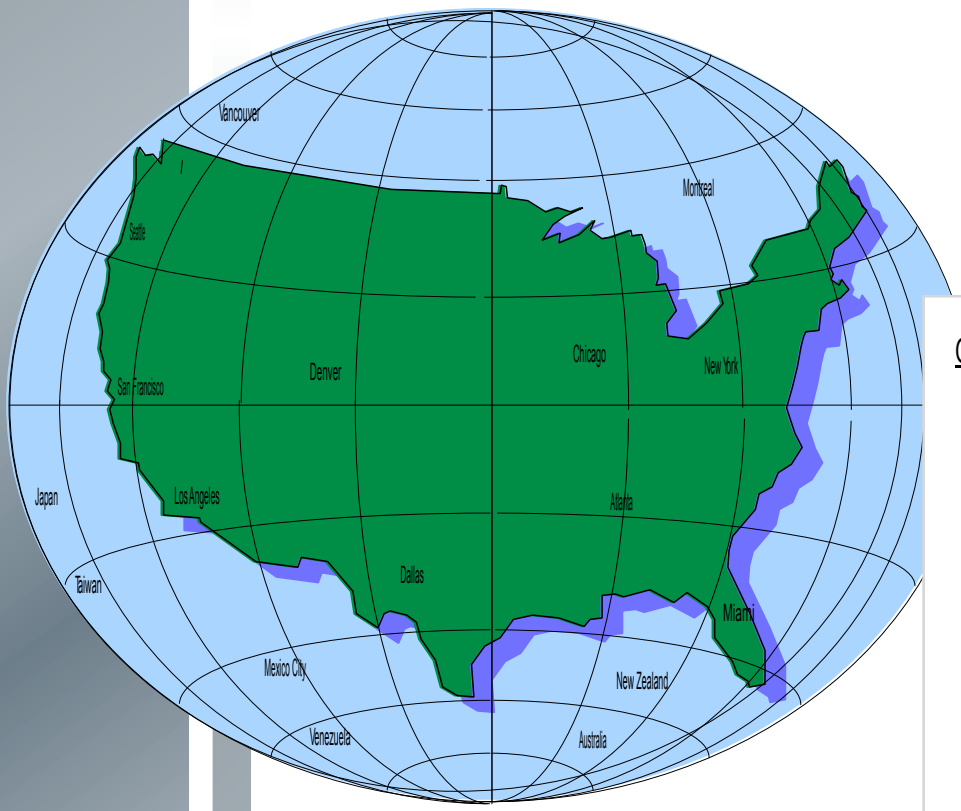
Arrakis Systems, inc.

12,000 series

Radio Broadcast Audio Consoles



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OPS MANUAL

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A WELCOME TO THE 12,000 SERIES

The 12,000 Series consoles represent the pinnacle of over two decades of dedication to audio broadcast console design by Arrakis Systems, inc. These consoles combine the engineering and manufacturing excellence that has made Arrakis #1 in radio console unit sales in the United States & well respected throughout the world!

The 12,000 console is a unique synthesis of old and new technologies. It was engineered for the specific purpose of creating a new Arrakis console standard. The concept was to create a console for all markets. To do this, the product had to be flexible, reliable, and easy to service. For ease of installation, service and expansion, the console is entirely front panel modular. Breaking new ground, the console is also of a universal bus design. This means that every audio bus, logic bus, and audio output is supported in each module position in the mainframe, hence any module may be placed in any mainframe slot. More importantly, it removes the functional limitations imposed by fixed bus mainframe designs. With three mainframe sizes of 8, 18, & 28 input module slots , the 12,000 fits any size market or application.

To be able to function in all market sizes, the 12,000 also supports a large standard complement of modules. There are four types of input module. Each features two stereo active balance inputs and three stereo assignable bus outputs. There is a basic MIC level input module, a more advances MIC input module (with PAN), a basic line level input module and a more advanced line level module (with INPUT MODE select). The console supports the control room and two studios with comprehensive monitoring and talkback/intercom systems. All three stereo buses are individually metered. Mono sum outputs are standard. Two internally assignable mix-minus buses support the telephone interface and are pre-set once by the engineer and should be left alone. Once set up, the telephone operation is user transparent requiring no additional action by the console operator. A ten minute up timer with panel controls and module reset capability is standard. All input modules, of course, support advanced logic control such as remote turrets, remote start and stop of sources, ready status lights, etc. A variety of option modules are also available such as D.A. modules, remote selector (input expander) modules, turret modules and digital workstation control modules.

The input modules features VCA (voltage controlled amplifier) control of audio to eliminate noisy faders due to time and wear. No audio passed through the fader and ON/OFF switches, just DC control voltages. Only the finest quality components are used throughout such as Penny & Giles slide faders, custom conductive plastic rotary faders with stainless steel shaft and bushing, ITT-Cannon switches, heavy aluminum panels, and solid furniture quality oak trim. Only gold PC board connectors are use. All IC's are socketed. Modules are programmable via DIP switches. The TURBO series of the 12,000 console line features an attractive and durable polycarbonate overlay on each module, improved ON/OFF switches with refined electronics an PC boards. The TURBO series also features a more comprehensive talkback/intercom system with station call and answer capabilities. Attention to detail makes the 12,000 perfect for the rugged professional broadcast environment.

The 12,000 is a truly remarkable console. The application of Arrakis ingenuity and creativity have made these consoles a major market console in features and performance. The advantage of Arrakis volume buying and manufacturing experience have brought these consoles within the budget of most small and medium market broadcasters. **Rugged, reliable and with the features and performance to match any product on the market, the 12,000 Series Consoles is a console designed with today's digital audio world in mind**

PUBLICATION DATE - 1/99 REV H1

This manual covers the entire 12,000 Turbo and 22,000 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.

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SECTION ONE

Product Description

1-1) FEATURES

- Totally Modular Console- Input modules, Output modules, Monitor modules
  - Ease of Service
  - Ease of Installation
  - Ease of Expansion
  - Totally Passive Motherboard Backplanes

- Three Mainframe Sizes - 8 channels (TMF-8), 18 channels (TMF-18) and 28 channels (TMF-28)
  - Newsroom
  - Production
  - 'ON AIR'

- Two Choices of Color - Tan (Standard) or Platinum (Deluxe)
  - Deluxe models also feature illuminated VU meters, thru-table mounting and upgraded trim

- Ultra-high Quality Construction and Design
  - Penny and Giles 3000 Series slide faders
  - VCA's DC control removes audio from the slide faders
  - ITT-Cannon switches
  - Conductive plastic rotary pots with stainless steel shaft and bushing
  - Gold connectors-- IC's socketed -- regulated power supply -- heavy construction
  - Durable and attractive polycarbonate overlays
  - Quiet action ON/OFF switches
  - Highest quality double sided fiberglass PC boards with solder masking

- Easy Connectorized Installation
- VCA Controlled Faders
- *Universal Bus* - Mainframe Design - any module can be placed in any slot
- Pre-fader Patch/Insert points on each input module
- Post-fader Direct Out on each input module

- Comprehensive Logic system
  - Start and stop sources by isolated (dry contact) internal reed relays
  - Remote channel ON/OFF control with Tally for turret/studio interface
  - Flashing OFF switches for cart machine status
  - Three muting buses for Control room and two studio monitoring systems
  - Timer reset selectable on each module
  - Monitor DIM function during cue and talkback

- Total Turret Support
- External regulated and protected Power Supply - 110/220 VAC, 60/50 Hz
- MIC Modules available with Panning feature
- Line Modules available with Mode Select feature
- Three Stereo Output Buses with two Mono Sums
- Monitor System for Control Room and Two Studios
- Stereo and mono Cue systems
- Talkback/Intercom to and from Two Studios
- Two User-transparent Telephone Mix-minus Buses
- Four Output Stereo D.A. Module (optional)
- Remote Selector (Input Expansion) Module (optional)
- Built-in Digital Timer with controller (10 minute up timer)
- Two Year Warranty

1-2) ELECTRONIC SPECIFICATIONS

FREQUENCY RESPONSE

±.5dB (20Hz -20kHz)

NOISE

Mic - 77dB below +8dBu out with -50dBu input , 20kHz filter
Line - 85dB below +8dBu out with +8dBu in, 20kHz filter

DISTORTION

Total Harmonic - .01% typical, 30kHz filter

INTERCHANNEL CROSSTALK

-75dB at 20kHz typical

IMPEDENCES

Mic Input - above 10,000 ohms, active balanced
Line Input - above 20,000 ohms, active balanced
Outputs - smaller than 100 ohms, active balanced smaller than 50 ohms, active unbalanced

OUTPUT LEVELS

Main Outputs - +27dBm max., active balanced, into 600 ohms
Monitor, Cue, Earphones - +19dBm max., unbalanced active, into 600 ohm

Tests are performed as per factory approved test procedures and equipment. All specifications are typical and are subject to change without notice

1-3) PHYSICAL SPECIFICATION

1-3a) MAINFRAME

- The 12,000 Series console mainframe is constructed of irridited, hardened aluminum panels of no less then .125" thickness.
- The panels are precision formed. There are no welds.
- The mainframe is finished with a two-part baked-on epoxy underlay covered with a durable industrial grade splatter coat.
- A series of threaded studs, washers and hex nuts are used to affix the high quality MIL-SPEC epoxy-fiberglass double sided solder masked motherboards
- All fasteners are nickle plated or black oxidized for lasting corrosion resistance and appearance.
- Attractive and durable hand rubbed oak panels finish the mainframe in front and on both sides.
- The Meter Bridge hinges up at the back for easy access to all the input and output connectors.
- The mainframe is available in tabletop or thru-table mounting configurations.

1-3b) MODULES

- All modules are covered with a 1/8" thick hardened aluminum faceplate.
- All faceplates are irridited, epoxy painted then finished with a durable and attractive polycarbonate overlay.
- All printing on the front of the modules is covered with this polycarbonate therefore it is nearly impossible to wear off the lettering and other markings.
- PC boards are made from the finest MIL-SPEC epoxy-fiberglass material. The boards are double sided and feature a green solder masking.
- All modules plug into the mainframe via gold plated computer style card edge connectors.
- All electronic components are evaluated for physical ruggedness, durability and longevity.

1-3c) POWER SUPPLY

- The power supply chassis is housed in an aluminum enclosure which features a a two-part baked-on epoxy underlay covered with a durable, industrial grade splatter coat.
- The power supply is designed to withstand vigorous mechanical shock and vibration.
- The power supply and mainframe are connected via heavy gauge cabling 18 feet long.

SECTION TWO

OPERATING INSTRUCTIONS

2-0) GENERAL OPERATING INSTRUCTIONS

2-0a) GENERAL DESCRIPTION

The 12,000 Series console is a sophisticated electronic product with many automatic features. It is highly recommended that users carefully study the console's operation before going ON AIR or performing production. The console is designed to be very user friendly and therefore relatively easy to operate. Learning to use the 12,000 can be an enjoyable and rewarding experience.

2-0b) PROPER CONSOLE OPERATION

The 12,000 is manufactured to the state-of-the-art in terms of ruggedness of design, ease of use, and surviving the often harsh broadcast environment. Premium grade electronic and mechanical components are used throughout. The life of the console, however, can be dramatically extended if care is taken in day to day operation. Abuse of switches and faders will reduce effective life to only a few years or less. Painted surfaces, while they consist of the hardest epoxy paint available, will scratch and wear quickly if abused. Polycarbonate overlays are susceptible to gouging and scratching if they are subjected to sharp instruments. All efforts have been made to make the console as "DJ proof" as possible, however, heavy handed operation, spilled liquids, heavy smoke and ball point pens can ruin even the most durable equipment.

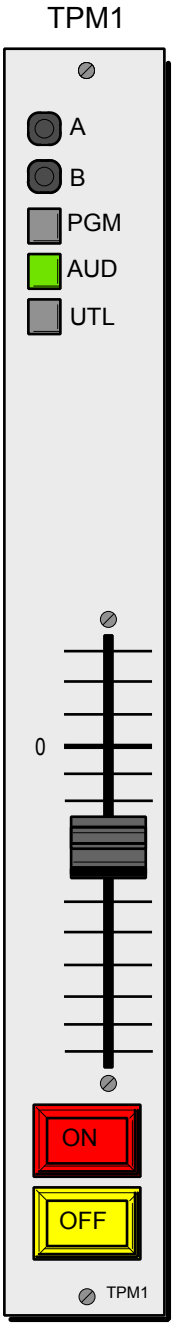
With proper care and maintenance the 12,000 will function reliably and attractively for many years.

2-1) TPMI -- STEREO LINE LEVEL INPUT MODULE

2-1a) AUDIO FUNCTION

This module is the basic line level, stereo input module used in this console series. The module's audio features are:

1) Two stereo balanced inputs (A & B)
2) Three stereo output buses (PGM, AUD, UTL)
3) Stereo CUE- (assigned by fader detent)
4) Illuminated channel ON and OFF SWITCHES
5) Stereo DIRECT OUT (turns on, off and fades with the module)
6) Stereo PREFADER PATCH (for insertion of an audio processing loop in the signal path)
7) Two MIX-MINUS buses for telephone interfacing



2-1b) LOGIC FUNCTION

The module also carries extensive logic control capability for both the "A" and "B" inputs.
The module's logic features are:

1) REMOTE START and STOP of audio sources (features dry contact reed relay closures. The relays are totally floating and isolated so there is no ground path between machines)
2) READY STATUS capability for the OFF switch (The internal OFF lamp driver can be disabled so that a cart machine can flash the OFF lamp to indicate that the cart is ready)
3) REMOTE CHANNEL ON/OFF (the module may be turned on or off from a remote location such as a news booth)
5) Three independent muting buses (assignable CR (control room), STUDIO 1 and/or STUDIO 2. Can mute monitors andactivate logic for "ON AIR" lights etc.)
6) The above functions are "A/B STEERED" (they follow the A/B SWITCH)
7) TIMER RESET capability (can be switched on or off)
8) Logic features set with DIP switches (no solder jumpers)

2-1c) ELECTRONIC FUNCTION

The module features a sophisticated state-of-the-art electronic design resulting in dependable long term operation and a high level of sonic performance. The module's electronic features include:

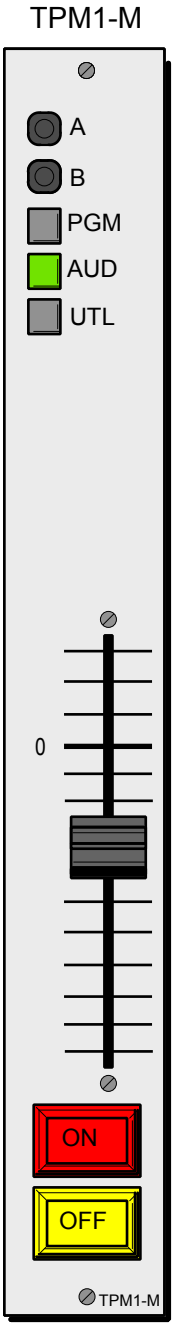
1) VCA's (Voltage Controlled Amplifiers- removes audio from the fader. The fader adjusts a DC voltage which in turn controls the VCA's volume. Virtually eliminates scratchy faders)
2) Penny and Giles 3000 Series slide fader
3) ITT-Cannon switches in the audio path (silver contacts)
4) High performance NE5532 Op Amp ICs (socketed for easy servicing)
5) 1% metal film resistors
6) Conductive plastic single turn trim pots for level adjust
7) Double sided solder masked PC board with gold plated edge connectors

2-2) TPMI-M -- MONO MIC LEVEL INPUT MODULE

2-2a) AUDIO FUNCTION

This module is the basic MIC level, mono input module used in this console series. The module's audio features are:

1) Two mono MIC level balanced inputs (A and B)
2) Three output buses (PGM, AUD, UTL)
3) CUE/TALKBACK- (into the monitor system. Activated by external logic control)
4) Illuminated channel ON and OFF SWITCHES
5) DIRECT OUT (turns on, off and fades with the module)
6) PREFADER PATCH (for insertion of an audio processing loop in the signal path)
7) Two MIX-MINUS buses for telephone interfacing



2-2b) LOGIC FUNCTION

The module also carries extensive logic control capability for both the "A" and "B" inputs. The module's logic features are:

1) ON/OFF TALLY (will drive external lamps to indicate if module is on or off)
2) COUGH MUTE (allows momentary muting of the module with an external logic command)
3) REMOTE CHANNEL ON/OFF (the module may be turned on or off from a remote location such as a news booth)
5) Three independent muting buses (assignable CR (control room), STUDIO 1 and/or STUDIO 2. Can mute monitors andactivate logic for "ON AIR" lights etc.)
6) The above functions are "A/B STEERED" (they follow the A/B SWITCH)
7) TIMER RESET capability (can be switched on or off)
8) Logic features set with DIP switches (no solder jumpers)

2-2c) ELECTRONIC FUNCTION

The module features a sophisticated state-of-the-art electronic design resulting in dependable long term operation and a high level of sonic performance. The module's electronic features include:

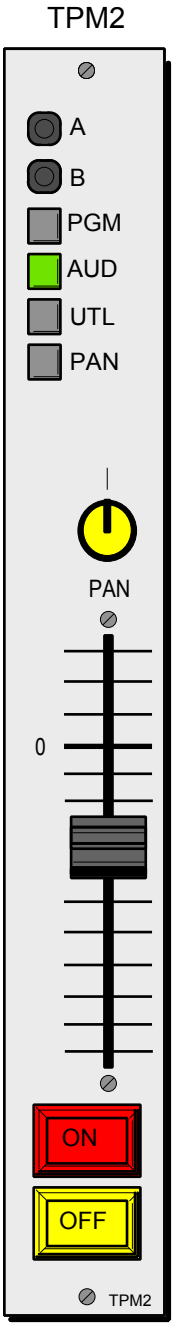
1) High performance MIC preamp IC (SSM2017)
2) Input level trim adjust allows preamp gain ranging 30dB to 70dB
3) VCA (Voltage Controlled Amplifier- removes audio from the fader. The fader adjusts a DC voltage which in turn controls the VCA's volume. Virtually eliminates scratchy faders)
4) Penny and Giles 3000 Series slide faders
5) ITT-Cannon switches in the audio path (silver contacts)
6) High performance NE5532 Op Amp ICs (socketed for easy servicing)
7) 1% metal film resistors
8) Conductive plastic multi-turn trim pot for level adjust
9) Double sided solder masked PC board with gold plated edge connectors

2-3) TPM2 -- MONO MIC LEVEL INPUT MODULE with PAN

2-3a) AUDIO FUNCTION

This module is the advanced MIC level, mono input module used in this console series. The module's audio features are:\

1) Two mono MIC level balanced inputs (A and B)
2) PAN pot and IN/OUTswitch (allows left to right panning of the signal for precise placement of the voice in the stereo image)
3) Three stereo output buses (PGM, AUD, UTL)
4) CUE/TALKBACK- (into the monitor system. Activated by external logic control)
5) Illuminated channel ON and OFF SWITCHES
6) Stereo DIRECT OUT (turns on, off, fades and PANs with the module)
7) PREFADER PATCH (for insertion of an audio processing loop in the signal path)
8) Two MIX-MINUS buses for telephone interfacing



2-3b) LOGIC FUNCTION

The module also carries extensive logic control capability for both the "A" and "B" inputs. The module's logic features are:

1) ON/OFF TALLY (will drive external lamps to indicate if module is on or off)
2) COUGH MUTE (allows momentary muting of the module with an external logic command)
3) REMOTE CHANNEL ON/OFF (the module may be turned on or off from a remote location such as a news booth)
5) Three independent muting buses (assignable CR (control room), STUDIO 1 and/or STUDIO 2. Can mute monitors and activate logic for "ON AIR" lights etc.)
6) The above functions are "A/B STEERED" (they follow the A/B SWITCH)
7) TIMER RESET capability (can be switched on or off)
8) Logic features set with DIP switches (no solder jumpers)

2-3c) ELECTRONIC FUNCTION

The module features a sophisticated state-of-the-art electronic design resulting in dependable long term operation and a high level of sonic performance. The module's electronic features include:

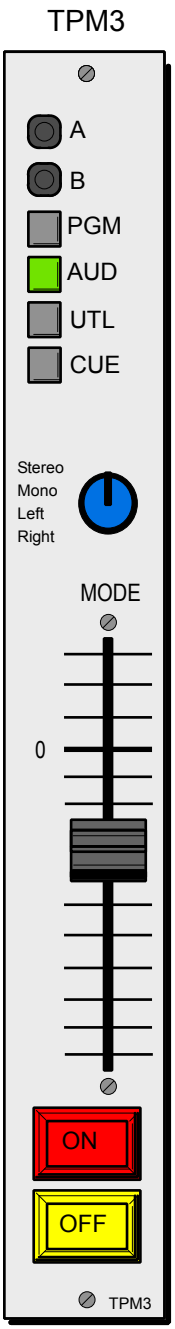
1) High performance MIC preamp IC (SSM2017)
2) VCA (Voltage Controlled Amplifier- removes audio from the fader. The fader adjusts a DC voltage which in turn controls the VCA's volume. Virtually eliminates scratchy faders)
3) Penny and Giles 3000 Series slide fader
4) Proprietary design Clarostat MOD-POT for PAN
5) ITT -Cannon switches in the audio path (silver contacts)
6) High performance NE5532 Op Amp ICs (socketed)
7) Conductive plastic multi-turn trim pot for level adjust
8) 1% metal film resistors
9) Double sided solder masked PC board with gold plated edge connectors

2-4) TPM3 -- STEREO LEVEL LEVEL INPUT MODULE with MODE SELECT

2-4a) AUDIO FUNCTION

This module is the advanced line level, stereo input module used in this console series. The module's audio features are

1) Two stereo balanced inputs (A and B)
2) MODE SELECT switch (selects input mode-- STEREO: normal mode, MONO: sums left and right inputs and feeds to both sides, LEFT: feeds left input to both sides, RIGHT: feeds right input to both sides)
3) Three stereo output buses (PGM, AUD, UTL)
4) Stereo CUE- (assigned by fader detent or push button)
5) Illuminated channel ON and OFF SWITCHES
6) Stereo DIRECT OUT (turns on, off and fades with the module)
7) Stereo PREFADER PATCH (for insertion of an audio processing loop in the signal path)
8) Two MIX-MINUS buses for telephone interfacing



2-4b) LOGIC FUNCTION

The module also carries extensive logic control capability for both the "A" and "B" inputs. The module's logic features are:

1) REMOTE START and STOP of audio sources (features dry contact totally isolated reed relay closures)
2) READY STATUS capability for the OFF switch (a cart machine can flash the OFF lamp to indicate that the cart is ready)
3) REMOTE CHANNEL ON/OFF (the module may be turned on or off from a remote location such as a news booth)
5) Three independent muting buses (assignable CR (control room), STUDIO 1 and/or STUDIO 2. Can mute monitors and activate logic for "ON AIR" lights etc.)
6) The above functions are "A/B STEERED" (they follow the A/B SWITCH)
7) TIMER RESET capability (can be switched on or off)
8) Logic features set with DIP switches (no solder jumpers)

2-4c) ELECTRONIC FUNCTION

The module features a sophisticated state-of-the-art electronic design resulting in dependable long term operation and a high level of sonic performance. The module's electronic features include:

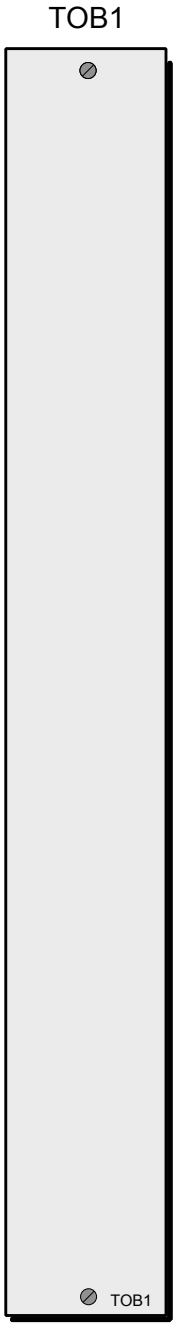
1) VCA's (Voltage Controlled Amplifiers- removes audio from the fader. The fader adjusts a DC voltage which in turn controls the VCA's volume. Virtually eliminates scratchy faders)
2) Penny and Giles 3000 Series slide fader
3) Greyhill "HI-REL" MODE switch
4) ITT-Cannon switches in the audio path (silver contacts)
5) High performance NE5532 Op Amp ICs (socketed for easy servicing)
6) 1% metal film resistors
7) Conductive plastic single turn trim pots for level adjust
8) Double sided solder masked PC board with gold plated edge connectors

2-5a) TOB1 -- OUTPUT FUNCTION

2-5a) AUDIO FUNCTION

This module performs the audio bus summing, drives the console outputs and drives the VU meter/monitor bus. The module's audio features are:

1) Stereo balanced outputs (can drive 600½) for:
   a) PGM (program)
   b) AUD (audition)
   c) UTL (utility)
2) Mono balanced outputs (can drive 600½) for:
   a) PGM MONO (mono sum of program left and right)
   b) AUD MONO (mono sum of audition left and right)
2) Unbalanced outputs for:
   a) PGM MIX-MINUS (interface to telephone hybrid from PGM)
   b) AUD MIX-MINUS (interface to telephone hybrid from AUD)
3) VU meter drivers (also drives monitoring system) for:
   a) PGM
   b) PGM MONO
   c) AUD
   d) UTL



2-5b) LOGIC FUNCTION

The module also carries drivers for external relays to be activated by the three independent muting systems. The module's logic features are:

1) CR MUTE RELAY OUTPUT (is activated when the control room MIC is turned on. Can trigger "ON AIR" lights, logging recorder phone ringer mute etc.),
2) STUDIO 1 MUTE RELAY DRIVER (is activated when any MIC's assigned to STUDIO 1 are turned on)
3) STUDIO 2 MUTE RELAY DRIVER (is activated when any MIC's assigned to STUDIO 2 are turned on)

2-5c) ELECTRONIC FUNCTION

The module features a sophisticated state-of-the-art electronic design resulting in dependable long term operation and a high level of sonic performance. The module's electronic features include:

1) High performance NE5532 Op Amp ICs (socketed for easy servicing)
2) 1% metal film resistors
3) Double sided solder masked PC board with gold plated edge connectors
4) Conductive plastic single turn trim pots for level adjust

NOTE - Remove the cover panel (two screws) to access the level adjust trim pots.

2-6) TCRM1 -- MONITOR MODULE

2-6a) MODULE FUNCTION

This module is handles monitoring, talkback/intercom and timer control functions. The module's features include:

1) MONITOR SELECT switch. Consists of:
   a) Two external monitor inputs (EXT 1 and EXT 2 are stereo active balanced line level inputs)
   b) PGM select (monitor program output)
   c) AUD select (monitor audition output)
   d) UTL select (monitor utility output)
2) MONITOR MONO button (mono sums the right and left monitor outputs together when pressed. Use for phase error or mono-compatibility checks)
3) TIMER CONTROL section consists of:
   a) START button (starts the timer when AUTO is not pressed)
   b) STOP button (stops the timer when AUTO is not pressed)
   c) RESET button (resets the timer)
   d) AUTO button (when this button is pressed the timer will automatically reset when an input module is turned on)
4) TALKBACK/INTERCOM section consists of:
   a) TALKBACK TO STUDIO 1/STUDIO 2 buttons
   b) CALL LOGIC TO STUDIO 1/STUDIO 2 outputs
   c) CALL LOGIC FROM STUDIO 1/STUDIO 2 inputs

(The console operator can talk to a studio by pressing the appropriate TALKBACK button. This will not only send the CR MIC's signal to the studio, but will also send "CALL LOGIC TO" that studio. The call logic tells the studio who is calling. When a studio is calling the control room the appropriate TALKBACK button will light up (CALL INDICATOR) telling the control room operator which studio is on the line ("CALL LOGIC FROM" a studio). When a studio is calling, the normal program audio into the control room monitor and headphones will DIM (or DUCK) allowing the TALKBACK audio to be heard. DIM level is adjustable)

5) HEADPHONES and MONITOR volume pots (also trim pot adjustable)
6) HEADPHONES and MONITOR outputs (monitor will mute with CR MUTE logic)
7) STUDIO 1 MUTED and STUDIO 1 UNMUTED outputs (STUDIO 1 MUTED output is usually connected to the studio #1's monitor speaker system. The output will mute with STUDIO 1 MUTE logic. STUDIO 1 UNMUTED is commonly used to feed studio #1's headphones)
8) STUDIO 2 UNMUTED output (can feed studio #2's monitor and headphone systems. An external muting relay is required if monitor muting is desired)
9) Output to AUX VU meters (sends monitor audio to the switch in the Meter Bridge. When this switch is in the bottom position the AUX meters read whatever the monitor is selected to)
10) AUTOCUE feature (mixes CUE audio into the control room monitor and headphones when cueing. The normal program audio will DIM during AUTOCUE so the CUE audio can be heard through the monitor and headphones)
11) MONO CUE output (is a mono sum of left and right CUE signals. Will mute with CR MUTE logic)
12) TALKBACK BUS (simplifies connecting the CR MIC into the TALKBACK TO STUDIOS 1 AND 2 system)
13) EXTERNAL STUDIO MONITOR inputs (can be used to feed a seperate signal to the studios)

2-7) TRS1 -- 1X5 STEREO REMOTE SELECTOR SWITCH MODULE

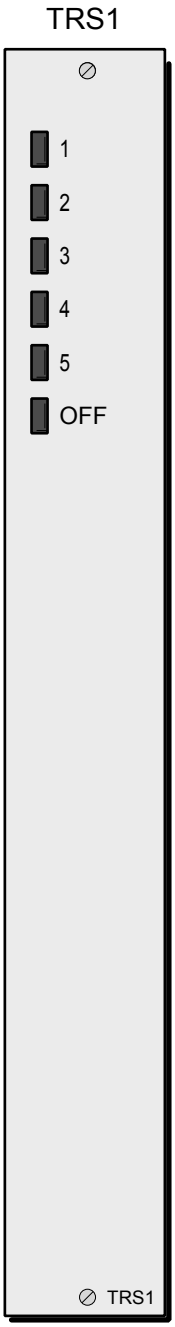
2-7a) AUDIO FUNCTION

This module selects one of five STEREO BALANCED audio sources to be routed to a destination or selects one of five destinations to receive a source.

1) The TRS1 is commonly used as selector switch to route remote audio and NET feeds to an input module.
2) The module can also function as an input pre-selector for the TCRM1 Monitor module's EXT MON inputs.
3) Since the switch is bi-directional, it can also be used as an output destination router.

2-7b) ELECTRONIC FUNCTION

The module contains no active electronics, just passive interlocking 4PDT switches.



2-8) TDA1 -- 1X4 STEREO DISTRIBUTION AMPLIFIER MODULE

2-8a) AUDIO FUNCTION

This module performs audio amplification and distribution. The module's audio features are:

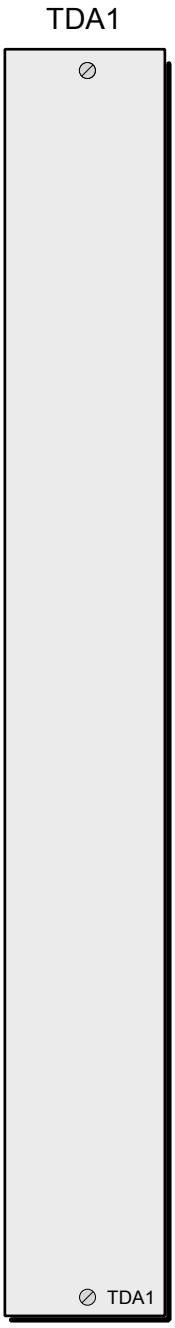
1) Stereo active balanced input
2) Five stereo active balanced outputs (can drive 600½)
3) Seperate trim pot adjustments for all outputs.

2-8b) ELECTRONIC FUNCTION

The module features a sophisticated state-of-the-art electronic design resulting in dependable long term operation and a high level of sonic performance. The module's electronic features include:

1) High performance NE5532 Op Amp ICs (socketed for easy servicing)
2) 1% metal film resistors
3) Double sided solder masked PC board with gold plated edge connectors
4) Conductive plastic single turn trim pots for level adjust

NOTE: Remove the cover panel (two screws) to access the level adjust trim pots.



2-9) TRR1 -- DUAL MACHINE CONTROL MODULE

2-9a) MODULE FUNCTION

This module has two banks of switches, each intended to provide convenient remote control of typical recorder shuttle functions. Each switch bank consists of five MOMENTARY DPST switches, of which one contact is normally open and the other is normally closed. Each switch has a 12 volt lamp built in to provide tally indication.
The two switch banks are labled:

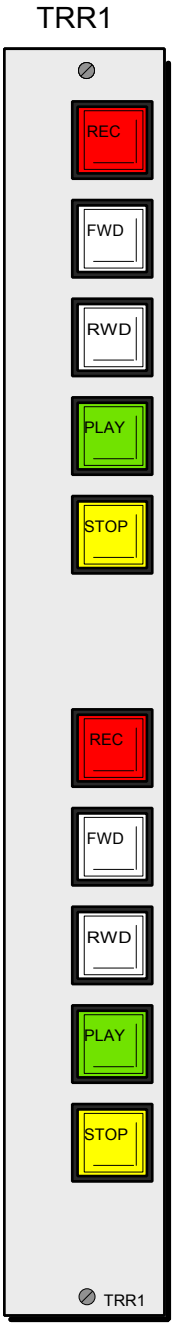
1) REC (cap color = RED, fill color = WHITE)
2) FWD (cap color = WHITE, fill color = BLACK)
3) RWD (cap color = WHITE, fill color = BLACK)
4) PLAY (cap color = GREEN, fill color = WHITE)
5) STOP (cap color = YELLOW, fill color = BLACK)

Upon special order the following STANDARD ENGRAVED CAPS are available:

1) TER (cap color = WHITE, fill color = BLACK)
2) SEC (cap color = WHITE, fill color = BLACK)
3) STRT (cap color = GREEN, fill color = WHITE)
4) AUTO (cap color = RED, fill color = WHITE)
5) TALK (cap color = WHITE, fill color = BLACK)
6) CGH (cap color = YELLOW, fill color = BLACK)
7) RSET (cap color = WHITE, fill color = BLACK)
8) ON (cap color = RED, fill color = WHITE)
9) OFF (cap color = YELLOW, fill color = BLACK)

Also upon special order CUSTOM ENGRAVED CAPS are available. Up to four characters (including spaces) can be engraved on a cap. There are four colors available:

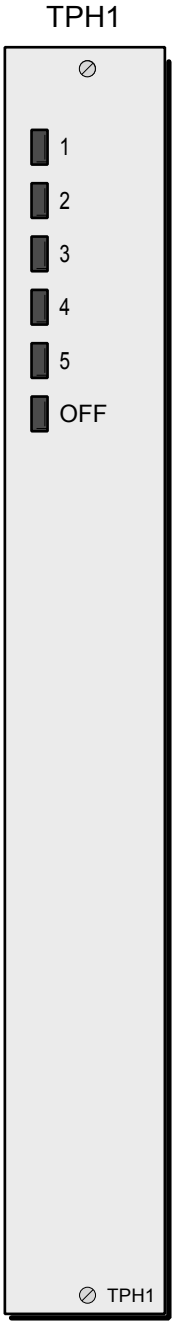
1) RED with WHITE fill
2) GREEN with WHITE fill
3) WHITE with BLACK fill
4) YELLOW with BLACK fill



2-10) TPH1 Phone System Module

2-10a) AUDIO FUNCTION

This module selects the feed to a telephone hybrid, and allows the caller and an announcer to easily communicate and cue off air. The announcer may select the caller to hear just the announcer (cue mode), the Program MIX (-) feed, Audition MIX (-), or one of two auxiliary signals.
With or without this module, the announcer is placed On-Air by activation of the announcer's MIC module and the caller is place On-Air by activating the input module assigned t the hybrid's caller output.



2-10b) SWITCH FUNCTION

Switch 1: **CUE** places caller onto console's CUE bus and routes the announcers MIC to the hybrid, so the caller and the announcer may communicate off air. The announcer's MIC channel ON-OFF switch would normally be off at theis time (the feed to this module is not effected by the MIC channel's On-Off status). The particular MIC channel which feeds the module is determined when the console is wired up.

Switch 2: **PGM** feeds Program MIX (-) to the hybrid.

Switch 3: **AUD** feeds Audition MIX (-) to the hybrid.

Switch 4: **AUX 1** feeds Auxiliary Input #1 to the hybrid.

Switch 5: **AUX 2** feeds Auxiliary Input #2 to the hybrid.

Switch 6: **OFFS**

2-10c) ELECTRONIC FUNCTION

The module features dependable long term operation and a high level sonic performance. The module's electronic features include:

1) 1% metal film resistors
2) Double sided PC board with gold plated edge connectors.
3) A conductive plastic single turn trimpost allows adjustment of the caller's audio levels onto the console's CUE bus.
4) High quality long lasting selector switches with silver plated contacts.

2-11) ENGRAVED “OFF” CAPS & COLORED FADER KNOBS

2-11a) STANDARD ENGRAVED "OFF" CAPS

The blank yellow "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	TRAFC
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

2-10b) 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). The red “ON” cap can also be engraved.

2-10b) COLORED FADER KNOBS

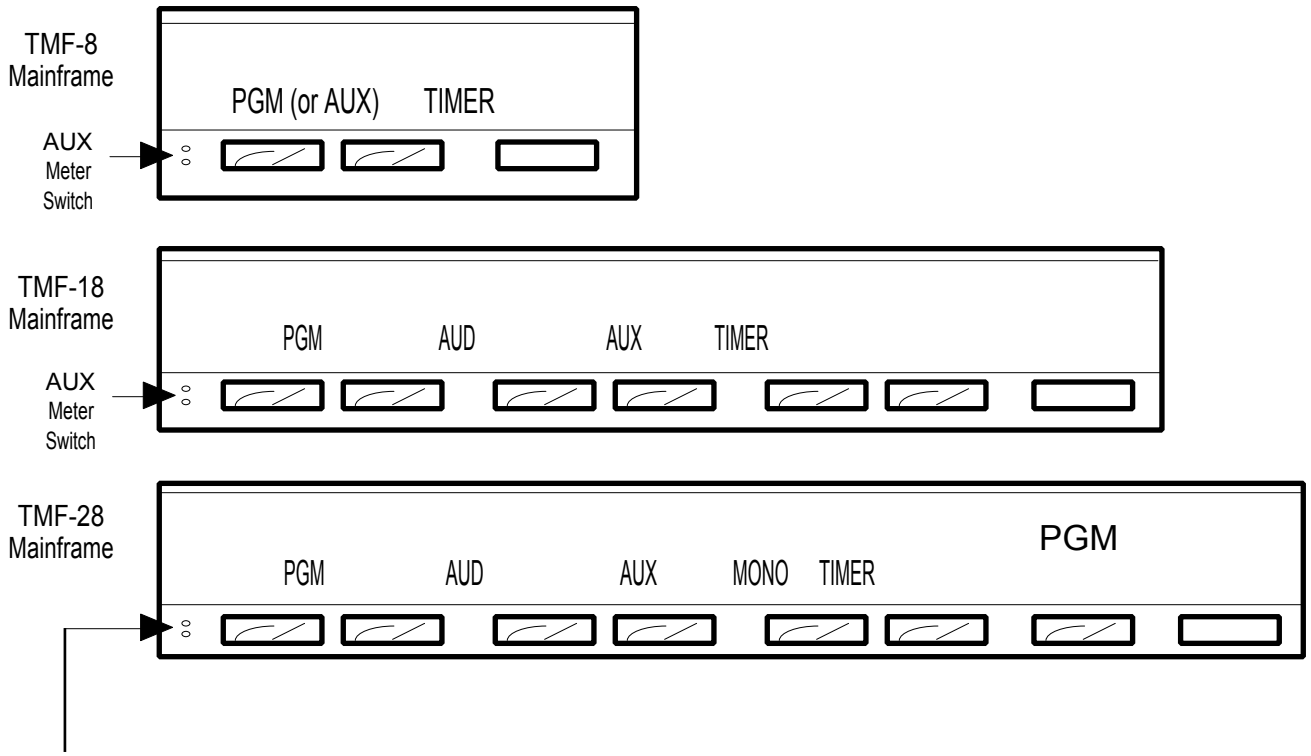
Black fader knobs come standard with the input modules. Colored fader knobs are available through special order. The part number is TCF-xxxx. For example, a RED knob is called TCF-RED.

Available colors: **RED YELLOW ORANGE GREY GREEN WHITE BLUE**

2-12) VU METER BRIDGES

2-12a) THE VU METER BRIDGE

The VU Meter Bridge houses different arrangements of VU meters depending on mainframe size. There is metering for the Program (PGM), Audition (AUD), Utility (UTL), PGM MONO and MONITOR VU buses. MONITOR metering is done through the AUX VU meters. PGM MONO metering is available on the TMF-28 meter bridge only. Deluxe (platinum colored) consoles feature illuminated meters. Standard (tan) consoles do not have illuminated meters, however illumination kits are available.



2-12b) AUX METER SWITCHING

On the left side of the VU meter panel is a two position switch. This switch selects the input to the 'AUX' set of meters. The top switch position normals the AUX meters to the UTL output bus. The bottom switch connects the AUX meters to the monitor selector switch on the Control Room Monitor module. The AUX meters will indicate whatever audio is coming through the monitor speakers (except cue and talkback audio). This makes it possible to meter external inputs to the monitor system such as the AIR MONITOR signal etc.

2-12c) TIMER

The meter bridge contains a 10 minute up-timer. The timer is controlled by a set of switches on the Control Room Monitor module. There are controls for:

a) TIMER START
b) TIMER STOP
c) TIMER RESET
d) AUTO (reset from module)

SECTION THREE

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.

3-1) UNPACKING & PHYSICAL INSTALLATION

3-1a) UNPACKING

The 12,000 Series console is shipped in a specially designed cardboard shipping container with foam fill. This box contains the console but not the power supply or installation supplies. The power supply is shipped in a seperate cardboard carton along with the manual, spare parts kit and installation kit. Check all cartons and equipment for shipping damage immediately upon recipt. If any damage is found contact Arrakis Systems immediately at **(970) 461-0730**. Do NOT throw away any packaging material until after console installation is complete and satisfactory.

3-1b) TABLETOP INSTALLATION

The tabletop version of the 12,000 Series console does not require a hole for console mounting, however holes must be provided for cable routing.

There must be sufficient clearance above and behind the console to accomodate the upward hinging meter panel. Refer to the diagram on the next page for console dimensions and clearances. In general, the console should be installed in a tabletop 36" deep with at least 3 to 4" of clearance on either side, 10" clearance above and 6" clearance behind.

The console can be screwed down to the tabletop if deemed necessary. Holes can be drilled through the bottom of the console in front of and behind the motherboards. The console can then be screwed down.

Arrakis Systems does not cover under warranty any damages incurred due to improper installation, therefore take care when drilling holes in the console mainframe. Even the smallest metal filing can cause a short circuit. Take appropriate steps to see that no metal debris gets under the motherboards or in the electronics. It is highly recommended to vacuum out any filings ordebris (as a result of drilling) from the console mainframe before powering up the console.

3-1c) THRU-TABLE INSTALLATION

The thru-table ("Deluxe") version of the 12,000 Series console requires a mounting hole in the tabletop. See the next page for hole dimensions.

The console can be screwed down if deemed necessary. It is suggested to screw the console down by drilling holes up through the tabletop into the console's wood side panels.

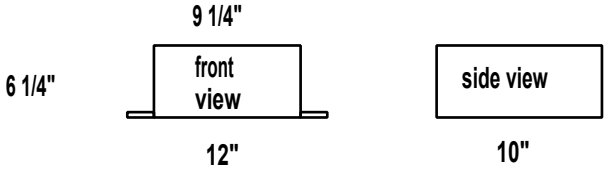
3-1d) POWER SUPPLY INSTALLATION

The console's power supply mounts beneath the tabletop, up under the table. It may also be mounted in the bottom or side of a cabinet. The power supply should be screwed down utilizing the screw holes provided for that purpose. Be sure to provide enough ventilation to insure adequate power supply cooling.

Power Cable lengths

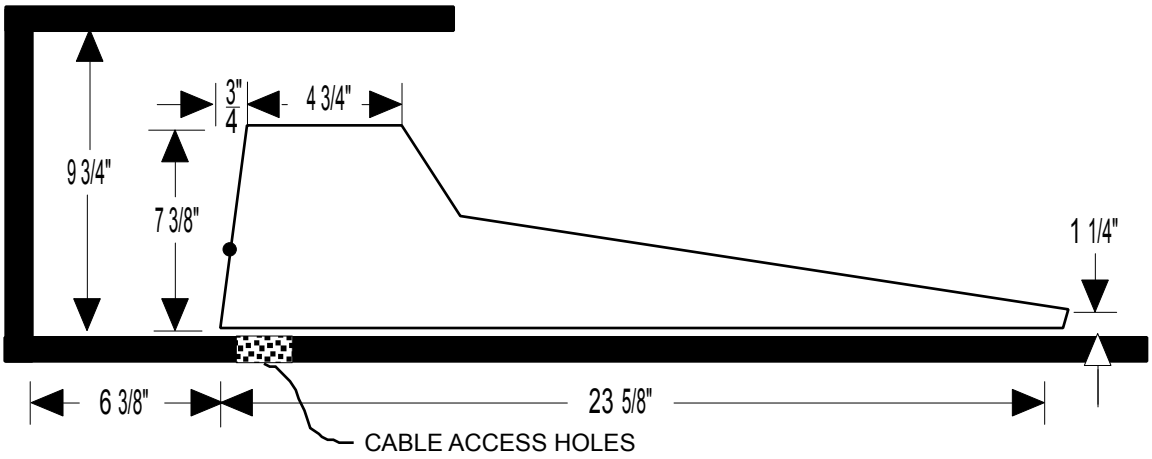
a) Power supply AC power cable - 6 feet
b) Power Supply DC power cable - 10 feet
c) Console DC power Cable - 8 feet

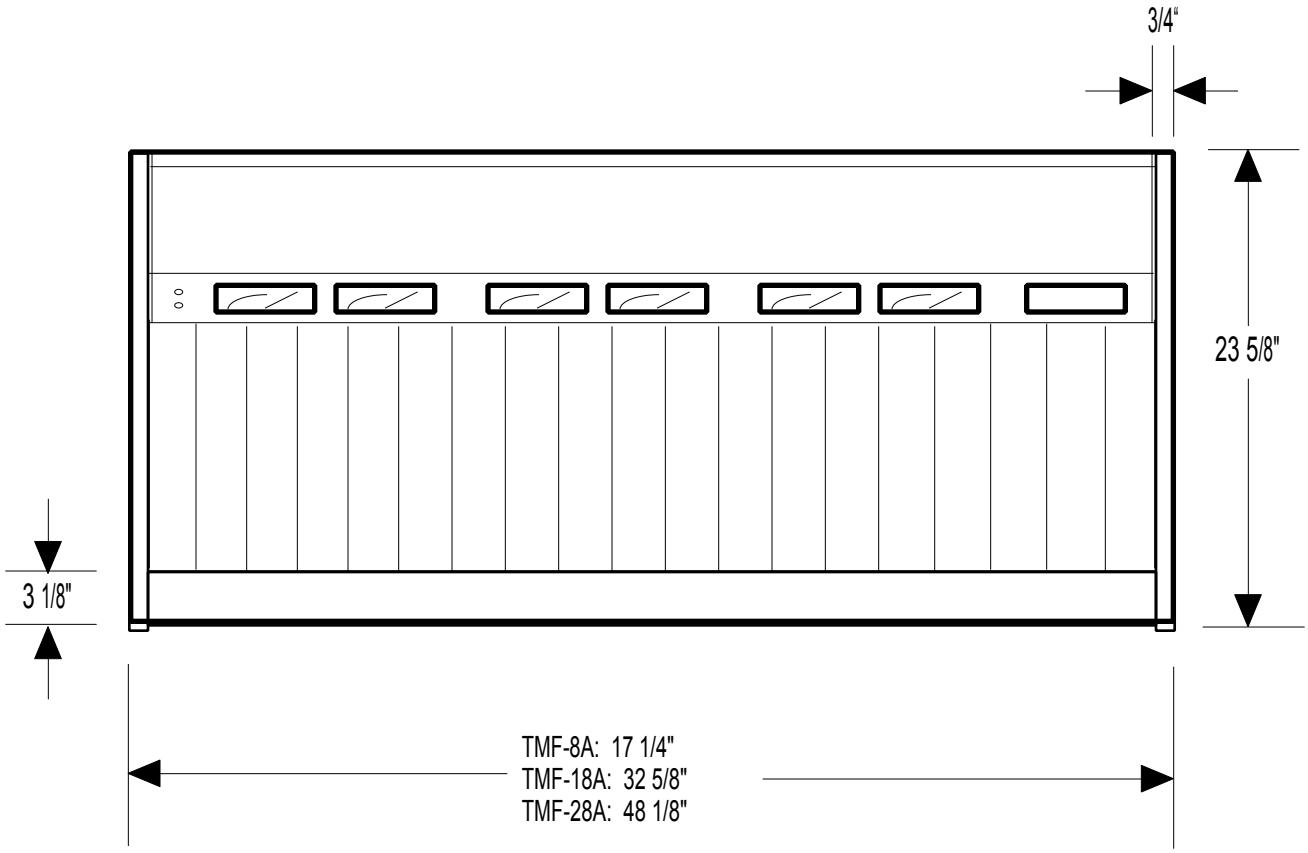
POWER SUPPLY DIMENSIONS



3-1) UNPACKING & PHYSICAL INSTALLATION (continued)

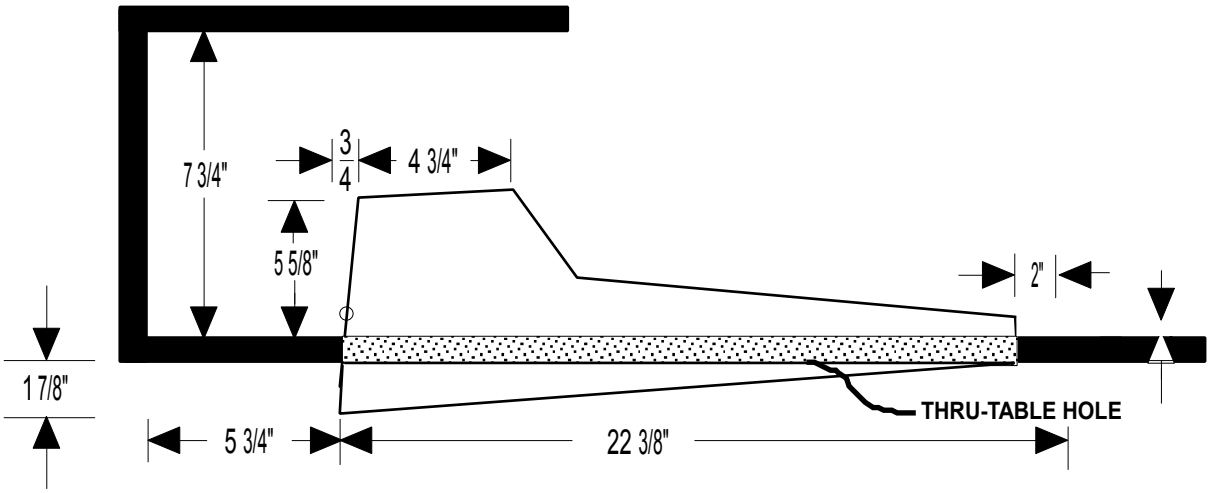
3-1e) STANDARD (TABLETOP MOUNT) CONSOLE DIMENSIONS AND CLEARANCES

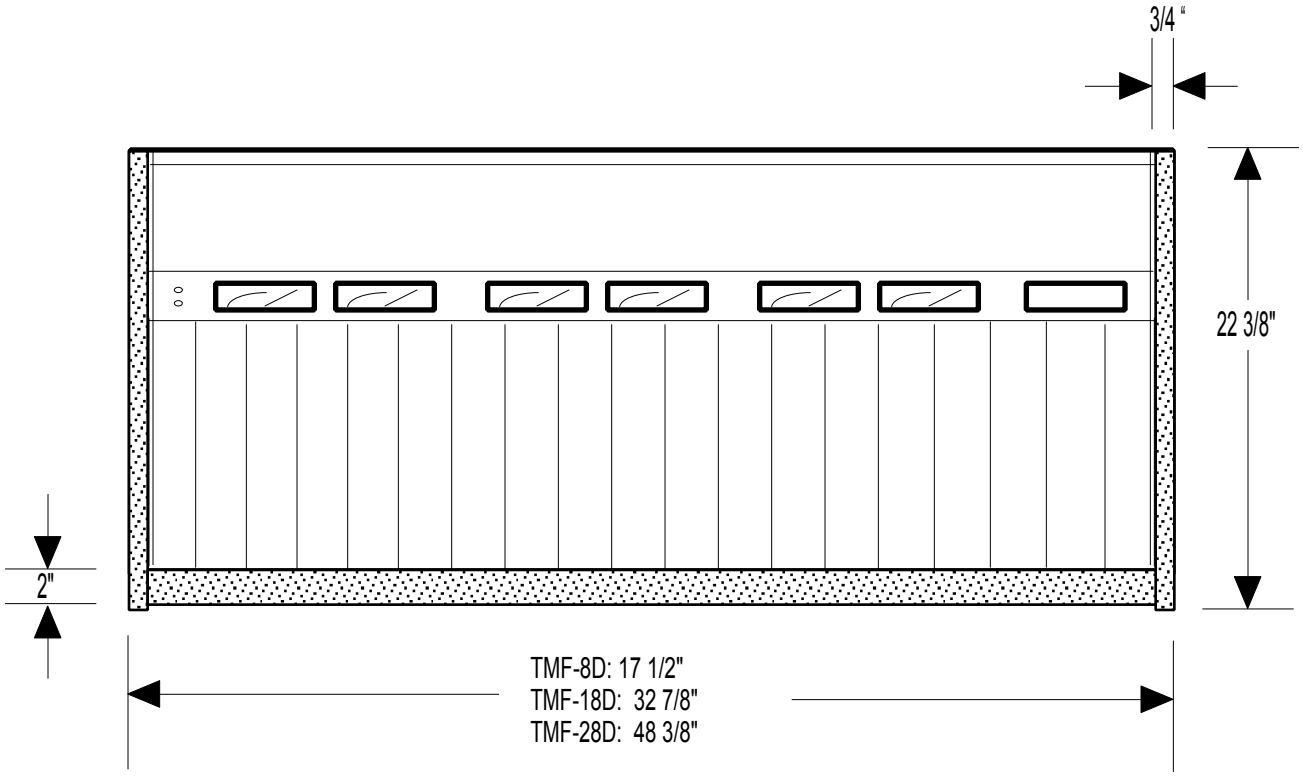




3-1) UNPACKING &PHYSICAL INSTALLATION (continued)

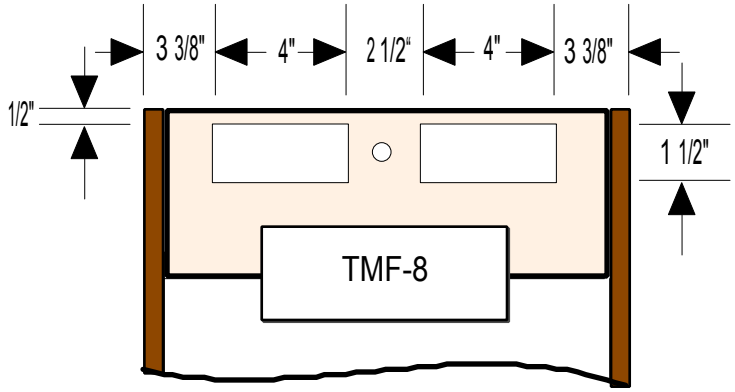
3-1f) DELUXE (THRU-TABLE MOUNT) CONSOLE DIMENSIONS & CLEARANCES



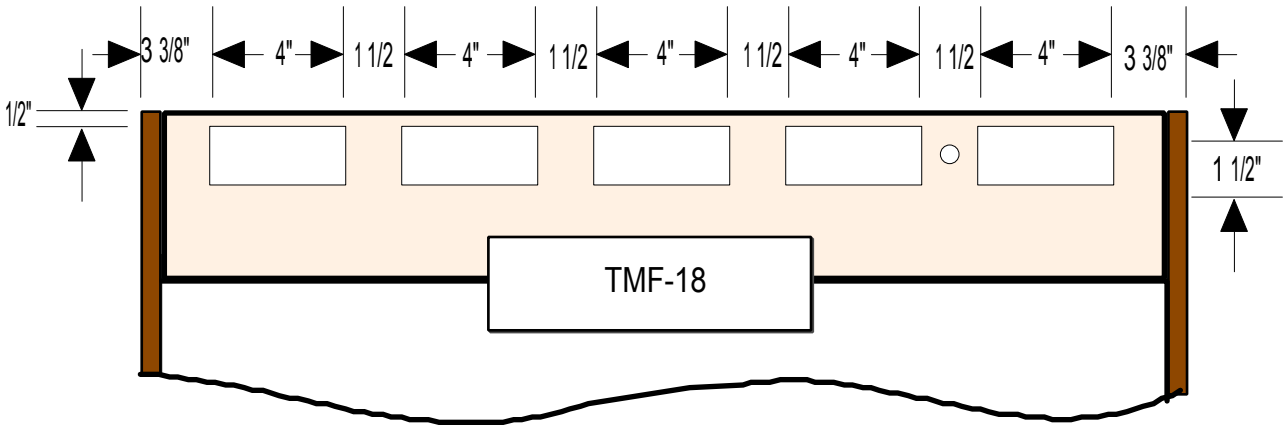


3-1) UNPACKING & PHYSICAL INSTALLATION (continued)

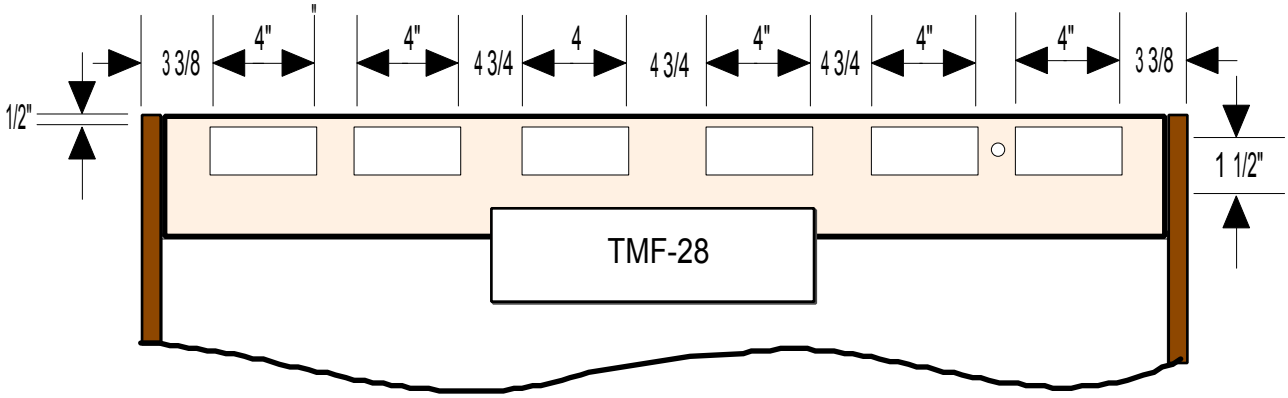
3-1g) CABLE ACCESS CUTOUT DIMENSIONS



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.

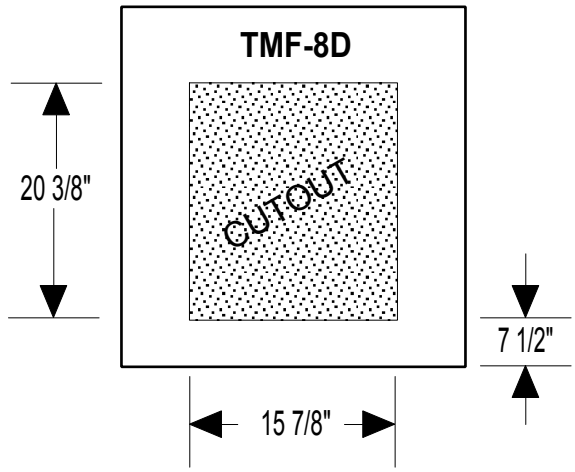


1 1/2 1/21



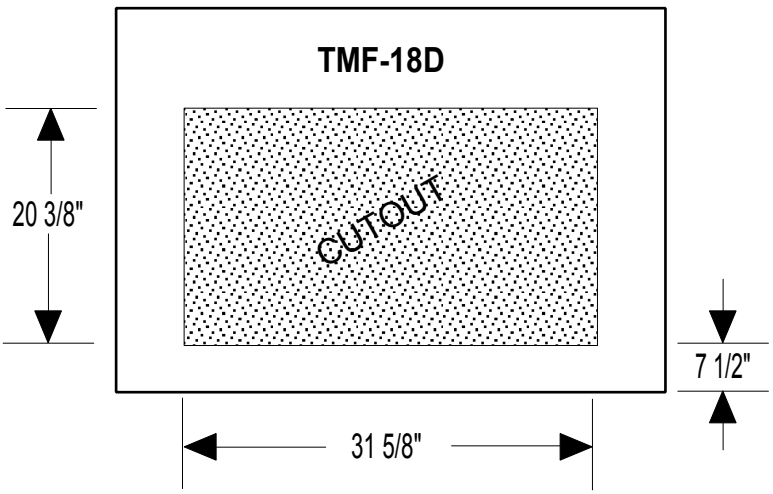
3-1) UNPACKING & PHYSICAL INSTALLATION (continued)

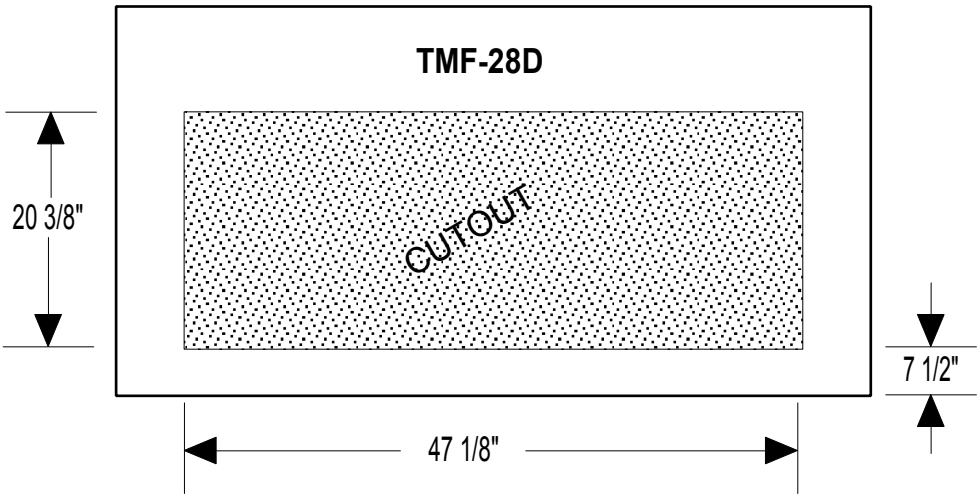
3-1h) TABLETOP CUTOUT DIMENSIONS, THRU-TABLE CONSOLEs



THRU-TABLE CONSOLEs
A rectangular hole in the tabletop is required for console installation.

Common tabletop dimensions are:
TMF-8 ---- 36" x 36"
TMF-18 -- 45" x 36"
TMF-28 -- 54" x 36"





3-2) GROUNDING

3-2a) GROUNDING OVERVIEW

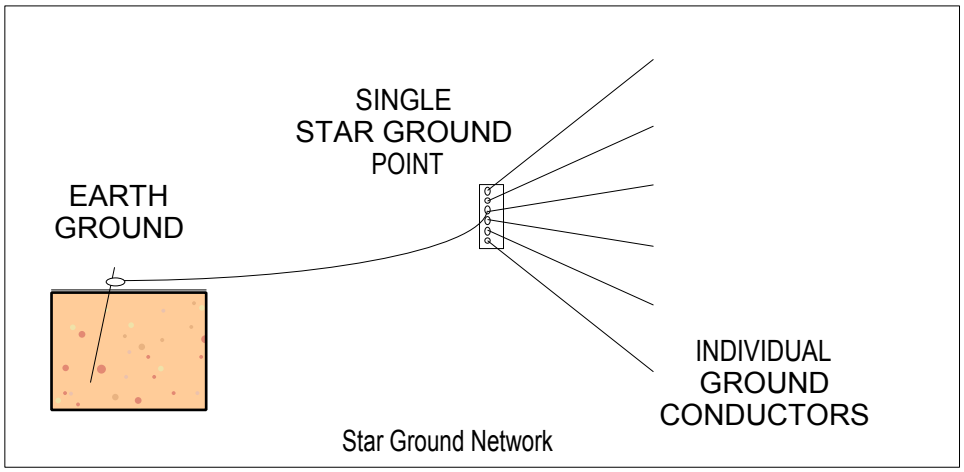
An audio installation is only as good (or bad) as its grounding system. Poor grounding practices are the number one cause of RF interference, hum, crosstalk and noise.

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 hummmmmm. 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.



Star Ground Network

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 the third prong of the AC power plug (AC System Ground). This should NEVER be defeated 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.

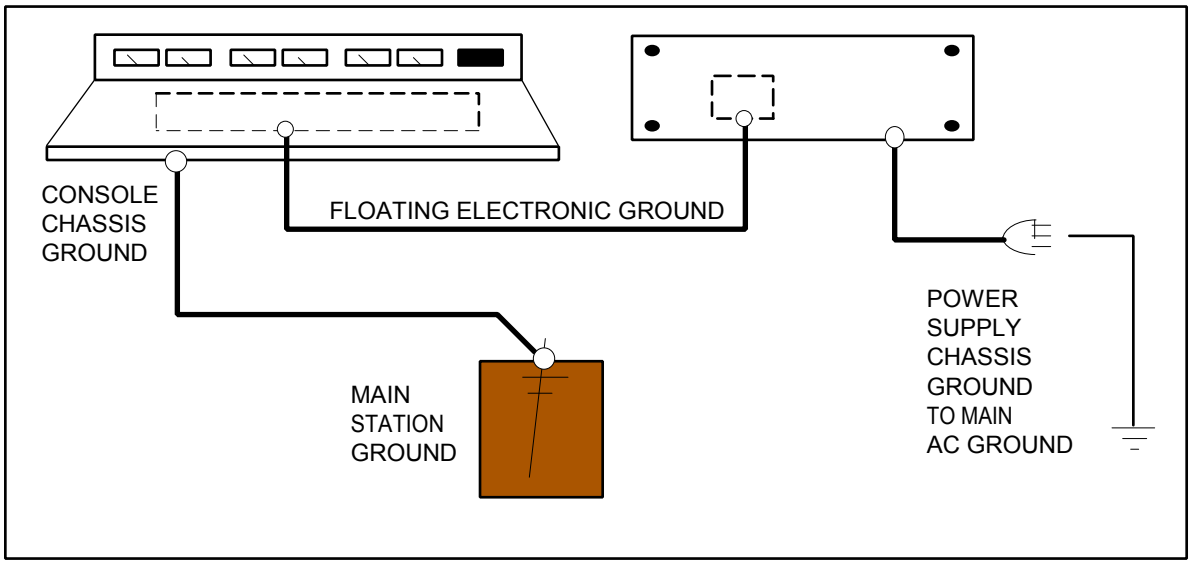
CONSOLE CHASSIS GROUND

The chassis of the console is ENTIRELY floating. It is not connected to Electronic Ground, AC Ground or anything else. There is AC in the meter panel to the timer module. Therefore, the chassis of the console MUST be grounded for AC shock protection . It should be connected to Station Ground for AC protection, to drain static shocks from the chassis and to shield against RF Interference.

To connect the console chassis to ground, a 1/4" hole is provided for a grounding stud. The hole is located on the bottom right side of the mainframe beneath the Meter Bridge. 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. The Meter Bridge can also be grounded for added safety. Be sure to scrape away any paint which may compromise the ground integrity.

The 12,000 Series console features a GROUNDING STRIP which runs across the rear of the mainframe. This strip can has a series of tapped holes (4-40) which can be used to affix ground wires to the console mainframe. It is suggested to run a ground strap from this strip to the 1/4" grounding stud discussed above. Once again, be sure to scrape away any paint when affixing ground wires to the strip.

CONSOLE AND POWER SUPPLY GROUNDING DIAGRAM



3-2)

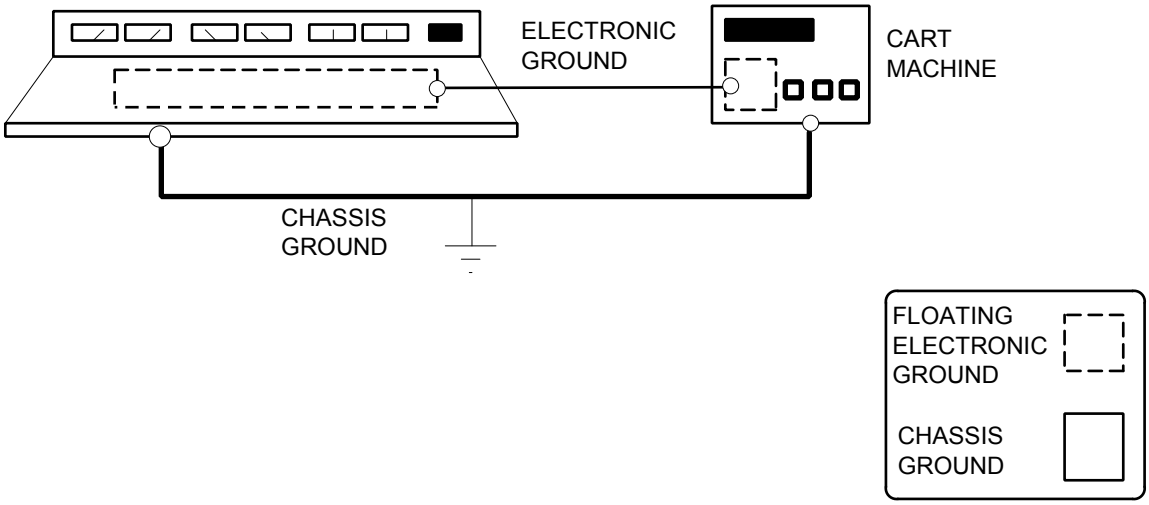
3-2c) GROUND LOOPS

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.

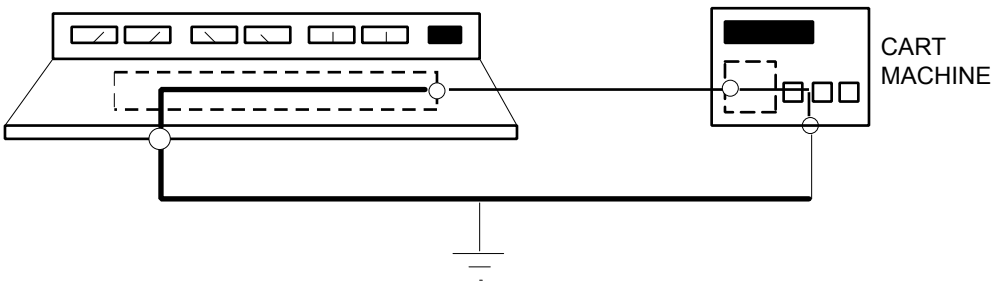
A ground loop is a low frequency LOOP ANTENNA which picks up 60 cycles being radiated within the building from its AC power distribution system. The loop is created when two pieces of equipment have more than one ground path between them.

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

No ground loop



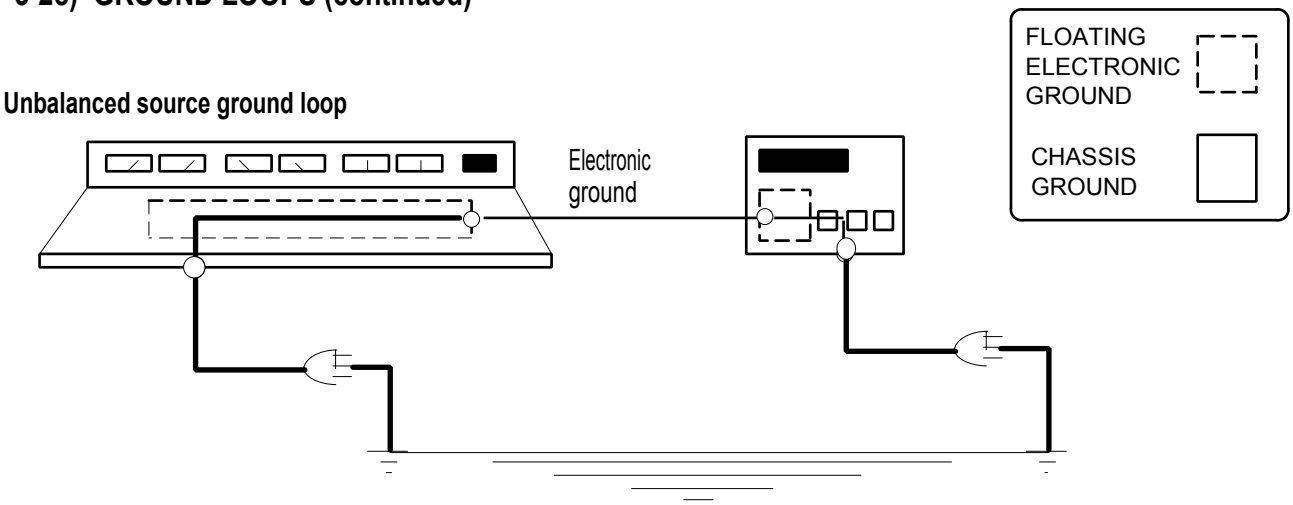
With ground loop



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.

3-2) GROUNDING (continued)

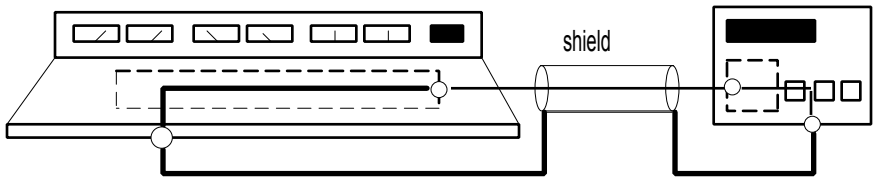
3-2c) GROUND LOOPS (continued)



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 of 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.

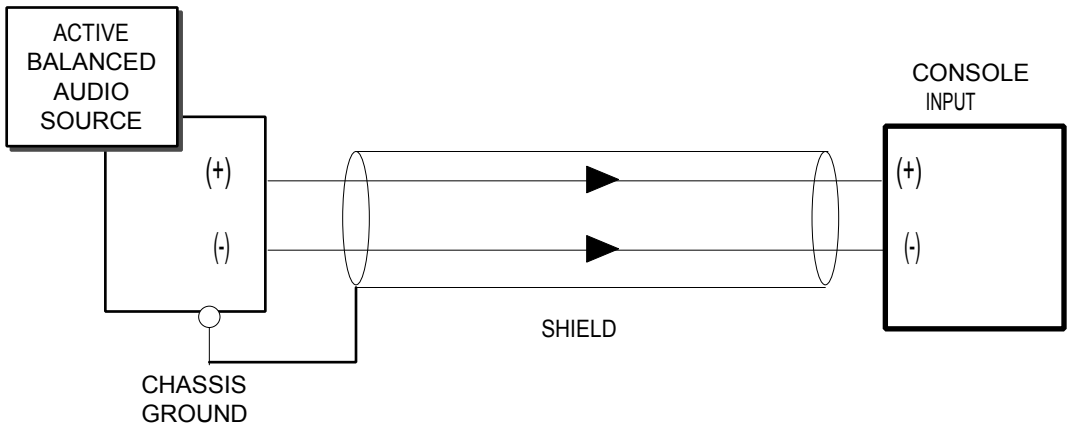
3-3) INPUT WIRING

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.

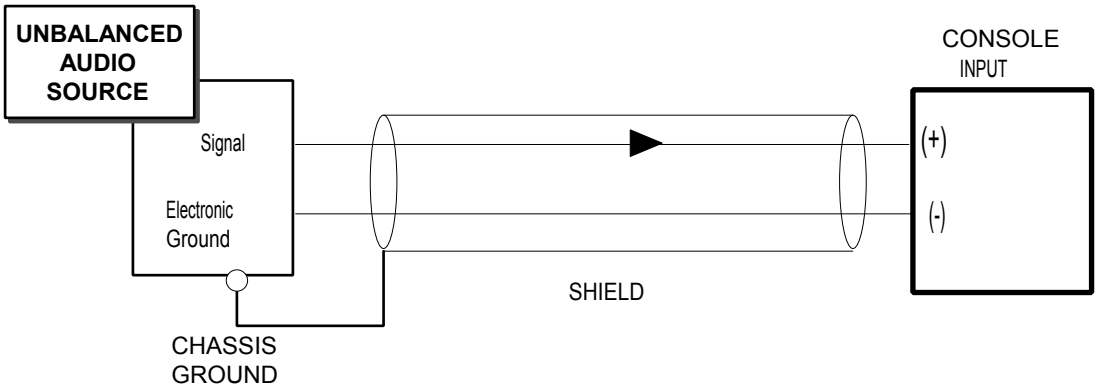
3-3b) BALANCED SOURCE OUTPUT TO BALANCED CONSOLE INPUT

The use of BALANCED wiring is strongly recommended



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

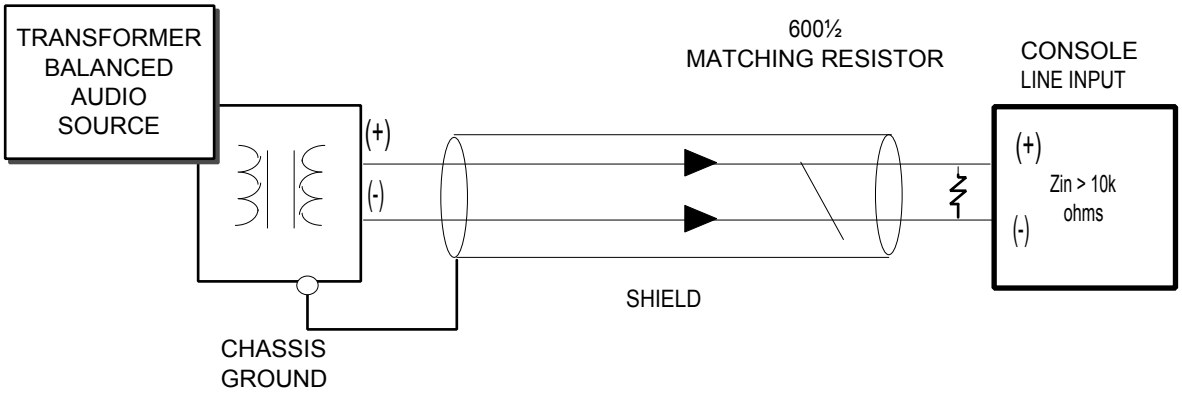
Use this wiring method for low noise installation of unbalanced audio sources to the console. 60 cycle hum will be rejected and ground loops avioded IF the Electronic Grounds are not connected between the source and console.



3-3) INPUT WIRING (contined)

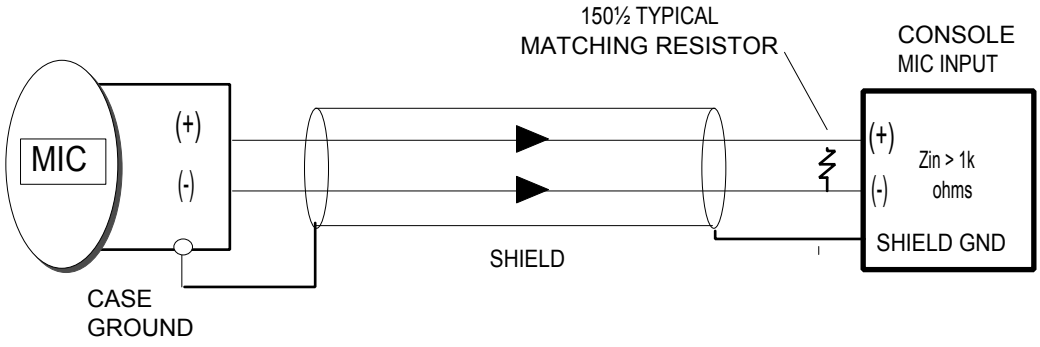
3-3d) LINE LEVEL TRANSFORMER BALANCED SOURCE OUTPUT TO ACTIVE BALANCED CONSOLE INPUT

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'c 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.



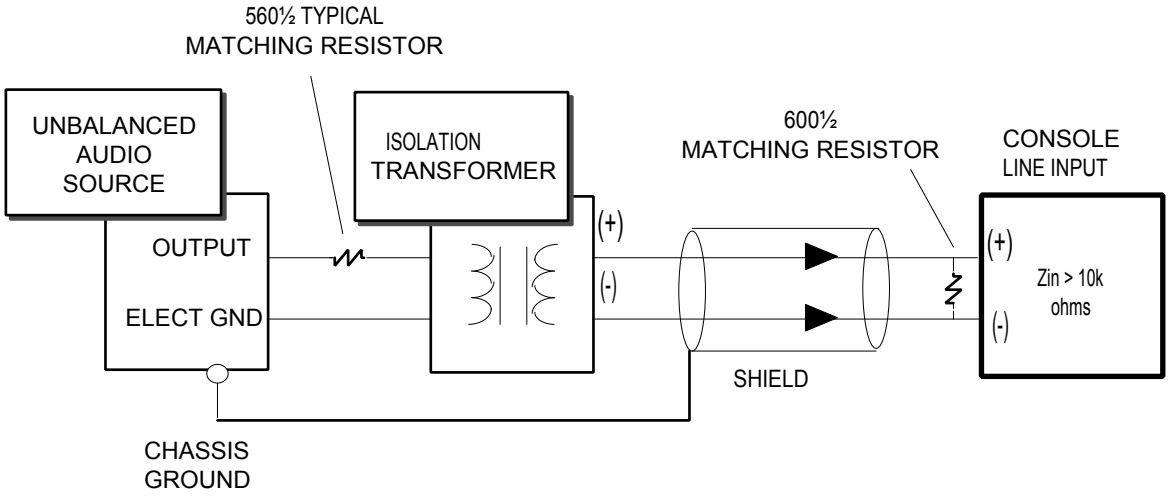
Stereo MICs need to be run through an outboard stereo MIC preamp then brought into the console as a stereo line level signal.

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 600½ audio transformer is used whose inputs and outputs want to see a fixed impedance of 600½ 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.

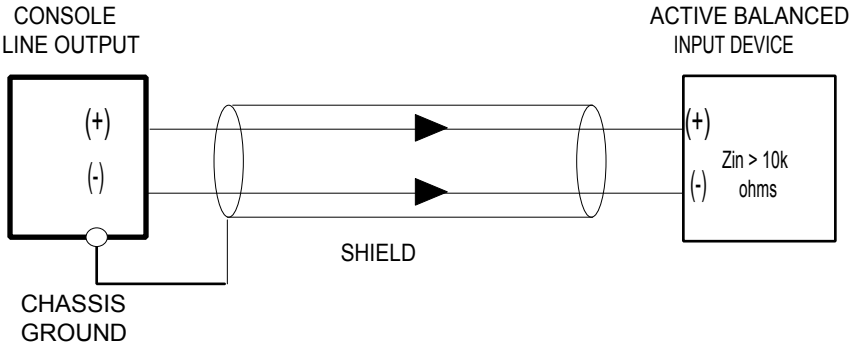
Most unbalanced sources are low impedance but not all. Check the Zout spec of the source device to insure the proper matching resistors are placed in series with the transformer primary leads. The total resistance, Zout + Zseries, should equal 600½ for a 600½ transformer. Different transformers and resistors may have to be used for proper impedance matching.



3-4) OUTPUT WIRING

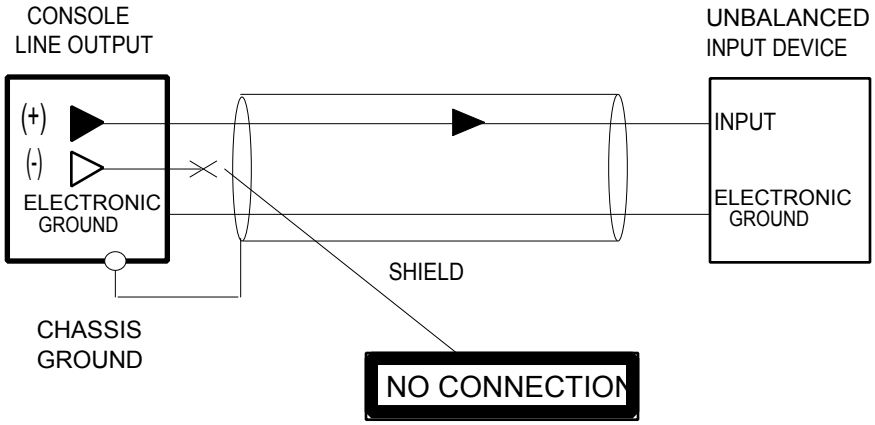
3-4a) CONSOLE BALANCED OUTPUT TO ACTIVE BALANCED INPUT

The console outputs are low impedance (>100 ohms balanced) and can therefore directly drive multiple high impedance inputs (>10k½) 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

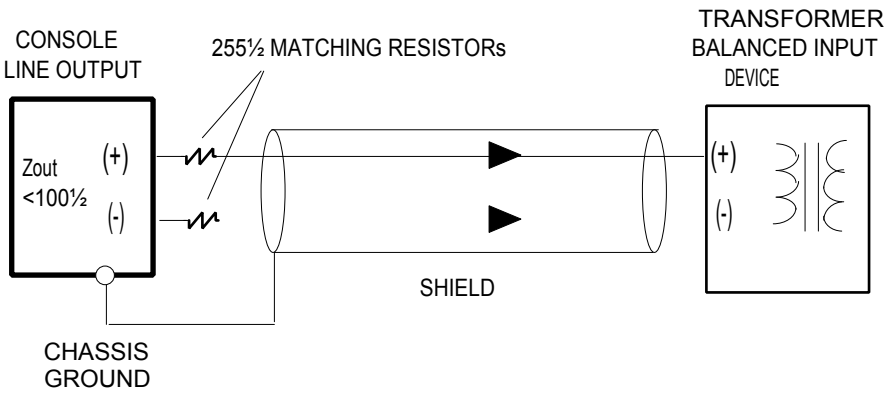
This diagram illustrates an active balanced console output to an unbalanced equipment input. Note that the (-) console output is left unconnected. If the (-) console output is grounded as you would with a transformer balanced output, then the console's output driver amplifier would be shorted and eventually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



3-4) OUTPUT WIRING (continued)

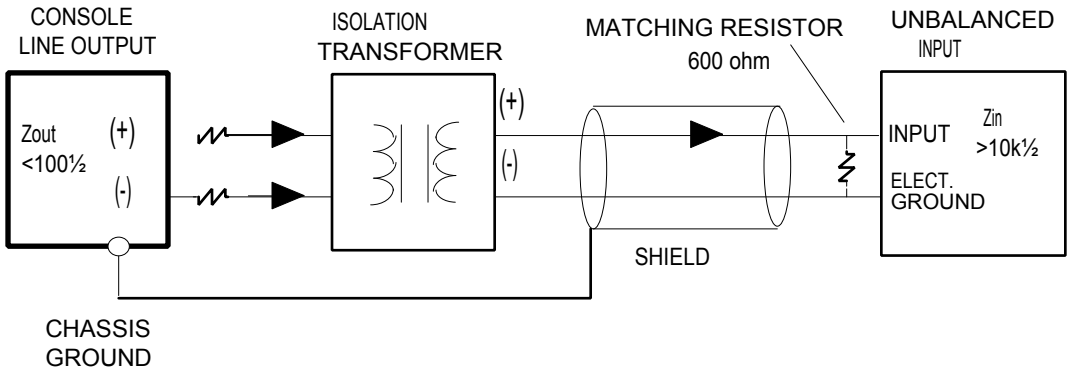
3-4c) CONSOLE BALANCED OUTPUT TO TRANSFORMER BALANCED INPUT

The console Output is low impedance (<100 ohms) and can therefore directly drive only ONE 600½ 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 47½ series resistance already built in. This means that a 253½ (255½ 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 o 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 600½ audio transformer is used whose inputs and outputs want to see a fixed impedance of 600½ for it to meet frequency response and distortion specifications. The Console Ouput is low impedance (<100½). To match impedances, a 253½ sereis 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.



3-4) OUTPUT WIRING (continued)

3-4e) CONSOLE OUTPUTS TO TELEPHONE LINES

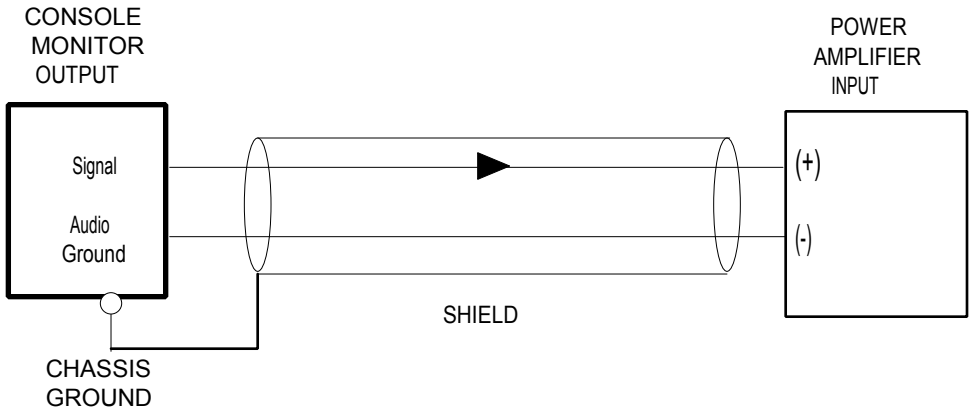
Under NO circumstances should a console output be used to directly drive telephone lines. The console outputs WILL be destroyed most likely by lightning. A telephone company approved coupler or (preferrably) a telephone hybrid MUST be used. Arrakis Systems doesn't, under any circumstances, warranty damage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

3-4f) MONITOR, HEADPHONE AND CUE SYSTEMS

The monitor, headphone and cue outputs are unbalanced with Zout <50½. These outputs will drive HI-Z headphones (>600 ohm) with no difficulty. These outputs will NOT, however, drive 8½ speakers or LO-Z headphones directly. In order to interface monitor and cue speakers to the console external power amplifiers must be used.

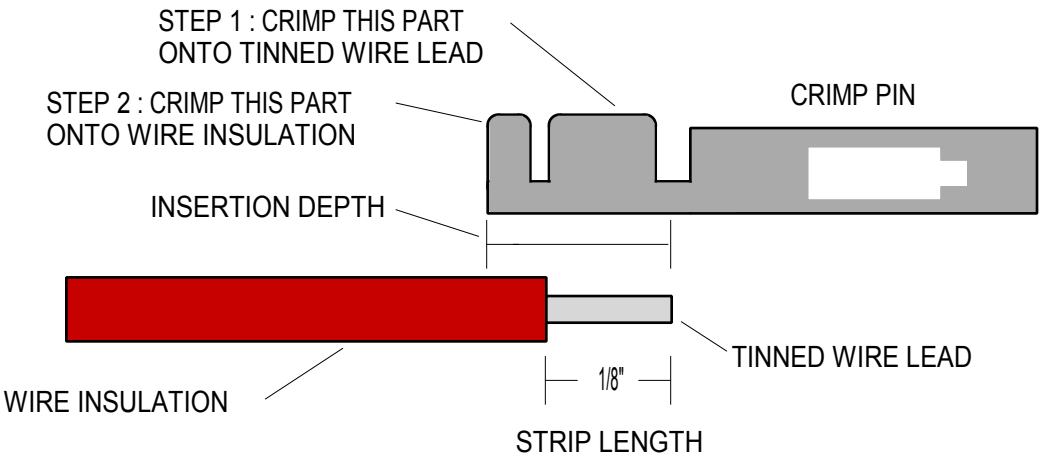
The monitor and cue outputs mute electronically when activated therefore do not require external muting relays.

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



3-4g) CONSOLE WIRING - CRIMP TOOL & CRIMP PINS

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 intermittant 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. free joint. Too much solder will inhibit pin insertion.
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
7I I**NSTALL** 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.

3-5) TPM1 -- STEREO LINE LEVEL INPUT MODULE

CONNECTOR ONE (CN1)

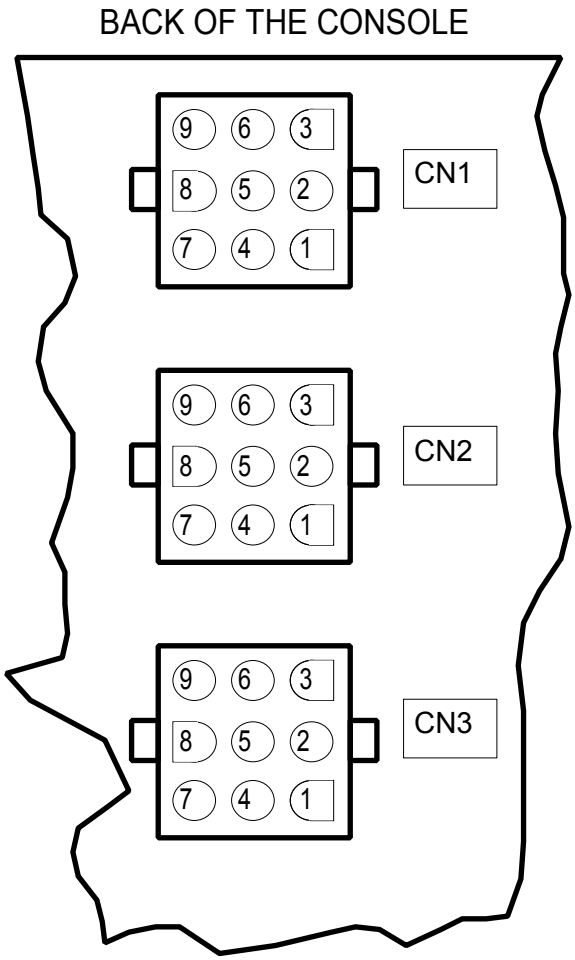
1) 'A' READY STATUS (OFF) LAMP (+VDC)
2) 'A' REMOTE START/STOP COMMON
3) 'A' LEFT (-) AUDIO INPUT
4) 'A' READY STATUS (OFF) LAMP (DRIVER)
5) 'A' REMOTE STOP (MOMENTARY)
   'A' REMOTE START (SUSTAINED)*
6) 'A' RIGHT (-) AUDIO INPUT
7) 'A' REMOTE START (MOMENTARY)
8) 'A' LEFT (+) AUDIO INPUT
9) 'A' RIGHT (+) AUDIO INPUT

CONNECTOR TWO (CN2)

1) 'B' READY STATUS (OFF) LAMP (+VDC)
2) 'B' REMOTE START/STOP COMMON
3) 'B' LEFT (-) AUDIO INPUT
4) 'B' READY STATUS (OFF) LAMP (DRIVER)
5) 'B' REMOTE STOP (MOMENTARY) OR
   'B' REMOTE START (SUSTAINED)*
6) 'B' RIGHT (-) AUDIO INPUT
7) 'B' REMOTE START (MOMENTARY)
8) 'B' LEFT (+) AUDIO INPUT
9) 'B' RIGHT (+) AUDIO INPUT

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) RIGHT PREFADER PATCH OUT
3) REMOTE CHANNEL ON
4) RIGHT PREFADER PATCH IN
5) LEFT PREFADER PATCH OUT
6) LEFT DIRECT OUT (MODULE OUTPUT)
7) LEFT PREFADER PATCH IN
8) REMOTE CHANNEL OFF
9) RIGHT DIRECT OUT (MODULE OUTPUT)



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

REMOTE CHANNEL ON/OFF

THE REMOTE CHANNEL ON/OFF FEATURE ALLOWS THE MODULE TO BE TURNED ON OR OFF FROM A REMOTE LOCATION SUCH AS A TALK BOOTH. A SIMPLE MOMENTARY CLOSURE TO GROUND (CN3-1) FROM THE REMOTE CHANNEL ON OR OFF LOGIC PORT (CN3-3 OR CN3-8) WILL TURN THE CHANNEL EITHER ON OR OFF. A REMOTE START OR STOP RELAY CLOSURE (TO ACTIVATE AUDIO SOURCE DEVICES) WILL BE GENERATED AS USUAL.

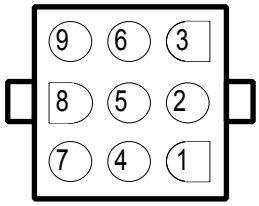
*DEPENDS ON DIPSWITCH SETUP. SEE MODULE PARTS LAYOUT FOR DIPSWITCH INFO.

3-5) TPM1 -- STEREO LINE LEVEL INPUT MODULE

Connectors CN1 and CN2 are the 'A' and 'B' line inputs to the TPM1 input module. Each connector handles audio inputs and A/B steered control logic.

REMOTE START/STOP

The control logic supports remote start and remote stop of audio source devices. If a momentary remote start closure is desired, then connect the source device's start lines between pins 2 and 7. If a sustained start closure is called for, connect the source device's start lines between pins 2 and 5, then flip the appropriate dipswitches to set up the module for a "SUSTAINED START" closure (see dipswitch info). The relay will be closed as long as the module is ON. If a momentary remote stop is desired, connect the source device's stop lines between pins 2 and 5. In this case no dipswitches need to be flipped. There is no sustained remote stop closure available.



CAUTION: THE REMOTE START AND STOP RELAYS ARE RATED FOR A MAXIMUM CURRENTOF 50 mA. EXCEEDING THIS RATING WILL WELD THE CONTACTS OF THE RELAY TOGETHER WITH RUINOUS RESULTS! ARRAKIS SYSTEMS DOES NOT COVER UNDER WARRANTY DAMAGE DUE TO IMPROPER CONSOLE INSTALLATION.

The remote start/stop relays are totally floating in respect to the console electronics and ground therefore they are true "DRY CONTACT"

READY STATUS

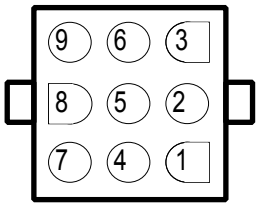
The module allows easy access to the OFF lamp for interface to a cart machine's "Ready Status" output. When the "OFF LAMP (DRIVER)" and "OFF LAMP (+VDC)" dipswitches are turned off, then the module's OFF lamp is entirely disconnected from the console's electronics. The lamp will light whenever 12-14VDC (80mA) is applied between pins 1 and 4. If the "OFF LAMP (+VDC)" dipswitch is left "ON", then the OFF lamp will light whenever pin 4 is connected to ground (CN3-1).

CAUTION: THE "OFF LAMP (DRIVER)" DIPSWITCH MUST BE FLIPPED "OFF" BEFORE APPLYING ANY VOLTAGES OR GROUND TO PIN 4. FAILURE TO DO SO WILL RESULT IN THE DESTRUCTION OF THE INTERNAL OFF LAMP DRIVER!

Once again, Arrakis Systems does not cover under warranty damages resulting from improper installation. Connector CN3 handles auxilliary audio and control logic.

PREFADER PATCH

The prefader patch allows audio processing gear to be added to the signal chain. When the "PATCH JUMPER" (see module layout) is removed the signal chain is broken within the module. Now the PATCH OUT and PATCH IN connections must be used to complete the signal path. The processing gear is placed in series between the patch out and in. The levels at the patch are around 0dBu unbalanced. With the "PATCH JUMPER" left in place the PATCH OUTs can also be utilized as a prefader AUX send... a sort of one output DA. The PATCH OUTs are very low impedance, <2½, therefore external resistance is suggested. The PATCH INs have a 18k ohm input impedance.



DIRECT OUT

The DIRECT OUT is a postfader signal which turns on and off along with the module. It can be used as a post fader AUX send for a variety of purposes. The level at the DIRECT OUTs are around0dBu unbalanced. The DIRECT OUTs are also very low impedance, <2½.

3-6) TPM1-M -- MONO MIC LEVEL INPUT MODULE

CONNECTOR ONE (CN1)

1) 'A' REMOTE CHANNEL ON
2) 'A' LOGIC GROUND
3) **SHIELD GROUND**
4) 'A' REMOTE CHANNEL OFF
5) 'A' COUGH MUTE
6) 'A' MIC LEVEL INPUT (-)
7) 'A' ON/OFF TALLY (+VDC = OFF, -VDC = ON)
8) 'A' CUE/TALKBACK
9) 'A' MIC LEVEL INPUT(+)

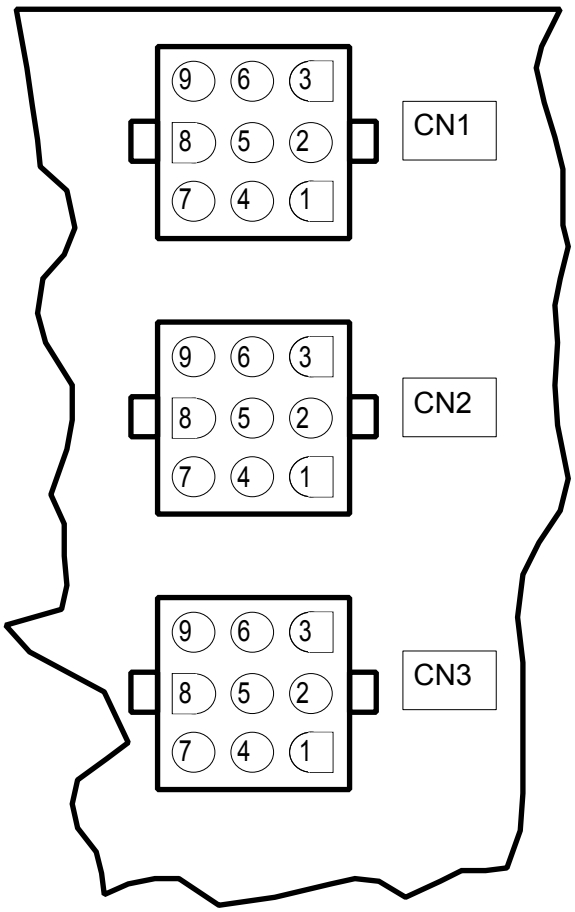
CONNECTOR TWO (CN2)

1) 'B' REMOTE CHANNEL ON
2) 'B' LOGIC GROUND
3) **SHIELD GROUND**
4) 'B' REMOTE CHANNEL OFF
5) 'B' COUGH MUTE
6) 'B' MIC LEVEL INPUT (-)
7) 'B' ON/OFF TALLY (+VDC = OFF, -VDC = ON)
8) 'B' CUE/TALKBACK
9) 'B' MIC LEVEL INPUT(+)

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) NC
3) NC
4) PREFADER PATCH OUT
5) TALKBACK BUS ASSIGN
6) DIRECT OUT (MODULE OUTPUT)
7) PREFADER PATCH IN
8) NC
9) DIRECT OUT (MODULE OUTPUT)

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

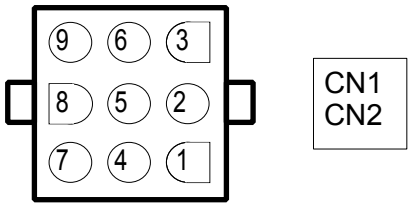
TALKBACK BUS ASSIGN, CR MIC

THE TALKBACK BUS ASSIGN FEATURE (CN3-5) ROUTES MIC AUDIO INTO THE TALKBACK/INTERCOM SYSTEM. CONNECTING A JUMPER FROM THE PREFADER PATCH OUT (CN3-4) TO THE TALKBACK BUS ASSIGN (CN3-5) PUTS THE MIC ON THE "TALKBACK TO STUDIO MONITORS" SYSTEM. TYPICALLY THIS JUMPER SHOULD BE INSTALLED ON THE "CONTROL ROOM" OR "ANNOUNCER" MIC. THIS MIC WILL THEN TALKTO THE STUDIOS WHEN THE CONSOLE OPERATOR PRESSES "TALKBACK TO STUDIO ONE" OR "TALKBACK TO STUDIO TWO" ON THE TCRM1 CONTROL ROOM MONITOR MODULE.

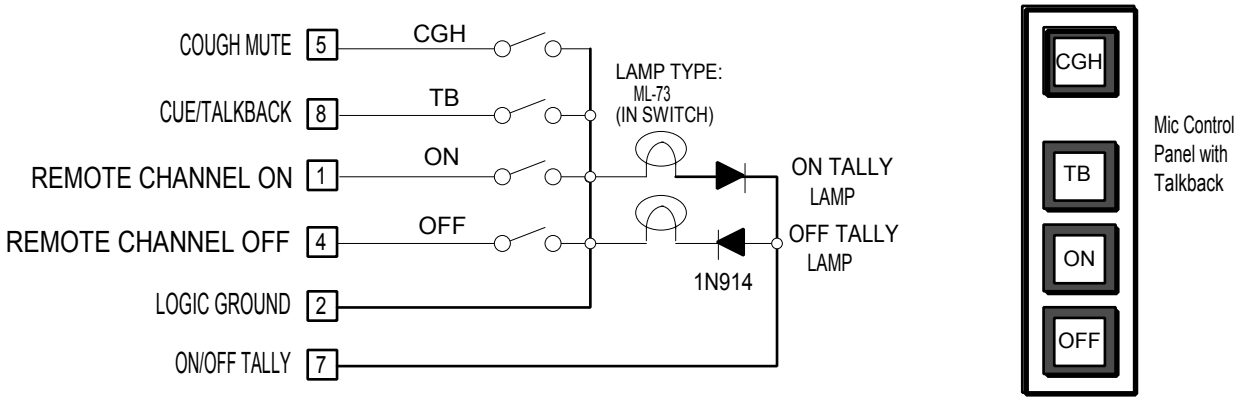
3-6) TPM1-M -- MONO MIC LEVEL INPUT MODULE

Connectors CN1 and CN2 are the 'A' and 'B' MIC inputs to the TPM1-M input module. Each connector handles audio inputs and A/B steered control logic.

The control logic allows the module to be operated from a remote location, typically a talk booth or interview table. A MIC control panel mounted in a turret provides the necessary functions to fully control the MIC module.



The following diagram outlines a typical interface used to control the MIC module from a remote turret control panel.



COUGH MUTE

When COUGH MUTE (pin 5) line is held to LOGIC GROUND (pin 2) then the module is muted. No audio will pass until ground is removed from pin 5.

CUE/TALKBACK

When CUE/TALKBACK (pin 8) is held to LOGIC GROUND then the MIC audio will appear in the console's CUE system. The MIC signal will be heard through the headphones (AUTOCUE) and the CUE speaker. This allows talkback from the talk booth (studio) TO the control room.

REMOTE CHANNEL ON/OFF

The module will turn ON or OFF with a momentary closure to logic ground.

ON/OFF TALLY

Indicates whether the module is ON or OFF. A "+" (positive) voltage here indicates that the module is OFF. A "-" (negative) voltage here indicates that the module is ON. This output will directly drive ML-73 incandescent lamps or LEDs (add 1k ohm series resistance for LED operation).

PREFADER PATCH

The PREFADER PATCH function is explained in section 3-5.

NOTE: The PATCH OUT level is about 0dBu. This output, a MIC preamp output with MIC level inputs and a line level output, can be utilized in a number of ways. The output impedance is 47½.

DIRECT OUT

The DIRECT OUT function is explained in section 3-5.

3-7) TPM2 -- MONO MIC LEVEL INPUT MODULE WITH PAN

CONNECTOR ONE (CN1)

1) 'A' REMOTE CHANNEL ON
2) 'A' LOGIC GROUND
3) SHIELD GROUND
4) 'A' REMOTE CHANNEL OFF
5) 'A' COUGH MUTE
6) 'A' MIC LEVEL INPUT (-)
7) 'A' ON/OFF TALLY (+VDC = OFF, -VDC = ON)
8) 'A' CUE/TALKBACK
9) 'A' MIC LEVEL INPUT (+)

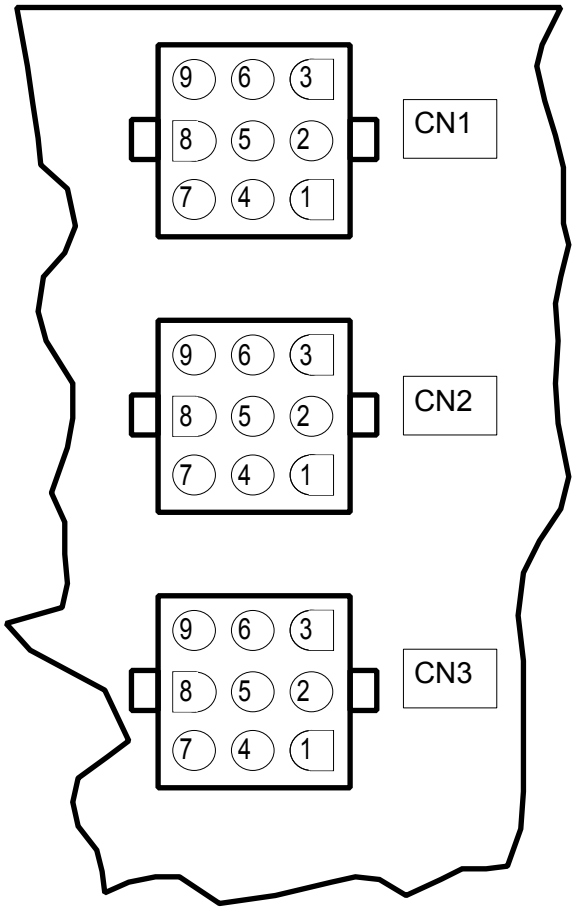
CONNECTOR TWO (CN2)

1) 'B' REMOTE CHANNEL ON
2) 'B' LOGIC GROUND
3) SHIELD GROUND
4) 'B' REMOTE CHANNEL OFF
5) 'B' COUGH MUTE
6) 'B' MIC LEVEL INPUT (-)
7) 'B' ON/OFF TALLY (+VDC = OFF, -VDC = ON)
8) 'B' CUE/TALKBACK
9) 'B' MIC LEVEL INPUT (+)

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) NC
3) NC
4) PREFADER PATCH OUT
5) TALKBACK BUS ASSIGN
6) LEFT DIRECT OUT (MODULE OUTPUT)
7) PREFADER PATCH IN
8) NC
9) RIGHT DIRECT OUT (MODULE OUTPUT)

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

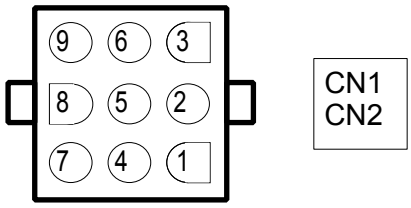
TALKBACK BUS ASSIGN, CR MIC

THE TALKBACK BUS ASSIGN FEATURE (CN3-5) ROUTES MIC AUDIO INTO THE TALKBACK/INTERCOM SYSTEM. CONNECTING A JUMPER FROM THE PREFADER PATCH OUT (CN3-4) TO THE TALKBACK BUS ASSIGN (CN3-5) PUTS THE MIC ON THE "TALKBACK TO STUDIO MONITORS" SYSTEM. TYPICALLY THIS JUMPER SHOULD BE INSTALLED ON THE "CONTROL ROOM" OR "ANNOUNCER" MIC. THIS MIC WILL THEN TALK TO THE STUDIOS WHEN THE CONSOLE OPERATOR PRESSES "TALKBACK TO STUDIO ONE" OR "TALKBACK TO STUDIO TWO" ON THE TCRM1 CONTROL ROOM MONITOR MODULE.

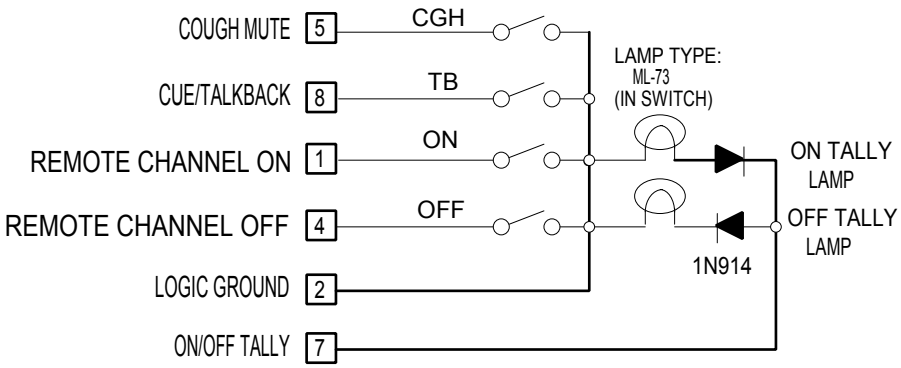
3-7) TPM2 -- MONO MIC LEVEL INPUT MODULE WITH PAN

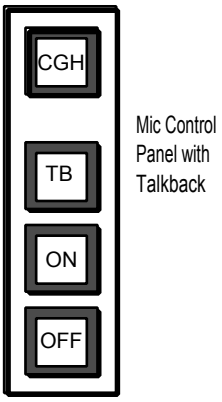
Connectors CN1 and CN2 are the 'A' and 'B' MIC inputs to the TPM2 input module. Each connector handles audio inputs and A/B steered control logic.

The control logic allows the module to be operated from a remote location, typically a talk booth or interview table. A MIC control panel mounted in a turret provides the necessary functions to fully control the MIC module.



The following diagram outlines a typical interface used to control the MIC module from a remote turret control panel.





COUGH MUTE

When COUGH MUTE (pin 5) line is held to LOGIC GROUND (pin 2) then the module is muted. No audio will pass until ground is removed from pin 5.

CUE/TALKBACK

When CUE/TALKBACK (pin 8) is held to LOGIC GROUND then the MIC audio will appear in the console's CUE system. The MIC signal will be heard through the headphones (AUTOCUE) and the CUE speaker. This allows talkback from the talk booth (studio) TO the control room.

REMOTE CHANNEL ON/OFF

The module will turn ON or OFF with a momentary closure to logic ground.

ON/OFF TALLY

Indicates whether the module is ON or OFF. A "+" (positive) voltage here indicates that the module is OFF. A "-" (negative) voltage here indicates that the module is ON. This output will directly drive ML-73 incandescent lamps or LEDs (add 1k½ series resistance for LED operation).

PREFADER PATCH

The PREFADER PATCH function is explained in section 3-5.
NOTE: The PATCH OUT level is about 0dBu. This output, a MIC preamp output with MIC level inputs and a line level output, can be utilized in a number of ways. The output impedance is 47 ohm.

DIRECT OUT

The DIRECT OUT function is explained in section 3-5.

3-8) TPM3 -- STEREO LINE LEVEL INPUT MODULE WITH MODE SELECT

CONNECTOR ONE (CN1)

1) 'A' READY STATUS (OFF) LAMP (+VDC)
2) 'A' REMOTE START/STOP COMMON
3) 'A' LEFT (-) AUDIO INPUT
4) 'A' READY STATUS (OFF) LAMP (DRIVER)
5) 'A' REMOTE STOP (MOMENTARY) OR 'A' REMOTE START (SUSTAINED)*
6) 'A' RIGHT (-) AUDIO INPUT
7) 'A' REMOTE START (MOMENTARY)
8) 'A' LEFT (+) AUDIO INPUT
9) 'A' RIGHT (+) AUDIO INPUT

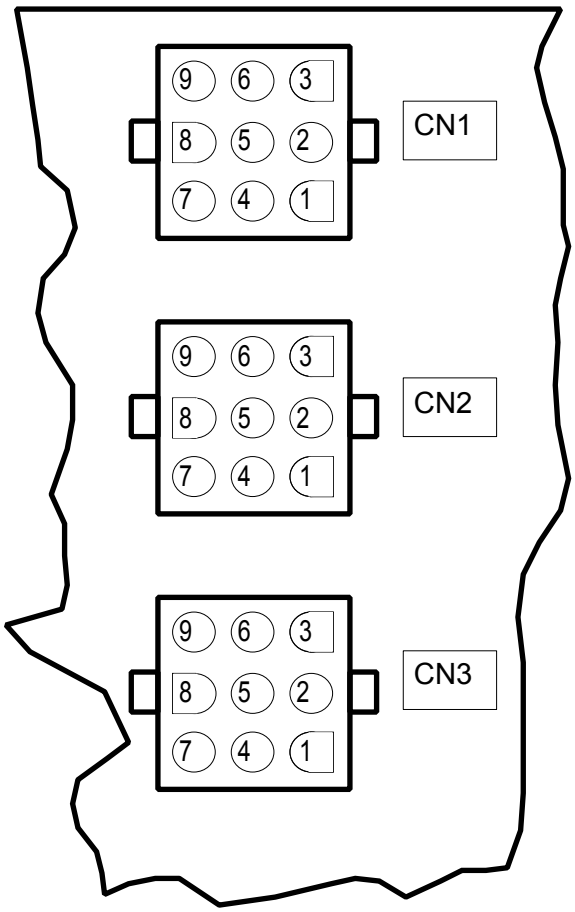
CONNECTOR TWO (CN2)

1) 'B' READY STATUS (OFF) LAMP (+VDC)
2) 'B' REMOTE START/STOP COMMON
3) 'B' LEFT (-) AUDIO INPUT
4) 'B' READY STATUS (OFF) LAMP (DRIVER)
5) 'B' REMOTE STOP (MOMENTARY) OR 'B' REMOTE START (SUSTAINED)*
6) 'B' RIGHT (-) AUDIO INPUT
7) 'B' REMOTE START (MOMENTARY)
8) 'B' LEFT (+) AUDIO INPUT
9) 'B' RIGHT (+) AUDIO INPUT

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) RIGHT PREFADER PATCH OUT
3) REMOTE CHANNEL ON
4) RIGHT PREFADER PATCH IN
5) LEFT PREFADER PATCH OUT
6) LEFT DIRECT OUT (MODULE OUTPUT)
7) LEFT PREFADER PATCH IN
8) REMOTE CHANNEL OFF
9) RIGHT DIRECT OUT (MODULE OUTPUT)

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

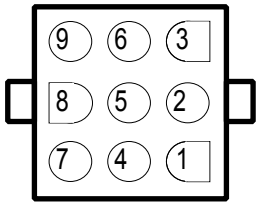
REMOTE CHANNEL ON/OFF

THE REMOTE CHANNEL ON/OFF FEATURE ALLOWS THE MODULE TO BE TURNED ON OR OFF FROM A REMOTE LOCATION SUCH AS A TALK BOOTH. A SIMPLE MOMENTARY CLOSURE TO GROUND (CN3-1) FROM THE REMOTE CHANNEL ON OR OFF LOGIC PORT (CN3-3 OR CN3-8) WILL TURN THE CHANNEL EITHER ON OR OFF. A REMOTE START OR STOP RELAY CLOSURE (TO ACTIVATE AUDIO SOURCE DEVICES) WILL BE GENERATED AS USUAL.

***DEPENDS ON DIPSWITCH SETUP. SEE MODULE PARTS LAYOUT FOR DIPSWITCH INFO.**

3-8) TPM3 -- STEREO LINE LEVEL INPUT MODULE WITH MODE SELECT

Connectors CN1 and CN2 are the 'A' and 'B' line inputs to the TPM3 input module. Each connector handles audio inputs and A/B steered control logic.



CN1
CN2

REMOTE START/STOP

The control logic supports remote start and remote stop of audio source devices. If a momentary remote start closure is desired, then connect the source device's start lines between pins 2 and 7. If a sustained start closure is called for, connect the source device's start lines between pins 2 and 5, then flip the appropriate dipswitches to set up the module for a "SUSTAINED START" closure (see dipswitch info). The relay will be closed as long as the module is ON. If a momentary remote stop is desired, connect the source device's stop lines between pins 2 and 5. In this case no dipswitches need to be flipped. There is no sustained remote stop closure available.

CAUTION: THE REMOTE START AND STOP RELAYS ARE RATED FOR A MAXIMUM CURRENT OF 50 mA. EXCEEDING THIS RATING WILL WELD THE CONTACTS OF THE RELAY TOGETHER WITH RUINOUS RESULTS! ARRAKIS SYSTEMS DOES NOT COVER UNDER WARRANTY DAMAGE DUE TO IMPROPER CONSOLE INSTALLATION.

The remote start/stop relays are totally floatingin respect to the console electronics and ground therefore they are true "DRY CONTACT" closures.

READY STATUS

The module allows easy access to the OFF lamp for interface to a cart machine's "Ready Status" output. When the "OFF LAMP (DRIVER)" and "OFF LAMP (+VDC)" dipswitches are turned off, then the module's OFF lamp is entirely disconnected from the console's electronics. The lamp will light whenever 12-14VDC (80mA) is applied between pins 1 and 4. If the "OFF LAMP (+VDC)" dipswitch is left "ON", then the OFF lamp will light whenever pin 4 is connected to ground (CN3-1).

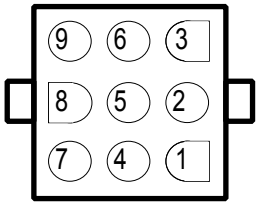
CAUTION THE "OFF LAMP (DRIVER)" DIPSWITCH MUST BE FLIPPED "OFF" BEFORE: APPLYING ANY VOLTAGES OR GROUND TO PIN 4. FAILURE TO DO SO WILL RESULT IN THE DESTRUCTION OF THE INTERNAL OFF LAMP DRIVER!

Once again, Arrakis Systems does not cover under warranty damages resulting from improper installation.

**** Connector CN3 handles auxilliary audio and control logic. ****

PREFADER PATCH

The prefader patch allows audio processing gear to be added to the signal chain. When the "PATCH JUMPER" (see module layout) is removed the signal chain is broken within the module. Now the PATCH OUT and PATCH IN connections must be used to complete the signal path. The processing gear is placed in series between the patch out and in. The PATCH OUTs are very low impedance, <2½, therefore external resistance is suggested. The PATCH INs have a 18k ohm input impedance.



CN3

DIRECT OUT

The DIRECT OUT is a postfader signal which turns on and off along with the module. It can be used as a postfader AUX send for a variety of purposes. The level at the DIRECT OUTs are around 0dBu unbalanced. The DIRECT OUTs are also very low impedance, <2 ohm.

3-9) TOB1 -- OUTPUT MODULE

CONNECTOR ONE (CN1)

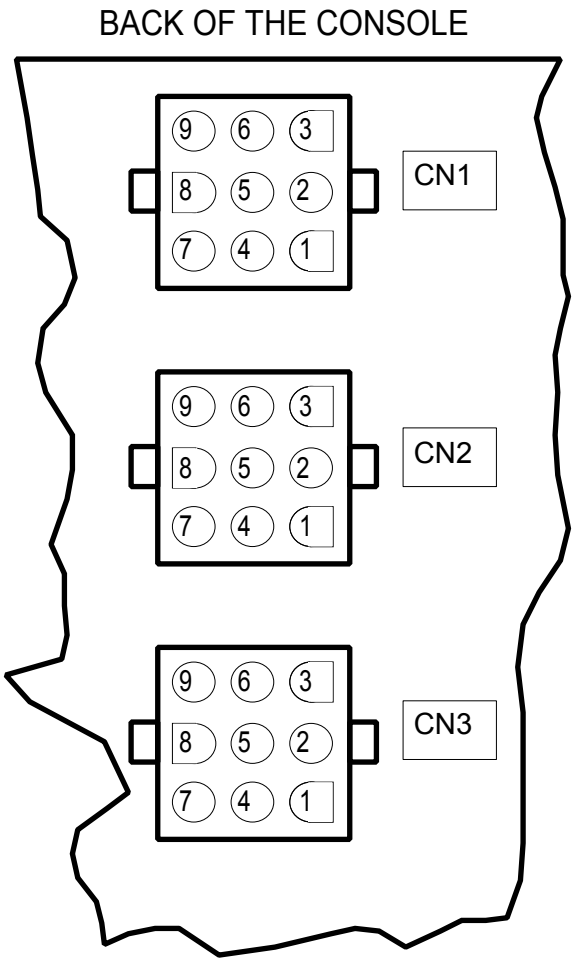
1) AUDIO GROUND
2) PROGRAM OUT LEFT (-)
3) PROGRAM MONO SUM OUT (-)
4) PROGRAM OUT RIGHT (+)
5) PROGRAM OUT LEFT (+)
6) AUDITION MONO SUM OUT (+)
7) PROGRAM OUT RIGHT (+)
8) PROGRAM MONO SUM OUT (+)
9) AUDITION MONO SUM OUT (-)

CONNECTOR TWO (CN2)

1) AUDIO GROUND
2) STUDIO 1 MUTE RELAY DRIVER OUT
3) AUDITION MIX-MINUS OUT (UNBALANCED)
4) LOGIC GROUND
5) STUDIO 2 MUTE RELAY DRIVER OUT
6) NC
7) CR MUTE RELAY DRIVER OUT
8) PROGRAM MIX-MINUS OUT (UNBALANCED)
9) NC

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) UTILITY OUT LEFT (+)
3) AUDITION OUT RIGHT (-)
4) UTILITY OUT RIGHT (+)
5) UTILITY OUT LEFT (-)
6) AUDITION OUT LEFT (+)
7) UTILITY OUT RIGHT (-)
8) AUDITION OUT RIGHT (+)
9) AUDITION OUT LEFT (-)



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

MODULE INTERFACING NOTES

-- THE CONSOLE OUTPUTS ARE ACTIVE BALANCED...THERE ARE NO TRANSFORMERS. DO NOT CONNECT ANY CONSOLE OUTPUT TO GROUND AS YOU MIGHT WITH A TRANSFORMER BALANCED OUTPUT. ALTHOUGH INTERNALLY PROTECTED, THE OUTPUT DRIVERS WILL EVENTUALLY FAIL UNDER SHORTED CONDITIONS.

-- NEVER CONNECT A CONSOLE OUTPUT DIRECTLY TO A PHONE LINE THE OUTPUT WILL BE DESTROYED BY PHONE LINE TRANSIENTS. PLEASE USE AN APPROVED TELEPHONE HYBRID OR COUPLER.

-- THE CONSOLE SUPPORTS THREE INDEPENDENT MUTING SYSTEMS, CR MUTE, STUDIO 1 MUTE AND STUDIO 2 MUTE. EACH INPUT MODULE MAY BE SET UP TO ACTIVATE ONE OR MORE OF THESE MUTES VIA DIP SWITCHES (SEE DIP SWITCH SETUP INFO). THE RELAY DRIVER OUTPUTS (-12VDC, 50mA MAX) WILL DRIVE MOST SMALL RELAYS. THE COIL OF THE RELAY CONNECTS BETWEEN THE RELAY DRIVER OUTPUT (CN2-7 FOR EXAMPLE) AND LOGIC GROUND (CN2-4). A BACK EMF DIODE IS RECOMMENDED. TYPICAL APPLICATIONS INCLUDE ACTIVATION OF "ON AIR" LIGHTS, PHONE RINGER MUTE, LOGGING RECORDERS ETC. SEE SECTION 3-16 FOR MORE INFORMATION.

3-10) TCRM1 -- CONTROL ROOM MONITOR MODULE

CONNECTOR ONE (CN1)

1) AUDIO GROUND
2) EXTERNAL MONITOR INPUT #2 RIGHT (-)
3) EXTERNAL MONITOR INPUT #1 LEFT (+)
4) EXTERNAL MONITOR INPUT #2 RIGHT (+)
5) EXTERNAL MONITOR INPUT #2 LEFT (-)
6) EXTERNAL MONITOR INPUT #1 RIGHT (-)
7) EXTERNAL MONITOR INPUT #2 LEFT (+)
8) EXTERNAL MONITOR INPUT #1 RIGHT (+)
9) EXTERNAL MONITOR INPUT #1 LEFT (-)

CONNECTOR TWO (CN2)

1) AUDIO GROUND
2) HEADPHONE OUT RIGHT
3) MONITOR OUT RIGHT
4) NC
5) HEADPHONE OUT LEFT
6) EXTERNAL STUDIO MONITOR INPUT LEFT
7) MONO CUE OUTPUT
8) MONITOR OUT LEFT
9) EXTERNAL STUDIO MONITOR INPUT RIGHT

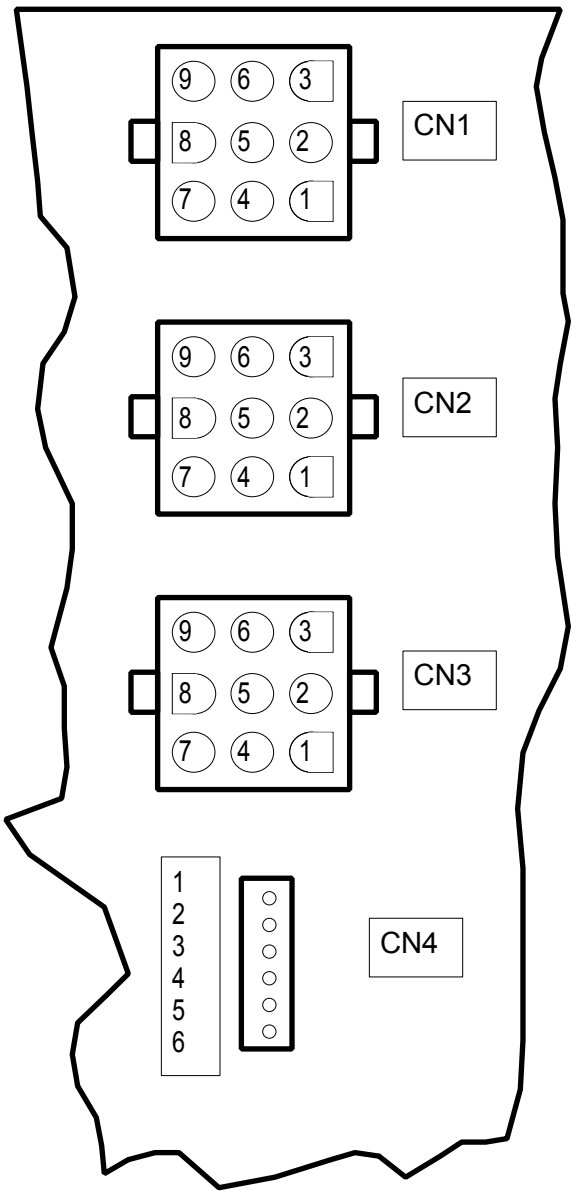
CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) INTERCOM AUDIO IN FROM STUDIO 1
3) STUDIO 2 UNMUTED OUT RIGHT
4) STUDIO 1 MUTED OUT RIGHT
5) INTERCOM AUDIO IN FROM STUDIO 2
6) STUDIO 1 UNMUTED OUT LEFT
7) STUDIO 1 MUTED OUT LEFT
8) STUDIO 2 UNMUTED OUT LEFT
9) STUDIO 1 UNMUTED OUT RIGHT

CONNECTOR FOUR (CN4)

1) CALL LOGIC TO STUDIO 2
2) CALL LOGIC TO STUDIO 1
3) CALL LOGIC FROM STUDIO 2
4) CALL LOGIC FROM STUDIO 1
5) TALKBACK BUS INSERT INPUT
6) AUDIO GROUND

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

MODULE INTERFACING NOTES

-- CN4 IS USED WHEN INTERFACING THE CONSOLE'S TALKBACK/INTERCOM FUNCTIONS TO OTHER 12,000 TURBO SERIES CONSOLES.

-- THE FOLLOWING PAGES DESCRIBE SOME OF THE MANY POSSIBLE TALKBACK AND INTERCOM CONFIGURATIONS.

3-10) TCRM1 -- CONTROL ROOM MONITOR MODULE

MODULE INTERFACING NOTES (CONTINUED)

-- THE TCRM1 AUDIO OUTPUTS ARE UNBALANCED. THEY ARE REFERENCED TO AUDIO GROUND.

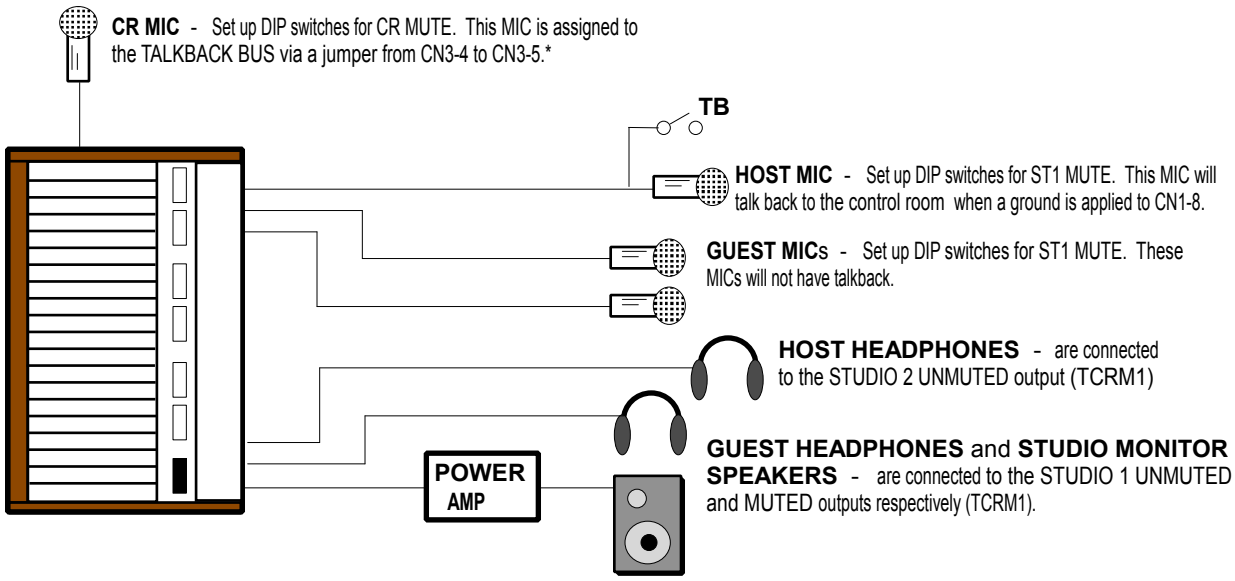
-- THE MONITOR AND CUE OUTPUTS WILL NOT DIRECTLY DRIVE 8½ SPEAKERS. AN EXTERNAL POWER AMPLIFIER MUST BE USED.

-- THE HEADPHONE OUTPUTS WILL DIRECTLY DRIVE HI-Z (³50½) HEADPHONES. AN EXTERNAL HEADPHONE AMPLIFIER MUST BE USEDTO DRIVE LO-Z HEADPHONES.

STUDIO TO STUDIO INTERFACE -- MONITORING AND TALKBACK/INTERCOM SYSTEMS

The TCRM1 CONTROL ROOM MONITOR module provides full communications facilities to accomodate the control room and two studios. The control room, in this scenario, is equipped with a 12,000 TURBO series console. The two studios may or may not be equipped with 12,000 TURBO series consoles. Some basic interface schemes are discussed here. There are many variations.

I) BASIC CONTROL ROOM TO TALK BOOTH INTERFACE -- In many circumstances the 12,000 is in a control room looking into an adjacent talk booth, news room or interview room where a few MICs are set up. There is no console in the booth.



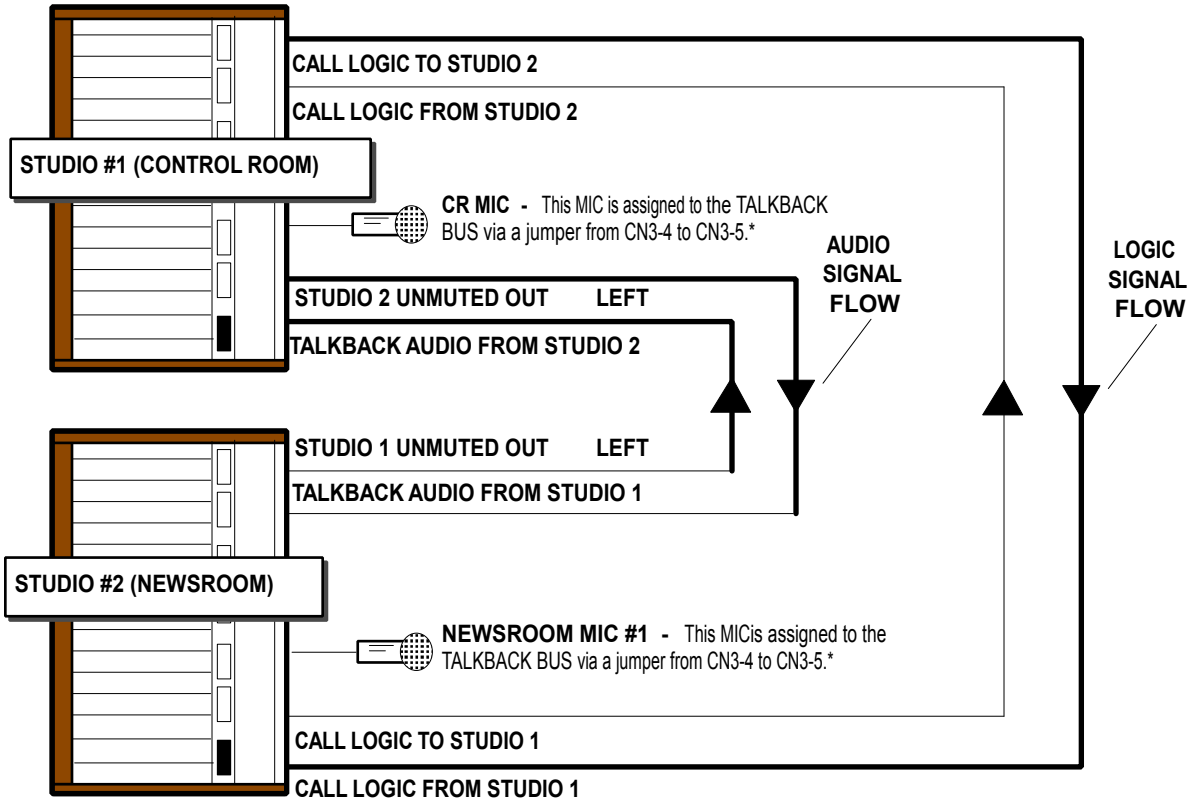
When the console operator presses TALKBACK TO STUDIO MONITOR 1 (on the TCRM1 module) the CR MIC will be heard through the LEFT studio monitor speaker and the LEFT guest headphones. When the console operator presses TALKBACK TO STUDIO MONITOR 2 the CR MIC is heard through the host's LEFT headphone only allowing private conversation from the control room to the host without the guests' listening. In both cases the RIGHT audio through the monitors and headphones is not effected.

*This assumes the CR MIC is connected to either a TPM1-M or TPM2 MIC level input module. If the CR MIC is brought in through a line level module (TPM1 or TPM3) then a jumper must be made from the module's PATCH OUT (CN3-2 or CN3-5) to the TCRM1's TALKBACK BUS INSERT input (CN4-5).

3-10) TCRM1 -- CONTROL ROOM MONITOR MODULE

MONITORING AND TALKBACK/INTERCOM SYSTEMS (continued)

2) CONTROL ROOM TO STUDIO INTERCOM, TWO 12,000'S -- In many circumstances there is one 12,000 Series console in the CONTROL ROOM and another 12,000 in an adjacent NEWSROOM (for example). The TCRM1's intercom features can be used to interface the two rooms.



When the console operator in the Control Room presses TALKBACK 2 (on the TCRM1 module) the CR MIC will feed to STUDIO 2 UNMUTED OUT LEFT. This in turn will feed the Newsroom's RIGHT monitor speaker and headphone by way of the TALKBACK FROM STUDIO 1 input. The TALKBACK 1 button on the Newsroom's TCRM1 will also light, indicating CALL FROM STUDIO 1 (Control Room). When the Newsroom operator presses the TALKBACK 1 button, audio from the main Newsroom MIC will be fed, via the STUDIO 1 UNMUTED LEFT output and the TALKBACK AUDIO FROM STUDIO 2 input, to the Control Room's RIGHT monitor speaker and headphone. The TALKBACK 2 button on the Control Room's TCRM1 will also light, indicating CALL FROM STUDIO 2 (Newsroom). If AUTOCUE has been defeated then TALKBACK will appear on the MONO CUE OUTPUT, mixed with any CUE audio which may be present. Monitor and CUE speakers will still mute whenever there is an open MIC.

These examples demonstrate two of the many different ways to utilize the 12,000's extensive remote control, monitoring, talkback and intercom capabilities. With a bit of ingenuity, an effective system can be created for most any circumstance.

*This assumes the CR MIC is connected to either a TPM1-M or TPM2 MIC level input module. If the CR MIC is brought in through a line level module (TPM1 or TPM3) then a jumper must be made from the module's PATCH OUT (CN3-2 or CN3-5) to the TCRM1's TALKBACK BUS INSERT input (CN4-5).

NOTE Jumpers J3 and J4 must be cut on both 12,000's TCRM1 modules to make the intercom work properly.

3-11) TRS1 -- 1x5 STEREO REMOTE SELECTOR SWITCH

CONNECTOR ONE (CN1)

1) SWITCH #3 LEFT (+)
2) SWITCH #2 LEFT (-)
3) SWITCH #1 RIGHT (-)
4) SWITCH #2 RIGHT (+)
5) SWITCH #2 LEFT (+)
6) SWITCH #1 LEFT (-)
7) SWITCH #2 RIGHT (-)
8) SWITCH #1 RIGHT (+)
9) SWITCH #1 LEFT (+)

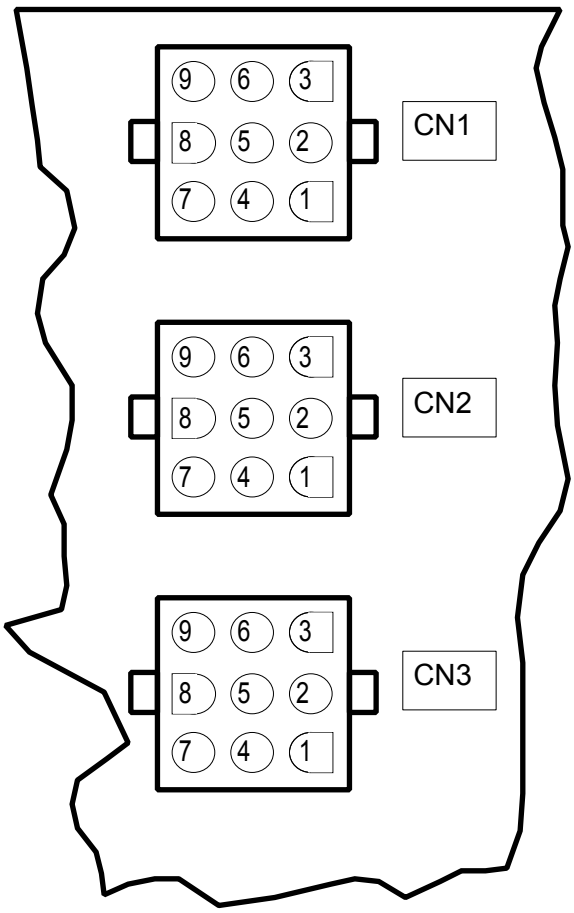
CONNECTOR TWO (CN2)

1) SWITCH #5 LEFT (-)
2) SWITCH #4 RIGHT (-)
3) SWITCH #3 RIGHT (+)
4) SWITCH #5 LEFT (+)
5) SWITCH #4 LEFT (-)
6) SWITCH #3 RIGHT (-)
7) SWITCH #4 RIGHT (+)
8) SWITCH #4 LEFT (+)
9) SWITCH #3 LEFT (-)

CONNECTOR THREE (CN3)

1) NC
2) OUTPUT LEFT (-)
3) NC
4) OUTPUT RIGHT (-)
5) OUTPUT LEFT (+)
6) SWITCH #5 RIGHT (-)
7) OUTPUT RIGHT (+)
8) SWITCH #5 RIGHT (+)
9) NC

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

MODULE INTERFACING NOTES

-- THE SWITCH IS A 4P5T CONFIGURATION WHICH HANDLES FIVE STEREO BALANCED SIGNALS.

-- TYPICAL APPLICATIONS INCLUDE INPUT MODULE PRE-SELECTOR AND EXTERNAL MONITOR INPUT EXPANDER.

-- THE SWITCH IS BI-DIRECTIONAL THEREFORE IT CAN BE USED ON AN OUTPUT AS WELL AS ON AN INPUT.

-- THE BOTTOM MOST POSITION IS “OFF”.

3-12) TDA1 -- 1x4 STEREO DISTRIBUTION AMPLIFIER MODULE - CONNECTOR ONE (CN1)

CONNECTOR ONE (CN1)

1) AUDIO GROUND
2) CH 2 OUT LEFT (+)
3) CH 1 OUT RIGHT (-)
4) CH 2 OUT RIGHT (+)
5) CH 2 OUT LEFT (-)
6) CH 1 OUT LEFT (+)
7) CH 2 OUT RIGHT (-)
8) CH 1 OUT RIGHT (+)
9) CH 1 OUT LEFT (-)

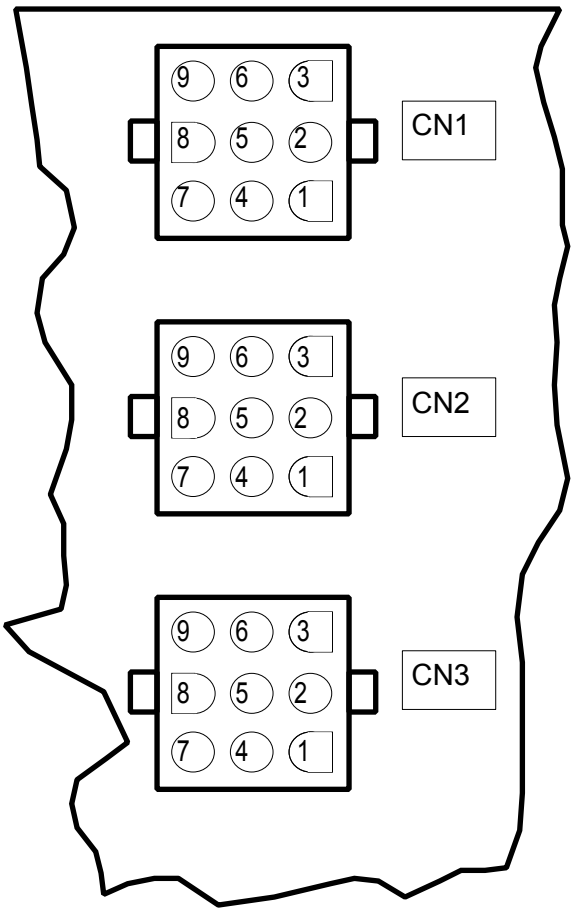
CONNECTOR TWO (CN2)

1) AUDIO GROUND
2) INPUT RIGHT (-)
3) NC
4) INPUT LEFT (+)
5) INPUT RIGHT (+)
6) NC
7) INPUT LEFT (-)
8) NC
9) NC

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) CH 4 OUT LEFT (-)
3) CH 3 OUT RIGHT (+)
4) CH 4 OUT RIGHT (-)
5) CHL 4 OUT LEFT (+)
6) CH 3 OUT LEFT (-)
7) CH 4 OUT RIGHT (+)
8) CH 3 OUT RIGHT (-)
9) CH 3 OUT LEFT (+)

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

MODULE INTERFACING NOTES

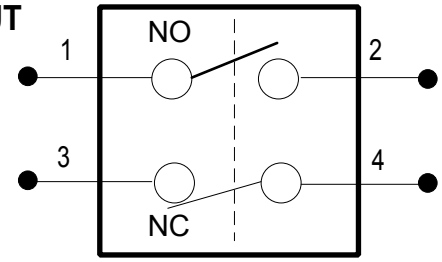
-- THE DA OUTPUTS ARE ACTIVE BALANCED...THERE ARE NO TRANSFORMERS. DO NOT CONNECT ANY CONSOLE OUTPUT TO GROUND AS YOU MIGHT WITH A TRANSFORMER BALANCED OUTPUT. ALTHOUGH INTERNALLY PROTECTED, THE OUTPUT DRIVERS WILL EVENTUALLY FAIL UNDER SHORTED CONDITIONS.

-- NEVER CONNECT A CONSOLE OUTPUT DIRECTLY TO A PHONE LINE . THE OUTPUT WILL BE DESTROYED BY PHONE LINE TRANSIENTS. PLEASE USE AN APPROVED TELEPHONE HYBRID OR COUPLER.

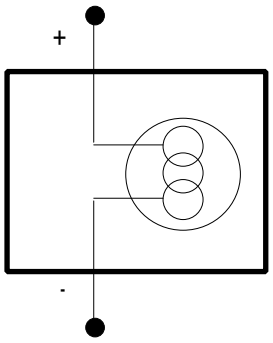
3-13) TRR1 -- MACHINE CONTROL MODULE

The TRR1 Machine Control module utilizes ten double pole, single throw momentary switches. Each switch has a built in lamp for tally indication.

SWITCH PINOUT



LAMP PINOUT



NOTES

1) The switch contacts are rated at 1A @125 VAC. Maximum lamp voltage 28V.
2) Each switch is equipped with a Microlamp ML-73 incandescent lamp. The lamp is a T1 3/4 wedge base. The lamp is rated at 14V @ 80mA. Other voltages are available from local suppliers.

3-14) TGEM-VID -- 6 POSITIN BINARY SELECT SWITCH

CONNECTOR ONE (CN1)

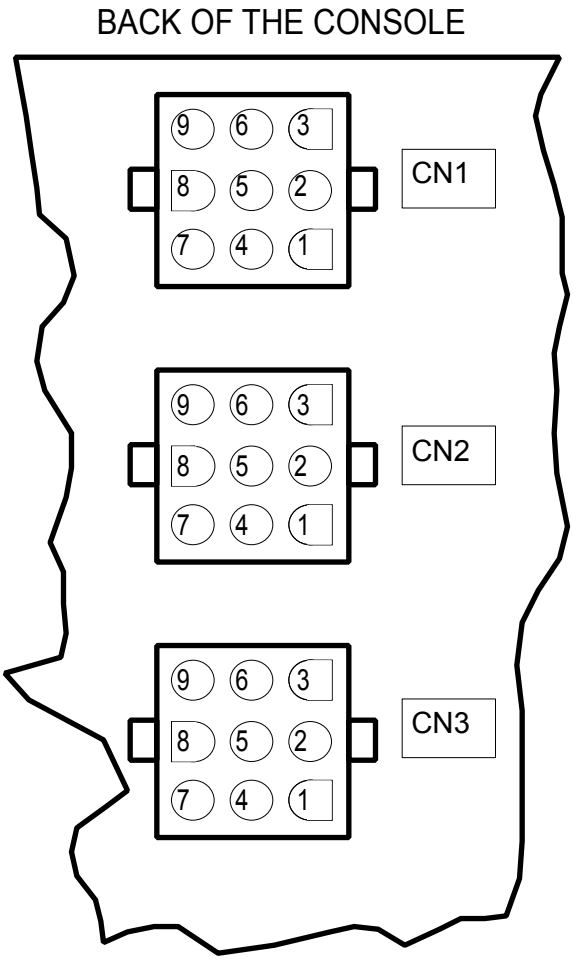
1)
2)
3)
4)
5)
6)
7)
8)
9)

CONNECTOR TWO (CN2)

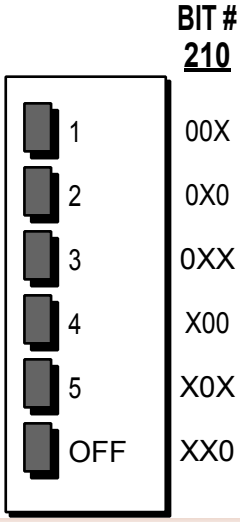
1)
2) COMMON
3)
4)
5)
6) BIT 1
7)
8) BIT 2
9) BIT 3

CONNECTOR THREE (CN3)

1)
2)
3)
4)
5)
6)
7)
8)
9)



IMPORTANT :Pins not defined may beconnected internally. Do not connect.



Function

The TGEM-VID Binary Select Switch allows selection between six binary encoded functions using only four wires.

The module was designed to interface to the Arrakis VGEM-6AF video routing switcher, however may be used for any three bit binary controlled equipment in a similar manner to a BCD thumbwheel switch.

3-15) TPH1 -- PHONE SYSTEM MODULE

CONNECTOR ONE (CN1)

1) AUDITION MIX-MINUS AUDIO INPUT (+)
2) PROGRAM MIX-MINUS AUDIO INPUT (-)
3) CUE SWITCH'S LOGIC INPUT
4) INPUT FROM HYBRID'S CALLER OUT (-) (NC)
5) PROGRAM MIX-MINUS AUDIO INPUT (+)
6) ANNOUNCER MIC LINE LEVEL INUPT (-)
7) PGM SWITCH'S LOGIC INPUT
8) INPUT FROM HYBRID'S CALLER OUT(+)
9) ANNOUNCER MIC LINELEVEL I NPUT (+)

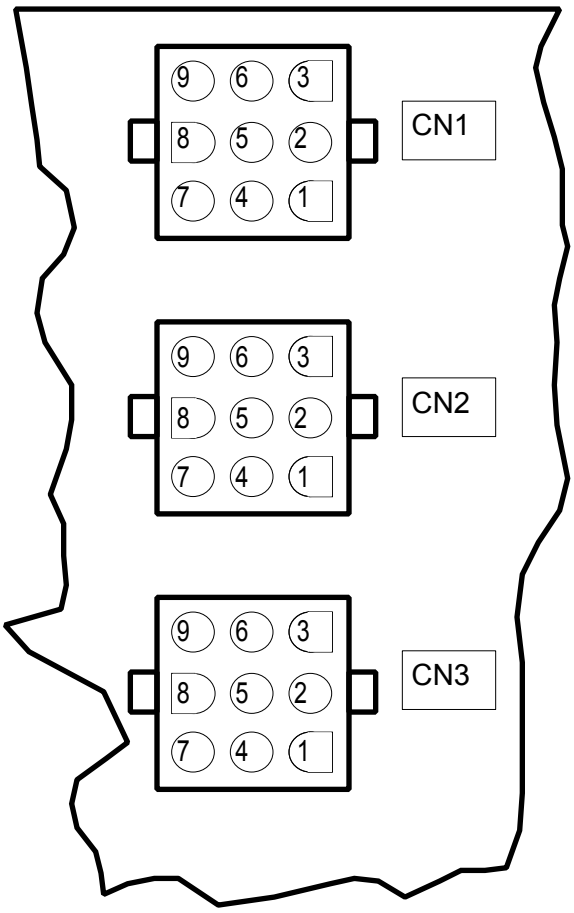
CONNECTOR TWO (CN2)

1) AUX 2 AUDIO INPUT (-)
2) AUX 1 SWITCH'S LOGIC INPUT
3) NC
4) AUX 2 AUDIO INPUT (+)
5) AUX 1 AUDIO INPUT (-)
6) AUD SWITCH'S LOGIC INPUT
7) NC
8) AUX 1 AUDIO INPUT (+)
9) AUDITION MIX-MINUS AUDIO INPUT (-)

CONNECTOR THREE (CN3)

1) AUDIO GROUND
2) OUTPUT TO HYBRID'S PHONE SEND INPUT (-)
3) NC
4) SWITCHED LOGIC OUTPUT
5) OUTPUT TO HYBRID'S PHONE SEND INPUT (+)
6) AUX 2 SWITCH'S LOGIC INPUT
7) CONSOLE CUE BUS AUDIO INSERT, UNSWITCHED
8) NC
9) NC

BACK OF THE CONSOLE



NOTE - ALL CONSOLE INPUT/OUTPUT CONNECTORS ARE LOCATED UNDER THE METER PANEL AT THE REAR OF THE CONSOLE

MODULE INTERFACING NOTES

-- CONNECT THE TCRM1 MONNITOR MODULE'S MIX (-) OUTPUTS TO THIS MODULE'S MIX (-) INPUTS.
-- CONNECT THE ANNOUNCER MIC INPUT MODULE'S PATCH OUTPUT TO THIS MODULE'S INPUT.
-- CONNECT THE hYBRID'S COLLER OUTPUT TO BOTH THIS MODULE AND AN INPUT MODULE DESIGNATED FOR THE PHONE.
-- CONNECT THIS MODULE'S OUTPUT TO THE HYBRID'S PHONE SEND INPUT.
-- THE SWITCHED LOGIC CURRENT MUST NOT EXCEED 50mA, AND MAY BE USED FOR ANY PURPOSE
-- CALLER'S LEVEL TO THE CONSOLE'S CUE BUS IS ADJUSTABLE VIA TRIMPOT ON THIS BOARD

3-16) MUTING SYSTEMS

3-16a) GENERAL MUTING SYSTEM DESCRIPTION

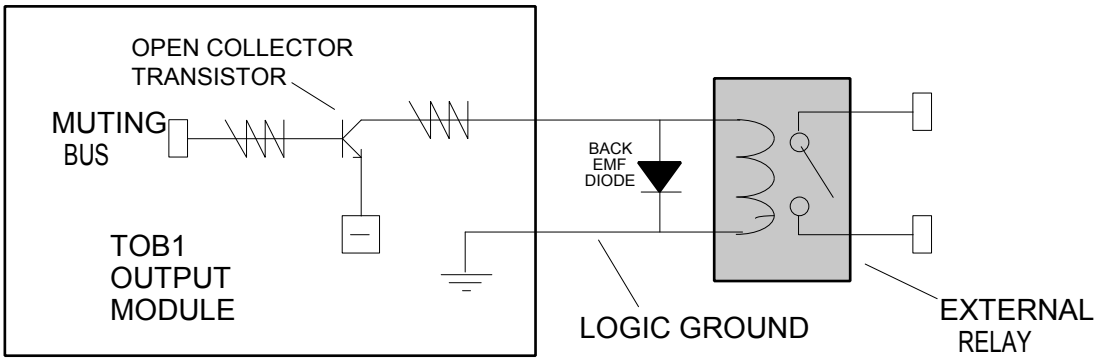
The 12,000 Series mainframe is equipped with three independant muting systems. These are: a) CR MUTE (Control Room), b) STUDIO 1 MUTE and c) STUDIO 2 MUTE. Each input module features DIP switches that determine which muting system, if any, is activated by that channel. The input module can be set up to mute on either the A input, the B input or both A and B. Refer to the DIP switch setup information found on the particular module's Major Parts Layout page in Section 4. When the CR MUTE logic is activated from an input module, the Control Room Monitor and Cue system outputs will mute and the CR MUTE RELAY DRIVER output (on the TOB1 module) will activate. Likewise, STUDIO 1 MUTE logic will inturrupt the monitor module's STUDIO 1 MUTED outputs and activate the STUDIO 1 MUTE RELAY DRIVER. The STUDIO 2 muting system activates only the STUDIO 2 MUTE RELAY DRIVER. There is no STUDIO 2 MUTED outputs on the TCRM1 Control Room Monitor module.

3-16b) EXTERNAL MUTE RELAY DRIVERS

The 12,000 Series console's three muting systems are brought out to three Open Collector EXTERNAL MUTE RELAY DRIVERS. These outputs will drive small relays directly to activate "ON AIR" lights, logging recorders, phone ringer mute, extra muted outputs etc. The drivers are located on the TOB1 output module (see Section 3-9).

The RELAY DRIVER OUTPUT voltages are:

MUTED: -12 VDC (APROX.)
UNMUTED: FLOATING



NOTES

1) 50 mA MAX CURRENT SINK - Do not use relays which require more than 50mA coil current. If a larger relay is needed simply drive the larger (>50mA) relay with a smaller (<50mA) relay.
2) Use LOGIC GROUND from the TOB1 Output module to reference the relay coil.
3) A back EMF diode is recommended.

3-17) MONITOR, HEADPHONE & CUE SYSTEMS

3-17a) MONITOR SYSTEM

The 12,000 Series Console features a comprehensive monitoring system which supports the Control Room and two studios. All monitor outputs are UNBALANCED LINE LEVEL with a nominal output level (trimpot adjustable) of +4dBu. THESE OUTPUTS WILL NOT DRIVE 8 ohm SPEAKERS DIRECTLY therefore an external power amplifier must be used.

The Studio Monitor outputs (muted and unmuted) can be utilized in a number of ways (see the TCRM1 Module Interfacing notes for some examples). The console operator can talk back into the Studio Monitor speakers by pressing one of the TALKBACK buttons on the TCRM1 Control Room Monitor module and speaking into the Control Room MIC (TALKBACK from Control Room TO a studio). The talkback audio will appear on the LEFT studio monitor outputs. Note that the Control Room MIC input module must be set up to feed the TALKBACK BUS via the module's TALKBACK BUS ASSIGN connector pin.

3-17b) HEADPHONE SYSTEM

The Headphone outputs are also UNBALANCED LINE LEVEL with a nominal output level (trimpot adjustable) of +4dBu. The Headphone outputs will directly drive HI-Z (³ 50ohm) headphones but will not drive LO-Z (8ohm) headphones. Use an external headphone amplifier to drive LO-Z headphones.

The UNMUTED Studio Monitor outputs are often wired to headphone jacks instead of monitor speakers.

3-17b) CUE/AUTOCUE SYSTEMS

The 12,000 Series Console features AUTOCUE INTO MONITOR AND HEADPHONES Whenever an input module is placed into CUE the AUTOCUE feature is activated.
AUTOCUE will:
a) DIM the Control Room Monitor and Headphones
b) feed CUE audio into the Control Room Monitor and Headphones.
The normal program audio will DIM (or DUCK) to a preset level during CUE. This level is adjustable, via trimpots on the TCRM1 Monitor module, for a DIM attenuation up to 20dB. DIM attenuation is factory preset to -12dB. CUE audio is automatically mixed over the DIM'd program audio. This is a stereo cue.

AUTOCUE is also activated during TALKBACK from a studio TO the Control Room. When the CUE/TALKBACK logic pin on a TPM1-M or TPM2 MIC module is activated then the Control Room Monitor and Headphones will DIM and the TALKBACK voice audio will automatically be mixed in.

The MONO CUE OUTPUT is a MONO UNBALANCED LINE LEVEL signal with a NON-ADJUSTABLE nominal output level of 0dBu. MONO CUE volume adjust must be done external to the console. This output will not drive an 8½ speaker directly. Use a power amplifier. This output can be used if the AUTOCUE feature is defeated.

3-17b) AUTOCUE DEFEAT

The AUTOCUE feature can be defeated. See AUTOCUE DEFEAT PROCEDURE on the TCRM1 Monitor module Major Parts Layout (section 4-8b).

3-18) CALIBRATION

3-18a) GENERAL CALIBRATION

-- The console has gain adjustment trim pots on each Input module, the Output module and the module.
-- Line level input modules have trim pots which independently adjust left and right channels. There is approximately 20dB of trim available allowing the module to accomodate input signal levels ranging from - 10dBu (consumer) to +8dBu (professional).*
-- MIC level input modules have approximately 40dB of trim and can accomodate MIC level signals from - 70dBu to -30dBu.
-- The output module 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 Monitor module has six trim pots which set the Control Room Monitor, Headphone and DIM levels.

3-18b) FACTORY PRESET LEVELS

The console is factory pre-calibrated for +4dBu IN = +4dBu OUT = 0VU. Therefore, when a +4dBubalanced 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 output. MIC inputs are factory calibrated for -55dBu IN = +4dBu OUT = 0VU.

3-18c) ADJUST FOR YOUR STATION LEVEL

If your station operating level is somthing 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 THEVU METER DRIVER TRIMPOTS NEED BE ADJUSTED. See TOB1 Output module Major Parts Layout (section 4-8b) for trim pot locations. The trim pots are very easily bumped out of calibration so take care to not touch the wrong ones.

ADJUST FOR YOUR STATION LEVEL: RECALIBRATION PROCEDURE

a) Generate a test tone and feed this tone BALANCED into an input module. 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 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 your chosen station operating level.
c) adjust the fader at the thick black line
d) set the module's VU METER DRIVER trim pots such that the meters read 0VU. The VU METER SELECT SWITCH (located on the left side of the VU meter bridge) should be in the top position.
The outputs of the console will now be at your station operating level when the VU meters read "0VU". 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 TO TMF-8 USERS: Even though the TMF-8 does not have AUD and UTL meters, those drivers must still be calibrated. The VU meter drivers also feed the monitor, so if the AUD and UTL VU meter drivers are turned down, the monitor system will not function properly.

VU METER RECALIBRATION PROCEDURE (continued, for TMF-8 consoles)

e) after setting the PGM VU meters to "0VU", press the bottom position on the VU SELECT SWITCH.
f) select PGM on the MONITOR SELECT switch (TCRM1 Monitor module). The meters will now read a little low. Compensate by moving the input module fader up until the meters again read "0VU".
g) select AUD on the MONITOR SELECT switch. Adjust the AUD VU METER trim pots for "0VU".
h) select UTL on the MONITOR SELECT switch. Adjust the UTL VU METER trim pots for "0VU".

NOTE: 0dBu = 0.775 VRMS with no load. dBu is compatible with all active-balanced equipment (low Zout, high Zin). If 600½ transformer balanced equipment is used, these calibration levels may change.

WARNING: Some voltmeters are optimized for 60 cycles and will not be accurate at midband audio

3-18) CALIBRATION (continued)

3-18d) OVERALL RECALIBRATION PROCEDURE

INTERNAL BUS LEVEL -- The key to calibration of the 12,000 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 module (TOB1) can be calibrated then the input modules.

TO RECALIBRATE THE ENTIRE CONSOLE, FOLLOW THIS PROCEDURE:

STEP 1 -- CALIBRATE 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.

0dBu = .775VRMS = 2.2V peak to peak
+4dBu = 1.23VRMS = 3.5Vpp
+8dBu = 1.95VRMS = 5.5Vpp

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 600ohm load on the output unless the output of the console is to be wired to a 600½ 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 TOB1 Output module. See TOB1 Major Parts Layout (section 4-8b) for trim pot locations.
e) Repeat steps b) and c) for PGM R, PGM MONO (SYSTEM 18 ONLY), AUD L and AUD R
f) After confirming that the VU METER SELECT switch on the meter bridge is in the TOP position, repeat steps b) and c) for UTL L and UTL R.

NOTE TO TMF-8 USERS: Refer to " NOTE TO TMF-8 USERS" on the previous page. follow those steps d) - g) to finish VU meter calibration.

STEP 2 -- SET INTERNAL BUS LEVEL

The Internal Bus Level is identical to the levels found at the input module's DIRECT OUT outputs. The optimum bus level is -2dBu.

a) Connect your voltmeter, dB meter or scope between the input module's LEFT DIRECT OUT and AUDIO GROUND. This is an unbalanced measurement. There should be no additional load on this output.
b) Adjust the input module'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 RIGHT DIRECT OUT output. Adjust the RIGHT input module trim pot until RIGHT DIRECT OUT 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 module calibration.

3-18) CALIBRATION (continued)

3-18d) OVERALL RECALIBRATION PROCEDURE (continued)

STEP 3 -- CALIBRATE OUTPUT MODULE

With the bus levels held at -2dBu, the TOB1 Output module can be calibrated. Only the CONSOLE OUTPUT trim pots need adjustment. The VU METER DRIVER trim pots have already been done.

a) Adjust the CONSOLE OUTPUT trim pots (see section 4-7b, TOB1 Major Parts Layout for trim pot locations) until all VU meters read "0VU". DO NOT TOUCH THE VU METER DRIVER TRIM POTS!! ONLY THE CONSOLE OUTPUT TRIM POTS.

b) Carefully replace the TOB1 faceplate to protect the trim pots from unintentional changes. TMF-8 CONSOLES: Use the Meter Bridge's VU METER SELECT SWITCH and the TCRM1's Input Select switch to complete calibration as previously described in VU Meter calibration section.

STEP 4 -- 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.

c) Set the module's fader at the thick black line

d) Adjust the input module trim pots such that the meters read 0VU. This can usually be done by removing the module to the right of the module to be calibrated leaving a space to access the trim pots. The module can also be placed on the extender cables supplied with the console to provide access to the trim pots.

e) Go on to the next input module.

f) 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 12,000 Series console to consumer level (-10dB) equipment, simply increase the gain on that particular input module until the console'sVU meters read "0VU".

STEP 5 -- CALIBRATE MONITOR MODULE

The TCRM1 Monitor module, in most cases, should not require recalibration. If necessary:

a) Place the TCRM1 Monitor module on extender cables (optional) or remove the module's faceplate.

b) Feed a test signal into the console such that the VU meters read "0VU".

c) Turn the MONITOR and HEADPHONES volume pots up full.

d) Make sure that no modules are in CUE. Any module in CUE will activate the DIM feature resulting in an inaccurate calibration.

e) Adjust the MONITOR and HEADPHONE TRIM pots until all the outputs read the same. The actual level is not as important as the balance between left and right signals. See the TCRM1 Major Parts Layout page (section 4-8b) for the location of the trim pots. The pots can be accessed by reaching behind the cabling with a small screwdriver. As previously mentioned, the module's faceplate may be removed to ease trimpot access. Skip steps f) and g) if the AUTOCUE feature on the TCRM1 module has been defeated.

f) Place an unused input module into CUE. This module should NOT have any signal fed to it. The monitor and headphone outputs should DIM.

g) Adjust the right and left DIM levels by turning the DIM trim pots.

Calibration is now complete!

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

3-1) CALIBRATION (continued)

3-18e) TDA1 DISTRIBUTION AMPLIFIER MODULE CALIBRATION

The TDA1 Distribution Amplifier module is normally calibrated for UNITY GAIN. That is, the level of the signal coming out is the same as the level of the signal going in.

CALIBRATION PROCEDURE

1) Feed a signal BALANCED into the LEFT DA input
2) Measure the BALANCED output level from CH 1 LEFT.
3) Adjust the appropriate trim pot (see TDA1 Major Parts Layout, section 4) until the level OUT is the same as the level IN.
4) Repeat for channels 2, 3 and 4.
5) Repeat for RIGHT input.
6) Immediately replace the blank cover panel to protect the trim pots from being bumped. It is very easy to throw the module out of calibration by inadvertently bumping a trim pot.

3-18f) TPH1 -- PHONE SYSTEM MODULE CALIBRATION

A trimpot on the module allows adjustment of the level of the phone hybrid in the console's CUE system.

SECTION FOUR

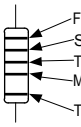
ELECTRONIC DESCRIPTION

4-0) RESISTOR COLOR CODE & IC PINOUTS

RESISTOR

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

COLOR CODE:



FIRST VALUE BAND
SECOND VALUE BAND
THIRD VALUE BAND
MULTIPLIER
TOLERANCE (BROWN = 1%)

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

CAPACITOR

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

ALL CAPS ARE RATED 16VDC OR GREATER

DIODE

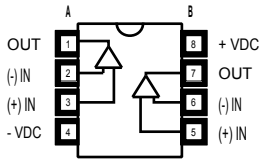
ALL DIODES, EXCEPT LEDs, ARE 1N914

OP AMP

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

MANUFACTURED BY
PHILLIPS OR NATIONAL

NE5532N

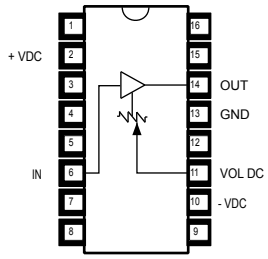


VCA

SSM2018T VOLTAGE
CONTROLLED AMP.

MANUFACTURED BY
ANALOG DEVICES

SSM2018TP

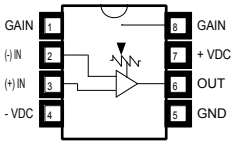


MIC PRE

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

MANUFACTURED BY
ANALOG DEVICES

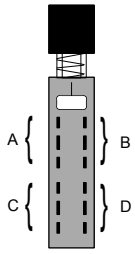
SSM2017P

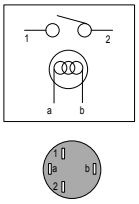


SWITCHES

SELECT SWITCHES 4PDT
MANUFACTURED
BY ITT CANNON

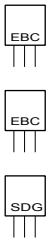
ON/OFF SWITCHES ARE SPST
MANUFACTURED
BY EAO OLTEN





TRANSISTORS

2N3904 NPN
2N3906 PNP
J111 JFET



DC POWER DISTRIBUTION

POWER BUS
VDC TO IC
.1µF BYPASS
= AUDIO GROUND
= LOGIC GROUND
= AUDIO POWER
= LOGIC POWER

LAMP

THE ON/OFF LAMPS
ARE ML-386, A T1 3/4 MIDGET
GROOVED LAMP (14V, 80mA)

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

DPST RELAY

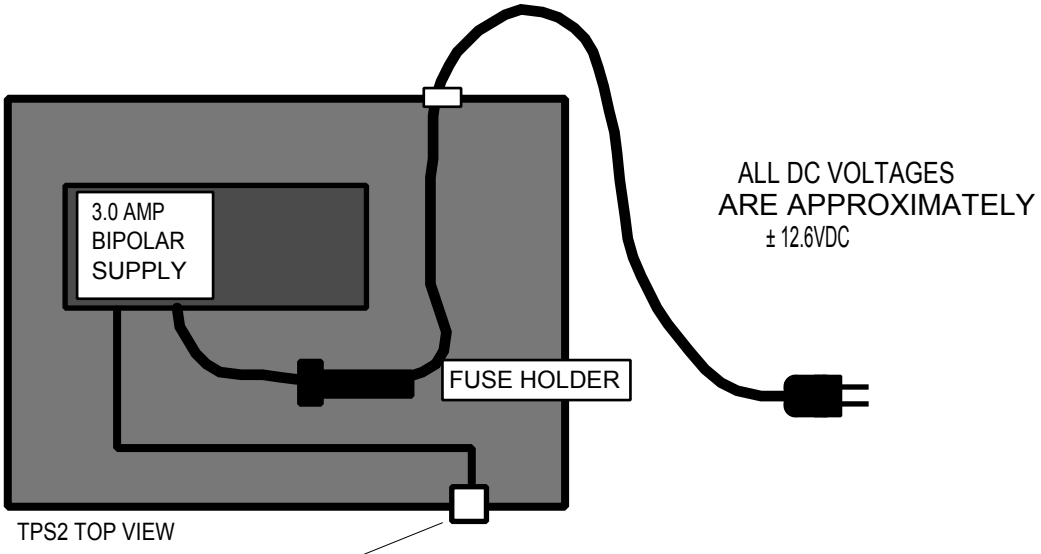
DPST RELAYS MRB 2A12
MANUFACTURED BY CLARE

NOTE: MODULE REMOVAL & REPLACEMENT ANY
MODULE CAN BE FULLY REMOVED OR INSERTED WHILE
THE CONSOLE IS "HOT" (POWERED UP). THIS WILL NOT
CAUSE ANY HARM TO THE CONSOLE ELECTRONICS

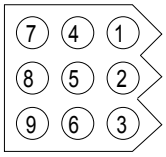
4-1) POWER SUPPLY DESCRIPTION

4-1a) TPS2 POWER SUPPLY -- GENERAL DESCRIPTION

The TPS2 power supply, used with 8 and 18 channel mainframes, contains one 3 Amp bipolar open frame power supply (as illustrated below). The TPS2-28 (used with 28 channel mainframes) contains two supplies, one 1.5 Amp supply (powers audio circuits) and one 3.0 Amp supply (powers logic circuits).



DC POWER CONNECTOR



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

4-1b) FUSES

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!!!

Grounding is accomplished by plugging the power supply into a grounded three prong AC outlet. The power supply's electronic ground is totally 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 the power supply cabinet MUST be grounded through other means. Failure to do so will result in a serious safety hazard.

4-1) POWER SUPPLY DESCRIPTION

4-1d) OPEN FRAME POWER SUPPLIES

The 12,000 series console uses two independent power supplies to provide DC power to the audio and logic circuitry. All power supplies are bipolar (positive and negative DC) "International Series" open frame supplies built for Arrakis by Power One Inc. Each supply is adjustable from roughly 10-17 VDC. Protection is provided in the form of current limiting-foldback. Load regulation is ± .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 300VDC output to chassis.

110VAC to 220VAC Conversion

The power supplies can be operated on a variety of AC line voltages. The supplies are set up for 120VAC operation as shipped from the factory unless otherwise requested. The supplies 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 open frame supplies.

JUMPER CONNECTIONS FOR VARIOUS AC SUPPLY VOLTAGES

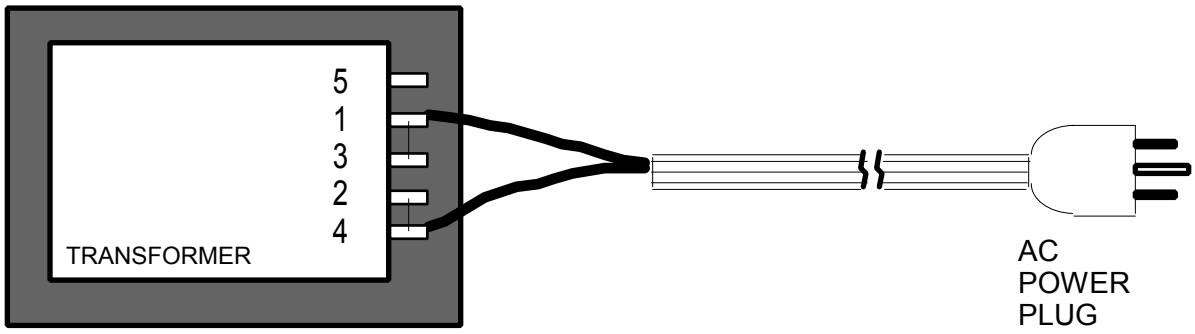
AC line input voltage conversion requires reconfiguration of the power supply's AC transformer:

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

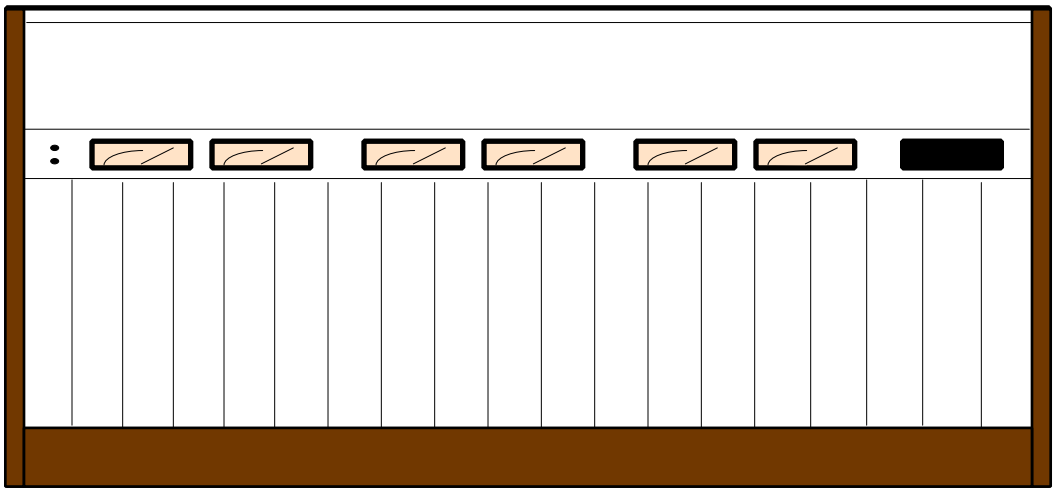
FOR 230VAC OPERATION -- APPLY AC TO PINS 1 AND 4
Jumper pin 2 to pin 3



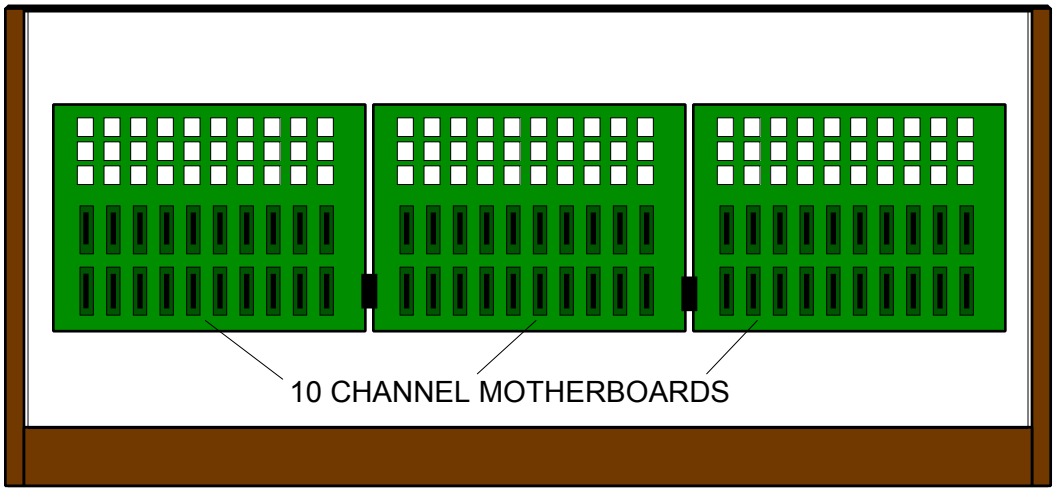
EXAMPLE- Transformer shown above set up for 120VAC operation

4-2) MAINFRAME DESCRIPTION

4-2a) MOTHERBOARD LOCATION

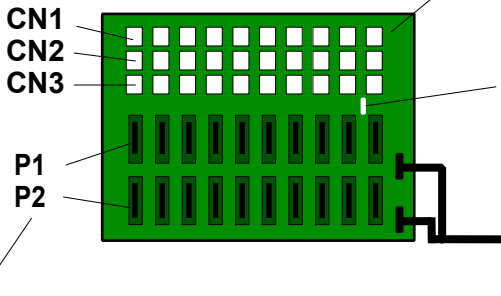


The mainframe contains one or more 10 channel motherboards. The motherboards are fixed into place on the mainframe with a series of nuts and washers. All audio and logic signal buses are located on the bottom side of the motherboards.



4-2) MAINFRAME DESCRIPTION

4-2b) MOTHERBOARD DESCRIPTION



INPUT/OUTPUT CONNECTORS
These nine pin connectors (made by AMP) are labled CN1, CN2 and CN3 on the module input/output connector diagrams.

INTERCOM CONNECTOR
This six pin connecto (made by MOLEX) is utilized by the TCRM1, when it is in this second from the last slot, for talkback/intercom.

DC POWER CONNECTIONS
(+) AUDIO ---------- RED WIRE
(-) AUDIO ---------- WHITE WIRE
(-) AUDIO ---------- WHITE WIRE
(-) LOGIC ---------- BLUE WIRE
LOGIC GROUND - GREEN WIRE
(+) LOGIC ---------- ORANGE WIRE

CARD EDGE CONNECTORS
These 50 pin gold plated connectors provide contacts for all input/output audio, logic, and power bus connections to and from, the modules. P1 interconnects the modules with CN1,CN2 and CN3. P2 is the bus connector for audio, logic and power.

MOTHERBOARD INTERCONNECT
is accomplished via 50 pin headers. Provides interconnect for all audio, logic and power buses. Also routes signal up to the meter bridge.

CONNECTOR P1

1)	9	CN1	2)	NC
3)	6		4)	NC
5)	3		6)	NC
7)	8		8)	NC
9)	5		10)	NC
11)	2		12)	NC
13)	7		14)	NC
15)	4		16)	NC
17)	1		18)	NC
19)	9	CN2	20)	NC
21)	6		22)	NC
23)	3		24)	NC
25)	8		26)	NC
27)	5		28)	NC
29)	2		30)	NC
31)	7		32)	NC
33)	4		34)	NC
35)	1		36)	NC
37)	6	CN3	38)	9
39)	8		40)	3
41)	2		42)	5
43)	4		44)	7
45)	NC		46)	1
47)	NC		48)	NC
49)	NC		50)	NC

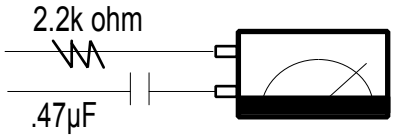
CONNECTOR P2

1)	PROGRAM LEFT	AUDIO BUSES	2)	AUDIO GROUND	
3)	PROGRAM RIGHT		4)	AUDIO GROUND	
5)	AUD MIX-MINUS		6)	AUDIO GROUND	
7)	PGM MIX-MINUS		8)	AUDIO GROUND	
9)	AUDITION LEFT		10)	AUDIO VDC (-)	
11)	AUDITION RIGHT		12)	AUDIO VDC (-)	AUDIO POWER
13)	UTILITY LEFT		14)	AUDIO VDC (+)	
15)	UTILITY RIGHT		16)	AUDIO VDC (+)	
17)	TALKBACK BUS		18)	LOGIC VDC (+)	LOGIC POWER
19)	NC		20)	LOGIC VDC (-)	
21)	CUE RIGHT		22)	LOGIC GROUND	
23)	CUE LEFT		24)	LOGIC GROUND	
25)	AUTOCUE LOGIC		26)	NC	LOGIC BUSES
27)	TIMER RESET BUS		28)	RESET TO TIMER	
29)	STUDIO 2 MUTE		30)	TIMER HOLD	
31)	STUDIO 1 MUTE		32)	CR MUTE	
33)	NC		34)	NC	VU DRIVE/ MONITOR BUSES
35)	NC		36)	NC	
37)	NC		38)	NC	
39)	NC		40)	NC	
41)	MONITOR VU LEFT		42)	MONITOR VU RIGHT	
43)	AUDITION VU MONO		44)	PROGRAM VU MONO	
45)	PROGRAM VU LFT		46)	PROGRAM VU RIGHT	
47)	AUDITION VU LEFT		48)	AUDITION VU RIGHT	
49)	UTILITY VU LEFT		50)	UTILITY VU RIGHT	

4-2) MAINFRAME DESCRIPTION (continued)

4-2c) ANALOG VU METER DESCRIPTION & WIRING

VU METERS - Each Selco AL-29/39R meter has a series capacitor (.47µF) an a series resistor (2.2k ohm) in each spade lug attached to the meter.



4-2d) VU METER LAMPS (ANALOG METERS, DELUXE MAINFRAMES)

Replacement VU meter lamps are available from Arrakis Systems Customer Service department. The lamps are also available from Selco/SIAFAM (800-229-2332). The SELCO part number is 19-29-39/12V. The lamps are rated for 100mA at 12VDC. upon the National Semiconductor LM3916N IC.

4-2f) VU METER WIRING HARNESS

The VU meter wiring harness extends to the motherboards' power and VU meter busses via the 50 pin ribbon cable connector attached to the motherboard on the right side of the console.

4-2g) TIMER DESCRIPTION

The 12,000 Series Console's 10 minute up timer uses the Arrakis timer PC board. The board has connections for power and logic lines. The board is based upon the Harris ICM7217CIPI and ICM7213IPD ICs.

4-2g) TIMER WIRING HARNESS

The timer's wiring harness extends to the motherboards' power and timer logic busses via the 50 pin ribbon cable connector attached to the motherboard on the right side of the console.

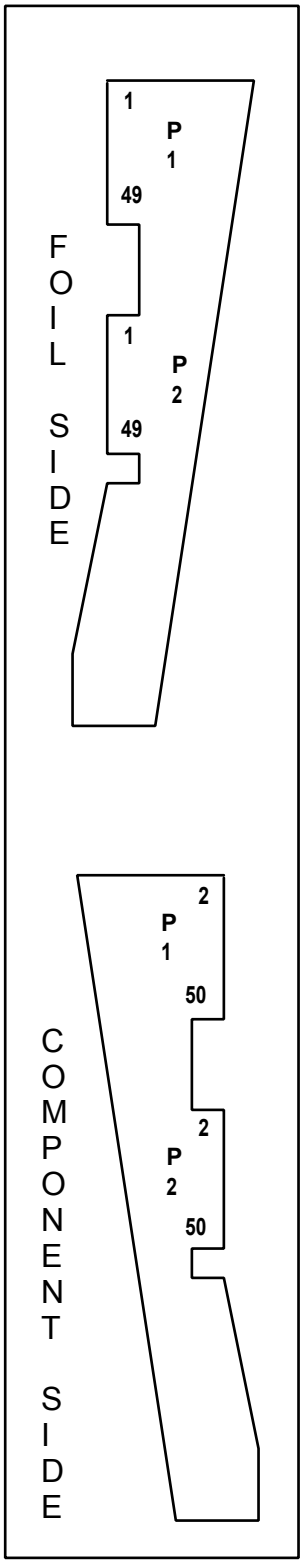
4-3a) TPM1 -- INPUT MODULE CARD EDGE CONNECTOR DIAGRAM

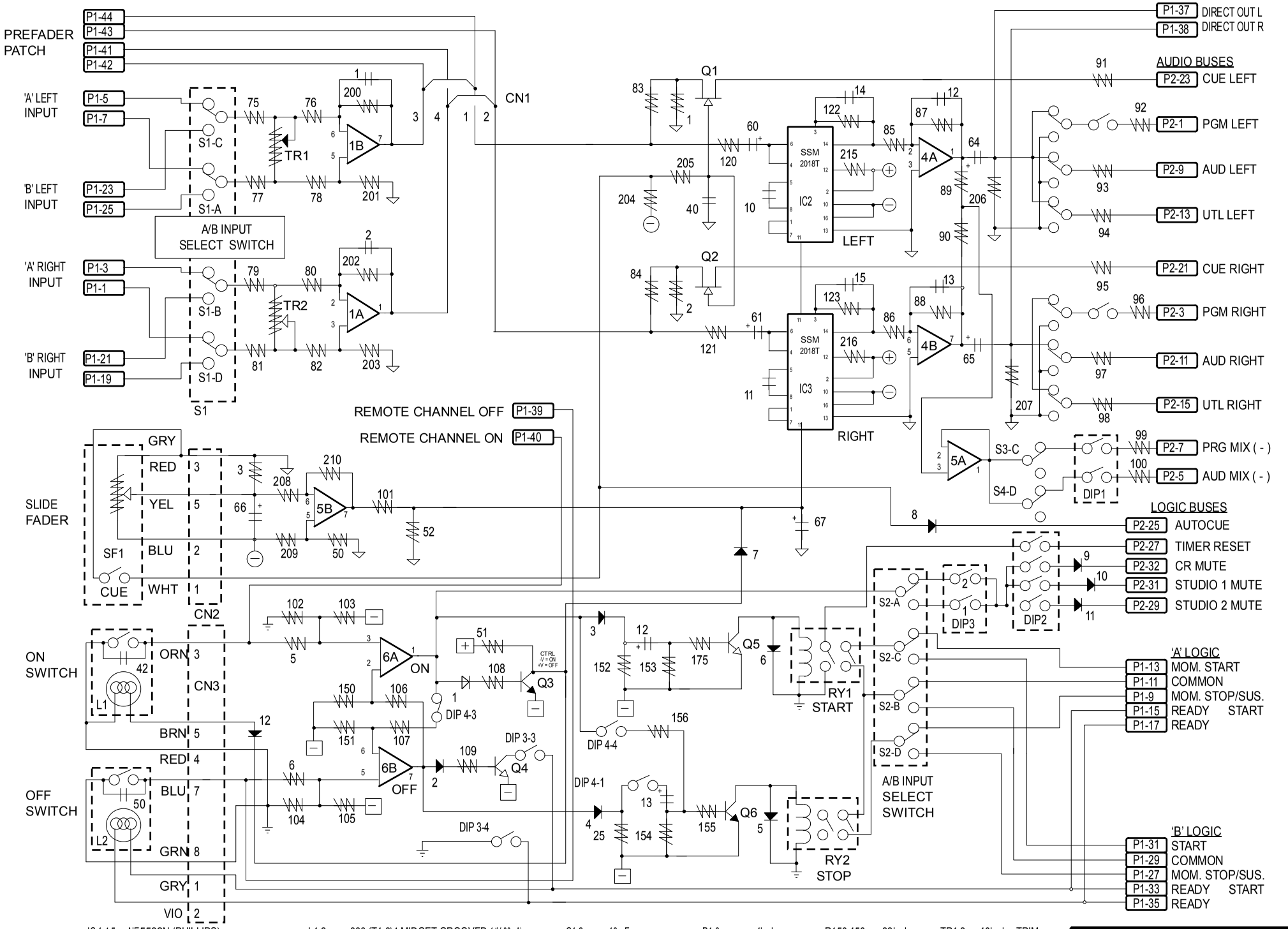
CONNECTOR P1

Foil Side		Component Side	
1)	'A' Right (+) Audio Input	2)	NC
3)	'A' Right (-) Audio Input	4)	NC
5)	'A' Left (-) Audio Input	6)	NC
7)	'A' Left (+) Audio Input	8)	NC
9)	'A' Remote Stp (mom)/Start (sus)	10)	NC
11)	'A' Remote Start/Stop Common	12)	NC
13)	'A' Remote Start (momentary)	14)	NC
15)	'A' "OFF" Lamp (driver)	16)	NC
17)	'A' "OFF" Lamp (ground)	18)	NC
19)	'B' Right (+) Audio Input	20)	NC
21)	'B' Right (-) Audio Input	22)	NC
23)	'B' Left (-) Audio Input	24)	NC
25)	'B' Left (+) Audio Input	26)	NC
27)	'B' Remote Stp (mom)/Start (sus)	28)	NC
29)	'B' Remote Start/Stop Common	30)	NC
31)	'B' Remote Start (momentary)	32)	NC
33)	'B' "OFF" Lamp (driver)	34)	NC
35)	'B' "OFF" Lamp (ground)	36)	NC
37)	Left Direct Output	38)	Right Direct Out
39)	Remote Channel OFF	40)	Remote Channel ON
41)	Right Prefader Patch Output	42)	Left Prefader Patch Out
43)	Right Prefader Patch In	44)	Left Prefader Patch In
45)	Audio Ground	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	Program Left Summing Bus	2)	Audio Ground
3)	Program Right Summing Bus	4)	Audio Ground
5)	Audition Mix-Minus Summing Bus	6)	Audio Ground
7)	Program Mix-Minus Summing Bus	8)	Audio Ground
9)	Audition Left Summing Bus	10)	Audio VDC(-)
11)	Audition Right Summing Bus	12)	Audio VDC(-)
13)	Utility Left Summing Bus	14)	Audio VDC(+)
15)	Utility Right Summing Bus	16)	Audio VDC(+)
17)	NC	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	Cue Right Summing Bus	22)	Logic Ground
23)	Cue Left Summing Bus	24)	Logic Ground
25)	Autocue Logic Bus	26)	NC
27)	Timer Reset Logic Bus	28)	NC
29)	Studio 2 Mute Logic Bus	30)	NC
31)	Studio 1 Mute Logic Bus	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC





IC 1,4,5 -- NE5532N (PHILLIPS)
IC 6 -------- NE532N (PHILLIPS)
IC 2,3 --- SSM2018T (ANLG DEV)
D1-12 ---- 1N914

L1,2 ------ 386 (T1 3\4 MIDGET GROOVED 14V, 80mA)
Q1,2 ------ J111 JFET
Q3-6 ----- 2N3904 NPN
RY1,2 -- MRB2A12 (CLARE)

C1-2 ------- 10 pF
C10-15 ---- 47 pF
C40-42 ---- .1µF
C50 --------- .47µF
C60-66 --- 10µF TANT.

R1-6 ---------- 1k ohm
R25 ---------- 2.2k ohm
R50-52 ------- 4.7k ohm
R75-109 ----- 10k ohm
R120-123 -- 18.7k ohm

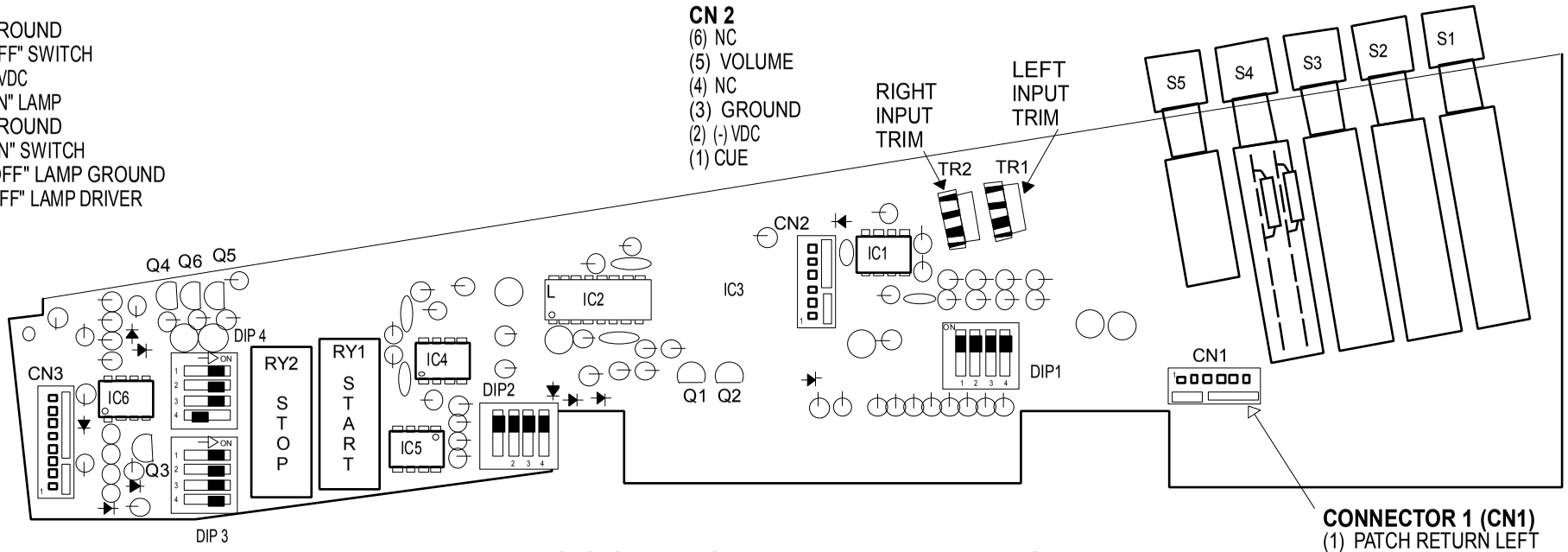
R150-156 ---- 22k ohm
R175 ---------- 47k ohm
R200-210 --- 100k ohm
R215-216 --- 124k ohm
ALL RESISTORS 1% METAL FILM

TR1,2 --- 10k ohm TRIM
SF1 ------ 10k ohm
(P&G 3210)

TPM1 - INPUT MODULE		
SCHEMATIC	PC1111-PB1	
REV C	7-95	GF 11/99
ARRAKIS SYSTEMS, inc.		

CN 3
(8) GROUND
(7) "OFF" SWITCH
(6) (+) VDC
(5) "ON" LAMP
(4) GROUND
(3) "ON" SWITCH
(2) "OFF" LAMP GROUND
(1) "OFF" LAMP DRIVER

CN 2
(6) NC
(5) VOLUME
(4) NC
(3) GROUND
(2) (-) VDC
(1) CUE



CONNECTOR 1 (CN1)
(1) PATCH RETURN LEFT
(2) PATCH RETURN RIGHT
(3) PATCH SEND LEFT
(4) PATCH SEND RIGHT
(5) NC
(6) NC

TPM1---BASIC STEREO LINE LEVEL INPUT MODULE

COMPONENT PARTS -LIST BY FUNCTION

IC1 ------- (NE5532N) DUAL OP AMP -- INPUT PREAMP STAGE
IC2 ------- (SSM2018TP) VOLTAGE CONTROLLED AMPLIFIER (VCA) -- CONTROLS LEFT LEVEL
IC3 ------- (SSM2018TP) VCA -- CONTROLS RIGHT LEVEL (MFG BY ANALOG DEVICES)
IC4 ------- (NE5532N) DUAL OP AMP -- STEREO SUMMING AMP FOR SSM2018 VCA ICS'
IC5 ------- (NE5532N) DUAL OP AMP -- DRIVER FOR VCA GAIN CONTROL PORTS
IC6 ------- (NE532N) DUAL OP AMP -- CONFIGURED AS A FLIP FLOP FOR MODULE ON/OFF*
Q1,2 ------ (J111) JUNCTION FET'S -- SWITCHES AUDIO TO CUE SUMMING BUS
Q3 -------- (2N3904) NPN TRANSISTOR -- "ON" LAMP AND VCA UN-MUTE DRIVER
Q4 -------- (2N3904) NPN TRANSISTOR -- "OFF" LAMP DRIVER
Q5,6 ------ (2N3904) NPN TRANSISTOR -- REMOTE START/STOP RELAY DRIVERS
RY1,2 ---- (MRB2A12) REED RELAYS -- REMOTE START/STOP

*NOTE- IF CHANNEL AUDIO DOES NOT TURN OFF, BUT YELLOW "OFF" LAMP LIGHTS, THEN CONFIRM IC6 IS NE 532 N AND NOT NE 5532 N.

CONNECTOR LIST

CN1 -- PREFADER PATCH JUMPER. IF THE PATCH IS TO BE COMPLETED EXTERNAL TO THE MODULE (THROUGH A RACK MOUNT COMPRESSOR, EQ ETC.) THEN REMOVE THE JUMPER ON THIS CONNECTOR. IF THE JUMPER IS REMOVED AND THE PATCH IS NOT COMPLETED EXTERNAL TO THE MODULE THEN THE MODULE WILL NOT FUNCTION.
CN2 -- SLIDE FADER
CN3 -- ON/OFF SWITCH AND LAMPS

DIP SWITCH LIST

DIP 1
(1) PGM MIX- MINUS ASSIGN
(2) AUD MIX- MINUS ASSIGN
(3) PGM RIGHT ASSIGN
(4) PGM LEFT ASSIGN

DIP 2
(1) TIMER RESET ASSIGN
(2) CR MUTE ASSIGN
(3) STUDIO 2 MUTE ASSIGN
(4) STUDIO 1 MUTE ASSIGN

DIP 3
(1) MUTE ON "B" INPUT
(2) MUTE ON "A" INPUT
(3) "OFF" LAMP (DRIVER)**
(4) "OFF" LAMP (GROUND)**

DIP 4
SWITCH (1) "ON" AND SWITCH (4) "OFF" =
MOMENTARY REMOTE START AND STOP.
SWITCH (1) "OFF" AND SWITCH (4) "ON" =
SUSTAINED REMOTE START CLOSURE.
(2) NC
(3) ALWAYS LEAVE "ON" !!!

**ALWAYS TURN THESE SWITCHES OFF WHEN DRIVING THE "OFF" LAMP FROM A CART MACHINE (READY STATUS INDICATION). FAILURE TO DO SO MAY CAUSE DAMAGE TO THE LAMP DRIVER (Q4).

MODULE CALIBRATION

RIGHT CHANNEL-
Adjust TR1
LEFT CHANNEL-
Adjust TR2
GAIN VARIATION = ~20dB.

THE MODULE WILL ACCOMMODATE INPUT LEVELS FROM -10dBu TO +8dBu.

TPM1- INPUT MODULE		
MAJOR PARTS LAYOUT		
REV C	7-95	PC1111-PB1
ARRAKIS SYSTEMS INC.		

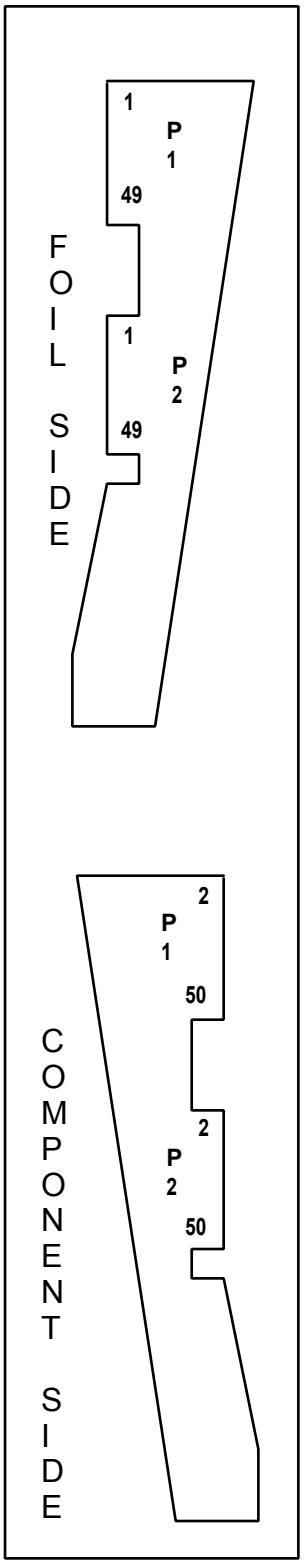
4-4a) TPM1-M -- INPUT MODULE CARD EDGE CONNECTOR DIAGRAM

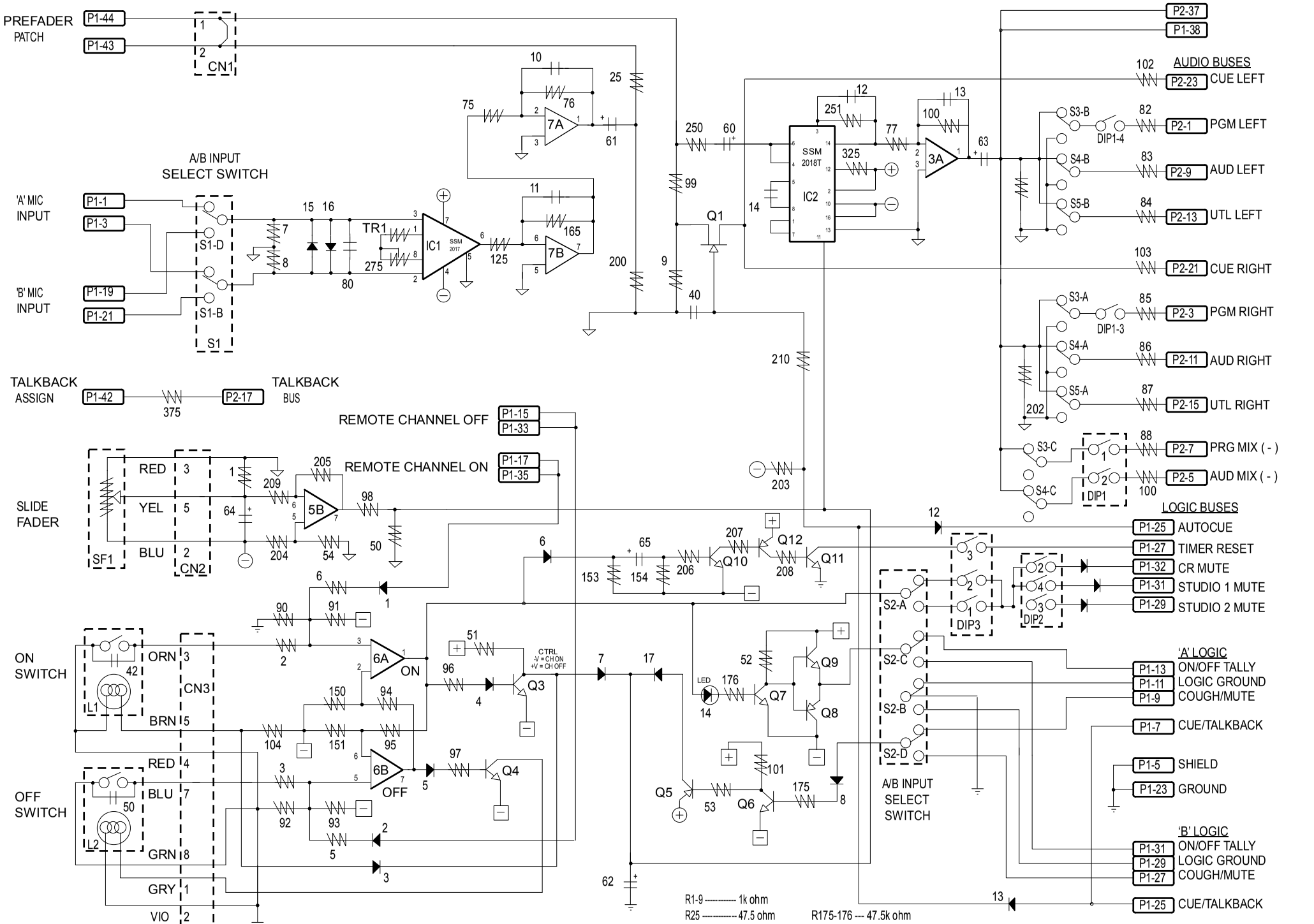
CONNECTOR P1

Foil Side		Component Side	
1)	'A' Mic (+) Audio Input	2)	NC
3)	'A' Mic (-) Audio Input	4)	NC
5)	Shield Ground (not switched)	6)	NC
7)	'A' Cue/Talkback Logic Input	8)	NC
9)	'A' Cough Mute Logic Input	10)	NC
11)	'A' Logic Ground	12)	NC
13)	'A' On/Off Tally	14)	NC
15)	'A' Remote Channel OFF	16)	NC
17)	'A' Remote Channel ON	18)	NC
19)	'B' Mic (+) Audio Input	20)	NC
21)	'B' Mic (-) Audio Input	22)	NC
23)	Shield Ground (not switched)	24)	NC
25)	'B' Cue/Talkback Logic Input	26)	NC
27)	'B' Cough Mute Logic Input	28)	NC
29)	'B' Logic Ground	30)	NC
31)	'B' On/Off Tally	32)	NC
33)	'B' Remote Channel OFF	34)	NC
35)	'B' Remote Channel ON	36)	NC
37)	Direct Output	38)	Direct Output
39)	NC	40)	NC
41)	NC	42)	Talkback Bus Audio Input
43)	Prefader Patch Out	44)	Prefader Patch In
45)	NC	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	Program Left Summing Bus	2)	Audio Ground
3)	Program Right Summing Bus	4)	Audio Ground
5)	Audition Mix-Minus Summing Bus	6)	Audio Ground
7)	Program Mix-Minus Summing Bus	8)	Audio Ground
9)	Audition Left Summing Bus	10)	Audio VDC(-)
11)	Audition Right Summing Bus	12)	Audio VDC(-)
13)	Utility Left Summing Bus	14)	Audio VDC(+)
15)	Utility Right Summing Bus	16)	Audio VDC(+)
17)	Talkback Bus	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	Cue Right Summing Bus	22)	Logic Ground
23)	Cue Left Summing Bus	24)	Logic Ground
25)	Autocue Logic Bus	26)	NC
27)	Timer Reset Logic Bus	28)	NC
29)	Studio 2 Mute Logic Bus	30)	NC
31)	Studio 1 Mute Logic Bus	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC





IC1 --------- SSM2017
IC 3,5,7 ----- NE5532N (PHILLIPS)
IC 6 ---------- NE532N (PHILLIPS)
IC 2 ---------- SSM2018TP (ANLG DEV)
D1-17 -------- 1N914

L1,2 ------------ 386 (T1 3\4 MIDGET GROOVED
Q5,8,12 ---------- 2N3906 PNP 14V, 80mA)
Q9 ---------------- 2N6426 NPN DARLINGTON
Q1 ---------------- J111 JFET
Q3,4,6,7,10,11 -- 2N3904 NPN

C10-14 ---- 47pF
C40-42 ---- .1µF
C50 --------- .47µF
C60-69 --- 10µF TANT.
C80 -------- 270pF

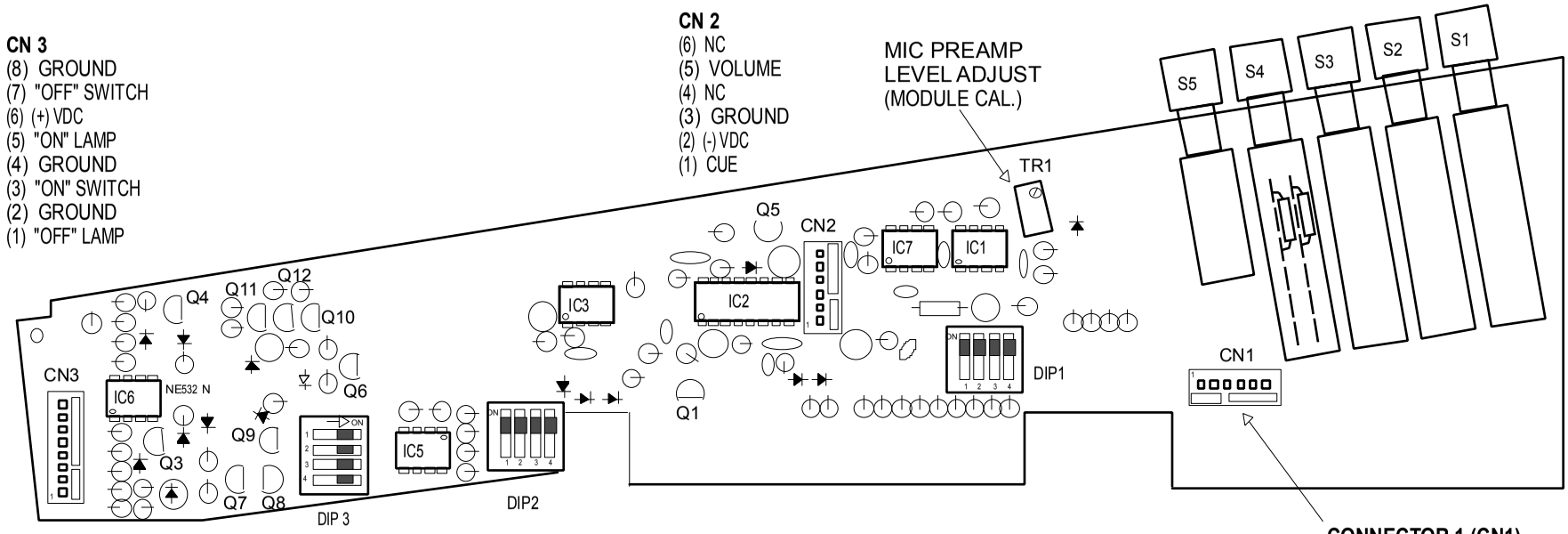
R1-9 ---------- 1k ohm
R25 ---------- 47.5 ohm
R50-54 ------ 4.75k ohm
R75-104 ---- 10k ohm
R125 --------- 12.1k ohm
R150-154 -- 22k ohm
R165 --------- 33.2k ohm

R175-176 --- 47.5k ohm
R200-210 -- 100k ohm
R250-251 -- 18.7k ohm
R275 --------- 10 ohm
R325 --------- 124k ohm
R375 --------- 3.24k ohm

TR1 -------- 500 ohm
SF1 -------- 10k ohm

ALL RESISTORS 1% METAL FILM

TPM1-M - INPUT MODULE		
SCHEMATIC		PC1111-PB2
REV C	7-95	GF 1/99
ARRAKIS SYSTEMS, inc.		



TPM1-M --- MIC LEVEL INPUT MODULE

COMPONENT PARTS -LIST BY FUNCTION

IC1 -------- (SSM2017P) -- MIC INPUT AUDIO PREAMP STAGE
IC2 -------- (SSM2018TP) -- VOLTAGE CONTROLLED AMP (VCA) -- CONTROLS AUDIOLEVEL
'SSM' ICs ARE MANUFACTURED BY ANALOG DEVICES
IC3 -------- (NE5532N) DUAL OP AMP -- VCA SUMMING AMP
IC5 -------- (NE5532N) DUAL OP AMP -- DRIVER FOR VCA GAIN CONTROL PORT
IC6 -------- (NE532N) DUAL OP AMP -- CONFIGURED AS A FLIP FLOP FOR MODULE ON/OFF*
IC7 -------- (NE5532N) DUAL OP AMP -- BUFFER AMP
Q1 -------- (J111) JUNCTION FET -- SWITCHES AUDIO TO CUE SUMMING BUS (TALKBACK)
Q3 -------- (2N3904) NPN TRANSISTOR -- "ON" LAMP AND VCA UN-MUTE DRIVER
Q4 -------- (2N3904) NPN TRANSISTOR -- "OFF" LAMP DRIVER
Q5 -------- (2N3906) PNP TRANSISTOR -- COUGH MUTE
Q6 -------- (2N3904) NPN TRANSISTOR -- COUGH MUTE
Q7 -------- (2N3904) NPN TRANSISTOR -- ON/OFF TALLY
Q8 -------- (2N3904) NPN TRANSISTOR -- ON TALLY DRIVER
Q9 -------- (2N6420) NPN DARLINGTON TRANSISTOR -- OFF TALLY DRIVER
Q10,11 --- (2N3904) NPN TRANSISTOR -- TIMER RESET
Q12 ------- (2N3906) PNP TRANSISTOR -- TIMER RESET

*NOTE- IF CHANNEL AUDIO DOES NOT TURN OFF, BUT YELLOW "OFF" LAMP LIGHTS THEN CONFIRM IC6 IS **NE532N** AND NOT **NE5532N.**,

CONNECTOR LIST

CN1 --- PREFADER PATCH JUMPER. IF THE PATCH IS TO BE COMPLETED EXTERNAL TO THE MODULE (THROUGH A RACK MOUNT COMPRESSOR, EQ ETC.) THEN REMOVE THE JUMPER ON THIS CONNECTOR. IF THE JUMPER IS REMOVED AND THE PATCH IS NOT COMPLETED EXTERNAL TO THE MODULE THEN THE MODULE WILL NOT FUNCTION.
CN2 --- SLIDE FADER
CN3 --- ON/OFF SWITCH AND LAMPS

DIP SWITCH LIST

DIP 1
(1) PGM MIX- MINUS ASSIGN
(2) AUD MIX- MINUS ASSIGN
(3) PGM RIGHT ASSIGN
(4) PGM LEFT ASSIGN

DIP 2
(1) NC
(2) CR MUTE ASSIGN
(3) STUDIO 2 MUTE ASSIGN
(4) STUDIO 1 MUTE ASSIGN

DIP 3
(1) MUTE ON "B" INPUT
(2) MUTE ON "A" INPUT
(3) TIMER RESET ASSIGN
(4) NC

MODULE CALIBRATION

MIC INPUT LEVEL
Adjust TR1

GAIN VARIATION = ~40dB.

THE MODULE WILL ACCOMODATE INPUT LEVELS FROM -70dBu TO -30dBu.

TPM1-M INPUT MODULE		
MAJOR PARTS LAYOUT		
REV C	7-95	PC1111-PB2
ARRAKIS SYSTEMS, inc.		

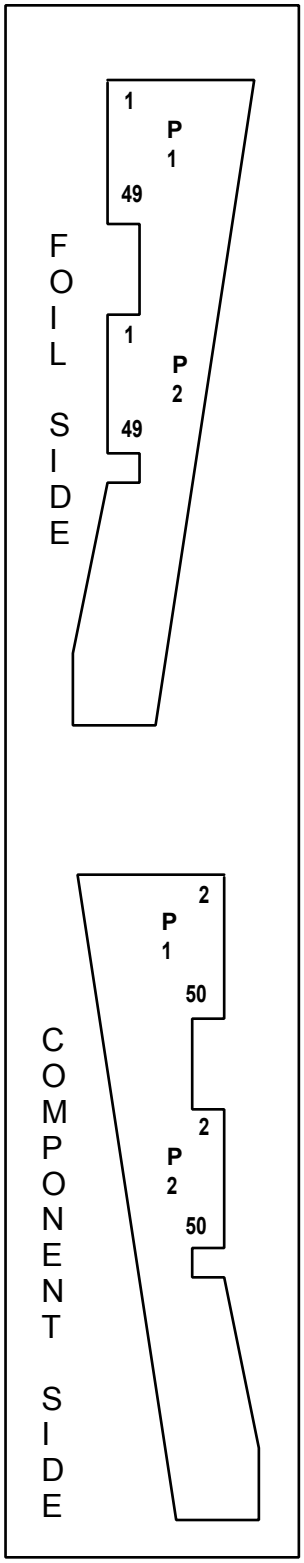
4-5a) TPM2 -- INPUT MODULE CARD EDGE CONNECTOR DIAGRAM

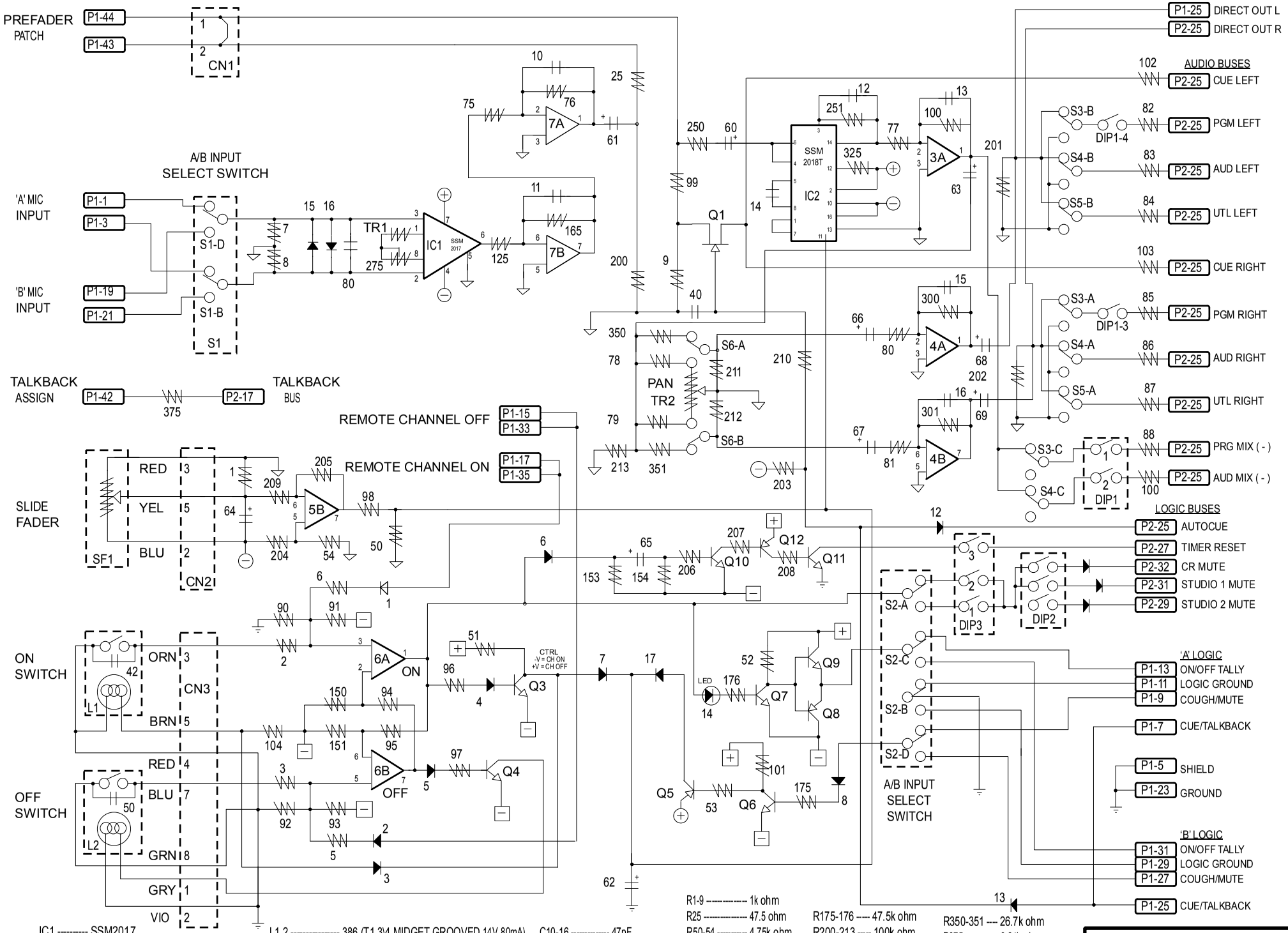
CONNECTOR P1

Foil Side		Component Side	
1)	'A' Mic (+) Audio Input	2)	NC
3)	'A' Mic (-) Audio Input	4)	NC
5)	Shield Ground (not switched)	6)	NC
7)	'A' Cue/Talkback Logic Input	8)	NC
9)	'A' Cough Mute Logic Input	10)	NC
11)	'A' Logic Ground	12)	NC
13)	'A' On/Off Tally	14)	NC
15)	'A' Remote Channel OFF	16)	NC
17)	'A' Remote Channel ON	18)	NC
19)	'B' Mic (+) Audio Input	20)	NC
21)	'B' Mic (-) Audio Input	22)	NC
23)	Shield Ground (not switched)	24)	NC
25)	'B' Cue/Talkback Logic Input	26)	NC
27)	'B' Cough Mute Logic Input	28)	NC
29)	'B' Logic Ground	30)	NC
31)	'B' On/Off Tally	32)	NC
33)	'B' Remote Channel OFF	34)	NC
35)	'B' Remote Channel ON	36)	NC
37)	Direct Output	38)	Direct Output
39)	NC	40)	NC
41)	NC	42)	Talkback Bus Audio Input
43)	Prefader Patch Out	44)	Prefader Patch In
45)	NC	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	Program Left Summing Bus	2)	Audio Ground
3)	Program Right Summing Bus	4)	Audio Ground
5)	Audition Mix-Minus Summing Bus	6)	Audio Ground
7)	Program Mix-Minus Summing Bus	8)	Audio Ground
9)	Audition Left Summing Bus	10)	Audio VDC(-)
11)	Audition Right Summing Bus	12)	Audio VDC(-)
13)	Utility Left Summing Bus	14)	Audio VDC(+)
15)	Utility Right Summing Bus	16)	Audio VDC(+)
17)	Talkback Bus	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	Cue Right Summing Bus	22)	Logic Ground
23)	Cue Left Summing Bus	24)	Logic Ground
25)	Autocue Logic Bus	26)	NC
27)	Timer Reset Logic Bus	28)	NC
29)	Studio 2 Mute Logic Bus	30)	NC
31)	Studio 1 Mute Logic Bus	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC





IC1 --------- SSM2017
IC 3,4,5,7 - NE**5532**N (PHILLIPS)
IC 6 --------- NE**532**N (PHILLIPS)
IC 2 --------- SSM2018TP (ANLG DEV)
D1-17 ------- 1N914

L1,2 ---------- 386 (T1 3\4 MIDGET GROOVED 14V, 80mA)
Q5,8,12 ---------- 2N3906 PNP
Q9 ---------- 2N6426 NPN DARLINGTON
Q1 ---------- J111 JFET
Q3,4,6,7,10,11 -- 2N3904 NPN

C10-16 ---------- 47pF
C40-42 ---------- .1µF
C50 ---------- .47µF
C60-69 ---------- 10µF TANT.
C80 ---------- 270pF

R1-9 ---------- 1k ohm
R25 ---------- 47.5 ohm
R50-54 --------- 4.75k ohm
R75-104 ------- 10k ohm
R125 ---------- 12.1k ohm
R150-154 ----- 22k ohm
R165 ---------- 33.2k ohm

R175-176 ---- 47.5k ohm
R200-213 ---- 100k ohm
R250-251 ----- 18.7k ohm
R275 ---------- 100HM
R300-301 ----- 39k ohm
R325 ---------- 124k ohm

R350-351 --- 26.7k ohm
R375 --------- 3.24k ohm
TR1 ---------- 500 ohm
TR2 ---------- 10k ohm
SF1 ---------- 10k ohm
ALL RESISTORS 1% METAL FILM

TPM1-M INPUT MODULE

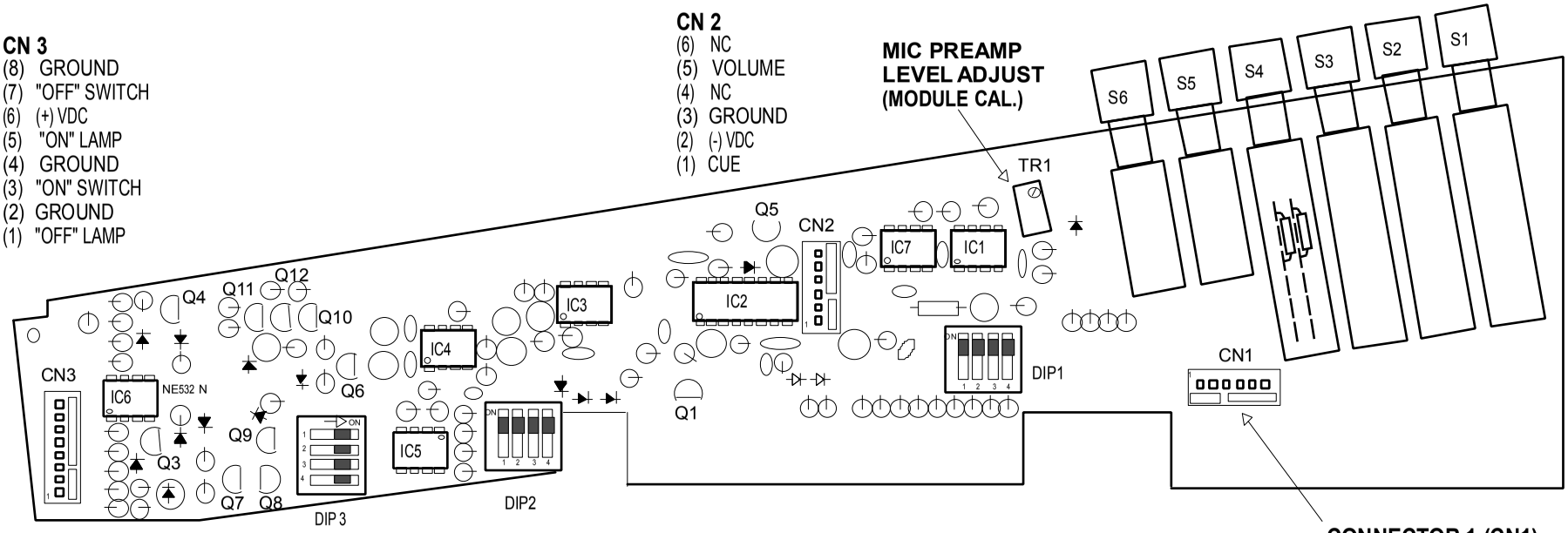
SCHEMATIC		PV1111-PB2
REV C	7-95	GF 1/99

ARRAKIS SYSTEMS,inc

CN 3
(8) GROUND
(7) "OFF" SWITCH
(6) (+) VDC
(5) "ON" LAMP
(4) GROUND
(3) "ON" SWITCH
(2) GROUND
(1) "OFF" LAMP

CN 2
(6) NC
(5) VOLUME
(4) NC
(3) GROUND
(2) (-) VDC
(1) CUE

MIC PREAMP LEVEL ADJUST (MODULE CAL.)



CONNECTOR 1 (CN1)
(1) PATCH RETURN
(2) PATCH SEND
(3) NC
(4) PAN POT
(5) GROUND
(6) PAN POT

TPM2 ---ADVANCED MIC LEVEL INPUT MODULE W/ PAN

COMPONENT PARTS -LIST BY FUNCTION

IC1 -------- (SSM2017P) -- MIC INPUT AUDIO PREAMP STAGE
IC2 -------- (SSM2018TP) -- VOLTAGE CONTROLLED AMP (VCA) -- CONTROLS AUDIOLEVEL
'SSM' ICs ARE MANUFACTURED BY ANALOG DEVICES
IC3 -------- (NE5532N) DUAL OP AMP -- VCA SUMMING AMP
IC4 -------- (NE5532N) DUAL OP AMP -- BUFFER AMP
IC5 -------- (NE5532N) DUAL OP AMP -- DRIVER FOR VCA GAIN CONTROL PORT
IC6 ------- (NE 532 N) DUAL OP AMP -- CONFIGURED AS A FLIP FLOP FOR MODULE ON/OFF*
IC7 -------- (NE5532N) DUAL OP AMP -- BUFFER AMP
Q1 -------- (J111) JUNCTION FET -- SWITCHES AUDIO TO CUE SUMMING BUS (TALKBACK)
Q3 -------- (2N3904) NPN TRANSISTOR -- "ON" LAMP AND VCA UN-MUTE DRIVER
Q4 -------- (2N3904) NPN TRANSISTOR -- "OFF" LAMP DRIVER
Q5 -------- (2N3906) PNP TRANSISTOR -- COUGH MUTE
Q6 -------- (2N3904) NPN TRANSISTOR -- COUGH MUTE
Q7 -------- (2N3904) NPN TRANSISTOR -- ON/OFF TALLY
Q8 -------- (2N3904) NPN TRANSISTOR -- ON TALLY DRIVER
Q9 -------- (2N6420) NPN DARLINGTON TRANSISTOR -- OFF TALLY DRIVER
Q10,11 -- (2N3904) NPN TRANSISTOR -- TIMER RESET
Q12 ------- (2N3906) PNP TRANSISTOR -- TIMER RESET

*NOTE -- IF CHANNEL AUDIO DOES NOT TURN OFF, BUT YELLOW "OFF" LAMP LIGHTS THEN CONFIRM IC6 IS NE532N AND NOT NE5532N.

DIP SWITCH LIST

DIP 1
(1) PGM MIX- MINUS ASSIGN
(2) AUD MIX- MINUS ASSIGN
(3) PGM RIGHT ASSIGN
(4) PGM LEFT ASSIGN

DIP 2
(1) NC
(2) CR MUTE ASSIGN
(3) STUDIO 2 MUTE ASSIGN
(4) STUDIO 1 MUTE ASSIGN

DIP 3
(1) MUTE ON "B" INPUT
(2) MUTE ON "A" INPUT
(3) TIMER RESET ASSIGN
(4) NC

MODULE CALIBRATION-

MIC INPUT LEVEL
Adjust TR1

GAIN VARIATION = ~40dB.

THE MODULE WILL ACCOMODATE INPUT LEVELS FROM -70dBu TO -30dBu.

CONNECTOR LIST

CN1 -- PREFADER PATCH JUMPER. IF THE PATCH IS TO BE COMPLETED EXTERNAL TO THE MODULE (THROUGH A RACK MOUNT COMPRESSOR, EQ ETC.) THEN REMOVE THE JUMPER ON THIS CONNECTOR. IF THE JUMPER IS REMOVED AND THE PATCH IS NOT COMPLETED EXTERNAL TO THE MODULE THEN THE MODULE WILL NOT FUNCTION.
CN2 -- SLIDE FADER
CN3 -- ON/OFF SWITCH AND LAMPS

TPM2- INPUT MODULE		
MAJOR PARTS LAYOUT		
REV C	7-95	PC1111-PB2
ARRAKIS SYSTEMS, inc.		

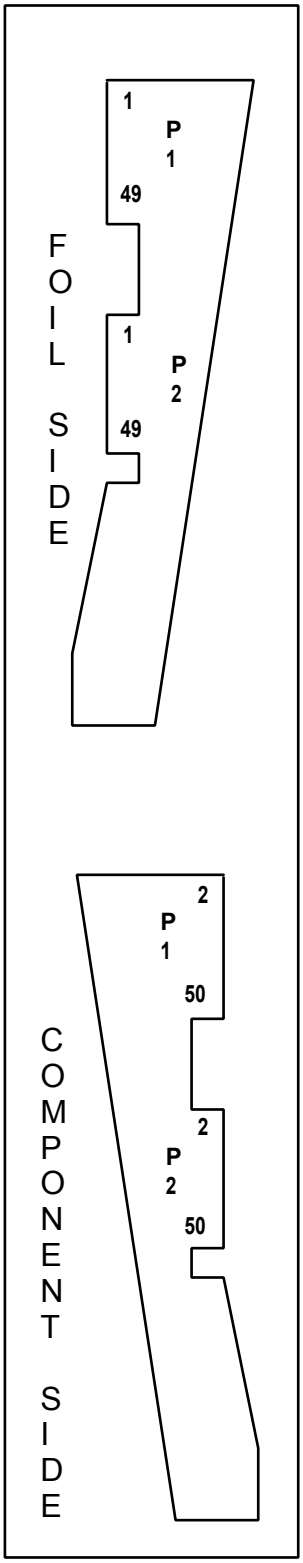
4-6a) TPM3 -- INPUT MODULE CARD EDGE CONNECTOR DIAGRAM

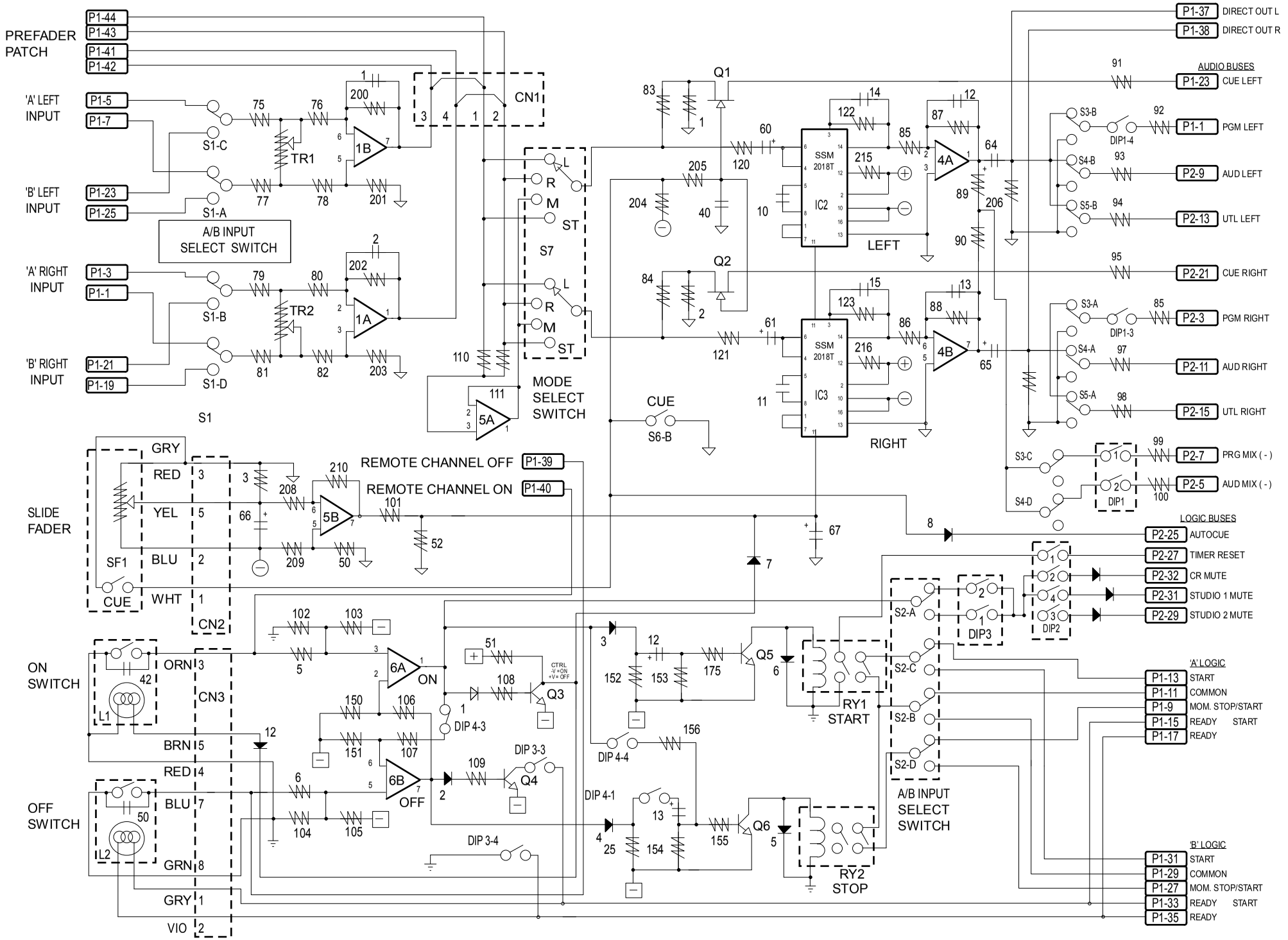
CONNECTOR P1

Foil Side		Component Side	
1)	'A' Right (+) Audio Input	2)	NC
3)	'A' Right (-) Audio Input	4)	NC
5)	'A' Left (-) Audio Input	6)	NC
7)	'A' Left (+) Audio Input	8)	NC
9)	'A' Remote Stp (mom)/Start (sus)	10)	NC
11)	'A' Remote Start/Stop Common	12)	NC
13)	'A' Remote Start (momentary)	14)	NC
15)	'A' "OFF" Lamp (driver)	16)	NC
17)	'A' "OFF" Lamp (ground)	18)	NC
19)	'B' Right (+) Audio Input	20)	NC
21)	'B' Right (-) Audio Input	22)	NC
23)	'B' Left (-) Audio Input	24)	NC
25)	'B' Left (+) Audio Input	26)	NC
27)	'B' Remote Stp (mom)/Start (sus)	28)	NC
29)	'B' Remote Start/Stop Common	30)	NC
31)	'B' Remote Start (momentary)	32)	NC
33)	'B' "OFF" Lamp (driver)	34)	NC
35)	'B' "OFF" Lamp (ground)	36)	NC
37)	Left Direct Output	38)	Right Direct Out
39)	Remote Channel OFF	40)	Remote Channel ON
41)	Right Prefader Patch Output	42)	Left Prefader Patch Out
43)	Right Prefader Patch In	44)	Left Prefader Patch In
45)	Audio Ground	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	Program Left Summing Bus	2)	Audio Ground
3)	Program Right Summing Bus	4)	Audio Ground
5)	Audition Mix-Minus Summing Bus	6)	Audio Ground
7)	Program Mix-Minus Summing Bus	8)	Audio Ground
9)	Audition Left Summing Bus	10)	Audio VDC(-)
11)	Audition Right Summing Bus	12)	Audio VDC(-)
13)	Utility Left Summing Bus	14)	Audio VDC(+)
15)	Utility Right Summing Bus	16)	Audio VDC(+)
17)	NC	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	Cue Right Summing Bus	22)	Logic Ground
23)	Cue Left Summing Bus	24)	Logic Ground
25)	Autocue Logic Bus	26)	NC
27)	Timer Reset Logic Bus	28)	NC
29)	Studio 2 Mute Logic Bus	30)	NC
31)	Studio 1 Mute Logic Bus	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC





IC 1,4,5 -- NE5532N (PHILLIPS)
IC 6 ------ NE532N (PHILLIPS)
IC 2,3 ----- SSM2018T (ANLG DEV)
D1-12 ---- 1N914

L1,2 ------ 386 (T1 3\4 MIDGET GROOVED 14V, 80mA)
Q1,2 ----- J111 JFET
Q3-6 ------ 2N3904 NPN
RY1,2 ---- MRB2A12 (CLARE)

C1-2 ----- 10 pF
C10-15 --- 47 pF
C40-42 --- .1µF
C50 ------ .47µF
C60-66 --- 10µF TANT.

R1-6 ---------- 1k ohm
R25 ---------- 2.2k ohm
R50-52 ------ 4.7k ohm
R75-111 ----- 10k ohm
R120-123 - 18.7k ohm

R150-156 --- 22k ohm
R175 ------- 47k ohm
R200-210 - 100k ohm
R215-216 - 124k ohm

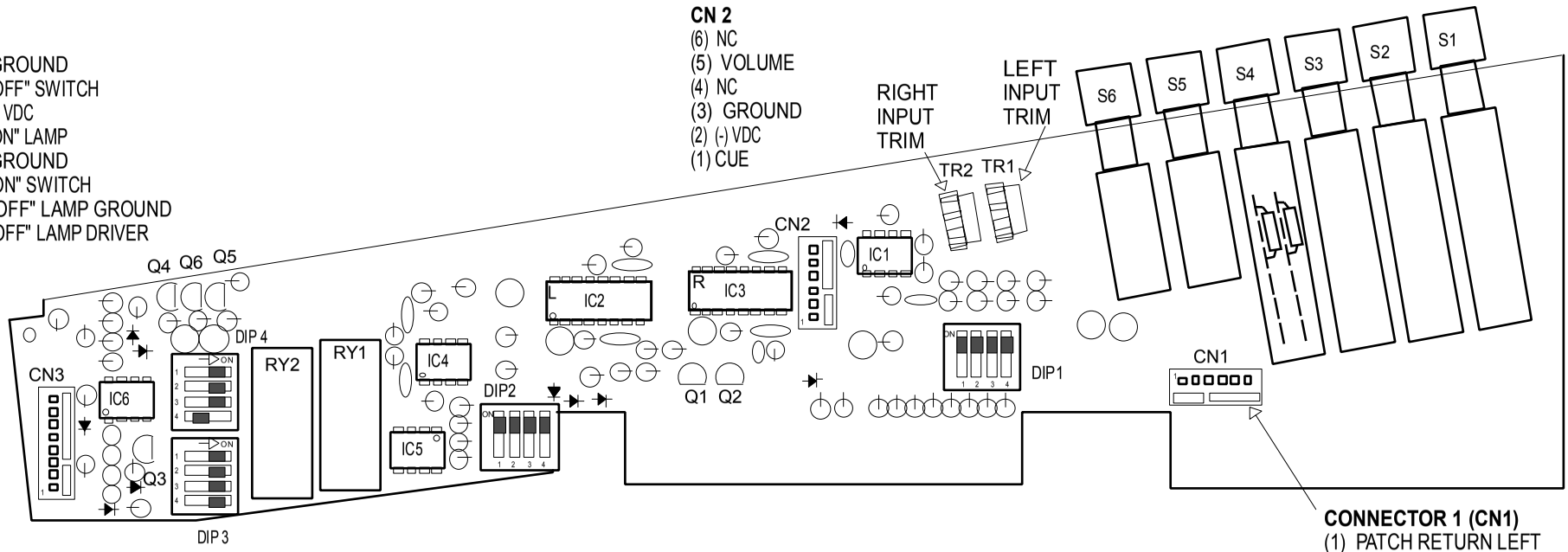
ALL RESISTORS 1% METAL FILM

TR1,2 --- 10k ohm TRIM
SF1 ------ 10k ohm (P&G 3210)

TPM3 - INPUT MODULE		
SCHEMATIC		
REV C	7-95	GF 11/99
ARRAKIS SYSTEMS, inc.		

CN 3
(8) GROUND
(7) "OFF" SWITCH
(6) (+) VDC
(5) "ON" LAMP
(4) GROUND
(3) "ON" SWITCH
(2) "OFF" LAMP GROUND
(1) "OFF" LAMP DRIVER

CN 2
(6) NC
(5) VOLUME
(4) NC
(3) GROUND
(2) (-) VDC
(1) CUE



CONNECTOR 1 (CN1)
(1) PATCH RETURN LEFT
(2) PATCH RETURN RIGHT
(3) PATCH SEND LEFT
(4) PATCH SEND RIGHT
(5) NC
(6) NC

TPM3--- ADVANCED STEREO LINE LEVEL INPUT MODULE WITH MODE SELECT

COMPONENT PARTS -- LIST BY FUNCTION

IC1 --------- (NE5532N) DUAL OP AMP -- INPUT PREAMP STAGE
IC2 --------- (SSM2018TP) VOLTAGE CONTROLLED AMPLIFIER (VCA) -- CONTROLS LEFT LEVEL
IC3 --------- (SSM2018TP) VCA -- CONTROLS RIGHT LEVEL (MFG BY ANALOG DEVICES)
IC4 --------- (NE5532N) DUAL OP AMP -- STEREO SUMMING AMP FOR SSM2018 VCA ICS'
IC5 --------- (NE5532N) DUAL OP AMP -- DRIVER FOR VCA GAIN CONTROL PORTS
IC6 --------- (NE532N) DUAL OP AMP -- CONFIGURED AS A FLIP FLOP FOR MODULE ON/OFF*
Q1,2 ------- (J111) JUNCTION FET'S -- SWITCHES AUDIO TO CUE SUMMING BUS
Q3 --------- (2N3904) NPN TRANSISTOR -- "ON" LAMP AND VCA UN-MUTE DRIVER
Q4 --------- (2N3904) NPN TRANSISTOR -- "OFF" LAMP DRIVER
Q5,6 ------- (2N3904) NPN TRANSISTOR -- REMOTE START/STOP RELAY DRIVERS
RY1,2 ----- (MRB2A12) REED RELAYS -- REMOTE START/STOP

*NOTE - IF CHANNEL AUDIO DOES NOT TURN OFF, BUT YELLOW "OFF" LAMP LIGHTS, THEN CONFIRM IC6 IS NE532N AND NOT NE5532N.

CONNECTOR LIST

CN1 -- PREFADER PATCH JUMPER. IF THE PATCH IS TO BE COMPLETED EXTERNAL TO THE MODULE (THROUGH A RACK MOUNT COMPRESSOR, EQ ETC.) THEN REMOVE THE JUMPER ON THIS CONNECTOR. IF THE JUMPER IS REMOVED AND THE PATCH IS NOT COMPLETED EXTERNAL TO THE MODULE THEN THE MODULE WILL NOT FUNCTION.
CN2 -- SLIDE FADER
CN3 -- ON/OFF SWITCH AND LAMPS

**ALWAYS TURN THESE SWITCHES OFF WHEN DRIVING THE "OFF" LAMP FROM A CART MACHINE (READY STATUS INDICATION). FAILURE TO DO SO MAY CAUSE DAMAGE TO THE LAMP DRIVER (Q4).

DIP SWITCH LIST

DIP 1
(1) PGM MIX- MINUS ASSIGN
(2) AUD MIX- MINUS ASSIGN
(3) PGM RIGHT ASSIGN
(4) PGM LEFT ASSIGN

DIP 2
(1) TIMER RESET ASSIGN
(2) CR MUTE ASSIGN
(3) STUDIO 2 MUTE ASSIGN
(4) STUDIO 1 MUTE ASSIGN

DIP 3
(1) MUTE ON "B" INPUT
(2) MUTE ON "A" INPUT
(3) "OFF" LAMP (DRIVER)**
(4) "OFF" LAMP (GROUND)**

DIP 4
SWITCH (1) "ON" AND SWITCH (4) "OFF" =
MOMENTARY REMOTE START AND STOP.
SWITCH (1) "OFF" AND SWITCH (4) "ON" =
SUSTAINED REMOTE START CLOSURE.
(2) NC
(3) ALWAYS LEAVE "ON" !!!

MODULE CALIBRATION

RIGHT CHANNEL-
Adjust TR1
LEFT CHANNEL-
Adjust TR2
GAIN VARIATION = ~20dB.

THE MODULE WILL ACCOMODATE INPUT LEVELS FROM -10dBu TO +8dBu.

TPM3- INPUT MODULE		
MAJOR PARTS LAYOUT		
REV C	7-95	PC1111-PB1
ARRAKIS SYSTEMS INC.		

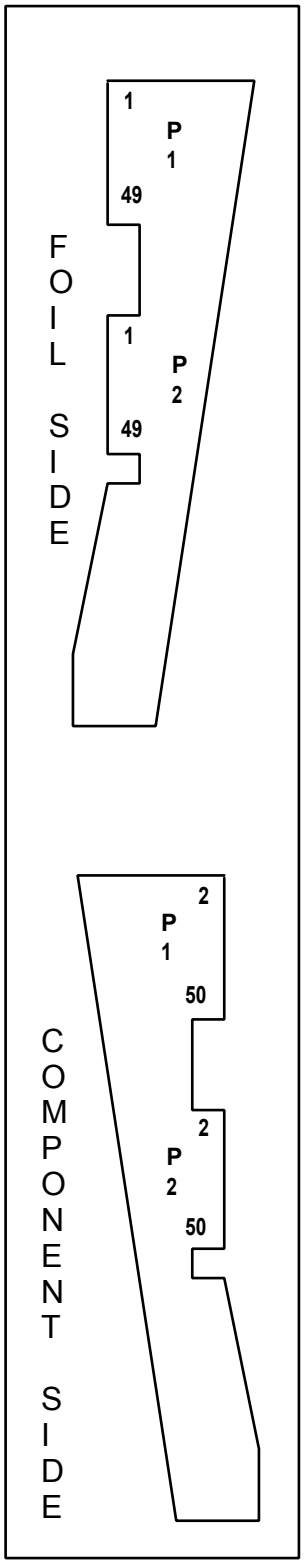
4-7a) TOB1 -- OUTPUT MODULE CARD EDGE CONNECTOR DIAGRAM

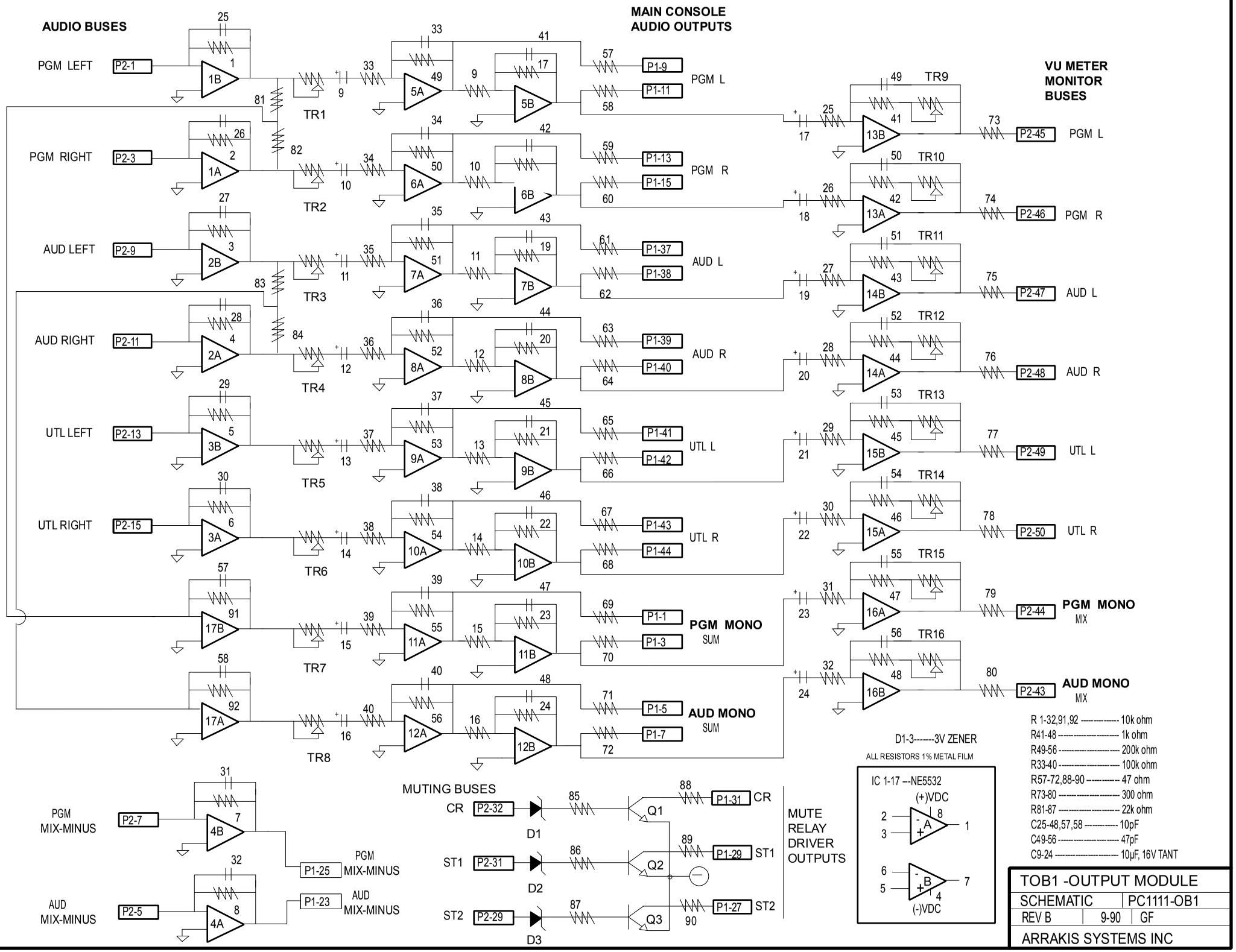
CONNECTOR P1

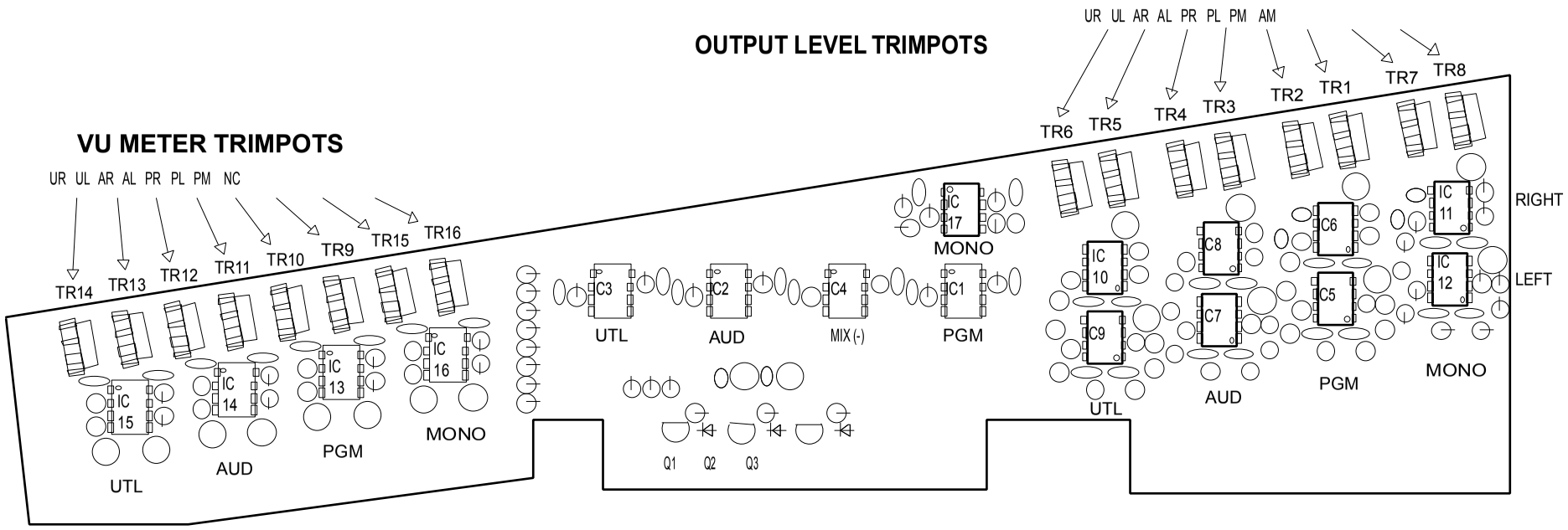
Foil Side		Component Side	
1)	Audition Mono Sum (-) Output	2)	NC
3)	Audition Mono Sum (+) Output	4)	NC
5)	Program Mono Sum (-) Output	6)	NC
7)	Program Mono Sum (+) Output	8)	NC
9)	Program Left (+) Output	10)	NC
11)	Program Left (-) Output	12)	NC
13)	Program Right (+) Output	14)	NC
15)	Program Right (-) Output	16)	NC
17)	Audio Ground	18)	NC
19)	NC	20)	NC
21)	NC	22)	NC
23)	Audition Mix-Minus Output	24)	NC
25)	Program Mix-Minus Output	26)	NC
27)	Studio 2 Mute Relay Driver Out	28)	NC
29)	Studio 1 Mute Relay Driver Out	30)	NC
31)	CR Mute Relay Driver Output	32)	NC
33)	Logic Ground	34)	NC
35)	Audio Ground	36)	NC
37)	Audition Left (+) Output	38)	Audition Left (-) Output
39)	Audition Right (+) Output	40)	Audition Right (-) Output
41)	Utility Left (+) Output	42)	Utility Left (-) Output
43)	Utility Right (+) Output	44)	Utility Right (-) Output
45)	NC	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	Program Left Summing Bus	2)	Audio Ground
3)	Program Right Summing Bus	4)	Audio Ground
5)	Audition Mix-Minus Summing Bus	6)	Audio Ground
7)	Program Mix-Minus Summing Bus	8)	Audio Ground
9)	Audition Left Summing Bus	10)	Audio VDC(-)
11)	Audition Right Summing Bus	12)	Audio VDC(-)
13)	Utility Left Summing Bus	14)	Audio VDC(+)
15)	Utility Right Summing Bus	16)	Audio VDC(+)
17)	NC	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	NC	22)	Logic Ground
23)	NC	24)	Logic Ground
25)	NC	26)	NC
27)	NC	28)	NC
29)	Studio 2 Mute Logic Bus	30)	NC
31)	Studio 1 Mute Logic Bus	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	Aud Mono Sum VU/Monitor Bus	44)	Pgm Mono SumVU/Monitor Bus
45)	Program Left VU/Monitor Bus	46)	Program Right VU/Monitor Bus
47)	Audition Left VU/Monitor Bus	48)	Audition Right VU/Monitor Bus
49)	Utility Left VU/Monitor Bus	50)	Utility Right VU/Monitor Bus




AUDIO BUSES
MAIN CONSOLE AUDIO OUTPUTS
VU METER MONITOR BUSES
PGM LEFT
P2-1
PGM RIGHT
P2-3
AUD LEFT
P2-9
AUD RIGHT
P2-11
UTL LEFT
P2-13
UTL RIGHT
P2-15
PGM L
PGM R
AUD L
AUD R
UTL L
UTL R
PGM MONO SUM
AUD MONO SUM
PGM MONO MIX
AUD MONO MIX
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
MUTING BUSES
CR
ST1
ST2
D1
D2
D3
Q1
Q2
Q3
MUTE RELAY DRIVER OUTPUTS
PGM MIX-MINUS
AUD MIX-MINUS
D1-3-------3V ZENER
ALL RESISTORS 1% METAL FILM
IC 1-17 ---NE5532
(+)VDC
(-)VDC
R 1-32,91,92 ---------- 10k ohm
R41-48 ---------- 1k ohm
R49-56 ---------- 200k ohm
R33-40 ---------- 100k ohm
R57-72,88-90 ---------- 47 ohm
R73-80 ---------- 300 ohm
R81-87 ---------- 22k ohm
C25-48,57,58 ---------- 10pF
C49-56 ---------- 47pF
C9-24 ---------- 10µF, 16V TANT
TOB1 -OUTPUT MODULE
SCHEMATIC PC1111-OB1
REV B 9-90 GF
ARRAKIS SYSTEMS INC



TOB1 -- OUTPUT MODULE

COMPONENT PARTS- LIST BY FUNCTION

IC1-IC4 ---------- (NE5532N) DUAL OP AMP --- STEREO SUMMING AMPS
IC5-IC12 --------- (NE5532N) DUAL OP AMP --- OUTPUT DRIVERS
IC13-IC16 ------- (NE5532N) DUAL OP AMP --- VU METER/MONITOR DRIVERS
Q1-Q3 ----------- (2N3904) NPN TRANSISTOR --- MUTE RELAY DRIVERS

*IF THE TCRM1 MONITOR MODULE DOES NOT FUNCTION CONFIRM TRIMMERS 9-15 ARE NOT TURNED DOWN. THE MONITOR AND VU METERS WORK OFF THE SAME SIGNAL BUS.,

CALIBRATION

CONSOLE OUTPUTS		VU METER/MONITOR DRIVERS	
PGM L	TR1	PGM L	TR9*
PGM R	TR2	PGM R	TR10
AUD L	TR3	AUD L	TR11
AUD R	TR4	AUD R	TR12
UTL L	TR5	UTL L	TR13
UTL R	TR6	UTL R	TR14
PGM MONO SUM	TR7	PGM MONO SUM	TR15
AUD MONO SUM	TR8	TR16	NC

TOB1- OUTPUT MODULE		
MAJOR PARTS LAYOUT		
REV B	9-90	PC1111-OB1
ARRAKIS SYSTEMS INC.		

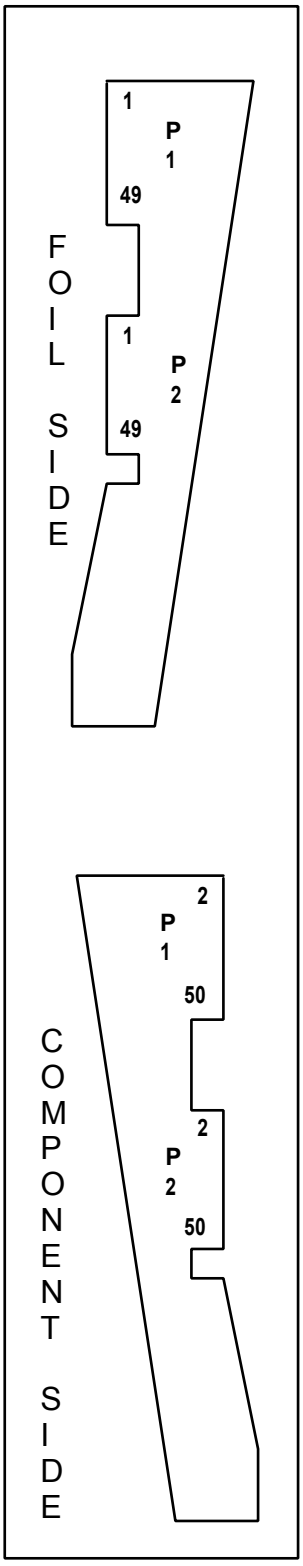
4-8a) TCRM1 -- MONITOR MODULE CARD EDGE CONNECTOR DIAGRAM

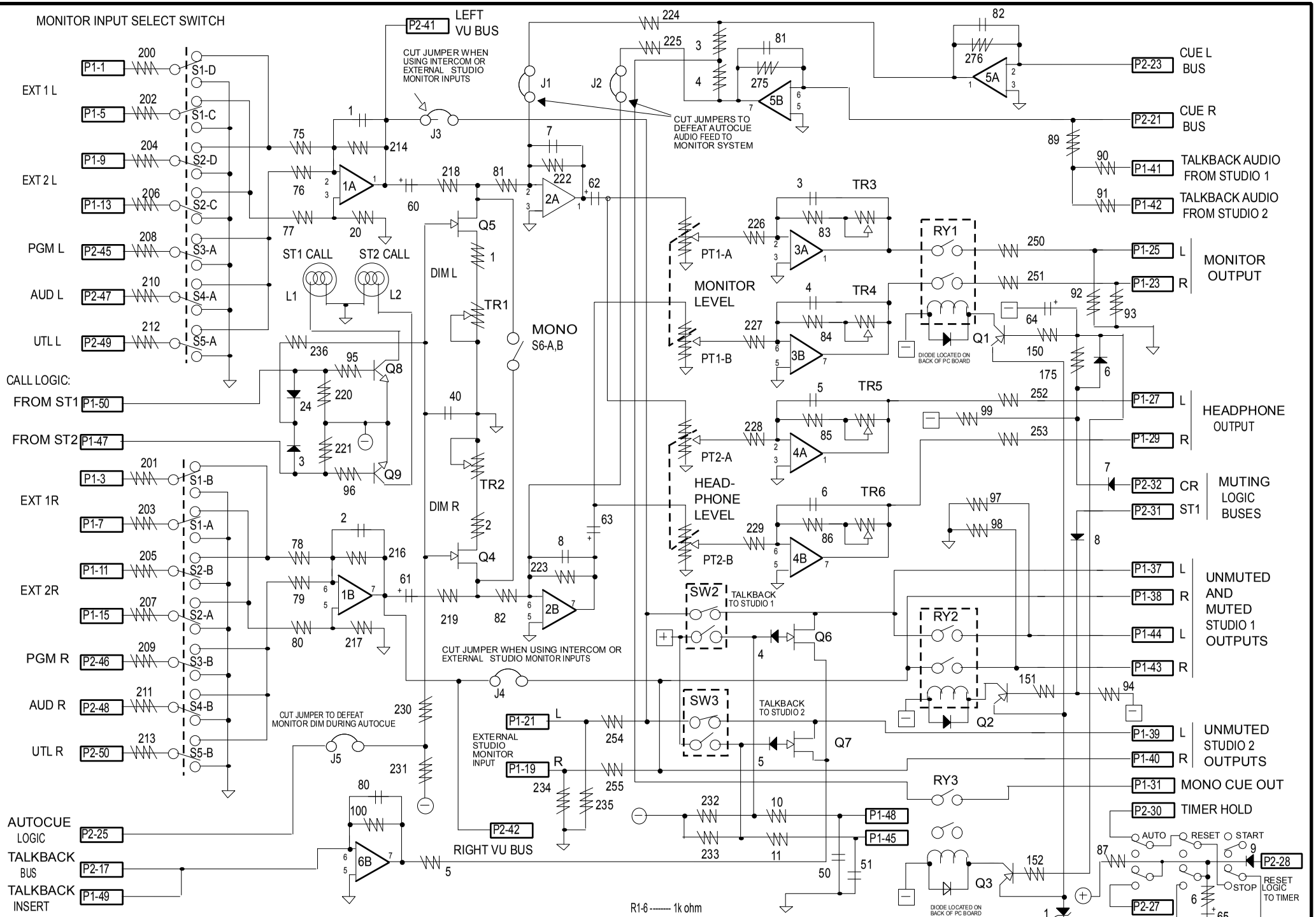
CONNECTOR P1

Foil Side		Component Side	
1)	External 1 Left (-) Monitor Input	2)	NC
3)	External 1 Right (-) Monitor Input	4)	NC
5)	External 1 Left (+) Monitor Input	6)	NC
7)	External 1 Right (+) Monitor Input	8)	NC
9)	External 2 Left (-) Monitor Input	10)	NC
11)	External 2 Right (-) Monitor Input	12)	NC
13)	External 2 Left (+) Monitor Input	14)	NC
15)	External 2 Right (+) Monitor Input	16)	NC
17)	Audio Ground	18)	NC
19)	External Studio Monitor Right In	20)	NC
21)	External Studio Monitor Left In	22)	NC
23)	Monitor Output Right	24)	NC
25)	Monitor Output Left	26)	NC
27)	Headphone Output Left	28)	NC
29)	Headphone Output Right	30)	NC
31)	Cue Mono Out to External Amp	32)	NC
33)	NC	34)	NC
35)	Audio Ground	36)	NC
37)	Studio #1 Left Unmuted Output	38)	Studio #1 Right Unmuted Output
39)	Studio #2 Left Unmuted Output	40)	Studio #2 Right Unmuted Output
41)	Talkback from Studio #1	42)	Talkback from Studio #2
43)	Studio #1 Right Muted Output	44)	Studio #1 Left Muted Output
45)	Call Logic to Studio #2	46)	Audio Ground
47)	Call Logic from Studio #2	48)	Call Logic to Studio #1
49)	Talkback Bus Insert Input	50)	Call Logic from Studio #1

CONNECTOR P2

Foil Side		Component Side	
1)	NC	2)	Audio Ground
3)	NC	4)	Audio Ground
5)	NC	6)	Audio Ground
7)	NC	8)	Audio Ground
9)	NC	10)	Audio VDC(-)
11)	NC	12)	Audio VDC(-)
13)	NC	14)	Audio VDC(+)
15)	NC	16)	Audio VDC(+)
17)	Talkback Bus	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	Cue Right Summing Bus	22)	Logic Ground
23)	Cue Left Summing Bus	24)	Logic Ground
25)	Autocue Logic Bus	26)	NC
27)	Timer Reset Logic Bus	28)	Reset Logic to Timer
29)	NC	30)	Hold Logic to Timer
31)	Studio 1 Mute Logic Bus	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	Monitor Left VU Bus	42)	Monitor Right VU Bus
43)	NC	44)	NC
45)	Program Left VU/Monitor Bus	46)	Program Right VU/Monitor Bus
47)	Audition Left VU/Monitor Bus	48)	Audition Right VU/Monitor Bus
49)	Utility Left VU/Monitor Bus	50)	Utility Right VU/Monitor Bus





IC1-6 -- NE 5532 N (SIGNETICS)
D1 ------ 1N5225 3V ZENER
D2-9 -- 1N914

L1,2 ------ ML-73 LAMP (14V, 80mA)
Q1-3 ------ 2N3906 PNP TRANSISTOR
Q4-7 ------ J111 JFET TRANSISTOR
Q8,9 ------ 2N3904 NPN TRANSISTOR
RY1-3 ---- MRB2A12 RELAY (CLARE)

C1-8 ----- 10pF
C40 ------ .1µF
C50,51 --- .47µF
C60-65 --- 10µF TANT.
C80-82 --- 270pF

R1-6 ------- 1k ohm
R10-11 ----- 4.75K ohm
R75-100 --- 10k ohm
R150-152 -- 22k ohm
R175 ------- 47k ohm
R200-236 -- 100k ohm
R250-255 -- 47 ohm
R275,276 --- 200k ohm
TR1,2 ------- 10k ohm
TR3-6 ------- 500k ohm
PT1,2 ------- 100k ohm

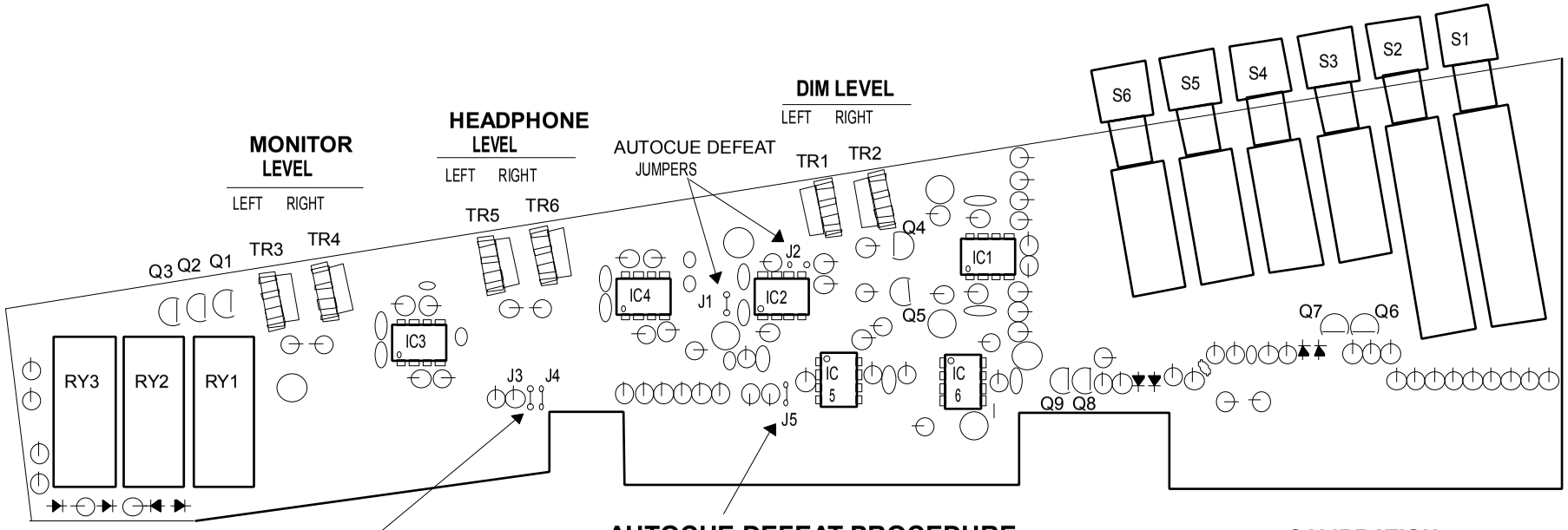
ALL RESISTORS 1% METAL FILM

TCRM1 -MONITOR MODULE

SCHEMATIC | PC1111-CRM1

REV B 9-90 | GF 1/99

ARRAKIS SYSTEMS INC.



JUMPERS J3 AND J4 DEFEAT AUDIO FEED TO STUDIO MONITORS FROM CONTROL MONITORS (CUT JUMPERS WHEN USING INTERCOM OR EXTERNAL STUDIO MONITOR INPUTS)

AUTOCUE DEFEAT PROCEDURE

PERFORM THESE TWO STEPS IF AUTOCUE INTO THE MONITOR AND HEADPHONE SYSTEMS IS NOT DESIRED. WIRE THE CUE SPEAKER AMPLIFIER TO "MONO CUE OUTPUT".

STEP 1 :

CUT JUMPER J5 TO DEFEAT AUTOCUE LOGIC CONTROL SIGNAL. THE MONITOR AND HEADPHONE OUTPUTS WILL NOT DIM DURING CUE WHEN THIS JUMPER IS CUT.

STEP 2 :

CUT JUMPERS J1 AND J2 TO INTURRUPT THE STEREO CUE AUDIO FEED TO THE MONITOR AND HEADPHONE OUTPUTS. CUE WILL ONLY APPEAR ON THE "MONO CUE" OUTPUT WHEN THESE JUMPERS ARE CUT.

CALIBRATION

TR1 - LEFT DIM TRIM (20dB)
TR2 - RIGHT DIM TRIM (20dB)
TR3 - LEFT MONITOR TRIM
TR4 - RIGHT MONITOR TRIM
TR5 - LEFT HEADPHONE TRIM
TR6 - RIGHT HEADPHONE TRIM

NOTE TO ADJUST THE TRIM POTS, PUT THE MODULE ON EXTENDER CABLES (OPTIONAL). IF EXTENDER CABLES ARE NOT AVAILABLE, THE MODULE FACEPLATE WILL NEED TO BE REMOVED TO ACCESS THE TRIM POTS.

TCRM1- CONTROL ROOM MONITOR MODULE

COMPONENT PARTS - LIST BY FUNCTION

IC1 ------- (NE5532N) DUAL OP AMP -- EXTERNAL MONITOR INPUT STAGE
IC2 ------- (NE5532N) DUAL OP AMP -- BUFFER AMP
IC3 ------- (NE5532N) DUAL OP AMP -- MONITOR OUTPUT DRIVER
IC4 ------- (NE5532N) DUAL OP AMP -- HEADPHONE OUTPUT DRIVER
IC5 ------- (NE5532N) DUAL OP AMP -- CUE SUMMING AMP
IC6 ------- (NE5532N) DUAL OP AMP -- TALKBACK SUMMING AMP
RY1 ------- (MRB2A12) REED RELAY -- CR MUTE
RY 2 ------ (MRB2A12) REED RELAY -- ST1 MUTE
RY 3 ------ (MRB2A12) REED RELAY -- MONO CUE MUTE
Q1,2,3 -- (2N3906) PNP TRANSISTORS--- REED RELAY DRIVERS
Q4,5 ----- (J111) FET -- DIMS MONITOR & HEADPHONE
Q6,7 ----- (J111) FET -- SWITCHES TALKBACK TO THE STUDIO MONITORS
Q8,9 ----- (2N3904) NPN TRANSISTORS -- DRIVE “CALL” LAMPS

NOTE -- IF THE TCRM1 MONITOR MODULE IS NOT FUNCTIONAL CHECK TO SEE IF THE VU METERS ARE MOVING. THE MONITOR GETS ITS AUDIO FEED FROM THE VU METER DRIVERS (ON THE, TOB1 OUTPUT MODULE). THEREFORE, IF THE VU METERS ARE NOT MOVING THE MONITOR WILL, BY DEFINITION, NOT WORK.

TCRM1-MONITOR MODULE		
MAJOR PARTS LAYOUT		
REV B	9-90	PC1111-CRM1
ARRAKIS SYSTEMS, inc		

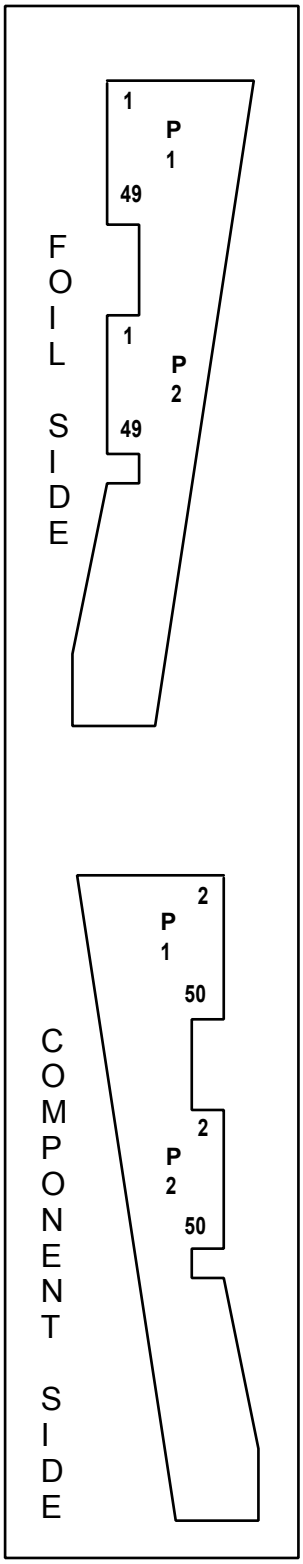
4-9a) TRS1 -- REMOTE SELECTOR #1 CARD EDGE CONNECTOR DIAGRAM

CONNECTOR P1

Foil Side		Component Side	
1)	Switch #1 Left (+)	2)	NC
3)	Switch #1 Left (-)	4)	NC
5)	Switch #1 Right (-)	6)	NC
7)	Switch #1 Right (+)	8)	NC
9)	Switch #2 Left (+)	10)	NC
11)	Switch #2 Left (-)	12)	NC
13)	Switch #2 Right (-)	14)	NC
15)	Switch #2 Right (+)	16)	NC
17)	Switch #3 Left (+)	18)	NC
19)	Switch #3 Left (-)	20)	NC
21)	Switch #3 Right (-)	22)	NC
23)	Switch #3 Right (+)	24)	NC
25)	Switch #4 Left (+)	26)	NC
27)	Switch #4 Left (-)	28)	NC
29)	Switch #4 Right (-)	30)	NC
31)	Switch #4 Right (+)	32)	NC
33)	Switch #5 Left (+)	34)	NC
35)	Switch #5 Left (-)	36)	NC
37)	Switch #5 Right (-)	38)	NC
39)	Switch #5 Right (+)	40)	NC
41)	Output Left (-)	42)	Output Left (+)
43)	Output Right (-)	44)	Output Right (+)
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	NC	2)	NC
3)	NC	4)	NC
5)	NC	6)	NC
7)	NC	8)	NC
9)	NC	10)	NC
11)	NC	12)	NC
13)	NC	14)	NC
15)	NC	16)	NC
17)	NC	18)	NC
19)	NC	20)	NC
21)	NC	22)	NC
23)	NC	24)	NC
25)	NC	26)	NC
27)	NC	28)	NC
29)	NC	30)	NC
31)	NC	32)	NC
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC



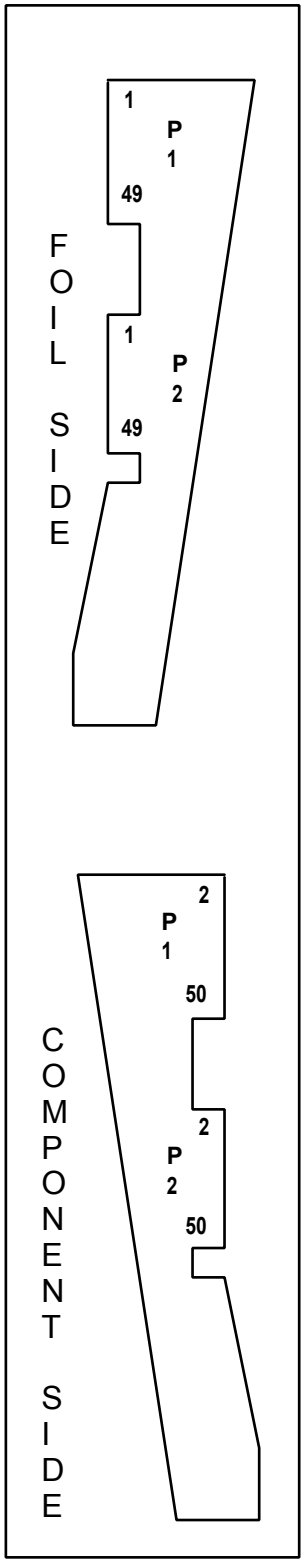
4-10a) TDA1 -- CARD EDGE CONNECTOR DIAGRAM

CONNECTOR P1

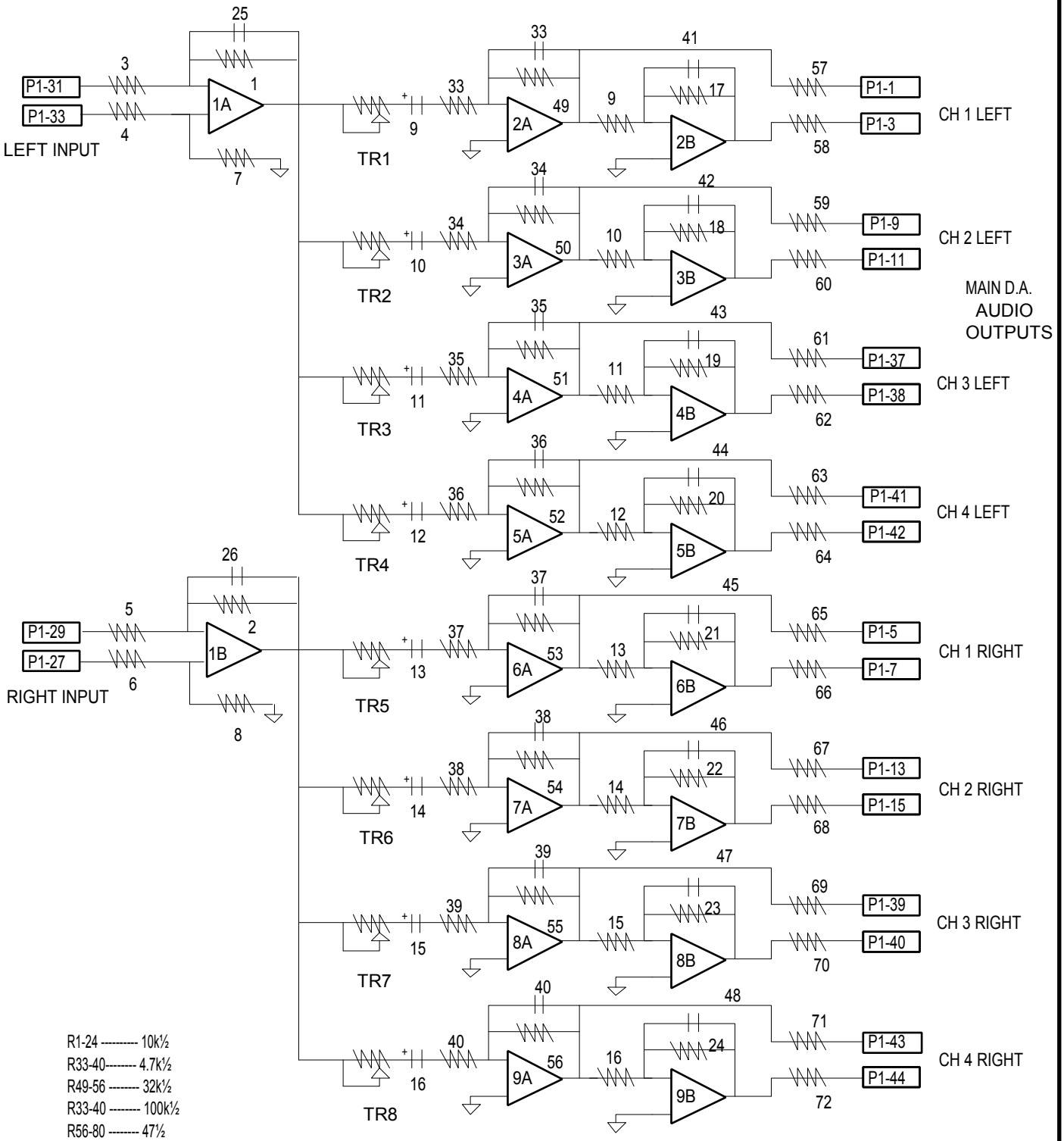
Foil Side		Component Side	
1)	CH 1 Left (-) Ouput	2)	NC
3)	CH 1 Left (+) Output	4)	NC
5)	CH 1 Right (-) Ouput	6)	NC
7)	CH 1 Right (+) Output	8)	NC
9)	CH 2 Left (-) Output	10)	NC
11)	CH 2 Left (+) Output	12)	NC
13)	CH 2 Right (-) Output	14)	NC
15)	CH 2 Right (+) Output	16)	NC
17)	Audio Ground	18)	NC
19)	NC	20)	NC
21)	NC	22)	NC
23)	NC	24)	NC
25)	NC	26)	NC
27)	Right (+) Input	28)	NC
29)	Right (-) Input	30)	NC
31)	Left (-) Input	32)	NC
33)	Left (+) Input	34)	NC
35)	Audio Ground	36)	NC
37)	CH 3 Left (-) Ouput	38)	CH 3 Left (+) Output
39)	CH 3 Right (-) Output	40)	CH 3 Right (+) Output
41)	CH 4 Left (-) Output	42)	CH 4 Left (+) Output
43)	CH 4 Right (-) Output	44)	CH 4 Right (+) Output
45)	NC	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

Foil Side		Component Side	
1)	NC	2)	Audio Ground
3)	NC	4)	Audio Ground
5)	NC	6)	Audio Ground
7)	NC	8)	Audio Ground
9)	NC	10)	Audio VDC(-)
11)	NC	12)	Audio VDC(-)
13)	NC	14)	Audio VDC(+)
15)	NC	16)	Audio VDC(+)
17)	NC	18)	NC
19)	NC	20)	NC
21)	NC	22)	NC
23)	NC	24)	NC
25)	NC	26)	NC
27)	NC	28)	NC
29)	NC	30)	NC
31)	NC	32)	NC
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC

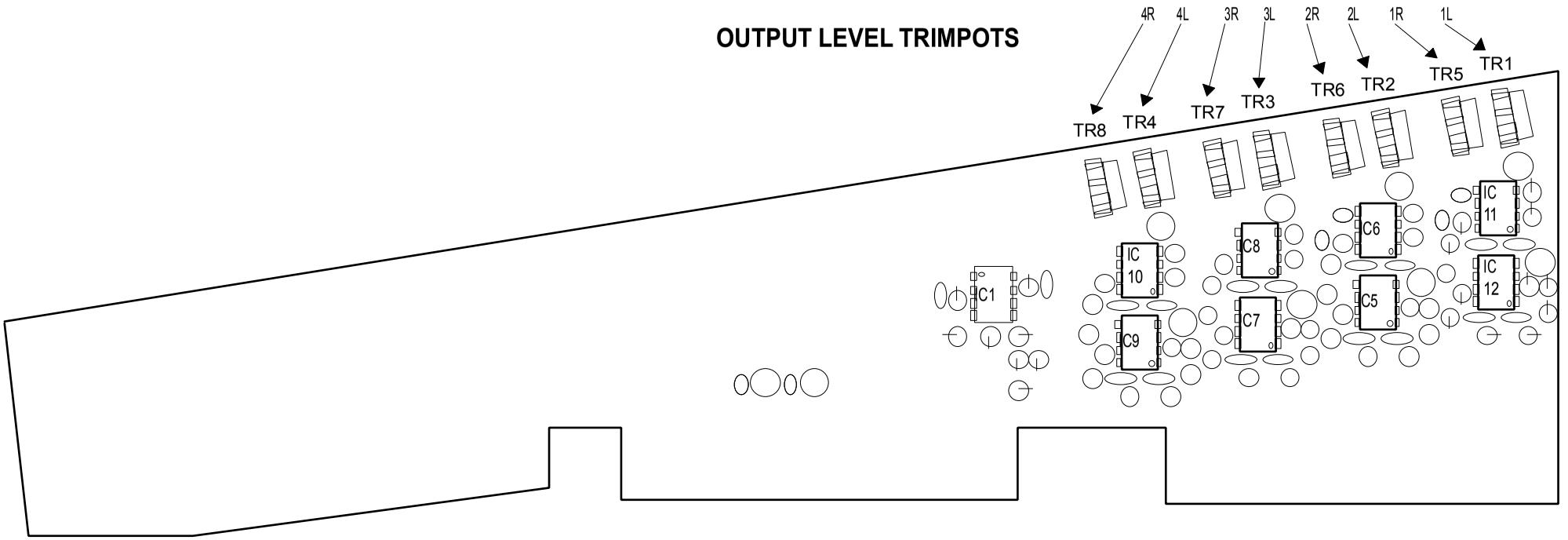


4-10a) TDA1 -- CARD EDGE CONNECTOR DIAGRAM



R1-24 --------- 10k½
R33-40-------- 4.7k½
R49-56 -------- 32k½
R33-40 -------- 100k½
R56-80 -------- 47½
C9-16 ---------- 10µF, 16V TANT
C25-48 --------- 10pF
IC1-16 -------- NE5532N
ALL RESISTORS 1% METAL FILM

TDA1 -D.A. MODULE		
SCHEMATIC	PC1111-OB1	
REV B	9-90	GF
ARRAKIS SYSTEMS INC.		



TDA1 -1x4 STEREO DISTRIBUTION AMPLIFIER MODULE

COMPONENT PARTS- LIST BY FUNCTION

IC1 ---------- (NE5532N) DUAL OP AMP --- STEREO DIFFERENTIAL INPUT AMP
IC2-IC9 ----- (NE5532N) DUAL OP AMP --- OUTPUT DRIVERS

CALIBRATION

DA OUTPUTS
CH1 L ----- TR1
CH1 R ---- TR5
CH2 L ----- TR2
CH2 R ---- TR6
CH3 L ----- TR3
CH3 R ---- TR7
CH4 L ----- TR4
CH4 R ---- TR8

TDA1- OUTPUT MODULE
MAJOR PARTS LAYOUT
REV B | 9-90 | PC1111-OB1
ARRAKIS SYSTEMS INC.

4-11a) TGEM-VID -- CARD EDGE CONNECTOR DIAGRAM

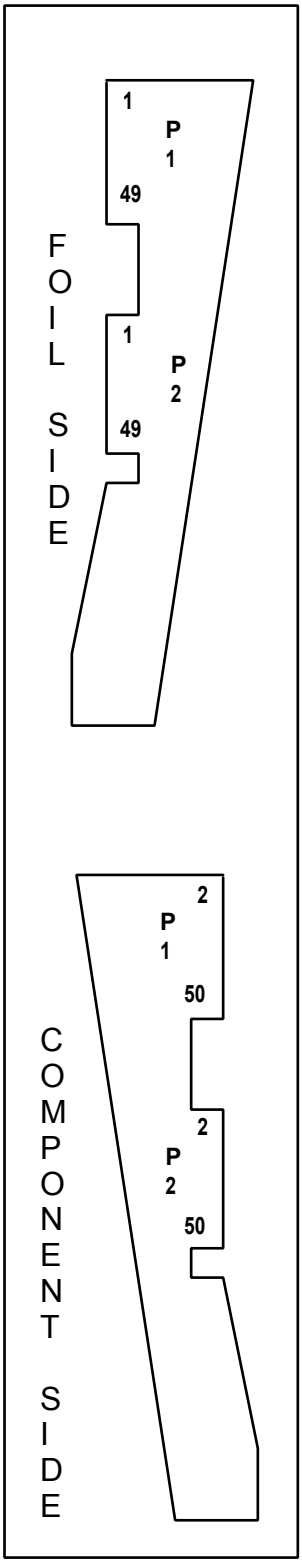
CONNECTOR P1

Foil Side		Component Side	
1)	NA	2)	NC
3)	NA	4)	NC
5)	NA	6)	NC
7)	NA	8)	NC
9)	NA	10)	NC
11)	NA	12)	NC
13)	NA	14)	NC
15)	NA	16)	NC
17)	NA	18)	NC
19)	BIT 0	20)	NC
21)	BIT 1	22)	NC
23)	NA	24)	NC
25)	BIT 2	26)	NC
27)	NA	28)	NC
29)	COMMON	30)	NC
31)	NA	32)	NC
33)	NA	34)	NC
35)	NA	36)	NC
37)	NA	38)	NC
39)	NA	40)	NC
41)	NA	42)	NA
43)	NA	44)	NA
45)	NC	46)	NC
47)	NC	48)	NC
49)	NC	50)	NC

IMPORTANT:
'N/A' PINS MAY BE CONNECTED INTERNALLY.

CONNECTOR P2

Foil Side		Component Side	
1)	NC	2)	NC
3)	NC	4)	NC
5)	NC	6)	NC
7)	NC	8)	NC
9)	NC	10)	NC
11)	NC	12)	NC
13)	NC	14)	NC
15)	NC	16)	NC
17)	NC	18)	NC
19)	NC	20)	NC
21)	NC	22)	NC
23)	NC	24)	NC
25)	NC	26)	NC
27)	NC	28)	NC
29)	NC	30)	NC
31)	NC	32)	NC
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC	42)	NC
43)	NC	44)	NC
45)	NC	46)	NC
47)	NC	48)	NC



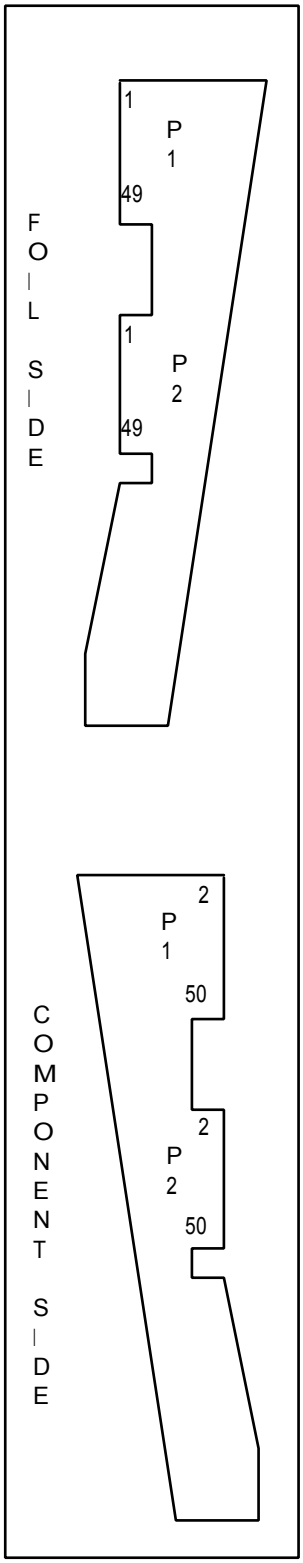
4-12a) TPH1 -- CARD EDGE CONNECTOR DIAGRAM

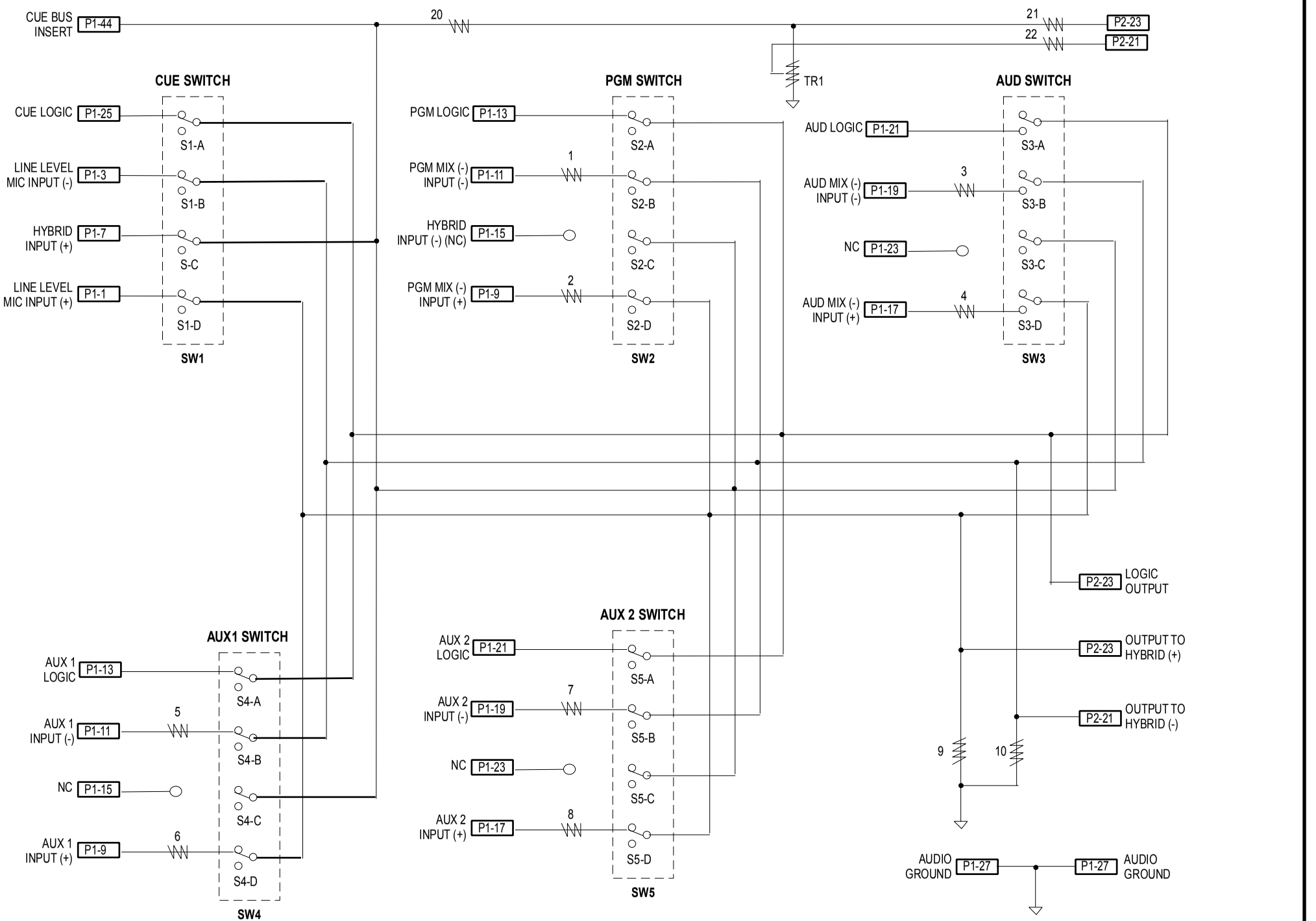
CONNECTOR P1

Foil Side		Component Side	
1)	Line Level MIC Input (+)	2)	NC
3)	Line Level MIC Input (-)	4)	NC
5)	CUE Switch's Logic Input	6)	NC
7)	Input from Hybrid (+)	8)	NC
9)	PGM Mix-Minus Input (+)	10)	NC
11)	PGM Mix-Minus Input (-)	12)	NC
13)	PGM Switch's Logic Input	14)	NC
15)	Input from Hybrid (-) (nc)	16)	NC
17)	AUD Mix-Minus Input (+)	18)	NC
19)	AUD Mix-Minus Input (-)	20)	NC
21)	AUD Switch's Logic Input	22)	NC
23)	NC	24)	NC
25)	AUX 1 Audio Input (+)	26)	NC
27)	AUX 1 Audio Input (-)	28)	NC
29)	AUX 1 Logic Input	30)	NC
31)	NC	32)	NC
33)	AUX 2 Audio Input (+)	34)	NC
35)	AUX 2 Audio Input (-)	36)	NC
37)	AUX 2 Logc Input	38)	NC
39)	NC	40)	NC
41)	Output Hybrid (-)	42)	Output to Hybrid (+)
43)	Swtiched Logic Output	44)	CUE Bus Insert
45)	NC	46)	Audio Ground
47)	NC	48)	NC
49)	NC	50)	NC

CONNECTOR P2

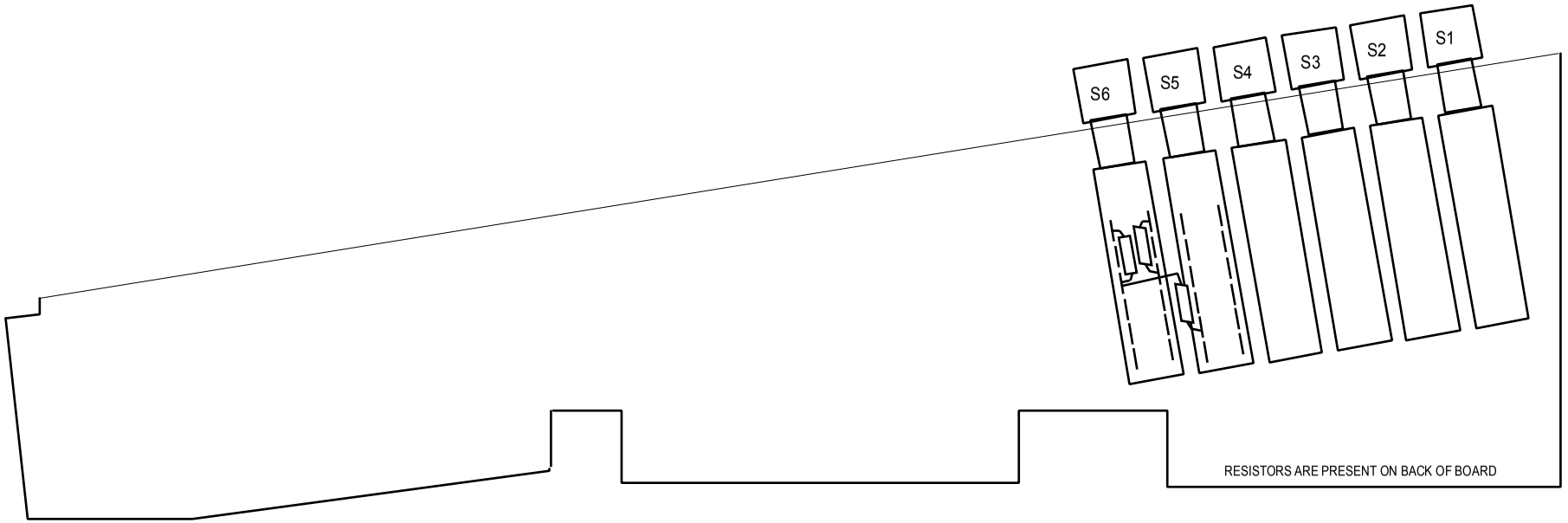
Foil Side		Component Side	
1)	Program Left Summing Bus	2)	Audio Ground
3)	Program Right Summing Bus	4)	Audio Ground
5)	Audition Mix-Minus Summing Bus	6)	Audio Ground
7)	Program Mix-Minus Summing Bus	8)	Audio Ground
9)	Audition Left Summing Bus	10)	Audio VDC(-)
11)	Audition Right Summing Bus	12)	Audio VDC(-)
13)	Utility Left Summing Bus	14)	Audio VDC(+)
15)	Utility Right Summing Bus	16)	Audio VDC(+)
17)	NC	18)	Logic VDC(+)
19)	NC	20)	Logic VDC(-)
21)	Cue Right Summing Bus	22)	Logic Ground
23)	Cue Left Summing Bus	24)	Logic Ground
25)	Auto Cue Logic Bus	26)	NC
27)	Timer Reset Logic Bus	28)	NC (Reset to Timer)
29)	Studio 2 Mute Logic Bus	30)	NC (Timer Hold)
31)	Studio 1 Mute Logic Bux	32)	Control Room Mute Logic Bus
33)	NC	34)	NC
35)	NC	36)	NC
37)	NC	38)	NC
39)	NC	40)	NC
41)	NC (MONITOR L VU)	42)	NC (MONITOR R VU)
43)	NC (AUD L VU)	44)	NC (PGM M VU)
45)	NC (PGM L VU)	46)	NC (PGM R VU)
47)	NC (AUD L VU)	48)	NC (AUD R VU)
49)	NC (UTL L VU)	50)	NC (UTL R VU)





R1-10 ---- 1 ohm
R20,22 -------- 10k ohm
TR1 -------- 5k ohm
ALL RESISTORS 1% METAL FILM

TPH1 - PHONE SYSTEM MODULE		
SCHEMATIC		PC1111-RS1
REV B	8-89	GF 9/99
ARRAKIS SYSTEMS INC.		



TPH1 -- PHONE SYSTEM MODULE

SECTION FIVE

PROOF OF PERFORMANCE

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.

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 amy 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 20,000 Hz. In broadcast, this test is typically performed from 50Hz to 15,000 Hz. Generally, the frequency response specification if 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 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 varie over the audio band of interest (20Hz-20kHz or 50Hz to 50kHz) while recording the Program output level on the voltmeter. nay variatin 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)

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

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 (electronic) Balanced' inputs and outputs. That is, there are no transformers or frequency response is flat across the product's entire bandwidth (between the upper and lower rolloff frequencies). The product's bandwidth is controlled strictly by internal RC time constants.

5-2) SIGNAL TO NOISE RATIO

5-2a) DEFINITION

All Arrakis consoles feature 'Active (electronic) Balanced' inputs and outputs. That is, there are no transformers or frequency response is flat across the product's entire bandwidth (between the upper and lower rolloff frequencies). The product's bandwidth is controlled strictly by internal RC time constants.

5-2b) TEST

This test 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 ouput, 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 ouput level is recorded. This is the 'signal' part of the SNR measurement. The input signal is then removed from the console and noise level is measure using the AC millivoltmeter. The RATIO between the SIGNAL out of the console and the residual NOISE measured by the millivoltmeter SNR. The formula for the SNR is:

$$SNR = 20[\text{Log}(Vsignal/Vnoise)]$$

5-2) SIGNAL TO NOISE RATIO (continued)

The many variable factors associated with this test make it difficult to accurately compare the 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. Therefor, SNR specs obtained using different test methods cannot be accurately compared. Futhermore, once the console is installed, 60 or 120 cycle hum (evene if very, very low) cn be the limiting noise factor in the test

5-2c) CONSOLE PERFORMANCE

SNR TEST: MIC LEVEL INPUT

Most microphones have low-Z output. These MICs require, for proper performance, that theinpu impedance of the console be matched to the MIC's output impedance. The input impedance of the console is high, therefore an impedance matching resistor must be placed acreoss the MIC input terminals. Place a 150 ohm METAL FILM 1% reistor 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 (+) ternimal to ground in the balanced signal generator case. Use a millivoltmeter to confirm that a -50dBm (2.4mVRMS) tone is being applied to the MIC input. Do NOT rely on a -50dBm calibrated setting from the signal generator. this setting is calibrated for a 600 ohm load, NOT a 150 ohm load. Set the channel fader to normal, the operating positin (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 onoly one input channel is on. Adjust a output summing amp trimpot to give a +8dBm (1.95 VRMS) at on 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.

SNR TEST: LIVE LEVEL INPUT

Apply a +8dBu (1.95 VRMS) tone from the signal generator to a line level input module. the conncteions 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 porper bus level (see "Calivration" section of the manual). Adjust a output summing amp trimpot to give a +8dBu (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 prevoius 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 the frequency above 45kHz. This increase in the noise floor occurs outside the aduio 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 20kHze 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 60/120 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 signal. This would measure .1% THD+N even if no distortion harmonics were present at all. An 80dB SNR means a minimum 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

5-1a) DEFINITION

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

5-1b) TEST

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

5-1c) CONSOLE PERFORMANCE

Crosstalk takes place in two basic ways. The first is capacitive crosstalk which increases 20 dB 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 bandlimited audio while capacitive crosstalk has a higher frequency spectrum.

SECTION SIX

MAINTENANCE & SERVICE

6-1) MAINTENANCE

Arrakis 12,000 Series console require no periodic maintenance with the exception of occasional cleaning and lamp replacement.

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

SLIDE FADERS
The Penny & Giles slide faders in the Arrakis 12,000 Series consoles have conductive plastic elements and can be cleaned with warm water. They do no require disassembly. Remove the fader's knob by pulling up on it. remove the fader from the console by removing the two mounting screws, clipping cable ties andn 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 rotary pots are sealed and cannot be disassembled. Front panel knobs may be removed by:
1) loosen the collet under the collored knob cover
2) lift the knob from 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 thse plastic surfaces! Damp dust the wood panels and occasionally treat with common furniture wax.

6-1b) ROUTINE PARTS REPLACEMENT

The front panel controls on a console are obvious 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 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 replacements parts. For example, consider a channel ON switch. This switch can be operated 4 million times before a failure can be expected. If this switch is operated once every 3 minutes, 24 hours a day, 7 days a week, then this switch has an expected life of almost 23 years!

MANUFACTURER SUGGESTED LIFE EXPECTANCY
ON/OFF Switches - 4 million operations
Momentary Switches (Talkback, Cue, etc.) - 100,000
Latching Switches (PGM, PAN, etc.) - 50,000
Faders - 100,000 operations (10% resistance change)
Lamps - continuous 40,000 hrs

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 fell free to call us. We are here to help and must have you field feedback to advance and improve our product. We can't solve every problem, but out people are here to try.

To contact our service department call on weekdays ONLY between:
8am to 5 pm (Mountain Standard Time)
10am to 7 pm (Eastern Time)
9am to 6pm (Central Time)
7am to 4pm (Pacific Time)

The phone number is: **(970) 461-0730**

Note - collect calls will not be accepted!

6-2b) TEST

Arrakis Systems will replace, at no charge, parts that fail due to defects in material or workpersonship 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.

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 with two days) and returned to you. Return shipping over and above the cost of UPS ground will be born 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 resposiblity for non-factory technical expenses!!

6-1) SERVICE (continued)

6-2d) WARRANTY REPLACEMENT OF PARTS

To have apart replaced under warranty, you must:
1) Call or write the “Customer Service Department” and describe what parts need replacement and the 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 Department”** with a letter referring to the replacement parts and your **NAME, CALL LETTERS, ADDRESS, DATE, and RMA#.**
4) Parts replaced under warranty will be shipped at Arrakis expense by UPS ground. Any expense over and above UPS ground will be born by the customer.

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 evergency failure. Thse parts, when used to rplace failures, are not replaced under warranty.

PURCHASED PARTS
Any Arrakis customer may purchase spare or replacement parts from the factory at reasonable prices. Arrakis Systems does no believe in operating it’s Customer Service 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) COD shipping
2) Credit card
3) Through Arrakis authorized dealer, who may offer terms. Arrakis does not sell items on account or payment plac, although dealers may.

IMPORTANT
NON-PAYMENT OR LATE-PAYMENT FOR PARTS WILL MAKE IT NECESSARY TO REFUSE FURTHER CUSTOMER SUPPORT UNTIL THE PROBLEM IS RESOLVED.

SECTION SEVEN

WARRANTY

WARRANTY

Arrakis Systems, inc. warrants this product to purchaser against defects in material and workpersonship 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.