KEPEX II
Keyable Program Expander

OPERATING INSTRUCTIONS

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1. General Information

1.1 DESCRIPTION

Introduction. Kepex II® is the logical extension to the original Kepex® introduced by Allison Research in 1969. It is, however, a fully new design, providing many new features, as well as significant refinements in control functions and audio performance. The device employs the industry standard Valley International TA-101 VCA as its gain control element. The important advances in both audio and control linearity and range offered by the TA-101 allow Kepex II to be configured for performance levels far beyond that of other designs.

Noise Control Applications. Kepex II is a multi-use device which tends not to sit idle in the equipment rack. It's the "problem solver" in the multi-track studio. In the area of noise reduction, or noise gating, reduction or elimination of the following undesirable noise sources is possible:

- Multi-track tape noise
- Instrument amplifier hum, buzz, noise, etc.
- Leakage noise from other instruments
- "Room sound" (reverberation, ambience, echo)
- Camera noise, air conditioner rumble, set noise, street noise, etc.
- Musician "noises" (pedal squeaks, chair and sheet music noises, etc.)
- Breath noises, lip "smacks", etc.

Effects Applications. Kepex II is capable of an enormous number of special effects—effects which often make the difference between a dull, unexciting program, and a dramatically "punchy" production. Best of all, most Kepex effects can be created "in the mix", from already recorded tracks, as can Kepex noise reduction processing. Some of the many possible effects are:

- Tightening "loose" drum sounds
- Removing excess cymbal ring...accentuating percussive impact
- Bringing "distant sound" up close...increased presence
- Stereo simulation from mono tracks
- Electronic music effects...keying one track from another.
- Increasing dynamic range via active expansion

1.2 KEPEX II SPECIFICATIONS

INPUT

Signal Input Impedance: Nominally 100 kohm balanced, or 50 kohm in parallel with 22 pF unbalanced

Input Level for +4 dB Output: +4 dB: device exhibits unity gain when fully on

Maximum Input Sensitivity for Turn-On: −40 dB for 1:100 gating ratio

Maximum Input Level Before Clipping: +21 dB

Key Input Impedance: Nominally 100 kohm balanced, or 50 kohm in parallel with 22 pF unbalanced

Maximum Key Input Sensitivity: −40 dB for 1:100 keying ratio

OUTPUT

Output Impedance: ≈200 ohm, unbalanced

Maximum Output Level: +21 dB (2 kohm or greater)

Quiescent Distortion @ +10 dB Input: ≤.015% 1kHz THD @ unity gain, ≤.05% SMPTE IMD @ unity gain

Output Noise and Hum @ unity gain, source impedance≈1000 ohm): ≤ −83 dB (20 Hz to 20 kHz)

Output Noise and Hum @ Maximum Attenuation (fully off): ≤ −110 dB (20 Hz to 20 kHz)

ELECTRICAL

Power Supply Requirement: ±15 Vdc @ 85 mAdc

MECHANICAL

Front Panel Controls:

release .04 sec to 10 sec/20 dB;
attack .02 ms to 20 ms
range 0 dB to 80 dB
ratio 1:1 to 1:100
thresh (threshold) +40 dB to +20 dB

Front Panel Switches: release shape **(lin/log)**
mode (in/out/key)

Metering 13 LED gain reduction meter

PACKAGING

Enclosure: Kepex II is designed to be housed in any of the Valley International "800" series powered or unpowered racks including: PR-10; PR-2; TR804; TR805; TR806; or CM 801A.

Panel Dimensions: Nominally 1.5" x 5.25" (38mm x 133mm)

Weight 11 oz. (313g)

Shipping Weight: 2 lb. (910g)

NOTES: The designations dB and dBv refer to 0dB≈ 0.775 Vms:dBm refers to 1 mW power into 600 ohm; noise measurements made with rms-responding meters in 20 kHz noise bandwidth. Specifications subject to change without notice.

2. Installation

2.1 POWERING/HOUSING

Kepex II is designed to be housed in any of the Valley International "800" series powered or unpowered racks including: PR-2A; PR-10A; TR804; TR805; TR806; or CM 801A.

2.2 SYSTEM INTERFACE CONSIDERATIONS

Kepex II is designed to interface into essentially line level circuits, having a nominal signal level in the range of −20 dB to +8 dB, re 0.775 Vrms.

The audio inputs into the device are electronically balanced differential inputs, exhibiting an impedance of 50 kohm on the inverting leg (low side) and 100 kohm on the non-inverting leg (high side). For situations requiring a phase reversal, the high and low (+ and −) input connections may be reversed without adverse ramifications. The inputs will handle, without clipping, signal levels up to 24 dB.

The output circuit is unbalanced, and has a voltage drive capability of +21 dB into impedances higher than 2 kohm, diminishing to +18 dB into 600 ohm. The output impedance is 47 ohm.

2.3 CONNECTIONS IN UNBALANCED CIRCUITS

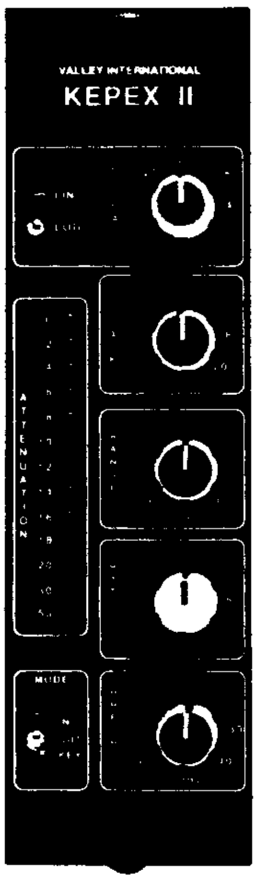
Often, in recording studio console installations, a patch point may be "unbalanced to unbalanced". In most such situations, the input and output circuits share a common power supply, and are integrally grounded together. In these cases, a beneficial scheme to avoid unwanted ground loops is to connect only the Kepex II output ground (to the circuit which the device is feeding its output signal), while leaving the Kepex II input ground(s) unconnected (connecting only the + and − inputs).

Often also, in such installations, the shield wires should be connected only at one end, and left open at the other end, so as to not allow ground currents to flow through the shields.

2.4 POWER LINE GROUND

The PR-10 and PR-2 cases are connected to the ground prong of the line cord, and are thus grounded to the power line ground. In some installations, an earth ground, separate from the power line ground, is employed to reduce ground noise. To properly separate the audio ground from the safety ground, please refer to the schematic diagrams provided with each individual powered rack.

3. Operating Instructions



3.1 THE CONTROLS

release time control (.04 sec to 10 sec/20 dB). Determines "turn-off" time, or the time required for gain to be reduced when the signal falls below threshold. The optimum release time setting is a function of the type of material being processed, as well as of the type of effect desired.

release shape switch **(lin/log)**. In the **lin** position, release occurs at a linear number of dB per second. in the **log** position the release time is slower when the amount of gain reduction is near 0 dB. As gain reduction increases, the release time exponentially becomes faster. This action reduces premature attenuation of the trailing edge of signal passages, thus preserving the natural instrument decay envelope. The **log** release position also serves to reduce modulation distortion when fast release times are chosen.

attack time control (.02 ms to 20 ms). Determines device "turn-on" time as signal is applied or rises abruptly. The slower settings are useful in allowing the device to ignore sharp noise transients which might otherwise cause undesirable false triggering. The faster settings are used when processing transient program material, to insure rapid "turn-on" in order to catch the leading edge of fast attack programs. The **attack** time control is also useful in contouring attack envelopes in "keyed" applications.

range control (0 dB to 80 dB). Determines how much of the attempted gain reduction actually takes place by limiting the maximum possible gain reduction. For instance, if a 5 dB range and a 1:100 ratio were selected, the degree of gating action would be limited to 5 dB.

expansion **ratio** control (1:1.1 to 1:100). Determines the expansion ratio when the signal is below threshold. In the mild 1:1.1 position, a 1 dB drop in signal level attempts a gain reduction of 1/10th dB. At the extreme 1:100 setting, a gating action occurs, as a signal 1 dB below threshold attempts to cause 99 dB of gain reduction.

threshold control (−40 dB to +20 dB). Signal levels (or "keying" signals) above threshold turn the device fully on to unity gain (the signal is passed without modification). As the signal level drops below threshold, expansion begins. The lower the signal, the greater the gain reduction.

mode (in/out/key) switch. Selects the operating mode. The **in** position is normally used. Here, the input signal is fed both to the VCA and to the control circuits, and gain reduction is caused by the input signal itself. In the **key** position, the input signal is fed only to the VCA: a second "key" input signal is fed to the control circuits, but not to the VCA, thus, the envelope if the input signal is affected by the envelope of the "keying" signal. The "keying" signal itself is not heard at the output, only its effect on the gain of the input signal. Hence, one signal modulates another. In the **output** position,the signal is passed unchanged through the VCA.

atten. (gain reduction display). A 13 element LED display indicated the amount of gain reduction which is incurred over the range of 0 dB to 50 dB.

3.2 PROPER USAGE OF CONTROLS

Threshold. The threshold control determines at what point the device will reach its maximum audio gain of unity. Signals above the threshold point will be passed at unity gain, with no modification, as in an ordinary amplifier. Signals below the threshold point will undergo a downward expansion action. That is to say, as the signal falls farther and farther below threshold, the device gain will go lower and lower. Thus, gain reduction is applied to low level signals (and noise).

Expansion Ratio. The expansion ratio control determines what slope the gain expansion of signals below threshold will exhibit. Expansion ratio is variable from a very mild 1:1.1 ratio, up to an extreme 1:100 ratio. These ratios are defined as follows: When set for a 1:1.1 ratio, a signal 1 dB below threshold will cause a gain reduction of .1 dB. Thus, assuming a 0 dB threshold, an input signal of .1 dB. Thus, assuming a 0 dB threshold, an input signal of −1 dB will come out as a −1.1 dB signal, a −10 dB input comes out −11 dB, etc. On the other end of the ratio spectrum, at 1:100, a signal 1 dB below threshold will cause 99 dB of gain reduction, resulting in a −100 dB output (see "Range"). Thus, the 1:100 ratio setting may be considered as a "gate", in that signals the slightest bit below threshold will effectively "switch" the device off.

Range. The range control establishes the minimum gain (or maximum gain reduction) which may be incurred. This control is variable from 0 dB (no gain reduction available) to 80 dB. In many applications it is desirable to limit the amount of gain reduction, via the range control, in order to prevent "pumping" and other undesirable effects.

Release Time. The release time control determines at what rate the gain will fall, from a higher gain to a lower gain, and is variable from .04 s to 10 s per 20 dB of gain change.

Release Shape Lin/Log. The release shape switch allows the selection of one of two release patterns. In the LINEAR position, the device gain falls linearly, at the rate set by the release time control. In the LOG position of the switch, the gain falls, initially, at a rate slower than in the LINEAR position, then speeding to a rate faster than in the LINEAR position. The effect of the LOG release shape is somewhat similar to a delayed release, and is effective for preserving the trailing edges of program content, while maintaining fast release times.

Attack Time. The attack time control determines the "turn on" time, or time constant for gain changes from a lower gain to a higher gain. It is variable from .02 ms to 20 ms per 20 dB of gain increase.

In/Out/Key Switch. When the IN position is selected, the gain characteristics of the Kepex II are controlled by the audio signal passing through the device. This is the normal operating position for the device for noise gating, expansion, dynamics enhancement, etc.

With the switch in the KEY position, the gain of the device is controlled by a second audio frequency which is applied to the KEY input of the Kepex II. For instance, if a piano track were patched to the audio input of the device, and a drum track were connected to the KEY input, the gain envelope of the piano track would be controlled by the gain envelope of the drum track. In essence, the piano would "follow the drums", even though the drums themselves would not be heard at the Kepex II output.

In OUT position, the Kepex II will act merely as a unity gain amplifier.

3.3 HINTS FOR OPTIMUM RESULTS

As a Noise Gate. In noise gating applications, the device is normally set up such that desired signals are above the threshold, and are passed without change, while undesirable signals (noise, hum, etc.) are below threshold, and are thus attenuated. The various controls should be experimentally adjusted, in accordance with the type of signal, type of unwanted noise, and the spacing between signal and noise. Certain guidelines, together with some experimentation, will assist you to make optimum settings.

Defined, percussive signals will be the easiest to process, while wide dynamic range, unpredictable signals will generally be the hardest. One might imagine the severe case of a concert violinist playing on a city street corner. Here, the desired signal level would, in all probability, fall below the level of the noise ambience, thereby making processing very difficult, if not impossible. This is particularly true since the street noise would be impulsive in nature, and would tend to fool the Kepex II into thinking it was signal.

In general, processing applications involving abnormally high noise levels together with wide range signals will dictate only limited processing, using restricted range settings, low expansion ratios, and slow release settings.

In multi-track recording studio usage, where noise levels are already low and signals are more defined, a much greater latitude of freedom exists in setting the controls, and excellent, even astounding, results can be easily produced.

It must be remembered that a typical multi-track musical work will consist of a number of individual tracks, with each track having a considerable amount of dead space, or space where no desired signal is present. If the processing is done on a Kepex II per track basis, before the tracks are combined, these dead spaces may be effectively shut down, with each Kepex II passing only the desired signal passages. In this manner, extreme improvements in the final signal-to-noise ratio may be realized, with the multi-track tape noise, as well as studio ambience and leakage noises greatly reduced.

Recommended Setup Sequence. The following procedure is recommended for intially setting the various controls. This method should allow you to make a quick assessment of the effect of the peculiarities of the particular program you are about to process, in order to arrive at an optimum setting. It should be remembered that if you are "soloing" one track of a multi-track program, you may hear the effect of the Kepex II much more predominately than when you bring up the remaining tracks. Often, effects such as "pumping" and "breathing", which sound objectionable when the track is soloed, will disappear when the track is played in context with the remainder of the program. Thus, it is advisable to alternate between the solo and mix modes when setting an individual Kepex II.

1. Start with the Kepex II set at its most extreme positions (high THRESHOLD, high RATIO, high RANGE, fast ATTACK, fast RELEASE, LINEAR RELEASE).

2. While listening, lower the THRESHOLD to the point where the desired program passages reliably cause full gain, as indicated by the LED meter. At this point in the setup, the gain will be fluctuating wildly, and a good deal of modulation distortion will be heard, due to the wide RANGE and fast RELEASE time.

3. Increase the RELEASE TIME to the point where excessive modulation effects cease. Also, experiment with the RELEASE LIN/LOG switch to obtain the best sounding RELEASE pattern.

4. Decrease the EXPANSION RATIO to the point giving the most pleasing expansion characteristics. The lower RATIOS will usually be more effective on wide range program material, and will give greater freedom from the undesired dropout of low level signal passages.

5. Experiment with the ATTACK TIME control. The slower ATTACK settings will tend to give smoother turn-on characteristics and freedom from false triggering from transient noise impulses. Attack times must be kept fast enough to capture the leading edges of program impulses, however. In general, transient programs such as percussion tracks will require fast attack times, while slow attacking instruments and voices will sound better with longer Kepex II attack times.

6. If excessive "pumping" is still heard, adjust the RANGE control to restrict the gain range coverage, as required. Remember to listen to the track in context with the rest of the mix in order to determine if the effects heard are really objectionable.

7. Touch up any of the controls as required for optimum results.

With practice, you will be able to quickly set up your Kepex II's to reliably give you a dramatic amount of background noise reduction. If your goal is to achieve a natural sound, you will want to use the milder settings in order to preserve the dynamics, while reducing noise. On the other hand, if you are creating artificial effects, the more drastic settings may be employed to not only reduce noise, but to increase or "tighten up" the dynamics to almost any degree desired. Remember, the Kepex II is capable of very drastic dynamics modification. Don't be afraid to try these capabilities, but also be conscious of their potential effect on music.

Dynamics Enhancement, Percussion Instruments. Percussion instruments are characterized as having an attack, as they are struck, followed by a decay, or after-sound. In modern recording situations, it is often desirable to make these instruments "tighter", by emphasizing the impact sound, with respect to the decay. This is one processing job where Kepex II is most at home in the studio, and gives results unobtainable by other methods.

The setup for percussion "tightening" is similar to that described above for noise reduction. You will generally want to use the fastest ATTACK setting to capture the initial impact. To the contrary, there may be instances, such as processing a bass drum played with too hard a beater, where you desire to soften the attack by using a slower ATTACK. The THRESHOLD will normally be set so that the impact of the instrument just causes the Kepex II to come full on. The RATIO will normally be set quite high, perhaps all the way to 1:100. Thus, a high amount of definition is given to the instrument impact.

Now, by operating the RELEASE TIME and RANGE controls, you can shorten, or accelerate the instrument's natural decay to any degree desired. The RANGE control will allow you to get rid of whatever amount of over-ring desired, while the RELEASE TIME control will adjust the rate of decay.

Ambience Reduction/Leakage Reduction, Etc. The usual effect of room ambience, when excess is to blur the definition of transient instruments through reverberation, reflections and resonances. The DYNAMICS ENHANCMENT techniques above will be equally effective in reducing, or controlling the amount of "room sound" heard. By proper manipulation of the controls, the apparent instrument to microphone distance may be adjusted.

As far as room leakage from other instruments, these sounds are normally heard only during the absence of sound from the instrument whose microphone you are listening to. By adjusting the Kepex II to "shut down" the mic during the absence of desired signal, room leakage will be greatly reduced, or rendered inaudible. Particularly, when a number of microphones are open to leakage, the use of a Kepex II per mic can make dramatic improvements in definition.

Dynamic Enhancement, Steady State Instruments. When it is desired to generally increase the dynamic range of program material, the lower EXPANSION RATIOS may be used, and the THRESHOLD adjusted so that Kepex II gain reaches unity only on the *loudest* passages. Thus, the entire range of program dynamics will be broadened. This sort of processing may be used to counteract the effects previously applied by compression or limiting, or whenever an increased dynamic range is indicated by the nature of the music. Fairly long RELEASE TIMES will generally be required when performing full range expansion, in order to prevent waveform distortion caused by gain modulation effects.

Keyed Effects. Many effects are possible when the Kepex II is operated in the KEY mode. As described earlier, the gain envelope of one instrument may be influenced by a second instrument applied to the KEY input. Often, special tracks may be prepared for the specific purpose of gain modulating other tracks. For instance, a tambourine track may be laid down solely to provide a modulating rhythm for an organ track, or for a vocal background track, etc. The full range of controls available on Kepex II will allow the production of unlimited KEYING EFFECTS as inspired by the imagination.

There are some more serious uses of the KEY mode. For instance, noise gating and other self-imposed dynamics modifications may be benefitted on occasion by passing the audio input signal through an equalizer feeding the KEY input, while connecting it, unequalized, to the signal input. In this manner, the signal itself remains unequalized, but the expansion characteristics are affected by applied equalization.

Often, artificial bass drums are created by the expedient of applying a low frequency audio oscillator (around 80Hz) to the signal input and applying a recorded metronome to the KEY input. In this manner, an absolutely precise bass drum is created which has fully adjustable parameters of beater hardness (ATTACK TIME), dampening (RELEASE TIME), and tuning (oscillator frequency).

Using the same techniques, it is possible to repair a badly recorded, but well played conventional bass drum, by applying the same oscillator to the signal input, but routing the original bass drum signal to the KEY input.

Thus, the musician who originally played the conventional bass drum is now playing the artificial one. The real drum serves only as a trigger for the oscillator.

Another use for the KEY mode is in situations where multiple tracks of background voices are supposed to come in on cue, but where the performers did not hit that cue with great accuracy. If one of these tracks has good cue-in timing, it may be used as a keying signal for the remainder of the tracks. With a Kepex II on each track, the properly timed track is fed to the KEY input of all tracks. Now, all tracks will come in precisely on cue, as directed by the good track. The same psychology may be applied to many other circumstances.

Artificial Stereo Effects. Another effect which can be easily generated with Kepex II is the synthesis of stereo, from a mono source. This effect is easily implemented with drums or other percussion instruments. Assume that the output of such a track is fed directly to the left channel, while it is passed through a Kepex II to the right channel. If the Kepex II controls are adjusted to alter the attack/decay characteristics, as described earlier, the impact sounds will predominate in the right channel, with respect to the unaltered sound in the left channel. A very realistic stereo separation can result due to the non-coherency of sound coming from the two channels. With proper level settings, the impacts will appear to come from the right, while the room ambience, over-ring, cymbals, etc., will appear to come from the left. The same sort of effects can produce interesting effects on other instruments such as piano, acoustic guitar, vibes, etc.

The range of effects obtainable by the clever use of Kepex II is unlimited in the hands of an operator who is familiar with the abilities of the device.

3.4 MISCELLANEOUS REAR CONNECTOR CAPABILITIES

The Kepex II design has the ability to perform a host of additional functions, via connections to the various rear connector points. These capabilities are described below:

Auxiliary VCA Controls. Two −20 dB/volt Auxiliary control inputs are provided to the VCA. These inputs will cause direct voltage controlled gain modification, on a log basis, at the rate of 20 dB gain per −volt applied, or 20 dB Attenuation per +volt (50 mV/dB). These connections may be used to apply a low frequency oscillator for tremolo effects, as well as any other use requiring voltage controlled gain. Kepex II's are normally shipped with these inputs terminated to ground to prevent stray signals from producing modulation distortion. These inputs exhibit a 5 k nominal impedance.

Voltage Control Output. This connection outputs the control voltages produced within the Kepex II, and may be used to drive remote VCA's (−20 dB/volt), as well as external metering devices, etc.

Unbalanced Input Monitor. The signal input stage of Kepex II is a differential amplifier, and as such may be bridged across a balanced line, without unbalancing that line. The output of that differential amplifier appears at the "Unbalanced Input Monitor" point, and may be used to feed other equipment without danger of unbalancing the input source.

Master Out Buss. When using multiple Kepex II's, it may be desirable to make A/B comparisons, with and without the Kepex II. The MASTER OUT BUSS is a logic buss which normally appears across all Kepex II units within a system. The application of a logic "1" (+5 Vdc) to this buss will cause all units in the system to revert to the "out" state.

Remote Parameter Control Inputs. All control parameters of Kepex II are Voltage Controlled, and all front panel pots and switches produce either variable control voltages, over the range of from 0 to +5 Vdc, or switch logic levels (0 V and +5 V) on or off. CMOS switching within the Kepex II allows electronic dis-connection of all front panel controls, in favor of externally applied control voltages and logic commands. Thus, the device may be remote controlled from external sources such as remote control units, computer systems, automation memory systems, etc.

Local/Remote Logic. Change over from front panel control to remote input control is accomplished by the application of a logic "1" (+5 V) to one of two logic inputs. One of these inputs is a buss extending across all units in a system, which is labeled "All Channels Remote". The other is an individual connection to each Kepex II, and is labeled "One Channel Remote". Thus, remote operation may be incurred either selectively, or to all channels with one logic command.

Parameter Control Voltage Outputs. The control voltages which are establishing the operating parameters of a Kepex II unit appear at the rear connector. This is true whether the parameter control voltages originated from the front panel controls, or from externally applied control voltages. Thus, the parameter control voltage outputs are always indicative of the parameter status of the device. The combination of inputs, outputs, and logic lines, with respect to the parameter control voltages, can be useful for a variety of purposes, as described below.

3.5 IMPLICATIONS OF REMOTE PARAMETER CONTROL

Automation. If the parameter control outputs are connected to the inputs of a computer storage mechanism, programming can be accomplished by establishing the parameters via the front panel controls. When the desired parameters are achieved, the computer system may be instructed to put that information to memory, for future recall. At such time as recall of prior programmed parameters is desired, the output from the storage mechanism may be directed to the parameter control inputs, and the local/remote logic line raised to receive remote parameter control. Thus, the front panel controls will be rendered inoperative, and the Kepex II operating parameters will be established by the previously stored program.

It is also easy to imagine automation schemes wherein initial programming is performed by means other than the front panel controls. Such means might include central control mechanisms, computer terminals, etc.

Gang Operation. In some situations, it might be desirable to establish operating parameters for two or more units in tandem, that is to say, one set of controls setting a number of Kepex II's. To do this, one Kepex II should be designated as the MASTER, and its local/remote logic line set to local, thus enabling its front panel controls. The parameter control outputs of this MASTER unit should then be directed to the parameter control inputs of the remaining units in the GANG. The local/remote logic inputs of the "slave" units should then be set to "remote", so that they may receive parameter control information, as sent by the MASTER.

Preset Parameter Operation. In some cases, it may be desirable to be able to select, on cue, between two pre-established parameter setups, during the course of program material. If two units are coupled as above in "gang" form, the "slave" unit may be switched between two parameter setups by the simple expedient of raising or lowering its local/remote logic line with a switch providing +5 V or 0 V. In "local" position (0 V), the parameters will be set by the front panel controls of the "slave", while in "remote" (+5 V), the parameters will be set by the "master". In this example, the "master" is simply serving as an auxiliary set of controls, which may be switched in or out of the "slave's" control path. For cost effectiveness, the "master" may be replaced by a remote box consisting of give potentiometers and two switches. The 5 V required for logic and potentiometer feed voltage is accessible on the rear connector of the "slave".

Wiring connections for remote situations described above may be simplified by using flat wire cables and mass termination systems such as offered by 3M and other companies.

3.6 SAMPLE SETTINGS

1. Vocals—Eliminating leakage from other instruments.

Release	.65 Log
Attack	.6
Range	20
Ratio	2
Threshold	As required for 0 attn of all passages

Notes: If leakage is severe, adjust Ratio and Range to minimize pumping of leakage.

Always listen with the rest of the mix. If vocal is soloed, audible effects may be heard which will not be heard when the mix is present.

2. Vocals—Eliminating tape noise, air conditioner rumble, etc.

Same general settings as above. More Range and higher Ratios may be used, if desired.

3. Piano—Eliminating noise or leakage.

Same general settings as for vocal. Lower Ratio and slower Release may be necessary for smoothness. Experiment with Lin/Log, and with Attack for different effects.

4. Drums—Tightening, reducing cymbal ring, reducing room sound, etc.

Release	.1 to .65 Lin
Attack	.02
Range	5 to 20
Ratio	100
Threshold	As required for 0 attn on drum impacts

Notes: Many effects are possible on percussion instruments. For "closet" sounds and other very "tight" effects, use fast Release, high Range, high Ratio, and Threshold set to just catch impacts.

For more natural sounds, use less drastic settings on all parameters. . . try Log Release. This will tend to preserve the after impact sounds.

To reduce impact sounds (soften drums) try slower Attack settings.

5. Creating Stereo Drums from Mono Tracks.

Pass unprocessed drums to one side of mix. Feed Kepexed drums to other side. Set Kepex for "tight" effects as above. The impact signal will appear to come from the processed side, while the after-ring will come from the other side.

6. Horns, Strings, Other More Sustained Instruments.

Use similar settings as for vocals. Tend toward longer Release. Use sparingly on strings (low Ratios, small Range, long Release).

7. Full Mix—For noise reduction between cuts, etc.

Release	1.6 to 10 (long) Log
Attack	.02
Range	10 to 50
Ratio	2
Threshold	As required for 0 attn on all desired passages

Note: Use only to attenuate noise at ends of music. More drastic settings will modify the music excessively.

8. Active Expansion of Full Mix.

Release	.65 to 4 Lin or Log. . . experiment
Attack	.02 to 2
Range	10 to 50
Ratio	Mild. . . 1.1 to 2
Threshold	Adjust so only the loudest passages cause 0 attn

Note: Useful on mixes which have been restricted in dynamic range by compression, etc. Active expansion will make soft passages softer and loud ones louder—restoring the dynamic range. Because of the low ratios, the range of attn as observed on the LEDs will be small, but the effect should be audible. Requires experimentation for optimum results.

9. Keyed Effects.

Many interesting effects can be created by using the Key Mode. Feed a Keying signal (generally a percussive instrument. . . drums, tambourine, etc.) into Key input. Connect a more sustained signal (piano, organ, vocal background, etc.) to normal audio input. The volume of the sustained signal will be modulated by the percussive instrument.

Sample Settings:

Release	.25 to 1.6 Lin
Attack	Experiment. . .
Range	5 to 80. . . experiment
Ratio	100
Threshold	As required for 0 attn on impacts of percussive key signal
Mode	Key

Note: Starting with these settings, experiment with Range, Release and Attack, for a variety of degrees of keyed effects. Anything goes that sounds good.

4.1 INTERNAL ADJUSTMENTS

Setup: RELEASE = .04 s (Lin); ATTACK = .02 ms; RANGE = 80 dB; RATIO = 1:100; MODE = Ext.

Feed an audio oscillator to the *external* (key) input. Leave *signal input* terminal unconnected.

Adjusting the 0 dB Threshold Trim.

1. Set oscillator for 0 dB (.775 Vrms), 1 kHz.
2. Set THRESHOLD CONTROL to "0" mark.
3. While observing the Gain Reduction LEDs, adjust "0 dB THRESHOLD ADJ" such that the "0 dB" LED just comes on.

Adjusting the 40 dB Threshold Trim.

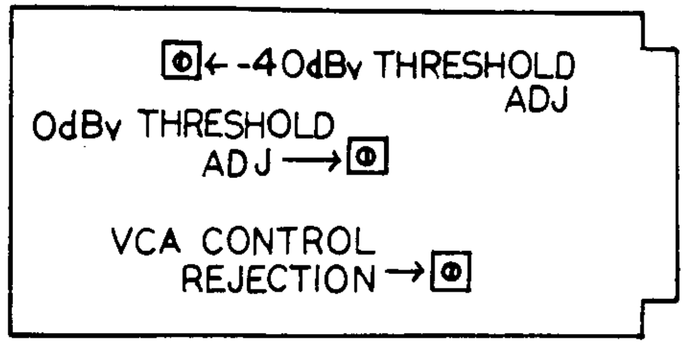
1. Set oscillator for −40 dB (.00775 Vrms), 1 kHz.
2. **Set THRESHOLD CONTROL to "−40" mark** (fully CCW.)
3. While observing the Gain Reduction LEDs, adjust "−40" THRESHOLD ADJ" such that the "0 dB" LED just comes on.
4. Repeat 0 dB THRESHOLD TRIM procedure above.

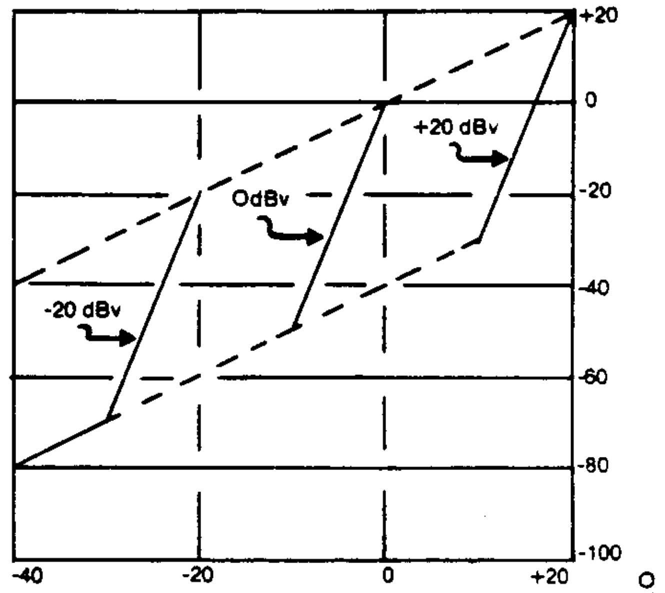
Adjusting the VCA Control Rejection Trim.

1. Set the oscillator for 10 Hz, 0 dB.
2. Adjust the THRESHOLD CONTROL such that the Gain Reduction LEDs are fluctuating up and down, reaching the "0 dB"LED, as well as lighting as many LEDs as possible below the "0 dB" LED.

3a. Monitor the Kepex II output with an amplifier/speaker, and adjust VCA CONTROL REJECTION TRIM for minimum audible output, or,

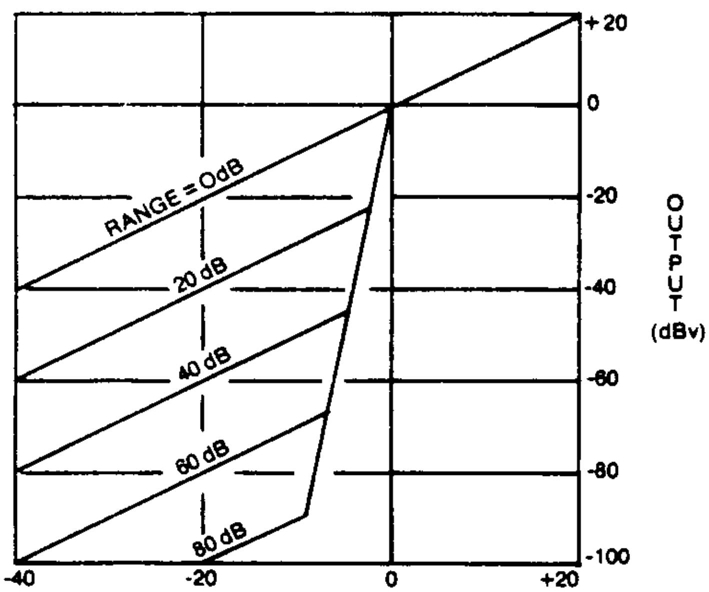
3b. Monitor the output with an oscilloscope, and adjust VCA CONTROL REJECTION TRIM for minimum output signal (should be less than 20 mV).



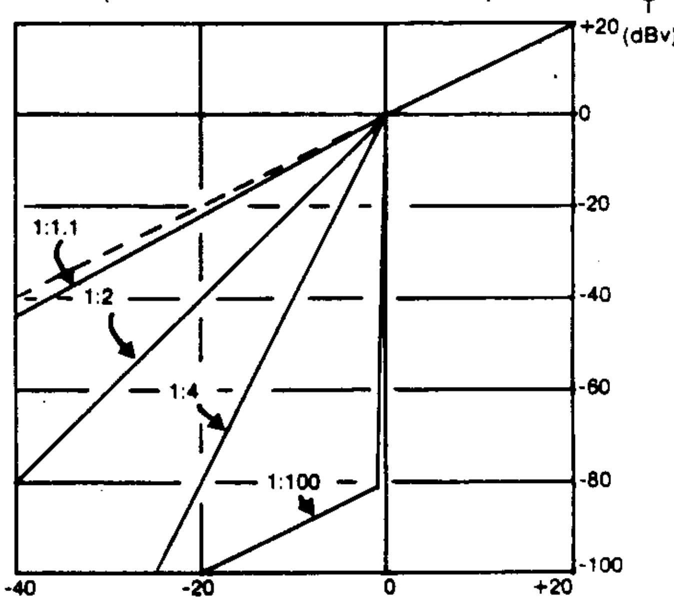


INPUT (dBv RE .775v)
EFFECT OF THRESHOLD CONTROL
(WITH 1:4 RATIO & 40 dB RANGE)

4.2 DESCRIPTIVE GRAPHS

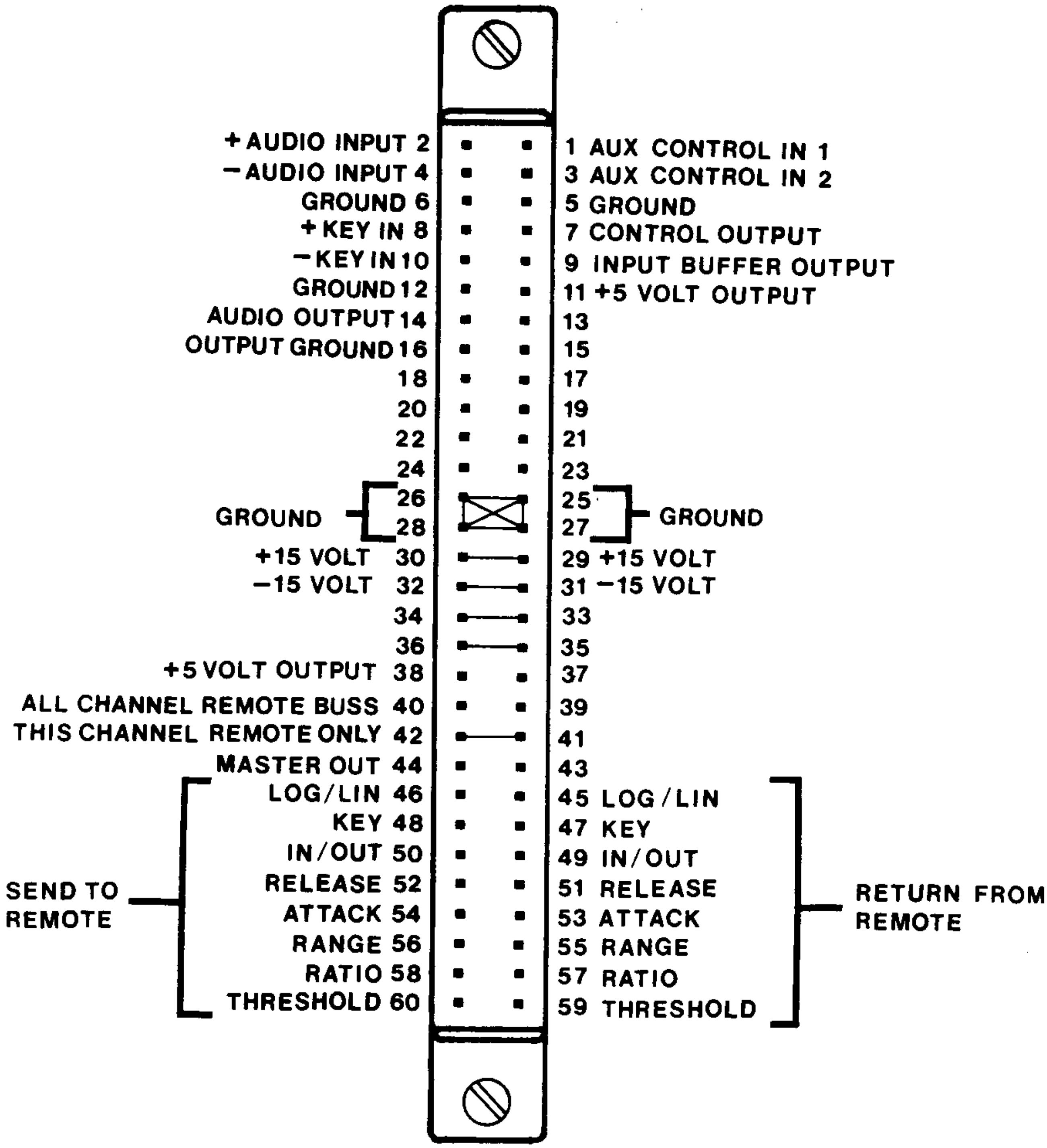


INPUT (dBv - .775v)
EFFECT OF RANGE CONTROL
(WITH OdBv THRESHOLD & 1:10 RATIO)

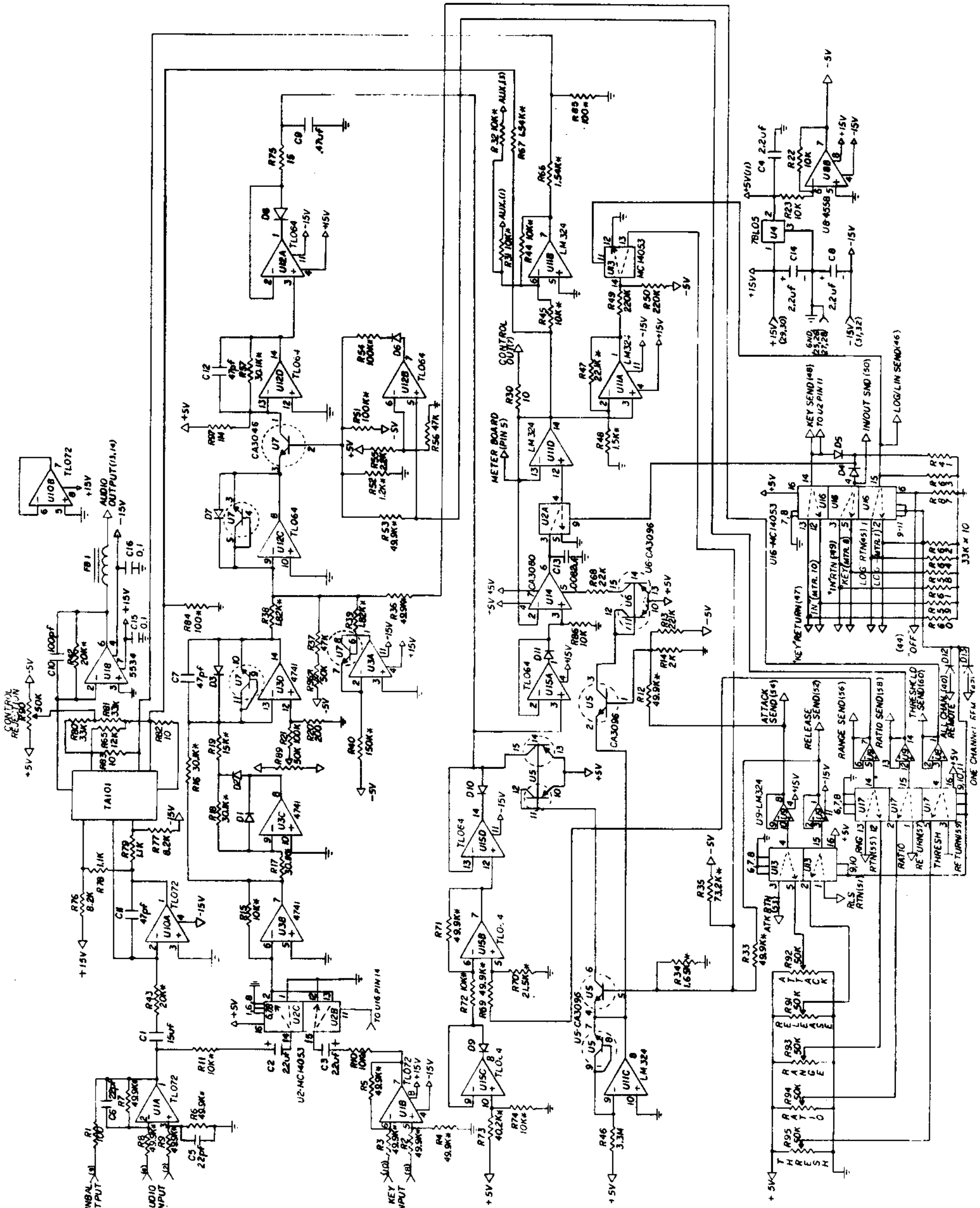


INPUT (dBv re .775v)
EFFECT OF RATIO CONTROL
(WITH OdBv THRESHOLD & 80 dB RANGE)

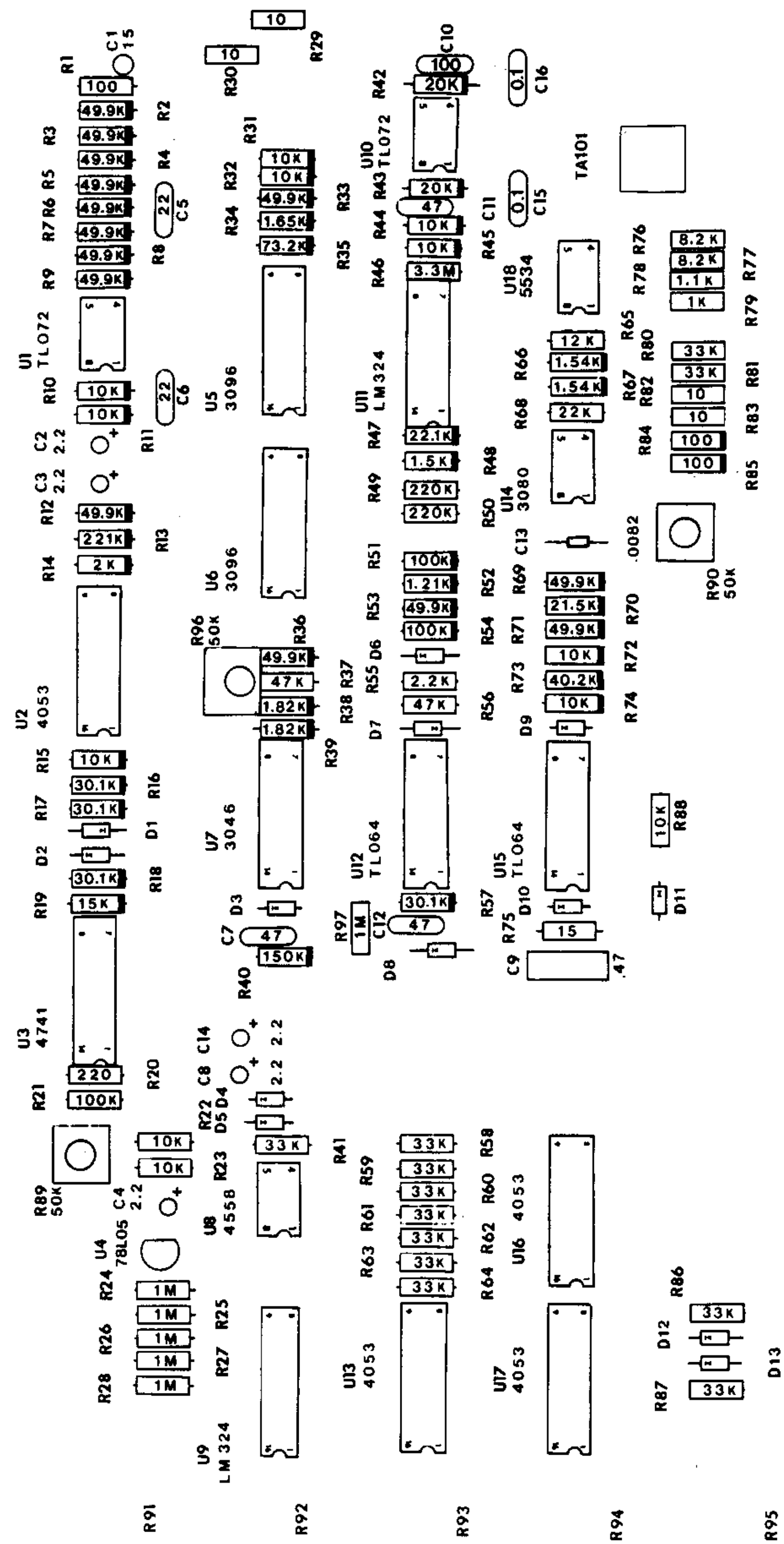
5.1 KEPEX II PIN OUT DIAGRAM



5.2 KEPEX II SCHEMATIC DRAWING



5.3 KEPEX II PARTS OVERLAY



5.4 METER BOARD