# OSCILLOSCOPES & WAVEFORM ANALYZERS
Three-Channel Recorder to 3 kHz, 12 Bits, 33.3 kHz Sample Rate
Model 7090A

- DC to 3 kHz bandwidth, 33.3 KHz sampling rate
- 3 Channels with simultaneous sampling
- 12-bit resolution, 1 k buffer/channel

- 6 trigger modes with up to 100% pre-trigger capture
- Full HP-IB programmability
- Annotation of set-up and trigger conditions and data points

DESIGNED FOR HP-IB SYSTEMS
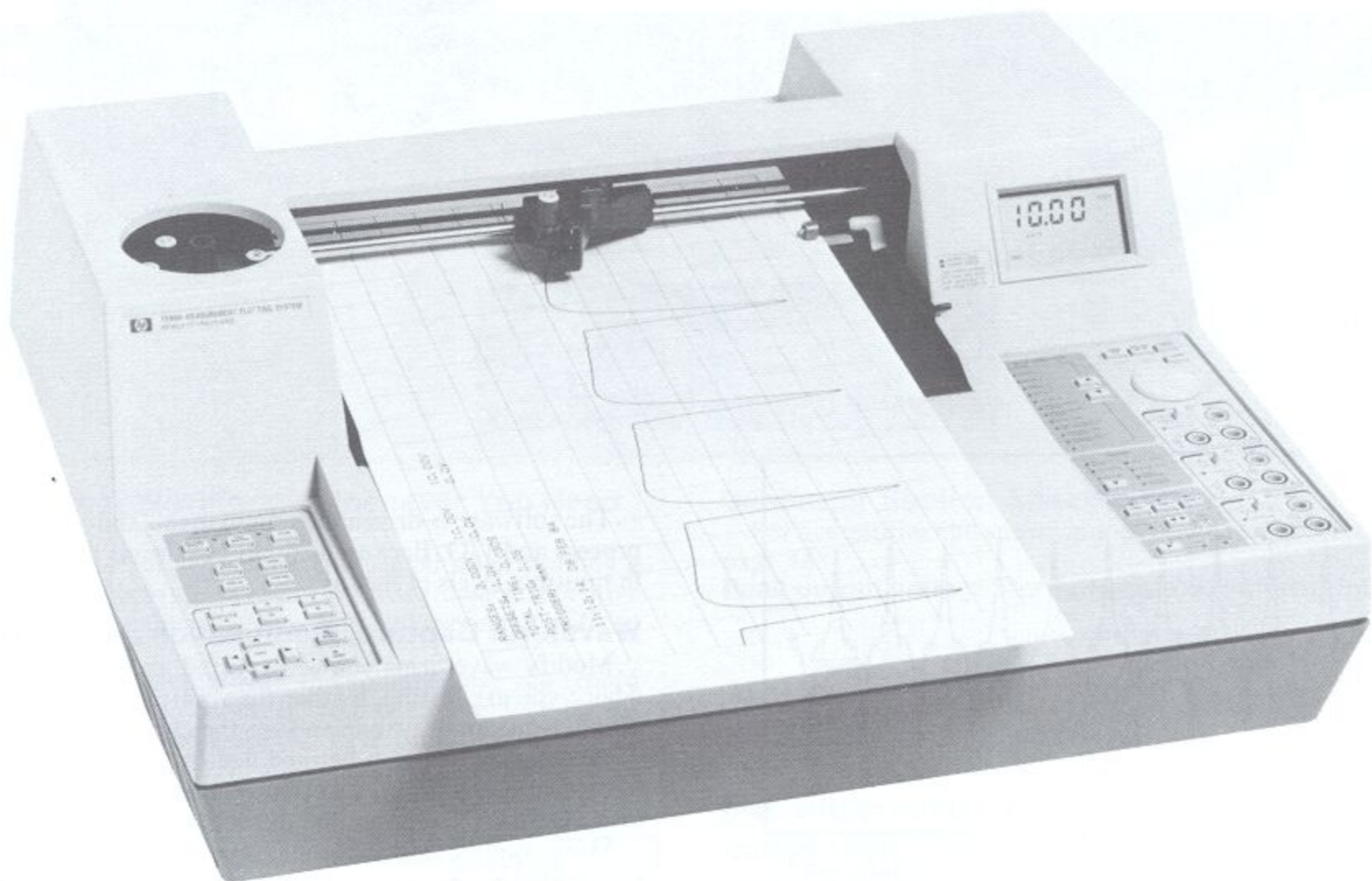
The HP 7090A is designed for low-frequency (<3 kHz) measurement, analysis, and documentation. The HP 7090A merges several technologies - waveform recording, digital plotting, analog recording, and automated measurement - to provide a powerful solution to a broad range of measurement applications. It significantly increases the ability to measure and display low-frequency phenomena and substantially improves real-time recording and digital plotting . . . all in one low-cost system.

Signal Capture
Simultaneous sampling on each of three channels, 12-bit resolution, bandwidth of dc to 3 kHz (33.3 k samples/s maximum), and 1000 word memory per channel allow high resolution measurement, storage, and display.

Flexible Triggering
The HP 7090A has six trigger modes which allow virtually any signal change to initiate signal capture, even decaying repetitive signals such as faults in a power line voltage, or in a transducer's carrier. Combined with pre-trigger capability, these trigger modes make the HP 7090A ideal for turn-on/off characterization, fault monitoring and mechanical motion analysis.

A System Component
All panel functions are programmable via the HP-IB interface. Data can be transferred from the internal 1 k-buffers or streamed in real time from the analog-to-digital converters at up to 500 points/s. In addition, the menu-driven HP 17090B Measurent Graphics Software package is available for HP 9000 Series 200 computers (BASIC 3.0 only). The software allows easy data manipulation, storage and retrieval, and system integration.

Versatile Capabilities
Uniquely, the HP 7090A is also a high performance analog/digital plotter. It is ideal for a graphics dump from a smart instrument or as part of an HP-IB system; you can also use the HP 7090A to take an X-Y dump from an analog instrument. With the HP 7090A, hand annotation is unnecessary. The 7090A annotates setup conditions, date and time, selected data points from memory, and trigger information. It draws user-defined axes and grids, eliminating the need for pre-printed graph paper. The HP 7090A even lets you plot overhead transparencies for technical presentations using your current spreadsheet/graphics software.

Applications
Capturing Low Frequency Electrical Transients: General diagnostic monitoring (such as looking for relative timing sequences) and fault monitoring (capturing pre-trigger data for intermittent failure analysis) are natural applications for the HP 7090A.

Measuring Phase Relationships: The simultaneous sampling on all channels is ideal for measuring current/voltage phase relationships in power systems.
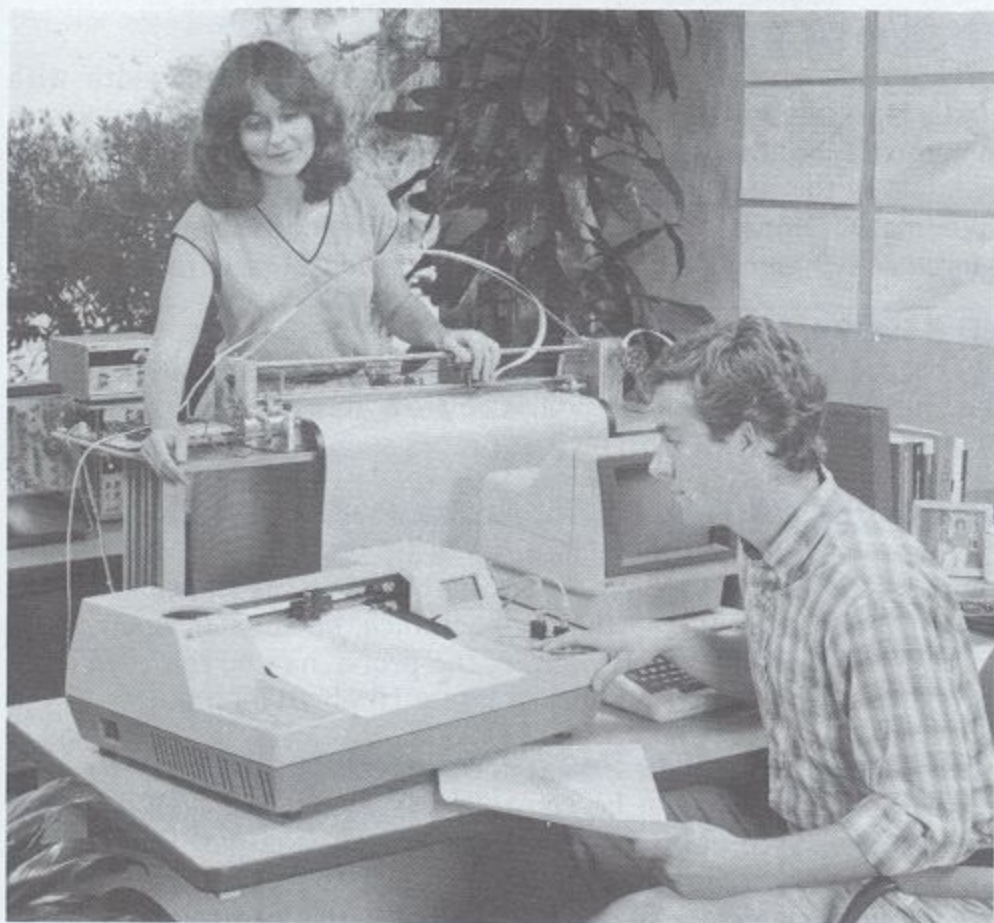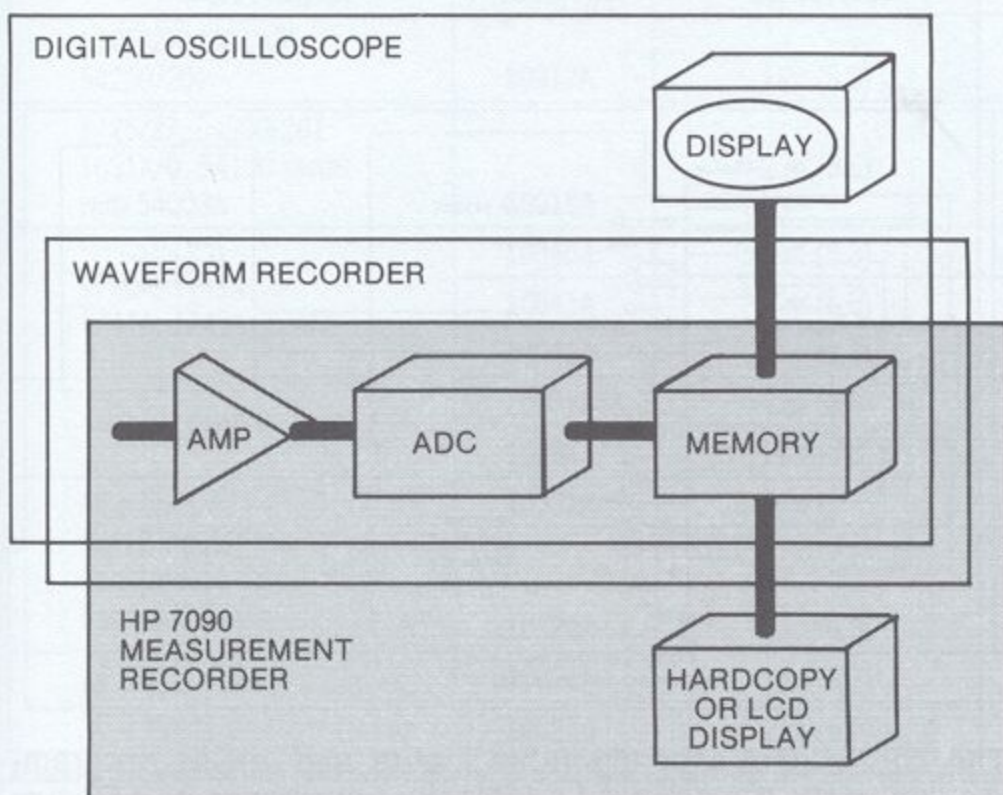
Analog Instrument/Digital System Link: The HP 7090A can integrate an analog instrument into an HP-IB system; the HP 7090A, with a controller can digitize output voltages from analog instruments for HP-IB system data entry.

Mechanical and Electromechanical Testing: Applications in which transducers convert velocity, acceleration, force, temperature or torque to voltage are a good fit for the HP 7090A. These applications have a maximum output frequency below 3 kHz. The HP 7090A's flexible trigger capabilities make it useful for one-shot electromechanical events such as clutch and mechanism engagements

Electromechanical Control Systems: The HP 7090A can measure the response of a system to a stimulus; a typical use would be exciting the system with a step function and using the measured response to determine damping ratio and the natural frequency of the control system.

Material Testing: The HP 7090A can record classic stress-strain curves, particularly those obtained from destructive testing. The data is stored in a buffer, so even though the sample has been destroyed, the data can be viewed and rescaled in several different ways.

Automatic Test: When linked to an HP 9000 Series 200 computer, the HP 7090A is a good, inexpensive learning tool for small companies considering automatic test systems. Applications include environmental and production line testing and proof of performance records.

DIGITAL OSCILLOSCOPE

DISPLAY

WAVEFORM RECORDER

AMP — ADC — MEMORY

HP 7090 MEASUREMENT RECORDER

HARDCOPY OR LCD DISPLAY

Measurement Graphics Software

Combining an HP 7090A, an HP 9000 Series 200 computer and the HP 17090B Measurement Graphics Software produces a powerful menu-driven system for measurement, data manipulation, and data storage and retrieval. The menu-driven software, written in BASIC 3.0 for Series 200 computers, takes advantage of the HP 7090A's capabilities as a system component. Data streaming is simplified, and can be done from each channel's A/D converter in real time or from each buffer after the data has been captured. All HP 7090A functions can be controlled by the computer.

Program Capabilities: There are six main functional areas of Measurement Graphics Software:

• Measurement Setup
• Measurement
• Display Annotation
• Data Manipulation
• Storage and Retrieval

The HP 17090B software helps you use the HP 7090's features easily and effectively plus, it provides storage, annotation and data transformation options not available on the HP 7090A unit alone.

Friendly, Menu-driven Interface: Each menu allows the user to view several parameters simultaneously. Series 200 softkeys and cursor-control knob minimize keyboard input. The "help" softkey displays the available choices and ranges for each parameter setting.

System Requirements: Measurement Graphics Software is written in BASIC 3.0 and requires a minimum of 216 K of RAM after the operating system is loaded; however, 433 K is recommended for optimum program speed. The software is designed for use with an HP 9000 Series 200 computer and an HP 7090A Measurement Plotting System. The software is supplied on two 3.5 inch microfloppy or 5.25 inch minifloppy discs and is accompanied by a user's manual.

Summary of HP 7090A Specifications*

Inputs
Number of channels: 3
Input alternator range: ±5 mV to ±100 V (full scale)
Input offset voltage: ±2 full scale or ±100 V maximum
Amplifier bandwidth ($\geq$ 3 dB): dc to 3 kHz for all full scale ranges $\geq$ 20 mV, 2.6 kHz for all full scale ranges $\leq$ 20 mV
Input impedance: 1 Mohm, shunted by 45 pf (Nominal)
CMRR: 140 dBdc; 100 dBac @ 60 Hz with 1 kohm unbalance in LOW terminal and most sensitive range (at 25°C)

Dynamic Performance
Slewing speed (Nominal)
  Direct mode: 127 cm/s (50 in/s)
  Plotting mode: 75 cm/s (30 in/s)
Acceleration (Nominal): 2 g constant
Peak capture: 250 μs at fastest timebase range

Triggering
Internal trigger:
  Inside or outside window
  Above or below level, selectable over the full-scale range in 1.0% increments (Nominal)
  Source: channel 1
External trigger:
  BNC connector, TTL level or contact closure to ground
Manual trigger:
  Available from front panel controls
Display: Up to 100% pre-trigger; up to 24 hour post-trigger delay after trigger before measurement start

Timebase
Range:
  Buffer mode: 30 milliseconds to 24 hours
  Direct record mode: 1 second to 24 hours
Accuracy: ±0.1%

Memory
Size: 1 K per channel
Resolution: 12 bits

Supplemental Characteristics

Analog to Digital
Maximum sampling rate: 33.3 k samples/s
Maximum streaming rate over HP-IB:

	ASCII	Binary
1 channel	167/s	500/s
1 channel plus trigger	143/s	333/s
3 channels	59/s	167/s
3 channels plus trigger	59/s	167/s

Writing System
6-pen carousel with automatic pen capping
Fiber-tip pens for paper or transparencies

Ordering Information   Price
HP 10833A or 45529A HP-IB (IEEE-488) 1-meter cable $81 ☎
HP 10833B or 45529B HP-IB (IEEE-488) 2-meter cable $91 ☎
HP 17090B Measurement Graphics Software
  Option 630 (3.5 in. disc size) $700
  Option 655 (5.25 in. disc size) $700
HP 7090A Measurement Plotting System $4,900