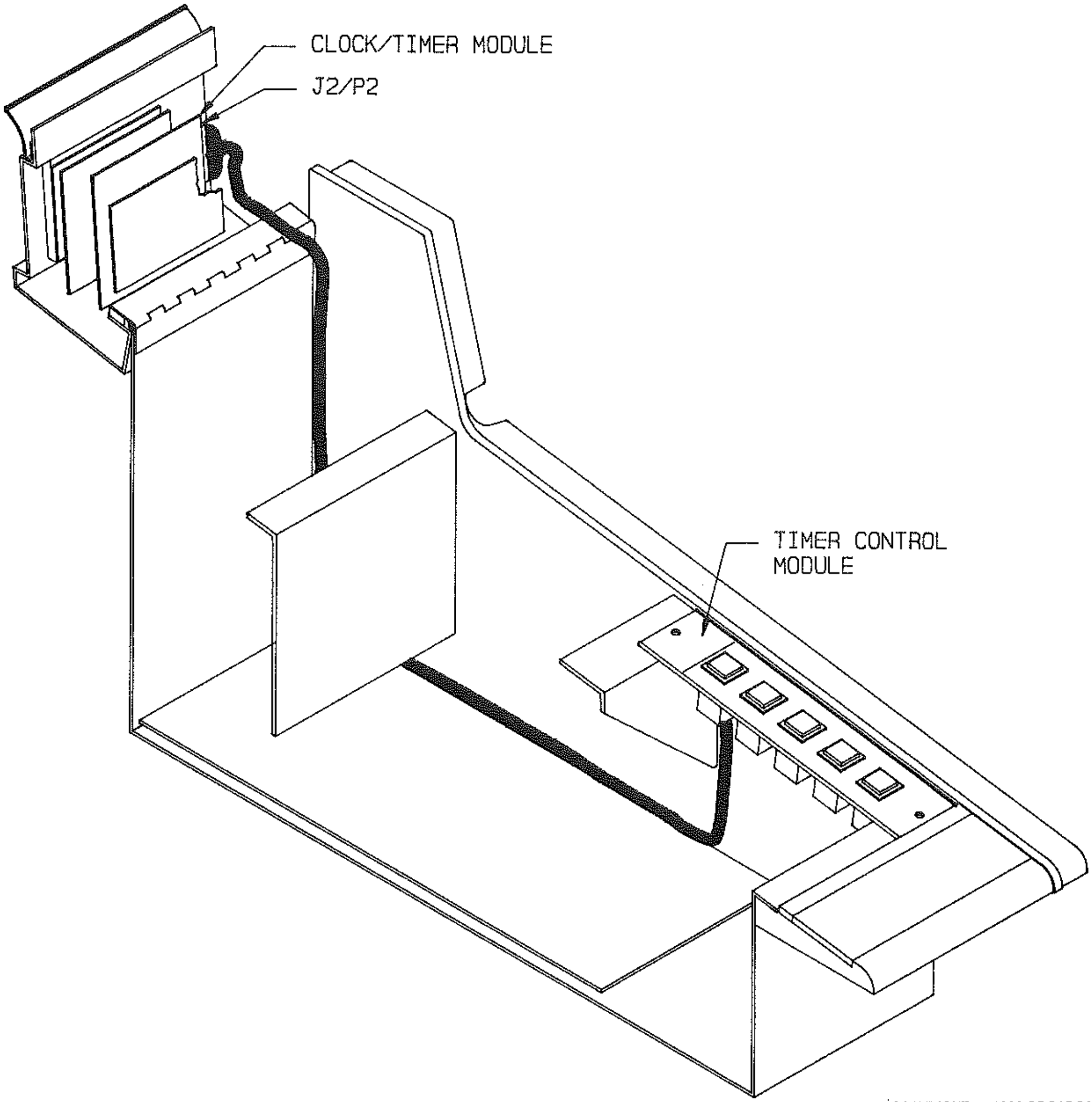

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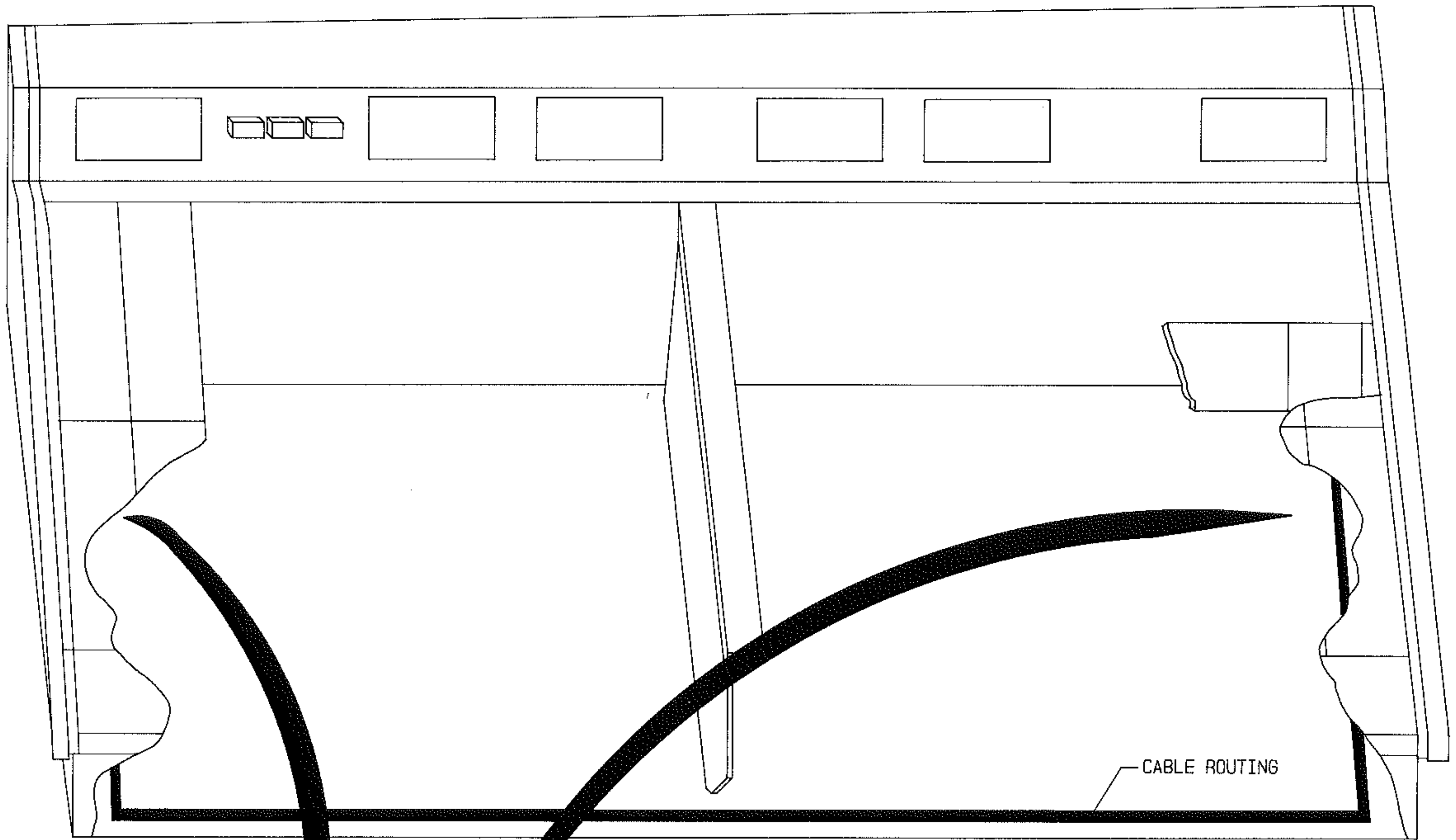
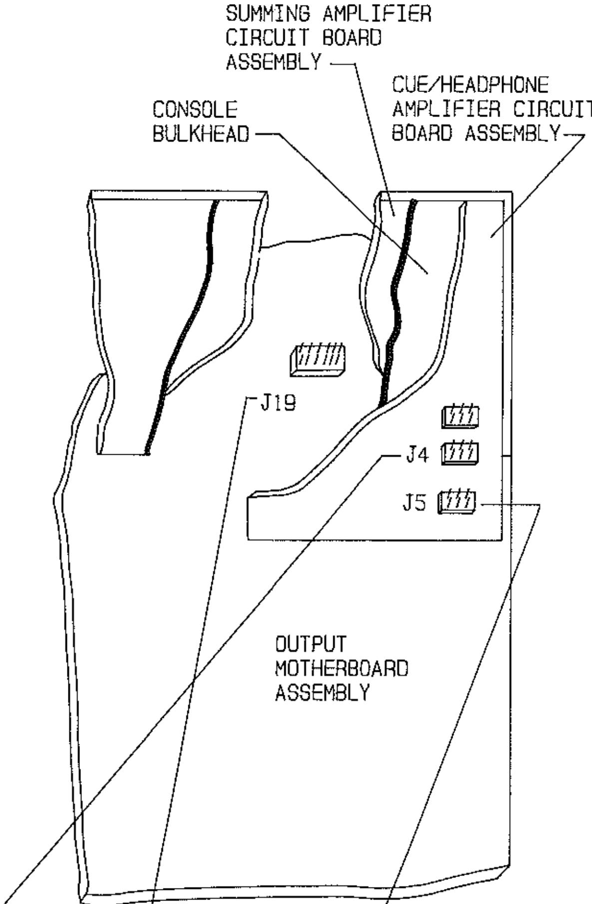
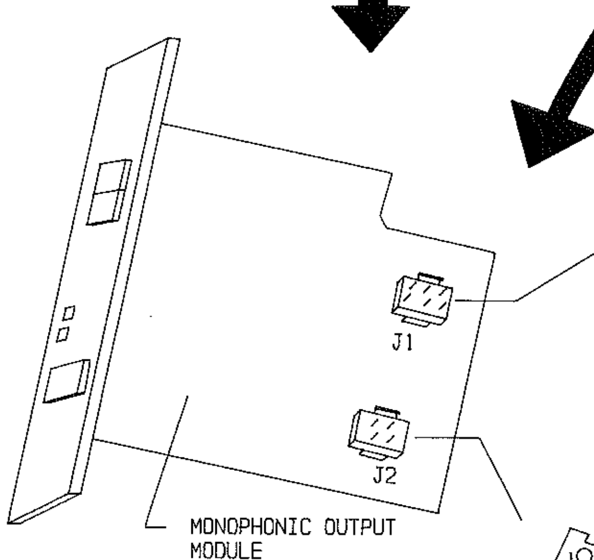
FIGURE 2-11. TIMER CONTROL MODULE INTERFACING

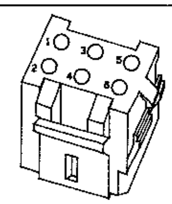
2-85. Monophonic module audio interfacing is provided on the cue/headphone amplifier circuit board (refer to Figure 2-12). Connector J4 provides interfacing for the monophonic 1 audio output. Connector J5 provides interfacing for the monophonic 2 audio output. Refer to Figure 2-12 and route the cable to the cue/headphone amplifier circuit board assembly as shown. Attach the mating connector to the cable and insert the connector in receptacle J4 or J5 on the cue/headphone amplifier circuit board assembly as required.

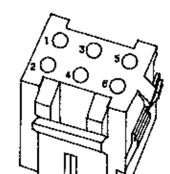
2-86. Monophonic module power supply potentials are provided on accessory module power supply connector J19 of the output motherboard assembly. Refer to Figure 2-12 and route and connect the monophonic output module power supply cable to connector J19 as shown.

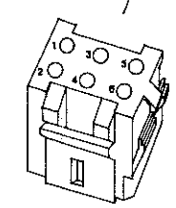












MONOPHONIC OUTPUT MODULE AUDIO CONNECTIONS

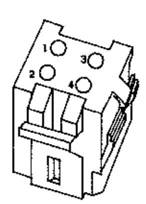
PIN NO.	DESCRIPTION
1	PROGRAM OUTPUT RIGHT CHANNEL
2	AUDITION OUTPUT RIGHT CHANNEL
3	PROGRAM OUTPUT LEFT CHANNEL
4	AUDITION OUTPUT LEFT CHANNEL
5	GROUND
6	MONOPHONIC OUTPUT

MONOPHONIC 1 OUTPUT MODULE AUDIO CONNECTIONS

PIN NO.	DESCRIPTION
1	PROGRAM OUTPUT RIGHT CHANNEL
2	AUDITION OUTPUT RIGHT CHANNEL
3	PROGRAM OUTPUT LEFT CHANNEL
4	AUDITION OUTPUT LEFT CHANNEL
5	GROUND
6	MONOPHONIC 1 INPUT

MONOPHONIC 2 OUTPUT MODULE AUDIO CONNECTIONS

PIN NO.	DESCRIPTION
1	PROGRAM OUTPUT RIGHT CHANNEL
2	AUDITION OUTPUT RIGHT CHANNEL
3	PROGRAM OUTPUT LEFT CHANNEL
4	AUDITION OUTPUT LEFT CHANNEL
5	GROUND
6	MONOPHONIC 2 INPUT



MONOPHONIC OUTPUT MODULE POWER SUPPLY CONNECTIONS

PIN NO.	DESCRIPTION
1	CONSOLE GROUND
2	CONSOLE -24V dc SUPPLY
3	CONSOLE +24V dc SUPPLY
4	POWER SUPPLY GROUND

ACCESSORY MODULE POWER SUPPLY CONNECTIONS

PIN NO.	DESCRIPTION
1	AUDIO POWER GROUND
2	CONSOLE -24V dc SUPPLY
3	CONSOLE +24V dc SUPPLY
4	AUDIO POWER GROUND
5	CONSOLE -24V dc SUPPLY
6	CONSOLE +24V dc SUPPLY
7	AUDIO POWER GROUND
8	CONSOLE -24V dc SUPPLY
9	CONSOLE +24V dc SUPPLY
10	AUDIO POWER GROUND
11	CONSOLE -24V dc SUPPLY
12	CONSOLE +24V dc SUPPLY

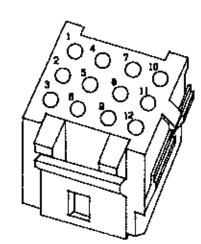


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FIGURE 2-12. MONOPHONIC OUTPUT MODULE INTERFACING

2-87. INSTALLATION ADJUSTMENTS. The monophonic output module installation adjustments involve the calibration of the module output level. Refer to the MONOPHONIC OUTPUT module section in this manual for the adjustment procedure.

2-88. TAPE/CART SOURCE REMOTE SWITCH MODULES.

2-89. INSTALLATION. Tape and cart source remote switch modules provide remote control of reel-to-reel and cartridge machine audio sources. The modules may be placed in any convenient accessory module location A through D or G through J (refer to Figure 2-2). The modules are secured to the chassis mainframe with two hex button-head screws.

2-90. INTERFACING. Tape and cart source remote switch module interfacing is provided by control cables. Refer to TAPE/CART SOURCE REMOTE SWITCH MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for tape and cart source remote switch module interfacing procedures.

2-91. INPUT EXPANDER MODULE.

2-92. INSTALLATION. The input expander module is designed for control of additional audio sources. The module may be placed in any convenient accessory module location A through D or G through J (refer to Figure 2-2). The module is secured to the chassis mainframe with two hex button-head screws.

2-93. INTERFACING. Input expander module interfacing is provided by audio source cables. Refer to INPUT EXPANDER MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for input expander module interfacing procedures.

2-94. FSK DECODER MODULE.

2-95. INSTALLATION. The FSK decoder module is designed to decode FSK information. The module may be placed in any convenient accessory module location A through D or G through J (refer to Figure 2-2). The module is secured to the chassis mainframe with two hex button-head screws.

2-96. WIRING. The FSK decoder module is interfaced to line input modules equipped with source remote control modules. Refer to FSK DECODER MODULE CONNECTIONS in the CONSOLE SYSTEM WIRING information for FSK decoder module interfacing procedures.

2-97. METER BRIDGE.

2-98. GENERAL. The Mix-Trak 90 meter bridge may be equipped with any combination of the following meter bridge accessories: 1) a clock/timer module, 2) analog meter assemblies, 3) peak-program-meter assemblies, or 4) LED bargraph meter assemblies. Each meter bridge accessory module is designed to be placed in any meter location for maximum flexibility. Standard 12 channel console meter assemblies include analog program and utility meters. Standard 18 channel console meter assemblies include analog program, audition, and utility meters. Typical 12 channel and 18 channel meter bridge configurations are presented in Figure 2-2.

2-99. Program Output Monitoring. Program output monitoring is performed by dedicated meters on 12 and 18 channel consoles. Program output meter locations are shown in Figure 2-2.

2-100. Audition Output Monitoring. Audition output monitoring is performed by dedicated meters on 18 channel consoles. The meter locations are shown in Figure 2-2. Audition monitoring on 12 channel consoles is performed by the utility meters. Utility meter locations are shown in Figure 2-2. For 12 channel consoles, a circuit on the utility meter switch circuit board must be properly programmed for audition output monitoring. Refer to the UTILITY METER SWITCH information in the following text for circuit programming procedures.

2-101. Monophonic Output Monitoring. The meter bridge may be equipped for the monitoring of monophonic console output signals. Figure 2-13 presents typical monophonic meter locations. If monophonic 2 output audio is desired, a circuit on the output motherboard assembly must be properly programmed. Refer to the OUTPUT MOTHERBOARD information in the following text for circuit programming procedures.

2-102. Auxiliary Output Monitoring. The Mix-Trak 90 series consoles are equipped with three auxiliary output buses. Auxiliary 1 and 2 output monitoring may be performed by the console utility meters. A circuit on the utility meter switch circuit board must be properly programmed for auxiliary 1 and 2 monitoring. Refer to the UTILITY METER SWITCH information in the following text for programming procedures. Auxiliary 3 output monitoring will require the use of a dedicated meter on the meter bridge. A circuit on the output motherboard assembly must be properly programmed to enable the auxiliary 3 output audio. Refer to the OUTPUT MOTHERBOARD information in the following text for circuit programming procedures.

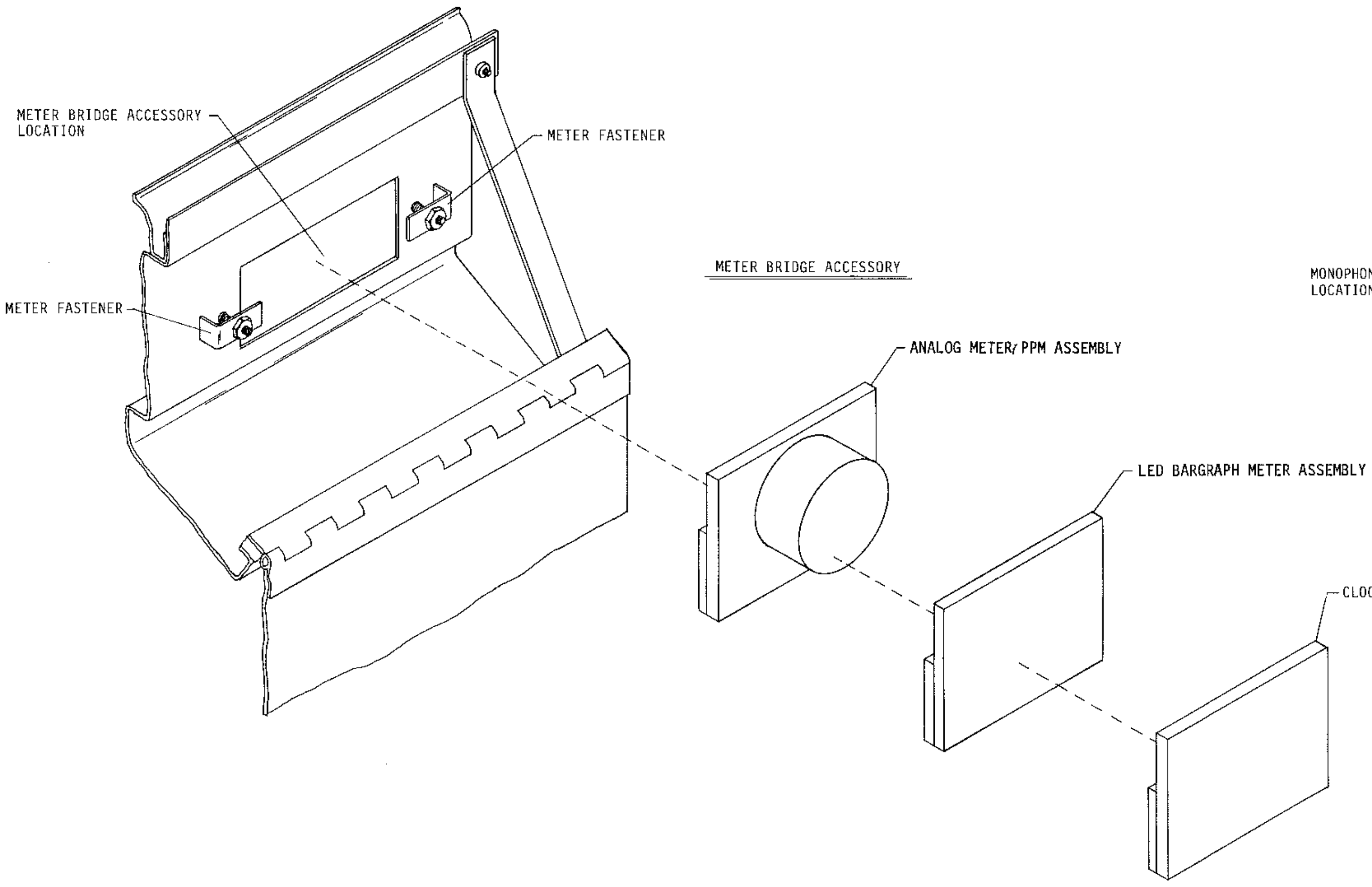
2-103. VU/PEAK-PROGRAM-METER/LED BARGRAPH METER ASSEMBLIES. To install and interface optional VU meter, peak-program-meter (PPM), and LED bargraph meters to the console, proceed as follows.

2-104. Installation. The VU, PPM, and LED bargraph meter assemblies display signal level information in the various meter formats. Each meter assembly may be installed in any meter location as required for signal level indications of the desired console output. Refer to Figure 2-13 and install the meter assembly in the desired location as shown.

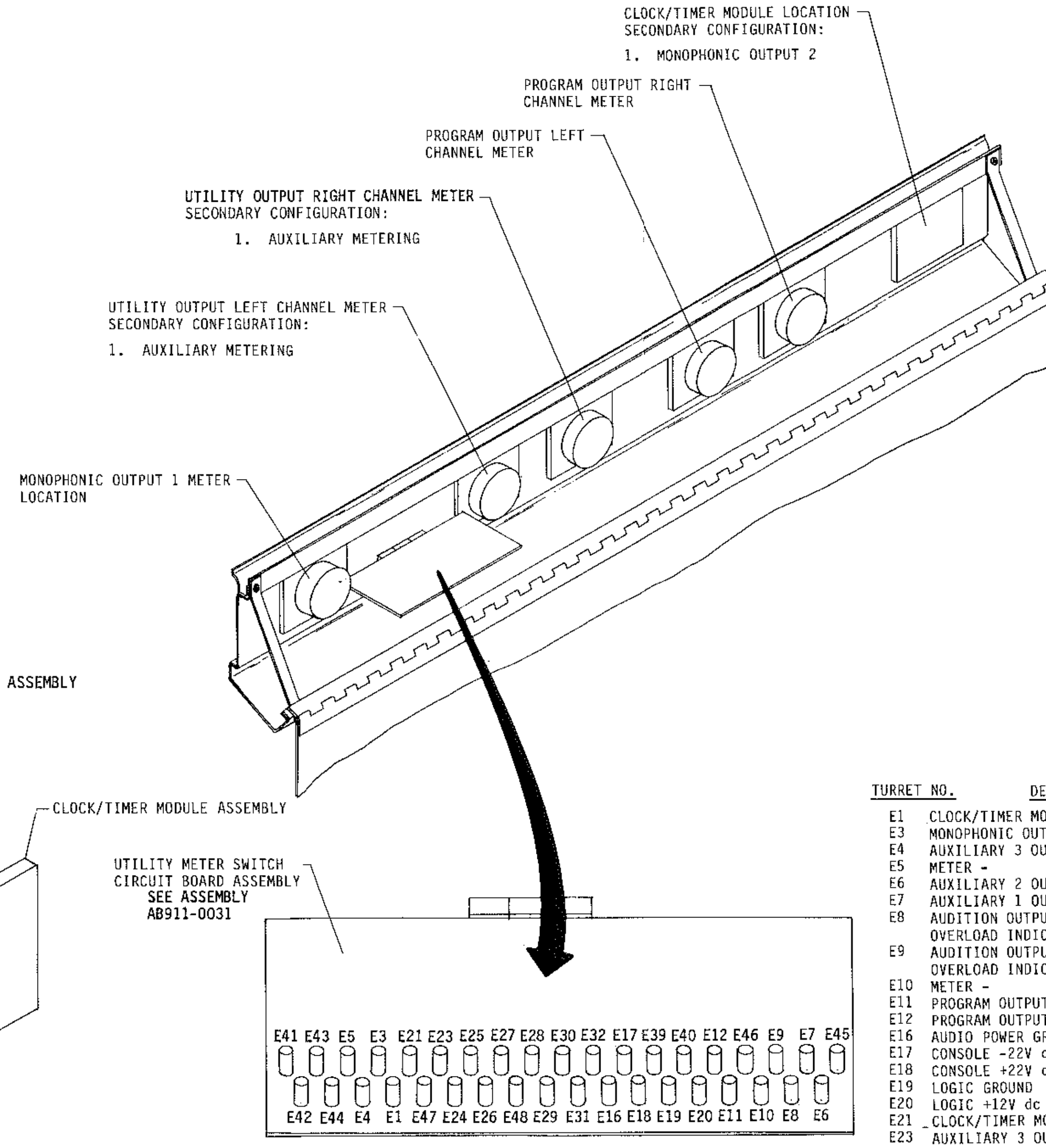
2-105. Wiring. The VU, PPM, and LED meter assemblies must be interfaced to the utility meter switch circuit board assembly to access the desired console output signal. Refer to Figure 2-13 and connect the meter assembly cable to the meter switch circuit board assembly for the desired console output signal.

2-106. CLOCK/TIMER MODULE. To install and interface the clock/timer module to the console, proceed as follows.

2-107. Installation. The clock/timer module presents clock and console timer information. Typical clock/timer module placement is shown in Figure 2-13. However, the module may be placed in any meter location as desired. Refer to Figure 2-13 and install the clock/timer module in the desired location.



METER BRIDGE ACCESSORY MODULE INSTALLATION



METER BRIDGE ACCESSORY MODULE WIRING

TURRET NO.	DESCRIPTION
E1	CLOCK/TIMER MODULE, PROGRAM OUTPUT +
E3	MONOPHONIC OUTPUT 1 +
E4	AUXILIARY 3 OUTPUT/MONOPHONIC 2 +
E5	METER -
E6	AUXILIARY 2 OUTPUT +
E7	AUXILIARY 1 OUTPUT +
E8	AUDITION OUTPUT, LEFT CHANNEL OVERLOAD INDICATOR +
E9	AUDITION OUTPUT, RIGHT CHANNEL OVERLOAD INDICATOR +
E10	METER -
E11	PROGRAM OUTPUT, RIGHT CHANNEL +
E12	PROGRAM OUTPUT, LEFT CHANNEL +
E16	AUDIO POWER GROUND
E17	CONSOLE -22V dc SUPPLY
E18	CONSOLE +22V dc SUPPLY
E19	LOGIC GROUND
E20	LOGIC +12V dc SUPPLY
E21	CLOCK/TIMER MODULE, AUDITION OUTPUT +
E23	AUXILIARY 3 OUTPUT OVERLOAD INDICATOR +
E24	MONOPHONIC OUTPUT 1 OVERLOAD INDICATOR +
E25	AUXILIARY 1 OUTPUT OVERLOAD INDICATOR +
E26	AUXILIARY 2 OUTPUT OVERLOAD INDICATOR +
E27	METER -
E28	AUDITION OUTPUT, RIGHT CHANNEL +
E29	AUDITION OUTPUT, LEFT CHANNEL +
E30	PROGRAM OUTPUT, LEFT CHANNEL OVERLOAD INDICATOR +
E31	PROGRAM OUTPUT, RIGHT CHANNEL OVERLOAD INDICATOR +
E32	METER -
E39	LOGIC GROUND
E40	LOGIC +12V dc SUPPLY
E41	UTILITY OUTPUT, LEFT CHANNEL +
E42	UTILITY OUTPUT, RIGHT CHANNEL +
E43	UTILITY OUTPUT, LEFT CHANNEL -
E44	UTILITY OUTPUT, RIGHT CHANNEL -
E45	METER-
E46	METER-
E47	METER-
E48	METER-

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FIGURE 2-13. METER BRIDGE ACCESSORY MODULE INSTALLATION

2-108. Programming. The clock/timer module timer display is controlled by: 1) microphone/line input module program and audition output selection and 2) the timer control module. For consoles not equipped with a timer control module, refer to Figure 2-14 and assign the module for program output control, audition output control, or program and audition output control of the timer display. For consoles equipped with a timer control module, remove jumpers JP5 and JP6 (refer to Figure 2-14).

2-109. The clock/timer module clock display may programmed to display information in a 12 or 24 hour format. Refer to Figure 2-14 and program the module as desired. The module is shipped from the factory to display clock information in a 12 hour format.

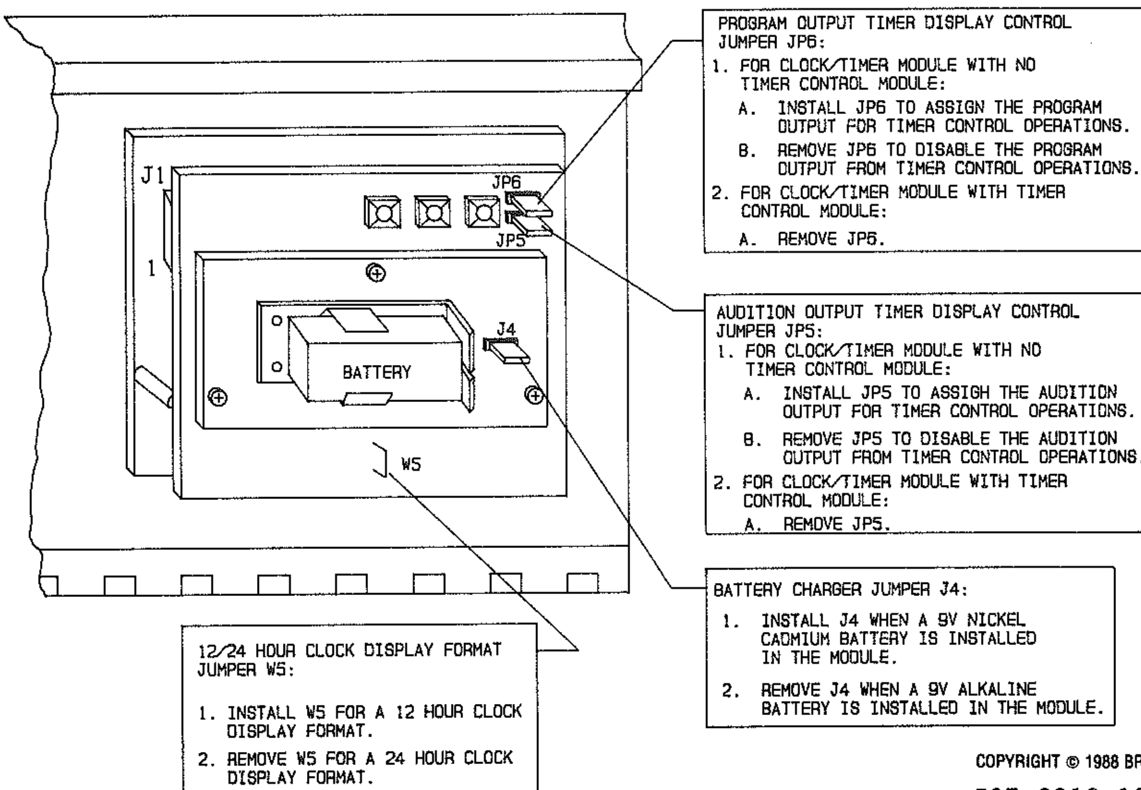

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FIGURE 2-14. CLOCK/TIMER MODULE PROGRAMMING

2-110. Battery Back-Up. The clock/timer module is equipped with a battery back-up system. The battery will maintain clock operation for approximately 2 to 3 hours in the event of a power supply failure. The system is designed for operation from a 9 volt Nickel-Cadmium battery. A 9 volt Alkaline battery may also be installed if a circuit board jumper is properly programmed. Refer to Figure 2-14 and install the battery and program the jumper as required.

2-111. Internal Wiring. The clock/timer module requires interfacing to the utility meter switch circuit board. Refer to Figure 2-15 and connect the clock/timer module cable to the utility meter switch circuit board as shown.

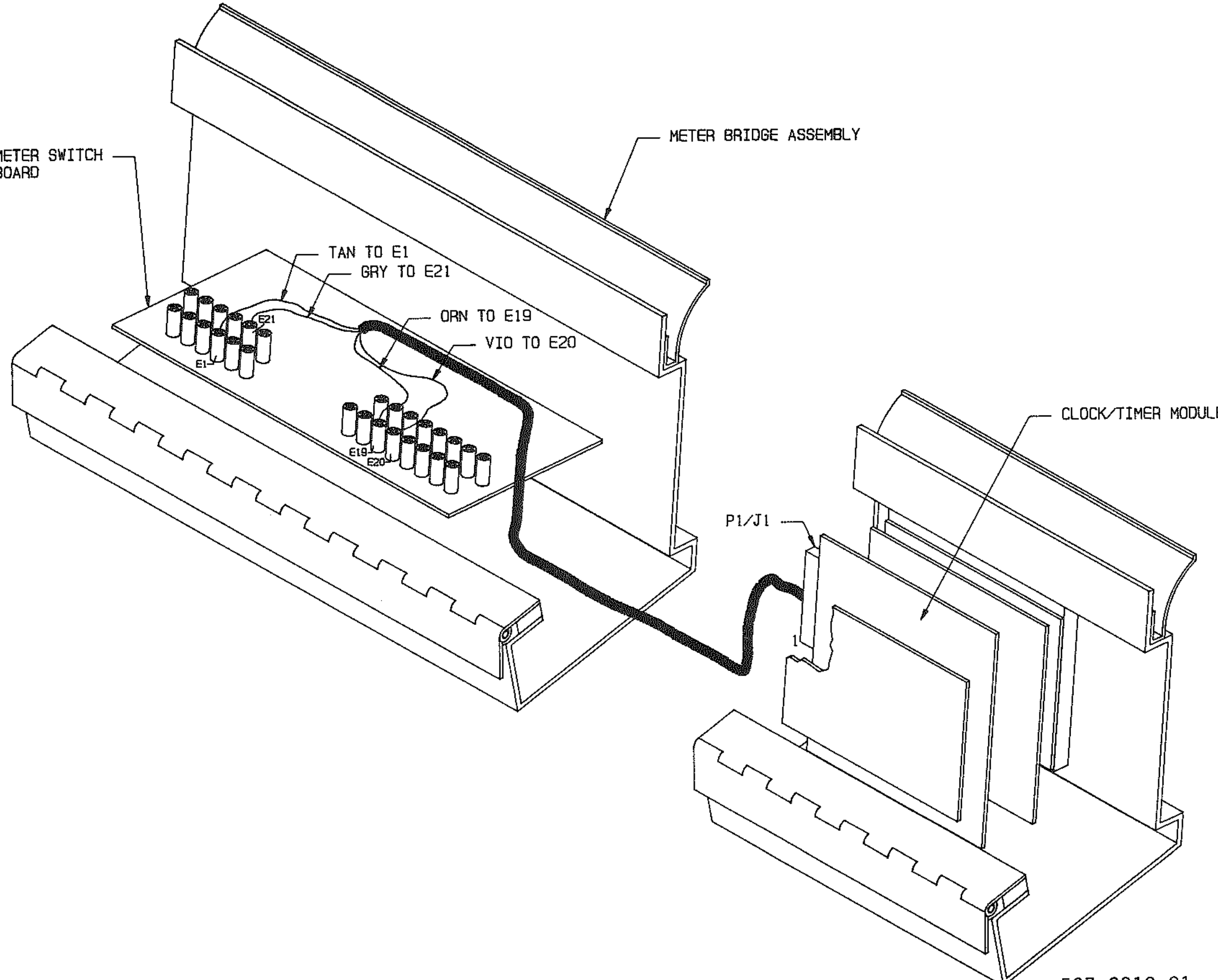

FIGURE 2-15. CLOCK/TIMER MODULE INTERNAL INTERFACING

2-112. Network Syncronization Interfacing. The clock/timer module is equipped with an automatic synchronization feature. The feature synchronizes the clock circuitry to the network audio to eliminate drift. If network audio synchronization is desired, refer to Figure 2-14 and connect the network audio to J1-1 and J1-2.

2-113. Master/Slave Clock Operation. The clock/timer modules in a multiple Mix-Trak 90 console installation may be connected in a master/slave clock configuration if desired. If master/slave clock operation is desired, select a master clock/timer module. Refer to Figure 2-14 and connect serial output port J1-5 on the master clock/timer module to serial input port J1-4 on the slave clock/timer modules.

2-114. AUTOMATIC POWER SUPPLY SWITCH PANEL.

2-115. INSTALLATION. The automatic power supply switch panel requires 1.75 inches (4.4 cm) of a 19 inch cabinet. The unit may be placed in any convenient location with in reach of the two console power supply modules. The panel is secured to the cabinet with four phillips-head screws.

2-116. INTERFACING. The automatic power supply switch panel requires interfacing to the two console power supply modules. Refer to AUTOMATIC POWER SUPPLY SWITCH PANEL CONNECTIONS in the CONSOLE WIRING information for automatic power supply switch panel interfacing.

2-117. STUDIO REMOTE PANEL.

2-118. INSTALLATION. The studio remote panel is designed for installation in an associated studio facility. The panel provides remote control of the microphone input module assigned to the studio, studio-to-control room talkback operations, and local monitor level control. Mount the panel in any convenient location within reach of the studio operator. The panel is secured with two hex button-head screws.

2-119. WIRING. The studio remote panel must be interfaced to the console mainframe. Refer to STUDIO REMOTE PANEL CONNECTIONS in the CONSOLE SYSTEM WIRING information for studio remote panel interfacing.

2-120. UTILITY RELAY.

2-121. INSTALLATION. A modular utility relay provides control of ancillary equipment such as an on-air warning light. Mount the relay in any convenient location within reach of the equipment to be controlled.

2-122. INTERFACING. The utility relay must be interfaced to the console and the ancillary studio equipment. Refer to UTILITY RELAY CONNECTIONS in the CONSOLE SYSTEM WIRING information for utility relay interfacing procedures.

2-123. PROGRAM EQUALIZER MODULES.

2-124. INSTALLATION. The program equalizer modules may be placed in any convenient accessory module location A through D or G through J (refer to Figure 2-2). The modules are secured to the chassis mainframe with two hex button-head screws.

2-125. WIRING. The program equalizer modules are designed to be interfaced to microphone input module, line input module, or program music/speech patch point networks. Refer to the PROGRAM EQUALIZER MODULE connections in the CONSOLE SYSTEM WIRING information for equalizer module interfacing procedures.

2-126. OUTPUT MOTHERBOARD ASSEMBLY.

2-127. PROGRAMMING. The output motherboard assembly is equipped with a jumper to route auxiliary 3 or monophonic 2 audio to an output amplifier module. Refer to Figure 2-16 and program jumper J3 as required for the desired output assignment.

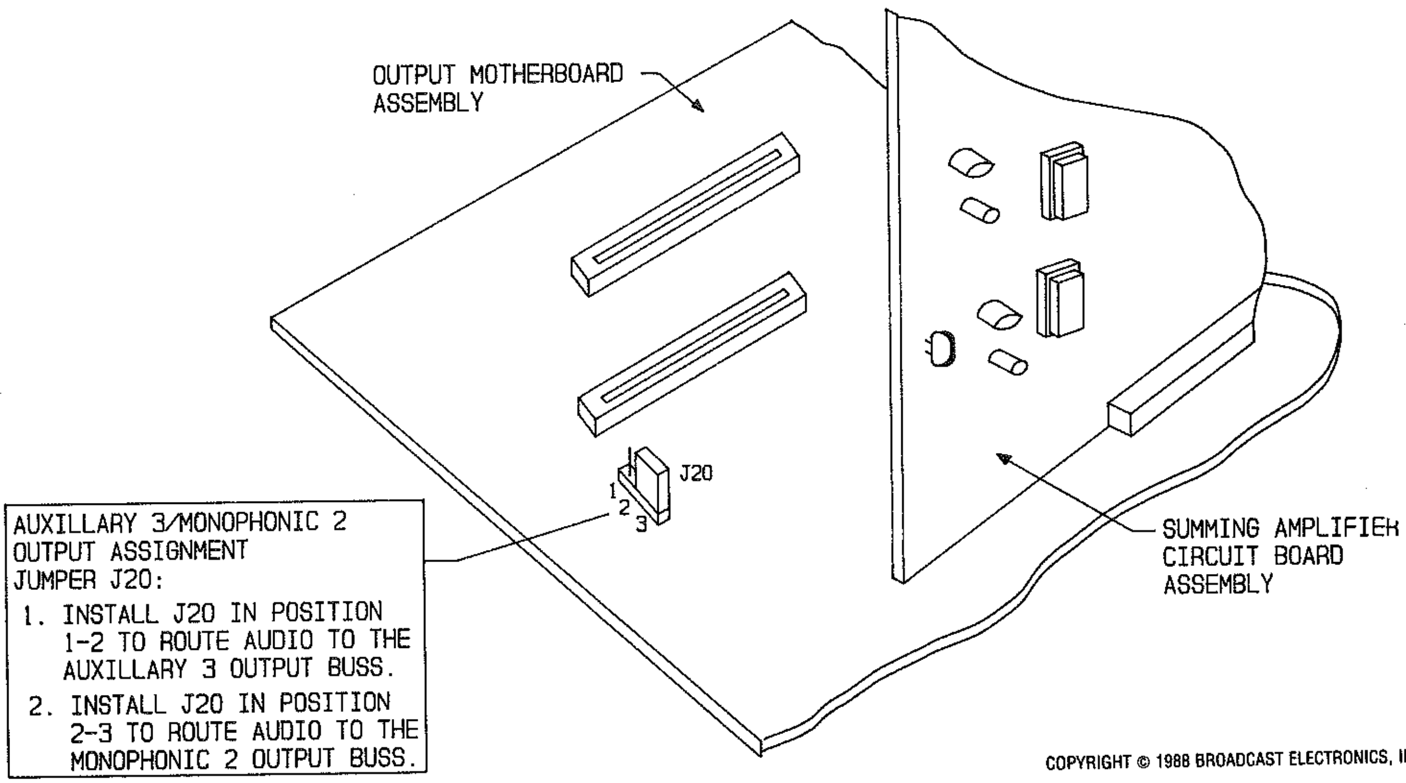

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FIGURE 2-16. OUTPUT MOTHERBOARD ASSEMBLY PROGRAMMING

2-128. SUMMING AMPLIFIER CIRCUIT BOARD.

2-129. PROGRAMMING. The summing amplifier circuit board assembly contains electronically balanced patch point networks for the connection of external audio processing equipment to the console program music and speech busses. The patch point networks consist of transmitting and receiving stages. If patch point interfacing is desired, refer to Figure 2-17 and program jumpers J1 through J4 to enable the patch point receiving stage as required. The patch point transmitting stages are designed for continuous operation.

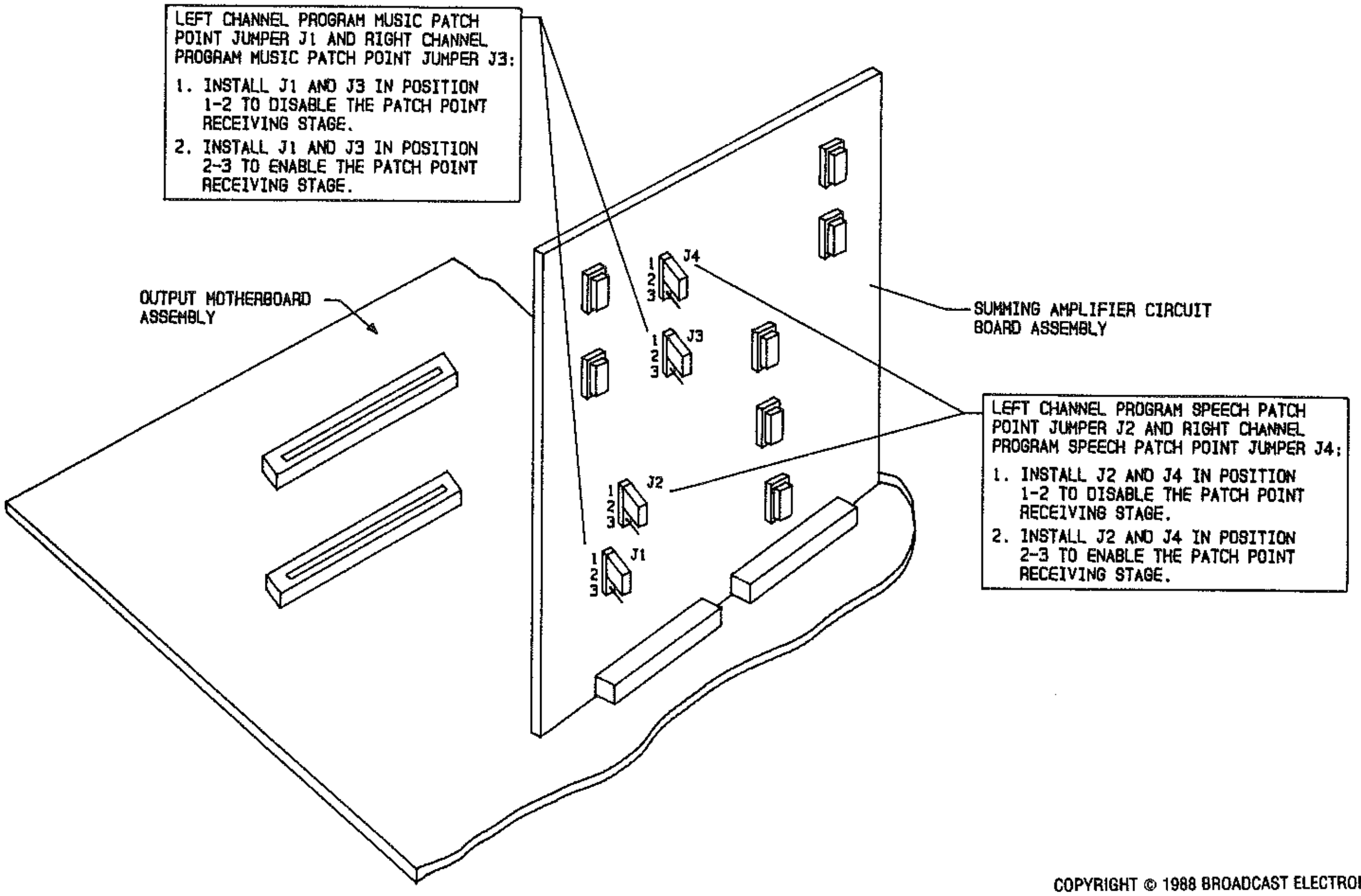

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FIGURE 2-17. SUMMING AMPLIFIER CIRCUIT BOARD PROGRAMMING

2-130. UTILITY METER SWITCH CIRCUIT BOARD.

2-131. PROGRAMMING. The utility meter switch circuit board provides access to console signals for output metering and contains a utility meter select circuit. Jumpers on the circuit board assembly select either audition, auxiliary 1, or auxiliary 2 audio for application to the utility meter (refer to Figure 2-18). For 12 channel consoles, program the jumpers to select either left/right audition audio or auxiliary 1/auxiliary 2 audio for application to the utility meter. For 18 channel consoles, ensure the jumpers are operated to the auxiliary 1 and auxiliary 2 positions.

2-132. CONSOLE SYSTEM WIRING.

2-133. GENERAL. The Mix-Trak 90 series audio consoles are designed with modular plug-in connectors for ease of equipment interfacing. Each console is equipped with a wiring kit which includes a wiring tool, 12 conductor mating connectors, and connector pins. Access for interfacing cables is provided on the mainframe bottom-panel (refer to Figure 2-19). A hinged cable access-panel is secured to the console chassis by four standoffs and mounting screws. Remove the screws and lower the panel to access the console wiring interface area.

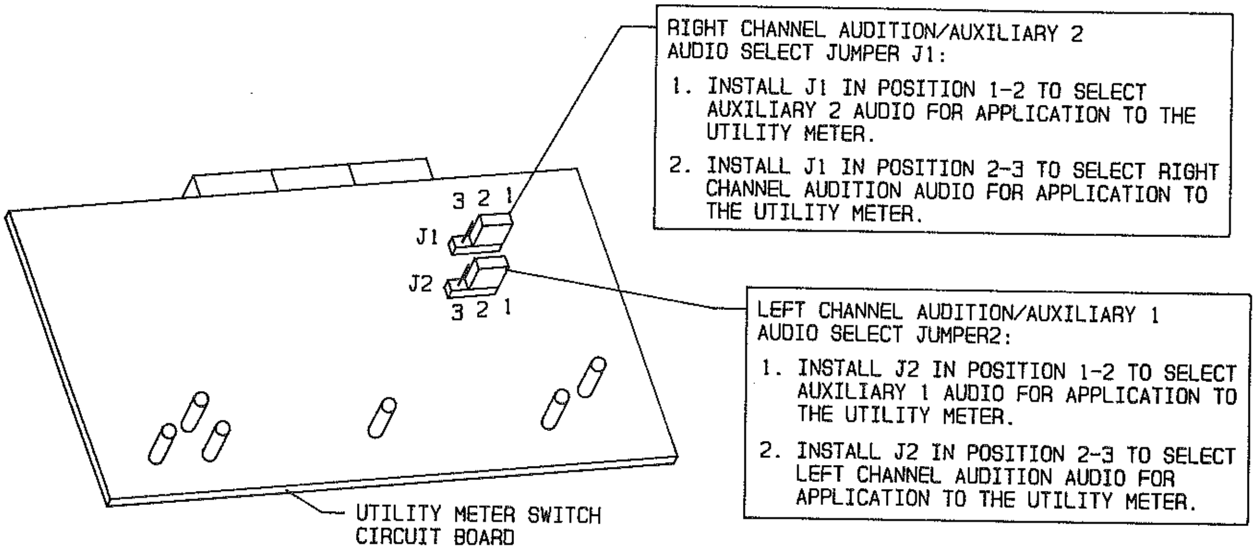

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FIGURE 2-18. UTILITY METER SWITCH CIRCUIT BOARD PROGRAMMING

2-134. Wiring Tool. A wiring tool is supplied in the console installation kit for connector pin crimping operations (refer to Figure 2-20). Figure 2-20 illustrates the correct wire preparation and crimping techniques for the wiring tool. The tool must be used in an appropriate manner to obtain high-quality connections. Use the tool to assemble all console interfacing cables.

2-135. GROUNDING. To obtain optimum noise performance from the Mix-Trak 90 console, the console and the various audio interconnections must be properly grounded and shielded. The following text presents console and audio interconnection grounding information.

2-136. Console Grounding System. The Mix-Trak 90 console is equipped with a programmable ground system. The system consists of: 1) a chassis ground terminal on the console mainframe and 2) a chassis ground terminal and a power supply circuit ground terminal on the power supply unit (refer to Figure 2-21). The system is designed to distribute and isolate ground circuits as required for optimum performance.

2-137. Normal Ground Configuration. A normal ground configuration consists of connecting an earth ground to the power supply unit. Connect an earth ground to the power supply unit CHASSIS and P.S. CIRCUIT ground terminals.

2-138. RFI Ground Configuration. If grounding for RFI conditions is required, an earth ground must be connected to the power supply unit and the mainframe. Connect an earth ground to the power supply unit CHASSIS and P.S. CIRCUIT ground terminals. Also, connect an earth ground to the console mainframe ground terminal.

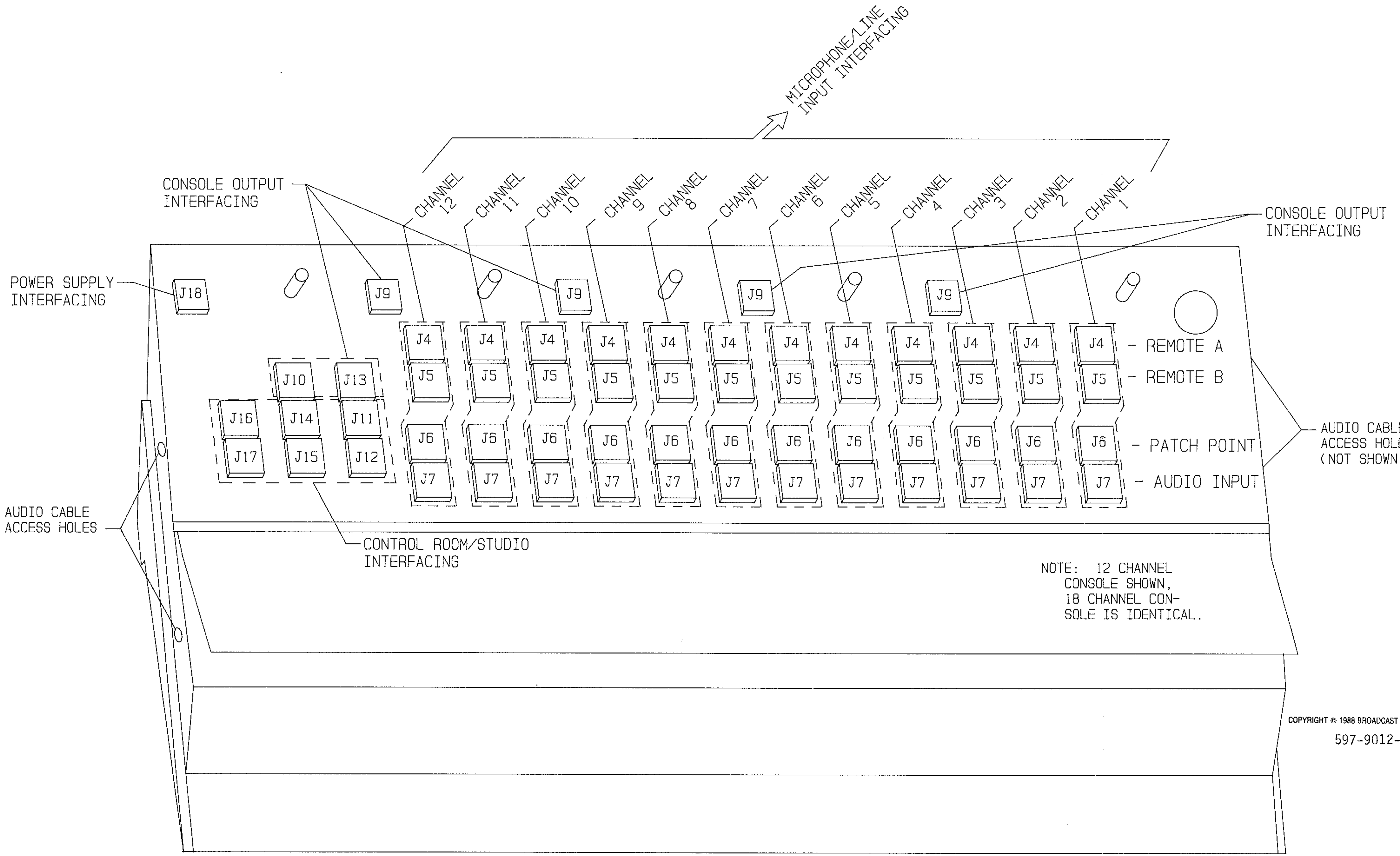

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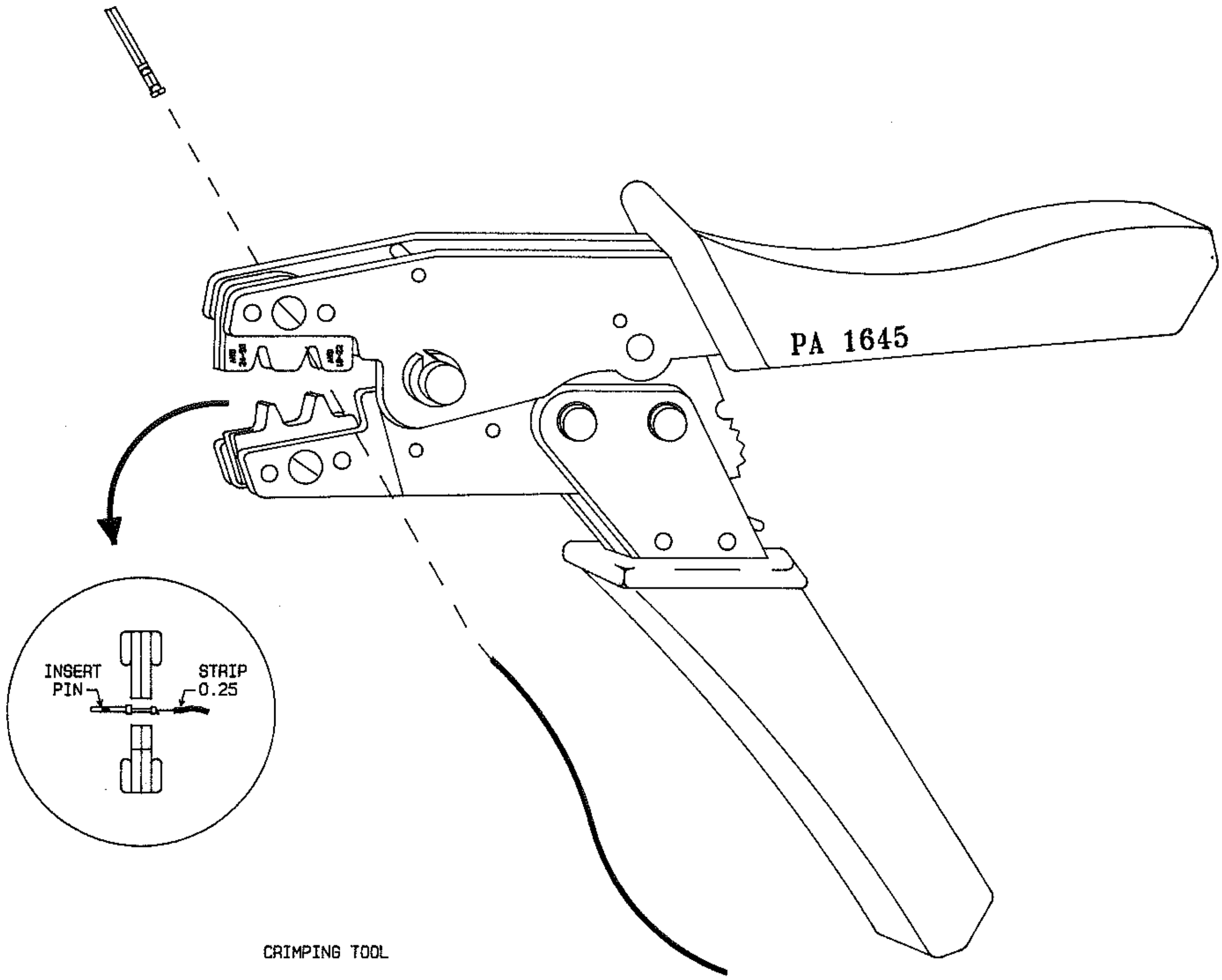
FIGURE 2-19.
MIX-TRAK 90 WIRING ACCESS AREA



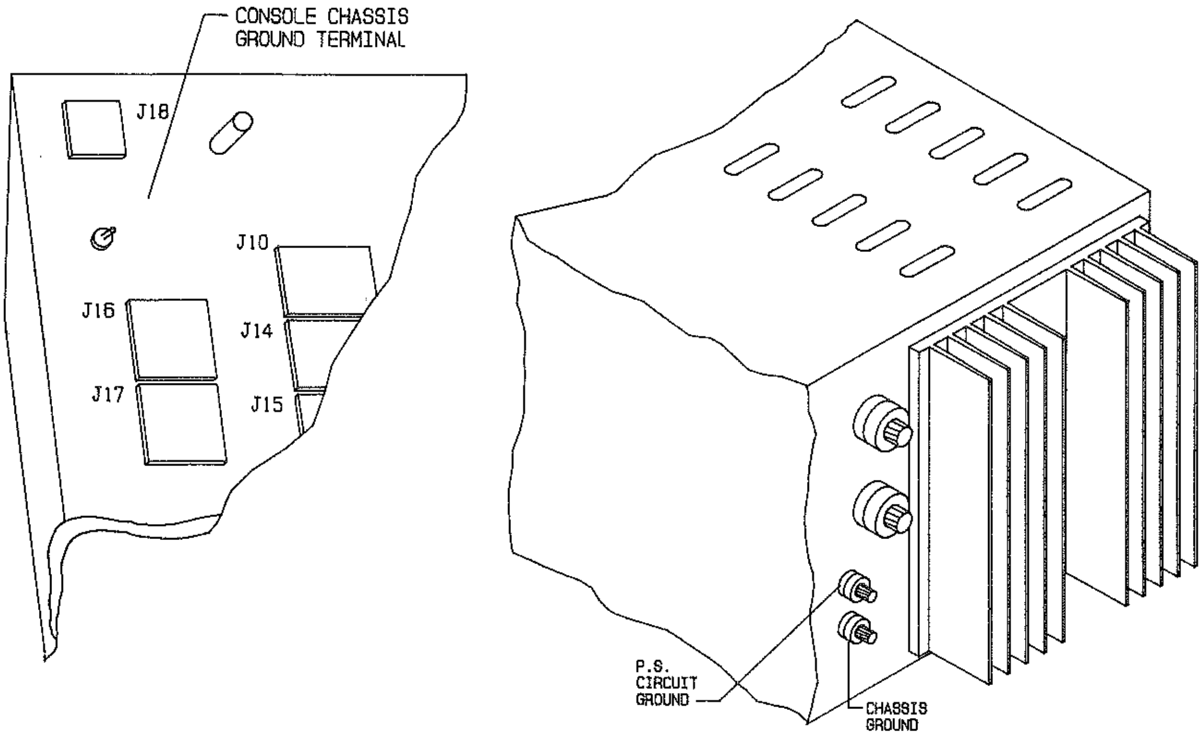
597-9012-13

FIGURE 2-20. WIRING TOOL OPERATION

2-139. Mainframe Ground Configuration. If a mainframe central ground point is required, an earth ground must be connected to power supply unit chassis and the mainframe unit. Connect an earth ground to the power supply unit CHASSIS ground terminal and to the mainframe chassis ground terminal.

2-140. Floating Ground Configuration. If a floating ground system is required, contact the Broadcast Electronics Customer Service Department for a recommended procedure.

2-141. Audio Interconnections. The shields of audio conductors attached to the console must be grounded to prevent the coupling of extraneous noise. Generally, the shields are grounded at the console. However, the shields may require grounding at the audio source or at a point between the audio source and the console. Particular care must be exercised to avoid ground loops at patch panels, external switching equipment, uninsulated jacks on associated equipment, and grounded racks or cabinets.



597-9012-72

FIGURE 2-21. CONSOLE CHASSIS GROUND TERMINALS

2-142. AUDIO CABLE. All Mix-Trak 90 series consoles require the construction of interfacing cables for internal and external audio communication. The audio interfacing cables must be constructed with the appropriate size and type of cable. The following text presents recommended Belden audio cables for line and microphone level service. Construct the cables with the Belden audio cable or equivalent.

LINE LEVEL AUDIO CABLE

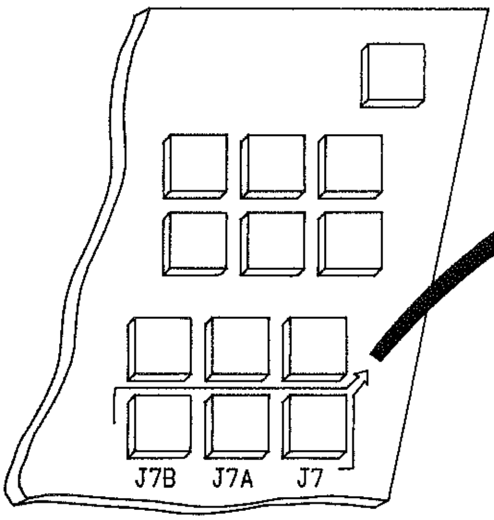
NO.	TYPE OF CABLE	GAUGE	PART NO.
1	2-conductor, braided with shield	24	Belden 8641
2	2-conductor, braided with shield	22	Belden 8451
3	2-conductor, braided with shield	20	Belden 8762
4	2-conductor, braided with shield	18	Belden 8760

MICROPHONE LEVEL AUDIO CABLE

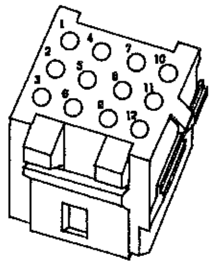
NO.	TYPE OF CABLE	GAUGE	PART NO.
1	2-conductor braided with shield	22	Belden 8441

2-143. AUDIO INPUT CONNECTIONS. Microphone and line input module audio interfacing is accomplished by modular connectors on the input motherboard. Access the console cable interfacing area by removing the screws and lowering the hinged cable access panel.

2-144. Audio Input Wiring. Connectors J7, J7A, and J7B on each input motherboard provide microphone/line input module audio source interfacing (refer to Figure 2-22). Figure 2-22 presents the audio input connector pin descriptions. Refer to Figure 2-22 and the following text to construct an audio interface cable using the wiring kit supplied with the console and the specified line or microphone level Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text).



MATING CONNECTOR



PIN NO.	DESCRIPTION
1	B INPUT, LEFT CHANNEL +
2	B INPUT, LEFT CHANNEL -
3	SHIELD GROUND
4	B INPUT, RIGHT CHANNEL +
5	B INPUT, RIGHT CHANNEL -
6	SHIELD GROUND
7	A INPUT, LEFT CHANNEL +
8	A INPUT, LEFT CHANNEL -
9	SHIELD GROUND
10	A INPUT, RIGHT CHANNEL +
11	A INPUT, RIGHT CHANNEL -
12	SHIELD GROUND

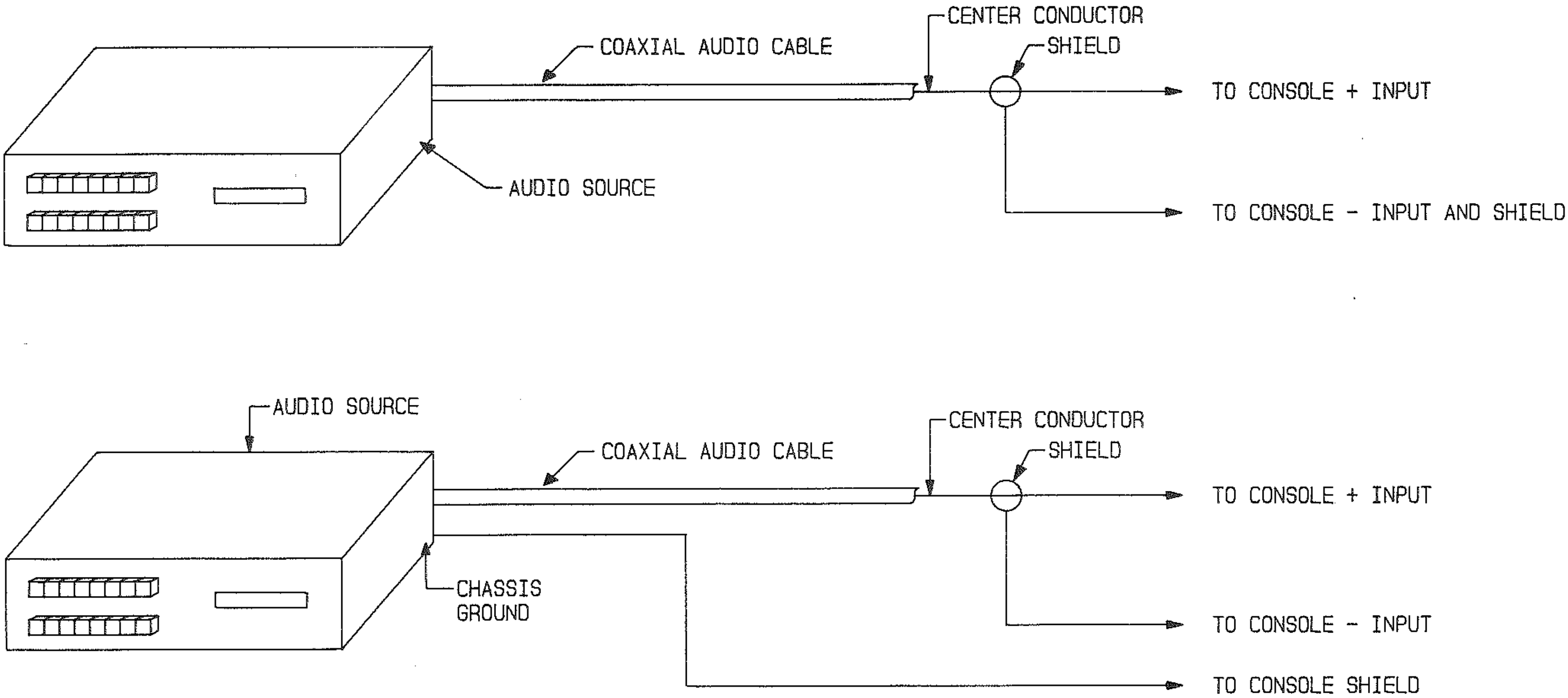
597-9012-18

FIGURE 2-22. AUDIO INPUT CONNECTIONS

2-145. For line level balanced stereophonic inputs, connect the audio source left and right channels to the modular connector as shown. If a monophonic line level input is assigned to a stereophonic line input module, it is recommended the left and right channels be connected in parallel to prevent the possible loss of audio during input selection. Connect the left and right channels in parallel at the modular connector. For microphone inputs, connect the audio source to the left channel only.

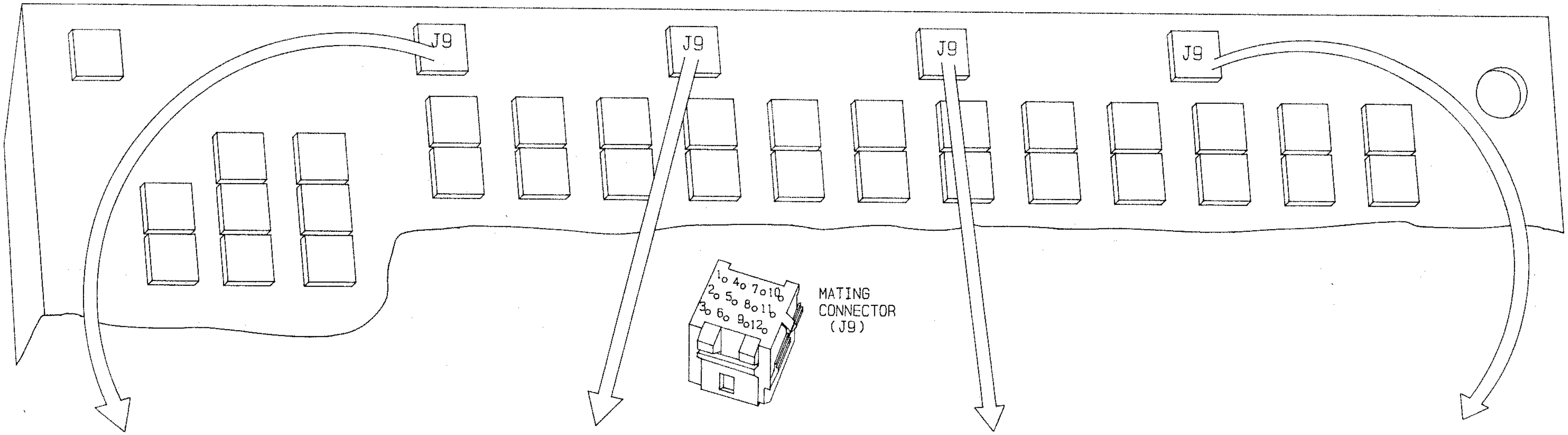
2-146. Unbalanced audio input connections are presented in Figure 2-23. Refer to Figures 2-22 and 2-23 and connect the unbalanced audio inputs to the console as required.

2-147. CONSOLE AUDIO OUTPUT INTERFACING. The console is equipped with two audio outputs: 1) program and 2) audition. Additional audio outputs such as monophonic 1, monophonic 2, auxiliary 1, auxiliary 2, and auxiliary 3 may be configured for operation if desired by the installation of output amplifier modules (refer to SECTION I, GENERAL INFORMATION). Connector J9 on each input motherboard provides console audio output interfacing (refer to Figure 2-24). To interface the console audio outputs to external equipment, proceed as follows.



NOTE: COAXIAL CABLE SHOWN. IDENTICAL CONNECTIONS FOR 2 CONDUCTOR AUDIO CABLE WITH SHIELD.

FIGURE 2-23. UNBALANCED AUDIO INPUT CONNECTIONS 597-9012-19



PROGRAM OUTPUT

PIN NO.	DESCRIPTION
1	PROGRAM OUTPUT, LEFT CHANNEL +
2	PROGRAM OUTPUT, LEFT CHANNEL -
3	LEFT CHANNEL GROUND
4	PROGRAM OUTPUT, LEFT CHANNEL +
5	PROGRAM OUTPUT, LEFT CHANNEL -
6	LEFT CHANNEL GROUND
7	PROGRAM OUTPUT, RIGHT CHANNEL +
8	PROGRAM OUTPUT, RIGHT CHANNEL -
9	RIGHT CHANNEL GROUND
10	PROGRAM OUTPUT, RIGHT CHANNEL +
11	PROGRAM OUTPUT, RIGHT CHANNEL -
12	RIGHT CHANNEL GROUND

AUDITION OUTPUT

PIN NO.	DESCRIPTION
1	AUDITION OUTPUT, LEFT CHANNEL +
2	AUDITION OUTPUT, LEFT CHANNEL -
3	LEFT CHANNEL GROUND
4	AUDITION OUTPUT, LEFT CHANNEL +
5	AUDITION OUTPUT, LEFT CHANNEL -
6	LEFT CHANNEL GROUND
7	AUDITION OUTPUT, RIGHT CHANNEL +
8	AUDITION OUTPUT, RIGHT CHANNEL -
9	RIGHT CHANNEL GROUND
10	AUDITION OUTPUT, RIGHT CHANNEL +
11	AUDITION OUTPUT, RIGHT CHANNEL -
12	RIGHT CHANNEL GROUND

AUXILIARY 1 AND AUXILIARY 2 OUTPUTS

PIN NO.	DESCRIPTION
1	AUXILIARY 1 OUTPUT +
2	AUXILIARY 1 OUTPUT -
3	AUXILIARY 1 OUTUT GROUND
4	AUXILIARY 1 OUTPUT +
5	AUXILIARY 1 OUTPUT -
6	AUXILIARY 1 OUTUT GROUND
7	AUXILIARY 2 OUTPUT +
8	AUXILIARY 2 OUTPUT -
9	AUXILIARY 2 OUTPUT GROUND
10	AUXILIARY 2 OUTPUT +
11	AUXILIARY 2 OUTPUT -
12	AUXILIARY 2 OUTPUT GROUND

MONOPHONIC 1 AND AUXILIARY 3/MONOPHONIC 2 OUTPUTS

PIN NO.	DESCRIPTION
1	MONOPHONIC 1 OUTPUT +
2	MONOPHONIC 1 OUTPUT -
3	MONOPHONIC 1 OUTPUT GROUND
4	MONOPHONIC 1 OUTPUT +
5	MONOPHONIC 1 OUTPUT -
6	MONOPHONIC 1 OUTPUT GROUND
7	AUXILIARY 3/MONOPHONIC 2 OUTPUT +
8	AUXILIARY 3/MONOPHONIC 2 OUTPUT -
9	AUXILIARY 3/MONOPHONIC 2 OUTPUT GROUND
10	AUXILIARY 3/MONOPHONIC 2 OUTPUT +
11	AUXILIARY 3/MONOPHONIC 2 OUTPUT -
12	AUXILIARY 3/MONOPHONIC 2 OUTPUT GROUND

597-9012-20

FIGURE 2-24.
CONSOLE AUDIO OUTPUT CONNECTIONS

2-148. Console Output Load Impedance. The console audio outputs are designed for operation into a minimum load impedance of 150 Ohms. Refer to the ELECTRICAL SPECIFICATIONS in SECTION I for load impedance and maximum output level specifications.

2-149. Console Output Connections. Refer to Figure 2-24 and the following information to connect each console output to external audio equipment as required. Construct audio output interfacing cables as required using the wiring kit supplied with the console and the specified Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text).

BALANCED AUDIO CONNECTIONS

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

UNBALANCED AUDIO CONNECTIONS

1. Connect the plus signal line to the + terminal.
2. Connect the shield to ground and to the - terminal.

2-150. PATCH POINT INTERFACING. The following text presents microphone/line input module and program music/speech buss patch point interfacing. Construct patch point interfacing cables using the wiring kit supplied with the console and the specified Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text). Perform the procedures as required for the desired patch point interfacing.

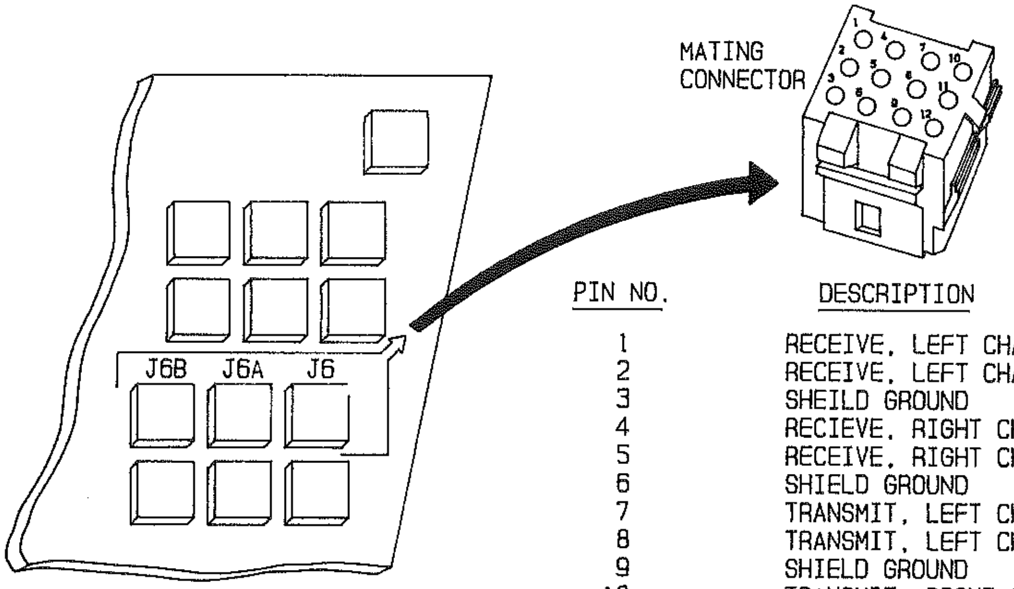
2-151. Microphone/Line Input Module. Connectors J6/J6A/J6B on each input motherboard provide microphone/line input module patch point interfacing (refer to Figure 2-25). The patch point network consists of transmitting and receiving stages for the connection of external audio processing equipment. Figure 2-25 presents the patch point connector pin descriptions. Refer to Figure 2-25 and the following information and connect the equipment to the patch point stages as required.

BALANCED AUDIO CONNECTIONS

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

UNBALANCED AUDIO CONNECTIONS

1. Connect the plus signal line to the + or - terminal.
2. Connect the shield to ground.



PIN NO.	DESCRIPTION
1	RECEIVE, LEFT CHANNEL +
2	RECEIVE, LEFT CHANNEL -
3	SHEILD GROUND
4	RECIEVE, RIGHT CHANNEL +
5	RECEIVE, RIGHT CHANNEL -
6	SHIELD GROUND
7	TRANSMIT, LEFT CHANNEL +
8	TRANSMIT, LEFT CHANNEL -
9	SHIELD GROUND
10	TRANSMIT, RIGHT CHANNEL +
11	TRANSMIT, RIGHT CHANNEL -
12	SHIELD GROUND

597-9012-21

FIGURE 2-25. PATCH POINT MICROPHONE/LINE INPUT INTERFACING

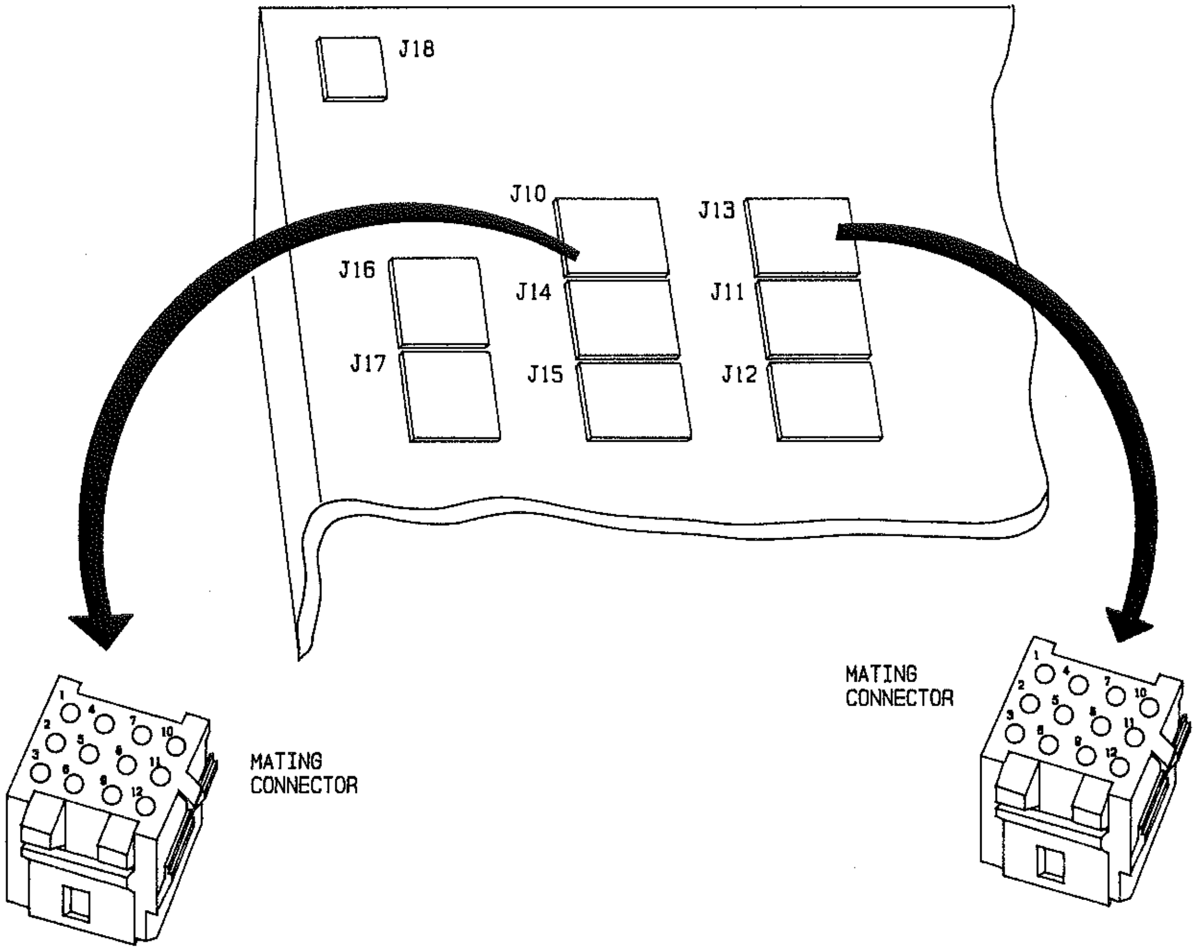
2-152. Program Music/Speech Output. Connectors J10 and J13 on the output motherboard provide program music and speech patch point interfacing (refer to Figure 2-26). The patch point networks are provided for the connection of external audio processing equipment. Connector J10 on the output motherboard provides program speech buss patch point interfacing. Connector J13 on the output motherboard provides program music buss patch point interfacing. Refer to Figure 2-26 and the following information to connect external audio equipment to the patch point stages.

BALANCED AUDIO CONNECTIONS

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

UNBALANCED AUDIO CONNECTIONS

1. Connect the plus signal line to the + or - terminal.
2. Connect the shield to ground.



PROGRAM SPEECH BUS
PATCH POINT INTERFACING

PIN NO.	DESCRIPTION
1	SHIELD GROUND
2	PROGRAM SPEECH, RECEIVE, RIGHT CHANNEL -
3	PROGRAM SPEECH, RECEIVE, RIGHT CHANNEL +
4	SHIELD GROUND
5	PROGRAM SPEECH, RECEIVE, LEFT CHANNEL -
6	PROGRAM SPEECH, RECEIVE, LEFT CHANNEL +
7	SHIELD GROUND
8	PROGRAM SPEECH, TRANSMIT, RIGHT CHANNEL -
9	PROGRAM SPEECH, TRANSMIT, RIGHT CHANNEL +
10	SHIELD GROUND
11	PROGRAM SPEECH, TRANSMIT, LEFT CHANNEL -
12	PROGRAM SPEECH, TRANSMIT, LEFT CHANNEL +

PROGRAM MUSIC BUS
PATCH POINT INTERFACING

PIN NO.	DESCRIPTION
1	SHIELD GROUND
2	PROGRAM MUSIC, RECEIVE, RIGHT CHANNEL -
3	PROGRAM MUSIC, RECEIVE, RIGHT CHANNEL +
4	SHIELD GROUND
5	PROGRAM MUSIC, RECEIVE, LEFT CHANNEL -
6	PROGRAM MUSIC, RECEIVE, LEFT CHANNEL +
7	SHIELD GROUND
8	PROGRAM MUSIC, TRANSMIT, RIGHT CHANNEL -
9	PROGRAM MUSIC, TRANSMIT, RIGHT CHANNEL +
10	SHIELD GROUND
11	PROGRAM MUSIC, TRANSMIT, LEFT CHANNEL -
12	PROGRAM MUSIC, TRANSMIT, LEFT CHANNEL +

597-9012-22

FIGURE 2-26. PROGRAM MUSIC/SPEECH BUS PATCH POINT INTERFACING

2-153. REMOTE CONTROL MODULE CONNECTIONS. With the installation of a remote control module, microphone or line input module operations such as module on/off control, input A/B status indications, and cue control may be initiated from a remote location. Connectors J4/J4A/J4B and J5/J5A/J5B on each input motherboard provide line/microphone input module remote control interfacing. Figure 2-27 presents the remote control connector pin descriptions.

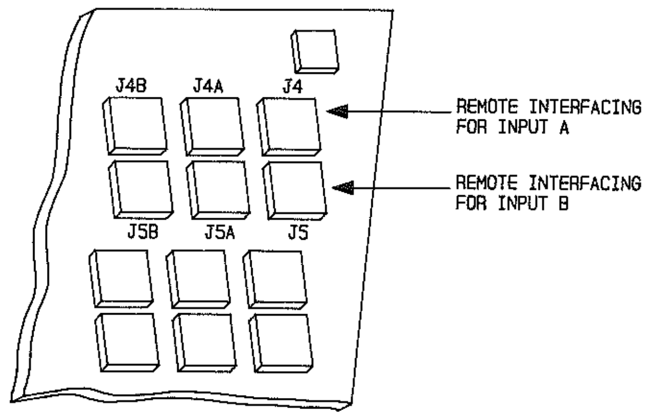
2-154. Connectors J4, J4A, and J4B control the operation of input A for an associated module. Connectors J5, J5A, and J5B control the operation of input B an for an associated module. Refer to Figure 2-27 and construct a remote control interface cable using the the wiring kit supplied with the console and the appropriate cable.

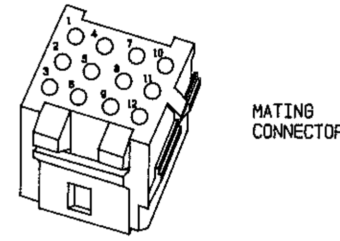
2-155. Module External Gain Control. Each microphone/line input module is designed for external gain control. An external gain control output is provided on pin 1 of connectors J5/J5A/J5B. The output provides a variable dc voltage for external gain control of additional modules. The control voltage range is from Ø volts dc to +13 volts dc. An external gain control input is located at pin 4 of connectors J5/J5A/J5B. The input connection accepts a variable dc voltage to control the module gain. Positive voltage decreases gain by 166 dB per volt. The control voltage input range is from Ø volts dc to +13 volts dc. If external gain control is required, refer to Figure 2-27 and connect interfacing wires to pins 1 and 4 of connector J5, J5A, or J5B for the desired module.

2-156. SOURCE REMOTE CONTROL MODULE CONNECTIONS. Source remote control modules operate in association with line input modules to provide remote control and sequencing of audio input sources. The source remote control module will monitor the status of audio source ready and End-Of-Message (EOM) signals and generate line input module and audio source control commands. Connectors J4/J4A/J4B and J5/J5A/J5B on each input motherboard provide source remote control module interfacing. Figure 2-28 presents the remote control connector pin descriptions.

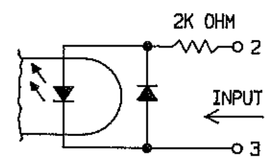
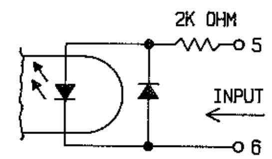
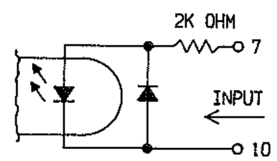
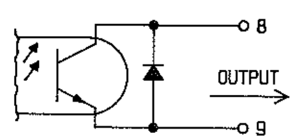
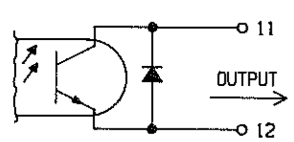
2-157. Connectors J4, J4A, and J4B control the operation of audio source A. Connectors J5, J5A, and J5B control the operation of audio source B. Refer to Figure 2-28 and construct a remote control interface cable using the the wiring kit supplied with the console and the appropriate cable.

2-158. CONTROL ROOM/STUDIO MONITOR MODULE CONNECTIONS. Control room and studio monitor interfacing is accomplished by modular connectors on the output motherboard (refer to Figure 2-29). Connectors J11 through J17 provide control room and studio interfacing for monitor power amplifiers, muting, and external monitor inputs. Refer to Figure 2-29 and the following text to construct audio output interfacing cables using the wiring kit supplied with the console and the specified Belden cable or equivalent for the desired control room and studio operations.

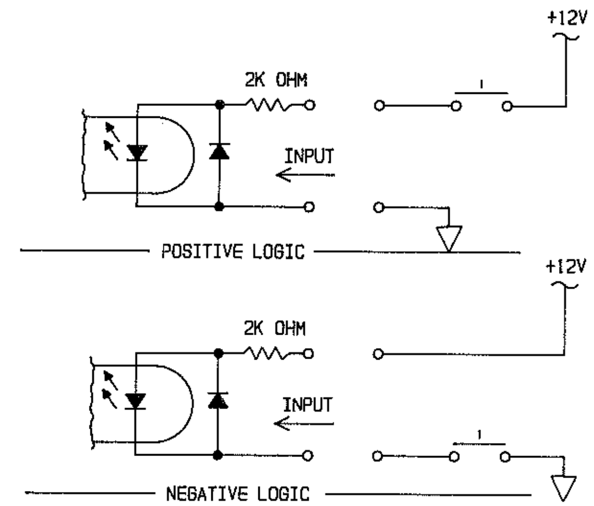




REMOTE CONNECTIONS

CONNECTOR	PIN NO.	DESCRIPTION	INTERNAL CONSOLE CIRCUIT	INTERFACE CIRCUIT
J4/J4A/J4B	1	+12v dc		
J5/J5A/J5B	1	EXTERNAL GAIN CONTROL OUTPUT, 10K OHMS OUTPUT INPEDANCE. OUTPUT VOLTAGE RANGE: FADER POSITION / VOLTAGE: APPROXIMATELY 12dB 0v dc; OFF +13v dc		EXTERNAL GAIN CONTROL OUTPUT-VARIABLE DC VOLTAGE OUTPUT FOR EXTERNAL GAIN CONTROL OF A MODULE.
J4/J4A/J4B J5/J5A/J5B	2	INPUT ON COMMAND +		REMOTE CONTROL COMMAND-ANY POSITIVE/NEGATIVE LOGIC MOMENTARY/CONTINUOUS SIGNAL REQUIRED TO ACTIVATE INPUT ON FUNCTION. +30V dc MAXIMUM, +5V dc MINIMUM. REFER TO NOTE 1 FOR TYPICAL INTERFACE CIRCUITS.
J4/J4A/J4B J5/J5A/J5B	3	INPUT ON COMMAND −		
J4/J4A/J4B	4	LOGIC GROUND		
J5/J5A/J5B	4	EXTERNAL GAIN CONTROL INPUT. 1K OHM INPUT IMPEDANCE. POSITIVE VOLTAGE DECREASES GAIN BY 166dB/VOLT. RANGE: 0V dc TO +13V dc.		EXTERNAL GAIN CONTROL INPUT-VARIABLE DC VOLTAGE INPUT FOR CONTROL OF MODULE GAIN.
J4/J4A/J4B J5/J5A/J5B	5	INPUT OFF COMMAND +		REMOTE CONTROL COMMAND-ANY POSITIVE/NEGATIVE LOGIC MOMENTARY/CONTINUOUS SIGNAL REQUIRED TO ACTIVATE INPUT OFF OR CUE FUNCTIONS. +30V dc MAXIMUM, +5V dc MINIMUM. REFER TO NOTE 1 FOR TYPICAL INTERFACE CIRCUITS.
J4/J4A/J4B J5/J5A/J5B	6	INPUT OFF COMMAND −		
J4/J4A/J4B J5/J5A/J5B	7	CUE ENABLE COMMAND +		
J4/J4A/J4B J5/J5A/J5B	10	CUE ENABLE COMMAND −		
J4/J4A/J4B J5/J5A/J5B	8	INPUT ON INDICATOR/ CONTROL		REMOTE STATUS INDICATOR OR CONTROL-OPTICAL COUPLER ENABLED DURING INPUT ON OR INPUT OFF CONDITIONS FOR INDICATOR OR EQUIPMENT CONTROL APPLICATIONS. 100 MA MAXIMUM CURRENT. +30V dc MAXIMUM VOLTAGE. REFER TO NOTE 2 FOR TYPICAL INTERFACE CIRCUITS.
J4/J4A/J4B J5/J5A/J5B	9	INPUT ON INDICATOR/ CONTROL		
J4/J4A/J4B J5/J5A/J5B	11	INPUT OFF INDICATOR/ CONTROL		
J4/J4A/J4B J5/J5A/J5B	12	INPUT OFF INDICATOR/ CONTROL		

NOTE 1:
TYPICAL REMOTE CONTROL INTERFACE CIRCUITS



NOTE 2:
TYPICAL REMOTE STATUS INDICATOR/ CONTROL INTERFACE CIRCUITS

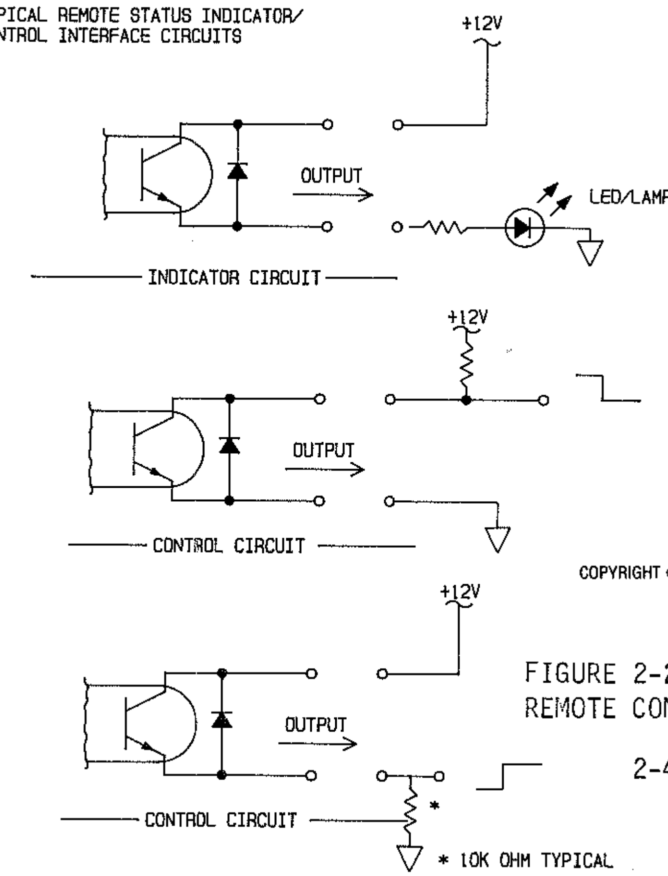


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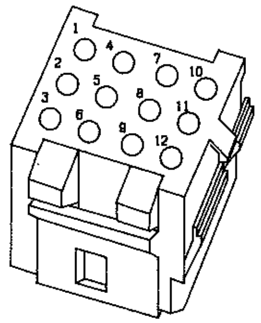
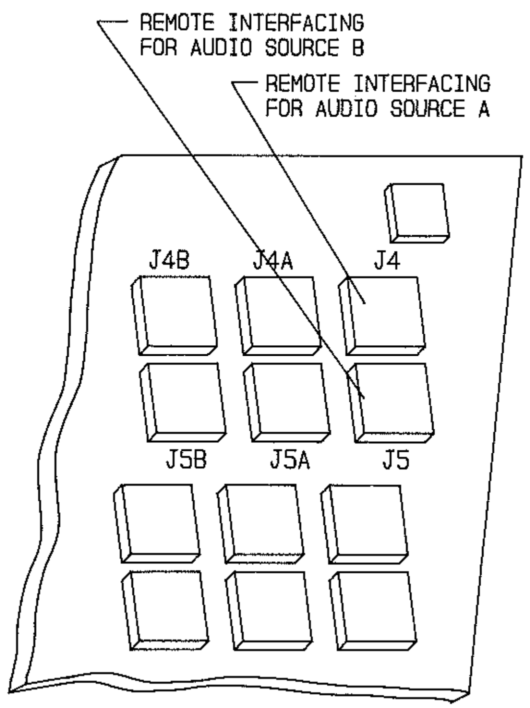
FIGURE 2-27.
REMOTE CONTROL CONNECTIONS

REMOTE CONNECTIONS



MATING CONNECTOR



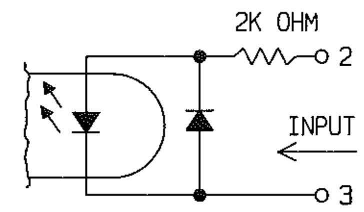
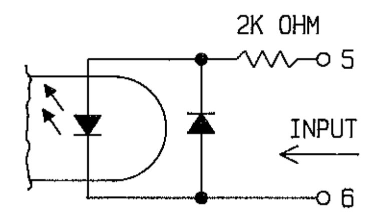
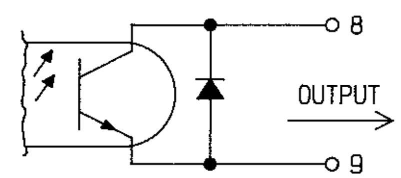
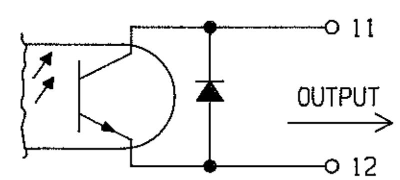
CONNECTOR	PIN NO.	DESCRIPTION	INTERNAL CONSOLE CIRCUIT	CIRCUIT APPLICATIONS
J4/J4A/J4B	1	+12v dc		
J5/J5A/J5B	1	EXTERNAL GAIN CONTROL OUTPUT, 10K OHMS OUTPUT INPEDANCE. OUTPUT VOLTAGE RANGE: FADER POSITION — VOLTAGE APPROXIMATELY 12dB — 0v dc OFF — +13v dc		EXTERNAL GAIN CONTROL OUTPUT-VARIABLE DC VOLTAGE OUTPUT FOR EXTERNAL GAIN CONTROL OF A MODULE.
J4/J4A/J4B J5/J5A/J5B	2	EOM INPUT +		END-OF-MESSAGE (EOM) SIGNAL-ANY POSITIVE/NEGATIVE LOGIC MOMENTARY/CONTINUOUS SIGNAL REQUIRED FROM AUDIO SOURCE TO INDICATE AN EOM CONDITION. +30V dc MAXIMUM, +5V dc MINIMUM.
J4/J4A/J4B J5/J5A/J5B	3	EOM INPUT -		
J4/J4A/J4B	4	LOGIC GROUND		
J5/J5A/J5B	4	EXTERNAL GAIN CONTROL INPUT. 1K OHM INPUT IMPEDANCE. POSITIVE VOLTAGE DECREASES GAIN BY 166dB/VOLT. RANGE: 0V dc TO +13V dc.		EXTERNAL GAIN CONTROL INPUT-VARIABLE DC VOLTAGE INPUT FOR CONTROL OF MODULE GAIN.
J4/J4A/J4B J5/J5A/J5B	5	READY INPUT +		AUDIO SOURCE READY SIGNAL-ANY POSITIVE/NEGATIVE LOGIC MOMENTARY/CONTINUOUS SIGNAL REQUIRED FROM AUDIO SOURCE TO INDICATE A READY CONDITION. +30V dc MAXIMUM, +5V dc MINIMUM.
J4/J4A/J4B J5/J5A/J5B	6	READY INPUT -		
J4/J4A/J4B J5/J5A/J5B	7	FSK INPUT		
J4/J4A/J4B J5/J5A/J5B	8	START OUTPUT COMMAND		AUDIO SOURCE START COMMAND-OPTICAL COUPLER ENABLED FOR AUDIO SOURCE START OPERATIONS. 100 MA MAXIMUM CURRENT. +30V dc MAXIMUM VOLTAGE.
J4/J4A/J4B J5/J5A/J5B	9	START OUTPUT COMMAND		
J4/J4A/J4B J5/J5A/J5B	10	FSK OUTPUT		
J4/J4A/J4B J5/J5A/J5B	11	STOP OUTPUT COMMAND		AUDIO SOURCE STOP COMMAND-OPTICAL COUPLER ENABLED FOR AUDIO SOURCE STOP OPERATIONS. 100 MA MAXIMUM CURRENT. +30V dc MAXIMUM VOLTAGE.
J4/J4A/J4B J5/J5A/J5B	12	STOP OUTPUT COMMAND		

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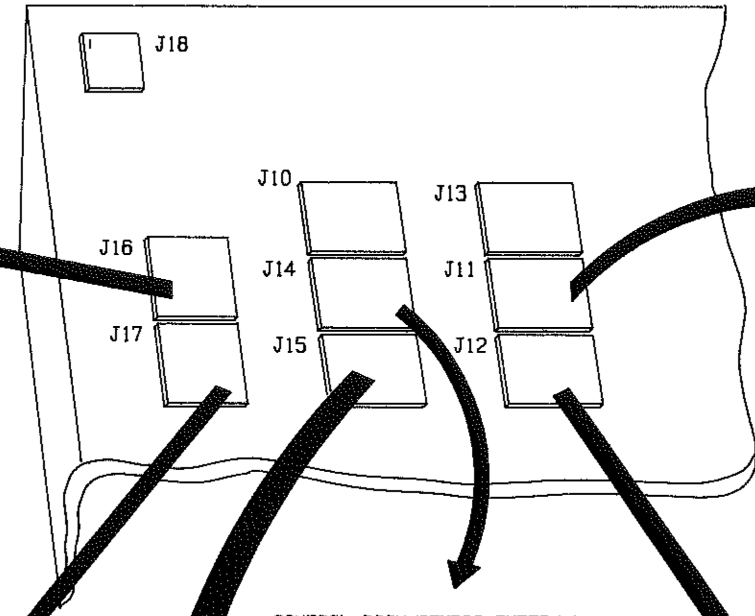
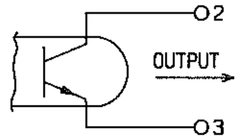
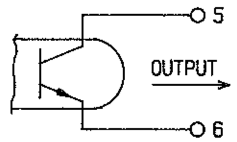
FIGURE 2-28.
SOURCE REMOTE CONTROL CONNECTIONS



STUDIO REMOTE CONTROL AND TALKBACK INTERFACING

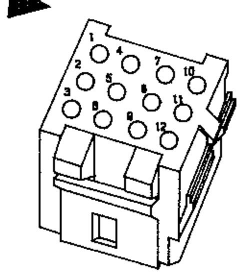
PIN NO.	DESCRIPTION
1	+12V dc REMOTE POWER SUPPLY
2	STUDIO B MUTE CONTROL COLLECTOR
3	STUDIO B MUTE CONTROL EMITTER
4	+12V dc REMOTE POWER SUPPLY
5	STUDIO A MUTE CONTROL COLLECTOR
6	STUDIO A MUTE CONTROL EMITTER
7	SHIELD GROUND
8	EXTERNAL TALKBACK INPUT -
9	EXTERNAL TALKBACK INPUT +
10	SHIELD GROUND
11	STUDIO B EXTERNAL MONITOR LEVEL CONTROL INPUT. 20K OHMS INPUT RESISTANCE. POSITIVE-GOING VOLTAGE DECREASES MONITOR LEVEL BY 8.3dB/VOLT. RANGE: +12 dc TO -1.5V dc.
12	STUDIO A EXTERNAL MONITOR LEVEL CONTROL INPUT. 20K OHMS INPUT RESISTANCE. POSITIVE-GOING VOLTAGE DECREASES MONITOR LEVEL BY 8.3dB/VOLT. RANGE: +12V dc TO - 1.5V dc.





STUDIO AUDIO INTERFACING

PIN NO.	DESCRIPTION
1	SHIELD GROUND
2	STUDIO B EXTERNAL MONITOR POWER AMPLIFIER DRIVER LEFT CHANNEL -
3	STUDIO B EXTERNAL MONITOR POWER AMPLIFIER DRIVER, LEFT CHANNEL +
4	SHIELD GROUND
5	STUDIO B EXTERNAL MONITOR POWER AMPLIFIER DRIVER, RIGHT CHANNEL -
6	STUDIO B EXTERNAL MONITOR POWER AMPLIFIER DRIVER, RIGHT CHANNEL +
7	SHIELD GROUND
8	STUDIO A EXTERNAL MONITOR POWER AMPLIFIER DRIVER, LEFT CHANNEL -
9	STUDIO A EXTERNAL MONITOR POWER AMPLIFIER DRIVER, LEFT CHANNEL +
10	SHIELD GROUND
11	STUDIO A EXTERNAL MONITOR POWER AMPLIFIER DRIVER, RIGHT CHANNEL -
12	STUDIO A EXTERNAL MONITOR POWER AMPLIFIER DRIVER, RIGHT CHANNEL +



MATING CONNECTOR

CONTROL ROOM/STUDIO EXTERNAL MONITOR INPUT 3 AND 4 INTERFACING

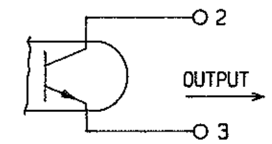
PIN NO.	DESCRIPTION
1	SHIELD GROUND
2	EXTERNAL MONITOR INPUT 4, RIGHT CHANNEL -
3	EXTERNAL MONITOR INPUT 4, RIGHT CHANNEL +
4	SHIELD GROUND
5	EXTERNAL MONITOR INPUT 4, LEFT CHANNEL -
6	EXTERNAL MONITOR INPUT 4, LEFT CHANNEL +
7	SHIELD GROUND
8	EXTERNAL MONITOR INPUT 3, RIGHT CHANNEL -
9	EXTERNAL MONITOR INPUT 3, RIGHT CHANNEL +
10	SHIELD GROUND
11	EXTERNAL MONITOR INPUT 3, LEFT CHANNEL -
	EXTERNAL MONITOR INPUT 3, LEFT CHANNEL +

CONTROL ROOM/STUDIO EXTERNAL MONITOR NETWORK AND OFF-AIR-INPUT INTERFACING

PIN NO.	DESCRIPTION
1	SHIELD GROUND
2	NETWORK INPUT, RIGHT CHANNEL -
3	NETWORK INPUT, RIGHT CHANNEL +
4	SHIELD GROUND
5	NETWORK INPUT, LEFT CHANNEL -
6	NETWORK INPUT, LEFT CHANNEL +
7	SHIELD GROUND
8	OFF-AIR INPUT, RIGHT CHANNEL -
9	OFF-AIR INPUT, RIGHT CHANNEL +
10	SHIELD GROUND
11	OFF-AIR INPUT, LEFT CHANNEL -
12	OFF-AIR INPUT, LEFT CHANNEL +

CONTROL ROOM MUTING AND AUDIO INTERFACING

PIN NO.	DESCRIPTION
1	SHIELD GROUND
2	CONTROL ROOM MUTE CONTROL EMITTER
3	CONTROL ROOM MUTE CONTROL COLLECTOR
4	SHIELD GROUND
5	+12V dc REMOTE POWER SUPPLY
6	+12V dc REMOTE POWER SUPPLY
7	SHIELD GROUND
8	CONTROL ROOM MONITOR POWER AMPLIFIER DRIVER, RIGHT CHANNEL -
9	CONTROL ROOM MONITOR POWER AMPLIFIER DRIVER, RIGHT CHANNEL +
10	SHIELD GROUND
11	CONTROL ROOM MONITOR POWER AMPLIFIER DRIVER, LEFT CHANNEL -
12	CONTROL ROOM MONITOR POWER AMPLIFIER DRIVER, LEFT CHANNEL +



CONTROL ROOM/STUDIO EXTERNAL MONITOR INPUT 1 AND 2 INTERFACING

PIN NO.	DESCRIPTION
1	SHEILD GROUND
2	EXTERNAL MONITOR INPUT 2, RIGHT CHANNEL -
3	EXTERNAL MONITOR INPUT 2, RIGHT CHANNEL +
4	SHIELD GROUND
5	EXTERNAL MONITOR INPUT 2, LEFT CHANNEL -
6	EXTERNAL MONITOR INPUT 2, LEFT CHANNEL +
7	SHIELD GROUND
8	EXTERNAL MONITOR INPUT 1, RIGHT CHANNEL -
9	EXTERNAL MONITOR INPUT 1, RIGHT CHANNEL +
10	SHIELD GROUND
11	EXTERNAL MONITOR INPUT 1, LEFT CHANNEL -
12	EXTERNAL MONITOR INPUT 1, LEFT CHANNEL +

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FIGURE 2-29.
CONTROL ROOM AND STUDIO INTERFACING

2-159. Control Room/Studio External Monitor Inputs. Modular connectors J12, J14, and J15 provide interfacing for control room and studio monitor inputs. The following text describes the operation of each connector.

2-160. Connectors J12 and J14 accept external monitor inputs for application to the control room and studio monitor modules. Connector J15 accepts control room and studio monitor module network and off-air monitor inputs. Each input is stereophonic, balanced, and RFI protected. It is recommended that all external monitor inputs be applied to the console at a +4 dBu nominal level to maintain a consistent level when switching between monitor input sources.

2-161. Control Room Muting and Audio Interface Connections. Connector J11 accepts control room muting and external monitor power amplifier connections. Control room mute terminals consist of an optical coupler which energizes during control room mute conditions. The mute terminals are designed to control ancillary equipment such as on-air warning lights and relays to mute telephones or other control room speakers. Balanced stereophonic monitor outputs provide audio to drive an external control room monitor power amplifier. Audio drive is interrupted during control room mute conditions to provide control room monitor muting.

2-162. Studio Muting Control Interfacing. Connector J16 is designed to accept studio A and B muting control connections. Studio A and B mute terminals consist of optical couplers which energize during control room mute conditions. The mute terminals are designed to control ancillary equipment such as on-air warning lights and relays to mute telephones or other studio monitor speakers.

2-163. Studio External Monitor Level Control. The studio monitor module is equipped with interfacing terminals for a feature which allows external control of the studio A and B monitor levels with a dc control voltage. Positive-going dc voltage decreases the monitor level by 8.3 dB per volt. The control voltage range is from +12v dc to -1.5v dc. If external monitor level control is required, connect a control voltage to J16 pin 11 for studio B and J16 pin 12 for studio A.

2-164. Studio A and Studio B Monitor Audio Interfacing. Balanced stereophonic studio A and studio B monitor outputs provide audio to drive external studio monitor power amplifiers. Audio drive is interrupted during studio mute conditions for studio monitor muting operation. Studio B monitor power amplifier interfacing is provided at J17 pins 1 through 6. Studio A monitor power amplifier interfacing is provided at J17 pins 7 through 12.

2-165. STUDIO REMOTE PANEL CONNECTIONS. The studio remote panel is designed to provide remote control of the studio microphone input module, local control of the studio monitor level, studio/control room talkback operation, and operator cough operation. To install the studio remote panel wiring, proceed as follows.

2-166. For remote studio microphone input module control operations, the microphone input module must be equipped with a remote control module. Ensure the studio microphone input module is equipped with a remote control module.

2-167. The studio remote panel requires interfacing to the studio monitor module and the microphone input module assigned to the studio. Figure 2-30 presents a typical studio remote panel installation and associated interfacing.

2-168. Refer to Figure 2-30 and connect the studio remote panel wiring. Construct interface cables using the wiring kit supplied with the console and the specified Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text). Talkback system connections are presented in the following text.

2-169. TALKBACK SYSTEM INTERFACING. Mix-Trak 90 console talkback operations are performed by the control room microphone system, the studio microphone system, the console cue speaker, and the studio monitor speakers. Figure 2-31 presents a typical console talkback system installation. If console talkback operation is required, refer to Figure 2-31 and the following information to install the console talkback system interfacing.

2-170. For console talkback system operation, the microphone input module assigned to the studio must be equipped with a remote control module. Ensure the studio microphone input module is equipped with a remote control module.

2-171. Refer to Figure 2-31 and install the console talkback system wiring. Construct the interfacing cables with the wiring kit supplied with the unit and the appropriate Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text).

2-172. INPUT EXPANDER MODULE CONNECTIONS. The input expander module interfaces to an associated input module to provide control of additional audio sources. Refer to Figure 2-32 and the AUDIO INPUT CONNECTIONS information in the preceding text to connect the audio sources to the input expander module. Construct the interfacing cables using the wiring kit supplied with the console and the specified Belden cable or equivalent (refer to AUDIO CABLE information in the preceding text).

2-173. TAPE/CART SOURCE REMOTE SWITCH MODULE CONNECTIONS. The tape and cart remote switch modules must be interfaced to the associated audio source. Refer to Figure 2-33 and interface the module to the appropriate audio source. Construct the interfacing cables as required using 18 to 24 gauge wire.

2-174. FSK DECODER MODULE CONNECTIONS. Audio source Frequency-Shift-Keying (FSK) information is decoded by the FSK decoder module. For FSK decoding operations, each line input module assigned to an audio source with FSK information must be equipped with a source remote control module. Ensure each line input module assigned to FSK audio sources is equipped with a source remote control module.

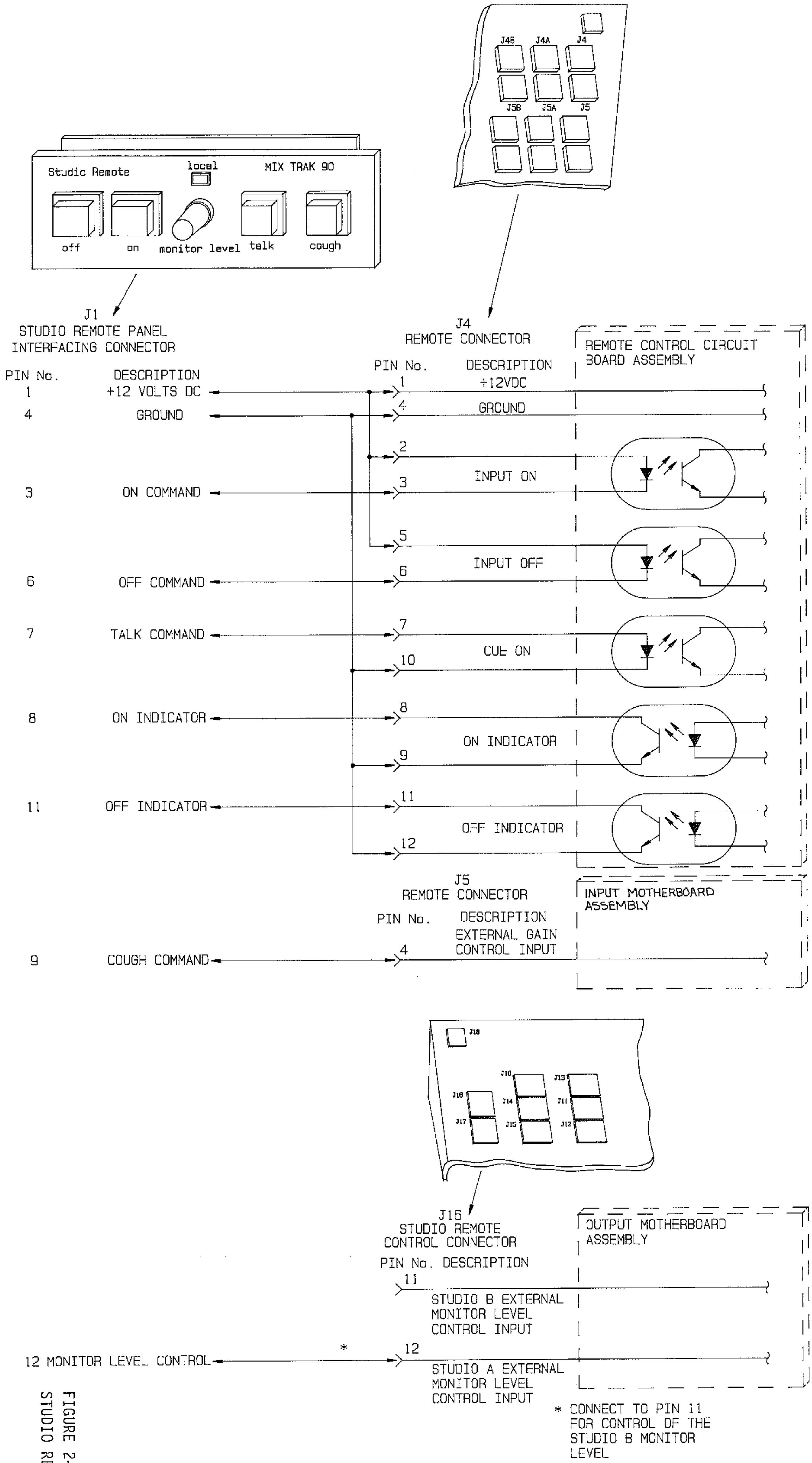

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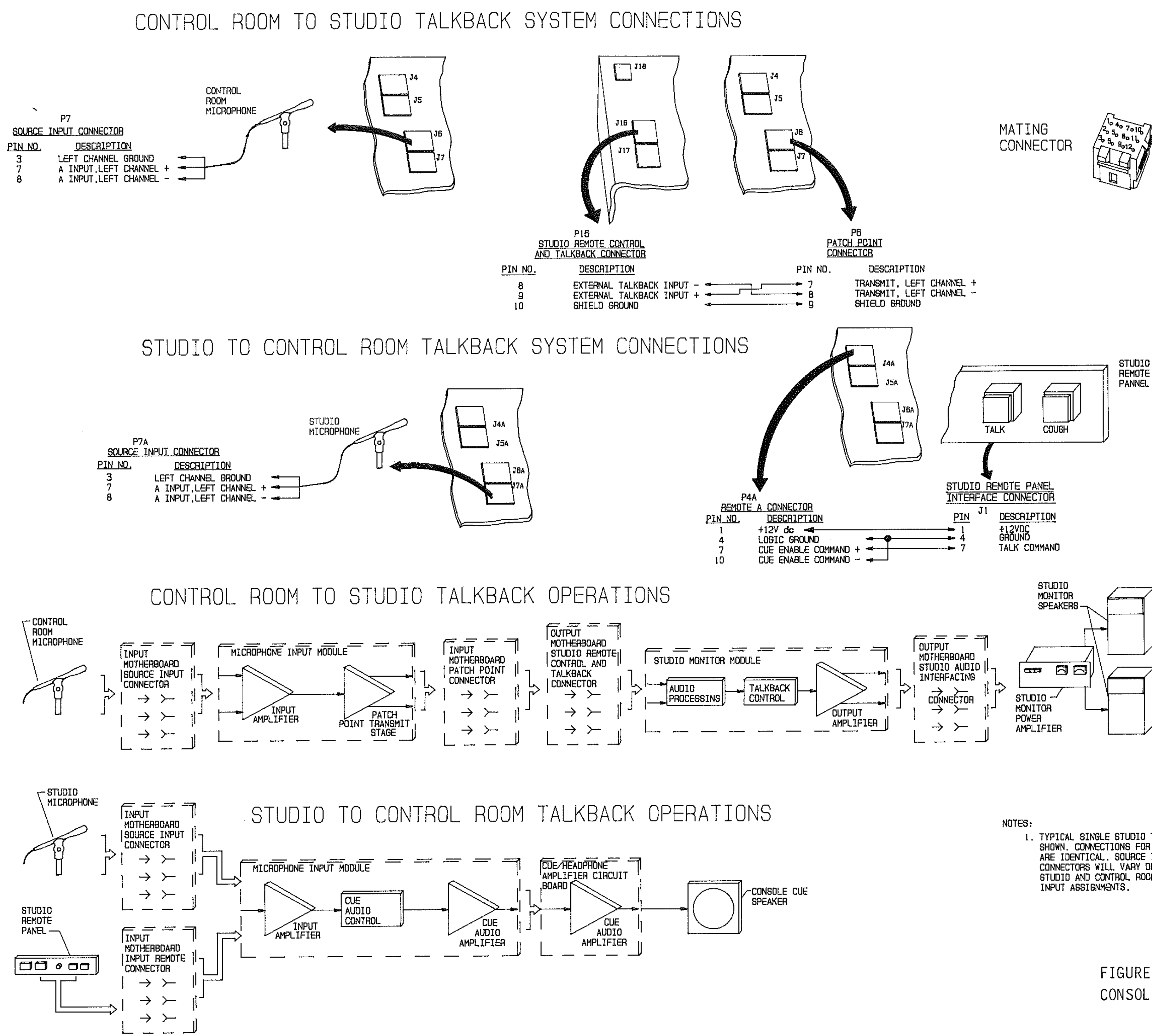
FIGURE 2-30.
STUDIO REMOTE PANEL CONNECTIONS



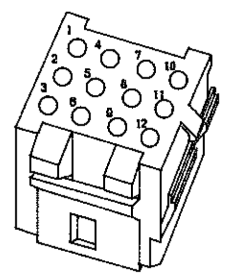
597-9012-28

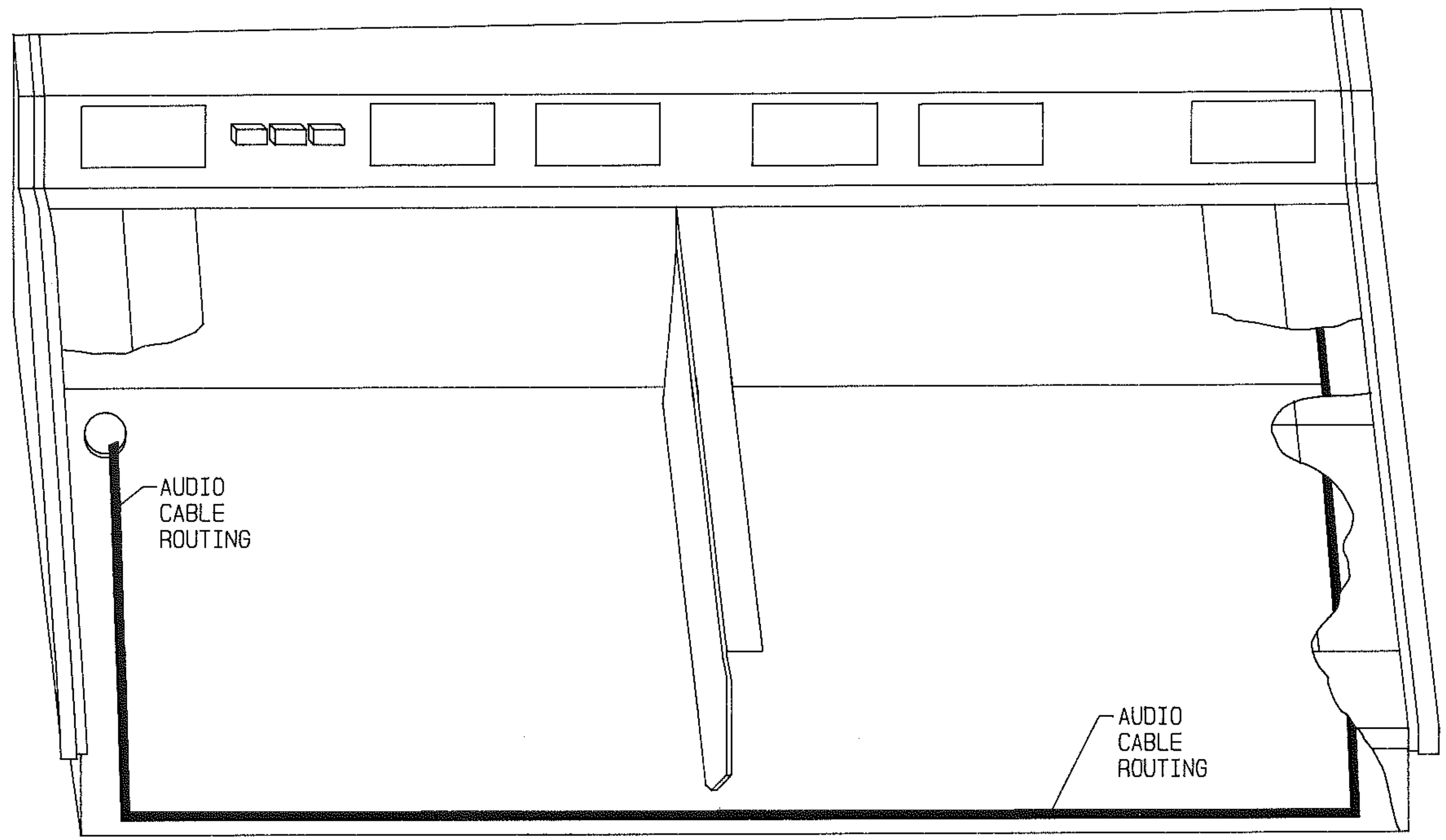
NOTES:

1. TYPICAL SINGLE STUDIO TALKBACK SYSTEM SHOWN. CONNECTIONS FOR A SECOND STUDIO ARE IDENTICAL. SOURCE INPUT AND REMOTE CONNECTORS WILL VARY DEPENDING ON STUDIO AND CONTROL ROOM MICROPHONE INPUT ASSIGNMENTS.

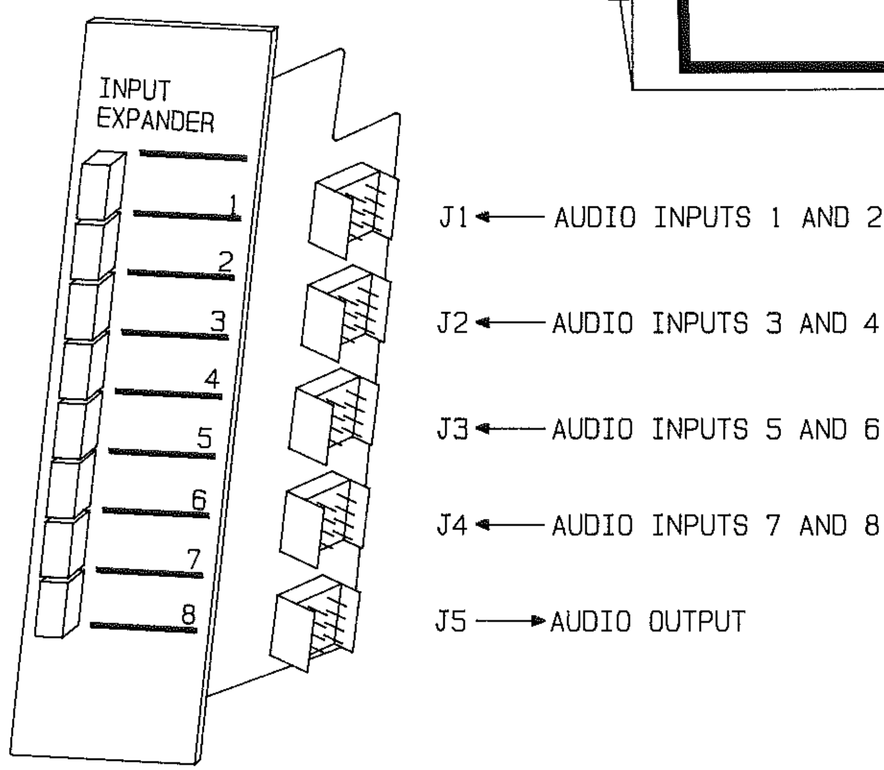
FIGURE 2-31.
CONSOLE TALKBACK SYSTEM INSTALLATION

MATING CONNECTOR





AUDIO CABLE ROUTING



INPUT EXPANDER MODULE

* AUDIO INPUT CONNECTOR J1

PIN NO.	DESCRIPTION
1	INPUT 2, LEFT CHANNEL +
2	INPUT 2, LEFT CHANNEL -
3	SHIELD GROUND
4	INPUT 2, RIGHT CHANNEL +
5	INPUT 2, RIGHT CHANNEL -
6	SHIELD GROUND
7	INPUT 1, LEFT CHANNEL +
8	INPUT 1, LEFT CHANNEL -
9	SHIELD GROUND
10	INPUT 1, RIGHT CHANNEL +
11	INPUT 1, RIGHT CHANNEL -
12	SHIELD GROUND

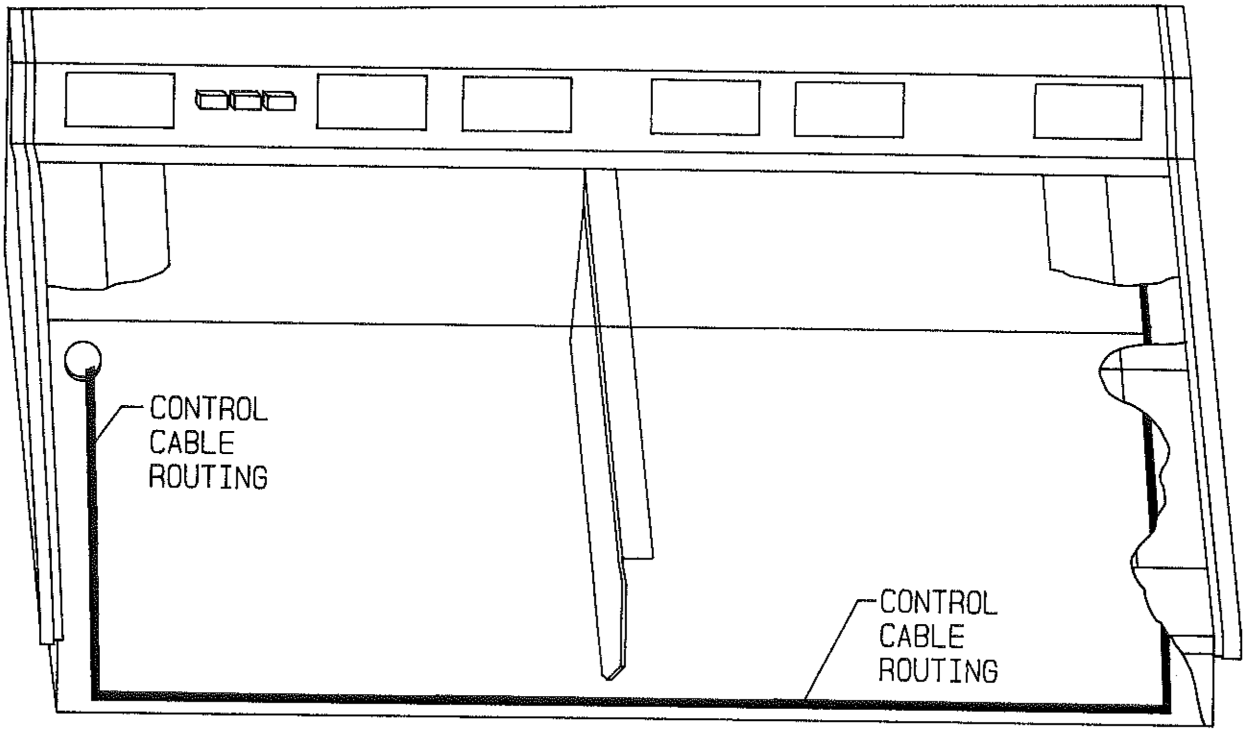
AUDIO OUTPUT CONNECTOR J5

PIN NO.	DESCRIPTION
1	LEFT CHANNEL +
2	LEFT CHANNEL -
3	SHIELD GROUND
4	RIGHT CHANNEL +
5	RIGHT CHANNEL -
6	SHIELD GROUND
7	LEFT CHANNEL +
8	LEFT CHANNEL -
9	SHIELD GROUND
10	RIGHT CHANNEL +
11	RIGHT CHANNEL -
12	SHIELD GROUND

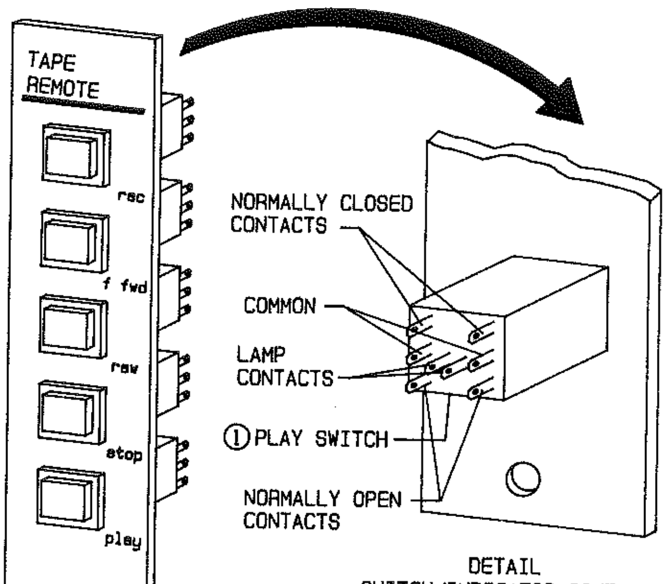
* NOTE: AUDIO INPUT CONNECTOR J1 SHOWN.
CONNECTORS J2 THROUGH J4 ARE IDENTICAL.

597-9012-31

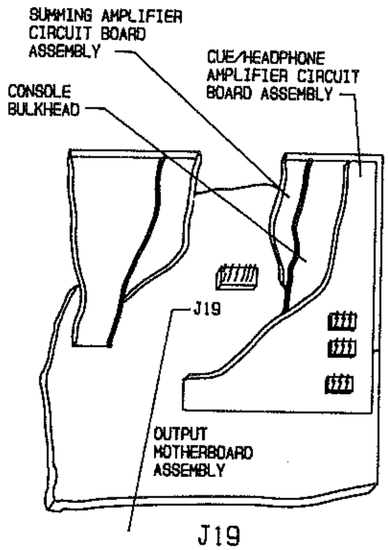
FIGURE 2-32.
INPUT EXPANDER MODULE INTERFACING



CONTROL CABLE ROUTING



DETAIL
SWITCH/INDICATOR CONTACTS



J19

ACCESSORY MODULE POWER SUPPLY CONNECTIONS

PIN NO.	DESCRIPTION
1	AUDIO POWER GROUND
2	CONSOLE -24V dc SUPPLY
3	CONSOLE +24V dc SUPPLY
4	AUDIO POWER GROUND
5	CONSOLE -24V dc SUPPLY
6	CONSOLE +24V dc SUPPLY
7	AUDIO POWER GROUND
8	CONSOLE -24V dc SUPPLY
9	CONSOLE +24V dc SUPPLY
10	AUDIO POWER GROUND
11	CONSOLE -24V dc SUPPLY
12	CONSOLE +24V dc SUPPLY

NOTES:

1. PLAY SWITCH SHOWN. ALL SWITCH/INDICATORS ARE IDENTICAL.
2. TAPE SOURCE REMOTE SWITCH MODULE SHOWN. CART SOURCE REMOTE SWITCH MODULE IS IDENTICAL.

597-9021-71

FIGURE 2-33. TAPE/CART REMOTE SWITCH MODULE INTERFACING

2-175. Refer to Figure 2-34 and interface the FSK decoder module to the mainframe and to a printer or video display terminal. Construct the audio cable using the wiring kit supplied with the unit and the specified Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text). Connect the power cable between J1 on the FSK decoder module and J19 on the output motherboard using the pins provided with the module.

2-176. PROGRAM EQUALIZER CONNECTIONS. The program equalizer modules are designed for connection to microphone input module, line input module, or program music/speech patch point networks. Refer to the PATCH POINT interfacing information in the preceding text and Figure 2-35 to connect a program equalizer module to the desired patch point network. Construct the interfacing cables using the wiring kit supplied with the unit and the specified Belden audio cable or equivalent (refer to AUDIO CABLE information in the preceding text).

2-177. UTILITY RELAY CONNECTIONS. A modular utility relay is designed to control ancillary equipment such as an on-air warning light. Refer to Figure 2-36 and connect the relay to the interfacing connectors as shown for control room, studio A, or studio B control operations. Attach the ancillary devices to the relay contacts as required.

2-178. POWER SUPPLY MODULE. The console power supply module generates unregulated dc operating potentials for application to the console mainframe. The power supply module interfaces to the console mainframe on connector J18 of the output motherboard (refer to Figure 2-37).

2-179. The power supply module is shipped from the factory with a 10 foot (3 meter) interfacing cable. If a different interfacing cable is required, refer to Figure 2-37 and construct the cable with 18 gauge 12-conductor cable such as Belden 8466 or equivalent. Connect the power supply cable cable between DC OUT on the power supply module and J18 on the output motherboard assembly.

2-180. AUTOMATIC POWER SUPPLY SWITCH PANEL CONNECTIONS. The automatic power supply switch panel requires interfacing to the two console power supply modules in a main/alternate power supply configuration. Connect the cables from the DC OUT receptacles on the power supply modules to the INPUT A and INPUT B connectors on the automatic power supply switch panel. Connect the cable from the DC OUT connector on the power supply switch panel to the mainframe dc input receptacle (refer to Figure 2-37).

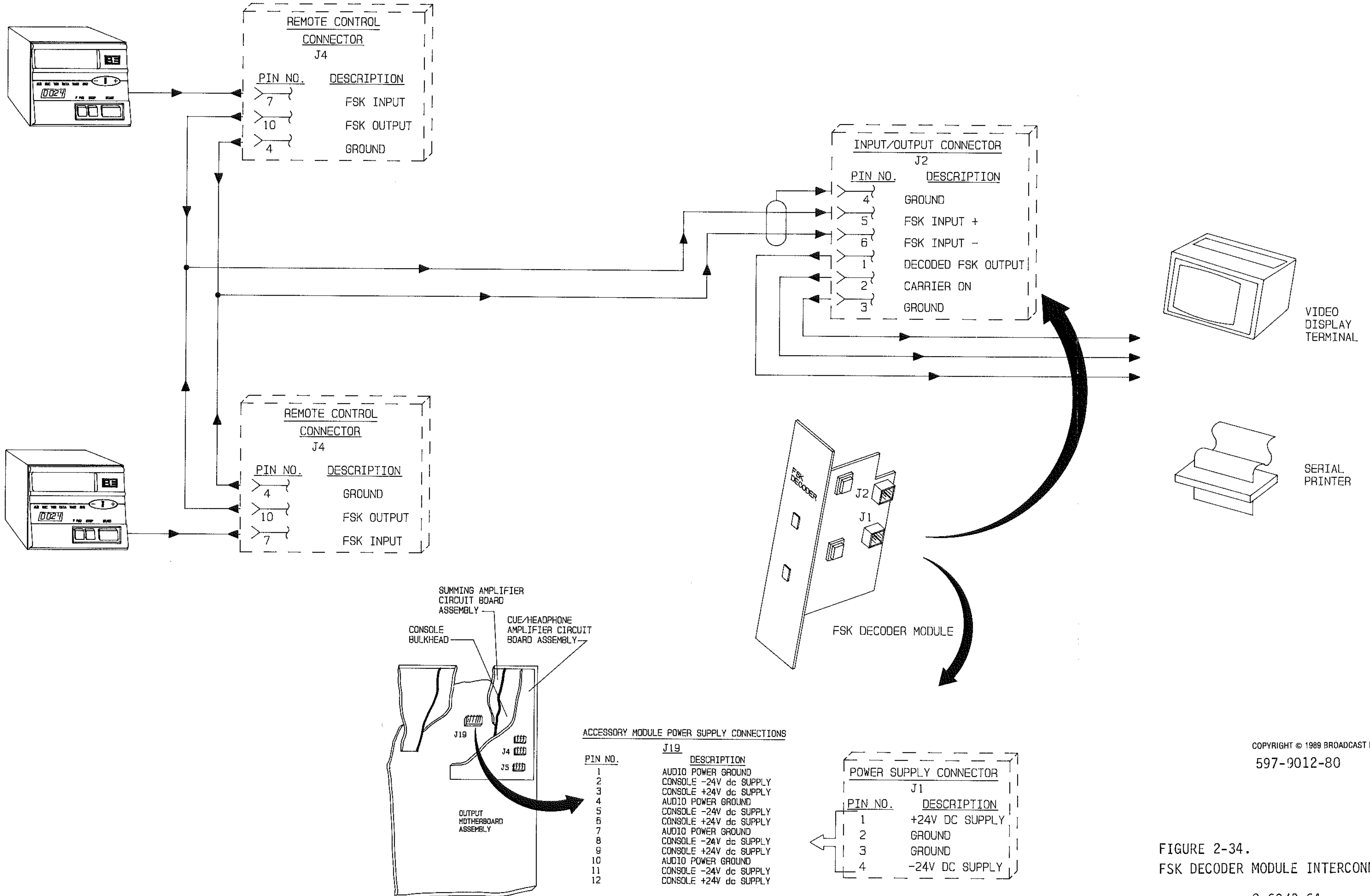


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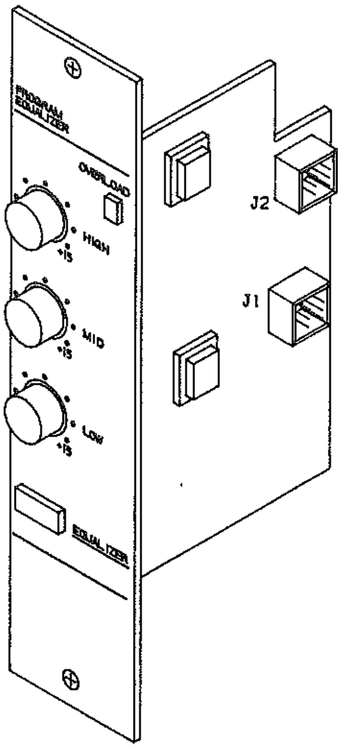
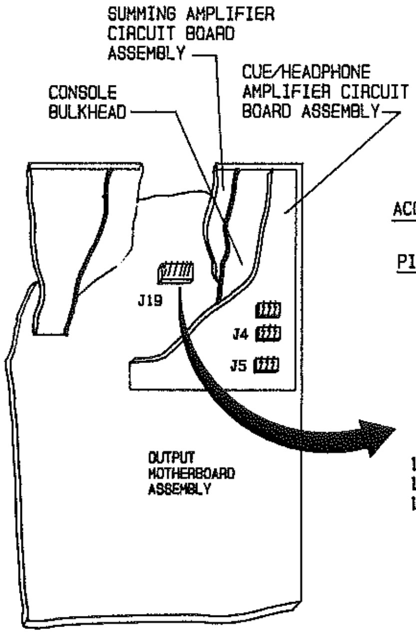
FIGURE 2-34.
FSK DECODER MODULE INTERCONNECTIONS



INPUT/OUTPUT CONNECTOR
J2

PIN NO.	DESCRIPTION
1	LEFT CHANNEL INPUT +
2	LEFT CHANNEL INPUT -
3	SHIELD GROUND
4	RIGHT CHANNEL INPUT +
5	RIGHT CHANNEL INPUT -
6	SHIELD GROUND
7	LEFT CHANNEL OUTPUT +
8	LEFT CHANNEL OUTPUT -
9	SHIELD GROUND
10	RIGHT CHANNEL OUTPUT +
11	RIGHT CHANNEL OUTPUT -
12	SHIELD GROUND

TO PATCH POINT INTERFACING



ACCESSORY MODULE POWER SUPPLY CONNECTIONS
J19

PIN NO.	DESCRIPTION
1	AUDIO POWER GROUND
2	CONSOLE -24V dc SUPPLY
3	CONSOLE +24V dc SUPPLY
4	AUDIO POWER GROUND
5	CONSOLE -24V dc SUPPLY
6	CONSOLE +24V dc SUPPLY
7	AUDIO POWER GROUND
8	CONSOLE -24V dc SUPPLY
9	CONSOLE +24V dc SUPPLY
10	AUDIO POWER GROUND
11	CONSOLE -24V dc SUPPLY
12	CONSOLE +24V dc SUPPLY

POWER SUPPLY CONNECTOR
J1

PIN NO.	DESCRIPTION
1	+24V DC SUPPLY
2	GROUND
3	GROUND
4	-24V DC SUPPLY

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FIGURE 2-35. PROGRAM EQUALIZER CONNECTIONS

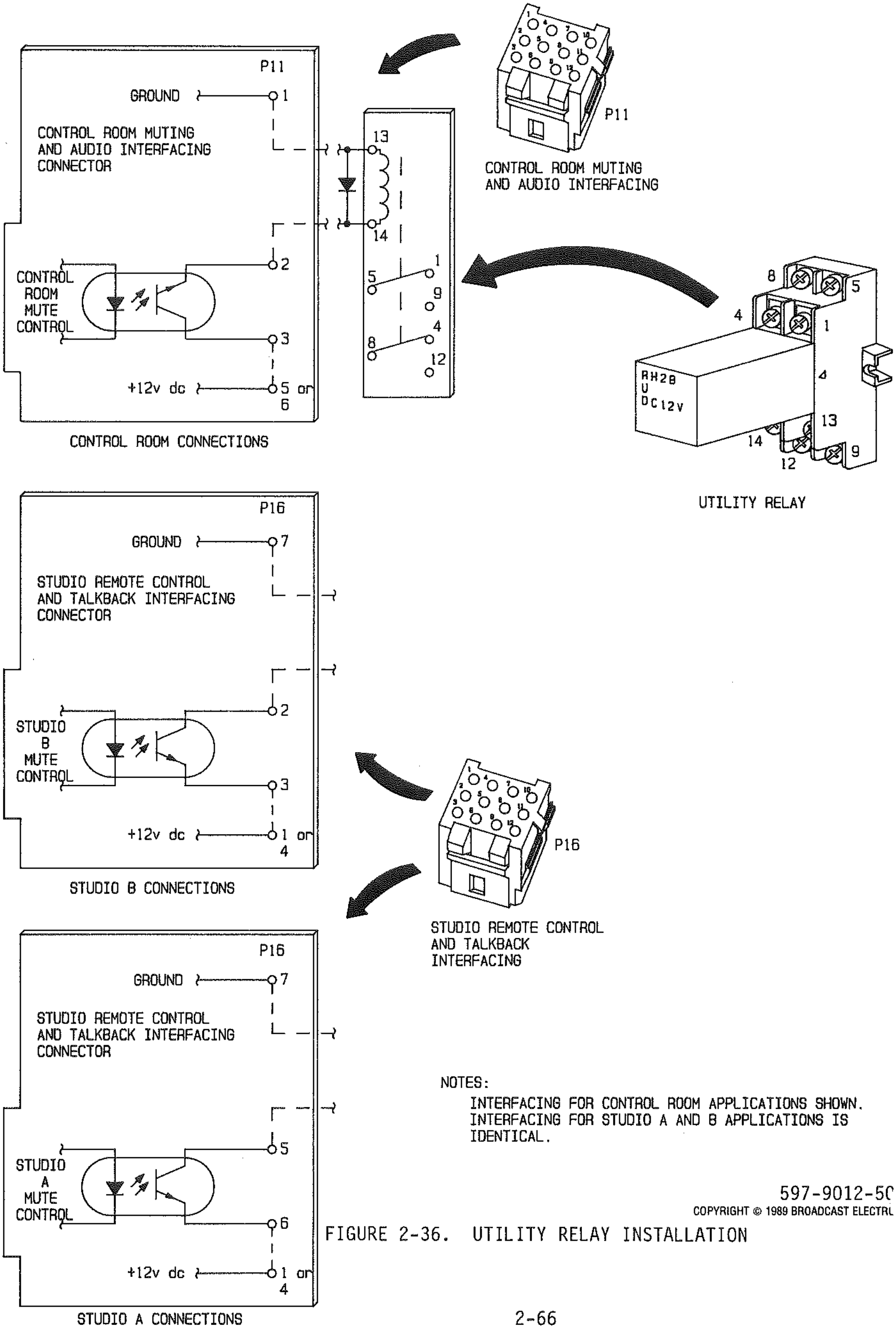

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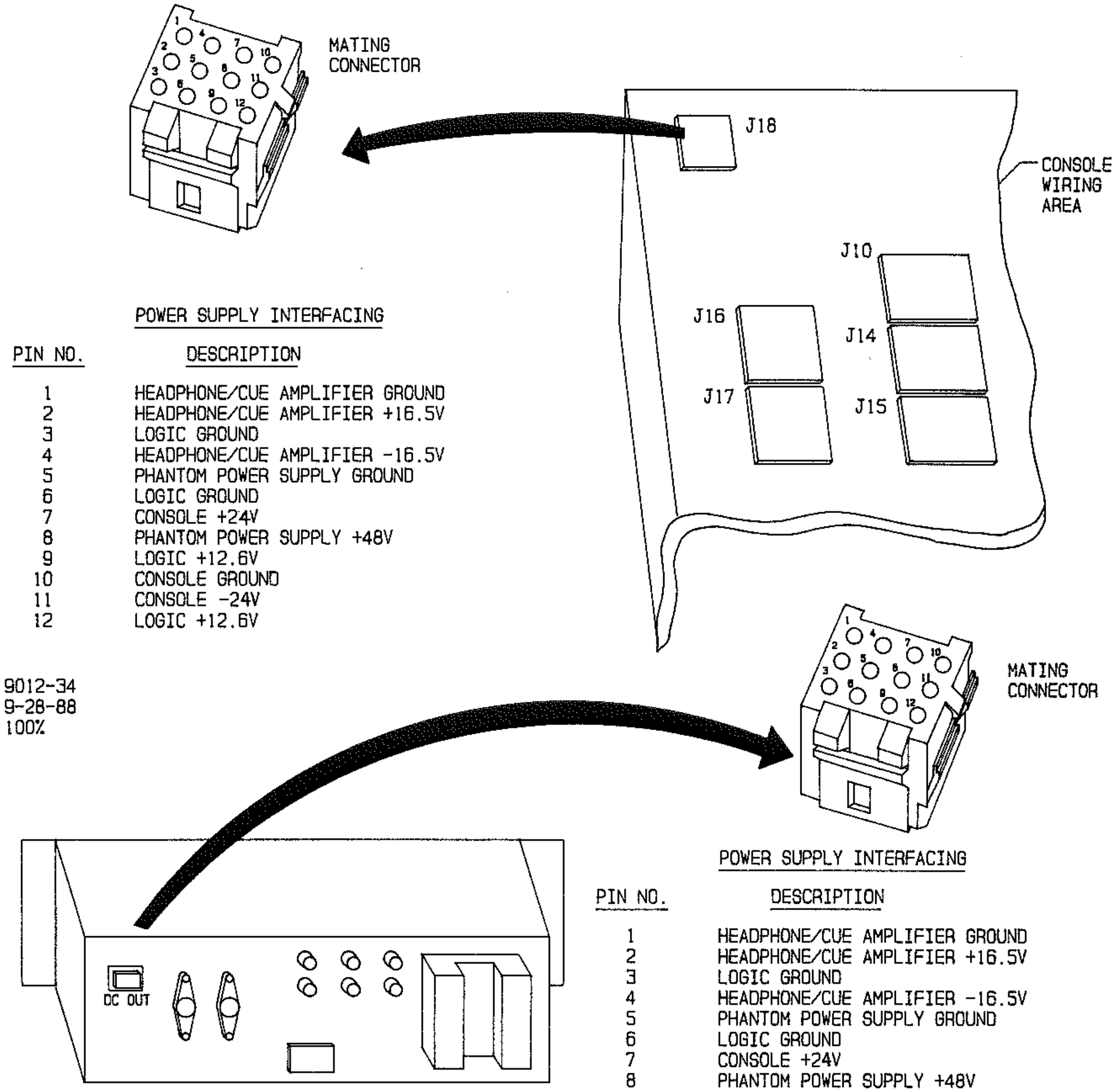
FIGURE 2-36. UTILITY RELAY INSTALLATION



POWER SUPPLY INTERFACING

PIN NO.	DESCRIPTION
1	HEADPHONE/CUE AMPLIFIER GROUND
2	HEADPHONE/CUE AMPLIFIER +16.5V
3	LOGIC GROUND
4	HEADPHONE/CUE AMPLIFIER -16.5V
5	PHANTOM POWER SUPPLY GROUND
6	LOGIC GROUND
7	CONSOLE +24V
8	PHANTOM POWER SUPPLY +48V
9	LOGIC +12.6V
10	CONSOLE GROUND
11	CONSOLE -24V
12	LOGIC +12.6V

POWER SUPPLY INTERFACING

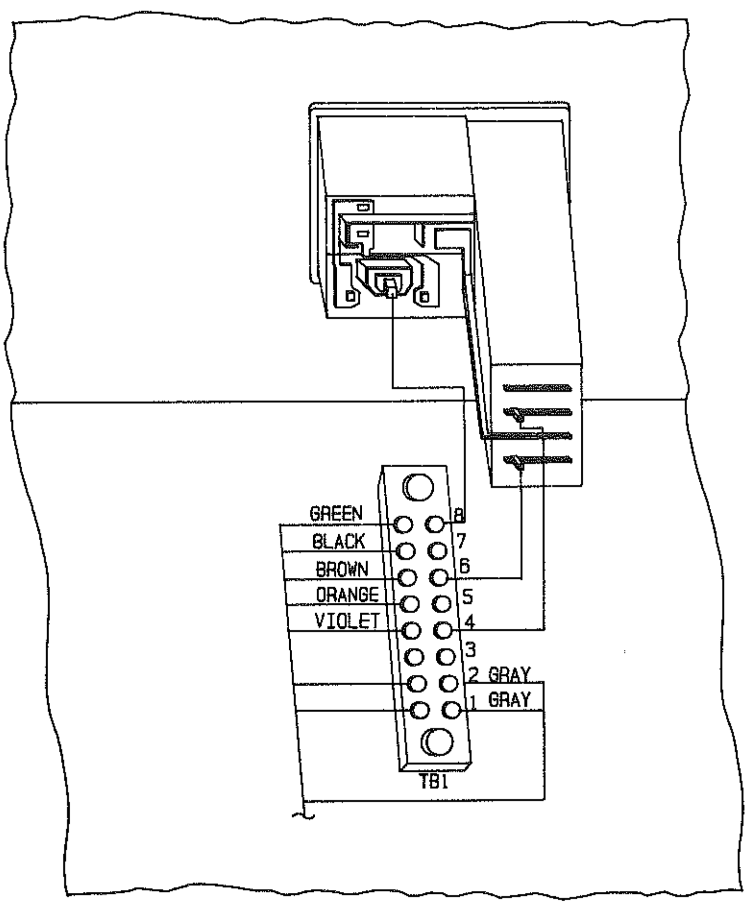
PIN NO.	DESCRIPTION
1	HEADPHONE/CUE AMPLIFIER GROUND
2	HEADPHONE/CUE AMPLIFIER +16.5V
3	LOGIC GROUND
4	HEADPHONE/CUE AMPLIFIER -16.5V
5	PHANTOM POWER SUPPLY GROUND
6	LOGIC GROUND
7	CONSOLE +24V
8	PHANTOM POWER SUPPLY +48V
9	LOGIC +12.6V
10	CONSOLE GROUND
11	CONSOLE -24V
12	LOGIC +12.6V

597-9012-34

FIGURE 2-37. POWER SUPPLY/MAINFRAME WIRING

WARNING — ENSURE ALL PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.

2-181. AC INPUT. The Mix-Trak 90 power supply module is programmed for the proper power supply voltage when shipped from the factory. The operating voltage requirement for the unit is indicated on the identification plate. If the unit is to be operated from an ac power source other than the original factory programmed source, refer to Figure 2-38 and reprogram unit for the desired ac input potential.



PRIMARY AC LINE VOLTAGE PROGRAMMING	
INPUT VOLTAGE	JUMPER TERMINALS
117V AC	INSTALL WIRE #24 IN TERMINAL 6 6-7 4-5
220V AC	INSTALL WIRE #24 IN TERMINAL 7 5-6

597-9012-82

FIGURE 2-38. POWER SUPPLY MODULE AC LINE VOLTAGE PROGRAMMING

2-182. Remove the ac line fuse from the rear-panel ac fuse-holder. Ensure the fuse is a slow-blow type rated at 4A for 105V to 132V operation or 2A for 210V to 264V operation.

2-183. The power supply module is also equipped with fuses for the +12 volt, ±24 volt, ±16.5 volt, and +48 volt dc potentials. Ensure the appropriate fuse is installed as described below for each dc output.

REF. DES.	DC SUPPLY	FUSE
F3	+12 Volt	5A
F1	-24 Volt	4A
F2	+24 Volt	4A
F4	+48 Volt	1/8A
F7	+16.5 Volt	1A
F6	-16.5 Volt	1A

2-184. Ensure the rear-panel power switch is operated to OFF and connect the console ac line cord to the appropriate power source.

2-185. INSTALLATION ADJUSTMENTS.

2-186. The Mix-Trak 90 console installation adjustments involve the alignment of the console audio level structure. The audio levels are of a critical nature and must be properly aligned for optimum console noise performance. The test equipment required for the installation adjustments is listed below.

TEST EQUIPMENT

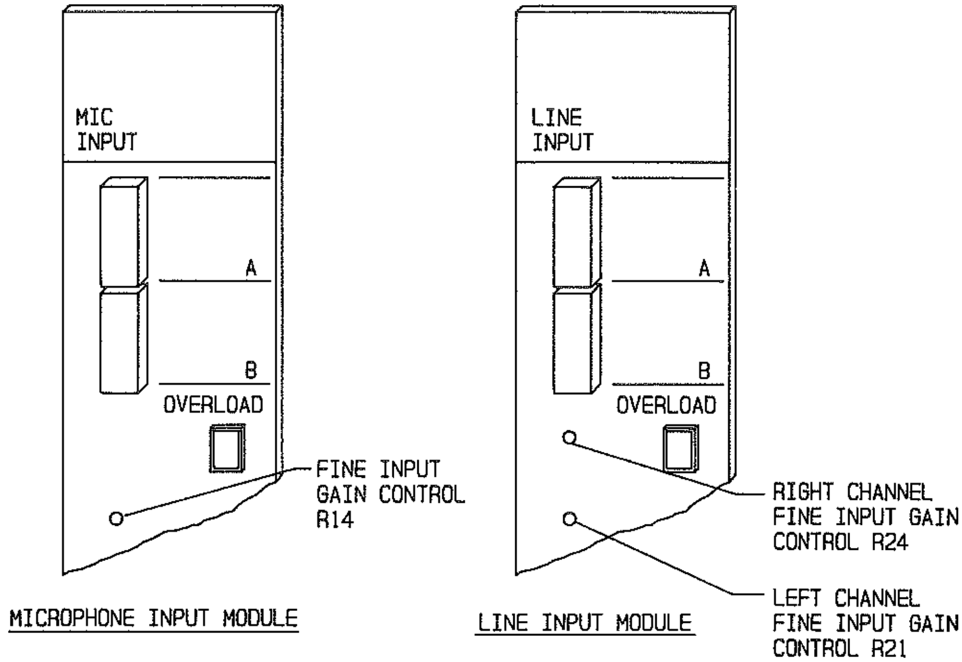
1. Low-Distortion Sinewave Output Audio Oscillator.
2. dB Calibrated Voltmeter.
3. Two 600 Ohm +-5%, 1/2 Watt Resistors.
4. Audio Source Alignment Tapes.

2-187. INPUT LEVEL ADJUSTMENTS. The Mix-Trak 90 console microphone and line input modules must be individually calibrated for the appropriate gain structure. Each input module is equipped with recessed front-panel gain adjustment controls for the fine alignment of the audio input levels (refer to Figure 2-39).

2-188. To obtain optimum console noise performance, the recessed front-panel gain controls and the module fader must be operated within a specific range during the alignment procedure. The front-panel recessed gain controls should be adjusted for operation between the 11 o'clock and 2 o'clock position with the module fader at the Ø dB position. To adjust the audio input levels, proceed as follows.

2-189. Line Input Modules. To adjust line input module levels, proceed as follows.

2-190. Select a line input module for audio level alignment.



597-9012-36

FIGURE 2-39. MICROPHONE AND LINE INPUT MODULE FINE GAIN CONTROLS

2-191. Refer to Figure 2-19 for console wiring access information and Figure 2-25 for patch point interfacing information to perform the following:

1. Terminate the patch point transmit outputs with the 600 Ohm resistors.

2. Connect the decibel calibrated voltmeter to the patch point left channel transmit outputs.

2-192. Insert the alignment material into the audio source and reproduce the test audio. If alignment audio is not available, connect the audio oscillator to the module input terminals and adjust the oscillator to the audio source output level.

2-193. Refer to the LINE INPUT MODULE information in SECTION III, OPERATION and operate the module to select the test audio.

2-194. Refer to Figure 2-39 and adjust left channel fine input gain control R21 for a meter indication of -5 dBu. For optimum console noise performance, adjust the control between the 11 o'clock and 2 o'clock position.

2-195. If a -5 dBu meter indication is not obtained by adjustment of the gain control, the module input amplifier must be re-programmed. Refer to the LINE INPUT MODULE PROGRAMMING in the preceding text and re-program the module left and right channel input amplifier or the input attenuator network (if installed) as required. Repeat the preceding adjustment procedure to align the input level.

2-196. Repeat the procedure for the right channel. Fine adjust the module right channel using right channel fine gain adjust control R24 (refer to Figure 2-39).

2-197. Repeat the procedure for the remaining line input modules. When line input module audio alignment is complete, remove all test equipment.

2-198. Microphone Input Modules. To adjust the microphone input modules, proceed as follows:

2-199. Select a microphone input module for audio level alignment.

2-200. Refer to Figure 2-19 for console wiring access information and Figure 2-25 for patch point interfacing information to perform the following:

1. Terminate the patch point transmit output with the 600 Ohm resistor.

2. Connect the dB calibrated voltmeter to the patch point transmit output.

2-201. Operate the microphone source to generate test audio.

2-202. Refer to the MICROPHONE INPUT MODULE information in SECTION III, OPERATION and operate the module to select the test audio.

2-203. Refer to Figure 2-39 and adjust fine input gain control R14 for a meter indication of -5 dBu. For optimum console noise performance, adjust the control between the 11 o'clock and 2 o'clock position.

2-204. If a -5 dBu meter indication is not obtained by adjustment of the gain control, the module input amplifier must be re-programmed. Refer to the MICROPHONE INPUT MODULE PROGRAMMING in the preceding text and re-program the module input amplifier as required. Repeat the preceding adjustment procedure to align the input level.

2-205. Repeat the procedure for the remaining microphone input modules. When microphone input module audio alignment is complete, remove all test equipment.

2-206. OUTPUT LEVEL VU METER ADJUSTMENT. Each Mix-Trak 90 console is shipped from the factory at a Ø dBu output level. If a different console output level is required, refer to the OUTPUT LEVEL VU METER ADJUSTMENT procedure in the OUTPUT AMPLIFIER module section of this manual.

WARNING	ENSURE THE CONTROL ROOM MONITOR AND HEAD-PHONE LEVELS ARE ADJUSTED FOR A SAFE MAXIMUM
WARNING	OPERATING LEVEL.

2-207. CONTROL ROOM MONITOR/HEADPHONE MAXIMUM LEVEL ADJUSTMENT. The control room monitor module is equipped with controls to establish the maximum control room monitor level and the maximum headphone level. To adjust the limit controls, proceed as follows.

2-208. Procedure. To adjust the control room monitor and headphone limit controls, proceed as follows:

2-209. Remove the control room monitor module from the console main-frame and connect the console extender cables to the module.

2-210. Refer to Figure 2-40 and adjust control room maximum monitor level control R69 and maximum headphone level control R151 fully counter-clockwise.

2-211. Refer to the CONTROL ROOM MONITOR MODULE information in SECTION III, OPERATION and operate the control room monitor section for program output monitoring. Operate the MONITOR LEVEL control to the fully clockwise position.

2-212. Operate the control room monitor external power amplifier level controls to the maximum position.

2-213. Refer to the LINE INPUT MODULE information in SECTION III, OPERATION and operate a line input module to route audio to the program output buss.

2-214. Refer to Figure 2-40 and adjust control room maximum monitor level control R69 for a safe maximum control room monitor operating level.

2-215. Refer to the CONTROL ROOM MONITOR MODULE information in SECTION III, OPERATION and operate the headphone section for program output monitoring. Operate the HEADPHONE LEVEL control to the fully clockwise position.

2-216. Refer to Figure 2-40 and adjust maximum headphone level control R151 for a safe maximum headphone operating level.

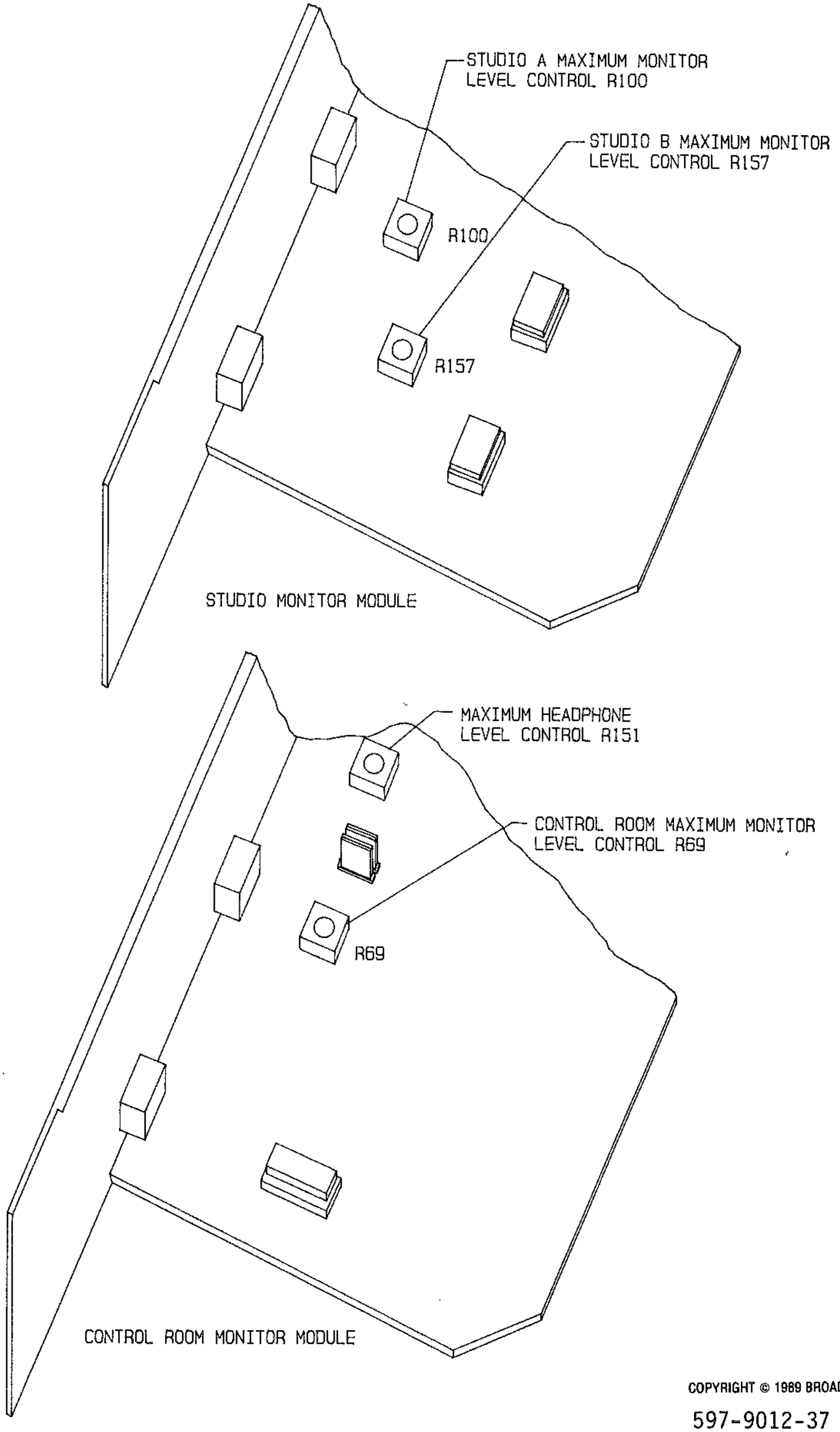


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FIGURE 2-40. CONTROL ROOM/STUDIO MONITOR MODULE LEVEL CONTROLS

2-217. Disconnect the extender cables from the control room monitor module and replace the module in the appropriate console mainframe position.

<u>WARNING</u> ENSURE THE STUDIO MONITOR LEVELS ARE ADJUSTED FOR A SAFE MAXIMUM OPERATING LEVEL.

2-218. STUDIO MAXIMUM MONITOR LEVEL ADJUSTMENT. The studio monitor module is equipped with controls to establish the maximum studio A and studio B monitor levels. To adjust the limit controls, proceed as follows.

2-219. <u>Procedure</u>. To adjust the studio limit controls, proceed as follows:

2-220. Remove the studio monitor module from the console mainframe and connect the console extender cables to the module.

2-221. Refer to Figure 2-40 and adjust studio A maximum monitor level control R100 fully counterclockwise.

2-222. Refer to the STUDIO MONITOR MODULE information in SECTION III, OPERATION and operate the studio A monitor section for program output monitoring. Operate the STUDIO A LEVEL control to the fully clockwise position.

2-223. Operate the studio A monitor external power amplifier level controls to the maximum position.

2-224. Refer to the LINE INPUT MODULE information in SECTION III, OPERATION and operate a line input module to route audio to the program output buss.

2-225. Refer to Figure 2-40 and adjust studio A maximum monitor level control R100 for a safe maximum studio A monitor operating level.

2-226. Repeat the procedure for studio B. Adjust studio B using studio B maximum monitor level control R157.

2-227. Disconnect the extender cables from the studio monitor module and replace the module in the appropriate console mainframe position.

OPERATION

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

SECTION III
OPERATION

3-1. INTRODUCTION.

3-2. This section presents operating information for the Mix-Trak 90 series audio consoles. The operating information contained in this section is presented by modular assemblies. The information includes control and indicator identification and standard operating procedures.

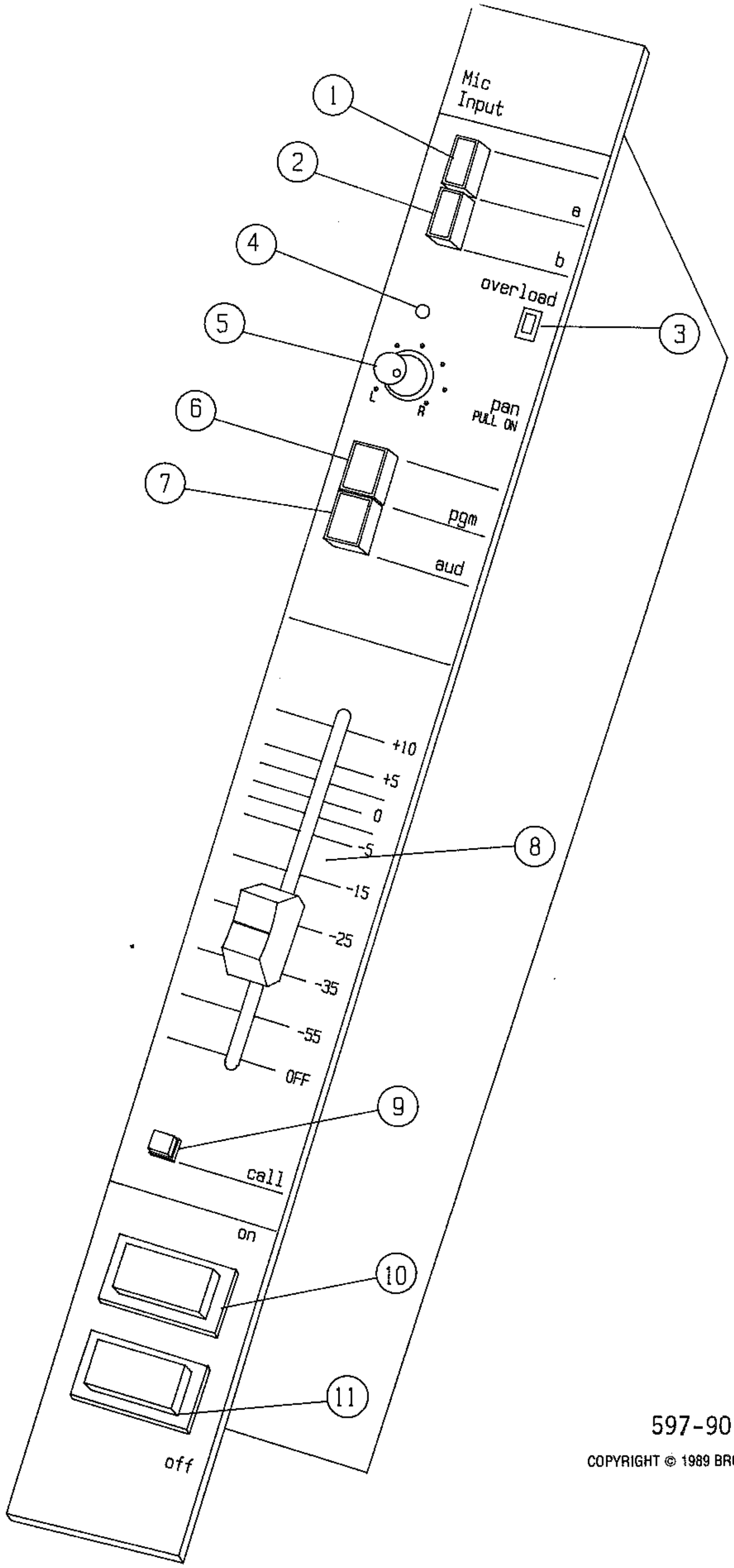

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FIGURE 3-1. MICROPHONE INPUT MODULE CONTROLS AND INDICATORS

3-3. MICROPHONE INPUT MODULE.

3-4. CONTROLS AND INDICATORS.

3-5. Refer to Figure 3-1 for the location of all controls and indicators associated with the microphone input module. The function of each control or indicator is described in Table 3-1.

TABLE 3-1. MICROPHONE INPUT MODULE CONTROLS AND INDICATORS.
(Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	A Microphone Input Select Switch/ Indicator	SWITCH: Configures microphone input A for application to the module audio circuitry. INDICATOR: Illuminates blue to indicate microphone input A is configured for application to the module.
2	B Microphone Input Select Switch/ Indicator	SWITCH: Configures microphone input B for application to the module audio circuitry. INDICATOR: Illuminates blue to indicate microphone input B is configured for application to the module.
3	OVERLOAD Indicator	Illuminates to indicate an excessive audio input condition.
4	Module Input Gain Control	Provides 20 dB of gain control adjustment for input level alignment.
5	PAN On/Off and Direction Control	ON/OFF CONTROL: A. When the PAN control is operated to the up position, configures the module for panorama operation. B. When the PAN control is operated to the down position, terminates the module panorama mode. DIRECTION CONTROL: When the panorama mode is enabled, directs the applied audio in a continuously variable manner to the left or right channel audio circuitry.

TABLE 3-1. MICROPHONE INPUT MODULE CONTROLS AND INDICATORS.
(Sheet 2 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
6	PGM Switch/ Indicator	SWITCH: Routes the selected microphone input to the internal console program buss. INDICATOR: Illuminates blue to indicate the selected microphone input is routed to the internal console program buss.
7	AUD Switch/ Indicator	SWITCH: Routes the selected microphone input to the internal console audition buss. INDICATOR: Illuminates blue to indicate the selected microphone input is routed to the internal console audition buss.
8	Fader Control	Controls the audio output level of the module.
9	CALL Switch/ Indicator	SWITCH: Configures the module to process studio microphone information for application to the console cue speaker. INDICATOR: Illuminates to indicate the associated studio facility is requesting studio-to-control room intercom operation.
10	ON Switch/ Indicator	SWITCH: Enables the module circuitry. INDICATOR: Illuminates to indicate the module is enabled.
11	OFF Switch/ Indicator	SWITCH: Disables the module circuitry. INDICATOR: Illuminates to indicate the module is disabled.

3-6. OPERATION.

3-7. The following text presents procedures for specific microphone input module operating functions. Perform the appropriate procedure for the type of operating function desired.

3-8. MODULE ON/OFF CONTROL. Enable the module by depressing the ON switch/indicator to illuminate the switch/indicator. The console muting system will mute the appropriate monitor speakers. To disable the module, depress the OFF switch/indicator to illuminate the switch/indicator.

3-9. If the module fader control functions are enabled, the module may be enabled/disabled by the operation of the fader. Operate the fader from the OFF position to enable the module. The ON switch/indicator will illuminate. Operate the fader to the OFF position to disable the module. The OFF switch/indicator will illuminate.

3-10. INPUT SELECTION. Configure input A for application to the module audio circuitry by depressing the input A switch/indicator to illuminate the switch/indicator blue. Configure input B for application to the module audio circuitry by depressing the input B switch/indicator to illuminate the switch/indicator blue. The OVERLOAD indicator will illuminate to indicate excessive audio input conditions.

3-11. PAN MODE. The microphone input module pan mode is an operational feature designed to direct audio to the left channel or right channel in a continuously variable format. The operator routes the applied microphone input to the left or right channels as determined by the PAN control.

3-12. To enable the pan mode, operate the PAN control to the up position. Rotate the PAN control as required to direct the signal to the left channel or right channel.

3-13. PROGRAM/AUDITION OUTPUT ROUTING. To route audio to the internal program output buss, depress the PGM switch/indicator to illuminate the switch/indicator blue. To route audio to the internal audition output buss, depress the AUD switch/indicator to illuminate the switch/indicator blue. To route audio to the both the program and audition output busses, depress both the PGM and AUD switch/indicators to illuminate the switch/indicators blue.

3-14. FADER CONTROL. Operate the module fader to maintain or vary the level of input audio as required. The fader control range is from +10 dB to -60 dB. If the fader on/off control functions are enabled, the module will be enabled when the fader is operated from the OFF position. The module will be disabled when the fader is operated to the OFF position.

3-15. CALL FUNCTIONS. Call functions are designed for microphone input modules assigned to associated studio facilities. The CALL indicator will illuminate to indicate the associated studio facility is requesting and is configured for studio-to-control room intercom operation. The CALL switch allows the console operator to route studio microphone information to the console cue speaker. For microphone input modules assigned to the control room, the CALL switch function must not be used. Refer to MICROPHONE INPUT MODULE INSTALLATION information in SECTION II of this manual for a procedure to disable the CALL switch function.

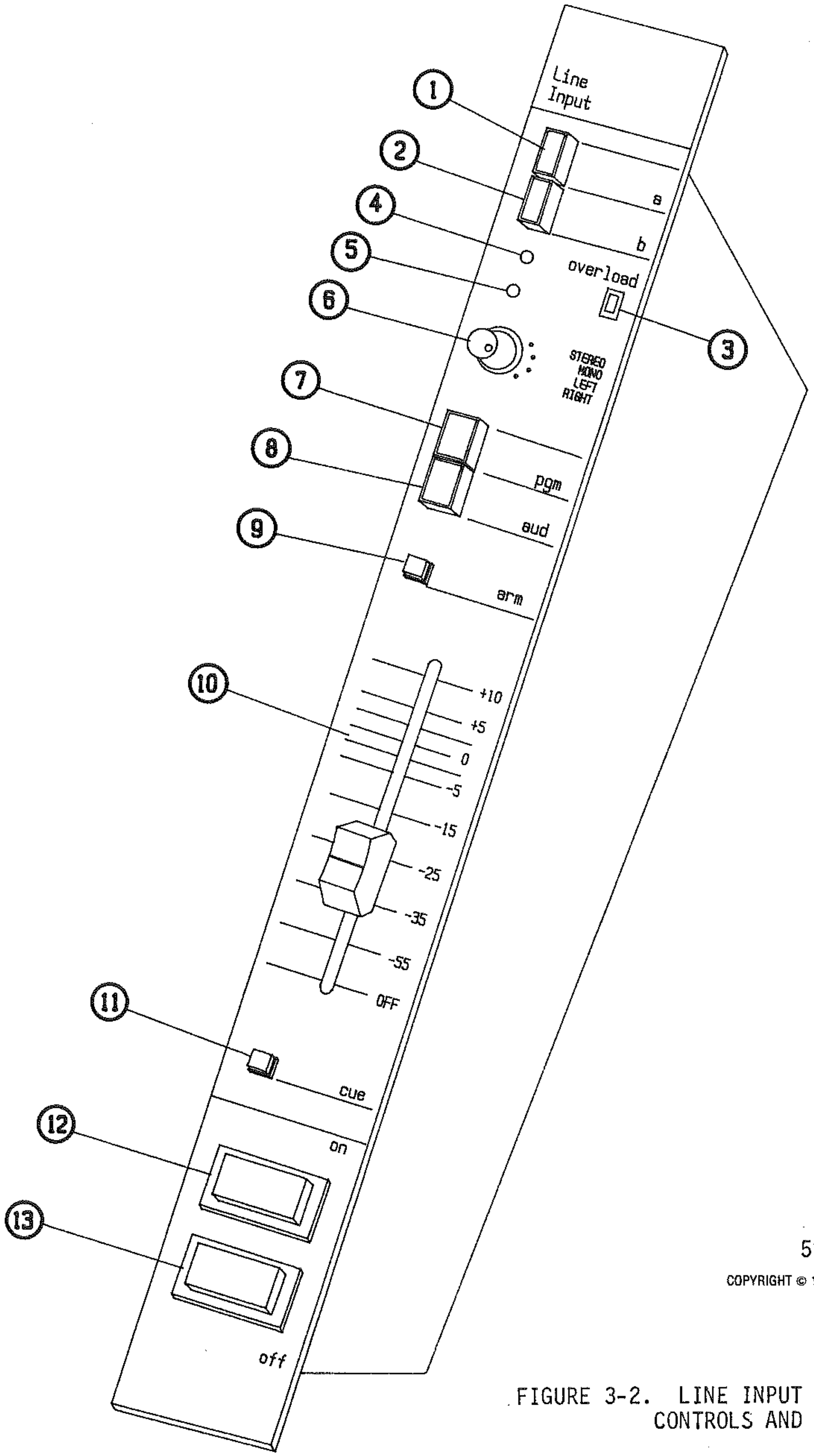

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FIGURE 3-2. LINE INPUT MODULE
CONTROLS AND INDICATORS

3-16. LINE INPUT MODULE.

3-17. CONTROLS AND INDICATORS.

3-18. Refer to Figure 3-2 for the location of all controls and indicators associated with the line input module. The function of each control or indicator is described in Table 3-2.

TABLE 3-2. LINE INPUT MODULE CONTROLS AND INDICATORS
(Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	A Line Input Select Switch/ Indicator	SWITCH: Configures line input A for application to the module audio circuitry. INDICATOR: Illuminates blue to indicate line input A is configured for application to the module.
2	B Line Input Select Switch/ Indicator	SWITCH: Configures line input B for application to the module audio circuitry. INDICATOR: Illuminates blue to indicate line input B is configured for application to the module.
3	OVERLOAD Indicator	Illuminates to indicate an excessive audio input condition.
4	Right Channel Input Gain Control	Provides 10 dB of gain control adjustment for right channel input level alignment.
5	Left Channel Input Gain Control	Provides 10 dB of gain control adjustment for left channel input level alignment.
6	STEREO, MONO, LEFT, RIGHT Input Select Switch	Selects stereo, mono, left channel, or right channel information for application to the module audio circuitry.

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

INDEX NO.	NOMENCLATURE	FUNCTION
7	PGM Switch/ Indicator	SWITCH: Routes the selected line audio input to the internal console program buss. INDICATOR: Illuminates blue to indicate the selected line input is routed to the internal console program buss.
8	AUD Switch/ Indicator	SWITCH: Routes the selected line audio input to the internal console audition buss. INDICATOR: Illuminates blue to indicate the selected line input is routed to the internal console audition buss.
9	ARM Switch/ Indicator	SWITCH: Configures the module for automatic sequencing operation. INDICATOR: Illuminates to indicate the module is configured for automatic sequencing operation.
10	Fader Control	Controls the audio output level of the module.
11	CUE Switch/ Indicator	SWITCH: Configures the module for cue channel operation. INDICATOR: Illuminates to indicate the module is configured for cue channel operation.
12	ON Switch/ Indicator	SWITCH: Enables the module circuitry. INDICATOR: Illuminates to indicate the module is enabled.
13	OFF Switch/ Indicator	SWITCH: Disables the module circuitry. INDICATOR: Illuminates to indicate the module is disabled.

3-19. OPERATION.

3-20. The following text presents procedures for specific line input module operating functions. Perform the appropriate procedure for the type of operation desired.

3-21. MODULE ON/OFF CONTROL. Enable the module by depressing the ON switch/indicator to illuminate the switch/indicator. Disable the module by depressing the OFF switch/indicator to illuminate the switch/indicator.

3-22. If the module fader control functions are enabled, the module may be enabled/disabled by the operation of the fader. Operate the fader from the OFF position to enable the module. The ON switch/indicator will illuminate. Operate the fader to the OFF position to disable the module. The OFF switch/indicator will illuminate.

3-23. INPUT SELECTION. Configure input A for application to the module audio circuitry by depressing the input A switch/indicator to illuminate the switch/indicator blue. Configure input B for application to the module audio circuitry by depressing the input B switch/indicator to illuminate the switch/indicator blue. The OVERLOAD indicator will illuminate to indicate excessive audio input conditions.

3-24. Operate the STEREO, MONO, LEFT, RIGHT input select switch to the appropriate position for the applied input signal. The STEREO position routes left channel input information to the console left channel circuitry and right channel input information to the console right channel circuitry. The MONO position sums the left and right channel input information for application to the console left and right channel circuitry. The LEFT position routes left channel input information to the console left and right channel circuitry. The RIGHT position routes right channel input information to the console left and right channel circuitry.

3-25. OUTPUT ROUTING. To route audio to the internal program output buss, depress the PGM switch/indicator to illuminate the switch/indicator blue. To route audio to the internal audition output buss, depress the AUD switch/indicator to illuminate the switch/indicator blue. To route audio to the both the program and audition output busses, depress the PGM and AUD switch/indicators to illuminate the switch/indicators blue.

3-26. FADER CONTROL. Operate the fader control to maintain or vary the level of an audio input as required. The fader control range is from +10 dB to -60 dB. If the fader on/off control functions are enabled, the module will be enabled when the fader is operated from the OFF position. The module will be disabled when the fader is operated to the OFF position.

3-27. CUE OPERATION. To configure the module for cue operation, depress the CUE switch/indicator to illuminate the switch/indicator. Line input audio will be routed to the console cue speaker for monitoring operations. The module may also be configured for cue channel monitoring by the module fader control if the fader cue control function is enabled. To configure the module for cue operation, operate the fader to the OFF position. The CUE and OFF switch/indicators will illuminate.

3-28. AUTOMATIC SEQUENCE OPERATION. An automatic sequencing feature is provided when a line input module is equipped with a source remote control module. The feature allows the operator to program a series of line input modules for automatic play operation. Automatic sequencing is initiated by enabling the first module in the sequence. To program the modules for automatic sequencing operations, proceed as follows.

3-29. Select the audio sources and determine the line input modules for automatic sequencing operations. Automatic sequencing is limited to the selection of audio sources and modules in increasing channel order (example: 1, 3, 5, 7 etc.). Random sequencing is not supported. Also, only one audio source from each module may be selected. The feature will not sequence two sources assigned to the same input module.

3-30. Audio source ready status indications are provided by the line input module OFF switch/indicator. Prior to programming, ensure each audio source selected for automatic sequencing is ready for operation by the illumination of the line input module OFF switch/indicator. Program the modules by depressing the ARM switch/indicator to illuminate the switch/indicator for each line input module in the sequence. If a module must be disarmed, depress the ARM switch/indicator to extinguish the switch/indicator.

3-31. To initiate sequencing operation, depress the ON switch/indicator to illuminate the switch/indicator for the first module in the sequence. The module OFF switch/indicator will extinguish. The console will respond by enabling the audio source. When play operation is complete, the ARM switch/indicator will extinguish and the next audio source in the sequence will be enabled. Sequencing operations will continue and terminate at the last audio source in the sequence.

3-32. Automatic sequencing operations may be terminated manually at any point in the sequence if required. To terminate sequencing operations, depress the ARM switch/indicator to extinguish the switch/indicator on the current on-air module. The module will terminate operation and stop the automatic sequencing at the end of the audio source material. To instantaneously terminate the current program material and the automatic sequencing, depress the current on-air module OFF switch/indicator.

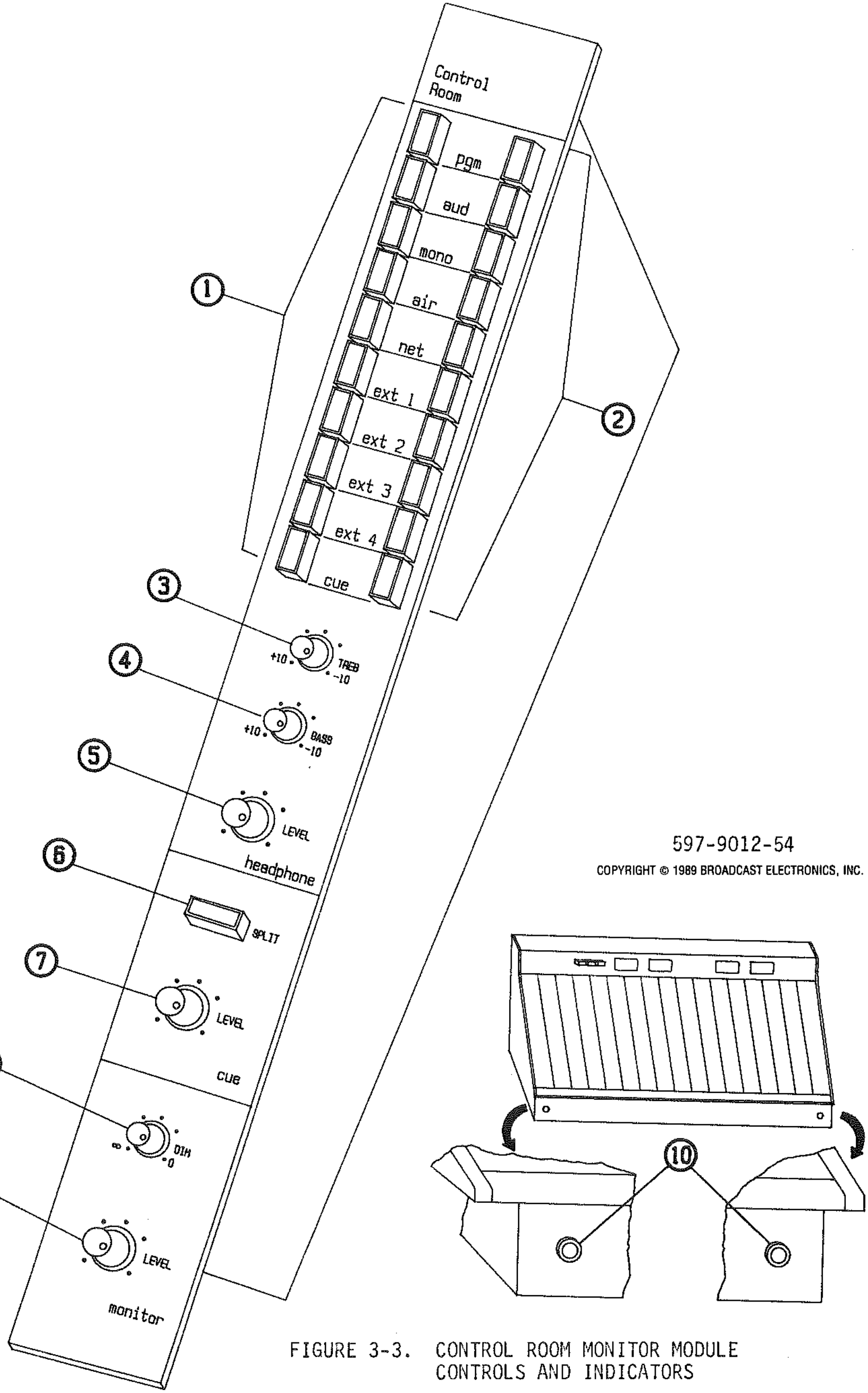

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FIGURE 3-3. CONTROL ROOM MONITOR MODULE CONTROLS AND INDICATORS

3-33. CONTROL ROOM MONITOR MODULE.

3-34. CONTROLS AND INDICATORS.

3-35. Refer to Figure 3-3 for the location of all controls and indicators associated with the control room monitor module. The function of each control or indicator is described in Table 3-3.

TABLE 3-3. CONTROL ROOM MONITOR MODULE CONTROLS AND INDICATORS
(Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	Control Room Monitor Select Switch/Indicator Assembly 1. PGM 2. AUD 3. MONO 4. AIR 5. NET 6. EXT 1 7. EXT 2 8. EXT 3 9. EXT 4 10. CUE	SWITCHES: Configures PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE audio for application to the control room monitor speakers. INDICATORS: Illuminates yellow to indicate an associated monitor input (PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4 or CUE) is selected for application to the control room monitor speakers.
2	Headphone Select Switch/Indicator Assembly 1. PGM 2. AUD 3. MONO 4. AIR 5. NET 6. EXT 1 7. EXT 2 8. EXT 3 9. EXT 4 10. CUE	SWITCHES: Configures PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE audio for application to the console headphone system. INDICATORS: Illuminates orange to indicate an associated monitor input (PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE) is selected for application to the console headphone system.
3	HEADPHONE TREB Control	Adjusts the headphone treble. The control range is from -10 dB to +10 dB.
4	HEADPHONE BASS Control	Adjusts the headphone bass. The control range is from -10 dB to +10 dB.

TABLE 3-3. CONTROL ROOM MONITOR MODULE CONTROLS AND INDICATORS
(Sheet 2 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
5	HEADPHONE LEVEL Control	Adjusts the headphone level.
6	CUE SPLIT Switch/Indicator	SWITCH: Operates the console headphone system to the split headphone/cue configuration. Left and right channel headphone information is routed to the left channel headphone circuit. Cue channel information is routed to the right channel headphone circuit. INDICATOR: Illuminates green to indicate the headphone system is configured for split headphone/cue operation.
7	CUE Level Control	Adjusts the console cue speaker level.
8	MONITOR DIM Control	Adjusts the control room monitor level during cue channel audio monitoring conditions.
9	MONITOR LEVEL Control	Adjusts the control room monitor level.
10	Headphone Receptacles	Console Headphone Receptacle.

3-36. OPERATION.

3-37. The following text presents procedures for specific control room monitor module operating functions. Perform the appropriate procedure for the type of operation desired.

WARNING

WARNING

TO MAINTAIN A SAFE OPERATING LEVEL ENVIRONMENT, ALWAYS OPERATE THE HEADPHONE SYSTEM BY INITIALLY ADJUSTING THE VOLUME CONTROL FULLY COUNTERCLOCKWISE AND THEN INCREASE THE LEVEL GRADUALLY.

3-38. HEADPHONE SYSTEM. To operate the console headphone system, proceed as follows.

3-39. The console headphone receptacle accepts a wide variety of low impedance stereophonic headphones. The receptacle will not accept monophonic headphones without severe degradation of the signal and possible damage to the circuitry. Ensure that only stereophonic headphones are connected to the console headphone receptacles.

CAUTION DO NOT CONNECT MONOPHONIC HEADPHONES TO THE CONSOLE HEADPHONE RECEPTACLE.

CAUTION DO NOT CONNECT HEADPHONES OF LESS THAN 8 OHMS TO THE HEADPHONE RECEPTACLE.

3-40. Insert the headphone jack into a console headphone receptacle.

3-41. To select headphone system audio, depress either the PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE switch/indicators to illuminate the switch/indicator orange.

3-42. Operate the HEADPHONE BASS and TREBLE controls as required for the desired audio characteristics.

3-43. Operate the HEADPHONE LEVEL control as required for the desired headphone level.

3-44. CUE SYSTEM. To operate the console cue system, proceed as follows:

3-45. Operate the CUE LEVEL control as required for the desired cue speaker level.

3-46. To operate the cue system in the split cue/headphone mode, depress the CUE SPLIT switch/indicator to illuminate the switch/indicator green. Left and right channel headphone information will be routed to the headphone system left channel and cue channel information will be routed to the headphone system right channel.

WARNING

WARNING

TO MAINTAIN A SAFE OPERATING LEVEL ENVIRONMENT, ALWAYS OPERATE THE MONITOR SYSTEM BY INITIALLY ADJUSTING THE VOLUME FULLY COUNTERCLOCKWISE AND THEN INCREASE THE LEVEL GRADUALLY.

3-47. MONITOR SYSTEM. To operate the control room monitor system, proceed as follows.

3-48. To select control room monitor audio, depress either the PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE switch/indicators to illuminate the switch/indicator yellow.

3-49. Operate the MONITOR LEVEL control as required for the desired monitor level.

3-50. Monitor Dim. The monitor dim function conveniently lowers the control room monitor speaker level for cue channel audio monitoring operations. The MONITOR DIM control adjusts the control room monitor level when any input module is configured for cue channel operation (if the appropriate circuitry is enabled). To adjust the control room monitor level during cue channel audio monitoring conditions, operate the MONITOR DIM control for the appropriate operating level with any input module cue channel enabled.

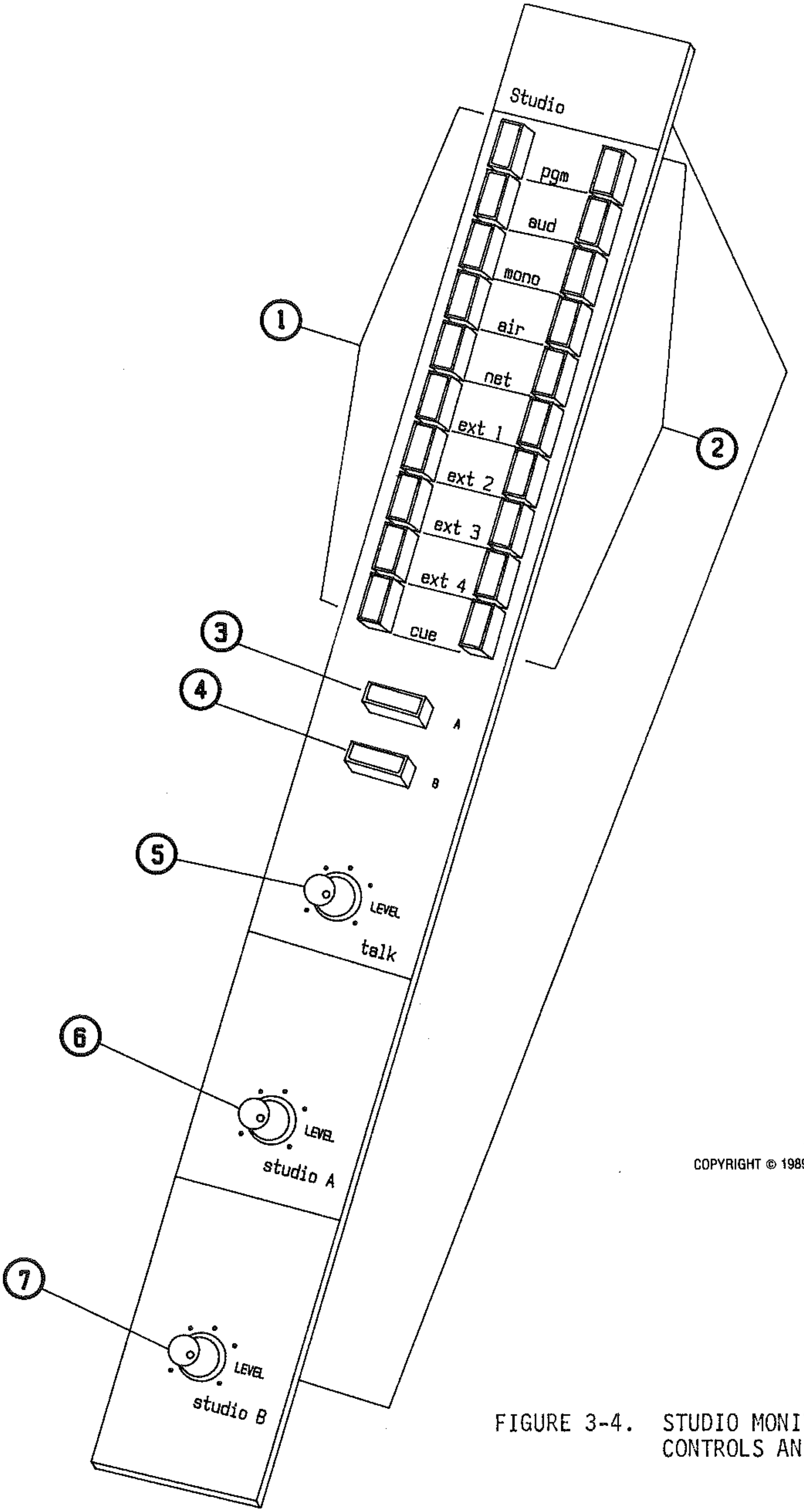

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FIGURE 3-4. STUDIO MONITOR MODULE CONTROLS AND INDICATORS

3-51. STUDIO MONITOR MODULE.

3-52. CONTROLS AND INDICATORS.

3-53. Refer to Figure 3-4 for the location of all controls and indicators associated with the studio monitor module. The function of each control or indicator is described in Table 3-4.

TABLE 3-4. STUDIO MONITOR MODULE CONTROLS AND INDICATORS (Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	Studio A Monitor Select Switch/ Indicator Assembly 1. PGM 2. AUD 3. MONO 4. AIR 5. NET 6. EXT 1 7. EXT 2 8. EXT 3 9. EXT 4 10. CUE	SWITCHES: Configures PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE audio for application to the studio A monitor speakers. INDICATORS: Illuminates yellow to indicate an associated monitor input (PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE) is selected for application to the studio A monitor speakers.
2	Studio B Monitor Select Switch/ Indicator Assembly 1. PGM 2. AUD 3. MONO 4. AIR 5. NET 6. EXT 1 7. EXT 2 8. EXT 3 9. EXT 4 10. CUE	SWITCHES: Configures PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE audio for application to the studio B monitor speakers. INDICATORS: Illuminates orange to indicate an associated monitor input (PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE) is selected for application to the studio B monitor speakers.
3	TALK A Switch	When depressed, allows the console operator to communicate with studio A via the talkback system.
4	TALK B Switch	When depressed, allows the console operator to communicate with studio B via the talkback system.
5	TALK LEVEL Control	Controls the talkback system level.

TABLE 3-4. STUDIO MONITOR MODULE CONTROLS AND INDICATORS
(Sheet 2 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
6	STUDIO A LEVEL Control	Controls the studio A monitor level.
7	STUDIO B LEVEL Control	Controls the studio B monitor level.

3-54. OPERATION.

3-55. The following text presents procedures for specific studio monitor module operating functions. Perform the appropriate procedure for the type of operation desired.

WARNING

WARNING

TO MAINTAIN A SAFE OPERATING LEVEL ENVIRONMENT, ALWAYS OPERATE THE MONITOR SYSTEM BY INITIALLY ADJUSTING THE VOLUME CONTROL FULLY COUNTERCLOCKWISE AND THEN INCREASE THE LEVEL GRADUALLY.

3-56. STUDIO A MONITOR SYSTEM. To operate the studio A monitor system, proceed as follows.

3-57. To select studio A monitor system audio, depress either the PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE switch/indicators to illuminate the switch/indicator yellow.

WARNING

WARNING

TO MAINTAIN A SAFE OPERATING LEVEL ENVIRONMENT, ALWAYS OPERATE THE MONITOR SYSTEM BY INITIALLY ADJUSTING THE VOLUME CONTROL FULLY COUNTERCLOCKWISE AND THEN INCREASE THE LEVEL GRADUALLY.

3-58. Operate the STUDIO A LEVEL control as required for the desired studio A monitor level.

3-59. STUDIO B MONITOR SYSTEM. To operate the studio B monitor system, proceed as follows.

3-60. To select studio B monitor system audio, depress either the PGM, AUD, MONO, AIR, NET, EXT 1, EXT 2, EXT 3, EXT 4, or CUE switch/indicators to illuminate the switch/indicator orange.

3-61. Operate the STUDIO B LEVEL control as required for the desired studio B monitor level.

3-62. TALKBACK SYSTEM. To operate the console talkback system, proceed as follows.

3-63. Control Room-To-Studio Intercom Operation. To operate the console talkback system for control room-to-studio communication, proceed as follows.

3-64. Depress the control room microphone input module OFF switch/indicator to illuminate the switch/indicator.

3-65. Depress the studio monitor module TALK A switch and communicate the message to the control room microphone for studio A communication. Depress the studio monitor module TALK B switch and communicate the message to the control room microphone for studio B communication. Intercom information will be routed through the console to the appropriate studio monitor speakers.

3-66. Operate the studio monitor module STUDIO A LEVEL or STUDIO B LEVEL control as required to adjust the intercom level in the associated studio. The studio intercom level may be adjusted locally by operating the associated studio remote panel MONITOR LEVEL control as required.

3-67. Studio-To-Control Room Intercom Operation. To operate the console talkback system for studio-to-control room intercom communication, proceed as follows.

3-68. The microphone input module of the studio for intercom communication must be operated to the proper configuration for studio-to-control room intercom communication. For studio A communication, operate the studio A microphone input module OFF switch/indicator to illuminate the switch/indicator and operate the A/B input switch/indicator to select the studio for intercom operation. For studio B communication, operate the studio B microphone input module OFF switch/indicator to illuminate the switch/indicator and operate the A/B input switch/indicator to select the studio for intercom operation.

3-69. In studio A, depress the studio remote panel TALK switch and communicate the message to the studio microphone for studio A-to-control room intercom operation. In studio B, depress the studio remote panel TALK switch and communicate the message to the studio microphone for studio B-to-control room intercom operation. The intercom information will be routed to the console cue speaker.

3-70. At the console, adjust the intercom level in the control room by operating the studio monitor module CUE LEVEL control as required.

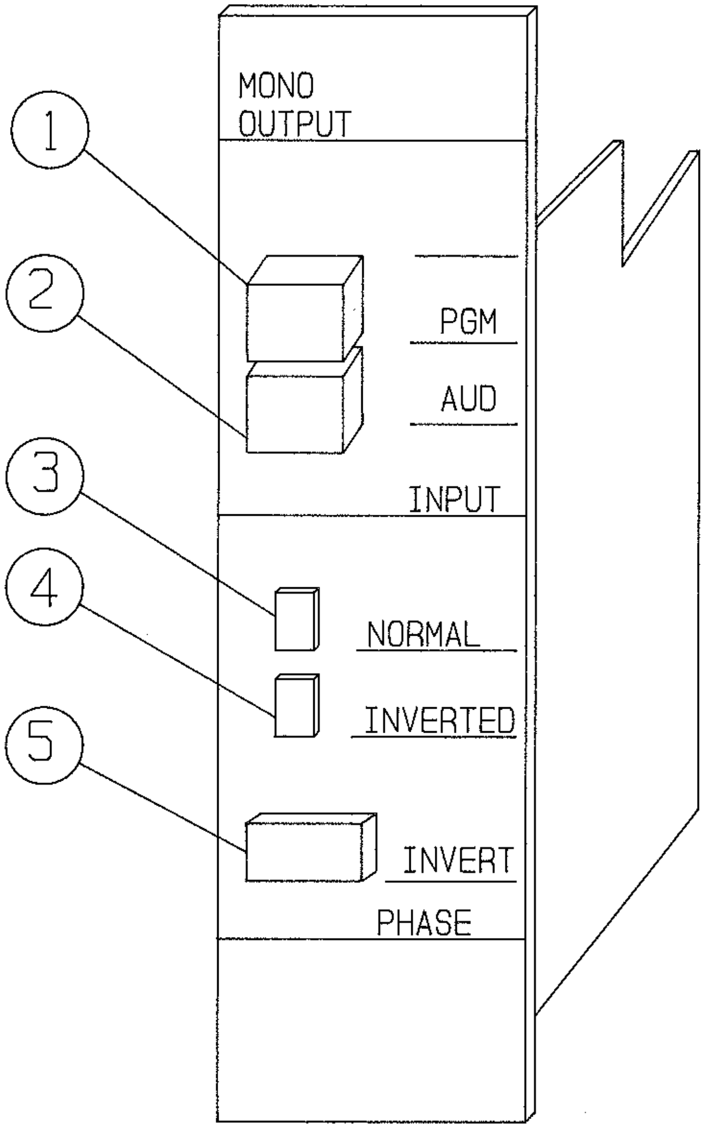

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FIGURE 3-5. MONOPHONIC OUTPUT MODULE CONTROLS AND INDICATORS

3-71. MONOPHONIC OUTPUT MODULE.

3-72. CONTROLS AND INDICATORS.

3-73. Refer to Figure 3-5 for the location of all controls and indicators associated with the monophonic output module. The function of each control or indicator is described in Table 3-5.

TABLE 3-5. MONOPHONIC OUTPUT MODULE CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	PGM Switch/ Indicator	SWITCH: Selects stereophonic program output audio for conversion to a monophonic format. INDICATOR: Illuminates blue to indicate stereophonic program output audio is selected for conversion to a monophonic format.
2	AUD Switch/ Indicator	SWITCH: Selects stereophonic audition output audio for conversion to a monophonic format. INDICATOR: Illuminates blue to indicate stereophonic audition output audio is selected for conversion to a monophonic format.
3	NORMAL Indicator	Illuminates to indicate the applied audio information is in-phase.
4	INVERTED Indicator	Illuminates to indicate the applied audio information is out-of-phase.
5	PHASE INVERT Switch/Indicator	SWITCH: For the selected input, inverts the phase of one channel. INDICATOR: For the selected input, illuminates green to indicate the phase inversion of one channel.

3-74. OPERATION.

3-75. PROGRAM/AUDITION OUTPUT SELECTION. Depress the PGM switch/ indicator to illuminate the switch/indicator blue to select program output audio for application to the monophonic module circuitry. Depress the AUD switch/indicator to illuminate the switch/indicator blue to select audition output audio for application to the monophonic module circuitry. The NORMAL indicator will illuminate to indicate in-phase stereophonic conditions. The INVERTED indicator will illuminate to indicate out-of-phase stereophonic conditions.

3-76. PHASE INVERT. Depress the PHASE INVERT switch to invert the phase of one channel for the selected audio input as required. The NORMAL indicator will illuminate to indicate an in-phase condition.

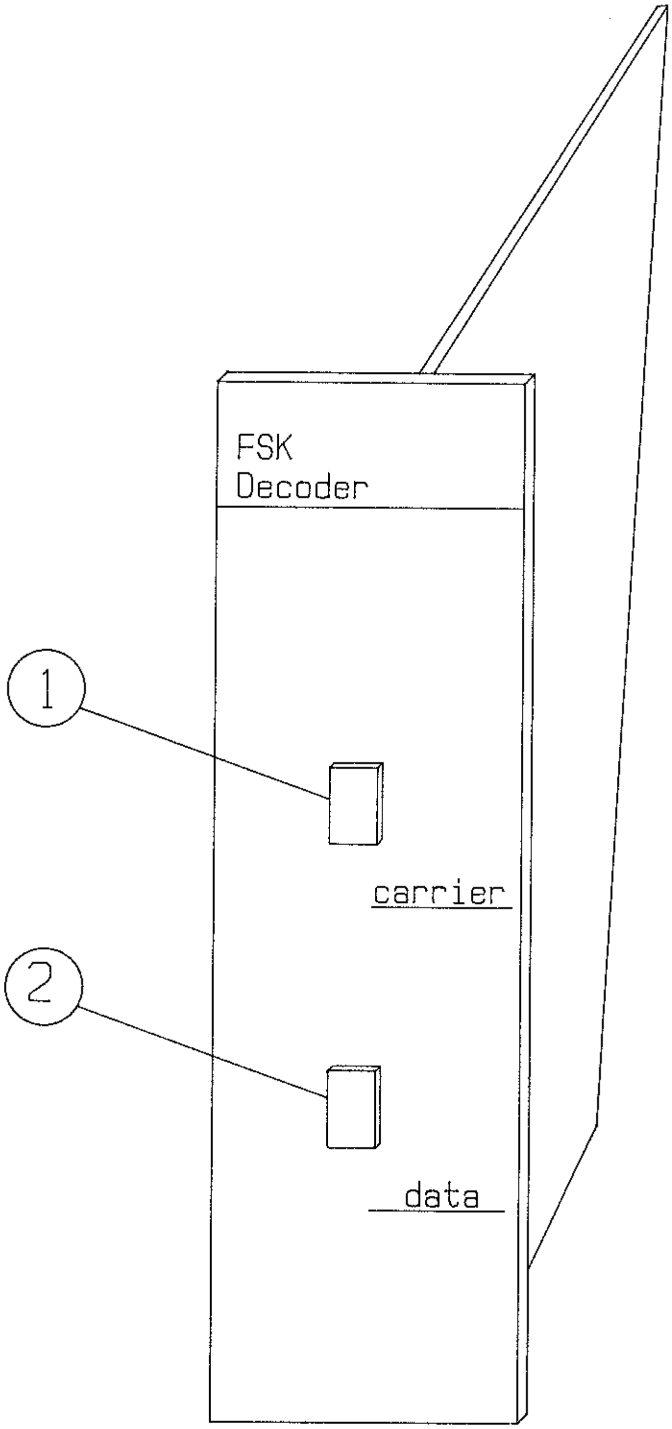

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FIGURE 3-6. FSK DECODER MODULE CONTROLS AND INDICATORS

3-77. FSK DECODER MODULE.

3-78. CONTROLS AND INDICATORS.

3-79. Refer to Figure 3-6 for the location of all controls and indicators associated with the FSK decoder module. The function of each control or indicator is described in Table 3-6.

TABLE 3-6. FSK DECODER MODULE CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	CARRIER Indicator	Illuminates to indicate the presence of the FSK carrier.
2	DATA Indicator	Illuminates to indicate data is present.

3-80. OPERATION.

3-81. During FSK decoding operations, check the CARRIER and DATA indicator status. The CARRIER and DATA indicators will illuminate to indicate proper FSK decoding operations.

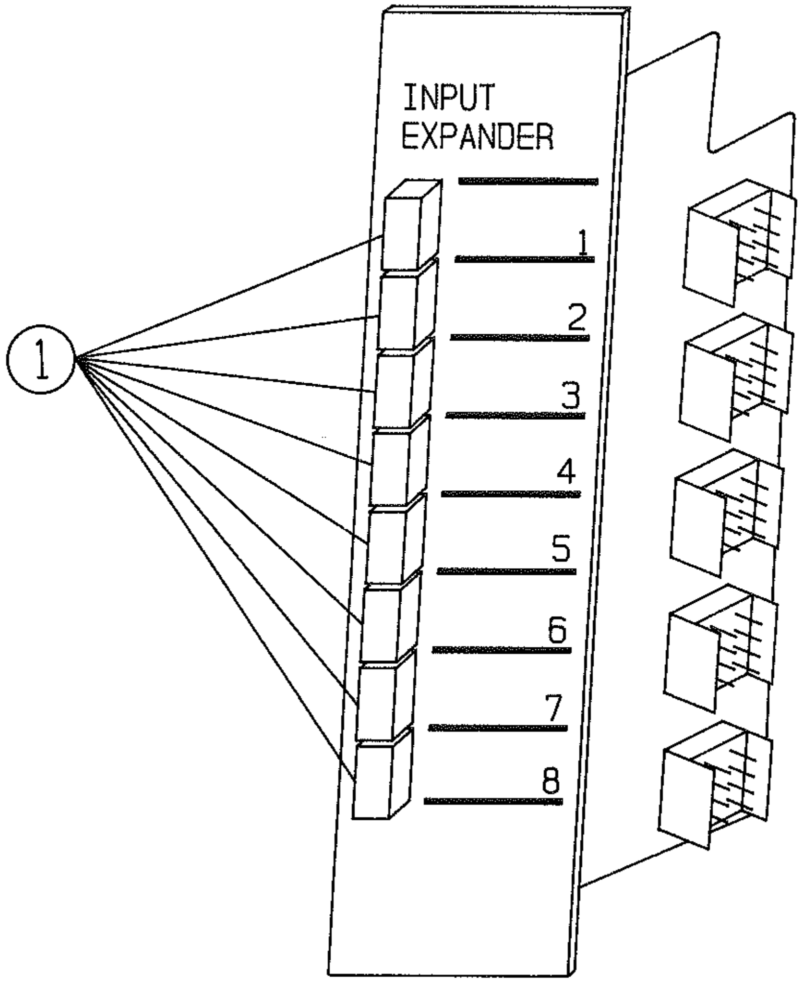

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FIGURE 3-7. INPUT EXPANDER MODULE CONTROLS AND INDICATORS

3-82. INPUT EXPANDER MODULE.

3-83. CONTROLS AND INDICATORS.

3-84. Refer to Figure 3-7 for the location of all controls and indicators associated with the input expander module. The function of each control or indicator is described in Table 3-7.

TABLE 3-7. INPUT EXPANDER MODULE CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	Input Select Switch/Indicators 1 Through 8	SWITCHES: Selects audio sources 1 through 8 for application to the input module. INDICATORS: Illuminates blue to indicate the associated audio source is selected for application to the input module.

3-85. OPERATION.

3-86. INPUT SELECTION. Select the desired input for application to the module circuitry by depressing input switch/indicators 1 through 8 as required to illuminate the switch/indicator blue.

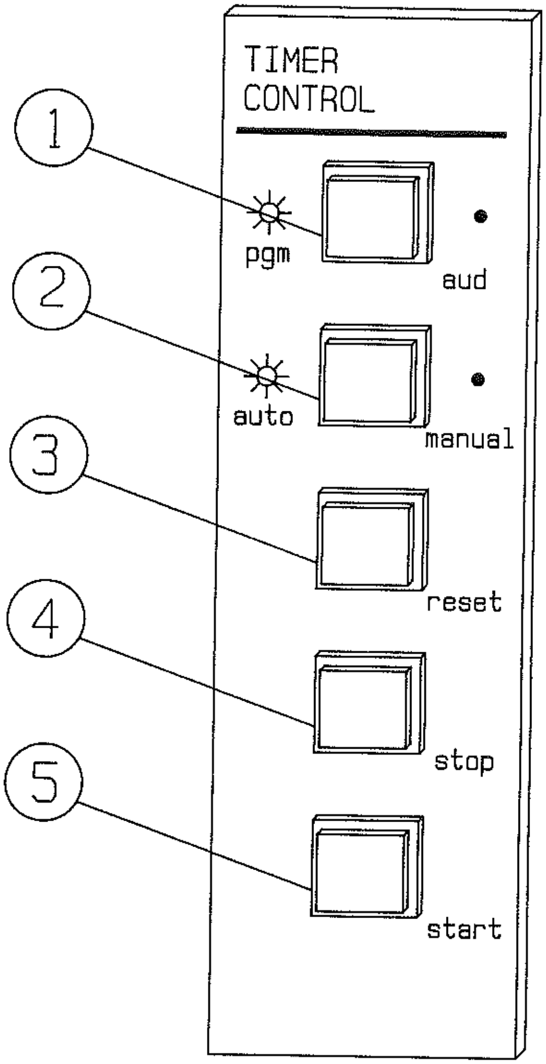

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FIGURE 3-8. TIMER CONTROL MODULE CONTROLS AND INDICATORS

3-87. TIMER CONTROL MODULE.

3-88. CONTROLS AND INDICATORS.

3-89. Refer to Figure 3-8 for the location of all controls and indicators associated with the timer control module. The function of each control or indicator is described in Table 3-8.

TABLE 3-8. TIMER CONTROL MODULE CONTROLS AND INDICATORS
(Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	PGM/AUD Switch/ Indicator	SWITCH: Selects either the program or audition output for timer control operations when the clock/timer module timer section is operating in the automatic mode. INDICATOR: Illuminates to indicate the program output is selected for timer control operations when clock/timer module timer section is operating in the automatic mode.
2	AUTO/MANUAL Switch/Indicator	SWITCH: Configures the timer section of the clock/timer module for automatic or manual mode operation. INDICATOR: Illuminates to indicate the timer section of the clock/timer module is configured for automatic mode operation.
3	RESET Switch/ Indicator	SWITCH: Resets the timer section of the clock/timer module to ØØ ØØ Ø during manual clock/timer mode operation. INDICATOR: Illuminates to indicate the manual timer control functions (stop, start, and reset) are enabled.
4	STOP Switch/ Indicator	SWITCH: Terminates operation of the clock/timer module timer section and freezes the display during manual clock/timer mode operation.

TABLE 3-8. TIMER CONTROL MODULE CONTROLS AND INDICATORS
(Sheet 2 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
		INDICATOR: Illuminates to indicate the manual timer control functions (stop, start, and reset) are enabled.
5	START Switch/ Indicator	SWITCH: Initiates operation of the clock/ timer module timer section during manual clock/timer mode operation. INDICATOR: Illuminates to indicate the manual timer control functions (stop, start, and reset) are enabled.

3-90. OPERATION.

3-91. AUTOMATIC MODE. To operate the timer control module to configure the clock/timer module timer section for automatic mode operation, proceed as follows:

3-92. Operate the AUTO/MANUAL switch/indicator to illuminate the switch/indicator.

3-93. Operate the PGM/AUD switch/indicator to illuminate the switch/indicator to assign the program output for timer control operations. Operate the PGM/AUD switch/indicator to extinguish the switch/ indicator to assign the audition output for timer control operations. Timer operation will be initiated by the program or audition output as selected.

3-94. MANUAL MODE. To operate the timer control module to configure the clock/timer module for manual mode operation, proceed as follows:

3-95. Operate the AUTO/MANUAL switch/indicator to extinguish the switch/ indicator. The RESET, STOP, and START manual mode function switch/indicators will illuminate to indicate the functions are enabled.

3-96. Operate RESET, STOP, and START manual mode function switch/ indicators to initiate timer reset, stop, and start operations as desired.

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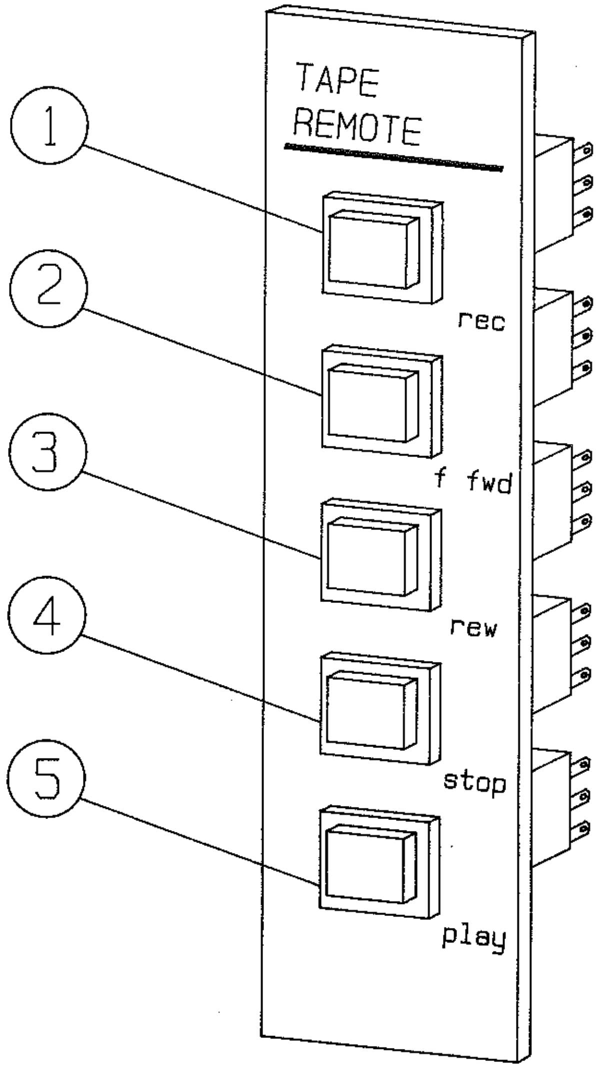

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FIGURE 3-9. TAPE SOURCE REMOTE SWITCH MODULE CONTROLS AND INDICATORS

3-97. TAPE SOURCE REMOTE SWITCH MODULE.

3-98. CONTROLS AND INDICATORS.

3-99. Refer to Figure 3-9 for the location of all controls and indicators associated with the tape source remote switch module. The function of each control or indicator is described in Table 3-9.

TABLE 3-9. TAPE SOURCE REMOTE SWITCH MODULE CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	REC Switch/ Indicator	SWITCH: Configures the tape source to the record mode. INDICATOR: Illuminates to indicate the tape source is configured to the record mode.
2	F FWD Switch/ Indicator	SWITCH: Configures the tape source to fast forward advance. INDICATOR: Illuminates to indicate the tape source is configured to fast forward advance.
3	REW Switch/ Indicator	SWITCH: Configures the tape source for rewind operations. INDICATOR: Illuminates to indicate the tape source is configured for rewind operations.
4	STOP Switch/ Indicator	SWITCH: Terminates tape source operation. INDICATOR: Illuminates to indicate the termination of tape source operation.
5	PLAY Switch/ Indicator	SWITCH: Initiates tape source operation. INDICATOR: Illuminates to indicate the tape source is enabled.

3-100. OPERATION.

3-101. The following text presents procedures for specific tape source remote switch panel operations. Perform the appropriate procedure for the type of operation desired.

3-102. STOP/PLAY CONTROL. To initiate operation of the tape source, depress the PLAY switch/indicator to illuminate the switch/indicator. To terminate operation of the tape source, depress the STOP switch/indicator to illuminate the switch/indicator.

3-103. RECORD CONTROL. To configure the tape source for record operations, depress the REC switch/indicator to illuminate the switch/indicator.

3-104. REWIND CONTROL. To configure the tape source for rewind operations, depress the REW switch/indicator to illuminate the switch/indicator.

3-105. FAST FORWARD CONTROL. To configure the tape source to fast forward advance, depress the F FWD switch/indicator to illuminate the switch/indicator.

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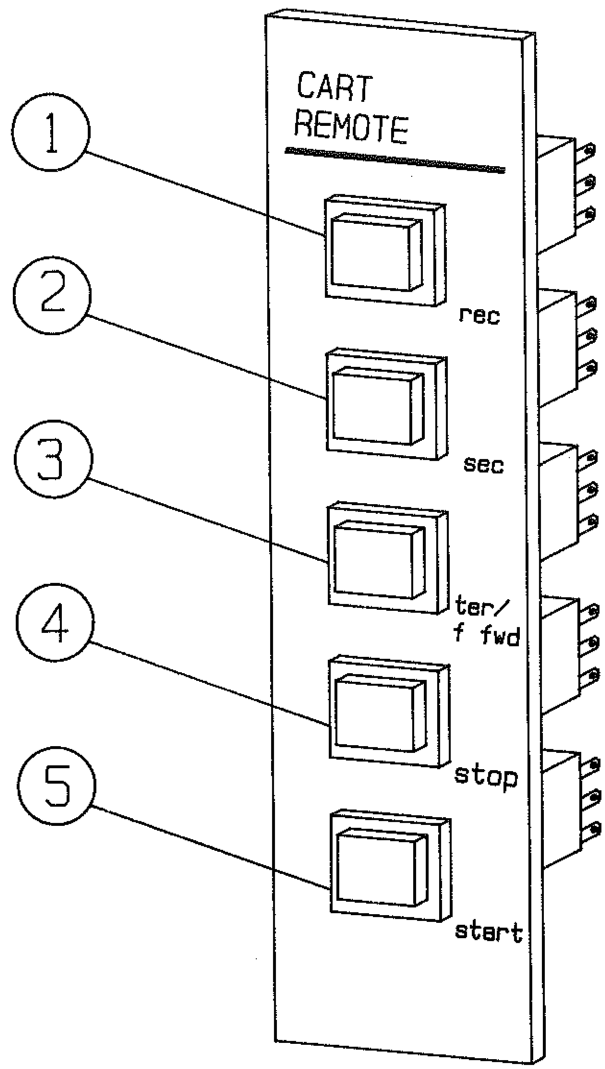

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FIGURE 3-10. CART SOURCE REMOTE SWITCH MODULE CONTROLS AND INDICATORS

3-106. CART SOURCE REMOTE SWITCH MODULE.

3-107. CONTROLS AND INDICATORS.

3-108. Refer to Figure 3-10 for the location of all controls and indicators associated with the cart source remote switch module. The function of each control or indicator is described in Table 3-10.

TABLE 3-10. CART SOURCE REMOTE SWITCH MODULE CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	REC Switch/ Indicator	SWITCH: Configures the cartridge machine to the record mode. INDICATOR: Illuminates to indicate the cartridge machine is configured to the record mode.
2	SEC Switch/ Indicator	SWITCH: Configures the cartridge machine to record a secondary cue tone. INDICATOR: Illuminates to indicate the cartridge machine is configured to record a secondary cue tone.
3	TER/F FWD Switch/Indicator	SWITCH: Configures the cartridge machine to record a tertiary cue tone or to fast forward advance. INDICATOR: Illuminates to indicate the cartridge machine is configured to record a tertiary cue tone or to fast forward advance.
4	STOP Switch/ Indicator	SWITCH: Terminates cartridge machine operation. INDICATOR: Illuminates to indicate the termination of cartridge machine operation.
5	START Switch/ Indicator	SWITCH: Initiates cartridge machine operation. INDICATOR: Illuminates to indicate the cartridge machine is enabled.

3-109. OPERATION.

3-110. The following text presents procedures for specific cart source remote switch panel operations. Perform the appropriate procedure for the type of operation desired.

3-111. STOP/START CONTROL. To initiate operation of the cartridge machine, depress the START switch/indicator to illuminate the switch/indicator. To terminate operation of the cartridge machine, depress the STOP switch/indicator to illuminate the switch/indicator.

3-112. RECORD CONTROL. To configure the cartridge machine for record operations, depress the REC switch/indicator to illuminate the switch/indicator.

3-113. SECONDARY CUE TONE RECORD CONTROL. To configure the cartridge machine to record a secondary cue tone, depress the SEC switch/indicator to illuminate the switch/indicator.

3-114. TERTIARY CUE TONE RECORD OR FAST FORWARD CONTROL. To configure the cartridge machine for tertiary cue tone record operations or to fast forward advance, depress the TER/F FWD switch/indicator to illuminate the switch/indicator.

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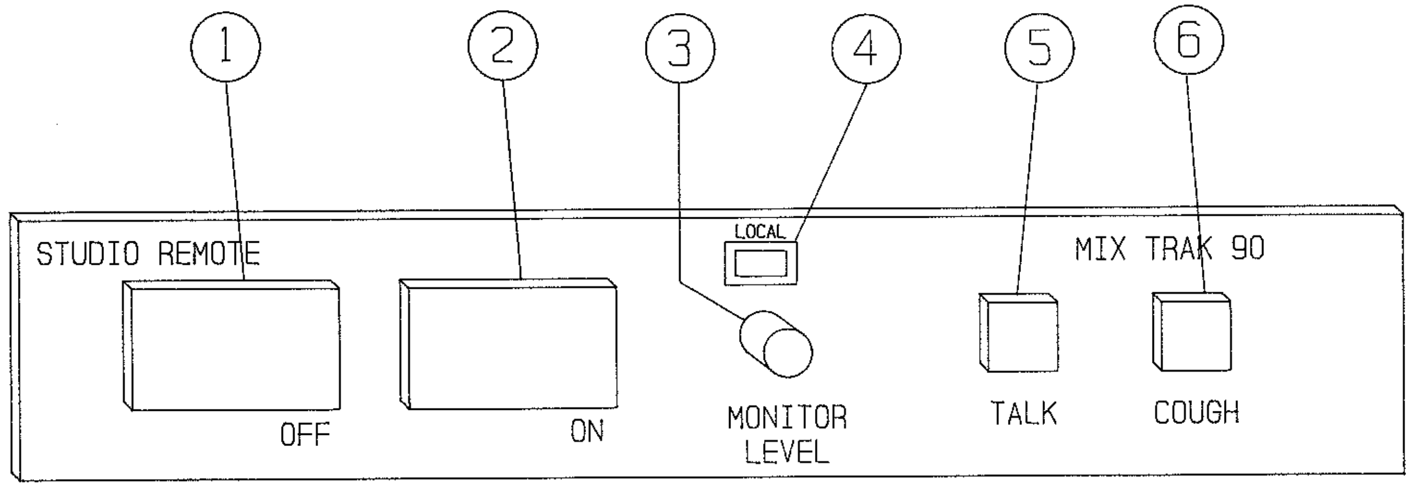

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FIGURE 3-11. STUDIO REMOTE PANEL CONTROLS AND INDICATORS

3-115. STUDIO REMOTE PANEL.

3-116. CONTROLS AND INDICATORS.

3-117. Refer to Figure 3-11 for the location of all controls and indicators associated with the monophonic output module. The function of each control or indicator is described in Table 3-11.

TABLE 3-11. STUDIO REMOTE PANEL CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	OFF Switch/ Indicator	SWITCH: Disables the microphone input module assigned to the studio. INDICATOR: Illuminates to indicate the microphone input module assigned to the studio is disabled.
2	ON Switch/ Indicator	SWITCH: Enables the microphone input module assigned to the studio. INDICATOR: Illuminates to indicate the microphone input module assigned to the studio is enabled.
3	MONITOR LEVEL On/Off Switch and Level Control	LEVEL CONTROL: Adjusts the studio monitor level. ON/OFF CONTROL: When the MONITOR LEVEL control is operated to the up position, local studio monitor speaker control is enabled. When the MONITOR LEVEL control is operated to the down position, local studio monitor speaker control is disabled.
4	LOCAL Indicator	Illuminates to indicate the studio monitor speakers are controlled locally by the MONITOR LEVEL control.
5	TALK Switch	When depressed, allows the studio to communicate to the control room via the console talkback system.
6	COUGH Switch	When depressed, attenuates the studio microphone audio 60 dB.

3-118. OPERATION.

3-119. The following text presents procedures for specific studio remote panel operating functions. Perform the appropriate procedure for the type of operation desired.

3-120. STUDIO MICROPHONE ON/OFF CONTROL. Enable the microphone input module assigned to the studio by depressing the ON switch/indicator to illuminate the switch/indicator. Disable the microphone input module assigned to the studio by depressing the OFF switch/indicator to illuminate the switch/indicator.

3-121. LOCAL STUDIO MONITOR LEVEL CONTROL. To operate the studio monitor speakers locally, operate the MONITOR LEVEL control to the up position. The LOCAL indicator will illuminate. Operate the MONITOR LEVEL control as required for the desired studio monitor level. To terminate local studio monitor level control, operate the MONITOR LEVEL control to the down position. The LOCAL indicator will extinguish.

3-122. TALKBACK OPERATION. For studio-to-control room intercom operations, depress the studio remote panel TALK switch and communicate the message to the studio microphone. The intercom information will be routed through the studio microphone input module to the console cue speaker.

3-123. COUGH CONTROL. Depress the COUGH switch to attenuate the studio microphone audio 60 dB as required during special operating conditions.

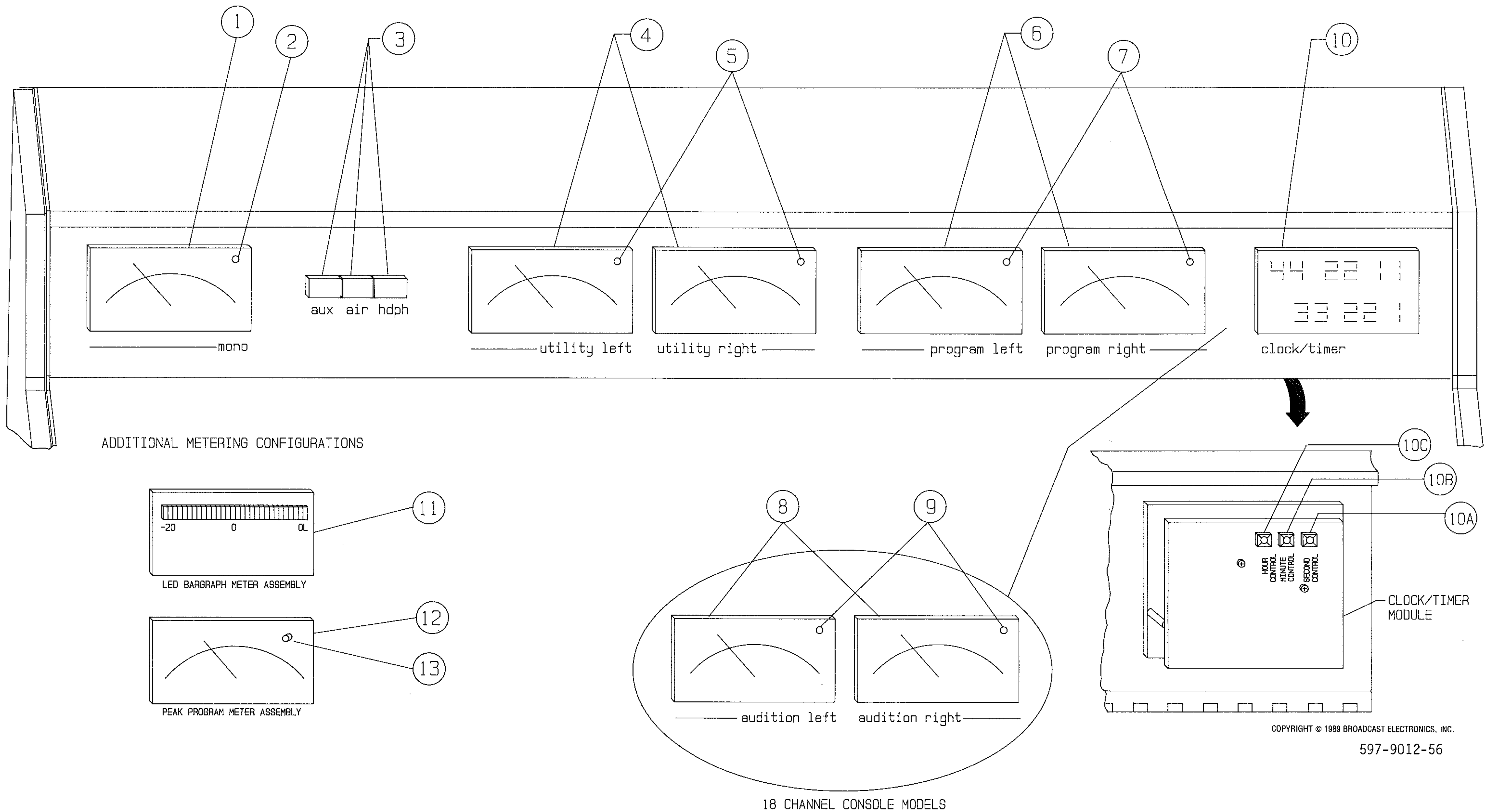

FIGURE 3-12. CONSOLE METER BRIDGE ASSEMBLY CONTROLS AND INDICATORS

3-124. CONSOLE METER BRIDGE ASSEMBLY.

3-125. CONTROLS AND INDICATORS.

3-126. Refer to Figure 3-12 for the location of all controls and indicators associated with the console meter bridge assembly. The function of each control or indicator is described in Table 3-12.

TABLE 3-12. CONSOLE METER BRIDGE ASSEMBLY CONTROLS AND INDICATORS (Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	MONO 1 Meter Assembly	Displays monophonic output 1 level parameters.
2	MONO 1 Meter Assembly Overload Indicator	Illuminates to indicate excessive monophonic 1 audio output conditions.
3	UTILITY Meter Switch/Indicator Assembly 1. AUX 2. AIR 3. HDPH	SWITCHES: 12 Channel Consoles- Configures audition/auxiliary 1 and 2, off-air, or headphone audio for application to the left and right channel utility meters. 18 Channel Consoles- Configures auxiliary 1 and 2, off-air, or headphone audio for application to the left and right channel utility meters. INDICATORS: 12 Channel Consoles- Illuminates blue to indicate an associated meter input (audition/auxiliary 1 and 2, off-air, or headphone) is routed to the left and right channel utility meters. 18 Channel Consoles- Illuminates blue to indicate an associated meter input (auxiliary 1 and 2, off-air, or headphone) is routed to the left and right channel utility meters.
4	LEFT and RIGHT Channel UTILITY Meter Assemblies	12 Channel Consoles: Displays left and right channel audition/auxiliary 1 and 2, off-air, or headphone level parameters. 18 Channel Consoles: Displays left and right channel auxiliary 1 and 2, off-air, or headphone level parameters.

TABLE 3-12. CONSOLE METER BRIDGE ASSEMBLY CONTROLS AND INDICATORS
(Sheet 2 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
5	UTILITY Meter Assembly Overload Indicator	Illuminates to indicate excessive audio conditions.
6	LEFT and RIGHT channel PROGRAM Meter Assemblies	Displays left and right channel program output level parameters.
7	PROGRAM Meter Assembly Overload Indicator	Illuminates to indicate excessive program output conditions.
8	LEFT and RIGHT Channel AUDITION Meter Assemblies (18 Channel Console)	Displays left and right channel audition output level parameters.
9	AUDITION Meter Assembly Overload Indicator (18 Channel Console)	Illuminates to indicate excessive audition audio output conditions.
10	CLOCK/TIMER Module	Displays clock information in a 12 or 24 hour time format. Displays associated program material elapsed time information in a minutes and seconds format.
10A	Seconds Control	Advances the clock/timer module second display.
10B	Minutes Control	Advances the clock/timer module minute display.
10C	Hour Control	Advances the clock/timer module hour display.
11	LED Bargraph Meter Assembly	Stereophonic 30-segment LED bargraph assembly for output metering applications.
12	Peak-Programming Meter Assembly	Peak-programming assembly for console output metering applications.
13	Peak-Programming Meter Assembly Overload Indicator	Illuminates to indicate excessive audio conditions.

3-127. OPERATION.

3-128. The following text presents procedures for specific console meter bridge operations. Perform the appropriate procedure for the type of operation desired.

3-129. MONOPHONIC OUTPUT METER. Observe the monophonic meter for monophonic output level indications. The overload indicator will illuminate to indicate excessive audio output conditions.

3-130. PROGRAM OUTPUT METER. Observe the program meters for program output level indications. The overload indicators will illuminate to indicate excessive audio output conditions.

3-131. AUDITION OUTPUT METER (18 Channel Consoles). Observe the audition meters for audition output level indications. The overload indicators will illuminate to indicate excessive audio output conditions.

3-132. UTILITY METER. Select audio for application to the LEFT and RIGHT channel UTILITY meters by depressing either the AUX, AIR, or HDPH switch/indicators to illuminate the switch/indicator blue. The selected parameter will be presented on the LEFT and RIGHT channel UTILITY meters. The overload indicators will illuminate to indicate excessive audio output conditions.

3-133. CLOCK/TIMER MODULE. The clock/timer module presents clock information on a six-digit LED display and elapsed time information on a five-digit LED display. Observe the displays as required for clock and elapsed time information.

3-134. Clock Set Operation. To set the clock/timer module clock display, proceed as follows:

3-135. Depress the hour control to advance and set the hour display.

3-136. Depress the minutes control to advance and set the minutes display.

3-137. Depress the seconds control to advance and set the seconds display.

3-138. Timer Control And Operation. The clock/timer module timer display is controlled automatically by the operation of the audition and program outputs. The display may also be controlled manually when the console is equipped with a timer control module.

3-139. The clock/timer module timer display is automatically enabled when a microphone or line input module PGM/AUD output switch indicator is depressed. Programmable jumpers on the clock/timer module assign either the program or audition output buss for timer control operations. The timer display will reset when a second line or microphone input module is enabled.

3-140. The timer display may be manually controlled by the timer control module. The module provides automatic/manual timer control selection and three manual control functions. Refer to the TIMER CONTROL MODULE information for specific operating procedures.

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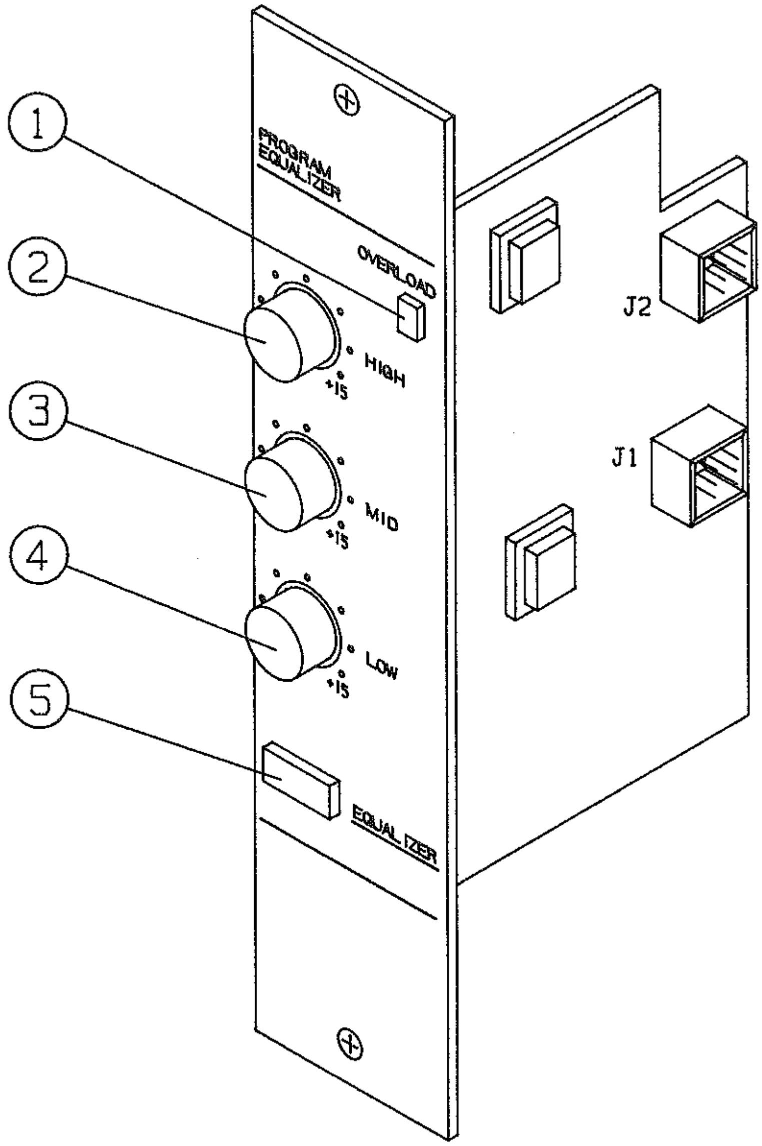

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FIGURE 3-13. PROGRAM EQUALIZER MODULE CONTROLS AND INDICATORS

3-141. PROGRAM EQUALIZER MODULE.

3-142. CONTROLS AND INDICATORS.

3-143. Refer to Figure 3-13 for the location of all controls and indicators associated with the program equalizer module. The function of each control or indicator is described in Table 3-13.

TABLE 3-13. PROGRAM EQUALIZER MODULE CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	OVERLOAD Indicator	Illuminates to indicate excessive low-band, mid-band, or high-band frequency equalization conditions.
2	HIGH Equalization Control	Provides equalization control for a high band of audio frequencies. The control frequency range is from 1 kHz to 20 kHz.
3	MID Equalization Control	Provides equalization control for a middle band of audio frequencies. The control frequency range is from 80 Hz to 12 kHz.
4	LOW Equalization Control	Provides equalization control for a low band of audio frequencies. The control frequency range is from 20 Hz to 250 Hz.
5	EQUALIZER Switch/ Indicator	SWITCH: Provides on/off control of the program equalizer module audio circuitry. INDICATOR: Illuminates to indicate the program equalizer module audio circuitry is enabled.

3-144. OPERATION.

3-145. The following text presents procedures for specific program equalizer operating functions. Perform the appropriate procedure for the type of operation desired.

3-146. MODULE ON/OFF CONTROL. Enable the module by depressing the EQUALIZER switch/indicator to illuminate the switch/indicator. Disable the module by depressing the EQUALIZER switch/indicator to extinguish the switch/indicator.

3-147. EQUALIZATION CONTROL. Operate the HIGH equalization control to boost/cut frequencies from 1 kHz to 20 kHz. Operate the MID equalization control to boost/cut frequencies from 80 Hz to 12 kHz. Operate the LOW equalization control to boost/cut frequencies from 20 Hz to 250 Hz. The overload indicator will illuminate to indicate excessive equalization conditions.

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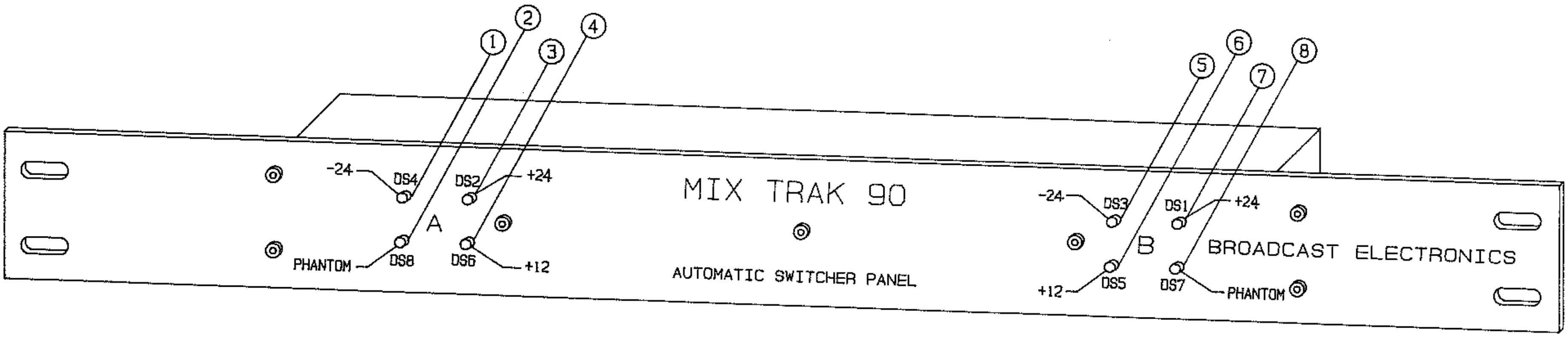

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FIGURE 3-14. AUTOMATIC POWER SUPPLY SWITCHER PANEL CONTROLS AND INDICATORS

3-148. AUTOMATIC POWER SUPPLY SWITCHER PANEL.

3-149. CONTROLS AND INDICATORS.

3-150. Refer to Figure 3-14 for the location of all controls and indicators associated with the automatic power supply switcher panel. The function of each control or indicator is described in Table 3-14.

TABLE 3-14. AUTOMATIC POWER SUPPLY SWITCHER PANEL CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	A Power Supply -24 Indicator	Illuminates to indicate the A power supply -24 volt potential is operational.
2	A Power Supply PHANTOM Indicator	Illuminates to indicate the A power supply microphone phantom supply is operational.
3	A Power Supply +24 Indicator	Illuminates to indicate the A power supply +24 volt potential is operational.
4	A Power Supply +12 Indicator	Illuminates to indicate the A power supply +12 volt potential is operational.
5	B Power Supply -24 Indicator	Illuminates to indicate the B power supply -24 volt potential is operational.
6	B Power Supply +12 Indicator	Illuminates to indicate the B power supply +12 potential is operational.
7	B Power Supply +24 Indicator	Illuminates to indicate the B power supply +24 volt potential is operational.
8	B Power Supply PHANTOM Indicator	Illuminates to indicate the B power supply microphone phantom supply is operational.

3-151. OPERATION.

3-152. The automatic power supply switcher panel indicators provide status indications of the power supply A and B dc operating potentials. Each indicator illuminates to indicate the associated power supply potential is operational. In the event of a power supply failure, the appropriate indicator will extinguish and power from the operating supply will be automatically routed to the console.

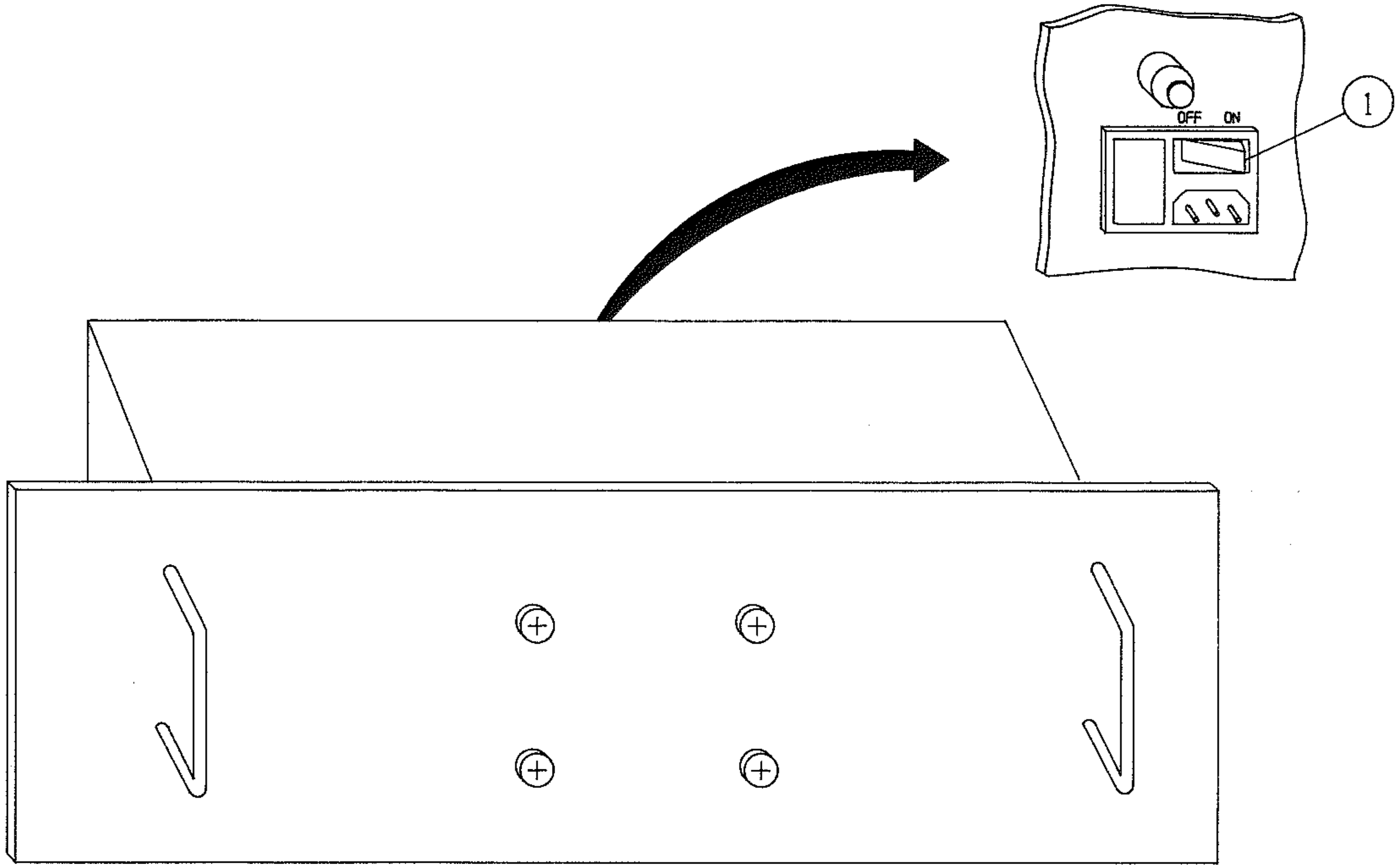

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FIGURE 3-15. POWER SUPPLY MODULE CONTROLS AND INDICATORS

3-153. POWER SUPPLY MODULE.

3-154. CONTROLS AND INDICATORS.

3-155. Refer to Figure 3-15 for the location of all controls and indicators associated with the power supply module. The function of each control or indicator is described in Table 3-15.

TABLE 3-15. POWER SUPPLY MODULE CONTROLS AND INDICATORS.

INDEX NO.	NOMENCLATURE	FUNCTION
1	AC Power Control Switch	Controls the application of ac power to the power supply module.

3-156. OPERATION.

3-157. Operate the AC power switch to on to apply ac power to the console.

THEORY OF OPERATION

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SECTION IV
THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section presents the overall theory of operation for the Broadcast Electronics Mix-Trak 90 series audio consoles.

4-3. The Mix-Trak 90 series audio console overall theory of operation is presented by modular assemblies. Figure 4-1 presents a block diagram of the Mix-Trak 90 audio console system. Refer to Figure 4-1 as required for a general description of audio console operation. The console audio, control, power supply, and talkback circuitry are discussed in further detail at the end of this section. Each Mix-Trak 90 modular component is discussed in detail by the modular sections in Part II of this manual.

4-4. GENERAL DESCRIPTION.

4-5. LINE INPUT MODULE.

4-6. Mix-Trak 90 line input modules select and process line level audio for application to the console output and mixing bus network. Input selection is accomplished by an interlocked two-position select switch/indicator. Audio amplification is performed by a programmable differential input amplifier. The amplifier is designed to provide the appropriate gain for a wide range of input audio levels.

4-7. Precision control of the audio source level is provided by a voltage-controlled-amplifier (VCA) network. The network consists of a slide-action attenuator assembly which controls a precision VCA stage. Balanced stereophonic patch point transmitting and receiving stages allow the connection of external audio processing equipment to the module. Output signal routing is accomplished by a two-position select switch/indicator.

4-8. Remote and local control of module operations is accomplished by a CMOS logic circuit. A cue circuit is provided to allow the auditioning of audio source material. DC operating potentials for the module circuitry are generated by a built-in regulator network.

4-9. MICROPHONE INPUT MODULE.

4-10. Microphone input modules select and process microphone level audio for application to the console output and mixing bus network. Input selection is accomplished by an interlocked two-position select switch/indicator. The module is equipped with an ultra low-noise differential input amplifier stage. The amplifier is designed to provide the appropriate gain for a wide range of input audio levels.

4-11. Precision control of the microphone audio source level is provided by a voltage-controlled-amplifier (VCA) network. The network consists of a slide-action attenuator assembly which controls a precision VCA stage. Balanced patch point transmitting and receiving stages allow the connection of external audio processing equipment to the module. Output signal routing is accomplished by a two-position select switch/indicator.

4-12. The microphone input module is equipped with a cue circuit. The cue circuit is designed for intercom operation. Remote and local control of module operations is accomplished by a CMOS logic circuit. The logic circuit consists of on/off control, cue control, and indicator driver networks. A built-in regulator network generates dc operating potentials for module circuitry.

4-13. INPUT EXPANDER MODULE.

4-14. Any microphone or line input module source selection capabilities may be increased by the installation of an input expander module. The module consists of a switch/indicator network which controls up to eight additional input sources. Individual muting of the input expander sources is not supported.

4-15. TAPE REMOTE SWITCH MODULE.

4-16. Remote control of tape audio source functions such as record, rewind, stop, play, and fast forward may be executed by the tape remote switch module. The module consists of five switch/indicators which illuminate to indicate the selected function.

4-17. CART REMOTE SWITCH MODULE.

4-18. Cart source remote functions such as record, secondary, tertiary/fast forward, stop, and start may be initiated by the cart source remote switch module. The module consists of five switch/indicators which illuminate to indicate the selected function.

4-19. INPUT/OUTPUT MOTHERBOARD ASSEMBLIES.

4-20. Console input, output, and internal circuit communication is provided by input and output motherboard assemblies. The input/output motherboards route information to and from the console modular assemblies through audio, power supply, and control bus networks. The audio bus is current-operated to provide maximum noise performance.

4-21. REMOTE CONTROL MODULE.

4-22. The remote control module allows control of a line or microphone input module from a remote location. The module is designed for maximum interfacing flexibility by allowing the connection of either positive or negative logic control circuitry. All remote control inputs and indications are processed through optical coupler networks to provide interfacing flexibility and a high degree of isolation. A CMOS logic circuit encodes remote on/off/cue control commands for application to the module and decodes module indications for application to remote indicators.

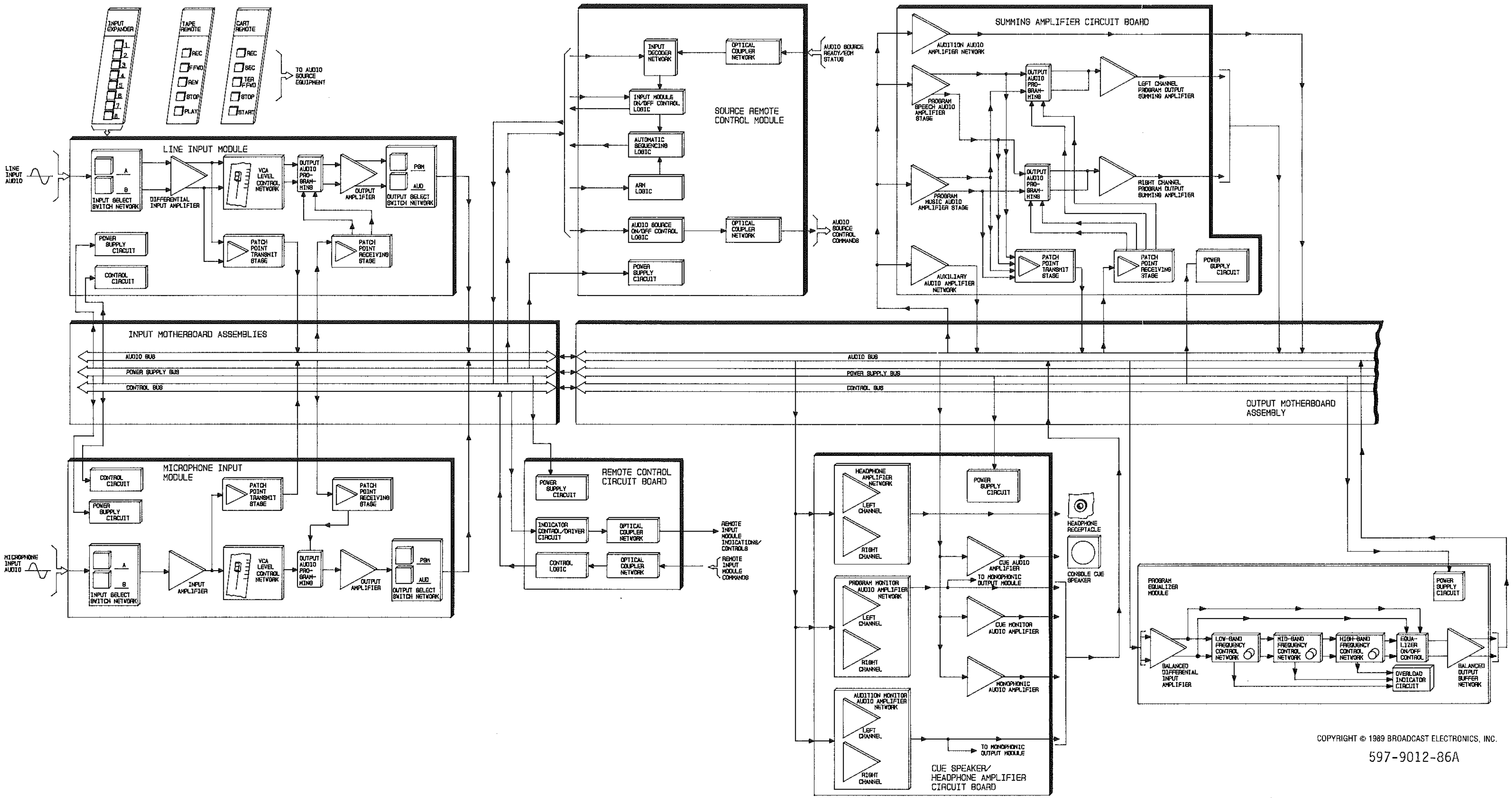

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FIGURE 4-1.
MIX-TRAK 90 SERIES CONSOLE BLOCK DIAGRAM
(Sheet 1 of 3)

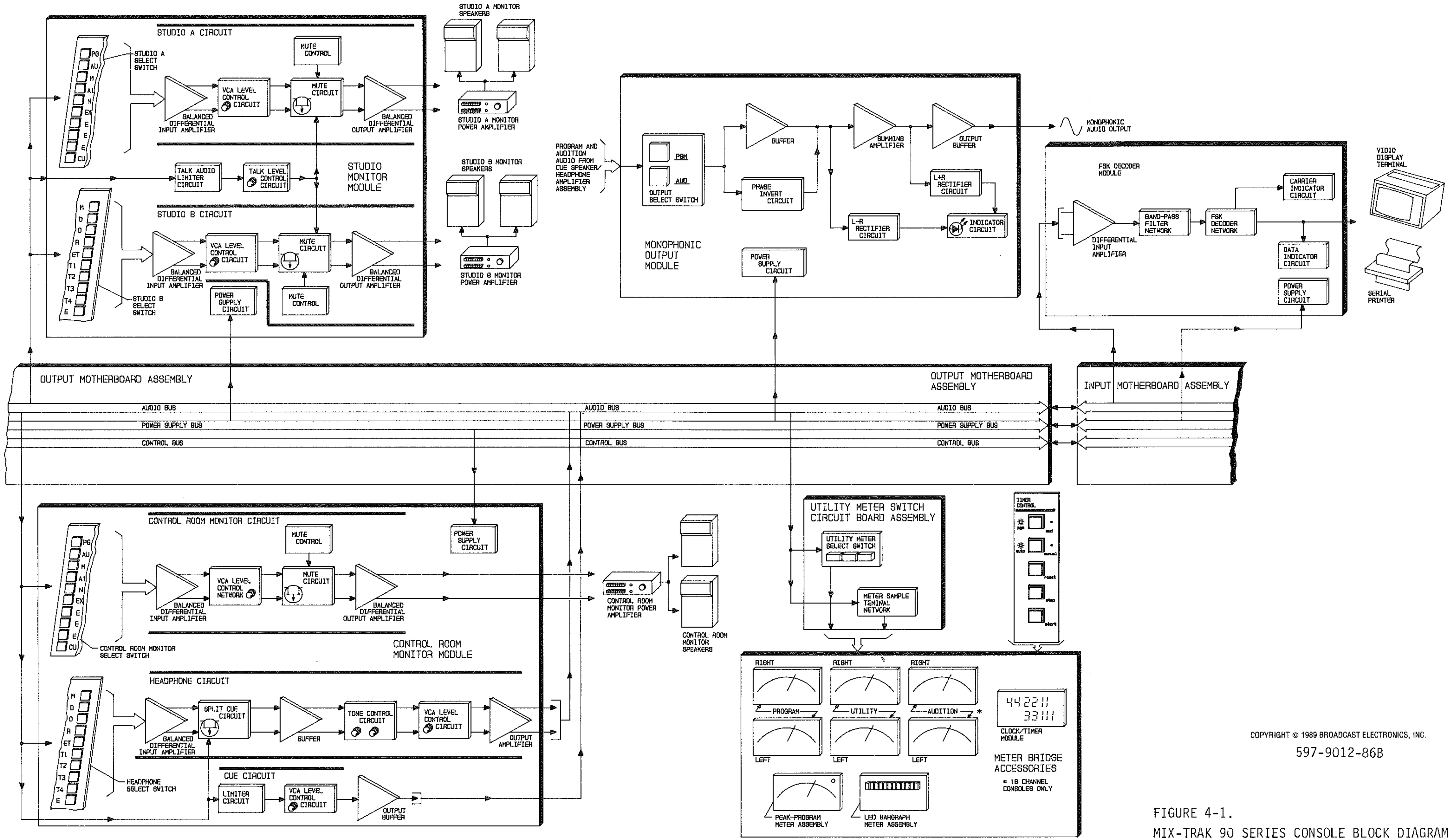

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FIGURE 4-1.
MIX-TRAK 90 SERIES CONSOLE BLOCK DIAGRAM
(Sheet 2 of 3)

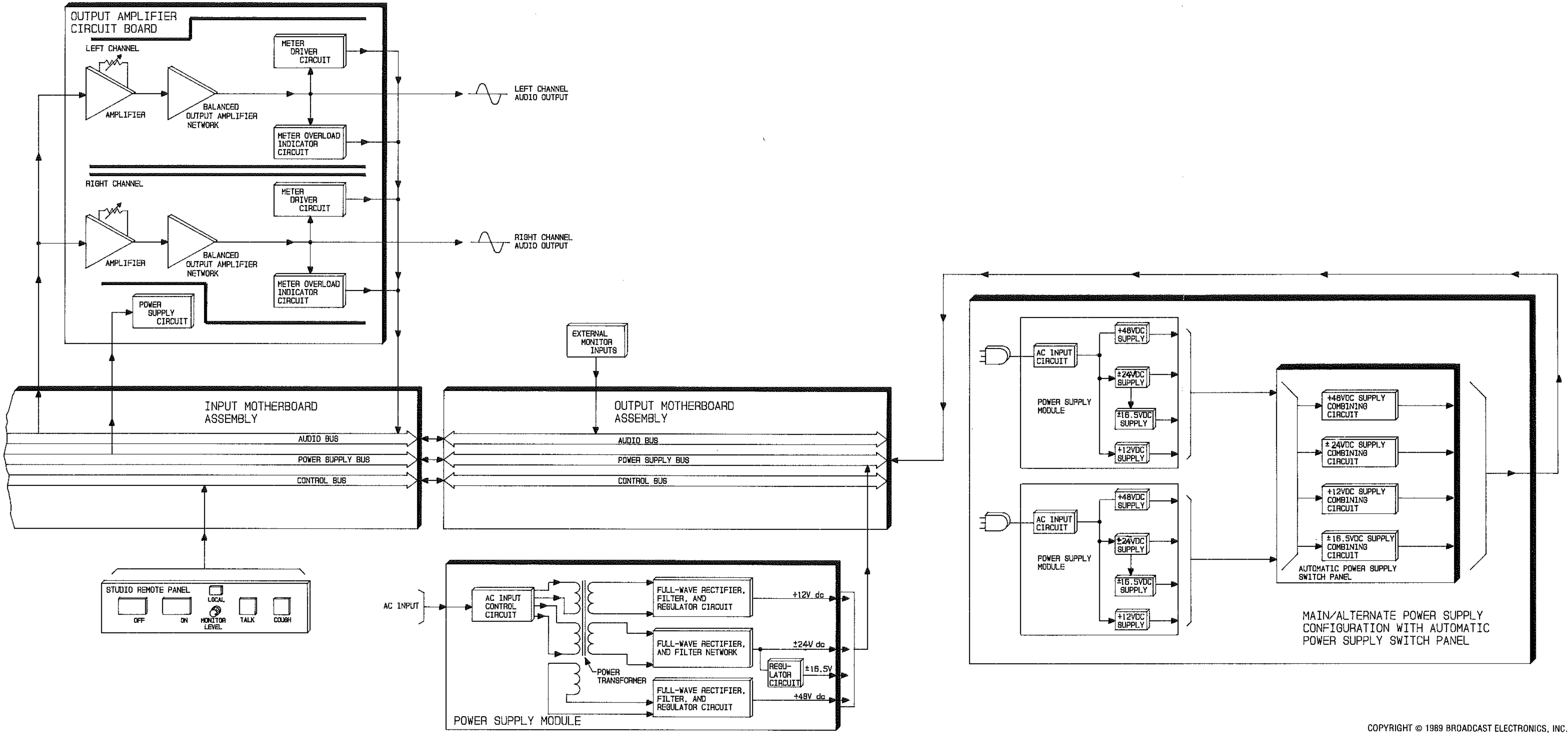

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FIGURE 4-1.
MIX-TRAK 90 SERIES CONSOLE BLOCK DIAGRAM
(Sheet 3 of 3)

4-23. SOURCE REMOTE CONTROL MODULE.

4-24. The source remote control module is designed for the control of line input module audio source equipment. The source remote control module consists of line input module on/off control logic, audio source control logic, arm control logic, and automatic sequencing logic. All audio source remote inputs and control commands are processed through optical coupler networks to provide interfacing flexibility and a high degree of isolation. The source remote control module circuitry is designed to generate remote module and audio source on/off control commands for automatic audio source sequencing.

4-25. SUMMING AMPLIFIER CIRCUIT BOARD.

4-26. Console audio output summing operations are performed by the summing amplifier circuit board assembly. Console program music and program speech busses are routed to the module for mixing and amplification to produce program output audio. Separate amplifier stages are provided for the audition, auxiliary 1, auxiliary 2, and auxiliary 3 output audio busses. Balanced stereophonic patch point transmitting and receiving stages provide interfacing for the connection of external audio processing equipment to the program music and program speech busses. A built-in regulator network generates dc operating potentials for circuit components.

4-27. CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD.

4-28. Program, audition, and cue audio for application to the cue speaker, headphone, or monitor circuitry is amplified at the cue speaker/headphone amplifier circuit board assembly. The assembly contains individual amplifier stages for: 1) headphone audio, 2) cue audio, 3) program audio, 4) audition audio, and 5) monophonic audio. The program, audition, and monophonic audio is routed for application to the monitor circuitry.

4-29. PROGRAM EQUALIZER MODULE.

4-30. Console audio processing operations are performed by the program equalizer module. The module is designed to provide audio processing for microphone input, line input, or program buss audio. The module consists of three individual tone control networks. A low-band frequency circuit boosts/cuts frequencies from 20 Hz to 250 Hz. A mid-band frequency circuit boosts/cuts frequencies from 80 Hz to 12 kHz. A high-band frequency circuit boosts/cuts frequencies from 1 kHz to 20 kHz. Operating potentials for the module are generated by a built-in regulator circuit.

4-31. CONTROL ROOM MONITOR MODULE.

4-32. All control room monitoring operations are performed by the control room monitor module. The module consists of three individual circuits which process audio for application to the control room monitor speakers, the headphone receptacle, and the console cue speaker.

4-33. CONTROL ROOM MONITOR CIRCUIT. A ten-position switch/indicator assembly selects either program, audition, monophonic, air, network, external 1, external 2, external 3, external 4, or cue audio for control room monitoring operations. The selected audio is amplified by a balanced differential input amplifier network. Precision control of the monitor audio level is provided by a voltage-controlled-amplifier (VCA) network. The network consists of a front panel mounted potentiometer assembly which controls a precision VCA stage. Control room monitor speaker muting operations are performed by a series-shunt field-effect-transistor (FET) muting circuit. The control room monitor circuit output stage consists of a second balanced differential amplifier which processes the monitor audio for application to an external control room monitor power amplifier.

4-34. HEADPHONE CIRCUIT. A second ten-position switch/indicator assembly selects either program, audition, monophonic, air, network, external 1, external 2, external 3, external 4, or cue audio for headphone monitoring operations. The headphone circuit input amplifier stage consists of a balanced differential amplifier circuit. Simultaneous monitoring of cue and headphone information is provided by a split cue circuit. The split cue circuit is designed to route headphone audio to the headphone left channel and cue audio to the headphone right channel for simultaneous cue/headphone monitoring operations.

4-35. Audio from the split cue circuit is routed through a buffer to the headphone tone control circuit. The tone control circuit consists of a bass and treble control network which allows the operator to adjust the headphone audio for the desired characteristics. Precision control of the headphone audio level is provided by a voltage-controlled-amplifier (VCA) network. The network consists of a potentiometer assembly which controls a precision VCA stage. Audio from the VCA network is applied to a balanced output driver circuit for application to the console headphone receptacle.

4-36. CUE CIRCUIT. The control room monitor cue circuit is designed to process audio for application to the console cue speaker. Cue audio from the console cue bus is applied to a limiter circuit. The limiter is design to provide protection from over-voltage input conditions. Precision control of the cue audio level is provided by a voltage-controlled-amplifier (VCA) network. The network consists of a potentiometer assembly which controls a precision VCA stage. Audio from the VCA circuit is applied through a buffer for application to the console cue speaker.

4-37. STUDIO MONITOR MODULE.

4-38. The studio monitor module consists of two identical audio circuits which control studio A and studio B monitor audio. The module circuitry also processes and routes intercom audio for application to the studio facilities.

4-39. A ten-position switch/indicator assembly selects either program, audition, monophonic, air, network, external 1, external 2, external 3, external 4, or cue audio for studio A monitoring operations. The selected monitor audio is applied to a balanced differential input amplifier stage. Precision control of the studio A audio level is provided by a voltage-controlled-amplifier (VCA) network. The network consists of a front-panel mounted potentiometer assembly which controls a precision VCA stage. Studio A monitor speaker muting operations are performed by a series-shunt field-effect-transistor (FET) muting circuit. The studio A monitor circuit output stage consists of a second balanced differential driver network which processes the monitor audio for application to an external studio A monitor power amplifier. The operation of the studio B circuitry is identical.

4-40. Intercom audio for application to the studio facilities is controlled by the operation of the studio monitor module talk audio circuit. Intercom audio from the control room microphone module is applied to a limiter circuit which provides protection from over-voltage input conditions. Control of the intercom audio level is provided by a talk level control circuit. Audio from the level control circuit is routed for application to the studio A and B monitor muting and output driver networks.

4-41. MONOPHONIC OUTPUT MODULE.

4-42. Monophonic program or audition output information is generated by the circuitry on the monophonic output module. A two-position switch/indicator selects either stereophonic program or audition audio for conversion to a monophonic format. The input signal phase is monitored by L-R and L+R rectifier circuits. The rectifier circuits process samples for application to a normal/inverted phase indicator circuit. A phase invert circuit consisting of a phase select switch and a operational amplifier allows the operator to conveniently reverse stereo phase relationships as required. Additional circuitry includes a conventional inverting summing amplifier stage and an output buffer stage.

4-43. METER BRIDGE ASSEMBLY.

4-44. UTILITY METER SWITCH CIRCUIT BOARD. The utility meter switch circuit board assembly consists of a three-position utility meter select switch and a meter sample terminal network. The meter switch/indicator selects the following audio signals for application to the utility meter assemblies.

12 CHANNEL CONSOLES	18 CHANNEL CONSOLES
1. audition/auxiliary 1 and 2	1. auxiliary 1 and 2
2. air	2. air
3. headphone	3. headphone

4-45. Meter sample distribution is accomplished by the meter sample terminal network. Samples of program output, audition output, auxiliary outputs, monophonic output, and clock/timer module information are routed to the terminal network for convenient application to the Mix-Trak 90 meter assemblies.

4-46. METER ASSEMBLIES. The Mix-Trak 90 series audio consoles are equipped with analog VU meter assemblies for the monitoring of program, utility, and audition (18 channel consoles only) audio output level parameters. Each VU meter assembly is configured with an overload indicator which illuminates to indicate excessive audio output conditions. Monitoring of audio output level parameters may also be performed by peak-program meter assemblies or LED bargraph meter assemblies.

4-47. CLOCK/TIMER MODULE. Console clock and timer functions are performed by the circuitry on the clock/timer module. The clock/timer module contains a crystal controlled Motorola 68701 microprocessor. The microprocessor is programmed to operate as: 1) a precision clock and 2) an elapsed timer.

4-48. The clock section of the clock/timer module contains a six-digit LED display. Clock information may be displayed in a 12 or 24 time format. A battery back-up circuit is provided to maintain clock operation during power failures. The clock is also equipped with an interfacing circuit and control programming for automatic synchronization. When the clock is connected to network audio, the clock will be automatically synchronized to network time to eliminate drift.

4-49. The timer section of the clock/timer module is equipped with a five-digit LED display. The control programming allows the timer section to be automatically controlled by the operation of the console program and audition busses or manually controlled by the timer control module.

4-50. TIMER CONTROL MODULE.

4-51. The timer control module is designed to provide manual timer control operations. The module consists of five switch/indicators which output logic commands to the clock/timer module for timer control operations such as program/audition assignment, auto/man control, reset, stop, and start.

4-52. FSK DECODER MODULE.

4-53. All audio source FSK information is decoded by the FSK decoder module. The module consists of an input amplifier, a band-pass filter, and an FSK decoder network. Operating status information is provided by carrier and data indicators. The output of the module is routed for application to a video display terminal or a serial printer.

4-54. OUTPUT AMPLIFIER CIRCUIT BOARD.

4-55. The output amplifier circuit board consists of identical left and right channel amplifier networks which increase the internal buss signal to an output level from Ø dBu to +8 dBu. The networks consist of audio amplifier stages and meter driver circuitry.

4-56. Audio from the internal signal bus is applied to an adjustable inverting amplifier stage. The stage is designed to provide an adjustable output level from Ø dBu to +8 dBu. Audio from the amplifier network is applied to a balanced short-circuit protected output driver network. The network is designed to output a normal signal level into a balanced or unbalanced load. Samples from the output driver network are processed by meter driver and meter overload indicator circuits for application to the meter assemblies.

4-57. STUDIO REMOTE PANEL.

4-58. The studio remote panel consists of four control switch/indicators and a potentiometer for the remote control of studio functions. On/Off switch/indicators provide logic commands for the remote control of the studio microphone input module. A talk switch/indicator is designed for control of studio-to-control room intercom operation. A monitor level control outputs a varying dc voltage for local control of the studio monitor level. A cough switch outputs a logic command to attenuate the studio signal approximately 60 dB for special operating conditions.

4-59. POWER SUPPLY MODULE.

4-60. The Mix-Trak 90 console power supply module is a self contained unit designed to generate dc operating potentials for application to the console mainframe. The ac input control circuit consists of a modular ac input receptacle, fuse holder, and ac power switch. AC power transformation is provided by a power transformer assembly. DC power transformation is provided by three full-wave rectifier and filter networks. One network generates a regulated +48 volt dc phantom microphone operating supply. A second network generates unregulated ±24 volt dc audio supplies and regulated ±16.5 volt dc supplies. The ±24 volt dc supplies provide operating potentials for the console audio circuitry. The ±16.5 volt dc supplies provide operating potentials for the cue speaker/headphone amplifier circuit board. A third network generates a regulated +12 volt dc supply for application to the console logic circuitry.

4-61. AUTOMATIC POWER SUPPLY SWITCH PANEL.

4-62. The Mix-Trak 90 series consoles may be equipped with a main/alternate power supply configuration which consists of two power supply modules and an automatic power supply switch panel. The automatic power supply switch panel contains six individual diode combining circuits and eight front-panel indicators. In the event of a power supply module failure, the combining circuits will automatically transfer dc potentials from the remaining operational power supply to the console without interruption.

4-63. FUNCTIONAL DESCRIPTION.

4-64. OVERALL CONSOLE AUDIO SYSTEM.

4-65. The Mix-Trak 90 series consoles internally process and route audio signals through numerous modules and assemblies. Figure 4-2 presents Mix-Trak 90 series console overall audio information. Refer to Figure 4-2 as required for overall console audio routing and processing information.

4-66. OVERALL CONSOLE CONTROL SYSTEM.

4-67. The Mix-Trak 90 series console control system is designed for high-reliability and flexible control circuit interfacing. The console modules utilize CMOS logic integrated circuits for control operations. Remote control modules are equipped with optical coupler networks to allow the use of either positive or negative logic for maximum control circuit interfacing flexibility. Figure 4-3 presents the Mix-Trak 90 series console overall control information. Refer to Figure 4-3 as required for overall console control routing and processing information.

4-68. OVERALL CONSOLE POWER SUPPLY SYSTEM.

4-69. DC operating potentials for the Mix-Trak 90 console are generated by the power supply circuit. The power supply circuit may consist of a single power supply module or a main/alternate power supply configuration which includes two power supply modules and the automatic power supply switch panel. DC potentials from the power supply module or main/alternate system are applied to the motherboard assemblies for distribution to built-in regulator networks on each console modular assembly. Figure 4-4 presents information on the Mix-Trak 90 series console overall power supply system. Refer to Figure 4-4 as required for overall console power supply system information.

4-70. TALKBACK SYSTEM.

4-71. The Mix-Trak 90 talkback system provides intercom communication between the control room and associated studio facilities. Control room-to-studio communication is performed by the control room microphone, the control room microphone input module, the control room monitor module, and the studio monitor speakers. Studio-to-control room communication is performed by the studio microphone, the studio microphone input module, the studio remote panel, the control room monitor module, and the console cue speaker. Figure 4-5 presents the talkback system circuitry. Refer to Figure 4-5 as required for talkback system information.

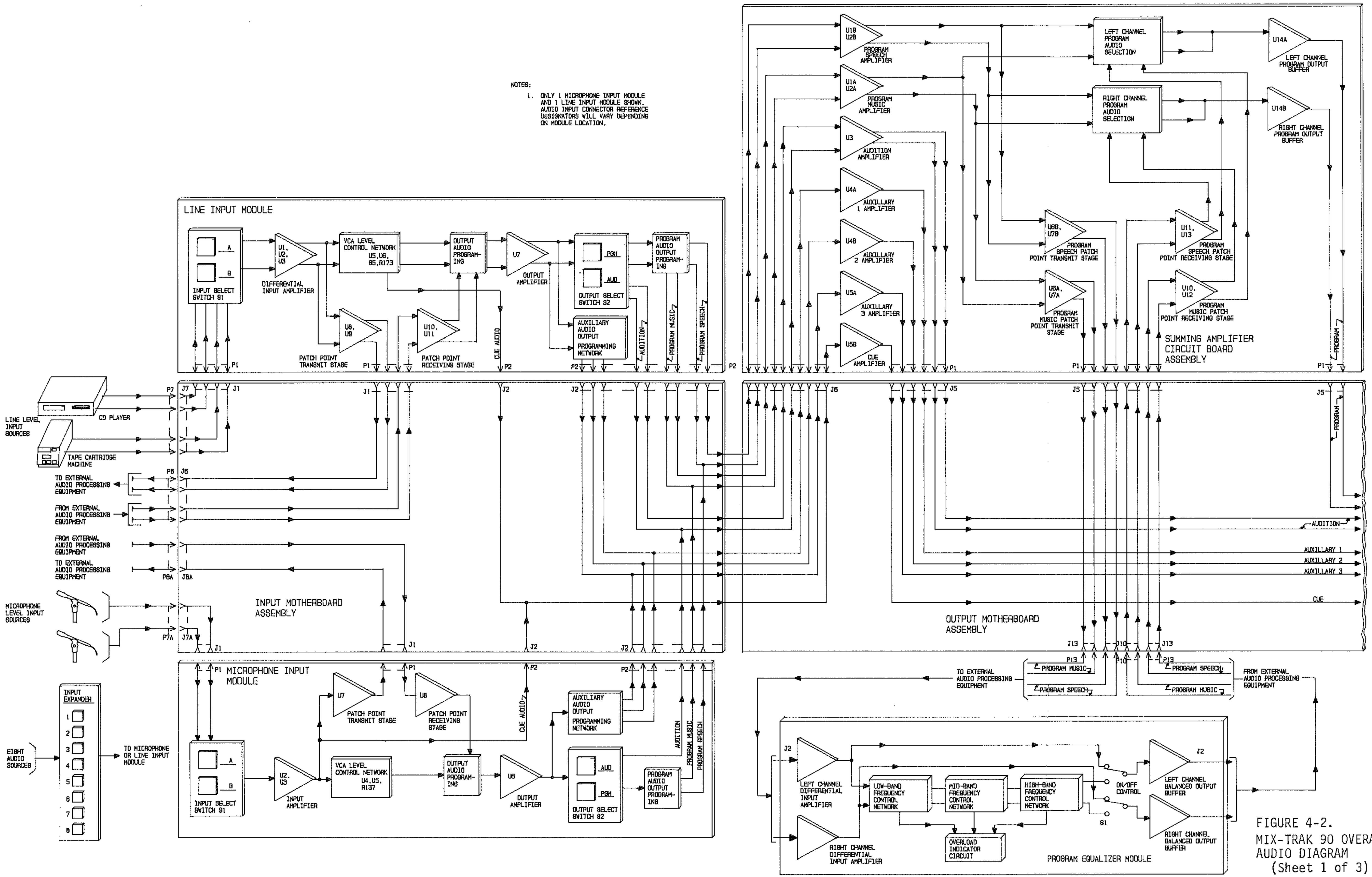

FIGURE 4-2. MIX-TRAK 90 OVERALL AUDIO DIAGRAM (Sheet 1 of 3)

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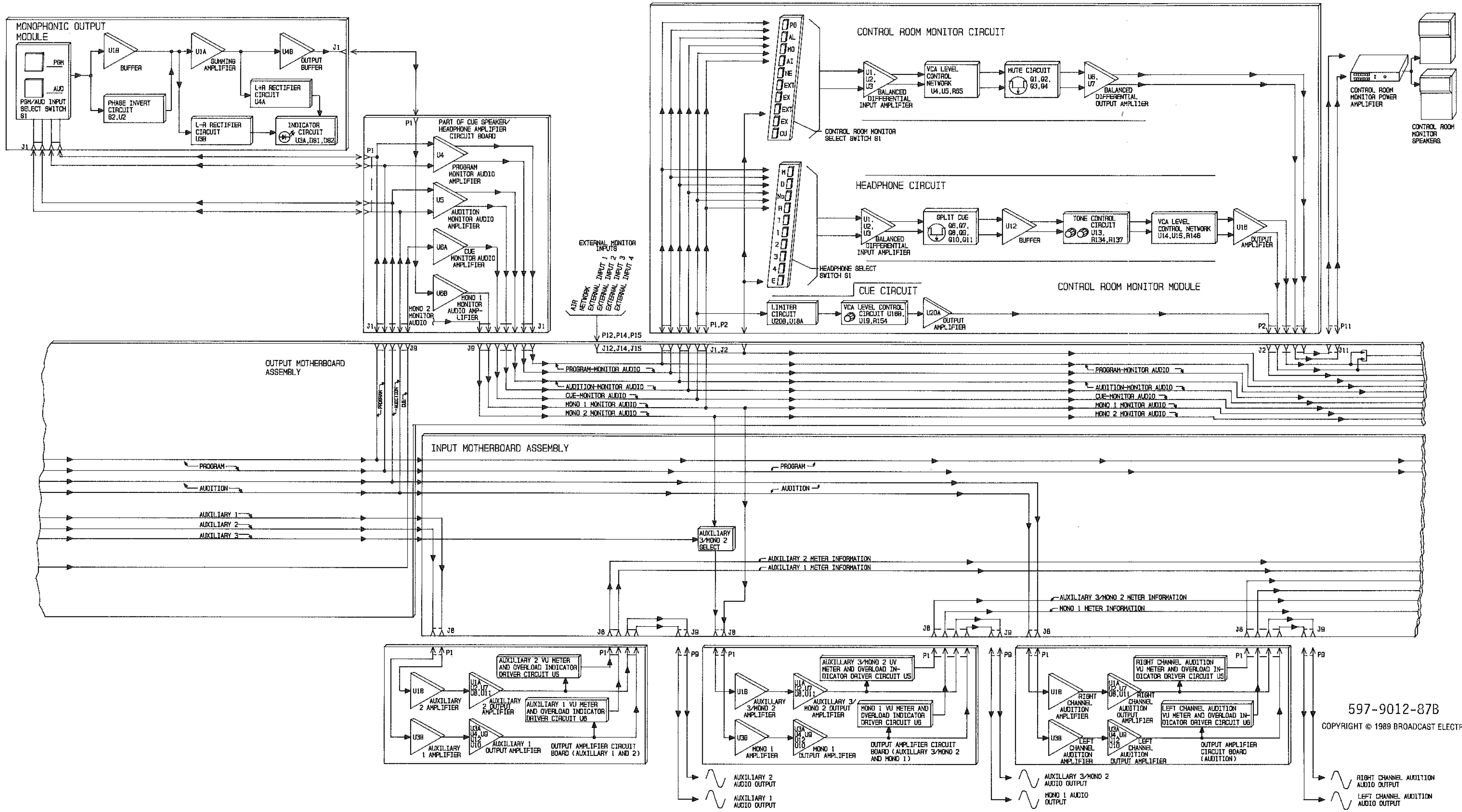

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FIGURE 4-2.
MIX-TRAK 90 OVERALL AUDIO DIAGRAM
(Sheet 2 of 3)

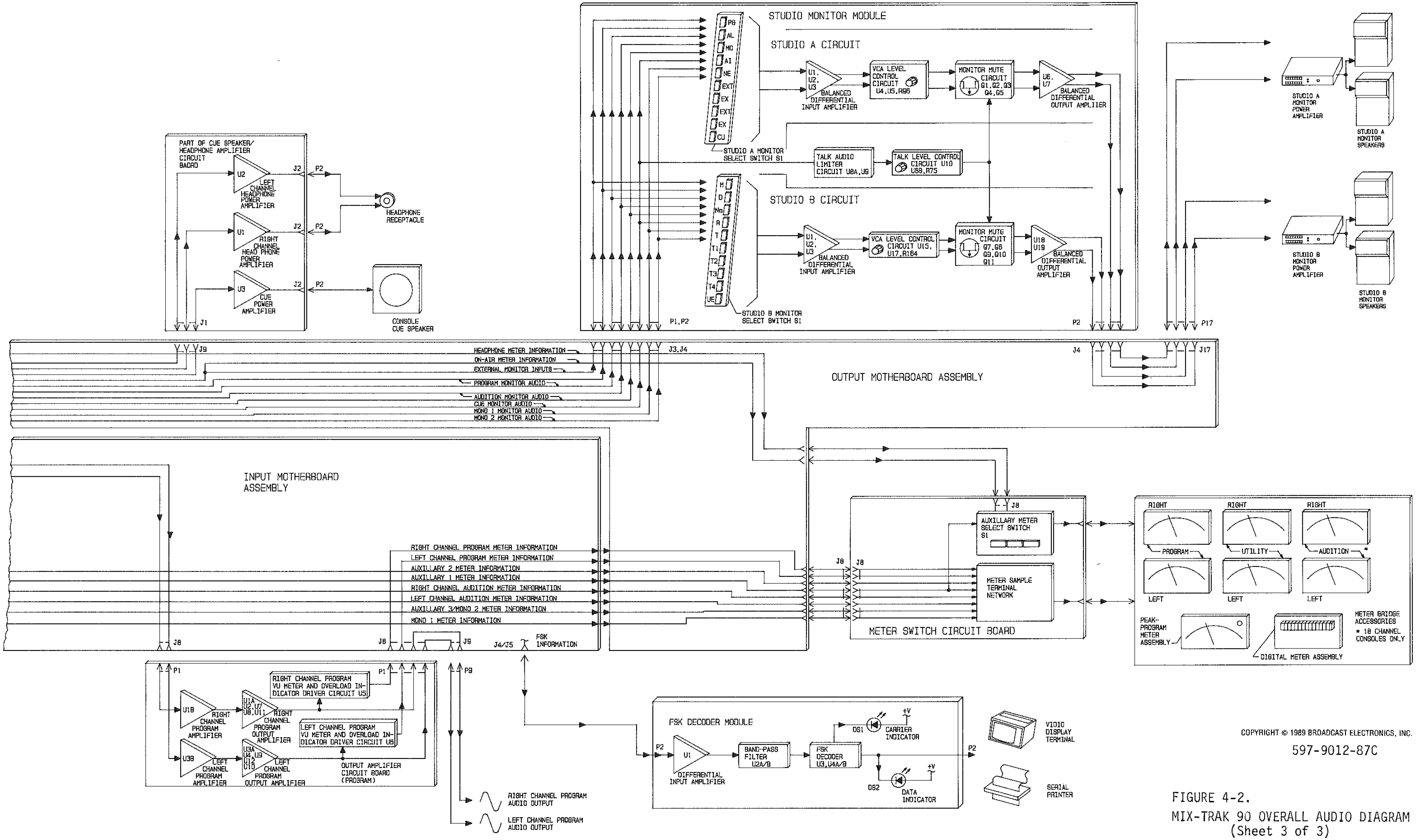

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FIGURE 4-2.
MIX-TRAK 90 OVERALL AUDIO DIAGRAM
(Sheet 3 of 3)

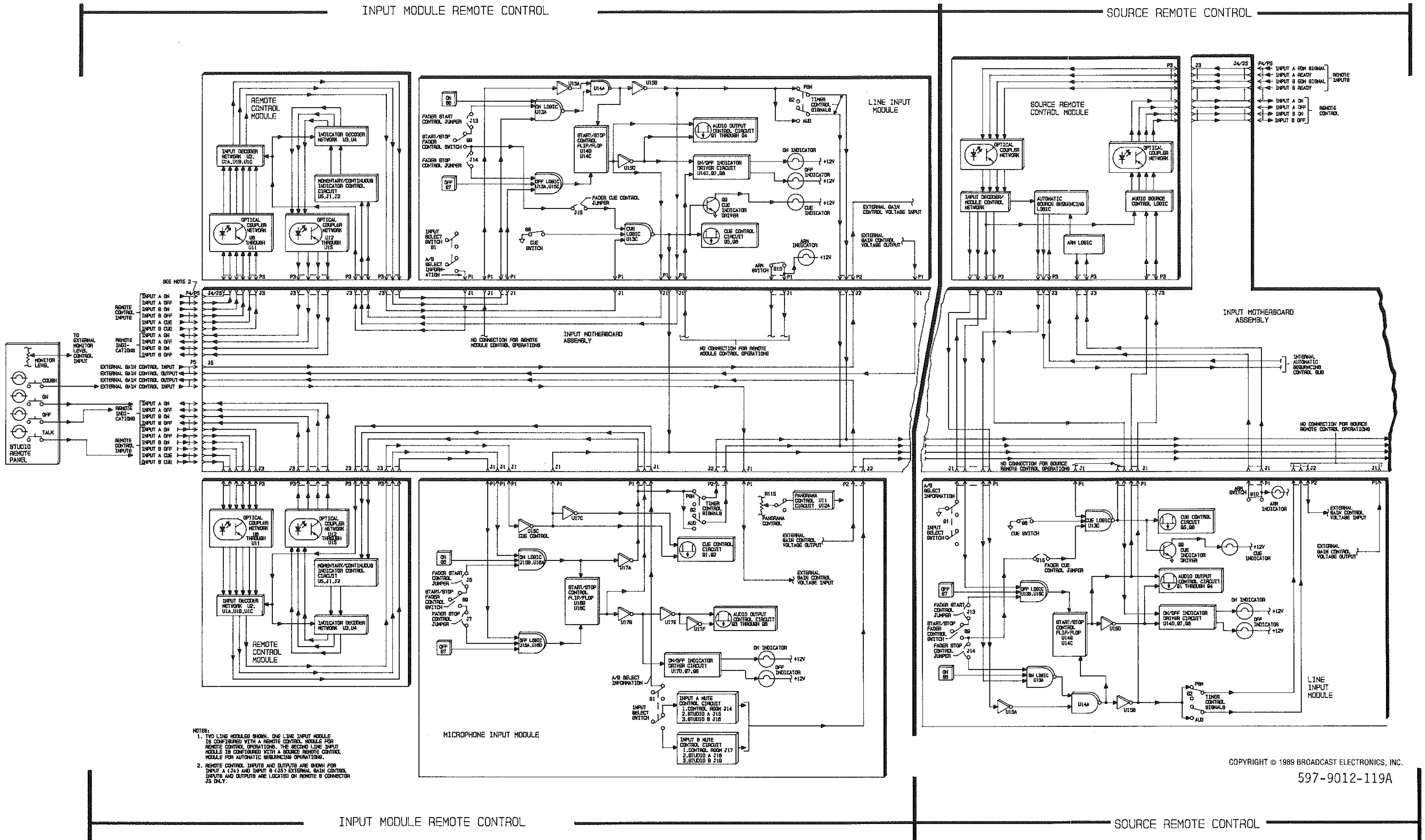

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FIGURE 4-3.
MIX-TRAK 90 OVERALL CONTROL SYSTEM DIAGRAM (Sheet 1 of 2)

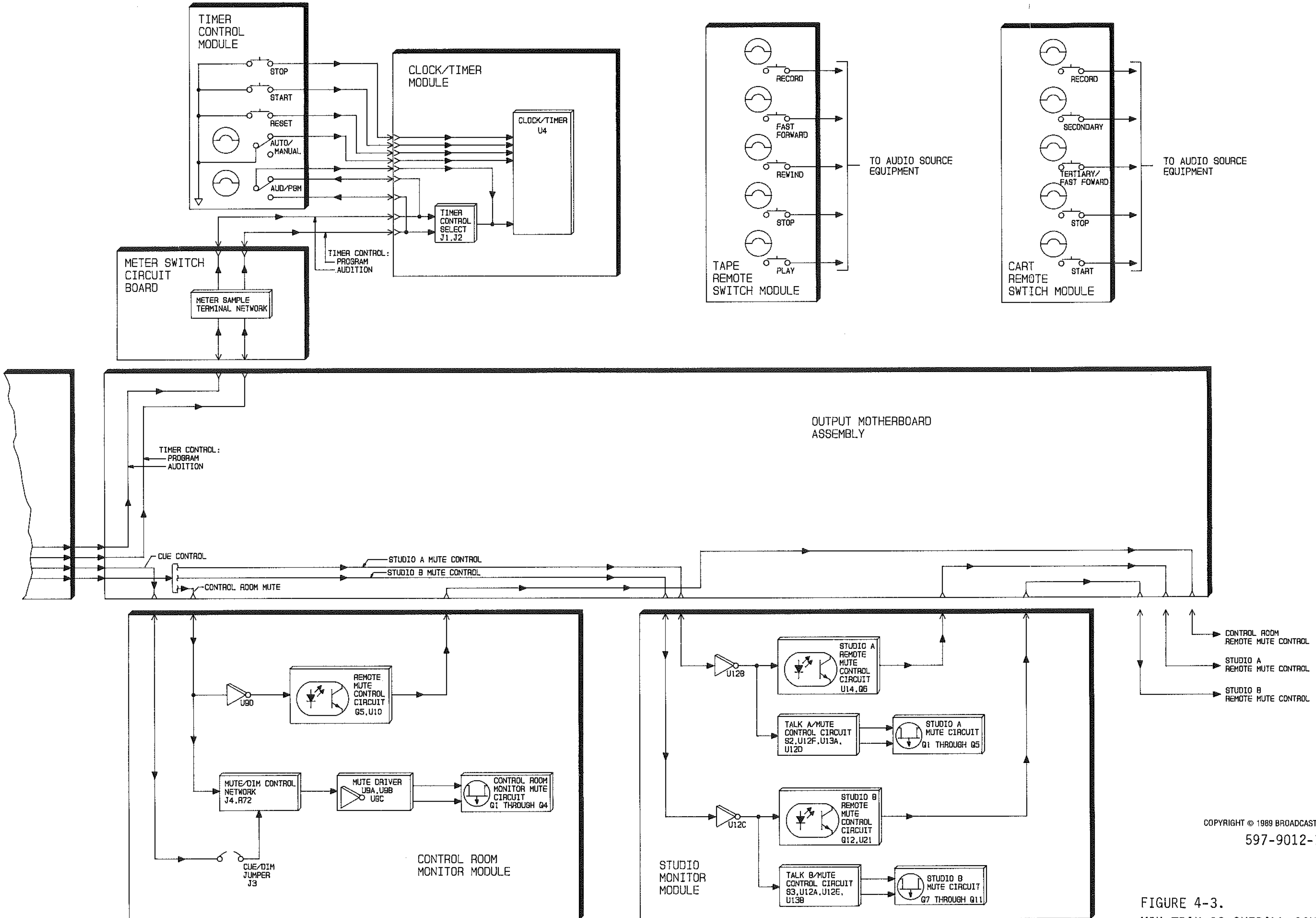

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FIGURE 4-3.
MIX-TRAK 90 OVERALL CONTROL SYSTEM DIAGRAM (Sheet 2 of 2)

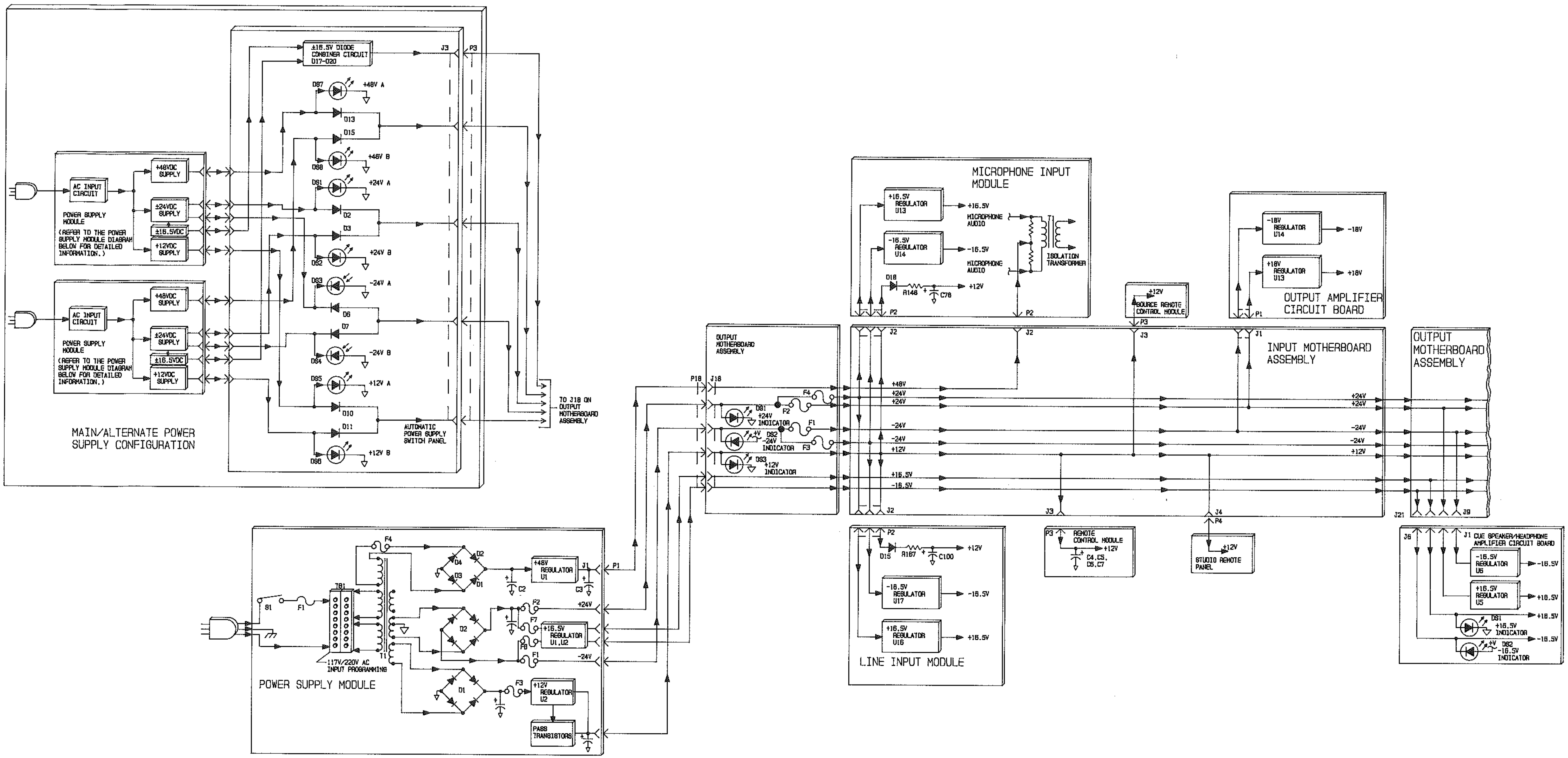

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FIGURE 4-4.
MIX-TRAK 90 OVERALL POWER SUPPLY SYSTEM DIAGRAM (Sheet 1 of 2)

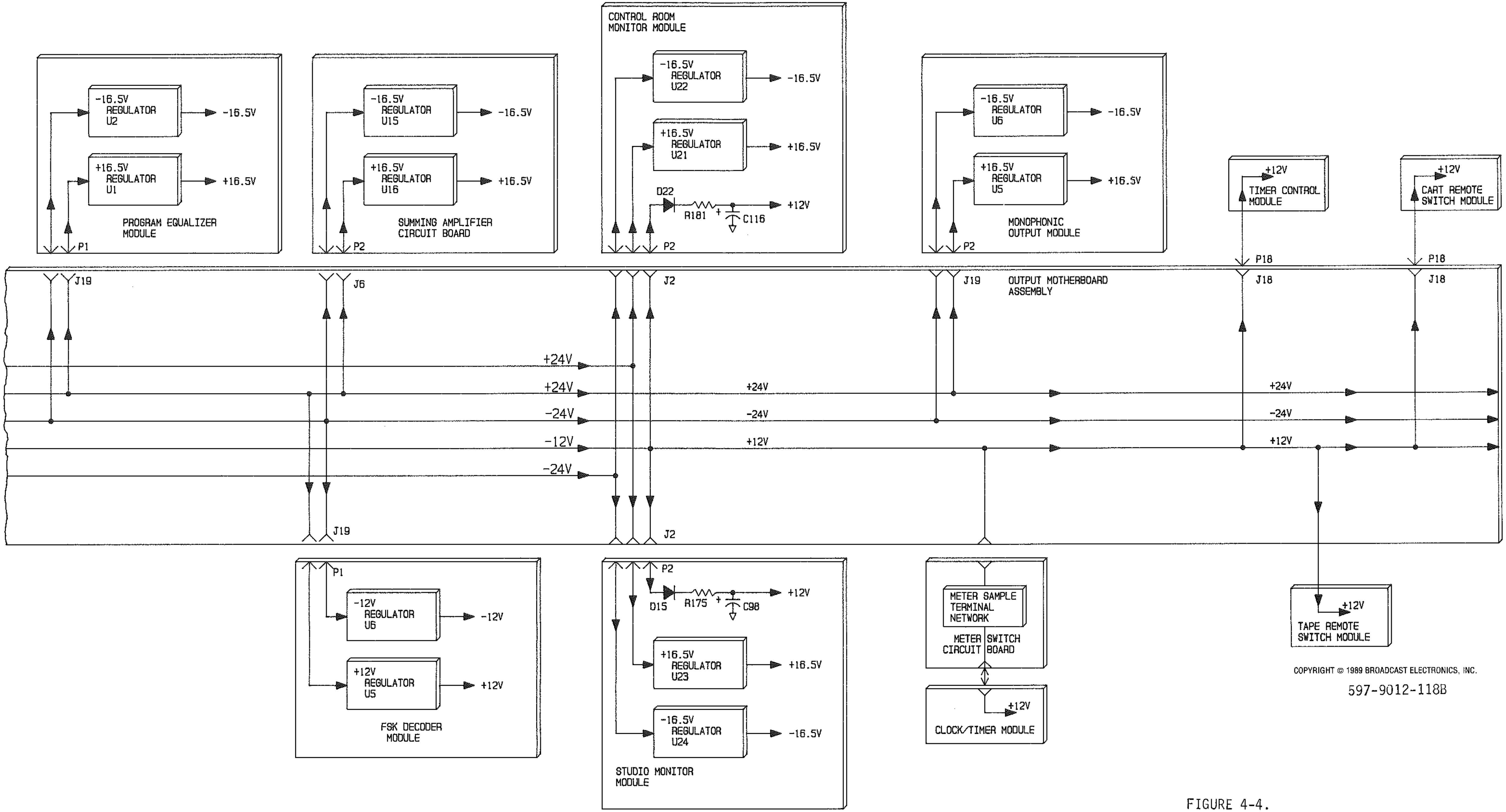

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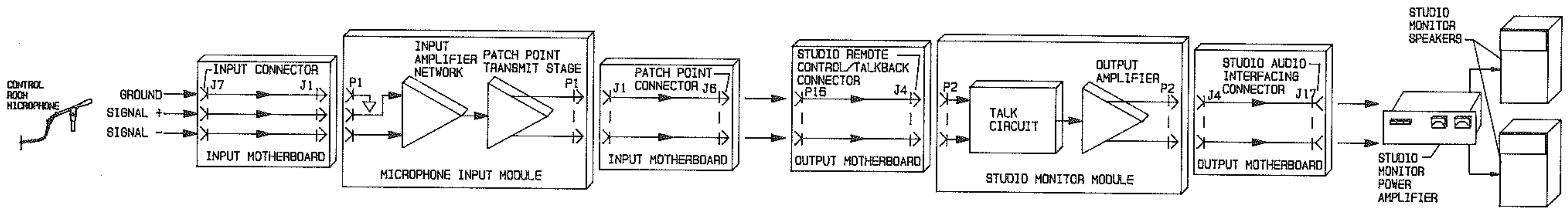
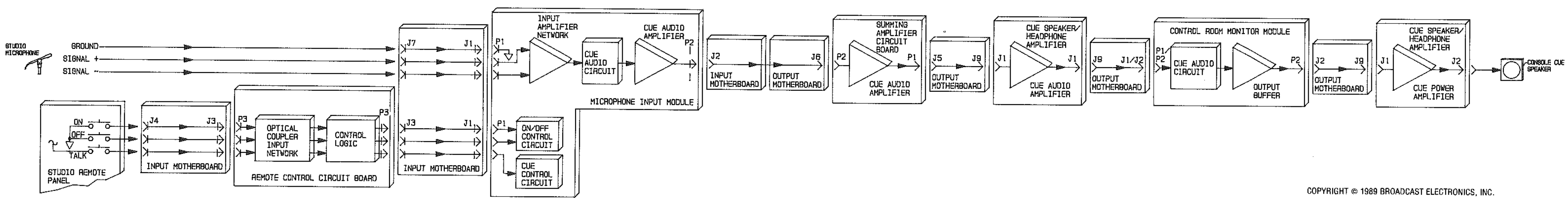
FIGURE 4-4.
MIX-TRAK 90 OVERALL POWER SUPPLY SYSTEM DIAGRAM (Sheet 2 of 2)



CONTROL ROOM-TO-STUDIO TALKBACK OPERATIONS



STUDIO-TO-CONTROL ROOM TALKBACK OPERATIONS

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FIGURE 4-5. TALKBACK SYSTEM DIAGRAM

MAINTENANCE

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION V

MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides general maintenance information and overall console system troubleshooting information for the Mix-Trak 90 series modular audio consoles.

5-3. SAFETY CONSIDERATIONS.

5-4. Low voltages are used throughout the Mix-Trak 90 console mainframe assembly, the accessory modules, and the power supply module. All high voltages and large current sources used within the power supply module have been shielded; however, do not touch any components within the console mainframe or power supply module with power energized. Good judgment, care, and common sense must be practiced to prevent accidents. The procedures contained in this section should be performed only by experienced and trained maintenance personnel.

5-5. FIRST LEVEL MAINTENANCE.

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

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

5-7. OVERALL CONSOLE SYSTEM.

5-8. Clean the console mainframe assembly, all accessory modules, and the power supply module of accumulated dust as required using a nylon-bristle brush and vacuum cleaner. Remove accumulated dirt from the console overlays using a cloth and any mild household cleaner. Inspect the console mainframe circuit boards and each accessory module for improperly seated semiconductors and components damaged by overheating. Also, periodically inspect the circuit boards, the accessory modules, and the chassis for loose hardware.

5-9. SECOND LEVEL MAINTENANCE.

5-10. Second level maintenance consists of procedures required to restore the Mix-Trak 90 console to operation after a fault has occurred. The maintenance philosophy of the console consists of isolating a problem to a specific assembly with subsequent troubleshooting to isolate the defective components. The defective components may be repaired locally or the entire device may be returned to Broadcast Electronics, Inc. for repair or replacement.

5-11. MODULE REMOVAL AND EXTENDER ASSEMBLY OPERATIONS.

5-12. Many Mix-Trak 90 modular assemblies may be removed from the console mainframe for maintenance procedures. Any Mix-Trak 90 input module, audio source switch module, or meter bridge accessory may be removed with power energized for troubleshooting or maintenance procedures. When removing microphone or line input modules with power energized, ensure the PGM/AUD switch/indicators are operated to off to prevent the generation of inadvertent audio noise.

5-13. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for maintenance procedures. When required, remove the desired plug-in module and connect the extender ribbon cable assemblies to the module. On microphone and line input modules, connect the 50-pin connector to the module before the 40-pin connector to prevent the generation of inadvertent audio noise.

5-14. TROUBLESHOOTING.

5-15. SAFETY CONSIDERATIONS. Low voltages are used throughout the Mix-Trak 90 console mainframe and all modular assemblies. The power supply module contains primary ac line voltage and high current capacitors. All power supply module high voltage and current components contain shields; however, do not perform any maintenance or troubleshooting procedures within the power supply module with power energized. Troubleshooting with power energized is always considered hazardous and caution should be observed. Good judgment, care, and common sense must be practiced to prevent accidents.

5-16. MODULE TROUBLESHOOTING. The Mix-Trak 90 series troubleshooting philosophy consists of isolating a problem to a specific module or assembly. The following text provides module troubleshooting information applicable to the overall console system.

5-17. Module Substitution. The modular design of the console allows modules and circuit boards to be substituted for isolating problems to a specific assembly. Perform circuit board substitution as required to isolate a console symptom to a specific assembly.

5-18. Power Supply Protection. Each console module with the exception of the output amplifier, cue/headphone amplifier, and the clock/timer module contain 10 Ohm series power supply protection resistors. In the event of a short-circuit potential on an individual module, the resistor will open to prevent the loss of power supply potentials to the entire console.

5-19. Main/Alternate Power Supply Configuration. If the console is configured with a main/alternate power supply system, the automatic power supply switch panel will control the application of power to the console mainframe. In the event of a power supply failure, the automatic power supply switch panel will route power from the operating supply module to the console. The appropriate power supply module A or B status indicator(s) on the automatic switch panel will extinguish to indicate a failed power supply circuit. Troubleshoot the defective power supply module by disconnecting the unit from primary ac power and the automatic power supply switch panel and isolate the circuit failure to specific components.

WARNING — DISCONNECT ALL PRIMARY POWER BEFORE REPLACING CIRCUIT BOARD COMPONENTS.

CAUTION
CAUTION — INADVERTENT CONTACT BETWEEN ADJACENT COMPONENTS OR MODULES WITH TEST EQUIPMENT MAY CAUSE SERIOUS DAMAGE TO THE CONSOLE CIRCUITRY. EXERCISE CARE WHEN TROUBLESHOOTING WITHIN AN ASSEMBLY WITH TEST EQUIPMENT AND POWER ENERGIZED.

5-20. CONSOLE SYSTEM TROUBLESHOOTING. Figure 5-1 presents the Mix-Trak 90 series console troubleshooting. The troubleshooting information utilizes modular troubleshooting techniques to isolate problems. Refer to Figure 5-1 and isolate the console malfunction to a specific module or assembly.

5-21. Once the problem is isolated to a specific assembly and power is totally deenergized, refer to the modular assembly schematic diagrams and the detailed theory of operation to assist in problem resolution. The defective assembly may be repaired locally or the entire device may be returned to Broadcast Electronics Inc. for repair or replacement.

WARNING — DISCONNECT ALL PRIMARY POWER BEFORE REPLACING CIRCUIT BOARD COMPONENTS.

CAUTION
CAUTION — WHEN REPLACING A COMPONENT MOUNTED ON A HEAT-SINK, ENSURE A THIN FILM OF HEAT-SINK COMPOUND IS USED TO ASSURE GOOD HEAT DISSIPATION.

5-22. COMPONENT REPLACEMENT. The circuit boards used in the Mix-Trak 90 series consoles are double-sided with plated-through holes. Due to the plated-through hole design, solder fills the holes by capillary action. This condition requires that defective components be removed carefully to avoid damage to the circuit board.

MIXTRAK 90 SYSTEM TROUBLESHOOTING

SYMPTOM	SOLUTION

1. ALL METER BRIDGE LAMPS AND INPUT MODULE ON AND OFF SWITCH/INDICATORS EXTINGUISHED.
2. ALL CONSOLE INPUT MODULES ARE ON.
	IS THE +12V LOGIC POWER SUPPLY STATUS INDICATOR ON THE OUTPUT MOTHERBOARD ILLUMINATED?
	- NO: IS THE POWER SUPPLY CABLE FROM THE POWER SUPPLY MODULE TO THE CONSOLE MAINFRAME SECURE?
	  - NO: SECURE THE POWER SUPPLY CABLE.
	  - YES: IS THE +12.6VDC FUSE ON THE CONSOLE POWER SUPPLY OPEN?
	    - NO: TROUBLESHOOT THE +12VDC LOGIC SUPPLY IN THE POWER SUPPLY MODULE.
	    - YES: REPLACE THE FUSE.
	- YES: +12V LOGIC POWER SUPPLY SHORT-CIRCUIT ON THE MOTHERBOARD OR METER BRIDGE ASSEMBLIES.

DISTORTED AUDIO ON ALL CONSOLE INPUTS AND OUTPUTS	ARE THE +-24V AUDIO POWER SUPPLY STATUS INDICATORS ON THE OUTPUT MOTHERBOARD ILLUMINATED?
	- NO: IS THE POWER SUPPLY CABLE FROM THE POWER SUPPLY MODULE TO THE CONSOLE MAINFRAME SECURE?
	  - NO: SECURE THE POWER SUPPLY CABLE.
	  - YES: ARE THE ±24VDC FUSES ON THE CONSOLE POWER SUPPLY OPEN?
	    - NO: TROUBLESHOOT THE ±24VDC AUDIO SUPPLIES IN THE POWER SUPPLY MODULE.
	    - YES: REPLACE THE FUSE.
	- YES: ARE ±24V FUSES F1 THROUGH F4 ON THE OUTPUT MOTHERBOARD OPEN?
	  - NO: CHECK THE ±24V REGULATORS ON THE SUMMING AMPLIFIER CIRCUIT BOARD.
	  - YES: ARE FUSES F1/F2 OR F3/F4 ON THE OUTPUT MOTHERBOARD OPEN?
	    - F1/F2: CHECK THE ±24V REGULATORS ON THE OUTPUT AMPLIFIER MODULES.
	    - F3/F4: CHECK THE ±24V REGULATORS ON THE INPUT MODULES.

FIGURE 5-1. MIX-TRAK 90 SYSTEM TROUBLESHOOTING (Sheet 1 of 3)

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MIX TRAK 90 SYSTEM TROUBLESHOOTING

SYMPTOM	SOLUTION
NO PROGRAM, AUDITION, OR AUXILIARY VU METER INDICATION	IS AUDIO PRESENT AT THE DEFECTIVE OUTPUT CHANNEL VU METER TERMINALS? YES: DEFECTIVE VU METER NO: IS AUDIO PRESENT AT U6 PIN 7 AND U5 PIN 7 ON THE DEFECTIVE OUTPUT CHANNEL OUTPUT AMPLIFIER CIRCUIT BOARD? YES: 1. CHECK THE WIRING FROM THE OUTPUT MOTHERBOARD TO THE METER SWITCH CIRCUIT BOARD. 2. CHECK THE WIRING FROM THE METER SWITCH CIRCUIT BOARD TO THE VU METER. NO: DEFECTIVE U5 AND U6 ON THE OUTPUT AMPLIFIER CIRCUIT BOARD.
ALL CONSOLE LAMPS ILLUMINATE BRIGHTLY.	1. CHECK PASS TRANSISTORS Q1 AND Q2 ON THE POWER SUPPLY MODULE. 2. CHECK INTEGRATED CIRCUIT U2 ON THE POWER SUPPLY CIRCUIT BOARD ASSEMBLY.
ALL MICROPHONE AND LINE INPUT MODULE OVERLOAD INDICATORS ILLUMINATED.	1. TROUBLESHOOT THE -24V POWER SUPPLY CIRCUIT.
DISTORTED PROGRAM, AUDITION, AND AUXILIARY OUTPUTS.	1. TROUBLESHOOT THE SUMMING AMPLIFIER CIRCUIT BOARD ASSEMBLY.

FIGURE 5-1. MIX-TRAK 90 SYSTEM TROUBLESHOOTING
(Sheet 2 of 3)

597-9012-121B

MIX TRAK 90 SYSTEM TROUBLESHOOTING

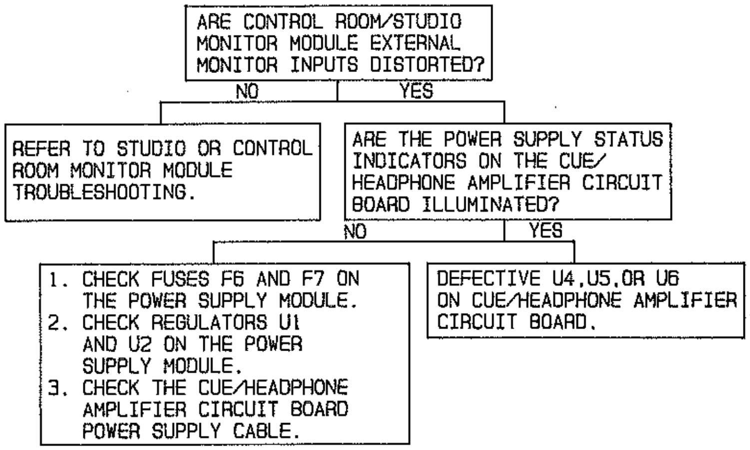
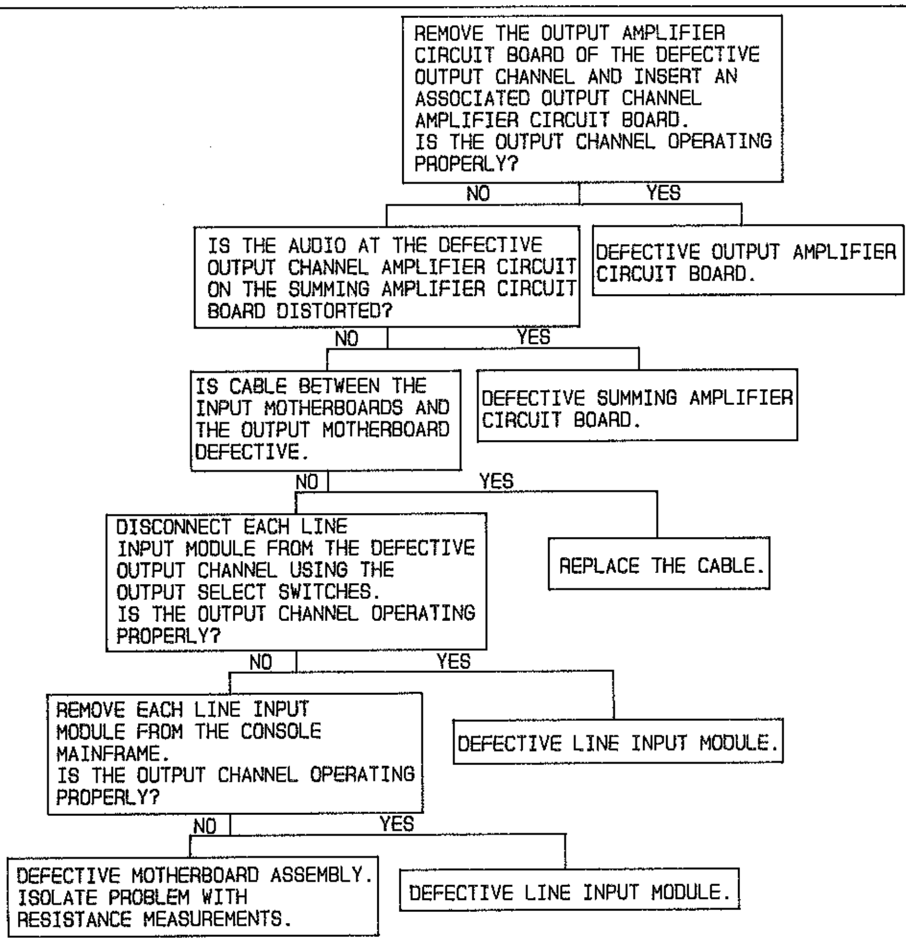
SYMPTOM	SOLUTION
DETORTED HEADPHONE, CONTROL ROOM MONITOR, AND STUDIO MONITOR OUTPUTS.	
DISTORTED PROGRAM, AUDITION, OR AUXILIARY OUTPUT	

FIGURE 5-1. MIX-TRAK 90 SYSTEM TROUBLESHOOTING
(Sheet 3 of 3)

597-9012-121C

5-23. On all circuit boards, the adhesion between the copper trace and the circuit board fails at almost the same temperature as solder melts. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. The use of a small soldering iron with steady pressure is required for circuit board repairs.

5-24. To remove a soldered component from a circuit board, cut the leads from the body of the defective component while the device is still soldered to the board. Grip a component lead with needle-nose pliers. Touch the soldering iron to the lead at the solder connection on the circuit side of the board. When the solder begins to melt, push the lead through the back side of the board and cut off the clinched end of the lead. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared by careful re-heating with a low wattage iron and removal the residual solder with a soldering vacuum tool.

5-25. Install the new component and apply solder from the circuit side of the board. If no damage has been incurred to the plated-through holes, soldering of the component side of the board will not be required.

WARNING

WARNING

WARNING

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

WARNING

OBSERVE THE MANUFACTURERS CAUTIONARY INSTRUCTIONS.

5-26. After soldering, remove residual flux with a suitable solvent. Rubbing alcohol is highly diluted and is not effective.

5-27. Inspect the circuit board to ensure the flux has been completely removed. Rosin flux is not normally corrosive, however in time, the flux will absorb enough moisture to become conductive and create problems.

5-28. INTEGRATED CIRCUITS. Special care should be exercised with integrated circuits. Each integrated circuit must be installed by matching the integrated circuit notch with the notch on the socket. Do not attempt to remove an integrated circuit from a socket with your fingers. Use an integrated circuit puller to lightly pry the component from the socket.

PARTS LIST

TABLE OF CONTENTS

LIST OF TABLES

SECTION VI

PARTS LIST

6-1. INTRODUCTION.

6-2. This section provides descriptions and part numbers of electrical components, assemblies, and selected mechanical parts required for maintenance of the Broadcast Electronics Mix-Trak 90 series modular audio consoles. Each table entry in the section is indexed by reference designators appearing on the applicable schematic diagram.

6-3. The section presents parts lists information for the overall console, the overall console sub-assemblies, and the console meterbridge. Parts list information for each modular assembly such as the microphone input module and summing amplifier assembly are listed in the modular publications in PART II of this manual.

TABLE 6-1. REPLACEABLE PARTS LISTS

TABLE	DESCRIPTION	PART NO.	PAGE
6-2	12 CHANNEL MAINFRAME ASSEMBLY	901-9012	2
6-3	18 CHANNEL MAINFRAME ASSEMBLY	901-9018	2
6-4	12 AND 18 CHANNEL MAINFRAME CABLE ASSEMBLIES	941-0015, 941-0022	2
6-5	12 CHANNEL INSTALLATION KIT	971-0023	3
6-6	18 CHANNEL INSTALLATION KIT	971-0026	3
6-7	40-PIN EXTENDER CABLE ASSEMBLY	941-0016	3
6-8	50-PIN EXTENDER CABLE ASSEMBLY	941-0017	3
6-9	SPARE PARTS KIT	971-0024	4
6-10	OUTPUT MOTHERBOARD ASSEMBLY	911-0063	4
6-11	INPUT MOTHERBOARD ASSEMBLY	911-0061	5
6-12	METER SWITCHBOARD ASSEMBLY	911-0031	5
6-13	MICROPHONE INPUT TRANSFORMER OPTION	951-0016	5
6-14	UTILITY RELAY	951-0036	5
6-15	VU METER KIT	971-0025	5

TABLE 6-2. 12 CHANNEL MAINFRAME ASSEMBLY - 901-9012

REF. DES.	DESCRIPTION	PART NO.	QTY.
H1,H2	Jack, Switchcraft #N-112B, 3-Conductor	417-0311	2
M1 THRU M4	Meter, 3.5 Inch (8.89 cm), Model 163 Window Mount w/Peak Flasher, Taut Band Type, Accuracy: ±2% (UTILITY and PROGRAM Meters)	310-0044	4
SPKR 1	Speaker, 4 Inch (10.16 cm), 8-10 Ohms, 7 Watts	414-0009	1
----	Overlay, Meter Bridge, Blue Trim	595-0086	1
----	Card Guide, Modular Console	407-0146	40
----	Lamp, Wedge #73, T-1 3/4 CE, 14V	320-0007	8
----	Lampholder, Wedge Base	416-5377	8
----	Label, Legend Strip, 12 and 18 Channel	594-3616	1
----	12 Channel Mainframe Cable Assembly	941-0015	1
----	Installation Kit	971-0023	1
----	Spare Parts Kit	971-0024	1
----	Line Output Module Assembly	911-0016	2
----	Headphone and Cue Speaker Power Amplifier Assembly	911-0065-002	1
----	Power Supply Assembly	951-0006	1
----	Control Room Monitor Module Assembly	951-0027	1
----	Summing Amplifier Circuit Board Assembly	911-0062	1
----	Output Motherboard Assembly	911-0063	1
----	Input Motherboard Assembly	911-0061	4
----	Meter Switchboard Assembly	911-0031	1

TABLE 6-3. 18 CHANNEL MAINFRAME ASSEMBLY - 901-9018

REF. DES.	DESCRIPTION	PART NO.	QTY.
H1,H2	Jack, Switchcraft #N-112B, 3-Conductor	417-0311	2
M1 THRU M6	Meter, 3.5 Inch (8.89 cm), Model 163 Window Mount w/Peak Flasher, Taut Band Type, Accuracy: ±2% (UTILITY, PROGRAM, and AUDITION Meters)	310-0044	6
SPKR 1	Speaker, 4 Inch (10.16 cm), 8-10 Ohms, 7 Watts	414-0009	1
----	Overlay, Meter Bridge, Blue Trim	595-0086	1
----	Card Guide, Modular Console	407-0146	58
----	Lamp, Wedge #73, T-1 3/4 CE, 14V	320-0007	12
----	Lampholder, Wedge Base	416-5377	12
----	Label, Legend Strip, 12 and 18 Channel	594-3616	1
----	18 Channel Mainframe Cable Assembly	941-0022	1
----	Installation Kit	971-0026	1
----	Spare Parts Kit	971-0024	1
----	Line Output Module Assembly	911-0016	2
----	Headphone and Cue Speaker Power Amplifier Assembly	911-0065-002	1
----	Power Supply Assembly	951-0006	1
----	Control Room Monitor Module Assembly	951-0027	1
----	Summing Amplifier Circuit Board Assembly	911-0062	1
----	Output Motherboard Assembly	911-0063	1
----	Input Motherboard Assembly	911-0061	6
----	Meter Switchboard Assembly	911-0031	1

TABLE 6-4. 12 AND 18 CHANNEL MAINFRAME CABLE ASSEMBLIES - 941-0015, 941-0022

REF. DES.	DESCRIPTION	PART NO.	QTY.
P2	Connector, Housing, 6-Pin	418-0670	1
P6	Plug, Housing, 6-Pin	417-0046	1
P21	Plug, Housing, 4-Pin	418-0240	1
----	Plug, 40-Pin Dual In-line	418-4001	5
----	Socket, Connector, 10-Pin	417-1003	4
----	Pins, Connector (for P2 and P21)	417-0053	9
----	Pins, Crimp Type (for P6)	417-8766	3

TABLE 6-5. 12 CHANNEL INSTALLATION KIT - 971-0023

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector, Housing, 12-Pin	418-1271	60
----	Pins, Connector	417-0053	800
----	Tool, Adjustment, 8 T000/5 Spectrol	407-0186	1
----	Driver, 3/32" Hex Ball	300-0007	1
----	Crimping Tool, Paladin PA-1645	300-0009	1
----	Tool, Contact Removal	710-0002	1
----	MT-90 Binder and Manual Assembly	971-9012	1
----	40-Pin Extender Cable Assembly	941-0016	2
----	50-Pin Extender Cable Assembly	941-0017	1

TABLE 6-6. 18 CHANNEL INSTALLATION Kit - 971-0026

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector, Housing, 12-Pin	418-1271	84
----	Pins, Connector	417-0053	1100
----	Tool, Adjustment, 8 T000/5 Spectrol	407-0186	1
----	Driver, 3/32" Hex Ball	300-0007	1
----	Crimping Tool, AMP TST-1	300-0010	1
----	Tool, Contact Removal	710-0002	1
----	MT-90 Binder and Manual Assembly	971-9012	1
----	40-Pin Extender Cable Assembly	941-0016	2
----	50-Pin Extender Cable Assembly	941-0017	1

TABLE 6-7. 40-PIN EXTENDER CABLE ASSEMBLY - 941-0016

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Connector, Header, 40-Pin Dual In-line	417-0134	1
P2,P3	Receptacle, 40-Pin	418-0028	2
P4	Receptacle, 40-Pin Dual In-line	417-4041	1
----	Blank, Male, 40-Pin Extender Circuit Board	511-0041	1
----	Blank, Female, 40-Pin Extender Circuit Board	511-0042	1

TABLE 6-8. 50-PIN EXTENDER CABLE ASSEMBLY - 941-0017

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Connector, Header, 50-Pin Dual In-line	417-0146	1
P2,P3	Receptacle, 50-Pin	417-0171	2
P4	Receptacle, 50-Pin Dual In-line	417-0147	1
----	Blank, Male, 50-Pin Extender Circuit Board	511-0066	1
----	Blank, Female, 50-Pin Extender Circuit Board	511-0067	1

TABLE 6-9. SPARE PARTS KIT - 971-0024

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Fuse, 3AG, 1/8 Ampere, 250V, Slow-Blow	334-0051	1
----	Fuse, 3AG, 2 Amperes, 250V	330-0200	1
----	Integrated Circuit, TL783C, Adjustable Three-Terminal Positive Voltage Regulator, 1.25V to 125V at 700 mA, TO-220 Case	227-0783	1
----	Integrated Circuit, MC1723CL, Adjustable Positive Voltage Regulator, 37V to 2V at 150 mA, 14-Pin DIP	227-0723	1
----	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	4
----	Integrated Circuit, LF353N, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0353	2
----	Integrated Circuit, LT1010CT, Power Buffer Amplifier, Continuous Output Current ±150 mA, Continuous Power 4W, TO-220 Case	220-1010	4
----	Integrated Circuit, NE5534AN, Low-Noise Operational Amplifier, 8-Pin DIP	221-5534	2
----	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
----	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
----	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	2
----	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
----	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
----	Integrated Circuit, TDA1074A, DC Controlled Dual Potentiomter, 18-Lead DIL	220-1074	1
----	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	1
----	Lamp, No. 73, 14V, 0.08A, T-1 3/4 Bulb, Wedge Base	320-0007	1

TABLE 6-10. OUTPUT MOTHERBOARD ASSEMBLY - 911-0063

REF. DES.	DESCRIPTION	PART NO.	QTY.
DS1,DS2,DS3	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	3
F1 THRU F4	Fuse, 3AG, 2 Amperes	330-0200	4
J1 THRU J6	Connector Header, 40-Pin Dual In-line	417-0134	6
J7,J8,J9	Connector Header, 40-Pin	417-0173	3
J10 THRU J19	Receptacle, 12-Pin	417-1276	10
J20	Connector Header, 3-Pin	417-0003	1
J21	Connector, Male, 4-Pin	418-0255	1
P20	Jumper, Programmable, 2-Pin	340-0004	1
R1,R2	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R3	Resistor, 510 Ohm ±5%, 1/4W	100-5133	1
XF1 THRU XF4	Fuse Clips, AGC	415-2068	8
----	Socket Contact, Flexstrip (for use w/417-4086)	417-0186	57
----	Card Guide, Vertical, VG2-5	407-0075	2
----	Blank Output Motherboard Assembly	511-0063	1

TABLE 6-11. INPUT MOTHERBOARD ASSEMBLY - 911-0061

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C9	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	9
J1,J1A,J1B	Connector Header, 40-Pin Dual In-line	417-0134	3
J2,J2A,J2B	Connector Header, 50-Pin Dual In-line	417-0146	3
J3,J3A,J3B	Connector Header, 40-Pin Dual In-line	417-0134	3
J4,J4A,J4B, J5,J5A,J5B, J6,J6A,J6B, J7,J7A,J7B	Receptacle, 12-Pin	417-1276	12
J8	Connector Header, 40-Pin Dual In-line	417-0134	1
J9	Receptacle, 12-Pin	417-1276	1
J10	Connector, 10-Pin	418-1003	1
R1,R2,R3	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	3
----	Socket Contact, Flexstrip (for use w/417-4086)	417-0186	114
----	Card Guide, Vertical, VG2-5	407-0075	2
----	Blank Input Motherboard Assembly	511-0061	1

TABLE 6-12. METER SWITCHBOARD ASSEMBLY - 911-0031

REF. DES.	DESCRIPTION	PART NO.	QTY.
E1,E3 THRU E12,E16 THRU E21,E23 THRU E32,E39 THRU E48	Terminal, Barrel, 4 Amperes	417-0133	37
J1,J2	Connector Header, 3-Pin	417-0003	2
J8	Connector, 40-Pin	417-0173	1
P1,P2	Jumper, Programmable, 2-Pin	340-0004	2
R1,R2	Resistor, 3.65 k Ohm ±1%, 1/4W	103-3641	2
S1	Switch, 3 Section, 4PDT, Blue Indications (Utility Meter Select Switch)	340-0111	1
----	Cap, Barrel Terminal	417-0133-001	37
----	Blank Meter Switchboard Circuit Board	511-0031	1

TABLE 6-13. MICROPHONE INPUT TRANSFORMER OPTION - 951-0016

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Transformer, Microphone Bridge, Ratio: 1:1 turns Primary: 150 Ohms Secondary: 1000 Ohms	370-0032	1

TABLE 6-14. UTILITY RELAY - 951-0036

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Relay, General Purpose Coil: 12V dc, 160 Ohms Contacts: DPDT, 0.9W @ 10 Amperes	270-0060	1
----	Socket, Surface Mount	417-0183	1

TABLE 6-15. VU METER KIT - 971-0025

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Meter, 3.5 Inch (8.89 cm) , Model 163 Window Mount w/Peak Flasher, Taut Band Type, Accuracy: ±2%	310-0044	1
----	Lamp, No. 73, 14V @ 0.08A, T-1 3/4 Bulb, Wedge Type	320-0007	2
----	Lampholder, Wedge Base	416-5377	2

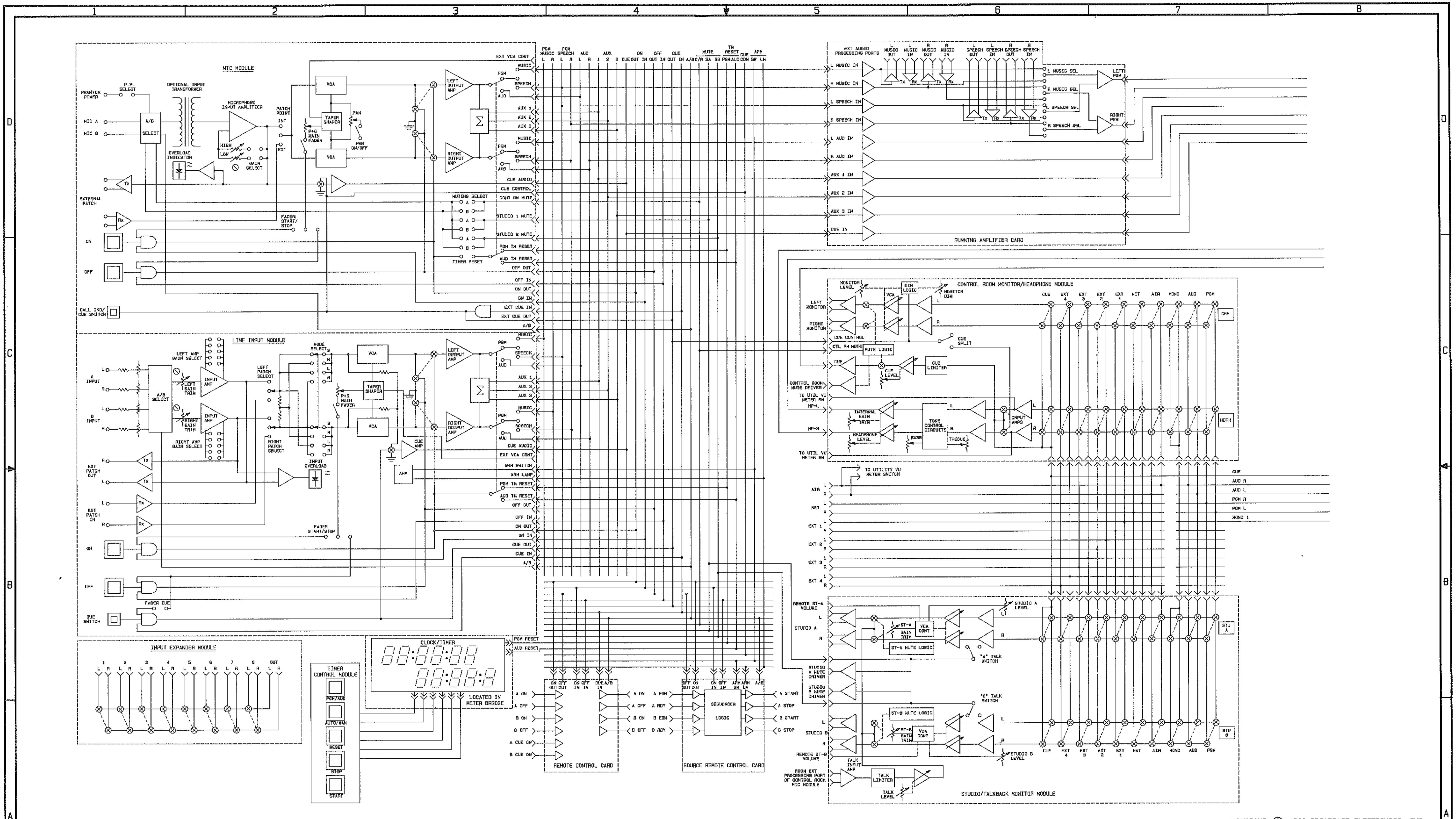
DRAWINGS

TABLE OF CONTENTS

SECTION VII
DRAWINGS

7-1. INTRODUCTION.

7-2. This section provides assembly drawings, wiring diagrams, and schematic diagrams as listed below for the Broadcast Electronics Mix-Trak 90 series audio consoles. The section presents drawings for the overall console, the overall console sub-assemblies, and the meterbridge assembly. Drawings for each modular assembly such as the microphone input module and summing amplifier assembly are listed in the modular publications in PART II of this manual.



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

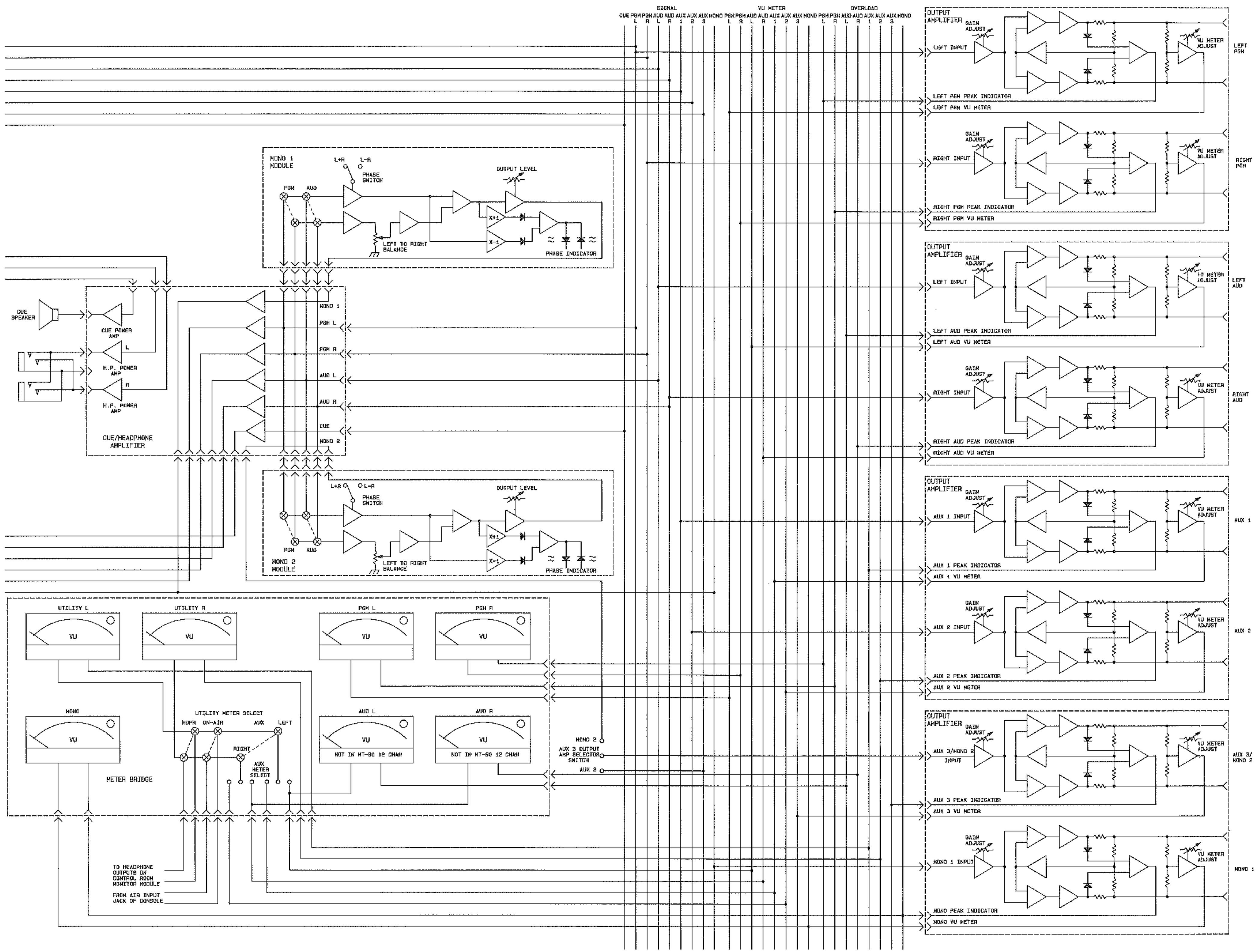
DWN. BY JAH 8-17-88
CHKD MH 5-22-88
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 901-9012
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

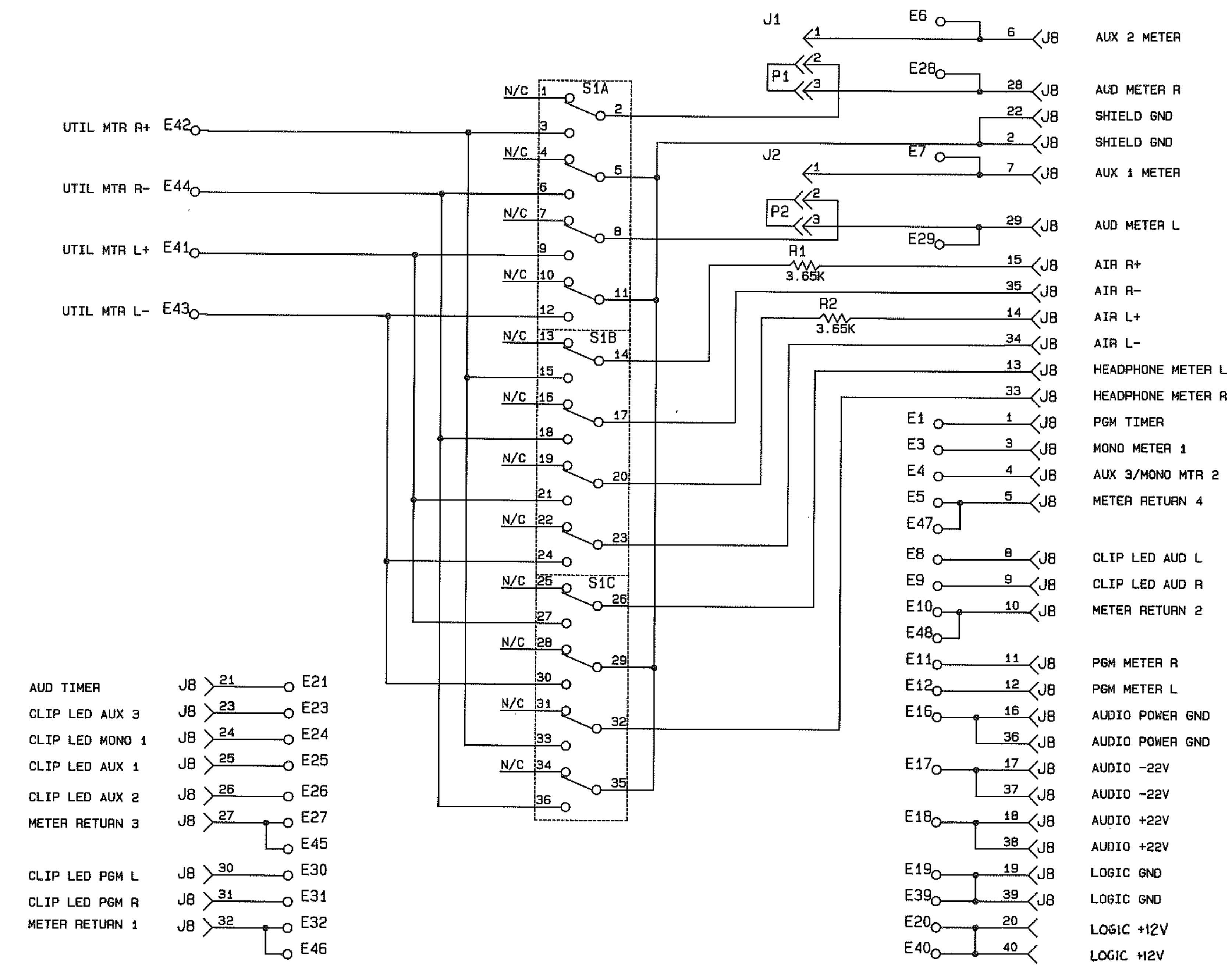
TITLE OVERALL BLOCK DIAGRAM

TYPE S | SIZE D | DWG. NO. 901-9012 | REV A
MODEL MT-90 | SCALE NONE | SHEET 1 OF 2



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

DWN. BY JAH 8-17-88	MATERIAL SEE B/M 901-9012	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
CHKD MH 8-22-88		
ME	FINISH	TITLE OVERALL BLOCK DIAGRAM
PROJ. ENGR.	SEE DWG RA592-0000	TYPE S SIZE D DWG. NO. 901-9012 REV A
MFG.	NEXT ASSY. ----	MODEL MT-90 SCALE NONE SHEET 2 OF 2



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

DWN. BY JAH 9-8-87
CHKD mH 8-22-88
ME
PROJ. ENGR.
MFG

MATERIAL SEE B/M 911-0031
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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 METER SWITCH BOARD

TYPE S | SIZE C | DWG. NO. 911-0031 | REV A
MODEL MT-90 | SCALE NONE | SHEET 1 OF 1

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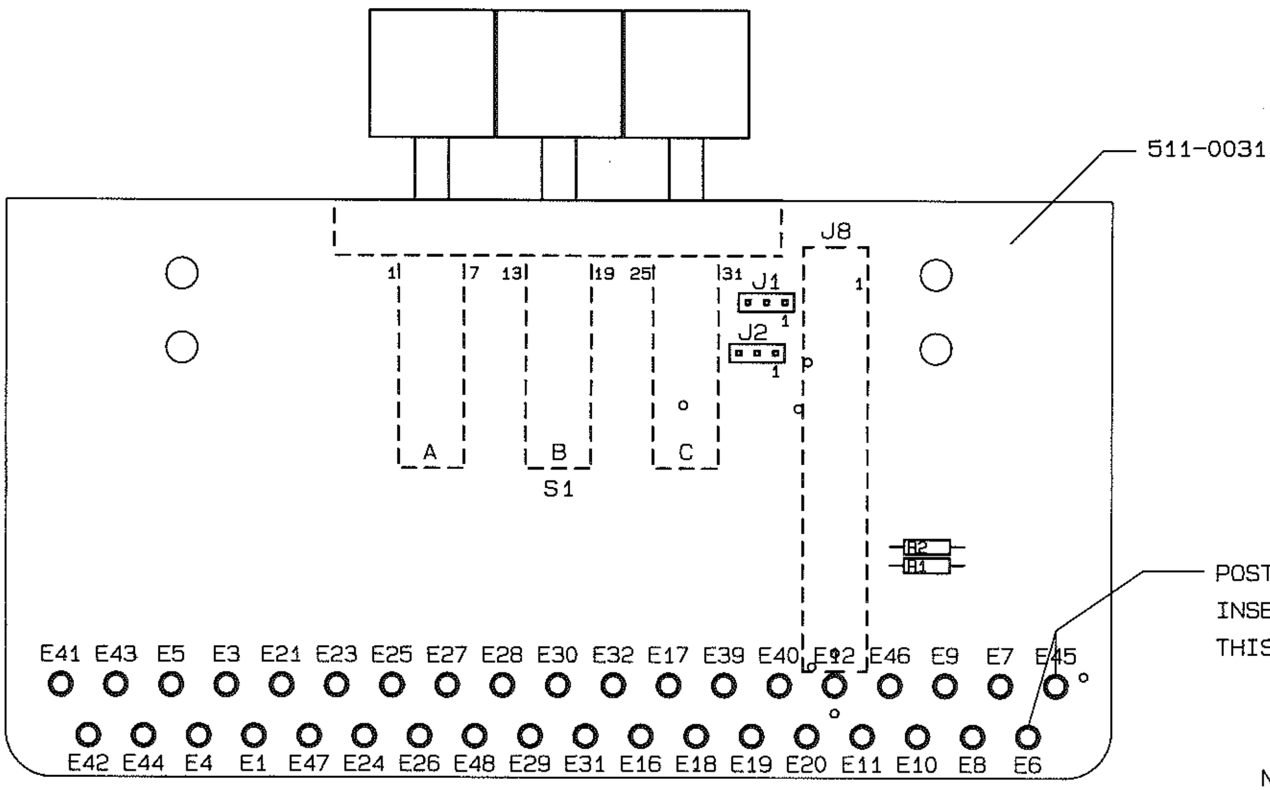


NOTE:

1. SEE SCHEMATIC SB911-0031.

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

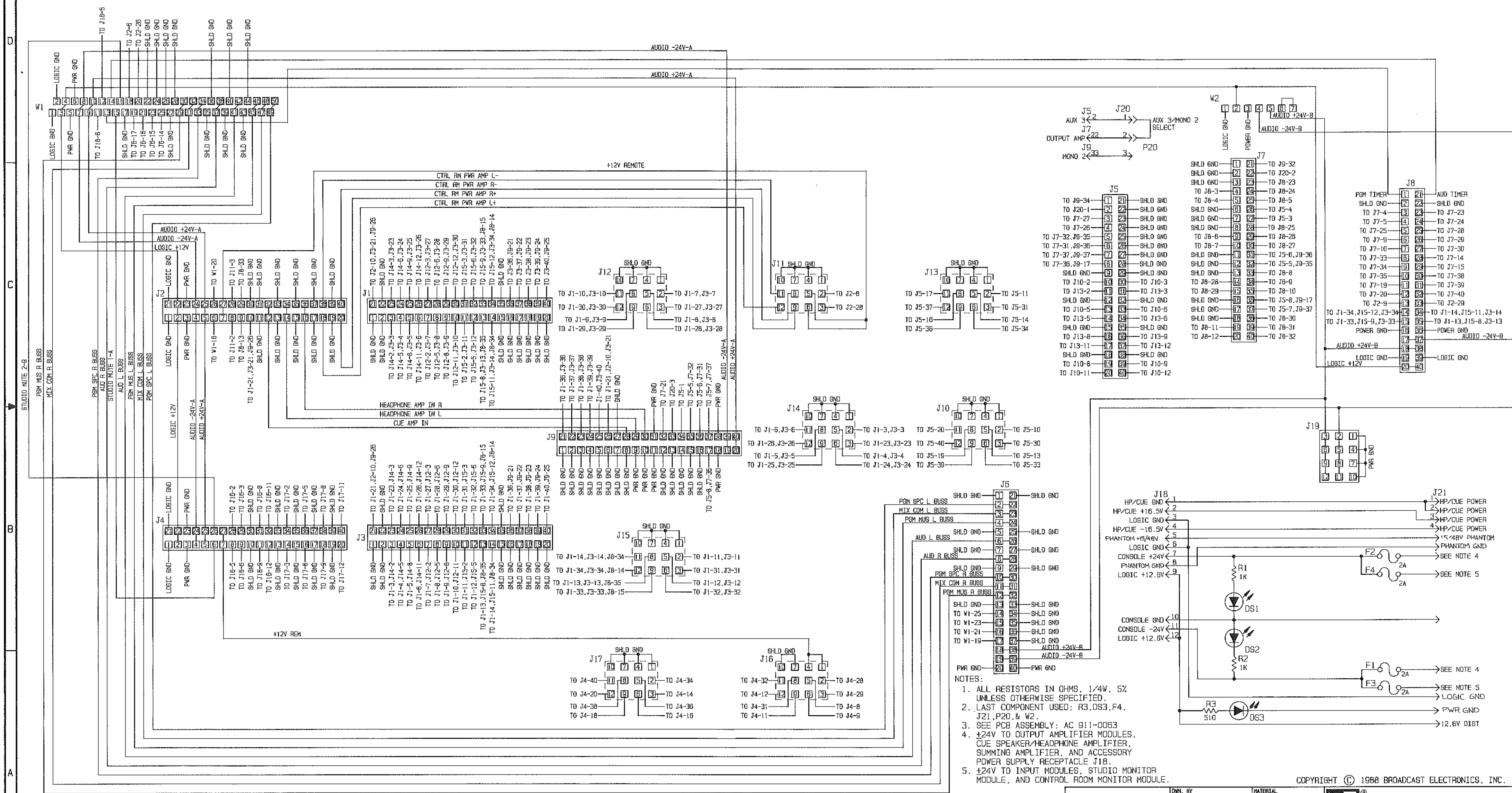
DWN BY	L.O. 7-23-87
CHKD	MH 8-22-88
ME	8/22/88
PROJ. ENGR.	8-22-88
MFG	8-2-88
MATERIAL	SEE B/M 911-0031
FINISH	
NEXT ASSY	901-9012 (12CH) 901-9018 (18CH)

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: PCB ASSEMBLY– METER SWITCH BD.

TYPE	SIZE	DWG.NO.	REV
A	B	911-0031	D

MODEL MT90 SCALE 1.5/1 SHEET 1 OF 1



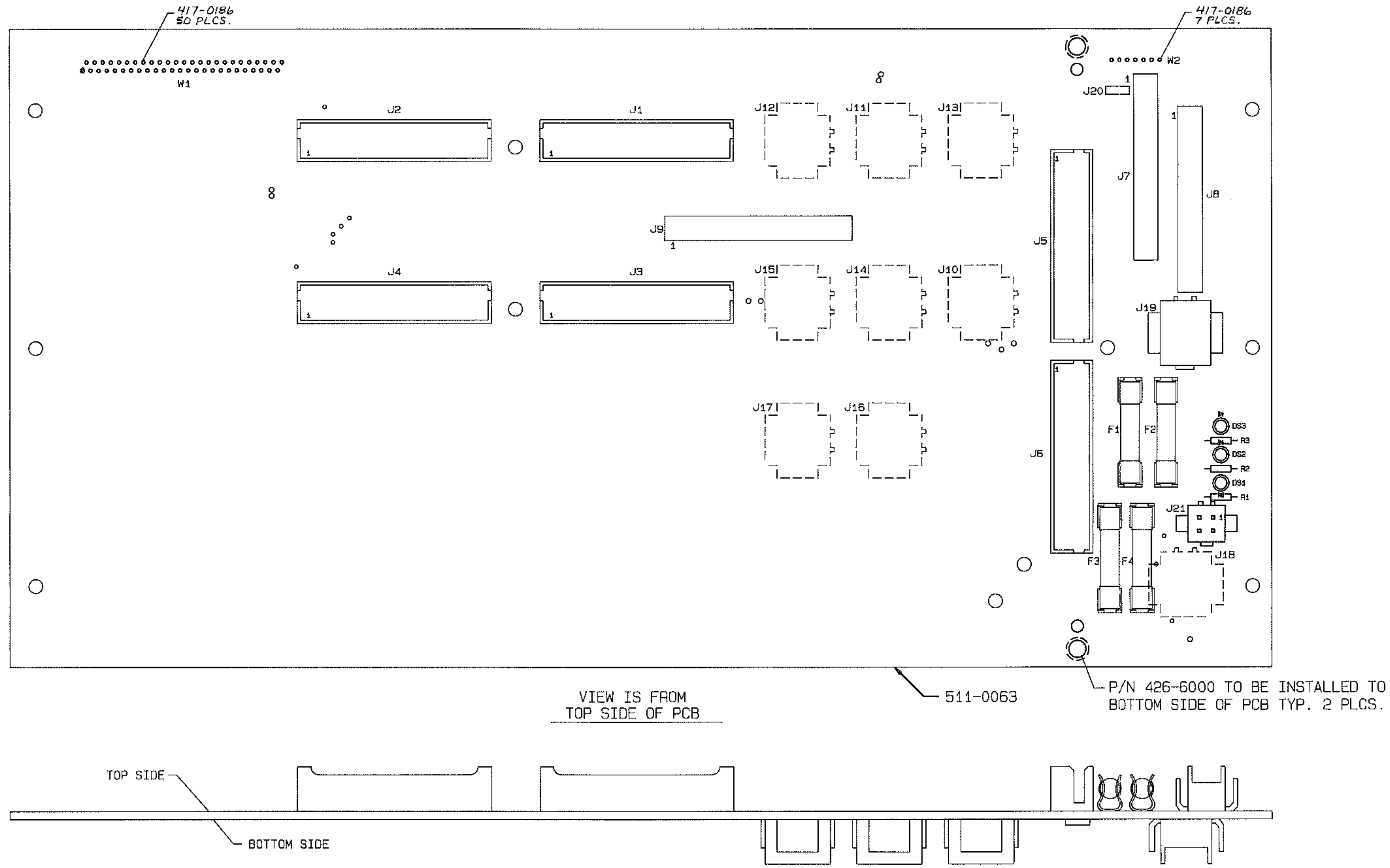
NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: R3, DS3, F4, J21, P20, & W2.
3. SEE PCB ASSEMBLY: AC 911-0063
4. ±24V TO OUTPUT AMPLIFIER MODULES, CUE SPEAKER/HEADPHONE AMPLIFIER, SUMMING AMPLIFIER, AND ACCESSORY POWER SUPPLY RECEPTACLE J18.
5. ±24V TO INPUT MODULES, STUDIO MONITOR MODULE, AND CONTROL ROOM MONITOR MODULE.

DWN. BY	JAH 12-2-88
CHKD	
ME	
PROJ. ENGR.	
MFG.	
MATERIAL	SEE B/M 911-0063
FINISH	
TOLERANCE (DECIMAL) U.O.S.	.x ± .030 .xx ± .015 .xxx ± .005 ANGLES ± 1°
NEXT ASSY.	SEE DWG RA592-0000 901-9012 (12CH) 901-9018 (18CH)

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	OUTPUT MOTHERBOARD
TYPE	S
SIZE	D
DWG. NO.	911-0063
REV	
MODEL	MT-90
SCALE	NONE
SHEET	1 OF 1



NOTES:

1. LAST COMPONENT USED: R3, J21, W2, F4, DS3.
2. CARD GUIDES P/N 407-0075 "QTY. 2", AND MOUNTING HARDWARE 420-6108 AND 423-6002 "QTY. 2 EACH", TO BE BAGGED SEPARATELY AND SENT TO STOCK WITH BOARD ASSEMBLY.

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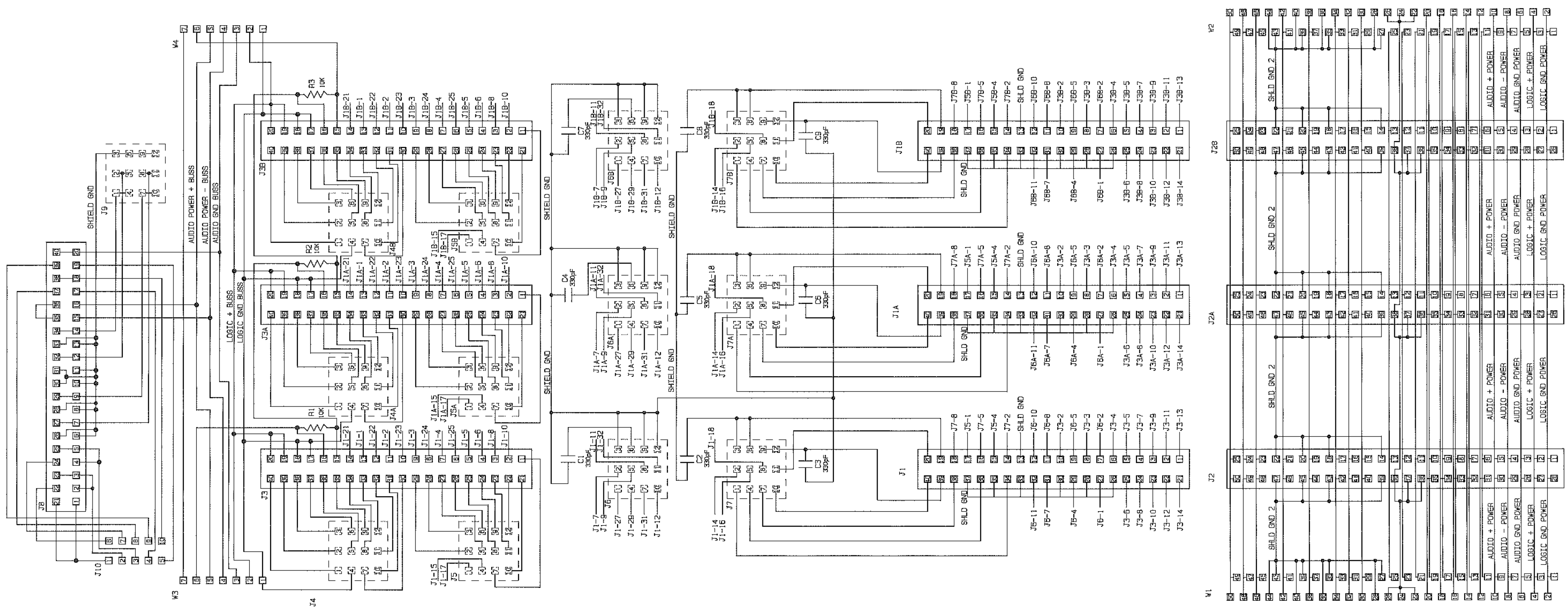
TOLERANCE DECIMAL U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

DWN BY	LO
DATE	7-17-87
CHKD	MH 8-22-88
ME	8/22/88
PROJ ENGR	
MFG	
MATERIAL	SEE B/M 911-0063
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"

BROADCAST ELECTRONICS, INC.
4100 N. 24TH ST. QUINCY, IL. 62305 217/224-9600
TELEX 250142 CABLE "BROADCAST"

TITLE	PCB ASSEMBLY OUTPUT MOTHERBOARD
TYPE	A
SIZE	C
DWG. NO.	911-0063
REV	E
MODEL	MT90
SCALE	1/1
SHEET	1 OF 1

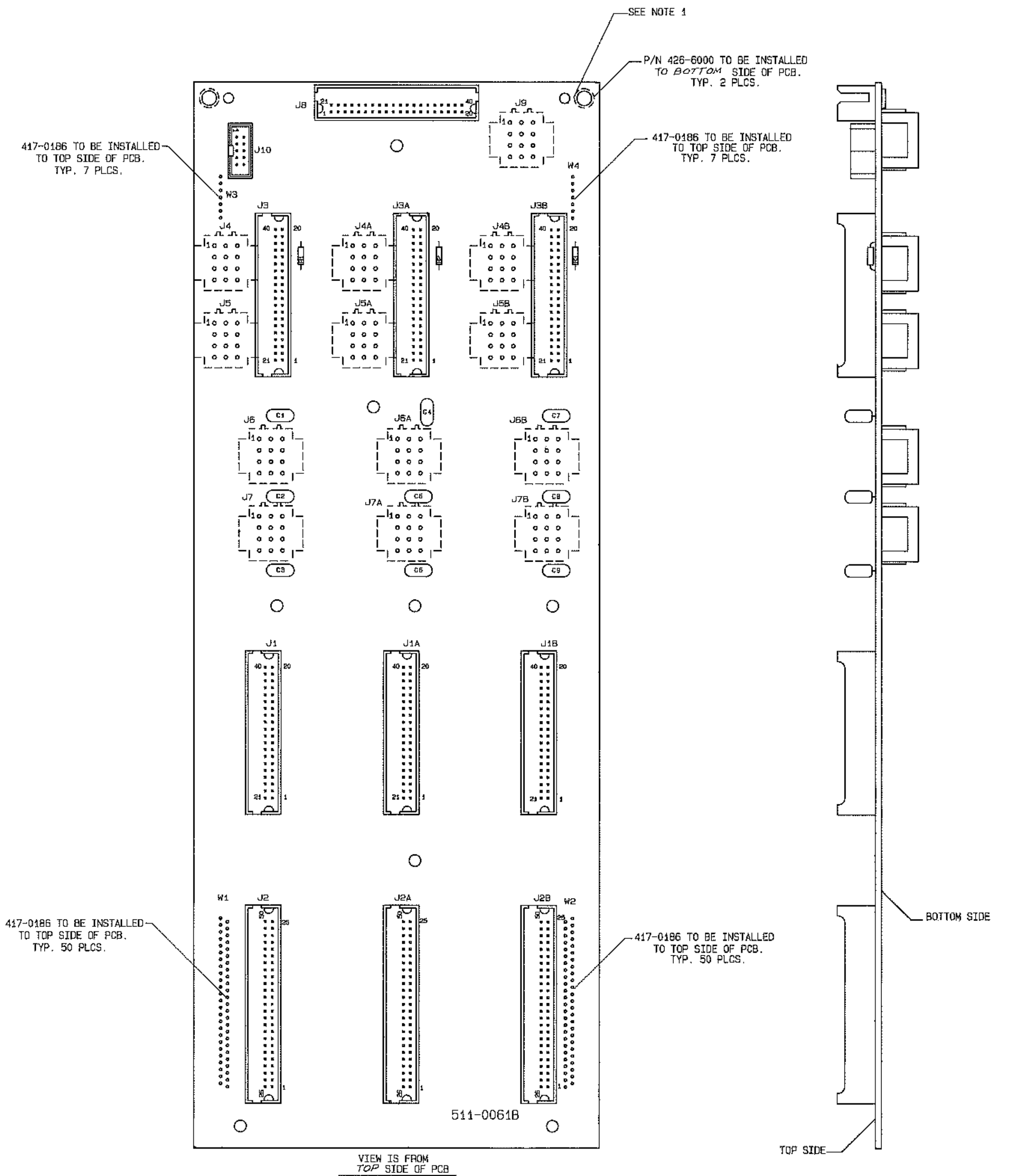


NOTES:

1. ALL RESISTORS IN OHMS, 1/4W,5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: R3,C9,J10,& W4.
3. SEE PCB ASSEMBLY AD 911-0061

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

DWN. BY JAH 11-10-88	MATERIAL SEE B/M 911-0061	BROADCAST ELECTRONICS INC. 4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
CHKD			
ME	FINISH	TITLE MOTHERBOARD	
PROJ. ENGR.	SEE DWG RA592-0000	TYPE S SIZE D DWG. NO. 911-0061	REV
MFG.	NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	MODEL MT-90 SCALE NONE	SHEET 1 OF 1



VIEW IS FROM *TOP* SIDE OF PCB

NOTE:

1. CARD GUIDES P/N 407-0075 "QTY. 2", AND MOUNTING HARDWARE 420-6108 AND 423-6002 "QTY. 2 EACH", TO BE BAGGED SEPARATELY AND SENT TO STOCK WITH BOARD ASSEMBLY.

TOLERANCE DECIMAL U.O.S.	.X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°
DWN BY	MERK 9-25-86
CHKD	MH 8-22-88
ME	9/12/88
PROJ. ENGR.	
MFG	
MATERIAL	SEE B/M 911-0061
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"
TITLE	PCB ASSEMBLY-MOTHERBOARD
TYPE	A
SIZE	D
DWG. NO.	911-0061
REV	C
MODEL	MT90
SCALE	1/1
SHEET	1 OF 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

APPENDIX

TABLE OF CONTENTS

SECTION VIII
APPENDIX

8-1. INTRODUCTION.

8-2. This appendix provides technical data associated with the maintenance of the Broadcast Electronics Mix-Trak 90 audio consoles. The information contained in this appendix is presented in the following order.

A. Operating Instructions, AMP Wiring Tool No. 29004-1.

B. Technical Information, Signetics Dual DC Controlled Potentiometers, TDA1074A.

C. Technical Information, SGS HI-FI Audio Power Amplifier, TDA2030.

D. Technical Information, dbx 2150 Series Voltage-Controlled Amplifiers.

E. Technical Information, VCA Associates Quad Transistor Array, MTA-401.

F. Technical Information, Signetics Programmable Analog Compandor, NE572.

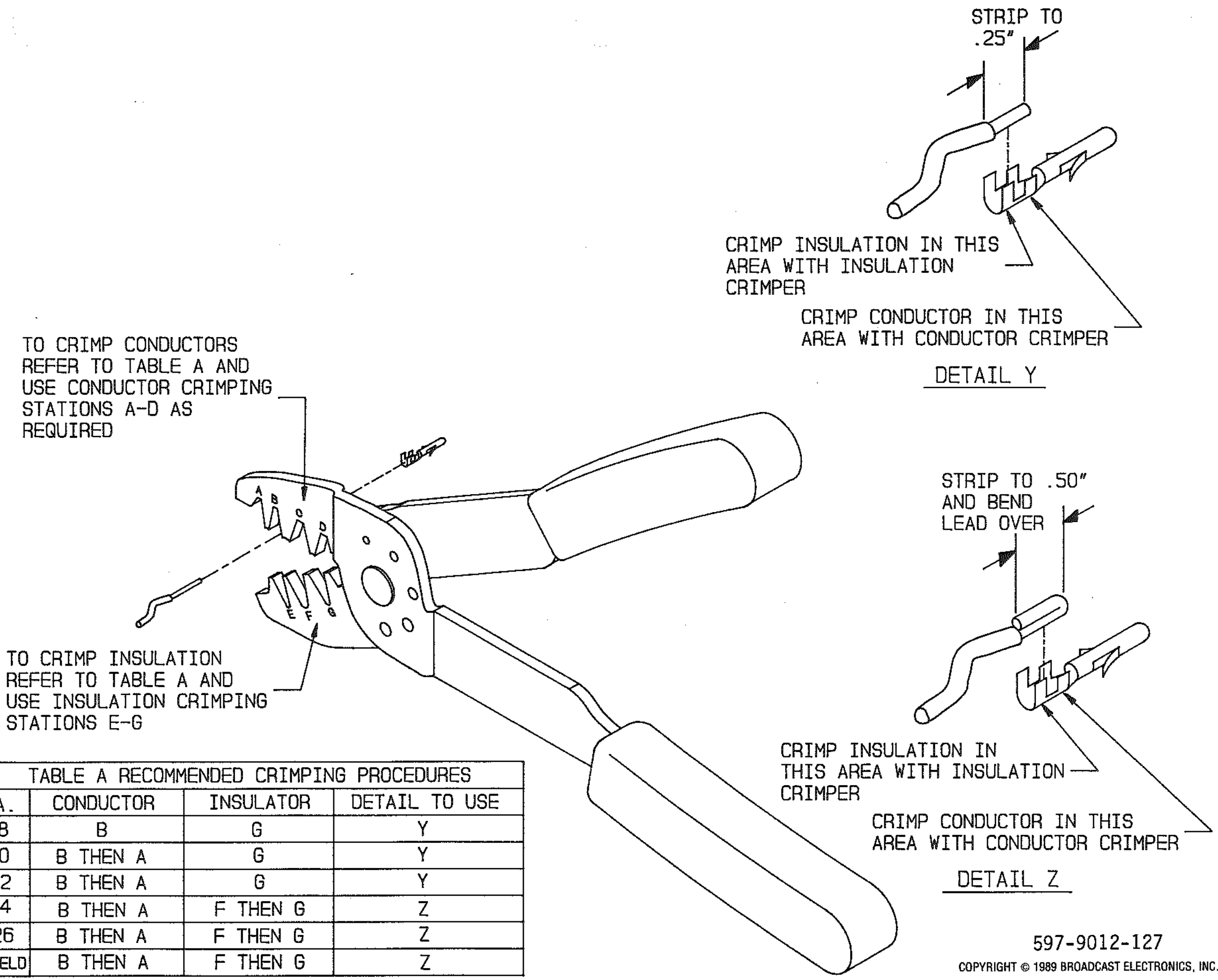


TABLE A RECOMMENDED CRIMPING PROCEDURES			
GA.	CONDUCTOR	INSULATOR	DETAIL TO USE
18	B	G	Y
20	B THEN A	G	Y
22	B THEN A	G	Y
24	B THEN A	F THEN G	Z
26	B THEN A	F THEN G	Z
SHIELD	B THEN A	F THEN G	Z

597-9012-127

OPERATING INSTRUCTIONS, AMP WIRING TOOL No. 29004-1

GENERAL DESCRIPTION

The TDA1074A is a monolithic integrated circuit designed for use as volume and tone control circuit in stereo amplifiers. This dual tandem potentiometer IC consists of two ganged pairs of electronic potentiometers with the eight inputs connected via impedance converters, and the four outputs driving individual operational amplifiers. The setting of each electronic potentiometer pair is controlled by an individual d.c. control voltage. The potentiometers operate by current division between the arms of cross-coupled long-tailed pairs. The current division factor is determined by the level and polarity of the d.c. control voltage with respect to an externally available reference level of half the supply voltage. Since the electronic potentiometers are adjusted by a d.c. control voltage, each pair can be controlled by single linear potentiometers which can be located in any position dictated by the equipment styling. Since the input and feedback impedances around the operational amplifier gain blocks are external, the TDA1074A can performs bass/treble and volume/loudness control. It also can be used as a low-level fader to control the sound distribution between the front and rear loudspeakers in car radio installations.

Features

- High impedance inputs to both 'ends' of each electronic potentiometer
- Ganged potentiometers track within 0.5 dB
- Electronic rejection of supply ripple
- Internally generated reference level available externally so that the control voltage can be made to swing positively and negatively around a well-defined 0 V level
- The operational amplifiers have push-pull outputs for wide voltage swing and low current consumption
- The operational amplifier outputs are current limited to provide output short-circuit protection
- Although designed to operate from a 20 V supply (giving a maximum input and output signal level of 6 V), the TDA1074A can work from a supply as low as 7.5 V with reduced input and output signal levels

QUICK REFERENCE DATA

Supply voltage (pin 11)	V_P	typ.	20	V
Supply current (pin 11)	I_P	typ.	22	mA
Input signal voltage (r.m.s. value)	$V_{i(rms)}$	max.	6	V
Output signal voltage (r.m.s. value)	$V_{o(rms)}$	max.	6	V
Total harmonic distortion	THD	typ.	0.05	%
Output noise voltage (r.m.s. value)	$V_{no(rms)}$	typ.	50	μV
Control range	$\Delta\alpha$	typ.	110	dB
Cross-talk attenuation (L/R)	α_{ct}	typ.	80	dB
Ripple rejection (100 Hz)	α_{100}	typ.	46	dB
Tracking of ganged potentiometers	ΔG_V	typ.	0.5	dB
Supply voltage range	V_P		7.5 to 23	V
Operating ambient temperature range	T_{amb}		−30 to + 80	°C

PACKAGE OUTLINE

18-lead DIL; plastic (SOT-102CS).

DC CONTROLLED DUAL POTENTIOMETERS — TDA1074A

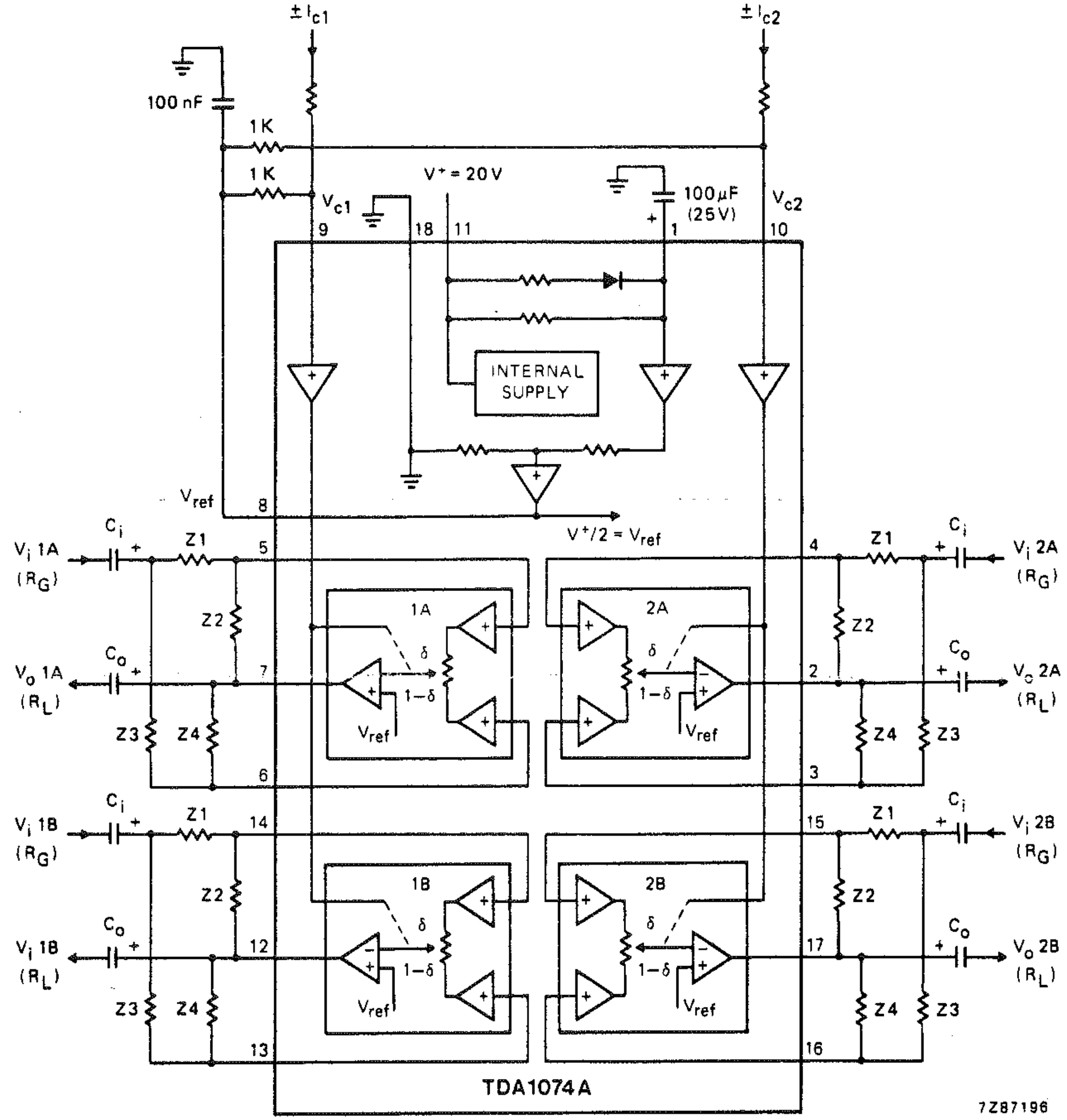


Fig. 1 Block diagram and basic external components; I_{c1} (at pin 9) and I_{c2} (at pin 10) are control input currents; V_{c1} (at pin 9) and V_{c2} (at pin 10) are control input voltages with respect to $V_{ref} = V_P/2$ at pin 8; Z1 = Z2 = Z3 = Z4 = 22 kΩ; the input generator resistance R_G = 60 Ω; the output load resistance R_L = 4.7 kΩ; the coupling capacitors at the inputs and outputs are C_i = 2,2 µF and C_o = 10 µF respectively.

LINEAR INTEGRATED CIRCUITS

14W Hi-Fi AUDIO AMPLIFIER

The TDA 2030 is a monolithic integrated circuit in Pentawatt® package, intended for use as a low frequency class AB amplifier. Typically it provides 14W output power (d = 0.5%) at ± 14V/4Ω; at ± 14V the guaranteed output power is 12W on a 4Ω load and 8W on a 8Ω (DIN 45500). The TDA 2030 provides high output current and has very low harmonic and cross-over distortion. Further the device incorporates an original (and patented) short circuit protection system comprising an arrangement for automatically limiting the dissipated power so as to keep the working point of the output transistors within their safe operating area. A conventional thermal shut-down system si also included.

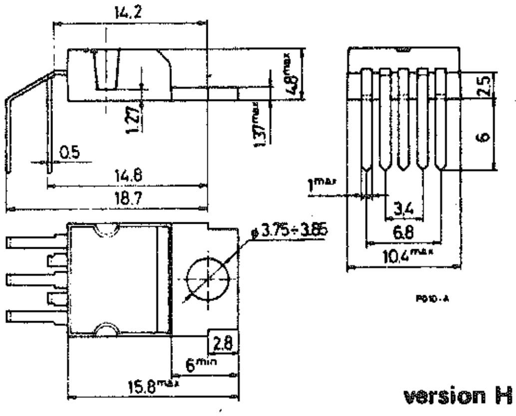
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	± 18	V
V_i	Input voltage	V_s	
V_i	Differential input voltage	± 15	V
I_o	Output peak current (internally limited)	3.5	A
P_{tot}	Power dissipation at $T_{case} = 90°C$	20	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	°C

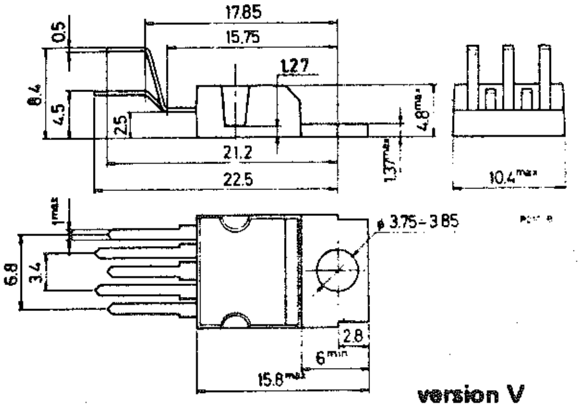
ORDERING NUMBERS: TDA 2030 H; TDA 2030 V

MECHANICAL DATA

Dimensions in mm

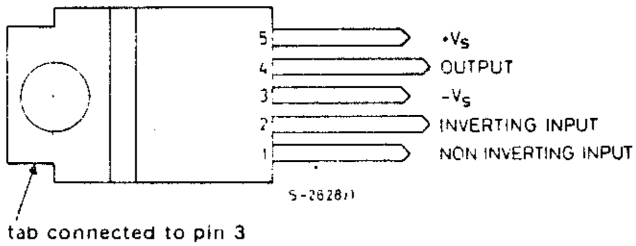


version H

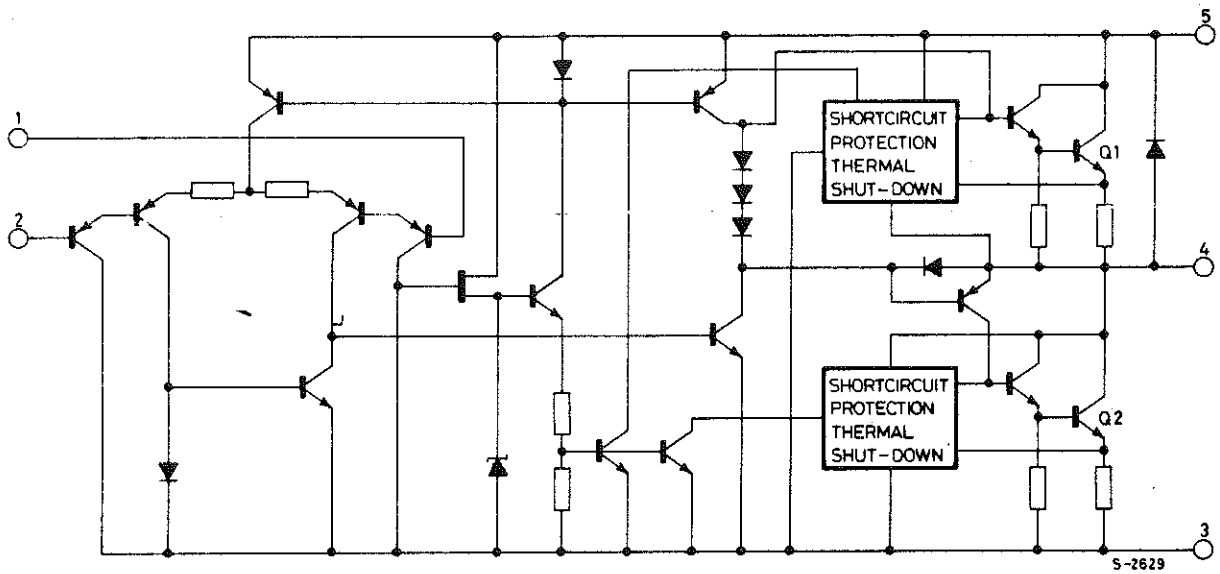


version V

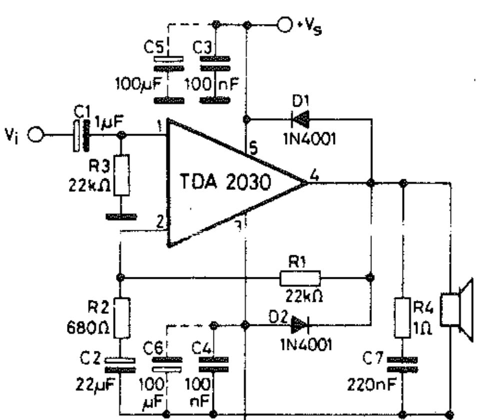
CONNECTION DIAGRAM
(top view)



SCHEMATIC DIAGRAM



TEST CIRCUIT



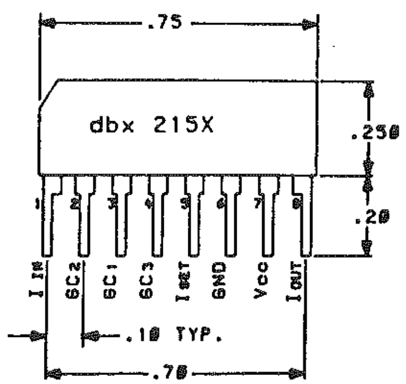
dbx 2150 SERIES VOLTAGE-CONTROLLED AMPLIFIERS

GENERAL DESCRIPTION

The dbx 2150 Series integrated-circuit, voltage-controlled amplifiers (VCAs) are high-performance, current-in/current-out devices with dual-polarity, voltage-sensitive control ports. They require little external support circuitry and are housed in a plastic 8-pin single-in-line (SIP) package, thereby affording unusually high PCB packing densities. Combining a high-gain-bandwidth product with low noise, low distortion, and low input-bias current, these devices offer performance similar to discrete or modular VCAs with the economy of ICs.

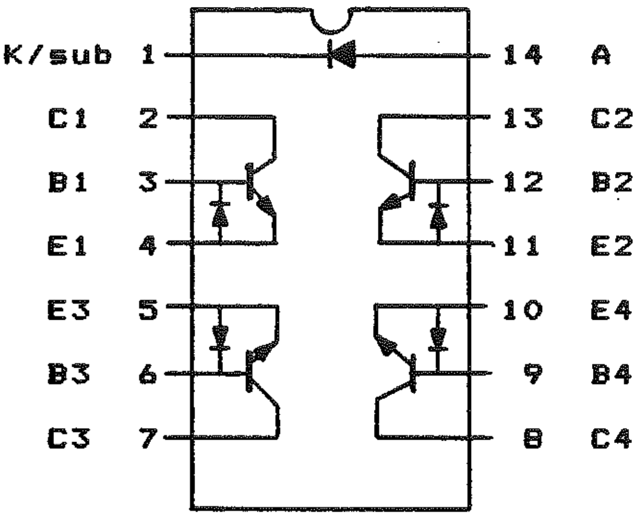
These VCAs may be used in VCF and VCO designs as well as in audio mixing console applications including voltage-controlled faders, voltage-controlled panners, voltage-controlled equalizers, and console automation systems.

PIN CONFIGURATION



VCA ASSOCIATES

7131 Owensmouth St. B-87
Canoga Park, CA 91303
Phone: (818) 704-9202
TWX: 5106015809 VCA ASSOC



TOP VIEW

The MTA 401 SUPERMATCHED QUAD NPN array is a junction isolated, diode-protected, monolithic transistor array featuring extremely low noise, tight Hfe and Vbe matching and excellent log conformity over a very wide current range. A thermally tracking diode is also on the die.

PARAMETER	MIN	TYP	MAX	UNITS
Hfe	100	150	200	
VCBO	36			Volts
VCEO	50			Volts
Vsat		30		mV
Ft		210		MHz
En (Ic=1.5mA)				
at 1 kHz		0.65		nV/rt Hz
at 10 Hz		1.00		nV/rt Hz
HFE MATCH		<1		percent
VBE MATCH		<1		percent
Ft MATCH		<1		percent
Vsat MATCH		<1		percent
Log conformity		<1		percent

PROGRAMMABLE ANALOG COMPANDOR NE572

DESCRIPTION

The NE572 is a dual channel, high performance gain control circuit in which either channel may be used for dynamic range compression or expansion. Each channel has a full wave rectifier to detect the average value of input signal; a linearized, temperature compensated variable gain cell (ΔG) and a dynamic time constant buffer. The buffer permits independent control of dynamic attack and recovery time with minimum external components and improved low frequency gain control ripple distortion over previous compandors.

The NE572 is intended for noise reduction in high performance audio systems. It can also be used in a wide range of communication systems and video recording applications.

FEATURES

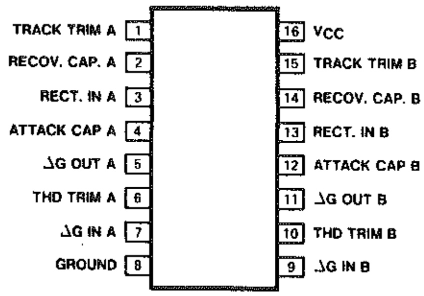
- Independent control of attack and recovery time.
- Improved low frequency gain control ripple
- Complementary gain compression and expansion with external Op Amp
- Wide dynamic range—greater than 110dB
- Temperature compensated gain control
- Low distortion gain cell
- Low noise—6μV typical
- Wide supply voltage range—6V–22V
- System level adjustable with external components.

APPLICATIONS

- Dynamic noise reduction system
- Voltage control amplifier
- Stereo expandor
- Automatic level control
- High level limiter
- Low level noise gate
- State variable filter

PIN CONFIGURATION

N PACKAGE



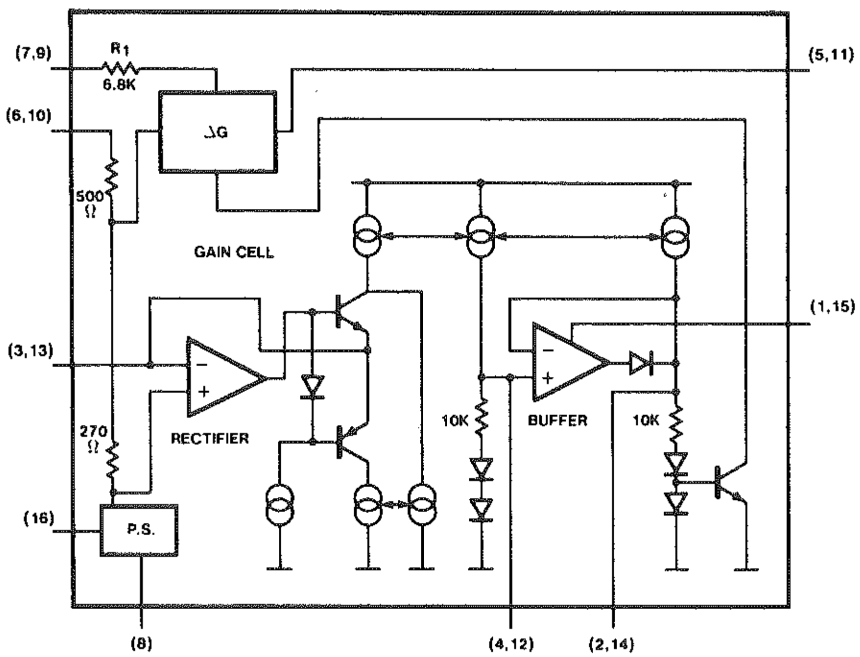
TOP VIEW

ORDER NUMBER
NE572N

ABSOLUTE MAXIMUM RATINGS

PARAMETER		RATING	UNIT
V_{CC}	Supply voltage	22	VDC
T_A	Operating temperature range	0 to 70	°C
P_D	Power dissipation	500	mW

BLOCK DIAGRAM



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SECTION I

LINE INPUT MODULE THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console line input module. A detailed block diagram of the line input module circuitry is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. When applicable, the text describes the operation of module audio circuitry: The audio circuit left and right channels are identical, therefore only the left channel will be discussed.

1-4. FUNCTIONAL DESCRIPTION.

1-5. INPUT CIRCUIT.

1-6. The Mix-Trak 90 console line input modules are designed to process audio from two balanced stereophonic or monophonic line level audio sources. Audio is applied to the module circuitry through programmable attenuator networks. The networks accept resistors for the attenuation of audio source input levels. The attenuator networks are provided to equalize the input level when two sources at different levels are applied to the module. Audio from the attenuator networks is routed to an input selection and audio amplifier circuit.

1-7. INPUT SELECTION. Audio source input selection is accomplished by interlocked two-position switch/indicator S1A/B. The switch selects and routes audio for application to the module audio circuitry. Switch S1A/B also contains A/B input select status contacts. The contacts output A/B select status information for application to remote control assemblies. Audio from input select switch network S1 is applied through left channel gain control potentiometer R21 to a left channel input amplifier network. R21 provides approximately 10 dB of gain control adjustment to align the audio input levels.

1-8. INPUT AMPLIFIER. Left channel input amplification is provided by a programmable instrumentation amplifier. The instrumentation amplifier consists of integrated circuits U1A/B and U3A. The amplifier stage is designed to accept input levels ranging from +8 dBu to -10 dBu and will generate a nominal audio output level of approximately -5 dBu. The gain of the amplifier stage is established by jumper network J4. The network consists of five jumper programmable positions which establish the amplifier stage gain for the following audio input levels: 1) +8 dBu, 2) +4 dBu, 3) Ø dBu, 4) -5 dBu, and 5) -10 dBu. The output of the amplifier stage is routed for application to overload indicator and patch point circuitry.

1-9. OVERLOAD INDICATOR CIRCUIT.

1-10. Samples from the left and right channel input instrumentation amplifiers are applied to overload indicator comparator U12A. When either the left or right channel level increases above approximately +20 dBu, the output of comparator U12A will go HIGH. Overload indicator DS1 will illuminate to indicate an excessive audio input level conditions.

1-11. PATCH POINT NETWORKS.

1-12. The line input module patch point networks consists of a transmitting stage, a receiving stage, and a jumper network. The patch point networks are incorporated into the module design to provide interfacing for the connection of external audio processing equipment.

1-13. Audio from the input instrumentation amplifier is applied to a patch point transmitting stage consisting of complementary buffers U8A/B and U9A/B. U8A/B and U9A/B produce balanced stereophonic audio at approximately -5 dBu for application to external audio processing equipment. The stage is configured for continuous operation to provide access to module audio without circuit board programming.

1-14. Audio from external audio processing equipment is applied to the patch point receiving stage. The receiving stage consists of a balanced two-stage inverting buffer network. Balanced left channel audio is applied to inverting buffers U10A/B. Positive audio is inverted at U10B and summed at the input of U10A to provide balanced-to-unbalanced audio conversion. The output of the stage is routed to left channel patch point jumper J6. J6 routes audio from either the input amplifier or the patch point receiving network to the audio level control circuit.

1-15. AUDIO LEVEL CONTROL CIRCUIT.

1-16. Audio from the input amplifier or the patch point receiving network is routed to the audio level control circuit. The audio level control circuit consists of: 1) a mono/stereo select switch, 2) a VCA taper control network, and 3) a VCA level control circuit. The entire control circuit functions to select and provide precision low-noise control of the module audio level.

1-17. MONO/STEREO SELECT. Mono/stereo select switch S5 is a rotary four-position switch designed to direct audio in a variable manner to a VCA level control circuit. The stereo position routes left channel audio to the VCA left channel circuit and right channel audio to the VCA right channel circuit. The mono position sums the left and right channel audio input information for application to both the VCA left and right channel circuitry. The left position routes left channel audio source information to the VCA left and right channel circuits. The right position routes right channel audio input information to the left and right channel VCA circuits.

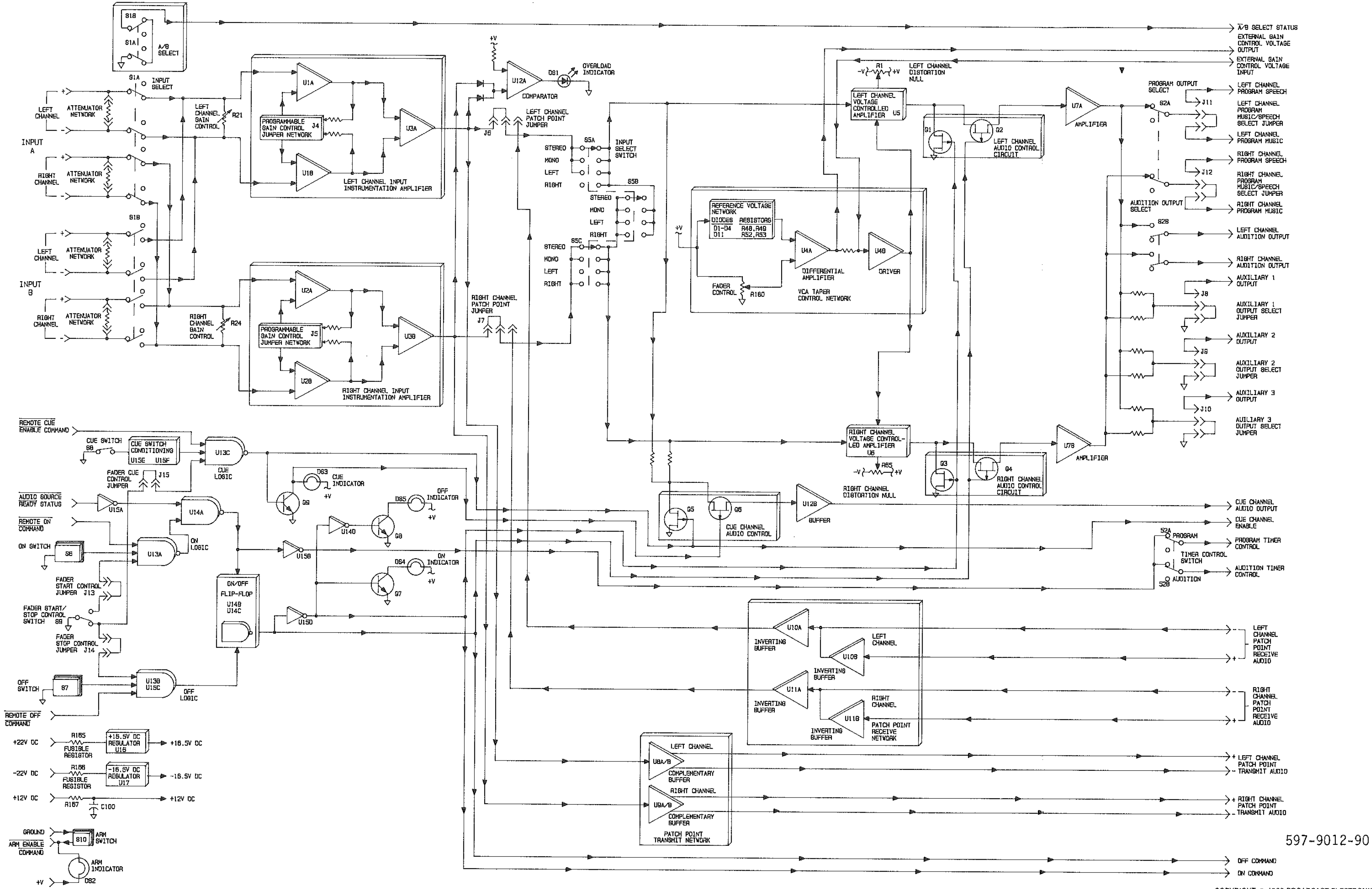


FIGURE 1-1.
LINE INPUT MODULE DETAILED BLOCK DIAGRAM

1-18. VCA TAPER CONTROL CIRCUIT. Module audio level control operations are performed by two 2150A series VCA modules. The VCA modules are directed by a taper control circuit which establishes the module operating parameters. The VCA taper control network consists of: 1) slide-action fader control R180, 2) a reference voltage network consisting of diodes D1 through D4, diode D11 and resistors R48, R49, R52, and R53, 3) differential amplifier U4A, and 4) driver U4B.

1-19. The taper control circuit is designed to operate in reponse to changes in the output voltage from fader control R180. R180 is designed with a dc control range from Ø to 5 volts. A non-linear taper control circuit gain response is established by the reference voltage network. When the voltage from R180 is from Ø volts (+10 dB fader position) to approximately 0.40 volts (-5 dB fader position), the taper control circuit gain will be unity. A 0.40 volt (-5 dB fader position) to 2 volt (-30 dB fader position) output from R180 will result in a circuit gain of approximaltey 2. A 2 volt (-30 dB fader position) to 5 volt (-55 dB fader position) output from R180 will generate a taper control circuit gain of approximately 4. As a result of gain design, a -55 dB to +10 dB non-linear operating response is established for the VCA level control network.

1-20. The dc control voltage from the VCA taper control circuit is applied to the VCA modules for precision control of the module audio level. When fader control R180 is operated to the +10 dB position, a Ø volt dc reference is applied to differential amplifier U4A. U4A will output approximately Ø volts dc through driver U4B to the VCA modules to establish maximum audio level gain. When fader R180 is operated to the -55 dB position, a +5 volt dc reference is applied to amplifier U4A. U4A will output approximately 12 volts dc through U4B to establish minimum audio level gain.

1-21. External Gain Control. An external gain control feature is incorporated into the taper driver circuit design for control of the module audio level by external equipment or additional input modules. DC control voltage from U4A is routed to control master/slave input module configurations or to control external audio equipment. An external gain control input routes control voltage to the taper control circuit for application to the VCA circuit.

1-22. VCA CIRCUIT. Audio from the input select switch network is applied to left channel voltage-controlled-amplifier (VCA) module U5. U5 is a 2150A series prescision low-noise voltage-controlled-amplifier. The VCA is a current-input/current output device with a voltage sensitive control port. VCA U5 activley controls the left channel audio level as directed by the VCA taper control circuit. Potentiometer R1 is provided to null distortion at the VCA stage. Audio from VCA module U5 is routed through a series-shunt audio control circuit consisting of field-effect-transistors (FET) Q1 and Q2. The output of the control circuit is applied to amplifier U7A. U7A operates in association with VCA U5 to convert the current output of the VCA to a voltage. The output of U7A is routed for application to the output circuit.

1-23. OUTPUT CIRCUIT.

1-24. Audio from amplifier U7A is applied to an output circuit for distribution to the console output buss network. The console output buss network consists of three stereophonic and three monophonic output busses. Stereophonic busses include: 1) program speech, 2) program music, and 3) audition. Monophonic busses inlcude: 1) auxiliary 1, 2) auxiliary 2, and 3) auxiliary 3. Each output bus is current-operated to provide maximum noise performance.

1-25. Output selection is accomplished by program/audition select switch S2A/B. Switch S2A is designed to route audio to left channel program music/speech select jumper J11. J11 assigns the audio to either the program speech buss or to the program music buss.

1-26. Audio from U7A is also applied to auxiliary 1 jumper J8, auxiliary 2 jumper J9, and auxiliary 3 jumper J10. The jumpers allow output audio to be assigned to the auxiliary 1, auxiliary 2, or auxiliary 3 output busses.

1-27. CONTROL CIRCUIT.

1-28. The line input module control circuit consists of individiual CMOS logic gates. The gates are organized into functional circuits to provide module on/off control, cue circuit control, muting control, and status indicator control.

1-29. ON/OFF CIRCUIT. Line input module on/off control functions are accomplished by on switch/indicator S6 and off switch/indicator S7. S6 and S7 are hall-effect switches which exhibit reliable low-noise operation. Module on/off control functions may also be initiated by the operation of the fader control. Detent switch S9 is incorporated into the fader to provide on/off control commands. A LOW module on command is generated when the fader is operated from the off position. A LOW module off command is generated when the fader is operated to the off position. Fader start control jumper J13 and stop control jumper J14 enable or disable the control functions as required.

1-30. A module on sequence is initiated when a LOW control command is generated by: 1) on switch/indicator S6, 2) the remote on switch/indicator, or 3) fader switch S9. The LOW is applied to NAND gate U13A which outputs a HIGH to NAND gate U14A. U14A NANDs a HIGH from U13A and a HIGH from inverter U15A to produce a LOW for application to the on/off flip-flop and a timer control circuit.

1-31. The control circuit on/off flip-flop is constructed from NAND gates U14B and U14C. With a LOW command from U14A, the output of the on/off flip-flop will go LOW. The LOW is routed through inverter U15D to produce complementary HIGH/LOW commands for application to left and right channel audio control networks. The commands configure the networks for audio output routing operations. A HIGH command from inverter U15D is also applied to an indicator circuit consisting of inverter U14D, driver transistors Q7 and Q8, on indicator DS4, and off indicator DS5. The HIGH: 1) biases driver transistor Q7 on to illuminate module on indicator DS4 and 2) biases driver transistor Q8 off to extinguish off inidicator DS5.

1-32. A module off sequence is initiated when a LOW control command is generated by: 1) off switch/indicator S7, 2) the remote off switch/indicator, or 3) fader switch S9. The LOW is applied to off logic U13B and U15C. The output of U13B/U15C will go LOW and reset on/off flip-flop U14B/C. The output of on/off flip-flop U14B/C will go HIGH. The HIGH is routed through inverter U15D to generate completementary HIGH/LOW commands to configure the audio control circuitry to mute the output audio. A LOW command from inverter U15D is also applied to: 1) bias transistor Q7 off to extinguish on indicator DS4 and 2) bias transistor Q8 on to illuminate off indicator DS5.

1-33. CUE CIRCUIT.

1-34. The line input module cue circuit consists of an on/off logic circuit and an audio control network. Audio for application to the console cue channel is routed from input select switch S5 to a cue channel control circuit consisting of field-effect-transistors (FET) Q5 and Q6. The audio control circuit is directed by a logic network consisting of cue switch S8, a switch conditioning circuit, and cue on/off gate U13C.

1-35. Audio is applied to the console cue channel when a LOW control command is generated by cue switch S8 or the remote cue switch. When a cue on command is generated by S8, the command is applied through a contact conditioning circuit consisting of inverters U15E/F. A console cue command may also be initiated by fader control swtich S9. Jumper J15 allows the fader cue feature to be disabled.

1-36. With a cue switch activated, a LOW cue control command is applied to NAND gate U13C. The output U13C will go HIGH. The HIGH will bias driver transistor Q9 on to generate a LOW control command and to illuminate cue indicator DS3. The LOW from Q9 and the HIGH from U13C provide complementary control signals for application to a series-shunt audio control circuit consisting transistors Q5 and Q6. The HIGH biases Q5 off and the LOW biases Q6 on to enable cue audio. The audio is routed through buffer U12B for application to the console cue speaker.

1-37. OUTPUT AUDIO CONTROL CIRCUIT.

1-38. Control of the line input module output audio is provided by left and right channel series-shunt field-effect-transistor (FET) control circuits. The left channel circuit consists of transistors Q1 and Q2. The transistors are controlled by complementary commands from on/off flip-flop U14B/C. When the module is operated to on, complementary HIGH/LOW control commands are applied to transistors Q1 and Q2. A HIGH biases Q1 off and a LOW biases Q2 on to enable the left channel program audio.

1-39. ARM CIRCUIT.

1-40. Audio source sequencing operations are initiated by the arm circuit. The arm circuit consists of switch S10 and indicator DS2. When audio source sequencing is required, a LOW arm enable command is routed from switch S10 for application to control circuitry on a source remote control module and to illuminate indicator DS2.

1-41. TIMER CONTROL CIRCUIT.

1-42. Control commands for application to the console clock/timer module are generated by the contacts of switch S2. A HIGH on command from inverter U15D is applied to program/audition output select switch S2. S2 will route a HIGH control command to the clock/timer module program or audition control line as required for the selected output buss.

1-43. POWER SUPPLY CIRCUIT.

1-44. DC operating potentials for application to the line input module components are produced by a regulator network. Unregulated ±24 volt supplies from the console power supply module are applied through fusible resistors R165 and R166 to a regulator network consising of U16 and U17. R165/R167 are a carbon-composition resistors which function as fusible links in the event of a short-circuit potential on the module. The fusible resistors limit a power supply failure to the module and prevent a failure in the entire console system.

1-45. ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U16 and -16.5 volt dc regulator U17. U16/U17 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U16 and U17 are routed for application to the module audio components.

1-46. A regulated +12 volt supply is applied through an RC filter network consisting of resistor R167 and capacitor C100. The output of the filter network is routed for application to the module control logic components.

SECTION II

LINE INPUT MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the line input module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. GENERAL.

2-6. The line input module circuitry should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-7. AUDIO SWITCHES.

2-8. Each line input module is equipped with ITT Shadow audio switches. The switches are sealed for low-noise long-life operation and do not permit cleaning. If a switch becomes noisy or defective, the switch will require replacement.

2-9. FADER CONTROL.

2-10. Each line input module is equipped with a Penny and Giles slide-action fader control. If a fader control becomes defective, the control may require: 1) cleaning or 2) replacement of the control shaft bushings.

2-11. To clean the slide-action fader, remove the fader from the line input module assembly. Remove the fader end-caps and slide the fader assembly out of the aluminum housing. Using distilled water and a cotton swab, remove all dust and dirt from the fader circuit board area. Re-assemble the fader control and replace the fader assembly in the module.

2-12. To replace the fader shaft bushings, replacement parts and a recommended procedure must be obtained from Penny and Giles Inc. Contact Penny and Giles at the address shown below for the replacement bushings and the installation instructions.

Penny and Giles
2716 Ocean Park Blvd.
Suite 1005
Santa Monica, California 90405

2-13. SECOND LEVEL MAINTENANCE.

2-14. Second level maintenance consists of produres required to restore a line input module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-15. ELECTRICAL ADJUSTMENTS.

2-16. VCA DISTORTION ADJUSTMENT. Left channel VCA distortion control R1 and right channel VCA distortion control R65 null distortion at the VCA modules. Distortion adjustment is not required unless VCA modules U5 or U6 are replaced. The VCA distortion is nulled as follows.

2-17. Required Equipment. The following test equipment is required to null the VCA distortion.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Extender Ribbon Cable Assemblies:
40-Pin Assembly
50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. Audio Analyzer - Capable of indicating distortion levels from 0.05% to 0.1% (Sound Technology 1710A Distortion Analyzer or equivalent).

2-18. Procedure. To null the VCA distortion, proceed as follows:

2-19. Remove the line input module from the mainframe and connect the extender cable assemblies between the line input module and the receptacles on the mainframe input motherboard assemblies.

2-20. Connect the audio signal generator to the A or B left channel input on the line input module associated input/remote connector.

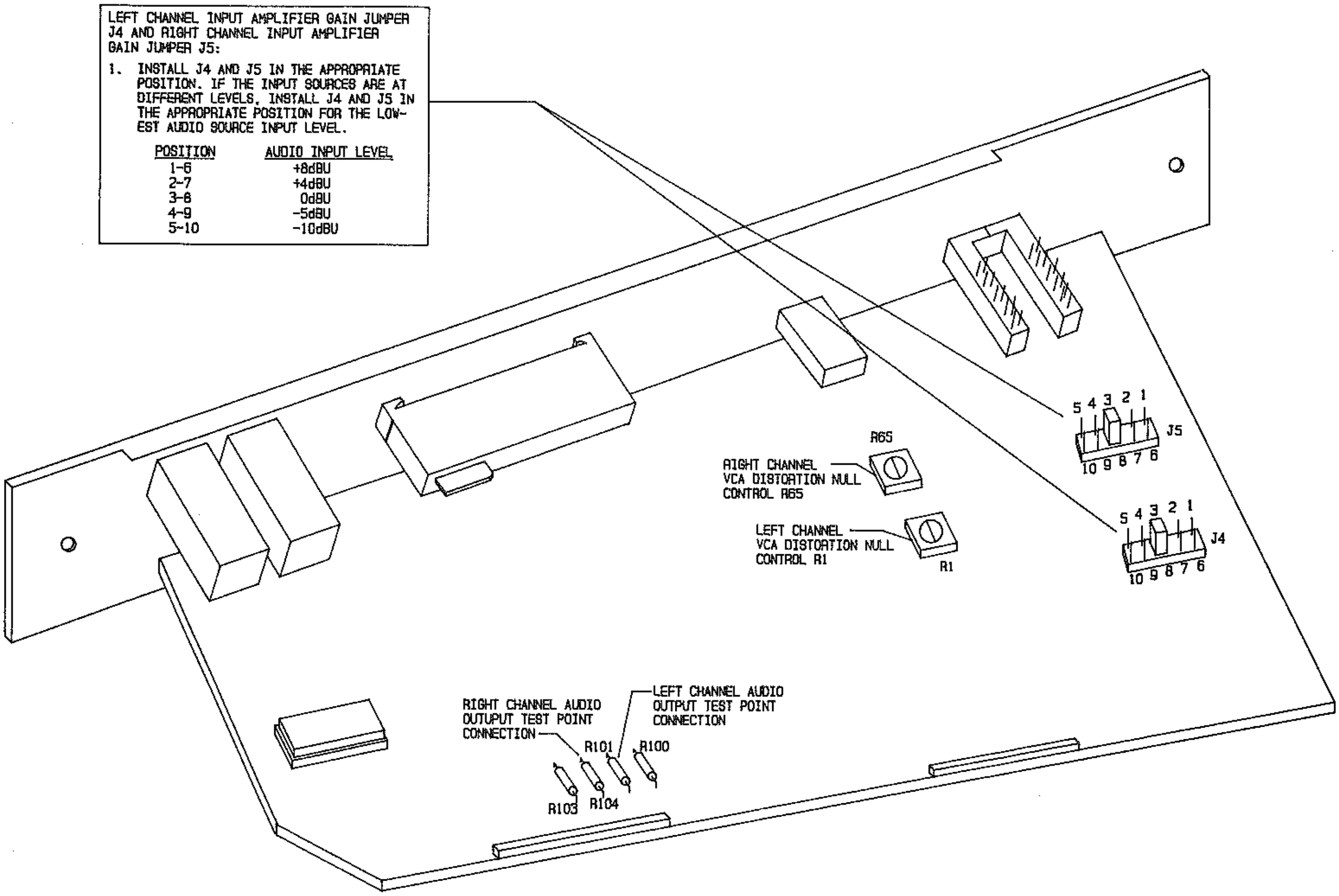
2-21. Refer to Figure 2-1 and connect the audio analyzer between chassis ground and resistor R101 as shown.

2-22. Refer to Figure 2-1 and install jumpers J4 and J5 in the Ø dBu position.

2-23. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-24. Operate the line input module at a normal level and route the test audio to the audition output bus.

2-25. Refer to Figure 2-1 and adjust left channel VCA distortion null control R1 for a minimum audio analyzer indication.



597-9012-107

FIGURE 2-1. LINE INPUT MODULE ADJUSTMENT CONTROLS

2-26. Repeat the procedure for the right channel. Connect the audio analyzer to resistor R104 and adjust the right channel distortion with right channel VCA distortion null control R65.

2-27. Disconnect all test equipment, reprogram jumpers J4 and J5 if required, and replace the line input module.

2-28. TROUBLESHOOTING.

2-29. The troubleshooting philosophy for the line input module consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures. To prevent the application of inadvertent audio noise to the console audio system, attach the 50-pin extender assembly to the module before the 40-pin assembly.

2-30. Figures 2-2 through 2-4 present the line input module troubleshooting. Refer to Figures 2-2 through 2-4 to isolate a failure to a specific group of components.

2-31. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-32. COMPONENT REPLACEMENT.

2-33. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

LINE INPUT MODULE GENERAL TROUBLESHOOTING.	
NUMBER	PROCEDURES
1	MEASURE THE VOLTAGE AT U16 PIN 2. THE VOLTAGE MUST BE +16.5VDC.
2	MEASURE THE VOLTAGE AT U17 PIN 3. THE VOLTAGE MUST BE -16.5VDC.
3	MEASURE THE VOLTAGE ACROSS R165. THE VOLTAGE MUST BE LESS THAN 1 VOLT DC.
4	MEASURE THE VOLTAGE ACROSS R166. THE VOLTAGE MUST BE LESS THAN 1 VOLT DC.
5	MEASURE THE VOLTAGE AT U14 PIN 14. THE VOLTAGE MUST BE GREATER THAN 10 VOLTS DC.
6	MEASURE THE VOLTAGE ACROSS R167. THE VOLTAGE MUST BE GREATER THAN 1 VOLT DC.
7	CHECK U13,U14,AND U15 FOR OVER-TEMPERATURE CONDITIONS.

597-9012-128

FIGURE 2-2. LINE INPUT MODULE GENERAL TROUBLESHOOTING

LINE INPUT MODULE CONTROL LOGIC TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO LOCAL MODULE ON/OFF CONTROL	1. DEFECTIVE S6 OR S7
NO REMOTE MODULE ON/OFF CONTROL	1. REFER TO SIMPLE REMOTE CONTROL MODULE TROUBLESHOOTING.
NO MODULE ON/OFF CONTROL WITH FADER	1. DEFECTIVE FADER SWITCH S9.
NO LOCAL AND NO REMOTE ON/OFF CONTROL	1. DEFECTIVE U13,U14,OR U15.
NO CUE OPERATION	1. CHECK CUE SWITCH S8. 2. CHECK FADER SWITCH S9. 3. DEFECTIVE U13 OR U15.

597-9012-129

FIGURE 2-3. LINE INPUT MODULE CONTROL LOGIC TROUBLESHOOTING

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

LINE INPUT MODULE AUDIO TROUBLESHOOTING

SYMPTOM	SOLUTION
MISSING OR DISTORTED AUDIO OUTPUT	ACTIVATE THE B AUDIO SOURCE AND OPERATE THE MODULE. IS NORMAL OUTPUT AUDIO PRESENT? YES: 1. DEFECTIVE S1. 2. DEFECTIVE AUDIO SOURCE. NO: IS AUDIO PRESENT AT U8 PINS 1 AND 7 AND U9 PINS 1 AND 7 — NO: 1. NO LEFT CHANNEL AUDIO: DEFECTIVE U1,U3,OR U8. 2. NO RIGHT CHANNEL AUDIO: DEFECTIVE U2,U3,OR U9. 3. NO LEFT CHANNEL AND NO RIGHT CHANNEL AUDIO: DEFECTIVE U1,U2,U3,U8,OR U9. — YES: IS AUDIO PRESENT AT CAPACITOR C81 AND C93? —— NO: DEFECTIVE S5 —— YES: OPERATE THE FADER TO THE 0dB POSITION. IS 0.00VDC PRESENT AT U5 AND U6 PIN 3? ——— NO: 1. DEFECTIVE U4. 2. DEFECTIVE FADER R180. ——— YES: OPERATE THE FADER TO THE +12dB POSITION. IS -0.072VDC PRESENT AT U5 AND U6 PIN 3? ———— NO: 1. DEFECTIVE U4 OR D11. 2. DEFECTIVE FADER R180 ———— YES: OPERATE FADER TO THE OFF POSITION. IS +0.4VDC PRESENT AT U5 AND U6 PIN 3? ————— NO: 1.DEFECTIVE U4 OR D11. 2. DEFECTIVE FADER R180. ————— YES: DEFECTIVE U5,U6,Q1,Q2,Q3,Q4,OR U7.
FADER NOT CONTROLLING CHANNEL LEVEL	OPERATE THE FADER TO THE +12dB POSITION. IS 0.00VDC PRESENT AT U4 PIN 3? OPERATE THE FADER TO THE OFF POSITION. IS +5.1VDC PRESENT AT U4 PIN 3? NO: 1. CHECK E11,E12,AND E13 2. DEFECTIVE FADER CONTROL R180. YES: 1. DEFECTIVE U4,D11,OR D1 THROUGH D4. 2. CHECK EXTERNAL GAIN CONTROL INPUT AT P1 PIN 15 FOR 0.0VDC.
NO CUE AUDIO OUTPUT	1. CHECK CUE SWITCH S8. 2. CHECK Q5,Q6,AND U12. 3. CHECK U13 AND U15.
NO PATCH POINT OPERATION	1. DEFECTIVE U10 AND U11.

597-9012-130

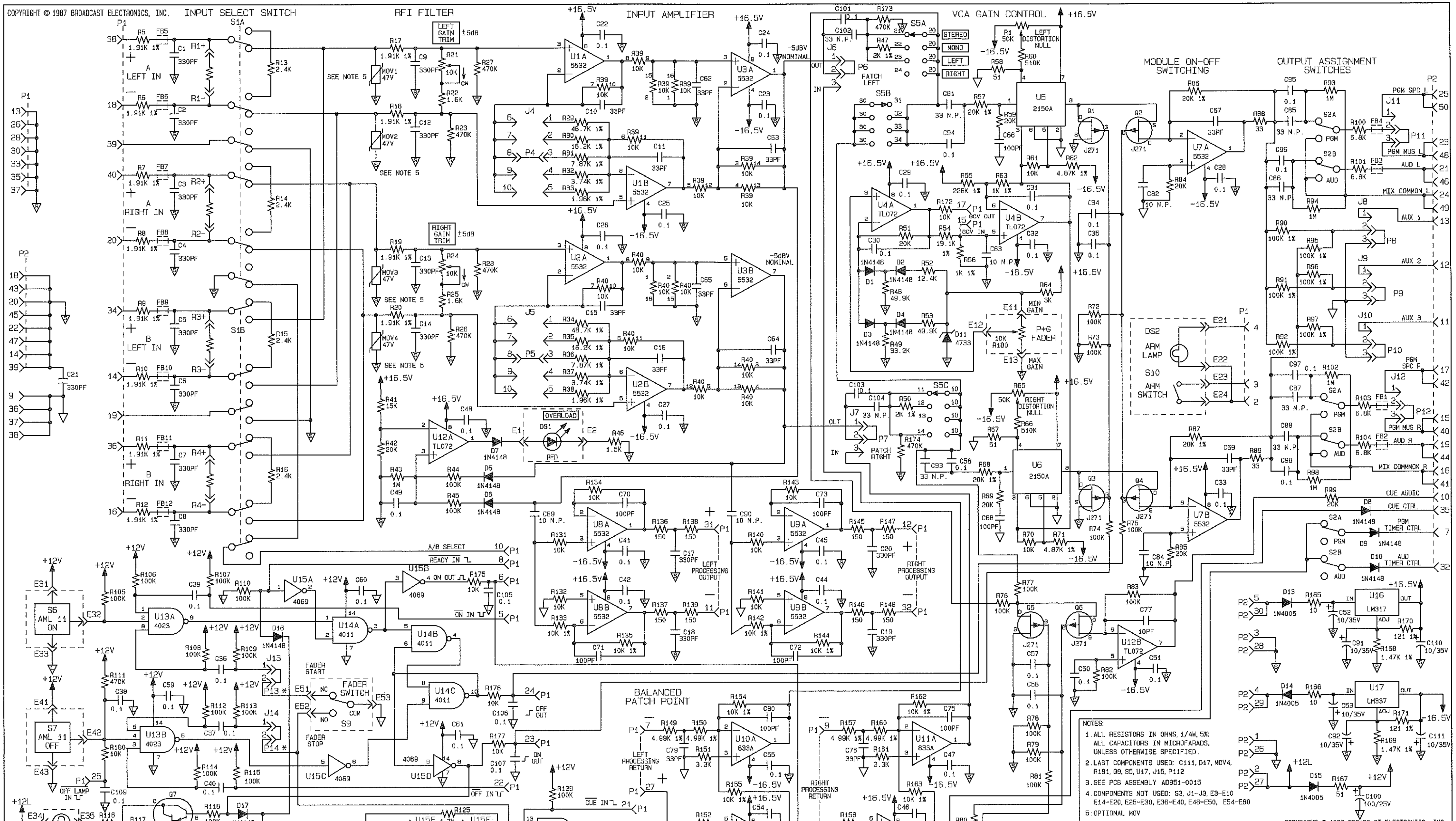
FIGURE 2-4. LINE INPUT MODULE AUDIO TROUBLESHOOTING

SECTION III

LINE INPUT MODULE DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the line input module.



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%; ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: C111, D17, MOV4, R181, Q9, S5, U17, J15, P112
3. SEE PCB ASSEMBLY AD951-0015
4. COMPONENTS NOT USED: S3, J1-J3, E3-E10 E14-E20, E25-E30, E36-E40, E46-E50, E54-E60
5. OPTIONAL MOV

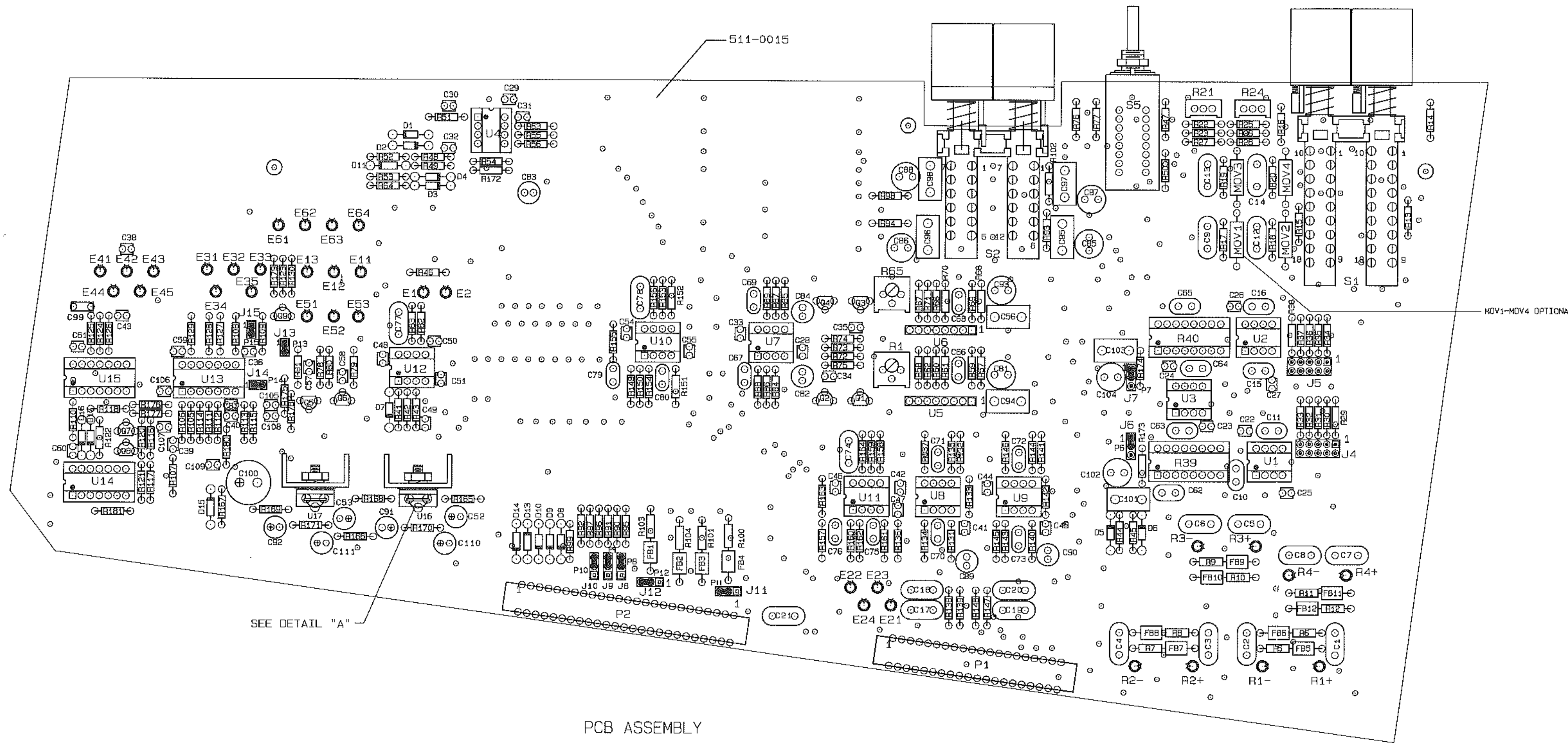
* SHIPPED IN OPEN CONDITION

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

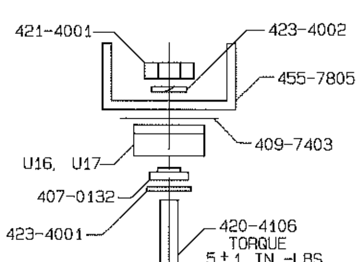
DWN BY	MERK 12-29-87
CHKD	MH 9-22-98
ME	
PROJ. ENGR.	
MFG	
MATERIAL	SEE B/M 951-0015
FINISH	
NEXT ASSY	AD951-0015

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

TITLE	PCB SCHEMATIC- LINE INPUT MODULE
TYPE	S
SIZE	D
DWG.NO.	951-0015
REV	B
MODEL	MT90
SCALE	NONE
SHEET	1 OF 1



PCB ASSEMBLY

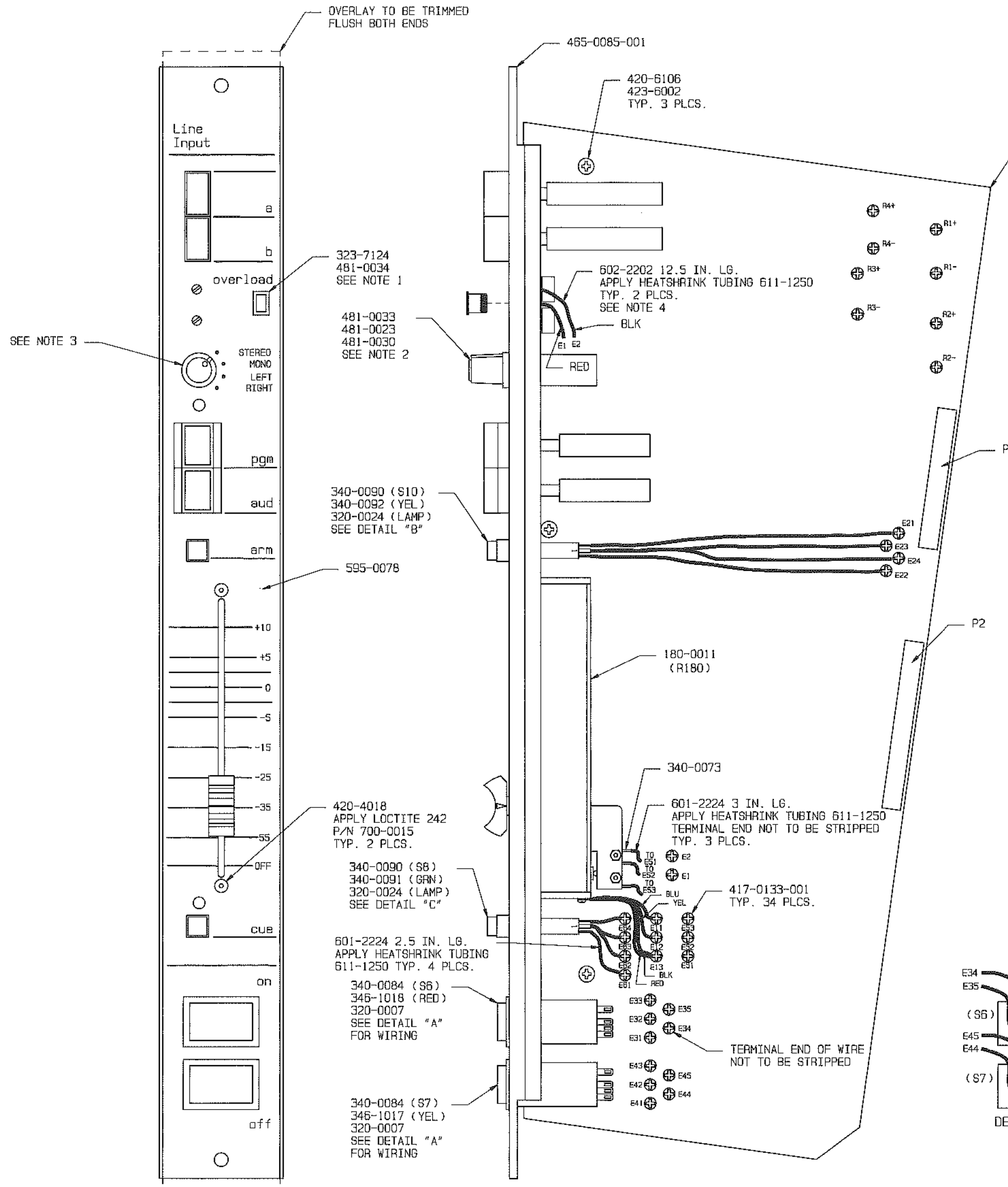


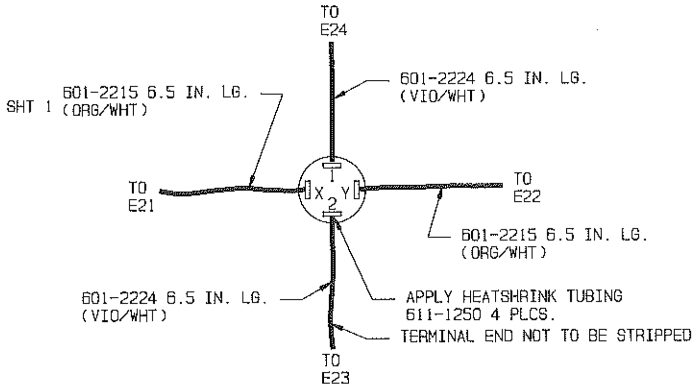
DETAIL "A"
TYPICAL 2 PLCS.

NOTE:

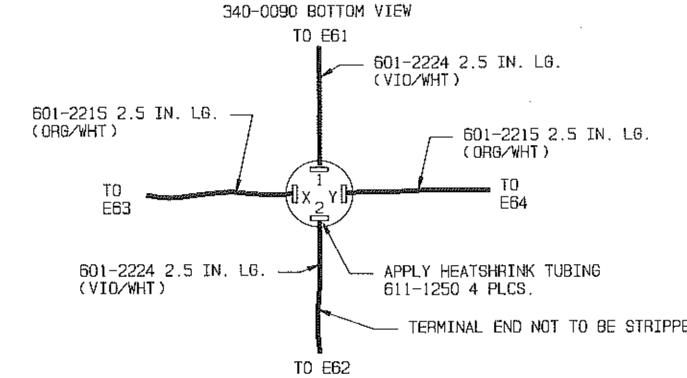
1. SEE SCHEMATIC SD951-0015
2. REFER TO PAGE 2 FOR MODULE ASSEMBLY
3. ◯ INDICATES SLOT IN BARREL TERMINAL.

TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°	DWN BY MERK 1-7-88	MATERIAL SEE B/M 951-0015	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST
	CHKD MH 8-22-88	FINISH	TITLE LINE INPUT MODULE
	ME 3/22/95		TYPE A · SIZE D · DWG.NO. 951-0015 · REV B
	PROJ. ENGR.	NEXT ASSY 901-9012 "12CH" 901-9018 "18CH"	MODEL MT90 · SCALE 1.5/1 · SHEET 1 OF 2
	MFG		





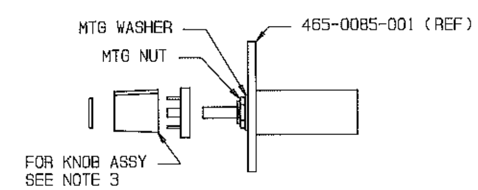
DETAIL "B"
340-0090 BOTTOM VIEW



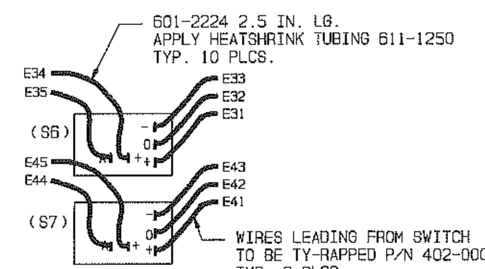
DETAIL "C"
340-0090 BOTTOM VIEW

NOTES:

1. LONG LEAD OF LED (323-7124) IS CATHODE SIDE TO BE CONNECTED TO E2 BY BLACK LEAD. SECURE LED CASING TO INSIDE OF 465-0085-001 WITH LOCTITE P/N 700-0063 2 PLCS. ROUTE LEAD AWAY FROM SWITCHES AND PCB.
2. NUT, LOCKWASHER,& LOCKING RING SUPPLIED WITH SWITCH TO BE REMOVED BEFORE ASSY. DISCARD RING THEN PUT NUT & LOCKWASHER BACK ON AND TIGHTEN AFTER THE EXTRUSION HAS BEEN FITTED TO PCB. SEE DETAIL "A"



DETAIL "A"



DETAIL "A"

3. TURN CONTROL FULLY CCW. POSITION KNOB LINE ON DOT CLOSEST TO "STEREO" AND TIGHTEN KNOB. PRESS IN CAP.
4. SECURE WIRE TO INSIDE OF EXTRUSION (465-0085-001) WITH TAPE P/N 700-0148.

TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xx ± .015 .xxx ± .005 ANGLES ± 1°	DWN. BY JAH 2-19-88	MATERIAL SEE B/M 951-0015	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST
	CHKD MH 3-22-88	FINISH	TITLE LINE INPUT MODULE
	ME	SEE DWG RA502-0000	TYPE A SIZE D DWG. NO. 951-0015 REV B
	PROJ. ENGR.	NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	MODEL MIX TRAK 90 SCALE 1/1 SHEET 2 OF 2
	MFG.		

SECTION IV

LINE INPUT MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the line input module. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram.

TABLE 4-1. LINE INPUT MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	LINE INPUT MODULE CIRCUIT BOARD ASSEMBLY	951-0015	4-1

TABLE 4-2. LINE INPUT MODULE CIRCUIT BOARD ASSEMBLY - 951-0015
(Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C9	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	9
C10,C11	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	2
C12,C13,C14	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	3
C15,C16	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	2
C17 THRU C21	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	3
C22 THRU C51	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	30
C52,C53	Capacitor, Electrolytic, 10 uF, 35V	023-1076	2
C54,C55	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C56	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C57 THRU C61	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	5
C62 THRU C65	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	4
C66	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C67	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C68	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C69	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C70 THRU C73	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	4
C74	Capacitor, Mica, 10 pF ±5%, 500V	042-1012	1
C75	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C76	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C77,C78	Capacitor, Mica, 10 pF ±5%, 500V	042-1012	2
C79	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C80	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C81	Capacitor, Electrolytic, 33 uF, 25V	020-3374	1
C82,C83,C84	Capacitor, Electrolytic, 10 uF, 35V	023-1075	3
C85 THRU C88	Capacitor, Electrolytic, 33 uF, 25V	020-3374	4
C89,C90	Capacitor, Electrolytic, 10 uF, 35V	023-1075	2
C91,C92	Capacitor, Electrolytic, 10 uF, 35V	023-1076	2
C93	Capacitor, Electrolytic, 33 uF, 25V	020-3374	1
C94 THRU C98	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	5
C99	Capacitor, Mylar Film, 0.01 uF ±10%, 100V	031-1043	1
C100	Capacitor, Electrolytic, 100 uF, 35V	023-1084	1

TABLE 4-2. LINE INPUT MODULE CIRCUIT BOARD ASSEMBLY - 951-0015
(Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C101	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C102	Capacitor, Electrolytic, 33 uF, 25V	020-3374	1
C103	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C104	Capacitor, Electrolytic, 33 uF, 25V	020-3374	1
C105 THRU C109	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	5
C110,C111	Capacitor, Electrolytic, 10 uF, 35V	023-1076	2
D1 THRU D10	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	10
D11	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D13,D14,D15	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	3
D16,D17	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
DS1	LED, Red, MV57124, 3V @ 20 mA Maximum	323-7124	1
DS2,DS3	Lamp, 11-903-1, 12V, 0.7W, T-1 Bi-Pin	320-0024	2
DS4,DS5	Lamp, No. 73, 14V, 0.08A, T-1 3/4 Bulb, Wedge Base	320-0007	2
E1,E2,E11, E12,E13,E21 THRU E24,E31 THRU E35,E41 THRU E45,E51, E52,E53,E61 THRU E64	Terminal, Barrel, 4 Amperes	417-0133	26
FB1 THRU FB12	Ferrite Beads	360-0001	12
J4,J5	Receptacle, Male, 13-Pin Dual In-line	417-2600	2
J6 THRU J12	Receptacle, Male, 3-Pin In-line	417-0003	7
J13,J14,J15	Receptacle, Male, 2-Pin In-line	417-4004	3
MOV1 THRU MOV4	Metal Oxide Varistor, V47MA2A, 27V ac RMS, 0.19 Joules	140-0017	4
P1	Receptacle, 40-Pin Dual In-line	417-4041	1
P2	Receptacle, 50-Pin Dual In-line	417-0147	1
P4 THRU P15	Jumper, Programmable, 2-Pin	340-0004	12
Q1 THRU Q6	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	6
Q7,Q8,Q9	Transistor, MPS-A14, Silicon, NPN, Darlington, TO-92 Case	211-0014	3
R1	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R5 THRU R12	Resistor, 1.91 k Ohm ±1%, 1/4W	103-1914	8
R13 THRU R16	Resistor, 2.4 k Ohm ±5%, 1/4W	100-2443	4
R17 THRU R20	Resistor, 1.91 k Ohm ±1%, 1/4W	103-1914	4
R21	Potentiometer, 10 k Ohm ±10%, 1/2W	178-1054	1
R22	Resistor, 1.6 k Ohm ±5%, 1/4W	100-1643	1
R23	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R24	Potentiometer, 10 k Ohm ±10%, 1/2W	178-1054	1
R25	Resistor, 1.6 k Ohm ±5%, 1/4W	100-1643	1
R26,R27,R28	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	3
R29	Resistor, 48.7 k Ohm ±1%, 1/4W	103-4875	1
R30	Resistor, 16.2 k Ohm ±1%, 1/4W	103-1625	1
R31	Resistor, 7.87 k Ohm ±1%, 1/4W	103-7874	1
R32	Resistor, 3.74 k Ohm ±1%, 1/4W	103-3744	1
R33	Resistor, 1.96 k Ohm ±1%, 1/4W	103-1964	1
R34	Resistor, 48.7 k Ohm ±1%, 1/4W	103-4875	1
R35	Resistor, 16.2 k Ohm ±1%, 1/4W	103-1625	1
R36	Resistor, 7.87 k Ohm ±1%, 1/4W	103-7874	1
R37	Resistor, 3.74 k Ohm ±1%, 1/4W	103-3744	1
R38	Resistor, 1.96 k Ohm ±1%, 1/4W	103-1964	1
R39,R40	Resistor Network, 10-10 k Ohm 0.5% Resistors, 0.7W Total Dissipation, 16-Pin DIP	226-0392	2
R41	Resistor, 15 k Ohm ±5%, 1/4W	100-1553	1
R42	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R43	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R44,R45	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R46	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R47	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R48	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R49	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R50	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R51	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R52	Resistor, 12.4 k Ohm ±1%, 1/4W	103-1245	1
R53	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1

TABLE 4-2. LINE INPUT MODULE CIRCUIT BOARD ASSEMBLY - 951-0015
(Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R54	Resistor, 19.1 k Ohm ±1%, 1/4W	103-1915	1
R55	Resistor, 226 k Ohm ±1%, 1/4W	103-2276	1
R56	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R57	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
R58	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R59	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R60	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R61	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R62	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R63	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R64	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R65	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R66	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R67	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R68	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
R69	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R70	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R71	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R72 THRU R83	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	12
R84,R85	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R86,R87	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	2
R88,R89	Resistor, 33 Ohm ±5%, 1/4W	100-3323	2
R90,R91,R92	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	3
R93,R94	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	2
R95,R96,R97	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	3
R98	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R99	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R100,R101	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	2
R102	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R103,R104	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	2
R105 THRU R110	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	6
R111	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R112 THRU R115	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	4
R116	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R117	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R118	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R120	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R121	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R122	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R123	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R124	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R125	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R126	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R127 THRU R130	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	4
R131,R132	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R133	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R134	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R135	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R136 THRU R139	Resistor, 150 Ohm ±5%, 1/4W	100-1533	4
R140,R141	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R142	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R143	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R144	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R145 THRU R148	Resistor, 150 Ohm ±5%, 1/4W	100-1533	4
R149,R150	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R151	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R152	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R153 THRU R156	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	4
R157	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1
R158	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R159	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1

TABLE 4-2. LINE INPUT MODULE CIRCUIT BOARD ASSEMBLY - 951-0015
(Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R160	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1
R161	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R162 THRU R164	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	3
R165,R166	Resistor, 10 Ohm ±5%, 1/4W	100-1024	2
R167	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R168,R169	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	2
R170,R171	Resistor, 121 Ohm ±1%, 1/4W	100-1231	2
R172	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R173,R174	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	2
R175 THRU R178	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	4
R179	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R180	Potentiometer, 10 k Ohm ±2%, Slide-attenuator	180-0011	1
R181	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R182	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R1+,R1-,R2+, R2-,R3+,R3-, R4+,R4-	Terminal Barrel, 4 Amperes	417-0133	8
S1	Switch, 2 Section, 6PDT Pushbutton, White/Blue Indications, (A/B Select)	340-0082	1
S2	Switch, 2 Section, 4PDT Pushbutton, White/Blue Indications, (AUD/PGM Select)	340-0086	1
S5	Switch, 3P4T, Right Angle, Modified (STEREO/MONO/LEFT/RIGHT Switch)	340-0083-001	1
S6,S7	Switch, Hall-Effect, Pushbutton, Rectangular, Momentary Action (ON/OFF Switches)	340-0084	2
S8	Switch, Miniature, Square Pushbutton, Momentary Action (CUE Switch)	340-0090	1
S9	Switch, Micro, Detent, 125V ac @ 100 mA	340-0073	1
S10	Switch, Miniature, Square Pushbutton, Momentary Action (ARM Switch)	340-0090	1
U1,U2,U3	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	3
U4	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U5,U6	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8-Pin DIP	220-2150	2
U7,U8,U9	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	3
U10,U11	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	2
U12	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U13	Integrated Circuit, MC14023B, CMOS, Triple 3-Input NAND Gate	228-4023	1
U14	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U15	Integrated Circuit, MC14069UBCP, Hex Inverter, CMOS, C-Channel and N-Channel Modes, 14-Pin DIP	228-4070	1
U16	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U17	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XR39,XR40	Socket, 16-Pin DIP	417-1604	2
XU1 THRU XU4,XU7 THRU XU12	Socket, 8-Pin DIP	417-0804	10
XU13,XU14, XU15	Socket, 14-Pin DIP	417-1404	3
----	Lens, Red (for ON Switch)	346-1018	1
----	Lens, Amber (for OFF Switch)	346-1017	1
----	Lens, Switch, Square, Green (for CUE Switch)	340-0091	1
----	Lens, Switch, Square, Yellow (for ARM Switch)	340-0092	1
----	Panel Mounting Grommet, MP65, for Rectangular Lamps (for OVERLOAD Indicator)	481-0034	1
----	Knob Cap, 11mm Gray w/Spot, C112 (for STEREO/MONO/LEFT/RIGHT Switch)	481-0023	1
----	Cap, Barrel Terminal	417-0133-001	34
----	Blank Stereo Line Input Module Circuit Board	511-0015	1

MICROPHONE INPUT MODULE

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SECTION I

MICROPHONE INPUT MODULE THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console microphone input module. A detailed block diagram of the microphone input module circuitry is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. When applicable, the text describes the operation of module audio circuitry. The audio circuit left and right channels are identical, therefore only the left channel will be discussed.

1-4. FUNCTIONAL DESCRIPTION.

1-5. INPUT CIRCUIT.

1-6. INPUT SELECTION. The Mix-Trak 90 audio console microphone input modules are designed to accept audio from two balanced microphone level audio sources. Audio source input selection is accomplished by interlocked two-position switch/indicator S1A/B. The switch selects and routes audio for application to the module audio input amplifier. Switch S1A/B also contains A/B select status contacts. The contacts output A/B select status information for application to remote control assemblies. Microphone audio from input select switch network S1 is routed for application to the optional microphone transformer and to the module input amplifier stage.

1-7. OPTIONAL PHANTOM SUPPLY TRANSFORMER. The microphone input module may be configured for operation with a condenser type microphone with the installation of optional isolation transformer assembly T1. T1 is a 600 Ohm primary/600 Ohm secondary isolation transformer designed for operation with a microphone phantom power supply potential. The Mix-Trak 90 phantom power supply is a regulated adjustable +15 to +48 volt dc operating potential provided for the phantom powering of a condenser type microphone. The supply is enabled/disabled by jumper J3. A potentiometer in the power supply module is provided to adjust the operating level of the supply.

1-8. INPUT AMPLIFIER. Microphone audio is amplified to a -5 dBu nominal level by a programmable high-gain low-noise instrumentation amplifier. The instrumentation amplifier consists of precision matched transistor array U1, operational amplifiers U2 and U3, input gain adjust control R14, and input amplifier gain jumper J4.

1-9. Positive-going audio waveforms from the select switch network are applied to matched transistor pair U1A/B and operational amplifier U2A. Transistor U1A functions as a precision low-noise preamplifier stage which operates from a constant current source established by transistor U1B. Integrated circuit U2A is configured as an inverting second stage amplifier which is biased to approximately 7 volts by R19 and R20. Together, amplifiers U1A and U2B provide precision low-noise amplification of the microphone audio. Feedback for the amplifier network is provided by resistors R48 and R49. Negative-going audio waveforms are applied to an identical amplifier circuit consisting of transistors U1C/D and operational amplifier U2B.

1-10. The outputs of U2A/B are applied to operational amplifier U3A. U3A differentially amplifies the applied audio for application to an overload circuit, a level control circuit, and a patch point transmit stage. Samples from U3A are also applied to integrator U3B. U3B operates in a feedback loop to invert any dc potential present at the output U3A and apply the voltage to the input to cancel any dc potentials. Potentiometer R61 is provided for common mode rejection ratio adjustment.

1-11. The overall gain of the instrumentation amplifier is controlled by input gain adjust control R14 and input amplifier gain jumper J4. Potentiometer R14 is a dual reverse logrithimic taper control designed to provide approximately 20 dB of gain control adjustment. R14A operates in association with the LOW gain position of J4 to establish the appropriate gain for microphone inputs from -35 dBu to -15 dBu. R14B operates in association with the HIGH position of J4 to establish the appropriate gain for microphone inputs from -55 dBu to -35 dBu.

1-12. OVERLOAD INDICATOR CIRCUIT.

1-13. Samples from the instrumentation amplifier are applied to overload indicator comparator U9A. When the output level of the instrumentation amplifier increases above approximately +18 dBu, the output of comparator U9A will go HIGH. Overload indicator DS1 will illuminate to indicate an excessive audio input level condition.

1-14. PATCH POINT NETWORKS.

1-15. The microphone input module patch point networks consists of a transmitting stage, a receiving stage, and a control jumper. The patch point networks are incorporated into the module design to provide interfacing for the connection of external audio processing equipment.

1-16. Audio from the input instrumentation amplifier is applied to a patch point transmitting stage consisting of complementary buffers U7A/B. U7A/B produce balanced monophonic audio at approximately -5 dBu for application to external audio processing equipment. The stage is configured for continuous operation to provide access to module audio without circuit board programming.

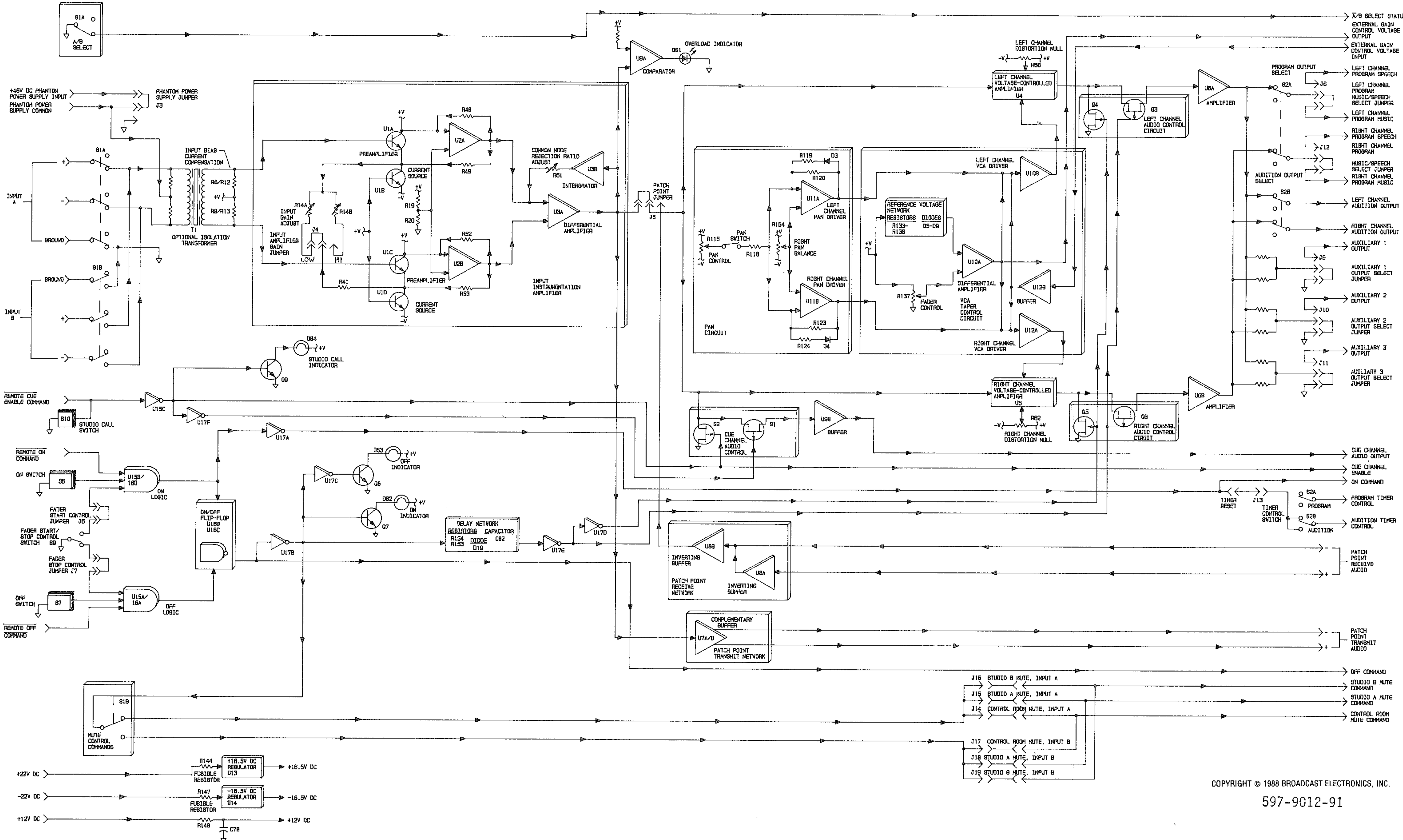

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FIGURE 1-1.
MICROPHONE INPUT MODULE DETAILED BLOCK DIAGRAM

1-17. Audio from external audio processing equipment is applied to the patch point receiving stage. The receiving stage consists of a balanced two-stage inverting buffer network. Balanced audio is applied to inverting buffers U8A/B. Positive-going audio is inverted at U8A and summed at the input of U8B to provide balanced-to-unbalanced audio conversion. The output of the stage is routed to patch point jumper J5. J5 routes audio from either the input amplifier or the patch point receiving network for application to the audio level control circuit.

1-18. AUDIO LEVEL CONTROL CIRCUIT.

1-19. Audio from the input amplifier or the patch point receiving network is routed to the audio level control circuit. The audio level control circuit consists of: 1) a VCA taper control circuit, 2) a pan control circuit, and 3) a voltage-controlled-amplifier (VCA) circuit. The entire control circuit functions to provide precision low-noise control of the module audio level.

1-20. VCA TAPER CONTROL CIRCUIT. Module audio level control operations are performed by two 2150A series VCA modules. The modules are directed by a taper circuit which establishes the module operating parameters. The VCA taper control network consists of: 1) slide-action fader control R137, 2) a reference voltage network consisting of diodes D5 through D9 and resistors R133 through R136, and 3) differential amplifier U10A, and 4) drivers U10B and U12A.

1-21. The taper control circuit operates in response to changes in the output voltage from fader control R137. R137 is designed with a dc control range from Ø to 5 volts. A non-linear taper circuit gain response is established by the reference voltage network. When the voltage from R137 is from Ø volts (+10 dB fader position) to approximately 0.40 volts (-5 dB fader position), the taper control circuit gain will be unity. A 0.40 volt (-5 dB fader position) to 2 volt (-30 dB fader position) output from R137 will result in a circuit gain of approximately 2. A 2 volt (-30 dB fader position) to 5 volt (-55 dB fader position) output from R137 will generate a taper control circuit gain of approximately 4. As a result of the gain design, a -55 dB to +10 dB non-linear operating response is established for the VCA level control network.

1-22. The dc control voltage from the VCA taper control circuit output is applied to the VCA modules for precision control of the module audio level. When fader control R137 is operated to the +10 dB position, a Ø volt dc reference is applied to differential amplifier U10A. U10A will output approximately Ø volts dc through left channel driver U10B and right channel driver U12A to the VCA modules to establish maximum audio level gain. When fader R137 is operated to the -55 dB position, a +5 volt dc reference is applied to amplifier U10A. U10A will output approximately 12 volts dc through drivers U10B/U12A to establish minimum audio level gain.

1-23. External Gain Control. An external gain control feature is incorporated into the taper driver circuit design for the control of the module by external equipment or additional input modules. DC control voltage from U10A is routed to control master/slave input module configurations or to control external audio equipment. An external gain control input routes control voltage through buffer U12B for application to the VCA circuit.

1-24. VCA CIRCUIT. Audio from patch point jumper J5 is applied to left channel voltage-controlled-amplifier (VCA) module U4. U4 is a 2150A series precision low-noise voltage-controlled-amplifier. The VCA is a current-input/current-output device with a voltage sensitive control port. VCA U4 actively controls the left channel audio level as directed by the VCA taper control circuit. Potentiometer R68 is provided to null distortion at the VCA stage. Audio from VCA module U4 is routed through a series-shunt audio control network consisting of field-effect-transistors Q3 and Q4. The output of the control circuit is applied to amplifier U6A. U6A operates in association with VCA U4 to convert the current output of the VCA to a voltage. The output of U6A is routed for application to the output circuit.

1-25. PAN CIRCUIT. Microphone audio is amplified in the VCA circuit left or right channel in a continuously variable format by the operation of the pan circuit. The circuit consists of pan control R115, left channel driver stage U11A, and right channel driver stage U11B.

1-26. The pan circuit operates in response to changes in control voltage from pan control R115. Pan control R115 is a dual function control switch/potentiometer assembly designed to route a control voltage to driver stages U11A/B. U11A and U11B are inverting driver stages with a polarized dual gain design.

1-27. When the pan control is operated to the right channel position, a positive voltage is applied to drivers U11A/B. U11A responds by generating a negative voltage. The negative voltage biases diode D3 off to establish a gain of about 25 for the stage. As a result, a negative voltage is applied to left channel VCA driver U10B. U10B inverts the applied negative voltage to output a positive voltage to decrease the left channel level. U11B also responds to the positive voltage from R115 by generating a negative voltage. The negative voltage biases diode D4 on to establish a gain of approximately one for the stage. As a result, a small negative voltage is applied through right channel VCA driver U12A to increase the right channel level.

1-28. When the pan control is operated to the left channel position, the pan circuit operates in an inverted manner. A negative voltage is applied to drivers U11A/B. The left channel circuit will generate a negative voltage to increase the left channel level. The right channel circuit will generate a positive voltage to decrease the right channel level.

1-29. OUTPUT CIRCUIT.

1-30. Audio from left channel amplifier U6A is applied to an output circuit for distribution to the console output buss network. The console output buss network consists of three stereophonic and three monophonic output busses. Stereophonic busses include: 1) program speech, 2) program music, and 3) audition. Monophonic busses include: 1) auxiliary 1, 2) auxiliary 2, and 3) auxiliary 3. Each output bus is current-operated to provide maximum noise performance.

1-31. Output selection is accomplished by program/audition select switch S2A/B. Switch S2A routes audio to left channel program music/speech select jumper J8. J8 assigns the audio to either the program speech buss or to the program music buss.

1-32. Audio from U6A is also applied to auxiliary 1 jumper J9, auxiliary 2 jumper J10, and auxiliary 3 jumper J11. The jumpers allow output audio to be assigned to the auxiliary 1, auxiliary 2, or auxiliary 3 output busses.

1-33. CONTROL CIRCUIT.

1-34. The microphone input module control circuit consists of individual CMOS logic gates. The gates are organized into functional circuits to provide module on/off control, cue circuit control, muting control, and status indicator control.

1-35. ON/OFF CIRCUIT. Line input module on/off control functions are accomplished by on switch/indicator S6 and off switch/indicator S7. S6 and S7 are hall-effect switches which exhibit reliable low-noise operation. Module on/off control functions may also be initiated by the operation of the fader control. Detent switch S9 is incorporated into the fader to provide on/off control commands. A LOW module on command is generated when the fader is operated from the off position. A LOW module off command is generated when the fader is operated to the off position. Fader start control jumper J6 and stop control jumper J7 enable or disable the control functions as required.

1-36. A module on sequence is initiated when a LOW control command is generated by: 1) on switch/indicator S6, 2) the remote on switch/indicator, or 3) fader switch S9. The LOW is applied to on logic consisting of NAND gates U15B and U16D. The logic outputs a LOW to the on/off flip-flop and a timer control circuit.

1-37. The on/off flip-flop is constructed from NAND gates U16B and U16C. With a LOW command from U15B/U16D, the output of the on/off flip-flop will go LOW. The LOW is routed through inverter U17B to inverters U17D/E. U17D/E produce complementary HIGH/LOW commands for application to left and right channel audio control networks. The commands configure the networks for audio output routing operations. A HIGH command from inverter U17B is also applied to: 1) a mute control circuit and 2) an indicator circuit consisting of inverter U17C, driver transistors Q7 and Q8, on indicator DS2, and off indicator DS3. The HIGH: 1) biases driver transistor Q7 on to illuminate module on indicator DS2 and 2) biases driver transistor Q8 off to extinguish off indicator DS3.

1-38. A module off sequence is initiated when a LOW control command is generated by: 1) off switch/indicator S7, 2) the remote off switch/indicator, or 3) fader switch S9. The LOW is applied to off logic consisting of NAND gates U15A and U16A. The output of the off logic will go LOW and reset on/off flip-flop U16B/C. The output of on/off flip-flop U16B/C will go HIGH. The HIGH is routed through inverter U17B to generate complementary HIGH/LOW commands to configure the audio control networks to mute the output audio. A LOW command from inverter U17B is also applied to: 1) bias transistor Q7 off to extinguish on indicator DS2 and 2) bias transistor Q8 on to illuminate off indicator DS3.

1-39. CUE CIRCUIT.

1-40. The microphone input module cue circuit is enabled when a studio talk command is applied through the remote cue line or when the studio call switch is operated. Audio for application to the cue channel is routed from patch point jumper J5 to a cue channel control circuit consisting of field-effect-transistors Q1 and Q2. The audio control circuit is directed by inverters U15C and U17F.

1-41. Audio is applied to the cue channel when studio call switch S10 is depressed or when a studio talk switch routes a talk command to the remote cue enable line. A LOW control command is applied to inverters U15C and U17F. U15C/U17F generate complementary control signals for application to a series-shunt audio control circuit consisting of transistors Q1 and Q2. The HIGH biases Q2 off and the LOW biases Q1 on to enable cue audio. A HIGH from inverter U15C is also applied to transistor Q9. The HIGH will bias driver transistor Q9 on to illuminate studio call indicator DS4.

1-42. OUTPUT AUDIO CONTROL CIRCUIT.

1-43. Control of the microphone input module output audio is provided by series-shunt field-effect-transistor control circuits. The left channel circuit consists of transistors Q3 and Q4. The transistors are controlled by complementary commands from inverters U17D/E. When the module is operated to on, complementary HIGH/LOW control commands are applied to transistors Q3 and Q4. A HIGH biases Q4 off and a LOW biases Q3 on to enable the left channel program audio.

1-44. MUTE CONTROL CIRCUIT.

1-45. A module on command from the control circuit is applied to contacts of switch S1B to provide mute control. When input A is selected, a HIGH command from inverter U17B is applied to a jumper network consisting of studio B mute jumper J16, studio A mute jumper J15, and control room mute jumper J14. The jumpers route the mute command to the studio A, studio B, or the control room mute lines to mute the selected audio facility. When input B is selected, a HIGH command is applied to control room mute jumper J17, studio A mute jumper J18, and studio B mute jumper J19 to mute the selected facility.

1-46. TIMER CONTROL CIRCUIT.

1-47. Control commands for application to the console clock/timer module are generated by the contacts of switch S2A/B. A HIGH control command from inverter U17A is applied to timer reset jumper J13. J13 disables the timer control command for microphone input modules if desired. The control command from J13 is applied to program/audition output select switch S2. S2 will route a HIGH control command to the clock/timer module program or audition control line as required for the selected output buss.

1-48. POWER SUPPLY CIRCUIT.

1-49. DC operating potentials for application to the line input module components are produced by a regulator network. Unregulated ±24 volt supplies from the console power supply module are applied through fusible resistors R144 and R147 to a regulator network consisting of U13 and U14. R144/R147 are a carbon-composition resistors which function as fusible links in the event of a short-circuit potential on the module. The fusible resistors limit a power supply failure to the module and prevent a failure in the entire console system.

1-50. ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U13 and -16.5 volt dc regulator U14. U13/U14 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U13 and U14 are routed for application to the module audio components.

1-51. A regulated +12 volt supply is applied through an RC filter network consisting of resistor R148 and capacitor C78. The output of the filter network is routed for application to the module control logic components.

SECTION II

MICROPHONE INPUT MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the microphone input module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. GENERAL.

2-6. The microphone input module circuitry should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-7. AUDIO SWITCHES.

2-8. The microphone input module is equipped with ITT Shadow audio switches. The switches are sealed for low-noise long-life operation and do not permit cleaning. If a switch becomes noisy or defective, the switch will require replacement.

2-9. FADER CONTROL.

2-10. Each microphone input module is equipped with a Penny and Giles slide-action fader control. If a fader control becomes defective, the control may require: 1) cleaning or 2) replacement of the control shaft bushings.

2-11. To clean the slide-action fader, remove the fader from the microphone input module assembly. Remove the fader end-caps and slide the fader assembly out of the aluminum housing. Using distilled water and a cotton swab, remove all dust and dirt from the fader circuit board area. Re-assemble the fader control and replace the fader assembly in the module.

2-12. To replace the fader shaft bushings, replacement parts and a recommended procedure must be obtained from Penny and Giles Inc. Contact Penny and Giles at the address shown below for the replacement bushings and the installation instructions.

Penny and Giles
2716 Ocean Park Blvd.
Suite 1005
Santa Monica, California 90405

2-13. SECOND LEVEL MAINTENANCE.

2-14. Second level maintenance consists of procedures required to restore a microphone input module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-15. ELECTRICAL ADJUSTMENTS.

2-16. VCA DISTORTION ADJUSTMENT. Left channel VCA distortion control R68 and right channel VCA distortion control R62 null distortion at the VCA modules. Distortion adjustment is not required unless VCA modules U4 or U5 are replaced. The VCA distortion is nulled as follows.

2-17. Required Equipment. The following test equipment is required to null the VCA distortion.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Extender Ribbon Cable Assemblies:
40-Pin Assembly
50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. Audio Analyzer - Capable of Indicating Distortion Levels of 0.05% to 0.1% (Sound Technology 1710A or equivalent)

2-18. Procedure. To null the VCA distortion, proceed as follows:

2-19. Remove the microphone input module from the mainframe and connect the extender cable assemblies between the microphone input module and the receptacles on the mainframe input motherboard assemblies.

2-20. Refer to Figure 2-1 and install jumper J4 in position 1-2.

2-21. Connect the audio signal generator to the A or B left channel input on the microphone input module associated input/remote connector.

2-22. Refer to Figure 2-1 and connect the audio analyzer between chassis ground and resistor R77 as shown.

2-23. Adjust the audio generator for a 1 kHz output at -50 dBu.

2-24. Operate the microphone input module at a normal level and route the test audio to the audition output bus.

2-25. Refer to Figure 2-1 and adjust left channel VCA distortion null control R68 for a minimum audio analyzer indication.

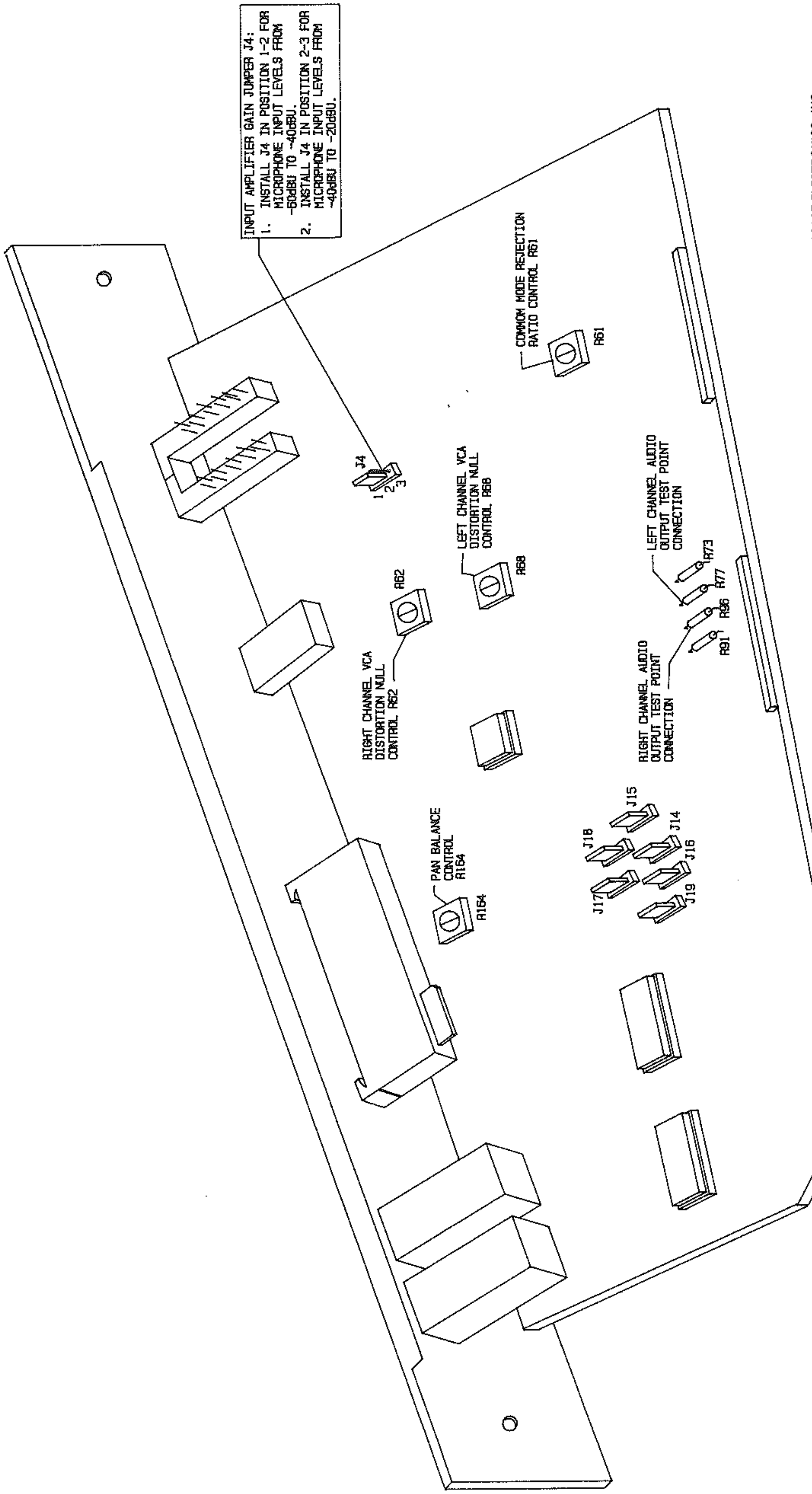

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FIGURE 2-1. MICROPHONE INPUT MODULE ADJUSTMENT CONTROLS

2-26. Repeat the procedure for the right channel. Connect the audio analyzer to resistor R96 and adjust the right channel distortion with right channel VCA distortion null control R62.

2-27. Disconnect all test equipment, reprogram jumper J4 if required, and replace the microphone input module.

2-28. PAN BALANCE CALIBRATION. Potentiometer R164 calibrates the pan circuit left and right channel balance. Pan balance calibration is not required unless replacement components are installed in the circuit or the complete microphone input module is replaced. The pan balance is calibrated as follows.

2-29. Required Equipment. The following test equipment is required to calibrate the pan circuit balance.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Extender Ribbon Cable Assemblies:
40-Pin Assembly
50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. VU Meter

2-30. Procedure. To calibrate the pan circuit balance, proceed as follows:

2-31. Remove the microphone input module from the mainframe and connect the extender cable assemblies between the microphone input module and the receptacles on the mainframe input motherboard assemblies.

2-32. Refer to Figure 2-1 and install jumper J4 in position 1-2.

2-33. Connect the audio signal generator to the A or B left channel input on the microphone input module associated input/remote connector.

2-34. Refer to Figure 2-1 and connect the VU meter between chassis ground and resistor R77 as shown.

2-35. Adjust the audio generator for a 1 kHz output at -50 dBu.

2-36. Enable the microphone input module. Operate the fader to the Ø position and route the test audio to the audition output bus.

2-37. Refer to Figure 2-1 and adjust pan balance control R164 until the VU meter indicates approximately -5 dBu.

2-38. Refer to Figure 2-1 and connect the VU meter to resistor R96 as shown.

2-39. Refer to Figure 2-1 and adjust pan balance control R164 until the VU meter indicates approximately -5 dBu.

2-40. Repeat the procedure to obtain equal VU meter indications from the both the left and right channels.

2-41. Disconnect all test equipment, reprogram jumper J4 if required, and replace the microphone input module.

2-42. COMMON MODE REJECTION RATIO ADJUSTMENT. Potentiometer R61 adjusts the microphone input module common mode rejection ratio. Due to the extremely low common mode rejection level, the adjustment cannot be performed without a special audio analyzer. If components are replaced in the circuit or potentiometer R61 is replaced, excellent performance may be obtained by adjusting R61 to approximately mid-range. If further adjustment is required, contact the Broadcast Electronics Customer Service Department for a recommended test procedure and list of test equipment.

2-43. TROUBLESHOOTING.

2-44. The troubleshooting philosophy for the microphone input module consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures. To prevent the application of inadvertent audio noise to the console audio system, attach the 50-pin extender assembly to the module before the 40-pin assembly.

2-45. Figures 2-2 through 2-4 present the microphone input module troubleshooting. Refer to Figures 2-2 through 2-4 to isolate a failure to a specific group of components.

2-46. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-47. COMPONENT REPLACEMENT.

2-48. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

MICROPHONE INPUT MODULE GENERAL TROUBLESHOOTING PROCEDURES	
NUMBER	PROCEDURE
1	MEASURE THE VOLTAGE AT U13 PIN 2. THE VOLTAGE MUST BE +16.VDC.
2	MEASURE THE VOLTAGE AT U14 PIN 3. THE VOLTAGE MUST BE -16.5VDC.
3	MEASURE THE VOLTAGE ACROSS R144 THE VOLTAGE MUST BE LESS THAN 1VDC.
4	MEASURE THE VOLTAGE ACROSS R147. THE VOLTAGE MUST BE LESS THAN 1VDC.
5	MEASURE THE VOLTAGE AT U16 PIN 14. THE VOLTAGE MUST BE GREATER THAN 10VDC.
6	MEASURE THE VOLTAGE ACROSS R148. THE VOLTAGE MUST BE GREATER THAN 1VDC.
7	CHECK U15,U16,AND U17 FOR OVER-TEMPERATURE CONDITIONS.

597-9012-131

FIGURE 2-2. MICROPHONE INPUT MODULE GENERAL TROUBLESHOOTING

MICROPHONE INPUT MODULE CONTROL LOGIC TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO LOCAL MODULE ON/OFF CONTROL	1. DEFECTIVE S6 OR S7.
NO REMOTE MODULE ON/OFF CONTROL	1. REFER TO SIMPLE REMOTE CONTROL MODULE TROUBLESHOOTING.
NO MODULE ON/OFF CONTROL WITH FADER	1. DEFECTIVE FADER SWITCH.
NO LOCAL AND NO REMOTE ON/OFF CONTROL	1. DEFECTIVE U15,U16,OR U17.

597-9012-132

FIGURE 2-3. MICROPHONE INPUT MODULE CONTROL LOGIC TROUBLESHOOTING

MICROPHONE INPUT MODULE AUDIO TROUBLESHOOTING

SYMPTOM	SOLUTION

MISSING OR DISTORTED AUDIO OUTPUT	ACTIVATE THE B AUDIO SOURCE AND OPERATE THE MODULE. IS NORMAL OUTPUT AUDIO PRESENT?
	NO: IS AUDIO PRESENT AT U7 PINS 1 AND 7?
	  NO: DEFECTIVE U1, U2, OR U3.
	  YES: OPERATE THE FADER TO THE 0dB POSITION IS 0.00VDC PRESENT AT U4 AND U5 PIN 3? OPERATE THE FADER TO THE OFF POSITION IS +0.4VDC PRESENT AT U4 AND U5 PIN 3?
	    NO: DEFECTIVE U10, U11, OR U12.
	    YES: DEFECTIVE U4, U5, U6, Q3, Q4, Q5, OR Q6.
	YES: 1. DEFECTIVE S1. 2. DEFECTIVE AUDIO SOURCE.

FADER NOT CONTROLLING CHANNEL LEVEL	OPERATE THE FADER TO THE +10dB POSITION. IS 0.00VDC PRESENT AT U10 PIN 3? OPERATE THE FADER TO THE OFF POSITION. IS +5.1VDC PRESENT AT U10 PIN 3? NO: 1. CHECK P33, P34, AND P35 2. DEFECTIVE FADER CONTROL R137. YES: 1. DEFECTIVE U10, U11, OR U12. 2. CHECK EXTERNAL GAIN CONTROL INPUT AT U12 PIN 5 FOR 0.00VDC.

NO LEFT CHANNEL OR RIGHT CHANNEL OUTPUT	IS THE PAN CONTROL OPERATED TO OFF?
	NO: OPERATE THE PAN SWITCH TO OFF.
	YES: OPERATE THE FADER TO THE 0dB POSITION. IS 0.00VDC AT U14 AND U15 PIN 3?
	  NO: DEFECTIVE U10, U11 OR U12.
	  YES: DEFECTIVE U6, Q3, Q4, Q5, OR Q6.

NO PATCH POINT OPERATION	1. DEFECTIVE U7 OR U8.

597-9012-133

FIGURE 2-4. MICROPHONE INPUT MODULE AUDIO TROUBLESHOOTING

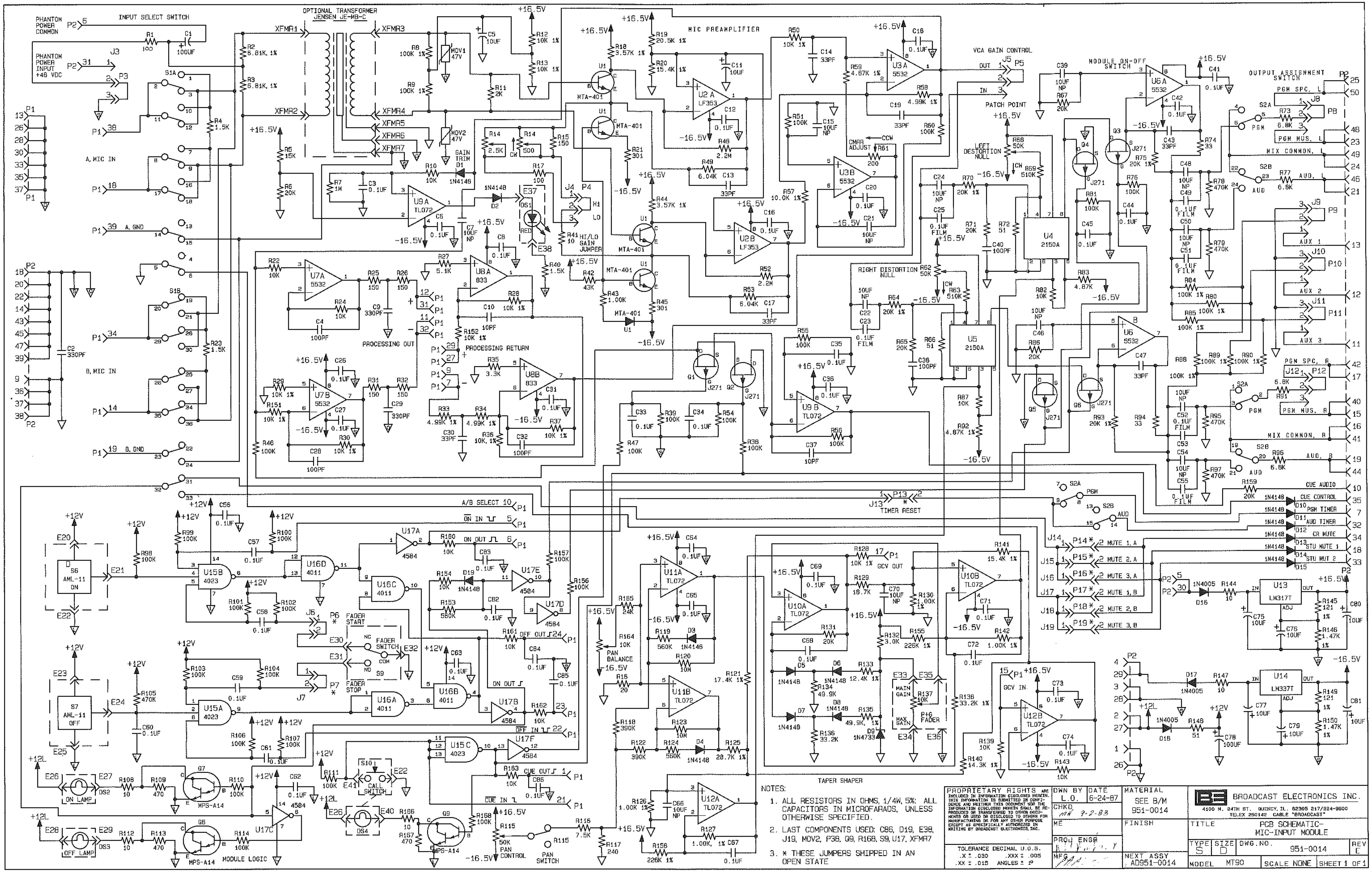
SECTION III

MICROPHONE INPUT MODULE DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the microphone input module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, MICROPHONE INPUT MODULE	SD951-0014
3-2	ASSEMBLY DIAGRAM, MICROPHONE INPUT MODULE	AD951-0014



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%; ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: C86, D19, E38, J19, MOV2, P38, Q9, R168, S9, U17, XFMR7
3. * THESE JUMPERS SHIPPED IN AN OPEN STATE

DWN BY L.O.	DATE 6-24-87	MATERIAL SEE B/M 951-0014	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST. QUINCY, ILL. 62305 217/224-9600 TELEX 250142 CABLE "BROADCAST"
CHKD MA	7-2-83	FINISH	TITLE PCB SCHEMATIC- MIC-INPUT MODULE
ME			
PROJ ENGR			TYPE S SIZE D DWG. NO. 951-0014 REV E
MFG		NEXT ASSY AD951-0014	MODEL MT90 SCALE NONE SHEET 1 OF 1

TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1/2°

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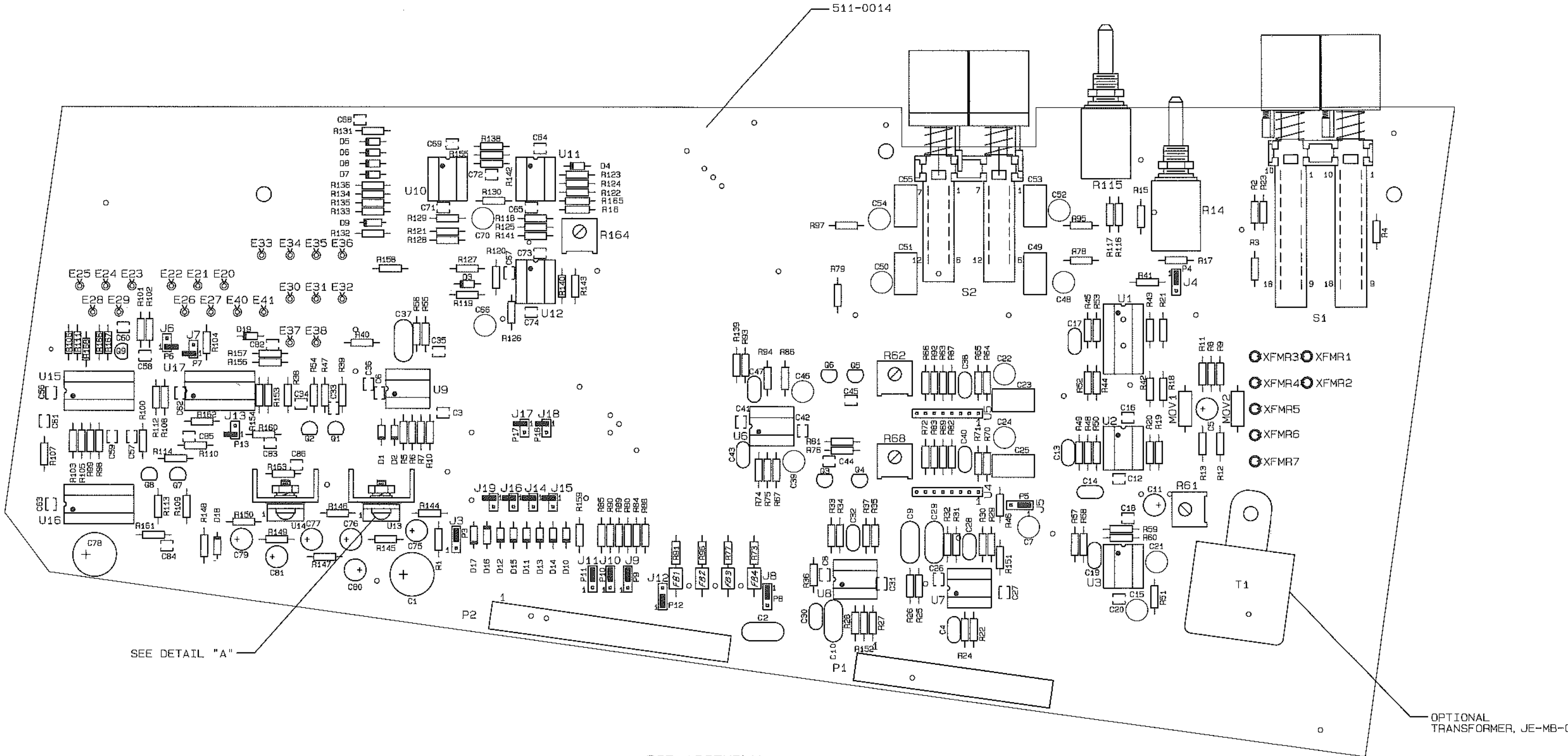
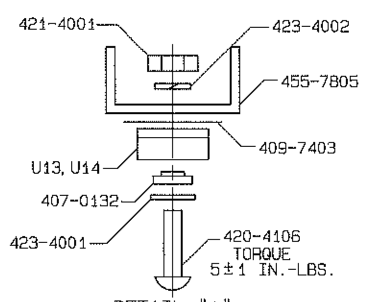


PCB ASSEMBLY

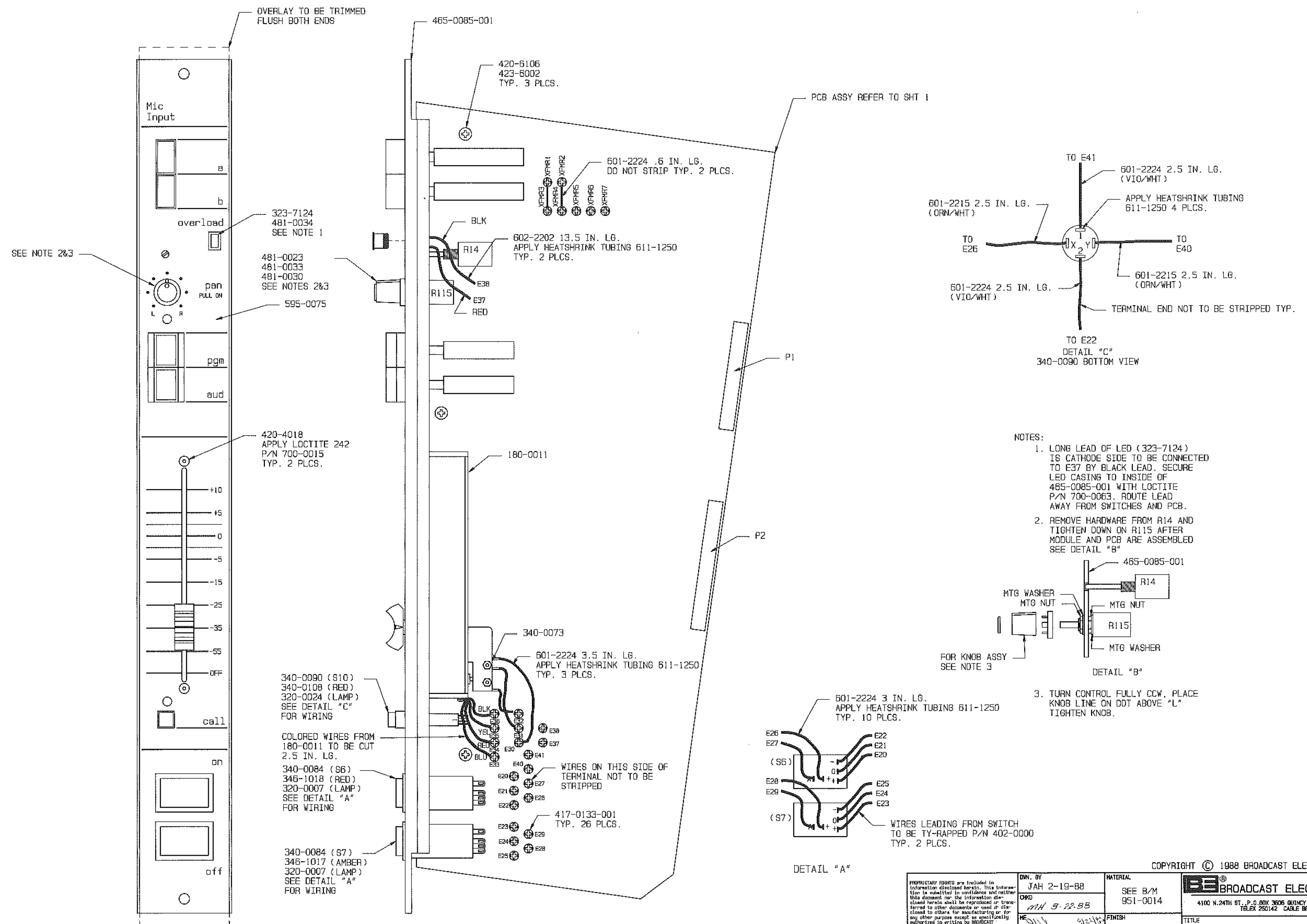


DETAIL "A"
TYPICAL 2 PLCS.

NOTE:
1. REFER TO SHEET 2 FOR MODULE ASSEMBLY.
2. SEE SCHEMATIC SD951-0014
3. ⊙< INDICATES SLOT IN BARREL TERMINAL.

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

DWN BY L.O. 6-24-87	MATERIAL SEE B/M 951-0014	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
CHKD MK 8-22-88	FINISH	TITLE MIC INPUT MODULE	
ME		TYPE A	SIZE D	DWG.NO. 951-0014	REV E
PROJ. ENGR.	NEXT ASSY 901-9012 "12CH" 901-9018 "18CH"	MODEL MT90	SCALE 1.5/1	SHEET 1 OF 2
MFG.			



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

DWN. BY	JAH 2-19-88
CHKD	MH 9-22-88
ME	9/22/88
PROJ. ENGR.	
MFG	
MATERIAL	SEE B/M 951-0014
FINISH	SEE DWG RA592-0000
NEXT ASSY.	901-9012 (12CH) 901-9018 (18CH)

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

TITLE MIC INPUT MODULE

TYPE	SIZE	DWG. NO.	REV
A	D	951-0014	E

MODEL MIX TRAK 90 | SCALE 1/1 | SHEET 2 OF 2

SECTION IV

MICROPHONE INPUT MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the microphone input module. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram.

TABLE 4-1. MICROPHONE INPUT MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	MICROPHONE INPUT MODULE ASSEMBLY	951-0014	4-1

TABLE 4-2. MICROPHONE INPUT MODULE ASSEMBLY - 951-0014
(Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 100 uF, 50V	020-1083	1
C2	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C3	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C4	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C5	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C6	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C7	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C8	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C9	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C10	Capacitor, Mica, 10 pF ±5%, 500V	042-1012	1
C11	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C12	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C13,C14	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	2
C15	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C16	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C17	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C18	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C19	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C20	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C21,C22	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	2
C23	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C24	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C25	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C26,C27	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C28	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C29	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C30	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C31	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C32	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C33 THRU C36	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	4
C37	Capacitor, Mica, 10 pF ±5%, 500V	042-1012	1

TABLE 4-2. MICROPHONE INPUT MODULE ASSEMBLY - 951-0014
(Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C38	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C39	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C40	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C41,C42	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C43	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C44,C45	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C46	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C47	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C48	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C49	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C50	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C51	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C52	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C53	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C54	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C55	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C56 THRU C65	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	10
C66	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C67,C68,C69	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C70	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C71 THRU C74	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	4
C75,C76,C77	Capacitor, Electrolytic, 10 uF, 35V	023-1076	3
C78	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C79,C80,C81	Capacitor, Electrolytic, 10 uF, 35V	023-1076	3
C82 THRU C86	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	5
D1 THRU D8	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	8
D9	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D10 THRU D15	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	6
D16,D17,D18	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	3
D19	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	1
DS1	LED, Red, MV57124, 3V @ 20 mA Maximum	323-7124	1
DS2,DS3	Lamp, No. 73, 14V, 0.08A, T-1 3/4 Bulb, Wedge Base	320-0007	2
DS4	Lamp, 11-903-1, 12V, 0.7W, T-1 Bi-Pin	320-0024	1
E20 THRU E38,E40,E41	Terminal, Barrel, 4 Amperes	417-0133	21
FB1 THRU FB4	Ferrite Bead	360-0001	4
J3,J4,J5	Receptacle, Male, 3-Pin In-line	417-0003	3
J6,J7	Receptacle, Male, 2-Pin In-line	417-4004	2
J8 THRU J12	Receptacle, Male, 3-Pin In-line	417-0003	5
J13 THRU J19	Receptacle, Male, 2-Pin In-line	417-4004	7
MOV1,MOV2	Metal Oxide Varistor, V47MA2A, 27V ac RMS, 0.19 Joules	140-0017	2
P1	Receptacle, 40-Pin Dual In-line	417-4041	1
P2	Receptacle, 50-Pin Dual In-line	417-0147	1
P3 THRU P19	Jumper, Programmable, 2-Pin	340-0004	17
Q1 THRU Q6	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	6
Q7,Q8,Q9	Transistor, MPS-A14, Silicon, NPN, Darlington, TO-92 Case	211-0014	3
R1	Resistor, 100 Ohms ±5%, 1/4W	100-1033	1
R2,R3	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	2
R4	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R5	Resistor, 15 k Ohm ±5%, 1/4W	100-1553	1
R6	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R7	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R8,R9	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R10	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R11	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R12,R13	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R14	Potentiometer, 500 Ohm & 2.5 k Ohm ±10%, 1/2W	190-5031	1
R15	Resistor, 150 Ohm ±5%, 1/4W	100-1533	1
R16	Resistor, 20 Ohm ±5%, 1/4W	100-2023	1
R17	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
R18	Resistor, 3.57 k Ohm ±1%, 1/4W	103-3574	1
R19	Resistor, 20.5 k Ohm ±1%, 1/4W	103-2055	1

TABLE 4-2. MICROPHONE INPUT MODULE ASSEMBLY - 951-0014
(Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R20	Resistor, 15.4 k Ohm ±1%, 1/4W	103-1551	1
R21	Resistor, 301 Ohm ±1%, 1/4W	100-3031	1
R22	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R23	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R24	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R25,R26	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R27	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R28,R29,R30	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	3
R31,R32	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R33,R34	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R35	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R36,R37	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R38,R39	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R40	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R41	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R42	Resistor, 43 k Ohm ±5%, 1/4W	100-4353	1
R43	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R44	Resistor, 3.57 k Ohm ±1%, 1/4W	103-3574	1
R45	Resistor, 301 Ohm ±1%, 1/4W	100-3031	1
R46,R47	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R48	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100-2273	1
R49	Resistor, 6.04 k Ohm ±1%, 1/4W	103-6044	1
R50	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R51	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R52	Resistor, 2.2 Meg Ohm ±5%, 1/4W	100-2273	1
R53	Resistor, 6.04 k Ohm ±1%, 1/4W	103-6044	1
R54,R55,R56	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	3
R57	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R58	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1
R59	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R60	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R61	Potentiometer, 200 Ohm ±10%, 1/2W	177-2034	1
R62	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R63	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R64	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	1
R65	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R66	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R67	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R68	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R69	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R70	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	1
R71	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R72	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R73	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R74	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R75	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	1
R76	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R77	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R78,R79	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	2
R80	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	1
R81	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R82	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R83	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R84,R85	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R86	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R87	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R88,R89,R90	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	3
R91	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R92	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R93	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	1
R94	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R95	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R96	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R97	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R98 THRU R104	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	7
R105	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R106,R107	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2

TABLE 4-2. MICROPHONE INPUT MODULE ASSEMBLY - 951-0014
(Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R108	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R109	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R110,R111	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R112	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R113	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R114	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R115	Potentiometer, 50 k Ohm ±10%, 1/2W, SPDT BJ	190-5051	1
R116	Resistor, 7500 Ohm ±5%, 1/4W	100-7543	1
R117	Resistor, 240 Ohm ±5%, 1/4W	100-2433	1
R118	Resistor, 390 k Ohm ±5%, 1/4W	100-3963	1
R119	Resistor, 560 k Ohm ±5%, 1/4W	100-5663	1
R120	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R121	Resistor, 17.4 k Ohm ±1%, 1/4W	103-1745	1
R122	Resistor, 390 k Ohm ±5%, 1/4W	100-3963	1
R123	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R124	Resistor, 560 k Ohm ±5%, 1/4W	100-5663	1
R125	Resistor, 28.7 k Ohm ±1%, 1/4W	103-2851	1
R126,R127	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	2
R128	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R129	Resistor, 18.7 k Ohm ±1%, 1/4W	103-1875	1
R130	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R131	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R132	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R133	Resistor, 12.4 k Ohm ±1%, 1/4W	103-1245	1
R134,R135	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	2
R136	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R137	Potentiometer, 10 k Ohm ±2%, slide-attenuator	180-0011	1
R138	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R139	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R140	Resistor, 14.3 k Ohm ±1%, 1/4W	103-1435	1
R141	Resistor, 15.4 k Ohm ±1%, 1/4W	103-1551	1
R142	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R143	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R144	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R145	Resistor, 121 Ohm ±5%, 1/4W	100-1231	1
R146	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R147	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R148	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R149	Resistor, 121 Ohm ±5%, 1/4W	100-1231	1
R150	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R151,R152	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R153	Resistor, 560 k Ohm ±5%, 1/4W	100-5663	1
R154	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R155	Resistor, 226 k Ohm ±1%, 1/4W	103-2276	1
R156,R157	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R158	Resistor, 226 k Ohm ±1%, 1/4W	103-2276	1
R159	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R160 THRU R163	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	4
R164	Potentiometer, 10 k Ohm ±10%, 1/2W (PAN Control)	177-1054	1
R165	Resistor, 24 k Ohm ±5%, 1/4W	100-2453	1
R166	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R167	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R168	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
S1	Switch, 2 Section, 6PDT Pushbutton, White/Blue Indications (A/B SELECT Switch)	340-0082	1
S2	Switch, 2 Section, 4PDT Pushbutton, White/Blue Indications (AUD/PGM SELECT Switch)	340-0086	1
S6,S7	Switch, Hall-Effect, Pushbutton, Rectangular, Momentary Action (ON/OFF Switches)	340-0084	2
S9	Switch, Micro, Detent, 125V ac @ 100 mA	340-0073	1
S10	Switch, Miniature Square Pushbutton, Momentary Action (CALL Switch)	340-0090	1
U1	Integrated Circuit, MTA-401, Quad Monolithic Transistor Array, NPN, 14-Pin DIP	220-0401	1
U2	Integrated Circuit, LF353N, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0353	1

TABLE 4-2. MICROPHONE INPUT MODULE ASSEMBLY - 951-0014
(Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U3	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8-Pin DIP	221-5532-001	1
U4,U5	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8-Pin DIP	220-2150	2
U6,U7	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8-Pin DIP	221-5532-001	2
U8	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	1
U9 THRU U12	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	4
U13	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U14	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
U15	Integrated Circuit, MC14023B, CMOS, Triple 3-Input NAND Gate	228-4023	1
U16	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U17	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
XMFR1 THRU XMFR7	Terminal, Barrel, 4 Amperes	417-0133	7
XU1	Socket, 14-Pin DIP	417-1404	1
XU2,XU3,XU6 THRU XU12	Socket, 8-Pin DIP	417-0804	9
XU15 THRU XU17	Socket, 14-Pin DIP	417-1404	3
----	Panel Mounting Grommet, MP65, for Rectangular Lamps (for OVERLOAD Indicator)	481-0034	1
----	Knob Cap, 11mm Gray W/Spot, C112 (PAN Switch)	481-0023	1
----	Lens, Switch, Square, Red (CALL Switch)	340-0108	1
----	Lens, Red (for ON Switch)	346-1018	1
----	Lens, Amber (for OFF Switch)	346-1017	1
----	Cap, Barrel Terminal	417-0133-001	1
----	Blank Microphone Input Module Circuit Board	511-0014	1

CONTROL ROOM MONITOR MODULE

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SECTION I

CONTROL ROOM MONITOR MODULE
THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console control room monitor module. A detailed block diagram of the control room monitor module circuitry is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. When applicable, the text describes the operation of module audio circuitry. The audio circuit left and right channels are identical, therefore only the left channel will be discussed.

1-4. FUNCTIONAL DESCRIPTION.

1-5. CONTROL ROOM MONITOR CIRCUIT.

1-6. INPUT NETWORK. The control room monitor circuit is designed to accept ten console audio sources for control room monitoring operations. The following text provides a list of the control room monitor circuit audio sources.

INTERNAL AUDIO SOURCES

1. Program output audio.
2. Audition output audio.
3. Monophonic output audio.
4. Cue channel audio.

EXTERNAL INPUTS

1. Off-Air audio.
2. Network audio.
3. External 1 audio.
4. External 2 audio.
5. External 3 audio.
6. External 4 audio.

1-7. Audio source selection is accomplished by input select switch S1. S1 is a yellow-coded ten-position switch/indicator designed to select audio for application to the module left and right channel input amplifier stages. The left channel input amplifier consists of integrated circuits U1A/B and U3A. U1A/B and U3A are configured as a precision instrumentation amplifier with a gain of approximately -6 dB. The output of the amplifier stage is routed for application to the level control circuit.

1-8. VCA LEVEL CONTROL CIRCUIT. Audio from the input amplifier network is applied to left channel voltage-controlled-amplifier (VCA) module U4. U4 is a 2150A series precision low-noise voltage-controlled-amplifier. The VCA is a current-input/current-output device with a voltage sensitive control port. VCA U4 actively controls the left channel audio level as directed by a VCA taper control circuit. Potentiometer R13 is provided to null distortion generated at the VCA stage. Audio from VCA module U4 is routed through a series-shunt mute circuit consisting of field-effect-transistors Q1 and Q2 for application to the output amplifier network.

1-9. VCA TAPER CONTROL CIRCUIT. Control room monitor audio level control operations are performed by two 2150A series VCA modules. The modules are directed by a taper circuit which establishes the module operating parameters. The VCA taper control network consists of: 1) rotary monitor level control R65, 2) a reference voltage network consisting of diodes D1 through D5, resistors R60 through R65, 3) differential amplifier U8A, and 4) driver U8B.

1-10. The taper control circuit operates in response to changes in the output voltage from monitor level control R65. R65 is designed with a dc control range from Ø to 5 volts. A non-linear taper circuit gain response is established by the reference voltage network. When the voltage from R65 is from Ø volts to approximately 0.40 volts, the taper control circuit gain will be unity. A 0.40 volt to 2 volt output from R65 will result in a circuit gain of approximately 2. A 2 volt to 5 volt output from R65 will generate a taper control circuit gain of approximately 4. As a result of the gain design, a non-linear operating response is established for the monitor audio level.

1-11. The dc control voltage from the VCA taper circuit output is applied to the VCA modules for precision control of the monitor audio level. When monitor level control R65 is operated fully counterclockwise, a Ø volt dc reference is applied to differential amplifier U8A. U8A will output approximately Ø volts dc through driver U8B to the VCA modules to establish minimum audio level gain. When monitor control R65 is operated fully clockwise, a +5 volt dc reference is applied to differential amplifier U8A. U8A will output approximately 12 volts dc through driver U8B to establish a maximum control room monitor speaker audio level.

1-12. The control room monitor speaker level is also controlled by external power amplifier level control R69. R69 is provided to limit the maximum level of the control room monitor speakers.

1-13. MONITOR DIM CIRCUIT. The monitor dim circuit is designed to lower the control room monitor speaker level during cue channel monitoring operations. When an input module is configured for cue channel operation, a HIGH is applied through the cue enable control line and cue dim jumper J3 to monitor dim control R72. R72 will output a voltage to control the monitor speaker level during cue channel monitoring operations. Jumper J3 is provided to disable monitor dim operation.

1-14. The monitor dim circuit may also be configured for operation during control room mute conditions. When a control room muting sequence is initiated, a HIGH is applied through the control room mute line and mute/dim jumper J4 to monitor dim control R72.

1-15. OUTPUT CIRCUIT. Audio from the muting circuitry is applied to an output amplifier network. The left channel output amplifier network consists of integrated circuits U6A/B. U6A/B are configured as inverting amplifier stages to provide unbalanced-to-balanced audio signal conversion at a nominal level of Ø dBu. The output of the amplifier network is routed for application to an external monitor power amplifier.

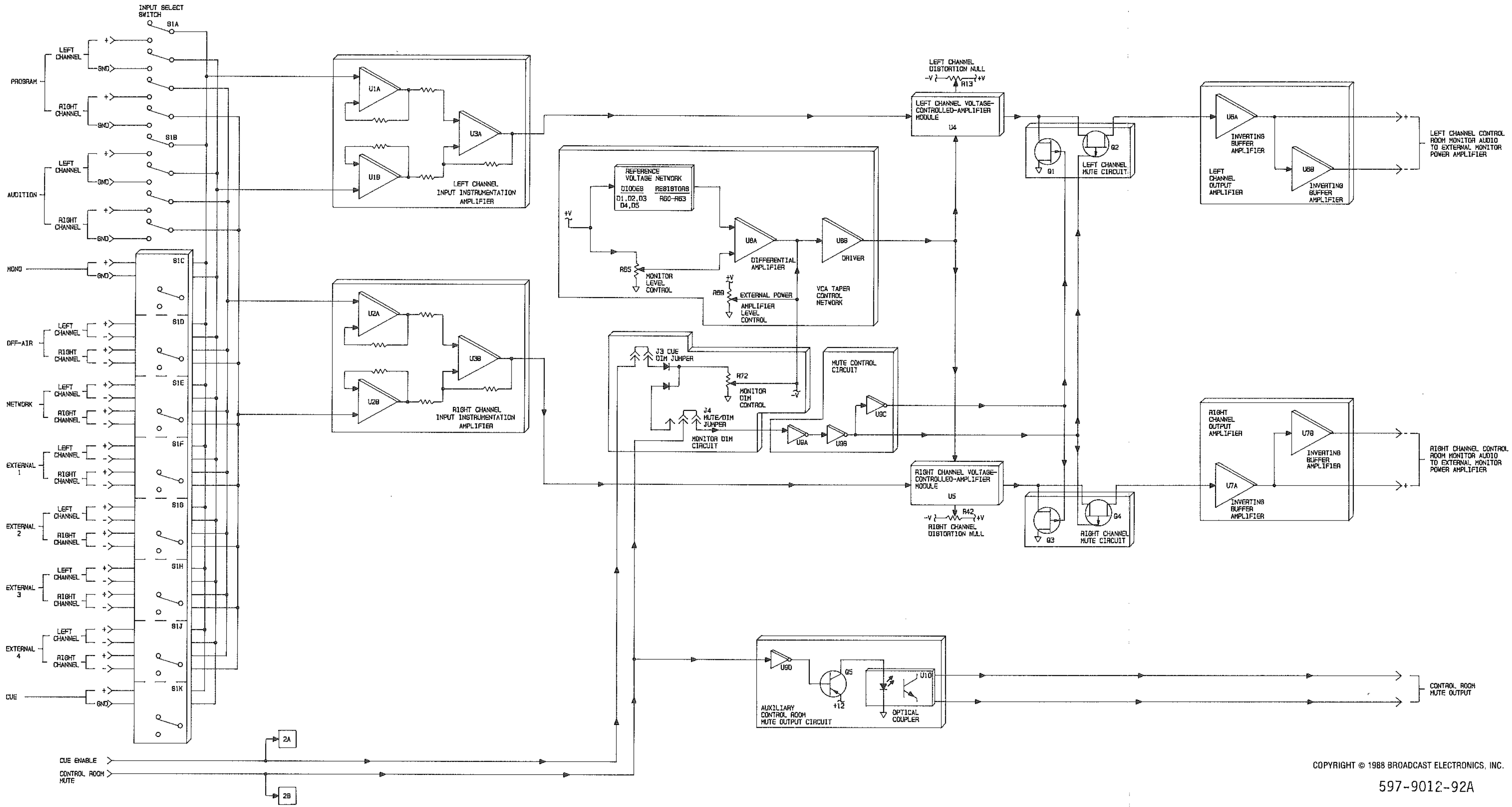

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FIGURE 1-1.
CONTROL ROOM MONITOR MODULE DETAILED BLOCK DIAGRAM (Sheet 1 of 2)

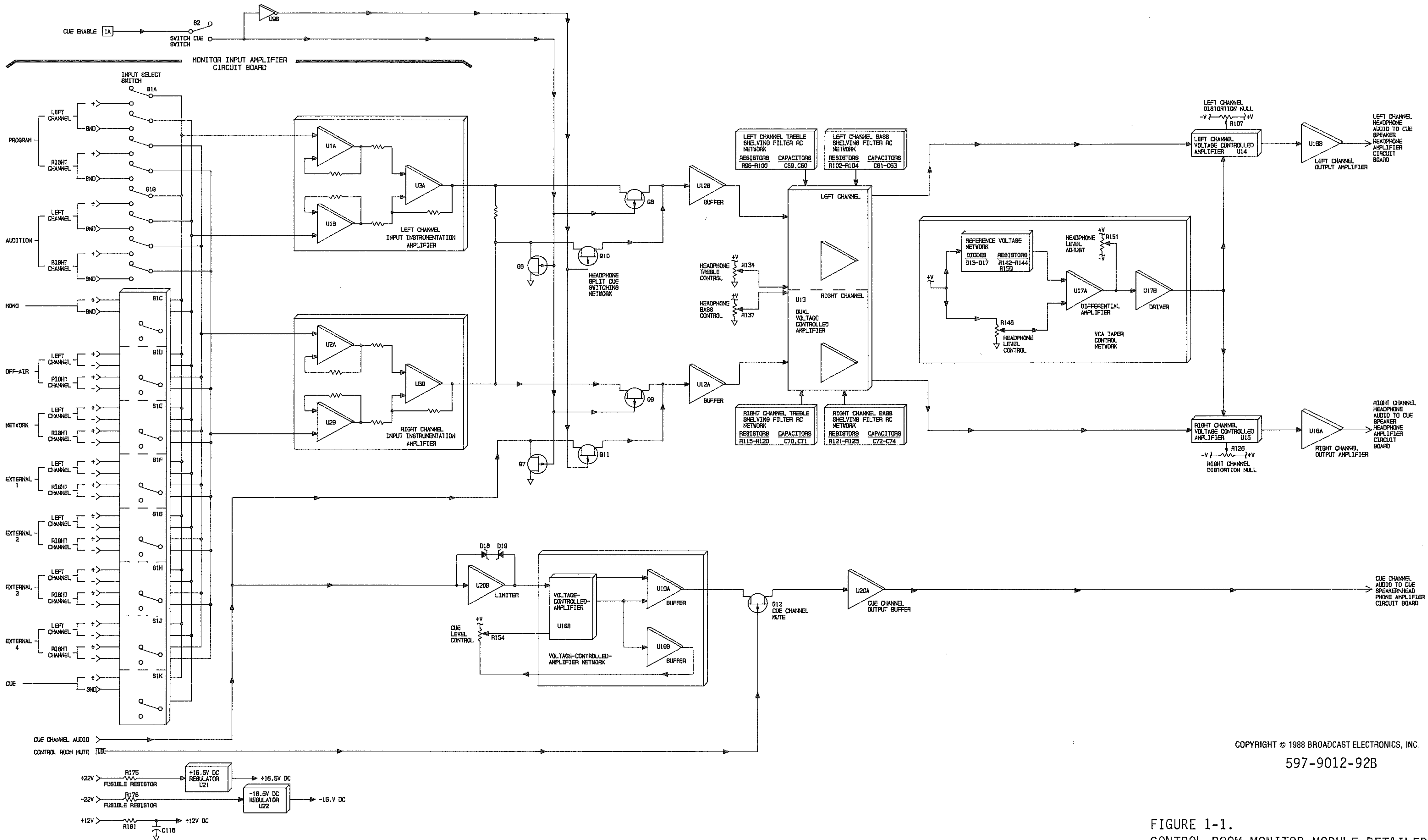

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FIGURE 1-1.
CONTROL ROOM MONITOR MODULE DETAILED
BLOCK DIAGRAM (Sheet 2 of 2)

1-16. MUTE CIRCUIT. The control room monitor mute circuit consists of an inverter control network and series-shunt field-effect-transistor (FET) circuits. When a microphone input module initiates a control room mute sequence, a HIGH is routed through the the control room mute command line to the mute control circuit. The HIGH is inverted at U9A which outputs a LOW to inverters U9B/C. U9B/C generates complementary control signals for application to left channel mute circuit transistors Q1 and Q2. A HIGH from inverter U9B will bias Q2 off and a LOW from U9C will bias Q1 on to mute the left channel monitor audio.

1-17. A HIGH from the control room mute line is also applied to the auxiliary control room mute output circuit. The HIGH is inverted LOW at U9D which biases transistor Q5 on. Q5 will route a control voltage to energize optical coupler U10 and provide an auxiliary control room mute output command for application to external circuitry.

1-18. HEADPHONE CIRCUIT.

1-19. INPUT NETWORK. The control room monitor module headphone circuit input network consists of an input select switch and an input amplifier stage. The input network is housed on a separate piggy-back mounted monitor input amplifier circuit board assembly. The input network is equipped for the monitoring of ten balanced console audio sources. The following text provides a list of the headphone circuit audio sources.

INTERNAL AUDIO SOURCES	EXTERNAL INPUTS
1. Program output audio.	1. Off-Air audio.
2. Audition output audio.	2. Network audio.
3. Monophonic output audio.	3. External 1 audio.
4. Cue channel audio.	4. External 2 audio.
	5. External 3 audio.
	6. External 4 audio.

1-20. Headphone audio source selection is accomplished by input select switch S1. S1 is a orange-coded ten-position switch/indicator designed to select audio for application to the left and right channel input amplifier stages. The left channel input amplifier consists of integrated circuits U1A/B and U3A. U1A/B and U3A are configured as a precision instrumentation amplifier with a gain of approximately -6 dB. The output of the amplifier stage is routed for application to the headphone split cue circuit.

1-21. SPLIT CUE CIRCUIT. Simultaneous headphone/cue monitoring operation is performed by the split cue circuit. The circuit consists of a front-panel control switch and field-effect-transistor switching network. The split cue circuit is designed to route left and right channel headphone information to the headphone left channel circuit and cue channel information to the headphone right channel circuit for simultaneous headphone/cue monitoring operations.

1-22. A split cue operating sequence is initiated when a line input module is configured to cue and when split cue switch S2 is depressed. A HIGH from the cue enable line will be routed through S2 to inverter U9B. Signals from S2 and U9B produce complementary control commands for application to the FET switching network consisting of transistors Q6 through Q11. A HIGH from switch S2 will bias transistors Q6, Q7, Q8, and Q9 off. A LOW from U9B will bias transistors Q10 and Q11 on. The resultant transistor configuration routes left and right channel headphone information to the headphone left channel and cue channel information to the headphone right channel. The output of the switching network is applied through buffers U12A/B to the headphone tone control network.

1-23. TONE CONTROL CIRCUIT. The headphone circuit is equipped with a tone control network to allow the operator to adjust the headphone audio for specific characteristics. Audio from buffers U12A/B is applied to integrated circuit U13. U13 is a dual voltage-controlled-amplifier stage which operates in association with individual RC networks to produce left and right channel treble and bass shelving filters. The left channel treble shelving filter RC network consists of resistors R96 through R100 and capacitors C59 and C60. The left channel bass shelving filter RC network consists of resistors R102 through R104 and capacitors C61 through C63. The treble and bass networks respond to control voltages from headphone treble control R134 and bass control R137. The controls continuously adjust the treble and bass filter gain networks for specific headphone audio characteristics.

1-24. VCA LEVEL CONTROL CIRCUIT. Audio from the tone control circuit is applied to left and right channel level control components. The left channel level control component consists of voltage-controlled-amplifier (VCA) U4. U4 is a 2150A series precision low-noise voltage-controlled-amplifier module. The VCA is a current-input/current-output device with a voltage sensitive control port. VCA U4 actively controls the left channel audio level as directed by the voltage from a VCA taper control circuit. Potentiometer R107 nulls the distortion generated at the VCA stage. Audio from VCA module U4 is routed for application to the output buffer network.

1-25. VCA TAPER CONTROL CIRCUIT. Headphone audio level control operations are performed by two 2150A series VCA modules. The modules are directed by a taper circuit which establishes the module operating parameters. The VCA taper control network consists of: 1) rotary headphone level control R146, 2) a reference voltage network consisting of diodes D13 through D17, resistors R142 through R144, and R159, 3) differential amplifier U17A, and 4) driver U17B.

1-26. The taper control circuit operates in response to changes in the output voltage from headphone level control R146. R146 is designed with a dc control range from Ø to 5 volts. A non-linear taper circuit gain response is established by the reference voltage network. When the voltage from R146 is from Ø volts to approximately 0.40 volts, the driver circuit gain will be unity. A 0.40 volt to 2 volt output from R146 will result in a circuit gain of approximately 2. A 2 volt to 5 volt output from R146 will result in a driver circuit gain of approximately 4.

1-27. The dc control voltage from the VCA driver circuit output is applied to the VCA modules for precision control of the module audio level. When headphone level control R146 is operated fully counterclockwise, a Ø volt dc reference is applied to differential amplifier U17A. U17A will output approximately Ø volts dc through driver U17B to the VCA modules to establish minimum audio level gain. When headphone control R146 is operated fully clockwise, a +5 volt dc reference is applied to differential amplifier U17A. U17A will output approximately 12 volts dc through driver U17B to establish a maximum headphone audio level.

1-28. The headphone level is also controlled by headphone level adjust control R151. R151 is provided to limit the maximum headphone level.

1-29. OUTPUT CIRCUIT. Audio from the VCA circuit is applied to an output amplifier network. The left channel output amplifier consists of integrated circuit U16B. U16B outputs headphone audio for application to the cue speaker/headphone amplifier circuit board assembly.

1-30. CUE CIRCUIT.

1-31. The control room monitor module cue circuit processes input module cue audio for application to the cue speaker/headphone amplifier circuit board. Cue channel audio is applied to a limiter circuit consisting of operational amplifier U20B and zener diodes D18 and D19. The limiter is configured to clip audio signal levels above +20 dBu. Audio from the limiter is applied to a voltage-controlled-amplifier network consisting of integrated circuit U18B and operational amplifier U19A/B.

1-32. Integrated circuit U18B functions as the voltage-controlled-amplifier stage. The VCA is controlled by cue level potentiometer R154. The output of VCA U18B is applied to U19A which is configured as a buffer stage. A voltage reference from U18B is also buffered by U19B and routed as a bias voltage to cue level control R154. This allows level control R154 to operate at the appropriate control range for VCA U18B.

1-33. The VCA network output from U19A is applied to cue channel mute transistor Q12. During cue channel monitoring conditions, a LOW is applied through the control room mute line to Q12. The LOW biases Q2 on to enable cue audio. The cue audio is routed through buffer U20A for application to the cue speaker/headphone amplifier circuit board. During a control room mute condition, a HIGH is applied to bias Q12 off and mute the cue speaker.

1-34. POWER SUPPLY CIRCUIT.

1-35. DC operating potentials for application to the control room monitor module components are produced by a regulator network. Unregulated ±24 volt supplies from the console power supply module are applied through fusible resistors R175 and R178 to a regulator network consisting of U21 and U22. R175/R178 are a carbon-composition resistors which function as fusible links in the event of a short-circuit potential on the module. The fusible resistors limit a power supply failure to the module and prevent a failure in the entire console system.

1-36. ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U21 and -16.5 volt dc regulator U22. U21/U22 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U21 and U22 are routed for application to the module audio components.

1-37. A regulated +12 volt supply is applied through an RC filter network consisting of resistor R181 and capacitor C116. The output of the filter network is routed for application to the module control logic components.

SECTION II

CONTROL ROOM MONITOR MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the control room monitor module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. GENERAL.

2-6. The control room monitor module circuitry should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-7. AUDIO SWITCHES.

2-8. The control room monitor module is equipped with ITT Shadow audio switches. The switches are sealed for low-noise long-life operation and do not permit cleaning. If a switch becomes noisy or defective, the switch will require replacement.

2-9. SECOND LEVEL MAINTENANCE.

2-10. Second level maintenance consists of procedures required to restore a control room monitor module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-11. ELECTRICAL ADJUSTMENTS.

2-12. CONTROL ROOM MONITOR CIRCUIT VCA DISTORTION ADJUSTMENT. Left channel VCA distortion control R13 and right channel VCA distortion control R42 null distortion at the VCA modules. Distortion adjustment is not required unless VCA modules U4 or U5 are replaced. The VCA distortion is nulled as follows.

2-13. Required Equipment. The following test equipment is required to null the VCA distortion.

A. Allen Wrench (supplied with the console).

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

B. Non-Metallic Adjustment Tool.

C. Extender Ribbon Cable Assemblies:
40-Pin Assembly
50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. Audio Analyzer - Capable of indicating distortion levels from 0.05% to 0.1% (Sound Technology 1710A Distortion Analyzer or equivalent).

2-14. Procedure. To null the VCA distortion, proceed as follows:

2-15. Remove the control room monitor module from the mainframe and connect the extender cable assemblies between the control room monitor module and the receptacles on the mainframe.

2-16. Connect the audio signal generator to a control room monitor module left channel external input on the control room/studio external input connector.

2-17. Refer to Figure 2-1 and connect the audio analyzer between chassis ground and resistor R23 as shown.

2-18. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-19. Operate the control room monitor module to select the test audio for control room monitoring operations.

2-20. Refer to Figure 2-1 and adjust left channel control room monitor VCA distortion null control R13 for a minimum audio analyzer indication.

2-21. Repeat the procedure for the right channel. Connect the audio analyzer to resistor R52 and adjust the right channel distortion with right channel control room monitor VCA distortion null control R42.

2-22. Disconnect all test equipment and replace the control room monitor module.

2-23. HEADPHONE CIRCUIT VCA DISTORTION ADJUSTMENT. Left channel VCA distortion control R107 and right channel VCA distortion control R126 null distortion at the VCA modules. Distortion adjustment is not required unless VCA modules U14 or U15 are replaced. The VCA distortion is nulled as follows.

2-24. Required Equipment. The following test equipment is required to null the VCA distortion.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Extender Ribbon Cable Assemblies:
40-Pin Assembly
50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. Audio Analyzer - Capable of indicating distortion levels from 0.05% to 0.1% (Sound Technology 1710A Distortion Analyzer or equivalent).

2-25. Procedure. To null the VCA distortion, proceed as follows:

2-26. Remove the control room monitor module from the mainframe and connect the extender cable assemblies between the control room monitor module and the receptacles on the mainframe.

2-27. Connect the audio signal generator to a control room monitor module left channel external input on the control room/studio external input connector.

2-28. Refer to Figure 2-1 and connect the audio analyzer between chassis ground and resistor R114 as shown.

2-29. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-30. Operate the control room monitor module to select the test audio for headphone monitoring operations.

2-31. Refer to Figure 2-1 and adjust left channel headphone VCA distortion null control R107 for a minimum audio analyzer indication.

2-32. Repeat the procedure for the right channel. Connect the audio analyzer to resistor R133 and adjust the right channel distortion with right channel headphone VCA distortion null control R126.

2-33. Disconnect all test equipment and replace the control room monitor module.

2-34. CONTROL ROOM MAXIMUM MONITOR LEVEL CONTROL. Potentiometer R69 adjusts the control room monitor maximum level. The adjustment procedure for the control is presented in the installation section of this manual. Refer to PART I SECTION II, INSTALLATION for the adjustment procedure.

2-35. HEADPHONE MAXIMUM LEVEL CONTROL. Potentiometer R151 adjusts the headphone maximum level. The adjustment procedure for the control is presented in the installation section of this manual. Refer to PART I SECTION II, INSTALLATION for the adjustment procedure.

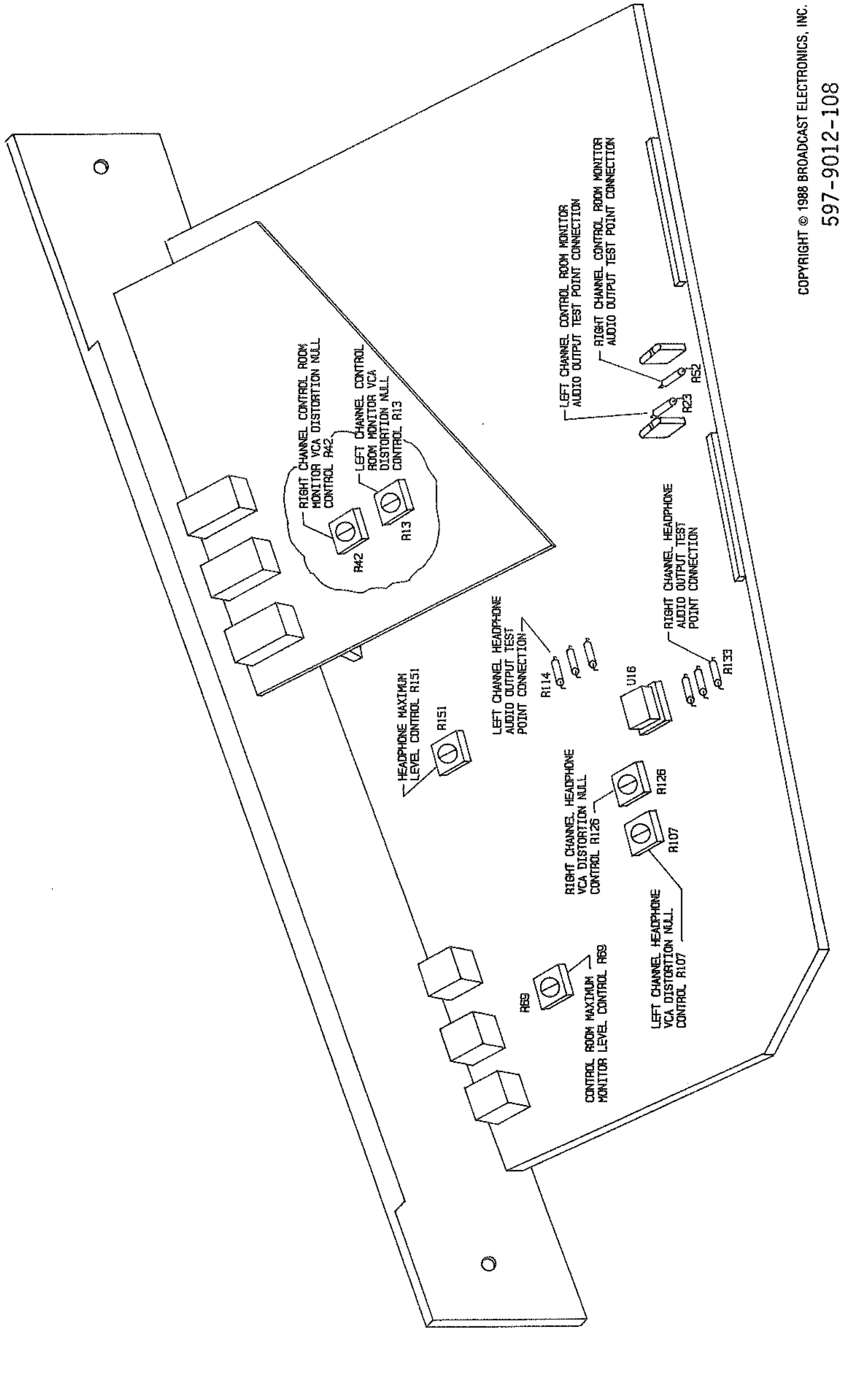

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FIGURE 2-1. CONTROL ROOM MONITOR MODULE ADJUSTMENT CONTROLS

2-36. TROUBLESHOOTING.

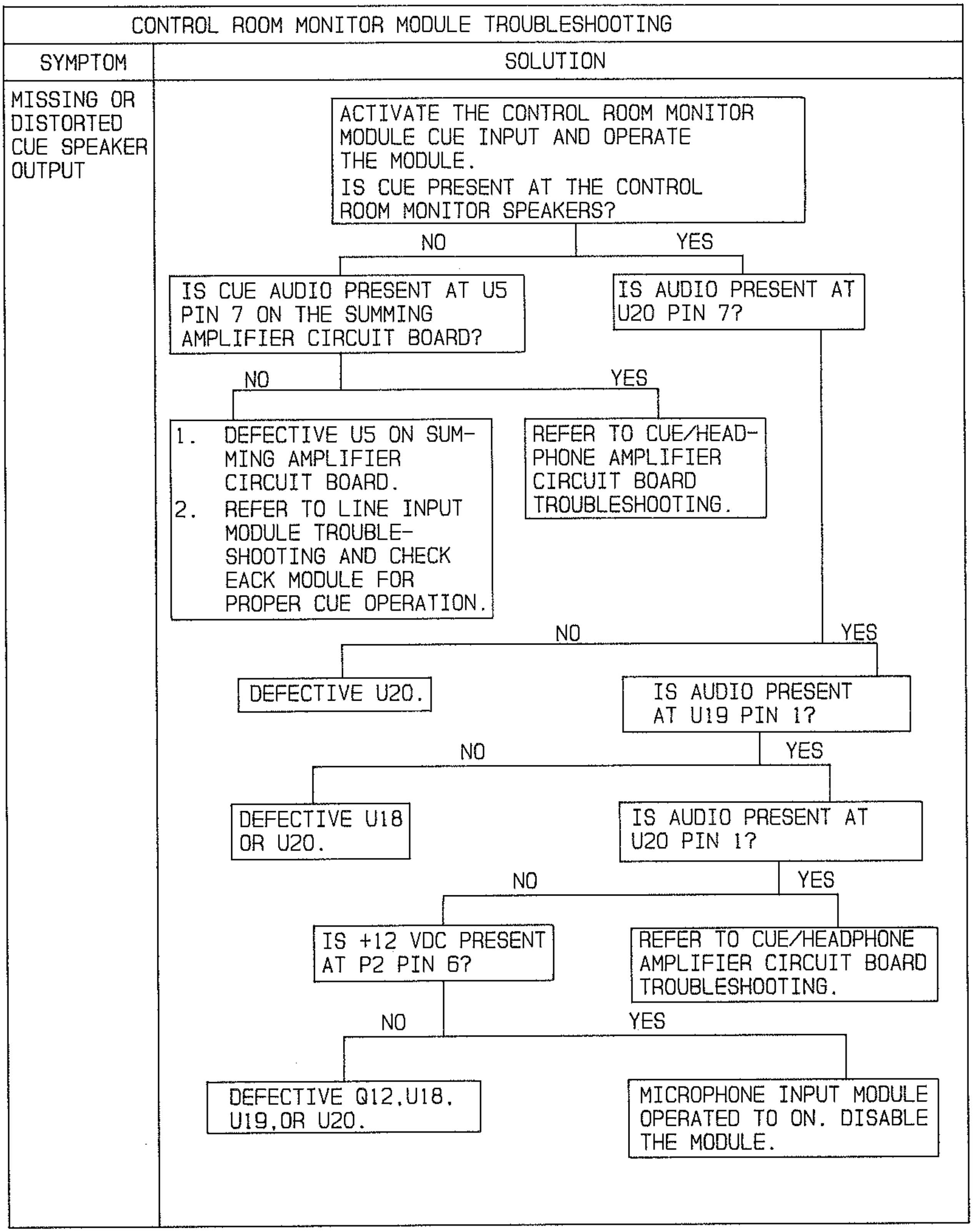
2-37. The troubleshooting philosophy for the control room monitor module consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures. To prevent the application of inadvertent audio noise to the console audio system, attach the 50-pin extender assembly to the module before the 40-pin assembly.

2-38. Figures 2-2 and 2-3 present the control room monitor module and the monitor input amplifier circuit board troubleshooting. Refer to Figures 2-2 and 2-3 to isolate a failure to a specific group of components.

2-39. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-40. COMPONENT REPLACEMENT.

2-41. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.



597-9012-135A

FIGURE 2-2. CONTROL ROOM MONITOR MODULE TROUBLESHOOTING
(Sheet 1 of 3)

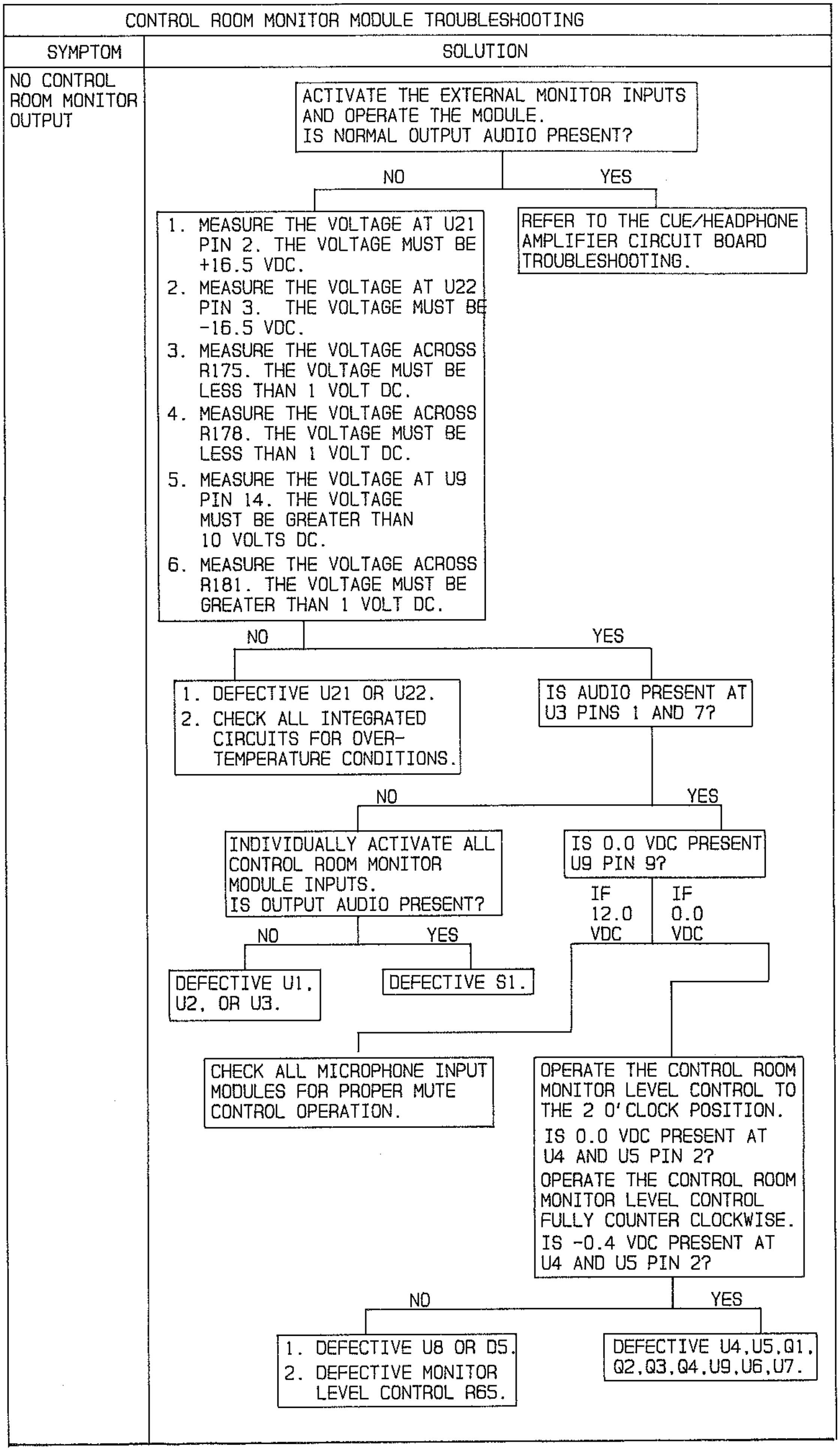


FIGURE 2-2. CONTROL ROOM MONITOR MODULE TROUBLESHOOTING (Sheet 2 of 3)

CONTROL ROOM MONITOR MODULE TROUBLESHOOTING

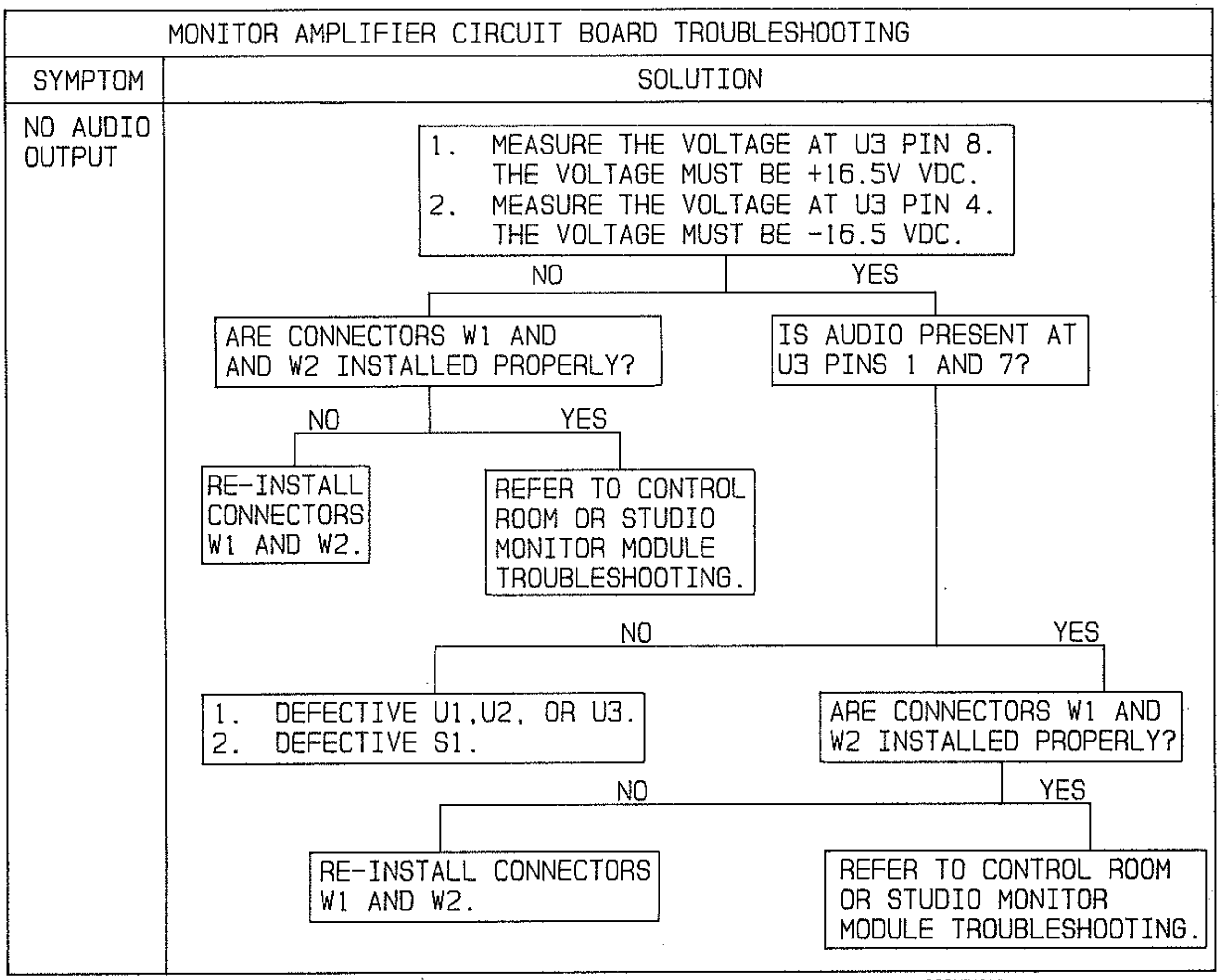
SYMPTOM	SOLUTION
NO HEADPHONE OUTPUT	(see flowchart below)

IS AUDIO PRESENT AT THE CONTROL ROOM MONITOR SPEAKERS?

- NO: REFER TO THE NO CONTROL ROOM MONITOR OUTPUT TROUBLESHOOTING INFORMATION
- YES: OPERATE THE UTILITY METER TO DISPLAY HEADPHONE AUDIO. IS HEADPHONE AUDIO PRESENT?
  - NO: REFER TO MONITOR INPUT AMPLIFIER TROUBLESHOOTING.
  - YES: IS AUDIO PRESENT AT U12 PINS 1 AND 7?
    - NO: DEFECTIVE Q6,Q7,Q8, Q9,Q10,Q11,OR U9.
    - YES: IS AUDIO PRESENT AT U13 PINS 2 AND 17?
      - NO: DEFECTIVE U13.
      - YES: IS AUDIO PRESENT AT U16 PINS 1 AND 7?
        - NO: OPERATE THE HEADPHONE LEVEL CONTROL TO THE 2 O'CLOCK POSITION. IS 0.00VDC PRESENT AT U14 AND U15 PIN 2? OPERATE THE HEADPHONE LEVEL CONTROL FULLY COUNTERCLOCKWISE. IS -0.4VDC PRESENT AT U14 AND U15 PIN 2?
          - NO:
            1. DEFECTIVE U14,U15, OR U17.
            2. DEFECTIVE HEADPHONE LEVEL CONTROL R146.
          - YES: DEFECTIVE U16.
        - YES: REFER TO THE CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING.

FIGURE 2-2. CONTROL ROOM MONITOR MODULE TROUBLESHOOTING (Sheet 3 of 3)

597-9012-135C



597-9012-137

FIGURE 2-3. MONITOR INPUT AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING

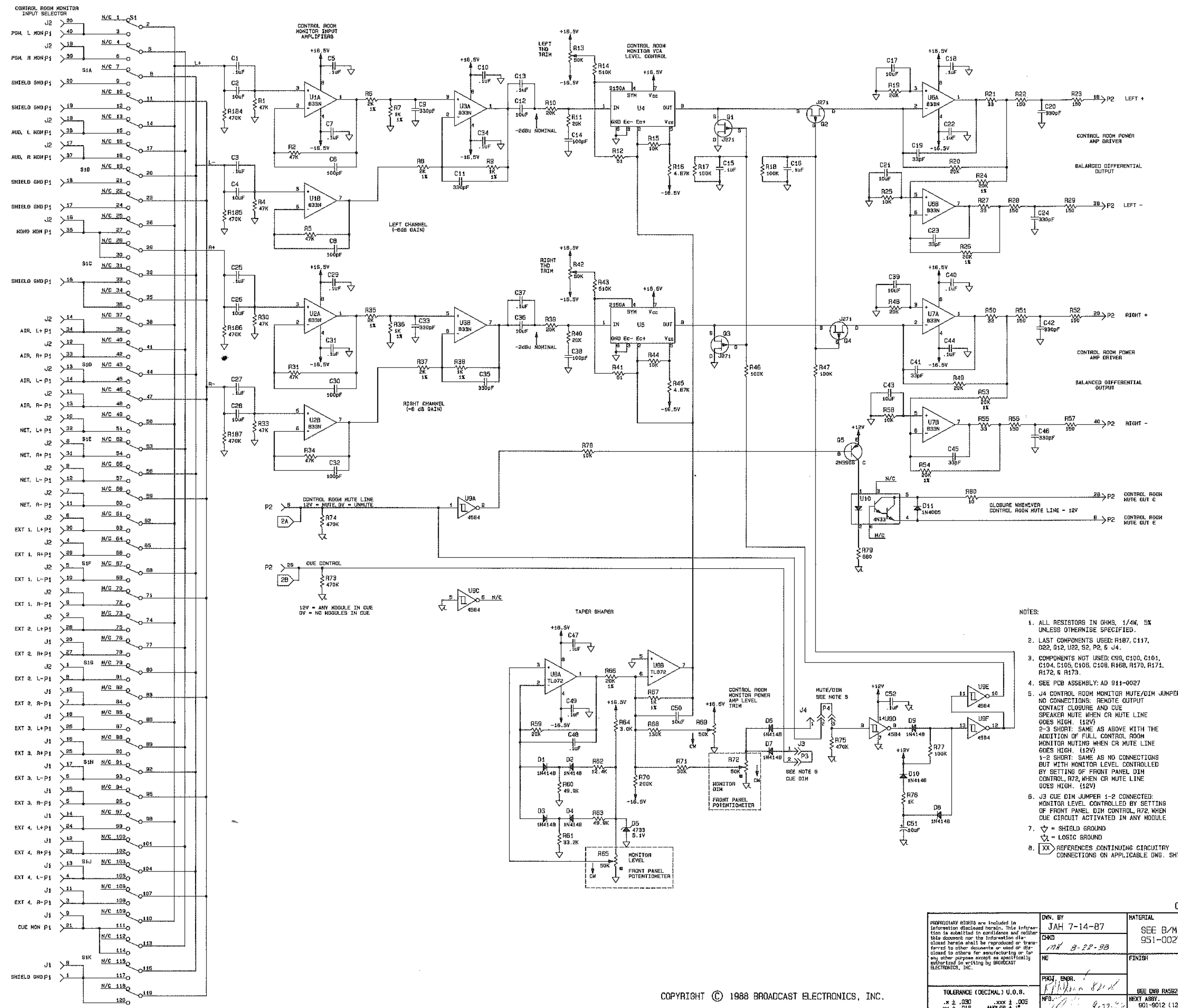
SECTION III

CONTROL ROOM MONITOR MODULE DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the control room monitor module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, CONTROL ROOM MONITOR MODULE	SD951-0027
3-2	ASSEMBLY DIAGRAM, CONTROL ROOM MONITOR MODULE	AD951-0027
3-3	SCHEMATIC DIAGRAM, MONITOR INPUT AMPLIFIER CIRCUIT BOARD	SD911-0101
3-4	ASSEMBLY DIAGRAM, MONITOR INPUT AMPLIFIER CIRCUIT BOARD	AC911-0101



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R187, C117, D22, Q12, U22, S2, P2, & J4.
3. COMPONENTS NOT USED: C99, C100, C101, C104, C105, C106, C108, R168, R170, R171, R172, & R173.
4. SEE PCB ASSEMBLY: AD 911-0027
5. J4 CONTROL ROOM MONITOR MUTE/DIM JUMPER
   NO CONNECTIONS: REMOTE OUTPUT CONTACT CLOSURE AND CUE SPEAKER MUTE WHEN CR MUTE LINE GOES HIGH. (12V)
   2-3 SHORT: SAME AS ABOVE WITH THE ADDITION OF FULL CONTROL ROOM MONITOR MUTING WHEN CR MUTE LINE GOES HIGH. (12V)
   1-2 SHORT: SAME AS NO CONNECTIONS BUT WITH MONITOR LEVEL CONTROLLED BY SETTING OF FRONT PANEL DIM CONTROL, R72, WHEN CR MUTE LINE GOES HIGH. (12V)
6. J3 CUE DIM JUMPER 1-2 CONNECTED: MONITOR LEVEL CONTROLLED BY SETTING OF FRONT PANEL DIM CONTROL, R72, WHEN CUE CIRCUIT ACTIVATED IN ANY MODULE
7. = SHIELD GROUND
   = LOGIC GROUND
8. XX REFERENCES CONTINUING CIRCUITRY CONNECTIONS ON APPLICABLE DWG. SHTS.

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

DWN. BY JAH 7-14-87
CHKD MH 8-22-93
ME
PROJ. ENGR.
MFG. 8-22-93

MATERIAL SEE B/M 951-0027
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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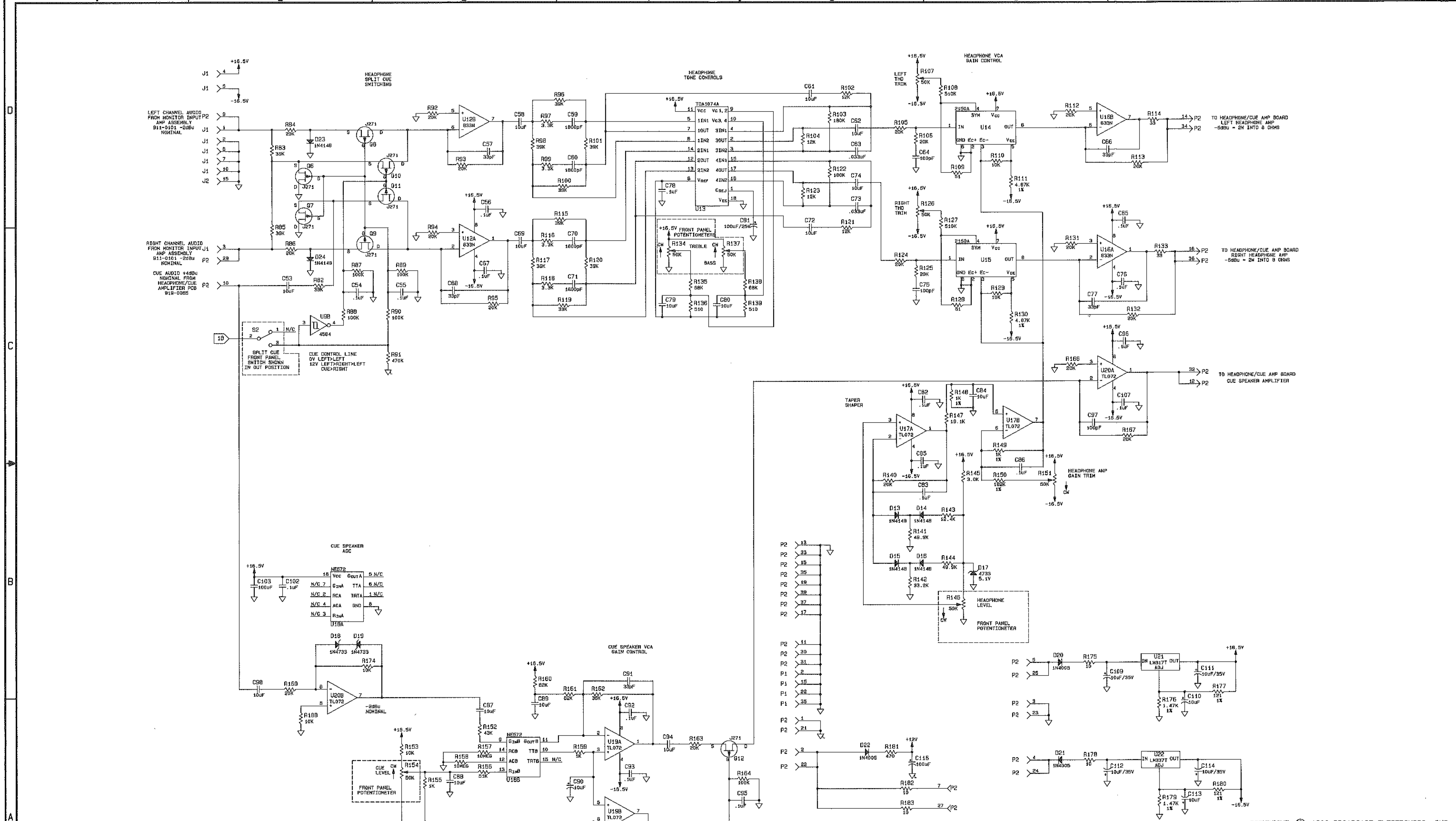
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE CONTROL ROOM MONITOR MODULE

TYPE	SIZE	DWG. NO.	REV
S	D	951-0027	A

MODEL MT-90 SCALE NONE SHEET 1 OF 2



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

DWN. BY JAH 7-14-87
CHKD MH 8-22-88
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 951-0027
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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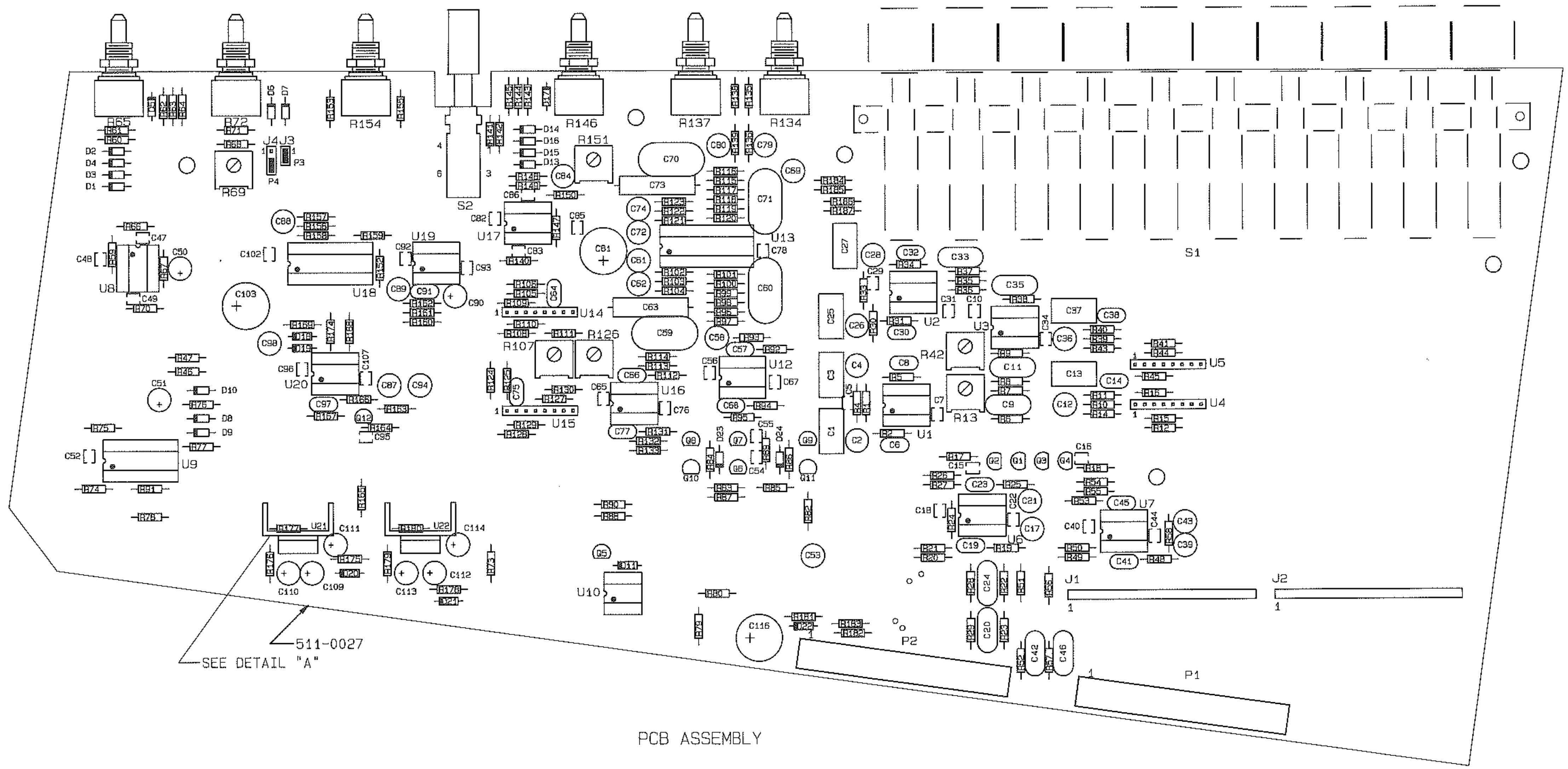
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

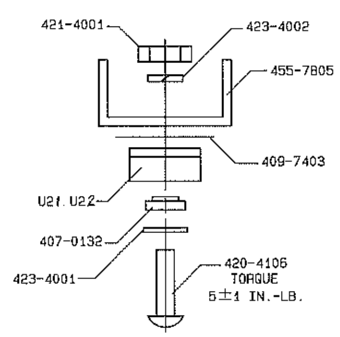
TITLE
CONTROL ROOM MONITOR MODULE

TYPE	SIZE	DWG. NO.	REV
S	D	951-0027	A

MODEL MT-90 SCALE NONE SHEET 2 OF 2



PCB ASSEMBLY



DETAIL "A"

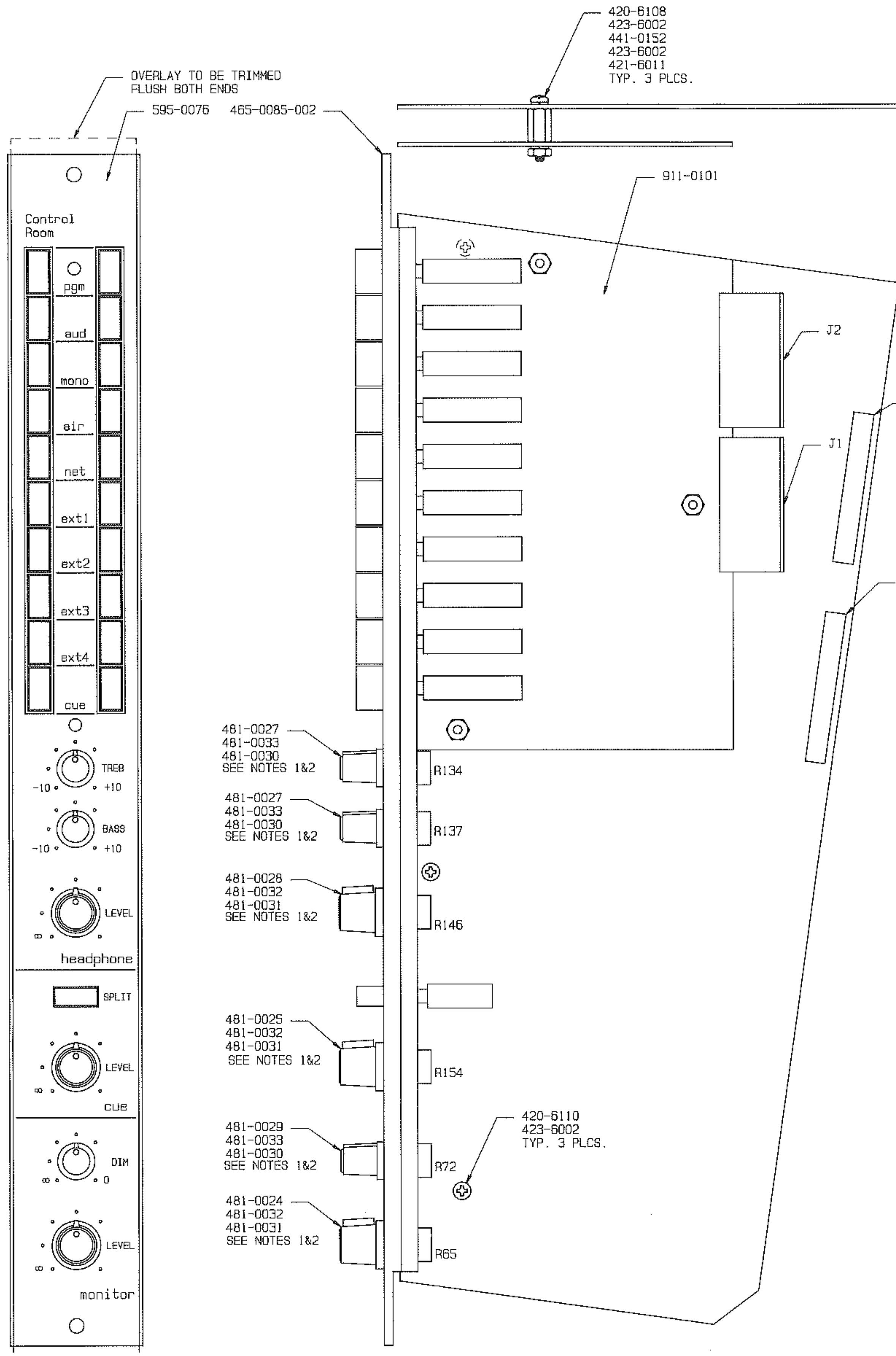
TYPICAL 2 PLCS.

NOTES:

1. REFER TO SHEET 2 FOR MODULE ASSEMBLY.

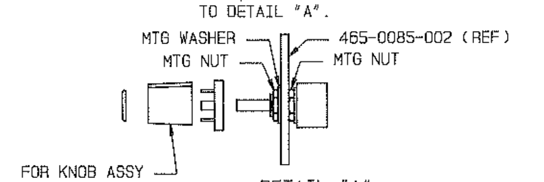
2. SEE PCB SCHEMATIC SD951-0027

TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°	DWN BY LO 6-1-87	MATERIAL SEE B/M 951-0027	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
	CHKD MH 8-22-88	FINISH	TITLE CONTROL ROOM MONITOR / HEADPHONE MODULE
	ME		TYPE A SIZE D DWG.NO. 951-0027 REV C
	PROJ. ENGR.	NEXT ASSY 901-9012 "12CH" 901-9018 "18CH"	MODEL MT90 SCALE 1.5/1 SHEET 1 OF 2
	MFG		



NOTE:

1. ON RESISTORS R65,R72,R134,R137, R146, & R154 ASSEMBLE ACCORDING TO DETAIL "A".



DETAIL "A"

2. SHAFTS MUST BE TURNED FULLY CCW, AND KNOB POINTERS POSITIONED AT DOT NEAREST TO THE FULLY CCW POSITION. KNOB CAN THEN BE TIGHTENED AND CAP PRESSED INTO PLACE.

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

DWN. BY JAH 2-20-88
CHKD MH 9-22-93
ME 5/12/88
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 951-0027
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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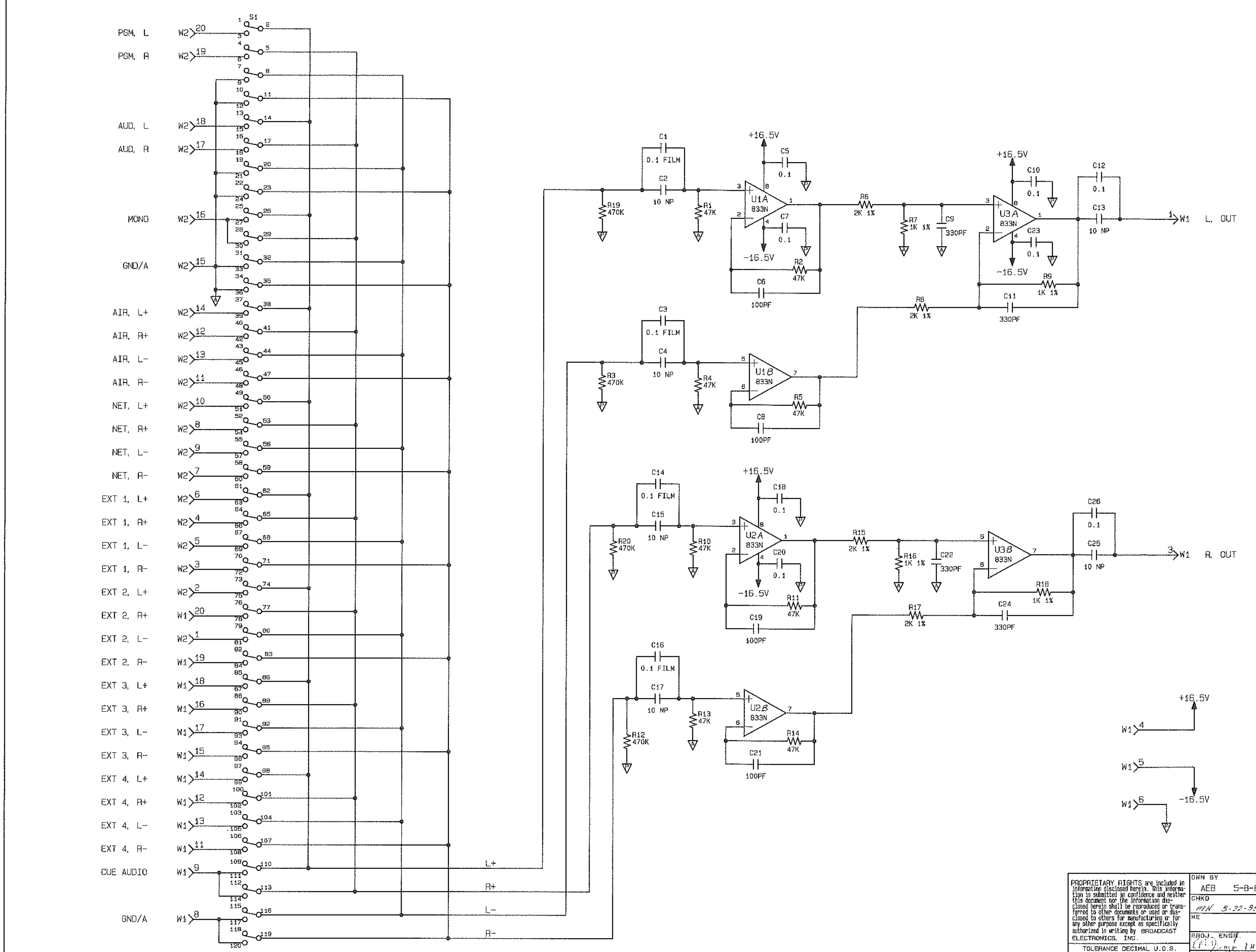
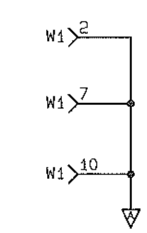
TELEX 250142 CABLE BROADCAST

TITLE CONTROL ROOM MONITOR/ HEADPHONE MODULE

TYPE A | SIZE D | DWG. NO. 951-0027 | REV A
MODEL MIX TRAK 90 | SCALE 1/1 | SHEET 2 OF 2





NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%: ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R20, C26, U3, W2, S1.
3. SEE PCB ASSEMBLY AD911-0101
4. ▽ DESIGNATES POWER SUPPLY GROUND.
5. ▽ DESIGNATES AUDIO CIRCUIT GROUND.

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

DWN BY	AEB 5-8-87
CHKD	MH 8-22-93
ME	
PROJ. ENGR.	[illegible]
MFG.	[illegible]
MATERIAL	SEE B/M 911-0101
FINISH	
NEXT ASSY	

BE BROADCAST ELECTRONICS INC.
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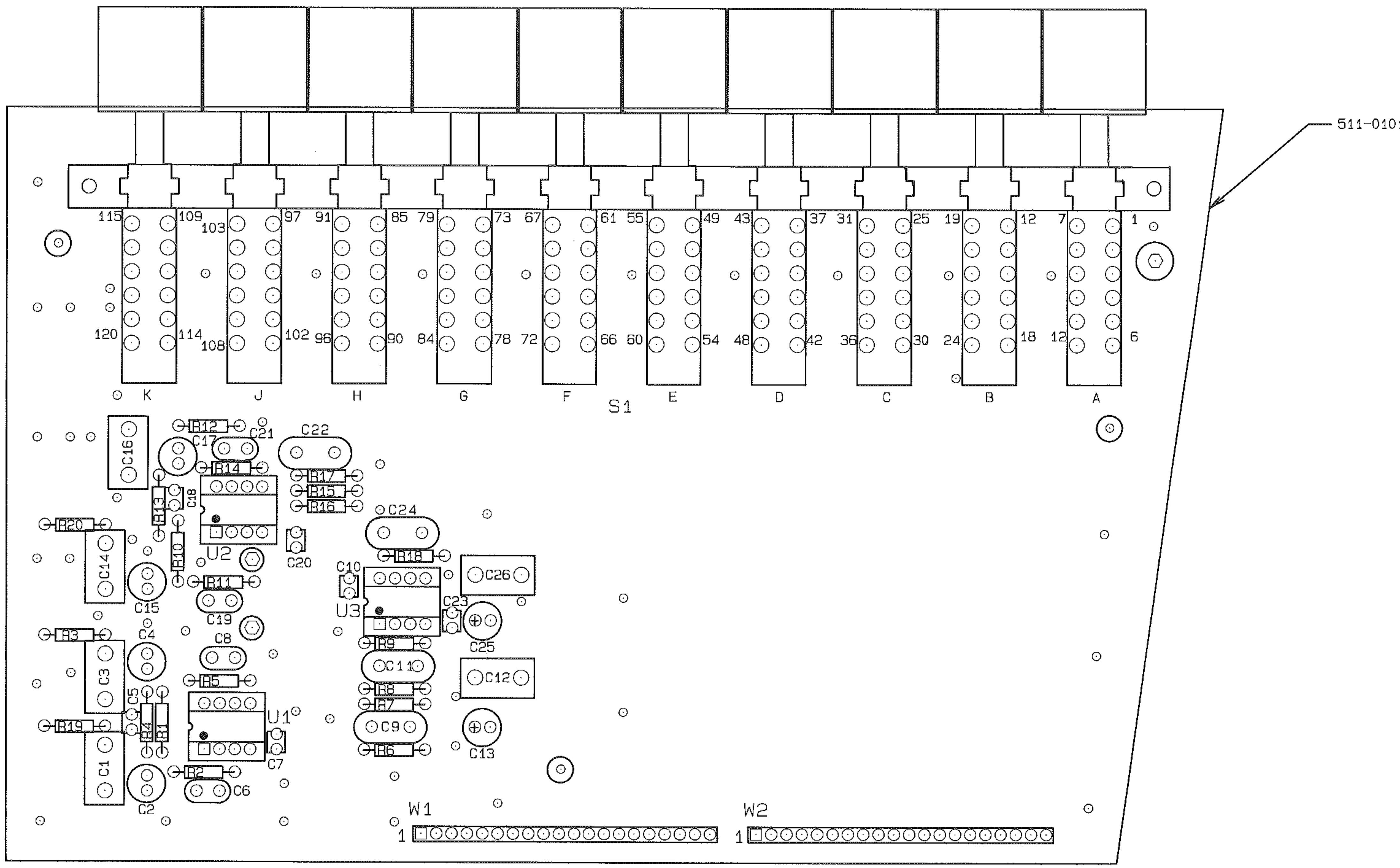
TITLE PCB SCHEMATIC MONITOR INPUT AMP. BOARD

TYPE	SIZE	DWG. NO.	REV
S	D	911-0101	A

MODEL MT90 SCALE NONE SHEET 1 OF 1



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

DWN BY: AEB 4-24-87	MATERIAL: SEE B/M 911-0101		
CHKD: MH 8-22-88			
ME: 8/12/88	FINISH		
PROJ. ENGR.			
MFG.	NEXT ASSY: 901-9012 (12CH) 901-9018 (18CH)		

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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: PCB ASSEMBLY
MONITOR INPUT AMP. BOARD

TYPE	SIZE	DWG. NO.	REV
A	C	911-0101	C

MODEL MT90 SCALE 2/1 SHEET 1 OF 1

SECTION IV

CONTROL ROOM MONITOR MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the control room monitor module. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram.

TABLE 4-1. CONTROL ROOM MONITOR MODULE PARTS LIST INDEX

TABLE 4-2. CONTROL ROOM MONITOR MODULE ASSEMBLY - 951-0027
(Sheet 1 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C2	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C3	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C4	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C6	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C7	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C8	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C9	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C10	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C11	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C12	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C13	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C14	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C15,C16	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C17	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C18	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C19	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C20	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C21	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C22	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C23	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C24	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C25	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C26	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C27	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C28	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C29	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C30	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C31	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C32	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C33	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C34	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1

TABLE 4-2. CONTROL ROOM MONITOR MODULE ASSEMBLY - 951-0027
(Sheet 2 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C35	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C36	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C37	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C38	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C39	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C40	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C41	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C42	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C43	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C44	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C45	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C46	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C47,C48,C49	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C50	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C51	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C52	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C53	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C54,C55,C56	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C57	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C58	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C59,C60	Capacitor, Mica, 1800 pF ±5%, 500V	040-1833	2
C61,C62	Capacitor, Electrolytic, 10 uF, 35V	023-1075	2
C63	Capacitor, Mylar, 0.33 uF, 50V	038-1049	1
C64	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C65	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C66	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C67	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C68	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C69	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C70,C71	Capacitor, Mica, 1800 pF ±5%, 500V	040-1833	2
C72	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C73	Capacitor, Mylar, 0.33 uF, 50V	038-1049	1
C74	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C75	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C76	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C77	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C78	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C79,C80	Capacitor, Electrolytic, 10 uF, 35V	023-1075	2
C81	Capacitor, Electrolytic, 100 uF, 35V	023-1084	1
C82,C83	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C84	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C85,C86	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C87,C88,C89	Capacitor, Electrolytic, 10 uF, 35V	023-1075	3
C90	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C91	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C92,C93	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C94	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C95,C96	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C97	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C98	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C102	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C103	Capacitor, Electrolytic, 100 uF, 35V	023-1084	1
C107	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C109 THRU C114	Capacitor, Electrolytic, 10 uF, 35V	023-1076	6
C116	Capacitor, Electrolytic, 100 uF, 35V	023-1084	1
D1 THRU D4	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D5	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D6 THRU D10	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	5
D11	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1
D13 THRU D16	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D17,D18,D19	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	3
D20,D21,D22	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	3
D23,D24	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
J1,J2	Socket, Flexstrip, 20-Pin	417-0168	2
J3	Connector, Header, 2-Pin	417-4004	1

TABLE 4-2. CONTROL ROOM MONITOR MODULE ASSEMBLY - 951-0027
(Sheet 3 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
J4	Connector, Header, 3-Pin	417-0003	1
P1,P2	Receptacle, 40-Pin Dual In-line	417-4041	2
P3,P4	Jumper, Programmable, 2-Pin	340-0004	2
Q1 THRU Q4	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	4
Q5	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	1
Q6 THRU Q12	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	7
R1,R2,R4,R5	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	4
R6	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R7	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R8	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R9	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R10,R11	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R12	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R13	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R14	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R15	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R16	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R17,R18	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R19,R20	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R21	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R22,R23	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R24	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
R25	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R26	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
R27	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R28,R29	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R30,R31, R33,R34	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	4
R35	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R36	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R37	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R38	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R39,R40	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R41	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R42	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R43	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R44	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R45	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R46,R47	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R48	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R49	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R50	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R51,R52	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R53,R54	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	2
R55	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R56,R57	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R58	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R59	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R60	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R61	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R62	Resistor, 12.4 k Ohm ±1%, 1/4W	103-1245	1
R63	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R64	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R65	Potentiometer, 50 k Ohm ±10%, 1/2W (Monitor Level)	178-5056	1
R66	Resistor, 20 k Ohm ±1%, 1/4W	103-2051	1
R67	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R68	Resistor, 130 k Ohm ±5%, 1/4W	100-1363	1
R69	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R70	Resistor, 200 k Ohm ±5%, 1/4W	100-2063	1
R71	Resistor, 30 k Ohm ±5%, 1/4W	100-3053	1
R72	Potentiometer, 50 k Ohm ±10%, 1/2W (Monitor Dim)	178-5056	1
R73,R74,R75	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	3
R76	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R77	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R78	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R79	Resistor, 680 Ohm ±5%, 1/4W	100-6833	1
R80	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1

TABLE 4-2. CONTROL ROOM MONITOR MODULE ASSEMBLY - 951-0027
(Sheet 4 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R82,R83	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	2
R84	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R85	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R86	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R87 THRU R90	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	4
R91	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R92 THRU R95	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	4
R96	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R97	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R98	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R99	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R100,R101	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	2
R102	Resistor, 12 k Ohm ±5%, 1/4W	100-1253	1
R103	Resistor, 180 K Ohm ±5%, 1/4W	100-1863	1
R104	Resistor, 12 k Ohm ±5%, 1/4W	100-1253	1
R105,R106	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R107	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R108	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R109	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R110	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R111	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R112,R113	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R114	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R115	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R116	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R117	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R118	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R119,R120	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	2
R121	Resistor, 12 k Ohm ±5%, 1/4W	100-1253	1
R122	Resistor, 180 k Ohm ±5%, 1/4W	100-1863	1
R123	Resistor, 12 k Ohm ±5%, 1/4W	100-1253	1
R124,R125	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R126	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R127	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R128	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R129	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R130	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R131,R132	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R133	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R134	Potentiometer, 50 k Ohm ±10%, 1/2W (Treble Control)	178-5056	1
R135	Resistor, 68 k Ohm ±5%, 1/4W	100-6853	1
R136	Resistor, 510 Ohm ±5%, 1/4W	100-5133	1
R137	Potentiometer, 50 k Ohm ±10%, 1/2W (Bass Control)	178-5056	1
R138	Resistor, 68 k Ohm ±5%, 1/4W	100-6853	1
R139	Resistor, 510 Ohm ±5%, 1/4W	100-5133	1
R140	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R141	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R142	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R143	Resistor, 12.4 k Ohm ±1%, 1/4W	103-1245	1
R144	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R145	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R146	Potentiometer, 50 k Ohm ±10%, 1/2W (Headphone Level Control)	178-5056	1
R147	Resistor, 19.1 k Ohm ±1%, 1/4W	103-1915	1
R148,R149	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	2
R150	Resistor, 182 k Ohm ±1%, 1/4W	103-1826	1
R151	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R152	Resistor, 43 k Ohm ±5%, 1/4W	100-4353	1
R153	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R154	Potentiometer, 50 k Ohm ±10%, 1/2W (Cue Level Control)	178-5056	1
R155	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R156	Resistor, 51 k Ohm ±5%, 1/4W	100-5153	1
R157,R158	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	2
R159	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1

TABLE 4-2. CONTROL ROOM MONITOR MODULE ASSEMBLY - 951-0027
(Sheet 5 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R160,R161	Resistor, 62 k Ohm ±5%, 1/4W	100-6253	2
R162	Resistor, 36 k Ohm ±5%, 1/4W	100-3653	1
R163	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R164,R165	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R166,R167, R169	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	3
R175	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R174	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R176	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R177	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R178	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R179	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R180	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R181	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R182,R183	Resistor, 10 Ohm ±5%, 1/4W	100-1024	2
R184 THRU R187	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	4
R188	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
S1	Switch, 10 Section 4PDT Pushbutton, Black/Yellow Indications (CONTROL ROOM MONITOR SELECT Switch)	340-0098	1
S2	Switch, 1 Section DPDT Pushbutton, White/Green Indications (HEADPHONE SPLIT CUE Switch)	340-0102	1
U1,U2,U3	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	3
U4,U5	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8-Pin DIP	220-2150	2
U6,U7	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	2
U8	Integrated Circuit, TL0072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U9	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U10	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
U12	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	1
U13	Integrated Circuit, TDA1074A, DC Controlled Dual Potentiomter, 18-Pin DIP	220-1074	1
U14,U15	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8-Pin DIP	220-2150	2
U16	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	1
U17	Integrated Circuit, TL0072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U18	Integrated Circuit, NE572N, Programmable Analog Compandor, 16-Pin DIP	220-0572	1
U19,U20	Integrated Circuit, TL0072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	2
U21	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U22	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XU1,XU2,XU3, XU6,XU7,XU8	Socket, 8-Pin DIP	417-0804	6
XU9	Socket, 16-Pin DIP	417-1604	1
XU10	Socekt, 6-Pin DIP	417-0600	1
XU12	Socket, 8-Pin DIP	417-0804	1
XU13	Socket, 18-Pin DIP	417-1804	1
XU16,XU17	Socket, 8-Pin DIP	417-0804	2
XU18	Socket, 14-Pin DIP	417-1404	1
XU19,XU20	Socket, 8-Pin DIP	417-0804	2
----	Cap, Knob, Yellow, 11mm w/Spot C112 (for Monitor DIM Control)	481-0029	1
----	Cap, Knob, Orange, 11mm w/Spot C112 (for Headphone BASS/TREBLE Controls)	481-0027	2

TABLE 4-2. CONTROL ROOM MONITOR MODULE ASSEMBLY - 951-0027
(Sheet 6 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Cap, Knob, Yellow, 15mm w/Spot C152 (for Monitor LEVEL Control)	481-0024	1
----	Cap, Knob, Orange, 15mm w/Spot C152 (for Headphone LEVEL Control)	481-0028	1
----	Cap, Knob, Green, 15mm w/Spot C152 (for Cue LEVEL Control)	481-0025	1
----	Monitor Input Amplifier Board Assembly	911-0101	1
----	Blank Control Room Monitor Module Circuit Board	511-0027	1

TABLE 4-3. MONITOR INPUT AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0101

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C2	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C3	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C4	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C6	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C7	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C8	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C9	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C10	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C11	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C12	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C13	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C14	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C15	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C16	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C17	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C18	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C19	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C20	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C21	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C22	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C23	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C24	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C25	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C26	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
R1,R2	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	2
R3	Resistor, 470 k Ohm 15%, 1/4W	100-4763	1
R4,R5	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	2
R6	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R7	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R8	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R9	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R10,R11	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	2
R12	Resistor, 470 k Ohm 15%, 1/4W	100-4763	1
R13,R14	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	2
R15	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R16	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R17	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R18	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R19,R20	Resistor, 470 k Ohm 15%, 1/4W	100-4763	2
S1	Switch, 10 Position 4PDT Pushbutton, Black/Orange Indications (HEADPHONE SELECT Switch)	340-0101	1
U1,U2,U3	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	3
XU1,XU2,XU3	Socket, 8-Pin DIP	417-0804	3
W1,W2	Flexstrip Jumpers, 20-Conductor, Straight Pins	600-0012	2

STUDIO MONITOR MODULE

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SECTION I

STUDIO MONITOR MODULE
THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console studio monitor module. A detailed block diagram of the studio monitor module circuitry is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. The studio monitor module contains monitoring circuitry for the studio A and B audio facilities. The studio A and B circuitry and the associated audio circuit left and right channels are identical, therefore only the studio A left channel circuit will be discussed.

1-4. FUNCTIONAL DESCRIPTION.

1-5. STUDIO A MONITOR CIRCUIT.

1-6. INPUT NETWORK. The studio A monitor circuit is designed to accept ten console audio sources for studio A monitoring operations. The following text provides a list of the studio A monitor circuit audio sources.

INTERNAL AUDIO SOURCES	EXTERNAL INPUTS
1. Program output audio.	1. Off-Air audio.
2. Audition output audio.	2. Network audio.
3. Monophonic output audio.	3. External 1 audio.
4. Cue channel audio.	4. External 2 audio.
	5. External 3 audio.
	6. External 4 audio.

1-7. Audio source selection is accomplished by input select switch S1. S1 is a yellow-coded ten-position switch/indicator designed to select audio for application to the module left and right channel input amplifier stages. The left channel input amplifier consists of integrated circuits U1A/B and U3A. U1A/B and U3A are configured as a precision instrumentation amplifier with a gain of approximately -6 dB. The output of the amplifier stage is routed for application to the level control circuit.

1-8. VCA LEVEL CONTROL CIRCUIT. Audio from the input amplifier network is applied to left channel voltage-controlled-amplifier (VCA) module U4. U4 is a 2150A series precision low-noise voltage-controlled-amplifier. The VCA is a current-input/current-output device with a voltage sensitive control port. VCA U4 actively controls the left channel audio level as directed by a VCA taper control circuit. Potentiometer R12 is provided to null distortion generated at the VCA stage. Audio from VCA module U4 is routed through a field-effect-transistor talk/mute switching circuit for application to the output amplifier network.

1-9. VCA TAPER CONTROL CIRCUIT. Studio monitor audio level control operations are performed by two 2150A series VCA modules. The modules are directed by a taper circuit which establishes the module operating parameters. The VCA taper control network consists of: 1) rotary studio A monitor level control R96, 2) a reference voltage network consisting of diodes D3 through D7, resistors R92 through R95, 3) differential amplifier U11A, and 4) driver U11B.

1-10. The taper control circuit operates in response to changes in the output voltage from monitor level control R96. R96 is designed with a dc control range from Ø to 5 volts. A non-linear taper circuit gain response is established by the reference voltage network. When the voltage from R96 is from Ø volts to approximately 0.40 volts, the control circuit gain will be unity. A 0.40 volt to 2 volt output from R65 will result in a circuit gain of approximately 2. A 2 volt to 5 volt output from R65 will generate a control circuit gain of approximately 4. As a result of the gain design, a non-linear operating response is established for monitor level control.

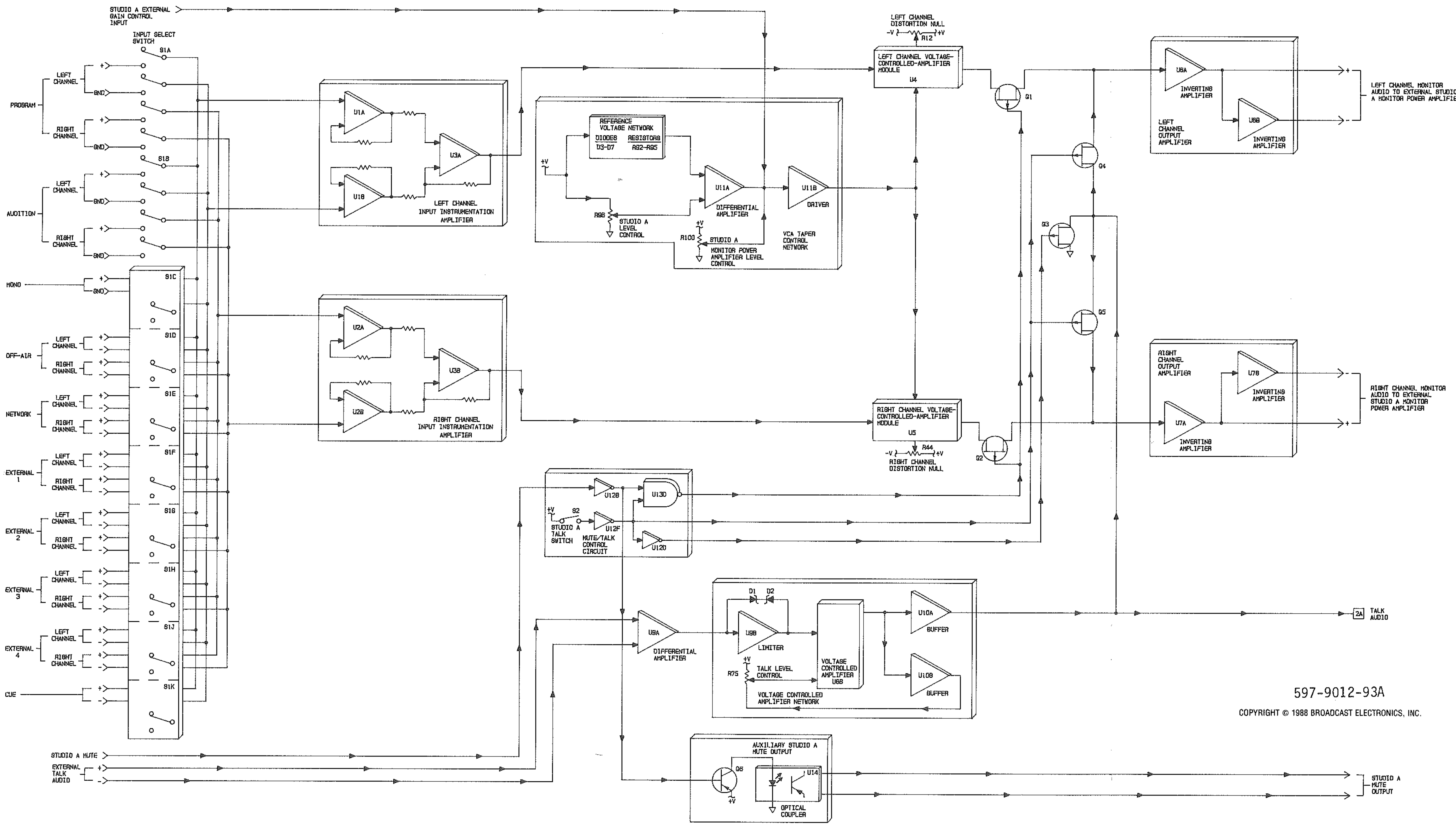
1-11. The dc control voltage from the VCA taper control circuit is applied to the VCA modules for precision control of the monitor audio level. When studio A monitor level control R96 is operated fully counterclockwise, a Ø volt dc reference is applied to differential amplifier U11A. U11A will output approximately Ø volts dc through driver U11B to the VCA modules to establish minimum audio level gain. When monitor control R96 is operated fully clockwise, a +5 volt dc reference is applied to differential amplifier U11A. U11A will output approximately 12 volts dc through driver U11B to establish a maximum studio A monitor speaker audio level.

1-12. The studio A monitor speaker level is also controlled by external monitor power amplifier level control R100. R100 is provided to limit the maximum level of the studio A monitor speakers.

1-13. External Gain Control. The studio A monitor speaker level may be controlled externally by the studio A external gain control input. The input routes a dc control voltage from an external potentiometer to the VCA taper control circuit to adjust the studio A monitor level.

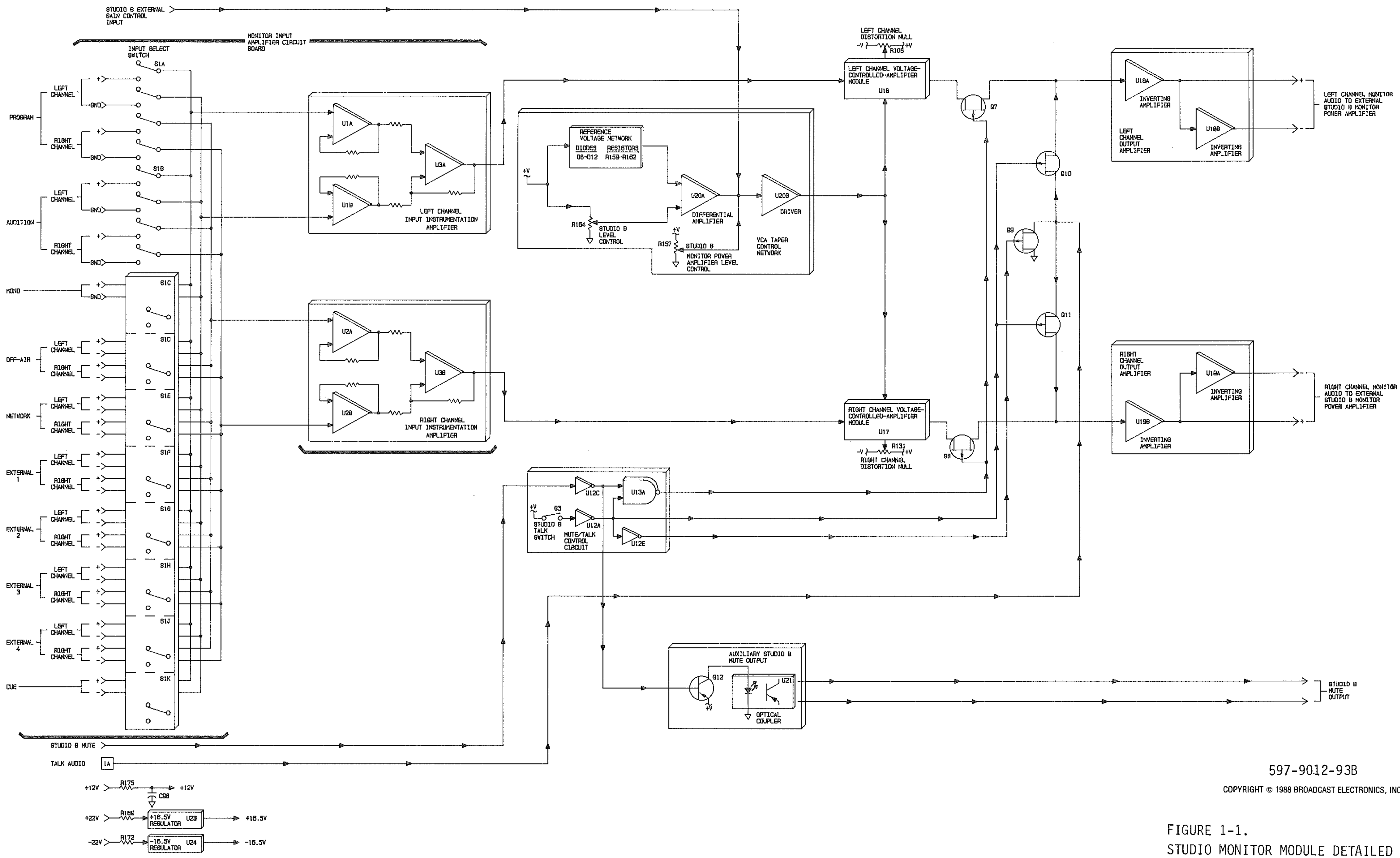
1-14. MUTE/TALK CIRCUIT. The studio A mute/talk circuit controls the muting of the studio A monitor speakers and the application of intercom audio. The mute/talk circuit consists of an inverter control network and a series-shunt field-effect-transistor switching network.

1-15. A studio monitor mute operating sequence is initiated when a HIGH is applied through the studio A mute line to inverter U12B. U12B outputs a LOW which is applied to NAND gate U13D. With talk switch S2 open, a HIGH from inverter U12F is applied to NAND gate U13D and inverter U12D. U13D, U12F, and U12D produce complementary control commands for application to a FET switching network consisting of transistors Q1 through Q5. A HIGH from U13D will bias transistors Q1 and Q2 off. A HIGH from U12F will bias transistors Q4 and Q5 off and a LOW from U12D will bias transistor Q3 on. The resultant transistor configuration will mute the studio A monitor speakers.



597-9012-93A

FIGURE 1-1.
STUDIO MONITOR MODULE DETAILED BLOCK DIAGRAM (Sheet 1 of 2)



597-9012-93B

FIGURE 1-1.
STUDIO MONITOR MODULE DETAILED BLOCK DIAGRAM (Sheet 2 of 2)

1-16. A studio talk operating sequence is initiated when studio talk switch S2 is closed. A HIGH is inverted LOW by U12F and applied to NAND gate U13D and inverter U12D. A LOW from the studio A mute line will be inverted HIGH at U12B and applied to U13D. U13D NANDs the LOW from U12F and a HIGH from U12B to output a HIGH to bias transistors Q1 and Q2 off. The HIGH from U12D will bias Q3 off and the LOW from U12F will bias Q4 and Q5 on. The resultant configuration will route talk audio to the external studio A monitor power amplifier.

1-17. Auxiliary Studio A Mute Output. A control command from the mute/talk control circuit is also applied to the auxiliary studio A mute output circuit. During studio A mute conditions, a HIGH is inverted LOW by U12B and applied to transistor Q6. The HIGH biases Q6 on to energize optical coupler U14 and provide an auxiliary studio A mute output command for application to external circuitry.

1-18. OUTPUT CIRCUIT. Audio from the mute/talk circuit is applied to an output amplifier network. The left channel output amplifier network consists of integrated circuits U6A/B. U6A/B are configured as an inverting amplifier stage to provide unbalanced-to-balanced audio signal conversion at a nominal level of Ø dBu. The output of the amplifier network is routed for application to an external monitor power amplifier.

1-19. TALK CIRCUIT.

1-20. The studio monitor module talk circuit processes talk audio from the control room for application to the studio A and B monitor speakers. Talk audio from the control room microphone input module is applied to differential amplifier U9A. U9A is configured to provide balanced-to-unbalanced signal conversion. The output of U9A is applied to a limiter circuit consisting of operational amplifier U9B and zener diodes D1 and D2. The limiter is configured to clip audio signal levels above +20 dBu. Audio from the limiter is applied to a voltage-controlled-amplifier network consisting of integrated circuit U8B and operational amplifier U10A/B.

1-21. Integrated circuit U8B functions as the voltage-controlled-amplifier stage. The VCA is controlled by talk level potentiometer R75. The output of U8B is applied to U10A which is configured as a buffer stage. A voltage reference from U8B is also buffered by U10B and routed as a bias voltage to talk level control R75. This allows R75 to operate at the appropriate control range for VCA U8B.

1-22. POWER SUPPLY CIRCUIT.

1-23. DC operating potentials for application to the studio monitor module components are produced by a regulator network. Unregulated ±24 volt supplies from the console power supply module are applied through fusible resistors R169 and R172 to regulator network consisting of U23 and U24. R169/R172 are a carbon-composition resistors which function as fusible links in the event of a short-circuit potential on the module. The fusible resistors limit a power supply failure to the module and prevent a failure in the entire console system.

1-24. ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U23 and -16.5 volt dc regulator U24. U23/U24 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U23 and U24 are routed for application to the module audio components.

1-25. A regulated +12 volt supply is applied through an RC filter network consisting of resistor R175 and capacitor C98. The output of the filter network is routed for application to the module control logic components.

SECTION II

STUDIO MONITOR MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the studio monitor module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. GENERAL.

2-6. The studio monitor module circuitry should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-7. AUDIO SWITCHES.

2-8. The studio monitor module is equipped with ITT Shadow audio switches. The switches are sealed for low-noise long-life operation and do not permit cleaning. If a switch becomes noisy or defective, the switch will require replacement.

2-9. SECOND LEVEL MAINTENANCE.

2-10. Second level maintenance consists of procedures required to restore a studio monitor module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-11. ELECTRICAL ADJUSTMENTS.

2-12. STUDIO A CIRCUIT VCA DISTORTION ADJUSTMENT. Left channel VCA distortion control R12 and right channel VCA distortion control R44 null VCA distortion products in the studio A level control circuit. Distortion adjustment is not required unless VCA modules U4 or U5 are replaced. The VCA distortion is nulled as follows.

2-13. Required Equipment. The following test equipment is required to null the VCA distortion.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Extender Ribbon Cable Assemblies:
   40-Pin Assembly
   50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. Audio Analyzer - Capable of indicating distortion levels from 0.05% to 0.1% (Sound Technology 1710A Distortion Analyzer or equivalent).

2-14. Procedure. To null the VCA distortion, proceed as follows:

2-15. Remove the studio monitor module from the mainframe and connect the extender cable assemblies between the studio monitor module and the receptacles on the mainframe.

2-16. Connect the audio signal generator to a studio monitor module left channel external input on a control room/studio external input connector.

2-17. Refer to Figure 2-1 and connect the audio analyzer between chassis ground and resistor R26 as shown.

2-18. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-19. Operate the studio monitor module to select the test audio for studio A monitoring operations.

2-20. Refer to Figure 2-1 and adjust left channel studio A monitor VCA distortion null control R12 for a minimum audio analyzer indication.

2-21. Repeat the procedure for the right channel. Connect the audio analyzer to resistor R53 and adjust the right channel distortion with right channel studio A monitor VCA distortion null control R44.

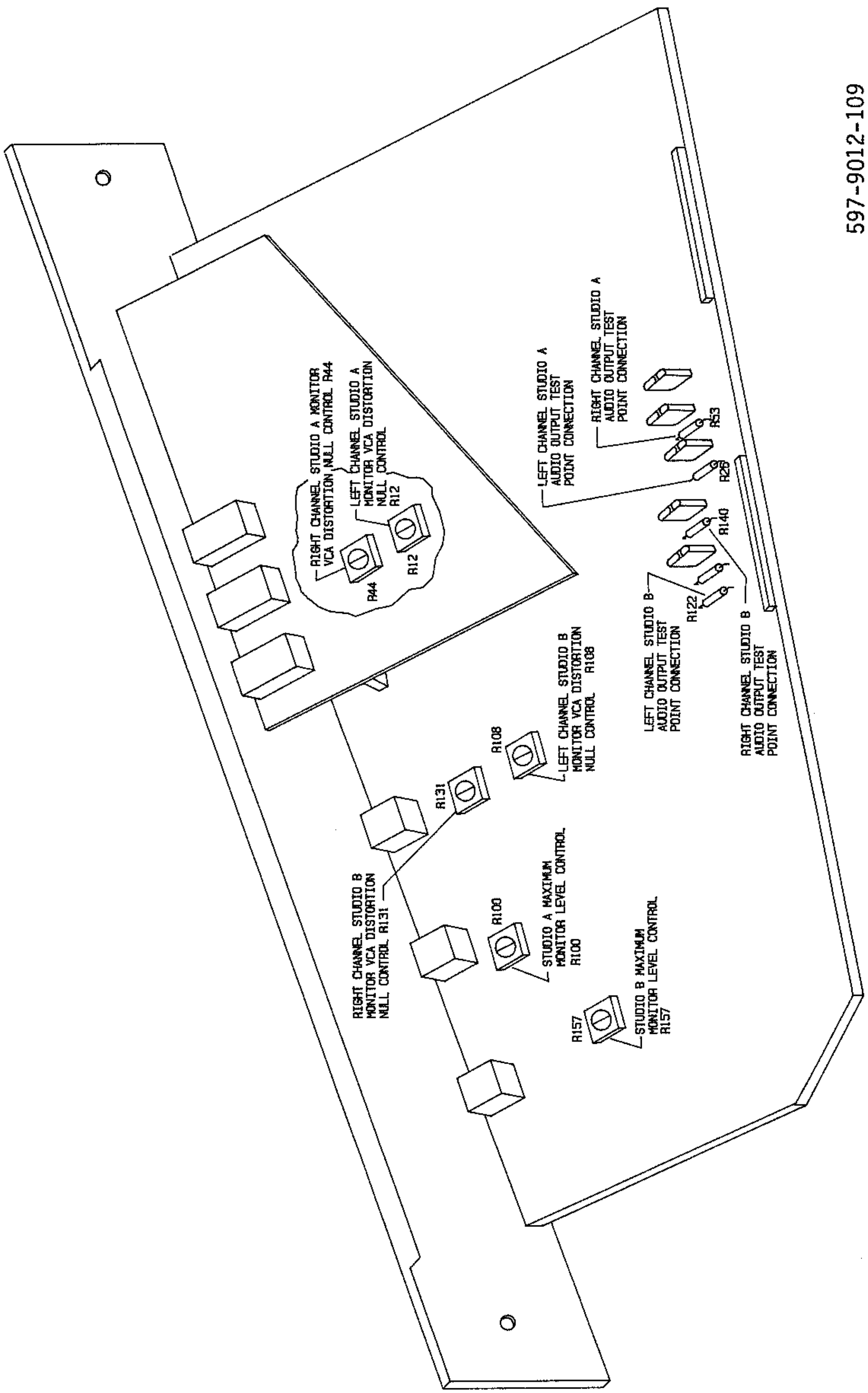
2-22. Disconnect all test equipment and replace the studio monitor module.

2-23. STUDIO B CIRCUIT VCA DISTORTION ADJUSTMENT. Left channel VCA distortion control R108 and right channel VCA distortion control R131 null VCA distortion products in the studio B level control circuit. Distortion adjustment is not required unless VCA modules U16 or U17 are replaced. The VCA distortion is nulled as follows.

2-24. Required Equipment. The following test equipment is required to null the VCA distortion.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.



597-9012-109

FIGURE 2-1. STUDIO MONITOR MODULE ADJUSTMENT CONTROLS

C. Extender Ribbon Cable Assemblies:
40-Pin Assembly
50-Pin Assembly

D. Audio Signal Generator (Potomac AG-51 or equivalent).

E. Audio Analyzer - Capable of indicating distortion levels from 0.05% to 0.1% (Sound Technology 1710A Distortion Analyzer or equivalent).

2-25. Procedure. To null the VCA distortion, proceed as follows:

2-26. Remove the studio monitor module from the mainframe and connect the extender cable assemblies between the studio monitor module and the receptacles on the mainframe.

2-27. Connect the audio signal generator to a studio monitor module left channel external input on a control room/studio external input connector.

2-28. Refer to Figure 2-1 and connect the audio analyzer between chassis ground and resistor R122 as shown.

2-29. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-30. Operate the studio monitor module to select the test audio for studio B monitoring operations.

2-31. Refer to Figure 2-1 and adjust left channel studio B monitor VCA null control R108 for a minimum audio analyzer indication.

2-32. Repeat the procedure for the right channel. Connect the audio analyzer to resistor R140 and adjust the right channel distortion with right channel studio B monitor VCA distortion null control R131.

2-33. Disconnect all test equipment and replace the studio monitor module.

2-34. STUDIO A AND B MAXIMUM MONITOR LEVEL CONTROL. Studio A potentiometer R100 and studio B potentiometer R157 adjust the studio A and B maximum monitor level. The adjustment procedure for the controls is presented in the installation section of this manual. Refer to PART I SECTION II, INSTALLATION for the adjustment procedure.

2-35. TROUBLESHOOTING.

2-36. The troubleshooting philosophy for the studio monitor module consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures. To prevent the application of inadvertent audio noise to the console audio system, attach the 50-pin extender assembly to the module before the 40-pin assembly.

2-37. Figure 2-2 presents the studio monitor module troubleshooting. Monitor input amplifier circuit board troubleshooting is presented in the CONTROL ROOM MONITOR MODULE section of this manual. Refer to Figure 2-2 and the CONTROL ROOM MONITOR MODULE section as required to isolate a failure to a specific group of components.

2-38. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-39. COMPONENT REPLACEMENT.

2-40. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

STUDIO MONITOR MODULE TROUBLESHOOTING

SYMPTOM	SOLUTION
NO STUDIO A AND NO STUDIO B MONITOR OUTPUT	ACTIVATE THE EXTERNAL MONITOR INPUTS AND OPERATE THE MODULE. IS NORMAL OUTPUT AUDIO PRESENT? YES: REFER TO CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING. NO: 1. MEASURE THE VOLTAGE AT U23 PIN 2. THE VOLTAGE MUST BE +16.5VDC. 2. MEASURE THE VOLTAGE AT U24 PIN 3. THE VOLTAGE MUST BE -16.5VDC. 3. MEASURE THE VOLTAGE ACROSS R169. THE VOLTAGE MUST BE LESS THAN 1VDC. 4. MEASURE THE VOLTAGE ACROSS R172. THE VOLTAGE MUST BE LESS THAN 1VDC. 5. MEASURE THE VOLTAGE AT U12 PIN 1. THE VOLTAGE MUST BE GREATER THAN 10VDC. 6. MEASURE THE VOLTAGE ACROSS R175. THE VOLTAGE MUST BE GREATER THAN 1VDC. NO: 1. DEFECTIVE U23 OR U24. 2. CHECK ALL INTEGRATED CIRCUITS FOR OVER-TEMPERATURE CONDITIONS. YES: TROUBLESHOOT THE MOTHERBOARD ASSEMBLIES.

FIGURE 2-2. STUDIO MONITOR MODULE TROUBLESHOOTING
(Sheet 1 of 3)

597-9012-138A

STUDIO MONITOR MODULE TROUBLESHOOTING

SYMPTOM	SOLUTION
NO STUDIO A MONITOR OUTPUT	See flowchart below

IS AUDIO PRESENT AT U3 PINS 1 AND 7?

- NO:
  1. DEFECTIVE U1,U2, OR,U3.
  2. DEFECTIVE S1.
  3. DEFECTIVE C1 THRU C4 OR C24 THRU C27.
- YES: **OPERATE THE STUDIO A MONITOR LEVEL CONTROL TO THE 2 O'CLOCK POSITION. IS 0.00VDC PRESENT AT U4 AND U5 PIN 2? OPERATE THE STUDIO A MONITOR LEVEL CONTROL FULLY COUNTERCLOCKWISE. IS -0.4VDC PRESENT AT U4 AND U5 PIN 2?**
  - NO:
    1. DEFECTIVE U11,D7,OR STUDIO A LEVEL CONTROL R96.
    2. CHECK EXTERNAL GAIN CONTROL INPUT AT P2 PIN 12 FOR 0.00VDC.
  - YES: **IS AUDIO PRESENT AT U6 AND U7 PIN 1?**
    - NO: **IS +12VDC PRESENT AT STUDIO A MUTE CONTROL LINE P2 PIN 6?**
      - NO: DEFECTIVE U12,U13, Q1,Q2,Q3,Q4,Q5, U6,OR U7.
      - YES: MICROPHONE INPUT MODULE OPERATED TO ON. DISABLE THE MODULE.
    - YES: **IS AUDIO PRESENT AT U6 AND U7 PIN 7?**
      - NO: DEFECTIVE U6 OR U7.
      - YES: DEFECTIVE EXTERNAL POWER AMPLIFIER.

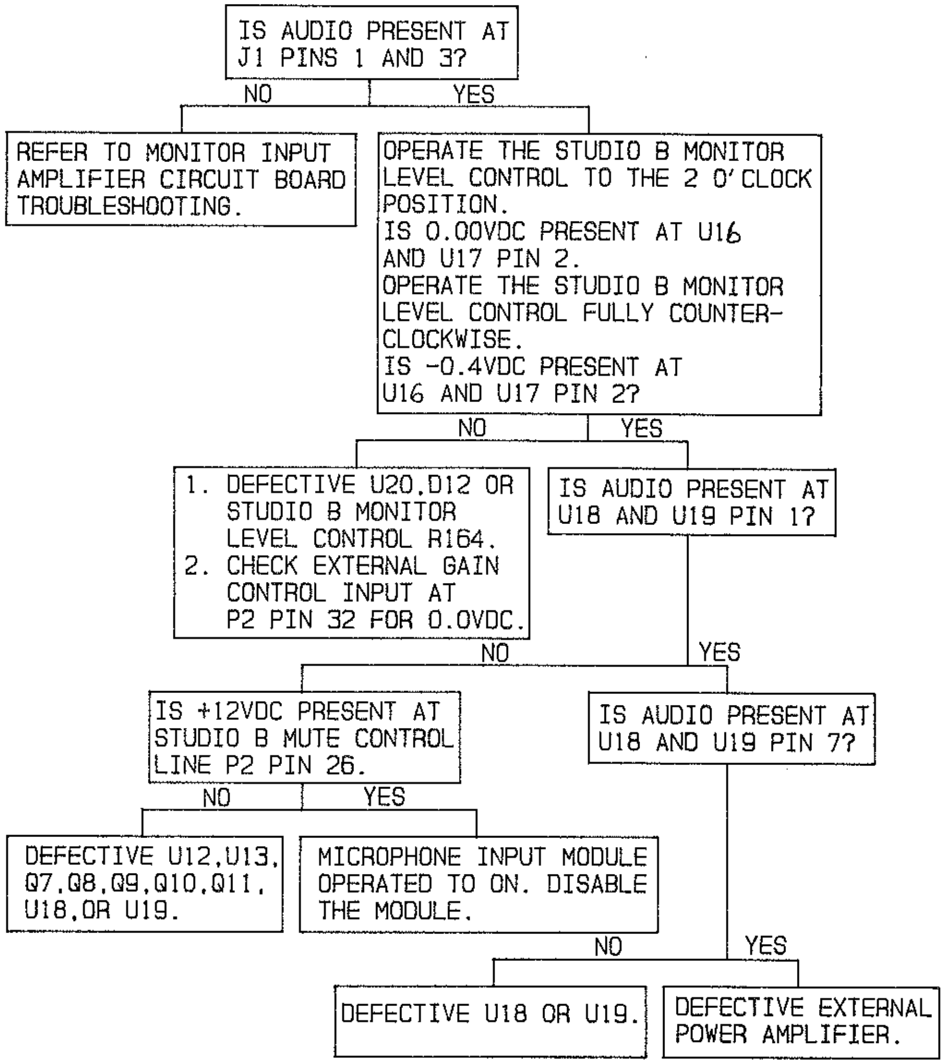
FIGURE 2-2. STUDIO MONITOR MODULE TROUBLESHOOTING (Sheet 2 of 3)

597-9012-138B

STUDIO MONITOR MODULE TROUBLESHOOTING

SYMPTOM	SOLUTION

NO STUDIO B MONITOR OUTPUT



NO INTERCOM OPERATION

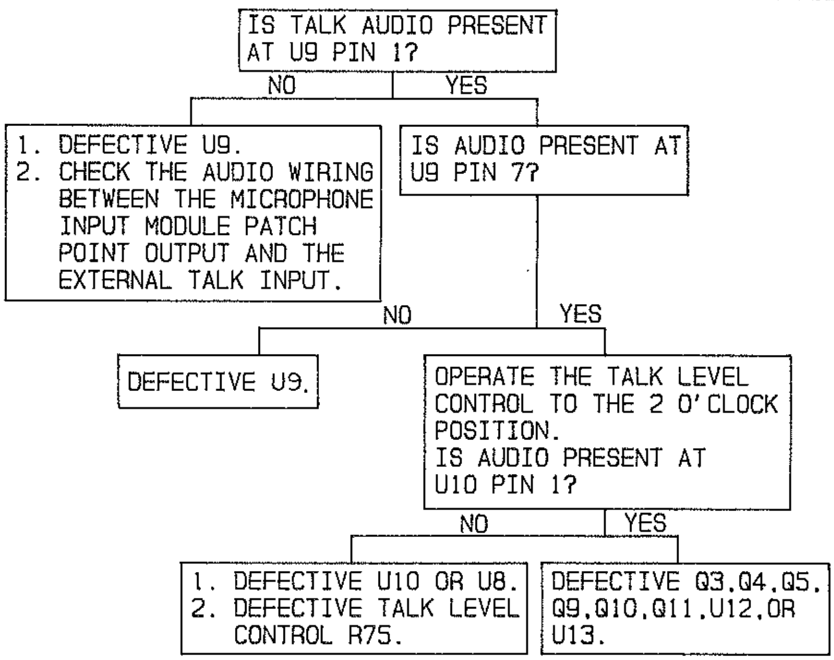


FIGURE 2-2. STUDIO MONITOR MODULE TROUBLESHOOTING (Sheet 3 of 3)

597-9012-138C

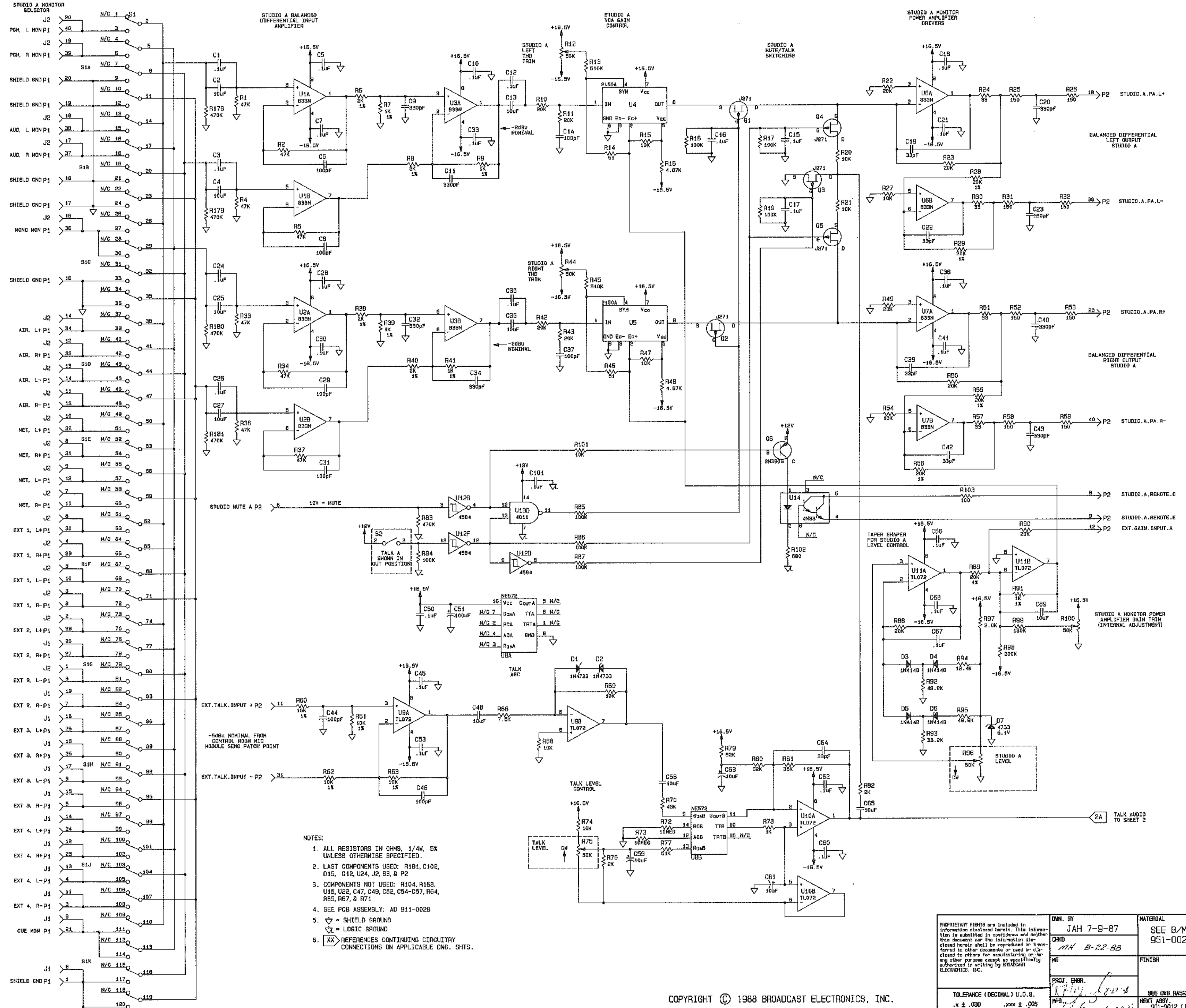
SECTION III

STUDIO MONITOR MODULE DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the studio monitor module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, STUDIO MONITOR MODULE	SD951-0028
3-2	ASSEMBLY DIAGRAM, STUDIO MONITOR MODULE	AD951-0028
3-3	SCHEMATIC DIAGRAM, MONITOR INPUT AMPLIFIER CIRCUIT BOARD (Refer to the CONTROL ROOM MONITOR MODULE section of this manual)	SD911-0101
3-4	ASSEMBLY DIAGRAM, MONITOR INPUT AMPLIFIER CIRCUIT BOARD (Refer to the CONTROL ROOM MONITOR MODULE section of this manual)	AC911-0101



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R181, C102, D15, Q12, U24, J2, S3, & P2
3. COMPONENTS NOT USED: R104, R168, U15, U22, C47, C49, C52, C54-C57, R64, R65, R67, & R71
4. SEE PCB ASSEMBLY: AD 911-0028
5. = SHIELD GROUND
   = LOGIC GROUND
6. XX REFERENCES CONTINUING CIRCUITRY CONNECTIONS ON APPLICABLE DWG. SHTS.

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

DWN. BY JAH 7-9-87
CHKD MH 8-22-88
ME
PROJ. ENGR.
MFG.

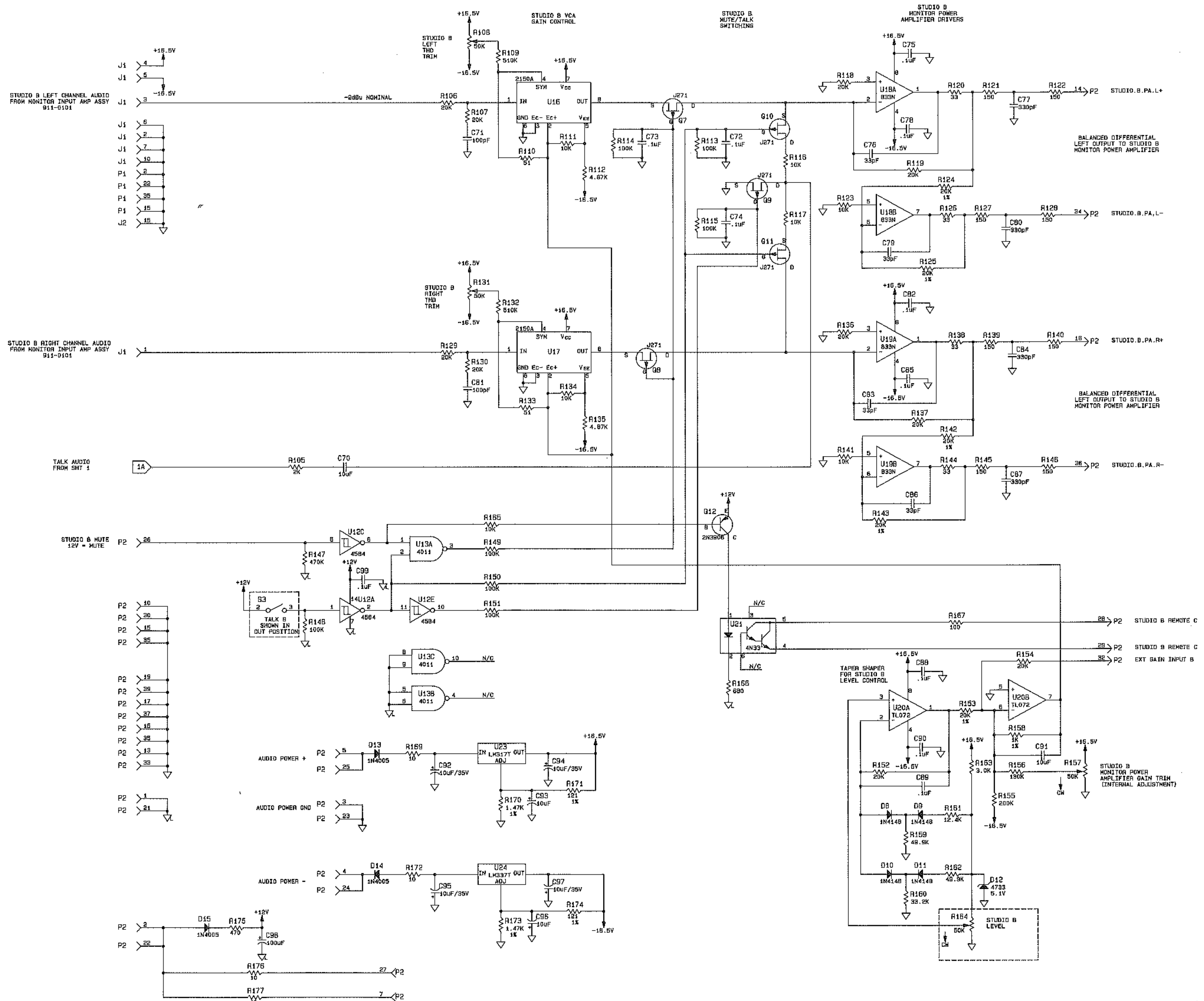
MATERIAL SEE B/M 951-0028
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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 STUDIO MONITOR MODULE

TYPE	SIZE	DWG. NO.	REV
S	D	951-0028	A

MODEL MT-90 SCALE NONE SHEET 1 OF 2



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

DWN. BY	JAH 7-9-87
CHKD	MH 8-22-98
ME	
PROJ. ENGR.	
MFG.	
MATERIAL	SEE B/M 951-0028
FINISH	SEE DWG RA592-0000
NEXT ASSY.	901-9012 (12CH) 901-9018 (18CH)

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 STUDIO MONITOR MODULE

TYPE	SIZE	DWG. NO.	REV
S	D	951-0028	A

MODEL MT-90 SCALE NONE SHEET 2 OF 2

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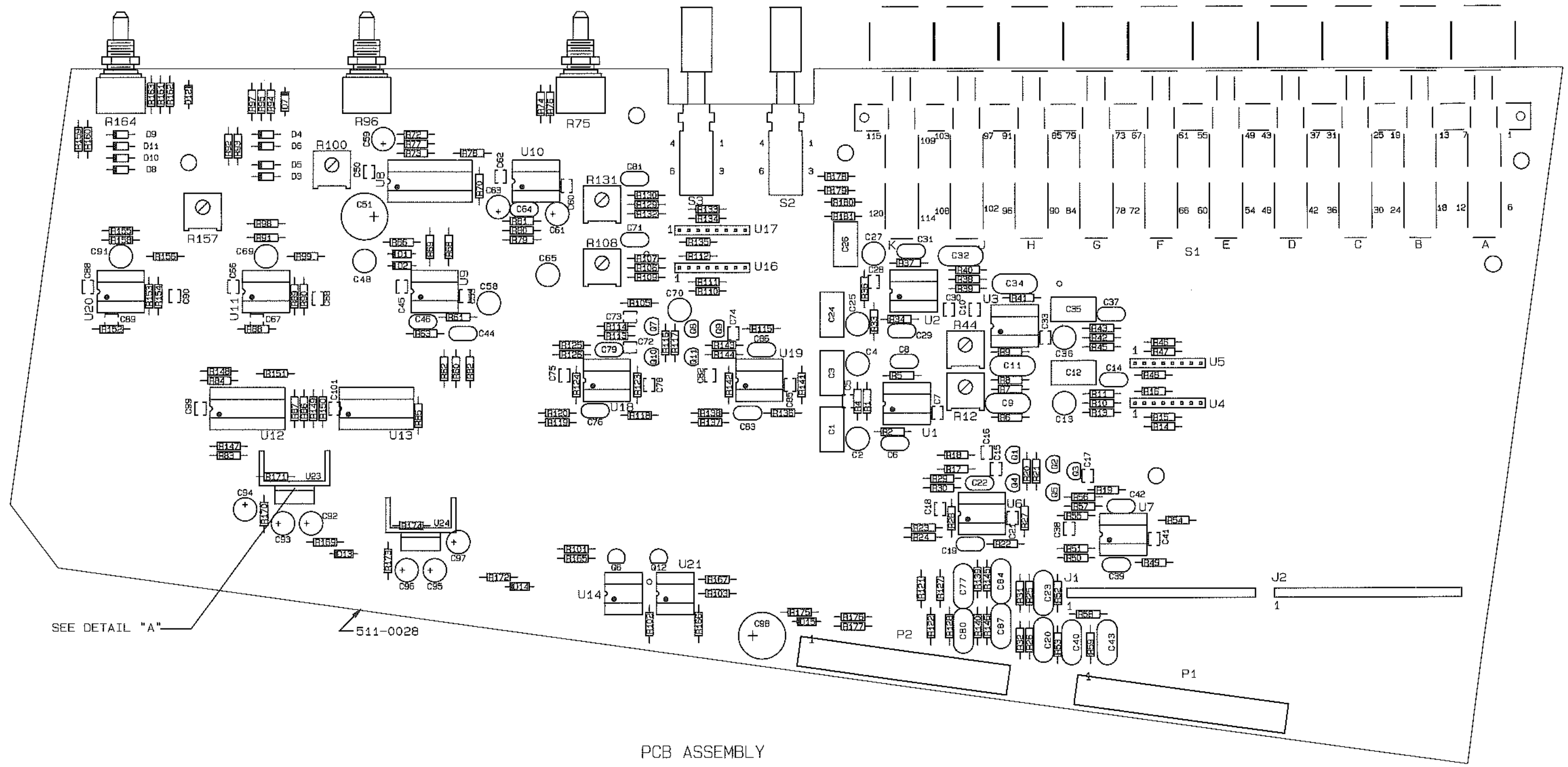
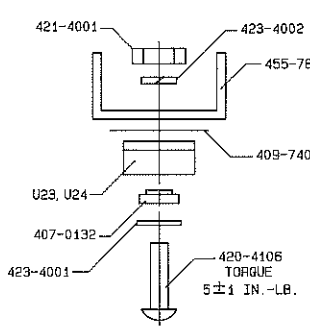


PCB ASSEMBLY



DETAIL "A"
TYPICAL 2 PLCS.

NOTE:

1. REFER TO SHEET 2 FOR MODULE ASSEMBLY.
2. SEE SCHEMATIC SD951-0028.

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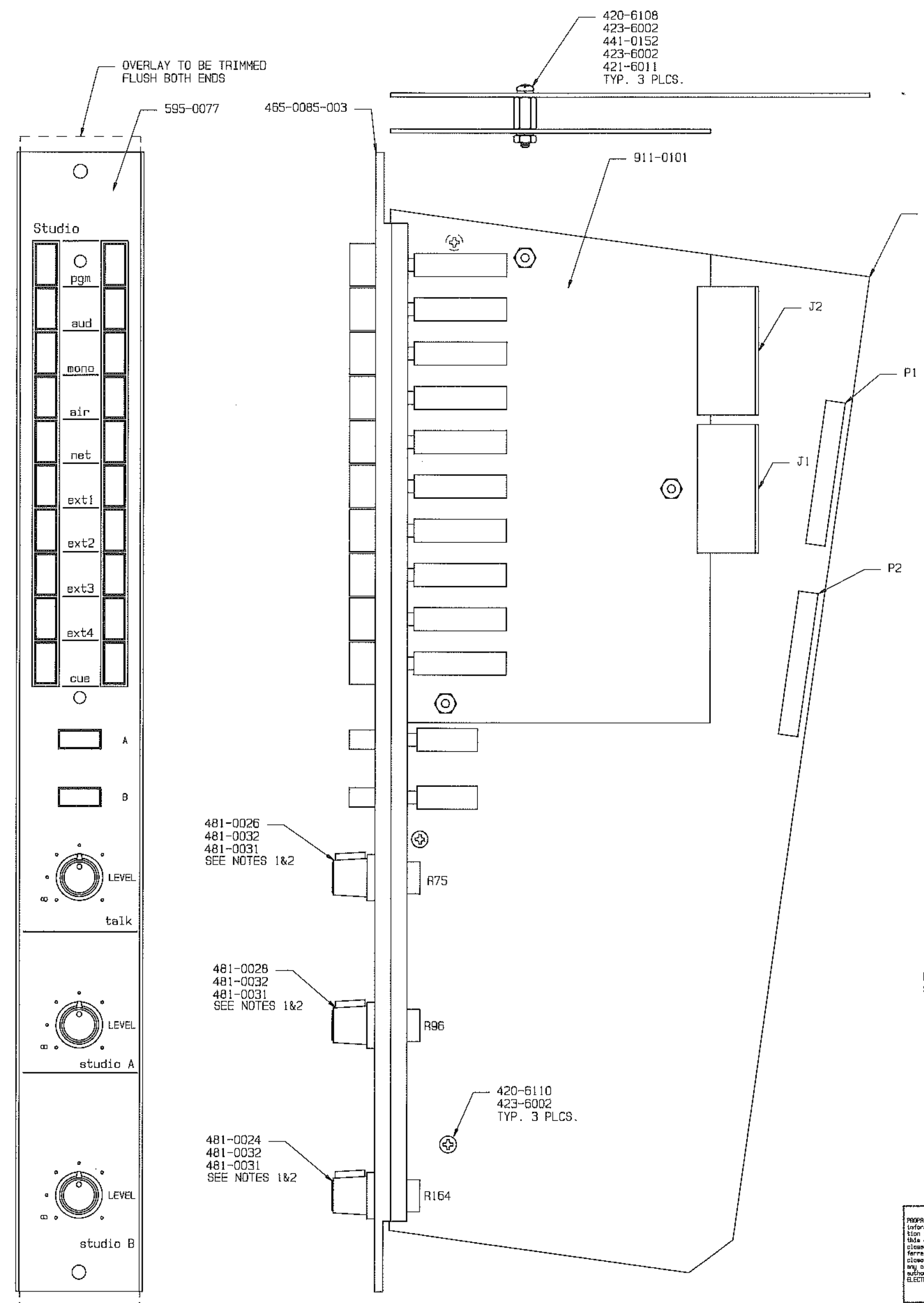
TOLERANCE DECIMAL U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 1°

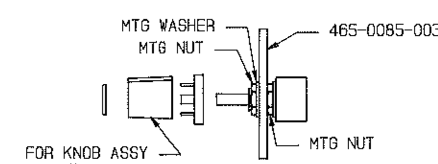
DWN BY	LO 5-5-87
CHKD	MH 9-22-88
ME	9/21/88
PROJ. ENGR.	
MFG	
MATERIAL	SEE B/M 951-0028
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"

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	STUDIO / TALKBACK MONITOR MODULE
TYPE	A
SIZE	D
DWG. NO	951-0028
REV	C
MODEL	MT90
SCALE	1.5/1
SHEET	1 OF 2



NOTE:
1. ON RESISTORS R75,R96, & R164 ASSEMBLE ACCORDING TO DETAIL "A".



DETAIL "A"

2. SHAFTS MUST BE TURNED FULLY CCW, AND KNOB POINTERS POSITIONED AT DOT NEAREST TO THE FULLY CCW POSITION. KNOB CAN THEN BE TIGHTENED AND CAP PRESSED INTO PLACE.

DWN. BY JAH 2-20-88	MATERIAL SEE B/M 951-0028	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST	
CHKD MH 8-22-88			
ME 3/22/88	FINISH	TITLE STUDIO/TALKBACK MONITOR MODULE	
PROJ. ENGR.	SEE DWG RA592-0000	TYPE A SIZE D DWG. NO. 951-0028	REV A
MFG.	NEXT ASSY. 901-9012 (12CH) 901-9016 (16CH)	MODEL MIX TRAK 90 SCALE 1/1	SHEET 2 OF 2

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

SECTION IV

STUDIO MONITOR MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the studio monitor module. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram.

TABLE 4-1. STUDIO MONITOR MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	STUDIO MONITOR MODULE ASSEMBLY	951-0028	4-1
4-3	MONITOR INPUT AMPLIFIER BOARD ASSEMBLY (Refer to the CONTROL ROOM MONITOR MODULE section of this manual)	911-0101	---

TABLE 4-2. STUDIO MONITOR MODULE ASSEMBLY - 951-0028
(Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C2	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C3	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C4	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C6	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C7	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C8	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C9	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C10	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C11	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C12	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C13	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C14	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C15 THRU C18	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	4
C19	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C20	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C21	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C22	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C23	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C24	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C25	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C26	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C27	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C28	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C29	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C30	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C31	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1

TABLE 4-2. STUDIO MONITOR MODULE ASSEMBLY - 951-0028
(Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C32	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C33	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C34	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C35	Capacitor, Mylar, 0.1 uF ±10%, 100V	030-1053	1
C36	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C37	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C38	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C39	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C40	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C41	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C42	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C43	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C44	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C45	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C46	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C48	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C50	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C51	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C53	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C58	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C59	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C60	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C61	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C62	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C63	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C64	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C65	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C66,C67,C68	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C69,C70	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	2
C71	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C72 THRU C75	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	4
C76	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C77	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C78	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C79	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C80	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C81	Capacitor, Mica, 100 pF, 500V	040-1022	1
C82	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C83	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C84	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C85	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C86	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C87	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C88,C89,C90	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C91	Capacitor, Electrolytic, 10 uF, 25V, Non-Polarized	023-1075	1
C92 THRU C97	Capacitor, Electrolytic, 10 uF, 35V	023-1076	6
C98	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C99,C101	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
D1	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D2	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D3 THRU D6	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D7	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D8 THRU D11	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D12	Diode, Zener, 1N4733A, 5.1V ±5%, 1W	200-4733	1
D13,D14,D15	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	3
J1,J2	Socket, Flexstrip, 20-Pin	417-0168	2
P1,P2	Receptacle, 40-Pin Dual In-line	417-4041	2
Q1 THRU Q5	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	5
Q6	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	1
Q7 THRU Q11	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	5
Q12	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	1
R1,R2,R4,R5	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	4
R6	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R7	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1

TABLE 4-2. STUDIO MONITOR MODULE ASSEMBLY - 951-0028
(Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R8	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R9	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R10,R11	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R12	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R13	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R14	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R15	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R16	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R17,R18,R19	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	3
R20,R21	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R22,R23	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R24	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R25,R26	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R27	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R28,R29	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	2
R30	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R31,R32	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R33,R34,R36, R37	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	4
R38	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R39	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R40	Resistor, 2 k Ohm ±1%, 1/4W	100-2041	1
R41	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R42,R43	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R44	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R45	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R46	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R47	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R48	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R49,R50	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R51	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R52,R53	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R54	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R55,R56	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	2
R57	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R58,R59	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R60 THRU R63	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	4
R66	Resistor, 7500 Ohm ±5%, 1/4W	100-7543	1
R68,R69	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R70	Resistor, 43 k Ohm ±5%, 1/4W	100-4353	1
R72,R73	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	2
R74	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R75	Potentiometer, 50 k Ohm ±10%, 1/2W (TALK Level Control)	178-5056	1
R76	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R77	Resistor, 51.1 k Ohm ±5%, 1/4W	100-5153	1
R78	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R79,R80	Resistor, 62 k Ohm ±5%, 1/4W	100-6253	2
R81	Resistor, 36 k Ohm ±5%, 1/4W	100-3653	1
R82	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R83	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R84 THRU R87	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	4
R88	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R89	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	1
R90	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R91	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R92	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R93	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R94	Resistor, 12.4 k Ohm ±1%, 1/4W	103-1245	1
R95	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R96	Potentiometer, 50 k Ohm ±10%, 1/2W (STUDIO A LEVEL Control)	178-5056	1
R97	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R98	Resistor, 200 k Ohm ±5%, 1/4W	100-2063	1
R99	Resistor, 130 k Ohm ±5%, 1/4W	100-1363	1
R100	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1

TABLE 4-2. STUDIO MONITOR MODULE ASSEMBLY - 951-0028
(Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R101	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R102	Resistor, 680 Ohm ±5%, 1/4W	100-6833	1
R103	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
R105	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R106,R107	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R108	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R109	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R110	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R111	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R112	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R113 THRU R115	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	3
R116,R117	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R118,R119	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R120	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R121,R122	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R123	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R124,R125	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	2
R126	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R127,R128	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R129,R130	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R131	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R132	Resistor, 510 k Ohm ±5%, 1/4W	100-5163	1
R133	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R134	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R135	Resistor, 4.87 k Ohm ±1%, 1/4W	103-4874	1
R136,R137	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R138	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R139,R140	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R141	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R142,R143	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	2
R144	Resistor, 33 Ohm ±5%, 1/4W	100-3323	1
R145,R146	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R147	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R148 THRU R151	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	4
R152	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R153	Resistor, 20.0 k Ohm ±1%, 1/4W	103-2051	1
R154	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R155	Resistor, 200 k Ohm ±5%, 1/4W	100-2063	1
R156	Resistor, 130 k Ohm ±5%, 1/4W	100-1363	1
R157	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R158	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R159	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R160	Resistor, 33.2 k Ohm ±1%, 1/4W	103-3325	1
R161	Resistor, 12.4 k Ohm ±1%, 1/4W	103-1245	1
R162	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R163	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R164	Potentiometer, 50 k Ohm ±10%, 1/2W (STUDIO B LEVEL Control)	178-5056	1
R165	Resistor, 10k Ohm ±5%, 1/4W	100-1053	1
R166	Resistor, 680 Ohm ±5%, 1/4W	100-6833	1
R167	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
R169	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R170	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R171	Resistor, 121 Ohm ±5%, 1/4W	100-1231	1
R172	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R173	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R174	Resistor, 121 Ohm ±5%, 1/4W	100-1231	1
R175	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R176,R177	Resistor, 10 Ohm ±5%, 1/4W	100-1024	2
R178 THRU R181	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	4
S1	Switch, 10 Section, 4PDT Pushbutton, Black/Yellow Indications (STUDIO A MONITOR SELECT Switch)	340-0098	1
S2	Switch, 1 Section Pushbutton, 2PDT, Momentary, Yellow/Black Indications (TALK A Switch)	340-0099	1

TABLE 4-2. STUDIO MONITOR MODULE ASSEMBLY - 951-0028
(Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
S3	Switch, 1 Section Pushbutton, 2PDT, Momentary, Orange/Black Indications (TALK B Switch)	340-0100	1
U1,U2,U3	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	3
U4,U5	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8-Pin DIP	220-2150	2
U6,U7	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	2
U8	Integrated Circuit, NE572N, Programmable Analog Compandor, 16-Pin DIP	220-0572	1
U9,U10,U11	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	3
U12	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U13	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U14	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
U16,U17	Integrated Circuit, 2150A, Voltage Controlled Amplifier, 8-Pin DIP	220-2150	2
U18,U19	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	2
U20	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	1
U21	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
U23	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U24	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XU1 THRU XU7	Socket, 8-Pin DIP	417-0804	5
XU8	Socket, 16-Pin DIP	417-1604	1
XU9 THRU XU11	Socket, 8-Pin DIP	417-0804	3
XU12,XU13	Socket, 14-Pin DIP	417-1404	2
XU14	Socket, 6-Pin DIP	417-0600	1
XU18 THRU XU20	Socket, 8-Pin DIP	417-0804	3
XU21	Socket, 6-Pin DIP	417-0600	1
----	Knob Cap, 15mm Orange W/Spot, C152 (for STUDIO B MONITOR LEVEL Control)	481-0028	1
----	Knob Cap, 15mm Gray W/Spot, C152 (for TALK LEVEL Control)	481-0026	1
----	Knob Cap, 15mm Yellow W/Spot, C152 (for STUDIO A MONITOR LEVEL Control)	481-0024	1
----	Monitor Input Amplifier Board Assembly (Refer to the CONTROL ROOM MONITOR MODULE section of this manual)	911-0101	1
----	Blank Studio Monitor Module Circuit Board	511-0028	1

REMOTE CONTROL MODULE
SOURCE REMOTE CONTROL MODULE

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LIST OF ILLUSTRATIONS

SECTION I

REMOTE CONTROL MODULE
SOURCE REMOTE CONTROL MODULE
THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console remote control and source remote control modules.

1-3. REMOTE CONTROL MODULE FUNCTIONAL DESCRIPTION.

1-4. The following text provides a functional description of the remote control module. Figure 1-1 presents a detailed block diagram of the remote control module circuitry. Refer to Figure 1-1 as required for the following circuit description. To simplify and clarify the discussion, the text will describe the operation of the remote control module circuitry for a remote input A on command.

1-5. GENERAL.

1-6. Remote control operations such as input A/B on/off control, input A/B on/off indications, and cue control for a line input or microphone input module are performed by the remote control module. The module is equipped with optical coupler input/output networks and CMOS control logic. The module utilizes the input optical coupler network in a manner to allow the initiation of a remote control function from either a positive or negative logic control circuit. The output optical coupler network is utilized in a similar manner to allow the connection of either a positive or negative logic indicator circuit.

1-7. REMOTE COMMAND CIRCUIT.

1-8. The remote control module input network consists of optical couplers U6 through U11. When a remote function is initiated such as an input A on command, the remote control circuit will energize optical coupler U6. U6 will output a HIGH control command to multiplexer U2. U2 controlled by A/B select information from the input module. When audio source A is selected on the input module, a LOW will be routed to U2. The LOW instructs the multiplexer to select source A remote control information. The remote control information from U2 is applied to an inverter network consisting of U1A/B/C. With the application of an input A on command, the HIGH from U2 will be inverted LOW by U1A and routed to the associated input module.

1-9. REMOTE INDICATION CIRCUIT.

1-10. The input module will respond to the input A on command by enabling the audio circuitry and processing the source A audio. The input module will also generate a continuous on command which is applied to one-shot U5A and jumper J2. U5A and jumper J2 allow the selection of either a momentary or continuous remote on command. The command from J2 is applied to an AND gate demultiplexer consisting of U4A/B/C/D. The demultiplexer is provided to decode the source on/off and A/B select information. With the application of an input A on command, the demultiplexer will output a HIGH through a control line to transistor driver array U3. U3 inverts the command and outputs a LOW to energize optical coupler U13 and generate a source A on indicator command for application to external circuitry.

1-11. SOURCE REMOTE CONTROL MODULE FUNCTIONAL DESCRIPTION.

1-12. The following text presents a functional description of the source remote control module. Figure 1-2 presents a detailed block diagram of the source remote control module circuitry. Refer to Figure 1-2 as required for the following circuit description. To simplify and clarify the discussion, the text will describe the operation of the source remote control module circuitry for the sequencing of the A audio sources on console channels 1 and 2.

1-13. GENERAL.

1-14. Control of line input module audio sources is performed by source remote control modules. The source remote control modules operate in association with the line input modules and a bus on the input motherboard assemblies to provide an automatic source sequencing feature. Sequencing operations are directed by the source remote control module which processes ready and end-of-message (EOM) status information from the audio sources and operating information from the line input module. The module evaluates the information and generates the appropriate audio source and line input module commands.

1-15. ARM CIRCUIT.

1-16. A line input module is configured for automatic source sequencing operations when the module arm switch/indicator is depressed. A LOW from the switch/indicator is applied to the associated source remote control module and is inverted HIGH by U2D. The HIGH is applied to arm flip-flop U1B. The Q output of U1B will go HIGH. The HIGH is inverted LOW by U3A and biases driver transistor Q1 on to illuminate the arm lamp on the line input module. The HIGH is also applied to an automatic source sequencing circuit.

1-17. INPUT CIRCUIT.

1-18. Audio source EOM and ready status information are applied to the module through an coupler network consisting of integrated circuits U6 through U9. The optical coupler network is utilized in a manner which allows audio source indications from either a positive or negative logic control circuit.

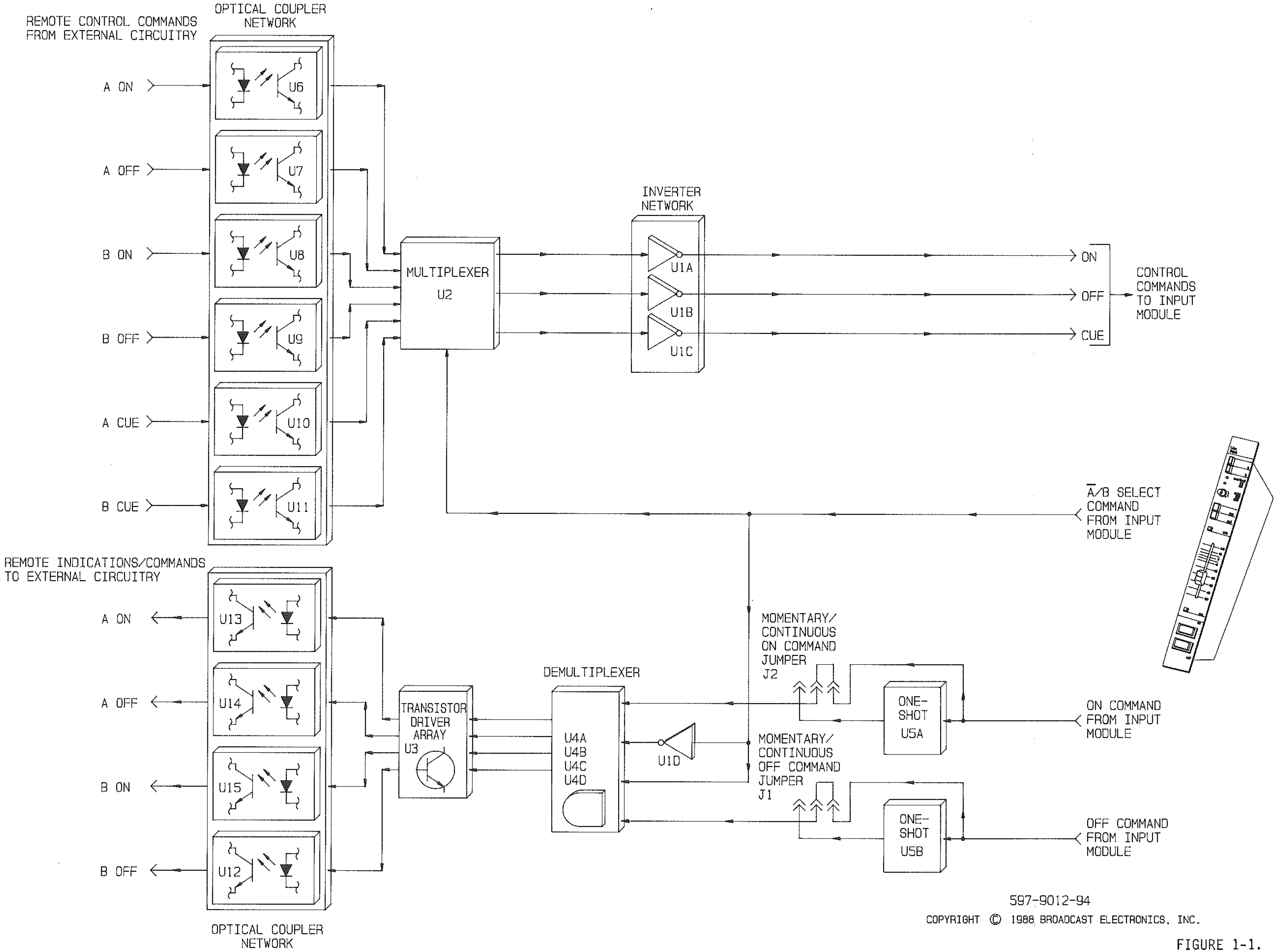

FIGURE 1-1.
REMOTE CONTROL MODULE DETAILED BLOCK DIAGRAM

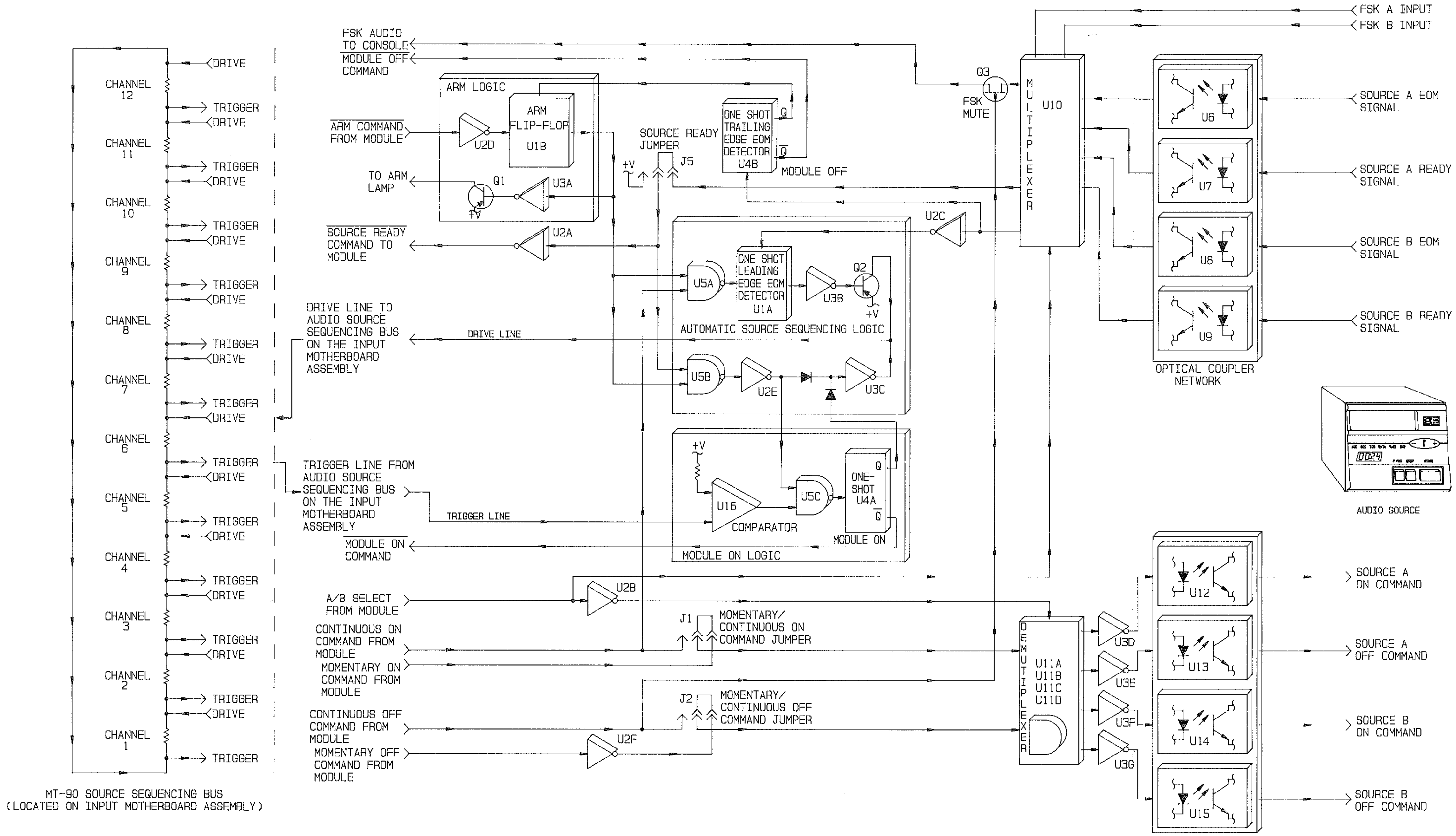

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FIGURE 1-2.
SOURCE REMOTE MODULE DETAILED BLOCK DIAGRAM

1-19. Audio source control and sequencing operations are controlled by the source ready status. When audio source A is ready, the source will output a ready command. The command will energize optical coupler U7. U7 will output a HIGH to multiplexer U10. U10 is controlled by A/B select information from the input module. With audio source A selected, a LOW will be routed to U10. The LOW instructs the multiplexer to select source A status information. As a result, the HIGH source A ready command from U10 will be applied through source ready jumper J5 to inverter U2A and to the automatic source sequencing logic. U2A inverts the command and outputs a LOW source ready command to the input module. Jumper J5 provides a ready status command for an audio source not equipped with a ready status output. J5 may also be programmed to configure the source remote control module as a remote control module.

1-20. AUTOMATIC SOURCE SEQUENCING LOGIC.

1-21. The automatic source sequencing logic consists of AND gates U5A/B, one-shot U1A, inverters U2E and U3B/C, and transistor Q2. With the channel 1 and 2 line input modules armed and the associated audio sources ready, an audio source sequencing operation is initiated when the channel 1 module on switch/indicator is depressed. The channel 1 source will begin operation and play the selected source. HIGH commands from the input module continuous on control line and from arm flip-flop U1B will be applied to NAND gate U5A. U5A will output a LOW to one-shot U1A.

1-21. The channel 1 audio source will play until the source outputs an end-of-message (EOM) command. The EOM command will energize optical coupler U6. U6 will output an EOM pulse to multiplexer U10. With the A input selected, U10 will output the pulse to inverter U2C and module off command one-shot U4B. The leading edge of the EOM pulse will trigger U1A which outputs a pulse to inverter U3B. U3B inverts the pulse to bias transistor Q2 on. Q2 will output a square-wave trigger pulse for application to the module drive line.

1-22. The drive line is controlled by NAND gate U5B and inverters U2E and U3C. When channel 1 is armed, ready, and not in operation, HIGH commands from the source ready jumper and from arm flip-flop U1B will be applied to NAND gate U5B. The output of U5B will go LOW. The LOW is inverted at U2E and U3C to clamp the drive line LOW. When the source is started, the LOW will be removed and the drive line will float to allow the application of the trigger pulse.

1-23. The source remote control module drive line is connected to a source sequencing bus on the input motherboard assemblies. The sequencing bus consists of a drive control line and a trigger control line for each channel in the console. The drive line is designed to route a control signal for application to the trigger lines of associated audio channels. The trigger line routes the pulse to a circuit which enables the line input module and the associated audio source.

1-24. With the channel 1 drive line floating, transistor Q2 will output a square-wave trigger pulse to the drive line. The pulse will be routed through the sequencing bus to the channel 2 trigger line. The trigger pulse is applied to comparator U16. When the pulse level increases above the comparator reference voltage, the output of U16 will go HIGH. The HIGH is applied to NAND gate U5C. U5C NANDs the HIGH from U16 and a HIGH from U2E to generate a LOW control pulse to trigger module on one-shot U4A. The $\overline{Q}$ output of U4A will route a LOW input module on command to channel 2. The Q output of U4A will route a HIGH to U3C. U3C inverts the signal and outputs a LOW to the drive line. This LOW clamps the drive line at ground potential for approximately one second to prevent the trigger pulse from enabling two armed input modules simultaneously.

1-25. With the application of an on command from one-shot U4A, the channel 2 input module will be enabled. Continuous and momentary on commands from the input module will be routed through jumper J1 to a demultiplexer consisting of AND gates U11A/B/C/D. J1 allows the selection of a continuous or momentary on command for application to the audio source. AND gate demultiplexer U11 is controlled by A/B select information from the input module. With source A selected, a LOW will be routed to the demultiplexer. The LOW instructs the demultiplexer to output a HIGH source A on command to inverter U3D. U3D outputs a LOW which energizes optical coupler U12 to generate a source A on command.

1-26. With the channel 2 audio source enabled, the trailing edge of the EOM signal from multiplexer U10 will trigger one-shot U4B. The Q output of U4B will go high to reset arm flip-flop U1B. The $\overline{Q}$ output will go LOW to generate a module off command and terminate channel 1 module operation.

1-27. FSK INFORMATION PROCESSING.

1-28. FSK information from audio sources A/B is processed by the source remote control module input circuit for application to the FSK decoder module. The FSK information is applied to multiplexer U10. U10 selects either audio source A or B FSK information as directed by the A/B select line and routes the information to the console for application to the FSK decoder module. Refer to the FSK DECODER module section of this manual for detailed information.

SECTION II

REMOTE CONTROL MODULE
SOURCE REMOTE CONTROL MODULE
MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information and troubleshooting information for the remote control module and the source remote control module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The remote control module and the source remote control module should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of procedures required to restore a remote control module or a source remote control module to operation after a fault has occurred. The procedures are divided into troubleshooting information and component replacement procedures.

2-8. TROUBLESHOOTING.

2-9. The troubleshooting philosophy for the remote control and source remote control modules consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures.

2-10. Figure 2-1 presents the remote control module troubleshooting information. Figure 2-2 presents the source remote control module troubleshooting information. Refer to Figures 2-1 and 2-2 to isolate a failure to a specific group of components.

2-11. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-12. COMPONENT REPLACEMENT.

2-13. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

REMOTE CONTROL MODULE TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO INDIVIDUAL REMOTE COMMAND (INPUT A ON, INPUT A OFF ETC.)	1. CHECK THE REMOTE CONTROL INTERFACING CIRCUIT. 2. CHECK THE REMOTE COMMAND ASSOCIATED OPTICAL COUPLER (U6 THROUGH U11). 3. CHECK INTEGRATED CIRCUITS U1 AND U2.
NO INDIVIDUAL REMOTE INDICATIONS (INPUT A ON, INPUT A OFF ETC.)	1. CHECK THE REMOTE INDICATION INTERFACING CIRCUIT. 2. ENSURE JUMPERS J1 AND J2 ARE INSTALLED. 3. CHECK THE REMOTE INDICATION ASSOCIATED OPTICAL COUPLER (U12 THROUGH U15). 4. CHECK INTEGRATED CIRCUITS U3,U4,AND U5.

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FIGURE 2-1. REMOTE CONTROL MODULE TROUBLESHOOTING

SOURCE REMOTE CONTROL MODULE TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO SOURCE READY INDICATIONS	1. CHECK AUDIO SOURCE FOR PROPER READY STATUS INDICATIONS 2. ENSURE JUMPER J5 IS INSTALLED. 3. CHECK OPTICAL COUPLERS U7 AND U9. 4. CHECK INTEGRATED CIRCUITS U10 AND U2.
INPUT MODULE WILL NOT OPERATE TO THE ARM MODE	1. CHECK ARM SWITCH S10 ON THE INPUT MODULE. 2. CHECK TRANSISTOR Q1. 3. CHECK INTEGRATED CIRCUITS U1,U2,AND U3.
NO SOURCE SEQUENCING	1. CHECK AUDIO SOURCE TO BE STARTED FOR PROPER READY STATUS INDICATIONS. 2. CHECK ENABLED AUDIO SOURCE FOR PROPER EOM STATUS INDICATIONS. 3. CHECK OPTICAL COUPLERS U6 AND U8. 4. CHECK INTEGRATED CIRCUITS U1,U2,U3, U5,AND TRANSISTOR Q2. 5. CHECK INTEGRATED CIRCUITS U16,U5,AND U4. 6. ENSURE JUMPER J1 IS INSTALLED. 7. CHECK INTEGRATED CIRCUITS U3,AND U11 AND OPTICAL COUPLERS U12 AND U14.
SIMULTANEOUS ENABLING OF TWO CONSOLE CHANNELS	1. CHECK INTEGRATED CIRCUITS U3 AND U4.
NO MODULE TERMINATION	1. CHECK INTEGRATED CIRCUIT U4.
NO SOURCE TERMINATION	1. ENSURE JUMPER J2 IS INSTALLED. 2. CHECK INTEGRATED CIRCUITS U3 AND U11 AND OPTICAL COUPLERS U13 AND U15.

597-9012-140

FIGURE 2-2. SOURCE REMOTE CONTROL MODULE TROUBLESHOOTING.

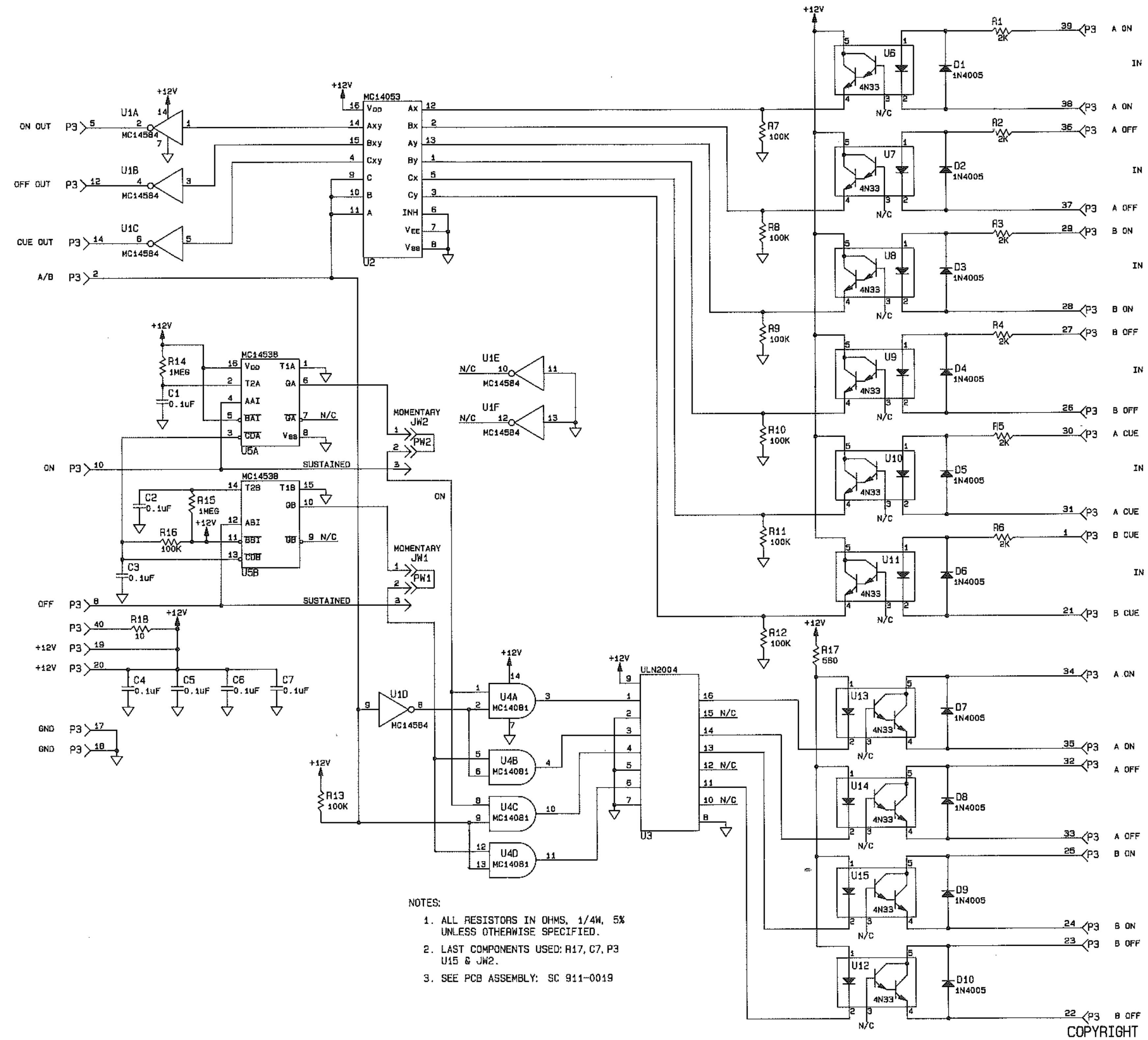
SECTION III

REMOTE CONTROL MODULE
SOURCE REMOTE CONTROL MODULE
DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the remote control module and the source remote control module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, REMOTE CONTROL MODULE	SC911-0019
3-2	ASSEMBLY DIAGRAM, REMOTE CONTROL MODULE	AC911-0019
3-3	SCHEMATIC DIAGRAM, SOURCE REMOTE CONTROL MODULE	SC911-0020
3-4	ASSEMBLY DIAGRAM, SOURCE REMOTE CONTROL MODULE	AC911-0020



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R17, C7, P3 U15 & JW2.
3. SEE PCB ASSEMBLY: SC 911-0019

DWN. BY	JAH 10-27-88
CHKD	MH 8-22-88
ME	
PROJ. ENGR.	R.M. [illegible]
MFG	[illegible]
MATERIAL	SEE B/M 911-0019
FINISH	SEE DWG RA592-0000
NEXT ASSY.	901-9012 (12CH) 901-9018 (18CH)
TOLERANCE (DECIMAL) U.O.S.	.x ± .030 .xx ± .015 .xxx ± .005 ANGLES ± 1°

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

TITLE: SIMPLE REMOTE CONTROL

TYPE	SIZE	DWG. NO.	REV
S	C	911-0019	A

MODEL MT-90 SCALE NONE SHEET 1 OF 1

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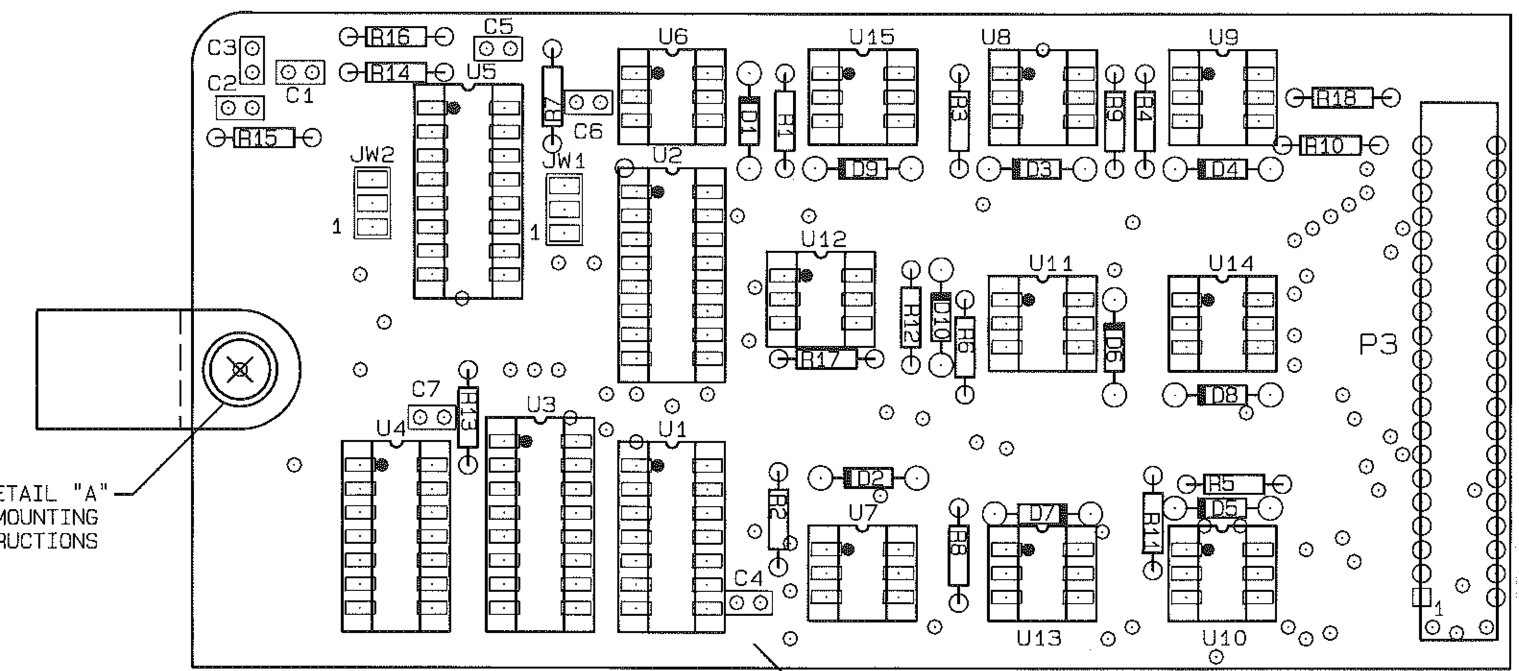
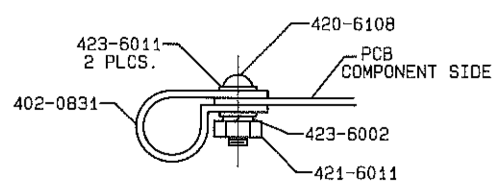


NOTE:
1. SEE SCHEMATIC SC911-0019



DETAIL "A"

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

DWN BY: G. S. 11-17-86
CHKD: mH 8-22-88
ME: [illegible] 8/22/88
PROJ ENGR: RM [illegible]
MFG: [illegible] 8-22-88

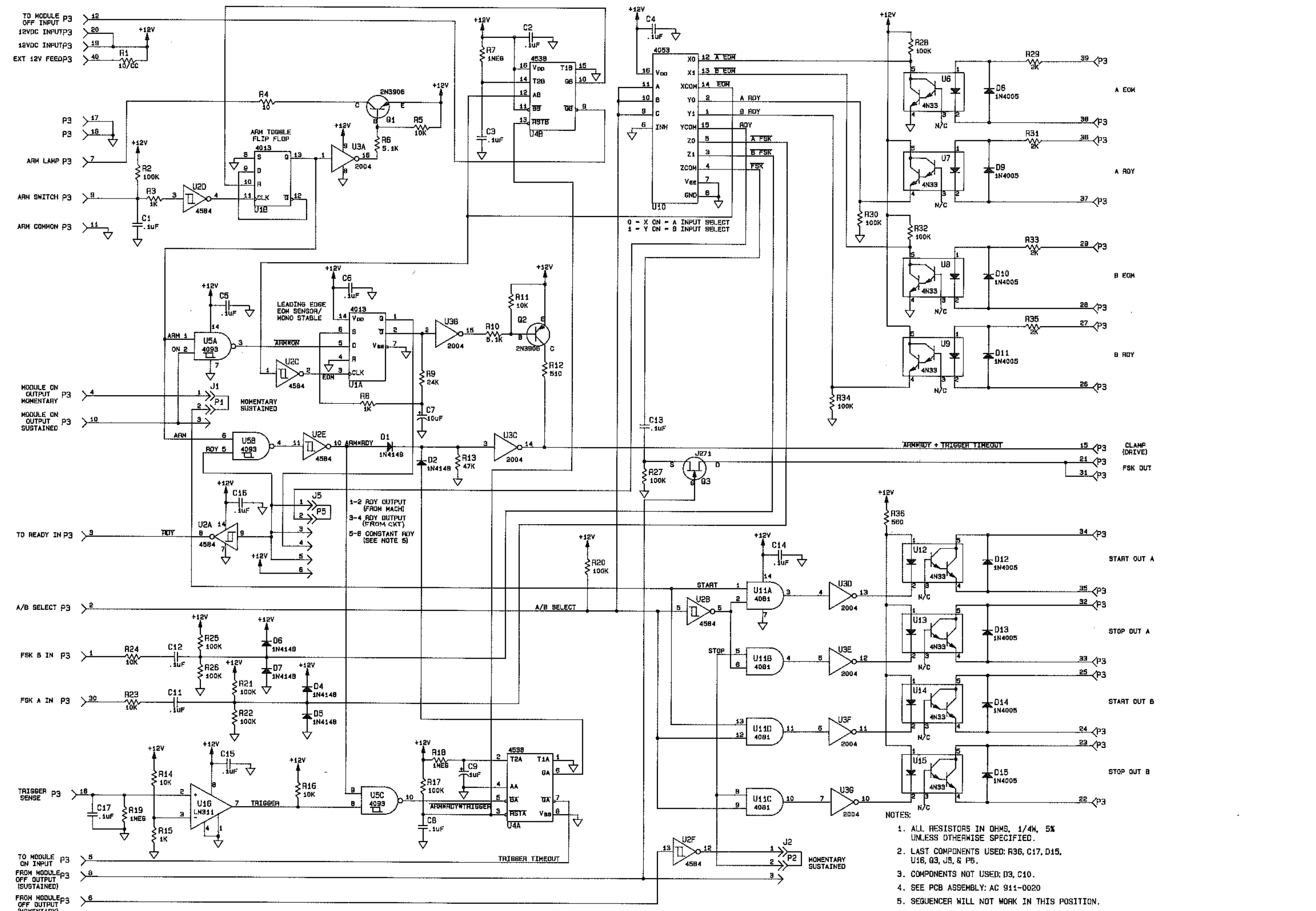
MATERIAL: SEE B/M 911-0019
FINISH
NEXT ASSY: 901-9012 "12CH" 901-9018 "18CH"

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: PCB ASSEMBLY- SIMPLE REMOTE CONTROL BOARD

TYPE	SIZE	DWG.NO.	REV
A	C	911-0019	A

MODEL MT90 SCALE 2:1 SHEET 1 OF 1



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R36, C17, D15, U16, Q3, J5, & P5.
3. COMPONENTS NOT USED: D3, C10.
4. SEE PCB ASSEMBLY: AC 911-0020
5. SEQUENCER WILL NOT WORK IN THIS POSITION.

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

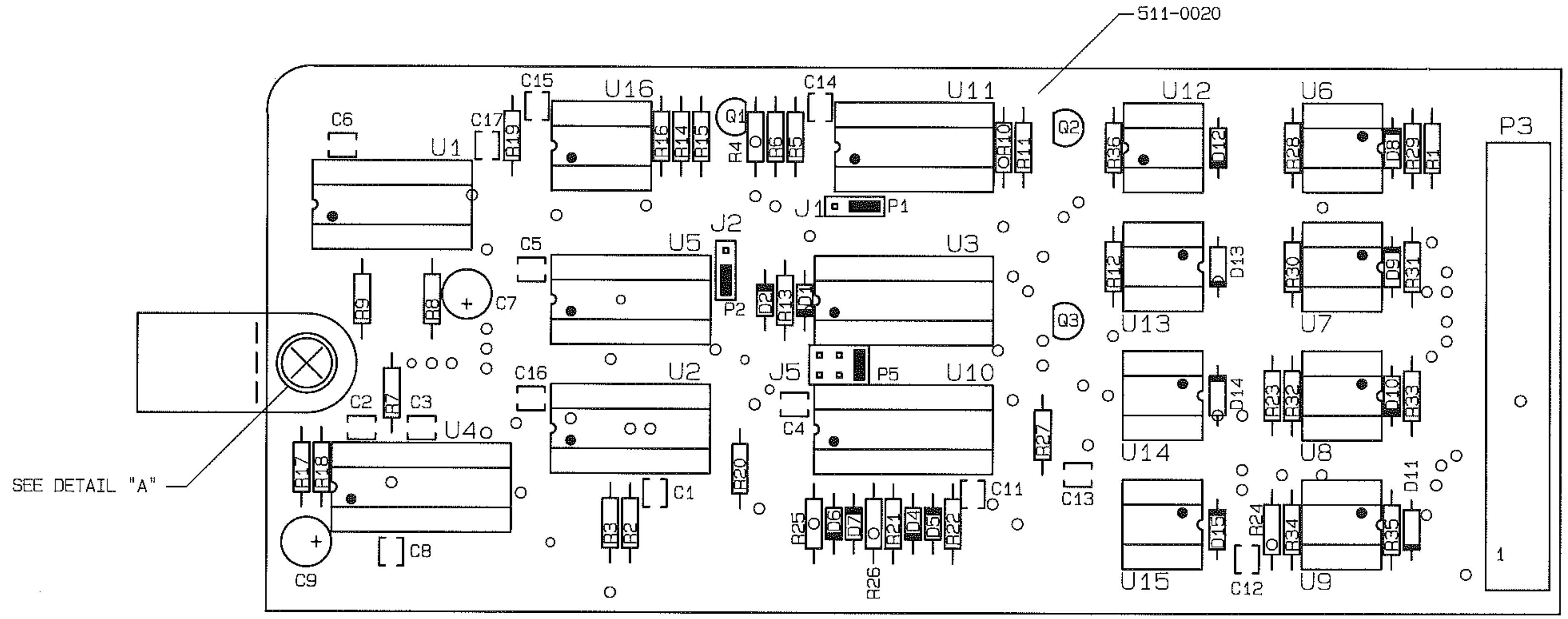
DWN. BY	JAH 10-27-87
CHKD	MH 8-22-88
ME	
PROJ. ENGR.	RMD 8-22-88
MFG.	PRB 8-22-88
MATERIAL	SEE B/M 911-0020
FINISH	SEE DWG RA592-0000
NEXT ASSY.	901-9012 (12CH) 901-9016 (18CH)

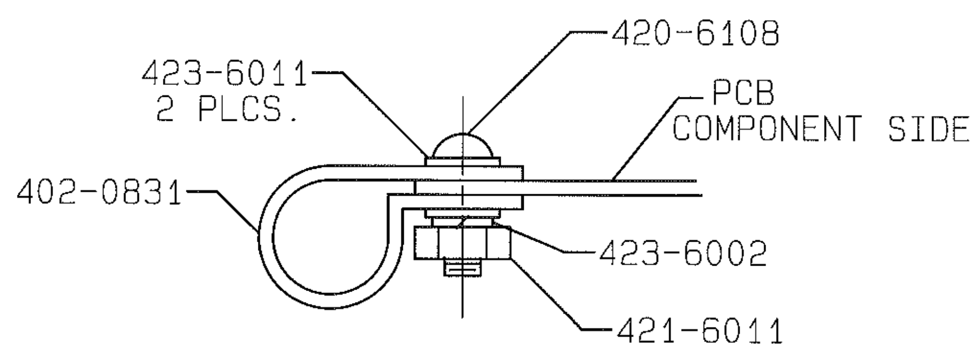
BROADCAST ELECTRONICS INC.
4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SOURCE REMOTE CONTROL

TYPE	SIZE	DWG. NO.	REV
S	C	911-0020	B

MODEL MT-90 SCALE NONE SHEET 1 OF 1





DETAIL "A"

NOTES:
1. LAST COMPONENT USED: R36, C17, D15, Q3, U16, J4, P5.
2. SEE PCB SCHEMATIC: SD 911-0020

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

DWN BY	KLS 11-5-87
CHKD	MH 8-22-88
ME	8-22-88 JH STEINKAMP
PROJ. ENGR.	8-22-88 R McDONOUGH
MFG.	8-22-88 PR BROSE
MATERIAL	SEE B/M 911-0020
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"

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

TITLE PCB ASSEMBLY-SOURCE REMOTE CONTROL BD.

TYPE	SIZE	DWG.NO.	REV
A	C	911-0020	C

MODEL MT90 SCALE 2/1 SHEET 1 OF 1

SECTION IV
REMOTE CONTROL MODULE
SOURCE REMOTE CONTROL MODULE
PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the remote control and source remote control modules. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram.

TABLE 4-1. REMOTE CONTROL MODULE/SOURCE REMOTE CONTROL MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	REMOTE CONTROL CIRCUIT BOARD ASSEMBLY	911-0019	4-1
4-3	SOURCE REMOTE CONTROL ASSEMBLY	911-0020	4-2

TABLE 4-2. REMOTE CONTROL CIRCUIT BOARD ASSEMBLY - 911-0019

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C7	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	7
D1 THRU D10	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	10
JP1,JP2	Programmable Jumper	340-0004	2
JW1,JW2	Connector Header, 3-Pin	417-0003	2
P1	Receptacle, 40-Pin Dual In-line	417-4041	1
R1 THRU R6	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	6
R7 THRU R13	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	7
R14,R15	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	2
R16	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R17	Resistor, 560 Ohm ±5%, 1/4W	100-5633	1
R18	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
U1	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U2	Integrated Circuit, MC14053B, Analog Multiplexers/Demultiplexers, CMOS MSI, 16-Pin DIP	220-4053	1
U3	Integrated Circuit, ULN2004, 7 NPN Darlington Driver Pack, 16-Pin DIP	226-2004	1
U4	Integrated Circuit, CD4081BE, Quad 2-Input AND Gate, CMOS, 14-Pin DIP	225-0008	1
U5	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1
U6 THRU U15	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	10
XU1	Socket, 14-Pin DIP	417-1404	1
XU2,XU3	Socket, 16-Pin DIP	417-1604	2
XU4	Socket, 14-Pin DIP	417-1404	1
XU5	Socket, 16-Pin DIP	417-1604	1
XU6 THRU XU15	Socket, 6-Pin DIP	417-0600	10
----	Blank Simple Remote Control Circuit Board	511-0019	1

TABLE 4-3. SOURCE REMOTE CONTROL ASSEMBLY - 911-0020
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 Thru C6	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	6
C7	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C8	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C9	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C11 THRU C17	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	7
D1,D2,D4 THRU D7	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	6
D8 THRU D15	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	8
J1,J2	Connector Header, 3-Pin	417-0003	2
J5	Connector Header, 3-Pin Dual In-line	417-2600	1
P1,P2	Programmable Jumper	340-0004	2
P3	Receptacle, 40-Pin Dual In-line	417-4041	1
P5	Programmable Jumper	340-0004	1
Q1,Q2	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	2
Q3	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	1
R1	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R2	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R3	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R4	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R5	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R6	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R7	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R8	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R9	Resistor, 24 k Ohm ±5%, 1/4W	100-2453	1
R10	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R11	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R12	Resistor, 510 Ohm ±5%, 1/4W	100-5133	1
R13	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
R14	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R15	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R16	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R17	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R18,R19	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	2
R20,R21,R22	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	3
R23,R24	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R25 THRU R28	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	4
R29	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R30	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R31	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R32	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R33	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R34	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R35	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R36	Resistor, 560 Ohm ±5%, 1/4W	100-5633	1
U1	Integrated Circuit, MC14013BCP, Dual D-Type Flip-Flop, CMOS, 14-Pin DIP	228-4013	1
U2	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U3	Integrated Circuit, ULN2004, 7 NPN Darlington Driver Pack, 16-Pin DIP	226-2004	1
U4	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1
U5	Integrated Circuit, MC14093B, Quad 2-Input NAND Schmitt Trigger, CMOS, 14-Pin DIP	220-4093	1
U6 THRU U9	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	4
U10	Integrated Circuit, MC14053B, Analog Multiplexers/Demultiplexers, CMOS MSI, 16-Pin DIP	220-4053	1
U11	Integrated Circuit, CD4081BE, Quad 2-Input AND Gate, CMOS, 14-Pin DIP	225-0008	1
U12 THRU U15	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	4

TABLE 4-3. SOURCE REMOTE CONTROL ASSEMBLY - 911-0020
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U16	Integrated Circuit, LT311, JFET-Input Differential Comparator, 8-Pin DIP	220-0311	1
XU1,XU2	Socket, 14-Pin DIP	417-1404	2
XU3,XU4	Socket, 16-Pin DIP	417-1604	2
XU5	Socket, 14-Pin DIP	417-1404	1
XU6 THRU XU9	Socket, 6-Pin DIP	417-0600	4
XU10	Socket, 16-Pin DIP	417-1604	1
XU11	Socket, 14-Pin DIP	417-1404	1
XU12 THRU XU15	Socket, 6-Pin DIP	417-0600	4
XU16	Socket, 8-Pin DIP	417-0804	1
----	Blank Source Remote Control Circuit Board	511-0020	1

MONOPHONIC OUTPUT MODULE

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

SECTION I

MONOPHONIC OUTPUT MODULE THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console monophonic output module. A detailed block diagram of the monophonic output module is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. FUNCTIONAL DESCRIPTION.

1-4. INPUT CIRCUIT.

1-5. Unbalanced stereophonic program and audition audio from the cue speaker/headphone amplifier circuit board is applied to the monophonic output module for conversion to a monophonic format. Input selection is accomplished by interlocked two-position switch/indicator S1. The switch selects and routes either program or audition audio for application to a summing amplifier circuit and a phase inverting circuit. Right channel audio is routed to the summing amplifier circuitry. Left channel audio is routed to the phase inverting circuitry.

1-6. PHASE INVERTING CIRCUIT.

1-7. Audio from input select switch S1 is applied to phase inverting switch S2. S2 operates in association with integrated circuit U2B to function as an inverting/non-inverting amplifier stage. When switch S2 is operated to the normal position, left channel audio will be routed to the non-inverting input of U2B and the inverting input will be grounded. As a result, U2B will operate as an non-inverting buffer stage. When the switch is operated to the invert position, left channel audio will be routed to the inverting input of U2B and the non-inverting input will be grounded. As a result, U2B will operate as an inverting buffer stage. The output of U2B is routed through potentiometer R22 to buffer U2A. Potentiometer R22 is configured to provide left/right balance control. The output of buffer U2A is applied to a summing amplifier circuit and an indicator circuit.

1-8. SUMMING AMPLIFIER CIRCUIT.

1-9. Right channel audio from buffer U1B and left channel audio from U2A of the phase inverting circuit is summed at amplifier U1A. U1A is configured for a gain of approximately one. The output of U1A is applied through potentiometer R13 to output buffer U4B. The monophonic output of U4B is routed for application to a console monophonic output bus.

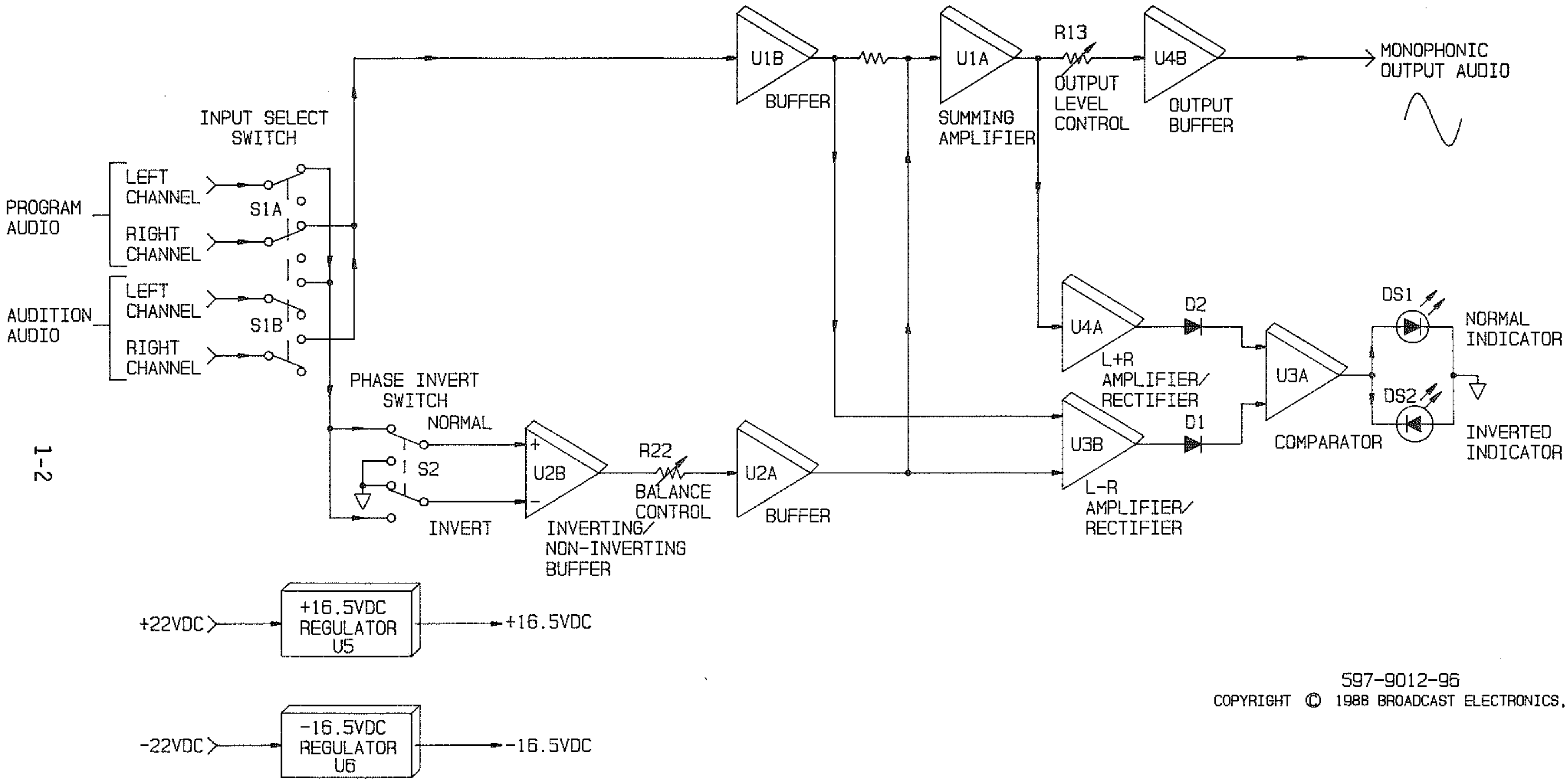


FIGURE 1-1. MONOPHONIC OUTPUT MODULE DETAILED BLOCK DIAGRAM

1-10. INDICATOR CIRCUIT.

1-11. The indicator circuit consists of: 1) L+R amplifier/rectifier network U4A, 2) L-R amplifier/rectifier network U3B, 3) comparator U3A, and 4) indicators DS1 and DS2. L+R audio from summing amplifier U1A is applied to an amplifier/rectifier network consisting of integrated circuit U4A and diode D2. The network is configured for a gain of approximately 19 dB. Left channel audio from buffer U2A and right channel audio from buffer U1B is applied to an L-R amplifier/rectifier network consisting of integrated circuit U3B and diode D1. The network is configured for a gain of approximately 15 dB.

1-12. The outputs from the L+R and L-R amplifier/rectifier networks are applied to comparator U3A and indicators DS1 and DS2. During in-phase audio conditions, the L-R audio will be a minimum of 6 dB below the L+R audio. The output of comparator U3A will be HIGH to illuminate normal indicator DS1. During out-of-phase audio conditions, the L-R audio will be greater than 6 dB below the L+R audio. The output of comparator U3A will go LOW to illuminate inverted indicator DS2.

1-13. POWER SUPPLY CIRCUIT.

1-14. DC operating potentials for application to the monophonic output module components are generated by a regulator network. Unregualted ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U5 and -16.5 volt dc regulator U6. U5/U6 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U5 and U6 are routed for application to the circuit board audio components.

SECTION II

MONOPHONIC OUTPUT MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the monophonic output module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The monophonic output module should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of procedures required to restore a monophonic output module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-8. ELECTRICAL ADJUSTMENTS.

2-9. OUTPUT LEVEL ADJUSTMENT. Potentiometer R13 adjusts the monophonic output module output level. The output level control is adjusted as follows.

2-10. Required Equipment. The following test equipment is required to adjust the monophonic module output level.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Audio Signal Generator (Potomac AG-51 or equivalent).

D. VU Meter.

2-11. Procedure. To adjust the monophonic output module output level, proceed as follows:

2-12. Ensure the output amplifier module and meter assembly assigned to the monophonic output is calibrated for the desired output level. If output amplifier module calibration is required, refer to the OUTPUT AMPLIFIER MODULE section in this manual.

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

2-13. Remove the monophonic output module and a line input module from the console mainframe.

2-14. Connect the audio signal generator to the A or B left and right channel inputs on a line input module input/remote connector.

2-15. Refer to Figure 2-1 and install line input module jumpers J4 and J5 in the Ø dBu position. Replace the line input module.

2-16. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-17. Operate the line input module fader to the Ø position and route the test audio to the audition output bus.

2-18. Depress the monophonic output module AUD switch/indicator to illuminate the switch/indicator.

2-19. Refer to Figure 2-1 and adjust monophonic output level control R13 until the monophonic output meter indicates Ø VU.

2-20. Disconnect all test equipment, reprogram jumpers J4 and J5 on the line input module if required, and replace the line input module and the monophonic output module.

2-21. BALANCE ADJUSTMENT. Potentiometer R22 adjusts the balance of the monophonic signal left and right channels. Adjustment of the control is not required unless replacement components are installed in the circuit. The monophonic module balance is adjusted as follows.

2-22. Required Equipment. The following test equipment is required to adjust the monophonic module balance.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Audio Signal Generator (Potomac AG-51 or equivalent).

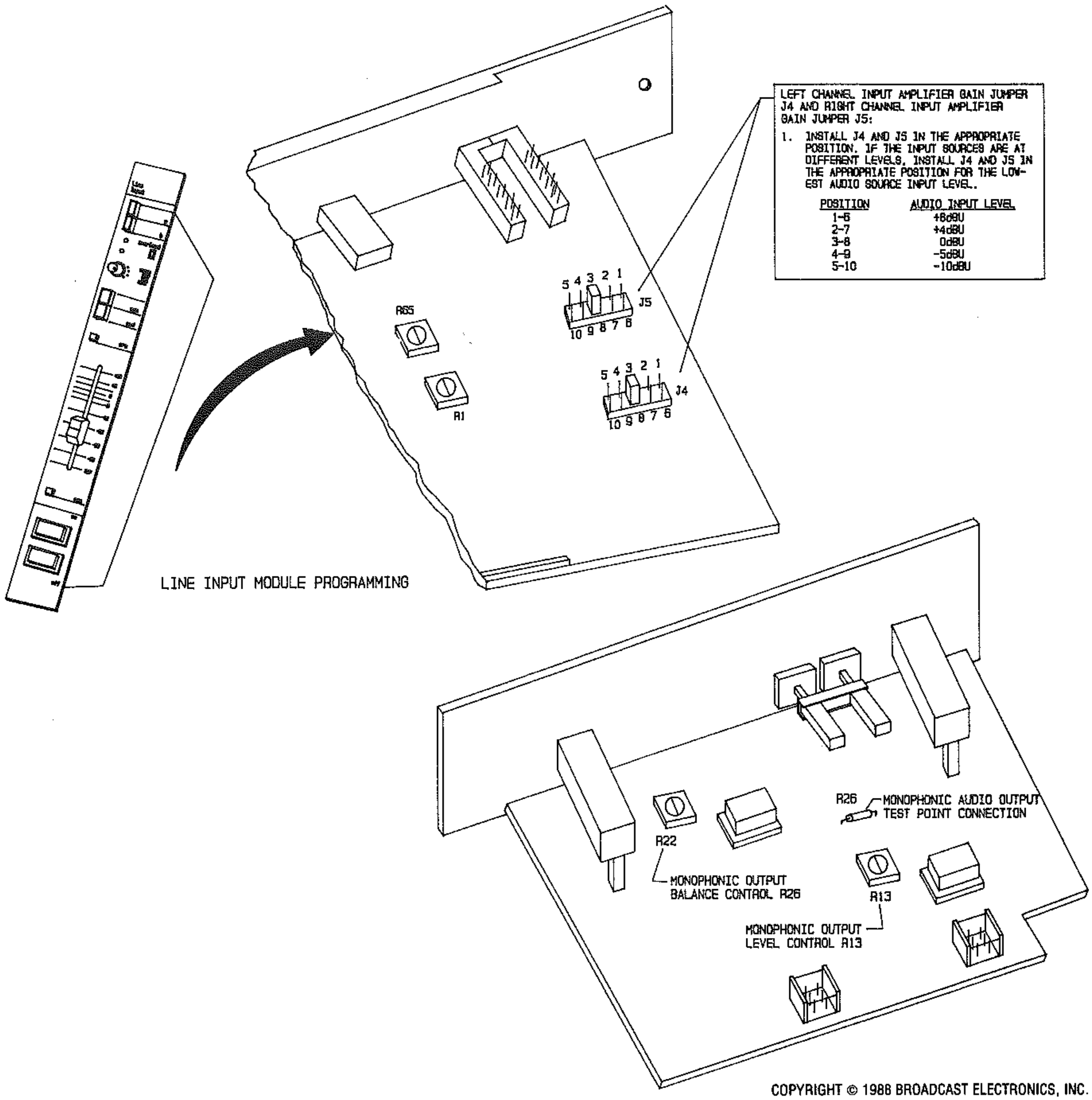
D. Calibrated Oscilloscope.

2-23. Procedure. To adjust the monophonic output module balance, proceed as follows:

2-24. Remove the monophonic output module and a line input module from the console mainframe.

2-25. Connect the audio signal generator to the A or B left and right channel inputs on a line input module input/remote connector.

2-26. Refer to Figure 2-1 and install line input module jumpers J4 and J5 in the Ø dBu position. Replace the line input module.



597-9012-115

FIGURE 2-1. MONOPHONIC OUTPUT MODULE ADJUSTMENT CONTROLS

2-27. Refer to Figure 2-1 and connect the oscilloscope to resistor R26 as shown.

2-28. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-29. Operate the line input module and route the test audio to the audition output bus.

2-30. Depress the monophonic output module AUD switch/indicator to illuminate the switch/indicator and depress the PHASE INVERT switch to illuminate the switch/indicator.

2-31. Refer to Figure 2-1 and adjust monophonic output balance control R22 to null the audio signal presentation on the oscilloscope.

2-32. Disconnect all test equipment, reprogram jumpers J4 and J5 on the line input module if required, and replace the line input module and the monophonic output module.

2-33. TROUBLESHOOTING.

2-34. The troubleshooting philosophy for the monophonic output module consists of isolating a problem to a specific circuit or group of components. Figure 2-2 presents the monophonic output module troubleshooting information. Refer to Figure 2-2 to isolate a failure to a specific group of components.

2-35. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-36. COMPONENT REPLACEMENT.

2-37. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

MONOPHONIC OUTPUT MODULE TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO AUDIO OUTPUT	1. CHECK REGULATORS U5 AND U6. 2. CHECK INTEGRATED CIRCUITS U1 AND U4. 3. CHECK SWITCH S1.
NO PHASE INVERT OPERATION	1. CHECK SWITCH S2 AND INTEGRATED CIRCUIT U2.
NO PHASE INDICATIONS	1. CHECK INTEGRATED CIRCUITS U3 AND U4. 2. CHECK INDICATORS DS1 AND DS2.

597-9012-141

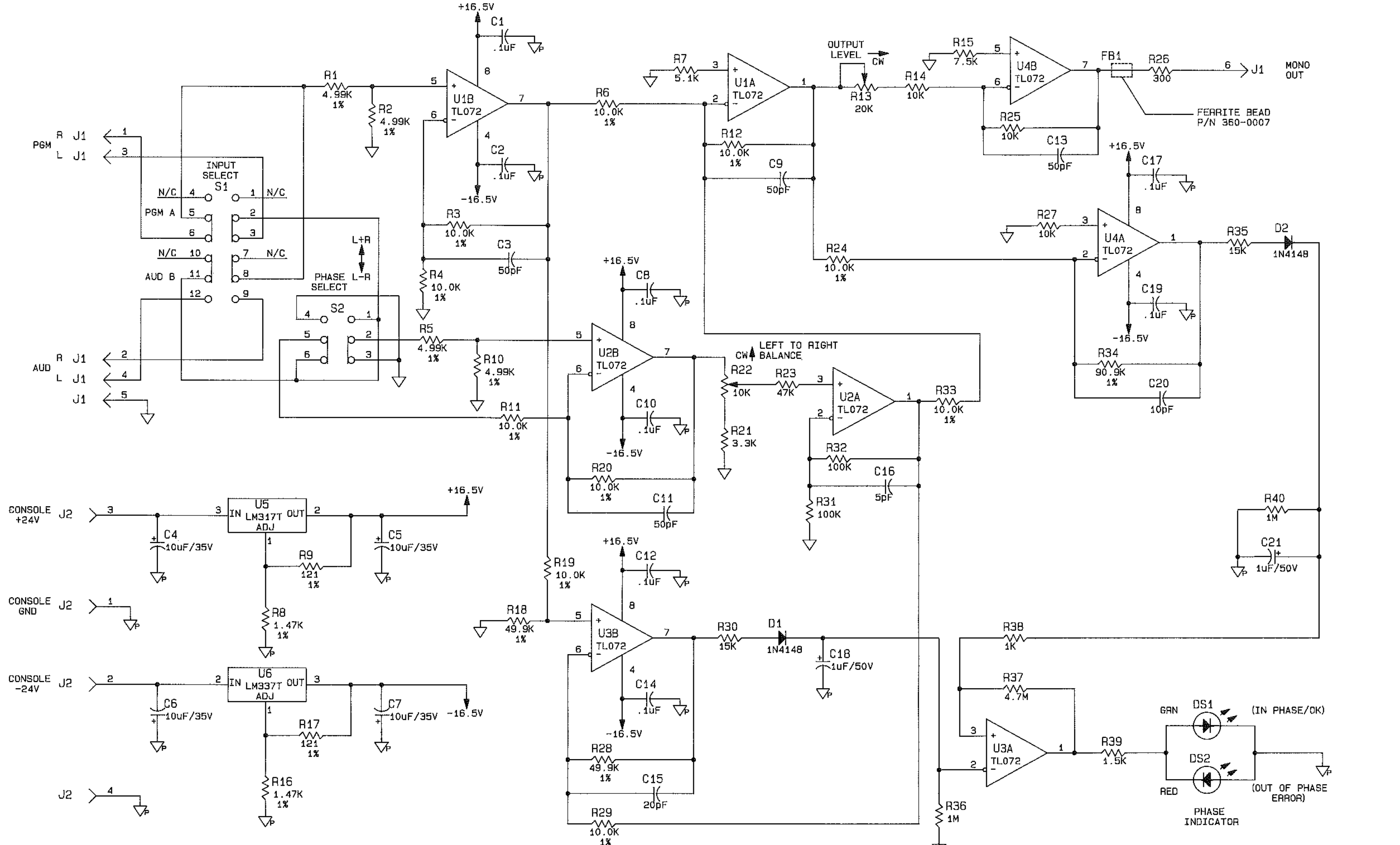
FIGURE 2-2. MONOPHONIC OUTPUT MODULE TROUBLESHOOTING

SECTION III

MONOPHONIC OUTPUT MODULE DRAWINGS

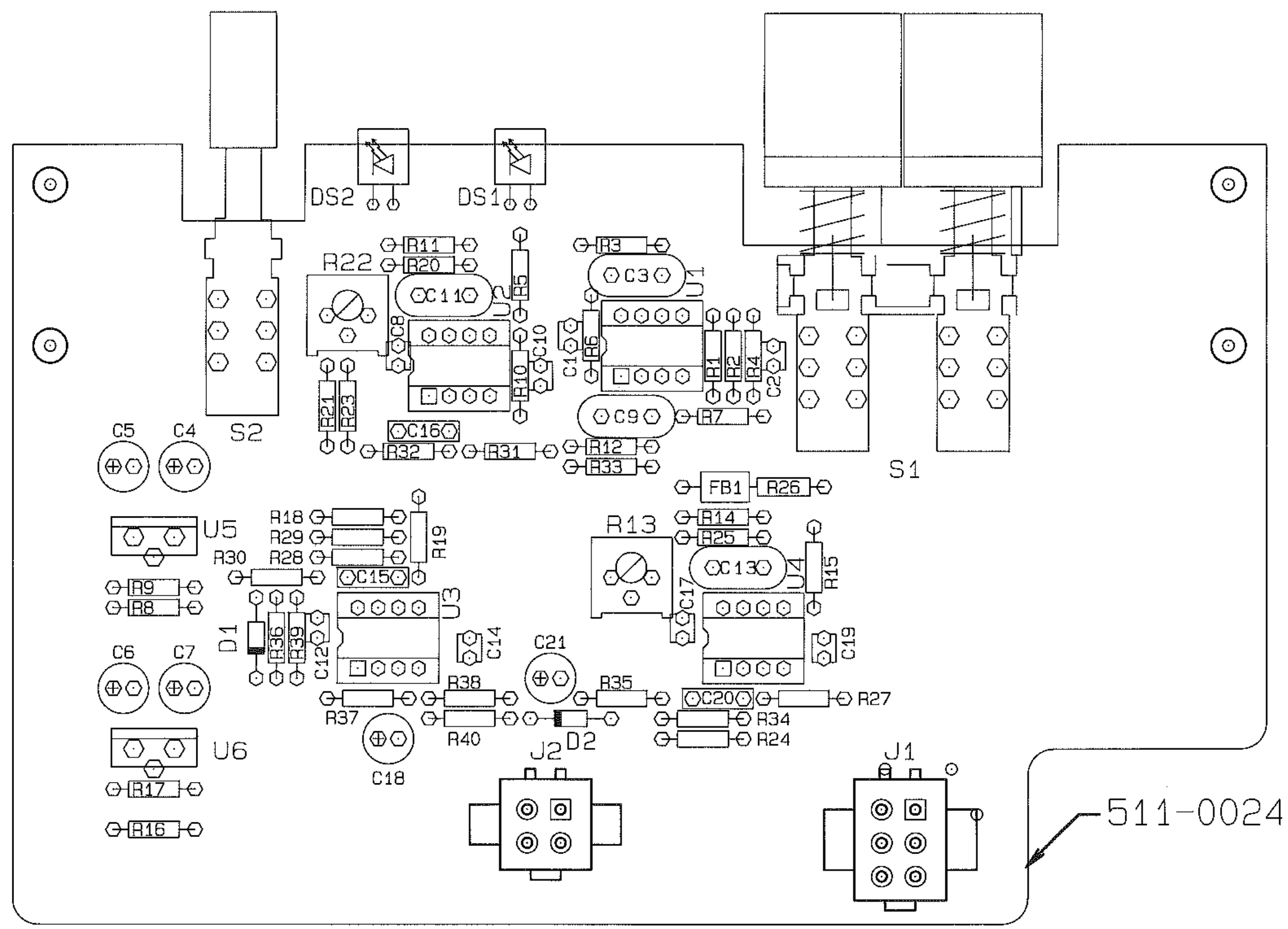
3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the monophonic output module.



NOTES:
1. RESISTORS ARE IN OHMS, 1/4W, UNLESS OTHERWISE SPECIFIED.
2. COMPONENTS LAST USED: U6, R40, C21, D2, S2, J2, P5, & DS2.
3. = POWER SUPPLY GND
 = AUDIO GND

DWN. BY JAH 6-22-88	MATERIAL SEE B/M 951-0024	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
CHKD MH 8-22-88			
ME	FINISH	TITLE MONO OUTPUT SWITCHER	
PROJ. ENGR.	SEE DWG RA592-0000	TYPE S SIZE C DWG. NO. 951-0024	REV A
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xx ± .015 .xxx ± .005 ANGLES ± 1°	NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	MODEL MT-90 SCALE NONE	SHEET 1 OF 1



PCB ASSEMBLY

NOTE:

1. REFER TO SHEET 2 FOR MODULE ASSEMBLY.
2. SEE SCHEMATIC SC951-0024

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

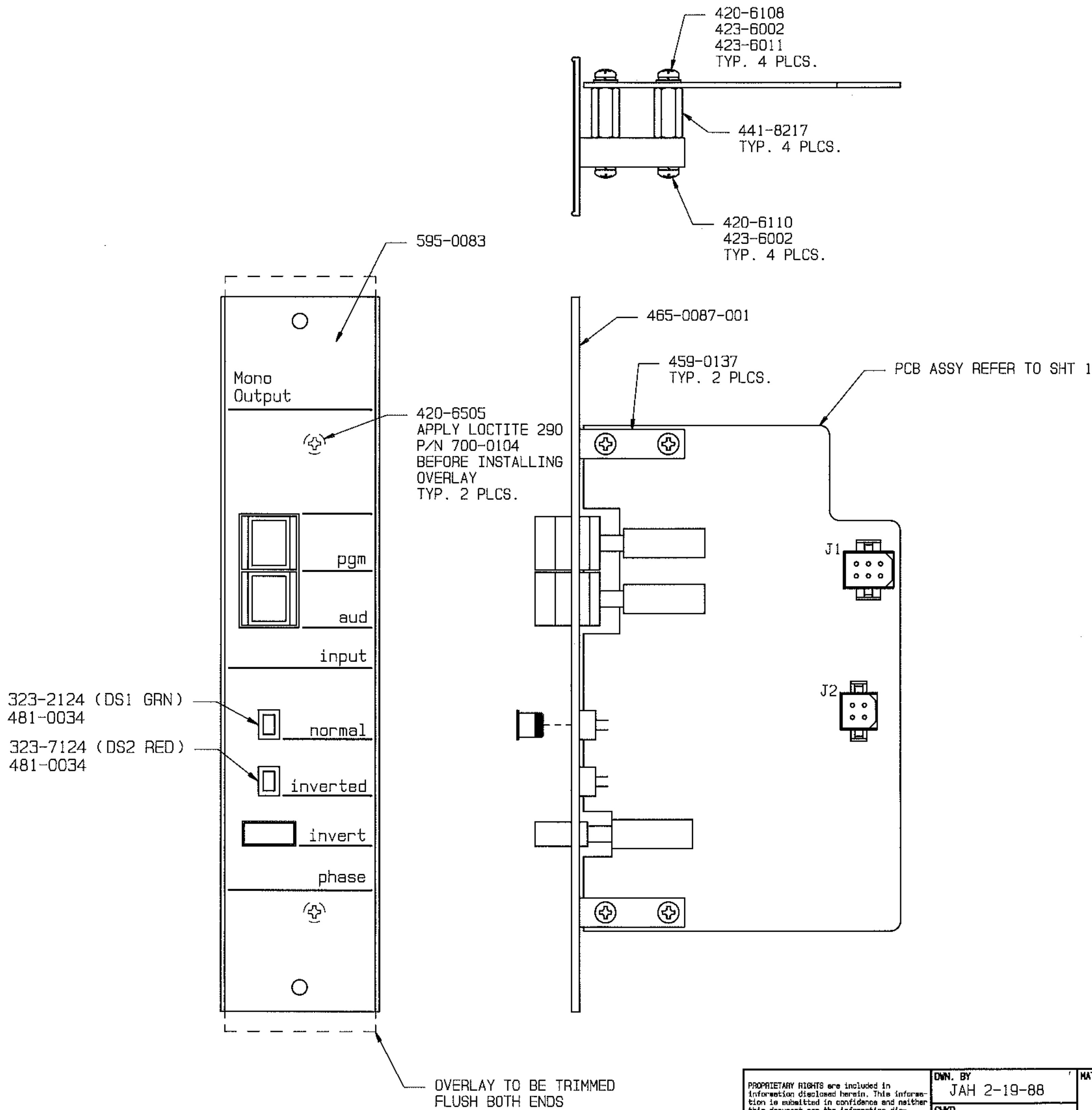
DWN BY	LO 5-28-87
CHKD	MH 8-22-88
ME	8/22/88
PROJ. ENGR.	
MFG.	
MATERIAL	SEE B/M 951-0024
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"

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 MONO OUTPUT MODULE

TYPE	SIZE	DWG.NO.	REV
A	C	951-0024	A

MODEL MT90 SCALE 2/1 SHEET 1 OF 2



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TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	DWN. BY JAH 2-19-88 CHKD ME 8/22/88 PROJ. ENGR. MFG 8-22-88	MATERIAL SEE B/M 951-0024 FINISH SEE DWG RA592-0000 NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	BE® BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST TITLE MONO OUTPUT MODULE TYPE A SIZE C DWG. NO. 951-0024 REV A MODEL MIX TRAK 90 SCALE 1/1 SHEET 2 OF 2

SECTION IV

MONOPHONIC OUTPUT MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the monophonic output module. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. MONOPHONIC OUTPUT MODULE PARTS LIST INDEX

TABLE 4-2. MONOPHONIC OUTPUT MODULE ASSEMBLY - 951-0024
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C3	Capacitor, Mica, 50 pF ±5%, 500V	040-5013	1
C4 THRU C7	Capacitor, Electrolytic, 10 uF, 35V	023-1076	4
C8	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C9	Capacitor, Mica, 50 pF ±5%, 500V	040-5013	1
C10	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C11	Capacitor, Mica, 50 pF ±5%, 500V	040-5013	1
C12	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C13	Capacitor, Mica, 50 pF ±5%, 500V	040-5013	1
C14	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C15	Capacitor, Ceramic Disc, 20 pF ±10%, 1kV	002-2013	1
C16	Capacitor, Ceramic Disc, 5 pF ±5%, 500V, Non-Polarized	001-5004	1
C17	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C18	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C19	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C20	Capacitor, Ceramic Disc, 10 pF ±10%, 1 kV, Non-Polarized	001-1014	1
C21	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
D1,D2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
DS1	Indicator, LED, Green, CMD54124A, 3V @ 20 mA Maximum (NORMAL Indicator)	323-2124	1
DS2	Indicator, LED, Red, CMD57124A, 3V @ 20 mA Maximum (INVERTED Indicator)	323-7124	1
FB1	Ferrite Bead	360-0007	1
J1	Receptacle, 6-Pin	417-0677	1
J2	Socket, 4-Pin	418-0255	1
R1,R2	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R3,R4	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R5	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1
R6	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R7	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R8	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R9	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R10	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1

TABLE 4-2. MONOPHONIC OUTPUT MODULE ASSEMBLY - 951-0024
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R11,R12	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R13	Potentiometer, 20 k Ohm ±10%, 1/2W	177-2054	1
R14	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R15	Resistor, 7.5 k Ohm ±5%, 1/4W	100-7543	1
R16	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R17	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R18	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R19,R20	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R21	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R22	Potentiometer, 10 k Ohm ±10%, 1/2W	177-1054	1
R23	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
R24	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R25	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R26	Resistor, 300 Ohm ±5%, 1/4W	100-3033	1
R27	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R28	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R29	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R30	Resistor, 15 k Ohm ±5%, 1/4W	100-1553	1
R31,R32	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R33	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R34	Resistor, 90.9 k Ohm ±1%, 1/4W	103-9095	1
R35	Resistor, 15 k Ohm ±5%, 1/4W	100-1553	1
R36	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R37	Resistor, 4.7 Meg Ohm ±5%, 1/4W	100-4773	1
R38	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R39	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R40	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
S1	Switch, 2 Sections, DPDT, Pushbutton, White/Blue Indications (AUD/PRO SELECT Switch)	340-0109	1
S2	Switch, 1 Section, DPDT, Pushbutton, White/Green Indications (PHASE INVERT Switch)	340-0102	1
U1 THRU U4	Integrated Circuit, TL072CP, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0072	4
U5	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U6	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XU1 THRU XU4	Socket, 8-Pin DIP	417-0804	4
----	Grommet, MP65, Rectangular (for DS1, DS2)	481-0034	2
----	Monophonic Output Modular Cable Assembly	941-0026	1
----	Blank Mono Output Module Circuit Board	511-0024	1

TABLE 4-3. MONOPHONIC OUTPUT MODULE CABLE ASSEMBLY - 941-0026

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Connector Housing, 6-Pin	418-0670	1
P2	Plug, Housing, 4-Pin	418-0240	1
P4	Connector Housing, 6-Pin	418-0670	1
P19	Connector Housing, 12-Pin	418-1271	1
----	Pins, Connector	417-0053	19

CLOCK/TIMER MODULE
TIMER CONTROL MODULE

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LIST OF TABLES

LIST OF ILLUSTRATIONS

SECTION I

CLOCK/TIMER MODULE
TIMER CONTROL MODULE
THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console clock/timer and timer control modules. A detailed block diagram of the clock/timer module and the timer control module is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. CLOCK/TIMER MODULE FUNCTIONAL DESCRIPTION.

1-4. GENERAL.

1-5. Console clock and timer information are presented to the console operator by the clock/timer module. The module consists of a Motorola MC68701L microprocessor unit and an LED display circuit. The microprocessor is programmed to function as a precision studio clock and as an elapsed timer. Clock information is presented on a 6-digit LED display. Timer information is presented on a 5-digit LED display. The clock section of the module also contains an interface circuit which allows the clock to be synchronized to network audio to eliminate drift.

1-6. MICROPROCESSOR.

1-7. Clock and timer information is generated by a microprocessor unit. Integrated circuit U4 is a Motorola MC68701 microprocessor unit with built-in read-only-memory (ROM) and random-access-memory (RAM). U4 also contains three 8-bit bidirectional communication ports and one 5-bit bidirectional communication port.

1-8. The microprocessor built-in ROM consists of a 2048 byte EPROM which provides a permanent location for the clock/timer control code. The code is programmed into the EPROM and directs the microprocessor for clock and timer operations. Microprocessor U4 also contains 128 bytes of RAM. The RAM is used for the processing of control program information.

1-9. MICROPROCESSOR CLOCK CIRCUIT. Microprocessor U4 operates from a precision 4 MHz reference signal. The reference signal is generated by crystal oscillator Y1 and capacitors C13 and C14. C14 is an adjustable capacitor provided for frequency calibration.

1-10. MICROPROCESSOR RESET CIRCUIT. The microprocessor reset circuit consists of two driver transistors. When a microprocessor reset command is required, a LOW is applied to transistor Q1. The LOW will bias Q1 and Q2 on to apply a LOW reset command to microprocessor U4.

1-11. TIMER CIRCUIT.

1-12. Five control lines and two programmable jumpers direct the operation of the clock/timer module timer section. The control lines are interfaced to the microprocessor via communication port 2. When the clock/timer module is operated without a timer control module, the timer is operated in an automatic mode. Command signals from the program and audition timer control buses are routed through control lines and the serial input line to reset the timer. Program jumper JP1 and audition jumper JP2 allows the selection of either the program or audition bus for timer control operations.

1-13. When the clock/timer module is operated with a timer control module, the timer may be operated in an automatic or manual mode. A HIGH manual control command or a LOW automatic mode command from the timer control module is routed through the auto/manual and serial output control lines to configure the timer for automatic or manual modes of operation. When the timer is configured to automatic mode, the timer is controlled by the timer control module audition/program switch. Control commands from the program and audition timer control busses are routed through the program/audition switch which selects either the program or audition output buss for timer reset operations. When the timer is operated in the manual mode, LOW commands from the timer control module stop, start, and reset switches are routed to the clock/timer module to control the timer as desired.

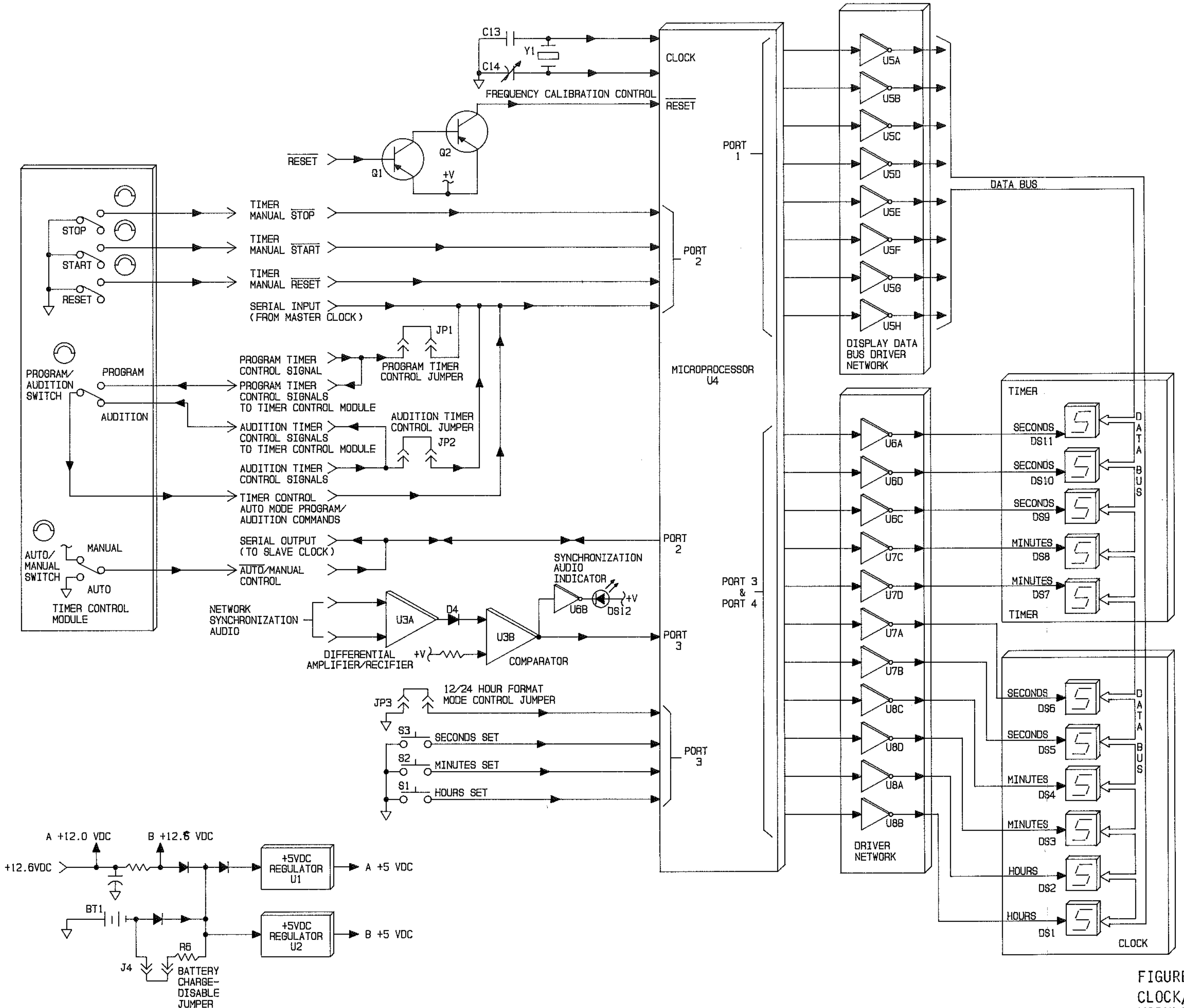
1-14. CLOCK CIRCUIT.

1-15. Clock operation is directed by a format control jumper, a synchronization circuit, and a clock set circuit. The control circuitry is interfaced to the microprocessor via port 3.

1-16. FORMAT JUMPER. The clock/timer module clock format is determined by jumper JP3. Jumper JP3 programs the clock to display information in a 12 or 24 hour time format. A LOW from JP3 configures the clock for a 12 hour time format. A HIGH from JP3 configures the clock for a 24 time format.

1-17. SYNCHRONIZAIION CIRCUIT. The synchronization circuit consists of a differential amplifier/rectifier stage and a comparator network. The circuit allows the clock to be synchronized to network audio to eliminate drift.

1-18. Clock synchronization is initiated when network audio at a level of -30 dBm or greater is applied to a differential amplifier/rectifier stage consisting of integrated circuit U3A and diode D4. Amplifier/rectifier stage U3A/D4 will output a dc level to comparator U3B. As the audio level increases above the comparator reference voltage, the output of U3B will go HIGH. The HIGH is routed to microprocessor U4. U4 responds by 1) incrementing the clock 0.1 seconds if the audio is received before the hour or 2) decrementing the clock 0.1 seconds if the audio is received after the hour. The HIGH from U3B is also applied to inverter U6B. U6B will output a LOW to illuminate synchronization audio indicator DS12.



597-9012-97

FIGURE 1-1.
CLOCK/TIMER MODULE AND TIMER CONTROL MODULE DETAILED BLOCK DIAGRAM

1-19. An indication of clock synchronization is provided by the clock decimal indicators. If the clock is incremented, the X10 digit decimal point will illuminate. If the clock is decremented, the clock X1 decimal point will illuminate. The decimal indicator display function is active only when the timer is operated to off.

1-20. CLOCK SET CIRCUIT. The clock set circuit consists of hour set switch S1, minutes set switch S2, and seconds set switch S3. The clock hour is set when switch S1 is depressed. A LOW is routed to port 3 of U4 to set the clock hour. Minutes set switch S2 and seconds set switch S3 operate in an identical manner.

1-21. DATA DISPLAY CIRCUIT.

1-22. Clock and timer information from microprocessor U4 is displayed on seven-segment LED digits. Clock information is presented on a six-digit display consisting of LED digits DS1 through DS6. Timer information is presented on a five-digit LED display consisting of DS7 through DS11. The data from U4 is interfaced to the LED displays through inverter driver networks.

1-23. When microprocessor U4 is required to display information on the clock seconds display, a HIGH from port 4 of U4 will be applied to inverter U7A. U7A will output a LOW to enable clock seconds display DS6. Next, port 1 of U4 will output an 8-bit code to a display data bus driver network consisting of inverters U5A through U5H. The 8-bit code from the data bus driver network is routed through the data bus to illuminate the required segments of LED display digit DS6. The remaining clock display digits and the timer display digits operate in an identical manner.

1-24. MASTER/SLAVE CLOCK OPERATION.

1-25. The clock/timer module may be connected in parallel to additional clock/timer modules for master/slave clock operation. When the serial output line from the master clock/timer module is connected to the serial input on additional clock/timer modules, the modules will be configured for master/slave operation.

1-26. POWER SUPPLY CIRCUIT.

1-27. DC operating potentials for application to the clock/timer module components are produced by a regulator network. A regulated +12.6 supply from the console power supply module is applied through an RC filter network produce two +12.0V dc supplies. The +12.6V dc supply is applied to +5V dc regulators U1 and U2. U1 and U2 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated +5 volt outputs from U1 and U2 are routed for application to the circuit board components.

1-28. The power supply circuit also contains a battery back-up system and battery charging network. The system is designed for the installation of a rechargeable nickel-cadmium battery or a non-rechargeable Alkaline battery. The battery will provide a +7.2V dc supply to maintain clock operation during a power failure and is charged during normal operation via jumper J4 and resistor R6. Jumper J4 is removed when a non-rechargeable alkaline cell is installed in the circuit. When a nickel-cadmium battery is installed, the battery will maintain clock operation for approximately 30 minutes. When a Alkaline battery is installed, the battery will maintain clock operation for approximately one hour and must be replaced after the power failure.

1-29. TIMER CONTROL MODULE FUNCTIONAL DESCRIPTION.

1-30. GENERAL.

1-31. The timer section of the clock/timer module may be controlled by the timer control module. The module consists of five switch/indicators which control timer functions such as: 1) automatic/manual mode operation, 2) automatic mode program/audition selection, and 3) manual start, stop, and reset operations.

1-32. TIMER CONTROL CIRCUITRY.

1-33. The timer control module configures the timer section of the clock/timer module for either automatic or manual operation via the manual/auto switch. The auto/manual switch routes control signals through the auto/manual control line and the serial output line for application to microprocessor U4. A HIGH is routed to U4 to configure the timer module for manual operation. A LOW is routed to U4 to configure the timer for automatic operation.

1-34. When the timer is configured for automatic operation, timer reset operations will be controlled by the program/audition switch/indicator. The timer is reset by pulses from the program and audition timer control bus. The pulses are routed to the program/audition switch. The switch selects either the program or audition signals and routes the signal through the auto mode control line to U4 to reset the timer.

1-35. When the timer is configured for manual operation, three switch/indicators provide stop, start, and reset timer control functions. A timer stop command is generated when the stop switch/indicator is depressed. A LOW is routed through the manual stop control line to U4 to stop the timer. The timer control module start and reset switch/indicators operate in an identical manner.

SECTION II

CLOCK/TIMER MODULE
TIMER CONTROL MODULE
MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the clock/timer module and the timer control module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The clock/timer and timer control modules should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of produres required to restore a clock/timer module or a timer control module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-8. ELECTRICAL ADJUSTMENTS.

2-9. CLOCK FREQUENCY CALIBRATION. Capacitor C14 calibrates the clock/timer module clock frequency. Adjustment of the control will not be required unless replacement components are installed in the circuit. The clock frequency is calibrated as follows.

2-10. Required Equipment. The following test equipment is required to calibrate the clock/timer module clock frequency.

A. Non-Metallic Adjustment Tool.

B. General Purpose Frequency Counter.

2-11. Procedure. To calibrate the clock/timer module clock frequency, proceed as follows:

2-12. Open the console meter bridge and access the clock/timer module.

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

2-13. Connect the frequency counter to test point TP1.

2-14. Refer to Figure 2-1 and adjust clock/timer module clock frequency adjust control C14 for a 1 MHz frequency counter indication.

2-15. Disconnect all test equipment and close the console meter bridge.

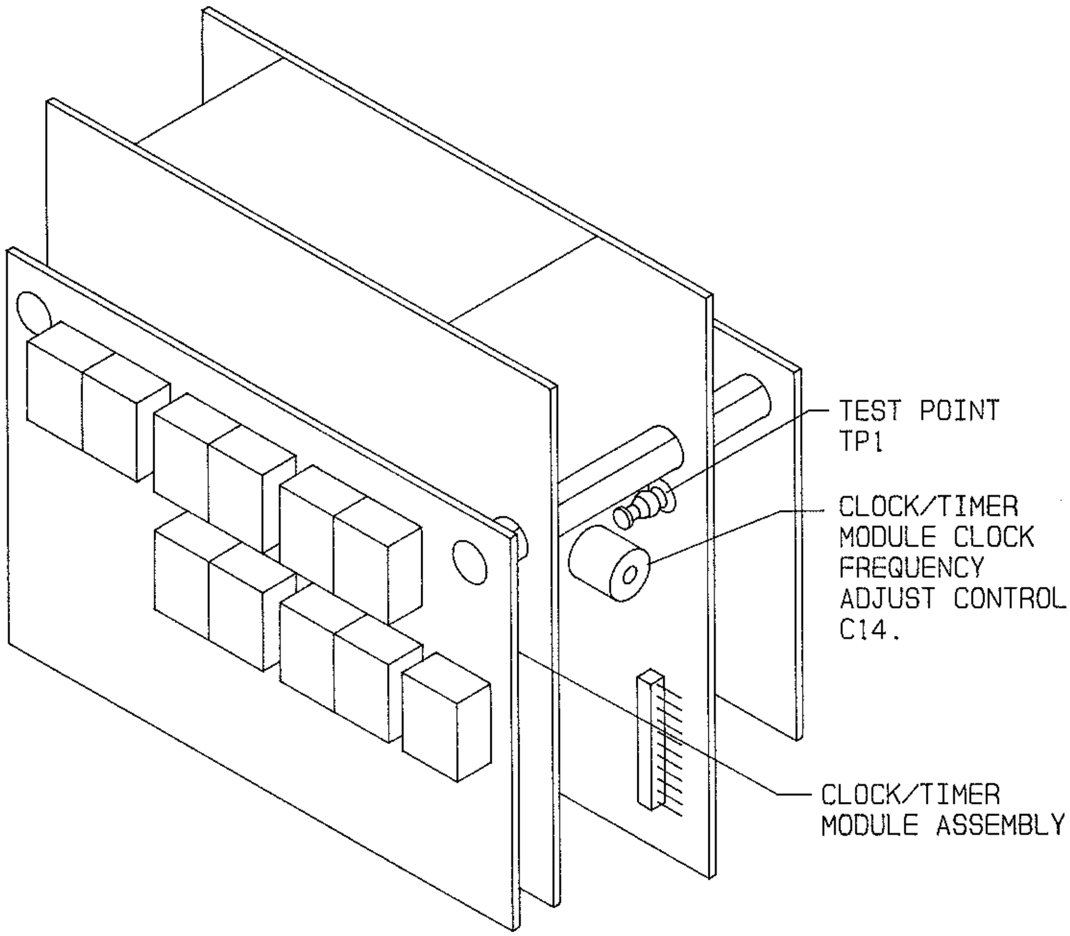


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FIGURE 2-1. CLOCK/TIMER MODULE ADJUSTMENT CONTROLS

2-16. TROUBLESHOOTING.

2-17. The troubleshooting philosophy for the clock/timer and timer control modules consists of isolating a problem to a specific circuit or group of components. Figure 2-2 presents the clock/timer troubleshooting information. Refer to Figure 2-2 to isolate a failure to a specific group of components.

2-18. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-19. COMPONENT REPLACEMENT.

2-20. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

CLOCK/TIMER MODULE TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO CLOCK/ TIMER OPERATIONS	1. CHECK REGULATORS U1 AND U2. 2. CHECK INTEGRATED CIRCUITS U4 AND U5.
MISSING CLOCK DIGIT	1. CHECK INTEGRATED CIRCUITS U7 AND U8. 2. CHECK SEVEN-SEGMENT LEDS, DS1 THROUGH DS6.
MISSING TIMER DIGIT	1. CHECK INTEGRATED CIRCUITS U6 AND U7. 2. CHECK SEVEN-SEGMENT LEDS DS7 THROUGH DS11.
NO CLOCK SYNCRONIZATION	1. CHECK INTEGRATED CIRCUIT U3. 2. CHECK THE SYNCHRONIZATION AUDIO TO THE CLOCK/TIMER MODULE.
NO TIMER AUTOMATIC MODE	1. WHEN THE CLOCK/TIMER MODULE IS CONFIGURED WITHOUT A TIMER CONTROL MODULE, ENSURE JUMPER JP1 OR JP2 IS INSTALLED.
NO MANUAL TIMER CONTROL OPERATIONS	1. CHECK THE TIMER CONTROL MODULE. 2. CHECK THE CABLE BETWEEN THE TIMER CONTROL MODULE AND THE CLOCK/TIMER MODULE

597-9012-142

FIGURE 2-2. CLOCK/TIMER MODULE TROUBLESHOOTING

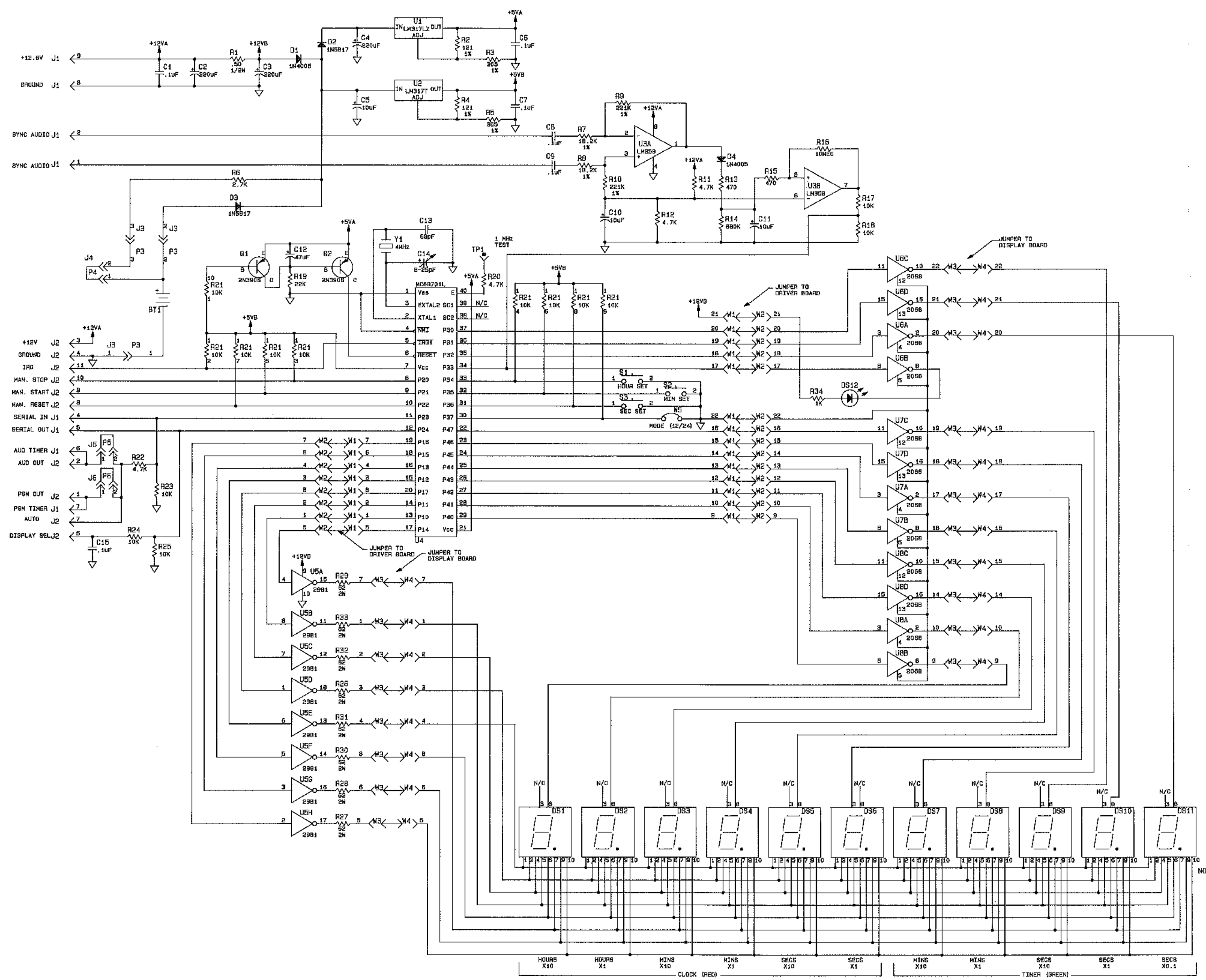
SECTION III

CLOCK/TIMER MODULE
TIMER CONTROL MODULE
DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the clock/timer module and the timer control module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, CLOCK/TIMER MODULE	SD951-0030
3-2	ASSEMBLY DIAGRAM, CLOCK/TIMER MODULE	AD951-0030
3-3	ASSEMBLY DIAGRAM, TIMER CONTROL MODULE	AC951-0035



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R34, C15, D5, U8, DS11, Q2, Y1, J6, P6, TP1, S3, & W5.
3. SEE PCB ASSEMBLY: AD 951-0030

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

DWN. BY JAH 11-2-87
CHKD ℳH 9-2-88
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 951-0030
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9016 (16CH)

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

TITLE CLOCK/TIMER MODULE

TYPE	SIZE	DWG. NO.	REV
S	D	951-0030	A

MODEL MT-90 | SCALE NONE | SHEET 1 OF 1

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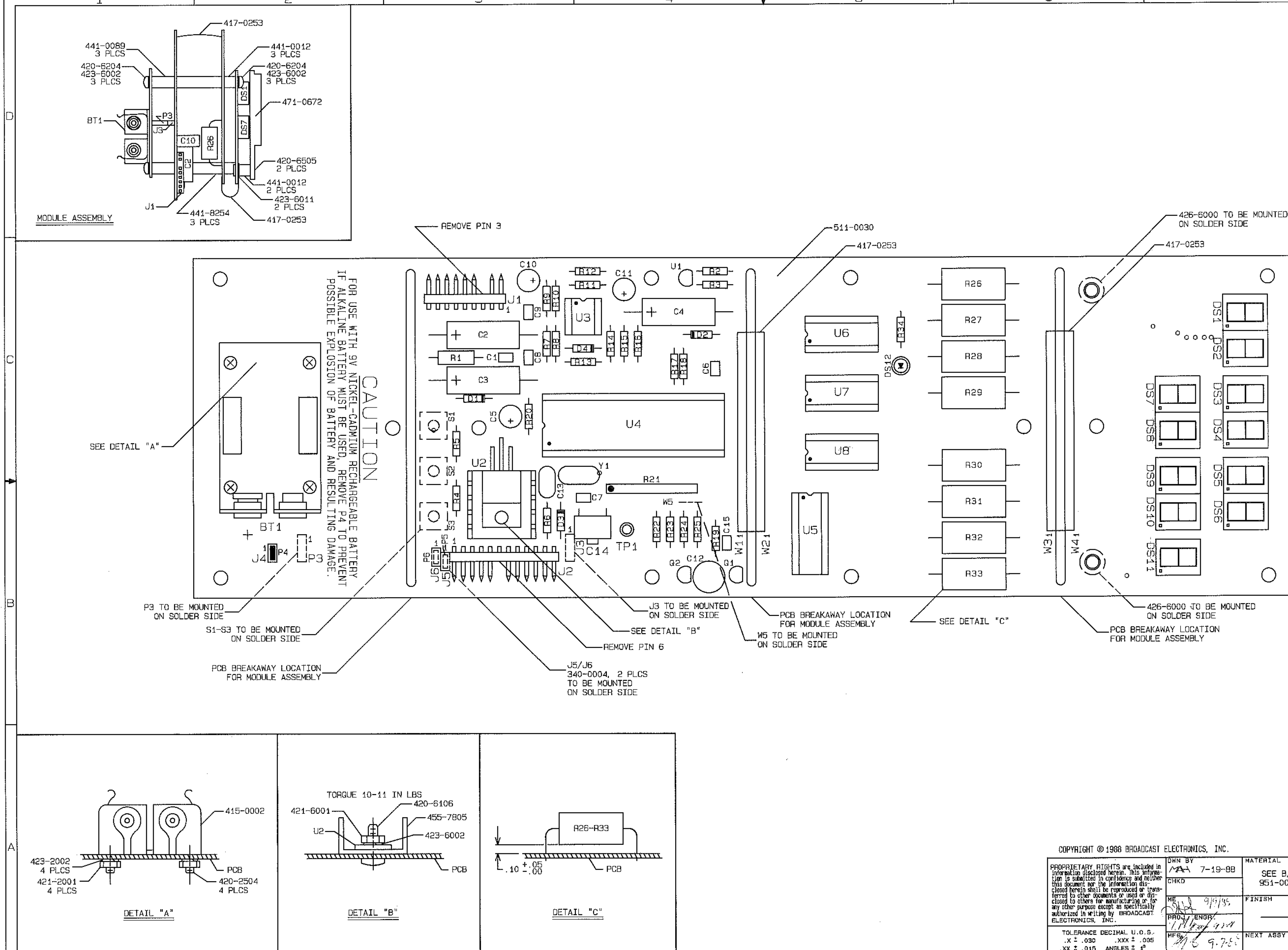

NOTE:
1. SEE SCHEMATIC SD951-0030.

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

DWN BY MAA 7-19-88	MATERIAL SEE B/M 951-0030	
CHKD	FINISH	
ME 9/9/85		
PROJ. ENGR.		
MFG. 9-7-85	NEXT ASSY	

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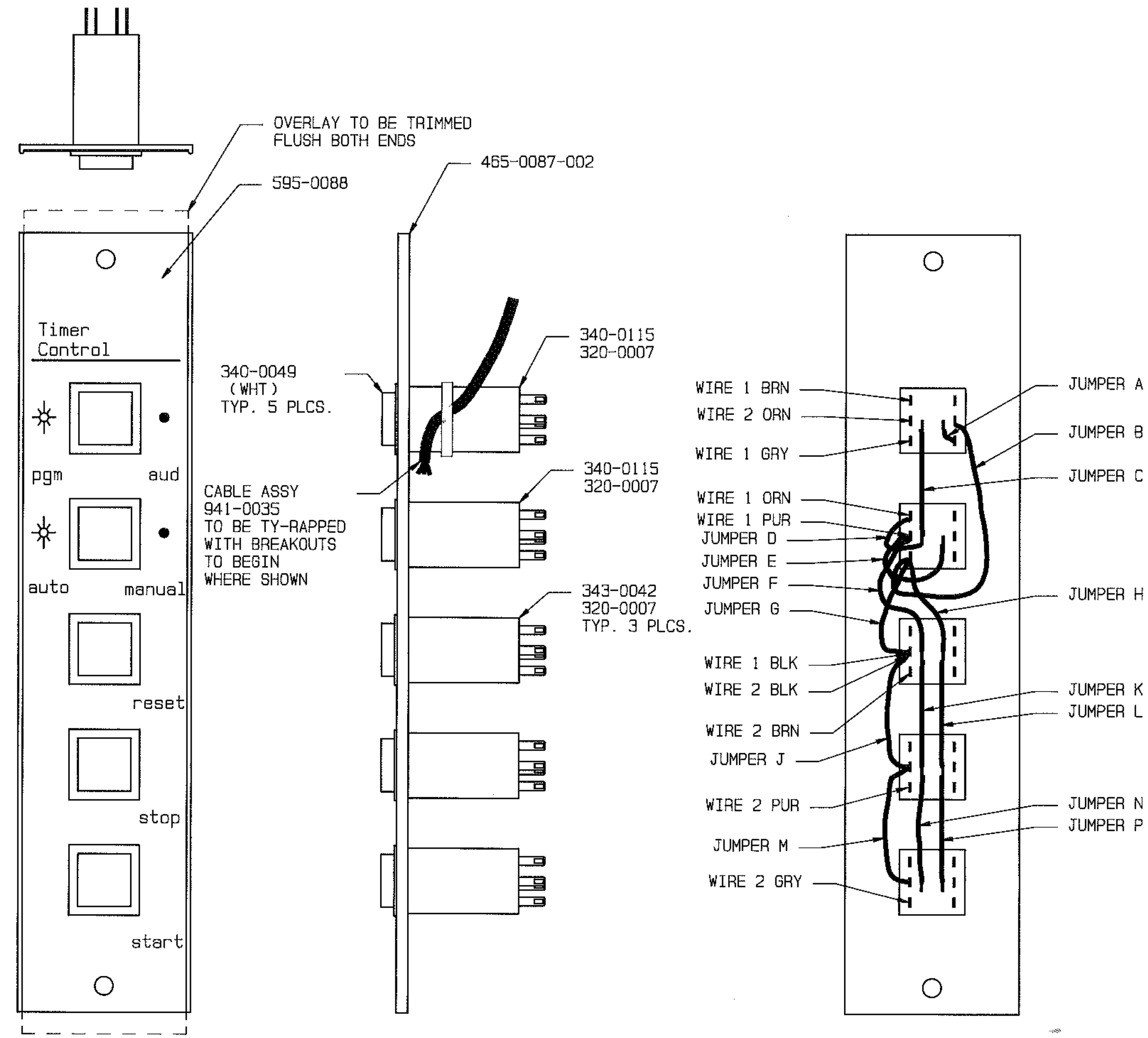
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE ASSEMBLY CLOCK/TIMER MODULE

TYPE	SIZE	DWG.NO.	REV
A	D	951-0030	B

MODEL MT-90 SCALE 2/1 SHEET 1 OF 1



JUMPER TABLE P/N 601-2200	
SYM	LENGTH
A	.2 IN.
B	4 IN.
C	1.5 IN.
D	1.5 IN.
E	1.5 IN.
F	2.1 IN.
G	1.8 IN.
H	1.7 IN.
J	2 IN.
K	1.5 IN.
L	1.5 IN.
M	2 IN.
N	1.5 IN.
P	1.5 IN.

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

DWN. BY JAH 6-20-88
CHKD MH 8-22-88
ME 8/22/88
PROJ. ENGR. 8-22-88
MFG 8-22-88

MATERIAL SEE B/M 950-0035
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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TITLE TIMER CONTROL MODULE

TYPE A SIZE C DWG. NO. 951-0035 REV A
MODEL MT-90 SCALE 1=1 SHEET 1 OF 1

SECTION IV

CLOCK/TIMER MODULE
TIMER CONTROL MODULE
PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the clock/timer module and the timer control module. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. CLOCK/TIMER MODULE AND TIMER CONTROL MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	CLOCK/TIMER MODULE CIRCUIT BOARD ASSEMBLY	951-0030	4-1
4-3	CLOCK/TIMER MODULE CABLE ASSEMBLY	941-0030	4-2
4-4	TIMER CONTROL MODULE	951-0035	4-3
4-5	TIMER CONTROL MODULE CABLE ASSEMBLY	941-0035	4-3

TABLE 4-2. CLOCK/TIMER MODULE CIRCUIT BOARD ASSEMBLY - 951-0030
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C2,C3,C4	Capacitor, Electrolytic, 220 uF, 25V	013-2284	3
C5	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C6 THRU C9	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	4
C10,C11	Capacitor, Electrolytic, 10 uF, 35V	023-1076	2
C12	Capacitor, Electrolytic, 47 uF, 35V	020-4773	1
C13	Capacitor, Mica, 68 pF ±5%, 500V	040-6813	1
C14	Capacitor, Ceramic, Adjustable, 8 to 25 pF, 175V	090-0825	1
D1	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1
D2,D3	Diode, 1N5817, Schottky Barrier Type, 20V, 1 Ampere	200-0019	2
D4,D5	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	2
D5	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	1
DS1 THRU DS6	LED, HD11070, Red, 7-Segment High Efficiency Common Cathode	320-0023	6
DS7 THRU DS11	LED, HD1107G, Green, 7-Segment Common Cathode	320-0022	5
J1	Housing, 9-Pin In-line	417-0161	1
J2	Connector Header, 12-Pin In-line	417-1203	1
J3	Connector Header, 3-Pin In-line	417-0003	1
J4,J5,J6	Receptacle, Male, 2-Pin In-line	417-4004	3
P3	Socket, Connector, 3-Pin	417-0223	1
P4,P5,P6	Programmable Jumper	340-0004	3
Q1,Q2	Transistor, 2N3906, PNP, Silicon, TO-92 Case	210-3906	2

TABLE 4-2. CLOCK/TIMER MODULE CIRCUIT BOARD ASSEMBLY - 951-0030
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R1	Resistor, 0.5 Ohm ±5%, 1/2W	110-5000	1
R2	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R3	Resistor, 365 Ohm ±1%, 1/4W	103-3631	1
R4	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R5	Resistor, 365 Ohm ±1%, 1/4W	103-3631	1
R6	Resistor, 2.7 k Ohm ±5%, 1/4W	100-2743	1
R7,R8	Resistor, 18.2 k Ohm ±1%, 1/4W	103-1825	2
R9,R10	Resistor, 221 k Ohm ±1%, 1/4W	103-2216	2
R11,R12	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	2
R13	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R14	Resistor, 680 k Ohm ±5%, 1/4W	100-6863	1
R15	Resistor, 470 Ohm ±5%, 1/4W	100-4733	1
R16	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R17,R18	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R19	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R20	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R21	Resistor Network, 9-10 k Ohm ±2%, 1/4W Resistors, Single In-line 10-Pin Package	226-1050	1
R22	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R23,R24,R25	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	3
R26 THRU R33	Resistor, 62 Ohm ±5%, 2W	130-6223	8
R34	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
S1,S2,S3	Switch, Pushbutton, Momentary, Circuit Board Mount	340-0116	3
TP1	Terminal, Turret, Double Shoulder	413-1597	1
U1	Integrated Circuit, LM317LZ, Adjustable Positive Voltage Regulator, 1.2 to 37V @ 0.1 Ampere, TO-92 Case	220-0317	1
U2	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U3	Integrated Circuit, LM358N, Dual Operational Amplifier, 8-Pin DIP	221-0358	1
U4	Integrated Circuit, MC68701, MOS, N-Channel, Silicon-Gate, Deplection Load, with Clock/Timer Program, 40-Pin DIP	220-6871	1
U5	Integrated Circuit, UDN2981A, CMOS, High-Voltage/High-Current Source Drivers, 50V @ 350 mA, 18-Pin DIP	220-2981	1
U6,U7,U8	Integrated Circuit, ULN2068B, 35V, 1.5A Darlington Quad Driver, 16-Pin DIP	220-2068	3
W1/W2,W3/W4	Flexstrip Jumper, 22-Pin	417-0253	2
Y1	Crystal, 4.0 MHz ±30 PPM @ 25°C, A/T Cut,HC49 Case	390-0022	1
XBT1	9V Battery Holder	415-0002	1
XU3	Socket, 8-Pin DIP	417-0804	1
XU4	Socket, 40-Pin DIP	417-4005	1
XU5	Socket, 18-Pin DIP	417-1804	1
XU6,XU7,XU8	Socket, 16-Pin DIP	417-1604	3
----	Clock/Timer Module Cable Assembly	941-0030	1
----	Blank Clock/Timer Module Circuit Board	511-0030	1

TABLE 4-3. CLOCK/TIMER MODULE CABLE ASSEMBLY - 941-0030

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Connector Housing, 9-Pin In-line	417-0161	1
----	Pins, Crimp Type	417-8766	8

TABLE 4-4. TIMER CONTROL MODULE - 951-0035

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Switch, Pushbutton, Square, 2PDT, Illuminated, 3A @ 125V ac	340-0115	2
----	Switch, Push, Illuminated, 2PDT, Square, Momentary Contact, 3A @ 125V ac	343-0042	3
----	Lamp, No. 73, Wedge Base, 14V, 0.08A, T-1 3/4 Bulb	320-0007	5
----	Switch Cap, White, Square	340-0049	5
----	Timer Control Module Cable Assembly	941-0035	1

TABLE 4-5. TIMER CONTROL MODULE CABLE ASSEMBLY - 941-0035

REF. DES.	DESCRIPTION	PART NO.	QTY.
P2	Plug, Housing, 12-Pin	417-1202	1
----	Pins, Crimp Type	417-8766	9

TAPE SOURCE REMOTE SWITCH MODULE
CART SOURCE REMOTE SWITCH MODULE

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SECTION I

TAPE SOURCE REMOTE SWITCH MODULE
CART SOURCE REMOTE SWITCH MODULE
THEORY OF OPERATION

1-1. INTRODUCTION.

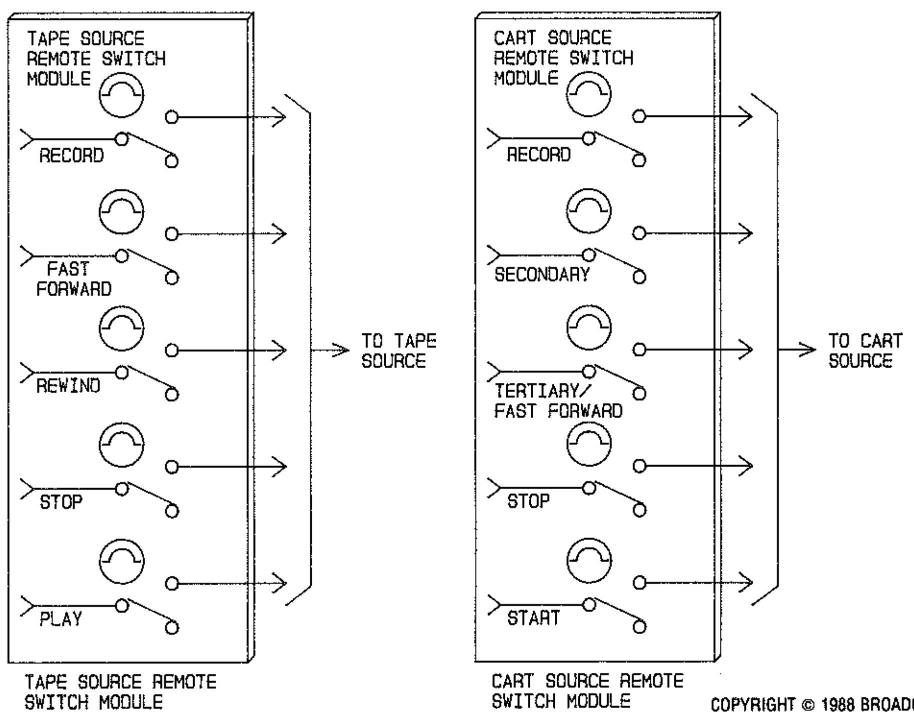
1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console tape and cart source remote switch modules. A diagram of the tape and cart remote switch modules is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. TAPE SOURCE REMOTE SWITCH MODULE FUNCTIONAL DESCRIPTION.

1-4. The tape source remote switch module consists of five color-coded momentary contact switch/indicators for the remote control of a tape source such as a reel-to-reel machine. The switches will provide control signals for basic operating functions such as record, fast forward, rewind, stop, and stop.

1-5. CART SOURCE REMOTE SWITCH MODULE FUNCTIONAL DESCRIPTION.

1-6. The cart source remote switch module consists of five color-coded momentary contact switch/indicators for the remote control of a cartridge machine source. The switches will provide control signals for basic operating functions such as record, secondary cue tone record, tertiary cue tone record/fast forward, stop, and stop.



597-9012-103

FIGURE 1-1. TAPE AND CART SOURCE REMOTE SWITCH MODULE DETAILED BLOCK DIAGRAM

SECTION II

TAPE SOURCE REMOTE SWITCH MODULE
CART SOURCE REMOTE SWITCH MODULE
MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information for the tape and cart source remote switch modules.

2-3. MAINTENANCE.

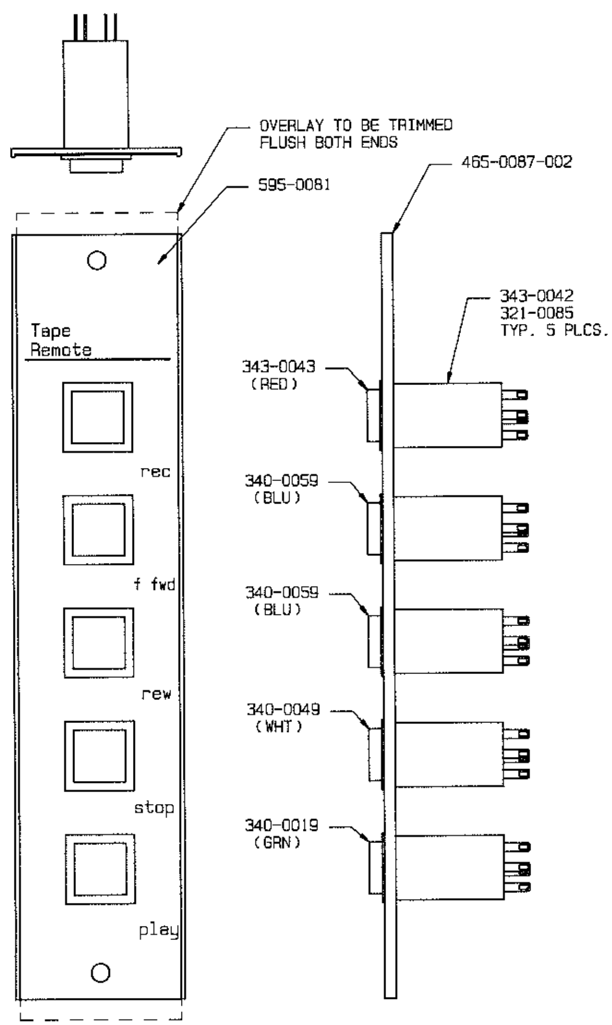
2-5. The tape and cart source remote switch modules should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. The modules should also be periodically inspected for loose wiring, otherwise no special maintenance procedures need be performed.

SECTION III

TAPE SOURCE REMOTE SWITCH MODULE
CART SOURCE REMOTE SWITCH MODULE
DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the tape and cart source remote switch modules.



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

DWN. BY	JAH 6-20-88
CHKD	MH 8-22-88
ME	9/1
PROJ. ENGR.	
MFG.	
MATERIAL	SEE B/M 951-0017
FINISH	
	SEE DWG RA592-0000
NEXT ASSY.	901-9012 (12CH) 901-9018 (18CH)

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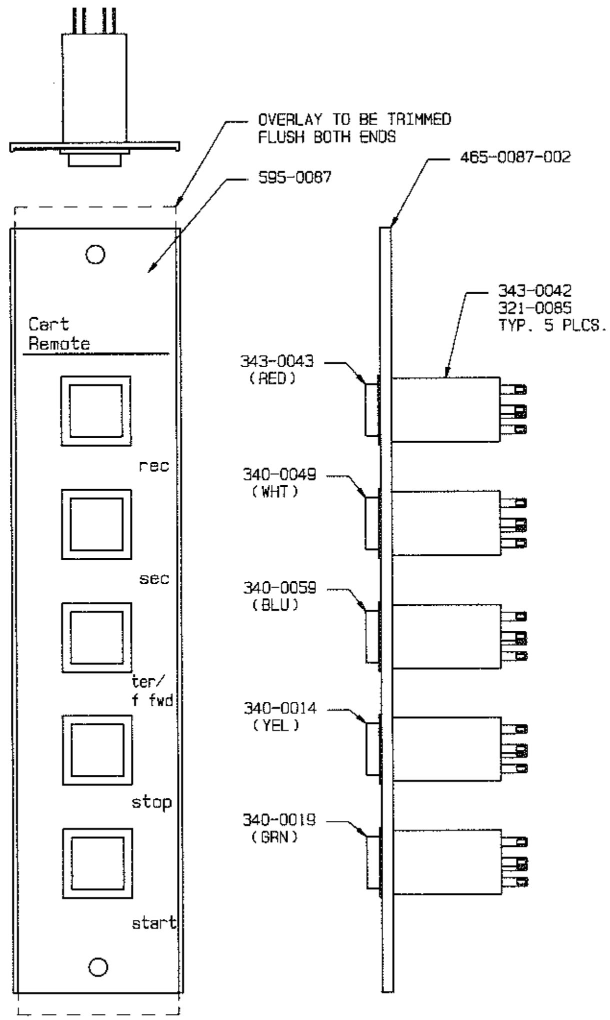
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: TAPE SOURCE REMOTE SWITCH MODULE

TYPE	SIZE	DWG. NO.	REV
A	C	951-0017	A

MODEL MT-90 SCALE 1=1 SHEET 1 OF 1



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

DWN. BY JAH 6-20-88	MATERIAL SEE B/M 951-0019	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
CHKD MH 8-22-88	FINISH	TITLE CART SOURCE REMOTE SWITCH MODULE
ME 9/22/88		TYPE A SIZE C DWG. NO. 951-0019 REV A
PROJ. ENGR.	SEE DWG RA5R2-0000	
MFG.	NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	MODEL MT-90 SCALE 1=1 SHEET 1 OF 1

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SECTION IV

TAPE SOURCE REMOTE SWITCH MODULE
CART SOURCE REMOTE SWITCH MODULE
PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the tape and cart source remote switch modules.

TABLE 4-1. TAPE AND CART SOURCE REMOTE SWITCH MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	TAPE SOURCE REMOTE SWITCH MODULE	951-0017	4-1
4-3	CART SOURCE REMOTE SWITCH MODULE	951-0019	4-1

TABLE 4-2. TAPE SOURCE REMOTE SWITCH MODULE - 951-0017

REF. DES.	DESCRIPTION	PART NO.	QTY.
S1 THRU S5	Switch, Push, Illuminated, 2PDT, Square, Momentary Contact, 3A @ 125V ac	343-0042	5
----	Lamp, No. 85, Wedge Base, 28V @ 0.04 Amperes	321-0085	5
----	Switch Cap, Blue, Square (for FAST FORWARD and REWIND Switches)	340-0059	2
----	Switch Cap, Red, Square (for RECORD Switch)	343-0043	1
----	Switch Cap, White, Square (for STOP Switch)	340-0049	1
----	Switch Cap, Green, Square (for PLAY Switch)	340-0019	1

TABLE 4-3. CART SOURCE REMOTE SWITCH MODULE - 951-0019

REF. DES.	DESCRIPTION	PART NO.	QTY.
S1 THRU S5	Switch, Push, Illuminated, 2PDT, Square, Momentary Contact, 3A @ 125V ac	343-0042	5
----	Lamp, No. 85, Wedge Base, 28V @ 0.04 Amperes	321-0085	5
----	Switch Cap, Blue, Square (for TERTIARY/FAST FORWARD Switch)	340-0059	1
----	Switch Cap, Red, Square (for RECORD Switch)	343-0043	1
----	Switch Cap, White, Square (for SECONDARY Switch)	340-0049	1
----	Switch Cap, Yellow (for STOP Switch)	340-0014	1
----	Switch Cap, Green, Square (for START Switch)	340-0019	1

STUDIO REMOTE PANEL

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SECTION I

STUDIO REMOTE PANEL THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console studio remote panel. A detailed block diagram of the studio remote panel is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

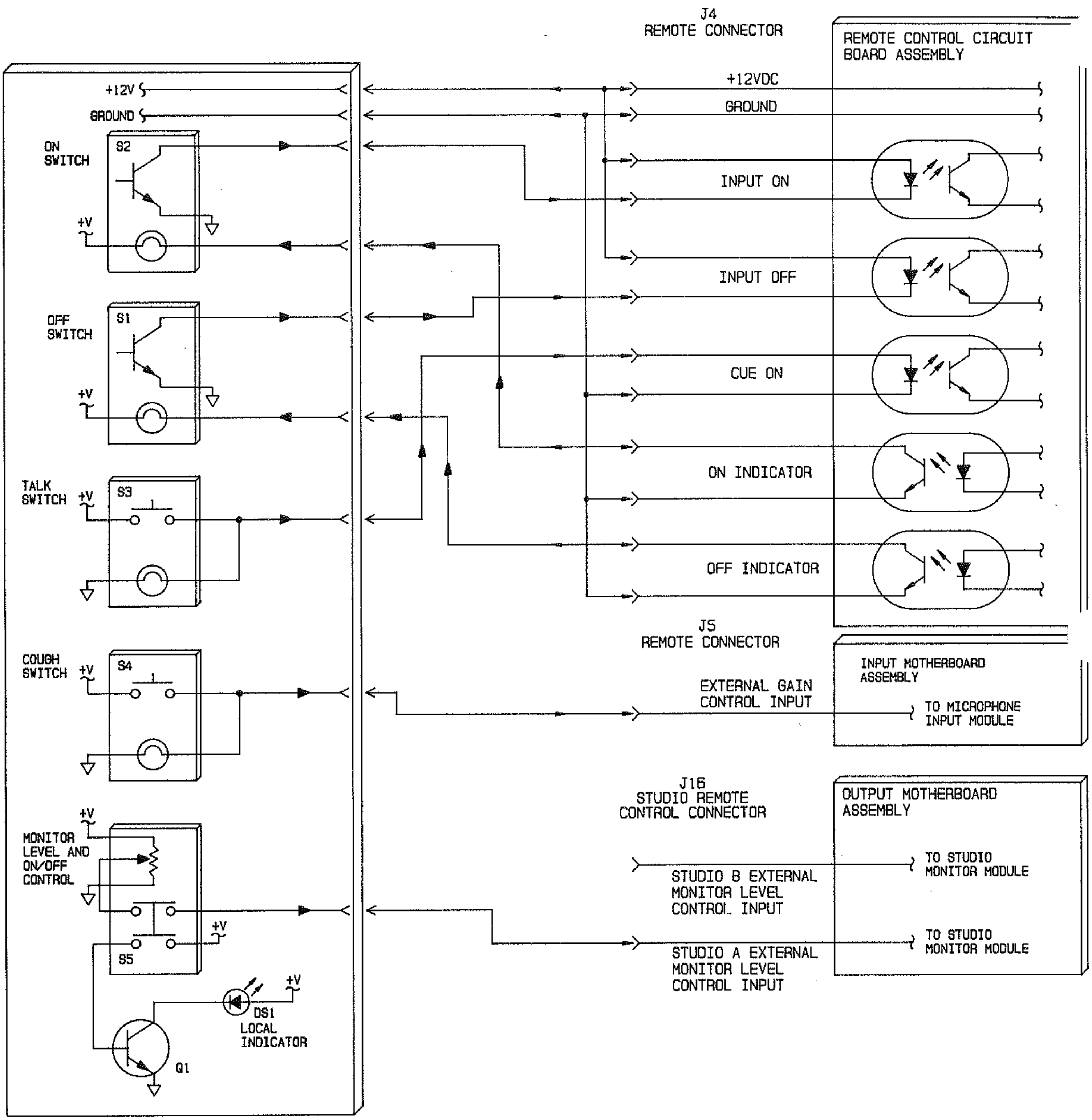
1-3. FUNCTIONAL DESCRIPTION.

1-4. Local control of a studio facility microphone level, monitor level, and intercom operation is performed by the studio remote panel. The panel consists of four switch/indicators and a potentiometer assembly. Two hall-effect switch/indicators provide on/off control of the studio facility microphone input module. Studio-to-control room intercom operation is controlled by a talk switch/indicator. A cough switch/indicator is provided to conveniently lower the microphone level for special operating conditions. Local control of the studio monitor level is provided by a monitor level control and indicator.

1-5. Hall-effect switch/indicators S1 and S2 output LOW on/off commands to the remote control circuit board assembly to enable/disable the studio facility microphone input module. On/off pulses from the input module are routed to the remote control circuit board assembly which outputs low control commands to the S1 and S2 indicators for on/off status indications. Studio-to-control room intercom operations are directed by talk switch/indicator S3. When S3 is depressed, a HIGH will be routed to the remote control circuit board assembly cue input. The HIGH configures the microphone input module to cue mode for studio-to-control room intercom communication.

1-6. Cough switch/indicator S4 is designed to generate a HIGH control command for application to the microphone input module external gain control input. The command lowers the microphone input level approximately 60 dB for special operating conditions.

1-7. Local control of the studio monitor level is provided by monitor on/off level control S5. When switch S5 is operated to the on position, a dc control voltage will be routed to the studio monitor module external gain control input for control of the studio facility monitor level. An indication of local monitor level control is provided by transistor Q1 and local indicator DS1. A positive dc voltage from the contacts of switch S5 is applied to transistor Q1. The voltage biases Q1 on and illuminates local indicator DS1.



597-9012-104

FIGURE 1-1. STUDIO REMOTE PANEL DETAILED BLOCK DIAGRAM

SECTION II

STUDIO REMOTE PANEL MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information for the studio remote panel.

2-3. MAINTENANCE.

2-4. GENERAL.

2-5. The studio remote panel circuitry should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. The panel should also be periodically inspected for loose wiring and components, otherwise no special maintenance procedures need be performed.

2-6. COMPONENT REPLACEMENT.

2-7. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

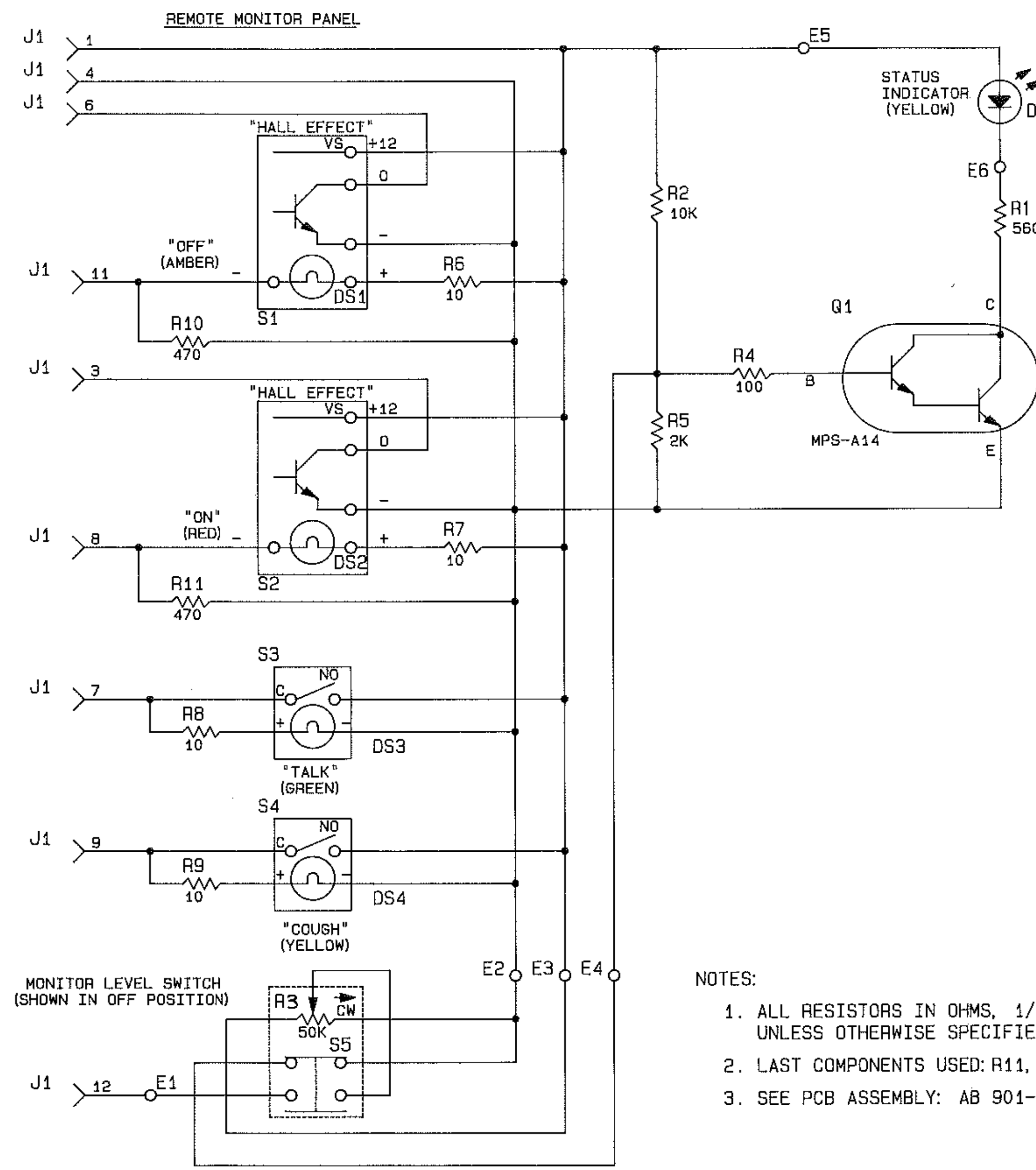
SECTION III

STUDIO REMOTE PANEL DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the studio remote panel.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, STUDIO REMOTE PANEL	SC901-0023
3-2	ASSEMBLY DIAGRAM, STUDIO REMOTE PANEL	AC901-0023



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R11, S5, J1, E6, DS5
3. SEE PCB ASSEMBLY: AB 901-0023

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

DWN. BY	JAH 6-7-88
CHKD	MH 9-2-88
ME	
PROJ. ENGR.	9-2-88
MFG.	9-7-88
MATERIAL	SEE B/M 901-0023
FINISH	
NEXT ASSY.	SEE DWG RA592-0000; 901-9012 (12CH); 901-9018 (18CH)

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TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: STUDIO REMOTE MODULE

TYPE	SIZE	DWG. NO.	REV
S	C	901-0023	A

MODEL MT-90 | SCALE NONE | SHEET 1 OF 1

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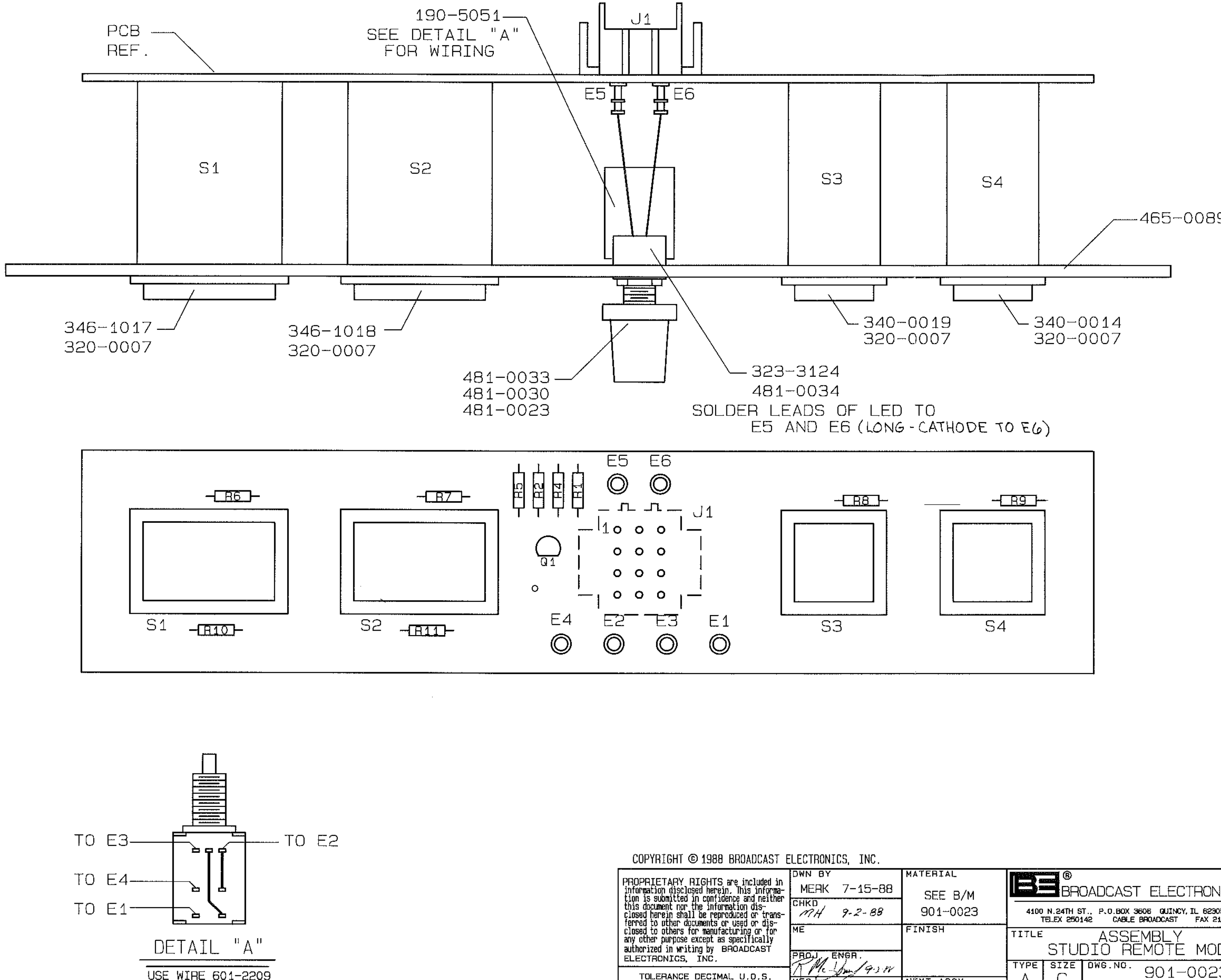

TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°	DWN BY MERK 7-15-88	MATERIAL SEE B/M 901-0023	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
	CHKD MH 9-2-88	FINISH	TITLE ASSEMBLY STUDIO REMOTE MODULE
	ME		TYPE A SIZE C DWG.NO. 901-0023 REV A
	PROJ. ENGR. R. Mc... 9-3-88	NEXT ASSY	MODEL MT90 SCALE 2/1 SHEET 1 OF 1
	MFG MB 9-7-88		

SECTION IV

STUDIO REMOTE PANEL PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the studio remote panel. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. STUDIO REMOTE PANEL PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	STUDIO REMOTE PANEL ASSEMBLY	901-0023	4-1

TABLE 4-2. STUDIO REMOTE PANEL CIRCUIT BOARD ASSEMBLY - 901-0023

REF. DES.	DESCRIPTION	PART NO.	QTY.
DS1 THRU DS4	Lamp, No. 73, 14V, 0.08A, T-1 3/4 Bulb, Wedge Base	320-0007	4
DS5	LED, Yellow, MV53124, 3V @ 20 mA Maximum	323-3124	1
E1 THRU E6	Terminal Turret, Double Shoulder	413-1597	6
J1	Receptacle, 12-Pin	417-1276	1
Q1	Transistor, MPS-A14, Silicon, NPN, Darlington, TO-92 Case	211-0014	1
R1	Resistor, 560 Ohm ±5%, 1/4W	100-5633	1
R2	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R3/S5	Potentiometer, 50 k Ohm ±10%, 1/2W, SPDT BJ	190-5051	1
R4	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
R5	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R6 THRU R9	Resistor, 10 Ohm ±5%, 1/4W	100-1023	4
R10,R11	Resistor, 470 Ohm ±5%, 1/4W	100-4733	2
S1,S2	Switch, Pushbutton, Rectangular, Momentary Contact, Illuminated (ON/OFF Switches)	340-0103	2
S3,S4	Switch, Pushbutton, Momentary Contact, Illuminated, SPDT, 3A @ 125V (TALK and COUGH Switches)	340-0015	2
----	Lens, Red (for ON Switch)	346-1018	1
----	Lens, Amber (for OFF Switch)	346-1017	1
----	Switch Cap, Yellow, Square (for COUGH Switch)	340-0014	1
----	Switch Cap, Green, Square (for TALK Switch)	340-0019	1
----	Knob Cap, 11mm Gray W/Spot, C112 (for MONITOR LEVEL Control)	481-0023	1
----	Panel Mounting Grommet, MP65, for Rectangular Lamps	481-0034	1
----	Blank Studio Remote Panel Circuit Board	511-0023	1

SUMMING AMPLIFIER CIRCUIT BOARD
CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD

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SECTION I

SUMMING AMPLIFIER CIRCUIT BOARD
CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD
THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console summing amplifier and cue speaker/headphone amplifier circuit boards.

1-3. SUMMING AMPLIFIER CIRCUIT BOARD FUNCTIONAL DESCRIPTION.

1-4. The following text provides a functional description of the summing amplifier circuit board. Figure 1-1 presents a detailed block diagram of the summing amplifier circuitry. Refer to Figure 1-1 as required for the following circuit description. The summing amplifier audio circuit left and right channels are identical, therefore only the left channel will be discussed.

1-5. GENERAL.

1-6. The console summing amplifier circuit board provides audio amplification for the console output bus system. Program music, program speech, audition audio, auxiliary 1 audio, auxiliary 2 audio, auxiliary 3 audio, and cue audio are applied to individual amplifier networks. Patch point transmitting and receiving networks are also incorporated into the circuit board design. The networks provide the interfacing required for the connection of external audio processing equipment to the program music and program speech audio networks.

1-7. PROGRAM AUDIO.

1-8. Left channel program music audio from the console buss system is applied to an inverting amplifier stage consisting of integrated circuit U1A. U1A is configured for a gain of approximately 1. The gain of U1A is established by resistive components on the circuit board and the output amplifier network resistance on an associated input module. The output of U1A is applied to a patch point transmit network and left channel program music jumper J1. J1 selects either non-processed audio from U1A or processed audio from the patch point receiving stage for application to the summing amplifier stage.

1-9. Left channel program speech audio from the console buss system is also applied to an inverting amplifier stage consisting of integrated circuit U1B. U1B is configured for a gain of approximately 1. The gain of U1B is established by resistive components on the circuit board and the output amplifier network resistance on an associated input module. The output of U1B is applied to a patch point transmit network and left channel program speech jumper J2. J2 selects either non-processed audio from U1B or processed audio from the patch point receiving stage for application to the summing amplifier stage.

1-10. AUDITION AUDIO.

1-11. Left channel audition audio from the console buss system is applied to inverting amplifier stage U3B. U3B is configured for a gain of approximately 1. The gain of U3B is established by resistive components on the circuit board and the output amplifier network resistance on an associated input module. The output of U3B is routed for application to the console output amplifier module assigned to the audition buss.

1-12. AUXILIARY AUDIO.

1-13. Auxiliary 1 audio from the console buss system is applied to inverting amplifier stage U4A. U4A is configured for a gain of approximately 1. The gain of U4A is established by resistive components on the circuit board and the output amplifier network resistance on an associated input module. The output of U4A is routed for application to the console output amplifier module assigned to the auxiliary 1 buss. The auxiliary 2 and auxiliary 3 amplifier circuitry is identical.

1-14. CUE AUDIO.

1-15. Cue audio from the console cue system is applied to the summing amplifier circuit board and amplified at U5B. U5B is an inverting amplifier configured for a gain of approximately 1. The gain of U5B is established by resistive components on the circuit board and the output amplifier network resistance on an associated input module. The output of U5B is routed for application to the cue speaker/headphone amplifier circuit board.

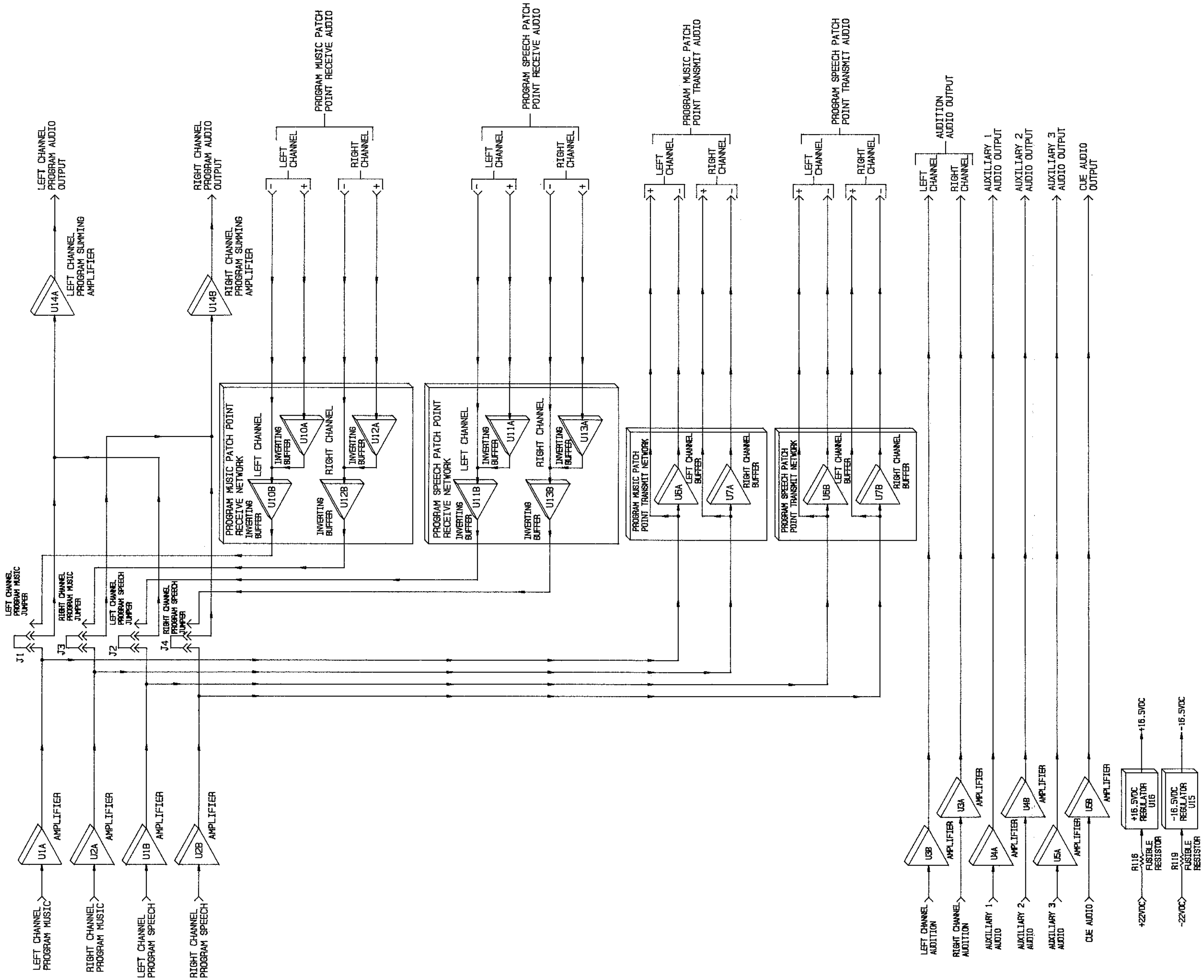
1-16. OUTPUT SUMMING AMPLIFIER NETWORK.

1-17. Left channel program music and program speech audio from jumpers J1 and J2 are applied to summing amplifier U14B. U14B is configured for a gain of one. The output of U14B is routed for application to the console output amplifier module assigned to the program buss.

1-18. PATCH POINT NETWORKS.

1-19. The summing amplifier patch point networks consist of a transmitting stage and a receiving stage. The patch point networks are incorporated into the design to provide interfacing for the connection of external audio processing equipment to the program music and program speech audio busses.

1-20. Left channel program music audio from U1A is applied to a patch point transmitting stage consisting of buffer U6A. U6A inverts the signal to produce balanced audio for application to external audio processing equipment. The stage is configured for continuous operation to provide access to the audio without circuit board programming.



597-9012-99

FIGURE 1-1.
SUMMING AMPLIFIER
CIRCUIT BOARD DETAILED
BLOCK DIAGRAM

1-21. Audio from external audio processing equipment is applied to the patch point receiving stage. The receiving stage consists of a two-stage inverting buffer network. Balanced left channel program music audio is applied to inverting buffers U10A/B. Positive-going audio is inverted at U10A and summed at the input of U10B to provide balanced-to-unbalanced audio conversion. The output of the stage is routed for application to left channel program music select jumper J1.

1-22. POWER SUPPLY CIRCUIT.

1-23. DC operating potentials for application to the summing amplifier circuit board components are produced by a regulator network. Unregulated ±24 volt supplies from the console power supply module are applied through fusible resistors R116 and R119 to a regulator network consisting of U15 and U16. R116/R119 are carbon-composition resistors which function as fusible links in the event of a short-circuit potential on the circuit board. The fusible resistors limit a power supply failure to the circuit board and prevent a failure in the entire console system.

1-24. ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U16 and -16.5 volt dc regulator U15. U15/U16 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U15 and U16 are routed for application to the circuit board audio components.

1-25. CUE SPEAKER/HEADPHONE AMPLIFIER FUNCTIONAL DESCRIPTION.

1-26. The following text provides a functional description of the cue speaker/headphone amplifier circuit board. Figure 1-2 presents a detailed block diagram of the cue speaker/headphone amplifier circuitry. Refer to Figure 1-2 as required for the following circuit description. The cue speaker/headphone amplifier audio circuit left and right channels are identical, therefore only the left channel will be discussed.

1-27. GENERAL.

1-28. The cue speaker/headphone amplifier circuit board contains six individual amplifier networks. The networks amplify audio for application to the console headphone system, cue speaker, and monitor system.

1-29. HEADPHONE AMPLIFIER CIRCUIT.

1-30. Left channel headphone audio from the control room monitor module headphone circuit is applied to amplifier U2. U2 is a power amplifier stage designed to output approximately 2 watts into an 8 Ohm load. Output limiting is provided by diodes D3 and D4. D3 and D4 limit positive and negative output peaks above ±16 volts. The output of power amplifier U2 is routed for application to the console headphone receptacles.

1-31. CUE SPEAKER AMPLIFIER CIRCUIT.

1-32. Cue audio from the cue circuit on the control room monitor module is applied to amplifier U3. U3 is a power amplifier stage designed for a nominal output of 5 watts. Output limiting is provided by diodes D5 and D6. D5 and D6 limit positive and negative output peaks above ±16 volts. The output of power amplifier U2 is routed for application to the cue speaker.

1-33. PROGRAM MONITOR AUDIO AMPLIFIER CIRCUIT.

1-34. Left channel program audio from the summing amplifier circuit board is applied to operational amplifier U4A. U4A is an inverting amplifier stage configured for a gain of approximately 6 dB. The output U4A is routed for application to the monitor circuitry on the control room and studio monitor modules.

1-35. AUDITION MONITOR AUDIO AMPLIFIER CIRCUIT.

1-36. Left channel audition audio from the summing amplifier circuit board is applied to operational amplifier U5A. U5A is an inverting amplifier stage configured for a gain of approximately 6 dB. The output U5A is routed for application to the monitor circuitry on the control room and studio monitor modules.

1-37. CUE MONITOR AUDIO AMPLIFIER CIRCUIT.

1-38. Cue audio from the summing amplifier circuit board is applied to operational amplifier U6A. U6A is an inverting amplifier stage configured for a gain of approximately 6 dB. The output U6A is routed for application to the monitor circuitry on the control room and studio monitor modules.

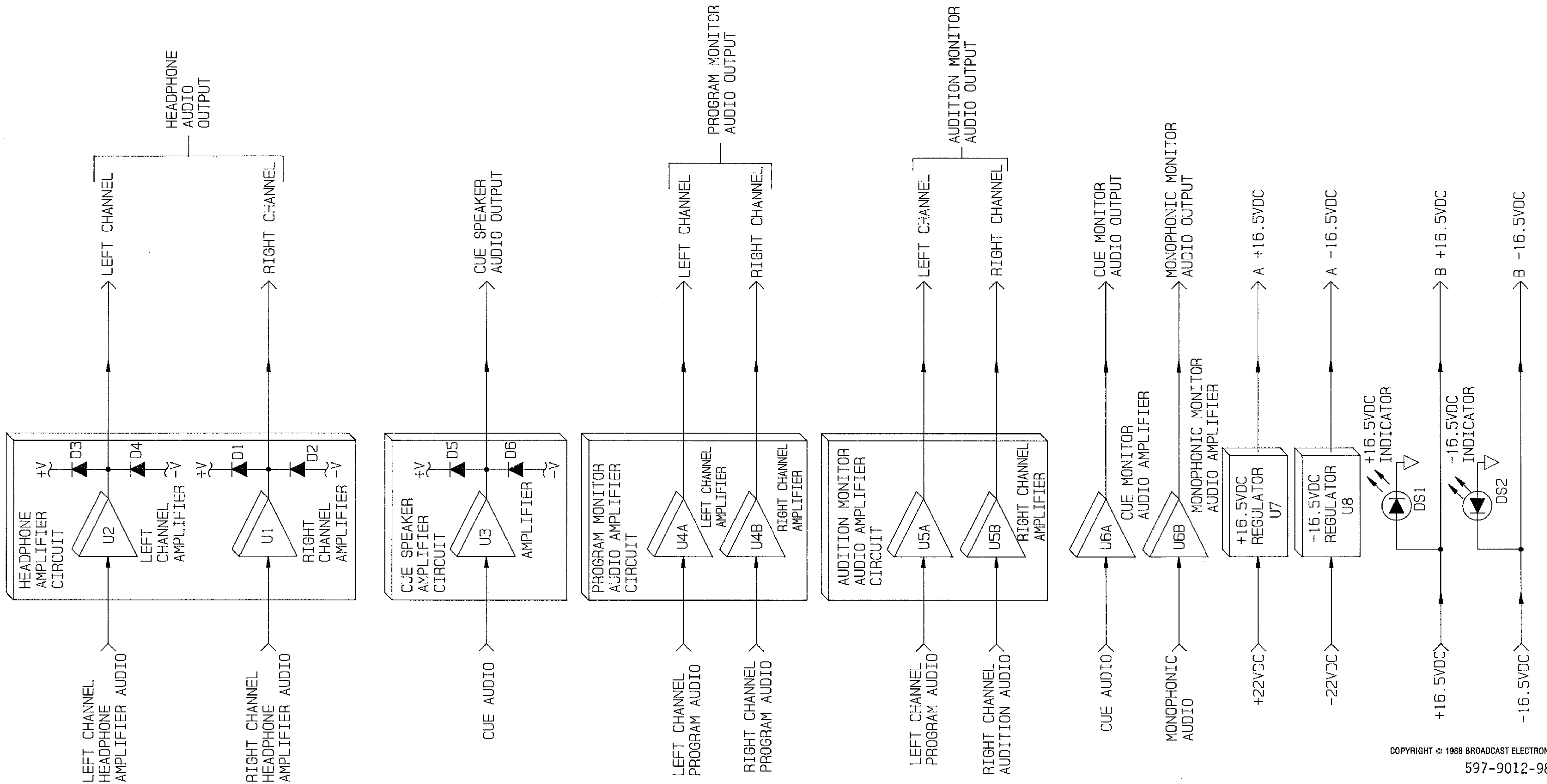
1-39. MONOPHONIC MONITOR AUDIO AMPLIFIER CIRCUIT.

1-40. Monophonic audio from the monophonic output module is applied to operational amplifier U6B. U6B is an inverting amplifier stage configured for a gain of approximately 6 dB. The output U6B is routed for application to the monitor circuitry on the control room and studio monitor modules.

1-41. POWER SUPPLY CIRCUIT.

1-42. DC operating potentials for application to the cue speaker/headphone amplifier circuit board components are produced by a regulator network. ±24V dc supplies from the console power supply module are applied to +16.5 volt dc regulator U7 and -16.5 volt dc regulator U8. U7/U8 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±16.5 volt outputs from U15 and U16 are routed for application to the program monitor, audition monitor, cue monitor, and monophonic monitor amplifier circuitry.

1-43. Regulated +16.5v and -16.5v dc supplies from the console power supply module are also routed to the cue speaker/headphone amplifier circuit board. The regulated supplies are applied to the headphone and cue speaker amplifier circuits. LEDs DS1 and DS2 provide operational status indications of the ±16.5 supplies.



597-9012-98

FIGURE 1-2.
CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD DETAILED BLOCK DIAGRAM

SECTION II

SUMMING AMPLIFIER CIRCUIT BOARD
CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD
MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information and troubleshooting information for the summing amplifier and cue speaker/headphone amplifier circuit boards.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The summing amplifier and cue speaker/headphone amplifier circuit boards should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the circuit boards for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of produres required to restore a summing amplifier or cue speaker/headphone amplifier circuit board to operation after a fault has occurred. The procedures are divided into troubleshooting information and component replacement procedures.

2-8. TROUBLESHOOTING.

2-9. The troubleshooting philosophy for the summing amplifier and cue speaker/headphone amplifier circuit board assemblies consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures.

2-10. Figure 2-1 presents the summing amplifier circuit board troubleshooting information. Figure 2-2 presents the cue speaker/headphone amplifier circuit board troubleshooting information. Refer to Figures 2-1 and 2-2 to isolate a failure to a specific group of components.

2-11. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

SUMMING AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING

SYMPTOM	SOLUTION
NO AUDIO OUTPUT	See the flowchart below.

1. MEASURE THE VOLTAGE AT U16 PIN 2. THE VOLTAGE MUST BE +16.5 VDC.
2. MEASURE THE VOLTAGE AT U15 PIN 3. THE VOLTAGE MUST BE -16.5 VDC.
3. MEASURE THE VOLTAGE ACROSS R116. THE VOLTAGE MUST BE LESS THAN 1 VDC.
4. MEASURE THE VOLTAGE ACROSS R119. THE VOLTAGE MUST BE LESS THAN 1 VDC.

- NO:
  1. DEFECTIVE U15 OR U16.
  2. CHECK ALL INTEGRATED CIRCUITS FOR OVER-TEMPERATURE CONDITIONS.
- YES: IS PROGRAM OUTPUT AUDIO PRESENT AT U14 PINS 1 AND 7?
  - NO:
    1. DEFECTIVE U1,U2,OR U14.
    2. REFER TO SYSTEM TROUBLE-SHOOTING INFORMATION.
  - YES: IS AUDITION OUTPUT AUDIO PRESENT AT U3 PINS 1 AND 7?
    - NO:
      1. DEFECTIVE U3.
      2. REFER TO SYSTEM AND LINE OUTPUT AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING INFORMATION.
    - YES: IS AUXILIARY OUTPUT 1 AUDIO PRESENT AT U4 PIN 1 AND AUXILIARY OUTPUT 2 AUDIO PRESENT AT U4 PIN 7?
      - NO:
        1. ENSURE THE AUXILIARY 1 AND 2 JUMPERS ON MICROPHONE AND LINE INPUT MODULES ARE PROPERLY INSTALLED.
        2. DEFECTIVE U4.
        3. REFER TO SYSTEM AND LINE OUTPUT AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING INFORMATION.
      - YES: IS AUXILIARY OUTPUT 3 AUDIO PRESENT AT U5 PIN 1 AND CUE AUDIO PRESENT AT U5 PIN 7?
        - NO:
          1. ENSURE THE AUXILIARY 3 JUMPER ON MICROPHONE AND LINE INPUT MODULES IS PROPERLY INSTALLED.
          2. DEFECTIVE U5.
          3. REFER TO SYSTEM AND LINE OUTPUT AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING INFORMATION.
        - YES: IS LEFT CHANNEL PATCH POINT AUDIO PRESENT AT U6 PINS 1 AND 7?
          - NO: DEFECTIVE U6
          - YES: IS RIGHT CHANNEL PATCH POINT AUDIO PRESENT AT U7 PINS 1 AND 7?
            - NO: DEFECTIVE U7
            - YES: DEFECTIVE U10,U11,U12, OR U13.

FIGURE 2-1. SUMMING AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING

597-9012-145

CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO HEADPHONE OUTPUT	1. CHECK ±16.5 VOLT INDICATORS DS1 AND DS2. IF EXTINGUISHED, CHECK FUSES F6 AND F7 ON THE POWER SUPPLY MODULE . IF DIMLY ILLUMINATED, CHECK REGULATORS U1 AND U2 ON THE POWER SUPPLY. 2. CHECK POWER AMPLIFIERS U1 AND U2.
NO CUE AUDIO OUTPUT	1. CHECK ±16.5 VOLT INDICATORS DS1 AND DS2. IF EXTINGUISHED, CHECK FUSES F6 AND F7 ON THE POWER SUPPLY MODULE . IF DIMLY ILLUMINATED, CHECK REGULATORS U1 AND U2 ON THE POWER SUPPLY. 2. CHECK INTEGRATED CIRCUIT U3.
NO PROGRAM MONITOR AUDIO OUTPUT	1. CHECK ±16.5 VOLT REGULATORS U7 AND U8. 2. CHECK INTEGRATED CIRCUIT U4.
NO AUDITION MONITOR AUDIO OUTPUT	1. CHECK ±16.5 VOLT REGULATORS U7 AND U8. 2. CHECK INTEGRATED CIRCUIT U5.
NO CUE MONITOR AUDIO OUTPUT	1. CHECK ±16.5 VOLT REGULATORS U7 AND U8. 2. CHECK INTEGRATED CIRCUIT U6.
NO MONOPHONIC MONITOR AUDIO OUTPUT	1. CHECK ±16.5 VOLT REGULATORS U7 AND U8. 2. CHECK INTEGRATED CIRCUIT U6.

597-9012-146

FIGURE 2-2. CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING

2-12. COMPONENT REPLACEMENT.

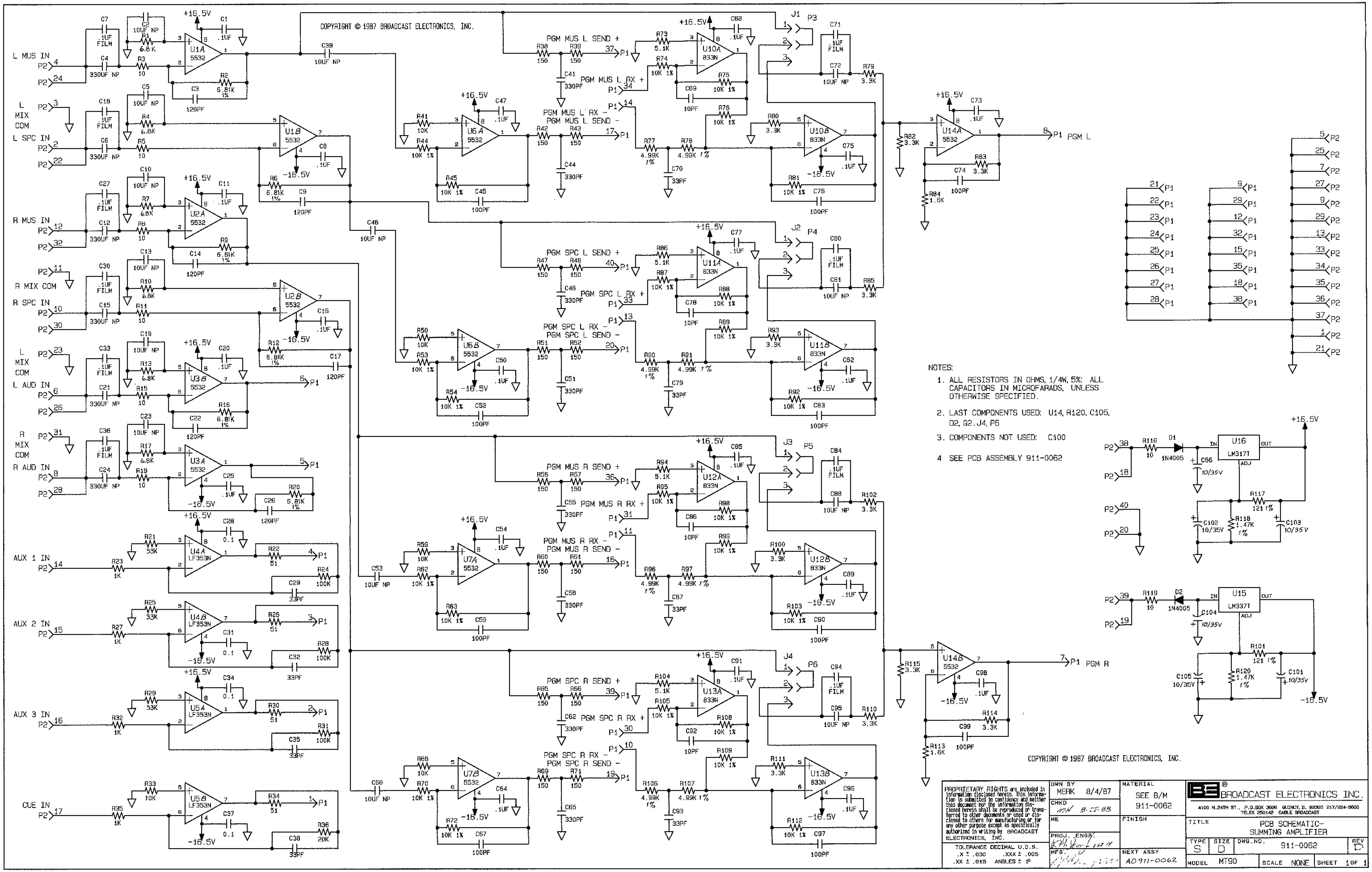
2-13. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

SECTION III

SUMMING AMPLIFIER CIRCUIT BOARD
CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD
DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the summing amplifier and cue speaker/headphone amplifier circuit board assemblies.



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%. ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: U14, R120, C105, D2, G2, J4, P6
3. COMPONENTS NOT USED: C100
4. SEE PCB ASSEMBLY 911-0062

TOLERANCE DECIMAL U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES ± 5°

DWN BY: MERK 8/4/87
CHKD: MH 8-12-88
PROJ. ENGR.
MFG.

MATERIAL: SEE B/M 911-0062
FINISH
NEXT ASSY: AD 911-0062

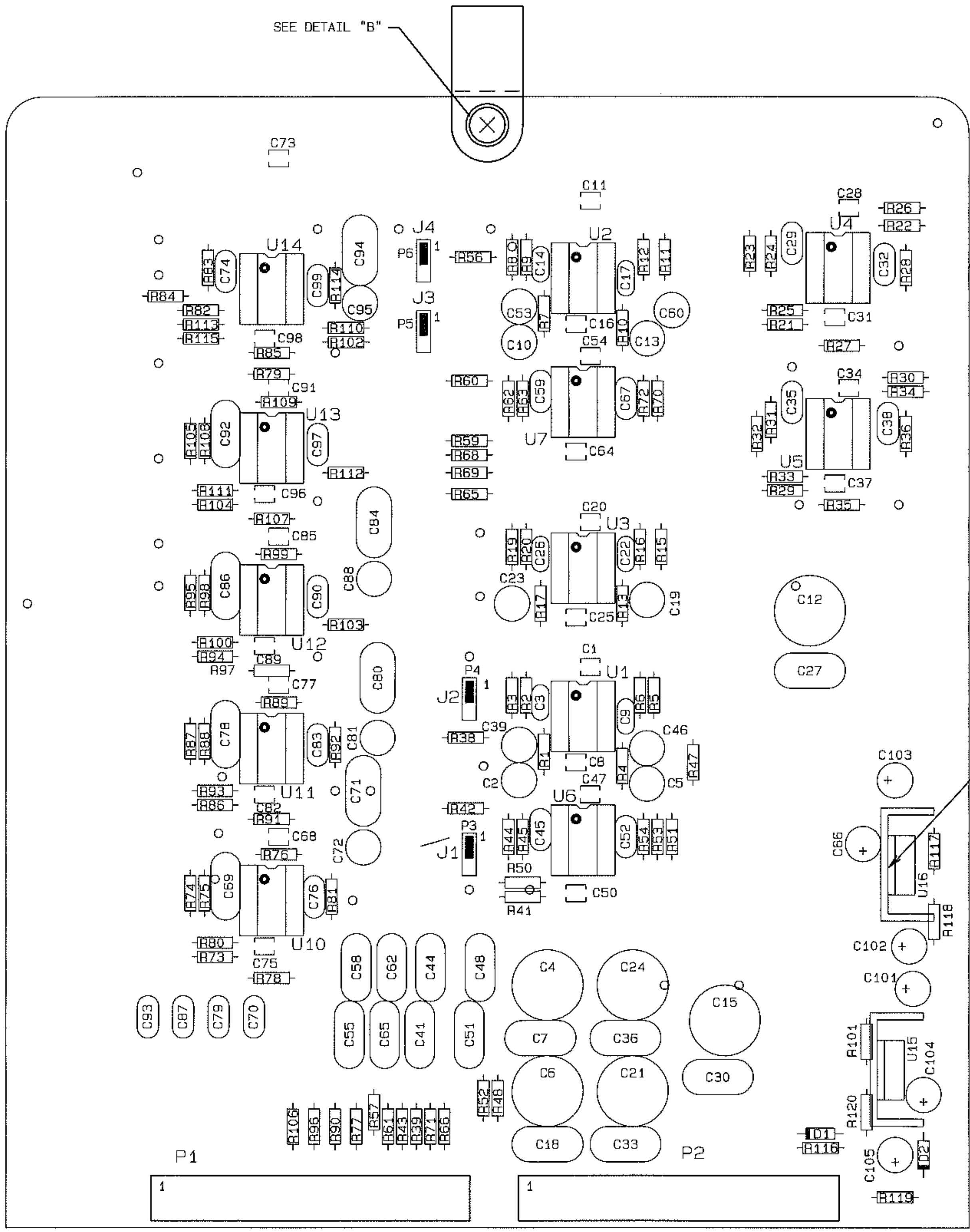
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST

TITLE: PCB SCHEMATIC-- SUMMING AMPLIFIER

TYPE	SIZE	DWG. NO.	REV
S	D	911-0062	D

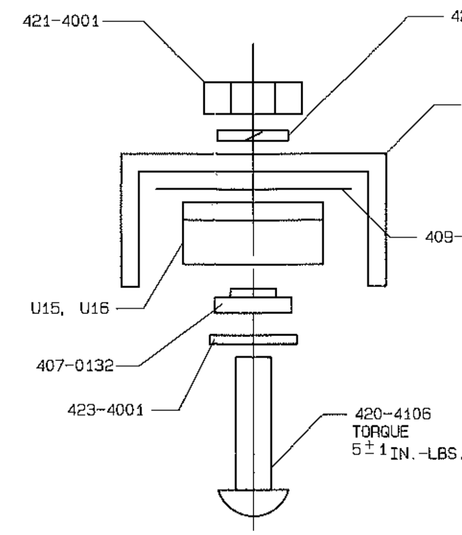
MODEL MT90 | SCALE NONE | SHEET 1 OF 1

SEE DETAIL "B"



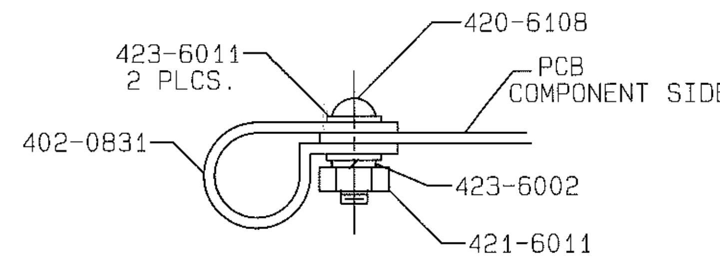
511-0062

SEE DETAIL "A"



DETAIL "A"

TYP. 2 PLCS. SCL. 1.5



DETAIL "B"

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

DWN BY GHD	2-23-87	MATERIAL SEE B/M 911-0062
CHKD MH	8-22-88	
ME	8/22/88	FINISH
PROJ. ENGR.		
MFG		NEXT ASSY 901-9012 "12CH" 901-9018 "18CH"

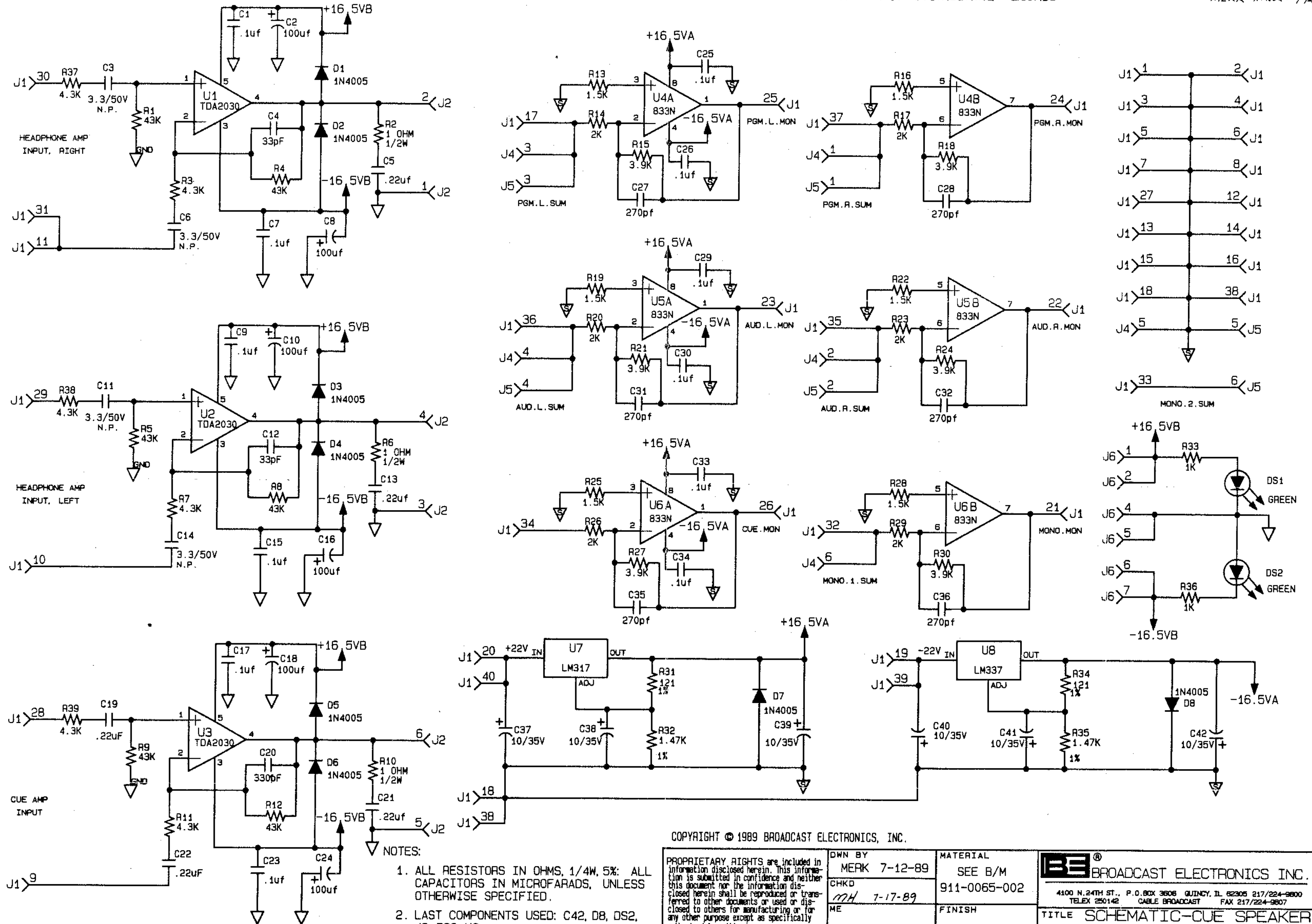
BROADCAST ELECTRONICS INC.
4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY- SUMMING AMPLIFIER

TYPE	SIZE	DWG. NO.	REV
A	D	911-0062	E

MODEL MT90 SCALE 2/1 SHEET 1 OF 1

REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-17-89	ENGINEERING RELEASE	MERK	RMD	7948



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%. ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: C42, D8, DS2, J6, R39, U8.
3. COMPONENTS NOT USED: J3
4. SEE PCB ASSEMBLY AC911-0065-002

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

DWN BY MERK 7-12-89
CHKD MH 7-17-89
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 911-0065-002
FINISH
NEXT ASSY AC911-0065-002

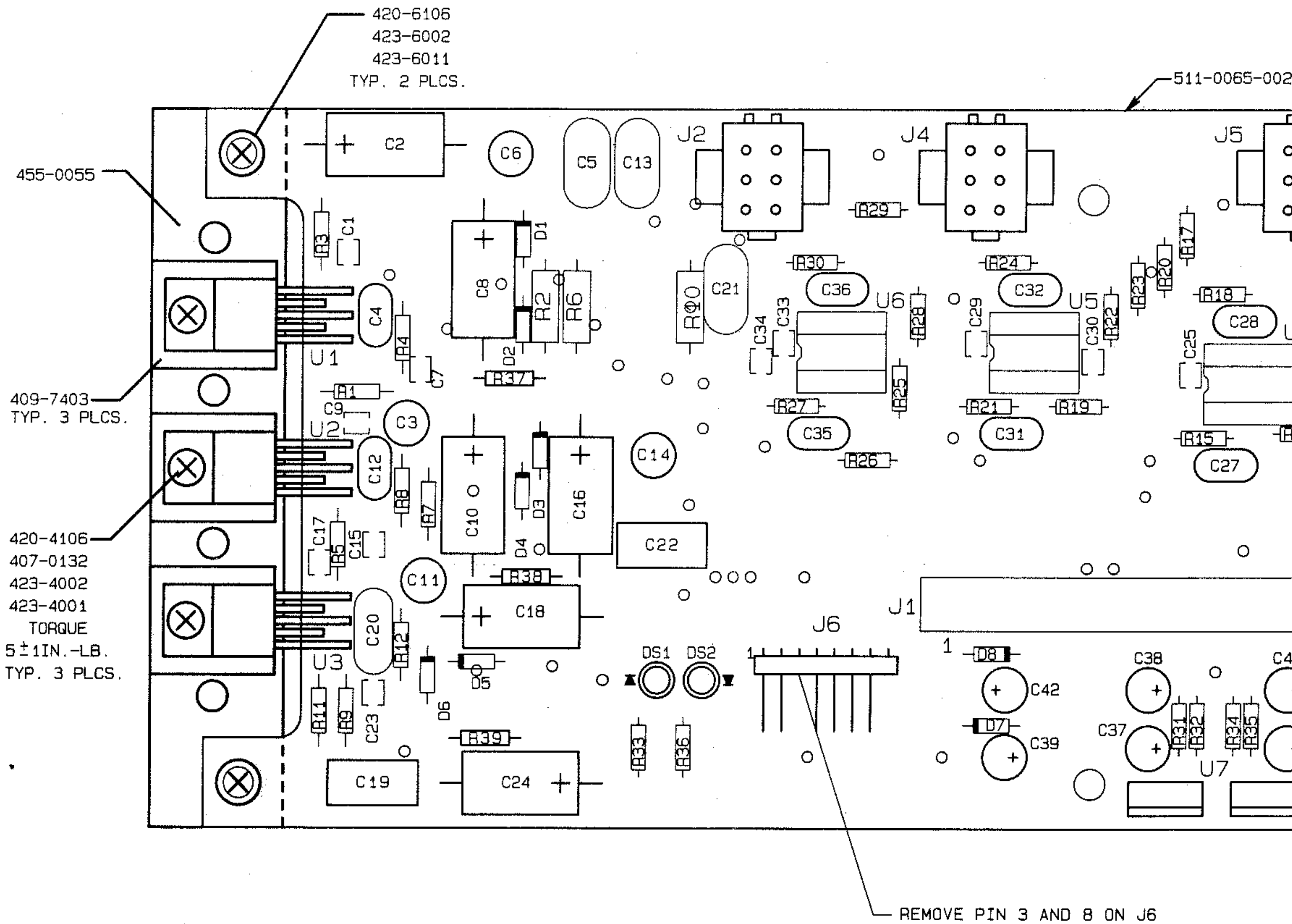
BROADCAST ELECTRONICS INC.
4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC-CUE SPEAKER /HEADPHONE AMPLIFIER

TYPE S | SIZE C | DWG.NO. 911-0065-002 | REV A

MODEL MT90 | SCALE NONE | SHEET 1 OF 1

REVISIONS					
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	7-17-89	ENGINEERING RELEASE	MERK	RH.J	7948



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

DWN BY	MERK 6-30-89
CHKD	MH 7-17-89
ME	
PROJ. ENGR.	
MFG.	
MATERIAL	SEE B/M 911-0065-002
FINISH	
NEXT ASSY	901-9012 *12CH* 901-9018 *18CH*

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 PCB ASSY-CUE SPEAKER /HEADPHONE AMPLIFIER

TYPE	SIZE	DWG.NO.	REV
A	C	911-0065-002	A

MODEL MT90 SCALE 2/1 SHEET 1 OF 1

SECTION IV

SUMMING AMPLIFIER CIRCUIT BOARD
CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD
PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the summing amplifier and cue speaker/headphone amplifier circuit boards. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. SUMMING AMPLIFIER AND CUE SPEAKER AMPLIFIER CIRCUIT BOARD PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	SUMMING AMPLIFIER CIRCUIT BOARD ASSEMBLY	911-0062	4-1
4-3	CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY	911-0065-002	4-4

TABLE 4-2. SUMMING AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0062
(Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C2	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C3	Capacitor, Mica, 120 pF ±5%, 500V	042-1222	1
C4	Capacitor, Electrolytic, 330 uF, 25V Non-Polarized	020-3385	1
C5	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C6	Capacitor, Electrolytic, 330 uF, 25V Non-Polarized	020-3385	1
C7	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C8	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C9	Capacitor, Mica, 120 pF ±5%, 500V	042-1222	1
C10	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C11	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C12	Capacitor, Electrolytic, 330 uF, 25V Non-Polarized	020-3385	1
C13	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C14	Capacitor, Mica, 120 pF ±5%, 500V	042-1222	1
C15	Capacitor, Electrolytic, 330 uF, 25V Non-Polarized	020-3385	1
C16	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C17	Capacitor, Mica, 120 pF ±5%, 500V	042-1222	1
C18	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C19	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C20	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C21	Capacitor, Electrolytic, 330 uF, 25V Non-Polarized	020-3385	1
C22	Capacitor, Mica, 120 pF ±5%, 500V	042-1222	1
C23	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C24	Capacitor, Electrolytic, 330 uF, 25V Non-Polarized	020-3385	1
C25	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C26	Capacitor, Mica, 120 pF ±5%, 500V	042-1222	1

TABLE 4-2. SUMMING AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0062
(Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C27	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C28	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C29	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C30	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C31	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C32	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C33	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C34	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C35	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C36	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C37	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C38	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C39	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C41,C44	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	2
C45	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C46	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C47	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C48	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C50	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C51	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C52	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C53	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C54	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C55,C58	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	2
C59	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C60	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C62	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C64	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C65	Capacitor, Mica, 330 pF ±5%, 500V	042-3322	1
C66	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C67	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C68	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C69	Capacitor, Micao 10 pF ±5%, 500V	042-1012	1
C70	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C71	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C72	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C73	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C74	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C75	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C76	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C77	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C78	Capacitor, Micao 10 pF ±5%, 500V	042-1012	1
C79	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C80	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C81	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C82	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C83	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C84	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C85	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C86	Capacitor, Micao 10 pF ±5%, 500V	042-1012	1
C87	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C88	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C89	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C90	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C91	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C92	Capacitor, Micao 10 pF ±5%, 500V	042-1012	1
C93	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C94	Capacitor, Mylar Film, 0.1 uF ±10%, 100V	030-1053	1
C95	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C96	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C97	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C98	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C99	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C101 THRU C105	Capacitor, Electrolytic, 10 uF, 35V	023-1076	5
D1,D2	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	2

TABLE 4-2. SUMMING AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0062
(Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
J1 THRU J4	Connector, Header, 3-Pin	417-0003	4
P1,P2	Receptacle, 40-Pin Dual In-line	417-4041	2
P3 THRU P6	Jumper, Programmable, 2-Pin	340-0004	4
R1	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R2	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	1
R3	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R4	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R5	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R6	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	1
R7	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R8	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R9	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	1
R10	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R11	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R12	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	1
R13	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R15	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R16	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	1
R17	Resistor, 6.8 k Ohm ±5%, 1/4W	100-6843	1
R19	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R20	Resistor, 6.81 k Ohm ±1%, 1/4W	103-6814	1
R21	Resistor, 33 k Ohm ±5%, 1/4W	100-3353	1
R22	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R23	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R24	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R25	Resistor, 33 k Ohm ±5%, 1/4W	100-3353	1
R26	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R27	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R28	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R29	Resistor, 33 k Ohm ±5%, 1/4W	100-3353	1
R30	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R31	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R32	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R33	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R34	Resistor, 51 Ohm ±5%, 1/4W	100-5123	1
R35	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R36	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R38,R39	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R41	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R42,R43	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R44,R45	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R47,R48	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R50	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R51,R52	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R53,R54	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R56,R57	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R59	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R60,R61	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R62,R63	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R65,R66	Resistor, 150 Ohm ±5%, 1/4W	100-1533	2
R68	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R69	Resistor, 150 Ohm ±5%, 1/4W	100-1533	1
R70	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R71	Resistor, 150 Ohm ±5%, 1/4W	100-1533	1
R72	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R73	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R74,R75,R76	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	3
R77,R78	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R79,R80	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	2
R81	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R82,R83	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	2
R84	Resistor, 1.6 k Ohm ±5%, 1/4W	100-1643	1
R85	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R86	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R87,R88,R89	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	3
R90,R91	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R92	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R93	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1

TABLE 4-2. SUMMING AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0062
(Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R94	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R95	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R96,R97	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R98,R99	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R100	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R101	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R102	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R103	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R104	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R105	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R106,R107	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R108,R109	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	2
R110,R111	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	2
R112	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R113	Resistor, 1.6 k Ohm ±5%, 1/4W	100-1643	1
R114,R115	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	2
R116	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R117	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R118	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R119	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R120	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
U1,U2,U3	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	3
U4,U5	Integrated Circuit, LF353N, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0353	2
U6,U7	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	2
U10 THRU U13	Integrated Circuit, LM833N, Dual Audio Operational Amplifier,	220-0833	4
U14	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	1
U15	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
U16	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
XU1 THRU XU7, XU10 THRU XU14	Socket, 8-Pin DIP	417-0804	12
----	Blank Summing Amplifier Circuit Board	511-0062	1

TABLE 4-3. CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0065-002
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Monolythic Ceramic, 0.1 uf ±20%, 50V	003-1054	1
C2	Capacitor, Electrolytic, 100 uF, 25V	013-1084	1
C3	Capacitor, Electrolytic, 3.3 uF, 50V	024-3364	1
C4	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C5	Capacitor, Mylar Film, 0.22 uF ±10%, 100V	030-2253	1
C6	Capacitor, Electrolytic, 3.3 uF, 50V	024-3364	1
C7	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	1
C8	Capacitor, Electrolytic, 100 uF, 25V	013-1084	1
C9	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	1
C10	Capacitor, Electrolytic, 100 uF, 25V	013-1084	1
C11	Capacitor, Electrolytic, 3.3 uF, 50V	024-3364	1
C12	Capacitor, Mica, 33 pF ±5%, 500V	042-3312	1
C13	Capacitor, Mylar Film, 0.22 uF ±10%, 100V	030-2253	1
C14	Capacitor, Electrolytic, 3.3 uF, 50V	024-3364	1
C15	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	1
C16	Capacitor, Electrolytic, 100 uF, 25V	013-1084	1
C17	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	1
C18	Capacitor, Electrolytic, 100 uF, 25V	013-1084	1

TABLE 4-3. CUE SPEAKER/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY - 911-0065
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C19	Capacitor, Electrolytic, 33 uF, 25V	020-3374	1
C20	Capacitor, Mica, 10 pF ±5%, 500V	042-1012	1
C21	Capacitor, Mylar Film, 0.22 uF ±10%, 100V	030-2253	1
C22	Capacitor, Electrolytic, 33 uF, 25V	020-3374	1
C23	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	1
C24	Capacitor, Electrolytic, 100 uF, 25V	013-1084	1
C25,C26	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	2
C27,C28	Capacitor, Mica, 270 pF ±5%, 300V	041-2722	2
C29,C30	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	2
C31,C32	Capacitor, Mica, 270 pF ±5%, 300V	041-2722	2
C33,C34	Capacitor, Monolythic Ceramic. 0.1 uF ±20%, 50V	003-1054	2
C35,C36	Capacitor, Mica, 270 pF ±5%, 300V	041-2722	2
C37 THRU C42	Capacitor, Electrolytic, 10 uF, 50V	023-1076	6
D1 THRU D8	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	8
DS1,DS2	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	2
J1	Connector, Header, 40-Pin	417-0173	1
J2,J4,J5	Receptacle, 6-Pin	417-0677	3
J6	Receptacle, Male, 8-Pin In-line, Right Angle	417-0080-001	1
R1	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R2	Resistor, 1 Ohm ±5%, 1/2W	110-1013	1
R3	Resistor, 2.2 k Ohm ±5%, 1/4W	100-2243	1
R4,R5	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	2
R6	Resistor, 1 Ohm ±5%, 1/2W	110-1013	1
R7	Resistor, 2.2 k Ohm ±5%, 1/4W	100-2243	1
R8,R9	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	2
R10	Resistor, 1 Ohm ±5%, 1/2W	110-1013	1
R11	Resistor, 2.2 k Ohm ±5%, 1/4W	100-22453	1
R12	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R13	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R14	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R15	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R16	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R17	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R18	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R19	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R20	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R21	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R22	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R23	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R24	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R25	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R26	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R27	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R28	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R29	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	1
R30	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R31	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R32	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R33	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R34	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R35	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	1
R36	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R37,R38,R39	Resistor, 2.2 k Ohm ±5%, 1/4W	100-2243	3
U1,U2,U3	Integrated Circuit, TDA2030V, Audio Power Amplifier, 14W Output, Pentawatt Package	220-2030	3
U4,U5,U6	Integrated Circuit, LM833N, Dual Audio Operational Amplifier, 8-Pin DIP	220-0833	3
U7	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U8	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XU4,XU5,XU6	Socket, 8-Pin DIP	417-0804	3
----	Blank Cue Speaker/Headphone Amplifier Circuit Board	511-0065	1

OUTPUT AMPLIFIER CIRCUIT BOARD

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LIST OF ILLUSTRATIONS

SECTION I

OUTPUT AMPLIFIER CIRCUIT BOARD THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console output amplifier circuit board. A detailed block diagram of the output amplifier circuitry is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. The text describes the output amplifier audio circuitry. The audio circuit left and right channels are identical, therefore only the left channel will be discussed.

1-4. FUNCTIONAL DESCRIPTION.

1-5. OUTPUT AMPLIFIER CIRCUIT.

1-6. Left channel audio is applied to a preamplifier stage consisting of operational amplifier U3B and left channel output level control R69. The stage is configured with a gain range of ±6 dB. The output from preamplifier U3B is applied to an output amplifier network consisting of integrated circuits U4A/B, U9, U10, and U12.

1-7. Audio from U3B is applied to the output amplifier network in an inverted and non-inverted format. Inverted audio from U3A is applied to an amplifier stage consisting of U4A and U9. Non-inverted audio from U3B is applied to a second amplifier stage consisting of U4B and U10. Together, U4A/U9 and U4B/U10 operate as a balanced output amplifier stage with a gain of one.

1-8. Amplifier U12 is designed as a monitoring stage. U12 monitors the output load for unbalanced audio output conditions. When the audio output load is balanced, the input of U12 is at virtual ground which isolates the stage from the circuit. When either the positive or negative output terminals are grounded, an audio signal will be applied to U12. U12 will output a signal to increase the gain of the remaining amplifier network. As a result, the network will output a normal signal into a balanced or unbalanced output condition.

1-9. METER OVERLOAD INDICATOR CIRCUIT.

1-10. Samples from the output amplifier network are applied to a meter indicator driver circuit consisting of comparator U6A. The samples are summed at diodes D5 and D6 and applied to the input of comparator U6A. When the sample level increases above approximately +28 dB, the output of comparator U6A will go HIGH. The HIGH is routed to the meter to illuminate the overload indicator.

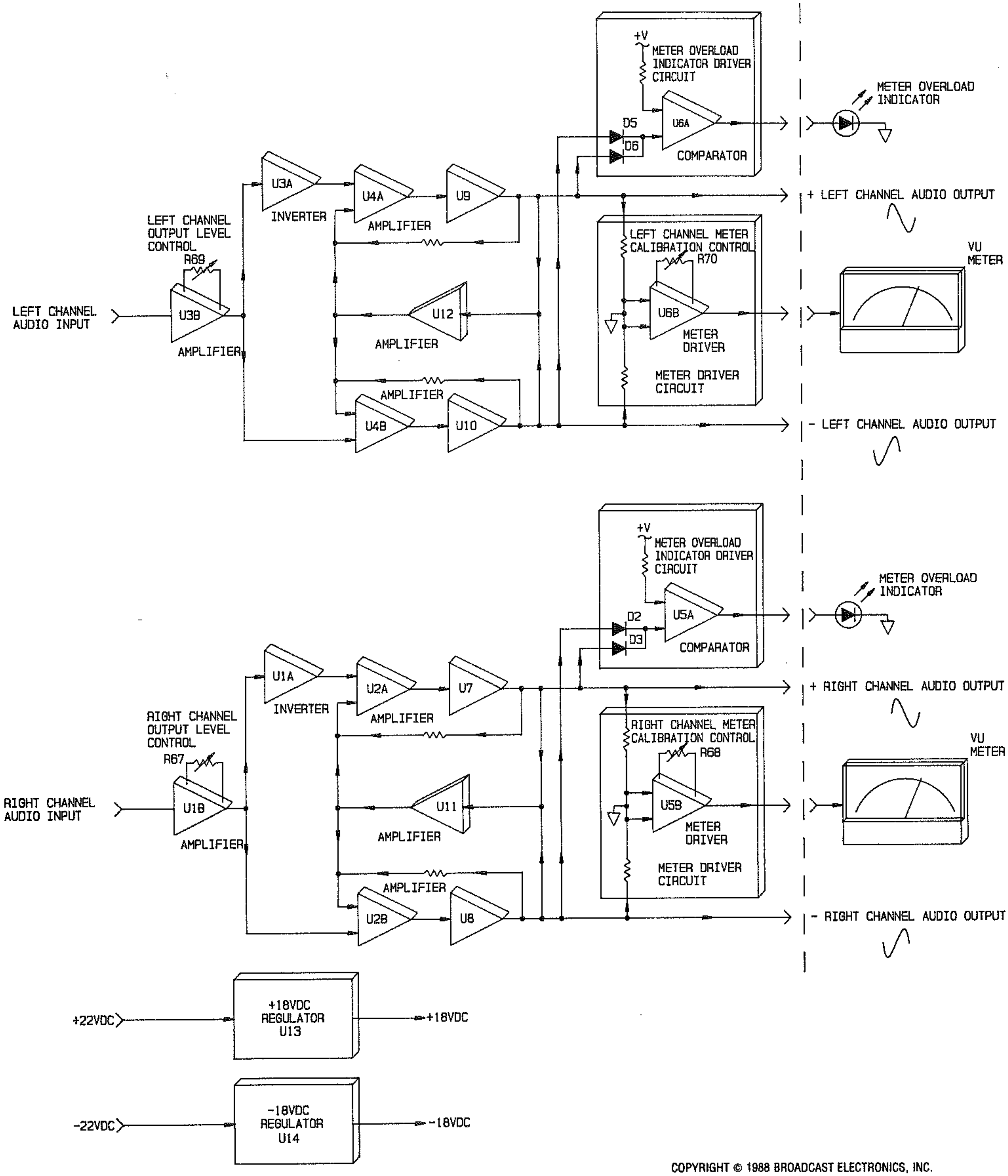

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FIGURE 1-1. OUTPUT AMPLIFIER CIRCUIT BOARD DETAILED BLOCK DIAGRAM

1-11. METER DRIVER CIRCUIT.

1-12. Samples from the output amplifier network are also applied to a meter driver circuit. The samples are differentially amplified at U6B. The output of U6B is routed to drive a console VU meter. Potentiometer R70 provides left channel meter calibration control.

1-13. POWER SUPPLY CIRCUIT.

1-14. DC operating potentials for application to the output amplifier circuit board components are produced by a regulator network. Unregulated ±24V dc supplies from the console power supply module are applied to +18 volt dc regulator U13 and -18 volt dc regulator U14. U13/U14 are three terminal adjustable regulators containing internal thermal and short-circuit current limiting features. The regulated ±18 volt outputs from U13 and U14 are routed for application to the circuit board audio components.

SECTION II

OUTPUT AMPLIFIER CIRCUIT BOARD MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the output amplifier circuit board.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The output amplifier circuit board should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of procedures required to restore an output amplifier module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting information, and component replacement procedures.

2-8. ELECTRICAL ADJUSTMENTS.

2-9. OUTPUT LEVEL/VU METER CALIBRATION. Left channel output level control R69 and left channel VU meter control R70 calibrate the left channel output level and VU meter parameters. Right channel output level control R67 and right channel VU meter control R68 calibrate the right channel output level and VU meter parameters. The output level and VU meters are calibrated as follows.

2-10. Required Equipment. The following test equipment is required to calibrate the output level and VU meter.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Audio Signal Generator (Potomac AG-51 or equivalent).

D. Audio Analyzer (Potomac AA-51 or equivalent).

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

2-11. Procedure. To calibrate the output level and VU meter, proceed as follows:

2-12. Remove a line input module from the console mainframe.

2-13. Connect the audio signal generator to the A or B left channel input on a line input module input/remote connector.

2-14. Refer to Figure 2-1 and install line input module jumpers J4 and J5 in the Ø dBu position. Replace the line input module.

2-15. Connect the audio analyzer between chassis ground and the left channel output pin on the connector for the output bus selected for calibration. Operate the analyzer for audio level indications.

2-16. Adjust the audio generator for a 1 kHz output at Ø dBu.

2-17. Operate the line input module fader to the Ø position and route the test audio to the output bus selected for calibration.

2-18. Refer to Figure 2-1 and adjust left channel output level control R69 until the analyzer indicates the desired output level.

2-19. Refer to Figure 2-1 and adjust left channel VU meter calibration control R70 until the selected output bus VU meter indicates Ø VU.

2-20. Repeat the procedure for the right channel. Connect the analyzer to the right channel output and calibrate the output level with right channel output level control R67. Calibrate the VU meter with right channel VU meter calibration control R68.

2-21. Disconnect all test equipment, reprogram jumpers J4 and J5 on the line input module if required, and replace the line input module.

2-22. TROUBLESHOOTING.

2-23. The troubleshooting philosophy for the output amplifier circuit board assembly consists of isolating a problem to a specific circuit or group of components. Two 40-pin and one 50-pin extender ribbon cable assemblies are provided to interface plug-in modular assemblies to the chassis mounted motherboards for troubleshooting procedures.

2-24. Figure 2-2 presents the output amplifier circuit board troubleshooting information. Refer to Figure 2-2 to isolate a failure to a specific group of components.

2-25. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-26. COMPONENT REPLACEMENT.

2-27. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

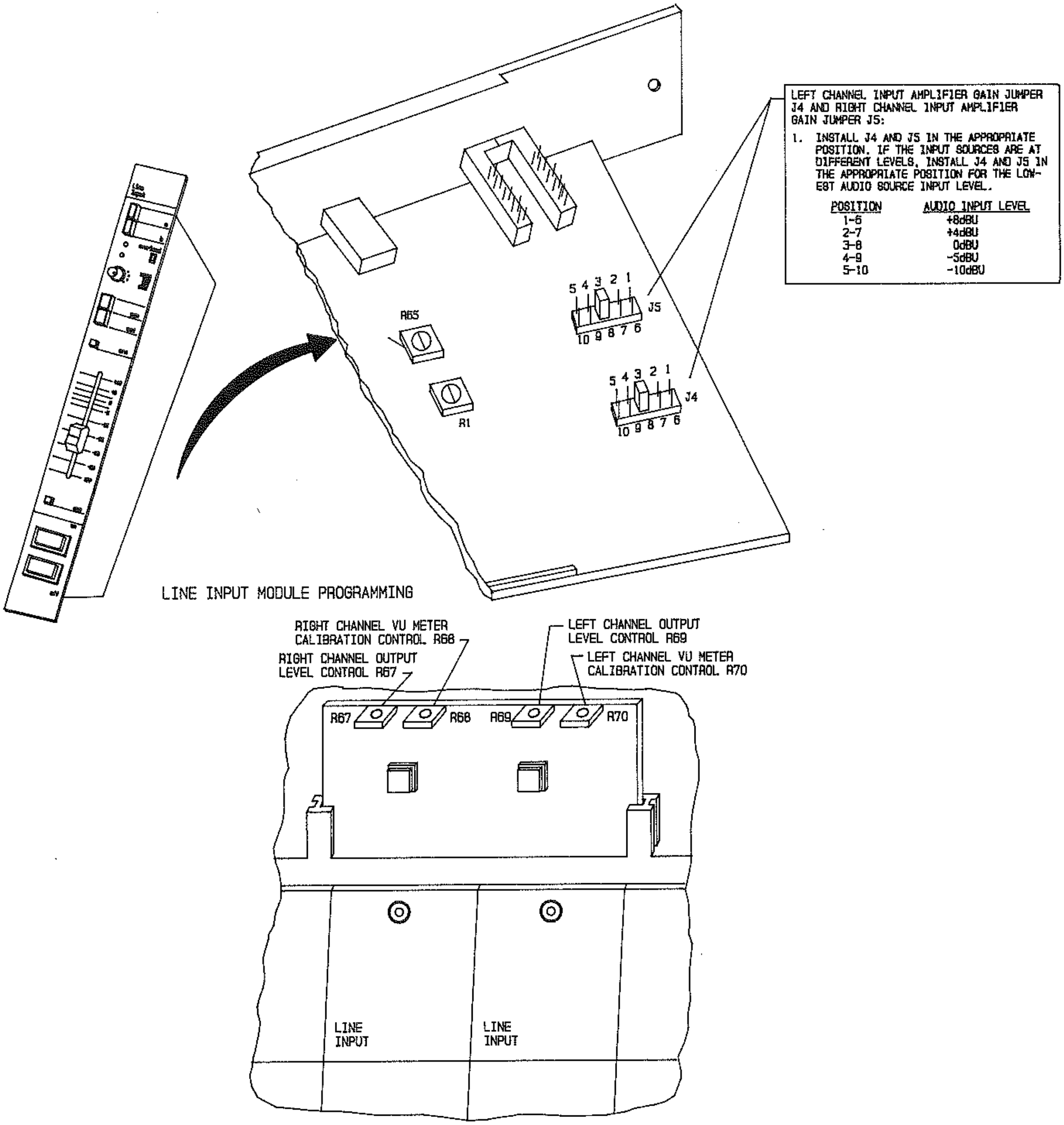

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FIGURE 2-1. LINE OUTPUT AMPLIFIER CONTROLS AND INDICATORS

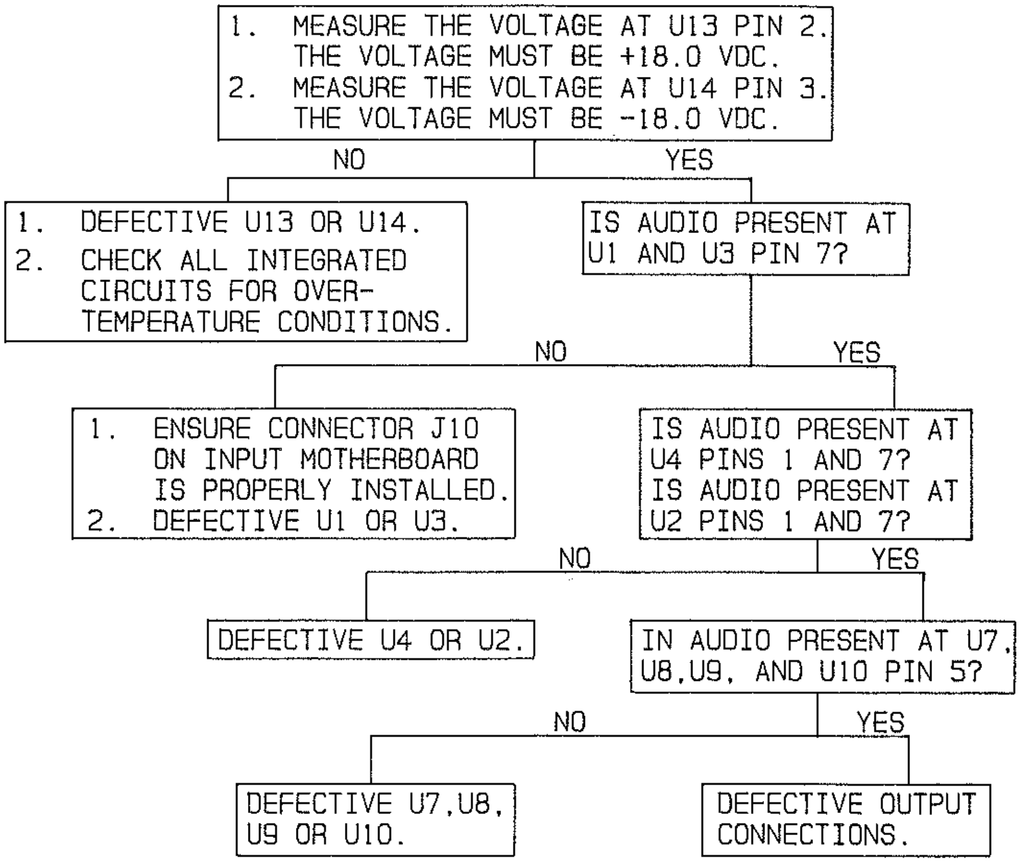
LINE OUTPUT AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO AUDIO OUTPUT	

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FIGURE 2-2. LINE OUTPUT AMPLIFIER CIRCUIT BOARD TROUBLESHOOTING

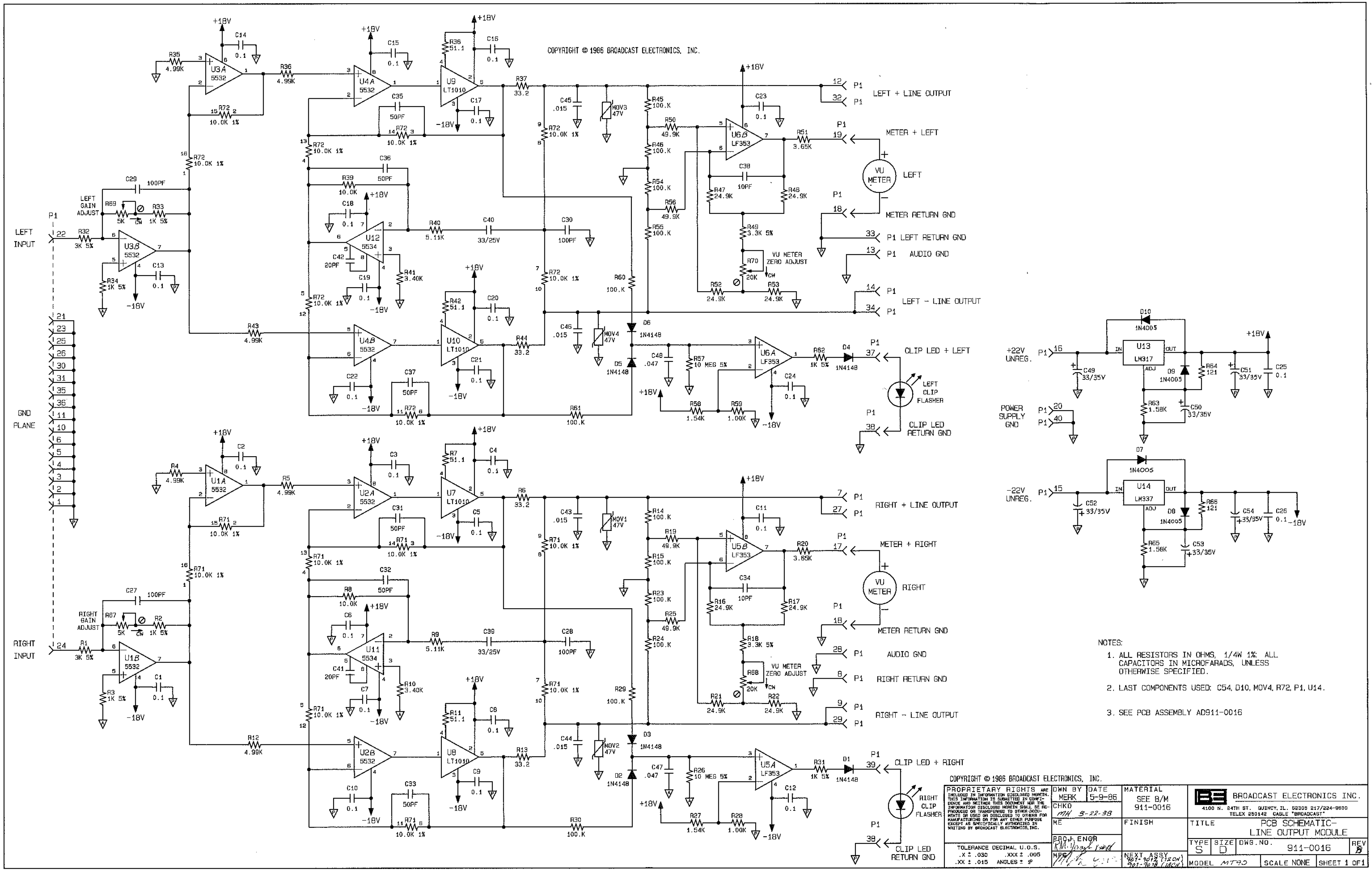
SECTION III

OUTPUT AMPLIFIER CIRCUIT BOARD DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the output amplifier circuit board.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, OUTPUT AMPLIFIER CIRCUIT BOARD	SD911-0016
3-2	ASSEMBLY DIAGRAM, OUTPUT AMPLIFIER CIRCUIT BOARD	AC911-0016



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LEFT INPUT
RIGHT INPUT
GND PLANE
LEFT GAIN ADJUST
RIGHT GAIN ADJUST
LEFT + LINE OUTPUT
LEFT - LINE OUTPUT
METER + LEFT
METER RETURN GND
P1 LEFT RETURN GND
P1 AUDIO GND
VU METER
LEFT
RIGHT
VU METER ZERO ADJUST
CLIP LED + LEFT
LEFT CLIP FLASHER
CLIP LED RETURN GND
RIGHT + LINE OUTPUT
RIGHT - LINE OUTPUT
METER + RIGHT
AUDIO GND
RIGHT RETURN GND
CLIP LED + RIGHT
RIGHT CLIP FLASHER
+22V UNREG.
-22V UNREG.
POWER SUPPLY GND
NOTES:
1. ALL RESISTORS IN OHMS, 1/4W 1%. ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: C54, D10, MOV4, R72, P1, U14.
3. SEE PCB ASSEMBLY AD911-0016
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TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°
DWN BY MERK
DATE 5-9-86
CHKD
ME
PROJ. ENGR
MFG
MATERIAL SEE B/M 911-0016
FINISH
NEXT ASSY
BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. QUINCY, IL. 62305 217/224-9600 TELEX 250142 CABLE "BROADCAST"
TITLE PCB SCHEMATIC- LINE OUTPUT MODULE
TYPE S
SIZE D
DWG. NO. 911-0016
REV B
MODEL MT-90
SCALE NONE
SHEET 1 OF 1

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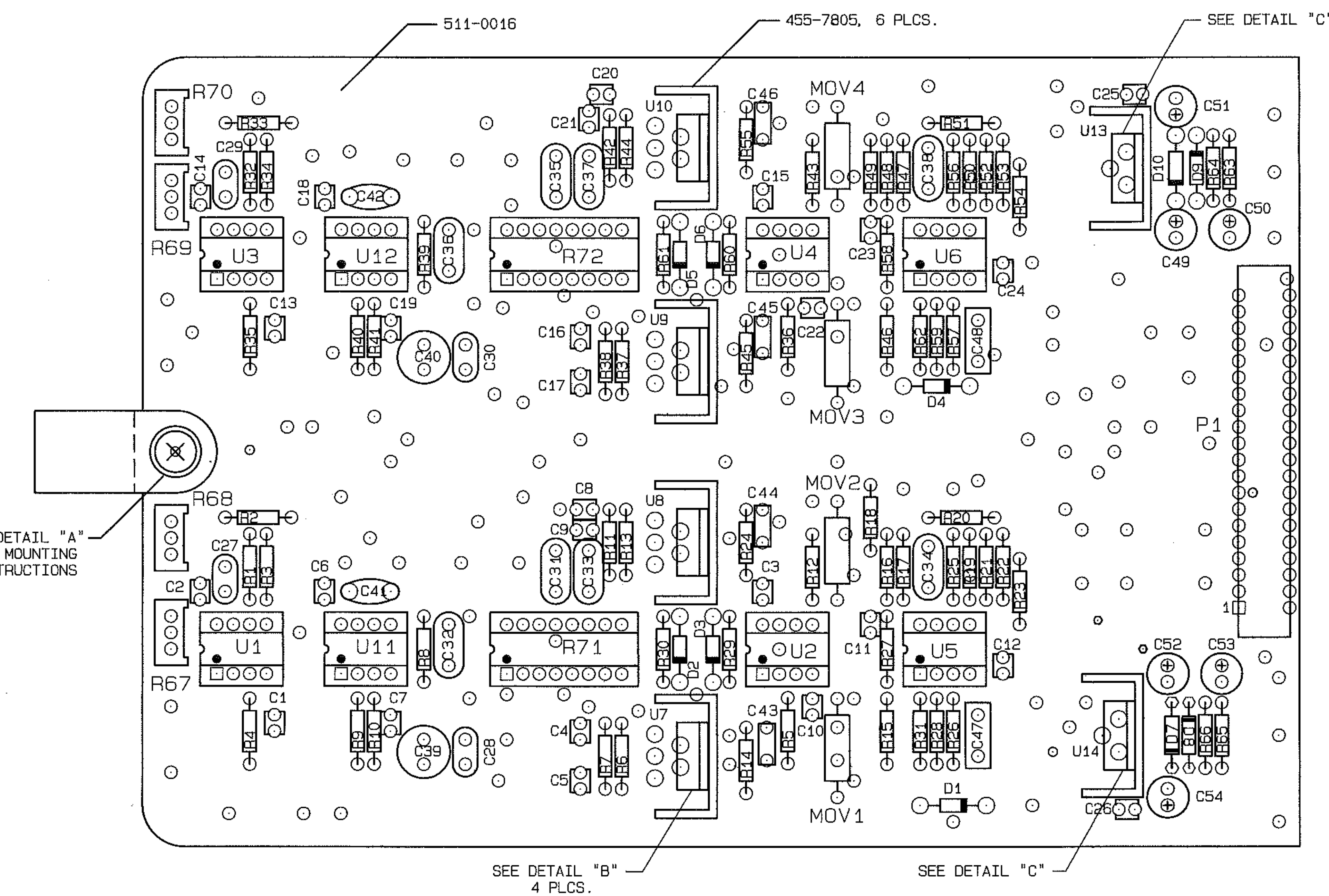
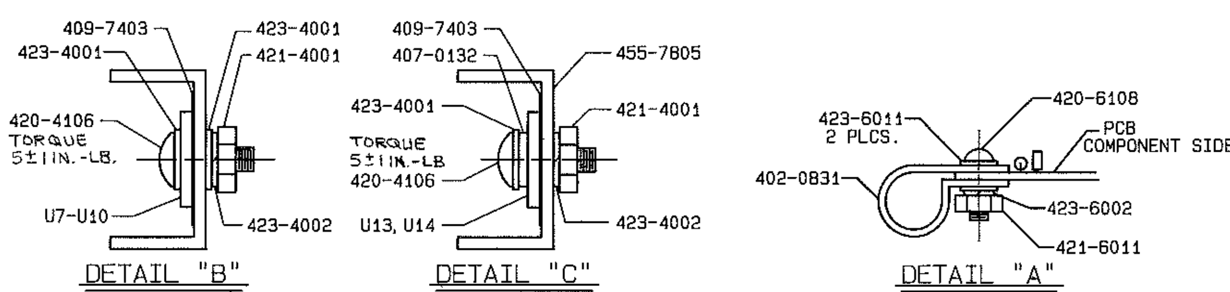


NOTE:
1. SEE SCHEMATIC SD911-0016.



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

DWN BY	MERK	6-17-86
CHKD	MH	8-24-88
ME		5/25/93
PROJ. ENGR		
MFG		

MATERIAL: SEE B/M 911-0016

FINISH

NEXT ASSY: 901-9012 (12 CH) 901-9018 (18 CH)

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

TITLE: PCB ASSEMBLY- LINE OUTPUT MODULE

TYPE	SIZE	DWG.NO.	REV
A	C	911-0016	B

MODEL MT90 | SCALE 2/1 | SHEET 1 OF 1

SECTION IV

FSK DECODER MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the FSK decoder module. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. FSK DECODER MODULE PARTS LIST INDEX.

TABLE	TITLE	PART NO.	PAGE
4-2	FSK DECODER MODULE CIRCUIT BOARD ASSEMBLY	951-0020	4-1
4-3	FSK DECODER CABLE ASSEMBLY	941-0023	4-2

TABLE 4-2. FSK DECODER MODULE CIRCUIT BOARD ASSEMBLY - 951-0020
(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, Polycarbonate, 0.01 uF ±2%, 100V	037-1043	2
C5,C6	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C7,C8	Capacitor, Polycarbonate, 0.01 uF ±2%, 100V	037-1043	2
C9	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030-1033	1
C10	Capacitor, Mylar Film, 0.022 uF ±10%, 200V	031-2243	1
C11	Capacitor, Mylar Film, 0.047 uF ±10%, 100V	030-4743	1
C12,C13,C14	Capacitor, Mylar Film, 0.022 uF ±10%, 200V	031-2243	3
C15,C16,C17	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C18 THRU C25	Capacitor, Electrolytic, 10 uF, 50V	023-1076	8
C26	Capacitor, Ceramic, 0.001 uF ±10%, 200V	030-1033	1
D1 THRU D4	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	4
D5 THRU D8	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	4
DS1	LED, Green, CMD54124A, 3V @ 20 mA Maximum	323-2124	1
DS2	LED, Yellow, CMD53124A, 3V @ 20 mA Maximum	323-3124	1
J1	Connector, Male, 4-Pin	418-0255	1
J2	Receptacle, 6-Pin	417-0677	1
P2	Connector Housing, 6-Pin	418-0670	1
Q1,Q2	Transistor, 2N3904, NPN, Silicon, TO-92 Case	211-3904	2
R1	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
R2	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R3	Potentiometer, 50 k Ohm ±10%, 1/2W	177-5054	1
R4	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
R5,R6	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	2
R7,R8	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	2
R9	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R10	Resistor, 249 Ohm ±1%, 1/4W	103-2493	1
R11	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R12	Resistor, 95.3 k Ohm ±1%, 1/4W	103-9535	1
R13	Resistor, 24.3 k Ohm ±1%, 1/4W	103-2435	1

TABLE 4-2. FSK DECODER MODULE CIRCUIT BOARD ASSEMBLY - 951-0020
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R14	Resistor, 221 Ohm ±1%, 1/4W	103-2213	1
R15	Resistor, 82 k Ohm ±5%, 1/4W	100-8253	1
R16	Resistor, 82.5 k Ohm ±1%, 1/4W	103-8255	1
R17,R18	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R19	Resistor, 1.8 k Ohm ±5%, 1/4W	100-1843	1
R20	Potentiometer, 5 k Ohm ±10%, 1/2W	177-5044	1
R21	Resistor, 1.8 k Ohm ±5%, 1/4W	100-1843	1
R22	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R23	Resistor, 33 k Ohm ±5%, 1/4W	100-3353	1
R24	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R25	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R26	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R27	Resistor, 470 Ohm ±5%, 1/2W	110-4733	1
R28,R29	Resistor, 3.6 k Ohm ±5%, 1/4W	100-3643	2
R30	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R31,R32	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R33	Resistor, 30 k Ohm ±5%, 1/4W	100-3053	1
R34	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R35	Resistor, 390 k Ohm ±5%, 1/4W	100-3963	1
R36	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R37	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R38	Resistor, 1.6 k Ohm ±5%, 1/4W	100-1643	1
R39	Resistor, 470 Ohm ±5%, 1/2W	110-4733	1
R40	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R41	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R42	Resistor, 1.05 k Ohm ±1%, 1/4W	103-1054	1
R43	Resistor, 121 Ohm ±5%, 1/4W	100-1231	1
R44	Resistor, 10 Ohm ±5%, 1/4W	100-1024	1
R45	Resistor, 1.05 k Ohm ±1%, 1/4W	103-1054	1
R46	Resistor, 121 Ohm ±5%, 1/4W	100-1231	1
R47	Resistor, 26.7 k Ohm ±1%, 1/4W	103-2675	1
R48	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
U1	Integrated Circuit, RC741DN, Operational Amplifier, 8-Pin DIP	221-7410	1
U2	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8-Pin DIP	221-5532-001	1
U3	Integrated Circuit, NE565N, Phase-locked Loop Linear, 14-Pin DIP	229-0565	1
U4	Integrated Circuit, NE5532AP, Dual Low Noise Operational Amplifier, 8-Pin DIP	221-5532-001	1
U5	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U6	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XU1,XU2	Socket, 8-Pin DIP	417-0804	2
XU3	Socket, 14-Pin DIP	417-1404	1
XU4	Socket, 8-Pin DIP	417-0804	1
----	Pins, Connector	417-0053	9
----	Overlay, FSK Decoder Module	595-0089	1
----	FSK Decoder Cable Assembly	941-0023	1
----	Blank FSK Decoder Module Circuit Board	511-0120	1

TABLE 4-3. FSK DECODER CABLE ASSEMBLY - 941-0023

REF. DES.	DESCRIPTION	PART NO.	QTY.
P1	Plug, Housing, 4-Pin	418-0240	1
----	Pins, Connector	417-0053	4

SECTION IV

OUTPUT AMPLIFIER CIRCUIT BOARD PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the output amplifier circuit board. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. OUTPUT AMPLIFIER CIRCUIT BOARD PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	LINE OUTPUT MODULE CIRCUIT BOARD ASSEMBLY	911-0016	4-1

TABLE 4-2. LINE OUTPUT MODULE ASSEMBLY - 911-0016
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C26	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	26
C27 THRU C30	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	4
C31,C32,C33	Capacitor, Mica, 50 pF ±5%, 500V	040-5013	3
C34	Capacitor, Ceramic Disc, 10 pF ±10%, 1kV, Non-Polarized	001-1014	1
C35,C36,C37	Capacitor, Mica, 50 pF ±5%, 500V	040-5013	3
C38	Capacitor, Ceramic Disc, 10 pF ±10%, 1kV, Non-Polarized	001-1014	1
C39,C40	Capacitor, Monolythic Ceramic, 33 uF ±20%, 25V, Non-Polarized	020-3374	2
C41,C42	Capacitor, Ceramic Disc, 20 pF ±10%, 1 kV	002-2013	2
C43 THRU C46	Capacitor, Polycarbonate, 0.015 uF ±10%, 100V	030-1532	4
C47,C48	Capacitor, Mylar Film, 0.047 uF ±10%, 100V	030-4743	2
C49 THRU C54	Capacitor, Electrolytic, 33 uF, 35V	024-3335	6
D1 THRU D6	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	6
D7 THRU D10	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	4
MOV1 THRU MOV4	Metal Oxide Varistor, V47MA2A, 27V ac RMS, 0.19 Joules	140-0017	4
P1	Receptacle, 40-Pin Dual In-line	417-4041	1
R1	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R2,R3	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R4,R5	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R6	Resistor, 33.2 Ohm ±1%, 1/4W	103-3322	1
R7	Resistor, 51.1 Ohm ±1%, 1/4W	103-5112	1
R8	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R9	Resistor, 5.11 k Ohm ±1%, 1/4W	103-5141	1
R10	Resistor, 3.40 k Ohm ±1%, 1/4W	103-3404	1
R11	Resistor, 51.1 Ohm ±1%, 1/4W	103-5112	1
R12	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1
R13	Resistor, 33.2 Ohm ±1%, 1/4W	103-3322	1
R14,R15	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R16,R17	Resistor, 24.9 k Ohm ±1%, 1/4W	103-2495	2
R18	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1

TABLE 4-2. LINE OUTPUT MODULE ASSEMBLY - 911-0016
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R19	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R20	Resistor, 3.65 k Ohm ±1%, 1/4W	103-3641	1
R21,R22	Resistor, 24.9 k Ohm ±1%, 1/4W	103-2495	2
R23,R24	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R25	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R26	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R27	Resistor, 1.54 k Ohm ±1%, 1/4W	103-1544	1
R28	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R29,R30	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R31	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R32	Resistor, 3 k Ohm ±5%, 1/4W	100-3043	1
R33,R34	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R35,R36	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	2
R37	Resistor, 33.2 Ohm ±1%, 1/4W	103-3322	1
R38	Resistor, 51.1 Ohm ±1%, 1/4W	103-5112	1
R39	Resistor, 10 k Ohm ±1%, 1/4W	100-1051	1
R40	Resistor, 5.11 k Ohm ±1%, 1/4W	103-5141	1
R41	Resistor, 3.40 k Ohm ±1%, 1/4W	103-3404	1
R42	Resistor, 51.1 Ohm ±1%, 1/4W	103-5112	1
R43	Resistor, 4.99 k Ohm ±1%, 1/4W	100-5041	1
R44	Resistor, 33.2 Ohm ±1%, 1/4W	103-3322	1
R45,R46	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R47,R48	Resistor, 24.9 k Ohm ±1%, 1/4W	103-2495	2
R49	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R50	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R51	Resistor, 3.65 k Ohm ±1%, 1/4W	103-3641	1
R52,R53	Resistor, 24.9 k Ohm ±1%, 1/4W	103-2495	2
R54,R55	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R56	Resistor, 49.9 k Ohm ±1%, 1/4W	103-4951	1
R57	Resistor, 10 Meg Ohm ±5%, 1/4W	100-1083	1
R58	Resistor, 1.54 k Ohm ±1%, 1/4W	103-1544	1
R59	Resistor, 1 k Ohm ±1%, 1/4W	103-1041	1
R60,R61	Resistor, 100 k Ohm ±1%, 1/4W	103-1062	2
R62	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R63	Resistor, 1.58 k Ohm ±1%, 1/4W	103-1584	1
R64	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R65	Resistor, 1.58 k Ohm ±1%, 1/4W	103-1584	1
R66	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R67	Potentiometer, 5 k Ohm ±10%, 1/2W	178-5044	1
R68	Potentiometer, 20 k Ohm ±10%, 1/2W	178-2054	1
R69	Potentiometer, 5 k Ohm ±10%, 1/2W	178-5044	1
R70	Potentiometer, 20 k Ohm ±10%, 1/2W	178-2054	1
R71,R72	Resistor Network, 10-10 k Ohm 0.5% Resistor, 0.7W Total Dissipation, 16-Pin DIP	226-0392	2
U1 THRU U4	Integrated Circuit, NE5532AP, Dual Low-Noise Operational Amplifier, 8-Pin DIP	221-5532-001	4
U5,U6	Integrated Circuit, LF353N, Dual JFET-Input Operational Amplifier, 8-Pin DIP	221-0353	2
U7 THRU U10	Integrated Circuit, LT1010CT, Power Buffer Amplifier, Continuous Output Current ±150 mA, Continuous Power 4W, TO-220 Case	220-1010	4
U11,U12	Integrated Circuit, NE5534AN, Low-Noise Operational Amplifier, 8-Pin DIP	221-5534	2
U13	Integrated Circuit, LM317KC, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0317	1
U14	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-220 Case	227-0337	1
XR71,XR72	Socket, 16-Pin DIP	417-1604	2
XU1 THRU XU6, XU11, XU12	Socket, 8-Pin DIP	417-0804	8
----	Blank Line Output Module Circuit Board	511-0016	1

POWER SUPPLY MODULE
AUTOMATIC POWER SUPPLY SWITCH PANEL

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LIST OF TABLES

LIST OF ILLUSTRATIONS

SECTION I

POWER SUPPLY MODULE
AUTOMATIC POWER SUPPLY SWITCH PANEL
THEORY OF OPERATION

1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Irak 90 series audio console power supply module and automatic power supply switch panel.

1-3. POWER SUPPLY MODULE FUNCTIONAL DESCRIPTION.

1-4. The following text provides a functional description of the power supply module. Figure 1-1 presents a detailed block diagram of the power supply module circuitry. Refer to Figure 1-1 as required for the following circuit description.

1-5. GENERAL.

1-6. The console power supply consists of a self-contained modular assembly external to the console mainframe. The module contains ac power transformation and dc rectification circuitry for the generation of all console operating potentials. The potentials are routed through a power supply cable to the console mainframe for distribution to the individual mainframe modules by the motherboard network.

1-/. AC INPUT CIRCUIT.

1-8. Primary ac power is applied to the module through the ac input receptacle. The ac input receptacle is equipped with built-in overload component fuse F5 and ac control component switch S1. Power from the receptacle is routed to terminal strip TB1. TB1 consists of a programming network for the configuration of the module for 117 volt or 234 volt ac input operation. AC power transformation is provided by transformer T1. T1 is equipped with three primary windings and two secondary windings. One primary winding and the two secondary windings produce low-voltage ac potentials for application to the rectifier and regulator networks.

1-9. RECTIFIER NETWORKS.

1-10. The ac potential from secondary 1 of power transformer T1 is full-wave rectified by bridge rectifier D2 and filtered by capacitors C2 and C3 into two ±24 volt dc supplies. The +24 volt potentials are protected from overload conditions by fuses F7 and F2. The -24 volt potentials are protected from overload conditions by fuses F1 and F6. The ±24 volt supplies are routed from the rectifier network to a power supply circuit board for regulation and distribution.

1-11. The ac potential from secondary 2 of power transformer T1 is full-wave rectified by bridge rectifier D1 and filtered by capacitor C1 into a +21 volt dc supply. The supply is protected from overload conditions by fuse F3 and routed to a power supply circuit board for regulation.

1-12. POWER SUPPLY CIRCUIT BOARD.

1-13. The power supply circuit board contains support circuitry for: 1) an audio regulator network and 2) a logic regulator network. The circuit board also contains components for a phantom power supply rectifier and regulator network.

1-14. AUDIO REGULATOR CIRCUIT. ±24 volt supplies from the rectifier circuit are applied to a regulator circuit which produces operating potentials for the console audio circuitry. The +24 volt supply from fuse F7 is applied to +16.5 volt regulator U1. Capacitors C6 and C8 provide filtering for the supply. The output of U1 is routed for application to the cue/headphone amplifier circuit board. The second +24 volt supply from fuse F2 is routed through the power supply circuit board to provide an unregulated dc potential for application to the audio circuitry on the console modular assemblies.

1-15. The -24 volt supply from fuse F6 is applied to -16.5 volt regulator U2. Capacitors C9 and C11 provide filtering for the supply. The output of U2 is routed for application to the cue headphone amplifier circuit board. The second -24 supply from F1 is routed through the power supply circuit board to provide an unregulated dc potential for application to the audio circuitry on the console modular assemblies.

1-16. Regulators U1 and U2 are three-terminal adjustable devices containing internal thermal-overload and short-circuit current limiting features. Additional protection for the regulators is provided by diodes D7 through D10. Diodes D9 and D10 provide protection from reverse polarity potentials applied to the outputs. Diodes D7 and D8 provide protection from a short circuit applied to the input.

1-17. LOGIC REGULATOR CIRCUIT. The +21 volt potential from fuse F3 is applied to +12.5 volt regulator U2. The output of U2 is applied to a pass transistor network consisting Q1 and Q2. Capacitor C4 provides filtering for the supply. The +12 volt output of the pass transistor network is routed for application to the logic circuitry on the console modular assemblies.

1-18. PHANTOM CIRCUIT. An ac potential from the primary of power transformer T1 is applied to a phantom power supply rectifier and regulator network. The supply is protected from overload conditions by fuse F4.

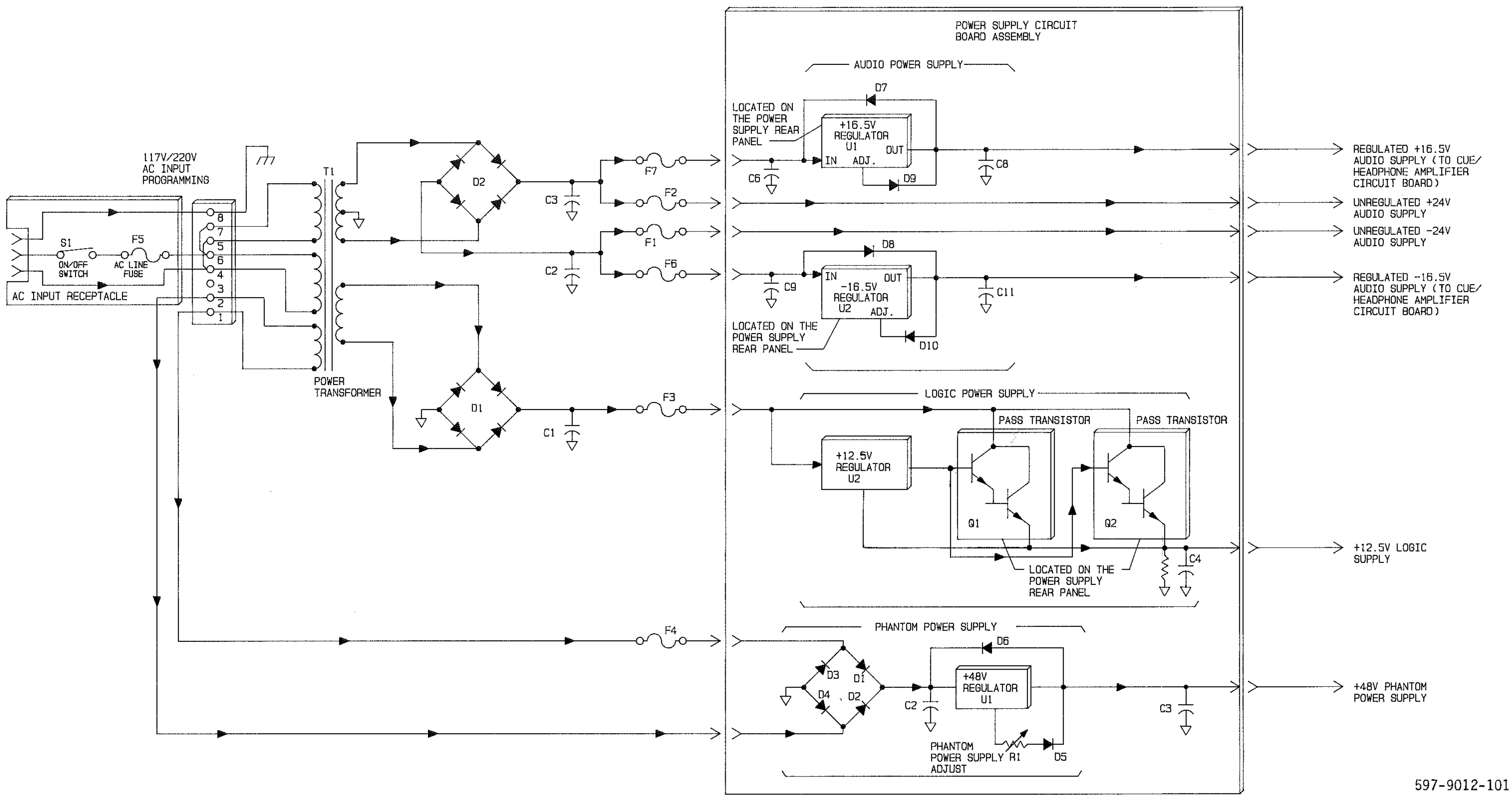


FIGURE 1-1.
POWER SUPPLY MODULE DETAILED BLOCK DIAGRAM

1-19. The ac potential is full-wave rectified by diodes D1 through D4 and filtered by capacitor C2 into a +59 volt dc supply. The +59 volt supply is applied to +48 volt regulator U1. Capacitor C3 provides filtering for the supply. The +48 volt output is routed to the console mainframe for phantom powering of condenser type microphones. Potentiometer R1 provides adjustment of the phantom power supply level from +15V to +48V dc.

1-20. Regulator U1 is a three-terminal adjustable device containing internal thermal-overload and short-circuit current limiting features. Additional protection for the regulator is provided by diodes D5 and D6. Diode D5 provides protection from reverse polarity potentials applied to the output. Diode D6 provides protection from a short circuit applied to the input.

1-21. AUTOMATIC POWER SUPPLY SWITCH PANEL FUNCTIONAL DESCRIPTION.

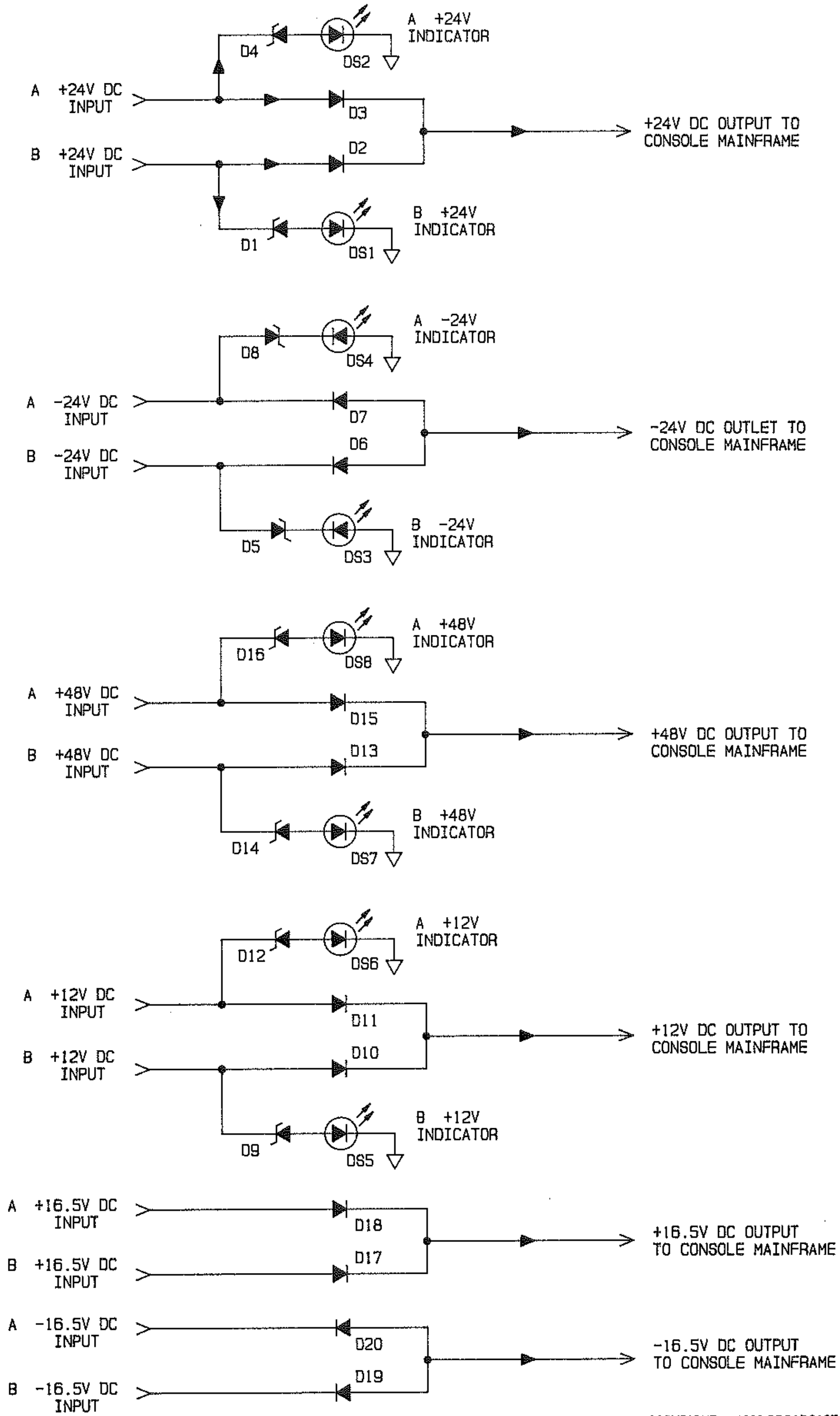
1-22. The following text provides a functional description of the automatic power supply switch panel. Figure 1-2 presents a detailed block diagram of the automatic power supply switch panel circuitry. Refer to Figure 1-2 as required for the following circuit description.

1-23. GENERAL.

1-24. The automatic power supply switch panel controls the application of dc operating potentials to the console in a main/alternate power supply configuration. The switch panel consists of individual diode combining networks for the: 1) ±24 volt supplies, 2) +48 volt supply, 3) +12 volt supply, and 4) ±16.5 volt supplies. In the event of a power supply failure, the switch panel will automatically transfer dc potentials from the remaining operational power supply to the console without console interruption.

1-25. SWITCHING NETWORKS.

1-26. +24 volt supplies from power supply module A and power supply module B are applied to the +24 volt diode combining circuit. The combining circuit consists of diodes D2 and D3. In the event of a failure in a +24 volt supply circuit, the combining circuit will automatically route the remaining operational +24 volt supply to the console without interruption. Power supply A +24 volt indicator DS2 and power supply B +24 volt indicator DS1 provide status indications. The indicators illuminate when the supplies are operational. The -24 volt, +48 volt, +12 volt and the ±16.5 volt supply combining circuits operate in an identical manner.



597-9012-102

FIGURE 1-2. AUTOMATIC POWER SUPPLY SWITCH PANEL DETAILED BLOCK DIAGRAM

SECTION II

POWER SUPPLY MODULE
AUTOMATIC POWER SUPPLY SWITCH PANEL
MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information and troubleshooting information for the power supply module and automatic power supply switch panel.

WARNING DISCONNECT ALL PRIMARY POWER BEFORE ATTEMPTING ANY POWER SUPPLY MAINTENANCE.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The power supply module and automatic power supply switch panel should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of procedures required to restore a power supply module or an automatic power supply switch panel to operation after a fault has occurred. The procedures are divided into electrical adjustment procedures, troubleshooting, and component replacement procedures.

2-8. ELECTRICAL ADJUSTMENTS.

2-9. +48 VOLT PHANTOM POWER SUPPLY ADJUST. Potentiometer R1 on the power supply module power supply circuit board adjusts the phantom power supply level from +15V to +48V dc. The phantom power supply is adjusted as follows.

2-10. Required Equipment. The following test equipment is required to adjust the phantom power supply level.

A. Non-Metallic Adjustment Tool.

B. Multipurpose voltmeter.

2-11. Procedure. To adjust the phantom power supply level, proceed as follows:

WARNING DISCONNECT ALL CONSOLE PRIMARY POWER BEFORE PROCEEDING.

2-12. Disconnect all console primary power and remove the power supply module top-panel.

2-13. Refer to Figure 2-1 and connect the voltmeter to the mounting base of regulator U1.

2-14. Apply power to the module.

WARNING

WARNING

MAINTENANCE WITH POWER ENERGIZED IS ALWAYS CONSIDERED HAZARDOUS AND CAUTION SHOULD BE OBSERVED. DO NOT TOUCH ANY COMPONENTS WITHIN THE POWER SUPPLY MODULE WHEN POWER IS ENERGIZED.

2-15. Refer to Figure 2-1 and adjust phantom power supply level control R1 until the voltmeter indicates the desired operating level.

WARNING DISCONNECT ALL CONSOLE PRIMARY POWER BEFORE PROCEEDING.

2-16. Disconnect the console primary power supply.

2-17. Remove the test equipment and replace the power supply module top-panel.

2-18. TROUBLESHOOTING.

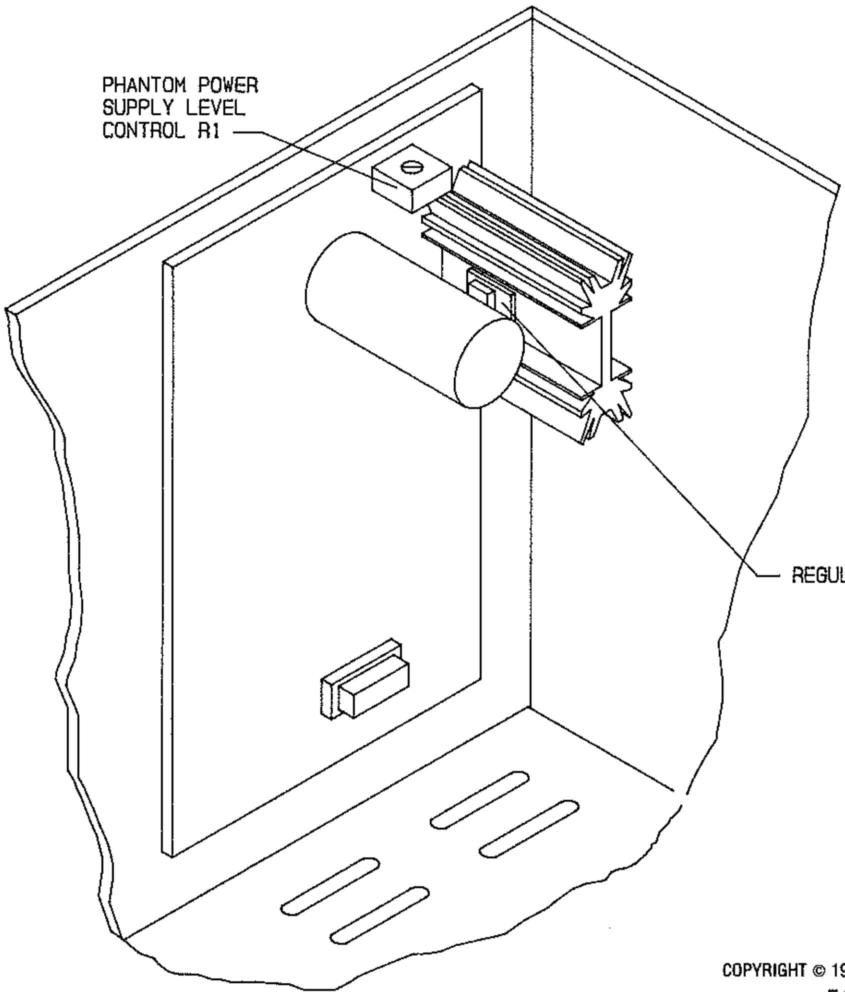
2-19. The troubleshooting philosophy for the power supply module and automatic power supply switch panel consists of isolating a problem to a specific circuit or group of components. Figure 2-2 presents the power supply module troubleshooting information. Refer to Figure 2-2 to isolate a failure to a specific group of components.

2-20. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-21. COMPONENT REPLACEMENT.

2-22. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

2-23. If the capacitors in the power supply module are replaced in the field, the capacitors must be correctly re-assembled to meet operating specifications. Refer to the power supply module assembly diagram in SECTION III for assembly information.



597-9012-111

FIGURE 2-1. POWER SUPPLY CIRCUIT BOARD ADJUSTMENT CONTROLS

POWER SUPPLY MODULE TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO +16.5 VOLT SUPPLY	1. CHECK FUSE F7. 2. CHECK REGULATOR U1.
NO +24 VOLT SUPPLY	1. CHECK FUSE F2.
NO -16.5 VOLT SUPPLY	1. CHECK FUSE F6. 2. CHECK REGULATOR U2.
NO -24 VOLT SUPPLY	1. CHECK FUSE F1.
NO ±24 VOLT SUPPLIES AND ±16.5 VOLT SUPPLIES	1. CHECK BRIDGE RECTIFIER D2. 2. CHECK FUSE F5.
NO +12 VOLT SUPPLIES	1. CHECK FUSE F3. 2. CHECK REGULATOR U2. 3. CHECK TRANSISTORS Q1 AND Q2. 4. CHECK BRIGE RECTIFIER D1.
NO PHANTOM POWER SUPPLY	1. CHECK FUSE F4. 2. CHECK REGULATOR U1. 3. CHECK DIODES D1 THROUGH D4.

597-9012-150

FIGURE 2-2. POWER SUPPLY MODULE TROUBLESHOOTING

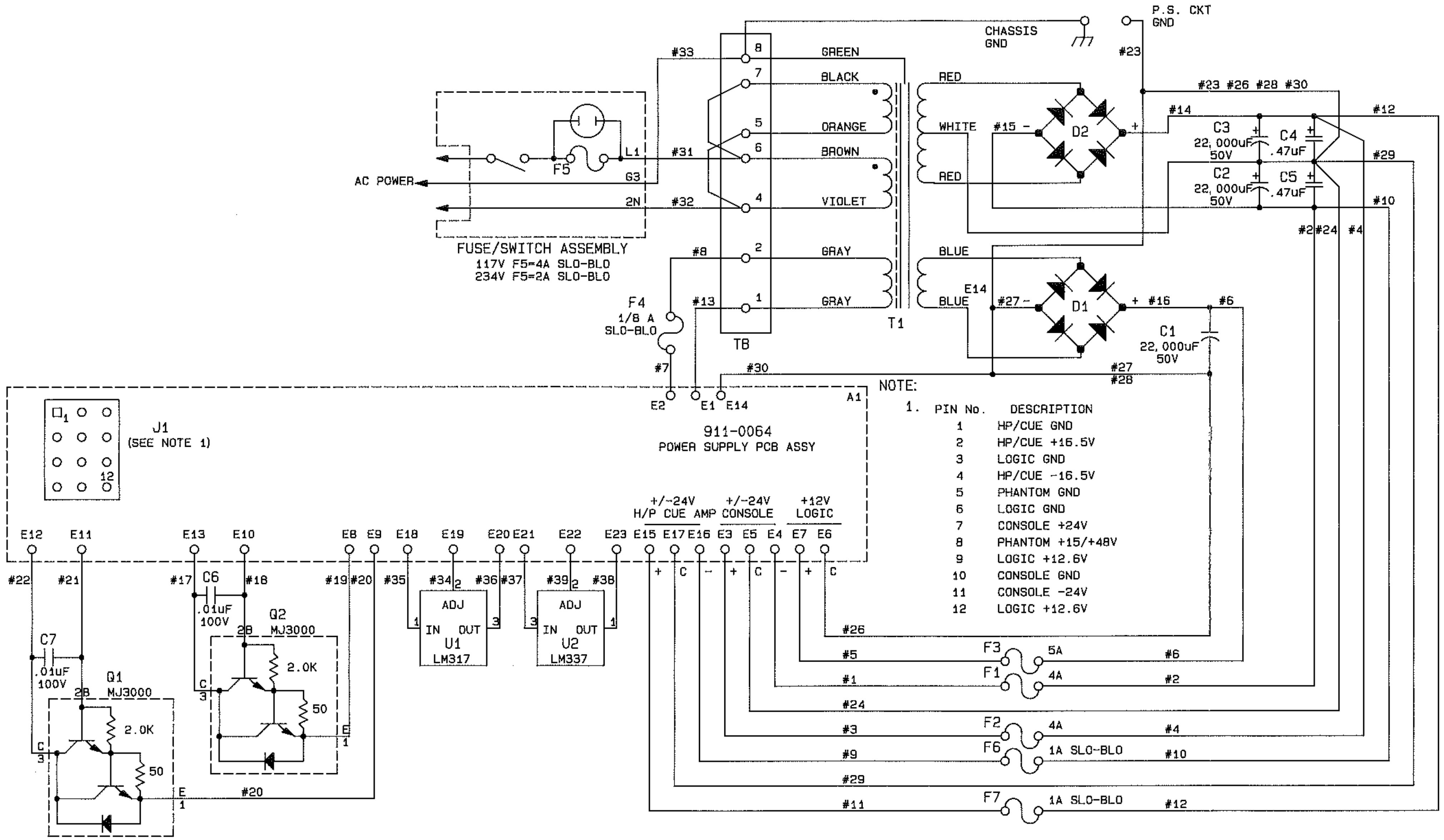
SECTION III

POWER SUPPLY MODULE
AUTOMATIC POWER SUPPLY SWITCH PANEL
DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the power supply module and automatic power supply switch panel.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, POWER SUPPLY MODULE	SC951-0006
3-2	ASSEMBLY DIAGRAM, POWER SUPPLY MODULE	AD951-0006
3-3	SCHEMATIC DIAGRAM, POWER SUPPLY CIRCUIT BOARD	SC911-0064
3-4	ASSEMBLY DIAGRAM, POWER SUPPLY CIRCUIT BOARD	AC911-0064
3-5	SCHEMATIC DIAGRAM, AUTOMATIC POWER SUPPLY SWITCH PANEL	SC951-0032
3-6	ASSEMBLY DIAGRAM, AUTOMATIC POWER SUPPLY SWITCH PANEL	AC951-0032



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

DWN. BY JAH 6-22-88
CHKD MH 8-22-88
ME
PROJ. ENGR.
MFG.

MATERIAL SEE B/M 951-0006
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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 POWER SUPPLY ASSY

TYPE S | SIZE C | DWG. NO. 951-0006 | REV A

MODEL MT-90 | SCALE NONE | SHEET 1 OF 1

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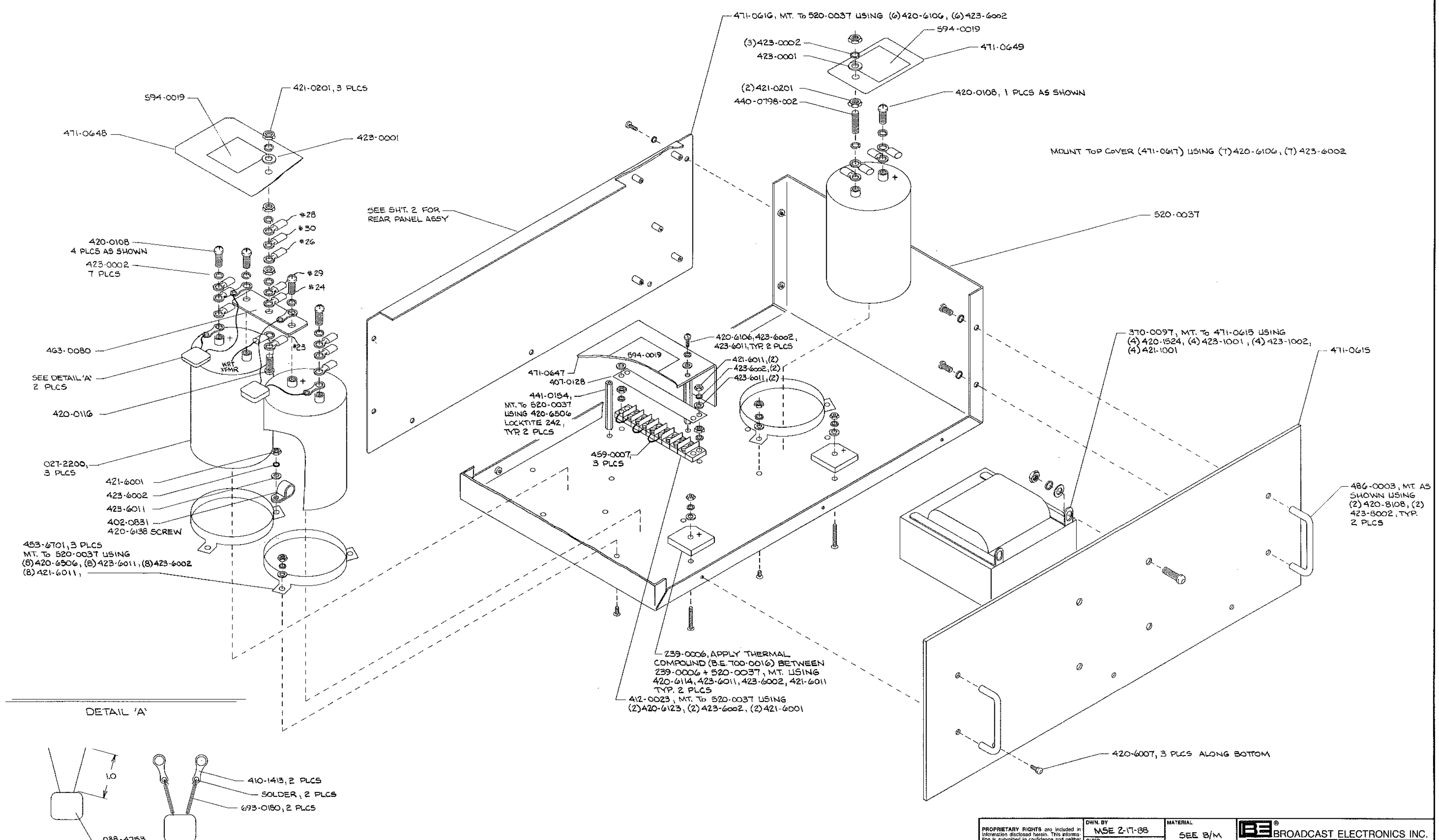

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TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY: MSE 2-17-88
CHKD:
ME:
PROJ. ENGR.:
MFG.:

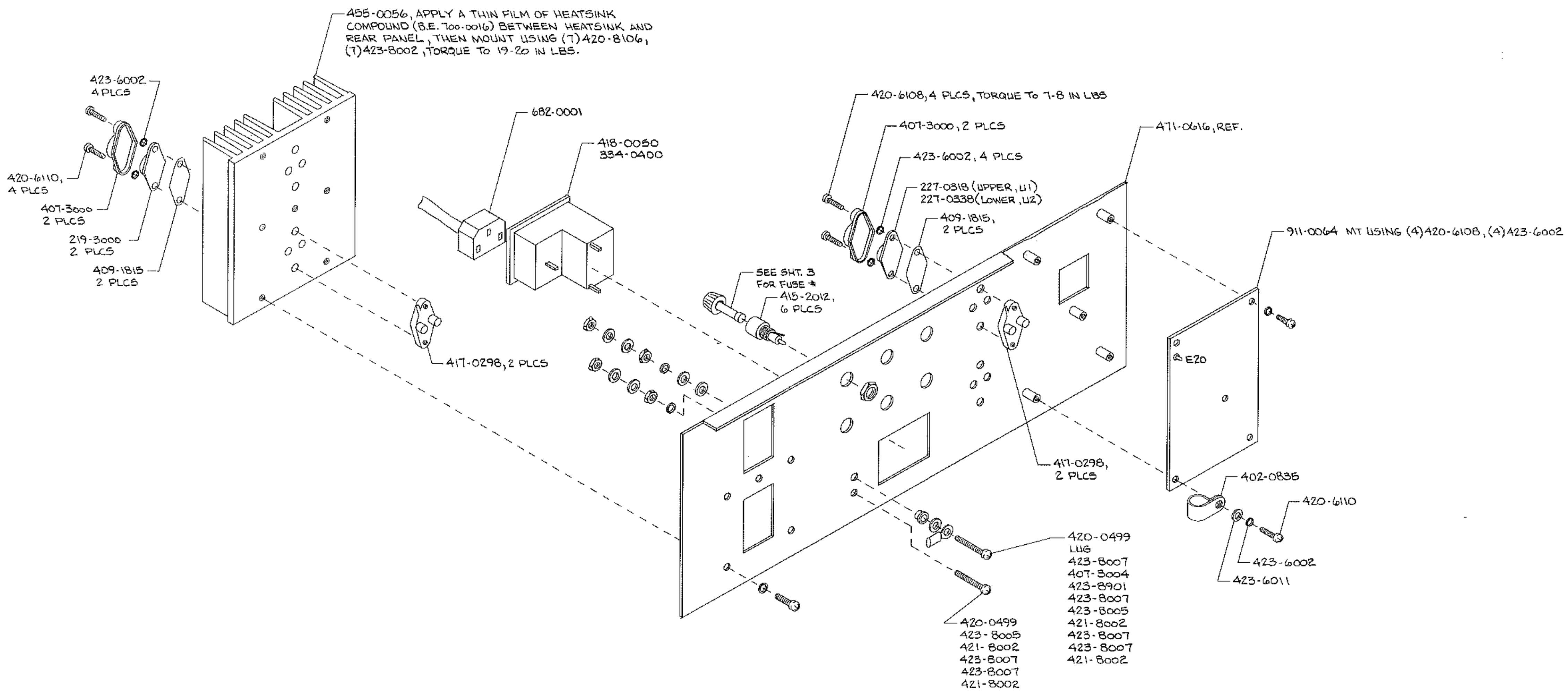
MATERIAL: SEE B/M 951-0006
FINISH:
SEE DWG RA592-9000
NEXT ASSY.

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

TITLE: —ASSY— CONSOLE POWER SUPPLY

TYPE	SIZE	DWG. NO.	REV
A	D	951-0006	B

MODEL MT90 | SCALE 1/2 | SHEET 1 OF 4



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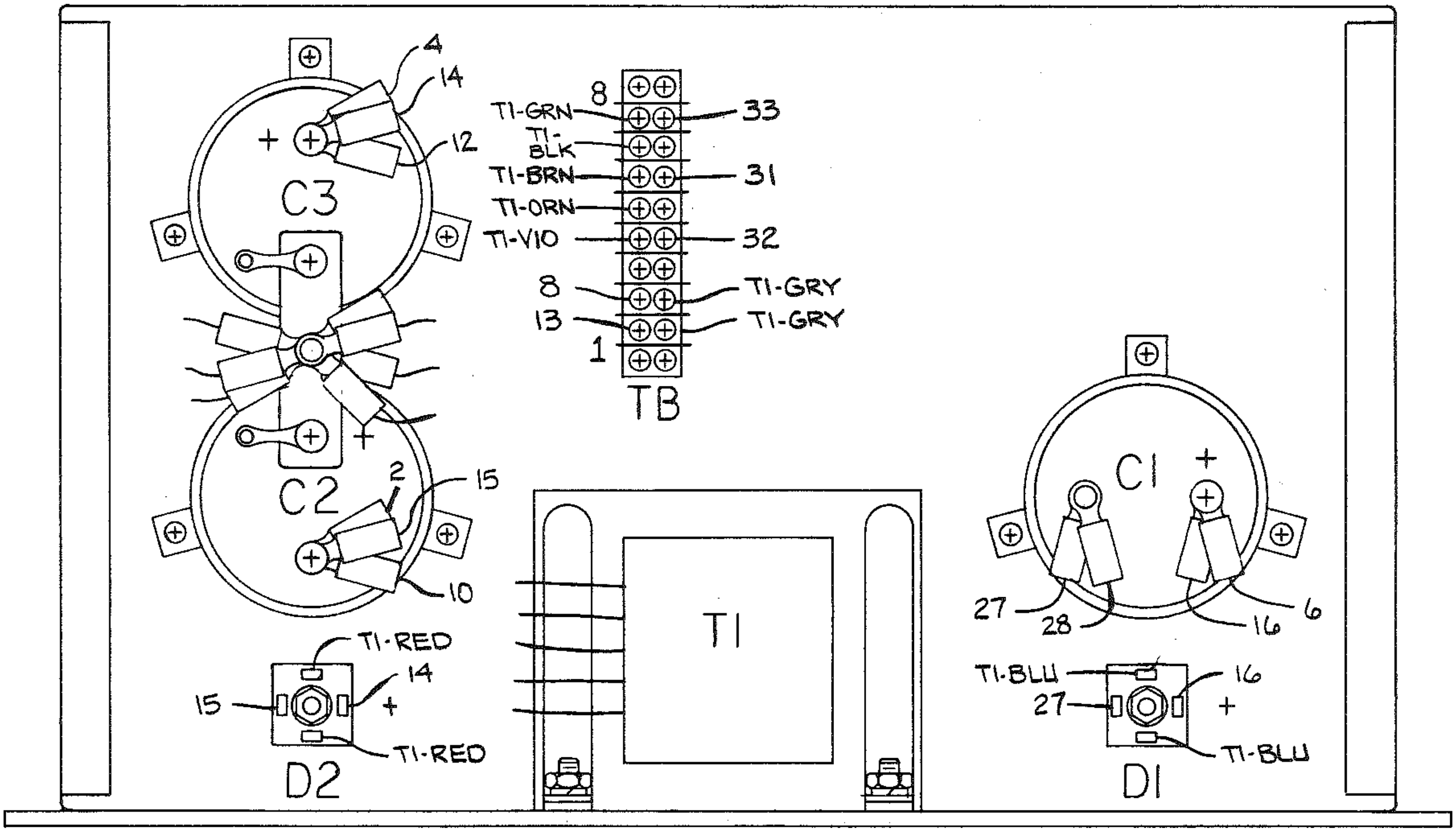
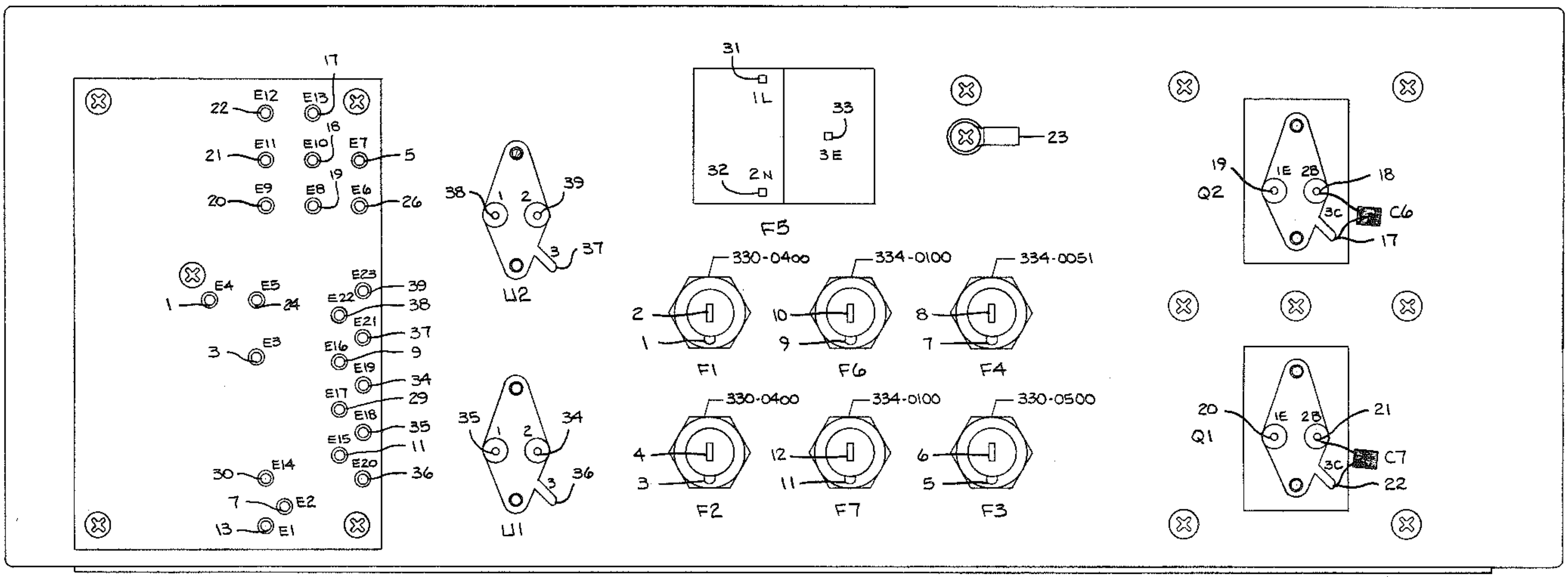
	CHKD		
	ME	FINISH	TITLE —ASSY— CONSOLE POWER SUPPLY
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	PROJ. ENGR. R.M. Hon 8-16-88	SEE DWG RA592-0000	TYPE A SIZE D DWG. NO. 951-0006 REV B
	MFG. MRS 8-2-88	NEXT ASSY.	MODEL MT 90 SCALE 1/2 SHEET 2 OF 4



VIEW TOP W/COVER REMOVED

AD951-0006

FIGURE 3-2. POWER SUPPLY MODULE ASSEMBLY DIAGRAM
(Sheet 3 of 4)

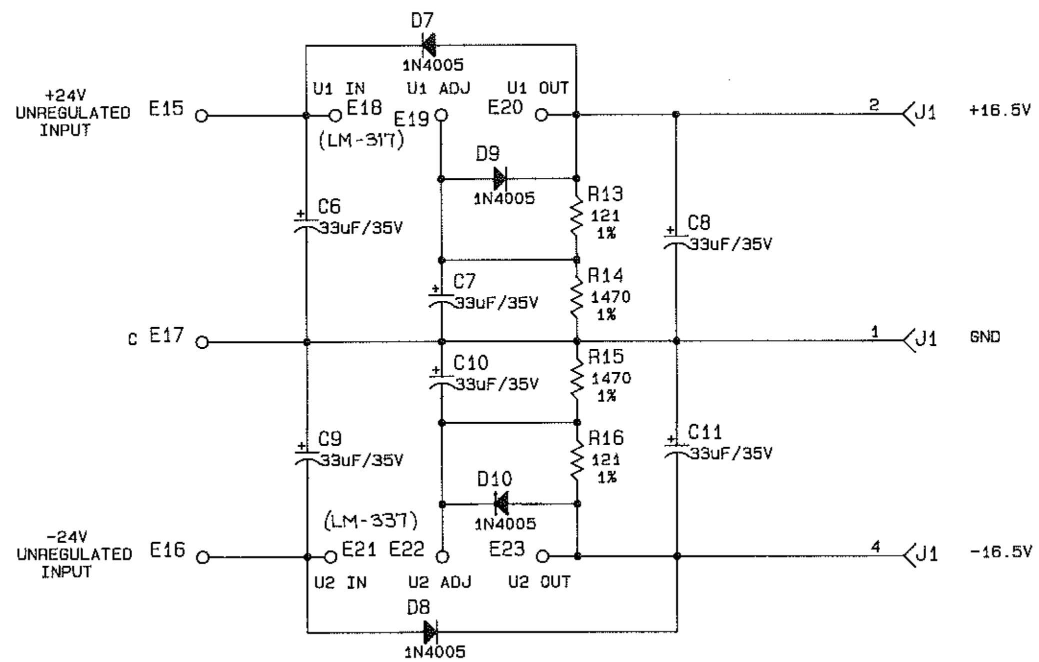


TOP OF REAR PANEL

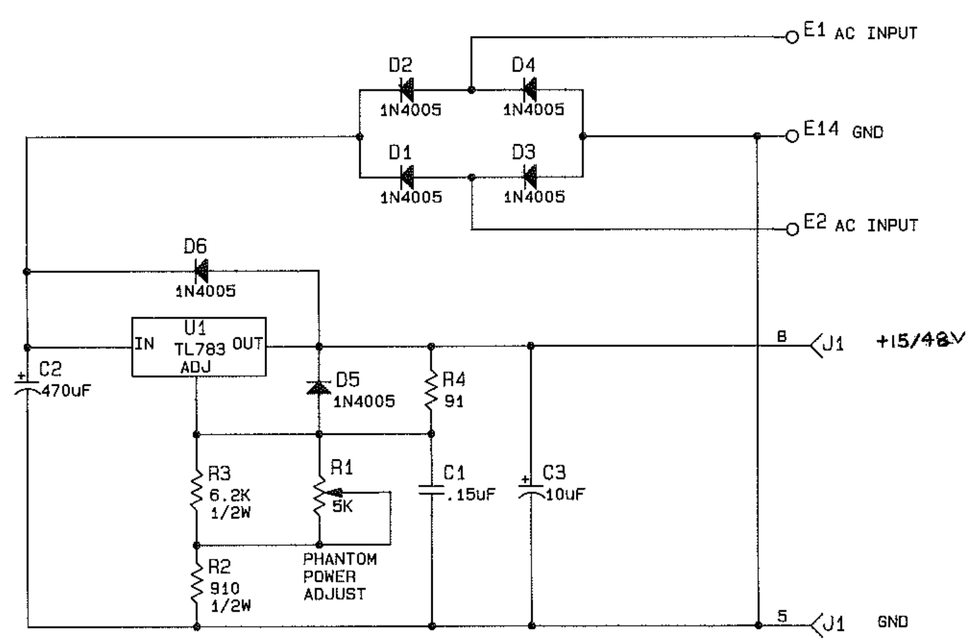
AD951-0006

FIGURE 3-2. POWER SUPPLY MODULE ASSEMBLY DIAGRAM
(Sheet 4 of 4)

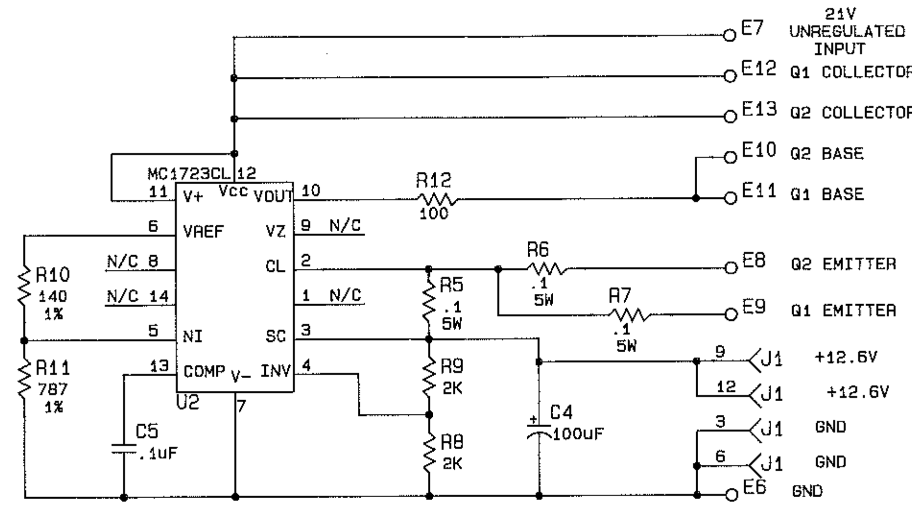
HEADPHONE/CUE REGULATOR



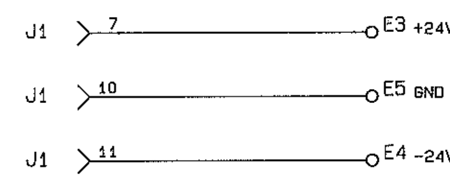
PHANTOM POWER SUPPLY



12.6V LOGIC REGULATOR



CONSOLE SUPPLY

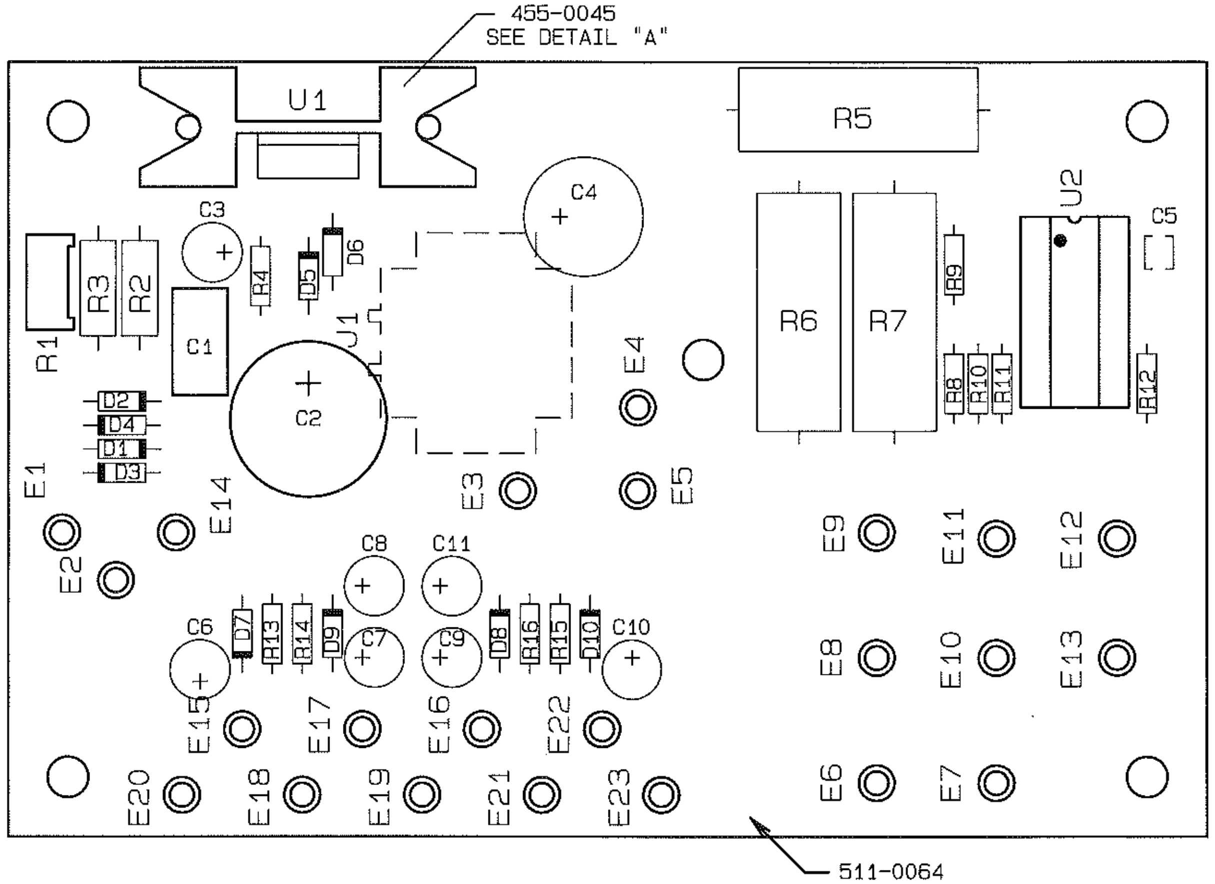


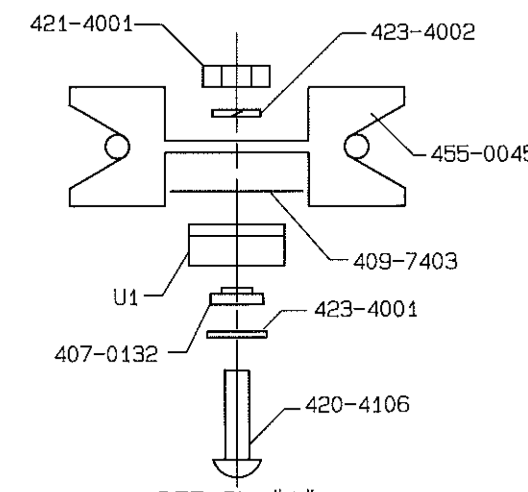
NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R16, C11, U2, D10, J1, & E23.
3. SEE PCB ASSEMBLY: AC 911-0064

DWN. BY JAH 5-26-88	MATERIAL SEE B/M 911-0064	BROADCAST ELECTRONICS INC. 4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
CHKD MH 8-22-88			
ME 8/25/88	FINISH	TITLE POWER SUPPLY	
PROJ. ENGR. 7/24/88	SEE DWG RAS92-0000	TYPE S SIZE C DWG. NO. 911-0064	REV A
MFG 8.25.88	NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	MODEL MT-90 SCALE NONE	SHEET 1 OF 1

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





DETAIL "A"
TORQUE TO 5-6 IN./LBS.

NOTE:
1. SEE SCHEMATIC SC911-0064

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

DWN BY	LO 6-15-87
CHKD	MH 8-22-88
ME	8/22/88
PROJ. ENGR.	
MFG	
MATERIAL	SEE B/M 911-0064
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"

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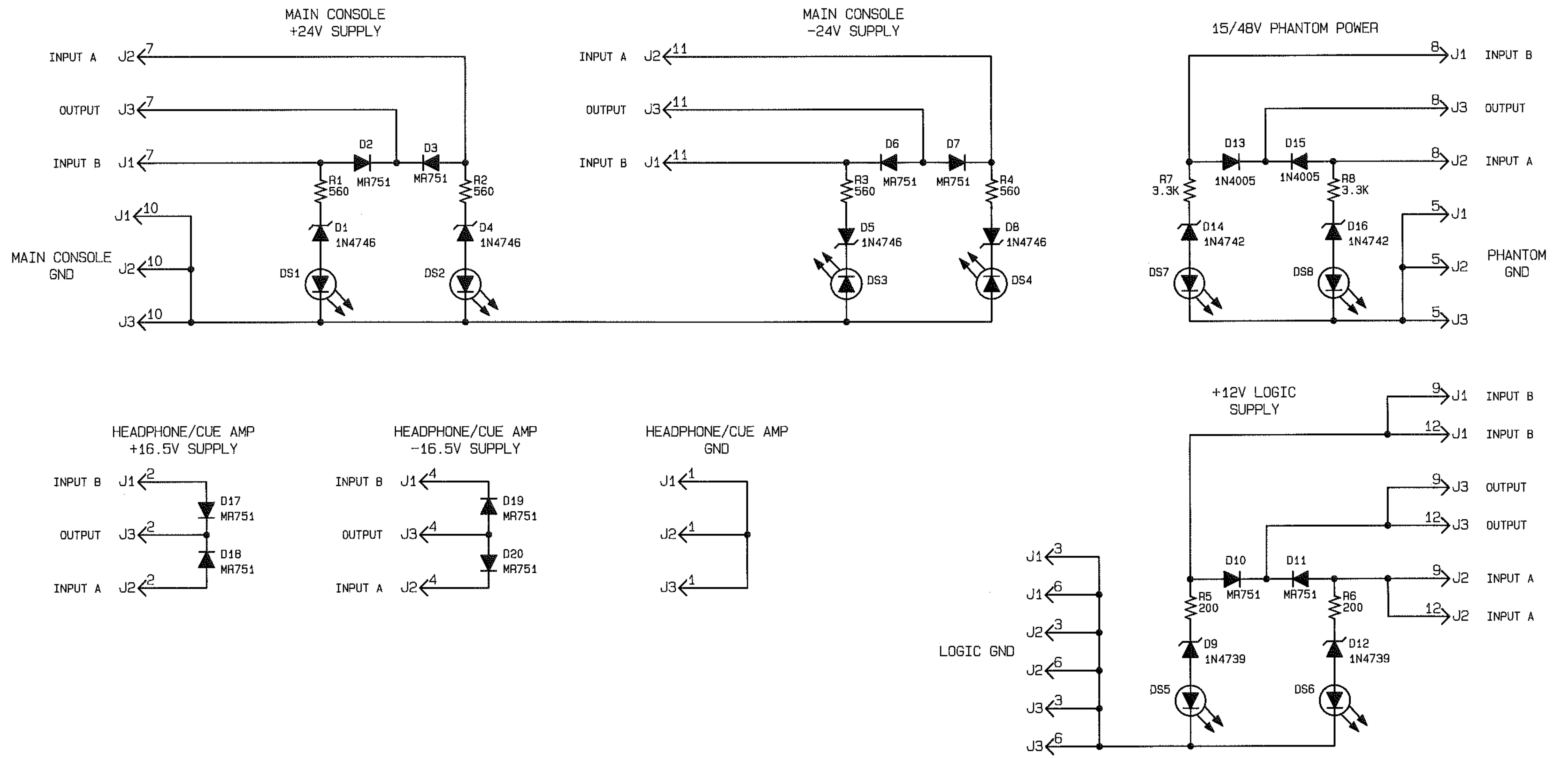
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB ASSEMBLY POWER SUPPLY BOARD

TYPE	SIZE	DWG. NO.	REV
A	C	911-0064	B

MODEL MT90 SCALE 2/1 SHEET 1 OF 1



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENT USED: R8, D20, DS8, J3.
3. SEE PCB ASSEMBLY AC951-0032

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

DWN BY KLS 10-27-87
CHKD MH 9-2-88
ME
PROJ. ENGR. 9-2-88
MFG. 9-7-88

MATERIAL SEE B/M 951-0032
FINISH
NEXT ASSY AC951-0032

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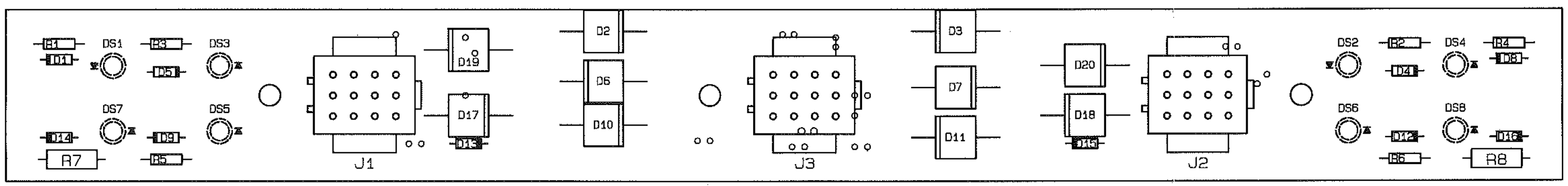
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE SCHEMATIC
POWER SUPPLY AUTOMATIC SWITCHER PANEL

TYPE	SIZE	DWG.NO.	REV
S	C	951-0032	C

MODEL MT90 SCALE NTS SHEET 1 OF 1



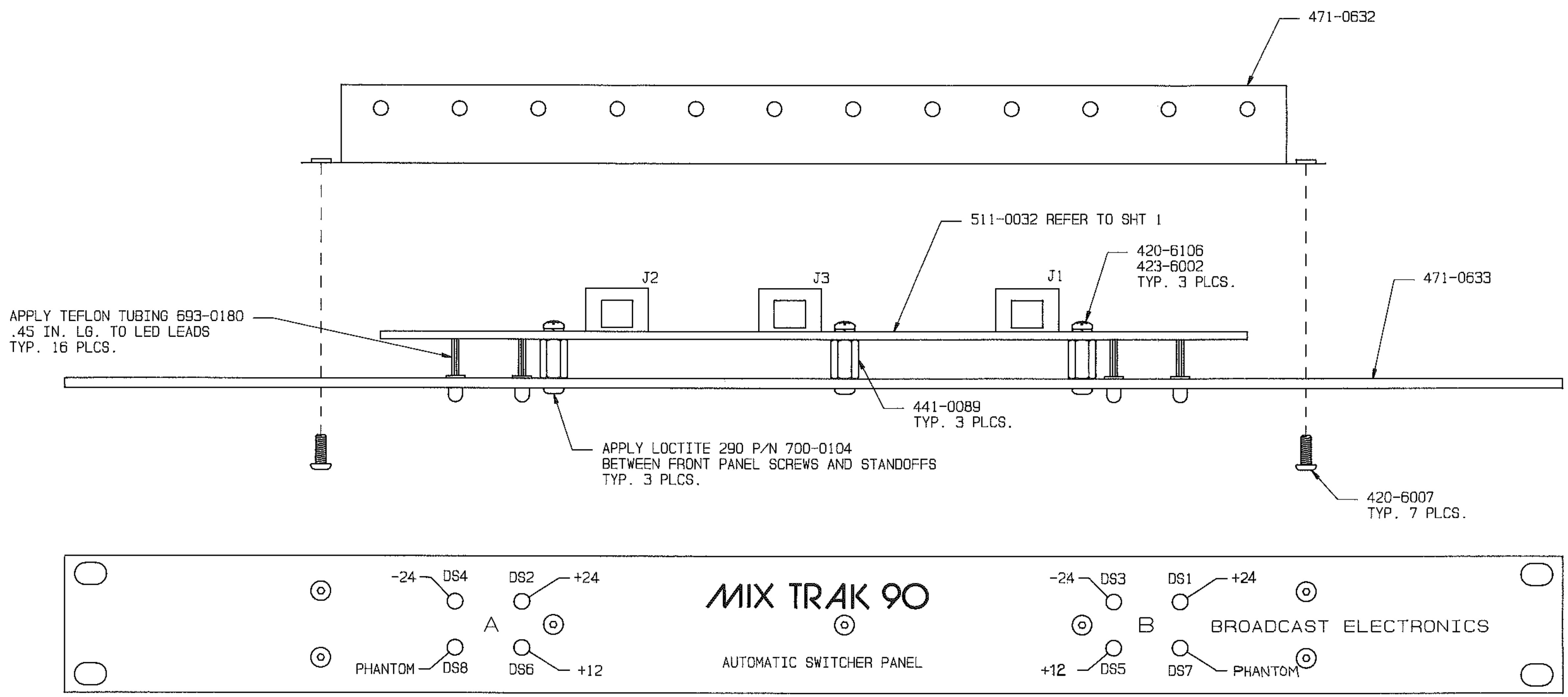
PCB ASSEMBLY

NOTE:

1. REFER TO SHEET 2 FOR PANEL ASSEMBLY
2. SEE SCHEMATIC SC951-0032

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

DWN BY KLS 10-27-87	MATERIAL SEE B/M 951-0032	BROADCAST ELECTRONICS INC.
CHKD MH 9-2-88		4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607
ME	FINISH	TITLE POWER SUPPLY AUTOMATIC SWITCHER PANEL
PROJ ENGR [signature] 9-2-88		TYPE A · SIZE C · DWG.NO. 951-0032 · REV B
MFG [signature] 9-7-88	NEXT ASSY 901-9012 "12CH" 901-9018 "18CH"	MODEL MT90 · SCALE 1.5/1 · SHEET 1 OF 2



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

DWN. BY JAH 2-20-88
CHKD MH 9-7-88
ME 9/9/88
PROJ. ENGR. 9-12-88
MFG. 9-7-88

MATERIAL SEE B/M 951-0032
FINISH
SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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

TITLE POWER SUPPLY AUTOMATIC SWITCHER PANEL

TYPE A | SIZE C | DWG. NO. 951-0032 | REV B

MODEL MIX TRAK 90 | SCALE 1/1 | SHEET 2 OF 2

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SECTION IV

POWER SUPPLY MODULE
AUTOMATIC POWER SUPPLY SWITCH PANEL
PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the power supply module and automatic power supply switch panel. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. POWER SUPPLY MODULE AND AUTOMATIC POWER SUPPLY SWITCH PANEL PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	POWER SUPPLY MODULE ASSEMBLY	951-0006	4-1
4-3	POWER SUPPLY CIRCUIT BOARD ASSEMBLY	911-0064	4-2
4-4	POWER SUPPLY CABLE ASSEMBLY	941-0036	4-2
4-5	AUTOMATIC POWER SUPPLY SWITCH PANEL ASSEMBLY	951-0032	4-3
4-6	AUTOMATIC POWER SUPPLY SWITCH PANEL CABLE ASSEMBLY	941-0032	4-3

TABLE 4-2. POWER SUPPLY MODULE ASSEMBLY - 951-0006
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
A1	Power Supply Circuit Board Assembly	911-0064	1
C1,C2,C3	Capacitor, Electrolytic, 22,000 uF, 50V	027-2200	3
C4,C5	Capacitor, Polyester, 0.47 uF ±10%, 100V	038-4753	2
C6,C7	Capacitor, Mylar Film, 0.01 uF, 100V	031-1043	2
D1,D2	Full-Wave Bridge Rectifier, MDA2502, Silicon, 200 PIV, 25 Amperes	239-0006	2
F1,F2	Fuse, 3AG, 32V, 4 Amperes	330-0400	2
F3	Fuse, 3AG, 250V, 5 Amperes	330-0500	1
F4	Fuse, MDL, 1/8 Ampere, 250V, Slow-Blow (for 120V Operation)	334-0051	1
F5	Fuse, 4AG, 125V, Slow-Blow	334-0400	1
F6,F7	Fuse, AGC, 1A, 250V, Slow-Blow (for 115V Operation)	334-0100	2
Q1,Q2	Transistor, MJ3000, Silicon, NPN Darlington, TO-3 Case	219-3000	2
T1	Transformer, Power Primary: 117/234V ±10%, 50/60 Hz, Single Phase Secondary: 1: 22V @ 4 Ampers Continuous 2: 22V @ 4 Amperes Continuous 3: 18V @ 5 Amperes Continuous 4: 59V @ 1 Ampere Continuous	370-0097	1

TABLE 4-2. POWER SUPPLY MODULE ASSEMBLY - 951-0006
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
TB	Barrier Strip, 8 Terminals	412-0023	1
U1	Integrated Circuit, LM317K, Three-Terminal Adjustable Positive Voltage Regulator, 1.2 to 37V, 1.5 Ampere Maximum, TO-3 Case	227-0318	1
U2	Integrated Circuit, LM337K, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, TO-3 Case	227-0338	1
XC1,XC2,XC3	Capacitor Mounting Bracket	453-6701	3
XF1 THRU XF4,XF6,XF7	Fuse Holder, AGC	415-2012	6
XF/S ASSY	Connector, Power, Snap-in, Black (Combination fuse holder, switch, and IEC Connector)	418-0050	1
XQ1,XQ2, XU1,XU2	Socket, Transistor, TO-3	417-0298	4
----	AC Line Cord, N.E.M.A.3-Wire North American Plug	682-0001	1
----	Insulator, Barrier Strip	407-0128	1
----	Shield, Capacitor (for C1)	471-0649	1
----	Shield, Capacitor (for C2 & C3)	471-0648	1
----	Power Supply Wire Harness Assembly	949-0154	1
----	Power Supply Cable Assembly	941-0036	1

TABLE 4-3. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 911-0064

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mylar Film, 0.15 uF, 100V	030-1553	1
C2	Capacitor, Electrolytic, 470 uF ±20%, 100V	020-4785	1
C3	Capacitor, Electrolytic, 10 uF ±20%, 63V	020-1075	1
C4	Capacitor, Electrolytic, 100 uF, 50V	020-1083	1
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C6 THRU C11	Capacitor, Electrolytic, 33 uF, 35V	024-3335	6
D1 THRU D10	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	10
E1 THRU E23	Terminal, Turret, Double Shoulder	413-1597	23
J1	Receptacle, 12-Pin	417-1276	1
R1	Potentiometer, 5 k Ohm ±10%, 1/2W	178-5044	1
R2	Resistor, 910 Ohm ±5%, 1/2W	110-9133	1
R3	Resistor, 6.2 k Ohm, 1/2W	110-6243	1
R4	Resistor, 91 Ohm ±5%, 1/4W	100-9123	1
R5,R6,R7	Resistor, 0.1 Ohm ±5%, 5W, W/W	130-1003	3
R8,R9	Resistor, 2 k Ohm ±5%, 1/4W	100-2043	2
R10	Resistor, 140 Ohm ±1%, 1/4W	103-1403	1
R11	Resistor, 787 Ohm ±1%, 1/4W	103-7873	1
R12	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
R13	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
R14,R15	Resistor, 1.47 k Ohm ±1%, 1/4W	103-1474	2
R16	Resistor, 121 Ohm ±1%, 1/4W	100-1231	1
U1	Integrated Circuit, TL783C, Adjustable Three-Terminal Positive Voltage Regulator, 1.25V to 125V at 700 mA, TO-220 Case	227-0783	1
U2	Integrated Circuit, UA723, Voltage Regulator, 14-Pin DIP	227-0723	1
XU2	Socket, 14-Pin DIP	417-1404	1
----	Blank Power Supply Circuit Board	511-0064	1

TABLE 4-4. POWER SUPPLY CABLE ASSEMBLY - 941-0036

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector, Housing, 12-Pin	418-1271	2
----	Pins, Connector	417-0053	24

TABLE 4-5. AUTOMATIC POWER SUPPLY SWITCH PANEL ASSEMBLY - 951-0032

REF. DES.	DESCRIPTION	PART NO.	QTY.
D1	Diode, Zener, 1N4746, 18V ±10%, 1W	200-4746	1
D2,D3	Diode, MR751, Silicon, 100V @ 6 Amperes	202-0751	2
D4,D5	Diode, Zener, 1N4746, 18V ±10%, 1W	200-4746	2
D6,D7	Diode, MR751, Silicon, 100V @ 6 Amperes	202-0751	2
D8	Diode, Zener, 1N4746, 18V ±10%, 1W	200-4746	1
D9	Diode, Zener, 1N4739A, 9.1V ±5%, 1W	200-0009	1
D10,D11	Diode, MR751, Silicon, 100V @ 6 Amperes	202-0751	2
D12	Diode, Zener, 1N4739A, 9.1V ±5%, 1W	200-0009	1
D13	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1
D14	Diode, Zener, 1N4742A, 12V ±5%, 1W	200-4742	1
D15	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	1
D16	Diode, Zener, 1N4742A, 12V ±5%, 1W	200-4742	1
D17 THRU D20	Diode, MR751, Silicon, 100V @ 6 Amperes	202-0751	4
DS1 THRU DS8	Indicator, LED, Green, 521-9175, 3V @ 40 mA Maximum	323-9224	8
J1,J2,J3	Receptacle, 12-Pin	417-1276	3
R1 THRU R4	Resistor, 560 Ohm ±5%, 1/4W	100-5633	4
R5,R6	Resistor, 200 Ohm ±5%, 1/4W	100-2033	2
R7,R8	Resistor, 3.3 k Ohm ±5%, 1/2W	110-3343	2
----	Automatic Power Supply Switcher Cable Assembly	941-0032	2
----	Blank Automatic Power Supply Switch Panel Circuit Board	511-0032	1

TABLE 4-6. AUTOMATIC POWER SUPPLY SWITCH PANEL CABLE ASSEMBLY - 941-0032

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Connector Housing, 12-Pin	418-1271	4
----	Pins, Connector	417-0053	48

INPUT EXPANDER MODULE

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SECTION I

INPUT EXPANDER MODULE THEORY OF OPERATION

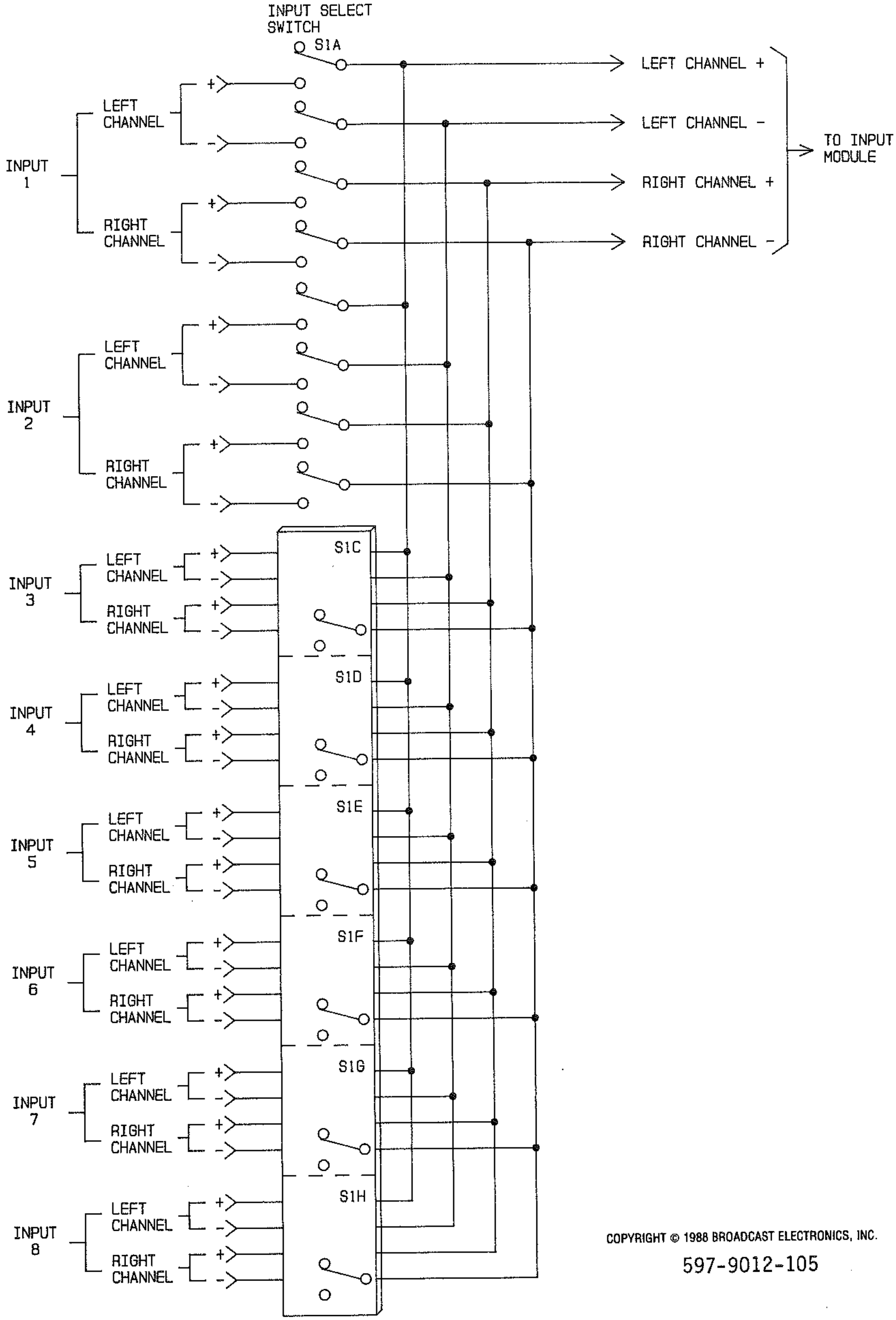
1-1. INTRODUCTION.

1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console input expander module. A detailed block diagram of the input expander module is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. FUNCTIONAL DESCRIPTION.

1-4. INPUT EXPANDER MODULE.

1-5. Additional input source selection and control capabilities for Mix-Trak 90 input modules is provided by the input expander module. The input expander module consists of eight color-coded switch/indicators designed to accept and control eight balanced stereophonic audio sources. The switch/indicators select an input source and route the audio for application to the associated line or microphone input module.



597-9012-105

FIGURE 1-1. INPUT EXPANDER MODULE DETAILED BLOCK DIAGRAM

SECTION II

INPUT EXPANDER MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information for the input expander module.

2-3. MAINTENANCE.

2-4. GENERAL.

2-5. The input expander module should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. The module should also be periodically inspected for loose wiring and components.

2-6. AUDIO SWITCHES.

2-7. The input expander module is equipped with ITT Shadow Inc. audio switches. The switches are sealed for low-noise long-life operation and do not permit cleaning. If a switch becomes noisy or detective, the switch will require replacement.

2-8. COMPONENT REPLACEMENT.

2-9. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.

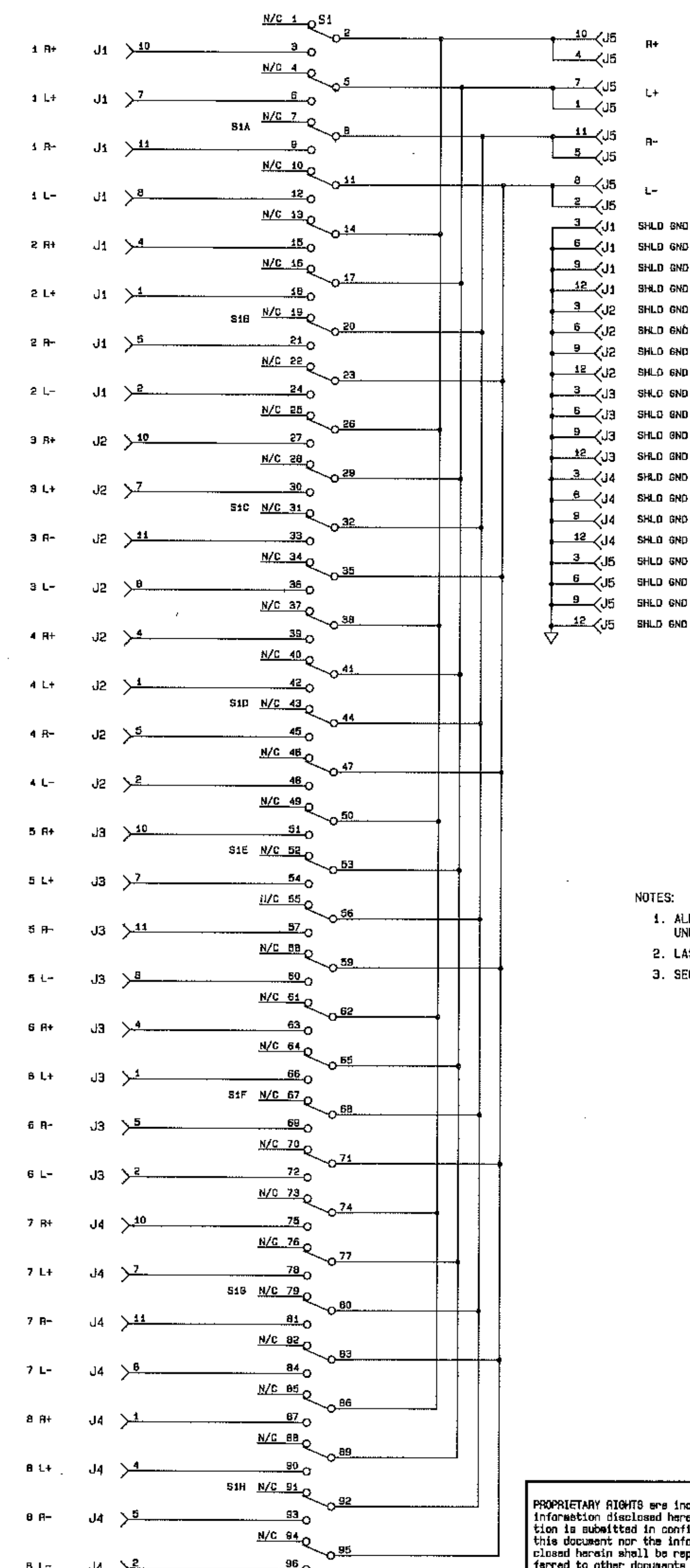
SECTION III

INPUT EXPANDER MODULE DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the input expander module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, INPUT EXPANDER MODULE	SC951-0018
3-2	ASSEMBLY DIAGRAM, INPUT EXPANDER MODULE	AC951-0018



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: S1, & J5
3. SEE PCB ASSEMBLY: AC 951-0018

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

DWN. BY	JAH 6-22-88
CHKD	mH 8-22-88
ME	
PROJ. ENGR.	8-22-88
MFG.	
MATERIAL	SEE B/M 951-0018
FINISH	SEE DWG RA592-0000
NEXT ASSY.	901-9012 (12CH) 901-9018 (18CH)

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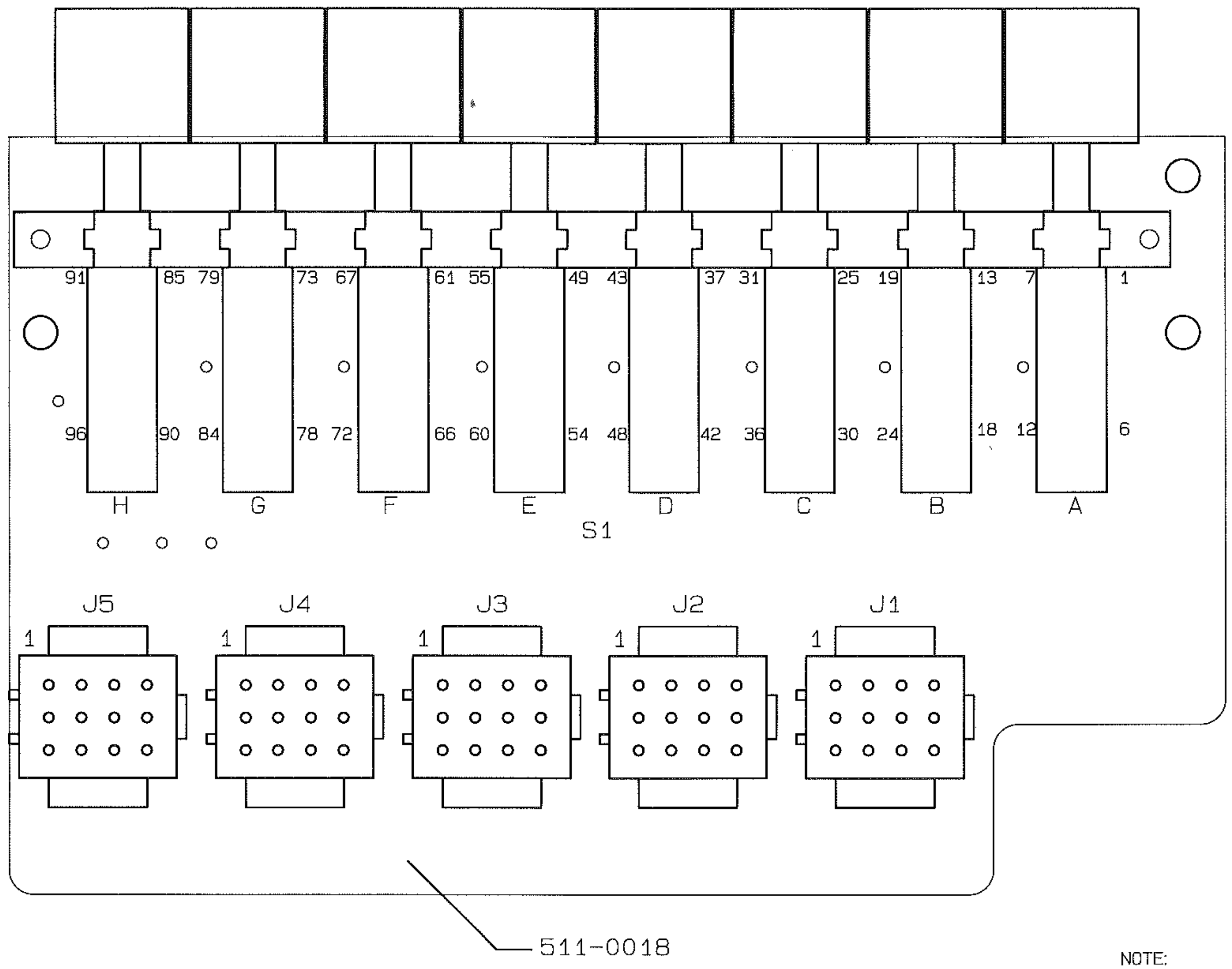
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: INPUT EXPANDER MODULE

TYPE	SIZE	DWG. NO.	REV
S	C	951-0018	A

MODEL MT-90 SCALE NONE SHEET 1 OF 1



PCB ASSEMBLY

NOTE:
1. REFER TO SHEET 2 FOR MODULE ASSEMBLY
2. SEE SCHEMATIC SC951-0018

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

DWN BY	MERK 10-5-87
CHKD	mH 8-22-88
ME	8/22/88
PROJ. ENGR.	8-22-88
MFG	8-22-88
MATERIAL	SEE B/M 951-0018
FINISH	
NEXT ASSY	901-9012 "12CH" 901-9018 "18CH"

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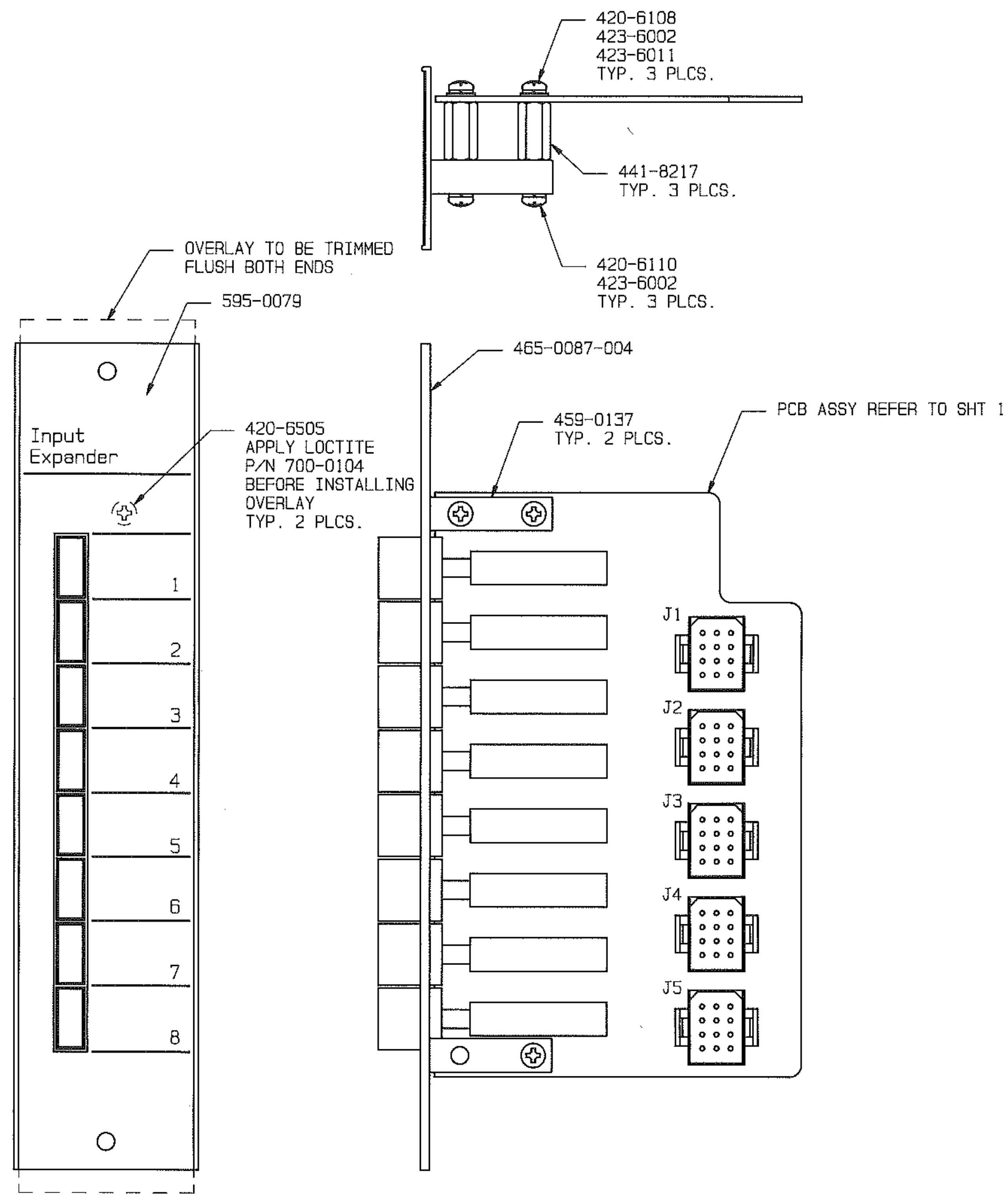
4100 N.24TH ST., P.O.BOX 3606 QUINCY, IL 62305 217/224-9600
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE	INPUT EXPANDER MODULE		
TYPE A	SIZE C	DWG.NO. 951-0018	REV A
MODEL MT90	SCALE 2/1	SHEET 1 OF 2	



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

DWN. BY JAH 2-19-88	MATERIAL SEE B/M 951-0018	BROADCAST ELECTRONICS INC. 4100 N.24TH ST.,P.O.BOX 3606 QUINCY,IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST	
CHKD MH 8-22-88			
ME 8/22/88	FINISH	TITLE INPUT EXPANDER MODULE	
PROJ. ENGR. 8-22-88	SEE DWG RA592-0000	TYPE A, SIZE C, DWG. NO. 951-0018	REV A
MFG	NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)	MODEL MIX TRAK 90, SCALE 1/1	SHEET 2 OF 2

FSK DECODER MODULE

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LIST OF ILLUSTRATIONS

SECTION IV

INPUT EXPANDER MODULE PARTS LIST

4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers of electrical components and assemblies required for maintenance of the input expander module. Each table entry in this section is indexed by the reference designators appearing on the applicable schematic diagram.

TABLE 4-1. INPUT EXPANDER MODULE PARTS LIST INDEX

TABLE	TITLE	PART NO.	PAGE
4-2	INPUT EXPANDER MODULE CIRCUIT BOARD ASSEMBLY	951-0018	4-1

TABLE 4-2. INPUT EXPANDER MODULE CIRCUIT BOARD ASSEMBLY - 951-0018

REF. DES.	DESCRIPTION	PART NO.	QTY.
J1 THRU J5	Receptacle, 12-Pin	417-1276	5
S1	Switch, 8 Section, 4PDT Pushbutton, Out Position White, In Position Blue	340-0114	1
----	Connector Housing, 12-Pin	418-1271	5
----	Pins, Connector	417-0053	65
----	Blank Input Expander Module Circuit Board	511-0018	1

SECTION I

FSK DECODER MODULE THEORY OF OPERATION

1-1. INTRODUCTION.

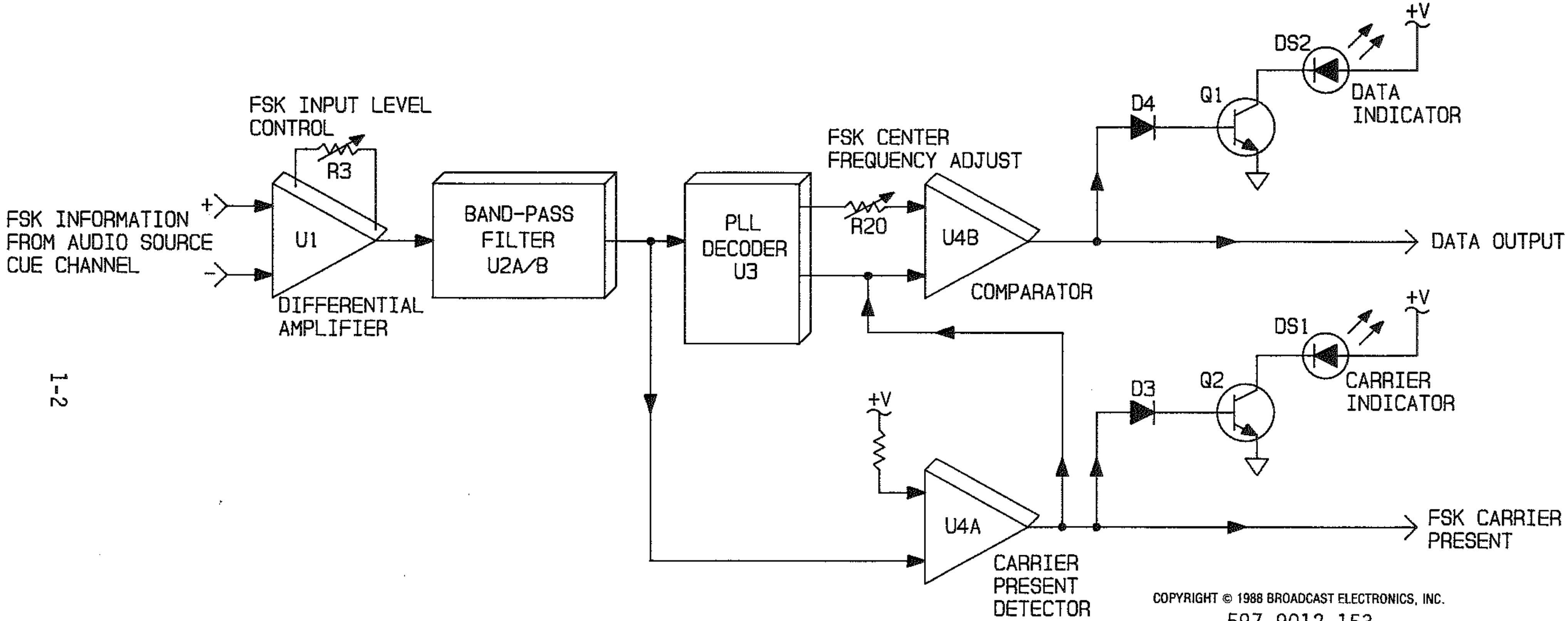
1-2. The following text provides detailed theory of operation for the Mix-Trak 90 series audio console FSK decoder module. A detailed block diagram of the FSK decoder circuitry is presented in Figure 1-1. Refer to Figure 1-1 as required for the following circuit discussion.

1-3. FUNCTIONAL DESCRIPTION.

1-4. FSK information from the audio source cue channel is applied to an input network consisting of an amplifier stage and a band-pass filter. The FSK information is applied to differential amplifier U1. Potentiometer R3 is provided to adjust the FSK input level. The output of U1 is applied to a band-pass filter consisting of integrated circuits U2A/B. The filter is configured to pass the FSK data frequency band from 3350 Hz to 3650 Hz.

1-5. The output of the filter network is applied to PLL decoder U3 and a carrier detector network. Decoder U3 locks to the FSK carrier frequency and generates a corresponding dc output as the carrier shifts to the mark and space frequencies. Potentiometer R20 is provided to adjust the FSK center frequency. The output of decoder U3 is applied to comparator U4B. U4B is designed to convert the dc information into an RS-232 format. The output of U4B is routed for application to a serial printer or video display terminal. The output of comparator U4B is also applied to a data indicator circuit consisting of transistor Q1 and indicator DS2. The data is half-wave rectified by diode D4 and applied to transistor Q1. The dc potential will bias Q1 on and illuminate data indicator DS2.

1-6. The non-decoded FSK information from the band-pass filter is also applied to carrier present detector U4A. If FSK information is present, the output of U4A will go HIGH. The HIGH will bias transistor Q2 on to illuminate carrier indicator DS1.



597-9012-153

FIGURE 1-1. FSK DECODER DETAILED BLOCK DIAGRAM

SECTION II

FSK DECODER MODULE MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides general maintenance information, electrical adjustment procedures, and troubleshooting information for the FSK decoder module.

2-3. FIRST LEVEL MAINTENANCE.

2-4. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.

2-5. The FSK decoder module should be periodically cleaned of accumulated dust using a nylon-bristle brush and vacuum cleaner. Inspect the module for improperly seated semiconductors and components damaged by overheating.

2-6. SECOND LEVEL MAINTENANCE.

2-7. Second level maintenance consists of procedures required to restore an FSK decoder module to operation after a fault has occurred. The procedures are divided into electrical adjustments, troubleshooting, and component replacement procedures.

2-8. ELECTRICAL ADJUSTMENTS.

2-9. FSK INPUT LEVEL. Potentiometer R3 adjusts the FSK decoder input level. The FSK decoder input level is adjusted as follows.

2-10. Required Equipment. The following test equipment is required to adjust the FSK input level.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. Bulk Erased Tape Cartridge.

D. Voltmeter.

2-11. Procedure. To adjust the FSK decoder input level, proceed as follows:

2-12. Remove the FSK decoder module from the console mainframe.

2-13. Create an FSK carrier test tape for input level alignment by recording FSK carrier information on the bulk erased tape cartridge.

2-14. Refer to Figure 2-1 and connect the voltmeter to U1 pin 6.

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING

2-14. Insert the FSK carrier test tape into an appropriate audio source and reproduce the FSK carrier information.

2-15. Refer to Figure 2-1 and adjust FSK input level control R3 until the voltmeter indicates 1.0 volts. The DATA indicator will illuminate.

2-16. Terminate the FSK test audio and replace the FSK decoder module.

2-17. FSK CENTER FREQUENCY ADJUSTMENT. FSK center frequency control R20 adjusts the operating frequency of the FSK decoder. Adjustment of the control is not required unless replacement components are installed in the circuit. The FSK decoder center frequency is adjusted as follows.

2-18. Required Equipment. The following test equipment is required to adjust the FSK center frequency.

A. Allen Wrench (supplied with the console).

B. Non-Metallic Adjustment Tool.

C. General Purpose Oscilloscope.

D. Frequency Counter.

E. Function Generator or Bulk Erased Tape Cartridge.

2-19. Procedure. To adjust the FSK center frequency control, proceed as follows:

2-20. Remove the FSK decoder module from the console mainframe.

2-21. Refer to Figure 2-1 and connect the oscilloscope and frequency counter to J2 pin 1.

2-22. Provide a signal source for FSK center frequency alignment by performing one of the following:

A. Refer to Figure 2-1 and connect a function generator to J2 pin 5 (FSK input +) and J2 pin 6 (FSK input -). Operate the generator to modulate a 3500 Hz tone ±200 Hz at a 50% duty cycle.

OR

B. Generate an FSK test tape for center frequency alignment by recording the letter U continuously on a bulk erased tape cartridge for approximately 1.5 mintues. Insert the test tape into an appropriate audio source.

2-23. Enable the FSK test signal source.

2-24. Refer to Figure 2-1 and adjust FSK center frequency control R20 for a symmetrical 150 Hz square-wave presentation on the oscilloscope. The CARRIER indicator will illuminate.

2-25. Remove all test equipment and replace the FSK decoder module.

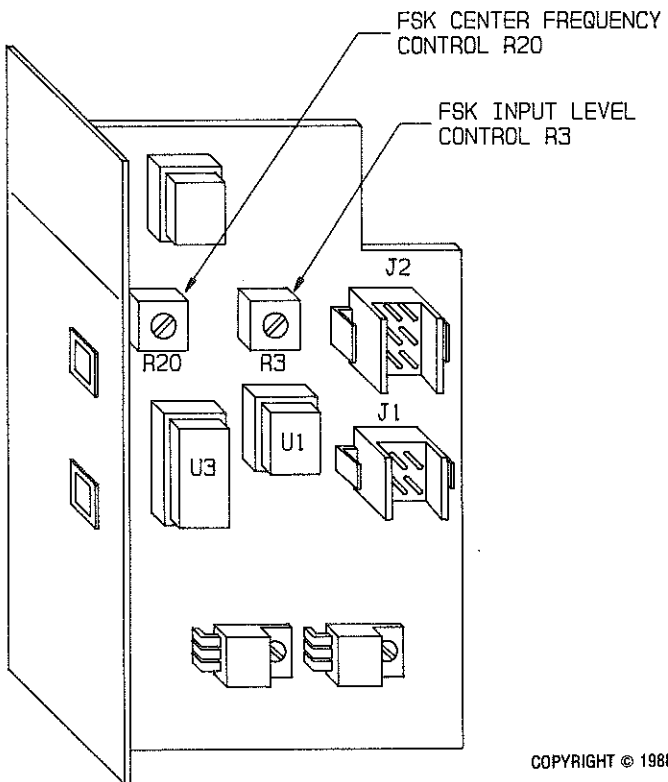
2-26. TROUBLESHOOTING.

2-27. The troubleshooting philosophy for the FSK decoder module consists of isolating a problem to a specific circuit or group of components. Figure 2-2 presents the FSK module troubleshooting information. Refer to Figure 2-2 to isolate a failure to a specific group of components.

2-28. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire module may be returned to Broadcast Electronics for repair or replacement.

2-29. COMPONENT REPLACEMENT.

2-30. Component replacement procedures for the console modular assemblies are presented in PART I, SECTION V. Refer to SECTION V as required for the replacement procedures.



597-9012-151

FIGURE 2-1. FSK DECODER MODULE ADJUSTMENT CONTROLS

FSK DECODER MODULE TROUBLESHOOTING	
SYMPTOM	SOLUTION
NO FSK OUTPUT	1. ENSURE THE FSK CARRIER IS PRESENT. 2. CHECK INTEGRATED CIRCUITS U4 AND U3. 3. CHECK INTEGRATED CIRCUITS U2 AND U1.
NO DATA INDICATIONS	1. CHECK TRANSISTOR Q1 AND LED DS2.
NO CARRIER INDICATIONS	1. CHECK INTEGRATED CIRCUIT U4, TRANSISTOR Q2, AND LED DS1.

597-9012-152

FIGURE 2-2. FSK DECODER MODULE TROUBLESHOOTING

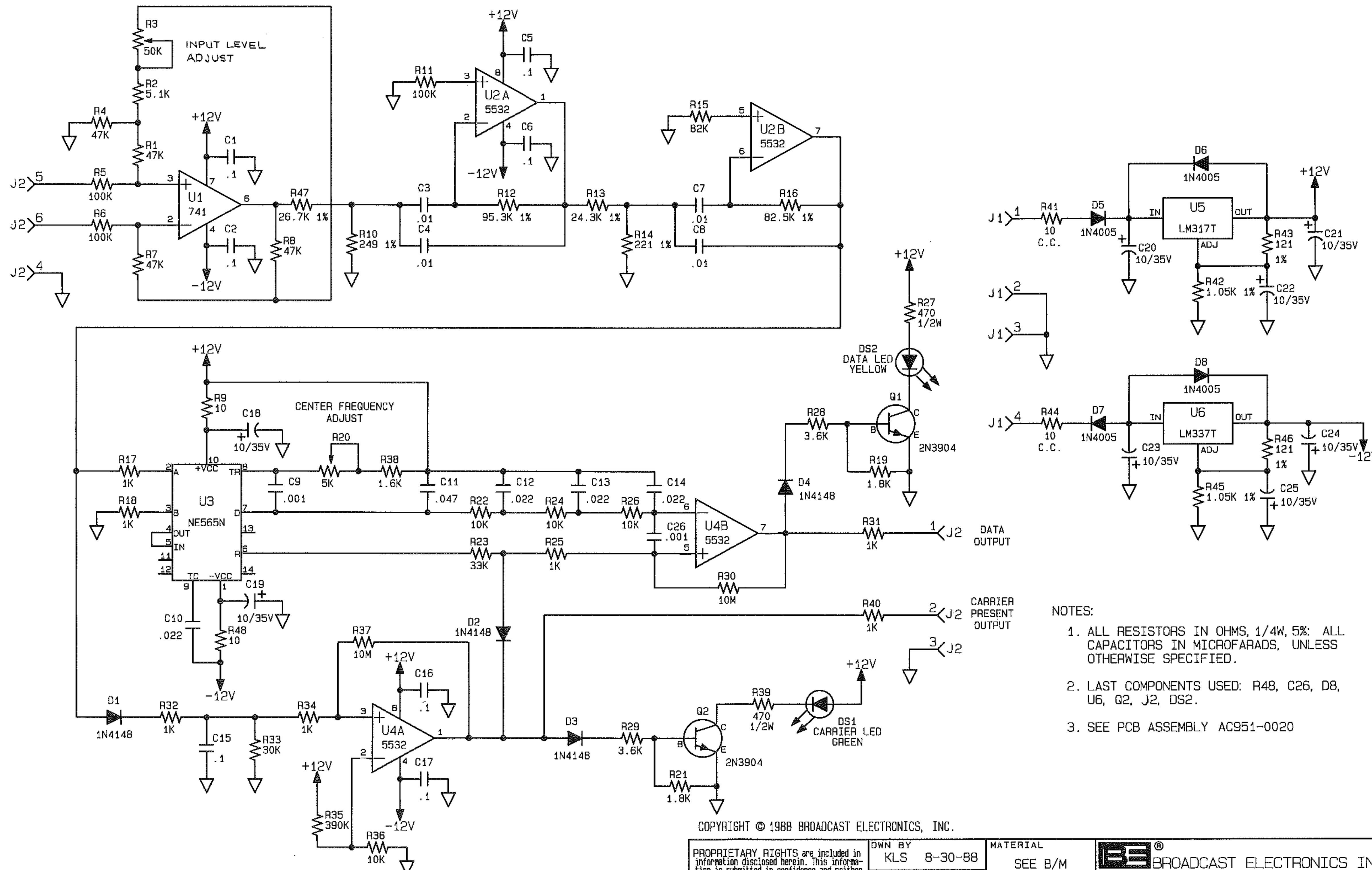
SECTION III

FSK DECODER MODULE DRAWINGS

3-1. INTRODUCTION.

3-2. This section provides assembly drawings and schematic diagrams as listed below for the FSK decoder module.

FIGURE	TITLE	NUMBER
3-1	SCHEMATIC DIAGRAM, FSK DECODER MODULE	SC951-0020
3-2	ASSEMBLY DIAGRAM, FSK DECODER MODULE	AC951-0020



NOTES:

1. ALL RESISTORS IN OHMS, 1/4W, 5%: ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: R48, C26, D8, U6, Q2, J2, DS2.
3. SEE PCB ASSEMBLY AC951-0020

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

DWN BY	KLS 8-30-88
CHKD	MH 11-16-88
ME	11-16-88
PROJ. ENGR	11-16-88
MFG	11-16-88
MATERIAL	SEE B/M 951-0020
FINISH	
NEXT ASSY	

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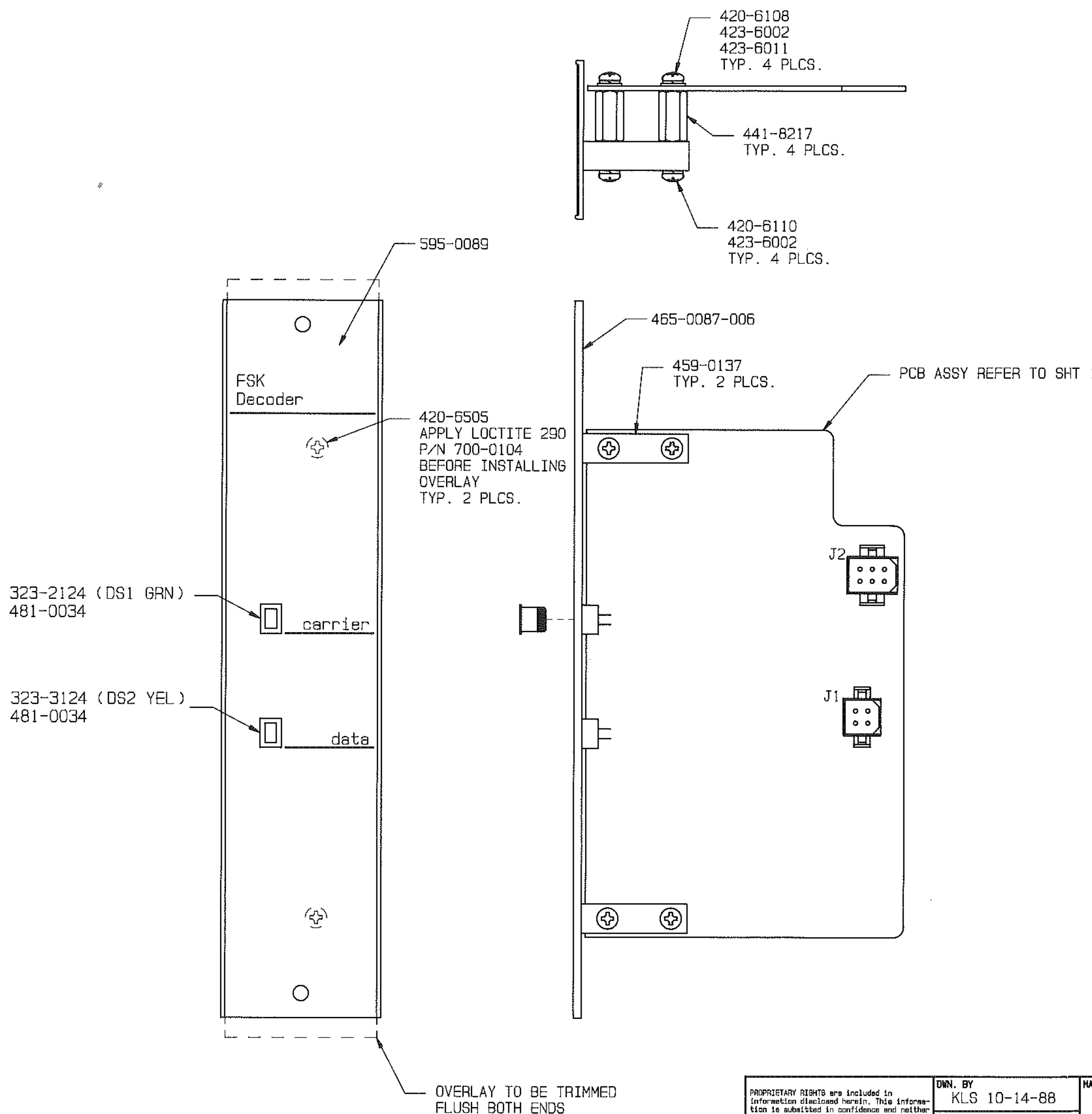
TELEX 250142 CABLE BROADCAST FAX 217/224-9607

TITLE PCB SCHEMATIC– FSK DECODER ACCESSORY MODULE

TYPE	SIZE	DWG.NO.	REV
S	C	951-0020	A

MODEL MT90 SCALE NTS SHEET 1 OF 1



NOTE:
1. COMPONENT NUMBERS 418-0670 AND 417-0053 NEED TO BE PUT IN ZIPLOC BAG (701-0017) AND MUST BE KEPT WITH MODULE.

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

DWN. BY KLS 10-14-88
CHKD MH 11-16-88
ME 11-16-88
PROJ. ENGR. 11-16-88
MFG 11-16-88

MATERIAL SEE B/M 951-0020
FINISH SEE DWG RA592-0000
NEXT ASSY. 901-9012 (12CH) 901-9018 (18CH)

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TELEX 250142 CABLE BROADCAST

TITLE FSK DECODER MODULE

TYPE	SIZE	DWG. NO.	REV
A	C	951-0020	A

MODEL MIX TRAK 90 | SCALE 1/1 | SHEET 2 OF 2

PRODUCT WARRANTY

LIMITED ONE YEAR

While this warranty gives you specific legal rights, which terminate one (1) year (6 months on turntable motors) from the date of shipment, you may also have other rights which vary from state to state.

Broadcast Electronics, Inc. ("BE"), 4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305, hereby warrants cartridge machines, consoles, transmitters and other new Equipment manufactured by BE against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one (1) year (6 months for turntable motors) from the date of shipment. Other manufacturers' Equipment, if any, shall carry only such manufacturers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. BE's sole responsibility with respect to any Equipment or parts not conforming to this warranty is to replace such equipment or parts upon the return thereof F.O.B. BE's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the services of the Equipment due to its being serviced pursuant to this warranty. The terms of the foregoing warranty shall be null and void if the Equipment has been altered or repaired without specific written authorization of BE, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in BE's product literature or instruction manual which accompany the Equipment purchased. BE shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BE.

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Except as set forth herein, and except as to title, there are no warranties, or any affirmations of fact or promises by BE, with reference to the Equipment, or to merchantability, fitness for a particular application, signal coverage, infringement, or otherwise, which extend beyond the description of the Equipment in BE's product literature or instruction manual which accompany the Equipment. Any card which is enclosed with the Equipment will be used by BE for survey purposes only.

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