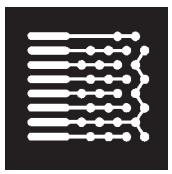
R-5 Audio Console

AUDIOARTS® ENGINEERING

OWNER'S MANUAL
March 1997



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

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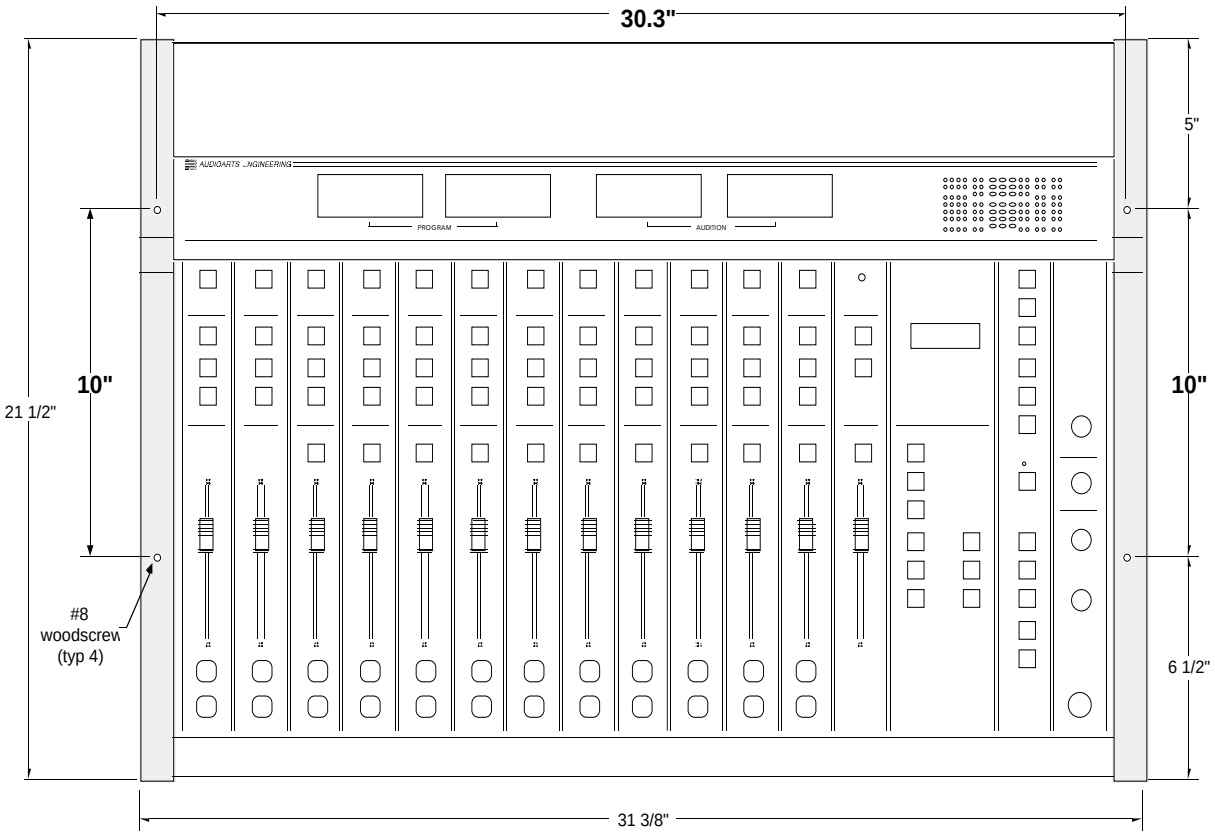
First Steps / Basic Info



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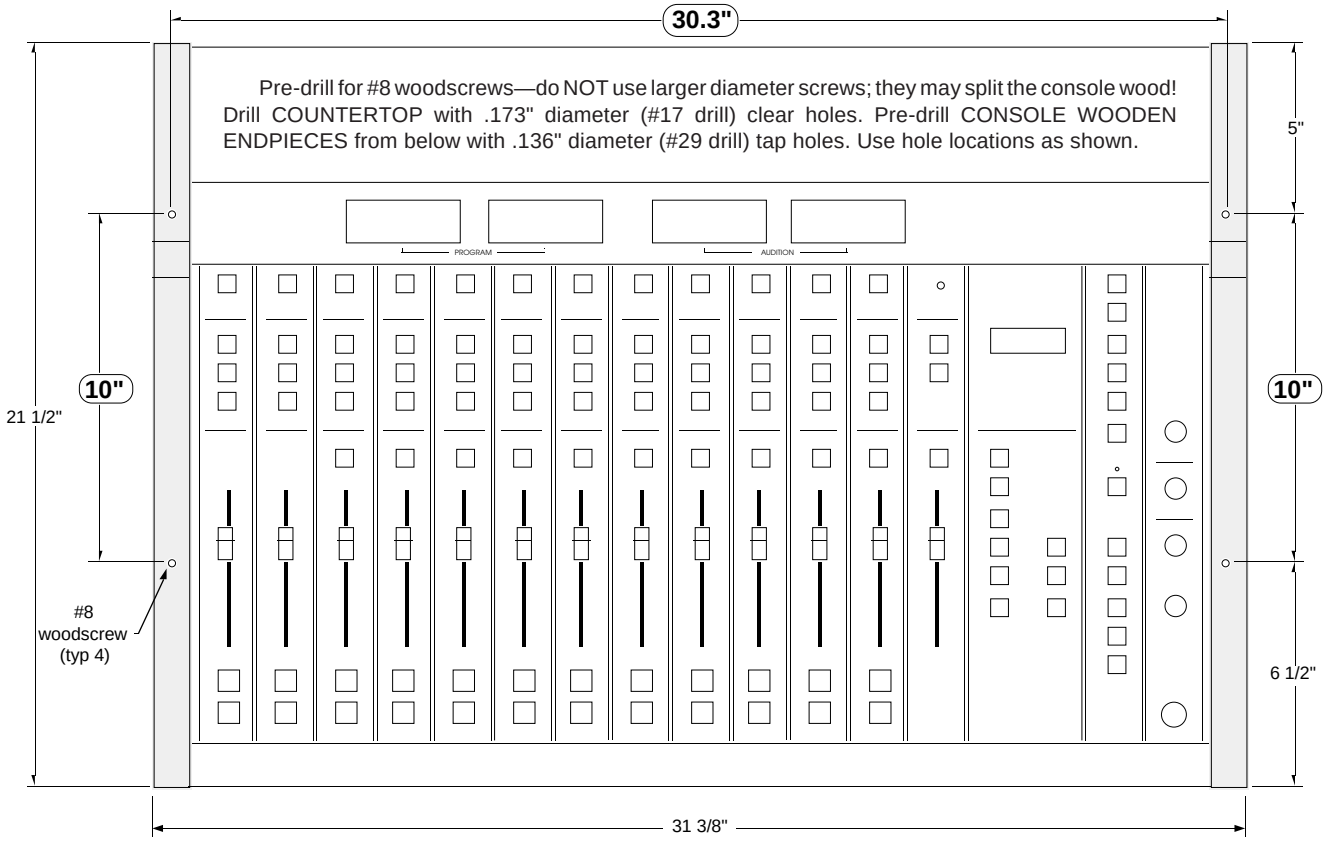
UNPACKING THE CONSOLE

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:

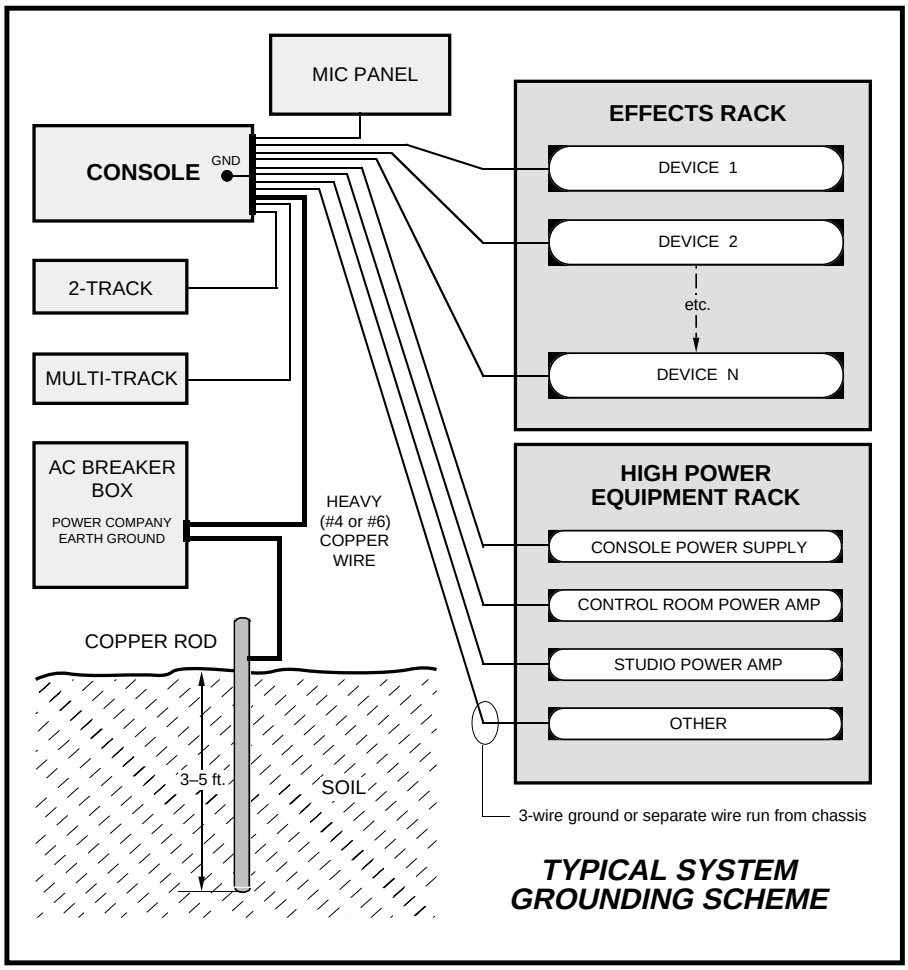
(A) EARTH GROUND, which is usually a heavy copper rod driven into the soil adjacent to the building (around 6 feet down) or a connection to the copper water pipes leading into the building. Either is acceptable (unless, of course, the water pipes are plastic).

(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 it's 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.

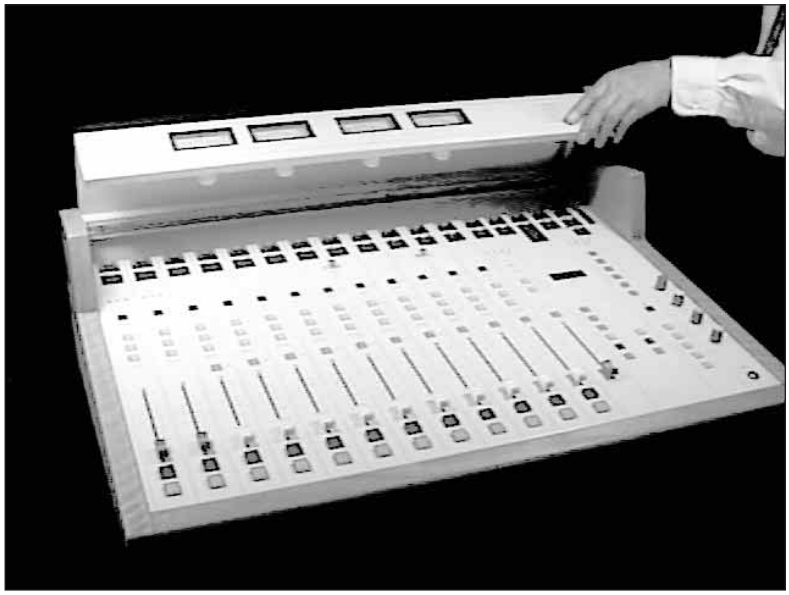
The four LEDs on the power supply front panel should light up to indicate the presence of their respective voltages. The console's VU meters and timer display will illuminate. All other switches should alternate on and off when pressed in succession. (Note CUE switches will de-activate when an associated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

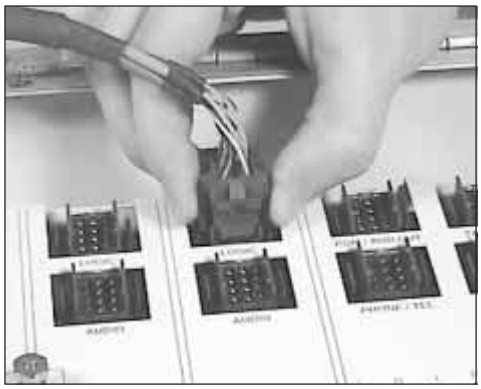
You are now ready to proceed with audio and control wiring. First, however, you should familiarize yourself with the R-5 wiring system and supplied tools (next section).

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.

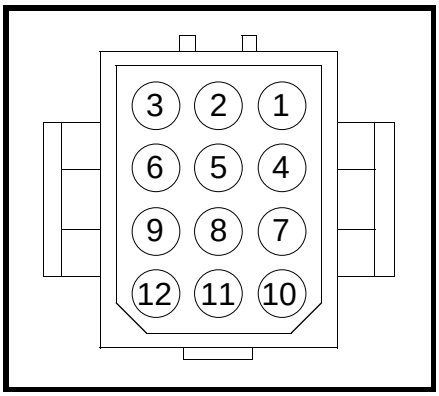
The supplied crimp tool (with extractor pin) is used to wire up all I/O connector plugs.

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.

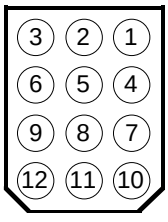
The audio signal pattern described in the text applies to input channel AUDIO (lower) connectors. Logic, output, monitor and accessory connectors have their own pinouts. See appropriate manual chapters for detailed information. In all cases, however, the pin numbering pattern (1-12) is identical.



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.

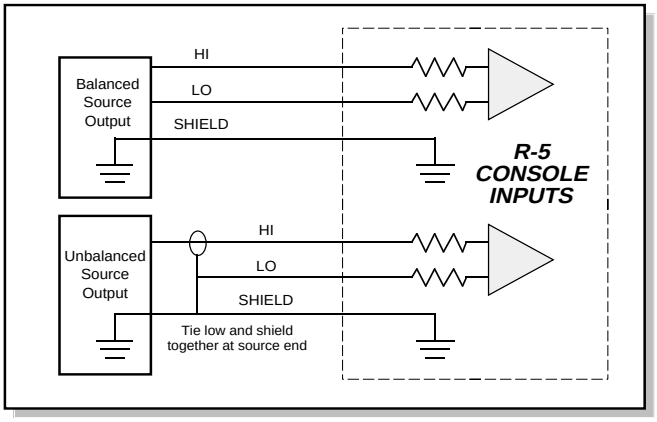
Not all equipment used in stations is balanced, however, and the most cost-effective devices often don't have +4 dBu output levels, either. Because of these realities, the R-5 console is designed to accept balanced or unbalanced sources with levels as low as -10dBu. If you will be using this type of 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).

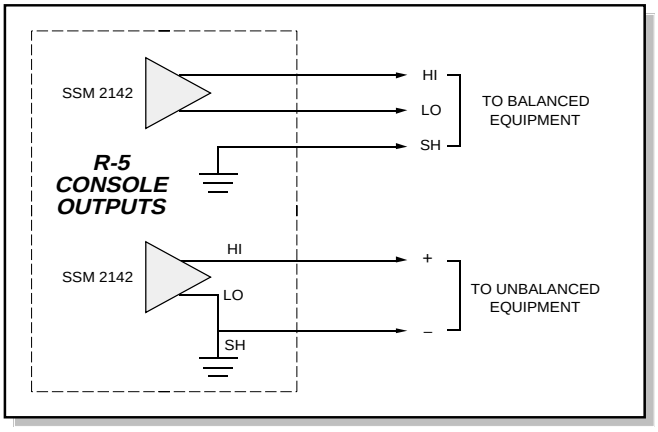
As a rule of thumb, consumer units (low level, –10dBu, unbalanced) usually utilize RCA jacks and two conductor wiring connections; professional level equipment (+4dBu, balanced) generally uses three-conductor XLR connectors.

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:





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

Mono Mic Inputs 2-4
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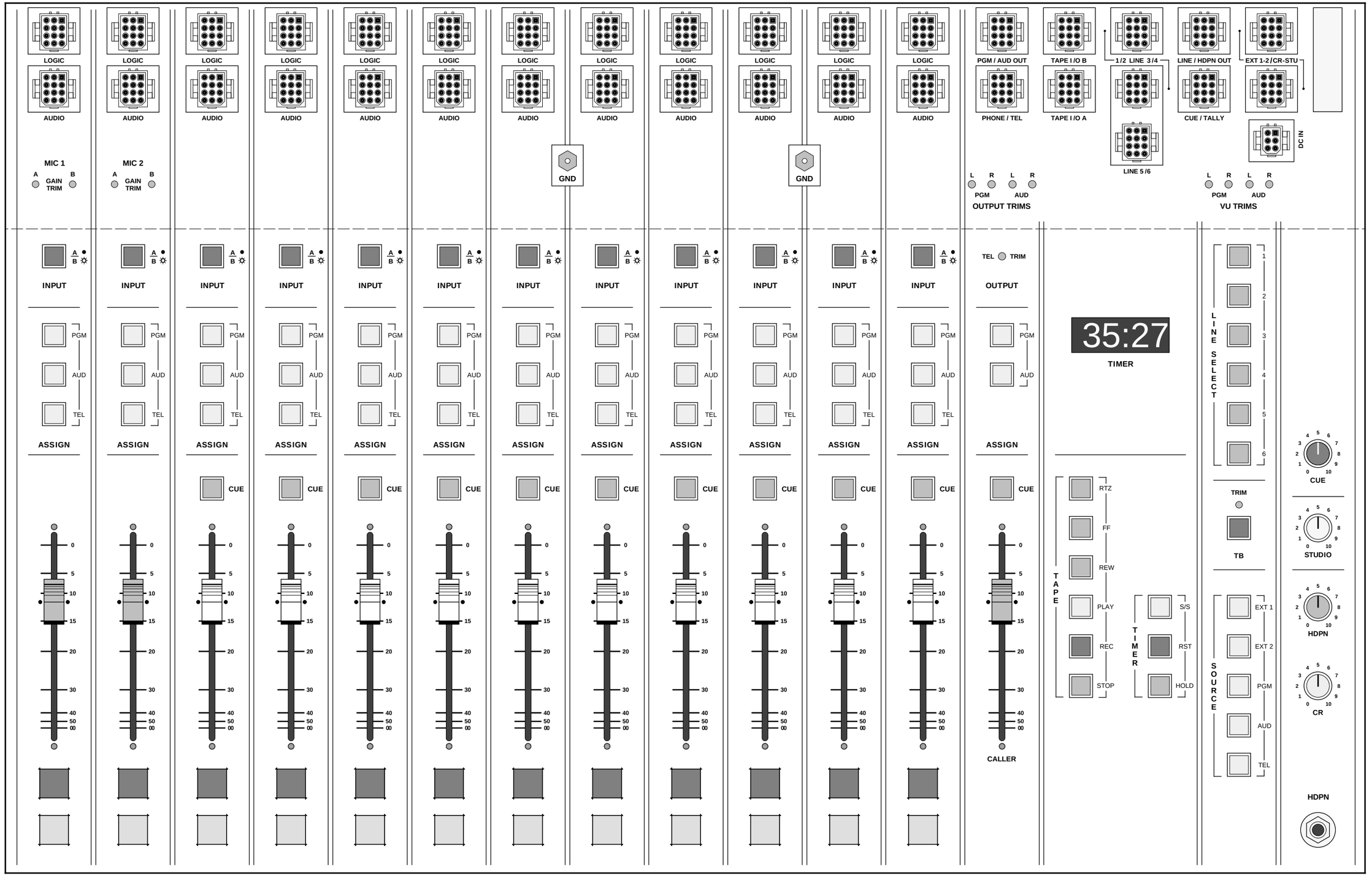
SET-UP AND TEST

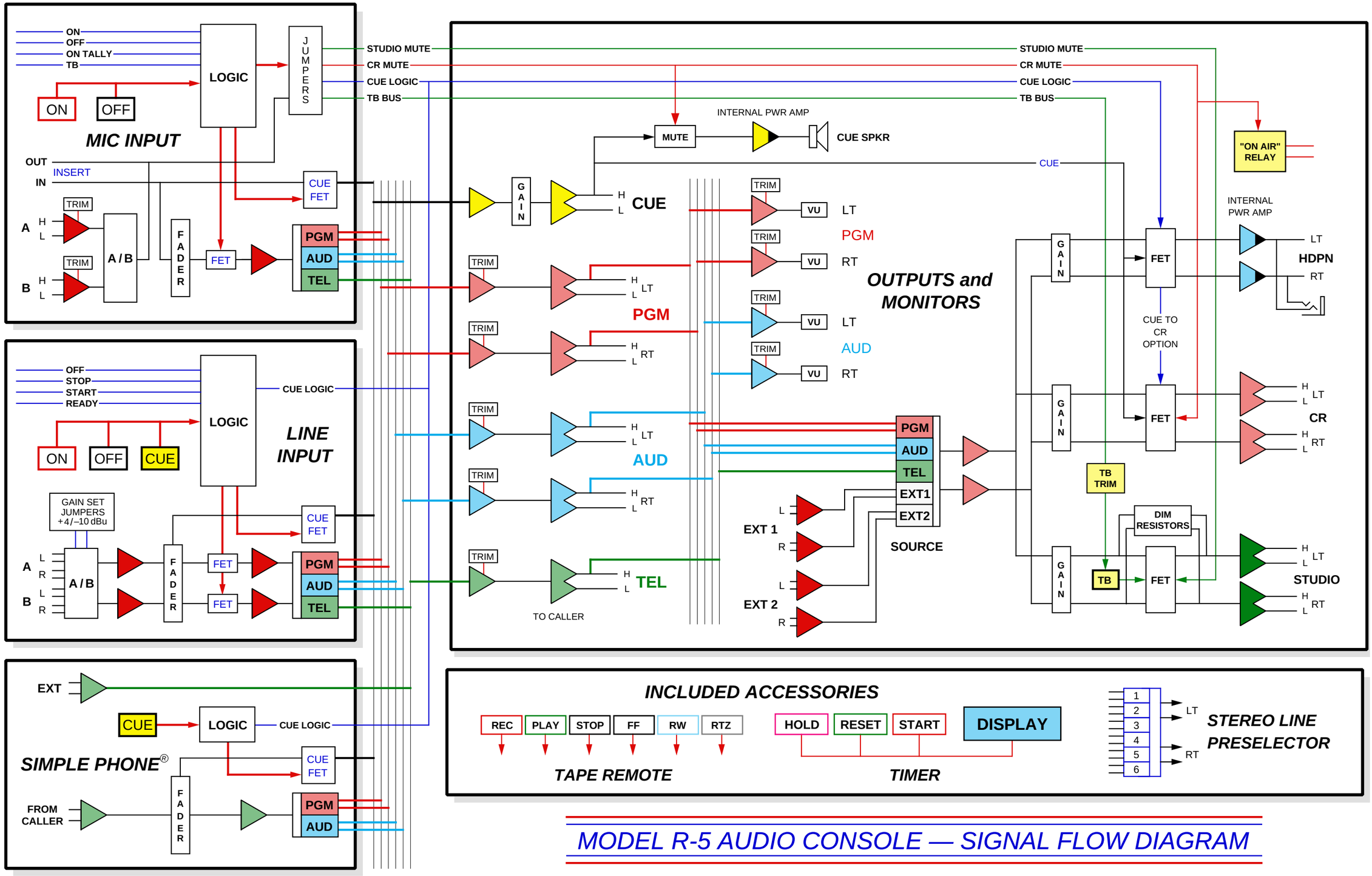
Once all wiring is complete, as called out in the instructions listed above, proceed to Chapter 8 ("Set-up and Test") which will walk you through a check-out procedure for your R-5 console.

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) ±1/4 dB
Mic (20Hz-20KHz) ±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/µs

PHASE RESPONSE
input to output <25°

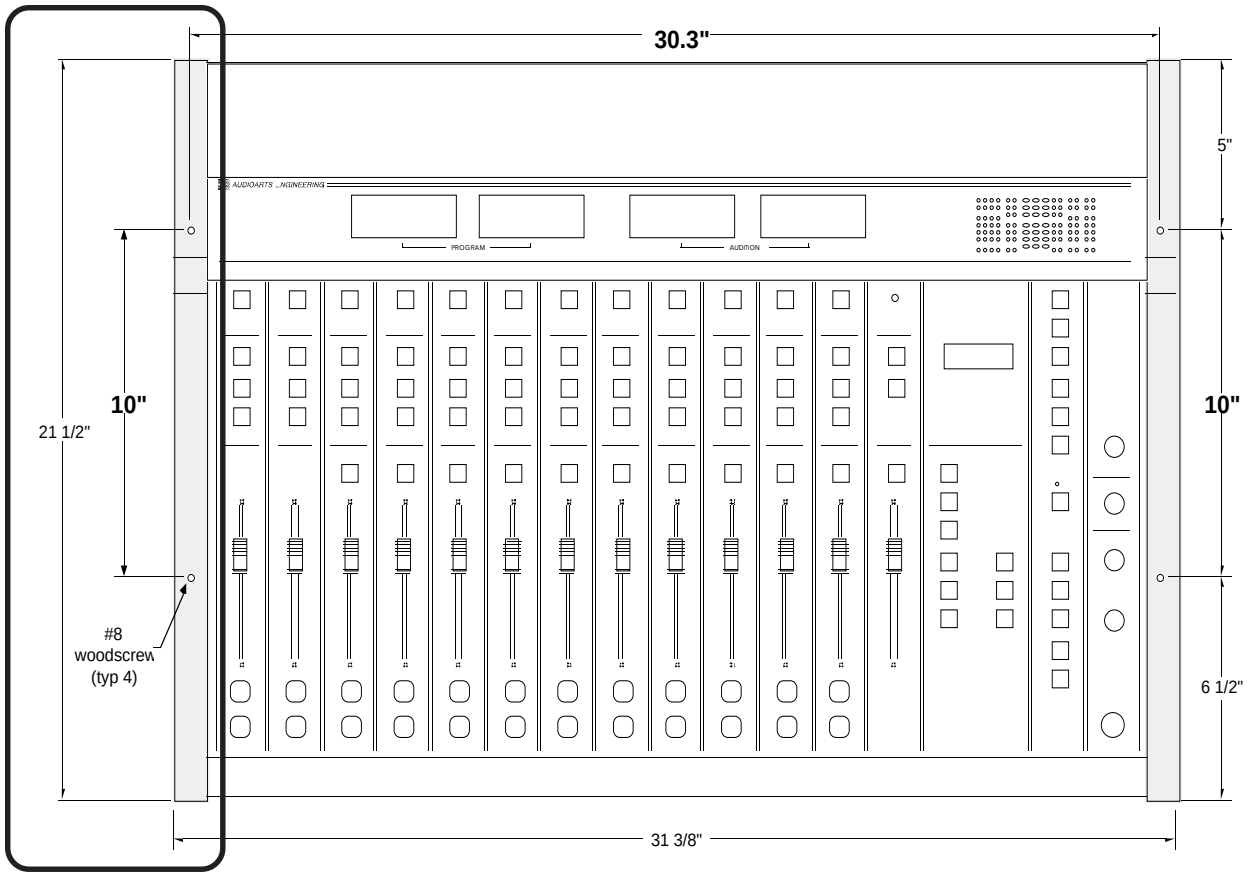
PHASE DIFFERENCE
left to right <1°

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

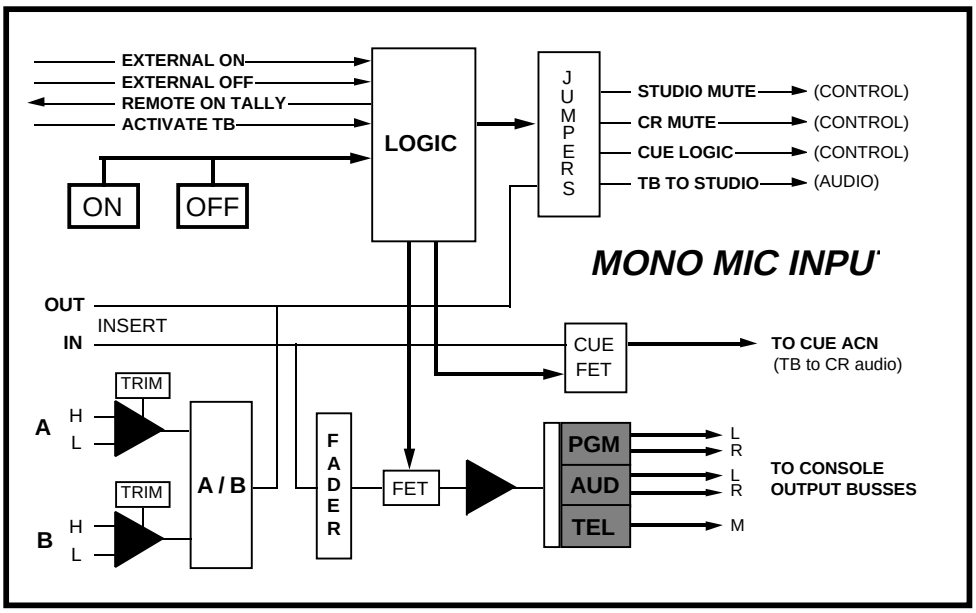
Each R-5 audio console is supplied with two mono microphone input channels; each channel can accept two microphone input signals which are accessed by an A/B input selector switch at the top of the channel. There are individual microphone gain trims provided for each A and B input, allowing you to match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

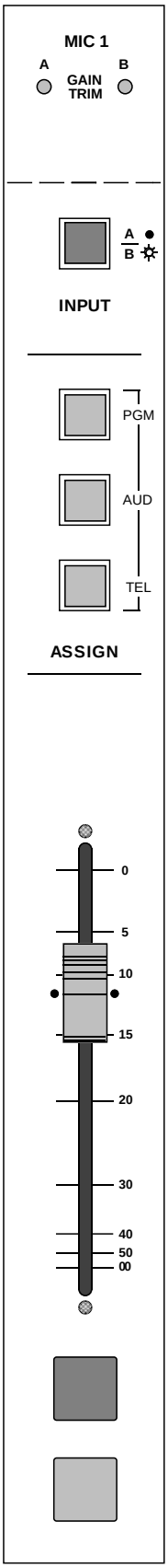
As you can see by the signal flow diagram below, a pre-fader, pre-on/off insert point is provided for mic inputs, allowing you to use outboard signal processing (equalization, reverberation, compression/limiting, etc.) for individual channels. Note this patch point is bridged at the factory with an internal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

⚠ If you plan to use an outboard patch loop, the console's internal 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).



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.

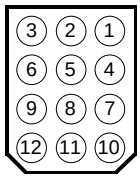
ON/OFF SWITCHES - Turn the channel ON and OFF. Brightly illuminated. If desired, they may be remotely controlled and programmed for different automatic functions:

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).

For more information on using balanced and un–balanced equipment com–binations with the R-5 console, see page 1-8.

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.

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).

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

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.

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

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)

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

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).

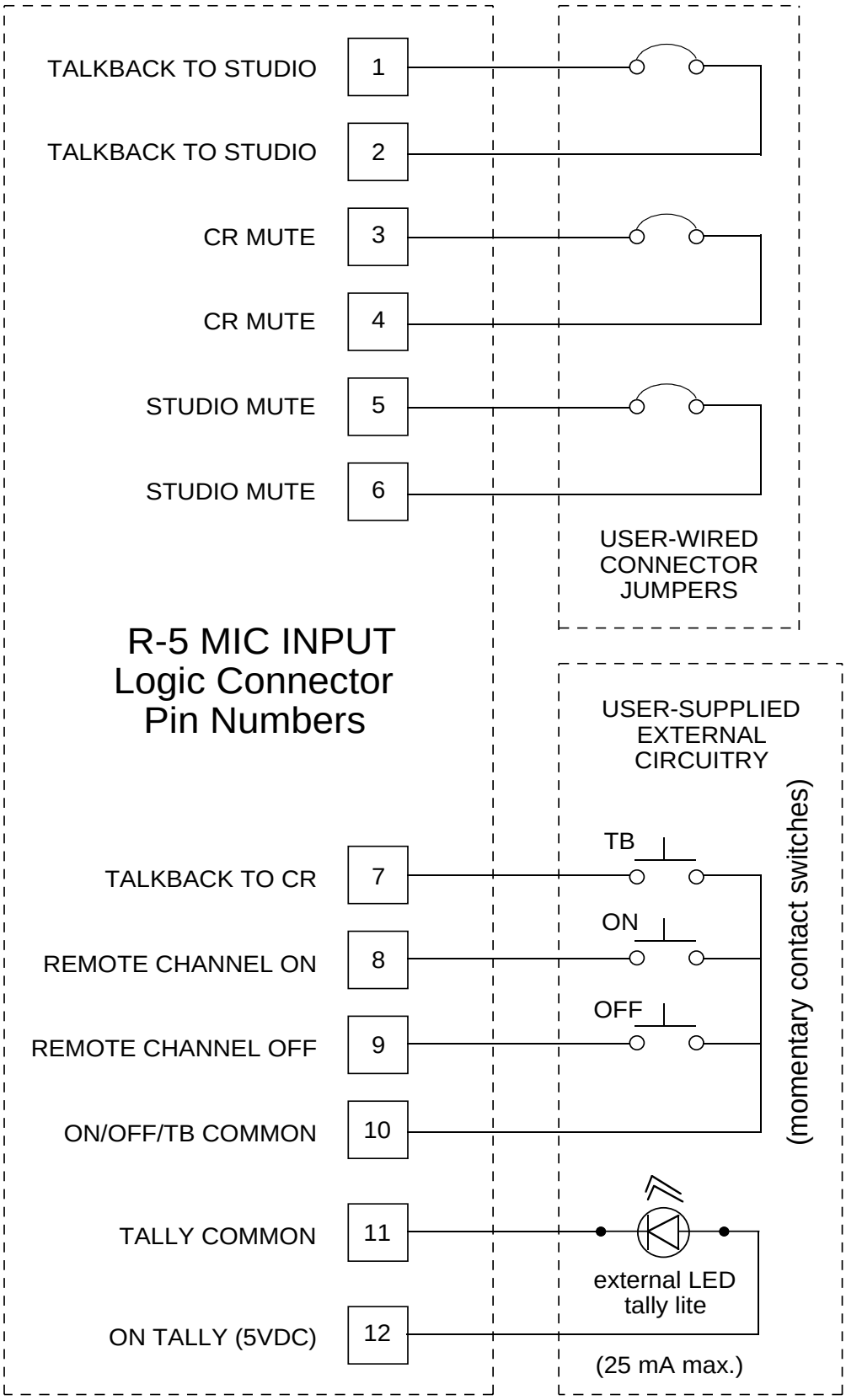
Pin 10 - ON/OFF/TB COMMON

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)

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.

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.



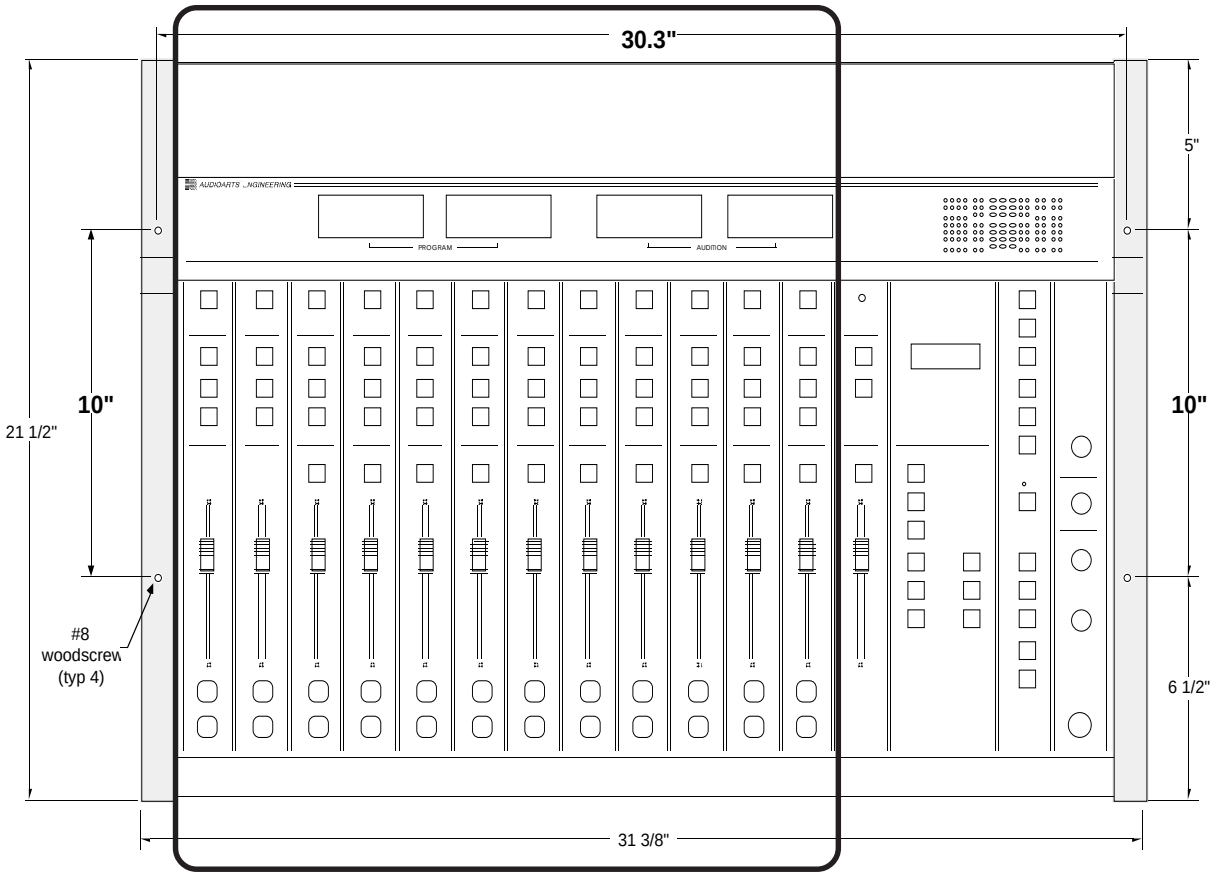
R-5 Mic Input Typical Remote Logic/Control Hook-ups

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



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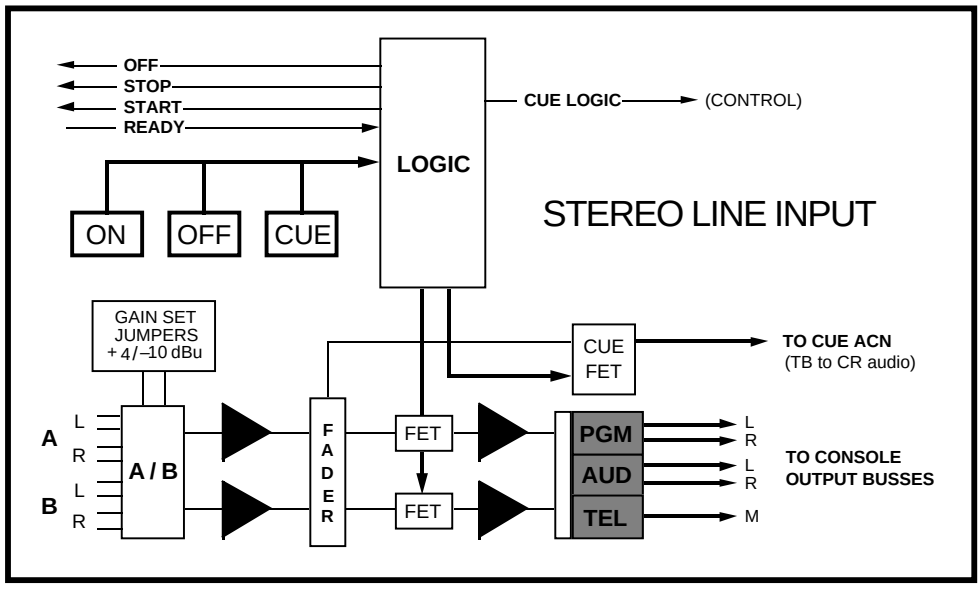
OVERVIEW

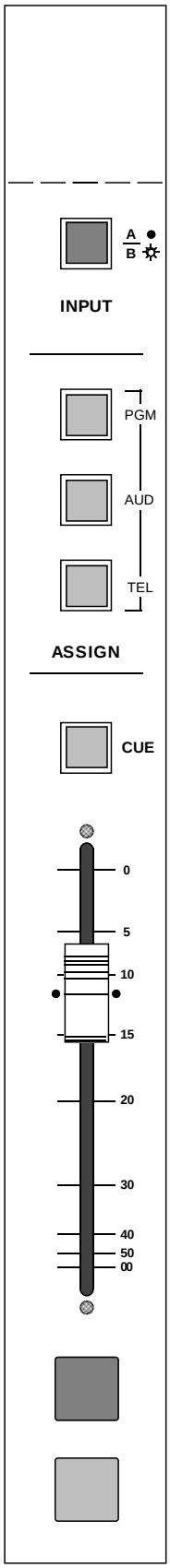
Each R-5 audio console is supplied with ten stereo line inputs; each input can accept two stereo line signals which are accessed by an A/B input selector switch at the top of the channel. Note there are two possible gain settings provided for each A and B input: +4dBu (professional level balanced inputs—the 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:

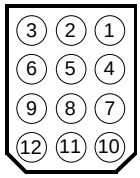
> **EXTERNAL CONTROL - Channel ON and OFF switches can START and STOP an external source machine. The external machine can also automatically shut OFF the channel when it reaches end-of-play, and can flash the channel OFF switch indicator LED when it is READY and cued up for play. All control ports are 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.

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.

For more information on using balanced and un–balanced equipment com–binations with the R-5 console, see page 1-8.

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]

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.

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.

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

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

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

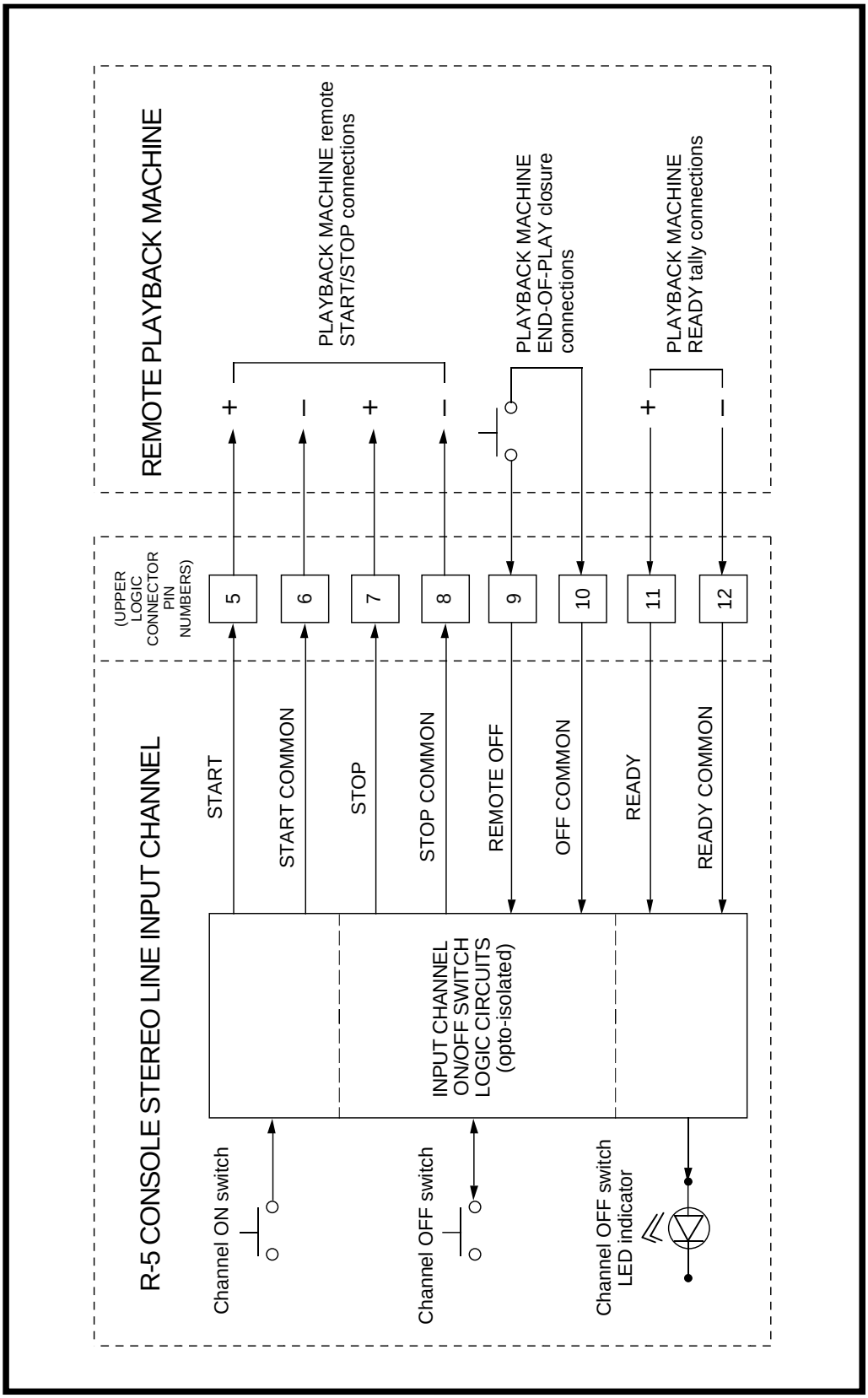
These pins are used to START and STOP a remote playback machine whenever the channel's ON and OFF buttons are pressed. They should be wired to the source machine's START and STOP connector pins. For machine connector details see the owner's manual for the particular unit you are using.

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.



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

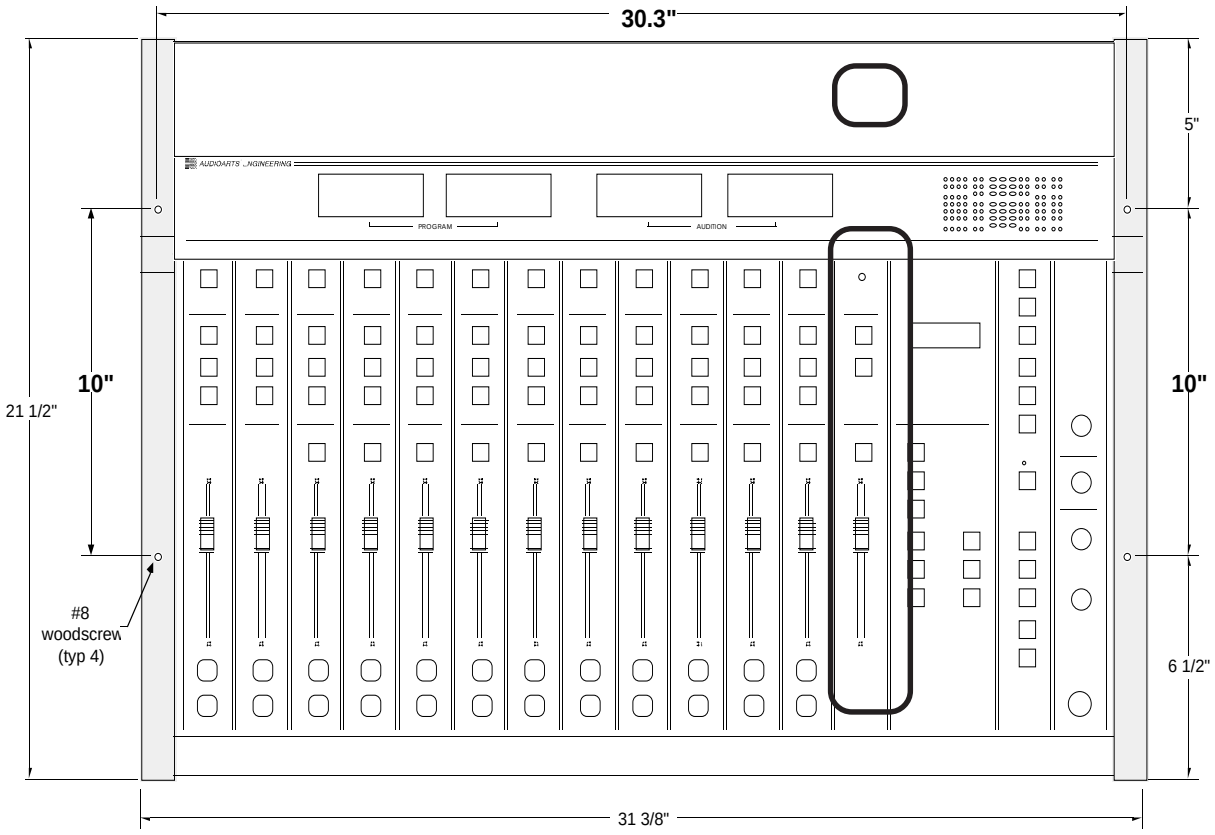
TECHNICAL DOCUMENTS

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



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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:

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

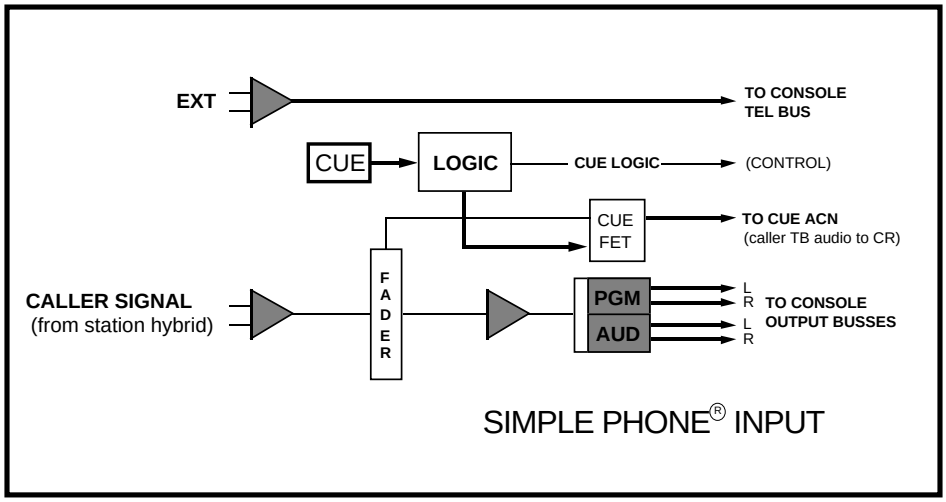
2) Deactivates CUE on the phone channel and assigns it to PGM,

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

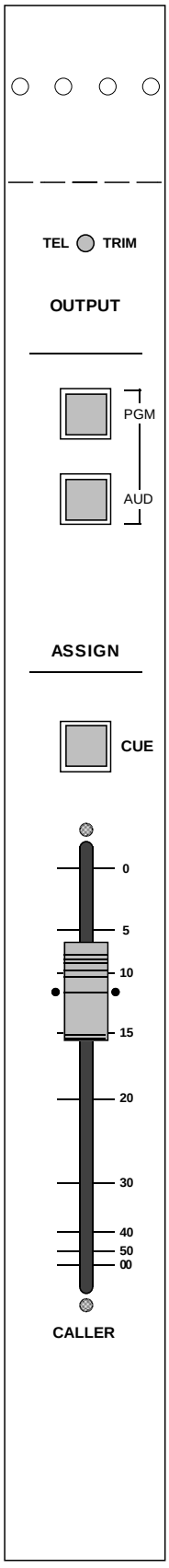
4) If the announcer wants to play any music during the segment, the appropriate stereo line input is assigned to PGM and TEL, letting the audience *and* the caller hear it.

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.



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.

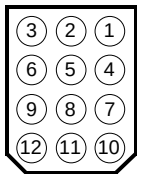
FADER - Long-throw carbon; plug-in for easy service. Controls the level of the caller's voice.

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 +4dBu levels).

Pin 1 - EXTERNAL INPUT, shield
Pin 2 - EXTERNAL INPUT, low
Pin 3 - EXTERNAL INPUT, high

Accepts a mono +4dBu 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 (+4dBu, electronically balanced). This port is used to get a signal back to the caller via the station's telephone hybrid (see below).

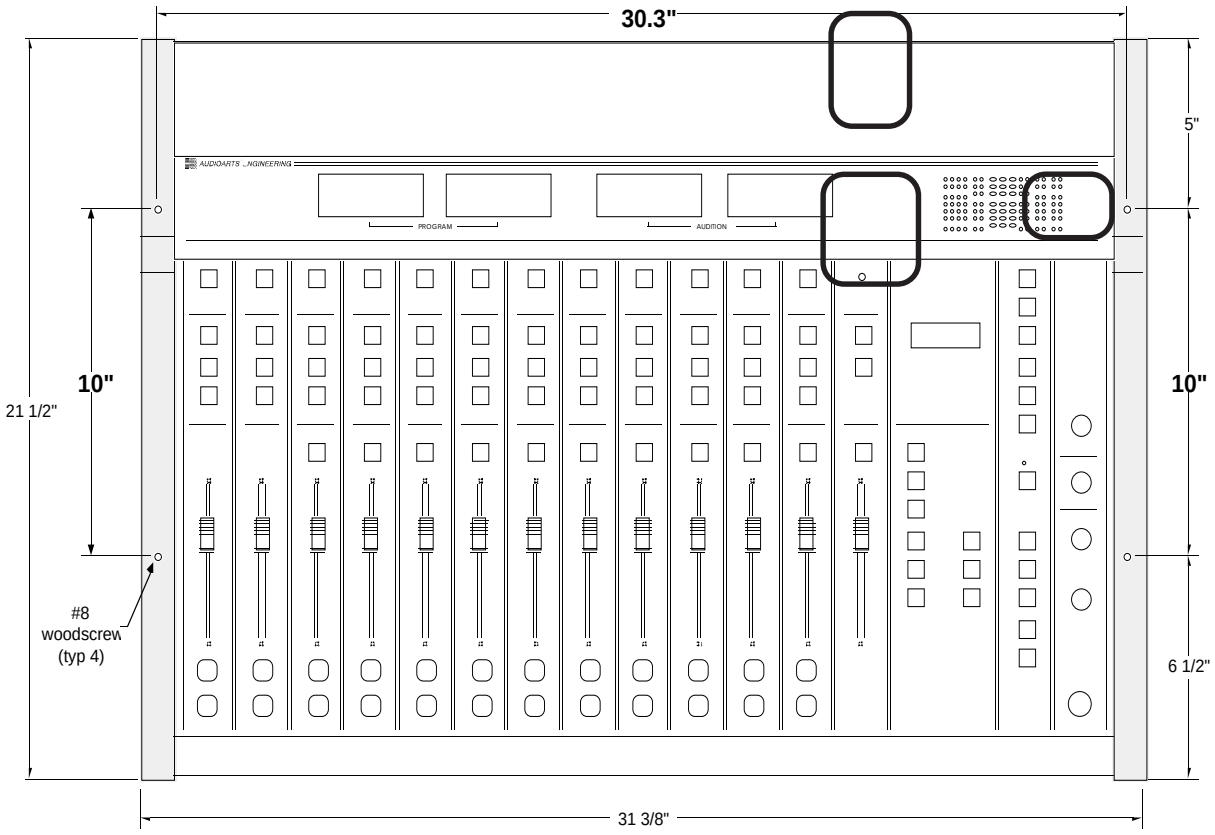
Pin 7 - FROM CALLER (+4dBu), shield
Pin 8 - FROM CALLER (+4dBu), low
Pin 9 - FROM CALLER (+4dBu), high
Pin 10 - FROM CALLER (-10dBu), shield
Pin 11 - FROM CALLER (-10dBu), low
Pin 12 - FROM CALLER (-10dBu), high

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 (+4dBu). 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

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.

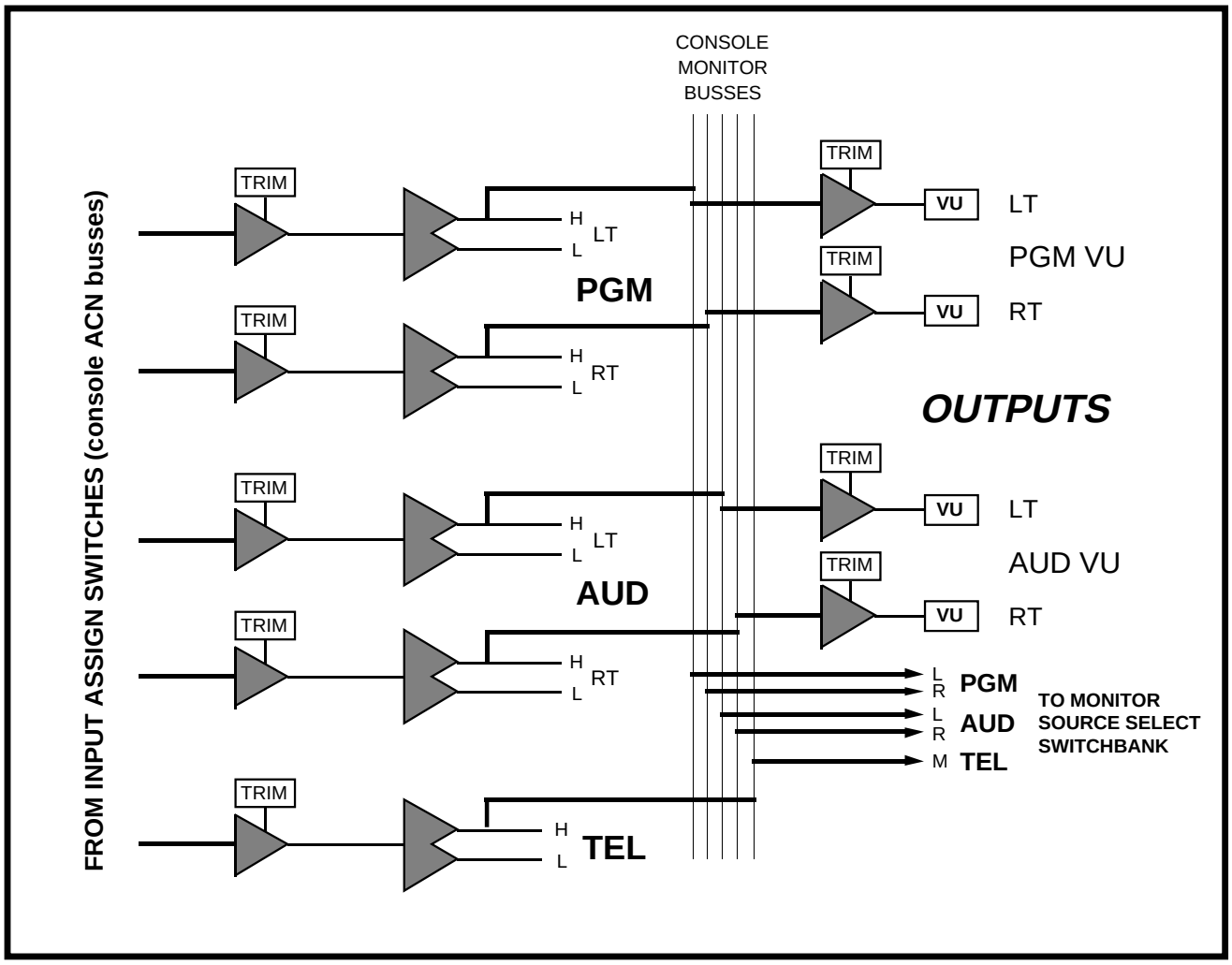
The R-5's Telephone (TEL) bus is the console's mono output; its level is adjusted by a trimpot located at the top of the phone channel. It does not have an associated VU meter. The TEL bus also serves another important function: it is used to generate a "mix-minus" feed for callers during on-air telephone 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.



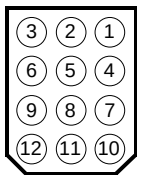
Signal Flow Diagram - Outputs

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 con–cerning the R-5 console wiring system and supplied tools, please refer to Chapter One, pages 1-6 and 1-7.

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).



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.

Program / Audition Outputs (Audio Connections)

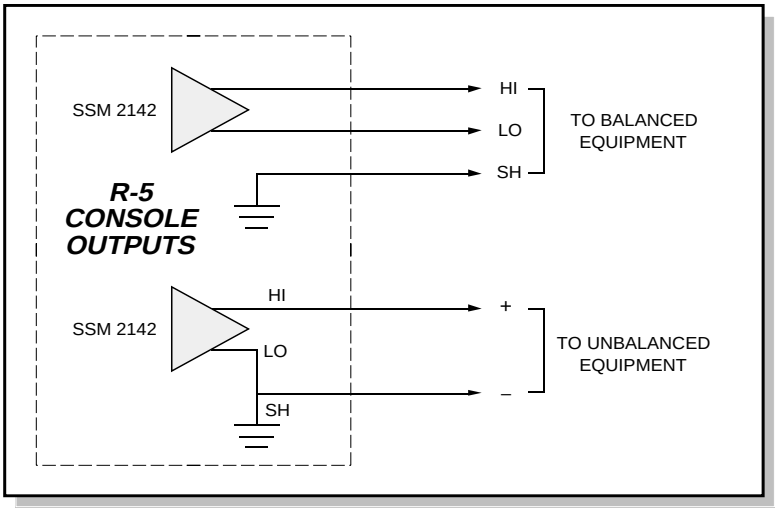
Pin 1 - LEFT PROGRAM OUTPUT, shield
Pin 2 - LEFT PROGRAM OUTPUT, low
Pin 3 - LEFT PROGRAM OUTPUT, high
Pin 4 - RIGHT PROGRAM OUTPUT, shield
Pin 5 - RIGHT PROGRAM OUTPUT, low
Pin 6 - RIGHT PROGRAM OUTPUT, high
Pin 7 - LEFT AUDITION OUTPUT, shield
Pin 8 - LEFT AUDITION OUTPUT, low
Pin 9 - LEFT AUDITION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

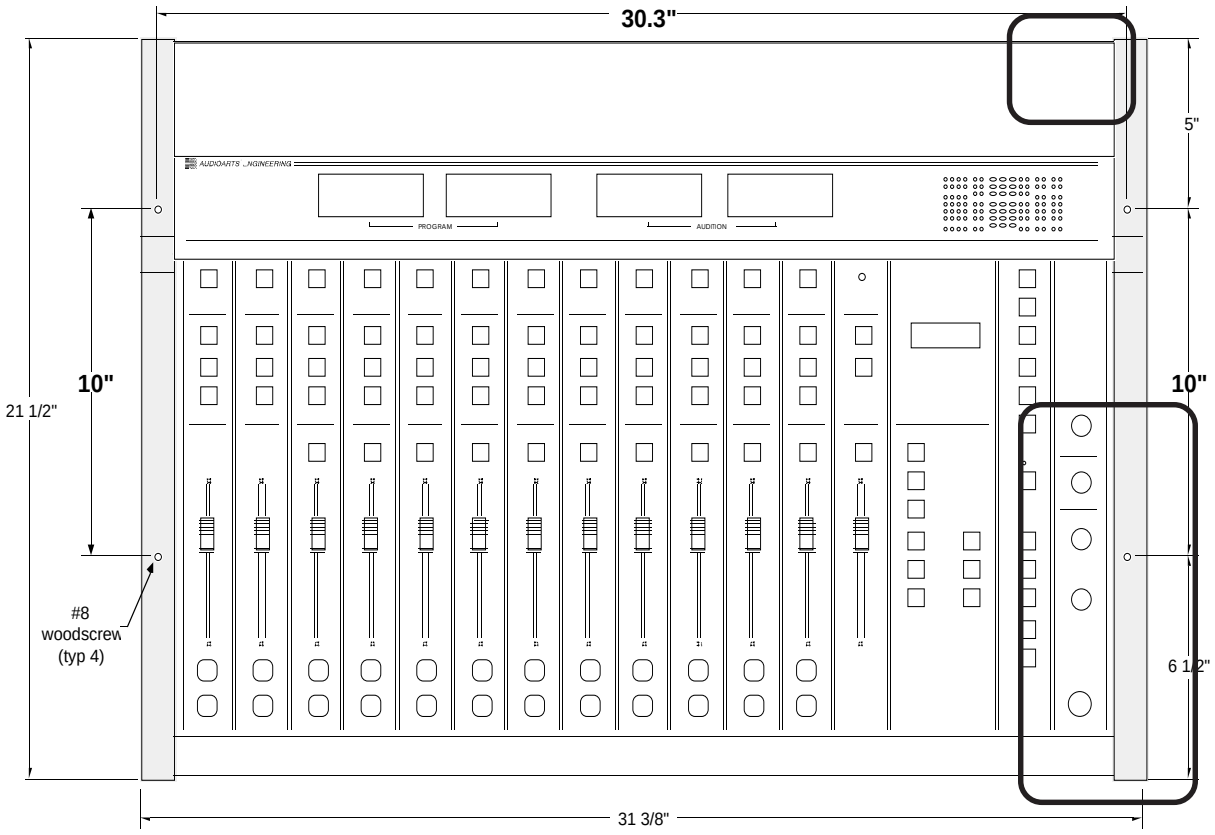
For more information on using balanced and un–balanced equipment com–binations with the R-5 console, see page 1-8.



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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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:

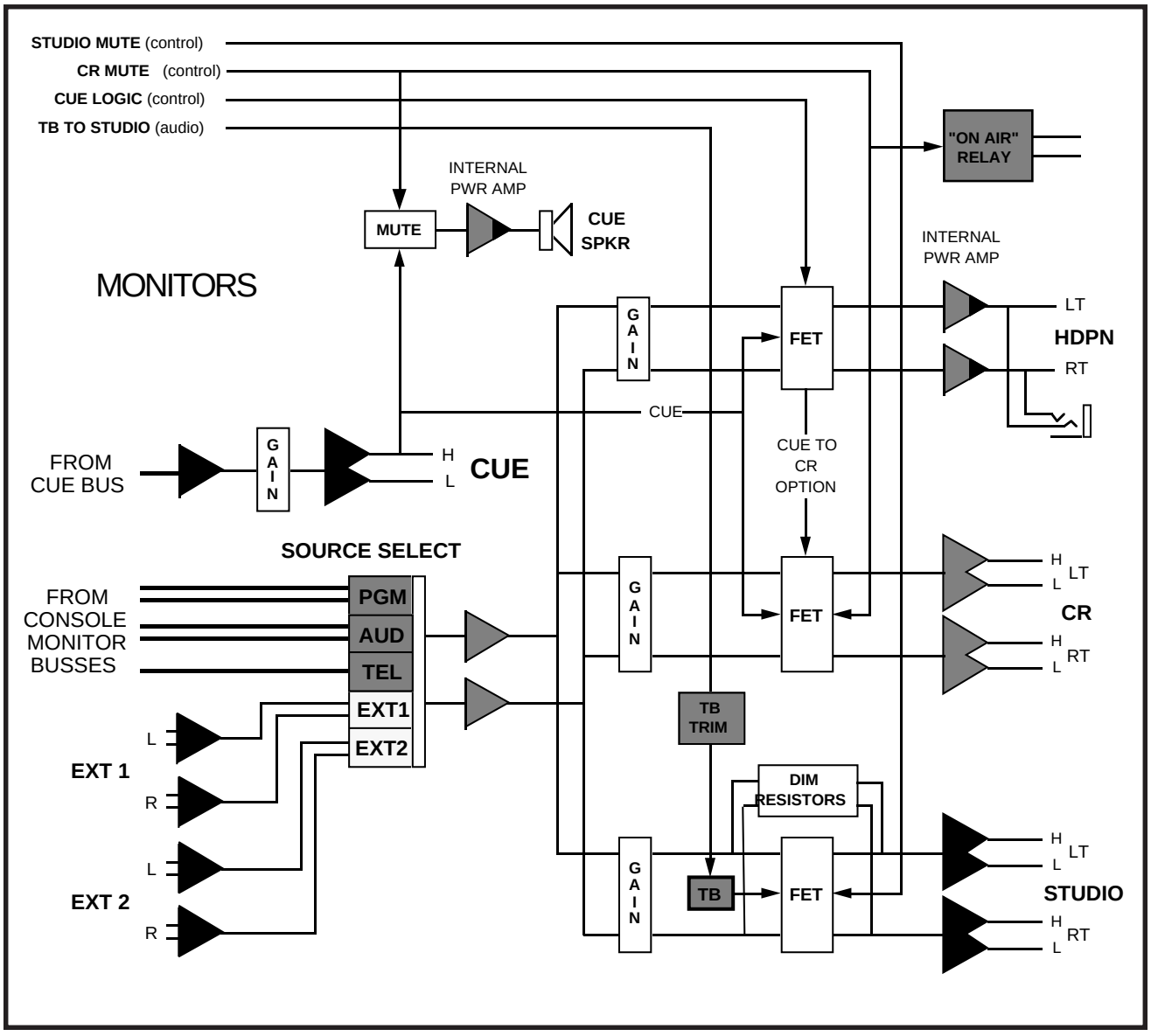
1) CUE can listen to any individual line input channel prior to it's going on-air. It does this even when the channel is off, regardless of any fader settings. The intended use here is for cueing up music tracks and program segments prior to on-air play. CUE is activated by pressing any line input channel 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.

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.

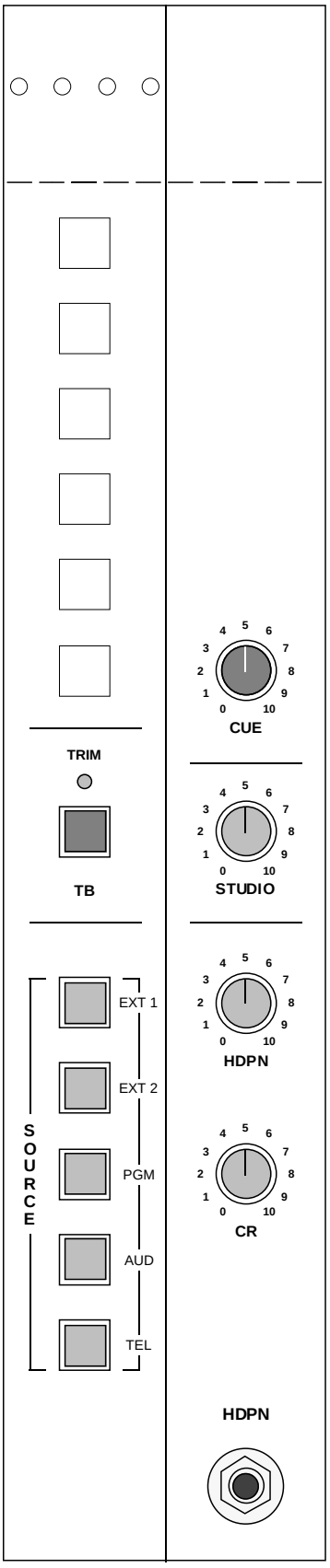
> **The purpose of this function (called "cue drop-out") is to prevent a potential on-air mishap: Assume a cue circuit system *without* this safety feature has been used to ready an audio track for airplay and that line channel now stands ready for firing (i.e., going on-air by pressing the channel ON 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 dropout" 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

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.

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.

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

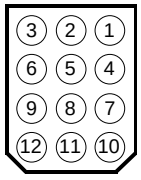
Pin 7 - HEADPHONE LEFT OUT, shield
Pin 8 - HEADPHONE LEFT OUT, low
Pin 9 - HEADPHONE LEFT OUT, high
Pin 10 - HEADPHONE RIGHT OUT, shield
Pin 11 - HEADPHONE RIGHT OUT, low
Pin 12 - HEADPHONE RIGHT OUT, high

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.

For more information on using balanced and un–balanced equipment com–binations with the R-5 console, see page 1-8.

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



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.

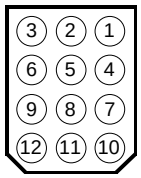
Cue Output

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.



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.

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

Monitor Circuits (Control/Logic Connections)

Cue/Tally

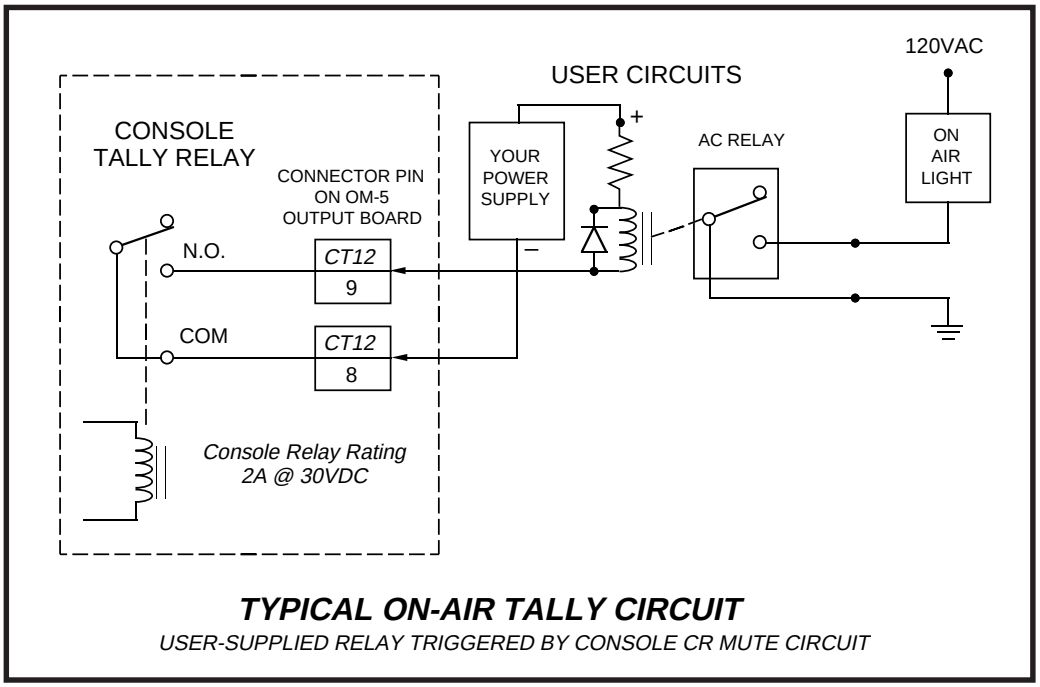
Pin 5 - CUE TO CR (jumper to pin 6 to activate)
Pin 6 - CUE TO CR

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.



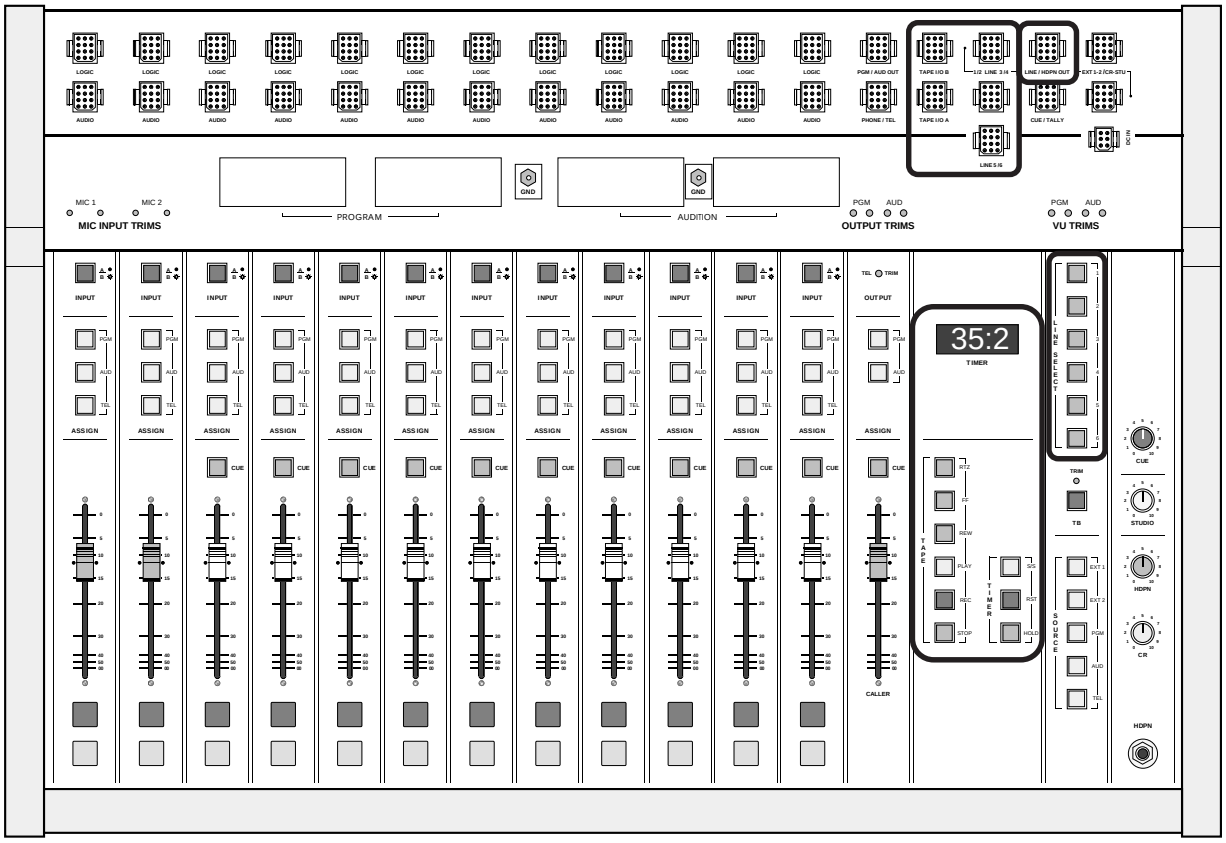
TYPICAL ON-AIR TALLY CIRCUIT

USER-SUPPLIED RELAY TRIGGERED BY CONSOLE CR MUTE CIRCUIT

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



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Line Selector (Audio) **7-5**
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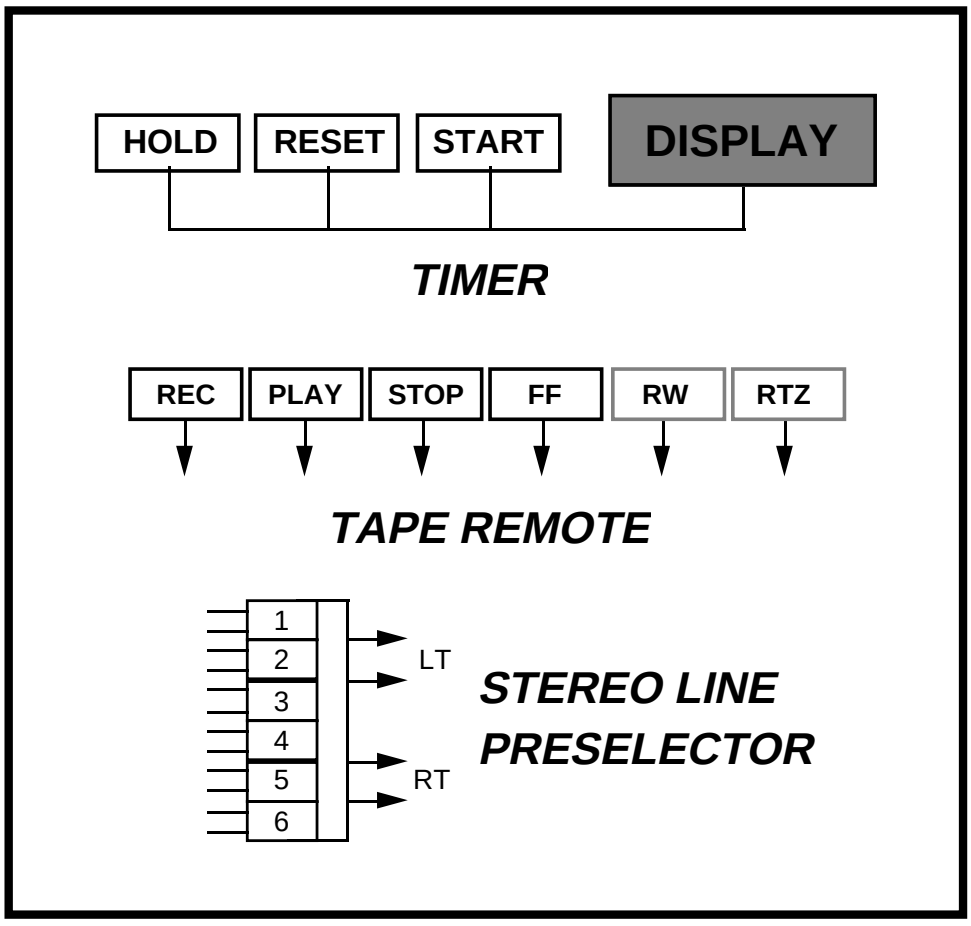
OVERVIEW

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

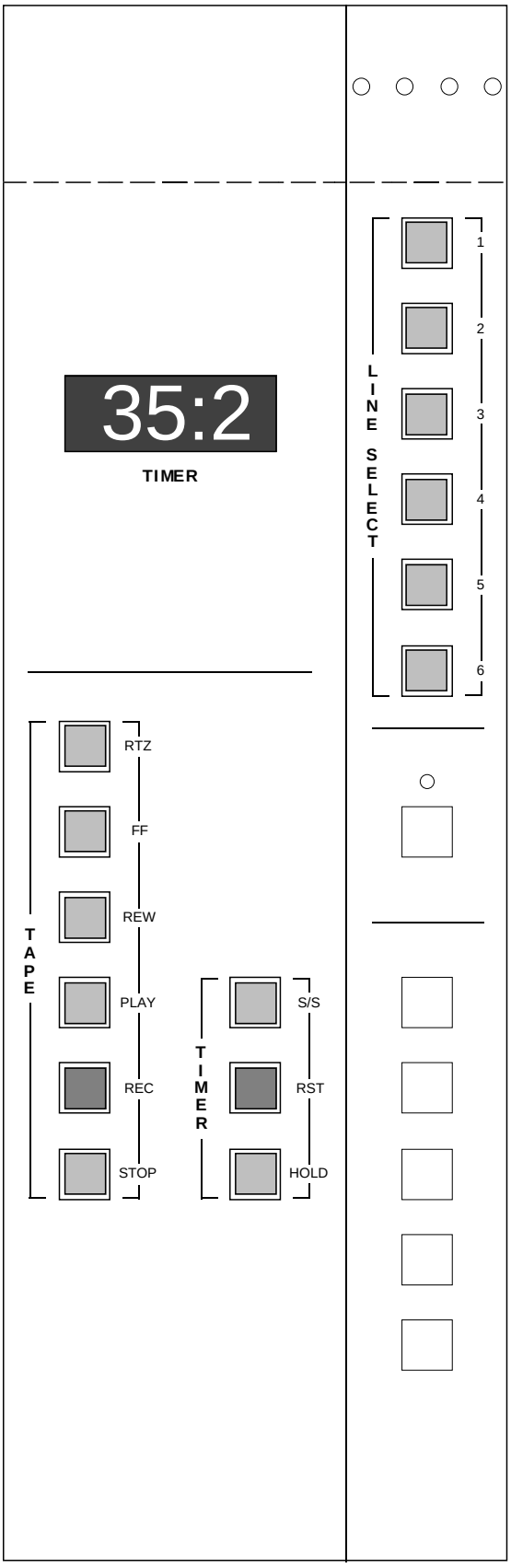
TAPE REMOTE – A full function switchbank (return-to-zero, fast forward, rewind, play, record, stop) for controlling one external recording machine.

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

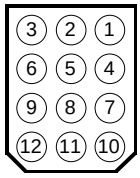


CONTROLS and FEATURES

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.

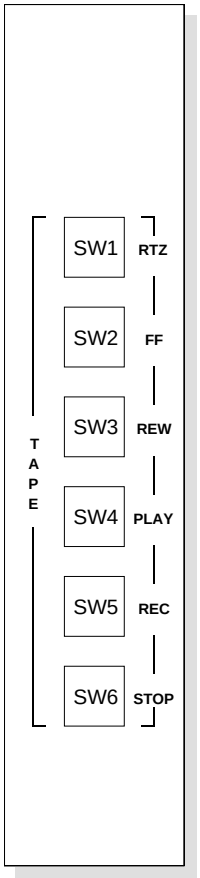
Tape Remote I/O "A" (LOWER connector, switches 1-3)

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)

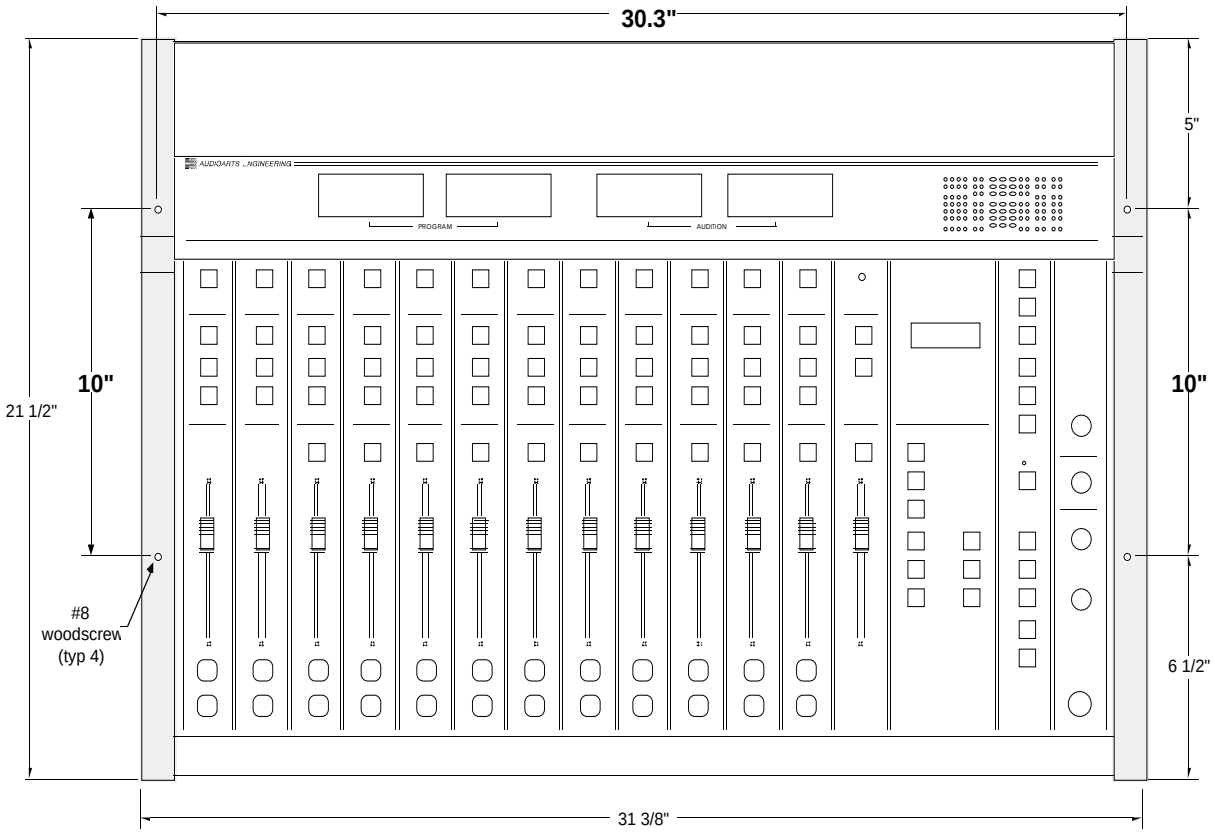
Pin 1 - LINE SELECTOR LEFT OUT, shield
Pin 2 - LINE SELECTOR LEFT OUT, low
Pin 3 - LINE SELECTOR LEFT OUT, high
Pin 4 - LINE SELECTOR RIGHT OUT, shield
Pin 5 - LINE SELECTOR RIGHT OUT, low
Pin 6 - LINE SELECTOR RIGHT OUT, high

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



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Timer **8-8**
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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 it's 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.*

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

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.

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.

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.

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.

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

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.

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.

Technical Documents

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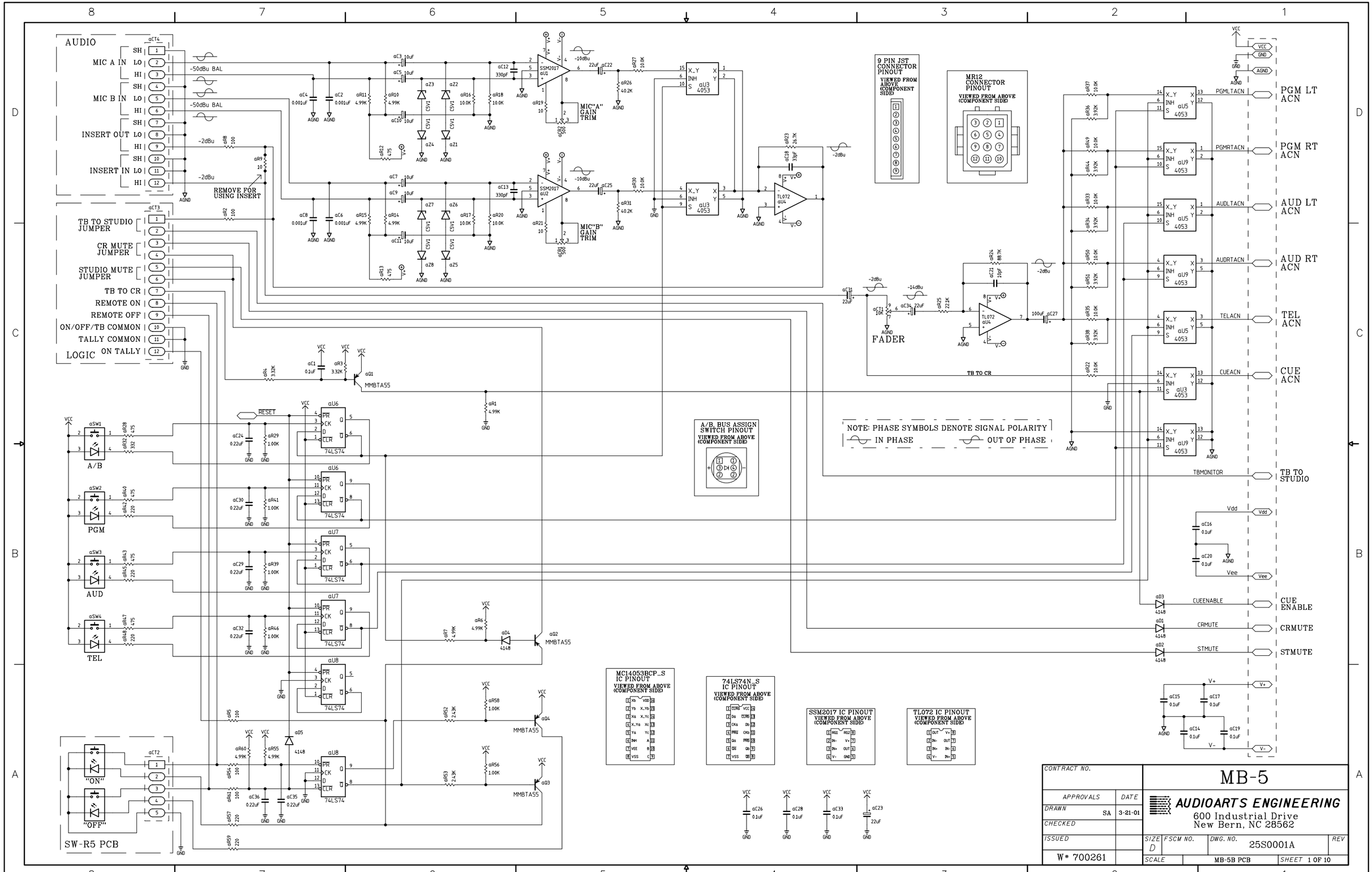
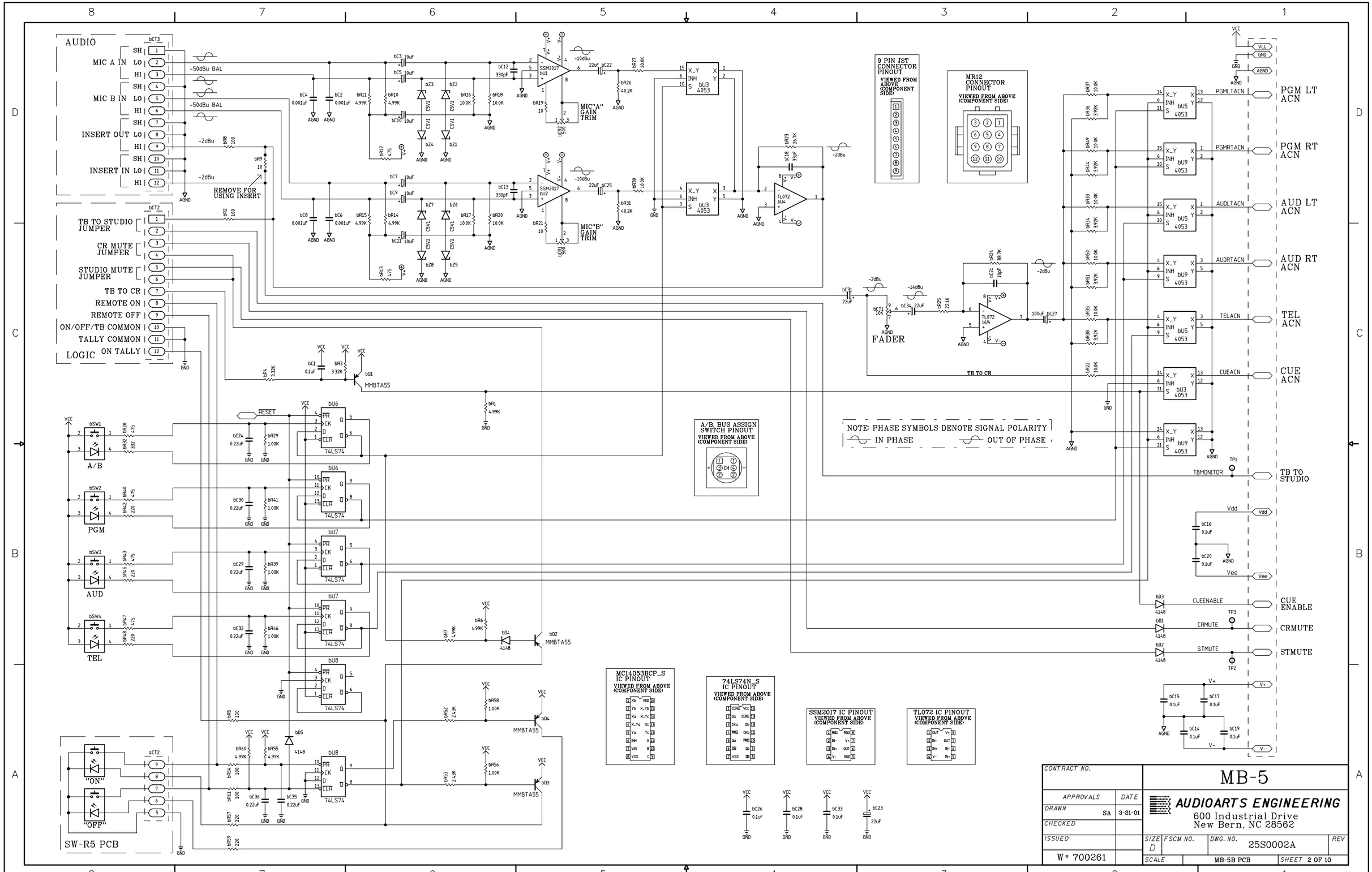


MB-5 Mother Board (Line Input Section "a")
Schematic - Sheet 1 of 10



MB-5 Mother Board (Line Input Section "b")
Schematic - Sheet 2 of 10

AUDIO
LINE A IN
LINE B IN
LT
RT
SH
LO
HI
+4dBu BAL
LOGIC
"LT" -10dBu GAIN SET
AUDIO COMMON
"RT" -10dBu GAIN SET
START
START COMMON
STOP
STOP COMMON
REMOTE OFF
OFF COMMON
READY
READY COMMON
MMBTA55
PS-2502
LH-1522
RESET
74LS74
A/B
PGM
AUD
TEL
CUE
"ON"
"OFF"
SW-R5 PCB
TL072
4053
FADER
-2dBu
-14dBu
9 PIN JST CONNECTOR PINOUT
VIEWED FROM ABOVE (COMPONENT SIDE)
NOTE: PHASE SYMBOLS DENOTE SIGNAL POLARITY
IN PHASE
OUT OF PHASE
PGM LT ACN
PGM RT ACN
AUD LT ACN
AUD RT ACN
TEL ACN
CUE ACN
CUEENABLE
Vdd
Vee
MC14053BCP_S IC PINOUT
74LS74N_S IC PINOUT
TL072 IC PINOUT
MR12 CONNECTOR PINOUT
A/B BUS ASSIGN SWITCH PINOUT

CONTRACT NO.		MB-5
APPROVALS	DATE	AUDIOARTS ENGINEERING
DRAWN SA	3-21-01	600 Industrial Drive, New Bern, NC 28562
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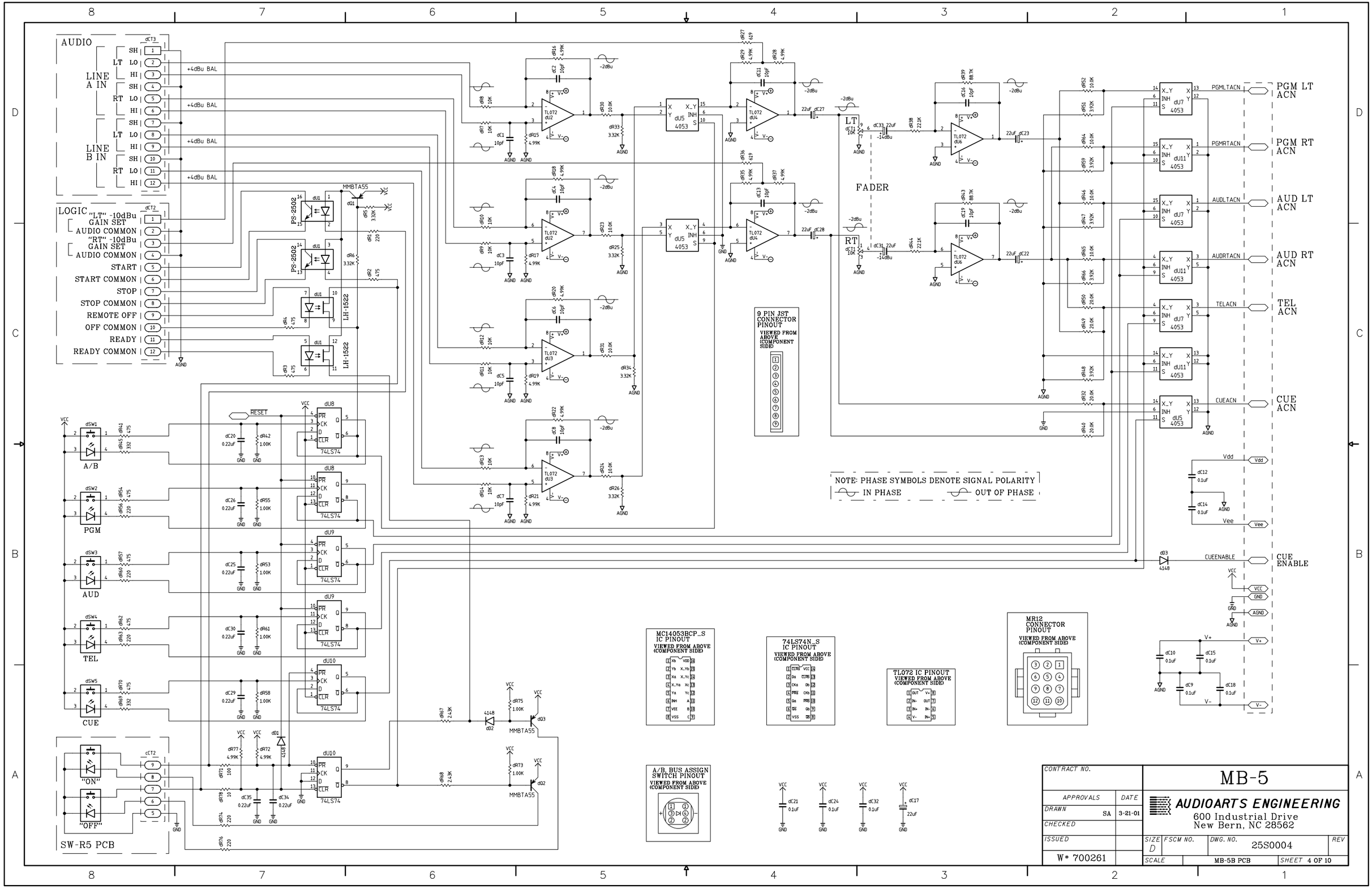
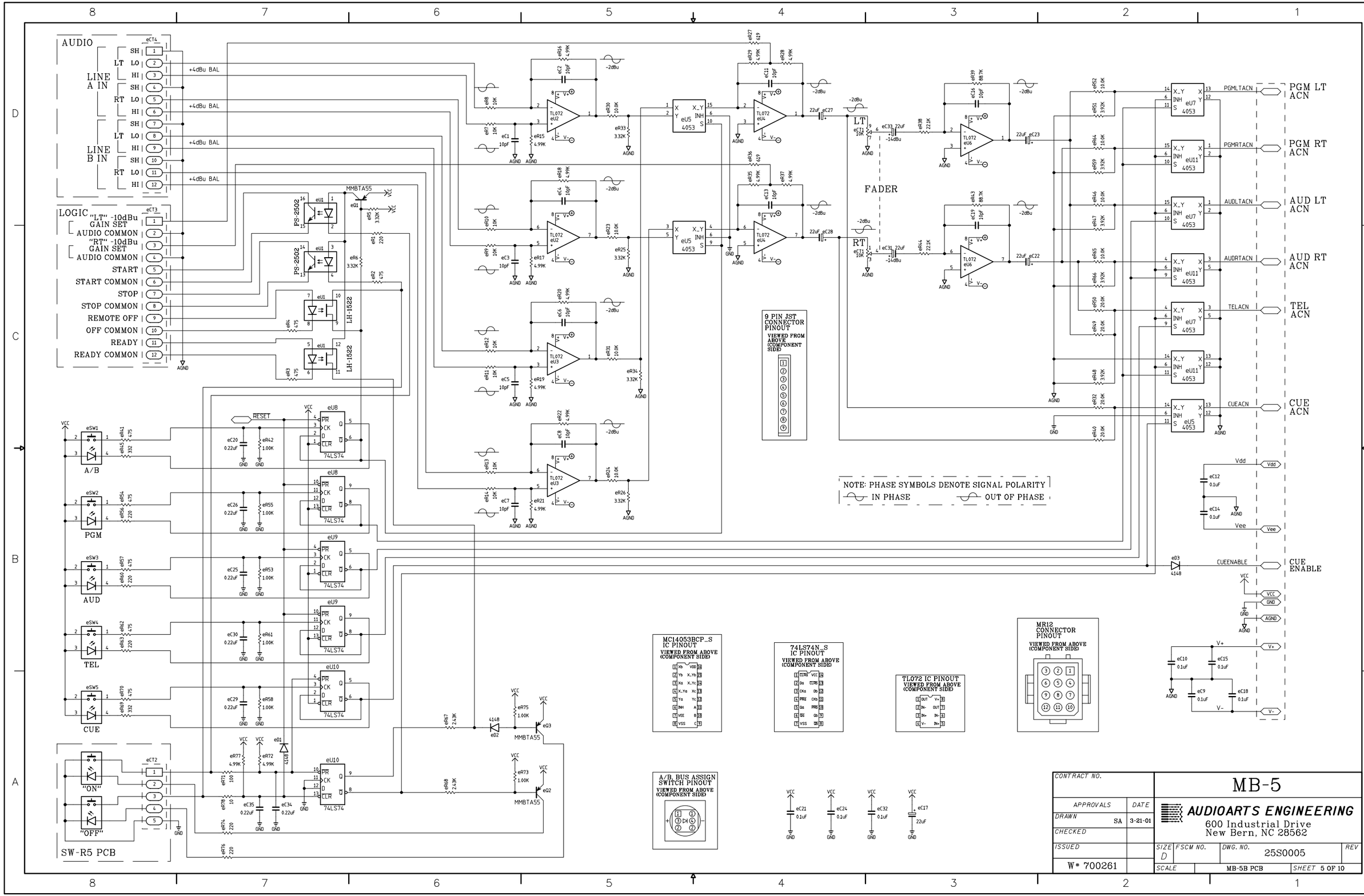
ISSUED		SIZE D · FSCM NO. · DWG. NO. 25S0003 · REV
W* 700261		SCALE · MB-5B PCB · SHEET 3 OF 10



MB-5 Mother Board (Line Input Section "d")
Schematic - Sheet 4 of 10



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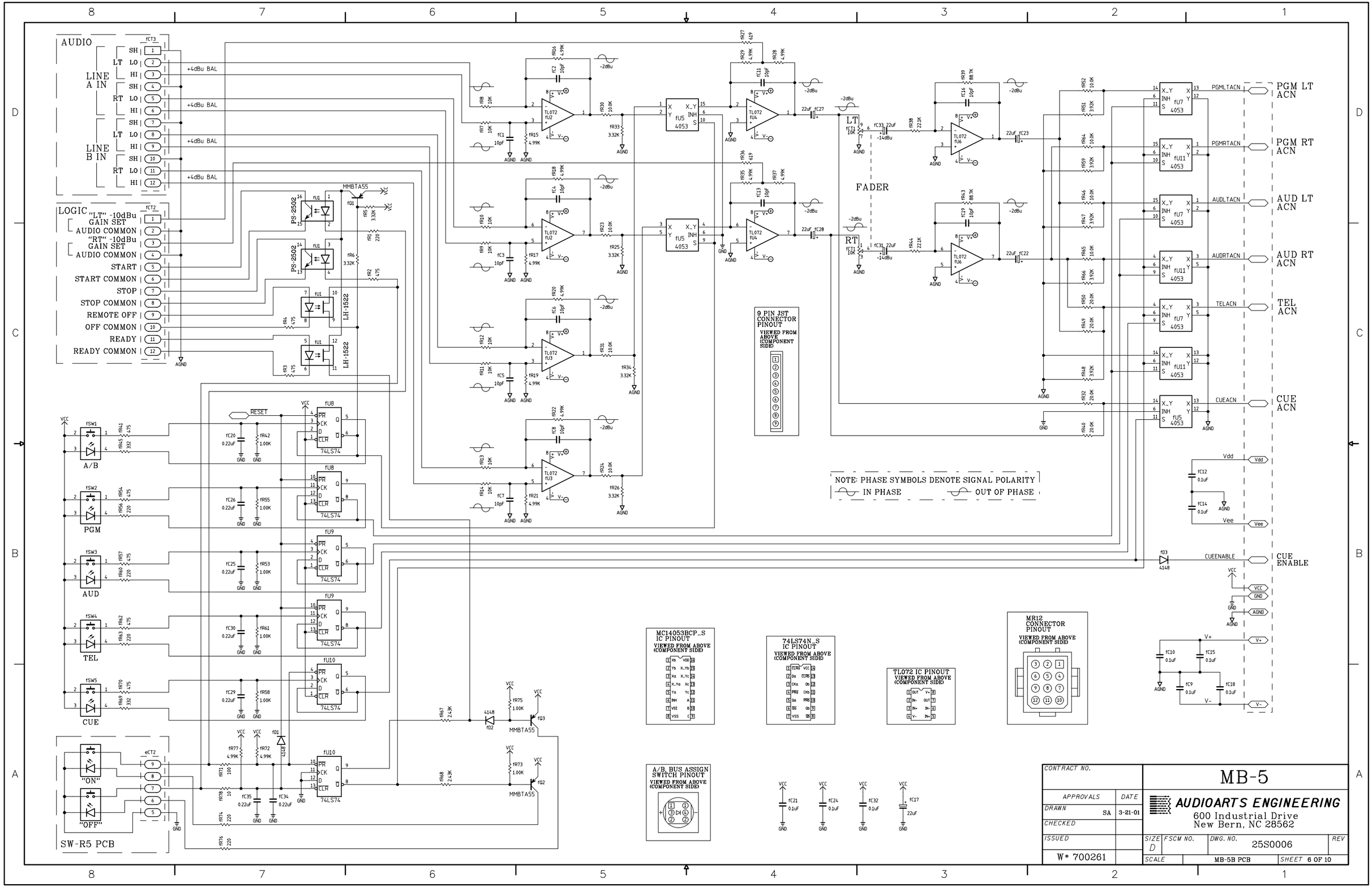

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MB-5

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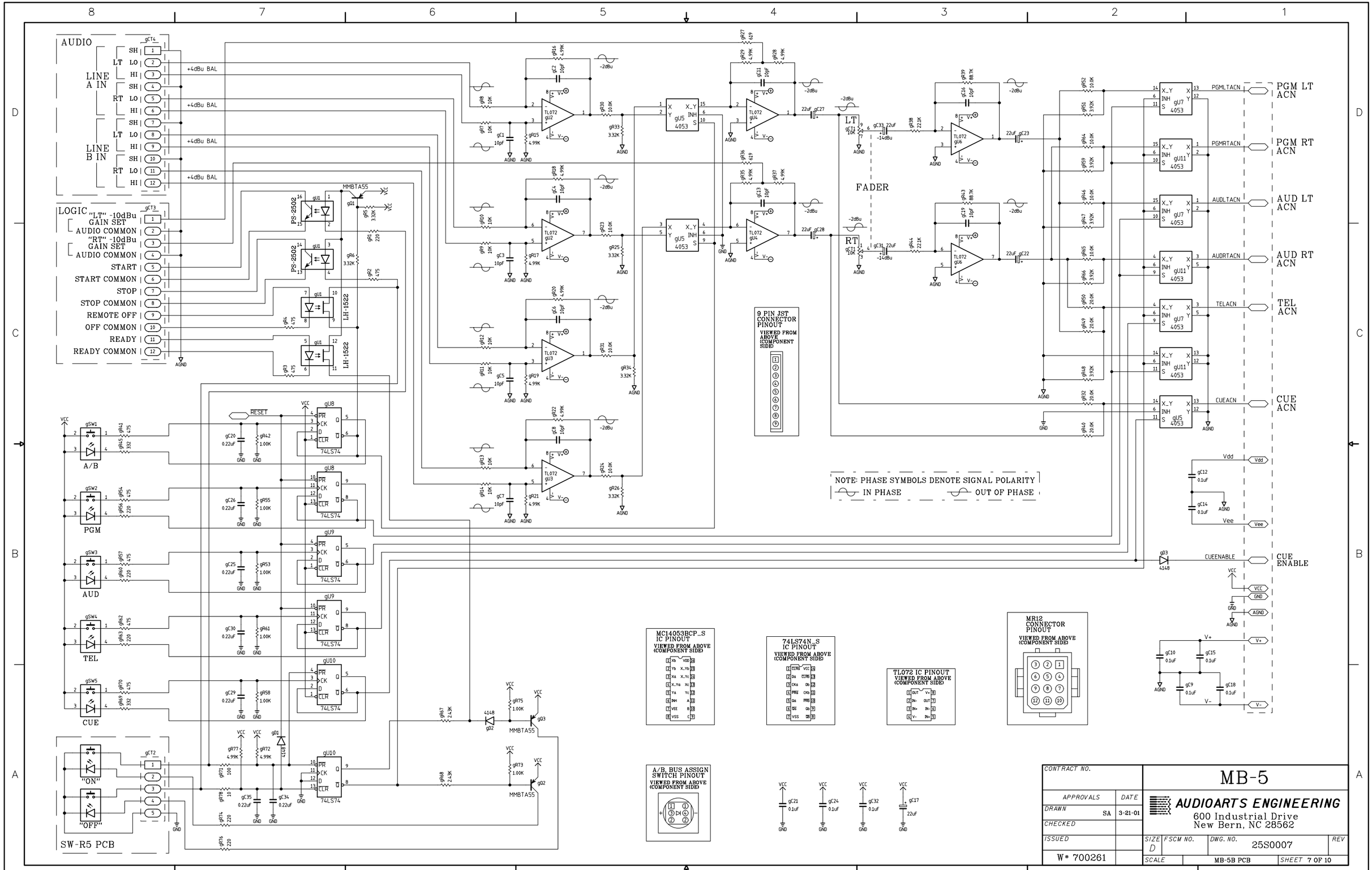
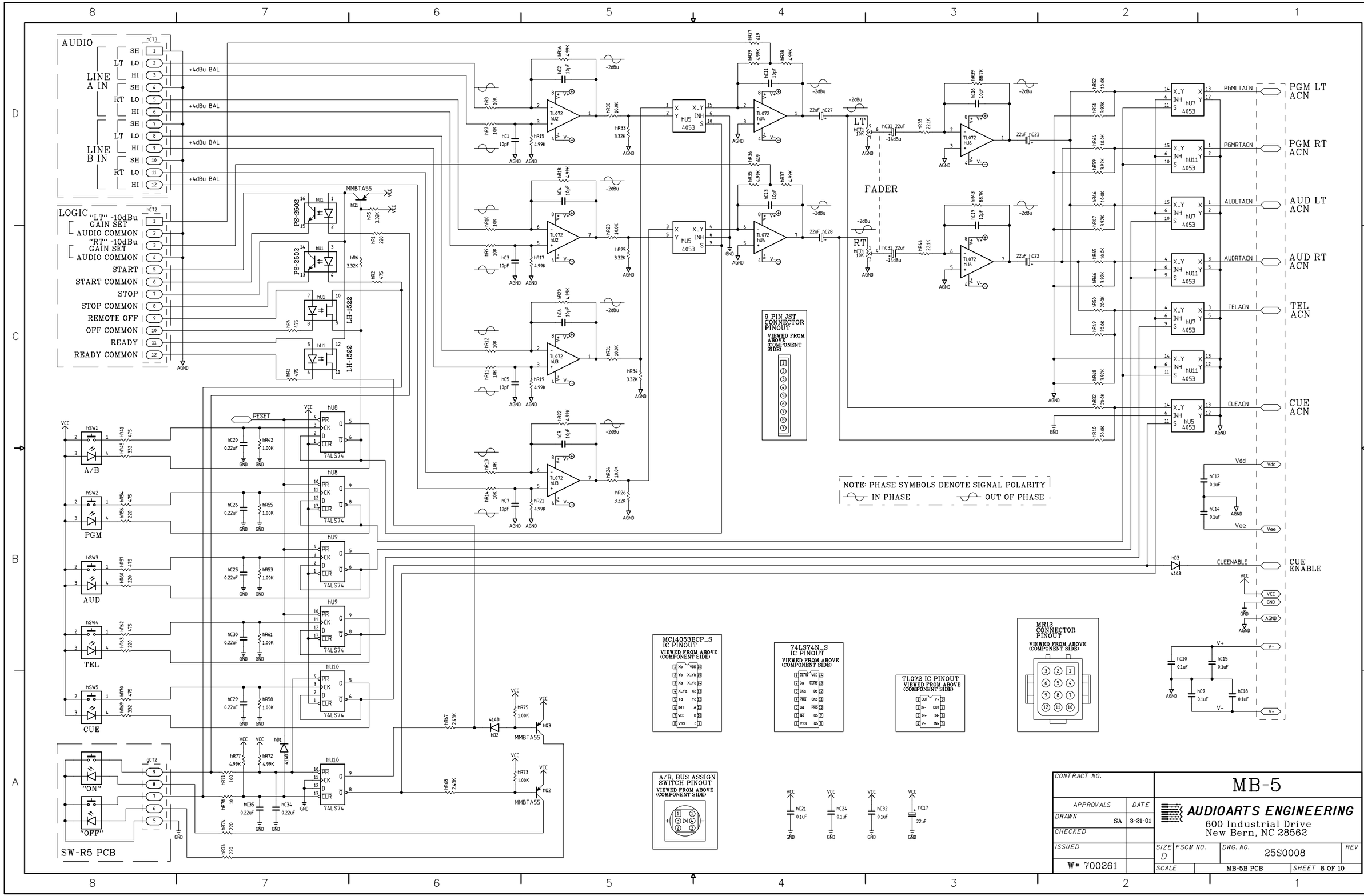
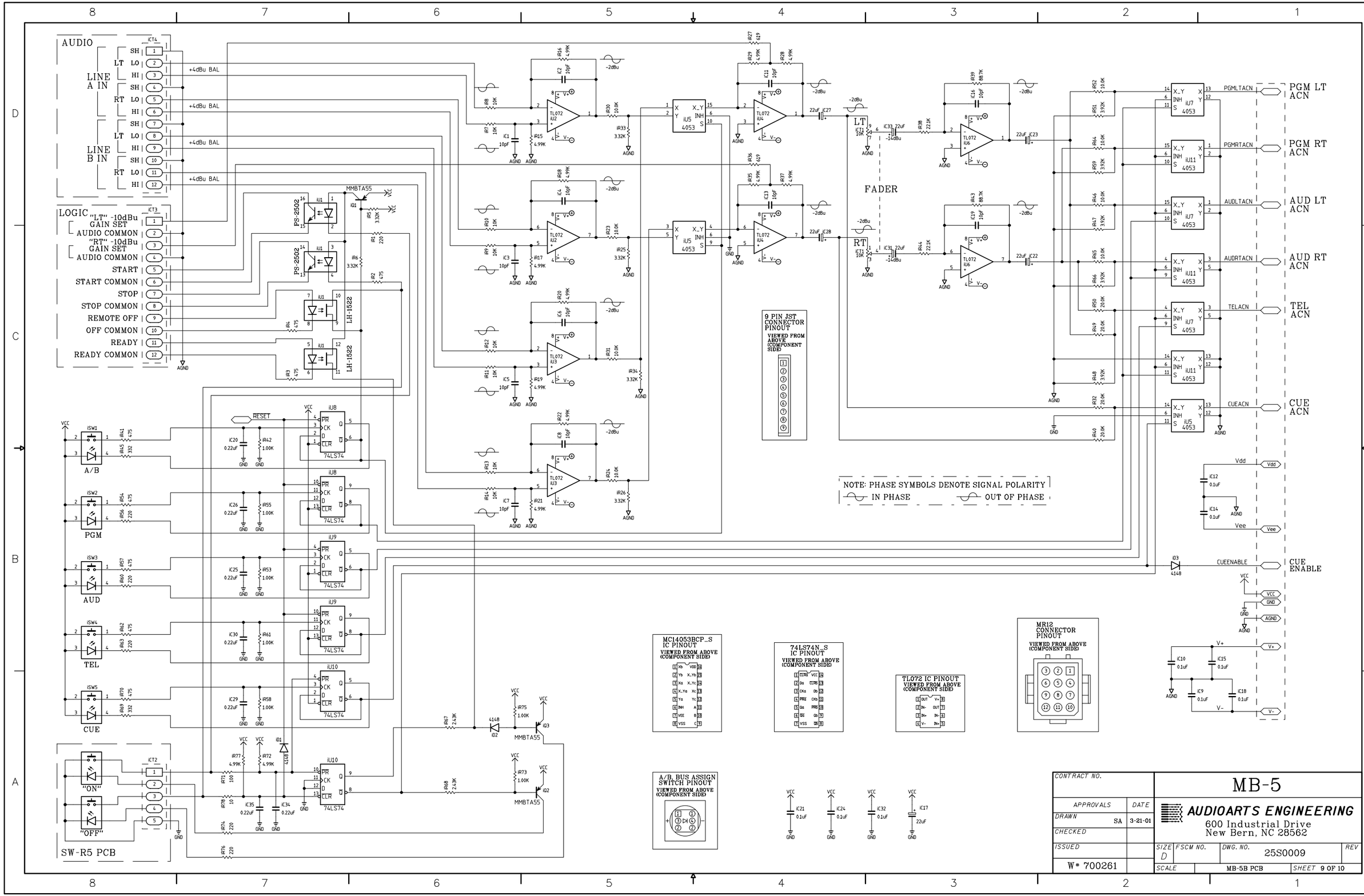
SCALE | MB-5B PCB | SHEET 6 OF 10



MB-5 Mother Board (Line Input Section "g")
Schematic - Sheet 7 of 10



MB-5 Mother Board (Line Input Section "h")
Schematic - Sheet 8 of 10



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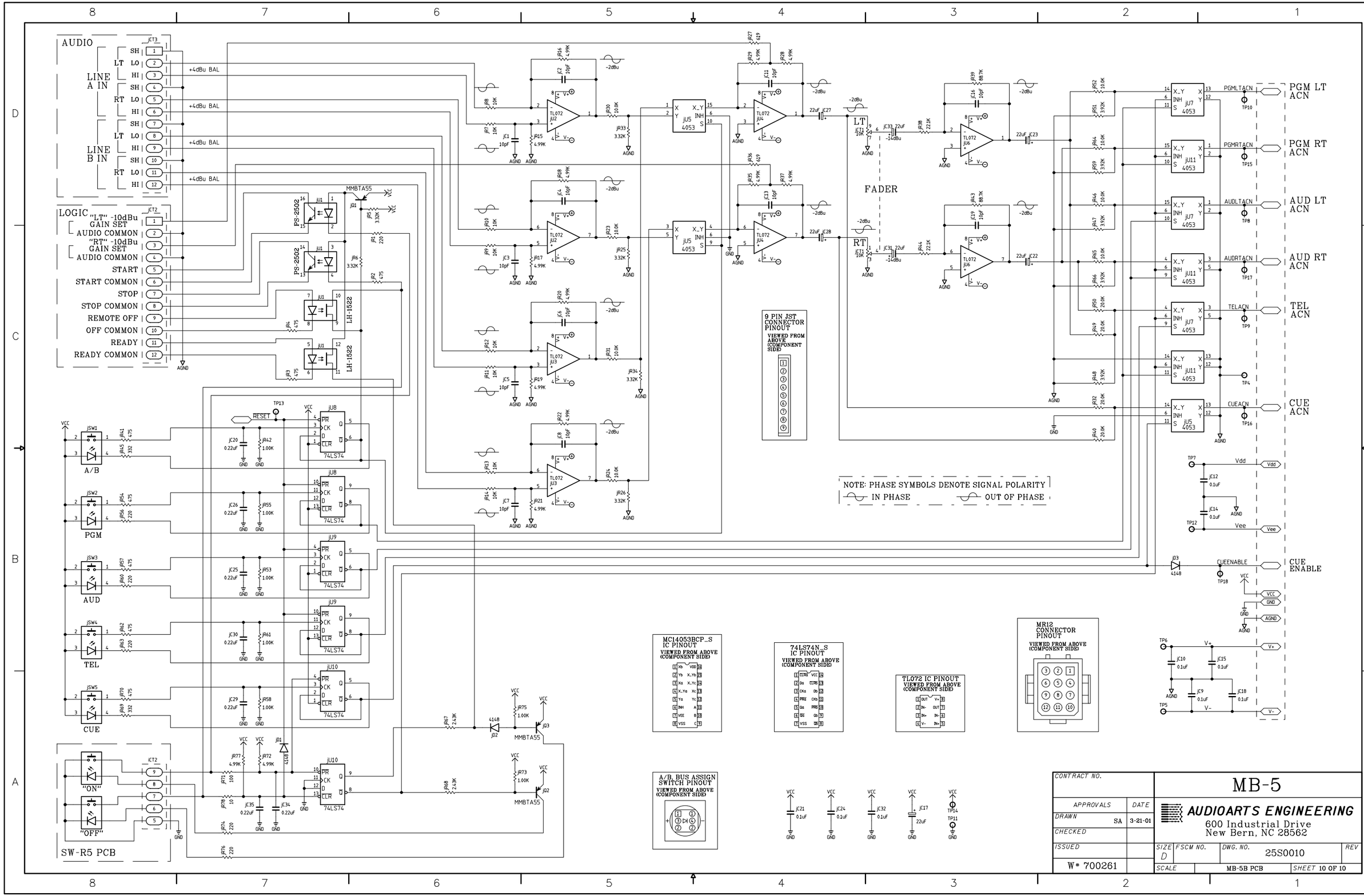


MB-5 Mother Board (Line Input Section "j")
Schematic - Sheet 10 of 10

Sergey Averin USA
Сергей Аверин США

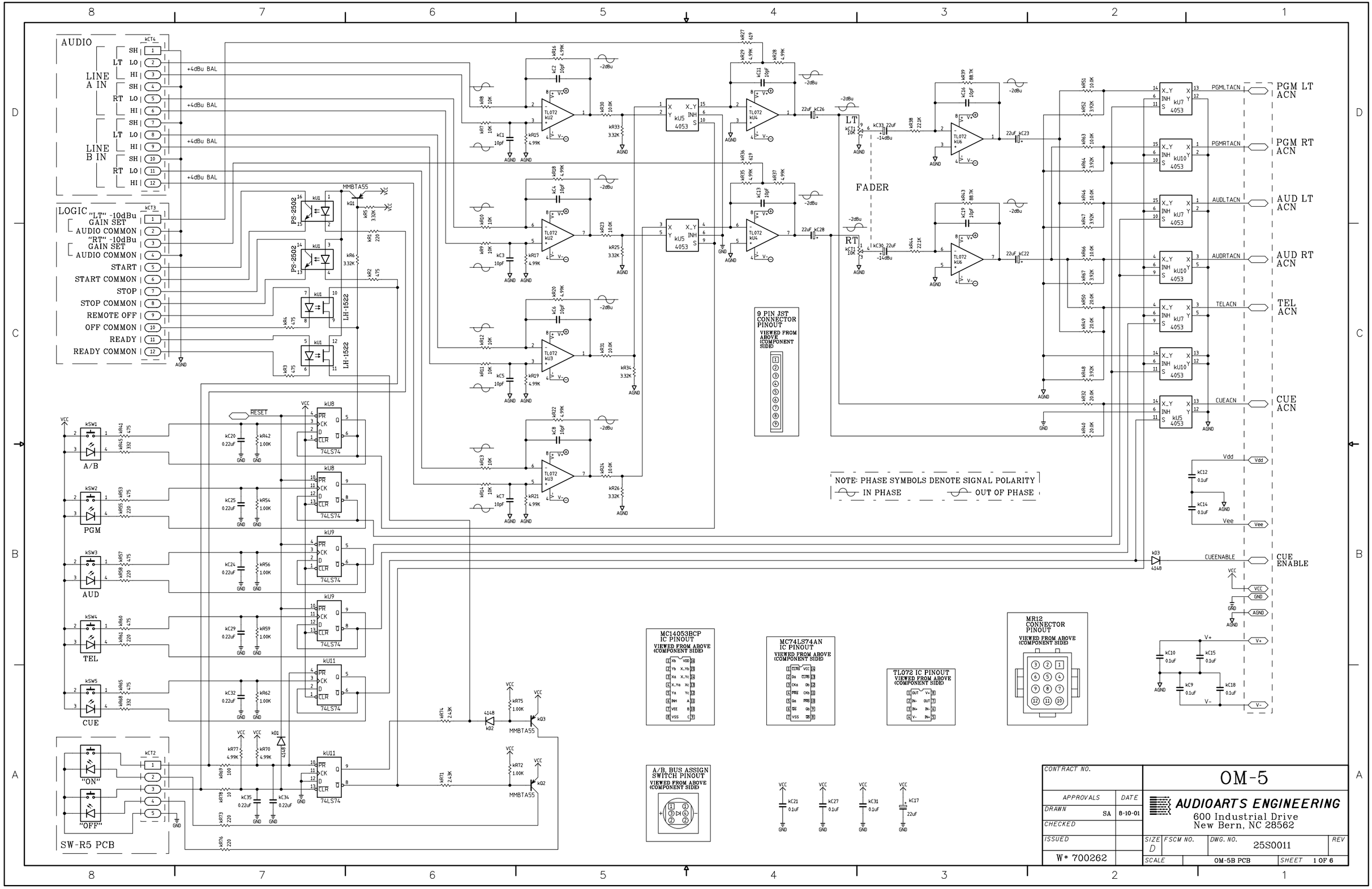
S/N

W#	part name	description	# in each unit
220014	CONN_PC_MT_12_PIN	12 PIN PC MOUNT CONNECTOR	20
245001	SOCKET_SMT_JS8_PIN	8 PIN .3" DIP SMT SOCKET	38
245002	SOCKET_SMT_JS14_PIN	14 PIN .3" DIP SMT SOCKET	30
245003	SOCKET_SMT_JS16_PIN	16 PIN .3" DIP SMT SOCKET	38
250066	HEADER_9_PIN_JST	9 PIN .098" HEADER	15
300046	Q74LS74	74LS74	30
320003	Q2017_IC	2017 MIC PREAMP IC	4
320006	QTL072	TL072 DUAL BIFET OP-AMP	34
340020	QLH1522AB	LH1522AB DUAL FET OPTO COUPLER	8
340021	QPS2502-2	8 PIN DUAL OPTO COUPLER	8
345002	QMMBTA55_SMT	MMBTA55 PNP SMT TRANSISTOR	32
355002	QC5V1_SMT_ZENER_DI	5.1V SMT ZENER DIODE C5V1	16
355003	Q1N4148_SMT_DIODE	1N4148 FAST SWITCHING SMT DIODE	34
380003	Q14053BCP	14053BCP	30
405001	CP10UF_50V_SMT	CAPACITOR, 10µF 50V ELECTROLYTIC	12
405002	CP22UF_25V_SMT	CAPACITOR, 22µF 25V ELECTROLYTIC	66
405003	CP100UF_25V_SMT	CAPACITOR, 100µF 25V	2
415001	CP10P_CER_SMT	CAPACITOR, 10pF 100V CERAMIC SMT	98
415002	CP33P_CER_SMT	CAPACITOR, 33pF 100V CERAMIC SMT	2
415004	CP330P_CER_SMT	CAPACITOR, 330pF 100V CERAMIC	4
415005	CP.001UF_CER_SMT	CAPACITOR, .001µF 50V CERAMIC SMT	8
415007	CP.1UF_CER_SMT	CAPACITOR, .1µF 50V CERAMIC SMT	92
415009	CP.22UF__CER_SMT	CAPACITOR, .22µF 50V CERAMIC SMT	68
435002	RESISTOR_10Ω_SMT_12	10 OHM 5% .25W MC1206 RESISTOR	14
435007	RESISTOR_100Ω_SMT_1	100 OHM 5% .25W MC1206 RESISTOR	18
435009	RESISTOR_220Ω_SMT_1	220 OHM 5% .25W MC1206 RESISTOR	58
435010	RESISTOR_332Ω_SMT_1	332 OHM 1% .25W MC1206 RESISTOR	18
435011	RESISTOR_475Ω_SMT_1	475 OHM 1% .25W MC1206 RESISTOR	76
435013	RESISTOR_619Ω_SMT_1	619 OHM 1% .25W MC1206 RESISTOR	16

MB-5 Mother Board Parts List – Sheet 1 of 2
(PCB is Wheatstone P/N 002540)

W#	part name	description	# in each unit
435015	RESISTOR_1.00K_SMT_	1.00 KOHM 1% .25W MC1206	68
435020	RESISTOR_2.43K_SMT_	2.43 KOHM 1% .25W MC1206	20
435021	RESISTOR_3.32K_SMT_	3.32 KOHM 1% .25W MC1206	52
435022	RESISTOR_3.92K_SMT_	3.92 KOHM 1% .25W MC1206	50
435023	RESISTOR_4.99K_SMT_	4.99 KOHM 1% .25W MC1206	130
435028	RESISTOR_10.0K_SMT_	10.0 KOHM 1% .25W MC1206	152
435034	RESISTOR_20.0K_SMT_	20.0 KOHM 1% .25W MC1206	32
435036	RESISTOR_22.1K_SMT_	22.1 KOHM 1% .25W MC1206	18
435037	RESISTOR_26.7K_SMT_	26.7 KOHM 1% .25W MC1206	2
435039	RESISTOR_40.2K_SMT_	40.2 KOHM 1% .25W MC1206	4
435043	RESISTOR_88.7K_SMT_	88.7 KOHM 1% .25W MC1206	18
500019	POT_TRIM_HOR_500Ω	500Ω TRIM POT	4
510106	SWITCH_R5_RED	SINGLE POLE MOMENTARY SWITCH	18
510107	SWITCH_R5_GRN	SINGLE POLE MOMENTARY SWITCH	30
510111	SWITCH_R5_MOUNT_FR	SINGLE POLE MOMENTARY SW	48
530094	BUTTON_R5_RED	LTM-LTR TYPE SWITCH DIFFUSER RED	10
530095	BUTTON_R5_GRN	LTM-LTR TYPE SWITCH DIFFUSER	30
530096	BUTTON_R5_YLW	LTM-LTR TYPE SWITCH DIFFUSER	8
700261	PCB_MB5	PRINTED CIRCUIT BOARD SMT	1

MB-5 Mother Board Parts List – Sheet 2 of 2
(PCB is Wheatstone P/N 002540)



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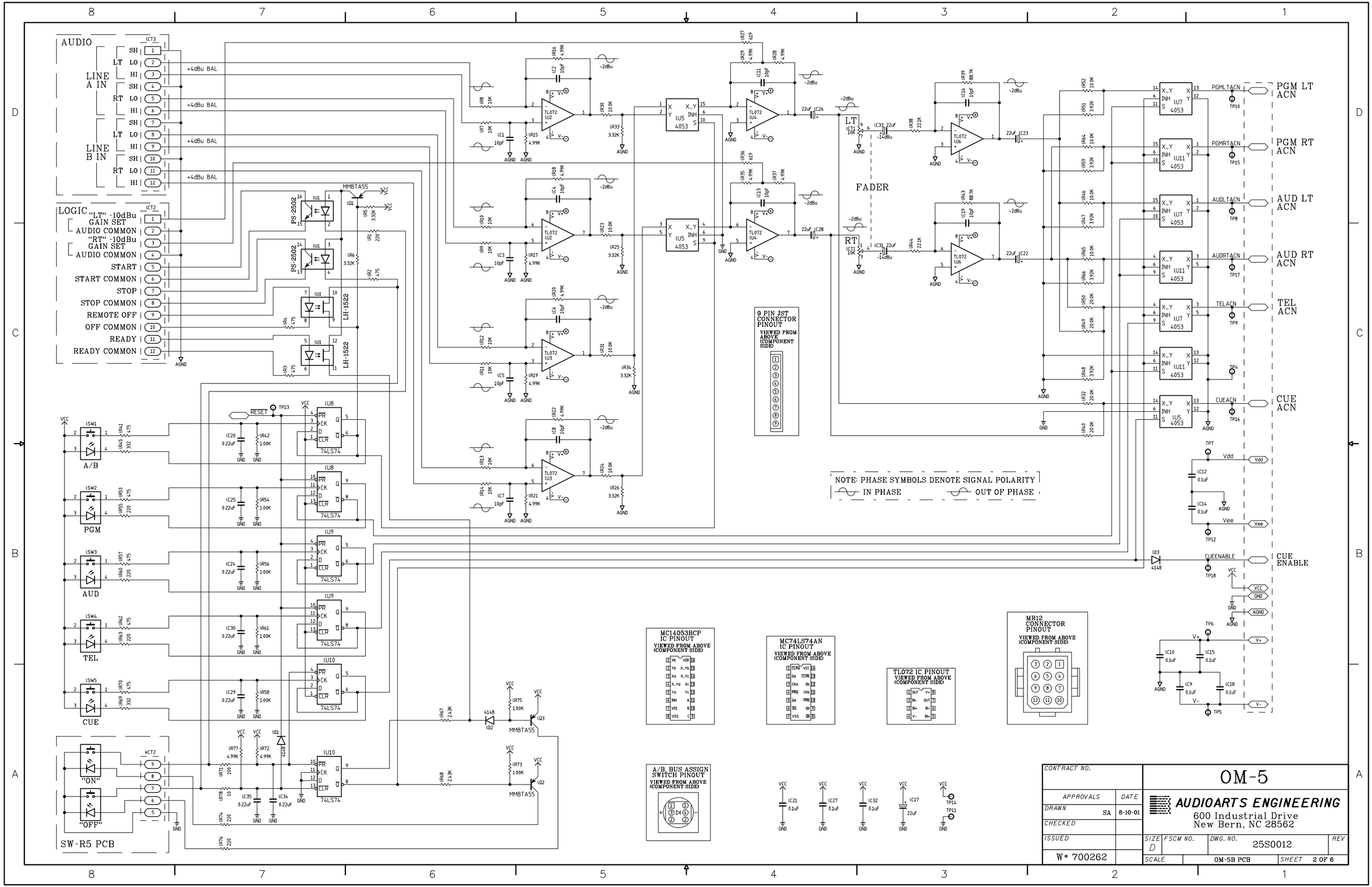

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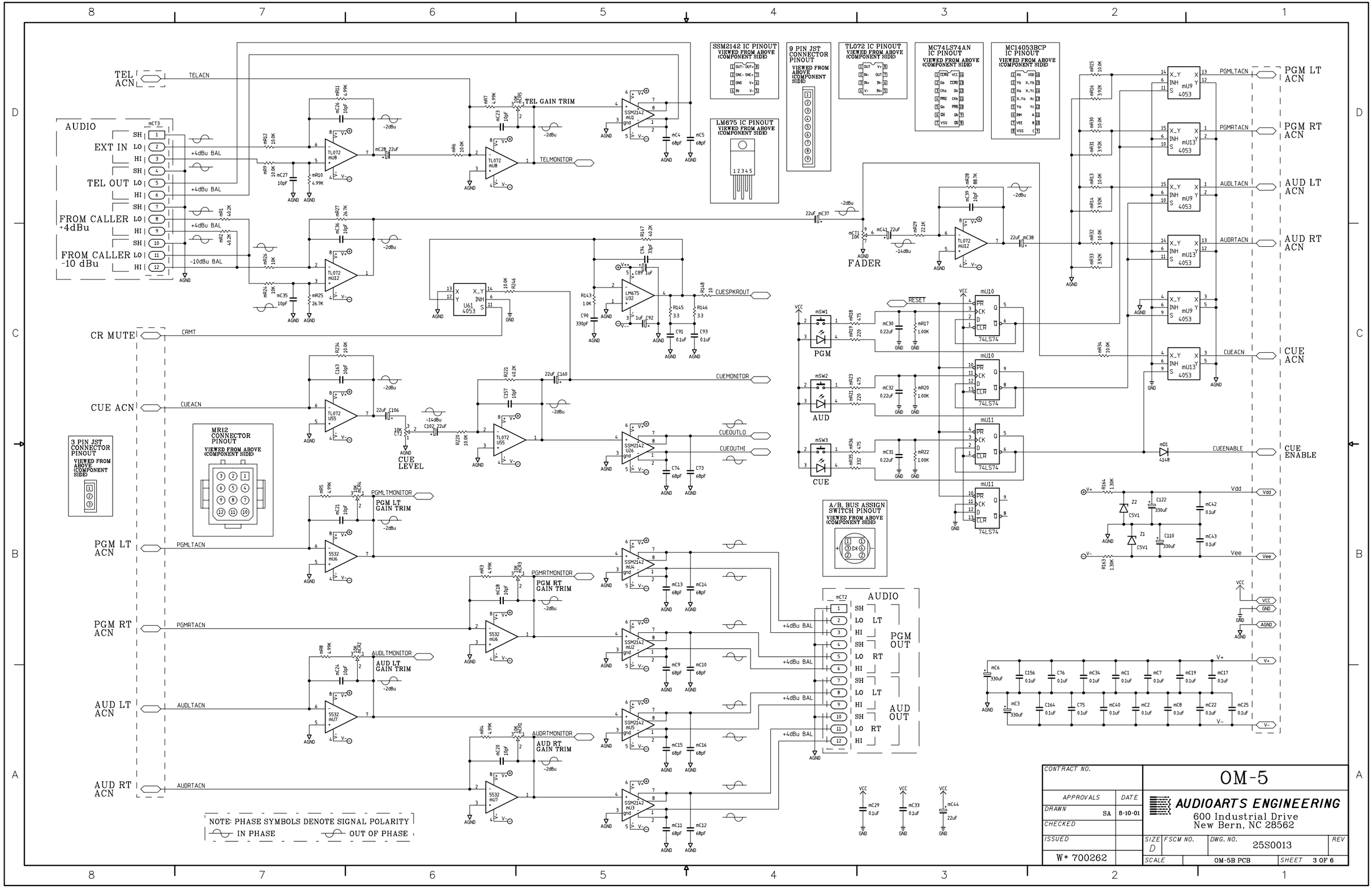
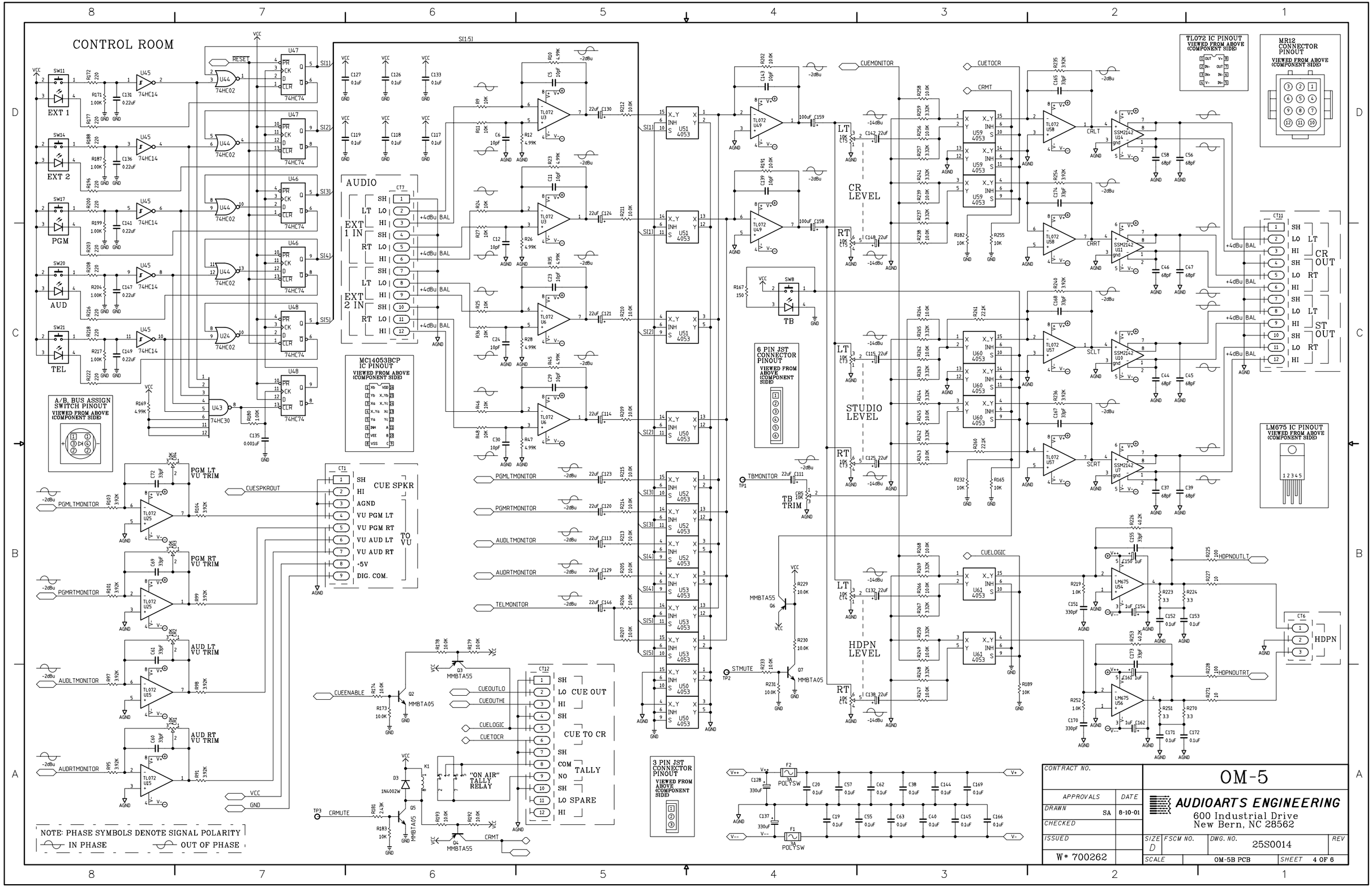
ISSUED		SIZE D / FSCM NO. / DWG. NO. 25S0012 / REV	
W* 700262		SCALE / OM-5B PCB / SHEET 2 OF 6	

OM-5 Output Board (Line Input Section "1") Schematic - Sheet 2 of 6



CONTRACT NO.		OM-5
APPROVALS	DATE	AUDIOARTS ENGINEERING 600 Industrial Drive New Bern, NC 28562
DRAWN SA	8-10-01	
CHECKED		
ISSUED		
W# 700262		SIZE D · FSCM NO. · DWG. NO. 25S0013 · REV
		SCALE · OM-5B PCB · SHEET 3 OF 6



CONTRACT NO.	
APPROVALS / DATE	
DRAWN SA 8-10-01	
CHECKED	
ISSUED	
W* 700262	

OM-5

AUDIOARTS ENGINEERING
600 Industrial Drive
New Bern, NC 28562

SIZE	FSCM NO.	DWG. NO.	REV
D		25S0014	
SCALE	OM-5B PCB	SHEET	4 OF 6

TAPE REMOTE

CT14
SW 1 LED + 1 — SW(1)LED
SW 2 LED + 2 — SW(2)LED
SW 3 LED + 3 — SW(3)LED
SW 1 LED - 4 — SW(1)LED
SW 2 LED - 5 — SW(2)LED
SW 3 LED - 6 — SW(3)LED
SW 1 N.O. 7 — SW(1)
SW 2 N.O. 8 — SW(2)
SW 3 N.O. 9 — SW(3)
SW 1 COM. 10 — SW(1)
SW 2 COM. 11 — SW(2)
SW 3 COM. 12 — SW(3)

CT10
SW 4 LED + 1 — SW(4)LED
SW 5 LED + 2 — SW(5)LED
SW 6 LED + 3 — SW(6)LED
SW 4 LED - 4 — SW(4)LED
SW 5 LED - 5 — SW(5)LED
SW 6 LED - 6 — SW(6)LED
SW 4 N.O. 7 — SW(4)
SW 5 N.O. 8 — SW(5)
SW 6 N.O. 9 — SW(6)
SW 4 COM. 10 — SW(4)
SW 5 COM. 11 — SW(5)
SW 6 COM. 12 — SW(6)

SW(1),SW(1)LED,SW(2),SW(2)LED,SW(3),SW(3)LED,SW(4),SW(4)LED,SW(5),SW(5)LED,SW(6),SW(6)LED

SW7: SW(1), SW(1)LED, SW(1)LED, R160 1.0K — SW"1"
SW9: SW(2), SW(2)LED, SW(2)LED, R166 1.0K — SW"2"
SW10: SW(3), SW(3)LED, SW(3)LED, R168 1.0K — SW"3"
SW13: SW(4), SW(4)LED, SW(4)LED, R175 1.0K — SW"4"
SW16: SW(5), SW(5)LED, SW(5)LED, R190 1.0K — SW"5"
SW19: SW(6), SW(6)LED, SW(6)LED, R201 1.0K — SW"6"

VCC
SW1 "1": R94 220, R92 1.00K, C59 0.22uF, R93 332 — U31 74HC14 — U21 74HC02 — U20 74HC74 — L(1)
SW2 "2": R100 220, R96 1.00K, C70 0.22uF, R102 332 — U31 74HC14 — U21 74HC02 — U20 74HC74 — L(2)
SW3 "3": R136 220, R135 1.00K, C71 0.22uF, R137 332 — U31 74HC14 — U21 74HC02 — U22 74HC74 — L(3)
SW4 "4": R139 220, R138 1.00K, C82 0.22uF, R140 332 — U31 74HC14 — U21 74HC02 — U22 74HC74 — L(4)
SW5 "5": R142 220, R141 1.00K, C88 0.22uF, R144 332 — U31 74HC14 — U24 74HC02 — U23 74HC74 — L(5)
SW6 "6": R155 220, R153 1.00K, C101 0.22uF, R154 332 — U31 74HC14 — U24 74HC02 — U23 74HC74 — L(6)

RESET

U24 74HC02 — U37 74HC30 — U45 74HC14
C64 0.1uF, C65 0.1uF, C66 0.1uF, C67 0.1uF, C68 0.1uF, C87 0.1uF, C81 0.1uF — GND
R151 4.99K, R152 1.00K, C100 0.001uF
C14 0.1uF, C42 0.1uF, C17 0.1uF, C54 0.1uF, C13 0.1uF, C41 0.1uF, C16 0.1uF, C49 0.1uF — AGND, V+, V-

LINE SELECTOR

AUDIO CT9
LINE 1 IN: SH 1, LO 2, HI 3, +4dBu BAL
RT: SH 4, LO 5, HI 6, +4dBu BAL
LINE 2 IN: SH 7, LO 8, HI 9, +4dBu BAL
RT: SH 10, LO 11, HI 12, +4dBu BAL
AGND

AUDIO CT13
LINE 3 IN: SH 1, LO 2, HI 3, +4dBu BAL
RT: SH 4, LO 5, HI 6, +4dBu BAL
LINE 4 IN: SH 7, LO 8, HI 9, +4dBu BAL
RT: SH 10, LO 11, HI 12, +4dBu BAL
AGND

MR12 CONNECTOR PINOUT
VIEWED FROM ABOVE (COMPONENT SIDE)
3 2 1 / 6 5 4 / 9 8 7 / 12 11 10

TL072 U1, U2, U4, U5 — R1 10K, R2 4.99K, R3 10K, R4 4.99K, R5 10K, R6 4.99K, R7 10K, R8 4.99K, R9 10K, R10 4.99K, R11 10K, R12 4.99K, R13 4.99K, R14 10K, R15 10K, R16 4.99K, R17 10K, R18 4.99K, R19 10K, R20 10K, R21 4.99K, R22 10K, R23 4.99K, R24 10K, R25 10K, R26 4.99K, R27 4.99K, R28 10K, R29 4.99K, R30 4.99K, R31 10K, R32 4.99K, R33 4.99K, R34 10K, R35 4.99K, R36 4.99K, R37 4.99K, R38 10K, R39 10K, R40 4.99K, R41 4.99K, R42 10K, R43 4.99K, R44 10K
C1 10pF, C2 10pF, C3 10pF, C4 10pF, C5 10pF, C6 10pF, C7 10pF, C8 10pF, C9 10pF, C10 10pF, C11 10pF, C12 10pF, C21 10pF, C22 10pF, C25 10pF, C26 10pF, C27 10pF, C28 10pF
-2dBu, AGND

L(1:6)
NOTE: PHASE SYMBOLS DENOTE SIGNAL POLARITY
IN PHASE
OUT OF PHASE

U16 4053: L(1) → L(1)
U18 4053: L(2) → L(2)
U19 4053: L(3) → L(3)
U19 4053: L(4) → L(4)
U16 4053: L(5) → L(5)
U17 4053: L(6) → L(6)

AUDIO CT16
LINE 5 IN: SH 1, LO 2, HI 3, +4dBu BAL
RT: SH 4, LO 5, HI 6, +4dBu BAL
LINE 6 IN: SH 7, LO 8, HI 9, +4dBu BAL
RT: SH 10, LO 11, HI 12, +4dBu BAL
AGND

TL072 IC PINOUT
VIEWED FROM ABOVE (COMPONENT SIDE)
1 OUT V+ 8 / 2 IN- OUT 7 / 3 IN+ IN- 6 / 4 V- IN+ 5

TL072 U8, U12, U13, U9 — R45 10K, R46 10K, R47 10K, R48 10K, R49 10K, R50 4.99K, R51 10K, R52 4.99K, R53 100, R54 100, R55 10, R56 10.0K, R57 10.0K, R58 4.99K, R59 4.99K, R60 4.99K, R61 100, R62 10K, R63 10K, R64 4.99K, R65 10.0K, R66 4.99K, R67 10, R68 100, R69 10.0K, R70 10.0K, R71 10.0K, R72 10K, R73 10.0K, R74 10.0K, R75 10.0K, R76 4.99K, R77 10K, R78 10.0K, R79 10.0K, R80 4.99K, R81 10K, R82 10.0K, R83 10.0K, R84 10.0K, R85 10.0K, R86 10.0K, R87 10.0K, R88 10.0K, R89 10.0K, R90 10, R91 10
C31 10pF, C32 10pF, C33 10pF, C34 10pF, C35 10pF, C36 10pF, C43 10pF, C48 10pF, C50 10pF, C51 10pF, C52 10pF, C53 10pF
-2dBu, AGND

CT8
LINE OUT: SH 1, LO LT 2, HI 3, SH 4, LO RT 5, HI 6, +4dBu BAL
HDPN OUT: SH 7, LO LT 8, HI 9, SH 10, LO RT 11, HI 12, +4dBu BAL
AGND

HDPNOUTLT
HDPNOUTRT

C14 0.1uF, C42 0.1uF, C17 0.1uF, C54 0.1uF, C13 0.1uF, C41 0.1uF, C16 0.1uF, C49 0.1uF — AGND, V+, V-

74HC02 IC PINOUT — VIEWED FROM ABOVE (COMPONENT SIDE)
1 1a 1Z 14 VCC / 2 1Z 2a 13 2Z / 3 2a 2b 12 1b / 4 2b 2Z 11 1Z / 5 2Z 1b 10 2a / 6 1a 2b 9 2Z / 7 VSS 1Z 8 2b

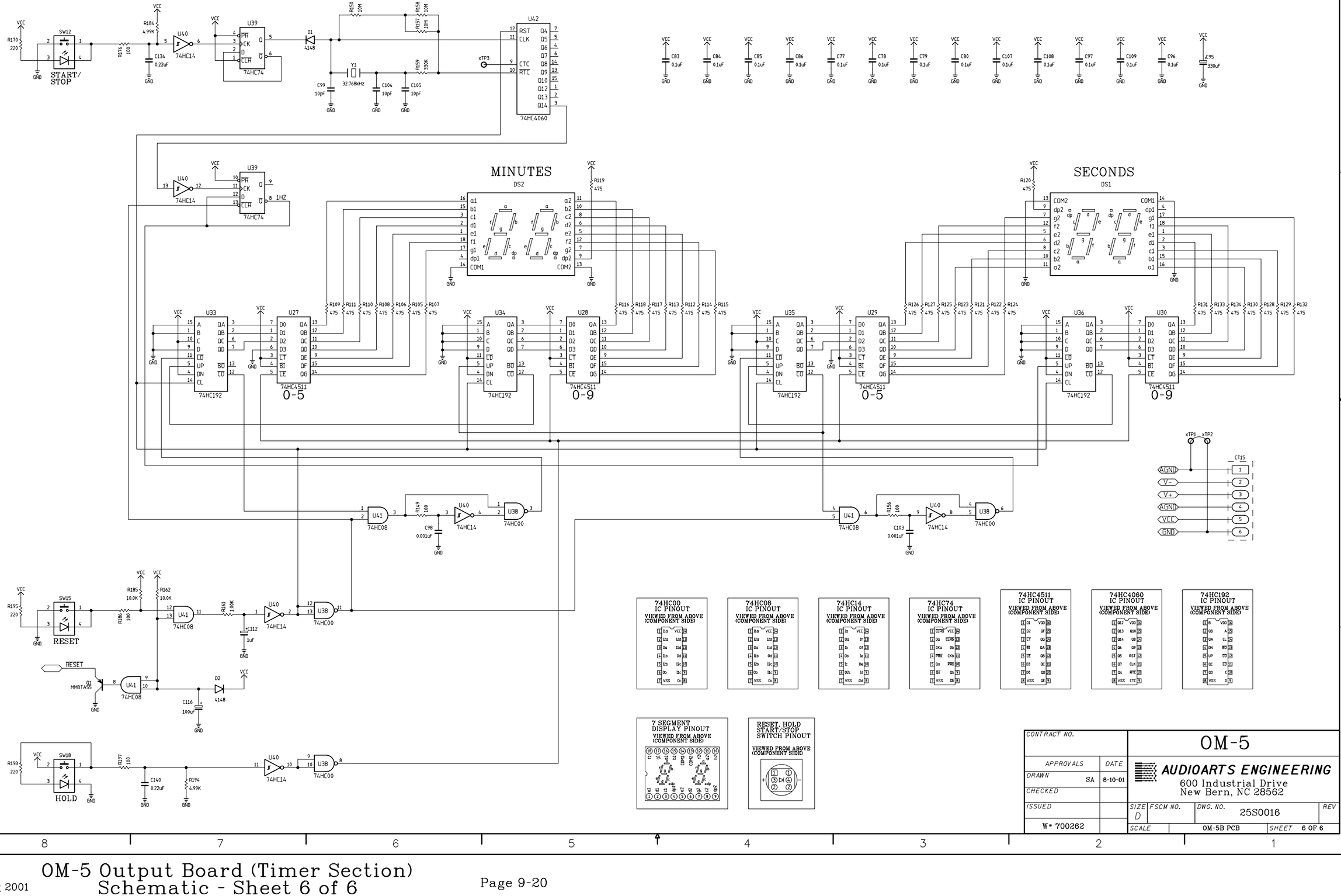
74HC14 IC PINOUT — VIEWED FROM ABOVE (COMPONENT SIDE)
1 1a 1Z 14 VCC / 2 1Z 2a 13 1a / 3 2a 2Z 12 2Z / 4 2Z 1b 11 2a / 5 1b 2b 10 2Z / 6 2b 2Z 9 1b / 7 VSS 1Z 8 2b

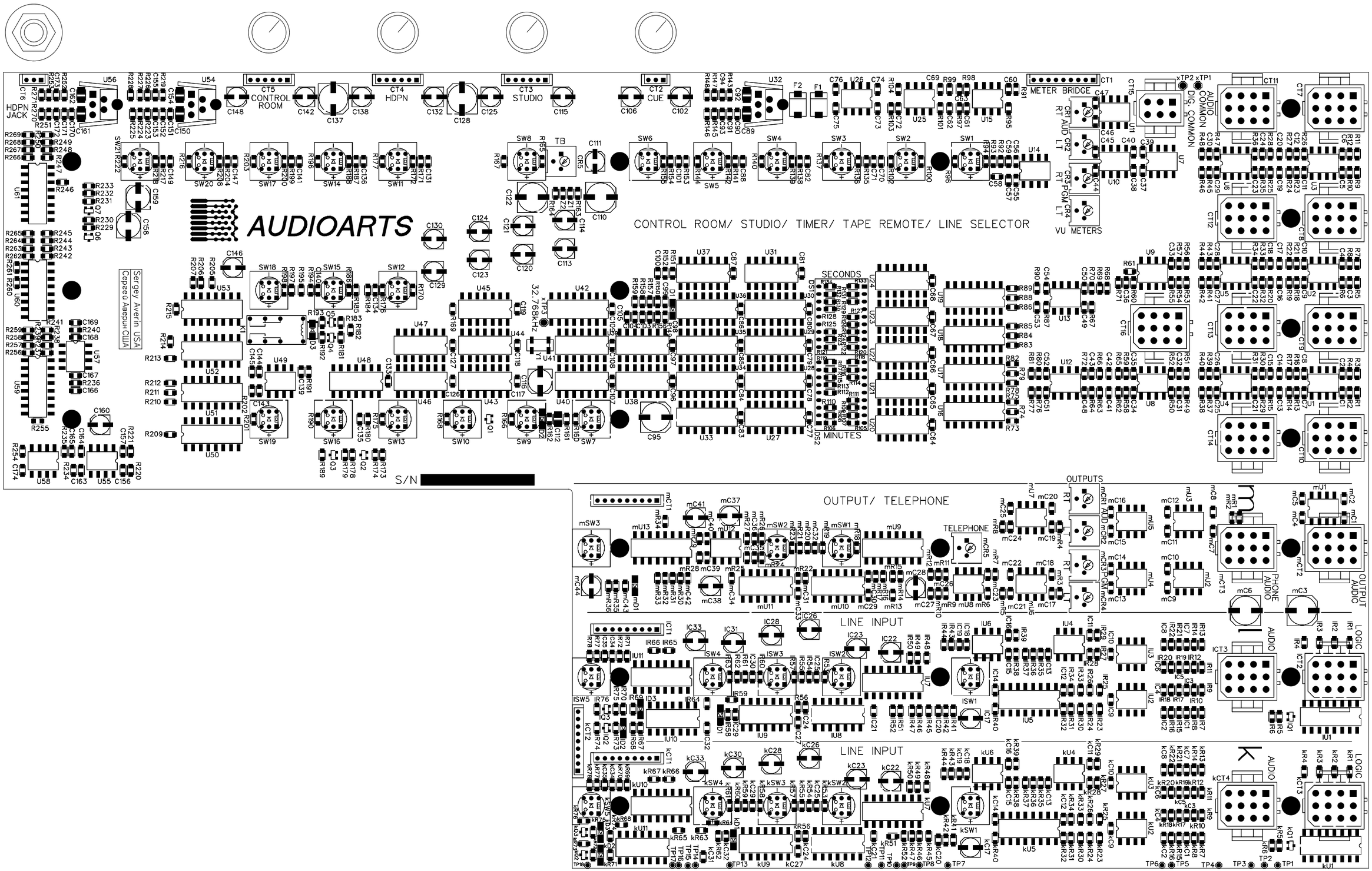
74HC30 IC PINOUT — VIEWED FROM ABOVE (COMPONENT SIDE)
1 1I 1Z 14 VCC / 2 1Z N/C 13 N/C / 3 2I 1I 12 1I / 4 2I 2I 11 2I / 5 1I 2I 10 N/C / 6 N/C 1I 9 N/C / 7 VSS OUT 8 2I

74HC74 IC PINOUT — VIEWED FROM ABOVE (COMPONENT SIDE)
1 1CLR 1D 14 VCC / 2 1D 1CLK 13 1PR / 3 1CLK 1Q 12 1CLR / 4 1PR 2D 11 1D / 5 2D 2CLK 10 2PR / 6 2Q 2PR 9 2CLK / 7 VSS 2Q 8 2D

MC14053BCP IC PINOUT — VIEWED FROM ABOVE (COMPONENT SIDE)
1 Xb VDD 16 / 2 Yb X_Yb 15 / 3 Xa X_Ya 14 / 4 X_Ya Xc 13 / 5 Ya Yc 12 / 6 INH A 11 / 7 VEE B 10 / 8 VSS C 9

CONTRACT NO.		OM-5
APPROVALS	DATE	AUDIOARTS ENGINEERING
DRAWN SA	8-10-01	600 Industrial Drive, New Bern, NC 28562
CHECKED		SIZE D / FSCM NO. / DWG. NO. 25S0015 / REV
ISSUED		SCALE / OM-5B PCB / SHEET 5 OF 6
W* 700262		


MINUTES
DS2
SECONDS
DS1
U33
U27
U34
U28
U35
U29
U36
U30
74HC192
74HC4511
0-5
0-9
74HC14
74HC74
74HC08
74HC00
74HC4060
U42
U39
U40
U41
U38
SW12
START/
STOP
SW15
RESET
SW18
HOLD
Y1
32.768kHz
D1
4148
D2
4148
Q1
MMBTA55
1HZ
xTP3
xTP1
xTP2
CT15
AGND
V-
V+
VCC
GND
74HC00
IC PINOUT
74HC08
IC PINOUT
74HC14
IC PINOUT
74HC74
IC PINOUT
74HC4511
IC PINOUT
74HC4060
IC PINOUT
74HC192
IC PINOUT
VIEWED FROM ABOVE
(COMPONENT SIDE)
7 SEGMENT
DISPLAY PINOUT
RESET, HOLD
START/STOP
SWITCH PINOUT
CONTRACT NO.
APPROVALS
DATE
DRAWN
SA
8-10-01
CHECKED
ISSUED
W* 700262
OM-5
AUDIOARTS ENGINEERING
600 Industrial Drive
New Bern, NC 28562
SIZE
D
FSCM NO.
DWG. NO.
25S0016
REV
SCALE
OM-5B PCB
SHEET
6 OF 6


AUDIOARTS
CONTROL ROOM/ STUDIO/ TIMER/ TAPE REMOTE/ LINE SELECTOR
HDPN JACK
CONTROL ROOM
HDPN
STUDIO
CUE
METER BRIDGE
AUDIO COMMON
DIG. COMMON
VU METERS
SECONDS
MINUTES
32.768KHz
Sergey Averin USA
Сергей Аверин США
S/N [redacted]
OUTPUT/ TELEPHONE
TELEPHONE
LINE INPUT
LINE INPUT
OUTPUTS
PHONE AUDIO
OUTPUT AUDIO
LOGIC
AUDIO

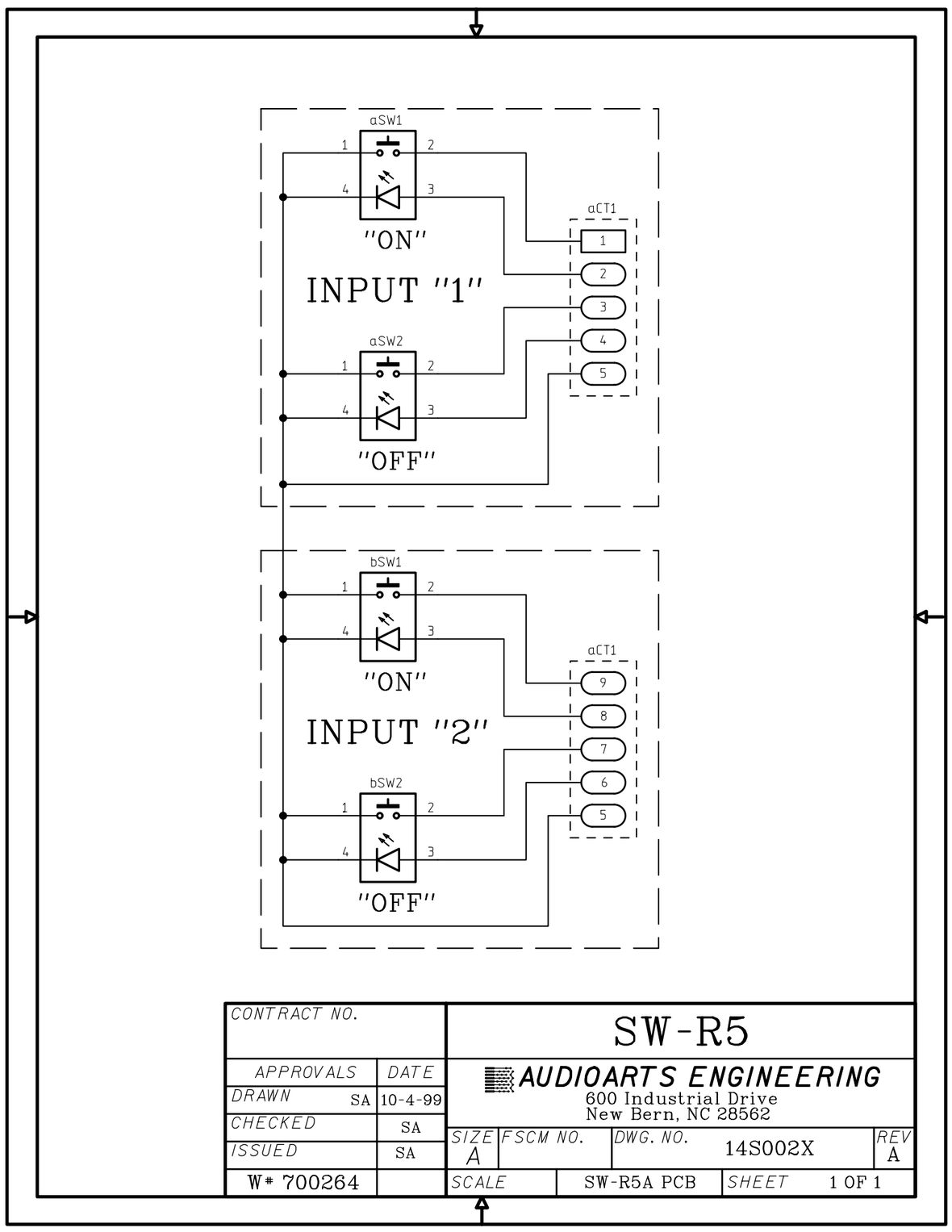
W#	part name	description	# in each unit
220014	CONN_PC_MT_12_PIN	12 PIN PC MOUNT CONNECTOR	15
230025	CONN_6_PIN_MR_PC_M	6 PIN PC MOUNT MR CONNECTOR	1
245001	SOCKET_SMT_JS8_PIN	8 PIN .3" DIP SMT SOCKET	38
245002	SOCKET_SMT_JS14_PIN	14 PIN .3" DIP SMT SOCKET	25
245003	SOCKET_SMT_JS16_PIN	16 PIN .3" DIP SMT SOCKET	30
250062	HEADER_3_PIN_JST	3 PIN .098" HEADER	2
250065	HEADER_6_PIN_JST	6 PIN .098" HEADER	3
250066	HEADER_9_PIN_JST	9 PIN .098" HEADER	5
300012	Q74HC00_TTL	74HC00	1
300013	Q74HC02_TTL	74HC02	3
300015	Q74HC08_TTL_DAMS	74HC08	1
300028	Q74HC30_TTL	74HC30	2
300035	Q74HC74_TTL	74HC74	7
300046	Q74LS74	74LS74	8
300053	Q74HC14_TTL	74HC14	3
300054	Q74HC4060_TTL	74HC4060 TTL	1
300055	Q74HC4511_TTL	74HC4511 TTL	4
300056	Q74HC192_TTL	74HC192 TTL	4
320004	Q2142_IC	2142 BALANCED LINE DRIVER IC	10
320006	QTL072	TL072 DUAL BIFET OP-AMP	26
320007	QLM675_IC	LM675 POWER OP AMP	3
320008	QNE5532	NE5532 DUAL OP-AMP	2
340020	QLH1522AB	LH1522AB DUAL FET OPTO COUPLER	2
340021	QPS2502-2	8 PIN DUAL OPTO COUPLER	2
345001	QMMBTA05_SMT	MMBTA05 NPN SMT TRANSISTOR	3
345002	QMMBTA55_SMT	MMBTA55 PNP SMT TRANSISTOR	10
355001	Q1N4002W_SMT_DIODE	1N4002W RECTIFYING 1AMP SMT	1
355002	QC5V1_SMT_ZENER_DI	5.1V SMT ZENER DIODE C5V1	2
355003	Q1N4148_SMT_DIODE	1N4148 FAST SWITCHING SMT DIODE	9

OM-5 Output Board Parts List – Sheet 1 of 3
(PCB is Wheatstone P/N 002541)

W#	part name	description	# in each unit
375007	CRYSTAL_32.768KHZ_S	32.768KHZ CRYSTAL	1
380003	Q14053BCP	14053BCP	19
405002	CP22UF_25V_SMT	CAPACITOR, 22µF 25V ELECTROLYTIC	38
405003	CP100UF_25V_SMT	CAPACITOR, 100µF 25V	3
405004	CP330UF_25V_SMT	CAPACITOR, 330µF 25V	7
405005	CP1UF_35V_TANT_SMT	CAPACITOR, 1µF 35V ELECTROLYTIC	7
415001	CP10P_CER_SMT	CAPACITOR, 10pF 100V CERAMIC SMT	77
415002	CP33P_CER_SMT	CAPACITOR, 33pF 100V CERAMIC SMT	11
415003	CP68P_CER_SMT	CAPACITOR, 68pF 100V CERAMIC SMT	20
415004	CP330P_CER_SMT	CAPACITOR, 330pF 100V CERAMIC	3
415005	CP.001UF_CER_SMT	CAPACITOR, .001µF 50V CERAMIC SMT	4
415007	CP.1UF_CER_SMT	CAPACITOR, .1µF 50V CERAMIC SMT	88
415009	CP.22UF__CER_SMT	CAPACITOR, .22µF 50V CERAMIC SMT	30
435001	RESISTOR_3.3Ω_SMT_1	3.3 OHM 5% .25W MC1206 RESISTOR	6
435002	RESISTOR_10Ω_SMT_12	10 OHM 5% .25W MC1206 RESISTOR	9
435007	RESISTOR_100Ω_SMT_1	100 OHM 5% .25W MC1206 RESISTOR	13
435008	RESISTOR_150Ω_SMT_1	150 OHM 5% .25W MC1206 RESISTOR	1
435009	RESISTOR_220Ω_SMT_1	220 OHM 5% .25W MC1206 RESISTOR	33
435010	RESISTOR_332Ω_SMT_1	332 OHM 1% .25W MC1206 RESISTOR	11
435011	RESISTOR_475Ω_SMT_1	475 OHM 1% .25W MC1206 RESISTOR	49
435013	RESISTOR_619Ω_SMT_1	619 OHM 1% .25W MC1206 RESISTOR	4
435015	RESISTOR_1.00K_SMT_	1.00 KOHM 1% .25W MC1206	40
435016	RESISTOR_1.30K_SMT_	1.30 KOHM 1% .25W MC1206	2
435020	RESISTOR_2.43K_SMT_	2.43 KOHM 1% .25W MC1206	5
435021	RESISTOR_3.32K_SMT_	3.32 KOHM 1% .25W MC1206	24
435022	RESISTOR_3.92K_SMT_	3.92 KOHM 1% .25W MC1206	22
435023	RESISTOR_4.99K_SMT_	4.99 KOHM 1% .25W MC1206	71
435028	RESISTOR_10.0K_SMT_	10.0 KOHM 1% .25W MC1206	137
435034	RESISTOR_20.0K_SMT_	20.0 KOHM 1% .25W MC1206	8

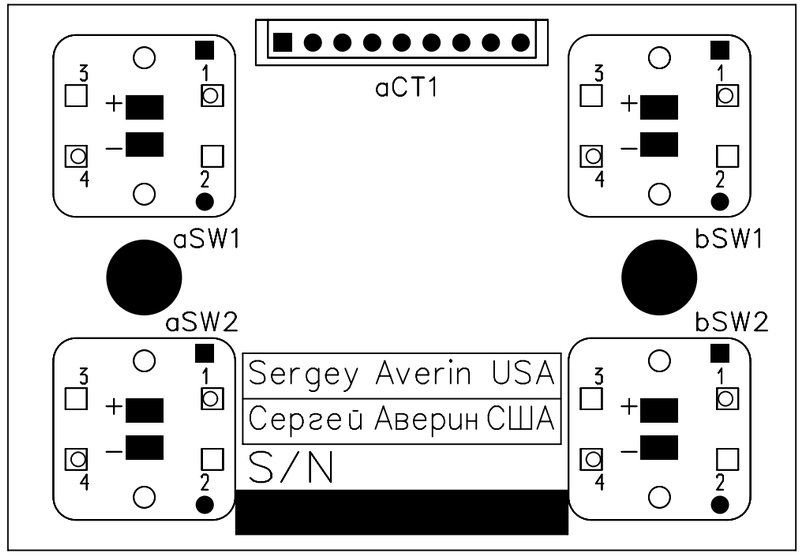
W#	part name	description	# in each unit
435036	RESISTOR_22.1K_SMT_	22.1 KOHM 1% .25W MC1206	7
435037	RESISTOR_26.7K_SMT_	26.7 KOHM 1% .25W MC1206	2
435039	RESISTOR_40.2K_SMT_	40.2 KOHM 1% .25W MC1206	10
435043	RESISTOR_88.7K_SMT_	88.7 KOHM 1% .25W MC1206	5
435047	RESISTOR_330K_SMT_1	330 KOHM 5% .25W MC1206 RESISTOR	1
435050	RESISTOR_10M_SMT_12	10 MOHM 5% .25W MC1206 RESISTOR	3
500017	POT_TRIM_HOR_10K	10K TRIM POT	10
510106	SWITCH_R5_RED	SINGLE POLE MOMENTARY SWITCH	19
510107	SWITCH_R5_GRN	SINGLE POLE MOMENTARY SWITCH	15
510111	SWITCH_R5_MOUNT_FR	SINGLE POLE MOMENTARY SW	34
530094	BUTTON_R5_RED	LTM-LTR TYPE SWITCH DIFFUSER RED	5
530095	BUTTON_R5_GRN	LTM-LTR TYPE SWITCH DIFFUSER	15
530096	BUTTON_R5_YLW	LTM-LTR TYPE SWITCH DIFFUSER	14
550006	RELAY_NEC_5V	DPDT RELAY,5V	1
610003	DISPLAY_DUAL_CLOCK	DUAL DIGIT LED DISPLAY	2
700262	PCB_OM5	PRINTED CIRCUIT BOARD SMT	1
825010	HEATSINK_LM675_W/PIN	HEATSINK FOR T-220 WITH MOUNTING	3
835001	FUSE_.3AMP_SMT_POL	FUSE/ POLYSWITCH .3AMP SMT	2

OM-5 Output Board Parts List – Sheet 3 of 3
(PCB is Wheatstone P/N 002541)



CONTRACT NO.		SW-R5			
APPROVALS	DATE	AUDIOARTS ENGINEERING 600 Industrial Drive New Bern, NC 28562			
DRAWN SA	10-4-99				
CHECKED	SA				
ISSUED	SA	SIZE A	FSCM NO.	DWG. NO. 14S002X	REV A
W* 700264		SCALE	SW-R5A PCB	SHEET 1 OF 1	

SW-R5 Switch Card Schematic - Sheet 1 of 1


aCT1
aSW1
bSW1
aSW2
bSW2
Sergey Averin USA
Сергей Аверин США
S/N

SW-R5 PARTS LIST			
COMPONENT NO.	**DESCRIPTION**	**QTY**	**WS P/N**
CT1	9 PIN .098" HEADER	1	***250066***
aSW1, aSW2, bSW1, bSW2	SWITCH ON/OFF	4	***530097***
ON SWITCH CAP	CAP_R5_ON_RED	2	***530097***
OFF SWITCH CAP	CAP_R5_OFF_ORG	2	***530098***
ON SWITCH LED	LED_ON/OFF_SWITCH_RED	2	***600027***
OFF SWITCH LED	LED_ON/OFF_SWITCH_YELLOW	1	***600031***
PRINTED CIRCUIT BOARD	PCB_SWR5A	1	***160035***

SW-R5 Switch Card Parts List
(PCB is Wheatstone P/N 002542)

R-5 CONSOLE PARTS LIST			
COMPONENT NO.	**DESCRIPTION**	**QTY**	**WS P/N**
	ASSEMBLED CONSOLE FRAME	1	***002560***
	OWNER'S MANUAL FOR R5 CONSOLE	1	***002599***
	R60 POWER SUPPLY	1	***007010***
	R5 POWER SUPPLY CABLE	1	***007019***
	1 1/4" FOAM PACKAGING CORNERS	4	***130040***
	SET OF 2, RIGHT & LEFT, R5 END CAPS	1	***130178***
	23 1/4" X 17 1/2" X 7 1/16" OUTER BOX	1	***160000***
	19 7/8" X 4" 1/16 X 14" POWER SUPPLY	1	***160014***
	34 1/2" X 25" X 11 7/8" 275#BC DOUBLE WALL BOX	1	***160035***

R-5 Console Parts List
(PCB is Wheatstone P/N 002590)

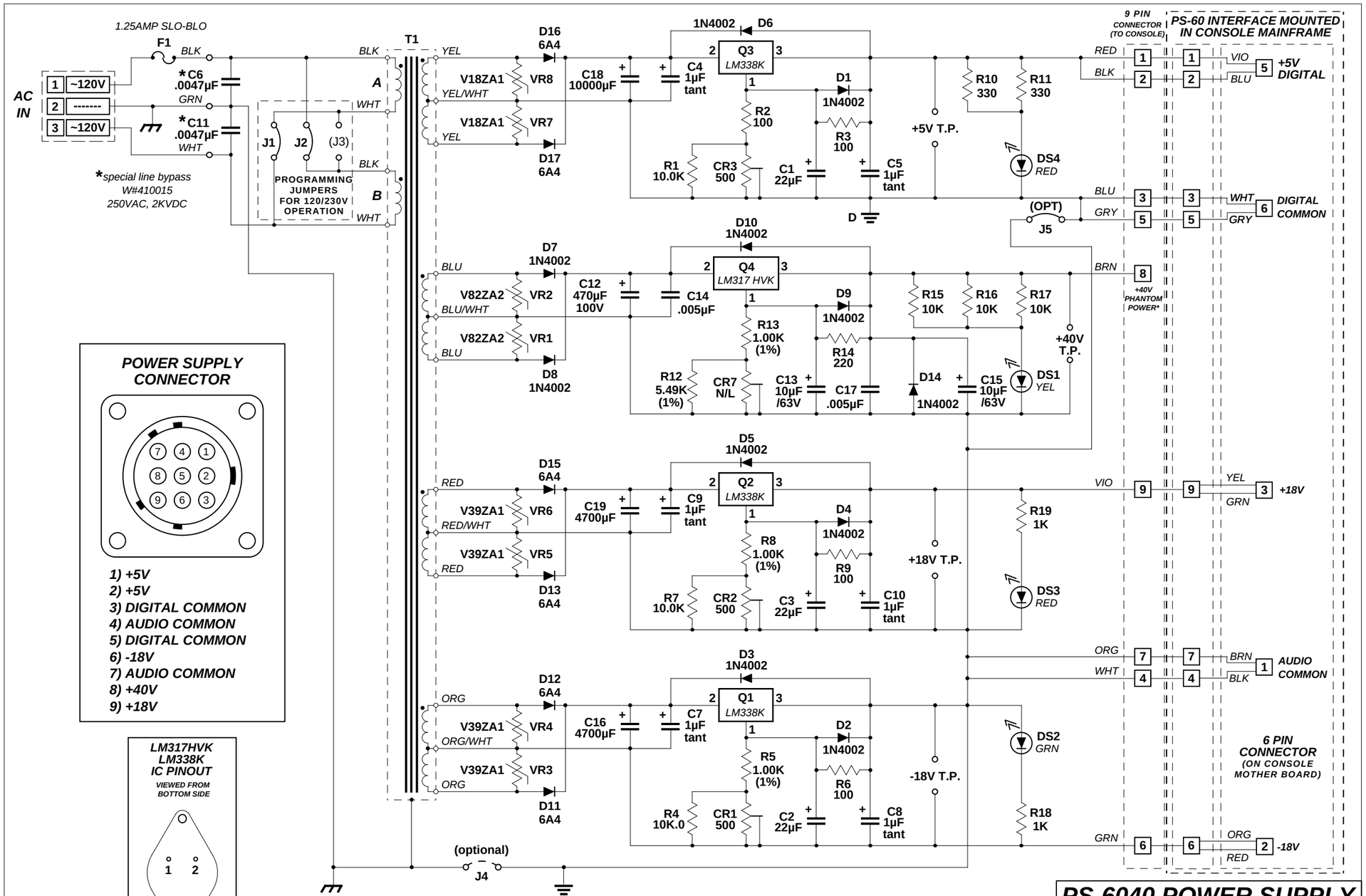
R-5 FRAME PARTS LIST

COMPONENT NO.	DESCRIPTION	QTY	WS P/N
	1.25 X 4 RED CLOCK PLEXI	1	***002463***
	MB5 LOADED INPUT SECTION CARD	1	***002540***
	OM5 LOADED OUTPUT SECTION CARD	1	***002541***
	SWR5 LOADED SWITCH CARD	6	***002542***
	FRAME FACE, PAINTED AND SCREENED	1	***002570***
	MB FACE, PAINTED AND SCREENED	1	***002571***
	MB REAR, PAINTED	1	***002572***
	CONSOLE BOTTOM PANEL, PAINTED	1	***002573***
	R5 SUPPORT BRACKET	1	***002575***
	R5 SPEAKER BRACKET	1	***002576***
	R5 ARMREST SUPPORT BRACKET	2	***002577***
	CONNECTOR KIT FOR R5	1	***002595***
	OAK SIDEPLATE LEFT	1	***100049***
	OAK SIDEPLATE RIGHT	1	***100050***
	30" OAK ARMREST	1	***100054***
	ALUMINUM CONTINUOUS HINGE, 72"X1.06"X.040"	.5	***110024***
	UNSHIELDED WIRE	16	***150000***
	26 COND FLAT RIBBON CABLE	5	***150083***
	CABLE MOUNT MULTI-PIN CONNECTOR	1	***230010***
	MULTI-PIN CONNECTOR STRAIN RELIEF	1	***230012***
	MULTIMATE SOCKET CONTACT (LOOSE PACK)	5	***230014***
	6 PIN CABLE MOUNT MR PLUG	1	***230026***
	3 PIN .098" PLUG FOR #26 AWG	2	***230028***
	6 PIN .098" PLUG FOR #26 AWG	3	***230031***
	9 PIN .098" PLUG FOR #26 AWG	26	***230032***

R-5 Frame Parts List – Sheet 1 of 2
(PCB is Wheatstone P/N 002560)

R-5 FRAME PARTS LIST			
COMPONENT NO.	**DESCRIPTION**	**QTY**	**WS P/N**
	20 POSITION SNAP APART SOCKET, .1" SIL	2	***250014***
	RTS JACK	1	***260005***
	PATCH CLIP	1	***280004***
	PATCH CLIP	8	***280007***
"CUE"/"HDPN"/"STUDIO"/"CR" POT	10K POT, DUAL AUDIO	4	***500029***
"CUE"/"HDPN"/"STUDIO"/"CR" KNOB	15mm GREY COLLET KNOB FOR 1/4" SHAFT	4	***520038***
FADER KNOB	WHITE FADER KNOB WITH BLACK LINE	10	***520051***
FADER KNOB	BLUE FADER KNOB WITH WHITE LINE	3	***520052***
"HDPN" CAP	11mm BLUE/105 CAP W/BLACK LINE FOR 15mm KNOB	1	***530043***
"CUE" CAP	11mm BLUE CAP W/WHITE LINE FOR 15mm KNOB	1	***530045***
"STUDIO" CAP	PASTEL GREEN CAP W/BLACK LINE FOR 15mm KNOB	1	***530079***
"CR" CAP	CREAM CAP W/BLACK LINE FOR 15mm KNOB	1	***530080***
FADER	10K SINGLE AUDIO TAPER SELMARK CARBON FADER 100mm	3	***540027***
FADER	10K DUAL AUDIO TAPER SELMARK CARBON FADER 100mm	10	***540028***
	VU METER	4	***630004***
	6V LIGHT BOX FOR AL29 METER	4	***630007***
	FLAT WASHER	1	***822007***
	SHOULDER WASHER	1	***822008***
	#6 THUMB SCREW	2	***823029***
	METER TERMINAL	8	***826001***
	SPEAKER	1	***960000***

R-5 Frame Parts List – Sheet 2 of 2
(PCB is Wheatstone P/N 002560)



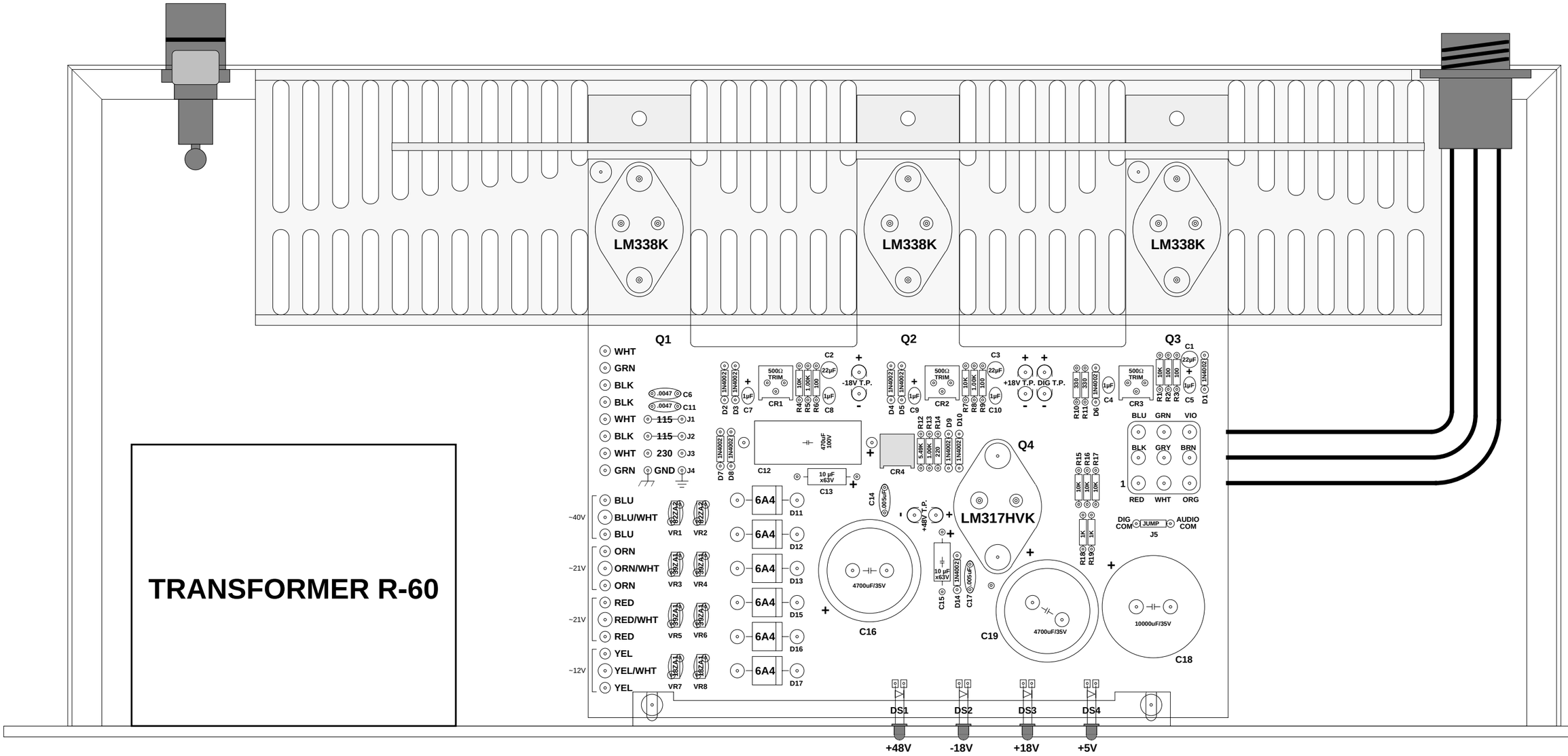
UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5 % AND ARE MEASURED IN OHMS.

** To ensure compliance with UL Standard #1419, this power supply voltage has been factory set to +40VDC. In order to maintain protection under these standards, do not modify this voltage setting to be greater than +40VDC.*

PS-6040 POWER SUPPLY		
R-5 ON - AIR CONSOLE		
07-25-96	Wheatstone® Corporation	
S.A.	600 Industrial Drive	
rev 10-19-00/KP	New Bern, NC. 28562	
W# 700205	PS-6040A PCB	24S0001C

PS-6040 Power Supply Schematic Drawing

R5 / Oct 2000



100Ω
220Ω
1.00K
5.49K
10.0K
} 1%

WHEATSTONE CORP.
PS-6040A
LOAD SHEET
24L0014A

PS-6040 Power Supply Load Sheet

PARTS LIST — POWER SUPPLY

COMPONENT NO.	DESCRIPTION	QTY	*WS P/N*
	PS-60 FACEPLATE	1	***007074***
	PS-60 CHASSIS	1	***007075***
	PS-60 COVER	2	***007076***
	PS-60 HEATSINK, SLOTTED	1	***007077***
	PS-60 CARD BRACKET	1	***007078***
	PS-60 HEATSINK FIN	1	***007084***
	CORD, GRAY POWER	1	***150016***
	CABLE, PS BLACK, 14/22 AWG	16	***150085***
	GROUND LUG	1	***230003***
	CONNECTOR, CABLE MOUNT MULTI-PIN	2	***230010***
	CONNECTOR, CHASSIS MOUNT MULTI-PIN	1	***230011***
	STRAIN RELIEF, MULTI-PIN CONNECTOR	2	***230012***
	PINS, MIL CABLE, FEMALE	18	***230014***
	PINS, MIL CABLE, MALE	9	***230015***
	PATCH CLIPS	1	***280000***
Q4	REG, LM317HVK, POSITIVE ADJUSTABLE	1	***330012***
Q1-Q3	REG, LM338, POSITIVE ADJUSTABLE	3	***330014***
D1-D10, D14	DIODE, 1N4002	11	***350003***
D11-D13, D15-D17	DIODE, POWER , CR6A4	6	***350009***
VR7, VR8	VARISTOR, 18ZA1	2	***360000***
VR3-VR6	VARISTOR, 39ZA1	4	***360002***
VR1, VR2	VARISTOR, 82ZA2	2	***360005***
C18	CAPACITOR, 10000µF 35V ELECTROLYTIC	1	***400006***
C13, C15	CAPACITOR, 10µF 63V ELECTROLYTIC	2	***400012***
C4, C5, C7-C10	CAPACITOR, 1µF 35V TANTALUM ORANGE	6	***400014***
C1-C3	CAPACITOR, 22µF 25V ELECTROLYTIC	3	***400017***
C16, C19	CAPACITOR, 4700µF 35V ELECTROLYTIC	2	***400019***
C12	CAPACITOR, 470UF 100V AXIAL LEAD UL APPROVED ELECTROLYTIC	1	***400031***
C6, C11, C14, C17	CAPACITOR, .0047µUF 1KV CERAMIC, UL RATED	4	***410015***

PS-6040 Power Supply Parts List - Sheet 1 of 2
(PCB is Wheatstone P/N 007118)

PARTS LIST — POWER SUPPLY			
COMPONENT NO.	**DESCRIPTION**	**QTY**	***WS P/N***
R5, R8 ,R13, R18, R19	RESISTOR, 1.0K, PRECISION	5	***430107***
R12	RESISTOR, 5.49K, PRECISION	1	***430140***
R1, R4, R7, R15-R17	RESISTOR, 10.0K, PRECISION	6	***430153***
R2, R3, R6, R9	RESISTOR, 100Ω, CARBON	4	***430212***
R14	RESISTOR, 220Ω, CARBON	1	***430214***
R10, R11	RESISTOR, 330Ω, CARBON	2	***430215***
CR1-CR3	POT, TRIM HOR 500Ω	3	***500019***
DS1-DS4	LED, ROUND, RL209	4	***600017***
	PRINTED CIRCUIT BOARD, PS6040	1	***700205***
	TRANSFORMER, POWER	1	***800005***
	SCR, 1032X3/4, HEX SHCS	4	***820007***
	SCR, 440X1/4, PH PAN	2	***820016***
	SCR, 440X3/8, PH PAN	18	***820021***
	SCR, 632X3/8, HEX SOCKET	6	***820034***
	SCR, 632X3/8, PH PAN S/S	7	***820035***
	NUT, KEP #4	18	***821005***
	NUT, KEP #6, SMALL PATTERN	10	***821006***
	NUT, KEP, ZINC 10	4	***821008***
	NUT, PEM	2	***821009***
	STUD, PEM, PS60 LUG	1	***821013***
	GROMMET, RUBBER 742	4	***824005***
	STRAIN RELIEF	1	***824009***
	INSULATOR, MICA	3	***825008***
	FUSE_1.25_AMP	1	***830053***
	FUSE_HOLDER	1	***830010***

PS-6040 Power Supply Parts List - Sheet 2 of 2

(PCB is Wheatstone P/N 007118)

Appendix

Chapter Contents

External On Tally Circuit A-2
External Headphone Pad Circuit A-2
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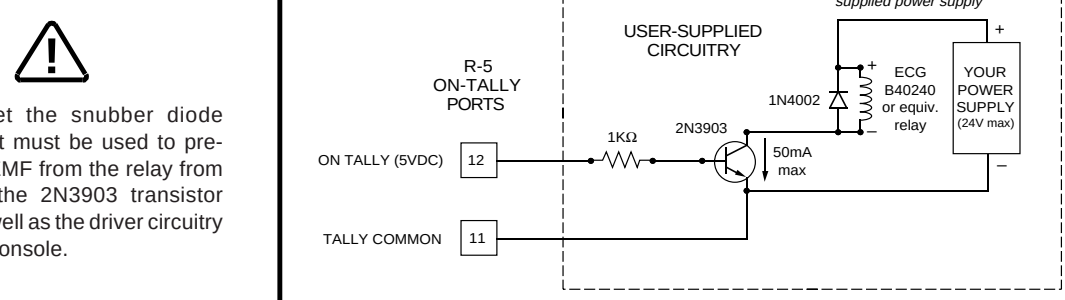
Denon DN-951 Cd Player Hook-up Diagram A-8
Studio Dimming Resistors A-9

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:

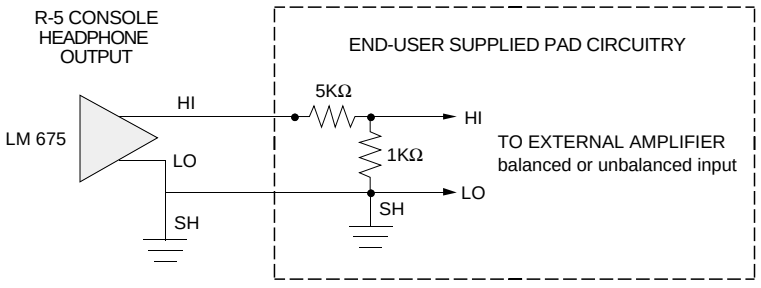


TYPICAL EXTERNAL ON TALLY CIRCUIT
User-supplied relay and power supply triggered by R-5 mono mic input channel ON TALLY control port

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:*



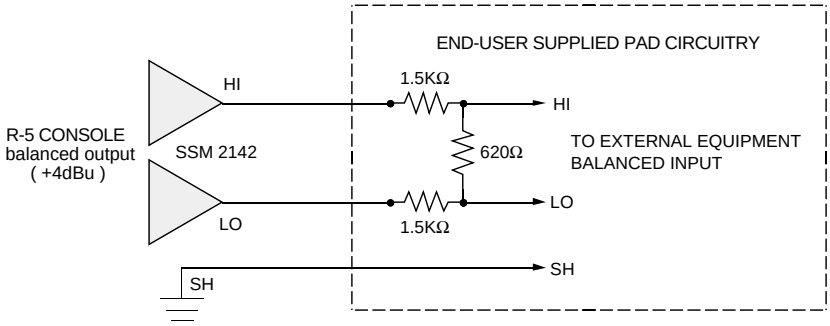
Suggested pad circuit (–14dB) for external headphone amp

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.

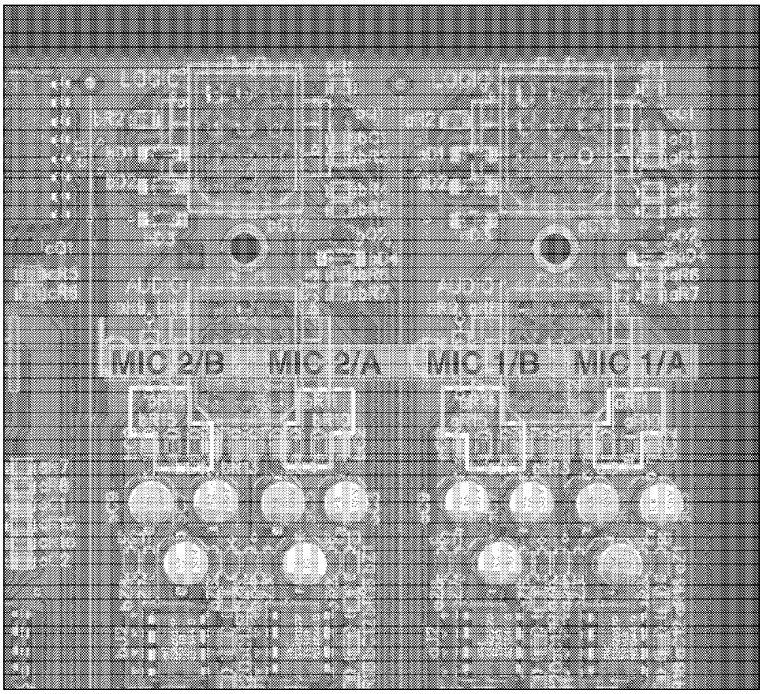
If your external amplifier doesn't have input gain controls, you may wish to introduce an external pad (attenuation) circuit at the amplifier end of the feed. The circuit shown in the drawing below will work with any of the console's electronically balanced outputs (i.e., any output except mono mic channel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



Suggested external pad circuit (–17dB)
R-5 Console Balanced Outputs

DISABLING PHANTOM POWER

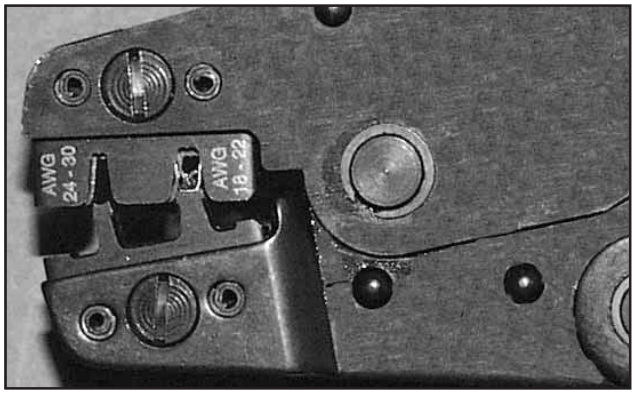
Mono mic input channels have built-in phantom power (+18VDC) that is always on. This will cause no problems for the majority of available microphones; however, should you find it necessary to disable phantom power, this can be accomplished by removing two 4.99KΩ (1% precision) resistors from each associated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



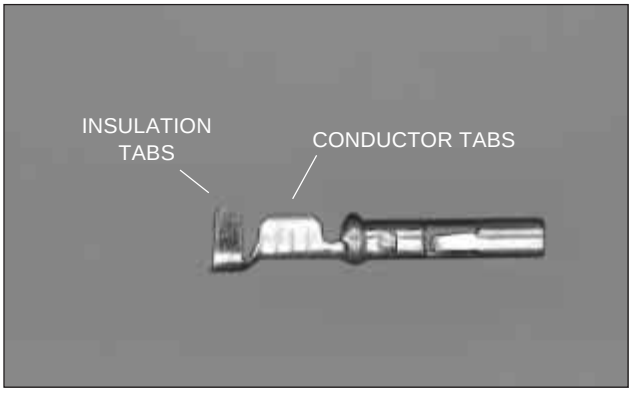
Rear view of MB-5 motherboard, behind microphone channel I/O audio connectors, showing location of phantom power resistors (four pairs: aR10/11, aR14/15, bR10/11, bR14/15).

HAND CRIMP TOOL WIRING INSTRUCTIONS

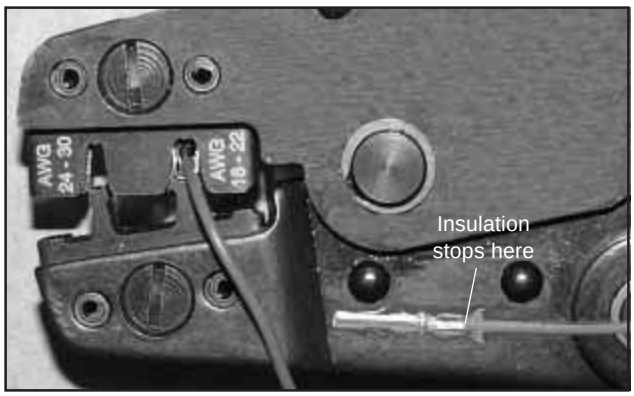
The supplied hand crimping tool (PALADIN model PA1645, W/S#850067) is used for all I/O wiring connections to and from the console. It is to be used with the supplied .062" pin diameter silver crimp terminals (figure 1) intended for 22 gauge wire.



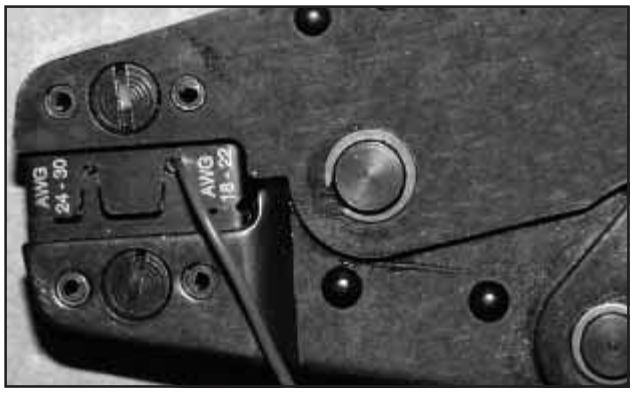
(2) The terminal conductor tabs (pointing UP) are placed in anvil 18-22; the terminal's insulation tabs extend in front towards the camera.



(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).

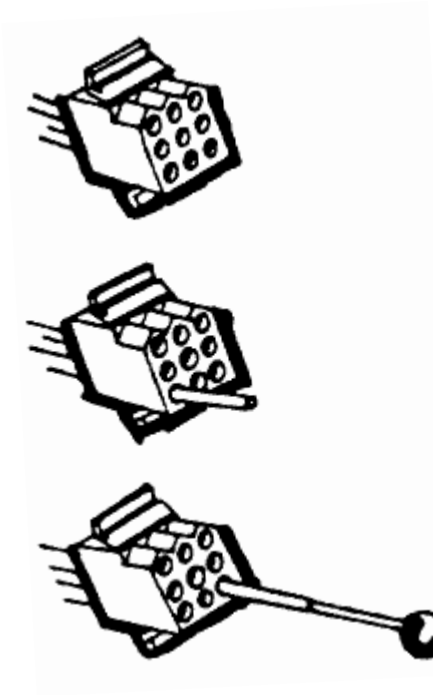
3) Close tool very slightly, only to the point of holding the terminal in position (figure 2).

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.

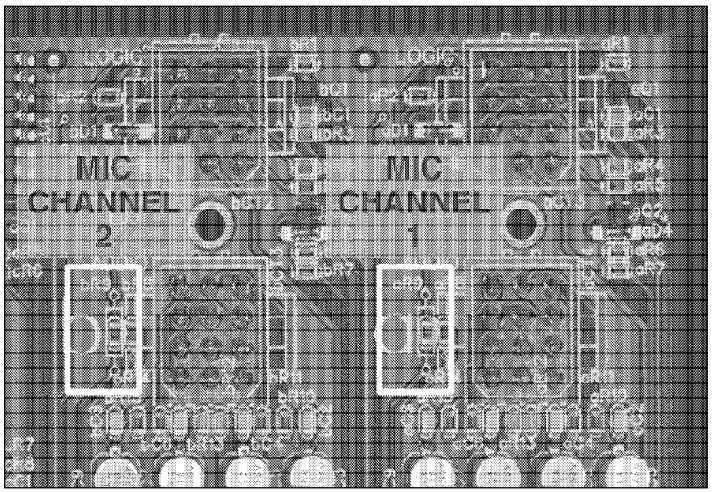
STEP 2.
Place extractor tip over pin terminal to be removed. Press handle portion of extractor in downward motion until tip rests upon Nylon Housing.

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

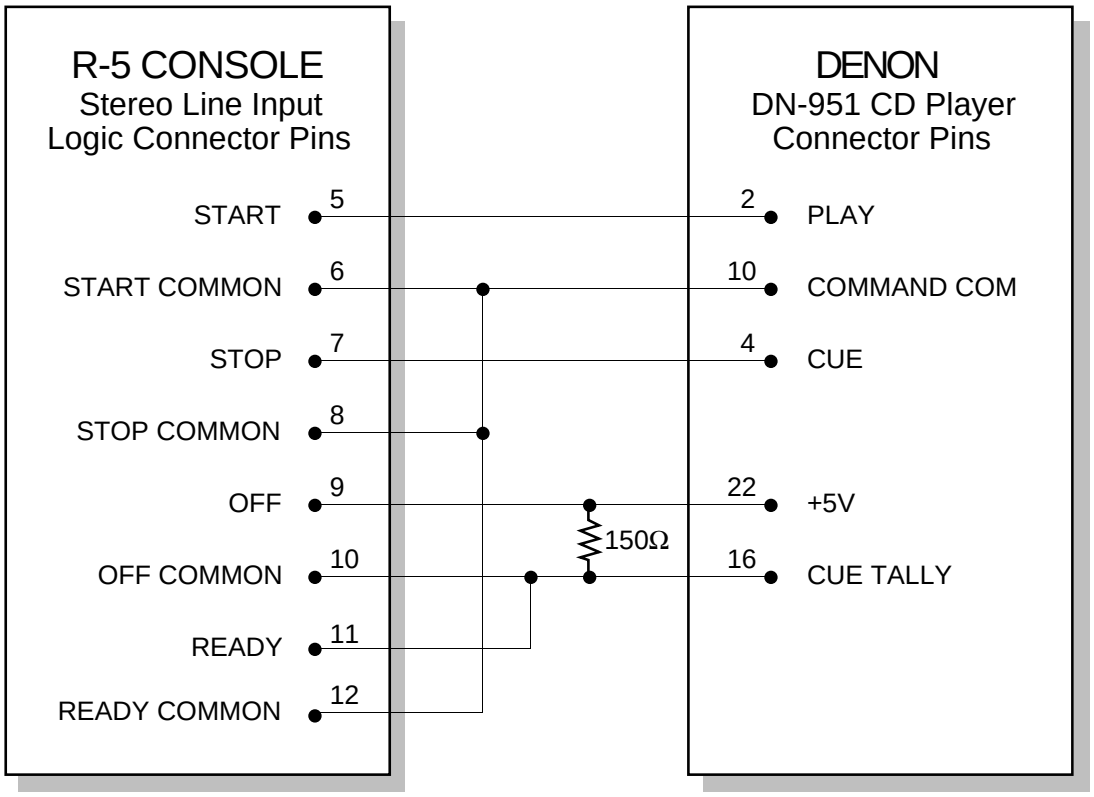
INSERT POINT BRIDGING RESISTORS

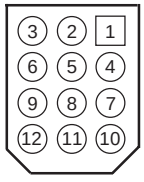
R-5 console mono mic input channels have built-in insert patch points. These patch points are bridged at the factory with a 10Ω resistor so signal will pass through the input channel without any external gear installed. If you will not be using the insert points, or will only be utilizing the INSERT 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 10Ω, 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.

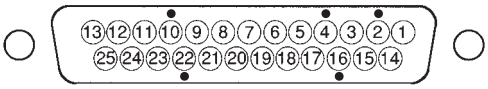


Rear view of MB-5 Motherboard PCB (detail). The mono mic input insert point bridging resistors shown must be removed if you plan to use external processing loops in the signal chain.





R-5 Console 12-pin connector

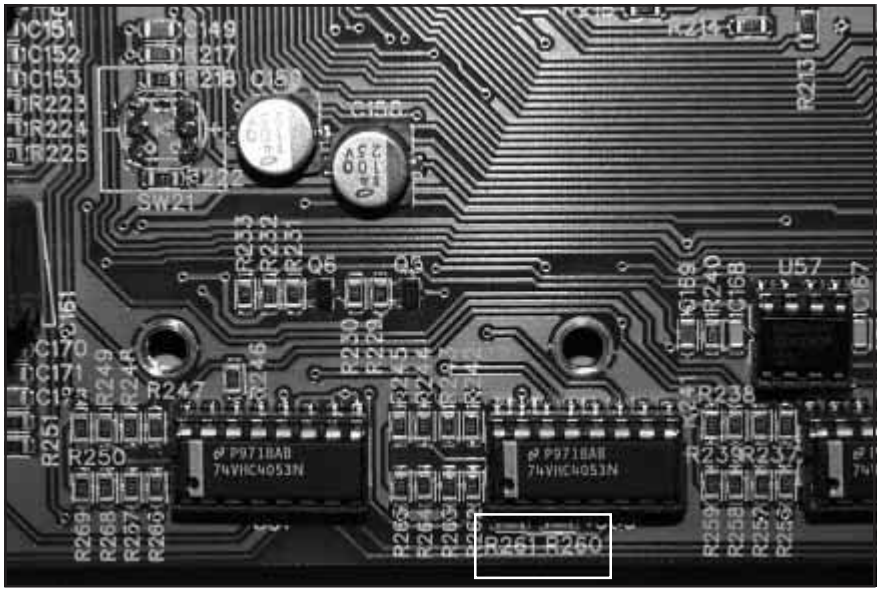


Denon Rear Panel DB-25

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 22.1KΩ 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.