

CARVIN

MX1644



16x4 Audio Mixer **OPERATION MANUAL**

Manual No. 5002 A

1.	RECEIVING INSPECTION AND PRECAUTIONS.....	1
2.	MX1644 RECORDING FEATURES.....	2
3.	MX1644 LIVE SOUND MIXING FEATURES.....	2
4.	INTRODUCTION TO THE CARVIN MX1644.....	3
5.	INTERCONNECTING THE MX1644 FOR RECORDING.....	4
	Four-Track Recorder Connections.....	4
	Control-Room Monitoring.....	5
	Two-Track Recorder Connections.....	5
	Connection to Outboard Effects.....	6
	Musicians Headphone Cue Mix.....	6
	Illustration of a Recording Set-Up.....	7
6.	RECORDING WITH THE MX1644.....	8
	Recording Basic Tracks.....	8
	Overdubbing Sessions.....	8
	Final Mixdown.....	9
7.	INTERCONNECTING THE MX1644 FOR LIVE SOUND MIXING.....	10
	Input Connections From the Stage.....	10
	Connecting the Main Amps and Speakers.....	10
	Connecting the Monitor Amps and Speakers.....	10
	Monitoring at the Mixer.....	11
	Connecting Outboard Effects.....	11
	Suggestions for Efficient Set-Up and Quality Sound.....	11
	Illustration of a Live Sound Set-Up.....	13
8.	MIXING LIVE SOUND WITH THE MX1644.....	14
9.	DISSASSEMBLY FOR SERVICING.....	15
10.	BACKUP CIRCUIT MODULES.....	16
	MX1644 CONTROL DESCRIPTIONS.....	17
	MX1644 REAR PANEL.....	19
	MX1644 TECHNICAL SPECIFICATIONS.....	19
	SCHEMATIC DIAGRAMS.....	20
	PARTS PLACEMENT DIAGRAMS.....	30
	PARTS LISTS.....	34
	SERVICING AND WARRANTY INFORMATION.....	53

CARVIN MX 1644
16 x 4 Audio Mixer
Operating Manual

1. INSPECTION AND PRECAUTIONS

Inspect your mixer and the shipping carton for any damage which may have occurred in shipping. If damage is found, notify the shipping company immediately and file a damage claim with that company. All shipments are insured but the claim must be filed by you, the consignee. Carvin cannot ship a replacement mixer until you can provide a claim number. Save all packaging for proof of damage and please notify CARVIN of any damage incurred.

SAVE THE CARTON AND ALL PACKING MATERIALS. In the event you re-ship your mixer ALWAYS use the original carton and packaging material to provide maximum protection for your unit. Neither CARVIN nor the shipping company can accept liability for damage which occurs in shipping due to improper packing. SAVE YOUR INVOICE. It will be required for warranty servicing in the event that servicing is necessary. IF you did not receive all the items you ordered, then the packages probably became separated in shipping. Please allow several days for the rest of your order to arrive before inquiring.

CAUTION- TO PREVENT ELECTRIC SHOCK DO NOT DEFEAT THE SAFETY GROUND ON THE POWER CORD. WARNING- TO PREVENT FIRE OR SHOCK HAZARD DO NOT EXPOSE TO RAIN, MOISTURE, EXPLOSIVE ATMOSPHERE OR INSTALL AN IMPROPER FUSE!

2. CARVIN MX1644 RECORDING FEATURES

- ** Four Track Studio Control Center
- ** Input/Output Channel Organization
- ** Independent 4 Into 2 Monitor Mixer
- ** Four Band Channel Equalizer
- ** Four Auxiliary Busses
- ** Solo on all Input and Output Channels
- ** Two Effects Returns w/ Pan
- ** Talkback w/ Built-In Mic and Monitor Dimming
- ** Peak Warning Indicators w/ Peak Stretching
- ** Patch Points on all Channels
- ** Microphone Phantom Power
- ** Mon Sends from Output Channels
- ** Alternate Metering of Mon and Two-Track
- ** Quick Tape Playback Through Monitors
- ** Independent Mic and Line Preamps
- ** Totally Modular Internal Construction
- ** Input Noise of -127 dBv
- ** +4 dB or -10 dB Operation Level
- ** THD less than .05%

3. MX1644 LIVE SOUND MIXING FEATURES

- ** Four Sub-Groups w/ Solo
- ** Two Independent Monitor Mixes Available
- ** Headphone Monitoring of Main or Monitor
- ** Compact for Easy Handling
- ** Talkback to Monitors
- ** 11 Step Gain Controls for Easy Set-Up
- ** Channels Assignable to L&R Stereo Output

4. INTRODUCTION TO THE CARVIN MX1644

The CARVIN MX1644 is a full function audio mixer designed to serve as both a control center for four track recording and as a live sound mixer. Recording basic tracks, overdubbing sessions, and final mixdown are all handled with ease by the 1644; signals are automatically routed to the appropriate sections of the console for each recording operation. One of the key features provided by the MX1644 but rarely found on PA "recording" mixers is an independent control room monitor mixer with buss/tape source selection. Working groups will find this mixer perfect for the double duty requirements of recording and live sound mixing.

The sixteen input channels of the 1644 include four band equalization, and four auxiliary mixing busses. Quiet performance starts with an ultra low noise differential mic preamp and is preserved throughout the mixer by careful attention to gain structure and use of low-noise integrated circuits. The 1644 comes with a built-in reverberation system so that smooth clean reverb can easily be added to your recordings or live mixes. The feed to the reverb system is internally connected to the EFF 1 send. The reverb return signal is normally connected to effects return A unless a plug is inserted into the effects return A jack.

As an option, the output section may be equipped with four nine band graphic equalizers. Each of the four output channels then will have a nine-band graphic equalizer in the signal path which is also available to be patched into input channels, monitors, or other signal paths when not needed at the outputs. Mixers which are purchased without the optional graphic EQ's can be upgraded in the field at a later date by ordering the MX1644 EQ upgrade package.

Construction of the 1644 is highly modular with individual circuit boards used for each channel and each master strip. Virtually all hand wiring has been eliminated through the use of highly reliable circuit board connectors and ribbon cable. The circuit boards themselves are made from flame retardent .062" material with a moisture repelling coating and silk screened component descriptions. The chassis is made of precision formed steel with long life pem-nut fasteners and a durable epoxy finish. One inch thick solid oak wood ends and a padded hand rest make the 1644 good looking and comfortable to use.

Some examples of the quality components found in the 1644 are the Switchcraft professional signal connectors (3-pin and 1/4") and ITT Schadow switches used throughout. These quality switches assure years of quiet, scratch free operation. Large professional VU meters are driven by a well damped circuit and are easy to read. Long throw 100mm faders have a precise audio taper for smooth fade outs and an integral dust shield for long life. The rotary pots are optimally damped for smooth operation. All of the knobs have easy to read top pointers and are color coded by function.

An internal heavy duty power supply spares the expense and inconvenience of a separate outboard supply and is located in such a way that system noise is not affected. Tight voltage regulation helps keep crosstalk low while current limiting protects the supply from accidental shorts. AC power is provided to the mixer by way of a standard detachable international line cord with safety ground.

Applications for the MX1644 include live sound mixing, four track recording, production studios, broadcast, and sound mixing for film.

5. INTERCONNECTING THE MX1644 FOR RECORDING

The MX1644 can be combined with a four-track tape recorder, control room monitors and cue headphone system to form a complete multitrack recording system. For trouble free operation and the lowest possible noise we recommend using only high quality shielded cables for all signal connections to the 1644. In general, custom built cables give the best results since cable lengths can be exact and proper connectors can be used so that connector adapters can be avoided. Signal cables should be routed away from AC power cables as much as possible.

Four-Track Tape Recorder Connections

Connections to the tape machine should be made as follows. Connect the "sub out" signals of the mixer's four output channels to the corresponding line level inputs of the four-track tape recorder. This requires four cables with 1/4 inch phone plugs on the mixer end and connectors appropriate for the tape machine on the other end. Likewise, connect the four line level outputs of the recorder to the "line in" jacks of channels one through four of the mixer. It's not a bad idea to permanently label the cables with channel number and "tape in" and "tape out" designations. All of the mixer's outputs are very low impedance and are designed to drive loads of 600 ohms or higher. Likewise all of the mixers line inputs are high impedance and can be driven from virtually any line level source. As with most modern solid state equipment no "impedance matching" is required. The normal situation is for a low impedance output to drive a high impedance input. In this case the input is said to "bridge" the output, that is, the input impedance is much higher than the output impedance. This allows one low impedance output to drive many paralleled high impedance inputs when necessary.

With the mixer and recorder connected as described above, the four output channels feed the four channels of the recorder and the output channel faders control the record level. If the mixer is equipped with the optional graphic equalizers then one EQ will be in line with each of the four recording outputs (unless the EQ is switched out). The playback (output) from the recorder is available at the line inputs to input channels 1, 2, 3, and 4 so that during normal mixdown of the four-track tape these four channels will be used. Because the line input signals from the first four channels also feed the output channel buss/tape switches (at the tape position) the tape playback signal is available at the output channel for quick tape playbacks without disturbing input channel settings. Returning the tape playback signal to the output channels also allows overdubbing without using up valuable input channels for tape playback. Note that when the tape switch on an output channel is depressed the tape playback signal then feeds that output channel's solo switch, two-track send, monitor send, and VU meter.

Control-Room Monitoring

Recording studios are usually set up with the mixer and multitrack recorder in a control room which is acoustically isolated from the studio where the musicians are to perform. This allows the recordist to listen over loudspeakers to the program being recorded. The MX1644 has been designed to operate in a professional recording environment where the musicians perform in a studio separated from the control room. The 1644 therefore has complete control room monitor mixing functions and is intended to be used with control room loudspeakers. A stereo power amplifier will be required to drive the control room monitor loudspeakers. The left and right "C R OUT" signals from the mixer should be connected to the line inputs of the stereo power amp using cables terminated with 1/4 inch phone jacks at the mixer end and connectors appropriate for the power amp inputs at the other end. Use a good heavy gauge speaker wire (16 AWG or heavier) to connect the power amp to the monitor loudspeakers and keep these speaker lines as short as possible.

Although control room loudspeakers are clearly the best way to monitor recording sessions, we recognize that working musical groups do not always have access to ideal facilities and often have to produce demo tapes in whatever room is available. To help make this a workable situation we have equipped the 1644 with a high quality stereo headphone amplifier which is driven from the control room output. The headphone output, when used with a good pair of isolating headphones, can serve as a reasonable substitute for proper control room monitors. Program that would normally be heard on the control room monitors (two-track buss, solo selections, cue mix setups, etc.) can therefore be auditioned through the phones when it is not possible to use loudspeakers for monitors. The phones jack is at the front of the mixer on the right-hand side. When used with a good pair of isolating headphones the 1644 can be used to produce quality multitrack recordings even when the musicians must share the same room as the mixer and recorder.

Two-Track Recorder Connections

After the multitrack tape has been recorded the mixer will be used to mixdown the four tracks to produce a final stereo (or mono) master tape. This requires a two-track (or mono) mastering tape recorder in addition to the multitrack recorder. The two-track recorder should be interfaced with the mixer by connecting the mixer's left and right "two-track out" signals to the line input jacks of the two-track recorder. This will require two cables with 1/4 inch phone plugs at the mixer end and connectors appropriate for the recorder on the other. The line outputs of the two-track recorder are then connected to the "two-track in" jacks of the mixer. This will require two more cables similar to those just described. The two-track playback can be heard in the control room (or phones) by selecting "2 TRK PB" at the control room group on the system master strip.

Connecting Outboard Effects

Although the reverberation system built into the MX1644 will meet many users requirements for effects, the mixer is equipped with two auxiliary busses for mixing effects send signals and has two effects return groups complete with level control, pan and assign functions. If more than two effects returns are required then unused input channels can be employed for this purpose with the added benefit of being able to apply the channel EQ to the effects return signal.

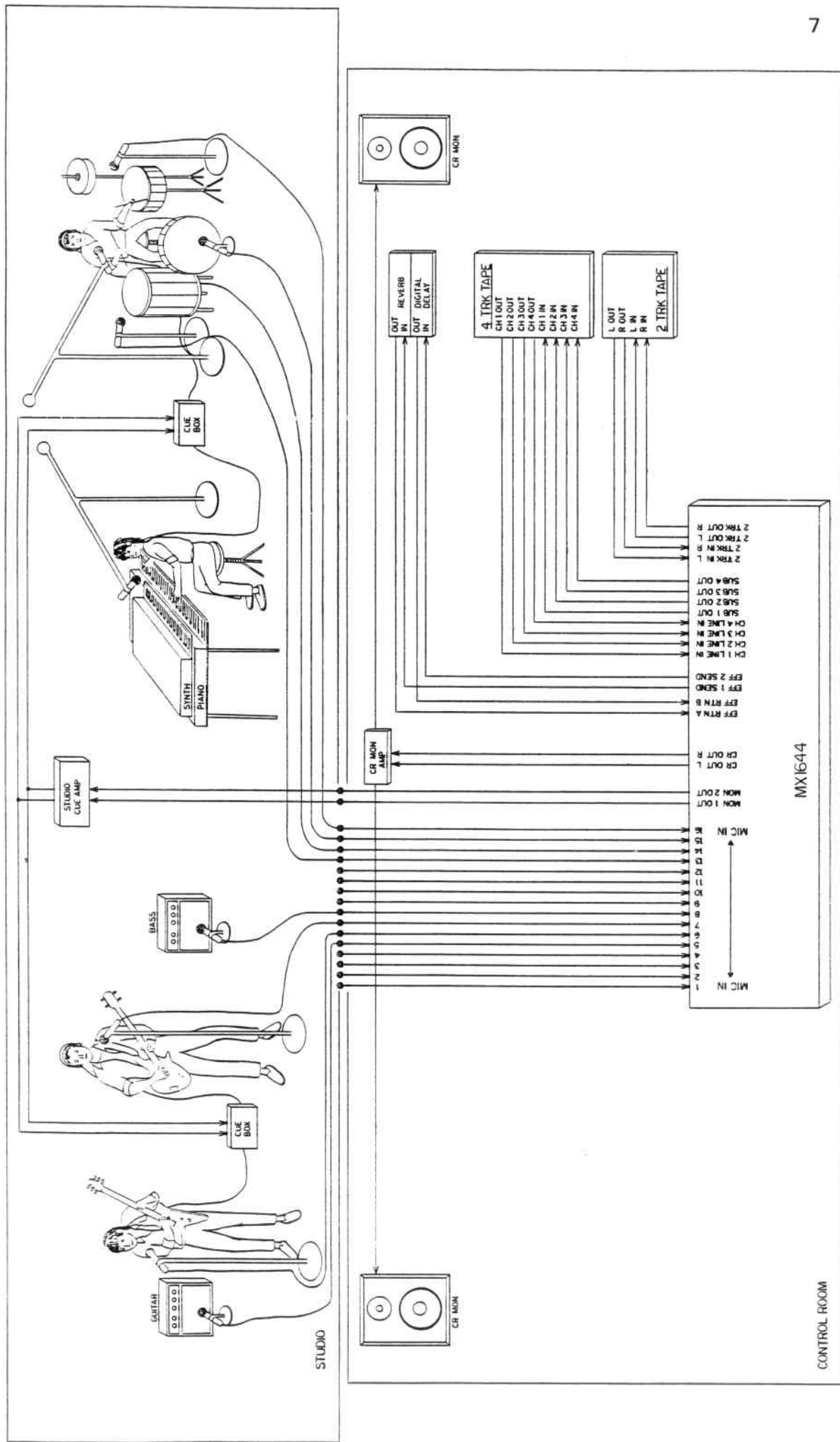
Outboard effects devices can be interconnected with the mixer by connecting the "EFF SEND" signal from the mixer to the line input of the effects device and then connecting the output of the effects unit back to the mixers "EFF RTN" jacks. The interconnect cables will require 1/4 inch phone jacks at the mixer ends and connectors appropriate for the effects device at the other end. Effects return A is normally used for the internal reverb return but return A can be used for other outboard effects simply by making the connections described. This will automatically defeat the internal reverb. Because the level of the effects send signal is fully adjustable and the effects return input has 20dB of gain adjustable, almost any outboard effects device can be accommodated.

Musicians Headphone Cue Mix

It will be necessary to provide a headphone cue mix for the musicians in the studio in order for them to play along with previously recorded tracks during overdubbing sessions and to allow them to hear any electronic instruments which are plugged directly into the mixer. The MX1644 has two auxiliary busses for setting up the cue mix; these are MON 1, and MON 2. Signals can be sent to these mixes from the input channels, the output channels, and the effects returns. The MON 1, and MON 2 send masters located on the effects master strip set the overall level of these output signals.

Although the output signals from the 1644 are capable of driving one or two high impedance headphones to a moderate level it is best to use an additional stereo power amplifier to drive the musicians headphones. Most professional studios use "cue boxes" in the studio following the power amp in order to facilitate distribution of the cue signals to a number of musicians. Connections from the mixer to the cue amplifier are straightforward. Connect the "MON 1", and "MON 2" outputs from the mixer to the inputs of the cue amp using a pair of cables with 1/4 inch phone plugs at the mixer end and connectors appropriate for the cue amp at the other end. The output of the cue amp must then be distributed to as many headphones as will be required in the studio. This can be accomplished by running speaker wire from the cue amp outputs into the studio and then connecting in parallel as many phone jacks as required. Because typical headphones have impedances of several hundred ohms it is usually possible to connect 10 or 20 sets of phones to the cue amp without overloading it. Just to be safe you may want to first connect a 4 ohm 10 watt resistor in series with the power amp output to prevent the amp from being loaded below 4 ohms.

A good, highly reliable headphone cue system is essential for doing overdubbing and for efficient recording operations in general. Valuable studio time can be too easily wasted because of intermittent cue boxes and headphone cords. We encourage you to plan your cue system carefully and then construct it to withstand the heavy use (and abuse) it will find in the studio.



CONTROL ROOM

MX1644

CARVIN 1151 INDUSTRIAL AVENUE
 ESCONDIDO, CA 92021
 (619) 747-7110

MX1644 SET-UP
 FOR RECORDING

DATE: 12.3.84
 DRAWN BY: J. C. Murphy
 APPROVED BY: J. C. Murphy
 DRAWING NUMBER: 2041

6. RECORDING WITH THE MX1644

Recording Basic Tracks

At the beginning of a recording session basic rhythm tracks are recorded with the intention of overdubbing final vocals and additional instrumental parts at a later time. Starting with a blank tape, the only signal sources are the microphones in front of the musicians in the studio and the outputs of any electronic instruments. The recording console is required to accept mic and line level signals, preamplify these signals, and pass them on to assigned channels of the multi-track tape recorder while also providing a cue mix for the musicians in the studio. Professional grade recording consoles like the 1644 also allow the engineer to set up a control room mix of the tracks as they are being recorded.

Once the basic tracks have been recorded a quick playback is required in order to make sure we have a good recording. However, we do not want to play the tracks back through the input channels because we need to keep the channels set as they are in case we need to record the basic tracks over again. With the 1644, quick playbacks are as easy as pressing the tape switches in the monitor section. The tape playback signals are then routed through the monitor mixer and the rough mix that was set up as the tracks were recorded is now heard again on playback. Tape playbacks are quick and easy on the 1644. If the basic tracks are good then we can move on to overdubbing operations; if they need to be recorded again then the console is ready to go as none of the original settings have been disturbed.

Overdubbing Sessions

During an overdubbing session previously recorded tracks are played back from the tape recorder while musicians in the studio simultaneously play new parts. As the old tracks are played back new tracks are being recorded. The mixing console must route the playback signals to the control room and also to the musician's headphone mix. Live signals from the studio must be preamplified and sent to the assigned channels of the tape machine to be recorded and also must be made available to both the control room and the headphone mix. The 1644 makes easy work of this complex task thanks to its carefully designed monitor section. For the tape playback signals, the TAPE switch on the corresponding output channel is depressed. This allows the two-track controls on these output channels to set the control room mix for the playback tracks, while the monitor send controls provide playback signals to the musicians headset.

Recording the new tracks is just like recording the basic tracks; the live signals from the studio are routed through an input channel and assigned to an unrecorded tape channel. The monitor send at the input channel provides the live signal to the headphone mix while the monitor send from the output channel provides the tape playback signal to the headphone mix. The engineer can set up the musicians monitor mix on the control room monitors (with reverb if desired), and then switch back to hear his own monitor mix and solo up various signals from the studio or from tape to make sure that a quality product is being created. After new tracks have been recorded a quick tape playback can be heard simply by pressing the TAPE switch on the output channels corresponding to the newly recorded tracks. On playback the monitor mix that was set up during recording will be heard as before. If a retake of the overdubbed tracks is necessary then the TAPE switches on the overdub channels are pressed again to switch back to the buss and the console is ready to record again.

Final Mixdown

At the final mixdown phase of a recording project all parts are on tape and we are ready to mix down the multi-track tape and record a stereo master tape. We now need to play the multi-track back through the input channels of the mixer so that final equalization can be applied to each track and effects can be added. Setting up the MX1644 for final mixdown of a four-track tape requires simply that the mic/line switches of channels one through four be depressed and that these channels be assigned to the two-track buss by depressing the L/R assign switches. Sub-grouping is possible by assigning the channels to be grouped to one of the output channels and raising the two-track level of the output channel to send the group signal to the two-track buss. Input and output channel patch points make it easy to patch in external effects such as compressors, noise gates, digital delay processors, etc.

7. INTERCONNECTING THE MX1644 FOR LIVE SOUND MIXING

Input Connections From the Stage

For live sound reinforcement ("PA" sound) the input signals to the mixer will come from microphones and instruments on the stage. Each mic and instrument is plugged into a "snake" box at the stage and then the snake cable carries these signals out to the mixer. At the mixer end of the snake the cable fans out to multiple XLR connectors which are connected to the "MIC IN" connectors of the mixer input channels corresponding to each instrument or voice. A strip of "light stick" masking tape (such as Scotch brand 230 Drafting Tape) can be applied across the writing strip of the mixer to allow labeling of the channels and output groups. Regular masking tape can be used for this purpose but it should be taken up at the end of each performance in order to avoid damage to the finish of the mixer.

Connecting the Main Amps and Speakers

Depending on whether you will be operating a stereo or a mono main sound system select either the "2TRK" or "MONO" main outputs from the 1644 to return to the stage to drive the main amps and speakers. The same snake used to feed signals from the stage to the mixer inputs usually has provisions to allow output signals from the mixer to return to the stage. Because this run to the stage can be quite long the MX1644 employs balanced XLR outputs in addition to unbalanced 1/4 inch phone jack outputs. The balanced outputs offer greater immunity to noise pickup than the unbalanced outputs and should be used to assure the lowest possible noise whenever long cable runs are necessary. However, the benefits of these balanced outputs can only be realized if they are fed to a balanced input of the power amp or electronic crossover (for multi-amplified speaker systems) once they get to the stage. Connections from the snake box to the power amp inputs are usually made with standard mic cables. The power amp outputs are then connected to the main loudspeakers using heavy gauge (16 AWG or heavier) speaker wire. The main speakers should be located in front of the musicians and to the side of the stage to avoid any possibility of feedback.

Connecting the Monitor Amps and Speakers

In a typical setup for live sound the 1644's "MON 1" and "MON 2" auxiliary busses will be used to provide monitor mixes for the musicians on stage. The "MON OUT 1 & 2" signals from the mixer will be connected to two more snake send lines (a 1/4 inch phone to XLR adapter may be required) and returned to the stage just like the main output signals. At the snake box on stage the monitor signals will be picked up and routed to the inputs of the monitor power amps.

Monitoring at the Mixer

The 1644's headphone output can be used to allow the sound mixer to solo individual channels, set up the stage monitor mixes, and audition the main output. The headphone amp is fed from the control-room output of the mixer so that whatever program is selected to feed the control-room outputs also feeds the headphones. In order to attenuate the sound heard from the main speakers while listening to the phones it is best to use isolating or "closed" headphones.

Connecting Outboard Effects

Refer to "Connection to Outboard Effects" in the previous section as these connections will be the same for sound reinforcement as for recording.

Suggestions for Efficient Set-Up and Quality Sound

We would like to take some space here for some general comments on setting up and operating a concert sound system. The most important point to emphasize is that a little planning before the day of the concert can prevent serious problems the night of the concert, especially if you are new to sound reinforcement work.

A good way to prepare for the show is to start with a list of all the equipment that will be required to do the job. Later you can use this list as a check list when it comes time to load up the truck. Your list should include everything you will need from the mixer down to the last interconnect cable. If you start with a block sketch of the sound system which shows the mixer, snake, main amps and speakers, monitor amps and speakers, you can then draw in each interconnect cable and label each end as to the type of connector. This diagram will allow you to set up the system in less time because you will not have to stop to think about what connects to what. Use your diagram to complete your equipment list, including every interconnect cable and the connectors required at each end. It's no fun scrambling to build interconnect cables when showtime is ten minutes away! A complete equipment list and system diagram can help prevent such last minute emergencies.

Put together a good tool kit and add it to your equipment list. Make sure your tool kit includes a generous assortment of connector adapters and enough spare connectors to repair each type of interconnect cable used in your system. If you don't have an accessory lamp with your mixer then it is a good idea to keep a flashlight handy for those occasions when the house lights go down and you're left in total darkness groping for the faders!

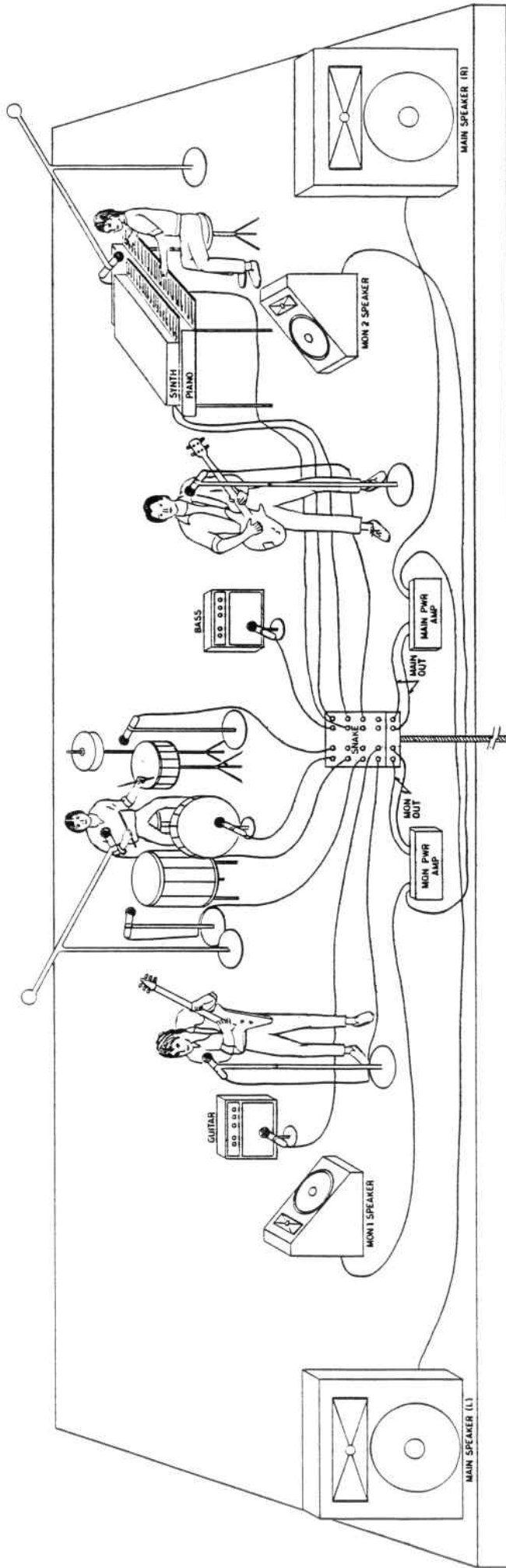
Try to check out the concert hall before hand to determine where you can obtain AC power and how far you will have to run power extension cords. Is there enough current capability that you will not blow all the circuit breakers on the opening note? To answer this question you need to know approximately what the total AC line current requirement of your sound system will be. You can determine the total current requirement (that is, the total number of "amps" required from the AC line) of the system by adding up the individual current requirements (in amps) of each piece of equipment in the system. Another way to determine your total current requirement is to add up the power requirements (in watts) of all the pieces of equipment in the system and then divide this number by 120 (the AC line voltage) to arrive at the total current draw. The current capability of the

concert hall power circuits you use should exceed your systems total current requirement by a healthy margin. As an example, let's say you have determined your total current requirement to be 20 amps, then for a good safety margin (50%) you should make sure that the circuits you use can supply 30 amps. In any event, make sure you power up the complete system well in advance of showtime so that if there are any problems you can deal with them.

There is really just one rule for good practice regarding the sequence in which you power up the system; that rule is "turn the loudspeaker power amps on last". This will prevent any excessive transients from getting to your loudspeakers and possibly damaging horn drivers. Similarly, when powering down the system the loudspeaker power amps should be the first units switched off. Besides the concern over damaging the loudspeakers, it is in poor taste to expose your audience to obnoxious pops and thumps and does not reflect well on your reputation as a quality sound technician. Make sure your audience hears only music from your sound system!

After the sound system is connected and powered up you will want to check each microphone and instrument connection to the mixer one line at a time. Have an assistant speak into each microphone and identify that microphone so that you can confirm that it feeds the correct channel of the mixer and that the channel is properly identified on the writing strip. You can communicate with your assistant on stage by using the 1644's talkback system. If your audience is seated at this time you can spare them from listening to this test by switching off the main speaker power amps and monitoring the mic check over headphones. At the same time that you are doing this check you can verify the stage monitor system by raising the monitor sends at each channel and then carefully raising the master monitor sends. Have your assistant verify stage monitor sound as he checks each mic and instrument. Finally, check the main system from one of the mics on stage. This completes the system checkout.

Before finishing this discussion we would like to comment further on the stage monitors. A good stage monitor mix is essential to the musicians if they are to perform well. The monitors provide "performance feedback" to the musicians by allowing them to hear themselves and the other players clearly. Thus it seems that the musicians frequently request "more monitor please". The sound mixer responds to this request by raising the monitor level and frequently ends up with the monitors ringing or with outright acoustic feedback. There is no simple solution to this problem of getting enough monitor level before feedback. If this becomes a problem, try changing the positions of the stage monitors so that they do not point toward nearby mics; but try to keep the monitors as close to the musicians as possible. Be sure to use good unidirectional mics and then keep the monitors as far off axis from the mics as possible so that the mics tend to reject sound from the monitors. Any peaks in the frequency response of the monitors (or mics) will aggravate this feedback problem so it is important that the monitors have a smooth response. A 1/3 octave graphic equalizer can help flatten the response of these speakers and therefore allow higher levels before feedback. In any event, monitor ringing or feedback should never be allowed to occur. Find the threshold for ringing and keep the monitor level below that threshold. Any adjustments to the monitor mix should be made slowly and carefully while you listen for any signs of ringing. Remember, feedback is the mark of an inexperienced sound mixer; hold yourself to professional standards and allow no feedback or ringing in your system.



CARVIN
 1515 INDUSTRIAL AVENUE
 FORT MONROE, CA 90501
 TEL: 714-777-1110

**MX1644 SET-UP FOR LIVE
 SOUND REINFORCEMENT**

DRAWN: *Sheldon* DATE: 08 Mar 84
 APPROVED: *Ed & Alvin* DATE: 23 Apr 84
 DRAWING NUMBER: 2042

8. MIXING LIVE SOUND WITH THE MX1644

With four sub-groups and two monitor mixes the MX1644 is a natural when it comes to mixing live sound. Additional features like optional nine-band graphic equalizers on each output channel, mono master control, 6 volt mini-lamp outlet and headphone monitoring system make this mixer a pleasure to use. The crystal clear transparency that makes the CARVIN MX1644 such an excellent recording console can provide a nice lift to your live sound as well.

The 1644 can be used for either mono or stereo (or even four channel) sound reinforcement. For the remainder of this discussion we will assume a stereo sound system is used. If a mono system is used the only difference will be that you will use the "MONO" output from the mixer and you will have to raise the "MONO MASTER" control. You can then use either the mono master or the two-track faders as your master level control.

The simplest way to set up the 1644 for stereo sound reinforcement is to assign all of the channels in use directly to the two-track buss by depressing the "L-R" assign switch on those channels. Unused channels should be left unassigned so that they contribute no noise to the system. The channel pan control then will allow you to pan across the stereo outputs. Raising the "2 TRK MSTR" faders will then put signal at the "2 TRK" stereo outputs. These faders then serve as the master level controls for the sound system. All of the level mixing will be done at the channel faders. Likewise all monitor mixing will be performed at the channel monitor send controls.

Sub grouping can be done on the 1644 when you want to be able to control several input signals with one fader. A typical example would be the case where you want the convenience of assigning all the vocal inputs to one sub group so that the vocals can all be controlled by one fader. In this case you might assign all vocals to sub group 1 by depressing the "1-2" assign switch at each vocal input channel and then setting these channel pan controls all hard left so that the signals are sent to sub 1 only instead of both sub 1 and sub 2. Now, to send the vocals from output channel one to the two-track buss it is necessary to raise both the sub 1 fader and the sub 1 "2 TRK" send control located just above the sub 1 solo button. The sub 1 two-track pan control can now be used to pan the vocal group across the stereo output. Individual vocal levels will be adjusted at the input channel faders to set up the vocal sub mix then the sub 1 fader is used to control the overall level of the vocal group in the main mix. Some users may prefer to assign all channels through the four sub groups so that the entire mix is controlled by the four sub faders. Other users will prefer to reserve the sub channels for specific groups such as vocals, drums, keyboards, etc. and then assign all other channels directly to the two track buss. When using the sub groups you have a choice of sending signals to the monitor mix from either the individual input channels or from the one sub group. Usually the sub group mix is appropriate for the monitor mix so the single monitor send at the sub channel can be used to send the group signal to the monitors. As with the input channels, the monitor send at the sub channels is pre fader so that the monitor level is independent of the sub fader level.

9. DISSASSEMBLY FOR SERVICING

Removing the Bottom Cover

In order to service the MX1644 it is necessary to first remove the mixer's bottom cover. The following steps give the procedure for safely removing the cover.

1. Disconnect the AC line cord and all other cables connected to the mixer.
2. Remove the 3 large screws at the bottom of each wooden end panel.
3. Stand the mixer up on its right end and remove the eight screws securing the bottom cover. Lift off the cover and note the locations of the foam pads so that you orient the cover correctly when you replace it.
4. Carefully disconnect the reverb connector (H2) from the effects master board and set the cover aside.

Removing a Circuit Module

When removing any of the Circuit Modules it is important that all ribbon cable connectors be unplugged from the module before the module is loosened from the top panel. Likewise, on reassembly the module should be secured to the top panel before the ribbon cable connectors are plugged into the module. The steps for removing a module are as follows:

1. Remove the bottom cover as described above.
2. Identify the module to be removed and carefully disconnect all ribbon cable connectors from that module. Be careful not to pull the ribbon out of the connector.
3. Remove all knobs from the controls on the top panel; then remove the control nuts from each pot being careful not to mar the finish. Use a 10mm nut driver for all control nuts.
4. The module should now be free to be removed. Pull the module behind the top panel and then bring it down under the master buss cable and out of the mixer.

Replace the module(s) and cover by reversing the steps above. Inspect the connectors that have been removed and reinstalled to see if any conductors of the ribbon cable have come loose due to handling. In the event that you see any loose connections use a small screwdriver to reseat the wire back into the connector being careful not to use too much force on the module.

10. BACKUP CIRCUIT MODULES

The MX1644 has been carefully designed to employ only eight distinct circuit modules. This modular construction simplifies not only the manufacturing of the mixer but also its servicing. If a problem occurs, in many cases it will be possible to determine which module has failed and then that module can be returned to CARVIN for repair. This spares the expense and inconvenience of returning the complete mixer. If the returned module is an input channel or an output channel then you can continue to operate the mixer while the problem module is being repaired. Failure of either the system master module or the effects master module will make the mixer inoperable. For applications where mixer down time would cause significant loss of income we suggest that spare modules be purchased and kept available in the event of failure. The most important module to back up is the System Master. The next most important module to back up is the Effects Master followed by the Power Supply, then Output Channel, Input Channel, Master Connect, and Input Connect modules in that order of priority. Module pricing as of the date of publication of this manual is given below.

MODULE	PRICE	PART NO.	TOTAL USAGE
System Master	\$70.00	PCB 1021	1
Effects Master	\$85.00	PCB 1017	1
Power Supply	\$115.00	PCB 1025	1
Output Channel	\$75.00	PCB 1020	4
Input Channel	\$95.00	PCB 1014	16
Graphic EQ	\$125.00	PCB 1015	2
Master Connect	\$140.00	PCB 1022	1
Input Connect	\$125.00	PCB 1012	2

MX1644 Control Descriptions

Input Channel x16

Effects Master Strip



1. Mic/Line Switch

This switch is used to select either the microphone or line input signals to the channel. Normally playback signals from the multitrack recorder are connected to line inputs 1 through 4 leaving line inputs 5 through 16 free for high-level signal inputs or even direct inputs from guitar or bass.

2. Input Gain Control

This rotary control simultaneously adjusts the gain of both the mic preamp and the line preamp and is used to set the level of the channel signal. The level should be kept as high as possible without triggering the peak warning LED.

3. Four Band EQ Section

The high and low bands of the channel equalizer are shelving type while the mid and hi-mid bands have a peak/dip characteristic. The range of EQ action is as follows:

- High: ± 15 dB @ 10kHz
- Hi-Mid: ± 15 dB @ 2kHz
- Mid: ± 15 dB @ 500 Hz
- Low: ± 15 dB @ 100 Hz

4. Mon and Effects Sends

Each channel has two monitor sends and two effects sends. Monitor sends are taken pre fader whereas effects sends are post fader. Effects 1 feeds the internal reverb system but is also available to feed external effects.

5. Pan and Assign Group

Input channel signals are assigned to output channel pairs by depressing the appropriate assign switches. The channel pan control then pans the signal across the assigned output channels or can be positioned to send the signal to any one output channel. By depressing the L-R assign switch the channel signal is sent directly to the two-track buss, bypassing the output channels.

6. Channel Solo Switch

Depressing the channel solo switch activates the on FED switching network which silently interrupts the signal to the control room and replaces it with the signal that is being soloed. When a solo switch is depressed an LED is illuminated at that switch and the master solo LED is illuminated as well.

7. Peak Warning Light

The channel peak LED illuminates whenever signal peaks come within 6dB of clipping any stage in the input channel. A peak stretching circuit is used to insure that even momentary overloads are clearly indicated to the operator. The operator should simply lower the channel gain control by one setting when a peak warning is indicated.

8. Channel Fader

A professional long throw 100mm fader is provided for precise control over the channel signal level. Fader graphics accurately indicate gain or attenuation settings.



1. Mini-Lamp Connector

A BNC connector is provided for use with an optional mini-lamp.

2. Send Master Section

After each of the mon and effects send signals have been summed, the send master controls set the overall output level for these four signals.

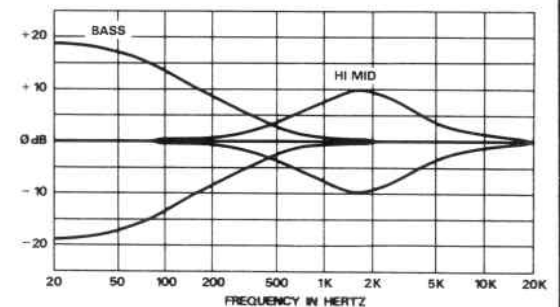
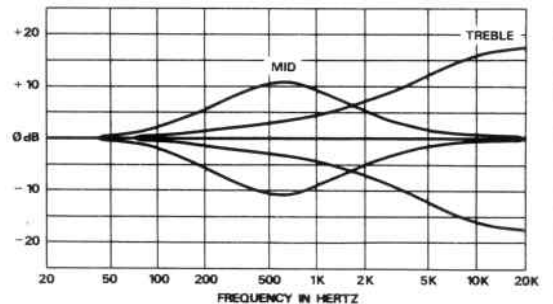
3. Effects Return Groups

The A and B effects return groups are identical. Each return group provides a way of returning an effects signal to the mixer, setting the return level, and assigning the effects to output channels, mon 1 and 2, or the two-track output. A pan control is provided to allow panning across the mon or output channels. The internal reverb normally returns through effects A unless a plug is inserted in the effects return A jack.

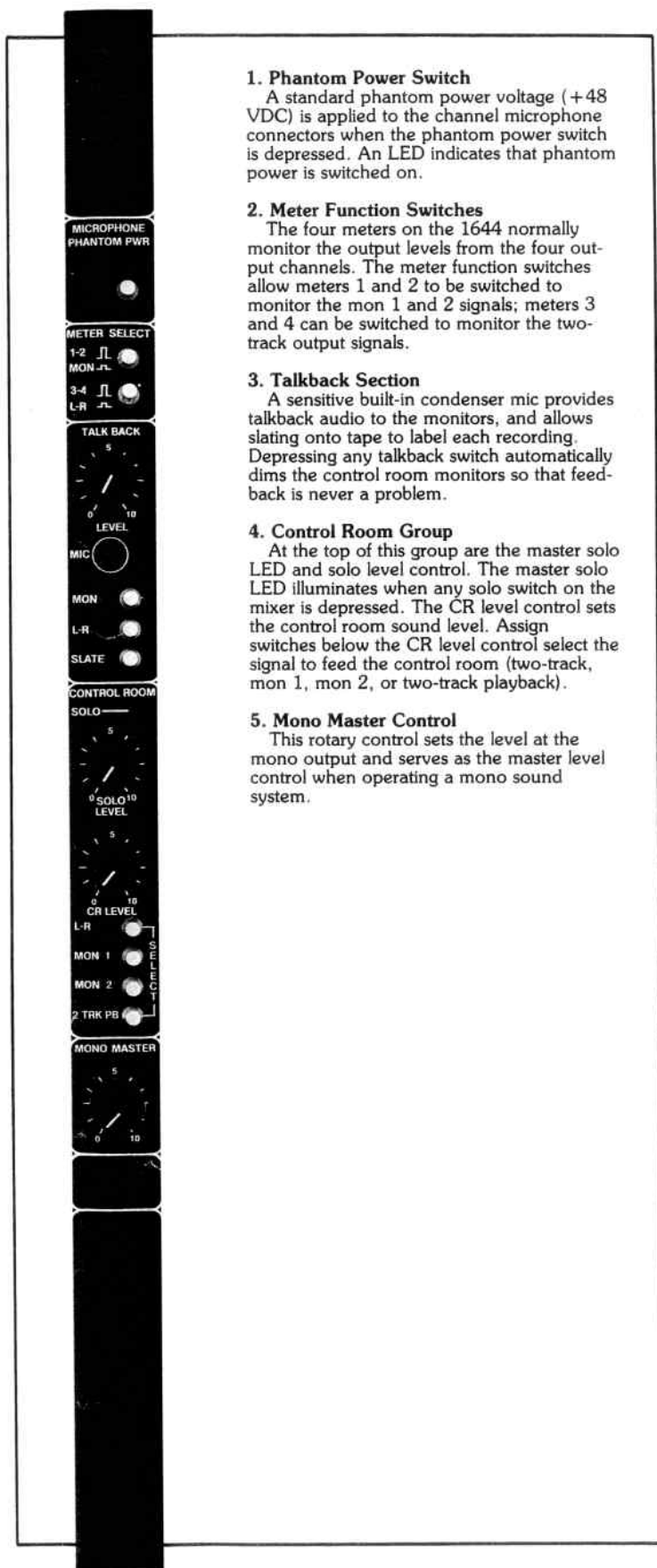
4. Two-Track Faders

The master two-track faders located below the system master strip are a close spaced fader pair to allow easy operation of both faders with one finger. These faders set the level of the two-track output signals.

EQ RESPONSE CURVES



System Master Strip



1. Phantom Power Switch

A standard phantom power voltage (+48 VDC) is applied to the channel microphone connectors when the phantom power switch is depressed. An LED indicates that phantom power is switched on.

2. Meter Function Switches

The four meters on the 1644 normally monitor the output levels from the four output channels. The meter function switches allow meters 1 and 2 to be switched to monitor the mon 1 and 2 signals; meters 3 and 4 can be switched to monitor the two-track output signals.

3. Talkback Section

A sensitive built-in condenser mic provides talkback audio to the monitors, and allows slating onto tape to label each recording. Depressing any talkback switch automatically dims the control room monitors so that feedback is never a problem.

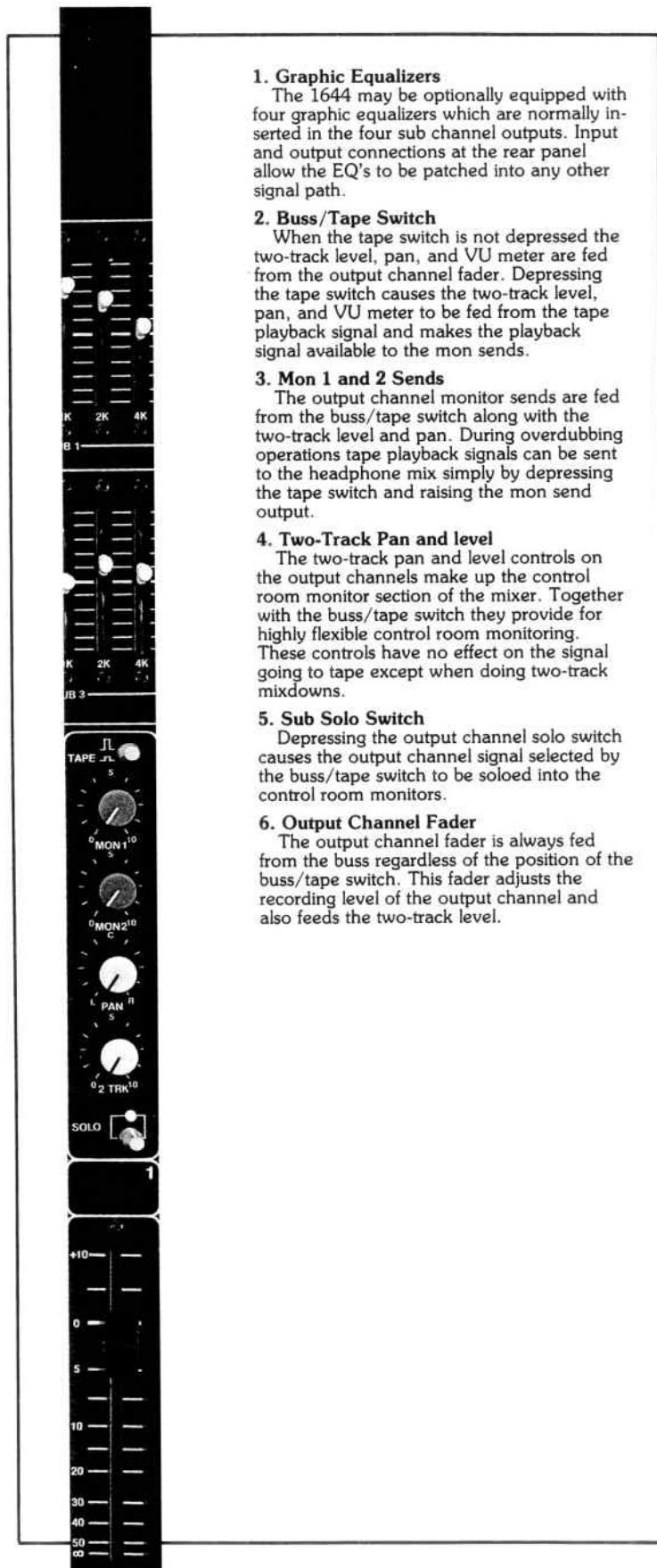
4. Control Room Group

At the top of this group are the master solo LED and solo level control. The master solo LED illuminates when any solo switch on the mixer is depressed. The CR level control sets the control room sound level. Assign switches below the CR level control select the signal to feed the control room (two-track, mon 1, mon 2, or two-track playback).

5. Mono Master Control

This rotary control sets the level at the mono output and serves as the master level control when operating a mono sound system.

Output Channel x4



1. Graphic Equalizers

The 1644 may be optionally equipped with four graphic equalizers which are normally inserted in the four sub channel outputs. Input and output connections at the rear panel allow the EQ's to be patched into any other signal path.

2. Buss/Tape Switch

When the tape switch is not depressed the two-track level, pan, and VU meter are fed from the output channel fader. Depressing the tape switch causes the two-track level, pan, and VU meter to be fed from the tape playback signal and makes the playback signal available to the mon sends.

3. Mon 1 and 2 Sends

The output channel monitor sends are fed from the buss/tape switch along with the two-track level and pan. During overdubbing operations tape playback signals can be sent to the headphone mix simply by depressing the tape switch and raising the mon send output.

4. Two-Track Pan and level

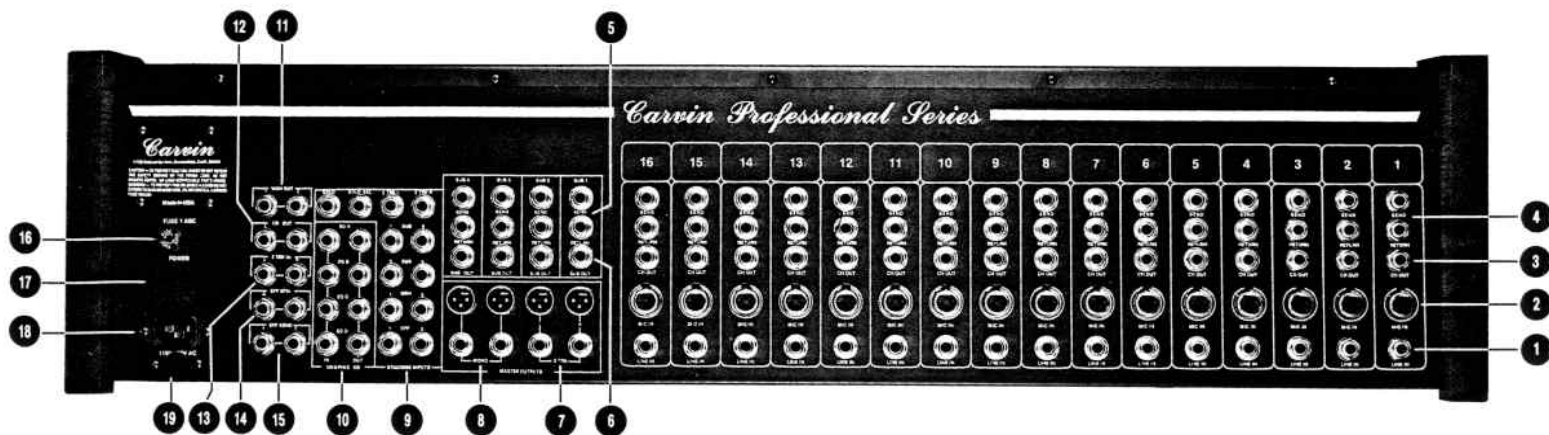
The two-track pan and level controls on the output channels make up the control room monitor section of the mixer. Together with the buss/tape switch they provide for highly flexible control room monitoring. These controls have no effect on the signal going to tape except when doing two-track mixdowns.

5. Sub Solo Switch

Depressing the output channel solo switch causes the output channel signal selected by the buss/tape switch to be soloed into the control room monitors.

6. Output Channel Fader

The output channel fader is always fed from the buss regardless of the position of the buss/tape switch. This fader adjusts the recording level of the output channel and also feeds the two-track level.



1. Line Input Jack

The input to the channel line preamp accepts unbalanced signals with levels from -25 dBv up to +20 dBv.

2. Mic Input Connector

The snap-in balanced XLR input to the differential mic preamp will accept signal levels up to 0 dBv.

3. Channel Direct Output

The channel direct output is taken post fader and post EQ and may be used as a direct input to the multitrack tape recorder, an auxiliary effects send, a cue send, etc.

4. Channel Send and Return Jacks

These jacks constitute the channel patch point and allow external signal processors to be patched into the channel signal path. The channel patch point is pre fader and post EQ.

5. Sub Output Send and Return Jacks

The sub output patch point is pre the output channel fader and allows insertion of external processors into the output channel signal path.

6. Sub Outputs

The sub output signals are available on 1/4" phone jacks. The mixer is calibrated at the factory for an output level of +4 dBv for 0 VU indication but can easily be recalibrated to provide an output level of -10 dBv

at 0 VU indication for use with tape recorders using a -10 dBv operating level.

7. Two-Track Output Jacks

The two-track output signals usually feed the two-track tape recorder. For live sound mixing the two-track outputs are used to feed the main sound system.

8. Mono Output Jacks

Balanced and unbalanced mono output signals are provided on two phone jacks and two XLR connectors.

9. Stacking Input Jacks

Stacking input jacks allow access to each of the summing busses in the mixer. This allows two 1644's to be combined for 32 input channel operation.

10. Graphic EQ Connections

Input and output connections are provided for each of the four optional graphic equalizers to allow patching into various signal paths.

11. Monitor Output Jacks

The two monitor outputs feed the stage monitors for live sound mixing and feed the headphone cue mix when recording.

12. Control Room Outputs

The control room L/R outputs are intended to feed the control room monitor loudspeakers. These outputs also feed the headphone amplifier.

13. Two-Track Input Jacks

The output from the two-track recorder is connected to the two-track inputs to allow two-track playback through the system.

14. Effects Return Input Jacks

These jacks are used to return signals from reverbs, or other external signal processors, to the output section of the mixer.

15. Effects Send Jacks

The effects send signals can be sent to external signal processors and returned through the effects return inputs to add effects to the audio.

16. AC Line Fuse

The AC line fuse provides protection to both the mixer and the user from improper AC power or other faults.

17. Power On/Off Switch

This is the main power switch for the mixer. A pilot light built into the switch indicates when power is switched on.

18. Power Cord Connector

A standard line cord connector allows the power cord to be detached when the mixer is not in use.

19. 120/240V AC Line Selector Switch

This restricted access switch allows the MX1688 to be powered from either 120V or 240V AC.

MX1644 Technical Specifications

Frequency Response

Mic or line inputs to two-track output: 15 Hz-25kHz ± 1 dB

Total Harmonic Distortion

Mic in to two-track out 40 dB gain
0 dBv output, 20-20kHz: less than .05%
Line in to two-track out 10 dB gain
+10 dBv output, 20-20kHz: less than .02%

Equivalent Input Noise

unweighted, 150 ohm source: -127 dBv

Output Noise

All faders minimum: -85 dBv
Sub fader at nominal, one channel assigned w/ nominal gain and channel fader settings: -78 dBv

Crosstalk

Adjacent channels: -60 dB at 1kHz

Common Mode Rejection Ratio:

-70 dB at 1kHz

Channel Equalizer

Type: 4 band fixed frequency
High band: ± 15 dB @ 10 kHz, shelving
Hi-Mid band: ± 15 dB @ 2 kHz, peak/dip
Mid band: ± 15 dB @ 500 Hz, peak/dip
Low band: ± 15 dB @ 100 Hz, shelving

Integrated Circuits: NE5532 ultra-low noise high speed op amps at input and output stages

Graphic Equalizers (4):

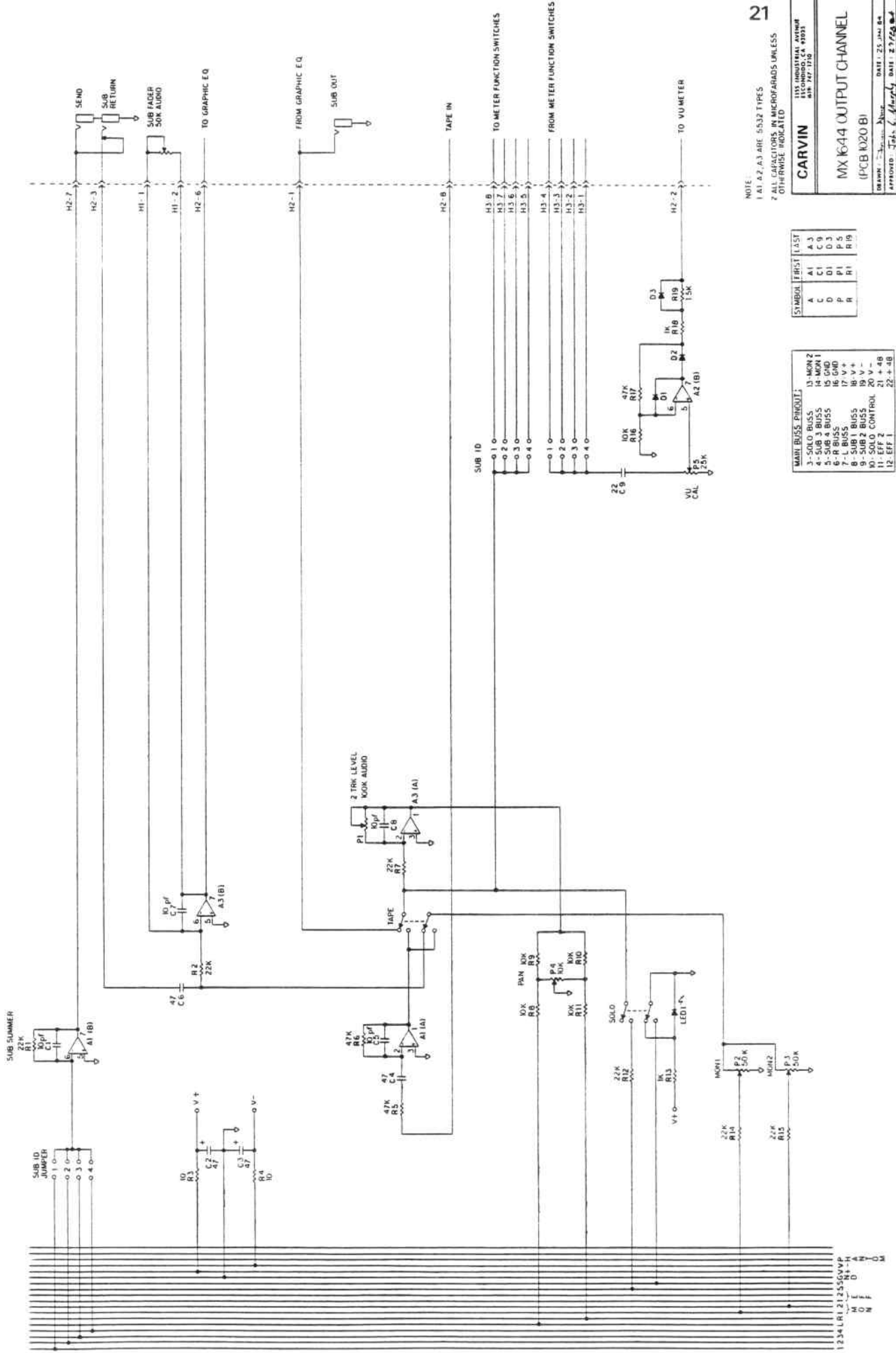
Type: 9 band on octave intervals
Max Boost/Cut: ± 15 dB
Center frequencies: 63,125,250,500,1k,2k,4k,8k, 16 kHz
Peak Warning Level: 6 dB below clipping (+14 dBv)
Phantom Power: +48 V DC applied to pins 2 and 3

Mic Input

Connector: 3-pin XLR type
Input impedance: 4.4k ohms (balanced)
Source impedance: nominal "low impedance" (50 ohms to 2k ohms)
Nominal input range: -70 to -10 dBv (.3mV to 300mV)
Maximum input level: +10 dBv (3.3 V)

Line Input	Connector:	1/4" phone jack
	Input impedance:	22k ohms (unbalanced)
	Nominal input range:	-20 dBv to +10 dBv (100mV to 3V)
	Maximum input level:	+30 dBv (30V)
Maximum Gain	Mic in to sub out:	74 dB
	Line in to sub out:	45 dB
Sub Outputs 1-4	Connector:	1/4" phone (unbalanced)
	Nominal output level:	+4 dBv (can be set up for -10 dBv)
	Maximum output level:	+20 dBv (10k ohm load)
Mono and Two-Track Outputs:	Connector:	3-pin XLR (balanced) and 1/4" phone (unbalanced)
	Nominal output level:	+4 dBv
	Maximum output level:	+20 dBv (10k ohm load)
Mon, Effects, and Control Room Outputs	Connector:	1/4" phone (unbalanced)
	Nominal output level:	+4 dBv
	Maximum output level:	+20 dBv (10k ohm load)
Headphone Output	Connector:	1/4" stereo phone jack
	Load impedance:	8 ohms or higher (stereo)
	Power Supply:	Fully regulated with current limiting
Accessory Mini-Lamp Connector:	BNC type female connector	
Power Requirements:	120V AC, or 240V AC 50 or 60 Hz	
	Weight:	70 lbs.
	Dimensions:	8 3/4" H, 35 1/8" W, 29" D
	Warranty:	1 year parts and labor

Note: 0 dBv referenced to .775 V RMS
All noise measurements are unweighted, 20kHz bandwidth



NOTE:
 1 A1, A2, A3 ARE 5532 TYPES
 2 ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE INDICATED

CARVIN
 115 INDUSTRIAL AVENUE
 BIRMINGHAM, CA 35201
 DATE: 25 JAN 84
 APPROVED: *John L. Murphy*
 DRAWN: *John L. Murphy*
 5 MAR 84

SYMBOL FIRST LAST

A	1	A 3
C	1	C 8
D	1	D 3
P	1	P 5
R	1	R 19

METER BUSS PINOUT:

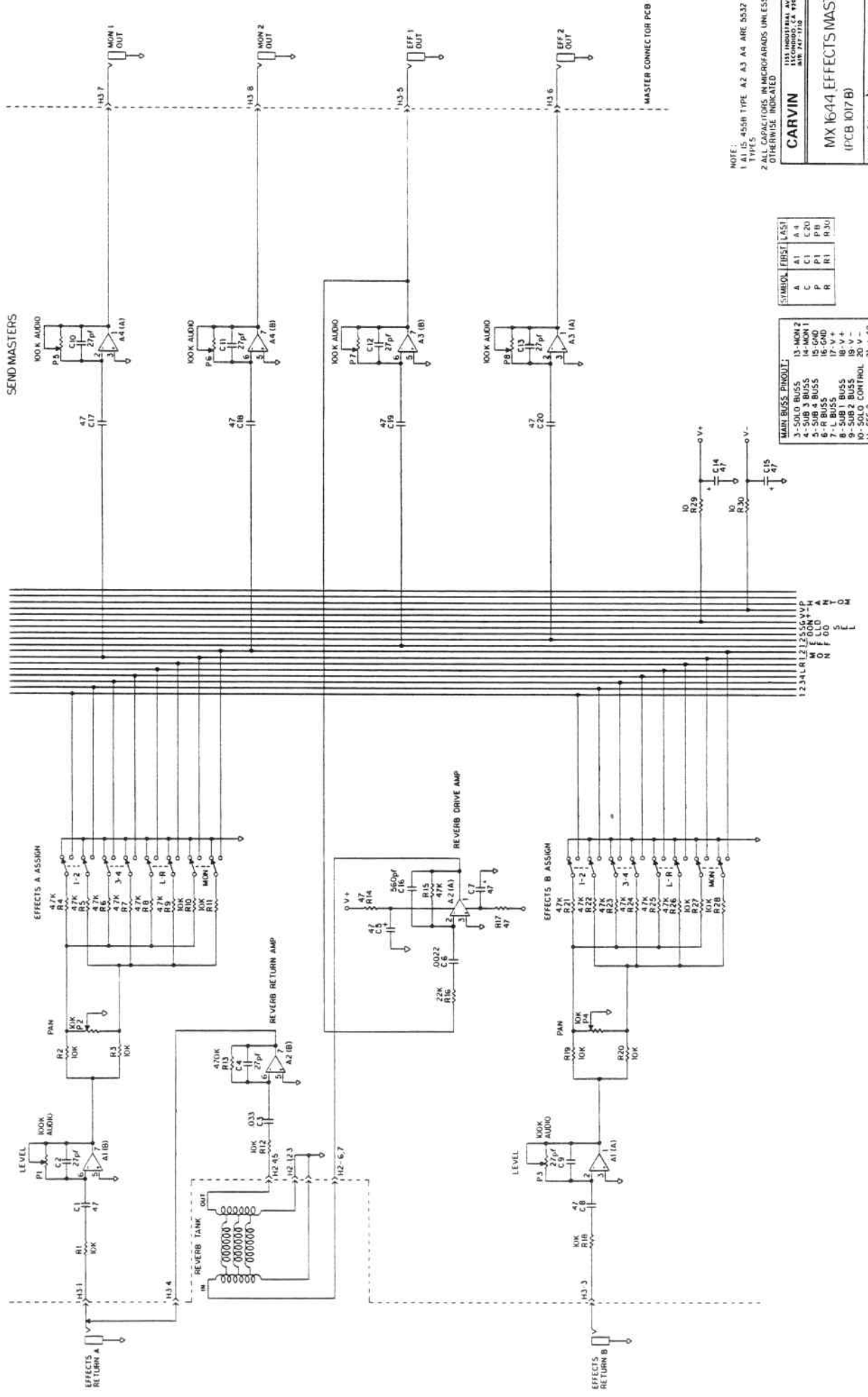
3- SOLO BUSS	13- MON 2
4- SUB 3 BUSS	14- MON 1
5- SUB 4 BUSS	15- GND
6- R BUSS	16- GND
7- L BUSS	17- V+
8- SUB 2 BUSS	18- V+
9- SUB 1 BUSS	19- V-
10- SOLO CONTROL	20- V-
11- EFF 2	21- +48
	22- +48

NOTE: 1. A1 A5 455B TYPE A2 A3 A4 ARE 5532 TYPES
2. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE INDICATED

CARVIN
133 INDUSTRIAL AVENUE
MILWAUKEE, WIS. 53126

MX 1644 EFFECTS MASTER
(PCB 1017 B)

DATE: 1/7/78
APPROVED: Z. A. [Signature]
DRAWN: [Signature]
NUMBER: 2019 A
6 MAR 84

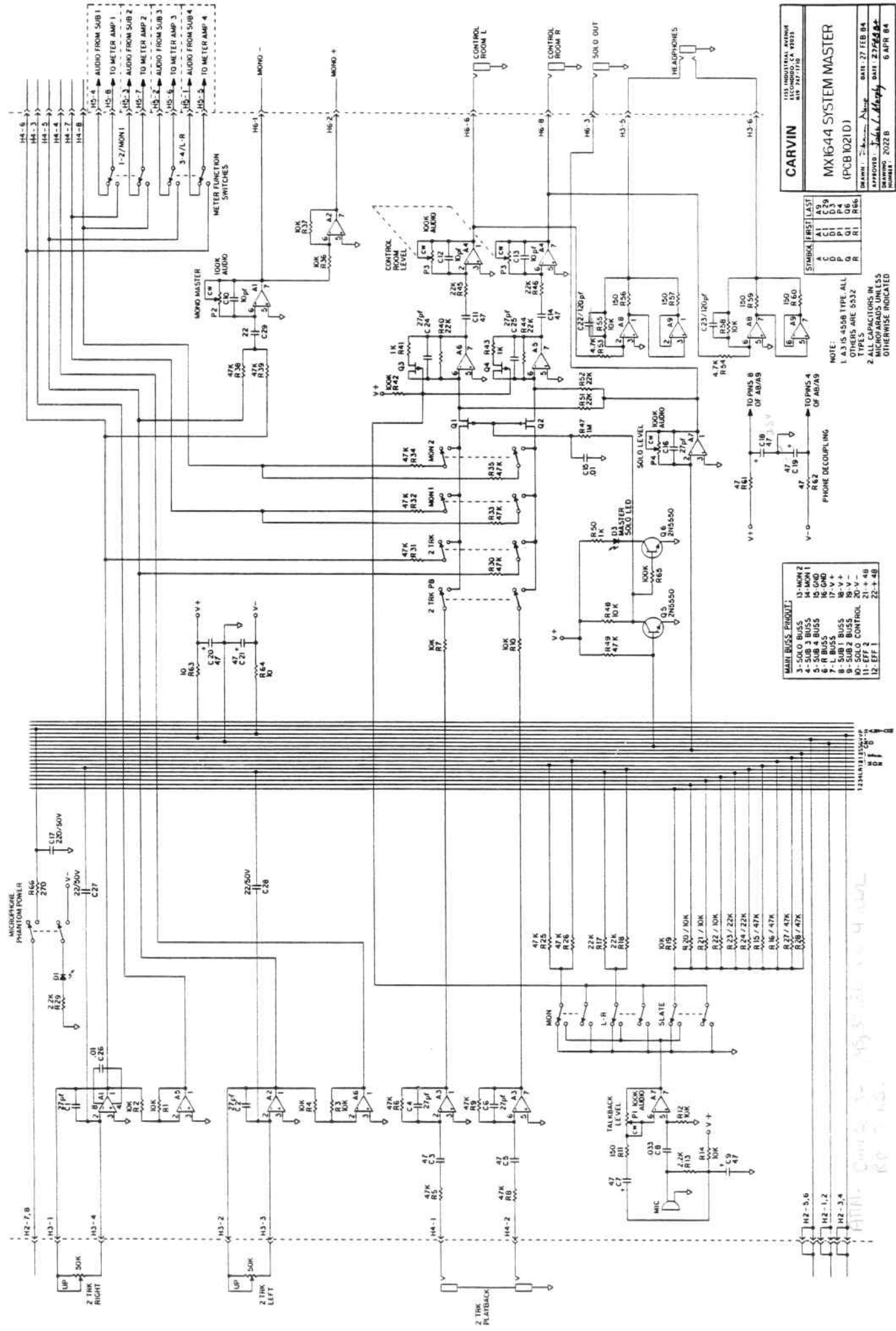


SYMBOL	FIRST	LAST
A	A1	A4
C	C1	C20
P	P1	P3
R	R1	R30

MAIN BUSS. POINTS:	
3-SUBO BUSS	13-MON 2
4-SUB 3 BUSS	14-MON 1
5-SUB 4 BUSS	15-EFF 1
6-SUB 5 BUSS	16-EFF 2
7-L BUSS	17-V+
8-SUB 1 BUSS	18-V+
9-SUB 2 BUSS	19-V-
10-SOLO CONTROL	20-V+
11-EFF 1	21-V+
12-EFF 2	22-V+

SEND MASTERS

MASTER CONNECTOR PCB



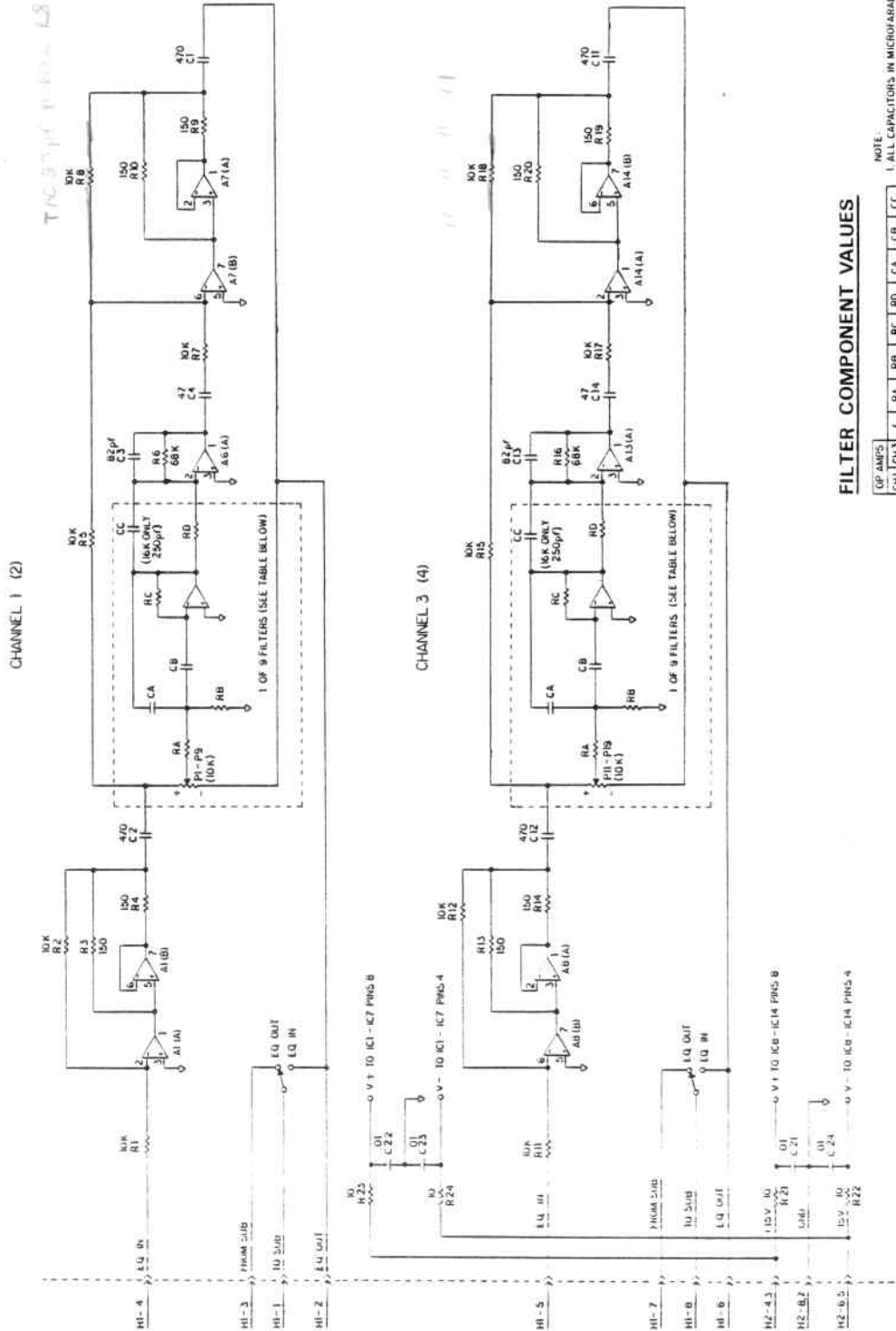
CARVIN
 155 INDUSTRIAL AVENUE
 TACOMA, CA 92033
MX1644 SYSTEM MASTER
 (PCB 10210)
 DRAWN BY: *John L. Murphy* DATE: 27 FEB 84
 APPROVED BY: *John L. Murphy* DATE: 27 FEB 84
 REVISED BY: *John L. Murphy* DATE: 6 APR 84

SYMBOL	REF	LAST
C	A1	C29
D	D1	D3
G	O1	O6
R	R1	R66

NOTE:
 1. A3 IS 4558 TYPE. ALL OTHERS ARE 5532 TYPES.
 2. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE INDICATED.

MAIN BISS PRODUIT:

3 - SOLO BUSS	14 - MON 1
5 - SUB 4 BUSS	15 - GND
6 - R BUSS	16 - GND
7 - L BUSS	17 - V+
8 - SUB 2 BUSS	18 - V+
9 - SUB 3 BUSS	19 - V+
10 - SOLO CONTROL	20 - V-
11 - EFF 2	21 - + 4B
12 - EFF 1	22 - + 4B

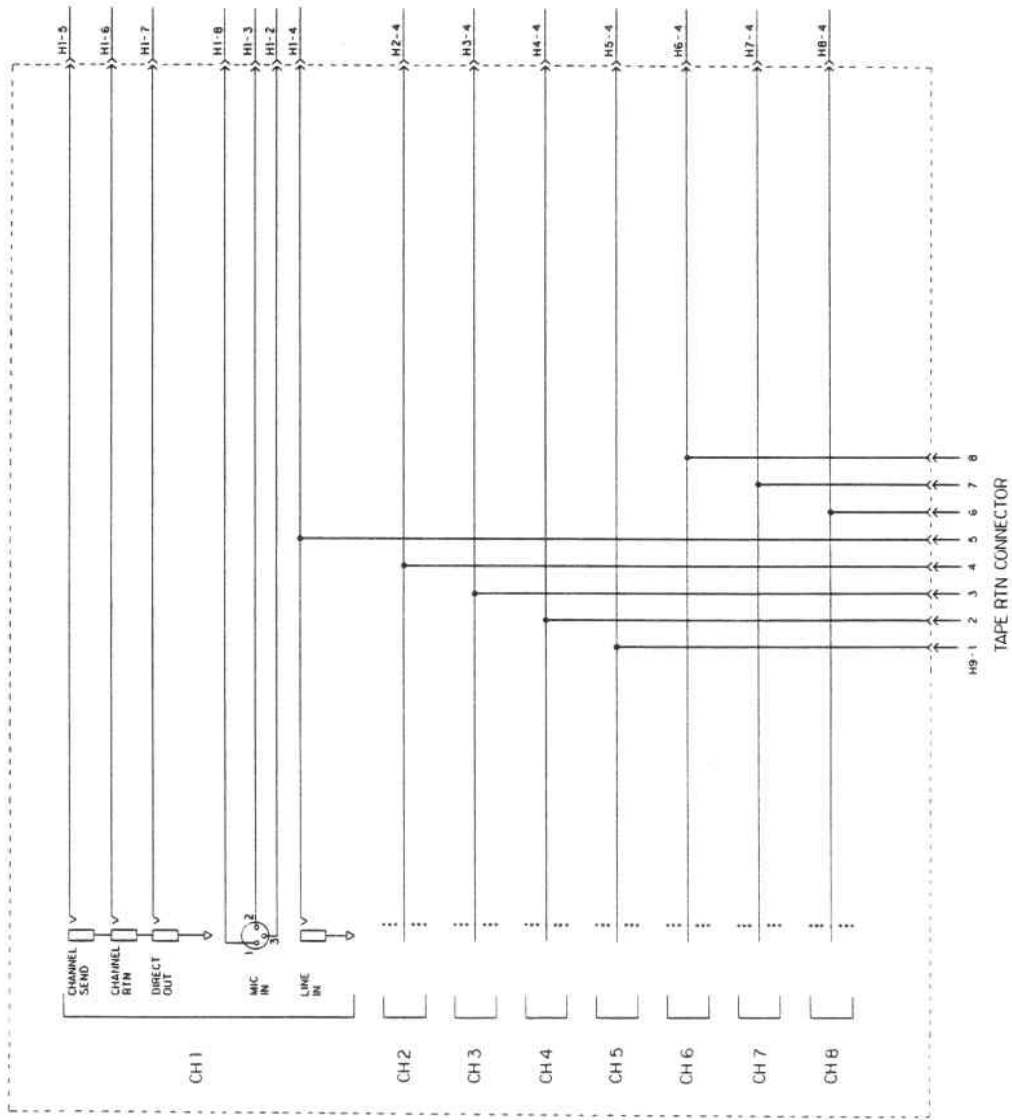


FILTER COMPONENT VALUES

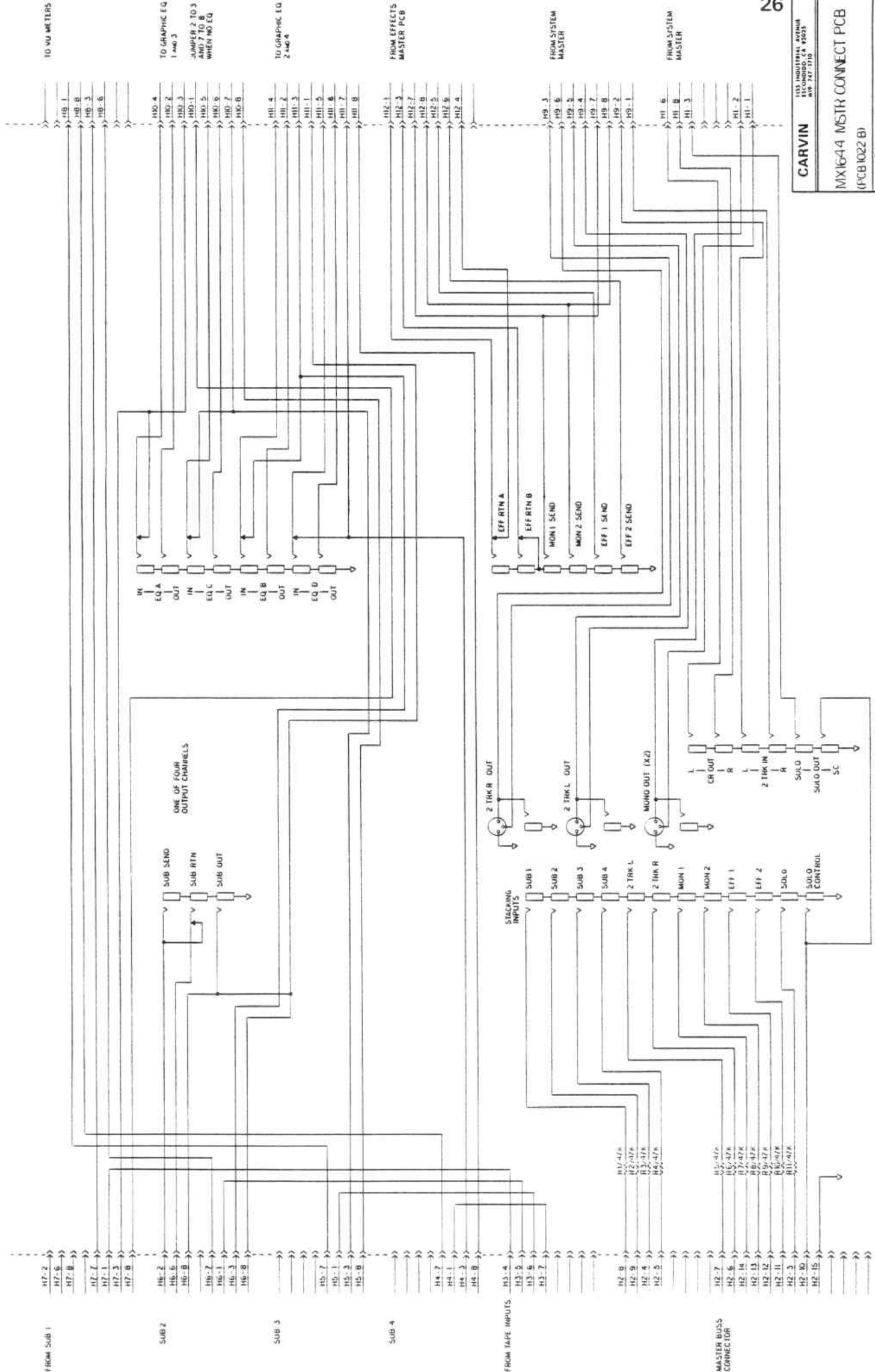
OP AMPS	CH1	CH3	F	RA	RB	RC	RD	CA	CB	CC
A1	A9	A3	1	7.5K	3.3K	4.7K	22	22	22	22
A2	A4	A4	2	3.3K	3.3K	3.3K	5.6K	22	22	22
A3	A5	A5	3	20K	20K	31K	3.6K	202	0.05	—
A4	A6	A6	4	10K	10K	3.3K	3.6K	0.05	0.05	—
A5	A7	A7	5	2.2K	2.2K	10K	3.6K	0.05	0.05	—
A6	A8	A8	6	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A7	A9	A9	7	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A8	A10	A10	8	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A9	A11	A11	9	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A10	A12	A12	10	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A11	A13	A13	11	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A12	A14	A14	12	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A13	A15	A15	13	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A14	A16	A16	14	4.7K	4.7K	10K	3.6K	0.05	0.05	—
A15	A17	A17	15	4.7K	4.7K	10K	3.6K	0.05	0.05	—

NOTE:
 1. ALL CAPACITORS IN MICROFARADS
 UNLESS OTHERWISE INDICATED
 2. ALL RESISTORS IN OHMS
 3. ALL RESISTORS ARE 20W
 4. AI AS A7 AB A13 A14
 ARE 5532 TYPES. ALL OTHER
 OP AMPS ARE 4558 TYPES

CARVIN	1151 INDUSTRIAL AVENUE REDWOOD, CA 95071 916-422-1110
MX 1644 INPUT CONNECTOR PCB 1012 B	
DRAWN: <i>[Signature]</i>	DATE: 17 MAR 82
APPROVED: <i>[Signature]</i>	DATE: 12 APR 82
DRAWING NUMBER: 2038	



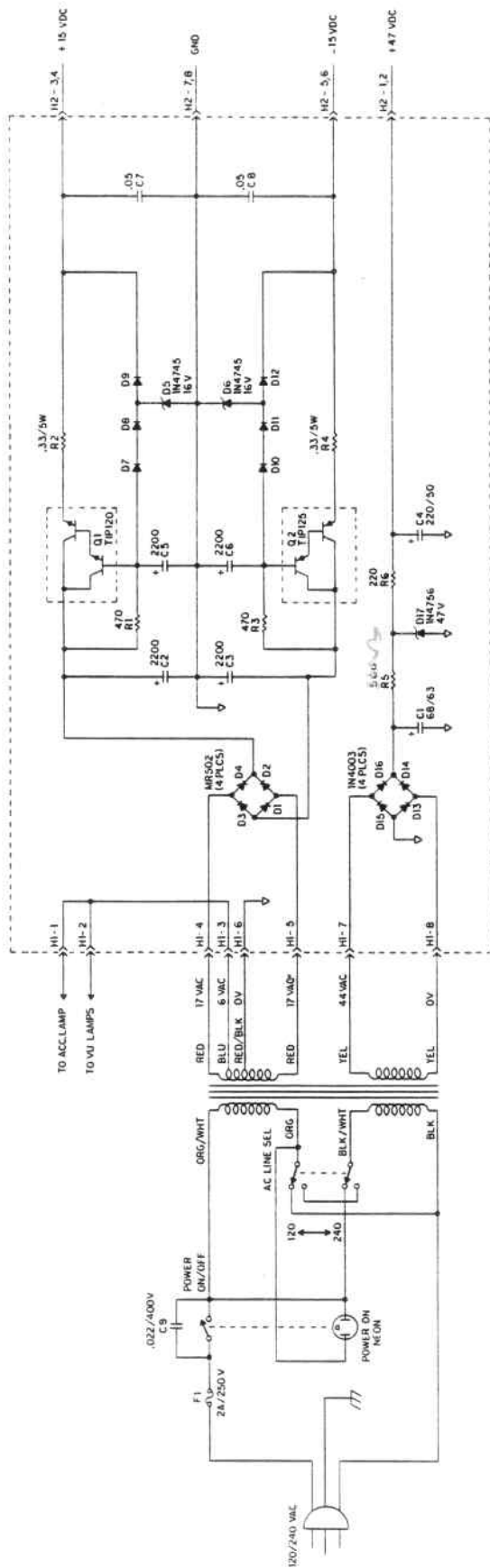
NOTE:
 1. CHANNELS 2 - 8 ARE TYPICAL OF CHS 1 - 8.
 2. CHANNELS 9 - 16 ARE TYPICAL OF CHS 1 - 8.



CARVIN
 103 INDUSTRIAL AVENUE
 BOSTON, MA 02108

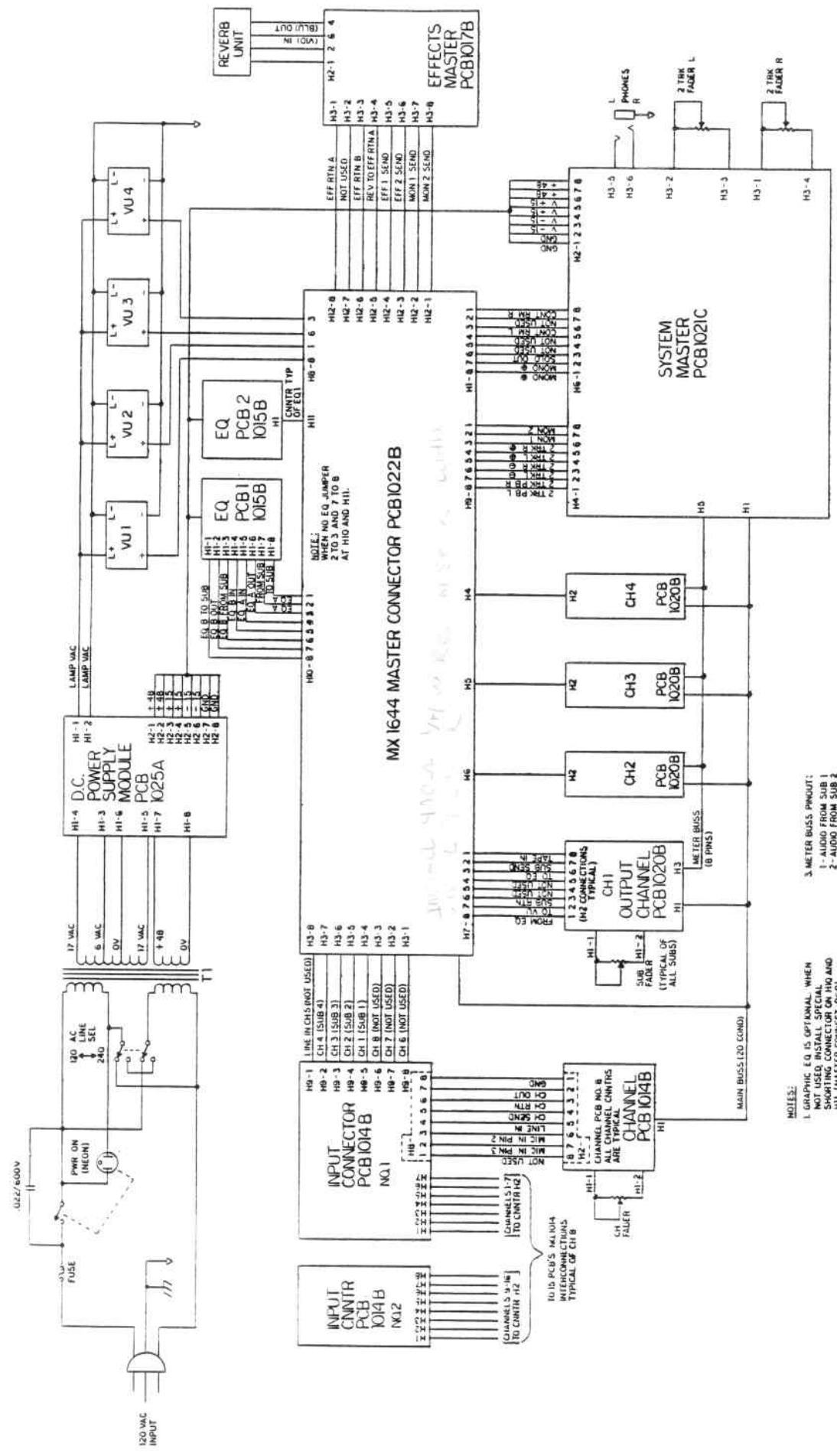
MX1644 MSTR CONNECT PCB
 (PCB 1022 B)

DATE: 27 Feb 84
 DRAWN: J. S. [Signature]
 APPROVED: J. S. [Signature] DATE: 27 FEB 84
 DRAWING NUMBER: 10220 A
 6 MAR 84



NOTE: UNLESS OTHERWISE INDICATED
 1. ALL CAPACITORS IN MICROFARADS
 2. DIODES 7, 8, 9, 10, 11, 12 ARE 1N4003

CARVIN	115 INDUSTRIAL AVENUE ESCOBEDO, CA 95025 415 387-7118
MX 1644 / 88 POWER SUPPLY (PCB 1025 A)	
DRAWN: <i>John L. Murphy</i>	DATE: 05 MAY 84
APPROVED: <i>John L. Murphy</i>	DATE: 16 MAR 84
DRAWING NUMBER: 2035	

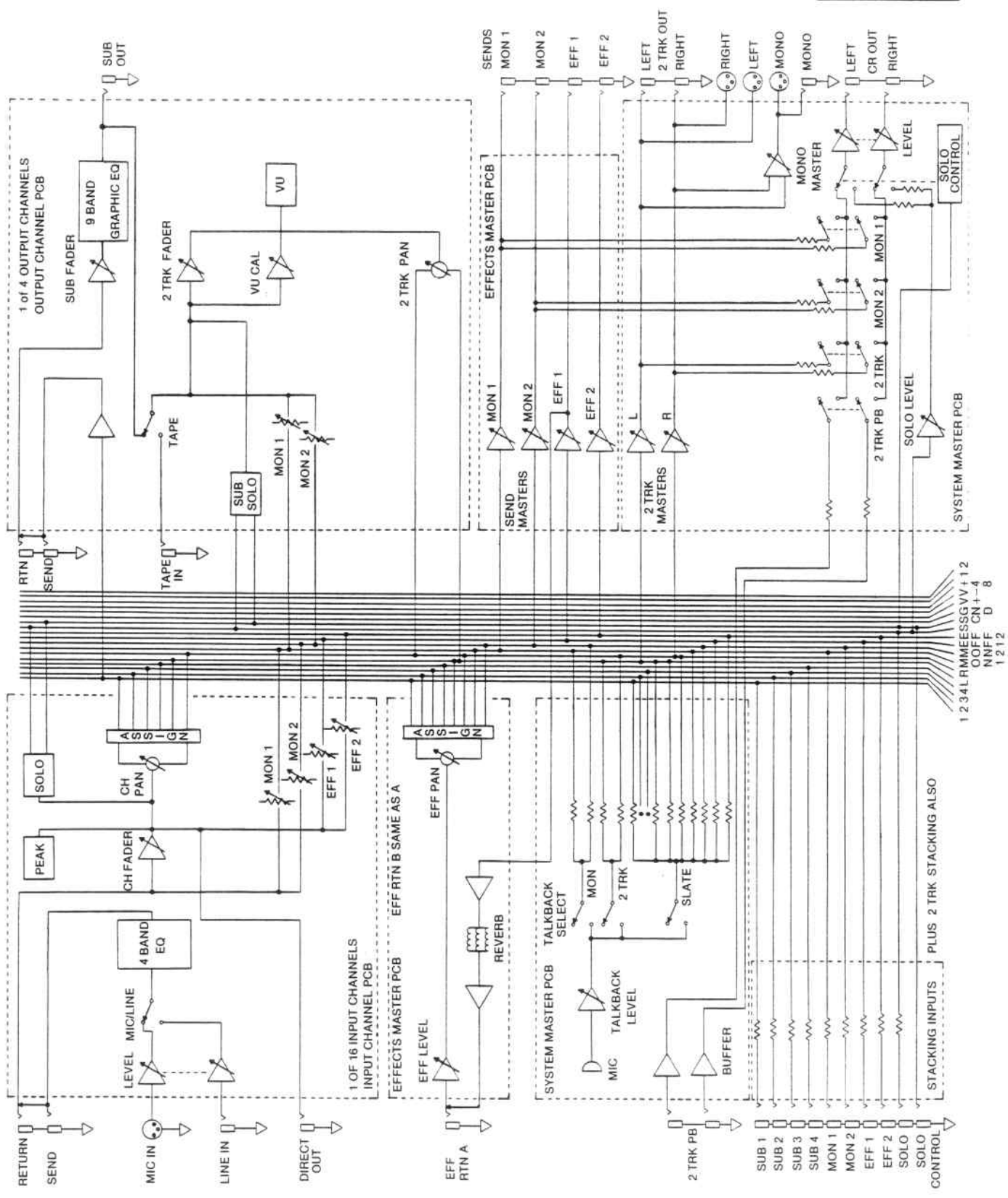


MX 1644 MASTER CONNECTOR PCB1022B

NOTE:
 WHEN NO EQ JUMPER
 2 TO 3 AND 7 TO 8
 AT HI0 AND HI1.

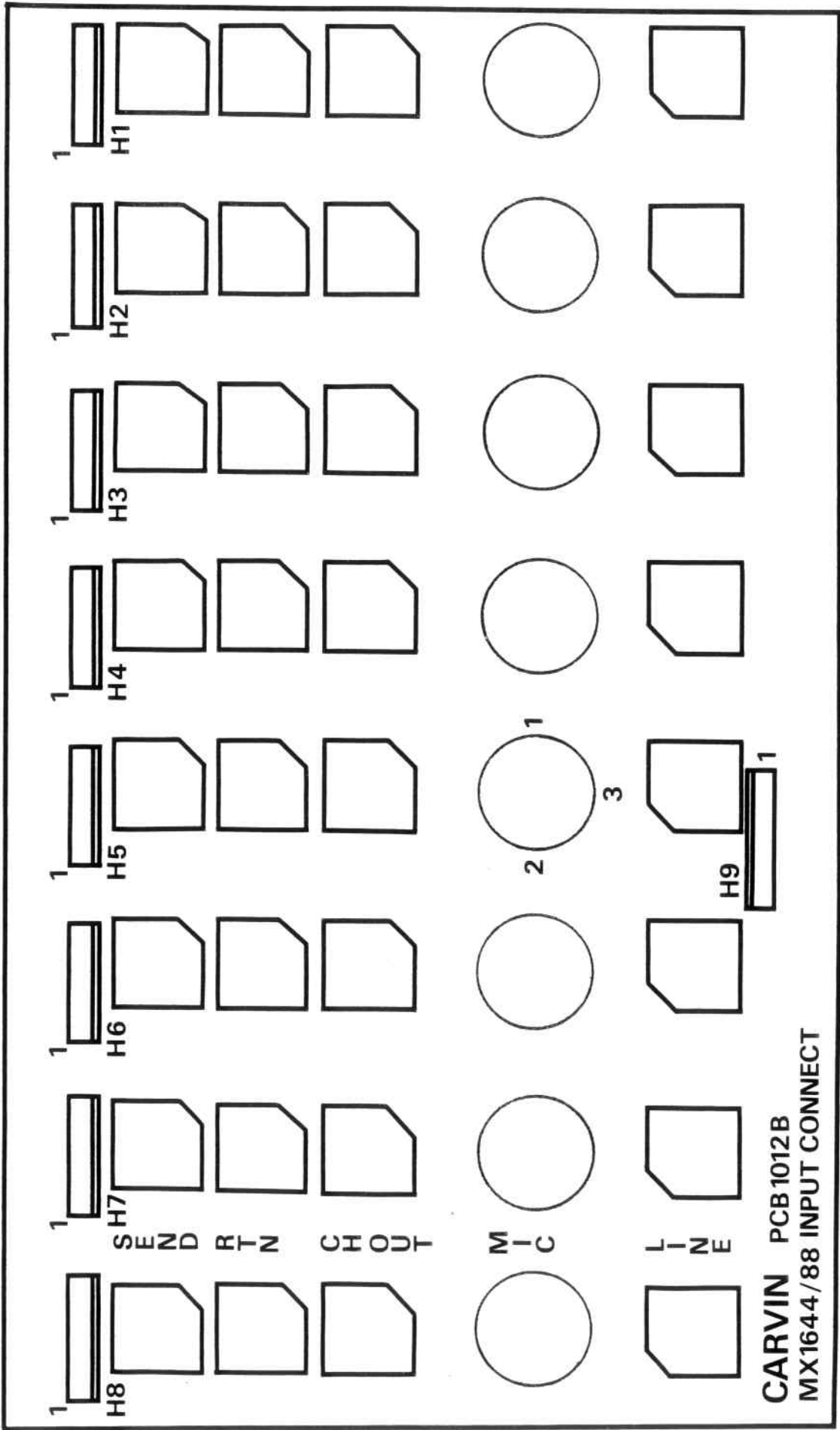
- NOTES:**
- GRAPHIC EQ IS OPTIONAL. WHEN NOT USED, INSTALL SPECIAL SHORTING CONNECTOR ON HI0 AND HI1 (MASTER CONNECT PCB).
 - MAIN BUSS PINOUT:
 3-50.0 BUSS
 4-SUB 3 BUSS
 5-CMD BUSS
 6-R BUSS
 7-L BUSS
 8-SUB 1 BUSS
 8-V +15
 8-SUB 2 BUSS
 19-V -15
 11-EFF 1
 12-EFF 1
 22-148 SWITCHED
 - METER BUSS PINOUT:
 1-AUDIO FROM SUB 1
 2-AUDIO FROM SUB 2
 3-AUDIO FROM SUB 3
 4-AUDIO FROM SUB 4
 5-AUDIO TO METER AMP 1
 6-AUDIO TO METER AMP 2
 7-AUDIO TO METER AMP 3
 8-AUDIO TO METER AMP 4

CARVIN
 MX1644
 BLOCK DIAGRAM
 DRAWN BY: *[Signature]* DATE: 3/14/74
 APPROVED BY: *[Signature]* DATE: 3/17/74
 DRWG NO. 2039

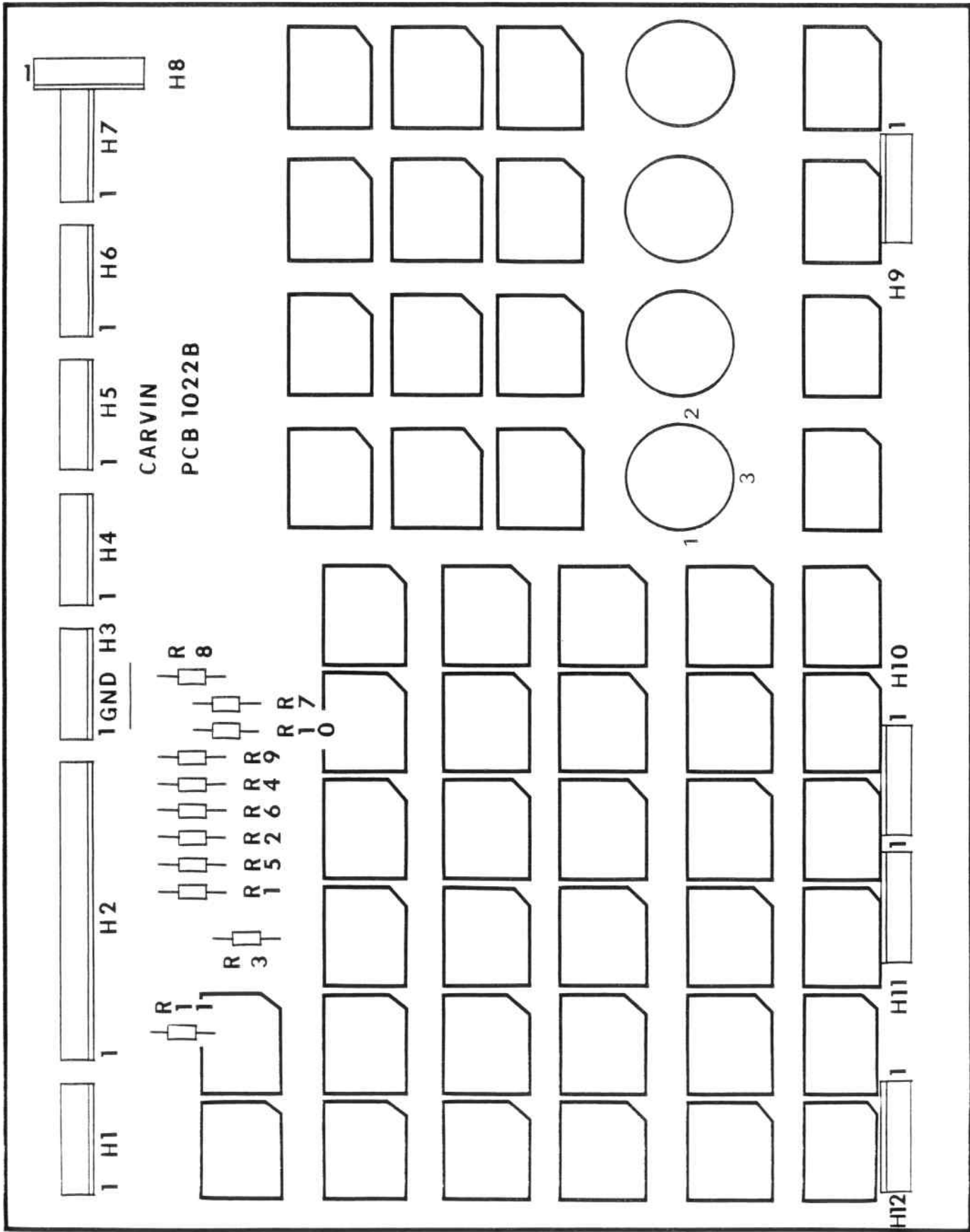


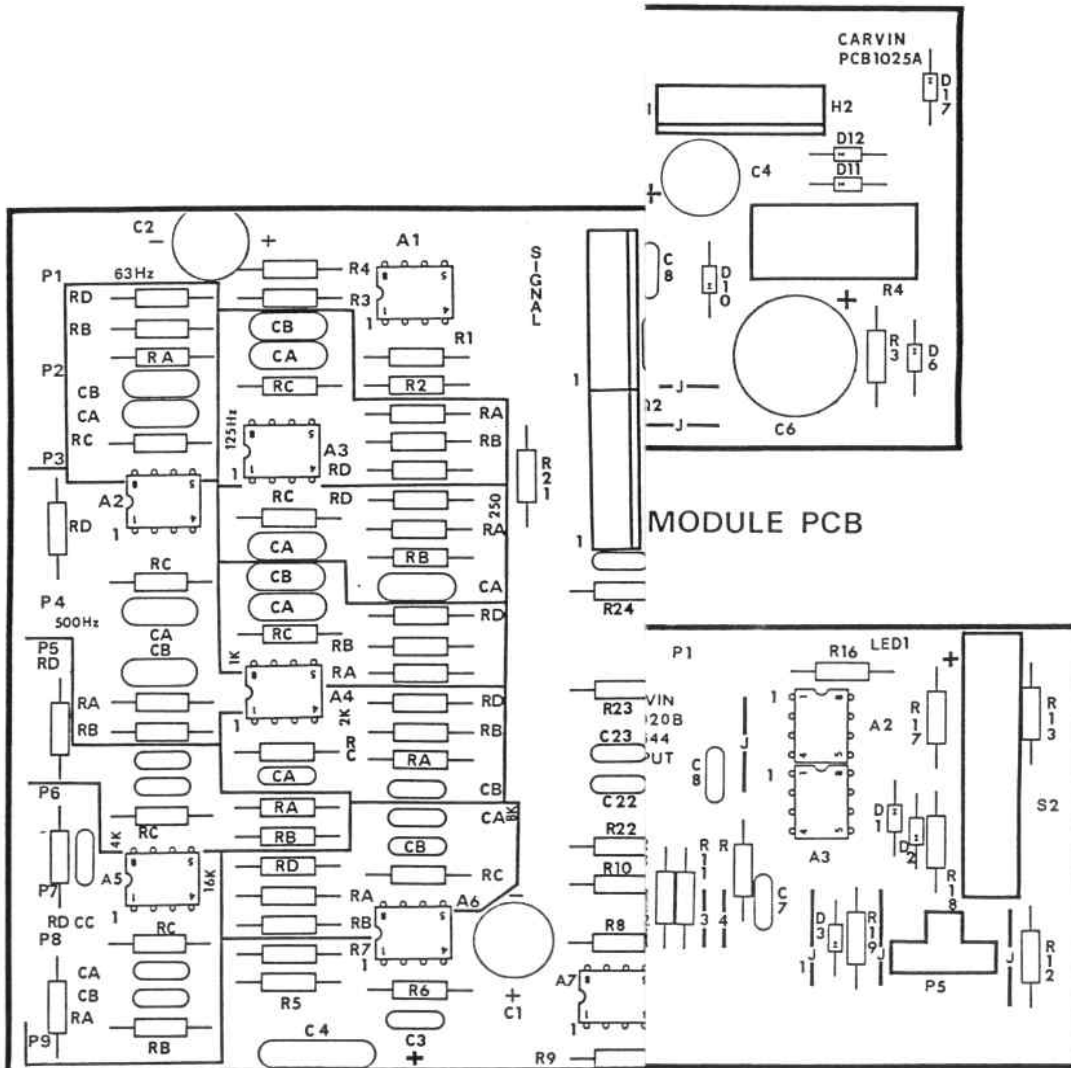
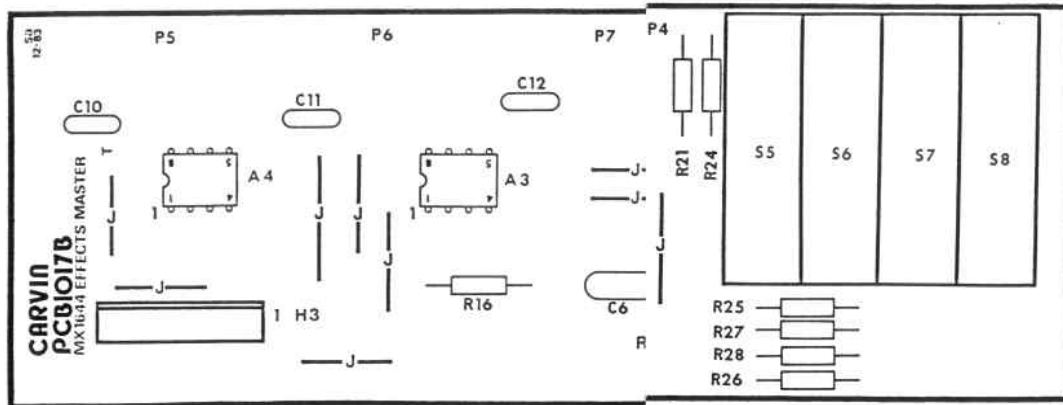
1 2 3 4 L RMMESSGVV+12
 OOFF CN+4
 NFFF D
 1 2 1 2

PLUS 2 TRK STACKING ALSO



MX1644 INPUT CONNECT PCB





IL PCB
MX1644 GRA

FILENAME: PCB 1014 C
 MX1644 INPUT CHANNEL
 CHASSIS NO. 1644-1
 DRAWING NO. 2023 B

31 MAY 84

PCB 1014 C PARTS LIST

PART	VALUE/DESCRIPTION
PCB	1014 C
A 1	RC4558N
A 2	RC4558N
A 3	RC4558N
A 4	NE5532P
C 1	27 pf
C 2	47
C 3	47
C 4	.033
C 5	22/16V
C 6	10 pf
C 7	47
C 8	82 pf
C 9	82 pf
C 10	22/50V
C 11	22/50V
C 12	470
C 13	.0047
C 14	.0047
C 15	.01
C 16	.047
C 17	.0022
C 18	.01 (MYLAR)
C 19	.022
C 20	470/16V
C 21	470/16V
C 22	27 pf
C 23	22/50V
C 24	22/50V
C 25	.01
D 1	1N4003
D 2	1N4003
D 3	1N4003
D 4	1N4003
D 5	1N4003
D 6	1N4003
D 7	TI LED (GREEN)
D 8	TI LED (RED)
H 1	HEADER, .100, 90', 22 PINS
H 2	HEADER, .100, 90', 8 PINS
L 1	FERRITE BEAD

L 2	FERRITE BEAD
P 1	B10 K (STRAIGHT PC MOUNT)
P 2	B50 K (STRAIGHT PC MOUNT)
P 3	B50 K (STRAIGHT PC MOUNT)
P 4	B50 K (STRAIGHT PC MOUNT)
P 5	B50 K (STRAIGHT PC MOUNT)
P 6	15A250K/05C10K (STRAIGHT PC MOUNT)
P 7	B50 K (STRAIGHT PC MOUNT)
P 8	B50 K (STRAIGHT PC MOUNT)
P 9	B50 K (STRAIGHT PC MOUNT)
P 10	B50 K (STRAIGHT PC MOUNT)
Q 1	PN4355
Q 2	PN4355
R 1	10 K
R 2	47 K
R 3	47 K
R 4	4.7 K
R 5	2.2 M
R 6	1 K
R 7	22 K
R 8	1 K
R 9	4.7 K
R 10	4.7 K
R 11	4.7 K
R 12	4.7 K
R 13	4.7 K
R 14	4.7 K
R 15	4.7 K
R 16	4.7 K
R 17	22 K
R 18	22 K
R 19	47 K
R 20	47 K
R 21	22 K
R 22	5.6 K/1%
R 23	5.6 K/1%
R 24	5.6 K/1%
R 25	5.6 K/1%
R 26	2.2 K/1%
R 27	2.2 K/1%
R 28	1 K
R 29	1 K
R 30	10
R 31	470
R 32	4.7 K
R 33	3.3 K
R 34	6.8 K
R 35	10 K
R 36	6.8 K
R 37	3.3 K
R 38	1 K
R 39	1 K
R 40	47 K

R 41	15 K
R 42	1.5 K
R 43	1.5 K
R 44	100 K
R 45	100 K
R 46	22
R 47	22
R 48	47 K
R 49	3.3 K
R 50	1 K
R 51	22 K
R 52	2.2 K/1%
R 53	2.2 K/1%
R 54	47 K
R 55	47 K

S 1	P/C MOUNT, PUSH-PUSH, DPDT
S 2	P/C MOUNT, PUSH-PUSH, DPDT
S 3	P/C MOUNT, PUSH-PUSH, DPDT
S 4	P/C MOUNT, PUSH-PUSH, DPDT
S 5	P/C MOUNT, PUSH-PUSH, DPDT

FILENAME: PCB 1020 B
 MX 1644 OUTPUT CH
 CHASSIS NO. 1644-1
 DRAWING NO. 2021 A

26 MAR 84

PCB 1020 B PARTS LIST

PART NAME	VALUE/DESCRIPTION
PCB	1020 B
A 1	NE5532P
A 2	NE5532P
A 3	NE5532P
C 1	10 pf
C 2	47
C 3	47
C 4	47
C 5	10 pf
C 6	47
C 7	10 pf
C 8	10 pf
C 9	22
D 1	1N4003
D 2	1N4003
D 3	1N4003
LED 1	T1 LED (GREEN)
P 1	A100 K (STRAIGHT PC MOUNT)
P 2	B50 K (STRAIGHT PC MOUNT)
P 3	B50 K (STRAIGHT PC MOUNT)
P 4	B10 K (STRAIGHT PC MOUNT)
P 5	25 K (TRIM POT)
R 1	22 K
R 2	22 K
R 3	10
R 4	10
R 5	47 K
R 6	47 K
R 7	22 K
R 8	10 K
R 9	10 K
R 10	10 K
R 11	10 K
R 12	22 K
R 13	1 K
R 14	22 K
R 15	22 K
R 16	10 K
R 17	47 K
R 18	1 K
R 19	1.5 K

S 1	P/C MOUNT, PUSH-PUSH, DPDT
S 2	P/C MOUNT, PUSH-PUSH, DPDT
H 1	HEADER, .100, 90', 22 PINS
H 2	HEADER, .100, 90', 8 PINS
H 3	HEADER, .100, 90', 8 PINS

FILENAME: PCB 1017 B
MX 1644 EFFECTS MASTER
CHASSIS NO. 1644-1
DRAWING NO. 2019 A

7 MAR 84

PCB 1017 B PARTS LIST

PART NAME	VALUE/DESCRIPTION
PCB	1017 B
A 1	RC4558N
A 2	NE5532P
A 3	NE5532P
A 4	NE5532P
C 1	47
C 2	27 pf
C 3	.033
C 4	27 pf
C 5	47
C 6	.0022
C 7	47
C 8	47
C 9	27 pf
C 10	27 pf
C 11	27 pf
C 12	27 pf
C 13	27 pf
C 14	47
C 15	47
C 16	560 pf
C 17	47/25 U
C 18	47/25 U
C 19	47/25 U
C 20	47/25 U
H 1	HEADER, .100/90', 22 PIN
H 2	HEADER, .100/90', 8 PIN
H 3	HEADER, .100/90', 8 PIN
P 1	A100 K (STRAIGHT PC MOUNT)
P 2	B10 K (STRAIGHT PC MOUNT)
P 3	A100 K (STRAIGHT PC MOUNT)
P 4	B10 K (STRAIGHT PC MOUNT)
P 5	A100 K (STRAIGHT PC MOUNT)
P 6	A100 K (STRAIGHT PC MOUNT)
P 7	A100 K (STRAIGHT PC MOUNT)
P 8	A100 K (STRAIGHT PC MOUNT)
R 1	10 K
R 2	10 K
R 3	10 K
R 4	4.7 K
R 5	4.7 K
R 6	4.7 K

R 7	22 K
R 8	4.7 K
R 9	4.7 K
R 10	10 K
R 11	10 K
R 12	10 K
R 13	470 K
R 14	47
R 15	47 K
R 16	22 K
R 17	47
R 18	10 K
R 19	10 K
R 20	10 K
R 21	4.7 K
R 22	4.7 K
R 23	4.7 K
R 24	4.7 K
R 25	4.7 K
R 26	4.7 K
R 27	10 K
R 28	10 K
R 29	10
R 30	10

S 1	P/C MOUNT, PUSH-PUSH, DPDT
S 2	P/C MOUNT, PUSH-PUSH, DPDT
S 3	P/C MOUNT, PUSH-PUSH, DPDT
S 4	P/C MOUNT, PUSH-PUSH, DPDT
S 5	P/C MOUNT, PUSH-PUSH, DPDT
S 6	P/C MOUNT, PUSH-PUSH, DPDT
S 7	P/C MOUNT, PUSH-PUSH, DPDT
S 8	P/C MOUNT, PUSH-PUSH, DPDT

FILENAME: PCB 1021 D
 MX 1644 SYSTEM MASTER
 CHASSIS NO. 1644-1
 DRAWING NO. 2022 B

11 JUNE 84

PCB 1021 D PARTS LIST

PART	VALUE/DESCRIPTION
PCB	1021 D
A 1	NE5532P
A 2	NE5532P
A 3	RC4558N
A 4	NE5532P
A 5	NE5532P
A 6	NE5532P
A 7	NE5532P
A 8	NE5532P
A 9	NE5532P
C 1	27 pf
C 2	27 pf
C 3	47
C 4	27 pf
C 5	47
C 6	27 pf
C 7	47
C 8	.033
C 9	47
C 10	10 pf
C 11	47
C 12	10 pf
C 13	10 pf
C 14	47
C 15	.01
C 16	27 pf
C 17	220/50V
C 18	47
C 19	47
C 20	47
C 21	47
C 22	120 pf
C 23	120 pf
C 24	27 pf
C 25	27 pf
C 26	.01 (CERAMIC)
C 27	22
C 28	22
C 29	22
D 1	T1 LED (RED)
D 2	1N4003
D 3	T1 LED (GREEN)
H 1	HEADER, .100/90', 22 PIN

H 2	HEADER, .100/90', 8 PIN
H 3	HEADER, .100/90', 8 PIN
H 4	HEADER, .100/90', 8 PIN
H 5	HEADER, .100/90', 8 PIN
H 6	HEADER, .100/90', 8 PIN
P 1	A100 K (STRAIGHT PC MOUNT)
P 2	A100 K (STRAIGHT PC MOUNT)
P 3	15A100K (X2) (STRAIGHT PC MOUNT)
P 4	A100 K (STRAIGHT PC MOUNT)
Q 1	J174
Q 2	J174
Q 3	J174
Q 4	J174
Q 5	2N5550
Q 6	2N5550
R 1	10 K
R 2	10 K
R 3	10 K
R 4	10 K
R 5	47 K
R 6	47 K
R 7	10 K
R 8	47 K
R 9	47 K
R 10	10 K
R 11	150
R 12	10 K
R 13	2.2 K
R 14	10 K
R 15	47 K
R 16	47 K
R 17	22 K
R 18	22 K
R 19	10 K
R 20	10
R 21	10 K
R 22	10 K
R 23	22 K
R 24	22 K
R 25	47 K
R 26	47 K
R 27	47 K
R 28	47 K
R 29	2.2 K
R 30	47 K
R 31	47 K
R 32	47 K
R 33	47 K
R 34	47 K
R 35	47 K
R 36	10 K
R 37	10 K
R 38	47 K

R 39	47 K
R 40	22 K
R 41	1 K
R 42	100 K
R 43	1 K
R 44	22 K
R 45	22 K
R 46	22 K
R 47	1 M
R 48	10 K
R 49	47 K
R 50	1 K
R 51	22 K
R 52	22 K
R 53	4.7 K
R 54	4.7 K
R 55	10 K
R 56	150
R 57	150
R 58	10 K
R 59	150
R 60	150
R 61	47
R 62	47
R 63	10
R 64	10
R 65	100 K
R 66	270

S 1	P/C MOUNT, PUSH-PUSH, DPDT
S 2	P/C MOUNT, PUSH-PUSH, DPDT
S 3	P/C MOUNT, PUSH-PUSH, DPDT
S 4	P/C MOUNT, PUSH-PUSH, DPDT
S 5	P/C MOUNT, PUSH-PUSH, DPDT
S 6	P/C MOUNT, PUSH-PUSH, DPDT
S 7	P/C MOUNT, PUSH-PUSH, DPDT
S 8	P/C MOUNT, PUSH-PUSH, DPDT
S 9	P/C MOUNT, PUSH-PUSH, DPDT
S 10	P/C MOUNT, PUSH-PUSH, DPDT

FILENAME: PCB 1015 B
 MX 1644 EQ
 DRAWING NO. 2025 A

2 MAR 84

PCB 1015 B PARTS LIST

PART	VALUE/DESCRIPTION
PCB	1015 B
A 1	NE5532P
A 2	RC4558N
A 3	RC4558N
A 4	RC4558N
A 5	RC4558N
A 6	NE5532P
A 7	NE5532P
A 8	NE5532P
A 9	RC4558N
A 10	RC4558N
A 11	RC4558N
A 12	RC4558N
A 13	NE5532P
A 14	NE5532P
C 1	470
C 2	470
C 3	82 pf
C 4	47
C 11	470
C 12	470
C 13	82 pf
C 14	47
C 21	.01
C 22	.01
C 23	.01
C 24	.01
H 1	.100, STRAIGHT, 8 PINS
H 2	.100, STRAIGHT, 8 PINS
P 1	10 K, 45mm, CTR CLICK, SLIDER POT
P 2	10 K, 45mm, CTR CLICK, SLIDER POT
P 3	10 K, 45mm, CTR CLICK, SLIDER POT
P 4	10 K, 45mm, CTR CLICK, SLIDER POT
P 5	10 K, 45mm, CTR CLICK, SLIDER POT
P 6	10 K, 45mm, CTR CLICK, SLIDER POT
P 7	10 K, 45mm, CTR CLICK, SLIDER POT
P 8	10 K, 45mm, CTR CLICK, SLIDER POT
P 9	10 K, 45mm, CTR CLICK, SLIDER POT
P 11	10 K, 45mm, CTR CLICK, SLIDER POT
P 12	10 K, 45mm, CTR CLICK, SLIDER POT
P 13	10 K, 45mm, CTR CLICK, SLIDER POT
P 14	10 K, 45mm, CTR CLICK, SLIDER POT
P 15	10 K, 45mm, CTR CLICK, SLIDER POT
P 16	10 K, 45mm, CTR CLICK, SLIDER POT

P 17 10 K, 45mm, CTR CLICK, SLIDER POT
 P 18 10 K, 45mm, CTR CLICK, SLIDER POT
 P 19 10 K, 45mm, CTR CLICK, SLIDER POT

R 1 10 K
 R 2 10 K
 R 3 150
 R 4 150
 R 5 10 K
 R 6 68 K
 R 7 10 K
 R 8 10 K
 R 9 150
 R 10 150
 R 11 10 K
 R 12 10 K
 R 13 150
 R 14 150
 R 15 10 K
 R 16 68 K
 R 17 10 K
 R 18 10 K
 R 19 150
 R 20 150
 R 21 10
 R 22 10
 R 23 10
 R 24 10

63 Hz (A)

C A .22
 C B .22
 R A 7.5 K
 R B 7.5 K
 R C 33 K
 R D 4.7 K

125 Hz (A)

C A .22
 C B .22
 R A 3.9 K
 R B 3.9 K
 R C 18 K
 R D 5.6 K

250 Hz (A)

C A .022 pf
 C B .022 pf
 R A 20 K
 R B 20 K
 R C 91 K
 R D 5.6 K

500 Hz (A)

C A	.022 pf
C B	.022 pf
R A	10 K
R B	10 K
R C	43 K
R D	5.6 K

1 K (A)

C A	.022 pf
C B	.022 pf
R A	4.7 K
R B	4.7 K
R C	22 K
R D	5.6 K

2 K (A)

C A	.0022
C B	.0022
R A	24 K
R B	24 K
R C	110 K
R D	5.6 K

4 K (A)

C A	.0022
C B	.0022
R A	12 K
R B	12 K
R C	56 K
R D	5.6 K

8 K (A)

C A	.0022
C B	.0022
R A	8.2 K
R B	8.2 K
R C	27 K
R D	4.7 K

16 K (A)

C A	.0022
C B	.0022
C C	250 pf
R A	3 K
R B	3 K
R C	15 K
R D	4.7 K

63Hz (B)

C A	.22
C B	.22
R A	7.5 K
R B	7.5 K
R C	33 K
R D	4.7 K

125 Hz (B)

C A	.22
C B	.22
R A	3.9 K
R B	3.9 K
R C	18 K
R D	5.6 K

250 Hz (B)

C A	.022 pf
C B	.022 pf
R A	20 K
R B	20 K
R C	91 K
R D	5.6 K

500 Hz (B)

C A	.022 pf
C B	.022 pf
R A	10 K
R B	10 K
R C	43 K
R D	5.6 K

1 K (B)

C A	.022 pf
C B	.022 pf
R A	4.7 K
R B	4.7 K
R C	22 K
R D	5.6 K

2 K (B)

C A	.0022
C B	.0022
R A	24 K
R B	24 K
R C	110 K
R D	5.6 K

4 K (B)

C A	.0022
C B	.0022
R A	12 K
R B	12 K
R C	56 K
R D	5.6 K

8 K (B)

C A	.0022
C B	.0022
R A	8.2 K
R B	8.2 K
R C	27 K
R D	4.7 K

16 K (B)

C A	.0022
C B	.0022
C C	250 p f
R A	3 K
R B	3 K
R C	15 K
R D	4.7 K

FILENAME: PCB 1022 B
 MX 1644 MASTER CONNECT
 DRAWING NO. 2020 A

27 JAN 84

PCB 1022 B PARTS LIST

PART	VALUE/DESCRIPTION
PCB	1022 B
H 1	HEADER, .100, 90', 8 PINS
H 2	HEADER, .100, 90', 22 PINS
H 3	HEADER, .100, 90', 8 PINS
H 4	HEADER, .100, 90', 8 PINS
H 5	HEADER, .100, 90', 8 PINS
H 6	HEADER, .100, 90', 8 PINS
H 7	HEADER, .100, 90', 8 PINS
H 8	HEADER, .100, 90', 8 PINS
H 9	HEADER, .100, 90', 8 PINS
H 10	HEADER, .100, 90', 8 PINS
H 11	HEADER, .100, 90', 8 PINS
H 12	HEADER, .100, 90', 8 PINS
J 1	XLR, MALE, PC
J 2	XLR, MALE, PC
J 3	XLR, MALE, PC
J 4	XLR, MALE, PC
J 5	111 PC
J 6	111 PC
J 7	111 PC
J 8	111 PC
J 9	111 PC
J 10	111 PC
J 11	111 PC
J 12	111 PC
J 13	111 PC
J 14	111 PC
J 15	112 APC
J 16	111 PC
J 17	111 PC
J 18	111 PC
J 19	111 PC
J 20	111 PC
J 21	111 PC
J 22	112 APC
J 23	111 PC
J 24	111 PC
J 25	112 APC
J 26	112 APC
J 27	111 PC
J 28	112 APC
J 29	111 PC
J 30	111 PC
J 31	111 PC
J 32	111 PC
J 33	112 APC

J 34	111 PC
J 35	111 PC
J 36	111 PC
J 37	111 PC
J 38	111 PC
J 39	111 PC
J 40	111 PC
J 41	112 APC
J 42	112 APC
J 43	112 APC
J 44	112 APC
J 45	111 PC
J 46	111 PC
J 47	111 PC
J 48	111 PC
J 49	111 PC
J 50	111 PC
J 51	111 PC
J 52	111 PC

R 1	47 K
R 2	47 K
R 3	47 K
R 4	47 K
R 5	47 K
R 6	47 K
R 7	47 K
R 8	47 K
R 9	47 K
R 10	47 K
R 11	47 K

FILENAME: PCB 1025 A
 MX 1644/88 POWER SUPPLY
 DRAWING NO. 2035

12 APRIL 84

PCB 1025 A PARTS LIST

PART	VALUE/DESCRIPTION
PCB	1025 A
C 1	68/63
C 2	2200
C 3	2200
C 4	220/50
C 5	2200
C 6	2200
C 7	.05
C 8	.05
D 1	MR502
D 2	MR502
D 3	MR502
D 4	MR502
D 5	1N4745/16V
D 6	1N4745/16V
D 7	1N4003
D 8	1N4003
D 9	1N4003
D 10	1N4003
D 11	1N4003
D 12	1N4003
D 13	1N4003
D 14	1N4003
D 15	1N4003
D 16	1N4003
D 17	1N4756/47V
H 1	HEADER, .100, 90', 8 PIN
H 2	HEADER, .100, 90', 8 PIN
Q 1	TIP120
Q 2	TIP125
R 1	470
R 2	.33/5W
R 3	470
R 4	.33/5W
R 5	560/1/4W
R 6	220

SEQ	PART #	DESCRIPTION	UNIT QTY
001	.022/600V	600V MYLAR	1
002	GF626	(-0039) 6AMP SLD SWTCH 24	1
003	HKP	FUSE HOLDER	1
004	LTGN0500	LRG LGHTD RCKR SWTCH	1
005	01LA13203	WHITE SLIDE KNB	16
006	01LA13203R	KN0B RED W/BLACK POINTER	6
007	TAN150006	BLK KNB W/6MM SHFT	189
008	C151YEL	YELLOW CAP FOR BLK PUSH 0	42
009	C151RD	RED CAP FOR BLK PUSH ON K	40
010	C151BL	BLUE CAP FOR BLK PUSH ON	42
011	C151GRY	GREY CAP FOR BLK PUSH ON	64
012	8843IC0	1/4RND6-32THRU1/2LNG STND	2
013	301	RECEPTICLE BLK (PLASTIC)	1
014	12BOPEN	12B DUAL OPEN JACK	1
015	6SLDLUG	#6 SOLDER LUG	1
016	6X1/4SLPH	6-32X1/4" SLT PH MS ZINC	12
017	6ISW	#6 INTERNAL STAR WASHER	14
018	6X1/2PPH	6-32X1/2" PHLLP PH MS NIC	4
019	6X1/4PPH	6-32X1/4"PHLLP PH MS BLK	13
020	MX44/88SID	WOOD SIDES FOR MX1688 & M	2
021	2AMP	3AG FUSE	1
022	3MMHXNUT	3MM HEX NUT	4
023	217180502	(000101) PLASTIC GROMMET	14
024	PT88/44	TRANSFORMER	1
025	MX1644-3	FADER PANEL	1
026	MX1644-1	FRONT PANEL	1
028	MX1644-4	REAR PANEL	1
029	3008	MX44/88 POWER SUPPLY SHIE	1
030	H851005	VU METER W/6V LAMP	4
031	122008	SHAKE PROOF INT LOCK WASH	112
032	75543	BNC FEMALE CHASIS CONNECT	1
033	8NUT	#8 HEX NUT	3
034	8ISW	##8 INTERNAL STAR WASHER	3
035	2158	SHOULDER WASHER	1
036	3006	MX44 EQ COVER PLATE	1
037	4ISW	#4 INTERNAL STAR WASHER Z	4
038	3.5X8MMPH	3.5X8 MM PPH BLK OX M/S	4
039	B16-6	BOTTOM FOR MX1644/1688	1
040	A50K100MM	VJ100N12(4X.2)15A50K-D	22
041	MX1644-5	METER BRIDGE	1
001	CT100F22-8	PANDUIT CONNECTOR	62
002	CT100F2222	PANDUIT CONNECTOR	23
005	H851005	VU METER W/6V LAMP	4
006	22V8-N2C	PANDUIT RIBBON	28
007	22V20-N2C	PANDUIT RIBBON	7

MX1644 Audio Mixer

Servicing in Your Area

You may select your own service center or have your own qualified technician work on the unit at your own expense. This will not void the warranty for future repairs unless damage was done because of improper servicing or component replacement. If damage was done, a normal fee for parts and servicing will be charged.

Under the 1 YEAR WARRANTY, Carvin will ship parts pre-paid to you or your technician providing that the defective part(s) are first returned for our inspection.

If you do not have a qualified service person, we ask that you do not involve yourself in servicing the unit. By sending the unit back to us, you may save time, money, and frustration. Also, you will know that your unit was serviced according to factory specifications.

If it is necessary to have your unit serviced locally, we strongly recommend that you have your technician call us before servicing your unit. We find that those who do this are able to make necessary repairs faster, and for less money. We are glad to help in this manner because we have pride in our products and we want them to work properly for many years.

REMINDER: CARVIN DOES NOT PAY FOR SERVICING OR PARTS OTHER THAN OUR OWN — NO EXCEPTIONS. IF YOU ELECT TO HAVE YOUR OWN SERVICING DONE, THESE BILLS MUST BE PAID BY YOU.

CAUTION — TO PREVENT ELECTRIC SHOCK DO NOT DEFEAT THE SAFETY GROUND ON THE POWER CORD. DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE.

WARNING — TO PREVENT FIRE OR SHOCK HAZARD DO NOT EXPOSE TO RAIN, MOISTURE, EXPLOSIVE ATMOSPHERE OR INSTALL AN IMPROPER FUSE!

Factory Servicing

We highly recommend utilizing our specialized servicing staff to bring your unit up to factory specifications. Regardless of your warranty status, please follow these guidelines when returning units for service:

1. Enclose a full description of the malfunction. Please use the "Service Authorization Form" included with this manual.
2. Include a copy of the original invoice to verify your warranty.
3. Return the product in its original carton with the original packing material. **NEITHER CARVIN NOR THE SHIPPING COMPANY WILL ASSUME LIABILITY FOR IMPROPERLY PACKED UNITS.** Ship the unit by UPS if possible. You must pre-pay the shipping cost.
4. Please allow 5 working days for servicing plus shipping time to and from destination. All repairs in by MONDAY will be ready by the following MONDAY.
5. Carvin will pre-pay the shipping back to you providing the unit is covered under warranty. If you wish to have it sent back by AIR, you will be required to pay the difference COD.
6. If your unit is out of warranty, you will be charged a modest fee (generally lower than typical repair shops). You must pay shipping charges both ways. These charges will be collected COD.
7. If in doubt about the malfunction, please call a Carvin salesman toll-free at 800-854-2235 (in Calif. 800-542-6070). Occasionally we receive merchandise that works fine, but because of an oversight, the unit was returned needlessly.

Limited Warranty

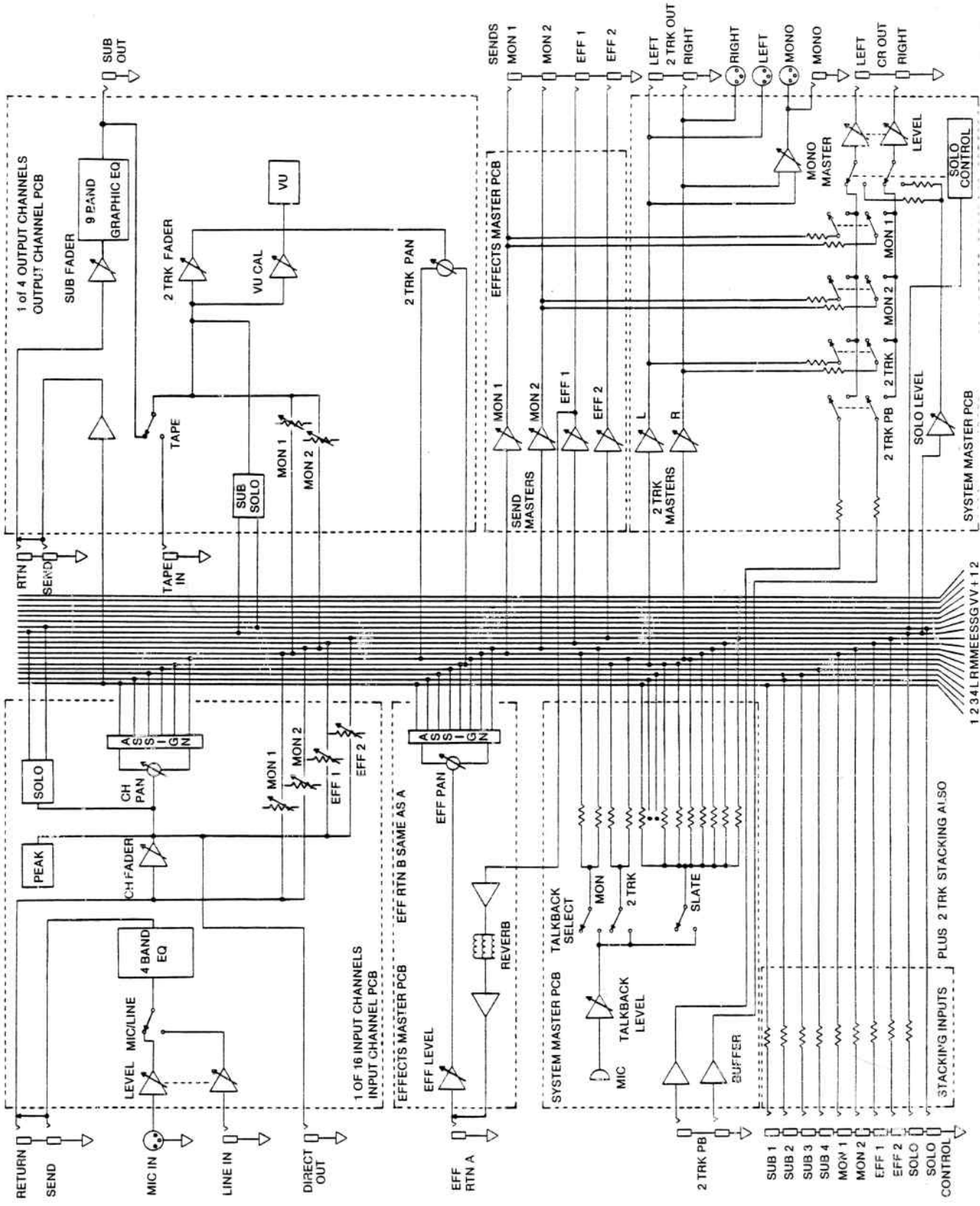
Your Carvin Professional Series Product is protected against failure for 1 YEAR. Carvin will service the unit, supply all parts, and pay the RETURN shipping charges at no charge to the customer providing the unit is under warranty. **CARVIN WILL NOT PAY FOR PARTS OR SERVICING OTHER THAN OUR OWN.**

This warranty is extended to the original purchaser only and is not transferable. **THIS WARRANTY DOES NOT INCLUDE FAILURES CAUSED BY INCORRECT USE, INADEQUATE CARE OF THE UNIT, OR NATURAL DISASTERS. A COPY OF THE ORIGINAL INVOICE IS REQUIRED TO VERIFY YOUR WARRANTY.**

Carvin takes no responsibility for any horn driver or speaker damaged by this unit.

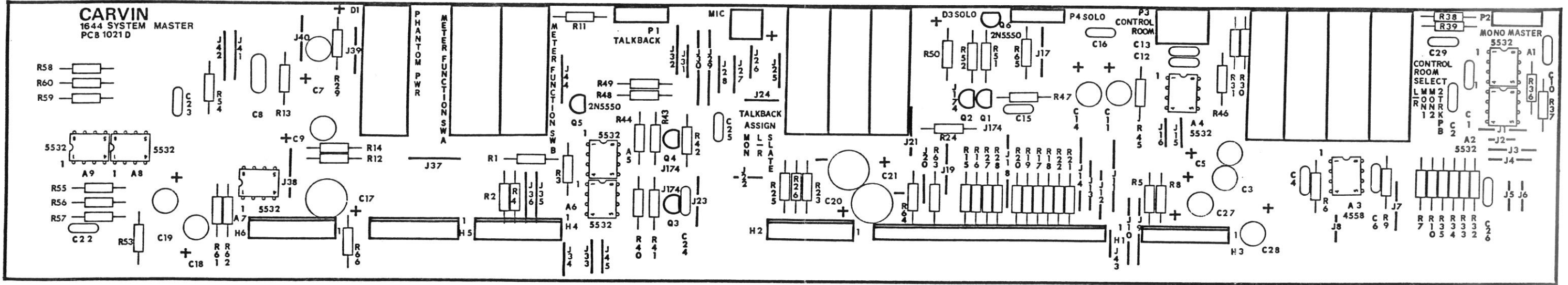
This warranty is in lieu of all other warranties, expressed or implied. No representative or person is authorized to represent or assume for Carvin any liability in connection with the sale or servicing of Carvin products. No liability is assumed for damage due to accident, abuse, lack of reasonable care, loss of parts, or failure to follow Carvin's directions. **CARVIN SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

In the interest of creating new products and improving existing ones, Carvin is continually researching the latest state of the art audio design methods, and modern packaging and production techniques. Thus, Carvin reserves the right to make changes in its products and specifications without notice or obligation.

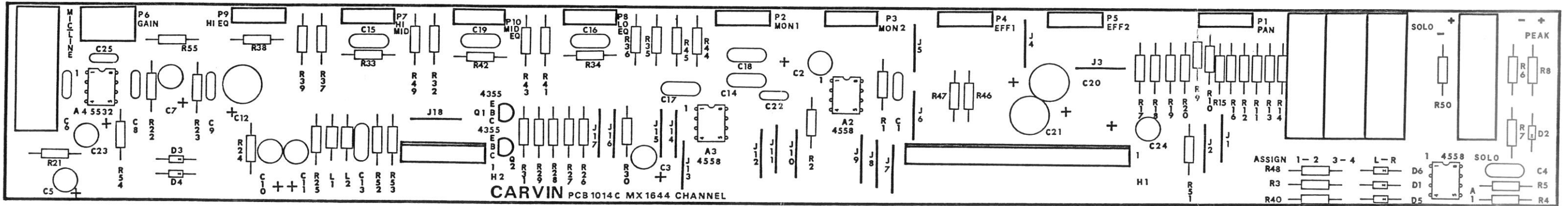


1 234 L RMMESSGVV+12
 00FF CN 1-4
 NNFF D
 1 212

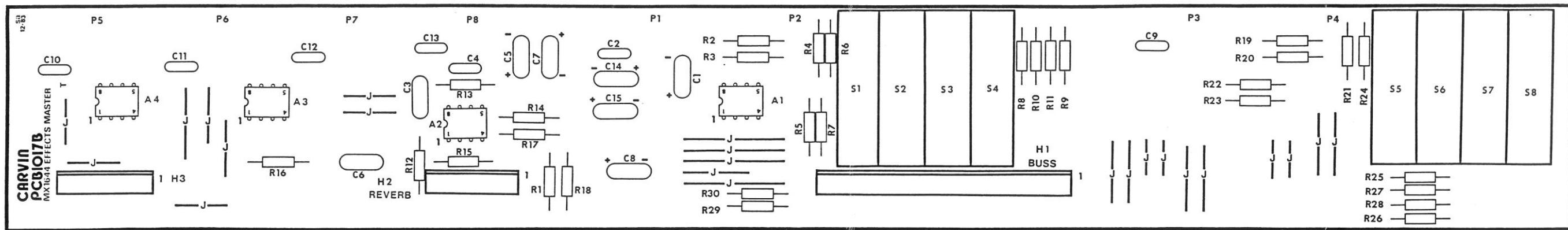
PLUS 2 TRK STACKING A.I.S.O



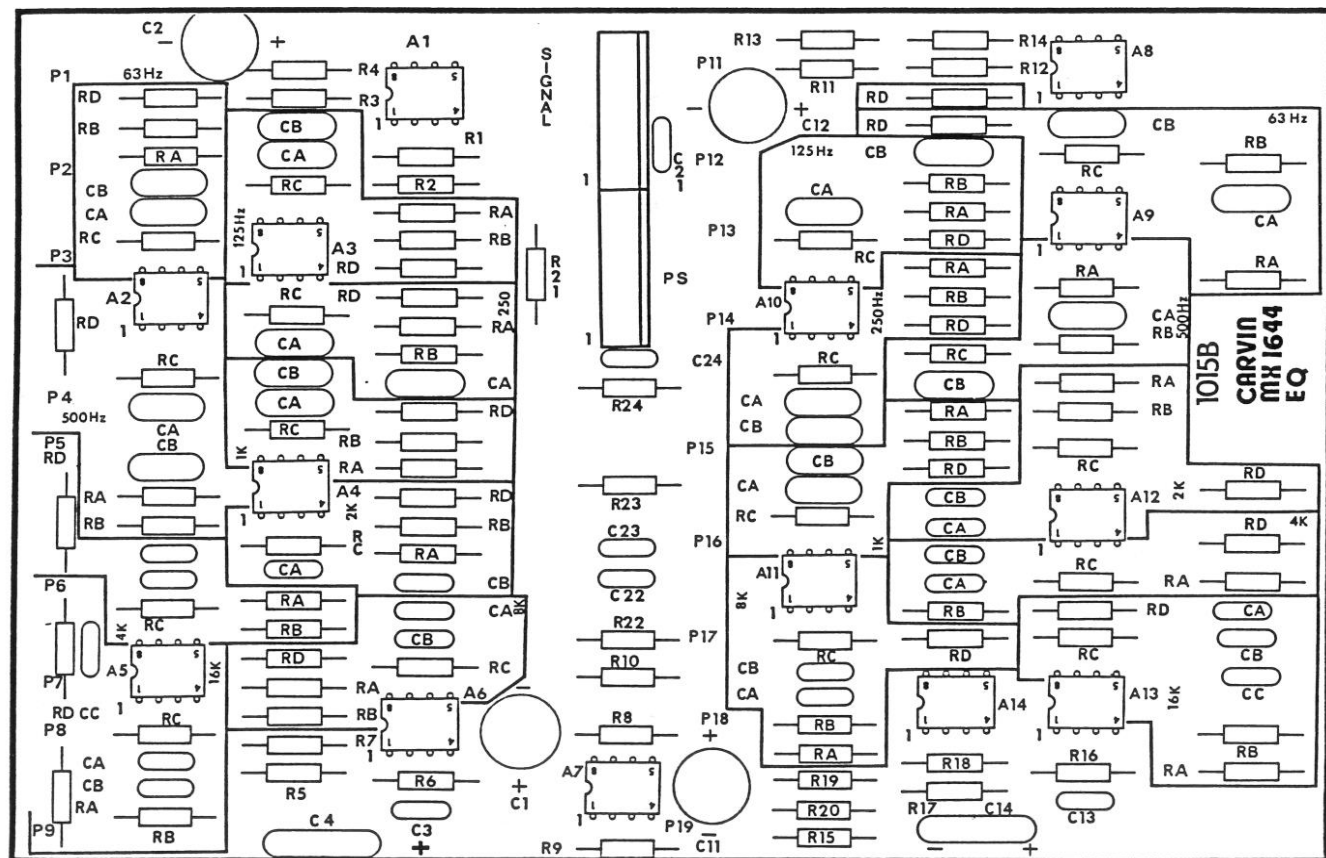
MX1644 SYSTEM MASTER PCB



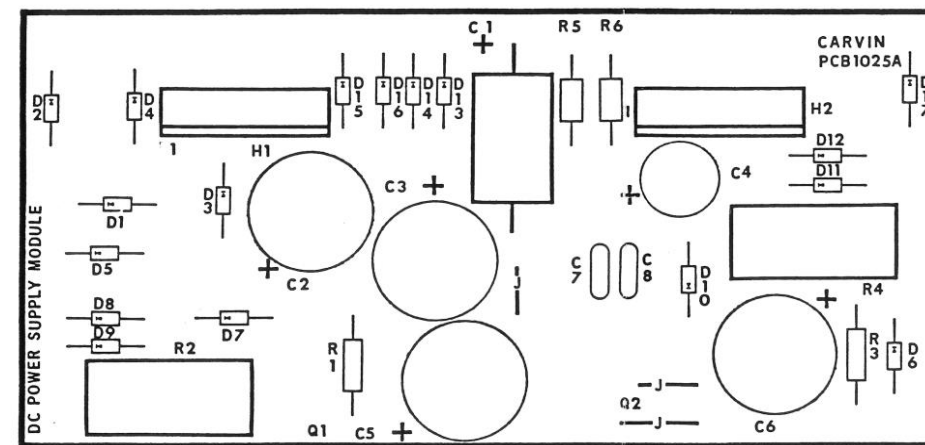
MX1644 INPUT CHANNEL PCB



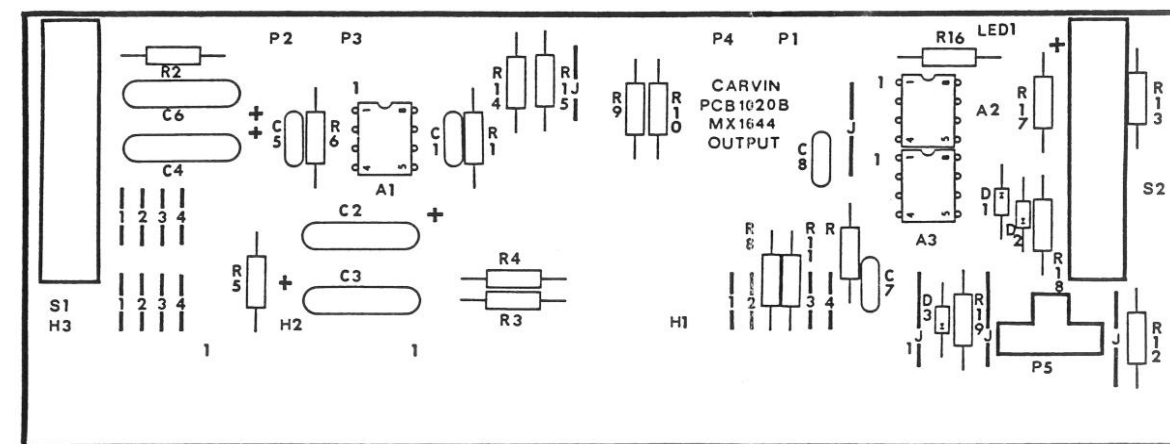
MX1644 EFFECTS MASTER PCB



MX1644 GRAPHIC EQ PCB



MX1644 DC POWER SUPPLY MODULE PCB



MX1644 OUTPUT CHANNEL PCB