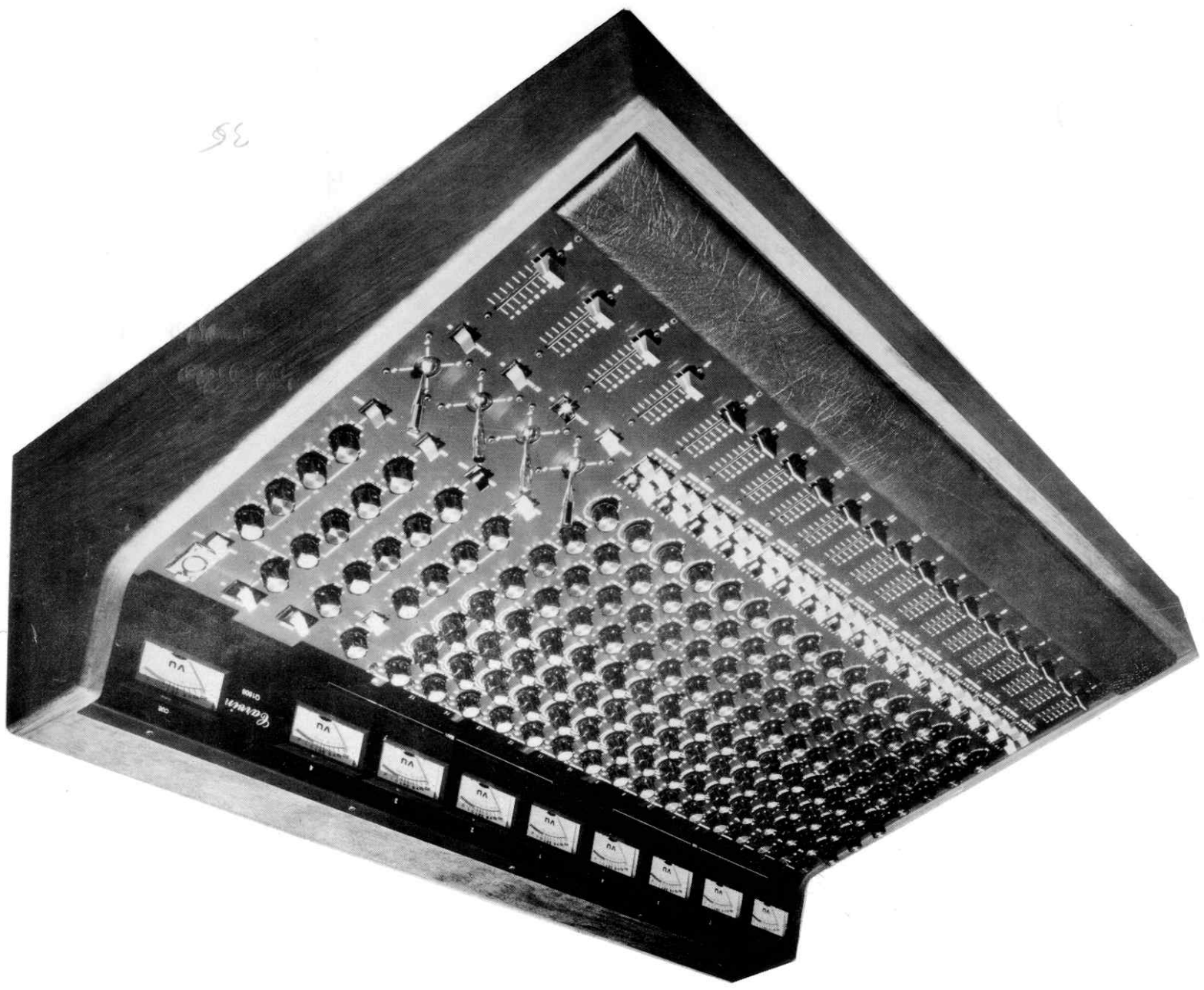


Juno's Master Copy

QM 515-78

35



# Q1608 MIXING CONSOLE

**CARVIN**

## LIMITED WARRANTY

Your Carvin Instrument Amplifier is protected against failure for 2 YEARS. The amplifier will be serviced by Carvin free of charge should anything go wrong within the warranty period (excluding tubes, if so equipped).

While Carvin suggests you utilize the specialized technicians of the Carvin Service Dept. Non-factory repairs will not void the warranty, although all charges for such repairs must be paid by the customer. Furthermore, Carvin will supply amp parts (at no charge) upon receipt of defective parts. Naturally, any damages caused by improper outside repairs will not be covered by the warranty. All shipping charges are to be paid by the customer.

Carvin Speaker Systems are warranted for a period of 1 Year. All JBL speakers are warranted by JBL for 5 Years. Any repairs should be sent directly to JBL Service Centers.

Speakers are not warranted against damage caused by excessive power levels. (Open Voice Coils are not covered by warranty as they are the result of excessive power applications). The description of an open voice coil is: A speaker that will give no sound. NOTE: An amplifier's rated output is specified at a low value of distortion. By overdriving the amp, substantially higher wattages are produced, so caution is advised to prevent damage to the speaker system.

All above warranties are extended to the Original Purchaser Only, by the Carvin Co., and do not cover failures caused by misuse or natural disasters.

## Q1608/MX16 MIXING CONSOLES

The Q1608 is a studio-quality mixing console featuring 16 input channels, four Sub-Outputs and four Main Outputs.

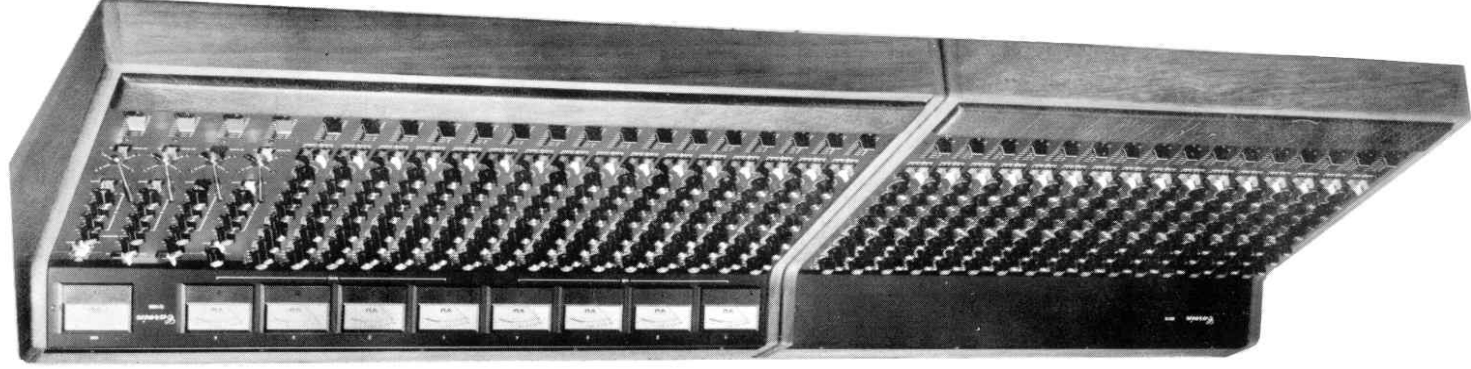
Each Input Channel contains variable input attenuation, L.E.D. overload circuitry, 3-band parametric equalization, one pre-fader and two post-fader buss sends, Carvin's unique Pan/Switching assign, full channel interrupt capability, and level fader.

Each Output Channel includes 2 separate Effects buss returns, Sub-Input capability, independent Sub-Output and Main Output Level controls, Joystick Panning Assign Between Sub and Main Outputs, and full interrupt capability.

In addition, Headphone Monitoring, Talkback facilities, a Pink-Noise Generator, a Main Cue Output amplifier and nine professional VU-type level meters are provided. The four joysticks may be freed for use with any Input Channels or outside programs.

The MX16 expander board contains 16 additional Input Channels, forming a 32-IN/4-OUT mixing console.

While every effort has been made to incorporate the features necessary in a board of this nature, an even greater emphasis has been placed on simplicity. For while any number of sophisticated mixers are available, very few can match the Q1608 in ease of operation and logical layout.



The information supplied within this manual is intended to explain the operation of the Q1608 as clearly and concisely as possible. In addition, basic circuit descriptions and a full set of block diagrams, schematics and component layout drawings are included for the technically-minded.

No attempt has been made to instruct the operator on the basic principles of sound-reinforcement or recording techniques. A number of books are available on these subjects.

### SETTING UP

Developing and adhering to a standard procedure will reduce the time wasted tracing down a forgotten switch or patch cord. To this end, we suggest you begin each new session by adjusting all controls to standard settings as shown below.

All Channel Mic/Line Pads at "0" (ccw).

All Channel Equalization controls at mid-position (flat).

All Channel Cue, Effects I and Effects II controls off (ccw).

All Pan controls at mid-position.

All Channel assign switches in center position.

All Channel faders down.

Monitor control off (ccw), Monitor Switch at MAIN.

Power switch OFF.

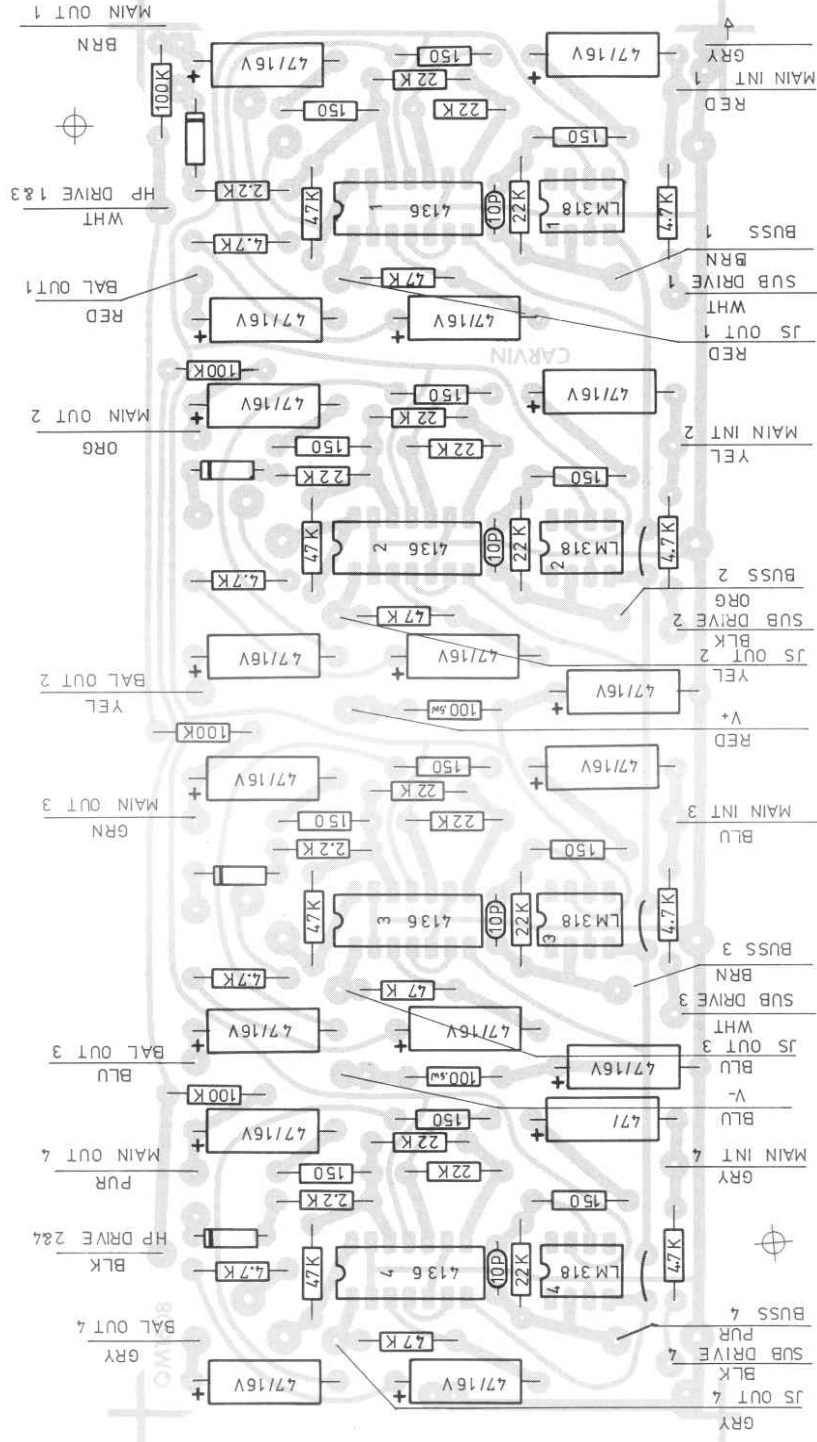
Pink noise switch at OUT.

Talkback control off (ccw), Talkback Switch OFF.

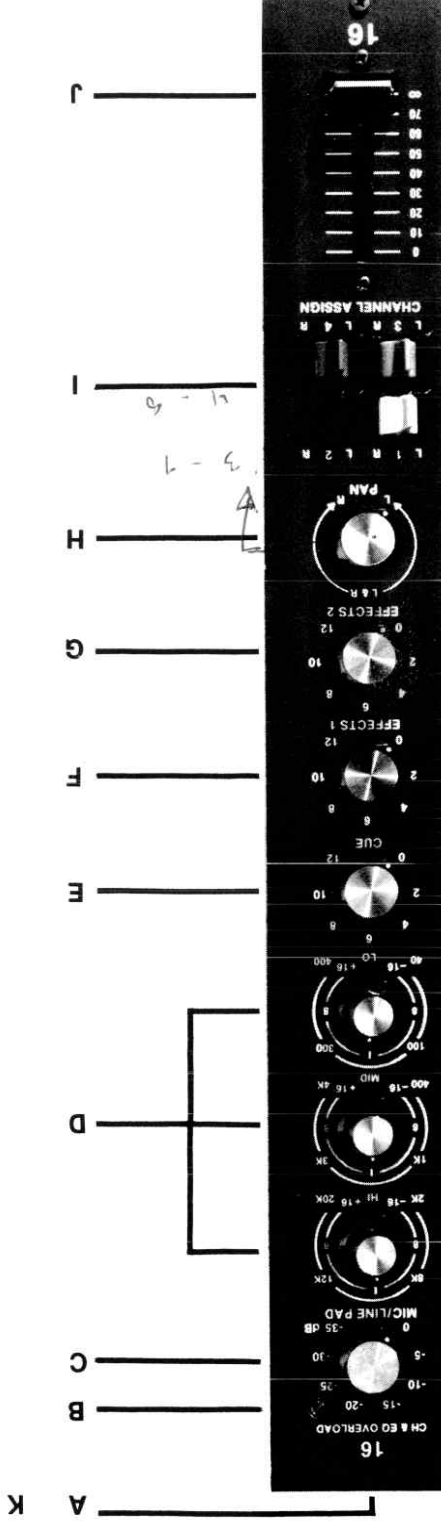
All Master Sub-Output, Effects I and Effects II and Sub-In switches centered (off).

Joystick controls centered, Joystick switches at BYPASS.

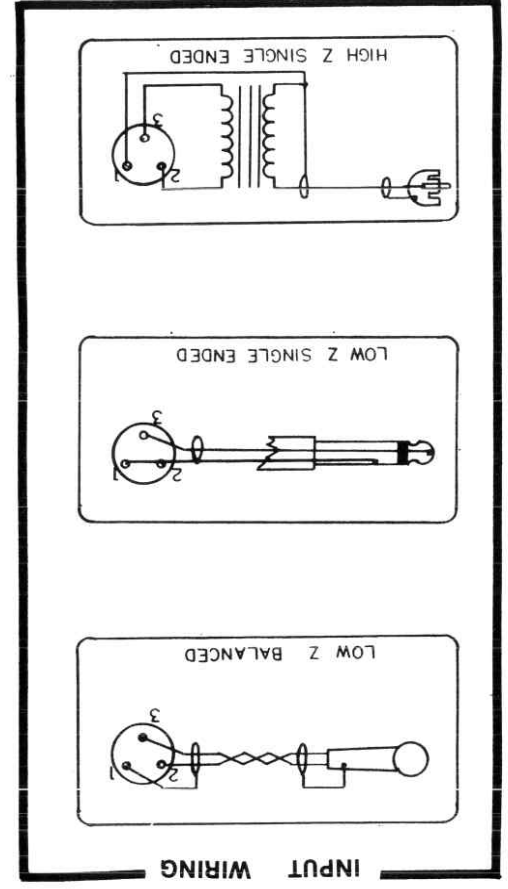
Main Faders down.



REVISIONS		DATE	CARVIN MUSIC CO
OK	5-16-78	5/31/78	QM 1608 MAIN OUTPUT
		DRAWN BY	P.C. PARTS LAYOUT
			W. Flannery



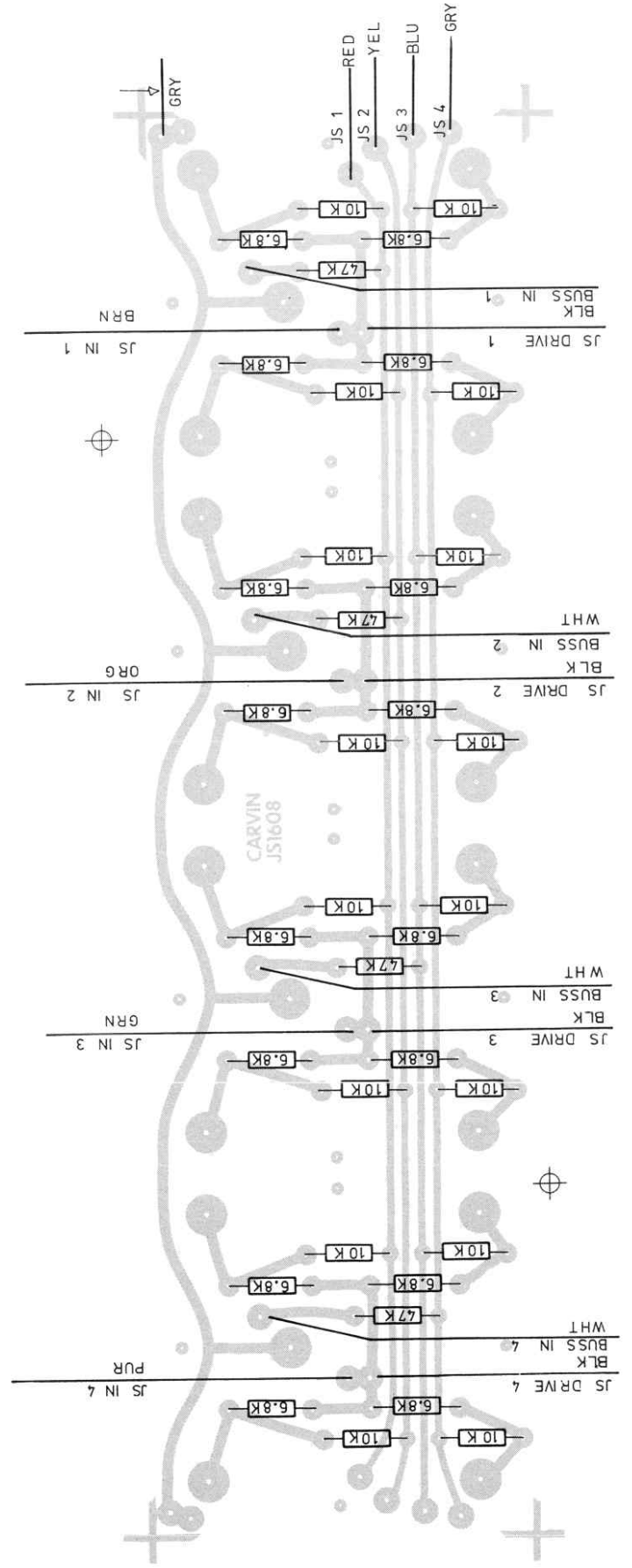
**CHANNEL DESCRIPTION**



**A. CHANNEL INPUT**  
 Each channel features a XLR-type connector located on the rear panel. Low impedance (150 Ohms to 600 Ohms) sources such as microphones, studio lines, etc. may be connected directly, whether balanced or single-ended. High impedance microphones, guitar signals and other high impedance sources should be matched with a transformer or suitable active circuit. Phantom powered microphones must be isolated from the Bal. input with a line input transformer.  
 The Carvin Bi-polar Input Circuitry is a fully differential configuration, providing superior common-mode rejection to most transformer-coupled inputs, while virtually eliminating high-level saturation and hum induction.

**B. & C. MIC/LINE PAD and PEAK LEVEL INDICATOR**  
 The signal level of each channel is monitored by an L.E.D. Peak Indicator circuit. The L.E.D. is offset on the panel for ease of visual contact.  
 When the channel level approaches its maximum undistorted level, the L.E.D. starts to illuminate.  
 Ideally, the signal into the channel should be as high as possible (for best signal/noise ratio) without allowing the L.E.D. to flash. It may be helpful to consider that the flashing of the L.E.D. is the equivalent of a V.U. Meter reading "0" (except that the L.E.D. can respond more quickly than any meter). Thus, the operator may allow the L.E.D. to flash occasionally, depending upon the amount of distortion allowable versus the signal/noise ratio desired.

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OK	5-16-78	5/31/78	JS1608 JOYSTICK ASSEM
DRAWN BY		P.C. PARTS LAYOUT	
		W. Flanery	









**C. POWER**  
 This is the overall power switch for the mixer. A neon indicator lamp is included in the switch. A short delay before the lamp turns on is normal.

**D. PINK NOISE GENERATOR**  
 A pseudo-random noise generator may be fed into either the Main or Cue Outputs through the Talkback system (below), and provides a constant signal which may be used for critical adjustment of sound equipment and speakers.  
 This noise filter provides equal emphasis in each area of the audio spectrum (pink noise) making it an excellent test signal for equalizing sound systems.

**E. TALKBACK**  
 The Talkback system features a balanced microphone input circuit with a Level Control and Assign Switch, directing the microphone to either the Cue Buss or all four Main Outputs. The switch may also be left in the center OFF position.  
 When assigned to the Cue Buss, the operator may contact the musicians through the stage-monitor system or studio-foldback system.  
 The Pink Noise Generator may be switched into the Talkback circuit for level and EQ tests, as described above.

**F. SUB-OUTS**  
 Each of the four Sub-Outputs present a fully mixed signal (including Effects I, Effects II and Sub-input mixes) and can be used as the final outputs of the mixing console, if desired. The Sub-Output connectors, located on the rear panel, offer a fully balanced line capable of driving a 600 Ohm loads. The four level controls on the front panel are independent of the Joysticks and Main Faders. Each Sub-Out drives its own level Meter (4 meters on the left end of the meter panel) for visual monitoring.  
 Typical uses of the Sub-Outputs include driving a tape-system during a stage performance or driving a studio monitor (in place of the Cue Buss) if full quad monitoring is desired.

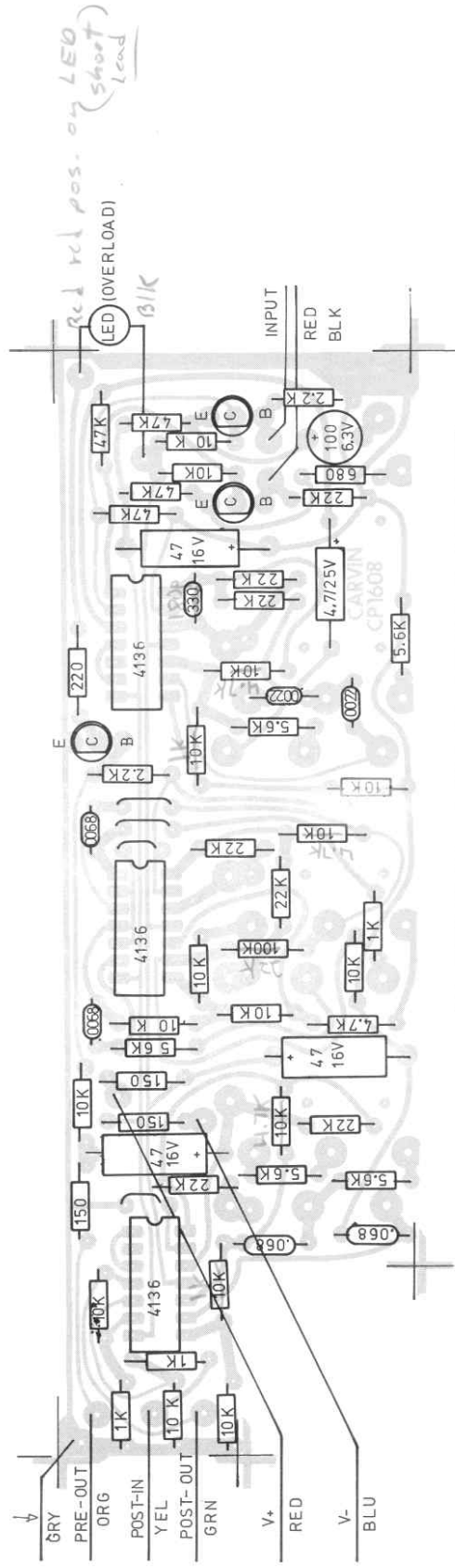
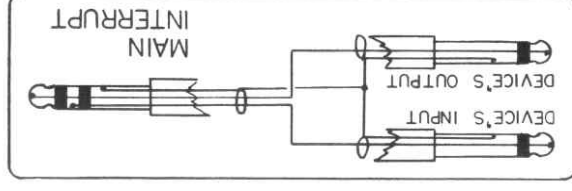
**G. EFFECTS I (REVERB)**  
 These are the four Master Reverbation controls, and they set the maximum overall amount of reverbation in each Main Output. It is possible to substitute an external effects system in place of the self-contained reverbation by using the Effects I IN/OUT jacks (on the rear panel), which automatically disconnects the built-in Reverb. Generally, however, the Effects II buss is used for external effects (below).

**H. EFFECTS II**  
 These four controls vary the total maximum amount of Effects II signal in each Main Channel. The Effects II IN and OUT jacks are located on the rear panel, below the EFFECTS I jacks. The controls should be off (ccw) when not in use.  
 External devices such as digital-delay systems, phase-shifters, etc. are incorporated into the mixer by connecting the Effects II OUT jack to the input of the device. The device's output is plugged into the Effects II IN jack.  
 The Channel Effects II and Main Effects II controls operate in the same way as the Effects I (Reverb) system.

**I. & J. SUB-IN**  
 Each Main Channel includes a SUB-IN jack, located on the rear panel. These jacks will accept line level inputs, and permit the outputs of a 4-channel tape deck to be fed directly into the mixer without using up four of the Input Channels. The controls on the front panel provide level adjustment, while the Switch can assign the Sub-ins to either their respective Main Channels, or into the Cue buss. A center OFF position is used for standby.

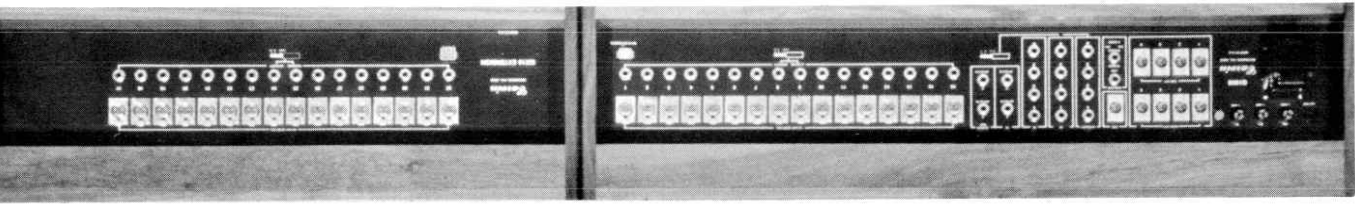
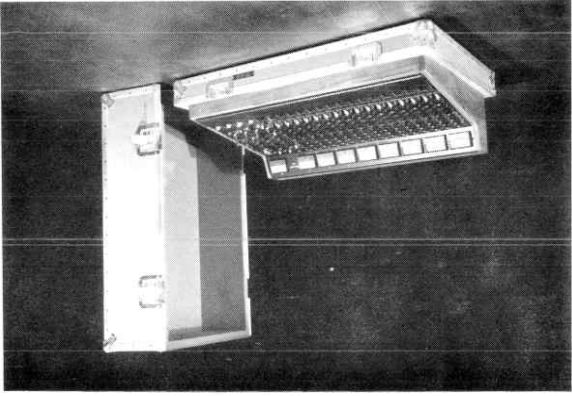
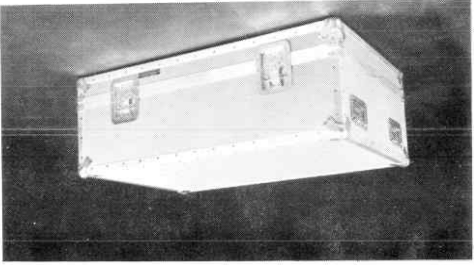
**K. & L. JOYSTICK NETWORK**  
 Four independent Joysticks provide full dynamic quadraphonic assign, and are used to assign the four sub-signals to any of the four Main Outputs.  
 It may be more desirable, however, to assign the sub-signals directly to their respective Main outputs, and use the Joysticks with any of the 16 Input Channels. This may be accomplished by setting the Joystick Switches to BYPASS, and running a patch cable from the desired Channel Interrupt Jack (see Channel Description) to one of the Joystick IN jacks, located on the rear panel. The Channel Assign and Pan controls will be defeated, and the Joystick will provide full quad-panning instead. All four Joysticks may be used in this manner, providing up to four Input Channels with joystick panning. The Joystick IN jack also may be used with any line level signal.  
 Note that when the Joysticks are Bypassed, the Sub-Output and Main Output signals will be identical, but with independent level controls.

**M. MAIN OUTPUTS**  
 Each of the four Main Outputs provide a fully balanced signal capable of driving 600 Ohm loads. The output connectors are located on the rear panel, while four slider-faders on the front panel control the signal level. The four VU meters are located in the center of the meter panel.  
 In addition, each of the Main Outputs offer a Main-Interrupt Jack, similar in design to the Channel-Interrupt jacks. These jacks may be used with compressors, graphic-equalizers, noise-reduction systems, etc. A stereo-jack is used, with the "ring" being the output going to the device's input and the "tip" being the return input connected to the device's output.



REVISIONS	DATE	CARVIN MUSIC CO
OK 5-16-78	5/31/78	
	DRAWN BY	CP1608 CH INPUT & EQ
		P.C. PARTS LAYOUT





**LINE CORD**

All Carvin Equipment is supplied with three-conductor line cords ending in grounding-type plugs. The arrangement will greatly reduce the possibility of electric shock, provided the equipment is used with three-conductor grounding-type outlets, and provided these outlets have been properly wired. If, at any time, electric shock is experienced, disconnect the amplifier and have a qualified technician correct the trouble.

**FUSE HOLDER**

Access to the fuse can be gained by pushing the fuse holder inwards, then turning counterclockwise. The type of fuse to be used is printed just below the fuse-holder. Should the fuse ever fail, replace it with an identical fuse (an extra fuse is provided). If the second fuse fails, then a problem is indicated, and the amp should be serviced. To prevent excessive damage to the amplifier, NEVER USE A FUSE WITH A HIGHER RATING.

**REAR PANEL**

**MX16 EXPANDER**

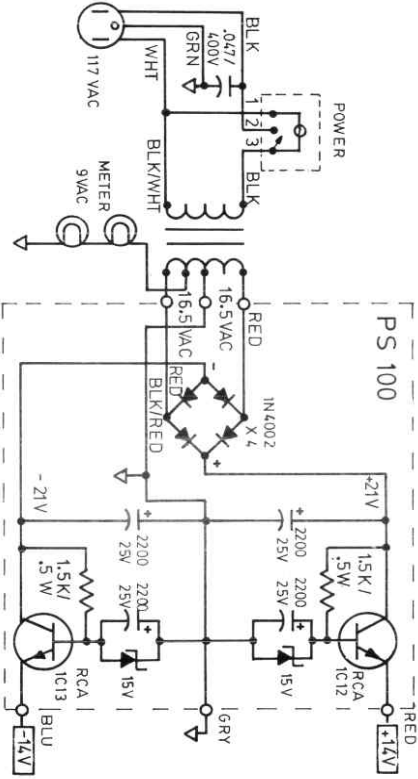
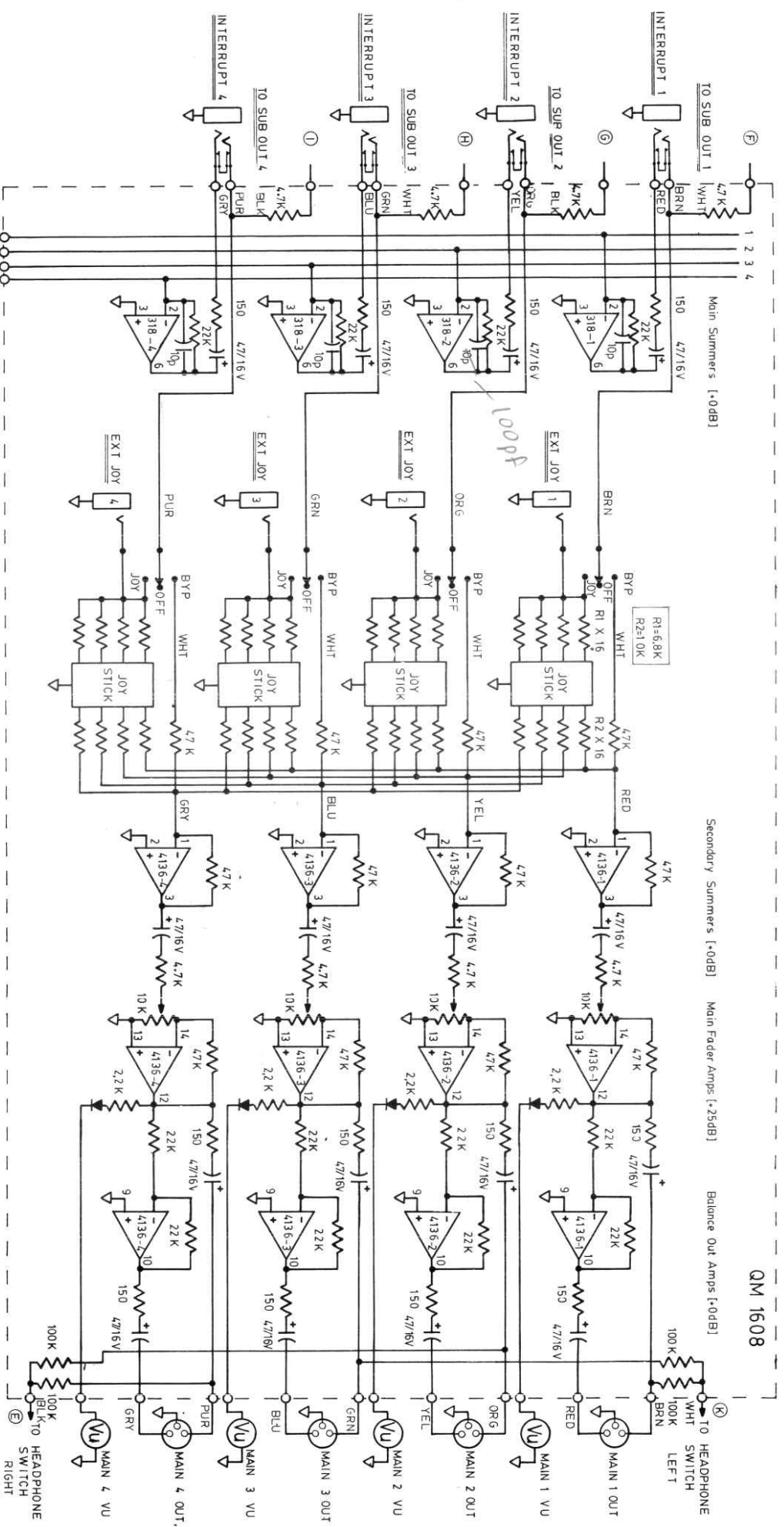
The MX16 Expander Board contains 16 Input Channels identical to those of the Q1608. Interconnection is made via a single cable (#C-1608 QMX) utilizing heavy-duty Cinch-Jones connectors. The cable supplies DC power to the MX16, as well as all buss interconnects.  
**CAUTION:** Do not connect or disconnect the MX16 while the Q1608 is ON, or damage may result to the mixing boards as well as related external equipment.

**ANVIL CASES**

If the Mixer was shipped to you, you received it in an Anvil Case. Be sure to always use these cases when transporting your mixer.  
 The Anvil Case was designed so that you can operate the mixer in the case with the top off.

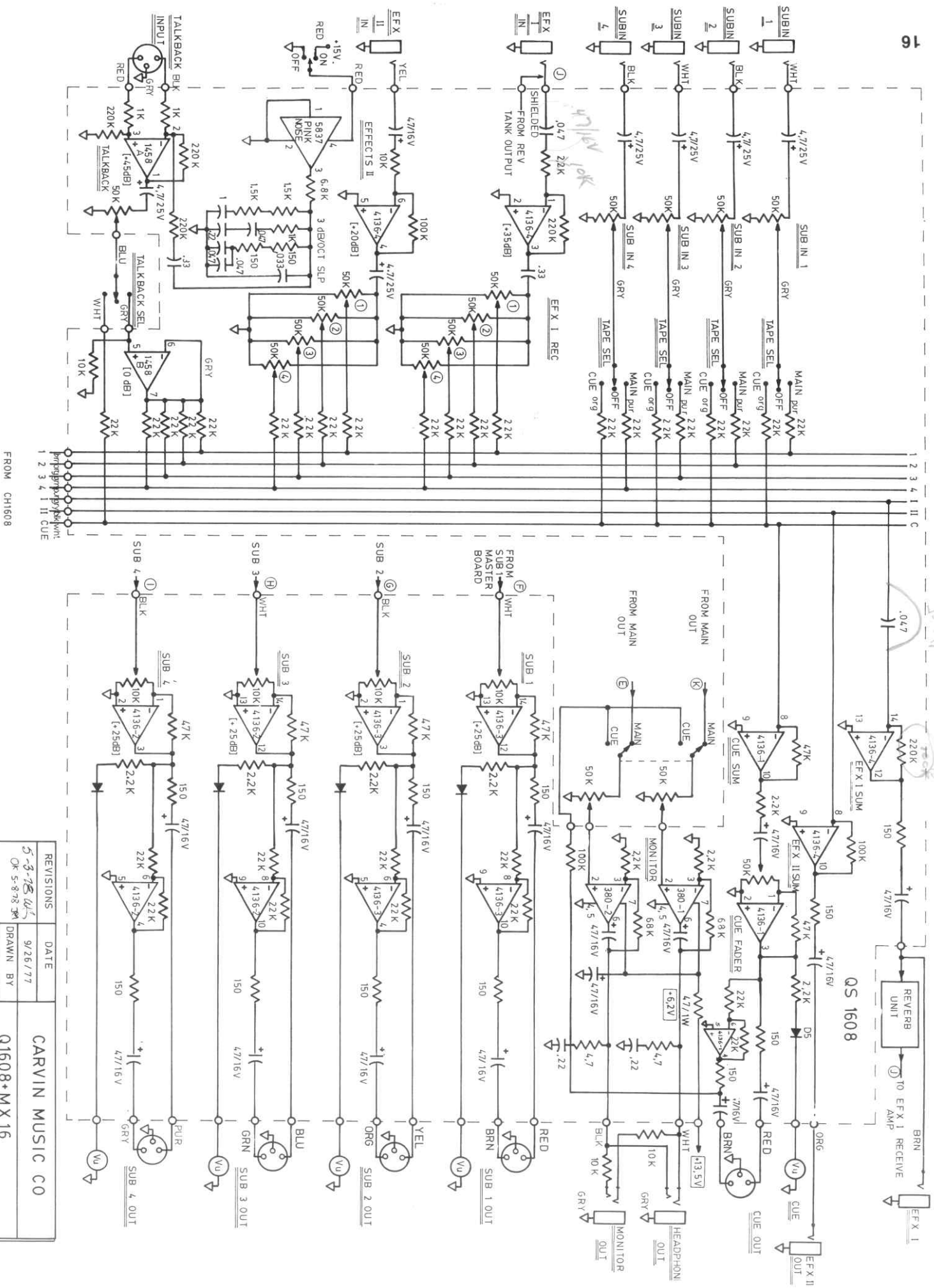
**UPKEEP**

The Solid Teak Cabinetry is of fine furniture quality and should be treated as such. To keep the hardwood from drying out, we recommend using Lemon Oil on a soft polishing cloth. Be very careful not to get the oil on the Black Panel or components.



REVISIONS	DATE	CARVIN MUSIC CO
5-3-75 (10)	9/23/77	Q1608 + MX16 MAIN QM1608 POWER SUPPLY PS 100
5-8-78 (3)	DRAWN BY W. Flansburg	





- SPECIFICATIONS
- BLOCK DIAGRAMS
- SCHEMATICS
- COMPONENT LAYOUTS

**SERVICING SECTION**

REVISIONS		DATE	CARVIN MUSIC CO	
5-3-78	WLT	9/26/77	DRAWN BY	Q1608+MX16
OK	5-8-78		BY	AUXILIARY QS1608

**Q1608 & MX16 SPECIFICATIONS**

Number of Inputs 16 or 32 Bal Input Channels, 1 Bal Talkback, All XLR Connectors.

Input Circuitry Lo Impedance Bal 150 to 600 Ohms, Bipolar differential circuits utilizing selected, low-noise discrete devices. Typically better than 75 dB.

Hum & Noise -125dBV/Equivalent Input Noise (E.I.N.)

S/N Ratio 72 dB Master Fader at nominal level.

Main Output Voltages 1 thru 8 Mains, Cue, Monitor; 10 V RMS Maximum into 600 Ohms + 22 dBm).

Output Headroom 18 dB above nominal level (+ 4 dBm).

Frequency Response ± 2 dB 15 Hz to 25 KHz at + 10 dBm.

Distortion (THD) Less than .05% nominal, Less than .15% at + 10 dBm.

Voltage Gain 8 Main Outputs: 74 dB, Cue: 72 dB, Monitor: 72 dB.

Level Indicators Individual Peak level LED's per channel (post EQ), Professional illuminated VU meters for all main outputs plus Cue, 0 VU = + 4 dBm.

Sub Inputs 4 Sub Inputs switchable to Main or Cue (tape playback).

Channel Interrupt 16 or 32 outputs for multi-channel recordings plus break-in for effects.

Channel Assignment QUAD. Each channel can be assigned to any 4 Mains or Turned off.

Channel Equalization Each channel features a continuously variable 3 Band adjustable 40 to 400 Hz, Mid Band; Freq adjustable 400 to 4K Hz, Hi Band; Freq adjustable 2K to 20K, Shelving on both Hi and Lo Bands, Bandpass on Mid Band. Boost and cut per each band: ± 16dB.

Main Outputs 8 with 4 Main Outputs (post joystick) plus 4 Sub Outputs (pre joystick), All Bal, featuring XLR Connectors. Note: Joysticks can be bypassed.

Other Outputs Cue and Stereo Monitor Outputs, Bal, Cue features XLR connector.

Main Interrupt Main Interrupt Jacks for Compressing, Limiting, Aux EQ, etc.

Joystick Interrupt Permits independent operation of Joysticks with individual channels.

Effects 1 (Reverb) Built-in Hammond reverb system with 30-40 milli-seconds delay. Total 1.6 seconds tone decay.

Effects 2 Separate Buss for additional effects - Echo, phase shifter, etc.

Test Generator Pseudo-random Pink Noise Generator switchable into cue or main.

Talkback System Bal, XLR in, Level Control, Switchable to Main or Cue, Quad Outputs into stereo Headphone Amps, Level Control, 8 Ohms Imp.

Power Requirements 110-120 VAC 50-60 Hz, Grounded (Three Wire) plug. Self-contained bipolar power supply, fully regulated and fused.

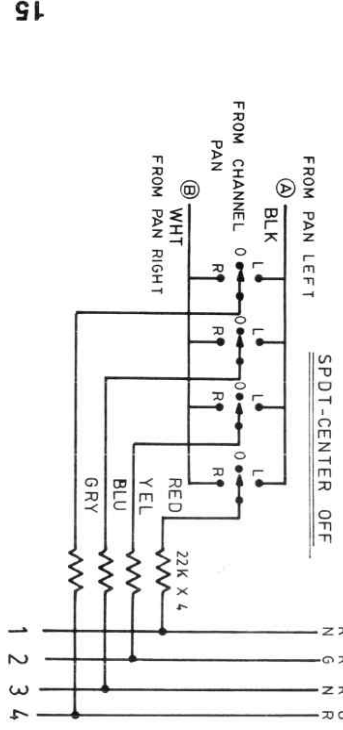
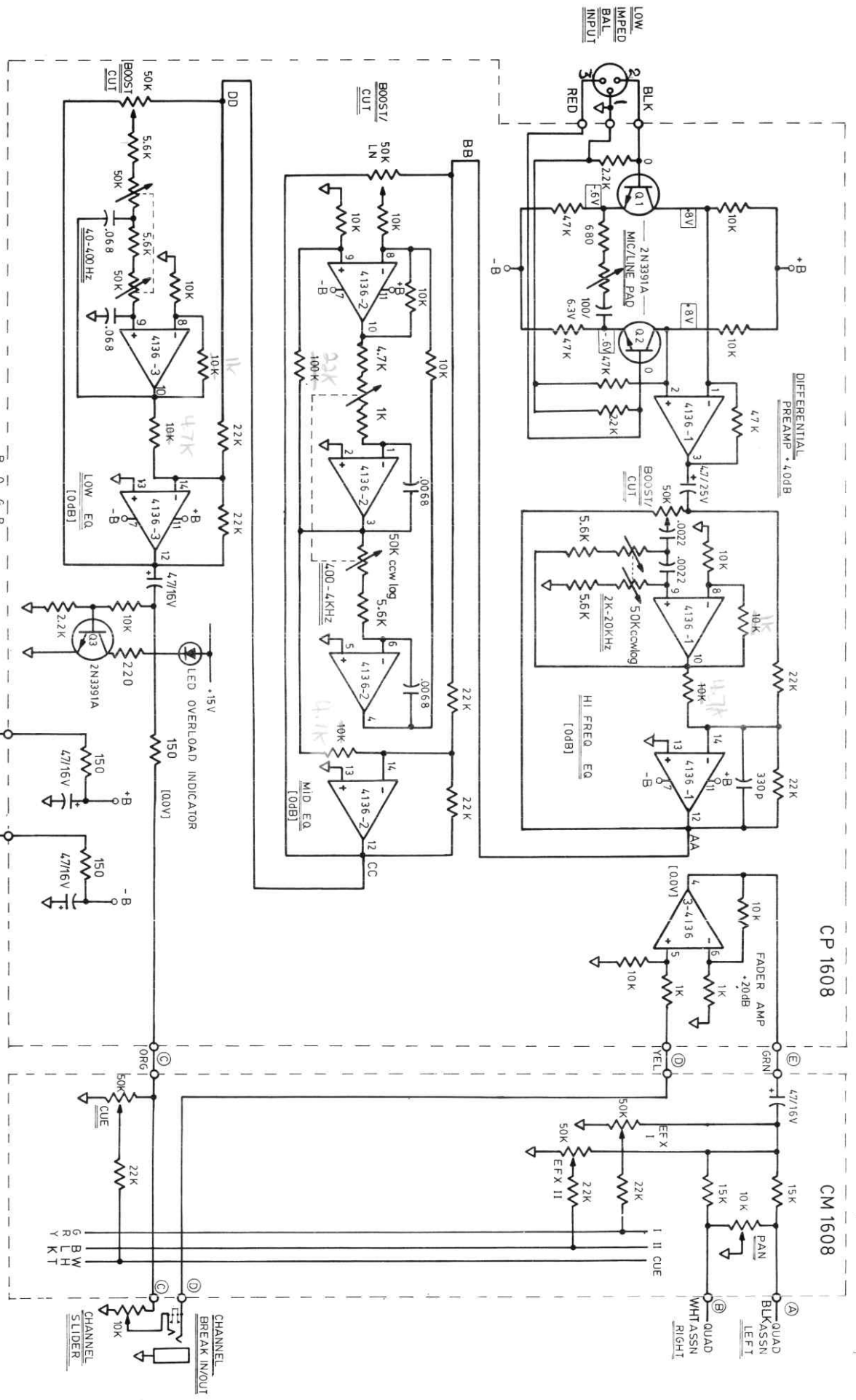
Construction Solid ¾" Teak Wood Cabinet (Not veneered) with Teak Formica bottom, Leatherette Handrest, 16 gauge steel Black finished chassis.

Dimensions Width 39", Height 11", Depth 24½", WEIGHT: 90 lbs.

WARRANTY 2 YEARS Parts and Labor. See pg. 60.

16 Channel Expander board for 32 ch operation of the Q1608. All related specifications identical to the connector.

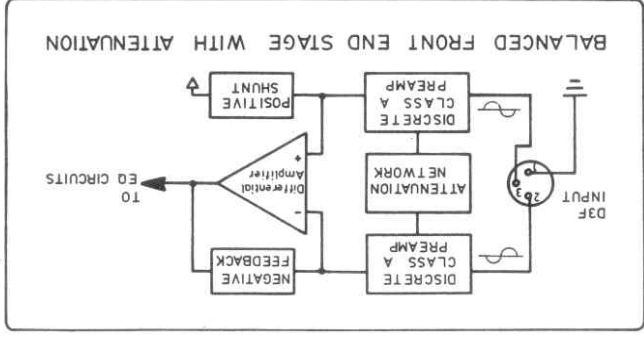
Dimension Width 29½", Height 11", Depth 24½", WEIGHT: 60 lbs.



REVISIONS	DATE	CARVIN MUSIC CO
5-1-75	11-15-77	Q1608 MIXER + MX16
5-8-78		EQUALIZATION, CP 1608
		CHANNEL MASTER CM 1608
		CHANNEL ASSIGN
DRAWN BY <i>W. Flanigan</i>		

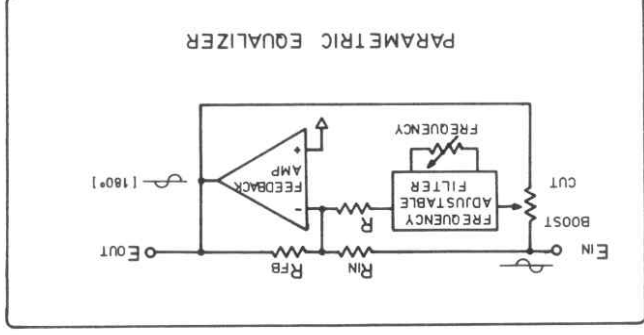
# CIRCUIT DESCRIPTIONS

**INPUT PRE-AMPLIFIER**  
 A discrete differential input circuit was selected over the common input-transformer design for a number of reasons. The Common-Mode-Rejection Ratio can be as good or better. (Carvin's input CMRR is typically 75 dB or greater). Both distortion and response typically deteriorate with transformers as the input signal is increased, whereas a differential input maintains its performance to nearly the saturation point. The Carvin Differential input is down less than 1 dB at 100 KHz, and can accept a high RMS with negligible loss in performance. Finally, transformers are extremely susceptible to hum induction, and must be carefully shielded to minimize this problem.  
 The Carvin Differential Input Circuit utilizes two low-noise discrete transistors in a differential configuration, the gain of which is determined by the total resistance between the two emitters. A special taper potentiometer placed between the emitters varies this resistance, providing up to 35 dB of attenuation. Bipolar transistors were chosen over FET devices due to their superior noise characteristics at low impedances.  
 The differential pair feeds the inputs of a low-noise operational amplifier, establishing high common-mode rejection, low distortion and an extended high-frequency response.



## PARAMETRIC EQUALIZER

Each band of the parametric equalizer consists of an active filter circuit placed within the feedback path of a high-gain op-amp.  
 Each band of the parametric equalizer utilizes an inverting op-amp configuration with a potentiometer forming the input and feedback dividers. The junction of the two resistors (the pot's wiper) is not fed directly to the inverting input, but passes through an active filter first. In addition, a pair of resistors forms a second feedback path, establishing a unity gain amp with a flat frequency response. As the active filter is moved toward the input point (by rotating the pot clockwise) the filtered signal adds to the flat input signal, providing up to 16 dB of Boost. Conversely, when the pot is fully counter-clockwise the filter is placed at the output, adding to the flat feedback signal and providing 16 dB of cut.  
 The active filters employ op-amps themselves, and include frequency adjustment by a pair of ganged pots. The high and low-pass filters use a "Sallen-Key" design, while the center bandpass filter uses the "State-Variable" configuration.

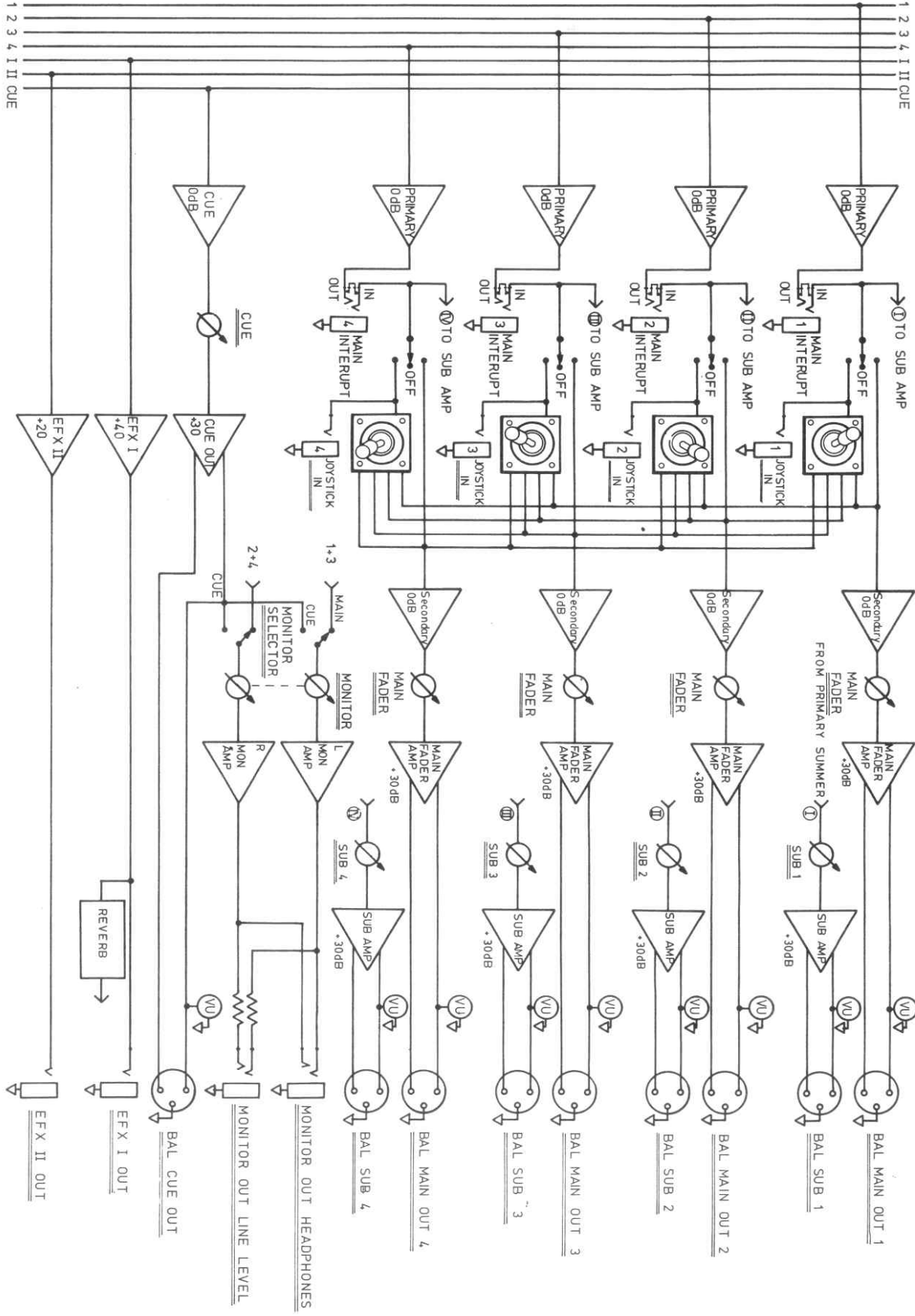


## PAN CONTROL and ASSIGN SWITCHES

The Pan circuit employs a single linear potentiometer with the wiper connected to ground. Two resistors couple the channel signal to each end of the pot, while the four Assign Switches can connect either side of the pot to their respective summing resistors. The effect of the input resistors, grounded pot and the summing action of each Main Buss is a smooth Panning effect between any two or more outputs: 1 to 2, 2 to 3, 1+3 to 4, 1+2 to 3+4, etc.

## SUMMING AMPLIFIERS

Through the Q1608, op-amp summing amplifiers are used. For minimum summing impedance and crosstalk, even at high frequencies, high-performance 15 MHz devices with a slew rate of 50 V-us are used as the Main Summing amps.



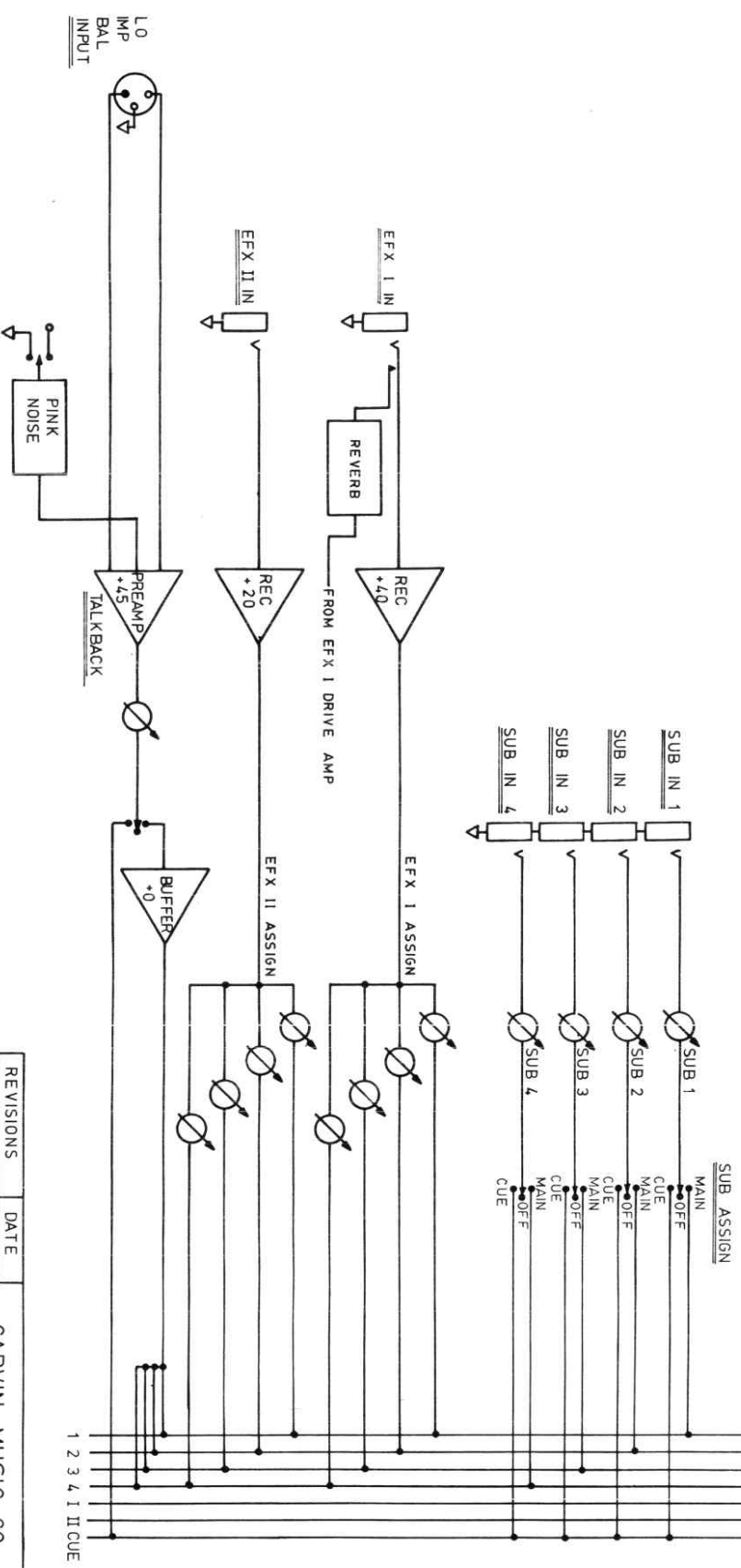
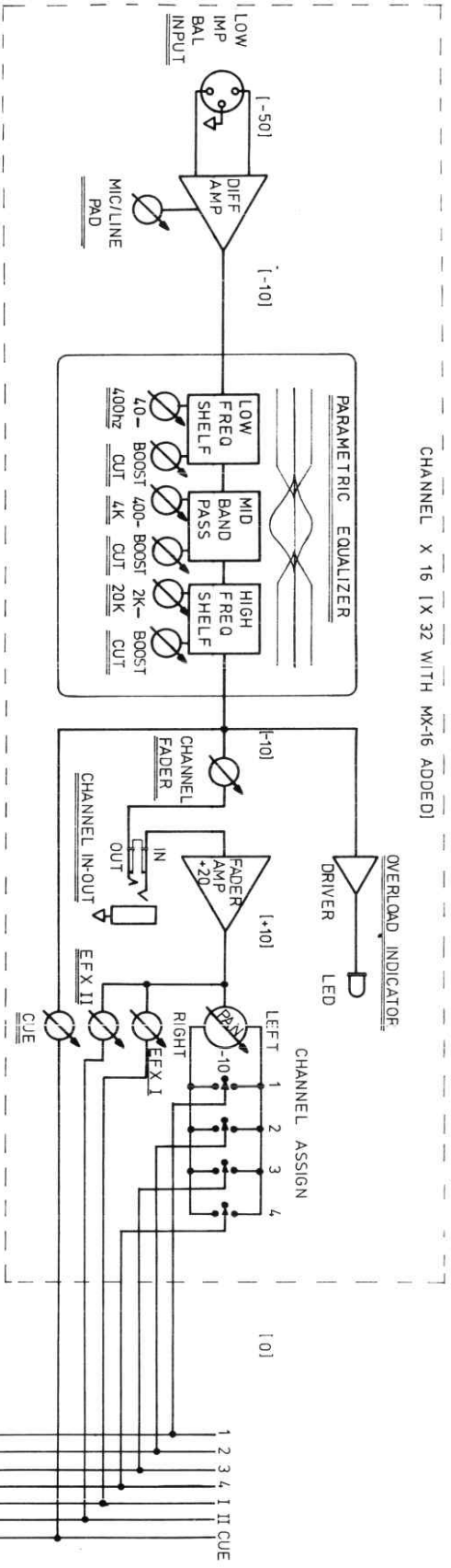
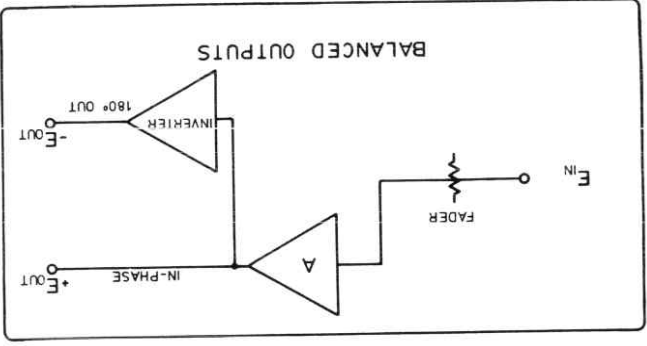
REVISIONS	DATE	CARVIN MUSIC CO
4/2.8-78 uE	12-5-77	Q 1608 MIXER
-OK 5.12.78		BLOCK DIAGRAM
	DRAWN BY	MAIN & SUB OUTPUTS
	W. Flaherty	



**JOYSTICKS**  
 The joysticks employ input and output resistors in conjunction with the summing principle of op-amps to form a special 4-way voltage divider. This provides four output signals from one input signal in proportions determined by the position of the joystick. The result is an assign system that can "place" a signal anywhere within the quad spectrum, allowing the signal to seemingly circle or criss-cross the listening room.  
 The Bypass switch connects the Sub Channels directly to the Main Output circuitry, allowing the joysticks to assign any line-level signals via the Joystick IN jacks.

**BALANCED OUTPUTS**

The Cue Output, the four Sub Outputs, and the four Main Outputs all feature low impedance, balanced signals. In other words, they produce a positive signal at one terminal of the output jack and a negative signal (180° out-of-phase) at the other terminal. This 180° phase reversal is produced by a signal "mirror"—an op-amp wired in a unity gain inverting configuration. In this way, the output level is effectively doubled in voltage and therefore has greater dynamic capability (greater headroom). Furthermore, when used with a balanced input, any extraneous signals (hum, etc.) will be rejected by the CMRR of the input, while the balanced signal is amplified.  
 Each output includes a 150 Ohm series resistor for short-circuit protection.



REVISIONS		DATE	CARVIN MUSIC CO
5-5-78	146	12-2-77	Q 1608 MIXER
OK 5-8-78			BLOCK DIAGRAM INPUT CIRCUITS
DRAWN BY			
W. Farley			