
AIR 1

RADIO MIXING CONSOLE

 *AUDIOARTS ENGINEERING*

Technical Guide
December 2007





Console Features

Overview

The AIR 1 console consists of an input section with eight faders and associated switches, monitor and headphone section with two faders and associated switches.

The basic purpose of the console is to take some of the many audio signals that are wired to the console inputs, and generate several outputs that combine these inputs in various groups and at various degrees of loudness, or signal strength. The typical application is in a radio station where it is desired to develop the signals that the station will broadcast (the on air signal), as well as several additional signals for recording and monitoring.

All programming is made via PCB mounted slide switches accessible through openings in the console's bottom panel.



AIR 1 Bottom Panel

Inputs



The AIR 1 console is designed to handle 6 analog stereo (+4dBu balanced) inputs, two mono microphone (-50dBu balanced) inputs, and one external stereo line level (+4dBu balanced) input that goes directly to control room or meter.

Analog Mono Mic Level Inputs

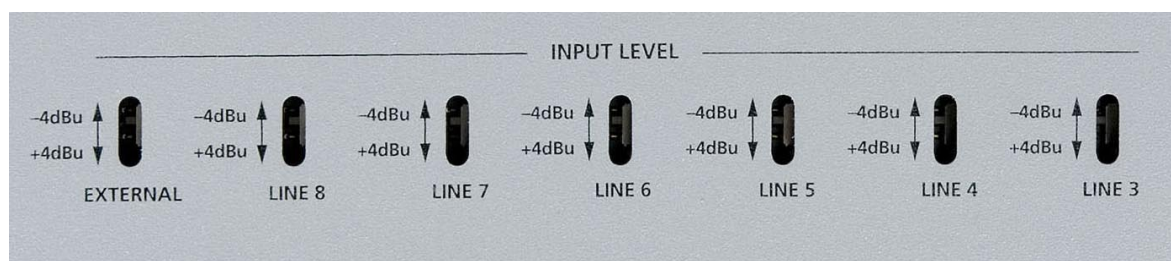
These inputs are used to connect to microphones, which typically put out signals at relatively low signal strength, and therefore require more amplification (increase in signal strength) to be properly audible in the output. Mic level sources are wired to female XLR connectors located on the rear of the console. These mic inputs feed the console's first two faders.

Example: with a microphone input of -60dBm @ 150 ohm at the port, gain trim can set levels from -22dBu to +16dBu (note maximum preamp gain is +76dB) at the PGM 1 or PGM 2 output.

Analog Stereo Line Level Inputs

These inputs are typically used to connect to machines, such as tape decks, cart machines, CD players, etc., that provide analog outputs. All six input line level signals and external signal are switchable between -4dBu and +4dBu via slide switches, LINE 3 - LINE 8 (SW 8 - SW 3 on MBA1-1 PCB) and EXTERNAL (SW 2 on MBA1-1 PCB), accessible through openings in the console's bottom panel.

- When UP the input level signal is -4dBu;
- When DOWN the input level signal is +4dBu.



Outputs



The console outputs include two program stereo busses (PGM 1 and PGM 2), a stereo monitor output, a mono cue output, and a stereo headphone jack.

The console's mono cue signal is provided to drive an external powered speaker, or amplifier and speaker combination, and also provides the cue signal used to interrupt monitor and headphones, if such interrupt has been enabled by the installer.

Program Outputs

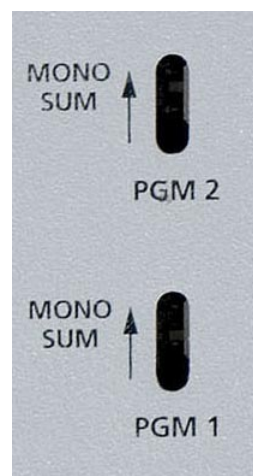
The console's main analog outputs are the two Program stereo busses (PGM 1 and PGM 2). The Program stereo outputs can be programmed to mono outputs via slide switches, PGM 1 MONO SUM and PGM 2 MONO SUM (SW 11 and SW 12 on MBA1-1 PCB).

When SW 12 is UP the PGM 1 is in mono mode, which sums the left and right PGM 1 channels and sends this mono signal to both left and right channels of the PGM 1 output.

When SW 12 is DOWN the PGM 1 is in stereo mode.

When SW 11 is UP the PGM 2 is in mono mode, which sums the left and right PGM 2 channels and sends this mono signal to both left and right channels of the PGM 2 output.

When SW 11 is DOWN the PGM 2 is in stereo mode.



Monitor Output

The AIR 1 has a MONITOR output designed to drive a stereo pair of powered speakers, or a stereo amplifier driving separate speakers, to allow the operator to listen to either PGM 1 or PGM 2, or an external signal. The console may be programmed to mute the monitor or to provide monitor and headphone split cue.

Cue to Monitor

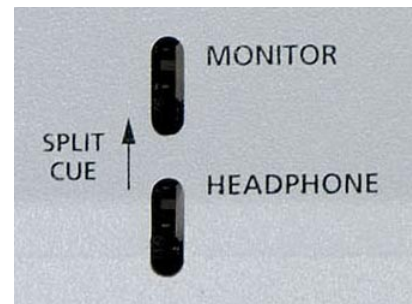
The CUE TO MONITOR (SW 1 on MBA1-1 PCB) slide switch, when activated (UP), sends cue to the monitor.





Split Cue, Monitor

The MONITOR SPLIT CUE (SW 3 on MBA1-1 PCB) slide switch, when activated (UP), allows a summed (L+R) version of the regular program to be sent to the right side of the monitor stereo output, while CUE is sent to the left side.

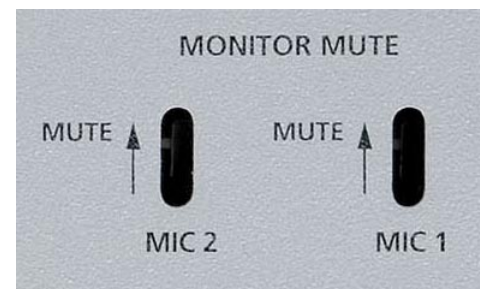


Split Cue, Headphone

For headphones, consoles are normally programmed at the factory for CUE to appear on the left channel, while the L+R sum of the monitor output appears on the right. This can be changed with the HEADPHONE SPLIT CUE (SW 4 on MBA1-1 PCB) slide switch. To defeat this split cue option, turn the switch off (DOWN). With this setting cue will interrupt both sides of the headphones.

Monitor Mute

The console has the ability to mute the monitor output. The console also has an ON AIR tally output that is used to drive user-provided external circuitry that will in turn operate the ON AIR indicator. This tally is automatically activated whenever the monitor mute is activated.



The two microphone channels can be programmed via MIC 1 and MIC 2 (SW 9 and SW 10 on MBA1-1 PCB) slide switches to mute the monitor speakers when the channel is ON.

When MIC 1, SW 10, is UP the console's monitor speakers are automatically muted when the MIC 1 channel is turned ON.

When MIC 2, SW 9, is UP the console's monitor speakers are automatically muted when the MIC 2 channel is turned ON.

This is done to prevent feedback from the monitor speaker to the announcer's mic.

At the same time that muting is enabled (by turning on either of the two MIC channels when set to activate the monitor mute), the ON AIR LED in the center of the meterbridge is also turned on, and a closure is provided at the TALLY output to activate the external circuitry for the ON AIR indicator.

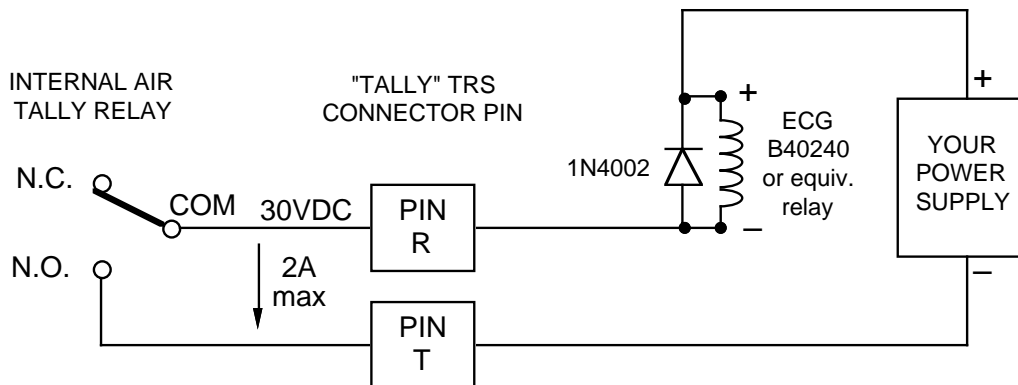
On Air Tally

For controlling an external “on-air” indicator, a relay is provided. The tally is activated when a mic channel set for monitor mute is turned on.

The relay connections are available at the “TALLY” TRS connector mounted on the rear of the console. Connect the on-air light to the external user-provided relay. Do not bring on-air light AC connections to any pin of any connector on the console.

TYPICAL MONITOR ON-AIR TALLY CIRCUIT

USER-SUPPLIED RELAY TRIGGERED BY CONSOLE MONITOR MUTE CIRCUIT



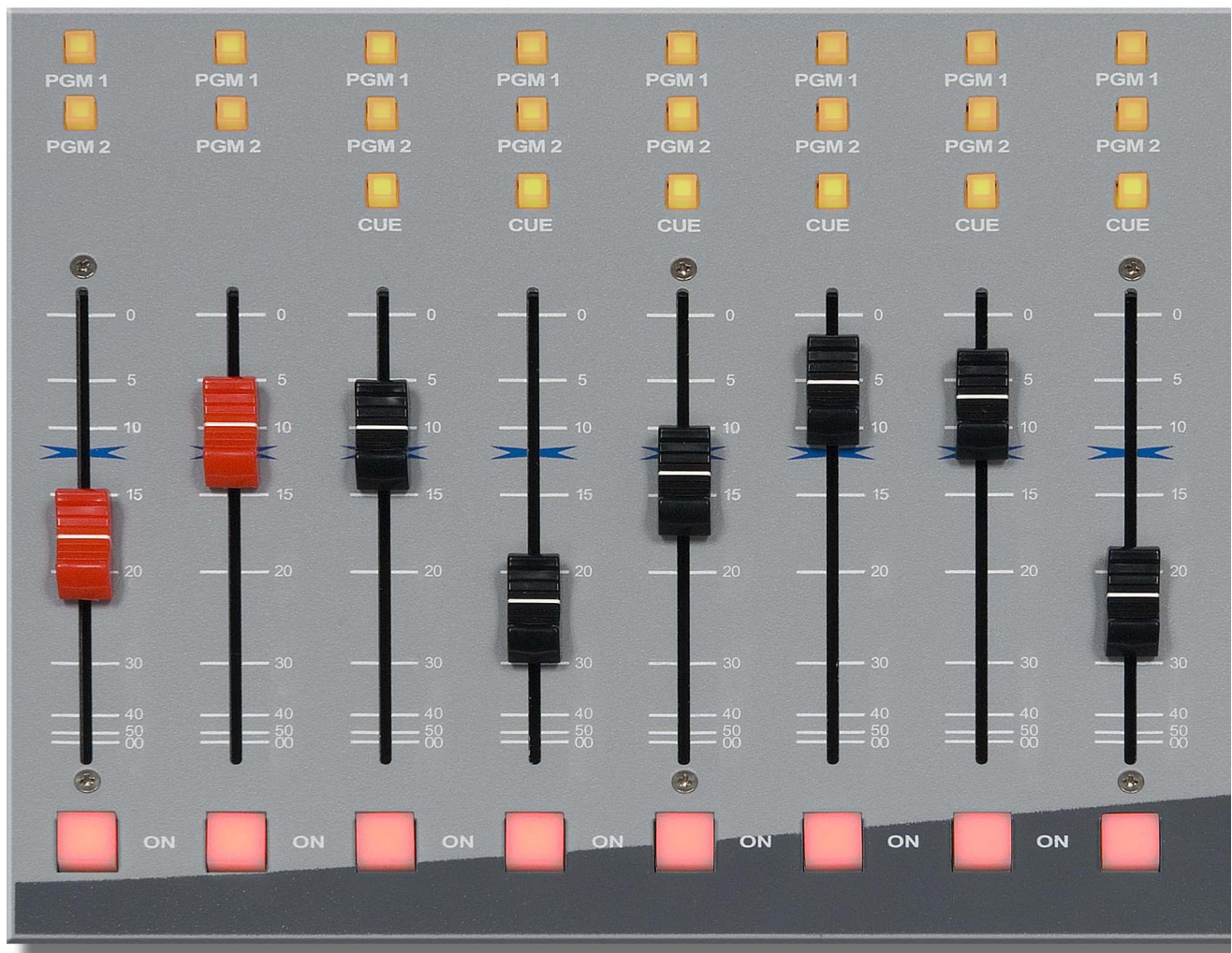
RELAY CIRCUIT POWERED BY USER SUPPLIED EXTERNAL SUPPLY

Controls and Functions

Input Section

The AIR 1 Input section consist of two mono microphone input channels and six stereo analog input channels.

The MIC and LINE input channels have the same controls, except that the MIC channels don't have a CUE switch.



Source

The AIR 1 console accepts two mono mic input signals via female XLR and six stereo line level input signals via TRS connectors.

MIC 1 and MIC 2 GAIN trimpots at the rear of the console below the MIC input XLR connectors are used to adjust the gain of each microphone input independently. These are normally “set and forget” adjustments, and are set at the factory for a gain of 54dB, thus bringing a -50dBu microphone input level up to +4dBu at the output.

If you have more than two microphones in use, you will need to provide external mic preamps for all but two of them. These additional mics will not be able to activate the muting and on air tally functions.

Program Assign

Output switches assign the selected source signal to any combination of the console’s two stereo Program outputs—PGM 1 and PGM 2. The button will be lit when the source is assigned to its respective bus. To remove a source from the bus, press the button again; the light will go off to indicate that the source is no longer assigned to that bus. NOTE that when the console is powered up all input channels will be off and assigned to PGM 1.

Cue Button

The CUE switch (not found on the MIC channels) places the channel’s signal on the console’s cue bus, where it may be heard in the external cue speaker, as an interrupt to the console operator’s headphones, and as an interrupt to the monitor speakers, if so programmed.

Press the CUE button. The channel’s input signal will be included in the console’s CUE output at a level that is independent of the FADER setting, and the button will light. The fader does not need to be turned ON. To remove a fader from cue, press the CUE BUTTON again; the light will go off to indicate the channel is no longer assigned to cue.

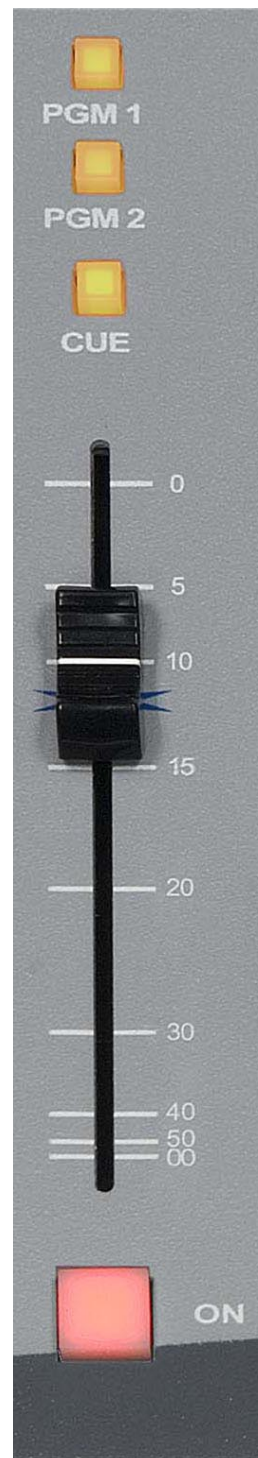
Fader

Level is set by a long-throw fader. The fader is the sliding mechanism that determines how strong is the presence of the input in some of the various console outputs.

If the fader is all the way down (that is, pulled toward the console operator), the signal will not be present in either of the two program main buses to which it is assigned. As the fader is moved up (that is, pushed away from the console operator) the signal will appear more strongly in each of the main buses to which it is assigned.

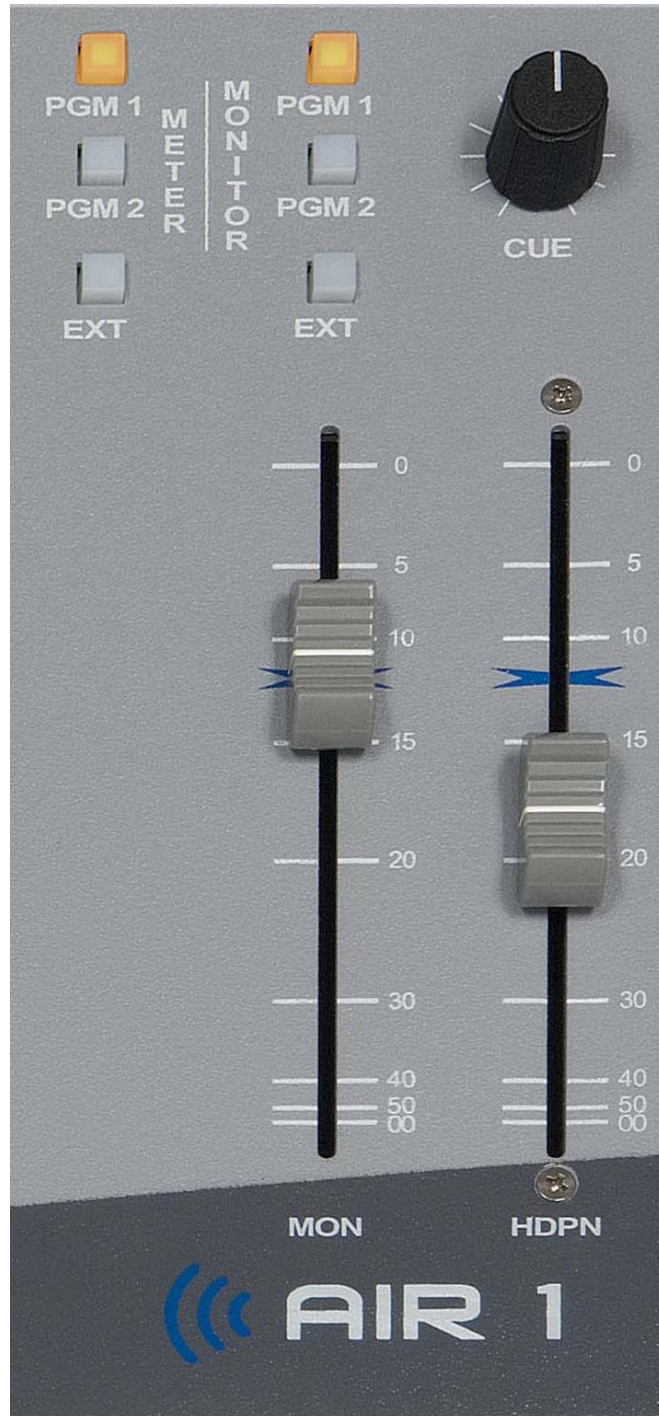
ON Button

The ON button turns the channel on and off by means of electronic switching. The channel is on when the ON button is lit. The mic channels can also be programmed (as mentioned in the previous chapter) to activate monitor mute and on air tally.



Master Section

The Master section includes the monitor, headphone, and meters controls.



Monitor

This is the console operator's monitor that allows the operator to listen to the console's two stereo Program outputs and an external stereo line level input. This section of the console includes the faders for the monitor and headphone, and a cue level control for cue circuits.

In a typical radio application the console is located in the Control Room. Speakers in the Control Room allow the console operator to listen to the console bus outputs to be assured that the console is performing as desired. These speakers are fed by a stereo signal from the console's monitor output. In addition to the monitor output, the operator may also desire to listen to specific isolated faders via the cue system and an external cue speaker, or may want to listen via headphones. Thus, the control room monitor consists of the above controls, along with two program assign (PGM 1 and PGM 2) buttons, and an external input (EXT) button.



In some instances the console operator may also be performing talent whose voice will be heard over the radio. The operator's microphone may thus provide a part of the signal that is going out over the air. If that signal is the one being monitored with the Control Room speakers, there is the potential for feedback. The amplified signal from the Control Room speakers is picked up by the microphone and preamplified to a new, higher, level, which then is once again picked up by the microphone. The signal quickly rises to an ear-splitting screech. To prevent this, the operator's microphone is normally set to MUTE the monitor output to prevent the occurrence of feedback.

The master CUE circuit can be programmed to interrupt monitor feed, or provide a split feed (program mono sum to right, cue to left) to the monitor speakers. It also automatically interrupts the headphone feed, either in split mode (by default) or both sides.

Program Select

Pressing either of the two program (PGM 1 or PGM 2) switches allows the operator to listen to the selected output bus. The button will be lit when the monitor is assigned to its respective bus.

EXT Switch

Pressing the EXT switch allows the operator to pick up the external input (useful for such items as tape recorders or air returns) to listen.

Monitor Fader

The MON fader determines the overall loudness of the signal being monitored as it appears in the Monitor speakers. As the fader slides up, the loudness increases up to a maximum at the top position. To decrease the loudness, slide the fader down.

NOTE: If the Monitor is muted and you slide the fader all the way up, then remove the condition that has the Monitor muted, the sound in the Monitor speakers will suddenly be **VERY LOUD!**



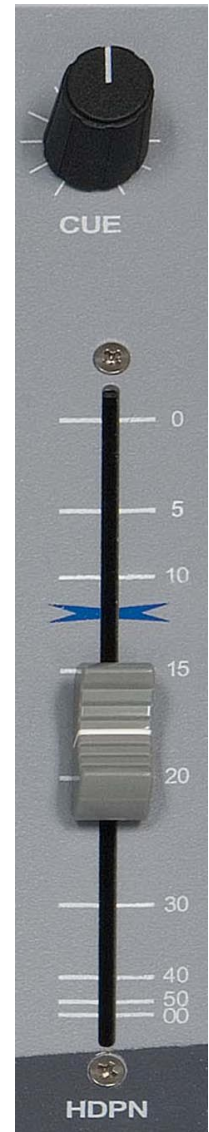
CUE Level Control

The CUE level control determines the overall loudness of the cue signal.

Headphone Fader

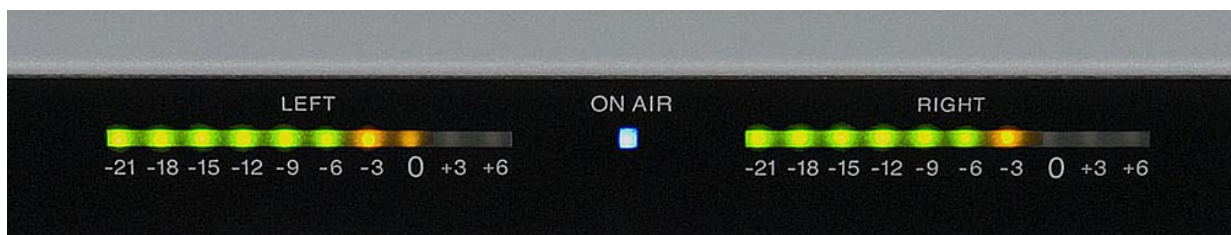
The HDPN fader determines the overall loudness of the headphone output signal, which monitors the same source (PGM 1, PGM 2, or EXT) as the Monitor speakers.

The headphone output signal appears at the HEADPHONE JACK, located on the back of the console as indicated in Chapter 1. The jack is provided as a place to plug in user-supplied **stereo** headphones. High impedance headphones work best; as the headphone impedance is reduced below about 200 ohms the available level decreases.



Meters

The METERS section consists of one 10-segment VU meter pair on the console's meterbridge and a METERS select buttons (PGM 1, PGM 2, and EXT), located on the Master section.



VU Meter Pair

The VU meter pair is a stereo LED bargraph type meter.

The level of the signal being metered is indicated by the number of display elements that are lighted. The more elements lighted, the stronger is the signal being displayed. The right two LEDs in each bargraph are red to indicate when the signal level is approaching a clipping (distorted) level. The next two LEDs

are yellow, indicating a normal level range, and the remaining LEDs are green. The left member of the pair indicates the level of the selected signal's left channel, while the right member of the pair indicates the level of the selected signal's right channel.

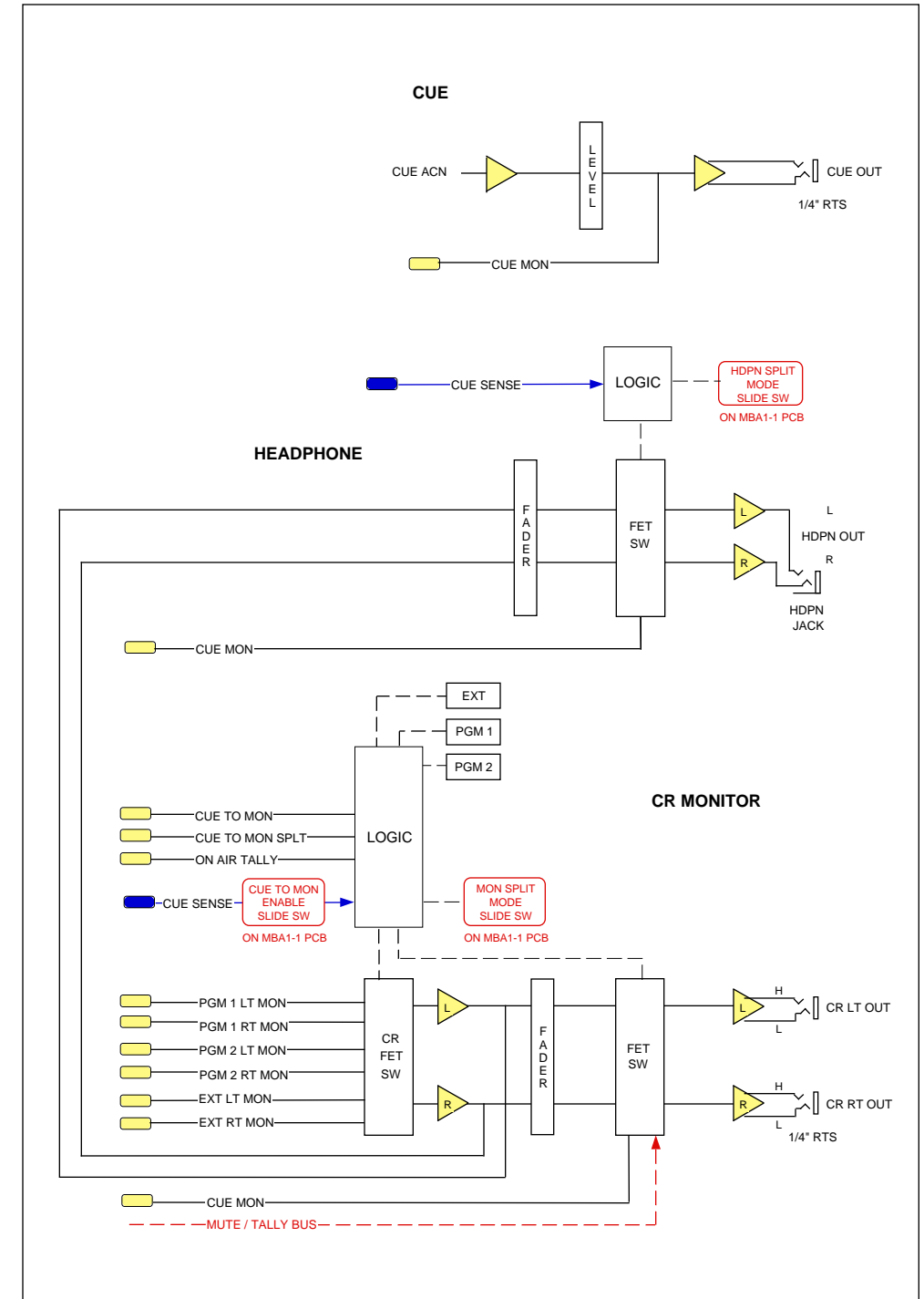
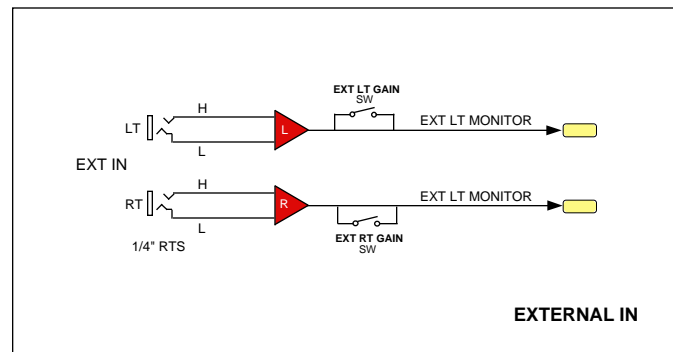
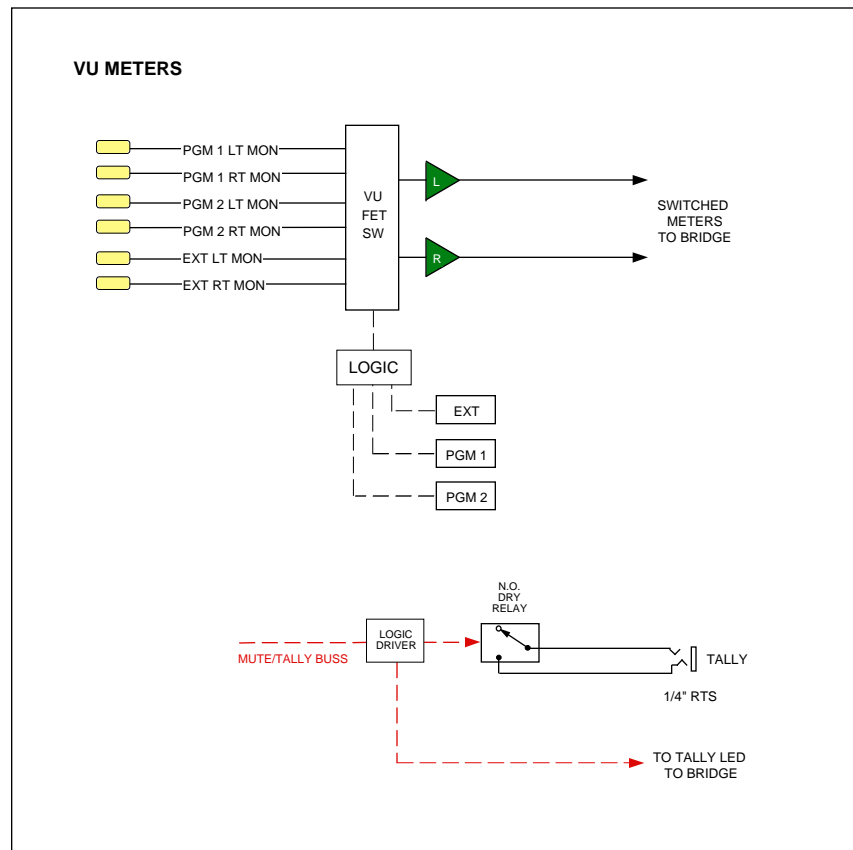
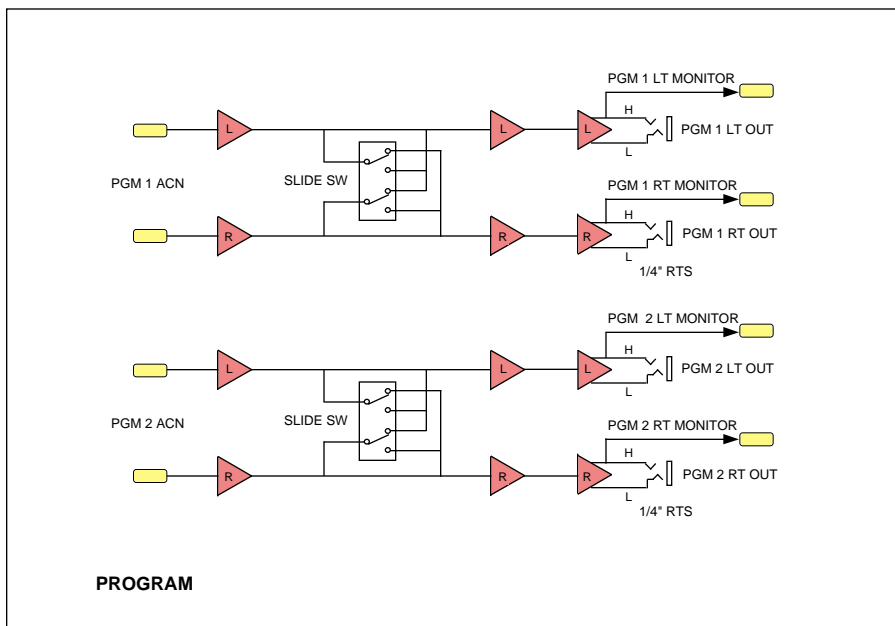
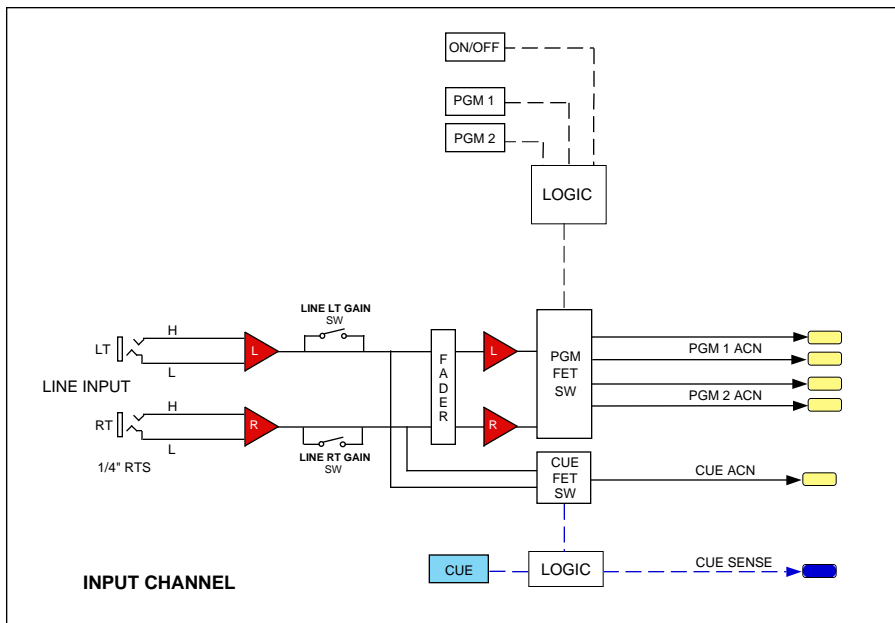
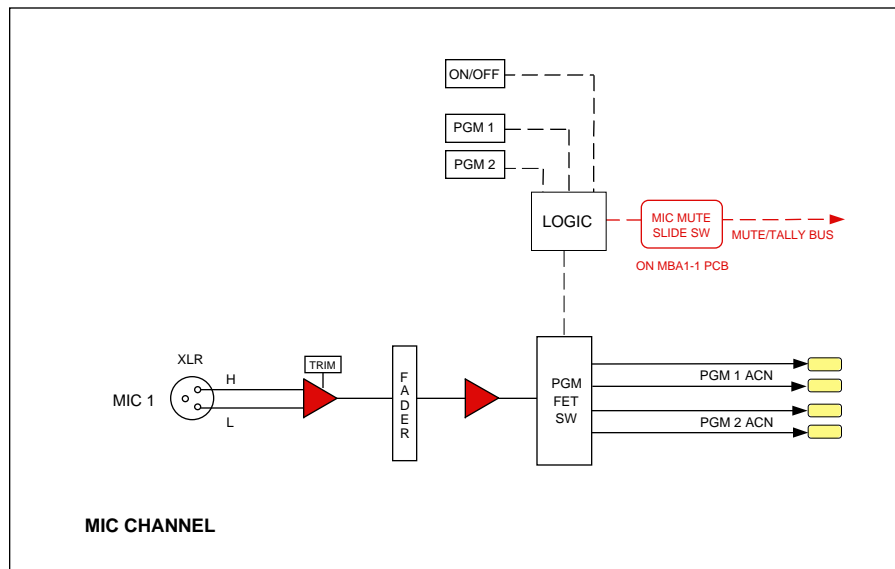
METER Select Buttons

The METER buttons (PGM 1, PGM 2, or EXT) select the source for the meter pair, as indicated above.

On Air LED

The ON AIR LED, located in the middle of the meterbridge, lights up when either of the two MIC channels is programmed by slide switch to have the MONITOR MUTE activated, and is also ON.





AIR 1
System Flow Diagram

Air-1 Dimensions

