

## SPECIFICATIONS

### INPUT

**Type** • RF-filtered true instrumentation differential balanced

**Input Impedance** • 50K Ohms balanced

**Nominal operating level** • user selectable

OVU = -10, 0, +4, +8 dBm

**Max Input level** • +27dBm

**CMRR** • greater than 40 dB

### SIDE CHAIN

#### Compression

Attack time • 5-50m Sec

Release time • 200m Sec-1 Sec

Ratio • 1.1:1-20:1

Threshold • 30 dB below nominal level (OVU)

with input full clockwise

#### Leveling

Attack time • 2.5 Sec

Release time • 5 sec

Rate • .5-5dB/Sec

Threshold • same as Compression

#### Peak Limiter

Attack time • 1 $\mu$  Sec

Release time • 10m Sec

Threshold • 12dB above nominal level (OVU)

**Gain reduction element** • APHEX 1537A Voltage Controlled Attenuator

### OUTPUT

Type • Electronically balanced transformerless. May be operated balanced or single-ended at full output.

Source impedance • 20 ohm balanced, 10 ohm unbalanced.

Maximum output • +27 dBm balanced or +21 dBm unbalanced.

Band width •  $\pm 1$ dB 5HZ-65KHZ

Hum and noise @ unity gain, +4op level • -72dBm

Noise referred to max output • -95dBm

Dynamic THD @ 20dB compression, 1 KHZ, +4 op level • .1%

**SIZE** • 13/4" H x 19" W x 9" D

**SHIPPING WEIGHT** • 11 lbs

**POWER REQUIREMENTS** • 90-250 VAC, 50-60HZ, 20W

AC input is IEC standard receptacle, with fuse, voltage select & RF filter.

the **COMPELLOR**<sup>TM</sup>



from **APHEX SYSTEMS LTD.**



**APHEX SYSTEMS LTD.**

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# the COMPELLOR™ AUDIO COMPRESSOR/LEVELER/PEAK LIMITER

Provides computer controlled dynamics for smooth undetectable compression, increased loudness, and intelligent automatic gain-riding.

Presenting the COMPELLOR, a revolutionary audio processor. It delivers intelligent compression, leveling, and peak limiting simultaneously! The COMPELLOR control circuits include analog computers that constantly analyze the input signal, varying complex control characteristics sent to a single VCA per channel. Operating controls are thus kept to a minimum, for the COMPELLOR intelligently varies all the parameters for you. All you need do is set input level to control the amount of processing, adjust output level, and set the balance between compression and leveling. That's it. The COMPELLOR will then provide complete dynamic control -- smooth, inaudible compression, increased loudness, freedom from constant gain riding, and the desired density -- all automatically. Its unique circuitry actually enhances transient qualities, making even heavy processing undetectable.

This smart, versatile, cost effective processor is equally at home in broadcast pre-processing, microphone control, audio recording and production, tape duplicating, live sound and film dubbing; producing the "sound" audio engineers have always sought but seldom found.

The COMPELLOR's simple audio path is comprised of a differential instrumentation input stage, the world renowned Aphex 1537A VCA, and a new, electronically balanced, transformerless output stage which can be used balanced or single-ended. The nominal operating level of the COMPELLOR (and OVU on the meter) is internally jumper selectable at -10, 0, +4, and +8dBm to match any system.

There are three main detector circuits for compression, leveling, and peak limiting.

**LEVELING** is performed in a manner related to the way the ear perceives loudness over long time intervals. The circuit maintains output level within 1dB for a 20dB input level change. The action is slow enough to have minimal effect on program transients or short term dynamics.

When leveling and compression are used together, the leveler maintains the gain platform so that compression is consistent over varying levels of material, providing a uniquely smooth sounding dynamic compression.

The leveling action is interactive between the two channels, preserving overall balance and stereo imaging.

**COMPRESSION** is also accomplished over a 20dB range of input levels, with the ratio varying from 1:1 to 20:1; the attack and release times derived from, and varying with, the program material. This "soft knee" helps to prevent the "choked" sound usually associated with deep compression. Further program dependent characteristics are imparted by other sections of the COMPELLOR's computer, the DYNAMIC VERIFICATION GATE (DVG), and the DYNAMIC RECOVERY COMPUTER (DRC).

The **DVG** monitors short term and long term average levels, compares them, and impedes gain changes when program dynamics might be sacrificed for arbitrary gain reduction. The DVG also prevents gain release during short term program pauses which otherwise would cause "pumping" or "breathing" effects. Vocal material is especially benefited by this feature, sounding natural even when extremely compressed. DVG action is indicated by a front panel LED.

The **DRC** allows very rapid recovery from gain reduction under certain complex wave conditions. Signals that are high in peak amplitude but low in relative power can cause an increase in the compression release rate. Unrequired gain reduction is thus inhibited,

preventing loss of transient wavefronts, holes, etc. The sonic benefit is substantial, contributing toward natural, open sound, even when highly compressed.

The **PEAK LIMITER** provides further dynamic control, holding an absolute ceiling 12dB above the nominal (OVU) level. Although extremely fast, this unique limiter is virtually inaudible in its operation.

The **SILENCE GATE** detects significant gaps in program material and freezes the processing, preventing noise "swell" or buildup common in other AGC devices, then instantly releases when program resumes.

The **STEREO ENHANCE** feature does just that. By detecting and matrixing certain stereo information and sending it to the sidechans, STEREO ENHANCE creates a subtle natural widening of the stereo image that is fully mono compatible. It is not a "stereo synthesizer" and it has no effect on mono or center channel material.

COMPELLOR™, Dynamic Verification Gate™ and Dynamic Recovery Computer™ are trademarks of Aphex Systems Ltd.

## APPLICATIONS

### BROADCASTING (as a pre-processing tool)

In the race for loudness it is quality which usually suffers. When required to work too hard, even the best multi-band processors degrade the audio. By pre-conditioning the signal with the COMPELLOR the following processor is fed a signal with an optimized dynamic range, thus allowing it to be operated in its "sweet spot" without concern for possible overload. Since the COMPELLOR does not degrade the audio, the total result will be cleaner sound, with equal, or greater, apparent loudness.

A different problem faces classical stations, especially with the newly expanded dynamic range of digital audio. The quieter passages get "lost" in the ambient noise floor, which may, in a moving automobile, be higher by more than 30dB. The COMPELLOR can "lift" these passages without changing dynamic and transient feel, thereby pleasing the audiophile and the commuter alike.

Another benefit of having the COMPELLOR in the broadcast chain is that fader settings on the console become less critical. The sound of the station will not change from the DJ who loves the sound of the meters pegging to the DJ who is afraid to make them move.

Television broadcasters are often faced with the problem of a large difference of apparent loudness between program material and commercials. With a COMPELLOR, the apparent loudness of the program can be increased, while already heavily compressed

commercials go through without further processing. The net result is consistent apparent levels from program to program and from program to commercial.

### PRODUCTION

The one drawback (if it can be called that) of the COMPELLOR is that it is almost impossible to get an "effect" or "coloration" out of it. So, if the goal is simply to have clean, uncolored level control on any particular track, the COMPELLOR is perfect. As mentioned, it is particularly natural sounding on vocals. Drums and bass also sound great processed by the COMPELLOR, though they would normally require different settings than for voice. Of course the COMPELLOR is excellent for processing a total mix to maintain maximum consistency and loudness (e.g. mastering).

### SOUND REINFORCEMENT

Feedback is one of the biggest problems in live sound. Just when the fader on a vocal input is set, the vocalist starts to sing louder. The COMPELLOR, however, can maintain maximum level before feedback.

The COMPELLOR also shines in controlling multiple sources of different levels, such as conferences. The speakers will all be equal in approximate loudness without changing the character of each individual's voice.

Paging systems can sound louder and clearer without any overload distortion and without increasing amplification.

### STL/PHONE LINE DRIVER

Maintaining consistent drive levels while controlling peaks (without overshoot and ringing) is just another way of describing the COMPELLOR. Full modulation of the STL can be sustained without concern for overload. Audio level will be kept well above the noise floor of phone lines or STL, again without crashing anything following the COMPELLOR.

### CARTING/TAPE DUPLICATION

Different audio levels from cart to cart is an all too typical problem. With the COMPELLOR, levels can be easily maintained to assure maximum signal to noise performance without tape saturation. The COMPELLOR is especially useful in assembling tapes from several sources with varying levels onto a single tape.

### MIC PROCESSING

One of the most difficult signals a processor encounters is the human voice. The COMPELLOR works beautifully on voice by producing a dense, "punchy" sound while retaining dynamic and transient qualities. The apparent level will be consistent without changing the urgency and excitement of a screaming DJ or altering the intimacy of a soft-spoken female voice.

### FILM DUBBING

Matching levels between multiple sources and within a single source is often a job which requires more than one person to ride gain and switch sources at the appropriate times. The COMPELLOR makes the job much simpler. It is especially effective on optical sound tracks which are so sensitive to any peak overload.

## ULTRA-SOPHISTICATED METERING

Just as the COMPELLOR is a unique multi-function device, so is its metering system. In each of its three modes, the novel multicolor LED display shows two measurements simultaneously (Compression and Leveling for GAIN REDUCTION, Peak and Average for PROGRAM in and out), plus showing action of the DVGs, Peak Limiters, and Silence Gate, plus status of the IN/OUT and STEREO ENHANCE switches.

In the **GAIN REDUCTION** mode, the meters display compression as a green bar and leveling as a red dot on the same scale, thus showing total gain reduction at a glance.

In the **PROGRAM** mode, VU (average) level is shown as a red bar, simultaneously peak level is shown as a green bar above the red! This novel visual presentation of dynamic range can be switched to read input or output, allowing an instant display of changes in peak to average ratio.



**INPUT** is a DC control that varies the output of the VCA and, thus, the amount of processing. Maximum compression and/or leveling is achieved with the control fully clockwise.

**PROCESS BALANCE** sets the ratio between compression and leveling, depending on the need. A 50/50 balance is most useful, as the leveling keeps the compression constant over varying program levels.

**IN/OUT** instantly takes the COMPELLOR in or out of circuit for A/B comparison. Sealed relays provide a hardware bypass which is also a failsafe feedthrough in case of power supply failure. A bi-color LED indicates status at a glance (red-in, green-out).

**SILENCE GATE THRESHOLD** sets the threshold of the SILENCE GATE between -40 to +4dB referenced to nominal input level. Below threshold the SILENCE GATE freezes gain reduction release, such as during program gaps or quiet passages. This will prevent noise buildup and permits normal fades, even with heavy processing. An LED shows SILENCE GATE action.

**OUTPUT** adjusts the output level over a 20dB range to compensate for heavy gain reduction.

**STEREO ENHANCE** switches in a unique detection and matrixing circuit which causes a pleasant widening of the stereo image without affecting non-stereo information. An LED indicates circuit operation.



APHEX 320A  
Compellor®



- The Compellor provides a clean consistent sound when used as a pre-processor
- Remote controllable relay hardware bypass
- Fader settings are less critical and the sound of the station will not change from announcer to announcer
- For television, level changes between programs and commercials will be smoothed out without affecting audio quality
- Servo balanced XLR in/outs for maximum audio quality
- Cable television operators can offer consistency in level when a customer switches between channels
- Two channel Frequency Discriminate Leveler varies its attack time
- Dynamic Verification Gate prevents pumping and breathing during short program pauses
- Dynamic Recovery Computer accelerates compressor recovery under complex program to preserve natural sound on transients
- Also available in mono with built in Aural Exciter™ - Model 323A

APHEX 250  
Aural Exciter® Type III



- The Aural Exciter increases presence, clarity, speech intelligibility and detail without distortion or overmodulation
- By pre-processing the audio, compensation can be made for the degradation the signal will receive further down the chain
- Single-ended process that can be applied at any point in the audio chain before the peak limiter, and needs no decoding
- Total flexibility in "tuning" the Aural Exciter to your needs
- Patented Harmonic Generation Process can actually increase bandwidth without increasing level
- Built-in single ended noise reduction can improve noisy sources
- Spectral Phase Refractor circuitry improves bass without eq.
- No unnatural distortion by-products
- Servo balanced XLR inputs and outputs for maximum audio quality
- Remote controllable relay hardware bypass

APHEX 720/722  
Dominator™ II



- The Dominator provides an absolute peak ceiling adjustable in .2dB steps over a 34dB range. Equipment following the Dominator (STL, telco lines, stereo generators, uplink transmitters, etc.) may be driven to maximum input level without overload
- Model 722 is for applications requiring pre-emphasized limiting, such as STL's, cable systems, satellite uplinks
- Greater consistency of peak audio levels, maximized S/N ratios, and highest possible resolution (more bits) in the digital domain
- Patented Automatic Limit Threshold varies ratio of handlimiting to clipping
- Remote controllable relay hardware bypass
- Switchable low to mid and mid to high crossover frequencies
- Servo balanced XLR ins and outs for maximum audio quality
- Model 722 - switchable pre- and de-emphasis, 50 or 75µsec. or flat
- Model 720 - flat only
- 104dB Dynamic Range
- The Model 720 is without emphasis circuitry at a lower cost

APHEX 120A  
1 x 4 Distribution Amp



Loading an output with multiple devices may cause noise, distortion and reliability problems. Y-cords and splitters are not the solution, a high quality distribution amp is. The Model 120A has one-input with four independent outputs. The inputs and outputs are transformerless and servo-balanced, allowing interface with balanced or unbalanced equipment (or even a dead short) without affecting the other outputs.

**APHEX 124A**  
-10dBV/+4dBu Interface Box



Interfacing a -10dBV unbalanced device (i.e. consumer DAT) with a +4dBu balanced device (i.e. mixing console) must be done properly to avoid level mismatches, noise, and distortion problems. The Model 124A has four discrete channels, two channels are -10dBV inputs to +4dBu outputs and two channels are +4dBu inputs to -10dBV outputs. The -10dBV outputs are active for low impedance and the +4dBu inputs are transformerless servo-balanced, allowing the interface to be transparent and problem free.

**APHEX**  
SYSTEMS

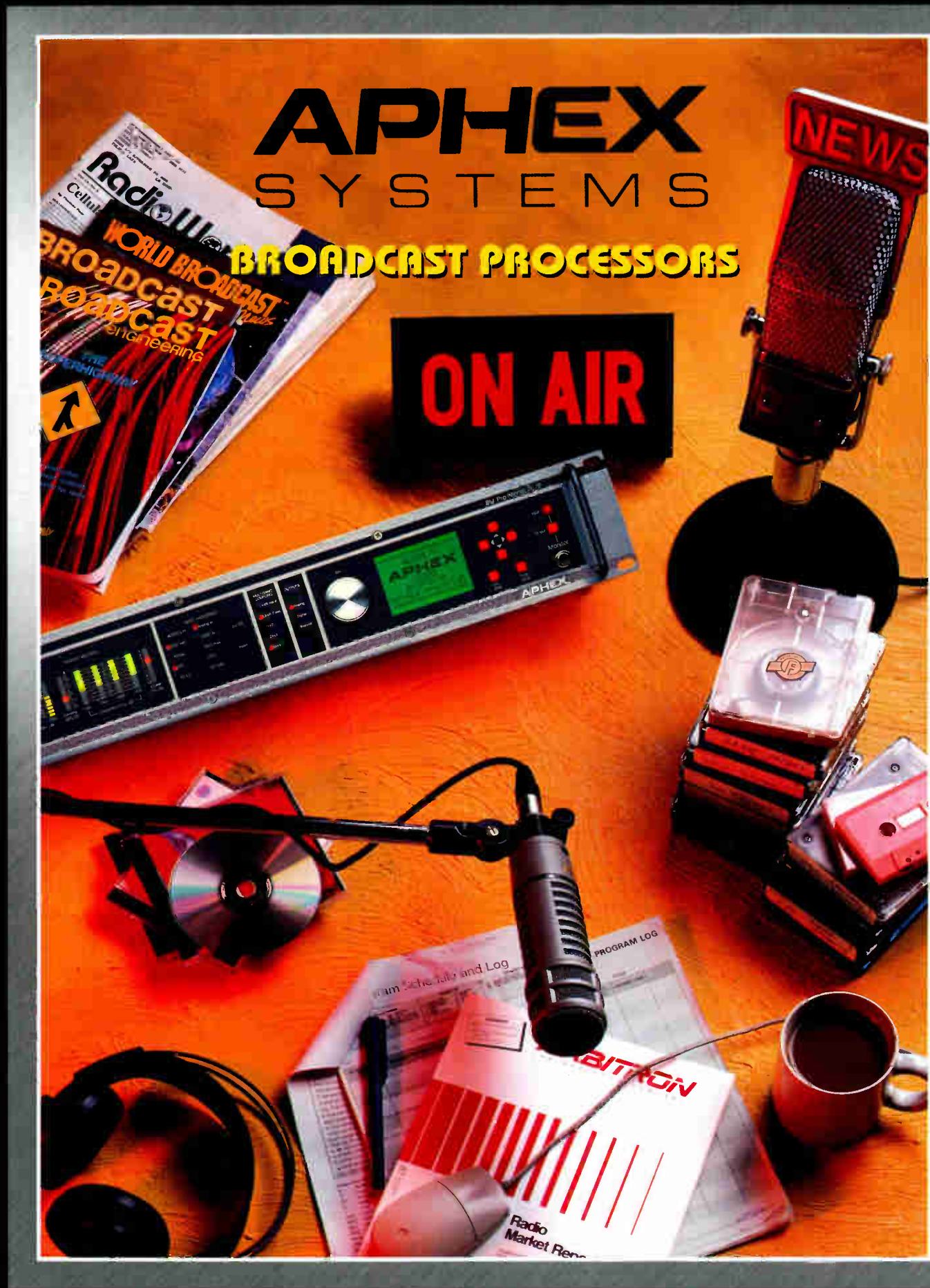
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**Improving the way the world sounds<sup>SM</sup>**

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08/00/5k





# THE APHEX FM PRO - MODEL 2020

Since 1981 Aphex has set standards for signal processing quality for the broadcast industry. The next expression in the tradition of excellence is the FM Pro Model 2020. The current demand for ever louder processing has created a situation in which quality is in inverse proportion to loudness. The FM Pro rewrites that formula through the utiliza-

tion of exclusive techniques (patented and patent pending) which increase density beyond any other processor while retaining naturalness and musicality. Combining the clarity of an analog audio signal path with the consistency and flexibility of digital control, the FM Pro is the complete one box solution.

- ✓ As Loud as You Want to be
- ✓ Tight Defined Bass
- ✓ Accurate, Present Mid-range
- ✓ Transparent, Natural High End
- ✓ Wide and Stable Stereo Imaging

- ✓ Complete One Box Solution
- ✓ Flexible and Easy to Use
- ✓ Programmable & Automatable
- ✓ Front Panel & Remote Controllable
- ✓ Cost Effective



## Options - Buy only what you need!

Configure the FM Pro to your specific requirements. The basic unit has flat (no pre-emphasis) processing with analog I/O. Option 1 adds AES/EBU digital I/O. Option 2 adds a pre-emphasis limiter. Option 3 adds the pre-emphasis limiter and PPDM stereo generator.

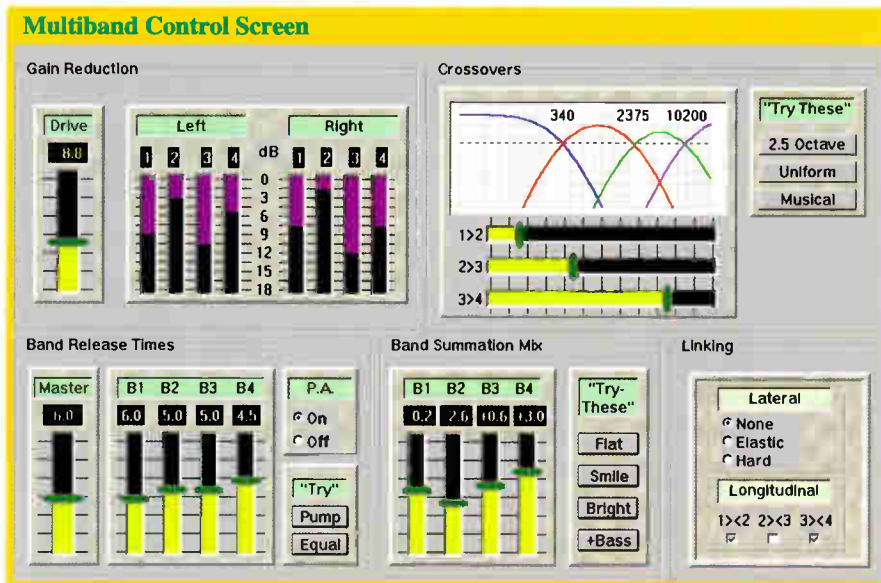
## Presets, Day and Day of Week Parting

The FM Pro has eight factory presets and sixteen user definable presets. All operating parameters can be modified and saved in a user preset. Day parting can be programmed for up to four changes of presets per day. In addition, each day of the week can be programmed to have its own day parting schedule of presets.

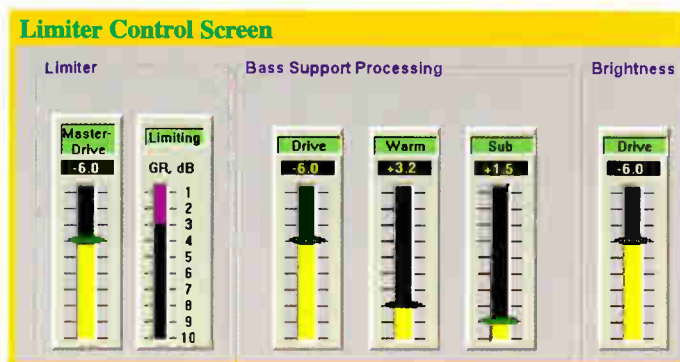
## Remote Software

RS 232, Windows® 3.1 and Windows 95 compatible.

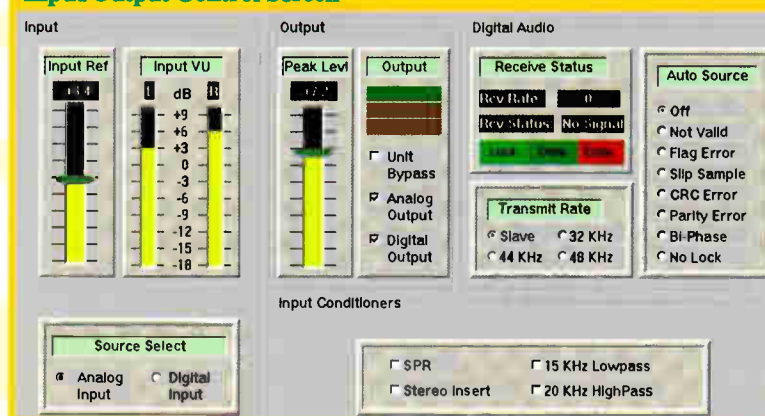
- Four band wave dependent compressor\*
- Adjustable drive
- Gain reduction metering
- Adjustable crossover frequencies
- Independently adjustable release times
- Adjustable band by band summation mix
- Post crossover multiband technique\*
- Selectable channel to channel linking (none, elastic, hard)
- Selectable band to band elastic linking



- Split band clipper\*
- Phase coherent crossover\*
- Adjustable master drive
- Limiting meter
- Adjustable bass drive
- Adjustable warm bass
- Adjustable sub bass
- Adjustable brightness

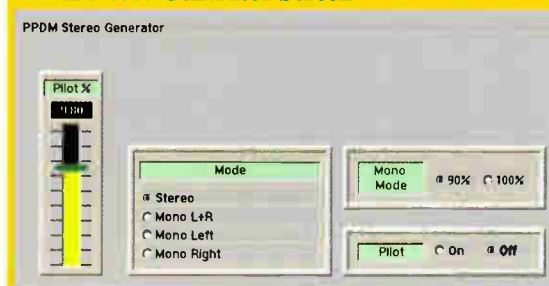


## Input/Output Control Screen



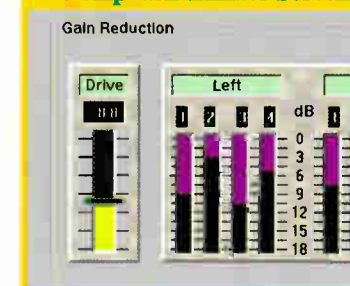
- Analog or digital (optional) input
- Analog, digital (optional) and MPX (optional) output
- Drift stabilized A/D converter\*
- Adjustable input reference level
- Automatic switch to analog during digital failure
- Selectable stereo insert, hi and lo cut filters, SPR, unit bypass
- Selectable transmit rate (slave, 32, 44.1, 48kHz)
- Adjustable peak output level
- Input VU meters

## MPX Stereo Generator Screen



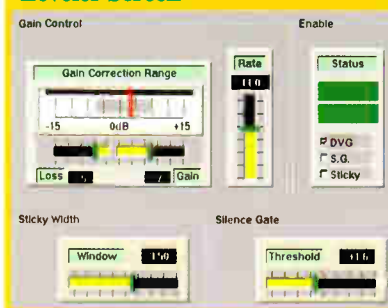
- Parallel path digital modulation\* stereo generator
- Adjustable pilot level
- Selectable pilot on/off
- Selectable mode (stereo, L+R, L, or R)
- Selectable modulation level for mono mode (90, 100%)

## Pre-emphasis Limiter Screen



- Distributed pre-emphasis filter\*
- Selectable 50/75µs pre-emphasis
- Selectable and switchable de-emphasis
- Selectable limiter on/off
- Adjustable hardness

## Leveler Screen



- Frequency discriminate leveler\*
- Adjustable rate
- Gain correction metering
- Selectable: dynamic verification gate\* sticky leveler\* silence gate w/adjustable threshold
- Adjustable gain correction range
- Adjustable window for sticky leveling

\*Denotes Aphex proprietary circuitry - patented or patent pending