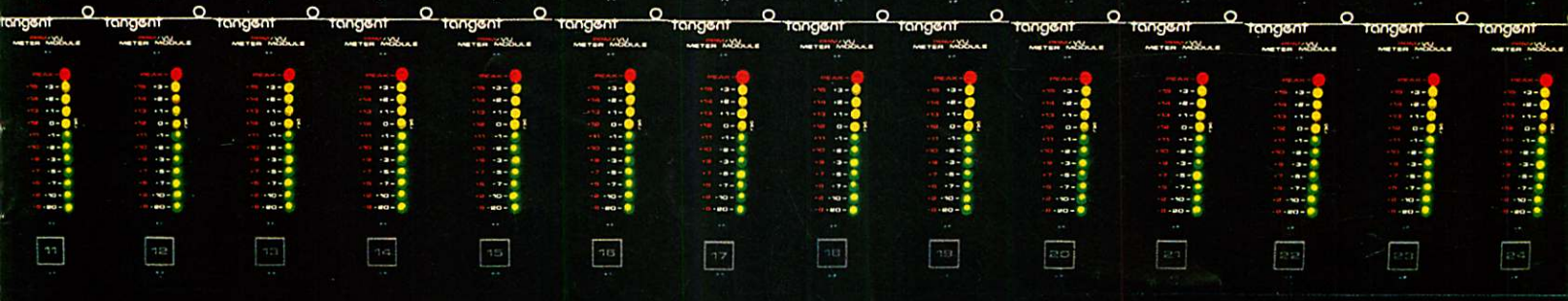
model 3216

professional recording console



tangent

Specifications

NOISE

All measurements were made with an HP 400 series average reading meter and corrected by 1.05db for RMS noise. All readings are *un*weighted and band limited at 6 dB/octave at 20Hz and 48dB/octave at 20kHz. OdBv = .774 volts. Since the console outputs are low impedance, load impedance does not affect the noise.

Mic Pre-amp equivalent input noise (Z_S = 150 ohms)	-127.0dBv minimum -128.5dBv typical -130.8dBv theoretical limit
Main Mix Buss equivalent input noise (channel faders full down, Master output fader full up; 16-channel console)	-88.0dBv minimum -90.3dBv typical
Channel Mix Buss equivalent input noise (One channel assigned, channel muted. Due to switching arrangement, noise is a function of the number of channels assigned, rather than the noise being a function of the number of channels available, which is the usual practice)	-105.0dBv minimum -110.0dBv typical

DISTORTION

Total Harmonic or Intermodulation (THD or IM, channel outputs at +18dBm or +24dBv into 10Kohm, 20Hz-20kHz)	Less than 0.075% minimum Less than 0.004% typical at 1kHz

SLEW RATE

Measured at any point in the audio chain	10 volts/micro-second minimum 13 volts/micro-second typical

FREQUENCY RESPONSE

Any input to any output. (3dB bandwidth extends from below 10Hz to above 50kHz)	±0.2dB, 20Hz-20kHz

OVERALL GAIN

Mic input to channel output	80dB

CROSSTALK

Left Main buss to Right Main buss	-60dB at 10kHz

INPUT IMPEDANCE

Mic	2kOhm at 1kHz, independent of Pad
Tape	20kOhm minimum at 1kHz

OUTPUT IMPEDANCE

Less than 100 Ohm at 1kHz, any output

Tangent Model 3216

The Tangent Model 3216 is the highest quality, most versatile 16-out recording console offered by any manufacturer at a moderate price.

Innovative and cost-effective design, with an eye to production efficiency, enables Tangent to offer sophisticated professional features previously found only on consoles costing 3 and 4 times as much.

The 16 submaster busses plus direct outputs allow recording and mixdown of 8, 16, 24 or 32 tracks. Semi-parametric EQ, multiple Echo and Cue sends, and Phantom Power are universal features that make the 3216 at home in any situation.

The optional Patch Bay gives easy access to numerous internal and external points and plenty of non-committed jacks are available for external equipment or multiple tie-lines. Mainframes holding 16, 24, or 32 Input/Output modules are offered, and balanced Tape Sends and balanced Tape Returns interface perfectly with professional recorders.

Tape Return Gain controls allow the console to work with full professional line levels or be easly interfaced to a semi-pro tape recorder without external line amplifiers.

For on-location work in theatres, large clubs, or outdoor festivals, the Tangent 3216 handles complex mixing situations with powerful ease. Record the show 24-track, run the main PA, and send several independent monitor mixes to the stage, simultaneously.

In addition to its expansive flexibility, the 3216 embodies the quality that gives silent, transparent recordings. TIM distortion is virtually non-existent in the 3216, and Tangent **guarantees** a slew rate of 10 volts/micro-second at **any** point in the audio chain.

Modern Recording, reviewing one of the Tangent family of mixing consoles, discovered "astonishingly quiet" performance and "superlative square-wave response".

Modern Recording's engineers also found distortion measurements so low they were "typically masked by the residual noise level".

These independent findings are even more impressive in the light that the Model 3216, top of the Tangent line, has even lower distortion, better signal-to-noise figures, and much faster slew rate than the model they reviewed.

This combination of flexible features and pure quality makes the Tangent Model 3216 an instant choice for professionals needing a powerful, yet properly-priced creative tool.

Input/Output Module

1-16 SUBMASTER SWITCHES assign the channel program signal to the desired submaster busses. The switches work in conjunction with the ODD/EVEN PAN control to route the channel program signal to any or all busses.

ODD/EVEN PAN positions the channel program signal anywhere in the stereo field between one or more odd and one or more even submaster busses. The submaster grouping is especially handy, for example, in using seven or eight microphones on a drum kit. After the relative volumes and stereo imagery are set, the volume of the entire drum set may be altered by moving only two controls, rather than seven or eight. The same concept applies for mixdown and live applications.

D means Direct. Pressing this button bypasses the entire submaster section and feeds the program signal from the channel master fader to the tape output connector on that channel. Direct can be used to supplement the submaster groupings when feeding all channels of a 24-channel recorder simultaneously.

SUB is the Submaster Level knob that controls the gain of the entire submaster grouping (the SUB control on I/O Number 1 controlling Subgroup 1, and so on). The submaster signal is sent to the tape in Input or Tape Mode, and is sent to the main stereo busses in Mixdown Mode.

CUE 1 and CUE 2 determine the amount of signal from each channel being sent to the respective cue busses. For recording, the two busses can also be used together as a stereo cueing system.

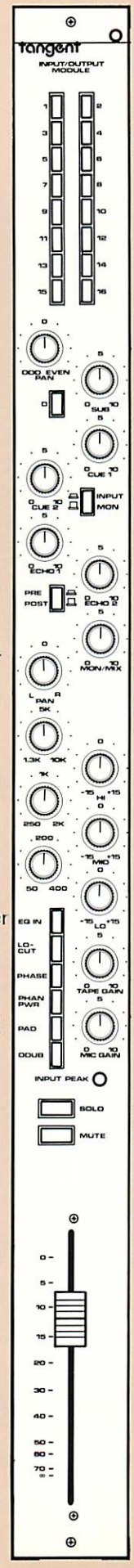
INPUT/MON Cue select switch chooses the pick-off point for the Cue send on each module. "INPUT" selects the program signal (pre-fader). "MON" selects the same signal being received by the Monitor.

ECHO 1 and ECHO 2 adjust the amount of signal being sent to each Echo buss. Since there are two Echo busses, signals can be sent and received in stereo. For live applications, one or both Echo busses can be used for additional Monitor mixes.

PRE/POST switch determines whether both Echo controls operate Pre or Post main fader.

MON/MIX sets the amount of signal fed from each channel to the control room monitors. In Mixdown or Input Mode, the signal is lifted from the submaster section. In Tape Mode, the signal is from the tape return.

PAN places the **MON/MIX** signal anywhere within the stereo field for control room monitoring. In the Mixdown Mode it acts as a pan control for the subgroup.



EQUALIZATION (semi-parametric) is provided with 15 dB of boost or cut in each band. The center frequency of each band is sweepable over a three-octave range, allowing the engineer to zero-in on a resonant frequency. Selective cymbol overtones may be brightened or the edge can be trimmed from a singer's voice with this extremely versatile equalizer. "Q", the filter bandwidth expressed in octaves, is a constant 1.5.

TAPE GAIN controls the level of the tape return in both Tape and Mixdown Modes. This control allows the engineer to adjust the console to accept the lower output levels from a semi-professional recorder **without** adding line amps or doing internal recalibrations. And when the user moves up to a professional recorder, the 3216 adjusts to professional levels at the turn of a knob.

MIC GAIN controls the gain of the microphone pre-amp over a 40dB range (+16 to +56dB). Used in conjunction with the PAD, more than 60dB of gain adjustment is provided.

INPUT PEAK LED flashes as signal peaks pass +15dB. The firing threshold is adjustable internally from +10 to +20dB. The LED reacts to the MIC signal in Input or Tape Mode, and to the tape return in Mixdown Mode.

EQ IN switches the equalizer into the program signal path.

LO-CUT switches a 12 dB/octave Butterworth filter into the signal path, in front of the equalizer section. By attenuating frequencies below 80 Hz, an engineer can attenuate the "rumble" problems sometimes encountered from in-studio and on-stage acoustic feedback from high-energy low frequencies.

PHASE inverts the phase of the program signal, just prior to the access patch point.

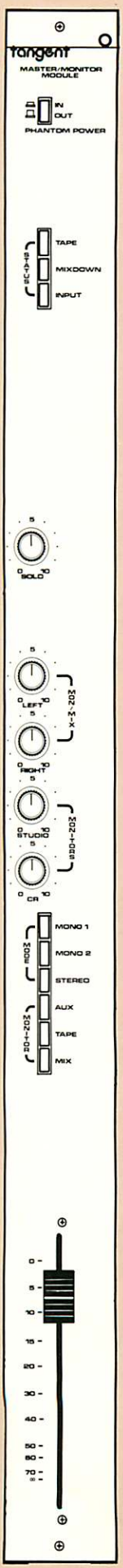
PHAN PWR applies +48 volts of phantom power to the microphone input for operating condenser microphones (+24 volts available on request).

PAD attenuates the microphone signal by 20dB, before the mic pre-amp. The Pad should only be used if the MIC GAIN control alone cannot prevent input clipping. Using the Pad unnecessarily will tend to impair good noise performance.

ODUB places the I/O into Input Mode, even if the rest of the console in in Tape or Mixdown Mode.

SOLO cuts off the normal signal feed to the control room monitor and feeds only the program signals (post-EQ) of the I/O's whose Solo switches are engaged. This allows the engineer to easily check the audio quality and EQ on a channel or group of channels without affecting the signals being sent to the recorder.

PENNY AND GILES conductive plastic long-throw 1120 series faders are standard.



Master/Monitor Module

INPUT Mode is used primarily during original recording onto a multi-channel recorder. Signal flow proceeds from the microphone pre-amp, through the equalizer, to the main fader, to the submaster section (where the signal may be assigned and panned between odd and even busses), and finally sent to the recorder. When Direct (D) is pushed, the submaster section is bypassed, and the program signal is sent from the master fader to the tape. The Monitor section takes its feed from the tape send in Input Mode. Engaging the Overdub (ODUB) switch on a given I/O module returns that module to Input Mode, regardless of the master status chosen.

TAPE Mode has the same signal flow (to the tape) as Input Mode, but the Monitor signal is taken from the Tape Return. This is useful for checking the quality of tracks while they're being recorded. Most overdubbing is done from the Tape Mode, since the cue feeds in the MON position follow the Monitor. Switching between Input and Tape Modes is totally silent and may be done without affecting tracks being recorded.

MIXDOWN Mode has the same signal flow as Input Mode except that the input signal is Tape rather than Mic, and the Tape Out is muted to prevent feedback. The program signal from each channel is mixed down into the stereo output busses using the MON/MIX PAN control. Subgrouping may be done in Mixdown Mode, providing extra flexibility.

SOLO controls the master level of the Solo buss.

MON/MIX Left and Right are gain controls for the stereo buss mix amplifiers. These may be used to trim the Left and Right signals for optimum signal/noise ratio, or to balance the stereo field.

MONITORS, Studio and Control Room (CR) are stereo volume controls for the Studio monitors and Control Room monitors, respectively.

MODE controls only the Control Room feed. **Mono 1** mixes the stereo signal into Mono and feeds it to the left channel only. This allows checking input signals for phase cancellations. **Mono 2** is a mono feed to both speakers to simulate program material played over a mono system. **Stereo** places the Control Room signal into the normal stereo perspective.

MONITOR switches control both the Studio feed and Control Room feed. **Aux** switches any auxilliary signal into the Monitor. **Tape** feeds the return from the two-channel dub-down recorder into the Monitor. **Mix** places the stereo output mix into the Studio and Control Room.

The **Master Fader** on the Master/Monitor Module is a stereo control that determines the stereo output level.

Echo/Cue Module

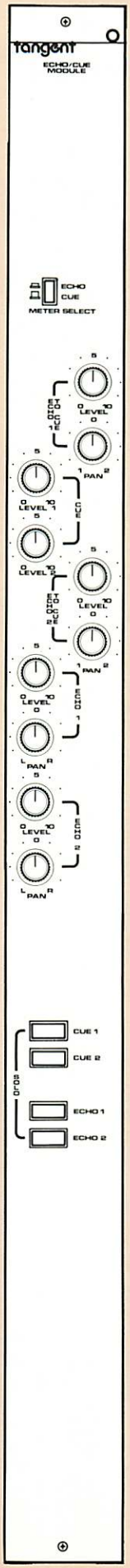
ECHO/CUE METER SELECT determines whether the two designated LED arrays follow the output of the ECHO 1 and ECHO 2 busses or the CUE 1 and CUE 2 busses.

ECHO 1 TO CUE returns Echo 1 to the Cue mixes, which are usually used as feeds to the headphones in the studio. This allows the performers to have a more realistic impression of how things will sound in the final mix.

CUE Level 1 and Level 2 are master volume controls for the Cue outputs.

ECHO 2 TO CUE returns Echo 2 to both Cue mixes.

ECHO 1 Level is the master return control from the first echo buss. The Pan control places that signal within the stereo field.



ECHO 2 Level is the master return from the second echo buss. The Pan control determines stereo positioning of the signal.

SOLO switches allow the engineer to exclude everything from the Control Room Monitors except the signal chosen. Cue 1, Cue 2, Echo 1, and Echo 2 may each be monitored for adjusting the individual Cue mixes or for monitoring just a returning Echo signal.

Talk/Slate Module

METER MODE selects between PPM and VU response characteristics for all of the console's 12-segment LED arrays. In the PPM (Peak Program Material) mode, the meters follow the traditional European fast attack and slow decay characteristics. In the VU mode, the meters respond to standard ASA characteristics. The top LED remains in Peak mode, with a threshold adjustable independent of the main calibration. This allows the peak indicator to be set for the overload point of the tape machine actually being used.

TALKBACK MIC is a female XLR connector designed to hold a talkback microphone at the end of a short gooseneck.

OSC controls the volume of the Oscillator tone being sent to the feeds.

MIC controls the level of the Talkback Microphone into the Feeds.

FREQ selects the frequency of the Oscillator being sent to the feeds. The Oscillator may be used to put reference tones onto tape or as a calibration tool.

FEED determines where the Microphone and Oscillator signals are sent. **Buss** puts the signals onto the 16 submaster busses for slating the multi-channel recorder. **Cue** puts the signals onto both Cue busses. **Mix** sends the signals to the dub-down deck and into the Studio monitors (Control Room speakers are muted).

OSC gates the Oscillator into the assigned feeds.

MIC gates the Talkback Microphone into the assigned feeds.

OPTIONS

Patch Bay

Tangent offers an unusually flexible modular patch bay containing up to 288 patch points. The system features 6 "normalled" (normally connected) patch points per input channel plus a more extensive output patching section than is found on many high-budget consoles.

Quality is first-rate, featuring standard size **gold-plated** TTY jacks (.175") mounting on mil-spec fiberglass printed circuit boards.

The Patch Bay enables the engineer to quickly change from one special effect to another, to easily convert an Input/Output Module to a submaster control, or to instantly send an output to two different mix-down machines.

Changing effects devices becomes very simple. If, for example, you wish to send the output of Echo 1 to a digital delay instead of a plate reverb, it requires only one quick patch on the front of the console. That change would otherwise require reaching behind the console or digging at the back of a rack panel.

Submasters may be changed from the usual rotary control to a slide fader by patching the output of the submaster to the input of a spare I/O Module. This also allows the additional flexibility of equalizing the entire submaster at once.

Echo returns may likewise be brought into the mix by patching the Echo return into an I/O Module. Slide fader control and semi-parametric equalization may then be used instead of the non-equalized, rotary returns on the Echo/Cue Module.

Multiple outputs to several tape machines or several effects devices are also possible by pre-wiring several open patch points in series. The multiple output then becomes a simple patch.

The Patch Bay is "normalled" for usual signal flow, so that an engineer needs to use patch cords only to make changes. This "normalling" of patch points minimizes the number of necessary patch cords.

The Producer's Desk is included in the price of the Patch Bay. For situations where the Producer's Desk would add too much width to the board, the Patch Bay may be special-ordered by itself. The Patch Bay fits a standard 19" rack.

Package Suggestions

We have found that many professional engineers prefer to return reverb, echo, or other effects thru an Input/Output module rather than the regular returns. Returning these effects thru an I/O allows an engineer to use the module's equalizer and to control the level on a slide fader rather than a rotary control.

Therefore, we recommend purchasing a mainframe with more input positions than your tape machine has channels. Since the smallest mainframe we make holds 16 I/O modules, users with eight-track machines are covered.

Owners of 16-track recorders will probably find the 24-channel mainframe most useful. Large studios offering 24-track recording will most likely need the flexibility of the 32-channel mainframe.

Even if you don't fill in all the input positions now, it is much easier to just drop in a few modules than to reinstall a larger mainframe. It does not cost that much more to plan for future expansion by getting a larger mainframe initially.

CUSTOMIZATIONS are available to the standard consoles, and prices are quoted only thru dealers.

Extra Metering

The console comes standard with 12-segment LED arrays. The entire set of meters may be switched to either PPM or VU response characteristics.

In the PPM (Peak Program Material) mode, the meters follow the traditional European fast attack and slow decay characteristic. This response makes it very easy to spot distortion on transients.

In the VU mode, all meters are designed to the standard ASA characteristic. The top LED remains in Peak mode with the threshold being adjustable independent of the main calibration. This allows the Peak indicator to be set for the actual overload point of the tape machine being used.

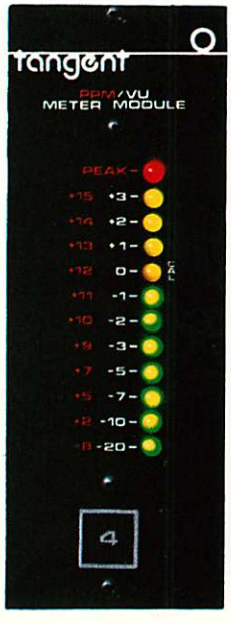
All console systems but one come complete with 20 of the 12-segment LED arrays. These meters allow visual monitoring of the 16 submaster outputs, the Left and Right outputs, and either the two Echo busses or two Cue busses. A switch on the Echo/Cue module determines whether the last two meters follow the Echo busses or Cue busses.

Additional LED arrays may be added anytime for monitoring the Direct outputs of modules 17-24 on a 24-channel mainframe or 17-32 on a 32-channel mainframe. Additional meters are also helpful for monitoring all the outputs of a 24-channel tape machine.

The 16-channel mainframe system with eight Input/Output modules contains 10, rather than 20, LED metering arrays. This package helps keep down the price of our smallest system. The The 10 meters are used to monitor the eight available submasters (since the system has only eight I/O modules, there are only eight usable submasters) and the Left and Right outputs. As I/O modules are added to the mainframe, the meters may also be added. This method allows those on tight budget to start small for less money, and yet expand later as their needs grow.

Because the LED arrays are color-coded, most people find it easy to monitor a large number of meters simultaneously. It only takes a moment to scan the entire console for a flashing red PEAK indication. Also, each meter is located above its respective Input/Output Module for immediate channel indentification.

Standard mechanical VU meters are also available, and each meter includes a Peak-indication LED. The VU meters are packaged in fours.



LEATHER OPTION includes a genuine dark-brown leather armrest to add an extra touch of class to your control room. Solid walnut 1¾" side panels are substituted for the standard ¾" thickness, and a walnut trim strip is affixed under the meters.

PEDESTAL OPTION is a sturdy base made from 1¾" solid walnut. Hidden beneath the attached console are extruded aluminum support braces.

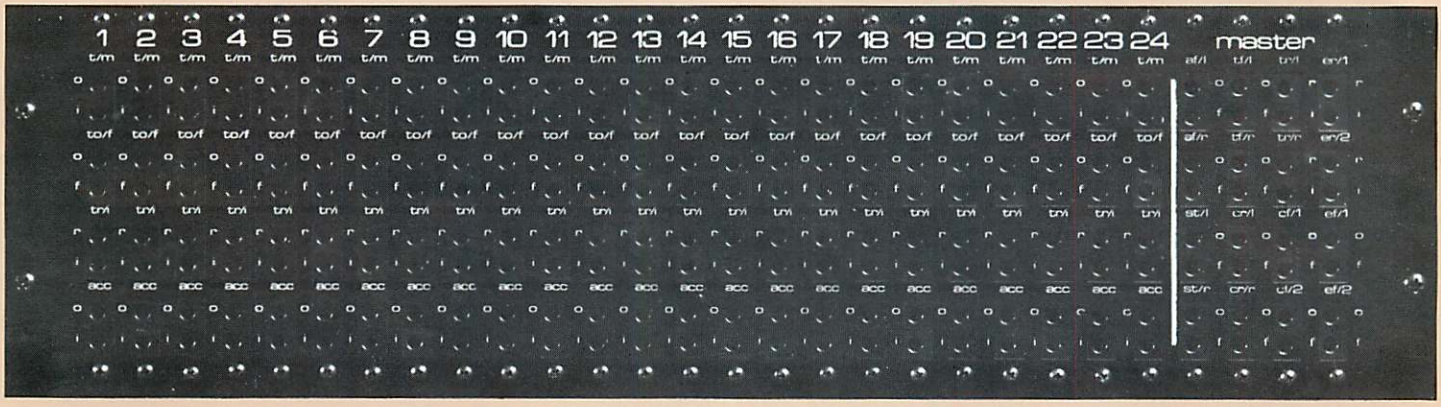
CONNECTOR OPTIONS

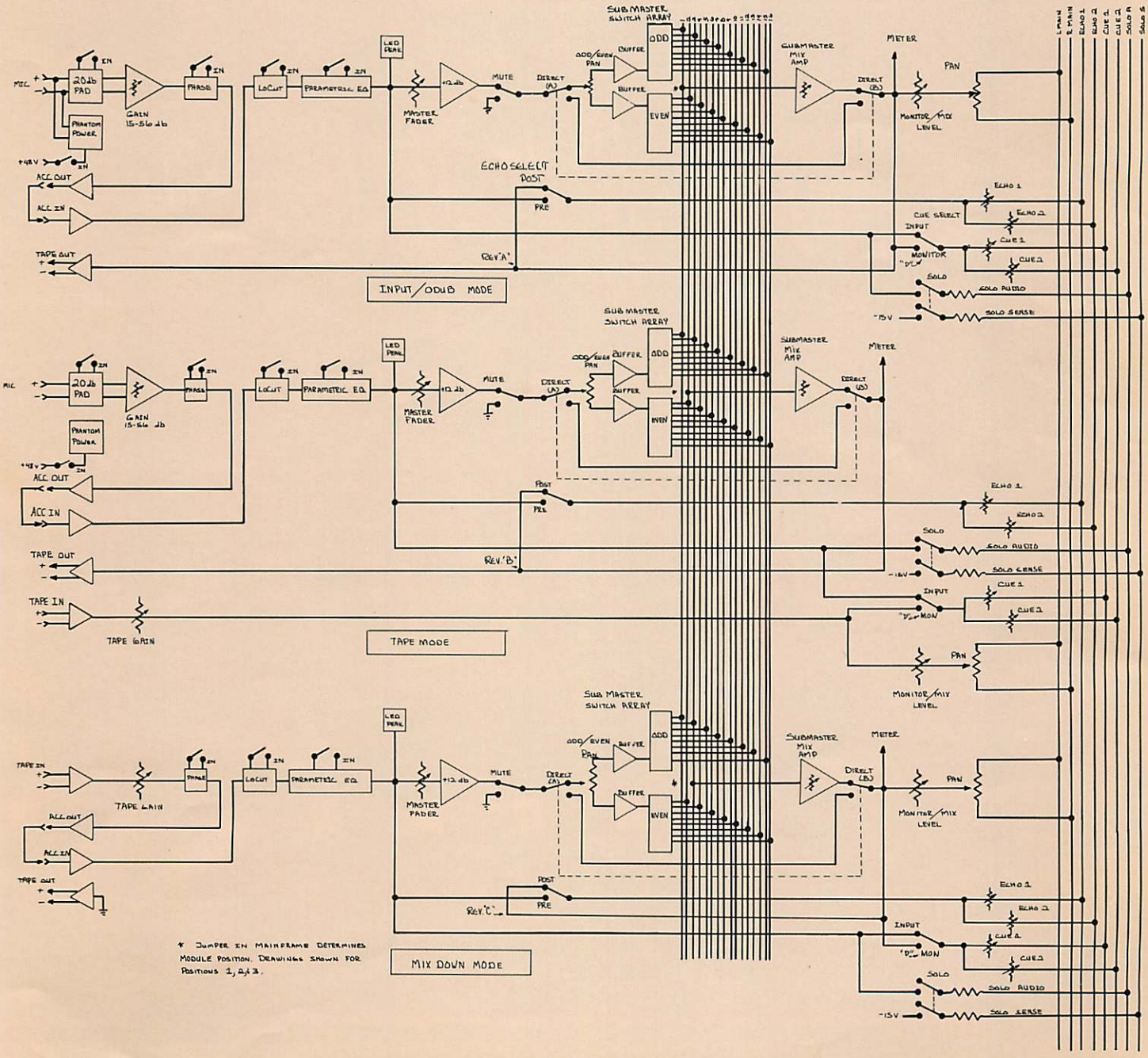
The standard console is terminated in Molex pins, which is desirable and cost-effective for most installations. However, three additional connector options are available.

The XLR option terminates the Mic Input, Tape Input, and Tape Output in XLR connectors, with the access points as phone jacks.

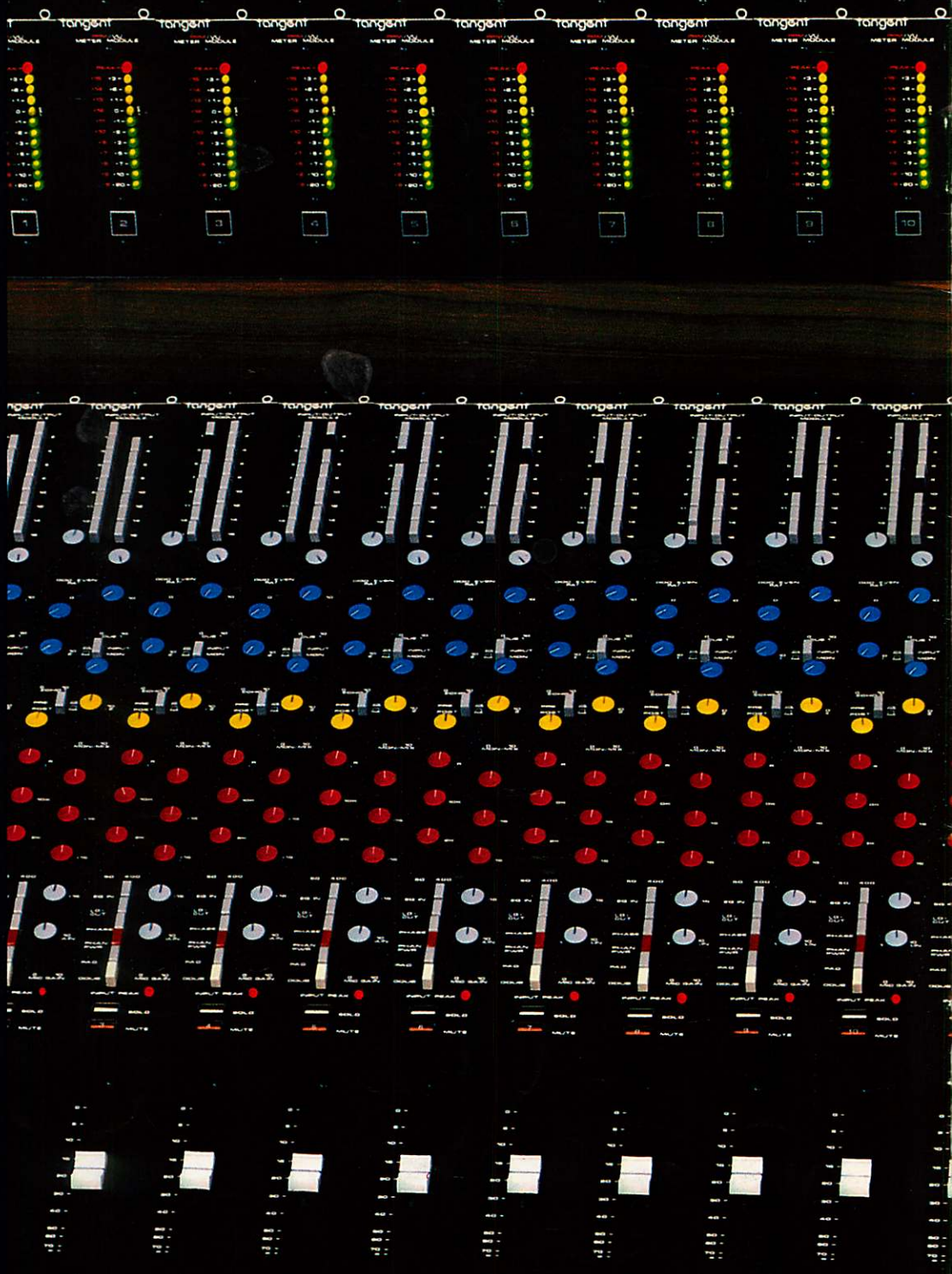
The Phono connector option has all the terminations at phone jacks except the Mic Input, which is XLR.

The Phono connector option has all phono terminations except the Mic Input, which is XLR.





* Jumper in mainframe determines module position. Drawings shown for positions 1, 2 & 3.



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