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QUANTUM AUDIO LABS
MODEL QM-168
AUDIO CONTROL CONSOLE

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NOT a voice # - Not a serial #

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INSTRUCTION MANUAL Glendale
CA

11/25/86

818 - 841 - 0970
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INTRODUCTION

The QM-168 is a professional mixing console designed for both recording and mixdown. Its exceptional performance and reliability are the result of Quantum's careful attention to mechanical, as well as electronic, design. Its adaptability is a result of well-planned, value-engineered features.

Inputs

There are sixteen input channels which can be switched to accept either balanced, low impedance microphones, or line-level sources. Each input channel has a low-noise, conductive plastic fader, a 15dB switchable microphone input attenuator, two echo send busses, six-band EQ (three controls, switchable frequencies), eight program output assignment switches, panning, solo, mute and two separately controlled cue sends (to feed headphones, or other remote lines).

Connecting accessories or **additional input channels** is easy. There are three Molex™ connectors on the rear panel; **one is for adding extra inputs**, and the other two are for use with an optional QM-174 patch bay.

Outputs

Each of the program outputs has its own SUBMASTER control and a VU Meter. A STEREO MASTER simultaneously controls busses 1 and 2, which are also the first two channels of the 8-track program output. Two echo returns, with individual level controls, can be switch-assigned into any of the first four program outputs. A built-in TALKBACK MIC (with a level control and push-to-talk switch) feeds the headphone mix, the eight program outputs and the studio monitors. Activating the talkback mic automatically mutes the control room monitor output, thereby avoiding feedback.

A Direct Output option may be ordered, in which case the post-EQ, post-fader signal from each input channel is brought to a special rear-panel connector. This is useful for bypassing the mixing busses and feeding a tape machine directly.

Monitors

The QM-168's Monitoring system is like a separate mixing console. There are 8 separate MONITOR LEVEL controls. When the MONITOR SELECT switch is in the LINE position, these eight controls are connected to the first eight Line Inputs. When the MONITOR SELECT switch is in the BUSS position, the

MONITOR LEVEL controls adjust the signal from each of the eight busses--without affecting the Program outputs. Each monitor signal can be panned between the left and right monitor outputs, whether signal is taken from the line input or the program output. When the MONITOR SELECT switch is in the PLAYBACK position the eight MONITOR LEVEL controls are bypassed, and the signals from LINE INPUTS 15 and 16 are connected directly to the MONITOR MASTER control, which simultaneously adjusts the Stereo Monitor outputs. This enables instantaneous switching of the monitors between the playback from a stereo tape machine, playback from an 8-track tape machine, or the console's output to these tape machines. Two independent CUE systems are included in this console. Each Line Input may be separately controlled for two different headphone mixes or for a single stereo headphone mix.

16-Track Monitor

When the console is ordered with the optional patchbay and the optional wood housing, a monitor expander may also be ordered. Designated the QM-120, the monitor expander creates a 16-track monitor section. The QM-120 also provides Echo Return to the Cue busses, and echo Return to the Monitor Section.

Value Engineering

The QM-168 is the product of more than eight years of field experience and evaluation, coupled to Quantum's know-how in the design and manufacturing of professional audio systems. The QM-168 represents Quantum's successful execution of an idea: to develop a professional mixer with the performance and features of a larger, sophisticated studio console but at a substantially lower cost.

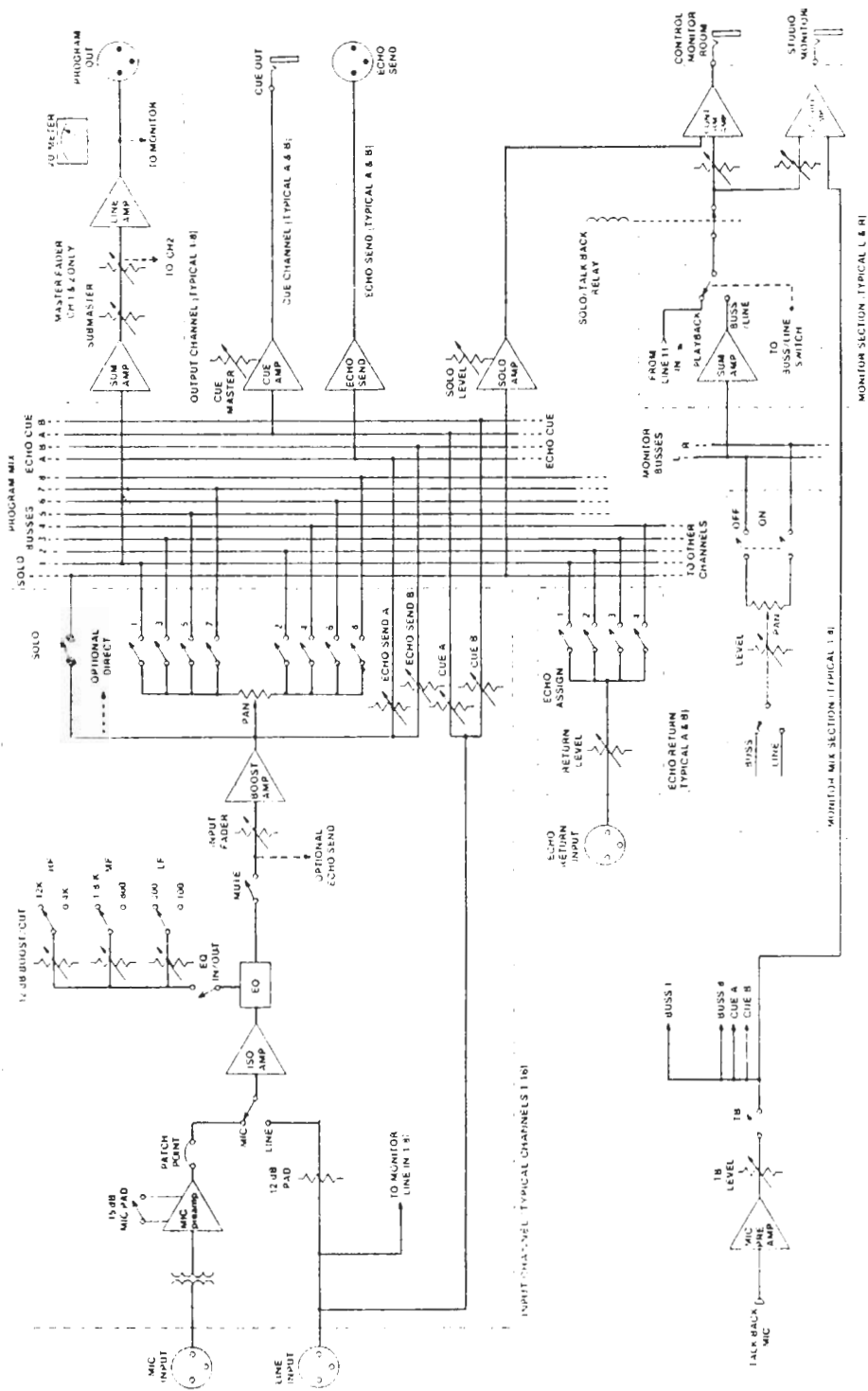


FIGURE 1. QM-168 BLOCK DIAGRAM (Single-Line diagram).

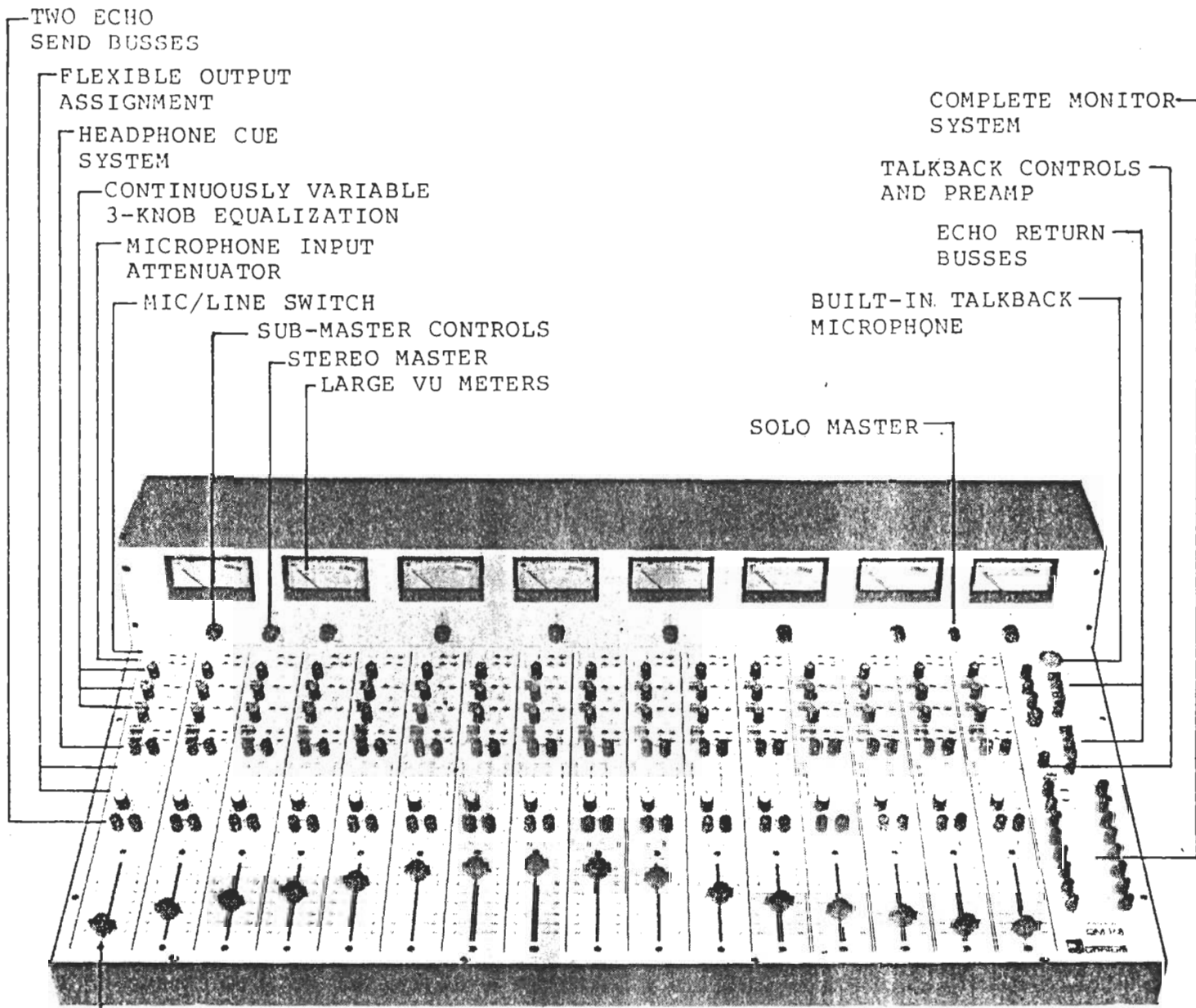
SPECIFICATIONS

MICROPHONE INPUT	Balanced, low-impedance input. Actual impedance is 1200 ohms; -50dB (2.5 mV) nominal input level.* Optional 48V phantom power available.
MIC PAD	15dB switchable gain-reduction provides adequate headroom for any type mic and program, while maintaining low noise and distortion.
LINE INPUT	Unbalanced, for low or medium impedance sources. Actual impedance is 2.5k-ohms; +4dB (1.23V) nominal input level, +30dB (25V) maximum input level.
ECHO RETURN INPUT	Unbalanced, for low or medium-impedance sources. Actual input impedance is greater than 2000 ohms; +4dB (1.23V) nominal level.
PROGRAM OUTPUT	Unbalanced, for 600-ohm or higher-Z lines. Actual output impedance is less than 100 ohms; +4dB (1.23V) nominal output level, +18dB (6.1V) maximum (600-ohm termination).
CONTROL RM MON OUT <u>STUDIO CUE</u> ECHO SEND	Unbalanced, for high impedance lines. Actual impedance is <u>2.5k-ohms</u> +21dB (<u>9V</u>) maximum level.
PATCH POINT	Multi-pin Molex™ connectors between mic preamp outputs and fader inputs (jumper cable supplied) The MIC PRE OUTPUT is unbalanced, for high impedance lines (2000 ohms or greater); -5dB (420 mV) nominal output level. The FADER INPUT is unbalanced, for low or high impedance sources. Actual impedance is approximately 10k-ohms; +4dB (1.23V) nominal input level. (See pin assignment diagram on back panel.)
DIRECT OUTPUT (Optional)	Multi-pin Molex™ connector carries the post-EQ, post-fader output of each input channel. Has 12dB less gain than the Program Outputs.

SPECIFICATIONS (Continued)

OVERALL GAIN	67dB maximum, mic input to program output.
FREQUENCY RESPONSE	20Hz to 20kHz, 1dB (ref. to 1kHz).
DISTORTION	Less than 0.1% THD +4dB (1.23V) to +18 dB(6.1V) output from 20Hz to 20kHz (600-ohm load).
SLEW RATE	Greater than 10 volts/microsecond.
NOISE	-127dBm equivalent input noise; 20Hz - 20kHz, 150-ohm termination. -70dB (0.24 mV) output noise.
EQUALIZATION	Low Frequency: ±12dB max (switchable) shelving at 100Hz or peaking at 300Hz. Mid Frequency: ±12dB max (switchable) peaking at 800Hz or 1.8kHz. High Frequency: ±12dB max (switchable) peaking at 4kHz or shelving at 12kHz.
VU METERS	"0 VU" corresponds with +4dB (1.23V) program output(+4dBm @ 600 ohms); meters are illuminated.*
POWER REQUIREMENTS	120V AC (convertable for 240V AC operation), 50 or 60 Hz, 60 watts.
DIMENSIONS	36" wide x 20" deep x 8.5" high; (91 cm x 51 cm x 22 cm).
NET WEIGHT	75 pounds (34 kg).
SHIPPING WEIGHT	80 pounds (36 kg).
WARRANTY	1 (one) year parts/90 days labor.

* 0dB is referenced to 0.775V. We use the term "dB" rather than "dBm" unless the actual impedance is 600 ohms. This is because, since "dBm" is a power expression, referenced to 1 milliwatt (0.775V across 600 ohms), the "dBm" value will change as the impedance changes. However, it is really the voltage drive value that is of significance, and the term "dB", as a voltage reference, does not change with circuit impedance (where the 0dB value is 0.775 volts). This should avoid the misleading aspect of the widely misused "dBm" while maintaining the most commonly accepted reference level.



CONDUCTIVE PLASTIC FADERS

*100 mm
DUNCAN 10K Audio Taper
or penny 4Giles*

FIGURE 2. QM-168 FRONT PANEL FEATURES.

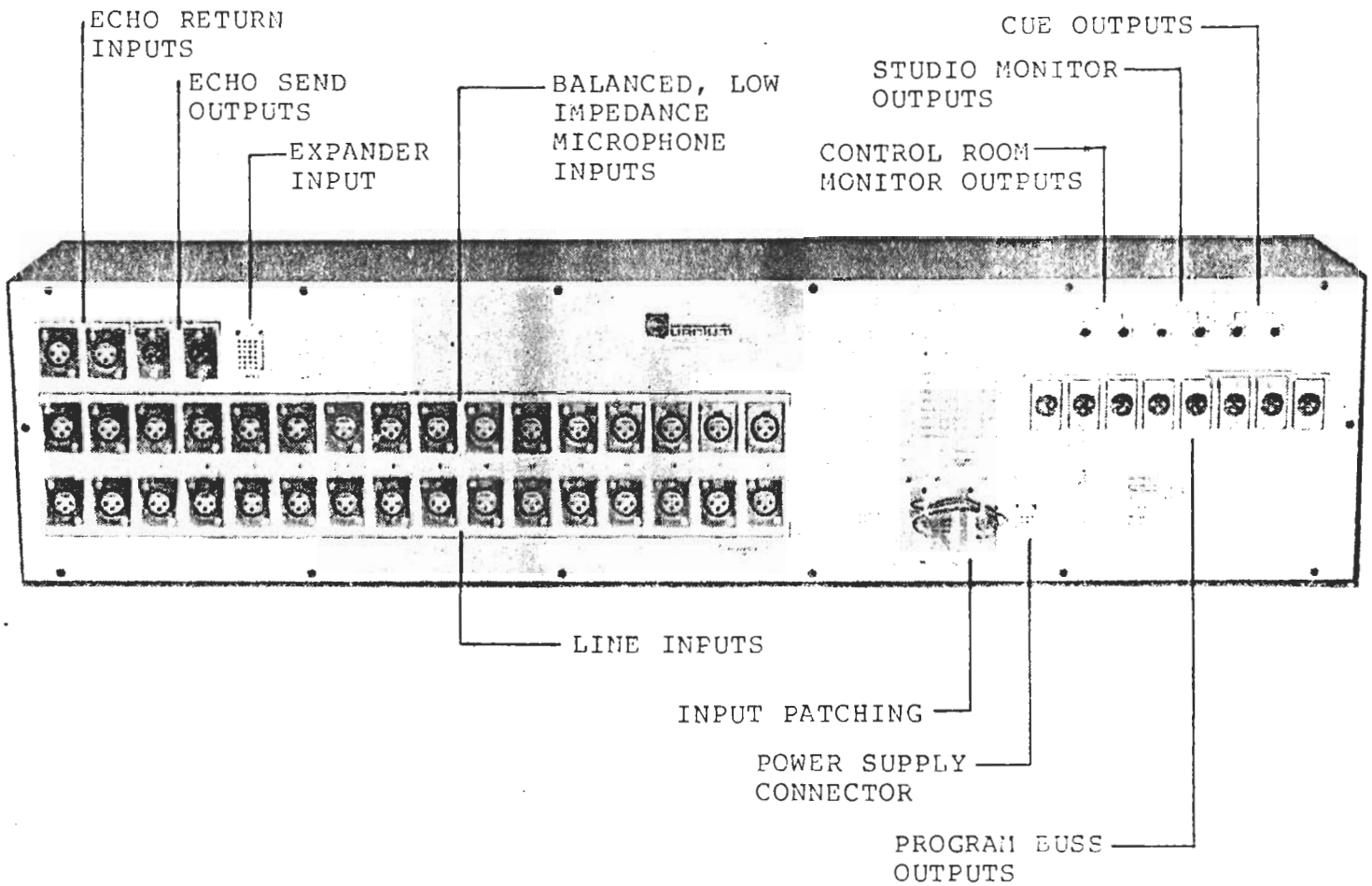


FIGURE 3. QM-168 REAR PANEL FEATURES.

OPERATION

NOTE: All connectors are on the rear panel; all controls, meters, and the TALKBACK MIC are on the front panel. Refer to the block diagram (Figure 1) and panel callouts (Figures 2 and 3) while you are reading the following paragraphs.

MICROPHONE INPUTS

Sixteen female, XL-type connectors accept balanced, low impedance, professional microphones, such as the Sennheiser MD-451, Electro-Voice RE-20, Neumann U-87, Shure SM-58, etc. To connect a balanced, low impedance microphone, use twisted-pair, shielded cable; wire the XL connectors on both ends of the cable so that the circuit remains floating between the mic and the QM-168. **For all unbalanced sources, use twisted-pair shielded cable, do not connect the shield at the source, and connect the shield to the low side of the line at the QM-168 input. See figure 4.**

LINE INPUTS

Sixteen female, XL-type connectors accept unbalanced, high-level instrument inputs, multi-track tape machine playback, or any other line-level, high or medium impedance sources. (The XL's are unbalanced.) We recommend use of LINE IN 1 through 8 for an 8-track tape machine, and LINE IN 15 and 16 for a stereo tape machine. Use cables like those illustrated for unbalanced lines. See figure 4. When the QM-120 16-track Monitor option is ordered, the 2-track Return to the monitor is provided on separate XL-type input connectors.

MIC/LINE SWITCH

This switch feeds the input channel from either the MIC or the LINE connector on the rear panel. Pushbutton unlatched (up)= MIC input; pushbutton latched (down)= LINE input.

MICROPHONE INPUT PAD (ATTENUATOR)

A switchable 15 dB pad affects only the MIC input (not LINE). Normally, the pad is not used, so the pushbutton is unlatched (up). Use the -15 dB position (pushbutton down) whenever microphone levels are high enough that the VU meter reads "0" with the input fader less than 1/2 way up (BOARD MASTER and Buss SUBMASTERS at full clockwise rotation.) The pad is most often used with condenser mics, but may even be helpful with dynamic mics in very loud environments.

FADER

Low noise, conductive plastic, linear-travel attenuators control the mix level of each input channel (MIC or LINE input).

ECHO SEND

Each input channel can be assigned to either or both of the two echo send busses. There are two ECHO SEND controls on each input for maximum flexibility; each ECHO Buss can be used for a different mix. The rotary ECHO SEND control adjusts the level of the post-fader, post-EQ signal. ECHO SEND is normally connected post fader, but a factory-installed modification can make one or both ECHO SENDS pre-fader. ECHO SEND A & B output connectors (unbalanced male XL's) are on the rear panel.

CUE SEND

Each input channel can be assigned to either or both of the two cue send busses. There are two CUE SEND controls for on each input, so two different mixes can be established for musicians with different monitoring needs. Alternately, by using the two CUE SEND controls together, a stereo mix may be derived. Because the cue send is taken from the Line Input, the operator can hear the pre-recorded channels (for overdubbing) while keeping the input module free for mixing. CUE A & B OUTPUT connectors (unbalanced phone jacks) are on the rear panel.

OUTPUT (MIX BUSS) ASSIGNMENT

There are eight program mixing busses. Corresponding BUSS switches ("1" through "8") on each input channel assign the channel to any combination of program mixing busses. Pushbuttons unlatched (up)=channel not assigned; pushbuttons latched (down)=channel assigned to the correspondingly numbered buss. Busses 1 and 2 feed the correspondingly numbered 8-track Program Outputs (outputs 1 & 2 of the 8 track output). Y-adapters or the optional patch bay may be used to simultaneously drive a stereo tape machine and the first two channels of an 8-track tape machine. Y-adapters may also be used to drive tracks 1&9, 2&10, etc. of a 16-track tape recorder.

INPUT AND OUTPUT CONNECTIONS, & GROUND LOOPS

Figure 4 illustrates a number of cables that might be used with the QM-168, depending on the particular input or output, and the type of device with which the console is used. It is important to avoid ground loops (more than one ground path between

two pieces of equipment) in order to minimize hum and buzz. We recommend the use of 2-conductor shielded cable for all the QM-168's XL inputs and outputs, even the unbalanced LINE inputs, PROGRAM outputs, ECHO inputs and ECHO outputs. Therefore, if you are connecting an unbalanced piece of equipment to one of these unbalanced QM-168 XL's, the shield should only be connected at one end of the cable. Generally, it is best to connect the shield at the input, and to cut the shield at the output.

Examine the cables A through D in Figure 4 to translate the above statement into actual cables. If a Remote device is feeding one of the QM-168 unbalanced inputs, then cut the shield at the remote end of the cable. If the QM-168's unbalanced output is feeding an unbalanced Remote device, then cut the shield at the QM-168 side of the cable.

When connecting the QM-168's unbalanced XL's to balanced devices, the shield may be connected at both ends of the cable. When feeding the QM-168's balanced MIC inputs from a balanced source device, use the cable shown in Figure 4A or 4B. These are only suggestions, and you may wish to experiment until you obtain minimal hum and buzz. Cables 4E and 4F are for the 168's CUE, and MONITOR outputs.

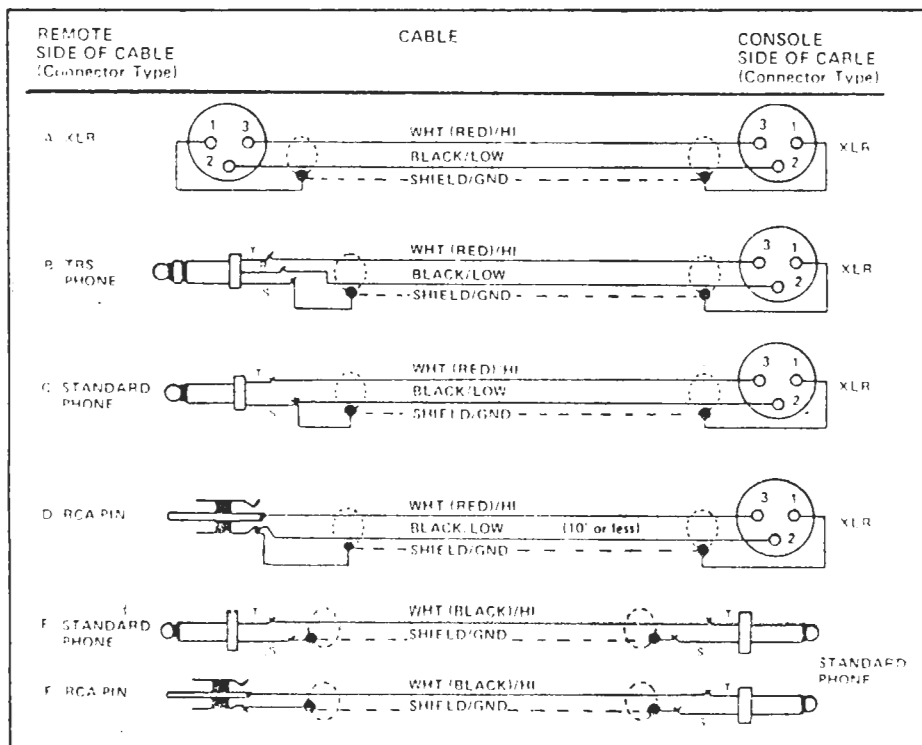


FIGURE 4. CABLE WIRING FOR QM-168

PANNING

The PAN control is permanently connected to the BUSS ASSIGN switches so that odd-numbered busses are on the left and even-numbered busses are on the right. If panning is not needed, set the PAN control at its center position and assign the signal to the desired buss(es) by latching any of the BUSS ASSIGN switches (1 through 8). When panning is desired, latch the appropriate odd and even-numbered switches, and set the PAN control to position the signal. A special circuit in the QM-168 maintains the proper balance in the PAN control, regardless of the number of busses to which the channel is assigned (loading effects are negligible).

EQUALIZATION

The HF EQ control can alter the frequency response at high frequencies by as much as ± 12 dB at the specified EQ frequency; the MF EQ and LF EQ controls do the same for mid and low frequencies. Peaking or shelving characteristics may be selected for the HF and LF controls, and either of two peaking characteristics may be selected for the MF control. See figure 5 (next page) for EQ curves.

Unlatching the "12K/4K" pushbutton enables the HF EQ control to provide a mild, high frequency equalization because the effect begins at higher frequencies, reaching a maximum effect 12kHz. With the same pushbutton latched, the HF EQ control yields a more pronounced equalization, reaching a maximum effect at 4kHz.

Unlatching the "100/300" pushbutton enables the LF EQ control to provide a mild, low frequency equalization because the effect begins at lower frequencies, reaching a maximum effect at 100Hz. With the same pushbutton latched, the LF EQ control yields a more pronounced equalization, reaching a maximum effect at 300Hz.

Unlatching the "1.8K/800" pushbutton enables the MF EQ control to provide ± 12 dB equalization at 1.8kHz (with decreasing effects at higher or lower frequencies). Latching the same pushbutton enables the MF EQ control to provide ± 12 dB equalization at 800Hz (with decreasing effects at higher or lower frequencies). The effect of the MF EQ control may be mild or pronounced at either center frequency, depending on the program material.

Latching the "EQ IN/OUT" pushbutton bypasses the entire EQ section of that input channel. Unlatching the "EQ IN/OUT" pushbutton allows normal EQ functioning.

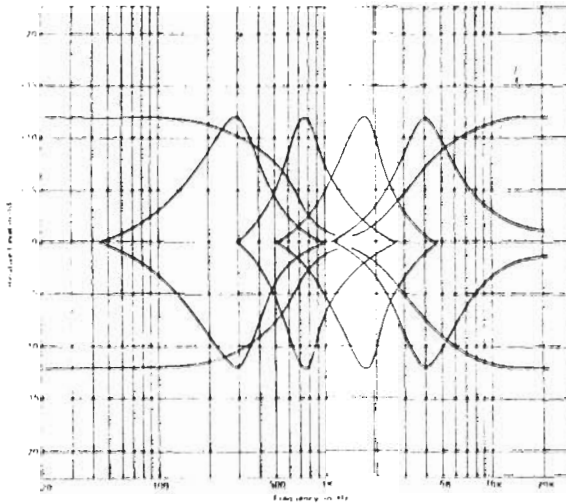


FIGURE 5. QM-168 CHANNEL EQUALIZATION

SOLO

Depressing any SOLO button silences the monitor mix feeding the Control Room Monitor, and instead substitutes the output from the soloed module(s). SOLO does not affect the Program Output Busses.

MUTE

MUTE is used in mixdown and overdubbing to silence a channel without having to bring down the channel fader. This is useful during passages when a given input might cause noise or when it would detract from the mix. For pick-up cues, preset the muted channel's level using the fader, and bring the channel into the mix at the desired instant by unlatching the MUTE switch.

PROGRAM OUTPUTS

Each of the eight program mix busses has its own SUBMASTER control and VU Meter. The STEREO MASTER attenuator simultaneously adjusts the level of busses 1 and 2 after their SUBMASTERS, but it does not affect busses 3 through 8. The SUBMASTERS and the STEREO MASTER are normally set at full clockwise rotation, and the input faders (and mic pads) are adjusted for approximately "0" VU nominal meter indications. The SUBMASTERS may be turned down (counterclockwise) for overall balance or minor level adjustments. The STEREO MASTER is turned down for stereo program fades.

VU METERS

Illuminated meters with true VU ballistics indicate Program Output levels. "0" VU = +4dB (1.23V), which is +4dBm with a 600-ohm termination.

INPUT PATCHING JACKS

Two Molex connectors on the rear panel (MIC PRE OUT and FADER IN) allow easy, channel by channel insertion of auxiliary signal processing equipment such as compressors, graphic equalizers, and noise gates. For added flexibility, use these patch points to connect the optional Quantum's QM-174 patch bay, or your own patch panel. Either the jumper cable supplied with the QM-168 or some external device (such as a patch bay) must be run between the Molex connectors in order to complete the signal flow through the input channels. (See Figure 6.)

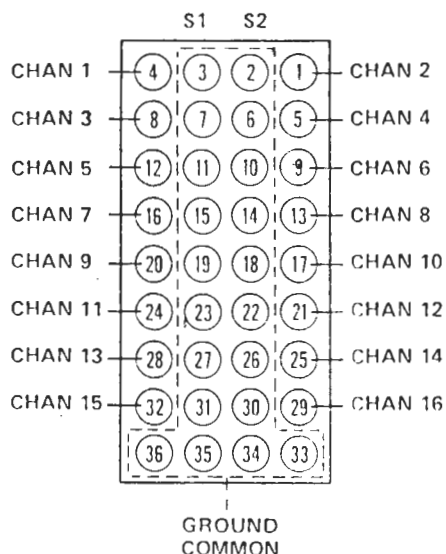


FIGURE 6. PIN ASSIGNMENT OF THE MIC PRE OUT/FADER IN CONNECTORS.

NOTE: When the Direct Output option is ordered, its connector is wired in this same configuration.

ECHO RETURN

Two unbalanced, female XL connectors (ECHO RETURN A and ECHO RETURN B) accept low to medium impedance sources. Each connector feeds an ECHO RETURN level control, and each control feeds four ECHO RETURN switches (#1, #2, #3 and #4). The switches assign the Echo signals to the four Program Mix Busses. The Echo Return connectors may be used as auxiliary line inputs.

MONITOR MIX

When the Monitor LINE switch is latched (down), the eight MONITOR LEVEL controls derive their signals from the eight LINE inputs. This monitor mode is useful for overdubbing and playback of tape recordings (up to 8 tracks). When the MONITOR BUSS switch is latched (down), the MONITOR LEVEL controls derive their signals from the program outputs. This monitor mode is useful for control room monitoring during live recording. When the Monitor switch is in the PLAYBACK position, the Monitor LEVEL controls are bypassed and the signal from Line Inputs 15 and 16 are applied directly to the Control Room and Studio Master controls.

There is one ON/OFF switch and one PAN control adjacent to each MONITOR LEVEL control. To assign the corresponding monitor input to the MONITOR OUT jacks, the ON/OFF switch should be latched (down). The corresponding PAN control then changes the proportion of that monitor signal applied to the Left and Right monitor outputs.

QM-120 16-TRACK MONITOR

The QM-120 is an external panel which may be added to the QM-168 for easier connection to 16-track tape machines. The QM-120 adds line inputs 9 through 16 to the monitor mix when the MONITOR switch is in the LINE position. The QM-120 also provides Echo return to the Monitor and Cue sections.

The addition of the QM-120 is normally a factory modification, and should be ordered on a console having these two additional options: the expanded wood housing and the QM-174 patch bay.

NOTE: FIGURE 7 HAS BEEN MOVED.
IT NOW APPEARS ON PAGE 27
OF THIS MANUAL.

FIGURE 7. QM-120 SCHEMATIC DIAGRAM

HEADPHONE CUE SYSTEM

Each of the two CUE OUT jacks derives a signal from a mix of all 12 LINE inputs, but this mix is independent of the monitor section. The CUE OUT mixes are established by 2 CUE MIX controls in each input module (24 controls in total) and two CUE MASTER controls. To drive 3 or more sets of phones from either CUE output, we recommend using an external power amplifier. If an auxiliary amplifier is not used, use high-impedance headphones (2000-ohm or greater). This headphone cue system is ideal for use by performers doing vocal or instrumental overdubs.

TALKBACK SYSTEM

A talkback mic (in the upper right corner of the mixer) is preamplified and controlled by TALKBACK LEVEL. Pressing the TALKBACK switch feeds this signal to all eight Program Output busses, the Phones Mix busses and to the Studio Monitor jacks. Pressing TALKBACK simultaneously mutes the Control Room MONITOR OUT jacks as it activates the mic, thereby avoiding feedback. Talkback is handy for making announcements or for identifying tapes (slating). With an auxiliary power amplifier and speakers, Talkback may be used for speaking to performers in the studio.

POWER

The AC POWER switch is on the rear panel. Connect the AC cable to a 120 V AC, 50 or 60 Hz, grounded (3-wire) outlet. Always replace the FUSE with another of the same size and type (1-amp, 3AG Slo-Blo).

The power transformer is mounted in a separate metal box so it can be located away from the QM-168. This eliminates the hum common in consoles which have the power transformer mounted internally. Qualified service personnel can easily convert the QM-168 for 240V AC operation. All that is necessary is to open the metal box, reconnect the power transformer primary leads as shown in Figure 8, and change the fuse size from 1-amp to 1/2 amp.

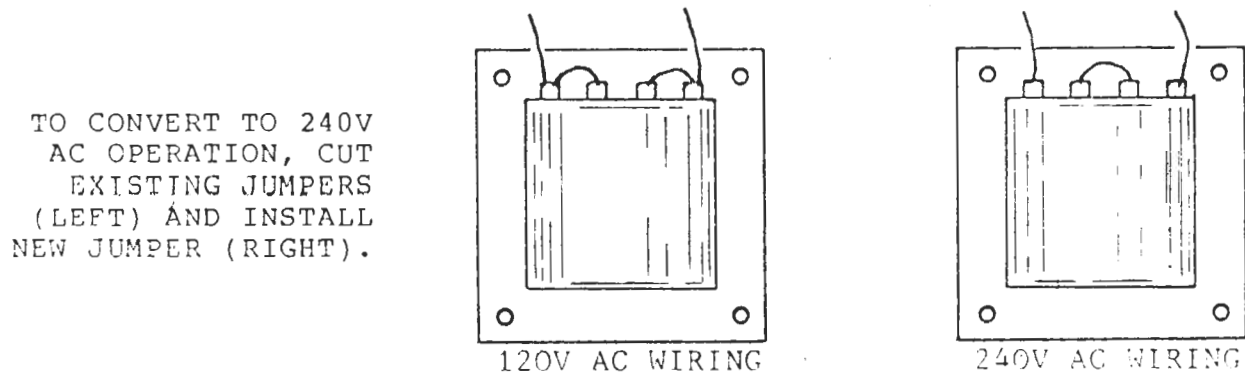


FIGURE 8. RE-WIRING THE POWER TRANSFORMER FOR 240V AC OPERATION

APPLICATIONS

Any recording console embodies a series of compromises, where electronic performance and overall cost are competing factors. At Quantum, we have used careful engineering design to achieve the the best possible electronic performance and long-term reliability for a modest amount of money.

The object in recording, overdubbing, and mixdown is to get the best possible signal onto the recording tape. The QM-168 recording console is designed to complement most tape machines, which typically have a nominal input level of +4dB (1.23 volts). The QM-128 console reads "0 VU" when it is delivering that nominal +4dB level. There is at least 14dB of headroom above nominal level (and typically 17dB headroom) before clipping. In addition, the nominal +4dB output level is 70dB above the noise level of the console itself.

When recording, overdubbing or mixing down, a skilled operator will keep the meters moving up to "0 VU" with very little overshoot into the red area. This is because instantaneous peaks can exceed the average level by a considerable margin, and VU meters show only average levels. Thus, a 0 VU peak (+4dB) could represent an instantaneous output of as much as +18dB.

Recording

To lay down original tracks, set the MIC/LINE switches to MIC and the BUSS/LINE switch to BUSS. Initially, set the STEREO MASTER and SUBMASTER controls to the maximum clockwise position. Then, use the SUBMASTER controls to trim the eight buss levels for optimum recording level on each track. You can mix the desired microphones onto as many as eight separate tracks at a time. Equalization and echo may be added as you are recording.

The MONITOR LEVEL controls adjust the level of the eight busses in the MONITOR outputs. Along with their PAN pots, the MONITOR LEVEL controls can be used to generate a monitor mix which is independent of what is being fed to the tape machine. The TALKBACK MIC feeds the program and phone mix busses, and may therefore be used to talk with the musicians or to identify "takes".

Overdubbing

After recording the original tracks, you can add vocals, rhythm, percussion or any other instruments to previously unused tracks (or unwanted recorded tracks) before starting mixdown. This requires a headphone for each musician, and a headphone amplifier. Set the tape machine to the "sync" mode (where sync allows you to use the record heads to listen to the already recorded tracks), and set the appropriate track (or tracks) to record.

You may use any input channel for your microphones, even though it may have been used to record an original track. Just switch the OUTPUT ASSIGN to the proper output buss for the blank track.

The TALKBACK MIC may be used to talk to the musicians or to identify takes on the tape. Adjust the CUE MIX so that each musician can hear both the previously recorded tracks and his live microphone(s).

Place the BUSS/LINE switch in the LINE position. The monitor section now is used to simulate the final mix. The 8 monitor level pots correspond to the 8 tracks (including the new ones being recorded). They may be panned left and right. The MONITOR control sets the overall level in the control room.

Mixdown

Mixdown is similar to doing original recording except that the source is the 8-track tape machine, and the outputs usually feed a two-track machine instead of an 8-track machine.

Note: Connect the tape machines as shown in figure 9 (next page). The Program Mix busses 1 and 2 feed the console's Stereo Output jacks (the #1 and #2 jacks of the console's 8-track output). Therefore, connect the Stereo Output jacks to the 2-track tape machine's record input, and place that machine in "source" or "input" mode (so that its play outputs are carrying the same signal as the console's Stereo Output). Connect the stereo tape machine's play output to Line In 15 and Line In 16 on the console. The 8-track tape machine's play outputs are connected to the console's LINE IN 1 through 8 (and the console's Program Out 1 through 8 remain connected to the 8-track machine's record inputs). For QM-120 option, see pg. 14.

Place the console's Monitor switch in the PLAYBACK position, put the two-track machine in record mode and the 8-track machine in play mode. Because PLAYBACK mode feeds the monitors with the signal coming into Line In 11 and Line In 12, and because that signal is derived from the console's Stereo Outputs (via the stereo tape machine), the console's Stereo Outputs will be heard in the Control Room and Studio Monitors.

For the mixdown, place all MIC/LINE switches to LINE and start the two tape machines. You will be mixing the output of the 8-track machine onto busses 1 and 2, feeding busses 1 and 2

to the stereo machine, and monitoring them as the stereo mix. Assign all inputs to busses 1 and 2, and use the input Pan controls for the desired stereo positioning. Effects may be added at this time, as described below.

CAUTION:

When the two-track machine is in record mode, DO NOT ASSIGN its play outputs (Line In 15 and Line In 16) to Busses 1 or 2. Doing so will set up an uncontrollable internal feedback loop, causing oscillations which may damage the console and monitor speakers.

Equalization may be added during recording or during mixdown, although it is usually better to equalize during the mixdown. (It is difficult to remove unwanted equalization that has already been applied to a tape). The 12kHz and 100Hz positions give you a gentle bass and treble control. The 4kHz position lets you boost or cut in the sibilance range, and the 300Hz position gives boost or cut in the mid-bass range. In the 800Hz position, the MF control boosts or cuts in the center of the vocal range, while in the 1.8kHz position, the MF control boosts or cuts in the upper vocal and instrumental range.

Echo may also be added either during recording or during mixdown. You can use any standard echo chamber which takes a +4dB (1.23 volt) nominal input signal and delivers back to the console the same nominal output level. Avoid overdriving spring reverb chambers. It's better to drive the spring more gently and increase the return level.

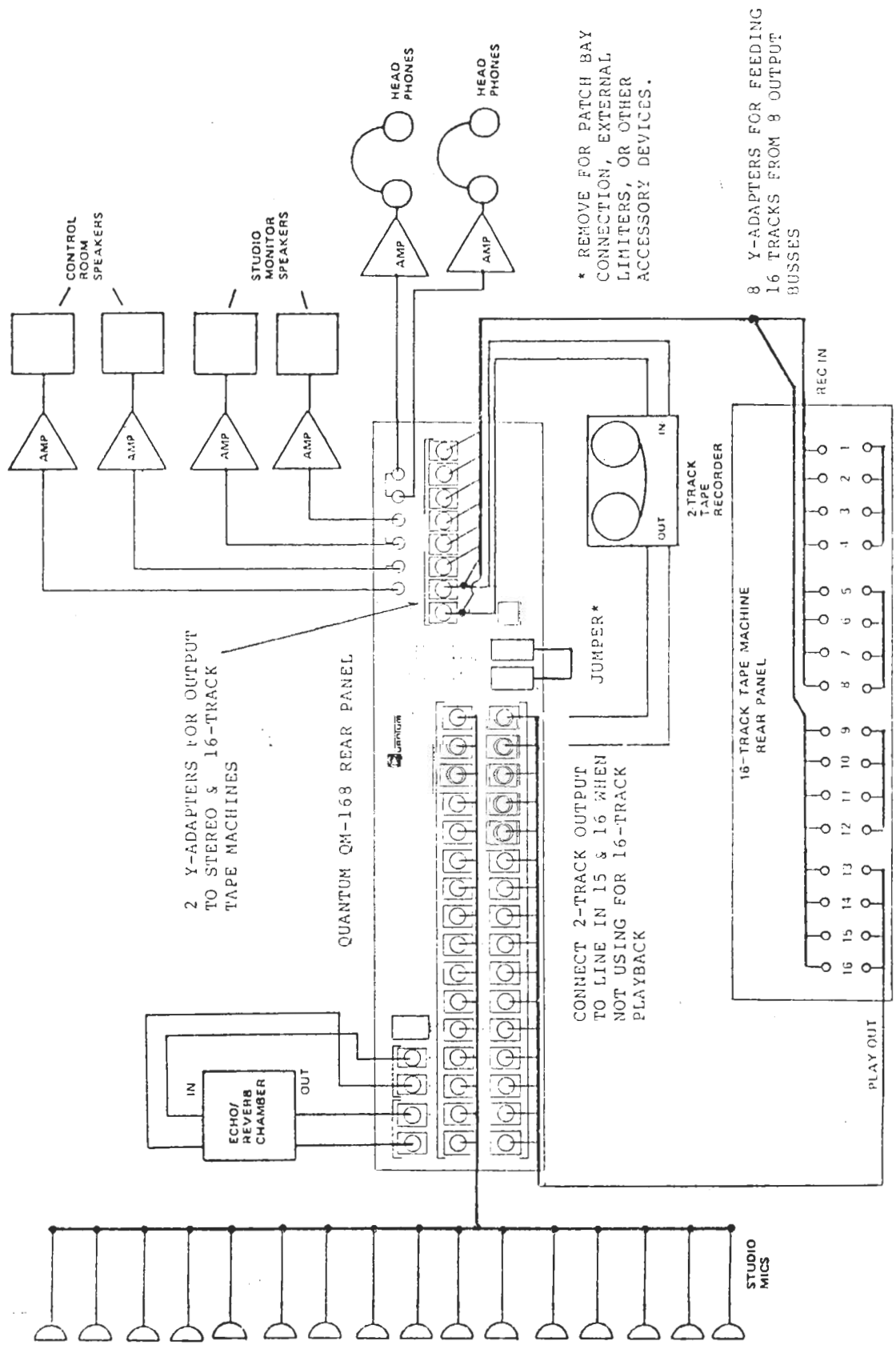


FIGURE 9. SIGNAL FLOW DIAGRAM FOR RECORDING & MONITORING OF 16-TRACK RECORDING, AND FOR MIXDOWN INTO STEREO RECORDING.

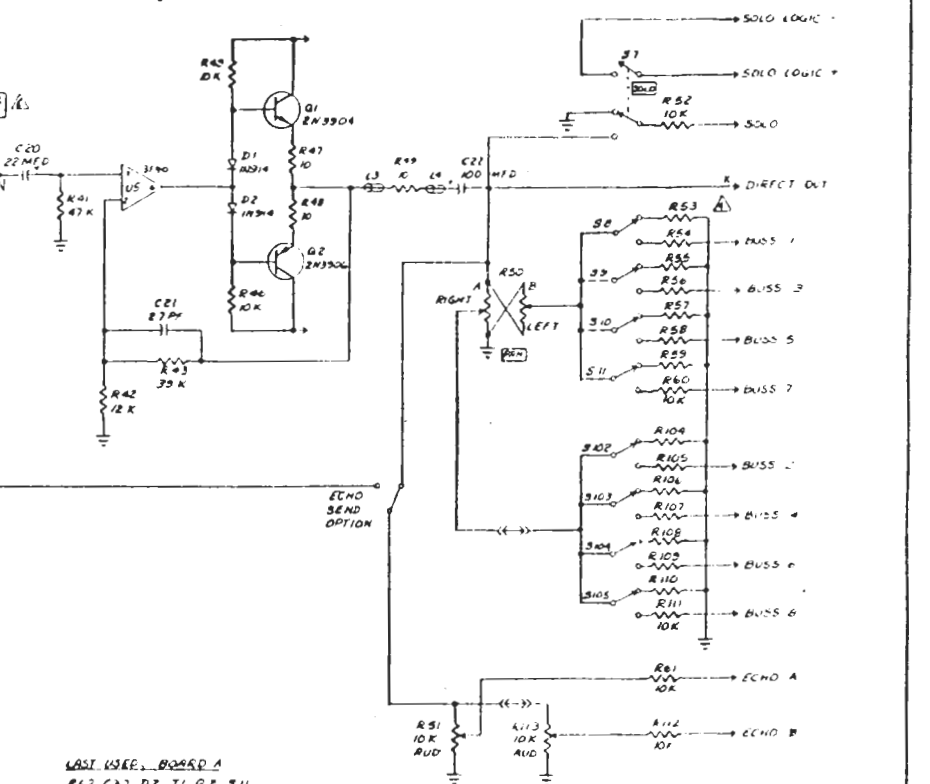
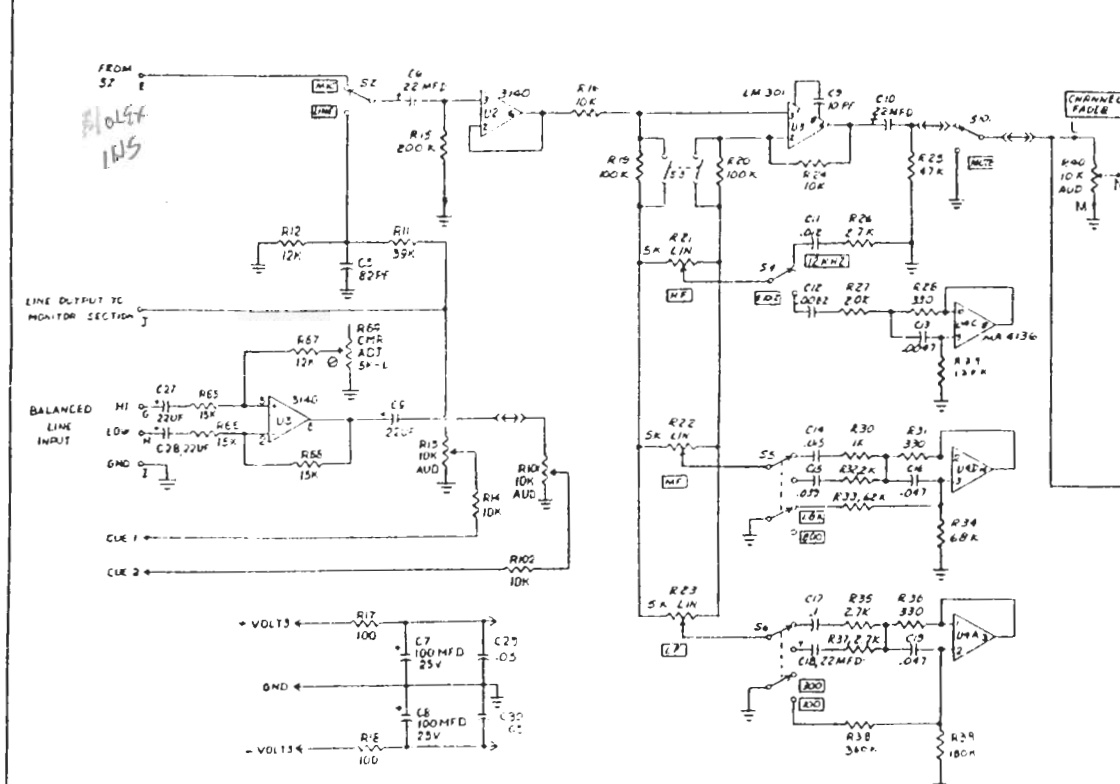
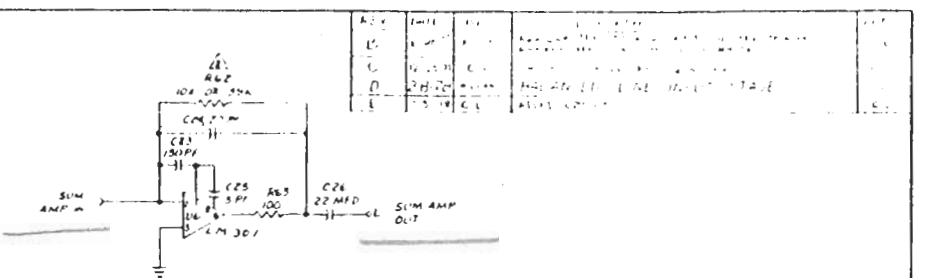
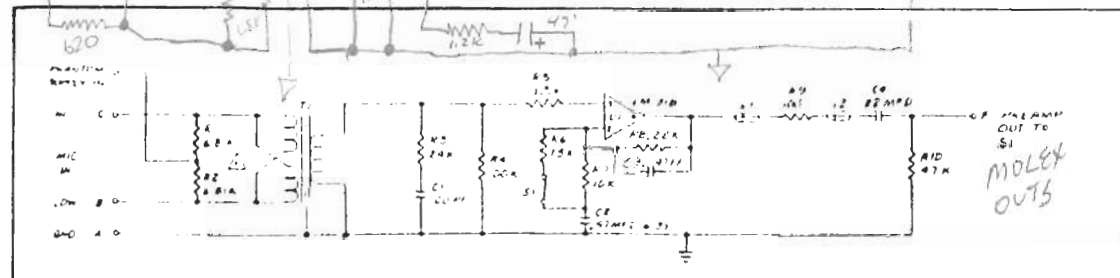
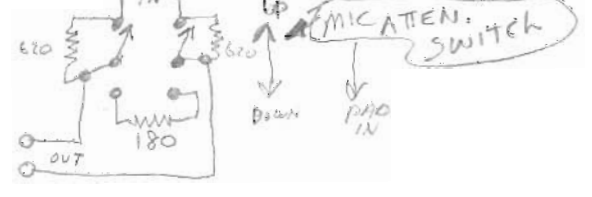
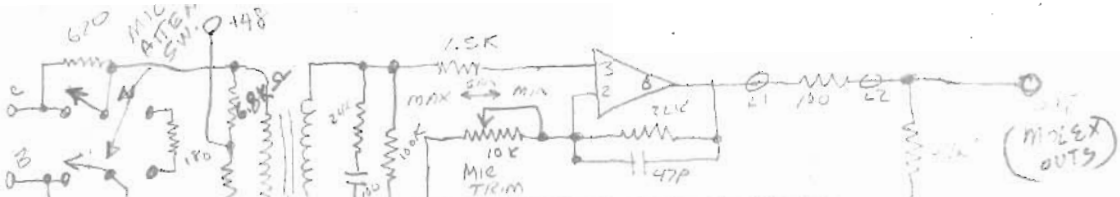
SERVICE

The QM-168 is covered by a limited warranty, one year for parts and 90 days for labor. The console is sturdily constructed, but abuse or normal wear may ultimately create a need for repairs.

Should your QM-168 require service, first consult your nearest Quantum Audio Labs dealer. He carries spare parts, is familiar with the circuitry, and will endeavour to give you the fastest possible service. You may call the factory during normal business hours (213-841-0970) for the name of the nearest dealer, or for any information. Do not return your console to the factory unless you have first received permission from the factory to do so.

CAUTION

As with any sophisticated audio equipment, improper repairs can create more problems than they solve. Also, lethal AC voltages are present inside the console. For these reasons, the QM-168 should only be repaired by a qualified service technician. The following pages contain schematic diagrams that may be helpful for troubleshooting purposes.



- 1. CHANNEL FADER NOT AVAILABLE ON PCB 1
- 2. ALL RESISTORS UNLESS SPECIFIED OTHERWISE ARE CARBON FILM 1/4W, 5% TOLERANCE UNLESS OTHERWISE SPECIFIED
- 3. ALL NUMBERS 0 BY LOCATED ON BOARD A, AND 100 BY BOARD B
- 4. R42, 20K IN ECHO SEND OPTION ONLY, OR ELSEWHERE
- 5. R1 & R2 OPTIONAL PREBIAS SUPPLY RESISTORS

LAST USED BOARD A
R42, C20, D2, T1, Q2, S11
LAST USED BOARD B
R104, R113

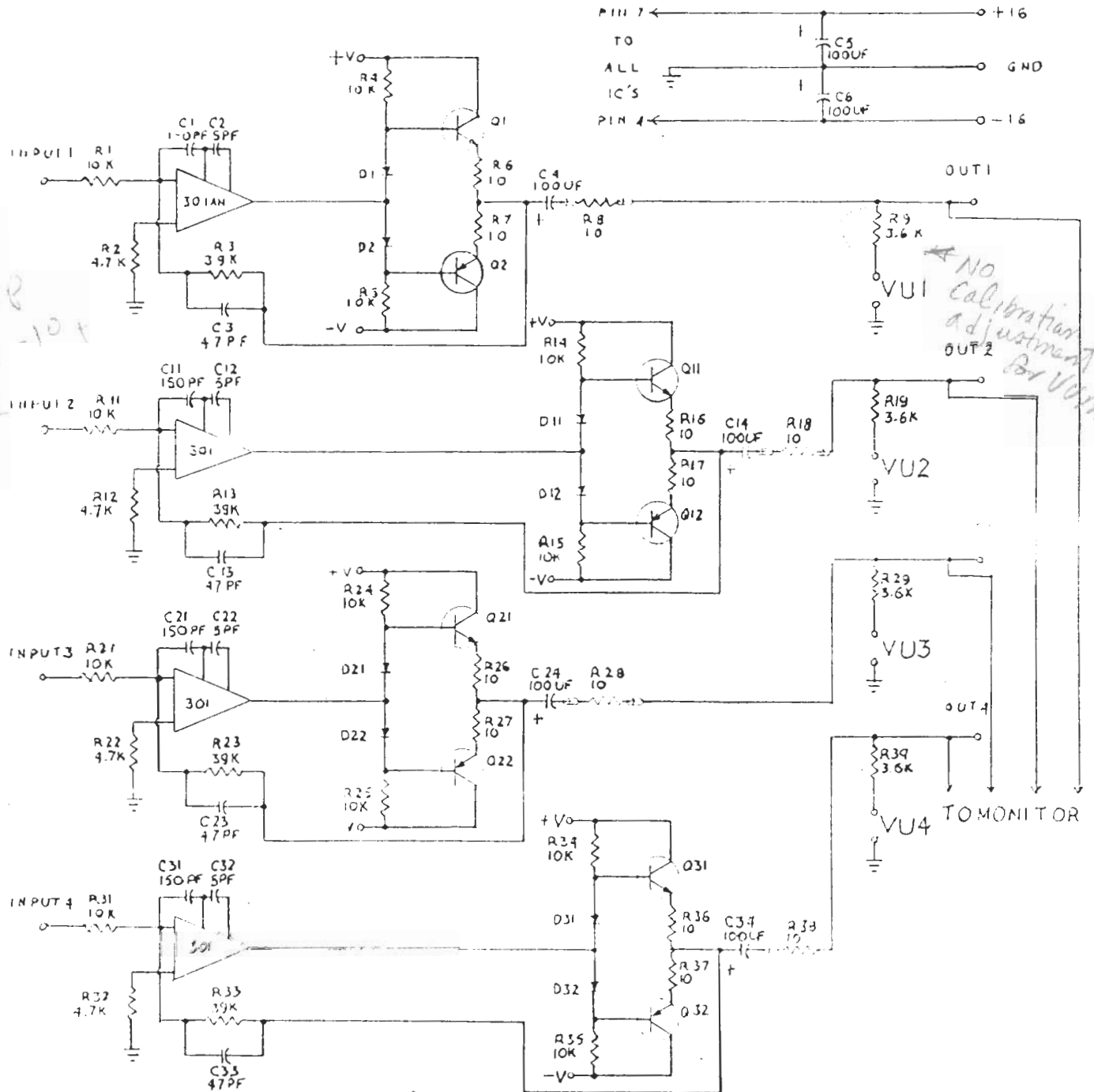
QUANTUM AUDIO LABS, INC	
DATE	1/18/77
SCHEMATIC, QM-12B INPUT	
1613E	

FIGURE 11. 1010 CIRCUIT CARD SCHEMATIC

*(+4 mVb
line in)
50 mic inp
master 1000-101
100-Ω bal*

NOTES:

- 1. FERRITE BEADS
- 1. Q1, 11, 21, 31 2N3904
- 02, 12, 22, 32 2N3906
- 3. ALL DIODES 1N914
- 2. ALL RESISTORS IN OHMS 1/4 WATT 5%
- 1. ALL CAPACITORS ARE 25 VOLTS OR BETTER



NO Calibration adjustment for VU meter

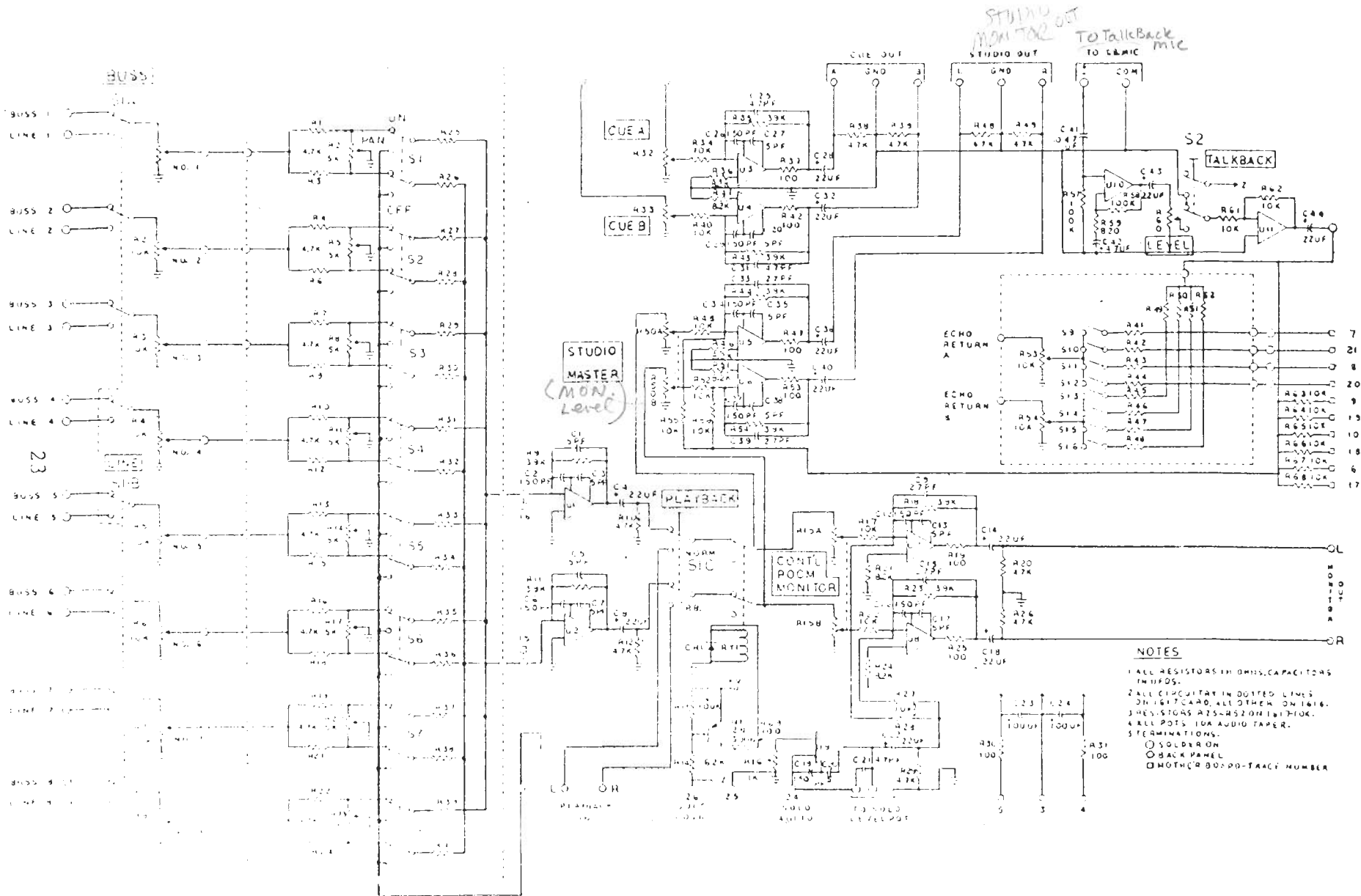


FIGURE 12. MONITOR CIRCUIT CARD SCHEMATIC

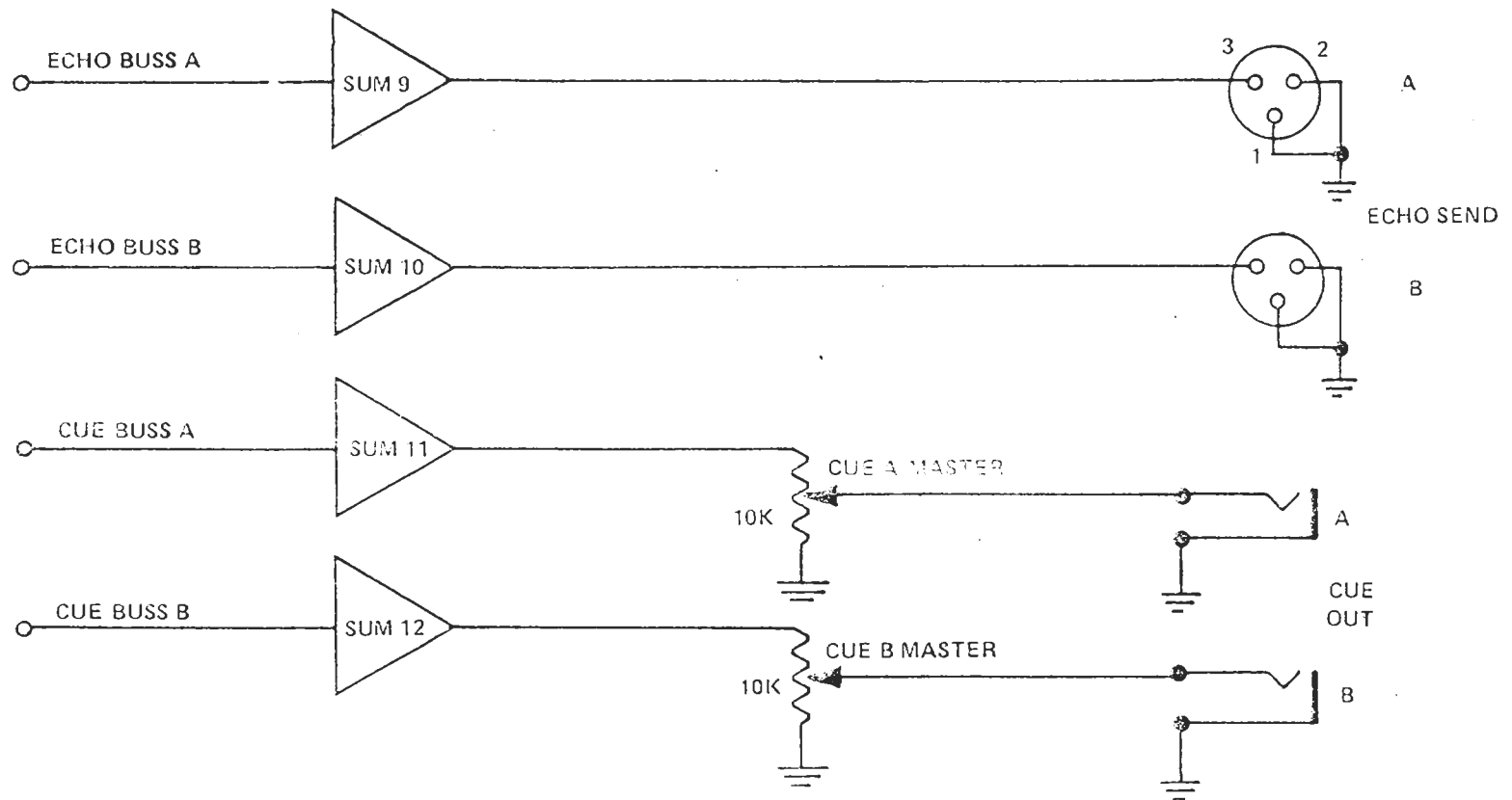


FIGURE 13. ECHO AND PHONE BUSSES SCHEMATIC

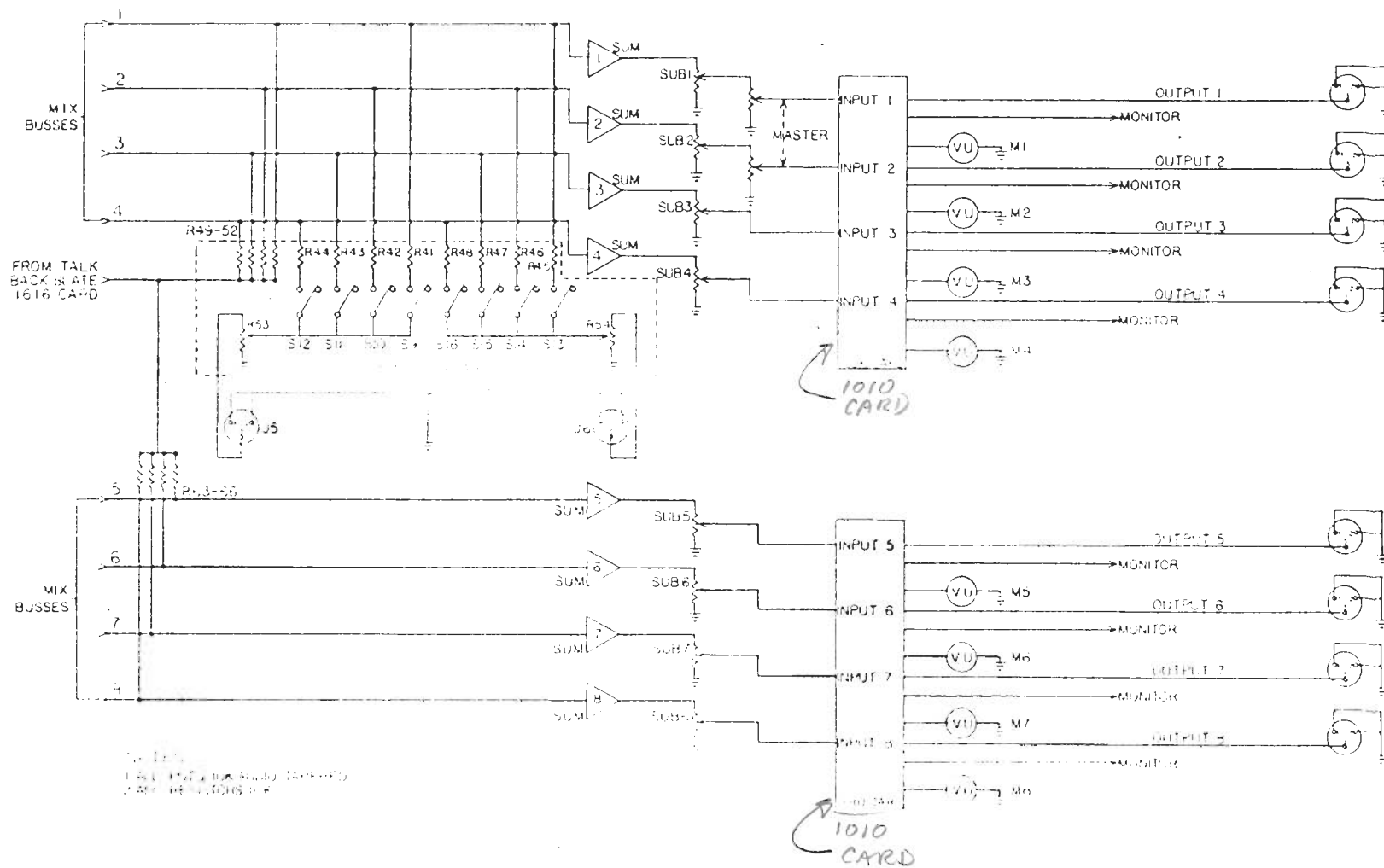
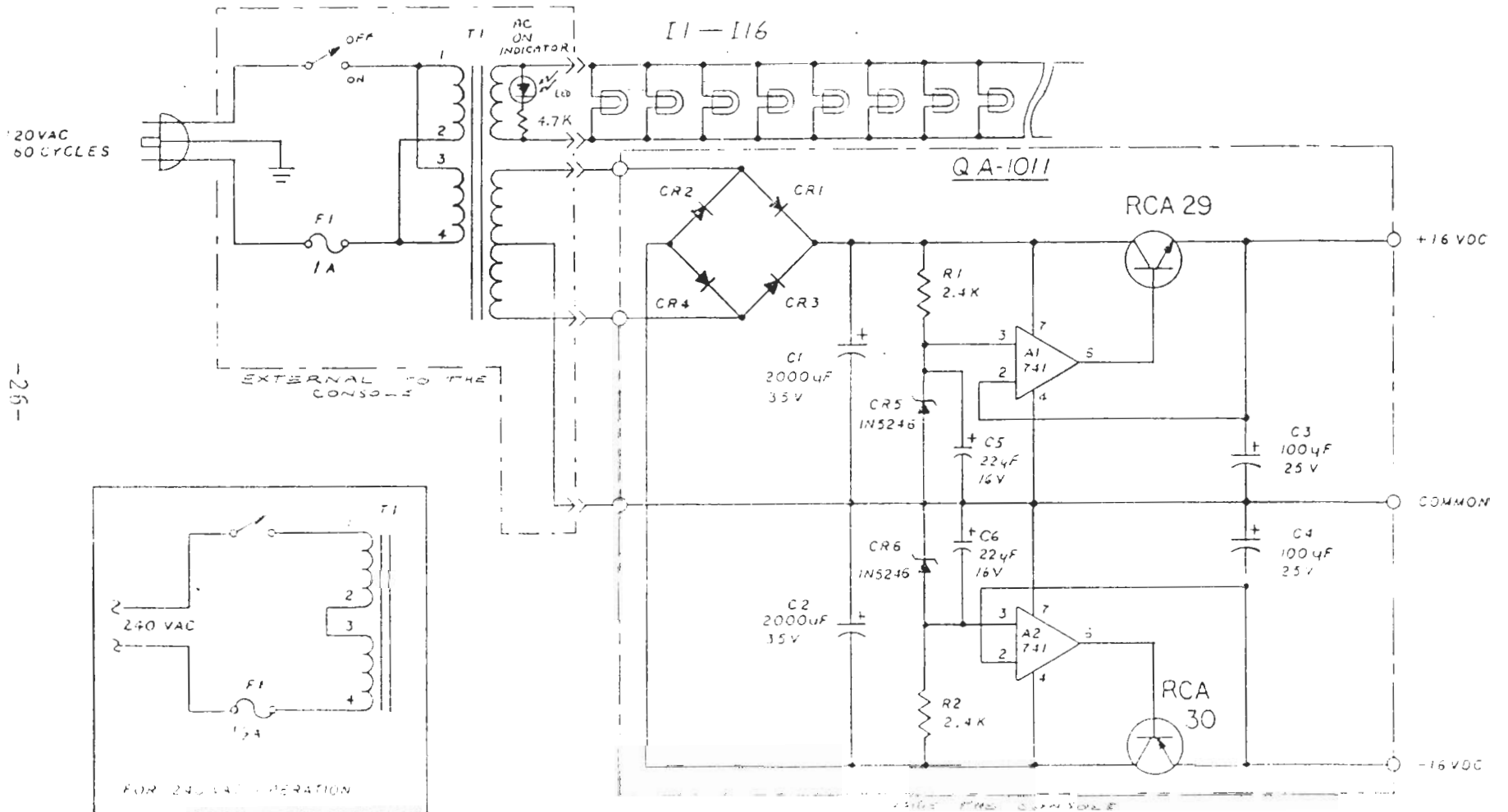


FIGURE 14. BUSS OUTPUTS SCHEMATIC



-25-

FIGURE 15. POWER SUPPLY SCHEMATIC

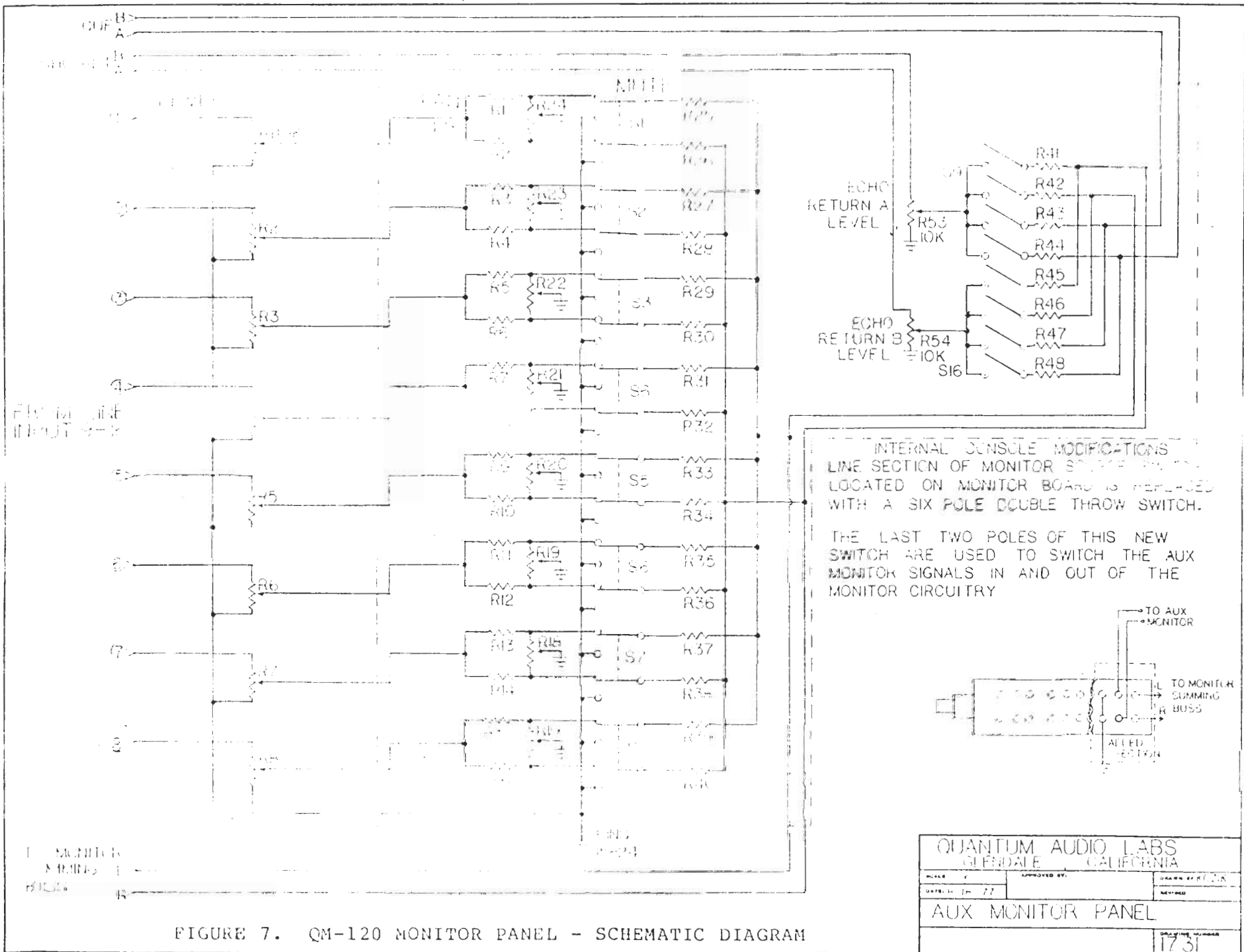


FIGURE 7. QM-120 MONITOR PANEL - SCHEMATIC DIAGRAM

QUANTUM AUDIO LABS GLENDALE CALIFORNIA		
DATE: 10-77	APPROVED BY:	DESIGNED BY: J.D.K.
AUX MONITOR PANEL		REVIEWED:
		DRAWING NUMBER 1731