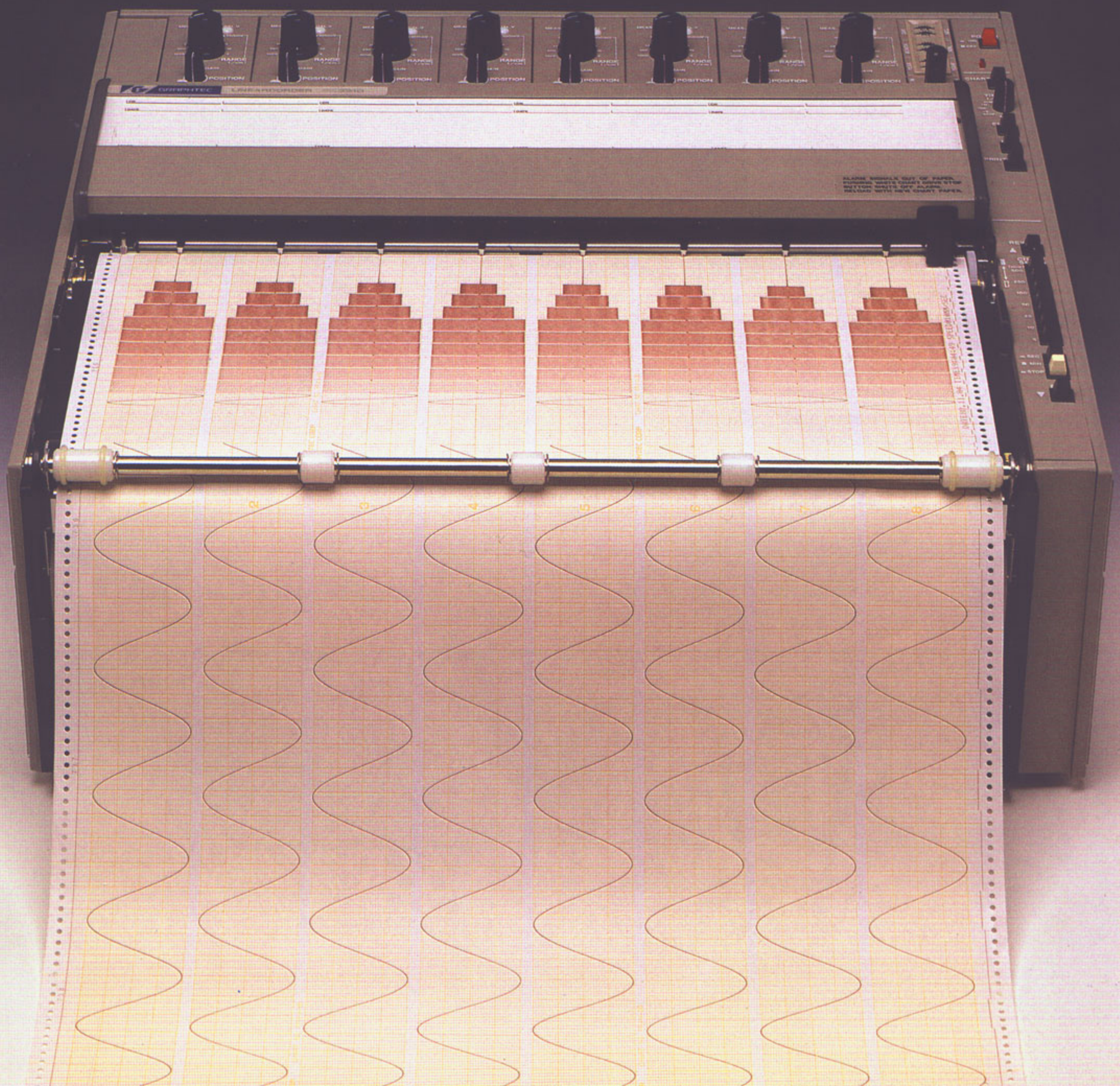


GRAPHTEC

THERMAL LINEAR CORDER WR3310 MARK VII

Multi-Channel Recording, High-Speed Frequency Response

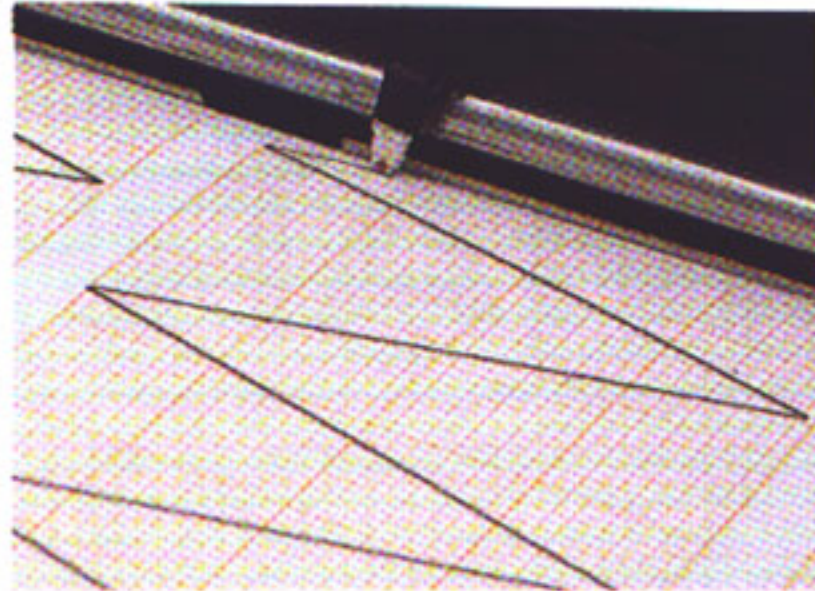


Superior Performance, High-Speed

The WR3310 Linearcorder Mark VII is a thermal writing pen oscillograph which has been designed to meet the standards required by even the most exacting of professionals. Our Mark VII recorders are used by government agencies around the world, which attests to their reliability and superior performance — a 140 Hz frequency response, 0.2% chart drive accuracy, and uniform trace density over a wide range of operating conditions. The WR3310 also offers versatile mounting — horizontal, vertical, or inverted.

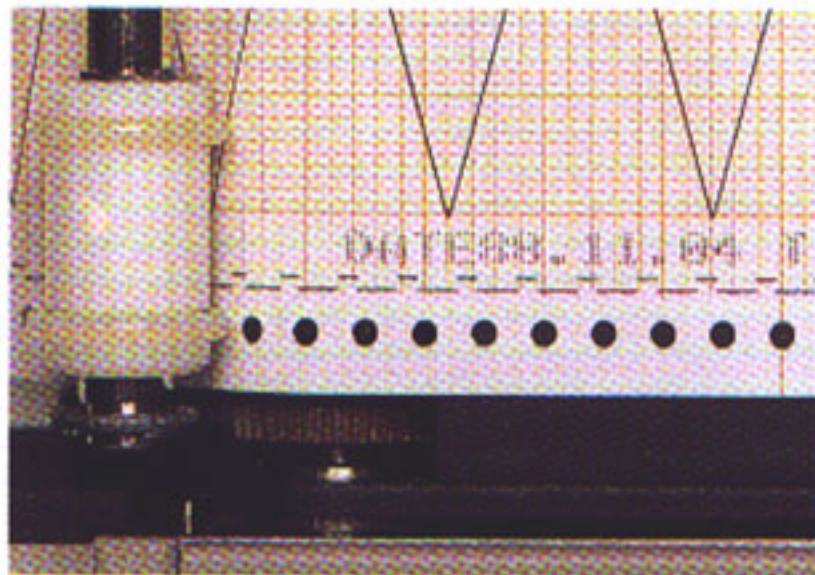
140 Hz Frequency Response

The WR3310 boasts a frequency response of DC to 140 Hz. Chart speeds can be set in seven steps in both the 5 to 500 mm/s and 5 to 500 mm/min ranges.



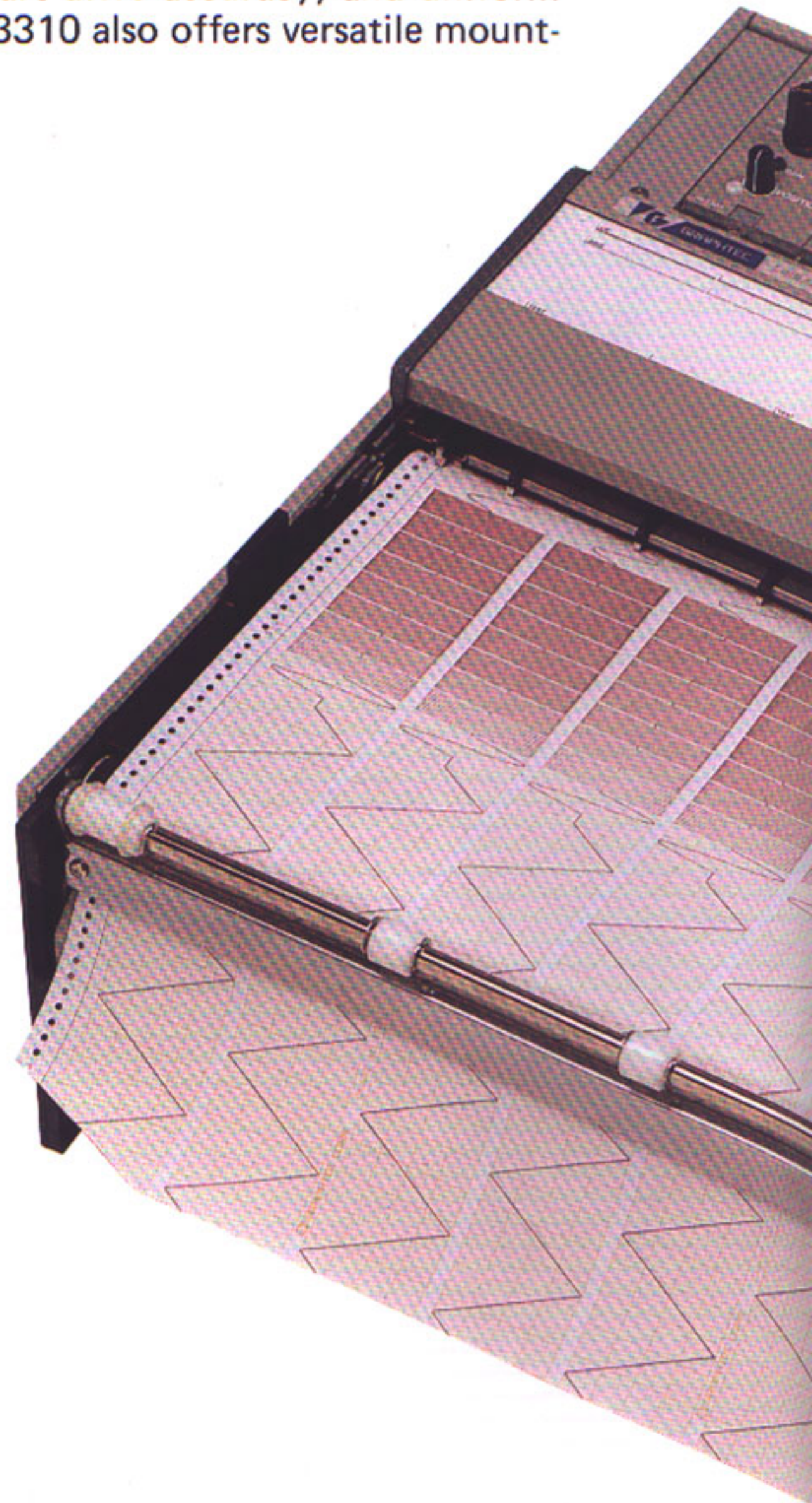
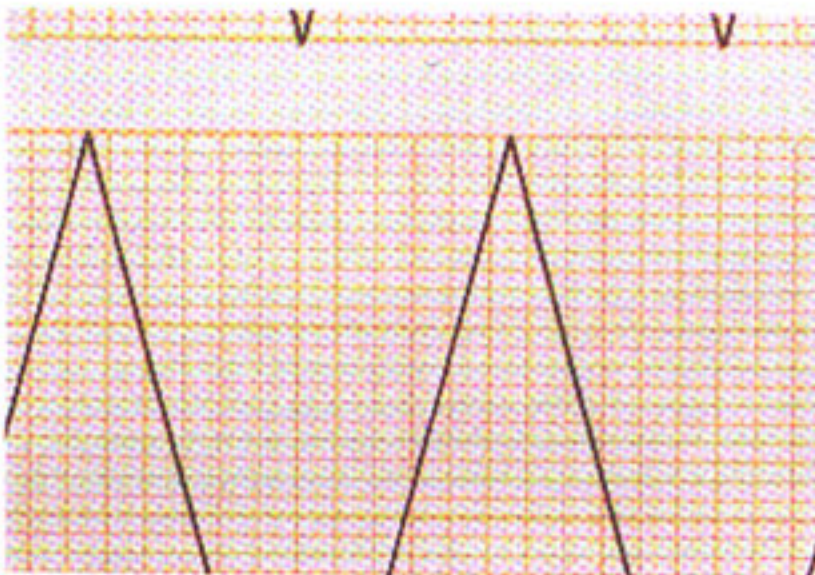
0.2% Highly Accurate Chart Feed

The stepper motor and sprocket chart drive eliminate chart wander and enable an accuracy of 0.2%. Line-synchronized chart feed by external pulse signals is provided as a standard feature.

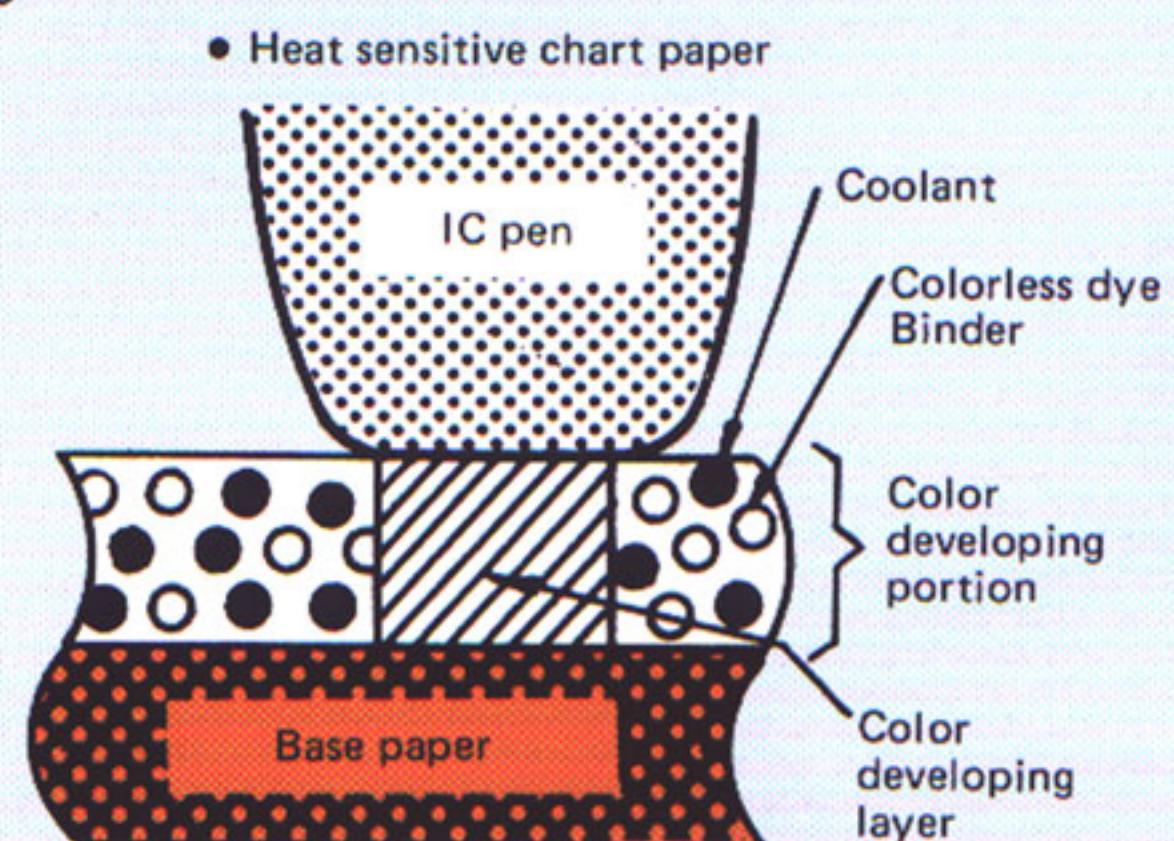
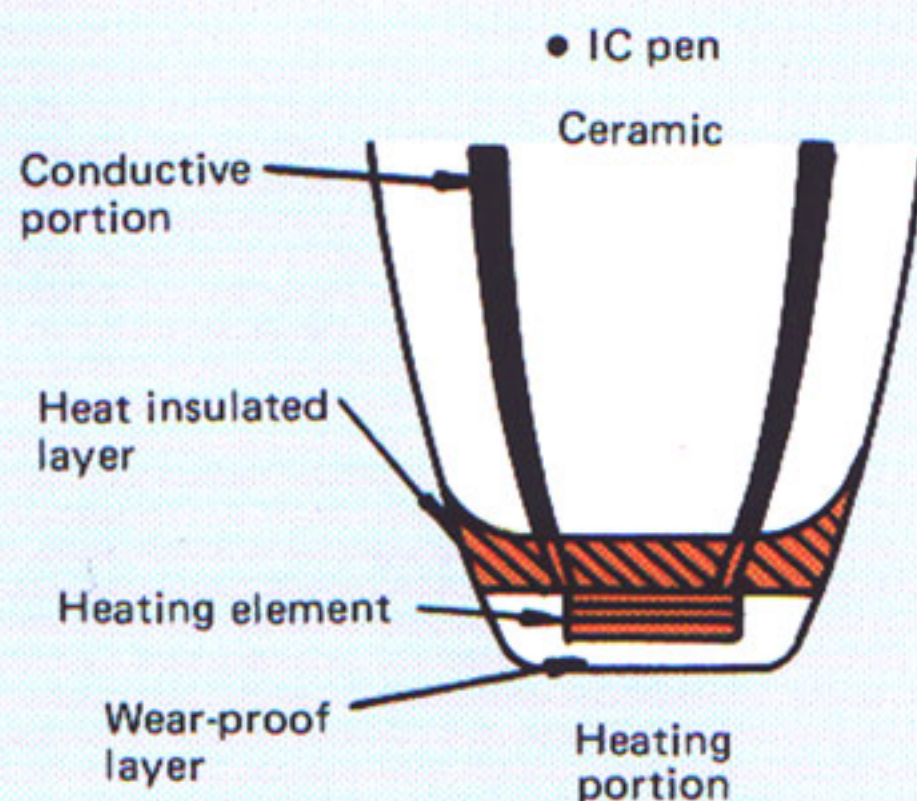


Thermal Recording for Crisp, Clear Traces

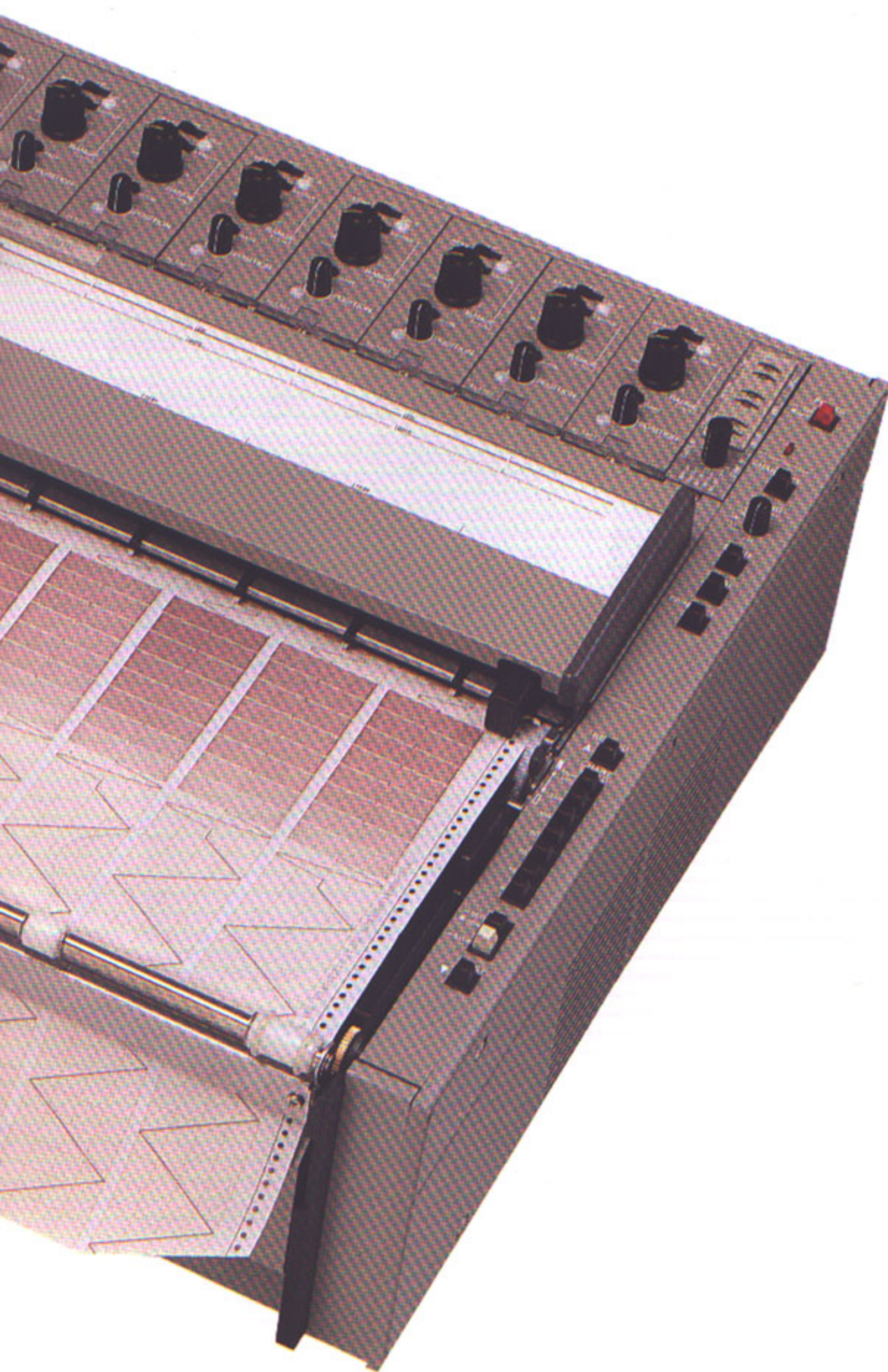
Graphtec's unique recording method uses heat-sensitive paper and thermal pens to ensure crisp, clear traces and easy-to-read digital data, without the maintenance and mess associated with ink technology.



Hot stylus pen tip



Frequency Response



Continuous Recording Up To 200 Meters

Both roll and Z-fold paper can be used with the WR3310. 100 m lengths stock inside the recorder, while an optional Z-fold chart supply box with a take-up tray enables the use of 200 m lengths. Roll paper can be rewound simply by depressing the Rewind switch, and an automatic roll chart take-up unit is available as an option.

Multiple Remote Control Functions

Remote control functions such as pen heat on/off, chart feed start/stop, synchronization with an external pulse, output of paper end signal, input of event marker signals, and input and output of time marker signals enable automated, unmanned recording.

1 V DC Reference Voltage Output

Rear panel reference voltage output connectors enable easy calibration whenever plug-in units are exchanged. The reference voltage output used for calibration is 1 V DC.

Wide Range of Plug-in Units

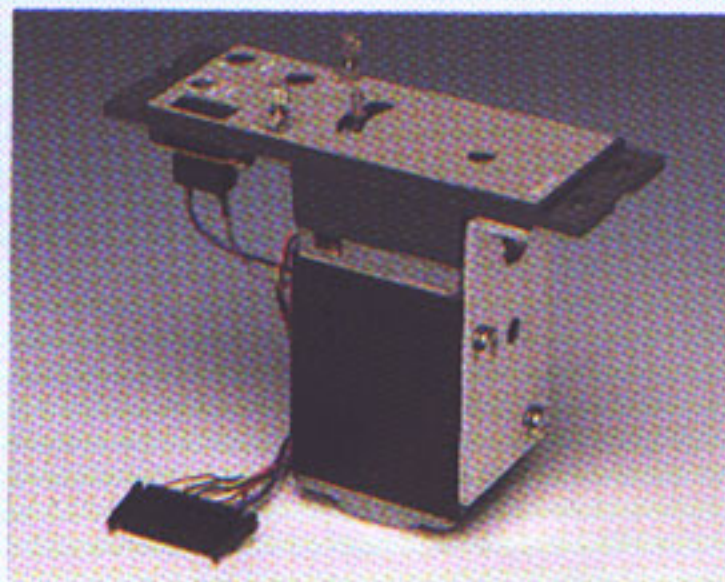
A wide range of plug-in units has been provided to meet specific application needs — standard sensitivity (L type) and high sensitivity (H type) voltage units, zero suppression units, $\pm 300\%$ and $\pm 1000\%$ bias units, DC bridge units, and an F-V conversion unit.

Options

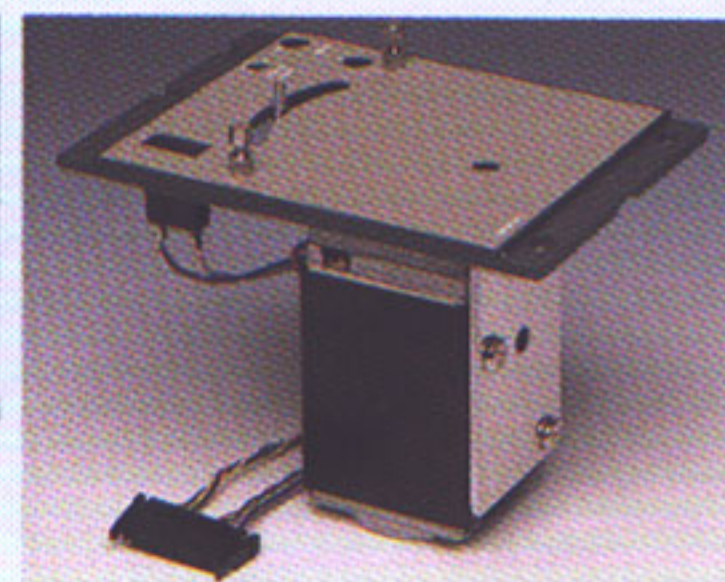
Options include a roll chart take-up unit, rack-mount brackets, and 1/2, 1/10, 1/20, or 1/100 of the standard chart speeds.

The heart of any recorder is its pen motor. Accurate reproduction of a waveform depends on the velocity of the pen motor and its ability to accelerate and decelerate from peak velocity. These characteristics are measured by frequency response and rise time. Graphtec pen motor frequency response is unexcelled:

DC to 140 Hz at 10 mm_{p-p} (40 mm span)
DC to 100 Hz at 20 mm_{p-p} (40 mm span)
DC to 60 Hz at 40 mm_{p-p} (40 mm span)
(± 0.5 dB)



GS3310

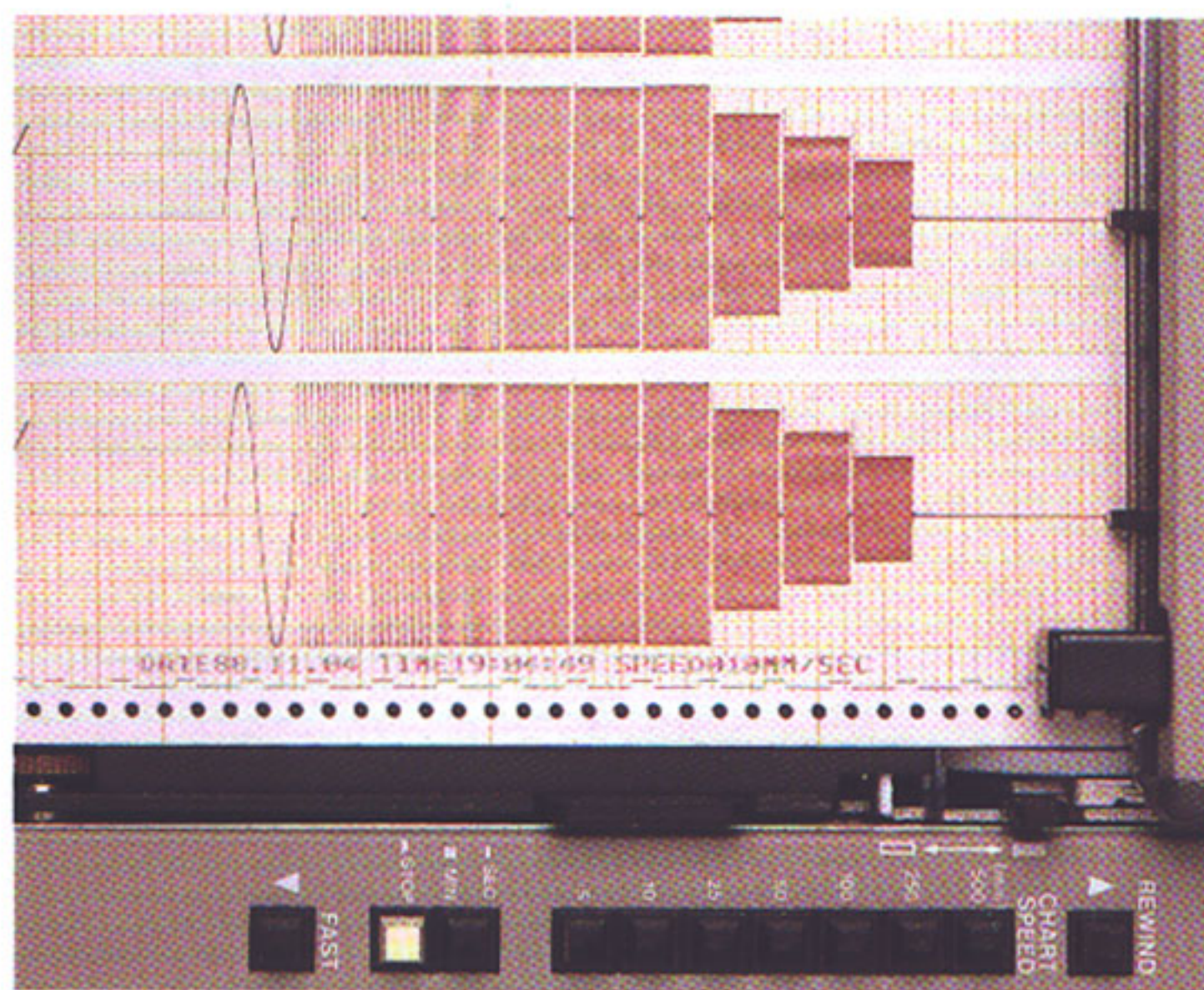


GW3310

Versatile Recording and Printing Functions

The WR3310 has a built-in printing function for annotation of the date, time (real or elapsed), and chart speed. Double-dot printing ensures clarity, and a back-up battery is provided to keep the internal clock running, even when the power is turned off. ASCII codes input from external devices can be used to print alphanumerics and symbols.

For maximum flexibility, there are two types of recording pens (standard or fine line), a choice of roll or Z-fold paper, and blue or black tracing.



Recording pens

Recording pen, hot stylus	KT-201A KT-202A	For GS3310, 40 mm span For GW3310, 80 mm span
Fine writing pen (diamond tip, 0.15 mm line)	KT-204 KT-205	For GS3310, 40 mm span For GW3310, 80 mm span
Event marker pen	KT-203	
Time marker pen	KT-209	
Print head	KT-208	

Recording paper (100 m standard)

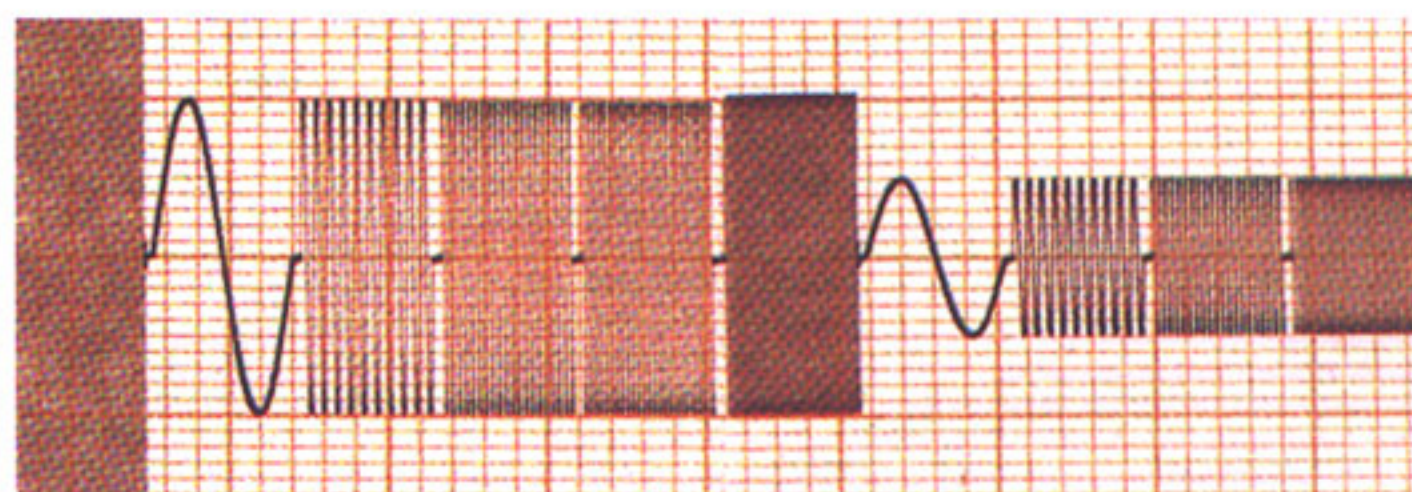
Black trace	Blue trace	
PR(PZ)410-2B	PR(PZ)410-2H	For WR3310-2
PR(PZ)412-4B	PR(PZ)412-4H	For WR3310-4
PR(PZ)413-6B	PR(PZ)413-6H	For WR3310-6
PR(PZ)414-8B	PR(PZ)414-8H	For WR3310-8
PR(PZ)416-AB	PR(PZ)416-AH	For WR3310-12
PR(PZ)420-1B	PR(PZ)420-1H	For WR3310-1D
PR(PZ)422-2B	PR(PZ)422-2H	For WR3310-2D
PR(PZ)423-3B	PR(PZ)423-3H	For WR3310-3D
PR(PZ)424-4B	PR(PZ)424-4H	For WR3310-4D
PR(PZ)426-6B	PR(PZ)426-6H	For WR3310-6D
PR(PZ)432-3B	PR(PZ)432-3H	For WR3310-3C
PR(PZ)433-4B	PR(PZ)433-4H	For WR3310-4C
PR(PZ)435-5B	PR(PZ)435-5H	For WR3310-5C
PR(PZ)436-6B	PR(PZ)436-6H	For WR3310-6C
PR(PZ)442-8B	PR(PZ)442-8H	For WR3310-8C

PR: Roll paper
PZ: Z-fold paper

Frequency response (1 Hz reference)	10 mm p-p: 0 to 140 Hz (± 0.5 dB) 20 mm p-p: 0 to 100 Hz (± 0.5 dB) 40 mm p-p: 0 to 60 Hz (± 0.5 dB)					20 mm p-p: 0 to 60 Hz (± 0.5 dB) 40 mm p-p: 0 to 45 Hz (± 0.5 dB) 80 mm p-p: 0 to 30 Hz (± 0.5 dB)				
Time marker	One mark each 1 or 10 s or 1 or 10 min (accuracy: $\pm 0.1\%$), and remote control by external contact closure or TTL signal									
Event marker	Push-button operation, or external control (contact closure or TTL signal)									
Remote paper feed START/STOP	External contact closure or TTL signal									
Remote pen heater ON/OFF	External contact closure or TTL signal									
Paper end alarm	When paper runs out, a beeper alarm sounds and recorder operation stops									
Paper rewind	Push-button operation (rewinds up to 5 m of roll paper at 100 mm/s speed)									
Annotation	Self-generated annotation: Date, time (elapsed or real) and chart speed Alphanumeric input: ASCII characters via built-in 8-bit parallel port									
Operating environment	0 to 45°C, 30 to 85% RH									
Power requirements	100, 117, 220, 240 V AC $\pm 10\%$ (switch selectable except for 1- and 2-channel models), 50/60 Hz									
Power consumption (approx.) L(H): at 10 mm p-p and 120 Hz DL(DH): at 20 mm p-p and 60 Hz	2L(H)	4L(H)	6L(H)	8L(H)	12L(H)	1DL(DH)	2DL(DH)	3DL(DH)	4DL(DH)	6DL(DH)
	205 VA	285 VA	365 VA	445 VA	505 VA	155 VA	185 VA	215 VA	245 VA	305 VA
Outer dimensions (mm) (difference ± 3 mm)	430(W) x 187(H) common									
	199(D)	289(D)	379(D)	450(D)	649(D)	199(D)	289(D)	379(D)	450(D)	649(D)
Weight (approx.)	13 kg	18 kg	24 kg	28 kg	41 kg	12 kg	16 kg	20 kg	23 kg	34 kg

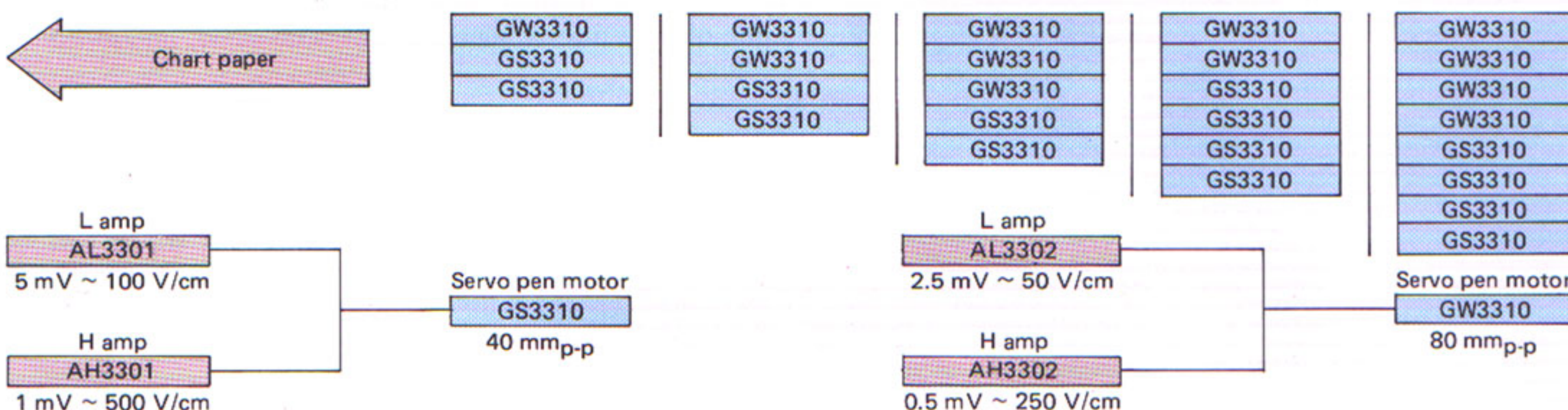
Real-Time Recording of High-Speed Events on up to 12 Channels

The Linearcorder Mark VII is capable of recording high-speed phenomena of up to 140 Hz, and can therefore be used for a wide range of applications from production sites to the laboratory. The WR3310 can be configured as a 1-, 2-, 3-, 4-, or 6-channel recorder with an amplitude of 80 mm per channel, or as a 2-, 4-, 6-, 8-, or 12-channel recorder with an amplitude of 40 mm per channel. 40 mm and 80 mm channels can also be combined as follows:



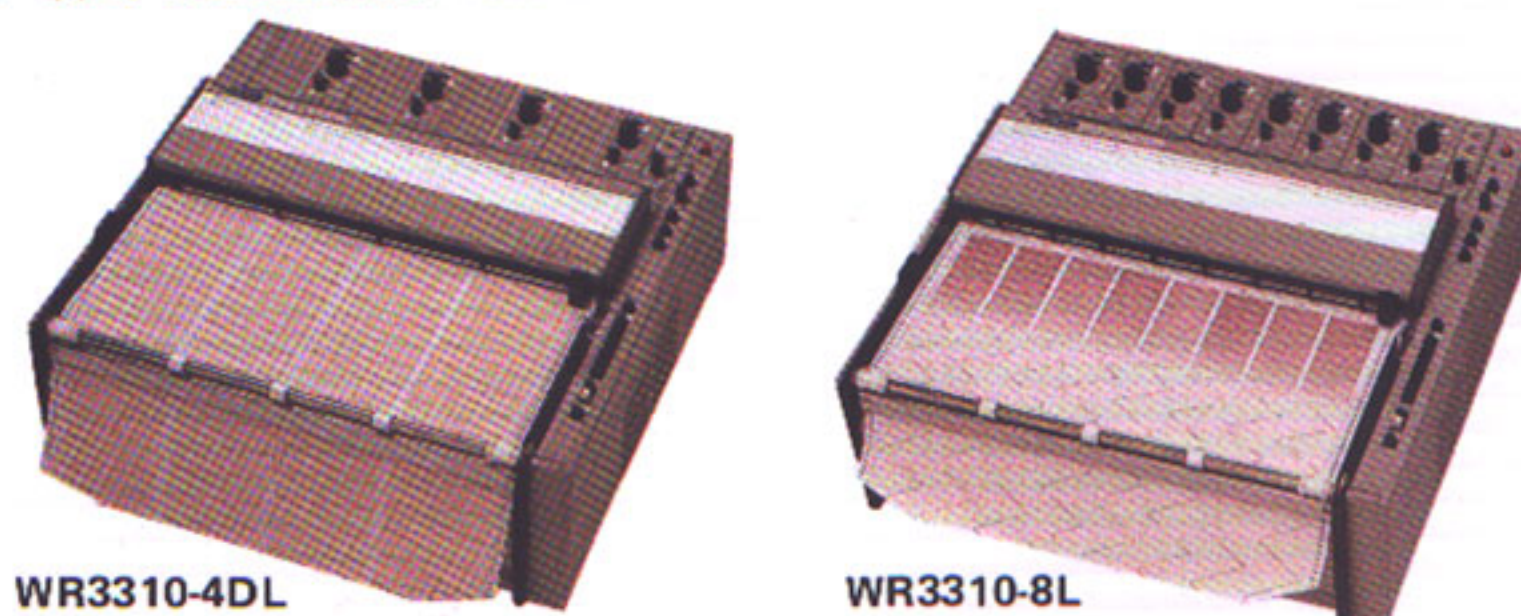
Configuration of servo pen motors GS3310 and GW3310, and preamplifiers AL3301, AH3301 and AL3302, AH3302.

Channels	3ch	4ch	5ch	6ch	8ch
Basic Recorder	4ch	6ch	8ch	8ch	12ch
Model	WR3310-3C	WR3310-4C	WR3310-5C	WR3310-6C	WR3310-8C



The model number identifies the number of channels, amplifier type, and channel width.

eg. WR3310-4DL — Standard voltage amp
 — Double (80 mm)
 — Number of channels



Specifications

	AL3301	AH3301	AL3302	AH3302
No. of channels	2/4/6/8/12		1/2/3/4/6	
Amplitude	40 mm per channel		80 mm per channel	
Chart drive	Stepper motor			
Paper feed speed	5, 10, 25, 50, 100, 250, and 500 mm/s or mm/min, and EXT (50 mm/s max) (Accuracy: $\pm 0.2\%$, ± 0.5 mm)			
Recording paper	100 m roll or Z-fold, blue or black trace			
Input format	Floating ground with guard shield			
Input resistance	1 M Ω , constant			
Maximum permissible input voltage	500 V DC (including common mode voltage)			
Measurement range (switching accuracy)	5, 10, 20, 50, 100, 200, 500, 1000 mV 0.5, 1, 2, 5, 10, 20, 50, 100 V/cm $\pm 1\%$ (reference range: 500 mV/cm)	1, 2, 5, 10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50, 100, 200, 500 V/cm $\pm 1\%$ (reference range: 500 mV/cm)	2.5, 5, 10, 25, 50, 100, 250, 500 mV 0.25, 0.5, 1, 2.5, 5, 10, 25, 50 V/cm $\pm 1\%$ (reference range: 250 mV/cm)	0.5, 1, 2.5, 5, 10, 25, 50, 100, 250 mV 0.5, 1, 2.5, 5, 10, 25, 50, 100, 250 V/cm $\pm 1\%$ (reference range: 250 mV/cm)
Accuracy	Within $\pm 0.5\%$ of full scale (including non-linearity and deadband)			
Sensitivity adjustment	Continuously variable over measurement range			
Zero setting	Can be set to any desired position in full scale (AL/AH3301: 40 mm, AL/AH3302: 80 mm)			
Calibration voltage	Twice measurement range (20 mm)		Four times measurement range (40 mm)	
CMRR	DC: 130 dB, AC: 110 dB	DC: 140 dB, AC: 120 dB	DC: 130 dB, AC: 110 dB	DC: 140 dB, AC: 120 dB
Input filter	-40 dB/-20 dB at 50 Hz			

Plug-in Units

AL3301 Standard Sensitivity Voltage Unit



	AL3301 (for ± 20 mm)	AL3302 (for ± 40 mm)
Input type	Floating ground with guard	
Maximum input voltage	500 V DC (including common mode voltage)	
Maximum sensitivity	5 mV/cm	2.5 mV/cm
Input resistance	1 M Ω (fixed)	
Measurement ranges	5, 10, 20, 50, 100, 200, 500, 1000 mV 0.5, 1, 2, 5, 10, 20, 50, 100 V/cm	2.5, 5, 10, 25, 50, 100, 250, 500 mV 0.25, 0.5, 1, 2.5, 5, 10, 25, 50 V/cm
Switching accuracy	$\pm 1\%$ (with respect to 500 mV/cm range)	$\pm 1\%$ (with respect to 250 mV/cm range)
Sensitivity adjustment	Settable anywhere within full measurement range	
Calibration voltage	Measurement range x2 (20 mm)	Measurement range x4 (40 mm)
Zero setting	Settable anywhere within full scale	
Input filter	Built-in (-20 dB/-40 dB/OFF, switchable)	
Common mode rejection ratio	DC: 130 dB, AC: 110 dB	

AH3301 High Sensitivity Voltage Unit



	AH3301 (for ± 20 mm)	AH3302 (for ± 40 mm)
Input type	Floating ground with guard	
Maximum input voltage	500 V DC (including common mode voltage)	
Maximum sensitivity	1 mV/cm	0.5 mV/cm
Input resistance	1 M Ω (fixed)	
Measurement ranges	1, 2, 5, 10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50, 100, 200, 500 V/cm	0.5, 1, 2.5, 5, 10, 25, 50, 100, 250 mV 0.5, 1, 2.5, 5, 10, 25, 50, 100, 250 V/cm
Switching accuracy	$\pm 1\%$ (with respect to 500 mV/cm range)	$\pm 1\%$ (with respect to 250 mV/cm range)
Sensitivity adjustment	Settable anywhere within full measurement range	
Calibration voltage	Measurement range x2 (20 mm)	Measurement range x4 (40 mm)
Zero setting	Settable anywhere within full scale	
Input filter	Built-in (-20 dB/-40 dB/OFF, switchable)	
Common mode rejection ratio	DC: 140 dB, AC: 120 dB	

Applications:

- Aerospace
- Automotive
- Manufacturing Test
- Research & Development
- Power Monitoring
- Quality Control

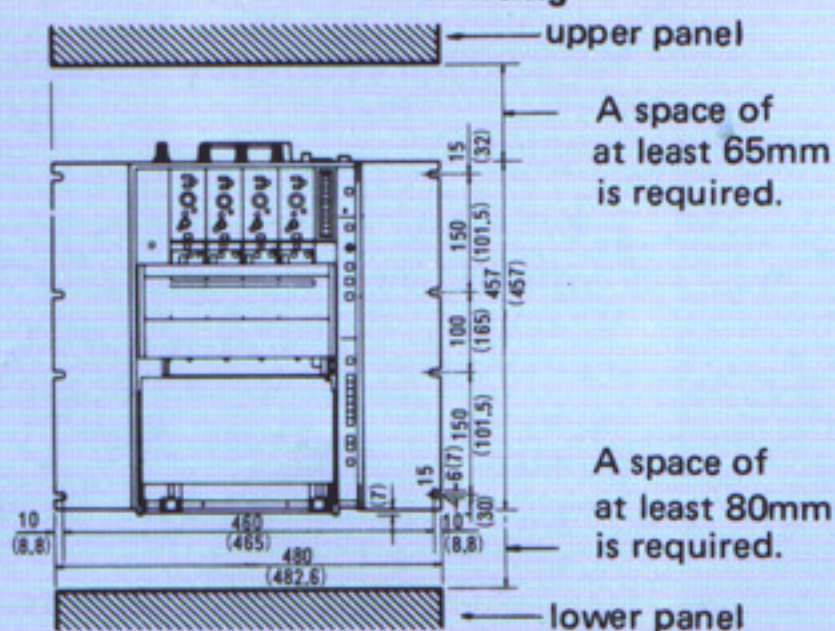


User's manual	1
Chart paper	1 roll
Input cables	Required channels
Fuses	2
Soft plastic cover	1
Storage bag for accessories	1
Philips screwdriver (3 mm)	1
Flatblade screwdriver (2 mm)	1
Allen wrench (3 mm)	1
Power cable	1
Print head input connector	1
Remote controls input connector	1
Cord for calibrated output	1

CH (80 mm)	CH (40 mm)	L (mm)
1	2	199
2	4	289
3	6	379
4	8	450
6	12	649

Metal dustproof cover	A-305 A-306 A-307 A-308 A-309	For 2-channel model For 4-channel model For 6-channel model For 8-channel model For 12-channel model
Roll paper take-up unit	A-321 A-322 A-323 A-324 A-325	For 2-channel model For 4-channel model For 6-channel model For 8-channel model For 12-channel model
Optional chart speeds	A-311 (1/2 standard) A-312 (1/10 standard) A-313 (1/20 standard) A-314 (1/100 standard)	2.5, 5, 12.5, 25, 50, 125, 250 mm/s, mm/min, and ext. 0.5, 1, 2.5, 5, 10, 25, 50 mm/s, mm/min, and ext. 0.25, 0.5, 1.25, 2.5, 5, 12.5, 25 mm/s, mm/min, and ext. 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 mm/s, mm/min, and ext.

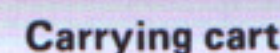
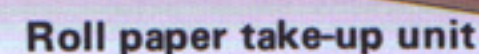
200 m Z-fold paper supply box	A-326 A-327 A-328 A-329 A-330	For 2-channel model For 4-channel model For 6-channel model For 8-channel model For 12-channel model
Rack-mount brackets	A-331 A-332 A-333 A-334 A-335 A-336 A-337	For 2-channel mode (INCH) For 4-channel mode (INCH) For 6-channel mode (INCH) For 8-channel mode (INCH) For 2-channel mode (DIN) For 4-channel mode (DIN) For 6-channel mode (DIN)
Acrylic dustproof cover	WDC-201 WDC-202 WDC-203 WDC-204 WDC-205	For 2-channel model For 4-channel model For 6-channel model For 8-channel model For 12-channel model
Carrying cart (assembly required)	TW-202 TW-204 TW-205	For 2-, 4-, 6-channel models For 8-channel model For 12-channel model



Technical drawing of a three-panel folding door system. The diagram shows the door assembly between an upper panel and a lower panel. Key dimensions and clearances are indicated:

- Upper Panel:** Indicated by an arrow pointing to the top boundary.
- Lower Panel:** Indicated by an arrow pointing to the bottom boundary.
- Door Panels:** Three panels are shown, each labeled "AC-1".
- Dimensions:**
 - Top panel height: 101.5
 - Panel height: 165
 - Panel height: 101.5
 - Panel height: 7.5
 - Panel height: 465
 - Panel height: 480
 - Panel height: 7.5
- Clearances:**
 - A space of at least 65mm is required between the upper panel and the top of the door assembly.
 - A space of at least 80mm is required between the bottom of the door assembly and the lower panel.

- Specifications are subject to change without notice.



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