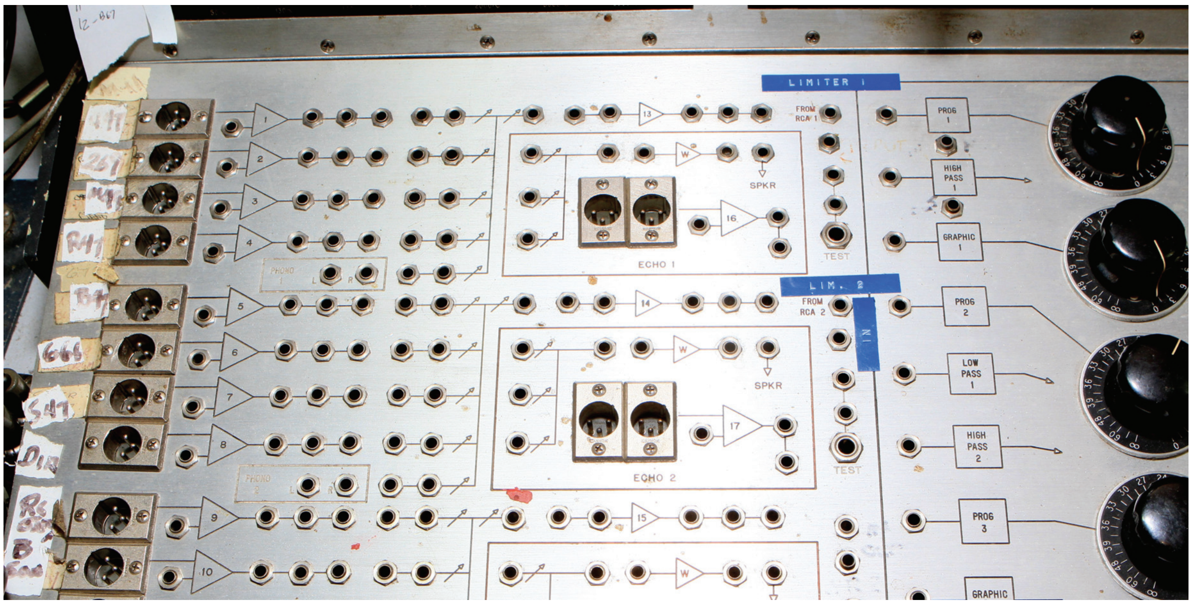
An Olde School Langevin Mixer

Rick Chinn – Uneeda Audio

This is a classic mixer with fixed gain blocks, slidewire faders, passive mixing networks, passive equalizers, etc. EVERYTHING IS PATCHED. THERE ARE NO NORMALS. No patch cords, no audio. Call it job security. The patching, etc. IS the mixer's block diagram, engraved right into the front panel. If you're not comfortable with signal flow concepts, then this might be quite daunting. The signal path is completely minimalist.



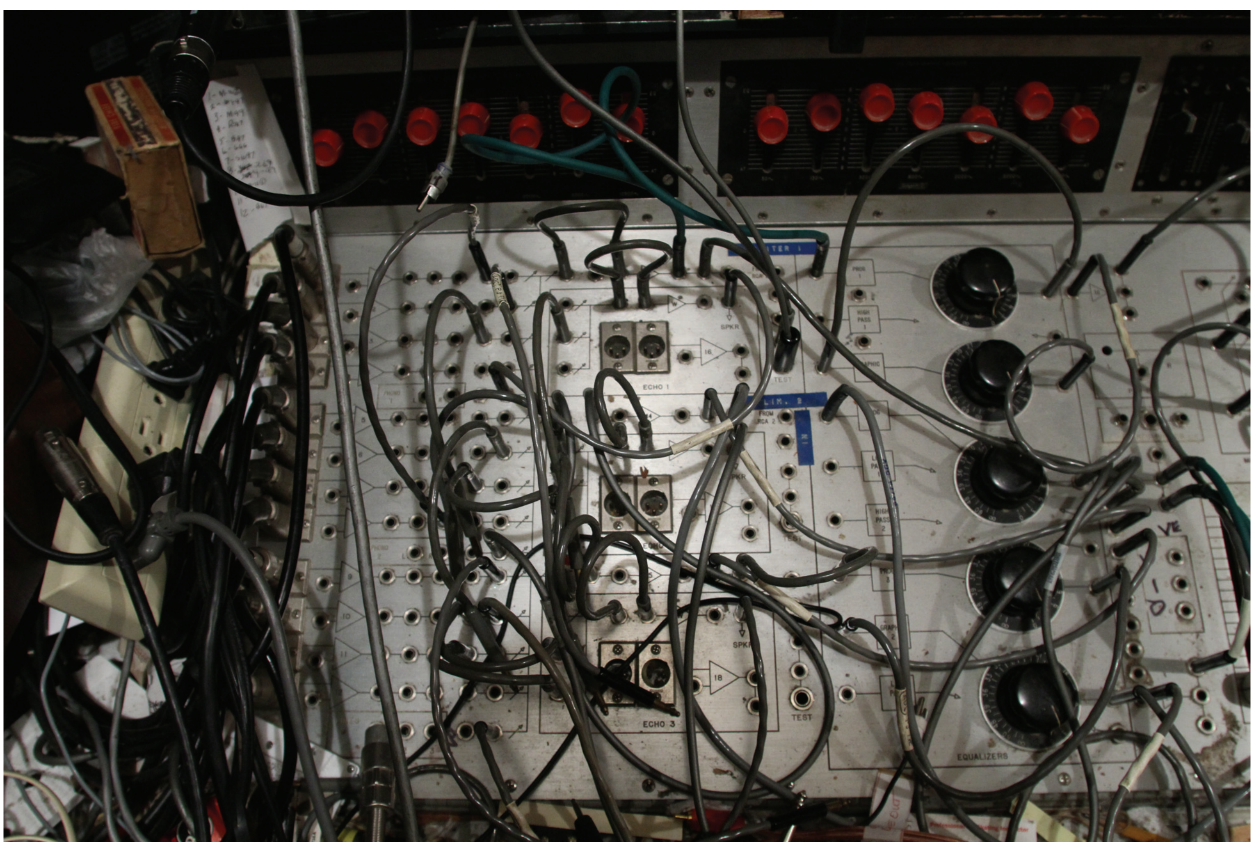
The origins of the design are straight out of the Langevin catalog, but the notion of putting the one-line block diagram on the panel came from Paul Veneklasen, who was an olde-school acoustician down in Santa Monica CA. He designed several auditoriums with sound systems here in Seattle, and his systems always took the form of multiple panels, with the block diagram engraved on them, so that anyone (knowledgeable) stepping up could figure out how things were connected. Glenn White Jr. worked with Veneklasen on these projects and he did the acoustics for Kearney's new studio on 5th Avenue in Seattle, and designed and built this console to go with it.

The faders are Langevins, as are the equalizers and rotary attenuators, and (of course) the 21 AM-16 amplifiers. Connections that would usually be wired/patched together are located next to each other, but they must be physically patched in order to be connected. EVERYTHING is 600-ohms input and output (sorta).

Overview

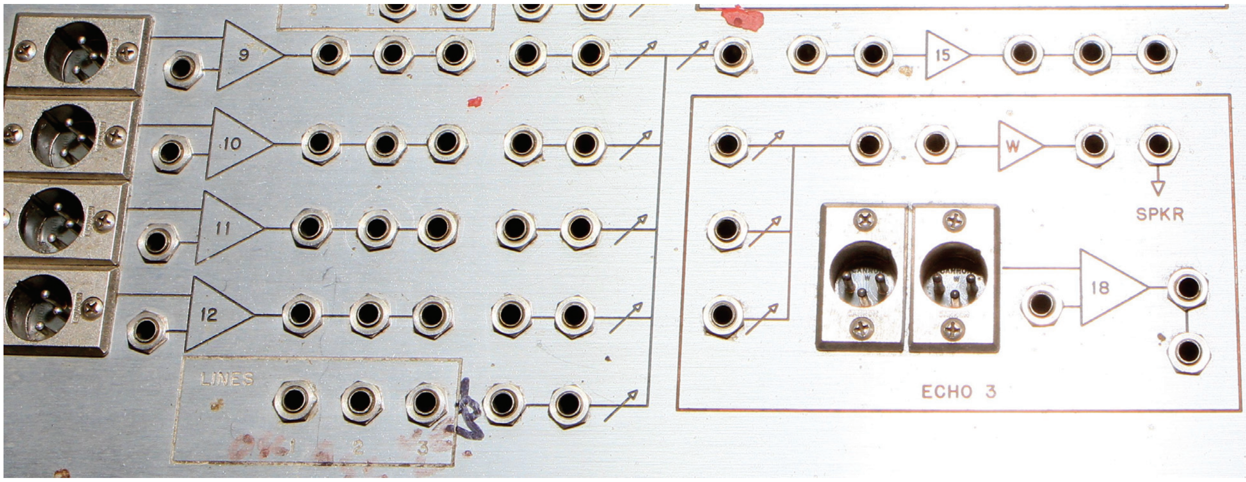
Originally the studio was 3-track, and that's the form that the mixer takes. There was originally no monitor section because each tape track had its own monitor speaker. After an 8-track machine was added, an outboard 8x2 mixer created an 8x2 mix for the monitors.

- There are 3 5-input mixers - These typically went to tape.
- There are 3 3-input mixers - These typically went to echo chambers (live chambers originally), but might also be pressed into service for cue mixes, or to enlarge one of the 5-input mixers.
- You patch the graphic EQs (2) in where needed
- You patch the program EQs (3) in where needed
- You patch the high pass filters (2) where needed
- You patch the lowpass filters (2) where needed
- You patch the VU meters (5) where needed.
- There is a !single! panpot that could be patched in as required.



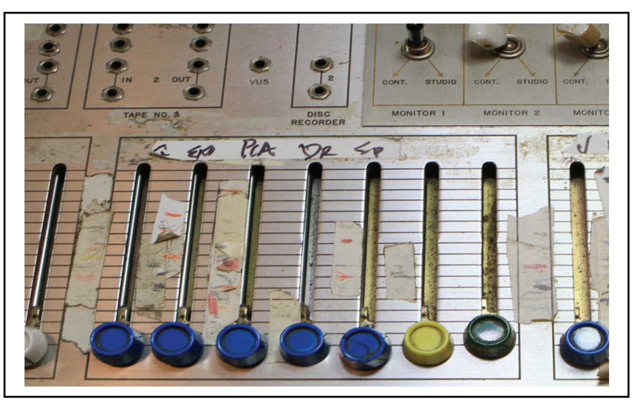
The picture above shows the console configured for use. Perhaps now you can get a feel for how this is used and what is meant by the one-line diagram being the panel of the mixer.

Microphone Inputs / Track mixers



As noted before, there are three 5x1 track mixers (called track mixers because they usually fed a tape track). In the picture, you can see inputs 9-12. There are 4 XLR connectors (yes, they're males) that are the microphone inputs. The TT phone jack is a 600-ohm input into the preamp. Each preamp is a Langevin AM-16 amplifier. These amplifiers are wired for 150-ohms in, 150-ohms out. They're wired 150-ohms in because that's what microphones need to see. They're wired 150-ohms output because these amps don't really care what they're driving, and wiring for 150R (150-ohms) lets you drive up to four loads (faders, equalizers, etc. Remember that all faders are 600-ohm input, so 4 of these patched together (in parallel) turns into 150R. The amplifiers aren't particular about driving a higher load impedance, so in general, you don't need to think about this.

After the preamp (the triangle), you can see a row of 3 jacks. These represent the output of the preamp. The line between them says that they are paralleled (multed). A patch from one of these jacks across to a fader input delivers that preamp's signal to that fader. Usually, these are patched straight across, 1 thru 12. The fader input also has a mult jack, which might be used to send the signal elsewhere, or for testing (since there is no solo system, you might need to patch to the input of a fader to confirm that there is a signal there).

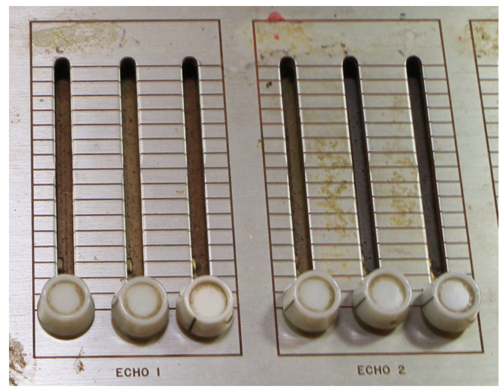


There are 3 5-input mixers in this unit. The thought was 4 inputs, one echo return. If you look at image 4851, you can see these three mixers (5 blue knobs, a yellow knob, and a green knob.

The 5 blue knobs are the 5 inputs, the yellow knob is the monitor level of that channel (control room monitor), and the green knob is the master level of that channel (goes to tape). Repeat this two more times.

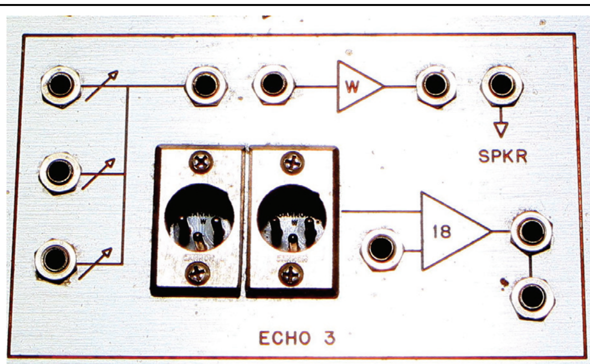
An unusual feature of this mixer arises because everything is passive. Look at the photo of the 5x1 mixer block. Note that the master fader is after the mix bus, but there are no electronics between them. This is an example of a mixer where you can pull the master fader down if the mix amp is overloading and have it do something. Another potentially useful wrinkle is being able to patch 2 (or more) mixers together without consuming an input. Since everything is passive, you can simply jump the outputs of two mixers together before they are sent to the AM16 mix booster. Yes, you may lose some level, but it will work and the electronics won't complain. Looking at this another way, if the input faders are set at –15, the master fader at –15, then that's 30 dB of loss. A 5-input mix network has a loss of 14dB, so that's 44dB, which just about equals the 45dB gain of the AM-16 amplifiers.

Echo Mixers

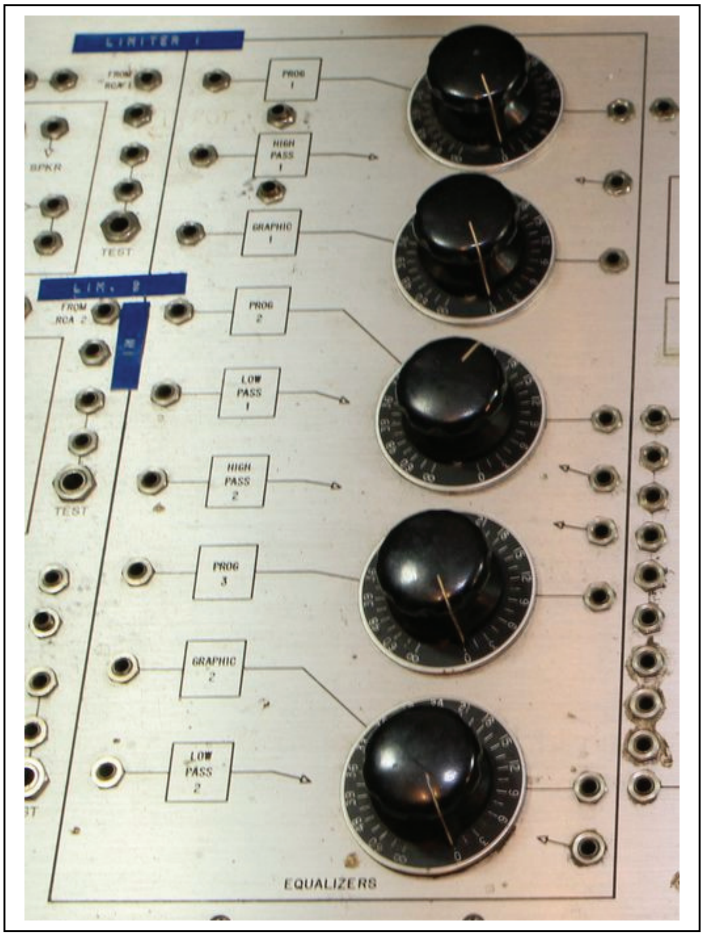


There are 3 three-input echo mixers (white knobs). Originally there were 3 echo chambers and one of these mixers fed each chamber. Since everything is patched, these mixers also got used for cue mixes, etc.

In the picture below, you can see this layout. The three-input mixer is at the left, and it usually fed a power amplifier (triangle symbol with W) that drove a speaker in the chamber. The left of the two XLRs was the output of the microphone in the chamber, and the right XLR was the mic input into the AM-16 that brought it back to line level. So, each echo chamber could have 3 inputs sent to it. Those three faders are the ones with the white knobs. There are three of these mixers. The patch from that amplifier to the speaker was at speaker level, but with the live chambers still at the 5th avenue location, and the mixer long removed from that, Kearney went to some sort of electronic reverb; MicMix springs, I think. There's no concept of a post fader echo send unless it's post fader signal of the whole mix.



In use, you create the equivalent of a prefader send by multing the signal at the top of a fader, sending it to one of the 3x1 mixers, and then out to the chamber. The chamber returns to an AM-16, which is then patched to the echo return fader input of the 5x1 mixer.



In another example, you have a group of vocals up and you want to verb the entire mix, so it follows whatever the dry mix is. Vocals are patched to the 5x1 mixer, then brought back to line level with an AM-16. you mult the output of the AM-16 and send it to the chamber, then the chamber return goes to one input of a 3x1 mixer, and the output of the dry mix AM-16 goes to the other input of the 3x1 mixer. The output of the 3x1 mixer might be hot enough to be line level without any makeup gain, otherwise you need another AM-16 here.

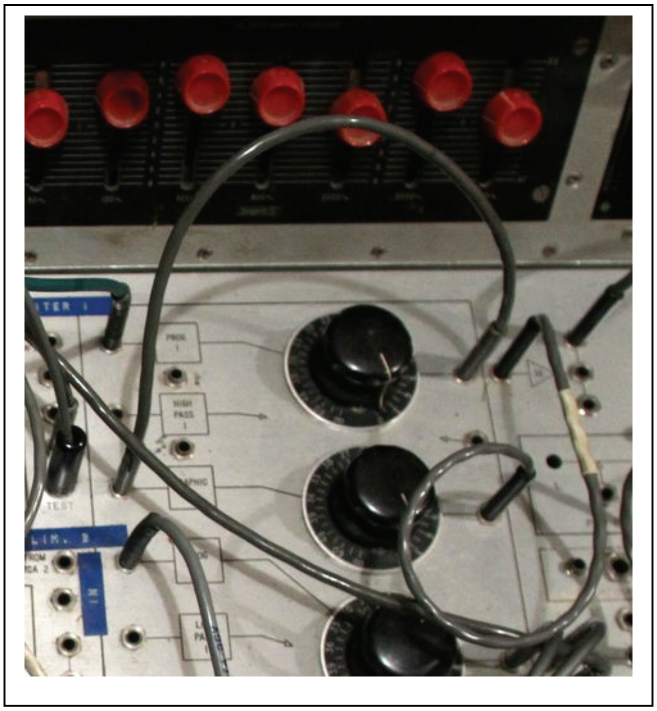
Equalization

There are 6 black knobs visible, in the block marked "Equalizers." All of the equalizers in the board are passive, meaning that they have insertion loss that must be made up somehow. They must also be terminated (loaded) in 600R. Each of the black knobs is a variable attenuator that lets you add additional insertion loss in the equalizer path. The attenuator also provides the proper load (termination) for the equalizer.

The graphic equalizers are type EQ252. Each has seven bands and 16dB of insertion loss. The program equalizers are type EQ251 two-band units with 14dB of insertion loss. They are basically bass and treble controls, with the notable exception that the treble boost curves are bell-shaped and tunable. Refer to the Langevin data sheets for more information.

Starting at the top, in the small squares in the line leading to the rotary attenuator, they are marked (in order) prog 1, high pass 1, graphic 1, prog 2, lowpass 1, high pass 2, prog 3, graphic 2 lowpass 2. Each program equalizer and each graphic equalizer has its own rotary attenuator. The highpass and lowpass filters have zero insertion loss within their passbands.

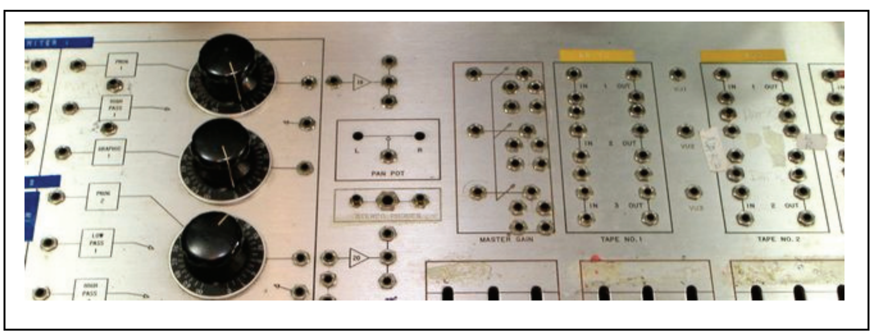
As you can see, the signal path didn't usually include equalization on every input, although with some repatching, it was sort-of possible. Also within the Equalizer block, you can see the jacks leading to the high pass and low pass filters. The 2nd square beneath Prog 1 goes to high pass 1, and coming out of that box is a line with an arrow... that continues at the arrow on the output side of the box. In reality, then, there are only 5 equalizers of two different types, and 2 high pass filters and 2 low pass filters. But since these are not dedicated to any one spot in the signal path, they get patched in where needed. You can't be completely brainless about this, as you have to keep track of signal losses, and then compensate for them using the rotary attenuators and the AM-16 amplifiers. Note that the high- and low-pass filters have no insertion loss.



In the picture, locate the green patch cord near the top, and between the two graphic equalizers. It's patched from the output of an AM-16 amp used as a mixer booster (overcomes the loss of the mixing network), into the input of Program EQ 1, which is then patched into graphic eq1, and that is patched into another AM-16 that overcomes the loss caused by the two cascaded equalizers (16 dB for the graphic, 14 dB for the program EQ). The AM-16's, in this configuration have 40dB of gain, which more than overcomes the loss caused by the two equalizers. In practice, you might add up to 10dB more loss using one of the rotary attenuators so you don't run out of headroom in the AM-16.

Outputs

To the right of the equalizer block are three AM-16 amplifiers which are the equalizer gain makeup amps. Note that every amplifier has 3 outputs, so that it may be patched to multiple destinations as required. One of these outputs now patches to the next block of the mixer, the master fader block. You can see two of them in the photo.. The master is a 3-gang control, and its output drives the tape machines directly.



The next set of boxes represents the tape machines and the feed to the disc recorder.

Monitors

Under the VU meters, is the monitor switching. There are provisions for 4 monitors. If you look carefully, you can see the amplifier triangle pointing to the lower switch. In each monitor block, the upper switch selects the source, which is one of the two jacks, then there is a level control (the yellow knob) and then the power amp, and then the lower switch. The top switch typically did tape out vs tape in switching, and the bottom switch could select control room, both, or studio speakers.

Finally, go back to the photo showing the 5x1 track mixers. Look at the AM-16s used for mic preamps. In addition to the XLR input, there's an extra TT input. The XLR input was intended for microphones, but the TT input is a 600R line input. I need to make some further measurements to figure out what the gain difference is here. This allows you to use a spare mic preamp for something else within the mixer. Note that the echo return preamps also follow this convention.

Loose Ends

You're probably wondering why there are MALE connectors used for INPUTS. There's 3 reasons.

1. Patching goes a bit faster when you don't need to know the gender of the patch cord end.
2. The male connectors are smaller and can be mounted closer together, facilitating mounting 12 of them on the face of the panel in a single column.
3. In 1965, the convention of always using females for inputs hadn't quite sunk in yet.

A slightly earlier system (1962) at the Seattle Center opera house (also Veneklasen/White) had females on both sides of the inputs.

The rotary pot above the panpot (purple knob) replaces the yellow slide fader that is missing. I don't know where the actual monitor level pot for monitor 4 is located. You can see where the panel has been modified to accomodate the scully, etc. In the control room now, there are only 2 monitor speakers.

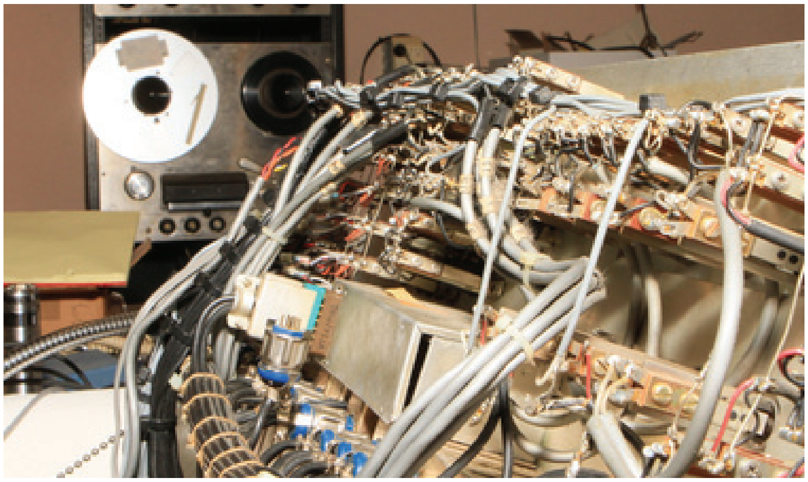
The panpot was an oddity (a luxury, actually) so if it was needed, it was patched into the signal path somewhere.

The rest of the stuff that I haven't talked about is patching for the scully, some mults, and vu meter patching. There is a talkback system, but it is external to the mixer. oh yeah... this board is wired pin 3 hot, not that it really matters.

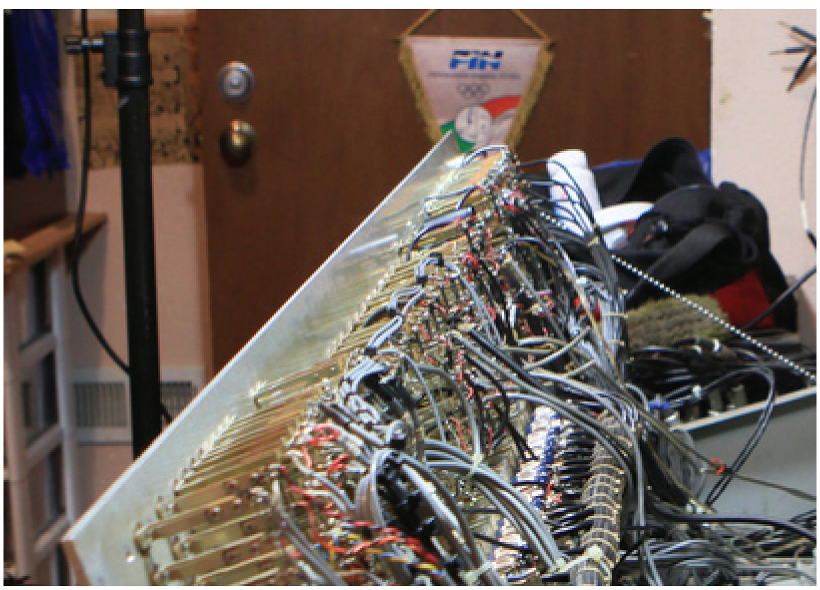
The 5 VU meters can be patched to any point in the circuit, as required and/or needed.

Internals

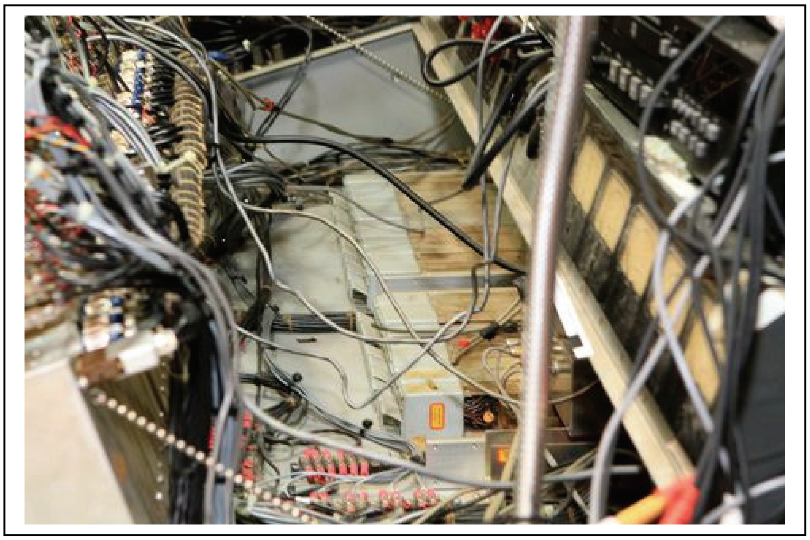
The guts are really pretty simple. Everything is hand-wired, in fairly tidy harnesses. The AM-16 amplifiers are located inside the chassis, more or less under the left-side of the mixer. There are 21 of them (12 mic, 3 echo mic preamp, 3 mix boosters, 3 eq makeup gain).



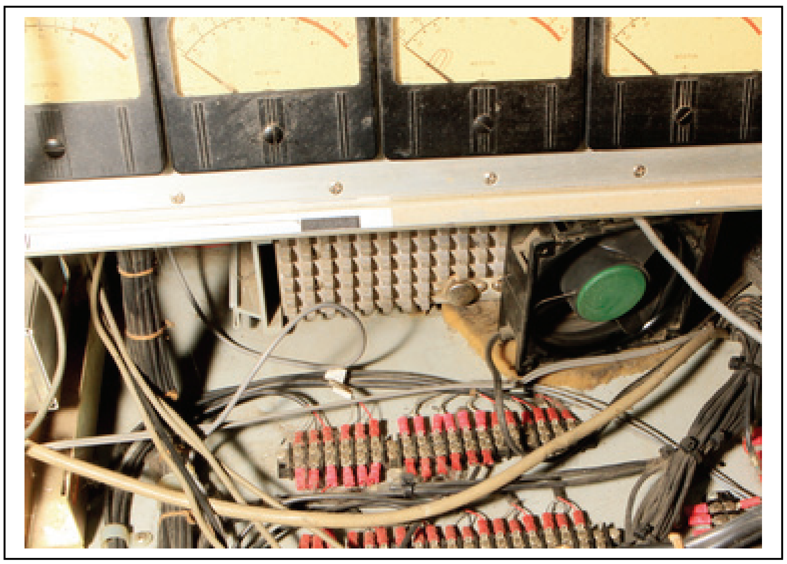
Mixer, looking from the left-hand side, to the right. At the bottom of the picture, is the harness going to the faders from the input patching.



Mixer, looking from the right to the left. Note the AM-16 amplifiers in their tray at the bottom of the mixer chassis.



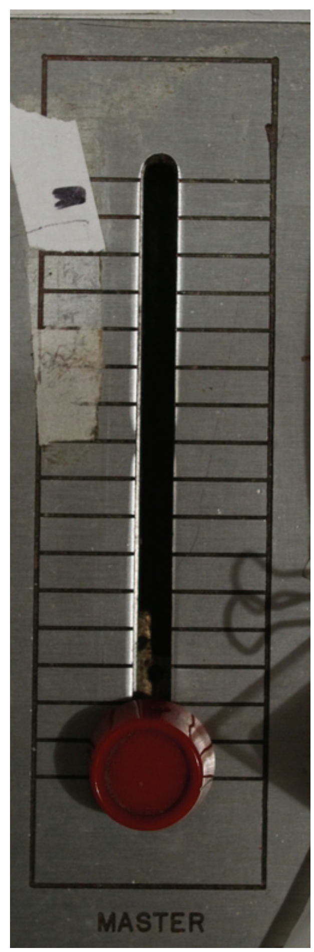
A closer look at the AM-16 amplifiers.



The thing with the waffle-grid heat sink is the power supply for the entire console.

List of Components

1. 21 type AM-16 amplifiers
2. RC612 rack cabinet. Holds 12 AM-16 amplifiers. There are 2 of these.
3. 1 type PS222 Power Supply
4. 3 type EQ251A Program Equalizers
5. 2 type EQ252A Graphic Equalizers
6. 2 type EQ255A Variable High Pass Filter
7. 2 type EQ255B Variable Low Pass Filter
8. 30 single-gang straight-line attenuators (exact model TBD)
9. 1 triple-gang straight-line attenuator .
10. 5 single-gang rotary attenuators
11. 1 straight-line panpot
12. 5 VU meters



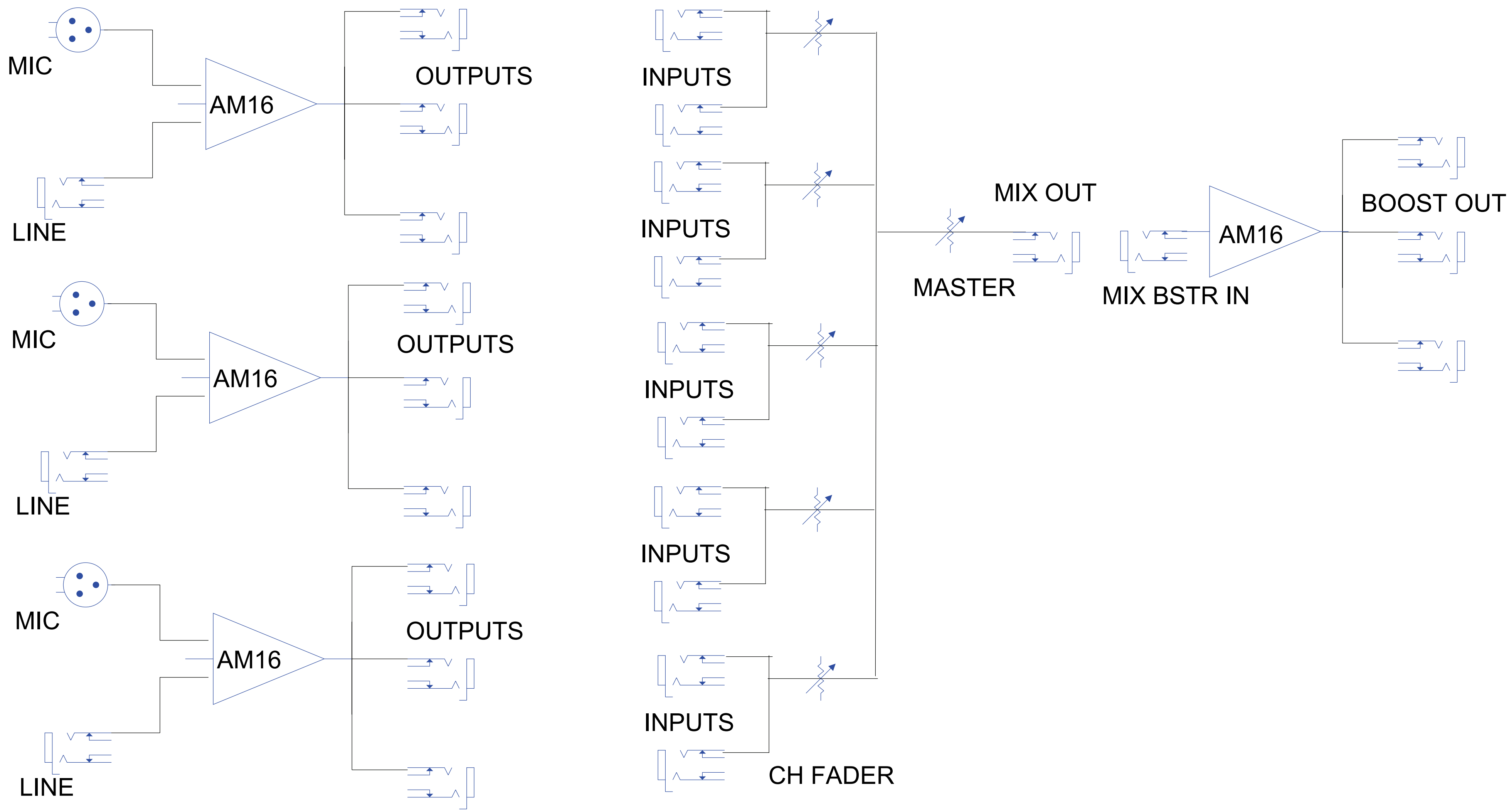
Some Trivia

This is the board’s master fader. Look at the engraving, on the top right. You can see there's a defect in the line.The panel is one giant piece of aluminum and the markings were engraved into the panel using a mechanical engraver.

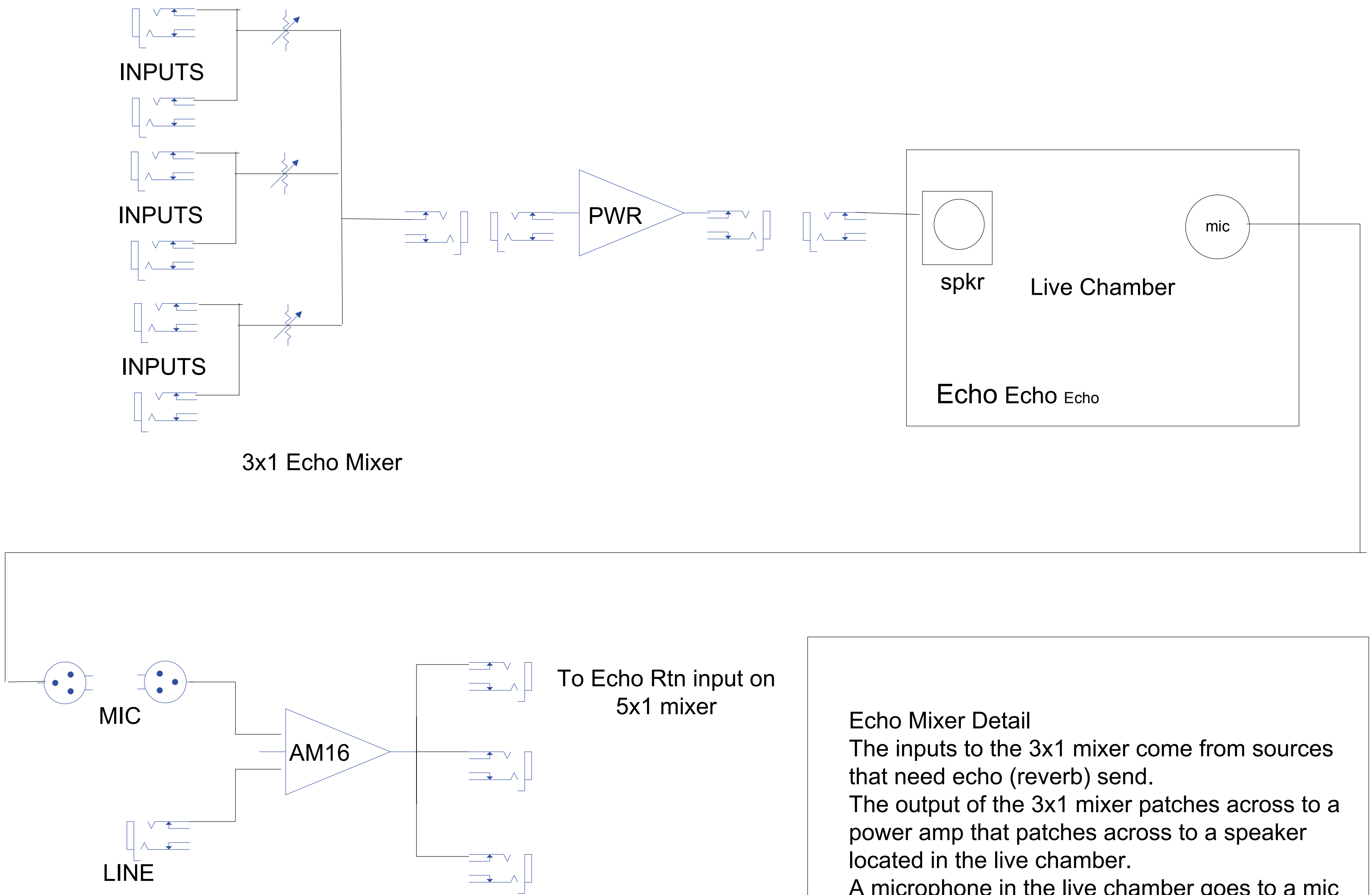
On April 29, 1965, there was a fairly severe (Mag 6.5) earthquake in/around Seattle. At the time of the earthquake (weekday morning), I was sitting in class in high school, at the basement level of an old (1912) stone/concrete school building. The quake felt like the Jolly Green Giant grabbed the building and shook it. At that same moment, somewhere else in Seattle, the engraver's cutter head was at the top right of the outline of the master fader of the console. That's what caused the bobble in the line right there. They decided that it was a bit of history and left it. It certainly does establish when and where this console was made.

http://earthquake.usgs.gov/earthquakes/states/events/1965_04_29.php

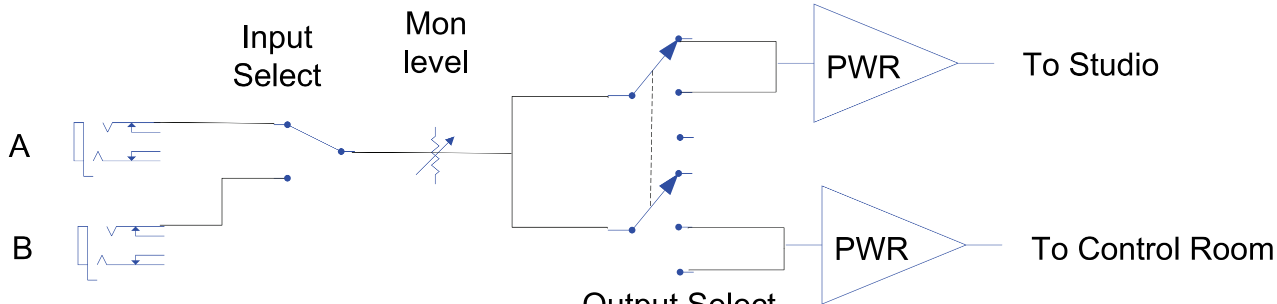
http://www.historylink.org/index.cfm?DisplayPage=output.cfm&File_Id=1986



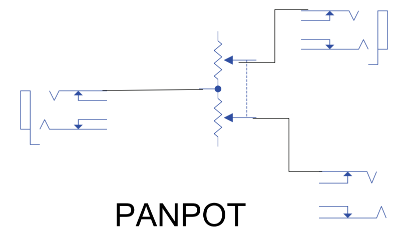
5X1 MONO / TRACK MIXER
There are 3 of these in the unit.
Inputs 1-4 are typically mics, input 5 is typically the echo return.
Mic inputs are patched across to fader inputs. The mix output patches across to the mix bst (boost) input.



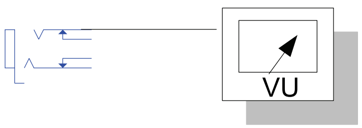
Echo Mixer Detail
The inputs to the 3x1 mixer come from sources that need echo (reverb) send.
The output of the 3x1 mixer patches across to a power amp that patches across to a speaker located in the live chamber.
A microphone in the live chamber goes to a mic preamp block, brought to line level, and then patched to the echo return input on one of the 5x1 mixers.



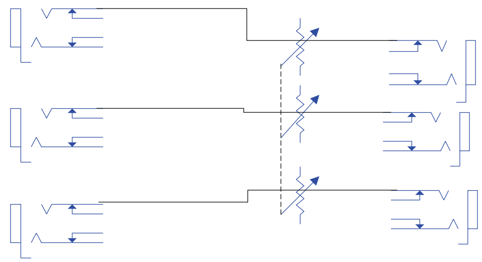
Output Select
Studio / Control room monitor switching
1 of 4



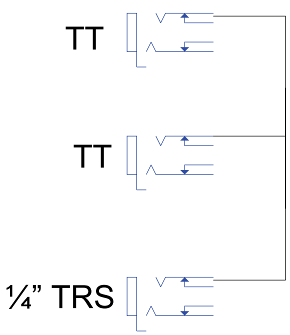
PANPOT



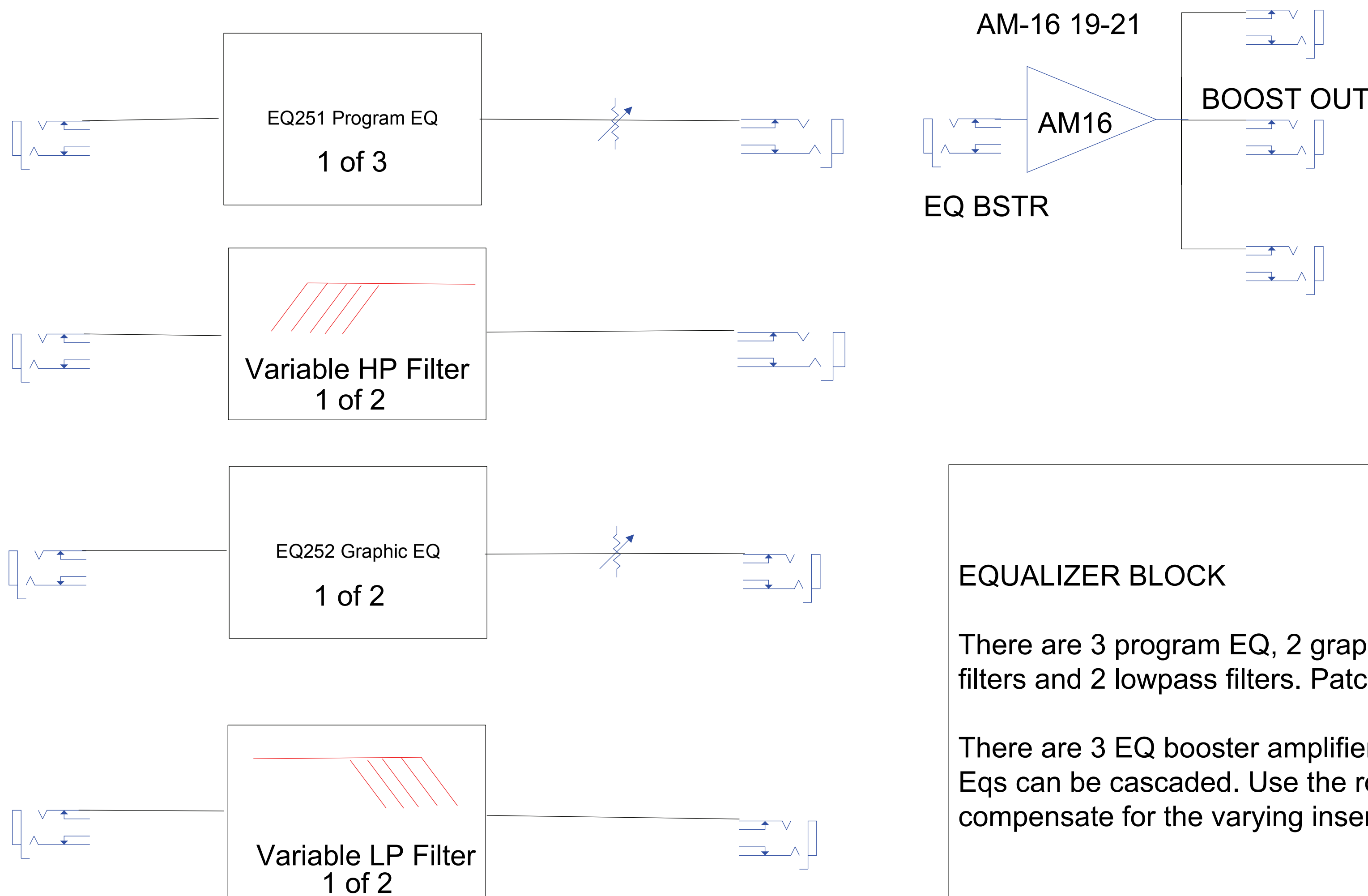
VU Meter
1 of 5



MASTER FADER
NOTE: each output of the fader has 5 paralleled jacks



“TEST” jacks



EQUALIZER BLOCK

There are 3 program EQ, 2 graphic EQ, 2 highpass filters and 2 lowpass filters. Patching as shown.

There are 3 EQ booster amplifiers.
Eqs can be cascaded. Use the rotary attenuators to compensate for the varying insertion loss.

- Preamplifier, Booster Amplifier or Program Amplifier
- Very Low Noise Generation
- Extreme Dependability
- All Transistors are Silicon Planar NPN
- Low Heat Dissipation
- Connections are Plug-in Type

AM16
PLUG-IN PREAMPLIFIER TRANSISTOR TYPE

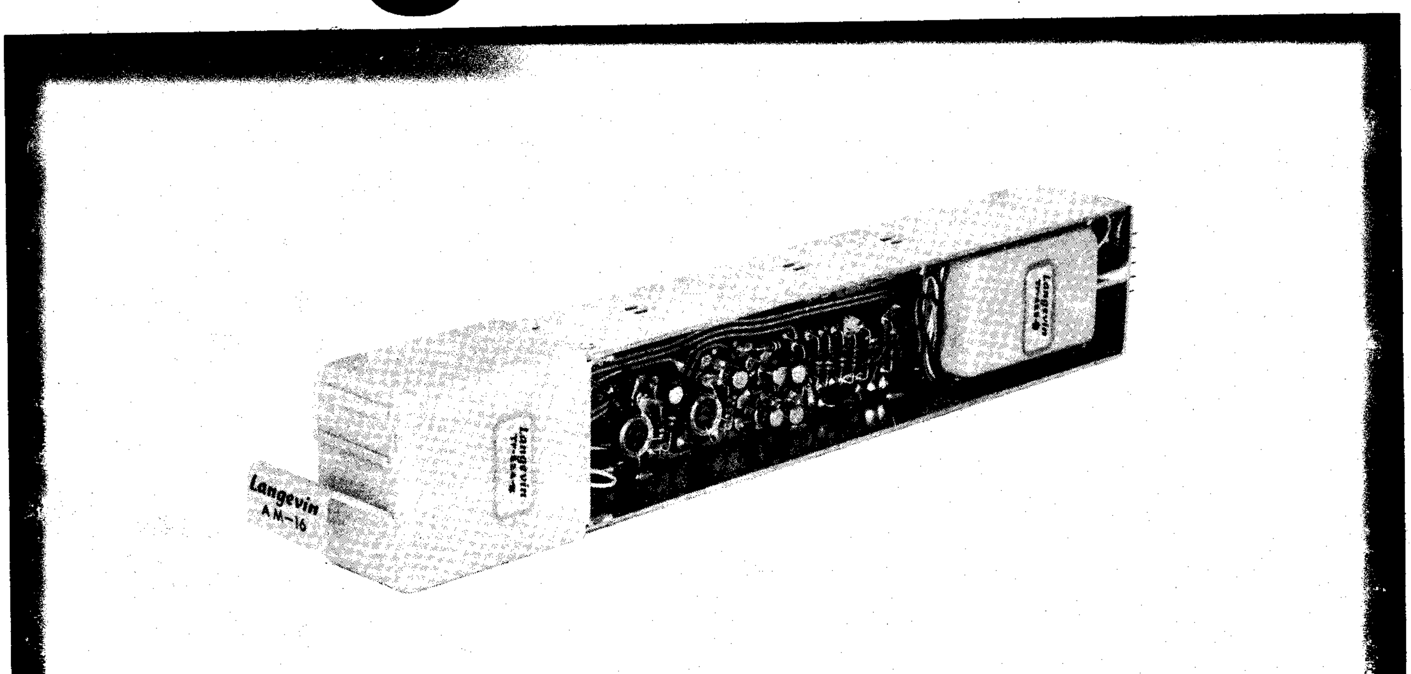
The AM16 is primarily a microphone pre-mixing amplifier. However, its performance also qualifies it for use as a post-mixing (booster) and as a low-level program amplifier. Of special note is the very LOW NOISE GENERATION figure (−127 dbm equivalent input, unweighted).

Extreme dependability has been stressed. All components are operated well within their ratings and no electrolytic capacitors or "chemical" parts have been used. All transistors are silicon planar NPN. The amplifier is not subject to damage from input or output overload or impedance mismatch.

Output power delivered to load is rated at +24 dbm, which may be reduced to +18 dbm by the omission of a strap connection. This lowers the supply current demanded from the external 24 v. DC source.

All conditional strapping of the amplifier . . . whether for input impedance, output impedance, or output capability . . . is performed on the mounting facility which receives it, and not on the amplifier proper. This allows complete interchangeability of all units within a given system without regard to their individual modes of employment.

Langevin AUDIO EQUIPMENT



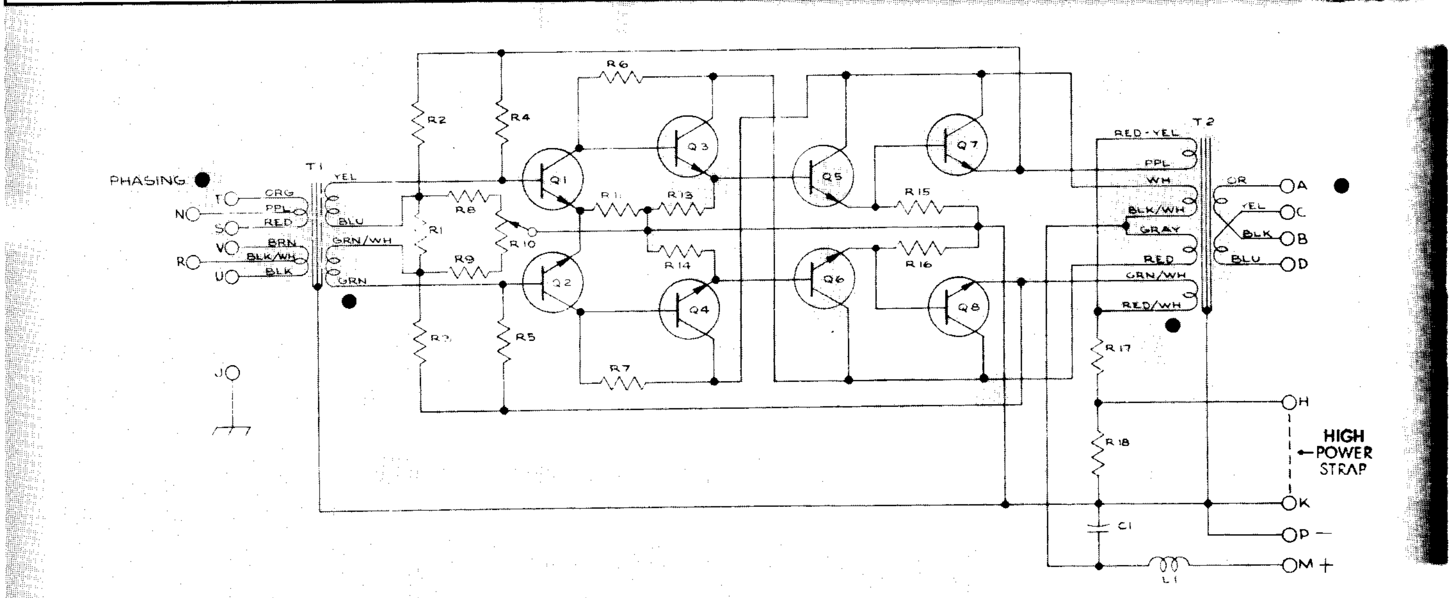
LANGEVIN • A DIVISION OF SONOTEC, INC., 1801 EAST CARNEGIE AVENUE • SANTA ANA, CALIFORNIA • PHONE: (714) 547-6204

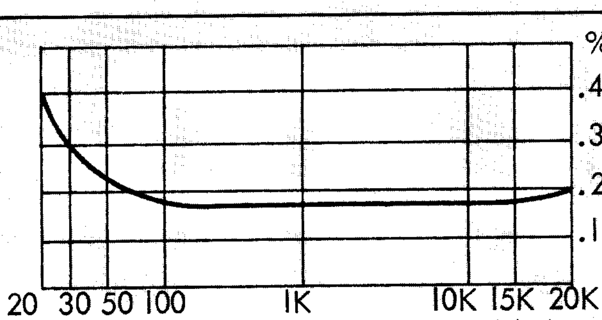
SPECIFICATIONS:

Performance Figures Listed Below Are GUARANTEED Values.

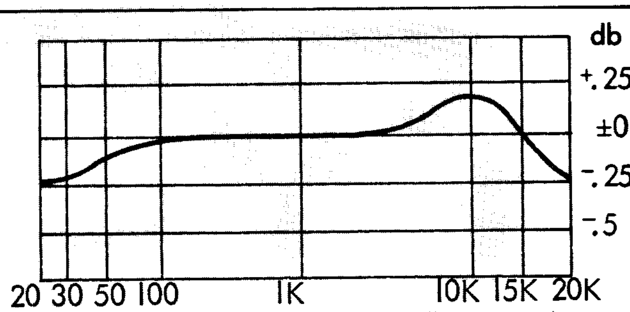
Gain:	45 ± 0.5 db
Input Z:	50, 150, 600 ohms
Load Z:	150, 600 ohms
Harmonic Generation: (Total)	Not over 0.5% from 30 cps to 20 Kcps @ +18 dbm (on "low-power"). Not over 0.75% from 30 cps to 20 Kcps @ +24 dbm (on "high-power").
Noise Generation:	Not over an input—equivalent level of −127 dbm (measured over bandwidwidth 20 cps to 20 Kcps).
Frequency Response:	±0.5 db from 20 cps to 20 Kcps (measured at approx. +14 dbm output).

Size:	Approximately 1¾" high x 1½" wide x 10½" long (not including plug pins).
Power Requirement:	24 v. DC (with negative grounded). 110 ma when on "high-power". 55 ma on "low".
Environmental Requirement:	Temperature of mounting space must not exceed 65°C (145°F), including rise due to AM16/s. (Dissipation of each AM16 is approx. 2 watts on "high-power."





Frequency Response at +14 dbm into rated load. Source: Rated.



% Total Harmonic Generation at +24 dbm into rated load. Amp. strapped "high".

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The amplifier shall be Langevin AM16. It shall be plug-in. It shall have magnetically and electrostatically shielded input and output transformers. Input impedances shall be 50, 150 and 600 ohms. Output impedances shall be 150 and 600 ohms. All strapping for impedance and "high-low-power" shall be on the tray or cabinet which receives the amplifier, and not on the amplifier proper. Noise level shall not exceed an equivalent input of −127 dbm, unweighted. Gain at 1 Kc shall be 45 ±0.5 db. When strapped for high power, harmonic generation at +24 dbm shall not exceed 0.75% from 30 cps to 20 Kc. When on low power, supply current demand shall be reduced, and harmonic generation at +18 dbm shall not exceed 0.5% from 30 cps to 20 Kc. Response at approx. +14 dbm shall be uniform ±0.5 db from 20 cps to 20 Kc. Amplifier shall employ only silicon transistors, and no electron tubes. It shall not contain any electrolytic capacitors, nor any part with known shelf or service life. Size shall be approx. 1¾" high, 1¼" wide, and 10½" long not including plug pins. Plug pins shall be gold-plated. Color scheme shall be gray and iridited cadmium plate

ACCESSORIES:

Mounting Tray No. TRY6 (for installation of single AM16 Amplifier).
Rack Cabinet No. RC612 (for installation of as many as 12 AM16 Amplifiers in 1¾" of vertical space in standard rack).
Power Supply No. PS221 (10 amperes).
Power Supply No. PS222 (3 amperes).

- PLUG-IN CONSTRUCTION
- 24 VOLT
- 3 AMPERE
- "REMOTE" SENSING OF OUTPUT VOLTAGE
- OVERLOAD PROTECTION

PS222
POWER SUPPLY
TRANSISTOR TYPE

GENERAL DESCRIPTION

The PS222 Power Supply is a solid-state regulated unit primarily intended for the powering of transistor-type audio amplifiers. Output is 24 volts at a maximum current of 3 amperes. The full-load ripple output is less than 1 x 10^{-3} V rms.

The power mains which feed the PS222 may be either 105-125 volts or 210-250 volts. Power mains frequency may range from 50 Hz to 400 Hz.

Dependability has been stressed in the design of the PS222. All components are operated below their ratings.

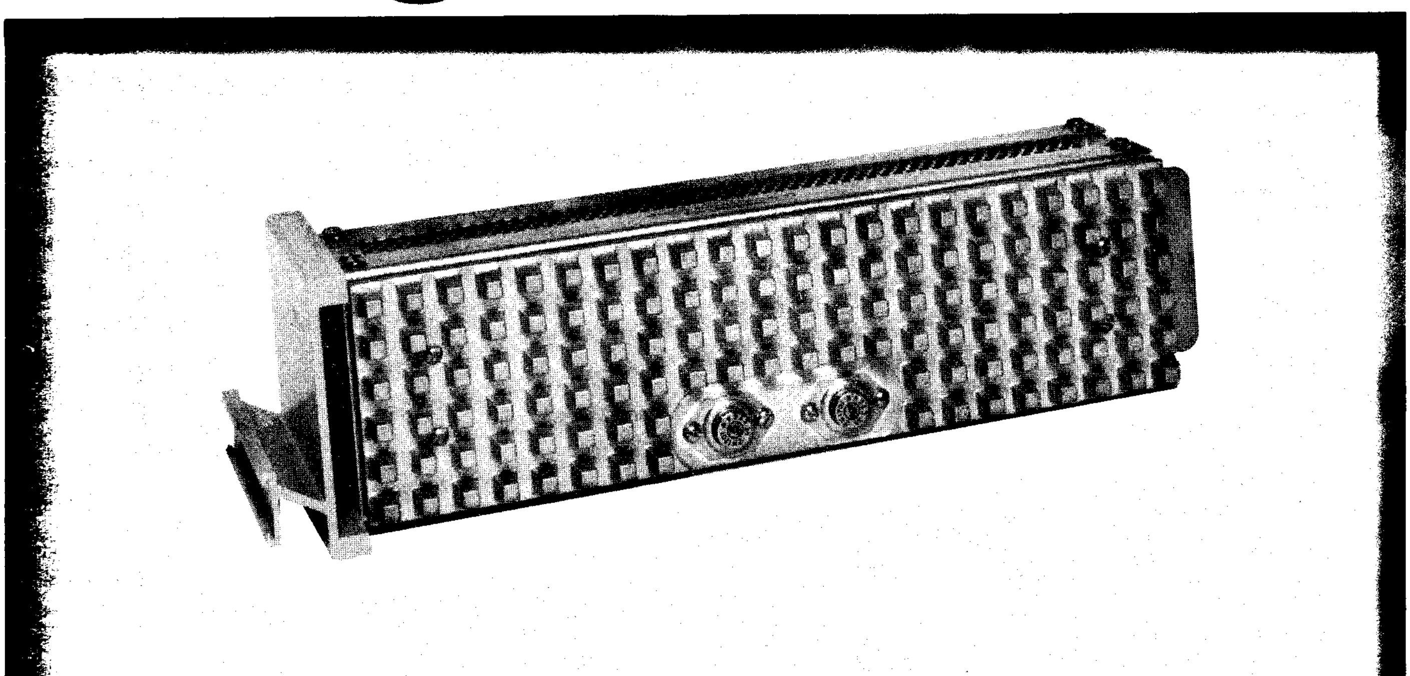
A protective circuit is incorporated in this unit which reduces output to zero in event of an overload or short circuit, preventing any damage to supply or amplifiers.

The power transformer is of the balanced-coil "hum-bucking" type in order to minimize its radiated field. It is equipped with an electrostatic shield between primary and secondary windings. Insulation is Class S silicone.

Inductors are not used . . . ripple reduction and regulation of output are achieved by series-resistance transistors driven by error amplifiers.

The "remote sensing" feature allows the PS222 to correct for voltage error which may exist AT THE LOAD. This feature may be strapped out of the circuit if not required.

Langevin AUDIO EQUIPMENT



LANGEVIN • 1801 EAST CARNEGIE AVENUE • SANTA ANA, CALIFORNIA 92705 • PHONE: (714) 546-8830

SPECIFICATIONS

Output Voltage: 24 volts. This may be adjusted to exactly 24 volts by use of a screwdriver-set control on side of chassis.

Output Current: 3 amperes, maximum

Regulation: Output voltage will not vary more than 0.1 volt from no load to full load

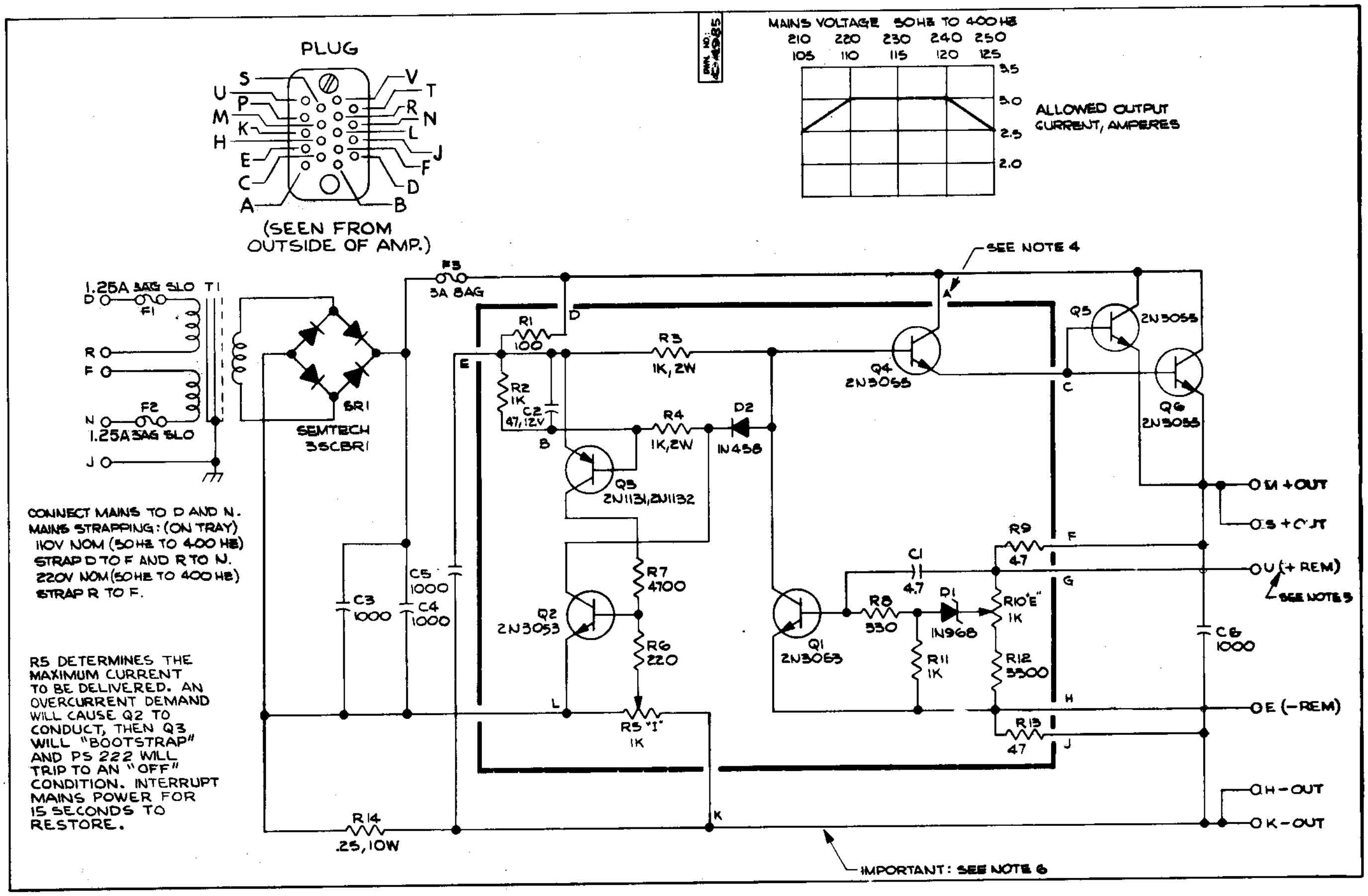
Overload Protection: Application of overload or short circuit will cause output voltage to drop to zero. Reset by removing mains power for approximately 15 seconds

Ripple: AC components in output voltage will not exceed 0.001 volt rms at any load

Mains: Mains voltage may be 105-125 volts or 210-250 volts, at user's option. Mains frequency may be 50 Hz to 400 Hz. Demand from mains is approximately 150 VA

Size: Approximately 3⅜″ high x 4¾₁₆″ wide x 12⅝″ long not including plug pins

NOTE: The performance figures given above are the GUARANTEED figures. A typical unit may be expected to have approximately 0.0003 volt rms ripple at full load and 0.00025 volt rms ripple at no load. Regulation for a no-load to a full-load condition is usually about 0.02 volt.



ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

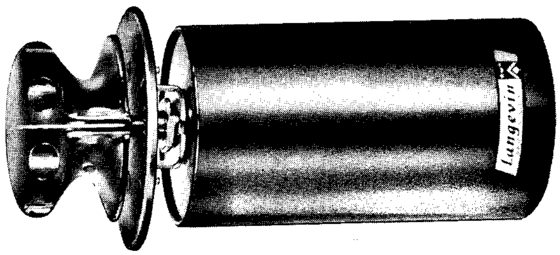
The power supply shall be Langevin PS222. It shall have a two-coil balanced input transformer with electrostatic shielding between primary and secondary. It shall operate from 105-125/210-250 volt 50-400 Hz mains. Strapping for mains voltage and the remote sensing feature shall be on the tray or cabinet which receives the unit, and not on the supply proper. DC output shall be 24 volts, 3 amperes (maximum). There shall be fuses in the mains connection and in the DC output. Voltage regulation shall be ±0.1 volt from full load to no load. Total ripple in the output shall not exceed 0.001 V rms under any condition of load. A remote sensing feature shall allow the voltage error correction to be referenced at point of load. Unit shall incorporate a protection circuit which will trip off the supply in event of short circuit or overload which may be reset by removing mains power for approximately 15 seconds. All active components shall be solid-state, and no electron tubes shall be used. Size shall be approximately 3⅜″ high x 4¾₁₆″ wide x 12⅝″ long not including plug pins. Plug pins shall be gold plated. Color scheme shall be grey and cadmium-plated metal, iridited.

ACCESSORIES

Mounting Tray TRY7 (For installation of single PS222 supply)

Rack Cabinet RC76 (For installation of as many as four PS222 supplies or four intermixed AM17 and PS222 units).

Langevin Rotary Filters



EQ255A VARIABLE HIGH PASS FILTER
EQ255B VARIABLE LOW PASS FILTER

- INDEPENDENT HIGH AND LOW PASS UNITS
- EACH UNIT USES NO MORE SPACE THAN A ROTARY EQUALIZER
- OVERLAPPING CUT-OFF FREQUENCIES PROVIDE MAXIMUM FLEXIBILITY
- FLAT RESPONSE, EXCEPT AT CUT-OFF POINTS
- NO HUM OR EXTRANEOUS NOISE PICKUP

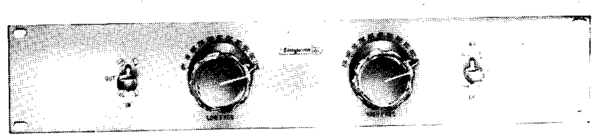
CONSTANT K
ZERO INSERTION LOSS
SOLDER-TERMINAL CONNECTIONS (ON REAR)
2 ¼" DIAMETER x 4 ⅞" DEEP

EQ255A POSITIONS, ELEVEN: "OFF" (FULL FREQUENCY TRANSMISSION), CUT-OFF FREQUENCIES 70, 100, 250, 500, 1000, 2000, 3000, 4000, 5000, AND 7500 CPS

EQ255B POSITIONS, ELEVEN: "OFF" (FULL FREQUENCY TRANSMISSION), CUT-OFF FREQUENCIES 10000, 8000, 6000, 5000, 4000, 3000, 2000, 1000, 500 AND 250 CPS

EQ259A VARIABLE HIGH AND LOW PASS FILTER

COMBINES **EQ255A** AND **EQ255B** ON A SINGLE PANEL, FOR RACK MOUNTING
LIGHT GRAY PANEL, ENGRAVED
INCLUDES "IN" AND "OUT" KEY
REQUIRES 3 ½" x 19" PANEL SPACE (5 ⅝" DEEP)



Fixed Filters & Equalizers

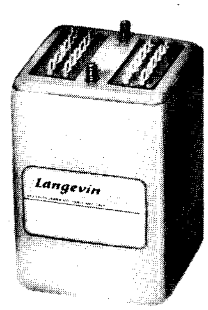
- 3 DB DOWN AT CUT-OFF FREQUENCIES
- 1 ⅞" w. x 2 ½" h. x 1 ¾" d.

LIGHT GRAY BAKED ENAMEL FINISH

LOW PASS FILTERS

ZERO INSERTION LOSS
ONE FULL SECTION CONSTANT K, AND TWO M-DERIVED HALF SECTIONS

MODEL	CUT-OFF FREQUENCY
LP8	8 KCPS
LP15	15 KCPS



HIGH PASS FILTERS

ZERO INSERTION LOSS
ONE FULL SECTION CONSTANT K

MODEL	CUT-OFF FREQUENCY
HP50	50 CPS
HP70	70 CPS
HP80	80 CPS

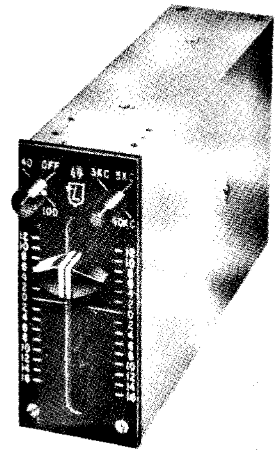
EQ257A RIAA EQUALIZER

- PRODUCES THE DESIRED RIAA CURVE CHARACTERISTICS
- USED FOR PLAYBACK OF PHONOGRAPH RECORDS

20 DB INSERTION LOSS
RIAA EQUALIZATION

Langevin

Equalizing for Spectral Character



MODEL EQ-251-A PROGRAM EQUALIZER

New Concept Gives Variable Equalization at 6 Important Points.

Only 1½ Inches Wide — 10 units require panel space of 3½ inches **high by 15 inches** wide.

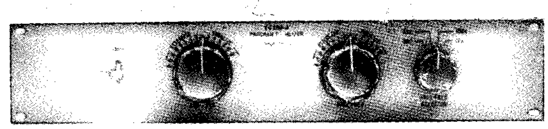
Flexible — 2 rotating cam switches for high and low peak settings.

No tubes or power required — all passive circuits.

Low Insertion loss of only 14 db.

Uses etched circuits of military quality for super-compactness.

Toroid coils — no hum.



GENERAL

The Model EQ-251A Equalizer is Langevin's miniaturization of an instrument that has long been standard for corrective equalization in recording and reproduction of sound. The diminutive size of this precision instrument permits mounting adjacent to mixer controls, thereby making possible multiple installations of several units in close proximity.

The Model EQ-251-A Equalizer's improved design features two sliding levers for equalization and attenuation. The perpendicular sliding action is more functional than rotary action, and facilitates reading of knob positions. Adjustable in 2 db steps at specified frequencies, with a range of [illegible] maximum equalization to 16 db maximum attenuation, the instrument is an ideal tool for dubbing and frequency response c[illegible]

This assembly is a passive, L/C/R, bridged T network, and does not require power supply, tubes or additional connections. It can be inserted directly into a transmission line with only input and output connections.

Two rotating cam switches are provided on the face panel. The switch [illegible] gives high frequency equalization peaks at 3 kc, 5 kc, 10 [illegible]. The left switch provides low frequency equalization peak se[illegible] 40 cps or 100 cps.

TECHNICAL SPECIFICATIONS

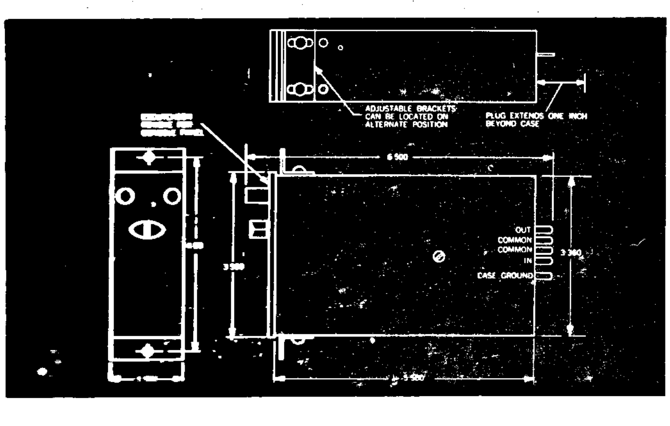
Circuit, Bridge T; **Impedance,** 600/600 ohms; **Insertion Loss,** 14 db; **Input Level,** minimum: −70 dbm, maximum: +20 dbm; **Phase Shift,** negligible; **Power Requirements,** none; **Terminals,** plug-in; **Finish,** black non-halation, satin finish, anodized aluminum with engraved markings. Chassis parts are nickel plate on brass. **Dimensions,** panel: 1½ inches wide by 3½ inches high; 5½ inch depth behind mounting panel.

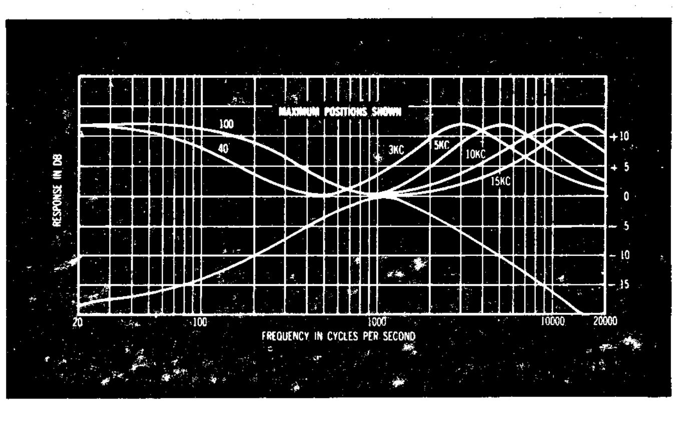
ORDERING INFORMATION

MODEL EQ-251-A PROGRAM EQUALIZER, complete with female plug receptacle, mounting hardware and instructions; Weight, Net, 1¾ lbs., shipping 3 lbs.

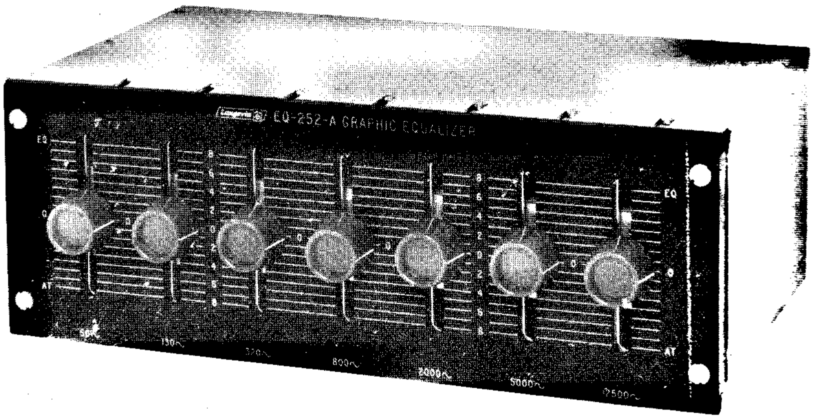
Model EQ-258-A Equalizer

Has the same specifications as the EQ-251-A but designed for rack mounting. Size is 3½ in. h by 19 in. w by 5¾ in. d. Finish is Langevin light gray. Complete with instructions. Weight, Net, 4½ lbs, 6 lbs shipping.





Langevin



MODEL EQ-252-A
GRAPHIC EQUALIZER

7 POSITIONS FOR ULTIMATE CONTROL OF SPECTRAL QUALITY IN RECORDING, TV-BROADCAST AND MOTION PICTURES

FEATURES

7 Selected Positions of Variable Hi-Lo Equalization and Attenuation.

Gold plated, Noise-free, Switching through ±8 db in 1 db steps during active use.

Hum-free performance through toroid coils from —70 to +24 dbm.

No tubes or power required — all passive Bridge T circuits in one integrated unit.

Small size: 3½" x 10½" x 5¾" deep.

The Langevin Model EQ-252-A Graphic Equalizer fufills the critical need for multiple control at the subjectively important points of the audio range. It employs miniaturized, military quality, gold plated, etched circuitry in each of the 7 plug-in filter units, resulting in a passive assembly requiring no tubes or power supplies. Only input and output connections are required. Sliding Levers permit 8 db of equalization and 8 db of attenuation in 1 db steps at 50, 130, 320, 800, 2000, 5000 and 12,500 cps during the program through noise-free gold-plated switching. Modern controls give quiet operation at −70 up to +24 dbm.

Filter assemblies use sealed toroid coils for hum-free operation. Careful design delivers ±½ db accuracy. Overlap from one filter to the next gives combined flat output when levers are in a straight line in any equalized or attenuated position (see curves). Special frequencies are available to order; overlap may or may not provide combined flat output between adjacent positions as the standard frequencies shown have been calculated for this effect. In zero position each or all filters are flat (resistive only, 16 db loss) from input to output. Because all passive circuitry is used there is no distortion when operated up to plus 24 dbm. Impedance is 600 ohms in and out; for other impedances use Langevin line to line transformers, Model TF-602-C. The model EO-252-A is limited to 600 ohms impedance for the reason that lower impedances would double the size of the equalizer components every time the impedance is halved.

SPECIFICATIONS

Circuit: Bridged T; **Impedance:** 600/600 ohms; **Insertion Loss:** 16 db; **Operating Level:** −70 to +24 dbm; **Positions:** 7, with 8 db of equalization and 8 db of attenuation at 50, 130, 320, 800, 2000, 5000 **and** 12,500 cps in 1 db steps; **Distortion:** none; **Coils:** Sealed toroids; **Power Requirements:** none; **Response:** See curves; **Panel Finish:** Black, satin finish, non-halation, anodized aluminum; **Terminals:** solder type, turret; **Filter Sections:** 7 plug-in, printed circuit type; **Size:** 3½" high by 10½" long by 5¾" deep overall.

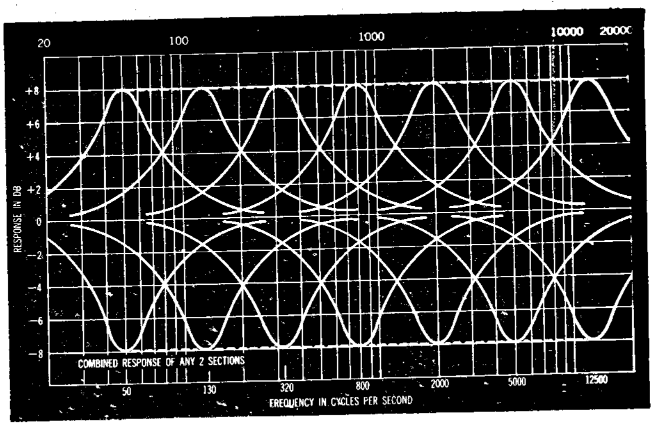
ORDERING INFORMATION

Model EQ-252-A Graphic Equalizer equipped with red knobs, complete with mounting hardware and instructions. Weight, net 9 lbs.; 14 lbs. shipping.

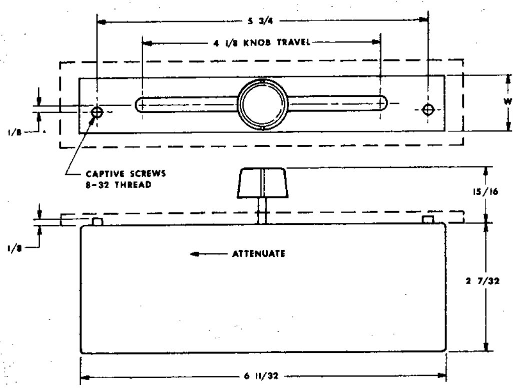
Recommended Accessories

When lower impedances than 600 ohms are required, use **the following** matching coils in and out:

Model TF-602-C Line to Line Transformer, Weight, Net, 2¾ **lbs.**; 3½ **lbs.** shipping.



Langevin Straight Line Units



WIDTHS: SINGLE: 15/16"
2 GANG: 1 11/16"
3 GANG: 2 1/2"
4 GANG: 3 1/4"
6 GANG: 4 5/8"

Straight Line Panoramic Dividers (Pan Pots)

SIMILAR TO RPP MODELS, BUT STRAIGHT LINE FORM.

AVAILABLE AS 2 CHANNEL **SPP200T**, AS 3 CHANNEL **SPP300T**.
DOES NOT INCLUDE ESCUTCHEON.
SPP200T AND SPP300T SAME SIZE UNITS (15/16" WIDTH).

STRAIGHT LINE STEP MIXER ATTENUATORS
WITH LAST STEP INFINITY

RESISTOR ACCURACY: 5% Single Units
2% Multiple Units

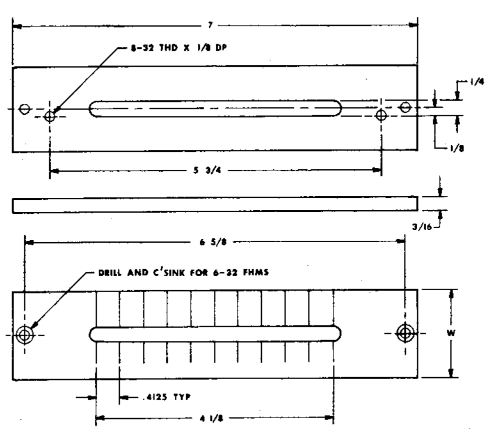
Langevin Model No.	Circuit	Steps	DB per Step	2 Gang Model	3 Gang Model	4 Gang Model	6 Gang Model
SMX 113	Unbal. Ladder	32	1/2	SMX 1132	SMX 1133	SMX 1134	SMX 1136
SMX 114	Bridged T	32	1 1/2	SMX 1142	SMX 1143	SMX 1144	SMX 1146
SMX 115	Potentiometer	20	2	SMX 1152	SMX 1153	SMX 1154	SMX 1156
SMX 120	Potentiometer	32	1 1/2	SMX 1202	SMX 1203	SMX 1204	SMX 1206

STRAIGHT LINE SLIDE WIRE MIXER ATTENUATORS

EMPLOYED IN MUSIC SCORING AND OTHER CRITICAL APPLICATIONS WHERE MAXIMUM QUALITY IS DESIRED. TRANSITION FROM ONE LEVEL TO ANOTHER APPROXIMATELY 1/10 DB APART. SAME DIMENSIONS AS STRAIGHT LINE MIXERS. STRAIGHT LINE SLIDE WIRE MIXERS SUPPLIED WITH KNOB LESS ESCUTCHEON UNLESS OTHERWISE SPECIFIED.

RESISTOR ACCURACY: 5% Single Units
2% Multiple Units

Langevin Model	Circuit	Impedances Available		2 Gang Model	3 Gang Model	4 Gang Model	6 Gang Model
		In	Out				
SMX 111	Unbal. Ladder	600	600	SMX 1112	SMX 1113	SMX 1114	SMX 1116
		150	150				



ESCUTCHEONS

SUFFIX		WIDTH
ES	Narrow Single	1 1/4"
EW	Wide Single	1 1/2"
E2	2 Gang	1 3/4"
E3	3 Gang	2 5/8"
E4	4 Gang	3 1/4"
E6	6 Gang	4 3/4"

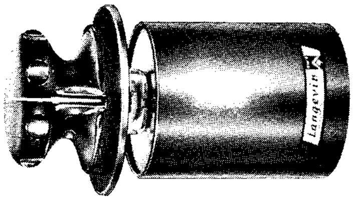
ORDERING INFORMATION: GIVE MODEL NUMBER, THEN ADD/E AND INDICATE NUMBER OF GANGS OR WIDTH FROM ESCUTCHEON TABLE.

Examples: SMX 1142/E2 SPP300T/EW

AUDIO CONTROLS DIVISION

503 South Grand Avenue / Santa Ana, California 92705 / Phone: (714) 547-6204

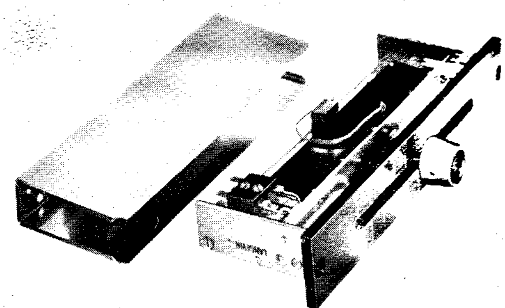
AUDIO CONTROLS DIVISION



Rotary & Straight Line Mixers & Attenuators

GENERAL

- **Solid Silver Brush Contacts**
  Contact noise virtually eliminated
  Extended life
- **Printed Contact Boards Heavily Plated with Silver**
  Smooth operation
  Low drag
- **Rotary Units**
  Permanently lubricated within dust-proof enclosure
  Stainless steel shafts
  Long life, non-seizing
  Low friction
- **Straight Line Units**
  2-5/16 inches deep behind panel
  6-5/8 inches long
  Integral female connector
  (male connector supplied as an accessory)
  Removable slip cover for inspection and cleaning
  Adjustable for amount of force required to move slider
  (slide wire types only)
  Carriage moves on precision ground chrome plated shaft



DESIGNATION CODE

D.................Detent

E.................Escutcheon

Q.................Cue Position

RAT.................Rotary Attenuator (except "Mixer" types)

RATM.................Meter Range Extender
(formerly ATX)

RMX.................Rotary Mixer Attenuator
(formerly MX)

RPP.................Rotary Panoramic Divider (Pan Pot)

SMX.................Straight Line Mixer Attenuator

SPP.................Straight Line Panoramic Divider (Pan Pot
(formerly SLPP)

V.................Last Step Infinity

HOW TO ORDER

_ _ _   _ _ _   _ _ _   _ _ _   _ _ _   _ _ _

STYLE:
R Rotary
S Straight Line

FUNCTION:
AT Attenuator (except "Mixer" type)
ATM VU Meter Range Extender
MX Attenuator, Mixer Type
PP Panoramic Divider (Pan Pot)

SPECIAL FEATURES:
D Detented (1)
Q Cue Position (1)
V Infinite Attenuation when fully CCW

TYPE:
See Catalog For Proper 3-Digit Listing. NOTE: Add "2" For Dual Unit, "3" For Triple, etc.,

INPUT IMPEDANCE:
In Ohms. Use "K" For Thousands of ohms.

OUTPUT IMPEDANCE:
In Ohms. Use "K" For Thousands of ohms.

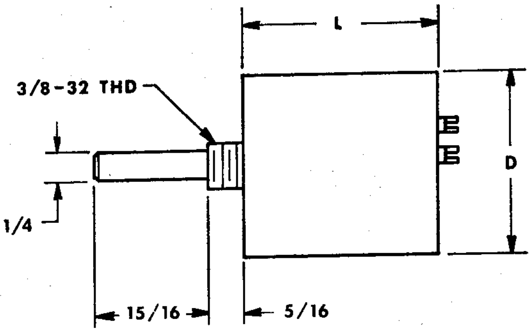
EXAMPLES OF ORDERING:

S	MX	Q	1112	/	600	/	600
Straight Line	Mixer-Type Attenuator	With Cue Position	Type 111 (See Catalog) 2-Gang		Input Impedance (Ohms)		Output Impedance (Ohms)

R	AT	616	/	150	/	250
Rotary	Attenuator	Type 616 (See Catalog) Single Gang		Input Impedance (Ohms)		Output Impedance (Ohms)

GENERAL NOTE:

(1) A CONTROL MAY BE DETENTED (CODE "D") OR IT MAY HAVE A CUE POSITION (CODE "Q"), BUT THE TWO ARE MUTUALLY EXCLUSIVE. THERE CAN BE NO "QD" CONTROL WHICH IS BOTH DETENTED AND WITH CUE.



ROTARY MIXERS

The Langevin Rotary Mixer has equal db steps for approximately ¾ of its rotation, then tapers the last steps to cut-off (infinity). Counter-clockwise rotation of a standard unit will cause an increase in attenuation. Dial calibration is approximate.

The price list indicates impedances available within seven days. Other impedances available on order.

Insertion loss for unbalanced and balanced ladders is 6db; this loss can be reduced to approximately 3db by using a 1:2 terminal impedance ratio. There is no insertion loss in the bridged T and balanced H circuits. Cue circuits are generally available and may be ordered by reference to the price list.

GROUNDING

Two grounding connections are provided. A case terminal is located on the terminal board. There is also a grounding lug on the shaft bushing. This provides ground connections for the bushing and shaft where the mixer attenuator is mounted on a non-conductive panel.

DIAMETERS: 1½" and 2¼"

LENGTHS: Single: 1⅝"
2 gang: 2⅞"
3 gang: 4"
4 gang: 4"

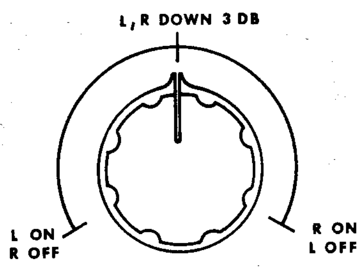
RESISTOR ACCURACY: 5% Single Units
2% Multiple Units

LANGEVIN MODEL	Circuit	Steps	DB Per Step	Degrees Between Steps	Total Degree of Rotation	Diameter (Inches)	2 Gang Model	3 Gang Model	4 Gang Model
RMX 201	UNBAL. LADDER	20	2	15	300	1½	RMX 2012	RMX 2013	RMX 2014
RMX 203	UNBAL. LADDER	32	1½	10	320	1½	RMX 2032	RMX 2033	RMX 2034
RMX 205	UNBAL. LADDER	45	1	7½	337½	2¼	RMX 2052	RMX 2053	RMX 2054
RMX 202	BAL. LADDER	20	2	15	300	2¼	RMX 2022	RMX 2023	RMX 2024
RMX 204	BAL. LADDER	32	1½	10	320	2¼	RMX 2042	RMX 2043	RMX 2044
RMX 209	BAL. LADDER	45	1	7½	337½	2¼	RMX 2092	RMX 2093	RMX 2094
RMX 601	BRIDGED T	20	2	15	300	2¼	RMX 6012	RMX 6013	RMX 6014
RMX 602	BRIDGED T	32	1½	10	320	2¼	RMX 6022	RMX 6023	RMX 6024
RMX 625	BRIDGED T	45	1	7½	337½	2¼	RMX 6252	Not Available	Not Available
RMX 604	BAL. H	20	2	15	300	2¼	RMX 6042	Not Available	Not Available
RMX 605	BAL. H	32	1½	10	320	2¼	RMX 6052	Not Available	Not Available

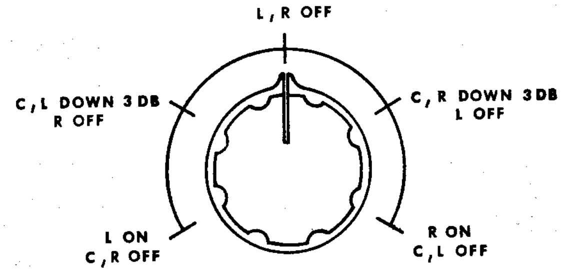
Rotary Panoramic Dividers (Pan Pots)

Model RPP200T

FOR MIXING 1 CHANNEL INTO 2
600Ω IMPEDANCE IN AND OUT
"T" CONFIGURATION
NO INSERTION LOSS
SPECIAL GEOMETRICALLY ACCURATE TAPER
WITH K108 KNOB AND SPECIAL DIAL
SIZE: 2¼" DIAMETER; 1⅝" LONG



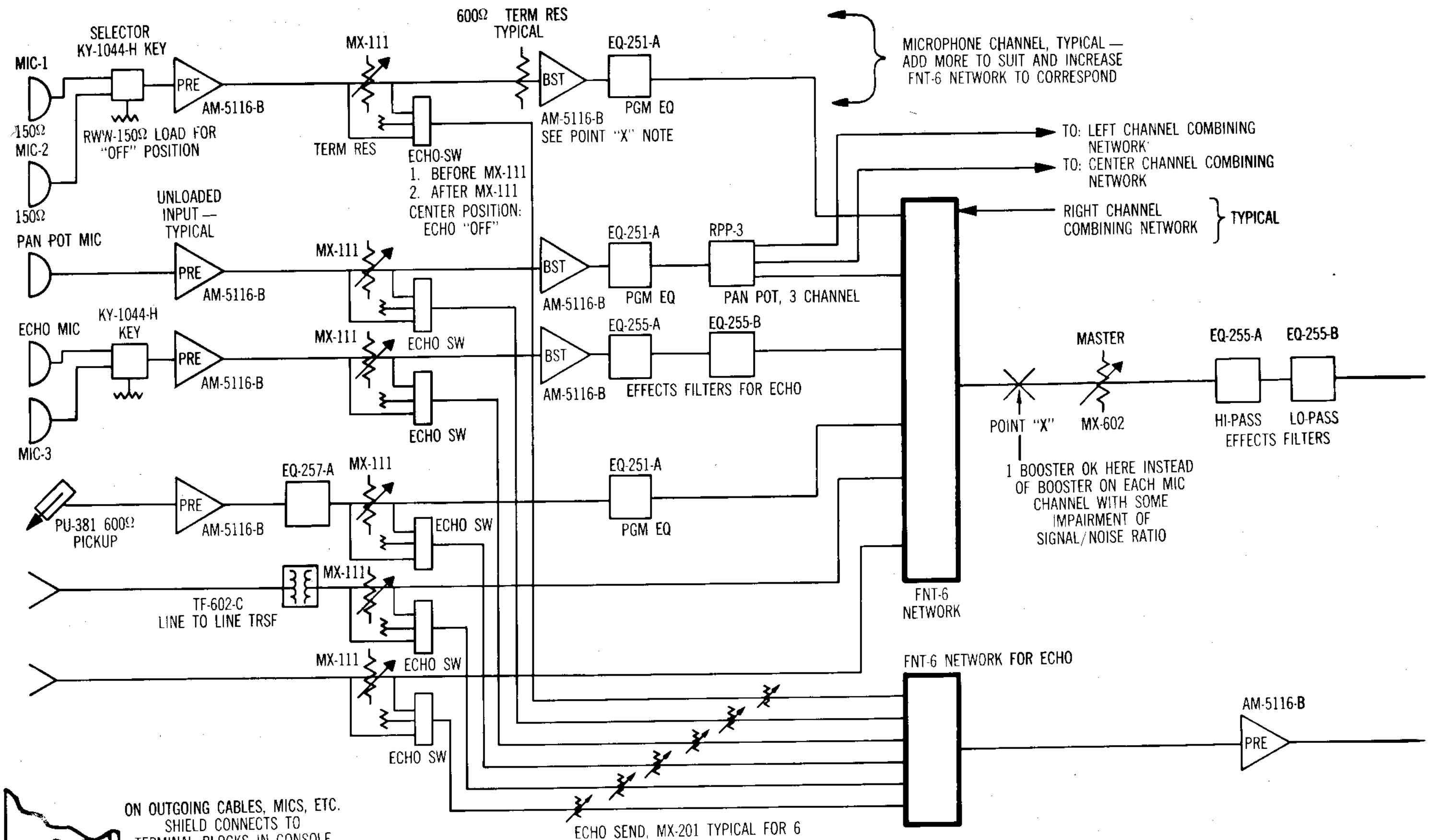
Model RPP300T

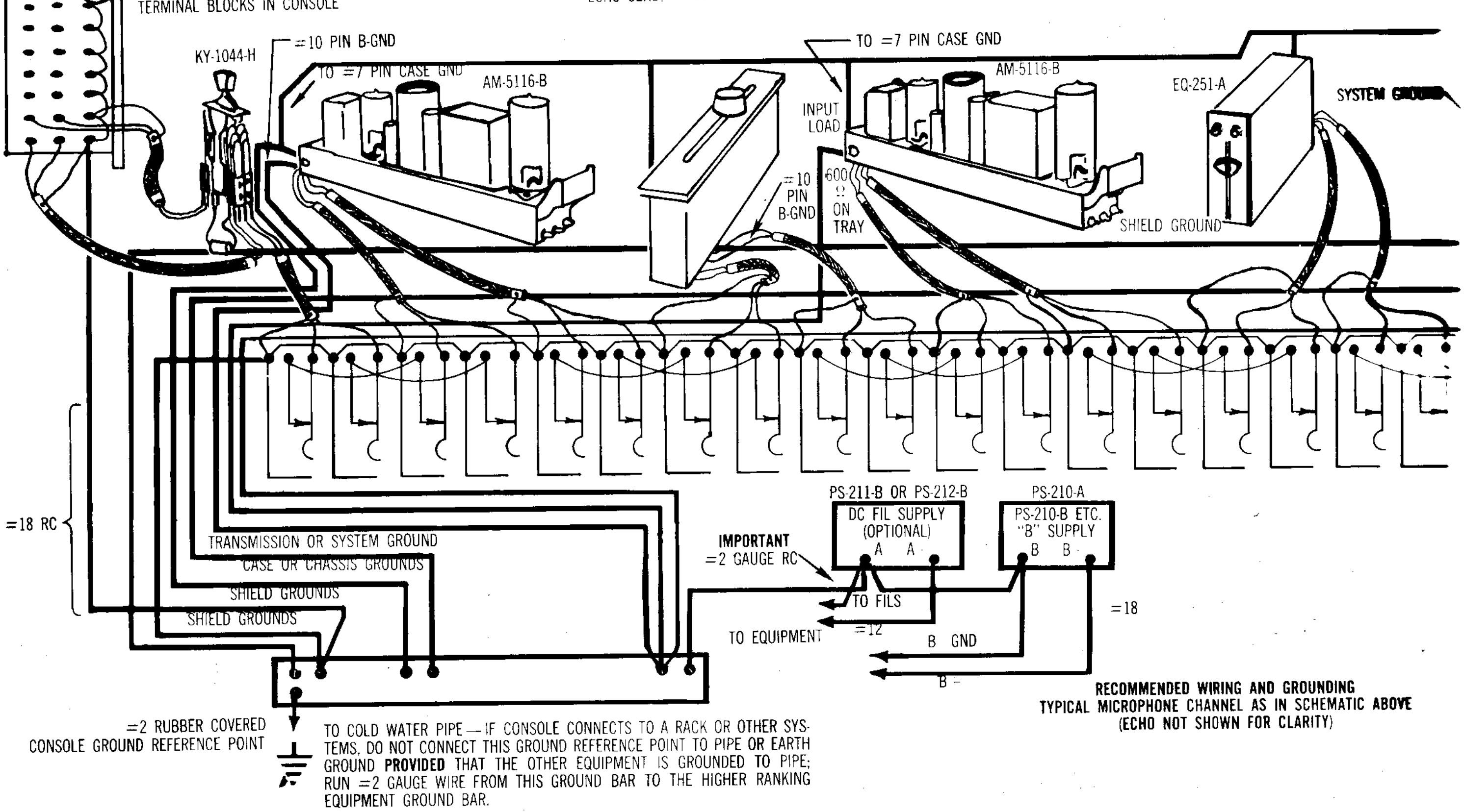


Similar to RPP2, but for dividing 1 channel into 3.
Length: 2⅞"

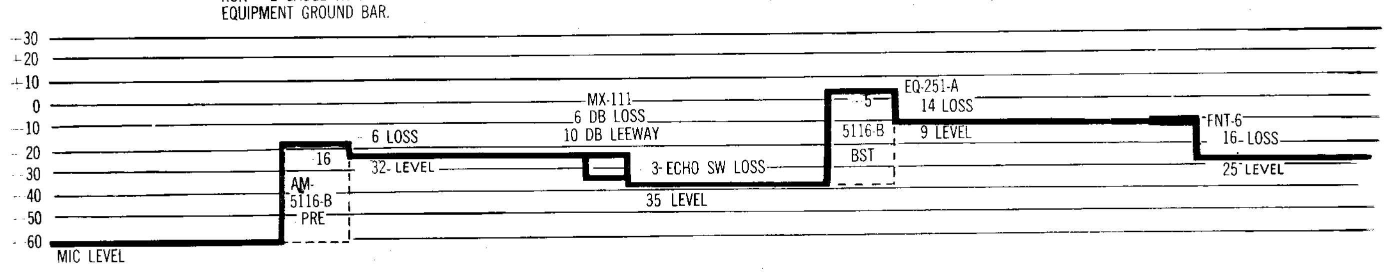
OTHER MODELS AVAILABLE ON REQUEST

RECOMMENDED WIRING AND GROUNDING PRACTICES

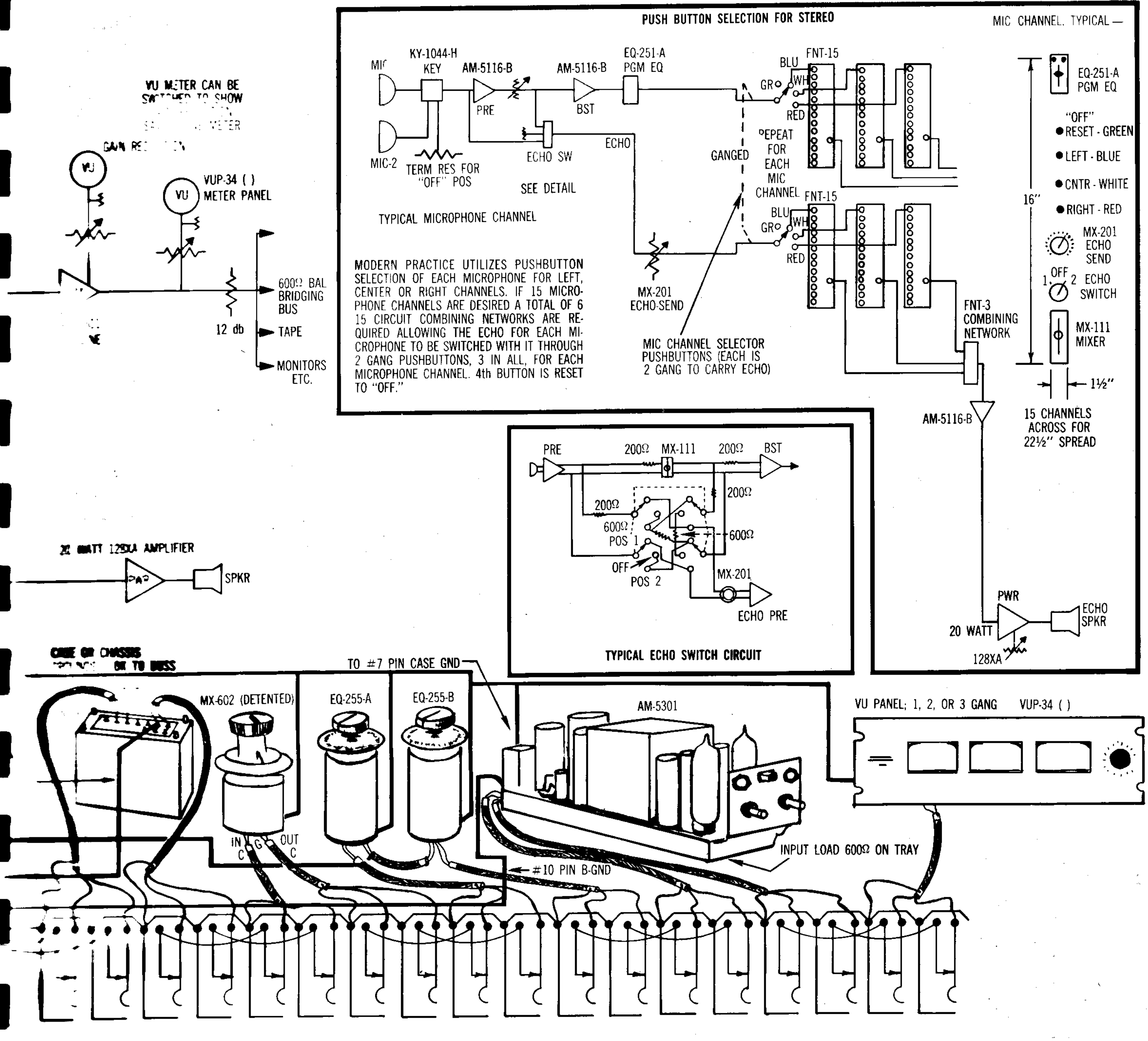




RECOMMENDED WIRING AND GROUNDING TYPICAL MICROPHONE CHANNEL AS IN SCHEMATIC ABOVE (ECHO NOT SHOWN FOR CLARITY)



RECOMMENDED WIRING AND GROUNDING PRACTICES



NOTES:

1. GROUND THE SHIELD OF A CABLE AT **ONE** END ONLY!

2. CONNECTION BETWEEN ONE SYSTEM AND ANOTHER **MUST** BE THROUGH TF-602-C LINE TO LINE COILS FOR ISOLATION, OR ONE SYSTEM MUST OUTRANK THE OTHER AND SUPPLY THE EARTH GROUND.

3. FOR CONSISTENCY — WHEN CABLES APPEAR BETWEEN TERMINAL BLOCKS OR STRIPS AND JACKS, GROUND THE SHIELD AT THE JACK. IF THE CABLE APPEARS ON A TERMINAL BLOCK OR STRIP BUT NOT AT JACKS GROUND AT THE TERMINAL BLOCK OR STRIP.
FOR CABLES BETWEEN PIECES OF EQUIPMENT, FOR EXAMPLE, AMPLIFIERS, HI AND LO PASS FILTERS, ETC., TIE THE SHIELD THROUGH A **SEPARATE** WIRE TO THE MAIN GROUND BAR IN THE CONSOLE OR EQUIPMENT.

4. **MAKE CERTAIN THAT SHIELDS NEVER CARRY SIGNAL NOR CURRENT.**