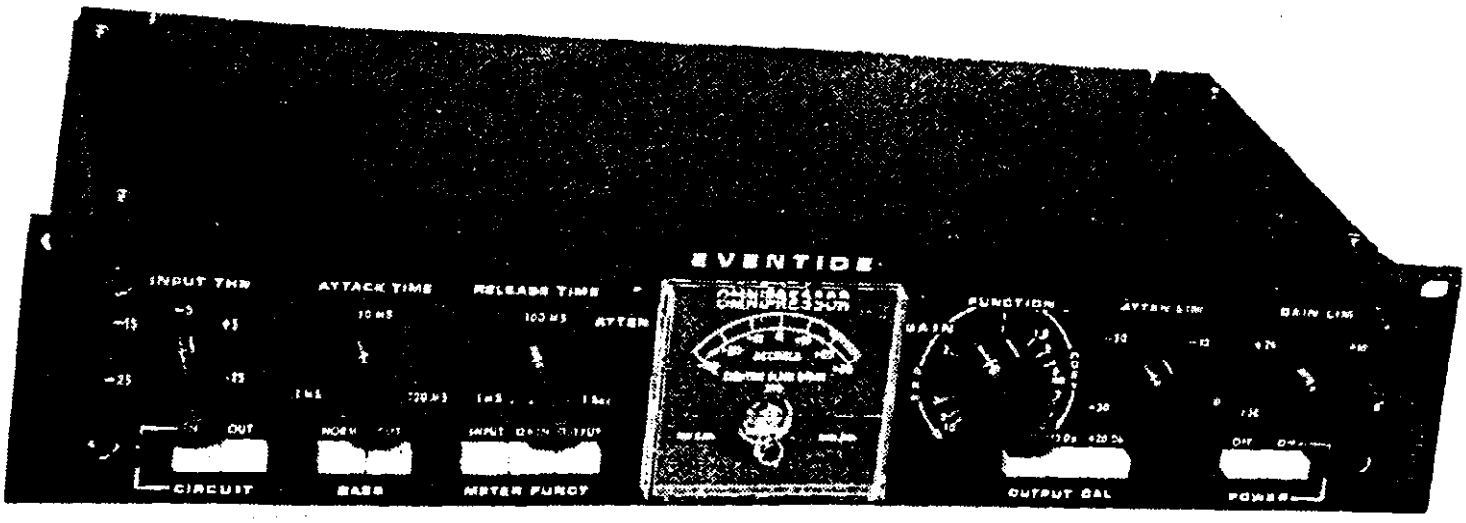
Eventide
the next step

OMNIPRESSOR



INSTRUCTION MANUAL

*OMNIPRESSOR is a registered trade mark of

EVENTIDE INC. • ONE ALSAN WAY • LITTLE FERRY, NEW JERSEY 07643 • 201-641-1200 • TWX: 710-991-8715

OMNIPRESSOR MODEL 2830
TABLE OF CONTENTS

WARRANTY

THE EVENTIDE CLOCK WORKS, INC. MODEL 2830 OMNIPRESSOR is warranted against defects in material and workmanship for a period of one year from date of purchase from EVENTIDE or AUTHORIZED DEALER. In case of difficulty, contact Eventide or your dealer for repair or return instructions.

This warranty does not apply to mechanical defects caused by use or rough handling or to damage caused by improper operation not in accordance with this manual. Cause of defect is in the sole judgement of Eventide.

This warranty is voidable at Eventide's option under the following circumstances:

User makes unauthorized modifications (electrical or mechanical)
The unit is connected to an improper voltage supply.
Any other condition occurs which causes catastrophic failure or impairs Eventide's ability to render proper service.

If the unit is modified by the customer without permission, the customer agrees to pay for any time or parts necessary to remove the modification before repair.

EVENTIDE WILL NOT BE RESPONSIBLE FOR CONSEQUENTIAL DAMAGES caused by failure for whatever reason of equipments of its manufacture. Sole liability is for repair or replacement (at Eventide's option) of the defective equipment under the terms described above.

DOMESTIC REPAIRS

Equipment to be repaired should be shipped prepaid to Eventide. Repaired equipment will be returned to the customer at Eventide's expense by U.P.S. When shipping by a premium method is requested by the customer, he will be billed for the difference.

FOREIGN REPAIRS

Since Eventide's prices contain no export surcharge, the warranty does not cover excess charges necessitated by foreign shipping. All shipping and brokerage charges must be paid by the customer.

EMERGENCY REPAIRS

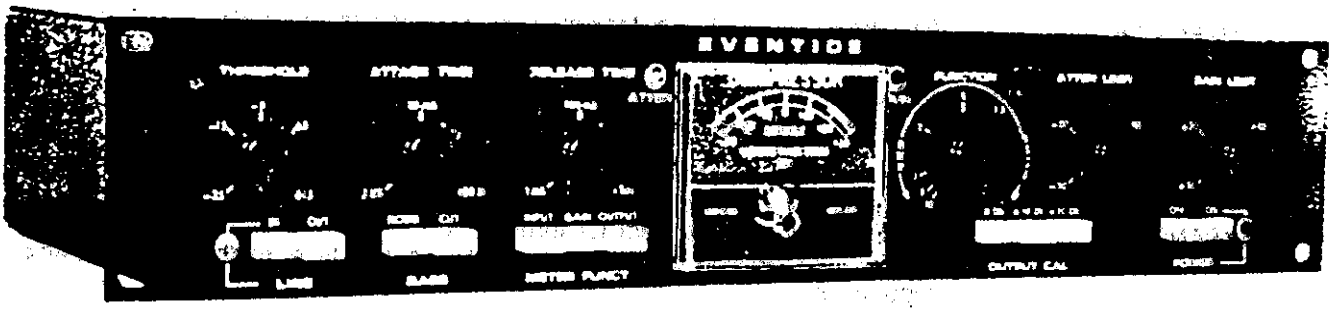
In an emergency, repairs can usually be effected within 24 hours, including shipping to any major airport city in the Continental United States. For more information, call *201-641-1200* during office hours.

VERY IMPORTANT NOTICE

ANY PIECE OF EVENTIDE EQUIPMENT SHIPPED BACK TO EVENTIDE FOR REPAIR MUST HAVE WITH IT A COMPLETE AND DETAILED REPORT OF THE PROBLEM, INCLUDING CONTROL SETTINGS. FULL INFORMATION WILL ENABLE US TO REPAIR THE EQUIPMENT QUICKLY AND EFFICIENTLY.

Eventide's omnipressor

The Eventide *Omnipressor* is a professional-quality dynamic modifier, combining the characteristics of a compressor, expander, noise gate, and limiter in one convenient package. Its dynamic reversal feature makes high level input signals lower than corresponding low level inputs. Musically, this reverses the attack-decay envelope of plucked string and similar instruments, and gives the effect of "talking backwards" when applied to a voice signal.

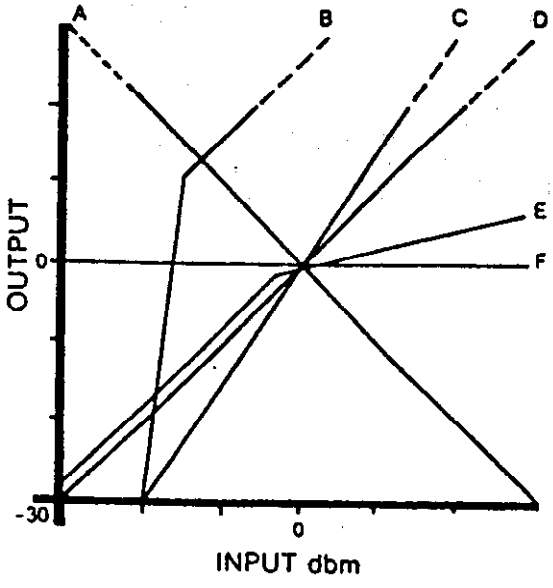


The *Omnipressor* provides an unusually wide range of controls, useful in all program-controlled gain changes. The continuously variable Expansion/Compression control goes from an expansion range of 10 to 1 (gate) to a compression range of -10:1 (abrupt reversal); attenuation and gain limit controls adjust the gain control range from a full 60 db to as little as plus and minus 1 db; and variable time constant controls adjust attack/decay times over an approximate 1000 to 1 ratio. The unit's bass cut switch limits low frequency response in the level detector.

The *Omnipressor's* unique metering system employs a logarithmic amplifier to generate information on Input, Output and Gain. When a return to normalcy is desired, the IN/OUT switch is used to bypass the *Omnipressor.*

Some of the unusual capabilities of the unit are illustrated on the graph below.

OMNIPRESSOR CAPABILITIES



A: DYNAMIC REVERSAL An input level of +10 results in an output of -10. An input level of -10 results in an output of +10.

B: GATE As the signal increases above -20, the device gain rapidly goes to maximum.

C: EXPANSION A 40db input range results in a 60db output range.

D: CONTROL CENTERED Input level equals output level.

E: LIMITING Gain is unity until input is 0dbm, above 0dbm, a 30db change in input produces a 6db output change. (Line is offset for clarity.)

F: INFINITE COMPRESSION Output level remains unchanged regardless of input level.

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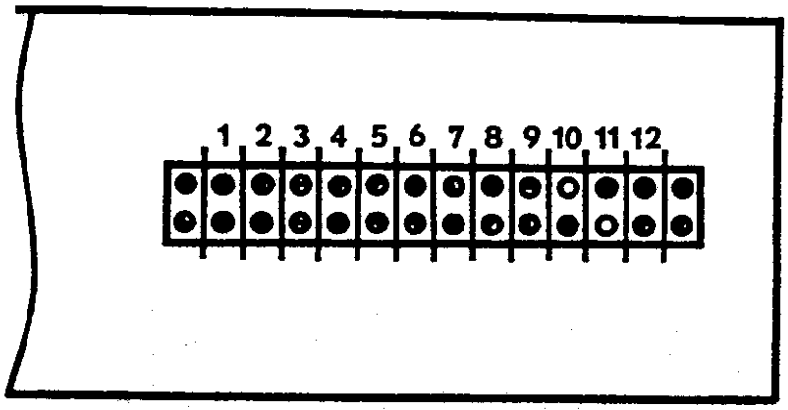
Eventide specifications:

MODEL 2830 OMNIPRESSOR

INPUT LEVEL	0 to +8dbm nominal level. Threshold control provided to center gain control operation over range of -25 to +15 dbm. Maximum level should not exceed +20dbm or clipping will occur.
INPUT IMPEDANCE	10K electronically balanced. 600 ohm xfmr available optionally.
OUTPUT LEVEL	0 to +8dbm nominal level. Maximum level before clipping is +18dbm. Calibrated +10 and +20 may be inserted to compensate for extremes of gain reduction.
OUTPUT IMPEDANCE	600 ohms nominal, single ended. 600 ohm transformer available.
FREQUENCY RESPONSE	+0, -½db 20Hz-16KHz; +0, -1db 15Hz-20KHz.
GAIN	AGC disabled: Unity, +10db, +20db depending upon OUTPUT CAL.
COMPRESSION	Continuously variable from 1:1 through ∞ through -10:1.
EXPANSION	Continuously variable from 1:1 through 10:1.
GAIN LINEARITY	Infinite compression setting gives constant output level ±1db for 60db change in input level.
FUNCTION CONTROL	Continuously variable function knob is used to set appropriate compression/expansion ratio. Control operates parabolically to give spread near center. Common settings are calibrated.
LIMIT CONTROLS	The ATTEN LIMIT and GAIN LIMIT controls serve to restrict the gain control range to any value between 0 and 30db in each direction.
DISTORTION	AGC DISABLED: .05% between 20Hz and 20KHz. Typ. .02% at 1KHz. -20db AGC, +20db output gain: Less than 1% above 100Hz, .5% at 1KHz.
SIGNAL/NOISE	At unity gain, output noise level is below -90dbm.
METERING	Front panel meter provided which measures either absolute input level, absolute output level, or gain on linear/log scale over 60db.
TIME CONSTANT	DEFINITION: Numbers refer to the time required for the Omnipressor to change gain by 10db in response to an input step change of 10db in infinite compression mode. ATTACK TIME: Continuously variable from 100µSec through 100mSec. RELEASE TIME: Continuously variable from 1mSec through 1 second.
POWER REQUIRED	115VAC, 50-60Hz ±12% or 230VAC, 50-60Hz ±12%; nominal 10 watts.
DIMENSIONS	48.26cm (19") wide; 8.89cm (3.5") high; 22.86cm (9") deep.
APPEARANCE	Black aluminum panel and chassis, white lettering. Red and green light emitting diode indicator lamps show power, in/out and gain/atten status.

Eventide distributor:

OMNIPRESSOR INTERFACE



REAR VIEW

Terminal #	Function
1	VC OUT HI
2	VC OUT LO
3	GND
4	VC IN HI
5	VC IN LO
6	GND
7	AUDIO IN HI
8	AUDIO IN LO
9	GND
10	AUDIO OUT HI
11	AUDIO OUT LO
12	GND

The Omnipressor inputs and outputs are unbalanced to ground. All "ground" and "return" terminals are common. However, it is advisable to use the terminals as suggested to avoid the possibility of ground loops. If option O3 is ordered (balanced in/out transformer coupling), the audio input and return are both isolated from ground.

Pin 1 is normally connected to Pin 4, and Pin 2 to Pin 5. To use the Omnipressor as a voltage-controlled amplifier, these jumpers must be removed. Refer to application note number 3 for voltage levels and requirements.

CONTROL AND INDICATOR DESCRIPTION

CONTROLS

IN/OUT SWITCH

This control switches the Omnipressor in and out of an an audio circuit. When the switch is in the OUT position, the unit is completely bypassed by a DC path and power need not be applied.

INPUT THRESHOLD

This control determines the operating point of the Omnipressor The threshold set on this control is the "crossover" point for the gain control voltage. For example, if the unit is set in a compression mode, an input signal below the threshold will have its amplitude increased, and an input signal above the threshold will have its amplitude reduced.

BASS CUT/NOR

This switch determines the frequency response of the level detector circuit. In the NOR position, the level detector has the same frequency response as the gain control section. In the CUT position, bass signals are attenuated and have relatively less effect on the overall compression/expansion operation of the Omnipressor.

ATTACK TIME

This control varies the time the Omnipressor requires to respond to a change in signal input level. Assuming a 10db step increment in input level, the attack time as set on the control is numerically equal to the time required for the level detector to reach its final state with respect to the new input level.

RELEASE TIME

This control varies the time the Omnipressor requires to respond to a decrease in signal input level. Assuming a 10db step decrement, the release time as set on the control is numerically equal to the time required for the level detector to reach its final state with respect to the new input level.

METER FUNCTION INPUT/GAIN/OUTPUT

This group of switches controls the function of the meter. It has no effect on the signal processing of the Omnipressor. In the INPUT position, the meter reads the input signal level applied to the unit. In the GAIN position, the meter reads the relative gain of the Omnipressor, and so gives an indication of the operation of the gain control function. In the OUTPUT position, the meter reads the output level of the Omnipressor. All level readings are in dbm referred to 600 ohms.

FUNCTION (COMPRESS/EXPAND)

This is the main control on the Omnipressor. It determines the unit's basic mode of operation. Fully counterclockwise, the Omnipressor gain varies sharply from full attenuation to maximum gain as a threshold level is exceeded. As the control is rotated clockwise, this action becomes less sharp until the gain varies only a few db from no input to full input. At the center divider, the Omnipressor gain is constant regardless of input level. As the control is turned clockwise from the center divider, the gain begins decreasing with increasing input level. For small compression ratios, the gain will vary only a few db for large input changes. More rotation produces substantial compression, until the

point of infinite compression is reached and the gain decreases 1 db for each db of signal increase, thus keeping the output level constant regardless of input. Rotation past this point produces dynamic reversal, in which a high level input produces a lower level output than does a low level input. Fully clockwise rotation results in full output attenuation above a certain threshold input.

OUTPUT CAL NOR/+10db/+20db

This group of switches serves to increase the output level of the Omnipressor when such a function would be desirable. If the unit is being used in extreme modes of compression or dynamic reversal, the input signal will frequently be large enough to initiate large amounts of consistent gain reduction. Under these circumstances, OUTPUT CAL +10db increases the gain of the output stage by 10db, and OUTPUT CAL +20 db increases the gain of the output stage by 20 db. This control has no effect on compression ratio or other operating parameters. It is equivalent to adding a simple amplifier after the unit.

ATTEN LIMIT

This control limits the maximum attenuation of the Omnipressor. In its fully counterclockwise position, 30 db of gain reduction is available. Fully clockwise, maximum attenuation will be about 1 db. ATTEN LIMIT overrides the FUNCTION control.

GAIN LIMIT

This control limits the maximum gain of the Omnipressor. In its fully counterclockwise position, 30db of gain is available. Fully clockwise, maximum gain will be about 1 db. This control overrides the action of the FUNCTION control.

POWER ON/OFF

Applies power to the Omnipressor.

INDICATORS

IN/OUT (green LED)

Becomes illuminated when the IN switch is depressed, indicates that the Omnipressor is in-circuit.

ATTEN (green LED)

Shows that the Omnipressor is operating in the gain reduction mode. Relative brightness indicates amount of gain reduction. Operation is instantaneous, so that peak limiting is indicated even though the meter has no time to respond.

GAIN (red LED)

Shows that the Omnipressor is operating in the gain increase mode. Relative brightness indicates the amount of gain increase. Operation is instantaneous, so that short increases are indicated even though the meter has no time to respond.

POWER (red LED)

Becomes illuminated when the POWER/ON switch is depressed, indicating that the unit is operational.

METER

The METER is calibrated over a 60db range in a linear/logarithmic fashion, so that each 10db takes up an identical space on the scale. Center scale corresponds to an input level of 0dbm, a gain of unity, and an output level of 0dbm, depending upon the setting of the METER FUNCTION switch described earlier. The red arc occupying the upper 12db of the scale applies in the output metering function, at which time it serves to warn that the output amplifier is clipping.

APPLICATIONS

YOUR OMNIPRESSOR LOVES YOU AND WANTS TO BE YOUR FRIEND! If you don't understand it, if you don't fondle its controls properly, it will cause you hours of confusion, and tempt you to dash it on the rocks or put it in a sack and drown it. PLEASE READ this applications section before blaming your Omnipressor for malfeasance or deviltry.

The Omnipressor, like most Eventide equipment, is a signal processor with wide-ranging use. It is not the normal, tame limiter or compressor which only tries to keep signals within a certain range. It is not a simple noise gate which is either off, letting nothing through, or on, letting everything through at unity gain. Rather, it is a special effects unit, which, in addition to the above, can generate such effects as infinite compression, dynamic reversal, extreme expansion, etc. The Omnipressor has a 60 db control range in addition to a wide dynamic range at constant gain. Because of this wide range, it is possible to overload system components following the Omnipressor if it is used improperly. Note, for instance, that with the output control wide open, and with the gain reading +30 on the meter, it is possible to obtain up to 50db gain from the unit. If you connected an amplifier with 50db gain between your console out and your tape recorder in, you might reasonably expect some distortion, right? Right!

Before using the Omnipressor in a session or in a performance, familiarize yourself with its operation. The ATTN and GAIN LIMIT controls serve to prevent uncontrolled operation by the novice user. Turn on the Omnipressor and turn the threshold control to zero. With no input, the level detector stage is producing the maximum possible control voltage. With no input, putting the FUNCTION knob in the expand section causes a great reduction in gain. As the input increases, the control voltage gets closer to 0. and the gain reduction decreases, until, at some point set by the threshold control, the gain starts increasing past unity (0db). This is expansion—increasing gain with increasing signal thus increasing dynamic range. Note how sharply the FUNCTION control varies the gain with no input signal. Also note that as the signal level approaches the threshold, the function control has a less pronounced effect, until, at the threshold, full rotation has almost no effect. Experiment with the two LIMIT controls. Again remove the input signal. Turn the two limit controls fully clockwise. Observe that the function control can only vary the meter by a few db, despite the fact that with no input, maximum expansion or compression should occur. Rotate the FUNCTION control to maximum expansion and vary the ATTN LIMIT control. Notice that the meter varies from negative full scale to almost center scale. Now, rotate the GAIN LIMIT control. Note that this control has no effect on the meter reading. Turn the FUNCTION control to maximum compression and repeat the experiment with the LIMIT controls. Note that now the GAIN LIMIT varies the meter reading from center to positive full scale, and the ATTN LIMIT control has no effect.

The LIMIT controls are very important in setting up the unit. They can prevent runaway gain, runaway attenuation, runaway engineer, and many other problems. For instance, if you wish to increase average program level by 10 db, but limit compression to a maximum of 15 db, set the GAIN LIMIT control with no input and the FUNCTION knob at full compress so that the meter reads +10 in the GAIN position. Now, turn the FUNCTION knob to full expand and set the meter at -5 with the ATTN LIMIT control. You are now free to set the compression ratio, threshold , and time constant for the most pleasing performance without worrying that you will get too much gain, too much attenuation, or uncontrolled operation, regardless of signal levels or peaks. This type of setability is perfect for sound reinforcement or broadcast use where unattended operation is the rule and wild effects are not desired. Controllable compression in sound reinforcement is particularly advantageous because feedback can be prevented conclusively while still permitting maximum output.

Another control not customarily found on dynamic modifiers is the BASS CUT/NOR switch. Unlike the LIMIT controls, it is not exceptionally useful. Its main application is to prevent large gain variations from being initiated by low frequency signals. A typical use would be in communications or advertising applications, where it is frequently desirable to give a signal as much "punch" as possible. Information in voice signals is generally carried in the range above 500Hz, although fundamentals are present below this frequency. By using a short time constant and cutting bass response, an improvement in intelligibility can be obtained in listening environments with less than optimum signal to noise ratios. Additional applications would be in processing signal tracks with leakage present. If, for instance, the bass drum leaked onto the voice track which you are limiting, the bass can be prevented from affecting the gain control operation. (Note that this does not reduce the amplitude of the leakage. Refer to the Noise Gate description for more information on reducing leakage.)

The model 2830 Omnipressor may be used as a fast peak limiter. By setting the ATTACK TIME constant control to 100 microseconds, the unit in effect no longer is an RMS responding detector, but rather follows peaks in the input signal. At this rate a single half cycle of 5KHz tone above the threshold is sufficient to reduce the Omnipressor gain by about 10db. Smaller peaks at even higher frequencies can be limited at this setting. Bear in mind that at very fast attack times, limiting is equivalent to clipping, and if the signal level is frequently above the threshold, harmonic distortion will be increased.

The above material gives general considerations for the operation of the Omnipressor. The remainder of this applications section is organized as a group of individual "application notes:" This section will be added to periodically, and if you wish to obtain updates, please be sure to fill in the warranty card. If you have a specific application you wish to make known, send us a note. Unique ideas will be credited to their source.

APPLICATION NOTE #1
"Your Backwards Omnipressor"

As we state in our promotional literature, one of the novel features of the Omnipressor is its ability to make signals sound backwards. This is a consequence of the Dynamic Reversal feature, which enables loud sounds to come out more softly than soft sounds. Speech waveforms, for instance, generally consist of loud peaks followed by trailing-off envelopes. By making these envelopes louder than the peaks, the illusion that the sound is coming out backwards is generated. Likewise, drum sounds consist of peaks roughly coincident with mechanical impact, followed by a decay envelope. The Omnipressor amplifies this envelope and "swallows" the impact.

The reversal effect is not limited to voice and drums. In general, any material with wide dynamic range can be "reversed". Plucked string instruments, virtually all percussion, and many natural sounds can be processed to good effect. Certain other material does not sound good in the reversal mode. Specifically, program material consisting of more than one type of sound will give inconsistent results at best. Trying to process an entire program source rather than individual tracks will generally meet with ignominious failure, although solos can be picked out and reversed on occasion.

CONTROL SETTINGS

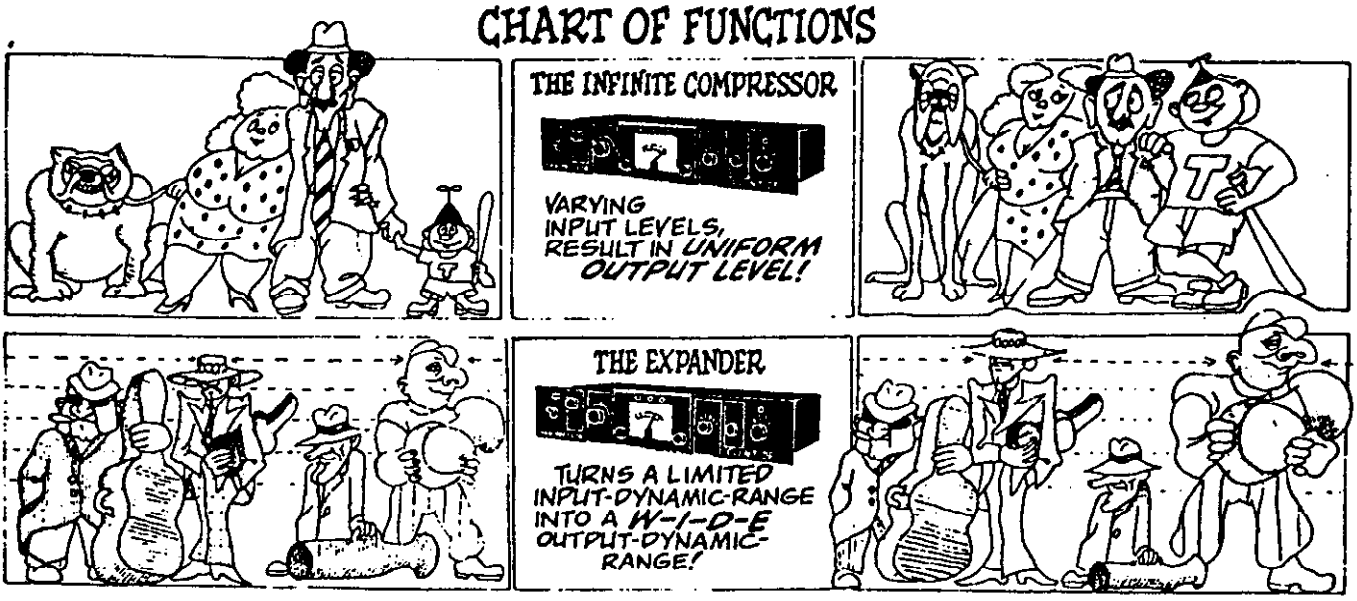
IN/OUT	IN
FUNCTION	-2 COMPRESS
ATTN/GAIN LIMIT	FULL CCW
TIME CONSTANT	ATTACK:5ms, RELEASE 100ms
THRESHOLD	0
OUTPUT	0
METER	GAIN

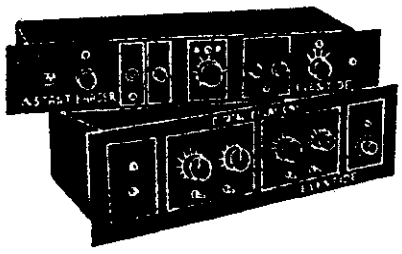
Experiment with the operational controls to obtain the most pleasing effect. It will probably be desirable to limit the maximum gain somewhat with the GAIN LIMIT control to prevent high noise levels with no signal. This applies particularly to taped material in which noise reduction was not employed.

ADDITIONAL POSSIBILITIES

If you can make forward things sound backwards, you should be able to make backward things sound forwards! Play a vocal tape backwards and reverse the dynamics. The voice should come out sounding almost normal, but the words will be pure gibberish. NSA is considering this method of encrypting data. Be the first on your block..... If you want tremendous "punch" on recorded material, record it normally, and then play it backwards through the Omnipressor set barely into the reversal mode, and re-record it. Playing the second tape backwards (i.e., voice forward), should result in a signal almost completely devoid of dynamic range. Also, you can use the second recording as an opportunity to add some echo, which will then precede the signal in real time. The reason backwards compression is so effective is that the program material is devoid of sharp attack transients which tend to bring down the succeeding program material.

INTRODUCING:
THE AMAZING EVENTIDE OMNIPRESSOR®
CHART OF FUNCTIONS





THE OMNIPRESSOR® $600 FROM THOSE WONDERFUL FOLKS WHO BROUGHT YOU THE INSTANT PHASER™ AND DIGITAL DELAY LINE

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8B

APPLICATION NOTE #2

Our advertisement opposite depicts in cartoon form and text the various standard operating modes of the Omnipressor. This note gives the initial control settings to achieve the effects depicted. The following settings apply to all modes:

IN/OUT.....IN BASS CUT/NOR.....NOR
TIME CONSTANT....ATTACK 5ms, RELEASE 100ms (except in GATE and LIMITER)
INPUT SIGNAL should be available 10-20 db over THRESHOLD setting.

	INFINITE COMPRESSOR
ATTN/GAIN LIMIT	FULL CCW
METER	OUTPUT
FUNCTION	∞. Apply signal from oscillator and vary input amplitude. Adjust FUNCTION control slightly until varying input has no effect on output level.

	EXPANDER
ATTN/GAIN LIMIT	FULL CCW
METER	GAIN
FUNCTION	AS DESIRED between 1 and 2. Use GAIN LIMIT if needed for wide expansion range.

	NOISE GATE
ATTN LIMIT	CCW
GAIN LIMIT	FULL CW
METER	GAIN
FUNCTION	10 EXPAND
ATTACK TIME	100µSec.
RELEASE TIME	AS DESIRED
THRESHOLD	ADJUST FOR DESIRED GATING ACTION.

	LIMITER
ATTN LIMIT	CCW
GAIN LIMIT	FULL CW
METER	GAIN
FUNCTION	∞.
THRESHOLD	ADJUST FOR LEVEL AT WHICH LIMITING IS DESIRED.

	DYNAMIC REVERSER
ATTN LIMIT	CCW
GAIN LIMIT	CCW
METER	GAIN
FUNCTION	-1
	Best settings of all controls will greatly depend upon program material.

APPLICATION NOTE #3

VOLTAGE CONTROLLED AMPLIFIER

The Omnipressor may be used as a high quality voltage controlled amplifier for modulation, electronic music, channel gain variation, amplitude scaling, filter generation, or, in fact, any application in which a fader or potentiometer is used. Characteristics in the voltage control mode include accurate voltage vs. amplitude curve, good tracking, low distortion regardless of signal level (below clipping level), and wide control range.

The gain control section of the Omnipressor has a linear control voltage vs. decibel output characteristic. This is equivalent to a logarithmic control voltage vs. output voltage curve. This makes it especially useful for audio and musical applications in which logarithmic response and logarithmic signal decay envelopes are prevalent. The control range available is 60 db. Gain is decreased with a positive control voltage and increased with a negative control voltage.

To operate the Omnipressor in the VCA mode, remove the factory-installed jumpers on the rear panel. (These jumpers go from VC OUT HI to VC IN HI, and from VC OUT LO to VC IN LO). The control signal should be applied to VC IN HI, the control signal return to VC IN LO, and chassis ground to the associated GND. Characteristics of the VCA section are as follows:

Input impedance nominal 18K ohms
Input voltage range +12 to -12 VDC
Control characteristic .4volts per decibel.
Linearity ±1db
Center:no input signal gives 0 gain ± 1 db
Frequency response essentially flat to 10KHz
Gain slew rate approx. 1db per microsecond

In the voltage control mode, the FUNCTION control and GAIN LIMIT and ATTEN LIMIT controls are disabled, as are the time constant controls and the BASS CUT/NOR. The OUTPUT GAIN switch group remains functional, and the METER and indicator lights operate.

The audio signal in the Omnipressor is theoretically "modulated" by the control voltage. However, due to the logarithmic characteristic of the control, and the unipolar nature of the control (reversing control polarity does not reverse output phase), it is recommended that the Omnipressor NOT be used as a balanced modulator (multiplicative mixer) except on an experimental basis.

APPLICATION NOTE # 4

OMNIPRESSOR TRACKING AND PANNING

One Omnipressor can be used to control the gain of several by appropriate connection of control inputs and outputs. Applications include stereo and quad strapping to prevent image shift in multichannel systems. A method of connection using minimal external circuitry is presented.

Omnipressors in the voltage control mode can also be used for stereo and quad panning. A sample connection circuit is shown.

The principles of voltage control as applied to the Omnipressor are discussed in Application Note # 3. Figure 1 shows how it is possible to interconnect an indefinite number of Omnipressors as stereo, quad, or what-have-you program limiters. The voltage outputs are half-wave rectified so that only positive excursions (gain reduction) are accepted. The outputs of the rectifiers go to what is in effect a linear OR gate. Whichever Omnipressor is compressing the most has its control voltage applied to the other Omnipressors. Thus the level of all channels is controlled, and the gain of each element in the system remains fixed with respect to the others.

If it is desired to have the gain of one channel control the gain of all the others, a simpler connection is possible. Just connect VCIN of the controlled units to VCOUT of the controlling unit. Since the output impedance of the Omnipressor is low (100ohm or less), adding a couple of loads will not cause too great an error. If it is desired to control a large number of channels from one unit, it would be a good idea to add a voltage follower buffer to the control output.

A voltage controlled "pan pot" (or quad panner) can be implemented with the Omnipressor. See figure 2 for details. In the diagram, the diodes limit the control voltage swing when the pot is turned all the way towards V+, so that at the center the channel gain is unity, and at V+, the variable R can be adjusted for a gain of +3 or +6 db, depending upon the style of panner you prefer. Then, V- and V+ should be adjusted so that when the pot is fully toward V-, the gain is -30 db. The advantage of this system is that a stereo panner can be effected with a single, low quality linear pot, and a quad panner can be effected with a cheap joystick. Other methods of generating signal position information may also be used. For instance, a signal location may be determined with a light pen and a CRT readout interfaced to a digital mini computer, and the computer could generate the control voltage for the Omnipressors through a digital to analog interface.

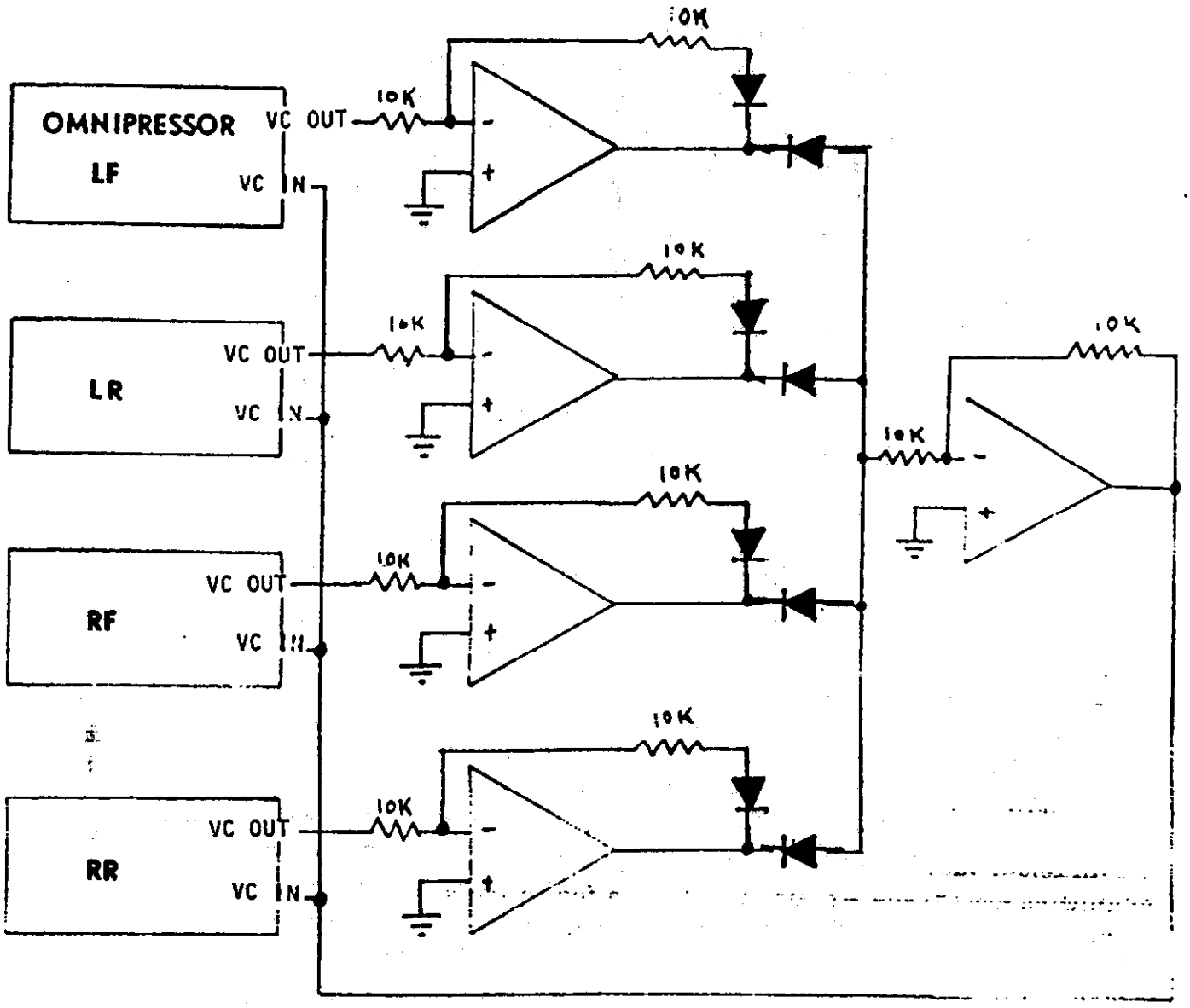

OMNIPRESSOR
LF
VC OUT
VC IN
LR
VC OUT
VC IN
RF
VC OUT
VC IN
RR
VC OUT
VC IN
10K

FIG 1

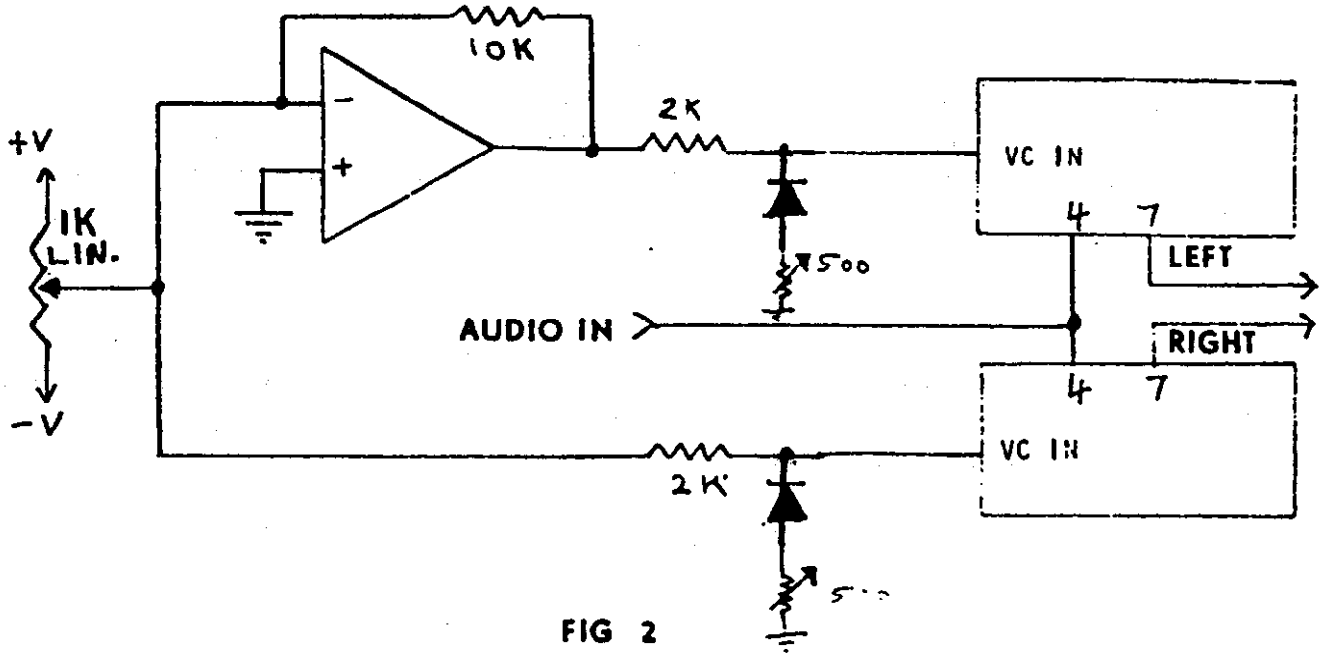
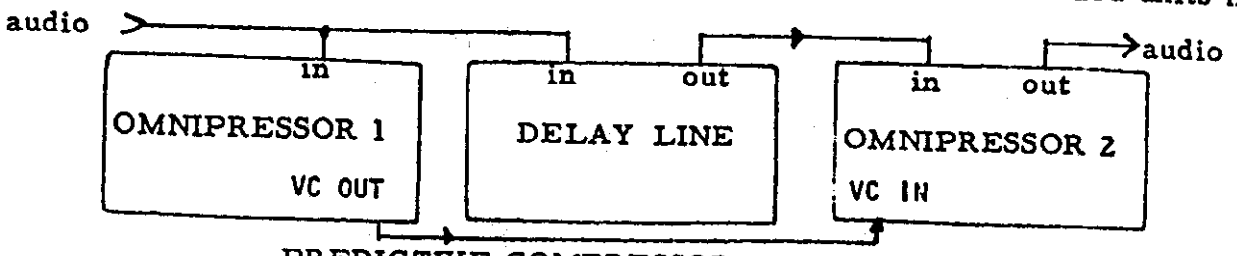

10K
2K
+V
1K
LIN.
-V
500
AUDIO IN
VC IN
4
7
LEFT
RIGHT
VC IN
2K
500

FIG 2

APPLICATION NOTE #5
PREDICTIVE COMPRESSION

In a previous note, we discussed the possibility of compressing material in reverse order to eliminate the compressor's inherent problem with fast attack transients. In a limiter, fast transients are in effect eliminated by signal clipping before the system gain can adjust to the new level. In a normal compressor, short bursts of high level material can get through before the gain can adjust. The first method creates varying amounts of distortion. The second engenders such phenomena as "p popping". The unique ability of the Omnipressor to separate the gain control from the level detector enables one to build what is most conveniently termed a "predictive" compressor. Such a unit should go a long way towards eliminating the unavoidable imperfections standard units have.



PREDICTIVE COMPRESSOR---BLOCK DIAGRAM

Connect two Omnipressors and an Eventide Digital Delay Line together as shown above. Note that in one Omnipressor, only the gain control section is used, and in the other, only the level detector section is used. What you have just fabricated is a compressor that can read the future, or, in more common parlance, one which has a negative attack time. It works as follows: A signal comes into the level detector which reacts to it depending upon the settings of the controls. Simultaneously, the signal is fed into the delay line which delays it by one or more milliseconds. The signal is then fed to the gain control section of the second Omnipressor. During this delay interval, the level detector has reached the optimum output voltage for the input signal, and before the time the signal reaches the gain control module, the gain has adjusted to the level of the signal.

This predictive mode of operation requires some experimentation to match the signal delay time to the Omnipressor time constant, but when the system is properly adjusted, a very close approximation to the "ideal compressor" is realized.

LIMITATIONS

This type of operation is particularly effective in applications in which only one signal must be processed. To maintain synchronism, a channel of delay is required for each channel of audio, whether or not that channel is to be otherwise processed. This would become cost prohibitive in any configuration exceeding stereo.

Equipment necessary to realize "predictive compression" has only recently become available. There is much room for experimentation. We would be pleased to know of your results and techniques.

APPLICATION NOTE #6

USE OF THE OMNIPRESSOR AS A NOISE REDUCTION UNIT

The Omnipressor makes a good compression/expansion noise reduction unit for enhancing the the transmission capability of some medium such as tape, digital equipment, low grade phone lines, etc. While it will not replace a good noise reduction unit such as the DBX or the Dolby for tape (devices intended primarily for noise reduction applications have frequency response tailoring), it will serve in a pinch when one of these devices is not available.

If the Omnipressor is set up as a compressor on the input end (feeding the tape machine or phone line) and as an expander on the output end, then the input dynamic range is compressed during transmission and a medium with, say, forty db dynamic range can appear to have a much wider range. If the input is compressed by a two to one range, and the output is expanded by a factor of 2 to 1, an apparant 80 db range exists for the transmission channel. In practice, this does not precisely obtain, but a very substantial audible improvement is possible with such processing. Since identical circuitry with identical time constants is used to produce compression and expansion, perfect dynamic tracking is obtained. If compression and expansion ratios are set properly, the system should be transparent to the listener.

INITIAL SET UP

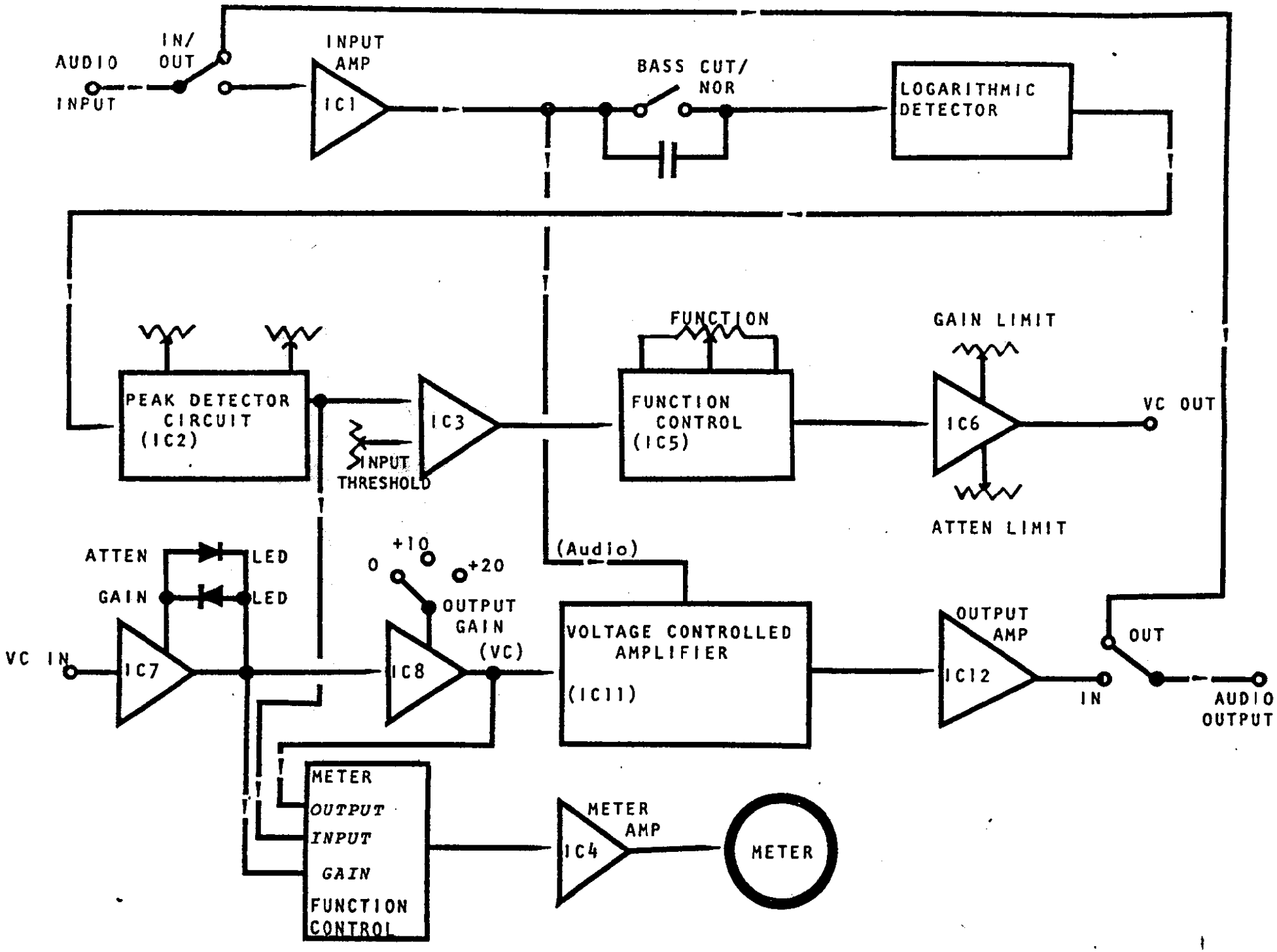
IN/OUT	IN
THRESHOLD	-10
ATTACK TIME	5ms
RELEASE TIME	50 ms
BASS CUT/NOR	NOR
METER FUNCTION	GAIN
OUTPUT CAL	0
ATTEN LIMIT	CCW
GAIN LIMIT	CCW

Set the FUNCTION control to a compression ratio of 2 for tape recording or sending signals on a transmission channel. Set the FUNCTION control to an expansion ratio of 2 to decode the compressed signal. To go from record to playback with a single Omnipressor, adjusting the FUNCTION control is the only required adjustment. If simultaneous encode and decode is required, be sure that both Omnipressors have identical front panel adjustments.

Only the basic set-up is given above. You might wish to experiment with compression/expansion ratios. Also, with certain types of signals, it might be desirable to put the BASS CUT/NOR switch on CUT. Remember that the set-up for encode and decode (compress and expand) should be identical except for the complementary setting of the FUNCTION control.

TECHNICAL DATA

OMNIPRESSOR MODEL 2830 BLOCK DIAGRAM



THEORY OF OPERATION

The unique features of the Omnipressor, Infinite Compression and Dynamic Reversal, are obtained by a process known as "open loop" operation. A standard, non-open loop compression amplifier operates as follows: the input signal goes through a gain control stage, after which the level is detected. If the output level is too high, a voltage is applied to the gain control stage to lower the output. Thus, the higher the compression ratio, the higher the gain of the amplifier necessary in the level detector to control the output level. Obtaining extremely high compression requires extremely high gain, which requires critical circuitry and can cause instability. This standard type of operation is referred to as "closed loop" because the processed signal level is used to determine further changes in its own amplitude.

Open loop processing, as employed by the Omnipressor, uses a completely independent level detector and gain control stage. The level detector produces a DC output proportional to the AC RMS input. This voltage is linear with respect to the input level variation in decibels. An input change from -30dbm to -10 dbm produces the same DC change as does an input change from +10 to +30 dbm, even though the actual input change measured in absolute terms is much greater. Likewise, the gain control module gives a fixed db change for a given control change in control voltage, regardless of whether the module gain is -30 db or +30 db.

Now, consider what happens when an input signal is applied to both the gain control module and the level detector module. We apply a 0 dbm signal and note that the level detector output is +1 volt. (All the numbers in this example are chosen for simplicity. Actual values will be different.) Now, we apply a +10 dbm signal and note that the level detector output is +2 volts. Assuming that the gain control module works on the same levels (.1 volt per decibel), we can take the DC output from the level detector, apply it to an inverting amplifier, and thence to the gain control module. Depending upon the gain of the inverting amplifier, various compression ratios are available.

INVERTING AMPLIFIER GAIN	INPUT LEVEL CHANGE	OUTPUT LEVEL CHANGE	COMPRESSION RATIO
.5	10db	5db	2
.75	10db	2.5 db	4
.90	10db	1db	10
.95	10db	.5db	20
.99	10db	.1db	100
1	10db	0	infinite
1.5	10db	-5db	-2
4	10db	-40db	-.25

As can be seen, a wide variety of compression ratios can be obtained with no critica high-gain DC amplifiers. Implementation of the various Omnipression functions is achieved as follows:

The audio input signal is buffered by IC-1, a differential amplifier. This provide an electronically balanced input. The buffered signal goes to the logarithmic amplifier via the BASS CUT/NOR switch, which inserts a series capacitor into the signa path in the CUT position. This capacitor, combined with the log detector's input impedance of 2.4K, forms a 200 Hz bass cut filter. (Note that the audio path bass response is unaffected by this capacitor.)

The log detector uses a chain of limiting amplifiers (IC-1L through IC-4L), whose outputs are summed in a log IC IC-5L. Q1 and Q2 provide ±6V power to IC-5L. The output of IC-5L is a bipolar (AC) differential signal whose voltage varies at 60mv/ decade with a common mode level of 5.6V. IC-6L, a balanced modulator with differential input, is used to amplify, level shift, and full-wave-rectify the log signal. Trimpot R38L (Log Gain) sets the gain of IC-6L and R39L (LFDA) balances the DC offsets of IC-5L and IC-6L. The end of the limiting amp chain (IC-4L) sends a zero-crossing signal to the carrier input (pin 8) of IC-6L. This signal is limited by D9 and D10. This enables IC-6L to act as a synchronous rectifier, so that the succeeding detection circuitry will act on either positive or negative peaks. IC-7L is a differential amplifier which buffers, amplifies, and level-shifts the output of IC-6L. R30L and R31L are collector loads for transistors inside of IC-6L. The output of IC-7L is a 1 volt/decade signal with 0VDC output for no input.

The output from this stage is peak detected by Q1-Q5 and IC-2. Q1-Q4 form a high slew rate operational amplifier. The output (emitter Q4) charges C9 through D2 and R19 (attack time) to the peak of the log signal at the base of Q1. The capacitor is discharged at a rate determined by R20 (release time) through Q5, a p-channel field effect transistor. The gate of Q5 is controlled by the output of Q4 so that the discharge current through Q5 is turned off during attack time. (Note that this circuitry enables attack times to be slower than decay times). IC-2 is a non-inverting unity-gain buffer, which prevents loading of C9. The output of IC2 is fed back via R10 to the inverting input of the discrete operational amplifier (Q2). Noise spikes on the output of IC-2 are filtered by R22 and C11.

IC3 inverts and level-shifts the detected signal so that its output is 0V for inputs equal to the input threshold control (R25) setting. The shifted signal is re-inverted by IC-5. The input and output of IC-5 are applied to either end of R32, the FUNCTION control. A variable gain and polarity signal is present on the wiper of R32. R49 and R50 load R32 so that a parabolic control function is obtained. IC6 is a limiting amplifier with a gain of -33. The ATTEN and GAIN LIMIT controls (R55 and R58) vary the voltages applied to IC6 through emitter followers Q6 and Q7. Diodes D7 and D6 limit the swing of IC6 by diverting currents in the driver stage of IC-6 when either limit is exceeded. 0 to +11 volts on the wiper of R56 corresponds to 0 to -30db attenuation limit.

The output of IC-6 is the voltage control output on the rear terminal strip. This signal is normally jumpered back to the voltage control input terminal on the same strip. IC-7 is used to buffer and limit this signal. The GAIN and ATTEN indicator lights (D8 and D9) are current driven by feedback loop currents in R62 and R63. The buffered signal is inverted by IC-8. The OUTPUT GAIN switch S5 adds DC offsets

corresponding to 0, 10, or 20 db of added gain. The signal is then applied to the gain control (VCA) module control input via R74. Gain is calibrated by trimpot R73.

The buffered audio from IC-1 is applied to the VCA module signal input through C18 and R80. Q10 provides a 7.5V positive supply voltage to the VCA. R77 is a DC offset trimpot which nulls harmonic distortion in the VCA. The VCA current output is converted to a voltage by IC12. Q8 and Q9 form a complementary output amplifier stage capable of supplying significant current to the load.

The meter circuit sums and offsets the various DC signals determined by the METER function switch S3. Trimpots set the gain and offset for each function. IC4 sums the signals and provides a current-limited current drive to the meter. The output of IC-2 is proportional to the signal input level. Gain is indicated by the output of IC-7 after the indicator Light Emitting Diodes. Output amplitude is calculated by summing the detector output and the Voltage Controlled Amplifier drive signal.

The power supply is of conventional design. A split-primary power transformer allows 220V operation by minor modification of the P.C. board. The split secondary permits use of identical +15 volt regulators for both the positive and negative supply voltages. IC-9 generates the +15V supply, and IC-10 the -15V supply. Current for the POWER and IN/OUT indicator LED's is provided by regulator shunt resistors R71 and R72. These resistors also reduce power dissipation in the regulator IC's.

ALIGNMENT INSTRUCTIONS

The Omnipressor is aligned at the factory and the alignment is sufficiently stable so that periodic adjustment should not be required. Alignment may be desirable after changing components or as assurance that the equipment is operating properly.

If it is impossible to align the unit according to these instructions, or if any pot must be turned to the end of rotation to achieve proper operation, then trouble-shooting procedures should be used to locate the defective circuitry causing the difficulty.

--- EQUIPMENT REQUIRED ---

Oscilloscope, single trace, DC coupled.	Tektronix 465 or equiv.
Audio signal generator, 20Hz-20KHz, .01%distortion	Radiometer BKF-10 or equiv.
Calibrated attenuator, 0-100db in 1 db steps	Hewlett-Packard 350B or equiv.
Distortion analyzer, .02% or better	Radiometer BKF-10 or equiv.
Audio voltmeter (optional)	HP400

---SETUP---

Jump VC OUT HI to VC IN HI; VC OUT LO to VC IN LO (normally supplied jumped)
Input and output should be terminated with 600 ohm resistors if the test equipment is not already terminated.
Set the audio generator to 0dbm, 1KHz, and connect to Omnipressor Input.
SET CONTROLS AS FOLLOWS:

IN/OUT	IN
CUT/NOR	NOR
METER	GAIN
INPUT THRESHOLD	-0-
ATTACK TIME	.1mSec
RELEASE TIME	100mSec
FUNCTION	CENTERED (1:1)
ATTEN LIMIT	FULLY CCW (-30)
GAIN LIMIT	FULLY CCW (+30)
OUTPUT	0db
ON/OFF	ON

---ALIGNMENT---

IC/PIN	TP	VOLTAGE or WAVEFORM	CONTROL SETTING	TRIM ADJ	FOR---
1/6	1	1.7VAC P-P	AS ABOVE	OBSERVE	
7L/6	2		AS ABOVE	R39L	Equal peaks
7L/6	2		Vary attenuator in 10db steps Note+10dbm gives 8V, 0dbm gives 7 etc., -60dbm gives 1.2V	R38L	1V peak change per 10db step.
3/6	R30	0VDC	Input threshold set at 0, 0dbm IN	R28	0VDC at TP
---	R49	0V	-60dbm input: Adjust FUNCTION for 0VDC at test point Loosen function knob mechanically and carefully re-position knob to 1:1 setting and retighten set screw.		

IC/PIN	TP	VOLTAGE or WAVEFORM	CONTROL SETTINGS	TRIM ADJ	FOR---
		OUTPUT (rear term strip)	Input 0 dbm, FUNCTION control centered, OUTPUT GAIN +10db	R73 Out Ga	+10dbm output
		SAME	SAME, OUTPUT GAIN 0db	R70 GA BT	0dbm out
		SAME	OUTPUT GAIN +20, INPUT -10	OBSERVE	+10dbm
		SAME	INPUT -30dbm, FUNCTION -.1 (fully CW). Output gain 0db	R64 DB CAL	0dbm OUT

---DISTORTION ADJUSTMENT---

Hook up distortion analyzer to Omnipressor Input and Output. Connect oscilloscope to distortion analyzer "residual distortion" output.

Input level 0dbm, 1 KHz, OUTPUT GAIN 0db. Set FUNCTION control at center, ATTACK TIME fully CCW, RELEASE TIME fully CW.

SET UP Distortion Analyzer for normal distortion measurement. Adjust R77 (HF DIST) for minimum distortion and symmetrical pattern on scope

READJUST R73 (OUT GA) if necessary for 0dbm output level.

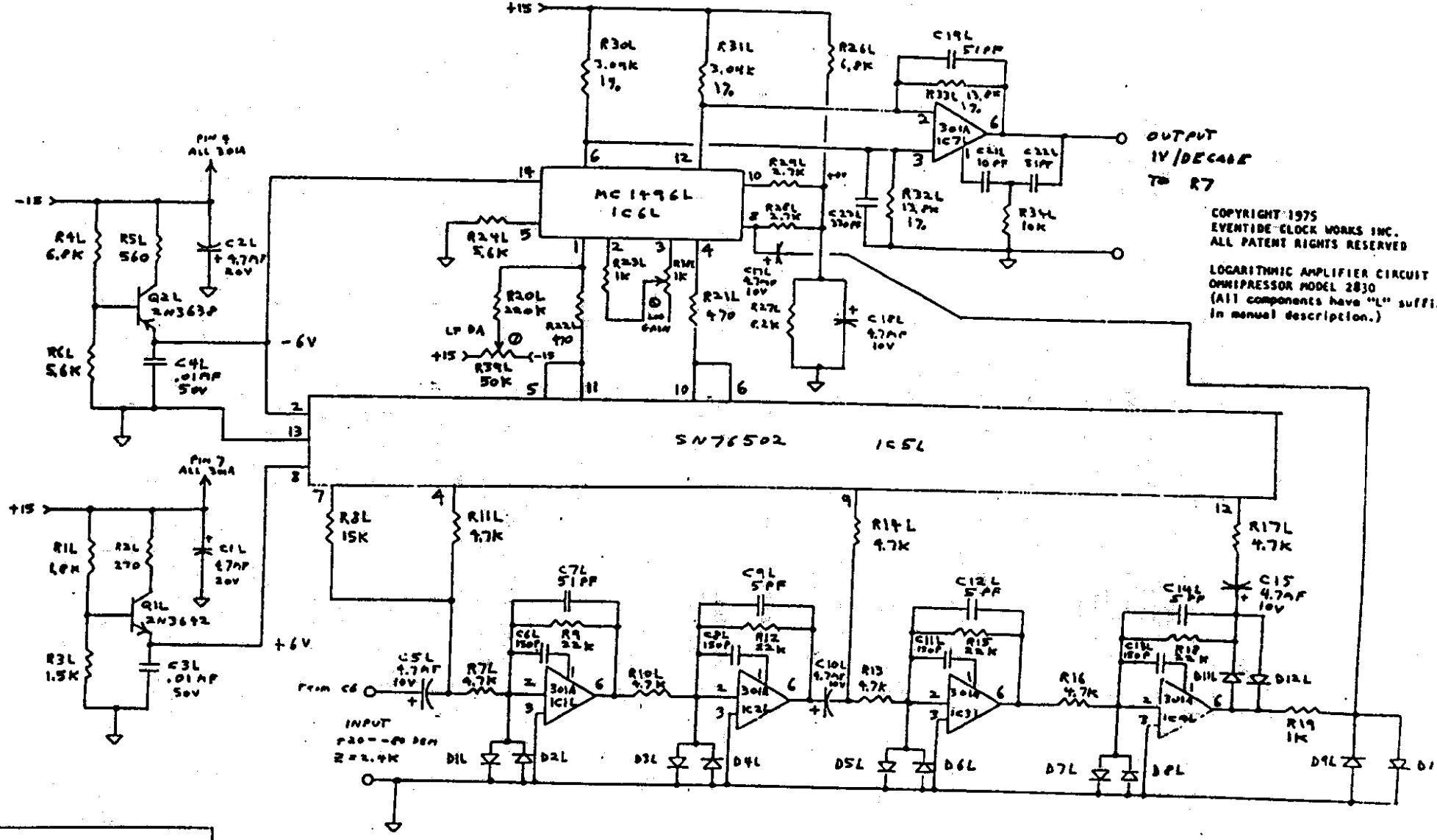
INCREASE INPUT LEVEL to +10dbm, frequency 100Hz. Low frequency filter on distortion analyzer, if any, should be OUT. Adjust function control to near ∞ for 0dbm output.

ADJUST R39L (LF DIST) POT for symmetrical pattern on oscilloscope screen. DO NOT NULL DISTORTION WITH METER.

---METER CALIBRATION---

1: SHORT CIRCUIT D3 and set MECHANICAL ZERO of meter with POWER OFF
2: SET INPUT to 0dbm, 1KHz, INPUT THRESHOLD 0, OUTPUT GAIN +10, METER on GAIN position, FUNCTION control centered.
3: SET R42 (GA ZE) to center meter.
4: SET INPUT to -20, INPUT THRESHOLD to +15, OUTPUT GAIN +10, turn FUNCTION control to +3 so that output level is +10dbm.
5: SET R38 (GA SEN) so that meter reads +20.
6: RECHECK STEP 3 and readjust R42 if necessary.
7: RETURN INPUT TO 0dbm, place METER switch in INPUT position.
8: ADJUST R36 (IN ZE) for a meter reading of 0 (centered) with input level 0dbm.
9: ADJUST R33 (IN SEN) for a meter reading of -20 with the input reduced to -20 dbm. Repeat steps 8 and 9 until no further adjustment is necessary.
10: SET INPUT to 0dbm, INPUT THRESHOLD 0, OUTPUT GAIN 0, FUNCTION at ∞. Vary the step attenuator from 0 to -20 several times, and make minor adjustments to the threshold and function control so that the output remains at precisely 0dbm as the attenuator is varied.
11: ADJUST R43 (OUT SEN) pot so that the meter, in the OUTPUT position does not vary as the attenuator is varied by 20 db.
12: RDJUST R46 (OUT ZE) so that the meter reads 0dbm.
13: REMOVE SHORT FROM D3.

THIS COMPLETES NORMAL ALIGNMENT OF THE OMNIPRESSOR.

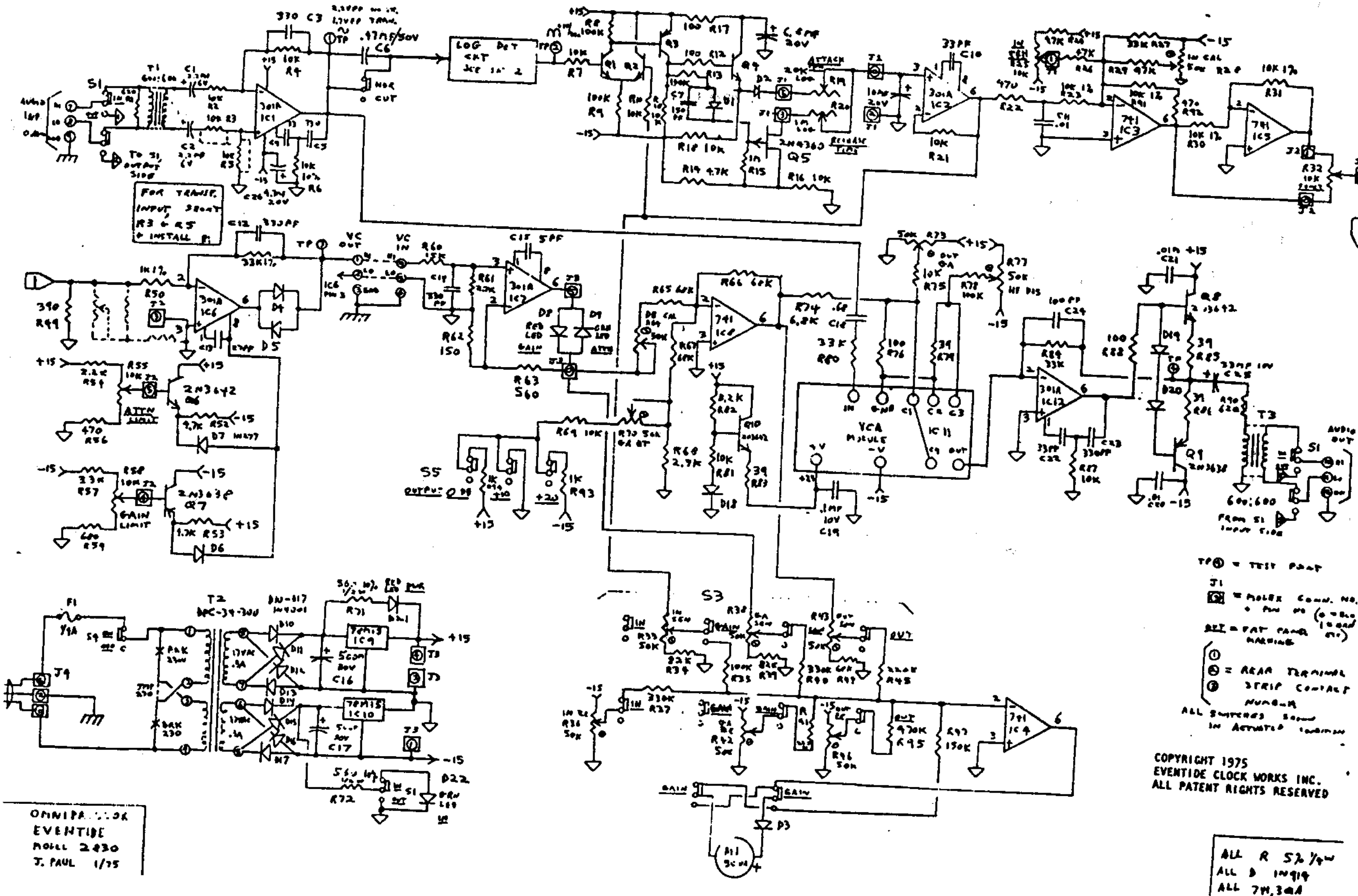


LOGARITHMIC AMPLIFIER CIRCUIT
OMNIPRESSOR MODEL 2830
(All components have "L" suffix in manual description.)

LOGARITHMIC AMP
FOR MODEL 2030
EVENTIME
J. PAUL 1/75

ALL DIODES IN914

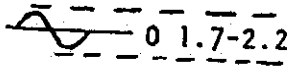
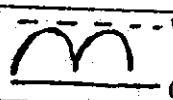
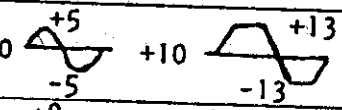
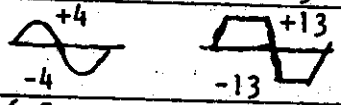
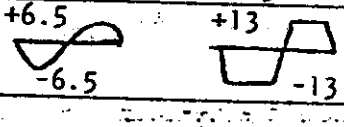
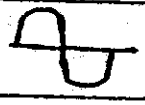
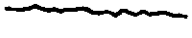
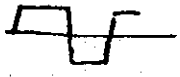
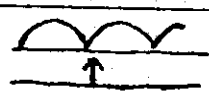
ALL 405 1/4W 5% C.F.


FOR TRANSF. INPUT SHORT R3 + R5 + INSTALL R1
LOG DET CKT SEE SH. 2
ATTACK
RELEASE TIME
VCA MODULE
OUTPUT
ATTN LIMIT
GAIN LIMIT
AUDIO OUT
TP = TEST POINT
= MOLEX CONN. NO. + PIN NO.
= REAR TERMINAL STRIP CONTACT NUMBER
ALL SWITCHES SHOWN IN ACTIVATED POSITION
COPYRIGHT 1975
EVENTIDE CLOCK WORKS INC.
ALL PATENT RIGHTS RESERVED
ALL R 5% 1/4W
ALL D 1N914
ALL 741, 301A
PIN 7=+15
PIN 4=-15
EVENTIDE
MODEL 2830
J. PAUL 1/75

Signal paths OK, meter reads improperly.

If all meter functions are defective, check IC4 and the meter movement. If only one function is bad, check its associated switch, trimpots, and input signal. If everything else is OK but meter won't calibrate, check resistor values.

IF PROBLEM WITH LOGARITHMIC AMPLIFIER, INCLUDING NON-LINEARITY OF GAIN REDUCTION, follow chart below sequentially--------

STEP	INPUT	TP	NORMAL WAVEFORM	PROBLEM IF WAVEFORM NOT OBSERVED
1	0dbm	IC1-6	 0 1.7-2.2VPP	Input amp and connections (problem NOT in logarithmic amplifier)
2	0dbm	IC7L-6	 Vpeak 6-8V 0V	LOG AMP OK
3	0/+10	IC1L-6	 0 +5 -5 +10 +13 -13	IC1L
4	-10/0	IC2L-6	 +8 -8 +13 -13	IC2L, IC1L
5	-30/-10	IC3L-6	 +4 -4 +13 -13	IC3L, IC2L, IC1L
6	-40/-30	IC4L-6	 +6.5 -6.5 +13 -13	IC4L, IC3L, IC2L, IC1L
7	-----	IC5L-8	+6 ±.7VDC	Q1L, C3L, IC5L
8	-----	IC5L-2	-6 +.7VDC	Q2L, C4L, IC5L, IC6L
9	0dbm	IC5L-10 IC5L-6 IC6L-4	 +5.6V, .47VPP	IC5L
10	0dbm	IC5L-11 IC5L-5 IC6L-1	 +5.6V, .47VPP	IC5L
11	-----	IC6L-14 IC6L-5	-6V -5V	IC6L
12	0dbm	IC6L-10	 +8 ±1V .1V ripple	R26L-R29L, C18L
13	0dbm	IC6L-8	 +8 ±1V 1.8VPP	R26L-R29L, C17L, D9L, D10L
14	0dbm	IC6L-6 IC6L-12	 +10.6 +10 0	IC6L
15	0,-10, -20, to -70	IC7L-6	 +7.5 0dbm -1V per 10db noisy at-70	IC7L

What to Do If ALL ELSE FAILS

The data in the Technical Information section is sufficient to enable a competent technician to maintain and repair the Omnipressor. Although there are certain components used in the unit which may be unavailable or difficult to obtain through normal distributor channels, if a component should fail, first try to obtain it locally. This pertains especially to standard devices such as resistors, capacitors, transistors, and operational amplifier IC's. The schematic has been deliberately marked with generic types rather than manufacturer's part numbers. Thus a Motorola type MLM301AP1 becomes a "301", replaceable with a similar part by Fairchild, National Semiconductor, or any other alternate source.

Certain components must be obtained from Eventide. These include the meter, the gain reduction module, the in/out transformers, and the function switches. If one of these components becomes defective, please contact the factory for assistance. Additional components such as the logarithmic amplifier and some of the tantalum capacitors are available through distributors but frequently require much searching and long lead times. We will be please to supply these parts for repair purposes.

Eventide Clock Works, Inc. stands ready to repair any equipment of its manufacture whether in or out of warranty. If the equipment is within warranty, please return it to us prepaid. We will fix it and return it to you prepaid at no additional charge. (If you specify return shipping other than by U.P.S., we will bill you for the difference in shipping charges.) If the unit is out of warranty, return it to us prepaid. We will repair it and return it to you, and bill you for repair and return shipping.

ALL RETURNED EQUIPMENT must be accompanied with a document indicating the nature of the problem. This is <u>especially</u> true if the problem is of an intermittent nature.

IN CASE OF EMERGENCY: We realize that our equipment is used in recording studios and at live concerts, and such enterprises are not time conscious in the normal "business hours" sense. If your equipment has problems which must be solved immediately, call our technical service number *201-641-1200*.

Eventide
the next step

digital delay lines
instant flanger®
omnipressor®
harmonizer®
monstermat®

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