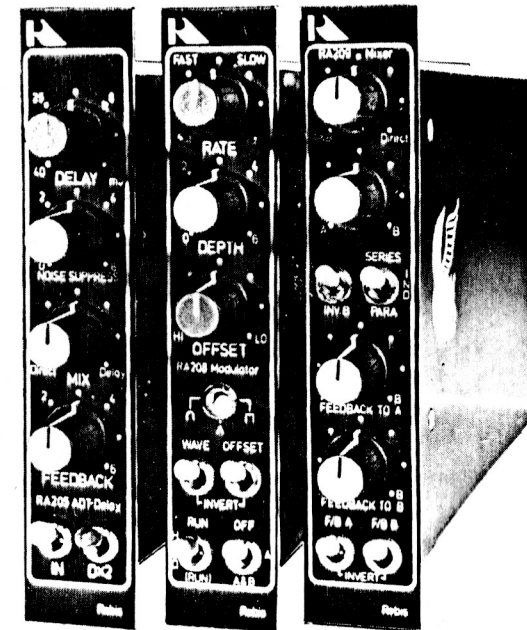


**RA200 Series
Delay System**
OPERATORS MANUAL

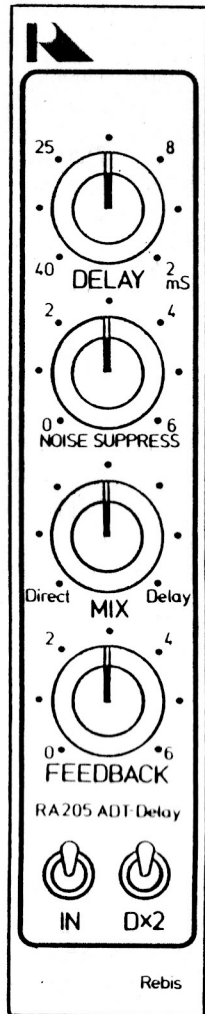


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RA205 ADT/DELAY



DELAY: Varies delay time from 2 to 40mS, or 4 to 80mS with DELAY RANGE SWITCH set to Dx2. (High frequency response is reduced on Dx2 range.)

NOISE SUPPRESS: Clockwise rotation reduces noise and high frequency headroom, therefore optimum setting is reached just before high frequency content is affected.

MIX: Sets balance between delay+ feedback and direct+antiphase feedback.

FEEDBACK: controls the level of delay output fed back to the input. When unit is used for reverberation alters length of decay.

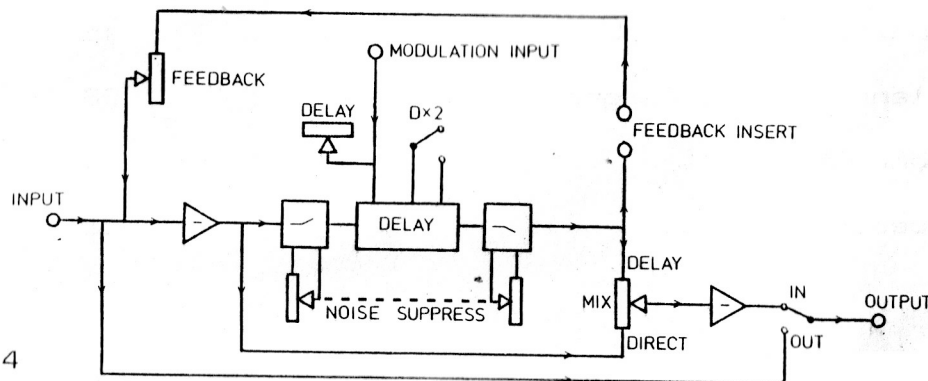
IN/OUT SWITCH: Bypasses unit.

DELAY RANGE SWITCH: Doubles DELAY control setting.

OPERATION:

To get the feel of the RA205 we suggest you try the following procedure:-

1. Turn the DELAY, MIX and FEEDBACK controls fully anticlockwise and the NOISE SUPPRESS control fully clockwise, now switch both the switches up.
2. Switch IN and the sound will be unaltered because the MIX control is turned to direct.
3. Turn the MIX control to delay and you are listening to delay only [40mS]. Switch in Dx2 for 80mS delay.
4. Now set the MIX control mid way to get the original signal with a single repeat. At 80mS delay [DELAY set to 40mS, Dx2 in] the repeat can be clearly heard.
5. With 8-40mS delay [switch Dx2 out] you get automatic double tracking (ADT) and the 2-8mS range produces enhancement and, as the control is swept, phasing. [see FLANGING & PHASING].
6. With a short delay setting, say 8mS, and the MIX control set to direct, turn the FEEDBACK up to 4. This gives a resonant tube effect. The note of the tube sweeps down as the delay is lengthened finally leaving the audio spectrum at about 40mS.
7. With longer delays [Dx2 in] the effect will change to echo, particularly effective between 50mS and 80mS.
8. Set the DELAY to 80mS and slowly turn the MIX control towards the centre. This cancels out the feedback to produce a more natural reverberation.



FLANGING AND PHASING:

Flanging and phasing are both terms for the effect produced when a delayed signal is mixed with its original and the delay is varied. The resulting frequency response is called a comb filter. As its name implies this consists of a series of peaks and troughs which sweep through the audio spectrum as the delay is altered. At long delays there are a vast number of these peaks and troughs and the effect is difficult to hear. As the delay is reduced the number of peaks and troughs are also reduced, increasing the audible effect.

The phasing effect produced with one RA205 is limited in range because the shortest delay obtainable is 2mS. However when two delay units are used one delay can be swept past the other to produce any range of phasing required.

NOISE SUPPRESS:

A dramatic reduction in high frequency noise can be achieved on programme like bass guitar by setting the NOISE SUPPRESS to 6. This causes no change in frequency response but does reduce high frequency headroom. Consequently when used on programme containing mainly mid frequencies the control may have to be backed off to avoid limiting any high frequencies present.

Noise suppression is usually set to zero for high frequency programme such as cymbals where the headroom is needed and any noise is masked by the signal itself.

MIX CONTROL:

The MIX control sets the balance between the delayed signal + feedback and the direct signal + antiphase feedback. This unique arrangement

has three advantages :-

1. For single repeat effects like ADT it gives a mix of direct and delayed signal.
2. When feedback is used the resonant effects can be cancelled out, at longer delay settings this produces natural reverberation.
3. Repeat echo can be mixed with either the original signal [MIX set to direct] for use in channel breaks, or without the original [MIX set to delay] when fed by an echo send.

FEEDBACK:

A break is provided in the feedback path which can be wired to a jackfield for the insertion of other units or for cross-linking effects.

If an equaliser such as the RA204 Parametric is inserted in the breaks variable frequency resonance effects can be created independent of the delay setting.

A limiter can be used to produce sustained feedback for synthesiser type effects.

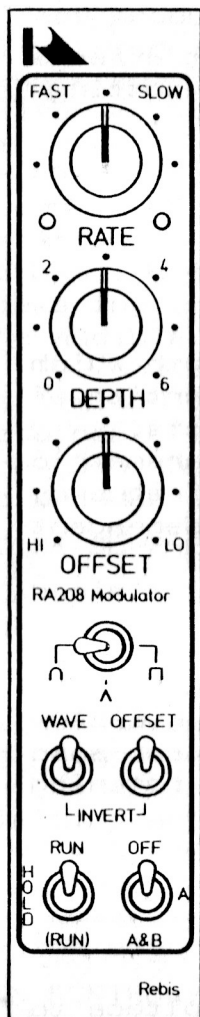
When two delays are used one can be inserted in the feedback break of the other for longer and, by use of the second units MIX and FEEDBACK controls, more complex echo. Two delays can also generate stereo bounce echo by cross patching their feedback breaks.

It should be noted that if the feedback break is not used pins 5 and 6 on the edge connector should be linked.

MODULATION:

The modulation input allows a D.C. voltage to take over control of delay length. Though it is possible to use a conventional oscillator for this purpose the ideal modulation source is the RA208 Modulator. [See following page.]

RA208 MODULATOR



RATE: Sets modulation period between 70mS and 40 seconds. [Rate 15Hz to 0.003Hz.]

LEDS: Change over to indicate rate and direction of sweep.

DEPTH: Modulation depth can be varied over 100% of delay range.

OFFSET: Sets delay length about which modulation occurs. (When the modulator is switched in the DELAY control on the delay module is inoperative.)

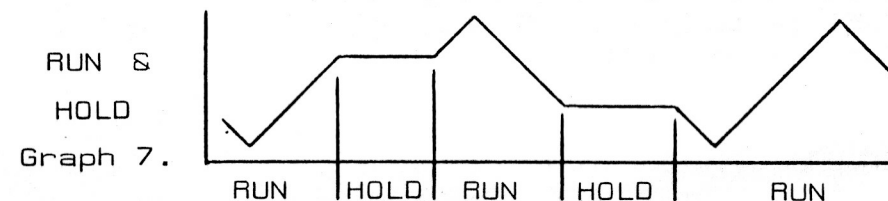
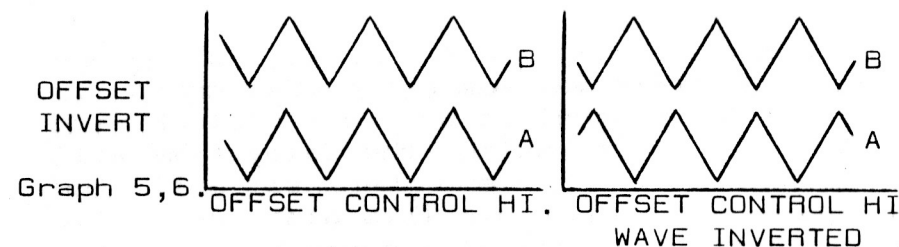
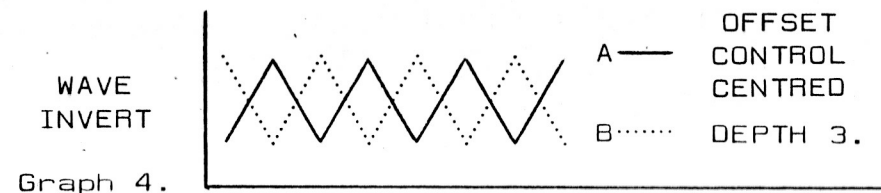
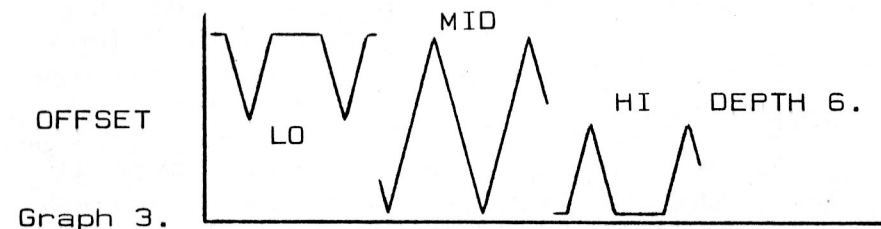
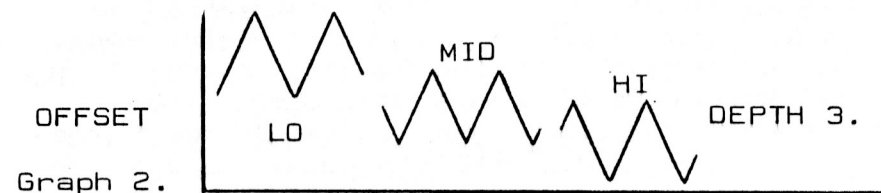
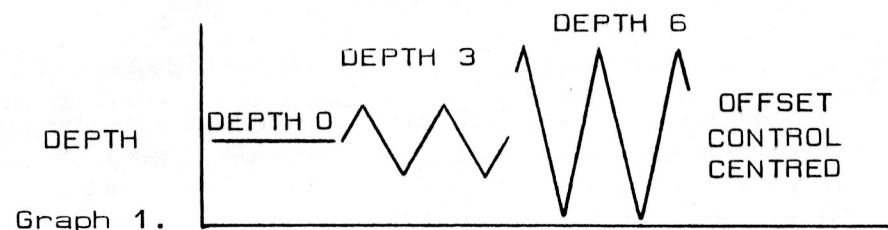
WAVEFORM SELECTOR: Triangle for flanging and phasing, sine for vibrato / fluid and square for chord / step effects.

WAVE INVERT: Reverses direction of sweep on output B.

OFFSET INVERT: Reverses action of OFFSET control on output B.

CYCLE SWITCH: The RUN position produces a continuous output cycle. HOLD stops and holds the output at any point in sweep. (RUN) is a momentary position giving a run and hold facility for special effects.

OUTPUT SWITCH: When used with two delays selects drive to delay A only, or to delays A & B. The OFF position activates the DELAY controls of the delay modules. [See OFFSET.]



OPERATION:

To grasp the action of the controls on the modulator it is important to remember that its output can have only one effect, to alter delay length. If the unit is switched in and the DEPTH control is set to zero, so that the output does not vary, the result is a static delay whose length is determined by the OFFSET control. This control therefore acts as a manual delay control. In fact when the modulator is switched in the DELAY controls on the RA205's cease to operate though the Dx2 switches still work as normal.

If two delay modules are set up for phasing and both are driven by the modulator (OUTPUT SWITCH to A+B), turning the OFFSET control will phase both signals in the same direction. When the OFFSET INVERT switch is in one delay will phase 'up' and the other will phase 'down'. If the same signal is fed to both delays the mixed result is positive flanging. The signal will be heard to peak as the OFFSET control passes the centre and the delay times equalise.

Increasing the DEPTH from zero produces a constant cyclic change in delay length whose frequency is determined by the RATE control. The centre delay length about which this variation occurs is set by the OFFSET control. (Graph 2.) When the OFFSET control is centred turning the DEPTH control fully clockwise will swing the delays over their maximum range. (See graph 1.) If the OFFSET control is set to 2 o'clock with the DEPTH still at maximum the delay time will increase to its maximum and then wait until the cycle brings it down again. This also applies to the other end of the delay range where, if the OFFSET is turned to 10 o'clock, the process is simply reversed. (See graph 3.)

The WAVE INVERT switch allows two delays to be driven in opposite directions automatically. The delay range areas covered can be moved apart using the OFFSET control with the OFFSET INVERT switch in. (See graphs 4, 5 and 6.)

The RATE control sets the frequency of the output waveform. Usually the higher the frequency of modulation the lower the depth required to produce a useful effect. Excessive depth at high frequencies gives extreme pitch shifting which tends to 'scramble' the programme.

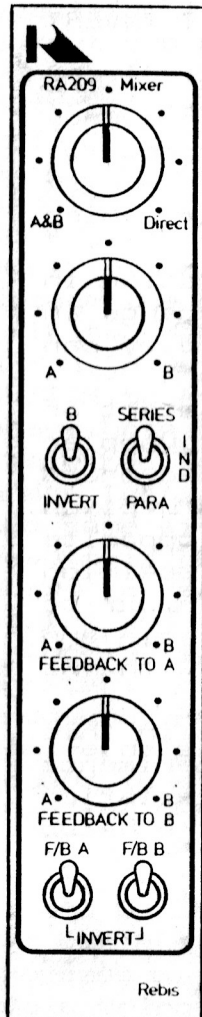
Slow rates of modulation find application in phasing or flanging, or for automatic change in tube resonance. A small slow change in delay can improve a straight ADT effect.

Medium modulation rates produce the start of pitch shifting effects such as vibrato, Doppler and fluid. Square wave used here can make chord or bell-like effects and sudden changes in pitch.

The CYCLE switch operation is shown opposite the module diagram. The momentary (RUN) position can give some interesting sounds if used to 'play' a particular effect, making it cycle and then hold at a certain point, in time with the music.

Careful consideration of the graphs in this section coupled with some practical experiments with programme will soon give you an appreciation of the range of effects possible with the RA208 Modulator.

RA209 MIXER



OUTPUT BALANCE: Sets the final balance between the A + B mix [see below] and the direct signal.

DELAY BALANCE: Mix control for outputs of delays A and B.

B INVERT: Inverts signal phase of input to delay B.

CONFIGURATION SWITCH: Selects the delay configuration **SERIES** **INDEPENDENT** or **PARALLEL**.

FEEDBACK TO A: Sets balance of delay outputs A and B sent to **FEEDBACK** control on delay A. [Sent via **INVERT** switch and feedback breaks.]

FEEDBACK TO B: Sets balance of delay outputs A and B sent to **FEEDBACK** control on delay B. [Sent via **INVERT** switch and feedback breaks.]

FEEDBACK A INVERT: Inverts the phase of feedback signal to delay A.

FEEDBACK B INVERT: Inverts the phase of feedback signal to delay B.

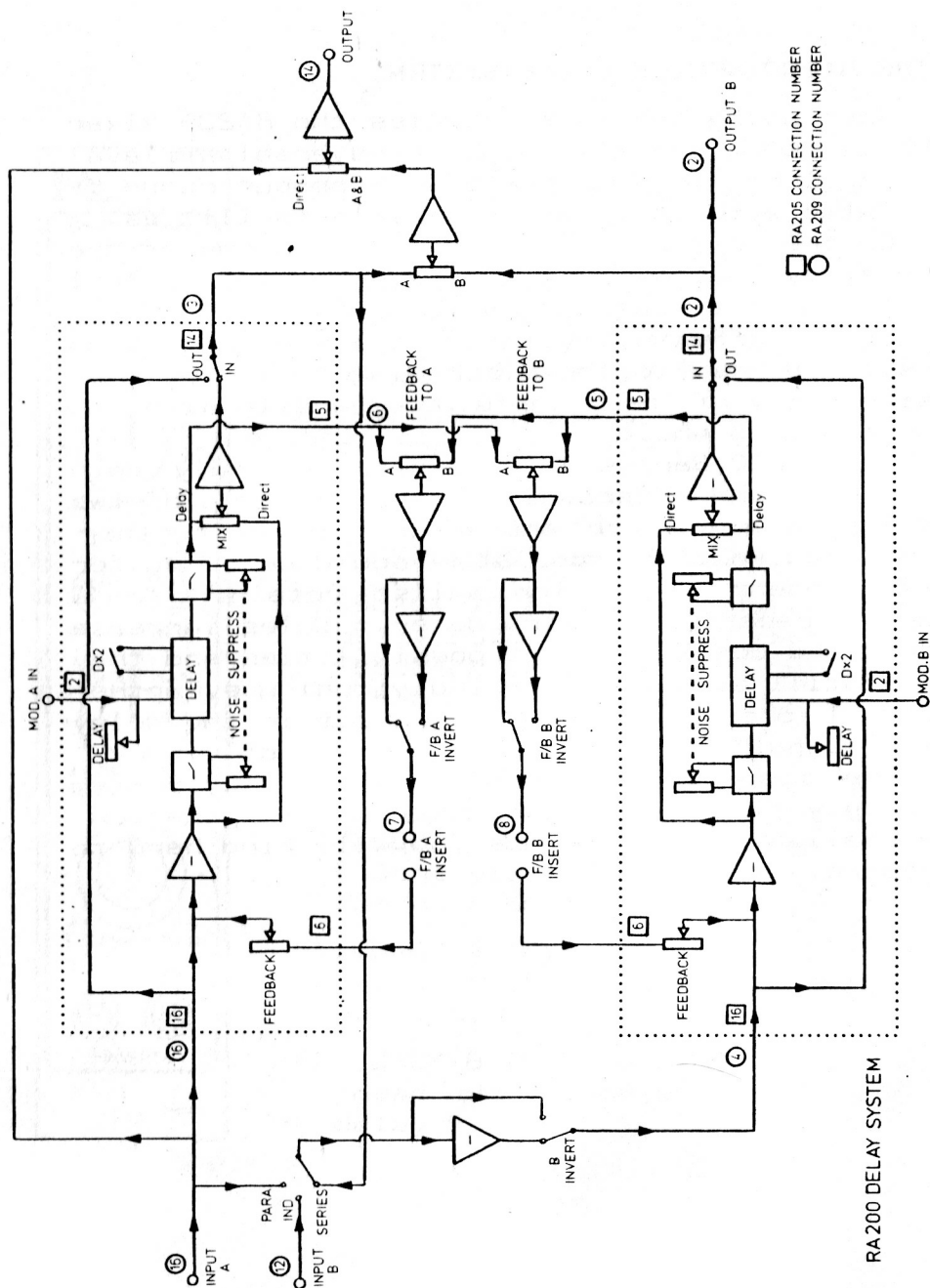
THE RA200 SERIES DELAY SYSTEM:

When using two delay modules the RA209 Mixer provides all the mixing, phase reversal and level control required to create an enormous range of effects without tying up console facilities.

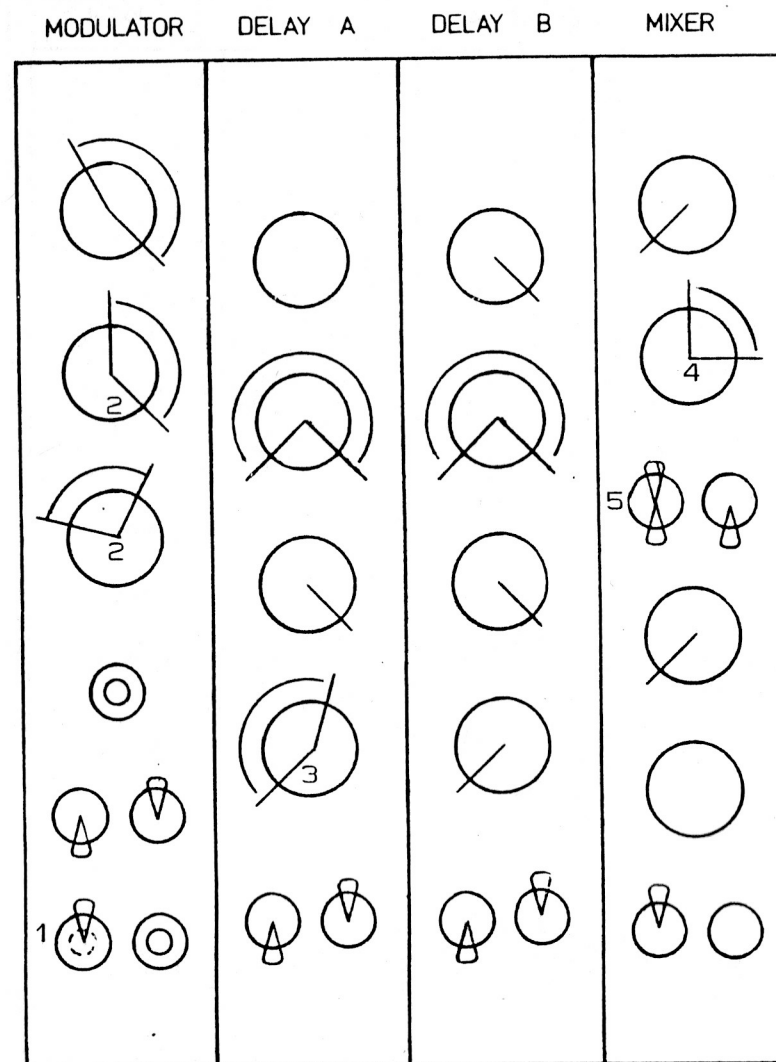
On the next page is the block diagram of the delay system. This is followed by several control position diagrams with notes covering the basic range of effects. Trying out these effects then relating them to the block diagram is the most simple way of familiarising yourself with the system as a whole.

The RA200 Series Delay System is truly both flexible and expandable. The basic setup of two delays a modulator and mixer can be further extended. Another modulator could be added for independent modulation whilst retaining dual drive capability. Extra delay modules increase echo and complex effect possibilities and they are still available for individual use. Further signal processors can be placed in the delay signal paths, both feedback and direct.

The scope of the RA200 Series Delay System is only limited by your creative imagination, a challenge we feel sure you will find hard to resist.

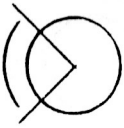
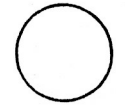
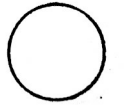
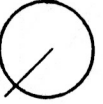
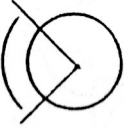


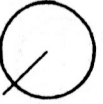
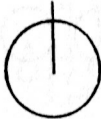
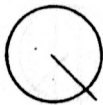
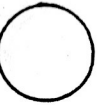


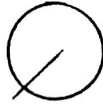
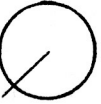
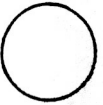
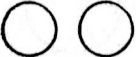


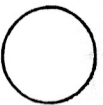

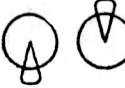




PHASING


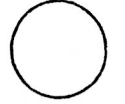
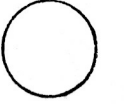





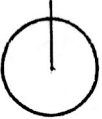


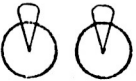

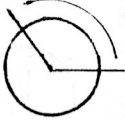
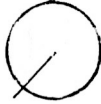


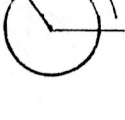

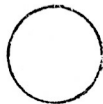






1. Hold at top of sweep then,
2. Set for top cancellation frequency.
3. Adjust for resonance.
4. Adjust for depth.
5. Try inverting phase.

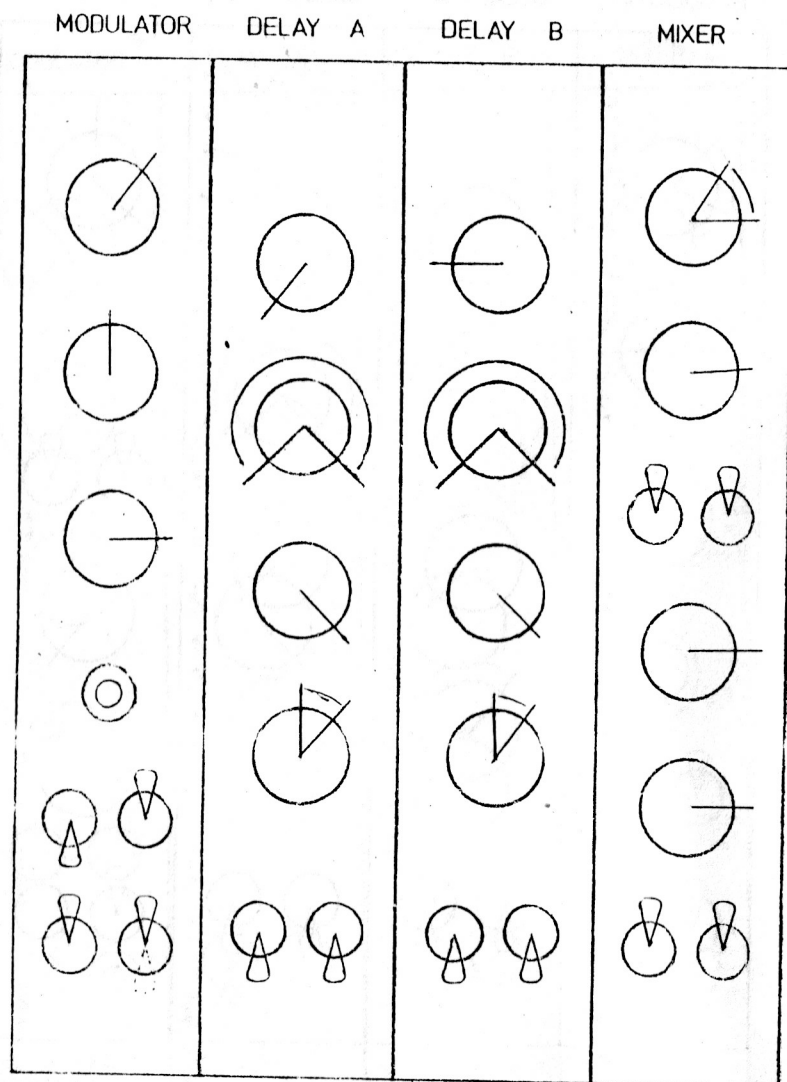
VIBRATO

MODULATOR	DELAY A	DELAY B	MIXER
			
			
			
			
			
			

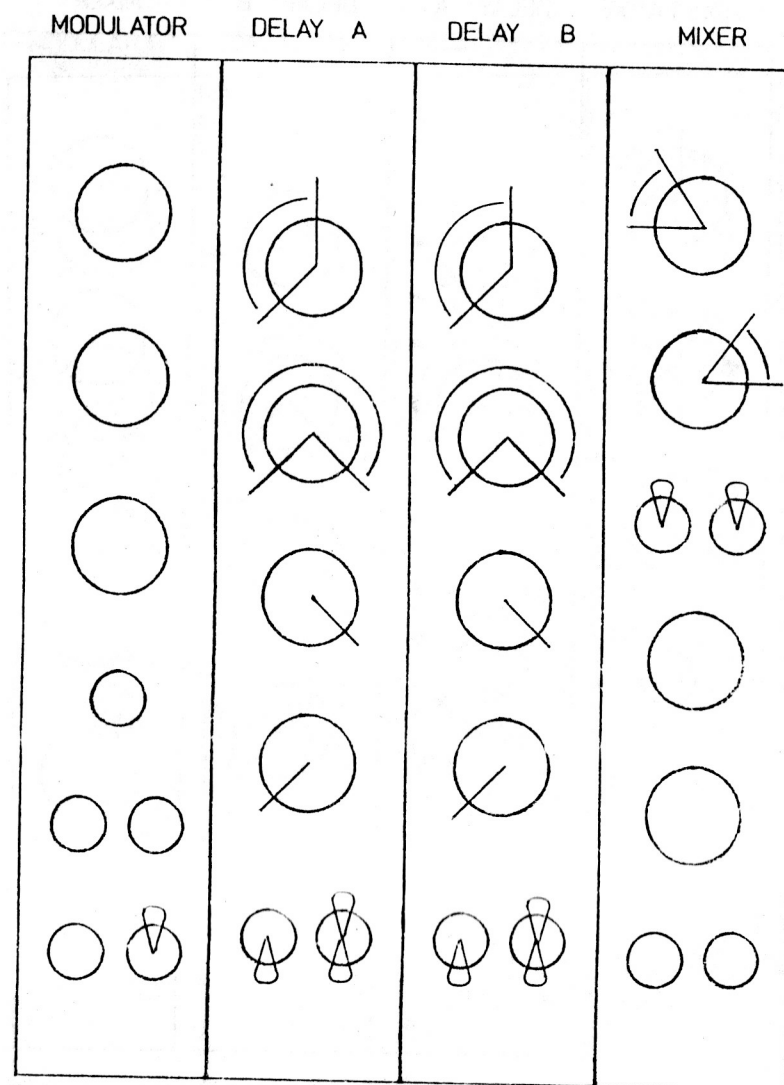
ALIEN

MODULATOR	DELAY A	DELAY B	MIXER
			
			
			
			
			
			

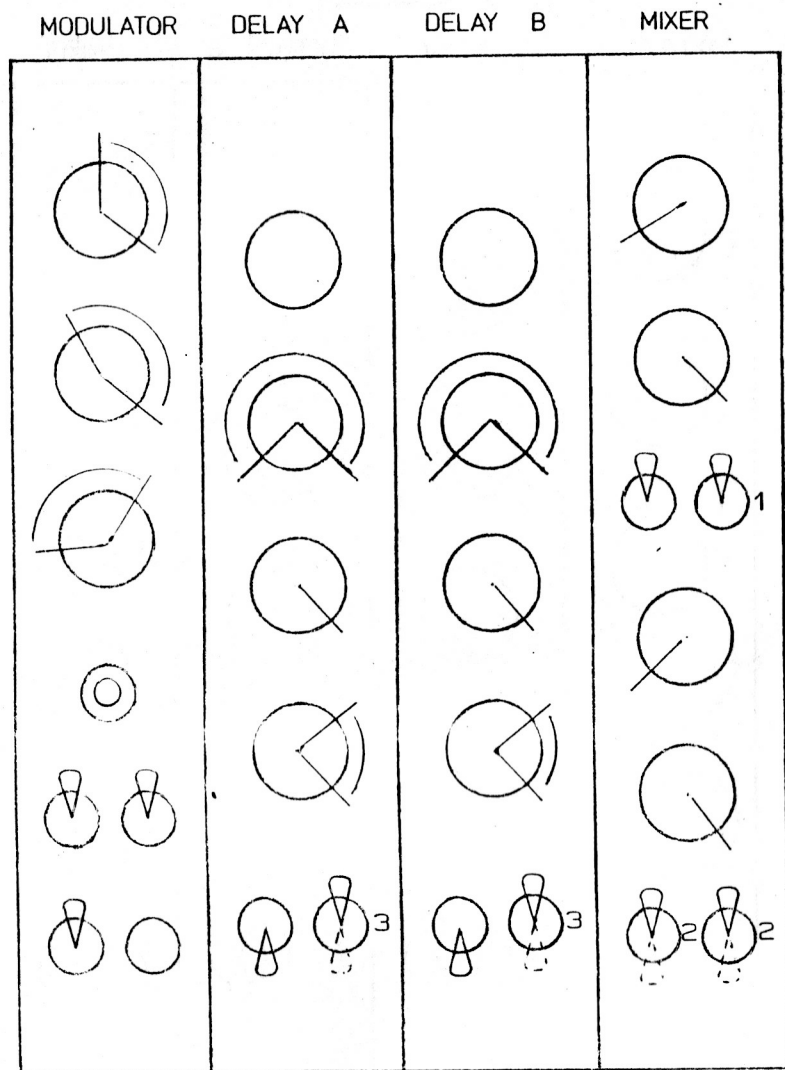
REVERB



PRE-ECHO

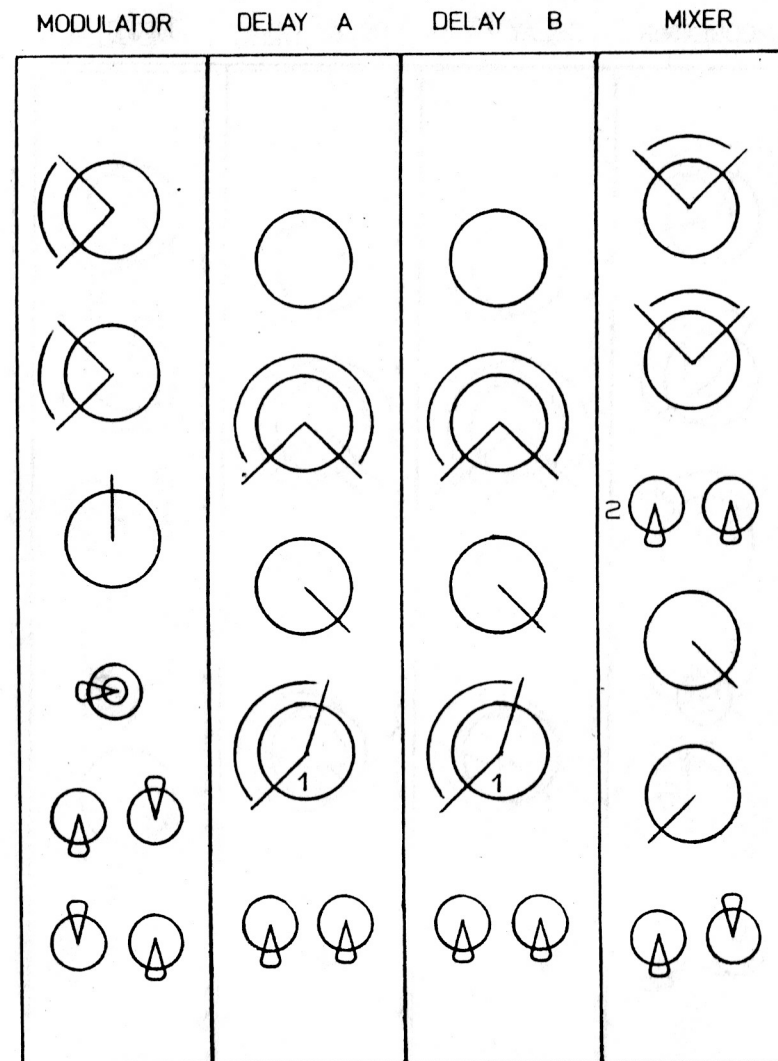


RESONANT TUBE



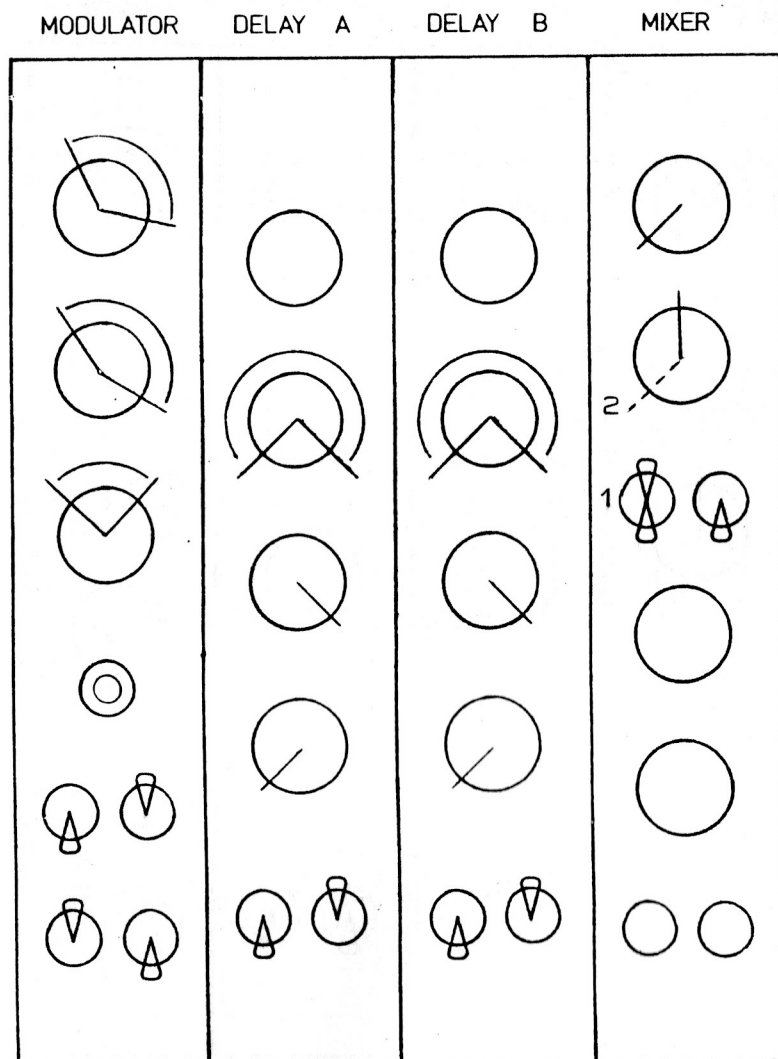
1. Smaller effect with PARA.
2. Try inverting phase of feedbacks for different sounds.
3. Dx2 lowers resonant frequency.

DOPPLER/FLUID



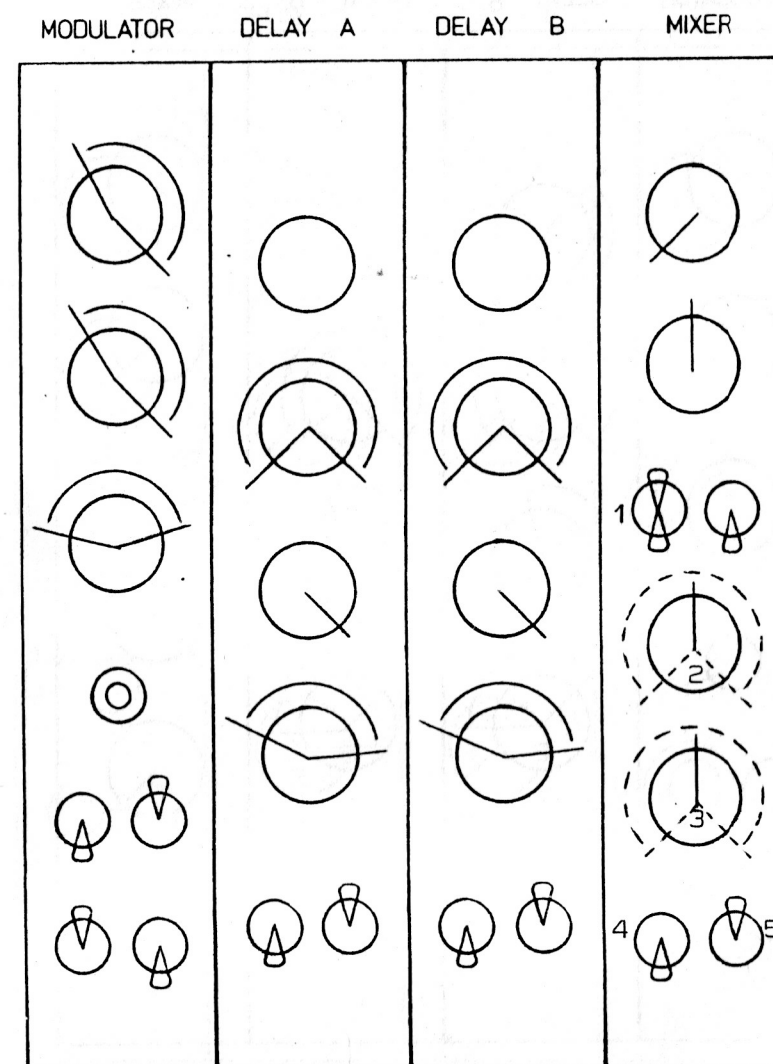
1. Increasing feedback enhances effect.
2. Try inverting B.

POSITIVE AND NEGATIVE FLANGING



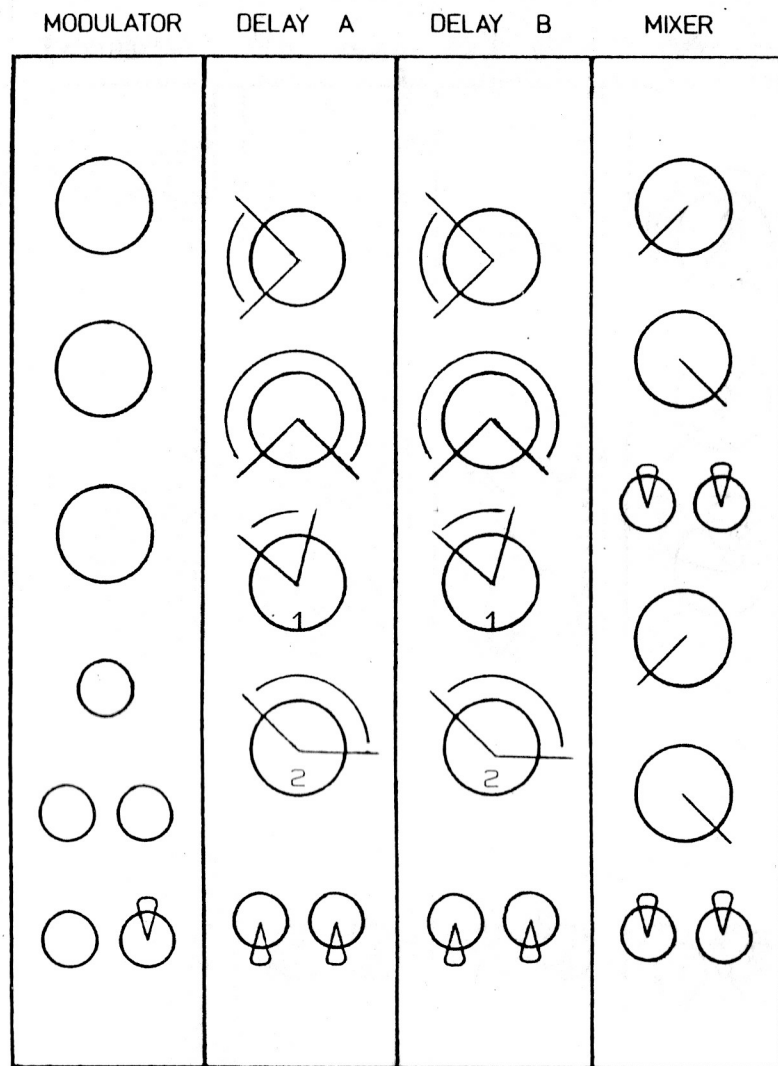
1. Up for positive down for negative.
2. For PSYCHO-ACOUSTIC PANNING use this position and both outputs [A & B].

RESONANT FLANGING



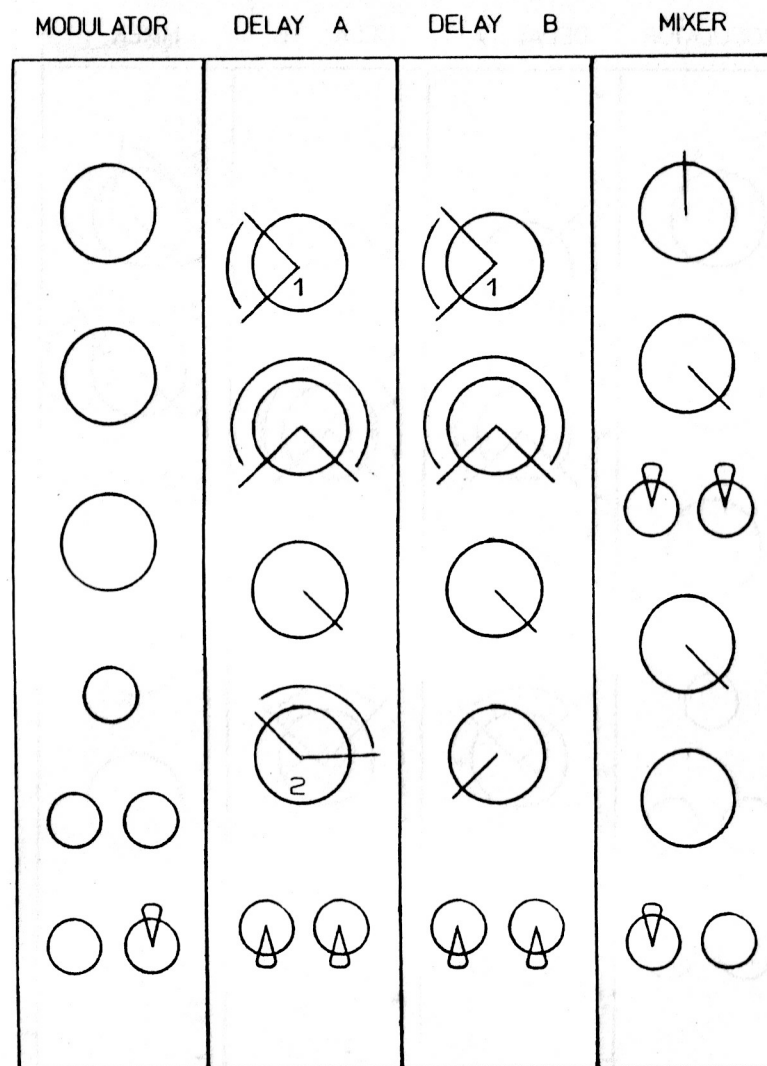
1. Up for positive down for negative.
- 2 & 3. Try different blends.
- 4 & 5. Try inverting feedback phases for different resonances.

ROOM ECHO



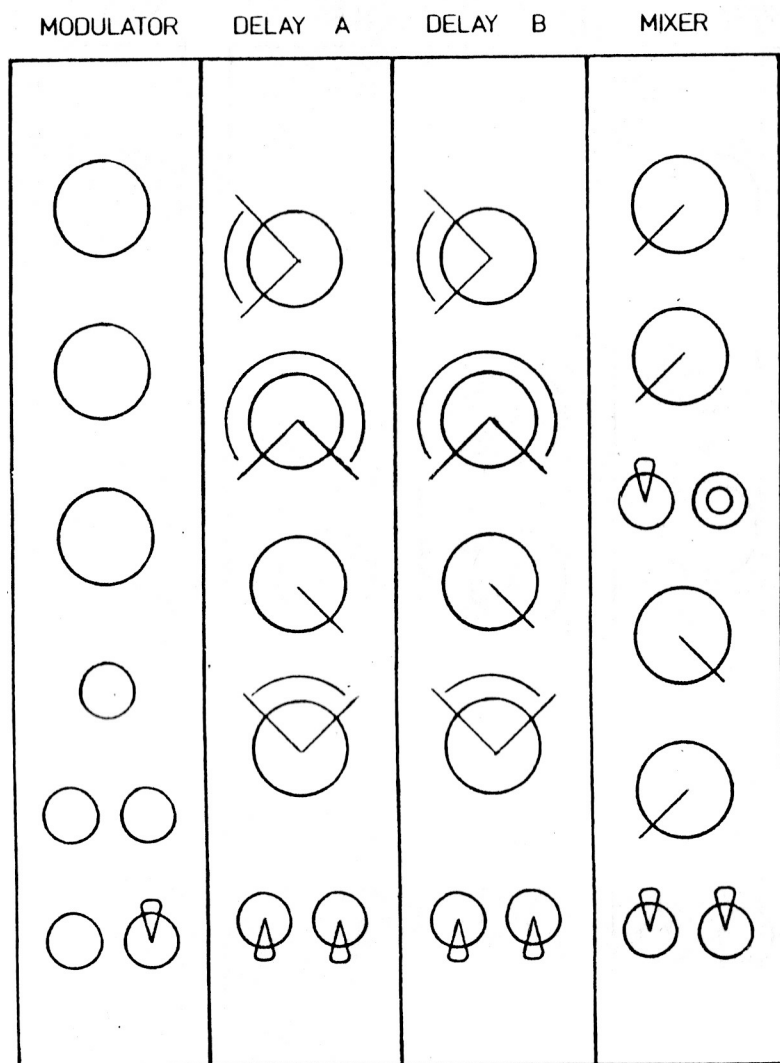
1. Balance out repeat.
2. Set decay length.

LONG MULTIPLE REPEAT ECHO.



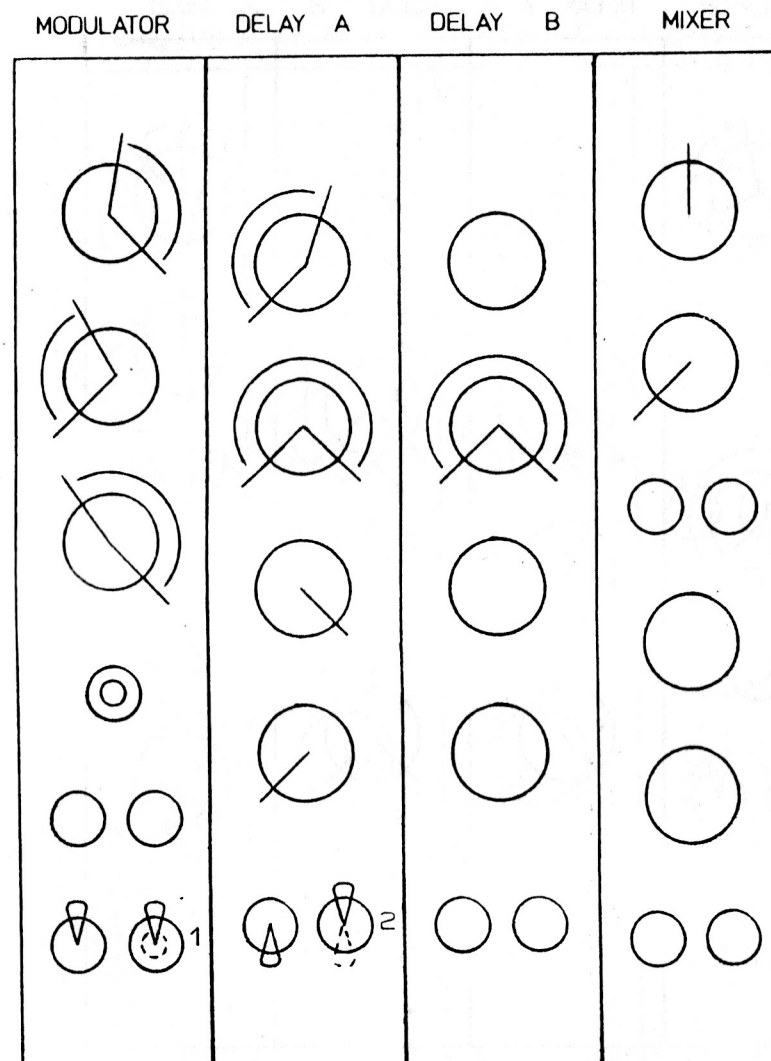
1. Adjust for delay length.
2. Adjust for number of repeats.

STEREO BOUNCE ECHO



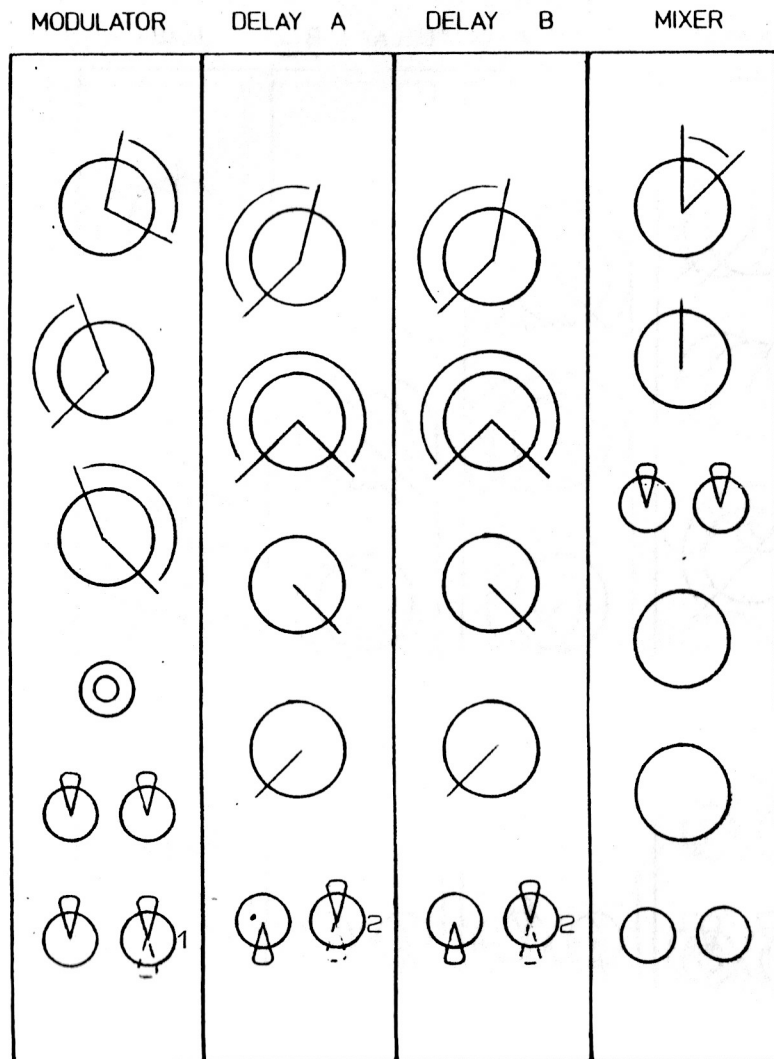
Use A input and output for left channel and B input and output for right channel.

ADT and SINGLE REPEAT ECHO.



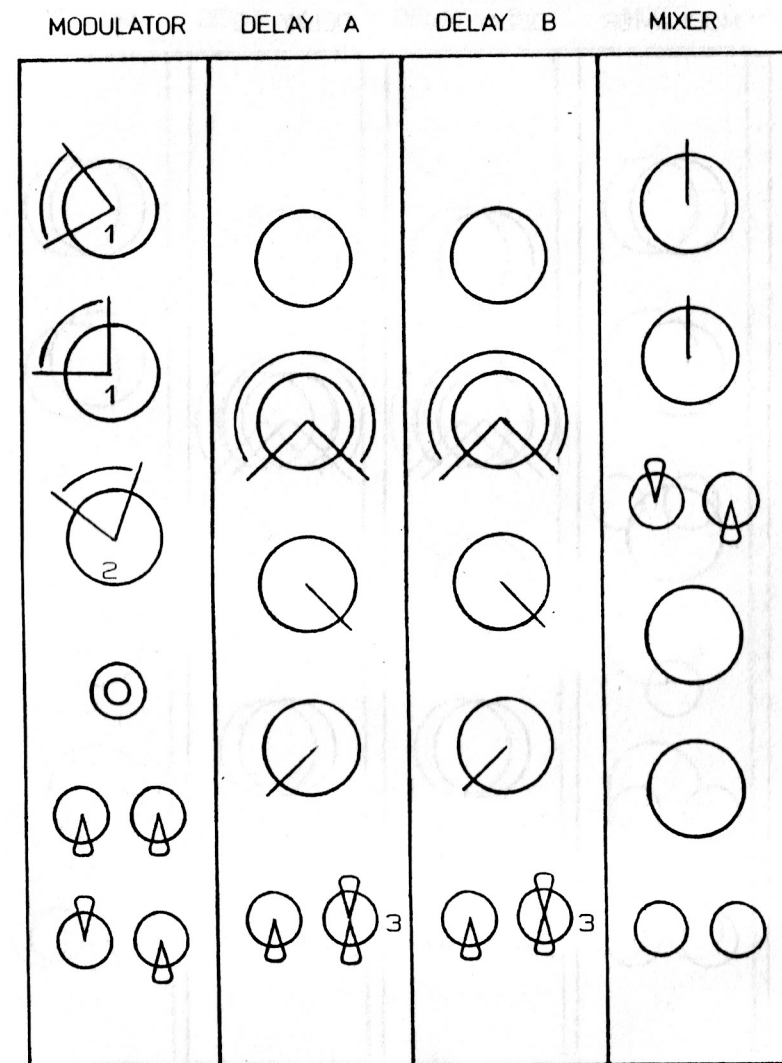
1. Modulated ADT with 'A' position, with controls as shown.
2. Single repeat echo with Dx2 position.

AUTO TRIPLE TRACK (ATT), DOUBLE REPEAT ECHO

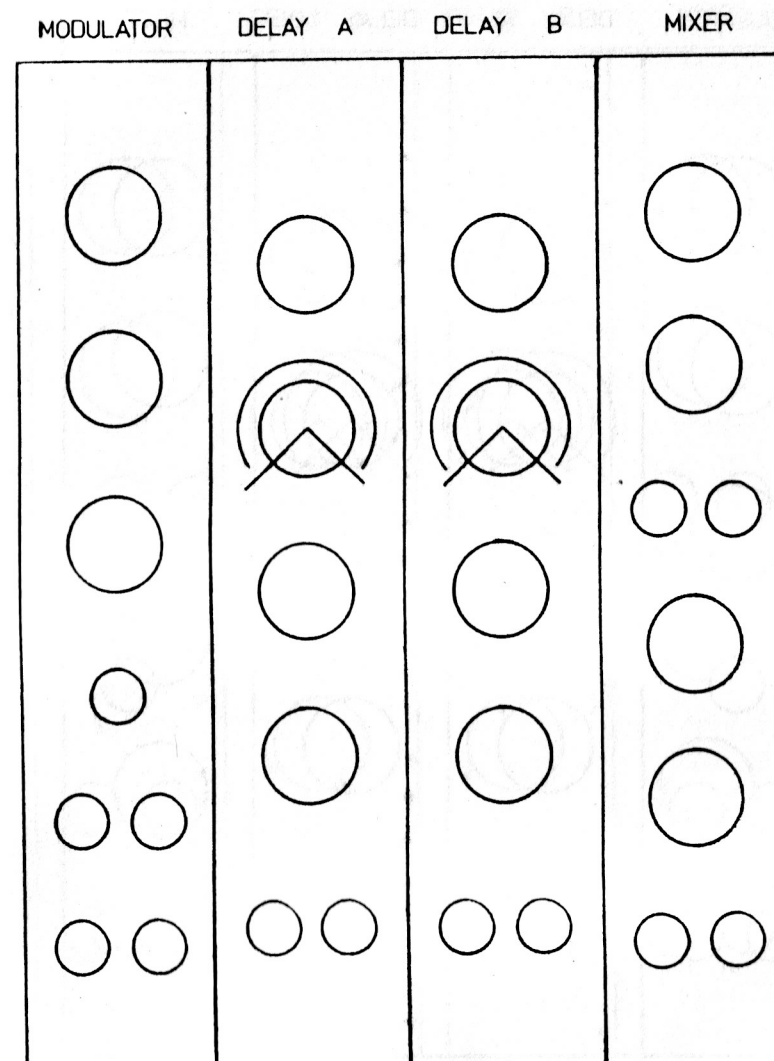
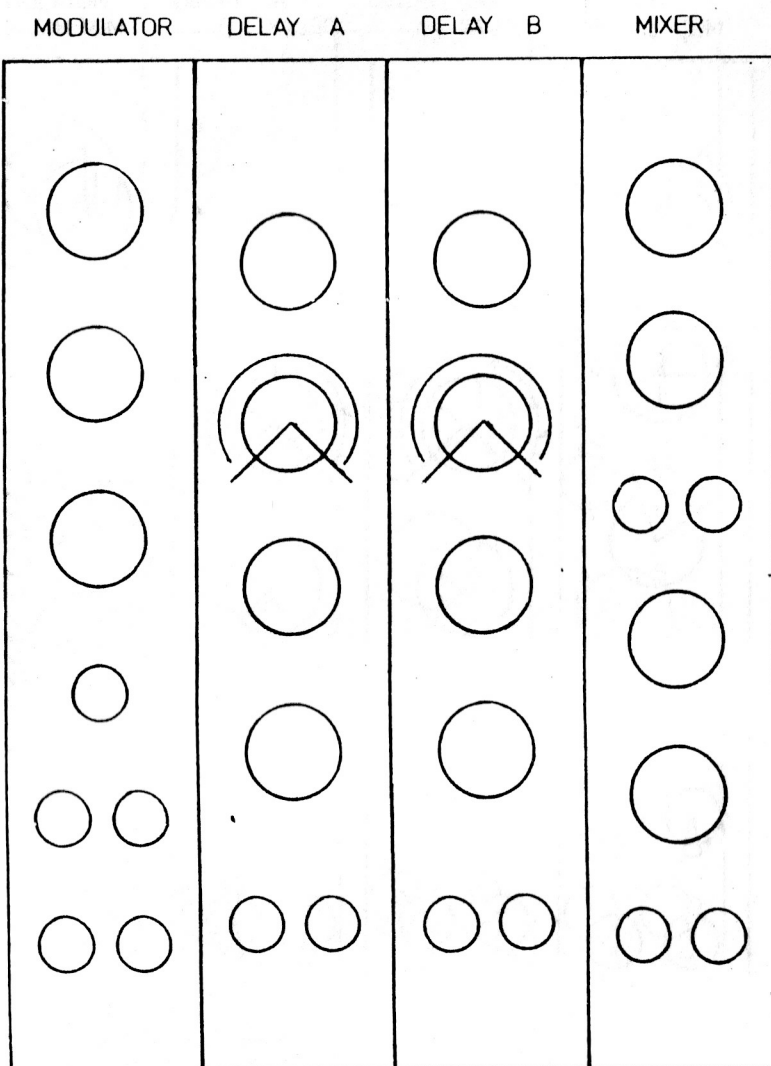


1. Modulated ATT with A+B position, controls as shown.
2. Double repeat echo with Dx2 positions.

PITCH SHIFTED TRIPLE TRACK



1. Adjust for depth of shift.
2. Adjust to trim out vibrato.
3. Longer delay gives more shift.



SPECIFICATIONS

RA205 ADT/DELAY:

DELAY TIME: Two ranges, 2mS to 40mS, 4mS to 80mS
continuously variable in range.

FREQUENCY RESPONSE (DELAYED SIGNAL):

40mS range, 15mS delay, -2dB @ 20Hz, -3dB @ 15kHz.

80mS range, 30mS delay, -2dB @ 20Hz, -3dB @ 7kHz.

NOISE [20Hz-20kHz.] : Direct, -90dBm. Delayed
40mS, -80dBm. 80mS, -74dBm.

NOISE SUPPRESS: Gives up to 15dB HF emphasis/
de-emphasis. Max input @ 10kHz, full NS, +4dBm. HF
then limited. Reduction in noise, 20Hz-20kHz, full
NS, 6dB. (10kHz component reduced by 15dB.)

DISTORTION: 0.5% maximum. (At 0dBm at 1kHz with
15mS delay, 0.25% typical.)

MAXIMUM INPUT: +19dBm.

MAXIMUM OUTPUT: +23dBm into 600 ohms.

INPUT IMPEDANCE: 100 kilohms.

OUTPUT IMPEDANCE: Less than 1 ohm.

RA208 MODULATOR:

RATE: Cycle time 70mS-40 secs, freq. 15Hz-0.03Hz.

DEPTH: Variable over whole output voltage range.

OFFSET: Modulation centre variable over entire
output voltage range.

OUTPUT VOLTAGE: Standard unit 1-12 volts, output
waveforms logged. Available with linear outputs.