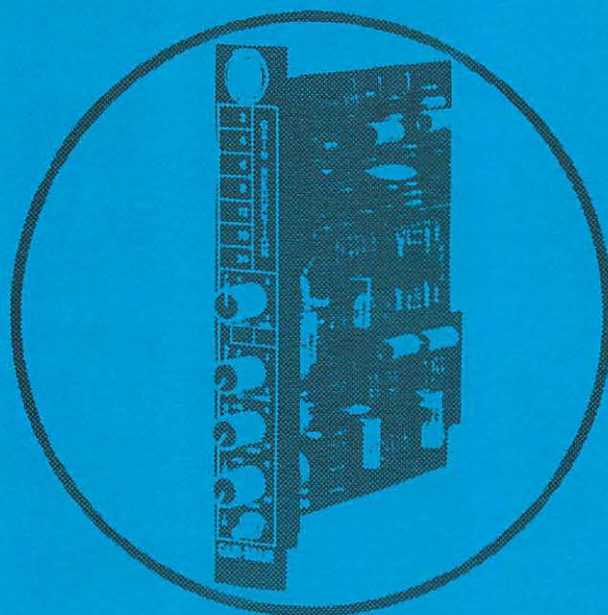


# GAIN BRAIN

## Model 700



ALLISON RESEARCH INC. IS PLEASED TO INTRODUCE A SLIGHTLY REVOLUTIONARY LITTLE CHUNK OF PROFESSIONAL AUDIO EQUIPMENT- THE GAIN BRAIN. GAIN BRAIN IS A LIMITER. NOT JUST ANOTHER LIMITER, BUT A RATHER EXTRAORDINARY LIMITER. GAIN BRAIN IS A TIDY LITTLE PACKAGE CONTAINING A UNIQUE COMBINATION OF PEAK AND RMS LIMITERS PLUS ULTRA-FAST, ACCURATE AND RELIABLE LIGHT EMITTING DIODE READ-OUT.

IT IS HIGHLY USEFUL IN APPLICATION REQUIRING A DEGREE OF APPARENT LEVEL CONTROL UNOBTAINABLE BY CONVENTIONAL PEAK LIMITERS OR COMPRESSORS. IN USE, GAIN BRAIN IS DISTINGUISHED BY ITS PREDICTABILITY AND BY ITS FREEDOM FROM RESTRICTED PUMPING EFFECT NORMALLY ASSOCIATED WITH LIMITERS. GAIN BRAIN'S EMPLOYMENT IS PARTICULARLY EFFECTIVE ON COMPLEX SIGNAL SOURCES WHICH ARE NORMALLY DIFFICULT TO LIMIT PROPERLY, SUCH AS DRUMS, HORNS, REEDS, PIANO, ELECTRONIC MUSIC AND CERTAIN VOCAL SOUNDS.

# GAIN·BRAIN™ limiting or conventional Peak limiting?

A COMPARISON OF OUTPUT LEVELS FOR DIFFERENT PROGRAM MATERIALS



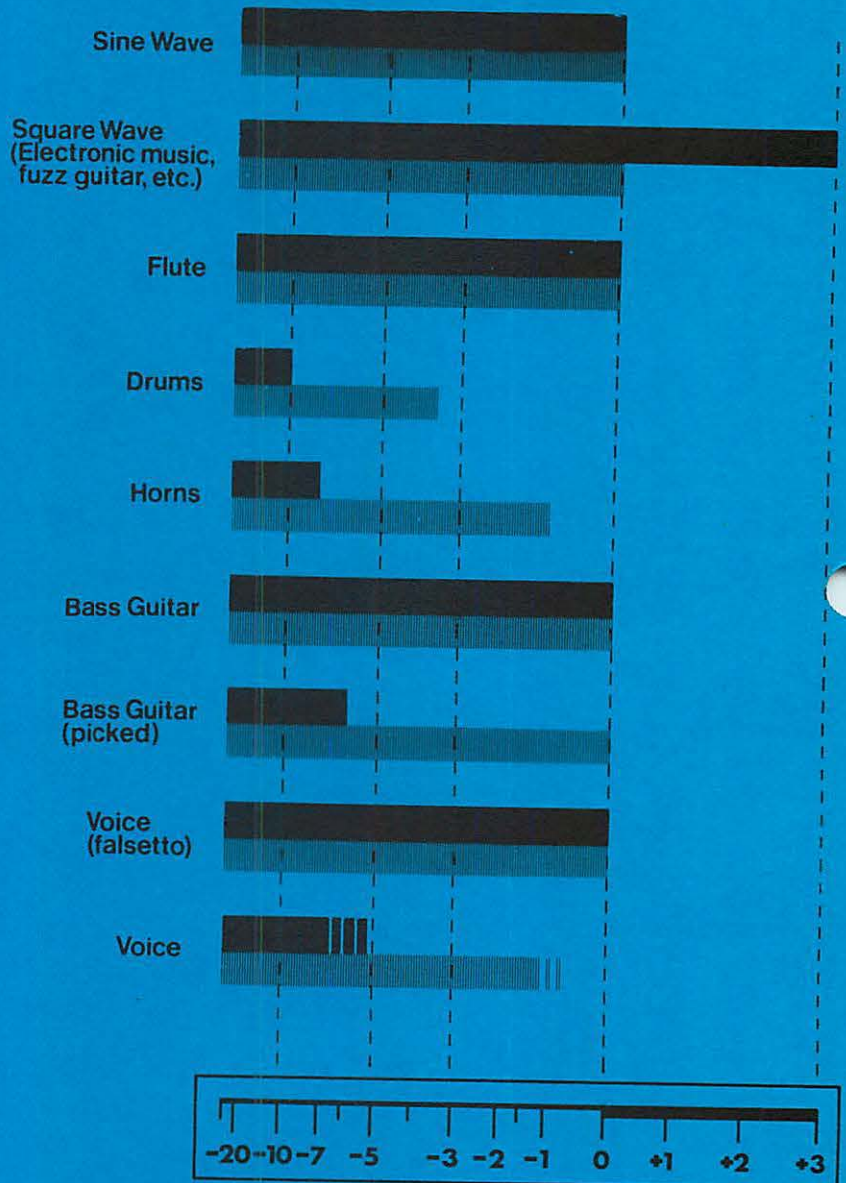
If you use a conventional limiter . . . this is what you get. Sure the peaks are level, but what about the sound? If you really want the horns 7db under the flutes or the bass 10db louder than the drums, go ahead and use your limiter; it doesn't recognize the apparent loudness of the program. It's activated only by the peak value of the input waveform and you know how little that resembles the actual audible power content.

**GAIN·BRAIN™** knows what you want to hear. It's activated by both the peak and the RMS content of the input waveform. The result is a really accurate control of the output level, for *all* the instruments, plus an absolute control of peaks. Depending upon your needs, the GAIN BRAIN may be adjusted to act only as a peak limiter, or only as an RMS limiter or anywhere in between.

Light emitting diodes sequentially indicate the gain reduction and the mode of limiting.



**allison research inc.**  
**nashville, tennessee**  
**(615) 385-1760**



Output of conventional Peak Limiter

Threshold 0 dBm (1.1V Peak)

Output of GAIN·BRAIN

RMS Threshold 0 dBm (Function in mid-position)

# READ ALL ABOUT IT...

## TECHNICAL DESCRIPTION

Fundamentally, GAIN BRAIN performs three distinctly separate limiting functions which are:

1. Ultra-fast attack and release time for inaudible transients
2. Moderate attack and variable release time for audible transients and for the peak component of sustained waveform
3. RMS activated attack and variable release time for the apparent level content of the input waveform

The relative limiting thresholds may be adjusted by the use of a front panel control (FUNCTION), as follows;

1. When rotated to "PEAK" position (CCW) all thresholds fall at the same point and GAIN BRAIN functions solely as a high performance peak limiter.
2. When rotated fully clockwise to "RMS" position the peak activated thresholds move up by 6dB, while the RMS activated threshold moves down by 6dB. Since this results in a separation of 12dB between the RMS and peak thresholds, the device performs essentially as an RMS limiter.
3. In mid position the RMS and peak thresholds are separated by 6dB. At this setting transients and complex signals (where the peak to RMS waveform ratio exceeds 6dB) will activate one or both of the peak limiter sections. Less complex waveforms will activate the RMS section

## RMS SECTION

It must be noted that the action of the RMS section of GAIN BRAIN is not the same as that of a slow attack limiter or compressor. In such devices the ultimate threshold is still determined by the peak value of the waveform. In the RMS section of GAIN BRAIN, the threshold is determined by the effective power content of the waveform (regardless of peak waveform excursions). This seemingly insignificant difference in parameters becomes one of major proportions since what the ear hears and what the VU meter indicates are RMS values. Since the peak to RMS ratios of music and speech waveforms vary drastically and are quite unpredictable, one cannot expect the apparent level output of a conventional peak limiter to remain constant from instrument to instrument. Conversely, a limiter which is strictly RMS activated cannot control waveform peaks.

Limiters are employed primarily for two purposes;

1. To provide electrical control of peak excursions in order to prevent over-load distortion, overmodulation, over-cutting of discs, etc.
2. To increase or to control apparent level

It is obvious that neither a peak limiter nor an RMS limiter will do both jobs satisfactorily, hence, GAIN BRAIN.

## METERING

In order to adequately monitor the complex functions of a device such as GAIN BRAIN, something more sophisticated than the mechanical VU or gain reduction meter must be used. Such a meter is simply too slow to accurately indicate the complex parameter changes involved. Additionally, the physical size vs readability ratio is not conducive to effective console mounting applications.

The gain reduction meter used in GAIN BRAIN is a 7 segment sequential light emitting diode (LED) array. It indicates gain reduction, incrementally, from 2dB to 24dB. Response time is considerably faster than that of the human eye, thereby allowing accurate reading of short duration, fast release time limiting. Thanks to solid state technology it is wear out and burn out proof.

Two additional indicators appear on GAIN BRAIN'S front panel. One indicates that limiting is being caused by the peak sections. The other indicates that limiting is being caused by the RMS section. They too are solid state LED devices.

## PHYSICAL DESCRIPTION

The basic GAIN BRAIN 700 module is supplied in card form with 1" by 7" epoxy front panel complete with all metering, controls and knobs. It is terminated with a standard 10 pin PC connector. The model 700 card is designed to mount in either of two Allison Research metal cases. Case model CM001 mounts one 700 module and provides a standard interface with recording consoles (1½" x 7" x 7" deep). Case model RM160 rack mounts up to 16 GAIN BRAIN (or KEPEX) modules.

The RM160 requires only 7" of rack space and contains integral power supply providing all necessary operating power.

GAIN BRAIN front panels are black in color. All metal cases are sky blue.

## SPECIFICATIONS

Gain Reduction Range	30dB
Noise Level (20Hz to 20kHz)	At least 83dB below threshold of peak limiting
Distortion	Total harmonic distortion is less than .3% from 40Hz to 15kHz
Attack Time - Peak Section	Less than 1.5dB overshoot one microsecond after application of 50kHz tone burst exceeding the threshold of limiting by 15dB
Attack Time - RMS Section	7 msec. to 40 msec. for 90% of ultimate gain reduction. Dependent on waveform complexity, amount of limiting and position of FUNCTION control
Release Time - Peak Section (for transients of less than 50 microseconds duration) (for other peak signals)	Less than one microsecond Variable by RELEASE control 50 msec. to 5 seconds
Release Time - RMS Section	Variable 250 msec. to 5 seconds
Limiting Ratio - Peak Section	Approx. 50 to 1
Limiting Ratio - RMS Section	Approx. 40 to 1
Limiting Thresholds	With FUNCTION control in PEAK position (CCW) all thresholds are at -20dBm with INPUT LEVEL control fully clockwise (variable to +30dBm (CCW)
Separation Between Thresholds	Rotating FUNCTION control from PEAK to RMS position raises peak thresholds 6dB, while lowering RMS threshold 6dB. This allows a separation of thresholds which is continuously variable from 0dB (PEAK position) to 12dB (RMS position)
Frequency Response	$\pm 1$ dB - 25Hz to 80kHz
Output Level	Up to +18dBm into 150 ohms or higher (+24dBm may be obtained by using a 150 ohm to 600 ohm output transformer)
Multiple Limiter Coupling	Connection provided for tandem limiting functions
Front Panel Controls (5)	INPUT LEVEL, OUTPUT LEVEL, RELEASE TIME, FUNCTION (PEAK/RMS), IN/OUT SWITCH
Power Requirements	Regulated 24VDC to 28VDC negative ground @ 70ma

### METERING SPECIFICATIONS

Gain Reduction Meter	7 increment sequential light emitting diode array indicates gain reduction from 2dB to 24dB
Accuracy	$\pm 1$ dB (2dB to 12dB gain reduction) $\pm 2$ dB (18dB to 24dB gain reduction)
Speed	Virtually instantaneous. Permits accurate reading of short term fast release limiting
Peak Limiting Indicator	Light emitting diode indicates when peak limiting is taking place
RMS Limiting Indicator	Light emitting diode indicates when RMS limiting is taking place

### PHYSICAL SIZE

GAIN BRAIN 700 Module

Card form with high impact plastic panel, controls and metering. 1" wide, 7" high, 6 $\frac{1}{2}$ " deep



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