

TASCAM

M-500 SERIES
MIXING CONSOLES



WE KNOW YOU

TASCAM equipment is made to serve the person we know best—the hardworking production professionals. We've gotten to know you by making equipment you respected for over a decade. You'll find that the M-500 Series mixers represent a significant breakthrough in the packaging of the capabilities you told us you need—speed, flexibility and dependability, all designed into a simple, uncluttered layout.

Each M-500 console actually consists of several independent, well-integrated mixing sub-systems on a simple chassis. Whatever the job at hand, your M-500 console lets you do it quickly and easily.

The 500 Series' features make them ideal for an incredible variety of applications. They are the astute professional's choice in the recording studio, the video production and post-production house, the industrial or corporate media department, the remote production van; in radio production, where our excellent RF immunity is imperative, in TV or film assembly, where our multiple submixes, powerful EQ control and rapid signal re-routing all facilitate speed in building multiple takes or in sweetening. In the studio, the editing room, or the sweetening room, the M-500's are right at home—designed from an understanding of the job.

Mixing engineers are people who understand that they are dealing with an electronic signal, and that access to that signal is what they most require. The challenge of designing circuits to maximize signal access and the ease with which it may be accomplished is what faces today's console builders. While some manufacturers have taken the approach of adding a front panel patch bay,

we at TASCAM have elected to design the M-500 Series mixers with even greater convenience, in the form of numerous top panel signal-routing switches—switches with names like PRE/POST/TAPE, MIC/INST/TAPE, MIC/LINE/TAPE. In most cases, these switches eliminate the need for moving patch cables at all. Each channel can take balanced mic/line, tape inputs (which can be selected to feed INPUT, AUX., or MONITOR). For convenience, the first two channels will accept INSTRUMENT inputs and the second two have PHONO inputs. Channels 5 and above accept unbalanced line inputs. You can select mic, line, tape, or instrument inputs. You can route any of three different sources on the board's 12 or 20 input channels to any of eight main program busses. You can do up to four different mono auxiliary mixes and you can select the Aux input sources independently of the PGM mix input sources. These auxiliary submixes can be assigned and re-routed from the top panel to do more than one task—to create four mono mixes, stereo mixes, or one stereo and two mono mixes for cueing, effects, remote feeds, or whatever you wish. You can monitor buss or tape. You can feed the Aux (1 through 4) systems with pre-fader or post-fader channel input signals, or with signal returning from a tape machine. And you can do all of this with the flick of a switch—saving you time and effort, and adding to the ease of your mix. No other console anywhere near the M-500 Series price range offers this kind of flexibility.

Compare block diagrams—you'll find more signal access points in the M-500's.

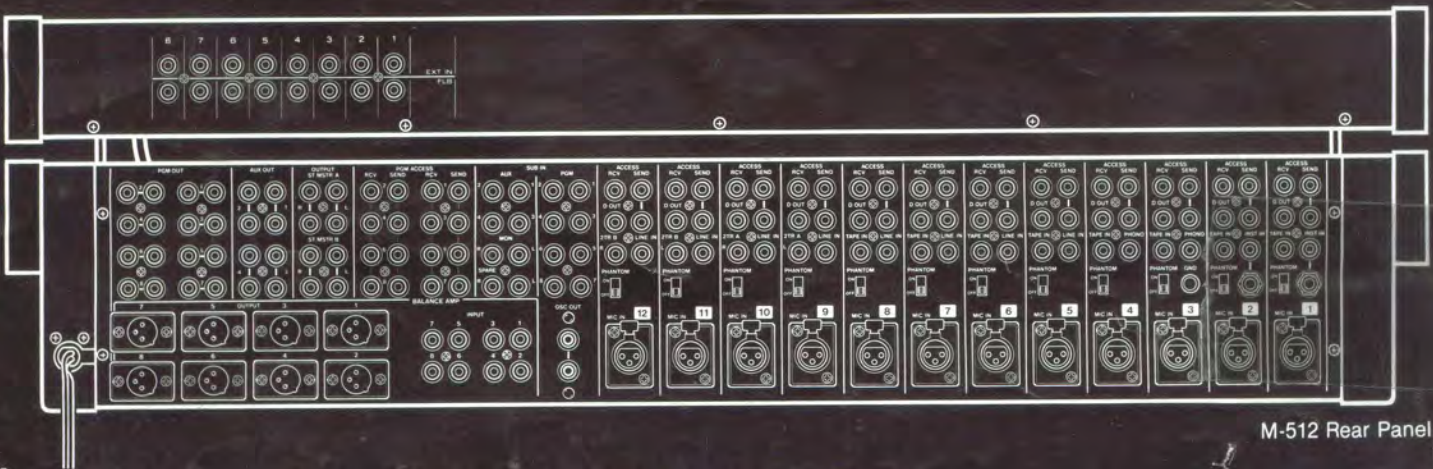
The M-512 and M-520 are nearly identical in operation. The major difference is that the M-512 has 12

input channels and an 8-track monitor section, while the M-520 has 20 inputs and a 16-track monitor section, and buss-out provisions for 16 tracks. They both include a separate monitor section that lets you blend the 8 or 16 multitrack tape inputs and/or the 8 program busses into a stereo mix.

COMPATIBLE WITH ALL STUDIO EQUIPMENT

The M-500 Series consoles are compatible with all modern systems. The majority of today's recording equipment is designed to operate at either +4 dBm nominal input level or -10 dBV nominal level, so the M-500 consoles are built to accommodate either level. In addition to the usual unbalanced connections, our M-512 and M-520 come equipped with eight balanced outputs; This approach lets you use the M-500's as either balanced or unbalanced consoles (or both, simultaneously).

The M-512 and M-520 are equipped with the necessary features for all production modes—record, overdub, remix, or assembly. These are truly multi-purpose audio mixing consoles, designed to function as multiple, independent primary mixing systems. We feel that in the M-500 Series mixers, we have introduced a design philosophy which is sure to begin a new direction in audio console engineering. Never before have so many important features and capabilities been incorporated in such a flexible, convenient package.



M-512 Rear Panel



12 OR 20 INPUT CHANNELS, EACH LOADED WITH FEATURES

- 3 Connectors per input channel (balanced MIC/LINE, unbalanced TAPE, and unbalanced PHONO, INSTRUMENT or LINE input)
- Electronically balanced XLRs for mic or line level input with switchable phantom power
- 2 Channels with built-in "direct boxes" for instrument inputs
- 2 channels with RIAA phono inputs
- Direct output, cue output and access (send/receive) patch points on each input channel
- 3-band sweep frequency parametric-type EQ, with switchable bypass
- Two sets of stereo tape returns to the monitor avoid the need to re-patch when remixing or playing stereo master tapes

WORK FASTER WITH MULTIPLE SUB-MIX SYSTEMS

- 8 main program mixing busses, each with a buss master control and access patch points, for 1-take

8-track recordings; direct channel outputs permit up to 12 discrete tracks (M-512) or 20 tracks (M-520) to be recorded at once

- 4 auxiliary mono mixing systems can be used for performer cues, effects sends, stage monitor (fold-back) sends, broadcast feeds, reference recording mixes, etc.
- Large, illuminated VU meters (with LED peak indicators) display the levels of the 8 program busses, 4 Aux outputs and 2 Master stereo outputs. Meter switching (in groups of 4) allows you to monitor externally patched signals.
- 16 (M-520)/8 (M-512) groups of stereo monitor mix controls; for convenient, independent 16/8 input monitor mix

BROAD COMPATIBILITY

- Input channels have switchable 30 dB pads, plus independent mic and line/tape gain trim controls, so they can accommodate any input from low output mics to high level lines (we provide a 90 dB sensitivity adjustment range)

- 8 electronically balanced XLR output circuits, internally switchable for +4 or +8 dBm nominal level, for compatibility with low-sensitivity systems or for driving very long audio lines

SOPHISTICATED SOLO SYSTEM

- Stereo "in place" solo permits the monitoring of individual or groups of inputs during a mix without affecting the main program busses
- PFL (Pre-Fader Listen) permits preview and trim adjustment, if necessary, before opening the fader

EASY TO INSTALL AND MAINTAIN

- No hidden costs: pre-wired rear panel connectors permit your mixer to be up and running the day it arrives
- Internally modular plug-in construction, replaceable faders, and complete product documentation aid rapid in-field serviceability

WHY WE USE TRANSFORMERLESS, DIFFERENTIAL AMPLIFIER INPUTS

These days, everybody is talking about the "active" input stage. Transformers have been used to achieve studio interfaces for decades, but there have always been drawbacks to this method of circuit coupling. Since transformers are "passive" devices, all the energy involved in the interface has to come from the source of the signal, which makes load calculations mandatory.

TASCAM uses an input amplifier in the M-500 series mixers that previously was available only to the laboratory technician—the transformerless balanced differential amplifier combines discrete circuitry and IC technology. This input design is inherently capable of delivering wider bandwidth and better transient response than typical transformer coupled designs. These benefits don't disappear when the signal level or source impedance changes. With M-500 series mixers, you get the same superb signal quality at any setting of PAD or TRIM, and the input circuit is much less sensitive to cable length and source impedance.

MIC inputs are balanced low impedance XLR connectors, with 48 volt phantom power. Balanced LINE level sources can be connected to the same XLR inputs by using the attenuation pad plus gain trim

A MODULAR DESIGN WITHOUT THE USUAL COST PENALTY

TASCAM engineers avoided much of the added cost of a modular console, and actually strengthened the M-500 consoles, by simplifying their mechanical design. Instead of building a separate card frame and mainframe slot for each channel, our engineers grouped the channels so that 4 at a time withdraw from the front panel. Electronic flexibility and serviceability are maintained because, internally, each channel and output section is on its own plug-in circuit board. This approach reduced the weight and cost of the mainframe, and lowered the cost of mechanical packaging per channel. The faders are mounted independently of the circuit boards and are secured by just two screws so they are readily replaceable in the field. They are also designed with standard spacing so they can be replaced with other common brands if you insist on a favorite. As always, we use a sturdy steel frame and the large panels serve as diagonal braces so the console is stronger than if each channel pulled out individually from the front.



*INPUT SELECTOR

Channels 1 & 2, MIC/INST/TAPE
Channels 3 & 4, MIC/PHONO/TAPE
Last 4 channels, MIC/LINE/2TR A-B
All other channels, MIC/LINE/TAPE

THE INPUT SECTION

MIC ATT—30,0:

Switches in a 30 dB pad so that very "hot" mics and line level sources do not overload the preamp.

PHASE—REVERSE, NORMAL:

Reverses the polarity of the XLR input connector so you don't have to rewire a cable or use an adaptor when the source is "out of phase."

INPUT—

Channels 1 & 2, MIC/INST/TAPE
Channels 3 & 4, MIC/PHONO/TAPE
Last 4 channels, MIC/LINE/2TR A-B
All other channels, MIC/LINE/TAPE:

MIC refers to the XLR input on each channel, and is a balanced Mic/Line input. INSTRUMENT is an unbalanced instrument input (built-in direct box). PHONO is an RIAA phonograph input. LINE, TAPE, and 2TR A-B are unbalanced line level inputs.

TRIM—MIC, TAPE:

These two concentric controls independently set the gain of the XLR input (for mic or line level sources) and of the selected TAPE, INST, PHONO or LINE input. The channel fader then does not need readjustment when changing sources.

OVERLOAD LED:

The overload LED turns on just before the post-preamp peak signal level becomes high enough to cause distortion; aids in optimum setting of the TRIM controls.

AUX 1, 2, 3, 4—

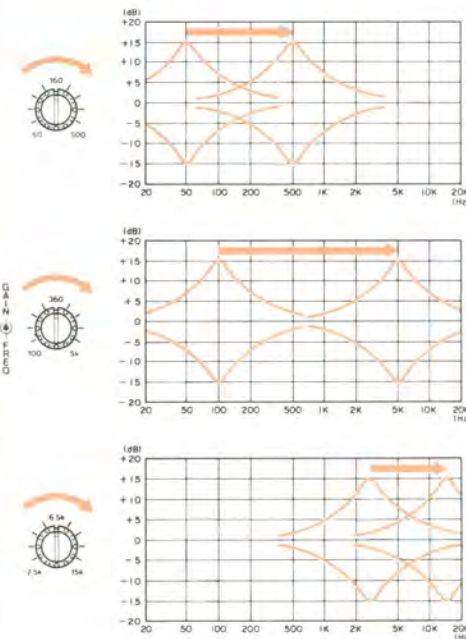
Last 4 channels, PRE/POST/LINE
All other channels, PRE/POST/TAPE:

The inputs to the 4 auxiliary (mono) submixing systems may be selected and muted in pairs. PRE position is used to create a cue mix or effects send mix that does not vary when the fader is operated. POST position is used to create a rough monitor mix for the engineer or effects send which does track the fader. TAPE position is used to create a cue mix from the tape machine's output (which includes the previously recorded and current "live" mics) for use during overdub-

bing. TAPE also may be used to derive effects sends from previously recorded tracks. LINE can be used for effects sends from line level sources, or to "loop" an effect returned to the channel into another signal processor.

EQUALIZER—GAIN/FREQ:

The three EQ bands each have concentric GAIN and frequency (FREQ) knobs. The frequency bands overlap for full coverage of the audio spectrum. Center frequencies may be swept from 50 Hz to 500 Hz, 100 Hz to 5 kHz, and 2.5 kHz to 15 kHz. The GAIN controls provide 15 dB of boost or cut at the selected center frequency. Because the center frequencies are sweepable, precise "pinpoint" corrections of the sound can be made using a minimum of boost or cut. This differs from fixed-frequency EQ, which often requires excessive boost or cut at the nearest available (but possibly incorrect) center frequency in order to have sufficient effect on the desired frequency.



ON switches the channel equalizer into the signal path and lights up the adjacent LED. This is useful for "A-B" comparisons of the EQ'd and "dry" sound. When off, the circuit is bypassed.

ASSIGN—1, 2, 3, 4, 5, 6, 7, 8:

Pressing these buttons assigns the post-fader, post-EQ signal to the respectively numbered program

mixing busses. To provide for stereo signal assignment, if any combination of odd and even numbered busses is selected, the PAN pot then sets the balance between them.

CHANNEL ON:

Pressing this button opens (turns on) the channel's contribution to all 8 program mixing busses, regardless of ASSIGN switch positions. It also turns on the post fader signal to the AUX systems. The LED above the ON switch is lighted when the channel is open.

SOLO:

Pressing this button mutes the stereo MASTER A signal (applied to the control room monitor output), and permits the engineer to hear only the channel or channels whose SOLO buttons are depressed. The LED above the button lights to indicate that the channel is "soloed." This is a stereo solo, so the signal is heard in the position set by the PAN pot. Since SOLO does not affect the Buss or Aux outputs, it is useful for identifying an input, critical adjustment of the signal's placement in the stereo perspective, of the EQ or fader levels, or troubleshooting a bad mic, etc., during the session.

PFL:

Pre Fader Listen is similar to the SOLO function, except that a mono signal is derived ahead of the channel fader and PAN pot. The "SOLO" LED is on when PFL is selected.

PAN—ODD, EVEN:

This pot pans the channel's output between any assigned odd numbered (Left) and even numbered (Right) mixing busses.

FADER:

Smooth, noise-free 100mm fader adjusts the level of the signal selected by the INPUT switch. Field-replaceable with P & G fader.

THE MONITOR SECTION

MONITOR 1-8 (M-512) OR 1-16 (M-520):

A group of monitor mix controls is provided for each of the multitrack tape inputs; each group consists of a MON switch, a LEVEL control and a PAN pot. Together, these monitor circuits permit a stereo mix to be derived from the 8 program busses, from an 8 (or 16) track tape machine's output, or from a combination thereof. This section can produce a cue mix for overdubbing, or a reference mix for the engineer.

MONITOR—MONO & LED:

This switch combines the Left and Right sides of the stereo monitor signal so that monaural compatibility can be verified (i.e., phase cancellations can be detected before they cause record cutting or broadcast problems). The LED turns on to indicate when the monitor is in "mono" mode.

MONITOR SELECT MATRIX:

These pushbuttons select the signal which actually feeds the three monitor system outputs (i.e., Stereo Master A & B Out, and the Headphone Out). MON derives signal from the mix created by the MONITOR GAIN and PAN controls. SPARE selects signal from a pair of rear-panel, external input connectors. 2TR A and 2TR B select stereo tape returns from the correspondingly labeled jacks on the last four input channels. AUX 1/2 and 3/4 select the respective AUX buss output signals. One, two, three or all of these MONITOR SELECT buttons may be engaged at the same time to monitor multiple signal sources.

STEREO MASTER A & B:

Each of these faders adjusts the level of the respective Stereo Master output jacks, deriving signal from the MONITOR SELECT switches. The only difference between 'A' and 'B' is the way the solo and talkback signals are treated.

The 'A' output is intended for control room monitoring, so both SOLO and PFL signals feed this output, but not the 'B' output, which is intended for studio monitoring. The

Talkback mic therefore feeds the 'B' output, while the 'A' output is automatically muted to avoid feedback. The 'B' output is useable as a broadcast clean feed or a master stereo record output.

HEADPHONES:

The HEADPHONES control adjusts the signal level at the adjacent stereo phone jack. The signal is the same as that fed to the Stereo Master A output; however, it is subject only to the HEADPHONES control and not to the Master fader. This jack is convenient when mixing in the presence of performers (without acoustic isolation), or when a monitor speaker system is unavailable. Any 8 ohm or higher impedance stereo headphones may be utilized.

SOLO:

This is a master level control for the solo and PFL signals applied to the monitor system. It permits the solo volume to be balanced to match the normal monitor mix (unless, of course, you prefer a distinct level change).

The SOLO light is located on the upper right portion of the panel. As a further reminder that normal control room/headphone monitoring is temporarily interrupted, the light is on whenever any SOLO or PFL button is engaged.

THE BUSS MASTER SECTION

AUX 1, 2, 3, & 4 MASTER FADERS:

You can use these four master faders to set the level of their respective Aux outputs. Thus, depending on how you are using the Aux systems, these can be output masters for cueing, effects sends, clean feeds, and so forth.



BUSS MASTER (GROUP) FADERS:

You can adjust the output levels of the program mixing busses with these 100 mm faders. Field-replaceable with P & G faders.

METER SELECT SWITCHES & LEDS—INT/EXT, 1-4 & 5-8:

You can press either of these switches so the corresponding group of 4 meters displays either an external signal (patched into one of 8 rear panel jacks) or the meter's "normal" internal signal. ("Normal" internal signals may be either the program buss level or, with the M-512's last 4 channels, the Aux or Stereo Master level if that has been selected with the AUX/BUSS/ST MASTER Meter Select Switch.)

When you select EXT position, an adjacent LED turns on so you know you are monitoring external signals. Foldback jacks on the meter inputs allow you to continue the external signal path without interruption, and without "Y" adaptors.

You can use EXT position to monitor tape machine returns, effects sends and/or returns, remotes, etc., all at the push of a button.

THE TALKBACK SYSTEM

TEST TONE— 40 Hz, 1 kHz, 10 kHz:

Use this switch to set the frequency of the built-in test oscillator. You can use 1 kHz for general level calibration and troubleshooting; both 1 kHz and 10 kHz are helpful in checking tape machine alignment. 40 Hz is primarily useful for a slate tone to mark edit points on a tape so you can hear them clearly during high-speed winding.

SLATE, OFF, TEST TONE:

Use this switch to assign the slate and test tone oscillator as follows: SLATE position assigns the talkback mic signal to the SLATE/TEST TONE assign switches (where it can be assigned to various mixing busses). TEST TONE position applies the test oscillator signal to the

SLATE/TEST TONE assign switches and the OSC OUT jacks.

SLATE/TEST TONE—BUSS, AUX 1/2, AUX 3/4:

You can use these switches to assign the slate tone (test tone) or vocal slate signal (from the talkback mic) to any of three locations: BUSS applies signal to the 8 program buss outputs (for labeling a tape, calibrating level or laying down cue tones). AUX 1/2 and AUX 3/4, apply signal to their outputs (for calibration, testing, etc.).

SLATE VOLUME:

Slate adjusts the signal level applied from the talkback mic to the 8 program busses and the 4 Aux busses.

T/B (TALKBACK) VOLUME:

T/B adjusts the signal level applied from the talkback mic to the studio monitors (i.e., to the Stereo Master B output) when the T/B switch is depressed.

MULTIPLE-OUTPUT POWER SUPPLIES

The M-500 Series consoles are each equipped with two different bipolar power supplies. Bipolar supplies, in general, lend themselves to lower noise and lower distortion than single-ended supplies, and are particular valuable in providing the M-500 high immunity to RFI. In this case, the 15 volt "rails" (busses) power the input, summing, and output amplifiers as well as the equalization. Many bipolar-supplied consoles have only 15 volt rails. We added separate higher voltage rails strictly for the balanced outputs. They let the consoles deliver a solid +28 dBm output, without the interaction that might otherwise cause "motorboating," oscillation or distortion if the balanced outputs shared the same supply as the other amplifiers in the console. The consoles also have separate power supply outputs for the logic, lamps and phantom power.

A FLEXIBLE MIXING SYSTEM YOU WON'T SOON OUTGROW

When you purchase a mixing console, you're making a commitment of time as well as money. Time spent learning how it works, connecting it to your other equipment, and becoming proficient in its use. It's comforting to know that when you've selected an M-500 Series console, you won't soon outgrow it. The M-512 and M-520 will never force you to buy a larger, far more costly console when all you need is one more mix. When you need another cue mix, effects mix, and so forth, the console's cue and direct output jacks can be patched into as many outboard mixers as you wish, such as our M-1B, a compact 8×2 line mixer. If you need to accommodate a few more input sources, patch in our MX-80 (a compact 8×2 mic/line mixer). If you need to see the level of more circuits simultaneously, plug in our meter bridge MU-40. If you want the jack points at a more convenient location, add one or more of our PB-32 or PB-64 Patch bays. Need EQ that goes beyond the sweep EQ on each channel?

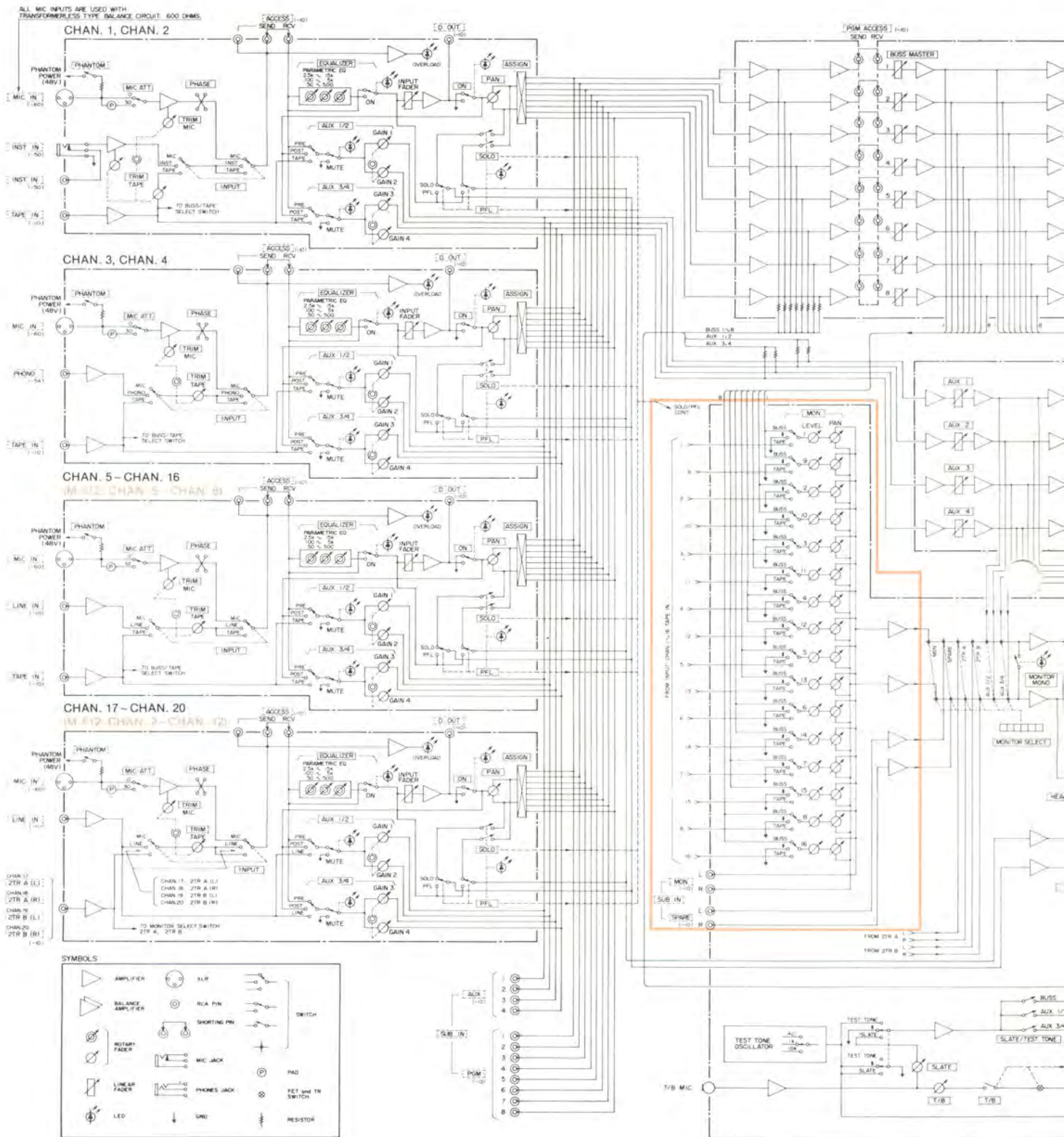
Try our PE-40 4-section, 4-band full parametric with adjustable 'Q,' frequency and gain. Need a good stereo reverb, or effects unit... we make a variety of signal processing equipment.

Add-on equipment definitely has its place, but suppose you're looking at major growth. The M-500 Series consoles are designed so that two or more can be "cascaded" with a handful of standard cables. Buss inputs and a solo logic interconnect let you configure a larger full-function mixing system with no loss of quality, and no loss of input channels. One of the advantages to this approach is that when you don't need all the inputs at once, you can split the "big console" into two smaller consoles and have two independent mixing systems.

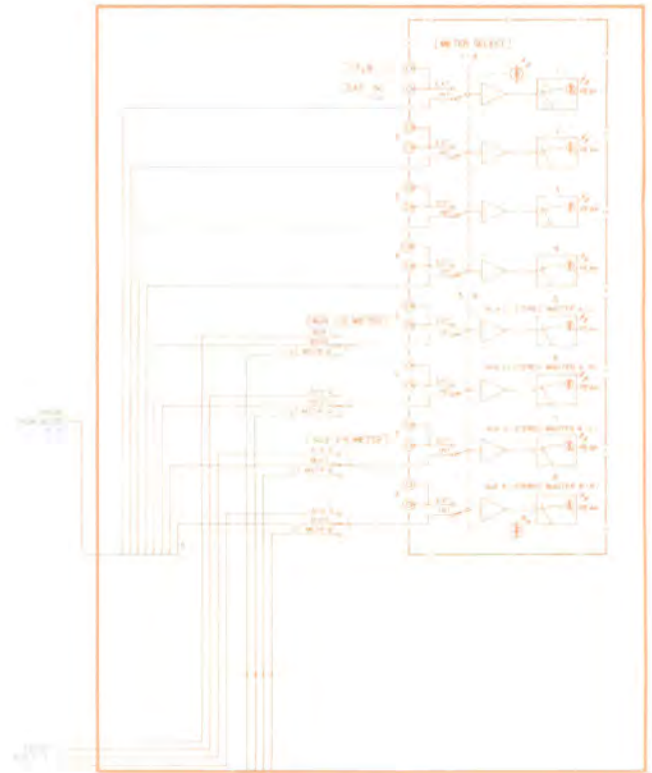
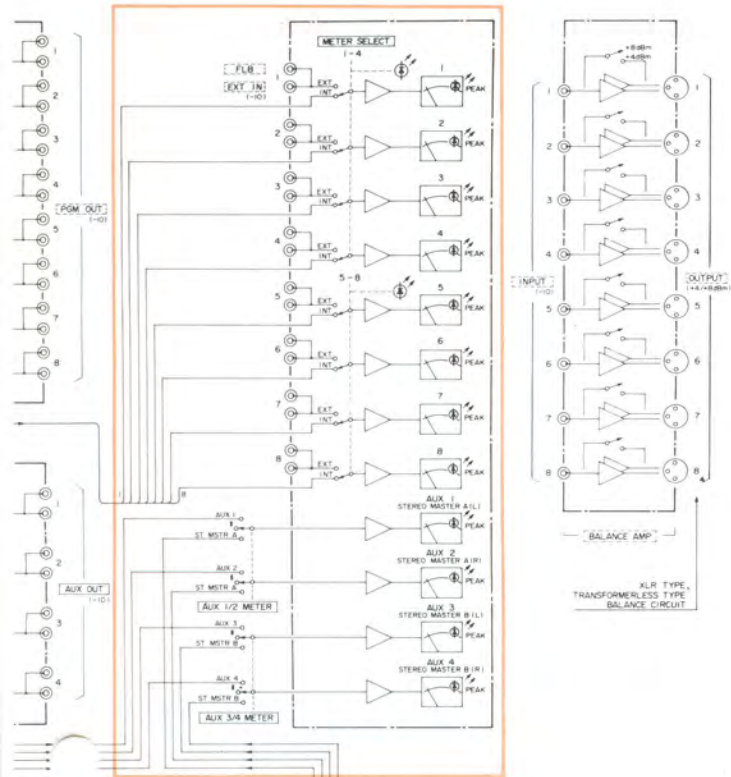
M-520 Meter Panel



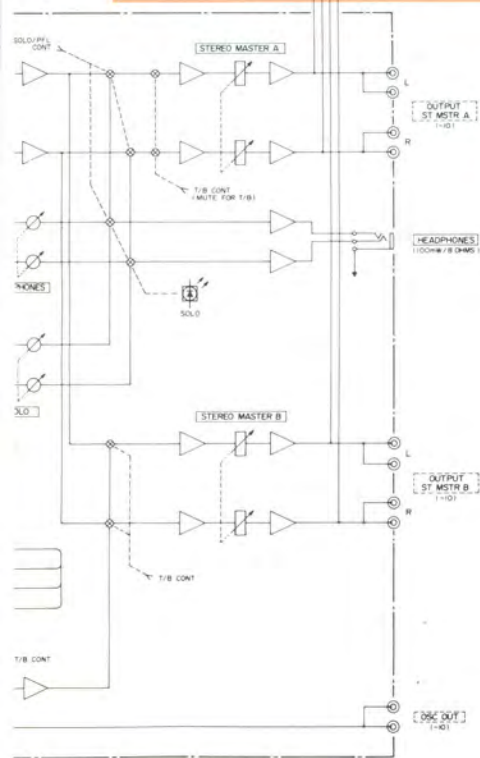
M-520 BLOCK DIAGRAM



M-512 meter section



M-512 monitor section



This setup depicts a typical system used for multitrack recording and remixing of music (for records, non-sync soundtracks, and so forth). The M-520 can accept up to 20 mic or line level sources for mixing onto the 8 program busses. Using the direct outs on each input with the 8 program busses allows a 16 track recording to be made in one pass, such as in an "on location" remote recording. As an example of this, we have shown the lead vocal mic from input channel 4 going directly to track 1 of the 16 track recorder via the channel 4 DIRECT OUT jack.

Insert points (ACCESS SEND/RCV "loops") on each input and on the busses give you a choice of where to insert signal processing. We have shown a compressor/limiter in the ACCESS SEND/RCV "loop" for the lead vocal on channel 4, where it can control excessive levels as the vocalist shouts or moves the mic closer and farther away. Another compressor/limiter is patched into channel 1, whose INSTRUMENT input is being used to take an electric guitar "direct". The compression here can add to the instrument's sustain. Channel 2 is a snare drum, and a noise gate is patched into that ACCESS SEND/RCV "loop" to reduce the "bleed" of sound from other parts of the drum kit into that mic when the snare drum is not being hit. A flanger is patched into these jacks on channel 3 for adding character to the keyboard on that channel. The benefit of processing individual inputs instead of entire programs is that the processing being applied to one input will not affect the sound of other inputs.

When you do want to process the entire program, you can do it using the ACCESS SEND/RCV "loop" on the program busses. For example, program mixing busses 2 and 3 are shown being used for a stereo mix of the keyboards. A pair of graphic equalizers has been "patched" into the ACCESS SEND/RCV jacks so the overall keyboard sound can be contoured over and above the sweep EQ on each channel being fed into the mix.

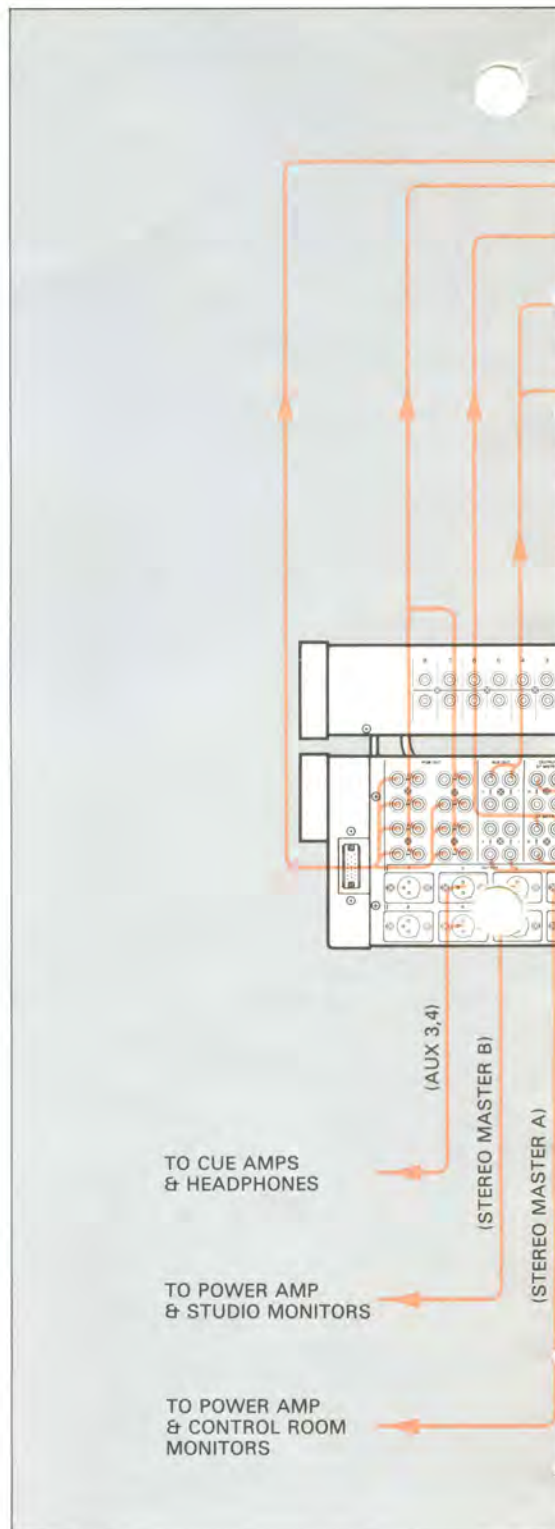
The 16 track tape recorder is fed primarily by the two sets of program outputs. Normally, busses 1 through 8 would be connected to tracks 1 through 8 and to tracks 9

through 16. However, we have instead fed track 1 from channel 4's DIRECT OUT jack.

The recorder's 16 outputs are connected to the TAPE IN jacks on channels 1 through 16, so all 16 channels can be remixed without patching. Just select the TAPE input position on these channels. To "Ping Pong" (combine previously recorded tracks onto a single empty track) while overdubbing, you can plug in a few mics or lines to channels 17 through 20, and set the first 16 channels to TAPE. This approach is not necessary, however, if you are strictly doing overdubbing without "Ping Pong." Instead, you can leave the input sources connected as shown, and set any of the first 16 channel inputs to MIC or LINE to get these sources onto tape. For performer headphone cueing, you can mix the tape returns (playback) using the AUX section of the console. It can pick up the tape inputs even though the input channels are simultaneously utilizing other input sources.

We have shown the STEREO MSTR A outputs going to two of the balanced outputs, which, in turn, feed power amps for the control room monitors. Similarly, the STEREO MSTR B outputs go to two more balanced outputs, and then to a pair of power amps for the studio monitor amps. The second set of STEREO MSTR B output jacks are routed to the 2-track master tape recorder, which is used during the mixdown from the multi-track recorder. The 2-track recorder's output is returned to the 2TR A jacks on channels 17 and 18 so you can bring the tape you just made back through the console.

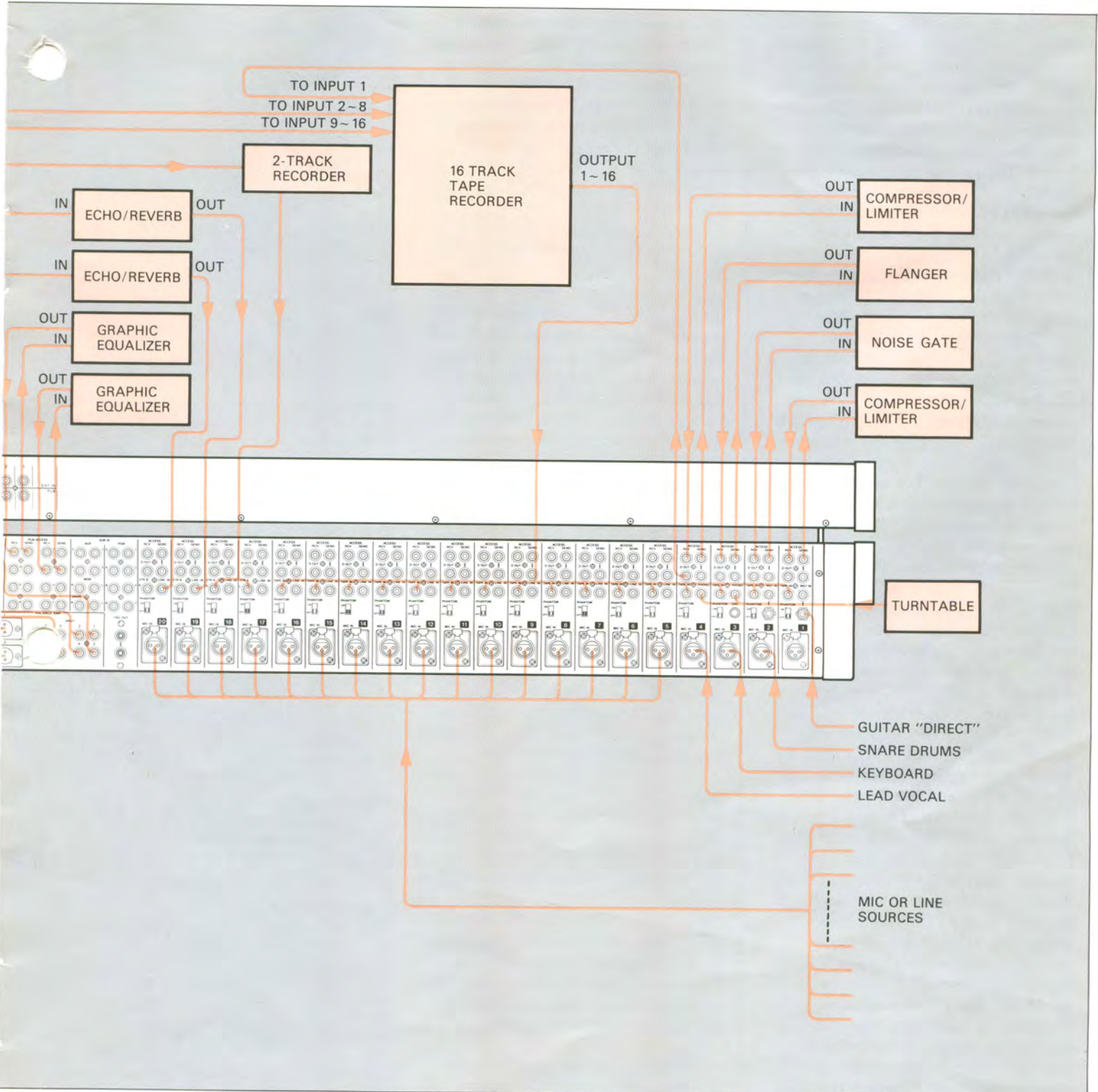
The AUX 1 and 2 circuits are being used for echo/reverb mixes. The signals returning from the echo/reverb signal processing equipment are brought to input channels 19 and 20; in this instance the unbalanced LINE inputs are used, although the XLR inputs could be selected were the outputs of the signal processors balanced. By returning the signals to input channels, you obtain more precise control over levels, you obtain an opportunity to equalize the return, and you have the option of applying the effect to the cue mixes (AUX 3 and 4), the program mixes



(busses 1 through 8), or both.

The output cables from a turntable are connected to the PHONO inputs on channels 3 and 4; this pair of inputs can be very handy for checking a test pressing, taking material from a music or effects library record, and so forth.

The EXT and FLB jacks on the meter pod can be used to "intercept"



the signal cables to and/or from any circuit you wish to monitor with the meters. If, for example, the the compressor/limiters do not have built-in metering (or their metering is inadequate), you can look at those levels. Monitor the console's output to the signal processor by running the ACCESS SEND first to a meter EXT IN, then running the meter FLB OUT to

the signal processor input. Monitor the signal processor output by plugging it into another meter EXT IN, then running the corresponding FLB OUT to the console's ACCESS RCV jack. Then all you have to do is select EXT IN for the appropriate VU meters.
 There are many other possibilities ... using 2TR B for

playback of a second 2 track (possibly cassette), using the system for simultaneous 8 track and 4 track recordings, and so forth. That's what TASCAM flexibility is all about.

This illustration depicts a typical broadcast production system utilizing the M-512. This is a generic application, and certainly will differ depending on the nature of the production (i.e., primarily music, interview-host, news, drama, and so forth). The M-512's excellent immunity to RFI (radio frequency interference) enables you to do production work in close proximity to a transmitter; no special precautions or installation measures are required other than accepted system grounding and shielding techniques.

Here, even though the end result will be a stereo program, a 4-track recorder is used for the production tracks. Its 4 tracks are fed, respectively, from program busses 1 through 4. In this case, let's assume you will use busses 1 and 2 for a stereo mix of any live mics so you will want to pass the signal through a pair of compressor/limiters to prevent excessive level excursions. This is accomplished using the PGM ACCESS SEND/RCV 1 & 2 patch points. We'll also assume you're using busses 3 and 4 to mix any previously recorded material, either from a phonograph connected to the channel 3 & 4 PHONO inputs, or from a 2-track cartridge or reel-to-reel tape player connected to channels 11 and 12. (NOTE: the 2TR B inputs may be used for unbalanced tape machine outputs, or the "MIC IN" XLRs for balanced tape machine outputs). Since we can assume that previously recorded sources have already been subjected to signal processing, compressor/limiters are not installed in the PGM ACCESS SEND/RCV 3 & 4 patch points.

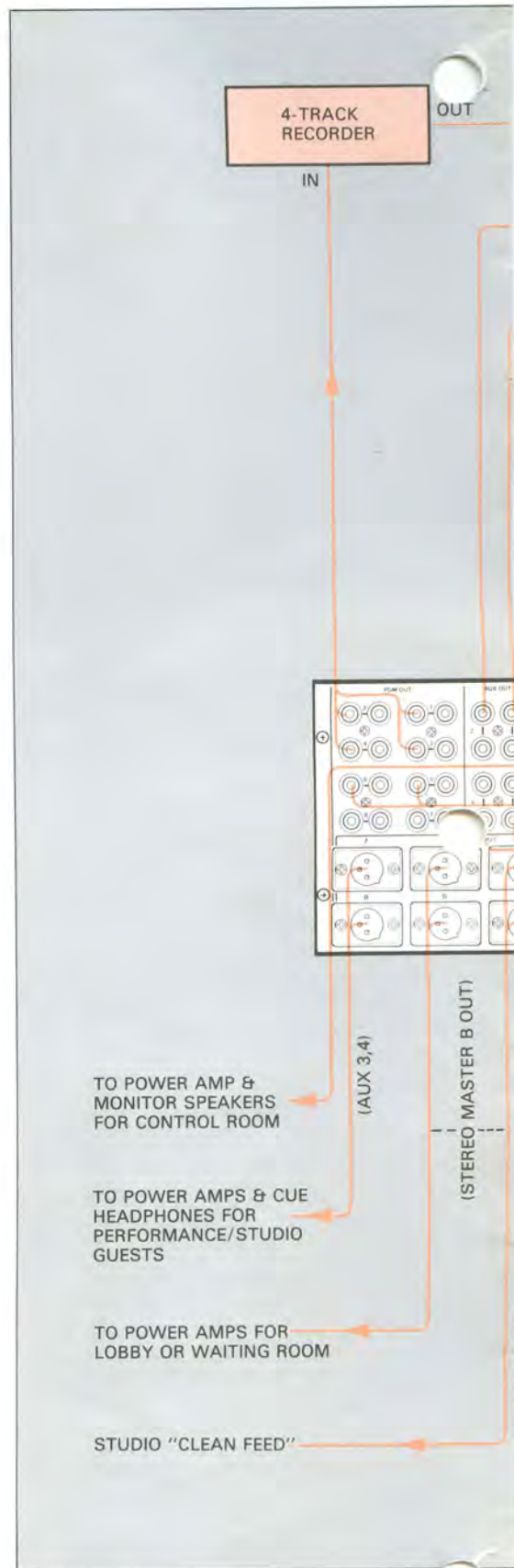
Studio mics are plugged into channels 5 through 8; more mics could be plugged into the remaining channels, if necessary. Keyboard and guitar signals are taken directly into the INST inputs of channels 1 and 2. Since it is assumed that the announcer has a well-trained, carefully modulated voice, no compressor is used on his input channel (6); what little compression might be needed for his/her voice is provided by the overall compression at the PGM ACCESS SEND/RCV point. However, the "guest" miked on channel 5 may not be a broadcast professional and may move closer

and farther from the mic, and/or use widely varying voice levels, so a compressor/limiter is patched into that input channel's ACCESS SEND/RCV point. This gives you the needed "gain riding" without "ducking" the entire live mix, as would occur if the signal processing were done entirely at the buss patch point.

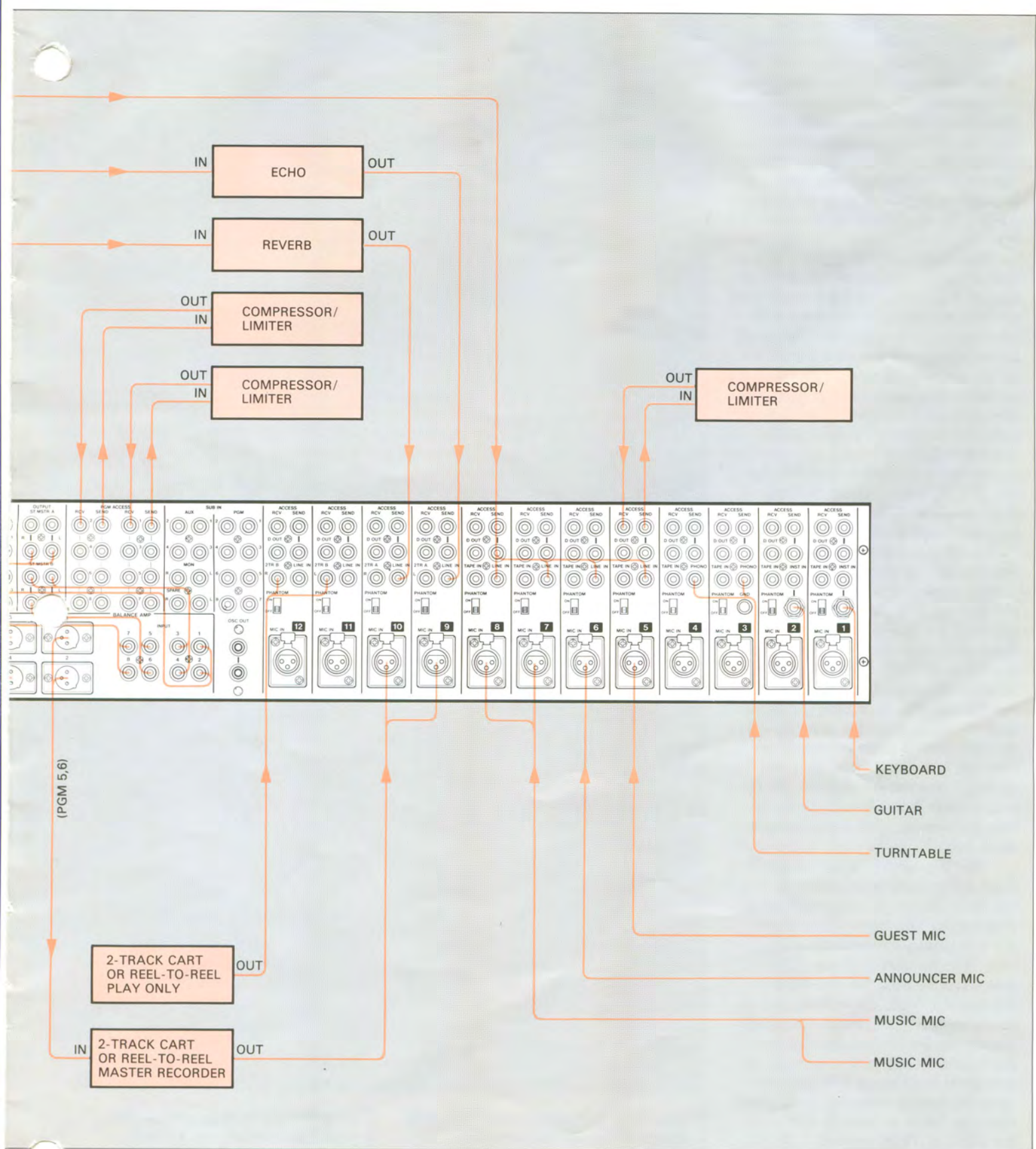
The 4-track recorder is returned to four of the input channel TAPE IN jacks (channels 5 through 8) so you can remix it to stereo. You can do that mix using two more of the main program mixing busses (5 and 6); these are shown going to a pair of balanced outputs, although the unbalanced PGM OUT jacks could be used without the balancing amps, depending on the requirements of your studio. Since there are independent MIC and TAPE TRIM controls, and since different mixing busses are used, you don't have to readjust any faders when switching between one original recording mode and the remix mode; you just operate the input selector switches and buss assign buttons. You can play back the "master" 2-track tape for reference via input channels 9 and 10 (the 2TR A inputs may be used for unbalanced tape machine outputs, or the "MIC IN" XLRs for balanced tape machine outputs).

We use the AUX 1 and 2 busses, in this case, for echo, reverb or other special effects. The corresponding AUX OUT connections go to the external signal processors, and the processed signals are returned to two of the input channels (9 and 10). By bringing the processed signal to a channel, you have an opportunity to EQ the signal, adjust the return level, and independently "print" the effects to the 2-track and 4-track recorders, and to the performer cue mixes.

Performers are cued using AUX 3 and AUX 4 mixes. To ensure low noise on the run to the studio, these outputs are connected to the balancing amplifiers, and the XLR outputs then feed the cue amps. Similarly, the STEREO MSTR B outputs, which are used for both a broadcast clean feed and a lobby/waiting room feed, are also connected to balanced outputs. You can connect the STEREO MSTR A output direct-



ly to a local power amp for control room monitoring, or the balanced outputs may be used, depending on



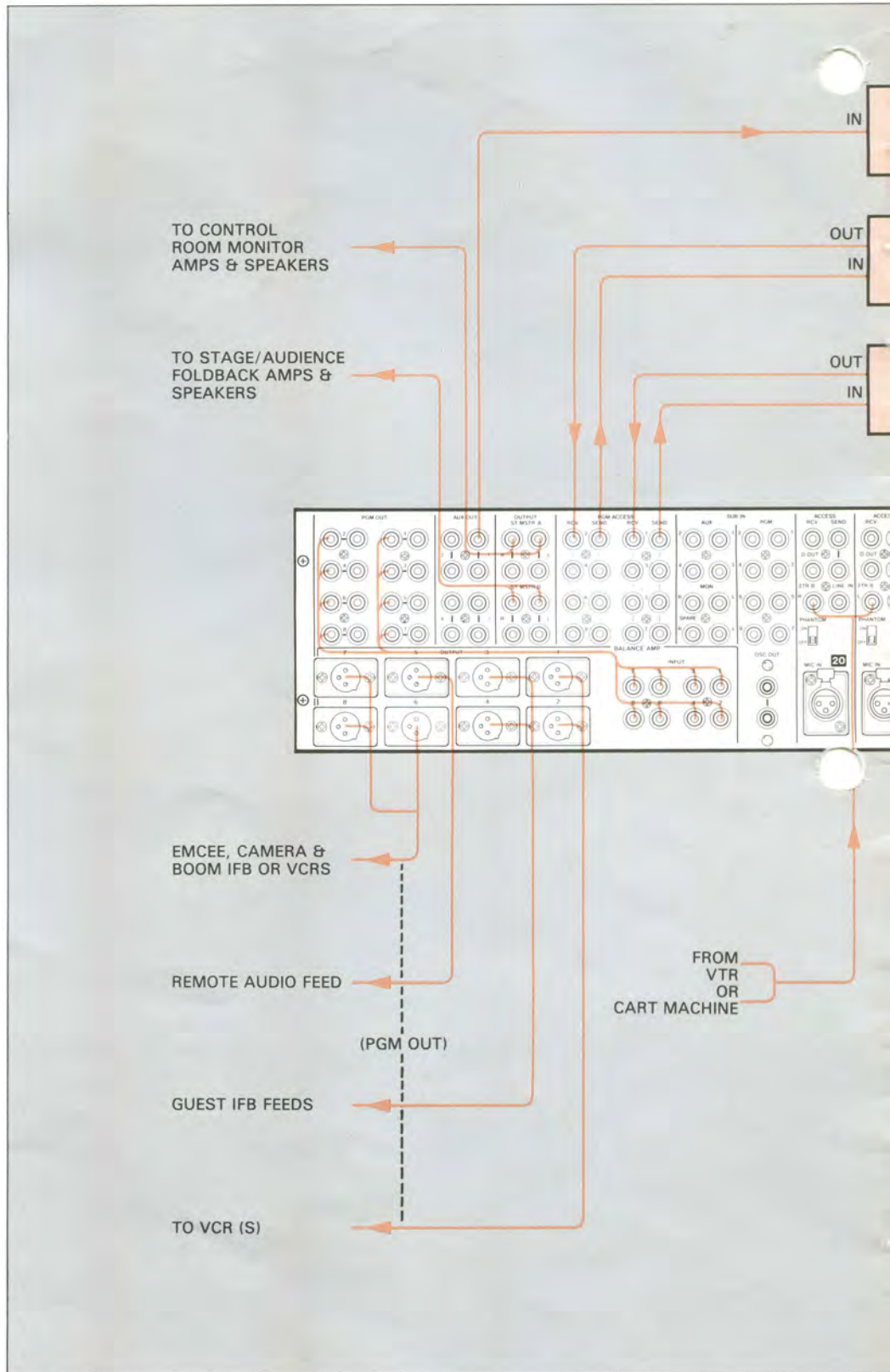
the requirements of the particular system.

As discussed in the previous "broadcast" application, the M-500 series consoles are well suited to use in the vicinity of RF. In a television environment, you can expect clean, quiet operation in the vicinity of cameras, wireless microphones, and satellite/remote transmitters. In this particular application, we show an M-520; an M-512 may be all that's needed for more basic production work.

We begin with an assumption that music for the show has been recorded previously on an 8-track tape machine (which may be done with the same mixing console). The music from the 8-track machine comes in to the console via the TAPE IN jacks on the first 7 channels. Additionally, you may wish to use several 2-track cartridge machines for effects or sweetenings, which may be connected to the TAPE IN jacks, the 2TR A or the 2TR B jacks of the remaining channels. The 2TR inputs also may be used to return audio from the VTR (s) for reference playback. Microphones for the announcer, emcee, guests, audience, and so forth can be plugged into the XLR inputs on channels 8 through 20; if necessary, those channels which also have cart machines or VCR audio returns can be switched to pick up the tape or the mic. However, if tape playback must be utilized at the same time as the mic, then a channel should be used for just one source. If more microphones are needed (as, for example, with a live band), then the first 7 channels' XLR inputs can be used, too.

You'll probably want to use at least one reverb or effects unit; this can be fed from the AUX 1 mix, and returned to any input channel; we show it returning to channel 19 here. The remaining three AUX mixes can be used for cue feeds to production crew, musicians, and so forth; some of the program mixing busses can be utilized for this purpose, too. You'll probably want to mix several different IFB (interruptable foldback) intercom feeds, and they can be done equally well with the AUX or PGM busses.

In this case, we have arbitrarily assigned program mixing busses 1 and 2 as VCR audio feeds (they can be used for mono or stereo mixes), busses 3 and 4 for guest IFB feeds,

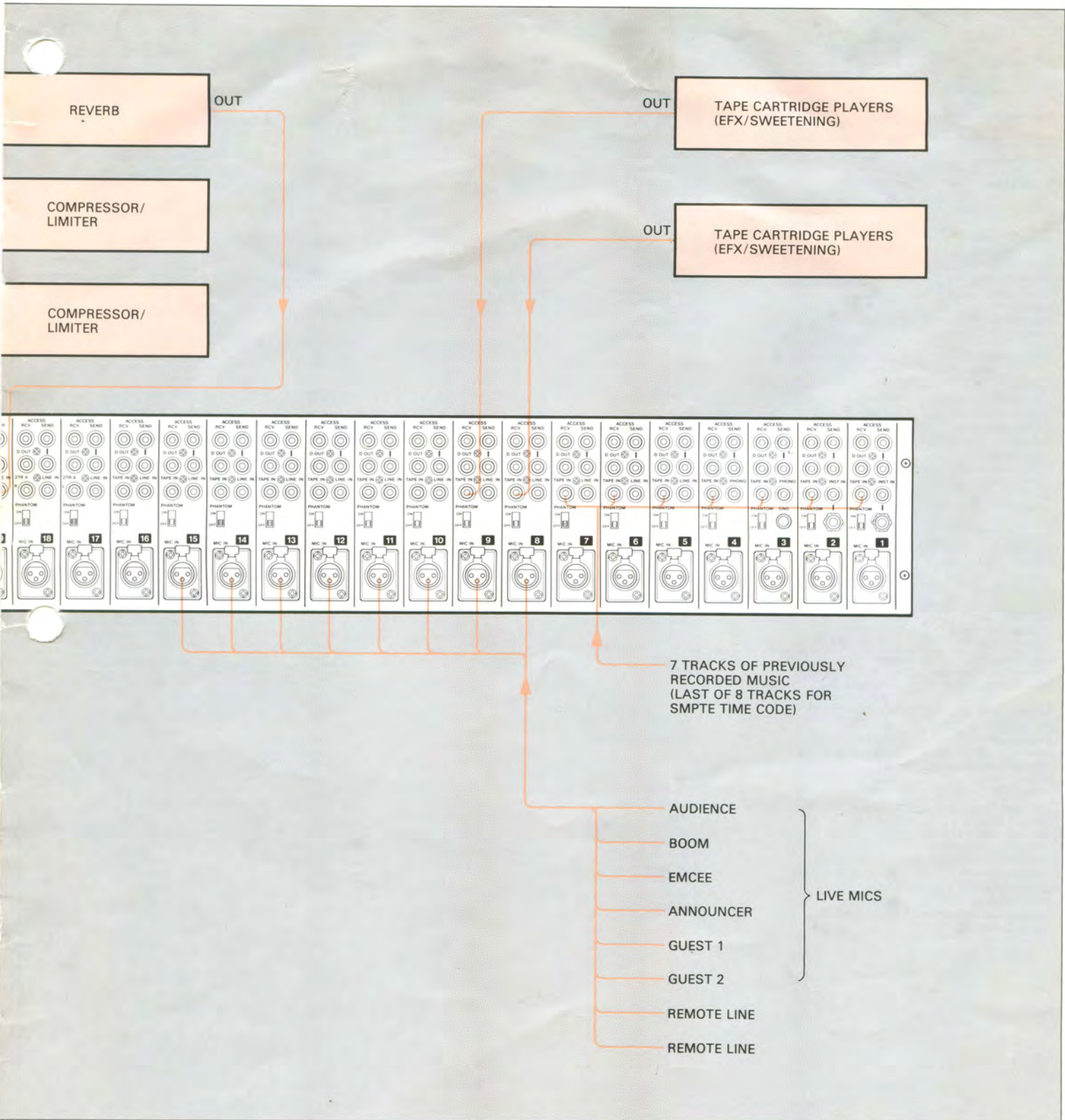


buss 5 for a remote audio feed, and busses 6 through 8 for emcee, camera & boom operator IFB feeds or for additional VCR feeds.

Compressor/limiters may be inserted in the PGM ACCESS SEND/RCV patch points for those

program mixes that require the signal processing; we have illustrated two such typical connections for the Buss 1 & 2 VCR feeds.

The ST MSTR A and ST MSTR B outputs are used, respectively, for control room monitor and stage/au-



dience foldback amp/speaker feeds, where applicable.

No two shows are the same, and therein lies the beauty of the M-500 Series consoles. You can often reconfigure the system to do the job with just the flick of a finger on a

few front-panel switches; if necessary, you can use the rear-panel patch points or add one or more optional patch bays for even greater convenience. Whether the production is in-house (interviews, quiz/game show) or Electronic Field

Production (live sports coverage, news), these consoles can do the job.

M-500 SERIES SPECIFICATIONS

CHARACTERISTICS

Mic Input (Low Impedance):	
Mic Impedance	200 ohms nominal (matched for mics of 600 ohms or less)
Input Impedance	2 k ohms, balanced
Nominal Input Level	-60 dBV (1 mV)
Minimum Input Level	-70 dBV (0.3 mV), MIC TRIM to max.
Maximum Input Level	+18 dBV (8 V), MIC ATT to 30 dB, MIC TRIM to min.
Instrument Input:	
Input Impedance	100 k ohms
Nominal Input Level	-50 dBV (3 mV)
Maximum Input Level	+10 dBV (3.15 V), TAPE TRIM to min.
Minimum Input Level	-58 dBV (1.3 mV), TAPE TRIM to max.
Tape Input, 2TR A/B Input:	
Input Impedance	47 k ohms
Nominal Input Level	-10 dBV (0.3 V)
Maximum Input Level	+18 dBV (8 V)
Phono Input:	
Input Impedance	47 k ohms
Nominal Input Level	-54 dBV (2 mV) at 1 kHz
Minimum Input Level	-62 dBV (0.8 mV) at 1 kHz, TAPE TRIM to max.
Maximum Input Level	-25 dBV (56 mV) at 1 kHz, TAPE TRIM to min.
Line Input:	
Input Impedance	100 k ohms
Nominal Input Level	-10 dBV (0.3 V)
Maximum Input Level	+18 dBV (8 V)
PGM/AUX 1, 2, 3, 4 Output:	
Output Impedance	100 ohms
Minimum Load Impedance	2 k ohms
Nominal Load Impedance	10 k ohms
Nominal Output Level	-10 dBV (0.3V)
Maximum Output Level	+18 dBV (8 V)
Stereo Master A/B Output:	
Output Impedance	100 ohms
Minimum Load Impedance	2 k ohms
Nominal Load Impedance	10 k ohms
Nominal Output Level	-10 dBV (0.3V)
Maximum Output Level	+18 dBV (8 V)
Balanced Amp Input (Separate type):	
Input Impedance	22 k ohms
Nominal Input Level	-10 dBV (0.3 V)
Maximum Input Level	+15 dBV (5.6 V)
Balanced Amp Output (Separate type):	
Nominal Load Impedance	600 ohm, balanced
Nominal Output Level	+4 dBm (1.23 V) / +8 dBm (1.95 V) switchable
Maximum Output Level	+28 dBm (19.5 V)
Direct Output:	
Output Impedance	100 ohms
Minimum Load Impedance	2 k ohms
Nominal Load Impedance	10 k ohms
Nominal Output Level	-10 dBV (0.3V)
Maximum Output Level	+18 dBV (8 V)
Access Send Output (Input ch./PGM buss):	
Output Impedance	100 ohms
Minimum Load Impedance	2 k ohms
Nominal Load Impedance	10 k ohms
Nominal Output Level	-10 dBV (0.3V)
Maximum Output Level	+18 dBV (8 V)
Access Receive Input (Input ch.):	
Input Impedance	220 k ohms
Nominal Input Level	-10 dBV (0.3V)
Maximum Input Level	+18 dBV (8 V)

Access Receive Input (PGM buss):	
Input Impedance	22 k ohms
Nominal Input Level	-10 dBV (0.3V)
Maximum Input Level	+18 dBV (8 V)
Program Sub Input:	
Input Impedance	22 k ohms
Nominal Input Level	-10 dBV (0.3V)
Maximum Input Level	+18 dBV (8 V)
Aux Sub Input:	
Input Impedance	22 k ohms
Nominal Input Level	-10 dBV (0.3V)
Maximum Input Level	+18 dBV (8 V)
Monitor Sub Input:	
Input Impedance	22 k ohms
Nominal Input Level	-10 dBV (0.3V)
Maximum Input Level	+18 dBV (8 V)
Spare Sub Input:	
Input Impedance	100 k ohms
Nominal Input Level	-10 dBV (0.3V)
Maximum Input Level	+18 dBV (8 V)
Oscillator Output:	
Frequency	40 Hz/1 kHz/10 kHz switchable
Output Impedance	470 ohms
Nominal Output Level	-10 dBV (0.3 V)
Headphones Output:	
Nominal Load Impedance	8 ohms
Maximum Output Power	Greater than 100 mW, 8 ohms

PERFORMANCE

Frequency Response: Line Input to—	
PGM Output	20 Hz—20 kHz ± 1 dB (Reference 30 kHz ± 1 dB)
Aux Output	20 Hz—20 kHz ± 1 dB (Reference 30 kHz ± 1 dB)
Mon Output	20 Hz—20 kHz ± 1 dB (Reference 30 kHz ± 1 dB)
Headphones Output	50 Hz—20 kHz ± 2 dB (Reference 30 kHz ± 3 dB)
Equalizer:	
Type	Sweep
Level	Boost/Cut ± 15 dB
Frequency (Low)	50 Hz to 500 Hz
(Middle)	100 Hz to 5 kHz
(High)	2.5 kHz to 15 kHz
Signal to Noise Ratio (at nominal input levels, EQ out, UNWTD/"A" WTD):	
1 line to 1 PGM output	86 dB/87 dB
16 lines to 1 PGM output (M-520)	73 dB/75 dB
8 lines to 1 PGM output (M-512)	77 dB/80 dB
1 line to access send	90 dB/92 dB
1 line to direct output	88 dB/90 dB
1 tape to 1 PGM output	86 dB/87 dB
16 tape to 1 PGM output (M-520)	73 dB/75 dB
8 tape to 1 PGM output (M-512)	77 dB/80 dB
1 tape to access send	90 dB/92 dB
1 tape to direct output	88 dB/90 dB
1 mic to 1 PGM output	68 dB/70 dB (150 ohm source)
20 mic to 1 PGM output (M-520)	50 dB/55 dB (150 ohm source)
12 mic to 1 PGM output (M-512)	52 dB/58 dB (150 ohm source)
1 mic to access send	68 dB/70 dB (150 ohm source)
1 mic to direct output	68 dB/70 dB (150 ohm source)
1 inst to 1 PGM output	72 dB/74 dB
1 phono to 1 PGM output	65 dB/68 dB
Balanced output	90 dB/95 dB

Crosstalk:	Better than 70 dB (1 kHz, nominal input level) Better than 60 dB (15 kHz, nominal input level)
Total Harmonic Distortion (THD):	
1 mic input to 1 PGM output	0.025% (at 1 kHz, EQ OUT nominal input level above 50 dB and MIC ATT 30 dB on, with 30 kHz L.P.F. and 400 Hz H.P.F. connected)
1 line input to 1 PGM output	0.02% (at 1 kHz, EQ OUT, nominal input level, with 30 kHz L.P.F. and 400 Hz H.P.F. connected)
Intermodulation Distortion (IMD), (SMPTE Method):	
1 mic input to 1 PGM output	0.06% (EQ OUT, nominal input level above 50 dB and MIC ATT 30 dB on)
1 line input to 1 PGM output	0.045% (EQ OUT, nominal input level)
Fader Attenuation:	80 dB or more
Overload Indicator:	25 dB above nominal input level
Peak Indicator:	10 dB above nominal output level
Dimensions (W x H x D):	
M-520:	1082 x 240 x 798 mm (42-15/16" x 9-7/16" x 31-7/16")
M-512:	802 x 240 x 798 mm (31-9/16" x 9-7/16" x 31-7/16")
Weight (net):	
M-520:	47 kg (103-10/16 lbs)
M-512:	38 kg (83-12/16 lbs)
Power Requirements:	
100/120/220/240 V AC, 50/60 Hz, 90 W (M-520), 70 W (M-512) (General Export Model) 120 V AC, 60 Hz, 95 W (M-520), 75 W (M512) (U.S.A./Canada Model) 220 V AC, 50 Hz, 95 W (M-520), 75 W (M-512) (Europe Model) 240 V AC, 50 Hz, 95 W (M-520), 75 W (M-51, U.K./Australia Model)	

OPTIONS

- *CS-520 Pedestal for M-520
- *CS-512 Pedestal for M-512
- *CS-521 Top/Side board for M-520
- *CS-513 Top/Side board for M-512

In these specifications, 0 dBV is referenced to 1.0 volt. Actual voltage levels are also given in parenthesis. To calculate the 0 dB = 0.775 volt reference level (i.e., 0 dBm in a 600 ohm circuit) add 2.2 dB to the listed value; i.e., -10 dBV re: 1 V = -7.8 dBm re: 0.775 V.

Changes in specifications of features may be made without notice or obligation.

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