

NEOTEKSERIES III

Introduction

A studio owner's choice of master recording console is of fundamental importance. The console forms the electronic heart of the studio and is the one piece of equipment that most critically affects the basic technical quality of the final product. This choice is complicated by the fact that manufacturers' claims and specifications are an unreliable basis for comparative judgements: they are highly subject to enhancement. In the absence of direct experience with each alternative it is difficult to evaluate the merits of one console versus another. We hope this material will serve to introduce the new Series III C and the concerns which have gone into its design and manufacture, but no literature can supplant a hands-on evaluation. We confidently solicit this most critical of tests.

Circuits

NEOTEK is the established leader in the application of advanced analog circuit design techniques to professional audio consoles. For over eight years we have exclusively produced consoles that are completely transformerless from inputs to outputs and in fact transformerless NEOTEK consoles were producing Grammy-winning albums years before others began offering optional transformerless functions. Among other increasingly popular features first seen on NEOTEK consoles are 3-mode solo and state-variable parametric equalizers. NEOTEK's designers have continued the years of painstaking development which has kept NEOTEK consoles at the leading edge of audio circuit design. The lead this experience has given us accounts in part for the reputation NEOTEK consoles have earned for clearly superior sonic quality.

There is more to contemporary console design than getting the iron out; this can even be a backwards step, as some new commercial designs prove. Advances in gain structure and impedance optimization, frequency compensation techniques, and grounding systems are as important as circuit topology in maintaining NEOTEK's leadership. It goes without saying that all console stages exhibit absolute stability and will operate with impunity in r.f. fields well in excess of 1 volt/meter.

Even the FET switching in the III C reflects refinements beyond standard circuits including those based on dielectrically isolated IC switches. Not only are the NEOTEK switches silent, but they are sonically transparent even when many stages are cascaded (a test we employ in their development).

Although NEOTEK has become known among designers for its refinement of op-amp circuitry, we are now extending the state of the art in discrete designs in applications where the very best op-amps, IC or otherwise, reach their limits. Our instrumentation amplifier mic pre is just one example. Exotic topologies using components unavailable until recently yield stages with half the noise of the NE5534 or OP-37, twice their output voltage, and over ten times their speed. This results in a stage that will produce +26dBu at over 200 volts/microsecond with a dynamic range of 130dB. These new circuits are completely complementary cross-coupled and operate pure Class A. Like all NEOTEK designs their power bandwidth exceeds their small signal bandwidth so transient distortion phenomena are completely eliminated. There is simply no comparable topology in any other console. Most importantly, these circuits were developed because they offer audible advantages of which conventional circuits are incapable.

Systems

The Series III is an in-line monitoring console in which all of the basic signal flow and metering is configured by logic-controlled solid state switching. Only a single master switch is required to change the entire console from RECORD to OVERDUB to MIXDOWN modes. Each input - output group is comprised of an input/monitor module containing NEOTEK's acclaimed transformerless mic preamp, a four-band multi-mode equalization section, six auxiliary buses, and monitor functions. There is an associated assignment/output module and peak/VU light column meter, and below the write-on strip is a fader module which may optionally accommodate VCA grouping or automation functions.

As the master recording console of a multitrack studio the Series III handles signals relating to microphones, tape machine inputs and outputs, headphone feeds, auxiliary signal processing equipment, and other interconnected facilities. What distinguishes the Series III is the ease with which any of these signals may be called up, manipulated, and auditioned.

On the input module, the availability of a readily accessible line gain control, dual mute system, split equalizer, and stereo solo as well as in-place solo, all contribute to the control an engineer can exercise or ignore as he chooses. In the output section the six equalized auxiliary bus masters which solo in stereo, the cue system submixer, flexible meter and peak indicator controls, and the unusually comprehensive monitor section and patch bay are further indications of the power that has been designed into the operating system of the Series III C.

This highly refined flexibility allows the complicated routings common to contemporary mixdown sessions to be achieved faster and easier (and with fewer patch cords) than with other consoles, with or without automation.

The stereo solo system of the III is an uncommon asset on multitrack consoles but it is essential for professional control when cutting stereo drum tracks, stereo piano, stereo strings, horns, or chorus. Even details as small as providing calibrations on every control to make the console faster to reset show the designed-in concern for the practical problems which engineers face.

The basic control offered by the Series III requires no manual switching or patching to handle all normal recording or mixing functions. A guest engineer can get to work immediately and easily learn to quickly give artists and producers their every request. The highly refined systems engineering of the Series III C and its logic-controlled FET switching ultimately means value; it inspires the confidence that results in repeat bookings from producers, artists, and free-lance engineers.

Sonic performance

Although the noise and distortion specifications of NEOTEK consoles are by far the best in the industry, it is more significant that in every direct comparison with other consoles without regard to price, the sound quality of NEOTEK has proven superior without exception.

NEOTEK consoles are used for the finest audiophile recordings such as those of TELARC Records, whose Grammy-winning catalog is considered to hold the finest discs ever recorded. TELARC attributes much of their technical quality to the choice of console, which they found to be the only one superior in terms of noise, distortion, and bandwidth to the preeminent digital recording system they employ. They comment not only on superlative measurements, which technicians reconfirm before every session, but also on an outstanding sonic clarity that distinguishes their NEOTEK console from others they had previously considered. When the balance of the system is sufficiently accurate to resolve console differences, critical engineers universally report this readily apparent sonic superiority.

It is for such reasons that well-known artists prefer NEOTEK consoles. Such professionals are familiar with a wide variety of equipment and are in the best position to make critical judgements. In recent months Series III consoles have been chosen for the personal studios of Chet Atkins and members of Fleetwood Mac, Supertramp, and the Doobie Brothers, among others. Their selections are significant because of the thorough evaluations that were performed: pointed conversations with current owners, performance measurements by top technicians, and critical listening tests that included running album sessions on NEOTEK consoles.

These evaluations concerned the construction and operational features of the console as well as its sonic merits - such professionals won't tolerate ill-conceived functions that fight creativity. In sum, the operational system of the Series III along with its superlative performance are an unbeatable combination - one that will set the standard for many years.

Prospective purchasers owe it to themselves to carefully study the operational features of each console under consideration, to work through common and uncommon situations. They should consult previous owners and above all listen critically to the consoles and their recorded product. A console's basic price is seldom an index of its value. NEOTEK owners have repeatedly shown that a console that sounds great, makes engineers look like heroes, and quickly gives producers and artists what they want is a far wiser choice than a console whose main attraction was an initial low price or a high media exposure.

The purchase of a recording console is also the initiation of an interdependent relationship with the console manufacturer and its dealer, and quality is as important in this regard as with the console itself. From every standpoint NEOTEK consoles offer outstanding value. We invite, and challenge, the most critical comparisons.

INPUT MODULE

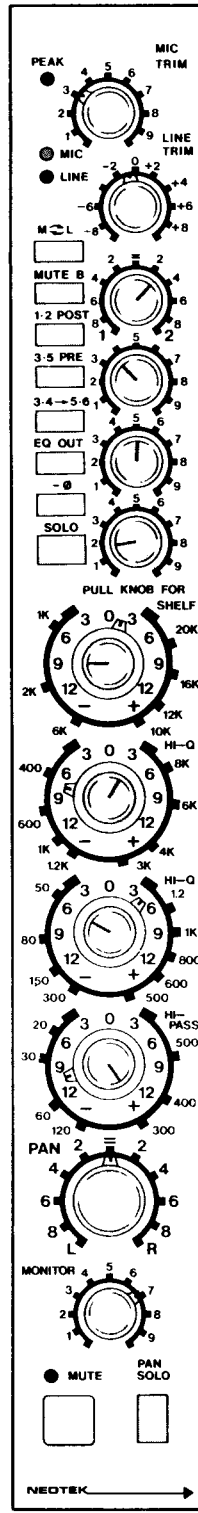
The gain of the **LINE INPUT** is continuously adjustable but has a calibrated detent position at its normal operating point.

Each channel responds to the A mute group unless the **MUTE B** switch is latched. Controls in the master section determine the effect of master mutes and in-place-solo functions on each of the two groups. For example, several channels may be taken in or out of a mix with a single switch, or channels used as echo returns may remain unmuted by in-place-solo of another input.

3 • 5 PRE moves the source of sends 3 and 5 to pre-fader. In record and overdub modes, this will move them out of the monitor channel and into the mic channel. Since either bus may easily be combined with the cue mix in the master section, an artist can hear his live mic on top of his old track at any relative level. Another use is simply to give pre-fader echo sends on buses 3 and 5.

The **PHASE REVERSE** switch silently reverses the polarity of the main channel signal, thus it may be used when mixing as well as when recording, as an artistic tool or to correct previous errors.

The Series III C four-band **PARAMETRIC EQUALIZER** uses the multi-mode state-variable topology that was seen first on NEOTEK consoles. Years of optimization have resulted not only in the exceptional musicality for which NEOTEK equalizers have become known but a network that is totally free of aberrations or interactions at any combination of control settings. The upper knob of each concentric section controls the amount of boost or cut and when these are in their normal positions the EQ section provides four bands of just-over-one octave peak/dip functions. The 20:1 frequency ranges offer wide overlap and the smooth sound of each band is maintained at frequency and amplitude extremes. All controls function smoothly and produce the expected results.



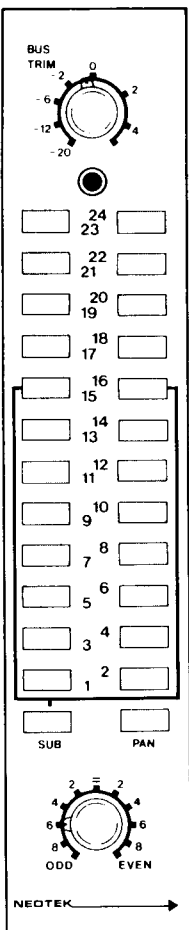
The **PAN** function is a dual control with sine-cosine characteristic which feeds the 2-mix. Its source is either the monitor control, in record or overdub modes, or the channel fader at mixdown.

The **MUTE** switch silently removes all post-fader sends from their buses. Because an input is actually removed from the 2-mix buses as it is muted, the noise gain of the 2-mix drops. This unique muting method can mean a 15 to 30dB improvement in noise performance over other consoles. The logic-controlled mute function also responds to master controls: **MUTE A**, **MUTE B**, **MUTE ALL**, **MUTE LOCK**, and **IN-PLACE-SOLO** (an exclusive mute function which mutes all channels except the one soloed). The mute function does not affect the fader output in record or overdub modes. This powerful logic control does not require VCAs or an automation system for its effectiveness. An LED indicates a muted channel.

Beneath the main modules, in a massive frame extrusion, is a durable melamine laminate write-on strip on which channel numbers are engraved.

The fader associated with each input channel is mounted on a separate panel; it may easily be changed or serviced. A four-inch semi-sealed conductive plastic fader is standard but many options may be retrofitted in the field: Penny & Giles faders, VCA subgrouping faders, and today's most popular automation system, the Valley People Fadex and 65K Programmer.

TRACK ASSIGN / OUTPUT



The **TRACK ASSIGN** module in each input group contains a multitrack bus combining amp with its gain trim control, and push-button switches to assign the post-fader output of the associate input module to any of the 24 multitrack buses. Such assignments are made as a single mono level unless the **PAN** switch is engaged; in this event assignment to odd/even pairs of tracks is made through the pan control on the assignment module. When assigned to one pair of tracks, this pan pot has a sine-cosine characteristic with -3dB center. If a -6dB center is desired, assignment to an additional unused pair of buses will yield that characteristic.

In complex mixdown sessions the console signal flow logic allows the multitrack buses to be used as additional echo sends. This results in an additional 24 mono or a dozen extra stereo echo buses. With the pan switch engaged, the pan control can serve as a pan or as a level control if only a single assignment is made. The ready accessibility of each bus master gain control increases the utility of this technique, as it will serve both as a master level control and to positively prevent the possibility of bus overload.

The **SUB** switch allows yet another use of the multitrack buses which will make mixdowns more effective. When engaged, the output of the main pan pot on the input module is removed from the 2-mix buses and may be assigned to any of the first sixteen multitrack buses, typically in stereo pairs; these buses then serve as submasters. The input module remains unmuted, so its echo sends are available to generate a submaster echo mix. This echo may be returned through an input channel and brought back into the subgroup so that it follows both individual faders and the subgroup master. Alternatively, the optional submaster modules provide returns for both the stereo submixes and the echo as well. Eight buses remain unaffected by the sub switch and so remain available as echo buses for the subgroups – in stereo if the pan switch is used. This highly effective submastering system does not require VCAs or automation for its function, but neither does it conflict if either of these options has been fitted.

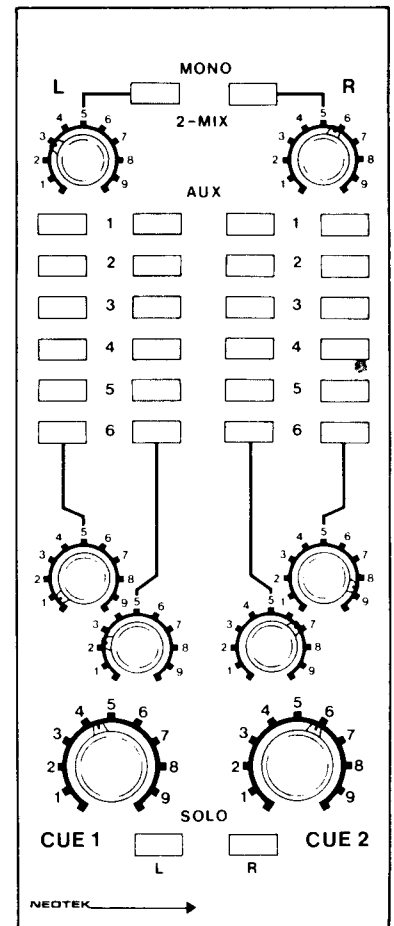
Each track assign module has a black button on the assignment switch that corresponds to its channel and track number. Those modules beyond 24 have only white buttons and no bus trim control or associated light-column meter.

The design of the **CUE MASTER** module is such that each cue has two inputs and each of these inputs may be any, or all, of the **AUX** buses and/or the 2-mix in stereo or mono. This module then is a small mixer used to select the inputs and levels that make up **CUE 1** and **CUE 2**. This may seem complex, indeed it can be when necessary, but in most cases **AUX 1** and **2** will be selected for **CUE 1** and **2**. The small pots have center detents and are seldom touched. Yet, the first time the talent asks, "Can I have the whole mix in stereo with the snare up a bit, my old tracks in stereo and my live mic down the middle with a little more reverb, and I don't want to hear the punch-in," just smile and give it to him without hesitation or patch cords.

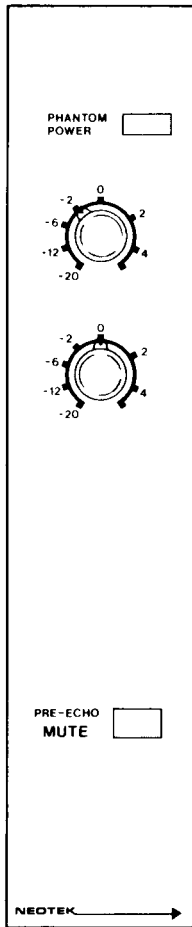
The 2-mix can be used for stereo cues or either side may be sent to the mono 2-mix. Any aux bus can be added in, if desired, and the whole mix monitored with its stereo solo.

This module may also be used at mixdown to get, for example, pre- and post-fader sends from every input module into the same stereo echo mix. It has enough other uses to make it worth its weight in gold patch cords.

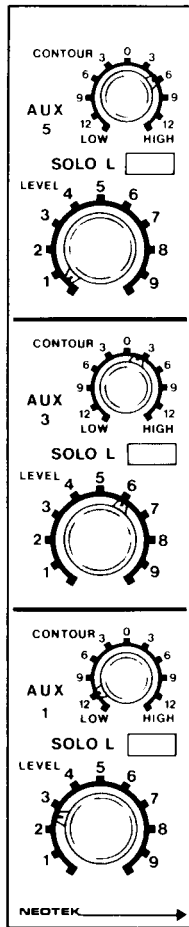
CUE MASTER



2-MIX



AUX BUS MASTER

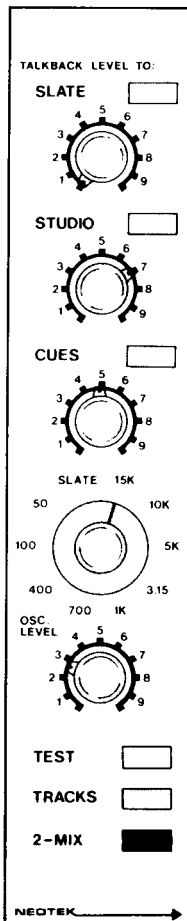
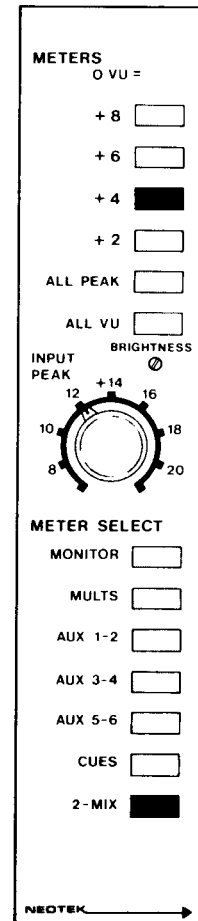


The principal controls on the **2-MIX** module are the gain trims for the main **LEFT** and **RIGHT** combining amps. The accessibility of these controls permits small adjustments in the level or balance of the main stereo mix without the need to make small adjustments on each input channel. The electronics on the 2-mix module are perhaps the most advanced ever offered on a professional console. Each stage, the combining amplifier and the fader, are specially designed, and are all discrete complementary topologies. They exceed by a wide margin the performance of any circuits based on op-amps, IC or otherwise, in terms of speed and dynamic range.

There are two **AUX BUS MASTER** modules on the IIC for control of the six auxiliary bus outputs. The level control is a true gain adjust, making it impossible to overload the master or operate it suboptimally. The **CONTOUR** control is a simple but highly effective frequency shaper that can remove boom from a chamber send or brighten a cue feed with minimum effort. Each aux bus output is normalised to a chamber feed in the patch bay and each is also available on the cue master module. Outputs from the aux buses solo in stereo: odd - left, even - right.

METER CONTROL

SLATE



The **METER CONTROL** module sets the OVU point for all the console light meters and can switch them all simultaneously to peak or VU response with a pair of momentary switches. Each meter may also be individually changed with a touch-sensitive switch on its face. A screwdriver trim is provided to adjust the brightness of all the light meters to suit the control room light level. This module also provides a control to set the threshold level for all the **PEAK** indicators on the input modules, allowing each engineer his preference. A set of interlocking switches is also provided to re-route the pair of analog meters which normally parallel the 2-mix light meters. This allows metering the cue sends, the aux bus sends, a pair of 4-jack mults in the patch bay, and whatever signal is selected for the monitor source be that the 2-mix, tape returns, or solo.

On the **SLATE** module are individual controls and assignment switches for the talkback mic level to the slate, studio and cues. An accurately leveled oscillator offers ten frequencies which are switch selected in order that they be precisely resettable. The frequencies are specially chosen for their utility in a recording studio. Switches assign the slate mix to the 2-mix and multitrack buses. A **TEST** switch sends the oscillator to a jack in the patch bay without causing a control room dim, for special purposes.

The Series III console is fitted with two **ECHO RETURN** modules to give a total of four returns; a third module is a plug-in option. Each section of an echo return module provides a panable line-level return to the 2-mix from normalised-through jacks in the patch bay. This signal may be monitored by use of its stereo solo function and sent to the 2-mix by a second switch with an LED indicator. Two more controls are provided to send returned echo to the cue mix, and another switch is available to invert the polarity of the modules signals.

The optional **DUAL STEREO SUBMASTER** is complex, not because of its own circuitry, but because of the way it interrelates with other console functions. This module contains the electronics for two stereo submasters and has two stereo faders associated with it. The mute and solo system of each submaster is identical to that of an input module with the exceptions that they are not affected by either **MUTE A** or **MUTE B**, and that they do not cause an in-place solo function (otherwise they would mute their own input channels).

The output module associated with each input channel allows stereo submastering onto multitrack buses. Each submaster module is then hard-wired to an odd-even pair of multitrack outputs and can return their signals into the 2-mix.

As with all such systems, in order for echo to follow the submaster a separate echo bus must be used. This is the purpose of the remaining eight bus assignments on the input group, allowing the echo buses on other input modules to remain available for normal uses. Unlike other non-

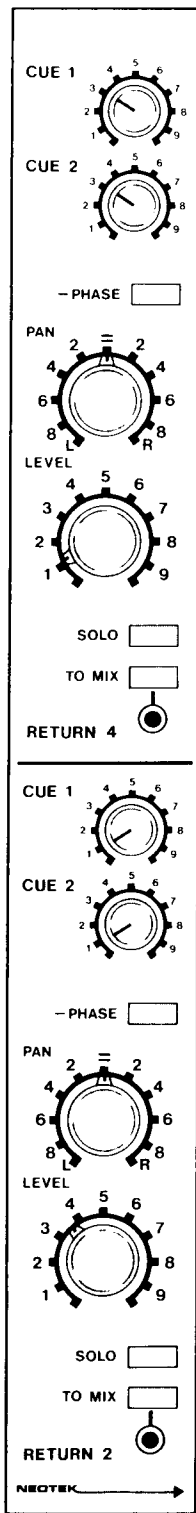
VCA submastering consoles, it is unnecessary to use an input module just to return the processed echo signal to the subgroup; a stereo return from the patch bay is provided on each submaster. Note that echo sends from inputs then follow the input faders as well as the submaster fader. Echo send from the submaster to the main echo buses is also provided should echo from the overall submix be desirable. This submastering system is an effective and low-cost means of providing tremendous control during mixdown. Although a similar approach has been taken by Neve and Solid State Logic, the Series IIIC is the only moderately priced console to offer such a system.

NEOTEK also offers a VCA subgrouping system using dedicated submaster faders to which any input channel fader may be assigned. This system is easily field retrofittable in all NEOTEK consoles, including those which already have dual stereo submaster modules. A VCA-based system is more costly but may be considered more desirable in some applications. Its principal differences are that it uses VCAs on the fader modules and does not require separate echo sends or returns.

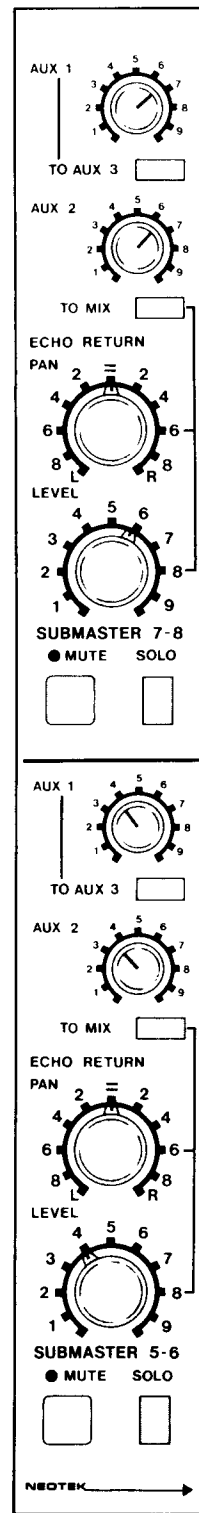
AUTOMATION

Views of automation are of three kinds: that it is a useful tool essential to the progressive studio, that it is a costly and ineffective accessory, that it mainly compensates for shortcomings in the functional design of consoles. The fact is that the greatest majority of multitrack studios who have automated consoles almost never use the automation functions other than grouping, muting, and soloing, it is simply more trouble than it's worth. For studios who feel automation to be cost-effective, all NEOTEK consoles may be fitted or retrofitted with today's most popular system: the Valley People Fadex and 65K Programmer. For the majority of users who hold, as we do, to the latter two views NEOTEK consoles offer a variety of grouping, group solo, group mute, in-place solo, and even VCA subgrouping functions which offer all the benefits of automation except fader position recall at much lower cost. They also don't require using up two tracks of tape currently at about \$1,500 each, but which seems to increase in value toward the ends of sessions. In a serious multitrack mixdown, fader position recall, even if desirable, is only one of the important aspects of the mix: the patch bay looks like an exploded spaghetti factory; all the console sends and returns are active; 2-tracks are running for slap and delay; and the effects rack looks like Las Vegas on Saturday night. None of this can be automated and given the flexibility of a NEOTEK console, the engineer really isn't interested in the added expense of fader position recall.

A great deal of effort has been expended to make NEOTEK consoles so powerful and flexible that the added cost and complexity of automation are an unnecessary addition in nearly every case.



RTN 4



SUB 7-8

RTN 2

SUB 5-6

MUTE ALL actuates the logic-controlled mute functions of every input channel in both mute groups. Because it does not mute echo returns, its effect will be that of causing the main program to silently vanish from the 2-mix while any returned echo dies out slowly. The logic-controlled functions of the Series IIC operate apart from automation or VCAs; they afford the engineer a substantial amount of operational control — nearly all of the benefits of automation without any of its drawbacks or cost.

IN-PLACE MUTES A and **IN-PLACE MUTES B** select which one, or both, of the mute groups will be affected when an in-place solo function is used. If, for example, input channels being used as echo returns (to provide equalization, recirculation, a large fader, or for whatever reason) are assigned to **MUTE B**, in-place solo on **MUTE A** will allow the engineer to audition inputs with their echo wherever that echo is being returned. Once this set-up is made, it requires no additional attention each time the engineer uses an in-place solo.

Latching the **IN-PLACE** switch will mean that any pan solo switch used on an input channel will instead cause an in-place solo. In-place solo is an exclusive mute, that is, it actuates all other logic-controlled mutes and leaves the soloed input(s) remaining in the mix along with only their own returned echo, since input channel mute kills echo sends as well as the 2-mix feed. The engineer may then audition the input module and its returns together in their full stereo spread at the same level and pan they have in the overall mix. This function may be used in the monitoring mix when recording (as well as its customary use when setting up a mixdown) because it will not interrupt the multitrack feeds. The Series III is the only in-line monitoring console able to offer this useful function.

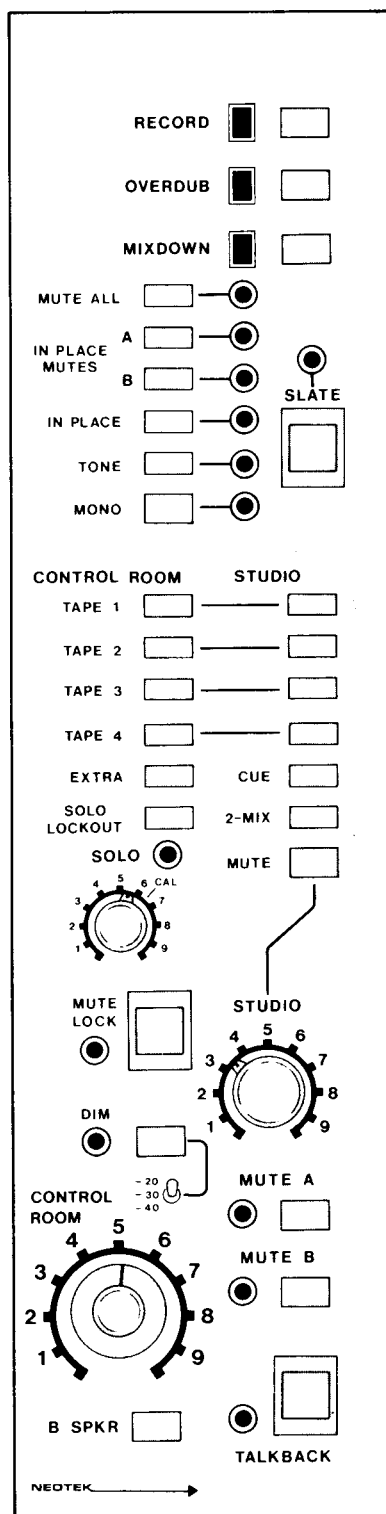
TONE turns on the oscillator and the **DIM** function but not the talkback mic. This latching switch is used to apply tones to the head of a 2-track master, align the multitrack machine, and so forth.

The **MONO** switch silently blends the left and right sides of the control room signal, whatever its source, while appropriately dropping the level. It is also logic-actuated along with its LED indicator whenever a mono solo function is used.

The **CONTROL ROOM INPUT SELECT** switches can call up five stereo inputs in place of the 2-mix. Every input and output of the stereo tape machines appears at normalised-through jacks in the patch bay, facilitating direct 2-track transfers, use of 2-tracks for echo delay, and so forth. Full monitoring capability is retained. Note that cues and echo send/returns are monitored in stereo using their stereo solo functions.

SOLO LOCKOUT interrupts the solo logic, permitting a number of channels whose solo switches are all latched to be put into solo mode with a single button.

An LED indicates that any **SOLO** function is operative and a stereo trim of the solo level is provided. This control has a calibrated unity-gain position, should it be desirable to accurately meter soloed signals.



The light-touch **MUTE LOCK** button engages a logic function which suspends the effects of any changes of input channel mutes until the mute lock is re-toggled. The mute LEDs will change, however, to indicate what will happen when mute lock is released. This function operates irrespective of the mute groups to allow an infinite number of groups of channels to be set up and then be taken noiselessly in or out (or both) of the mix. It is equivalent to electronic editing. In addition to its use for grouping mutes in multi-track mixdown, it can also permit instant change of level, EQ, and echo sends on tracks returned through pairs of input channels. This is equivalent to a scene change in film or video post-production work.

DIM is also a logic-controlled switch; it drops the level of the stereo control room by the amount selected by its associated switch and allows immediate return to the exact previous level.

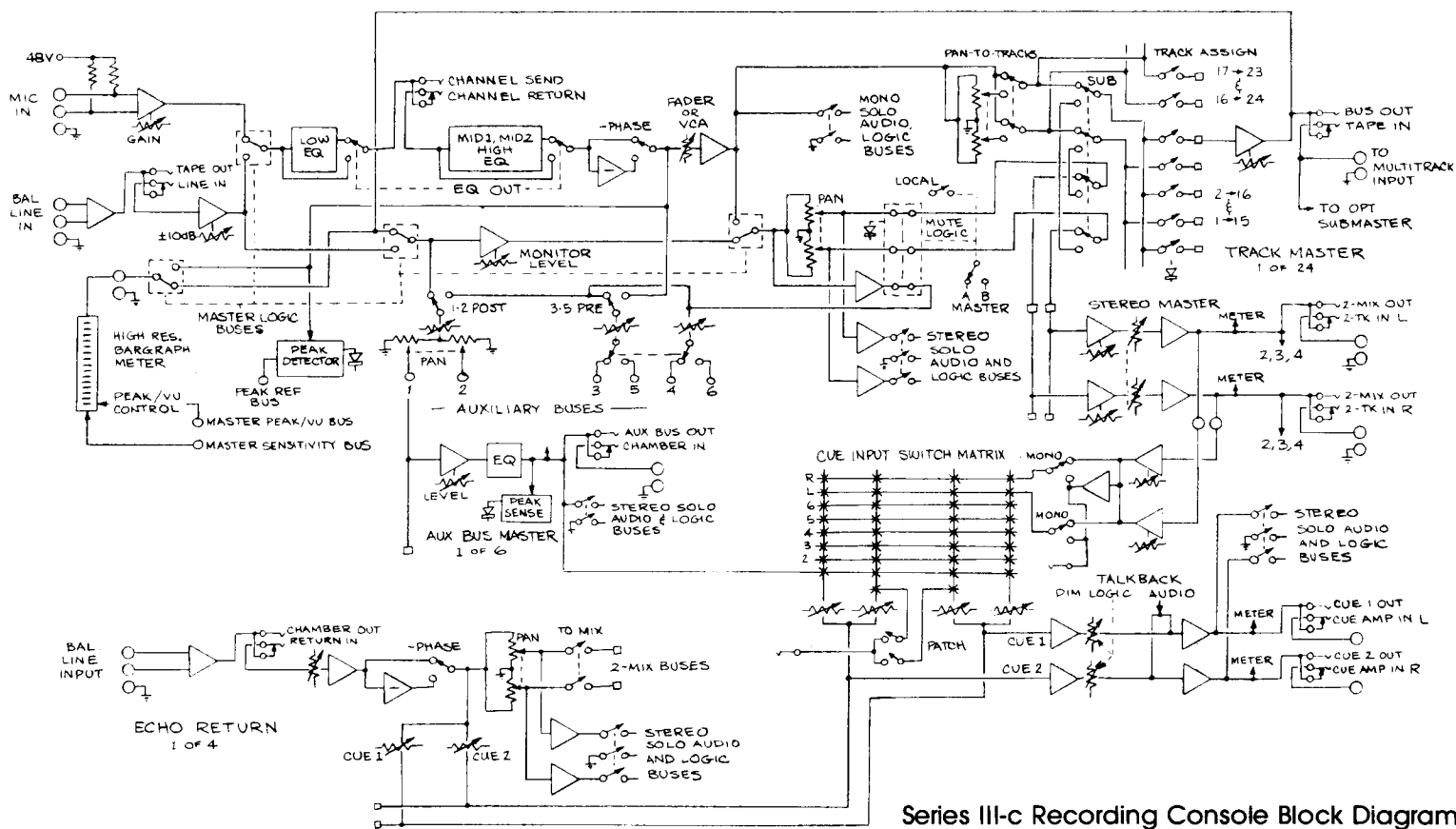
Absolute tracking of the **CONTROL ROOM LEVEL** control is critical. The precision stepped attenuator used in NEOTEK consoles offers better than 1/2dB matching over most of its range. Its 32 positions allow high resolution settings and yet easy return to chosen levels. In addition, its unique construction has been designed specifically to handle high quality audio signals.

The **B SPEAKER** switch mutes the main monitor speakers and routes the control room signal to an alternate amp/speaker reference.

The three interlocking switches, **RECORD**, **OVERDUB**, and **MIXDOWN** direct digital logic-controlled FET switches in each input module to select the appropriate input (mic or line) and to configure the cue, echo, monitor, meter, and 2-mix source appropriate to each operating mode. In the record mode monitoring, cue, echo, and track meters all refer to the console multi-track bus outputs. Input channels are in the sequence: mic pre-equalizer-fader-track assignment. In overdub mode, routing is identical except that the monitor and cue/echo functions refer to the multitrack returns. These returns will typically be previously recorded tracks played back from the recording head (sync) or will be the returned tape machine inputs (console outputs) on those tracks being recorded. By this scheme, the cue, echo, and monitor mixes do not change between record and overdub or during punch-ins. In mixdown mode the main channel sequence is: tape return (from playback head)-equalization-fader-pan-2-mix. Cue, echo and metering then refer to the main channel and the monitor is inoperative. There are many additional subtleties, but all of this basic restructuring is controlled entirely by selecting one of three pushbuttons.

The momentary **SLATE** switch applies the talkback mic and oscillator to the buses and talkback to cue or studio while simultaneously actuating the control room dim function.

The **STUDIO INPUT** selector switches allow sending the stereo cue or 2-mix signals to the studio playback speakers as well as any of four 2-track returns.



Series III-c Recording Console Block Diagram

Specifications

Manufacturers' claims and specifications are the least reliable basis on which to evaluate console performance; they are highly subject to enhancement. NEOTEK has long contended that excellent performance specifications are the consequence, not the goal, of superlative design. Our consoles have produced gold albums, Grammy-winning albums, and audiophile albums both digital and analog of the highest caliber; they are used whenever engineers demand maximum quality. It is also true, however, that when measured from input to output and compared to all other consoles, in every case NEOTEKs are demonstrably superior in terms of noise, distortion, and dynamic range. More importantly, after years of intensive listening comparisons by the most critical engineers one fact has been firmly established: when it comes to sonic quality, nothing at any price beats a NEOTEK.

SERIES IIIc PATCHBAYS

RED = COMP-NY

