

TECHNICAL MANUAL

Broadcast Audio Corporation

SYSTEM 20

POWER ONE INC.
CALIPLANO, CA
1-805-987-8741

POWER SUPPLIES IN THE BROADCAST AUDIO BOARD ARE MADE BY POWER ONE.
THE MODEL # FOR THE +/-18 VOLT SUPPLY IS HN24-3.6
(THEY HAVE ADDED AN 'A' INTO THIS NOW, BUT IS SUPPOSED TO BE THE SAME
SIZE. **NOTE THAT THIS IS A 24 VOLT SUPPLY THAT WE MUST FIELD MODIFY
FOR 18 VOLTS. SEE THE BROADCAST AUDIO/POWER ONE SHEET SCHEMATIC
FOR DETAILS. IT INVOLVES ADDING A 5K6 RESISTOR.**

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TECHNICAL MANUAL

Introduction: BAC audio products combine highest technical standards with human-engineered features and styling, designed expressly for the demanding requirements of today's broadcasting studio. Recognizing that audio quality cannot be improved, once degraded in any way, the design philosophy has been to preserve the full frequency range and transient content of the audio signals.

Liability: The installation and operating instructions in this manual are based on the information available at time of publication and should not afford serious risk to the user. However, the manufacturer does not assume liability relative to useage of the manual and in no case will be responsible of injury or damage to persons or property. See 4.1 Safety Notice, 4.0 MANUFACTURER'S LIABILITY.

Shipping Damage: Before signing the carrier's receipt, inspect the containers for external damage. Note any visible damage on the receipt before signing. Unpack and inspect equipment within fifteen days of receipt. If damage is discovered, make a written request to the carrier for an inspection. Retain all packing cartons and materials for the inspection. The carrier is responsible for any shipping damage, but the recipient is responsible for promptly filing a claim.

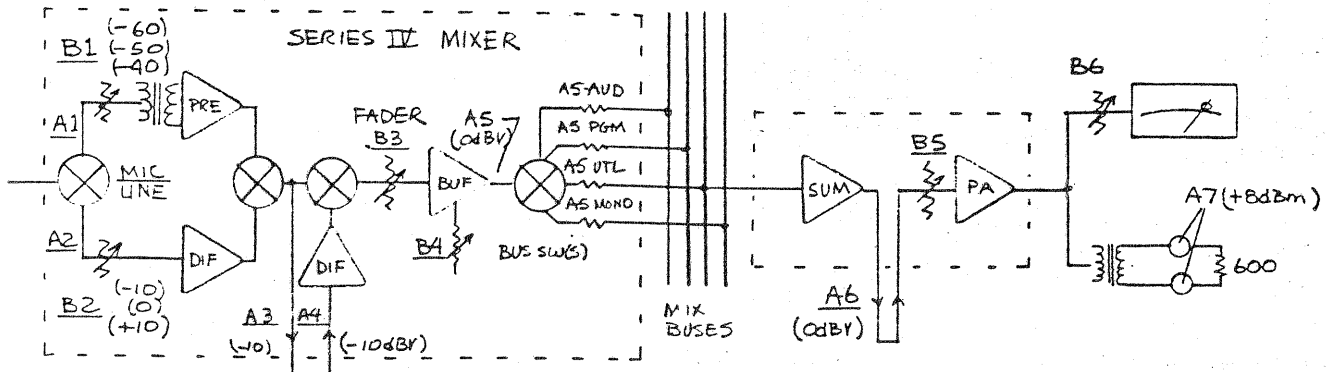
Warranty: BAC products are warranted to be free of defects in parts or labor for a period of 1 year from date of purchase. To obtain warranty service, contact BROADCAST AUDIO CORPORATION with original invoice number, model, type, and serial number. Failure to provide complete identification information may delay repair or replacement under the warranty.

Replacement Parts: When ordering replacement parts, please provide model, type, and serial number. The replacement part supplied may not be identical to the original, but will be an electrically correct replacement.

Ordering Information: Write or call -

Broadcast Audio Corporation
11355 Pyrites Way
Rancho Cordova, CA 95670
(916)-635-1048

SYSTEM 20 MODULAR AUDIO CONSOLE SETUP AUDIO SIGNAL LEVELS



TEST PARAMETERS:

1. Use the above block diagram to locate the various AUDIO LEVEL TEST POINTS.
2. All audio voltage measurements are to be made with a high performance, high impedance voltmeter with a dB voltage scale.
3. Audio signal source generator should be a high quality, low distortion, sine wave signal with a frequency of 1000 Hz.
4. Harmonic and intermodulation distortion measurements should be under 0.05% while performing the following tests.

TEST CONDITIONS:

- A1 - Microphone input test signal INPUT LEVEL; -55dBV \pm 0.5dB as measured at the input of the mixer.
- A2 - Line level input test signal INPUT LEVEL; 0dBV \pm 0.5dB as measured at the input of the mixer.
- B1 - The MIC/LINE switch set in the MIC setting (up position).
- B2 - The Gain Trim -10/0/+10 dBm switch set at 0 (mid position).
- A3 - INSERT (Patch) output (Send) level should be 0 dBV.
- A4 - INSERT (Patch) input (Return) level to be 0 dBV.
- B3 - FADER should be positioned to approximately "60" on the module face reference scale

NOTE: EQ equipped modules should have all EQ switches in the OUT (bypass) position. MODE equipped modules should be set in the STEREO mode, with the PAN control mechanically centered.

B4 - Gain adjust B4 L&R should be preset to their mid rotation position.

A5 - A5*AUD, A5*PGM, and A5*UTL, should have a signal voltage level of approximately 0dBV. Move FADER B3 for the closest compromise of 0dBV between A5 L&R signal levels. Then adjust controls B4 L&R for exactly a 0dBV signal voltage level at A5 L&R. (NOTE: It is almost impossible to measure a signal on the mixing bus, because of the extremely low input impedance of the summing amplifier on the Line Amplifiers.) There is no MONO mixing bus on the SYSTEM 20.

A6 - Voltage level should also be 0dBV at this time.

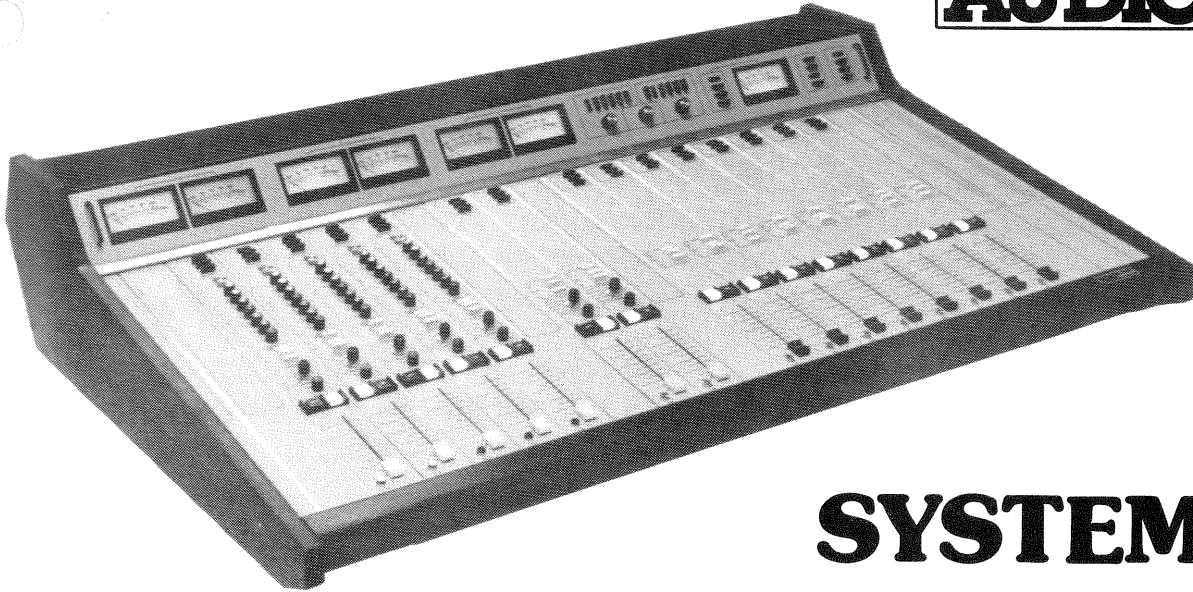
B5 - Level control on all Line Amplifier Cards should be adjusted to obtain an A7 output signal across the Console OUTPUT Terminals of +8dBm level (600 Ohms terminated). This process to be done for all program outputs (600 Ohms terminated). (NOTE: Serial #1-530 used linear trim pots and the normal setting is about 12 o'clock. Later consoles use log taper trim pots and the normal setting is about 3 o'clock). In Cue and Headphone amplifiers, the settings are higher than Line.

B6 - VU calibrate controls on meter motherboard should now be adjusted so that all VU Meters read 0 VU. (NOTE: It is not necessary to terminate each A7 output to adjust the VU Meter calibration).

Power Supplies: Set 12v supply to 12.5v, as measured at power supply barrier strip. Set 18v supplies to $\pm 0.1v$.

Peak Flashers: Adjust output level to +13dBm @ 1kHz; turn LED calibrate pot on meter motherboard until LED lights. (NOTE: This is the factory setting - individual station preference may vary).

1.4 Functional Diagram:



SYSTEM 20

SYSTEM 20 is the latest addition to the Broadcast Audio Corporation family of fine mixers. **SYSTEM 20** uses 100% new electronics, designed especially for this product. It does retain the elegant low profile appearance of our other audio consoles and is the only mixer in its class that sits on top of the desk, without requiring recessed mounting. That makes it easy to install, with all in/out connections made from the top.

Operators will appreciate the smooth feel of Penny & Giles log taper slide faders and the symmetrical panel layout that is easily understood at first glance.

SYSTEM 20 has three available plug-in mixers: Type A has in/out selectors, 7-frequency graphic equalizer, low-cut filter, stereo/mono mode switch and pan pot; Type B has in/out selectors, stereo/mono mode switch and pan pot; Type C has in/out selectors. Each mixer has a transformer balanced mic input *and* a differential balanced line level input. A universal output amplifier is used as line amplifier, stereo headphone and stereo cue amplifier.

SYSTEM 20 uses noiseless d-c audio switching of all program and monitor functions, which also enables each mixing channel to be turned off and on from a remote location, such as an announce studio, news booth, or video switcher. Ten relays with either maintained or momentary contacts can be assigned for muting and remote start. Four additional relays give a momentary "stop" contact when an assigned mixer is turned off. Remote control of a second monitor output lets a studio announcer select his own monitor audio source. In fact, two entirely separate programs could be broadcast simultaneously, using the remote control and remote monitoring function.

SYSTEM 20 SPECIFICATIONS

GENERAL

Operating Mode: Three stereo outputs, plus mono/sum.

Mixing Channels: Up to 20 mixers, each with separate mono mic and stereo high level inputs. ± 10 dB gain trim switch for unusual input levels.

Audio Inputs: Up to 66 stereo inputs — 3 inputs per mixer plus two 4-position remote input switches, user assigned to mixer inputs. These can also be used for submaster assignments.

Input Headroom: 30dB with nominal gain setting.

Audio Outputs: Total of 8 — stereo Program, stereo Audition, stereo Utility, Mono/Sum, stereo Monitor, stereo Headphones, stereo Cue and stereo auxiliary (studio) Monitor.

Source Impedance: Microphone — 150/250 ohms transformer balanced. Line — 600 ohms differential balanced (20k ohms balanced bridging optional).

Patch Points: Mixers — prefader; Line Amplifiers — between summing and output circuits.

Remote Control: Each mixer can be turned on/off with momentary contact to ground. Relays are assignable to any combination of mixers. Two 2-Form B (mute) eight 1-Form C, momentary or maintained (start) four 1-Form C, momentary (stop).

GAIN

Microphone Inputs: 91dB nominal at 0VU output (+8dBm).

Line Inputs: 38dB nominal at 0VU output (+8dBm).

PERFORMANCE

Frequency Response: Within ± 0.3 dB, 20 - 20,000 Hz, all program and monitor circuits.

Rise Time: Less than 6 μ sec. line input to any program output, less than 12 μ sec. microphone input to any program output.

Harmonic Distortion: Less than 0.09% THD 20 - 20,000 Hz at +8dBm output level. Less than 0.02% at 1,000 Hz, +28dBm.

Intermodulation Distortion: Less than 0.03% SMPTE at +28dBm or below.

Monitor Outputs: Stereo Headphone — 4 volts into 10 ohms; stereo cue — 10 watts into 8 ohms; stereo control room and aux Monitor outputs — 0.5 volts into 10k ohm load.

NOISE

Microphone Inputs: -125dBv equivalent input noise, 20 - 20,000 Hz, unweighted, with -55dBv input level to one active mixer input.

Line Inputs: -90 dBm equivalent input noise, 20 - 20,000 Hz, unweighted, with 0dBm input level to one active mixer input.

Crosstalk: Signal to crosstalk greater than 70dB, 20 - 15,000 Hz, any program input to any program output.

ELECTRICAL & MECHANICAL

Power: 105 - 125 volts a-c 50/60 Hz, 250 VA maximum. 210 - 250 volts a-c 50/60 Hz optional.

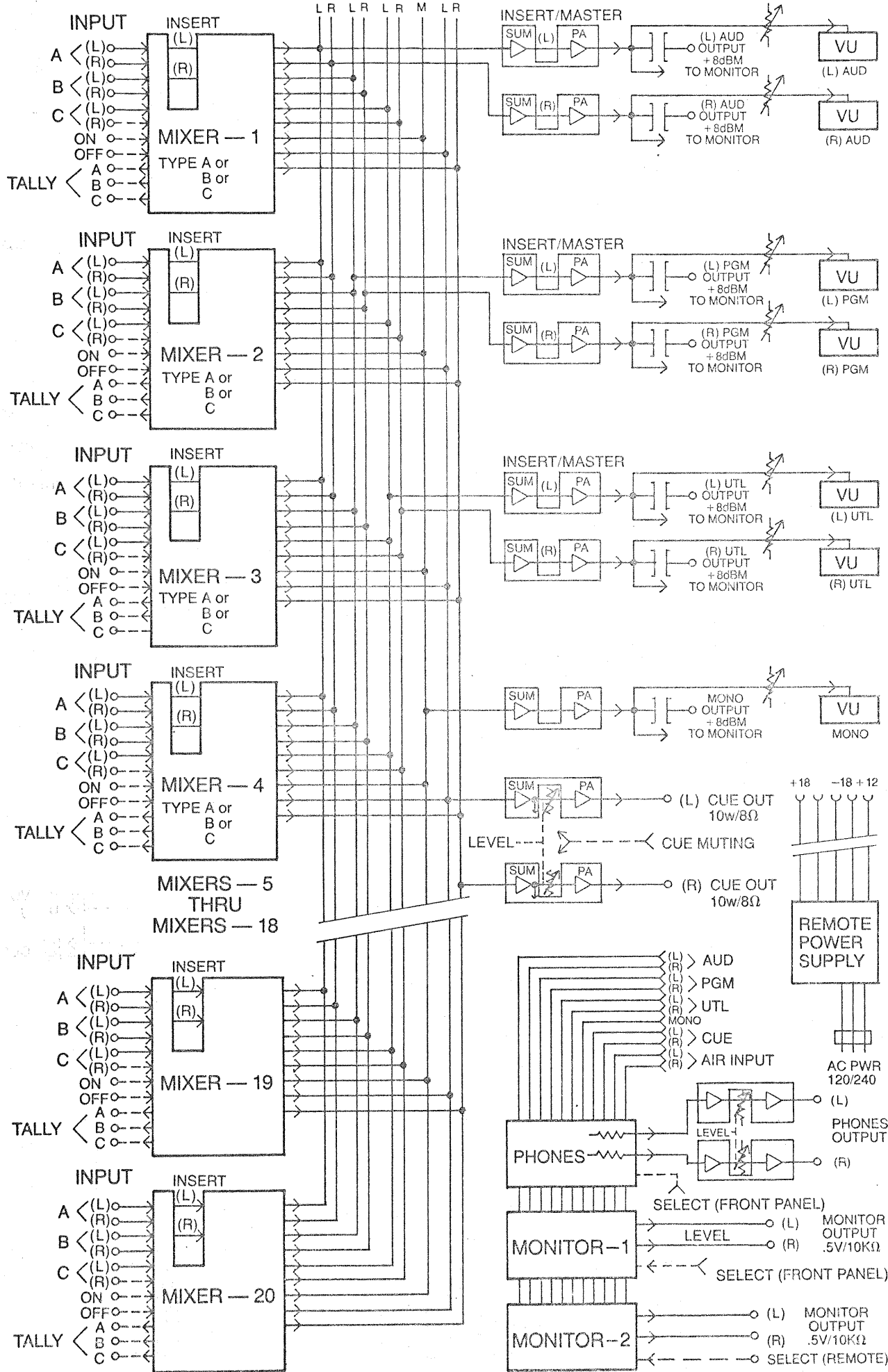
Size: 50.25W x 33.5D x 10.5H (inches). 127.6W x 85.1D x 26.7 H (centimeters).

Shipping Weight: 200 pounds, 535.9 kg. (typical). Two containers.

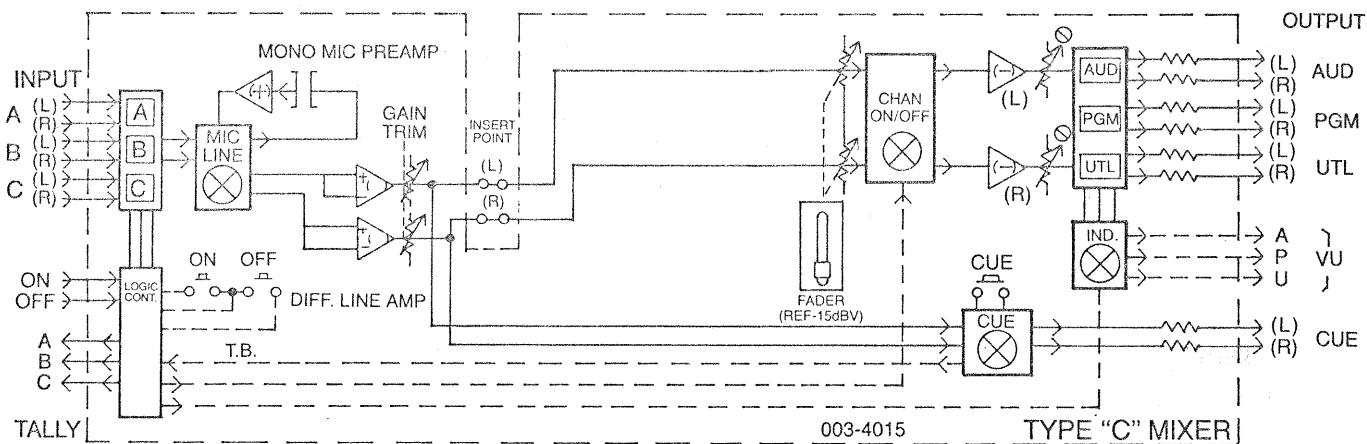
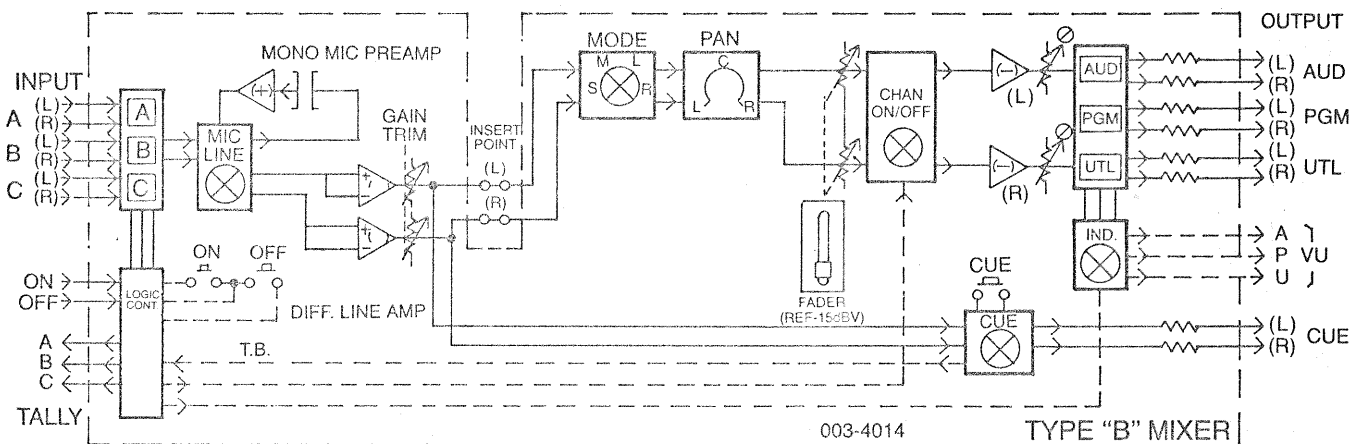
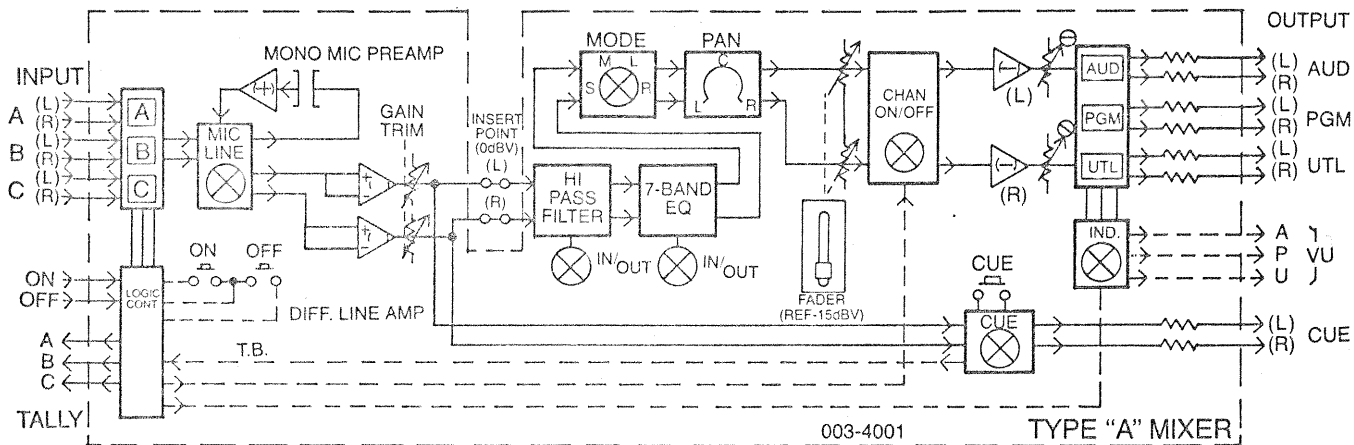
SYSTEM 20 FUNCTIONAL DIAGRAM

MIC — 55dBv
 LINE — 0dBm

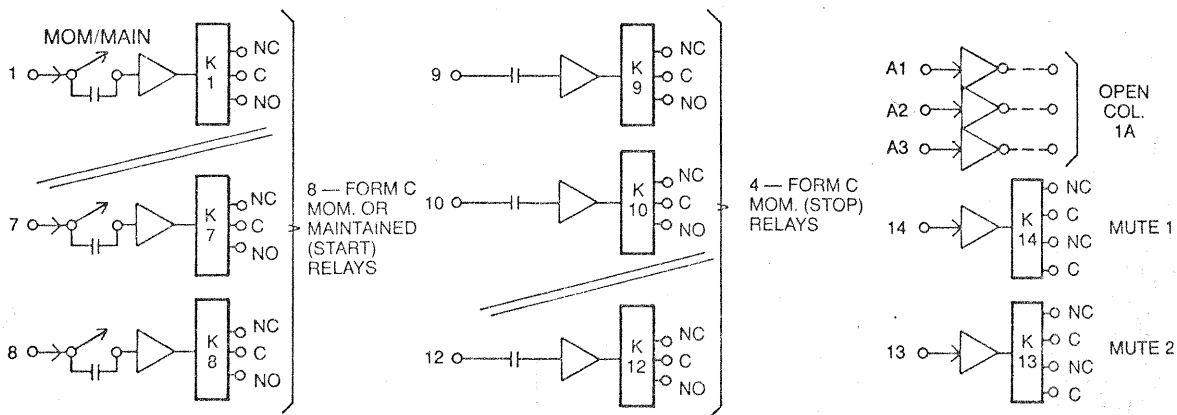
AUD PGM UTL CUE



MIXER FUNCTIONAL DIAGRAM TYPES A/B/C



RELAY LOGIC



2.0 INSTALLATION

2.1 Unpacking:

The console and power supply are in separate containers. Retain both cartons and fillers until the equipment is installed and operating satisfactorily. If there is shipping damage, the carrier is responsible but the receiver is responsible for promptly filing a written claim.

2.2 Inspection:

The meter panel swings upward by lifting on the handles at each end of the panel. Remove the protective tape and check to see that the amplifier cards and VU meters are securely in place and undamaged.

The walnut armrest hinges downward to allow removal of the mixers. To release the armrest, turn the two knurled 1/4 turn fasteners located at the back side of the center support panel, near each end of the console. Support the armrest while loosening or tightening the fasteners to avoid damage by dropping the polished surface.

To remove the mixers, loosen the screw and remove the retaining tab at each end of the mixer and lift the mixer straight up, using a gentle forward and back rocking motion to extract the circuit board from its edge connector. When replacing a mixer, use caution! Too much force may damage the circuit board or edge connector if they are not correctly aligned. Both mixers and line amplifiers may be removed or inserted with power on.

The power supply can now be connected to the console, using the cable provided. Check for correct operation of mixer "off/on" switches and VU meter lights. Refer to Figure 3.1.1, 3.0 OPERATION for details of the console's operating modes.

2.3 Audio Inputs:

Audio inputs to the console (except for barrier strip remote inputs) are located at the rear of the mixer mother board. The input cables enter through slots in the bottom plate and should be soldered to the input terminals for each mixer. The mixers must be removed to gain access to the terminals which are located beside the edge connectors at the rear of the mixer mother board. The connections are identified on the mother board and are the same for each mixer. If only one audio source is connected to a mixer, it would normally go to the "A" input. Likewise, if more than one audio source appear on a mixer, the most frequently used should be "A".

Use a low wattage soldering iron, 25 watts or less, to avoid damage to the mother board. NOTE: DAMAGE CAUSED BY OVERHEATING WILL NOT BE COVERED UNDER WARRANTY.

Follow normal good audio practice of using shielded pair cable with the shield connected at the console, but not connected at the audio source. If problems develop, then try connecting the shield at the source, also. If in a high RF field, keep the unshielded wires short. A braid or copper strap to station ground is advised and may be absolutely necessary. Separate grounds to each mother board should be tried if RFI is a problem.

If frequent microphone changes occur, short cables with female inline connectors can be used for convenience.

2.3.1 Remote Inputs:

Two groups of 4-position selector switches are located beside the Mono meter. Each switch will accept 4 stereo inputs, which can be wired to an unused mixer input switch to expand capacity. The 4-position switches and the mixer input switch position are usually color coded for ease of operation and will be factory-wired to the specified mixer positions.

2.3.2 Unbalanced Inputs:

Although the line level inputs are differential balanced, the design also permits the use of unbalanced inputs. The audio cable shield should be connected to both ground and minus (-) terminals, with the inner conductor going to the plus (+) terminal. With this connection, an unbalanced input will not cause a significant change in frequency response.

2.3.3 Monaural Inputs:

Monaural audio sources can be used with Type C mixers by simply paralleling the left and right inputs. Normally, the resulting mismatch will cause no problem. Type A and B mixers have a stereo/mono "mode" switch which can be used to feed a single mono input to both stereo channels.

2.3.4 Input Sensitivity/Impedance:

Each mixer can accept either mono mic or stereo line level inputs. A 2-position slide switch on the mixer circuit board selects both impedance and sensitivity, which are: -55 dBv/150 ohms transformer balanced, and 0 dBm/600 ohms differential balanced. The switch is located on the component side of the mixer circuit board, and is accessible through slots in the center support bracket. With the switch "up" the sensitivity is 0 dBm, "down" is -55 dBv.

2.3.5 Gain Trim:

To compensate for variations in input levels, a Gain Trim switch is provided. It is a 3-position slide switch which is located on the non-component side of the mixer circuit board, and is accessible through slots in the center support bracket. With the switch "up" the gain is reduced by 10 db, "down" increases the mixer gain by 10 db, and the center position is "off".

2.4 Audio Outputs:

All audio outputs from the console appear on barrier strips along the front edge of the two output mother boards, located under the meter panel. The barrier strips clamp a stripped wire under a metal plate, so that wire terminals are not required. The various audio outputs are identified on the PC boards for ease of wiring.

All outputs except Cue, Phones and Monitor are transformer balanced. Recommended practice with balanced outputs is to use shielded pair cable with the shield connected at the load input, but not at the console output. If problems develop, then try connecting the shield at the console. Use shielded cable between the console and monitor amplifier, keeping unshielded leads as short as possible. A headphone jack should be mounted in a convenient location and connected to the Phones output, using shielded cable.

2.5 Air Monitor Input:

This is an unbalanced input which feeds both the Phones and Monitor selector switches. A high quality audio signal at this input will offer less incentive for operators to monitor only the console output and perhaps fail to detect on-air problems. It is possible to use a stereo receiver as both an air audio source and monitor amplifier, by feeding the "tape output" of the receiver to the Air Monitor input, and the console monitor output to the "tape monitor input" of the receiver. The Air Monitor input terminals are on the middle mother board under the meter panel, along with the Mono, Cue, and Headset amplifiers. This input presents a 10K load to the air receiver.

2.6 Speaker Muting: (See Figure 2.6.1)

Two plug-in muting relays are provided for speaker muting. Each has 2 Form B contacts, appearing on barrier strips in front of the relay. The logic level to each relay driver is also available, so that an external triac or solid state relay can be used to control on-air lights, with switching away from sensitive audio circuits.

There are 3 logic lines from each mixer, in series with one section of the 3-station input selector switch. Thus, only 1 of 3 logic lines can be active (+5 vdc) at any time. Diode isolation is provided so that several logic lines can operate the same muting relay, if desired.

The muting and control relays are located on the mother board at the right side of the console, beneath the meter panel. The logic lines and relay driver inputs appear on solder terminals, which must be interconnected for the desired muting combinations.

The Cue amplifier is electronically muted, via LCR's at the amplifier input. A Cue Mute terminal appears on the same mother board, and must be connected to the logic output from the control room mic, if Cue muting is required when the mic is "on".

2.7 External Start/Control: (See Figure 2.6.1)

Eight plug-in relays, with Form C contacts, are available for starting external equipment, such as turntables or tape equipment. The relays have solid state drivers, with DIP switch selection of maintained or momentary action. Four "stop" relays, with Form C contacts, give a momentary action for turning off equipment.

Inductive ac circuits, such as turntable motors or incandescent lamps should not be switched directly by the control relays, as transients will probably appear in the form of "pops" in the audio output. A triac or solid state relay is best for turning on motors, and should be located as close to the motor as possible. Zero voltage turn on solid state relays will give the lowest possible switching noise. Most solid state relays can be driven directly from the logic lines.

The logic lines and relay driver inputs appear on solder terminals which must be interconnected according to the desired control functions. See Section 2.9 for a method by which a cartridge reproducer can turn off its mixer, after the tape message ends.

2.8 Accessory Timer Control:

The accessory timer is usually jumpered to run continuously (instructions supplied). A momentary Form A contact will reset the timer to zero, allowing a new timing cycle to begin. One control relay must be delegated to the timer, but any number of mixers can be used to control the timer. Without the continuous-run jumper, the timer can be remote controlled to start, stop, and reset, which may be advantageous in some applications.

2.9 Remote Mixer Control: (See Figure 2.6.1)

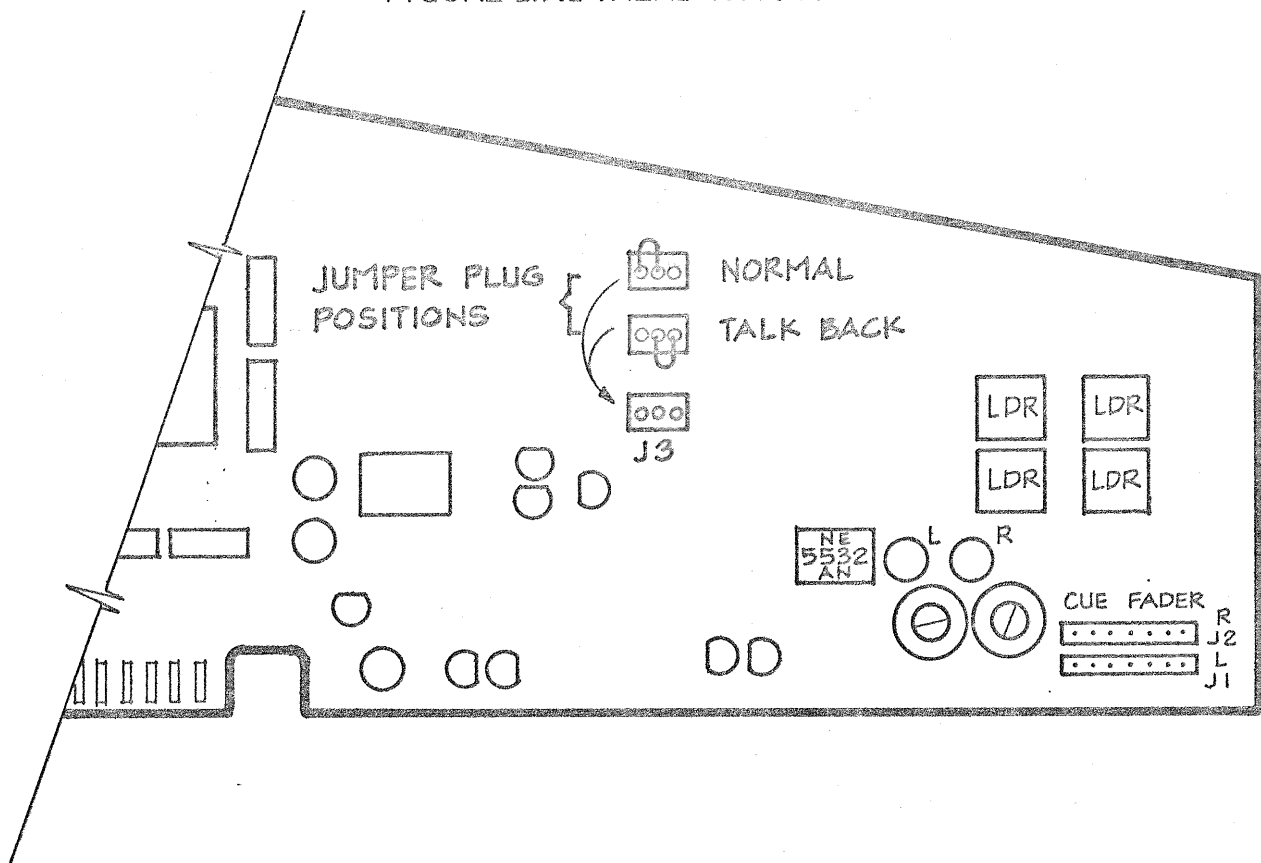
Each mixer can be turned on or off from a remote location, using 2 Form A momentary switches, which are electrically in parallel with the push buttons on the mixer. The remote switches should be connected between the ground terminal and "start/stop" solder terminals located on the relay mother board. All control functions designated to a mixer will also occur when the mixer is turned on by remote switches.

An interesting application of remote mixer control is to use the secondary or tertiary tones within the cartridge tape system so turn the mixer off after a tape message ends. A Form A momentary contact from the cartridge reproducer will turn off the mixer that was also used to start the tape.

2.9.1 Installing Additional Mixers:

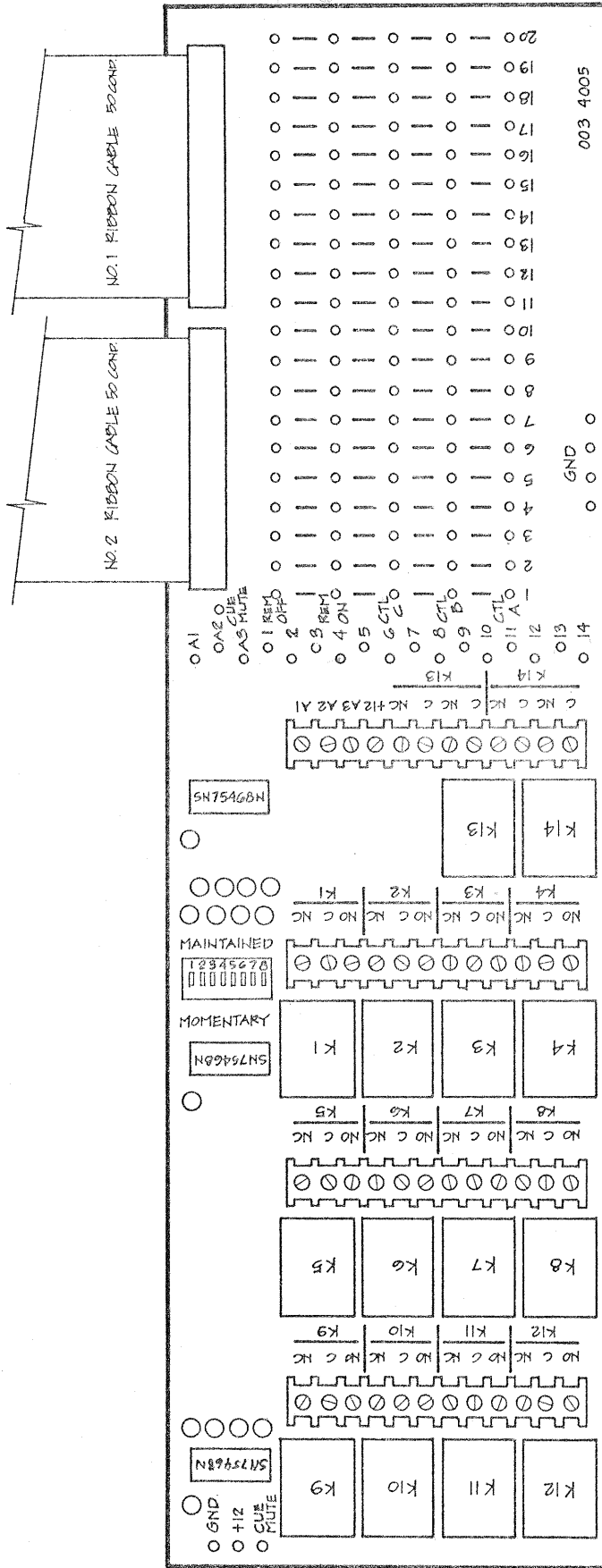
Remove the mixer blanks by loosening the screw and removing the retaining tab at each end. Gently insert the mixer into the 2 edge connectors, using the card guide at the meter end of the mother board, to orient the mixer circuit board. Due to the summing circuit at the input to the line amplifiers, there is no loading effect when additional mixers are added.

FIGURE 2.9.2 TALKBACK SYSTEM



To activate the talkback system, install the jumper plug at J3 in the "talkback" position on both the control room mic mixer and studio mic mixer. This will mute the monitor speakers in the control room and studio when the Cue button is depressed on either mixer. See Section 3.8, of 3.0 OPERATION.

Figure 2.6.1 Muting/Control Connections



- Remote Off/On: Connect switches between off/on terminals and ground.
- Muting Relays: Connect jumper from Mixer Control terminal to relays K13 & 14.
2 Form B contacts each relay.
- Start Relays: Connect jumper from Mixer Control terminal to relays K1-8.
1 Form C contact each relay. DIP switch selects maintained or momentary contact closures when mixer turned on.
- Stop Relays: Connect jumper from Mixer Control terminal to relays K9-12.
Momentary contact closure when mixer turned off.
- Cue Muting: Connect jumper from Mixer Control terminal to Cue Mute terminal.
Cue muting is electronic.
- Note: Diode jumpers may be required in cross-connected circuits.

3.0 OPERATION

3.1 Basic Control Functions: (See Figure 3.1.1)

3.2 Mixers: (See Figure 3.2.1)

Three types of interchangeable mixers are available, each with internal switches to select between microphone and line level sensitivity, and for trimming the selected sensitivity up or down, to compensate for unusual input levels.

The front panel Input switches select from the 3 available stereo inputs, which will normally be the same nominal input level. The logic output from the mixer is also selected by the Input switches, so that 3 separate Start/Control lines are available from each mixer. Thus, each mixer can receive audio from 3 audio sources and selectively start any of the 3 when the mixer is turned on.

The Output switches feed the mixer output to either of the 3 stereo busses. These switches also feed the VU meter lamp logic to the appropriate meters. The Cue button is a separate switch that allows cueing with the fader in any operating position. The "soft" audio turnon characteristics of the mixer circuitry make it possible to start most audio sources, such as turntables and cartridge tapes, with the fader up.

Off/On control of the mixer is by means of illuminated momentary pushbuttons which control the electronic audio switching and logic circuits. When the mixer is "on", external start logic is sent to the Input switches, and VU meter lamp logic goes to the Output switches for routing to the selected input/output circuits. If there is a power failure or interruption, all mixers will be in the "off" condition when power is restored. The Off/On buttons pull away from the switch housing for easy lamp replacement.

The Fader is a professional length Penny & Giles log taper slide potentiometer, for accurate tracking between channels and ease of operation. Although rugged and reliable, it should be treated with the care that precision electronic equipment deserves. Rough handling or spilling foreign objects, such as ashes or liquids, into the slider can cause damage. For optimum performance and user convenience the normal operating position of the fader should be between 60 and 80 on the mixer scale. If not, an adjustment of the audio source level, or the internal Gain Trim switch within the mixer may be necessary.

Mixers may be removed and reinserted with power on, but care must be taken during reinsertion to see that the mixer contacts line up correctly with the edge connectors on the mother board. Excess force could cause damage.

3.3 Mono Source Select: (See Figure 3.3.1)

The console has 3 stereo line outputs and 1 mono line output. Each of the 3 stereo outputs can be used as a source for the mono output. Stereo outputs from Audition, Program, or Utility are still available when a mono output is derived from any of these.

When a mono output is not required for programming purposes, the meter can be used to detect out of phase stereo signals. A lower than normal meter reading indicates the presence of out of phase material. This condition often occurs on tape cartridges and is particularly annoying to listeners with mono FM receivers.

3.4 Monitor/Cue/Phones: (See Figure 3.4.1)

Identical source switches select the audio inputs to the Monitor and Headphone outputs. In addition to inputs for the 3 stereo and 1 mono outputs, there are switch positions for cue audio and the output of an on-air receiver or modulation monitor - both in stereo. The stereo cue feature enables the operator to hear the audio source just as it will appear on the air, and at greater volume through the monitor amplifier. Either high or low impedance headphones may be used with the console. The amplifier will drive several headphones, but if more than 2 are used, an isolating network may be required.

3.5 External Start/Control:

A standard console can start up to 10 external devices each time the mixer for that device is turned on, and stop up to 4 devices when the mixer is turned off. Examples are: Starting turntables or tape equipment, controlling "on-air" lights, and muting monitor speakers. Several mixers can also control the same muting circuit, as in the case of several mic inputs from the same studio. It is also possible to use the Secondary or Tertiary tones from the cartridge reproducers to turn off the mixer at the end of an announcement. The Start/Control functions are determined by internal jumpers installed per Section 2.7, of 2.0 INSTALLATION. Either momentary or maintained signals are possible. A 20 mixer console will provide logic signals for up to 60 control functions, but external relays or solid state switches may be required for control of more than 10 devices.

3.6 Accessory Timer:

A 60 minute 4 digit timer is available for timing programs, announcements, and music leadins under control of selected mixer "on" switches. Basic operation is as follows: The timer runs continuously, but is reset to zero each time a controlling mixer is turned on. Thus, a new timing cycle is begun whenever a new event begins, such as starting a turntable, tape, or turning on a microphone. The same mixer can be used for start/control and timing. The controlling mixers are selected by internal connections

installed per Section 2.8, of 2.0 INSTALLATION. The timer is in its own cabinet, which can be placed upon the console or elsewhere. A matching digital clock is also available.

3.7 Remote Mixer Control:

The momentary "off/on" buttons on each mixer control electronic audio switches which can also be remote controlled by similar switches. For example, a news booth or announce studio can have pushbutton off/on control of a mic mixer. This method of audio switching is noiseless. If desired, additional remote buttons can be added to turn on mixers with start/control for tape reproducers, etc. The method of connecting remote mixer control is described in Section 2.9, of 2.0 INSTALLATION.

3.8 Talkback Methods:

The redundant nature of the console configuration makes possible a variety of talkback methods, including the use of an unused mixing buss. However, the easiest and most practical method of communicating between a control room and studio is as follows:

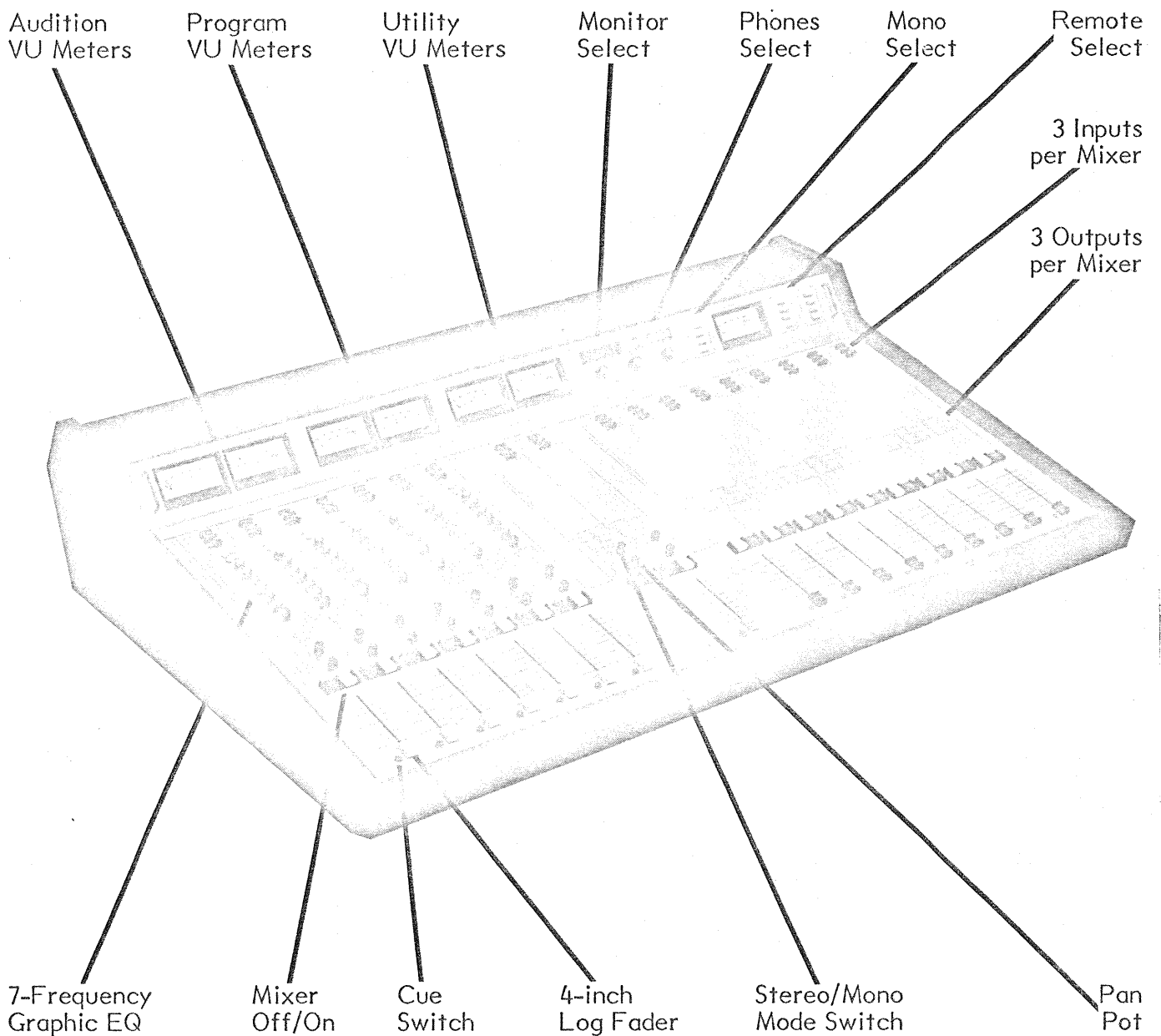
1. Select Cue position on Monitor Switch bank.
2. Depress Cue button on control room mic mixer to talk to studio.
3. Depress Cue button on studio mic mixer to listen to studio.

This talkback method requires that both mic mixers be in the "off" mode during talkback. An internal connection should be made to the mic mixers so that the control room monitor speaker will mute while talking to studio, and the studio speaker will mute while talking to control room. This connection is described in Section 2.9.2, 2.0 INSTALLATION. The cue speaker in the control room will normally be wired to mute when the monitor speaker mutes, so no additional connections will be required.

3.9 Remote Input Switches:

Two groups of 4-position selector switches are located beside the Mono meter. These Remote Inputs feed two unused mixer inputs to expand capacity. When specified at time of order, the 4-position switches and mixer input switches can be color coded for ease of identification.

FIGURE 3.1.1 BASIC CONTROL FUNCTIONS

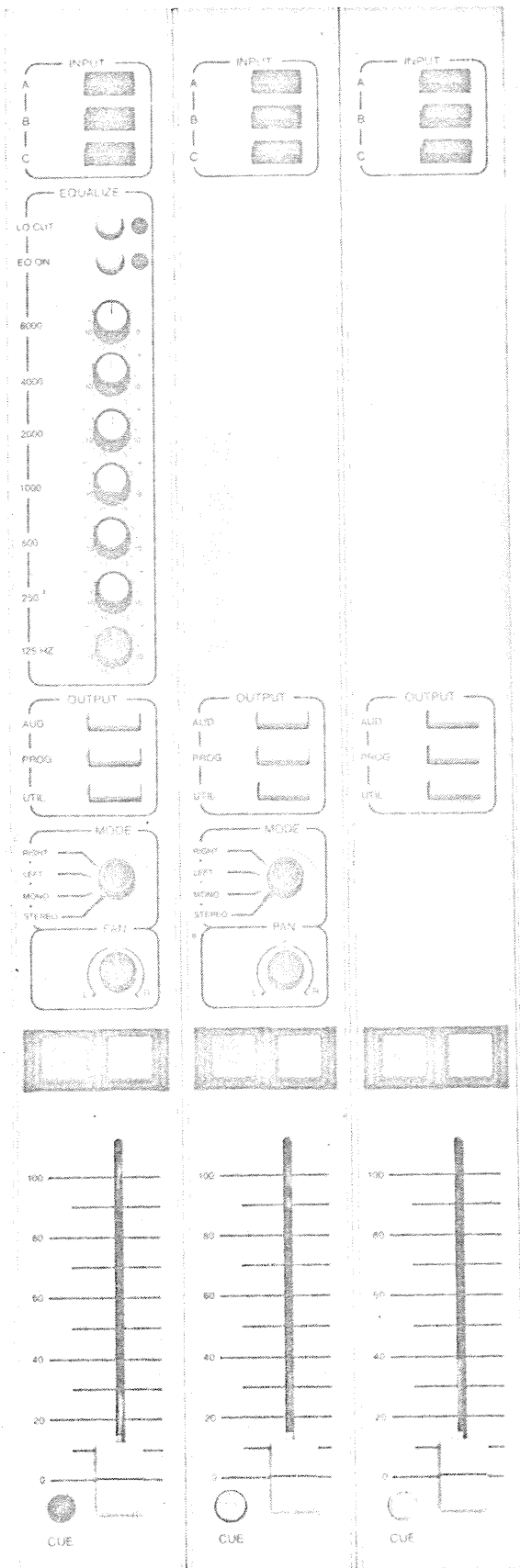


VU meters are "blackout" type, illuminated only when a mixing buss is being fed from an "on" mixer.

Off/On buttons are illuminated momentary pushbuttons.

Remote Select switches are user defined and can be used as input or output switches.

FIGURE 3.2.1 STEREO MIXER MODULE



Input Select: 3 audio inputs with internal switch for mic/line sensitivity. Individual routing of muting/control logic.

Low-cut filter

EQ-In/Out Switch

7 - Frequency Graphic EQ

Output Select: 3 stereo outputs with VU meter lamp logic.

Mode Select: Stereo/Mono L/R select.

Pan Pot: Places mono audio source within stereo field.

Mixer On/Off: Illuminated buttons turn mixer off & on, and send logic level to Input & Output switches.

Fader: Professional 104 mm. log taper stereo fader.

Cue: Momentary or maintained pushbutton cue switch.

FIGURE 3.3.1 MONO SOURCE SELECT

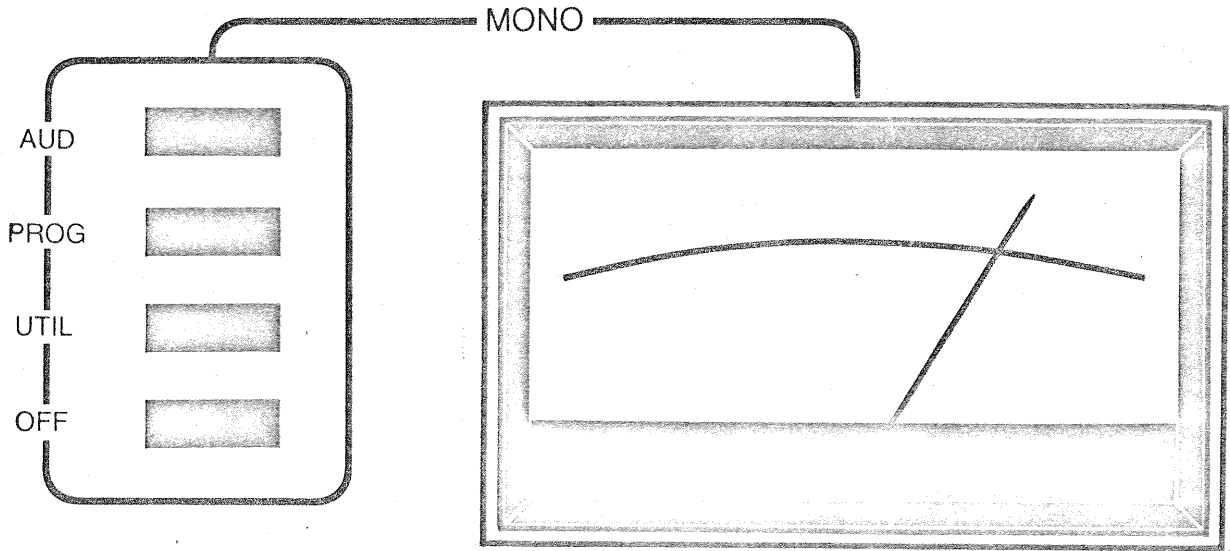
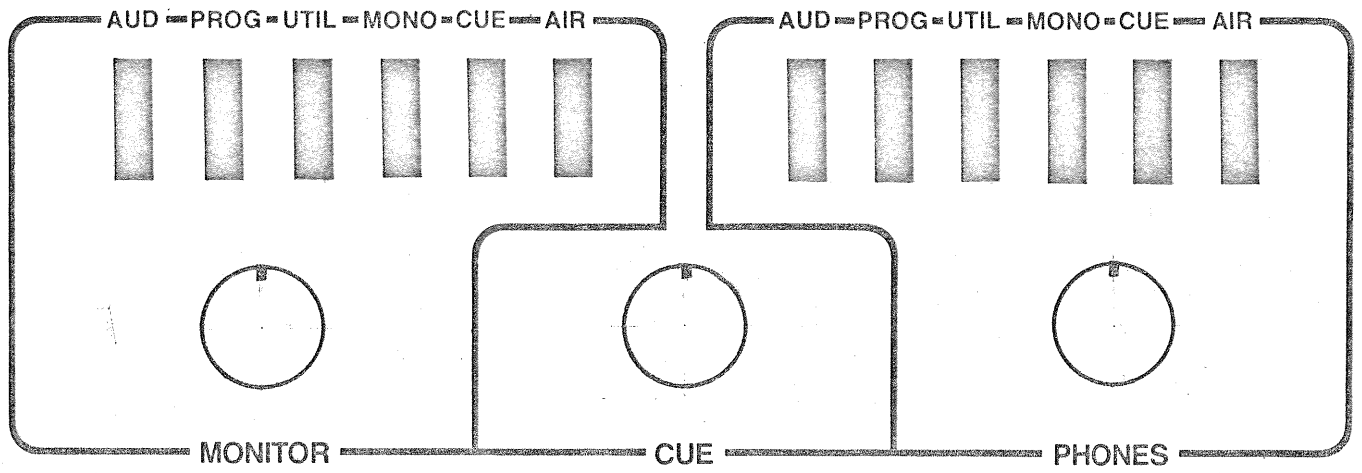


FIGURE 3.4.1 MONITOR/CUE/PHONES



4.0 MANUFACTURER'S LIABILITY

4.1 Safety Notice:

WARNING: THE CURRENTS AND VOLTAGES IN THIS EQUIPMENT ARE DANGEROUS AND UNDER CERTAIN CONDITIONS COULD BE FATAL.

This manual is intended as general guidance for trained and qualified installation, operating, maintenance and service personnel who are familiar with, and aware of, the dangers inherent to handling potentially hazardous electrical and/or electronic circuits. It is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this or other electronic equipment.

THE INSTALLATION, OPERATION, MAINTENANCE AND SERVICING OF THIS EQUIPMENT INVOLVES RISKS TO BOTH PERSONNEL AND EQUIPMENT, AND MUST BE PERFORMED ONLY BY PROPERLY TRAINED AND EXPERIENCED PERSONNEL EXERCISING DUE CARE. PERSONNEL MUST FAMILIARIZE THEMSELVES WITH SAFETY REQUIREMENTS, SAFE HANDLING AND OPERATING PRACTICE, AND RELATED FIRST-AID PROCEDURES (E.G. FOR ELECTRICAL BURNS AND ELECTRICAL SHOCK).

Manufacturer not responsible for injury or damage resulting from improper installation, operation, maintenance or servicing, or from the failure of persons engaged in such tasks to exercise due care.

As with all electronic equipment, care should be taken to avoid electrical shock in circuits where substantial currents or voltages may be present, either through design or short circuit.

4.2 Liability Limitation:

The procedures outlined in this manual are based on the information available at the time of publication and should permit the specified use with minimum risk. However, the manufacturer cannot assume liability with respect to technical application of the contents and shall, under no circumstances, be responsible for damage or injury (whether to person or property) resulting from its use.

The manufacturer is specifically not liable for any damage or injury arising out of failure to follow the instructions in this manual or failure to exercise due care and caution during installation, operation, maintenance and service of this equipment.

4.3 Cautionary Notice:

Always disconnect power before opening covers, enclosures, panels or shields. Never make internal adjustments, perform maintenance or service when alone or when tired.

Keep away from live circuits, know your equipment and don't take chances. Proper training of experienced personnel and observing the above guidelines will help assure safe and continued operation of this equipment.

WARNING: DISCONNECT PRIMARY POWER PRIOR TO SERVICING.

5.0 MAINTENANCE

5.1 Fuses:

Separate primary fuses for the three dc voltage supplies are on the front panel of the rack mounting power supply. All are standard 3AG size. If a fuse blows, check for signs of overheating - such as odor or burned components. Remove the damaged module before replacing the fuse. If there is no apparent damage, replace the fuse and apply power.

5.2 Status Indicators:

The power supply has both ac and dc indicators for each supply. The ac indicator is electrically located between the primary fuse and power transformer. The dc indicator is across the supply output. The ac indicator is neon with an external resistor, while the dc indicator is incandescent.

5.3 Changing Lamps:

The power supply uses standard cartridge indicators with T-2 lamps. To replace, remove the knurled collar nut and pull the indicator straight out. Align the pins of the indicator with the socket before inserting.

The Mixer off/on indicators are #330 T-1.75 midget flange lamps. To change, remove the pushbutton cap by gently lifting, with a slight rocking motion. The lamp is contained by the button assembly.

The VU meter indicators are #73 T-1.75 wedge base lamps. The lamp mounts in a remarkable removable socket which separates from the back of the meter by turning the socket a quarter-turn in either direction.

5.4 Troubleshooting:

The power supply status indicators are the first thing to check in the event of a system failure. Before replacing blown fuses, check for possible causes of the overload, such as burned resistors, hot components, smoke or odor from circuit boards. The following chart indicates typical symptoms and probable causes.

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>
AC & DC indicators off.	Primary fuse blown.
DC indicator off.	Possible failure of power supply. Disconnect wire connecting supply to console to see if indicator lights with no load. Possible overload within console, however, dc fuse will normally blow.

Not all malfunctions will cause an overload which will blow a fuse. However, determining which module is defective is usually a simple matter, due to the redundancy of this console. Virtually any failure mode will have to be caused by either a defective Mixer or Output Amplifier. The failure of any module can be verified by substituting one from a working section of the console.

The Output Amplifiers are identical and may be interchanged. Since they are single channel amplifiers (2 required for each stereo function) the best method of troubleshooting is to reverse the left and right amplifiers, to see if the problem moves to the other channel.

The Mixers are stereo, and so a failure of one or both channels could occur as a result of a technical problem within this module.

Although the Mixers and Output Amplifiers may be removed and reinserted with power on, no electronic components, including integrated circuits and transistors, should be removed or inserted with power on.

The following table illustrates typical symptoms and probable causes of console malfunctions:

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>
Same malfunction occurs when mixer output switched to different mixing buss.	Defective mixer or audio source.
Malfunction in I channel of I output only, such as Left Program.	Defective Left Program output amplifier.
Malfunction in I channel of Cue or Headphone output, such as Left Channel audio.	Defective Left Channel Cue or Headset amplifier, or LCR audio switch failure.
Any Monitor audio symptoms, when Headphone output is normal.	Defective external monitor amplifier, or LCR audio switch.
Audio distortion and/or noise, regardless of combination of mixers or outputs used.	Defective ± 18 vdc power supply.

5.5 Repairs:

If a module becomes defective, it should first be given a thorough inspection. Look for mechanical problems, such as loose or unsoldered connections, cold solder joints, or broken leads on components. A burned resistor is usually caused by a short to ground, and offers a good clue as to what component has failed.

A defective integrated circuit may cause distortion or abnormal noise levels. The dc voltage at the output pin of each IC should be 1/2 the supply voltage, as measured with a VTVM. If not, substitute another IC. Do not remove or insert integrated circuits with power on. However, modules may be removed and reinserted with power applied.

A defective transistor in an Output Amplifier will probably cause extreme distortion, and a half wave output as viewed on a scope.

When removing soldered components, use a low wattage soldering iron, 25 watts or less. **NOTE: DAMAGE FROM OVERHEATING IS NOT COVERED UNDER WARRANTY.**