
BMX II BMX II BMX II
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Broadcast Console Technical Manual



PR&E Document #75-4



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BMX Series II

Audio Control Console

Professional Price List

Mainframe: Includes housing, power supply, stereo program and audition output amplifiers, control room monitor module, cue speaker, connector kit, spare parts kit, owner's manual, extender module.

| Part # | | Qty. | Price | Extension |
|--------|--|------|---------|-----------|
| 99-148 | 10-Input Mainframe, switchable Stereo Output Meters | | 5105.00 | |
| 99-121 | 14-Input Mainframe, switchable Stereo Output Meters | | 5730.00 | |
| 99-122 | 22-Input Mainframe, Stereo Program & Audition Meters | | 6980.00 | |
| 99-123 | 26-Input Mainframe, Stereo Program & Audition Meters | | 7560.00 | |

Input Modules and Blank Panels: Please note: One blank panel required for each unused input position.

| Part # | | Qty. | Price | Extension |
|--------|--|------|--------|-----------|
| 99-77 | Microphone Input Module | | 551.00 | |
| 99-164 | Line Input Module, Transformerless Instrumentation Input | | 652.00 | |
| 99-78 | Line Input Module, Jensen Transformer Input | | 692.00 | |
| 99-15 | Blank Panel, 1.5" wide | | 30.00 | |

Options and Accessories: Please note: BMX-10 meter panel has two unused cutouts for timers and the mono output VU meter. BMX-14 and 22 have three. BMX-26 has four.

| Part # | | Qty. | Price | Extension |
|--------|---|------|--------|-----------|
| 99-124 | Monaural Output Module with VU Meter & Meter Buffer Amp | | 494.00 | |
| 99-159 | Studio Talkback Monitor Module | | 546.00 | |
| 99-14 | Remote Line Selector Module | | 224.00 | |
| 99-17 | DT-3 Digital Timer | | 275.00 | |
| 99-27 | Timer Control Button Panel | | 105.00 | |
| 99-56 | TD-I Digital Time of Day Clock | | 255.00 | |

Special Options: These modules require special mainframe wiring. The Line Output Assignment Switcher uses left trim panel of Mainframe.

| Part # | | Qty. | Price | Extension |
|---------|---|------|--------|-----------|
| 99-120 | Line Output Assignment Switcher | | 165.00 | |
| 99-140 | Telephone Mix/Monaural Output Module with VU Meter and Meter Buffer Amp | | 830.00 | |
| 76 - 11 | Peak Program Meter in Place of VU Meter | | 185.00 | |

Logic Interface Units: Please note: Each interface is supplied with its own mating connectors and pins. The TT-3 Turntable Interface is supplied with connectors, two 6 foot cables and instructions for the remote control modifications of the Technics model SP-IOMKII and SP-15 turntables.

| Part # | | Qty. | Price | Extension |
|--------|--|------|--------|-----------|
| 99-109 | TCI-1 – Interface for three TOMCAT cartridge recorders or reproducers | | 150.00 | |
| 99-110 | TT-3 – Interface for two TECHNICS model SP-IOMKII or SP-15 turntables | | 155.00 | |
| 99-111 | TI-2 – Interface for tape or cartridge recorder | | 130.00 | |
| 99-125 | CI-2 – Interface for three cartridge play decks | | 150.00 | |
| 99-143 | Solid State Relay Interface for Control Room and Studio Warning Lights | | 190.00 | |

Prefabricated Logic Control Cables: For each piece of equipment to be remote controlled, a cable from the BMX to the interface and a cable from the interface to the equipment are required.

BMX Console to any Interface Unit

| Part # | Length | Qty. | Price | Ext. |
|---------|---------|------|-------|------|
| 99-38-1 | 3 feet | | 17.00 | |
| 99-38-2 | 6 feet | | 20.00 | |
| 99-38-3 | 9 feet | | 23.00 | |
| 99-38-4 | 12 feet | | 26.00 | |
| 99-38-5 | 15 feet | | 29.00 | |
| 99-38-6 | 18 feet | | 32.00 | |
| 99-38-7 | 21 feet | | 35.00 | |
| 99-38-8 | 24 feet | | 38.00 | |

TI-2 Interface to MCI Tape Recorder

| Part # | Length | Qty. | Price | Ext. |
|----------|---------|------|-------|------|
| 99-127-1 | 3 feet | | 21.00 | |
| 99-127-2 | 6 feet | | 24.00 | |
| 99-127-3 | 9 feet | | 27.00 | |
| 99-127-4 | 12 feet | | 30.00 | |
| 99-127-5 | 15 feet | | 33.00 | |
| 99-127-6 | 18 feet | | 36.00 | |

CI-2 Interface to ITC SP & 3D Series Cartridge Reproducer

| Part # | Length | Qty. | Price | Ext. |
|---------|---------|------|-------|------|
| 99-29-1 | 3 feet | | 17.00 | |
| 99-29-2 | 6 feet | | 20.00 | |
| 99-29-3 | 9 feet | | 23.00 | |
| 99-29-4 | 12 feet | | 26.00 | |

CI-2 Interface to ITC 99 Series Cartridge Reproducer

| Part # | Length | Qty. | Price | Ext. |
|----------|---------|------|-------|------|
| 99-130-1 | 3 feet | | 21.00 | |
| 99-130-2 | 6 feet | | 24.00 | |
| 99-130-3 | 9 feet | | 27.00 | |
| 99-130-4 | 12 feet | | 30.00 | |

TCI-Interface to TOMCAT Cartridge Recorder or Reproducer

| Part # | Length | Qty. | Price | Ext. |
|----------|---------|------|-------|------|
| 99-126-1 | 3 feet | | 17.00 | |
| 99-126-2 | 6 feet | | 20.00 | |
| 99-126-3 | 9 feet | | 23.00 | |
| 99-126-4 | 12 feet | | 26.00 | |

TI-2 Interface to ITC RP Series Cartridge Recorder

| Part # | Length | Qty. | Price | Ext. |
|----------|---------|------|-------|------|
| 99-128-1 | 3 feet | | 27.00 | |
| 99-128-2 | 6 feet | | 32.00 | |
| 99-128-3 | 9 feet | | 37.00 | |
| 99-128-4 | 12 feet | | 42.00 | |

TI-2 Interface to ITC Series 99 Cartridge Recorder

| Part # | Length | Qty. | Price | Ext. |
|----------|---------|------|-------|------|
| 99-132-1 | 3 feet | | 23.00 | |
| 99-132-2 | 6 feet | | 26.00 | |
| 99-132-3 | 9 feet | | 29.00 | |
| 99-132-4 | 12 feet | | 32.00 | |

LOGIC INTERFACE & CABLES SUBTOTAL _____

Console Overbridge Kit: Includes all parts, hardware, and pre-finished oak end panels to add overbridge to existing BMX series consoles. Overbridge assembly adds two inches to the overall front to back console dimension, but does not change the installation cut-out dimensions. Overbridge accepts accessory panels 4.75" high by multiples of 1.5" wide. Maximum depth behind panel is 4".

| Part # | | Qty. | Price | Extension |
|----------|--|------|--------|-----------|
| 99-108-2 | Overbridge for BMX-10 mainframe, 24" panel space | | 375.00 | |
| 99-108-3 | Overbridge for BMX-14 mainframe, 30" panel space | | 390.00 | |
| 99-108-5 | Overbridge for BMX-22 mainframe, 42" panel space | | 405.00 | |
| 99-108-6 | Overbridge for BMX-26 mainframe, 48" panel space | | 420.00 | |

Control Turrets: Designed to be attached to studio cabinetry, pre-finished with FORMICA brand laminate and oak end panels. Turret accepts accessory panels 4.75" high by multiples of 1.5" wide. Maximum depth behind panel is 4".

| Part # | | Qty. | Price | Extension |
|---------|--|------|--------|-----------|
| 99-94-1 | Turret, 18" panel space, 22" overall width | | 214.00 | |
| 99-94-2 | Turret, 24" panel space, 28" overall width | | 220.00 | |
| 99-94-3 | Turret, 30" panel space, 34" overall width | | 226.00 | |

| Part # | Overbridge and Turret Accessories | Qty. | Price | Extension |
|----------|--|------|--------|-----------|
| 99-95 | DT-3 Timer w/START, STOP, HOLD, RESET, AUTO buttons mounted on 4.5" wide panel | | 342.00 | |
| 99-96 | DT-3 Timer w/START, STOP, HOLD, RESET buttons mounted on 4.5" wide panel | | 336.00 | |
| 99-146 | DT-3 Timer mounted on 4.5" wide panel | | 290.00 | |
| 99-97 | TD-1 Time of Day Clock mounted on 4.5" wide panel | | 270.00 | |
| 99-98 | Microphone control, ON, OFF, COUGH, TALK-BACK buttons 1.5" wide | | 68.00 | |
| 99-106 | Microphone control, ON, OFF, COUGH buttons, 1.5" wide | | 58.00 | |
| 99-99 | Microphone control, 5 "GUESTS", ON, OFF w/5-selectors, 3" wide | | 96.00 | |
| 99-101 | Stereo Monitor Level, 1.5" wide | | 58.00 | |
| 99-102 | Stereo Headphone Level, 1.5" wide, w/separate jack panel | | 78.00 | |
| 99-160-3 | Monitor Selector Panel With Monitor and Headphone Level Controls, 3" wide | | 390.00 | |
| 99-160-1 | Monitor Selector Panel With Monitor Level Control, 3" wide | | 375.00 | |
| 99-160-2 | Headphone Selector Panel With Level Control, 3" wide | | 375.00 | |
| 99-105-1 | Blank Panel, 1.5" wide | | 6.00 | |
| 99-105-2 | Blank Panel, 3" wide | | 7.00 | |
| 99-105-3 | Blank Panel, 4.5" wide | | 8.00 | |
| 99-105-4 | Blank Panel, 6" wide | | 12.00 | |
| 99-105-6 | Blank Panel, 9" wide | | 15.00 | |
| 99-112 | Power Supply, 12 volts at 3 amps, 6 outputs | | 174.00 | |
| 99-157 | Power Supply, \pm 16 volts DC at 1 amp | | 235.00 | |

TURRET/OVERBRIDGE SUBTOTAL _____

| Part # | Spare Components | Qty. | Price | Extension |
|---------|---|------|--------|-----------|
| 99-11-0 | Control Room Monitor Module with meter switching | | 640.00 | |
| 99-11-2 | Control Room Monitor Module without meter switching | | 640.00 | |
| 99-9-2 | Stereo Line Output Amplifier Module | | 415.00 | |
| 99-8-4 | Monaural Output Amplifier Module | | 329.00 | |
| 99-137 | Telephone Mix/Monaural Output Module | | 665.00 | |
| 99-104 | VU Meter with Bezel and Meter Buffer Amp | | 165.00 | |
| 99-145 | Peak Program Meter with Bezel and Meter Buffer Amp | | 350.00 | |
| 99-73 | Power Supply with 6 foot cable | | 944.00 | |
| 99-76 | Coupling Unit/Status Indicator for Redundant Power Supply | | 355.00 | |
| 76-1-2 | Connector Kit, 10-Input Mainframe | | 67.00 | |
| 76-1-3 | Connector Kit, 14-Input Mainframe | | 74.00 | |
| 76-1-5 | Connector Kit, 22-Input Mainframe | | 87.00 | |
| 76-1-6 | Connector Kit, 26-Input Mainframe | | 94.00 | |
| 76-3 | Spare Parts Kit | | 90.00 | |
| 75-4 | BMX Series II Technical Manual | | 30.00 | |
| 99-16 | Extender Board for Input and Output Modules | | 125.00 | |

| Part # | Copy Stands and Cartridge Holders | Qty. | Price | Extension |
|----------|--|------|--------|-----------|
| 99-50-1 | Copy Stand, 22" Control Turret | | 130.00 | |
| 99-50-2 | Copy Stand, BMX-10 & 28" Control Turret | | 145.00 | |
| 99-50-3 | Copy Stand, BMX-14 & 34" Control Turret | | 155.00 | |
| 99-50-5 | Copy Stand, BMX-22 | | 170.00 | |
| 99-50-6 | Copy Stand, BMX-26 | | 180.00 | |
| 99-149-2 | Sliding Copy Stand, BMX-10 | | 232.00 | |
| 99-149-3 | Sliding Copy Stand, BMX-14 | | 244.00 | |
| 99-149-5 | Sliding Copy Stand, BMX-22 | | 256.00 | |
| 99-149-6 | Sliding Copy Stand, BMX-26 | | 272.00 | |
| 99-150 | Desktop Cartridge Holder, 40 Cartridges | | 174.00 | |
| 99-167 | Desktop Cartridge Holder, 100 Cartridges | | 235.00 | |
| 99-151-2 | Cart Storage Overbridge, BMX-10, 50 Cartridges | | 282.00 | |
| 99-151-3 | Cart Storage Overbridge, BMX-14, 70 Cartridges | | 296.00 | |
| 99-151-5 | Cart Storage Overbridge, BMX-22, 90 Cartridges | | 330.00 | |

SPARE COMPONENTS/COPY STAND SUBTOTAL _____

All prices are in U.S. dollars, FOB Pacific Recorders and Engineering Plant in San Diego, California, U.S.A. Taxes, tariffs and freight charges are not included. All prices and specifications are subject to change without notice.

BMX II BROADCAST OPERATIONS CONSOLE TECHNICAL MANUAL

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This listing provides a reference of current pages of this document, and their revision numbers (i.e., A.1, A.2, etc.). When a revision to this document is received from PR&E, simply replace the old pages with the new ones, discard the old pages, and post the new status page in the front of this manual (**NOTE:** It may be desirable to retain replaced status pages in order to have a record of document changes). If deemed necessary by PR&E's Engineering Department, comment information relating to any change may also be included on this page.

| <u>Page No.</u> | <u>Revision</u> | <u>Comments</u> |
|-----------------|-----------------|---|
| ALL | A | New Release. |
| ALL | B | Added Transformerless Stereo Line Output Amplifier specifications, equipment description, replacement parts and schematics. |
| Page 103 | B-1 | New Universal Power Supply schematic. |



PACIFIC RECORDERS
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REVISION B-1

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BMX SERIES II CONSOLE TECHNICAL MANUAL

1.0 GENERAL INFORMATION

This chapter contains an introduction to the BMX Series II Broadcast Operations Console Technical Manual, an overview of the BMX II's features, specifications and warranty information.

1.1 INTRODUCTION

Congratulations on your decision to join the growing ranks of Pacific Recorders & Engineering Corporation (PR&E) broadcasters. PR&E is in the business of supplying the finest audio systems to the world's leading broadcast facilities. Your decision to go with PR&E means that you expect more than simple working hardware. Please be assured that it is our strong desire to provide each of our customers with the kind of products, systems, documentation and support that we would specify if we were in your position.

We invite your comments and suggestions for improvement of this document, and of all our services. By constant attention to our customer's needs, we will continue to earn our reputation for excellence, and to refine our understanding of the requirements of the marketplace.

This manual is designed to provide the information required to understand, install, operate and maintain the BMX Series II Broadcast Operations Console. It is assumed that the reader has a working knowledge of audio control consoles, systems and installation practices.

The BMX II console is a very sophisticated device with an extensive range of features and capabilities. To obtain the maximum benefit of the console's capabilities, it is strongly recommended that the Installation, Operation, and Equipment Description chapters of this manual be read thoroughly prior to installing the console.

Each BMX II console is specifically configured to the customer's requirements, thoroughly tested, and "burned-in" prior to packing for shipment. Should you encounter any difficulty during installation or initial operation, we recommend that you contact PR&E for assistance.

1.2 DESCRIPTION

The BMX II console is designed with the capacity to accomplish almost any type of stereo on-air audio control task in a radio broadcast facility. In addition, patch points are supplied for all input modules and line output amplifiers for the insertion of processing equipment, giving this console the capability for creative production as well.

Functionally, mechanically and electronically the BMX II provides the maximum value in performance and features, and is currently being produced in five mainframe sizes, which will accommodate 10, 14, 18, 22 or 26 input modules. Highest quality components and circuit designs are used throughout the console, and the gain structure of the console has been designed so that normal operation is easily handled without any danger of internal clipping while operating the amplifiers at optimum signal to noise conditions.

In order to realize the full potential of the BMX II console, it is important that the user become fully acquainted with the extensive audio and logic control functions available. The console block diagram and module schematics, located in Chapter 7 of this document, show the audio signal flow and the extensive logic control inputs and outputs which are available to the user. These can be very useful in determining how to best utilize your BMX II console, and as a reference to understanding the operating functions and features.

The input modules accommodate the range of input levels normally found in broadcast operations, without the use of external pads or amplifiers. A patch point is provided for each input position after the input amplifier and before the fader. This is the optimum point at which to insert external processing devices such as limiters and equalizers. Patch points are also provided for each main output channel (after the mixing amplifier and before the line output amplifiers).

All console inputs and program outputs are balanced, for best noise rejection and simplified system grounding. When properly installed using the information in this manual, the BMX II console is free of internal pops, clicks, and RFI.

The separately packaged power supply is fully regulated and is protected with magnetic circuit breakers, as well as electronic safeguards against excessive current and line voltage fluctuations. The power supply provides four separate voltage outputs. Two of these outputs (± 16 volts) are used to power the audio circuitry. The third output (+12 volts) is used to power the logic control circuitry, lamps and relays. The fourth output (+48 volts) is for the phantom powering of condenser microphones connected to the Microphone Input Modules.

NOTE: The BMX Series II console differs from the BMX Series I console in the following respects:

MICROPHONE INPUT MODULE

- A) Remote control TALKBACK via the CUE system was added.
- B) Separate remote control lines for ON, OFF, COUGH and TALKBACK are brought out to the LOGIC connector for both the "A" and "B" inputs.
- C) Mute/Talkback status is selected by a Logic Options Switch on each module.

STEREO LINE INPUT MODULE

- A) CUE circuitry is logic controlled and CUE function is remote controllable.



- B) Logic control status is assignable to either or both of the "A" and "B" inputs by a Logic Options Switch on each module.

MAINFRAME

- A) Four non-dedicated Molex connectors, labeled Option 1-4, have been added to the back panel. These are utilized for the optional Telco Mix Module or for custom applications by user or factory.
- B) New mainframe logic cables are used to accommodate the expanded logic features of the Series II system.

These changes required a change in the pin-out assignments of the mainframe logic wiring harnesses. Therefore, BMX Series I Microphone and Line Input Modules are not compatible with the BMX Series II console mainframe. All the other console modules are interchangeable between the two series.

NOTE: BMX Series I Microphone and Stereo Line Input Modules may be modified to make them electrically compatible with the BMX Series II mainframe. Contact PR&E's Customer Service Department for a copy of this modification procedure (PR&E #71-7).

1.3 SPECIFICATIONS

Following is a list of specifications for the BMX II Broadcast Operations Console:

NOTE: In July of 1989 PR&E began equipping BMX II consoles with a transformerless version of the Stereo Line Output Amplifier (PR&E #99-321-2). In those instances where specifications for consoles equipped with this new module and those equipped with the transformer version (PR&E #99-9-2) differ, both specifications are provided. In order to determine with which version a console shipped after July of 1989 is equipped, consult the "Notes" section of BMX II Test Data Sheet (provided with the console).

MICROPHONE INPUT

| | |
|-------------------|---|
| Source Impedance | 150 ohms. |
| Input Impedance | 1000 ohms minimum, balanced. |
| Input Level Range | Adjustable from -60 dBu to -35 dBu. |
| Input Headroom | Greater than 30 dB above nominal input. |

HIGH LEVEL INPUTS

| | |
|-----------------------|---|
| Source Impedance | 600 ohms. |
| Input Impedance: | |
| Transformer Input | 10K ohms, balanced and floating. |
| Instrumentation Input | Greater than 40K ohms, balanced and floating. |



Input Level Range:

Line Input Module
Monitor Input Modules
Patch Return Inputs

Adjustable from -12 dBu to +8 dBu.

Nominal +4 dBu/+8 dBu.

Nominal -10 dBu.

Input Headroom

Greater than 30 dB above nominal input.

MAIN OUTPUTS

Load Impedance

600 ohms and greater.

Source Impedance

95 ohms, balanced, transformer coupled.

Output Level Range

Adjustable from +4 dBu to +8 dBu.

Maximum Output Levels:

Line Output Amplifiers

+26 dBm, 600 ohm load (Transformerless Output Amplifier).

+28 dBm, 600 ohm load (Transformer Output Amplifier).

+26 dBm, 600 ohm load.

Telco Mix Module

MONITOR OUTPUTS

Main Outputs:

Load Impedance
Source Impedance
Output Level

600 ohms or greater.

30 ohms, unbalanced.

0 dBu nominal, +20 dBu maximum.

Headphone Outputs:

Load Impedance
Source Impedance
Output Level

45 ohms or greater.

Less than 4 ohms.

0 dBu nominal, +20 dBu maximum.

FREQUENCY RESPONSE

Microphone Input to Program Output

+0 dB, -0.9 dB, 20 Hz to 20 kHz.

Line Input to Program Output

+0 dB, -0.8 dB, 20 Hz to 20 kHz.

NOISE

Microphone Input Amplifier

-127 dBu RMS equivalent input noise, 150 ohm source, 20 kHz bandwidth.

Line Input Amplifier

-88 dBu RMS equivalent input noise, 600 ohm source, 20 kHz bandwidth.

Output Noise with one microphone channel ON, fader at -15 dB, input sensitivity at -50 dBu.

76 dB below output, reference +8 dBu, 150 ohm source, 20 kHz bandwidth.



PACIFIC RECORDERS
& ENGINEERING CORPORATION

Output Noise with one line channel ON, fader at -15 dB, input sensitivity at +8 dBu.

80 dB below output, reference +8 dBu, 600 ohm source, 20 kHz bandwidth.

Output Noise with no input channels ON

82 dB below output, reference +8 dBu, 20 kHz bandwidth.

DISTORTION. T.H.D.

Mic Input to Program Output
(Transformerless Output Amplifier)

Less than 0.02%, 20 Hz to 20 kHz, -50 dBu input, +8 dBu output into 600 ohm load, 80 kHz meter bandwidth; less than 0.01% at 1 kHz, +26 dBu output.

Mic Input to Program Output
(Transformer Output Amplifier)

Less than 0.02%, 20 Hz to 20 kHz, -50 dBu input, +8 dBu output into 600 ohm load, 80 kHz meter bandwidth; less than 0.01% at 1 kHz, +28 dBu output .

Line Input to Program Output
(Transformerless Output Amplifier)

Less than 0.008%, 20 Hz to 20 kHz, +8 dBu input, +8 dBu output into 600 ohm load, 80 kHz meter bandwidth; less than 0.01% at 1 kHz, +26 dBu output.

Line Input to Program Output
(Transformer Output Amplifier)

Less than 0.008%, 20 Hz to 20 kHz, +8 dBu input, +8 dBu output into 600 ohm load, 80 kHz meter bandwidth; less than 0.01% at 1 kHz, +28 dBu output.

DISTORTION. I.M.D.

Mic Input to Program Output
(Transformerless Output Amplifier)

Less than 0.02 % at +26 dBu, 20 Hz to 20 kHz.

Mic Input to Program Output
(Transformer Output Amplifier)

Less than 0.025 % at +8 dBu; less than 0.03 % at +28 dBu, 30 Hz to 20 kHz.

Line Input to Program Output
(Transformerless Output Amplifier)

Less than 0.01 % at +26 dBu, 20 Hz to 20 kHz.

Line Input to Program Output
(Transformer Output Amplifier)

Less than 0.015 % at +8 dBu; less than 0.3 % at +28 dBu, 30 Hz to 20 kHz.

CROSSTALK

Interchannel Crosstalk

Less than -85 dB at 1 kHz; less than -75 dB at 20 kHz.

POWER REQUIREMENTS

| | | |
|-------------------------------|--------------------------|------------|
| 120 VAC, $\pm 8\%$, 50/60 Hz | BMX-10, fully configured | 300 watts. |
| | BMX-14, fully configured | 330 watts. |
| | BMX-18, fully configured | 360 watts. |
| | BMX-22, fully configured | 390 watts. |
| | BMX-26, fully configured | 420 watts. |

NOTES:

- A) These specifications are for the basic signal paths, per channel, with either or both channels of a stereo pair operating, and with 600 ohm loads connected to the program outputs.
- B) 0 dBu corresponds to an amplitude of 0.775 volts RMS regardless of the impedance of the circuit. It is the same voltage value as 0 dBm measured in a 600 ohm circuit. This enables convenient level measurement with meters calibrated for 600 ohm circuits.
- C) Noise specifications are for a 14-input console; larger consoles will have slightly reduced signal to noise ratios due to increased summing amplifier gain. Noise specifications are based upon a 20 kHz measurement bandwidth; the use of a meters with 30 kHz bandwidth will result in a noise measurement increase of approximately 1.7 dB.

Pacific Recorders & Engineering Corporation reserves the right to change specifications without notice or obligation.

1.4 WARRANTY INFORMATION

This product carries a manufacturer's warranty which is subject to the following guidelines and limitations:

- A) Except as expressly excluded hereinafter, Pacific Recorders & Engineering Corporation ("Seller") warrants equipment of its own manufacture against faulty workmanship or the use of defective materials for a period of one (1) year from date of shipment to Buyer. The liability of the Seller under this Warranty is limited to replacing, repairing or issuing credit (at the Seller's discretion) for any equipment, provided that Seller is promptly notified in writing within five (5) days upon discovery of such defects by Buyer, and Seller's examination of such equipment shall disclose to its satisfaction that such defects existed at the time shipment was originally made by Seller, and Buyer returns the defective equipment to Seller's place of business in Carlsbad, California, packaging and transportage prepaid, with return packaging and transportage guaranteed.
- B) Equipment furnished by Seller but manufactured by another shall be warranted only to the extent provided by the other manufacturer.
- C) Thermal filament devices such as lamps and fuses are expressly excluded from this warranty.

- D) The warranty period on equipment or parts repaired or replaced under warranty shall expire upon the expiration date of the original warranty.
- E) This Warranty is void for equipment which has been subject to abuse, improper installation, improper operation, improper or omitted maintenance, alteration, accident, negligence (in use, storage, transportation or handling), operation not in accordance with Seller's operation and service instructions, or operation outside of the environmental conditions specified by Seller.
- F) This Warranty is the only warranty made by Seller, and is in lieu of all other warranties, including merchantability and fitness for a particular purpose, whether expressed or implied, except as to title and to the expressed specifications contained in this manual. Seller's sole liability for any equipment failure or any breach of this Warranty is as set forth in subparagraph A) above; and Seller shall not be liable or responsible for any business loss or interruption, or other consequential damages of any nature whatsoever, resulting from any equipment failure or breach of this warranty.



2.0 INSTALLATION

This chapter provides instruction in the proper installation of the BMX II console. Included are sections describing general installation guidelines, cable preparation, mainframe configuration, grounding and shielding, power connection, patch point connection, audio and logic connection, remote control capabilities, and module internal option switches.

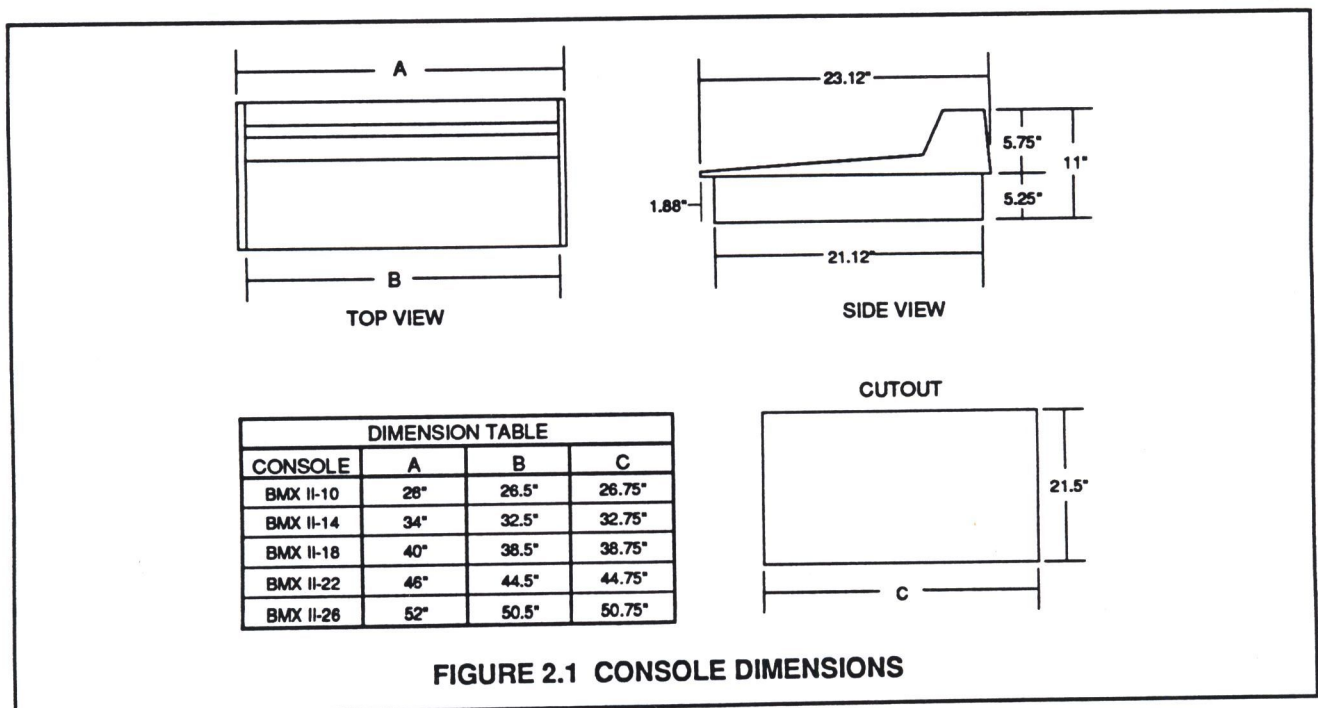
2.1 GENERAL GUIDELINES

The BMX II should be carefully unpacked and inspected for any shipping damage. If the inspection reveals any damage, immediately file a claim with the delivering carrier. The packing material should be kept as evidence of mishandling, as well as to allow return of the equipment to the factory, if necessary.

Included with the console are spare parts kits (as described in Chapter 5), and the appropriate connector kit, which contains all of the Molex connector housings and pins necessary to prepare the audio input/output and logic cables (as described in Section 2.2), along with the crimping, pin extraction and module removal tools.

The console mainframe is installed by setting it into a cutout in the work surface of the studio cabinetry (console and cutout dimensions are provided in Figure 2.1). Prior to installing the mainframe, a final check should be made to confirm that the cutout dimensions are correct. Also, be sure that the cabinetry is in its proper position and leveled, as it is unlikely that the cabinetry can be moved, squared or leveled once the weight of the console has been added.

NOTE: The cabinetry in which the BMX II is to be mounted must be of sufficiently sturdy construction to support the console.



The mainframe is supported by the hardwood oak end panels, and is actually suspended between these two panels, with the front oak piece serving only as trim molding.

NOTE: Care should be taken to avoid locating the console within six feet of any intense electromagnetic hum fields such as are produced by large power transformers and motors. Likewise, cables to and from the console should be routed to achieve maximum practical distance from AC mains power wiring. Particular attention should be paid to some of the low-cost, supposedly “professional”, power amplifiers which have appeared in the marketplace. In many cases the low cost has been partially achieved through the use of small core power transformers operating on the edge of saturation. While these units may operate to their own specifications, the electromagnetic fields they radiate may impair the performance of the console, neighboring turntables, tape recorders and cartridge machines.

Signal, logic and power connections are made to the connector panel located at the rear of the console. This panel is recessed to provide the installer flexibility of wire routing in console installation.

The power supply is usually installed in the console support cabinetry using EIA standard rack rails. Adequate ventilation must be provided for the proper dissipation of heat. The power supply is designed for convection cooling by the two rectifier/regulator heat sinks located on opposite sides of the chassis. Large heat sinks were chosen over the use of fans to eliminate the problems of dust circulation, noise, and potential mechanical failure associated with fan cooling.

2.2 CABLE PREPARATION

Before beginning the installation, a plan should be drawn up showing how the system will be interconnected. All cables and connectors should be tagged with numbers and/or legends, and logged.

Only unspliced (preferably new) cables should be used in connecting the mainframe. Audio connections should be made with two-conductor stranded insulated foil shielded cable with drain wire. The cable used should be equivalent to Belden types 8451, 9451, or 8761.

Strip the cable insulation jacket and foil shield back about 1-1/2 inches, and sleeve the shield drain wire with heat-shrink tubing, leaving about 3/16 inch of the wire exposed. Then, strip the insulation of each signal wire back about 3/16 inch, and sleeve the shield (at cable ends) with heat-shrink tubing.

NOTE: It is very important to sleeve the shield drain wire and the shield (at cable ends) with heat-shrink tubing. This is the only means of assuring an installation according to recommended grounding procedures.

The Molex pins are designed so that the short tab “ears” are crimped onto the stripped wire to make the electrical connection, while the long “ears” are crimped over the insulated section of the wire to help support the connection.

In order to crimp, insert the short ears of the Molex crimp pin into notch “B” of the crimping tool (PR&E #70-3), with the ears pointing toward the letter “B”. Insert the wire into the terminal so that the stripped



portion is between the short crimp ears, and the insulation is between the long crimp ears. Crimp the short ears.

Now place the long ears of the pin into tool notch "A", with the ears pointing toward the letter "A". Crimp the long ears over the insulated section of wire. See Figure 2.2 for an example of a properly crimped Molex pin.

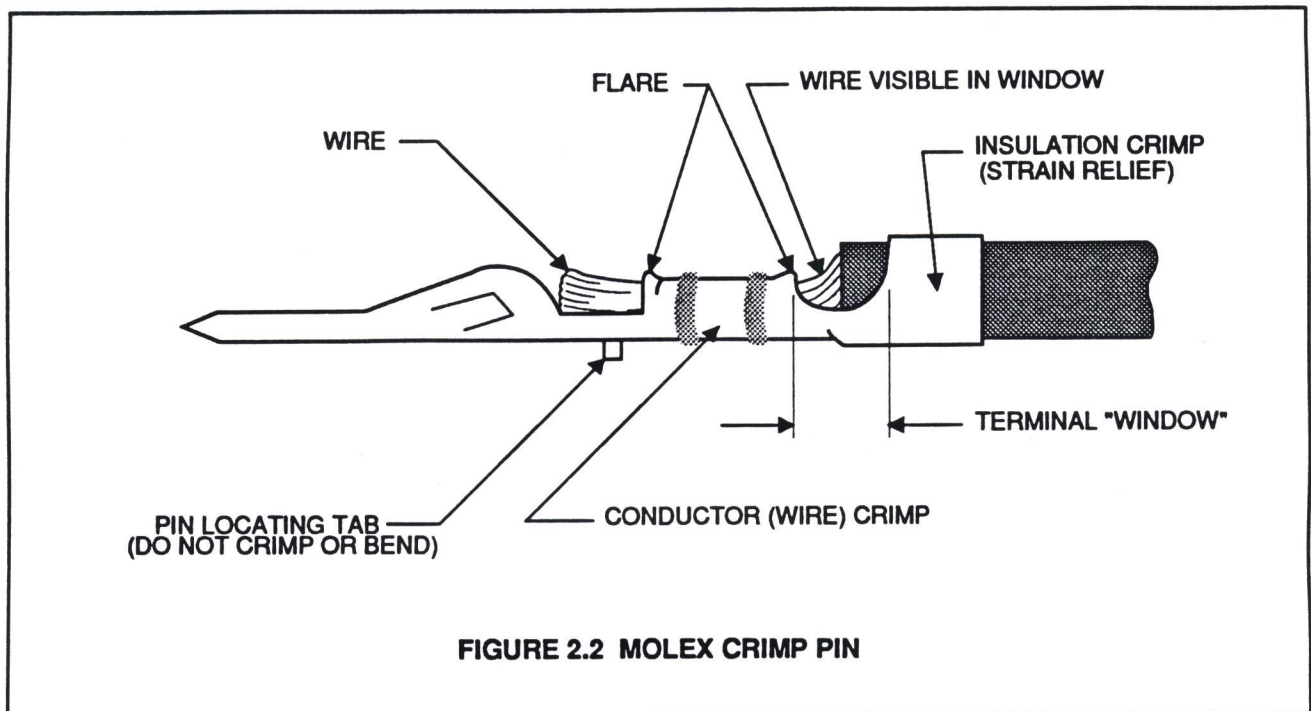


FIGURE 2.2 MOLEX CRIMP PIN

NOTE: When using Molex Crimping Tool #HTR-1719-C (PR&E #70-5), place a pin into slot "B" with the long ears on the "B" side of the tool and pointing toward the letter "B". Place the wire into the tool from the "B" side, and then crimp the pin.

Logic control cables should be fabricated in a similar manner using 22 gauge multiple conductor, non-shielded, jacketed cable. The number of conductors required will be determined by application.

Once the pins are crimped, they may be inserted and locked into the nylon connector housings in accordance with the pin-out diagrams contained in Section 2.7. A click can be felt indicating that the locking ears on the pin have set. If a pin is inserted in the wrong connector position, or it is desired to make a circuit change, use the connector pin extractor tool (PR&E #70-4) to release the pin and press it out of the connector housing.

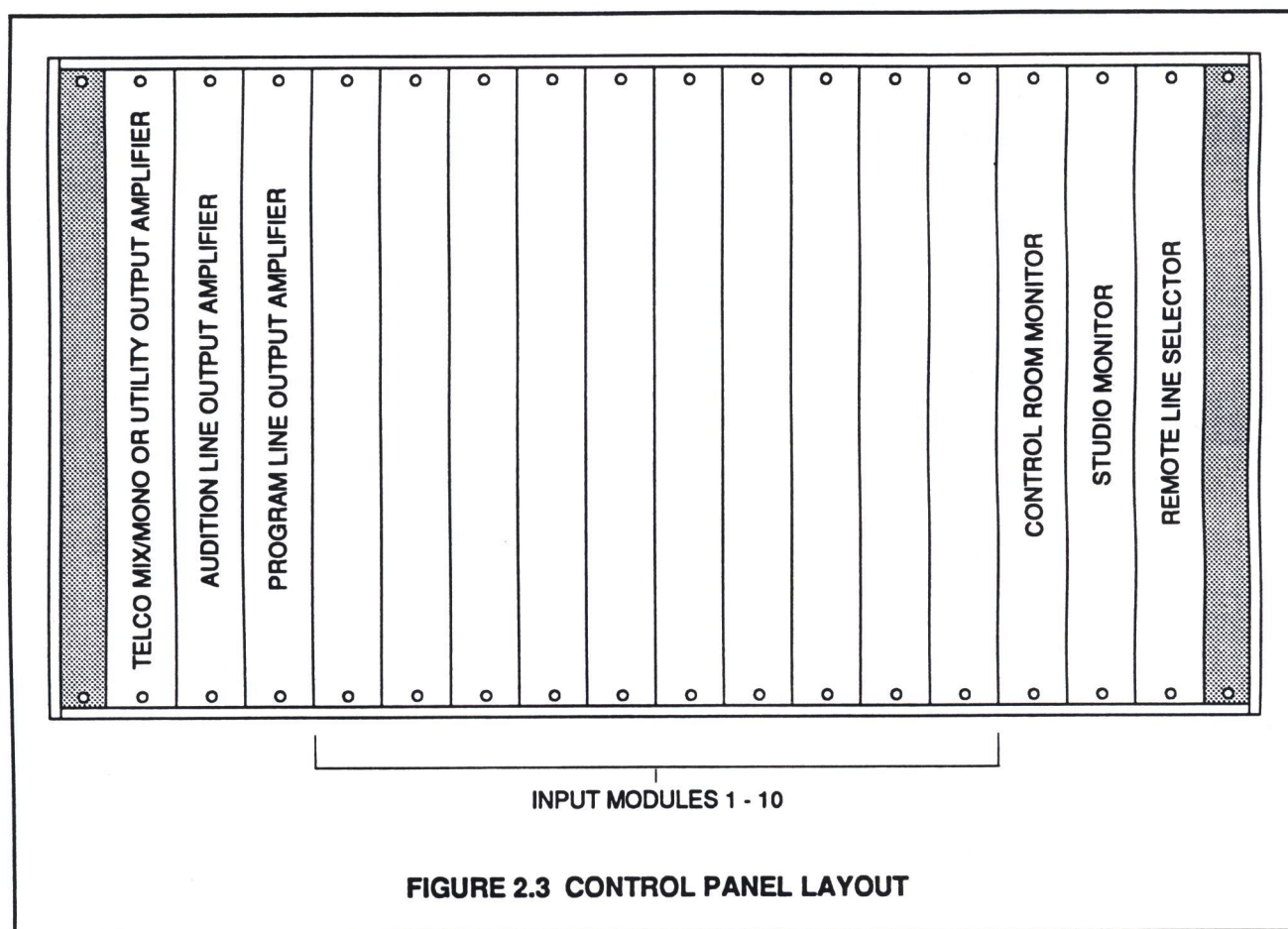
2.3 MAINFRAME CONFIGURATION

Each BMX II mainframe is factory configured to the customer's order by the installation of microphone input, line input and other modules in their specified and/or dedicated locations. This section contains descriptions of the BMX II mainframe's control panel, meter panel, and connector panel.

2.3.1 Control Panel

Figure 2.3 illustrates the control panel layout of a BMX II-10 console. The positions identified by module names are dedicated to those modules only, and will not accept any other type of plug-in module. The positions indicated by shading are supplied with blank panels, unless timer remote controls or other panel options have been ordered and installed at the factory.

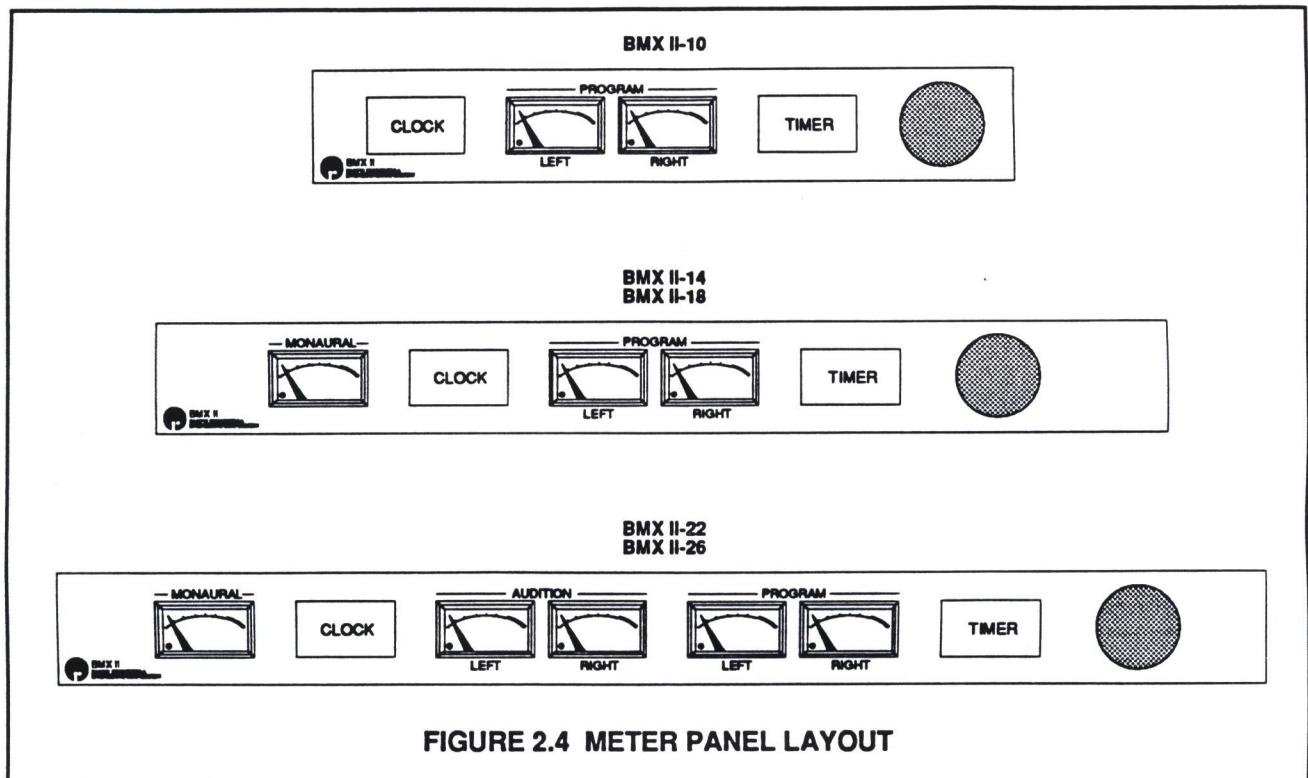
The Telco Mix/Monaural Output, Utility Output Amplifier, Studio Monitor and Remote Line Selector Modules are optional. Blank panels are supplied for these positions when the modules are not present.



2.3.2 Meter Panel

Figure 2.4 illustrates the layout of the meter panels for the entire range of BMX II consoles. A Meter Switch located on the Control Room Monitor Module is used to select the source displayed by the PROGRAM meters on the BMX II-10, -14 and -18 mainframe sizes.

Blank filler panels are supplied for any unused clock, timer or monaural VU meter position.

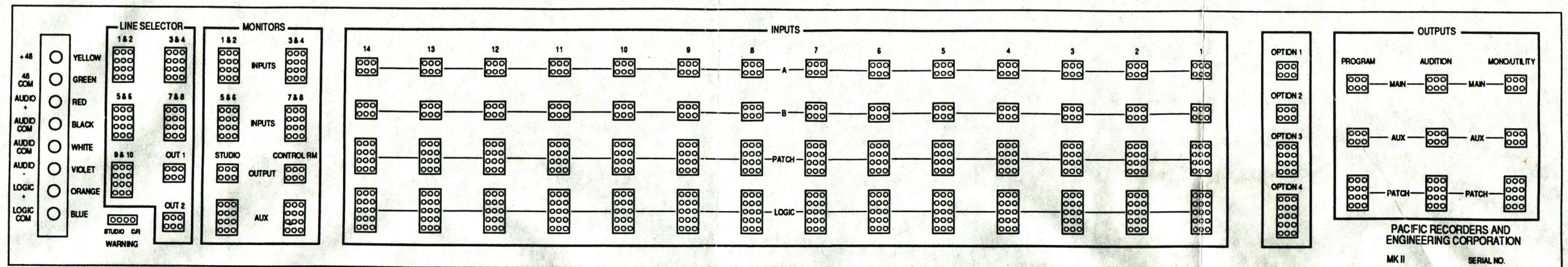


2.3.3 Connector Panel

Figure 2.5 (on the following page) illustrates the Molex connector panel for a BMX II-14 console, and is intended to provide the installer with a map to the location of the various groups of connectors on the panel. As a general rule, the connectors for any given module are located on the panel behind that module's position in the mainframe.

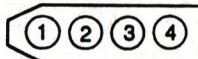
The connectors labeled **OPTION** are used for system interconnection and/or the outputs of the optional Telco Mix/Monaural Output Module.

NOTE: Audio and logic pin assignment information is provided as a quick reference only. When connecting the console, it is highly recommended that the complete information contained in Section 2.7 be used as a thorough guideline.



MOLEX CONNECTORS (REAR VIEW)

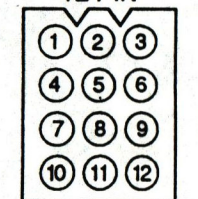
4 PIN



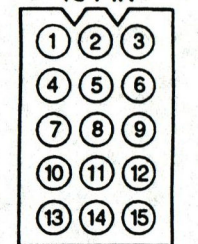
6 PIN



12 PIN



15 PIN



| REMOTE LINE SELECTOR AUDIO PIN ASSIGNMENT | | | | |
|---|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Input 1/Left | 1 & 2 | 1 | 2 | 3 |
| Input 1/Right | 1 & 2 | 4 | 5 | 6 |
| Input 2/Left | 1 & 2 | 7 | 8 | 9 |
| Input 2/Right | 1 & 2 | 10 | 11 | 12 |
| Input 3/Left | 3 & 4 | 1 | 2 | 3 |
| Input 3/Right | 3 & 4 | 4 | 5 | 6 |
| Input 4/Left | 3 & 4 | 7 | 8 | 9 |
| Input 4/Right | 3 & 4 | 10 | 11 | 12 |
| Input 5/Left | 5 & 6 | 1 | 2 | 3 |
| Input 5/Right | 5 & 6 | 4 | 5 | 6 |
| Input 6/Left | 5 & 6 | 7 | 8 | 9 |
| Input 6/Right | 5 & 6 | 10 | 11 | 12 |
| Input 7/Left | 7 & 8 | 1 | 2 | 3 |
| Input 7/Right | 7 & 8 | 4 | 5 | 6 |
| Input 8/Left | 7 & 8 | 7 | 8 | 9 |
| Input 8/Right | 7 & 8 | 10 | 11 | 12 |
| Input 9/Left | 9 & 10 | 1 | 2 | 3 |
| Input 9/Right | 9 & 10 | 4 | 5 | 6 |
| Input 10/Left | 9 & 10 | 7 | 8 | 9 |
| Input 10/Right | 9 & 10 | 10 | 11 | 12 |
| Output 1/Left | OUT-1 | 1 | 2 | 3 |
| Output 1/Right | OUT-1 | 4 | 5 | 6 |
| Output 2/Left | OUT-2 | 7 | 8 | 9 |
| Output 2/Right | OUT-2 | 10 | 11 | 12 |

| WARNING CONNECTOR LOGIC PIN ASSIGNMENT | |
|--|------------|
| Function | Pin Number |
| Logic Common | 1 |
| Studio WARNING Command | 2 |
| Logic Common | 3 |
| Control Room WARNING Command | 4 |

| MONITOR INPUT AUDIO PIN ASSIGNMENT | | | | |
|------------------------------------|--------------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Input 1/Left | INPUTS 1 & 2 | 1 | 2 | 3 |
| Input 1/Right | INPUTS 1 & 2 | 4 | 5 | 6 |
| Input 2/Left | INPUTS 1 & 2 | 7 | 8 | 9 |
| Input 2/Right | INPUTS 1 & 2 | 10 | 11 | 12 |
| Input 3/Left | INPUTS 3 & 4 | 1 | 2 | 3 |
| Input 3/Right | INPUTS 3 & 4 | 4 | 5 | 6 |
| Input 4/Left | INPUTS 3 & 4 | 7 | 8 | 9 |
| Input 4/Right | INPUTS 3 & 4 | 10 | 11 | 12 |
| Input 5/Left | INPUTS 5 & 6 | 1 | 2 | 3 |
| Input 5/Right | INPUTS 5 & 6 | 4 | 5 | 6 |
| Input 6/Left | INPUTS 5 & 6 | 7 | 8 | 9 |
| Input 6/Right | INPUTS 5 & 6 | 10 | 11 | 12 |
| Input 7/Left | INPUTS 7 & 8 | 1 | 2 | 3 |
| Input 7/Right | INPUTS 7 & 8 | 4 | 5 | 6 |
| Input 8/Left | INPUTS 7 & 8 | 7 | 8 | 9 |
| Input 8/Right | INPUTS 7 & 8 | 10 | 11 | 12 |

| STUDIO MONITOR AUDIO PIN ASSIGNMENT | | | | |
|-------------------------------------|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Output w/Level Cont./Left | OUTPUT | 1 | 2 | 3 |
| Output w/Level Cont./Right | OUTPUT | 4 | 5 | 6 |
| Direct Output w/mute/Left | AUX | 1 | 2 | 3 |
| Direct Output w/mute/Right | AUX | 4 | 5 | 6 |
| Direct Output w/o mute/Left | AUX | 7 | 8 | 9 |
| Direct Output w/o mute/Right | AUX | 10 | 11 | 12 |

| CONTROL ROOM MONITOR AUDIO PIN ASSIGNMENT | | | | |
|---|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Monitor Output/Left | OUTPUT | 1 | 2 | 3 |
| Monitor Output/Right | OUTPUT | 4 | 5 | 6 |
| Headphone Output/Left | AUX | 1 | 2 | 3 |
| Headphone Output/Right | AUX | 4 | 5 | 6 |
| Cue Amp Output | AUX | 7 | 8 | 9 |
| Cue Speaker Input | AUX | 10 | 11 | 12 |

| MIC INPUT MODULE AUDIO PIN ASSIGNMENT | | | | |
|---------------------------------------|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Microphone A | A INPUT | 1 | 2 | 3 |
| -No Connection- | A INPUT | 4 | 5 | 6 |
| Microphone B | B INPUT | 1 | 2 | 3 |
| -No Connection- | B INPUT | 4 | 5 | 6 |
| Patch Send | PATCH | 1 | 2 | 3 |
| -No Connection- | PATCH | 4 | 5 | 6 |
| Patch Return | PATCH | 7 | 8 | 9 |
| -No Connection- | PATCH | 10 | 11 | 12 |

| MIC INPUT MODULE LOGIC PIN ASSIGNMENT | |
|---------------------------------------|------------|
| Function | Pin Number |
| Logic Common | 1 |
| Logic +12 VDC | 2 |
| ON | 3 |
| OFF | 4 |
| ON Tally | 5 |
| OFF Tally | 6 |
| COUGH | 7 |
| TALKBACK | 8 |
| ON | 9 |
| OFF | 10 |
| ON Tally | 11 |
| OFF Tally | 12 |
| COUGH | 13 |
| TALKBACK | 14 |
| -No Connection- | 15 |

| LINE INPUT MODULE AUDIO PIN ASSIGNMENT | | | | |
|--|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Input A/Left | A INPUT | 1 | 2 | 3 |
| Input A/Right | A INPUT | 4 | 5 | 6 |
| Input B/Left | B INPUT | 1 | 2 | 3 |
| Input B/Right | B INPUT | 4 | 5 | 6 |
| Patch Send/Left | PATCH | 1 | 2 | 3 |
| Patch Send/Right | PATCH | 4 | 5 | 6 |
| Patch Return/Left | PATCH | 7 | 8 | 9 |
| Patch Return/Right | PATCH | 10 | 11 | 12 |

| LINE INPUT MODULE LOGIC PIN ASSIGNMENT | |
|--|------------|
| Function | Pin Number |
| Logic Common | 1 |
| Logic +12 VDC | 2 |
| ON | 3 |
| OFF | 4 |
| ON Tally | 5 |
| OFF Tally | 6 |
| READY | 7 |
| AUDIO RESET TO OFF | 8 |
| CUE | 9 |
| START PULSE | 10 |
| STOP PULSE | 11 |
| CUE Tally | 12 |
| -No Connection- | 13 |
| -No Connection- | 14 |
| -No Connection- | 15 |

| OPTION 4 CONNECTOR AUDIO PIN ASSIGNMENT | | | | |
|---|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Talkback Preamp Output | OPTION 4 | 1 | 2 | 3 |

| OPTION 4 CONNECTOR LOGIC PIN ASSIGNMENT | |
|---|------------|
| Function | Pin Number |
| Logic Common | 5 |
| Remote TALKBACK Command | 6 |
| Logic Common | 8 |
| Remote Studio MUTE Command | 9 |

| STEREO OUTPUT AMPLIFIER AUDIO PIN ASSIGNMENT | | | | |
|--|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Main Output/Left | MAIN | 1 | 2 | 3 |
| Main Output/Right | MAIN | 4 | 5 | 6 |
| Aux Output/Left | AUX | 1 | 2 | 3 |
| Aux Output/Right | AUX | 4 | 5 | 6 |
| Patch Send/Left | PATCH | 1 | 2 | 3 |
| Patch Send/Right | PATCH | 4 | 5 | 6 |
| Patch Return/Left | PATCH | 7 | 8 | 9 |
| Patch Return/Right | PATCH | 10 | 11 | 12 |

| MONAURAL OUTPUT AMPLIFIER AUDIO PIN ASSIGNMENT | | | | |
|--|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Main Output | MAIN | 1 | 2 | 3 |
| -No Connection- | MAIN | 4 | 5 | 6 |
| Aux Output | AUX | 1 | 2 | 3 |
| -No Connection- | AUX | 4 | 5 | 6 |
| Patch Send | PATCH | 1 | 2 | 3 |
| -No Connection- | PATCH | 4 | 5 | 6 |
| Patch Return | PATCH | 7 | 8 | 9 |
| -No Connection- | PATCH | 10 | 11 | 12 |

| TELCO MIX MODULE AUDIO PIN ASSIGNMENT | | | | |
|---------------------------------------|-----------|------------|-----|------|
| Signal | Connector | Pin Number | | |
| | | Shield | Low | High |
| Telephone Monitor Output, Direct | OPTION 1 | 1 | 2 | 3 |
| Telephone Monitor Output, Att. | OPTION 1 | 4 | 5 | 6 |
| Send to Hybrid #1 | OPTION 2 | 1 | 2 | 3 |
| Send to Hybrid #2 | OPTION 2 | 4 | 5 | 6 |
| PROGRAM Patch Send/Left | OPTION 3 | 1 | 2 | 3 |
| PROGRAM Patch Send/Right | OPTION 3 | 4 | 5 | 6 |
| AUDITION Patch Send/Left | OPTION 3 | 7 | 8 | 9 |
| AUDITION Patch Send/Right | OPTION 3 | 10 | 11 | 12 |

NOTE: Audio and logic pin assignment information is provided here as a quick reference only. When connecting the console, it is highly recommended that the complete information contained in Section 2.7 be used as a thorough guideline.

FIGURE 2.5 CONNECTOR PANEL LAYOUT

2.4 GROUNDING AND SHIELDING

Grounding in modern broadcast consoles is more critical than with older devices of more limited band-pass capabilities. Achieving low system ground impedance with a small piece of equipment is relatively easy. However, the problem becomes progressively more difficult as the system becomes larger. In designing the BMX II, much thought was given to system grounding requirements and the elimination of DC path ground loops.

The shield pins on each console connector are connected directly to the console mainframe ground, and the only location where the console mainframe ground meets the console's "audio common" point is the power terminal strip on the console mainframe. Therefore, the station's "technical ground" should be connected to either of the two screw terminals labeled "AUDIO COMMON" on the console power terminal strip.

NOTE: Do not connect the station's "technical ground" to any terminals on the power supply terminal strip.

A preferred method of connecting the line shields in a system is to connect **both** ends of every shield to **all** affiliated equipment. However, this method is only satisfactory if every component shares a common earth ground. This can be accomplished using isolated ground receptacles tied to the station's "technical ground".

If isolated ground receptacles are not available when grounding the BMX II, observe the following guidelines:

- A) Shields of cables connecting the console to auxiliary equipment should be connected at the console end only, and should not be terminated to the ground of the auxiliary equipment.
- B) Ensure that the auxiliary equipment is connected to a "clean" ground by its power cord assembly, or by the addition of a separate ground wire connected between the chassis of the auxiliary equipment and the station's "technical ground".

NOTE: Buzz pickup is generally electrostatic, due to capacitive pickup between an audio line and a power line. When shielded lines are used this should be no problem, unless the audio lines are run in the same wire-way or area as a power line. Radio-frequency interference can also manifest itself as a buzz in the program audio. RF interference is minimized by the extensive RF bypassing and ground-plane techniques used in the BMX II, and the shielded lines external to the unit.

2.5 POWER CONNECTION

The power outlet for the BMX II power supply should be assigned for the BMX II exclusively. Confirm that the outlet supplies 120 VAC, $\pm 8\%$, 50/60 Hz, and that the voltage does not sag under a load of up to 5 amperes. The third pin "U-ground" on the power connector must be left intact and connected to a properly installed three way AC outlet. For safety, the "U-ground" wire is connected to the chassis of

the power supply and the cores of the power transformers.

WARNING: Do not defeat the safety ground in any way. To do so may provide a potentially dangerous condition to the operator.

NOTE: The DC outputs of the power supply are not referenced to the power supply chassis and, therefore, are completely floating from the AC safety ground.

The AC mains cord should be kept away from low level audio wiring to avoid the possibility of inducing hum into that wiring. Also, even though the power transformers were designed for very low radiated magnetic fields, the power supply should not be placed unnecessarily close to tape playback units or other sensitive equipment.

Console connection to the power supply is made with the supplied six foot multi-conductor cable. This cable carries only regulated DC power, and will not radiate hum into adjacent audio wiring. The cable is color-coded, and the corresponding color names are printed adjacent to the terminals on the console and the power supply.

Should it be necessary to install the power supply at a distance further than permitted by the supplied cable, it is recommended that a new cable be made rather than splicing a longer length to the existing cable. Cable lengths up to twenty feet may be fabricated using 14 gauge wire. Cables longer than 20 feet are not recommended.

It is very important to check and double check the power supply connections prior to turn-on. An error in wiring could result in damage to the power supply and/or console circuitry. Once the power supply is turned on, the meter lamps will illuminate. Use an accurate DC voltmeter to verify the operating voltages at the test terminals on the front panel of the power supply.

NOTE: For information on the Redundant Power Supply Coupler Unit (PR&E #99-76), see Chapter 8.

2.6 PATCH POINT CONNECTION

Each BMX II input and output module features an audio PATCH connector. These connectors provide the ideal point to connect external processing equipment such as equalizers, limiters, filters, etc. A patch bay system may also be connected to provide a very flexible processing/patching facility.

The output at each patch point is unbalanced, and designed to operate into low-impedance (600 ohm or higher) loads. The patch return is unbalanced, 5K ohm impedance.

The level at all patch points (microphones, line, and output) is -10 dBu nominal. This level was determined to provide optimum headroom within the console as well as a good compatibility match with currently available processing equipment. See Section 2.7 for pin assignment.

2.7 AUDIO AND LOGIC CONNECTION

Good wiring practice calls for care in making each connection and in neatness of cable layout. Complete information relative to console input, output and logic terminations is contained in the connection reference drawings included in this section.

A standard connection theme is used throughout all PR&E consoles - the use of 3, 6 and 12 pin Molex connectors for audio wiring. The standard pinout sequence is as follows:

| | |
|---------|---|
| Pin #1 | Shield of monaural or left channel signal pair. |
| Pin #2 | Low of monaural or left channel signal pair. |
| Pin #3 | High of monaural or left channel signal pair. |
| Pin #4 | Shield of right channel signal pair. |
| Pin #5 | Low of right channel signal pair. |
| Pin #6 | High of right channel signal pair. |
| Pin #7 | Shield of left channel signal pair. |
| Pin #8 | Low of left channel signal pair. |
| Pin #9 | High of left channel signal pair. |
| Pin #10 | Shield of right channel signal pair. |
| Pin #11 | Low of right channel signal pair. |
| Pin #12 | High of right channel signal pair. |

This system of pin assignments takes advantage of the three pin per row design of the Molex connectors and, therefore, makes visual inspection of the finished wiring very simple. As viewed from the rear of the console, the shields are always connected to the left pins, the low wires (black) to the center pins and the high wires (red) to the right pins. While this inspection will not indicate if a connector is in the correct position, it will verify proper shield and polarity connection.

Each BMX II input module offers a comprehensive set of logic functions, as outlined in Section 2.8. These functions are brought out from each of the input module positions to the 15-pin Molex connectors labeled LOGIC, and are designed to drive interface relays and/or opto-isolators to control auxiliary equipment.




Fabrication of interface systems is straightforward. However, should the installer prefer to use prefabricated units, interface devices and cable assemblies are available from PR&E to control most professional grade tape decks, cartridge machines and turntables. Information on these interfaces is provided in Section 8.4.

NOTE: The logic functions are referenced to the console logic power supply and, as such, should never be directly connected to auxiliary equipment control logic power supplies and/or grounds.


The BMX II uses "common" or "ground" switching for all of its control inputs, thus preventing the possibility of defective remote controls shorting out the logic power supply. Connection to the control

circuitry requires an understanding of the logic nomenclature and symbols. These are outlined below.

Control Outputs:

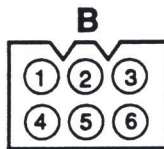
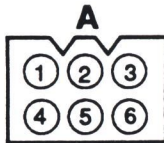
| | | |
|---------------|---|--|
| Tally (light) |  | Provides a +12 VDC continuous source when activated. |
| Pulse |  | Provides a +12 VDC pulse source when activated. |
| Sink |  | An open collector that provides a connection to Logic Common when activated. |

Control Inputs:

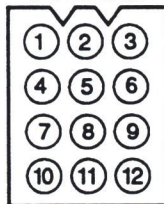
| | | |
|---------|---|---|
| Control |  | A line above the word indicates that the function is activated when a connection to Logic Common is made. |
|---------|---|---|

2.7.1 Microphone Input Module Connection

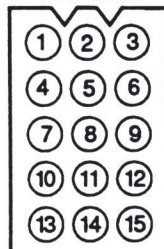
INPUT



PATCH



LOGIC



| AUDIO PIN ASSIGNMENT | | | | |
|----------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Microphone A | A INPUT | 1 | 2 | 3 |
| -No Connection- | A INPUT | 4 | 5 | 6 |
| Microphone B | B INPUT | 1 | 2 | 3 |
| -No Connection- | B INPUT | 4 | 5 | 6 |
| Patch Send | PATCH | 1 | 2 | 3 |
| -No Connection- | PATCH | 4 | 5 | 6 |
| Patch Return | PATCH | 7 | 8 | 9 |
| -No Connection- | PATCH | 10 | 11 | 12 |

NOTE: The PATCH connector must be wired so that the Patch Send is connected through to the Patch Return. If no external processing or patch bay equipment is connected, a mating connector with a jumper from pin #3 to pin #9 must be installed.

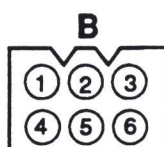
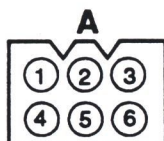
| LOGIC PIN ASSIGNMENT | |
|----------------------|------------|
| Function | Pin Number |
| Logic Common | 1 |
| Logic +12 VDC | 2 |
| ON | 3 |
| OFF | 4 |
| ON Tally | 5 |
| OFF Tally | 6 |
| COUGH | 7 |
| TALKBACK | 8 |
| ON | 9 |
| OFF | 10 |
| ON Tally | 11 |
| Off Tally | 12 |
| COUGH | 13 |
| TALKBACK | 14 |
| -No Connection- | 15 |

NOTES:

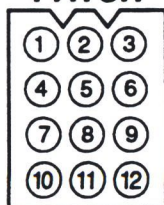
- Pins 3 through 8 control the microphone connected to INPUT A; pins 9 through 14 control the microphone connected to INPUT B.
- Consult Section 2.8.1 when connecting Microphone Input Module remote controls.

2.7.2 Stereo Line Input Module Connection

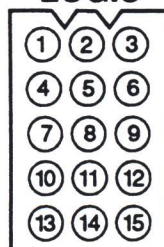
INPUT



PATCH



LOGIC



AUDIO PIN ASSIGNMENT

| Signal | Connector | Pin Number | | |
|--------------------|-----------|------------|-----|------|
| | | Shield | Low | High |
| Input A/Left | A INPUT | 1 | 2 | 3 |
| Input A/Right | A INPUT | 4 | 5 | 6 |
| Input B/Left | B INPUT | 1 | 2 | 3 |
| Input B/Right | B INPUT | 4 | 5 | 6 |
| Patch Send/Left | PATCH | 1 | 2 | 3 |
| Patch Send/Right | PATCH | 4 | 5 | 6 |
| Patch Return/Left | PATCH | 7 | 8 | 9 |
| Patch Return/Right | PATCH | 10 | 11 | 12 |

NOTE: The PATCH connector must be wired so that the Patch Sends are connected through to the Patch Returns. If no external processing or patch bay equipment is connected, a mating connector with jumpers from pins #3 to #9 and #6 to #12 must be installed.

LOGIC PIN ASSIGNMENT

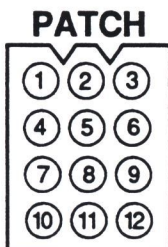
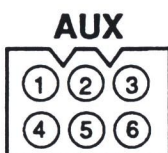
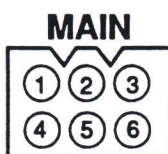
| Function | Pin Number |
|--------------------|------------|
| Logic Common | 1 |
| Logic +12 VDC | 2 |
| ON | 3 |
| OFF | 4 |
| ON Tally | 5 |
| OFF Tally | 6 |
| READY | 7 |
| AUDIO RESET TO OFF | 8 |
| CUE | 9 |
| START PULSE | 10 |
| STOP PULSE | 11 |
| CUE Tally | 12 |
| -No Connection- | 13 |
| -No Connection- | 14 |
| -No Connection- | 15 |

NOTES:

- Logic is assignable to either INPUT A or INPUT B, as selected by an internal option switch (reference Section 2.9.2).
- Consult Section 2.8.2 when connecting Stereo Line Input Module remote controls.

2.7.3 Stereo Line Output Amplifier Connection

OUTPUT NAME



| AUDIO PIN ASSIGNMENT | | | | |
|----------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Main Output/Left | MAIN | 1 | 2 | 3 |
| Main Output/Right | MAIN | 4 | 5 | 6 |
| Aux Output/Left | AUX | 1 | 2 | 3 |
| Aux Output/Right | AUX | 4 | 5 | 6 |
| Patch Send/Left | PATCH | 1 | 2 | 3 |
| Patch Send/Right | PATCH | 4 | 5 | 6 |
| Patch Return/Left | PATCH | 7 | 8 | 9 |
| Patch Return/Right | PATCH | 10 | 11 | 12 |

NOTES:

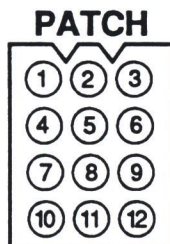
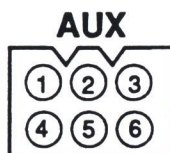
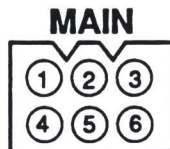
- A) The PATCH connector must be wired so that the Patch Sends are connected through to the Patch Returns. If no external processing or patch bay equipment is connected, a mating connector with jumpers from pins #3 to #9 and #6 to #12 must be installed.
- B) In consoles which have a Telco Mix/Monaural Output Module installed, the PROGRAM and AUDITION Patch Sends (pins #1 through #6) are not used, and the Patch Returns are connected to the Telco Mix Module Patch Sends (reference Section 2.7.8).



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2.7.4 Monaural Line Output Amplifier Connection

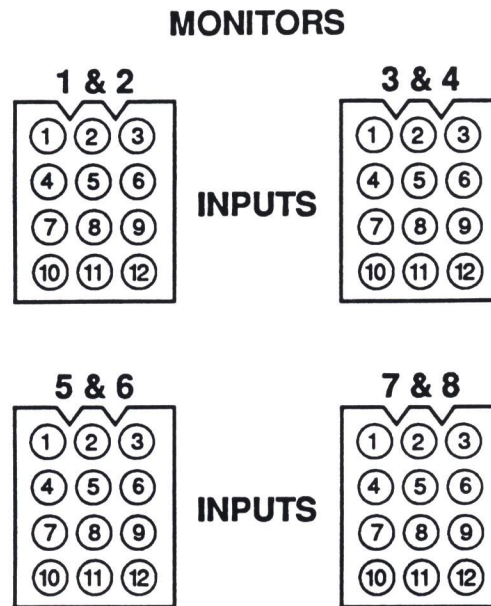
OUTPUT NAME



| AUDIO PIN ASSIGNMENT | | | | |
|----------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Main Output | MAIN | 1 | 2 | 3 |
| -No Connection- | MAIN | 4 | 5 | 6 |
| Aux Output | AUX | 1 | 2 | 3 |
| -No Connection- | AUX | 4 | 5 | 6 |
| Patch Send | PATCH | 1 | 2 | 3 |
| -No Connection- | PATCH | 4 | 5 | 6 |
| Patch Return | PATCH | 7 | 8 | 9 |
| -No Connection- | PATCH | 10 | 11 | 12 |

NOTE: The PATCH connector must be wired so that the Patch Send is connected through to the Patch Return. If no external processing or patch bay equipment is connected, a mating connector with a jumper from pin #3 to Pin #9 must be installed.

2.7.5 Monitor Module Input Connection



| AUDIO PIN ASSIGNMENT | | | | |
|-----------------------------|------------------|-------------------|------------|-------------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Input 1/Left | INPUTS 1 & 2 | 1 | 2 | 3 |
| Input 1/Right | INPUTS 1 & 2 | 4 | 5 | 6 |
| Input 2/Left | INPUTS 1 & 2 | 7 | 8 | 9 |
| Input 2/Right | INPUTS 1 & 2 | 10 | 11 | 12 |
| Input 3/Left | INPUTS 3 & 4 | 1 | 2 | 3 |
| Input 3/Right | INPUTS 3 & 4 | 4 | 5 | 6 |
| Input 4/Left | INPUTS 3 & 4 | 7 | 8 | 9 |
| Input 4/Right | INPUTS 3 & 4 | 10 | 11 | 12 |
| Input 5/Left | INPUTS 5 & 6 | 1 | 2 | 3 |
| Input 5/Right | INPUTS 5 & 6 | 4 | 5 | 6 |
| Input 6/Left | INPUTS 5 & 6 | 7 | 8 | 9 |
| Input 6/Right | INPUTS 5 & 6 | 10 | 11 | 12 |
| Input 7/Left | INPUTS 7 & 8 | 1 | 2 | 3 |
| Input 7/Right | INPUTS 7 & 8 | 4 | 5 | 6 |
| Input 8/Left | INPUTS 7 & 8 | 7 | 8 | 9 |
| Input 8/Right | INPUTS 7 & 8 | 10 | 11 | 12 |

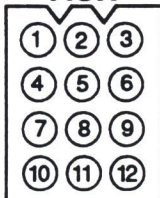
2.7.6 Control Room Monitor Module Connection

CONTROL ROOM

OUTPUT



AUX



| AUDIO PIN ASSIGNMENT | | | | |
|------------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Monitor Output/Left | OUTPUT | 1 | 2 | 3 |
| Monitor Output/Right | OUTPUT | 4 | 5 | 6 |
| Headphone Output/Left | AUX | 1 | 2 | 3 |
| Headphone Output/Right | AUX | 4 | 5 | 6 |
| Cue Amp Output | AUX | 7 | 8 | 9 |
| Cue Speaker Input | AUX | 10 | 11 | 12 |

NOTE: The Cue Amp Output signal is provided in the event that an external cue speaker is desired. In order for the console cue speaker to work, the Cue Amp Output must be connected to the Cue Speaker Input.

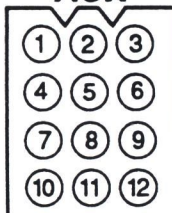
2.7.7 Studio Monitor Module Connection

STUDIO

OUTPUT



AUX



| AUDIO PIN ASSIGNMENT | | | | |
|------------------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Output w/Level Cont./Left | OUTPUT | 1 | 2 | 3 |
| Output w/Level Cont./Right | OUTPUT | 4 | 5 | 6 |
| Direct Output w/mute/Left | AUX | 1 | 2 | 3 |
| Direct Output w/mute/Right | AUX | 4 | 5 | 6 |
| Direct Output w/o mute/Left | AUX | 7 | 8 | 9 |
| Direct Output w/o mute/Right | AUX | 10 | 11 | 12 |

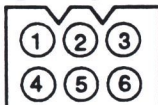
NOTE: Studio Monitor Module Talkback outputs are provided at the OPTION 4 connector to control a Studio Monitor Selector/Level Control Panel (reference Section 2.7.9).



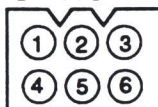
2.7.8 Telco Mix Module (Option 1-3) Connection

The Telco Mix section of the Telco Mix/Monaural Output Module uses the connectors labeled OPTION 1, OPTION 2 and OPTION 3 for all outputs, as defined below. For information on the installation of the Telco Mix Module, and the modification of Stereo Line Input Modules for phone line input, see Section 6.4 of this document.

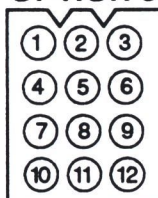
OPTION 1



OPTION 2



OPTION 3



| AUDIO PIN ASSIGNMENT | | | | |
|----------------------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Telephone Monitor Output, Direct | OPTION 1 | 1 | 2 | 3 |
| Telephone Monitor Output, Att. | OPTION 1 | 4 | 5 | 6 |
| Send to Hybrid #1 | OPTION 2 | 1 | 2 | 3 |
| Send to Hybrid #2 | OPTION 2 | 4 | 5 | 6 |
| PROGRAM Patch Send/Left | OPTION 3 | 1 | 2 | 3 |
| PROGRAM Patch Send/Right | OPTION 3 | 4 | 5 | 6 |
| AUDITION Patch Send/Left | OPTION 3 | 7 | 8 | 9 |
| AUDITION Patch Send/Right | OPTION 3 | 10 | 11 | 12 |

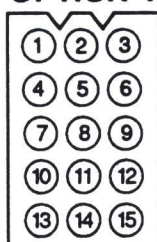
NOTES:

- The telephone input signals are routed from the phone line input modules to the Telco Mix Module via the console's UTILITY bus.
- The Telephone Monitor Output signals (Direct and Attenuated) are provided for external monitoring of the phone lines ahead of the PROGRAM and AUDITION buses.
- The Send to Hybrid #1 signal contains a mix of phone line #2 and the PROGRAM or AUDITION bus; the Send to Hybrid #2 signal contains a mix of phone line #1 and the PROGRAM or AUDITION bus.
- The PROGRAM and AUDITION Patch Send outputs are routed to the Patch Return inputs of the PROGRAM and AUDITION amplifier PATCH connectors.



2.7.9 Studio Talkback (Option 4) Connection

These Studio Talkback outputs are provided for connection to a Studio Monitor Selector/Level Control Panel located in the Studio.

OPTION 4

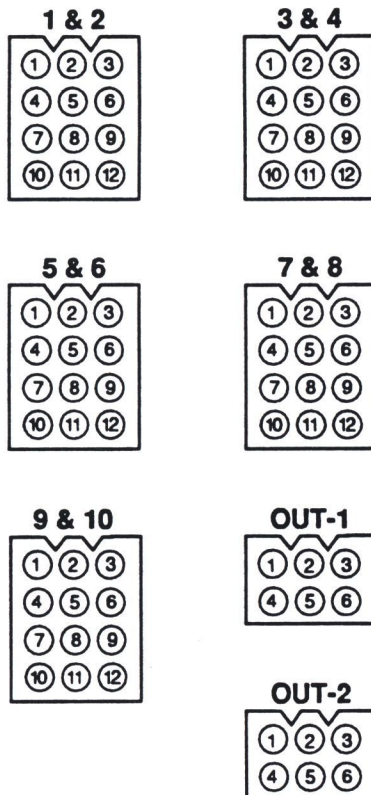


| AUDIO PIN ASSIGNMENT | | | | |
|------------------------|-----------|------------|-----|------|
| | | Pin Number | | |
| Signal | Connector | Shield | Low | High |
| Talkback Preamp Output | OPTION 4 | 1 | 2 | 3 |

| LOGIC PIN ASSIGNMENT | |
|--|------------|
| Function | Pin Number |
| Logic Common | 5 |
| Remote TALKBACK Command  | 6 |
| Logic Common | 8 |
| Remote Studio MUTE Command  | 9 |

2.7.10 Remote Line Selector Module Connection

LINE SELECTOR





AUDIO PIN ASSIGNMENT

| | | Pin Number | | |
|----------------|-----------|------------|-----|------|
| Signal | Connector | Shield | Low | High |
| Input 1/Left | 1 & 2 | 1 | 2 | 3 |
| Input 1/Right | 1 & 2 | 4 | 5 | 6 |
| Input 2/Left | 1 & 2 | 7 | 8 | 9 |
| Input 2/Right | 1 & 2 | 10 | 11 | 12 |
| Input 3/Left | 3 & 4 | 1 | 2 | 3 |
| Input 3/Right | 3 & 4 | 4 | 5 | 6 |
| Input 4/Left | 3 & 4 | 7 | 8 | 9 |
| Input 4/Right | 3 & 4 | 10 | 11 | 12 |
| Input 5/Left | 5 & 6 | 1 | 2 | 3 |
| Input 5/Right | 5 & 6 | 4 | 5 | 6 |
| Input 6/Left | 5 & 6 | 7 | 8 | 9 |
| Input 6/Right | 5 & 6 | 10 | 11 | 12 |
| Input 7/Left | 7 & 8 | 1 | 2 | 3 |
| Input 7/Right | 7 & 8 | 4 | 5 | 6 |
| Input 8/Left | 7 & 8 | 7 | 8 | 9 |
| Input 8/Right | 7 & 8 | 10 | 11 | 12 |
| Input 9/Left | 9 & 10 | 1 | 2 | 3 |
| Input 9/Right | 9 & 10 | 4 | 5 | 6 |
| Input 10/Left | 9 & 10 | 7 | 8 | 9 |
| Input 10/Right | 9 & 10 | 10 | 11 | 12 |
| Output 1/Left | OUT-1 | 1 | 2 | 3 |
| Output 1/Right | OUT-1 | 4 | 5 | 6 |
| Output 2/Left | OUT-2 | 7 | 8 | 9 |
| Output 2/Right | OUT-2 | 10 | 11 | 12 |

2.7.11 WARNING LIGHT CONNECTION

The console provides +12 VDC commands for the activation of Control Room and Studio warning light systems. These commands come from the Control Room and Studio Monitor Modules, and appear on the rear panel Molex connector labeled WARNING. The commands are intended for the control of mechanical or solid state relays, such as those incorporated in the WL-2 Warning Light Interface (PR&E #99-143), as described in Section 8.4.6.



| LOGIC PIN ASSIGNMENT | |
|--|------------|
| Function | Pin Number |
| Logic Common | 1 |
| Studio WARNING Command  | 2 |
| Logic Common | 3 |
| Control Room WARNING Command  | 4 |

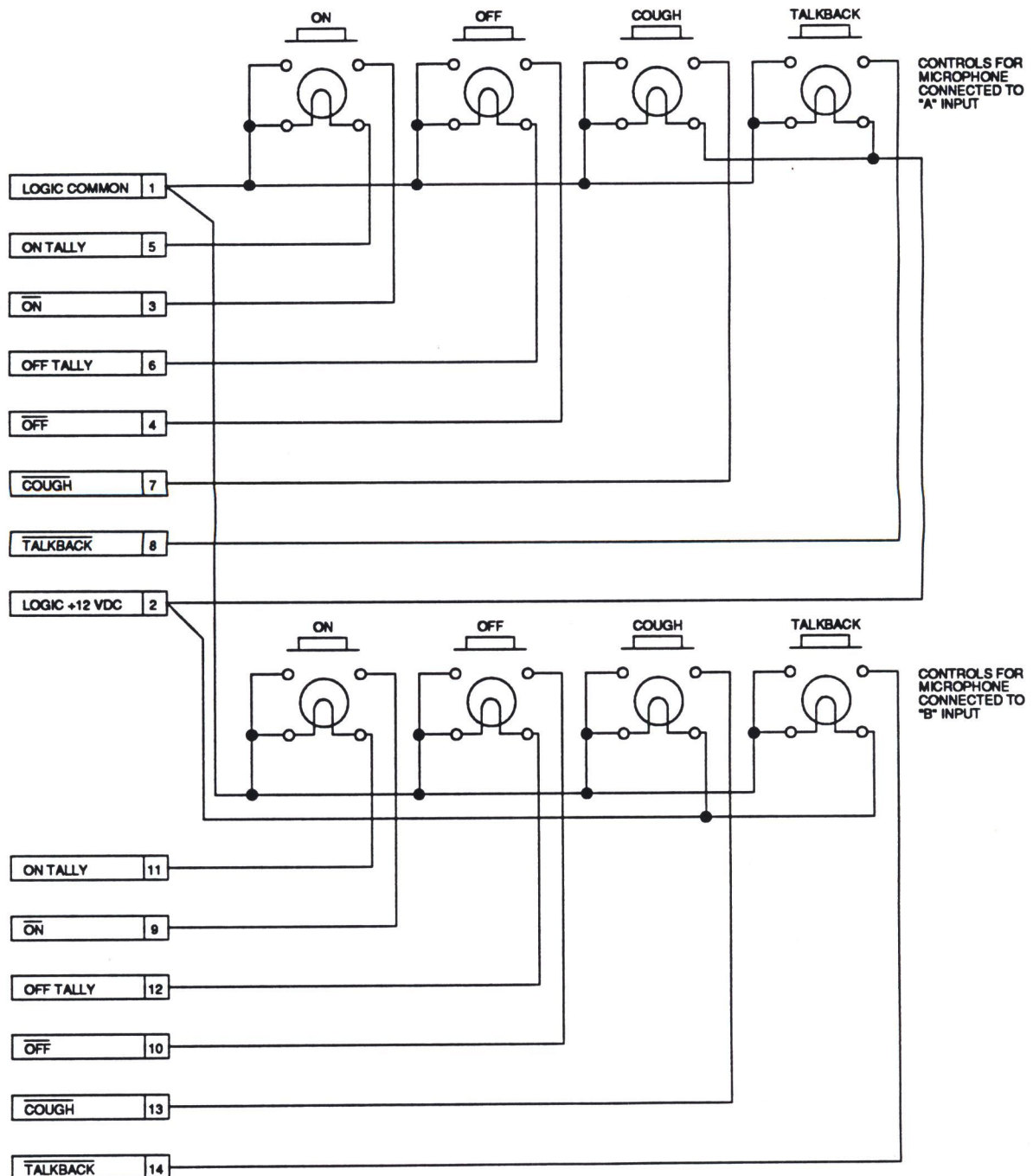


2.8 MODULE REMOTE CONTROL CAPABILITIES

This section outlines BMX II remote control capabilities. Included are descriptions of Microphone and Stereo Line Input Module remote controls.

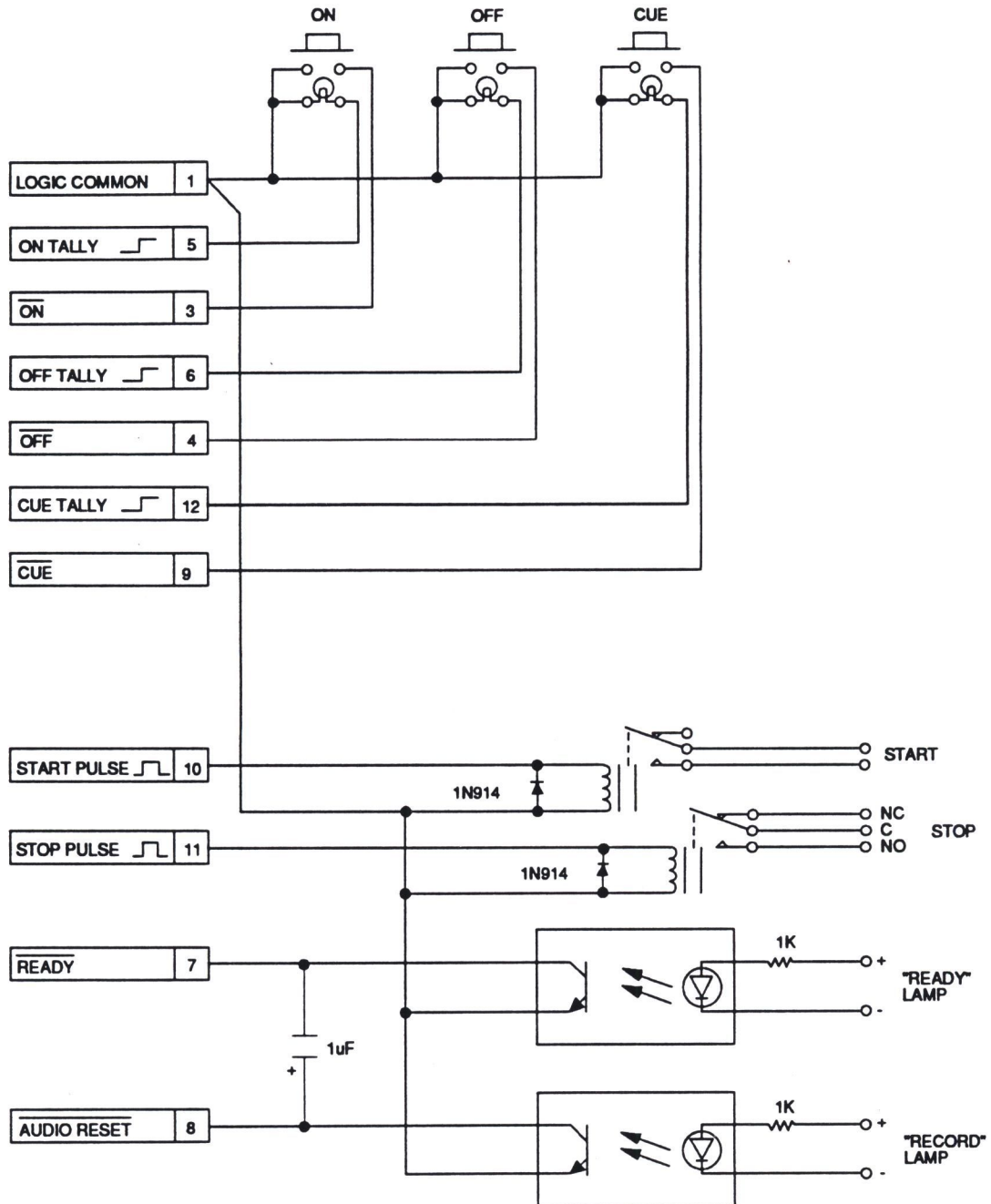
2.8.1 Microphone Input Remote Control

The schematic below illustrates the full remote control capability of the Microphone Input Module. Note that there are separate remote controls for both A and B inputs.



2.8.2 Stereo Line Input Remote Control

The schematic below illustrates the full remote control and machine interface control capability of the Stereo Line Input Module. Typical remote control applications include providing cartridge input ON and OFF buttons at a co-host or news turret control position, and ON, OFF and CUE buttons adjacent to tape machines, turntables and compact disc players.



*NOTES:

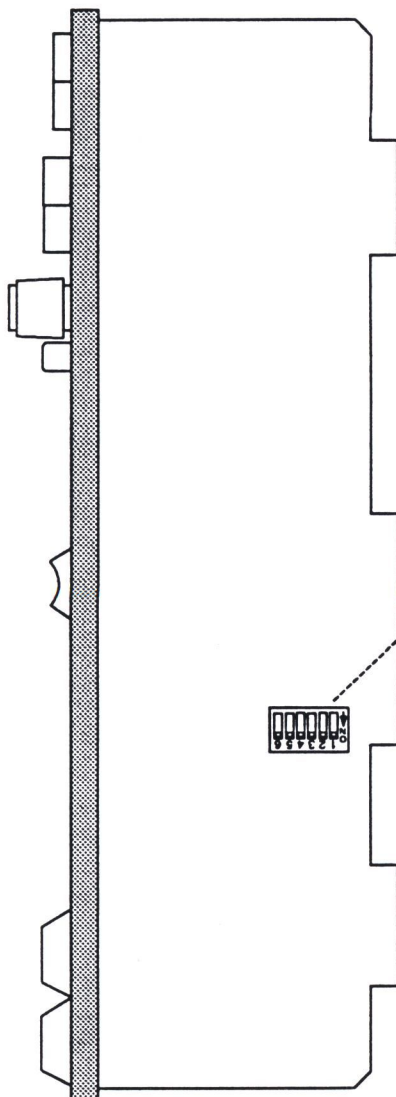
1. Button switches are momentary type; lamps are 12-14 volt, 80 mA.
2. Relays are 12 volt DC, 100 mA maximum.
3. Opto-isolators are Motorola MCT-2 or equivalent.

2.9 MODULE INTERNAL OPTION SWITCHES

Some BMX II modules are equipped with internal option switches, which can be set to enable or disable selected module functions. This section provides the location of these switches on the module printed circuit assemblies, and their function(s). Included are descriptions of the Microphone Input and Stereo Line Input Module option switches.

2.9.1 Microphone Input Module Option Switch

Monitor mute and talkback logic control status is selectable on each input module by a six station DIP switch located on the PC board.

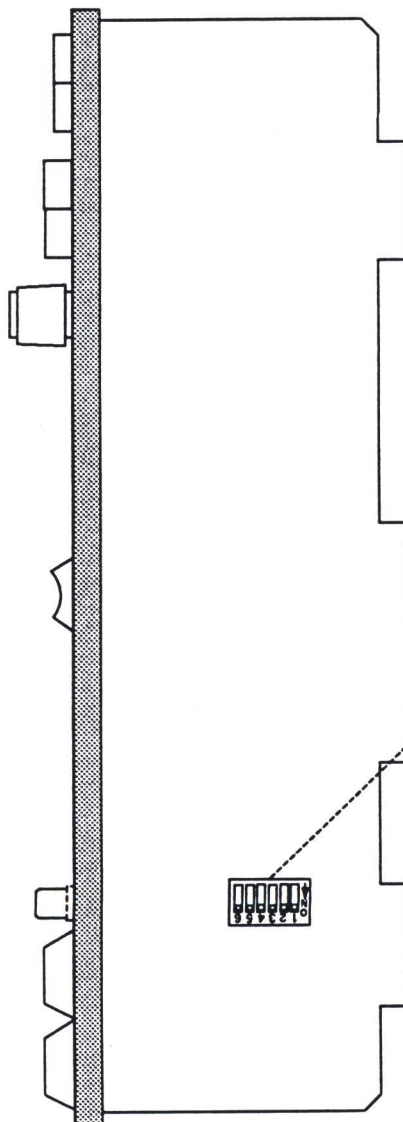


| ● S8, Input logic assignment selector | | |
|---------------------------------------|---------|--|
| # | INPUT | FUNCTION |
| 1 | A-input | ON (CLOSED): Control room speakers mute. OFF (OPEN): No mute function. |
| 2 | A-input | ON (CLOSED): Talkback function enabled. OFF (OPEN): No talkback function. |
| 3 | A-input | ON (CLOSED): Studio speakers mute. OFF (OPEN): No mute function. |
| 4 | B-input | ON (CLOSED): Control room speakers mute. OFF (OPEN): No mute function. |
| 5 | B-input | ON (CLOSED): Talkback function enabled. OFF (OPEN): No talkback function. |
| 6 | B-input | ON (CLOSED): Studio speakers mute. OFF (OPEN): No mute function. |

2.9.2 Stereo Line Input Module Option Switch

The logic control functions of the line input module are selected by a six station DIP switch located on the PC board.

NOTE: The module OFF lamp does not illuminate when the module is logic enabled. This is because the OFF lamp is utilized as a machine READY status indicator. To illuminate the OFF lamp on those inputs (A or B) where external logic control is not needed, place the corresponding logic option switch (1 or 2) into the OFF position.



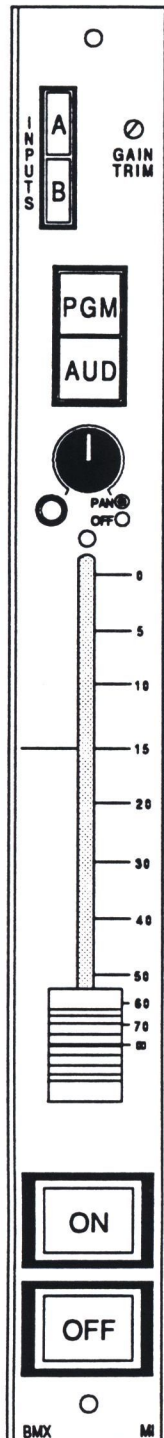
| ● S9, Input logic assignment selector | |
|---------------------------------------|---|
| # | FUNCTION |
| 1 | ON (CLOSED): Input A logic enabled.* OFF (OPEN): Input A logic not enabled. |
| 2 | ON (CLOSED): Input B logic enabled.* OFF (OPEN): Input B logic not enabled. |
| 3 | ON (CLOSED): Remote cue operates only when logic A or B enabled. OFF (OPEN): Remote cue operates at all times. |
| 4 | ON (CLOSED): Cue resets to OFF when module "ON" button is pressed. OFF (OPEN): No cue reset function. |
| 5 | ON (CLOSED): Timer resets to zero when module "ON" button is pressed. OFF (OPEN): No timer reset function. |
| 6 | ON (CLOSED): Timer resets only when switch 5 is on, and logic A or B is enabled. OFF (OPEN): Timer resets whenever switch 5 is on. |

*START and STOP pulses are enabled at rear panel logic connector outputs.

3.0 OPERATION

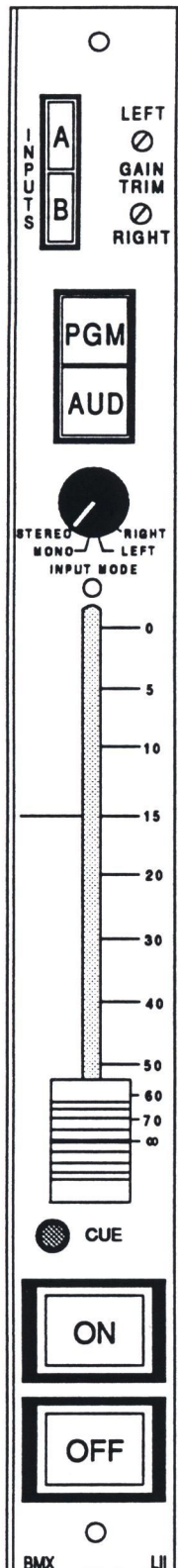
This chapter contains sections describing BMX II module operation. Each section contains an illustration of a module's front panel controls, accompanied by operating instructions.

3.1 MICROPHONE INPUT MODULE



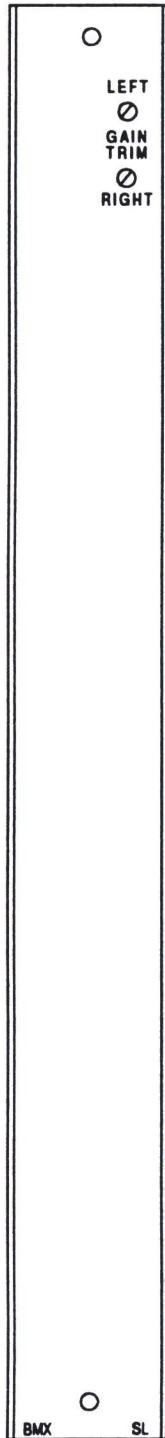
- The Input Selector switches between microphones connected to the A and B inputs of the module. Remote control and monitor muting logic is independent for each input.
- The GAIN TRIM control adjusts the input sensitivity of the microphone preamplifier over the range of -35 dBu to -60 dBu.
- The alternate action PROGRAM and AUDITION buttons provide the ability to assign the module to either or both of the stereo output buses.
- The PAN control with ON/OFF switch allows positioning of the microphone signal in the left-right stereo image.
- The mixing fader is a stepless, infinite resolution control with a reference line at the -15 dB point. The reference is the normal position for a properly adjusted input level to achieve "0" VU on the console output meters.
- The ON button turns the module audio on and initiates the appropriate monitor commands, as programmed during installation.
- The OFF button turns the module audio off and cancels the muting commands.

3.2 STEREO LINE INPUT MODULE



- The Input Selector switches between stereo sources connected to the A and B inputs of the module.
- The GAIN TRIM control adjusts the input sensitivity of the line preamplifier over the range of -12 dBu to +8 dBu.
- The alternate action PROGRAM and AUDITION buttons provide the ability to assign the module to either or both of the stereo output buses.
- The INPUT MODE selector provides the following input operating modes: STEREO, MONO (sum of left and right), LEFT to both outputs, and RIGHT to both outputs.
- The mixing fader is a stepless, infinite resolution control with a reference line at the -15 dB point. The reference is the normal position for a properly adjusted input level to achieve "0" VU on the console output meters.
- The electronic alternate action CUE button routes the pre-fader signal to the console cue system. The CUE button lamp flashes to tally its status. A steady tally indication is available with the installation of an optional jumper wire between points E20 and E21 on the module PC assembly.
- The ON button turns the module audio on and initiates machine start control and timer reset commands, as programmed during installation.
- The OFF button turns the module audio off and initiates machine stop control commands, as programmed during installation.

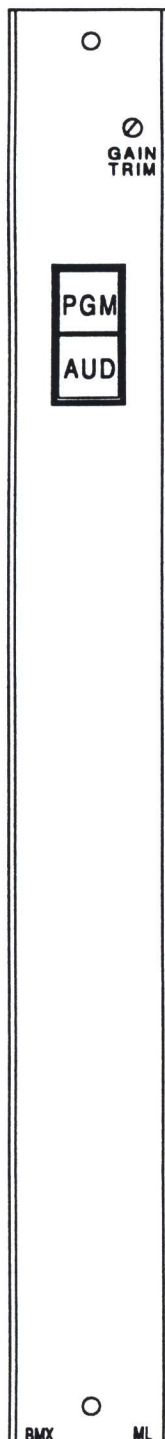
3.3 STEREO LINE OUTPUT AMPLIFIER



- The GAIN TRIM controls labeled LEFT and RIGHT adjust the gain of the output amplifiers.



3.4 MONAURAL LINE OUTPUT AMPLIFIER

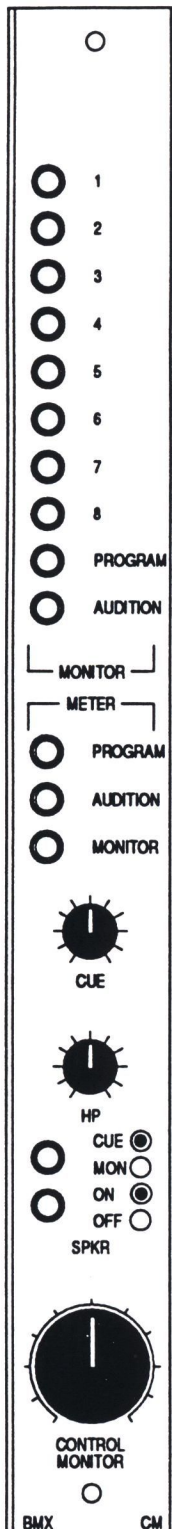


- The GAIN TRIM control adjusts the gain of the output amplifier.
- The MONAURAL OUTPUT switch selects the source from either the stereo PROGRAM or AUDITION bus.



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3.5 CONTROL ROOM MONITOR MODULE



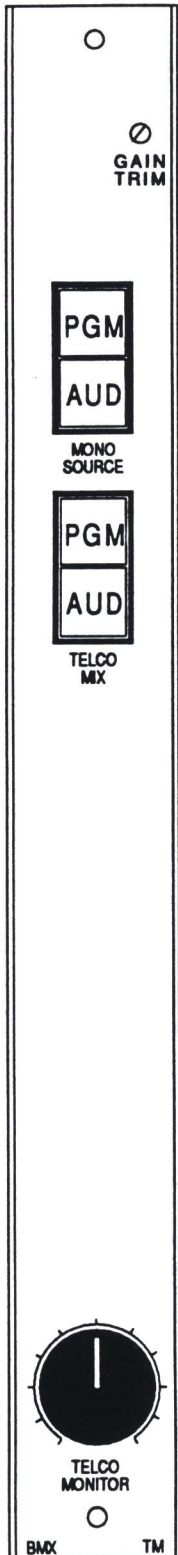
- The MONITOR switch selects the monitor source from PROGRAM, AUDITION, or up to eight external sources.
- The METER switch selects PROGRAM, AUDITION or MONITOR source for display on the PROGRAM VU meters (BMX II-10, -14 and -18 only).
- The CUE level control determines cue volume.
- The HP level control determines headphone volume.
- The headphone source switch selects between MONITOR source and CUE.
- The SPKR ON/OFF switch turns the control room speakers on or off.
- The CONTROL MONITOR level control adjusts the volume of the Control Room speakers.

3.6 STUDIO MONITOR AND TALKBACK MODULE



- The MONITOR switch selects the monitor source from PROGRAM, AUDITION, or up to eight external sources (the same eight sources that are connected to the Control Room Monitor Module).
- The studio talkback microphone (electret condenser) is active whenever the TALKBACK button is depressed.
- The SPKR ON/OFF switch turns the studio speakers on or off.
- The STUDIO MONITOR level control adjusts the volume of the Studio speakers.

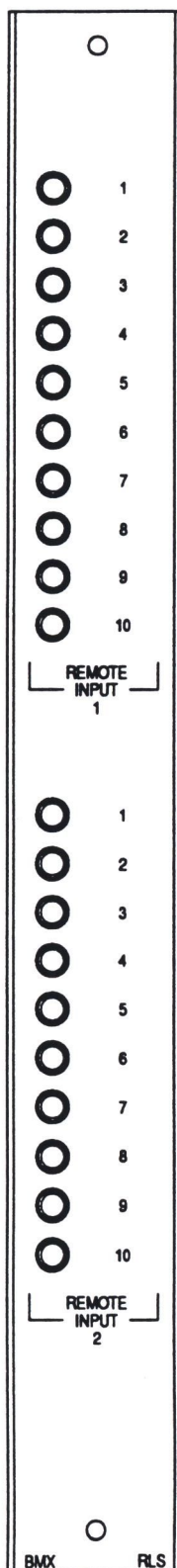
3.7 TELCO MIX/MONAUURAL OUTPUT MODULE



- The GAIN TRIM control adjusts the gain of the monaural output amplifier.
- The MONO SOURCE switch selects the mono output amplifier source from either the PROGRAM or AUDITION bus.
- The TELCO MIX switch assigns the telephone caller(s) to either the PROGRAM or AUDITION bus.
- The TELCO MONITOR control adjusts the volume of the Telephone Monitor Output.



3.8 REMOTE LINE SELECTOR MODULE



- This module consists of two 10-station selector switches. Each switch bank accesses the same remote inputs. The stereo output of each switch bank may be connected externally to any console input position.



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4.0 EQUIPMENT DESCRIPTION

This chapter contains sections describing each of the BMX II's modules, including function and circuitry, as well as the VU meter buffer amplifier, power supply, and mainframe. Corresponding schematics are located in Chapter 7 of this document.

4.1 MICROPHONE INPUT MODULE

4.1.1 Function

The Microphone Input Module accommodates a wide range of input levels to permit the use of all contemporary microphones. Input preamplifier gain is adjustable over the nominal input range of -60 dBu to -35 dBu. The A/B input selector provides two microphone inputs per module, each with programmable monitor mute selection for control room or studio. The mute circuitry incorporates an automatic 40 millisecond delay before the mic is turned on, permitting "room reverb" to decay off mic.

The PAN control allows for the positioning of the signal in the stereo image, and the alternate action PROGRAM and AUDITION buttons provide the ability to assign the module to either or both stereo output buses. The modules have been modified at the factory to allow for phantom powering of condenser microphones (reference Section 6.1).

4.1.2 Circuitry

AUDIO

The transformer coupled microphone input preamplifier (U1) utilizes variable feedback control to provide an overall voltage gain range of 24 dB to 50 dB. The gain control is adjusted to provide a nominal -10 dBu output from the preamp to the patch send line. The mix fader "in hand" attenuation of 15 dB reduces this level to -25 dBu. Fader buffer amplifier U2 recovers the fader attenuation with 15 dB of voltage gain. The -10 dBu signal is routed to the channel ON/OFF relay. This relay feeds the PAN control and PAN/ON switch. The PAN switch shunts R25 in the PAN mode, increasing the gain of U2 by 3 dB, to accommodate the 3 dB loss contributed by the PAN control. The signal is then routed to the mix buses by the PGM and AUD button switches.

LOGIC

NOTE: Early Microphone Input Modules were produced with "Version A" logic. These modules are identified by the 4-position DIP switch located on the PC assembly, as opposed to the 6-position DIP switch used on newer modules with "Version B" logic. The description below is for modules with "Version B" logic. If you have an older module with "Version A" logic, consult the schematic located in Chapter 7 of this document.

The logic circuitry is divided into two sections. The first section controls the ON/OFF status of the module. Power up reset circuit R37 and C29, via U5B, resets flip-flop U7A-B such that the ON line is

low. Power up circuit R62, R63, C36 and CR8 ensures that the OFF lamp turns on. The ON line low state, via driver Q6, illuminates the OFF lamp. Pressing ON switch S7, via U4D, sets U7A-B such that the ON line is high, turning the module on. The ON line's high state, via U5A and driver Q5, illuminates the ON lamp and, via U5A, U4B and time delay circuit R42, R45, C31 and U6B and driver Q1, also turns on audio relay K1. Pressing OFF switch S6 via U5B similarly turns the module OFF.

The second section handles the remote control, talkback and mute functions. Pressing A input switch S1 or B input switch S2 turns on its respective data switches in U3. If neither is selected via U6A and U7D, no data switches are turned on and remote operation is inhibited.

With A input switch S1 pressed, the REMOTE ON A switch, via U3 and U4D, will turn the module on; the REMOTE OFF A switch, via U3 and U5B, will turn the module off; and the COUGH A switch, via U3 and U5A, will momentarily turn off audio relay K1 and the ON lamp. The ON TALLY A and OFF TALLY A lamps will follow the ON and OFF lamps via S1 and S2, respectively. The TALKBACK A remote switch, via A T/B ENABLE options switch S8-2 and S1, will momentarily force the NOT TALKBACK line low which, via U5A, turns off audio relay K1 and the ON lamp, and, via U4C and time delay circuit R43, R46, C32, and U6C and driver Q2, also turns on TALKBACK relay K2.

Either the ON line's high state, via U4E, or the NOT TALKBACK line's low state, via U6D, pulse stretcher circuit R41, R44, C30, CR5, and U4A and inverter U4F, will force the MUTE line to go high. The MUTE line's high state, via R65, S1, A-C/R-MUTE option switch S8-1 and R66, or via R64, S2, B-C/R-MUTE option switch S8-4, and R49, will turn on driver Q7, momentarily muting the control room monitors.

The MUTE line's high state, via R65, S1, A-STUDIO-MUTE Option switch S8-3, and R67, or via R64, S2, B-STUDIO-MUTE option switch S8-6, and R50, will turn on driver Q8, momentarily muting the studio monitors.

4.2 STEREO LINE INPUT MODULE

4.2.1 Function

The stereo line input module will accommodate nominal input levels from -12 dBu to +8 dBu. The A/B input selector allows for the selection of either of two stereo inputs. Module control logic may be programmed to control source equipment connected to either the A or B input, and the INPUT MODE switch allows for the selection of a STEREO, MONO, LEFT or RIGHT source to be sent to the output assignment switches.

4.2.2 Circuitry

AUDIO

NOTE: This section contains descriptions of the audio circuitry for both the transformerless input version (PR&E #99-164-0) and the transformer input version (PR&E #99-78-0) of the Stereo Line Input Module.



Transformerless Input Version

NOTE: The stereo audio path consists of two identical sets of circuitry. For clarity and simplicity, only the left channel is described below.

Resistors R41, R43, R45 and R46 form a 24 dB pad in front of the instrumentation input amplifier comprised of U12A, U12B and U13. This pad provides a true bridging input impedance to source equipment, while attenuating the signal to the optimum level for the input amplifier. Input preamplifiers U12A and U12B utilize a variable cross-coupled feed-back control to provide an input gain range of -18 dB to +2 dB. The gain control is adjusted to provide a -10 dBu output to the Patch Send line. The mix fader "in-hand" attenuation of 15 dB loss reduces the signal level to -25 dBu. The 15 dB gain of fader buffer amplifier U3 raises the signal level to -10 dBu, and sends the signal to the MODE switch and on to the channel ON/OFF relay. This relay feeds the PGM and AUD assignment button switches.

Transformer Input Version

NOTE: The stereo audio path consists of two identical sets of circuitry. For clarity and simplicity, only the left channel is described below.

Resistors R1, R2 and R3 form a 24 dB, 10K ohm to 600 ohm pad in front of input transformer T1. This pad provides a true resistive input impedance to source equipment as well as a low source impedance to the bridging input transformer. The input transformer is a 10K:10K ohm repeat coil. Input preamplifier U1 utilizes a variable feedback control to provide a pad input to amplifier output gain range of -18 dB to +2 dB. The gain control is adjusted to provide a -10 dBu output to the Patch Send line. The mix fader "in-hand" attenuation of 15 dB loss reduces the signal level to -25 dBu. The 15 dB gain of fader buffer amplifier U2 raises the signal level to -10 dBu and sends the signal to the MODE switch and on to the channel ON/OFF relay. The relay feeds the PGM and AUD assignment button switches.

NOTE: The transformer input version of the Stereo Line Input Module may be modified to provide an additional 24 dB of input sensitivity, per the procedure contained in Section 6.2 of this document.

LOGIC

NOTE: The logic circuitry is identical for both the transformer and the transformerless input versions of the Stereo Line Input Module.

The logic circuitry is divided into three sections. The first controls the ON/OFF status of the module. Power up reset circuit R28, R29, C32, via U7B and U7C, sets flip-flop U9A such that the OFF line is high and the ON line is low. The OFF line's low state, via U6D and associated driver circuit Q9, illuminates the OFF lamp. Pressing ON switch S7, via U4E and U7A, forces the state of U9A and U3B such that the OFF line is low and the ON line is high, thus turning the module on. The OFF line low state, via driver Q2, illuminates the ON lamp; the ON line, via time delay circuit R37, R38, C38, U6C and driver R39, Q3, turns on audio relay K1. Pressing OFF switch S8, via U4D and U7C, similarly turns the module off.

The second section controls the CUE status of the module. The power up circuit also sets flip-flop U9B, via U8C, such that NOT CUE is high. Pressing CUE switch S6, via U6B, reverses the state of U9B such that the NOT CUE line is low (i.e. cue mode is on). The NOT CUE low state turns on blink circuit R32, R33, R34, CR5, C34, U8B, U3E, which, via U3D and driver Q12, blinks the CUE lamp.

NOTE: The CUE lamp blinking indication may be changed to a steady on state by jumpering E20 to E21 on the module circuit board.

The NOT CUE low state, via driver Q11, turns on cue relay K2. Pressing the CUE switch again will toggle U9B out of the CUE mode. If CUE RESET ENABLE option switch S9-4 is turned on, turning on the module will reset the cue mode to off, via U8C.

The third section receives and generates pulse commands for controlling external equipment. Commands are said to be enabled when either the A (S1) or B (S2) input is selected and its corresponding INPUT ENABLE option switch (S9-1 for A, S9-2 for B) is turned on. When commands are enabled, a REMOTE ON switch, via U4F and U5D, will turn the module on and a REMOTE OFF switch, via U4C and U5C, will turn the module off.

A remote CUE switch, via U3F and U6A, will toggle the module in and out of the cue mode. When REMOTE CUE DISABLE option switch S9-3 is turned on, the remote cue switch only functions if logic commands are enabled.

When logic commands are enabled, a low on the NOT READY input, via U4A, U5A and U8A, is required for the OFF lamp to illuminate.

When logic commands are enabled via U8D and U3C, turning the module on generates a start pulse at monostable U11A, which is output via driver Q5, while turning the module off generates a stop pulse at monostable U11B, which is output via driver Q7. When logic commands are enabled, a low on the NOT AUDIO RESET input, via U4B, U5B, U7B, and U7C, turns the module off but inhibits generation of a stop pulse at U8D.

The ON line going high causes monostable U10B to generate a pulse output, via R40 and Q4, to TIMER RESET option switch S9-5. When this switch is turned on, the timer will reset every time the module is turned on. When TIMER RESET DISABLE option switch S9-6 is turned on, the timer only resets if logic commands are enabled.

Driver circuits for the ON, OFF and CUE lamps and START and STOP pulse outputs are short circuit protected. For example, when the OFF line goes low, current is momentarily pulsed through RN4B and C39, turning on Q2 (Q1 is off). With the collector of Q2 high, Q1 is then turned on through RN3D, which holds Q2 on. If the collector is shorted to ground, Q1 immediately turns off, which turns off Q2 before it can overheat and fail. After the short is removed, it is necessary for the OFF line to go high and then low again, feeding another pulse through C39.

4.3 STEREO LINE OUTPUT AMPLIFIER

4.3.1 Function

The Stereo Line Output Amplifier contains the mixing and distribution amplifiers for a console line output. The console mainframe is supplied with two of these modules; one for the PROGRAM bus and one for the AUDITION bus. Each module supplies two distribution outputs, with the transformerless version (PR&E #99-321-2) capable of supplying up to +26 dBm at each output and the transformer version (PR&E #99-9-2) capable of supplying up to +28 dBm at each output.

NOTE: In July of 1989 PR&E began equipping BMX II consoles with a transformerless version of the Stereo Line Output Amplifier. In order to determine with which version of this module a console shipped after July of 1989 is equipped, consult the "Notes" section of the BMX II Test Data Sheet.

The main output is an active balanced design. Patch send and return points are also provided for the connection of external processing equipment and/or a patch field.

4.3.2 Circuitry

NOTE: This section contains descriptions of the audio circuitry for both the transformerless output version (PR&E #99-321-2) and the transformer output version (PR&E #99-9-2) of the Stereo Line Output Amplifier.

Transformerless Output Version

NOTE: The stereo audio path consists of two identical sets of circuitry. For clarity and simplicity, only the left channel is described below.

Bus summing amplifier U3 is a low-noise type 5534 integrated circuit operational amplifier. The output of the summer is connected to inverting amplifier U4 to provide an in-phase output to the bus patch point. Both of these amplifiers operate at unity gain, and, therefore, provide a nominal level of -10 dBu to the bus patch point.

The Patch Return signal is fed directly to jumper E1, which will normally be jumpered to E3, unless the optional master fader is installed (when the master fader is installed, the high side of the fader is driven by the Patch Return signal, and the wiper is fed to E2 which is jumpered to E3). U1 serves to buffer the fader or Patch Return signal. The voltage gain of U1 is adjusted by front panel LEFT GAIN TRIM control R26, and has a gain range of 6 dB to 14 dB. The output of U1 is connected to line output amplifiers A1 and A2, operating as a push-pull pair to provide balanced drive to the console distribution output lines.

Transformer Output Version

NOTE: The stereo audio path consists of two identical sets of circuitry. For clarity and simplicity, only the left channel is described below.

Summing amplifier U1 operates at unity gain from the mix bus. Amplifier U3 serves as an isolation buffer for the summing amplifier, and as an inverter to correct the polarity inversion of the bus summing amplifier. U3 operates at unity gain and supplies the Patch Send line with a -10 dBu signal. Output amplifier U5 and associated discrete circuitry operates over the gain range of 6.6 dB to 11.2 dB, as set by feedback gain trim control R30. Output transformer T1 provides additional voltage gain due to the 1:3 winding ratio. Gain trim control R30 is set to provide an amplifier input to transformer output gain of 18 dB, the resulting output signal being + 8 dBm.

Note the auxiliary mix outputs from U1 and U2. These Left and Right bus signals are returned to the mother board and routed to the Monaural Line Output Amplifier position.

4.4 MONAURAL LINE OUTPUT AMPLIFIER

4.4.1 Function

The Monaural Line Output Amplifier may select and mix either the PROGRAM or AUDITION stereo signal to derive a monaural output. Patch Send and Return points are available for the connection of external processing equipment and/or a patch field. The output is an active balanced design.

4.4.2 Circuitry

The MONO SOURCE switch selects either the PGM or AUD stereo auxiliary outputs. The stereo signal is mixed to mono by amplifier U1. U1 operates at a gain of -6 dB to accommodate the mixing gain of similar input signals. The output to the Patch Send line is -10 dBu. Output amplifier U2 and associated discrete circuitry provides the nominal 18 dB gain to the +8 dBm output line level. Gain trim R13 provides a 5 dB trim range for the output amplifier.

4.5 CONTROL ROOM MONITOR MODULE

4.5.1 Function

The Control Room Monitor Module allows for the monitoring of PROGRAM, AUDITION, or any of eight stereo line inputs by means of an interlocking monitor selector. This module consists of four sections: monitor, meter, cue and headphone. Each section has a relationship with the others that can best be appreciated by reviewing the module schematics located in Chapter 7 of this document.

4.5.2 Circuitry

This module consists of a monitor section, meter section, cue section and a headphone section. The monitor section takes the signal selected by the 10-station monitor switch and buffers it with the bridging amplifiers formed by T1, U1, and T2, U2. The input to output gain of each bridging amplifier is - 8 dB. This signal is routed to the HEADPHONE selector switch and to monitor muting relay K1. This relay feeds the MONITOR LEVEL control.

The METER switch (BMX II-10, -14 and -18 only) selects which signal, PROGRAM, AUDITION or MONITOR, is displayed by the output meters.

The cue section consists of summing amplifier U3, which feeds the HEADPHONE switch and cue mute relay K2. This relay routes the cue signal to CUE LEVEL control R27. Amplifier U7 and associated discrete circuitry provides the drive for the meter panel mounted cue speaker. The amplifier was designed to drive the 45 ohm speaker with a maximum power of 750 milliwatts.

The HEADPHONE switch selects between the monitor selection and the cue mix. HEADPHONE LEVEL control R26 feeds headphone amplifiers U4 and U5. These amplifiers, with their associated circuitry, supply signals to the trim panel mounted headphone jack and to the rear connector. Monitor and cue muting relays K1 and K2 are driven by transistor Q1. Q1 conducts when its base is pulled low through R22 by a MUTE command from a microphone module. The collector of Q1 is also the source of the WARNING command voltage.

4.6 STUDIO MONITOR MODULE

4.6.1 Function

The Studio Monitor Module is expressly designed for applications where a separate voice/announce booth or conference studio is required. An electret condensor mic and talkback circuit lets the operator talk into the studio monitor system. Monitoring of PROGRAM, AUDITION, or any of eight stereo line inputs is provided by means of an interlocking monitor selector.

The module has three separate pairs of outputs, for use with monitor amplifiers, remote level control and studio headphones.

4.6.2 Circuitry

NOTE: This module duplicates the control room monitor module selector and buffer amplifier sections.

The output of the buffers are routed through the mute and talkback relays to the MONITOR LEVEL control. The talkback circuit consists of an electret condenser microphone and preamplifier U3. The microphone signal level is set by R24, which is buffered by amplifier U4, and feeds talk to studio relays K1 and K3. Pressing the TALKBACK button mutes the control room monitor via CR4, and the talkback relays to switch as driven by Q2. Studio monitor mute relay K2 is driven by Q1 when its base is pulled low through R26 by a command from a studio assigned Microphone Input Module or a REMOTE STUDIO MUTE command. Warning light command voltage is supplied by the collector of Q4.

4.7 TELCO MIX/MONAUURAL OUTPUT MODULE

4.7.1 Function

The Telco Mix/Monaural Output Module is designed to interface up to two phone lines with the BMX II. Two Line Input Modules are assigned as phone inputs, and are modified and connected in accordance



with the procedure outlined in Chapter 6. The outputs of these two modules are routed to the Telco Mix Module via the UTILITY bus. The output of the module dedicated to phone line 1 goes to UTILITY bus Left, while the phone line 2 output goes to UTILITY bus Right.

This module provides three separate and unique “mix-minus” mixes. Two mixes are used for return to the callers, with line 1 being summed with PROGRAM or AUDITION and sent to the line 2 output and line 2 being summed likewise and sent to the line 1 output. The third mix is a mix of just the callers which allows for monitoring the phone lines ahead of the PROGRAM and AUDITION buses, and may be fed to a “telco monitor” speaker and/or headphone system.

The Monaural Output section of this module acts as a standard mono output, and provides a mix of either the PROGRAM or AUDITION buses with or without the phones mixed in.

4.7.2 Circuitry

MONAURAL OUTPUT SECTION

The stereo PROGRAM and AUDITION auxiliary signals are buffered by unity gain summing amplifiers U1, U2, U3 and U4. The outputs of these amplifiers are routed to MONAURAL SOURCE switches S3 and S4. The stereo output of the source switch is summed to monaural through R66 and R67 and amplified by U8, which feeds the monaural patch output connector at -10 dBu level. The patch return signal is connected to the non-inverting input of amplifier assembly U9 and associated discrete components. The gain of the amplifier is adjusted by trim-pot R76, and feeds output transformer T3. The combination of the amplifier gain and the 1:3 turns ratio of the transformer provide an output level operating range of +3 dBm to +9 dBm.

TELCO MIX SECTION

The bus operating mode of the module is selected by TELCO MIX switches S1 and S2, which select which console bus will be used for the telephone callers, PROGRAM or AUDITION. The switch performs two functions. First it selects which console bus will be mixed to mono and fed to the callers. Second, it assigns the mix of the two callers back into the PROGRAM or AUDITION bus, “downstream” of the pickup point to prevent feedback.

The stereo output of the TELCO MIX switch is mixed to mono by amplifier U5, whose output is sent to “mix-minus” summing amplifiers U11 and U12. The signals from the dedicated telephone input modules arrive at the Telco Mix Module on UTILITY bus Left and Right; Telco #1 on UTILITY Left and Telco #2 on UTILITY Right. These signals are buffered by inverting (summing type) amplifiers U6 and U7, respectively.

The output of U6 is summed by U12 to create a mix of the TELCO MIX selection and Caller #1, while the output of U7 is summed by U11 to create a mix of the TELCO MIX selection and Caller #2. The output of U11 is buffered by transistors Q1 and Q2, transformer coupled by T1, and routed to the Telco #1 output. The output of U12 is buffered by transistors Q3 and Q4, transformer coupled by T2, and routed to the Telco #2 output.



The outputs of amplifiers U6 and U7 are also mixed by amplifier U10, whose output is the Telco Monitor. The output of U10 also feeds the TELCO MIX switch for assignment to the PROGRAM or AUDITION summing amplifiers U1, U2, U3 and U4. The outputs of amplifiers U1 through U4 are routed to the PROGRAM and AUDITION outputs for external connection, via the console Molex connector panel, into the Patch Returns of the PROGRAM and AUDITION output amplifiers.

4.8 REMOTE LINE SELECTOR MODULE

4.8.1 Function

The Remote Line Selector Module provides a selection of 10 stereo input signals switched to two outputs. The inputs and outputs are located on the rear Molex connector panel for ease of assignment. Typical applications include use as a line pre-selector ahead of input modules and tape recorders.

4.8.2 Circuitry

This module consists of two 10-station stereo selector switches fed from 10 stereo common remote inputs. The switch used is not available with a mechanical lockout mechanism to prevent pushing two or more buttons in a switch assembly simultaneously. Therefore, the switches in each 10-station assembly have been wired in series to avoid the possibility of remote input lines being tied together through accidental depression of two or more buttons.

4.9 VU METER BUFFER AMPLIFIER

4.9.1 Function

The console VU meters are driven by balanced isolation buffer amplifiers, and fully conform to American National Standard C16.5-1954.

4.9.2 Circuitry

The VU meter buffer amplifier consists of dual integrated circuit amplifier U1 configured for a balanced symmetrical input, and operating with cross-connected feedback. The gain of the amplifiers is adjusted by trim potentiometer R8. The output of the two amplifiers is coupled to the VU meter through the recommended source resistance of 3600 ohms. Light emitting diodes DS1 and DS2 provide over-drive protection to the meter movement.

4.10 POWER SUPPLY ASSEMBLY

4.10.1 Function

The fully-regulated power supply provides four separate voltage outputs, and is protected with magnetic circuit breakers, as well as electronic safeguards against excessive current.

4.10.2 Circuitry

The power supply has three discrete power modules: a bipolar 16 volt Audio supply, a 12 volt Logic supply and 48 volt "Phantom" power supply. Each module has its own circuit breaker, power transformer and regulator circuitry. Voltage test points are located on the front panel for ease of routine measurement. Connection to the supply is made at the rear panel terminal strip. The power supply can be configured at the factory for either 120 VAC or 240 VAC 50/60 Hz operation.

4.11 MAINFRAME

4.11.1 Function

The console housing contains all the interconnection wiring required to accommodate a full complement of modules. Each input position is wired in a universal fashion and, therefore, will accept either a Microphone or Line Input Module. The three extreme left module positions are dedicated to the output amplifier modules, while the three extreme right positions are dedicated to the monitoring and selector modules.

4.11.2 Circuitry

The mainframe itself does not contain active electronic components with the sole exception of the meter amplifier modules mounted in the meter panel. Access to the rear of the meter panel is provided by a removable panel attached with quarter turn fasteners.

The meter panel assemblies for the BMX II-10, -14 and -18 input mainframes are supplied with a stereo pair of output meters and a cue speaker. The panel is pre-wired to accept an output meter for the optional monaural output module. The BMX II-10 panel has one additional cutout for the installation of a digital clock or timer. A special version of this panel is available, without cue speaker, for applications requiring an additional cutout for a meter or timer/clock.

The BMX II-14 and -18 meter panels share identical layouts, and each has two cutouts for the installation of digital clocks and timers. These panels are also available with the cue speaker replaced by an additional meter/timer cutout.

The meter panels for the 22 and 26 input mainframes are supplied with four output meters, a stereo pair each for PROGRAM and AUDITION, and a cue speaker. These panels are also pre-wired for the optional monaural output meter. The remaining two spaces in all models may be used to install digital clocks and timers. As with the BMX II-10, -14 and -18 models, these panels are also available with the cue speaker replaced by an additional meter/timer cutout.

For an illustration of BMX II meter panel layout, see Figure 2.4. For detailed descriptions of the optional DT-4 Digital Timer and control panel and the TD-2 and TD-171 Digital Clocks see Chapter 8.

MAINTENANCE
AND ALIGNMENT

5.0 MAINTENANCE AND ALIGNMENT

This chapter contains sections describing routine maintenance, troubleshooting, level alignment, the spare parts kit, and replacement parts for the BMX II.

5.1 ROUTINE MAINTENANCE

Routine maintenance is usually limited to cleaning the linear motion faders, checking all button switches for proper operation, replacing burned out lamps or damaged "winkey" buttons, and keeping the panel surfaces clean. Panel surfaces may be cleaned with a weak solution of dishwashing detergent. The procedures for fader cleaning, checking power supply voltages, lamp replacement, button replacement and meter replacement are described below.

5.1.1 Fader Cleaning

To facilitate cleaning, the Penny & Giles faders can be removed from the Microphone and Stereo Line Input Modules by unplugging the two connecting cables and unscrewing the two button-head retaining screws located on the module front panel. Once this is accomplished, remove the fader side cover that is opposite the cable entry point. This will expose the conductive plastic track. Rinse the inside surfaces of the fader with warm clean water (tap water is acceptable). Do not use hot water.

NOTE: Do not use solvents of any kind when cleaning the fader.

If necessary, use a very soft brush or cotton tipped swab to loosen any heavy contamination, taking care to avoid damaging the wiper fingers. Dry the fader thoroughly using an air jet or hair dryer set at its lowest temperature.

Replace the side cover and re-install the fader and cables.

5.1.2 Checking Power Supply Voltages

The BMX II power supply is designed to provide very low-noise power to the console. Banana jacks are provided on the front panel of the power supply for checking power supply voltages. Each output should be within 0.5 volts of its specified DC voltage.

The outputs should also be checked periodically for ripple and noise with a sensitive AC voltmeter. The reading should be less than 350 microvolts RMS.

5.1.3 Lamp Replacement

NOTE: When replacing a lamp, replace it with an identical type. Do not substitute lamps of different voltage or current ratings.

Meter lamp replacement is accomplished by squeezing the mounting ears on the lamp socket to remove



the socket from the rear of the lamp bracket assembly. Replace the bayonet based lamp with PR&E #12-21, and re-install the socket in the lamp bracket assembly.

The module ON and OFF lenses are removed by hand by lifting them straight up out of the switch housing, and are unique in that they unseat and withdraw the lamp with them. Install the wedge based replacement lamp (PR&E #12-20) into the socket in the switch housing, and re-install the lens.

The CUE lenses are removed by unscrewing them from the switch housing. The lamp is contained in the lens, and should be replaced with PR&E #12-16.

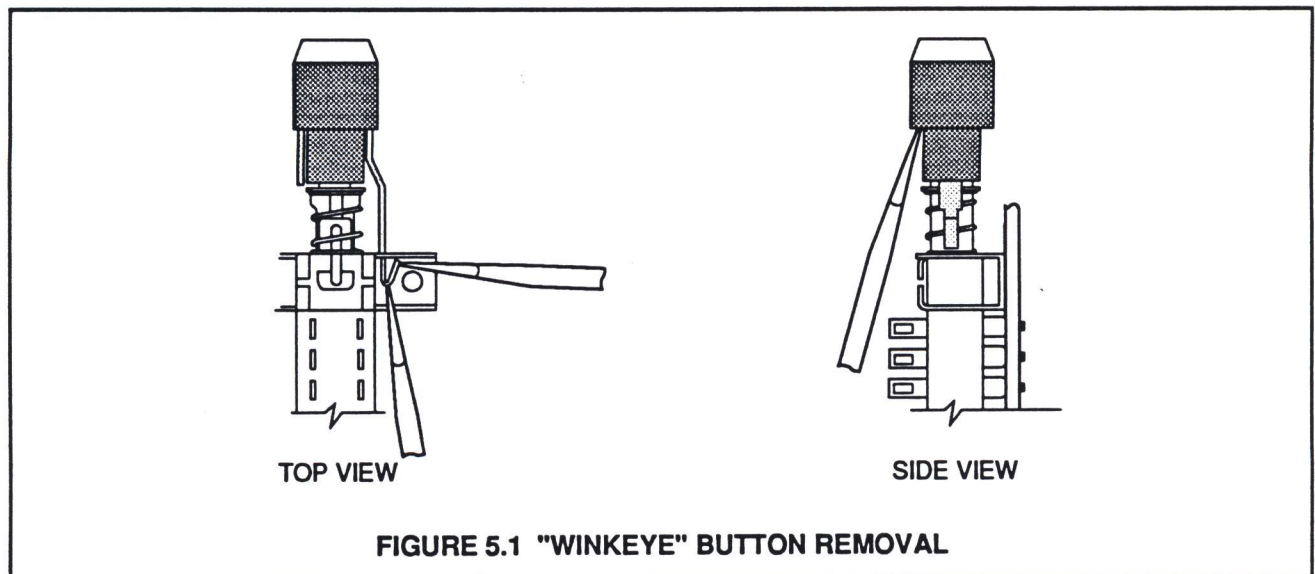
5.1.4 Button Replacement

The rectangular A/B selector, and all round "winkey" buttons (PR&E #'s 25-14 and 25-75, respectively) are removed using a two step procedure. The first step is the release of the actuator tab, and the second step is the dislodgement of the button from the switch shaft. This can be accomplished as follows:

NOTE: When removing a button, make sure that the switch shaft is in the "out" or disengaged position.

- 1) Use a small screwdriver to depress the retaining tab, as shown in Figure 5.1 (top view), and to apply a slight outward pressure to the tab. This will release the tab.
- 2) Once the tab is released, the button may be removed by applying outward pressure to the base of the button, per Figure 5.1 (side view).

NOTE: It may take considerable force to remove a "winkey" button once the tab has been released, so exercise caution. Also, avoid twisting the screwdriver shaft between the parts, as this will result in deforming the parts.



The "winkey" buttons used for PGM and AUD (PR&E #25-13) can be removed by applying even

pressure to the back of the button to dislodge it from the switch shift. This can be accomplished using a two-prong device, such as needle nose pliers. Again, it may take considerable force to remove the button, so exercise caution.

Snap the replacement button onto the switch shaft, making sure that the actuator tab is engaged into the body of the button.

Module ON and OFF and TALKBACK lenses are easily replaced by hand by lifting them straight up out of the switch housing and then snapping in the replacement.

NOTE: When the ON, OFF and TALKBACK lenses are removed, the switch lamps are also removed with them. Be sure to re-install this lamp into the switch housing before replacing the lens.

5.1.5 Meter Replacement

Consoles manufactured prior to January 1988 were equipped with Crompton VU meters (PR&E #46-4). Consoles manufactured since then are equipped with Sifam VU meters (PR&E #46-12). The two can be distinguished by the fact that Sifam meters have a small PR&E logo in the lower left corner of the meter face, while Crompton meters do not. Replacements of both types of VU meters are available from PR&E.

NOTE: Sifam meters may be substituted for Crompton meters, but, due to the slightly smaller size of the Sifam meters, a dress plate adaptor (PR&E #80-1055) must be installed at the time of meter replacement. This changeover also requires that the meter buffer amplifier be changed. A Sifam meter and buffer amplifier assembly may be obtained from PR&E (PR&E #99-222-1).

5.2 TROUBLESHOOTING (MODULE REMOVAL)

The modular construction of the console greatly enhances troubleshooting, since module substitution will usually isolate any problem other than a power supply failure. To remove a module from the mainframe, remove the black button head screws from the top and bottom of the module. Then, insert the Module Removal Tool (PR&E #70-56) into the fader slot and carefully pull the module up and out of the mainframe.

NOTE: An important feature when troubleshooting the BMX II is that modules may be removed or inserted with power applied to the console.

Once the module at fault has been identified and removed, it is recommended that the Equipment Description section for the module in question be read thoroughly prior to troubleshooting that module. Use the module extender board (PR&E #99-16) or standard service bench techniques to isolate the problem. The PR&E #99-16 extender board will accommodate all types of console modules except for the Studio and Control Room Monitor and Remote Line Selector modules. The monitor modules have their own extender board (PR&E #99-317).

NOTE: Most of the active analog and digital components are socketed for ease of replacement.

WARNING: The CMOS logic devices are susceptible to destruction from static discharge while being handled. It is recommended that considerable caution be exercised when working with these parts.

5.3 LEVEL ALIGNMENT

All consoles are set for a +8 dBm output level unless +4 dBm is specifically requested at time of order. Consoles may be ordered and modified for other operating levels. Consult PR&E for additional information.

Gain trim controls on the output amplifiers should not require retrimming unless components which affect amplifier gain have been replaced. Gain trim controls on the input modules should be adjusted so that the input accommodates the signal level from the source equipment.

NOTE: Always set the mixing fader at the “-15” dB mark before adjusting the input module gain trim controls. This will ensure that the optimum gain structure (i.e., dynamic range, headroom and signal to noise ratio) has been maintained. Should additional input gain range accommodation be required than permitted by the GAIN TRIM controls, refer to Section 6.2 of this document.

The BMX II input modules and output amplifiers were level aligned at the time of factory test as follows:

MICROPHONE INPUT MODULES

Fader set at “- 15” mark. 1 kHz test signal at -50 dBv (Ref. 0.774v) to module input, GAIN TRIM control adjusted to give +8 dBm console output into a 600 ohm, 1% termination load.

STEREO LINE INPUT MODULES

Fader set at “- 15” mark. 1 kHz test signal at +8 dBm to both module left and right inputs, GAIN TRIM controls adjusted to give +8 dBm console output into a 600 ohm, 1% termination load.

STEREO OUTPUT AMPLIFIER

1 kHz test signal at -10 dBm applied to Patch Return, GAIN TRIM controls adjusted to give +8 dBm output into a 600 ohm, 1% termination load.

MONAURAL OUTPUT AMPLIFIER

Using test signal into Stereo Line Input Module (above), select PROGRAM source on Monaural Output Amplifier, and adjust GAIN TRIM control for a +8 dBm output into a 600 ohm, 1% termination load.

VU METER AMPLIFIERS

1 kHz test signal at +8 dBm console output level, meter amplifier trim control set for “O” VU meter indication.

NOTE: It is very important that the test levels are maintained exactly as specified to avoid a buildup of tolerance errors.

5.4 SPARE PARTS KIT

The following kit of spare parts (PR&E #76-3) is supplied with each console mainframe. This kit is excluded from the limited warranty, and is provided to support initial installation only.

| <u>DESCRIPTION</u> | <u>QTY</u> | <u>PR&E#</u> |
|------------------------------------|------------|------------------|
| Diodes | | |
| 1N4001 | 2 | 11-7 |
| 1N914B | 2 | 11-13 |
| Integrated Circuits | | |
| Dual D flip-flop, 4013 | 2 | 211-43 |
| Dual Monostable, 4538 | 2 | 21-76 |
| Dual 4-input NAND, 4012 | 2 | 21-70 |
| Hex Inverter, 4584 or 74C14N | 2 | 21-46 or 21-17 |
| Op Amp, DIP, NE5534N | 4 | 20-28 |
| Op Amp, Dual, LF353N | 1 | 20-32 |
| Quad 2-input AND, 4081 | 2 | 21-68 |
| Quad 2-input NAND, 4093 | 2 | 21-4 |
| Quad 2-input NOR, 4001 | 2 | 21-61 |
| Quad 2-input OR, 4071 | 2 | 21-57 |
| Triple 2-input Analog Switch, 4053 | 2 | 21-71 |
| Triple 3-input OR, 4075 | 2 | 21-67 |
| Lamps | | |
| 14V, .08A, .13MSCP, 756 | 4 | 12-21 |
| 14V, .08A, .30 MSCP, 382 | 4 | 12-16 |
| 14V, .08A, .31 MSCP, 658 | 2 | 12-20 |
| Relay Assembly | 2 | 90-156 |
| Transistors | | |
| FET, PN4303 or 2N4303 | 4 | 9-1 |
| NPN, MJE181 | 2 | 7-1 |
| NPN, MPS6560 | 2 | 7-11 |
| PNP, MJE171 | 2 | 8-1 |
| PNP, MPSA63 | 4 | 8-4 |
| PNP, MPSU95 | 2 | 8-6 |
| PNP, 2N3638A-5 | 4 | 8-8 |
| Voltage Regulators | | |
| Fixed, 12V, 5A, UA78H12ASC | 1 | 20-31 |
| Variable, SG250K, LM350K | 1 | 20-30 |

This kit should provide sufficient spares for the initial operating period, however, it is recommended that



this kit be replenished and kept on hand for service use. In applications where any down time is unacceptable, it is recommended that the following be kept on hand:

| <u>DESCRIPTION</u> | <u>PR&E#</u> |
|--|-------------------------|
| Power Supply Assembly | 99-73 |
| Microphone Input Module | 99-77 |
| Stereo Line Input Module | 99-164-0 |
| Stereo Line Output Amplifier | 99-9-2 or |
| Stereo Line Output Amplifier (Transformerless) | 99-321-2 |
| Control Room Monitor Module | 99-11-2 |

5.5 REPLACEMENT PARTS

The components used are, wherever possible, standard items of general availability. However, should difficulty be encountered locating any of these items, PR&E maintains a stock of replacement parts. The power supply transformers and circuit breakers, Penny & Giles faders, potentiometers, VU meters, "winkeye" button caps, and all engraved button caps are manufactured to custom design specifications and are, therefore, available only from PR&E.

Following is a partial list of parts and assemblies used in the BMX II console, and the PR&E part number for easy reference:

| <u>DESCRIPTION</u> | <u>PR&E#</u> |
|---|-------------------------|
| Button Caps, Illuminating | |
| Amber (Line Input Cue) | 25-99 |
| Red, "ON" | 25-2-1 |
| White, "TALKBACK" | 25-8-2 |
| Yellow, "OFF" | 25-5-1 |
| Button Caps, Self-Indicating ("Winkeye") | |
| Rectangular, Blk-Org, "A" | 25-14-1 |
| Rectangular, Blk-Org, "B" | 25-14-2 |
| Round, Blk-Org | 25-75 |
| Square, Blk-Org, "PGM" | 25-13-1 |
| Square, Blk-Org, "AUD" | 25-13-2 |
| Capacitors | |
| Electrolytic, 1 μ F, 50V, Low Leakage | 60-45 |
| Electrolytic, 2.2 μ F, 50V, Low Leakage | 60-50 |
| Electrolytic, 10 μ F, 16V, Low Leakage | 60-48 |
| Electrolytic, 10 μ F, 25V | 60-84 |
| Electrolytic, 10 μ F, 50V, NP | 60-70 |
| Electrolytic, 10 μ F, 100V | 60-41 |
| Electrolytic, 22 μ F, 16V | 60-55 |
| Electrolytic, 22 μ F, 25V | 60-76 |
| Electrolytic, 22 μ F, 25V, Axial | 60-11 |
| Electrolytic, 22 μ F, 25V, NP | 60-85 |



| | |
|---|------------------|
| Electrolytic, 100 μ F, 16V | 60-36 |
| DESCRIPTION | PR&E# |
| Electrolytic, 100 μ F, 25V | 60-52 |
| Electrolytic, 100 μ F, 25V, Axial | 60-5 |
| Electrolytic, 100 μ F, 63V | 60-53 |
| Electrolytic, 220 μ F, 16V | 60-44 |
| Electrolytic, 220 μ F, 16V, Axial | 60-18 |
| Electrolytic, 220 μ F, 25V | 60-78 |
| Electrolytic, 470 μ F, 16V | 60-64 |
| Electrolytic, 470 μ F, 80V | 60-40 |
| Electrolytic, 8700 μ F, 40V, Low Leakage | 60-38 |
| Electrolytic, 20000 μ F, 40V, Low Leakage | 60-39 |
| Metalized Polyester, .022 μ F, 250V | 63-9 |
| Metalized Polyester, .1 μ F, 100V | 63-7 |
| Metalized Polyester, .47 μ F, 100V | 63-10 |
| Monolythic, .1 μ F, 50V | 62-5 |
| Monolythic, 1 μ F, 50V | 62-6 |
| Tantalum, 1.5 μ F, 35V | 65-3 |
| Tantalum, 10 μ F, 20V | 65-6 |
| Circuit Breakers | |
| Single Pole, Series Trip, Fast, .125A, Baton Handle, Blue | 30-9 |
| Single Pole, Series Trip, 2A, Baton Handle, Red | 30-18 |
| Single Pole, Series Trip, 2A, Baton Handle, Yellow | 30-19 |
| Diodes | |
| 1N4001 | 11-7 |
| 1N4004 | 11-17 |
| 1N914B | 11-13 |
| Zener, 1N4757A | 11-21 |
| Diode Bridge, 25A, 100V, MDA-2501 | 11-15 |
| DIP Switch, 6-Station, SPST | 26-2 |
| DT-4 Digital Timer | 99-180-1 |
| Extender Modules | |
| For Input/Output Modules | 99-16 |
| For Monitor Modules | 99-317 |
| Faders | |
| Audio Taper, Dual Channel, 5K ohm | 24-5 |
| Audio Taper, Single Channel, 5K ohm | 24-106 |
| Heatsink, Single Device, Power Supply | 31-203 |
| Insulators | |
| For TO-3, Silpad | 31-2 |
| For TO-220AB, Silpad | 31-3 |
| Integrated Circuits | |
| Dual D Flip-Flop, 4013 | 21-43 |
| Dual Monostable, 4538 | 21-76 |
| Dual 4-input NAND, 4012 | 21-70 |



| | |
|--|-------------------------|
| Hex Inverter, 4584 | 21-46 |
| <u>DESCRIPTION</u> | <u>PR&E#</u> |
| Op Amp, Dual, 8-Pin DIP, 5532 | 20-53 |
| Op Amp, DIP, 5534 | 20-28 |
| Op Amp, Dual, LF353 | 20-32 |
| Op Amp, TO-5, 5534 | 20-8 |
| Quad 2-input AND, 4081 | 21-68 |
| Quad 2-input NAND, 4093 | 21-4 |
| Quad 2-input NOR, 4001 | 21-61 |
| Quad 2-input OR, 4071 | 21-57 |
| Triple 2-input Analog Switch, 4053 | 21-71 |
| Triple 3-input OR, 4075 | 21-67 |
| IC Sockets | |
| 8-Pin, TO-5 | 16-109 |
| 8-Pin | 16-108 |
| 14-Pin | 16-114 |
| 16-Pin | 16-116 |
| Knobs | |
| Black, with indicator, 1/2" Dia. | 32-111 |
| Black, with indicator, 23/32" Dia. | 32-102 |
| Black, with indicator, 31/32" Dia. | 32-101 |
| Lamps | |
| 14V, .08A, .13MSCP, 756 | 12-21 |
| 14V, .08A, .30 MSCP, 382 | 12-16 |
| 14V, .08A, .31 MSCP, 658 | 12-20 |
| Lamp Socket for VU Meter | 16-3 |
| LED, Red, Diffused, 0.5 (MCD), 20MA | 12-7 |
| Line Output Assignment Switcher | 99-120 |
| Microphone, Electret | 23-1 |
| Modules | |
| Control Room Monitor Module | 99-11-2 |
| Control Room Monitor Module w/ Meter Switcher | 99-11-0 |
| Microphone Input Module | 99-77 |
| Monaural Line Output Amplifier | 99-8-4 |
| Remote Line Selector | 99-14 |
| Stereo Line Input Module | 99-164-0 |
| Stereo Line Output Amplifier | 99-9-2 |
| Stereo Line Output Amplifier (Transformerless) | 99-321-2 |
| Studio Monitor Module | 99-159 |
| Telco Mix/Monaural Output Module | 99-137 |
| Output Amplifier Function Module | 95-119 |
| Potentiometers | |
| Dual, 2.5K, Linear Taper | 24-67 |
| Dual, 10K, CW, Audio Taper | 24-26 |
| Dual, 750 ohm | 24-88 |



| | |
|--|------------------|
| Single, 10K, CW, Audio Taper | 24-27 |
| DESCRIPTION | PR&E# |
| Single, 1/2W, 10K, CCW, Audio Taper | 24-20 |
| Single, 750 ohm | 24-97 |
| Power Supply Assembly | 99-73 |
| Relay, DPDT, 12V, Sealed, PC Mount | 28-4 |
| Resistor/Inductor Assembly, 40μH | 90-91 |
| Spare Parts Kit | 76-3 |
| Switches | |
| 1-Station, SPST; ON/OFF (Input Mod.), TALKBACK (Studio Mon.) | 25-102 |
| 1-Station, Pushbutton, 4PDT, Round, Blk/Orange | 25-602 |
| 1-Station, Pushbutton, Round; CUE (Line Input) | 25-100 |
| 2-Station, 6-Pole; A/B (Input Modules), PGM/AUD (Telco Module) | 25-105 |
| 2-Station, 4PDT; PGM/AUD (Input Modules) | 25-712 |
| 2-Station, 4PDT; PGM/AUD (Telco, Mono Output Modules) | 25-721 |
| 2-Station, Pushbutton, 4PDT, Round, Blk/Orange | 25-70 |
| 3-Station, Pushbutton, 4PDT, Round, Blk/Orange | 25-724 |
| 10-Station, Pushbutton, 4PDT, Rnd, Blk/Orange | 25-714 |
| Rotary, 4-Position | 27-327 |
| Toggle, DPST, 3A, 125V, 2-Position (Power Supply) | 26-201 |
| TD-171 Slave Clock | 99-312-1 |
| TD-2 Digital Time of Day Clock | 99-179-1 |
| Technical Manual | 75-4 |
| Tools | |
| Module Removal Tool | 70-56 |
| Molex Crimp Tool | 70-3 |
| Molex Pin Extraction Tool | 70-4 |
| Transformers | |
| Audio, Control Room Monitor | 49-310 |
| Audio Input, Studio Monitor | 49-3 |
| Audio, Mic Input Module | 49-5 |
| Audio, JE-112PC | 49-103 |
| Audio, JE-123-A | 49-303 |
| Power, 16V, 8A | 48-2 |
| Power, 38V, 5.5A | 48-1 |
| Power, 88V, 120MA | 48-7 |
| Transistors | |
| FET, PN4303 or 2N4303 | 9-1 |
| FET, 2N5638 | 9-2 |
| NPN, MJE181 | 7-1 |
| NPN, MPS6560 | 7-11 |
| PNP, MJE171 | 8-1 |
| PNP, MPSA63 | 8-4 |
| PNP, MPSU95 | 8-6 |
| PNP, 2N3638A-5 | 8-8 |



Trim-pot, Single-Turn, 72PR10K

DESCRIPTION

Voltage Regulators

Fixed, 12V, 5A, UA78H12ASC

Variable, SG250K, LM350K

VU Meter, Type R32F

VU Meter Buffer Amplifier

24-54

PR&E#

20-31

20-30

46-12

95-72



6.0 OPTIONS AND MODIFICATIONS

This chapter contains sections describing phantom microphone powering, additional line input gain, the UTILITY mix bus, and Telco Mix Module installation.

6.1 PHANTOM MICROPHONE POWERING

The BMX II is equipped with a +48 volt “phantom” power supply for the powering of condenser microphones connected to the Microphone Input Modules. This “phantom” power is available whenever the MICROPHONE toggle switch on the BMX II power supply is placed in the “ON” position. All necessary modifications to the Microphone Input Modules have been accomplished at the factory (see note below), so condenser microphones may be connected just like any other microphone.

NOTE: For microphones connected to the “A” input, jumper wires have been installed between points E1 and E3 on the Microphone Input Module PC assembly. For microphones connected to the “B” input, jumper wires have been installed between points E2 and E4 (reference the schematic located in Chapter 7).

6.2 ADDITIONAL TRANSFORMER LINE INPUT GAIN

An additional 24 dB of input sensitivity is available on the transformer input version of the Stereo Line Input Module for applications, such as low level telephone lines, which require more gain than provided by the trim controls. The standard input sensitivity range is -12 dBm to +8 dBm. In order to modify this to be -36 dBm to -16 dBm, accomplish the following (reference the schematic located in Chapter 7):

- 1) Remove input pad resistors R1, R2 and R3 (input A) and R101, R102 and R103 (input B).
- 2) Install wire jumpers between R1 and R3, and R101 and R103.

6.3 UTILITY MIX BUS

The console mainframe wiring assembly is equipped with a spare set of mixing buses called the UTILITY buses (Left and Right). These buses were designed to provide an additional stereo output capability, if required.

NOTE: The UTILITY buses are also used when the Telco Mix/Monaural Output Module is installed, as described in Section 6.4.

The UTILITY buses terminate at the console position assigned to the Monaural Line Output Amplifier, and, therefore, cannot be used when this position is occupied. If this position is not being used, then a Stereo Line Output Amplifier may be installed in the UTILITY position. First, however, resistors R7 and R9 must be removed from the PC assemblies of all three Stereo Line Output Amplifiers (these resistors are the signal feed source for the Monaural Output Amplifier).

Once the stereo UTILITY output amplifier is installed in the mainframe, the Microphone and Stereo Line Input Modules will have to be modified to feed the UTILITY bus. Refer to the schematics in Chapter 7 to locate points E18 and E19 on the Microphone Input Module and E12, E13, E112 and E113 on the Stereo Line Input Module. These "E" points are the inputs to the UTILITY bus, and must be connected in accordance with the specific task being assigned the UTILITY bus.

6.4 TELCO MIX MODULE INSTALLATION

The Telco Mix/Monaural Output Module was developed in 1979, two years after the introduction of the BMX series of consoles. Therefore, the module had to accommodate the existing facilities of the original design plus whatever minor modifications could be easily made. The module takes advantage of two "extra" mix buses on the main mother board, UTILITY Left & Right, to provide the capability for handling up to two telephone callers with independent mix-minus feeds for each, plus a monitor mix of the callers.

When installing the Telco Mix/Monaural Output Module, one or two Stereo Line Input Modules are chosen to be connected to the incoming telephone signals. The lines are brought from the hybrid units to these input modules in the normal manner; however, the output assignment from these modules is handled differently. The modules' output assignment system is modified so the telco signals will be routed to the Telco Mix Module via the stereo UTILITY buses when both the PGM and AUD buttons are released. In this mode, the input module handling caller #1 is assigned to UTILITY bus Left, and the input module handling caller #2 is assigned to UTILITY bus Right.

The two signals are summed together in the Telco Mix Module, and then assigned to either the PROGRAM or AUDITION bus, as selected by the TELCO MIX buttons. In this way the operator may assign the caller(s) to the PROGRAM bus for "on-air" operation, or to the AUDITION bus for "off-air" conversation or recording. The TELCO MIX buttons also simultaneously determine which mix will be fed back to the callers.

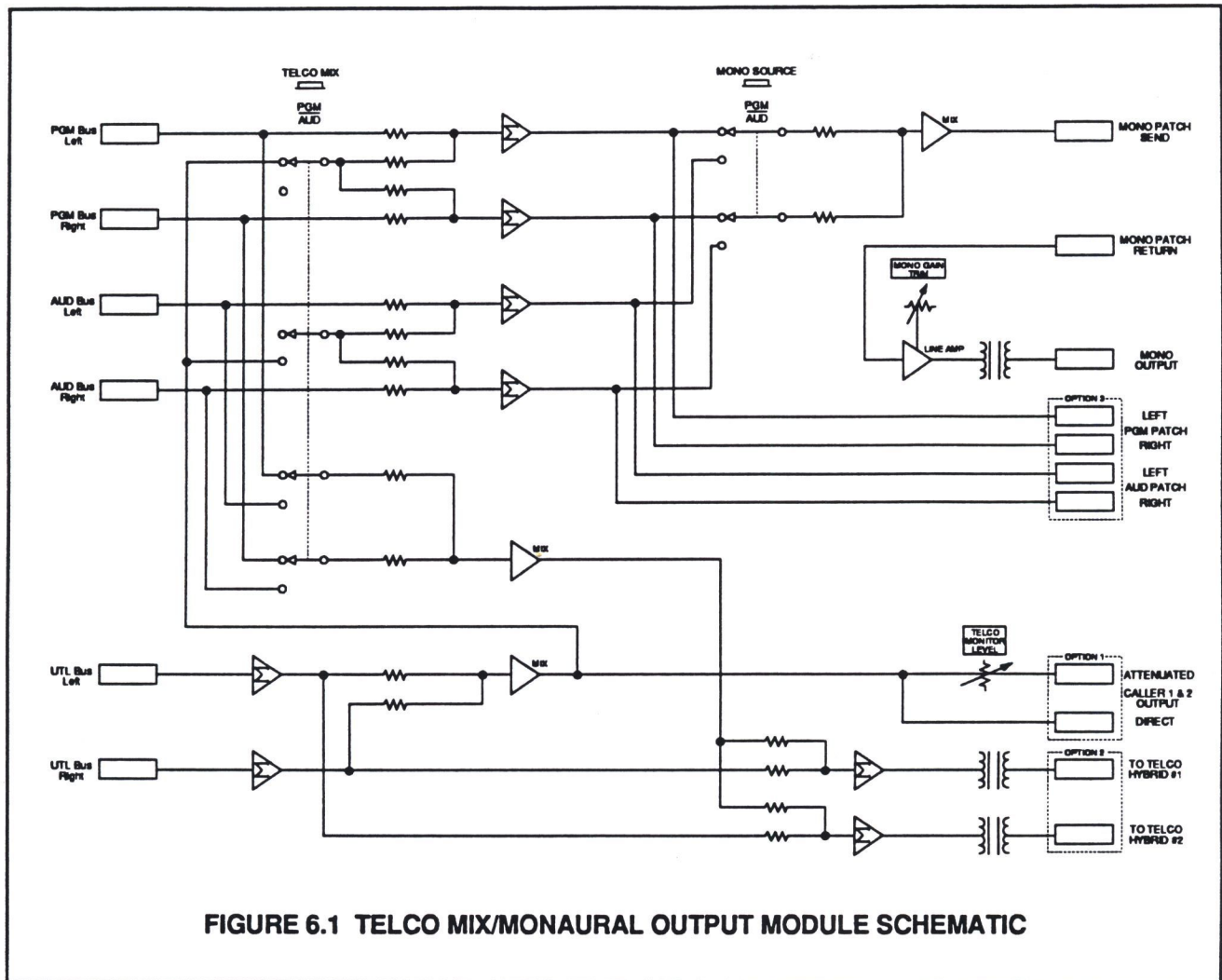
There are two individual mix-minus signals fed back to the callers. Both mix-minus signals consist of PROGRAM or AUDITION, as selected by the front panel TELCO MIX control, plus the opposite caller. Therefore, Caller #1 hears the assigned mix plus Caller #2, while Caller #2 hears the assigned mix plus Caller #1.

There are also two outputs available for monitoring only the summed callers, one fixed level and the other adjusted by the front panel TELCO MONITOR control. These monitor outputs are usually used in talk show systems to feed a power amplifier and small speaker located near the host and guests. The fixed level output is provided to feed a host volume control, while the variable output is for combo operator/host operations.

NOTE: The Telco Monitor output consists of only those callers whose input modules are in the ON state and assigned to the UTILITY bus.

The Telco Mix/Monaural Output Module also provides the normal features of the standard Monaural Output Module, independent of the functions of the Telco Mix facility. See Figure 6.1 for a schematic

illustrating the inner workings of the Telco Mix/Monaural Output Module.



6.4.1 Telco Mix Mainframe Installation

The Telco Mix Module requires the addition of a #90-189 cable assembly to the console mainframe. The assembly consists of a PC edge connector and three Molex connectors. The edge connector is installed in the unused cutout at the Monaural Output Amplifier location, near the front of the mainframe. This connector should be mounted with pin #1 closest to the front of the mainframe. The Molex connectors at the other end of the cable assembly are installed on the rear connector panel in the locations labeled **OPTION**. Install J2 in **OPTION 1**, J3 in **OPTION 2** and J4 in **OPTION 3** with the connector notches facing up.

The Telco Mix Module functions by interrupting the Patch Return points of the PROGRAM and AUDITION amplifiers and mixing the callers into the final output. Therefore, a patch point jumper cable must be installed to interconnect the Telco Mix Module Patch Sends to the Patch Returns of the PROGRAM and AUDITION amplifiers. For pin assignment, see Section 2.7.8 of this document.



NOTE: The PROGRAM and AUDITION amplifier Patch Sends are not used when the Telco Mix Module is installed.

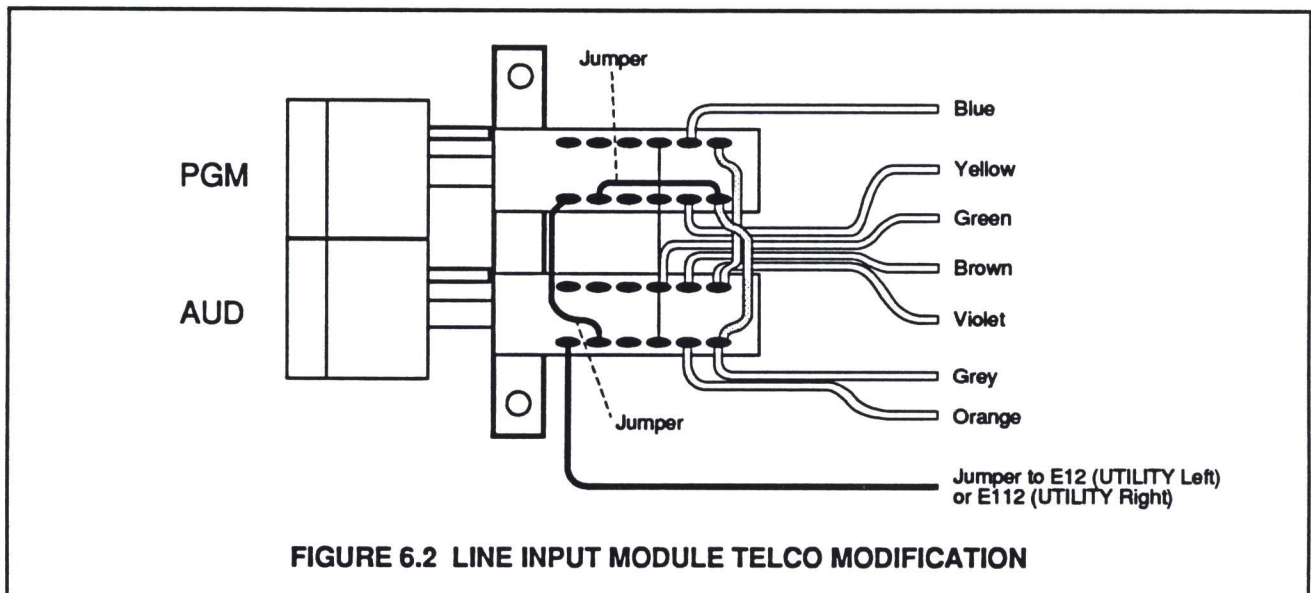
6.4.2 Line Input Module Modification

The Stereo Line Input Modules which have been designated to receive the telephone inputs require a minor modification to allow assignment to the appropriate UTILITY buses. The modification will result in the following switching/assignment:

| <u>Button Status</u> | <u>Assignment Result</u> |
|-----------------------|--------------------------|
| PGM engaged | PROGRAM |
| AUD engaged | AUDITION |
| PGM & AUD engaged | PROGRAM and AUDITION |
| Both buttons released | UTILITY (Left or Right) |

NOTE: The module's normal assignment capabilities have not been impaired, but, when using the module as a telco input, both PGM and AUD buttons must be disengaged in order to avoid sending the hybrid's output back to itself.

The modification to the module involves the simple addition of two jumper wires on the PGM/AUD switch assembly, and the routing of a single wire from this assembly to an existing "E" point on the printed circuit board. Figure 6.2 illustrates the two jumpers and the UTILITY assignment lead.



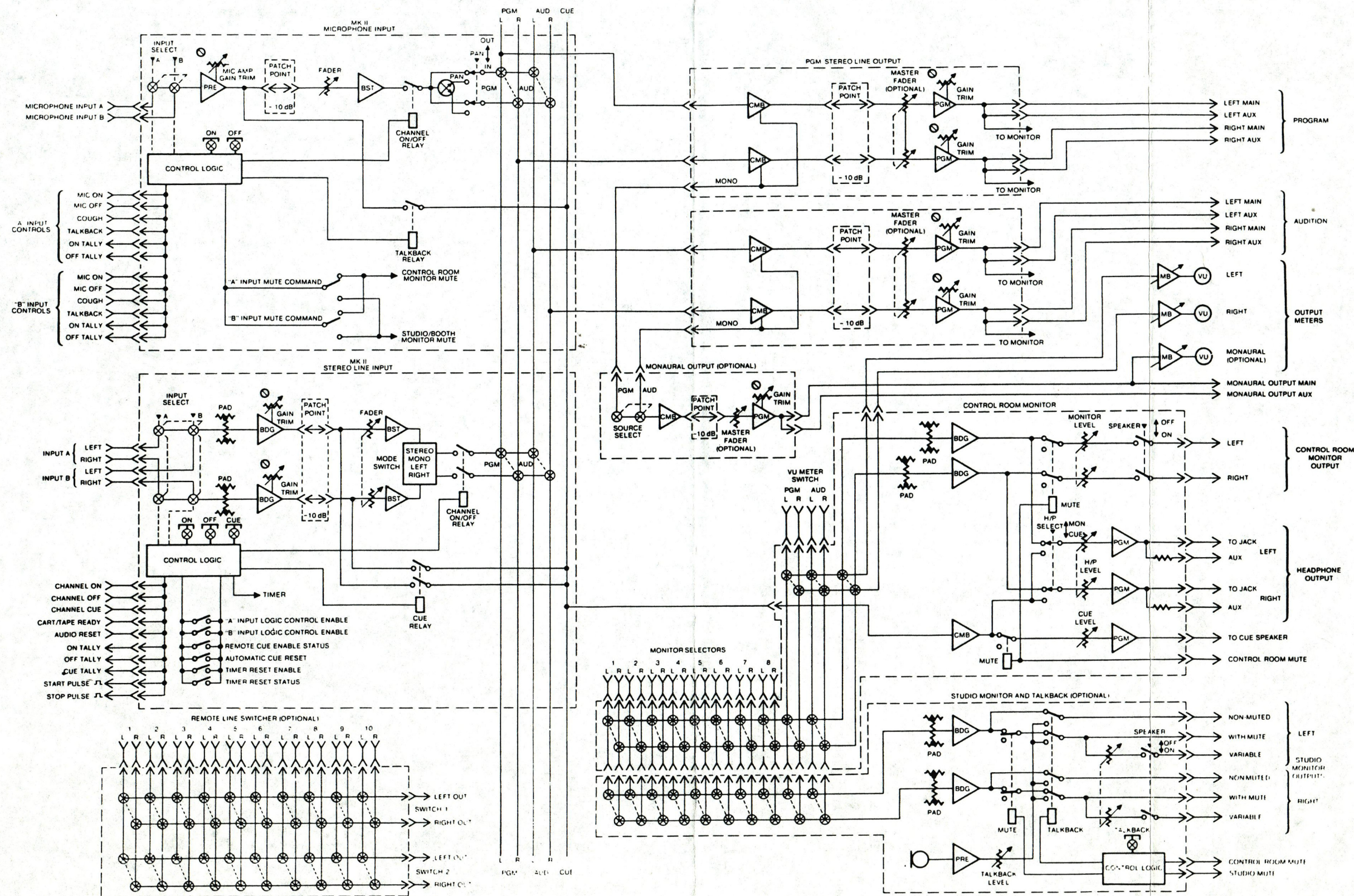
The UTILITY assignment lead is attached to one of two eyelets, E12 or E112, located near the center edge connector. The module representing Caller #1 will have the assignment lead connected to E12 (UTILITY Left), and the module for Caller #2 will be connected to E112 (UTILITY Right).

7.0 DRAWINGS AND SCHEMATICS

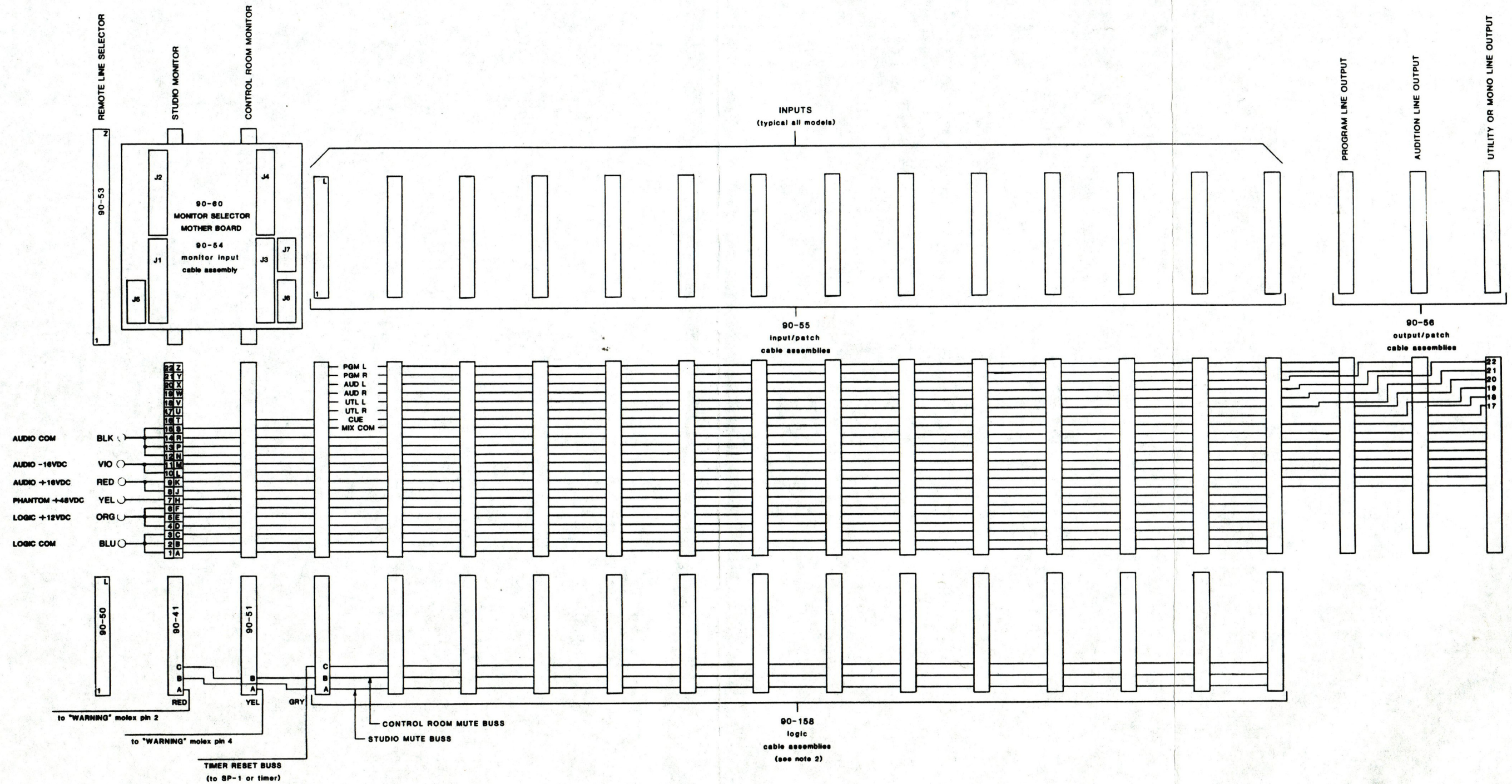
This chapter is made up of the following drawings and schematics:

- 7.1 Functional Block Diagram
- 7.2 Circuit Plate Wiring
- 7.3 Monitor Selector Mother Board Schematic
- 7.4 Console Wiring (Edge Connector Layout)
 - 7.4.1 Microphone Input Module Audio
 - 7.4.2 Stereo Line Input Module Audio
 - 7.4.3 Input Module Logic
 - 7.4.4 Monitor Module Input
 - 7.4.5 Control Room Monitor Module Output
 - 7.4.6 Studio Monitor Module Output
 - 7.4.7 Remote Line Selector Module Input
 - 7.4.8 Remote Line Selector Module Output
 - 7.4.9 Program Amplifier Output
 - 7.4.10 Audition Amplifier Output
 - 7.4.11 Monaural Amplifier Output
 - 7.4.12 Telco Mix Module Output
 - 7.4.13 VU Meter Signal/Power
 - 7.4.14 C/R and Studio Warning Output
 - 7.4.15 Talkback (Option 4) Output
 - 7.4.16 External Timer Power/Reset Output
- 7.5 Microphone Input Module Audio Schematic
- 7.6 Microphone Input Module Logic Schematic (Version A)
- 7.7 Microphone Input Module Logic Schematic (Version B)
- 7.8 Stereo Line Input Module Audio Schematic (Transformerless)
- 7.9 Stereo Line Input Module Audio Schematic (Transformer Version)
- 7.10 Stereo Line Input Module Logic Schematic
- 7.11 Stereo Line Output Amplifier Schematic (Transformerless)
- 7.12 Stereo Line Output Amplifier Schematic (Transformer Version)
- 7.13 Monaural Line Output Amplifier Schematic
- 7.14 Control Room Monitor Module Schematic
- 7.15 Control Room Monitor Module Schematic (Switching)
- 7.16 Studio Monitor Module Schematic
- 7.17 Studio Monitor Module Schematic (Switching)
- 7.18 Telco Mix/Monaural Output Module Schematic
- 7.19 Remote Line Selector Module Schematic
- 7.20 VU Meter Buffer Amplifier Schematic
- 7.21 Output Amplifier Function Module Schematic
- 7.22 Power Supply Schematic

NOTE: On PR&E schematics, capacitor values are in microfarads (μF), unless otherwise specified, and resistors are 1/4 watt, 5%, unless otherwise specified.



- LEGEND**
- AMPLIFIER
 - SWITCHING FUNCTION
 - METER STD VOL UNIT AUDIO LEVEL
 - BDG-BRIDGING AMP
 - BST-BOOSTER AMP
 - PGM-PROGRAM AMP
 - CMB-COMBING AMP
 - PRE-PRE AMP
 - MB-METER BUFFER



2. The Series I console used a 90-52 assembly for the logic connectors.

1. 90-XX designations refer to cable assemblies used at that connector or group of connectors.

NOTES:



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7.2 CIRCUIT PLATE WIRING

INPUTS

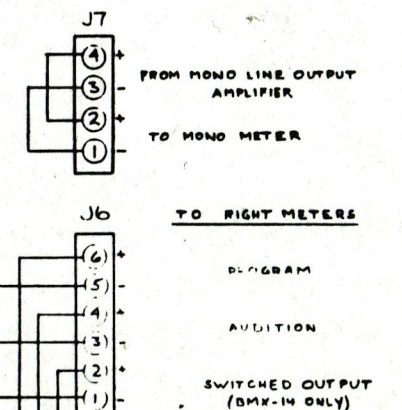
1L J2 10
 1R J4 10
 2L J2 8
 2R J4 8
 3L J2 6
 3R J4 6
 4L J2 4
 4R J4 4
 5L J2 2
 5R J4 2
 6L J2 1
 6R J4 1
 7L J1 9
 7R J3 9
 8L J1 7
 8R J3 7
 PGM L J1 5
 PGM R J3 5
 AUD L J1 4
 AUD R J3 4
 N/C J1 2
 N/C J3 2

TO LEFT METERS J5

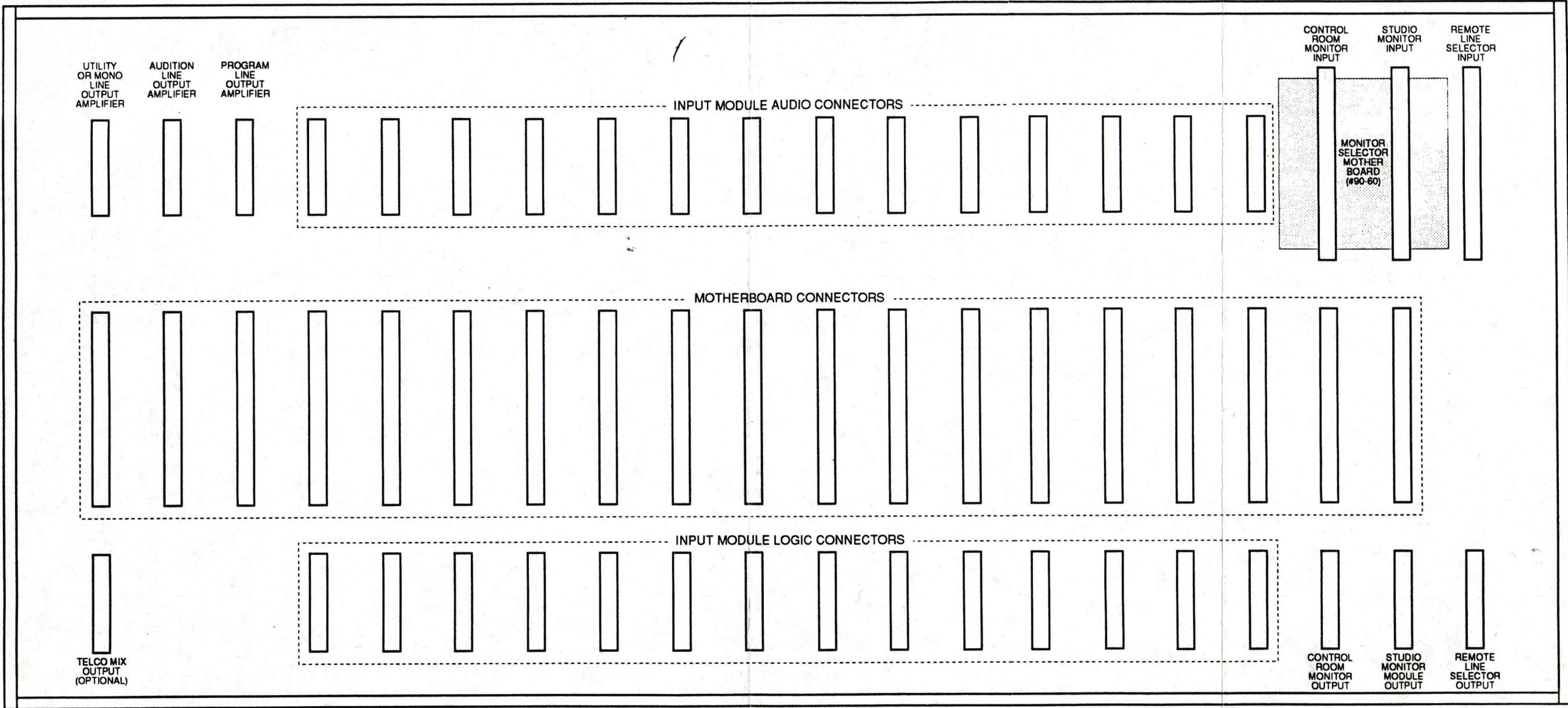
PROGRAM + 6
 AUDITION - 5
 SWITCHED OUTPUT (BMX-14 ONLY) + 4
 - 3
 + 2
 - 1

STUDIO MONITOR

CONTROL ROOM MONITOR

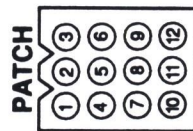
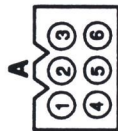


TOP VIEW



CONSOLE FRONT

REAR PANEL INPUT MODULE AUDIO MOLEX CONNECTORS



| Input Signal | From Rear Panel Molex Connectors | | To Edge Connector | |
|---------------------|-------------------------------------|-----|----------------------|-----|
| | Connector | Pin | Connector | Pin |
| A Input - low | A | 2 | | 10 |
| A Input - high | " | 3 | | L |
| B Input - low | B | 2 | | 8 |
| B Input - high | " | 3 | | J |
| Patch Send - low | PATCH | 2 | | 4 |
| Patch Send - high | " | 3 | | D |
| Patch Return - low | " | 8 | | 2 |
| Patch Return - high | " | 9 | | B |

NOTES :

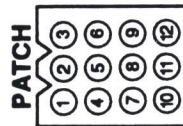
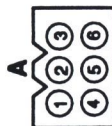
- A) The input connector shield wire (pin 1) is tied to the edge connector ground lug.
- B) The PATCH connector shield wires (pins 1 and 7) are tied to the edge connector ground lug.
- C) Low wires are black; high wires are red.
- D) The PR&E part number for this assembly is 90-55.

INPUT MODULE AUDIO EDGE CONNECTOR (TOP VIEW)



CONSOLE
FRONT
→

REAR PANEL INPUT MODULE AUDIO MOLEX CONNECTORS



| Input Signal | From Rear Panel Molex Connectors | | To Edge Connector | |
|---------------------------|-------------------------------------|-----|----------------------|-----|
| | Connector | Pin | Connector | Pin |
| A Input/Left - low | A | 2 | | 10 |
| A Input/Left - high | " | 3 | | L |
| A Input/Right - low | " | 5 | | 9 |
| A Input/Right - high | " | 6 | | K |
| B Input/Left - low | B | 2 | | 8 |
| B Input/Left - high | " | 3 | | J |
| B Input/Right - low | " | 5 | | 7 |
| B Input/Right - high | " | 6 | | H |
| Patch Send/Left - low | PATCH | 2 | | 4 |
| Patch Send/Left - high | " | 3 | | D |
| Patch Send/Right - low | " | 5 | | 3 |
| Patch Send/Right - high | " | 6 | | C |
| Patch Return/Left - low | " | 8 | | 2 |
| Patch Return/Left - high | " | 9 | | B |
| Patch Return/Right - low | " | 11 | | 1 |
| Patch Return/Right - high | " | 12 | | A |

INPUT MODULE AUDIO EDGE CONNECTOR (TOP VIEW)



CONSOLE
FRONT



NOTES :

- The input connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- The PATCH connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
- Low wires are black; high wires are red.
- The PR&E part number for this assembly is 90-55.

**INPUT MODULE
LOGIC
EDGE CONNECTOR
(TOP VIEW)**

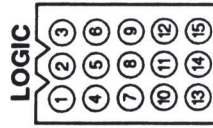


CONSOLE
FRONT
↓

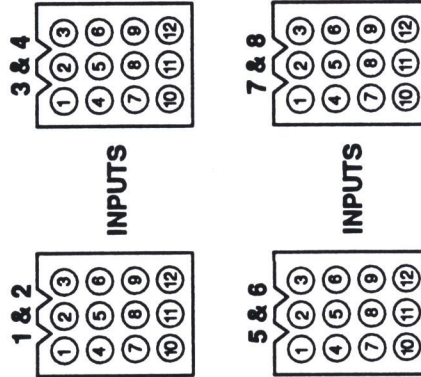
| WIRE COLOR | From Edge Connector | To Rear Panel Molex Connector | |
|---------------|------------------------|----------------------------------|-----|
| | Pin | Connector | Pin |
| Black | 10 | LOGIC | 1 |
| White | 9 | " | 2 |
| Red | 8 | " | 3 |
| Green | 7 | " | 4 |
| Orange | 6 | " | 5 |
| Blue | 5 | " | 6 |
| White/Black | 4 | " | 7 |
| Red/Black | L | " | 8 |
| Green/Black | K | " | 9 |
| Orange/Black | J | " | 10 |
| Blue/Black | H | " | 11 |
| Black/White | F | " | 12 |
| Red/White | E | " | 13 |
| Green/White | D | " | 14 |
| Blue/White | -- | " | 15 |

NOTE: The PR&E part number for this assembly is 90-158.

**REAR PANEL INPUT MODULE
LOGIC MOLEX CONNECTOR**



REAR PANEL MONITOR INPUT MOLEX CONNECTORS



| Input Signal | From Rear Panel Molex Connectors | | To Monitor Selector Mother Board | | To Edge Connector |
|-----------------|-------------------------------------|-----|-------------------------------------|-----|----------------------|
| | Connector | Pin | Connector | Pin | |
| 1L - low | 1 & 2 | 2 | J2 | 10 | 22 |
| 1L - high | " | 3 | J2 | 11 | Z |
| 1R - low | " | 5 | J4 | 10 | 21 |
| 1R - high | " | 6 | J4 | 11 | Y |
| 2L - low | " | 8 | J2 | 8 | 20 |
| 2L - high | " | 9 | J2 | 9 | X |
| 2R - low | " | 11 | J4 | 8 | 19 |
| 2R - high | " | 12 | J4 | 9 | W |
| 3L - low | 3 & 4 | 2 | J2 | 6 | 18 |
| 3L - high | " | 3 | J2 | 7 | V |
| 3R - low | " | 5 | J4 | 6 | 17 |
| 3R - high | " | 6 | J4 | 7 | U |
| 4L - low | " | 8 | J2 | 4 | 16 |
| 4L - high | " | 9 | J2 | 5 | T |
| 4R - low | " | 11 | J4 | 4 | 15 |
| 4R - high | " | 12 | J4 | 5 | S |
| 5L - low | 5 & 6 | 2 | J2 | 2 | 14 |
| 5L - high | " | 3 | J2 | 3 | R |
| 5R - low | " | 5 | J4 | 2 | 13 |
| 5R - high | " | 6 | J4 | 3 | P |
| 6L - low | " | 8 | J1 | 11 | 12 |
| 6L - high | " | 9 | J2 | 1 | N |
| 6R - low | " | 11 | J3 | 11 | 11 |
| 6R - high | " | 12 | J4 | 1 | M |
| 7L - low | 7 & 8 | 2 | J1 | 9 | 10 |
| 7L - high | " | 3 | J1 | 10 | L |
| 7R - low | " | 5 | J3 | 9 | 9 |
| 7R - high | " | 6 | J3 | 10 | K |
| 8L - low | " | 8 | J1 | 7 | 8 |
| 8L - high | " | 9 | J1 | 8 | J |
| 8R - low | " | 11 | J3 | 7 | 7 |
| 8R - high | " | 12 | J3 | 8 | H |

CONTROL ROOM AND
STUDIO MONITOR INPUT
EDGE CONNECTOR
(TOP VIEW)



CONSOLE
FRONT



- NOTES :**
A) The input connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
B) Low wires are black; high wires are red.
C) The PR&E part number for this assembly is 90-54.

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7.4.4 CONSOLE WIRING - MONITOR MODULE INPUT

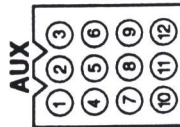
CONTROL ROOM
MONITOR
OUTPUT
EDGE CONNECTOR
(TOP VIEW)



CONSOLE
FRONT
↓

| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|-----------------------|------------------------|-----------------------------------|-----|
| | Pin | Connector | Pin |
| Mon. Out/Left - low | 10 | OUTPUT | 2 |
| Mon. Out/Left - high | L | " | 3 |
| Mon. Out/Right - low | 9 | " | 5 |
| Mon. Out/Right - high | K | " | 6 |
| HP Out/Left - low | 6 | AUX | 2 |
| HP Out/Left - high | F | " | 3 |
| HP Out/Right - low | 5 | " | 5 |
| HP Out/Right - high | E | " | 6 |
| Cue Amp Out - low | 4 | " | 8 |
| Cue Amp Out - high | D | " | 9 |

REAR PANEL CONTROL ROOM
MONITOR OUTPUT
MOLEX CONNECTORS



NOTES :

- A) The OUTPUT connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- B) The AUX connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
- C) Pins 11 and 12 on the rear panel AUX connector are used for Cue Speaker Input.
- D) Low wires are black; high wires are red.
- E) The PR&E part number for this assembly is 90-51.

7.4.5 CONSOLE WIRING - CONTROL ROOM MONITOR MODULE OUTPUT



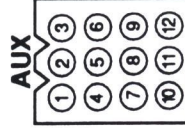
STUDIO MONITOR
OUTPUT
EDGE CONNECTOR
(TOP VIEW)



CONSOLE
FRONT
↓

| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|------------------------------------|------------------------|-----------------------------------|-----|
| | Pin | Connector | Pin |
| Out/Left, w/level control - low | 10 | OUTPUT | 2 |
| Out/Left, w/level control - high | L | " | 3 |
| Out/Right, w/level control - low | 9 | " | 5 |
| Out/Right, w/level control - high | K | " | 6 |
| Out/Left, direct w/muting - low | 8 | AUX | 2 |
| Out/Left, direct w/muting - high | J | " | 3 |
| Out/Right, direct w/muting - low | 7 | " | 5 |
| Out/Right, direct w/muting - high | H | " | 6 |
| Out/Left, direct w/o muting - low | 6 | " | 8 |
| Out/Left, direct w/o muting - high | F | " | 9 |
| Out/Right, dir. w/o muting - low | 5 | " | 11 |
| Out/Right, dir. w/o muting - high | E | " | 12 |

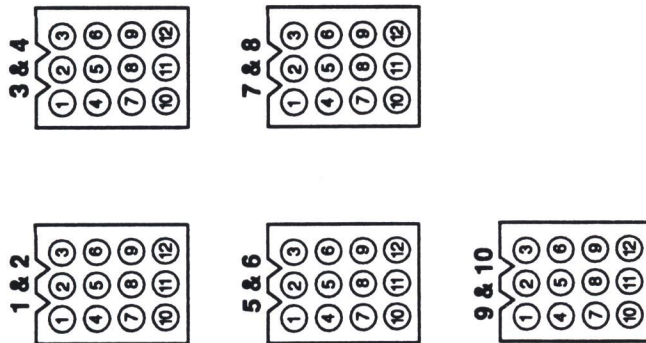
REAR PANEL STUDIO
MONITOR OUTPUT
MOLEX CONNECTORS



NOTES :

- The OUTPUT connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- The AUX connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
- Low wires are black; high wires are red.
- The PR&E part number for this assembly is 90-41.

REAR PANEL REMOTE LINE SELECTOR INPUT MOLEX CONNECTORS



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NOTES :
A) The input connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
B) Low wires are black; high wires are red.
C) The PR&E part number for this assembly is 90-53.

| Input Signal | From Rear Panel Molex Connectors | Pin | To Edge Connector | Pin |
|--------------|----------------------------------|-----|-------------------|-----|
| 1L - low | 1 & 2 | 2 | 22 | |
| 1L - high | - | 3 | Z | |
| 1R - low | - | 5 | 21 | |
| 1R - high | - | 6 | Y | |
| 2L - low | - | 8 | 20 | |
| 2L - high | - | 9 | X | |
| 2R - low | - | 11 | 19 | |
| 2R - high | - | 12 | W | |
| 3L - low | 3 & 4 | 2 | 18 | |
| 3L - high | - | 3 | V | |
| 3R - low | - | 5 | 17 | |
| 3R - high | - | 6 | U | |
| 4L - low | - | 8 | 16 | |
| 4L - high | - | 9 | T | |
| 4R - low | - | 11 | 15 | |
| 4R - high | - | 12 | S | |
| 5L - low | 5 & 6 | 2 | 14 | |
| 5L - high | - | 3 | R | |
| 5R - low | - | 5 | 13 | |
| 5R - high | - | 6 | P | |
| 6L - low | - | 8 | 12 | |
| 6L - high | - | 9 | L | |
| 6R - low | - | 11 | K | |
| 6R - high | - | 12 | J | |
| 7L - low | 7 & 8 | 2 | 10 | |
| 7L - high | - | 3 | H | |
| 7R - low | - | 5 | 9 | |
| 7R - high | - | 6 | F | |
| 8L - low | - | 8 | E | |
| 8L - high | - | 9 | D | |
| 8R - low | - | 11 | C | |
| 8R - high | - | 12 | B | |
| 9L - low | 9 & 10 | 2 | 6 | |
| 9L - high | - | 3 | A | |
| 9R - low | - | 5 | | |
| 9R - high | - | 6 | | |
| 10L - low | - | 8 | | |
| 10L - high | - | 9 | | |
| 10R - low | - | 11 | | |
| 10R - high | - | 12 | | |

REMOTE LINE SELECTOR INPUT EDGE CONNECTOR (TOP VIEW)



CONSOLE
FRONT
→

7.4.7 CONSOLE WIRING - RLS MODULE INPUT

REMOTE LINE
SELECTOR
OUTPUT
EDGE CONNECTOR
(TOP VIEW)



CONSOLE
FRONT
→

| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|------------------|------------------------|-----------------------------------|-----|
| | Pin | Connector | Pin |
| 1L - low | 10 | OUT-1 | 2 |
| 1L - high | L | " | 3 |
| 1R - low | 9 | " | 5 |
| 1R - high | K | " | 6 |
| 2L - low | 8 | OUT-2 | 2 |
| 2L - high | J | " | 3 |
| 2R - low | 7 | " | 5 |
| 2R - high | H | " | 6 |

REAR PANEL REMOTE LINE
SELECTOR OUTPUT
MOLEX CONNECTORS



NOTES :

- A) The output connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- B) Low wires are black; high wires are red.
- C) The PR&E part number for this assembly is 90-50.

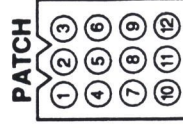
**PROGRAM LINE
OUTPUT AMPLIFIER
EDGE CONNECTOR
(TOP VIEW)**



CONSOLE
FRONT



**REAR PANEL PROGRAM OUTPUT
MOLEX CONNECTORS**



| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|---------------------------|------------------------|-------------------------------------|-----|
| | Pin | Connector | Pin |
| Main Output/Left - low | 10 | MAIN | 2 |
| Main Output/Left - high | L | " | 3 |
| Main Output/Right - low | 9 | " | 5 |
| Main Output/Right - high | K | " | 6 |
| Aux Output/Left - low | 8 | AUX | 2 |
| Aux Output/Left - high | J | " | 3 |
| Aux Output/Right - low | 7 | " | 5 |
| Aux Output/Right - high | H | " | 6 |
| Patch Send/Left - low | 4 | PATCH | 2 |
| Patch Send/Left - high | D | " | 3 |
| Patch Send/Right - low | 3 | " | 5 |
| Patch Send/Right - high | C | " | 6 |
| Patch Return/Left - low | 2 | " | 8 |
| Patch Return/Left - high | B | " | 9 |
| Patch Return/Right - low | 1 | " | 11 |
| Patch Return/Right - high | A | " | 12 |
| Additional Wiring | | | |
| Output Signal | From Edge Connector | To Monitor Selector Mother Board | |
| | Pin | Connector | Pin |
| Main Output/Left - low | 10 | J1 | 5 |
| Main Output/Left - high | L | " | 6 |
| Main Output/Right - low | 9 | J3 | 5 |
| Main Output/Right - high | K | " | 6 |

NOTES :

- A) The output connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- B) The PATCH connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
- C) Shield wires going to the Monitor Selector Mother Board are connected at the edge connector ground lug only.
- D) Low wires are black; high wires are red.
- E) The PR&E part number for this assembly is 90-56.

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AUDITION LINE OUTPUT AMPLIFIER EDGE CONNECTOR (TOP VIEW)



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| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|---------------------------|------------------------|-----------------------------------|-----|
| | Pin | Connector | Pin |
| Main Output/Left - low | 10 | MAIN | 2 |
| Main Output/Left - high | L | " | 3 |
| Main Output/Right - low | 9 | " | 5 |
| Main Output/Right - high | K | " | 6 |
| Aux Output/Left - low | 8 | AUX | 2 |
| Aux Output/Left - high | J | " | 3 |
| Aux Output/Right - low | 7 | " | 5 |
| Aux Output/Right - high | H | " | 6 |
| Patch Send/Left - low | 4 | PATCH | 2 |
| Patch Send/Left - high | D | " | 3 |
| Patch Send/Right - low | 3 | " | 5 |
| Patch Send/Right - high | C | " | 6 |
| Patch Return/Left - low | 2 | " | 8 |
| Patch Return/Left - high | B | " | 9 |
| Patch Return/Right - low | 1 | " | 11 |
| Patch Return/Right - high | A | " | 12 |

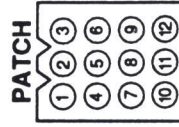
Additional Wiring

| Output Signal | From Edge Connector | To Monitor Selector Mother Board | |
|--------------------------|------------------------|-------------------------------------|-----|
| | Pin | Connector | Pin |
| Main Output/Left - low | 10 | J1 | 3 |
| Main Output/Left - high | L | " | 4 |
| Main Output/Right - low | 9 | J3 | 3 |
| Main Output/Right - high | K | " | 4 |

NOTES :

- The output connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- The PATCH connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
- Shield wires going to the Monitor Selector Mother Board are connected at the edge connector ground lug only.
- Low wires are black; high wires are red.
- The PR&E part number for this assembly is 90-56.

REAR PANEL AUDITION OUTPUT MOLEX CONNECTORS



7.4.10 CONSOLE WIRING - AUDITION AMPLIFIER OUTPUT

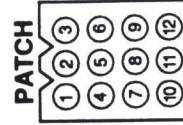
UTILITY OR MONO LINE OUTPUT AMPLIFIER EDGE CONNECTOR (TOP VIEW)



CONSOLE
FRONT



REAR PANEL UTILITY OUTPUT MOLEX CONNECTORS



| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|---------------------------|------------------------|-----------------------------------|-----|
| | Pin | Connector | Pin |
| Main Output/Left - low | 10 | MAIN | 2 |
| Main Output/Left - high | L | " | 3 |
| Main Output/Right - low | 9 | " | 5 |
| Main Output/Right - high | K | " | 6 |
| Aux Output/Left - low | 8 | AUX | 2 |
| Aux Output/Left - high | J | " | 3 |
| Aux Output/Right - low | 7 | " | 5 |
| Aux Output/Right - high | H | " | 6 |
| Patch Send/Left - low | 4 | PATCH | 2 |
| Patch Send/Left - high | D | " | 3 |
| Patch Send/Right - low | 3 | " | 5 |
| Patch Send/Right - high | C | " | 6 |
| Patch Return/Left - low | 2 | " | 8 |
| Patch Return/Left - high | B | " | 9 |
| Patch Return/Right - low | 1 | " | 11 |
| Patch Return/Right - high | A | " | 12 |

Additional Wiring

| Output Signal | From Edge Connector | To Monitor Selector Mother Board | |
|-------------------------|------------------------|-------------------------------------|-----|
| | Pin | Connector | Pin |
| Main Output/Left - low | 10 | J7 | 3 |
| Main Output/Left - high | L | " | 4 |

NOTES :

- The output connector shield wires (pins 1 and 4) are tied to the edge connector ground lug.
- The PATCH connector shield wires (pins 1, 4, 7 and 10) are tied to the edge connector ground lug.
- Shield wires going to the Monitor Selector Mother Board are connected at the edge connector ground lug only.
- Low wires are black; high wires are red.
- The PR&E part number for this assembly is 90-56.

7.4.11 CONSOLE WIRING - MONAURAL AMPLIFIER OUTPUT

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**TELCO MIX
AUDIO
EDGE CONNECTOR
(TOP VIEW)**

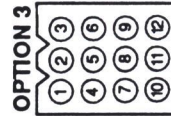


**CONSOLE
FRONT**



| Output Signal | From Edge Connector | To Rear Panel Molex Connectors | |
|-------------------------------------|------------------------|-----------------------------------|-----|
| | Pin | Connector | Pin |
| Telco Monitor Output, Direct - low | 1 | OPTION 1 | 2 |
| Telco Monitor Output, Direct - high | A | " | 3 |
| Telco Monitor Output, Att. - low | 2 | " | 5 |
| Telco Monitor Output, Att. - high | B | " | 6 |
| Send to Hybrid #1 - low | 3 | OPTION 2 | 2 |
| Send to Hybrid #1 - high | C | " | 3 |
| Send to Hybrid #2 - low | 4 | " | 5 |
| Send to Hybrid #2 - high | D | " | 6 |
| PROGRAM Patch Send, Left - low | 5 | OPTION 3 | 2 |
| PROGRAM Patch Send, Left - high | E | " | 3 |
| PROGRAM Patch Send, Right - low | 6 | " | 5 |
| PROGRAM Patch Send, Right - high | F | " | 6 |
| AUDITION Patch Send, Left - low | 7 | " | 8 |
| AUDITION Patch Send, Left - high | H | " | 9 |
| AUDITION Patch Send, Right - low | 8 | " | 11 |
| AUDITION Patch Send, Right - high | J | " | 12 |

**REAR PANEL TELCO MIX
(OPTION) MOLEX CONNECTORS**



NOTES:

- A) The output connector shield wires (pins 1, 4, 7, and 10) are tied to the edge connector ground lug.
- B) Low wires are black; high wires are red.
- C) The PR&E part number for this assembly is 90-189.

| VU Meter Signal | From Monitor Selector Mother Board (#90-60) | | To Meter Signal Connector | |
|-----------------------------|---|-----|---------------------------|-----|
| | Connector | Pin | Connector | Pin |
| BMX II-10 | | | | |
| Program/Left - shield | -no connection- | | P6 | 1 |
| Program/Left - low | J5 | 5 | * | 2 |
| Program/Left - high | * | 6 | * | 3 |
| Program/Right - shield | -no connection- | | P4 | 1 |
| Program/Right - low | J6 | 5 | * | 2 |
| Program/Right - high | * | 6 | * | 3 |
| BMX II-14, BMX II-18 | | | | |
| Program/Left - shield | -no connection- | | P6 | 1 |
| Program/Left - low | J5 | 5 | * | 2 |
| Program/Left - high | * | 6 | * | 3 |
| Program/Right - shield | -no connection- | | P4 | 1 |
| Program/Right - low | J6 | 5 | * | 2 |
| Program/Right - high | * | 6 | * | 3 |
| BMX II-22, BMX II-26 | | | | |
| Program/Left - shield | -no connection- | | P6 | 1 |
| Program/Left - low | J5 | 5 | * | 2 |
| Program/Left - high | * | 6 | * | 3 |
| Program/Right - shield | -no connection- | | P4 | 1 |
| Program/Right - low | J6 | 5 | * | 2 |
| Program/Right - high | * | 6 | * | 3 |
| Monaural - shield | -no connection- | | P10 | 1 |
| Monaural - low | J7 | 1 | * | 2 |
| Monaural - high | * | 2 | * | 3 |
| BMX II-22, BMX II-26 | | | | |
| Program/Left - shield | -no connection- | | P6 | 1 |
| Program/Left - low | J5 | 5 | * | 2 |
| Program/Left - high | * | 6 | * | 3 |
| Program/Right - shield | -no connection- | | P4 | 1 |
| Program/Right - low | J6 | 5 | * | 2 |
| Program/Right - high | * | 6 | * | 3 |
| Audition/Left - shield | -no connection- | | P8 | 1 |
| Audition/Left - low | J5 | 3 | * | 2 |
| Audition/Left - high | * | 4 | * | 3 |
| Audition/Right - shield | -no connection- | | P10 | 1 |
| Audition/Right - low | J6 | 3 | * | 2 |
| Audition/Right - high | * | 4 | * | 3 |
| Monaural - shield | -no connection- | | P14 | 1 |
| Monaural - low | J7 | 1 | * | 2 |
| Monaural - high | * | 2 | * | 3 |

NOTE: The meter connector shield wires are connected at the meter end only.



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7.4.13 CONSOLE WIRING - VU METER SIGNAL/POWER

| VU Meter Power Connection | |
|-----------------------------|-----------|
| Meter | Connector |
| BMX II-10 | |
| Program/Left | P5 |
| Program/Right | P3 |
| BMX II-14, BMX II-18 | |
| Program/Left | P5 |
| Program/Right | P3 |
| Monaural | P9 |
| BMX II-22, BMX II-26 | |
| Program/Left | P5 |
| Program/Right | P3 |
| Audition/Left | P9 |
| Audition/Right | P7 |
| Monaural | P14 |

| VU Meter Power Connector Wiring | | |
|-----------------------------------|------------|--------------------|
| From Console Power Terminal Strip | | To Power Connector |
| Connector | Wire Color | Pin |
| Logic Com | Blue | 1 |
| Logic + | Orange | 2 |
| Audio - | Violet | 3 |
| Audio Com | Black | 4 |
| Audio + | Red | 5 |

STUDIO OR C/R MONITOR
OUTPUT EDGE CONNECTOR
(TOP VIEW)



CONSOLE
FRONT
→

| Output Signal | From Edge Connector | | To Rear Panel Molex Connector | |
|------------------------|---------------------|-----|----------------------------------|-----|
| | Connector | Pin | Connector | Pin |
| Studio WARNING Command | STUDIO MONITOR | A | WARNING | 2 |
| C/R WARNING Command | C/R MONITOR | A | " | 4 |

NOTE : WARNING connector pins 1 and 3 are tied to the console ground lug.

REAR PANEL C/R AND
STUDIO WARNING OUTPUT
MOLEX CONNECTOR

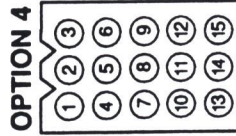


**STUDIO MONITOR
OUTPUT
EDGE CONNECTOR
(TOP VIEW)**



CONSOLE
FRONT
→

**REAR PANEL
TALKBACK (OPTION 4)
MOLEX CONNECTOR**



| Output Signal | From Edge Connector | To Rear Panel Molex Connector | |
|-------------------------------|------------------------|----------------------------------|-----|
| | Pin | Connector | Pin |
| Talkback Preamp Output - low | 4 | OPTION 4 | 2 |
| Talkback Preamp Output - high | D | " | 3 |
| Remote TALKBACK Command | 3 | " | 6 |
| Remote Studio MUTE Command | 2 | " | 9 |

NOTES :

- A) The Talkback Preamp Output shield wire (pin 1) is connected to the console ground lug.
- B) OPTION 4 connector pins 5 and 8 are tied to console LOGIC COMMON.

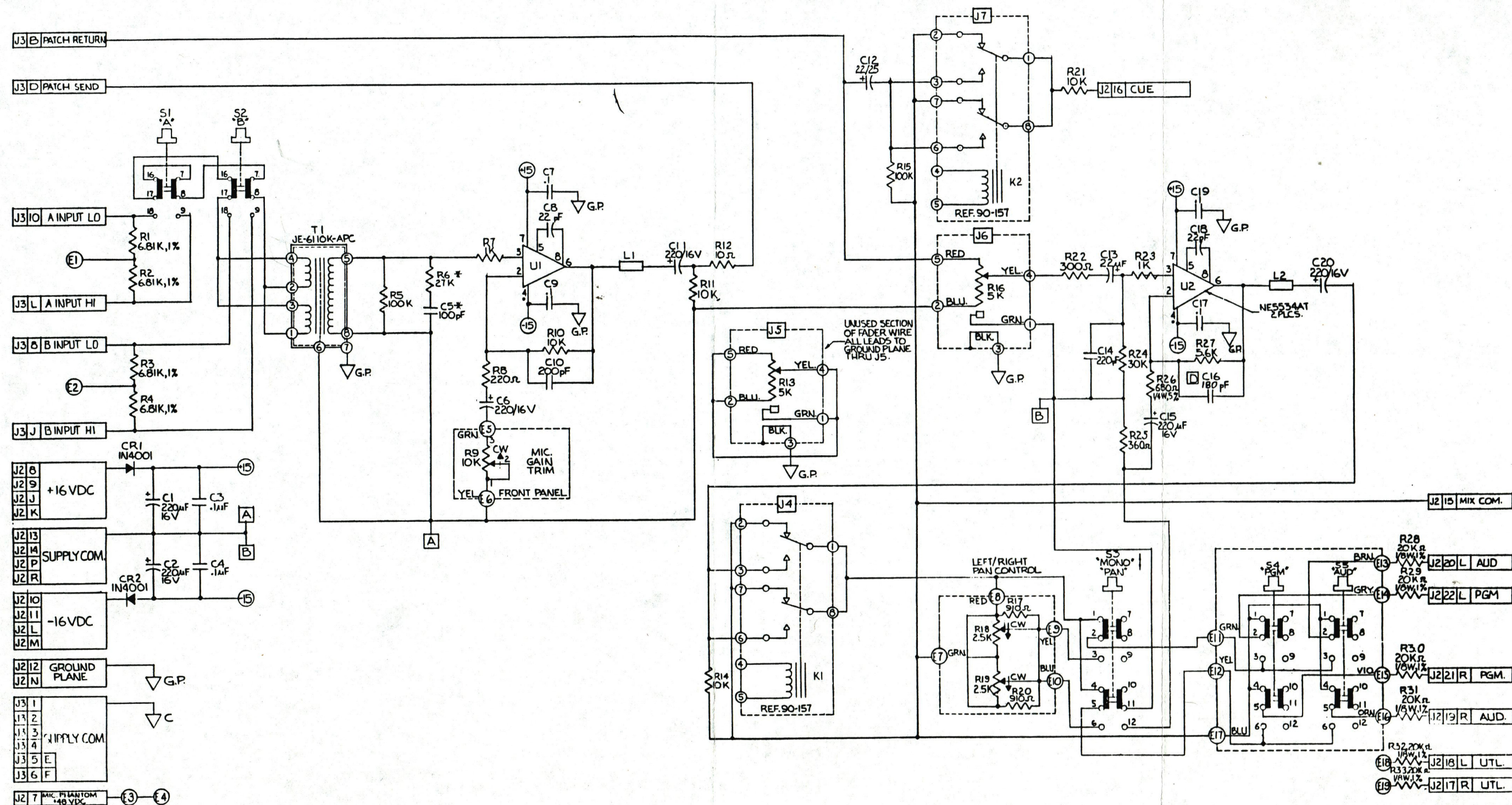
| Output Signal | From | To Meter Panel Molex Connector | |
|---------------------|------------------------------|--------------------------------|-----|
| | | Connector | Pin |
| Logic +12 VDC | Console power terminal strip | RESET | 2 |
| Timer RESET Command | Console TIMER RESET bus | " | 3 |

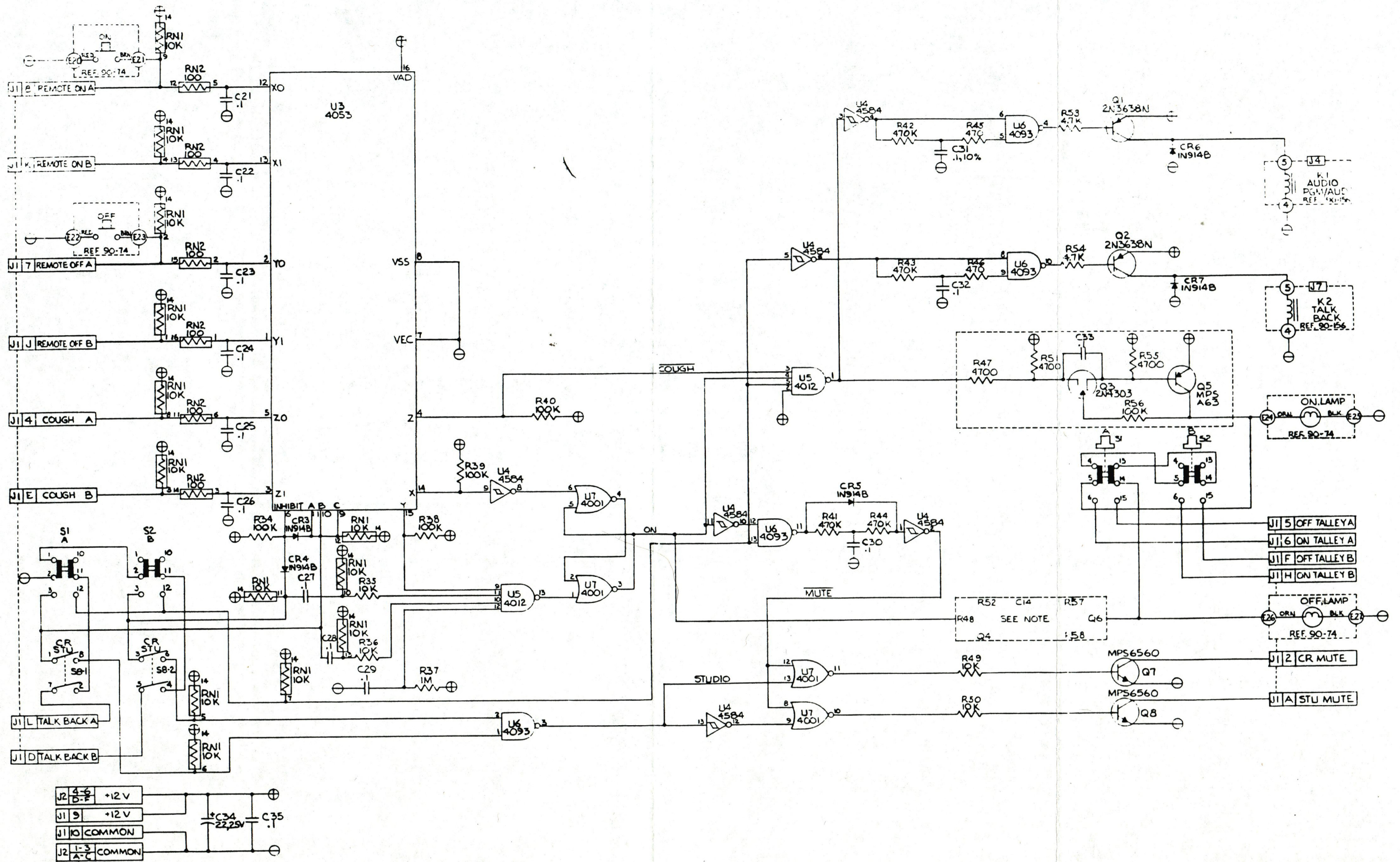
EXTERNAL TIMER RESET
MOLEX CONNECTOR



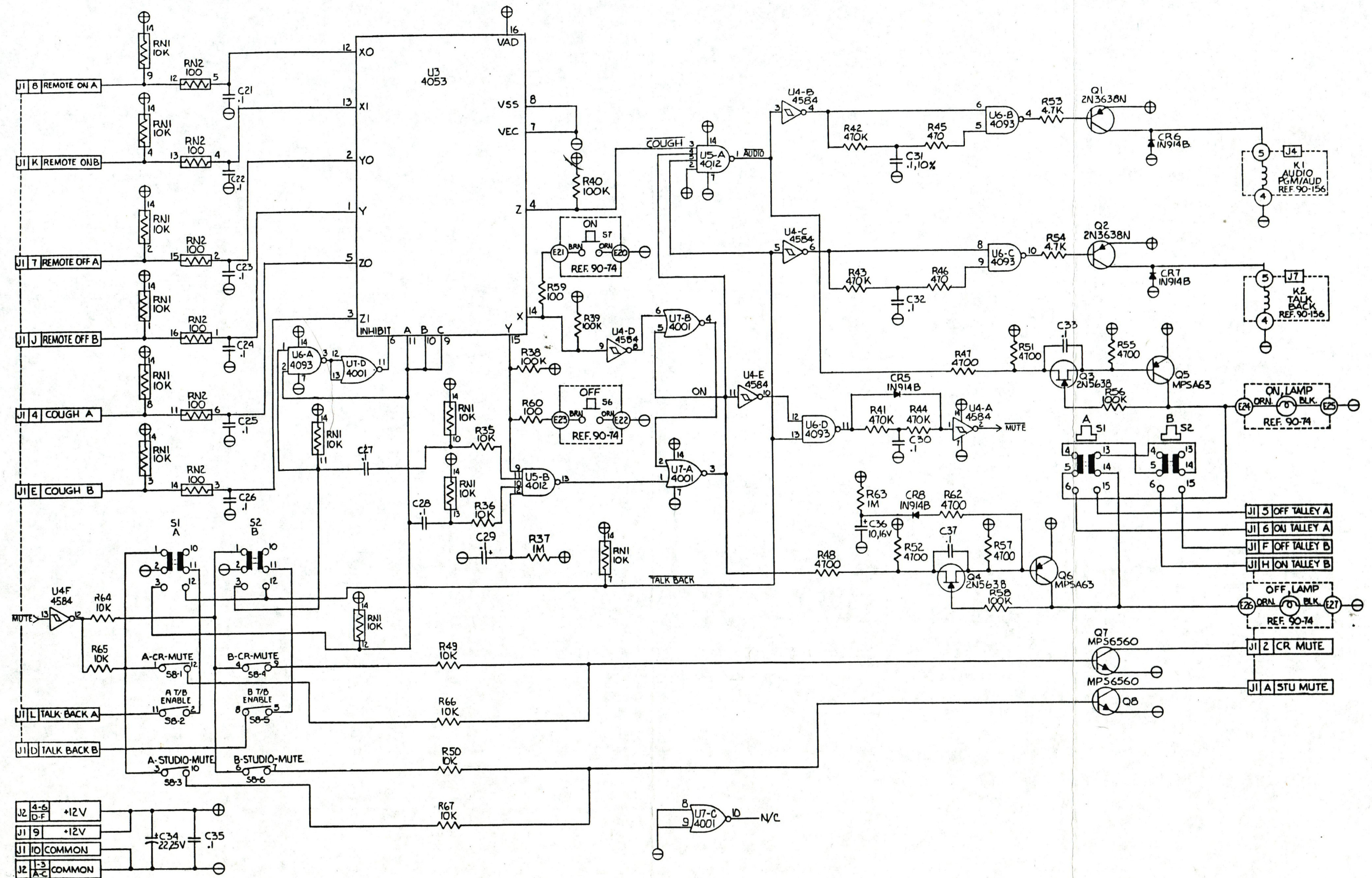
NOTES :

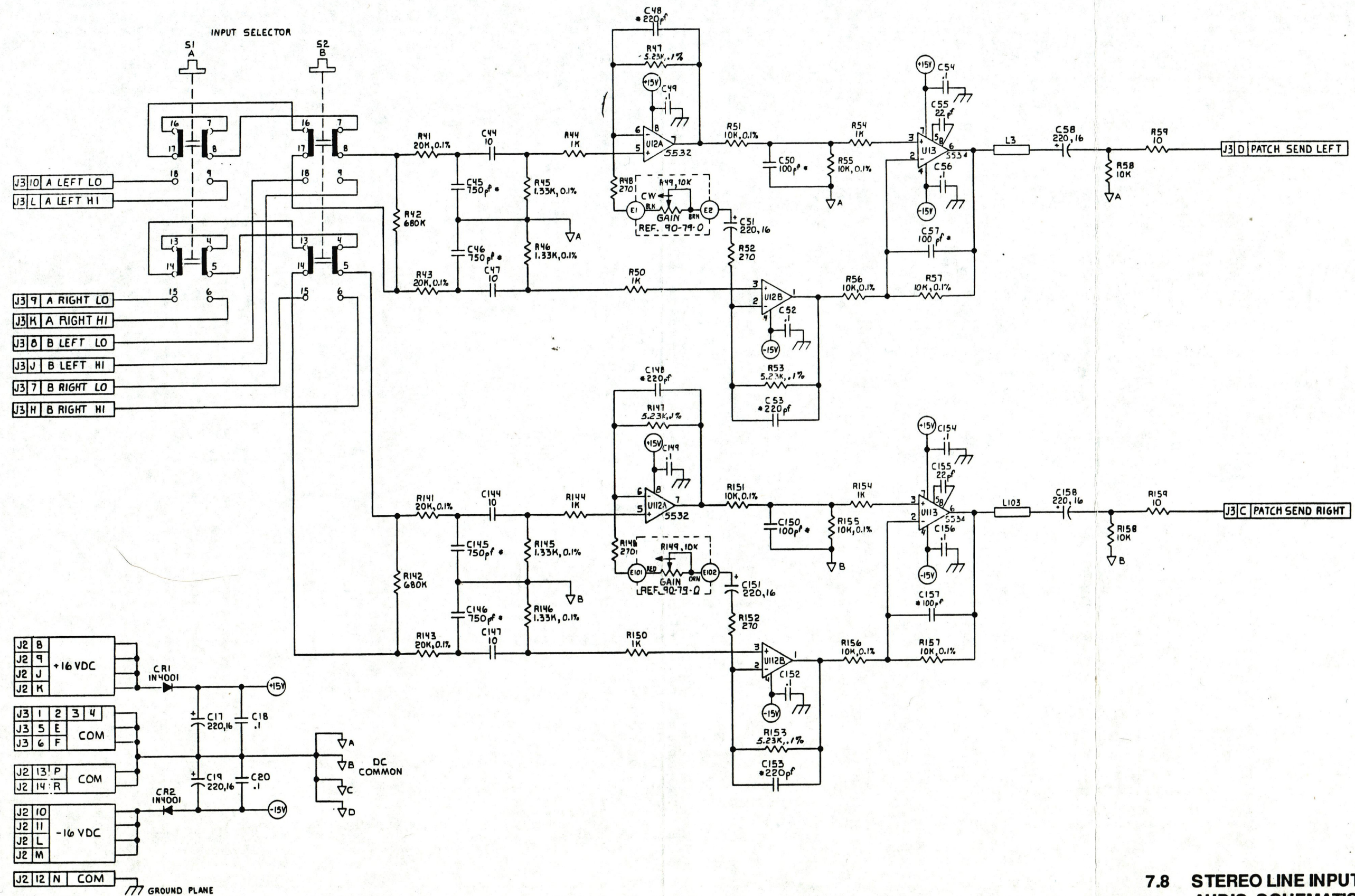
- A) The free-hanging external timer RESET connector is located just behind the timer position in the console meter panel.
- B) RESET pin 1 is tied to console LOGIC COMMON.



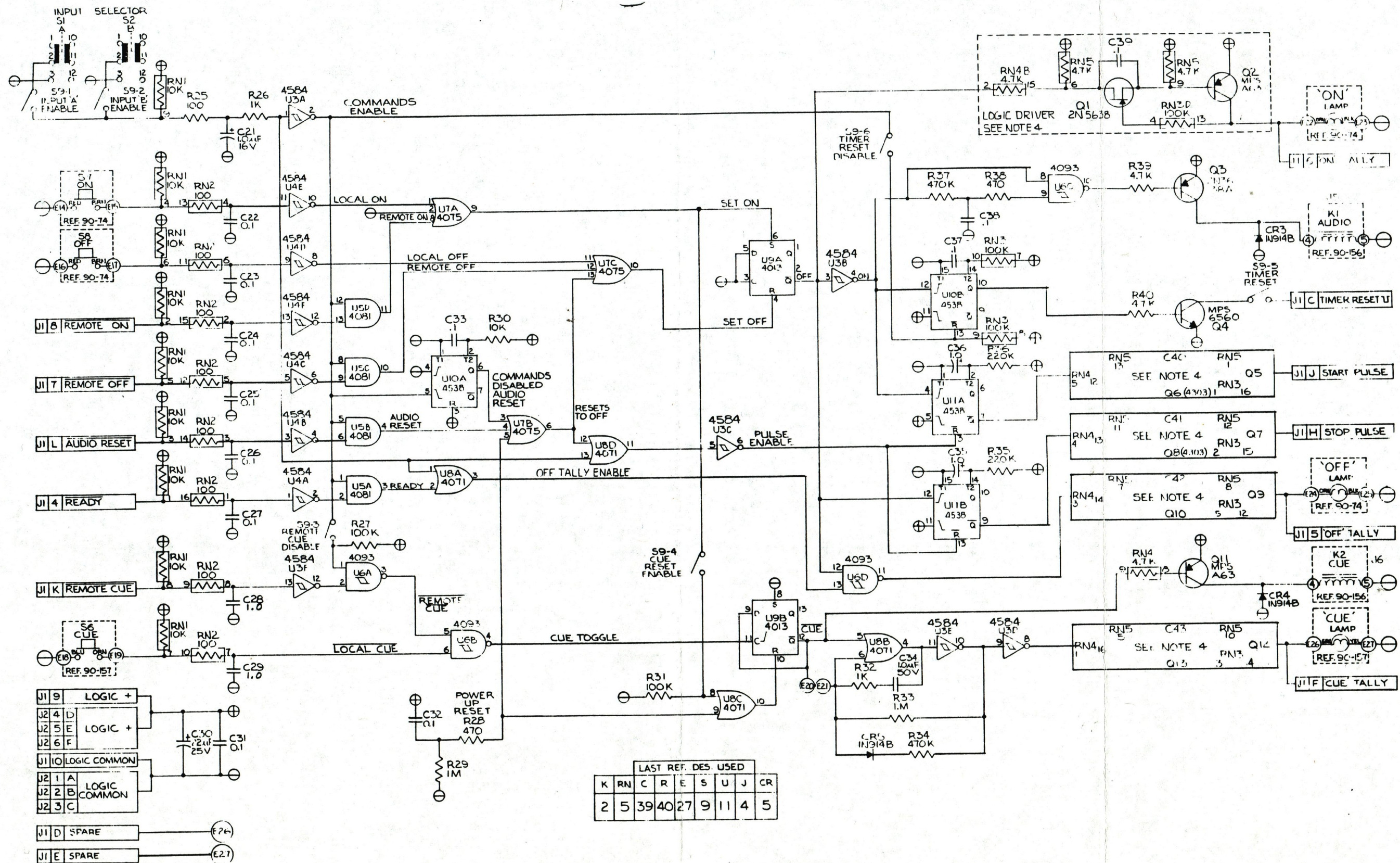


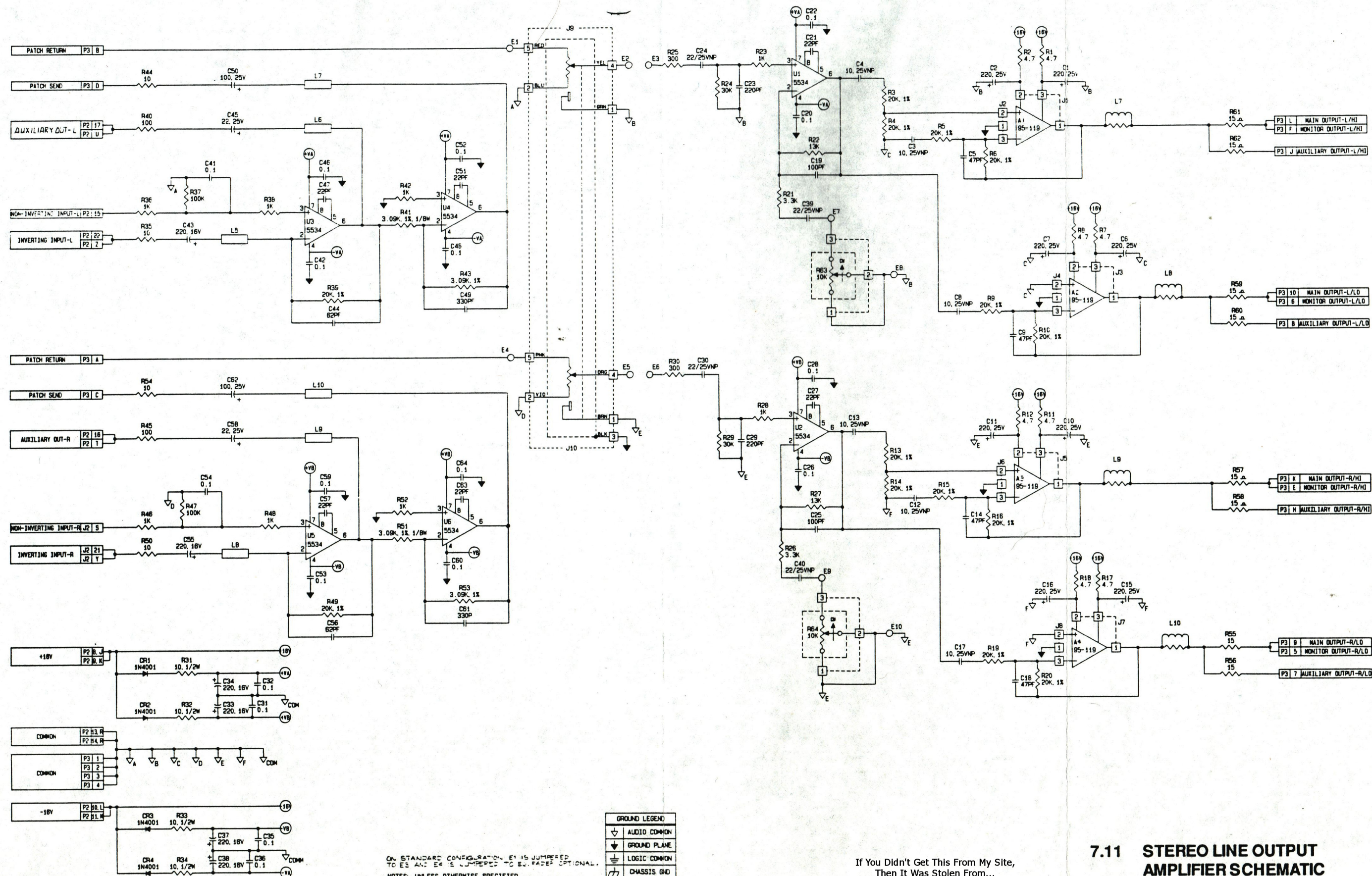
7.6 MICROPHONE INPUT MODULE
LOGIC SCHEMATIC (VERSION A)





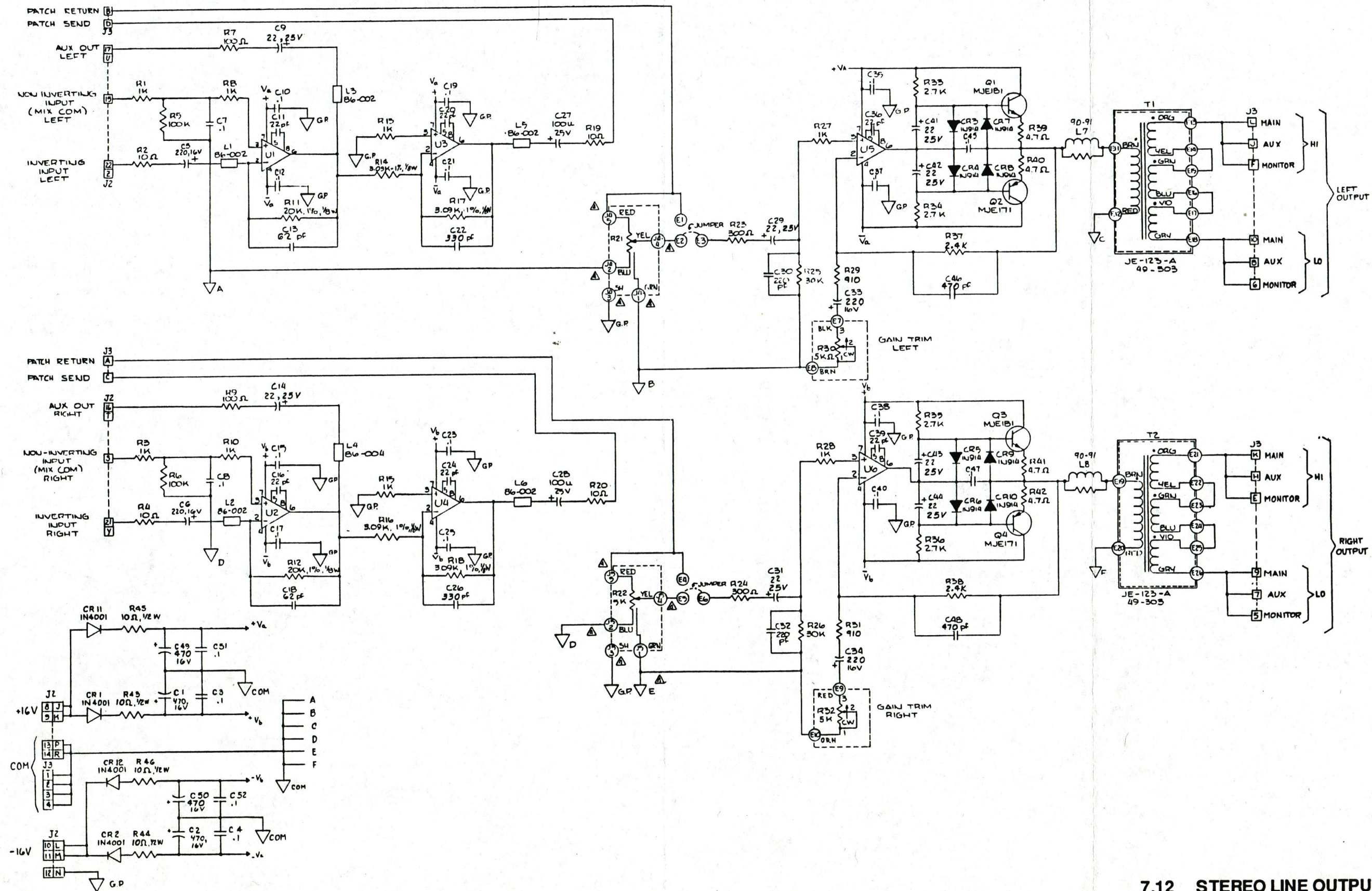
**7.8 STEREO LINE INPUT MODULE
AUDIO SCHEMATIC
(TRANSFORMERLESS)**
SHEET 1 OF 2



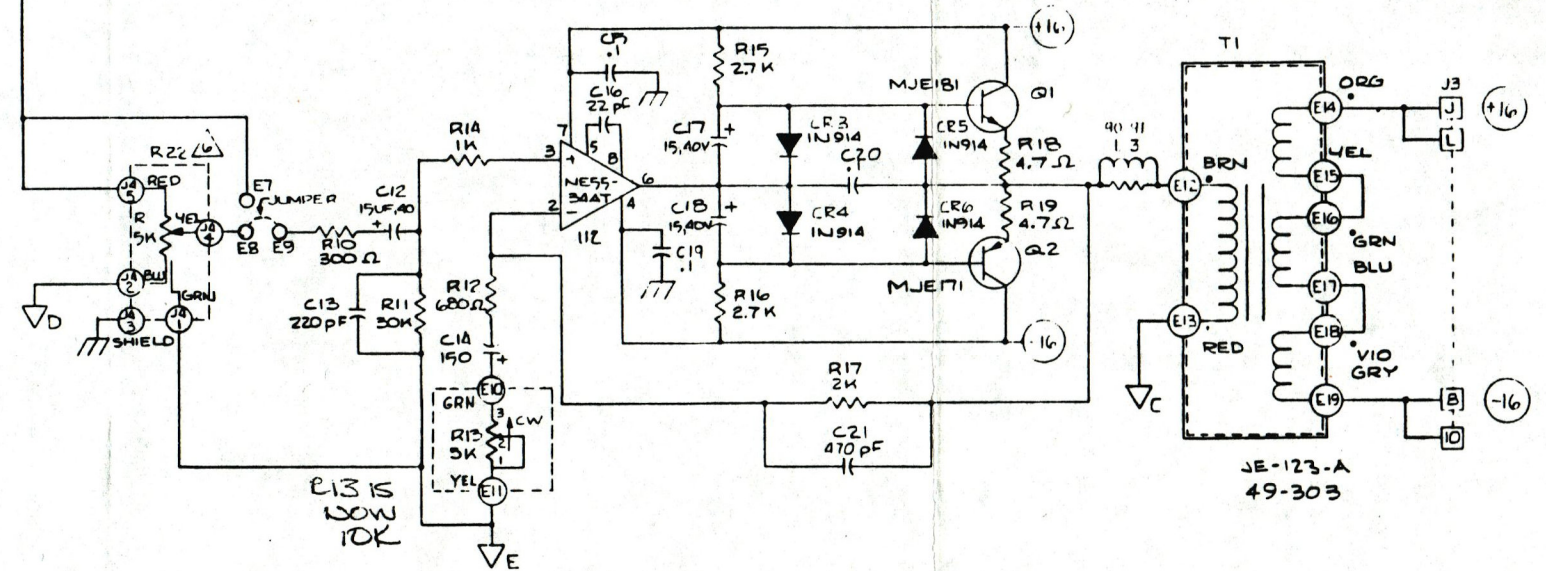
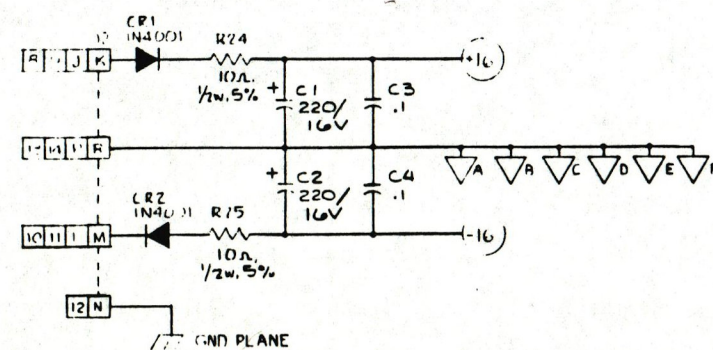
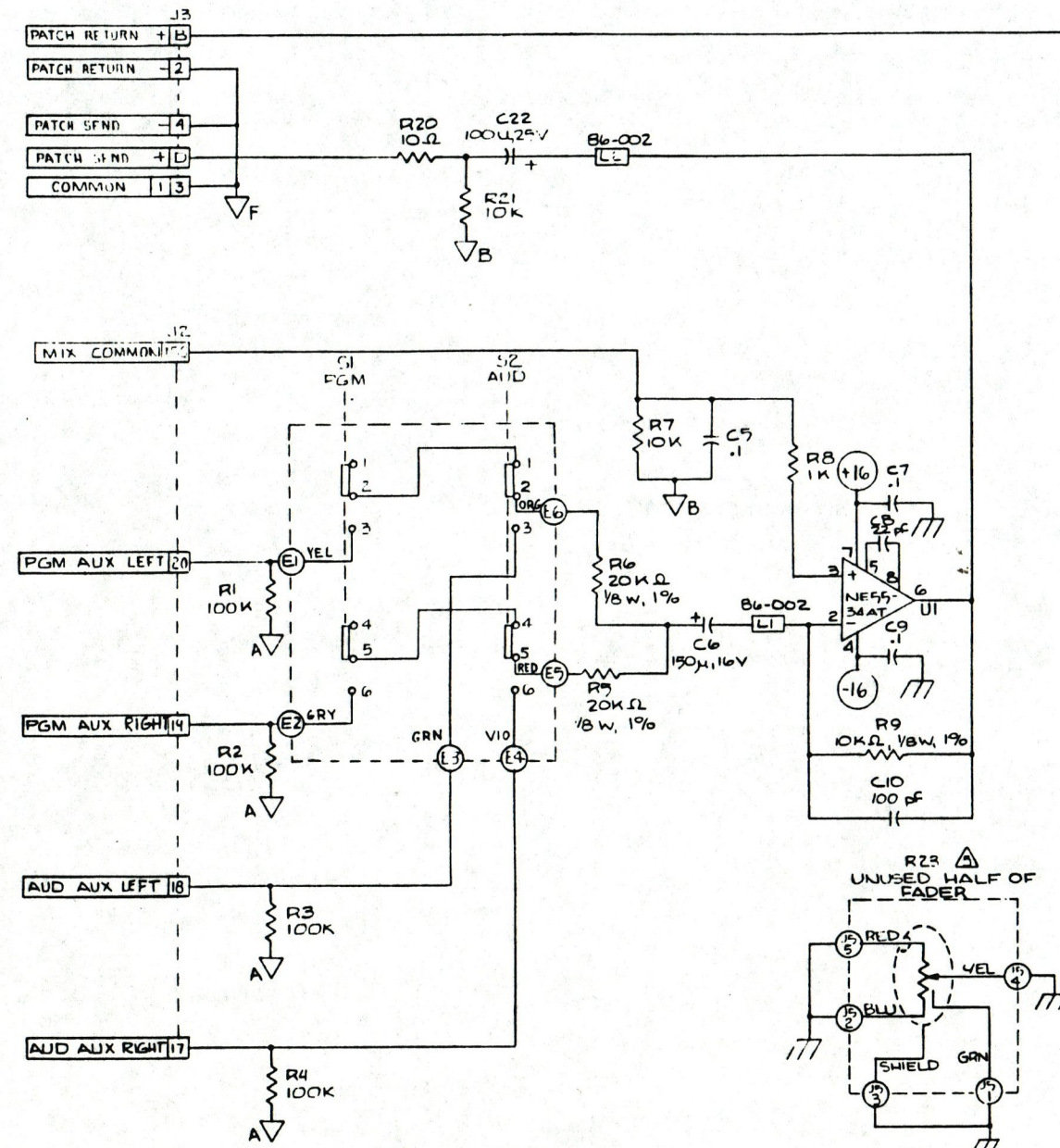


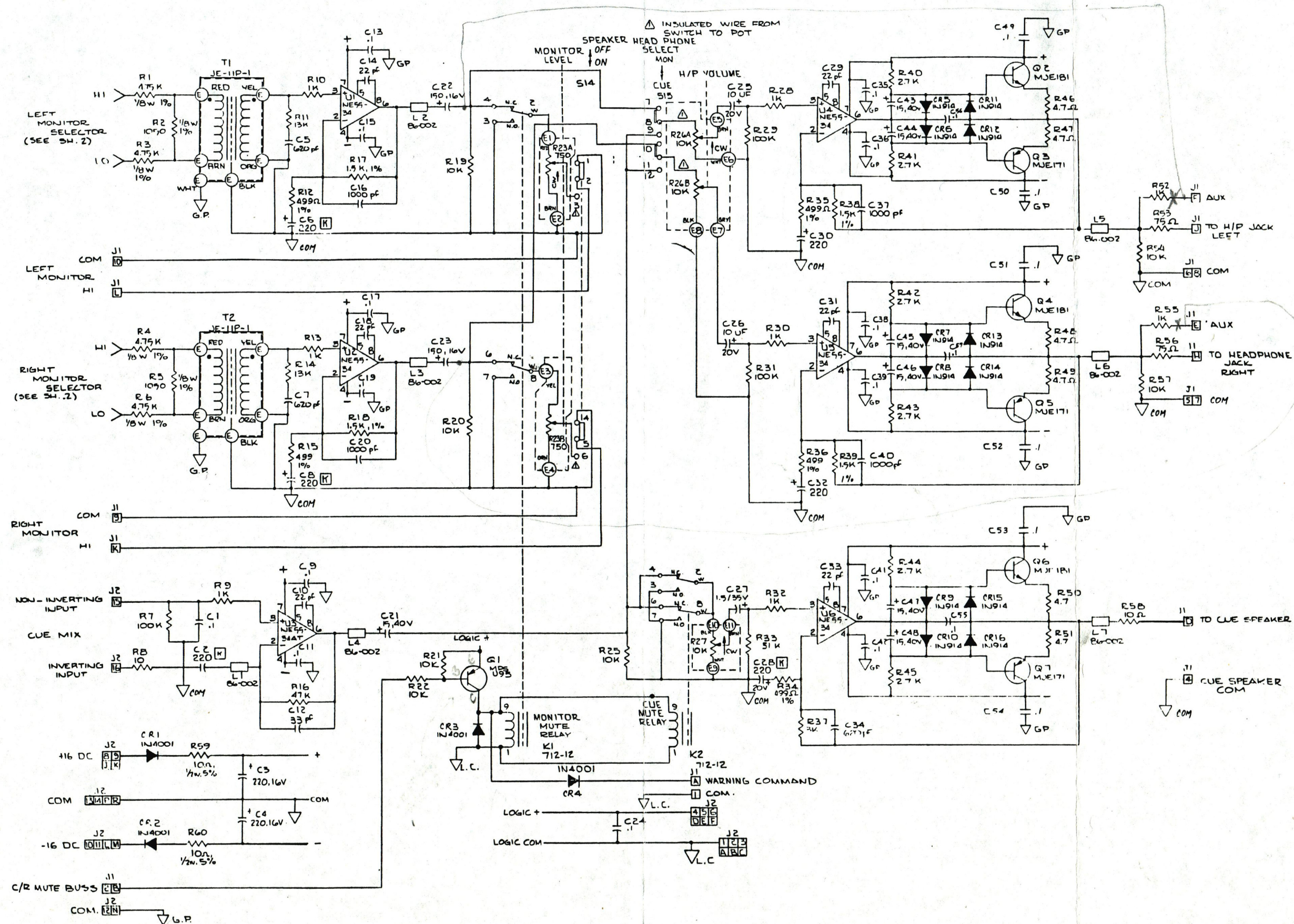
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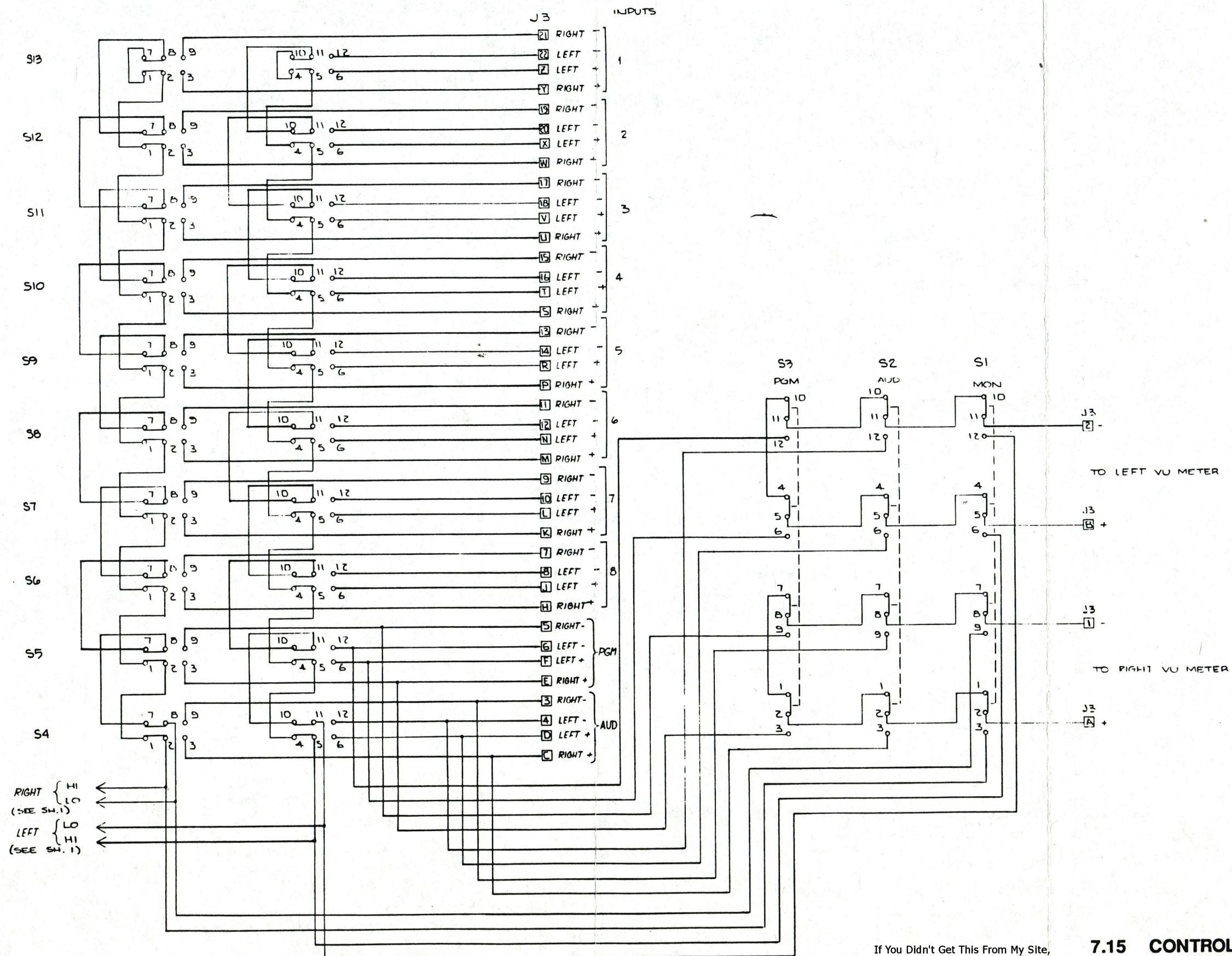
7.11 STEREO LINE OUTPUT AMPLIFIER SCHEMATIC (TRANSFORMERLESS)



7.12 STEREO LINE OUTPUT
AMPLIFIER SCHEMATIC
(TRANSFORMER VERSION)

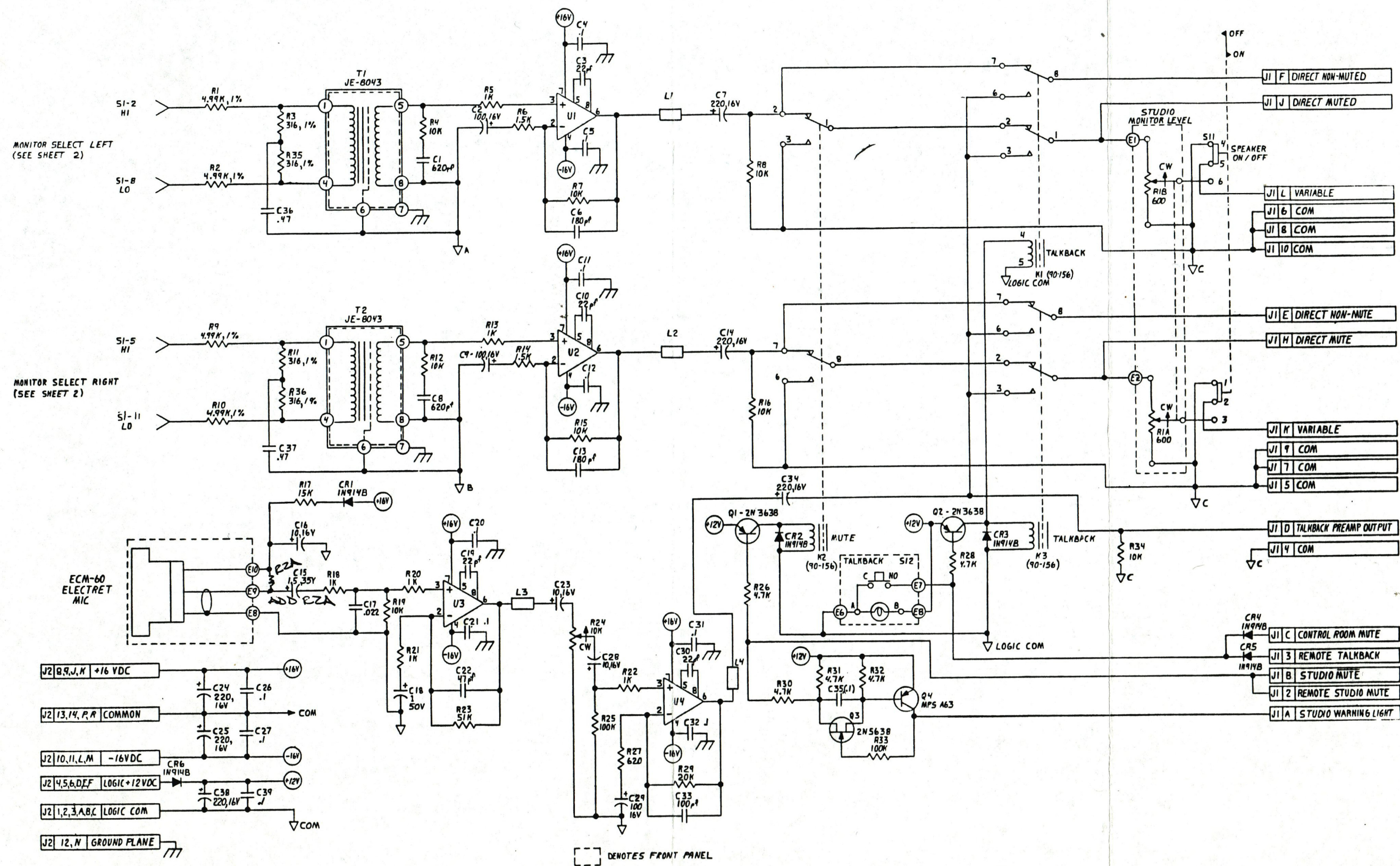


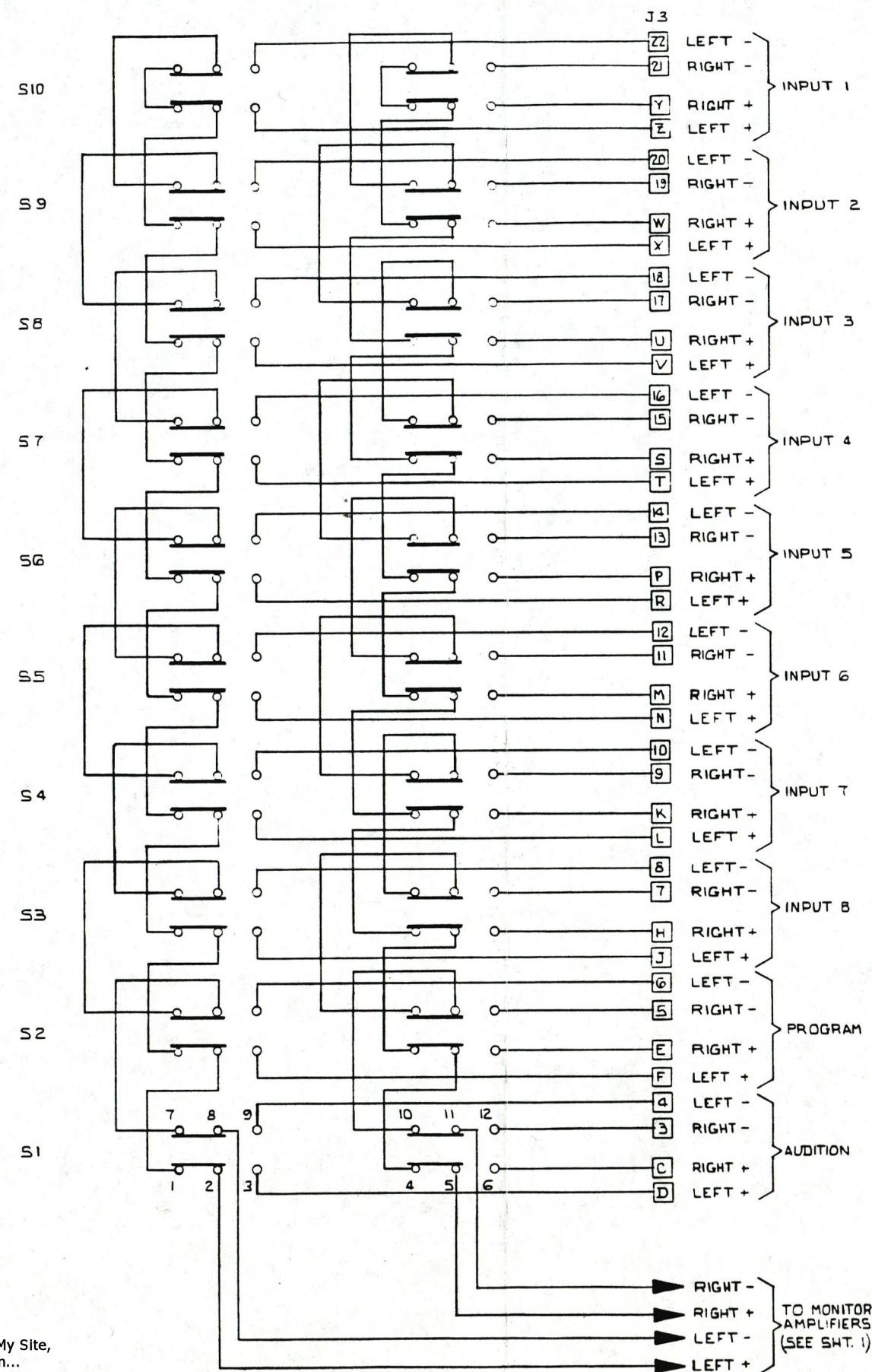




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7.15 CONTROL ROOM MONITOR MODULE SCHEMATIC (SWITCHING)

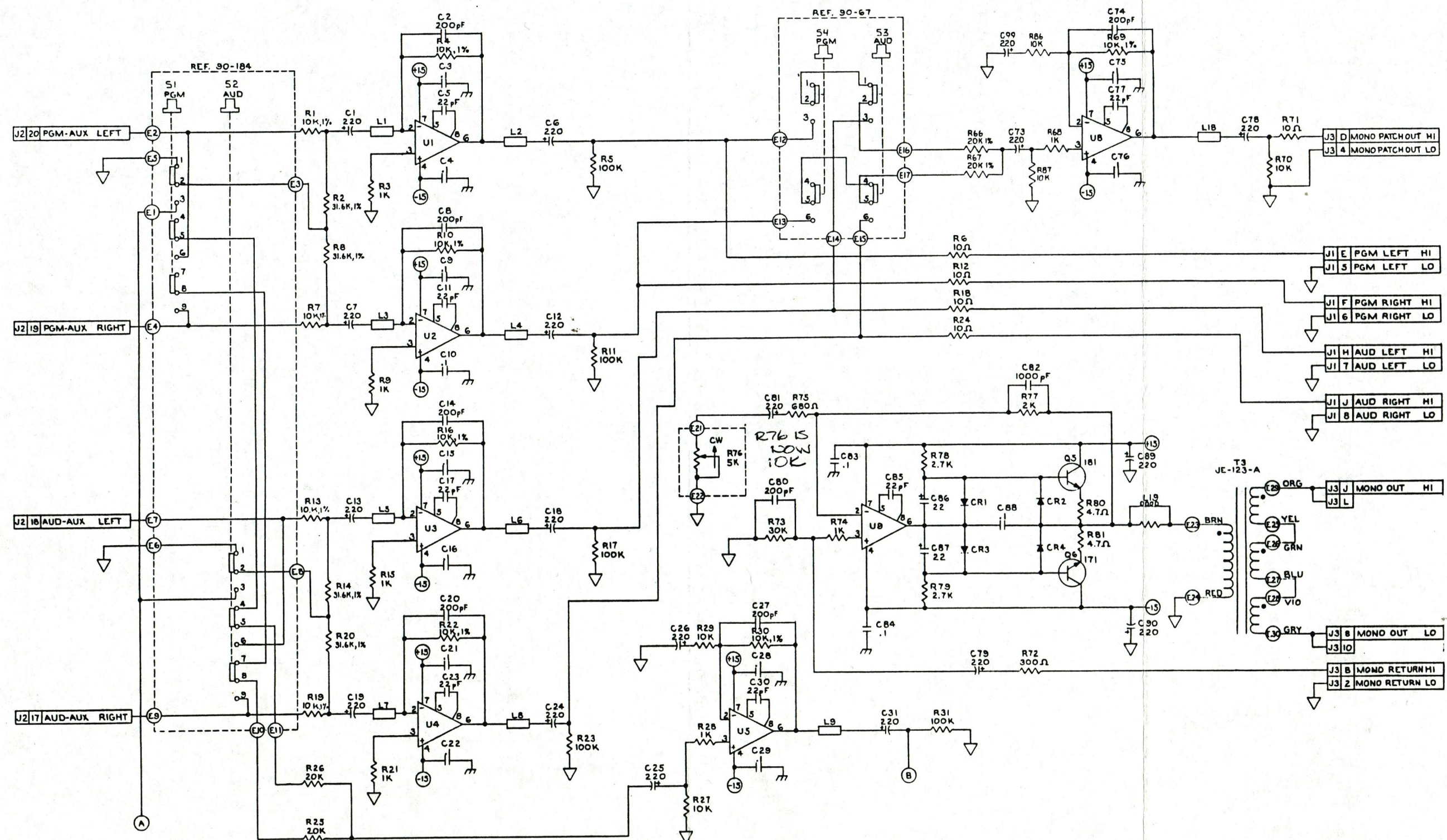




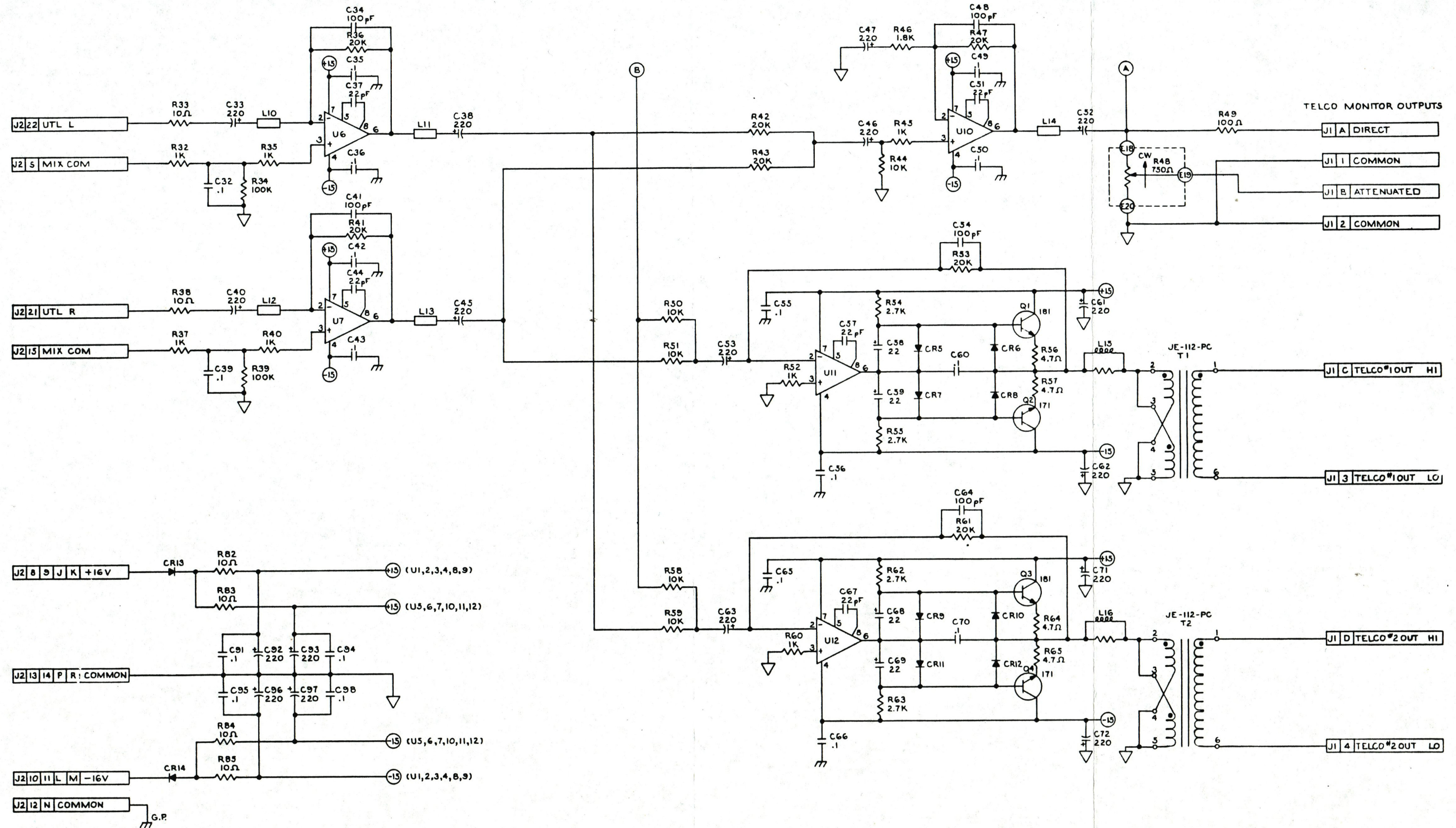
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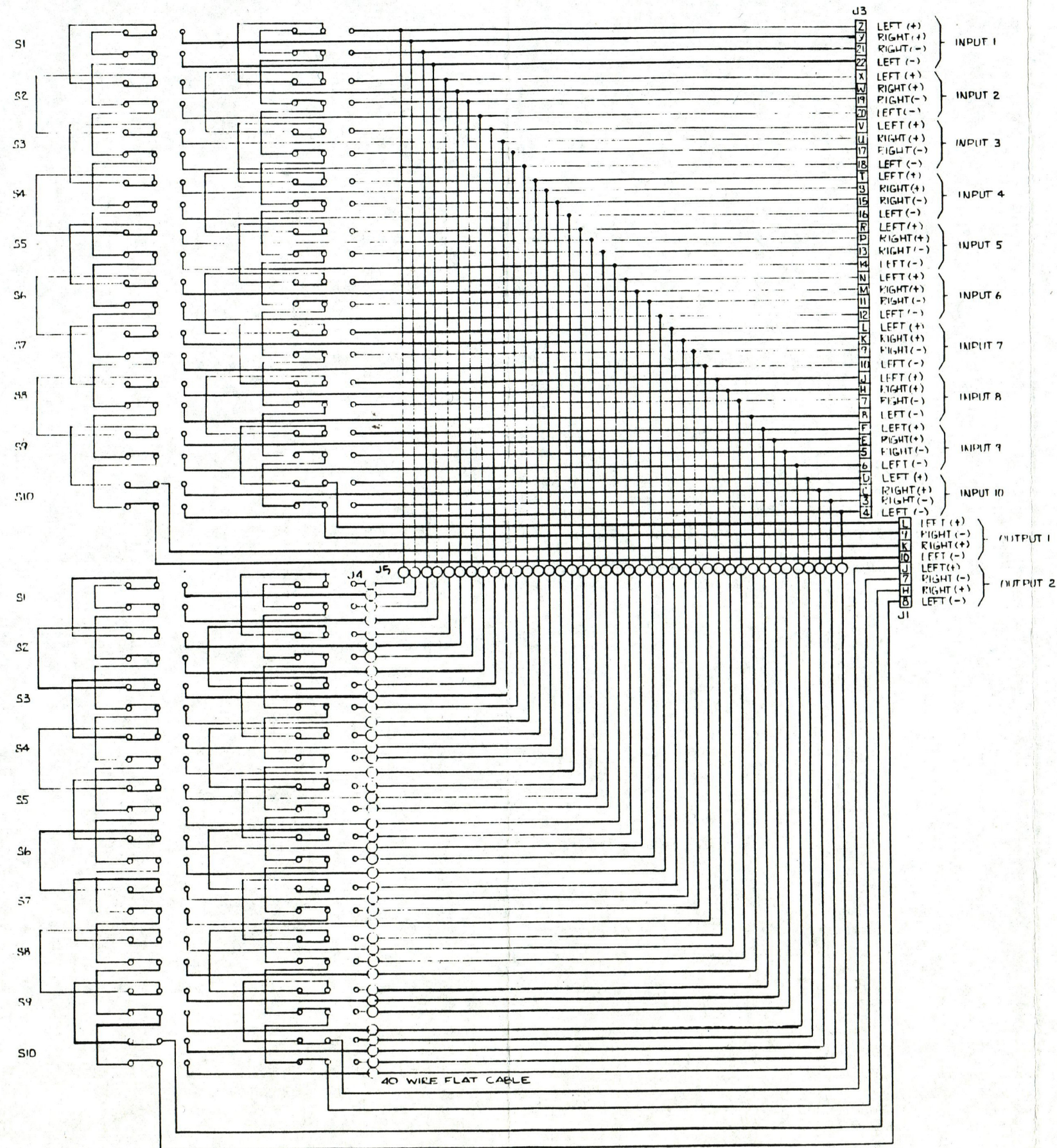
7.17 STUDIO MONITOR MODULE SCHEMATIC (SWITCHING)



7.18 TELCO MIX/MONAUROAL
OUTPUT MODULE SCHEMATIC
SHEET 2 OF 2

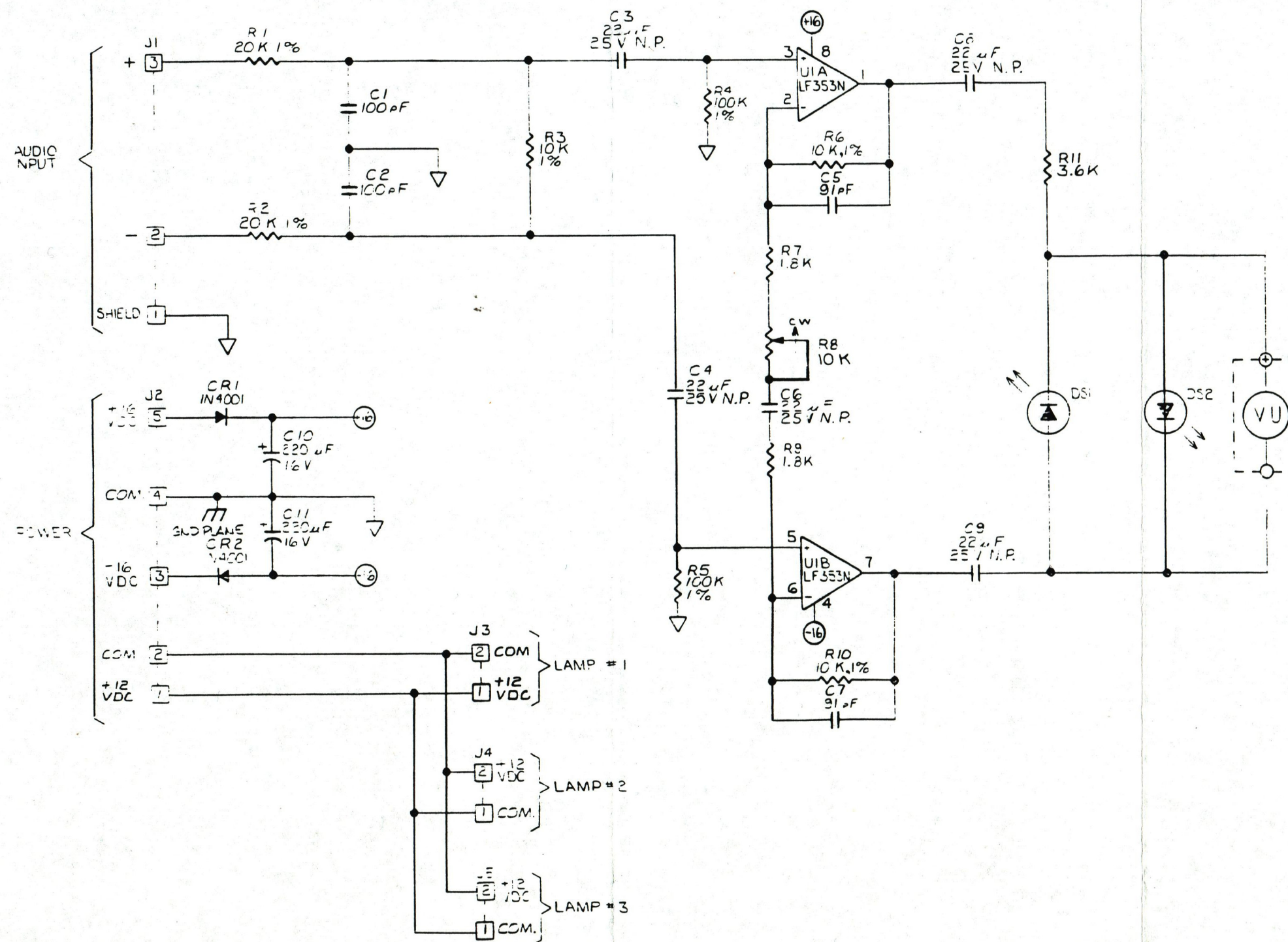


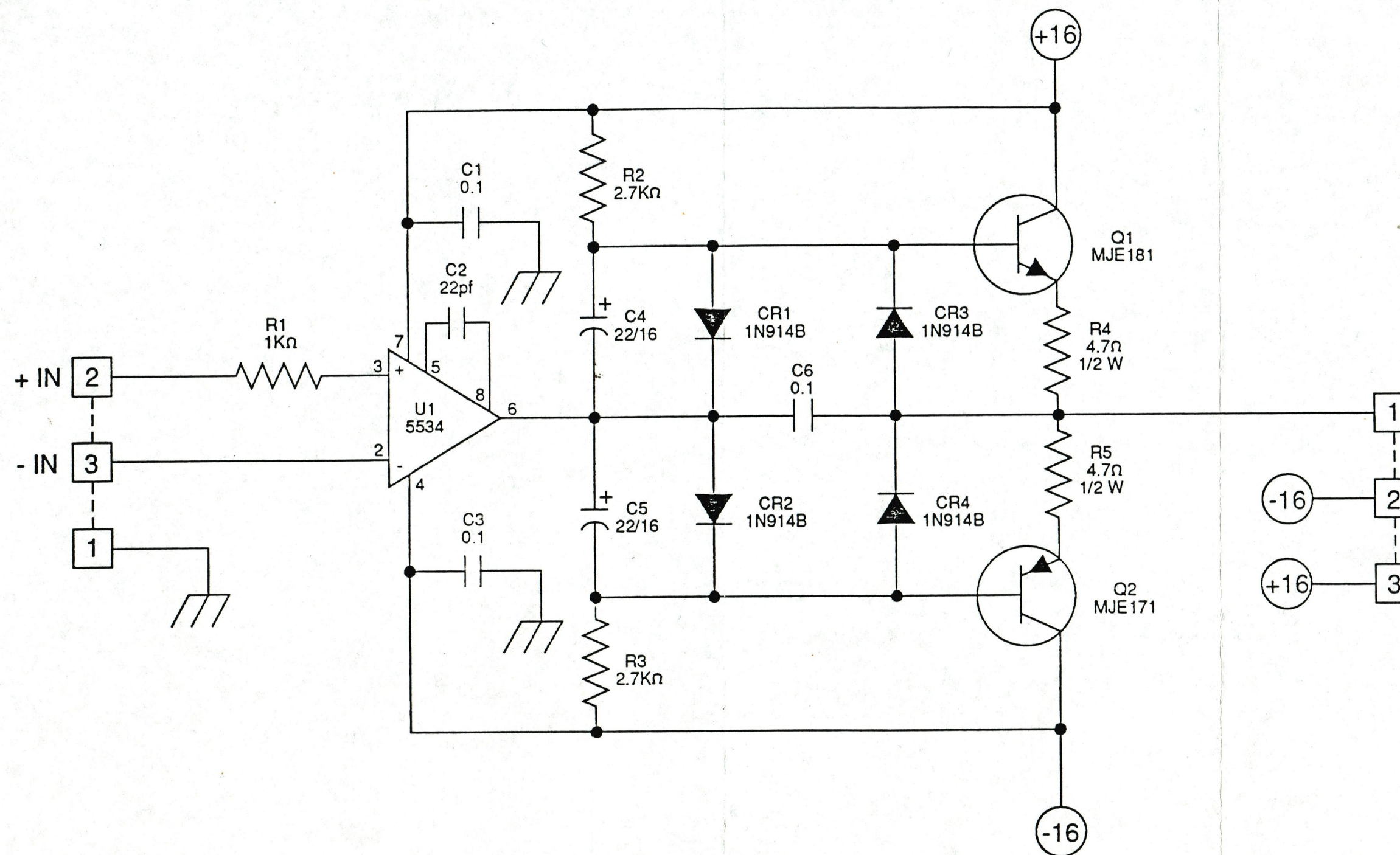
7.18 TELCO MIX/MONAUROAL
 OUTPUT MODULE SCHEMATIC
 SHEET 1 OF 2

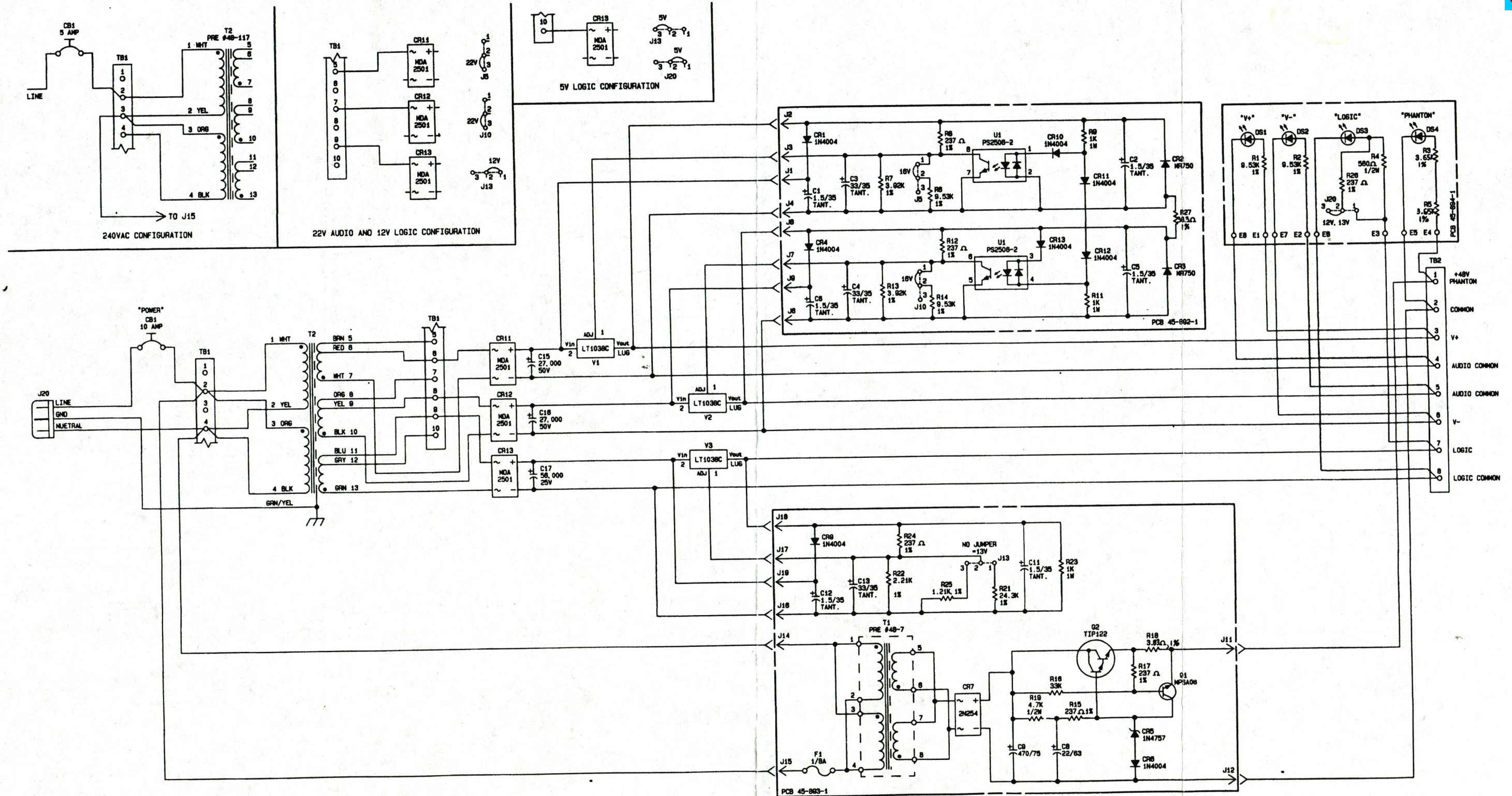


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7.19 REMOTE LINE SELECTOR MODULE SCHEMATIC







7.22 POWER SUPPLY SCHEMATIC

8.0 ACCESSORIES

This chapter contains descriptions of the various BMX II console accessories. Included are sections describing clocks and timers, the Line Output Assignment Switcher, the Redundant Power Supply Coupler Unit, and auxiliary equipment interfaces.

Section 8.5 contains schematics for the accessories described below.

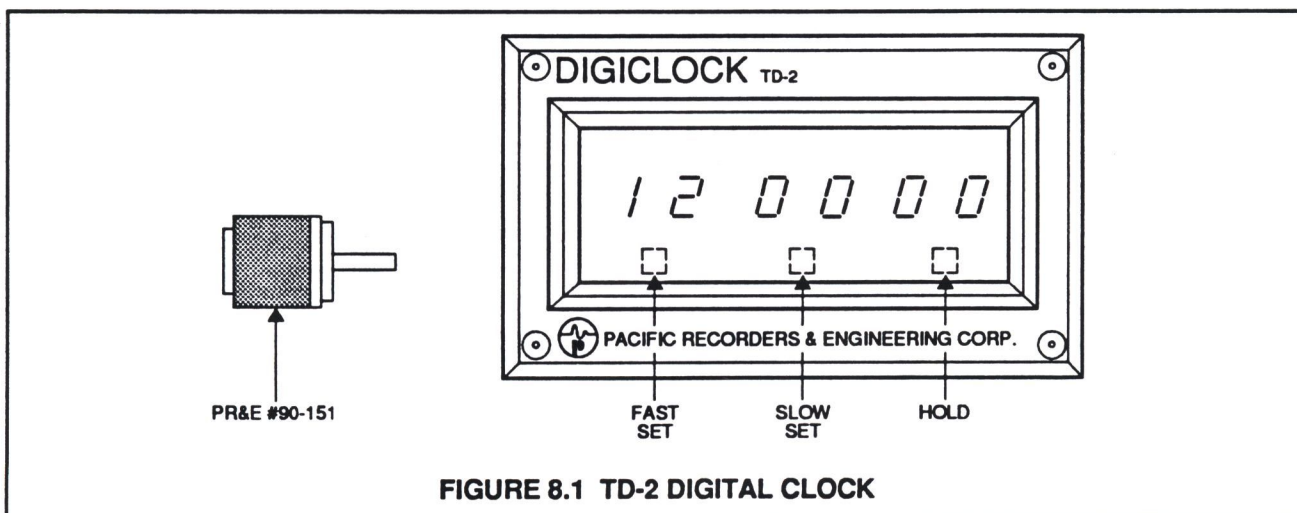
8.1 CLOCKS AND TIMERS

BMX II meter panel clock and timer positions are defined in Figure 2.4. These positions accommodate the TD-2 Digital Clock (PR&E #99-179-1) or the TD-171 Digital Slave Clock (PR&E #99-312-1), and the DT-4 Digital Timer (PR&E #99-180-1).

8.1.1 TD-2 Digital Clock

The TD-2 is a six-digit (hours, minutes, seconds) general purpose digital clock. The only connection required at the rear of the clock is the external power source (PR&E #50-17, supplied with the clock).

Setting the clock requires the use of a small magnet tool (PR&E #90-151) to operate the Hall-effect switches located immediately behind the front panel lens. These switches are centered beneath the three pairs of digits about 1/4" above the bottom of the bezel, as shown in Figure 8.1.



To adjust the clock, place the end of the adjusting magnet against the panel in the appropriate area. Use the FAST SET switch to advance the hours, and the SLOW SET switch to advance the minutes. The HOLD switch will cause the hours, minutes and seconds to stop and hold at their current setting.

CIRCUITRY

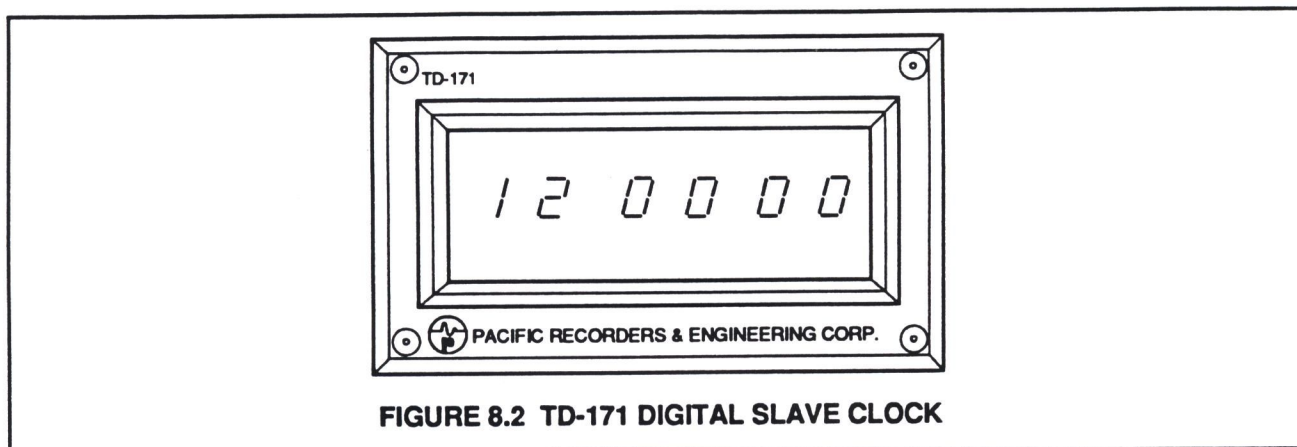
The TD-2 is designed around MM5314 digital clock integrated circuit U3. The time base is supplied by crystal oscillator/divider circuit Y1 and U1. The voltage doubler circuit of Q1, Q2, C4, CR1, CR2, and

C5 provides the high positive voltage required to pin 15 of U3. The display multiplex frequency is determined by C3 and R2.

The segments of displays DS1 through DS6 are driven by transistors Q4 through Q10, and the digits are selected by inverters Q11 through Q16 and drivers Q17 through Q22. Hall-effect switches U4 through U6 are magnetically activated to set the clock's FAST, SLOW and HOLD functions.

8.1.2 TD-171 Digital Slave Clock

The TD-171 Digital Slave Clock is a six-digit (hours, minutes, seconds) digital display specifically designed to operate with an ESE or compatible master clock time code generator. It is constructed in an aluminum case for shielding, uses an external power supply (PR&E #50-17, supplied with the clock), and is designed specifically for use in PR&E consoles. Power and master clock connection are made to the rear of the unit.



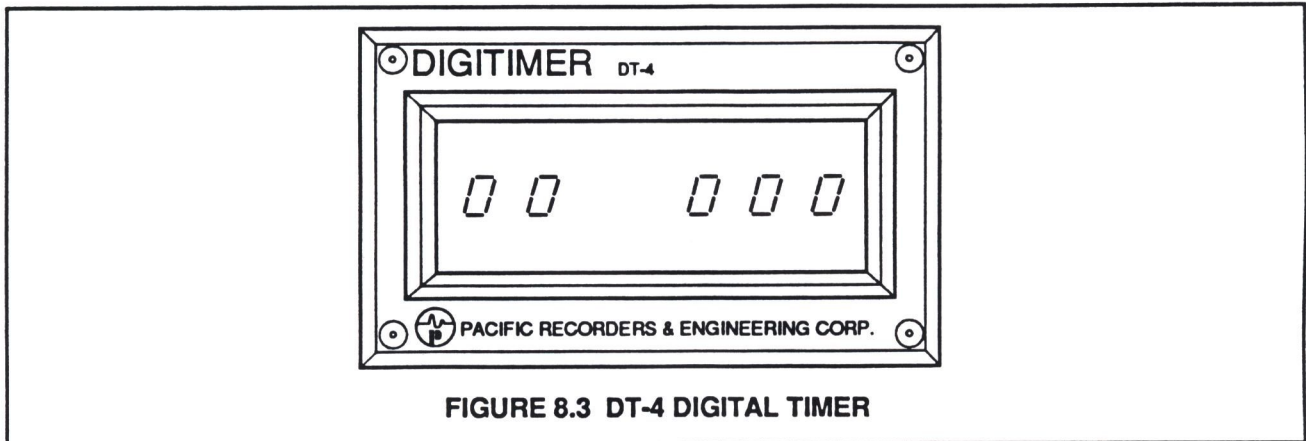
CIRCUITRY

The TD-171 circuit is virtually the same as the ESE model ES-171 unit (the TD-171 is manufactured with the express consent of ESE). The time code consists of 24 bits of pulse width modulated data. A wide pulse (260 microseconds) represents a binary one (1), and a narrow pulse (65 microseconds) represents a binary zero. The data rate is 60 Hz.

Demodulation is accomplished using shift registers U3, U4 and U5. The incoming data is buffered by transistor Q2 and gate U1 before it is fed to shift register U3. One of the one-shots of dual monostable U2 is used to clock the shift registers. The pulse width of this one-shot is set to be 2.5 times the pulse width of the narrow data pulse. As a result a "one" or "zero" will be clocked into U3 depending on the width of the data pulse. The second one-shot of U2 is retrigged by each data pulse until the completion of all 24 bits of data. U2 then times out and triggers another one-shot, formed by two gates of U1. This transfers the data from the shift register outputs to the latches contained in decoder/drivers U6 through U11, prior to the next transmission of data. This completes the serial-to-parallel conversion. The decoder/drivers and displays then translate the parallel BCD information into the visual time display.

8.1.3 DT-4 Digital Timer

The DT-4 is a five-digit (minutes, seconds, tenths-of-a-second) digital timer which is controlled by either the Timer Control Panel (PR&E #99-27) or the console timer reset bus.



NOTE: A four-pin timer reset Molex connector is provided for connection to an external timer, if desired. This free-hanging connector is located in the console meter panel, immediately behind the timer position.

The Timer Control Panel is located in the narrow far right console position which would otherwise be occupied solely by the headphone jack, and functions as follows:



- When AUTO is selected on the Timer Control Panel, the switch will be illuminated and the timer will reset and restart whenever a Stereo Line Input Module with the "timer reset" function enabled is turned ON (reference Section 2.9.2).
- The RSET button resets the timer to zero.
- The HOLD button will hold the timer display at the present time count while the running time count continues internally. Releasing the HOLD button will display the running time count.
- The STRT button starts the timer.
- The STOP button stops the timer.
- Console headphone jack location.

CIRCUITRY

The DT-4 is designed around MK50397 timer integrated circuit U4. The time base and display multiplex frequency is provided by crystal oscillator/divider circuit Y1 and U1. The segments of displays DS1 through DS5 are driven by transistors Q1 through Q7, while the digits are selected by transistors Q8 through Q12.

Power-up circuit R13, CR1 and C9 resets U4 to zero, and sets start/stop flip-flop U2A and U2C so that the NOT RUN line is high. An external START command causes the flip-flop to change state to the RUN condition. An external STOP command via U2C will set the flip-flop back to the STOP condition. An external RESET command via U2B will reset U4 to zero. An external HOLD command via U3D will momentarily hold the display at the present time count, while the real time count continues internally.

A READ or RUN command is routed via U3C, U3B and U3A to enable the tenth of second display, and, via Q13, to turn on the decimal point. Strapping J1 pin E to J1 pin F continuously enables both the tenth of second display and decimal point. A BLANK command to U4 allows the entire display to be blanked.

NOTE: In some cases it may be desirable to disable the tenth of second and decimal point indicators. This can be accomplished by cutting the strap between pins E and F (.1 SEC LOCK) on the timer connector.

8.2 LINE OUTPUT ASSIGNMENT SWITCHER

The Line Output Assignment Switcher (PR&E #99-120) is mounted in the narrow far left console position, and allows for the assigning of either the PROGRAM or AUDITION amplifier output signals to the PROGRAM and AUDITION amplifier AUX output connectors.

When the Line Output Assignment Switcher is installed, the rear panel PROGRAM AUX connector becomes the OUTPUT LINE 1 connector, and the AUDITION AUX connector becomes the OUTPUT LINE 2 connector, thereby allowing either the PROGRAM or AUDITION signal to be output at each connector, as selected by the module's front panel switches (illustrated below).



- The OUTPUT LINE 1 switch selects the PROGRAM AUX output from either the PROGRAM or AUDITION bus.
- The OUTPUT LINE 2 switch selects the AUDITION AUX output from either the PROGRAM or AUDITION bus.

8.3 REDUNDANT POWER SUPPLY COUPLER UNIT

The Redundant Power Supply Coupler Unit (PR&E #99-76) is used whenever redundant power is desired. When two power supplies are connected to the unit, the power supply voltages are diode-coupled, with the highest of the two voltages being supplied to the console. If there is a voltage failure, redundant power is instantaneously supplied to the console, and the Remote Power Fail Indicator on the coupler unit is illuminated.

The unit should be installed adjacent to the two console power supplies, and connected with the two prefabricated cables supplied. The connections to the supplies and to the console are made to the heavy-duty barrier strips on the rear of the coupler. The cables are color-coded, and the corresponding color names are printed adjacent to the terminal strips.

NOTE: The high-current diodes used in the coupler have very low forward voltage drop and, therefore, do not add significantly to the heat dissipation of the power supply system. However, the second power supply in a redundant system does add approximately 50 watts of heat, due to the excitation current consumed by the power transformers.

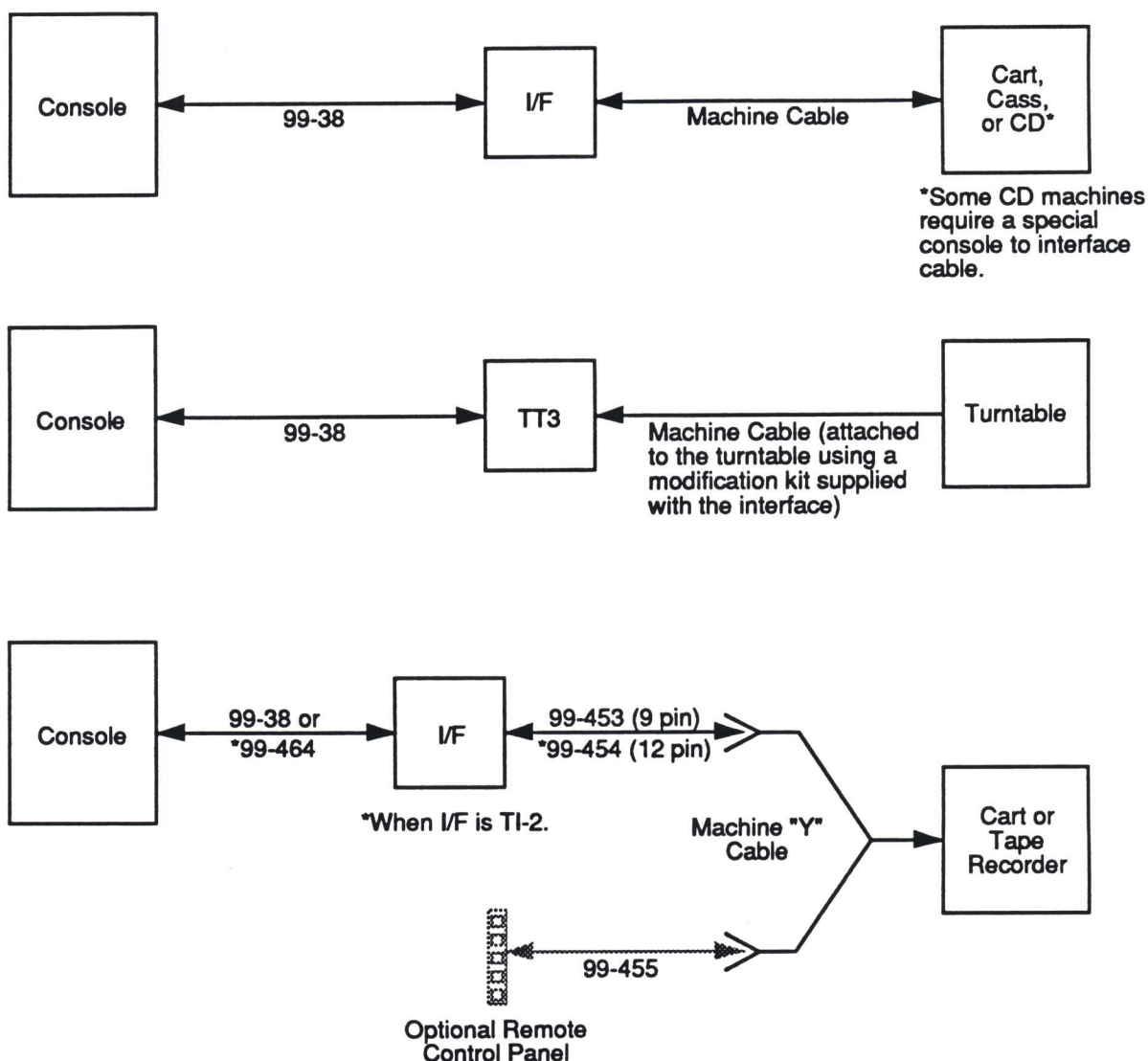
8.4 LOGIC INTERFACES

PR&E recommends the use of logic interface electronics between the console and any piece of auxiliary equipment to protect the console from hazardous voltages, and to prevent ground loops, such as those which occur when control circuitry is referenced to a different ground or power supply.

A variety of different interfaces are manufactured by PR&E to accommodate most types of cart, tape and cassette machines, turntables, and compact disc players. Cable assemblies connecting the console to the interface, and the interface to the auxiliary equipment are also produced by PR&E. For complete interface information, including all standard machine cable assemblies and machine "Y" cables, contact PR&E.

The table below provides a listing of the various interfaces described in this section, as well as their part number and a general description of their use. Figure 8.4 (on the following page) provides an overview of the logic interface and cable system.

| Interface | PR&E P/N | For Use With |
|------------------|----------|--|
| TCI-2A | 99-165 | PR&E TOMCAT, Micromax cart machines |
| CI-2 | 99-125-0 | Cart machines, CD players and cassette machines w/12-28 V lamp tallies |
| CI-2 (5V) | 99-125-1 | Cart machines, CD players and cassette machines w/5 V lamp tallies |
| TI-2 | 99-111 | Reel to reel tape machines w/12-28 V lamp tallies |
| TT-3 | 99-110 | Turntables |
| WL-2 | 99-143 | Studio and Control Room warning lights |
| Dual Relay | 99-419 | General purpose switching, mute contacts |
| Cassette Skimmer | 99-410 | Cassette recorders |

**NOTES:**

- A) The addition of the optional cart or tape recorder remote control panel is made possible by the installation of the machine "Y" cable.
- B) Pin assignment for the PR&E #99-38 and #99-464 console to interface cables is defined in Section 8.5.

FIGURE 8.4
LOGIC INTERFACE AND CABLE SYSTEM OVERVIEW



8.4.1 TCI-2A Cartridge Interface

The TCI-2A Cartridge Interface (PR&E #99-165) was specifically designed for use with PR&E TOMCAT and Micromax cart machines. Each TCI-2A can accommodate up to three reproducers or recorder/reproducers. For a schematic of this interface, as well as a diagram of the console to interface cable (PR&E #99-38), see Section 8.5.

NOTE: If you already have TCI-2 interfaces for TOMCAT, they may be modified slightly to work with both TOMCAT and Micromax cart machines, as follows:

1. Replace resistors R1, R3, R5, R7 and R9 with 750 ohm, 1/2 watt resistors (PR&E #3-751).
2. On the component side of the PC board, cut the trace going to J4 pin 4.
3. Add an insulated jumper wire between J4 pin 1 and the trace that previously went to J4 pin 4 (which was cut in step 2).
4. Verify that resistor R14 is a 10M ohm, 1/4 watt resistor (PR&E #2-106).

CIRCUITRY

The TCI-2A uses opto-isolators to eliminate potential audio/logic ground loops. The LED inputs of opto-isolators U1 thru U5 are connected to the cart machine tally outputs through current limiting resistors R1, R3, R5, R7 and R9. The collector of opto-isolator U1 is connected to the AUDIO RESET line on console connector J1. When the FWD LIGHT tally is present at cart connector J4, current flows through U1's LED, turning on its output transistor, and pulling the AUDIO RESET line to console LOGIC COMMON. When the STOP LIGHT tally is present at cart connector J4, U2 will operate in the same manner, pulling the READY line to console LOGIC COMMON. Capacitor C2 will pulse the AUDIO RESET line low at the "rising edge" of the STOP LIGHT tally, thus providing a console AUDIO RESET when the cart machine stops.

Opto-isolators U3, U4 and U5 provide open collector outputs referenced to an isolated COMMON on connector J3. These opto-isolators function in the same manner in conjunction with the remaining cart tallies; PLAY LIGHT, SEC LIGHT and TER LIGHT.

NOTE: These outputs can be used to provide automatic "cart sequencing" by connecting the appropriate cart cue line on connector J3 to the console ON input on J2 of the "next" cart machine interface. The isolated COM on connector J3 needs to connect to LOGIC COMMON as well. If needed, a switch can be installed in series with the connection to disable the cart sequence. The J3 outputs from several cart machines may also be paralleled together to form an "end of message" warning bus. This bus can then be buffered, as needed, to drive external warning lights. Contact PR&E for more information.

Opto-isolators U6 and U7 are connected through current limiting resistors R11 and R13 to the console START and STOP pulses on J1, respectively. The open collector outputs of U6 and U7 are connected to the cart START and STOP inputs of connector J4, respectively. The resistor and capacitor on each

opto-isolator (i.e., C1/R2 on U1, etc.) slows down the switching time on the opto-isolator's output transistor.

8.4.2 CI-2 Cartridge Interface (+12 to +28 Volt Logic)

The CI-2 Cartridge Interface (PR&E #99-125-0) was designed for use with those commercial cart machines which use +12 to +28 volt logic. The CI-2 uses dry relay contacts for start and stop functions, and also serves as a capable logic interface for CD players and cassette machines. The CI-2 also routes machine status indicator feedback to the console module "OFF" lamp, mimicking machine READY, PAUSE or STOP indicators.

Each CI-2 can accommodate up to three machines. For a schematic of this interface, as well as a diagram of the console to interface cable (PR&E #99-38), see Section 8.5.

CIRCUITRY

When a cartridge is inserted, current is fed to isolator circuit CR9-12, R2, R4, C2 and U2, forcing the NOT READY line low and momentarily pulsing NOT AUDIO reset low (ensuring module turn-off). A START pulse input via CR1 will turn on relay K1, starting the cartridge machine. Current fed to isolator circuit CR5-8, R1, R3, C1 and U1 will force the NOT AUDIO RESET line low. A STOP pulse input via CR2 will turn on relay K2, stopping the cartridge machine.

8.4.3 CI-2 Cartridge Interface (+5 Volt Logic)

The CI-2 Cartridge Interface (PR&E #99-125-1) was designed for use with those commercial cart machines which use +5 volt logic feedback. Its function is identical to the CI-2 Interface for +12 to +28 Volt Logic. For a schematic of this interface, as well as a diagram of the console to interface cable (PR&E #99-38), see Section 8.5.

CIRCUITRY

The circuitry for the +5 volt version of the CI-2 Cartridge Interface functions identically to that of the +12 to +28 volt version (reference Section 8.4.2), except that resistors R3 and R4 are 100 ohm, 1/4 watt, instead of 1K ohm, 1/2 watt.

8.4.4 TI-2 Tape Interface

The TI-2 Tape Interface (PR&E #99-111) was designed for use with those commercial reel to reel tape machines which use +12 to +28 volt logic. Each TI-2 accommodates one machine. For a schematic of this interface, as well as a diagram of the console to TI-2 interface cable (PR&E #99-464), see Section 8.5.

NOTE: This interface may also be used with cartridge machines. In this event, use console to interface cable #99-38 if the replay lockout function is desired.

CIRCUITRY

When the tape machine is stopped, current is fed to STOP LAMP isolator circuit R1, R2, R3, CR1, C1 and U1, forcing the NOT STOP LAMP line low, which, via U4C and pulse driver circuit R4, R20, CR8, C10 and Q1, momentarily holds the NOT AUDIO RESET low (ensuring module turn-off).

When the tape machine is in the record mode, current is fed to RECORD LAMP isolator circuit R9, R10, C3, CR3 and U3, holding the NOT AUDIO RESET low.

The NOT REPLAY line, strapped low by jumpering pins 14, 15 or J1 (i.e., reel to reel mode) via R11, R12, C4, U5B and U5C, holds resistor U6B such that the START ENABLE line is always high. When the STOP LAMP and START ENABLE lines are both high, via U5D, R14 and Q2, the NOT READY output will go low. With the NOT START ENABLE line low, a START pulse input via R16, R17, C6, U4E and U4D will trigger monostable circuit R18, C7, CR4 and U6A, which momentarily turns on driver circuit R19 and Q3 and TAPE START relay K1 (starting the tape machine). A STOP pulse input via CR6 turns on TAPE STOP relay K2 (stopping the tape machine).

Either the NOT STOP LAMP line's low state or current fed to PLAY LAMP isolator circuit R6, R7, R8, CR2, C2 and U2 forces the NOT RUN line low, which, via U5A and U4A, asserts the CART line high (i.e., there is a cartridge in place).

When used for cartridge machine operation, the NOT REPLAY line is left unstrapped to the high state. Without a cartridge loaded, the CART line is low, which, via U5B and U5C, presets U6B such that the NOT START ENABLE line is low. After insertion of a cartridge (CART line is high), a start pulse input will, as in reel to reel operation, start the cartridge machine. The NOT RUN line will then go low, which, via U4B, will clock the low state on the data input of register U6B, asserting the NOT START ENABLE line high. When the cartridge machine recues and stops, the RUN line will go low and the NOT START ENABLE line remains high, which inhibits further start pulses from triggering monostable U6A, and prevents restarting the cartridge machine. Either the CART line going low (by removing the cartridge) via U5B, or a STOP pulse input, via R13, C5 and U4F via U5C, will again preset register U6B, asserting the NOT START ENABLE line low.

8.4.5 TT-3 Turntable Interface

The TT-3 Turntable Interface (PR&E #99-110) was designed for use with most commercial turntables. Each TT-3 can accommodate up to two turntables. For a schematic of this interface, as well as a diagram of the console to interface cable (PR&E #99-38), see Section 8.5.

CIRCUITRY

When the turntable is stopped, no current will be fed to isolator circuit R1, R2, C1, C2 and U1, allowing the NOT RUN line to go high, which, via driver R3, R12, and Q1, holds the NOT READY output low (i.e., turntable is ready) and momentarily pulses, via C8, the NOT AUDIO RESET line low (ensuring module turn-off). With the NOT RUN line's high state fed to U2D, a START pulse, via R4, R5, C3, U2D and U2B, will cause a CONTROL pulse output via isolator circuit R8, R9, Q2, U3, R10, R11 and C5,



starting the turntable. With the RUN line's high state fed to U2C (i.e., the turntable is running), a STOP pulse, via R6, R7, C4 U2C and U2B will similarly cause a CONTROL pulse output, stopping the turntable.

8.4.6 WL-2 Warning Light Interface

The WL-2 Warning Light Interface (PR&E #99-143) is an opto-isolated switched AC relay designed to illuminate external studio and/or control room warning lights. This interface has two inputs (STUDIO and CONTROL ROOM), which are activated by a 12 volt DC command output from the console's rear panel WARNING connector. Each input has a corresponding AC output.

Pin assignment for the console WARNING connector is defined in Section 2.7.11. For a schematic of this interface, see Section 8.5.

NOTE: The WL-2 inputs are polarity sensitive, and will not work unless connected correctly.

CIRCUITRY

NOTE: The WL-2 contains two independent relays. For clarity and simplicity, only relay K1 is described below.

A voltage between 3 VDC and 32 VDC applied to input connector J1 energizes solid state relay K1. Relay K1 then switches the "hot" lead (black) of the 115 VAC input to output connector J2. Switching transitions occur during the zero crossing point of the AC source to minimize noise transients.

8.4.7 Dual Relay Interface

The Dual Relay Interface (PR&E #99-419) consists of two separately controlled relays, which can be used for audio or control circuitry. For a schematic of this interface, see Section 8.5.

CIRCUITRY

NOTE: The Dual Relay Interface contains two independent 4PDT relays. For clarity and simplicity, only relay A is described below.

With no control voltage applied, relay A will have continuity between each WIPER terminal and its respective N.C. terminal. With 12 VDC applied to terminals COM and +12 V, each WIPER will have continuity to its respective N.O. terminal.

NOTE: Relays A and B each draw .036 amps when energized with contacts rated at 2 amps at 30 VDC.

8.4.8 Cassette Skimmer Interface

The Cassette Skimmer Interface (PR&E #99-410) is used to create cassette recordings of selected console microphone inputs. One to four Microphone Input Modules may be connected to the skimmer,

which will toggle up to two cassette tape machines from the pause mode into the record mode whenever a connected mic module is turned "ON". In this way, a recording of a personality or personalities may be created for later review.

Another method of connecting the cassette skimmer is to connect it to the Control Room Monitor Module. When this is accomplished, the tape machine will be placed in record whenever the Control Room speakers mute.

For a schematic of this interface, see Section 8.5.13.

CIRCUITRY

Power is applied to the interface through input connectors J1 through J4 and diodes CR2, CR4, CR6 and CR8. This arrangement allows any or all of the four inputs to be used. The ON TALLY voltage is routed through diodes CR1, CR3, CR5 and CR7 to the "fast attack/slow release" circuit comprised of R1, R2, CR9, R3 and C5.

When ON TALLY voltage is applied, C5 is charged quickly through CR9 and R3. When ON TALLY voltage is removed, C5 is discharged slowly through R2 and R1. Schmitt inverter squares up and inverts this signal and sends it to monostables that generate the PLAY and PAUSE pulses for each cassette recorder. U2 generates pulses for Cassette 1 and U5 generates pulses for Cassette 2.

U2A and U5A are configured to trigger on the "falling edge" of the inverted ON TALLY voltage, which indicates the beginning of cassette skimming and cassette RECORD. U2B and U5B are configured to trigger on the "rising edge" of the inverted ON TALLY voltage, which causes the cassette to PAUSE.

Grounding the SKIM DISABLE input on J5 disables the PLAY and PAUSE pulses for Cassette 1, and grounding the SKIM DISABLE input on J7 disables these pulses for Cassette 2.

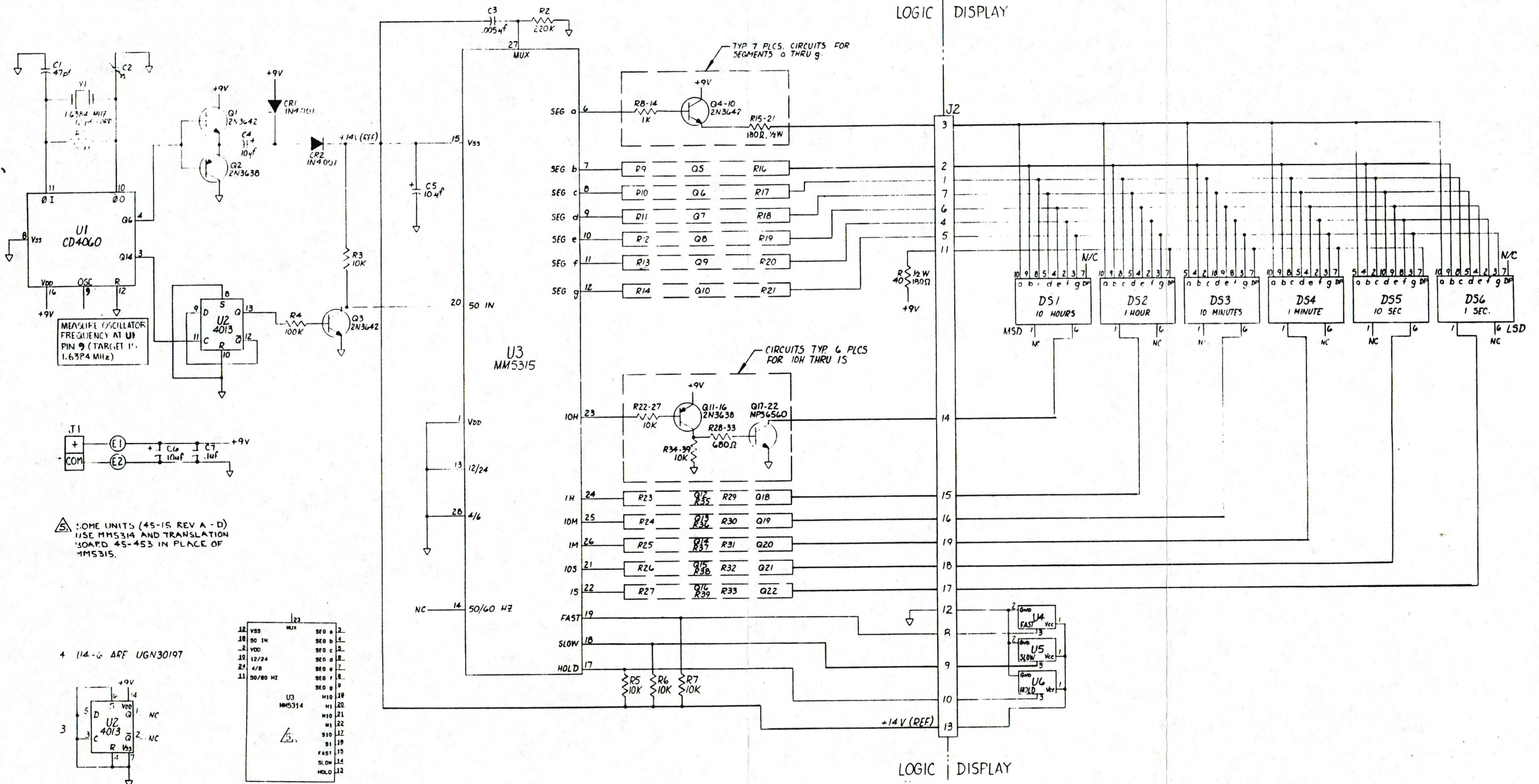
Each of the four monostables generates a 0.1 second pulse governed by the time constant of C7/R6, C8/R9, C10/R14 and C11/R17. Each monostable is connected to an opto-isolator to eliminate any audio or logic ground loops. Opto-isolators U3, U4, U6 and U7 are driven by transistors Q1, Q2, Q3 and Q4.

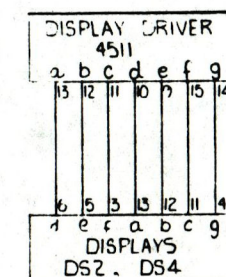
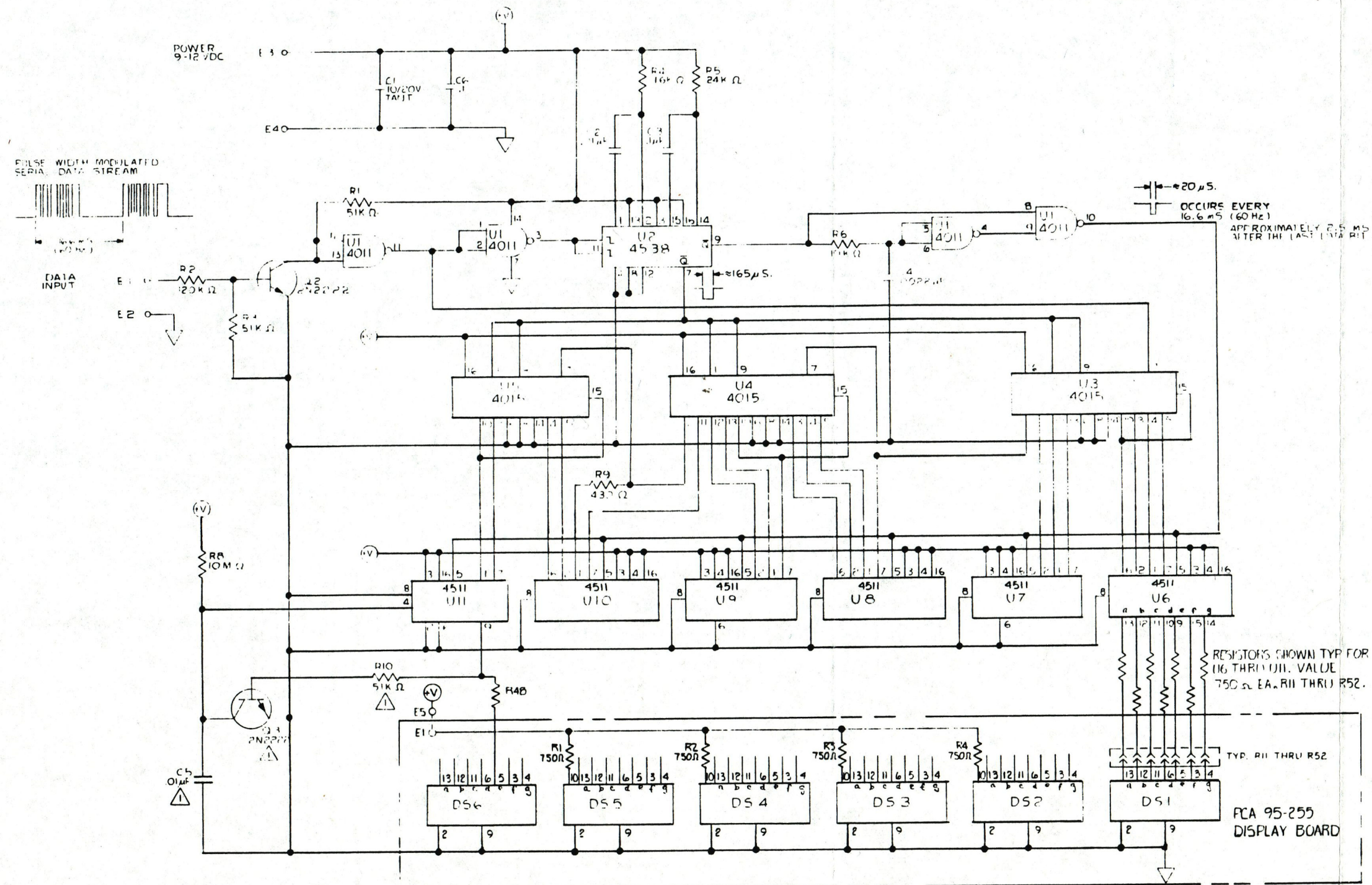
8.5 ACCESSORY SCHEMATICS

This section contains schematics for the various accessories described in this chapter, as follows:

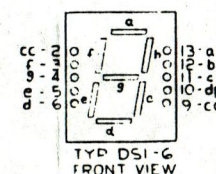
- 8.5.1 TD-2 Digital Clock
- 8.5.2 TD-171 Digital Slave Clock
- 8.5.3 DT-4 Digital Timer
- 8.5.4 Timer Control Panel
- 8.5.5 Line Output Assignment Switcher
- 8.5.6 Power Supply Coupler Unit
- 8.5.7 TCI-2A Cartridge Interface
- 8.5.8 CI-2 Cartridge Interface
- 8.5.9 TI-2 Tape Interface
- 8.5.10 TT-3 Turntable Interface
- 8.5.11 WL-2 Warning Light Interface
- 8.5.12 Dual Relay Interface
- 8.5.13 Cassette Skimmer Interface
- 8.5.14 #99-38 Console To Interface Cable
- 8.5.15 #99-464 Console To TI-2 Interface Cable

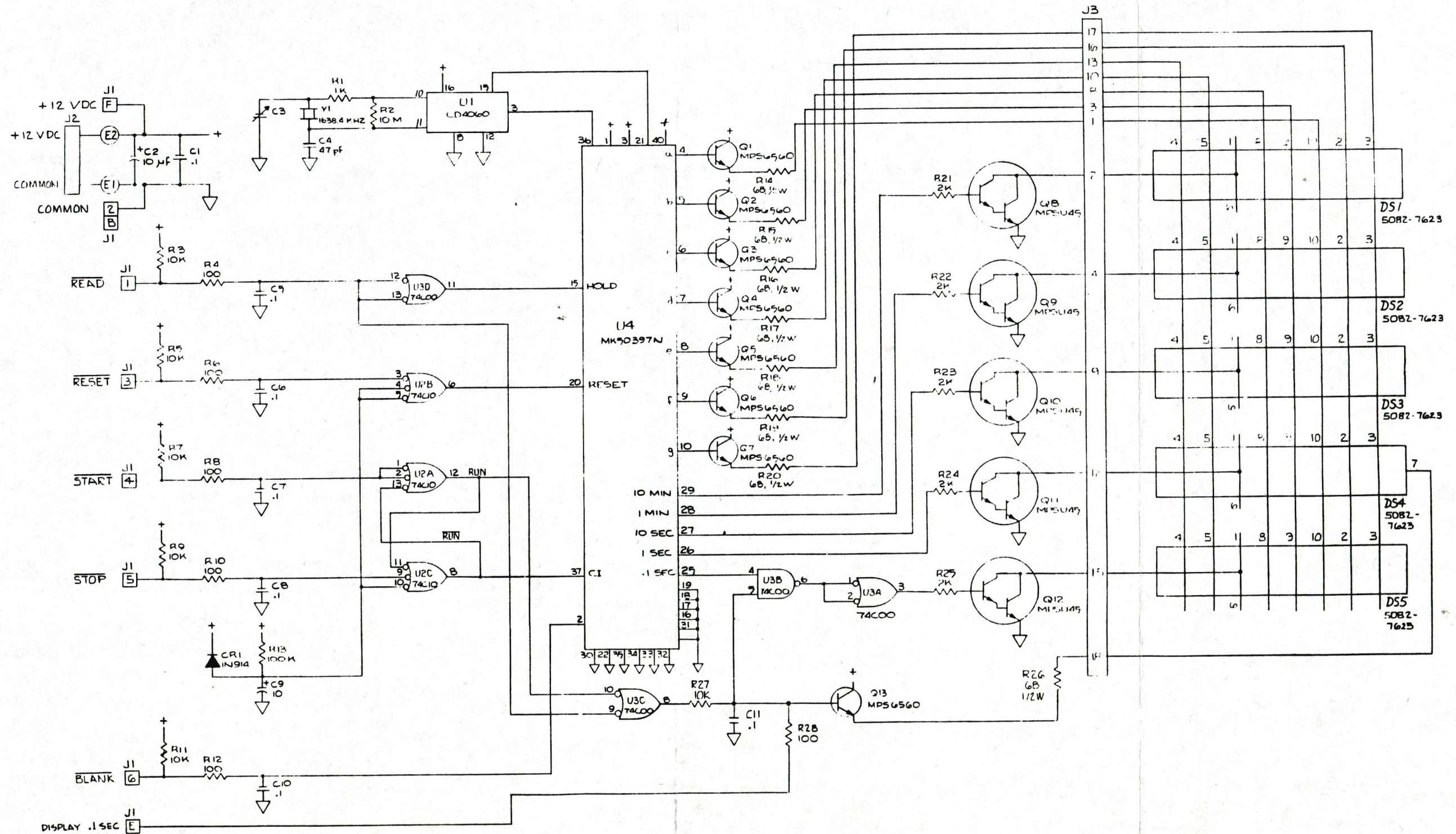
NOTE: On PR&E schematics, capacitor values are in microfarads (μF), unless otherwise specified, and resistors are 1/4 watt, 5%, unless otherwise specified.

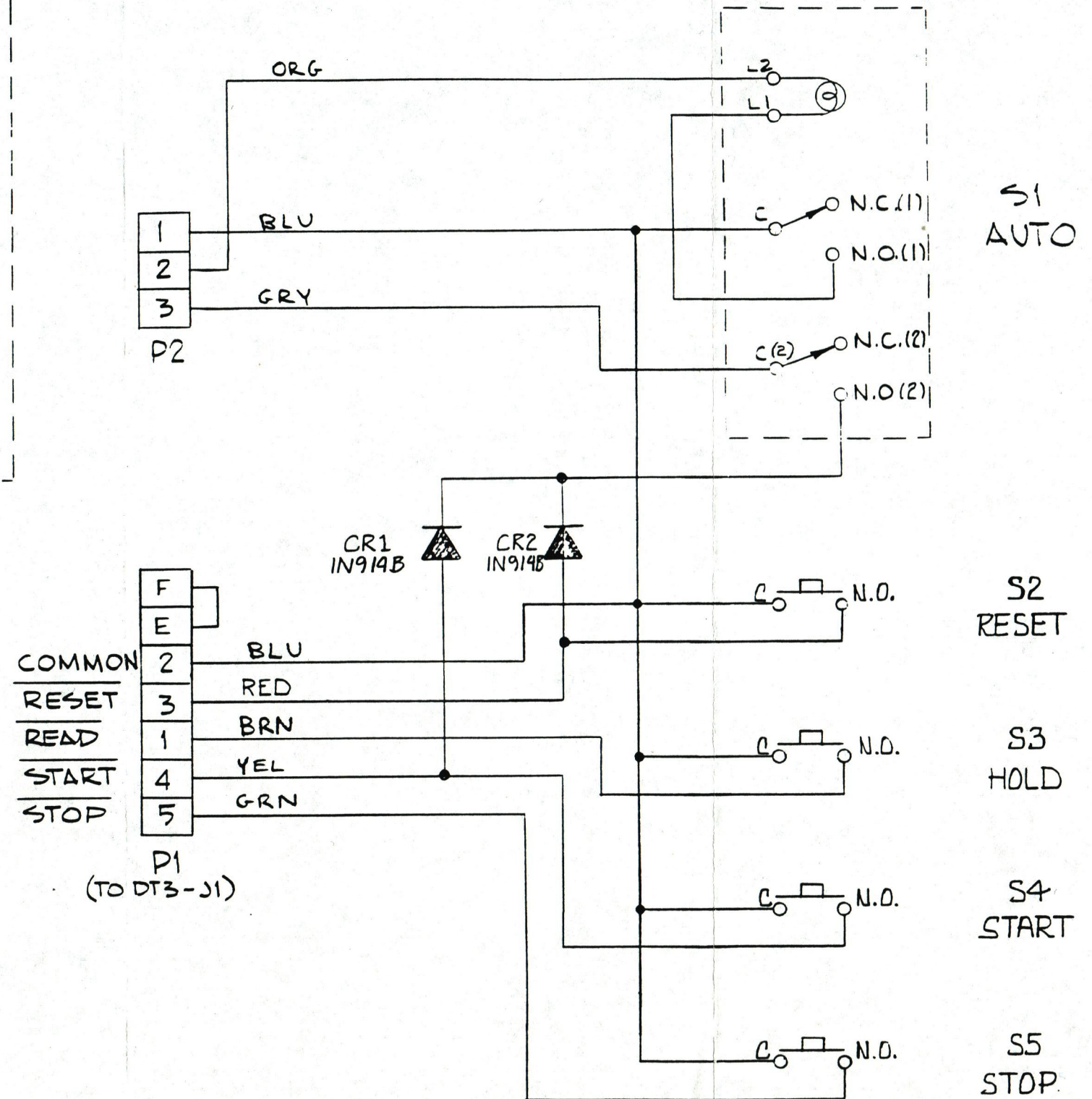
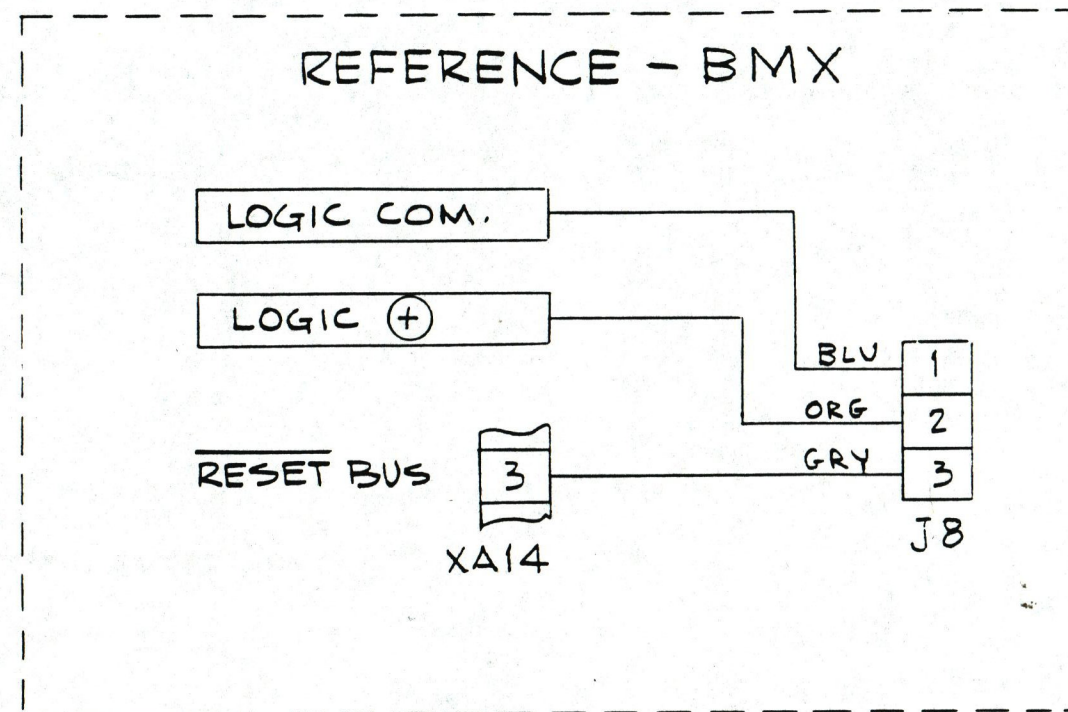


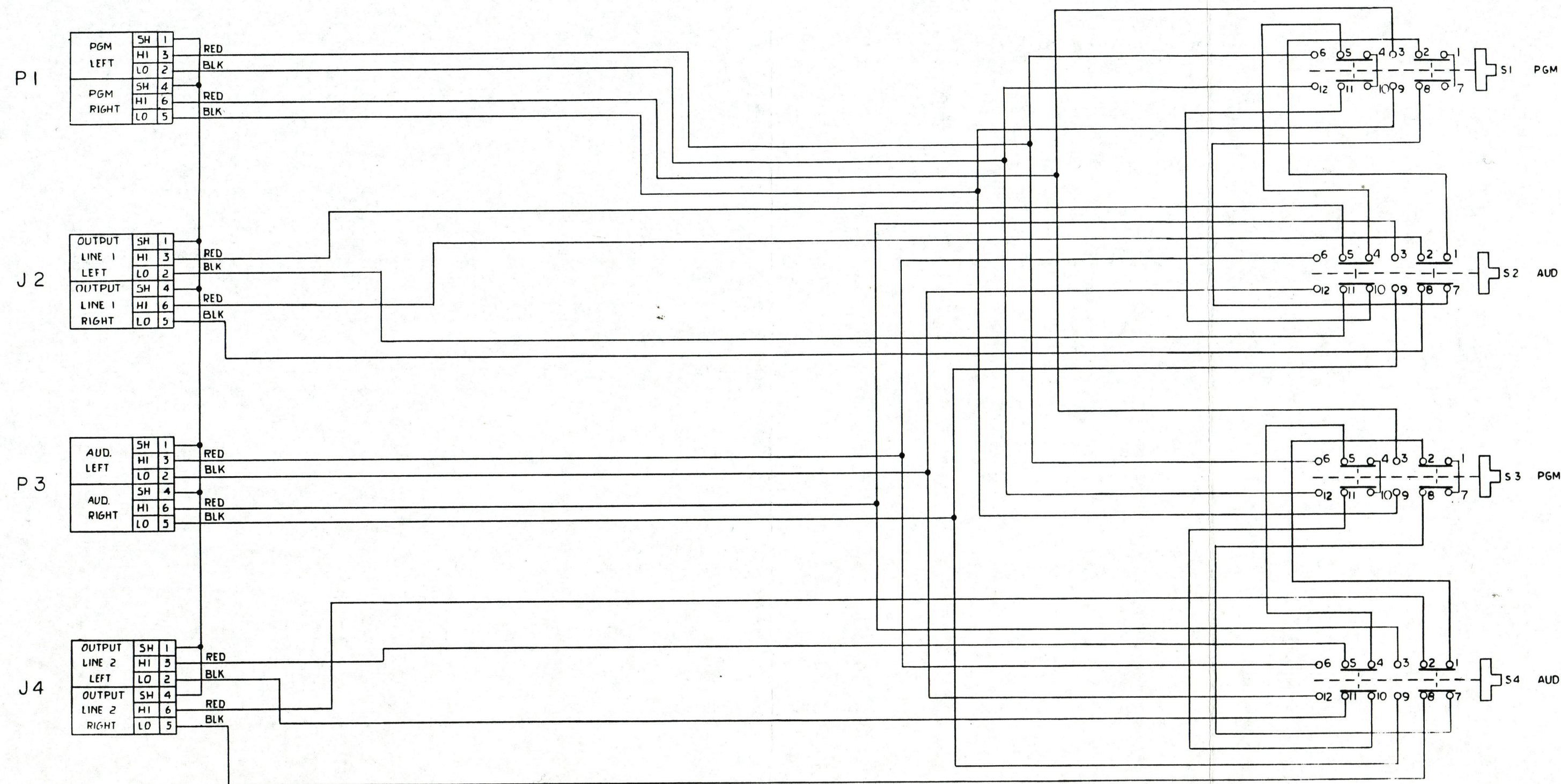


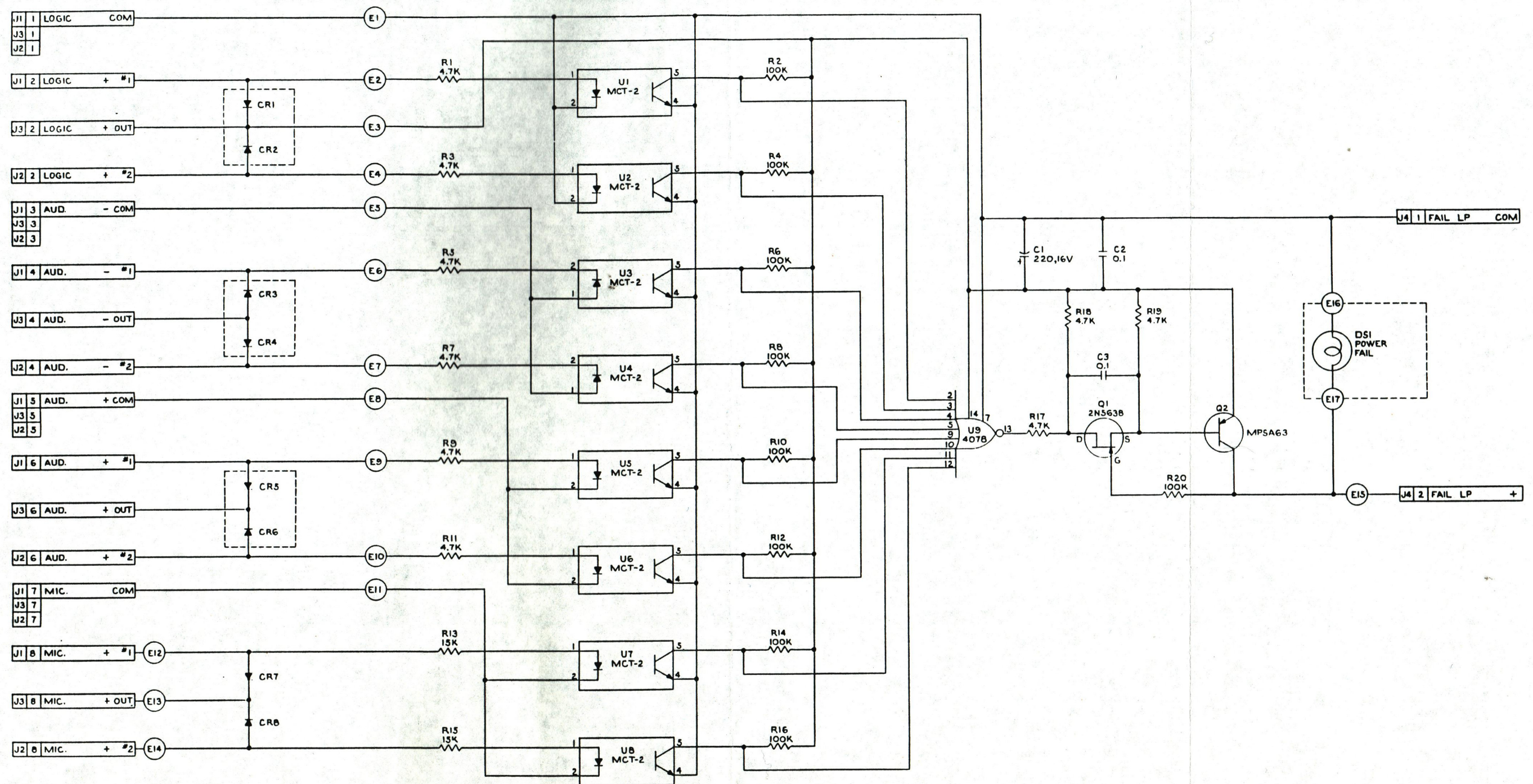
DS2 & DS4 ARE
INSTALLED UPSIDE DOWN

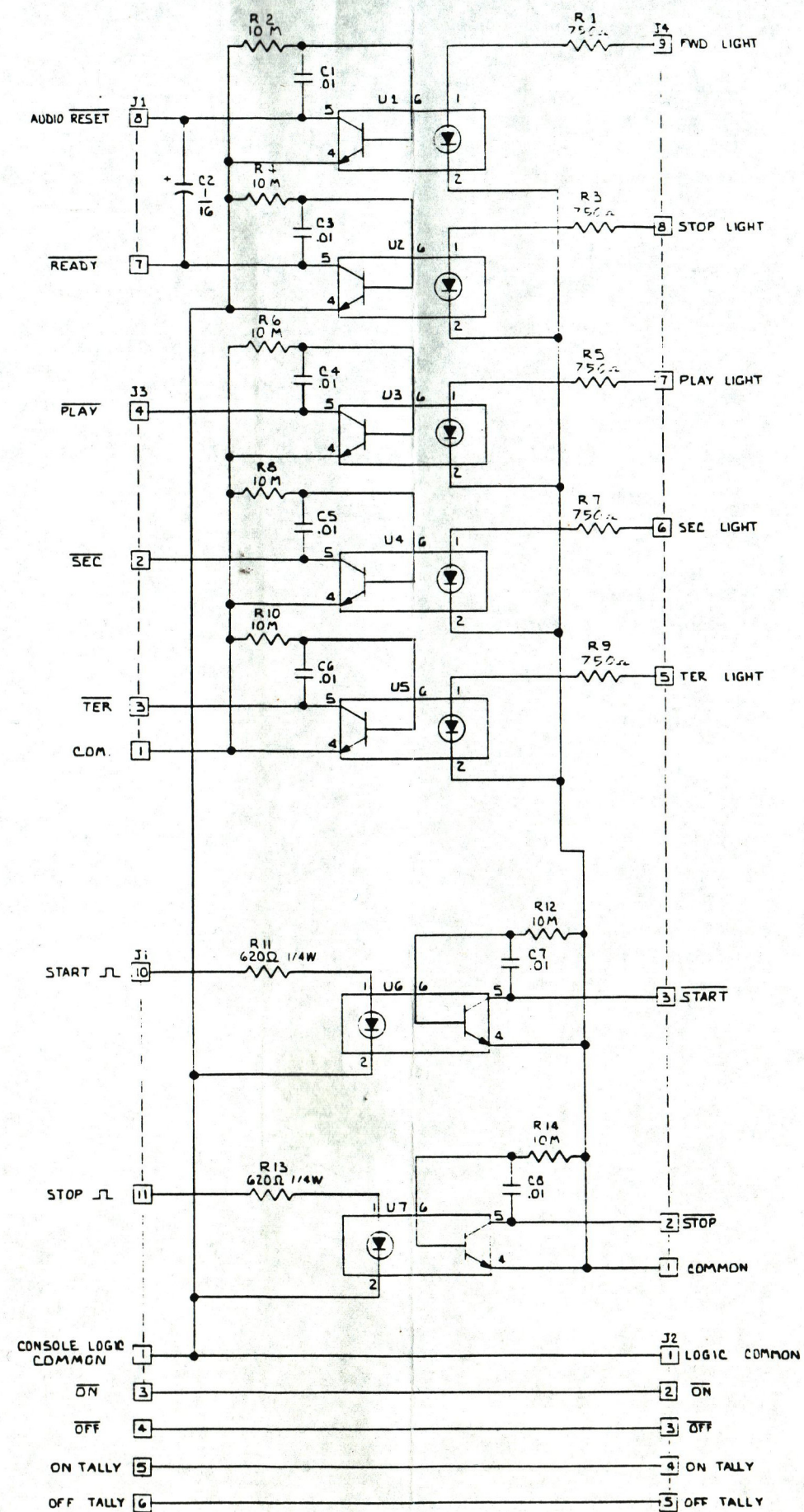










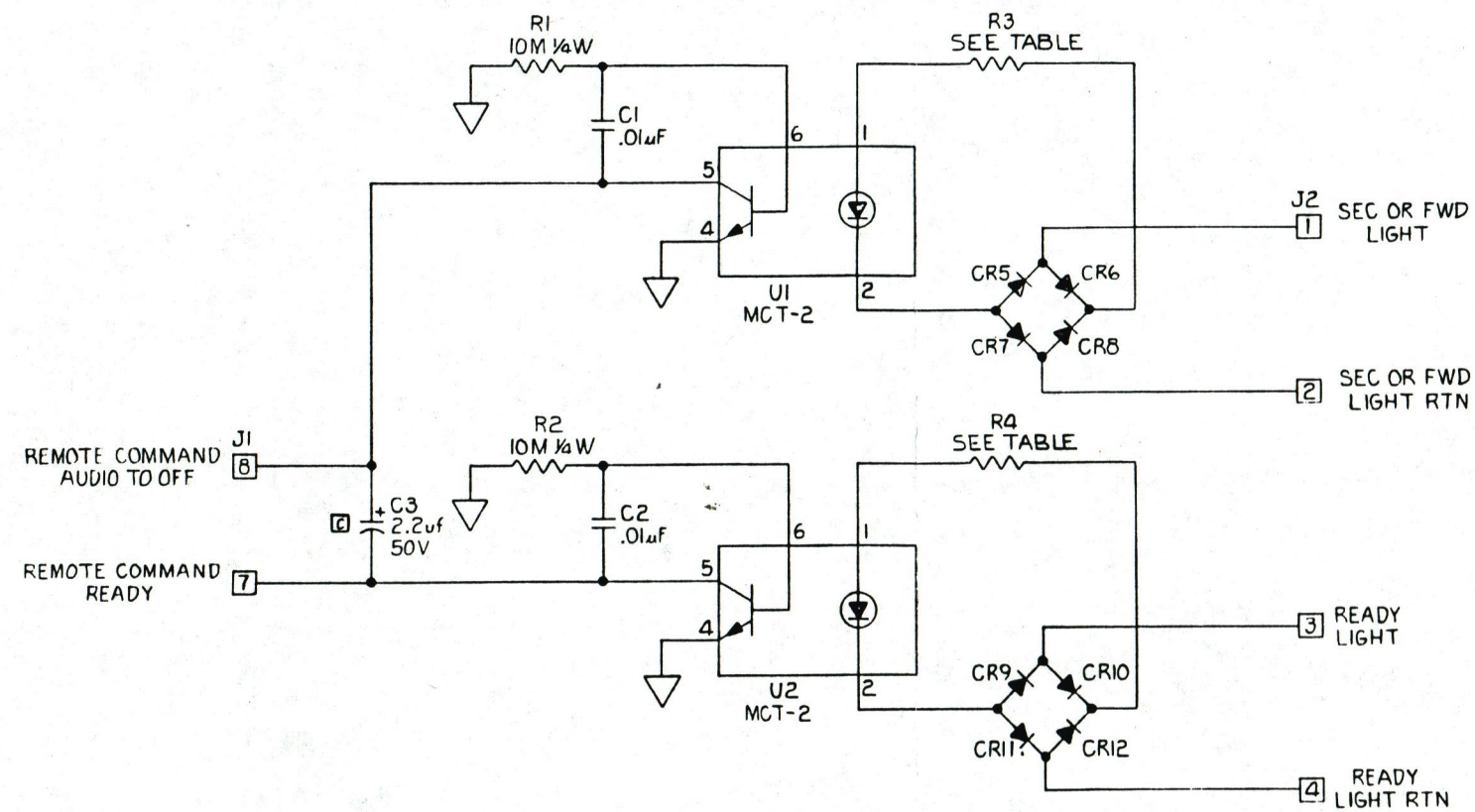


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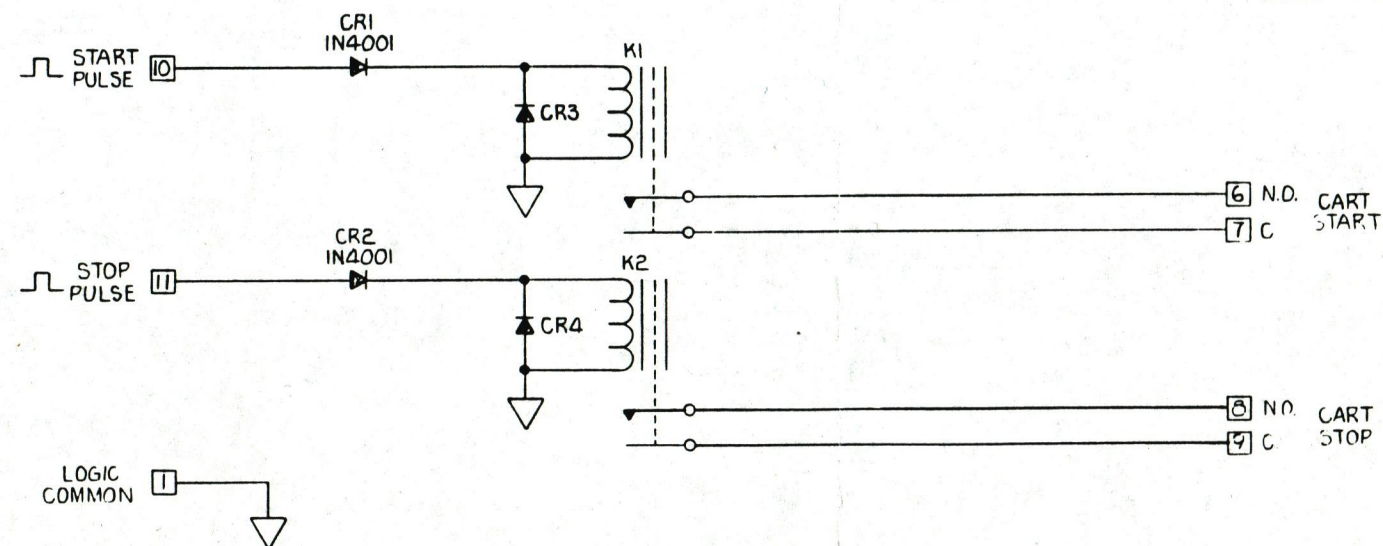
www.SteamPoweredRadio.Com

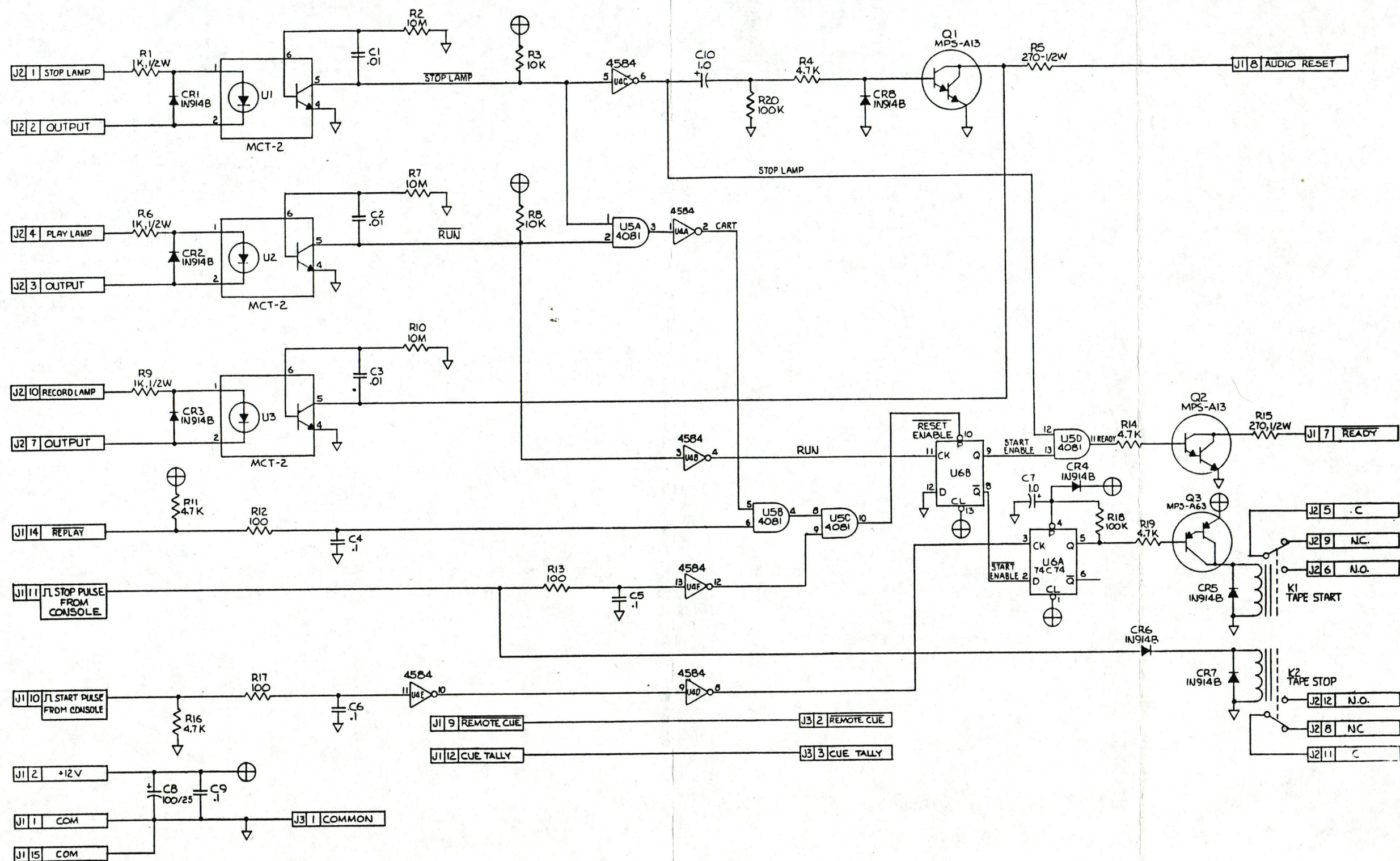
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8.5.7 TCI-2A CARTRIDGE INTERFACE



| VALUE TABLE | | |
|-------------|----------|------------|
| DASH NO. | -0 | -1 |
| R3 | 1K 1/2 W | 100Ω 1/4 W |
| R4 | 1K 1/2 W | 100Ω 1/4 W |

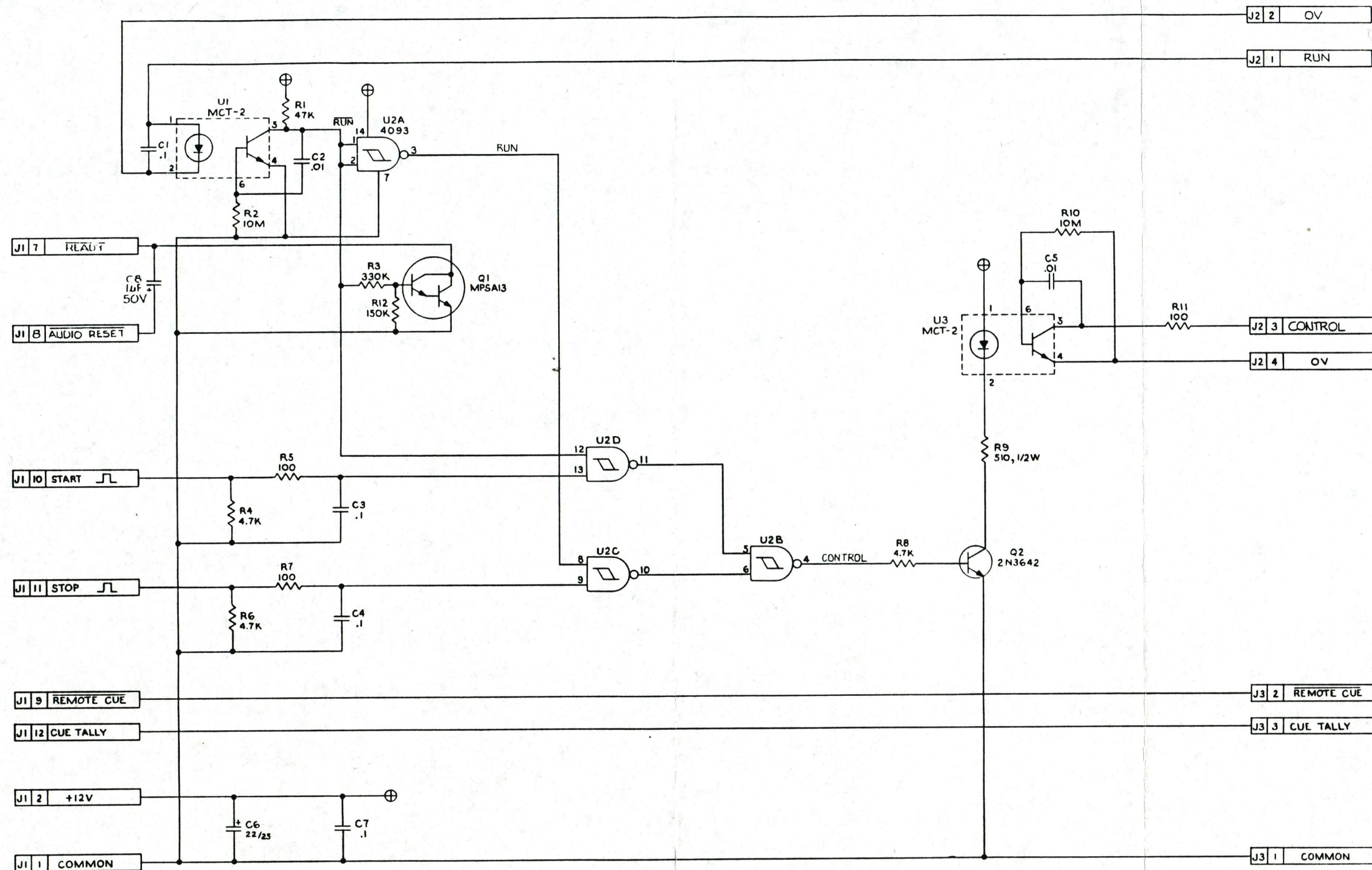




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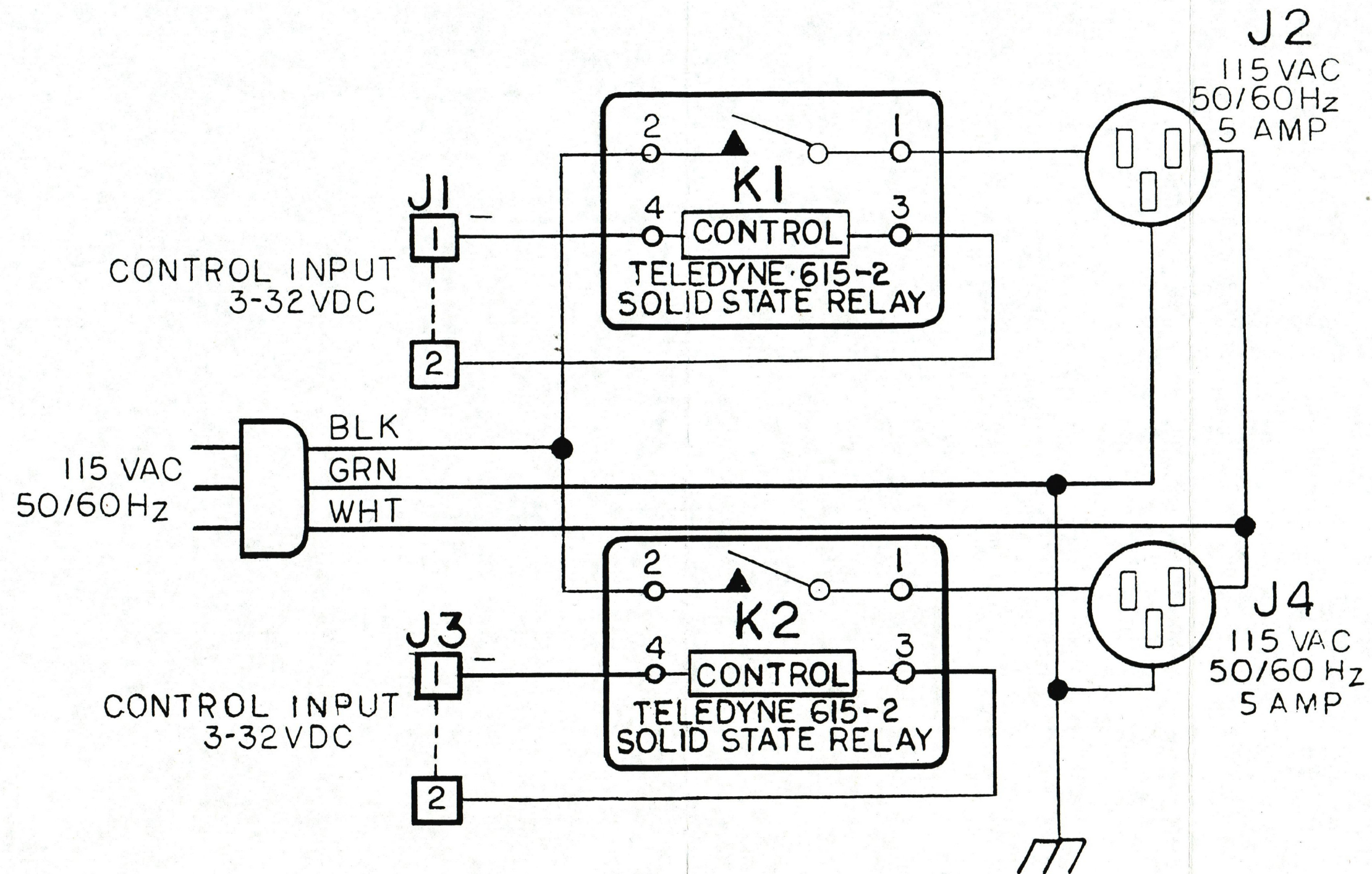
8.5.9 TI-2 TAPE INTERFACE

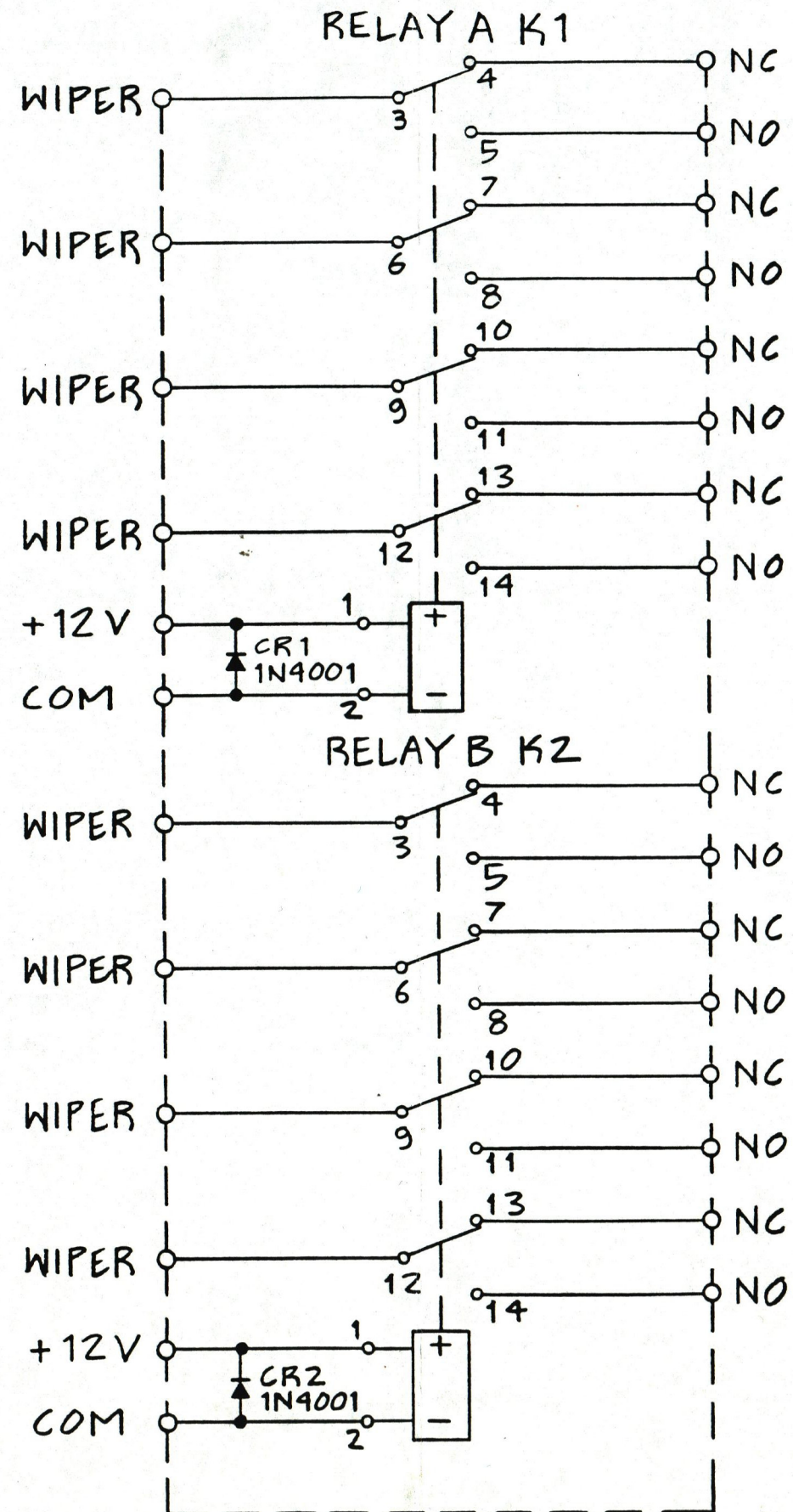


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8.5.10 TT-3 TURNTABLE INTERFACE

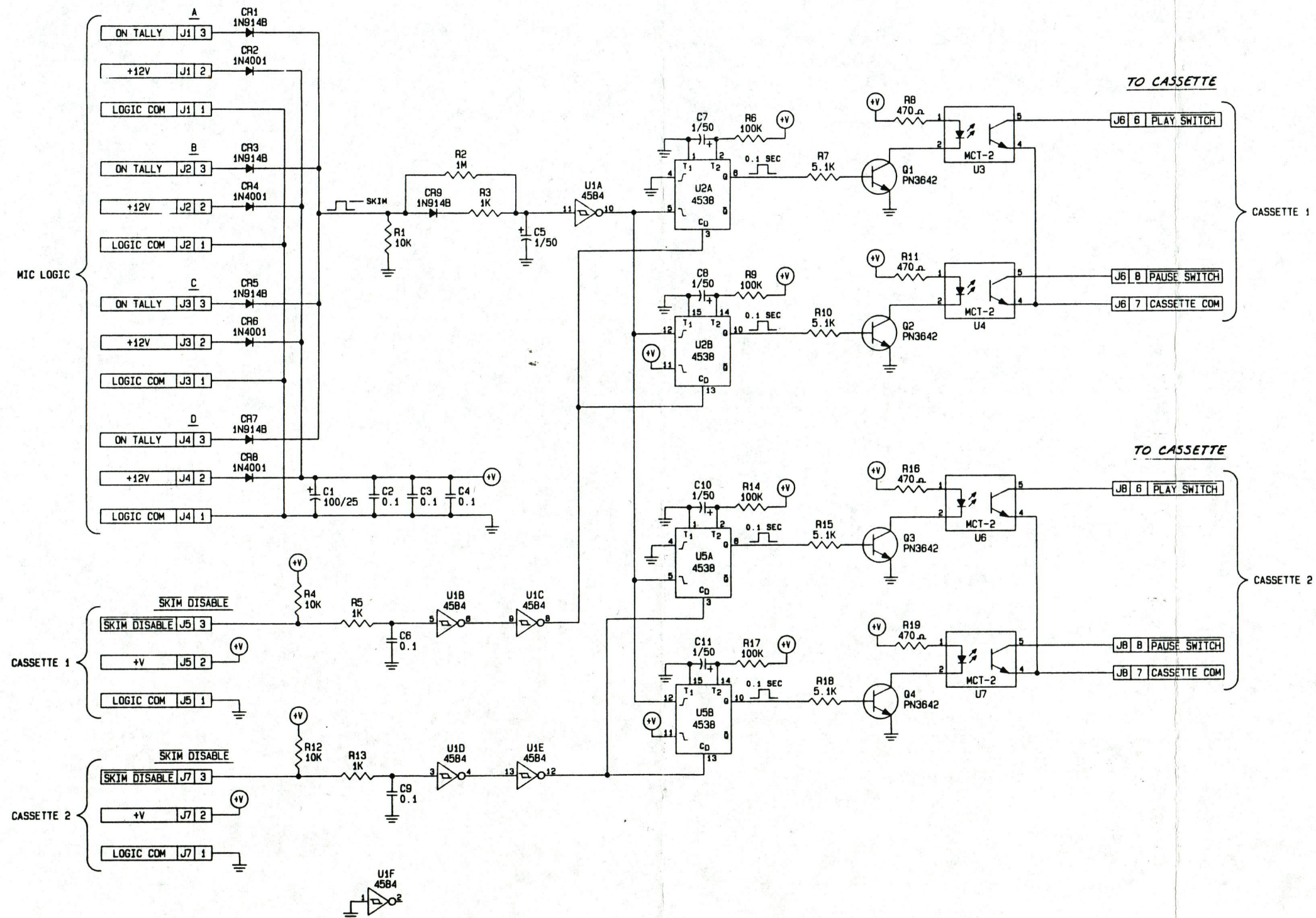




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8.5.12 DUAL RELAY INTERFACE



P1, P2: HOUSING: 15-PIN MALE MOLEX #03-06-2152 (PR&E #15-607)
TERMINALS: MALE MOLEX #02-06-2103 (PR&E #15-3)

CABLE TYPE: BELDEN #8458, 15-CONDUCTOR

| P1 | P2 | WIRE COLOR |
|-----------|-----------|-------------------|
| 1 | 1 | BLK |
| 2 | 2 | WHT |
| 3 | 3 | RED |
| 4 | 4 | GRN |
| 5 | 5 | ORG |
| 6 | 6 | BLU |
| 7 | 7 | WHT/BLK |
| 8 | 8 | RED/BLK |
| 9 | 9 | GRN/BLK |
| 10 | 10 | ORG/BLK |
| 11 | 11 | BLU/BLK |
| 12 | 12 | BLK/WHT |
| 13 | 13 | RED/WHT |
| 14 | 14 | GRN/WHT |
| 15 | 15 | BLU/WHT |



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8.5.14 #99-38 Console To Interface Cable