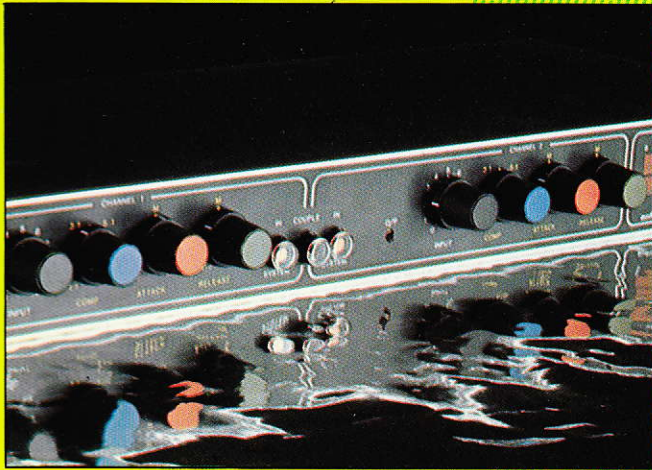
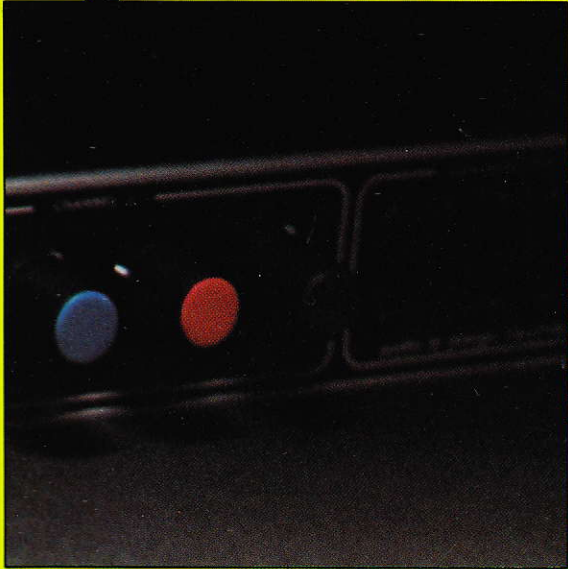


Gemini Easyrider



**Controlled
Signal
Processing**



GEMINI EASY

CONTROLLED SIGNAL PROCESSOR

Why you need a Compressor/Limiter

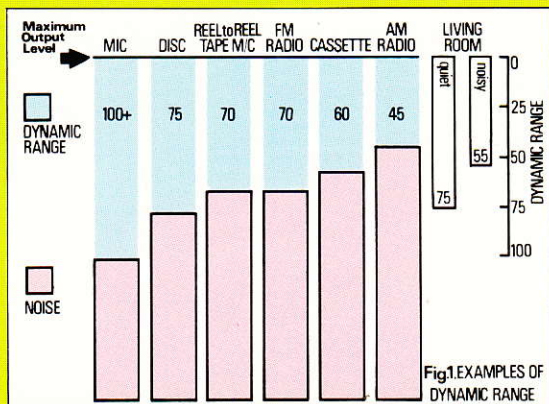
First, let's consider a particular property of 'live' sound and see how it compares with the technical limitations of equipment and materials normally used in its recording and reproduction.

DYNAMIC RANGE

Each medium that can pass (or transfer) audio signals has a difference in amplitude (or loudness) ranging from where the signal is obscured by noise (is too quiet) to where it saturates the medium (is too loud). This difference is termed the medium's dynamic range and is measured in decibels (dB's).

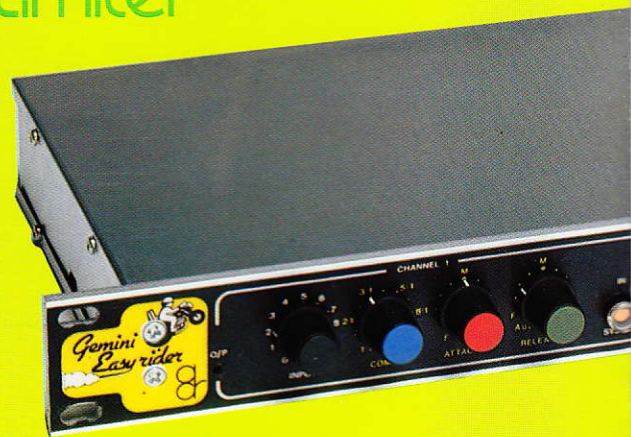
A typical, high level, magnetic tape, for example, has a dynamic range of approx. 67dB. (Source: 'Studio Sound', Vol 21 No 4, Apr '79). 'Live' sounds are not so restricted; emitted into free air, sound can easily have a dynamic range in excess of 120dB.

Fig 1.(Right) Illustrates some (optimistic) examples of dynamic range including those typically available to the listener.



To help you overcome these restrictions you need a compressor/limiter which can 1) compress the dynamic range of a signal down to fit that of a more restricted medium and 2) maintain an overall maximum level (or limit).

The Gemini Easy Rider has been designed by Audio & Design (Recording) Ltd to perform these functions.



MULTITRACK

Modern multitrack techniques, requiring acoustically 'dead' rooms and high input levels, can give rise to very wide dynamic range signals. On the road to presenting those signals as a final product there are two important considerations:

- 1) you are likely to encounter a medium whose dynamic range is more restricted
- 2) you may find it difficult to record sound peaks without overloading your equipment.



GEMINI EASYSIDER

WORKING AT YOUR FINGERTIPS...

What the easy-rider does



IN BRIEF

The Gemini Easyrider processes any 'line' level signal (i.e. output of pre-amp). It has two channels, which can be stereo coupled for mastering (Fig 3), each with independent input control, output preset.

The compression ratio (COMP) can be

varied from 1:1 to 20:1 (LIM) with semi-automatic attack and release controls (Fig 2). Gain Reduction is indicated in

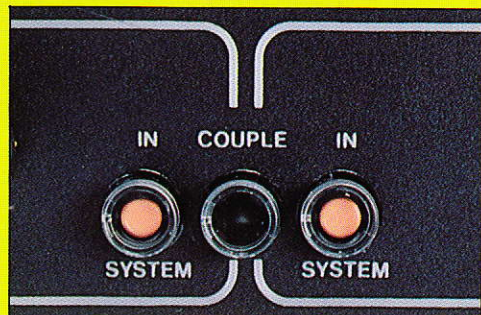
twin, 20 element, calibrated l.e.d. displays (Fig 4).

The threshold of compression is automatically varied to average 10dB compression under dynamic conditions, with constant output level at any ratio.

THE CONTROLS

INPUT — over 30dBs of gain for matching internal levels to your signal level with ample 'make-up' gain.

OUTPUT — presetable for 'set it and leave' drive up to +12dBm.



COMPRESSION RATIO

(COMP) (Fig 2) — the ratio (or slope) of input to output after level rises above the threshold e.g. 2:1 ratio means "for every 2dBs input above threshold raise output 1dB". Continuously variable 1:1 to 20:1 (LIM).

ATTACK (Fig 2) — The reaction speed for instituting gain reduction at the set ratio after signal level exceeds threshold. The attack time is variable from 500μs (Fast) — 5ms (Slow) plus programme controlled handling of fast transients.

RELEASE (Fig 2) — controls recovery speed when signal falls below threshold. Set 4ms (Fast) to 4secs (Slow) with 'automatic' position.

STEREO MATCH (COUPLE) (Fig 3) — links the two channels to prevent 'image shift' which would otherwise occur if gain reduction is uneven (channel to channel), essential when preparing stereo masters.

The Gemini Easyrider is the latest in our range of stereo compressor limiters. It will add 'punch' to your recordings by improving signal density and 'tighten' the sound by allowing higher average modulation level on tape. In addition, you don't need any sound engineering experience to operate it.



Local Distributor



SPEC. FOR ONE CHANNEL

Frequency Response: +0dB-1dB, 20Hz to 25kHz at threshold ref 1kHz

Noise: Better than -82dB Ref to limit level
Condition: Measured band limited 25Hz and 25kHz

Distortion: @ 1kHz 0.15% Ref to +12dBm (max limit level)
Condition: 3 sec release time @ 1kHz, 10dB Gain Reduction

Clip Level: Output stage +18dBm into 600 Ohms
Input stage +18dBm

Crosstalk: @ 10kHz -77dB, ref to +12dBu on opposite channel

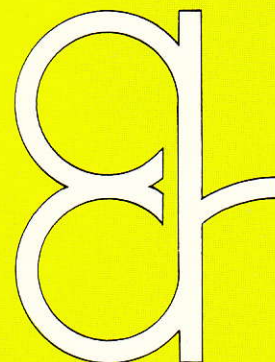
Make-up Gain: 33dB
Output (Pre-set): Calibrated -3dBm to +12dBu, ref limit threshold
Stereo matching (worst case): ± 1 dB Channel to channel over 20dB gain reduction
Input impedance: Greater than 10k @ 1kHz
Output impedance: Less than 1 Ohm @ 1kHz

Thresholds/Ratios: switched 1:1 variable 1.5:1 to 20:1 thresholds automatically adjusted
Limit Attack: Fast: 500 μ S for 10dB over limit threshold
Slow: 5mS for 10dB over limit threshold
Release: Dynamic attack changes in relation to level
Fast: 15mS on 10dB over limit threshold
Slow: 4 secs on 10dB over limit threshold
Auto: 15mS on 5 Secs via 12 way Barrier strip via 3 pole jack socket

Input/Output/Earthing: Calibrated 20 segment LED Bar graph
Side Chain Access: 230 VAC $\pm 7\%$
Metering: 115 VAC $\pm 10\%$, 50/60Hz selectable
Power requirements: 15 watts
Power Consumption: STD Rack, 1 $\frac{3}{4}$ " x 19" x 7 $\frac{1}{2}$ "
Size: (44.45mm x 482.6mm x 190.5mm)
Weight: 5.5lb (2.5kg)
Shipped in purpose-built export packing

U.S.A. Audio & Design Recording, Inc.
P.O. Box 786, Bremerton, WA 98310 U.S.A.
Tel: (206) 275 5009. Telex: 230 152426 ADRUSA

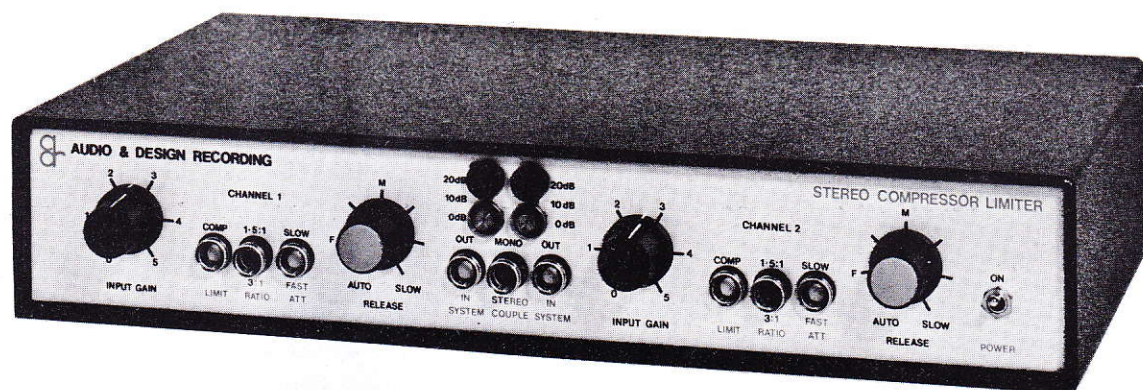
Worldwide Audio & Design (Recording) Ltd,
North Street, Reading, Berks RG1 4DA.
Tel: (0734) 53411. Telex: 848722 ADR UK



AUDIO/SIGNAL
PROCESSING



**audio & design
recording**



The Gemini Compact

The Stereo Compressor-Limiter

Stereo Compressor-Limiter

The Gemini Compact

Audio & Design Recording Inc., is the US distribution company for the products of **Audio & Design Recording Ltd.**, in Great Britain. The company manufactures professional audio products to the highest of European broadcast and recording standards. It has specialised for over ten years in the field of audio processors and has achieved a reputation as leaders in this scene.

The Gemini Compact is a true stereo compressor-limiter that has been designed to meet the requirements of the self-op recording artist and semi-professional users. **The Gemini**, is technically superb, having most of the flexibility of more exotic units, whilst retaining that simplicity operation so essential for the self-op artist.

The Gemini may be used for stereo or dual mono compression-limiting. The system is suitable for operation with all systems having levels of between -10 and +10dBm. The output limit threshold can be simply pre-set to suit following equipment. It is only necessary to select **limit** or **compressor** function (in the compress mode you can select either 1.5:1 or 3:1) and just increase the input potentiometer to obtain the amount of compression or limiting required. An added feature is the fact that after 10dB compression the slope tightens to that of a limiter so you just can't send unexpected peaks into the following system.

The attack and release characteristics of a system are vitally important, since these determine the dynamic response. Its all very well having an averaging network that sounds good on everything — it sounds good because its not doing much and it certainly doesn't make for a good limiter. The professional needs a flexible system with which he can control and create; only a peak sensing side-chain will make possible the dramatic effects of fast gain-change. **The Gemini** gives you all the flexibility you need to get a professional sound plus the benefit of a smooth *automatic* network for when you haven't the time to be creative.

Our reputation has been built-up on the fact that our units really work well and *sound* good! The units we make are designed for recording work — to handle extreme amounts of gain-change smoothly. The parameters that have been chosen in the specification do this successfully.

A light indication, to show compression and limiting, was selected for the ease with which this can be seen at a distance. It is usual to judge by ear rather than by indicator for this type of work and meters, although used professionally, can offer little more information than can be learned from this dual light system. The orange indicator just lights, indicating the threshold of compression; as it comes to full brightness, the red indicator just lights at 10dB gain reduction to go on to full brightness for 20dB.

An *in / out* switch allows each channel to be bypassed and a direct comparison is possible between direct and the processed signal.

On Voice, the compressor-limiter combination of **The Gemini Compact** is ideal; making possible the use of a soft slope to retain dynamics whilst providing the ability to hold sudden peaks as they occur.

Bass instruments can be tightly controlled, keeping difficult peaks down to reasonable level, yet increasing the overall impact of the sound through higher average levels.

Mid-band instruments can be compressed before or after equalisation for maximum intensity and bite.

Overall programme material can be tastefully compressed or limited to suit the recording or transmission media being used.

In sound reinforcement situations power amplifiers can be dramatically increased in efficiency whilst still providing speaker protection when fed from **The Gemini Compact**, whilst direct injection from an electronic instrument amplifier will give considerable scope for on stage use, without fear of feedback.

SPECIFICATIONS

Input:

10k ohms unbalanced
Variable potentiometer

Output:

< 1 ohm source
unbalanced.
Clip + 18dBm.

Limit Threshold:

At the input: -20dBm
At the output: variable from -10
to +10dBm.

Ratios:

Limiter 20:1
Compressor 1.5:1 and 3:1

Range:

> 30dB compression

Attack-time:

500 μ s and 5ms

Release-time:

Variable from 25ms to 3secs plus
automatic.

Frequency Response:

± 0.5 dB 30Hz-20kHz

Noise (-3db @ 25kHz):

< -78dB ref. limit threshold

Distortion:

< 0.2% at 1kHz for 10dB
compression (> 0.4sec release)

Stereo Matching:

± 1 dB on control voltage tracking
over 20dB range.

Power Requirements:

100-120v and 220-240v AC; 50
or 60Hz at 250mA.

Dimensions & Format:

Metal free-standing case
in charcoal grey
12 1/4 x 2 1/4 x 7" deep.
silver anodised front panel.

audio & design recording

84 Oxford Road, Reading, Berks, RG1 7LJ England

AUDIO/SIGNAL
PROCESSING

F690 Music-Voice Ratio Limiter

The technique of **voice-over** or **ducking** has come to be widely used for effect in pop programme compilation and the disco scene. It can also prove useful in film dubbing and in general broadcast work where, using the **F690 system**, engineers can establish and automatically maintain an optimum **music-voice ratio** at the output of the desk.

It is common practice to use the control voltage of one limiter (linked to the announcer's microphone channel) to control another through which the music channel is being routed. This is crude since the amount of attenuation is somewhat random and unpredictable, according to voice input level and subsequent gain reduction in the voice limiter; also there is the serious drawback that should the music level be lower (e.g. fading) it can often be attenuated below an audible level.

The **F690 Music-Voice Ratio Limiter** consists of a standard **F600 Broadcast Limiter** fitted with a voice operated threshold switching circuit. In this system, the music is routed through the limiter in the normal way and the input level is adjusted so that the signal is just limiting on peaks (or by whatever amount is required under normal conditions); then the release time is selected which will also determine the fade-up rate of the music after ducking.

A clean feed from the announcer's microphone is routed to the **V-O input**, the sensitivity of which is adjustable for signals larger than -30dBm. The control for this is front panel mounted and marked **V-O sensitivity**.

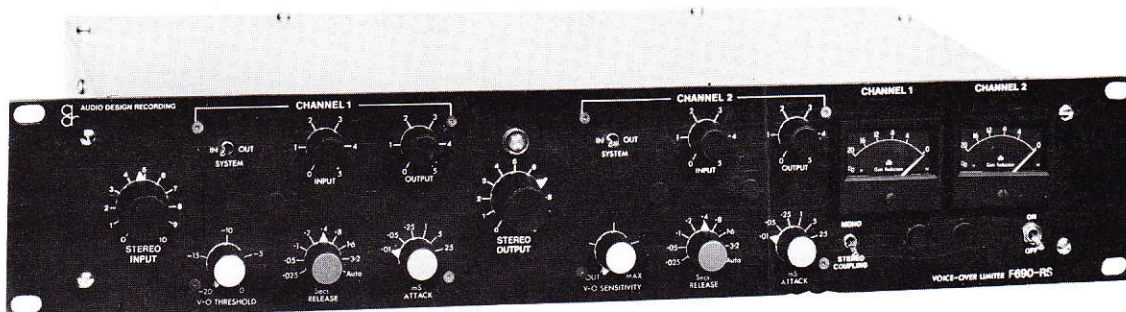
As soon as the announcer speaks, the music will be attenuated by the action of the limit threshold switching to a level below the standard limit threshold; the lower level being determined by the setting of the **V-O threshold** control which may be lowered by 20dB with reference to the standard threshold level.

The music output from the device is then finally mixed with the announcer's voice at the output of the desk. It may of course be desirable to compress or limit the voice but this must be done separately from the voice-over system.

Having established the music-voice balance this will **automatically** be maintained at the output of the desk irrespective of operator actions. Should he fail to attenuate a music channel sufficiently to maintain intelligibility the voice-over device will function automatically to establish the pre-determined desired balance. For voice-over effect the operator merely allows the music to remain at normal programme level whilst speaking.

The difference between this system and others is that *the music is only attenuated by the amount by which it exceeds the lower threshold*; if it has already faded below this level *no further attenuation takes place*, since a sufficient adjustment has already taken place to give a good music-voice balance.

The stereo **F690-RS** can be well used in a mono installation with one channel for voice and the other for the music voice-over control. In other respects the specification is identical to the **F600 Broadcast Limiter**.





FM Stereo Ex-press Limiter

- ★ **Compressor, Limiter, Expander**
- ★ **Digital Logic Switching**
- ★ **Stereo, self powered**
- ★ **1 $\frac{3}{4}$ " Ht. Rack Mounting**
- ★ **Ultimate Level Clipper**
- ★ **Dynamic Pre-emphasis**
- ★ **Excellent technical specification**

The **FM Ex-press Limiter** is a superb, compact compressor-limiter-expander, designed to provide high quality, high level F.M. signals.

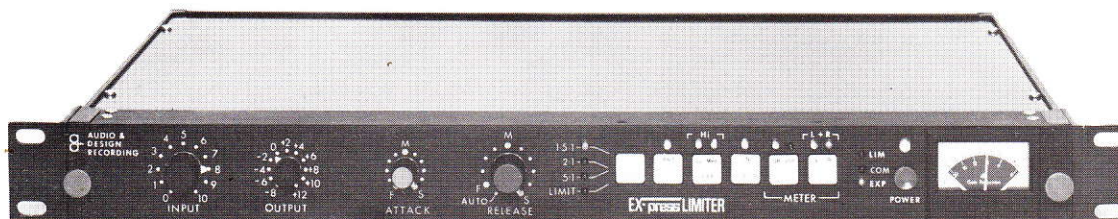
Function mode is controlled by digital logic momentary switches with no audio path contact to wear out. A memory system retains 'last use' settings when switched off, with a series of led indicators to show the status of functions when the unit is powered.

The **Ex-press** has stereo *input/output* attenuators, variable *attack* and *release* times and an *auto* release network. Ratios provided are 1.5:1, 2:1, 5:1, and limit (20:1) turning into a limit slope after 10dB of compression to ensure smooth overload protection. The softer ratios combine minimum dynamic change with subtle compression ideal for "beautiful music" and "M.O.R.", whilst the tighter slopes, with fast release, give extremely high modulation levels for maximum loudness and punch, i.e. rock formats etc.

It is only necessary to initially set *output* level under limiting conditions, select *ratio* required and adjust *input* to provide compression, switching in *expander* if necessary. No worries about transients, our C.C.C. (clever clipper circuit) takes care of those.

The 1:2 Expander function comes with 'range' factory pre-set on the pc board (10dB) and there is a choice of three *threshold* settings.

A unique dual-calibrated meter with both V.U. and Gain Reduction scales monitors *output* level (*left, right, sum*) or *Gain Reduction* and led's indicate *limiter, compressor* and *expander* operation.



Technical Specification

For One Channel

Frequency Response	:	+0-0.5dB, 20Hz to 25kHz at threshold
Noise	:	Better than -82dB Ref to +12dBm (max limit level)
Condition	-	Measured band limited 25Hz and 25kHz
Distortion	:	@ 1kHz 0.15% Ref to +12dBm (max limit level)
Condition	-	Measured with 3 sec release time @ 1kHz and 10dB Gain Reduction
Common Mode Rejection	:	@ 1kHz -70dB @ 10kHz -50dB
Clip Level	:	Output Stage +24dBm Balanced into 600 Ohms Input Stage +24dBm
Crosstalk	:	@ 10kHz -87dB, ref to +12dBm on opposite channel
Gain Control Range	:	25dB From onset of limiting
Make-up Gain	:	28dB
Output	:	Calibrated -8dBm to +12dBm, ref to limit threshold
Stereo matching worst case	:	± 1dB channel to channel over 20dB gain reduction
Compressor/Limiter Thresholds/Ratios:	Limit :	-16dBm
	5:1 :	-20dBm
	2:1 :	-28dBm
	1.5:1 :	-40dBm
Limit Attack	:	Fast 500μS For 10dB over limit threshold Slow 5mS For 10dB over limit threshold
Release	:	Fast: 25mS on 10dB over limit threshold Slow: 3 secs on 10dB over limit threshold Auto: 25mS on 5 sec
"RMS" Sidechain	:	5mS attack on 500mS release
Expander thresholds/ratio:	1.8:1	Low -36dBm } Med -22dBm } Ref to input High -7dBm }
Expander control range	:	10dB
Pre-emphasis for 25, 50, 75μS options, switchable on side-chain		
electronic balancing for input and output — on board switching for output		
Input impedance	:	Greater than 47k @ 1kHz
Output impedance	:	Less than 2 ohms (balanced) @ 1kHz
Metering:	:	2 scales showing: standard V.U. gain reduction 0-20dB
Power Requirements	:	Main 230 VAC ± 7% } Selectable on rear panel 115 VAC ± 10% }
Power Consumption	:	20 watts
Size:	:	STD Rack, 1¾" x 19" x 11.4" (44.45mm x 482.6mm x 290mm)
Weight	:	9.6 lb (4kg) Shipped in purpose built export packing



F600 Broadcast Limiter

THE F600 BROADCAST LIMITER has proven to be an extremely successful design concept; having evolved from our original diode-bridge limiter of 1965. Over the course of time it has been constantly updated to take advantage of the latest developments in technology, so that now it is a highly sophisticated f.e.t design with excellent noise and distortion figures. The system's most important attribute has always been those dynamic characteristics; smoothness of operation in handling initial transients being unsurpassed.

The device is ideal for use in systems that have critical overload conditions such as broadcast transmitters, optical recording on film, disc-cutting and high level sound re-inforcement installations. The overshoot is so minimal that it can be safely worked within 2dB of the system overload point.

The unit has variable input and output attenuators and the threshold may be simply adjusted between -16dBm and +15dBm at the output.

A switch modifies the response of the limiter side-chain to give a 50 μ S, 75 μ S or flat curve. The two characteristics increase the sensitivity of the limiting action to high frequencies and would be used prior to an FM transmitter or for de-essing in other recording situations.

There are six attack-time options from 10 μ S to 25mS, whilst there are nine release-time positions from 25mS to 3.2secs plus an automatic multiple network designed to increase average programme level with a minimum of modulation effects.

Operation is simple: The unit is inserted in line with the system with the **bypass** switch **out** whilst normal levels are established to suit the channel requirements.

With the limiter now switched **in**, the input attenuator is advanced until the amount of gain reduction typically required is indicated on the meter. It is then only necessary adjust the output attenuator to provide the maximum output level required into the following equipment (this can be set-up on tone (monitoring on PPMs) or programme if VU metering is standard (see bulletin on Limiting and VU metering).

SPECIFICATIONS:

INPUT

10k Ω unbalanced - variable input attenuator. Balanced units: code F600/T

OUTPUT

Unbalanced, source <1 Ω clip level +18dBm
F600/T version balanced, <75 Ω source with clip level >+22dBm.

SYSTEM GAIN

Maximum 34dB; unity in bypass mode.

ATTACK TIMES

10 μ S, 25 μ S, 500 μ S, 1mS, 2.5mS and 25mS

RELEASE TIMES

25mS, 50mS, 100mS, 200mS, 400mS, 800mS
1.6secs and 3.2secs plus automatic.

THRESHOLD

Input: maximum sensitivity for limiting -19dBm (input unattenuated).

Output: variable from +15dBm.

RATIO: >30:1

DISTORTION: < 0.2% THD @ 1kHz

SIGNAL-NOISE RATIO

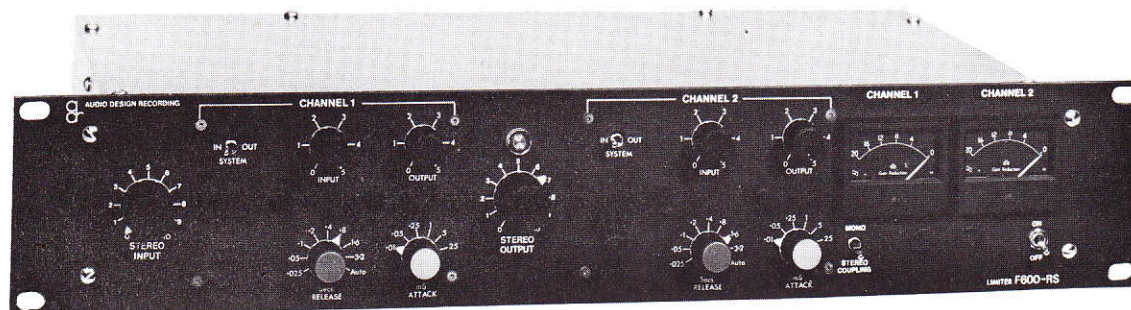
>80dB referenced to limiter threshold

METER: scaled 0-20dB gain reduction

F600-R rack-mounting mono unit

F600-RS Rack-mounting stereo unit

Both units have a front panel size of 88mm x 482mm (3½ x 19"), the depth being 247mm (8½") excluding XLR connectors. A tapped mains transformer provides options for 2:



PROTECTION IS OUR BUSINESS



THE FUSE — a simple, inelegant solution



THE COMPLEX — a more flexible, infinitely more elegant solution

The fuse is a very simple protection device which works, we think, a little too well. Because it would be highly embarrassing, not to say time consuming, to replace one on a big gig or during a heavy session. The **ADR Complex Limiter**, on the other hand, works equally as well — with the following bonus points:-

- 1 *The **Peak Limiter**, guaranteed not to overshoot by more than 2dB over threshold, 'resets' itself each time it operates.*
- 2 *The **Compressor**, set at 2:1 ratio will give a useful amount of 'subjective loudness' to punch programme through without increasing the chance of hearing damage at concerts.*
- 3 *The **Gate** will cut-out auditorium 'feedback' on open mikes during pauses.*

all this adds up to a better, more controlled, sound requiring minimal attention.

There are some pretty big P.A companies using ADR's elegant solution regularly on tours.....

.....shouldn't you be too!!

For ADR user list and details of the **F 760X-RS Complex Limiter's** variety of other uses write, phone or telex.

audio & design (recording) ltd.
84 Oxford Road, Reading, Berks, England

