AUTOGRAM/CRL

R / TV - 20 AUDIO CONSOLE

R / TV - 12 AUDIO CONSOLE

INSTRUCTION MANUAL

DECEMBER 10, 1987

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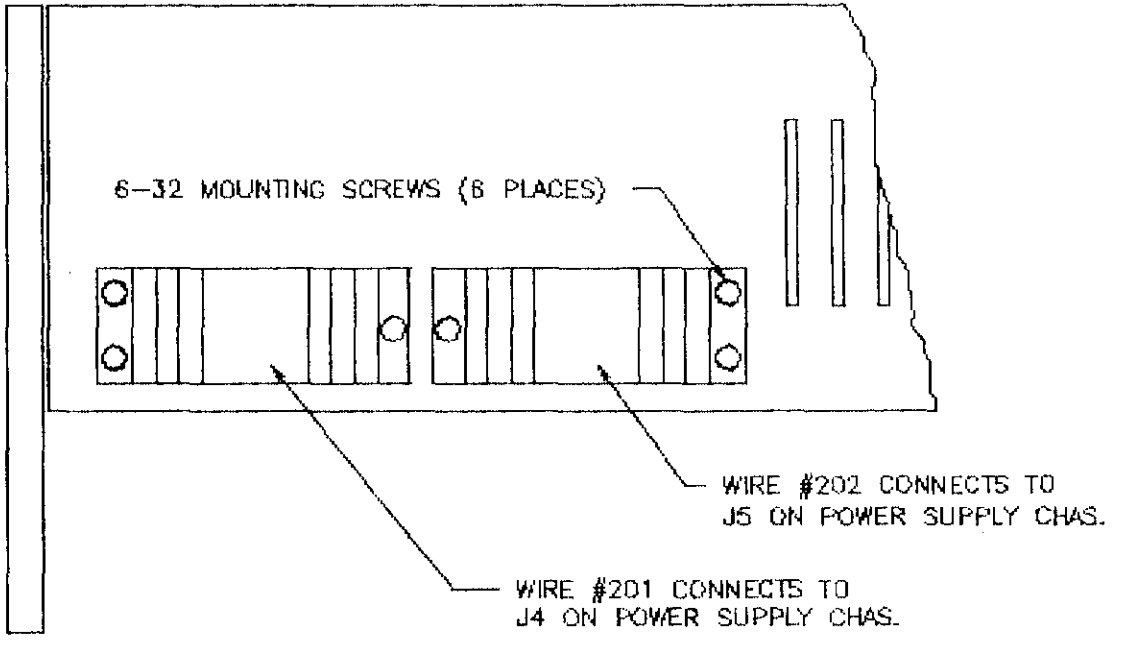
NOTICE: INSTALL REAR MOUNTED REGULATORS BEFORE TURNING ON POWER.

R/TV12 R/TV20



AUTOGRAM CORP.

6 / 8 / 88

AUTOGRAM CORPORATION

R/TV SERIES AUDIO CONSOLES

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STATIC ELECTRICITY NOTICE

Static Electricity also known as Electro-Static Discharge (E.S.D) and Electro-Magnetic Interference (E.M.I) can upset the operation of digital based devices. The R/TV SERIES AUDIO CONSOLES because of the extensive use of digital circuitry can be affected by E.S.D. and E.M.I. Autogram has expended great effort in making the R/TV Console resistant to Static Electricity and External Radio Frequency Energy. However, normal care must be exercised by the installing personnel to insure that the installation is within Standards of Good Engineering Practice.

If Static Electricity is present in the area into which the R/TV Console is to be installed, the customer is advised to use whatever means practical to eliminate the static charges.

Static Electricity can be reduced by installation of commercially available Anti-Static carpets, anti-static treatment of existing carpet, and humidification.

Grounding the console and associated equipment to a firm studio ground system will aid in the reduction of problems associated with R.F.I. as well as helping to dissipate static charges.

Care should be taken to insure that personnel are grounded prior to handling printed circuit boards.

AUTOGRAM PRODUCT WARRANTY

AUTOGRAM warrants the original purchase of all products manufactured by AUTOGRAM CORPORATION and sold hereunder will, at the date of shipment, meet all published specifications and will be free from defects in design, workmanship, and material.

Warranties do not cover damage from lightning, floods, earthquakes, hurricanes, tornadoes, or acts of civil disobedience.

Warranties may not be honored when failure is caused by improper use or abuse, maintenance, repair or alteration by unauthorized persons.

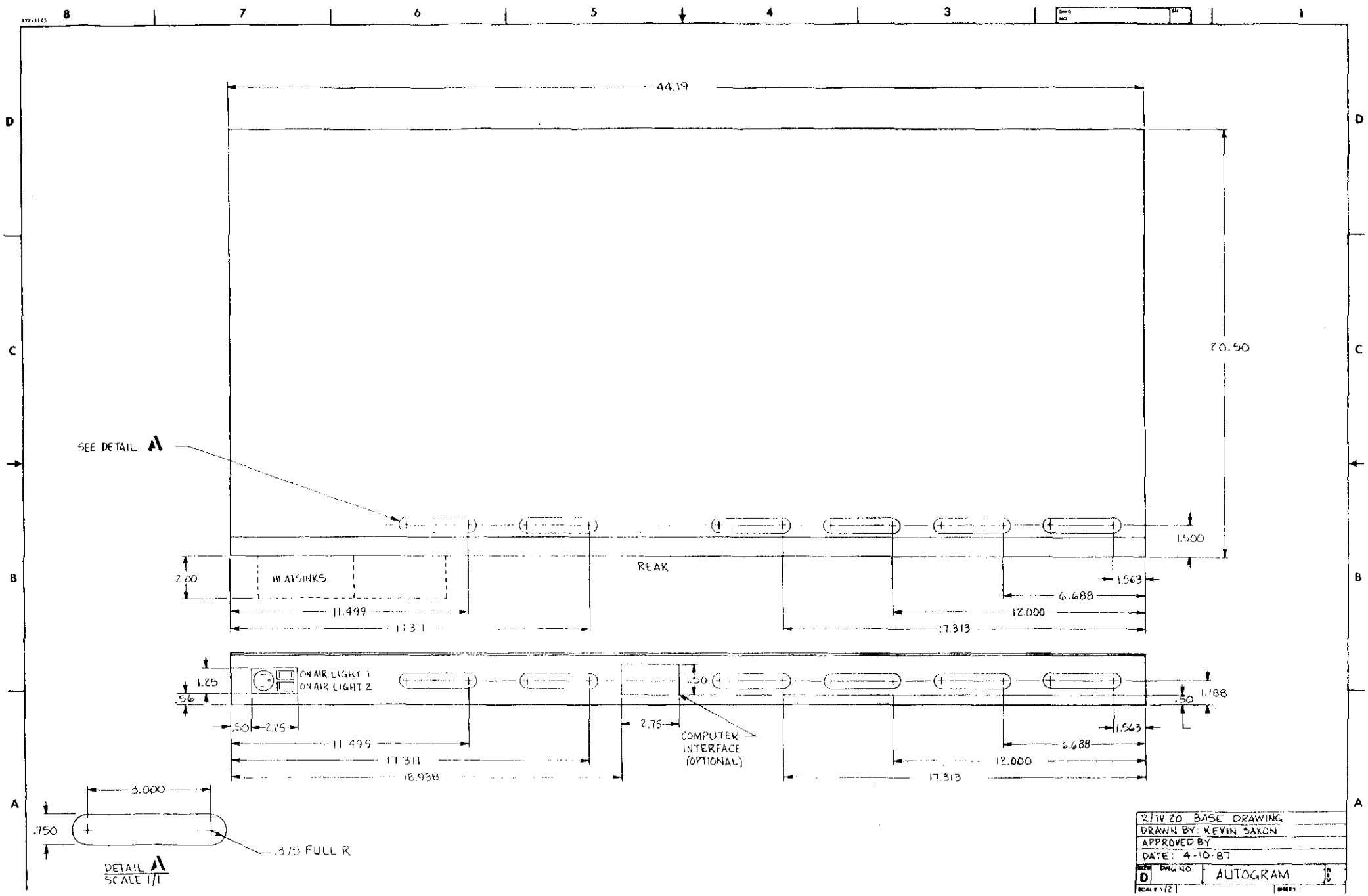
AUTOGRAM agrees to repair or replace any equipment of its manufacture that fails to meet warranty conditions as set forth above for two (2) years from the date of invoice with the exception of lamps, fuses, and other expendable items. All major parts, such as VU Meters, Step Attenuators, Key Switches, etc., sold hereunder, which are not of AUTOGRAM CORPORATION manufacture, are sold subject to the warranty programs of the suppliers thereof.

In no event shall AUTOGRAM have any liability for consequential damages, loss, or expenses directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause.

Defective parts under warranty must be returned to AUTOGRAM per instructions. Parts replaced under warranty will be shipped freight prepaid by regular UPS or US Mail First Class. Any other method of shipment requested by the customer, such as air express, will be billed to the customer.

Ernest T. Ankele, Jr.
President
3/1/95

vii. R/TV-20 Base Drawing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COMPUTER
INTERFACE
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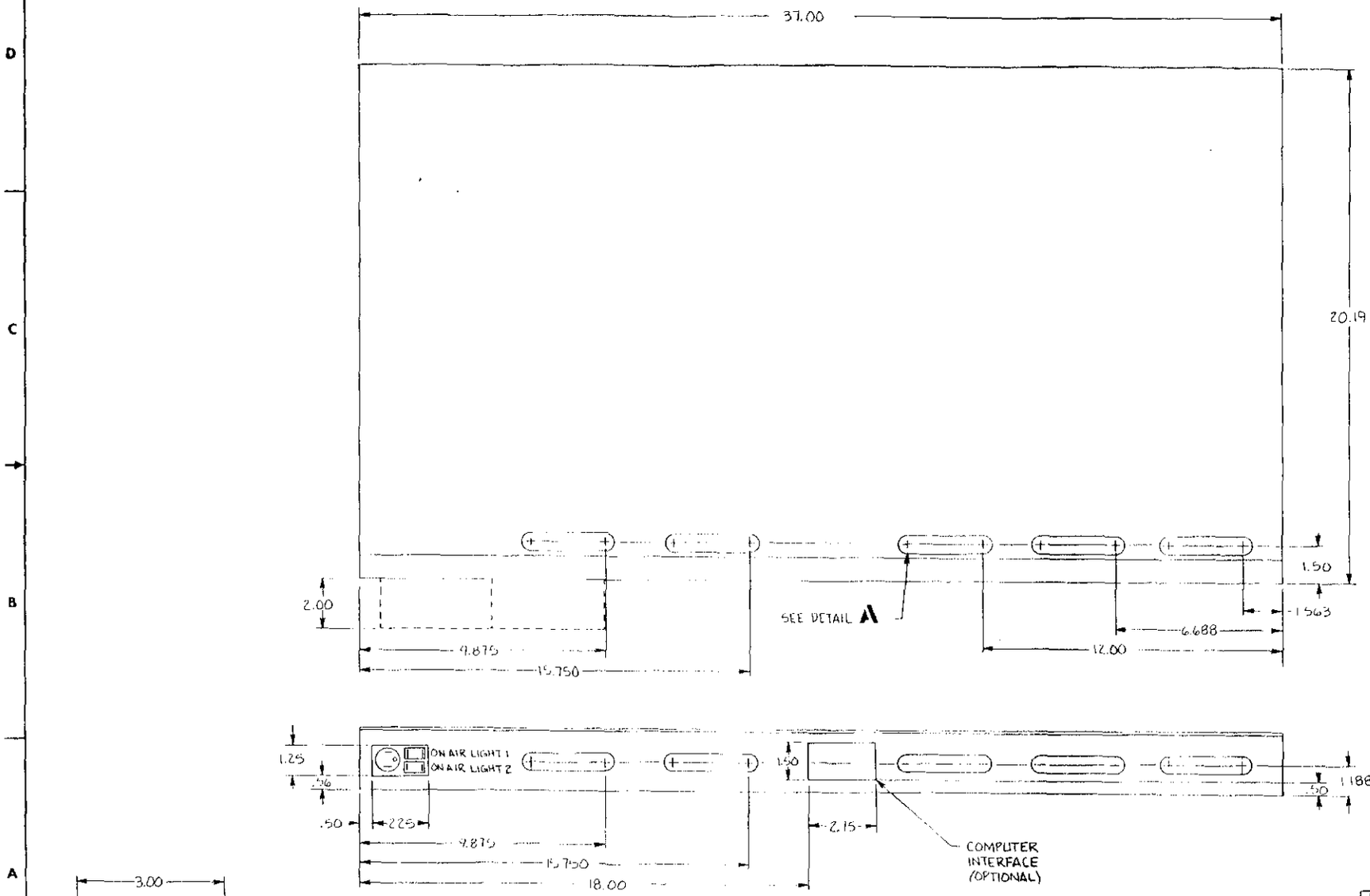
DETAIL A
SCALE 1/1
R/TV-20 BASE DRAWING
DRAWN BY: KEVIN SAXON
APPROVED BY
DATE: 4-10-87
AUTOGRAM

viii. R/TV-12 Base Drawing



R/TV-12 BASE DRAWING	
DRAWN BY: KEVIN SAXON	
APPROVED BY:	
DATE-4-22-87	
D	AUTOGRAM

SECTION 1

INTRODUCTION

1.0.0 GENERAL

The Autogram R/TV SERIES AUDIO CONSOLES represents the latest in audio systems design. Integrated within the R/TV-20 console are eighteen dedicated input channels along with two channels with eight sources on each. The R/TV-12 console has eight dedicated channels and four channels with four sources on each. This arrangement gives the R/TV-20 a total of 34 stereo inputs while the R/TV-12 has 24 stereo inputs. PENNY AND GILES "long throw" conductive plastic linear (slide) potentiometers are used to operate the voltage controlled amplifier (V.C.A.) circuits. Switching of the various audio circuits is accomplished by the latest design HIGH VOLTAGE CMOS electronic switches. Each channel is made up of the attenuator, an ON (start) pushbutton switch, an OFF (stop) pushbutton switch, a PGM (program) switch, a AUD (audition) pushbutton switch, and a Channel Board. The Channel Board along with all other audio boards are contained within a R.F.I. protected metal cage. Each channel board will feed either a Stereo Program Bus or a Stereo Audition Bus or both simultaneously. Additionally, two mono Mix-Minus buses, a Main Mono Output (which is derived from either the Program or Audition Output channels and is switch selectable), and a mono Cue bus may be fed. Monitoring is supplied by a line level monitor amplifier driver (monitor power amplifiers are not included), a 2 watt R.M.S. per channel headphone amplifier, and a 2 watt cue amplifier. The monitor driver and headphone amplifier may be switched between Program, Audition, External, and Air (external and air signals are user provided). The audio boards plug into Mother Boards for quick and simple changes. All external connections to the audio boards are made through a new type miniature pluggable screw terminal connector. This type connector allows for sources to be quickly moved between various channels as well as prewiring sources before connecting them to the console.

1.1.0 CHANNEL BOARD

The Channel Boards provide audio and control interfacing between the console and the audio source equipment. The Channel Boards also contain the V.C.A.s and electronic switches which control the feeds to the various buses. All logic for operating the front panel lamps and detecting the Channel switches is on the respective Channel Board.

1.1.1 CHANNEL BOARD AUDIO INPUT

The audio input levels to the Channel Boards are fully adjustable to accommodate signals between -15 dBm and +15 dBm nominal. The adjustment is made by means of small programming jumper plugs which set the course range to +10 dBm, 0 dBm, or -10 dbm. A fine adjustment trimmer allows for +5 or -5 dB further calibration of nominal input signals. The normal input impedance of the Channel Board is >10,000 ohms electronically balanced (transformerless), however a programming jumper is provided to select a precision 600 ohm termination if required. All adjustments are provided for both left and right channels. When shipped from the factory, all inputs are set to accept -10 dBm nominal levels and the termination is off.

1.1.2 CHANNEL BOARD CONTROL

Open collector type outputs (50v @ 300ma) are available on the Channel Board which provide control signals for the various source equipment. Momentary START and STOP pulses as well as an ENABLE signal which is ON whenever the channel is ON are available on the 10 pin Control Connector. Each channel may be remotely controlled by means of the REMOTE ON and REMOTE OFF inputs. A special provision on the Channel Board permits the effective slider position to be set at a nominal level when the channel is brought on by remote control. The automatic level set may be disabled if it is not required. Another feature which may be selected will allow the channel to be turned OFF at the completion of an AUX (also referred to as E.O.M or secondary) signal supplied by the audio source equipment. Tertiary signals may also be connected to the console to activate the "Count-Down" feature of the optional AUTOCLOCK. In some installations it is desirable to allow the "ready lamp" circuit of an associated tape cartridge machine to directly activate the stop lamp on the console. A cut and jumper must be made on the Channel Board to enable this function. The "ready lamp" circuit of the cart machine is then connected to the STOP terminal on the Channel Board Control Connector. Two programming jumpers are provided to select which "Mute Bus" is activated when the channel is turned ON. Either "Mute Bus-1", "Mute Bus-2", both Buses, or no Buses may be selected. Relays are provided on the Power Supply Chassis which give isolated contacts for "Mute Buses" 1 and 2. Two switched 120/240 VAC outlets are available to turn on external warning lamps. Jumpers are available to allow the channel to feed either the PRE-FADER or POST-FADER Mix-Minus buses. Another programming jumper allows the channel to reset the optional AUTOCLOCK timer while the final jumper is used by the optional Microprocessor board.

1.2.0 FRONT PANEL WIRING

Wiring from the Channel Board to the front panel is by a 16 conductor ribbon cable which is plug connected on each end. The four control pushbutton switches associated with each channel are connected by short pig-tail leads to a Switch Interface Board mounted on each slider assembly. The pig-tails use a locking miniature connector which allows for very quick replacement of the switches. The slider uses the miniature locking connector as well. Each slider assembly is attached to the front panel by only two small nuts for quick and easy replacement. The voltage applied to the front panel lamps is adjustable to provide longest possible bulb life.

1.3.0 MICROPHONE PREAMPLIFIER BOARD

Basic amplification for microphone level circuits is handled by the Microphone Preamplifier Board. This board consists of four (4) identical amplifiers. The board is of an isolated design thus allowing the pre-amplifiers to be used with any input of the console. The output level of each Microphone Pre-amplifier is -10 dBm balanced and is designed to drive a normal 600 ohm or bridging type balanced or unbalanced input. Programming jumpers on each Microphone Pre-amplifier circuit allow the user to (1) select a 10 dB input attenuator and (2) elevate the normal output level 10 db. Note that if the nominal output level is increased to 0dbm, the Microphone Pre-amplifier headroom (30db) is reduced by 10 db. The isolated design allows for the Microphone Preamplifier Output to easily drive "outboard" processing equipment. The Console comes

equipped with One (1) Microphone Pre-Amplifier Board (up to four (4) microphones) and can accept one more optional Board for expansion to a total of 8 microphones.

1.4.0 MULTILINE INPUT BOARDS

The Multiline Input Boards interface four (4) stereo audio sources each. Three programming jumpers allow selection of -10 dBm, 0 dBm, or +10 dBm ranged sources as well as permitting either balanced bridging or terminated operation. All switching is done with the High Voltage CMOS type electronic switches. In the R/TV-20 Console, the first pair of Multiline Input Boards are connected to Channel Board 19 while the second pair is used with Channel 20. The R/TV-12 Console uses four Multiline Boards connected to channels 9-12 respectively. The output of the Multiline Input Board is -10 dBm balanced and could be connected to any Channel of the console. Control switching is not routed through the Multiline Input Boards; however, a set of contacts is available on the front panel Remote Line Select switches to enable the user to wire in selectable remote start functions.

1.5.0 AUDIO OUTPUT BOARDS

The Audio Output Boards provide both mixing and line amplification. Three Audio Output Boards are used in the console and all are identical. The Program Board and Audition Board are used as stereo amplifiers while the Mix Minus Board is used as two independent Mono amplifiers. Each output circuit is of the Balanced Bridge type which has a very low characteristic impedance. The maximum console output before clipping is +26dbm/600 ohms. Protection from lightning, etc. is provided by board mounted M.O.V.s (Metal Oxide Varistors). The master gain controls for the various buses are located on the Audio Output Boards. A Processing Patch Point is provided for connecting to external processing equipment.

1.6.0 MONO-SILENCE SENSE BOARD

The Mono-Silence Sense board provides the summing networks and switching to drive the Mono Output which is identical to the circuit used on the Audio Output Boards. Additionally, the Silence Sense system is on this board and will be used with the optional Microprocessor Board for Live-Assist and Automation functions.

1.7.0 MONITOR OUTPUT BOARD

The Monitor Output Board is essentially the same as the Audio Output Boards except it contains the V.C.A.s needed to control the Monitor level via the front panel Monitor Level Control. Programming jumpers allow selecting either "Mute Bus-1", "Mute Bus-2", both, or neither to mute the output.

1.8.0 MONITOR/PHONES SELECT BOARD

The Monitor/Phones Select Board is controlled by the front panel Monitor and Phones Select Switches provides electronic switching of the various audio sources to be monitored. Two external stereo sources may be connected to the Monitor/Phones Select Board and are referred to as AIR and EXTERNAL but may be

any high level source. The input circuitry is identical to that of the Channel Boards and will accept signals between -15 dbm and +15 dbm. The AIR and EXTERNAL input feed both the Monitor Output and the Headphone Output Boards.

1.9.0 HEADPHONE/CUE OUTPUT BOARD

The Headphone/Cue Output Board contains the V.C.A.s for the Headphone and Cue power amplifiers. Each Power Amplifier is rated at 2 watts R.M.S. and is designed to drive an 8 ohm load impedance. The headphone amplifiers are connected to two front panel mounted stereo phone jacks but may be wired to external jacks. The headphone amplifiers develop sufficient output voltage to drive higher impedance type headphones. Programming jumpers are included to allow muting of the cue amplifier from either of the two "Mute" buses. Cue Muting may be disabled if it is not desired.

1.10.0 MICROPROCESSOR BOARD

The OPTIONAL Microprocessor Board serves as an interface between the console and an external computer or LIVE-ASSIST controller. With this board the external computer device can take command of the R/TV-20 and operate it as a sophisticated audio switcher. The Microprocessor Board also serves as decoder for the optional Autogram logging system and can directly drive a printer for program logging operation.

1.11.0 POWER SUPPLY CHASSIS

The Main Power Supply Chassis provides all voltages required to operate the AUTOGRAM R/TV SERIES AUDIO CONSOLES. If an AUTOCLOCK is used with the console, it may be powered by the internal console power supply or by its own wall-mounted power pack. Basically the console uses two fully regulated bi-polar power supplies (+ and - 15 volts and + and - 15.6 volts) to run all the program systems. An unregulated bi-polar 12 volt supply provides power for the Headphone/Cue Power Amplifiers. An adjustable regulated supply of +18 to +24 volts operates the front panel lamps. The final supply is for the 5 volts required for the various digital systems.

A rechargeable battery pack is supplied to maintain the front panel status in the event of a short power failure. The battery pack will hold the logic circuits for about 60 seconds after which it is automatically disconnected resetting the console. In the reset condition, the console will come up with all Channel Boards in the OFF state and PGM and AUD OFF. A MASTER RESET Switch is located on the Power Supply which can be used in the event of a failure of the Auto-Reset system.

The Main Power Supply may be operated from 120 VAC 50/60 hz. + or - 10 volts or 240 VAC 50/60 hz. + or - 10 volts. An internal wiring change is required to operate at the higher voltage. The console is protected by a line fuse and M.O.V.s (metal oxide varistors)for surge protection. Each main output voltage is fuse protected and has LED indicators to show fuse/voltage status.

Relays for the two mute buses are mounted on the Main Power Supply Chassis and each provides an isolated "C" type contact as well as a switched AC (60 watt max) output for driving warning lights, etc.

SECTION 2

OPERATION

2.0 GENERAL

This section describes the front panel controls as well as the basic operating procedures for both the R/TV-12 and R/TV-20 consoles. Where differences exist, each console will be covered separately. The final portion of this section will discuss the many options available to programming personnel.

2.1 FRONT PANEL CONTROLS

Five basic controls for each MIXER channel are available to the operator:

1. OFF — This pushbutton switch turns the MIXER OFF.
2. ON — This pushbutton switch turns the MIXER ON.
3. PGM — This pushbutton switch sends the MIXER audio to the PROGRAM Bus.
4. AUD — This pushbutton switch sends the MIXER audio to the AUDITION Bus.
5. SLIDER — This slide control is used to adjust the level of the MIXER audio. A CUE detent position is available to send the audio to the CUE Bus.

Both PGM and AUD may be turned on at the same time to feed the MIXER audio to both PROGRAM and AUDITION Buses.

In addition to the above basic controls, various other selector switches are located on the front panel:

1. MONITOR — The MONITOR select switches are used to select the audio signal sent to the Monitor speakers. The sources selected may be OFF (no signal), PGM (Program), AUD (Audition), EXT (External), AIR (Air Signal).
2. PHONES — The PHONES select switches are used to select the audio signal sent to the headphones. The sources selected may be OFF (no signal), PGM (Program), AUD (Audition), EXT (External), AIR (Air Signal).
3. METER — The METER select switches are used to select either Program or Audition to feed the left and right channel stereo meters.
4. MONO — The MONO select switches are used to select which bus is fed to the MONO output: PROGRAM or AUDITION. The selected output is displayed on the MONO meter.

5. REMOTE — The REMOTE LINES select switches are used to select the input source for some MIXERS. The configuration is different for the R/TV-12 and R/TV-20 consoles:

a. The R/TV-12 console has four REMOTE LINES select switch banks. Each bank can select one of four inputs. The top bank is connected to Channel 9 with the others connected to Channel 10, 11, and 12 respectively.

b. 20 console has two REMOTE LINES select switch banks. Each bank can select one of eight inputs. The top bank is connected to Channel 19 and the bottom bank is connected to Channel 20.

Three rotary volume controls are also located on the front panel: MONITOR LEVEL, HEADPHONE LEVEL, and CUE LEVEL. These controls set the audio level of the various monitoring systems.

2.2 TYPICAL OPERATING PROCEDURES

The following procedures are presented as examples only. The exact operating procedure depends on the operational needs of the user.

2.2.1 Example 1, Compact Disk Input.

First assume the following conditions; then, proceed to operation.

2.2.1.1 Conditions

a. Left and right stereo inputs are connected to the input of MIXER Number 1.
b. Stereo program line is the final output.
c. Audio output is monitored with stereo studio speakers.
d. All mixers are turned OFF.
e. All PGM and AUD indicators are OFF.
f. The MONITOR LEVEL control is fully ccw.
g. The MONITOR SELECT switch is set to OFF.
h. All MIXER slide controls are fully down but not in detent (CUE) position.
i. VU METER selector is in PGM.
j. MONO selector is in PGM.

2.2.1.2 Operation

a. Press PGM switch on MIXER 1. (PGM lamp should turn on).
b. Press PGM on MONITOR SELECT switch bank.
c. Press the ON switch on MIXER 1. (ON lamp should turn on). The CD Player will start if connected to remote start circuit; otherwise, manually start the player.
d. Advance MIXER 1 slider until audio peaks on LEFT and RIGHT vu meters are indicating approximately 0 VU.

e. Adjust MONITOR LEVEL control until the sound from the studio speakers is at a comfortable level.
f. Note that the MONO vu meter is reading about the same as the left and right meters. If not, a phasing problem may be suspected.

2.2.2 Example 2, Microphone Input

Assume conditions are the same as in 2.2.1.1 except that a microphone is connected to MIXER 2 and that headphones are plugged into one of the two headphone jacks.
NOTE: In actuality, the microphone is connected to one of the isolated microphone pre-amplifiers which is then connected to the left and right inputs of MIXER 2.

2.2.2.1 Operation

a. Select PGM on the PHONES SELECT switch bank.
b. Select PGM on the MONITOR SELECT switch bank.
c. Press the PGM switch on MIXER 2.
d. Press the ON switch on MIXER 2. If all jumper options are in place, the MONITOR speakers will mute.
e. While talking into the microphone, advance the slider on MIXER 2 until audio peaks on vu meters indicate approximately 0 vu.
f. Adjust the PHONES LEVEL control until the sound on the stereo headphones is at a comfortable level.

2.2.3 Dual Channel Operation

The R/TV-12 and R/TV-20 Consoles may be used in a dual channel mode by pressing both the PGM and the AUD switches on the selected MIXER. In this condition the audio will be fed to both the PROGRAM and AUDITION outputs. Of course some mixers may be fed to the Program bus while others are fed to the Audition bus.

2.2.4 Mono Output

The MONO output can be selected to either PROGRAM or AUDITION; therefore, the MONO output could be used to feed a monaural transmitter on PROGRAM while a stereo transmitter was being fed on AUDITION. The selectable Mono output thus makes simulcasting much simpler.

2.3 SPECIAL FUNCTIONS

The R/TV consoles offer many user options. Most can be set up by means of special plug-in jumpers on the various circuit boards. Other options are available from AUTOGRAM CORPORATION and can be added to the console at any time.

2.3.1 Jumper Selected Options

The jumpers are located on the specific circuit boards. See section 3 for location of the boards and jumpers.

2.3.1.1 Channel Boards

A. Jumpers for selecting proper audio level. Normally connected by Engineering personnel.
B. MIX-MINUS FEEDS.
   1. The PRE-FADER jumper sends the MIXER audio to the PRE-FADER MIX-MINUS bus at all times. This feature is useful for connecting the control room microphone to a telephone interface system.

   2. The POST-FADER jumper sends the MIXER audio to the POST-FADER MIX-MINUS bus only when the MIXER is ON and the SLIDER is turned up. This feature allows a sub-mix to be fed to a telephone interface system or recording equipment.
   3. The MUTE BUS select jumpers are normally used on the microphone channels to mute the monitor speakers and turn on ON AIR lights.
   4. The AUTOCLOCK RESET jumper is used with the optional timer to reset the stop-watch when a MIXER is turned on. This may not be desired on some channels such as the microphone channels; therefore, the jumper should be OFF for those sources.
   5. The AUX jumper allows the MIXER to turn OFF at the completion of an End of Message (EOM) signal on a tape or some CD players.
   6. The AUTO-SLIDER jumper is used in conjunction with a remote-control switch at another location (newsroom, etc.). With AUTO-SLIDER selected; when the remote ON switch is pressed, the audio level of that MIXER is set to the CAL point. This happens regardless of the setting of the slide pot. The ON lamp on the MIXER will flash to tell the operator that he does not have control of the slider. To regain control, quickly press the associated OFF switch then the ON switch.

2.3.1.2 Jumper Options on Other Boards

Most of the jumpers on boards other than the CHANNEL BOARD are used to select audio level matching and muting. A 10 dB attenuator is available for each microphone channel to be used with "hot" microphones. Another jumper will allow the cue speaker to mute when the microphone channel is turned on.

2.3.2 Optional products

Several products are available from AUTOGRAM CORPORATION which will enhance the R/TV audio consoles.

2.3.2.1 AUTOCLOCK

The AUTOCLOCK is a combination clock and timer which can be mounted in the console. The two displays give both real-time and elapsed time for sources started from the console. An outdoor temperature probe is used to give the operator a convenient temperature display in either F or C. Another feature of

the AUTOCLOCK gives the high and low temperature and the time of occurrence. The special tertiary bus in the R/TV console can be connected to the AUTOCLOCK to flip the elapsed timer into a count-down mode. This is normally activated by placing a tertiary tone on a cart at a fixed time before the end (say 10 seconds). The AUTOCLOCKS can be synced to an external time reference and can be connected together to give the same time and temperature readings in various locations.

2.3.2.2 AUTOCOUNT

The AUTOCOUNT provides just the elapsed time function without the countdown feature. The display has both 1/10 and 1/100 second digits for critical timing situations. The 1/100 digit may be turned off if desired.

2.3.2.3 LIVE ASSIST

The LIVE ASSIST option consists of a plug-in microprocessor board and a small remote switch box. With this option up to 32 steps of sequential operation may be programmed. This would be useful to give the operator a short break or to allow automatic operation of one bus while doing live work on the other bus. Four separate programs, each with 32 steps may be entered into the LIVE ASSIST memory. The live assist box will allow complete remote control of each MIXER on the console.

2.3.2.4 PRODUCTION CENTER

The PRODUCTION CENTER is used in the production room to place encoded log messages on the cue track of cart tapes. Additionally, timing for secondary, tertiary, and a misc. output can be programmed. With a printer connected to the LIVE ASSIST microprocessor board (optional), a hard-copy log can be produced showing all the activity on the console and the time performed.

2.3.2.5 RP-16 RELAY PANEL

The RP-16 RELAY PANEL is used by engineering personnel to connect sources requiring an isolated contact for starting and stopping source equipment.

SECTION 3

INSTALLATION

3.0 GENERAL

This section will discuss the installation procedures for the R/TV series consoles. Please refer to the drawings at the end of the section for assistance.

3.1 UNPACKING AND INSPECTING THE EQUIPMENT

Remove all packing material an carefully lift the console from the package. Retain the packing list. Inspect the console for damaged or missing components. Check all controls for ease of operation. Any claims for damage should be filed promptly with the transportation agency. If such claims are to be filed, all packing material must be retained.

3.2 INSTALLATION

The arrangement of studio and control room facilities determines the location of the console in a particular station. Carefully plan the placement of equipment and wiring before beginning installation. Placement is not critical but approximately 15.24 cm (6 inches) should be left at the rear of the unit to allow for adequate ventilation. Keep in mind that there are two heat sinks mounted on the rear of the console which extend about 5.08 cm (2 inches) from the console back. For access to all internal connections, lift the front edge of he unit top and fold back; the front panel can then be pulled forward and down. The top and front panels are held in the fully open position by retaining cables. Approximately 78.74 cm (31 inches) front to back is required for the fully open unit. All source and output wiring is made on miniature pluggable screw-type connectors which are located on the individual printed circuit boards. Access to the boards is made by removing the R.F. protection cover which is attached to the card cage by means of captive screws. Wiring to muting relays and special AUTOCLOCK functions is by means of barrier type screw terminals on the power supply chassis.

During installation the following rules should be followed to eliminate grounding problems:

A. Ground input and output cable shields at console end only.

B. Use standard audio shielded twisted pair with insulated cover.

C. Audio leads should be separated from power and control wiring.

D. Use 1- to 2-inch ground strap to connect the console chassis to common ground.

BE SURE THAT CABLE SHIELDS DO NOT COME IN CONTACT WITH ANYTHING BUT GROUNDING TERMINALS.

3.3 WIRING INSTRUCTIONS

Console location and type of installation determine the position of the input, output, control, and primary power wiring. Refer to the Base Drawings at the beginning of this manual for access hole locations. Openings at the rear and bottom of the console provide access to the various boards for incoming and outgoing leads. If wiring is to enter from the bottom of the console, corresponding holes must be cut through the table top for wiring access.

CONNECT PRIMARY POWER ONLY AFTER ALL OTHER CONNECTIONS ARE MADE.

****
* NOTE *
* *
* UNLESS OTHERWISE SPECIFIED, THE CONSOLE WAS FACTORY WIRED FOR 120 VOLTS *
* A.C.PRIMARY POWER. *
* *
* ALL CONTROL OUTPUTS FROM THE CHANNEL BOARDS ARE OPEN COLLECTOR AGAINST *
* GND. RATED AT 50vdc, 500 ma MAXIMUM. ONLY POSITIVE D.C. VOLTAGES MAY BE *
* SWITCHED. AN INTERFACING DEVICE (RELAY,ETC.) MUST BE USED FOR A.C. OR *
* NEGATIVE VOLTAGES. *
****

Please refer to the drawings and charts at the end of this section for connection data for the various boards. Suggested interfacing of specific equipment may be found in Appendix 3 at the end of this manual.

3.4 INITIAL INSTALLATION PROCEDURE

1. Install 4 AA nicad batteries (included) on power supply chassis.

NOTE : If AUTOCLOCK was not ordered, skip next 3 steps.

2. Install 1 AA alkaline battery (included) in AUTOCLOCK.
3. Install AUTOCLOCK power pack.
4. Install AUTOCLOCK temperature probe.

NOTE : The AUTOCOUNT Timer does not use an internal battery.

3.5 CONNECTOR WIRING

When installing wires in audio connectors:

1. Strip wires about 1/4 inch.
2. Tin stranded wires if desired (this step is not required).
3. Push wire down as far as possible into connector.
4. Tighten screws as much as possible.

3.6 SPECIAL INSTALLATION CONSIDERATIONS

1. The Channel Board options must be programmed by use of the program jumpers. (See Board drawings at the end of this section)

2. Either Muting bus may be used.

3. Other boards have various programming options and should be set up at this time. (See board drawings at the end of this section)

4. DO NOT use jumper for internal AUTOCLOCK power if you are also using the external power pack.

5. Any external relays controlled by the "OPEN-COLLECTOR" outputs from the Channel Boards MUST have spike-suppression diodes across the coils.
6. If the device (cart machine,etc.) being controlled by the Channel Board has a separate ground terminal for its control circuits then that terminal should be connected to pin 1 or pin 8 of the 10 pin control connector on the Channel Board. This is to help isolate conducted static electricity.
7. Wire Mono sources to both left and right inputs of Channel Boards.
8. DO NOT GROUND EITHER SIDE OF OUTPUT CHANNELS. If you require and unbalanced output from Program, Audition, Mix Minus, or Monitor simply connect to either the + or - output terminal. - terminal will give phase reversal.

3.7 LIST OF JUMPER OPTIONS

3.7.1 CHANNEL BOARD

1. Set up for input for both left and right channels.
   a. 600 ohm termination "ON" or "OFF".
   b. Level select. Both off = -10 dBm. Select for 0dBm or +10dBm.
      Note: trimmer pot give about 15 dB of fine adjustment.
2. Mix Minus Feeds. One for PRE-FADER the other for POST-FADER.
3. MUTE Bus 1 or MUTE Bus 2. Generally, use Mute Bus 1 for mic. muting and Bus 2 for special functions.
4. AUTOCLOCK RESET. Selects if the Autoclock timer is reset when the channel is activated.
5. AUX Cancels Channel. Either enabled or disabled. If enabled, the aux (E.O.M. or secondary) output from a cart machine will turn off the channel at the completion of that tone.
6. AUTO-SLIDER control. Either enabled or disabled. If enabled, the effective slider value will be set to the calibration point (15 dB gain in hand) when the channel is turned on by a remote start closure. This will happen even if that channel is in "Cue". The on lamp will blink on the front panel to advise of this condition.

3.7.2 MICROPHONE PRE-AMPLIFIER BOARD

1. 10 dB input attenuator. ON or OFF.
2. -10 or 0 dBm nominal output. Use -10 dbm for maximum headroom.

3.7.3 MULTILINE BOARD

1. Input conditioning is similar to the Channel Board.

3.7.4 MONITOR OUTPUT BOARD

1. MUTE BUS 1 OR MUTE BUS 2. Select which Mute Bus will mute monitor.

3.7.5 MONITOR/PHONES SELECT BOARD

1. Input conditioning for EXTERNAL AND AIR are like the ChannelBoard.

3.7.6 HEADPHONE/CUE OUTPUT BOARD

1. MUTE BUS 1 or 2. Select which mute bus will mute the cue speaker.

3.9 POWER SUPPLY CONNECTIONS

TB-1 WIRING

PIN	FUNCTION
1	GROUND
2	ACLK RESET
3	ACLK START
4	ACLK STOP
5	ACLK F/C
6	ACLK SET
7	ACLK T.O.H. (INPUT FOR TOP OF HOUR SYNC.)
8	ACLK RCV -
9	ACLK RCV +
10	GROUND
11	ACLK XMT -
12	ACLK XMT +

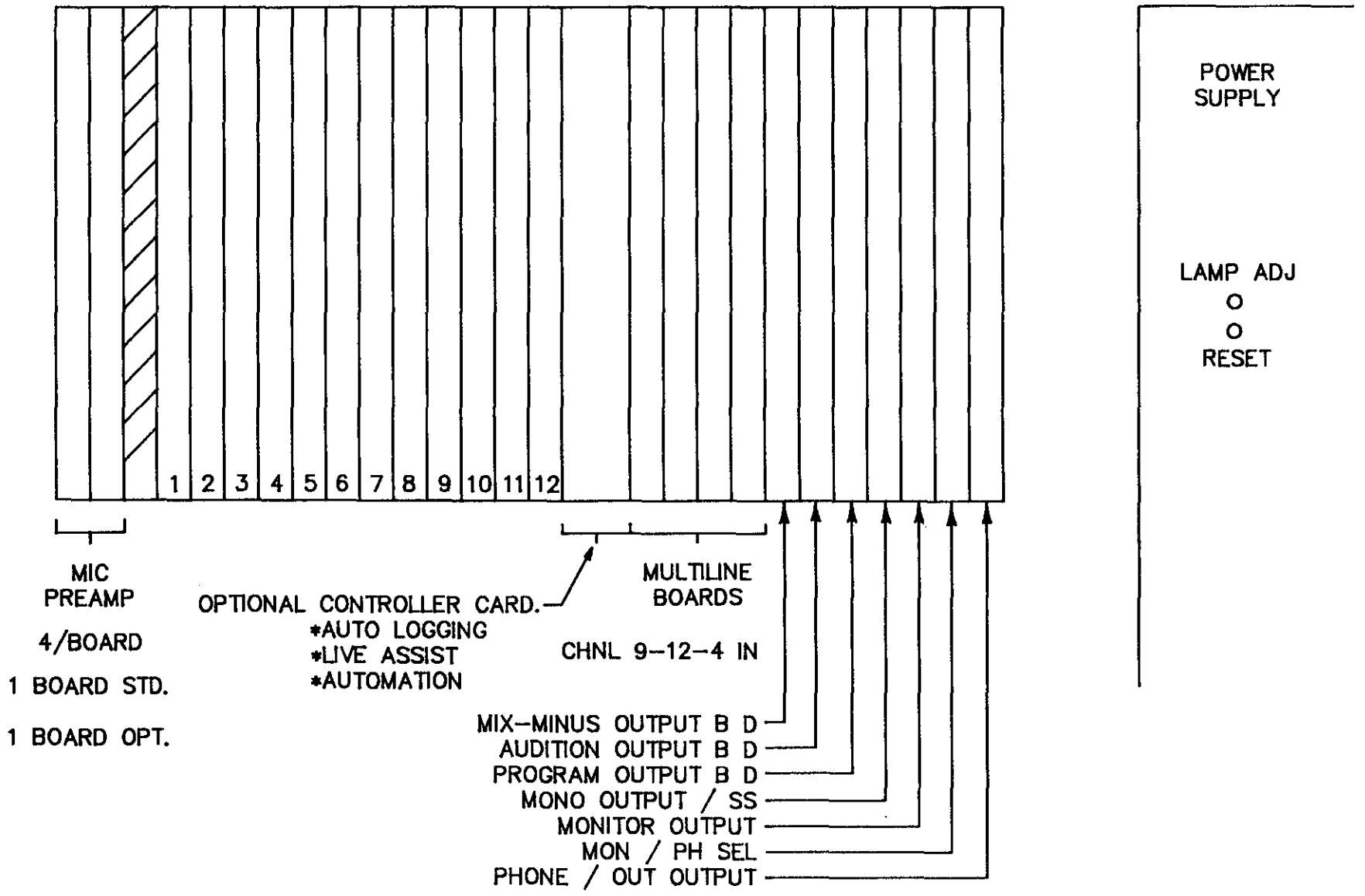
==========

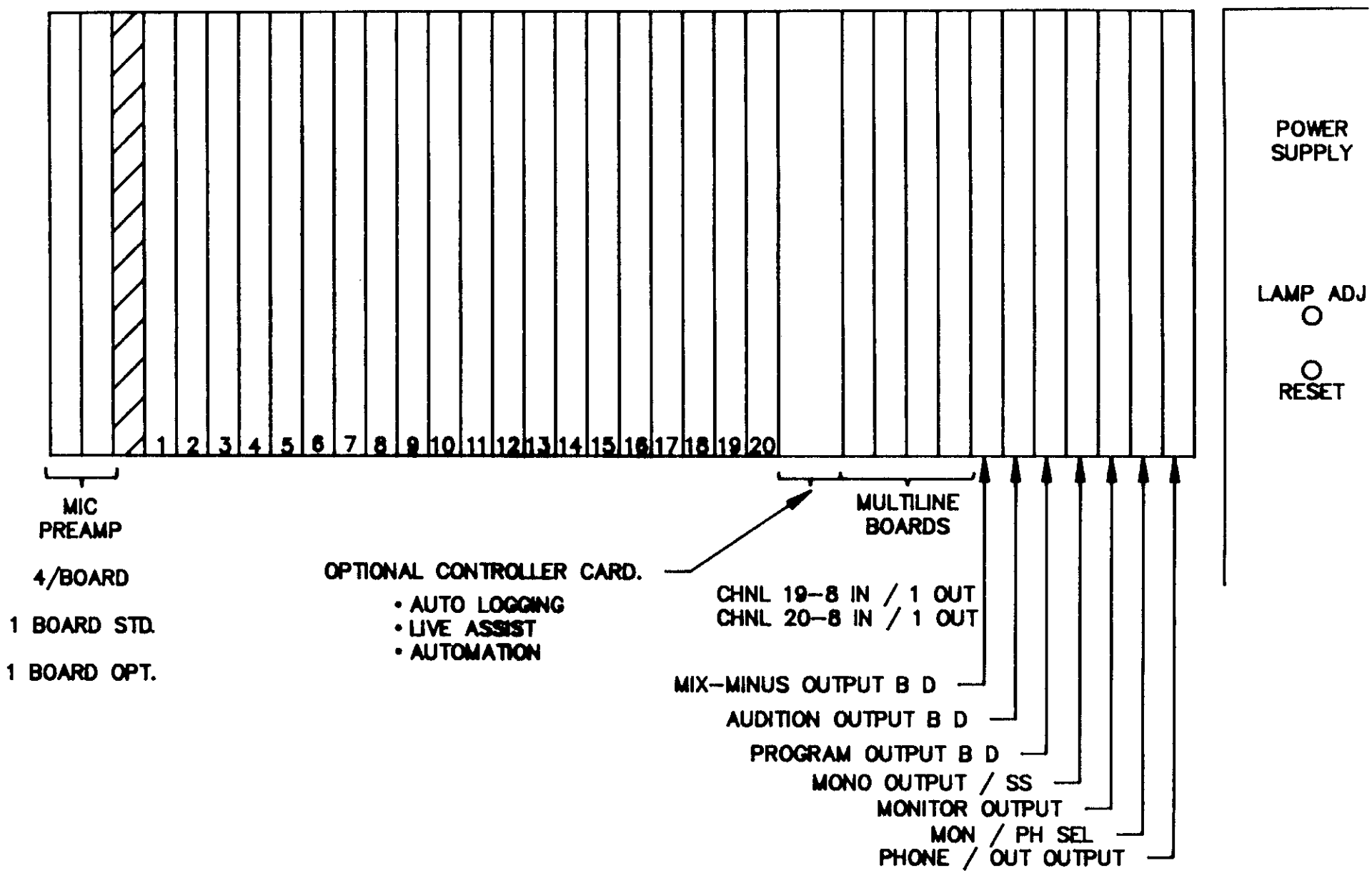
TB-2 WIRING

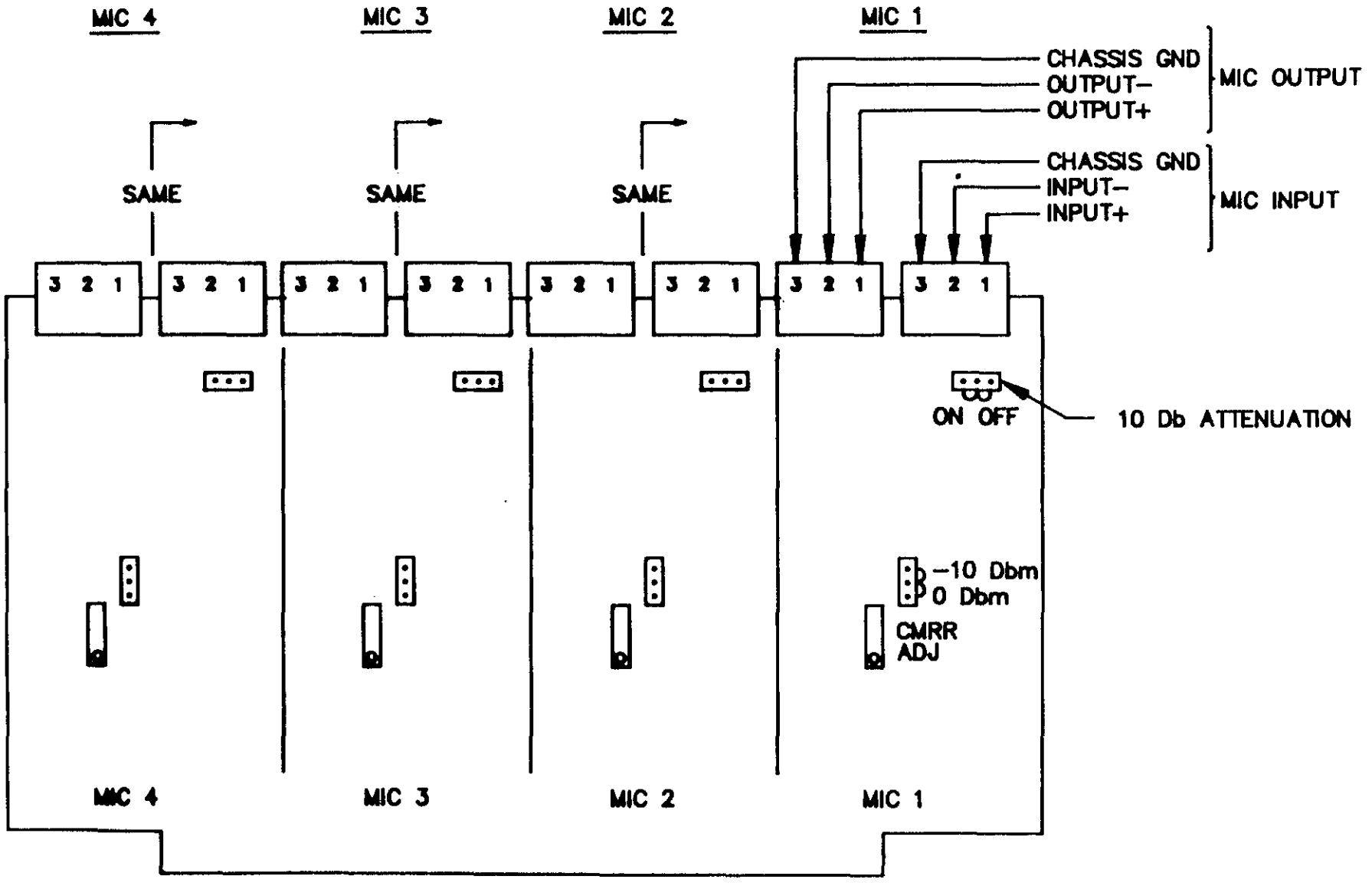
PIN	FUNCTION
1	GROUND
2	ACLK POWER (CONNECT TO WALL MOUNT POWER PACK)
3	+8V INTERNAL
4	GROUND
5	ACLK TEMP - (CONNECT TO BLACK LEAD OF TEMPERATURE PROBE)
6	ACLK TEMP + (CONNECT TO RED LEAD OF TEMPERATURE PROBE)
7	K2 COMMON (RELAY K2 ARMATURE)
8	K2 N.O. (NORMALLY OPEN CONTACT)
9	K2 N.C. (NORMALLY CLOSED CONTACT)
10	K1 COMMON (RELAY K1 ARMATURE)
11	K1 N.O. (NORMALLY OPEN CONTACT)
12	K1 N.C. (NORMALLY CLOSED CONTACT)

NOTE: the AUTOCLOCK may be powered either by use of an external wall mounted 8 volt power supply or by the internal 8 volt source on the console power supply. The external supply should be used if the console is frequently powered down.

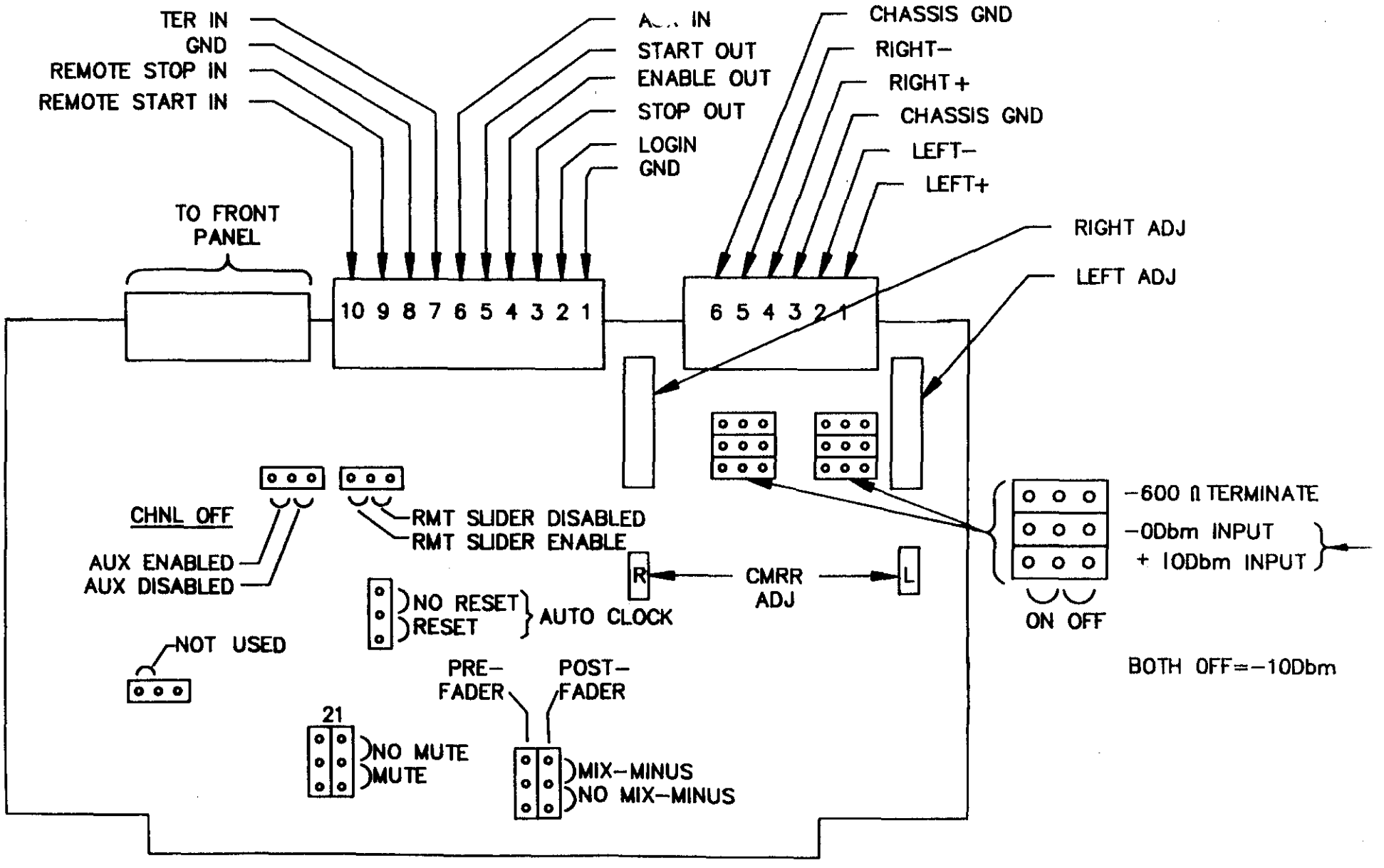
DO NOT CONNECT BOTH SOURCES OF POWER TO TB-2 PIN 2.


1 2 3 4 5 6 7 8 9 10 11 12
POWER SUPPLY
LAMP ADJ
O
O
RESET
MIC PREAMP
4/BOARD
1 BOARD STD.
1 BOARD OPT.
OPTIONAL CONTROLLER CARD.
*AUTO LOGGING
*LIVE ASSIST
*AUTOMATION
MULTILINE BOARDS
CHNL 9–12–4 IN
MIX–MINUS OUTPUT B D
AUDITION OUTPUT B D
PROGRAM OUTPUT B D
MONO OUTPUT / SS
MONITOR OUTPUT
MON / PH SEL
PHONE / OUT OUTPUT

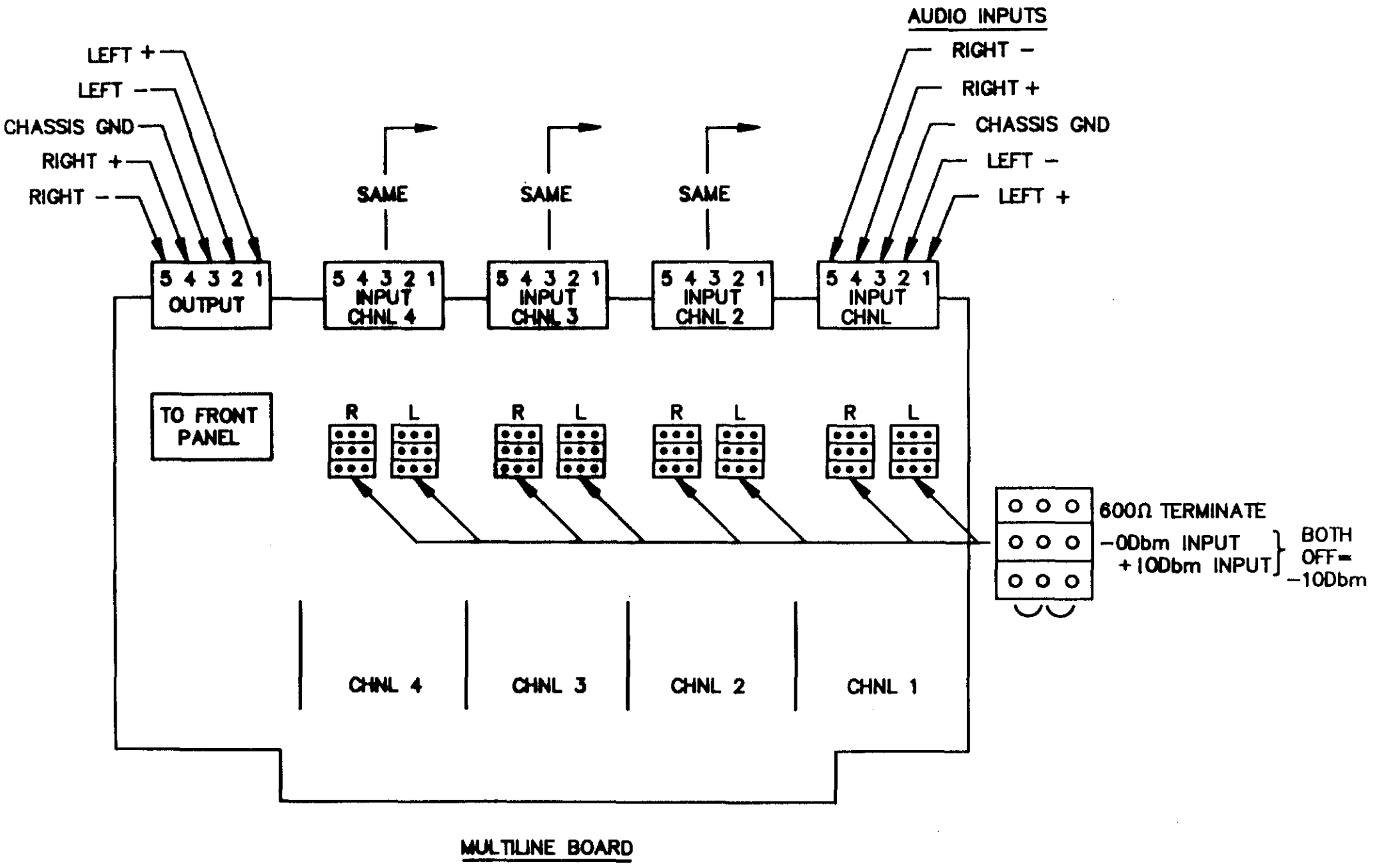

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
POWER SUPPLY
LAMP ADJ
RESET
MIC PREAMP
4/BOARD
1 BOARD STD.
1 BOARD OPT.
MULTILINE BOARDS
OPTIONAL CONTROLLER CARD.
• AUTO LOGGING
• LIVE ASSIST
• AUTOMATION
CHNL 19–8 IN / 1 OUT
CHNL 20–8 IN / 1 OUT
MIX–MINUS OUTPUT B D
AUDITION OUTPUT B D
PROGRAM OUTPUT B D
MONO OUTPUT / SS
MONITOR OUTPUT
MON / PH SEL
PHONE / OUT OUTPUT

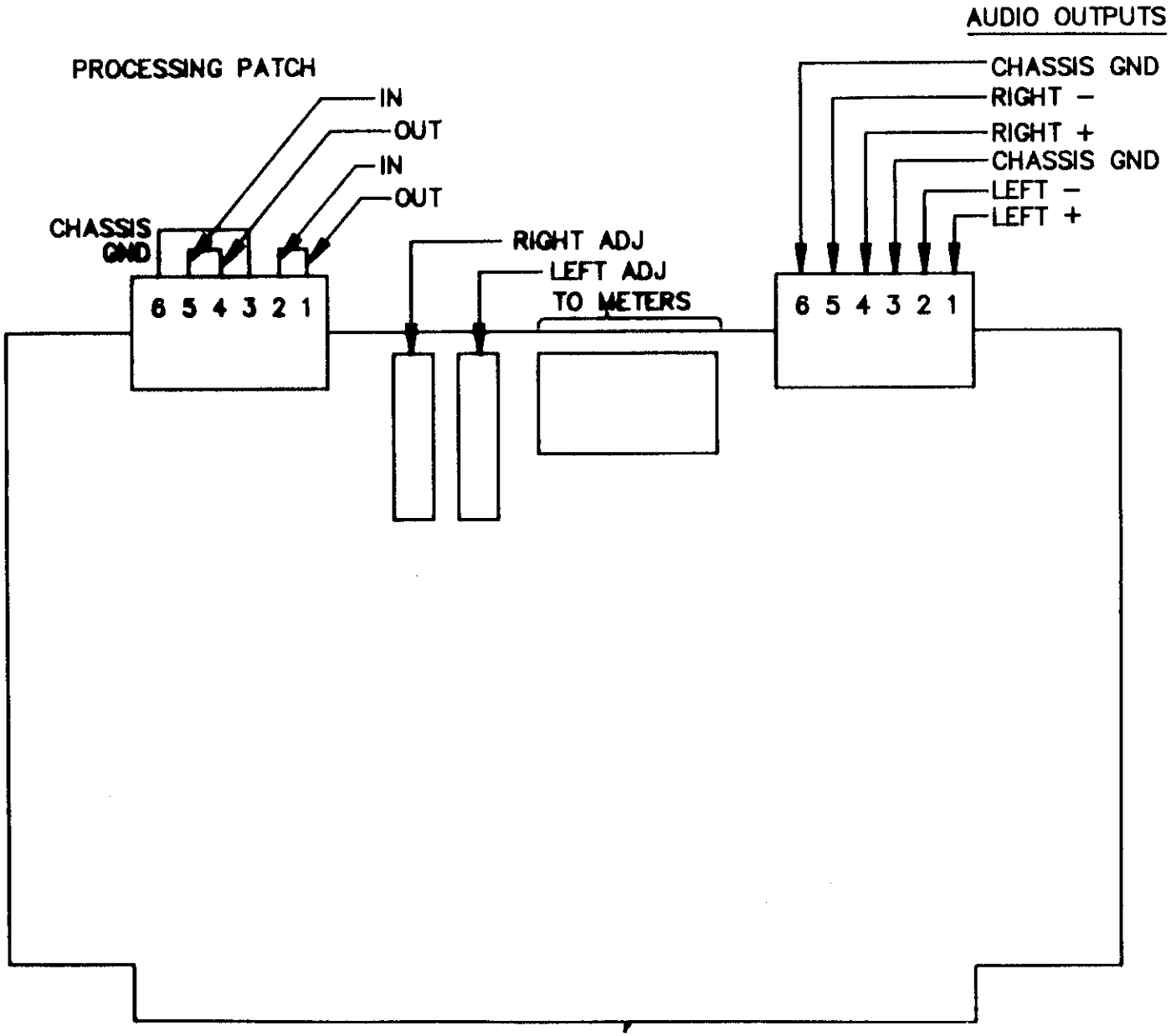


MIC–PREAMP BOARD

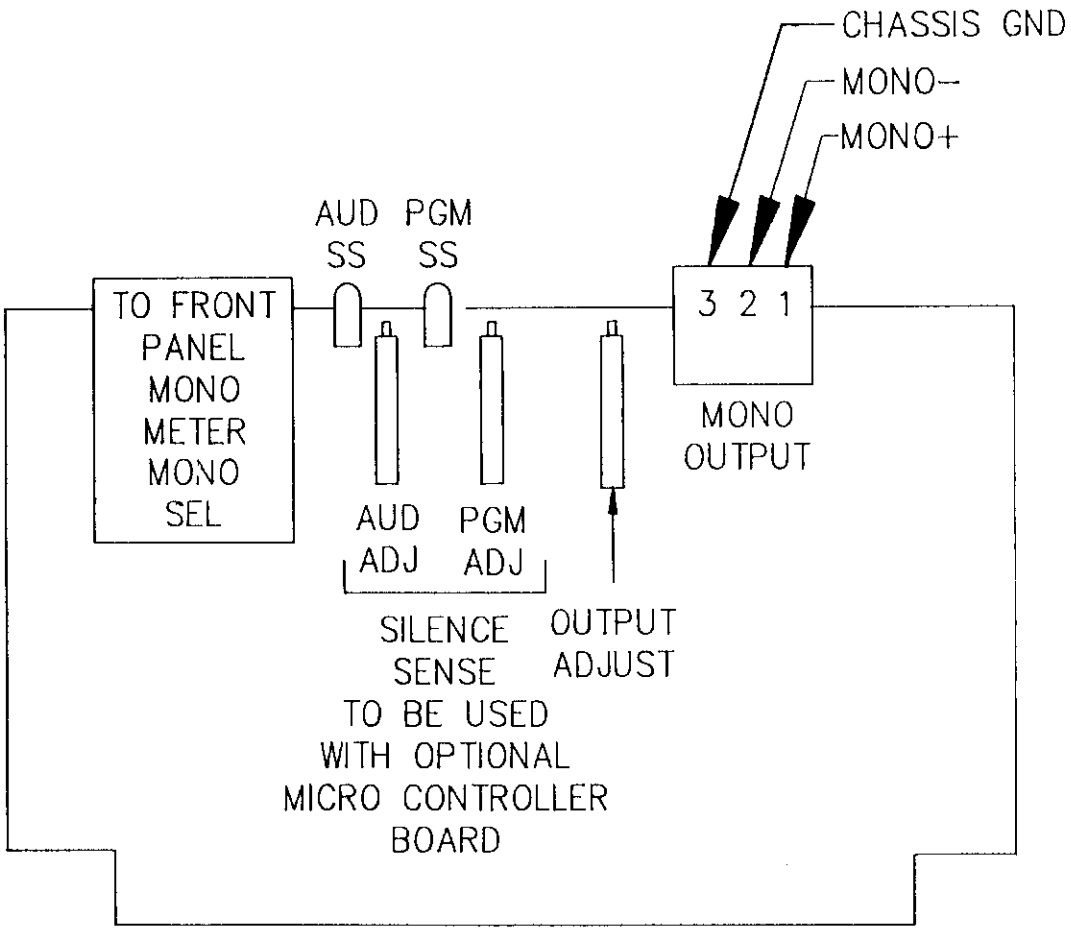


CHANNEL BOARD

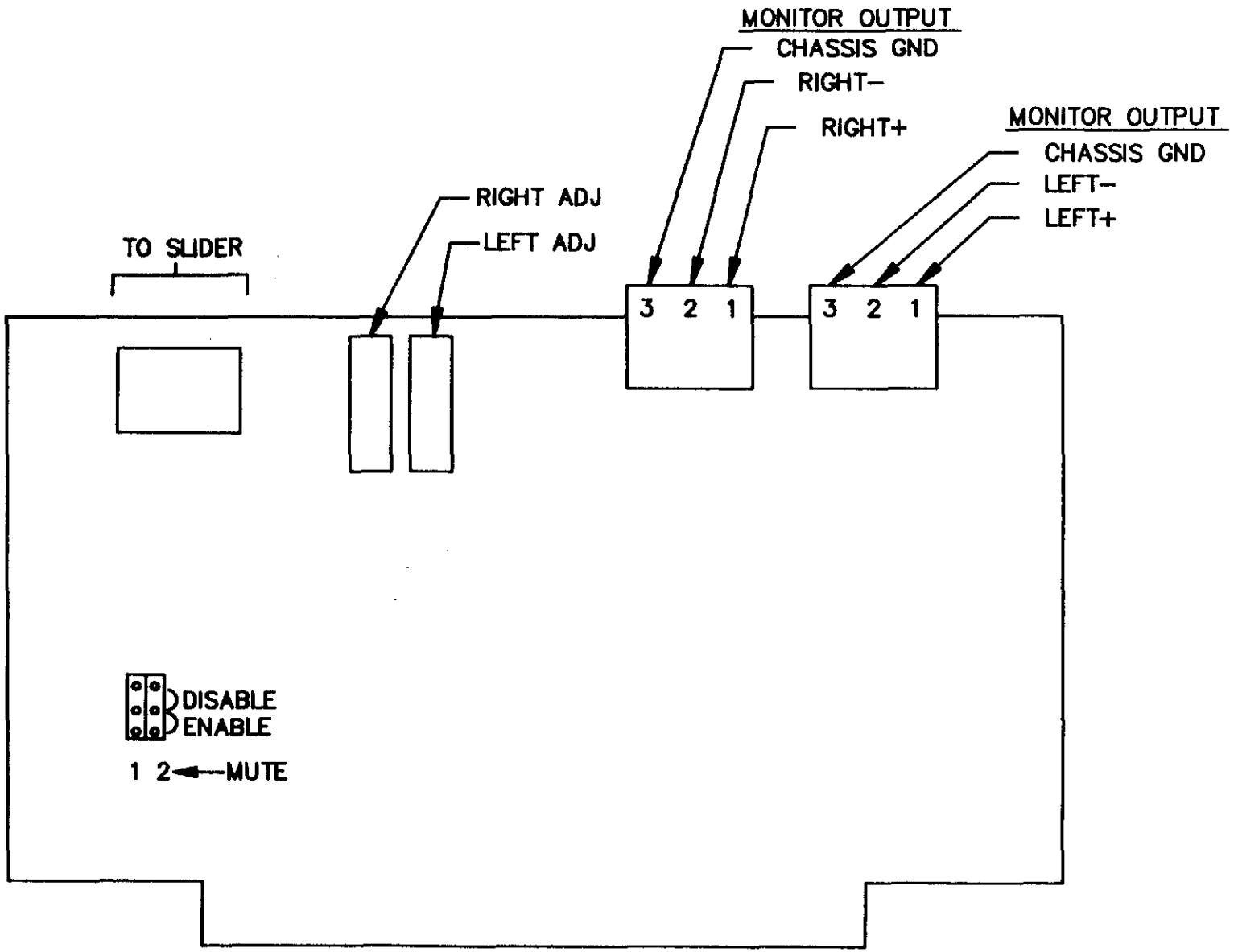

AUDIO INPUTS
LEFT +
LEFT −
CHASSIS GND
RIGHT +
RIGHT −
RIGHT −
RIGHT +
CHASSIS GND
LEFT −
LEFT +
SAME
SAME
SAME
5 4 3 2 1
OUTPUT
5 4 3 2 1
INPUT
CHNL 4
5 4 3 2 1
INPUT
CHNL 3
5 4 3 2 1
INPUT
CHNL 2
5 4 3 2 1
INPUT
CHNL
TO FRONT
PANEL
R
L
R
L
R
L
R
L
600Ω TERMINATE
−0Dbm INPUT
+10Dbm INPUT
BOTH
OFF=
−10Dbm
CHNL 4
CHNL 3
CHNL 2
CHNL 1
MULTILINE BOARD



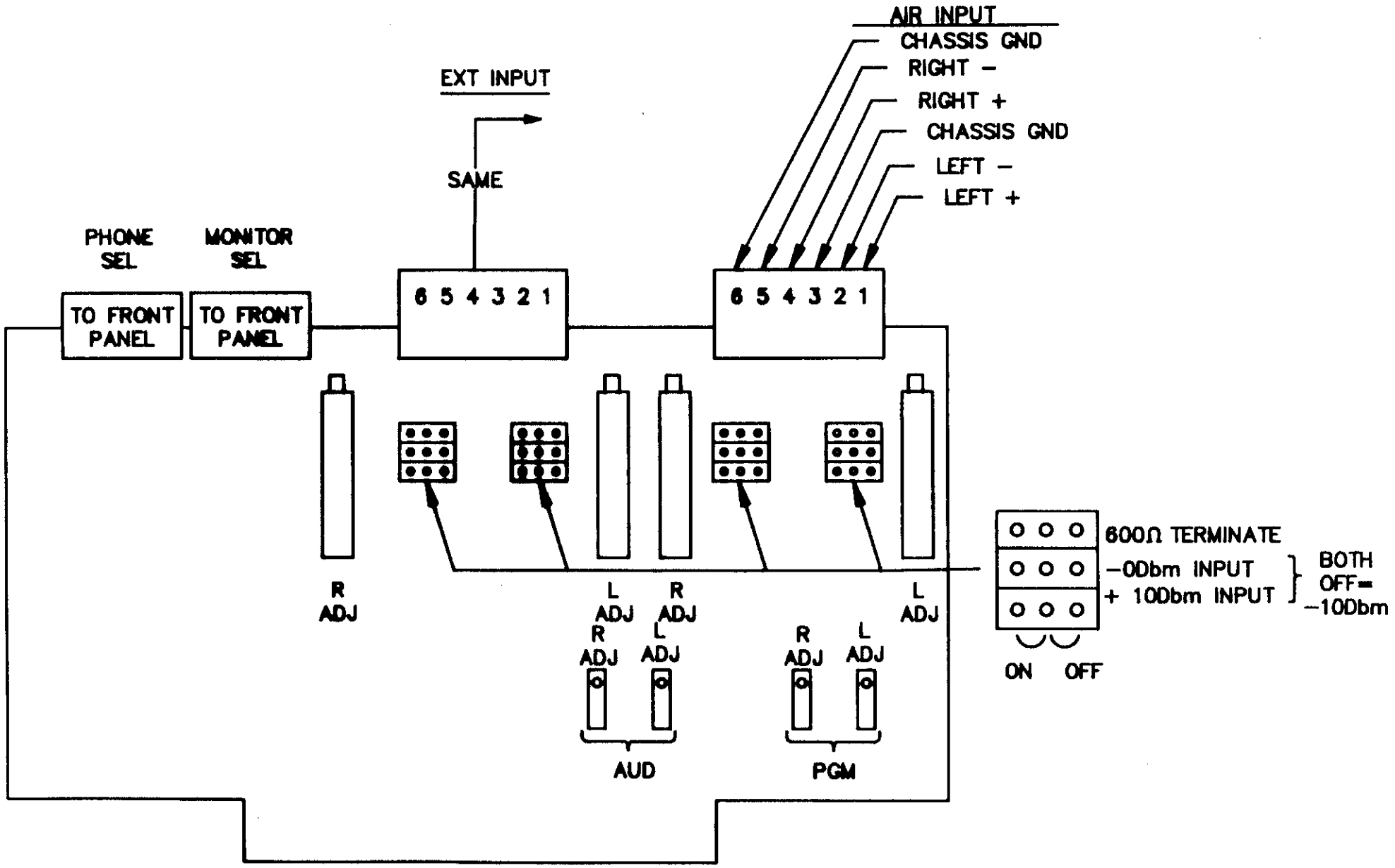
OUTPUT BOARD



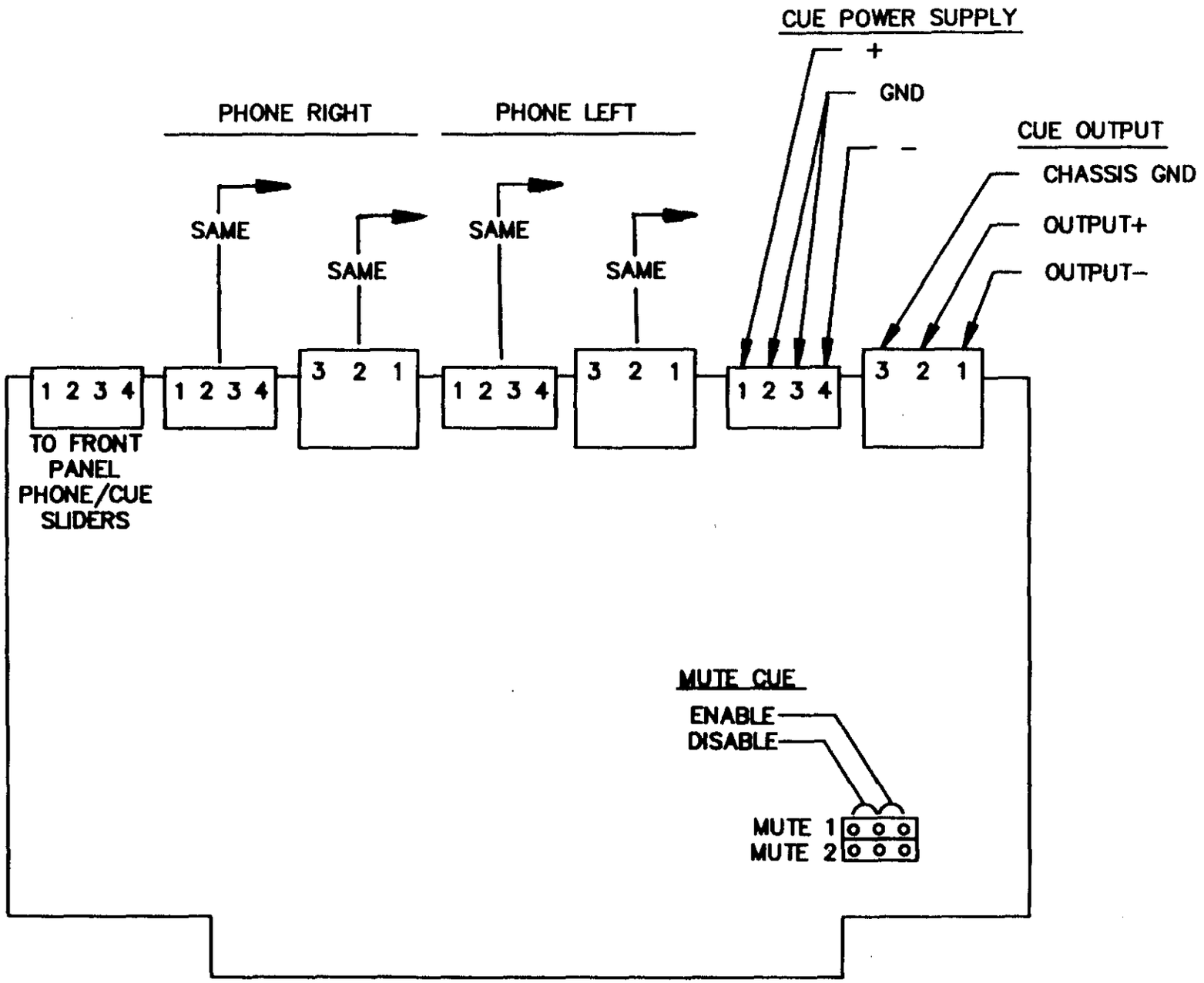
MONO OUTPUT/SILENCE SENSE BOARD



MONITOR OUTPUT



MONITOR / PHONE SELECT BOARD



PHONE / CUE OUTPUT BOARD

SECTION 4

THEORY OF OPERATION

4.0 OVERVIEW

Please refer to the associated Block Diagrams as you read through the following discussion. Drawing 4.5 shows the basic audio configuration for the console while drawing 4.6 is a simplified diagram of the various digital systems. Only one typical Channel board is shown for simplification.

4.1 AUDIO SYSTEM

The general flow of signal will be discussed and although in some cases there are several boards of a particular type used, only one will be covered.

4.1.1 INPUT CIRCUITS

The input scheme (Universal Input Amplifier) used in the R/TV series consoles allows many options when connecting sources to the Channel Board, Multiline Board, and the External and Air inputs to the Monitor/Phones Select Board. A programmable attenuator network is used which can be set up to provide 600 ohm termination and 0, 10, or 20 db of attenuation. Without the terminator, the input impedance is approximately 20k ohms. The first active stage is a balanced to un-balanced converter which acts much like an electronic transformer. This stage, as well as most other amplifiers in the R/TV console, use TL072 low noise FET op-amps. Where higher output current is required, the NE5532 op-amp is used. The Common Mode Rejection Ratio (CMRR) can be trimmed by means of a multi-turn pot. The input stage is configured to be unity gain which gives an output of about 190 mv rms with a -10 dBm input signal and both attenuator jumpers off. There is about 55 mv loss in the input resistors. The next stage is used to provide voltage gain and fine level adjustment. The universal input amplifier is used wherever balanced input circuits are to be connected.

4.1.2 VOLTAGE CONTROLLED AMPLIFIER

In the Channel Board, the output of the universal input amplifier is connected to the Voltage Controlled Amplifier (VCA). Capacitive coupling is used here in order to assure no undesired dc offset voltage at the VCA input. A Control Feedthrough pot intentionally introduces a controlled offset to reduce noises produced when the SLD voltage is transversed quickly.

The VCA is optimized for a nominal input of 80 ua rms which corresponds to about 1 volt rms from the universal input amplifier connected through a 12k resistor. One point that should be mentioned here is that all resistors used in the R/TV console are precision 1% metal film which are by nature very low noise devices. The VCA used throughout the R/TV console is the SSM2013 which features full class A performance providing extremely good audio characteristics. Amplification as well as attenuation are employed to give improved signal to noise ratio. The 0 gain point relates directly to the calibration point for the front panel sliders (forth mark from top: 15 db gain in hand). Dc control for the channel VCAs is buffered by an op-amp which is configured to give a special "feel" to the sliders.

4.1.3 BUS SELECTION

A current to voltage converter stage follows the VCA and is used to drive the bus select switches. These switches are high voltage CMOS type DG212 which exhibit very low "on" resistance. 10k ohm resistors couple the switches to the Program and Audition mixing buses.

Two mono summing amplifiers are used on the Channel Boards: pre-fader, and post-fader. These are used to drive the Mix-Minus buses (through programmable jumpers). The pre-fader summed signal is also routed through another electronic switch and goes to the cue mix bus.

4.1.4 OUTPUT AMPLIFIERS

The console has three dual channel output amplifiers which contain the mix amps for each of the program type buses: PROGRAM, AUDITION, and MIX-MINUS Pre-Fader and Post-Fader. The mix-amp is a summing node current input circuit which is operated at unity gain with respect to an individual Channel Board output. An additional inverting stage is used when the Output Board is connected to the Mix-Minus bus. The mix-amp output is brought to a plug type connector to route to external processing gear. Capacitors may be added for use with offset sensitive equipment. The next stage is used for gain adjustment and buffering to the power amplifier.

The line drivers are connected in a bridge configuration to give about +26 dbm into a 600 ohm load; however, the actual drive impedance is very low. Provisions are made for optional coupling capacitors if desired, but in most applications are not needed. The output stage has both R.F. bypassing as well as metal oxide varistor transient protection.

Two auxiliary output feeds come from the Output Board: a balanced feed for the meter select switch and the Monitor/Phones Select Board; and an unbalanced feed for the Mono/Silence Sense Board.

4.1.5 MONO AND SILENCE SENSE

The unbalanced feeds from the Program Output Board and Audition Output Board come to the Mono Silence Sense Board summing amplifiers. Here the left and right channels are mixed to provide program mono and audition mono signals for the Mono Select switches. These DG212 switches direct the chosen mono audio to an adjustable gain buffer stage. The output amplifiers are identical to those used in the Program output amplifiers.

The summed Program and Audition signals are also used to drive the Silence Sense detectors. When the audio level on the Program and Audition buses goes above a pre-set threshold, it forces a low on drivers which go to the optional Microprocessor Board as well as to the on-board LEDs.

4.1.6 MONITOR/PHONES SELECT

The Monitor/Phones Select Board is used to determine which signal is fed to the Monitor Output Board and the headphone section of the Phones/Cue Board. Universal input amplifiers and modified input amplifiers produce an unbalanced feed from the various balanced sources. DG212 switches direct the chosen signals to the proper output amplifiers.

The Monitor Output Board first buffers the selected signal from the monitor portion of the Monitor/Phones Select Board with an input stage which simulates a mix-amp. Following the input stage is the VCA which is controlled by a dc voltage from the front panel gain control. The output amplifier is identical to that used in the program type output boards. Additionally, the muting buses are brought to the VCA via a programmable jumper which allow selecting muting options.

4.1.7 PHONE/CUE OUTPUT

The second output from the Monitor/Phones Select Board goes to the headphone portion of the Phones/Cue Board. The input stages of this board consist of a virtual ground buffer, a VCA, and a current to voltage converter. Following the VCA buffer is a driver IC (NE5532) which supplies the current gain needed for the output booster transistors. The output is conservatively rated at 2 watts rms.

The Phones/Cue Board has another power amplifier resident: the Cue amplifier. The input system of the cue amplifier is identical to that of the headphones with the addition of programmable jumpers to allow the VCA to be muted by either or both of the mute buses. The cue power amplifier is identical to that used for the headphones.

4.1.8 SPECIAL FUNCTION BOARDS

There are two types of special function boards in the R/TV console: the Microphone Pre-amplifier board and the Multiline Select Board.

4.1.8.1 MICROPHONE PRE-AMPLIFIER

The Microphone Pre-amplifier Board uses a SSM-2015 I.C. as a true differential input amplifier. The unit is optimized for a source impedance of 150 ohms. The input circuit is capacitively coupled for use with "phantom-powered" microphones. A programmable jumper selects a shunt resistor in the resistive input network which will provide 10 dB attenuation. A special ferrite filter and associated capacitors provide R.F.I. filtering. CMRR is adjustable by means of a trimmer pot.

The output from the pre-amplifier is connected to the power stage by means of another programmable jumper which allows the nominal balanced output to be either 0 dBm or -10 dBm. The lower level is recommended for maximum microphone pre-amplifier headroom.

The power amplifier stage is essentially the same as that used for the Output Boards except that it operates from bi-polar 15 volts rather than bi-polar 15.6 volts.

4.1.8.2 MULTILINE SELECT BOARD

The Multiline Select Boards are essentially a pre-select switch with input buffering and balanced output. The input structure is that of the universal input stage with the exception that there are no trimmer pots. The input level can be selected in three broad ranges (+10, 0, -10 dBm) with or without termination.

The output of the input stage is connected to a group of DG212 switches which are selected by means of front panel interlocking pushbutton switches.

Two types of Multiline Select Boards are used in the R/TV consoles:

1. Primary, which includes a balanced output amplifier.
2. Secondary, no output amplifier.

The primary type board is used in all Multiline positions in the R/TV-12 console while it is paired with a secondary type in the R/TV-20. In this configuration, the electronic switch outputs form a mixing bus which jumper between the set dedicated to channels 19 or 20.

The output stage of the primary type Multiline Select Board is made up of two op-amp stages connected in a balanced bridge configuration. The output from the Multiline Primary Board can be connected to any Channel Board input.

4.4.0 DIGITAL SYSTEM

Typically, most digital circuitry is located on the Channel Board; although, various other boards employ some digital switching. The optional Microprocessor Board will not be discussed here since this unit has its own manual.

4.4.1 CHANNEL CONTROL

The front panel pushbutton switches (ON, OFF, PGM, AUD) are connected through a ribbon cable to the respective Channel Board. When a button is pressed, the associated circuit is pulled down to what is referred to as GROUND*. This ground is connected to system ground through a 10 ohm resistor which is used to give isolation and to aid in static electricity protection.

Each of the four pushbutton outputs are connected to a special de-bouncer chip which insures that when a switch has been pressed, a low is produced on the following inverter.

4.4.2 CHANNEL LOGIC

Two types of flip-flops are used to handle the actual logical operations. The first is connected to the conditioned ON - OFF signals and is used to generate the enable and enable- controls. The second type flip-flop is a alternate action device which is operated by the PGM and AUD conditioned switch signals.

The "Q" outputs from the PGM and AUD flip-flops are connected to lamp drivers and analog switches for audio routing. The state of these outputs are also read by the optional microprocessor via a 74HC245 bus driver.

4.4.3 EXTERNAL CONTROL

External control signals (Remote ON and Remote OFF) are diode connected to the ON pushbutton input and the OFF pushbutton input respectively; therefore, a low on the external inputs will produce the same effect as pressing the ON or OFF front panel pushbutton.

4.4.4 AUTO-SLIDER

An additional provision of the External ON input allows selection of an AUTO-SLIDER function which will send a voltage to the VCA which corresponds to having the slider at the calibration mark (15 dB gain in hand). The effective slider value will be set even if the actual slider is in "CUE". The optional microprocessor can also set the effective slider value and can select between two different levels and off. When the AUTO-SLIDER function is engaged, either by REMOTE ON or microprocessor control, the front panel ON lamp will flash. The flash is controlled by a Mother Board mounted oscillator which produces the OSC signal. To regain manual control of a remotely started channel, press the OFF button then the ON button on the console.

4.4.5 ENABLE (EN) FUNCTIONS

The outputs (EN and EN-) of the ON-OFF flip-flop are used to perform many different functions:

1. Controls the "Mute" input of the VCA which turns audio on and off.
2. The Enable driver is turned on and off for external control.
3. Mute Bus switches are controlled.
4. Drivers for front panel ON and OFF lamps are operated.

4.4.6 XON AND XOFF

Two conditioned momentary signals are produced when the ON and OFF pushbuttons are depressed: XON and XOFF. These are used to control drivers for the external START and STOP functions. Additionally, the XON signal is coupled to the Autoclock Reset bus driver. This jumper selected option will allow the timer to reset when the channel is turned on.

4.4.7 AUX IN

The secondary switch output from source equipment can be connected to the AUX IN terminal which when selected will cancel the associated channel at the completion of the AUX Tone.

4.4.8 TER AND LOG

Two additional inputs may be connected to the Channel Board, Tertiary and Log. The tertiary TER signal is simply diode connected to the TER Bus. The TER Bus is connected to the Autoclock countdown input.

Logging from a tape cartridge source is routed by a switch which is controlled by the optional Microprocessor Board. The logging information is encoded on the tape by using the optional AUTOCODE II encoder. This allows verification of material played on the air. The verification information is sent to a printer connected to the Microprocessor Board.

4.4.9 MASTER RESET

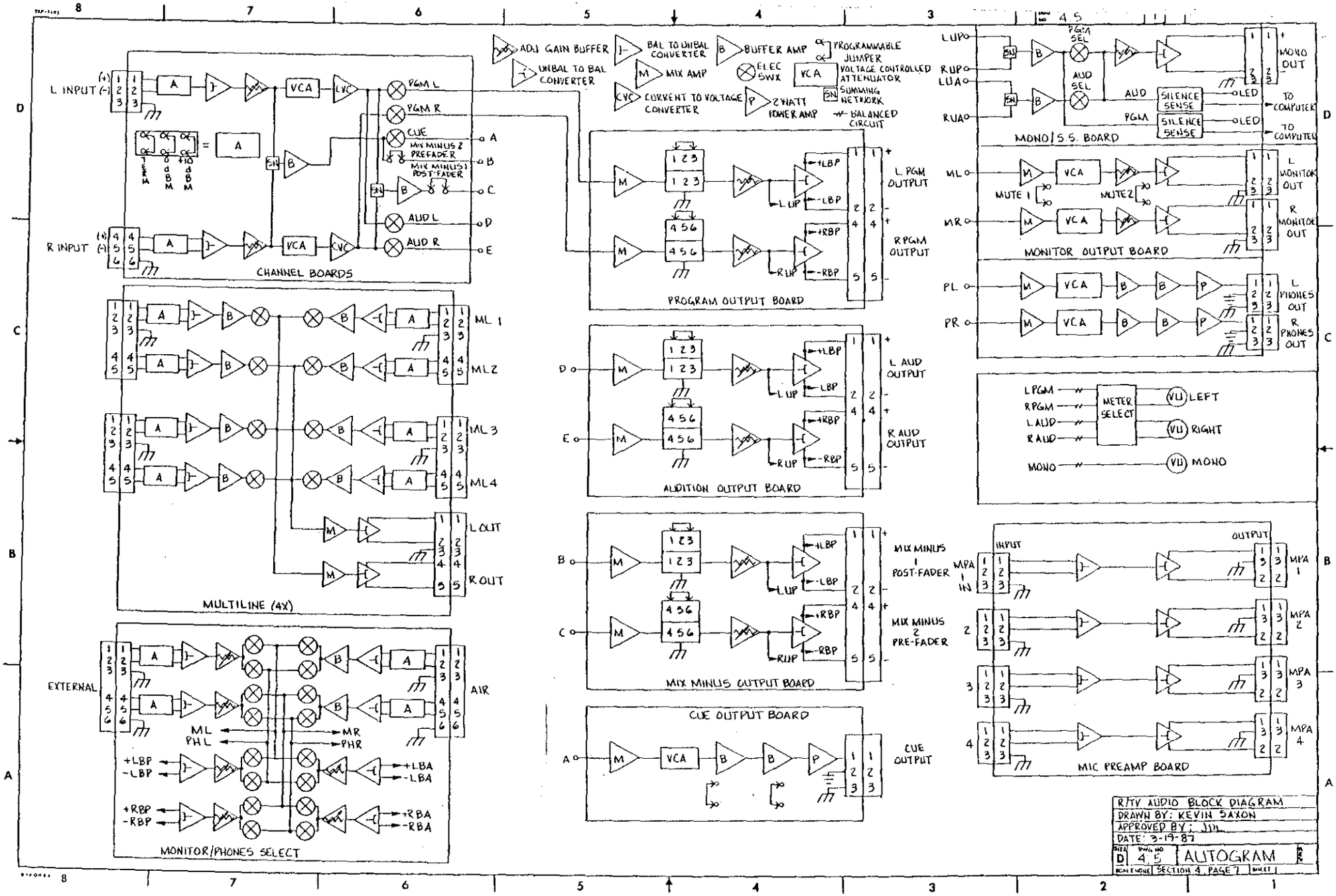
A Master RESET signal is connected to the Channel Board which when pressed turns all channels off and turns off the Program and Audition bus switches. A Reset is forced 60 seconds after a power interruption. The battery backup system will hold the console configuration for this length of time.

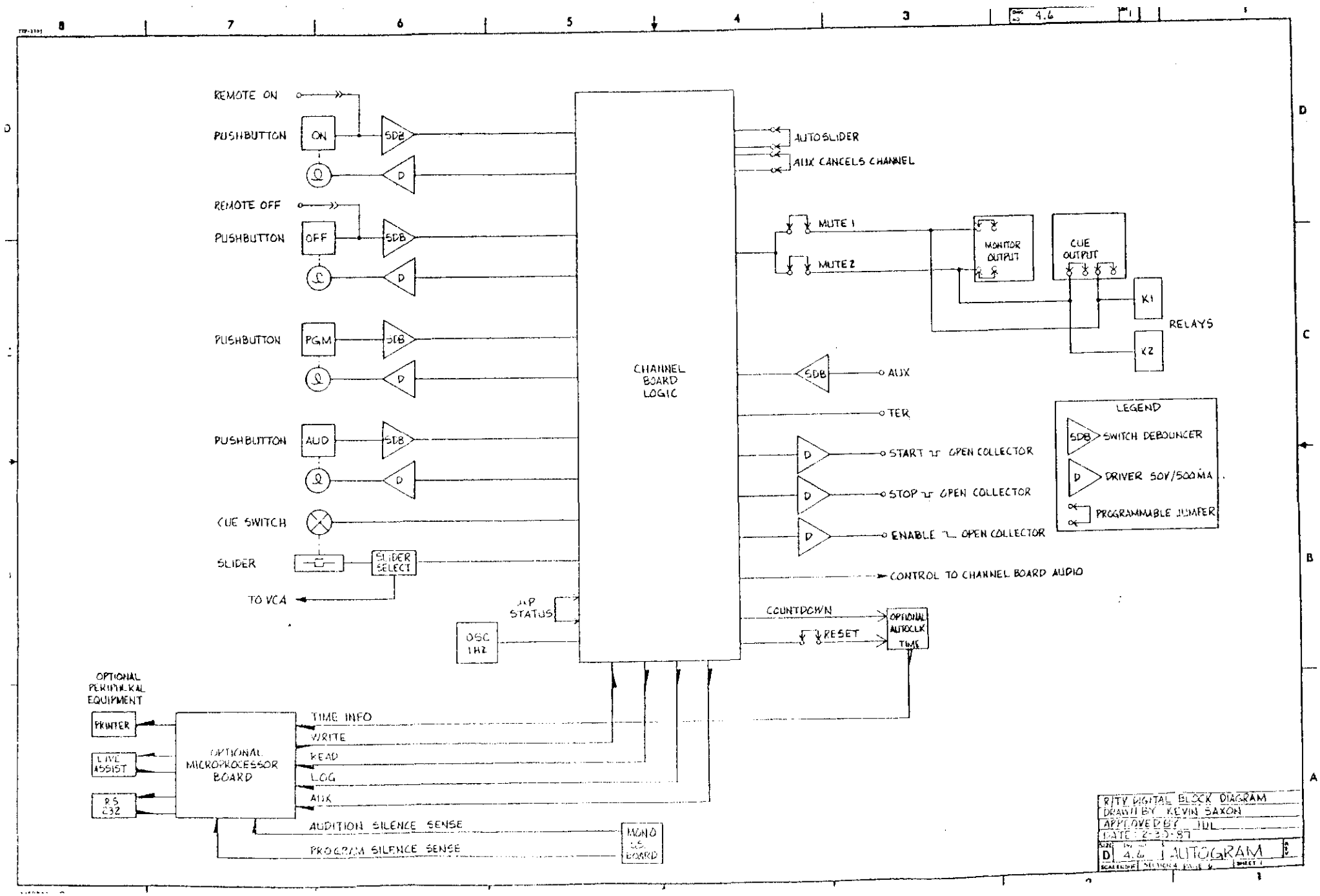
4.4.10 MICROPROCESSOR INTERFACE

Each Channel Board contains interfacing I.C.s which allow the optional Microprocessor Board to both take control and monitor the status of the various channels. The microprocessor can perform the following functions:

1. Turn a specific channel on and off.
2. Select either Program or Audition Buses for a specific channel.
3. Set the effective slider level to one of two levels; Normal (set point), Low (-15 dB).
4. Read the status of all channels (on or off, under remote control, and which bus is activated.
5. Monitor the Silence-Sense outputs.
6. Sense activity on each AUX input.
7. Read the position of a status jumper on each Channel Board.
8. Perform a self test to identify active channels.
9. Read and decode the activity on the LOG bus.

Please refer to the manual included with the Microprocessor Board for more information.


ADJ GAIN BUFFER
UNBAL TO BAL CONVERTER
BAL TO UNBAL CONVERTER
MIX AMP
CURRENT TO VOLTAGE CONVERTER
BUFFER AMP
ELEC SWX
2 WATT POWER AMP
PROGRAMMABLE JUMPER
VCA VOLTAGE CONTROLLED ATTENUATOR
SUMMING NETWORK
BALANCED CIRCUIT
L INPUT
R INPUT
CHANNEL BOARDS
PGM L
PGM R
CUE
MIX MINUS 2 PREFADER
MIX MINUS 1 POST-FADER
AUD L
AUD R
PROGRAM OUTPUT BOARD
L PGM OUTPUT
R PGM OUTPUT
AUDITION OUTPUT BOARD
L AUD OUTPUT
R AUD OUTPUT
MIX MINUS OUTPUT BOARD
MIX MINUS 1 POST-FADER
MIX MINUS 2 PRE-FADER
CUE OUTPUT BOARD
CUE OUTPUT
MULTILINE (4X)
ML 1
ML 2
ML 3
ML 4
L OUT
R OUT
EXTERNAL
AIR
MONITOR/PHONES SELECT
MONO/S.S. BOARD
MONO OUT
TO COMPUTER
LED
MONITOR OUTPUT BOARD
L MONITOR OUT
R MONITOR OUT
L PHONES OUT
R PHONES OUT
METER SELECT
LEFT
RIGHT
MONO
MIC PREAMP BOARD
MPA 1
MPA 2
MPA 3
MPA 4
R/TV AUDIO BLOCK DIAGRAM
DRAWN BY: KEVIN SAXON
APPROVED BY:
DATE: 3-19-87
AUTOGRAM
SECTION 4 PAGE 7


REMOTE ON
PUSHBUTTON
ON
SDB
D
REMOTE OFF
PUSHBUTTON
OFF
SDB
D
PUSHBUTTON
PGM
SDB
D
PUSHBUTTON
AUD
SDB
D
CUE SWITCH
SLIDER
SLIDER SELECT
TO VCA
CHANNEL BOARD LOGIC
AUTOSLIDER
AUX CANCELS CHANNEL
MUTE 1
MUTE 2
MONITOR OUTPUT
CUE OUTPUT
K1
K2
RELAYS
SDB
AUX
TER
D
START OPEN COLLECTOR
D
STOP OPEN COLLECTOR
D
ENABLE OPEN COLLECTOR
CONTROL TO CHANNEL BOARD AUDIO
LEGEND
SDB SWITCH DEBOUNCER
D DRIVER 50V/500MA
PROGRAMMABLE JUMPER
JP STATUS
OSC 1HZ
COUNTDOWN
RESET
OPTIONAL AUTOCLK TIME
OPTIONAL PERIPHERAL EQUIPMENT
PRINTER
LIVE ASSIST
RS 232
OPTIONAL MICROPROCESSOR BOARD
TIME INFO
WRITE
READ
LOG
AUX
AUDITION SILENCE SENSE
PROGRAM SILENCE SENSE
MONO SS BOARD
R/TV DIGITAL BLOCK DIAGRAM
DRAWN BY KEVIN SAXON
APPROVED BY JDL
DATE 2-20-87
D 4.6 AUTOGRAM

SECTION 5

BOARD AND ASSEMBLY DESCRIPTION

5.0 GENERAL

This section contains the circuit description, parts list, board layout, and schematics of the various circuit boards and assemblies used in the R/TV series consoles.

5.1 MICROPHONE PRE-AMPLIFIER BOARD

The MICROPHONE PRE-AMPLIFIER BOARD consists of four identical amplifier units and is used to interface low-level microphone sources to the R/TV console. All input and output connections are made by means of 3 pin miniature pluggable screw-type connectors.

For simplicity, only Pre-Amplifier number 1 will be described:

Connections from a balanced low impedance (150 ohm) microphone are made on P2 with pin 1 as positive, pin 2 as negative, and pin 3 as chassis ground. Resistors R15,R16,R35, and R36 along with shunt resistor R34 form a 10 dB H-pad, however the shunt is attached to a programmable jumper which allows for disabling the pad. C23 and C24 are dc isolating capacitors to allow using phantom powered microphones.

Ferrite filter L4 along with C39, C40, and C51 are used for R.F.I. suppression. R68 and R67 provide proper ground reference for the pre-amplifier I.C. U8 (SSM-2015). This device is an ultra low noise audio amplifier well suited to microphone preamplification. True differential inputs using on-chip super matched transistors give high common mode rejection consistent with low distortion.

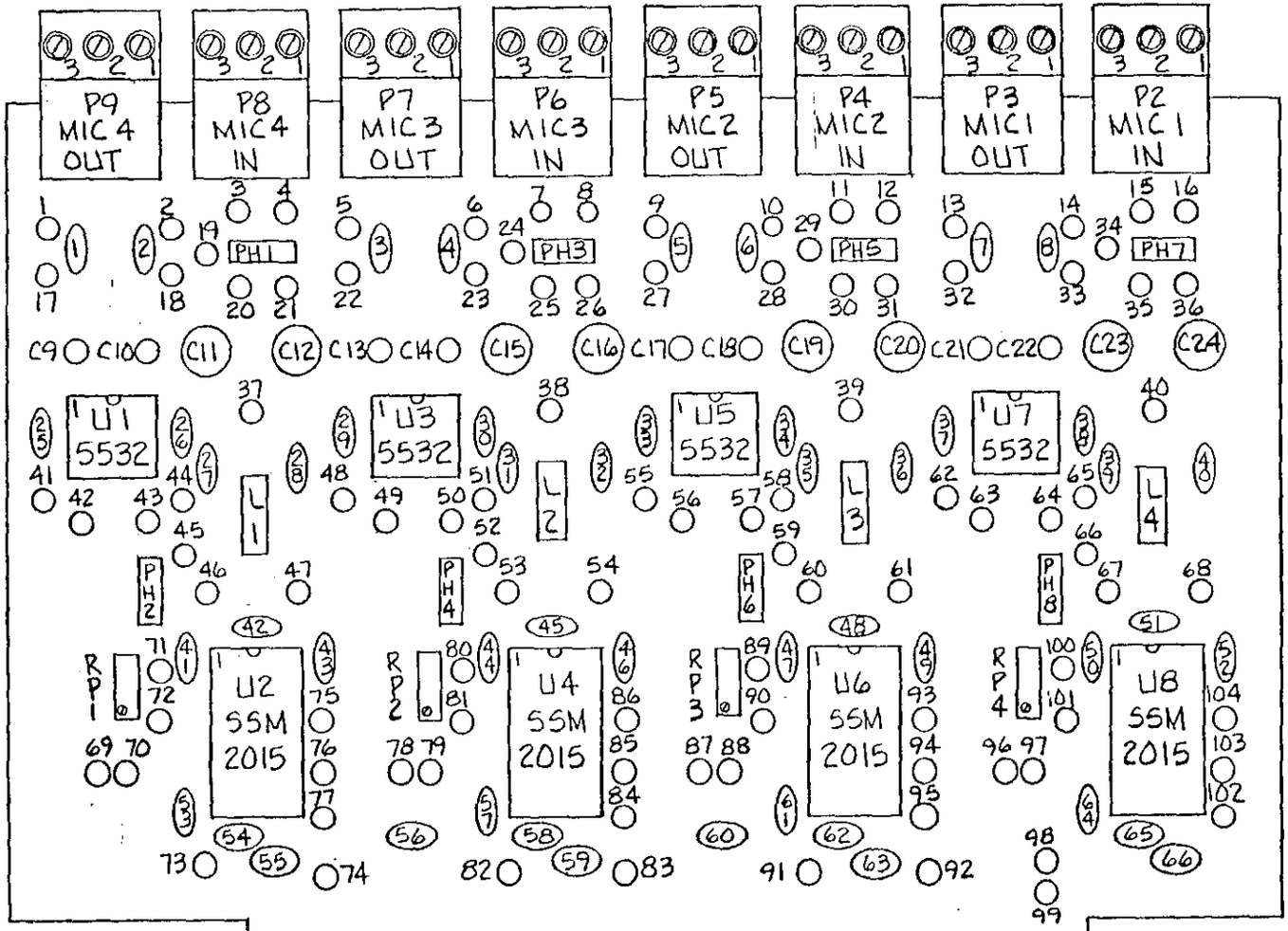
Following the pre-amplifier is the balanced output amplifier which can drive low impedance lines. The normal output level is -10 dBm/600 ohms, however the level may be increased to 0 dBm by means of programming jumper PH8 which parallels R64 with R66 thus increasing the overall gain of U7B. It should be noted that when the elevated output level is used then the headroom is reduced by 10 dB. U7A is a inverting voltage follower which provides the negative phased output. C7 and C8 are used for R.F.I. suppression.

5.1.1
PARTS LIST FOR
MICROPHONE PREAMPLIFIER BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
16	C1-8,C27-28,C31-32,C35-36,C39-40	Capacitor, .001uf/50v, disk
8	C9-10,C13-14,C17-18,C21-22	Capacitor, 2.2uf/35v, tant.
8	C11-12,C15-16,C19-20,C23-24	Capacitor, 47uf/50v, elect.
4	C25,C29,C33,C37	Capacitor, 100pf/50v, disk
8	C26,C30,C34,C38,C42,C45,C48,C51	Capacitor, 220pf/50v, disk
8	C41,C43-44,C46-47,C49-50,C52	Capacitor, 15pf/50v, disk
4	C53,C57,C61,C64	Capacitor, 50pf/50v, disk
8	C54,C55,C58-59,C62-63,C65-66	Capacitor, .1uf/35v, tant.
2	C56,C60	Capacitor, 100uf/25v, elect.
4	L1-4	Filter, Ferrite, VK200
8	P2-9	3 pin Buchanan Plug Assy.
8	PH1-8	Headers, Programming, 3 pin
8	PJ1-8	Jumpers, Programming, Molex
28	R1-2,R5-6,R9-10,R13-14,R41-42,R44-45, R48-49,R51-52,R55-56,R58-59,R62-63, R65-66,R75,R86,R93,R104	Resistor, 10k, 1% M.F., 1/4w
16	R3-4,R7-8,R11-12,R15-16,R20-21,R25-26, R30-31,R35-36	Resistor,75.0, 1% M.F., 1/4
8	R17-18,R22-23,R27-28,R32-33	Resistor,49.9, 1% M.F., 1/4w
4	R19,R24,R29,R34	Resistor,121, 1% M.F., 1/4w
4	R37-40	Resistor,100k, 1% M.F., 1/4w
4	R43,R50,R57,R64	Resistor,1.62k, 1% M.F., 1/4w
8	R46-47,R53-54,R60-61,R67-68	Resistor,1k, 1% M.F., 1/4w
16	R69-70,R73-74,R78-79,R82-83,R87-88, R91-92,R96-R99	Resistor,10.0, 1% M.F., 1/4w
4	R71,R80,R89,R100	Resistor,22.1k, 1% M.F., 1/4w
4	R72,R81,R90,R101	Resistor,17.4k, 1% M.F., 1/4w
4	R76,R85,R94,R103	Resistor,221, 1% M.F., 1/4w
4	R77,R84,R95,R102	Resistor,30.1k, 1% M.F., 1/4w
4	RP1-4	Pot, Multiturn, 2k, Spec. 64Y
4	U1,U3,U5,U7	I.C., NE5532, Dual Op-amp
4	U2,U4,U6,U8	I.C., SSM2015, Mic. pre-amp

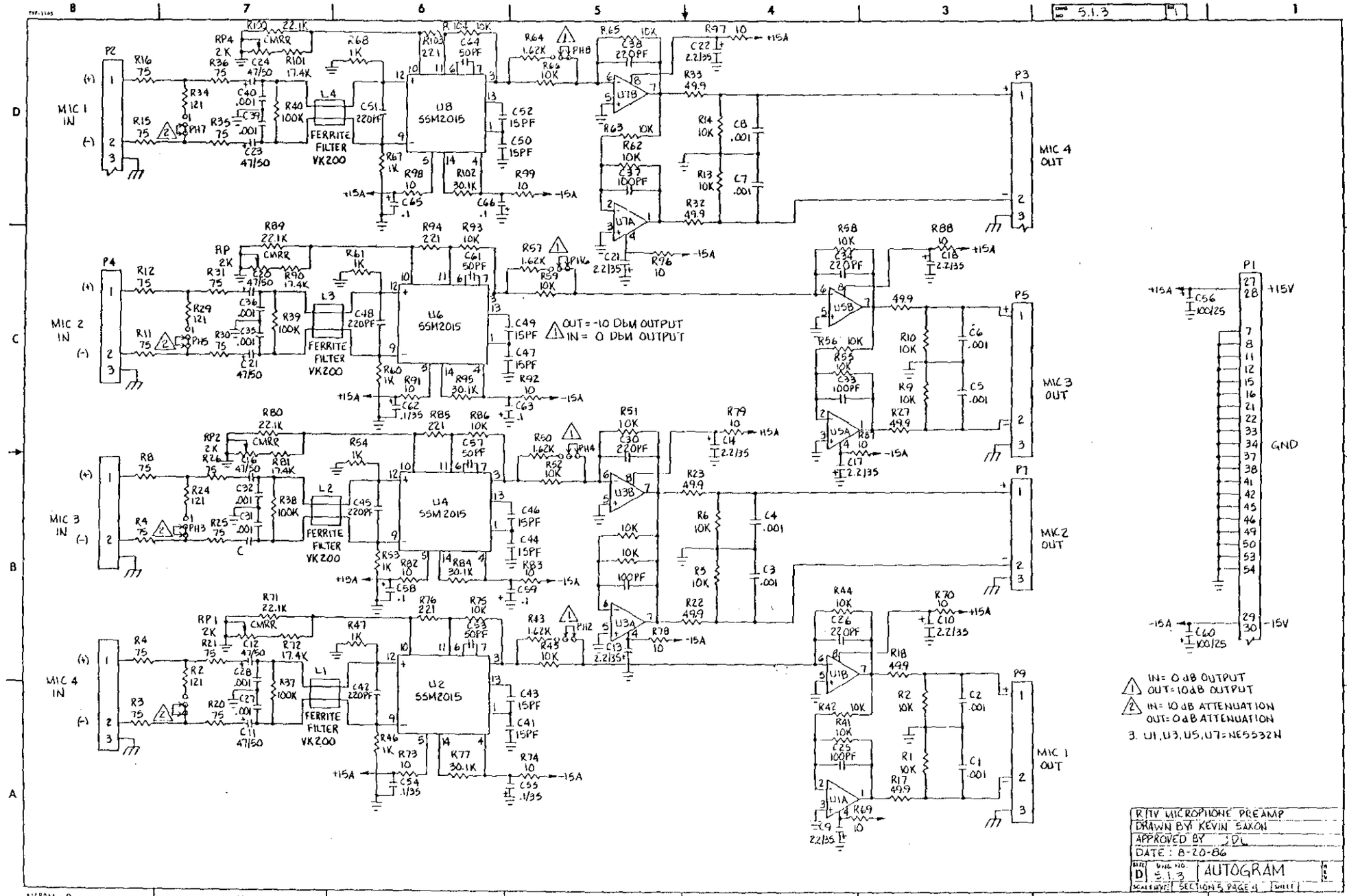
Misc. Parts:

4	------	8 pin dip sockets
4	------	14 pin dip sockets
1	------	Mic. Pre-Amp P.C. Board



NOTES:
O=RESISTORS
⬭=CAPACITORS
P2-P9 ARE 3 PIN BUCHANNAN'S.

MIC PREAMP BOARD LAYOUT
DWG. NO. 5.1.2
SECTION 5, PAGE 3


MIC 1 IN
MIC 2 IN
MIC 3 IN
MIC 4 IN
U8 SSM2015
U6 SSM2015
U4 SSM2015
U2 SSM2015
FERRITE FILTER VK200
OUT = -10 DBM OUTPUT
IN = 0 DBM OUTPUT
MIC 4 OUT
MIC 3 OUT
MIC 2 OUT
MIC 1 OUT
+15V
GND
-15V
IN= 0 dB OUTPUT
OUT=10dB OUTPUT
IN= 10 dB ATTENUATION
OUT= 0dB ATTENUATION
3. U1,U3,U5,U7=NE5532N
R/TV MICROPHONE PREAMP
DRAWN BY: KEVIN SAXON
APPROVED BY: JDL
DATE: 8-20-86
AUTOGRAM
5.1.3
SECTION 5 PAGE 9

5.2 CHANNEL BOARD

The CHANNEL BOARD provides interfacing of both audio and control signals between the R/TV Console and various source equipment. Additionally, the CHANNEL BOARD connects to its respective front panel switches, lamps, and slider. Discussion of the CHANNEL BOARD circuitry will be in covered in two parts: Audio and Digital.

5.2.1 CHANNEL BOARD AUDIO CIRCUITS

The audio input connections are made on the 6 pin miniature pluggable connector, P2. The CHANNEL BOARD can accept both balanced and unbalanced signals in a range of -15 to +15 dBm (.137 to 4.35 volts rms). The nominal input impedance of the CHANNEL BOARD is approximately 20k ohms; however, a precision 600 ohm termination resistor may be connected between the + and - inputs by means of a small programmable jumper. A selectable attenuator is used to allow setting the coarse level to one of three values. With both programmable jumpers out, the CHANNEL BOARD is set up for -10 dBm input range; with PH13 (PH10 for the right channel) connected the input range is 0 dBm; with PH14 (PH11 for the right channel) connected the input range is +10 dBm. A small increase in attenuation is available by connecting both jumpers, however this is not a normal condition.

I.C. U14B (U13B for the right channel) is used to provide balanced to unbalanced conversion with very good common mode rejection which is trimmable with RP4 (RP3 for the right channel). About 10 dB of fine gain range adjustment is available using RP2 (RP1 for the right channel). U14A (U13A for the right channel) is used to provide the voltage gain needed to drive the Voltage Controlled Amplifier (VCA), U16 (U15 for the right channel) and is capacitively coupled to prevent any dc offset voltages from affecting the VCA U18B (U18A for the right channel) is a current to voltage convertor which provides drive for the bus select switch, U17. 10k ohm resistors are used to connect the bus select switch output to the respective buses. Audio for both the Cue bus and the pre-fader Mix-Minus bus is provided by summing the left and right channel VCA input signals through 20k ohm resistors to inverting amplifier U11A producing a monaural signal with no degradation of stereo channel separation. The Post-fader Mix-Minus signal is produced in a similar fashion by summing the output of the VCA current to voltage convertors using U11B. Selection of signals to drive the Mix-Minus buses is by means of programmable jumpers PH7 and PH8. Cue bus selection is by one section of the analog switch U12.

The required D.C. control voltage for the VCAs is provided by an asymmetric driving amplifier, U11C. The SLDS (slider switch) output is normally 0-5 volts D.C. as set by the position of the front panel slider control and is coupled to the inverting input of U11C by means of a non-linear network consisting of R17, R16, R20, D9, AND D8. This network along with the feedback resistor R24, bias resistor R19, and voltage divider R25/R26 creates a specialized response curve to give a distinctive "feel" to the slide controls. A ten to one voltage divider follows U11C which conditions the control voltage to that required for the VCAs : -.15 to +.90 volts for the full range of attenuation. The output of the D.C. control amplifier is zero when the slider is at the calibration mark (15 dB gain in hand).

A negative going control signal produces up to 15 dB amplification in the VCA, while a positive going signal will give up to 90 dB of attenuation. RP5 and RP6 are used to adjust the VCAs for minimum control feedthrough noise. The "Mute" port (pin 10) of the VCAs is controlled by the EN- signal which turns off the VCA when the channel is turned off.

5.2.2 CHANNEL BOARD DIGITAL CIRCUITS

All Front Panel controls for a particular channel are connected via a 16 wire ribbon cable to connector P4 on the Channel Board. The various pushbutton switches are momentary type and switch to Ground * when pressed. Ground * is isolated from true ground by a 10 ohm resistor which is used to reduce static-electricity related problems. U2 is a special purpose IC which provides de-bouncing for the push-button switches. An inverter (U4A, U4F, U4B, and U4F) follows each de-bouncer and is connected to U3C, U5C, U5A, and U5D respectively which allow access to the control circuits by the optional Microprocessor Interface Board.

The ON control signal sets flip-flop U9B and is inverted by U3 which turns on driver U1E thus providing the START pulse for switching external equipment. U1 is an open collector device rated at 50 volts @ 500 MA (non-inductive) per section MAXIMUM. If a relay type device is to be operated by U1, a despiking diode MUST be placed across the relay coil. The outputs of U9B are then latched and are referred to as the Enable and Inverted Enable (EN,EN-) signals.

EN is used to turn on U1A to illuminate the ON front panel lamp; to operate the external open-collector ENABLE output; to operate the MUTE switch; and to supply the status signal for the computer interface chip. The -EN output drives the OFF lamp buffer as well as the VCA mute inputs. flip-flop U9B may be reset by pressing the OFF pushbutton, by computer control, or by a Master Reset pulse. The trailing edge of an AUX (secondary or E.O.M.) signal from a particular source can reset U9B if this option is programmed by jumper PH1. The AUX signal is connected to the CLOCK input of U9B which resets the flip-flop on a low to high transition.

Both Channel ON and Channel OFF inputs are connected through another de-bounce circuit to the Remote ON and Remote OFF terminals for remote control of the channel. A programming option allows the effective value of the slider to be set to the calibration point when the channel is turned on remotely. This feature is known as Autoslider and is activated by U9A. When the channel is turned on by computer control or by remote control with Autoslider enabled, the front panel ON lamp will flash. The 1 hz oscillator is on the motherboard and is gated with U5B and U10B. The computer can call for a reduced audio level via the CHILO signal which uses U10A and U10C to select a new value to be sent to the VCA control amplifier.

The PGM (Program) and AUD (Audition) front panel switches operate flip-flops U7A and U7B respectivly which are connected in a toggling configuration. The PGM and AUD outputs are connected to the Program and Audition Bus select analog switches. The Master Reset is connected to U7 which insures that both buses are Off when the Console is powered up. Supply voltage for the four flip-flops on the Channel Board is VCB which is battery backed to maintain the front panel configuration in the event of short power outages.

The slider mounted CUE switch closes VCC which is then conditioned by R6, R9, and C6 and is routed to U12B to control the Cue audio bus. U12C is used to select the feed to the LOG bus and is controlled by the computer. U12A and U12D are switches to operate the MUTE buses and are activated by the EN signal and routed via PH4 and PH5. U1H is used to reset the optional AUTOCLOCK whenever the channel is turned on and is selected by PH6.

The TER (tertiary) signal from the related source equipment is simply diode coupled to the TER bus and is used to transfer the AUTOCLOCK to the Count-Down mode when the tertiary pulse is detected.

U8 is used as a data buffer to collect the status of the channel for the computer. U6 is a latch which allows the computer to take control of the channel. If the optional Microprocessor Board is not installed in the the Console U8 and U6 will have no effect on the operation of the Channel Board.

5.2.3
PARTS LIST FOR
CHANNEL BOARD
R/TV AUDIO CONSOLE

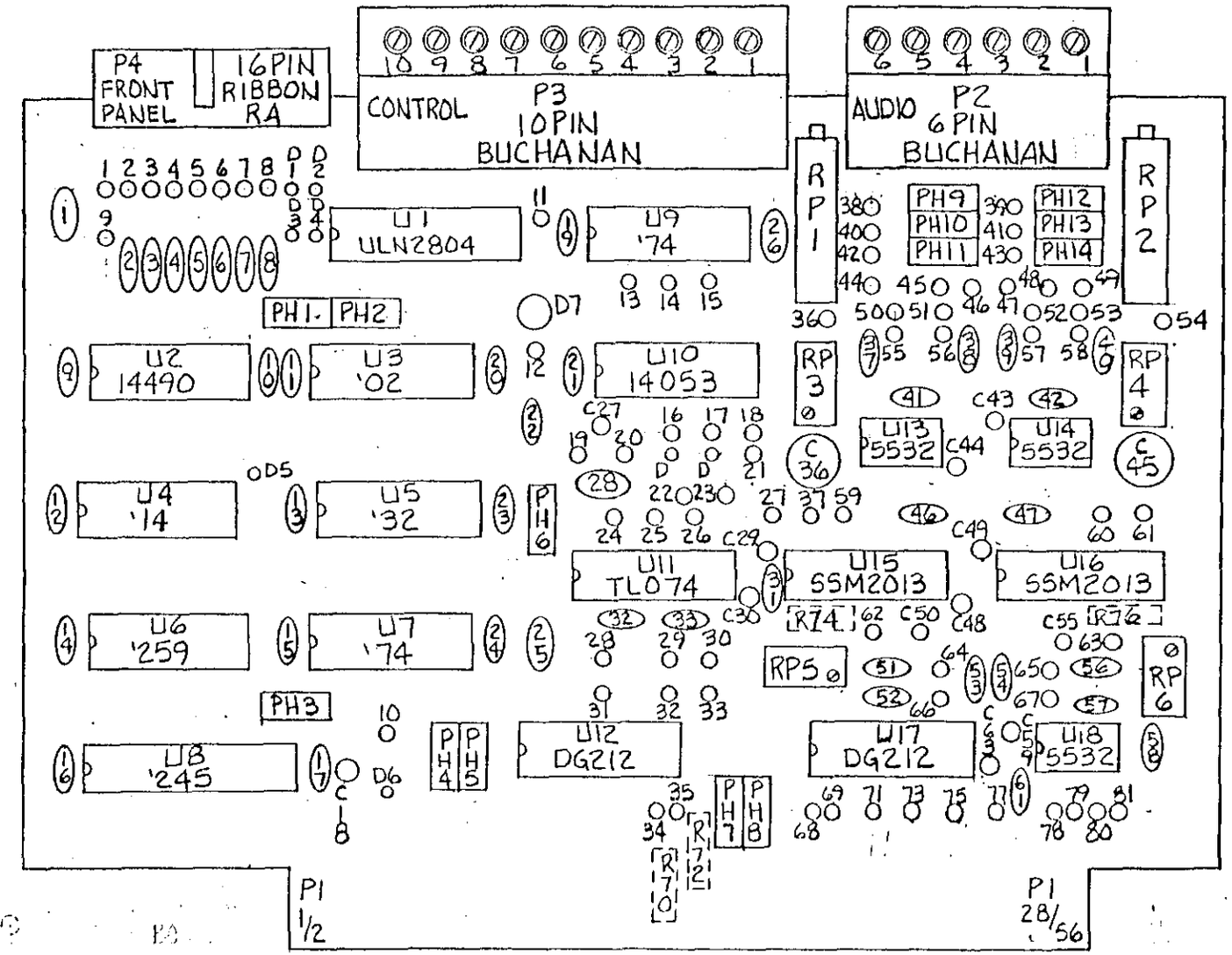
QTY	REFERENCE DESIGNATOR	DESCRIPTION
5	C1,C25-26,C28-C29	Capacitor, .1uf/50v, disk
22	C2-C17,C19-C24	Capacitor, .01uf/50v, disk
1	C18	Capacitor, 2.2uf/35v, tant.
11	C27,C30-31,C34-35,C43-44,C49,C59-60	Capacitor, .1uf/35v, tant.
10	C32-33,C41-42,C46-47,C52,C57-58,C61	Capacitor, 150pf/50v, disk
2	C36,C45	Capacitor, 100uf/10v, elect.
4	C37-C40	Capacitor, 220pf/50v, disk
2	C50,C55	Capacitor, 1uf/35v, tant.
2	C51,C56	Capacitor, .005uf/50v, disk
2	C53,C54	Capacitor, 50pf/50v, disk
8	D1-D6,D8-9	Diode, 1N914/1N4148
1	D7	Diode, Tranzorb,P6KE6.8
1	P2	6 pin Buchanan Plug Assy
1	P3	10 pin Buchanan Plug Assy
1	P4	16 pin Rt. Angle Rib. Header
14	PH1-PH14	Headers, Programming, 3 pin
14	PJ1-PJ14	Jumpers, Programming,Molex
5	R1,R11-12,R70,R72	Resistor, 10, 1% M.F., 1/4w
7	R2-R8	Resistor, 100, 1% M.F., 1/4w
4	R9,R23,R36,R54	Resistor, 1k, 1% M.F., 1/4w
3	R10,R45,R48	Resistor, 100k, 1% M.F., 1/4w
2	R19,R25	Resistor, 61.9k,1% M.F., 1/4w
1	R14	Resistor, 1.62k, 1% M.F., 1/4w
1	R15	Resistor, 2.74k, 1% M.F., 1/4w
3	R16,R24,R26	Resistor, 121k, 1% M.F., 1/4w
1	R17	Resistor, 6.81k,1% M.F., 1/4w
4	R18,R21,R30,R33	Resistor, 20k,1% M.F., 1/4w
21	R22,R28-29,R32-33,R44,R46-47,R49,R55, R57,R59-60,R68-69,R71,R73,R75,R77-78, R81	Resistor, 10k, 1% M.F., 1/4w

PARTS LIST FOR
CHANNEL BOARD, Contd.
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	R20	Resistor, 30.1k,1% M.F., 1/4w
3	R27,R62,R63	Resistor, 1.5m, 5% C.F., 1/4w
6	R31,R34,R66,R67,R79,R80	Resistor, 15k, 1% M.F., 1/4w
2	R37,R61	Resistor, 12.1k,1% M.F., 1/4w
2	R38-39	Resistor, 604, 1% M.F., 1/4w
2	R40-41	Resistor, 1.62k,1% M.F., 1/4w
2	R42-43	Resistor, 332, 1% M.F., 1/4w
5	R13,R50-R53	Resistor, 2.21k,1% M.F., 1/4w
2	R56,R58	Resistor, 9.31k,1% M.F., 1/4w
2	R64-65	Resistor, 49.9, 1% M.F., 1/4w
2	R74,R76	Resistor, 3.65k, 1% M.F., 1/4w
2	RP1-2	Pot, multiturn, 5k Spec. 43P
2	RP3-4	Pot, multiturn, 1k Spec. 64Z
2	RP5-6	Pot, multiturn, 100k Spec 64Y
1	U1	I.C.,ULN2804, Darl. Array
1	U2	I.C.,MC14490, Swx. Debounce
1	U3	I.C.,74HC02, CMOS NOR
1	U4	I.C.,74HC14, CMOS INV, S.T.
1	U5	I.C.,74HC32, CMOS OR
1	U6	I.C.,74HC259,CMOS Latch
2	U7,U9	I.C.,74HC74, CMOS D.FF
1	U8	I.C.,74HC245,CMOS Data Buff.
1	U10	I.C.,MC14053, Analog Switch
1	U11	I.C.,TL074, Quad opamp
2	U12,U17	I.C.,DG212, Analog Switch
3	U13-14,U18	I.C.,TL072, Dual opamp
2	U15-16	I.C.,SSM2013, VCA

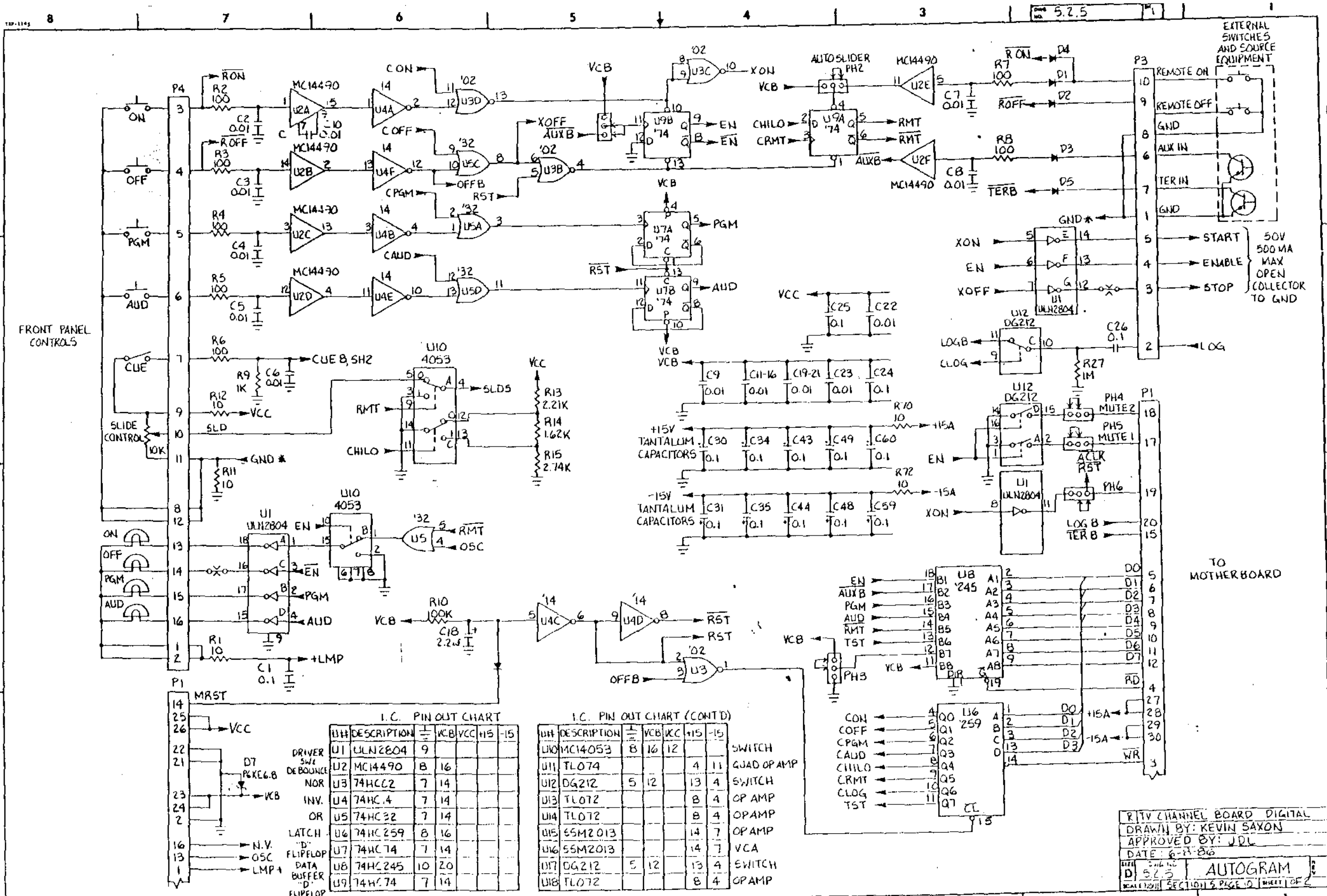
Misc. Parts:

3	------	8 pin dip sockets
8	------	14 pin dip sockets
5	------	16 pin dip sockets
1	------	18 pin dip socket
1	------	20 pin dip socket
1	------	Channel P.C. Board



NOTES:
○=RESISTORS
⬭=CAPACITORS

CHANNEL BOARD LAYOUT
DWG. NO 5.2.4
SECTION 5, PAGE 9



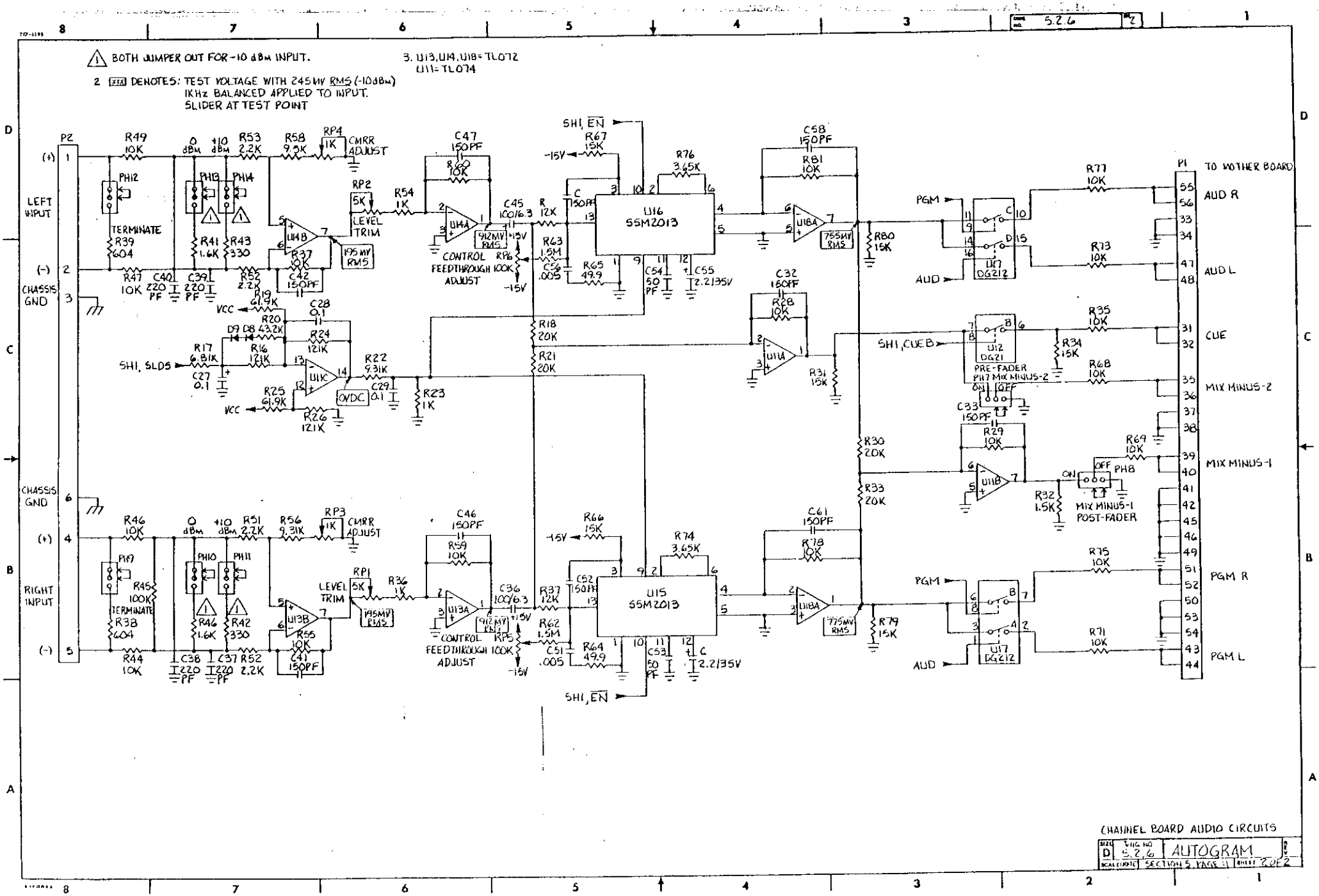
I.C. PIN OUT CHART

	U#	DESCRIPTION	⏚	VCB	VCC	+15	-15
DRIVER	U1	ULN2804	9				
SW. DEBOUNCE	U2	MC14490	8	16			
NOR	U3	74HC02	7	14			
INV.	U4	74HC14	7	14			
OR	U5	74HC32	7	14			
LATCH	U6	74HC259	8	16			
"D" FLIPFLOP	U7	74HC74	7	14			
DATA BUFFER	U8	74HC245	10	20			
"D" FLIPFLOP	U9	74HC74	7	14			

I.C. PIN OUT CHART (CONT'D)

U#	DESCRIPTION	⏚	VCB	VCC	+15	-15	
U10	MC14053	8	16	12			SWITCH
U11	TL074				4	11	QUAD OP AMP
U12	DG212	5	12		13	4	SWITCH
U13	TL072				8	4	OP AMP
U14	TL072				8	4	OP AMP
U15	SSM2013				14	7	OP AMP
U16	SSM2013				14	7	VCA
U17	DG212	5	12		13	4	SWITCH
U18	TL072				8	4	OP AMP

R TV CHANNEL BOARD DIGITAL
DRAWN BY: KEVIN SAXON
APPROVED BY: JDL
DATE: 6-13-86
SIZE D DWG NO. 5.2.5 AUTOGRAM
SCALE NONE SECTION 5 PAGE 10 SHEET 1 OF 2


1 BOTH JUMPER OUT FOR -10 dBm INPUT.
2 [XXX] DENOTES: TEST VOLTAGE WITH 245 MV RMS (-10dBm) 1KHz BALANCED APPLIED TO INPUT. SLIDER AT TEST POINT
3. U13, U14, U18 = TL072 U11 = TL074
P2
P1
TO MOTHER BOARD
LEFT INPUT
RIGHT INPUT
CHASSIS GND
TERMINATE
LEVEL TRIM
CMRR ADJUST
CONTROL FEEDTHROUGH ADJUST
U16 SSM2013
U15 SSM2013
U17 DG212
U12 DG211
PRE-FADER PH7 MIX MINUS-2
MIX MINUS-1 POST-FADER
AUD R
AUD L
CUE
MIX MINUS-2
MIX MINUS-1
PGM R
PGM L
PGM
AUD
SH1, SLDS
SH1, CUE B
SH1, EN
VCC
-15V
+15V
0VDC
CHANNEL BOARD AUDIO CIRCUITS
AUTOGRAM
SECTION 5, PAGE 11
SHEET 2 OF 2

5.3 MULTILINE INPUT BOARD

The MULTILINE INPUT BOARD is essentially an audio pre-select switching system consisting of four identical stereo inputs and one balanced high level stereo output. Normally the balanced output is connected to the input of a particular Channel Board; however, this output could be routed outside the console for other uses.

Selecting signals from the front panel switches are connected to P7 via a 10 wire ribbon cable. These MLSEL inputs are active low and are filtered by a 100 ohm series resistor and a .01uf capacitor which operate the respective inputs of U14, a Schmidt trigger type inverter. The outputs of U14 are connected to U13 and U15 which are analog electronic switches.

To simplify discussion of the audio portion of the MULTILINE INPUT BOARD only the Left Channel of Input 1 will be covered since all inputs are identical.

Audio is connected to P1 pins 1 and 2 with pin 1 positive +. Pin 3 is chassis ground for shielding purposes. Programming Header PH22 is used to select a 600 ohm terminating resistor if desired. Input resistors R20, R21, and R76 along with C19 and C20 form a high impedance input network which has good RFI rejection. Programming Header PH23 is used to select 0dBm input level while Programming Header PH24 will select +10 dBm input range. With both PH23 and PH24 disabled, the input is set for -10 dBm range. U12B is used as a unity gain balanced to unbalanced converter stage. U12A is a voltage amplifier and driver for the Electronic Switch, U15B.

U4A is used as a summing amplifier which buffers the left switch bus ML SEL L. U4B is a driver amplifier for the active balanced output stage U2. Output audio is coupled through resistors R28 and R30 to P6 pin 1 and 2.

The normal output level of the MULTILINE INPUT BOARD is -10 dBm.

When the MULTILINE INPUT BOARD is used in the R/TV-20 console two boards are used in pairs to give a total of 8 inputs. The left and right channel mixing buses (ML SEL L and ML SEL R) are connected together via the Mother Board, however U1,U2,U3, and U4 are not installed in the second board (inputs 5-8).

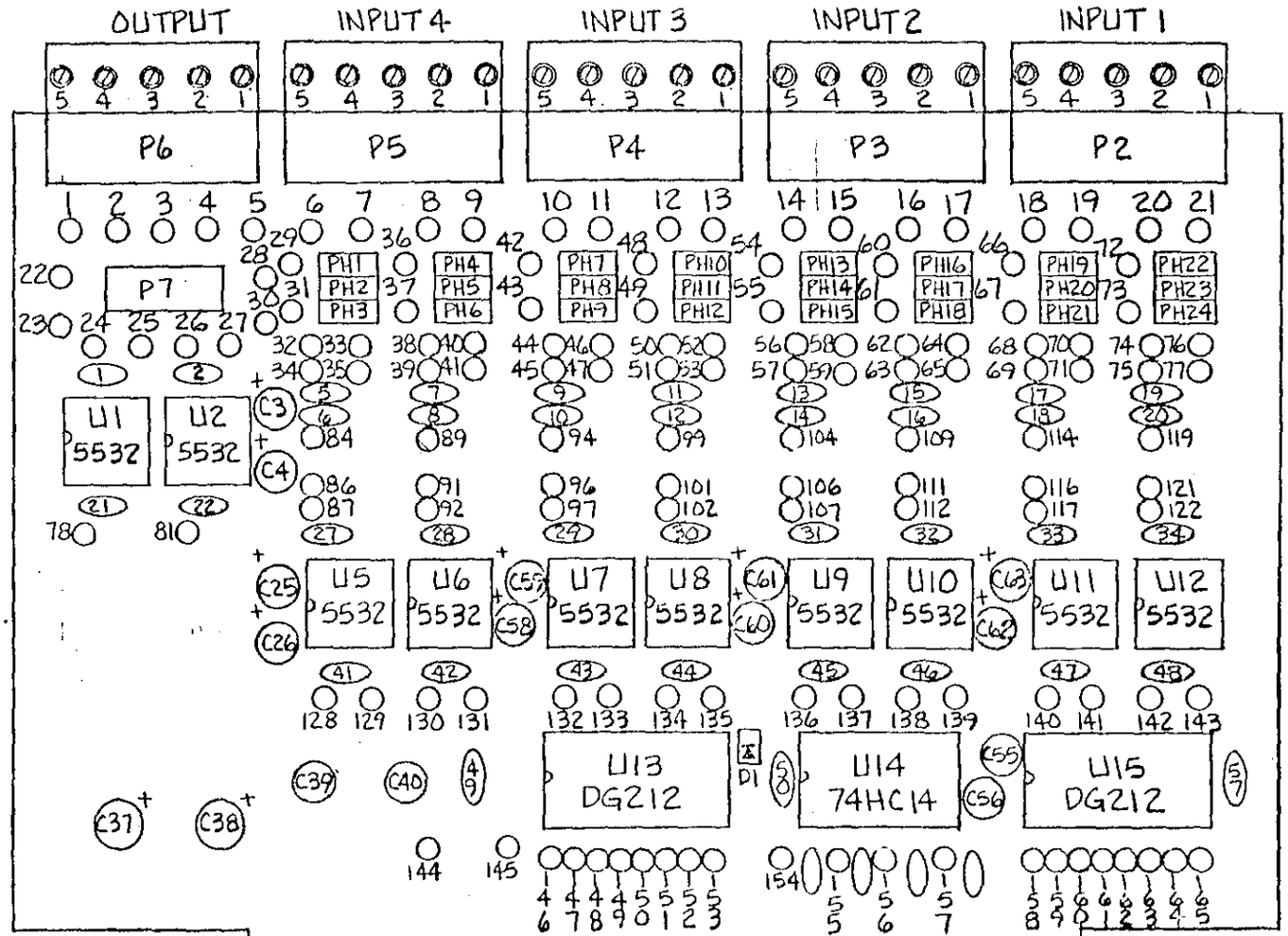
When the MULTILINE INPUT BOARD is used in the R/TV-12 console each board is separate and the mix-bus jumpers on the Mother Board are cut.

5.3.1
PARTS LIST FOR
MULTILINE INPUT BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
20	C1-2,C21-22,C27-34,C41-48	Capacitor, 50pf, 50v, disk
12	C3-4,C25-26,C55-56,C58-63	Capacitor, .1uf, 35v, tant.
16	C5-20	Capacitor, 200pf, 50v, disk
2	C37-38	Capacitor, 330uf, 6.3v, elect.
2	C39-40	Capacitor,100uf,25v,elect.
2	C49,C57	Capacitor, .1uf, 10v, disk
5	C50-54	Capacitor, .01uf, 50v, disk
1	D1	Diode, Tranzorb, P6KE6.8
5	P2-6	5 Pin Buchanan Plug Assy.
1	P7	10 pin ribbon header
24	PH1-24	Headers, Programming, 3pin
24	PJ1-24	Jumpers, Programming, Molex
3	R1,R144,R145	Resistor, 10, 1%,M.F., 1/4w
4	R2-5	Resistor, 100, 1%,M.F., 1/4w
48	R66-21,R24-27,R84,R87,R89,R92, R94,R97,R99,R102,R104,R107,R109,R112, R114,R117,R119,R122,R146,R149-150, R153-158,R161-162,R165	Resistor, 10k, 1%, M.F., 1/4w
4	R22-23,R28,R30	Resistor, 49.9, 1%,M.F., 1/4w
8	R29,R36,R42,R48,R54,R60,R66,R72	Resistor, 604, 1%, M.F., 1/4w
8	R31,R37,R43,R49,R55,R61,R67,R73	Resistor, 1.62k, 1%, M.F., 1/4w
8	R32,R38,R44,R50,R56,R62,R68,R74	Resistor, 332, 1%, M.F., 1/4w
8	R33,R40,R46,R52,R58,R64,R70,R76	Resistor, 100k, 1%, M.F., 1/4w
16	R34-35,R39,R41,R45,R47,R51,R53,R57, R59,R63,R65,R69,R71,R75,R77	Resistor, 2.21k, 1%, M.F., 1/4w
2	R78,R81	Resistor, 20k, 1%, M.F., 1/4w
16	R129,R131,R133,R135,R137,R139,R141, R143,R147-148,R151-152,R159-160, R163-164	Resistor, 15k, 1%, M.F., 1/4w
8	R86,R91,R96,R101,R106,R111,R116,R121	Resistor, 3.92k, 1%, M.F., 1/4w
8	R128,R130,R132,R134,R136,R138,R140, R142	Resistor, 30.1k, 1%, M.F., 1/4w
2	U1-2	I.C., NE5532, Dual Op-amp
8	U5-12	I.C., TL072, Dual Op-amp
2	U13,U15	I.C., DG212, Analog Switch
1	U14	I.C., 74HC14, CMOS INV, S.T.

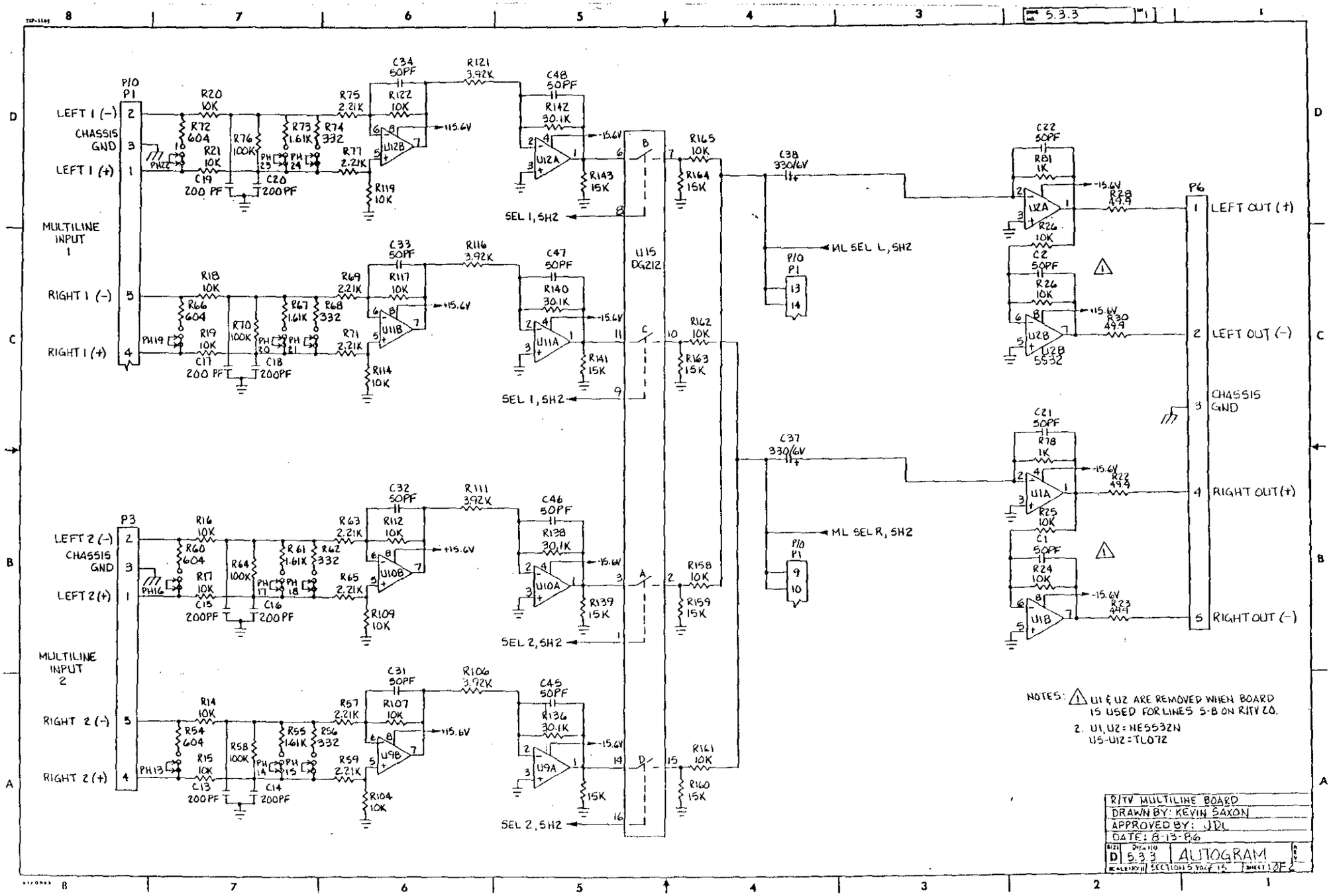
Misc. Parts

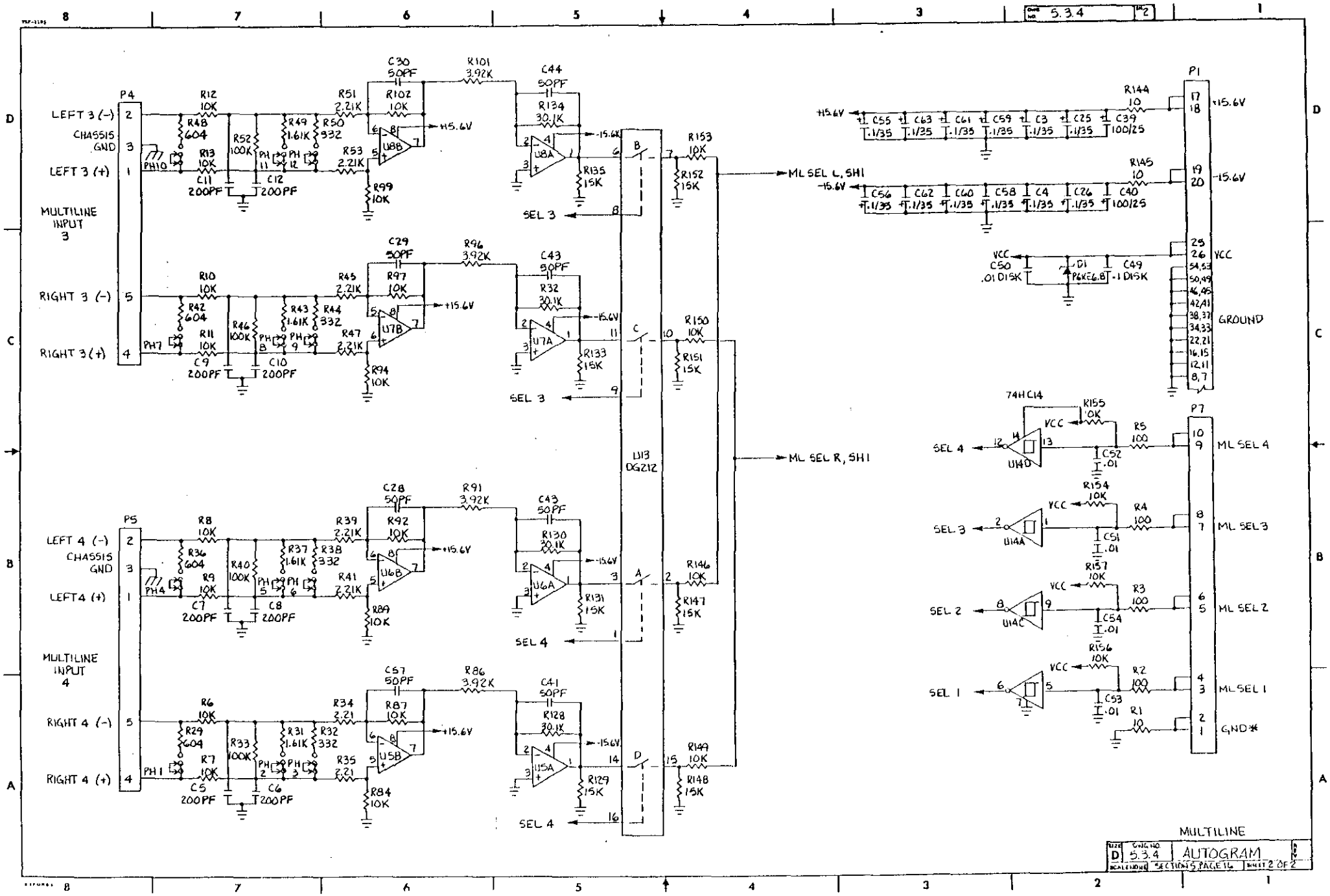
12	-------	8 pin dip sockets
2	-------	16 pin dip sockets
1	-------	14 pin dip socket
1	-------	Multiline P.C. Board



NOTES:
1. P2-P6 ARE 6 PIN BUCHANNANS
2. ○ = RESISTORS
3. ⬭ = CAPACITORS

MULTILINE INPUT BOARD LAYOUT
DWG NO. 5.3.2
SECTION 5, PAGE 14


5.3.3
P10
P1
LEFT 1 (-)
CHASSIS GND
LEFT 1 (+)
MULTILINE INPUT 1
RIGHT 1 (-)
RIGHT 1 (+)
P3
LEFT 2 (-)
CHASSIS GND
LEFT 2 (+)
MULTILINE INPUT 2
RIGHT 2 (-)
RIGHT 2 (+)
R20 10K
R72 604
R21 10K
R76 100K
R73 1.61K
R74 332
R75 2.21K
R77 2.21K
R119 10K
C19 200 PF
C20 200PF
C34 50PF
R122 10K
R121 3.92K
+15.6V
-15.6V
U12B
U12A
C48 50PF
R142 30.1K
R143 15K
SEL 1, SH2
R18 10K
R66 604
R19 10K
R70 100K
R67 1.61K
R68 332
R69 2.21K
R71 2.21K
R114 10K
C17 200 PF
C18 200PF
C33 50PF
R117 10K
R116 3.92K
U11B
U11A
C47 50PF
R140 30.1K
R141 15K
SEL 1, SH2
R16 10K
R60 604
R17 10K
R64 100K
R61 1.61K
R62 332
R63 2.21K
R65 2.21K
R109 10K
C15 200PF
C16 200PF
C32 50PF
R112 10K
R111 3.92K
U10B
U10A
C46 50PF
R138 30.1K
R139 15K
SEL 2, SH2
R14 10K
R54 604
R15 10K
R58 100K
R55 1.61K
R56 332
R57 2.21K
R59 2.21K
R104 10K
C13 200PF
C14 200PF
C31 50PF
R107 10K
R106 3.92K
U9B
U9A
C45 50PF
R136 30.1K
15K
SEL 2, SH2
U15 DG212
R165 10K
R164 15K
R162 10K
R163 15K
R158 10K
R159 15K
R161 10K
R160 15K
C38 330/6V
ML SEL L, SH2
C37 330/6V
ML SEL R, SH2
C22 50PF
R81 1K
R28 49.9
R26 10K
C2 50PF
R26 10K
R30 49.9
U2B 5532
C21 50PF
R78 1K
R22 49.9
R25 10K
C1 50PF
R24 10K
R23 49.9
U1B
P6
1 LEFT OUT (+)
2 LEFT OUT (-)
3 CHASSIS GND
4 RIGHT OUT (+)
5 RIGHT OUT (-)
NOTES: 1. U1 & U2 ARE REMOVED WHEN BOARD IS USED FOR LINES 5-8 ON RITV 20.
2. U1, U2 = NE5532N
U5-U12 = TL072
R/TV MULTILINE BOARD
DRAWN BY: KEVIN SAXON
APPROVED BY: JDL
DATE: 8-13-86
D 5.3.3 AUTOGRAM
SCALE NONE SECTION 5 PAGE 15 SHEET 12 OF 12


P4
LEFT 3 (-)
CHASSIS GND
LEFT 3 (+)
MULTILINE INPUT 3
RIGHT 3 (-)
RIGHT 3 (+)
P5
LEFT 4 (-)
CHASSIS GND
LEFT4 (+)
MULTILINE INPUT 4
RIGHT 4 (-)
RIGHT 4 (+)
U8B
U8A
U7B
U7A
U6B
U6A
U5B
U5A
SEL 3
SEL 3
SEL 4
SEL 4
LI13 DG212
ML SEL L, SHI
ML SEL R, SHI
P1
+15.6V
-15.6V
VCC
GROUND
74HC14
U14D
U14A
U14C
U14B
SEL 4
SEL 3
SEL 2
SEL 1
ML SEL 4
ML SEL 3
ML SEL 2
ML SEL 1
GND*
MULTILINE
AUTOGRAM
5.3.4

5.4 OUTPUT BOARD

The OUTPUT BOARD consists of both mix (summing) amplifiers and line amplifiers. Signals from the Mix Bus enter the board on pins 39 and 40 for the left channel and pins 35 and 36 for the right channel except when the Board is used in the MIX-MINUS slot, then the input signals enter on pin 5 for Mix-Minus Bus 1 and pin 6 for Mix-Minus Bus 2. I.C. U-1 is used simply as a phase inverter for the Mix-Minus buses. U-2A and U3-A perform the actual mixing function and are operated at unity gain. With a properly calibrated input channel active, the signal level at the output of the mix-amp will be approximately 1 volt r.m..s. The mix-amp output is connected through P-4 (shipped with jumpers installed) which can be used as a processing patch-point. U2B and U3B serve as adjustable gain buffer amplifiers which drive the line amplifier output stages.

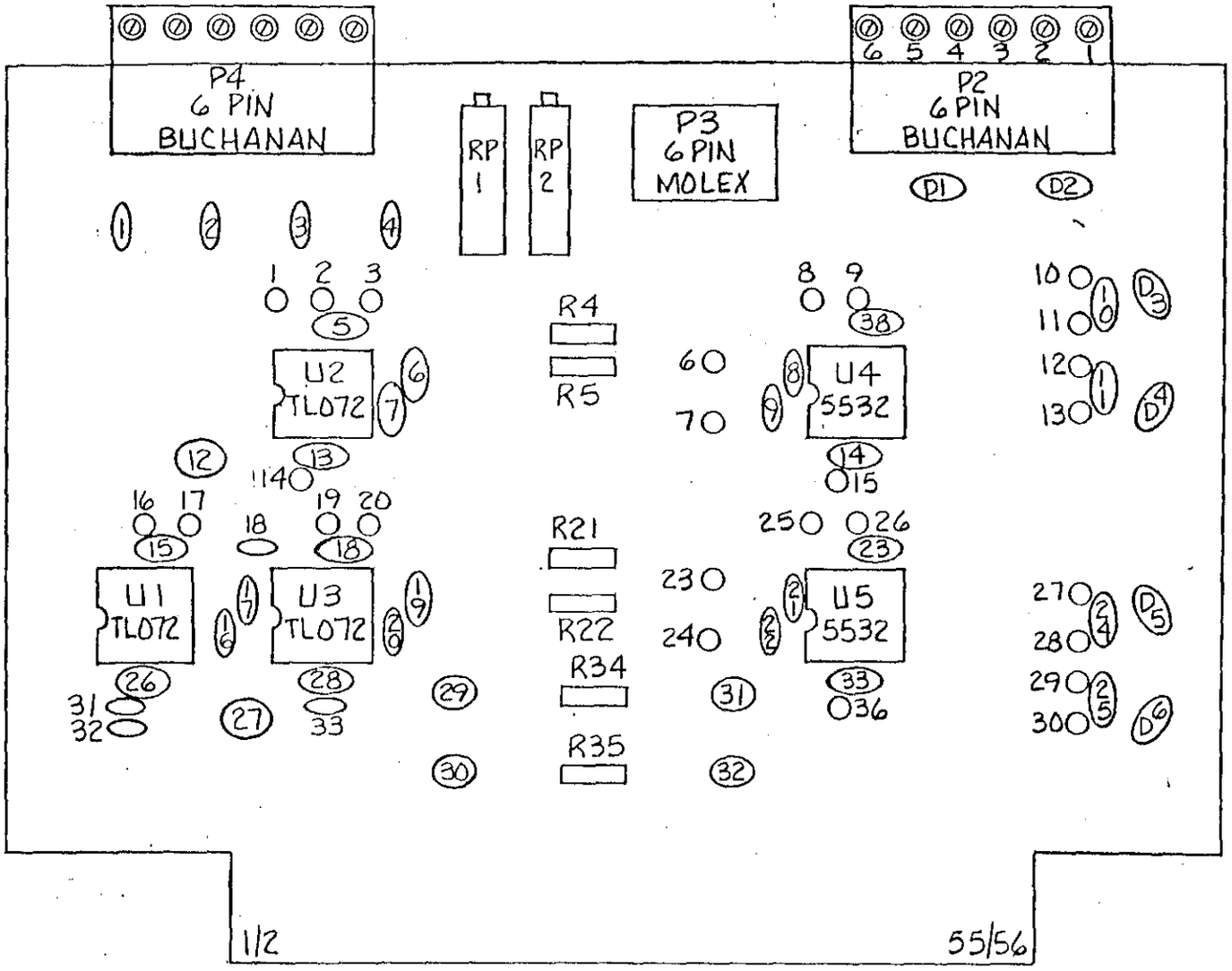
U4 and U5 are the line driver amplifiers for the left and right channels respectively and are operated with 6 dB of gain. As an electronically balanced output stage, each channel is capable of +26 dBm into 600 ohms before clipping. The actual output impedance of each amplifier is about 50 ohms. When shipped, the console is calibrated for 0VU = +8 dBm. The OUTPUT BOARD is protected by several metal oxide varistors (M.O.V.) as well as rf bypass capacitors. P-3 is used to connect the V.U. meters. Capacitors may be added in the output section as well as in the processing patch area if ac coupling is required.

5.4.1
PARTS LIST FOR
AUDIO OUTPUT BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
4	C1-4 *OPTIONAL*	Capacitor, 100uf, 25v, elect.
4	C29-C32	Capacitor, 100uf, 25v, elect.
10	C5,C13-15,C18,C23,C26,C28,C33,C38	Capacitor, 50pf, 50v, disc
10	C6-9,C16-17,C19-22	Capacitor, 1uf, 35v, tant.
4	C10-11,C24-25	Capacitor, .001uf, 50v, disc
2	C12,C27	Capacitor, 330uf, 6.3v, elect.
4	C34-37 *OPTIONAL*	Capacitor, 470uf, 50v, elect.
2	D1-2	M.O.V.,V82ZA2
4	D3-D6	M.O.V.,V39ZA1
2	P2,P4	Connector, 6 pin, Buchanan
1	P3	Connector, 6 pin, Molex
4	R1,R5,R18,R22	Resistor, 2.00k, 1/4w, 1%, M.F.
2	R2,R19	Resistor, 8.25k, 1/4w, 1%, M.F.
2	R3,R20	Resistor, 3.65k, 1/4w, 1%, M.F.
16	R4,R8,R11-12,R14-R17,R21,R25,R28-29, R31-33,R36	Resistor, 10.0k, 1/4w, 1%, M.F.
6	R6-7,R23-24,R34-35	Resistor, 10.0, 1/4w, 1%, M.F.
2	R9,R26	Resistor, 20.0k, 1/4w, 1%, M.F.
4	R10,R13,R27,R30	Resistor, 49.9, 1/4w, 1%, M.F.
2	RP1-2	Pot, Multiturn, 10k, Spec. 43P
5	U1-5	I.C., Op-Amp, NE5532N

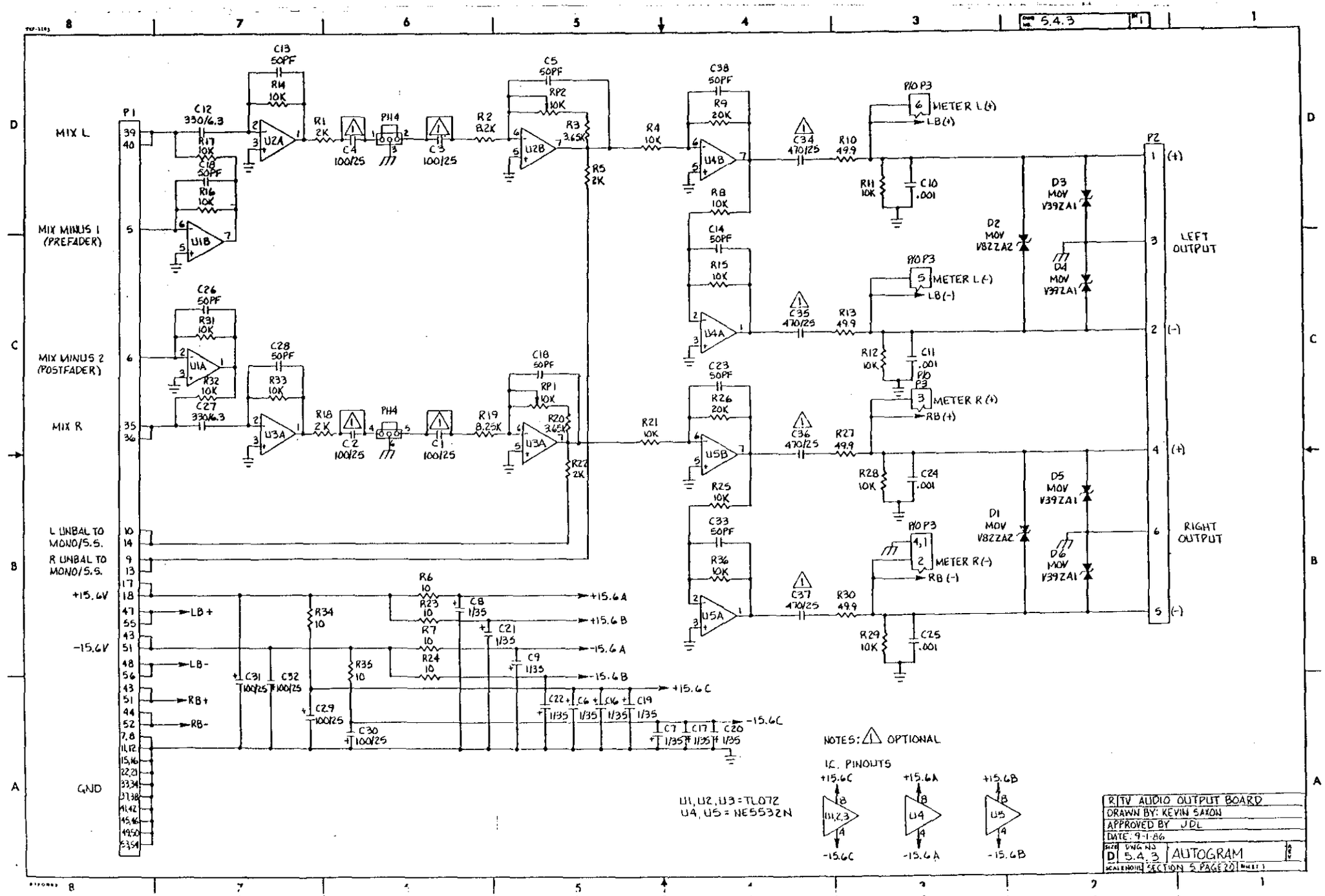
MISC. PARTS

1	------	Output P.C. Board
5	------	8 pin dip I.C. sockets



NOTES:
O=RESISTORS
⬭=CAPACITORS

AUDIO OUTPUT BOARD LAYOUT
DWG. NO 5.4.2
SECTION 5 PAGE 19.


5.4.3
MIX L
MIX MINUS 1 (PREFADER)
MIX MINUS 2 (POSTFADER)
MIX R
L UNBAL TO MONO/S.S.
R UNBAL TO MONO/S.S.
+15.6V
-15.6V
LB+
LB-
RB+
RB-
GND
P1
P2
LEFT OUTPUT
RIGHT OUTPUT
METER L(+)
METER L(-)
METER R(+)
METER R(-)
LB(+)
LB(-)
RB(+)
RB(-)
U1,U2,U3=TL072
U4,U5=NE5532N
NOTES: OPTIONAL
IC PINOUTS
R TV AUDIO OUTPUT BOARD
DRAWN BY: KEVIN SAXON
APPROVED BY JDL
DATE: 9-1-86
D 5.4.3
AUTOGRAM
SECTION 5 PAGE 20

5.5 MONO/SILENCE SENSE BOARD

The MONO/SILENCE SENSE BOARD consists of two Mono summing networks (one for Program and one for Audition), the Mono selecting electronic switch, the Mono line driver amplifier, 2 Silence Sense Detector circuits, and the Silence Sense Driver circuits.

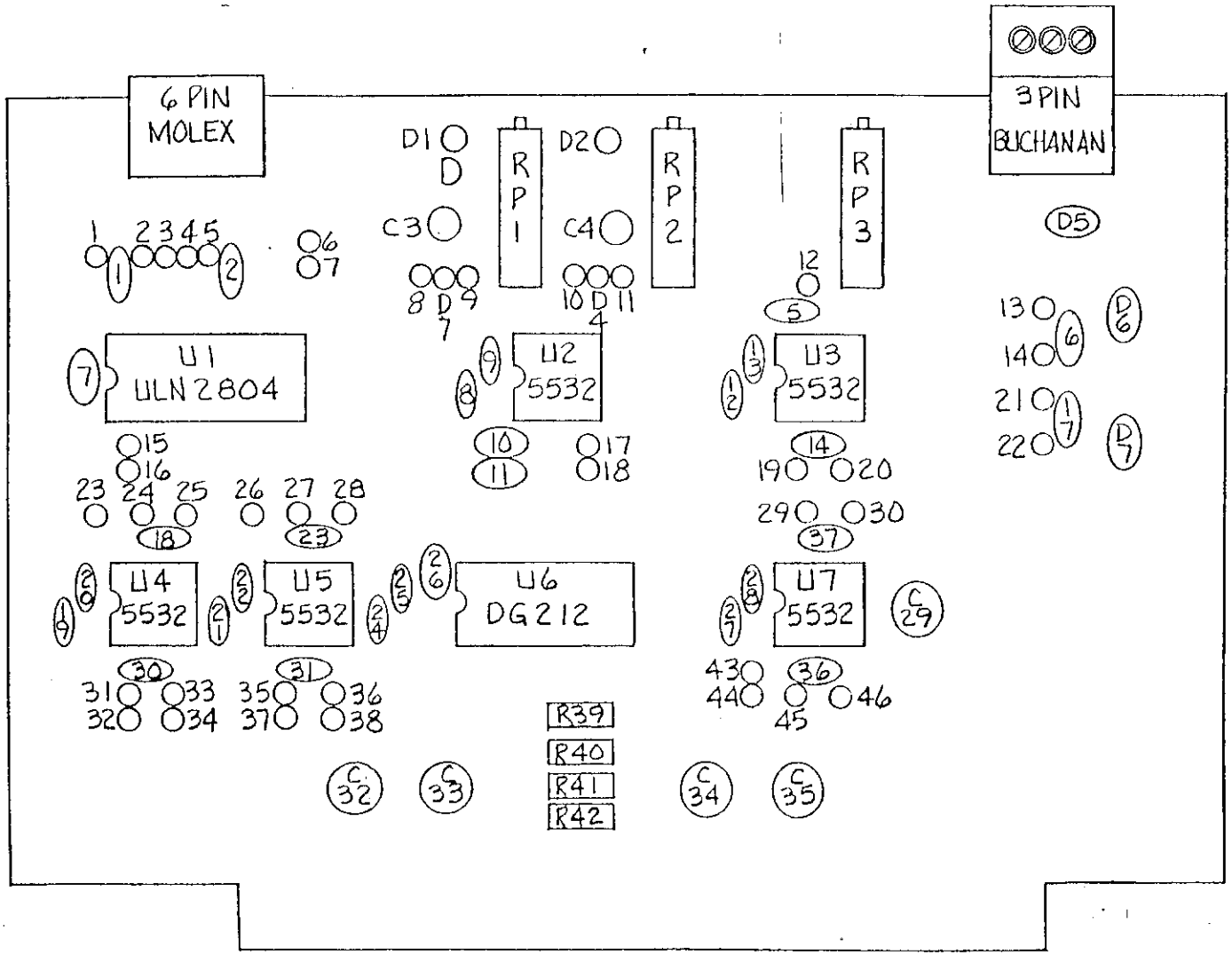
Audio from the Unbalanced outputs of the Program and Audition OUTPUT Boards is coupled via the Mother Board to the card edge connector. Stereo to Mono conversion takes place in the summing networks made up of R36, R37, and R38 for Program and R32, R33, and R34 for Audition. I.C.s U5 and U4 are used to elevate the Program and Audition Mono signals to about 1 volt rms which drives U6, the electronic Mono select switch. Two sections of the Darlington array (U1) are used as inverter/buffers for the front panel Mono Select Switch output and operate the logic inputs for U6. The selected audio passes through U7 which is an adjustable gain amplifier then on to U3, the line driver. The Mono output is identical to the other program type output circuits and will drive a 600 ohm load to +26 dBm before clipping. The output is calibrated to 0vu =+8dBm at the factory. Part of P3 is used to connect the front panel VU meter.

The Program and Audition Mono signals from U5 and U4 are also used to drive two Silence Sense Detector circuits. U2 provides a very high gain stage which is operated past clipping and in association with diodes D3 and D4 form the detection process. Presence of audio will cause the respective parts of U1 to conduct which will then turn on the associated LED and also signal the Microprocessor Board (optional). The level at which the circuit fires is adjustable by use of the Silence Sense Threshold controls RP2 (Program) and RP1 (Audition).

All low level stages of the Mono Silence Sense Board are powered from bi-polar 15 volts while the output line driver stages are powered by bi-polar 15.6 volts.

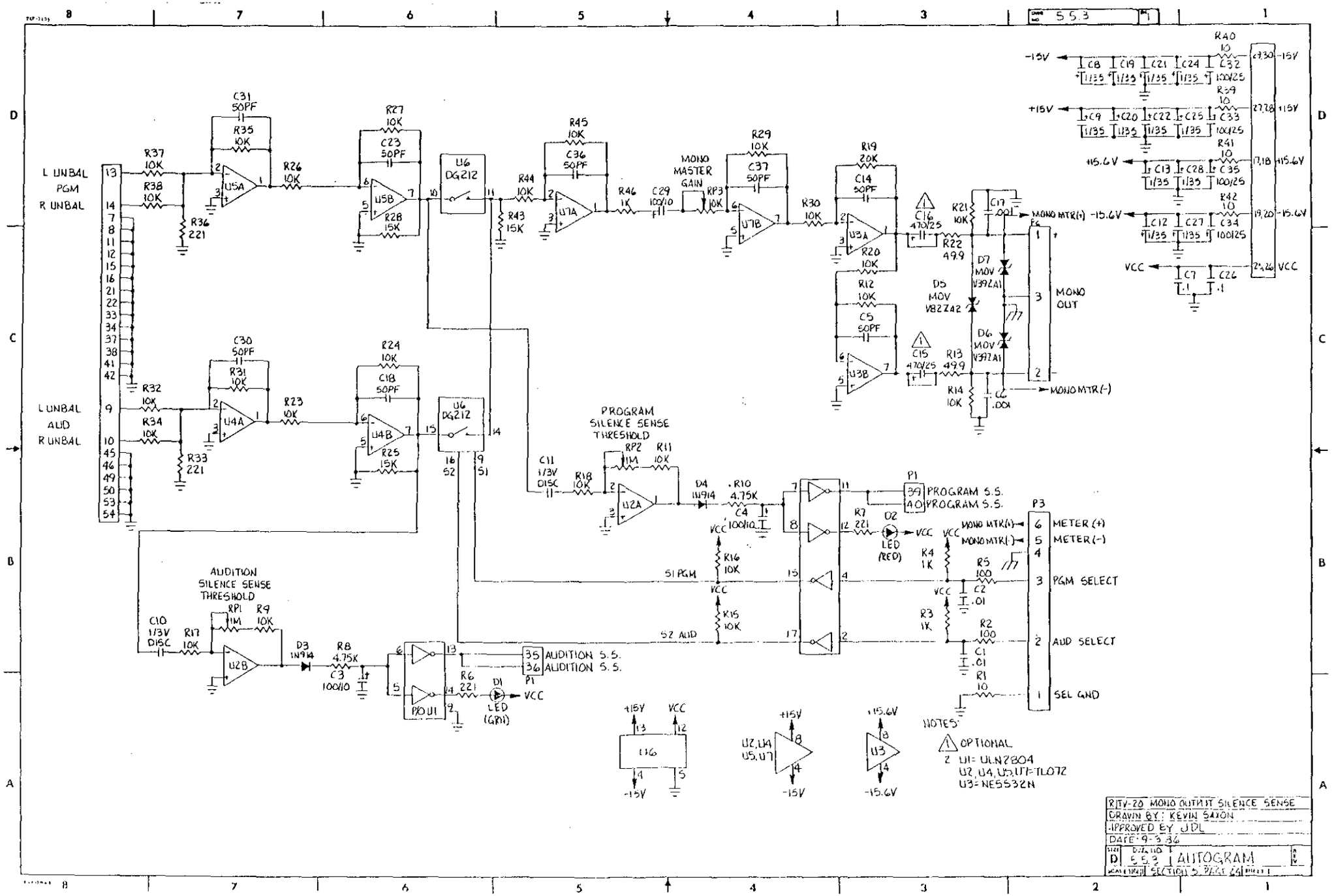
5.5.1
PARTS LIST FOR
MONO/SILENCE SENSE BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
2	C1-2	Capacitor, .01uf, 50v, disc
3	C3-4,C29	Capacitor, 100uf, 10v, elect.
8	C5,C14,C18,C23,C30-31,C36-37	Capacitor, 50pf, 50v, disc
2	C6,C17	Capacitor, .001uf, 50v, disc
2	C7,C26	Capacitor, .1uf, 50v, disc
12	C8-9,C12-13,C19-22,C24-25,C27-28	Capacitor, 1uf, 35v, tant.
2	C10-11	Capacitor, 1uf, 3v, disc
2	C15-16 *OPTIONAL*	Capacitor, 470uf, 25v, elect.
4	C32-35	Capacitor, 100uf, 25v, elect.
1	D1	L.E.D., green
1	D2	L.E.D., red
2	D3-4	Diode, 1N914
1	D5	M.O.V., V82ZA2
2	D6-7	M.O.V., V39ZA1
1	P2	Connector, 3 pin Buchanan
1	P3	Connector, 6 pin, Molex
5	R1,R39-42	Resistor, 10.0, 1% M.F., 1/4w
2	R2,R5	Resistor, 100, 1% M.F., 1/4w
2	R3-4	Resistor, 1.0k, 1%, M.F., 1/4w
24	R9,R11-12,R14-18,R20-24,R26-27, R29-32,R34-35,R37-38,R44-45	Resistor, 10.0k, 1% M.F., 1/4w
4	R6-7,R33,R36	Resistor, 221, 1% M.F., 1/4w
2	R8,R10	Resistor, 4.75k, 1% M.F., 1/4w
2	R13,R22	Resistor, 49.9, 1% M.F., 1/4w
1	R19	Resistor, 20.0k, 1% M.F., 1/4w
3	R25,R28,R43	Resistor, ,15.0k, 1% M.F., 1/4w
2	RP1-2	Pot, multiturn, 1M, Spec. 43P
1	RP3	Pot, multiturn, 10k, Spec. 43P
1	U1	I.C., driver, ULN2804
5	U2-5,U7	I.C., Dual op-amp, NE5532
1	U6	I.C., Switch, DG212
Misc. Parts		
5	------	8 pin dip I.C. sockets
1	------	16 pin dip I.C. socket
1	------	18 pin dip I.C. socket
1	------	Mono/SS P.C. Board



NOTES:
O=RESISTORS
⬭=CAPACITORS

MONO/S.S. BOARD LAYOUT


L UNBAL PGM R UNBAL
L UNBAL AUD R UNBAL
PROGRAM SILENCE SENSE THRESHOLD
AUDITION SILENCE SENSE THRESHOLD
MONO MASTER GAIN
MONO OUT
MONO MTR(+)
MONO MTR(-)
S1 PGM
S2 AUD
PROGRAM S.S.
AUDITION S.S.
PGM SELECT
AUD SELECT
SEL GND
METER (+)
METER (-)
NOTES:
1 OPTIONAL
2 U1= ULN2804
U2, U4, U5, U7= TL072
U3= NE5532N
RITV-20 MONO OUTPUT SILENCE SENSE
DRAWN BY: KEVIN SAXON
APPROVED BY: JDL
DATE: 9-3-86
AUTOGRAM
SCALE: NONE SECTION 5 PAGE 261

5.6 MONITOR OUTPUT BOARD

The MONITOR OUTPUT BOARD provides the interface between the Monitor Select output and the user provided external monitoring amplifier. The Left and Right Channel outputs from the Monitor section of the Monitor/Phones Select Board enter the Monitor Output Board on pins 13 and 14 respectively and are treated as a Mix Bus type signal. U1A and U4A are employed as summing amplifiers and provide about 1 volt rms to drive the Voltage Controlled Amplifiers (VCA), U2 and U5. The VCAs are operated in the attenuator mode only and will provide about 1 volt rms out of the current to voltage convertor stages U1B and U4B with the front panel Monitor Level control set at maximum and +8 dBm console output (the Monitor Select front panel switch must be selected to the active console output channel). A gain control is provided in each VCA output amplifier to allow calibration to another value if desired.

A muting system is provided by transistor Q-1 which is selectable between MUTE BUS 1 and/or MUTE BUS 2. If no Mute Bus is selected then the Monitor Output amplifier will not mute. The actual muting takes place when pin 10 of the VCAs is above 3 volts. Approximately 96dB of attenuation is provided by the mute system (relative to 1 volt rms input with front panel gain control at maximum).

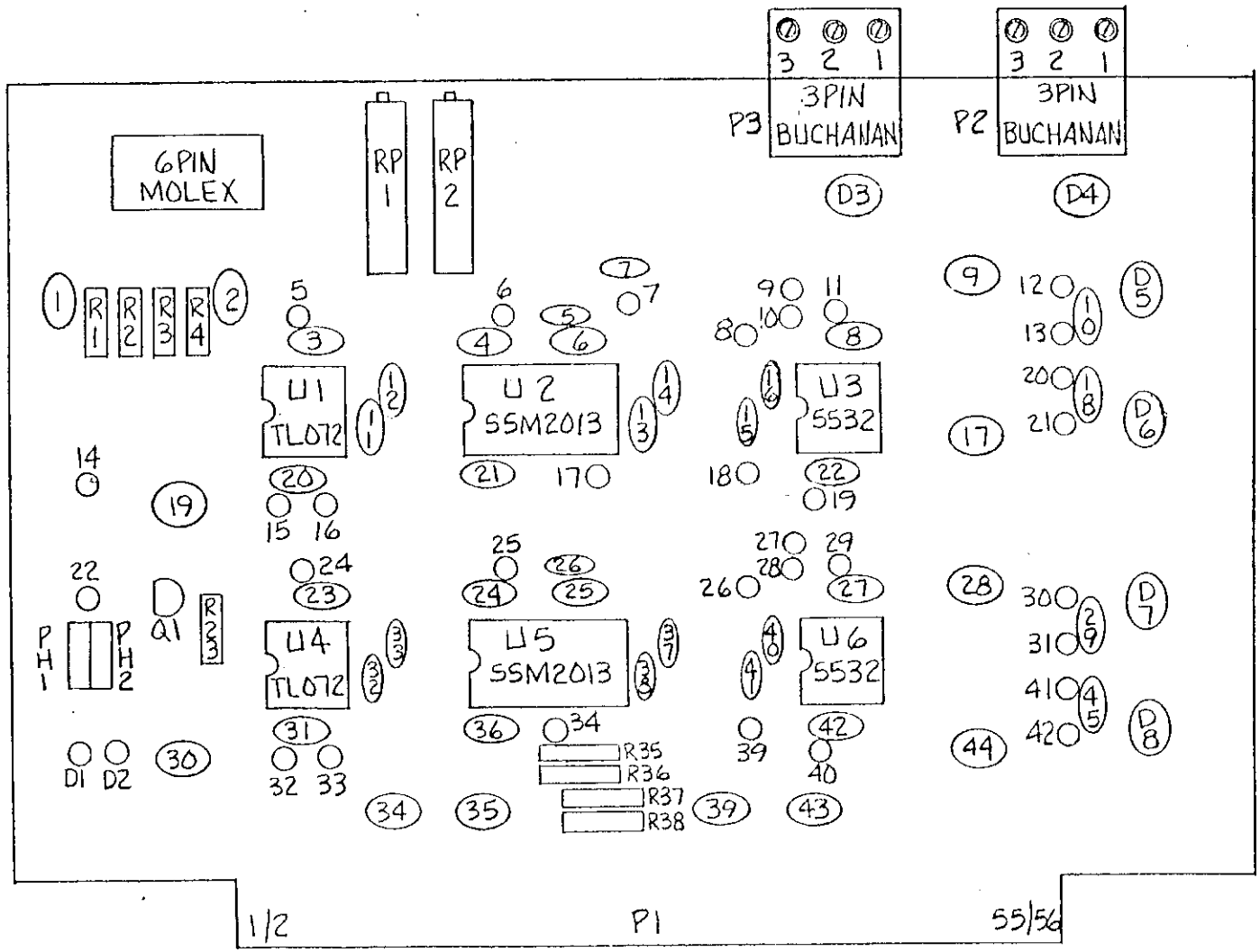
The output of the VCA current to voltage convertors is connected to the electronically balanced line driver stage (U3 and U6). The first half of the line driver is set up for about 6 dB gain while the second half is adjusted for unity gain. Since the line driver is operated on bi-polar 15.6 volts, the maximum output before clipping is about +26 dBm into a 600 ohm load. As shipped from the factory, the nominal output level is +8 dBm with the front panel gain control set to maximum and the selected console output channel adjusted for +8 dBm. The line amplifier output stages are protected by several metal oxide varistors as well as R.F. protection capacitors.

5.6.1
PARTS LIST FOR
MONITOR OUTPUT BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
2	C1-2	Capacitor, .1uf, 50v, disc
10	C3,C6,C8,C20,C22-23,C25,C27,C31,C42	Capacitor, 50pf, 50v, disc
2	C4,C24	Capacitor, .005uf, 50v, disc
2	C5,C26	Capacitor, .22uf, 35v, tant.
1	C7	Capacitor, 2.2uf, 35v, tant.
4	C9,C17,C28,C44 *Optional*	Capacitor, 470uf, 25v, elect.
4	C10,C18,C29,C45	Capacitor, .001uf, 50v, disc
12	C11-C16,C32-33,C37-38,C40-41	Capacitor, 1uf, 35v, tant.
2	C19,C30	Capacitor, 330uf, 6.3v, elect.
4	C34-35,C39,C43	Capacitor, 100uf, 25v, elect.
2	C21,C36	Capacitor, 150pf, 50v, disc
2	D1-2	Diode, 1N914
2	D3-4	M.O.V., V82ZA2
4	D5-D8	M.O.V., V39ZA1
2	P2-3	3 pin Buchanan Plug Assy.
1	P4	6 pin Connector, Molex
2	PH1-2	Header, Programming, 3 pin
2	PJ1-2	Jumper, Programming, Molex
1	Q1	Transistor, TIS93, PNP
9	R1,R3,R8,R18,R26,R35-39	Resistor, 10, 1% M.F., 1/4w
2	R2,R4	Resistor, 49.9k, 1% M.F., 1/4w
2	R5,R24	Resistor, 4.75k, 1% M.F., 1/4w
6	R6,R12,R21,R25,R30,R42	Resistor, 49.9, 1% M.F., 1/4w
16	R7,R9,R10,R13,R14-15,R19-20,R22-23, R27-28,R31-32,R40,R41	Resistor, 10.0k, 1% M.F., 1/4w
2	R16,R33	Resistor, 12.1k, 1% M.F., 1/4w
2	R11,R29	Resistor, 20.0k, 1% M.F., 1/4w
2	R17,R34	Resistor, 15.0k, 1% M.F., 1/4w
2	R43-44	Resistor, 3.65k, 1% M.F., 1/4w
2	RP1-2	Pot, multiturn, 10K, Spec. 43P
4	U1,U3,U4,U6	I.C., NE5532, Op-amp
2	U2,U5	I.C., SSM2013, VCA

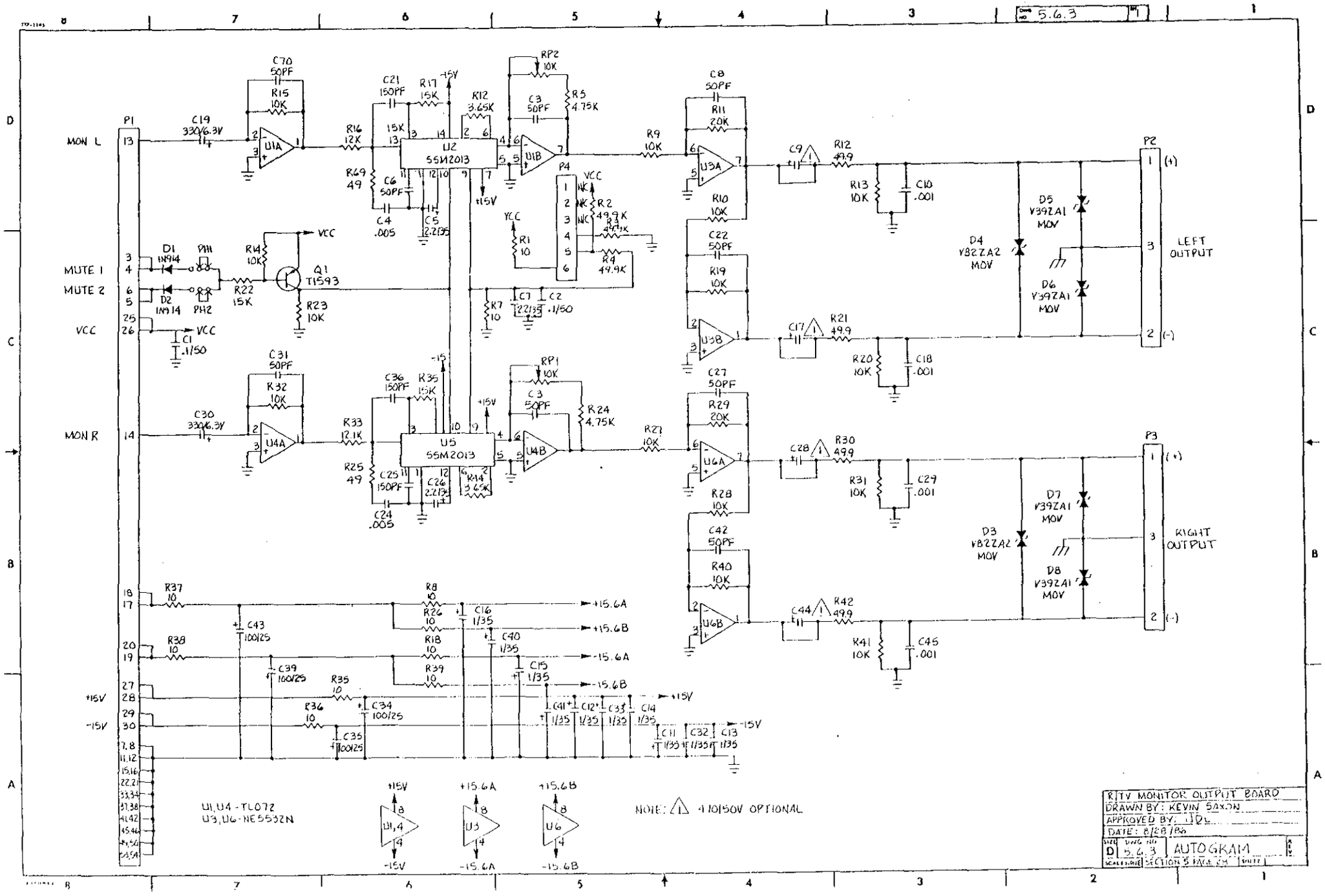
MISC. PARTS:

4	------	8 pin dip sockets
2	------	14 pin dip sockets
1	------	Monitor Output P.C. Board



NOTES:
O=RESISTORS
⬭=CAPACITORS

MONITOR OUTPUT BOARD LAYOUT
DWG NO. 5.6.2
SECTION 5 PAGE 27


5.6.3
P1
MON L
MON R
MUTE 1
MUTE 2
VCC
U1A
U2
SSM2013
U1B
U3A
U3B
U4A
U5
SSM2013
U4B
U6A
U6B
Q1
T1593
D1
1N914
D2
1N914
P2
P3
P4
LEFT OUTPUT
RIGHT OUTPUT
D4
VB2ZA2
MOV
D5
V39ZA1
MOV
D6
V39ZA1
MOV
D3
VB2ZA2
MOV
D7
V39ZA1
MOV
D8
V39ZA1
MOV
+15V
-15V
+15.6A
-15.6A
+15.6B
-15.6B
U1,U4 - TL072
U3,U6 - NE5532N
NOTE: 1 4.10|50V OPTIONAL
R/TV MONITOR OUTPUT BOARD
DRAWN BY: KEVIN SAXON
APPROVED BY: JDL
DATE: 8/28/86
AUTOGRAM
SECTION 5 PAGE 6.3

5.7 MONITOR/PHONES SELECT BOARD

The MONITOR/PHONES SELECT BOARD is used to select the audio signals to be sent to the MONITOR OUTPUT BOARD and the headphone amplifier portion of the PHONES/CUE OUTPUT BOARD. The user selects the desired source via two front panel mounted ganged switch assemblies which are connected to the MONITOR/PHONES SELECT BOARD by means of ten conductor ribbon cables.

The sources available for monitoring are: PROGRAM (the left and right channel Program outputs of the console), AUDITION (the left and right channel Audition outputs of the console), AIR (a universal input which may be connected to the station modulation monitor or a tuner for monitoring the "Air" signal),and EXTERNAL (another universal input which can be connected to whatever source is desired).

U11-U14 are used as balanced buffer amplifiers for Program and Audition to isolate the electronic switches from the actual console output. For simplicity only the left channel program buffer will be discussed since all are identical.

The balanced output of the left channel program amplifier is connected via the Mother Board to pins 55 (+) and 56 (-) of the board edge connector. Resistors R102, R104, R105, R108, and R109 comprise a balanced high-impedance "H" pad which essentially bridges the console output. C53 and C55 provide RFI protection.

U14A is used as an electronic transformer and is coupled to switch driver amplifier U14B by means of calibration pot RP8. U9C and U10C are electronic switches for Program Left and feed the left phones bus (PhL) and the left monitor bus (MonL) respectively. The switches are coupled to the buses through 10k ohm resistors.

The External and Air inputs are essentially the same as the Program and Audition inputs except the connections are made with miniature pluggable screw-type connectors and have various programming options available. First a programmable jumper allows selection of a precision 600 ohm termination resistor if required. Next, the input range can be set to -10 dBm, 0 dBm or +10 dBm by means of two additional programmable jumpers. If both jumpers are disconnected, the input is -10 dBm. The level is further adjustable with a top accessable
trimmer pot.

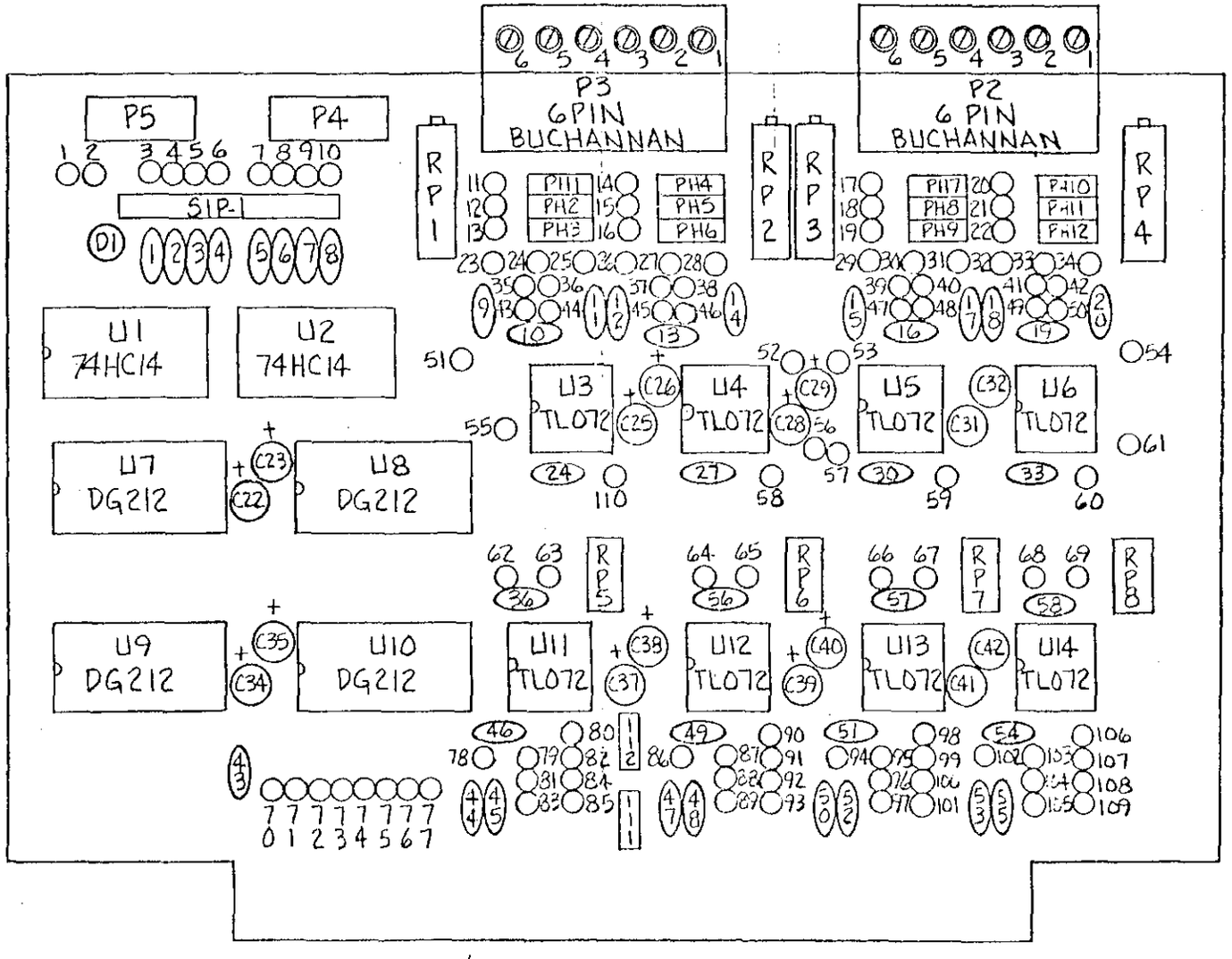
The front panel switches provide a continuous closure against Ground* (protected ground) when a button is selected. This signal is buffered by U1 for the Phone Selects and U2 for the Monitor Selects. U1 and U2 are Schmitt-trigger inverters and drive the digital control inputs of the various analog switches directly.

5.7.1
PARTS LIST FOR
MONITOR/PHONES SELECT BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
8	C1-8	Capacitor, .01uf, 50v, disk
16	C9,C11-12,C14-15,C17-18,C20,C44 C45,C47-48,C50,C52-53,C55	Capacitor, 200pf, 50v, disk
16	C10,C13,C16,C19,C24,C27,C30,C33,C36, C46,C49,C51,C54,C56-58	Capacitor, 50pf, 50v, disk
2	C21,C43	Capacitor, .1uf, 50v, disk
16	C22-23,C25-26,C28-29,C31-32,C34,C37-42	Capacitor, .1uf, 35v, tant.
1	D1	Diode, Tranzorb, P6KE6.8
2	P2-3	6 pin Buchanan Plug Assy.
2	P4-5	10 pin Rib. Header
12	PH1-12	Headers, Programming, 3 pin
12	PJ1-12	Jumpers, Programming, Molex
4	R1-2,R111-112	Resistor, , 10, 1%, M.F., 1/4w
8	R3-10	Resistor, 100, 1%, M.F.,1/4w
4	R11,R14,R17,R20	Resistor, 604, 1%, M.F., 1/4w
4	R12,R15,R18,R21	Resistor, 1.62k, 1%, M.F., 1/4w
4	R13,R16,R19,R22	Resistor, 332, 1%, M.F., 1/4w
36	R23,R25-26,R28-29,R31-32,R34,R43-50, R71,R73,R75,R77,R79,R82-83,R85,R87, R89,R91,R93,R95,R97,R99,R101,R103,R105, R107,R109	Resistor, 10k, 1%, M.F., 1/4w
4	R24,R27,R30,R33	Resistor, 100k, 1%, M.F., 1/4w
16	R35-42,R81,R84,R88,R92,R96,R100,R104, R108	Resistor, 2.21k, 1%, M.F., 1/4w
8	R51-54,R80,R90,R98,R106	Resistor, 1k, 1%, M.F., 1/4w
12	R55-57,R61,R63,R65,R67,R69-70,R72,R74, R76	Resistor, 15K, 1%, M.F., 1/4w
8	R58-60,R62,R64,R66,R68,R110	Resistor, 30.1k, 1%, M.F., 1/4w
4	R78,R86,R94,R102	Resistor, 383, 1%, M.F., 1/4w
4	RP1-4	Pot, multiturn, 10k, Spec. 43P
4	RP5-8	Pot, multiturn, 10k, Spec. 64Y
2	U1-2	I.C., 74HC14, CMOS INV, S.T.
8	U3-6,U11-14	I.C., NE5532N, Quad Op-Amp
4	U7-10	I.C., DG212CJ, Analog Switch

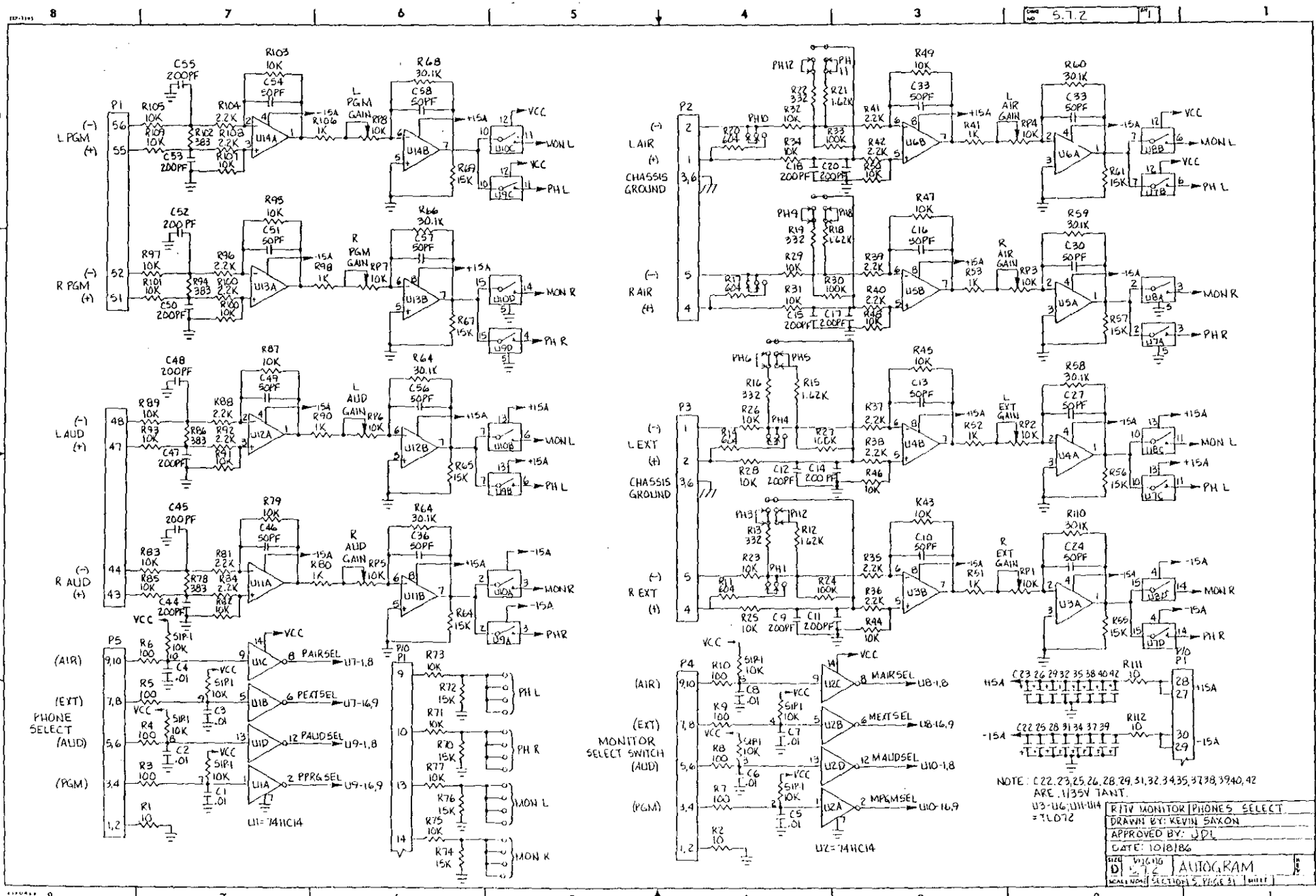
Misc. Parts:

8	-------	8 pin dip sockets
2	-------	14 pin dip sockets
4	-------	16 pin dip sockets
1	-------	Mon/Ph Sel P.C. Board



NOTES:
O=RESISTORS
⬭=CAPACITORS

MONITOR/PHONES SELECT BOARD LAYOUT
DWG NO 5.7.2
SECTION 5, PAGE 30


L PGM (-)
L PGM (+)
R PGM (-)
R PGM (+)
L AUD (-)
L AUD (+)
R AUD (-)
R AUD (+)
L AIR (-)
L AIR (+)
R AIR (-)
R AIR (+)
L EXT (-)
L EXT (+)
R EXT (-)
R EXT (+)
CHASSIS GROUND
PHONE SELECT
MONITOR SELECT SWITCH
(AIR)
(EXT)
(AUD)
(PGM)
MON L
MON R
PH L
PH R
U1= 74HC14
U2= 74HC14
NOTE: C22,23,25,26,28,29,31,32,34,35,37,38,39,40,42 ARE .1/35V TANT.
U3-U6, U11-U14 = TL072
R17 MONITOR PHONES SELECT
DRAWN BY: KEVIN SAXON
APPROVED BY: JDL
DATE: 10/8/86
AUTOGRAM
SECTION 5, PAGE 31

5.8 HEADPHONE/CUE OUTPUT BOARD

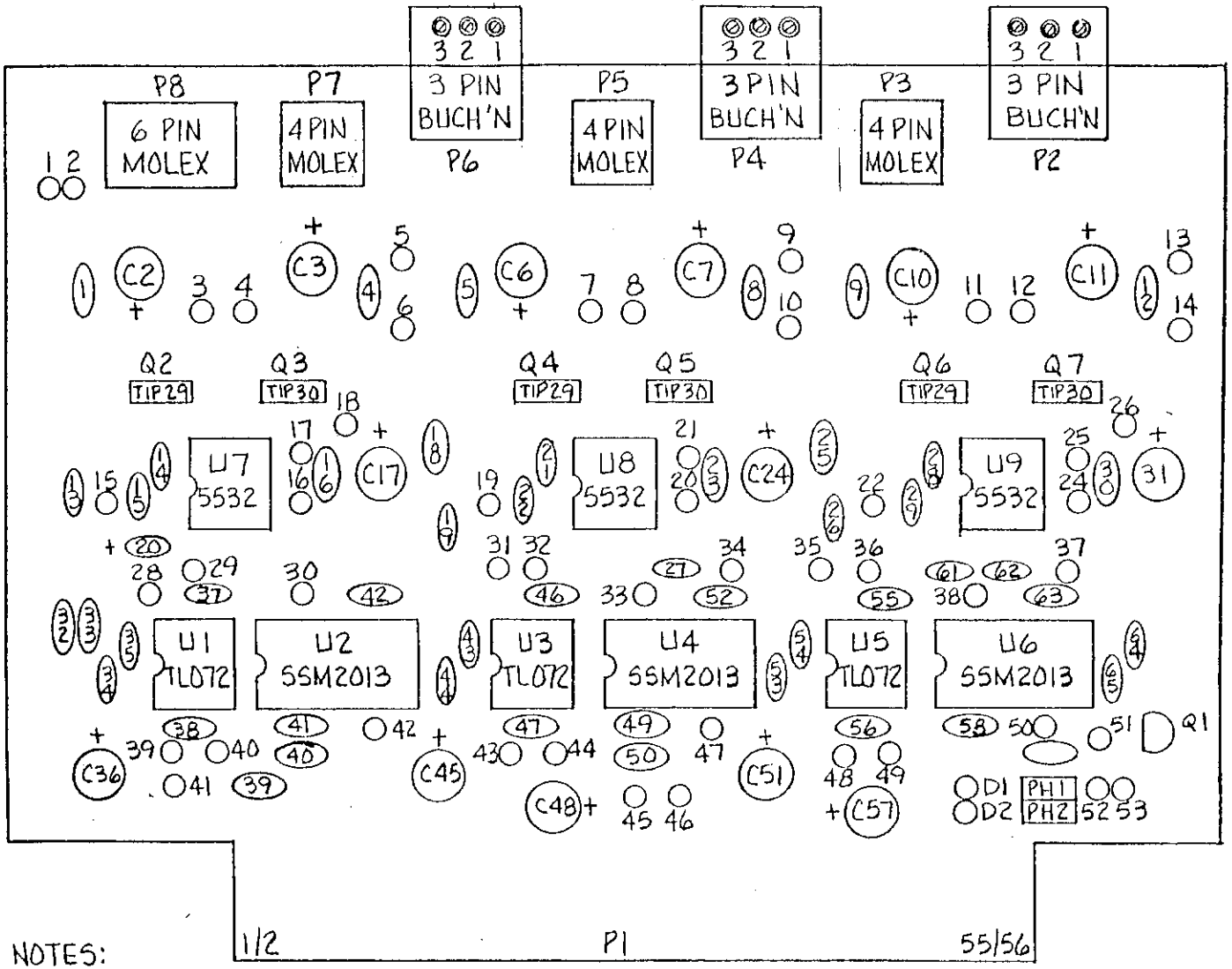
The HEADPHONE/CUE OUTPUT BOARD consists of three similar amplifiers. Two sections are used for the left and right channel headphones while the third provides the cue monitoring. The major difference in the amplifiers is that provisions are made to allow muting of the cue circuit. The Cue-Mix Bus is connected through pins 31-32 of the board edge connector to the summing input of U5A. The input amplifier operates at unity gain to provide approximately one volt rms output with a properly calibrated console input channel selected to "Cue". Following the input amplifier is the Voltage Controlled Amplifier (VCA) which is connected through P8 to the front panel Cue Gain Control. The VCA is operated in the attenuator mode only and will source sufficient current to provide one volt rms output from the current to voltage convertor U5B with the front panel control at maximum. The front panel control is connected to supply 5 volts dc to the VCA control port divider network when the pot is turned Off which allows for about 96 dB attenuation. The Cue Amplifier may be muted by either or both Mute buses and is selected by means of programming jumpers PJ-1 and PJ-2. If both jumpers are OFF the cue monitor will not be muted. The selected Mute signal is connected to Q1 which acts as an inverter to drive the Muting port of the VCA.

Input signals for the Headphone Amplifiers are provided by the Monitor/Phones Select Board and enter the Headphone/Cue Board on pin 9 for the Left Channel and pin 10 for the Right Channel. The Left and Right Channel inputs are treated as mix bus signals and are coupled to the summing nodes of ICs U3A and U1A. The output of the summing amplifiers connects to the respective VCAs which are controlled by the front panel Headphone gain control. All levels and voltages are similar to the Cue Amplifier except there is NO muting for the Headphone Amplifiers.

Each VCA output amplifier is connected to an independent power amplifier. The driver I.C.s (U7,U8,and U9) provide sufficient voltage gain for the various current booster transistors. While all I.C.s obtain their power from the main bi-polar 15 volt supply bus, the output booster transistors are powered by an independent bi-polar 12 volt supply and are mutually decoupled to reduce crosstalk. While rated at 2 watts nominal, the power amplifiers will produce about 4 watts rms.

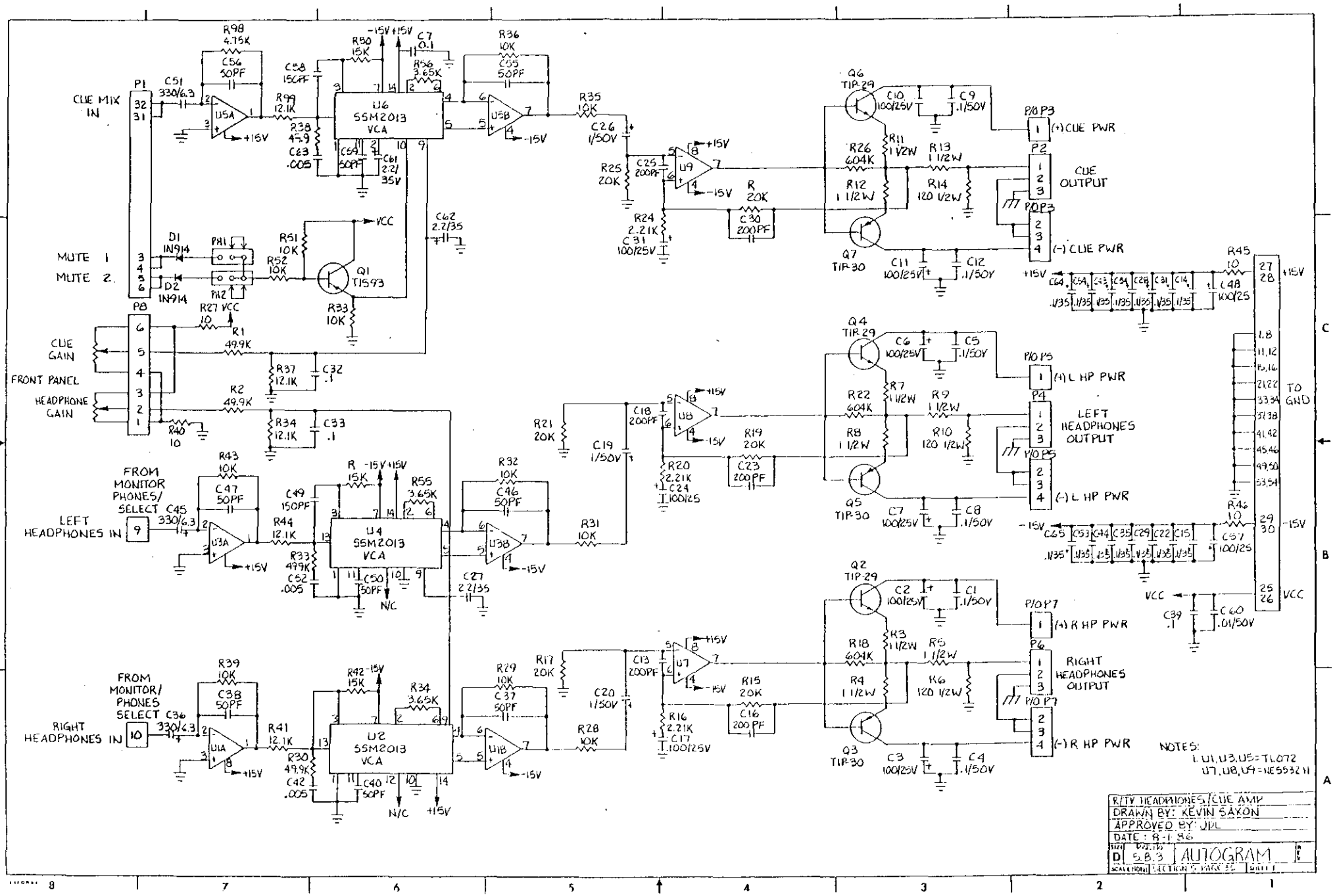
5.8.1.
PARTS LIST FOR
HEADPHONE/CUE BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
9	C1,C4,C5,C8,C9,C12,C32,C33,C34	Capacitor, .1uf, 50v, disc
11	C2-3,C6-7,C10,C11,C17,C24,C31,C48,C57	Capacitor, 100uf, 25v, elect.
6	C13,C16,C18,C23,C25,C30	Capacitor, 200pf, 50v, disc
14	C14-15,C21-22,C28-29,C34-35,C43-44, C53-54,C64-65	Capacitor, 1uf, 35v, tant.
3	C19-20,C26	Capacitor, 1uf, 50v, elect.
3	C27,C61-62	Capacitor, 2.2uf, 35V, tant.
3	C36,C45,C51	Capacitor, 330uf, 6.3v, elect.
9	C37-38,C40,C46-47,C50,C55-56,C59	Capacitor, 50pf, 50v, disc
3	C41,C49,C58	Capacitor, 150pf, 50v, disc
3	C42,C52,C63	Capacitor, .005, 50v, disc
1	C60	Capacitor, .01uf, 50v, disc
2	D1-2	Diode, 1N914
3	P2-3,P6	3 pin Buchanan Plug Assy.
3	P3,P5,P7	Connector, 4 pin Molex
1	P8	Connector, 6 pin, Molex
2	PH1-2	3 pin Programming Header
2	PJ1-2	Programming Jumper, Molex
1	Q1	Transistor, TIS-93, PNP
3	Q2,Q4,Q6	Transistor, TIP-29, NPN
3	Q3,Q5,Q7	Transistor, TIP-30, PNP
2	R1-2	Resistor, 49.9K, 1% M.F., 1/4w
9	R3-5,R7-9,R11-R13	Resistor, 1, 5% C.F., 1/2 w
3	R6,R10,R14	Resistor, 120, 5%C.F., 1/2 w
6	R15,R17,R19,R21,R23,R25	Resistor, 20.0k, 1% M.F., 1/4w
3	R16,R20,R24	Resistor, 2.21K, 1% M.F., 1/4w
3	R18,R22,R26	Resistor, 604, 1% M.F., 1/4w
4	R27,R40,R45,R46	Resistor, 10.0, 1% M.F., 1/4w
14	R28-29,R31-32,R35-36,R39,R43,R48, R52-53	Resistor, 10.0k, 1% M.F., 1/4w
3	R30,R33,R38	Resistor, 49.9, 1% M.F., 1/4w
5	R34,R37,R41,R44,R49	Resistor, 12.1k, 1% M.F., 1/4w
3	R42,R47,R50	Resistor, 15.0k, 1% M.F., 1/4w
3	R54-56	Resistor, 3.65k, 1% M.F., 1/4w
6	U1,U3,U5,U7,U8,U9	I.C.,NE5532, dual Op-amp
3	U2,U4,U6	I.C.,SSM2013, VCA
MISC. PARTS:		
6	------	8 pin dip sockets
3	------	14 pin dip sockets
3	------	3 pin transistor sockets,Molex
3	------	Autogram RTV Trans. heat sinks
3	------	1 inch stand off
6	------	3/8 inch #4-40 screws
3	------	1/4 inch #4-40 nuts
6	------	Trans Mtg. hdwr and insulators
6	------	#4 lockwashers
1	------	Phone/Cue P.C. Board



NOTES:
O=RESISTORS
⬭=CAPACITORS
R54-R57 LOCATED ON BOTTOM OF BOARD.

PHONES/CUE BOARD LAYOUT
DWG NO 5.8.2
SECTION 5, PAGE 35


CUE MIX IN
MUTE 1
MUTE 2
CUE GAIN
FRONT PANEL
HEADPHONE GAIN
FROM MONITOR PHONES/ SELECT
LEFT HEADPHONES IN
FROM MONITOR/ PHONES SELECT
RIGHT HEADPHONES IN
U6 SSM2013 VCA
U4 SSM2013 VCA
U2 SSM2013 VCA
Q1 TIS93
Q6 TIP29
Q7 TIP30
Q4 TIP29
Q5 TIP30
Q2 TIP29
Q3 TIP30
P/O P3
(+) CUE PWR
CUE OUTPUT
(-) CUE PWR
P/O P5
(+) L HP PWR
LEFT HEADPHONES OUTPUT
(-) L HP PWR
P/O P7
(+) R HP PWR
RIGHT HEADPHONES OUTPUT
(-) R HP PWR
TO GND
VCC
N/C
NOTES:
1. U1, U3, U5 = TL072
U7, U8, U9 = NE5532 N
R/TV HEADPHONES/CUE AMP
DRAWN BY: KEVIN SAXON
APPROVED BY: JPL
DATE: 8-1-86
AUTOGRAM

5.9 MAIN POWER SUPPLY

All required voltages for the R/TV Series Consoles are supplied by the self-contained MAIN POWER SUPPLY. Power for the optional AUTOCLOCK may be supplied by the Console or by an external wall mounted power pack if it is desired to power-down the Console for long periods. The MAIN POWER SUPPLY may be operated from 120 V.A.C. 50/60 hz (normal configuration) or from 240 V.A.C. 50/60 hz with internal wiring changes. Input voltage should be maintained between 110 and 130 volts or between 230 and 250 volts (if connected for 240 volt operation) for best performance. All output voltages are fuse protected an there are convenient LED indicators to show status. The A.C. input is connected through a three pin international (IEC) type connector and associated RFI/EMI filter. The input is protected by three Metal Oxide Varistors (M.O.V.s) which are connected to provide both line to line and common mode protection. All rectifiers and main filter capacitors are mounted on a single large printed circuit board which uses ground plane techniques to provide good grounding.

All program audio boards in the R/TV consoles are powered by either bi-polar 15 volts or bi-polar 15.6 volts or a combination of both, therefore a tapped transformer winding is used for these supplies. Full wave bridge rectification is used for both voltage levels with high capacitor values for good filtering. The bi-polar 15 volt supply employs 78T15 and 7915 type linear voltage regulators which are mounted on large heat sinks attached to the back of the console. The bi-polar 15.6 volt supply uses 7815 and 7915 regulators, however a 1N4004 diode is added in the ground return to elevate the voltage .6 volt. Capacitors are added on the input and output terminals of all regulators for stability.

Voltage for the Headphone and Cue Power Amplifiers is provided by an unregulated bi-polar 12 volt supply. Each amplifier is isolated by 1 ohm resistors and decoupled with 1000 uf capacitors for both the positive and negative circuits.

An adjustable regulated 18 to 24 volt single ended supply is used to furnish voltage for the front panel and meter lamps. This supply uses a LM350K type regulator which is rated at 3 amps.

The digital portion of the R/TV console is powered by a battery backed 5 volt system. A full wave rectifier/filter provides about 9 volts which is connected to a 7805 regulator. The ground return for the 7805 is connected through a 1N4004 diode which raises the regulated output voltage to 5.6 volts. A diode mixing circuit is used to create the 5 volt VCC and in conjunction with four NICAD AA batteries, produce the 5 volt VCB. Transistors Q1 and Q2 as well as one section of the Darlington Array (U1) are used as a voltage controlled switch which will disconnect the battery voltage after about one minute of power outage. The batteries's main function is to provide short-term power backup to the Channel Boards. The automatic disconnection feature is used to prevent excessive drain on the batteries. If primary power is interrupted longer than 1 minute, all Channel Boards will reset. A manual reset pushbutton is also provided.

Two relays are contained within the Power Supply which provide isolated contacts for general use as well two switched 120/240 V.A.C. sockets for

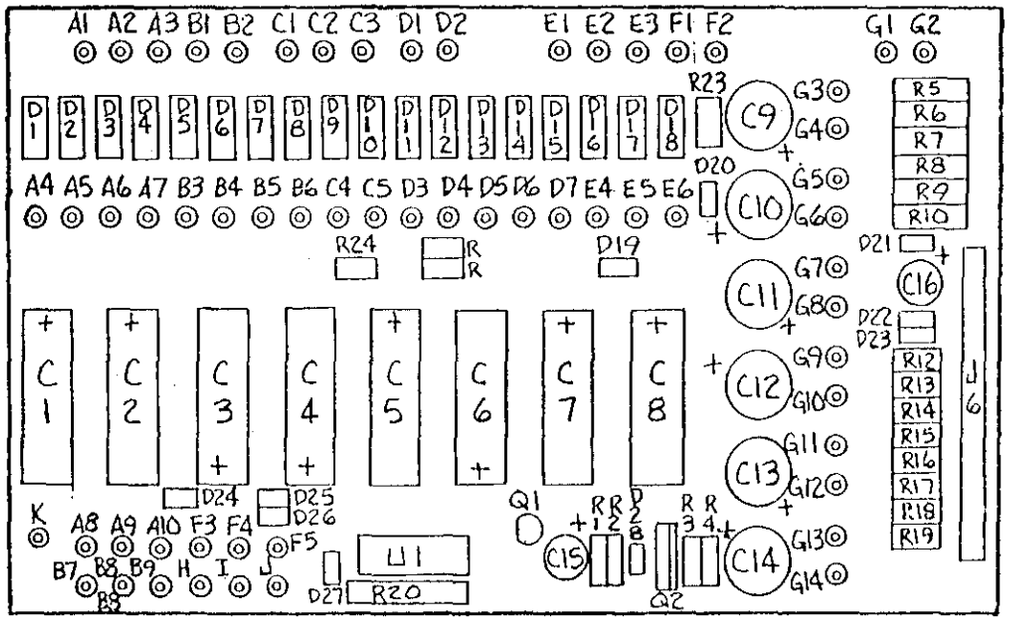
connection to "ON AIR" warning lights (60 watt maximum each). The relays are driven by independent sections of the Darlington Array (U1) which receive control from the two Mute Buses. Connections for the "dry" contacts (3 amp maximum) are on a barrier type terminal strip and both normally open and normally closed contacts are available.

The remaining sections of U1 are used to provide processing for the tertiary bus which activates the "Count-Down" feature of the optional AUTOCLOCK. Diodes are included on the Power Supply Board to allow connecting an external "Top of Hour" pulse to synchronize the AUTOCLOCK to a user provided time reference (WWV Receiver, Network, etc.).

All external connections from the Console to the Main Power Supply are made through Molex connectors which allow for easy exchange of the power supply chassis in the event of failure.

5.9.1
PARTS LIST FOR
POWER SUPPLY BOARD
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
8	C1-8	Capacitor,2500uf,35v,Elect.
6	C9-14	Capacitor,1000uf,35v, Elect.
2	C15,C16	Capacitor,100uf,25v,Elect.
18	D1-18	Diode,MR501
10	D19-28	Diode,1N4004
1	J6	Connector,24 Pin, Molex
1	Q1	Transistor,TIS-92,NPN
1	Q2	Transistor,TIP-30,PNP
1	R1	Resistor,1 Meg,1/4w ,5%,C.F.
2	R2,R4	Resistor,1.00K,1/4W,1%,M.F.
2	R3,R22	Resistor,221,1/4W,1%,M.F.
6	R5-10	Resistor,1,1W,5%,W.W.
1	R11	Resistor,10.0K,1/4W,1%,M.F.
1	R12	Resistor,332,1/4W,1%,M.F.
6	R13-18	Resistor,1.62K,1/4W,1%,M.F.
2	R19,R21	Resistor,2.00K,1/4W,1%,M.F.
1	R20	Resistor SIP,1k
1	R23	Resistor,220,1/2W,5%,C.F.
1	R24	Resistor,2.74K,1/4W,1%,M.F.
1	U1	I.C.,ULN2804,Darlington
Misc Parts:		
59	------	Sm. Solder Term., 12371-2-05
1	------	Lg. Solder Term., 1304-B4
1	------	R/TV PWR BD P.C. Board
1	------	18 pin dip socket



POWER SUPPLY BOARD LAYOUT

NOTES:
1. ◎=BOARD TERMINAL

DWG NO. 5.9.3
SECTION 5 PAGE 40

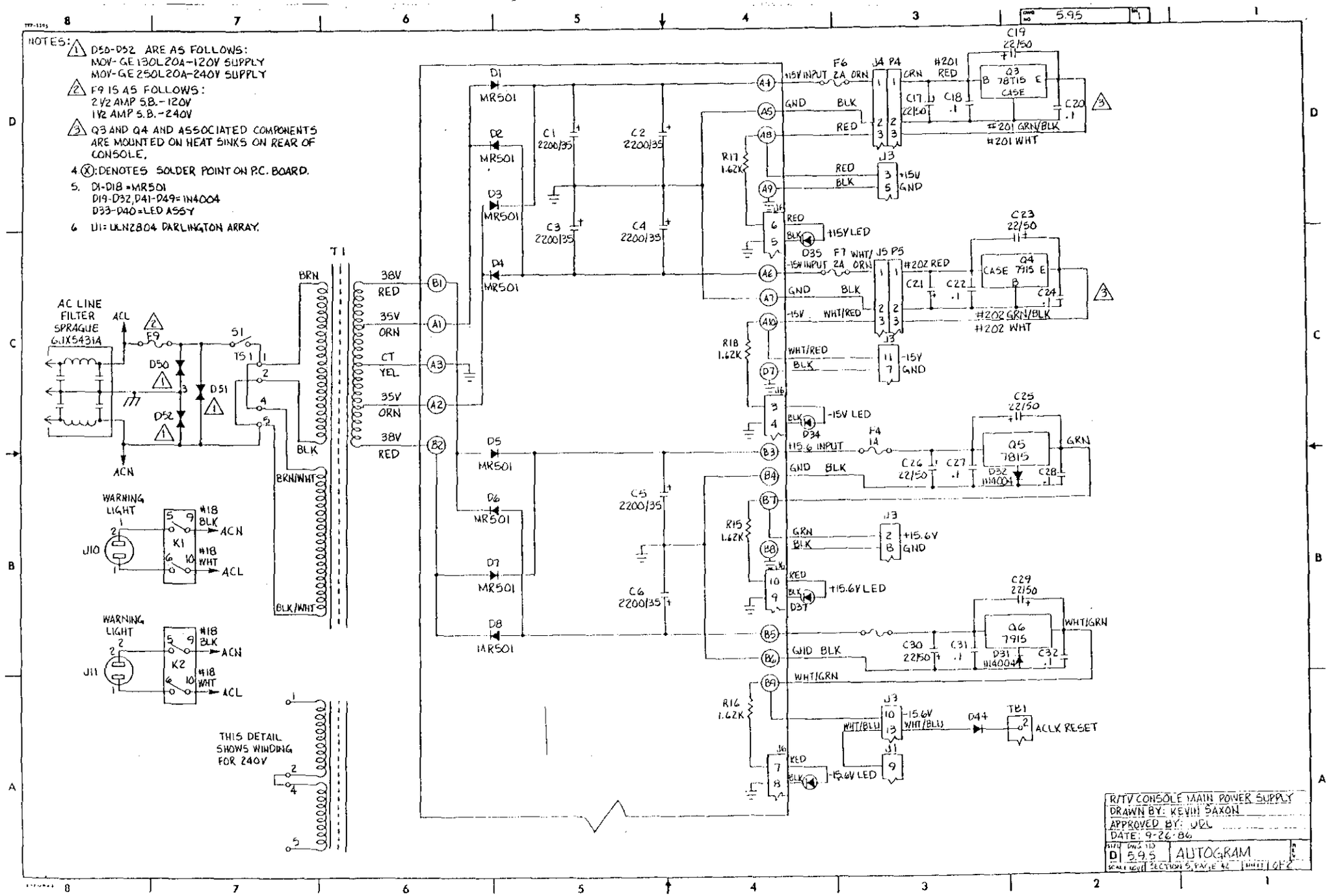
5.9.4
PARTS LIST FOR
POWER SUPPLY CHASSIS
R/TV AUDIO CONSOLE

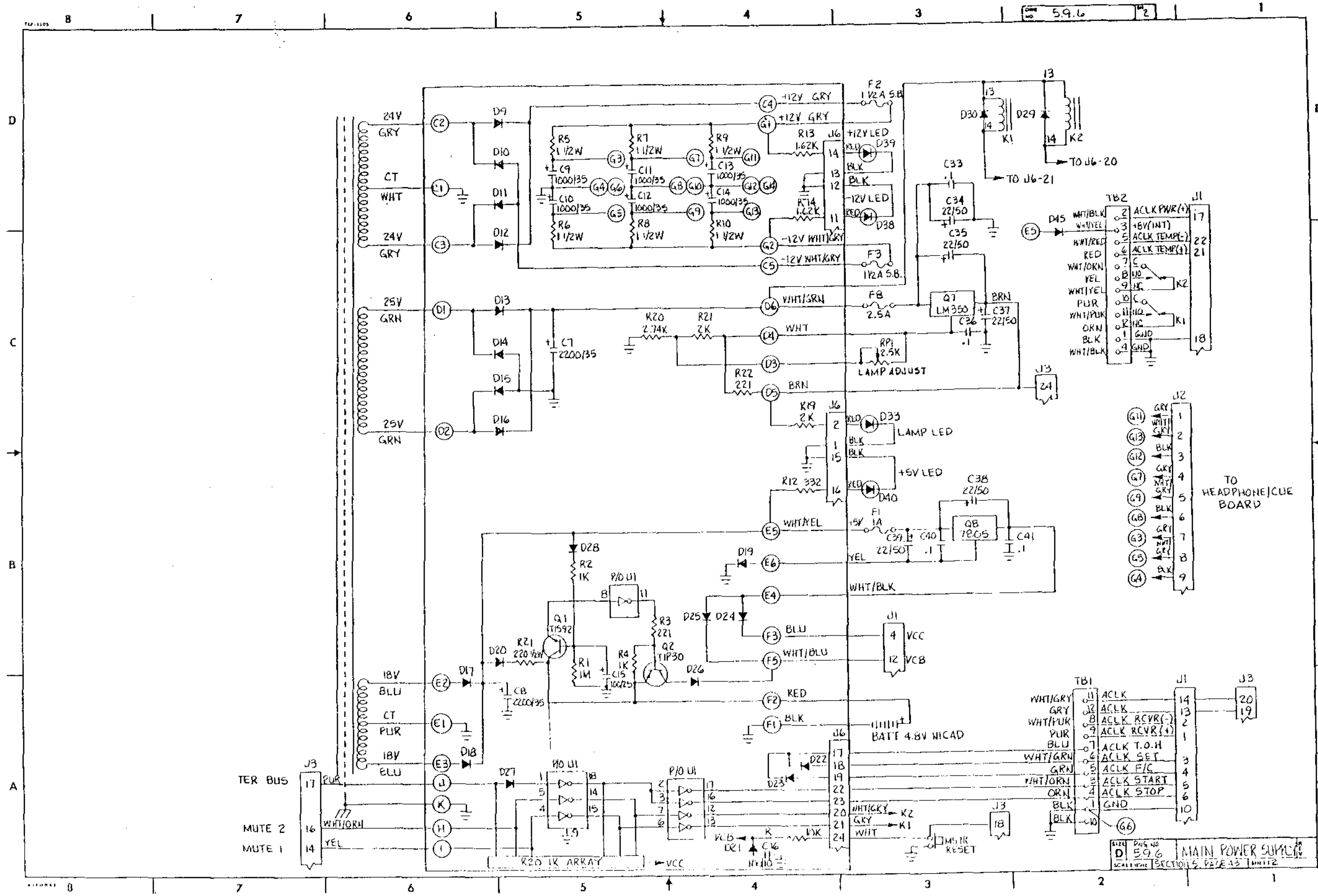
QTY	REFERENCE DESIGNATOR	DESCRIPTION
4	B1-4	Battery,AA,ni-cad
13	C17,C19,C21,C23,C25,C30,C34-35,C37-39	Capacitor,22UF,50V,Elect.
12	C18,C20,C22,C24,C27-28,C31-33,C36, C40-41	Capacitor,.1UF,50V,Disc
10	D29-32,D44-49	Diode,1N4004
8	D33-40	LED Assy, LH-SOLR-322
3	D50-52	MOV,V130LA20A, or V250LA20A
3	F1,F4,F5	Fuse,1 amp
2	F2-3	Fuse,1 1/2 amp,Slo-Blo
2	F6-7	Fuse,2 amp
2	F8-9	Fuse,2 1/2 amp,Slo-Blo
	NOTE: F9 is 1 1/2 amp Slo-Blo when used with 240v supply.	
1	FLTR-1	Filter, 6JX5431A,Sprague
2	J1,J3	Jack,24 pin female,Molex
1	J2	Jack,9pin female, Molex
1	J4	Jack,3pin,male,Molex
1	J5	Jack,3pin,female,Mo lex
2	K1-2	Relay,4PDT,24V,RY4S-U,IDEC
1	P4	Plug,3pin,female,Mo lex
1	P5	Plug,3pin,male,Molex
1	Q3	Regulator,UA78T15K,+15 V,3 amp
1	Q5	Regulator,UA7815K,+15 V
2	Q4,Q6	Regulator,UA7915K,-15 V
1	Q7	Regulator,LM350K, adj.
1	Q8	Regulator,UA7805K,+5 V.
1	RP-1	Potentiometer, 2.5K
1	S1	Switch,SPST,110B,Carling
1	S2	Switch,pushbutton,44112011
2	SO1-2	Socket,AC,2R2-1,Cinch
2	SO3-4	Socket,Relay,SY4S-51,IDEC
1	T1	Transformer,020-0843,Leightner
2	TB1-2	Terminal Strip,Barrier,12 pin
	TB3	Terminal Strip, 5pin, Smith
3	TB4-6	Terminal Strip, 2pin,Smith

Misc. Parts:

1	Autogram RTV Power Supply Chassis
1	Autogram RTV AC Receptacle Mounting Plate
2	Wakefield 641A Heatsinks
6	1 inch stand-off
6	Keystone TO-3 Transistor Sockets
1	Large Solder Lug
9	Fuse Sockets
1	AA battery holder for 4 cells

Misc. Hardware


NOTES:
1. D50-D52 ARE AS FOLLOWS: MOV-GE130L20A-120V SUPPLY MOV-GE250L20A-240V SUPPLY
2. F9 IS AS FOLLOWS: 2½ AMP S.B.-120V 1½ AMP S.B.-240V
3. Q3 AND Q4 AND ASSOCIATED COMPONENTS ARE MOUNTED ON HEAT SINKS ON REAR OF CONSOLE.
4. (X): DENOTES SOLDER POINT ON P.C. BOARD.
5. D1-D18 = MR501 D19-D32, D41-D49 = IN4004 D33-D40 = LED ASSY
6. U1: ULN2804 DARLINGTON ARRAY.
AC LINE FILTER SPRAGUE 6.1X5431A
ACL
ACN
F9
S1
TS1
D50
D51
D52
T1
BRN
BLK
BRN/WHT
BLK/WHT
38V RED
35V ORN
CT YEL
35V ORN
38V RED
WARNING LIGHT
J10
K1
#18 BLK
#18 WHT
WARNING LIGHT
J11
K2
THIS DETAIL SHOWS WINDING FOR 240V
D1 MR501
D2 MR501
D3 MR501
D4 MR501
D5 MR501
D6 MR501
D7 MR501
D8 MR501
C1 2200/35
C2 2200/35
C3 2200/35
C4 2200/35
C5 2200/35
C6 2200/35
+15V INPUT
F6 2A ORN
J4 P4
#201 RED
GND BLK
RED
#201 GRN/BLK
#201 WHT
C17 22/50
C18 .1
C19 22/50
Q3 7815 CASE
C20 .1
R17 1.62K
J3
+15V GND
RED BLK
+15V LED
D35
F7 WHT/ 2A ORN
J5 P5
#202 RED
-15V INPUT
GND BLK
-15V WHT/RED
#202 GRN/BLK
#202 WHT
C21
C22 .1
C23 22/50
Q4 7915 CASE
C24 .1
R18 1.62K
WHT/RED BLK
-15V GND
-15V LED
D34
+15.6 INPUT
F4 1A
GND BLK
C26 22/50
C27 .1
C25 22/50
Q5 7815
D32 IN4004
C28 .1
GRN
R15 1.62K
GRN BLK
+15.6V GND
+15.6V LED
D37
C29 22/50
Q6 7915
D31 IN4004
C30 22/50
C31 .1
C32 .1
WHT/GRN
GND BLK
R16 1.62K
WHT/BLU
-15.6V WHT/BLU
D44
TB1
ACLK RESET
-15.6V LED
R/TV CONSOLE MAIN POWER SUPPLY
DRAWN BY: KEVIN SAXON
APPROVED BY: UCL
DATE: 9-26-84
D 5.9.5 AUTOGRAM



MAIN POWER SUPPLY
DWG NO 59.6
SECTION 5, PAGE 43
TER BUS
MUTE 2
MUTE 1
J3
24V GRY
CT WHT
25V GRN
18V BLU
CT PUR
18V BLU
+12V GRY
-12V WHT/GRY
F2 1 1/2A S.B.
F3 1 1/2A S.B.
R5 1 1/2W
R6 1 1/2W
R7 1 1/2W
R8 1 1/2W
R9 1 1/2W
R10 1 1/2W
C9 1000/35
C10 1000/35
C11 1000/35
C12 1000/35
C13 1000/35
C14 1000/35
R13 1.62K
R14 1.62K
+12V LED
-12V LED
D39
D38
C7 2200/35
R20 2.74K
R21 2K
R22 221
WHT/GRN
F8 2.5A
Q7 LM350
C33
C34 22/50
C35 22/50
C36 .1
C37 22/50
RP1 2.5K
LAMP ADJUST
BRN
R19 2K
LAMP LED
D33
+5V LED
D40
R12 332
C38 22/50
Q8 7805
F1 1A
C39 22/50
C40 .1
C41 .1
WHT/YEL
YEL
WHT/BLK
D19
D28
R2 1K
P/O U1
Q1 TIP32
R21 220 1/2W
R1 1M
R4 1K
C15 100/25
R3 221
Q2 TIP30
D20
D24
D25
D26
BLU
WHT/BLU
J1 4 VCC
12 VCB
RED
BLK
BATT 4.8V NICAD
C8 2200/35
D17
D18
D27
R20 1K ARRAY
VCC
VCB
D21
C16
10K
D22
D23
WHT/GRY K2
GRY K1
WHT
MSTR RESET
K1
K2
D29
D30
TO J6-20
TO J6-21
TB2
J1
D45
ACLK PWR(+)
+5V(INT)
ACLK TEMP(-)
ACLK TEMP(+)
WHT/BLK
WHT/YEL
WHT/RED
RED
WHT/ORN
YEL
PUR
WHT/PUR
ORN
BLK
J2
TO HEADPHONE/CUE BOARD
TB1
ACLK
ACLK RCVR(-)
ACLK RCVR(+)
ACLK T.O.H
ACLK SET
ACLK F/C
ACLK START
ACLK STOP
GND
WHT/GRY
GRY
WHT/PUR
PUR
WHT/GRN
GRN
WHT/ORN
ORN

5.10 MOTHER BOARDS

The Mother Boards in the R/TV console are used to interconnect audio and digital signals as well as furnishing power to the various plug-in boards. When installed in the console card-cage, the Mother boards are jumpered together making one very large Mother Board assembly.

The four types of Mother Boards used in the R/TV Consoles are:

MB-1	Interfaces Microphone Pre-amps and Channels 1-8 In R/TV-20 ONLY
MB-2	Interfaces Channels 9-20 and Microprocessor Board in R/TV-20 Interfaces Channels 1-12 and Microprocessor Board in R/TV-12
MB-3	Interfaces all Output boards and the Power Supply R/TV-20 & 12
MB-4	Interfaces Microphone Pre-amps in R/TV-12 only

5.10.1 Mother Board 1 (MB-1)

Mother Board 1 contains ten 56 pin edge connectors for connecting the Microphone Pre-amplifiers and Channel Boards 1-8 in the R/TV-20 console only. Two 74HC138 decoder I.C.s are located on the board and are used to supply enabling commands to the Channel Boards when the optional Microprocessor Board is used. Each decoder operates four Channel Boards and send out either a read enable or a write enable signal. Digital bus termination resistors are also located on this board. All audio and power buses are located near the back of this board while the digital signals are positioned near the front.

5.10.2 Mother Board 2 (MB-2)

Mother Board 2 contains thirteen 56 pin edge connectors for connecting Channel Boards 9-20 (Channel Boards 1-12 in the R/TV-12 console) and the optional Microprocessor Board. Three 74HC138 decoder I.C.s are located on this board. U4 (74HC14) is used as a 1Hz oscillator to provide pulsing for the front panel lamps when required.

5.10.3 Mother Board 3 (MB-3)

Mother Board 3 is used in both R/TV consoles and contains eleven 56 pin edge connectors for connecting the following boards:

1. Multiline Boards 1-4
2. Mix Minus Output Board
3. Audition Output Board
4. Program Output Board
5. Mono-Silence Sense Board
6. Monitor Output Board
7. Phone/Cue Output Board

In addition to the board connectors is P12 which is used to connect the power supply cable.

5.10.4 Mother Board 4 (MB-4)

Mother Board 4 is used only in the R/TV-12 console and contains two 56 pin edge connectors for connecting the Microphone Pre-Amp Boards. Digital bus termination resistors are also on this board.

5.10.5
PARTS LIST FOR
MOTHER BOARD 1 : AUTOGRAM PART NUMBER 25100901
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
2	C1-2	Capacitor, .01uf, 50v, disc
1	D1	Diode, Tranzorb, P6KE6.8
10	P1-10	Connector, Board Edge, 56 pin
10	R1-10	Resistor, 10k, 1% M.F., 1/4w
1	SIP1	Array, Resistor, 10k, Term.
2	U1-2	I.C., 74HC138, decoder
2	------	16 pin dip sockets
1	------	P.C. Board, MB-1

5.10.6 PARTS LIST FOR
MOTHER BOARD 2 : AUTOGRAM PART NUMBER 25100902
R/TV AUDIO CONSOLE

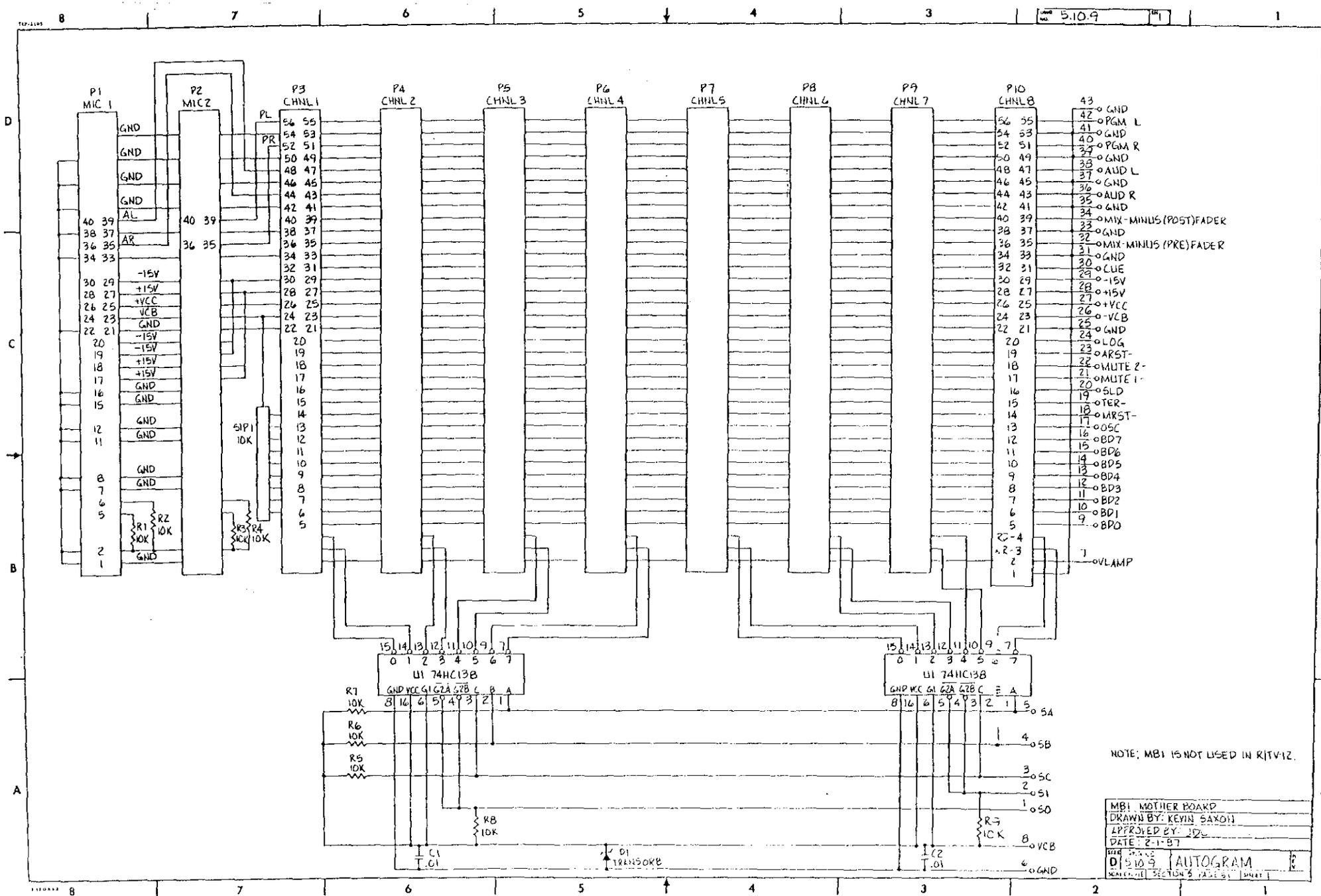
QTY	REFERENCE DESIGNATOR	DESCRIPTION
3	C1-4	Capacitor, .01uf, 50v, disc
1	C5	Capacitor, 2.2uf, 35v, tant.
1	D1	Diode, Tranzorb, P6KE6.8
13	P1-13	Connector, Board Edge, 56 pin
3	R1-3 *Used only in R/TV-12	Resistor, 10k, 1% M.F., 1/4w
3	R4-6	Resistor, 10k, 1% M/F./ 1/4w
1	R7	Resistor, 470k, 5% C.F., 1/4w
3	U1-3	I.C., 74HC138, decoder
1	U4	I.C., 74HC14, Inverter, S.T.
3	------	16 pin dip sockets
1	------	14 pin dip socket
1	------	P.C. Board, MB-2

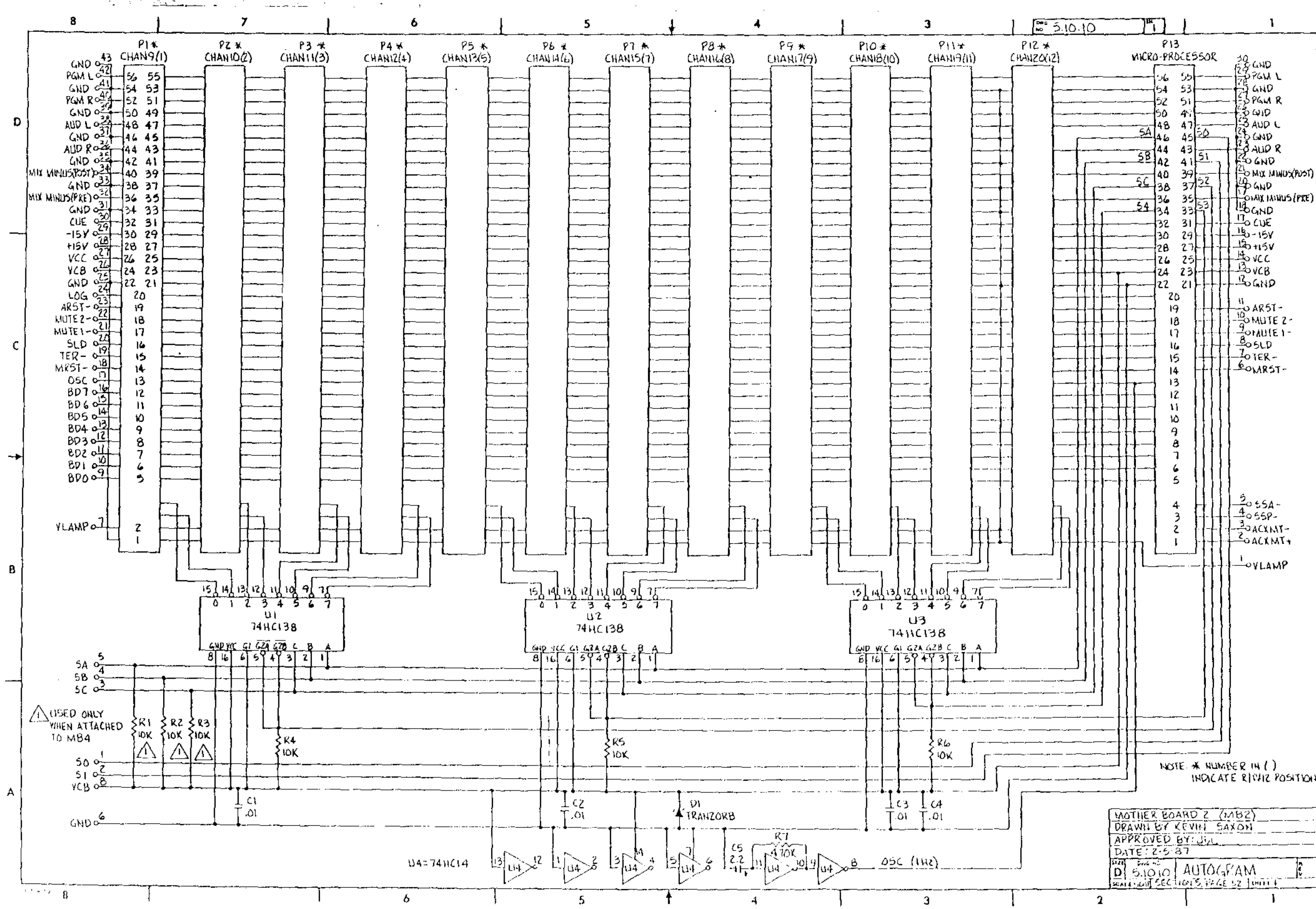
5.10.7
PARTS LIST FOR
MOTHER BOARD 3 : AUTOGRAM PART NUMBER 25100903
R/TV AUDIO CONSOLE

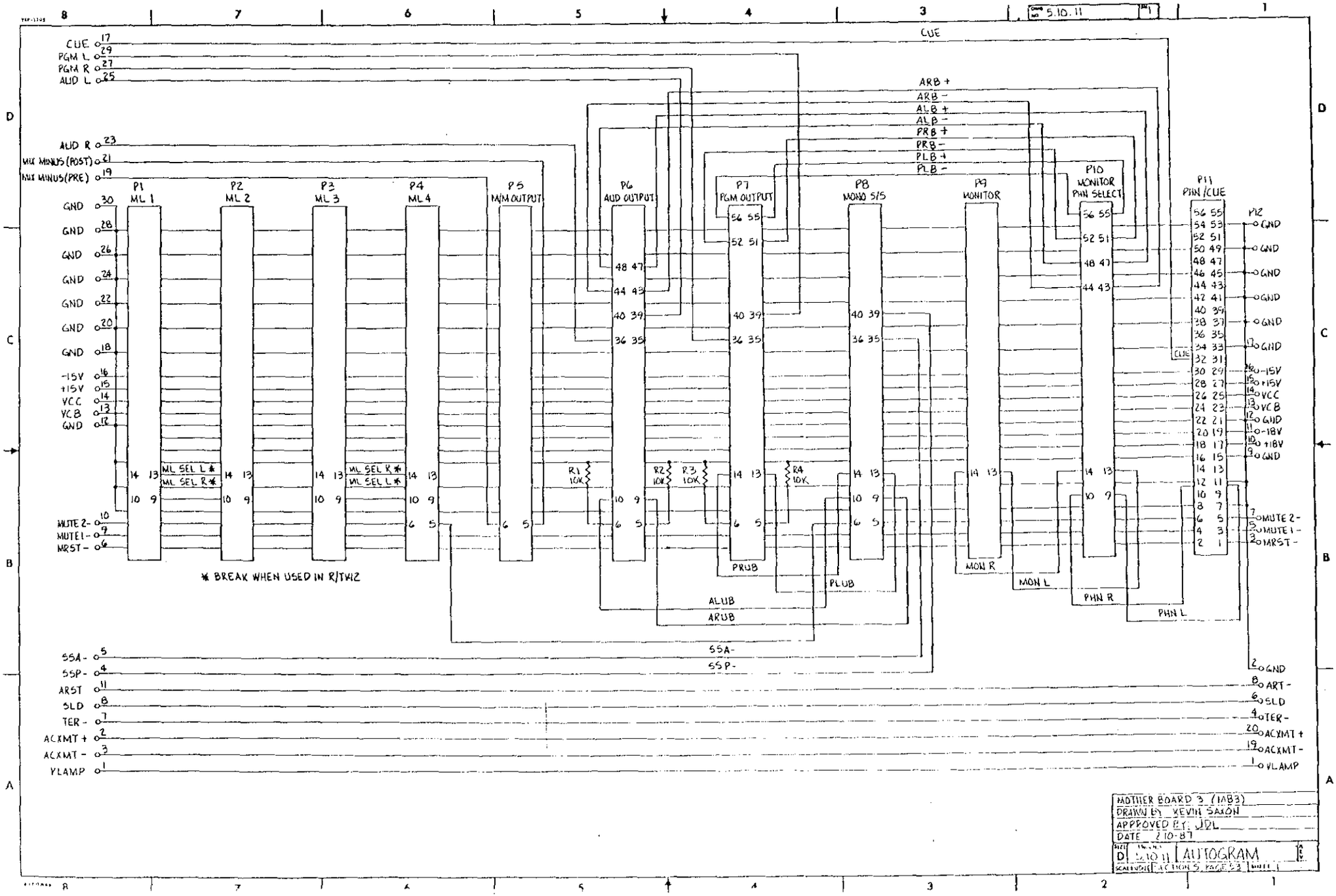
QTY	REFERENCE DESIGNATOR	DESCRIPTION
11	P1-11	Connector, Board Edge, 56 pin
1	P12	Connector, Molex, 24 pin
4	R1-4	Resistor, 10k, 1% M/F./ 1/4w
1	------	P.C. Board, MB-3

5.10.8
PARTS LIST FOR
MOTHER BOARD 4 : AUTOGRAM PART NUMBER 25100904
R/TV AUDIO CONSOLE

QTY	REFERENCE DESIGNATOR	DESCRIPTION
2	P1-2	Connector, Board Edge, 56 pin
6	R1-6	Resistor, 10k, 1% M/F./ 1/4w
1	SIP1	Array, Resistor, 10k, pull-up
1	------	P.C. Board, MB-3


5.10.9
P1 MIC 1
P2 MIC2
P3 CHNL 1
P4 CHNL 2
P5 CHNL 3
P6 CHNL 4
P7 CHNL5
P8 CHNL 6
P9 CHNL 7
P10 CHNL8
PL
PR
GND
AL
AR
-15V
+15V
+VCC
VCB
SIP1 10K
R1 10K
R2 10K
R3 10K
R4 10K
U1 74HC138
R7 10K
R6 10K
R5 10K
R8 10K
R9 10K
C1 .01
C2 .01
D1 TRANSORB
SA
SB
SC
S1
S0
VCB
GND
PGM L
PGM R
AUD L
AUD R
MIX-MINUS (POST) FADER
MIX-MINUS (PRE) FADER
CUE
LOG
ARST-
MUTE 2-
MUTE 1-
SLD
TER-
MRST-
OSC
BD7
BD6
BD5
BD4
BD3
BD2
BD1
BD0
VLAMP
NOTE: MB1 IS NOT USED IN RITV-12.
MB1 MOTHER BOARD
DRAWN BY: KEVIN SAXON
APPROVED BY:
DATE: 2-1-87
AUTOGRAM


P1 * CHAN9(1)
P2 * CHAN10(2)
P3 * CHAN11(3)
P4 * CHAN12(4)
P5 * CHAN13(5)
P6 * CHAN14(6)
P7 * CHAN15(7)
P8 * CHAN16(8)
P9 * CHAN17(9)
P10 * CHAN18(10)
P11 * CHAN19(11)
P12 * CHAN20(12)
P13 MICRO-PROCESSOR
GND
PGM L
PGM R
AUD L
AUD R
MIX MINUS(POST)
MIX MINUS(PRE)
CUE
-15V
+15V
VCC
VCB
LOG
ARST-
MUTE 2-
MUTE 1-
SLD
TER-
MRST-
OSC
BD7
BD6
BD5
BD4
BD3
BD2
BD1
BD0
VLAMP
SSA-
SSP-
ACXMT-
ACXMT+
U1 74HC138
U2 74HC138
U3 74HC138
SA
SB
SC
S0
S1
VCB
GND
USED ONLY WHEN ATTACHED TO MB4
R1 10K
R2 10K
R3 10K
R4 10K
R5 10K
R6 10K
R7 10K
C1 .01
C2 .01
C3 .01
C4 .01
C5 2.2
D1 TRANZORB
U4=74HC14
OSC (1Hz)
NOTE: * NUMBER IN ( ) INDICATE R1/R12 POSITION
MOTHER BOARD 2 (MB2)
DRAWN BY KEVIN SAXON
APPROVED BY: JJL
DATE: 2-5-87
D 5.10.10 AUTOGRAM
SECTION 5, PAGE 52
5.10.10


5.10.11
CUE
PGM L
PGM R
AUD L
AUD R
MIX MINUS (POST)
MIX MINUS (PRE)
GND
-15V
+15V
VCC
VCB
MUTE 2-
MUTE 1-
MRST-
SSA-
SSP-
ARST
SLD
TER-
ACXMT+
ACXMT-
VLAMP
ARB+
ARB-
ALB+
ALB-
PRB+
PRB-
PLB+
PLB-
P1 ML 1
P2 ML 2
P3 ML 3
P4 ML 4
P5 M/M OUTPUT
P6 AUD OUTPUT
P7 PGM OUTPUT
P8 MONO S/S
P9 MONITOR
P10 MONITOR PHN SELECT
P11 PHN/CUE
P12
ML SEL L *
ML SEL R *
R1 10K
R2 10K
R3 10K
R4 10K
PRUB
PLUB
ALUB
ARUB
MON R
MON L
PHN R
PHN L
* BREAK WHEN USED IN R/TWIZ
MOTHER BOARD 3 (MB3)
DRAWN BY KEVIN SAXON
APPROVED BY: JDL
DATE 2-10-87
D 5.10.11
AUTOGRAM
SCALE NONE
SECTION 5 PAGE 53
SHEET 1

5.11 FRONT PANEL ASSEMBLY

The following miscellaneous boards and assemblies complete the R/TV Console.

1. Switch/Slider Interconnect Board
2. Multiline Selector R/TV-12
3. Multiline Selector R/TV-20
4. Monitor and Phones Selector
5. Mono Selector
6. Meter Selector
7. Slider Assembly
8. Lighted Pushbutton Switch Assembly
9. Cable Assemblies
10. Meter Assemblies.
11. Mechanical Assembly

5.11.1 Interconnect Board

The Interconnect Boards are used to interface the four lighted push-button switches and slide control associated with each channel to the 16 conductor ribbon cable that connects to the respective Channel Board.

5.11.2 Multiline Selector Assembly, R/TV-12

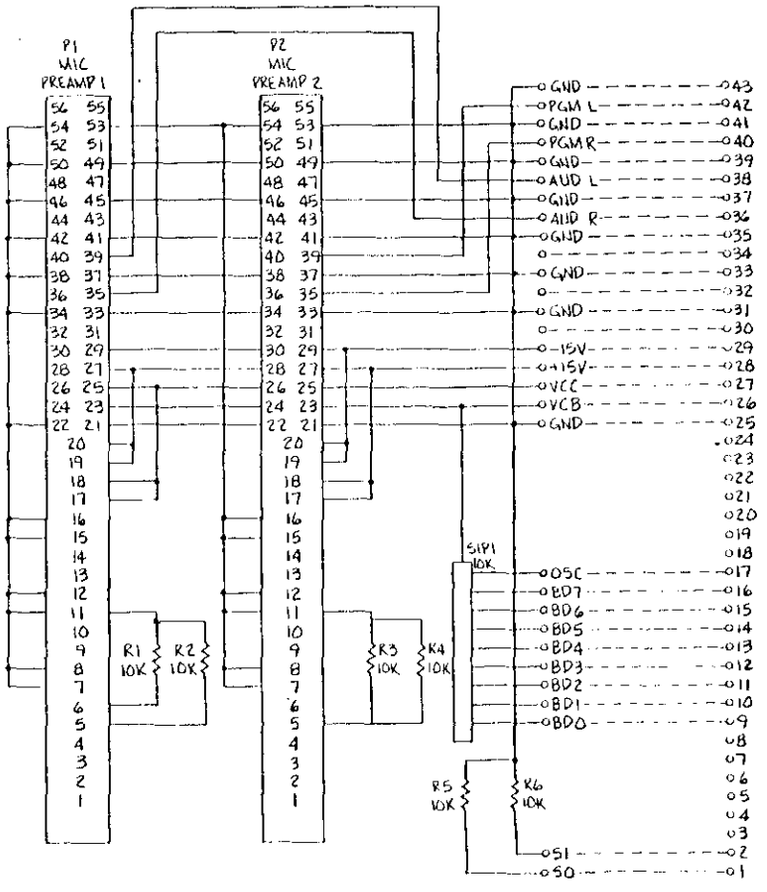
The R/TV-12 Multiline Selector Assembly consists of a 4 position interlocking push-button switch unit, a SW1 Board, a ten pin right-angle ribbon connector and mounting brackets. The switch operates an associated Multiline Board to select 1 of 4 stereo audio sources. Additional runs on the SW1 board allows using an optional plug in type connector to facilitate routing a control signal through the switch.

5.11.3 Multiline Selector Assembly, R/TV-20

The R/TV-20 Multiline Selector Assembly is essentially the same as the R/TV-12 assembly except that an eight position interlocking switch unit and two SW1 Boards are used. The first four switches connect to one ten conductor ribbon cable and on to the primary Multiline Board. The second group of four switches connect to another ribbon cable then to the secondary Multiline Board. This arrangement allows selecting one of eight stereo sources. The optional control connectors are wired so that the two sections can be chained together.

5.11.4 Monitor and Phones Selector Assembly

The Monitor and Headphones selector assemblies are identical. Each uses a 5 position interlocking push-button switch unit and a SW1 Board. The first position on the switch is OFF and as such is used only as a release mechanism. The next four positions are active and are connected through a ten conductor ribbon cable to the Mon/Ph Select Board. The selectors allow four sources to be monitored; Program, Audition, External, and Air.



TO MB2

USED ONLY IN RITV-12

MOTHER BOARD 4 (MB4)	
DRAWN BY: KEVIN SAXON	
APPROVED BY: JDL	
DATE: 3-10-87	
SIZE D	DWG NO 5.10.12
AUTOGRAM	
SCALE	SECTION 5 PAGE 4 SHEET 1

5.11.5 Mono Selector Assembly

The Mono Selector Assembly is used to select either Program or Audition monaural signals to be sent to the MONO output. The interlocking two-position push-button switch actually grounds either of two select lines which are connected to the Mono/S.S. Board.

5.11.6 Meter Selector Assembly

The Meter Selector assembly is used to determine which stereo signal is fed to the left and right channel meters. The audio output from both the Program and Audition output boards is connected to the Meter Selector Board. The two-position interlocking push-button switch then routes the selected audio signals to the meters. The Meter Selector Assembly and the Mono Selector Assembly are identical; however, each uses a different switch contact arrangement.

5.11.7 Slider Assembly

The Slider Assembly consists of a 10k Linear conductive plastic slide pot with cue switch (Penny and Giles type 3210), a custom escutcheon plate, 2 two inch spacers, and the pigtail leads with a 5 pin mini-Molex female connector attached. All pig-tail leads from the slider and the four associated lighted pushbutton switches plug into the Interconnect Board which is mounted to the spacers on the Slider-Assembly.

5.11.8 Lighted Pushbutton Switch Assembly

The Lighted Pushbutton Switch Assembly consists of one Eaton Compulite (or equivalent) pushbutton switch, one #85 lamp (or optional L.E.D. replacement), four short pig-tail leads, and a four pin mini-Molex female connector. additionally, for each two switches there are 2 end type barriers and one center barrier used.

5.11.9 Cable Assemblies

The following Cable Assemblies are used in the R/TV Consoles:

1. 16 conductor ribbon cables from front panel to Channel Boards The R/TV-20 console uses 20 while the R/TV-12 console uses 12.
2. 10 conductor ribbon cables for Monitor and Phones select and Multiline Select. A total of 6 cables are used.
3. Autoclock cable from Autoclock connector to power supply chassis.
4. Power interconnect cable from power supply to Mother Board 3.
5. Two 15 volt regulator cables. From Power Supply to rear mounted Regulators.
6. Phone/Cue power cable from Power Supply Chassis to Phone/Cue Board.
7. Headphone cable assembly.
8. Monitor, Cue, and Headphones gain control cable assemblies.
9. Mono Select cable assembly.
10. Meter Select cable assembly.
11. Mono Meter cable assembly.
12. Power cord.

Please refer to Appendix 1 for the complete run list of the various cable assemblies.

5.11.10 Meter Assemblies

The Meter Assemblies consist on on V.U. meter, a Meter Board, two amp sockets, two lamp brackets, to #1819 lamps, and meter mounting brackets.

5.11.11 Mechanical Assembly

The mechanical parts for the R/TV-20 and R/TV-12 consoles include all cabinet and card cage parts as well as the front panel and small hardware.

5.120 Parts Lists For Misc. Boards And Assemblies.

5.12.01 Parts List for Interconnect Board : Autogram Part #25100965

QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	P1	Connector, Header, 16 pin
1	P2	Connector, Molex, 5 pin
4	P3-6	connector, Molex, 4 pin
1	------	P.C. Board, Interconnect

5.12.02 Parts List for Multiline Selector Assembly, R/TV-12 :
Autogram Part #25102005

QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	P1	Connector, Header, 10 pin
1	S1-4 (4 section interlocked unit)	Switch, pushbutton, ITT, DPDT
1	------	P.C. Board, SW-1
1	------	Sw. Bracket P.N. 25107802

5.12.03 Parts List for Multiline Selector Assembly, R/TV-20 :
Autogram Part #25102010

QTY	REFERENCE DESIGNATOR	DESCRIPTION
2	P1-2	Connector, Header, 10 pin
1	S1-8 (8 section interlocked unit)	Switch, pushbutton, ITT, DPDT
2	------	P.C. Board, SW-1
1	------	Sw. Bracket P.N. 25107804

5.12.04 Parts List for Monitor/Phones Selector Assembly,
Autogram Part #25102015

QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	P1	Connector, Header, 10 pin
1	S1-5 (5 section interlocked unit)	Switch, pushbutton, ITT, DPDT
1	------	P.C. Board, SW-1
1	------	Sw. Bracket P.N. 25107803

5.12.05 Parts List for Mono/Meter Selector Assembly, Autogram Part #25102020

QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	P1	Connector, Molex, 12 pin
1	S1-2 (2 section interlocked unit)	Switch, pushbutton, ITT, 4PDT
2	------	P.C. Board, Mono/Mtr
1	------	Sw. Bracket P.N. 25107801

5.12.06 Parts List for Slider Assembly, Autogram Part #25102025

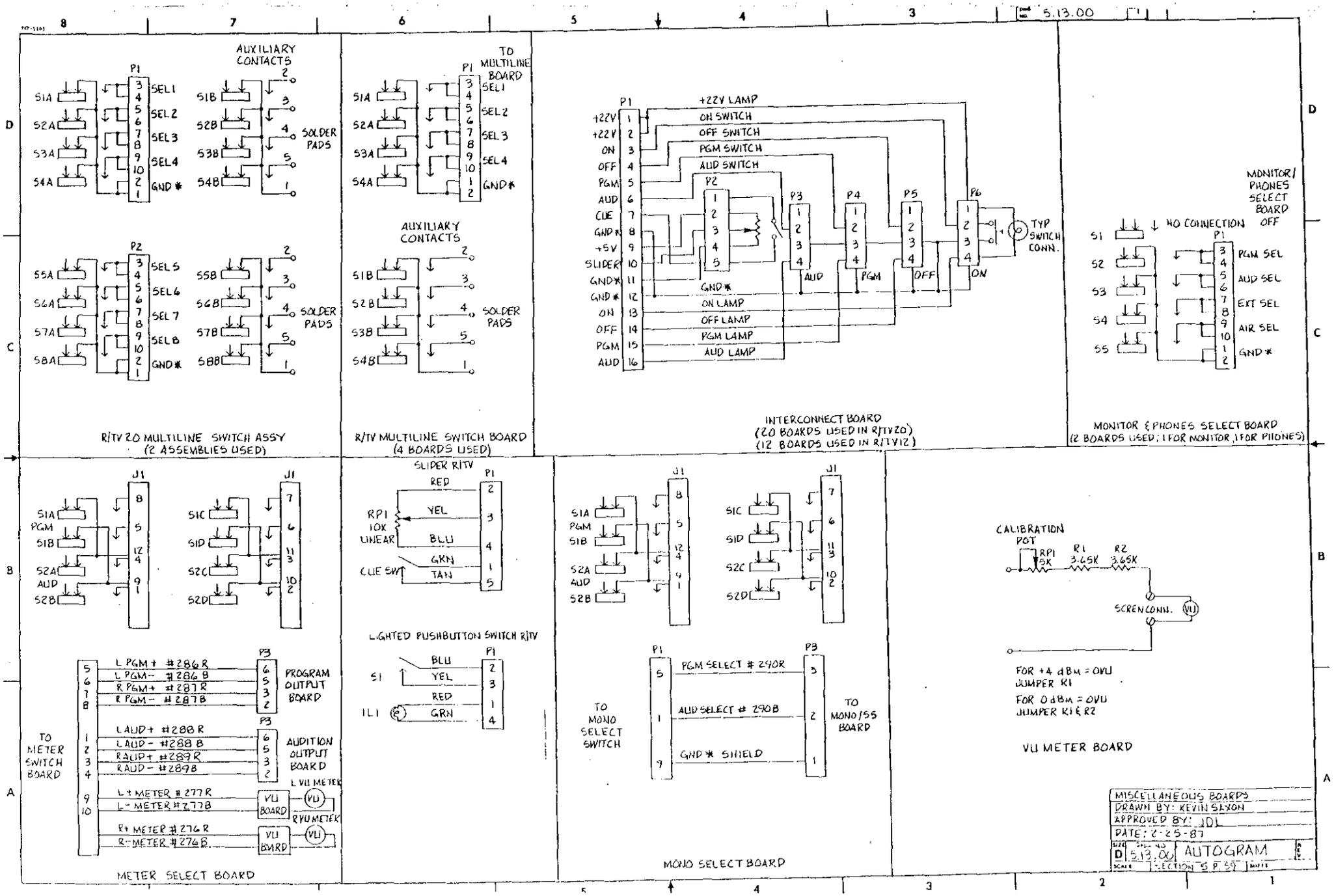
QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	P-1	Connector, Molex, 5 pin
1	S1	Switch, cue, Part of RP-1
1	RP-1	Slider, 10k, Penney & Giles
1	------	Plate, P.N. 25107901
2	------	Stand-Off, 2 inch

5.12.07 Parts List for Lighted Pushbutton Assembly, Autogram Part #25102030

QTY	REFERENCE DESIGNATOR	DESCRIPTION
1	IL1	Lamp, #85, 28 volt
1	P1	Connector, Molex, 4 pin
1	S1	Switch, pushbutton, Compulite

5.12.07 Parts List for VU Meter Board, Autogram Part #25005303

QTY	REFERENCE DESIGNATOR	DESCRIPTION
2	R1-2	Resistor, 3.65k, 1%, M.F.,1/4w
1	RP1	Pot, multiturn, 5k, Spec. 43P
1	------	P.C. Board, V.U. Meter


5.13.00
AUXILIARY CONTACTS
P1
S1A
S2A
S3A
S4A
SEL1
SEL2
SEL3
SEL4
GND *
S1B
S2B
S3B
S4B
SOLDER PADS
P2
S5A
S6A
S7A
S8A
SEL5
SEL6
SEL 7
SEL8
S5B
S6B
S7B
S8B
R/TV 20 MULTILINE SWITCH ASSY
(2 ASSEMBLIES USED)
TO MULTILINE BOARD
R/TV MULTILINE SWITCH BOARD
(4 BOARDS USED)
+22V LAMP
ON SWITCH
OFF SWITCH
PGM SWITCH
AUD SWITCH
+22V
ON
OFF
PGM
AUD
CUE
GND *
+5V
SLIDER
ON LAMP
OFF LAMP
PGM LAMP
AUD LAMP
TYP SWITCH CONN.
INTERCONNECT BOARD
(20 BOARDS USED IN R/TV20)
(12 BOARDS USED IN R/TV12)
MONITOR/ PHONES SELECT BOARD OFF
NO CONNECTION
S1
S2
S3
S4
S5
PGM SEL
AUD SEL
EXT SEL
AIR SEL
MONITOR & PHONES SELECT BOARD
(2 BOARDS USED; 1 FOR MONITOR, 1 FOR PHONES)
J1
PGM
AUD
SLIDER R/TV
RED
RP1
10K LINEAR
YEL
BLU
GRN
CUE SW
TAN
LIGHTED PUSHBUTTON SWITCH R/TV
S1
ILL
L PGM+ #286R
L PGM- #286B
R PGM+ #287R
R PGM- #287B
PROGRAM OUTPUT BOARD
L AUD+ #288R
L AUD- #288B
R AUD+ #289R
R AUD- #289B
AUDITION OUTPUT BOARD
TO METER SWITCH BOARD
L+ METER #277R
L- METER #277B
R+ METER #276R
R- METER #276B
VU BOARD
L VU METER
R VU METER
METER SELECT BOARD
PGM SELECT # 290R
AUD SELECT # 290B
GND * SHIELD
TO MONO SELECT SWITCH
TO MONO/55 BOARD
MONO SELECT BOARD
CALIBRATION POT
RP1 5K
R1 3.65K
R2 3.65K
SCREEN CONN.
FOR +4 dBm = 0VU
JUMPER R1
FOR 0 dBm = 0VU
JUMPER R1 & R2
VU METER BOARD
MISCELLANEOUS BOARDS
DRAWN BY: KEVIN SLYON
APPROVED BY: JDL
DATE: 2-25-87
SIZE D
SCALE NONE
5.13.00
AUTOGRAM
SECTION 5 PAGE 59
SHEET

SECTION 6

DEBUG

6.0.0 GENERAL

The purpose of this section is to aid in trouble shooting the R/TV series consoles. If the microprocessor option is installed in the console, please refer to that manual for assistance in solving live-assist related problems.

DEBUG will be divided into three major categories: POWER, AUDIO, and DIGITAL.

For the most part, the procedure will be to identify and replace offending circuit boards as board level repair normally requires specialized equipment; however, some suggestions will be made in certain areas as to possible IC replacement.

6.1.0 POWER

1. Check the connection of the power cord to the AC outlet and power supply.
2. Check the power outlet.
3. Check that the power switch is ON.
4. Check that all LEDs on the power supply are ON and are of approximately equal brightness.
5. Make the following measurements on the 24 pin flat MOLEX connector on the MOTHERBOARD:

NOTE* Remove the HEADPHONE/CUE BOARD for access. Pin 1 is nearest rear of console. Connect ground lead of meter to chassis.

PIN 2	Should be about +15.6 volts
PIN 3	Should be about +15.0 volts
PIN 4	Should be about +5.0 volts
PIN 10	Should be about -15.6 volts
PIN 11	Should be about -15.0 volts
PIN 12	Should be about +5.0 volts
PIN 24	Should be between 17.0 and 24.0 volts (depending on setting of lamp adjust pot).

The above represents the normal status of the power supply. If variations are discovered, check all MOLEX connectors for tightness. It is possible for a component failure on a specific board to cause a fuse to blow or a regulator to shut down. Turn off Power, then remove all boards. Turn on power. Recheck voltages. If voltages are still incorrect, then proceed to specific pin indicated below. If voltages are now correct, replace the boards one at a time until the defective board is found.

6.1.1 PIN 2 (+15.6 V.) VOLTAGE NOT CORRECT.

Check fuse F4. Replace 7815 regulator Q5 on power supply.

6.1.2 PIN 3 (+15.0 V.) VOLTAGE NOT CORRECT.

Check fuse F6. Replace 78T15 regulator Q3 on heat sink on console back.

6.1.3 PIN 4 (+5.0 V. VCC) VOLTAGE NOT CORRECT.

Check fuse F6. Replace 7805 regulator Q8 on power supply.

6.1.4 PIN 10 (-15.6 V.) VOLTAGE NOT CORRECT.

Check fuse F5. Replace 7915 regulator Q6 on power supply.

6.1.5 PIN 11 (-15.0 V.) VOLTAGE NOT CORRECT.

Check fuse F6. Replace 7915 regulator Q4 on heat sink on console back.

6.1.6 PIN 12 (+5.0 VCB) VOLTAGE NOT CORRECT.

Check fuse F6. Replace batteries.

6.1.7 PIN 24 (+17-+24 V.) VOLTAGE NOT CORRECT.

Check fuse F8. Replace LM350 regulator Q7.

6.1.8 HEADPHONE AND CUE BOARD POWER AMPLIFIER VOLTAGES.

Positive and negative voltage for the two headphone amplifiers and the cue amplifier are decoupled from the same bi-polar power supply. Fuse F-2 services the +12 volt supply while fuse F-3 services the -12 volt supply. If either of these fuses are blown, then all three amplifiers will be affected. Individual voltages may be checked on the four pin MOLEX connectors on the top edge of the Headphone/Cue Board. The pin nearest the front of the console is positive, the center two pins are ground, and the pin nearest the rear of the console is negative. This is an unregulated supply, therefore the voltage with no output will be about 16-17 volts.

6.1.9 SPECIAL SERVICE NOTE.

The MAIN POWER SUPPLY CHASSIS is floating with respect to Audio and Digital ground. Actual chassis ground is connected on the Mother Board. If the POWER SUPPLY CHASSIS is removed from the console for servicing, all voltage measurements must be referred to the circuit board ground plane or TB-1 pin 1.

6.2.0 AUDIO SYSTEMS DEBUG

6.2.1 MALFUNCTION ON A SPECIFIC INPUT CHANNEL.

First verify that all digital controls (ON, OFF, PGM, AUD) function properly. If not, proceed to Digital Debug, 6.3.0. Verify that the audio source is actually working. Move the audio connector to a Channel Board which is known to be good. Check the ribbon connector at each end for good connection. Move the ribbon cable from an adjacent channel to the defective channel to check if the problem is related to the slide pot. If the malfunction is in the Channel Board, observe the various output channels (Program, Audition, Prefader Mix Minus, Postfader Mix Minus, and Cue) to help isolate the nature of the problem. Replace the offending Channel Board.

6.2.2 MALFUNCTION ON THE CONSOLE OUTPUT CHANNELS.

If there is no output on either Program or Audition, remove the respective output connector while viewing the meters (be sure the meter switch corresponds to the output channel in question. This procedure will eliminate short circuits in external studio equipment. If the meters activate with the output removed, then the problem is in the external systems. If the problem is in the Mono output board, check the selector switch and wiring on the front panel and the connector on the board. Change the respective Output Board if the problem still exists.

6.2.3 MALFUNCTION OF A MULTILINE INPUT.

Verify that the associated Channel Board is functioning by connecting an audio source directly to the Channel Board input connector. If this is ok, then check the ribbon cable and associated front panel switch. Change the malfunctioning Multiline Board.

6.2.3 MALFUNCTION IN THE MONITOR/PHONES SELECT BOARD.

Check the ribbon cables and front panel switches. If the problem is with the External or Air signals, verify that the external equipment is operating properly. Change the malfunctioning Monitor Select Board.

6.2.4 MALFUNCTION IN THE MONITOR OUTPUT BOARD.

Verify that the external monitor amplifier is operating. Check the VCA control cable connector. Replace the Monitor Output Board. Check the Monitor/Phones Select Board.

6.2.5 MALFUNCTION IN THE HEADPHONE/CUE BOARD.

Check the cue speaker and wiring. Check the various board connectors. Check the headphones. Replace the Headphone/Cue Board.

6.2.6 MALFUNCTION IN THE MICROPHONE PREAMPLIFIER BOARD.

Check each microphone preamplifier section. If the problem is in a specific section, change either the SSM2015 or the NE5532 IC. If the problem is on all sections, replace the board.

6.3.0 DIGITAL CIRCUITS DEBUG.

The Digital Circuits in the R/TV console are those associated with control of the individual channels as well as external starts and stops.

6.3.1 PROBLEMS WITH FRONT PANEL CONTROLS ON A SPECIFIC CHANNEL.

Check the lamps in the associated switches. Move the ribbon cable to an adjacent Channel Board. If the problem remains then the trouble is on the front panel; if not, the problem is with the Channel Board. If the problem is on the front panel, switches can be unplugged and moved to other connectors to help isolate the malfunction. Replace the offending switch assembly, slider assembly, or Channel Board.

6.3.2 PROBLEMS WITH REMOTE CONTROL SYSTEMS.

The R/TV remote output controls are OPEN COLLECTOR, GROUND SINKING, FOR POSITIVE VOLTAGES ONLY. Install a relay or other isolation device if the external equipment requires it. All remote outputs for a specific Channel Board are via the ULN2804 Darington driver IC. Change this I.C. first. If that does not correct the problem, change the Channel Board.

6.3.3 MUTE, AUTOCLOCK RESET, AND TERTIARY CONTROLS.

The Autoclock reset, mute, and tertiary outputs from the Channel Boards are configured as a Bus, therefore it is possible for a failure on a specific Channel Board to cause all others to not operate. In this event, remove the Channel Boards one at a time until the problem goes away. Replace the offending Channel Board.

APPENDIX 1

A1.0 R/TV CONSOLE CALIBRATION.

A1.1 EQUIPMENT NEEDED.

1. Low distortion audio oscillator with BALANCED output.
2. Distortion analyzer with BALANCED input and 600 ohm termination.
3. Digital type multi-meter with ac volts capability (true r.m.s. type is preferred).

A1.2 PROCEDURE.

1. Select a Channel Board to be used for the calibration procedure.

2. Remove the selected Channel Board and install on Extender board. Connect extender cable to Channel Board and Switch interface board. Set the input jumpers for both Left and Right channels to NO termination and -10 dBm range (ALL JUMPERS OFF). Place MIX-MINUS jumpers to ON.

3. Connect the audio oscillator to the selected Channel Board input. If the oscillator does not have separate connections for both Left and Right channels: connect to the Left channel and connect jumpers to the Right channel.

4. Set the oscillator to 1.0 Khz with sufficient level to produce 245 mv rms (-10dBm) measured at the Channel Board input terminals with the digital multi-meter.

5. Place MIX MINUS jumpers on the Channel Board in the ON position.

6. Place the associated slider at the calibrate position (fourth line from top). Turn Channel ON and turn on PGM and AUD .

7. Adjust the Left Channel Level Trim (on Channel Board) for 775 mv r.m.s. as measured on pin 7 of IC U18.

8. Adjust the Right Channel Level Trim (on Channel Board) for 775 mv r.m.s. as measured on pin 1 of IC U18.

9. Remove power. Replace Channel board in card cage. Turn on power, PGM, AUD, and ON switches.

10. Connected the Distortion Analyzer to the Left Channel Program output. Terminate output into 600 ohms.

*NOTE: THE DISTORTION ANALYZER MUST HAVE A BALANCED INPUT. THE OUTPUT BOARDS MAY BE DAMAGED IF EITHER + OR - IS GROUNDED. USE A HIGH QUALITY TRANSFORMER IF AN UNBALANCED ANALYZER MUST BE USED.

11. Adjust the LEFT channel PROGRAM master gain control (on Program Output Board) to provide +8 dBm as read on Analyzer.

R/TV CONSOLE CALIBRATION.

12. Connected the Distortion Analyzer to the Right Channel Program output. Terminate output into 600 ohms.

13. Adjust the RIGHT channel PROGRAM master gain control (on Program Output Board) to provide +8 dBm as read on Analyzer.

14. Repeat steps 11-13 for the AUDITION Board, adjusting the Audition master gain controls with the analyzer connected to the respective Audition outputs.

15. Adjust meter calibration trimmers for 0VU on the Left and Right channel VU meters. (Meter select switch in PGM Position with Program left and right channel outputs terminated into 600 ohms).

16. Connect Analyzer to the MONO output and terminate with 600 ohms. Be sure MONO select switch is in PGM.

17. Adjust the MONO Master gain control for +8 dBm as indicated by the analyzer.

18. Adjust the MONO meter calibration trimmer for 0VU on the MONO meter.

19. Connect the Analyzer to the Pre-Fader Mix Minus Output. Terminate with 600 ohms.

20. Adjust the Pre-Fader Mix Minus Master Gain Control to give +8 dBm as indicated on the analyzer.

21. Connect the Analyzer to the Post-Fader Mix Minus Output. Terminate with 600 ohms.

22. Adjust the Post-Fader Mix Minus Master Gain Control to give +8 dBm as indicated on the analyzer.

MONITOR CALIBRATION.

23. Remove power. Place the Monitor/Phones Select Board on the extender. The ribbon cables do not need to be connected for the following procedure.

24. Turn on power. Adjust for +8 dBm (terminated) on both Left and Right channels for Program and Audition. Use the same Channel board and set up as in previous steps.

25. Adjust RP8 on MONITOR/PHONES SELECT BOARD for 1 volt (r.m.s.) measured on pin 7 of U14B.

26. Adjust RP7 on MONITOR/PHONES SELECT BOARD for 1 volt (r.m.s.) measured on pin 7 of U13B.

27. Adjust RP6 on MONITOR/PHONES SELECT BOARD for 1 volt (r.m.s.) measured on pin 7 of U12B.

R/TV CONSOLE CALIBRATION.

28. Adjust RP5 on MONITOR/PHONES SELECT BOARD for 1 volt (r.m.s.) measured on pin 7 of U11B.

29. Remove power. Replace MONITOR/PHONES SELECT BOARD in card cage. Connect ribbon cables.

30. Connect analyzer BALANCED input to the LEFT channel monitor output.

31. Turn on power. Adjust console for +8dBm output on PGM and AUD.

32. Push in PGM button on MONITOR Select switch.

33. Turn front panel MONITOR GAIN Control fully clockwise.

34. Adjust Left channel MONITOR MASTER GAIN CONTROL (on Monitor output board) to provide +8dBm as read on the analyzer.

35. Repeat for the right channel.

SILENCE-SENSE CALIBRATION.

NOTE: Silence-Sense is used only with optional Microprocessor Board.

36. Set up console for +8 dbm output on Left and Right channels of both Program and Audition (1khz).

37. Reduce input to console left and right channels by 20 dB.

38. Adjust PROGRAM Silence-Sense Threshold control (RP2 on MONO/SILENCE-SENSE BOARD) until the RED LED just begins to glow.

39. Adjust AUDITION Silence-Sense Threshold control (RP1 on MONO/SILENCE-SENSE BOARD) until the GREEN LED just begins to glow.

R/TV SERIES AUDIO CONSOLE

MAIN CHASSIS AND FRONT PANEL

WIRING

LIST OF WIRE NUMBERS USED

WIRE NUMBER	FUNCTION
201	+15 VOLT REGULATOR TO POWER SUPPLY CHASSIS
202	-15 VOLT REGULATOR TO POWER SUPPLY CHASSIS
204	R/TV-20 MULTILINE OUTPUT CH 19
205	R/TV-20 MULTILINE OUTPUT CH 20
204	R/TV-12 MULTILINE OUTPUT CH 9
205	R/TV-12 MULTILINE OUTPUT CH 10
206	R/TV-12 MULTILINE OUTPUT CH 11
207	R/TV-12 MULTILINE OUTPUT CH 12
260	LEFT CHANNEL HEADPHONE INTERCONNECT
261	RIGHT CHANNEL HEADPHONE INTERCONNECT
262	LEFT CHANNEL HEADPHONE OUTPUT
263	RIGHT CHANNEL HEADPHONE OUTPUT
275	MONO METER
276	RIGHT CHANNEL METER
277	LEFT CHANNEL METER
278	METER LAMPS
279	CUE GAIN CONTROL
280	HEADPHONE GAIN CONTROL
281	MONITOR GAIN CONTROL
283	AUTOCLOCK CABLE 1
284	AUTOCLOCK CABLE 2
286	LEFT PROGRAM OUT TO METER SWITCH
287	RIGHT PROGRAM OUT TO METER SWITCH
288	LEFT AUDITION OUT TO METER SWITCH
289	RIGHT AUDITION OUT TO METER SWITCH
290	MONO SELECT CABLE
1-20	CHANNEL INTERFACE CABLES (16 WIRE RIBBON)

10 WIRE RIBBON CABLES FOR MULTILINE SELECT:

1	MLINE 1 (RTV-20 CH19 1-4),(RTV-12 CH9)
2	MLINE 2 (RTV-20 CH19 5-8),(RTV-12 CH10)
3	MLINE 3 (RTV-20 CH20 1-4),(RTV-12 CH11)
4	MLINE 4 (RTV-20 CH20 5-8),(RTV-12 CH12)
5	MONITOR SEL. (10 WIRE RIBBON)
6	HEADPHONE SEL. (10 WIRE RIBBON)
X	POWER CORD (I.E.C.)

R/TV-20 CARD CAGE SLOT ALLOCATION

SLOT	BOARD
1	MICROPHONE PREAMP NUMBER 1
2	MICROPHONE PREAMP NUMBER 2 (OPTIONAL)
3	CHANNEL BOARD NUMBER 1
4	CHANNEL BOARD NUMBER 2
5	CHANNEL BOARD NUMBER 3
6	CHANNEL BOARD NUMBER 4
7	CHANNEL BOARD NUMBER 5
8	CHANNEL BOARD NUMBER 6
9	CHANNEL BOARD NUMBER 7
10	CHANNEL BOARD NUMBER 8
11	CHANNEL BOARD NUMBER 9
12	CHANNEL BOARD NUMBER 10
13	CHANNEL BOARD NUMBER 11
14	CHANNEL BOARD NUMBER 12
15	CHANNEL BOARD NUMBER 13
16	CHANNEL BOARD NUMBER 14
17	CHANNEL BOARD NUMBER 15
18	CHANNEL BOARD NUMBER 16
19	CHANNEL BOARD NUMBER 17
20	CHANNEL BOARD NUMBER 18
21	CHANNEL BOARD NUMBER 19
22	CHANNEL BOARD NUMBER 20
23	MICROPROCESSOR BOARD (OPTIONAL)
24	MULTILINE BOARD #1 CH 19 1-4
25	MULTILINE BOARD #2 CH 19 5-8
26	MULTILINE BOARD #3 CH 20 1-4
27	MULTILINE BOARD #4 CH 20 5-8
28	OUTPUT BOARD #1 (MIX MINUS)
29	OUTPUT BOARD #2 (AUDITION)
30	OUTPUT BOARD #3 (PROGRAM)
31	MONO-SILENCE SENSE BOARD
32	MONITOR OUTPUT BOARD
33	MONITOR PHONES SELECT BOARD
34	PHONE-CUE OUTPUT BOARD

R/TV-12 CARD CAGE SLOT ALLOCATION

SLOT	BOARD
1	MICROPHONE PREAMP NUMBER 1
2	MICROPHONE PREAMP NUMBER 2 (OPTIONAL)
3	CHANNEL BOARD NUMBER 1
4	CHANNEL BOARD NUMBER 2
5	CHANNEL BOARD NUMBER 3
6	CHANNEL BOARD NUMBER 4
7	CHANNEL BOARD NUMBER 5
8	CHANNEL BOARD NUMBER 6
9	CHANNEL BOARD NUMBER 7
10	CHANNEL BOARD NUMBER 8
11	CHANNEL BOARD NUMBER 9
12	CHANNEL BOARD NUMBER 10
13	CHANNEL BOARD NUMBER 11
14	CHANNEL BOARD NUMBER 12
15	MICROPROCESSOR BOARD (OPTIONAL)
16	MULTILINE BOARD #1 CH 9 1-4
17	MULTILINE BOARD #2 CH 10 1-4
18	MULTILINE BOARD #3 CH 11 1-4
19	MULTILINE BOARD #4 CH 12 1-4
20	OUTPUT BOARD #1 (MIX MINUS)
21	OUTPUT BOARD #2 (AUDITION)
22	OUTPUT BOARD #3 (PROGRAM)
23	MONO-SILENCE SENSE BOARD
24	MONITOR OUTPUT BOARD
25	MONITOR PHONES SELECT BOARD
26	PHONE-CUE OUTPUT BOARD

R/TV SERIES CONSOLE EXTERNAL REGULATOR WIRING

WIRE #	COLOR	FROM	TO
201	RED	J4 PIN 1	Q3 "B" (78T15,+15V)
201	WHITE	J4 PIN 3	Q3 "E" (78T15,+15V)
201	GREEN	J4 PIN 2	Q3 "CASE" (78T15,+15V)
201	BLACK	J4 PIN 2	Q3 "CASE" (78T15,+15)

J4 IS A 3 PIN LARGE MOLEX WITH MALE PINS (TYPE 03-09-1031)

202	RED	J5 PIN 1	Q4 "CASE" (7915,-15V)
202	WHITE	J5 PIN 3	Q4 "E" (7915,-15V)
202	GREEN	J5 PIN 2	Q4 "B" (7915,-15V)
202	BLACK	J5 PIN 2	Q4 "B" (7915,-15)

J5 IS A 3 PIN LARGE MOLEX WITH FEMALE PINS (TYPE 03-09-2031)

MULTILINE OUTPUT JUMPERS

R/TV-20 CONSOLES

WIRE #	COLOR	FROM	TO
204	RED	BD.#24 P6 PIN 1	BD.#21 P2 PIN 1
204	BLACK	BD.#24 P6 PIN 2	BD.#21 P2 PIN 2
204	GREEN	BD.#24 P6 PIN 4	BD.#21 P2 PIN 4
204	WHITE	BD.#24 P6 PIN 5	BD.#21 P2 PIN 5
205	RED	BD.#25 P6 PIN 1	BD.#22 P2 PIN 1
205	BLACK	BD.#25 P6 PIN 2	BD.#22 P2 PIN 2
205	GREEN	BD.#25 P6 PIN 4	BD.#22 P2 PIN 4
205	WHITE	BD.#25 P6 PIN 5	BD.#22 P2 PIN 5

R/TV-12 CONSOLES

204	RED	BD.#14 P6 PIN 1	BD.#11 P2 PIN 1
204	BLACK	BD.#14 P6 PIN 2	BD.#11 P2 PIN 2
204	GREEN	BD.#14 P6 PIN 4	BD.#11 P2 PIN 4
204	WHITE	BD.#14 P6 PIN 5	BD.#11 P2 PIN 5
205	RED	BD.#15 P6 PIN 1	BD.#12 P2 PIN 1
205	BLACK	BD.#15 P6 PIN 2	BD.#12 P2 PIN 2
205	GREEN	BD.#15 P6 PIN 4	BD.#12 P2 PIN 4
205	WHITE	BD.#15 P6 PIN 5	BD.#12 P2 PIN 5
206	RED	BD.#16 P6 PIN 1	BD.#13 P2 PIN 1
206	BLACK	BD.#16 P6 PIN 2	BD.#13 P2 PIN 2
206	GREEN	BD.#16 P6 PIN 4	BD.#13 P2 PIN 4
206	WHITE	BD.#16 P6 PIN 5	BD.#13 P2 PIN 5
207	RED	BD.#17 P6 PIN 1	BD.#14 P2 PIN 1
207	BLACK	BD.#17 P6 PIN 2	BD.#14 P2 PIN 2
207	GREEN	BD.#17 P6 PIN 4	BD.#14 P2 PIN 4
207	WHITE	BD.#17 P6 PIN 5	BD.#14 P2 PIN 5

R/TV SERIES WIRING RUN LIST

WIRE #	COLOR	FROM	TO
NOTE: BOARD NUMBERS WITH BRACKETS <0> INDICATE R/TV-12 POSITION			
260	RED	L. H.P. JACK PIN 1	R. H.P. JACK PIN 1
260	BLK	L. H.P. JACK PIN 3	R. H.P. JACK PIN 3
260	SHD	N.C.	N.C.
261	RED	L. H.P. JACK PIN 2	R. H.P. JACK PIN 2
261	BLK	L. H.P. JACK PIN 3	R. H.P. JACK PIN 3
261	SHD	N.C.	N.C.
262	RED	BD. 34 <26> P4 PIN 1	R. H.P. JACK PIN 1
262	BLK	BD. 34 <26> P4 PIN 2	R. H.P. JACK PIN 3
262	SHD	BD. 34 <26> P4 PIN 3	N.C.
263	RED	BD. 34 <26> P6 PIN 1	R. H.P. JACK PIN 2
263	BLK	BD. 34 <26> P6 PIN 2	R. H.P. JACK PIN 3
263	SHD	BD. 34 <26> P6 PIN 3	N.C.
275	RED	BD. 31 <23> P3 PIN 6	MONO METER BOARD +
275	BLK	BD. 31 <23> P3 PIN 5	MONO METER BOARD -
275	SHD	BD. 31 <23> P3 PIN 4	N.C.
276	RED	MTR SWX PIN 11	RIGHT MTR. BOARD +
276	BLK	MTR SWX PIN 12	RIGHT MTR. BOARD -
276	SHD	N.C.	N.C.
277	RED	MTR SWX PIN 9	LEFT MTR. BOARD +
277	BLK	MTR SWX PIN 10	LEFT MTR. BOARD -
277	SHD	N.C.	N.C.
278	RED	P.S. J1 PIN 19	METER LAMPS +
278	BLK	P.S. J1 PIN 20	METER LAMPS -
278	SHD	N.C.	
279	RED	CUE POT PIN 1	BD.#34 <26> P8 PIN 4
279	BLK	CUE POT PIN 2	BD.#34 <26> P8 PIN 5
279	SHD	CUE POT PIN 3	BD.#34 <26> P8 PIN 6
280	RED	PHONE POT PIN 1	BD.#34 <26> P8 PIN 1
280	BLK	PHONE POT PIN 2	BD.#34 <26> P8 PIN 2
280	SHD	PHONE POT PIN 3	BD.#34 <26> P8 PIN 3
281	RED	MONITOR POT PIN 1	BD.#32 <24> P4 PIN 4
281	BLK	MONITOR POT PIN 2	BD.#32 <24> P4 PIN 5
281	SHD	MONITOR POT PIN 3	BD.#32 <24> P4 PIN 6
284	GREEN	ACLK PIN 12	POWER SUPPLY J-1 PIN 1
284	WHITE	ACLK PIN 13	POWER SUPPLY J-1 PIN 2
284	YELLOW	ACLK PIN 8	POWER SUPPLY J-1 PIN 3
284	ORANGE	ACLK PIN 9	POWER SUPPLY J-1 PIN 4
284	BROWN	ACLK PIN 4	POWER SUPPLY J-1 PIN 5
284	RED	ACLK PIN 5	POWER SUPPLY J-1 PIN 6

R/TV SERIES WIRING RUN LIST

WIRE #	COLOR	FROM	TO
284	GRAY	ACLK PIN 3	POWER SUPPLY J-1 PIN 9
284	BLACK	ACLK PIN C	POWER SUPPLY J-1 PIN 10
284	BLUE	ACLK PIN 11	POWER SUPPLY J-1 PIN 13
284	PURPLE	ACLK PIN 10	POWER SUPPLY J-1 PIN 14
283	RED	ACLK PIN 1	POWER SUPPLY J-1 PIN 17
283	BLACK	ACLK PIN A	POWER SUPPLY J-1 PIN 18
283	WHITE	ACLK PIN 14	POWER SUPPLY J-1 PIN 21
283	GREEN	ACLK PIN 15	POWER SUPPLY J-1 PIN 22
286	RED	MTR SWX PIN 5	BD.#30 <22> P3 PIN 6
286	BLACK	MTR SWX PIN 6	BD.#30 <22> P3 PIN 5
286	SHIELD	XXX	BD.#30 <22> P3 PIN 4
287	RED	MTR SWX PIN 7	BD.#30 <22> P3 PIN 3
287	BLACK	MTR SWX PIN 8	BD.#30 <22> P3 PIN 2
287	SHIELD	XXX	BD.#30 <22> P3 PIN 1
288	RED	MTR SWX PIN 1	BD.#29 <21> P3 PIN 6
288	BLACK	MTR SWX PIN 2	BD.#29 <21> P3 PIN 5
288	SHIELD	XXX	BD.#29 <21> P3 PIN 4
289	RED	MTR SWX PIN 3	BD.#29 <21> P3 PIN 3
289	BLACK	MTR SWX PIN 4	BD.#29 <21> P3 PIN 2
289	SHIELD	XXX	BD.#29 <21> P3 PIN 1
290	RED	MONO SWX PIN 5	BD.#31 <23> P3 PIN 3
290	BLACK	MONO SWX PIN 1	BD.#31 <23> P3 PIN 2
290	SHIELD	MONO SWX PIN 9	BD.#31 <23> P3 PIN 1

POWER SUPPLY
J-3 WIRING

24 PIN MOLEX CONNECTOR TO MOTHERBOARD

PIN	WIRE COLOR	TO	FUNCTION
1	BLK	M.B. PIN 22	GND
2	GRN	M.B. PIN 10	+15.6V
3	RED	M.B. PIN 15	+15 V
4	BLU	M.B. PIN 14	+5 VCC
5	BLK	M.B. PIN 17	GND
6	BLK	M.B. PIN 9	GND
7	BLK	M.B. PIN 12	GND
8	BLK	M.B. PIN 2	GND
9	BLK	M.B. PIN 21	GND
10	WHT/GRN	M.B. PIN 11	-15.6V
11	WHT/RED	M.B. PIN 16	-15 V
12	WHT/PUR	M.B. PIN 13	+5 VCB
13	WHT/BLU	M.B. PIN 8	AUTOCLOCK RESET (ARST)
14	YEL	M.B. PIN 5	MUTE 1
15	BLK	M.B. PIN 23	GROUND
16	WHT/ORG	M.B. PIN 7	MUTE 2
17	PUR	M.B. PIN 4	TERTIARY BUS
18	WHT	M.B. PIN 3	MASTER RESET (MRST)
19	GRY	M.B. PIN 20	AUTOCLOCK XMT +
20	WHT/GRY	M.B. PIN 19	AUTOCLOCK XMT -
21	BLK	M.B. PIN 12	GND
22	BLK	M.B. PIN 2	GND
23	BLK	M.B. PIN 6	GND
24	BRN	M.B. PIN 1	LAMP V.

APPENDIX 3

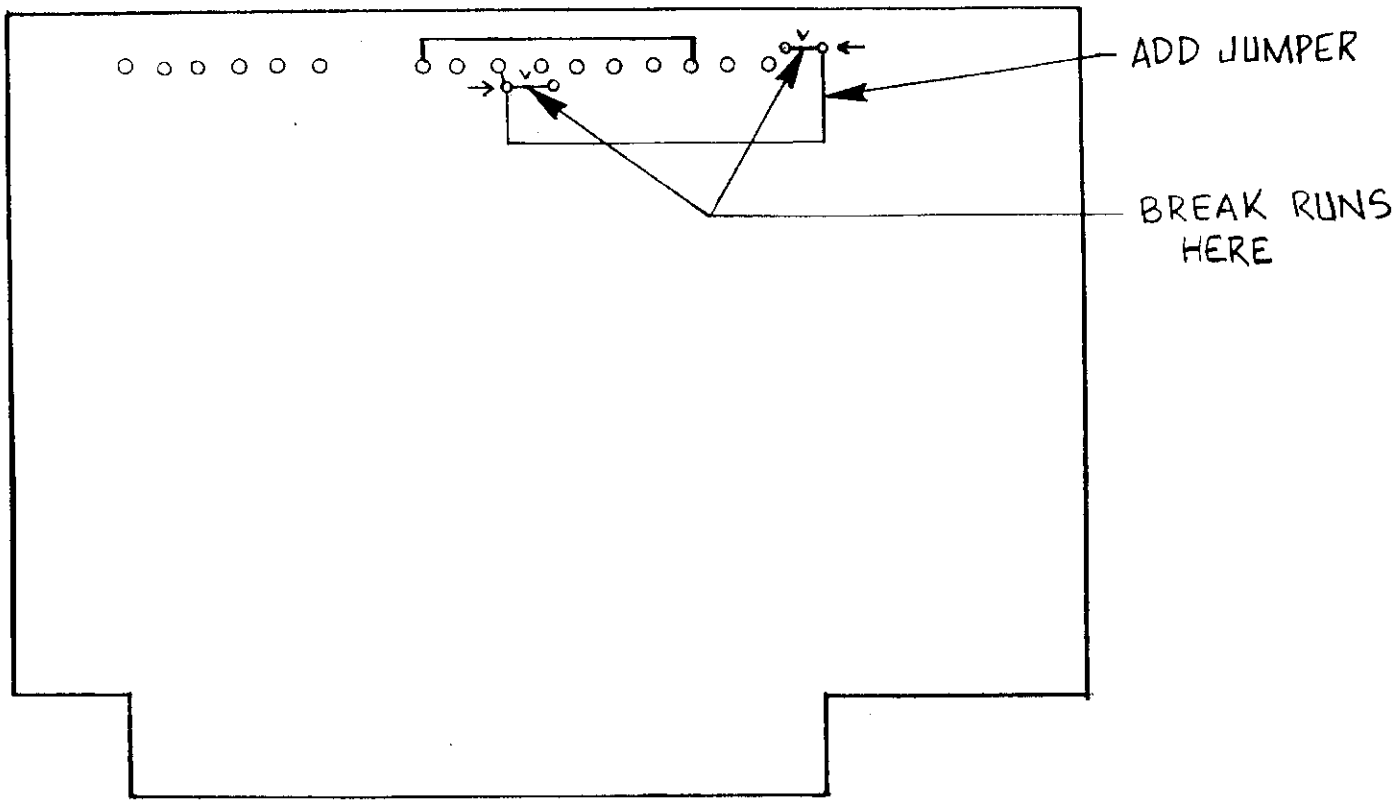
TYPICAL SOURCE INTERFACING

The following appendix is included to aid in interfacing various source equipment to the R/TV series audio consoles.

Every effort has been made to verify the accuracy of the provided data; however, AUTOGRAM CORPORATION assumes no responsibility for errors. It is up to the installing personnel to check the instruction manuals of the equipment to be interfaced to insure compatibility.

Remember that all control outputs on the CHANNEL BOARDS are "GROUNDED OPEN-COLLECTOR" type. If the source to be interfaced requires other than a low going signal for control, then a relay must be used between the console and the source.

If it is desired to have the console STOP lamp flash with the cart machine READY light, a modification must be made on each affected CHANNEL BOARD. Pages 1 and 2 of this appendix address this modification.



CHANNEL BOARD MODIFICATION TO ALLOW CART MACHINE READY LAMP CIRCUIT TO FLASH CHANNEL "OFF" LAMP

CHANNEL BOARD Modification to allow the cart machine ready lamp circuit to flash the console "STOP" lamp.

Many modern cart machines have a provision which will flash the ready lamp after a cart has been played. In some applications it is desirable to have this provision also flash the console STOP lamp on the associated channel. A modification is required on the respective CHANNEL BOARD.

Refer to the drawing on page 1 of this Appendix.

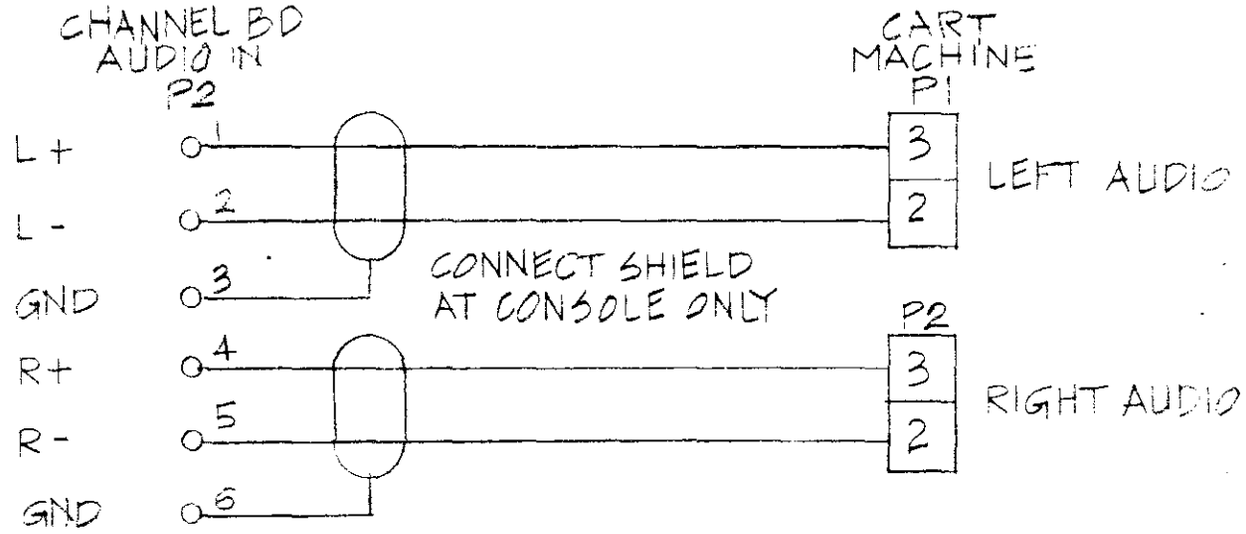
Cut the etch on the printed circuit board at the points indicated. Install an insulated wire jumper between the points marked by the arrows.

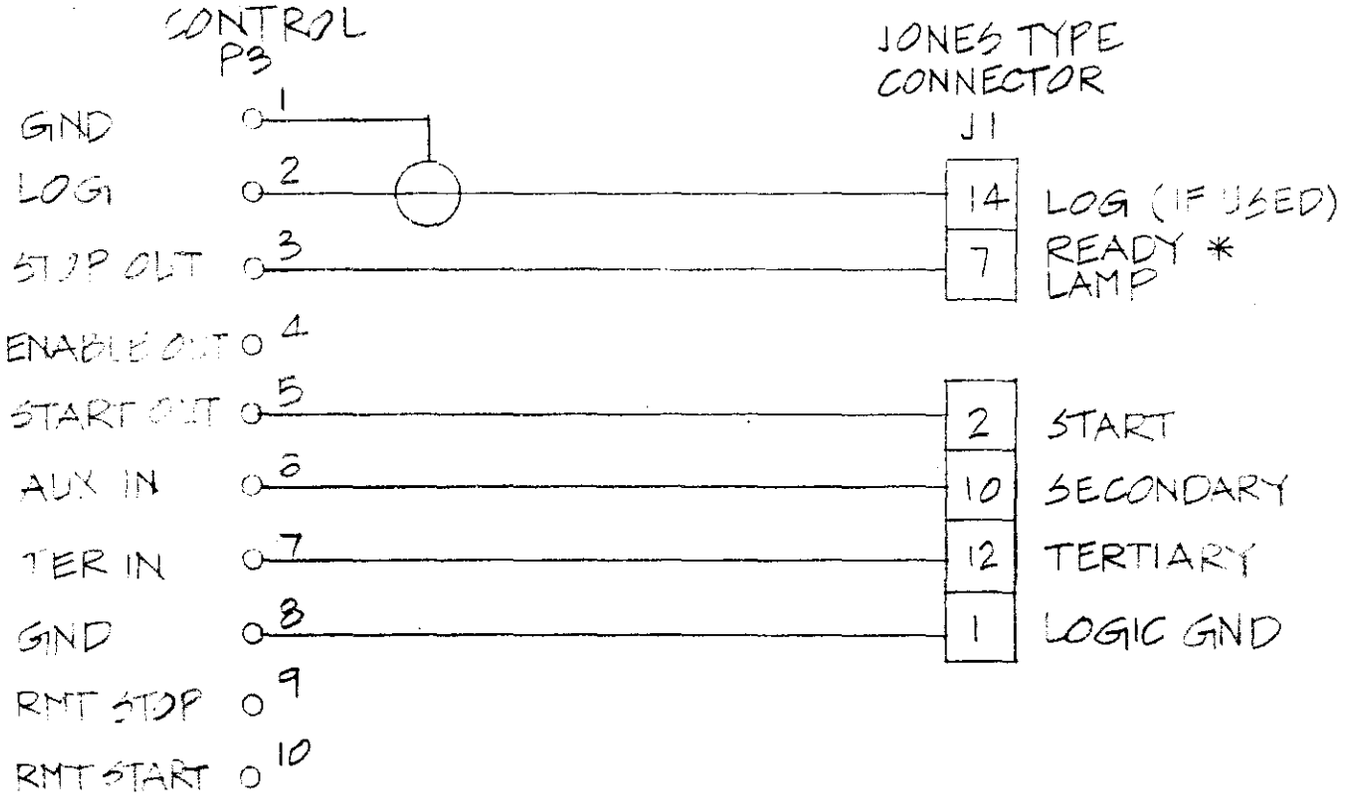
Connect the "READY" circuit open collector output from the cart machine to the CHANNEL BOARD "STOP" output (P3 pin 3).

With the modification, the console will source the lamp voltage for the STOP lamp and the cart machine open collector will provide the grounding pulse.

For Dynamax Cart Machines, please consult Autogram.

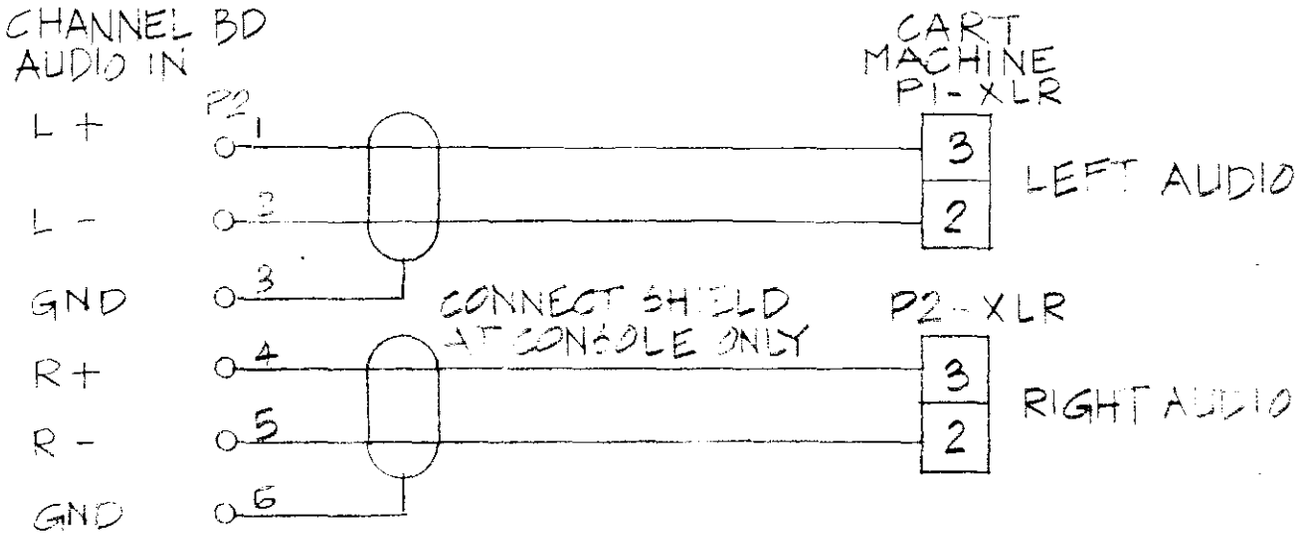
INTERFACE FOR ITC DELTA CART-
PRE MID 1985 VERSION MACHINES

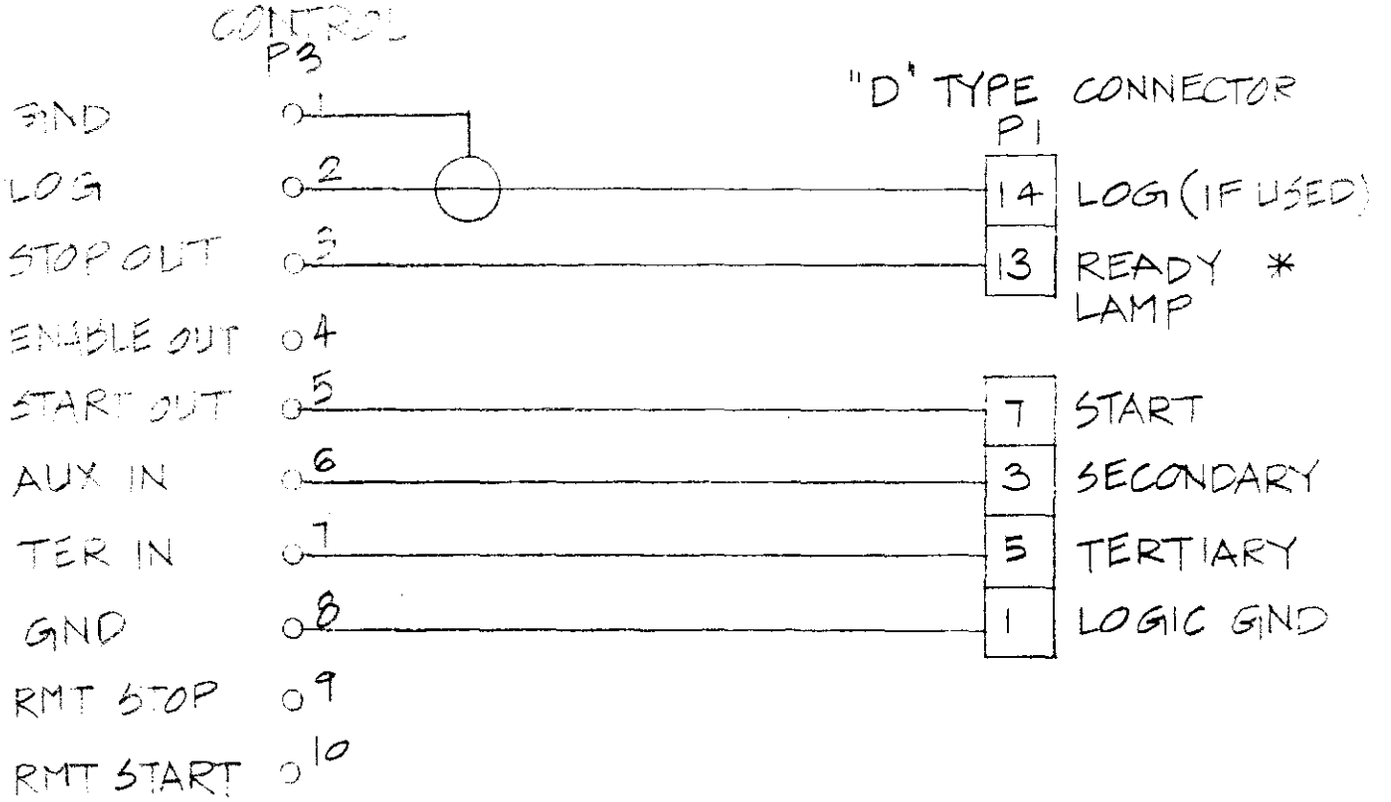




* NOTE : MODIFY CHANNEL BOARD AS PER SECTION 7 A3 PAGE 1 AND 2 IF READY LAMP FLASH IS DESIRED

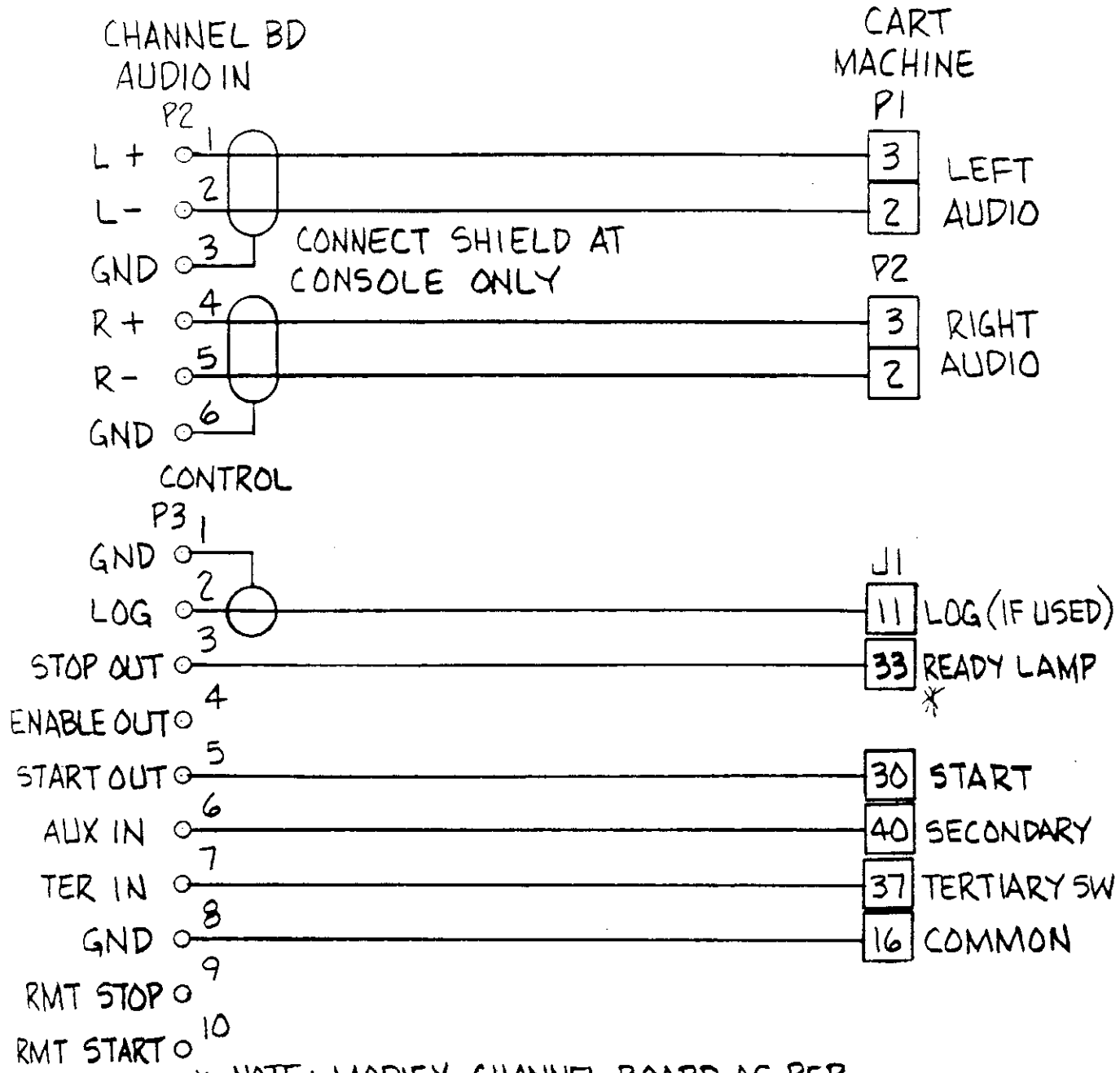
INTERFACE FOR ITC DELTA CART- POST MID 1985 VERSION MACHINES





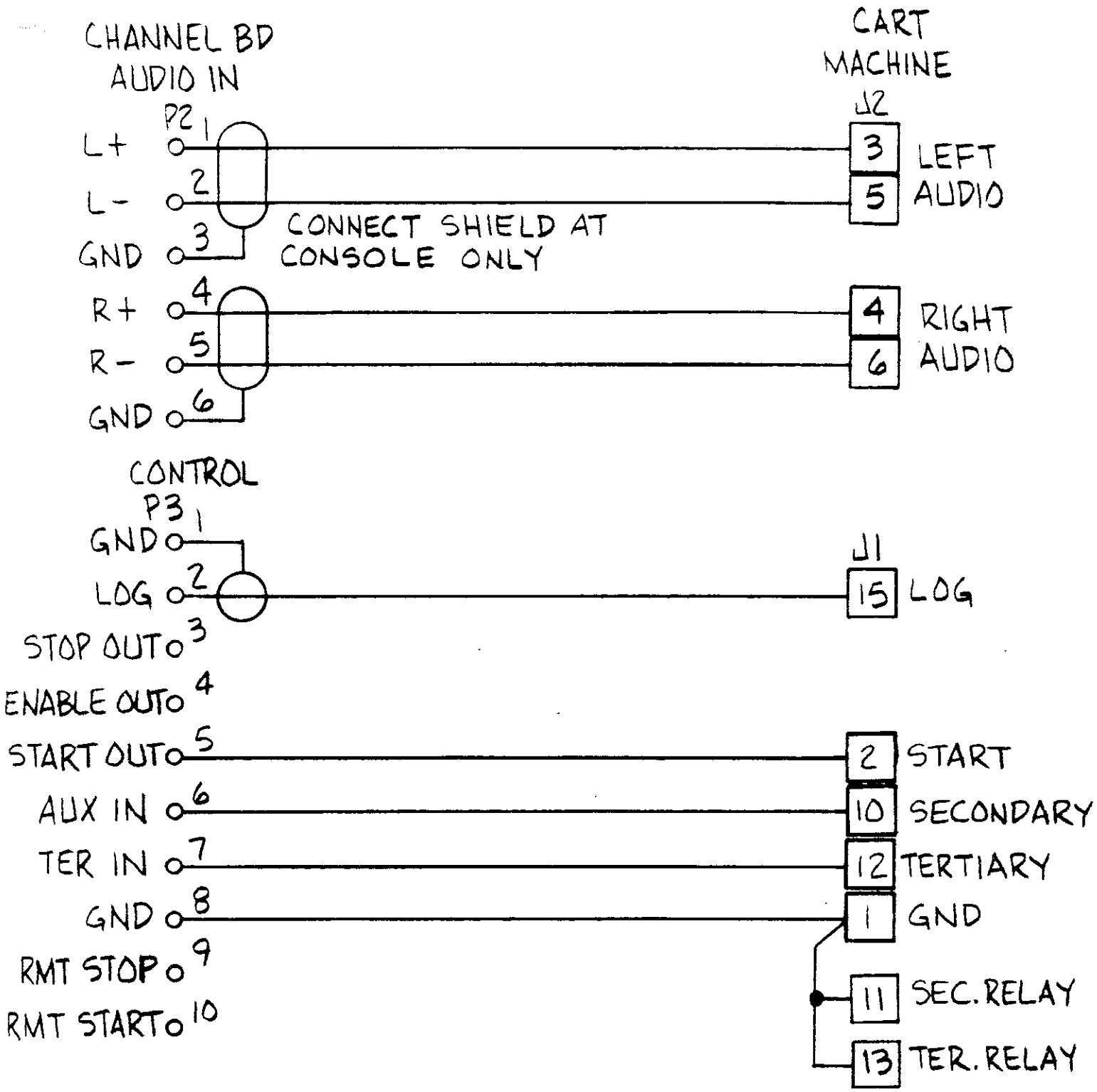
*NOTE : MODIFY CHANNEL BOARD AS PER SECTION 7 A3 PAGE 1 AND 2 IF READY LAMP FLASH IS DESIRED

INTERFACE FOR ITC SERIES 99 CART MACHINE

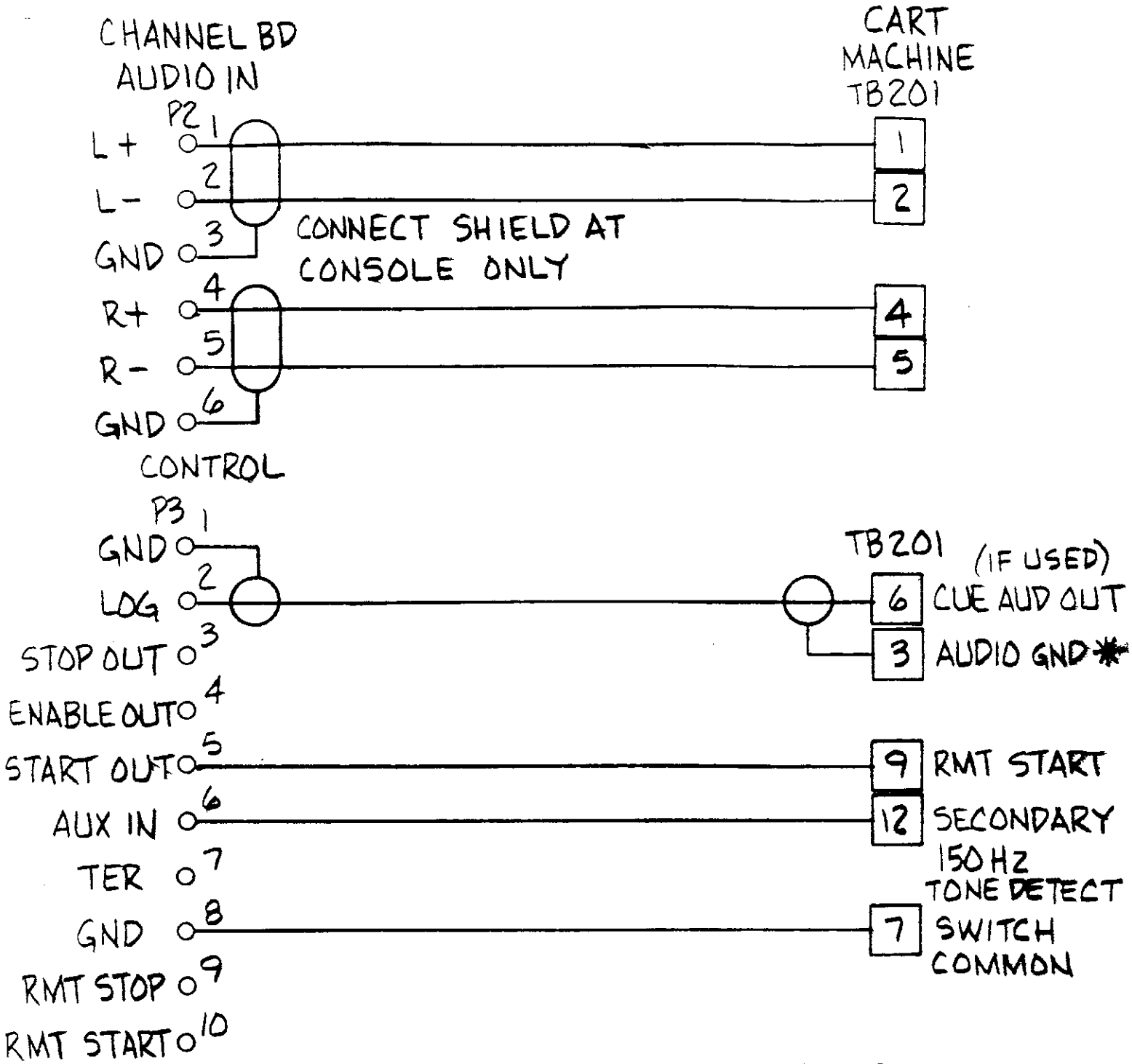


* NOTE: MODIFY CHANNEL BOARD AS PER SECTION 7 A3 PAGE 1 & 2 IF READY LAMP IS DESIRED

INTERFACE FOR ITC WP/RP SERIES CART MACHINE

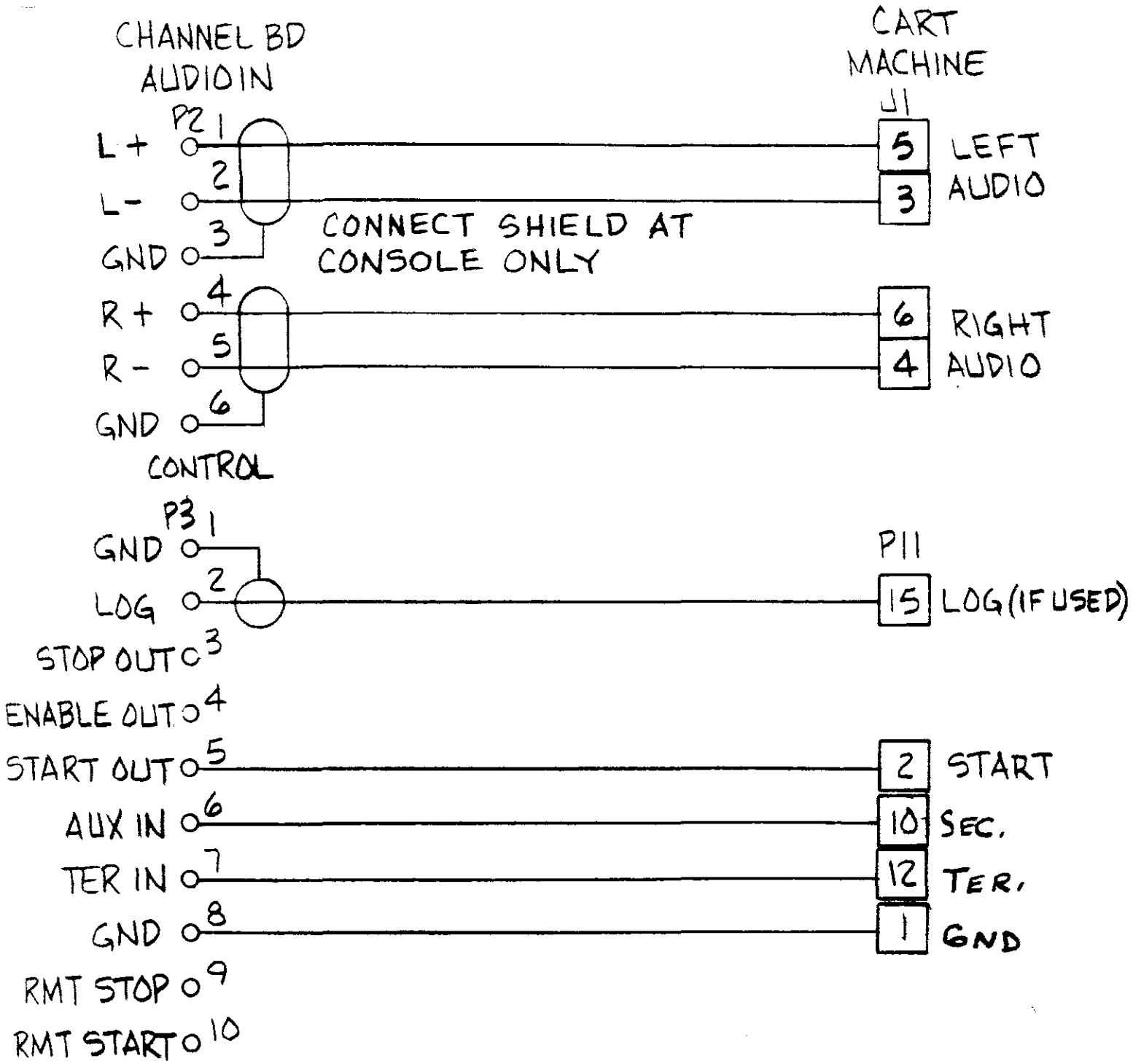


INTERFACE FOR ITC OMEGA CART MACHINES

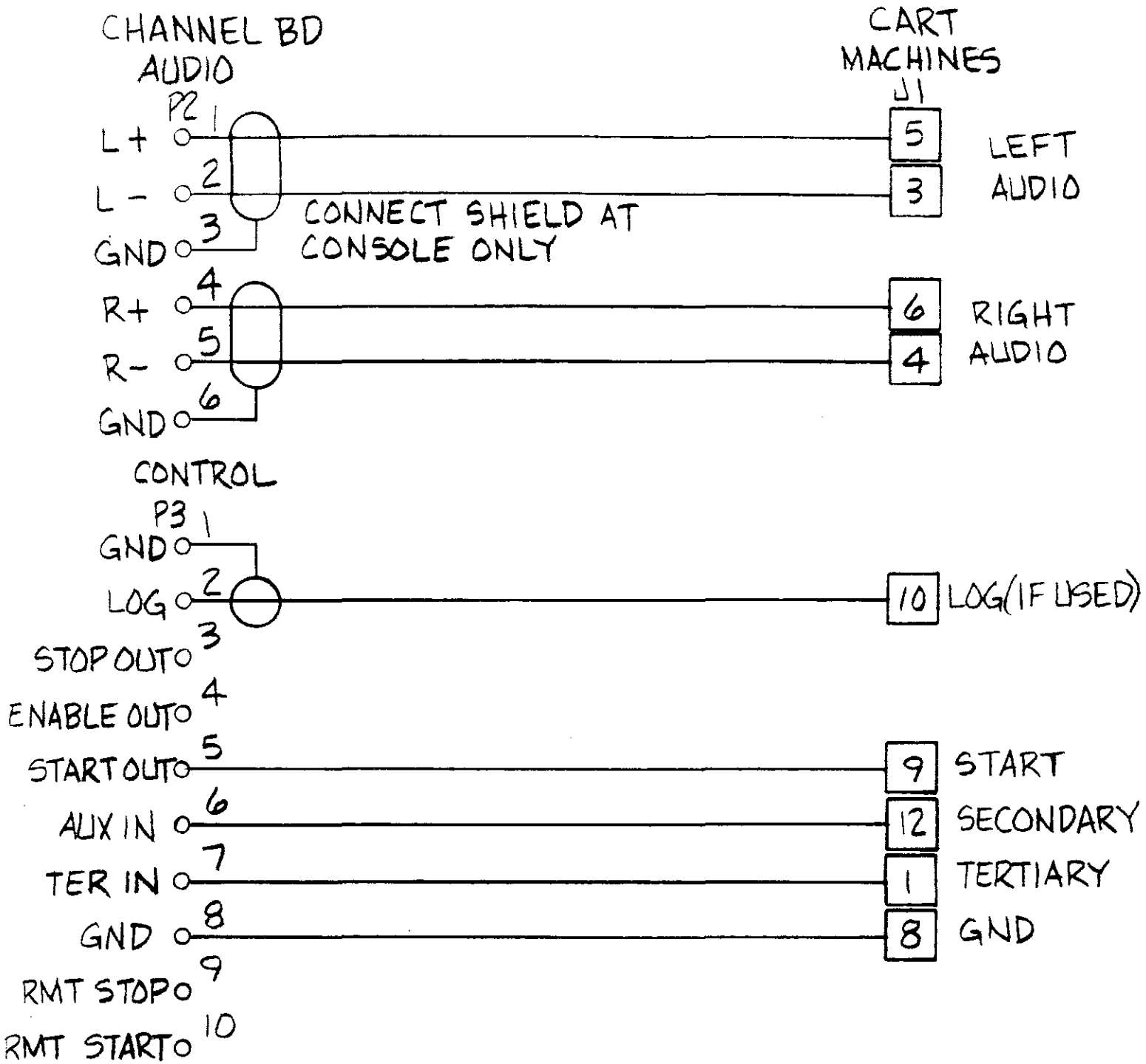


* CUE LOG OUTPUT MAY REQUIRE SHIELD TO BE GROUNDED AT EACH END

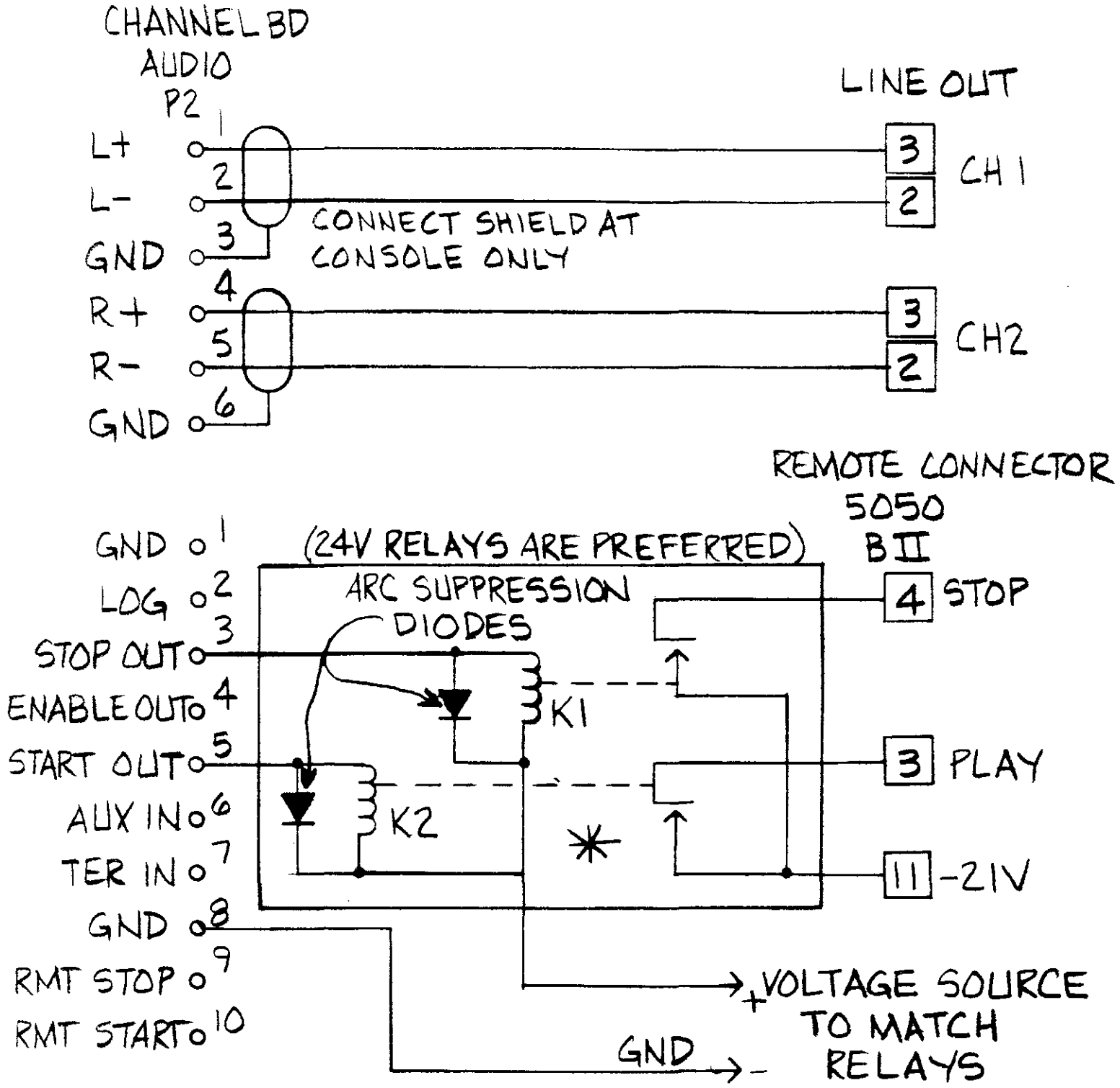
INTERFACE FOR AUDICORD 'S SERIES CART MACHINES



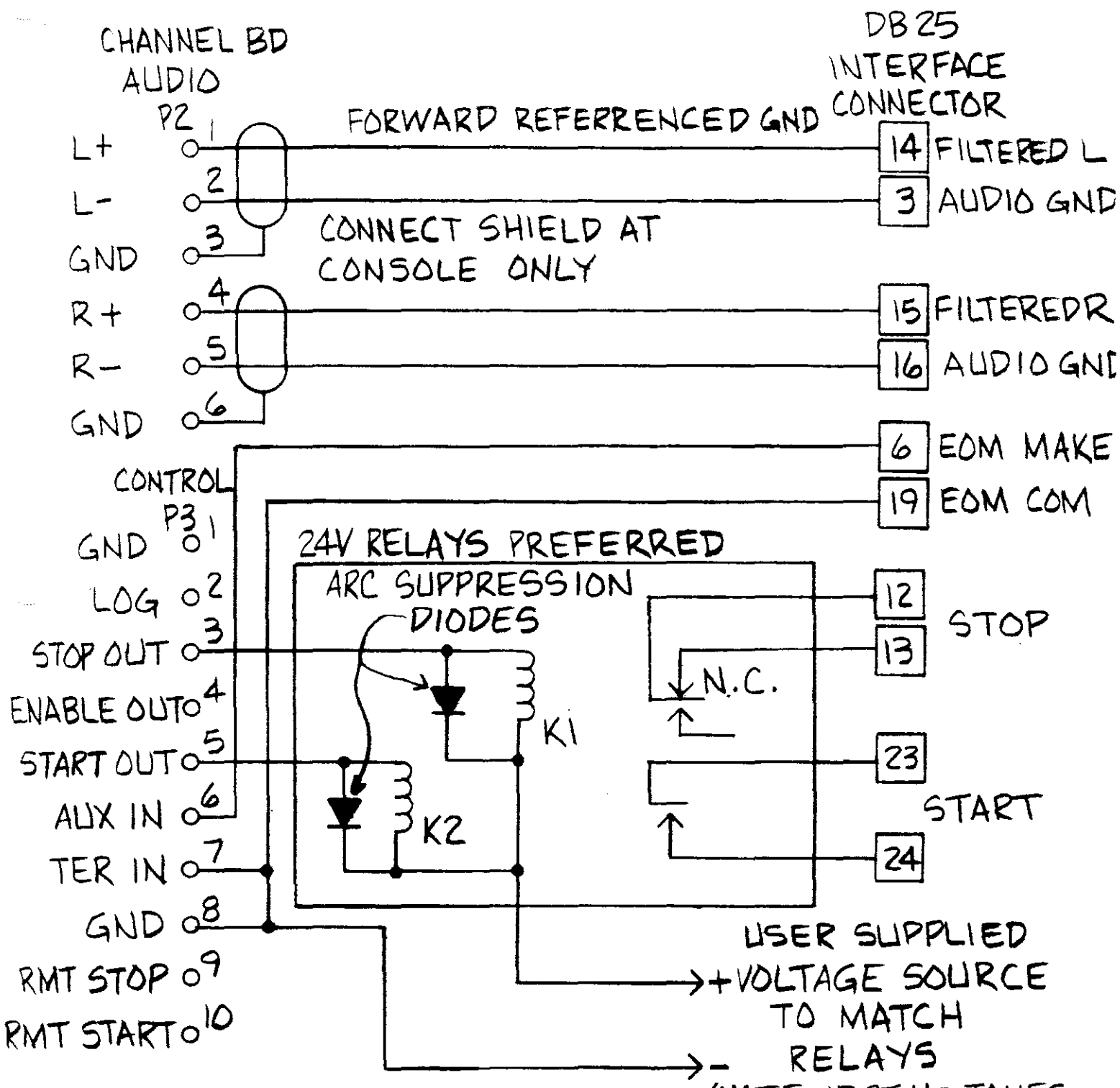
INTERFACE FOR AUDICORD "E" SERIES CART MACHINES



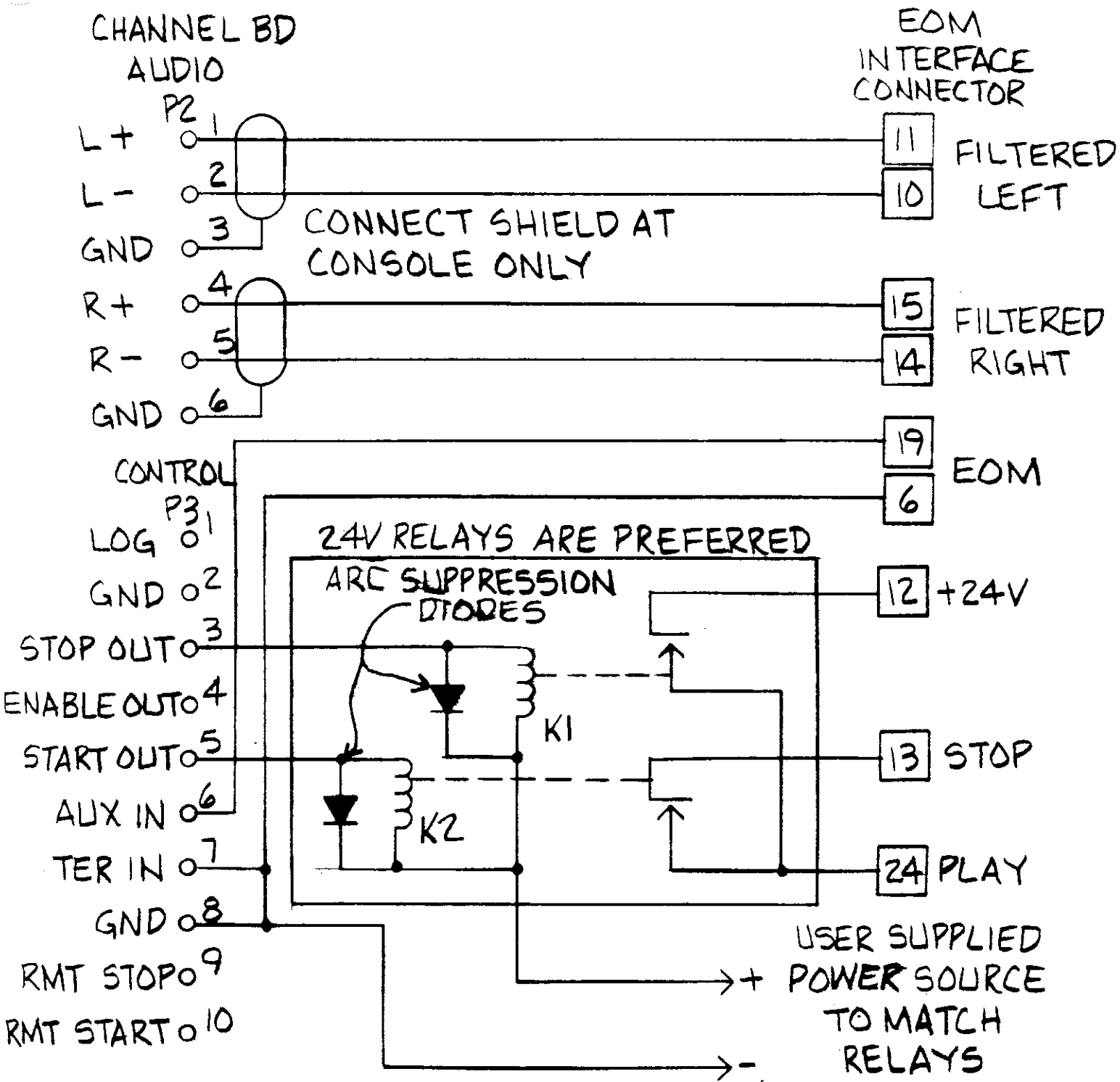
INTERFACE FOR OTARI MT-5050 B II RECORDER (PLAYBACK)



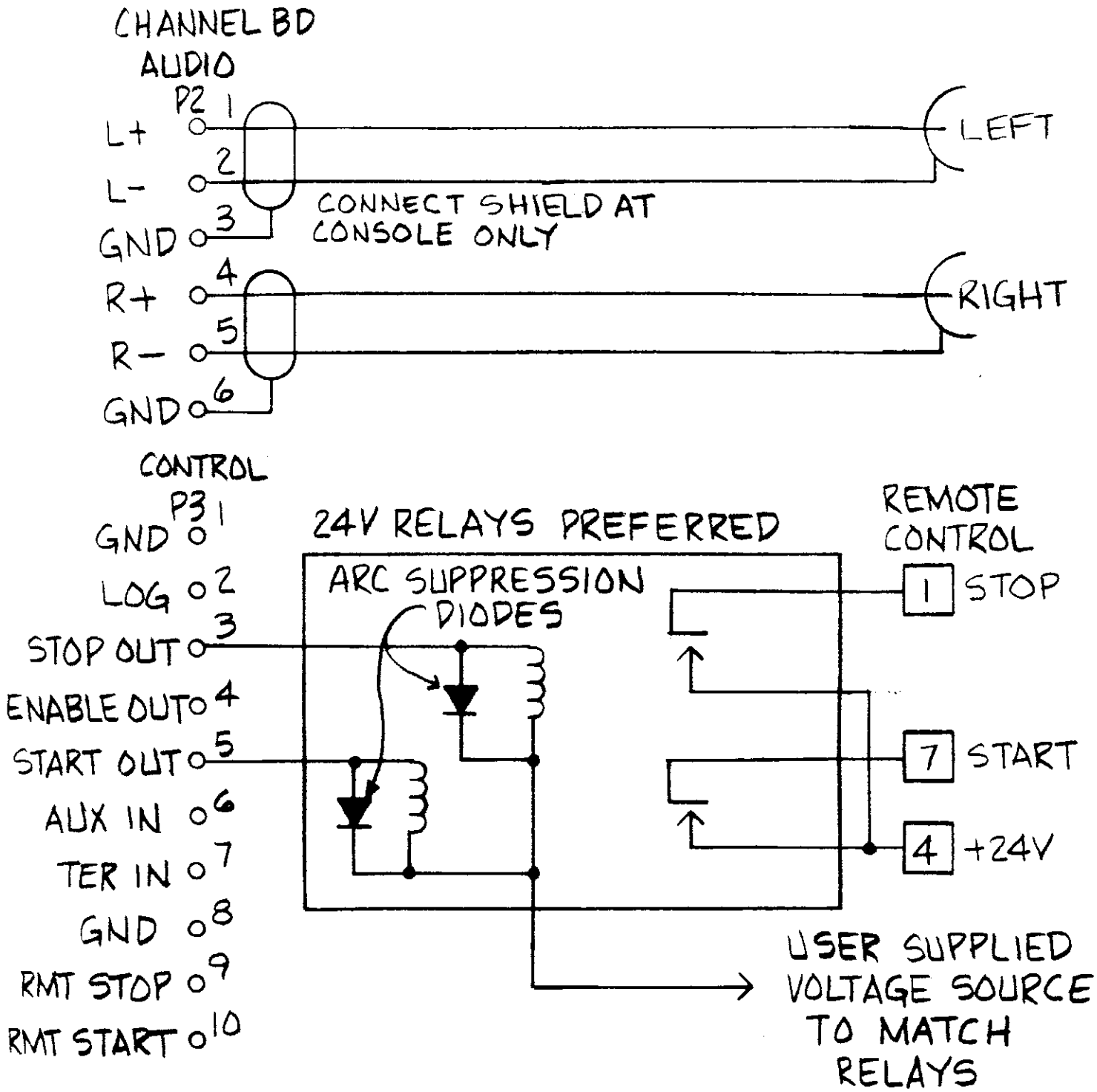
INTERFACE FOR OTARI ARS-1000 TAPE PLAYBACK MACHINE



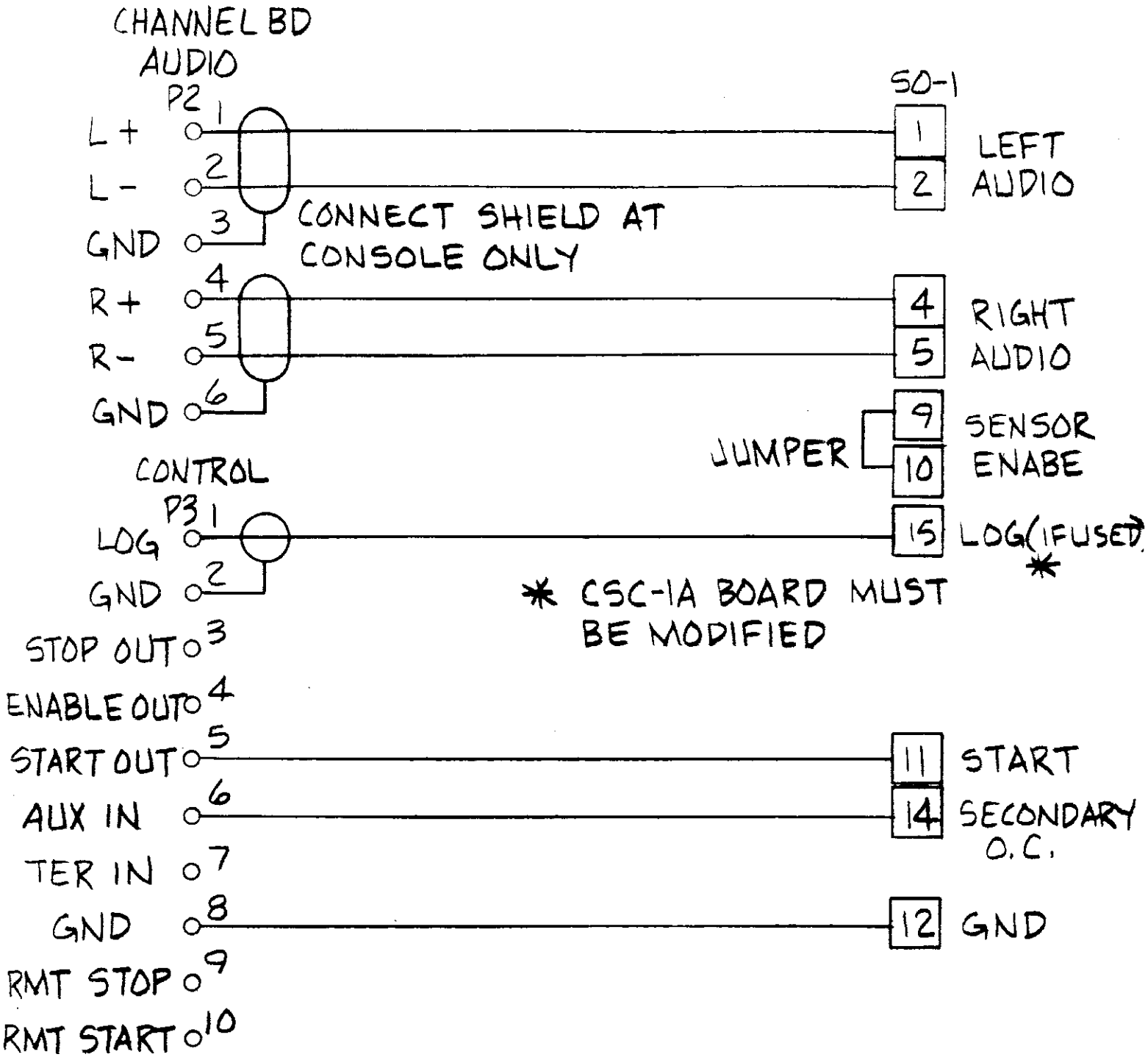
INTERFACE FOR REVOX PR-99 TAPE PLAYBACK MACHINE



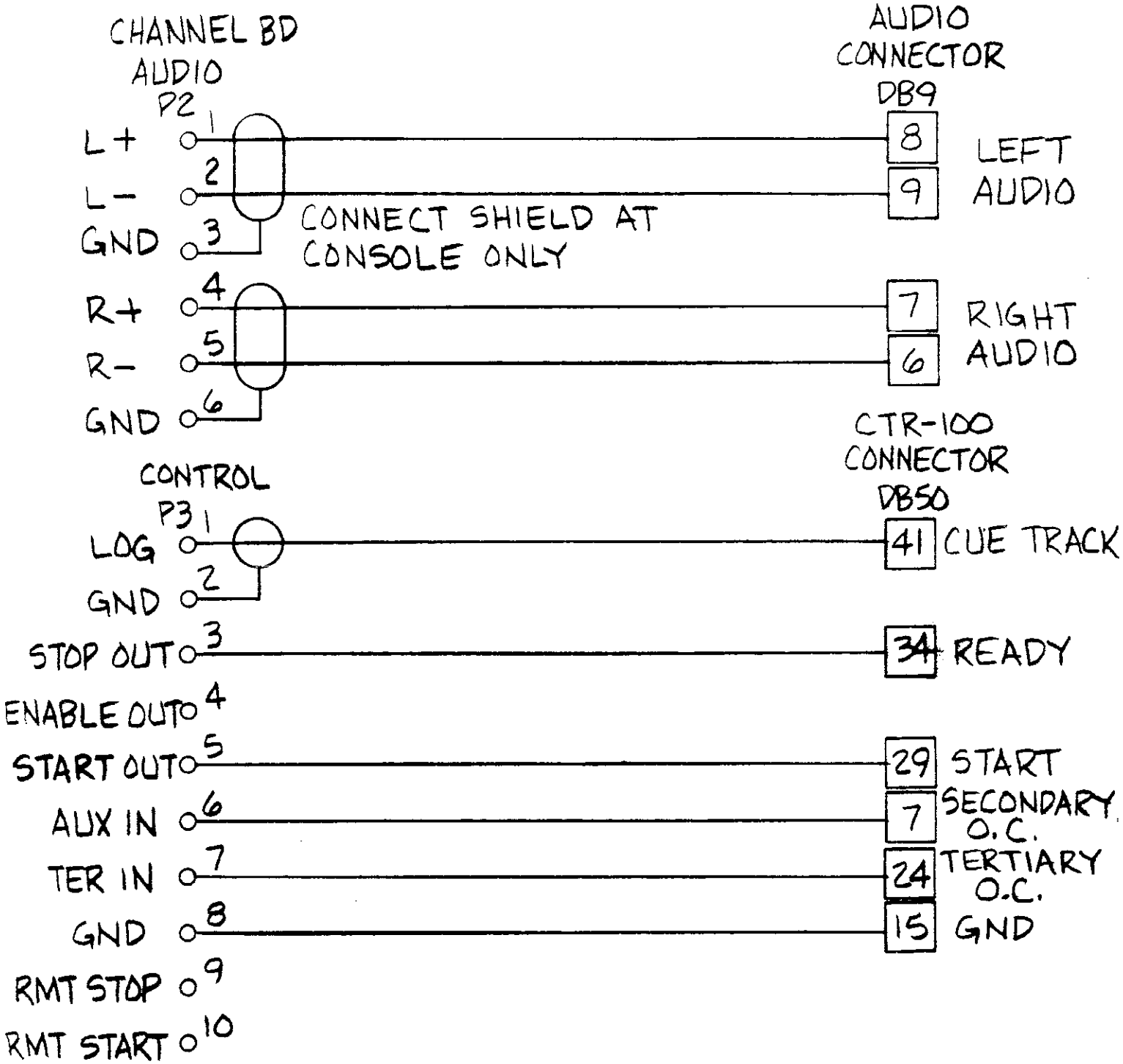
INTERFACE FOR REVOX B77 RECODERS



INTERFACE FOR SMC CAROUSELS 350 & 450 ALSO 700 PLAYBACKS

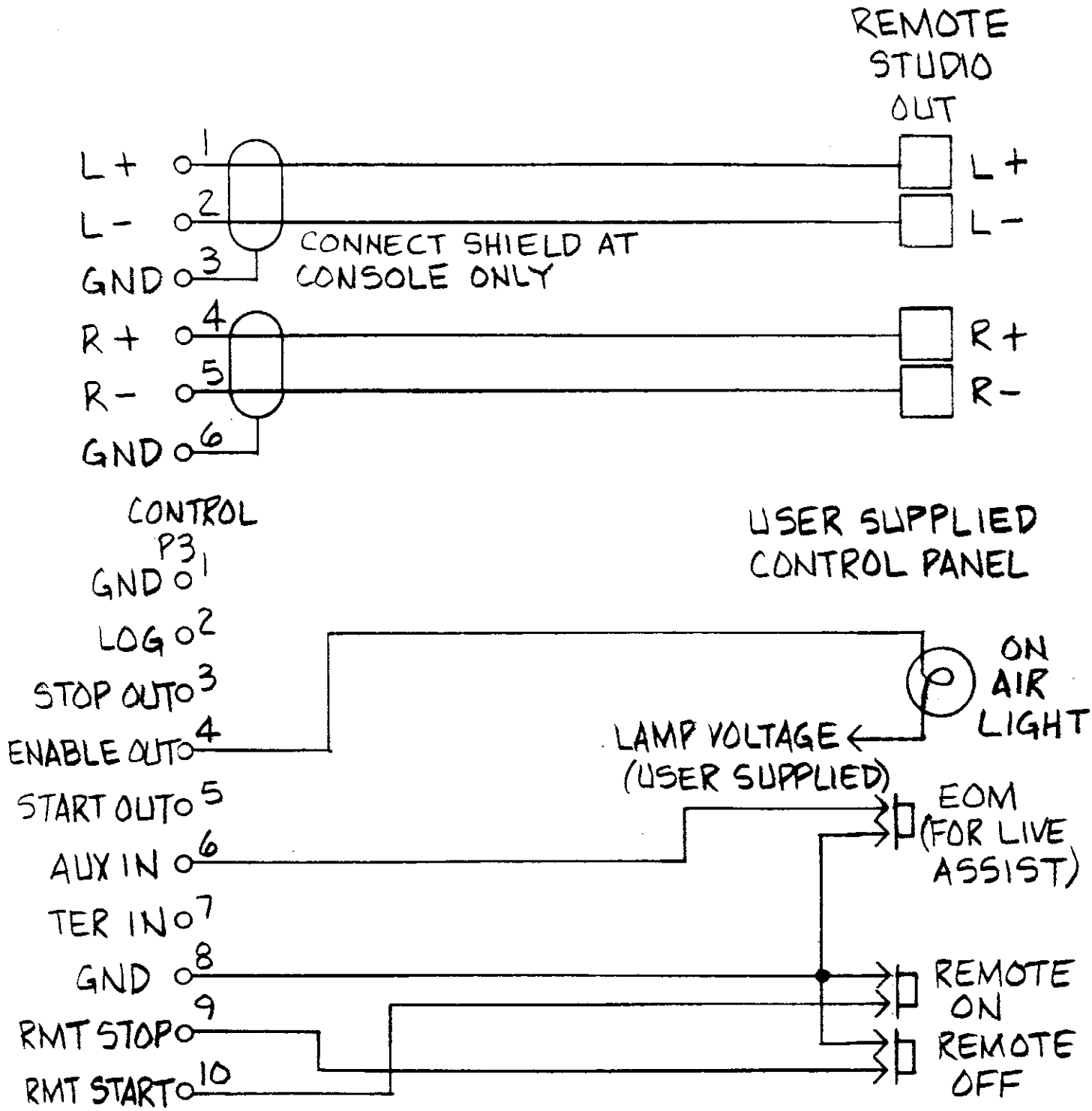


INTERFACE FOR FIDELIPACK DYNAMAX CART MACHINES

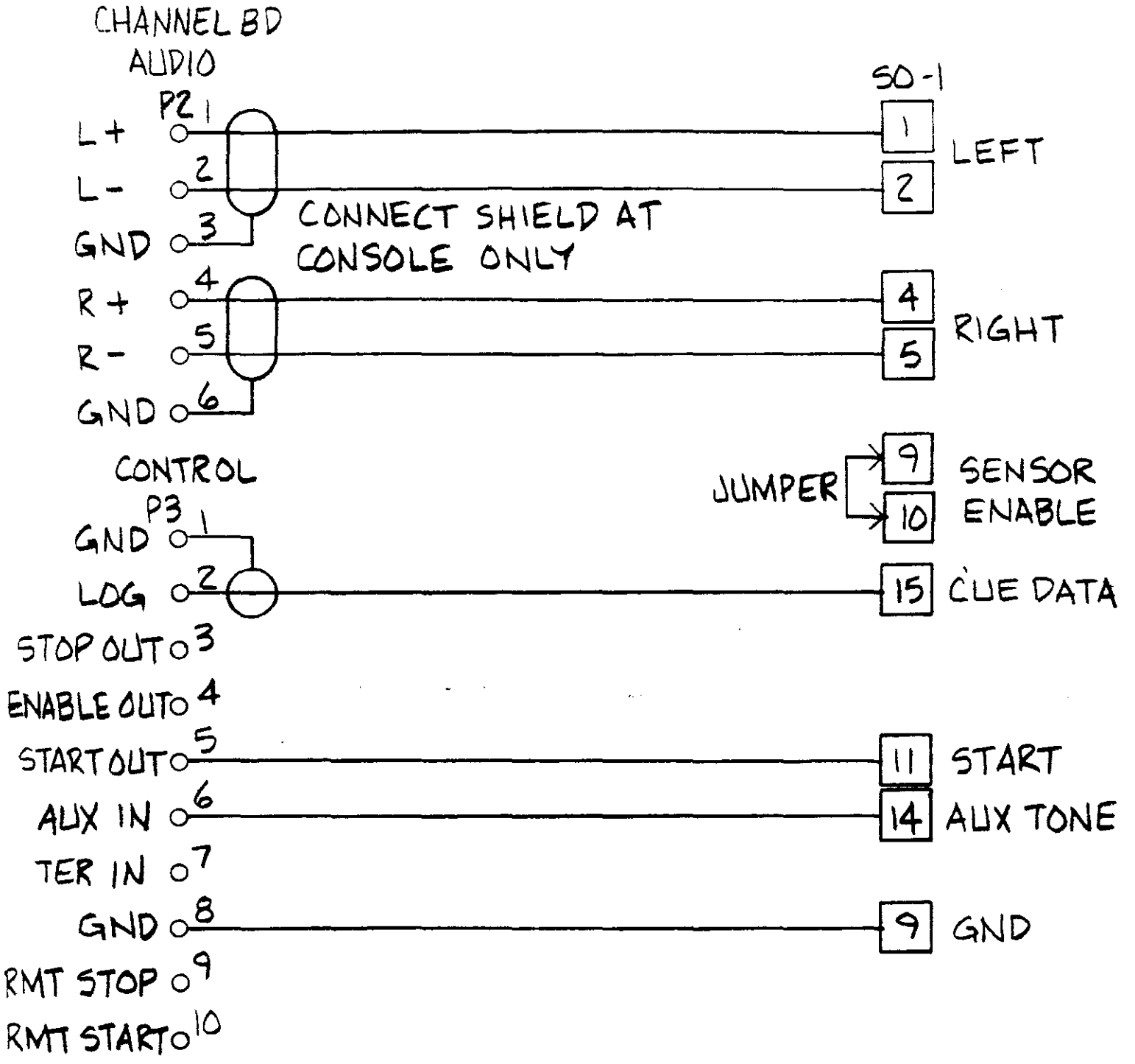


(For Lamp Flash Modification, Please Consult Autogram)

INTERFACE FOR REMOTE STUDIO CONTROL



INTERFACE FOR IGM
GO CART 24



INTERFACE FOR AUDIO-METRICS AMCDS-1000A MULTIPLAY CD PLAYER