

EV **TAPCO**®

6001RB
MIXER/REVERB

OWNER'S MANUAL

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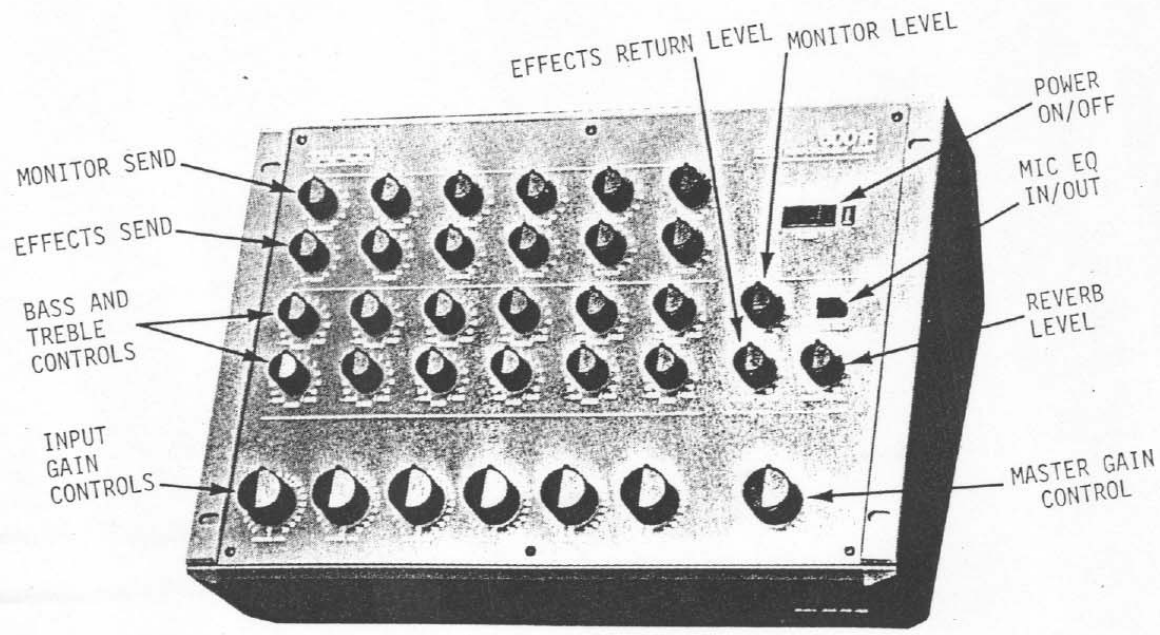


Figure 1. The TAPCO 6001R mixer with Differential AutoPad[®].

INTRODUCTION

The 6001R Mixer with differential AutoPad® and a reverberation system is designed to offer all the versatility you need for almost any sound reinforcement job—to help you get that super sound you are after, whatever it is.

SETTING UP FOR MIXING

As you can see in Figure 2, your first setup is really straightforward. We've illustrated the most common use for all of the 6001R's input and output connections. The first time you set up your system, use the following control settings:

<u>INPUT CONTROLS</u> (Channels 1 through 6)	
CHANNEL GAIN	6
BASS and TREBLE	All flat (0)
EFFECTS Send	10
MONITOR Send	10
 <u>MASTER SECTION</u>	
MASTER GAIN	6
REVERB LEVEL	6
MONITOR Master	10
EFFECTS RETURN	Depends upon the output level of your effects device —try 10 to start with

Setting the mixer up as shown will at least get some signal in or out each of the connectors. Then you can start adjusting levels to figure out what you need to do in the way of mic placing to make the 6001R work just right for the particular situation. Study the section for each control to see what the control does. In any case, always make all of the necessary connections and interconnections in your system before you turn anything on. Then be sure to follow this sequence:

1. Turn on the mixer and any other low level equipment in the system. Give everything at least 30 seconds to fully stabilize.
2. Turn on the power amp(s).

When you shut down the system, turn the power amps off first, and always allow a minute or so for the power supply capacitors to fully discharge before you turn off the low level equipment. This simple routine may save your speakers, because nearly all low level sound equipment produces some sort of "turn on thump". Your 6001R mixer, however, has a ramp on/off power supply, which means the power comes on gradually when the power switch is turned to ON. The mixer also shuts off gradually when turned off.* So, to avoid the remote possibility that your speakers could be traumatized or even killed by unexpected DC transients, make sure that your power amps are OFF, and wait at least a minute before you turn your low level equipment ON or OFF. By low level, incidentally, we mean everything except power amps. Remember, if a little DC gets through when the power amps have been off for a minute or so, it's of no consequence. But if it's on.... Not to worry, however. Speaker cone kits and new drivers are sold to those unfortunates who slaughter their speakers without meaning to. That is one of the reasons that many sound mixer people have a way of getting very upset when someone messes with their board. Nobody can blame them—it can get expensive.

*When the system is on, just as in any system using electronics, any power interruption can cause a sudden power spike, or "thump," which can damage the speakers.

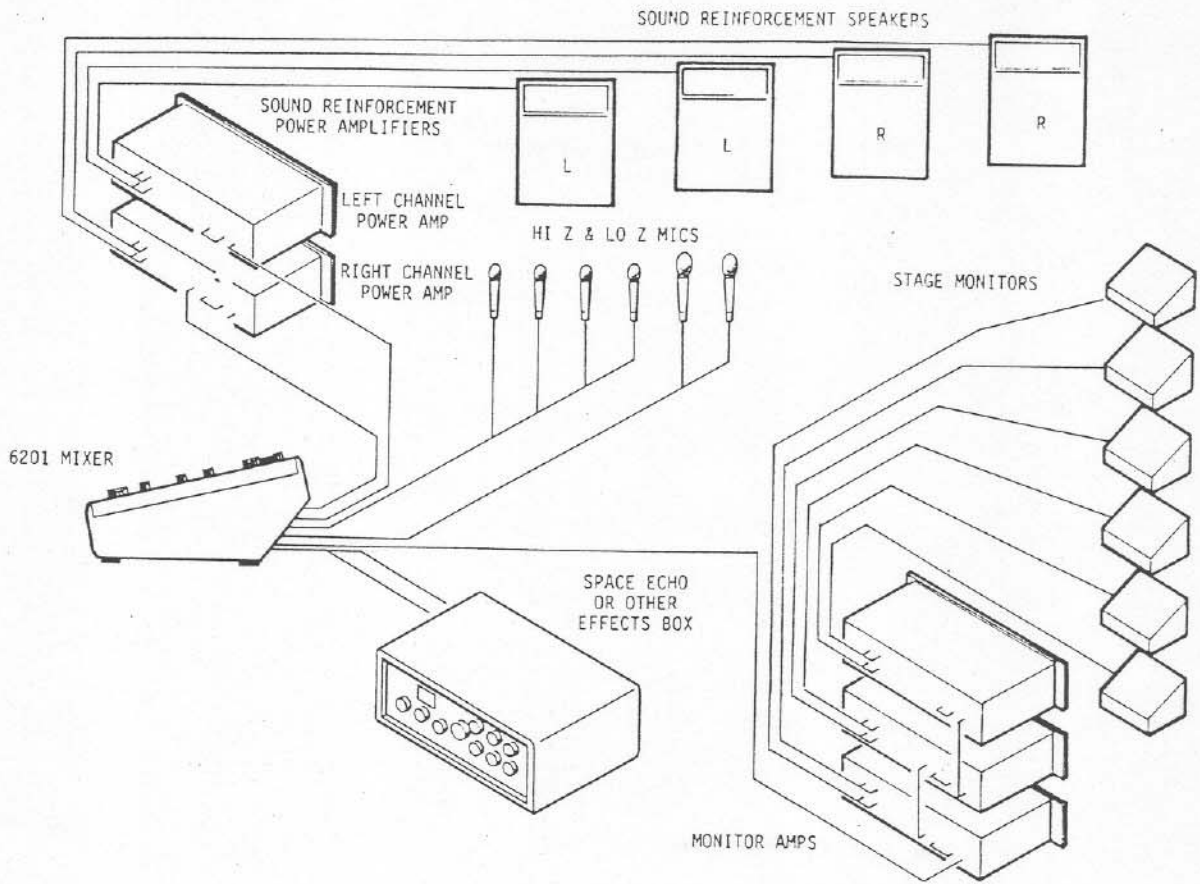


Figure 2. A professional sound reinforcement system.

TAPCO products are designed to keep any turn-on thump within very strict limits, or no thump at all—that's just a part of the way we do things. But we can't speak for anyone else—so play it safe.

CONSIDERATIONS ABOUT MIXING

As it is with any kind of machine or tool, the more knobs, levers, and switches, the greater the flexibility; the more things you can do with it. It's the same with mixers.

But (and that is a big but), when the method and the art is fully understood after practice and experience, the knobs, switches, and levers start to come off the equipment. The functions they performed become systems, often beautiful ways of doing things simply—at least as far as the person working the equipment is concerned.

That is what has happened with respect to volume controls and faders. Increasing the gain in one piece of equipment often also increases the noise level, too; so it becomes necessary to adjust the equipment for best level and lowest noise.

DIFFERENTIAL AutoPad®

Every manufacturer has made great strides in lowering noise levels. Nowadays you can't tell if the system is on until someone steps up to the mic and says something.

But until AutoPad® by TAPCO, and now differential AutoPad®, came along it was always one hand on the gain and one hand on the slider to most mixer-people. That meant some fast hand motion to adjust such other things as effects, monitor level, monitor send, reverb, and so on. That is unless you are a good mixer. Then you'd preset the gain based on what you knew was going to happen.

Your 6001R with differential AutoPad® is preferential treatment to your mixing problems, with one hand you are in control of the situation—for cleanest sound with lowest noise.

When super levels are needed, you can crank up the gain, a little at a time, and get the gain needed. The noise level raises slightly, but no one hears it because of the sound. And when quiet voicings are coming through, you can lower the noise level to bring out the subtle nuances that make for a "live" performance.

MIXING BASICS

Really good sound is the result of control. And the 6001R gives you the control you need, with solid, positive adjustments for money-making recording sessions and live performances. What follows here is sort of a TAPCO primer in the basics of mixing. Bear with us if the description gets too basic for you in spots; because it is the basics, it has to be basic. Hmmm...

INPUTS (see Figure 3, next page)

Each channel has two inputs, one Hi Z (high impedance) and one Lo Z (low impedance). The high impedance input jack will accept virtually all Hi Z mics with ¼-inch phone jack plugs.

The low impedance input jack is an XLR socket with a push-to-release latch. The socket will accept any Lo Z dynamic mic with a mic card terminated in an XLR connector, balanced, or unbalanced. Pin one is ground, pin two is the minus (low) side of the signal, and Pin three is the positive (high) side of the signal—the hot lead. If you insist on using the XLR setup unbalanced, pins 1 and 2 will be connected to

each other and to the shield or ground. But don't do it unless you have to. Your 6001R has real transformer-coupled low impedance inputs for a very good reason. When mic cables longer than 20 feet are needed, low impedance mic lines keep the signal up to optimum level. Your performers can run, slide, jump, and strut all over the stage tethered to that XLR input without picking up enough hum to bother with. A balanced line has the helpful tendency to cancel out stray hum fields—and some not so stray, what with all of the electronics on the stage nowadays. If you run across a performer with an unbalanced mic, he probably stays in one place during his act. That is, if high volume is needed and hum-producing gear is around. But with balanced mic input, no problem.

What happens if you have a Lo Z mic plugged in and you plug in a Hi Z mic? A set of contacts in the Hi Z mic jack disconnect the Lo Z input internally. Then the channel sees only the Hi Z mic input. To make the Lo Z mic live again, all you have to do is unplug the Hi Z mic. That is an example of what we meant when we said that some of the knobs, levers, and switches came off as the system was perfected. The mic input transformer changes the impedance of the Lo Z mic to the high impedance necessary to the rest of the circuit at that point. You don't have to worry about impedance transformers.*

And it's a good match—one that keeps you in master control. No gimmicks or hardware accessories needed—just another built-in feature courtesy of TAPCO designed to make your job easier. So if you want your Lo Z mics live, keep the Hi Z jacks empty—just a point of interest; in our 6201 stereo mixer the inputs are controlled by a mic/line switch. In your 6001R you can use the Hi Z and Low Z inputs for almost any level equipment, such as electric pianos (without preamps), acoustic piano pickups, synthesizers, electric pianos (preamplified), electric horn pickups, guitar pickups, violin pickups; in short, just about anything designed for electronic amplification by means of a transducer.

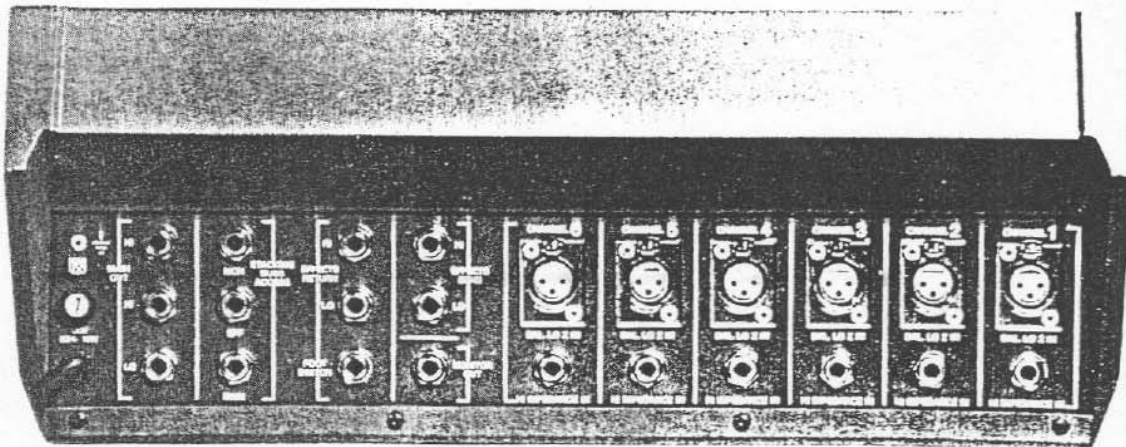


Figure 3. The 6001R Rear Panel

*Note: Piezoelectric pickups (Barcus Berry, Frap, etc.) will not work well. You should use the manufacturers recommended preamp between the pickup and the 6001R. The preamps do more than just bring the signal up to a useable level—they match impedances for optimum energy transfer.

MORE MIXING BASICS

The individual channel bass and treble controls add a tremendous flexibility to the 6001R's mixing capabilities. Plus and minus 18 dB boost and cut give you more than an adequate range of control to make everything sound just the way you want it to. In fact, if you find the end of the control before you reach the sound you want, it is very likely that something hooked up to mixer in that channel is screwed up. Check the mic, the placement of the mic, the effects box, the connections, and whatever else is in the channel.

It is generally accepted that any equipment used for professional sound work must have a wide frequency response that is also flat. Thus we are assured of high quality, real sounding reproduction. However, in live music PA systems it is often necessary to change or restrict the frequency response of one or more of the input channels in order to come up with good sound quality and balance.

In many respects, good sound quality is a very subjective thing. Someone with a "tin" ear won't be as critical. And the person with a trained ear may be bothered by small differences in what he or she perceives aurally. Most of the time, wide range response isn't necessary. A clean, frequency-restricted sound is preferable and to be sought after because of what follows in these pages.

One of the biggest problems in professional PA work is the prevention and elimination of feedback, that nails-on-the-blackboard screech and spaceship take off howl that really messes up the performance. Equalization can be used to create a "feedback safety margin" so you don't get feedback. It's done by eliminating all the unuseable parts of the audio spectrum, those that aren't really necessary to the clean sound you are after. Another way is to change the response of one or another part of the spectrum. Audible feedback actually begins long before that terrible howling sound steals the show. It's the more subtle effects of beginning feedback that can make the whole system sound bad, even though it may never break into a full howl. This slight ringing (sounds almost like really crummy reverb) becomes more and more of a problem as the number of microphones increases. Use your 6001R's input bass and treble controls to set up the frequency response of the mic inputs so only the really necessary information is amplified. An open mic on a stage full of loud music is kind of like a radio antenna in that the mic picks up a little of everything. The bass and treble controls can be used kind of like a tuner, to zero in on the sound you want. By carefully selecting your equalization you can eliminate feedback and get a cleaner overall sound at the acoustic power you want.

Cleaner overall sound—that's what we're all after. Wouldn't it be great if you could duplicate the perfect sound of the studio on stage? Very difficult proposition of course, but certainly an ideal worth working for. Two of the most noticeable qualities of good studio recordings are a definite lack of crosstalk, and a high degree of definition. Every sound source seems almost perfectly isolated, and perfectly clear. Crosstalk, sounds leaking in from outside the direct pickup pattern of a mic, can be reduced on stage with better mic placement and your 6001R's input controls.

Actually the problems of crosstalk and definition go hand in hand—you can't have a high degree of definition when there's too much leakage, the imagery suffers. But even when there is very little crosstalk,

definition can often be improved, especially when there are two instruments or voices that have similar qualities. For instance, two vocalists can become virtually indistinguishable if their different vocal qualities cannot somehow be made more obvious. This problem is compounded by crosstalk—if the electric guitars and bass are leaking all over the place the whole sound turns to mush. And you might as well ashcan your equipment and use just one mic. But that's not professional, is it? And not what you are getting paid for.

With careful mixing you can really clean up your act. First, get rid of as much extraneous noise and leakage as possible by good mic placement and judicious use of the bass and treble controls. With practiced, careful use of the controls on your 6001R, you can give each sound source its own little space in the total perspective.

RACK MOUNTING YOUR 6001R

As shipped, your new mixer has the rack mounting brackets stored in toward the center of the mixer. To put them in position to rack mount the mixer, remove the hex socket screws on the side of each bracket and lift the bracket away carefully. Turn the bracket, end for end, and reinstall the bracket using the mounting screws you just removed. The bracket should then appear as shown in Figure 4. We gave you hex-socket mounting screws intentionally. Brackets have been left in the rack when the mixer is removed because the person removes the wrong screws.

With a hex "Allen" wrench necessary, you won't be as likely to get to your mixing session without the brackets. You see, they also make very convenient carrying handles. The mixer is designed to fit neatly in a 12½" standard space in any standard 19" rack. The rear panel is angled upward when the mixer is in place, for convenient installation of your cables in the input and output jacks.

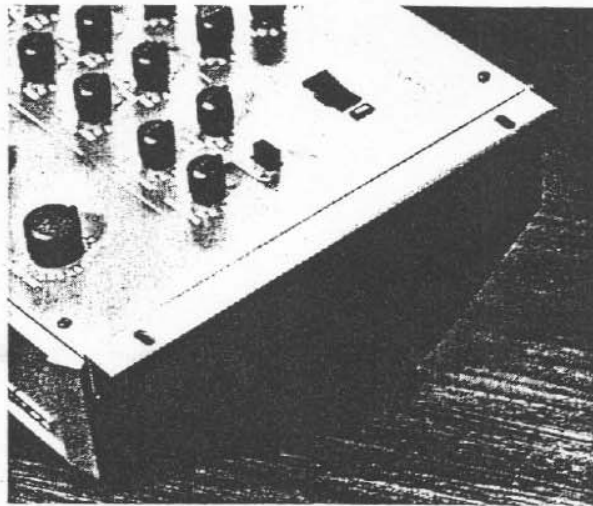


Figure 4. Bracket in position for a 19" rack installation.

6001R FUNCTIONAL DESCRIPTION

Your new 6001R mixer features pre-EVERYTHING monitor mix, lower noise, lower distortion, ramp on/off power supply, independent monitor mix, equal-gain signal path structure, in-phase inputs and outputs, transformer-coupled, balanced Lo Z XLR inputs, straightforward stacking system, and easy access and serviceability.

The reverb in your 6001R has been designed to give you real-room performance. Signal shaping techniques consistent with the equal-gain structure were used to give that live TAPCO reverb sound. Your 6001R has been designed around a reverb contour setting of 7, which is the optimum setting.

INPUT CHANNELS

All six input channels have high and low impedance microphone level inputs. The BAL. LO Z IN connections, as shown in Figure 3, are through XLR connectors to an impedance-matching transformer. The HI IMPEDANCE IN sensitivity is 18 dB below the low Z. When a HI Z mic is plugged in, the LO Z input is automatically disconnected by way of a switching phone jack. From the inputs the signal enters the differential AutoPad® preamp circuit, which is controlled by the CHANNEL GAIN pot.

The next stage is an active Baxandall tone control with BASS AND TREBLE controls. After that, the signal in the channel is routed directly to the main mix buss and also through the EFFECTS fader to the effects-mix buss. Consequently, the effects signal is post-channel gain and post-equalization. Monitor signal is pre-everything, traveling directly from the channel input through a gain stage and MONITOR pot to the monitor mix buss.

MONITOR MIX

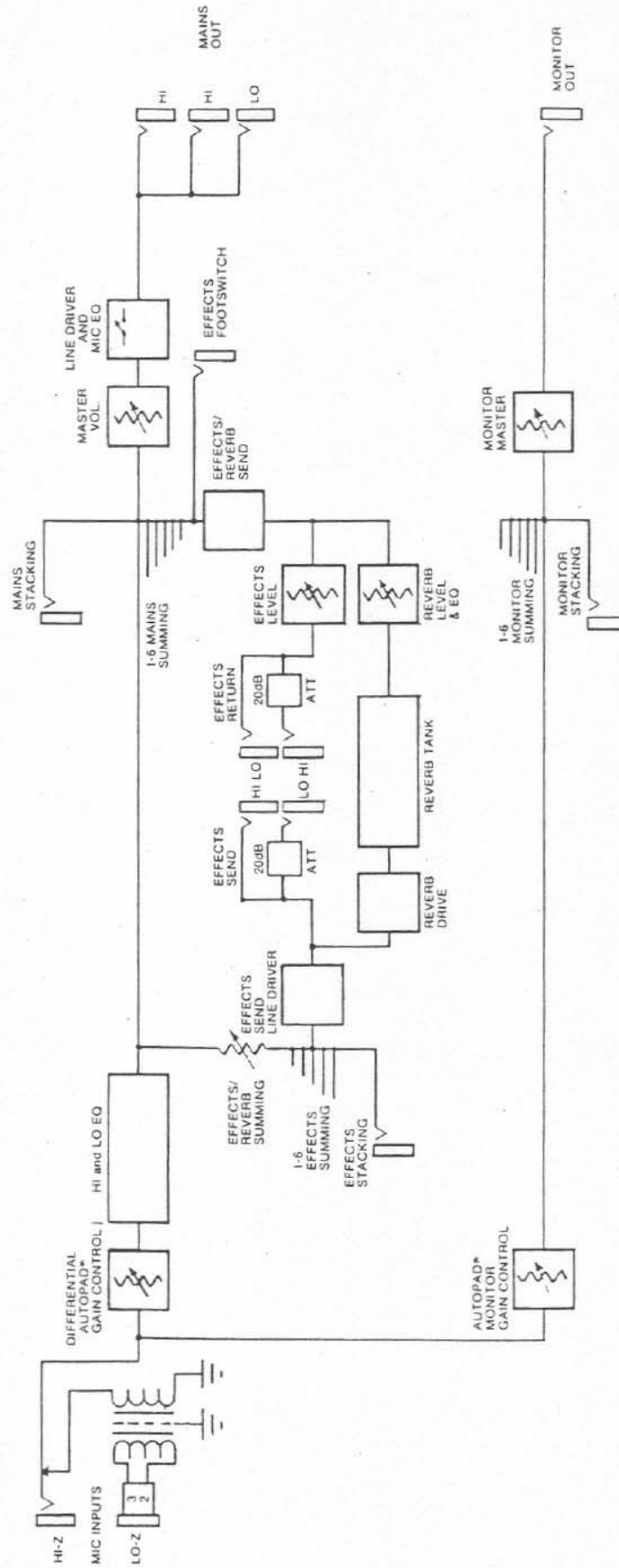
The six input channel monitor signals are summed along with the MON STACKING BUSS ACCESS input at the monitor mix buss. Then they are processed through the summing amp and directly to the MONITOR OUT jack. Overall monitor level is controlled by the MONITOR pot in the output section. The nature of the entire stacking system is discussed on the next page.

EFFECT MIX (EFFECTS Send and Internal Reverb)

From the input effects faders audio is summed and amplified on its way to the EFFECTS SEND HI and LO (down 20 dB) outputs. Just as in the monitor section, the EFF. STACKING BUSS ACCESS signal is summed along with the six effects inputs at the effects mix buss. Besides going to the effects outputs, the effects mix is routed to the internal reverb section whose delay mechanism is a dual-spring reverb tank especially modified to TAPCO standards. The amount of reverberant signal re-mixed onto the main buss is controlled by the REVERB LEVEL pot.

EFFECTS RETURN

Two inputs for external effects devices are provided on the rear panel of your 6001R. The EFFECTS RETURN HI input is for normal levels, while the LO input provides 20 dB of extra gain and is sensitive enough for electric guitars and bass effects boxes. What happens if you really aren't sure whether your effects is high level or low level? Be our guest and plug it into the EFFECTS RETURN LO jack. If it sounds awful (unless the effect is meant to sound awful) plug it into the EFFECTS RETURN HI jack. If it doesn't sound right then, check the effects



6001R BLOCK DIAGRAM

box—what more can we say? Both inputs may be used simultaneously; they are controlled by the EFFECTS RETURN pot, which adjusts the level for both. Relative balance can be achieved by output level control at the effects boxes. After this gain control the effects returns are mixed with the internal reverb signal and fed to the main mix buss. The combined effects mix can be removed from the main buss through the use of a grounding switch plugged into the FOOT SWITCH input jack. Use shielded cable.

MAIN MIX

The effects mix, MAIN STACKING BUSS ACCESS signal, and the audio from all six input channels are summed at the main mix buss. An AutoPad® stage controls the overall output level via the MASTER GAIN pot, and a line driver amp gives added drive capability. A MIC EQ switch is also provided for a high-end boost, if desired. There are two MAIN OUT HI outputs and a MAIN OUT LO output, which is down 20 dB.

STACKING SYSTEM—OR ADDING CHANNELS

You can increase the number of channels for your mix simply by connecting another mixer to your 6001R. The three STACKING BUSS ACCESS jacks allow two six-channel mixers to be connected together. One mixer should be designated the "master" and the other the "sub" mixer. Then connect the three principal outputs of the "sub" mixer (MAIN OUT HI, EFFECTS SEND HI, and MONITOR OUT) to the corresponding STACKING BUSS ACCESS inputs on the "master" mixer. The "master" outputs now become the principal outputs of the combined 12-channel system.

If you now set all the master gain controls on the output sections of both mixers to mid-position, the gains through all busses will be normalized so that all 12 channels have the same gain structures with respect to the system outputs. Now, the MASTER GAIN control, MONITOR master control, and the MIC EQ switch on the "master" output section will control all 12 channels, and the two units will behave just like a single 12-channel mixer. The output section of the "sub" mixer will control only the six "sub" channels, and may be used to trim the "sub" output levels when you so desire it. Outputs of effects boxes should be applied to one of the effects return inputs of the "master" mixer if your mix is somewhat normal. If your mix isn't normal or fairly straightforward, we expect that you will know what you are doing.

COMPATIBILITY WITH OTHER MIXERS

The 6001R is fully compatible with another 6001R. Of course—that is what it was designed for, in part. And as you might expect, any TAPCO mixer can be stacked to a 6001R. Of course that does not apply to a lone 6001EA Expander because it is designed to be powered from a 6100RA Sound Reinforcement Mixing System. You can stack a 6100RA/6100EA combination, however. (Let's see, that's 6 channels plus 6 channels, plus 8 channels...hmmmm...). The 6100EA/6100RB combination can also be stacked, because your 6100R has both kinds of connector input.

With the ability to add other mixers, you can add more effects, or more monitors, or increased channel capability for whatever you are into at the time. What about running your brand "X" mixer with a 6100R? Frankly, we haven't tried all of them. But audio is audio, so there should be no problem. If you do have a problem, we would like to hear about it. Perhaps we can help. No matter how well something is designed, someone will surely find a way to mess it up. It's Murphy's Law, which states in part; "The more you try to do things right, the better the chance for error."

MIXER INPUT CONSIDERATIONS

Hi Z MICROPHONE INPUT - Six $\frac{1}{4}$ " phone jacks are provided on the rear panel, one for each channel. They will accept any dynamic Hi Z mic terminated in a standard $\frac{1}{4}$ " phone plug. These jacks are switching jacks. If a Lo Z mic is plugged into the XLR jack, the act of plugging in a Hi Z mic will internally disconnect the Lo Z mic. To restore the channel to Lo Z mic operation, all you have to do is unplug the Hi Z mic. That's our "priority override." **Lo Z MICROPHONE INPUT** - Six XLR jacks are provided, one for each channel. They will accept virtually any low-impedance microphone. And because real transformers are used in the 6001R, the impedance match is a good one. The jacks are Switchcraft female DF3 latching jacks. Just push any standard XLR male mic connector into the jack until it clicks in place. To remove the mic, grasp the connector, depress the "PUSH" plate with your thumb, and pull out the plug.

BALANCED vs. UNBALANCED INPUT - Hi Z mics are generally unbalanced. That doesn't mean they are irrational, only that one side of the two-conductor cable is grounded at the jack. They are susceptible to hum pickup because both conductors carry the audio. An AC line running parallel to the mic cable induces a current in the mic cable's shield, which means that the voltage developed across the shield is mixed in with the audio. Because the frequency of the AC line is 60 Hz, you get HUMMMM in the audio. If you can't move the lines, at least place the mic cables and AC lines so they cross each other at right angles. That will cut the hum somewhat. Another thing: Hi Z unbalanced mics are good up to 20 to 30 feet from the jack. Past that point the highs tend to roll off because of the shunt capacitance of the cable. It's the same effect as using too long a cord with a guitar. Balanced input is better for most pro sound reinforcement. The shunt capacitance of the cable is the same, but because the mic impedance is often 1/200th of Hi Z impedance, you can have 200 times as long a mic cable before the highs start to roll off. The added benefit of a balanced line is, any AC hum voltages are canceled out at the transformer because they arrive out of phase. Though you can run a Lo Z mic unbalanced, three conductors are preferred. One signal lead goes to pin 3 in the jack and is electrically positive, or "high." The other signal lead goes to pin 2 and is electrically negative, or "low." And of course the shield is connected to ground. The signal path floats above ground, so that any noise induced in the shield is drained completely to ground, and it doesn't get mixed, appreciably, in with the audio. With good connections and balanced input, and proper routing of the cables (no AC lines with the mic cables), you probably will have to look elsewhere than in the mic input for hum problem answers.

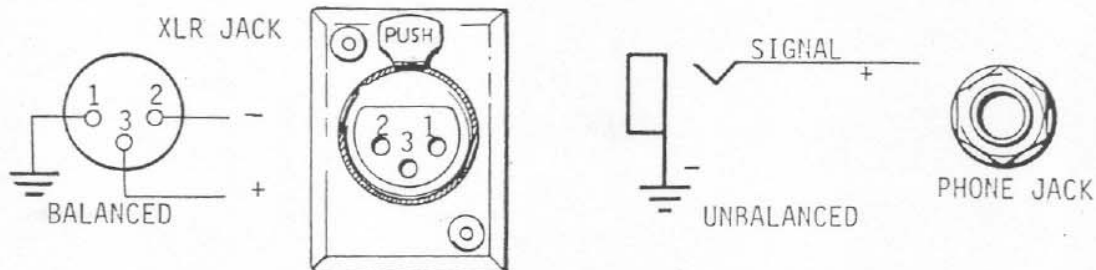


Figure 5. Input jacks and their schematic equivalents.

6001R SPECIFICATIONS

Frequency Response (Lo Z mics to Main Output) (Lo Z mics to Main Output)	20Hz to 20kHz, +0, -1dB
THD (Lo Z mics to Main Output 0dBm out @ 1kHz)	.05%
Equivalent Noise Input (Mic input to Line output 150 Ohm source, Avg +40dB)	-128dBV = 100dB s/n @ 20Hz to 20kHz (Main Out)
Maximum Input Level	+2dBm @ 1 kHz
Maximum Output Level	+18dBm into 600 Ohms @ 20Hz to 20kHz (Main Out)
Input Gain Attenuation	40dB
Microphone Equalization	+9dB @ 20kHz (Switchable)
Bass/Treble Equalization (Active Baxandall)	\pm 18dB @ 500Hz and 1kHz Shelving
Differential AutoPad [®]	All mic inputs
Hi Z Input Sensitivity (Compared to Lo Z Sens)	18dB down

RELATIVE MIXER LEVELS:

Effects Send Lo is down 20dB from Effects Send Hi.

Reverb Contour is fixed: For those familiar with TAPCO mixers, the relative setting is about 7.

Effects Return Lo provides an extra 20 dB gain compared to Effects Return Hi. The Lo input is sensitive enough for electric guitars and bass guitars.

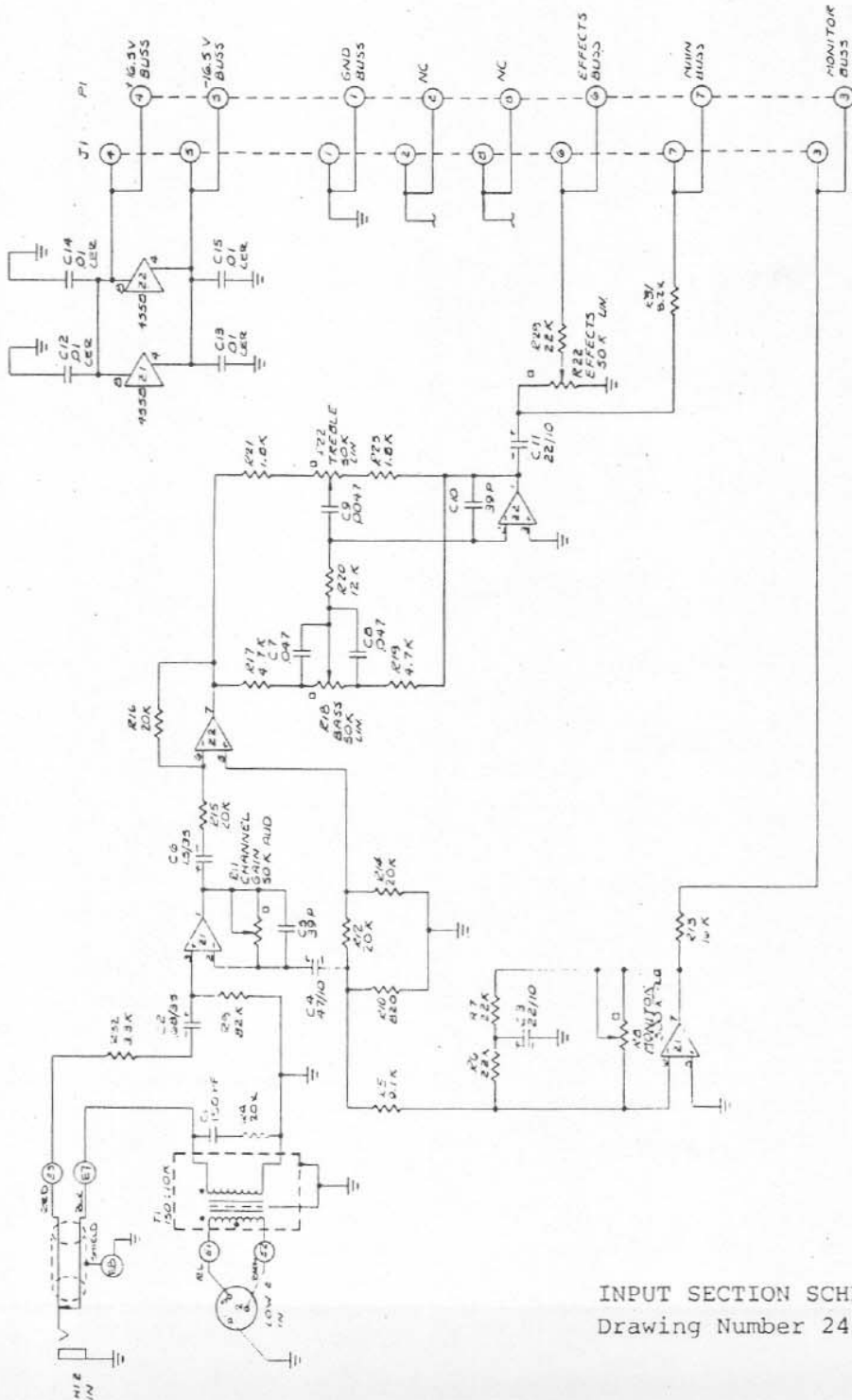
Main Out Lo is 20 dB down from Main Out Hi.

Effects On/Off Footswitch must be a grounding switch, and shielded for reduced hum pickup.

AutoPad[®] Master Gain

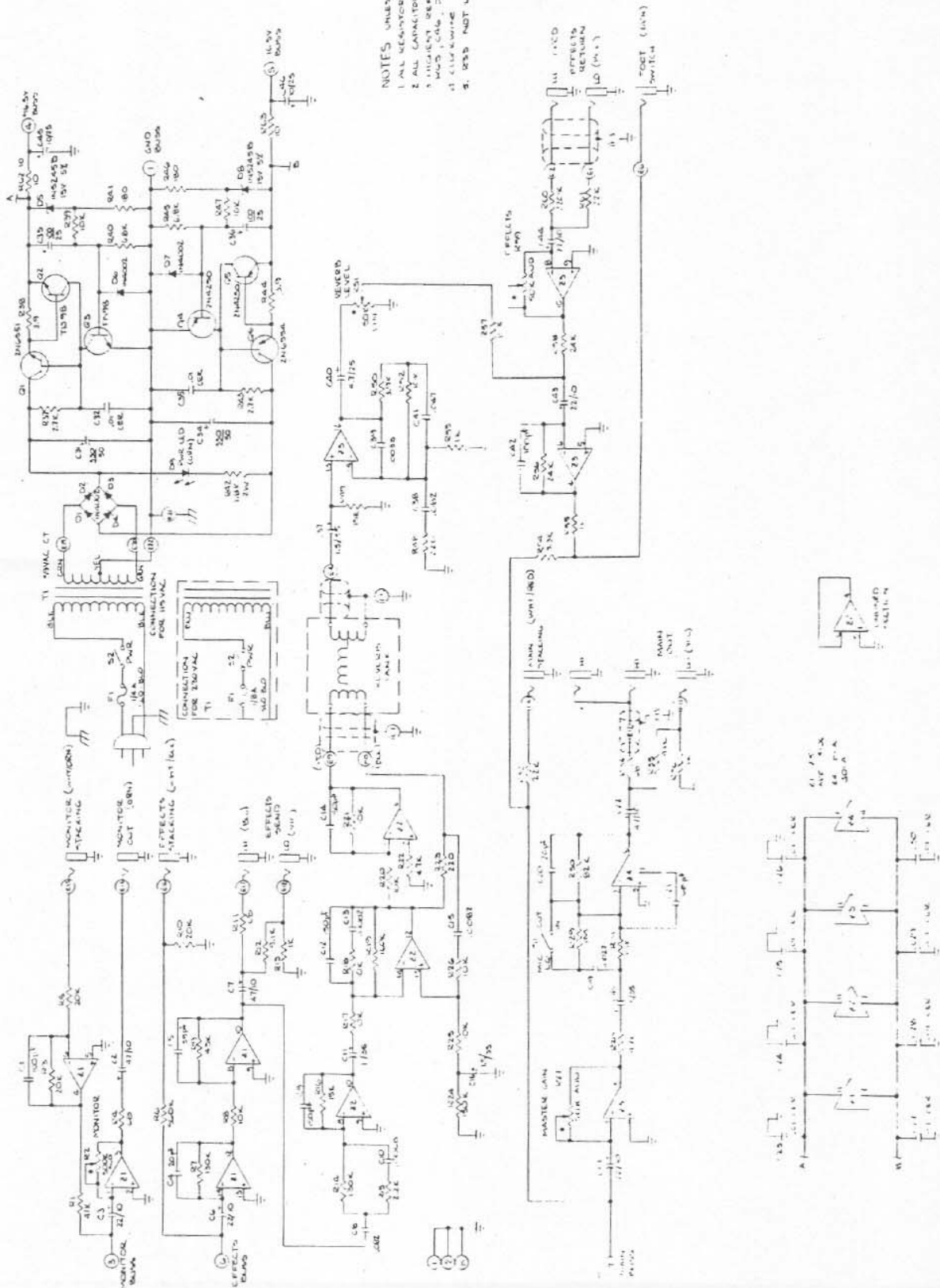
Height, Width, Depth: 7" High x 17½" Wide x 12-3/8" (On Desk)

Top Panel (for rack mtg.): 12-1/4" High x 19" EIA Std.



- NOTES:
1. UNLESS OTHERWISE NOTED RESISTORS ARE 1/4 W, 5% CARBON FILM. ALL RESISTANCE VALUES ARE IN OHMS.
 2. UNLESS OTHERWISE NOTED ALL CAP VALUES ARE IN MICROFARADS. LAST REF DES USED: R32 C15, 22, J0, EB, F1.
 3. CLEVERLINE LOT ROTATION IS INDICATED BY SYMBOL 0
 4. U14, U5, U7 TO NOT USED

INPUT SECTION SCHEMATIC - 6001R
Drawing Number 24287 Revision A



NOTES UNLESS OTHERWISE SPECIFIED:
 1. ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
 2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
 3. HIGHEST RESONANCE DESIGNATOR JARD
 4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 5. RES NOT USED

POWER SUPPLY AND OUTPUT SECTION SCHEMATIC - 600IR
 Drawing Number 24289 Revision New