

INNOVATIVE ELECTRONICS  
FOR THOSE WHO DEMAND  
PURITY IN SOUND

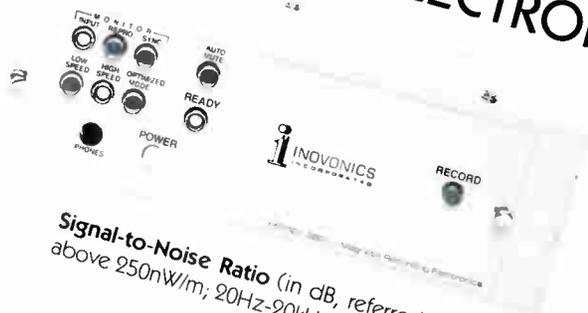


# INOVONICS INCORPORATED

- TAPE RECORDER ELECTRONICS
- TAPE TENSION KIT
- BROADCAST AUDIO PROCESSORS
- LIMITERS
- NOISE SUPPRESSOR
- HEADROOM METERS
- ACOUSTIC ANALYZER

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# MODEL 380 MAGNETIC RECORDING ELECTRONICS



The Model 380 represents Inovonics' fourth generation of self-contained Magnetic Recording electronics for professional audio recording applications. The 380 is suitable either for new OEM installations or for substantially improving the performance of existing magnetic tape and film recording equipment. Features include:

- Equalization, level and bias adjustments for routine, two-speed operation, and a third, "optimized" operating mode with separate adjustments to accommodate a different tape stock, operating level, track format, EQ characteristic, etc.
- "Pickup" (insert) Record Capability with adjustable delay, and "Sync" Reproduce with automatic monitor transfer.
- Provision for remote selection of monitor function, and defeatable "Auto Mute" to attenuate playback during high speed search.
- Adjustable circuitry to reduce the effects of tape compression and phase distortions.
- Increased erase, bias and signal headroom for high coercivity tapes.
- Switchable "VU" or 10ms, quasi-peak program monitoring.
- Two or more units easily interconnected for stereo or multi-track installations.

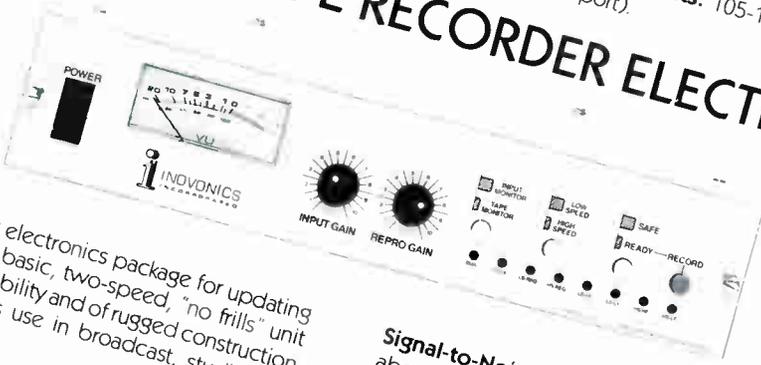
## Frequency Response (in Hz):

30ips  
15ips  
7 1/2ips

OVERALL  
± 1dB, 45-25k  
± 1dB, 25-20k  
± 1dB, 20-18k

SYNC  
REPRODUCE  
± 1dB, 60-20k  
± 1dB, 30-20k  
± 1dB, 20-16k

# MODEL 370 TAPE RECORDER ELECTRONICS



The Inovonics 370 is a replacement electronics package for updating older professional recorders. It is a basic, two-speed, "no frills" unit with excellent performance, high reliability and of rugged construction to meet the demands of continuous use in broadcast, studio and educational applications.

The 370 accommodates virtually any combination of original and replacement heads of either high or low impedance. It is pin-compatible with Ampex 300-, 350- and 440-series machines and easily adapted to most other professional recorders. Features include:

- All controls are "up front" for easy setup; calibration adjustments are stable, multi-turn pots.
- Entire electronics assembly unplugs from the front for ease in servicing; all components are standard, "off-the-shelf" available parts.
- Two units plug together for stereo operation.

## Overall Frequency Response (in Hz):

± 2dB, 25-25k  
± 2dB, 20-15k  
± 2dB, 20-8k

Signal-to-Noise Ratio (in dB, referred to a "peak" record level 6dB above 250nW/m, 20Hz-20kHz, 2- or multi-track format):

	OVERALL	STANDBY
30ips	u'wtd. -65	wtd. -79
15ips	-63	-75
7 1/2ips	-64	-75

Erase: 125kHz, Bias: 250kHz

## Recorded Distortion (THD at 15-mil-wavelength bias peak; 15ips):

	HIGH SPEED (uncorrected)	OPTIMIZED MODE ("linearized")
Operating Level	.40%	.35%
3dB above Op Level	.50%	.40%
6dB above Op Level	.95%	.70%
9dB above Op Level	2.50%	.85%

**Line Input:** "Electronically-balanced," bridging; accepts nominal line levels between -10 and +10dBm in CALIB position of INPUT GAIN control. Control affords additional ± 12dB gain range.

**Line Output:** Balanced, transformer-isolated; provision for balanced, transformerless operation. May be adjusted for nominal line levels between +4 and +10dBm. Clipping Level, +28dBm into 600-Ohm load; +30dBmV into bridging inputs.

**Power Requirements:** 105-130VAC (230V available), 50/60Hz; 0.3A (plus transport)

Signal-to-Noise Ratio (in dB, referred to a "peak" record level 6dB above 200nW/m, 20Hz-20kHz, full-track format):

	OVERALL	STANDBY
15ips	u'wtd. -66	wtd. -74
7 1/2ips	-67	-75
3 3/4ips	-63	-70

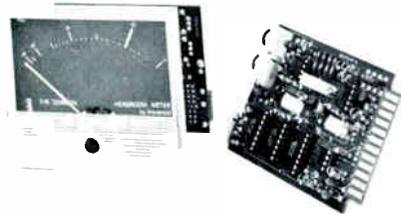
**Head Impedance Range:**  
Erase: 0.2-2.0mH  
Record: 3-15mH  
Reproduce: 3mH-1H

**Line Input:** "Electronically-balanced," bridging; accepts nominal line levels between -10 and +10dBm.

**Line Output:** Balanced, transformer-isolated; may be adjusted for nominal line levels between +4 and +10dBm. Clipping Level, +24dBm into 600-Ohm load.

**Power Requirements:** 105-130VAC (230V available), 50/60Hz; 0.3A (plus transport)

# MODEL GHM-00, GHM-01 HEADROOM METER



The Gordon Headroom Meter is a peak-reading audio level indicator conforming to the UK/EBU standard (BS4297:1968) for response to audio program peaks. The device responds per the UK/EBU specification, indicator ballistic behavior has been optimized for a much more artistically-desirable display than the conventional PPM.

The Gordon Headroom Meter is available in two versions. The GHM-00 is a complete metering system including both an electronics assembly and an optimum meter movement with expanded-range scale. The GHM-01 is a retrofit electronics kit for adapting existing "VU" meters.

Any number of meters in a given installation can be simultaneously switched into a "lineup" mode by a single contact closure. In the

case of the GHM-00, gain is increased by a preset amount for ease in system calibration with steady-state test tones; the GHM-01 is returned to true "VU" operation. Similarly, another single contact closure imparts a 75-microsecond pre-emphasis characteristic to all connected meters. This provides more meaningful measurements in disc transfer and FM broadcasting.

**Input Impedance:** 180k, balanced; 90k, unbalanced.

**Input Sensitivity:** Accepts nominal line levels between 0dBm and +10dBm. An alternate single-ended input can be used with levels down to -20dBm.

**Frequency Response:**  $\pm 0.25$ dB, 20Hz-20kHz. Phase response is linear.

**Peak Response:** Quasi-peak, per UK/EBU, 10ms. integration characteristic (BS4297: 1968).

**Peak Response Accuracy:** GHM-00,  $\pm 0.5$ dB; GHM-01,  $\pm 1$ dB for "VU" meters which meet ANSI C16.5-1954.

**Power Requirement:**  $\pm 15$ VDC bipolar, regulated; 16mA per meter.

**Meter Size (GHM-00):** Nominal 3 1/8-inch (3.5"  $\times$  3.0"); surface- or bezel-mountable.

# MODEL 201 AVERAGE AND PEAK RESPONDING LIMITER



Inovonics' Model 201 is an unusually smooth dual-function audio limiter designed for studio recording, mastering, and broadcast production work. Serving as both a fast peak limiter and independent average-responding limiter, Model 201 restricts program peaks to a preset ceiling value while maintaining the average program level within desired limits. Features include variable dynamic range compression, exclusive open-loop gain reduction and ripple-canceling circuitry, and visual indication of gain reduction.

**Frequency Response:**  $\pm 0.5$ dB, 20Hz-20kHz.

**Signal-to-Noise Ratio:**  $> 75$ dB, 20Hz-20kHz referred to +4dBm.

Distortion (THD):	50Hz-200Hz	200Hz-20kHz
Peak Limiter		
Slow Release:	$< 0.5\%$	$< 0.25\%$
Fast Release:	$< 1.0\%$	$< 0.25\%$
Average Level limiter:	$< 0.5\%$	$< 0.25\%$

## Limiter Timing:

Peak Limiter	
Attack:	Continuously variable between 1 $\mu$ s/dB limiting and 1ms/dB limiting.
Release:	Continuously variable between 5ms/dB limiting and 50ms/dB limiting.
Average Level limiter	
AVG Response:	10ms/dB limiting
"VU" Response:	30ms/dB limiting

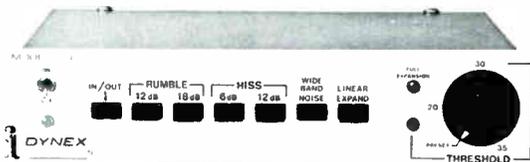
## Input:

Sensitivity:	Adjusts to accommodate input levels between -15 and +5 VU with calibrated "unity gain" position.
Impedance:	100k, unbalanced (transformer optional).

## Output:

Transformer-isolated line output feeds 600 ohm line or bridging inputs at +4 or +8dBm. Clipping level +24dBm.

# MODEL 241 "DYNEX" NOISE SUPPRESSION



A program-controlled filter/expander, Model 241 DYNEX is an effective tool for suppression of residual background noise in audio reproduction systems, TV film chains, etc. Model 241 offers a choice of operating modes for selective suppression of low-frequency, high-frequency, or wideband noise, or restoration of program dynamics by linear expansion.

**Frequency Response:**  $\pm 0.5$ dB, 20Hz-20kHz

**Signal-to-Noise Ratio:** Output noise below -85dBm

**Distortion:**  $< 0.1\%$  THD up to +8dBm  
 $< 0.3\%$  THD up to +23dBm

## Noise Suppression Characteristics:

Choice of LF rolloff, HF rolloff or wideband suppression. Restoration to flat response begins when energy in the suppressed band exceeds threshold.

## Linear Expand:

10dB of broadband program attenuation with linear re-expansion to unity gain beginning at threshold.

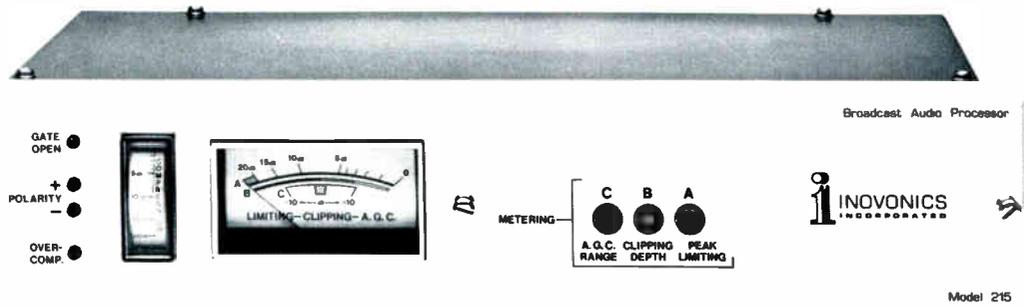
## Input:

100k unbalanced bridging (transformer optional) for nominal line levels between 0 and +8dBm.

## Output:

Transformer-isolated line output feeds 600 ohm line or bridging inputs at nominal line levels. Clipping level +23dBm.

# MODEL 215 BROADCAST AUDIO PROCESSOR



The Inovonics 215 offers an "as needed" approach to audio processing for AM and FM broadcasting. Processing options are provided in the form of plug-in subassemblies to perform gain-riding A.G.C., average level compression and peak control functions. The various options are available singly or in pairs to fulfill a specific processing requirement or to complement existing equipment. "Fully-loaded," the 215 stands alone as a complete broadcast audio processing chain.

## Gated A.G.C. Amplifier (-01 option):

**Capture Range:**  $\pm 10\text{dB}$

**Correction Rate:** 0.5dB/second

**Pink Noise Source:** Pseudo-random digital Pink Noise may be substituted for program for set-up or test.

## Average Level Compressor (-02 option):

**Compression Ratio:** Program-variable, approximately 2:1 at 10dB compression.

**Stereo Interconnection:** Compressors are slaved when two units are interconnected.

## AM Peak Controller (-03 option):

**Phase-Follower:** Inaudible "phase rotation" circuit to maintain maximum positive modulation.

**Peak Controller:** Integrated feedback-limiter/clipper circuit with adjustable clipping depth.

**Asymmetry:** Positive peaks continuously variable to +150%.

## FM Peak Controller (-04 option):

**Selective Limiting Characteristic:** Selectable "flat" or 75/25 $\mu\text{s}$  complementary prelimiting pre-emphasis and post-limiting de-emphasis.

**Peak Controller:** integrated feedback-limiter/clipper circuit with adjustable clipping depth.

**Frequency Response:**  $\pm 1\text{dB}$ , 50Hz-15kHz

**Distortion:** <0.3% above 200Hz, approx. 1% at 50Hz.

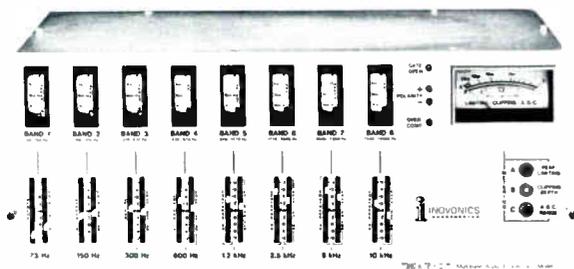
**Noise:** Better than 60dB below 100% modulation.

**Input:** Balanced, -30 to +10dBm.

**Output:** Balanced, 0 to +20dBm; +24dBm clipping level.

**"Proof" Mode:** A.G.C., Compressor and Peak Controller defeated; HPF and LPF electronically set for maximum bandwidth.

# MODEL 231 "MAP-II" MULTIBAND AUDIO PROCESSOR



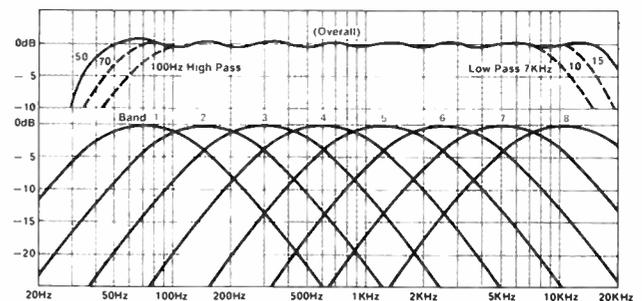
The Inovonics 231 is a user-oriented discriminate processor of advanced design to assure optimum modulation in AM broadcast applications.

The MAP-II includes a slow, "gain-riding", gated A.G.C. to erase input program level variation. The eight bandpass compressors offer control over the input and the output signal in each, to afford ultimate "dynamic equalization" of the program material.

The unique Peak Controller incorporates a true, fast peak limiter with a clipper in a feedback arrangement to give total control over clipping depth and asymmetry. Maximum positive modulation is assured by an inaudible phase "rotation" circuit, rather than the usual phase switching schemes.

A built-in Pink Noise generator aids in system setup.

All component parts are readily available, "off the shelf", and circuit assemblies are accessible from the front of the unit for ease in servicing.



Overall Frequency Response and Bandpass Compressor Characteristics

**Frequency Response** (when set "flat"):  $\pm 1\text{dB}$ , 50Hz-15kHz.

**Distortion** (at any operating point): <0.3% above 200Hz; <1.0% at 50Hz.

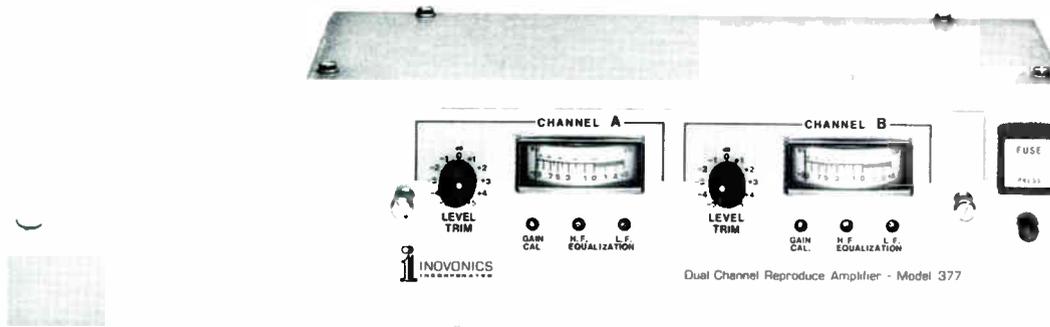
**Noise:** better than 65dB below 100% modulation.

**Input:** Balanced, -30 to +10dBm.

**Output:** Balanced, 0 to +20dBm; +24dBm clipping level

**Power:** 100/120/220/240VAC, 30W; 50/60Hz

# MODEL 377 DUAL CHANNEL REPRODUCE AMPLIFIER



The Inovonics 377 is a self-contained, dual-channel magnetic tape reproduce amplifier. Designed primarily for broadcast automation systems, the 377 also finds use in background music installations, tape duplicator "QC" checkers and other basic, single-speed applications.

- Accommodates virtually any tape reproduce head. -01 option can be strapped for either Hi-Z or Lo-Z head windings. Pin-compatible with Ampex and Schafer equipment.
- Low noise design utilizes an optimum combination of IC and discrete circuitry for lowest residual electronics noise.
- Wide equalization adjustment range for both NAB and IEC recording characteristics, 1 $\frac{1}{8}$  to 30ips.
- Multi-turn trim adjustments and fully regulated power supply assure stability of settings and drift-free operation.
- Entire electronics amplifier subassembly unplugs from the front panel for ease of maintenance.

## Frequency Response (in Hz):

15ips	± 2dB, 30-22k
7 $\frac{1}{2}$ ips	± 2dB, 20-18k
3 $\frac{3}{4}$ ips	± 3dB, 20-14k

**Output:** Transformer-isolated, feeds 600-ohm line or bridging inputs, balanced or unbalanced, at +4 or +8dBm for zero-VU.

## Signal-to-Noise Ratio (STANDBY in dB; 2-track format):

	u'wtd.	wtd.
15ips	-70	-81
7 $\frac{1}{2}$ ips	-70	-81
3 $\frac{3}{4}$ ips	-69	-80

**Recommended Head Inductances:** -00 version-200mH to 1H, 400mH optimum. -01 version-same as -00 or strappable for 3 to 6mH, 4mH optimum.

**Power Requirements:** 105-130VAC (230V available), 50/60Hz; 1/4A (plus transport, if powered by 377).

# MODEL 405 "TENTROL" RECORDER CONSTANT TENSION ACCESSORY KIT



Inovonics' Series 405 is an easily installed accessory kit which provides constant tape tension on most professional audio recorders and duplicator transports. The kit is designed to reduce capstan slippage, eliminate pitch change, extend head life, and improve high-frequency system performance.

Active in the "RECORD" and "REPRODUCE" modes, it may be used to control either the holdback or takeup tension. TENTROL does not disturb the tape path since it utilizes a tachometer which is attached to the reel motor.

TENTROL is designed for use with all Ampex 3-motor transports and is adaptable to many others.

**Tape Widths:** 1" and under.

**Tape Speeds:** Speed pairs from 3 $\frac{3}{4}$  - 7 $\frac{1}{2}$  ips to 60-120ips.

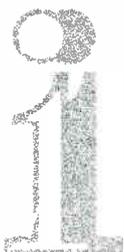
**Reel Sizes:** "Cine" (1 $\frac{1}{8}$ " hub through 14" with NAB hub.

**Nominal Constant Tension at Head:** Adjustable from 3 to 9 ozs. within motor torque and heat dissipation limitations. Variation throughout reel ± 1/2 oz.

**Starting Torque:** Adjustable for optimum starting characteristics.

**Maximum Torque Available:** 85% of rated maximum motor torque.

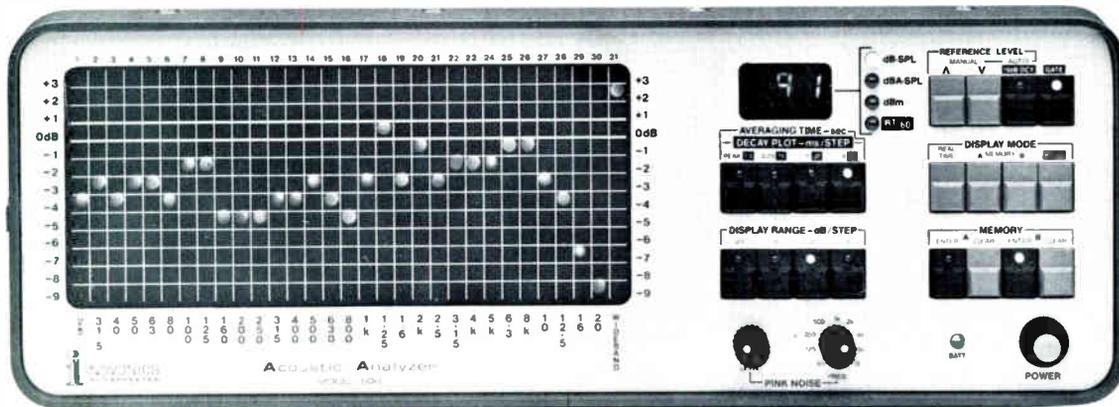
**Power Requirements:** TENTROL receives power from the tape transports and will operate at 50 or 60 Hz.



Since 1972 Inovonics has been providing sophisticated audio recording, processing and instrumentation equipment for the professional broadcast, recording and sound-related industries.

Products designed and manufactured by Inovonics are distributed worldwide through professional audio and video equipment dealers. Contact your distributor, or Inovonics directly, for additional information, or a demonstration of any item.

# MODEL 500 ACOUSTIC ANALYZER



Here's everything you need for one-third-octave sound-level and reverberation-time analysis. Inovonics' Model 500 Acoustic Analyzer. It's one very sophisticated but easy-to-use instrument. Lightweight but rugged, Model 500 goes wherever you go. From the freeway interchange to the auditorium, concert hall, and laboratory.

## 500 Features:

- Large, easy-to-read 13 × 31 LED matrix displays both real-time and reverberation decay plots.
- Filter rectifier time constants can be selected for peak or log-averaging readings in the real-time mode. Decay plot scanning rate may be set for integrating periods of 7.5, 15, 30, or 60 milliseconds-per-step.
- Digital readout indicates Reference Level in dB-SPL or dBA-SPL from 40 to 139, and in dBm from -60 to +39 for line input signals. RT<sub>60</sub> measurements to 10 seconds are displayed with 10 ms resolution.
- Analyzer sensitivity is manually programmable up and down in 1 dB steps.
- "Auto Level" function automatically programs analyzer sensitivity based on wideband level information.
- Dual, independent memories store or accumulate spectrum or decay plots.
- A rear-panel connector provides an external oscilloscope output and trigger for auxiliary bar-graph display. The digital I/O interface connector readies the Inovonics 500 for peripherals such as hard-copy printers or three-dimensional displays.
- An internal generator supplies wideband pink noise for real-time analysis or noise in octave bands for RT<sub>60</sub> measurements.
- The analyzer operates from either the AC line or its own internally charged battery.

**Analyzer Sensitivity:** (for 0dB Reference Level) 40 to 139 dB-SPL or dBA-SPL, microphone; -60 to +39 dBm, line.

**Display Range/Accuracy:** 0.5, 1 or 2 dB/step with relative Reference Level and indicated display error less than ±0.25dB; 3dB/step with less than ±0.5dB error.

**Filter Characteristics:** 2 pole-pair filters on ISO one-third-octave centers, 25Hz to 20kHz. Response exceeds ANSI S1.11/Class II/1971 standard. Relative filter accuracy ±0.5dB.

**Rectifier Characteristics:** Peak or 0.25, 1 or 4 second log-averaging response.

**Reverberation Analysis:** RT<sub>60</sub> readout internally extrapolated from 30 or 15 dB initial decay. Measurements to 9.99 seconds with 10 ms resolution; Accuracy ±3%, ±2 counts for decays greater than 0.1 second.

**Microphone Input:** 200 ohms, balanced with XLR connector.

**Line Input:** 100K-ohms, unbalanced; calibrated to ±0.5 dB.

**Pink Noise Source:** Digitally-synthesized, pseudo-random; ±0.5 dB spectral accuracy. Selectable wideband or octave-band output with 2-pole filters on ISO centers, 63Hz to 8kHz. Manually-gated, unbalanced output is variable to +5 dBm.

**External Oscilloscope Output:** BNC connectors for 'scope vertical and sweep trigger; external 'scope display has 7.5, 15, 30 or 45 dB dynamic range.

**Interface Connector:** Permits external control of memory storage, pink noise gating and decay plot scan; provides display data output and internal clocking signals for interfacing with digital peripherals.

**Power Requirement:** 115/230 VAC, ±10%; 50/60 Hz; 25 watts.

**Internal Battery:** 3-hour typical operating life; recharges in 8 hours.

# MODEL 153 X-Y RECORDER INTERFACE

The Inovonics 153000 Assembly provides interface between the Model 500 Acoustic Analyzer and an X-Y recorder so that hard-copy records can be made of real-time and reverb-time acoustic analyses.

Digital data from the 500 is converted into step-function analog X and Y outputs to feed any plotter with 2 VDC full-scale sensitivity, such as the Hewlett-Packard 7015 B or UREI 200/2020. The Assembly conveniently

mounts within the recess of the Model 500 back panel, and may remain installed without inconvenience.

A "CAL" button facilitates plotter setup, and a "PLOT" button initiates the transfer of display or memory data to paper. Data forms with coordinates and other pertinent information can be generated on any office copier from a master supplied with the 153000 Assembly

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