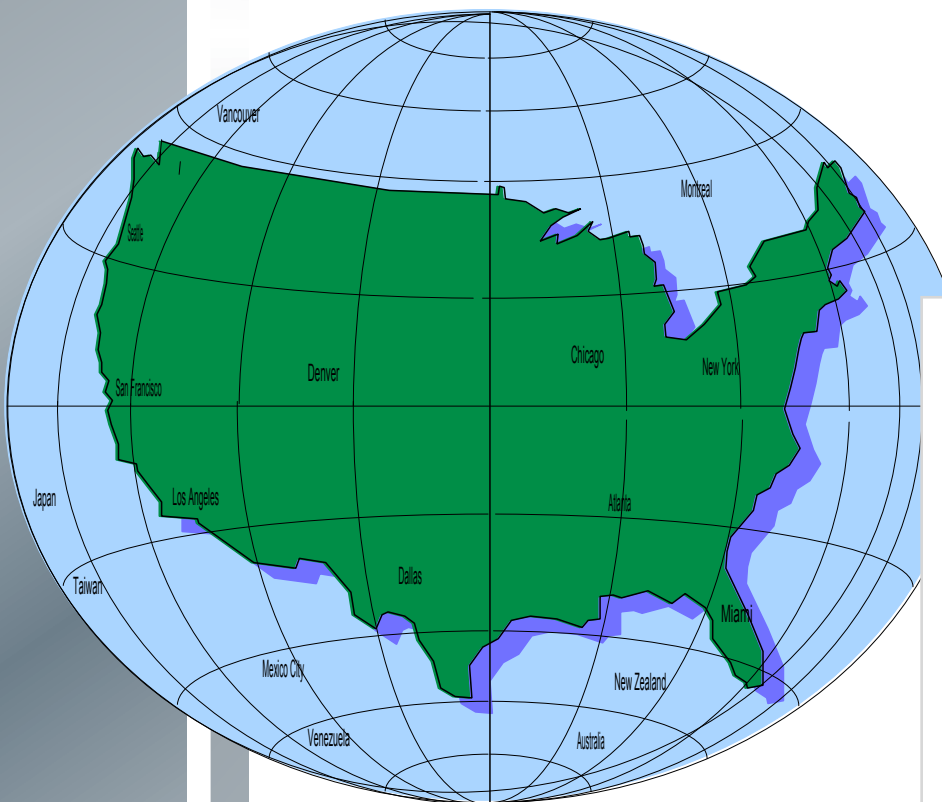


1200 series

Radio Broadcast
Audio Consoles



General Contents

- Section 1
Product Description
- Section 2
Operating Instructions
- Section 3
Installation Procedures
- Section 4
Electronic Description
- Section 5
Specifications
- Section 6
Maintenance & Service
- Section 7
Warranty

O
P
S
M
A
N
U
A
L

WELCOME

A WELCOME TO THE 1200 SERIES

The 1200 Series console represents the pinnacle of over two decades of dedication to audio broadcast console design by Arrakis Systems, inc. This console combines the engineering and manufacturing excellence that has made Arrakis #1 in radio console unit sales in the United States and respected world-wide!

As you work with this manual and the console, please feel free to call our customer service staff with any questions that you may have. Arrakis Systems is dedicated to providing you with the best possible product and the best possible service that can be delivered.

WELCOME

PUBLICATION DATE - 1/99 REV C

This manual covers the entire 1200 Series console line by Arrakis Systems inc.

DANGER

This product contains potentially lethal voltages and currents and should be installed or serviced only by trained and experienced personnel.

WARNING

Audio consoles are complex products. Unlike consumer component stereo equipment, they cannot be properly installed, calibrated, or serviced except by trained and experienced technicians. Arrakis Systems does not take responsibility for warranty repairs to improperly installed equipment.

Table of Contents

Section 1

PRODUCT DESCRIPTION

- 1-1) 1200-5s description
- 1-2) 1200-10s description
- 1-3) 1200-15s description
- 1-4) Electronic Specifications

Section 2

OPERATING INSTRUCTIONS

- 2-1) 1200-5s Operating Instructions
- 2-2) 1200-10s & 1200-15s Operating Instructions
- 2-3) Engraved "OFF" Caps, Colored Fader Knobs

Section 3

INSTALLATION PROCEDURES

- 3-0) IMPORTANT
- 3-1) Unpacking & Physical Installation
- 3-2) Grounding Systems & Ground Loops
- 3-3) Console Audio Input Wiring
- 3-4) Console Audio Output Wiring
- 3-4g) Crimping Instructions
- 3-5) Console Overall I-O Connector Diagram
- 3-6) Mono MIC Level Inputs
- 3-7) Stereo Line Level Inputs
- 3-8) Sustained Logic
- 3-9) Program & Audition Outputs
- 3-10) Monitor & Earphone Outputs
- 3-11) Cue System
- 3-12) Talkback to the Console
- 3-13) Muting Relay
- 3-14) Muting System
- 3-15) Mix-Minus Channel Assignments
- 3-16) Calibration
- 3-16) Remote Selector Switch Wiring

Table of Contents

Section 4	ELECTRONIC DESCRIPTION 4-0) Resistor Color Code & IC Pinouts 4-1) Power Supply 4-2) Console Overview 4-3) Overall Input/ Output Diagram 4-4) Output Board (PC-1200-OB1) 4-5) Input Board (PC-1200-PB3) 4-6) Console Assemblies
Section 5	SPECIFICATIONS & TESTING 5-0) Introductions 5-1) Frequency Response 5-2) Signal to Noise Ratio (SNR) 5-3) Total Harmonic Distortion (THD) 5-4) Crosstalk 5-5) Proof of Performance
Section 6	INSTALLATION PROCEDURES 6-1) Maintenance 6-2) Service
Section 7	WARRANTY

PRODUCT DESCRIPTION

SECTION ONE

Product Description

PRODUCT DESCRIPTION

1-1) 1200 SERIES 5 CHANNEL CONSOLE

FEATURES

- Five input channel console
- Nine total inputs standard
- Slide faders standard
- VCA level control
- DC audio switching
- Relay isolated remote start
- Telephone mix minus bus
- Talkback to a 2nd studio
- Ch 1 is mono mic level standard
- Ch 2-5 are stereo line level
- Stereo output w mono mix
- Assignable Mix minus bus
- Stereo Line level Monitor out
w Dim & Talkback
- 2 external monitor inputs
- Muting relay standard
- Mono Cue w Autocue
- Stereo line level Earphones
- VCA's on Monitor-Q-Earphn
- Six input remote selector
- All balanced input-outputs
- Connector compatible w
1200 series consoles
- also in other size models

DESCRIPTION

The 1200-5S Console is a perfect console for the digital world of today. Designed to complement and support the Arrakis Digilink Extreme, the 1200-5S features VCA control of all faders and DC control of all audio switching.

Upon factory order, any of the five channels may be customer selected to be mono MIC or stereo line level. MIC channels include ON tally, mute and talkback. A six input remote select switch will usually be assigned to channel 4. Channel 5 can be used with a stereo line input or is particularly well suited as an input channel for an Arrakis Digilink Xtreme!

The console features a stereo output with mono mixdown and an internally assigned mix minus bus for telephone hybrid interfacing. With stereo Monitor and Earphone, Mono cue w autocue, plus monitor & talkback to a 2nd studio, the 1200-5S is a full featured professional radio console.

The 1200-5S is ideal for live assist On Air use with a Digilink Xtreme for Newsrooms, talk studios, edit, studios, and production rooms in the digital audio studio of today!!

PRODUCT DESCRIPTION

1-2) 1200 SERIES 10 CHANNEL CONSOLE

FEATURES

- Ten input channel console
- Nineteen total inputs standard
- Slide faders standard
- VCA level control
- DC audio switching
- Relay isolated remote starts
- Telephone mix minus bus
- Talkback to a 2nd studio
- Ch 1 is mono mic level standard
- Ch 2-10 are stereo line level
- Pgm & Aud outputs w mono mix
- Assignable Mix minus bus
- Stereo Line level Monitor out w Dim & Talkback
- 2 external monitor inputs
- Muting relay standard
- Mono Cue w Autocue
- Stereo line level Earphones
- VCA's on Monitor-Q-Earphn
- Two 6 input remote selectors
- All balanced input-outputs
- Connector compatible w 12000 series consoles
- also in other size models

DESCRIPTION

The 1200-10S Console is an ideal mid-sized console for the digital world of today! Designed to complement and support the Arrakis Digilink Xtreme, the 1200-10S features VCA control of all faders and DC control of all audio switching.

Upon factory order, any of the 10 channels may be customer selected to be mono mic or stereo line level. MIC channels include ON tally, mute and talkback. Two user wired 6 input remote select switches provide additional inputs. The line input channels are particularly well suited as input channels for an Arrakis Digilink Xtreme!

The console features two stereo outputs (Pgm, Aud) with mono mixdowns and an internally assigned mix minus bus for telephone hybrid interfacing. With stereo Monitor and Earphone, Mono cue w autocue, plus monitor & talkback to a 2nd studio, the 1200-10S is a full featured professional radio console.

The ten channel 1200-10S is ideal for live assist On Air use with a Digilink Xtreme for Newsrooms, talk studios edit studios, and production rooms in the digital audio studio of today!

PRODUCT DESCRIPTION

1-3) 1200 SERIES 15 CHANNEL CONSOLE

FEATURES

- Fifteen input channel console
- Fourteen total inputs standard
- Slide faders standard
- VCA level control
- DC audio switching
- Relay isolated remote starts
- Telephone mix minus bus
- Talkback to a 2nd studio
- Ch 1 is mono mic level standard
- Ch 2-15 are stereo line level
- Pgm & Aud outputs w mono mix
- Assignable Mix minus bus
- Stereo Line level Monitor out
w Dim & Talkback
- 2 external monitor inputs
- Muting relay standard
- Mono Cue w Autocue
- Stereo line level Earphones
- VCA's on Monitor-Q-Earphn
- Two 6 input remote selectors
- All balanced input-outputs
- Connector compatible w
12000 series consoles
- also in other size models

DESCRIPTION

The 1200-15S Console is an ideal mid-sized console for the digital world of today! Designed to complement and support the Arrakis Digilink Xtreme, the 1200-15S features VCA control of all faders and DC control of all audio switching.

Upon factory order, any of the 15 channels may be customer selected to be mono mic or stereo line level. MIC channels include ON tally, mute and talkback. Two user wired 6 input remote select switches provide additional inputs. The line input channels are particularly well suited as input channels for an Arrakis Digilink Xtreme!

The console features two stereo outputs (Pgm, Aud) with mono mixdowns and an internally assigned mix minus bus for telephone hybrid interfacing. With stereo Monitor and Earphone, Mono cue w autocue, plus monitor & talkback to a 2nd studio, the 1200-15S is a full featured professional radio console.

The ten channel 1200-15S is ideal for live assist On Air use with a Digilink, Xtreme for Newsrooms, talk studios edit studios, and production, rooms in the digital audio studio of today!

PRODUCT DESCRIPTION

1-4) ELECTRONIC SPECIFICATIONS

STEREO LINE INPUT

a) Frequency Response -	±0.5dB typical, 20 Hz to 20kHz
b) Signal to Noise -	-85dB typical, +8dBu in, +8dBu out
c) Total Harmonic Distortion -	.02% typical, +8dBu in, +8dBu out
d) Stereo Separation -	-82dB typical (1kHz), -68dB typical (20kHz)
e) Program to Audition X-talk -	-85dB typical (1kHz), -75dB typical (20kHz)
f) Cue to Program X-talk -	-90dB typical (1kHz), -75dB typical (20kHz)
g) Maximum Input, Output -	+23dBu, balanced input and output

MIC INPUT

a) Frequency Response -	±0.5dB typical, 20 Hz to 20kHz
b) EIN -	-115dB typical, -50dBu in, +8dBu out
c) Total Harmonic Distortion -	.05% typical, -50dBu in, +8dBu out

NOTE- All tests are typical. All tests were performed on an Audio Precision test suite. Specifications are subject to change without notice.

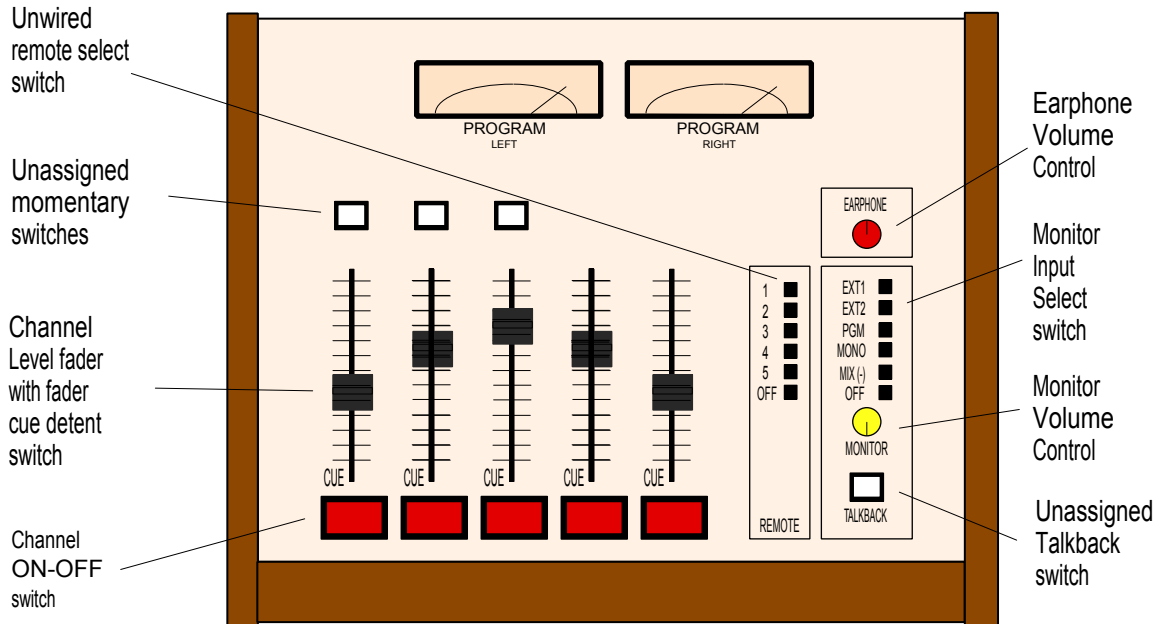
OPERATING INSTRUCTIONS

SECTION TWO

OPERATING INSTRUCTIONS

OPERATING INSTRUCTIONS

2-1) BASIC OPERATION - 5 channel 1200 console



1) Input Channels

This is a five channel console with a single input per channel. Channels can be selected as mono mic or stereo line level when factory ordered. Each slide fader on line level channels has a cue detent switch at the bottom of travel to activate the mono mix cue system. The illuminated channel ON-OFF switches are push once for ON and push again for OFF. The push button switches above channels 1-3 are unwired and may be customer assigned to a variety of custom switch or tally functions.

2) Remote Select Switch

This six position interlocked switch is 4PDT and may therefore switch stereo balanced audio signals. The switch comes unwired from the factory for maximum flexibility.

3) Earphone System

The earphone input follows the monitor select switch. A volume control is provided. The earphone will 'Autocue' (dim the program audio and play mono cue over the right earphone speaker) when a channel is placed into cue. External Talkback will also appear in the right speaker over the dimmed program audio.

4) Monitor

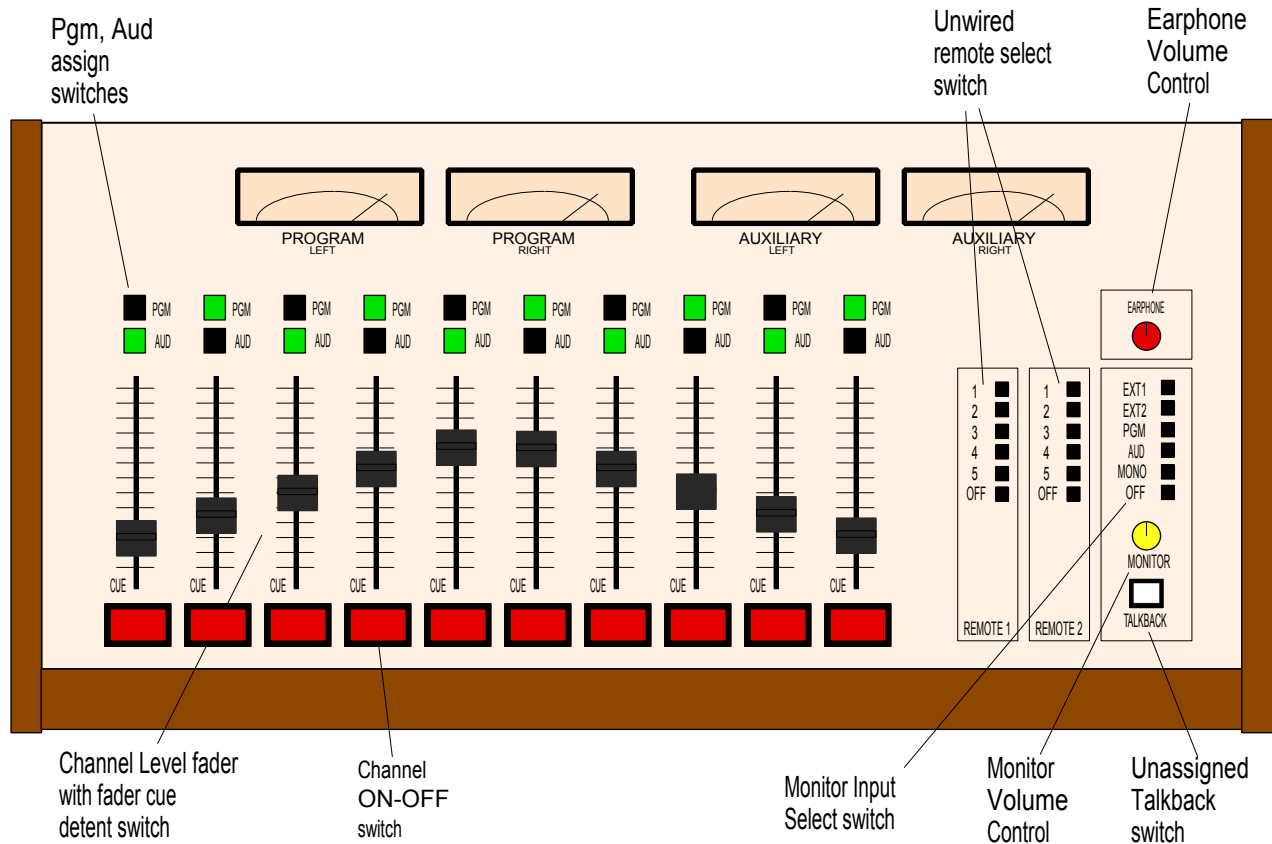
The monitor system may select any one of five inputs: 1) External Input 1, 2) External Input 2, 3) Program, 4) Mono mix of Program, or 5) the Mix Minus output. The monitor system will 'Autocue' (dim the program audio and play mono cue over the right monitor speaker) when a channel is placed into cue. External Talkback will also appear in the right speaker over the dimmed program audio. The unassigned 'Talkback' switch may be user wired to switch mic audio to feed talkback to another studio.

5) VU Meters

The meters will follow the Monitor input select switch so that you may meter the off air signal as well as the other buses.

OPERATING INSTRUCTIONS

2-2) BASIC OPERATION - 10 & 15 channel 1200 console



1) Input Channels

This is a ten or fifteen channel console with a single input per channel. Channels can be selected as mono mic or stereo line level when factory ordered. Each slide fader on line level channels has a cue detent switch at the bottom of travel to activate the mono mix cue system. The illuminated channel ON-OFF switches are push once for ON and push again for OFF. The push button switches above the channels are output bus assign switches.

2) Remote Select Switch

These six position interlocked switches are 4PDT and may therefore switch stereo balanced audio signals. The two switches come unwired from the factory for maximum flexibility.

3) Earphone System

The earphone input follows the monitor select switch. A volume control is provided. The earphone will 'Autocue' (dim the program audio and play mono cue over the right earphone speaker) when a channel is placed into cue. External Talkback will also appear in the right speaker over the dimmed program audio.

4) Monitor

The monitor system may select any one of five inputs: 1) External Input 1, 2) External Input 2, 3) Program, 4) Audition, or 5) Mono mix of Program. The monitor system also will 'Autocue' (dim the program audio and play mono cue over the right monitor speaker) when a channel is placed into cue. External Talkback will also appear in the right speaker over the dimmed program audio. The unassigned 'Talkback' switch may be user wired to activate talkback logic & feed talkback audio into another studio.

5) VU Meters

The Program meters are fixed to the Program bus. The 'Aux' set of meters will follow the Monitor input select switch so that you may meter the off air signal as well as the other buses.

OPERATING INSTRUCTIONS

2-3) ENGRAVED ON/OFF CAPS & COLORED FADER KNOBS

2-3a) STANDARD ENGRAVED CAPS

The blank RED "ON-OFF" cap on each input module can be replaced with an engraved one. Engraved caps are available from Arrakis Systems upon special order (part N¼ TSC-xxxx, TSC-MIC1 for example).

A list of available engravings:

MIC ANNC	CART 2	REM 1	DAT 2	HOST MIC
MIC 1	CART 3	REM 2	DAT 3	TALENT
MIC 2	CART 4	REM 3	TRACK 1	NEWS
MIC 3	CART 5	RR 1	TRACK 2	TRAFIC
CD 1	CART 6	RR 2	TRACK 3	NET
CD 2	TT 1	RR 3	TRACK 4	EFX
CD 3	TT 2	CD 4	TRACK 5	CHURCH
CART REC 1	TT 3	CASS 1	TRACK 6	SPORTS
CART REC 2	PHONE 1	CASS 2	TRACK 7	STUDIO
CART REC 3	PHONE 2	CASS 3	TRACK 8	EAS
CART 1	PHONE 3	DAT 1	GUEST MIC	WX

2-3b) CUSTOM ENGRAVED CAPS

Custom engraving is also available (part N¼ TCC-xxxx). The cap will fit two lines of type, with 7 characters per line (including blank spaces).

2-3c) COLORED FADER KNOBS

Black fader knobs come standard, except for MIC channels which have white fader knobs. Other colors are available through special order. The part number is TCF-xxxx. For example, a RED knob is called TCF-RED.

Available colors:

RED YELLOW ORANGE GREY GREEN WHITE BLUE

INSTALLATION PROCEDURES

SECTION THREE

INSTALLATION PROCEDURES

INSTALLATION PROCEDURES

IMPORTANT

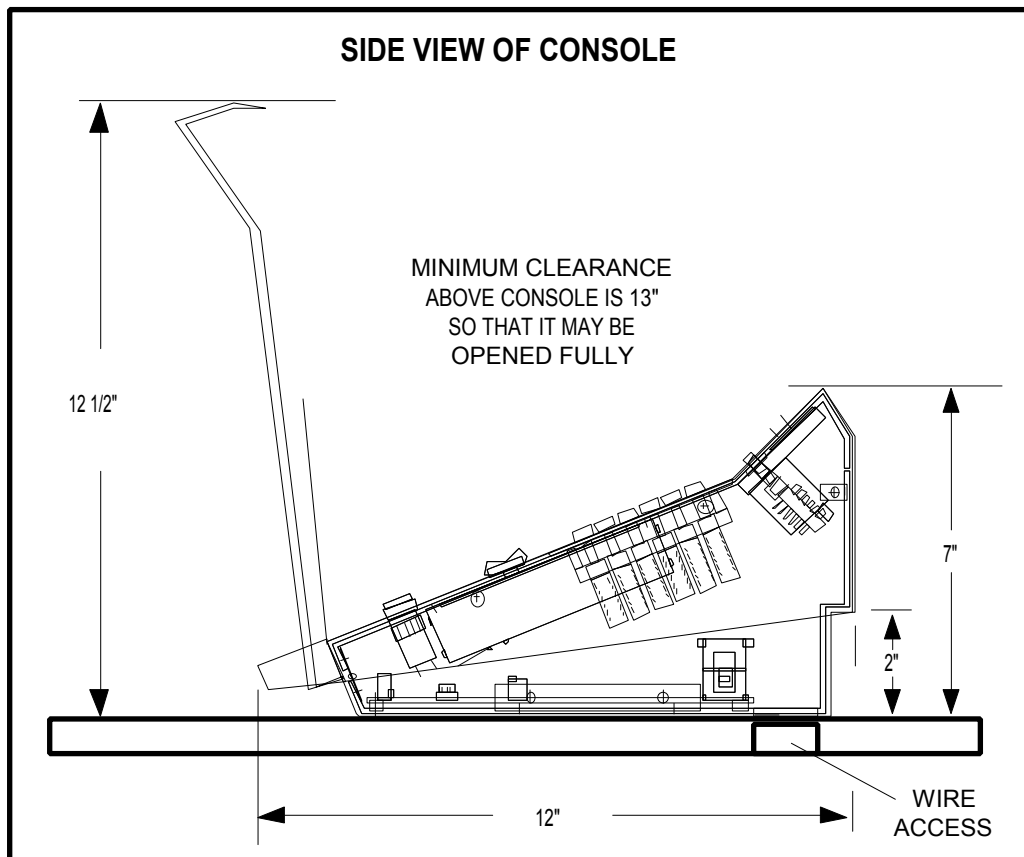
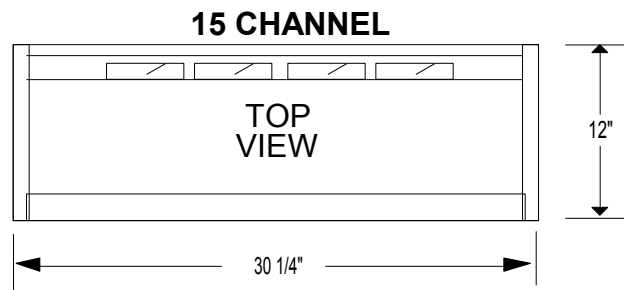
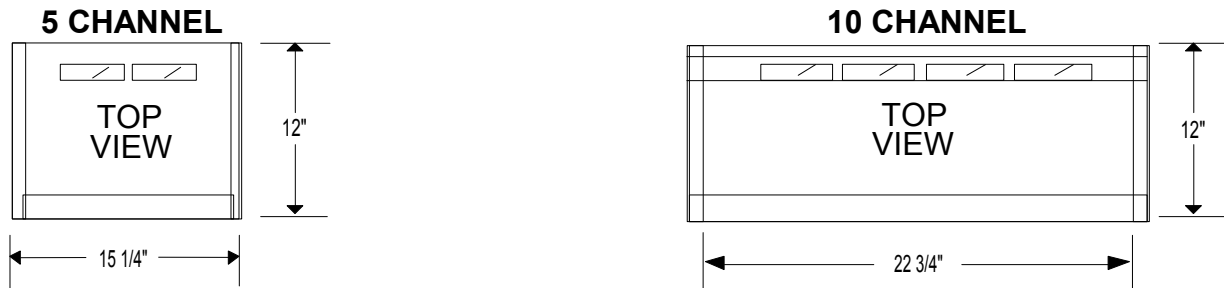
- READ THESE INSTRUCTIONS CAREFULLY -

These instructions provide specific information for this product that must be followed for correct installation and calibration. Incorrect installation will reduce performance, damage the console, or damage other equipment in the studio. Arrakis Systems does not take warranty responsibility for equipment that is not installed per this manual.

INSTALLATION PROCEDURES

3-1) UNPACKING & PHYSICAL INSTALLATION (continued)

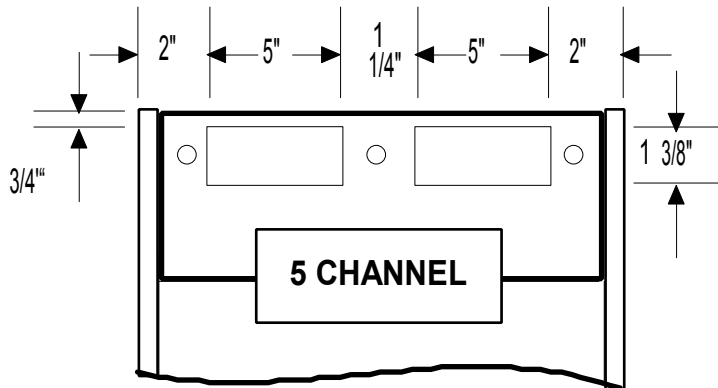
3-1e) TABLETOP CONSOLE DIMENSIONS AND CLEARANCES



INSTALLATION PROCEDURES

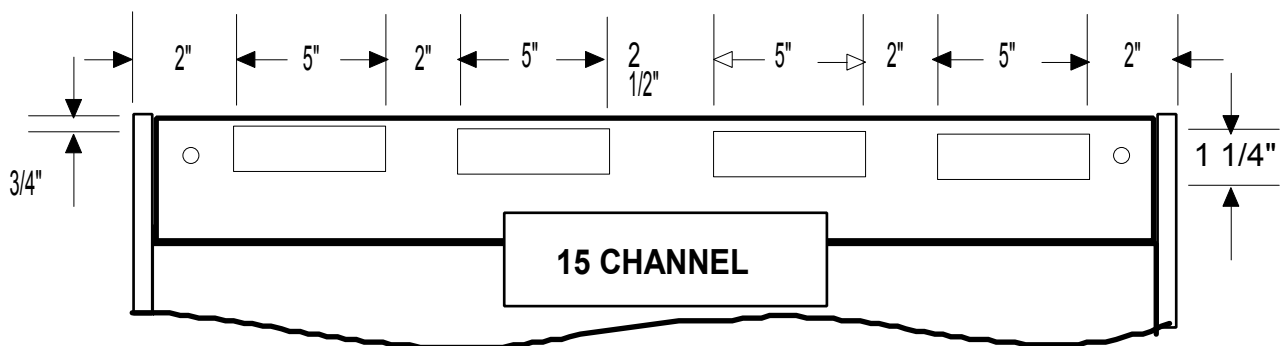
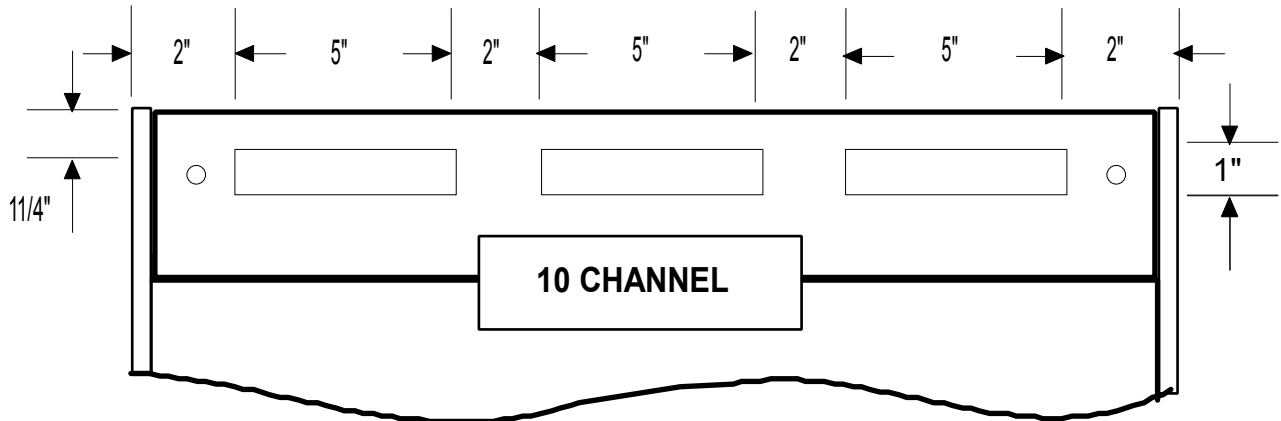
3-1) REV-12 Rear Panel Connections

3-1f) CABLE CUTOUT DIMENSIONS, TABLETOP CONSOLE



TABLETOP CONSOLES

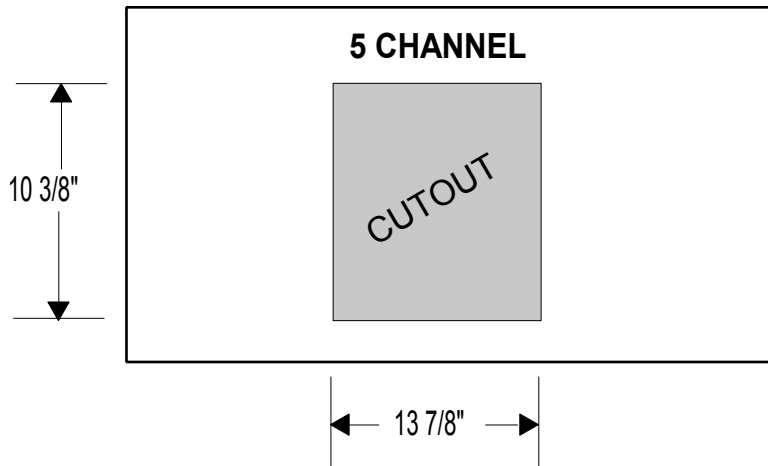
Cabling routes through CABLE ACCESS CUTOUTS in the bottom rear of the console. Cut holes in the tabletop beneath the console to ease cable routing and installation.



INSTALLATION PROCEDURES

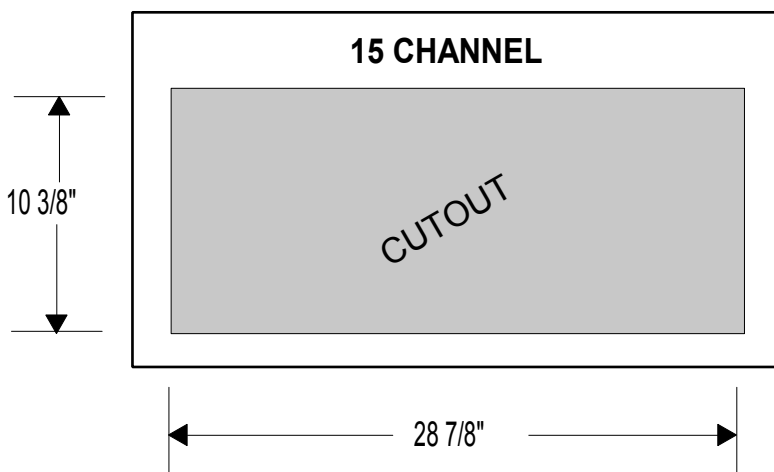
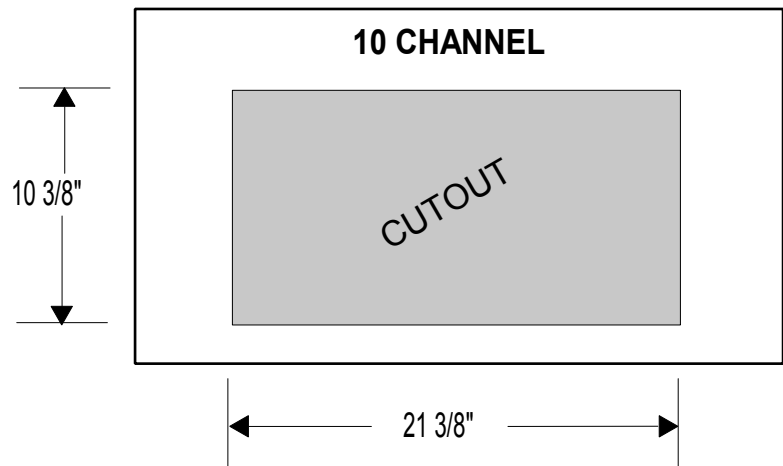
3-1) UNPACKING & PHYSICAL INSTALLATION (continued)

3-1g) TABLE SURFACE CUTOUT DIMENSIONS, THRU-TABLE MOUNTING



THRU-TABLE CONSOLES

A rectangular hole in the surface of the table is required for console installation when mounting through the tabletop.



INSTALLATION PROCEDURES

3-2) GROUNDING

3-2a) GROUNDING OVERVIEW

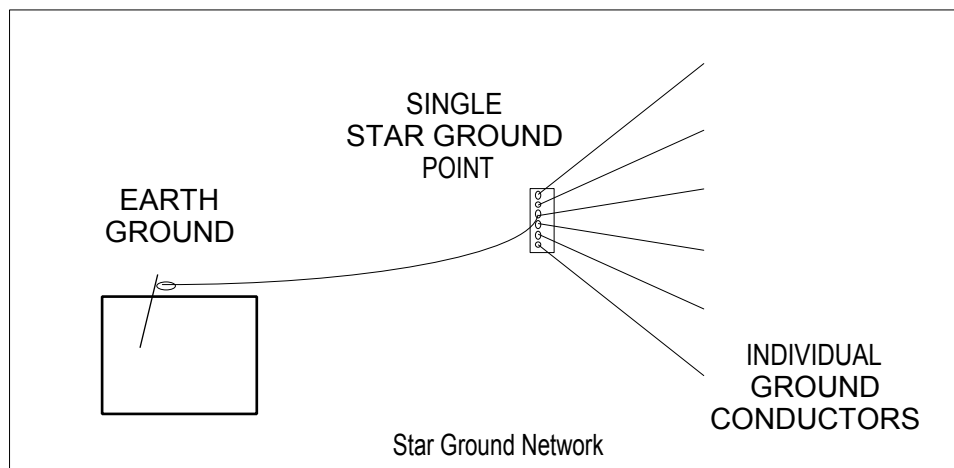
An audio installation is only as good (or bad) as its grounding system. Poor grounding practices are the number one cause of RF interference, hum, crosstalk and noise.

Grounding is used for FOUR distinct and different purposes:

- (1) SAFETY FROM SHOCK HAZARD
- (2) SHIELDING FROM RF INTERFERENCE
- (3) AC POWER DISTRIBUTION
- (4) REFERENCING BETWEEN TWO OR MORE PIECES OF ELECTRONIC EQUIPMENT (ELECTRONIC GROUND)

These four purposes are often at odds with each other and therefore require separate grounding systems. As an example, AC power ground carries large current and creates transients as equipment is turned on and off. It is therefore not a clean ground and should not be used for or connected to Electronic Ground where it will induce noise. As another example, RF ground should drain RF energy away from electronic semiconductor devices AND Electronic Ground where the RF can be reintroduced into the equipment. A last example is Shock Hazard ground (Chassis ground) which is AC ground from the third prong of the AC power plug. This ground is normally connected to the metal chassis of the electronic product to prevent shock hazard. If this ground is connected to Electronic Ground and an unbalanced signal wire is used (it will have Electronic Ground also), then there are two different ground paths and a ground loop is created with its associated 60 cycle hummmmm. The important point in this discussion is to remember the basic principle that Electronic Ground must remain pure and NOT connected to (1) Safety Ground (2) RF Ground or (3) AC Power Ground. Star ground networks are effective in reducing crosstalk and hum.

IMPORTANT --- SMALL STUDIOS CAN BE ASSEMBLED USING SLOPPY GROUNDING PRACTICES AND OFTEN WORK ACCEPTABLY. HOWEVER, THAT IS SIMPLY LUCK. GOOD GROUNDING PRACTICES SHOULD ALWAYS BE USED!!!



INSTALLATION PROCEDURES

3-2) GROUNDING (continued)

3-2b) CONSOLE GROUNDING

The console has two parts. One is the console itself, the second is the power supply.

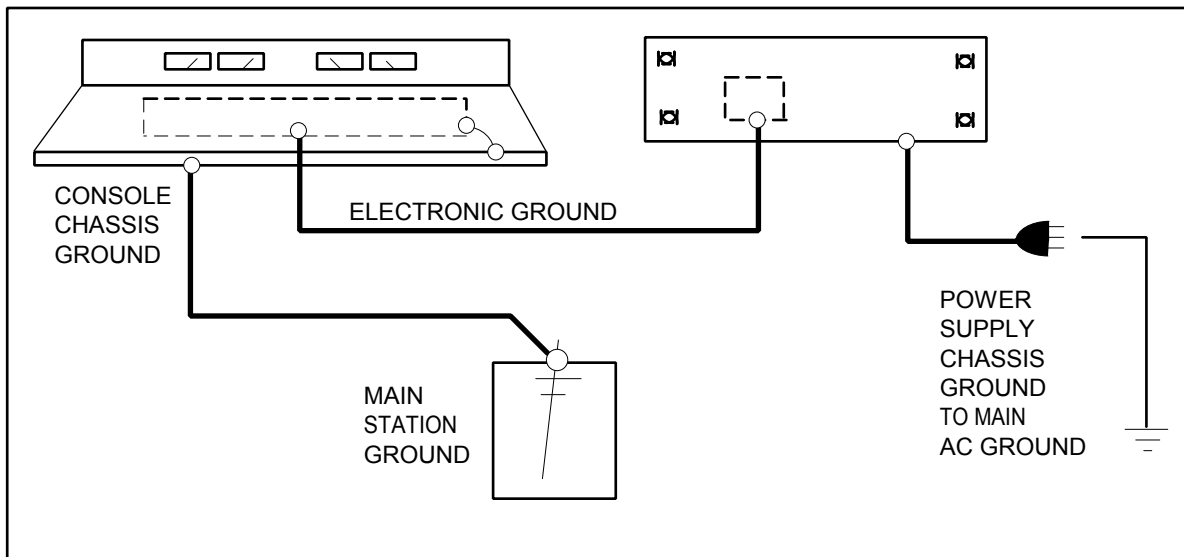
POWER SUPPLY GROUND

Since the power supply contains AC, the chassis of the power supply is connected internally to **NEVER** be defeated the third prong of the AC power plug (AC System Ground). This should through the use of a 3-2 prong adapter. If the chassis of the power supply is not grounded a serious shock hazard exists. The Electronic Ground from the open-frame supplies in the cabinet are FLOATED with respect to power supply Chassis Ground. The 3-2 prong adapter therefore will not remove a ground loop since none exists.

CONSOLE CHASSIS GROUND

The chassis of the console is connected to Electronic Ground. It is not connected to AC Ground or RF ground. There is no AC in the console itself. For RF protection, the chassis should be grounded to main station ground. To connect the console chassis to ground, a 1/4" holes are provided for a grounding stud. The holes are located on the bottom rear of the chassis, to either side. In high RF fields, or highest quality installations, a 4 inch copper ground strap should be used to ground the console chassis to the main Station Ground. Be sure to a studded lock washer that will penetrate the paint surface and securely connect to the aluminum of the chassis itself.

CONSOLE AND POWER SUPPLY GROUNDING DIAGRAM



INSTALLATION PROCEDURES

3-2) GROUNDING (continued)

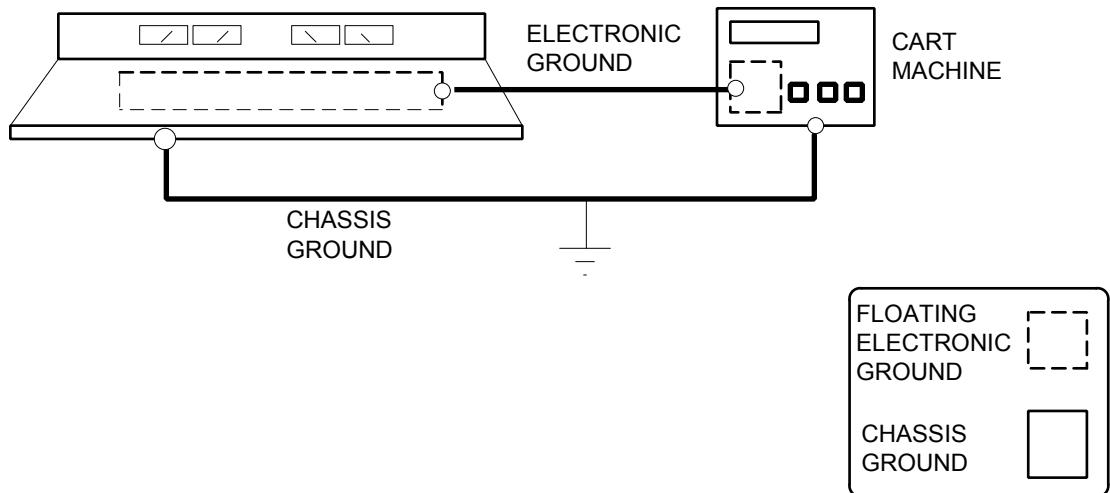
3-2c) GROUND LOOPS

Modern audio consoles do NOT generate 60 or 120 cycle hum. Hum is caused by 60 cycle radiation from power supply transformers located too close physically to electronic equipment (generally 1"-6") or by **GROUND LOOPS!**

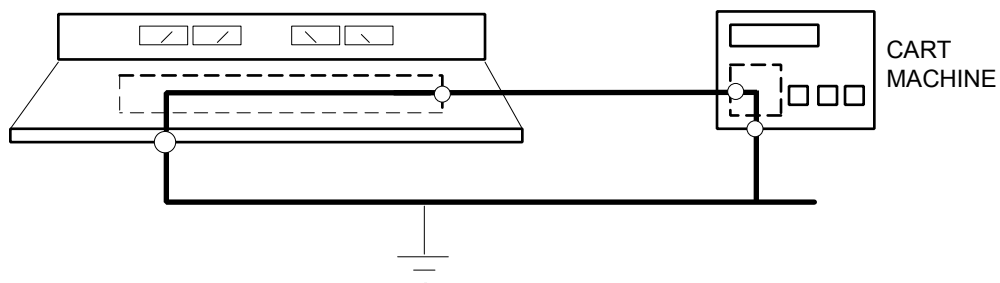
A ground loop is a low frequency LOOP ANTENNA which picks up 60 cycles being radiated within the building from its AC power distribution system. The loop is created when two pieces of equipment have more than one ground path between them.

THE WAY TO REMOVE THE HUM IS TO SIMPLY TO BREAK THE LOOP !!

No ground loop



With ground loop



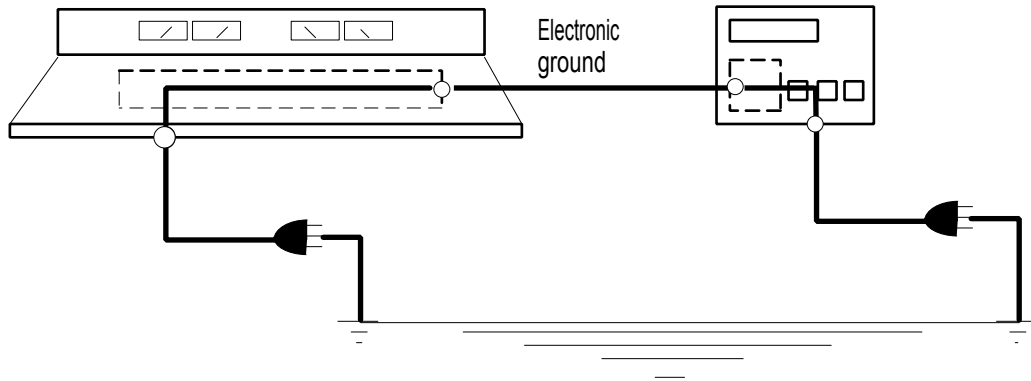
NOTE: A ground loop is created when chassis and electronic ground are connected in both pieces of equipment. This is generally accomplished through the AC ground on the third prong of the AC power cord or by connecting the audio cable shield at both ends.

INSTALLATION PROCEDURES

3-2) GROUNDING (continued)

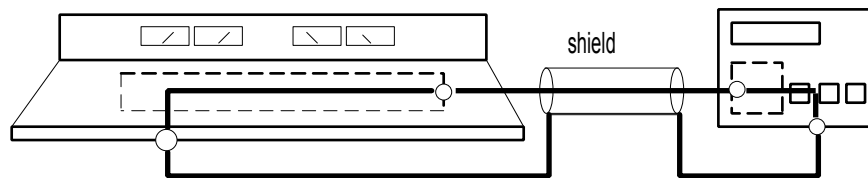
3-2c) GROUND LOOPS (continued)

Unbalanced source ground loop



A typical ground loop is formed when Electronic Ground is connected within the product to Chassis Ground. Unbalanced semi-pro equipment is often built this way. Unbalanced equipment requires that Electronic Ground be connected through the audio signal cable between the two pieces of equipment. The third prong of the AC power plug completes the ground loop. Lifting the third prong or insertion of an audio isolation transformer are the only ways to break the loop.

Shield ground loop



Another typical ground loop is created when audio cabling has the shield connected at both ends between two pieces of equipment. It doesn't matter whether the shield is connected to Chassis or Electronic Ground, it is incorrect. Correct procedure is for the shield to be connected at ONE end only and that end should be the SOURCE equipment chassis. Remember, the only purpose for the shield is to drain RF interference to ground away from Electronic Ground and any electronic components. That means that grounding of the shield is only required at one end.

INSTALLATION PROCEDURES

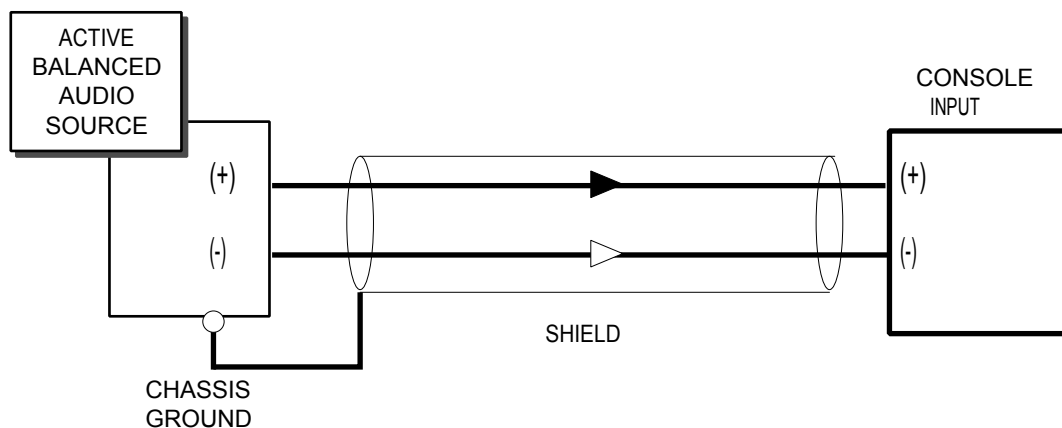
3-3) INPUT WIRING

3-3a) RECOMMENDED WIRE

Only individually FOIL SHIELDED TWISTED PAIR cable is recommended by Arrakis Systems. Use of unshielded twisted pair such as multipair telephone cable is NOT recommended for a quality installation that will achieve the maximum possible performance from this console.

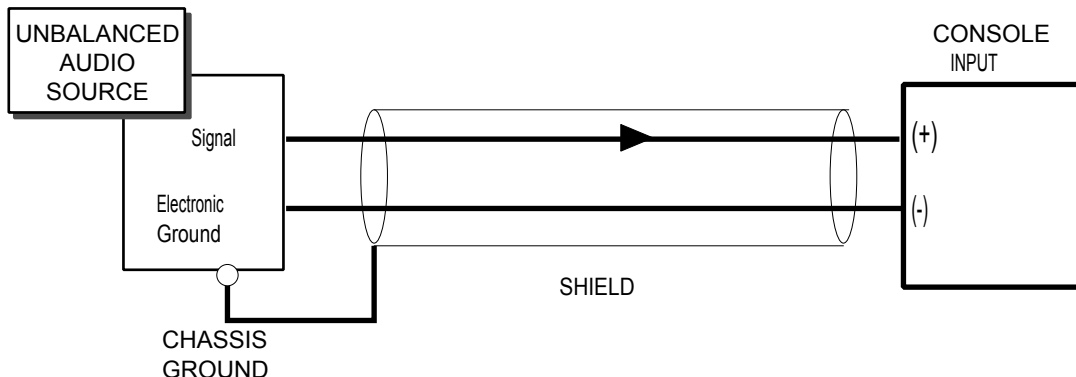
3-3b) BALANCED SOURCE OUTPUT TO BALANCED CONSOLE INPUT

The use of BALANCED wiring is strongly recommended



3-3c) UNBALANCED SOURCE OUTPUT TO BALANCED CONSOLE INPUT

Use this wiring method for low noise installation of unbalanced audio sources to the console. 60 cycle hum will be rejected and ground loops avoided IF the Electronic Grounds are not connected between the source and console.

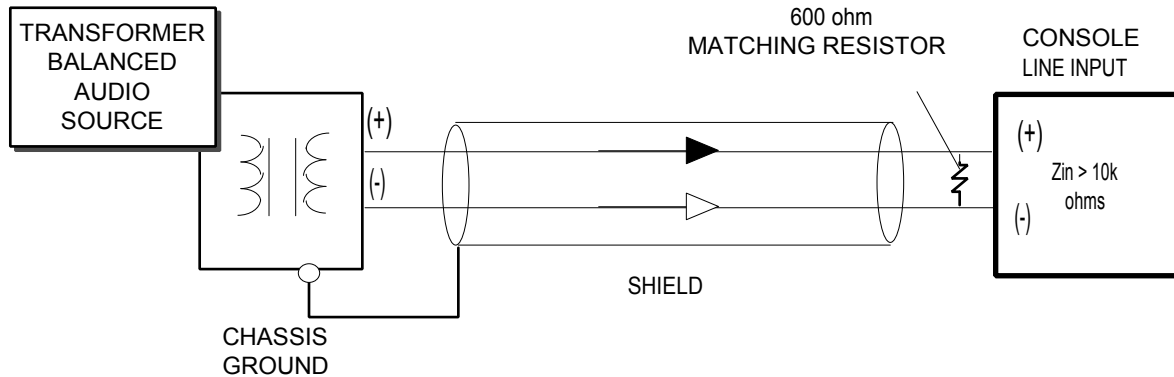


INSTALLATION PROCEDURES

3-3) INPUT WIRING (continued)

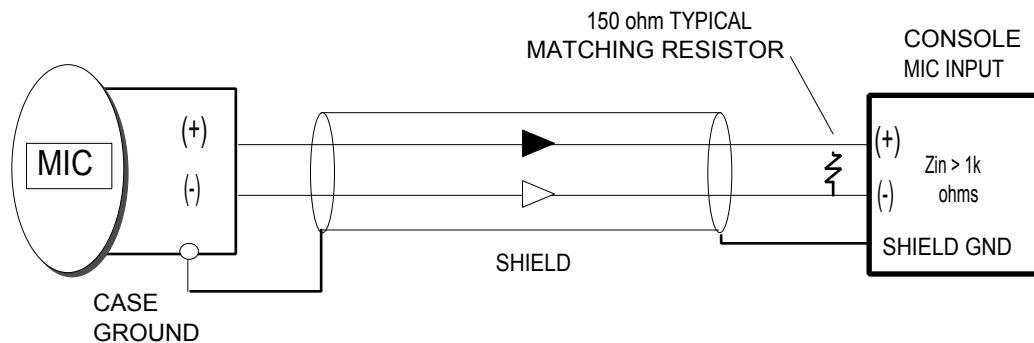
3-3d) LINE LEVEL TRANSFORMER BALANCED SOURCE OUTPUT TO ACTIVE BALANCED CONSOLE INPUT

The Source Transformer Output wants to see a fixed impedance of generally 600 ohms for it to meet frequency response and distortion specifications. The Console Input is high impedance (>10,000 ohms). To match impedances, a 600 ohm resistor must be placed across the input of the console as shown below.



3-3e) MIC LEVEL BALANCED SOURCE OUTPUT TO MIC LEVEL ACTIVE BALANCED CONSOLE INPUT

Most MICs will interface directly to the console's high impedance input, however some MICs require a matching resistor to be placed across the console input to insure proper frequency response and distortion characteristics. Refer to the MIC's spec sheet for impedance matching information. High voltage static discharges can ruin the MIC module's input stage. The MIC channel inputs are diode protected against most static discharges.



Stereo MICs need to be run through an outboard stereo MIC preamp then brought into the console as a stereo line level signal.

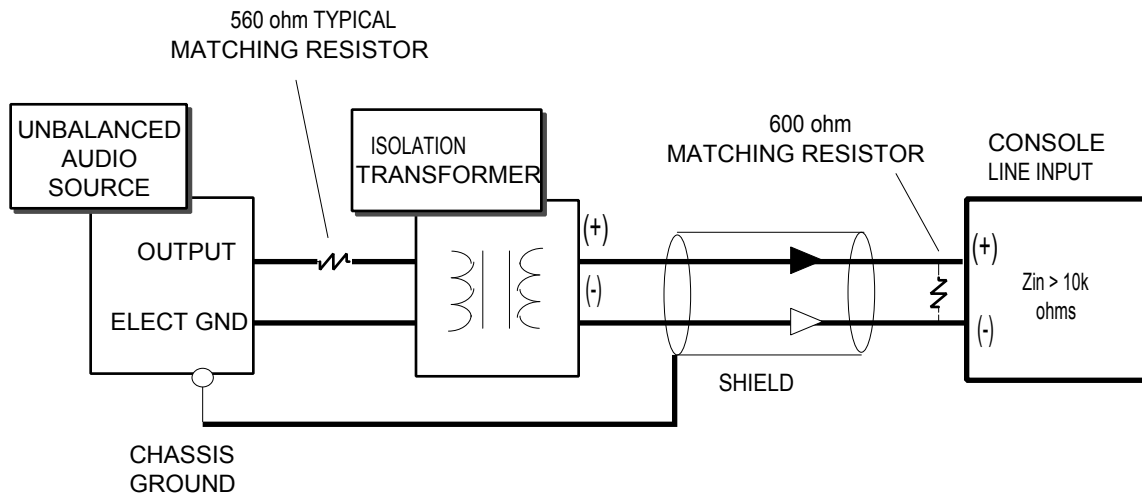
INSTALLATION PROCEDURES

3-3) INPUT WIRING (continued)

3-3f) UNBALANCED SOURCE OUTPUT THROUGH AN ISOLATION TRANSFORMER TO BALANCED CONSOLE INPUT

In some situations an Isolation Transformer is required to solve tough RF Interference or ground loop problems where the Source Output is unbalanced. The Isolation Transformer must be impedance matched to both the source and the console. Typically a 600 ohm audio transformer is used whose inputs and outputs want to see a fixed impedance of 600 ohm for it to meet frequency response and distortion specifications. The Console Input is high impedance (>10,000 ohms). To match impedances, a 600 ohm resistor must be placed across the input of the console as shown below.

Most unbalanced sources are low impedance but not all. Check the Z_{out} spec of the source device to insure the proper matching resistors are placed in series with the transformer primary leads. The total resistance, $Z_{out} + Z_{series}$, should equal 600 ohm for a 600 ohm transformer. Different transformers and resistors may have to be used for proper impedance matching.

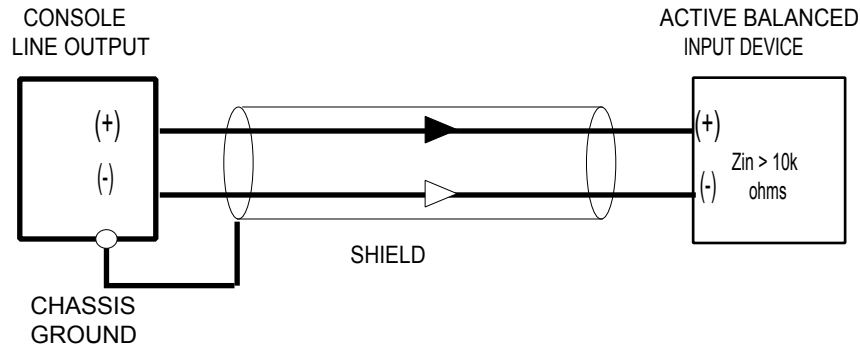


INSTALLATION PROCEDURES

3-4) OUTPUT WIRING

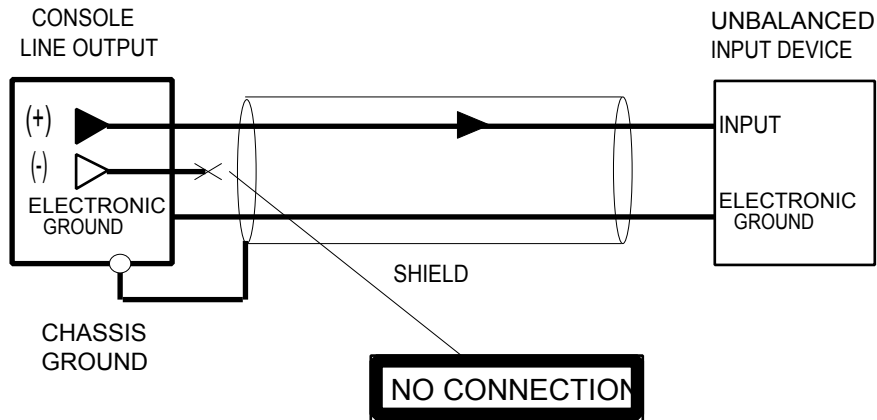
3-4a) CONSOLE BALANCED OUTPUT TO ACTIVE BALANCED INPUT

The console outputs are low impedance (>100 ohms balanced) and can therefore directly drive multiple high impedance inputs (>10k ohm) without a distribution amplifier. These active balanced (transformerless) outputs do NOT require a terminating resistor as a transformer balanced output would.



3-4b) CONSOLE BALANCED OUTPUT TO UNBALANCED INPUT

This diagram illustrates an active balanced console output to an unbalanced equipment input. Note that the (-) console output is left unconnected. If the (-) console output is grounded as you would with a transformer balanced output, then the console's output driver amplifier would be shorted and eventually fail.

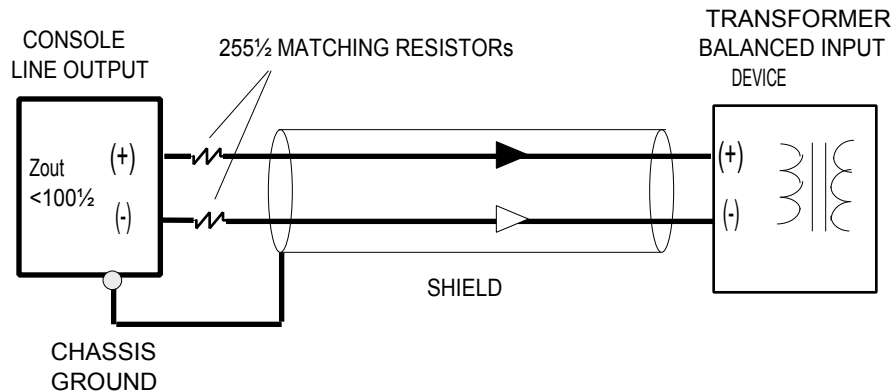


INSTALLATION PROCEDURES

3-4) OUTPUT WIRING (continued)

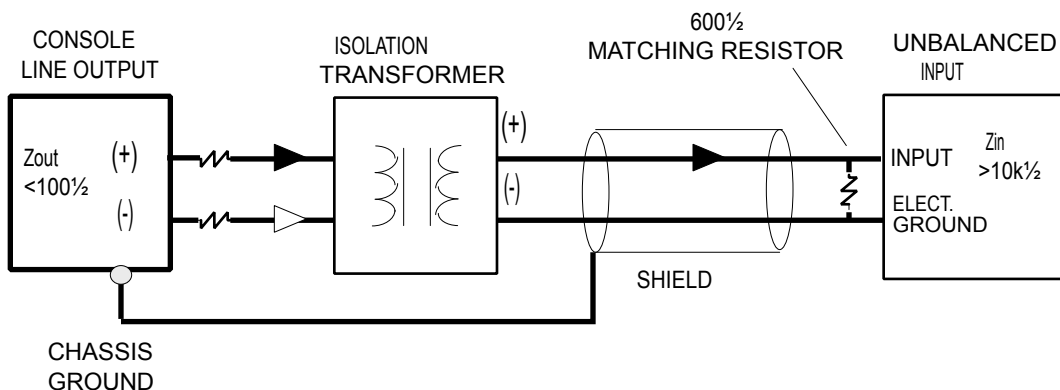
3-4c) **CONSOLE BALANCED OUTPUT TO TRANSFORMER BALANCED INPUT**

The console Output is low impedance (<100 ohms) and can therefore directly drive only ONE 600Ω input impedance transformer balanced input without a distribution amplifier. The transformer needs to see a 600 ohm balanced driving impedance for accurate frequency response and low distortion. Each console Output has a 47Ω series resistance already built in. This means that a 253 ohm (255 ohm is the closest standard value) series resistor must be added to each leg of the balanced console output as shown below.



3-4d) **CONSOLE BALANCED OUTPUT TO ISOLATION TRANSFORMER TO UNBALANCED INPUT**

In some situations an Isolation Transformer is required to solve tough RF Interference or ground loop problems where the Input Device is unbalanced. The Isolation Transformer must be impedance matched to both the console and the Input Device. Typically a 600ohm audio transformer is used whose inputs and outputs want to see a fixed impedance of 600Ω for it to meet frequency response and specifications. The Console Output is low impedance (<100 ohm). To match impedances, distort a 253 ohm series resistor must be added to each leg of the console output as shown above. A 600 ohm resistor must be placed across the input of the Input Device (as shown below) assuming the Input Device is high impedance. Place the transformer close to the console output.



INSTALLATION PROCEDURES

3-4) OUTPUT WIRING (continued)

3-4e) CONSOLE OUTPUTS TO TELEPHONE LINES

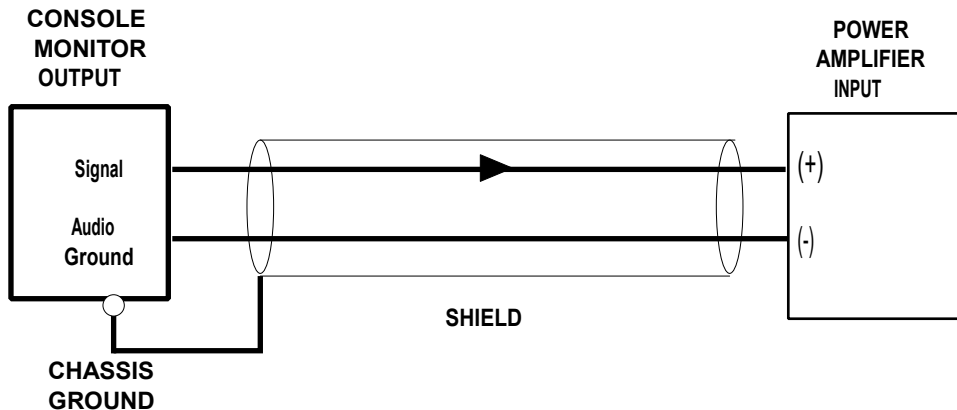
Under NO circumstances should a console output be used to directly drive telephone lines. The console outputs WILL be destroyed most likely by lightning. A telephone company approved coupler or (preferably) a telephone hybrid MUST be used. Arrakis Systems doesn't, **under any circumstances**, warranty damage due to lightning or any telephone line transients.

3-4f) MONITOR, HEADPHONE AND CUE SYSTEMS

The monitor, headphone and cue outputs are unbalanced with $Z_{out} < 50\Omega$. These outputs will drive ($> 600\Omega$) with no difficulty. These outputs will NOT, however, drive 8Ω speakers or LO-Z headphones directly. In order to interface monitor and cue speakers to the console external power amplifiers must be used.

The monitor and cue outputs mute electronically when activated therefore do not require external muting relays.

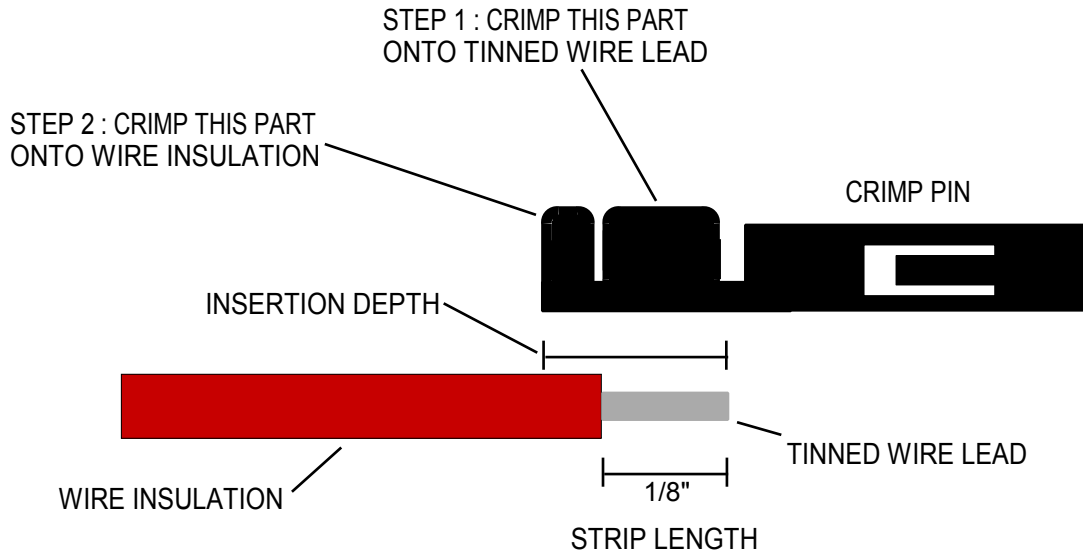
The diagram below shows how to interface the unbalanced Monitor output to a balanced input power amplifier.



INSTALLATION PROCEDURES

3-4g) CONSOLE WIRING - CRIMP TOOLS & CRIMPS -

Good crimps are mandatory for reliable console operation and clean signal path. It pays to be extra careful in crimping right from the beginning. A good crimp now may save many hours of frustration later. A good crimp will exclude air from the joint. If air gets in the crimp joint oxidation can occur resulting in an intermittent contact. A good crimp will strain relieve the joint by grabbing the cable insulation taking most of the strain off the wire itself.



CRIMPING INSTRUCTIONS

- 1) **STRIP** the wire's insulation off exposing the recommended wire length.
- 2) **TIN** the exposed wire with a small amount of solder.
- 3) **INSERT A PIN** in the crimp tool such that the tool is aligned with the part of the pin which will crimp onto the tinned wire lead. Use the "B" part of the tool for most applications. Hold the pin in place by partially squeezing the crimp tool.
- 4) **INSERT THE WIRE** into the pin to the prescribed depth then . . .
- 5) **CRIMP** the pin by squeezing the tool until the pin is squashed. Oversqueezing the crimp pin will cause it to easily break in half, under-squeezing will allow the wire to slip out.
- 6) **REINSERT** the pin in the crimp tool such that the tool is aligned with the part of the pin which will crimp onto the wire insulation.
- 7) **SQUEEZE** the crimp tool once again to crimp the insulation. This acts as a strain relief.
- 6) **SOLDER** the wire/pin joint with a **SMALL** amount of solder. This will insure a long lasting trouble free joint. Too much solder will inhibit pin insertion.
- 7) **INSTALL** the pin into the housing (after all crimps on the cable end are completed).

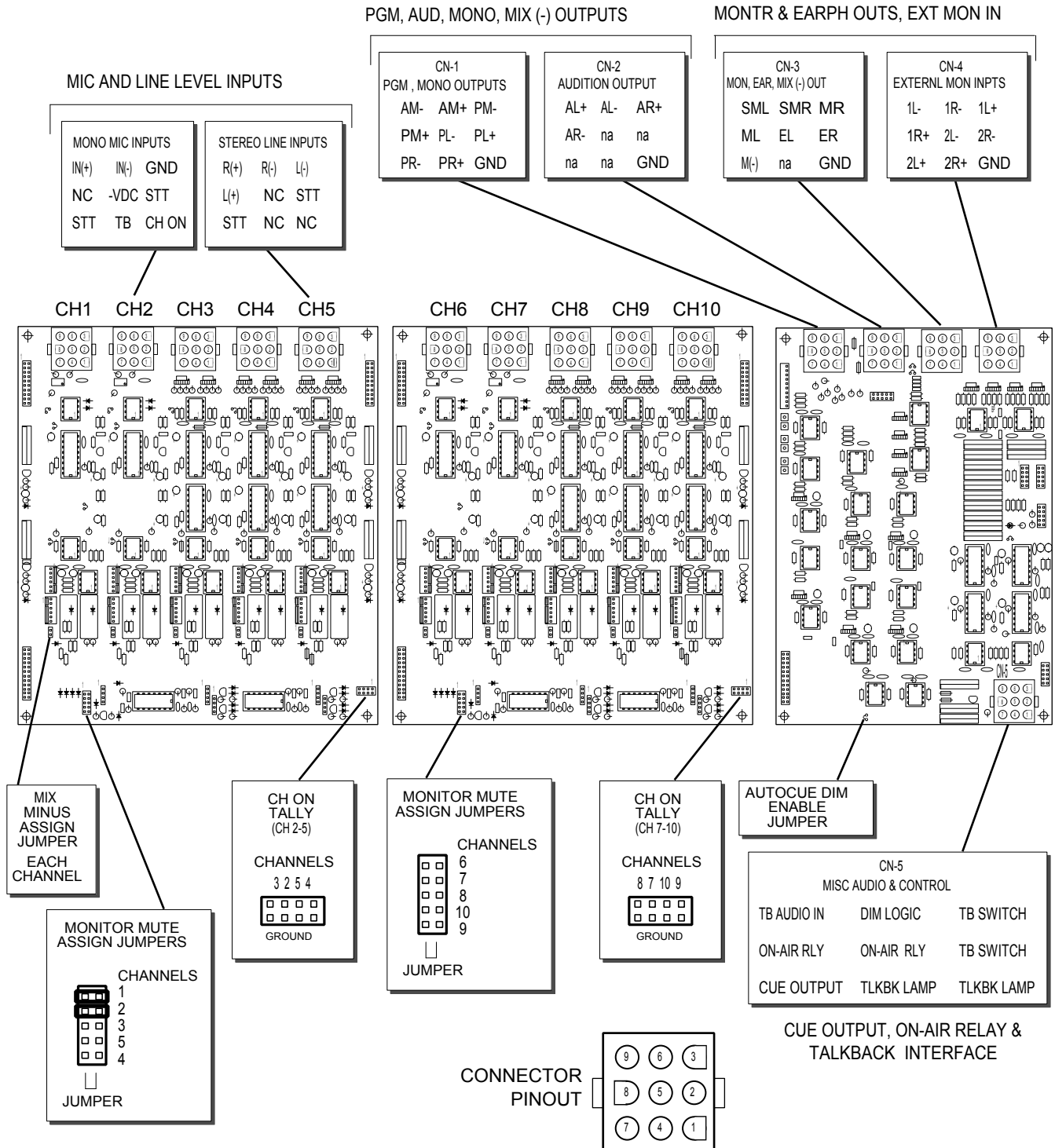
NOTES

- 1) The connector and pins are made by AMP. **CONNECTOR HOUSING = AMP P/N 350720-1**
.086" FEMALE CRIMP PIN = AMP P/N 350689-1
- 2) A PIN EXTRACTION TOOL is available to remove pins from housings. **AMP P/N 305183**
- 3) If the wire is too large to effectively crimp, try just soldering the pin on without crimping.

INSTALLATION PROCEDURES

3-5) CONSOLE OVERALL INPUT/OUTPUT CONNECTOR DIAGRAM

The diagram below illustrates a summary of the basic audio I/O and logic connectors for the 10 channel 1200 Series Console. The 5 channel and 15 channel consoles are similar. The following pages examine these connections in detail.



INSTALLATION PROCEDURES

3-6) MONO MIC INPUTS

Unless specified differently upon order, channel one will be a mono MIC channel and the remaining channels will be stereo line level channels. Channels cannot be converted from mic to line in the field. Upon initial order, any of the channels can be specified mic or line. Additional channels may be converted to MIC by contacting Arrakis service.

a) LEVELS

The mic trimpot will adjust gain by roughly 30dB . The trimpots are factory set for -55dBu input levels.

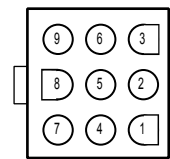
b) INPUT IMPEDANCE

The 1200 mono mic inputs are high impedance active balanced design (>1,000 ohm input impedance). A parallel resistor may be required across the mic Input to match the mic impedance. Refer to instructions For your specific mic.

MONO MIC INPUT CONNECTOR

PIN FUNCTION

- 1) REMOTE CH ON
- 2) REMOTE START (CH2-5)
- 3) SHIELD GROUND
- 4) TALKBACK LOGIC
- 5) -VDC FOR CH ON ONLY
- 6) MIC (-)AUDIO INPUT
- 7) REMOTE START (CH2-5)
- 8) NC
- 9) MIC (+)AUDIO INPUT



MIC LEVEL IN & LOGIC
 IN(+) IN(-) GND
 NC -VDC NC
 NC TB CH ON

c) CONTROL LOGIC

1) REMOTE CH ON

Connect pin 1 to pin 5 to turn the MIC channel ON. The channel will turn off when the pins are disconnected.

2) REMOTE START

(50 mA max) is provided on channels 2 through 5 on each Input Board The first channel does not have a start relay.

3) TALKBACK LOGIC

Connect pin 4 to pin 3 to provide talkback from the MIC channel to the monitors.

4) SUSTAINED LOGIC

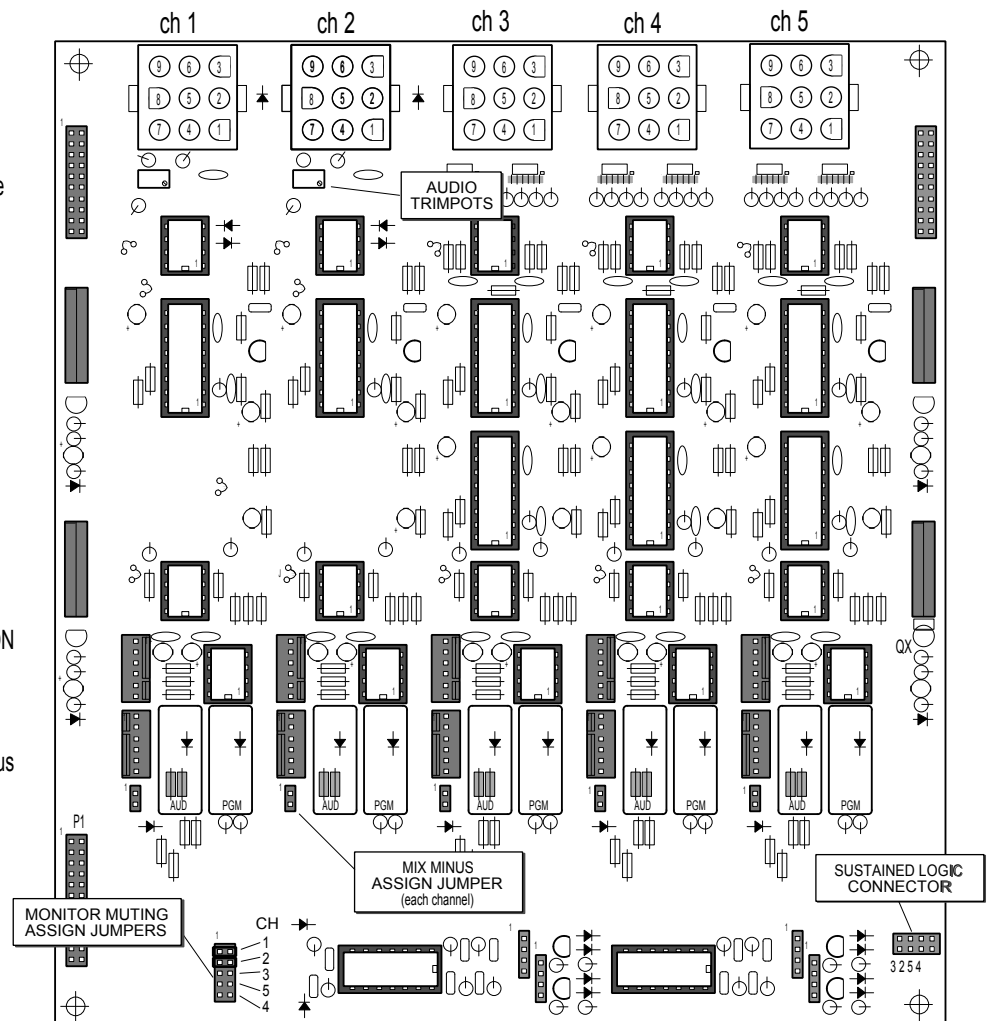
A sustained collector transistor drive to -VDC is provided for channels 2 through 5, although not channel 1. Refer to Section 3-8 for detailed information. If tally indication is needed for channel 1, connect pin 1 to ground through an LED, which will light when the channel is ON.

d) MIX MINUS

The channel is assigned to the MIX MINUS bus when the MIX MINUS jumper is in place. Typically, a telephone channel is NOT assigned to the MIX (-) bus. Activation is with the AUDITION bus.

e) MONITOR MUTING

The jumper will assign the channel to the mute bus



INPUT BOARD ILLUSTRATED ABOVE CONFIGURED WITH TWO MIC CHANNELS AND THREE LINE CHANNELS

INSTALLATION PROCEDURES

3-7) STEREO LINE LEVEL INPUTS

a) LEVELS

The audio trimpots will adjust levels from -10dBV to +8dBu for consumer and pro sources. The trimpots are factory set for +4dBu input levels.

b) INPUT IMPEDANCE

The 1200 stereo line inputs are high impedance active balanced design (>10,000 ohm input impedance)

c) CONTROL LOGIC

1) REMOTE START

An isolated, momentary reed relay closure (50 mA max) is provided for remote start of sources. Closure lasts approximately 1/3 second.

This closure is available on channels 2 through 5 on each Input Board. The first channel on the PC board is often a mic channel and does not have a start relay. For example, the 10 channel 1200 console (1200-10S) will have remote start relays on channel 2 through 5 and channels 7 through 10 only.

IMPORTANT

the Remote Start reed relay has a maximum capacity of 50 milliamps. If more current is required, use the reed relay to drive a larger, external relay.

2) SUSTAINED LOGIC

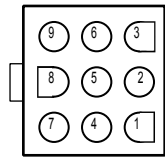
A sustained collector transistor drive to -VDC is provided for channels 2 through 5, although not channel 1. This connection is in parallel to the channel's 'ON' lamp. Refer to Section 3-8 for detailed information.

d) MIX MINUS

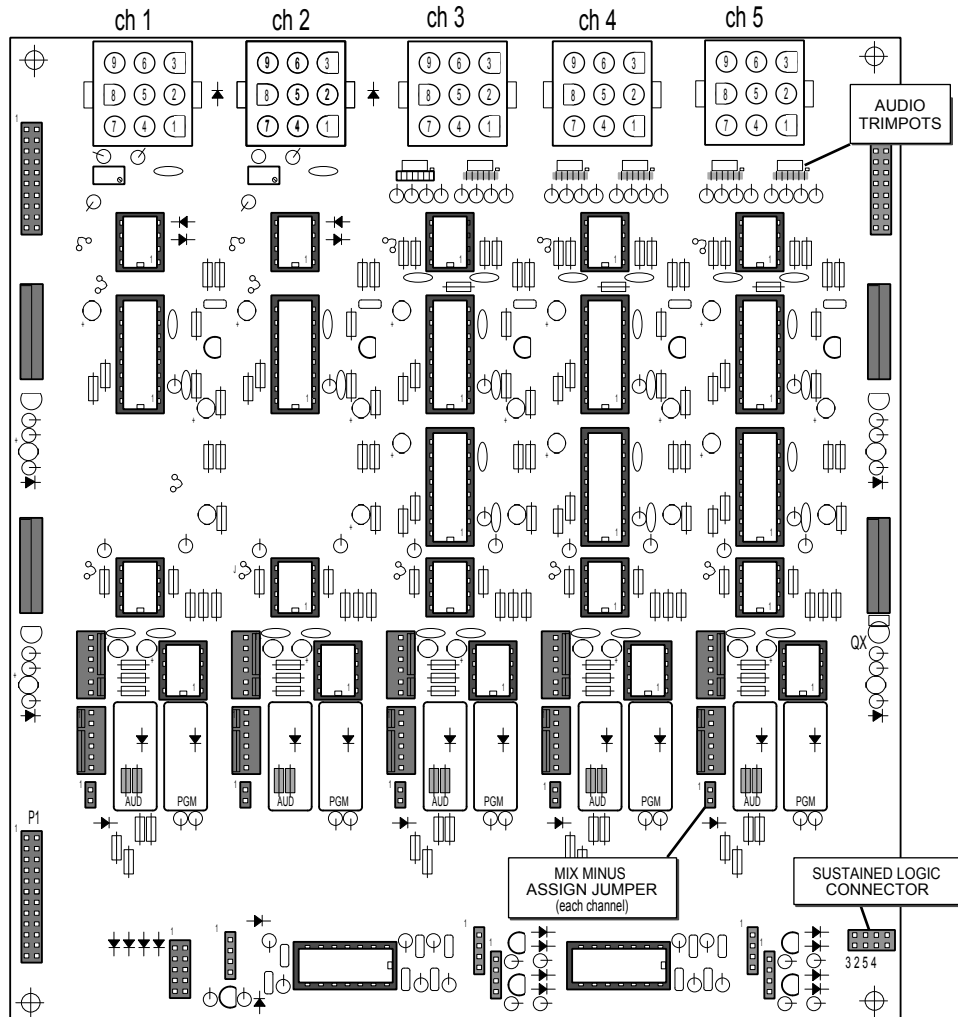
The channel is assigned to the MIX MINUS bus when the MIX MINUS jumper is in place. Typically, a telephone channel is NOT assigned to the MIX (-) bus. Activation is with the AUDITION bus.

STEREO LINE INPUT CONNECTOR

PIN	FUNCTION
1)	NC
2)	REMOTE START (CH 2-5)
3)	LEFT (-) AUDIO INPUT
4)	NC
5)	NC
6)	RIGHT (-) AUDIO INPUT
7)	REMOTE START (CH 2-5)
8)	LEFT (+) AUDIO INPUT
9)	RIGHT (+) AUDIO INPUT



LINE LEVEL IN & LOGIC
 R(+) R(-) L(-)
 L(+) NC STT
 STT NC NC



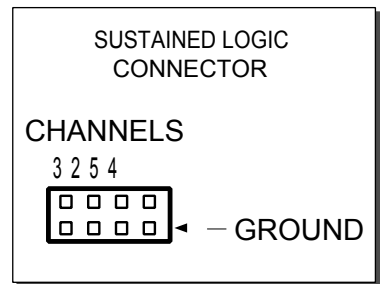
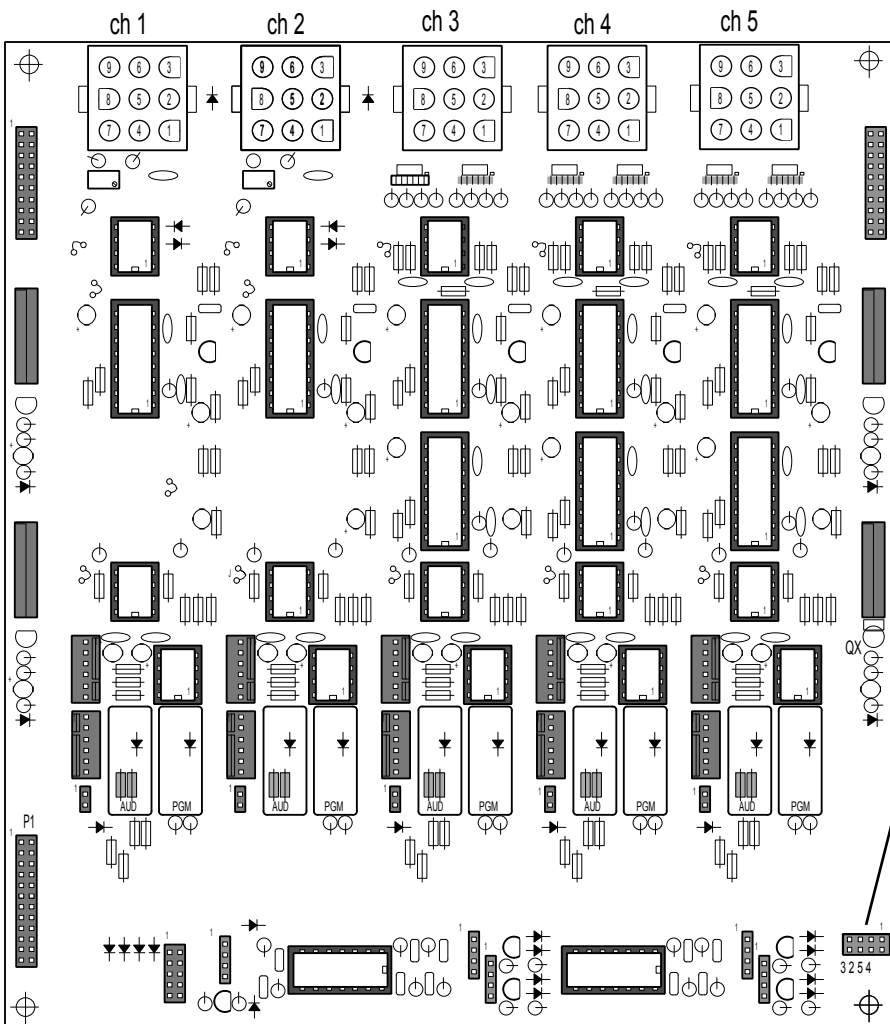
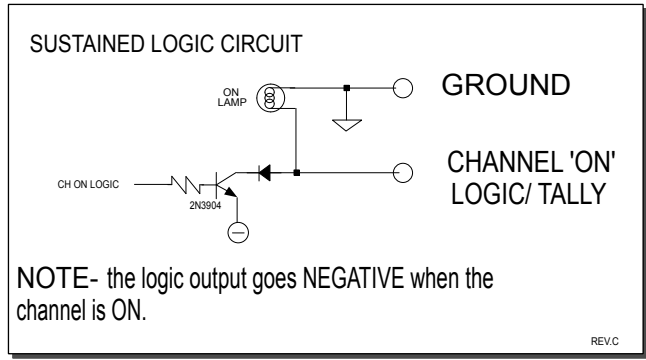
INSTALLATION PROCEDURES

3-8) SUSTAINED LOGIC

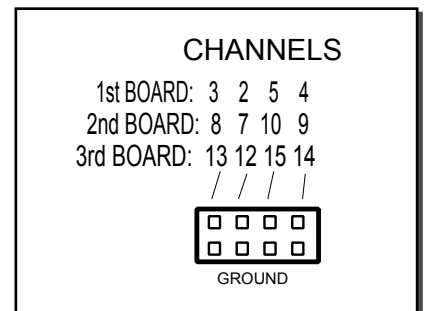
For situations such as an external channel 'ON' tally lamp, the 1200 Series Console provides a transistor driven logic output for four of the five input channels on each input board. The circuit activates when the channel is turned 'ON'.

This transistor output driver should be used to drive an external relay for interface to other equipment, although it may drive a LED directly through a 1k ohm resistor.

WARNING - Maximum current allowed is 50mA.
Improper use will destroy the channel's drive transistor.



NOTE
Up to three Input Boards may be in the console, depending on console size. The connector pinouts are as follows



INSTALLATION PROCEDURES

3-9) PROGRAM & AUDITION OUTPUTS

a) **LEVELS** - balanced out of the console equals 0VU on the meters. Refer to Section 3-16 for details on level calibration.

b) **OUTPUT IMPEDANCE** - The 1200's audio outputs are low impedance active balanced design (>100 ohm output impedance)

c) **MONO MIX OUTPUTS** - both Program and Audition outputs have mono mixdowns of the stereo outputs. They do not have level adjust and simply follow the stereo trim levels.

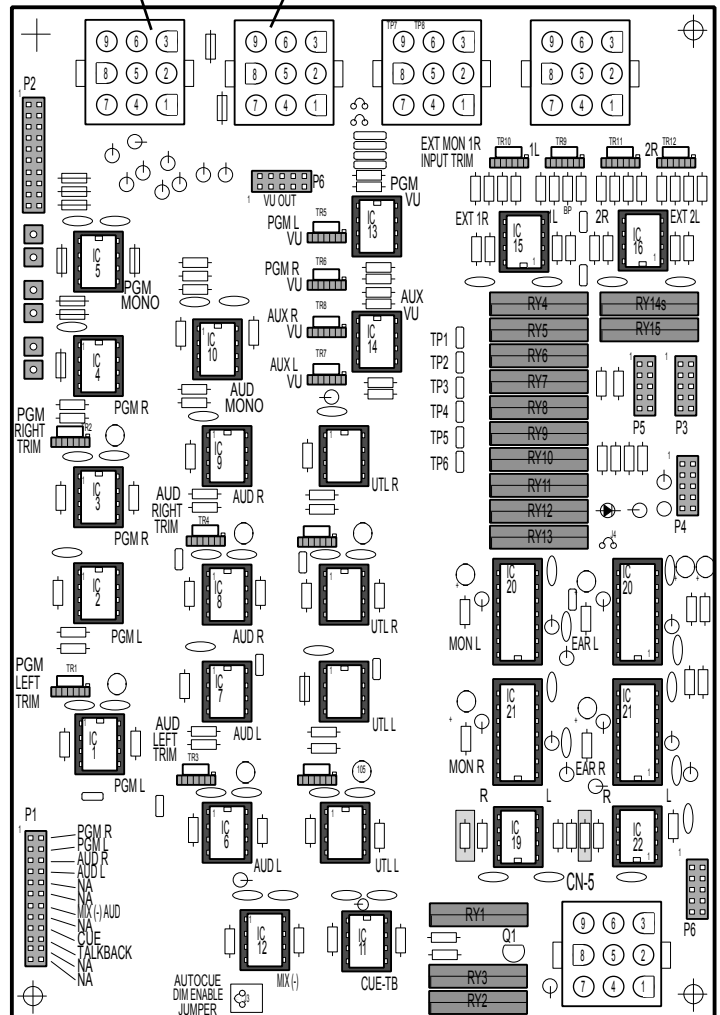
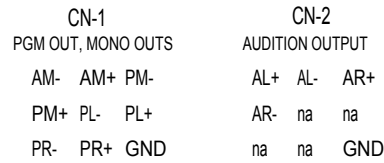
CN-1: PGM, MONO MIX OUT CONNECTOR

- 1) GROUND
- 2) PROGRAM LEFT (+) OUT
- 3) PROGRAM MONO MIX (-) OUT
- 4) PROGRAM RIGHT (+) OUT
- 5) PROGRAM LEFT (-) OUT
- 6) AUDITION MONO MIX (+) OUT
- 7) PROGRAM RIGHT (-) OUT
- 8) PROGRAM MONO MIX (+) OUT
- 9) AUDITION MONO MIX (-) OUT

CN-2: AUDITION OUTPUT CONNECTOR

- 1) GROUND
 - 2) na
 - 3) AUDITION RIGHT (+) OUT
 - 4) na
 - 5) na
 - 6) AUDITION LEFT (-) OUT
 - 7) na
 - 8) AUDITION RIGHT (-) OUT
 - 9) AUDITION LEFT (+) OUT
- (na = not applicable)

PGM. MONO & AUD OUTPUT CONNECTORS



OUTPUT BOARD

INSTALLATION PROCEDURES

3-11, 3-12, 3-13) CUE SYSTEM, TALKBACK SYSTEM, ON-AIR RELAY

3-11) CUE SYSTEM

The 1200 handles CUE two ways:

1) **AUTOCUE** feeds cue audio into the right side of the monitor system while ducking the program audio.

2) &/or connect the mono CUE Output to an external cue amp.

a) Mono Cue Output - the Cue output on PIN 7 of connector CN-5 is a mono mix of a stereo cue feed. Output level is about +4dBu and low impedance to drive

an external power amp and speaker. This output will mute when the console muting bus is activated by an open MIC (the MIC channel's MUTE JUMPER must be in place)

b) How to disable AUTOCUE - Cutting a wire jumper (shown below) will defeat AUTOCUE'S DIM feature. Cutting the two resistors indicated defeats the audio feed into the monitor/earphones.

3-12) TALKBACK SYSTEM

The 1200 features a talkback input to the monitor-cue system. Audio (typically from another studio) fed to the talkback input appear on the right earphone and will monitor speakers, as well as the CUE output. The DIM LOGIC feature allows you to duck the monitor program audio's level so that the talkback rides over the program audio.

a) TB AUDIO IN

An unbalanced talkback audio input is on Pin 9 of CN-5. The input gain stage has a gain of 10 for low level signals. Add an external series resistor of value 10k ohm - 100k ohm to reduce the level to match your talkback audio feed.

b) TALKBACK SWITCH & LAMP

may be wired for any purpose.

c) DIM LOGIC IN

a ground on Pin 6 of CN - headphones by approximately 20dB.

3-13) ON-AIR RELAY

Pins 5 & 8 on CN-5 are the two poles of a reed relay that will close when the muting bus is active (typically when a MIC channel is open). Maximum current is 50 milliamps which can drive an external relay for on air lights, etc.

!! NEVER CONNECT RELAY TO 110VAC!!

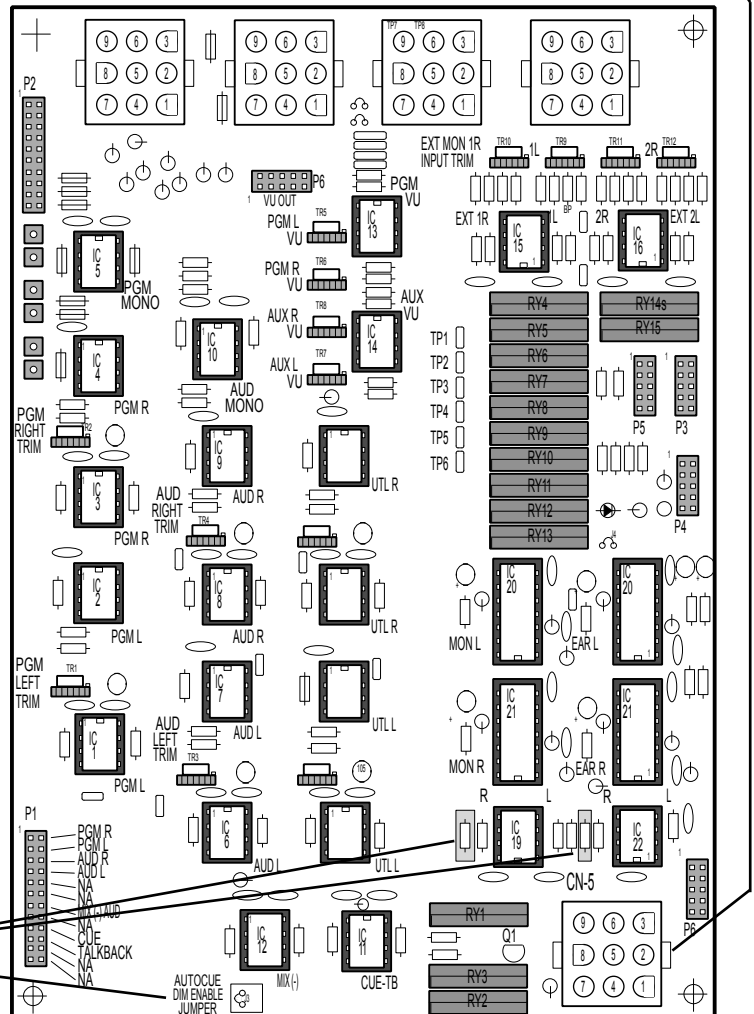
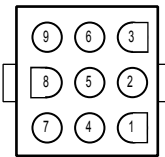
CN-5: MISC AUDIO & CONTROL

- 1) TALKBACK LAMP (12V, 80ma)
- 2) TALKBACK SWITCH (.5A MAX)
- 3) TALKBACK SWITCH (.5A MAX)
- 4) TALKBACK LAMP (12V, 80ma)
- 5) ON-AIR RELAY (50mA MAX)
- 6) DIM LOGIC IN (GND- ACTIVATE DIM)
- 7) MONO CUE AUDIO OUT
- 8) ON-AIR RELAY (50mA MAX)
- 9) TALKBACK AUDIO INPUT

AUTOCUE DEFEAT
TO DEFEAT ' AUTOCUE ' FEATURE: CLIP JUMPER J3, RESISTOR 170 AND RESISTOR 171.

CUE, ON-AIR RELAY OUTPUTS TALKBACK AUDIO & MONITOR DIM INPUTS

CN-5 MISC AUDIO & CONTROL		
TB AUDIO IN	DIM LOGIC	TB SWITCH
ON-AIR RELAY	ON-AIR RELAY	TB SWITCH
CUE OUTPUT	TB LAMP	TB LAMP

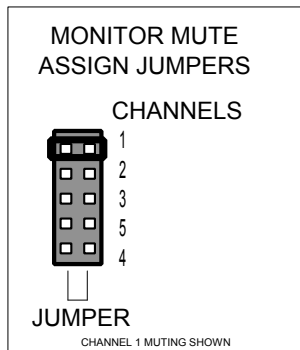


INSTALLATION PROCEDURES

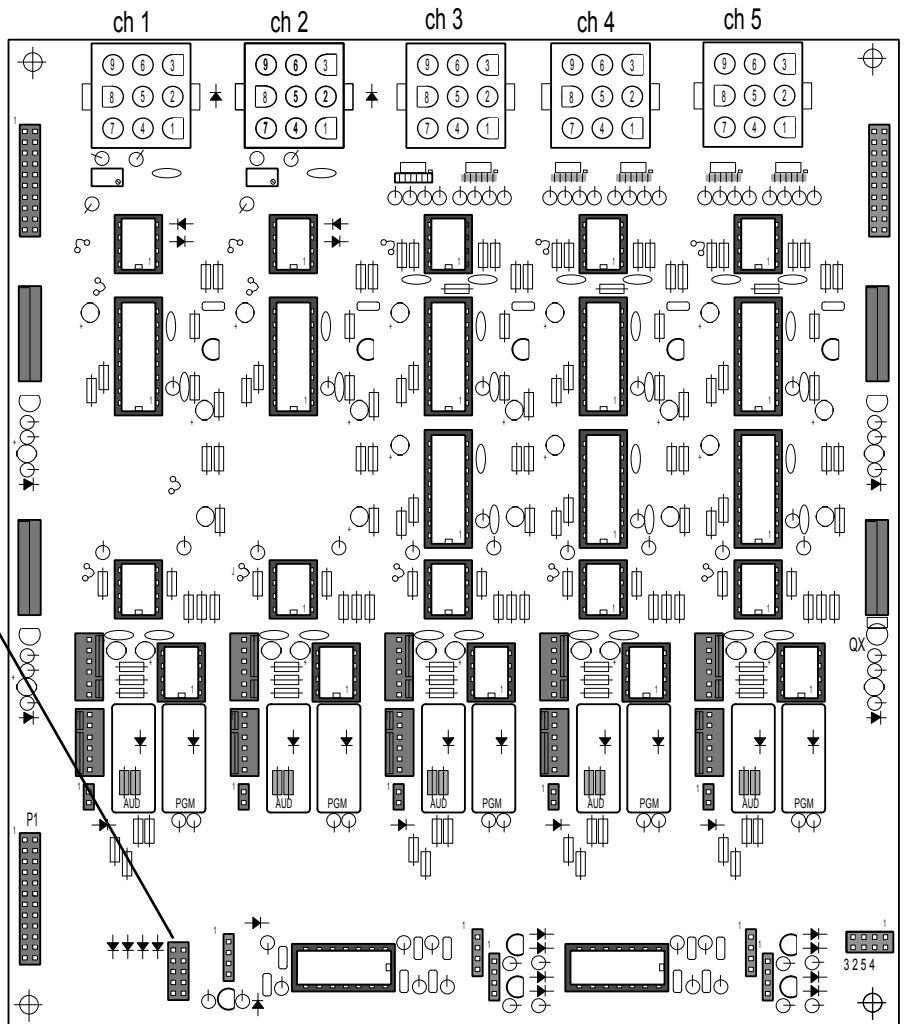
3-14) MUTING SYSTEM

SELECTING A CHANNEL TO MUTE

Any channel in the console can be assigned to activate the monitor system's muting function. The assigned channels will mute the monitor and cue outputs whenever the channel is turned ON. Install jumpers on the connector illustrated below to assign appropriate channel to the muting bus. Extra jumpers are provided with the console's installation kit. Unless otherwise specified, Channel 1 on the console is configured as a MIC input and is supplied with its muting jumper in place.

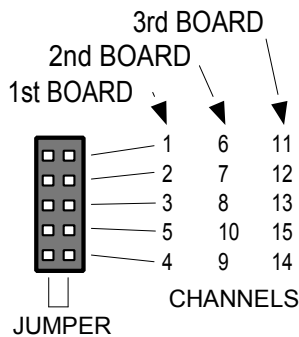


NOTE - the channel order is 1-2-3-5-4 and is not a misprint.



NOTE

Up to three Input Boards may be in the console, depending on console size. The connector pinouts are as follows:



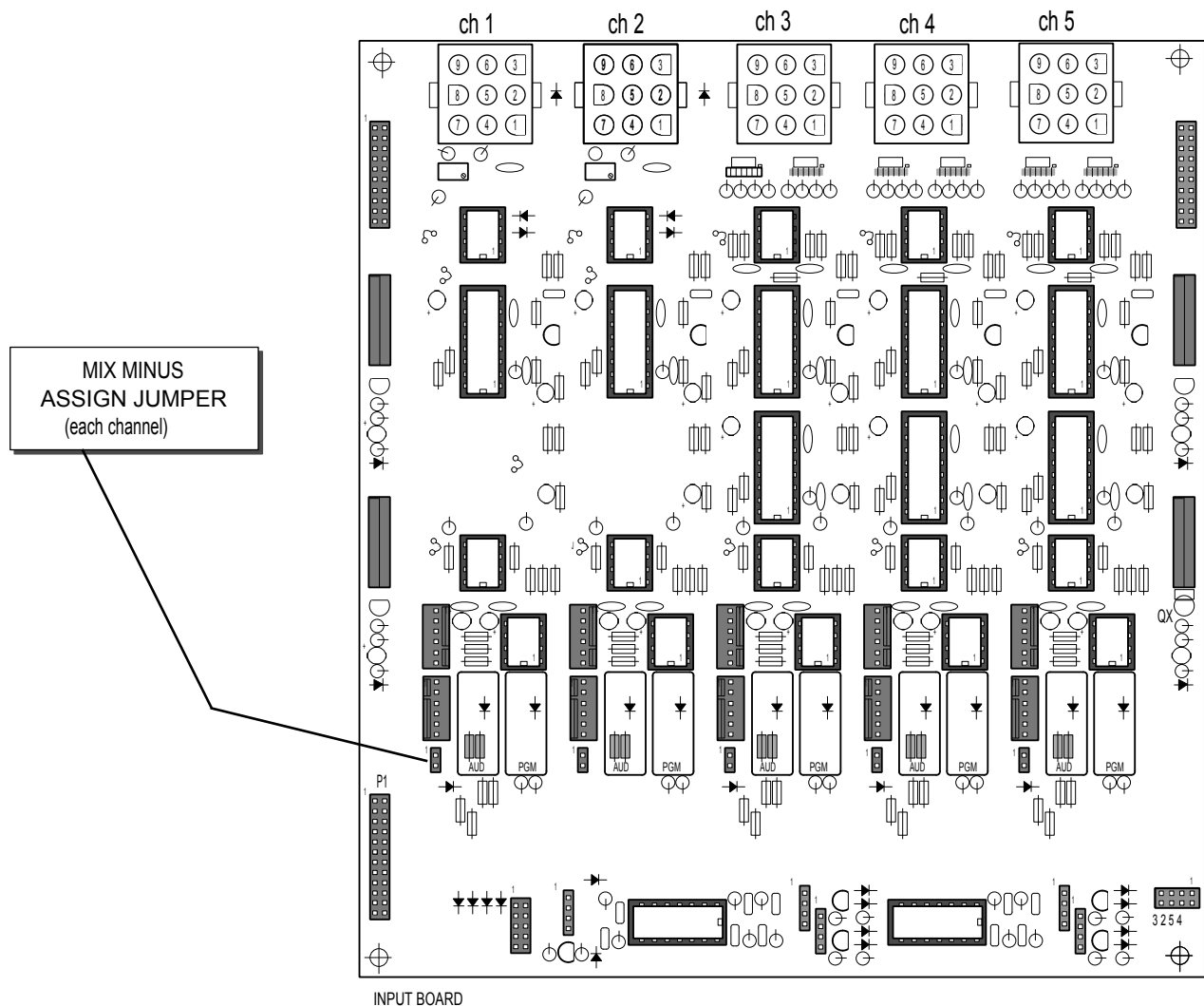
INSTALLATION PROCEDURES

3-15) MIX MINUS CHANNEL ASSIGNMENT

The 1200 Series Console features a Mix Minus system which may be used for telephone or remote feed applications. Audio is sent to this 'MIX (-)' bus from all assigned channels in the console. A jumper is used to assign a channel. If the jumper is in place, a mono mix of the channel's signal is placed on the MIX (-) bus when the AUDITION bus assign switch is pressed (except on 5 channel consoles, where there is no audition switch) and when the channel is turned ON.

For TELCO applications, all console channels EXCEPT for the phone channel should be jumpered for MIX (-). The console's MIX (-) output (on the Output Board, see Section 3-10) is fed to the telephone hybrid for audio return to the caller. The hybrid receives all console audio except for the caller's audio so that there will not be feedback in the system.

MIX (-) is assigned for each channel at the factory. To unassign a channel for TELCO use, simply remove the black two pin jumper on that channel.



INSTALLATION PROCEDURES

3-16) CALIBRATION

3-16a) GENERAL CALIBRATION

- The console has gain adjustment trim pots on each input channel, and the output amps.
- Line level input channels have trim pots which independently adjust left and right channels. There is approximately 20dB of trim available allowing the module to accommodate input signal levels ranging from -10dBV (consumer) to +8dBu (professional).*
- MIC level input channels have approximately 30dB of trim and can accommodate MIC level signals from -65dBu to -35dBu.
- The output amp has a trim gain adjust of roughly 10dB. The console can be set up to operate at nominal station operating levels ranging from 0dBu to +8dBu.
- The Cue and Monitor Outputs have fixed gain, although the External Monitor Inputs are adjustable.

3-16b) FACTORY PRESET LEVELS

The console is factory pre-calibrated for +4dBu IN = +4dBu OUT = 0VU. Therefore, when a +4dBu balanced signal is applied to a line input module and the fader is set at the thick black line, then the VU meters will read 0VU and the console will be sending out a +4dBu balanced signal. MIC inputs are calibrated for -55dBu IN = +4dBu OUT = 0VU.

3-16c) ADJUST FOR YOUR STATION LEVEL

If your station operating level is something other than +4, then the console will need to be adjusted. Simply recalibrate the VU meters to reflect your nominal station level ("0VU").

DO NOT TOUCH THE OUTPUT LEVEL TRIMPOTS!!! ONLY THE VU METER DRIVER TRIMPOTS NEED BE ADJUSTED. See the following pages for VU meter trim pot locations.

CAUTION - Trim pots are very easily bumped out of calibration so take care to not touch the wrong ones.

VU METER RECALIBRATION PROCEDURE

- Generate a test tone and feed this tone BALANCED into an input channel. This should be no problem if you have a balanced test tone. If your tone generator has unbalanced outputs hook the SIGNAL lead from the tone generator to the (+) input on the channel, and hook the GROUND from the signal generator to the (-) input on the channel. This is effectively a balanced connection.
- calibrate the output of the tone generator to your chosen station operating level using a voltmeter.*
- set the channel fader at the thick black line. Turn on the channel & assign to PGM.
- select PGM on the Monitor Select Switch
- adjust the VU METER DRIVER trim pots such that the meters read 0VU.

The outputs of the console will now be at your station operating level when the VU meters read "0VU" and the console's internal gain structure has preserved. Note that the input module did not require adjustment nor did the console output trimmers Only the VU METER DRIVER trim pots were adjusted.!

NOTE - 0dBu = 0.775 VRMS with no load. dBu is compatible with all active-balanced equipment (low Zout, high Zin). If 600 ohm transformer balanced equipment is used, these calibration levels may change.

**-10dBu = 0.245VRMS
0dBu = 0.775VRMS
+4dBu = 1.225VRMS
+8dBu = 1.945VRMS**

IMPORTANT - Some voltmeters are optimized for 60 cycles and will not be accurate at midband audio frequencies (1kHz).

3-16) **CALIBRATION (continued)**

3-16d) **OVERALL RECALIBRATION PROCEDURE**

IMPORTANT - Overall recalibration is only necessary under unusual circumstances. Recalibrate if all trim pots are moved drastically away from factory settings or when left and right trims are in substantially different positions. This procedure takes some time and concentration.

INTERNAL BUS LEVEL - The key to calibration of the 1200 Series console is to set the internal summing bus audio level to -2dBu (.615 VRMS, 1.7V peak to peak). This maximizes headroom and signal to noise ratio (SNR) while it minimizes distortion (THD). After the bus levels are correctly set the output levels can be calibrated then the input levels.

To recalibrate the entire console, follow this procedure:

STEP 1 - RECALIBRATE VU METERS

To set the console's VU meters you must choose a nominal audio operating level for all the equipment in your facility. This "0VU" reference audio level is often "+4". Other common station levels are "0" or "+8". +4dBu nominal station operating level (+4dBu = 0VU) is assumed for this discussion.

$$\begin{aligned}0\text{dBu} &= .775\text{VRMS} = 2.2\text{V peak to peak} \\+4\text{dBu} &= 1.23\text{VRMS} = 3.5\text{Vpp} \\+8\text{dBu} &= 1.95\text{VRMS} = 5.5\text{Vpp}\end{aligned}$$

- a) With an audio frequency tone generator, feed a midband (~1kHz) tone into any line level input module. The level of this tone is not important at this time, nor is the fader setting on the particular input module, however the tone should be around +4. Feed the signal into both left and right inputs.
- b) Connect a voltmeter, dB meter or oscilloscope to the PROGRAM LEFT output of the console. Measure between PROGRAM OUT LEFT (+) and PROGRAM OUT LEFT (-). This is a BALANCED measurement (do NOT measure between PGM L and GROUND. That would be an unbalanced measurement). There should be no other load on the output. Do not put a 600 $\frac{1}{2}$ load on the output unless the output of the console is to be wired to a 600 $\frac{1}{2}$ transformer balanced device. Be aware that some voltmeters are not accurate at midband audio frequencies since they may be optimized for 60 cycles.
- c) Adjust the level of the tone until the voltmeter, dB meter or scope indicates +4dB. This can be accomplished by either adjusting the input module's slide fader or by adjusting the tone generator's output. Do not be concerned with the console's fader and trim pot setting at this time as we are now only setting the VU meters.
- d) Adjust the PGM L VU METER DRIVER trim pot until the PGM L meter reads "0VU". The VU METER DRIVER trim pots are located on the Output Board. See following pages for trimpot locations.
- e) Repeat steps b), c) and d) for the PGM R meter
- f) After confirming that the MONITOR SELECT switch is selected to PGM, repeat steps b), c) and d) for AUX L and AUX R VU meters.

STEP 2 - SET INTERNAL BUS LEVEL

The Internal Bus Level is identical to the levels found at the input channel's IC4 OP AMP. The optimum bus level is -2dBu.

- a) Connect your voltmeter, dB meter or scope between an input channel's IC4 PIN 1 and AUDIO GROUND. This is an GROUND. This is an unbalanced measurement of the LEFT bus level.
- b) Adjust the input channel's slide fader until the voltmeter, dB meter or scope indicates -2dBu (-2dBu = .615VRMS = 1.7Vpp). It is recommended to tape the slide fader in place to retain its setting.
- c) Move the voltmeter, dB meter or scope to the input channel's IC4 PIN 7. Adjust the RIGHT input trim pot until the signal reads -2dBu. Now both left and right audio buses are set for -2.
- d) DO NOT MOVE THE SLIDE FADER OR TRIM POTS on the input module. Both left and right bus levels must be held at -2dBu throughout the next step, Output Board calibration.

INSTALLATION PROCEDURES

3-16) **CALIBRATION (continued)**

3-16d) **OVERALL RECALIBRATION PROCEDURE (continued)**

STEP 3 - RECALIBRATE OUTPUT BOARD

With the bus levels held at -2dBu, the Output Board can be calibrated. Only the OUTPUT LEVEL trim pots need adjustment. The VU METER DRIVER trim pots have already been done!

- a) Select AUD on the Monitor Select Switch
- b) Adjust the PGM trim pots until the PGM VU meters read "0VU".

DO NOT TOUCH THE VU METER DRIVER TRIM POTS!! ONLY THE OUTPUT LEVEL TRIM POTS.

- c) Adjust the AUD trim pots until the AUX VU meters read "0VU".

STEP 4 - RE CALIBRATE INPUT MODULES

Each input module can now be calibrated to the station operating level you have chosen... "+4" in this case for line level and -55dBu for MIC inputs.

- a) Connect the test tone to the first line level input module to be calibrated. The connection should be BALANCED. This should pose no problem if you have a balanced test tone. If your tone generator has unbalanced outputs hook the SIGNAL lead from the tone generator to the (+) input on the module, and hook the GROUND from the signal generator to the (-) input on the module. This is effectively a balanced connection.
- b) Calibrate the output of the tone generator to +4dBu = 1.23VRMS = 3.5Vpp.
- d) Set the module's fader at the thick black line Turn on the channel & assign to PGM.
- c) Adjust the input's trim pots such that the meters read 0VU.
- d) Go on to the next input
- e) Calibrate the MIC input modules with a small bladed screwdriver.

If all your audio source devices (cart machines, CD players etc.) are properly calibrated to your station operating level, all inputs will be correct. Confirm calibration of the audio source devices. If there is a calibration mismatch either change the source's output levels or recalibrate the particular input module in question to match the source. To interface the 1200 Series console to consumer level (-10dB) equipment, simply increase the gain on that particular input module until the console's VU meters read "0VU".

Recalibration is now complete!

NOTE: Problems with calibration can add hum, noise, pops & clicks, distortion etc. Call the Arrakis Analog Customer Service Dept. at the factory if you have these symptoms or trouble with calibration.

3-16e) EXTERNAL MONITOR INPUT CALIBRATION

The External Monitor Inputs have trim pots which allow roughly 10dB of adjustment. To calibrate:

- a) Feed a balanced signal into an External Monitor Input at your station operating level (typically +4dBu)
- b) Press the Monitor Select switch for the input you are feeding (EXT 1 or EXT 2)
- c) Adjust the right and left trim pots such that the AUX VU meters read 0VU
- d) Repeat for other input

INSTALLATION PROCEDURES

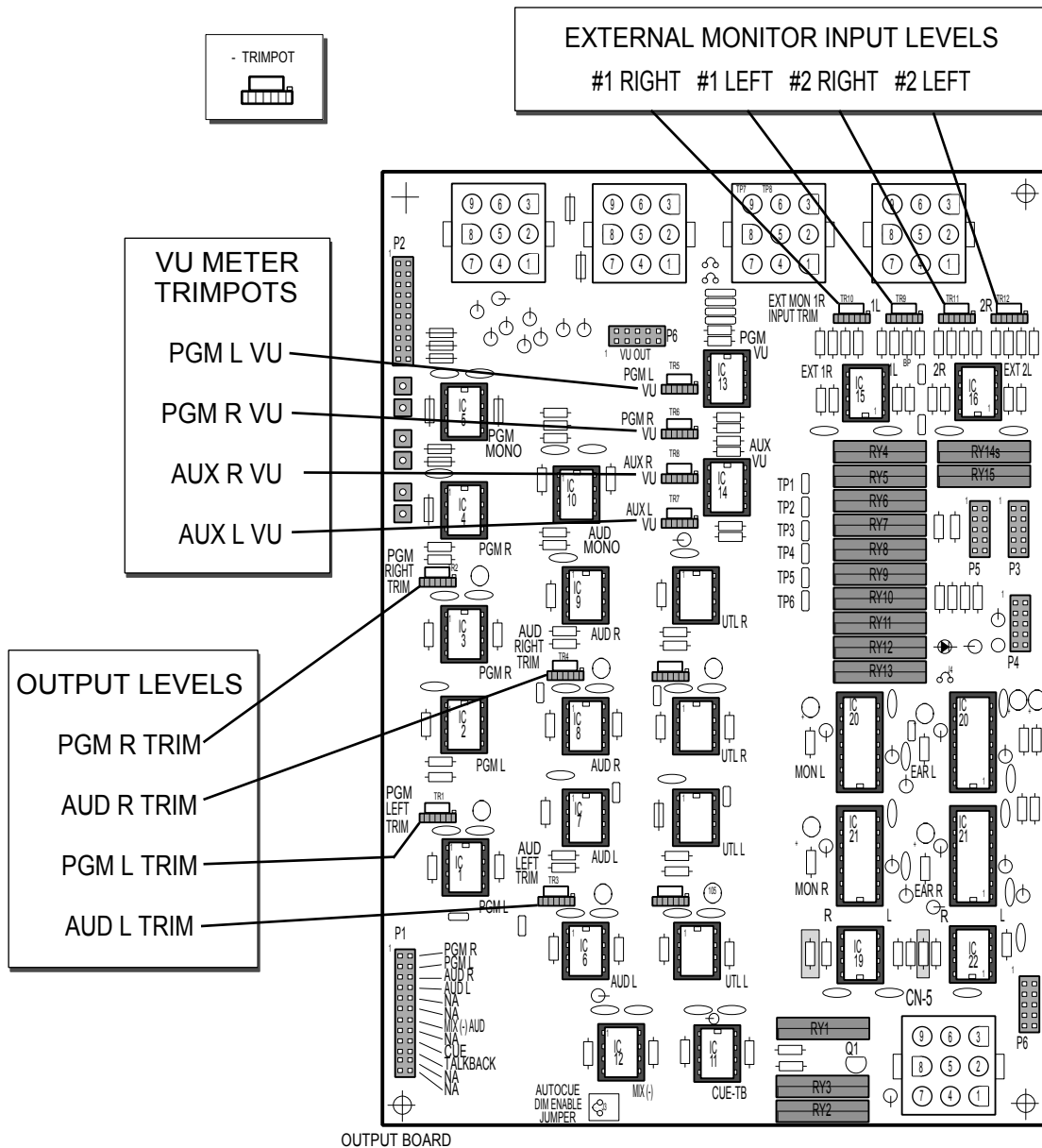
3-16) CALIBRATION (continued)

TRIMPOT PLACEMENT AND USE

a) **Audio Output Trimpots** - The Pgm & Aud output trimpots will adjust gain by roughly 10dB . The trim level is factory set for +4dBm as 0VU on the meters.

b) **VU Meter Trimpots** - The VU meter trimpots adjust from -10dBm to +8dBm for a 0 VU display. The factory calibrates the meters for +4dBm at 0 VU.

c) **External Monitor Input Trimpots** - These trimpots adjust from -10dBm to +8dBm input for trimming the level of external audio inputs to the monitor system.



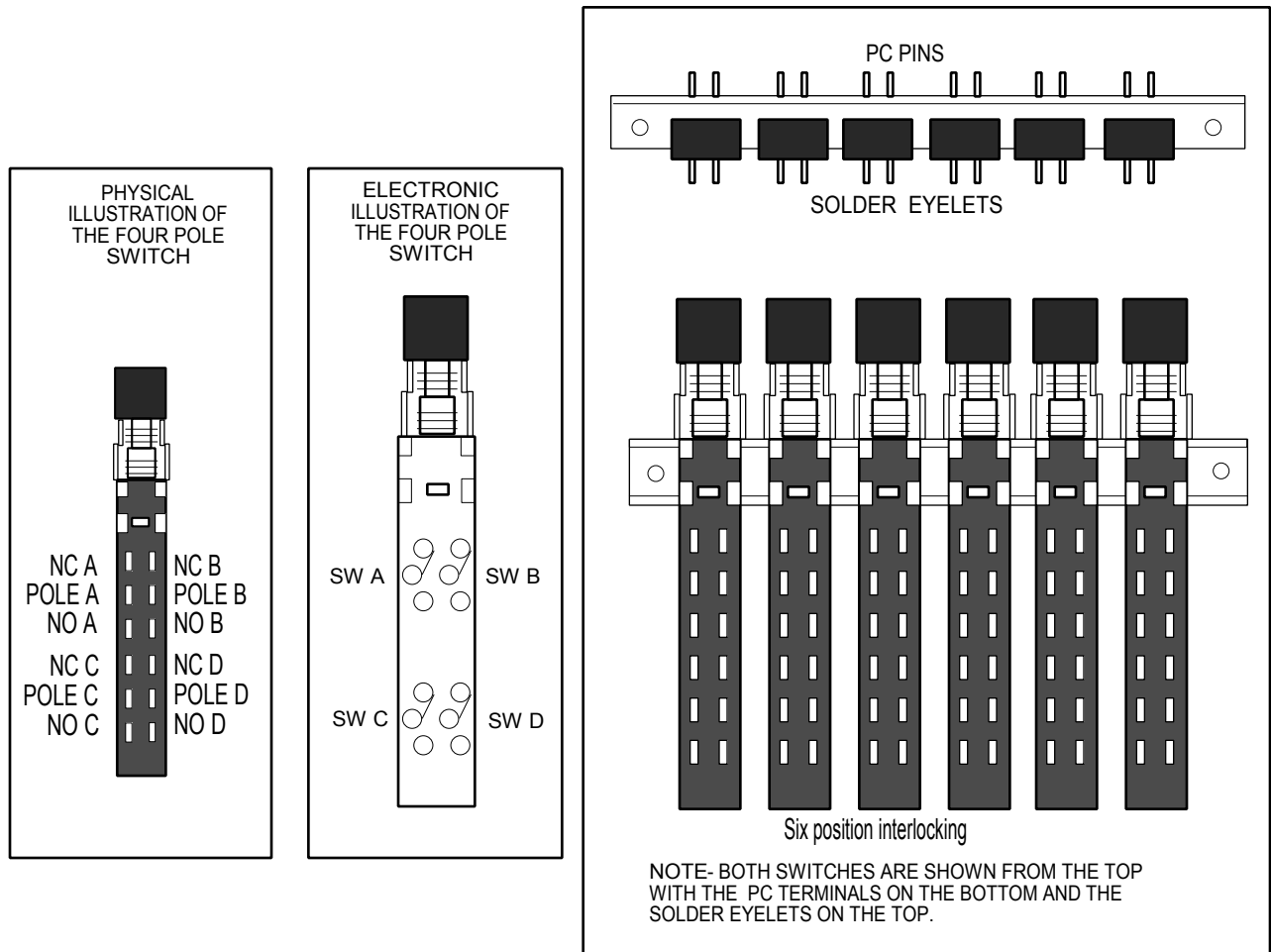
INSTALLATION PROCEDURES

3-17) REMOTE SELECT SWITCH

The 1200 consoles come with one or two unwired multiple 6 position interlocked switches for use by the customer. The switch is unwired for maximum flexibility.

The switches are four pole double throw switches which are ideal for switch stereo balanced audio.

The switches are 50,000 operation wiping switches and may be used to switch dry mic level signals stereo lines level signals, and logic, currents to a 50 milliamp maximum.



SECTION FOUR

**ELECTRONIC
DESCRIPTION**

ELECTRONIC DESCRIPTION

4-0) RESISTOR COLOR CODE & IC PINOUTS

RESISTOR

ALL RESISTORS ARE METAL FILM, 1%, 1/4 WATT
ALL POTS ARE CONDUCTIVE PLASTIC

COLOR CODE:

EXAMPLE: YELLOW / VIOLET / GREEN / RED / BROWN
4 7 5 3 1 = 47.5 k ohm 1%

CAPACITOR

CAPS CONSIST OF:
1) DISC CERAMIC
2) MONOLYTHIC CERAMIC
3) TANTALUM

ALL CAPS ARE RATED 16VDC OR GREATER

DIODE

ALL DIODES ARE 1N914

OPAMP

NE5532 OPAMP
USE NO SUBSTITUTIONS
MANY "EQUIVALENT" ICs
ARE PIN COMPATIBLE BUT
LACK PERFORMANCE.

MANUFACTURED BY
PHILLIPS OR NATIONAL

VCA

SSM2018T VOLTAGE
CONTROLLED AMP.

MANUFACTURED BY
ANALOG DEVICES

SSM2018TP

MIC PRE

SSM2017 MIC PREAMP
USE NO SUBSTITUTION
MANY "EQUIVALENT" ICs
ARE PIN COMPATIBLE BUT
LACK PERFORMANCE.

MANUFACTURED BY
ANALOG DEVICES

SSM2017P

SWITCHES

SELECT SWITCHES 4PDT
MANUFACTURED
BY ITT CANNON

ON/OFF SWITCHES ARE SPST
MANUFACTURED
BY EAO OLTEN

TRANSISTORS

NPN

PNP

JFET

DC POWER DISTRIBUTION

POWER BUS

VDC TO IC

± = AUDIO POWER

± = LOGIC POWER

↓ = AUDIO GROUND

⊥ = LOGIC GROUND

1µF BYPASS

HEX INVERTER

CD4069/74C04 HEX
INVERTER BUFFER

PIN 1 3 5 9 11 13

GND = 14

(-)VDC = 7

PIN 2 4 6 8 10 12

LAMP

THE ON/OFF LAMPS
ARE M1, 389, AT1 3/4 MIDGET
GROOVED LAMP (14V, 80mA)

NOTE: A SMALL PIECE OF SHRINK TUBING CAN BE
FASHIONED TO REMOVE LAMPS FROM THEIR SOCKETS.

NOTE: CONNECTOR REMOVAL & REPLACEMENT

ANY CONNECTOR CAN BE FULLY REMOVED OR
INSERTED WHILE THE CONSOLE IS "HOT" (POWERED
UP). THIS WILL NOT CAUSE ANY HARM TO THE
CONSOLE ELECTRONICS

SPST RELAY

SPST RELAYS HE3621A1210
MANUFACTURED BY HAMLIN

DPST RELAY

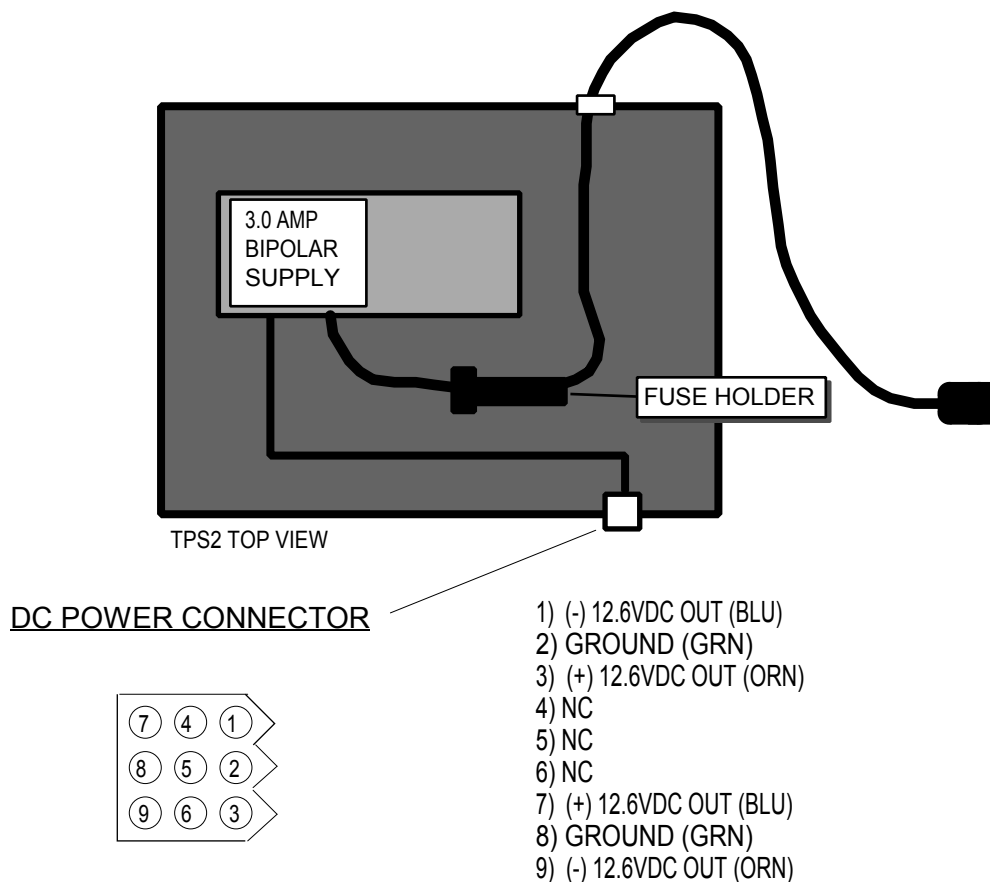
DPST RELAYS MRB 2A12
MANUFACTURED BY CLARE

ELECTRONIC DESCRIPTION

4-1) POWER SUPPLY DESCRIPTION

4-1a) 1200 POWER SUPPLY - GENERAL DESCRIPTION

The 1200's power supply (Arrakis model number TPS2) contains one 3 amp bipolar open frame power supply. See Section 3-1d for cabinet dimensions.



4-1b) FUSE

The power supply cabinet is equipped with an INTERNAL AC fuse. If the fuse blows, then replace it with a 2 AMP SLO-BLO FUSE.

Use no substitutions!

NOTE - WARNING!!! ALWAYS unplug the power supply before opening the chassis. Potentially deadly AC line voltage is present within the power supply cabinet.

4-1c) GROUNDING

THE POWER SUPPLY CABINET MUST BE GROUNDED AT ALL TIMES!!! ground is totally. Grounding is accomplished by plugging the power supply into a grounded three prong AC outlet. The power supply's electronic floating in respect to the cabinet's chassis ground (AC ground), therefore there is no advantage to removing the third prong on the AC power cord to try to alleviate a ground loop. If the AC ground is defeated on the power cord or AC outlet then the power supply cabinet **MUST** be grounded through other means. Failure to do so will result in a safety hazard.

ELECTRONIC DESCRIPTION

4-1) POWER SUPPLY DESCRIPTION

4-1d) OPEN FRAME POWER SUPPLY

The 1200 series console uses a bipolar (positive and negative DC) "International Series" open frame supply built for Arrakis by Power One Inc. The supply is adjustable from roughly ± 10 to ± 17 VDC. Protection is provided in the form of current limiting-foldback. Load regulation is $\pm .05\%$ for 50% load change. Ripple is 5mv peak to peak maximum. Transient response is 50ms to a 50% load change.

SAFETY SPECIFICATIONS

Power One literature shows they meet or exceed safety requirements for IEC380, IEC435, VDE 0730 Part 2, VDE 0804, ECMA-47, CEE 10 Part 2P, UL1012, CSA22.2 No. 143, CSA 22.2 No. 154. Specifically, leakage current is less than 5 milliamps. Dielectric withstand is 3750VAC input to chassis and input to output with 300 VDC output to chassis.

4-1e) 110VAC to 220VAC CONVERSION

The power supply can be operated on a variety of AC line voltages. The supply is set up for 120VAC operation as shipped from operation as shipped from the factory unless otherwise requested. The supply will run on frequencies from 47 to 63 Hz and voltage variations of +10% to -13%. Conversion to different line voltages is accomplished by moving jumpers on the power supply.

JUMPER CONNECTIONS FOR VARIOUS AC SUPPLY VOLTAGES

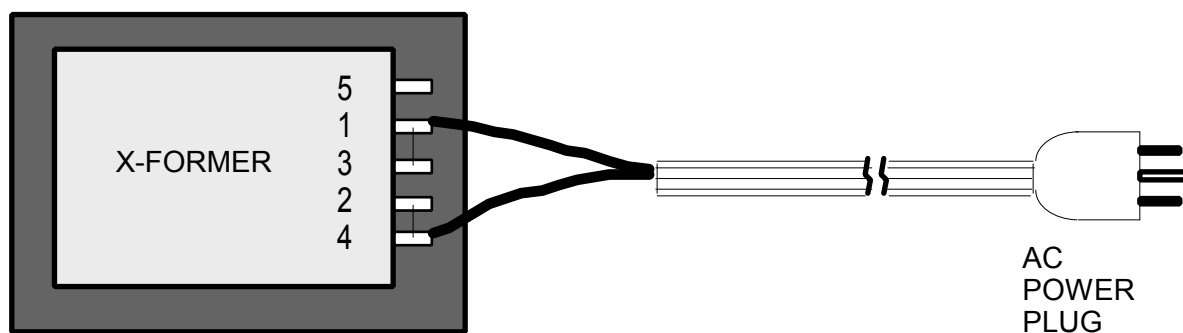
AC line input voltage conversion requires reconfiguration of the power supply's AC transformer:

FOR 110VAC OPERATION - APPLY AC TO PINS1 AND 5
Jumper pins1 to 3 and pins 2 to 4

FOR 120VAC OPERATION - APPLY AC TO PINS1 AND 4
Jumper pins1 to 3 and pins2 to 4

FOR 220VAC OPERATION - APPLY AC TO PINS1 AND 5
Jumper pin 2 to pin 3

FOR 230VAC OPERATION - APPLY AC TO PINS 1 AND 4
Jumper pin 2 to pin 3



EXAMPLE- Transformer jumpers set for 120VAC operation

ELECTRONIC DESCRIPTION

4-1) POWER SUPPLY SCHEMATIC

DATE-3-89	DESC- 3.0 AMP POWER SUPPLY	REV- A
DRN BY- MP	MODEL- 1200 SERIES	
CHKD BY- GF	PRODUCT- CONSOLE	ARRAKIS SYSTEMS INC.

4-2) CONSOLE OVERVIEW

Three Console Sizes- 5 channels, 10 channels & 15 channels

Newsroom

Production

'ONAIR'

Ultra-high Quality Construction and Design

Penny and Giles 3000 Series slide faders

VCAs' DC control removes audio from the slide faders

ITT Schadow switches

Conductive plastic rotary pots with stainless steel shaft and bushing

Gold connectors -- IC's socketed -- regulated power supply -- heavy construction

Durable and attractive Baked Epoxy finish on painted surfaces

Solid Oak Trim for lasting beauty

Quiet action ON/OFF switches

Highest quality double sided fiberglass PC boards with solder masking

Easy Connectorized Installation

VCA Controlled Faders

Quasi-Modular Design- Inputs grouped 5 per PC board

Comprehensive Logic system

Start sources by isolated (dry contact) internal reed relays

Remote channel ON/OFF control for turret/studio interface (MIC inputs)

Channel ON Tally also for turret/studio interface

MIC Channel activated ON-AIR relay for interface to ON-AIR light system etc.

Channel selectable muting for Control Room monitoring system

Monitor DIM function during cue and talkback

Turret Support

External regulated and protected Power Supply- 110/220 VAC, 60/50 Hz

Two Stereo Output Buses with two Mono Sums

Monitor System for Control Room and Two Studios

Mono Cue system

AUTOCUE into right headphone/monitor while dimming program audio

Talkback/Intercom features

Any channels are selectable to the User-transparent Telephone Mix-minus Bus

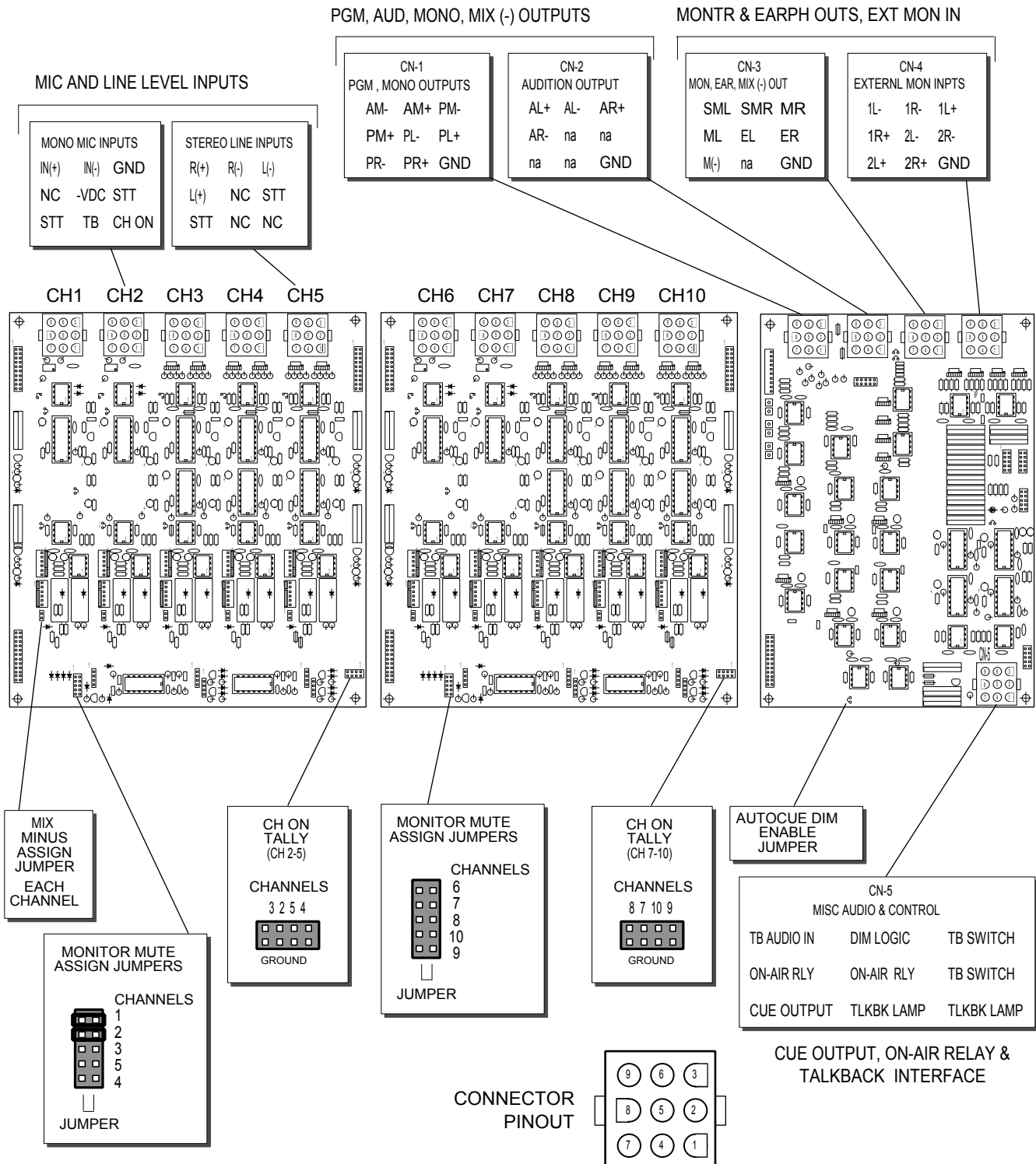
Long lasting professional VU Meters

Two Year Warranty

ELECTRONIC DESCRIPTION

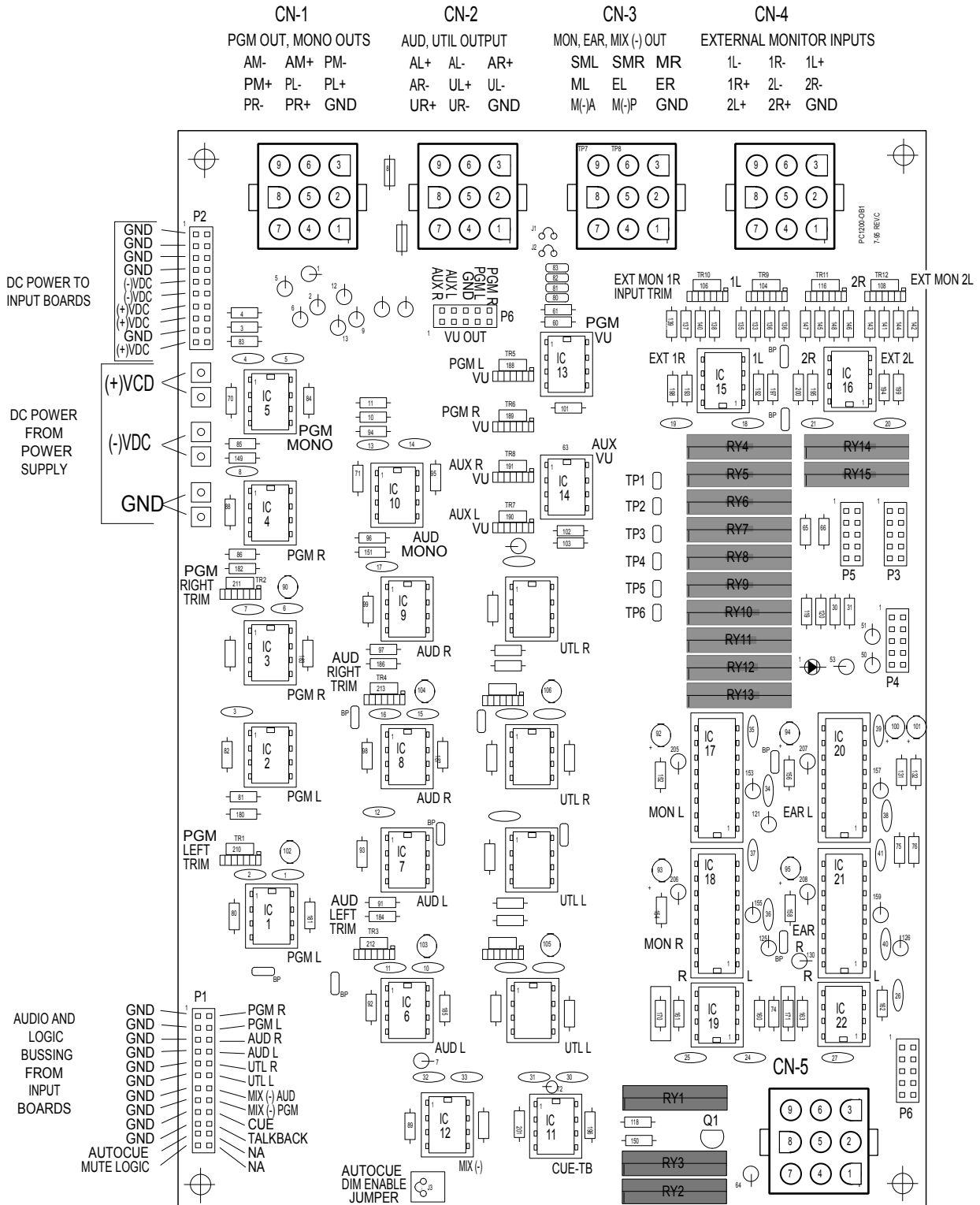
4-3) OVERALL INPUT/OUTPUT CONNECTOR DIAGRAM

The diagram below illustrates a summary of the basic audio I/O and logic connectors for the 10 channel 1200 Series Console. The 5 channel and 15 channel consoles are similar.



ELECTRONIC DESCRIPTION

4-4) 1200 SERIES OUTPUT BOARD - PHYSICAL LAYOUT



NOTES:

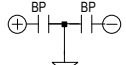
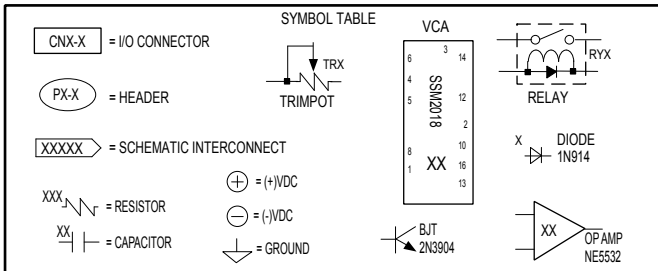
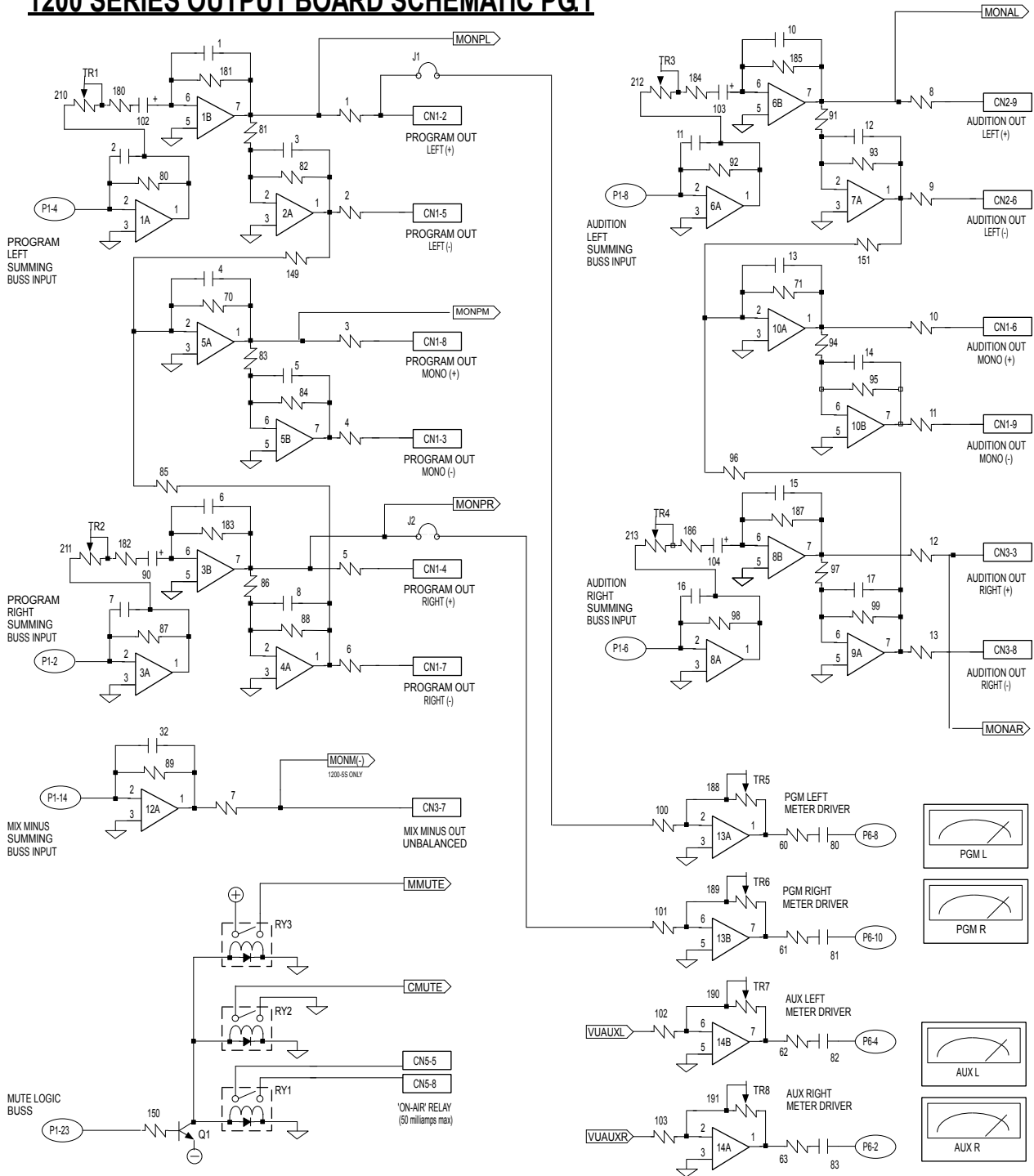
- 1) TO DEFEAT 'AUTOCUE' FEATURE: CLIP JUMPER J3, RESISTOR 170 AND RESISTOR 171.
- 2) CERTAIN SECTIONS OF THIS BOARD (I.E. - UTL AMPS, ETC.) ARE NOT USED IN EVERY APPLICATION

CN-5 MISC AUDIO & CONTROL

TB AUDIO IN	DIM LOGIC	TB SWITCH
MUTE RELAY	MUTE RELAY	TB SWITCH
CUE OUTPUT	TB LAMP	TB LAMP

ELECTRONIC DESCRIPTION

4-4) 1200 SERIES OUTPUT BOARD SCHEMATIC PG.1

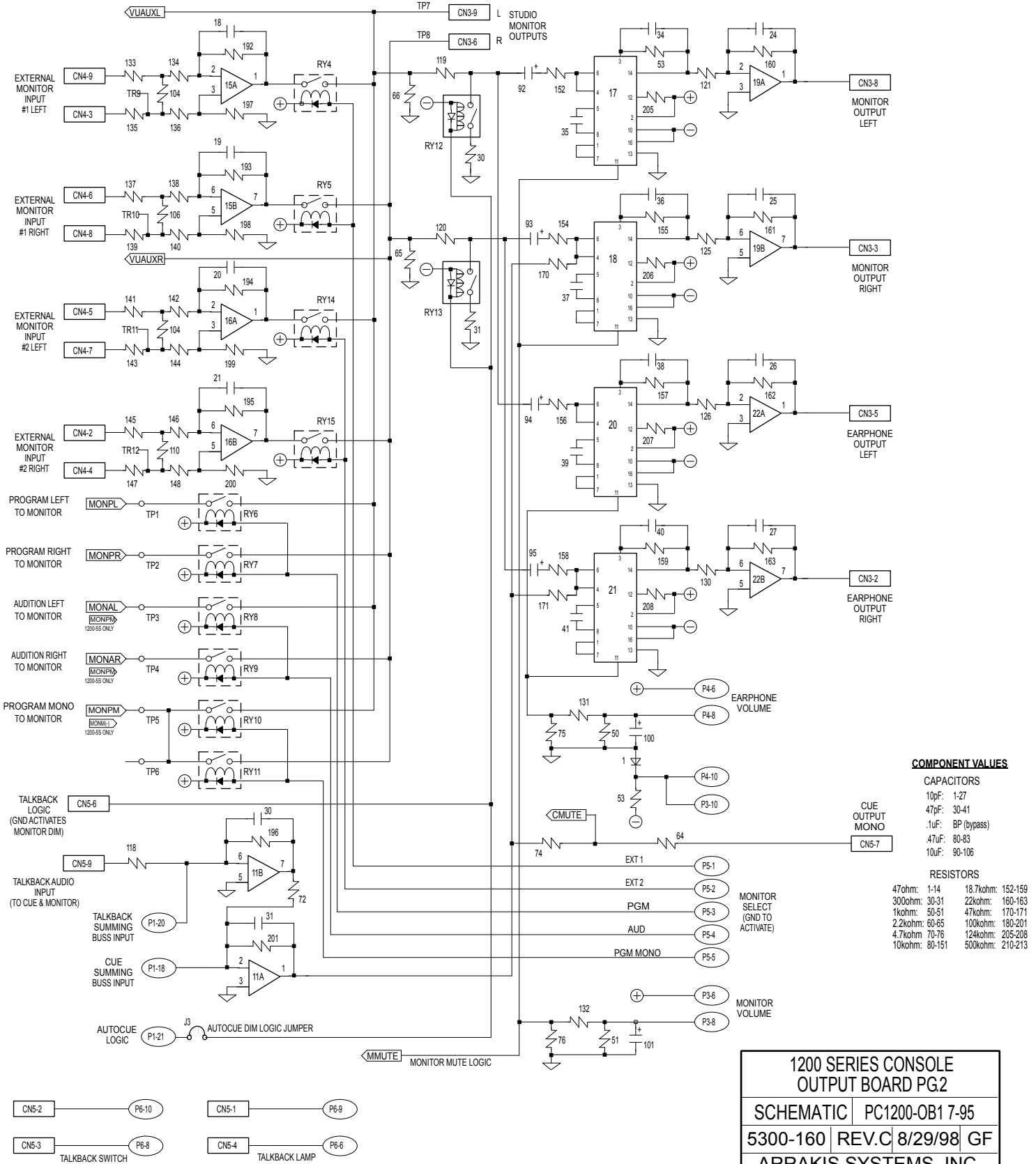


NOTE: 1200-5S DOES NOT USE ICS 6,7,8,9,10

1200 SERIES CONSOLE OUTPUT BOARD PG.1	
SCHEMATIC	PC1200-OB1 7-95
5300-160	REV.C 1/19/99 GF
ARRAKIS SYSTEMS, INC.	

ELECTRONIC DESCRIPTION

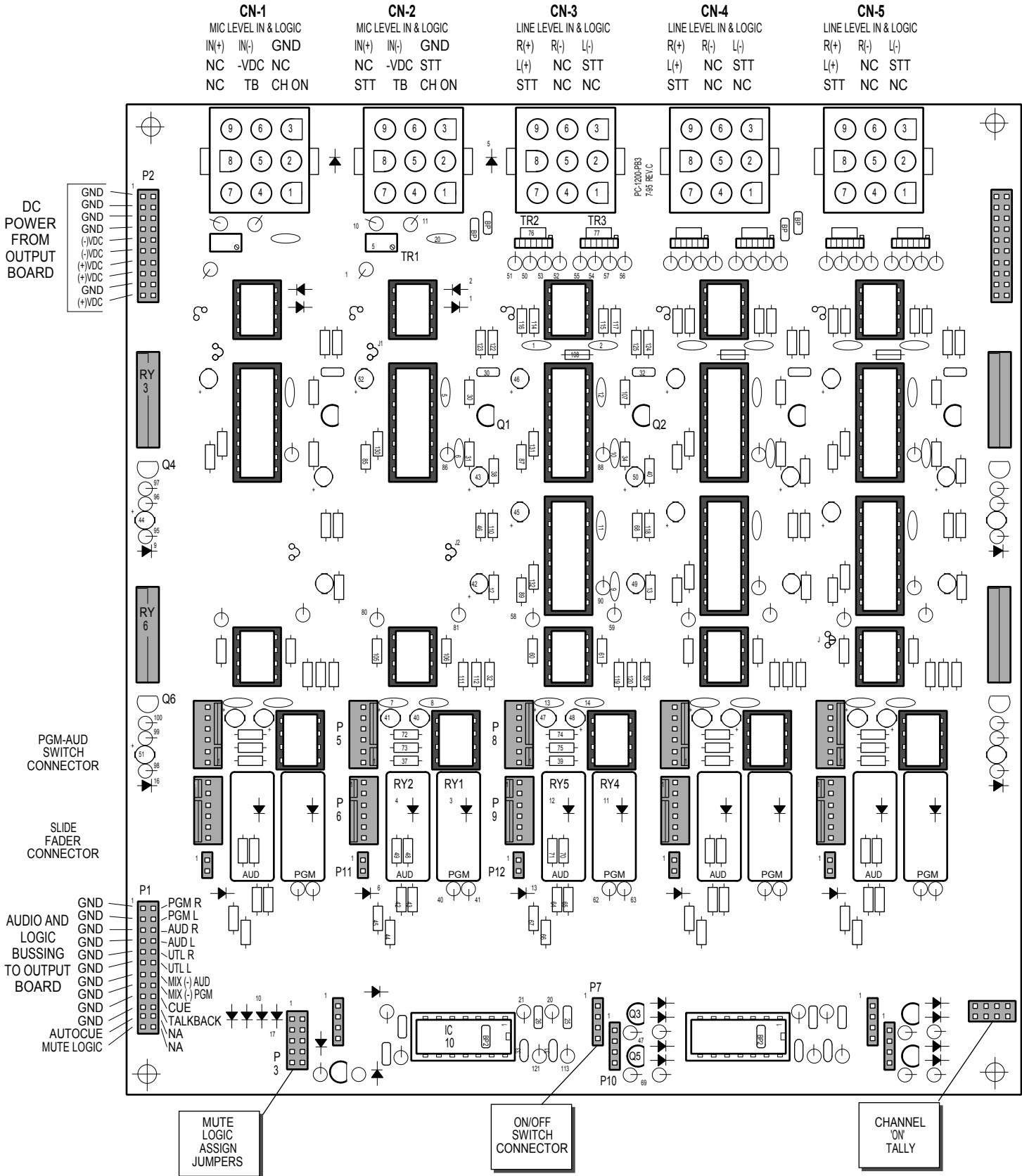
4-4) 1200 SERIES OUTPUT BOARD SCHEMATIC PG. 2



ELECTRONIC DESCRIPTION

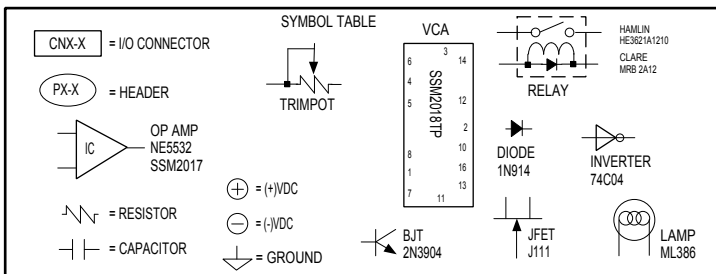
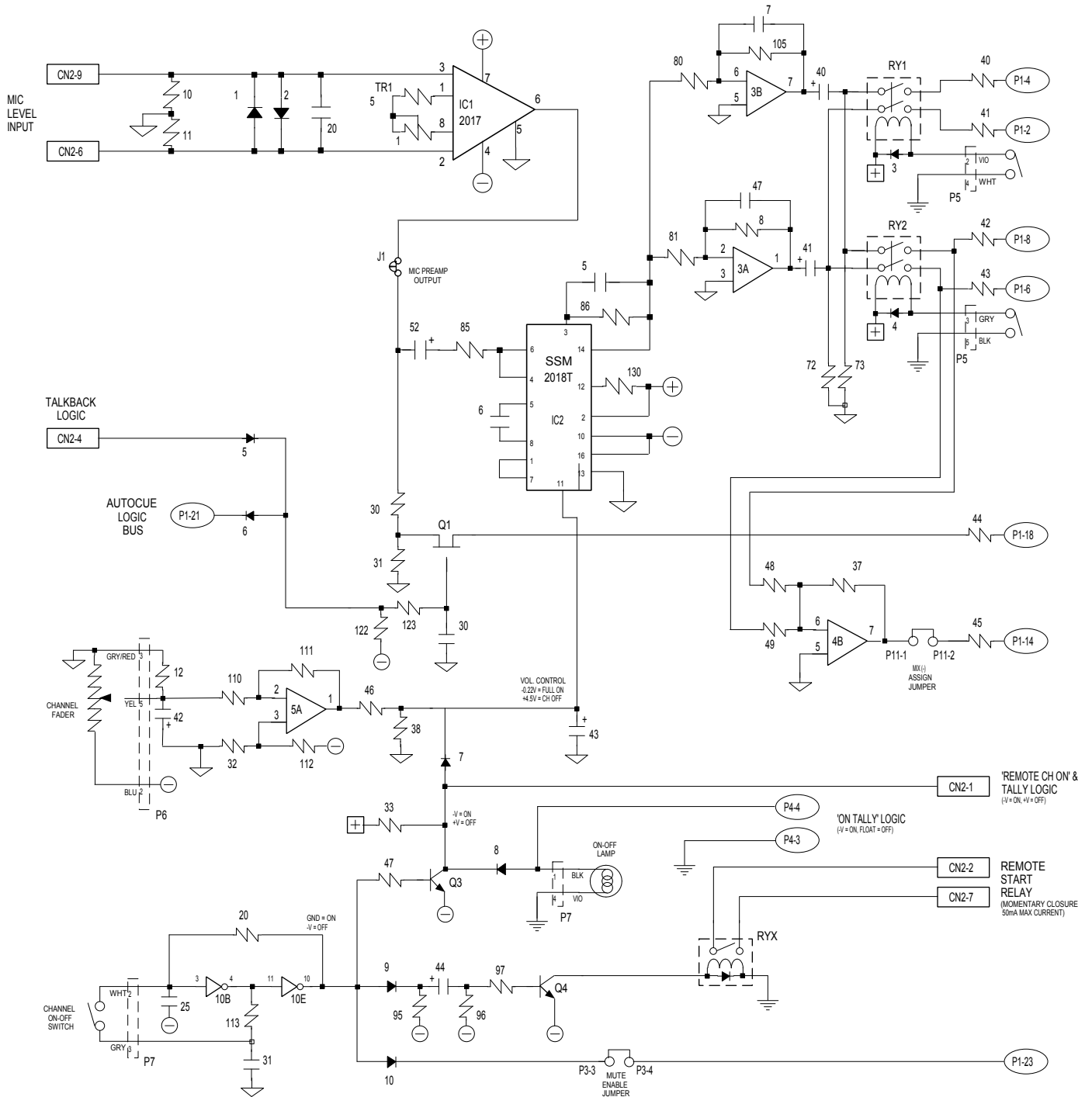
4-5) 1200 SERIES INPUT BOARD (PC1200-PB3) - PHYSICAL LAYOUT

CHANNELS 1 & 2 SHOWN MIC LEVEL
CHANNELS 3, 4 & 5 SHOWN LINE LEVEL



ELECTRONIC DESCRIPTION

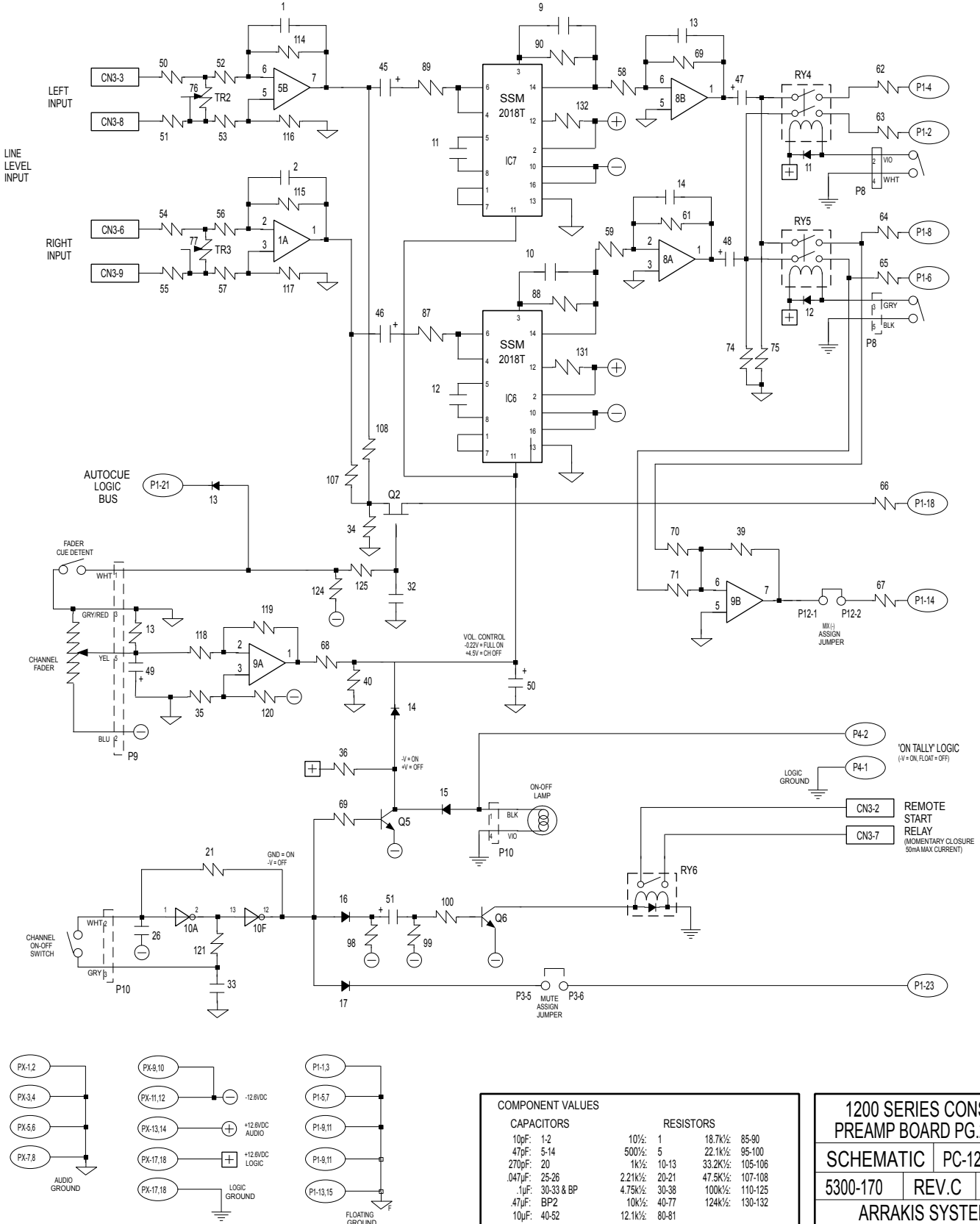
4-5) 1200 SERIES INPUT BOARD (PC-1200-PB3) - SCHEMATIC - MICROPHONE LEVEL INPUT CHANNELS



1200 SERIES CONSOLE PREAMP BOARD PG1 (MIC)	
SCHEMATIC	PC-1200-PB3 7-95
5300-170	REV.C 12/4/98
ARRAKIS SYSTEMS INC.	

ELECTRONIC DESCRIPTION

4-5) 1200 SERIES INPUT BOARD (PC-1200-PB3) - SCHEMATIC - LINE LEVEL INPUT CHANNELS



ELECTRONIC DESCRIPTION

4-6) CONSOLE ASSEMBLIES

4-6a) Overall Assembly Diagram - The diagram illustrated below is a summary of the basic assemblies used on the 1200 Series. The diagram also indicates where the assemblies connect within the console .

PC BOARD ASSEMBLIES

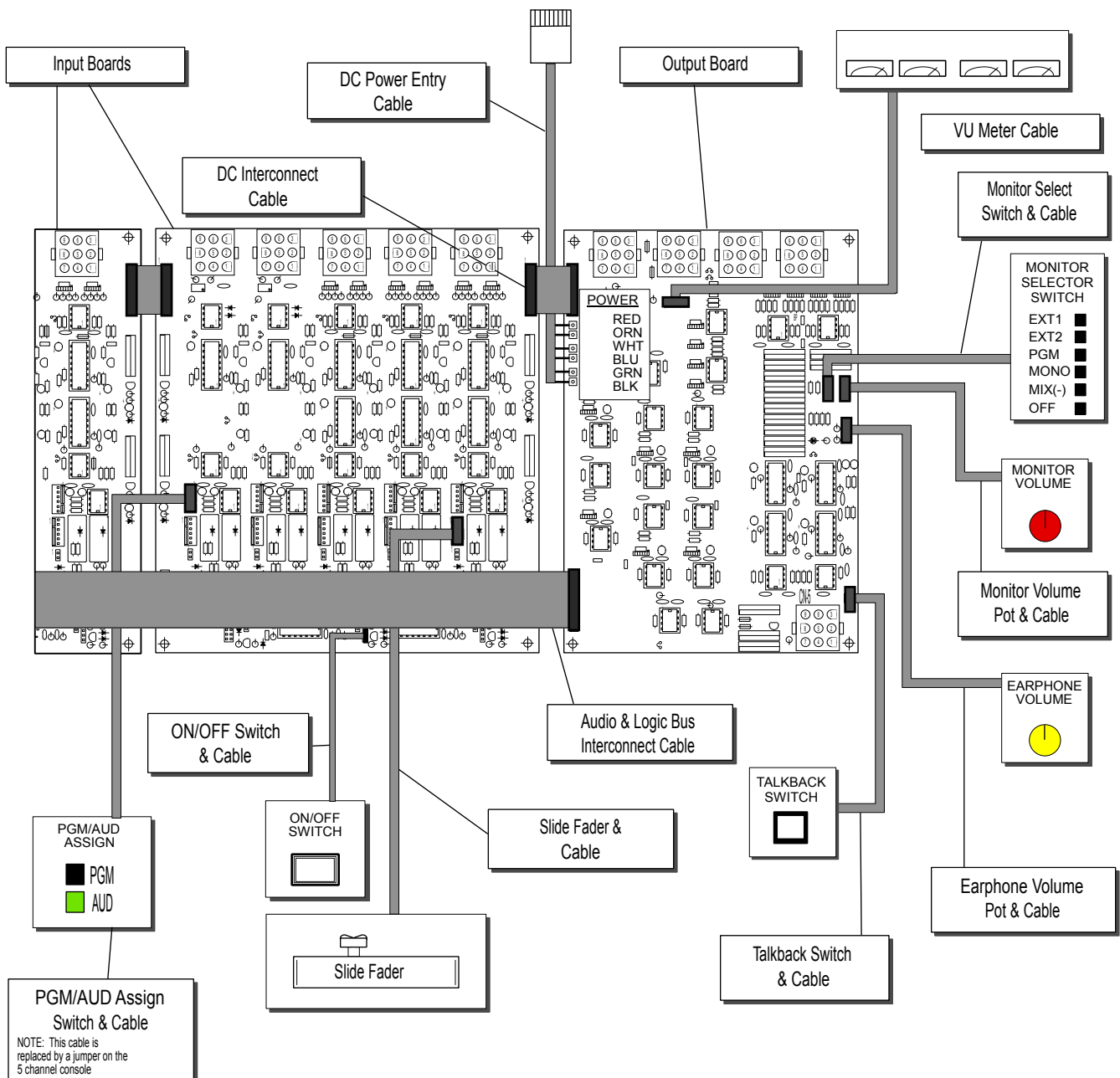
- 1) Input Board(s) (MIC or Line Levels)
- 2) Output Board

CONNECTING CABLE ASSEMBLIES

- 1) DC Power Entry Cable
- 2) DC Interconnect Cable
- 3) Audio & Logic Bus Interconnect Cable

CONTROL & METERING ASSEMBLIES

- 1) VU Meter Cable
- 2) Monitor Select Switch & Cable
- 3) Monitor Volume Pot & Cable
- 4) Earphone Volume Pot & Cable
- 5) Talkback Switch/Lamp & Cable
- 6) PGM/AUD Assign Switch & Cable
- 7) ON/OFF Switch & Cable
- 8) Slide Fader (with or without CUE detent)



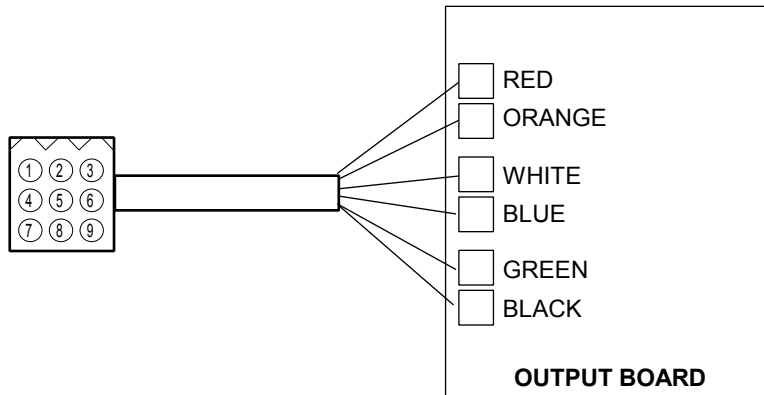
ELECTRONIC DESCRIPTION

4-6) CONSOLE ASSEMBLIES

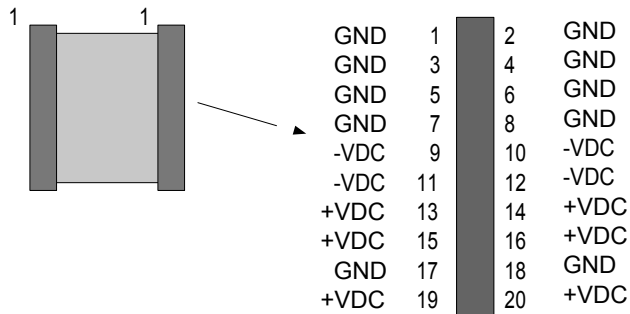
4-6b) DC Power Entry Cable - This cable connects power between the external Power Supply and the Output Board

Connector Pinout

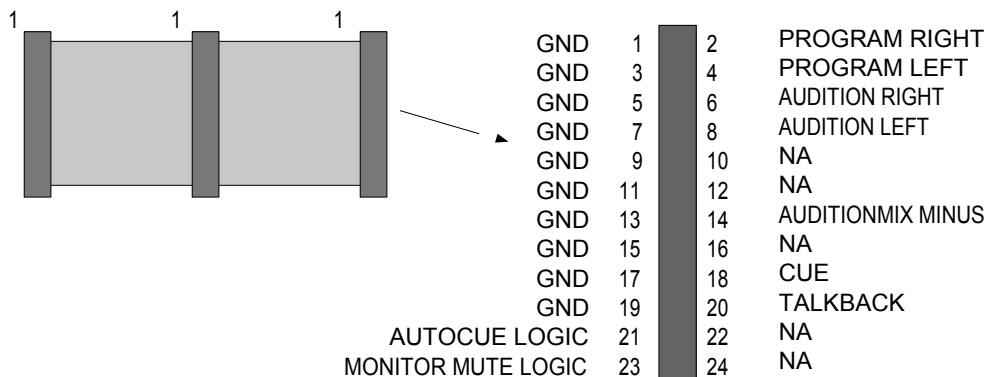
- 1) (-) 12.6VDC (BLU)
- 2) GROUND (GRN)
- 3) (+) 12.6VDC (ORN)
- 4) NC
- 5) NC
- 6) NC
- 7) (+) 12.6VDC (BLU)
- 8) GROUND (GRN)
- 9) (-) 12.6VDC (ORN)



4-6c) DC Interconnect Cable - This cable connects power between the PC boards



4-6d) Audio & Logic Bus Interconnect Cable - This cable connects buses between the PC boards



ELECTRONIC DESCRIPTION

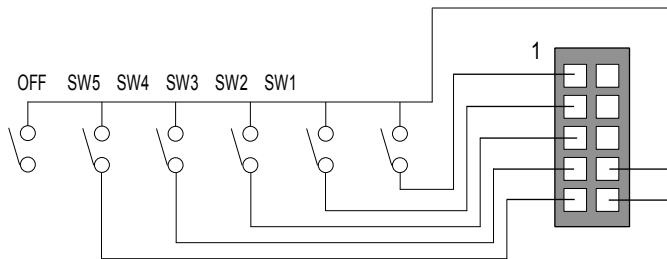
4-6) CONSOLE ASSEMBLIES

4-6e) VU Meter Cable - This cable connects the Output Board and the VU meters.



AUX RIGHT	1	2	AUX RIGHT
AUX LEFT	3	4	AUX LEFT
GROUND	5	6	GROUND
PROGRAM LEFT	7	8	PROGRAM LEFT
PROGRAM RIGHT	9	10	PROGRAM RIGHT

4-6f) Monitor Select Switch & Cable - This cable connects the Monitor Select switch to the Output Board.



5 CHANNEL CONSOLE

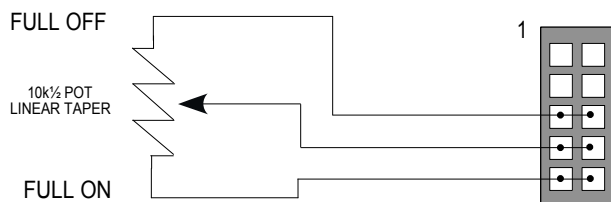
SW1 = EXT 1	1	2	nc
SW2 = EXT 2	3	4	nc
SW3 = PGM	5	6	nc
SW4 = MONO	7	8	GND
SW5 = MIX (-)	9	10	GND

10 & 15 CHANNEL CONSOLES

SW1 = EXT 1	1	2	nc
SW2 = EXT 2	3	4	nc
SW3 = PGM	5	6	nc
SW4 = AUD	7	8	GND
SW5 = MONO	9	10	GND

*NOTE: cable harness is the same on all console models. The functional difference is in the Output board.

4-6g) Monitor Volume Pot & Cable - This cable connects the Monitor Volume pot to the Output Board.

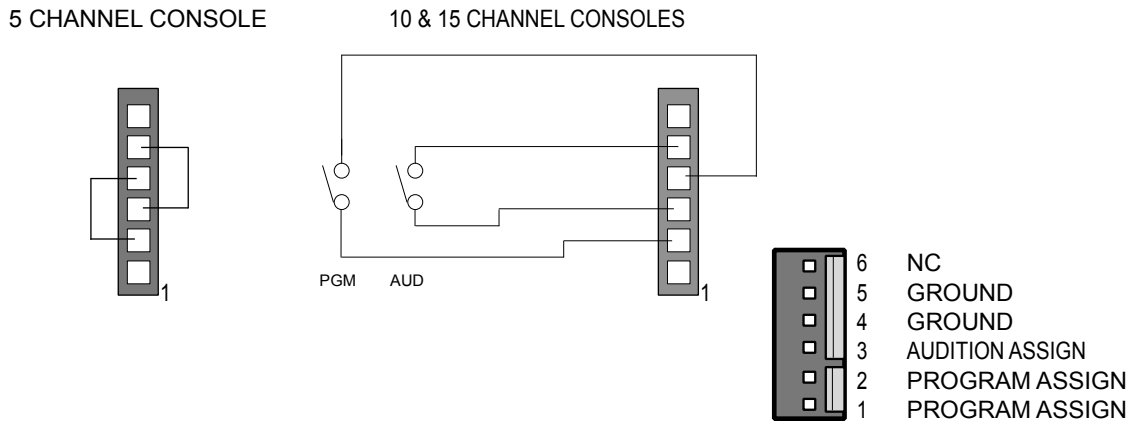


nc	1	2	nc
nc	3	4	nc
+VDC	5	6	+VDC
CTRL	7	8	CTRL
-7VDC	9	10	-7VDC

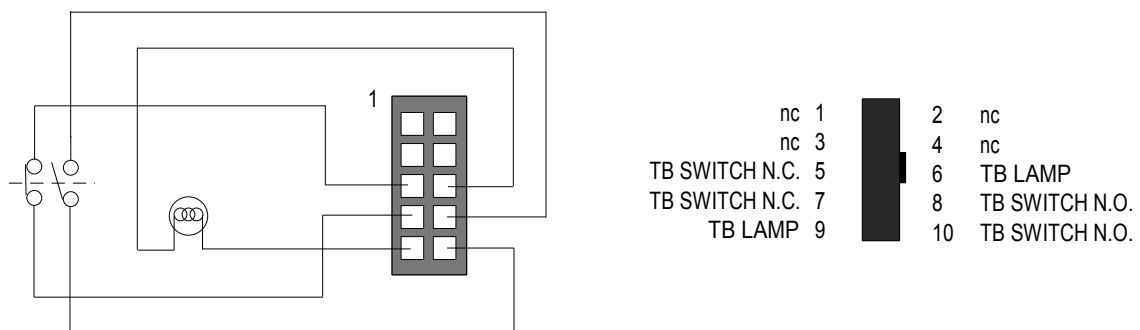
ELECTRONIC DESCRIPTION

4-6) CONSOLE ASSEMBLIES

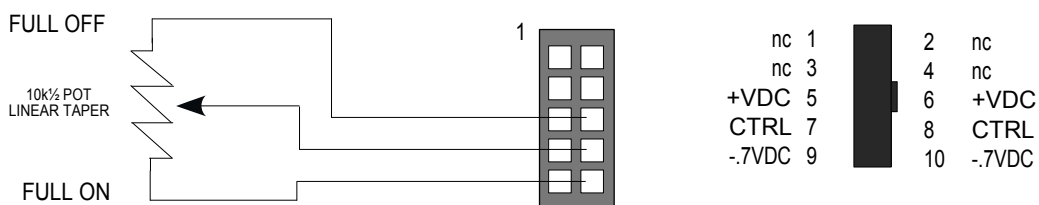
4-6h) PGM/AUD Assign Switch & Cable - This cable connects the Talkback switch to the Output Board.



4-6i) Talkback Switch/Lamp & Cable - This cable connects the Talkback switch to the Output Board.



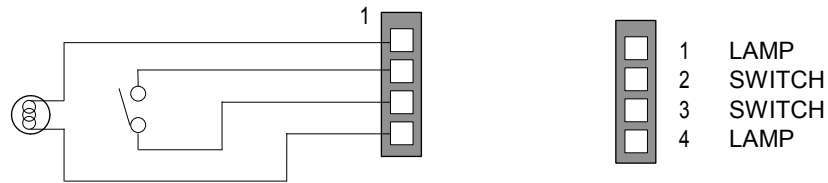
4-6j) Earphone Volume Pot & Cable - This cable connects the Earphone Volume pot to the Output Board.



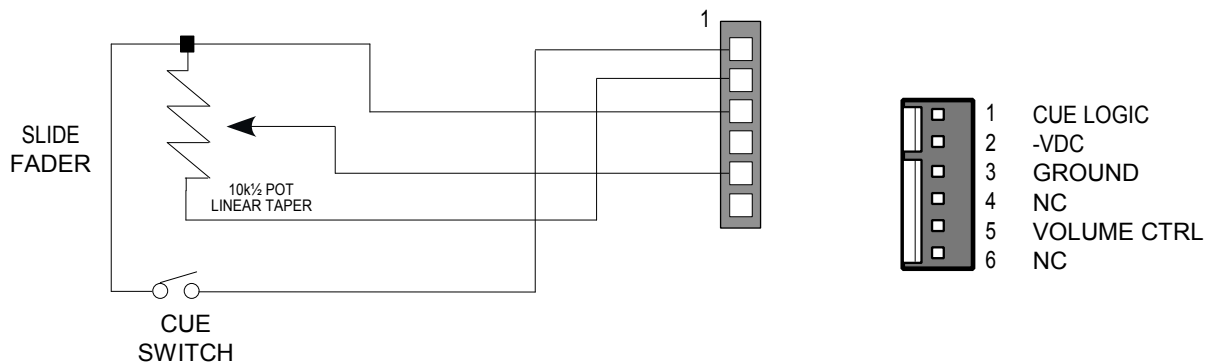
ELECTRONIC DESCRIPTION

4-6) CONSOLE ASSEMBLIES

4-6k) **ON/OFF Switch & Cable** - This cable connects the ON/OFF Switch to a channel on an Input Board.



4-6l) **Slide Fader** - This cable connects the Slide Fader to a channel on an Input Board.



SECTION FIVE

**SPECIFICATIONS
& TESTING**

5-0) INTRODUCTION

The performance test listed this section are:

- 1) Frequency Response
- 2) Signal to Noise Ratio
- 3) Total Harmonic Distortion
- 4) Crosstalk

The purpose of this section of the manual is to provide a general description of the measurement techniques used by Arrakis Systems. Information is also provided regarding variations in test data due to differences in equipment and procedure.

IMPORTANT - *many types of test equipment, test setups, test conditions and test methods are used in our industry. It is impossible to provide information for all the various combinations used in the real world. For this reason all specifications listed in this manual, or in any other published literature on these products, are general. Specifications may change without notice and may differ between the manual and other literature.*

5-1) **FREQUENCY RESPONSE**

5-1a) DEFINITION

This test defines the product's bandwidth and measures any variations in the product's output level as a function of frequency. In consumer audio the test is performed from 20Hz to 20,000Hz. In broadcast, this test is typically performed from 50 Hz to 15,000Hz. Generally, the frequency response specification is referenced to an arbitrary 0dB. Any deviation from this 0dB reference is specified as plus and/or minus dB over the stated bandwidth. The frequency response specification varies greatly between manufacturers. A typical frequency response spec is "+/- .5dB 20Hz-20kHz." It is generally accepted that a person with good hearing can hear a level change as small as .2dB.

5-1b) TEST

The test is performed with an audio signal generator and a voltmeter* (or oscilloscope). The signal generator is connected either balanced or unbalanced to a console input. The voltmeter is connected either balanced or unbalanced to a console output (such as Program Left Output). The frequency of the signal generator is varied over the audio band of interest (20Hz-20kHz or 50Hz to 50kHz) while recording the Program output level on the voltmeter. Any variation in the output level is noted over the entire frequency range. Many newer model digital voltmeters measure in absolute and relative dB which makes the test very simple. If you do not have this type of voltmeter, then you must calculate dB using the following formula (see next page).

***WARNING:** some voltmeters are optimized for AC line measurements (50/60Hz) and are not accurate over the entire audio frequency range (20Hz-20kHz).

5-1) FREQUENCY RESPONSE (continued)

$$\text{dB}=20[\log(V1/V2)]$$

where V2 is the reference level (some arbitrary voltage usually measured at 1kHz) and V1 is the voltage level in question.

5-1c) CONSOLE PERFORMANCE

All Arrakis consoles feature “Active Balanced” (electronic balanced) inputs and outputs. That is, there are no transformers or inductors in the signal path. Accordingly, there is no midband ripple at all. The frequency response is flat across the product’s entire bandwidth (between the upper and lower roll off frequencies). The product’s bandwidth is strictly controlled by internal RC time constants.

5-12 SIGNAL TO NOISE RATIO

5-2a) DEFINITION

The purpose of this test is to measure the noise floor of the console and compare it to the nominal signal level. This will tell us the console’s signal to noise ratio (SNR). The maximum signal level can also be measured then compared to the console’s noise floor thereby quantifying the console’s dynamic range.

5-2b) TEST

This is extremely difficult to perform due to differences in test procedures, setup and equipment. Many times consistent results are elusive. Careful attention to test parameters is essential to obtaining meaningful results. The equipment needed for this test is an audio frequency signal generator and an audio millivoltmeter.

The signal is applied to a console input, either mic or line, at a known level and impedance. The AC millivoltmeter is connected to a console output, Program Left for example. The levels are set up such that the VU meters read “0VU” with all the slide faders at their nominal setting (the thick line or ‘in hand setting’). The output level is recorded. This is the ‘signal’ part of the SNR measurement. The input signal is then removed from the console and the noise level is measured using the AC millivoltmeter. The RATIO between the SIGNAL out of the console and residual NOISE measured by the millivoltmeter is the SNR. The formula for the SNR is :

$$\text{SNR}=20[\text{Log}(V_{\text{signal}}/V_{\text{noise}})]$$

5-2) SIGNAL TO NOISE RATIO (continued)

The many variable factors associated with this test make it difficult to accurately compare SNR specifications between equipment manufacturers. Differences in signal levels, input and output impedances, band limiting filters, test setup and other factors have substantial impact on the test results. Therefore, SNR specs obtained using different test methods cannot be accurately compared. Furthermore, once the console is installed, 60 cycle hum (even if very, very low) can be the limiting noise factor in this test.

5-2c) **CONSOLE PERFORMANCE**

SNR TEST: MIC LEVEL INPUT - most microphones have a low-Z output. These MICs require, for proper performance, that the input impedance of the console be matched to the MIC's output impedance. The input impedance of the console is very high, therefore an impedance matching resistor must be placed across the MIC input terminals. Place a 150 ohm METAL FILM 1% resistor across the (+) and (-) inputs of the MIC channel. If the signal generator is UN-balanced, then connect the (+) input to ground with a wire jumper and feed audio into the (-) input. If you have a balanced signal generator apply balanced (+) and (-) audio to the MIC input. Do NOT connect the (+) terminal to ground in the balanced signal generator case. Use a millivoltmeter to confirm that a -50dBm calibrated setting from the signal generator. This setting is typically calibrated for a 600 ohm load, NOT a 150 ohm load. Set the channel fader to normal the operating position (the 'thick black line' or 'in hand setting'). The input module should already be calibrated for normal bus level (see "Calibration" section of the manual). Make certain that only one input channel is on. Adjust an output summing amp trimpot to give a +8dBm (1.95 VRMS) at one of the console outputs (no load is necessary on the output). Your SIGNAL is therefore +8dBu. Remove the signal generator leads from the input connector (remove the ground from the (+) input if applicable). The level that you now read at the output is the NOISE. Compute SNR using the formula shown on the previous page.

SCR TEST: LINE LEVEL INPUT - Apply a +8dBu (1.95 VRMS) tone from the signal generator to a line level input module. The connections can be either balanced or unbalanced as outlined above. An input terminating resistor is not necessary. Set the channel fader to the normal operating position. The input module should be adjusted for proper bus level (see "Calibration" section of the manual). Adjust an output summing amp trimpot to give a +8dBu (1.95 VRMS) at one of the console outputs (no load necessary on the output). Your SIGNAL is therefore +8dBu. Remove the signal generator leads from the input connector (remove the ground from the (+) input if applicable). The level that you now read at the output is the NOISE. Compute SNR using the formula shown on the previous page.

5-2) SIGNAL TO NOISE RATIO (continued)

IMPORTANT - *The IC used for the VCA (SSM2018) has a noise floor that, due to slew rate optimization, increases with frequency above 45kHz. This increase in the noise floor occurs outside the audio frequency band and can (should be) ignored. A broadband noise measurement would include those frequencies above 45kHz hence this type of measurement would be misleading. Therefore a 20kHz or 30kHz band limiting filter MUST be used during SNR measurements to obtain accurate results.*

Additionally:

- 1) A peak reading meter will measure 1.1dB better than an RMS reading meter.
- 2) A 20kHz filter will read approximately 1.8dB better than a 30kHz filter.
- 3) Stray 60 cycle fields and RFI will effect the test.

5-3) TOTAL HARMONIC DISTORTION

5-3a) DEFINITION

This test measures the nonlinear response of the signal chain to a fixed frequency sinusoidal tone. A tone is applied to an audio input. A measuring device at the output cancels (nulls) the input tone then measures the total energy of the remaining harmonics (harmonics are multiples of the frequency of the applied tone) and any noise present. The ratio of the total energy of the harmonics plus noise to that of the fundamental (applied tone) x100 is the percent harmonic distortion +N. It is generally accepted that a good ear can hear 0.1% THD.

5-3b) TEST

A low distortion audio signal generator is connected to a console input, balanced or unbalanced as outlined above in the SNR description. A distortion analyzer is connected to a console output, balanced or unbalanced. The distortion analyzer will null out the fundamental frequency and read distortion in percent (%) THD+N

5-3c) CONSOLE PERFORMANCE

IMPORTANT - *a distortion test is limited by the noise in the system. As an example, a 60dB S/N ratio means that the noise is down only 1000 times from the signal. This would measure .1% THD+N of .01%. To find true THD, where noise limits the test, a spectrum analyzer must be used.*

Once again, attention must be paid to filtering and test setup since excess noise will result in excess THD+N.

5-4) CROSSTALK

5-4a) DEFINITION

Crosstalk is a measure of the amount of signal that bleeds from one audio chain into another. Problems occur when producing two separate programs on a console at the same time or when cueing during programming. If audible crosstalk occurs, then ON AIR integrity can be compromised or a recording can be effected.

5-4b) TEST

Apply a test tone to one audio chain, such as Audition Left & Right. Measure, with a millivoltmeter, how many dB down (from the applied signal) the signal appears in another audio chain, such as Program Left or Right.

5-4c) CONSOLE PERFORMANCE

Crosstalk takes place in two basic ways. The first is capacitive crosstalk which increases by 20dB for a ten times increase in frequency. The worst case frequency for this type of crosstalk is therefore 20kHz. the second type of crosstalk is power supply related where ground between two circuits is modulated by heavy currents. Ground modulation crosstalk tends to be of a low frequency nature and sounds like ordinary audio while capacitive crosstalk is predominantly high frequencies and sounds 'tinny.'

5-5) PROOF OF PERFORMANCE

STEREO LINE INPUT

- a) Frequency Response ± 0.5 dB typical, 20 Hz to 20kHz
- b) Signal to Noise -85dB typical, +8dBu in, +8dBu out
- c) Total Harmonic Distortion02% typical, +8dBu in, +8dBu out
- d) Stereo Separation -82dB typical (1kHz), -68dB typical (20kHz)
- e) Program to Audition X-talk -85dB typical (1kHz), -75dB typical (20kHz)
- f) Cue to Program X-talk -90dB typical (1kHz), -75dB typical (20kHz)
- g) Maximum Input, Output +23dBu, balanced input and output

MIC INPUT

- a) Frequency Response ± 0.5 dB typical, 20Hz to 20kHz
- b) EIN -115dB typical, -50dBu in, +8dBu out
- c) Total Harmonic Distortion05% typical, -50dBu in, +8dBu out

NOTE- All tests are typical. All tests were performed on an Audio Precision test suite. Specifications are subject to change without notice.

MAINTENANCE & SERVICE

SECTION SIX

MAINTENANCE & SERVICE

6-1) MAINTENANCE

The Arrakis 1200 Series consoles require no periodic maintenance with the exception of occasional cleaning and lamp replacement.

6-1a) **CLEANING**

SWITCHES - Switches typically require no cleaning, just operate the switch a few dozen times.

SLIDE FADERS - the Penny & Giles slide faders in the Arrakis 1200 Series consoles have conductive plastic elements and can be cleaned with warm water. They do not require disassembly. Remove the fader's knob by pulling up on it. Remove the fader from the console by removing the two mounting screw, clipping cable ties and carefully pulling the connector from the PC board. To clean, simply hold the fader under a stream of warm tap water and operate back and forth 50 to 100 times. For extremely dirty faders, a mild soap solution can also be used. Allow the faders to dry **TOTALLY** before using (this often means they must dry overnight). A light silicone based lube can be applied **SPARINGLY** to the slide fader if required: take the cover plate off the fader (two screws) and use a swab to apply some lube to the fader's two guide rods. **IMPORTANT:** Do NOT use solvents, cleansers or sprays on the faders. The warm water with mild soap cleaning technique is recommended by Penny & Giles.

ROTARY POTS - The Clarostat MOD-POTS are sealed and cannot be disassembled. Front panel knobs may be removed by: 1) loosen the collet under the colored knob cover then 2) lift the knob off the shaft. Replacement pots are available from Arrakis.

SURFACES - Use mild soap and warm water. Abrasives will scratch the polycarbonate overlays, and solvents will ruin these plastic surfaces. Damp dust the wood panels and occasionally treat with a common furniture wax.

6-1b) **ROUTINE PARTS REPLACEMENT**

The front panel controls on a console are obviously subject to ordinary wear and tear. Abusive treatment of the controls will result in a substantial reduction of their life expectancy. Be aware of the average use each control in the console is subjected to. It is possible to predict the life expectancy of a switch by noting its frequency of use and comparing that to the switch's life expectancy rating. Provisions can then be made to schedule maintenance and request budgeting for replacement parts. For example, consider a channel ON switch. this switch can typically be operated 4 million times before a failure can be expected (4,000,000 operations MTBF). If this switch is operated once every 3 minutes, 24 hours a day, 7 days a week, this this switch has an expected life of almost 23 years!

MANUFACTURER SUGGESTED LIFE EXPECTANCY:

- ON/OFF Switches - 4,000,000 operations
- Momentary Switches (TALKBACK) - 50,000 operations
- Latching Switches (PGM, AUD, MONITOR etc)
- Faders - 100,000 operations (10% resistance change)
- Lamps - 40,000 hours *continuous* operation

6-2) **SERVICE**

6-2a) **TECHNICAL QUESTIONS**

Arrakis Systems maintains a staff of friendly broadcast engineers, design engineers, and technicians who have many years of in depth field experience in broadcasting. All of our technical resources are available to you to answer installation questions, solve problems, and repair equipment. If you have a question or problem, please feel free to call us. We are here to help and must have your field feedback to advance and improve our product. We can't solve every problem, but our people are here to try.

To contact our customer service department call on weekdays **ONLY** between:

- 7am - 3:30pm (pacific time)
- 8am - 4:30pm (mountain time)
- 9am - 5:30pm (central time)
- 10am - 6:30pm (eastern time)

Our phone number is: **970-461-0730**

Ask for **ANALOG CUSTOMER SUPPORT**

NOTE: COLLECT CALL WILL NOT BE ACCEPTED!

6-2b) **WARRANTY SERVICE**

Arrakis Systems will replace, at no charge, parts that fail due to defects in material or workmanship during the warranty period of the product to the original owner only.

Arrakis Systems does not warranty equipment that has failed due to improper installation, abuse, or acts of nature. It is solely at the discretion of Arrakis Systems as to whether a part is defective under warranty conditions. Refer to Section 7 for details.

6-2c) **WARRANTY SERVICE PROCEDURE**

Arrakis Systems assumes that its customers have on staff (or access to) competent technical personnel and adequate test equipment. If a product fails, we will first seek to ascertain the problem over the phone and solve it at the 'component level' where we find the specific part(s) that have failed and repair or replace them. This is the least expensive and time consuming solution for you. Depending on the circumstances and at our discretion, Arrakis will replace the specific PC board that we suspect to be at fault. If replacing PC boards does not solve the problem, then the console is to be returned to the factory where it will be repaired (normally within 2 days) and returned to you. Return shipping over and above the cost of UPS ground will be borne by the customer.

Under NO circumstances will Arrakis Systems replace the defective console with a new one. Under absolutely NO circumstances does Arrakis take any responsibility for non-factory technical expenses!!!!!!!!

6-2d) **SERVICE** (continued)

6-2a) **TECHNICAL QUESTIONS**

To have a part replaced under warranty, you must:

- 1) Call or write the 'Customer Service Dept: and describe what parts need replacement and circumstances of the failure.
- 2) A RMA (Return Merchandise Authorization) number will be issued.
- 3) Return ALL defective parts to the factory (shipping Prepaid) to the attention of the 'Customer Service Dept' with a letter referring to the replacement parts and your NAME, CALL LETTERS, ADDRESS, DATE & RMA NUMBER.

IMPORTANT - *If the defective parts are not returned within 30 days, you will be invoiced for them and it will be assumed that they do not fall under warranty. Also, until it is cleared up, further customer service may be refused.*

SPARE PARTS - A spare parts kit is provided with the console. these parts are provided to take care of emergency failure. These parts, when use to replace failures, are not replaced under warranty.

PURCHASED PARTS - Any Arrakis customer may purchase spare or replacement parts from the factory at reasonable prices. Arrakis does not believe in operating it's Customer Support Department as a profit center and therefore charges as little as possible. We have a fixed service charge to cover paperwork expenses to which we add the price of the parts and shipping expenses.

PAYMENT OPTIONS - Parts may be purchased either by:

- 1) C.O.D. shipping
- 2) Credit Card
- 3) Through an Arrakis authorized dealer, who may offer terms. Arrakis does not sell items on account or payment plan, although dealers may.

IMPORTANT - *Non-payment or late-payment for parts will make it necessary to refuse further customer service support until the issue is resolved.*

WARRANTY

SECTION SEVEN

WARRANTY

WARRANTY

Arrakis Systems, inc. warrants this product to purchaser against defects in material and workmanship for a period of two year from the date of original retail purchase. No claim shall be maintained hereunder unless written notice is received by seller within 30 days of the facts giving rise to the claim. The sole or exclusive liability of Seller for breach of warranty shall be refund of the purchase price of the item sold, or at it's option, to replace or repair the item or part concerned FOB it's factory. Arrakis' liability shall arise only if the purchaser causes the defective part or item to be delivered to Arrakis for inspection upon Arrakis' request at Purchaser's expense. This warranty shall not be effective if the alleged defect is due to abuse, damage by accident, misuse, misapplication, has been modified without express written permission of Arrakis Systems, exposure, excessive moisture, or any other use of the equipment other than the use for which the manufacturer prescribed.

No warranties express or implied shall be applicable to any equipment sold hereunder, and the foregoing shall constitute the Buyers' sole right and remedy under the agreements in this paragraph contained. In no event shall Arrakis Systems, inc. have any liability for consequential damages or for loss, damage, or expense directly or indirectly arising from the use of the products, or any inability to use them either separate or in combination with other equipment or materials of from any other cause.

Arrakis' warranty is given solely to the original user and only to the extent above described. No other dealer, agent, or employee is authorized to make any modification, extension, or addition to this warranty.