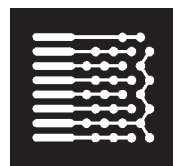

R-5 Audio Console

 *AUDIOARTS® ENGINEERING*

OWNER'S MANUAL
March 1997



R-5 Audio Console Technical Manual — revised 3/97

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**AUDIOARTS ENGINEERING
600 Industrial Drive
New Bern, North Carolina 28562
252-638-7000 (Fax 252-637-1285)
Email: email@wheatstone.com**

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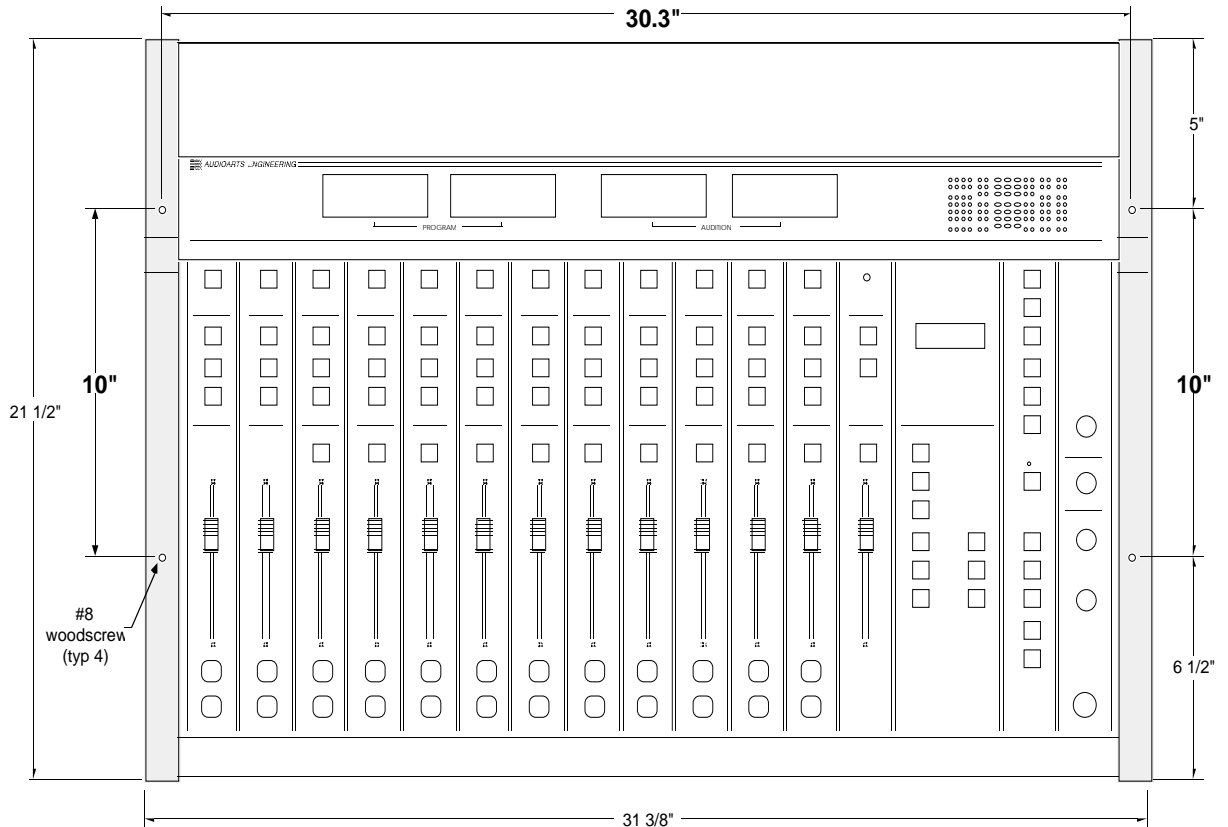
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First Steps/Basic Info



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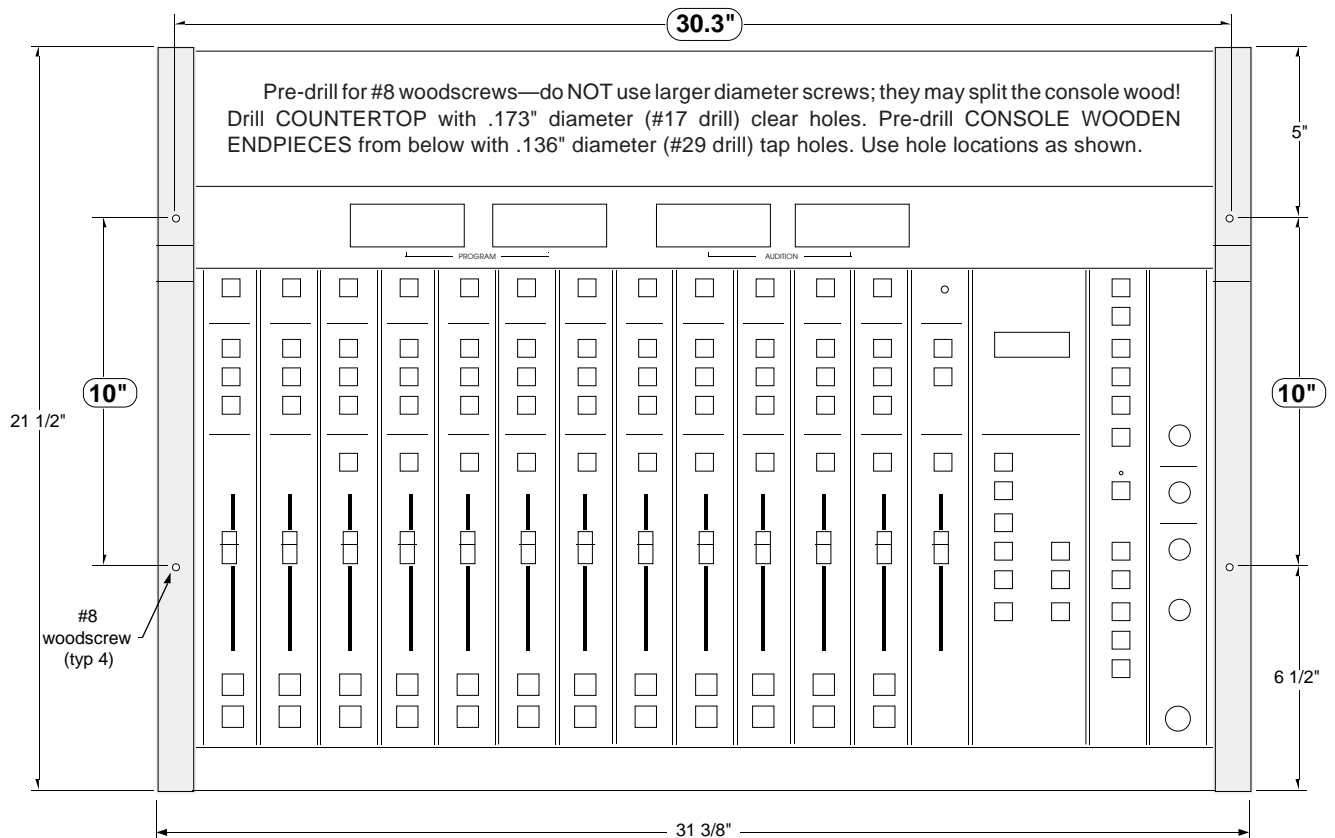
UNPACKING THE CONSOLE

The console is shipped as two packages. One (larger) carton contains the console and technical documentation; the other (smaller) contains the rackmount power supply, connecting cable, and connector kit.

MAINFRAME INSTALLATION

DO NOT CONNECT THE R-5 CONSOLE TO ITS POWER SUPPLY, AND DO NOT CONNECT THE POWER SUPPLY TO THE AC POWER LINE UNTIL INSTRUCTED TO DO SO.

It is not necessary to prepare the counter by making a cutout, since the R-5 is mounted above the counter top. If you will be securing the console to a counter top, you will need to drill mounting holes for four #8 woodscrews as shown in the drawing below.



Attach the console mainframe to the counter top by screwing up through the counter into the tap holes you have drilled into the bottom of the mainframe's left and right wooden end pieces (two per side).

The first step is to ground the console.

SYSTEM GROUND

While console power supply common, audio common, and the mainframe chassis are connected together at the R-5 mainframe, they are not connected to electrical ground and the chassis of the power supply. *Safety requirements dictate that a positive connection from the console mainframe to electrical ground be made in the completed installation; audio requirements also dictate this same connection—*use the two grounding lugs on the connector surface area of the mainframe (underneath the hinged meterbridge) to establish your system ground (see left AUD VU meter area on drawing on page 1-1).

The system ground serves two important purposes:

- (1) Provides a zero signal reference point for the entire audio system;
- (2) Assures safety from electrical shock.

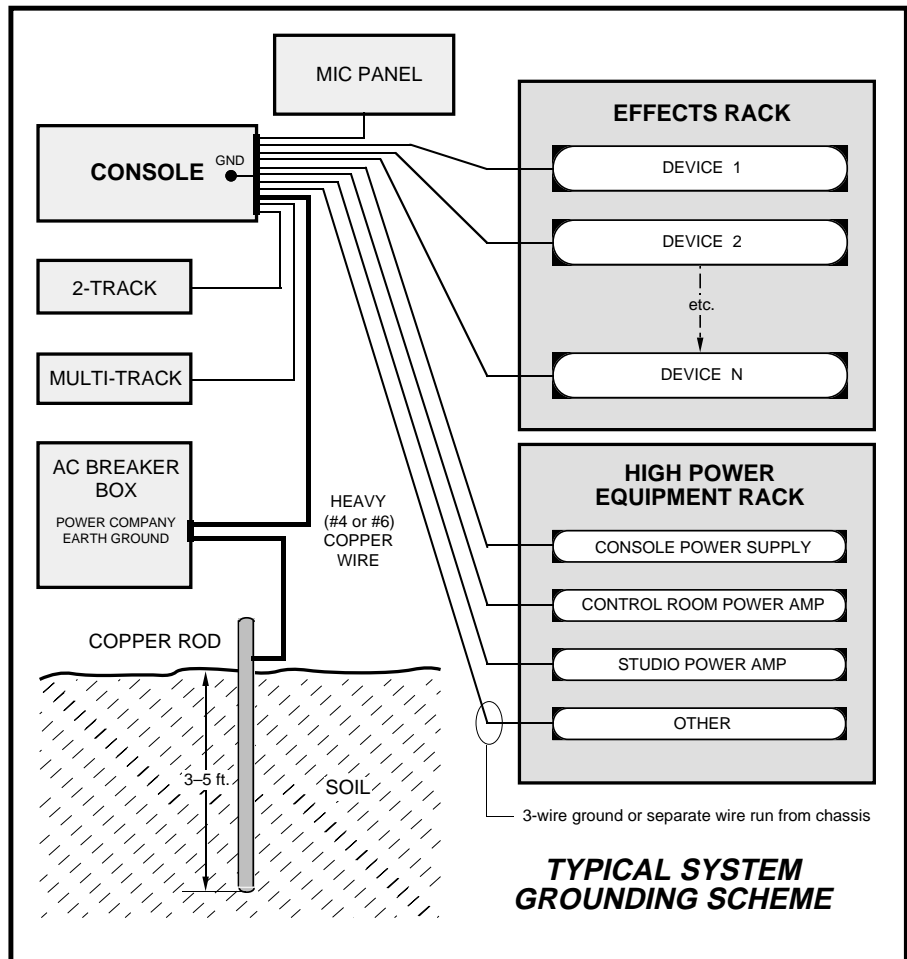
There exist two terms that one encounters in a discussion of ground:

- (A) EARTH GROUND, which is usually a heavy copper rod driven into the soil adjacent to the building (around 6 feet down) or a connection to the copper water pipes leading into the building. Either is acceptable (unless, of course, the water pipes are plastic).
- (B) THE POWER COMPANY EARTH CONDUCTOR that enters the building at the power line breaker box; this conductor should be (and is often by code) tied to the above-mentioned earth ground at one point. This point is the SYSTEM EARTH GROUND.

TIE THE CONSOLE GROUND LUG TERMINALS TO THE SYSTEM EARTH GROUND. TIE EVERY PIECE OF EQUIPMENT IN THE ENTIRE AUDIO SYSTEM TO THE CONSOLE'S GROUND LUG TERMINALS. If the system earth ground point is inaccessible, tie the console ground terminals to the power company earth conductor at the main breaker box (see drawing "Typical Grounding Scheme" on page 1-4).

Each piece of equipment should be connected by its own ground wire (usually the round third pin on the AC cord). This means that every AC outlet must have a separate conductor run to the console ground lug terminals; the outlets cannot be daisy-chained as is normally encountered in commercial and residential AC systems. Any equipment not supplied with 3-wire AC cables must have individual ground wires (16 gauge or larger) connected to their chassis grounds and then run to the console ground lug terminals.

Tie the console's ground lug terminals to the system earth ground. Tie every piece of equipment in the entire audio system to the console ground lug terminals.



Further Grounding Details

Check all equipment to be absolutely certain that each unit is power transformer isolated from the AC mains to prevent safety hazards.

It is assumed that in each piece of audio equipment the audio ground and the chassis are tied together at some point. *Any piece of equipment lacking a grounded chassis is likely to be prone to interference problems.*

Locate all unbalanced audio equipment in the same rack if possible, to minimize chassis ground potential differences. It may also be helpful to insulate each piece of unbalanced equipment from its mounting rails in the rack by means of nylon 10-32 screws and insulating washers between rails and faceplates.

As a rule of thumb, consumer units (low level, -10dBu, unbalanced) usually utilize RCA jacks and two conductor wiring connections; professional level equipment (+4dBu, balanced) generally uses three-conductor XLR connectors.

The next step is to install the rackmount power supply.

THE CONSOLE POWER SUPPLY

The R-5 console uses a separate rackmount power supply unit. The power supply should be mounted in an adjacent equipment rack within fifteen feet (but no closer than 3 feet) of the console. It should be mounted in a rack space (it requires two rack spaces or 3-1/2") where proper air circulation is possible. Avoid locating any high gain equipment (such as phono preamps, tape recorders, etc.) too near the power supply, to avoid magnetic interference into that equipment.

Once the supply is mounted, connect the linking power cable at the console end; the connector is a 6-pin plug that mates with a matching socket ("DC IN") mounted on the console connector area underneath the righthand end of the hinged meterbridge (see drawing page 1-10). Connect the other end of the cable to the rear of the rackmounted power supply.

The power feed recommended in the text is often installed and referred to in studios as an "isolated AC ground" outlet. It is usually orange in color.

The power supply is fitted with a 3-wire grounded AC cord that should be plugged into a "clean" AC power source. That is, an AC source that feeds only the control room audio gear. This source should be a separate feed from those powering lighting, air-conditioning, or any other non-audio machinery. The third pin ground wire of the AC source should be tied to the system earth ground point (see "System Ground" section). *Note that while the AC power cord ground wire terminates at the power supply chassis, it does NOT connect to the R-5 console common; the console itself must be grounded separately. (See previous section: "System Ground".)*

ENERGIZING THE CONSOLE

Assuming the console mainframe is properly installed and grounded, and its power supply correctly rackmounted and connected to the console, you may now energize the rackmount power supply by plugging it into the AC mains.

The four LEDs on the power supply front panel should light up to indicate the presence of their respective voltages. The console's VU meters and timer display will illuminate. All other switches should alternate on and off when pressed in succession. (Note CUE switches will de-activate when an associated line input red channel ON switch is pressed. Amber channel OFF switches should deactivate ON switches when pressed.

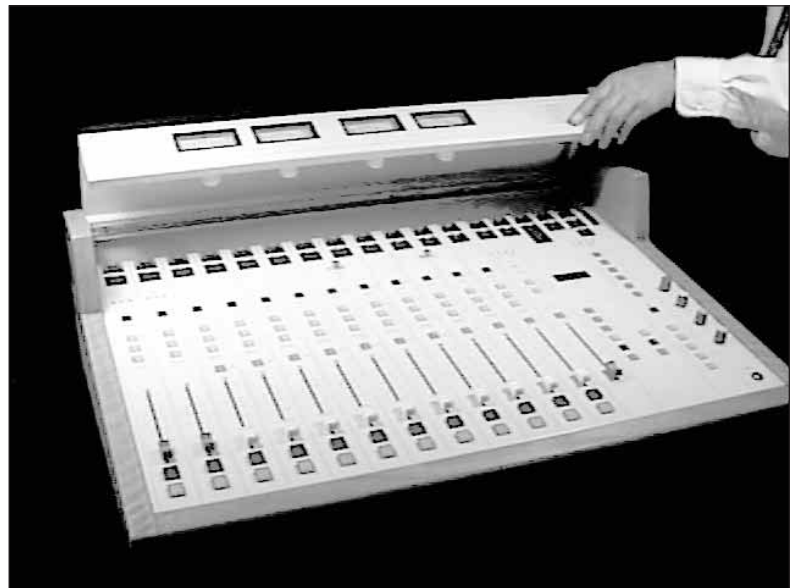
Once you have verified proper power-up, unplug the rackmount power supply to de-energize the console.

You are now ready to proceed with audio and control wiring. First, however, you should familiarize yourself with the R-5 wiring system and supplied tools (next section).

WIRING OVERVIEW

All audio/control connections and end-user programming of R-5 console functions take place at 12-pin AMP-type connectors located along the top of the console, directly underneath the hinged meterbridge (see top of drawing on page 1-1). Each connector consists of a printed-circuit board ("PCB") mounted female socket and a supplied mating male plug.

All R-5 console wiring takes place at the top of the console, underneath the hinged meterbridge.



Close-up of a wired-up 12-pin I/O connector plug being inserted into its PCB-mounted socket.



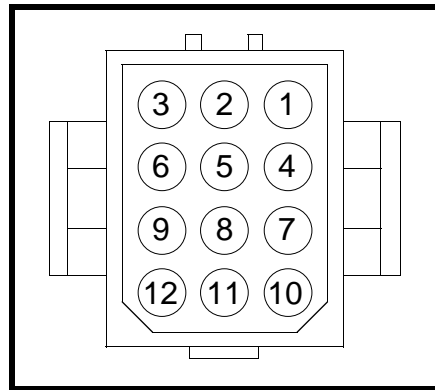
The supplied crimp tool (with extractor pin) is used to wire up all I/O connector plugs.

A connector kit is included with each console, and consists of mating plugs, a crimp tool (Paladin model PA1645), an appropriate number of crimp type wiring pins (.062" pin diameter; to be used with 22 gauge wire) and a pin extractor tool (used to remove crimp pins that have been accidentally inserted in the wrong connector block hole, or if rewiring or wiring repair is needed).

Individual Channel I/O Connectors

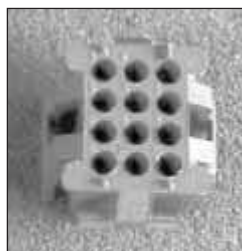
Console input channels each have two 12-pin connectors: **UPPER** (for **LOGIC** and control) and **LOWER** (for **AUDIO**). Note that audio signal connections follow a logical pattern: They are grouped in 4 sets of 3 pins each (1-3, 4-6, 7-9, and 10-12). The first pin of each group (1, 4, 7, and 10) is audio common (ground) for connection of shields. The next pin (2, 5, 8, and 11) is the low side for balanced signals, or ground for unbalanced signals. The third pin (3, 6, 9, and 12) is the high side for balanced signals, or the signal connection for unbalanced ones.

The audio signal pattern described in the text applies to input channel **AUDIO** (lower) connectors. Logic, output, monitor and accessory connectors have their own pinouts. See appropriate manual chapters for detailed information. In all cases, however, the pin numbering pattern (1-12) is identical.

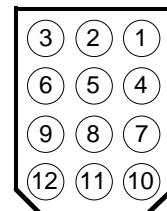


R-5 console typical 12-pin connector socket.

The pin orientation shown below is identical to what you would see when looking at the **BACK** of a mating 12-pin plug while performing wiring:



I/O connector plug (rear view). The beveled corners in the key diagram to the right correspond to the plug's mating PCB-mounted socket (shown above).



Instructions for the use of the supplied crimp tool and extractor pin are printed on each tool's packaging. Duplicate copies of this information are also reproduced in the Appendix of this manual (see pages A-5 thru A-6).

BALANCED vs UNBALANCED CONNECTIONS

By now everyone knows (or should know) that balanced inputs and outputs are highly desirable—they have an intrinsic ability to reject hum, noise, crosstalk, and RF, even if the shielding and grounding leave something to be desired. The R-5 console has electronically balanced inputs and outputs, and leaves the factory ready to accept professional level, +4dBu balanced source signals.

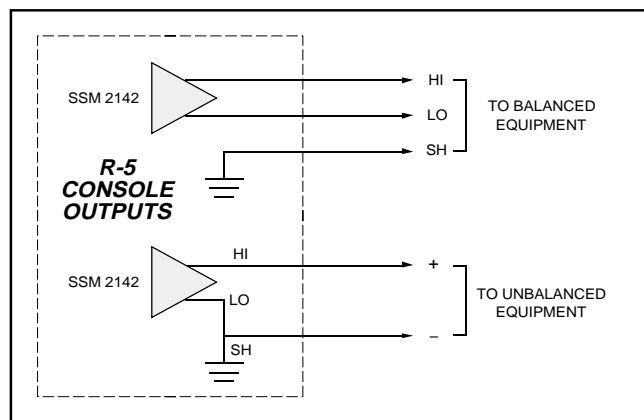
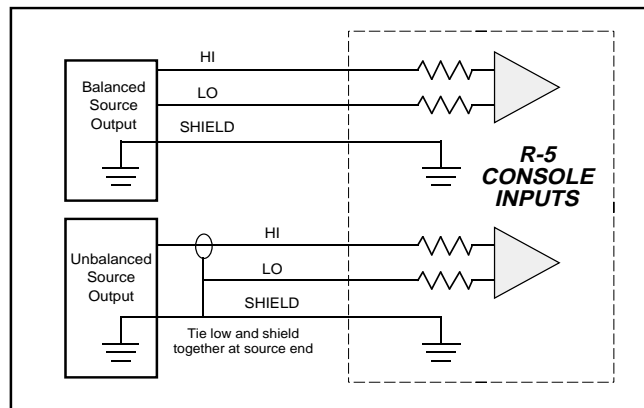
Not all equipment used in stations is balanced, however, and the most cost-effective devices often don't have +4 dBu output levels, either. Because of these realities, the R-5 console is designed to accept balanced or unbalanced sources with levels as low as -10dBu. If you will be using this type of equipment, be aware that line input gain for affected channels should be reprogrammed for low level -10dBu signals (see bottom of page 3-4 and top of page 3-5).

Connecting unbalanced inputs is simple—wire to the console with typical shielded two conductor cable (like Belden 9451), just as if you were connecting a balanced source. At the unbalanced machine's output, connect the black wire (LOW) to the shield. This "pseudo-balanced" connection has proven to be the simplest and most trouble-free way to go. Another plus is that the wiring need not be changed out if a balanced output machine is subsequently installed in that position.

If you will be connecting console OUTPUTS to an unbalanced system, be sure to connect the LOW side and SHIELD together at the console, and connect the unbalanced system to the HIGH side output and LOW/SHIELD connections.

The diagrams below summarize these connections:

As a rule of thumb, consumer units (low level, -10dBu, unbalanced) usually utilize RCA jacks and two conductor wiring connections; professional level equipment (+4dBu, balanced) generally uses three-conductor XLR connectors.



WIRING UP THE CONSOLE

With the console mainframe installed and properly grounded, and the rackmount power supply installed, connected, and console power-up verified, you are now ready to proceed with audio and control wiring.

Note the main portion of this manual is organized by channel type (inputs, outputs, monitors and accessories). Each chapter has a special section devoted to wiring hook-ups; use the information in these sections (typically called "Audio Connections" and "Logic and Control Wiring") to proceed.

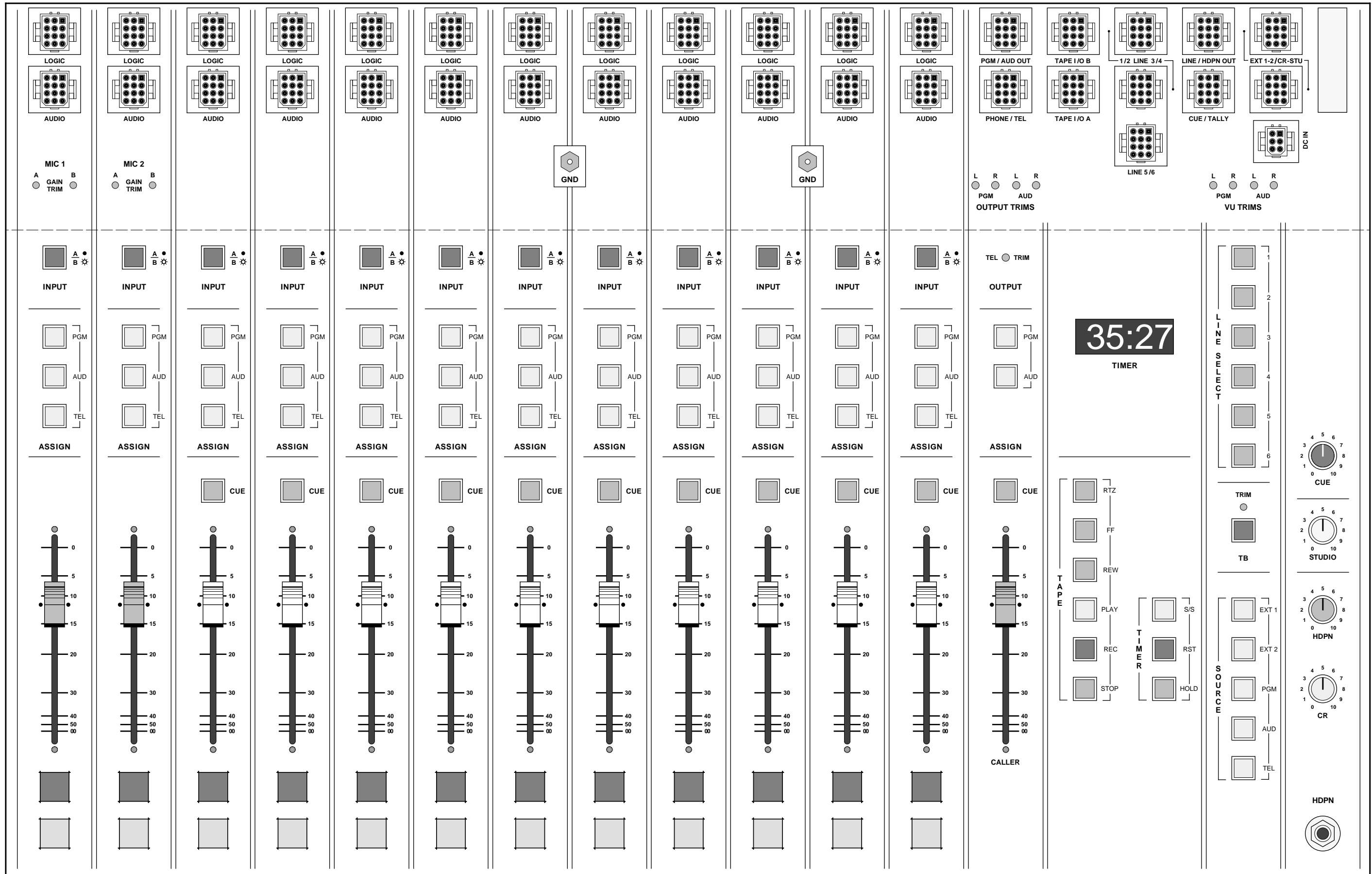
Specific Wiring Instructions:	Page
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Stereo Line Inputs	3-4
Telephone Input	4-4
Outputs	5-4
Monitors	6-5
Accessories	7-4

SET-UP AND TEST

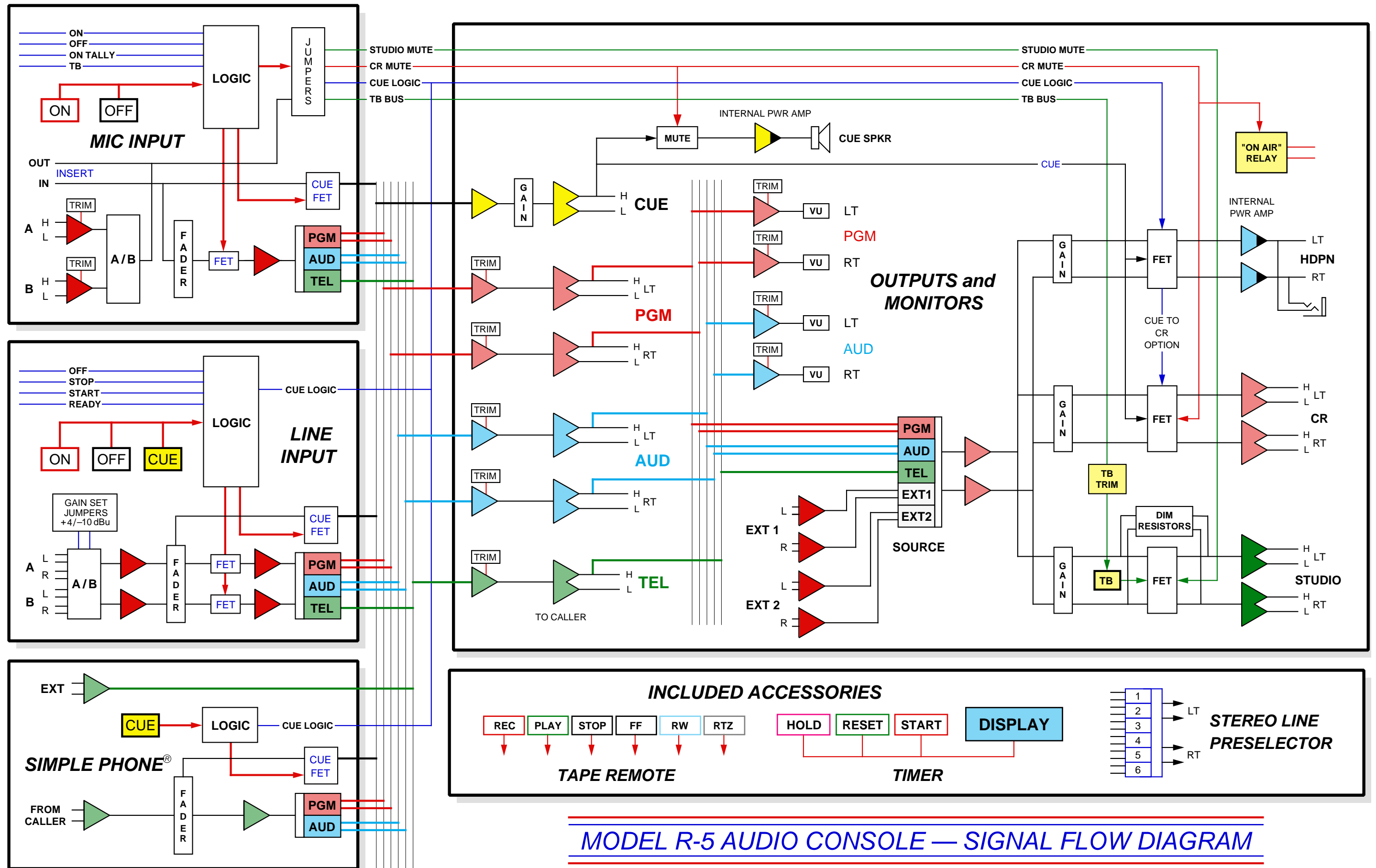
Once all wiring is complete, as called out in the instructions listed above, proceed to Chapter 8 ("Set-up and Test") which will walk you through a check-out procedure for your R-5 console.

TECHNICAL DOCUMENTATION

Technical documentation and drawings (schematics, printed circuit board pictorials and load sheets, parts lists) are contained in Chapter 9.



R-5 Console Controls and I/O Connectors



MODEL R-5 AUDIO CONSOLE — SIGNAL FLOW DIAGRAM

PERFORMANCE SPECIFICATIONS

(Unless otherwise noted, test conditions are +4dBu output; +4dBu line input, -50dBu mic input)

FREQUENCY RESPONSE

Line (20Hz-20KHz) $\pm 1/4$ dB
Mic (20Hz-20KHz) $\pm 1/4$ dB

DYNAMIC RANGE

Line 110dB
Mic 98dB

S/N RATIO (ref +8dBu)

Line 90dB
Mic 78dB

HEADROOM

ref +4dBu 24dB

OFF ISOLATION

1 KHz -95dB
20 KHz -70dB

ASSIGN ISOLATION

1 KHz -100dB
20 KHz -75dB

THD + N (20Hz-20KHz)

Line, +4dBu .007%
Line, +16dBu .007%
Mic, +16dBu .010%

CMMR (mic @60Hz) -65dB

IMD (SMPTE)

Line, +16dBu .006%
Mic, +16dBu .007%

DIM

Line, +24dBu .003%
Mic, +24dBu .004%

MAXIMUM INPUT

Line +28dBu
Mic -12dBu

MAXIMUM OUTPUT

+28dBu

MAXIMUM INPUT GAIN

Line 26dB
Mic 85dB

GAIN TRIM

Line settings 0dB,+14dB
Mic range 32dB
(-50dBu in; -12dB to +20dB)

BUS CROSSTALK

1 KHz -95dB
20 KHz -70dB

SLEW RATE 15V/ μ s

PHASE RESPONSE

input to output $< 25^\circ$

PHASE DIFFERENCE

left to right $< 1^\circ$

OVERALL DIMENSIONS

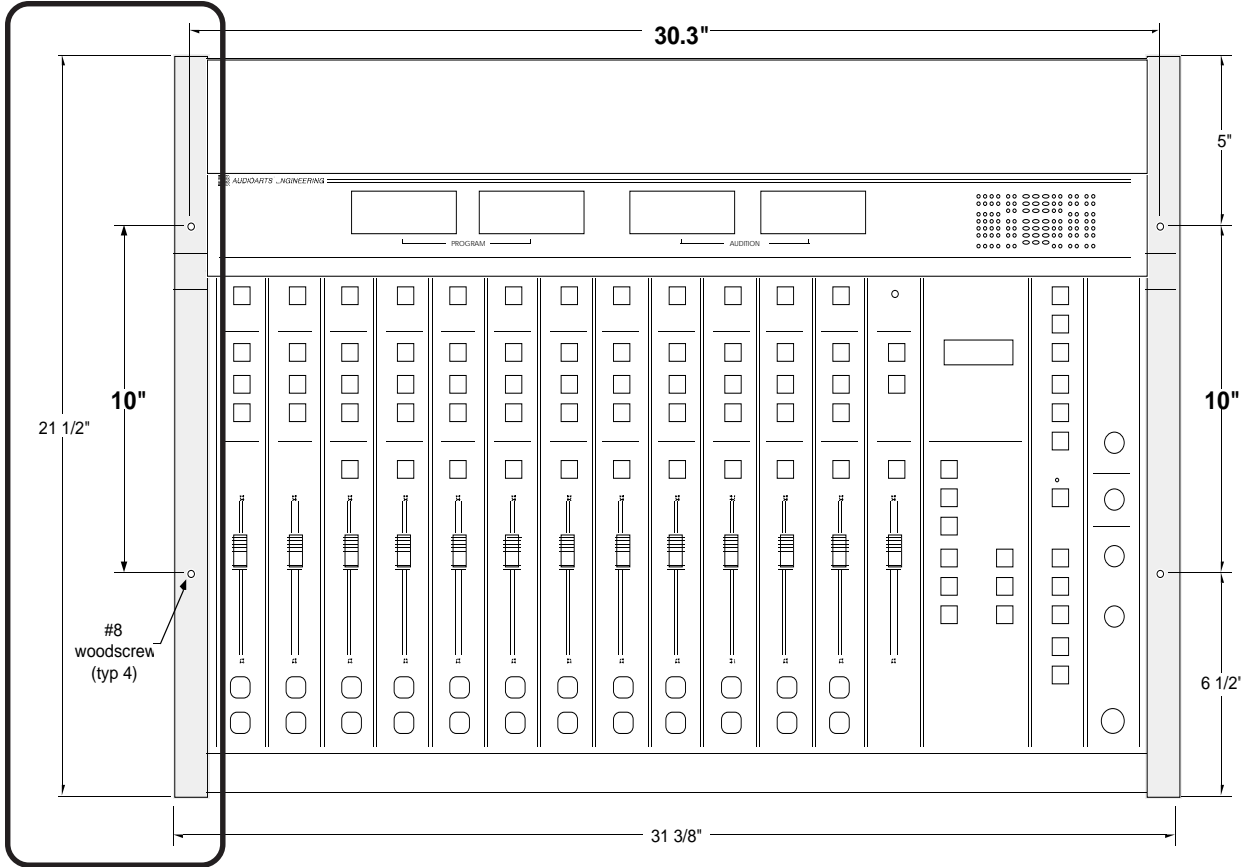
front-to-back 21-1/2"
width 31-3/8"
meterbridge height 8"

POWER CONSUMPTION

100 watts (120VAC)

Specifications subject to change without notice.

Mono Mic Inputs



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- Overview** 2-2
- Signal Flow Diagram**..... 2-2
- Controls and Features**..... 2-3
- Mono Mic Input Channel Wiring**..... 2-4
- Audio Connections**..... 2-4
- Logic and Control Wiring**..... 2-5
- Drawing - Typical Remote Logic/Control Hook-ups** 2-6
- Technical Documentation**..... 2-7

OVERVIEW

Each R-5 audio console is supplied with two mono microphone input channels; each channel can accept two microphone input signals which are accessed by an A/B input selector switch at the top of the channel. There are individual microphone gain trims provided for each A and B input, allowing you to match differing signal levels.

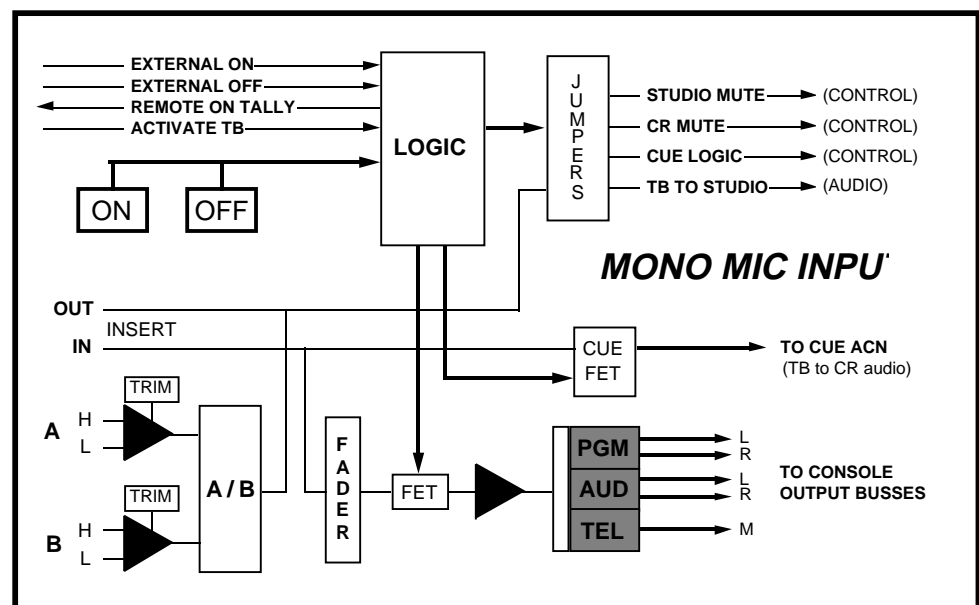
Typically the two microphone channels will be used for the operator's control room mic and a second microphone in another studio; for this reason the channels may be programmed to automatically mute control room or studio monitor speakers (factory preset to dim instead of mute - see page A-10) when they are turned on, to prevent microphone feedback. Mic inputs may also be turned ON and OFF from a remote location, allowing talent in remote studios to control their microphones directly. It is also possible to activate TALKBACK-to-CR from another studio.

As you can see by the signal flow diagram below, a pre-fader, pre-on/off insert point is provided for mic inputs, allowing you to use outboard signal processing (equalization, reverberation, compression/limiting, etc.) for individual channels. Note this patch point is bridged at the factory with an internal 10Ω resistor; if you will be using an outboard processing loop, the jumper resistor must be removed. See page A-7.

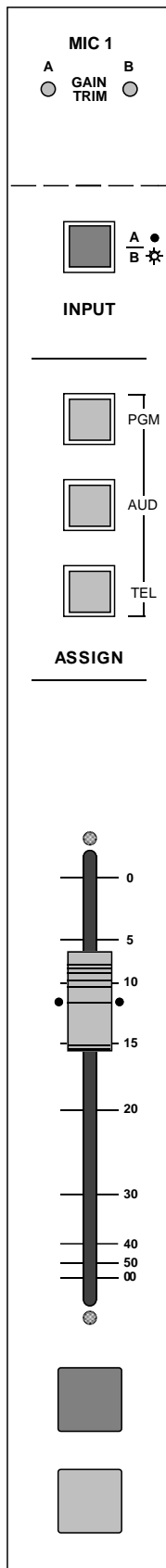
Once they have passed through the channel's fader, microphone input signals are assigned to the console's output busses: PROGRAM (stereo), AUDITION (stereo) and/or TELEPHONE (mono).



If you plan to use an outboard patch loop, the console's internal jumper resistor must be removed. See page A-7.



Mono Mic Input Signal Flow Diagram



CONTROLS and FEATURES

GAIN TRIM - Concealed front panel gain trim potentiometers (located just above the A/B selector switch, beneath the hinged meterbridge) provide a 32dB control range, assuring compatibility with various input levels. There are separate trimpots for A and B sources.

A/B SOURCE - This switch (LED illuminated) selects between the two electronically balanced microphone level inputs. The "B" source is selected when the switch is lit.

INSERT POINT (internal) - Mono mic inputs have a patch point available at the channel's audio connector to allow insertion of outboard processing. The insert point is unbalanced, pre-fader, pre-on/off.

ASSIGN - These three switches (LED illuminated) determine where the input signal will be sent; they route the channel signal to the console's stereo Program (PGM), stereo Audition (AUD) and/or mono Telephone (TEL) busses.

FADER - Long-throw carbon; plug-in for easy service.

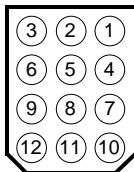
ON/OFF SWITCHES - Turn the channel ON and OFF. Brightly illuminated. If desired, they may be remotely controlled and programmed for different automatic functions:

EXTERNAL CONTROL - Microphone channels may be turned ON and OFF from a remote location; A TALKBACK-to-CR function can also be remotely activated. The channel's ON switch can control a remote LED tally indicator (see ON TALLY, bottom of page 2-5). These functions are intended for a user-provided talent/guest control panel in a separate studio. Three momentary contact switches are required (see drawing on page 2-6).

PROGRAMMABLE FUNCTIONS - These include control room MUTE, studio MUTE/DIM, and TALKBACK-to-STUDIO. These are programmed via jumpers at the channel's logic connector (see page 2-5). Note the CR MUTE signal can also activate the console's ON-AIR TALLY RELAY (see MONITORS chapter, CUE/TALLY connector pinout, page 6-6).

MONO MIC INPUT CHANNEL WIRING

This section calls out specific pin-by-pin wiring instructions for microphone input channels, both audio and logic (control) connectors. If you need more general information concerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

Mono Mic Input (Audio Connections)

Mono mic input channel audio connections are made at the channel's LOWER 12-pin AUDIO connector. These consist of electronically balanced inputs for two microphones (A and B, pins 1 thru 6) and an unbalanced mono patch insert point (pins 7 thru 12).

- Pin 1 - MIC A INPUT, shield
- Pin 2 - MIC A INPUT, low
- Pin 3 - MIC A INPUT, high
- Pin 4 - MIC B INPUT, shield
- Pin 5 - MIC B INPUT, low
- Pin 6 - MIC B INPUT, high

Always be careful to double check pin numbering on the connector block and the wiring diagram before inserting the pin in the block!

The R-5 console will accept balanced, low impedance (150Ω nom.) microphone signals up to -12dBu levels. Individual gain trims for A and B sources (each with a 32dB range) allow you to match various incoming signal levels (with a typical -50dBu mic source signal, the resulting input gain trim range will be -12dB to +20dB). Maximum deliverable mic gain is 85dB. Phantom power (+18V) is built-in. (While this is rarely necessary, phantom power can be disabled if required—see Appendix, page A-4).

Mic channel insert points are unbalanced (nominal level -2.5dBu, nominal insert out impedance 100Ω; insert in 10KΩ) and are intended for outboard signal processing (equalization, reverb, digital processing, etc.). If you will be using unbalanced equipment at these ports, be sure to tie LOW and SHIELD together at the source end of each patch.

- Pin 7 - INSERT OUT, shield
- Pin 8 - INSERT OUT, low
- Pin 9 - INSERT OUT, high
- Pin 10 - INSERT IN, shield
- Pin 11 - INSERT IN, low
- Pin 12 - INSERT IN, high

Insert points are jumpered at the factory; if you plan to use them, they must be activated by removing a 10Ω resistor from the console's MB-5 Motherboard PCB. See APPENDIX, page A-7.

If you do plan to use an insert patch point as an outboard processing loop, you must remove the console's built-in jumper resistor on the MB-5 Motherboard PCB (see APPENDIX, page A-7); otherwise signal will not pass through your external equipment. If you will be using an INSERT OUT port as a DIRECT OUT feed to another input, without bringing the signal back into the channel's INSERT IN port, the built-in jumper resistor should remain in place to preserve the signal path through the input channel.



For more information on using balanced and unbalanced equipment combinations with the R-5 console, see page 1-8.

Mono Mic Input (Logic and Control Wiring)

See next page for a diagram showing typical mic input channel logic connections.

Mono mic input channel control connections are made at the channel's UPPER12-pin LOGIC connector. Available control functions are as follows:

Pin 1 - TB TO STUDIO (jumper to pin 2 to activate)

Pin 2 - TB TO STUDIO

Typically one of the console's mic channels will be devoted to the control room (console operator's) mic and the other to an additional studio. If the mic channel you are wiring is for the control room mic, you would logically want it to be able to talk back to the additional studio. By jumpering pins 1 and 2 together, a pre-fader, pre-on/off microphone signal for this input channel will appear at the console's studio monitor output when the console's TALKBACK button is pressed. (See TB, page 6-4).

Pin 3 - CR MUTE (jumper to pin 4 to activate)

Pin 4 - CR MUTE

If the microphone input channel you are wiring is for the control room mic, you will probably want the console's control room monitor output to mute whenever that mic is on-the-air to prevent announcer feedback. This can be accomplished by jumpering Pins 3 and 4 together; whenever the channel's ON button is pressed, control room speakers will mute.

Pin 5 - STUDIO MUTE (jumper to pin 6 to activate)

Pin 6 - STUDIO MUTE

If the channel you are wiring is devoted to a studio mic, you can make the console's studio monitor output mute whenever the channel is ON by jumpering Pins 5 and 6 together.

Pin 7 - TB TO CR (control line; jumper to pin 10 to activate)

Again, if you are wiring a channel for a studio microphone you will want that channel to be able to talk back to the control room (CR). By providing a contact closure between Pins 7 and 10 (via a user-supplied momentary "TB" switch located in the studio) the channel's pre-fader, pre-on/off signal will appear on the console's CUE bus (and hence at the built-in cue speaker) allowing the operator to hear it off-air. Note this same talkback signal will also automatically interrupt the operator's headphone feed.

Pin 8 - REMOTE ON (momentary contact to pin 10 latches channel ON)

Used to turn a mic channel ON from another location (user-supplied momentary contact switch required).

Pin 9 - REMOTE OFF (momentary contact to pin 10 latches channel OFF)

Used to turn a mic channel OFF from another location (user-supplied momentary contact switch required).

Pin 10 - ON/OFF/TB COMMON

Used in conjunction with Pins 7, 8 and 9 for external control of channel.

Pin 11 - TALLY COMMON (return from remote tally indicator)

Pin 12 - ON TALLY (lights remote tally indicator)

In addition to its own built-in switch "lamp" (in reality a solid state LED indicator) the channel's ON switch can also run a second tally indicator (maximum draw 25 milliamps) typically located in a user-supplied studio talent control panel ON switch. This second indicator lets studio talent know when their microphone is live.

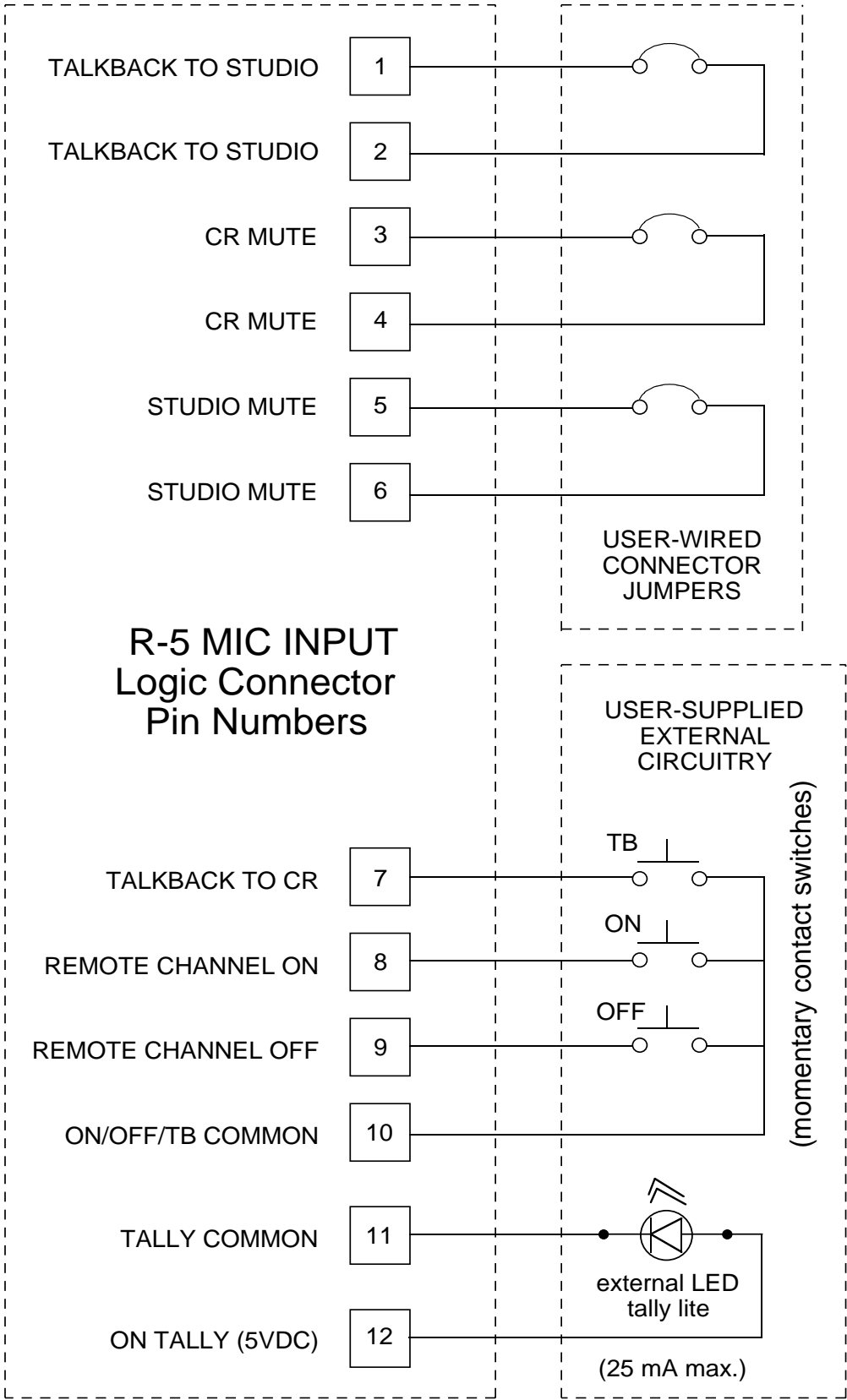


Note only ONE microphone channel may be programmed for TB to STUDIO!

If you have not done the modification described on page A-10, the studio level will DIM by 15dB instead of muting completely.

If desired, the console's CUE bus (and hence any TB-to-CR signals) can also be programmed to interrupt the control room speakers. See CUE-TO-CR, page 6-6.

The mic input ON TALLY may also be used to drive an external logic circuit. If the external circuit will include additional lamps or relays, these must be powered from a separate supply. See APPENDIX, page A-2, for a recommended circuit.



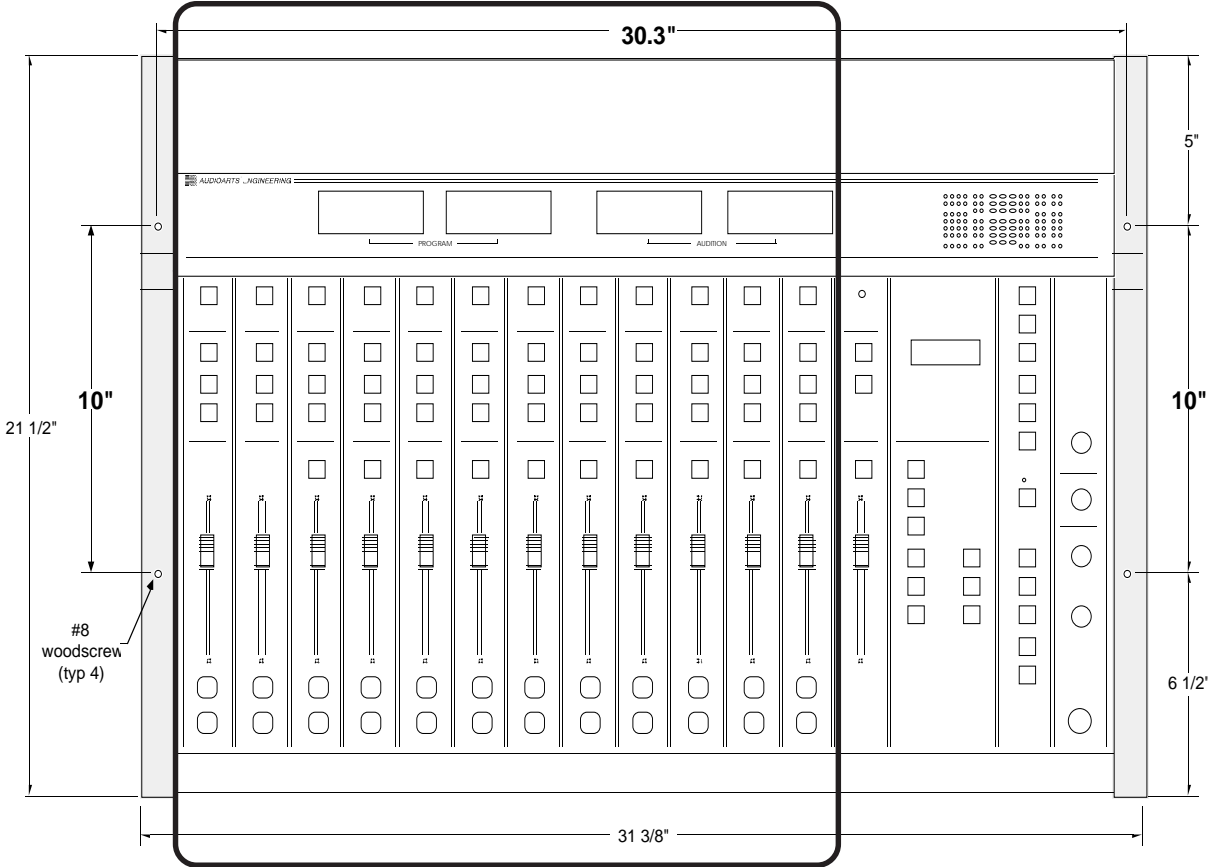
R-5 Mic Input Typical Remote Logic/Control Hook-ups

TECHNICAL DOCUMENTATION

Schematics for mono mic input channel circuitry may be found on pages 9-2 and 9-3. The MB-5 printed circuit board drawing on page 9-12 (sections "a" and "b") shows circuitry components; a parts list is on pages 9-13 and 9-14.

Mono mic input channel ON/OFF switches are mounted on a separate SW-R5 switchcard PCB (two channels to a card). A pictorial of the card is on page 9-25; a parts list is on page 9-26.

Stereo Line Inputs



Chapter Contents:

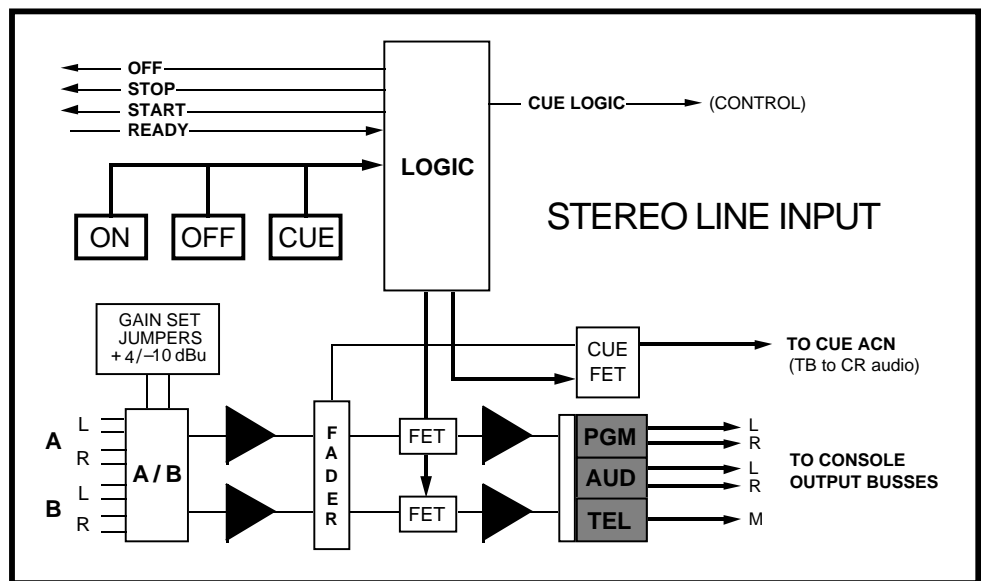
- Overview** 3-2
- Signal Flow Diagram**..... 3-2
- Controls and Features** 3-3
- Stereo Line Input Channel Wiring** 3-4
- Audio Connections** 3-4
- Logic and Control Wiring** 3-5
- Drawing - Typical Remote Control Hook-ups** 3-6
- Technical Documents** 3-7

OVERVIEW

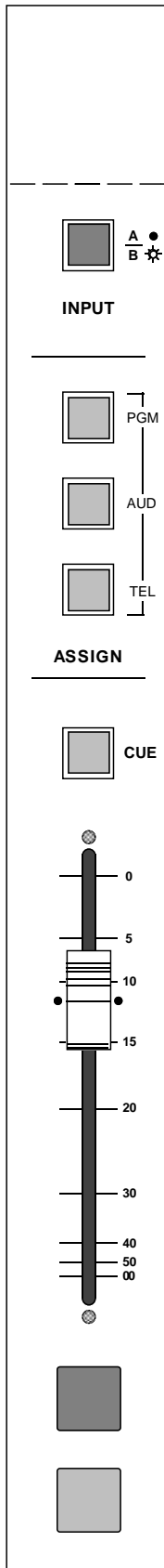
Each R-5 audio console is supplied with ten stereo line inputs; each input can accept two stereo line signals which are accessed by an A/B input selector switch at the top of the channel. Note there are two possible gain settings provided for each A and B input: +4dBu (professional level balanced inputs—the factory default) or an alternate -10dBu setting for low level "consumer-type" equipment (the -10dBu setting is activated by wiring jumpers in each channel's upper LOGIC connector; see top of page 3-5).

Each channel has its own CUE switch, allowing material to be previewed prior to airplay; the CUE function is automatically deactivated when the channel ON switch is pressed. At this point the channel signal is routed (at the level set by the linear fader) to whichever console output busses have been selected via the three ASSIGN switches (PGM, AUD and/or TEL)

Stereo line inputs also have built-in control circuitry that enables the console operator to START and STOP external source machines by pressing channel ON and OFF switches. Additionally, the channel's OFF switch indicator LED can be controlled by a remote source machine, allowing it to function as a flashing READY lite to show the operator when a machine is cued up and ready to begin play. Finally, stereo line input channels may be automatically turned off by the remote source machine (typically when it has reached end-of-play). Detailed wiring information for these control functions may be found on pages 3-5 and 3-6.



Stereo Line Input Signal Flow Diagram



CONTROLS and FEATURES

GAIN SET - The stereo line inputs have two possible input gain settings: +4dBu (for balanced, professional level equipment, usually equipped with XLR output jacks), and -10dBu (for low level consumer-type equipment, usually equipped with RCA plugs). The factory default setting is for +4dBu levels; if you will be using low level equipment, it will be necessary to re-program input gain at the channel's LOGIC (upper) I/O connector. See top of page 3-5 for details.

A/B SOURCE - This switch (LED illuminated) selects between the two electronically balanced stereo line level inputs. The "B" source is selected when the switch is lit.

CUE - When pressed, this switch (LED illuminated), routes the channel signal to the console's CUE bus, where it may be heard by the operator on the meterbridge mounted internal cue speaker. CUE also automatically interrupts the operator's headphones, and can be programmed to interrupt the console's control room output as well, allowing it to be heard on the CR monitor speakers.

ASSIGN - These switches (LED illuminated) determine where the input signal will be sent; they route the channel signal to the console's stereo Program (PGM), stereo Audition (AUD) and/or mono Telephone (TEL) busses.

FADER - Stereo, long-throw carbon; plug-in for easy service.

ON/OFF SWITCHES - Turn the channel signal ON and OFF. Brightly illuminated. If desired, they can perform several remote functions:

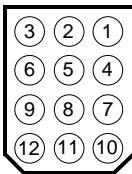
EXTERNAL CONTROL - Channel ON and OFF switches can START and STOP an external source machine. The external machine can also automatically shut OFF the channel when it reaches end-of-play, and can flash the channel OFF switch indicator LED when it is READY and cued up for play. All control ports are opto-isolated. Exact wiring details are called out on pages 3-5 and 3-6.

STEREO LINE INPUT CHANNEL WIRING

This section calls out specific pin-by-pin wiring instructions for stereo line input channels, both audio and logic (control) connectors. If you need more general information concerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.

Stereo Line Input (Audio Connections)

Line input channel audio connections are made at the channel's LOWER 12-pin AUDIO connector. These consist of electronically balanced inputs for two stereo line signals (A and B) .



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

For more information on using balanced and unbalanced equipment combinations with the R-5 console, see page 1-8.

- Pin 1 - LEFT LINE A IN, shield**
- Pin 2 - LEFT LINE A IN, low**
- Pin 3 - LEFT LINE A IN, high**
- Pin 4 - RIGHT LINE A IN, shield**
- Pin 5 - RIGHT LINE A IN, low**
- Pin 6 - RIGHT LINE A IN, high**
- Pin 7 - LEFT LINE B IN, shield**
- Pin 8 - LEFT LINE B IN, low**
- Pin 9 - LEFT LINE B IN, high**
- Pin 10 - RIGHT LINE B IN, shield**
- Pin 11 - RIGHT LINE B IN, low**
- Pin 12 - RIGHT LINE B IN, high**

Always be careful to double check pin numbering on the connector block and the wiring diagram before inserting the pin in the block!

The R-5 console normally accepts professional balanced (+4dBu level) line level signals (maximum input +28dBu). However, the inputs may be reprogrammed for -10dBu source levels if desired (see LOGIC connector, next section). Generally speaking, -10dBu consumer-type equipment will usually be found with RCA type output jacks; professional +4dBu level equipment is more likely to use XLR jacks. Note the above ports connect to high impedance, electronically balanced bridging-type input circuitry. If you will be connecting unbalanced equipment to these input ports, be sure to tie LOW and SHIELD together at the source end.

Stereo Line Input (Logic and Control Wiring)

Line input channel remote control connections (and optional -10dBu gain settings) are made at the each channel's UPPER 12-pin LOGIC connector. Pins are as follows:

- Pin 1 - LEFT -10dBu GAIN SET (jumper to pin 2 to activate)**
- Pin 2 - [audio common]**
- Pin 3 - RIGHT -10dBu GAIN SET (jumper to pin 4 to activate)**
- Pin 4 - [audio common]**

R-5 stereo line inputs normally accept professional +4dBu balanced levels. However, they can be re-programmed for low level (-10dBu) consumer-type source machines (usually unbalanced sources). If you will be using this type of equipment, install the jumpers listed above. Also, when wiring audio to the console from these machines, be sure to tie LOW and SHIELD together at the source end of the connection. (See upper drawing on page 1-8.)

The remaining functions listed below (pins 5 through 12) will interface with one playback machine (presumably the one connected to the channel's "A" input). All control ports are opto-isolated.

- Pin 5 - EXT START (w/pin 6 will start a remote playback machine)**
- Pin 6 - external START common**
- Pin 7 - EXT STOP (w/pin 8 will stop a remote playback machine)**
- Pin 8 - external STOP common**

These pins are used to START and STOP a remote playback machine whenever the channel's ON and OFF buttons are pressed. They should be wired to the source machine's START and STOP connector pins. For machine connector details see the owner's manual for the particular unit you are using.

- Pin 9 - REMOTE OFF**
- Pin 10 - remote OFF common**

A momentary closure between pins 9 and 10 (usually provided by professional playback machines at end-of-play) will turn the line input channel OFF. For machine connector details see the owner's manual for the particular unit you are using.

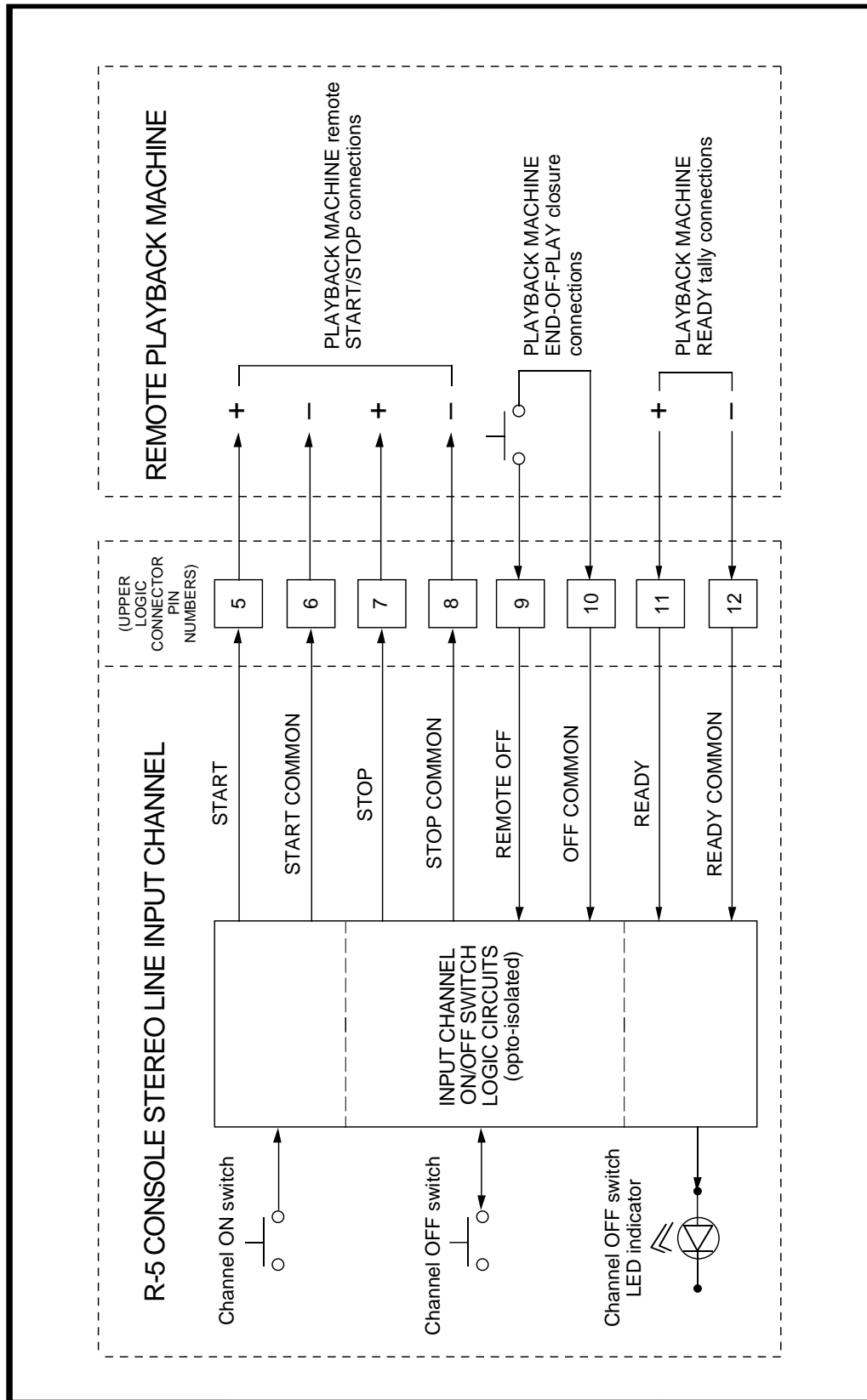
- Pin 11 - READY**
- Pin 12 - READY common**

These pins, when hooked to a source machine's READY TALLY port, allow the channel OFF switch indicator LED to be flashed by the source machine, letting it function as a READY indicator to tell the console operator when that machine is cued up and ready to play. Functionally, the source machine puts out momentary negative pulses to ground which cause the R-5 logic circuits to interrupt current to the OFF switch LED, making it flash instead of shine steadily. For machine connector details see the owner's manual for the particular unit you are using.

As a rule of thumb, consumer units (low level, -10dBu) usually utilize RCA jacks and two conductor wiring connections; professional level (+4dBu) equipment generally uses three-conductor XLR connections.

See drawing on next page for a summary diagram of external source machine control wiring.

For a wiring diagram showing a typical control hook-up to an external source machine (in this case Denon 951 CD player) see Appendix, page A-8.



Typical R-5 Stereo Line Input Remote Control Hook-ups

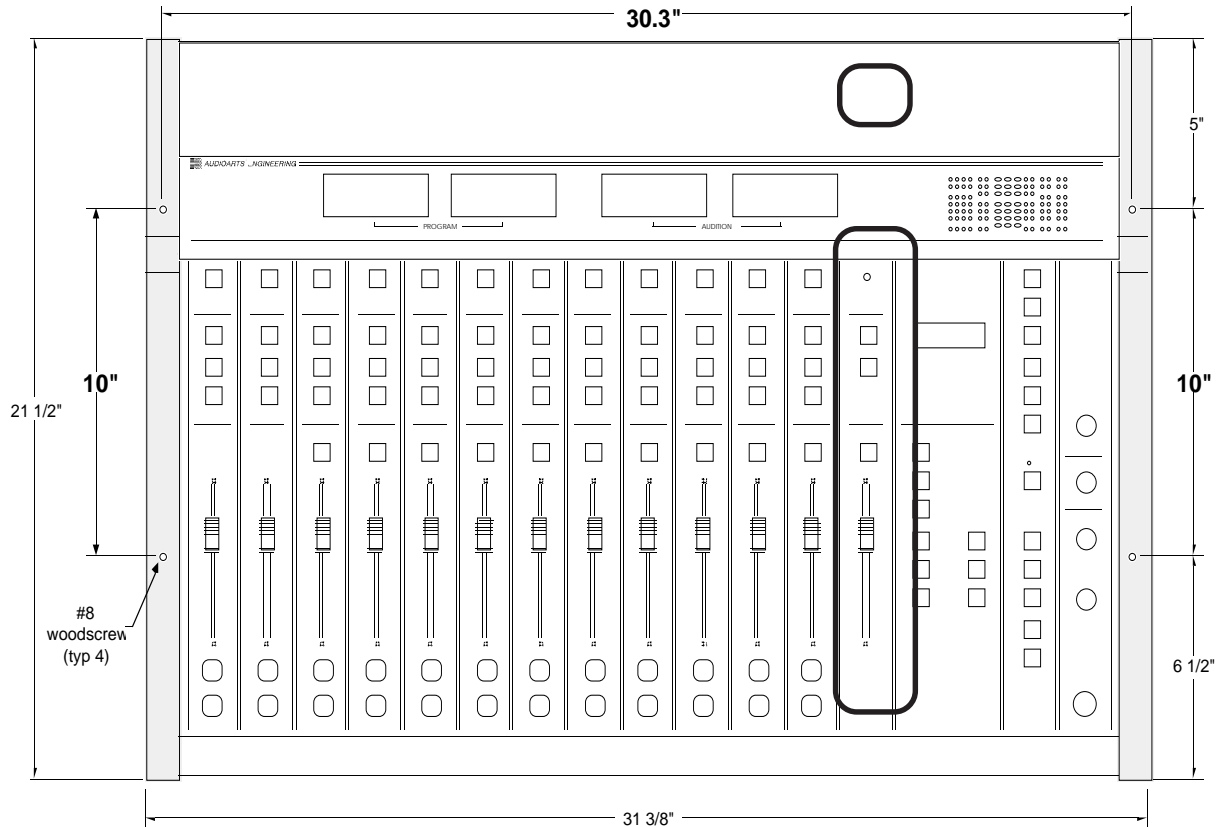
TECHNICAL DOCUMENTS

Stereo line input channel circuitry resides on two printed circuit boards: the console's main MB-5 Motherboard (sections "c" thru "j" correspond to line inputs 1 thru 8) and the console's OM-5 output board (sections "k" and "l" correspond to line inputs 9 and 10). Pertinent MB-5 schematic sheets are found on pages 9-4 thru 9-11; OM-5 schematics are on pages 9-15 and 9-16.

The MB-5 printed circuit board drawing on page 9-12 and the OM-5 drawing on page 9-21 show circuit components. Parts lists are on pages 9-13 and 9-14 for the MB-5, and pages 9-22 thru 9-24 for the OM-5.

Stereo line input channel ON/OFF switches are mounted on separate SW-R5 switchcard PCBs (two channels to a card). A pictorial of the card is on page 9-25; a parts list is on page 9-26.

Telephone Input



Chapter Contents:

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Signal Flow Diagram	4-2
Controls and Features	4-3
Wiring - Audio Connections	4-4
Technical Documentation	4-5

OVERVIEW

This specialized input channel is designed to handle telephone call-in talk segments. It makes use of the console's mono TEL bus to generate a mix-minus feed to the caller; any inputs assigned to the TEL bus are fed to the caller, whose voice signal is returned via the dedicated phone channel fader and then routed (through ASSIGN switches) to either the PROGRAM bus for live on-air broadcast or to the AUDITION bus for delayed tape recording.

A CUE button allows interviewing the caller prior to airing. A separate input (EXT, see flow diagram below) goes directly to the console TEL bus; it may be used to introduce an additional feed to the caller.

The phone channel is used in conjunction with your station's telephone hybrid, which interfaces between the console and the station's call-in phone lines. The hybrid's output feeds the phone channel caller input. The console's mono TEL output provides the signal going back to the caller; this output feeds the hybrid's input.

A typical call-in segment might proceed as follows:

An alternate set-up might feed the announcer mic signal (taken from that mic channel's insert out point) into the phone channel's external input, allowing the caller to hear the announcer without having to disturb the operator's mic channel assign switch settings.

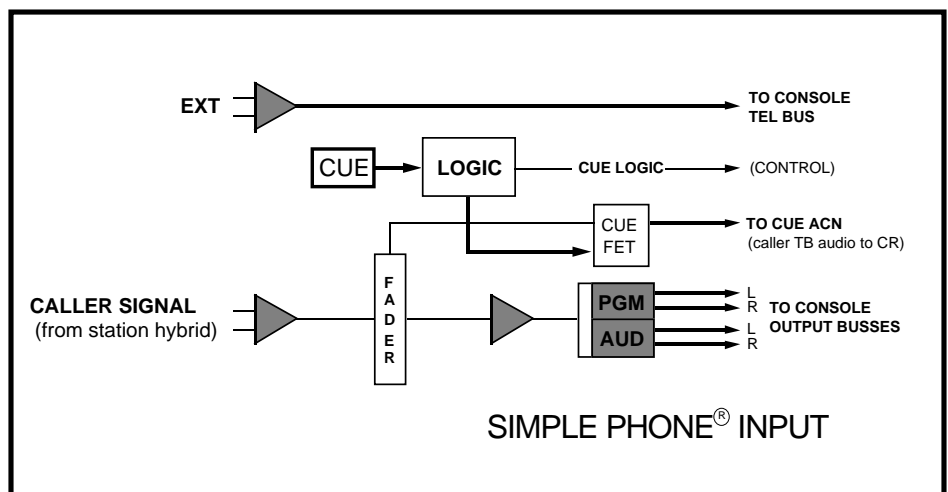
See also OUTPUTS chapter, page 5-2, for additional information on phone channel operation.

1) Caller phones in, announcer picks up off-air during a track play to set up the call. He assigns his mic channel to TEL (first deactivating PGM/AUD assignments so his voice doesn't go out over the air), hits his mic ON switch, hits the phone channel CUE switch and talks to the caller, whose voice comes up on the console's CUE speaker (and anywhere else CUE has been programmed to interrupt—typically HDPN and/or CR). When he is ready to take the call on-air, the operator

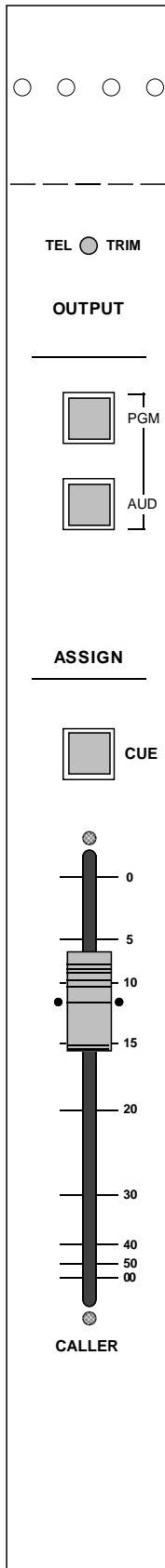
2) Deactivates CUE on the phone channel and assigns it to PGM,

3) Assigns *his* MIC channel to PGM (leaving TEL assigned) and does the segment (caller voice level is controlled by the phone channel fader).

4) If the announcer wants to play any music during the segment, the appropriate stereo line input is assigned to PGM and TEL, letting the audience *and* the caller hear it.



Telephone Input Signal Flow Diagram



CONTROLS and FEATURES

TEL TRIM - A recessed front panel trimpot at the top of the channel adjusts the console's mono TEL output level.

ASSIGN - These switches (LED illuminated) determine where the call-in segment signal will be sent; they route the channel signal to the console's stereo Program (PGM) or stereo Audition (AUD) busses. Typically when PGM is assigned the call segment will go out on-air; when the console's AUDITION output has been wired to feed a recorder, the AUD button permits off-air taping for later use.

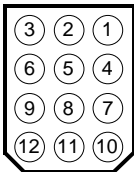
FADER - Long-throw carbon; plug-in for easy service. Controls the level of the caller's voice.

CALLER INPUT PORTS - There are two electronically balanced voice input ports available: one is for -10dBu signals, the other for +4dBu levels. They accept signal from your station's telephone hybrid.

EXTERNAL INPUT (internal) - Accepts a +4dBu balanced mono signal. Feeds the console's TEL bus (see previous page).

TELEPHONE INPUT CHANNEL WIRING

This section calls out specific pin-by-pin wiring instructions for the telephone input channel audio connector. If you need more general information concerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

Always be careful to double check pin numbering on the connector block and the wiring diagram before inserting the pin in the block!

Telephone Input (Audio Connections)

Telephone input channel audio connections are made at the channel's LOWER 12-pin PHONE/TEL connector. These consist of electronically balanced inputs for an external mono line level signal, the console's mono TEL output, and two caller inputs (one for -10dBu signals and the other for $+4\text{dBu}$ levels).

Pin 1 - EXTERNAL INPUT, shield

Pin 2 - EXTERNAL INPUT, low

Pin 3 - EXTERNAL INPUT, high

Accepts a mono $+4\text{dBu}$ level balanced signal. Feeds that signal to the console's TEL bus. Useful as a pre-fader, pre-on/off announcer mic feed (i.e., from a mic channel insert out point) to the caller.

Pin 4 - TELEPHONE OUTPUT, shield

Pin 5 - TELEPHONE OUTPUT, low

Pin 6 - TELEPHONE OUTPUT, high

The console's mono TEL bus output signal ($+4\text{dBu}$, electronically balanced). This port is used to get a signal back to the caller via the station's telephone hybrid (see below).

Pin 7 - FROM CALLER ($+4\text{dBu}$), shield

Pin 8 - FROM CALLER ($+4\text{dBu}$), low

Pin 9 - FROM CALLER ($+4\text{dBu}$), high

Pin 10 - FROM CALLER (-10dBu), shield

Pin 11 - FROM CALLER (-10dBu), low

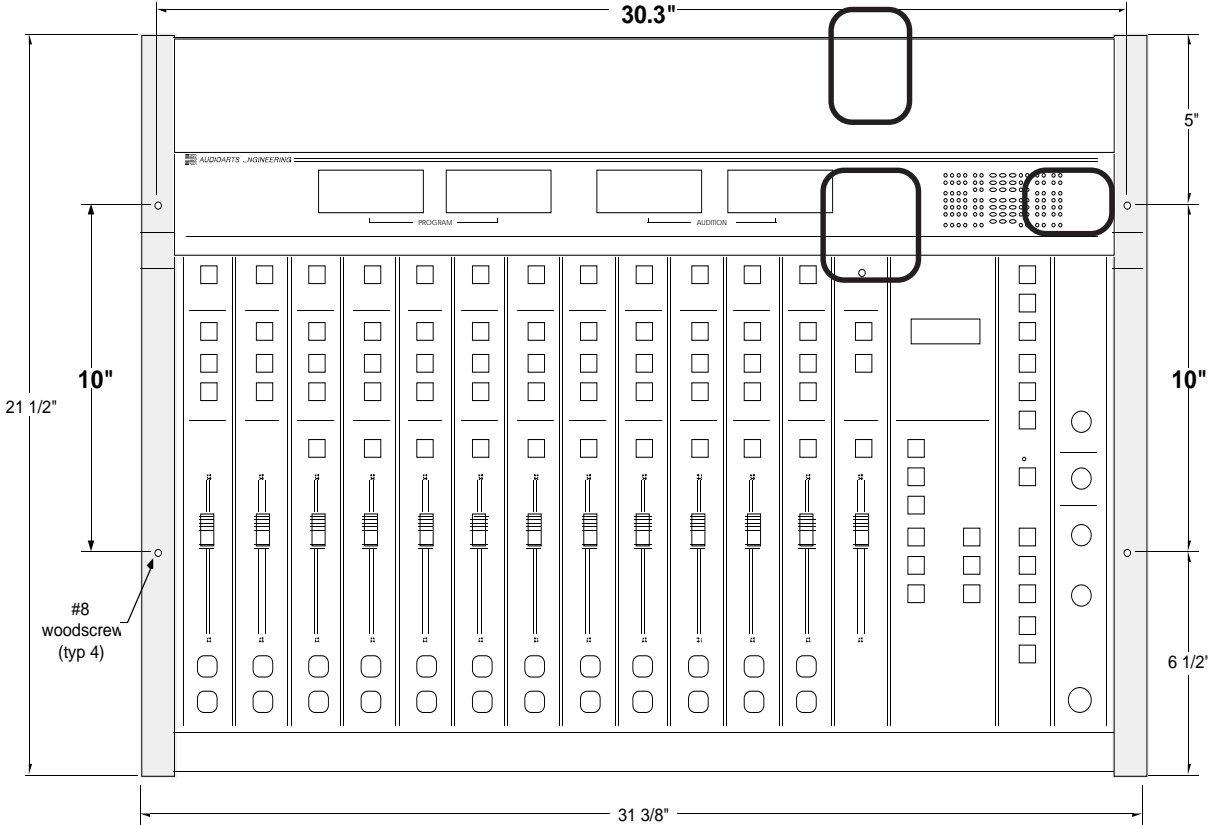
Pin 12 - FROM CALLER (-10dBu), high

These ports are used to get the caller's voice signal into the console. There are two available: one for low level signals (-10dBu) and the other for high level ($+4\text{dBu}$). The signals cannot come directly off a telephone company line, but must first interface through your station's telephone hybrid. This hybrid's output actually feeds the console's caller input ports. If you will be using the -10dBu port and the source signal is unbalanced, be sure to tie LOW and SHIELD together at the source end.

TECHNICAL DOCUMENTATION

Phone channel circuitry is on the console's OM-5 printed circuit board. A schematic is on page 9-17; the PCB pictorial is on page 9-21 (section "m"). The parts list is on pages 9-22 thru 9-24.

Outputs



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- Overview** 5-2
- Controls and Features** 5-2
- Signal Flow Diagram** 5-3
- Output Wiring** 5-4
- Technical Documentation** 5-5

OVERVIEW

The make-up of R-5 output signals is determined by which input channels have been assigned to which output busses. For example, if input channels 2, 5 and 7 have their PGM assign buttons activated, then their combined signal will appear at the console's Program output.

The R-5 console has three main outputs: PROGRAM (stereo), AUDITION (stereo) and TELEPHONE (mono). All three are electronically balanced and will drive +4dBu into 600Ω loads. Typically PROGRAM is the master output and goes out over-the-air. AUDITION can be used to feed a stereo tape machine for recording segments for later airplay. These two stereo outputs are monitored by two pairs of VU meters (PGM left/right and AUD left/right). Output levels for PGM and AUD are set by concealed front panel trimports located just above the telephone input channel underneath the console's hinged meterbridge. VU calibration trimpots are located just above the Line Select switchbank at the righthand end of the mainframe (beneath the hinged meterbridge). See drawing on page 5-1.

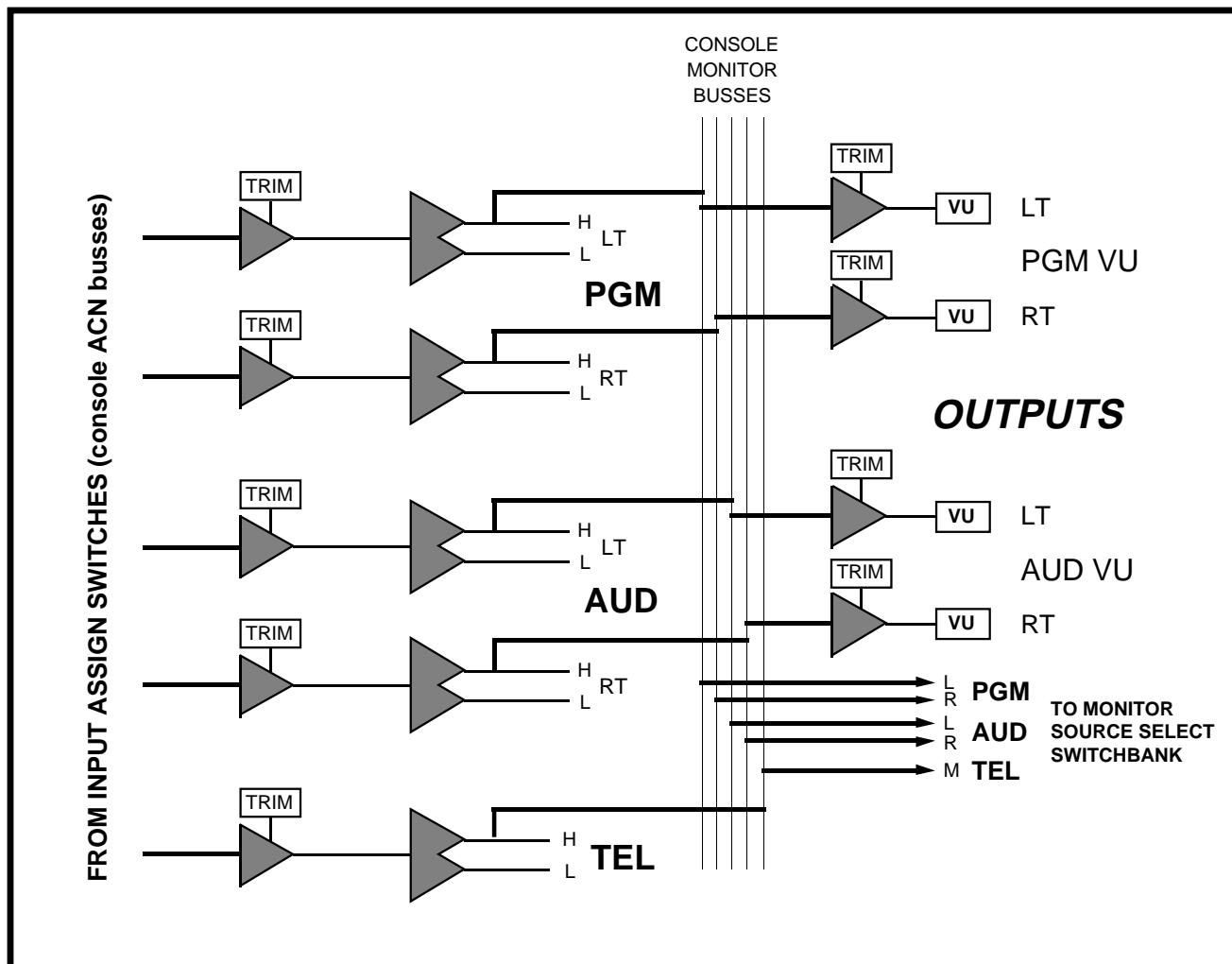
The R-5's Telephone (TEL) bus is the console's mono output; its level is adjusted by a trimpot located at the top of the phone channel. It does not have an associated VU meter. The TEL bus also serves another important function: it is used to generate a "mix-minus" feed for callers during on-air telephone segments. In other words, the TEL bus ACN (active combining network) signal is picked up by the phone input channel and used to feed callers (thru the station telephone hybrid) a special version of everything going out over the air—*minus their own voice*. This prevents feedback during call-in segments.

Example: If the telephone segment is a "name that tune" contest, the announcer's mic and the line input channel being used to play the contest tune would both have PGM and TEL assign switches activated. The telephone input channel would be assigned to PGM. The caller hears a mono version of the tune plus the announcer over his telephone line (which receives the console's TEL output thru the station hybrid). Since PGM is also assigned, however, a full stereo version of the same two signals plus the caller's voice (phone channel PGM assign) is simultaneously going out over the air.

Output wiring connectors for all three busses (PGM, AUD and TEL) are located at the top of the console, above the phone channel.

CONTROLS and FEATURES

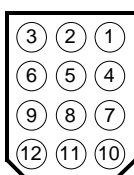
R-5 console output circuitry is internal. The only applicable controls are the front panel trimpots called out in the OVERVIEW section above.



Signal Flow Diagram - Outputs

OUTPUT WIRING

This section calls out specific pin-by-pin wiring instructions for the R-5 console main outputs (PGM, AUD, and TEL). If you need more general information concerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

PGM, AUD and TEL outputs are wired at the two 12-pin connectors located under the hinged meterbridge, at the top of the PHONE channel. The upper connector is for PGM and AUD, the lower connector (which also handles other signals used to operate the PHONE channel [see PHONE INPUT chapter] contains the console's mono TEL output pins.

Note all three R-5 outputs (PGM, AUD, TEL) are electronically balanced, and will drive +4dBu levels into 600Ω loads. Maximum output is +28dBu. If you wish to utilize unbalanced outputs, be sure to tie LOW and SHIELD together at the appropriate console connector pins (see diagram below).

Program / Audition Outputs (Audio Connections)

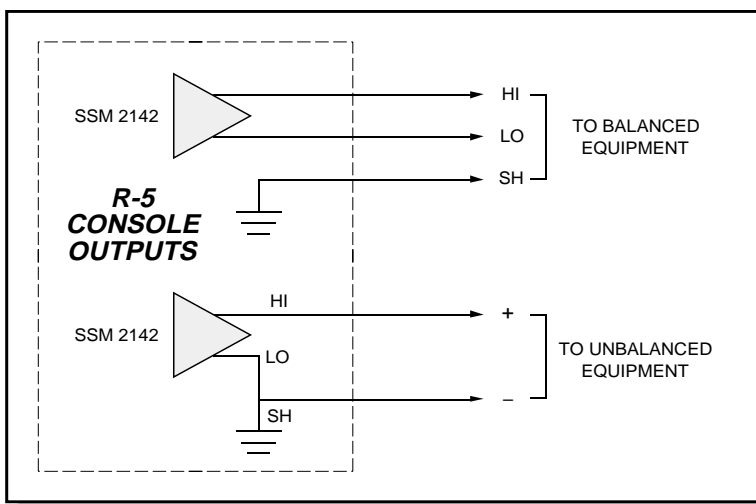
- Pin 1 - LEFT PROGRAM OUTPUT, shield
- Pin 2 - LEFT PROGRAM OUTPUT, low
- Pin 3 - LEFT PROGRAM OUTPUT, high
- Pin 4 - RIGHT PROGRAM OUTPUT, shield
- Pin 5 - RIGHT PROGRAM OUTPUT, low
- Pin 6 - RIGHT PROGRAM OUTPUT, high
- Pin 7 - LEFT AUDITION OUTPUT, shield
- Pin 8 - LEFT AUDITION OUTPUT, low
- Pin 9 - LEFT AUDITION OUTPUT, high
- Pin 10 - RIGHT AUDITION OUTPUT, shield
- Pin 11 - RIGHT AUDITION OUTPUT, low
- Pin 12 - RIGHT AUDITION OUTPUT, high

Always be careful to double check pin numbering on the connector block and the wiring diagram before inserting the pin in the block!

Mono Telephone Output (Audio, PHONE/TEL Connector)

- Pin 4 - TELEPHONE OUTPUT, shield
- Pin 5 - TELEPHONE OUTPUT, low
- Pin 6 - TELEPHONE OUTPUT, high

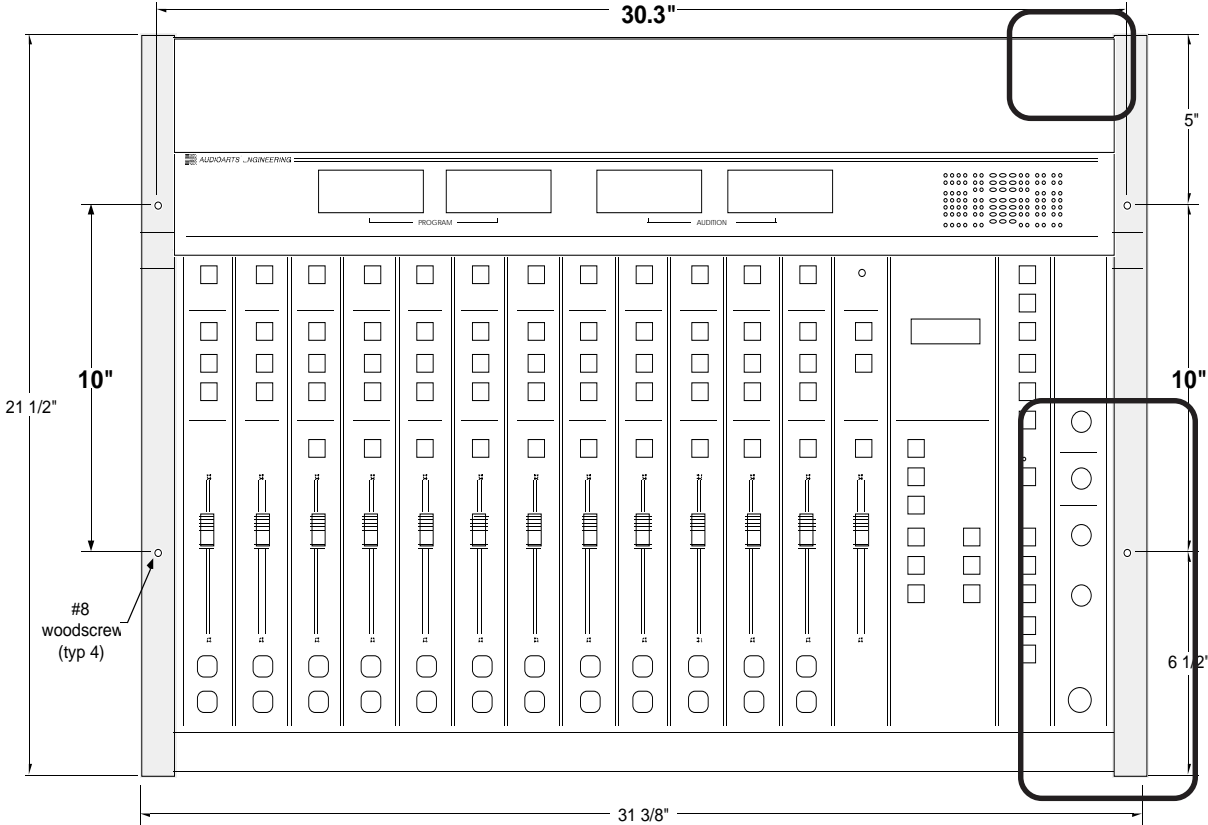
For more information on using balanced and unbalanced equipment combinations with the R-5 console, see page 1-8.



TECHNICAL DOCUMENTATION

For a schematic see page 9-17. A printed circuit board pictorial is on page 9-21; a parts list is on pages 9-22 thru 9-24.

Monitors



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- Controls and Features** 6-4
- Monitor Circuit Wiring** 6-5
- Audio Connections** 6-5
- Control Wiring** 6-6
- Technical Documentation** 6-7

OVERVIEW

The R-5 console has three stereo monitor circuits available to the console operator that allow him (and other studio personnel) to hear various console signal mixes without interfering with program content going out over-the-air. They are:

1) CONTROL ROOM (CR) - a dedicated output designed to drive a separate, user-provided power amp/speaker system in the main control room;

2) STUDIO - a second stereo output intended for a remote (i.e., non CR) studio power amp/speaker system;

3) HEADPHONE (HDPN) - an additional output (w/built-in power amp) that drives the console operator's headphones. Its output appears at two places: a headphone jack in the lower righthand corner of the console and at a connector in the console's I/O wiring section.

What audio signal these three stereo monitor circuits carry is determined by a SOURCE select switchbank which can choose from five signals: the console's PGM, AUD, and TEL outputs, and two EXTERNAL line inputs, which can be fed whatever end-user requirements dictate.

A fourth mono utility circuit, CUE, operates in conjunction with the other three. This circuit appears at its own output connector for hook-up to an external power amp/speaker system, and also includes an integral power amp that drives the console's built-in meterbridge mounted cue speaker. It is specifically designed to accomplish two important functions:

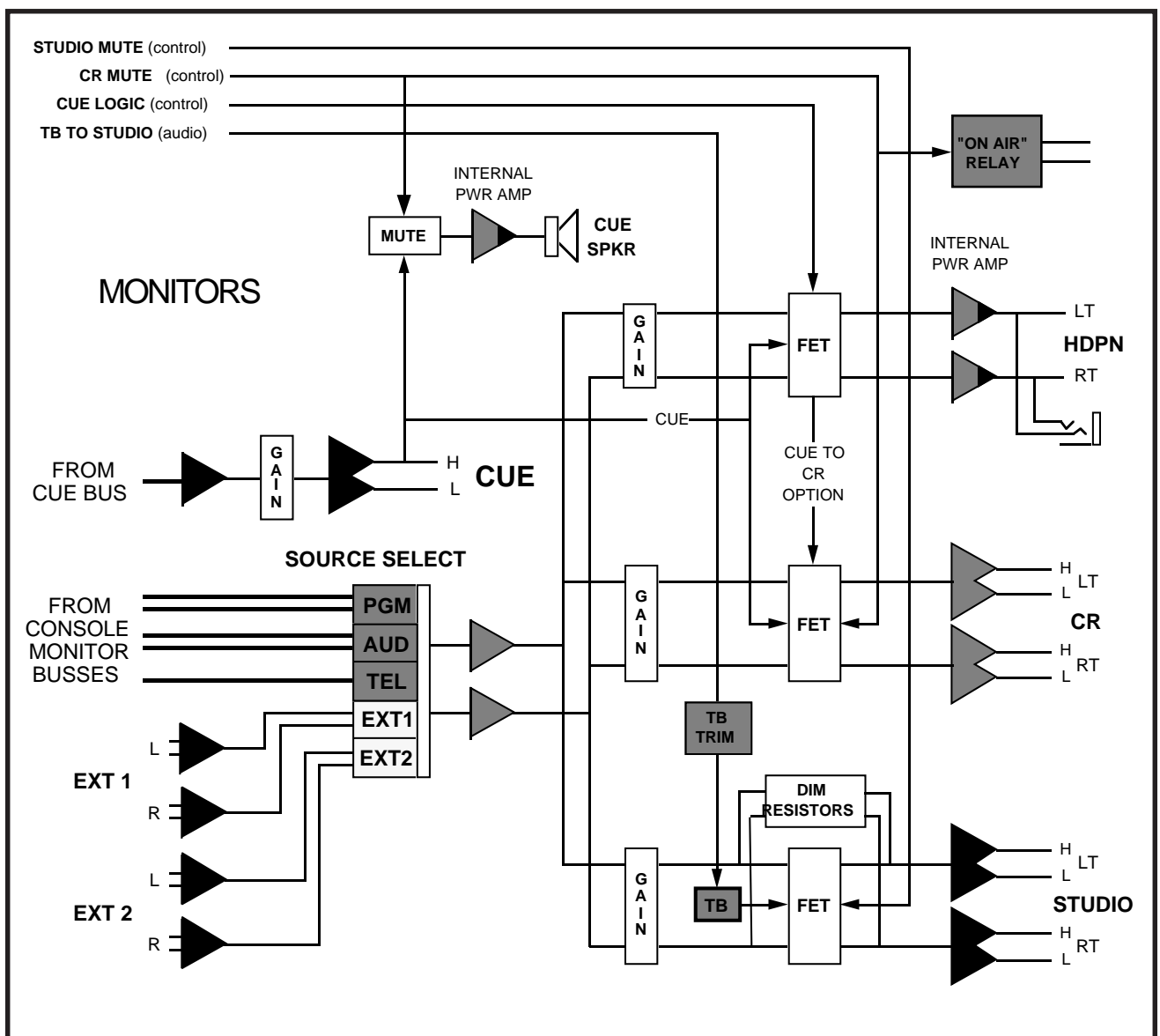
1) CUE can listen to any individual line input channel prior to it's going on-air. It does this even when the channel is off, regardless of any fader settings. The intended use here is for cueing up music tracks and program segments prior to on-air play. CUE is activated by pressing any line input channel cue switch, and when this is done its signal automatically interrupts the console operator's headphone output and comes out of the console's cue speaker. When the input channel's ON switch is pressed (for on-air play), CUE is automatically deactivated.

The purpose of this function (called "cue drop-out") is to prevent a potential on-air mishap: Assume a cue circuit system *without* this safety feature has been used to ready an audio track for airplay and that line channel now stands ready for firing (i.e., going on-air by pressing the channel ON switch). The console operator, however, has forgotten to turn the CUE switch off. He then turns on his announcer mic, does his set-up, and segues into the next cut by hitting the line input ON switch. In addition to feeding the console's PROGRAM output, *cue audio from that input will also be coming out of the console cue speaker, where it will be picked up by his open microphone.* The R-5's "cue drop-out" feature prevents this possibility.

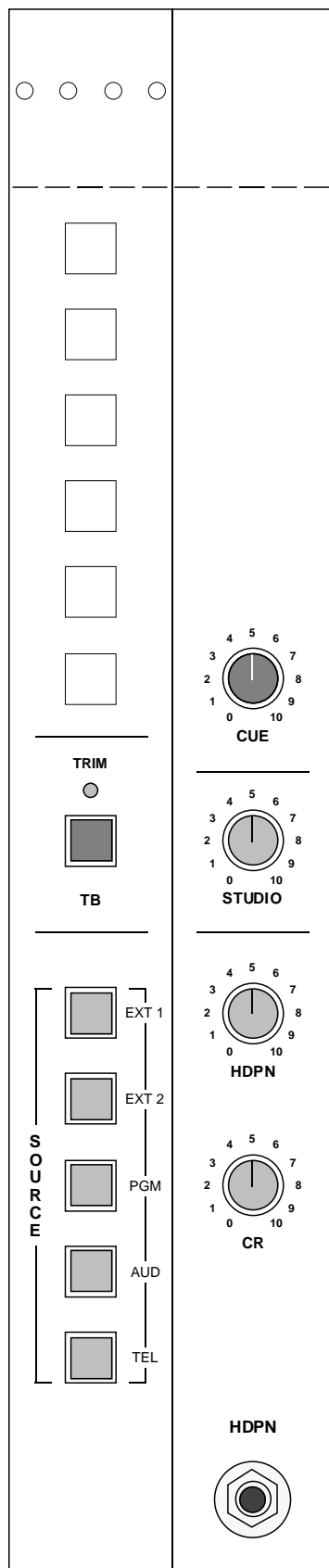
2) The CUE bus also serves as a communication path for off-air links between a) another studio and the control room, and b) telephone callers and the console operator prior to over-the-air phone-in segments. In the former case a studio microphone input channel can be placed into TALKBACK-to-CR mode by a user-provided switch located in the other

CUE can also be programmed to interrupt the console's stereo CR output, allowing it's signal to appear at the control room's monitor speakers. See CUE-to-CR, page 6-6.

studio (see page 2-5), and that studio's microphone signal is then routed to the CUE bus (regardless of the studio mic channel ON/OFF switch status and fader setting) where the console operator can hear it on his headphones and the console cue speaker (provided, of course, that his own microphone is not on-the-air; if this is the case, then the cue speaker will be mute). For telephone work CUE allows the console operator to listen to a telephone caller (via the console's CUE speaker or his headphones) prior to putting him over the air (page 4-2).



SIGNAL FLOW DIAGRAM – R-5 MONITOR CIRCUITS



CONTROLS and FEATURES

CUE - The master level control for the CUE circuit. It controls the built-in cue speaker; its output is also available at an I/O connector and may be used to feed a separate, user-provided amplifier/speaker system. The CUE output (mono) is electronically balanced and will drive +4dBu into 600Ω loads. *Note CUE is designed to automatically interrupt the console's headphone output (and the CR output, when so-programmed; see page 6-6). When it does so, the level of the interruption is determined by the setting of this control. If the CUE pot is set too high, you could end up with an unpleasantly loud interrupt signal!*



STUDIO - Controls the level of the console's studio output. The output is electronically balanced, +4dBu into 600Ω. The studio output signal is determined by the SOURCE select switchbank (see below).

TB (w/TRIM control) - When pressed, this momentary contact switch (LED illuminated) routes the console operator's microphone signal (pre on/off, pre-fader) to the studio output, where talent/guests can hear it over a user-provided amplifier/speaker system. A recessed trimpot sets the talkback level. Communication back from the studio is accomplished by placing the studio microphone channel into Talkback-to-CR mode; the studio signal then appears on the console's CUE bus where the operator can hear it. See page 2-5 for wiring details.

HDPN - Sets the level of the console's headphone output. This appears at a front panel headphone jack (bottom of panel) and also at an I/O connector. The headphone signal is determined by the SOURCE select switchbank (below).

CR - The level control for the console's control room output. It signal is determined by the SOURCE select switchbank (below). Output is electronically balanced, +4dBu into 600Ω.

HDPN JACK - This stereo tip-ring-sleeve jack powers the console operator's headphones. *Medium impedance (nom. 60Ω) or higher headsets are recommended.*

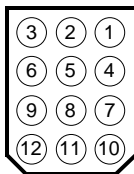
SOURCE - This switchbank determines what signal the STUDIO, CR and HDPN monitor circuits listen to. In addition to the three console outputs (PGM, AUD and TEL), two external stereo line inputs are provided. Typical uses for these include an off-the-air (tuner) signal, recorder playback, AM or FM monitors for dual format facilities—in short, any line level signal end-user requirements may dictate. Note one of these external inputs can accept the output of the console's six position LINE SELECT switchbank; greatly expanding monitor signal capacity. See ACCESSORIES (Chapter 7) for details.

ON-AIR TALLY (internal) - The R-5 console provides a relay closure (activated whenever CR output is muted) to control an external ON-AIR tally light. See page 6-6 for details.

The four monitor circuit I/O wiring connectors (12-pin) are located in the upper righthand corner of the console, underneath the hinged meterbridge. See key drawing at beginning of chapter and large fold-out drawing on page 1-10 for connector locations.

For a suggested PAD circuit, see APPENDIX, page A-2.

For more information on using balanced and unbalanced equipment combinations with the R-5 console, see page 1-8.



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

MONITOR CIRCUIT WIRING

This section calls out specific pin-by-pin wiring instructions for R-5 monitor circuits. If you need more general information concerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.

Monitor Circuits (Audio Connections)

Headphone Output

The R-5's headphone output is designed to drive medium impedance (nominally 60Ω) or higher headsets through a built-in power amp. As the headphone output signal that appears at this connector is paralled off the built-in operator's headphone output jack, it may (depending on individual operator preferences and headphone level control settings) be too hot for an external amplifier that lacks input trim controls. Therefore, if you will be using this port with an external power amp/speaker combination, you may want to attenuate the signal, either with a supplementary pad circuit or by using the external amplifier's input trim controls.

- Pin 7 - HEADPHONE LEFT OUT, shield
- Pin 8 - HEADPHONE LEFT OUT, low
- Pin 9 - HEADPHONE LEFT OUT, high
- Pin 10 - HEADPHONE RIGHT OUT, shield
- Pin 11 - HEADPHONE RIGHT OUT, low
- Pin 12 - HEADPHONE RIGHT OUT, high

External 1 and 2 Inputs (SOURCE select switchbank)

These stereo line inputs are electronically balanced, and will accept +4dBu levels. If you will be hooking up unbalanced equipment to these ports, be sure to tie LOW and SHIELD together at the source end.

- Pin 1 - EXTERNAL ONE LEFT IN, shield
- Pin 2 - EXTERNAL ONE LEFT IN, low
- Pin 3 - EXTERNAL ONE LEFT IN, high
- Pin 4 - EXTERNAL ONE RIGHT IN, shield
- Pin 5 - EXTERNAL ONE RIGHT IN, low
- Pin 6 - EXTERNAL ONE RIGHT IN, high
- Pin 7 - EXTERNAL TWO LEFT IN, shield
- Pin 8 - EXTERNAL TWO LEFT IN, low
- Pin 9 - EXTERNAL TWO LEFT IN, high
- Pin 10 - EXTERNAL TWO RIGHT IN, shield
- Pin 11 - EXTERNAL TWO RIGHT IN, low
- Pin 12 - EXTERNAL TWO RIGHT IN, high

Cue Output

The console's cue output signal is mono, electronically balanced, and will deliver +4dBu levels into 600Ω. If you will be hooking up unbalanced equipment to this port, be sure to tie LOW and SHIELD together at the console end.

Pin 1 - CUE OUTPUT, shield

Pin 2 - CUE OUTPUT, low

Pin 3 - CUE OUTPUT, high

Control Room and Studio Outputs

Control room and studio outputs are electronically balanced, and will deliver +4dBu levels into 600Ω. If you will be hooking up unbalanced equipment to these ports, be sure to tie LOW and SHIELD together at the console end.

Pin 1 - CONTROL ROOM LEFT OUTPUT, shield

Pin 2 - CONTROL ROOM LEFT OUTPUT, low

Pin 3 - CONTROL ROOM LEFT OUTPUT, high

Pin 4 - CONTROL ROOM RIGHT OUTPUT, shield

Pin 5 - CONTROL ROOM RIGHT OUTPUT, low

Pin 6 - CONTROL ROOM RIGHT OUTPUT, high

Pin 7 - STUDIO LEFT OUTPUT, shield

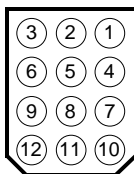
Pin 8 - STUDIO LEFT OUTPUT, low

Pin 9 - STUDIO LEFT OUTPUT, high

Pin 10 - STUDIO RIGHT OUTPUT, shield

Pin 11 - STUDIO RIGHT OUTPUT, low

Pin 12 - STUDIO RIGHT OUTPUT, high



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

Monitor Circuits (Control/Logic Connections)

Cue/Tally

Pin 5 - CUE TO CR (jumper to pin 6 to activate)

Pin 6 - CUE TO CR

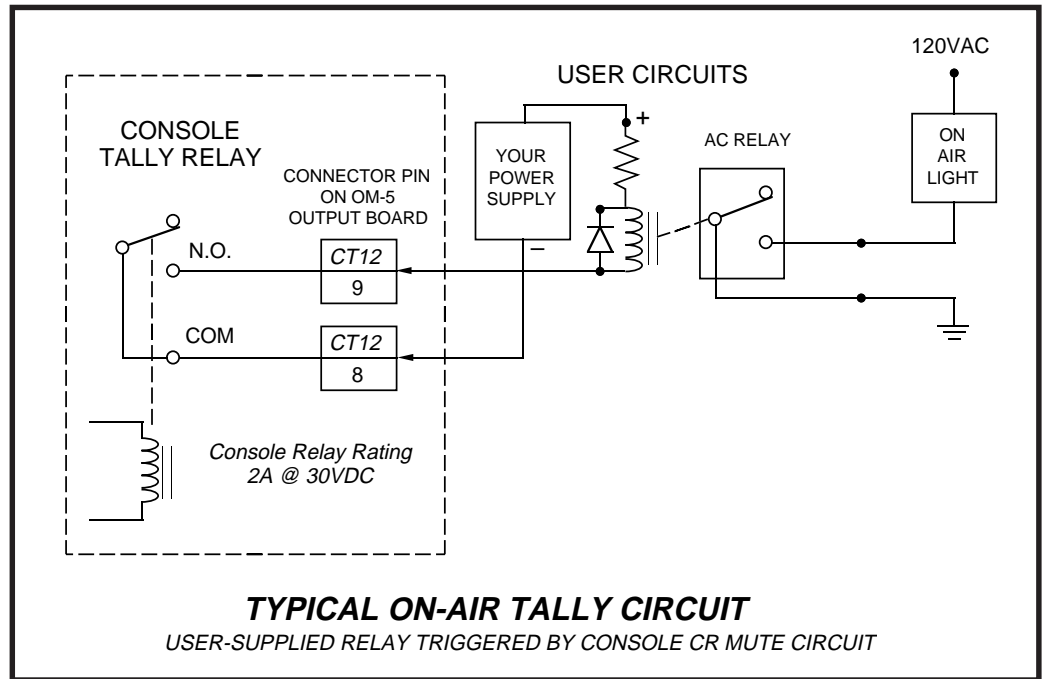
This function allows CUE, which normally only interrupts HEADPHONE, to also interrupt the console's CONTROL ROOM output.

Pin 8 - ON AIR TALLY common

Pin 9 - ON AIR TALLY normally open

The R-5's on-air tally relay is activated (i.e., closed) whenever the console's control room output is muted; in other words, whenever the console operator's microphone is live (provided, of course, that his mic input channel has been programmed to MUTE CR whenever it is turned ON; see page 2-5). This closure can be used to activate a visual ON-AIR light. It will handle 1 amp of current at 125VDC/250VAC. See drawing on next page for a typical hook-up.

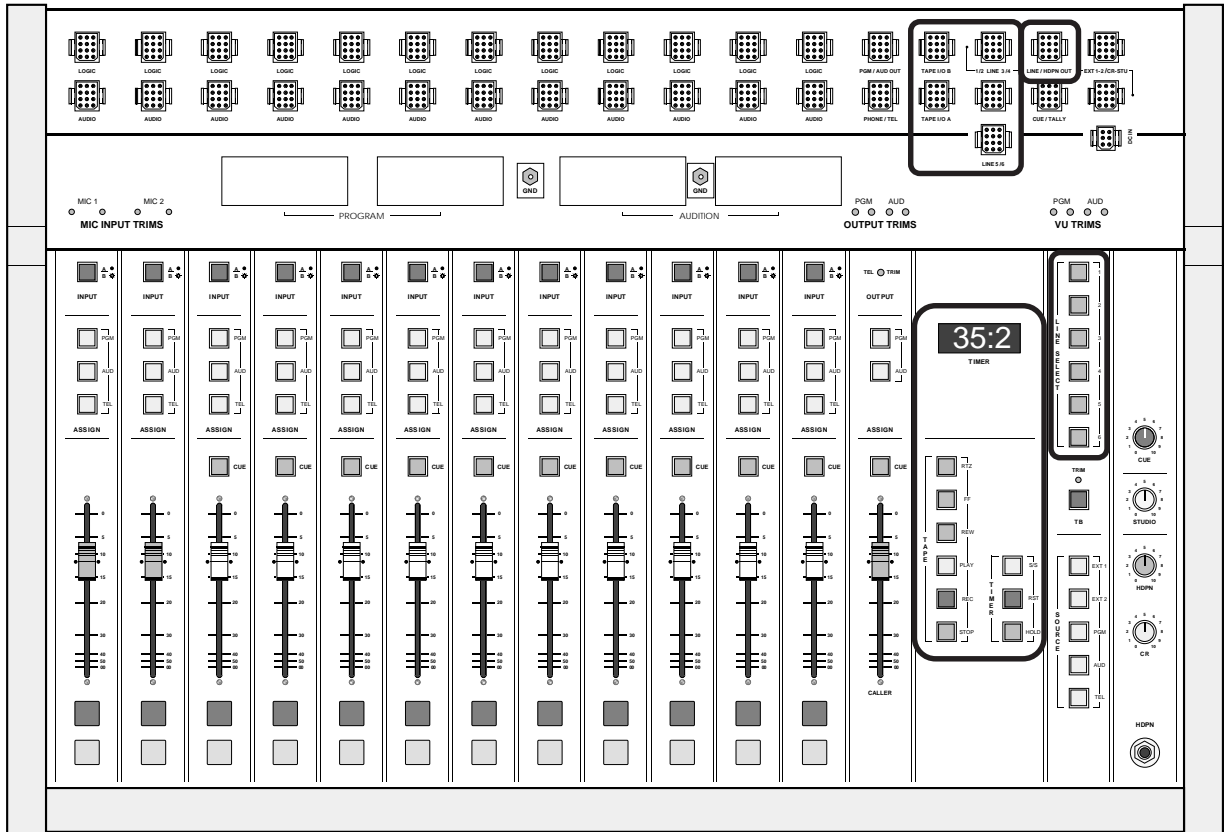
Cue/Tally connector pins 4, 7, and 10 are audio common and unused; Pins 11 and 12 are N/C.



TECHNICAL DOCUMENTATION

R-5 monitor circuits are shown on the schematic on page 9-18. A printed circuit board pictorial is on page 9-21 and a parts list is on pages 9-22 thru 9-24.

Accessories



Chapter Contents:

- Overview** 7-2
- Signal Flow Diagram** 7-2
- Controls and Features** 7-3
- Accessory Wiring** 7-4
- Tape Remote Switches (Control)** 7-4
- Line Selector (Audio)** 7-5
- Technical Documentation** 7-6

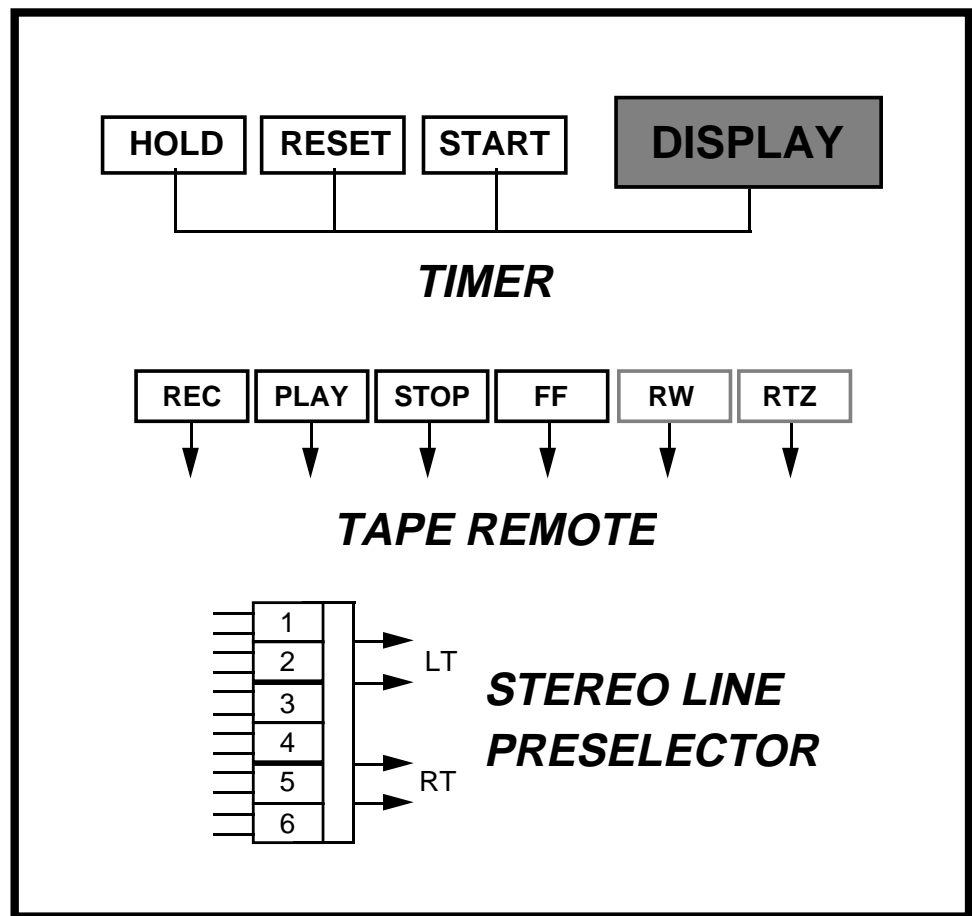
OVERVIEW

There are three accessory sections to the R-5 console:

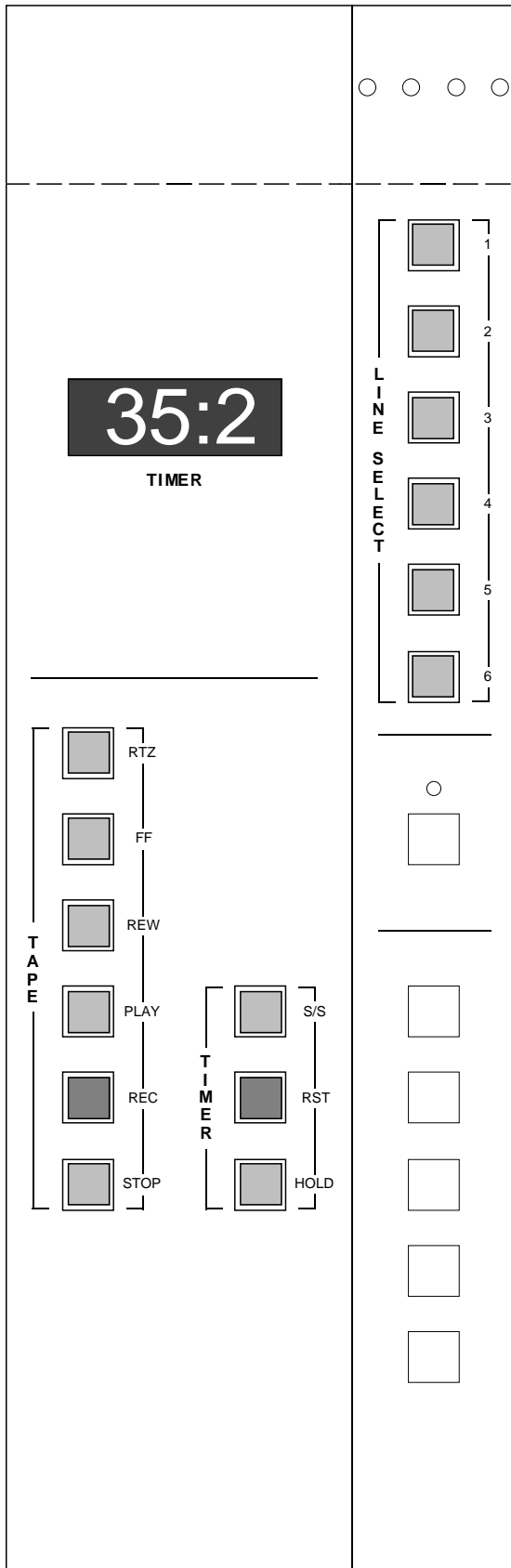
TAPE REMOTE - A full function switchbank (return-to-zero, fast forward, rewind, play, record, stop) for controlling one external recording machine.

TIMER - A four digit display with START/STOP, RESET and HOLD control buttons.

LINE SELECT - A six-input selector switchbank that chooses one of six stereo line inputs and outputs it to an audio connector for routing to another console input. May be used to expand the input capability of a line input channel or the monitor source selector (via EXT 1 or EXT 2 inputs; see MONITOR chapter, page 6-4).



R-5 Accessories – Signal Flow Diagram

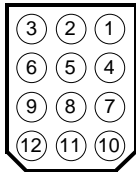


CONTROLS and FEATURES

TAPE - These six switches (functions as labeled) can control an external recording machine. Switches have built-in LED indicators that can be powered by the external machine.

TIMER - A built-in 4-digit timer display with three control switches (LED illuminated). Used to time tracks and program segments.

LINE SELECT - A line selector switchbank that accepts six external stereo line inputs. Its output can feed another console input channel or one of the monitor source selector switchbank's external inputs. Expands the input capability of the console.



I/O connector plug (rear view, as it would be seen while wiring); the beveled orientation corners shown correspond to the plug's mating PCB-mounted sockets.

ACCESSORY WIRING

This section calls out specific pin-by-pin wiring instructions for the R-5 tape remote and external line selector switchbanks. If you need more general information concerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.

Tape Remote (Control Connections)

R-5 tape remote switches are simple closures brought out to I/O pins on the two connectors dedicated to this accessory section. The top (upper) connector is labeled TAPE I/O B and handles wiring for switches 4 thru 6 (PLAY, REC, STOP). The lower connector (TAPE I/O A) is dedicated to switches 1 thru 3 (RTZ, FF, REW). Note each switch has an associated LED indicator that may be powered by the remote machine if desired.

Tape Remote I/O "A" (LOWER connector, switches 1-3)

- Pin 1 - SWITCH 1, LED+
- Pin 2 - SWITCH 2, LED+
- Pin 3 - SWITCH 3, LED+
- Pin 4 - SWITCH 1, LED-
- Pin 5 - SWITCH 2, LED-
- Pin 6 - SWITCH 3, LED-

Always be careful to double check pin numbering on the connector block and the wiring diagram before inserting the pin in the block!

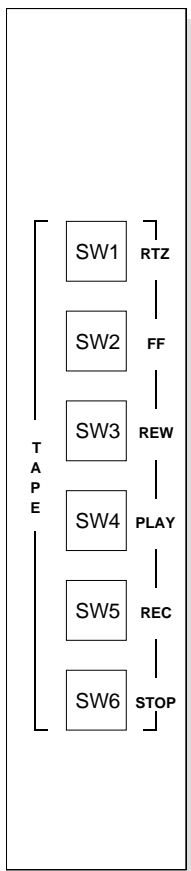
Tape remote switch LEDs are designed to operate from +5VDC.

- Pin 7 - SWITCH 1, normally open
- Pin 8 - SWITCH 2, normally open
- Pin 9 - SWITCH 3, normally open
- Pin 10 - SWITCH 1, common
- Pin 11 - SWITCH 2, common
- Pin 12 - SWITCH 3, common

Tape remote switch connections are simple stand-alone control closures that run directly to the section's I/O connectors. There is no interface to the rest of the R-5 console circuitry.

Tape Remote I/O "B" (UPPER connector, switches 4-6)

- Pin 1 - SWITCH 4, LED+
- Pin 2 - SWITCH 5, LED+
- Pin 3 - SWITCH 6, LED+
- Pin 4 - SWITCH 4, LED-
- Pin 5 - SWITCH 5, LED-
- Pin 6 - SWITCH 6, LED-
- Pin 7 - SWITCH 4, normally open
- Pin 8 - SWITCH 5, normally open
- Pin 9 - SWITCH 6, normally open
- Pin 10 - SWITCH 4, common
- Pin 11 - SWITCH 5, common
- Pin 12 - SWITCH 6, common



Line Selector (Audio Connections)

The R-5 accessory line selector picks one of six external stereo line inputs coming into the console (via three dedicated 12-pin connectors) and sends it to the LINE output pins on the console's "LINE/HDPN OUT" connector, where it may be picked up and wired to another console input to expand its source capability (a stereo line input channel or one of the two external line input ports on the console's monitor SOURCE select switchbank are typical destinations).

Input connectors are located under the console's hinged meterbridge, above the timer display. Output pins are on the upper connector directly to the right of the inputs (LINE/HDPN OUT)

Each switch has a built-in LED indicator powered by the console. Although the section contains active audio circuitry, it is functionally equivalent to a "dry" switchbank, with no internal audio connections to the console's other circuitry.

Line Selector – Inputs 1 & 2

- Pin 1 - **LINE 1 LEFT IN**, shield
- Pin 2 - **LINE 1 LEFT IN**, low
- Pin 3 - **LINE 1 LEFT IN**, high
- Pin 4 - **LINE 1 RIGHT IN**, shield
- Pin 5 - **LINE 1 RIGHT IN**, low
- Pin 6 - **LINE 1 RIGHT IN**, high
- Pin 7 - **LINE 2 LEFT IN**, shield
- Pin 8 - **LINE 2 LEFT IN**, low
- Pin 9 - **LINE 2 LEFT IN**, high
- Pin 10 - **LINE 2 RIGHT IN**, shield
- Pin 11 - **LINE 2 RIGHT IN**, low
- Pin 12 - **LINE 2 RIGHT IN**, high

Line Selector – Inputs 3 & 4

- Pin 1 - **LINE 3 LEFT IN**, shield
- Pin 2 - **LINE 3 LEFT IN**, low
- Pin 3 - **LINE 3 LEFT IN**, high
- Pin 4 - **LINE 3 RIGHT IN**, shield
- Pin 5 - **LINE 3 RIGHT IN**, low
- Pin 6 - **LINE 3 RIGHT IN**, high
- Pin 7 - **LINE 4 LEFT IN**, shield
- Pin 8 - **LINE 4 LEFT IN**, low
- Pin 9 - **LINE 4 LEFT IN**, high
- Pin 10 - **LINE 4 RIGHT IN**, shield
- Pin 11 - **LINE 4 RIGHT IN**, low
- Pin 12 - **LINE 4 RIGHT IN**, high

Line Selector – Inputs 5 & 6

- Pin 1 - LINE 5 LEFT IN, shield**
- Pin 2 - LINE 5 LEFT IN, low**
- Pin 3 - LINE 5 LEFT IN, high**
- Pin 4 - LINE 5 RIGHT IN, shield**
- Pin 5 - LINE 5 RIGHT IN, low**
- Pin 6 - LINE 5 RIGHT IN, high**
- Pin 7 - LINE 6 LEFT IN, shield**
- Pin 8 - LINE 6 LEFT IN, low**
- Pin 9 - LINE 6 LEFT IN, high**
- Pin 10 - LINE 6 RIGHT IN, shield**
- Pin 11 - LINE 6 RIGHT IN, low**
- Pin 12 - LINE 6 RIGHT IN, high**

Line Selector – Outputs (LINE/HDPN OUT connector)

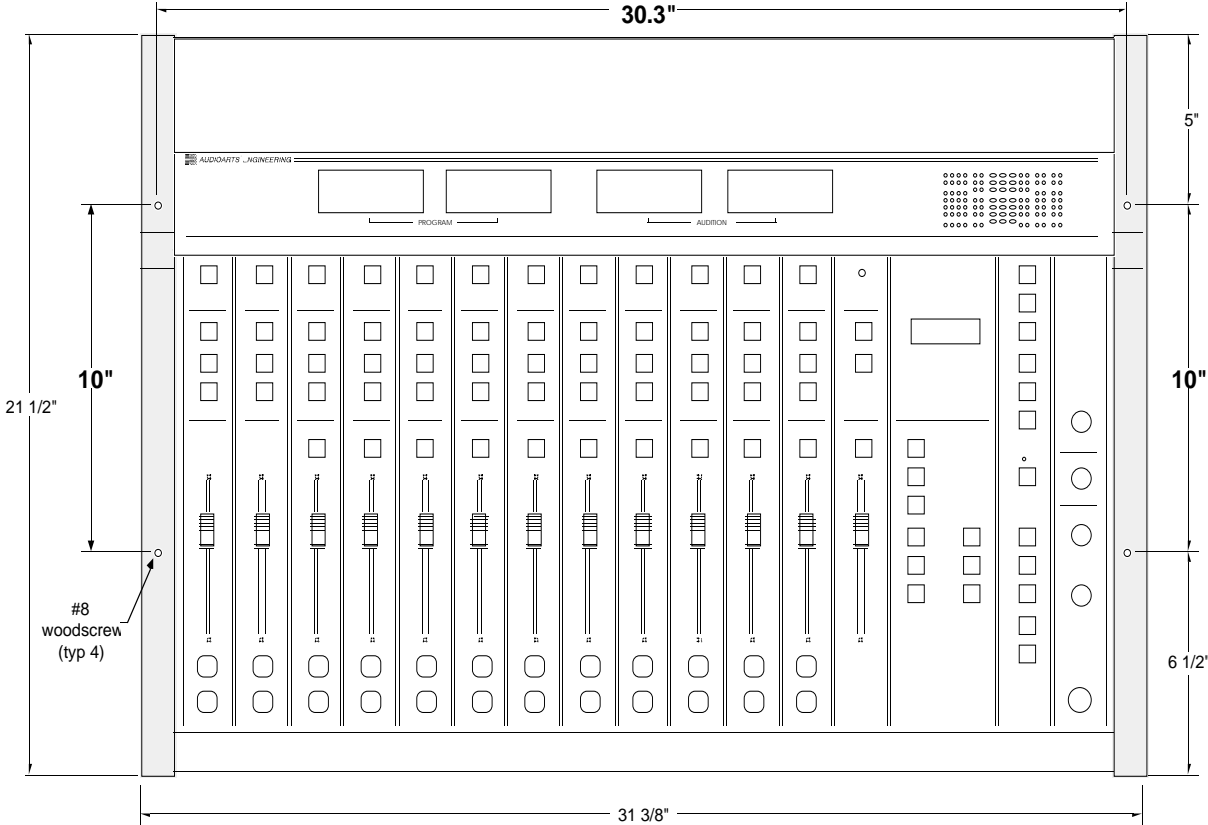
- Pin 1 - LINE SELECTOR LEFT OUT, shield**
- Pin 2 - LINE SELECTOR LEFT OUT, low**
- Pin 3 - LINE SELECTOR LEFT OUT, high**
- Pin 4 - LINE SELECTOR RIGHT OUT, shield**
- Pin 5 - LINE SELECTOR RIGHT OUT, low**
- Pin 6 - LINE SELECTOR RIGHT OUT, high**

As stated before, typically these outputs will be used to feed the an R-5 stereo line input channel, or EXT 1 or 2 on the console's monitor SOURCE SELECT switchbank, to expand their source capabilities. However, they can also be used to feed an audio system external to the console. If that system is unbalanced, we suggest tying LOW and SHIELD together at the console end.

TECHNICAL DOCUMENTATION

Tape remote and line selector schematics are on page 9-19. The timer schematic is on page 9-20. A printed circuit board pictorial is on page 9-21, and a parts list is on pages 9-22 thru 9-24.

Set-up and Test



Chapter Contents:

- Factory Calibration** 8-2
- End-User Set-up and Test** 8-2
- Mono Mic Inputs** 8-2
- Stereo Line Inputs** 8-3
- Telephone Input** 8-5
- Outputs** 8-6
- Monitors (Audio)** 8-6
- Monitors (Control)** 8-7
- Talkback** 8-8
- Tape Remote** 8-8
- Timer** 8-8
- Line Selector** 8-9

FACTORY CALIBRATION

Your R-5 console has been pre-calibrated at the factory as follows:

- 1) Microphone input gain trimpots are adjusted so a -50dBu balanced input signal yields a -2.5dBu output at the insert out patch point.
 - 2) With the input channel fader set to max (all the way up) and the channel assigned to PGM, AUD and TEL, output trimpots are then set to yield a +16dBu output level.
 - 3) The fader is then pulled down to its nominal setting (the two dots on the scale) and the console's VU meter trimpots adjusted so the meters read 0dB (resulting in +4dBu console output levels.)
- These are the standard factory settings.

END-USER SET-UP AND TEST

Assuming you have completed the basic steps called out in the first chapter of this manual (i.e., mainframe is properly installed and grounded, power supply is correctly rackmounted and connected to the console, power-up has been verified) and the audio input, output and control wiring for the console (as called out in subsequent manual chapters [mono mic inputs, stereo line inputs, telephone input, outputs, monitors, and accessories] is complete, you are now ready to verify proper set-up and operation.

Before proceeding, power up the console, and check the following:

- 1) Make sure all channel ON/OFF switches are OFF.
- 2) De-activate all CUE switches.
- 3) Turn off all ASSIGN switching.
- 4) Run all FADERS down (off).
- 5) Turn all monitor pots (CUE, STUDIO, HDPN and CR) down to zero.
- 6) Set all INPUT A/B source select switches to "A" (unlit).
- 7) Plug in the console operator's headphone set.

Mono Mic Inputs

First, make sure of the following:

- 1) Has a microphone been connected to the mono input channel you will be testing? Is the channel's A/B input select switch set correctly for the microphone you will be using?
- 2) If you are using external equipment with the channel's insert patch points, is that equipment turned on and operational? If you are NOT using external equipment, is the patch point bridged at the channel's audio connector? (If NO, then see bottom of page 2-4.)

Assuming the preceding conditions are correct, then

- 1) ASSIGN the channel to PGM.
- 2) Press the channel's red ON switch.
- 3) Move the FADER up to its nominal setting (indicated by two dots).
- 4) At the console's monitor SOURCE select switchbank, press PGM.

5) Speak normally into the microphone; the console's left and right PROGRAM meters should respond appropriately.

6) Put on the headphones and slowly turn up the HDPN level control; you should hear your own voice.

7) If your particular microphone does not yield a 0dB VU meter reading when used under normal announcer conditions, first make sure any external processing equipment being used at the channel's patch point has its input and output gain settings properly adjusted. In other words, the signal being returned to the console should be at the same level as the signal leaving it (in the case of a factory calibrated console, this level will be -2.5dBu). If it is not, make the necessary gain setting adjustment to the external gear. If the settings are already correct, you may find it necessary, depending on your particular microphone model and announcer mic technique, to adjust the MIC GAIN TRIM control (at the top of the channel, underneath the hinged meterbridge) until a 0dB reading is obtained with normal voice input and a nominal ("two dot") fader setting.

8) If you have a microphone connected to the channel's "B" input, then press the INPUT source select switch to activate that input (the switch will light) and verify proper signal flow. (Note there is a separate mic input gain trim for the "B" input.)

9) Turn off the first mic channel (press the amber OFF switch) and move to the second mono mic input channel; repeat the same steps.

10) If the second mic input channel is used for a microphone in another studio, and you have wired remote control functions from that studio to the console channel, verify that these work properly. In other words, user-supplied ON and OFF switches in the remote studio should turn the channel ON or OFF.

11) If the channel's remote ON TALLY port has been utilized, when the channel is ON the remote indicator in the studio (either in the studio ON switch itself, or as a separate ON-AIR light powered by a user-supplied circuit [see page APPENDIX, page A-2]) should be illuminated.

Mono mic input studio and control room MUTE and TALKBACK functions are discussed later in the MONITOR CONTROL SIGNALS section (page 8-7) of this chapter.

Stereo Line Inputs

As you test your first stereo line input channel, you will also be verifying the console's control room (CR), STUDIO and CUE circuits. We will therefore assume you have installed:

a) a control room amplifier/monitor speaker system and that it is being fed by the console's CR output;

b) a studio amplifier/monitor speaker system fed by the console's STUDIO output; and

c) an external cue amp/speaker system fed by the console's mono CUE output. Note this external CUE speaker system is optional, as the R-5 console already contains its own built-in cue speaker/amp combination.

See APPENDIX, page A-3, for a discussion of appropriate gain settings on user-supplied external amplifier/speaker monitor systems.

We will also assume that these external amplifier/speaker systems are energized and their gain settings are adjusted to an operational level.

1) Make sure a source machine is connected to the first stereo line input channel (presumably the "A" source). Cue the machine up with program material so it is ready to play. If the source machine has a low consumer level output (-10dBu) make sure the console input connector has been reprogrammed appropriately (see top of page 3-5). If the machine is a professional unit with +4dBu output levels the console will accept this signal with no further modification.

2) Run the fader up to its nominal setting.

3) Assign the channel to PGM.

4) Press the channel's red ON switch. If you have wired the source machine to fire off of the console's ON switch, it should begin play immediately. (If the source machine is not wired for control by the console, then start it playing manually.) The console PROGRAM VU meters should respond, and the source material should be audible over the operator's headphone set.

NOTE: The external source machine can also be wired to feed a READY tally signal to the console's OFF switch LED indicator. In this case, once it is cued up and ready to play, the console's OFF switch should flash intermittently instead of shining steadily. Note also the source machine, once it reaches end-of-play, can also be wired to automatically turn the console input channel OFF. If this is the case in your installation, verify that these events occur as you test the channel.

5) Turn up the CR level pot. You should hear the input signal on the control room monitor speakers.

6) Turn up the STUDIO level pot. You should hear the signal on the studio monitor speakers.

7) Re-assign the input channel to AUD *instead* of PGM. All monitor audio should stop, and the console AUDITION meters should now respond instead of the PROGRAM meters.

8) Press the monitor SOURCE select switchbank AUD switch. Once again, input audio should be heard over the CR and STUDIO monitors, as well as the operator's headphones.

9) Re-assign the input channel to TEL. Select TEL on the monitor SOURCE select switchbank. A mono version of the audio should be playing through CR, STUDIO and HDPN.

10) De-activate the TEL monitor SOURCE select switch.

11) Press the channel CUE switch. Turn up the CUE level control. You should hear audio on the console's built-in cue speaker and a mono version of channel audio on the headphones. If you have installed an external cue amplifier/speaker system, audio should be playing through it. If you have programmed CUE to interrupt the console's CR output (see page 6-6), the mono cue signal should appear over the CR monitor speakers. *Note the input channel fader setting does not affect the CUE interrupt level. Only the rotary CUE level control pot does this.*

12) Press the channel's ON switch again. Note the CUE signal drops out. *Whenever a channel ON button is pressed, that channel's CUE switch is automatically de-activated.* If you wish to override this feature, simply press the CUE button another time—the cue signal will again be audible.



See inset paragraph, page 6-2, for the reasoning behind this feature.

13) Press the input channel amber OFF switch. All audio should stop. If the source machine has been wired for control by the console, it should stop playing.

14) If you have a source machine connected to the channel's "B" input, check that signal path as well, using the console's PGM ASSIGN and PGM MONITOR signal path. (*Note external source machine remote control functions are not available for the B source; They function only with the "A" input port.*)

15) Check the remaining stereo line input channels.

Telephone Input

Prior to test, we will assume the following:

1) The console's mono TEL output has been connected to your station's telephone hybrid input.

2) The station hybrid's output is feeding the R-5 phone channel CALLER INPUT either at -10dBu or +4dBu, depending on output level (see page 4-4).

3) You will be talking to the caller via the console operator's microphone input channel, using the console's TEL bus.

4) The console's PGM output is your on-air feed; the console's AUD output is going to an external recording machine.

5) You will be playing a music track during the call using one of the console's stereo line input channels.

6) The console operator's headphones are plugged in; the HDPN level pot is turned up.

To test, perform the following steps:

1) Have an associate call the station using a regular contest line.

2) Assign your microphone channel to TEL, press the channel ON switch and bring up the fader.

3) Activate the phone channel CUE switch and pick up on the call.

4) Hold your set-up conversation. You should hear the caller over the console's cue speaker (provided the CUE level pot is turned up, of course) and on your headphones. The caller will hear your voice from the station hybrid (which is receiving the console's TEL output).

5) You are now ready to "go on the air". For this test we will send the call-in segment to the console's AUD output, recording it for future airplay (it could just as easily be going out over the air via the console's PGM output). Select AUD on the monitor SOURCE select switchbank. If you have a recording machine hooked-up to the console's AUD output, start it recording.

6) Deactivate the phone channel CUE button, press its AUD assign switch and bring up the caller's fader.

7) Assign your mic channel to AUD (this is in addition to the earlier TEL assign).

8) Do your phone-in segment, conversing with the caller. If you want to play a track, assign the appropriate stereo line input channel to AUD *and* TEL and do so.

9) You should be able to hear the entire segment as it would be on-air through the console operator headphones. NOTE you will not be able to monitor it on the control room speakers, because they will have been muted by the console operator's mic channel.

10) When the segment is over, de-activate TEL assign on your mic channel and AUD assign on the phone channel. If you wish, play back the recorded segment to verify that everything has worked properly.

NOTES: Depending on your particular set-up, you may wish to proceed in a slightly different manner. For example, the caller could be receiving your voice by a direct feed from your mic channel's insert out patch point wired to the phone channel's EXT line input port. If this is the case, then the console operator's mic signal will *always* be present on the console's TEL bus, regardless of input ASSIGN switching, channel ON/OFF switches and/or fader settings. This makes the segment easier operationally: To do the set-up, pick up on the call and press the phone channel CUE switch. Do your set-up using the operator's mic and the console cue speaker, and when you're ready to go "on-air" turn off phone channel CUE, assign the phone channel and your mic channel to PGM (or AUD if you're taping for future airplay), and use their respective faders to control voice levels (don't forget to press your mic channel's ON switch). If you will be feeding music to the caller, be sure to assign that line input channel to TEL (so the caller can hear it through the station hybrid) as well as PGM/AUD ("air/tape") so the tune will also go out "over-the-air".

Outputs

Typically, the console's main stereo output (PROGRAM) will be the on-air feed. AUDITION might then be wired to a stereo recording machine, allowing program segments to be recorded for later airplay. The mono TEL output is usually used to feed the station's telephone hybrid; it provides the signal going back to incoming callers. These outputs are all electronically balanced, with a +4dBu level into 600Ωs when the associated VU meters are reading 0dB.

With a stereo line input playing and assigned to PGM, AUD and TEL, verify that audio is indeed present at these respective console outputs.

Note again that if a console output is being used to feed consumer type (-10dBu level equipment), the outgoing signal may be too hot for the receiving unit. In this case, turn down the external machine's input gain trims, or, if they are not available, you may wish to install a pad circuit between the console output and the outboard unit (see page A-3 for a suggested circuit). Be aware also of the proper way to hook up unbalanced equipment to the console's balanced outputs (see page 1-8).

Monitors

Audio Signals

See "Stereo Line Inputs" section in this chapter for general testing of monitor audio circuits. Note the monitor SOURCE select switchbank, in addition to the console's three output busses (PGM, AUD, TEL), has two

other selections: EXT 1 and EXT 2. These can be any line level signal you wish to feed the console (including the output of the accessory line select switchbank; see page 7-5). When selected, the audio you are feeding these EXTERNAL monitor ports should appear on the console's CR, STUDIO and HEADPHONE monitor outputs.

If you are using the console's I/O connector headphone output (instead of or in addition to the console operator's front panel headphone output jack) be sure you are familiar with the information set forth on page 6-5 of this manual. Assuming you have set-up an external headphone system, verify that its operation and level settings are as they should be. In other words, the external headphone system should follow the monitor SOURCE select switchbank, and should be interrupted by CUE whenever a CUE switch is pressed anywhere on the console.

Control Signals

You will already have verified the CUE interrupt feature of the R-5 console during your test of the stereo line inputs.

The console's MUTE control lines should also be tested. Presumably you will have assigned the console's first mono mic input channel to an announcer mic located in the control room, and programmed that channel to MUTE the console's CR output whenever that microphone is turned on. To test this function:

- 1) Set up a stereo line input module to play a track; assign it's input channel to PGM, assign the monitor SOURCE select switchbank to PGM, turn ON the channel and then and turn up the CR level control. Assuming the source machine connected to the line input is working properly, you should hear audio at the control room speakers.
- 2) Now turn on the announcer mic channel. The control room speakers should mute immediately, preventing feedback.
- 3) If you have wired up the console's ON-AIR TALLY function as well (page 6-6), the control room's ON-AIR indicator should also light up when the MUTE function activates.

Assuming your second mic input channel is dedicated to a studio microphone, and that studio has its own amplifier/speaker system fed by the console's STUDIO output, AND the second mic input channel has been programmed to MUTE STUDIO, then:

- 1) Set up a stereo line input module to play a track; assign it's input channel to PGM, assign the monitor SOURCE select switchbank to PGM, turn ON the channel and turn up the STUDIO level control. Assuming the source machine connected to the line input is working properly, you should hear audio at the studio speakers.
- 2) Now turn on the studio mic channel. The studio monitor speakers should mute immediately, preventing feedback.
- 3) If you have wired up the channel's remote ON TALLY function as well (page 2-5), the studio's ON TALLY indicator should light up when the channel is turned ON.

NOTE that while the console's individual mic channel remote TALLY functions (page 8-3) key directly off input channel ON switches, the console's ON-AIR TALLY function is activated by CR MUTE.

If you have not done the modification described on page A-10, the studio level will DIM by 15dB instead of muting completely.

Talkback

There are two possible talkback paths with the R-5 console: CR to STUDIO and STUDIO to CR.

In the first, CR to STUDIO, the announcer mic channel's pre-fader, pre-on/off signal is routed to the console's studio output whenever the momentary action TB switch is pressed. Naturally, in order for this to work the studio output must be operational; in other words, the STUDIO level control must be turned up, and the studio microphone channel must be OFF (if it were ON the studio speakers would be dimmed or muted). To test:

- 1) With the STUDIO level control set at its normal level (hopefully 6 or 7; see page APPENDIX, page A-3) press and hold the console's TB button and
- 2) Speak into the console operator's (announcer) mic. Your voice should come out over the studio monitor speakers. If the level is too loud or too soft, adjust the front panel trimpot just above the TB button until it is the way you want it.

In the second instance (STUDIO to CR TB), a microphone input channel (presumably the console's second one) assigned to a studio microphone has a remote momentary closure switch connected to that channel's TB-to-CR control port. When the (user-supplied) talkback button in the studio is pressed the studio microphone's pre-fader, pre-on/off signal is placed on the console's CUE bus, where the console operator can hear it on the built-in cue speaker (or anywhere CUE interrupt is programmed to occur). The level of the interrupt is determined by the CUE level pot; the studio mic fader setting has no effect on the talkback level.

Accessories

Tape Remote Controls

Assuming you have wired up this switchbank per the console pinouts called out on page 7-4 and in conjunction with the manufacturer's information for your specific machine, verify each control function by activating individual switches. Note, again, that each switch's LED indicator must be powered by the external machine; there are no internal power connections from the console.

Timer

When the console is initially powered up, the digital timer display will energize immediately. After this first power-up, it may be necessary to hit the RST (reset) button and/or S/S (start/stop) buttons in succession to zero out the timer counter. Once this is done the timer will be fully functional thereafter, with controls operating as follows:

S/S (START/STOP) - If the timer counter is stopped, pressing this button once will cause it to start. If the counter is active, pressing this button once will cause it to stop.

RST (RESET) - When pressed, resets the timer to zero. If the counter is running, the display will immediately start to count up. If the counter is stopped, the display will remain at 00:00.

HOLD - As long as this button is held down, the timer display will freeze at whatever number it was at when the button was pushed. *Note the HOLD button does NOT stop the timer counter*; when the HOLD button is released, the timer display will immediately jump to the current count and continue from there.

Line Selector

The accessory line selector switchbank should feed whichever signal is activated to the switchbank output (and hence to any console or external audio input this output has been wired to). Note individual switch LED indicators are powered from the R-5 console itself and should illuminate whenever a switch is turned on. Verify that designated audio signals are going to the correct input destination.

This concludes set-up and test.

Appendix

Chapter Contents

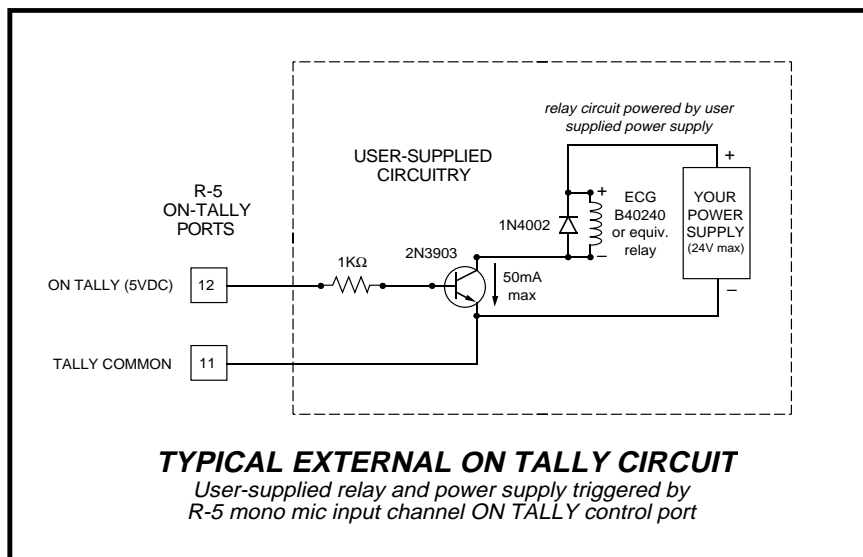
External On Tally Circuit	A-2
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EXTERNAL ON TALLY CIRCUIT

R-5 input channel on tally circuits are designed to power 25 milliamps at 5 volts DC (a typical solid state LED indicator). If you wish to run a larger load with this control port, it will be necessary to provide an external relay with its own power supply. The drawing below shows a suggested circuit for accomplishing this:

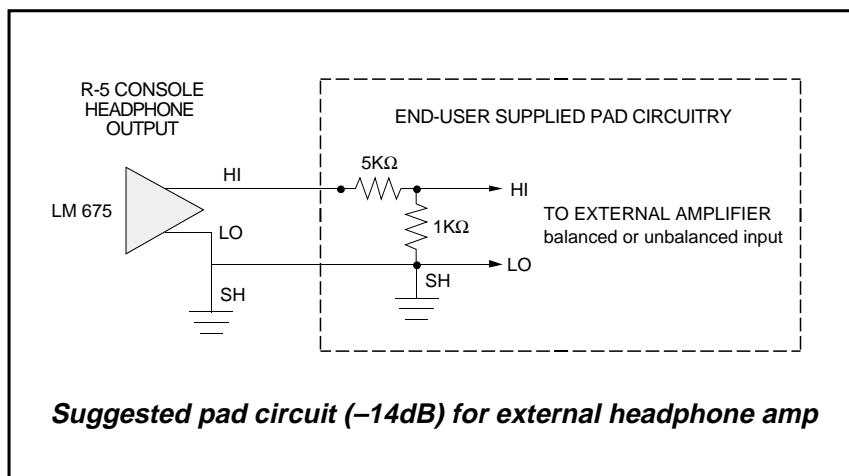


Don't forget the snubber diode (1N4002). It must be used to prevent back EMF from the relay from damaging the 2N3903 transistor shown, as well as the driver circuitry in the R-5 console.



EXTERNAL HEADPHONE PAD CIRCUIT

The R-5's external headphone output parallels the console's headphone jack, which is driven by an internal power amp. If you will be using the built-in jack AND driving an external amplifier from the I/O connector port (see page 6-5 for details), you may find (depending largely on the console operator's preferred HDPN level pot setting) that the feed to the external headphone power amplifier is too hot for the amp's input circuitry. If the external amp lacks input gain trims to remedy this, we suggest the following pad circuit be installed *at the amp*:

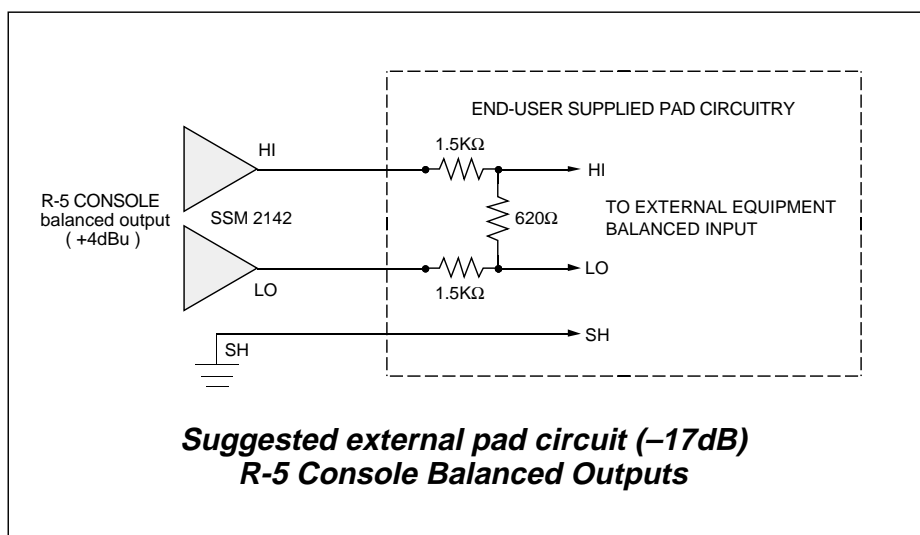


MONITOR LEVEL SETTINGS

It is a characteristic of most all rotary potentiometers that they perform best in the mid and upper portions of their audio control range. This is just common sense: if the gain structure of your external monitor/speaker system is set way up so a console level pot setting of only 2 or 3 results in a very loud signal at the speaker, then a very small movement of the control will result in a major level change. If, on the other hand, the external amp/speaker system has its input gain turned down, then the console level control can have a 6 or 7 setting, resulting in a much a wider control range (i.e., a small movement of the pot results in a correspondingly small change in level).

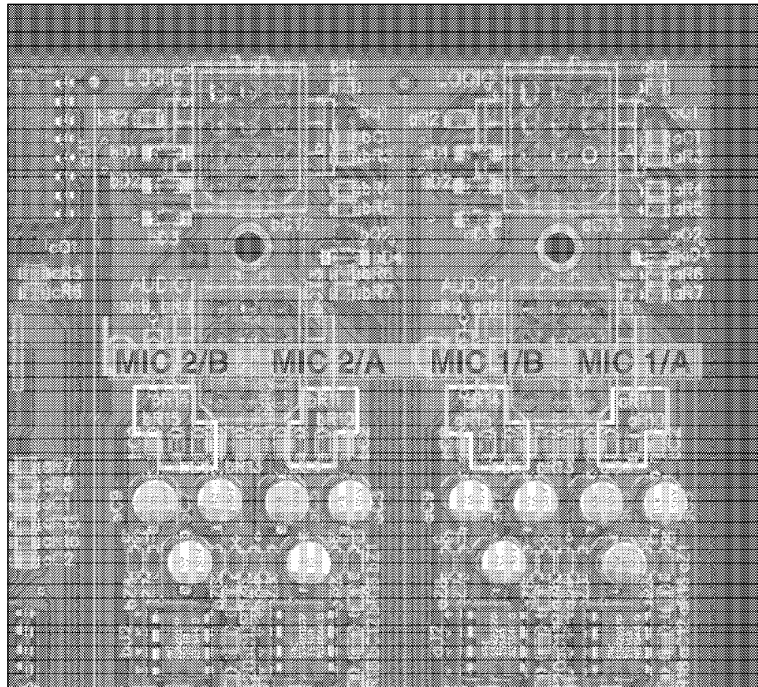
There are other advantages as well: left-right tracking is more consistent throughout a control's mid and upper range than at the bottom of it's taper; when a control pot is choked back to "almost off" the signal is radically attenuated; if the external amplifier is then turned way up to produce a satisfactory speaker level, any distortion or left/right mismatches introduced by the control pot will be amplified as well. Bottom line? Set your external amplifier input gain controls/trims so a console rotary control setting of 6 or 7 results in a satisfactory studio/control room speaker level. This will give you the best of both worlds.

If your external amplifier doesn't have input gain controls, you may wish to introduce an external pad (attenuation) circuit at the amplifier end of the feed. The circuit shown in the drawing below will work with any of the console's electronically balanced outputs (i.e., any output except mono mic channel insert patch points and the console's HDPN circuit [see preceding section]). It will provide approximately 17dB of attenuation.



DISABLING PHANTOM POWER

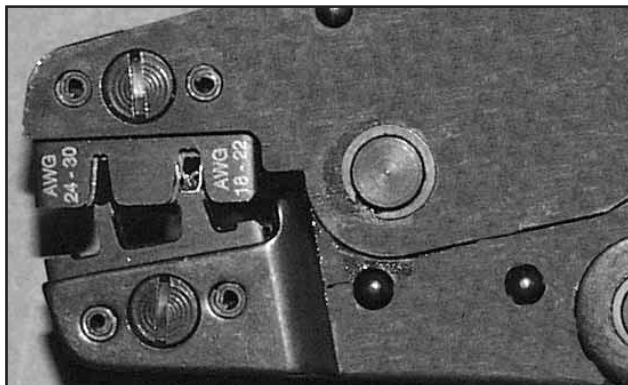
Mono mic input channels have built-in phantom power (+18VDC) that is always on. This will cause no problems for the majority of available microphones; however, should you find it necessary to disable phantom power, this can be accomplished by removing two 4.99K (1% precision) resistors from each associated microphone input channel. The four respective resistor pairs are shown below.



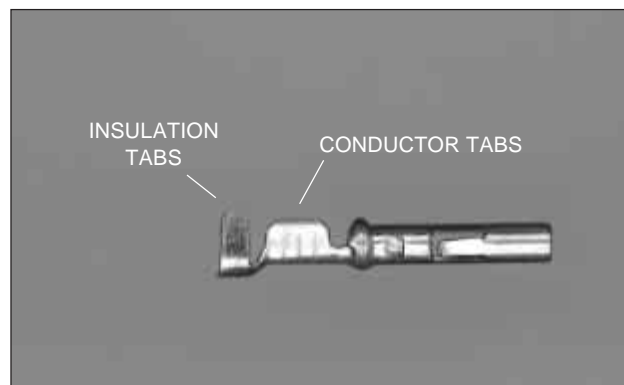
Rear view of MB-5 motherboard, behind microphone channel I/O audio connectors, showing location of phantom power resistors (four pairs: aR10/11, aR14/15, bR10/11, bR14/15).

HAND CRIMP TOOL WIRING INSTRUCTIONS

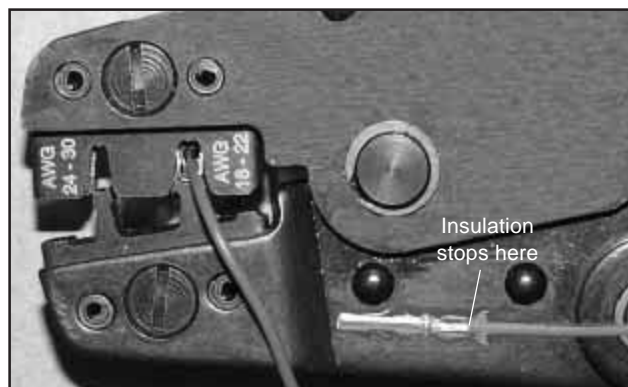
The supplied hand crimping tool (PALADIN model PA1645, W/S#850067) is used for all I/O wiring connections to and from the console. It is to be used with the supplied .062" pin diameter silver crimp terminals (figure 1) intended for 22 gauge wire.



(2) The terminal conductor tabs (pointing UP) are placed in anvil 18-22; the terminal's insulation tabs extend in front towards the camera.



(1) .062" pin diameter silver crimp terminal



(3) The stripped 22 gauge wire is placed into the terminal and crimped. Note the wire's insulation must stop just short of the conductor tabs (detail)



(4) Final step: jaws fully closed; the insulation tabs have been crimped.

1) Strip wire approximately 3/16" (insert in proper wire stripper, rotate one half turn, and pull insulation off wire).

2) Leaving wire aside for the moment, with Paladin tool fully open (engraved side toward you) bring a terminal into position from the unmarked side of the tool. Place the conductor tabs (inner set as shown in figure 1) on the "18-22" or "24-30" (depending on the wire) anvil (slightly curved surface) so that the circular portion of the tabs rests in the curved surface of the anvil and the two tabs face up into the walls of the female jaw. The insulation tabs will be flush with the top of the tool (figure 2).

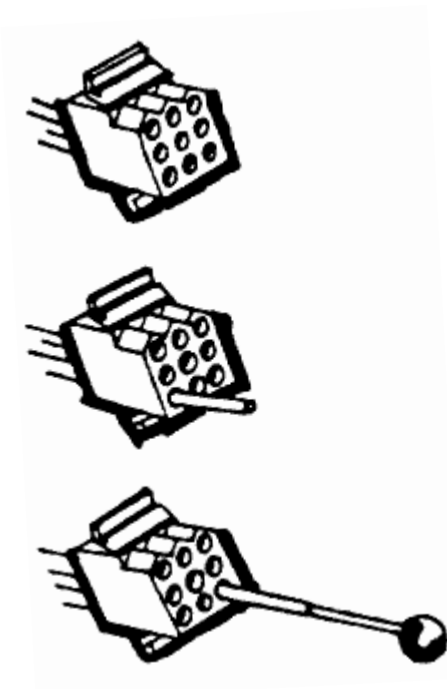
3) Close tool very slightly, only to the point of holding the terminal in position (figure 2).

4) Insert wire into terminal until wire insulation is stopped by conductor tabs (figure 3). CRIMP by squeezing handles until jaws are fully closed.

5) If there is an insertion error or if a circuit change is needed, you'll need to use an extractor tool to remove terminals (next section).

EXTRACTOR PIN INSTRUCTIONS

If you should accidentally insert a crimp terminal pin into the wrong socket, the supplied pin extractor tool (Waldom P/N W-HT-2023) will let you correct your mistake without having to sacrifice a connector.



STEP 1.
Push wire attached to pin terminal, to be removed, forward to free pin terminal locking flanges from the Nylon Connector Housing.

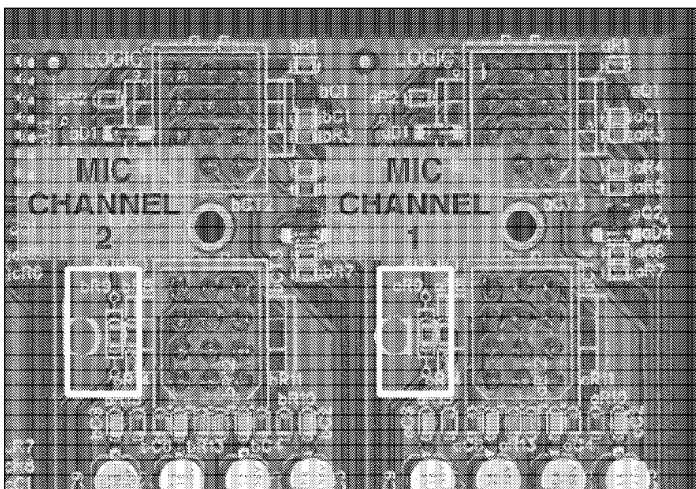
STEP 2.
Place extractor tip over pin terminal to be removed. Press handle portion of extractor in downward motion until tip rests upon Nylon Housing.

STEP 3.
Push ball at top of extractor down toward pin terminal; pin terminal will extract from Nylon Housing.

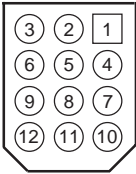
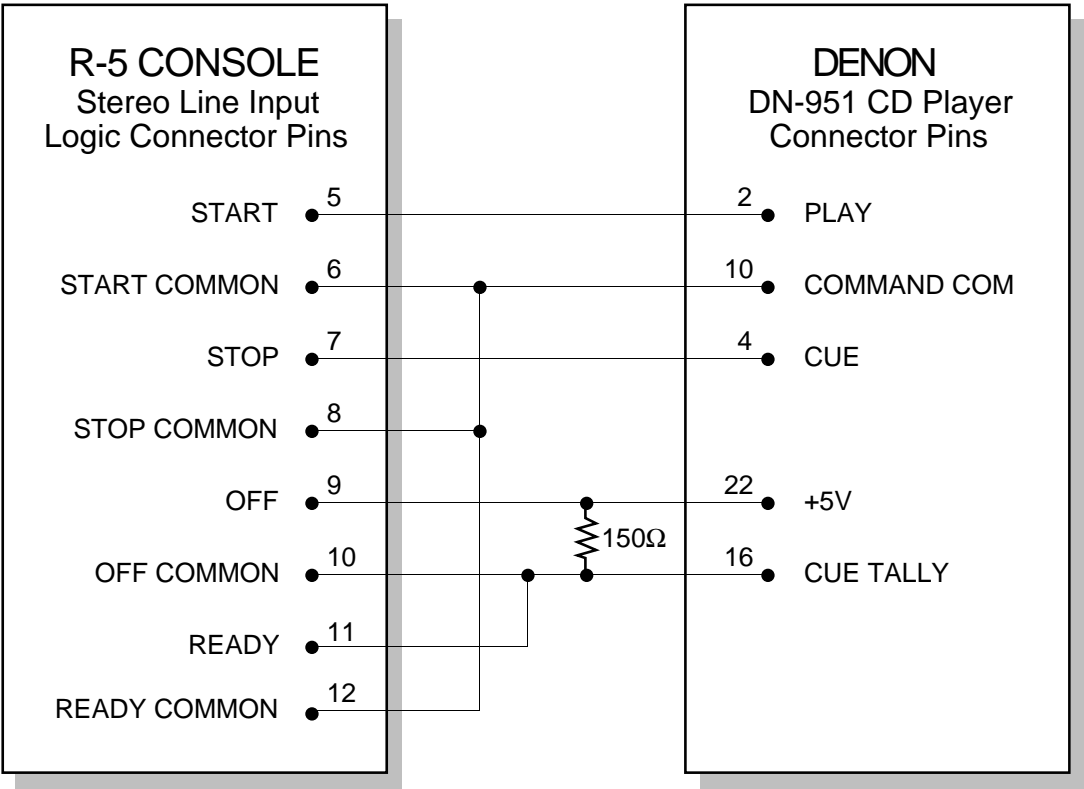
INSERT POINT BRIDGING RESISTORS

R-5 console mono mic input channels have built-in insert patch points. These patch points are bridged at the factory with a 10 Ω resistor so signal will pass through the input channel without any external gear installed. If you will not be using the insert points, or will only be utilizing the INSERT OUT port (for use as a direct output from the input channel) there is no need to modify anything. If, however, you plan to use the insert point as a pair of I/O ports for an outboard processing loop, with the signal leaving the console from INSERT OUT and returning after processing to INSERT IN, it will be necessary to remove the insert bridging resistor for that channel.

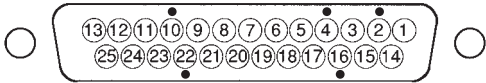
There are two bridging resistors; both are 10 Ω , with one for mic input channel 1 (resistor "aR9") and one for mic input channel 2 (resistor "bR9"). These are shown on the schematic drawings at coordinates D-7 (pages 9-2 and 9-3) and on the MB-5 Motherboard PCB pictorial (page 9-12) in the upper righthand corner of the page. The photo below shows a close-up of the pertinent section of the board. Note once the resistor(s) are removed, each position has two thru-hole pads for jumper replacement should you decide to go back to the original factory configuration.



Rear view of MB-5 Motherboard PCB (detail). The mono mic input insert point bridging resistors shown must be removed if you plan to use external processing loops in the signal chain.



R-5 Console 12-pin connector

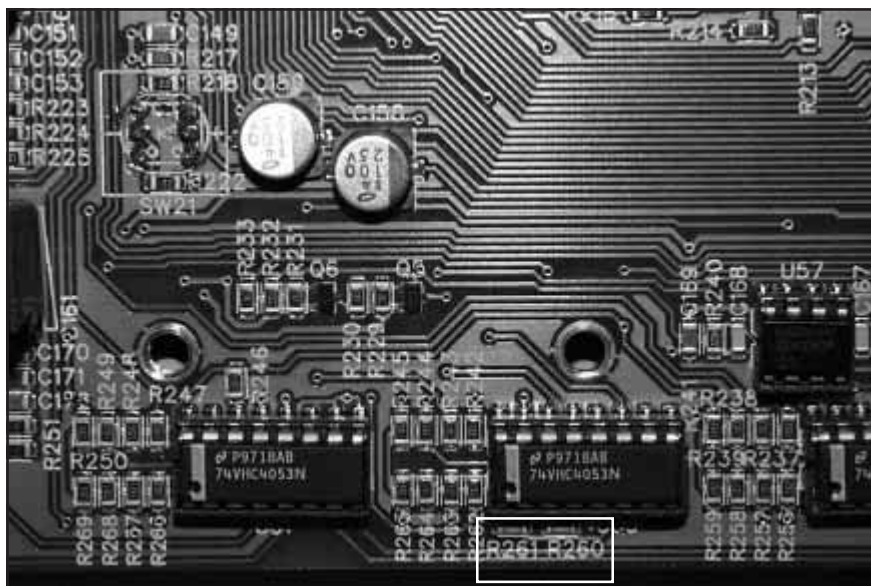


Denon Rear Panel DB-25

Hook-up Diagram for Denon Model DN-951 CD Player

STUDIO DIMMING RESISTORS

The R-5 STUDIO MUTE circuit is factory set as a 15dB dimming circuit instead of a muting circuit by the presence of two resistors, R260 and R261, with a value of 22.1K Ω each. These are shown on the schematic drawing at coordinates C-3 (p.9-18) and on the OM-5 Output Board pictorial (p.9-21) at the left edge of the page. To change the circuit to perform muting instead of dimming, remove R260 for the right Studio Out and R261 for the left Studio Out. The photo below shows a closeup of the pertinent section of the board.



Rear view of OM-5 Output Board PCB (detail). The dimming resistors shown must be removed if you need full muting capability in the Studio Output.