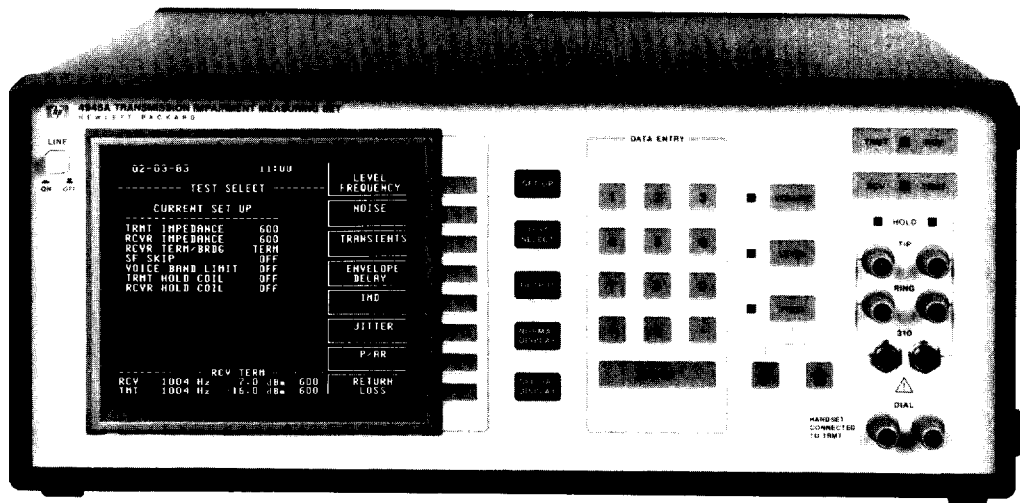


DATA COMMUNICATIONS TEST EQUIPMENT

Transmission Impairment Measuring Set (TIMS)

Model 4945A

- Compatible with North American standards
- Complete testing of:
 - Voice grade data channels
 - Program channels
 - High speed digital channels
- 110 kHz bandwidth
- Portable package for field use
- Versatile I/O for systems use
- Master/Slave capability for end-to-end testing
- Automatic gain slope measurement
- Programmable sweep



HP-IB
SYSTEMS
RS-232



HP 4945A

HP 4945A Product Description

The HP 4945A Transmission Impairment Measuring Set provides the complete set of measurements needed to quickly isolate faults and qualify circuits for voice, data or broadcast transmission up to 110 kHz. All measurements are compatible with current Bell standards including the ability to test local distribution loops for Dataphone Digital Service (DDS) to 56 kbps.

Softkeys Guide the User

All set-up selections, measurement selections and results are presented on the CRT display. Softkeys are the key to making the HP 4945A extremely flexible while maintaining ease of operation. All appropriate choices for a particular measurement or configuration are present, thus eliminating guesswork or nonsense configurations. Through softkeys, you are never more than two key presses away from a parameter change.

A Convenient Display

The CRT allows you to see more information than conventional segmented displays. All of the set-up conditions are presented in a logical, easy-to-understand format. The lower three status lines on the display always contain the important set-up information as well as the current level and frequency of both the transmitter and receiver. Some measurements, such as JITTER, have the "measure all" capability which allows simultaneous display of both amplitude and phase jitter in all three frequency bands (4-20 Hz, 20-300 Hz, 4-300 Hz). And don't worry about the CRT in the field environment. HP's experience and rigid testing standards assure you of a reliable product for field use.

Complete Measurement Capability

The HP 4945A offers you all the measurements needed to install, troubleshoot, and maintain both voice and data circuits. These measurements are designed in accordance with Bell System Technical Reference 41009 and IEEE 743-1984. The list includes:

LOSS	3 LEVEL IMPULSE NOISE
ATTENUATION DISTORTION	GAIN HITS
GAIN-SLOPE	PHASE HITS
MESSAGE CIRCUIT NOISE	DROPOUTS

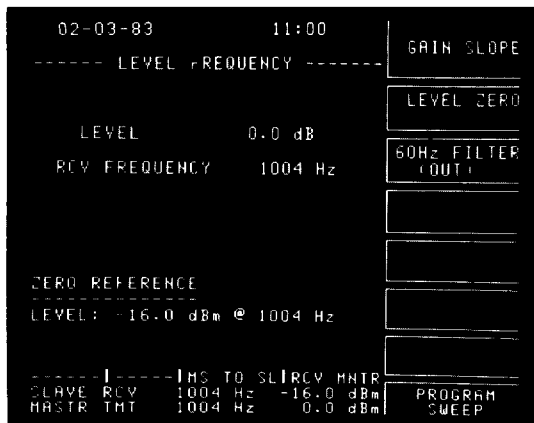
NOTCHED NOISE **PEAK-TO-AVERAGE RATIO (P/AR)**
SIGNAL-TO-NOISE RATIO **ENVELOPE DELAY DISTORTION**
NOISE-TO-GROUND **2-WIRE RETURN LOSS**
AMPLITUDE JITTER **4-WIRE RETURN LOSS**
PHASE JITTER
INTERMODULATION DISTORTION

02-03-83	11:00	AMPLITUDE JITTER (ON)
----- JITTER -----		PHASE JITTER (ON)
20-300 Hz	AMP	0.2 % PK
20-300 Hz	PHASE	12.5 DEG
4-300 Hz	AMP	0.3 % PK
4-300 Hz	PHASE	12.7 DEG
4-20 Hz	AMP	0.5 % PK
4-20 Hz	PHASE	0.8 DEG
----- RCV TERM -----		MEASURE ALL
RCV	1004 Hz	6.7 dBm 600
TXT	1004 Hz	-16.0 dBm 600

The CRT display provides more area for displaying useful data. Here, both phase and amplitude jitter in all three bands are simultaneously displayed along with the current receive and transmit status.

Master/Slave Capability

Master/Slave saves time and money by allowing you to control the remote (Slave) TIMS from the local (Master) TIMS. This HP-pioneered and patented technique allows the Master unit to completely control and collect data from the remote Slave unit over the lines under test. Master/Slave greatly reduces the time, coordination, and highly-skilled manpower needed for performing end-to-end tests. The Master/Slave technique used on the HP 4945A is also backward-compatible with the HP 4943A and HP 4944A.



Master/Slave measurement results are displayed just like manual end-to-end results. The status lines indicate the direction of test (Master to Slave) and the current status of the Slave's receiver and Master's transmitter.

Systems Capability

The HP 4945A can be controlled by a computer or controller over three different interfaces. For the larger systems, HP-IB provides the speed and versatility needed to tie together many test instruments in a customized system. For those faced with the problem of the HP 4945A being distant from the controller, RS-232C provides a low-cost solution for control. With the addition of inexpensive modems, an HP 4945A can be controlled over dial or leased lines. If portable data collection is a must, HP-IL provides a low-cost portable solution with a handheld calculator, such as the HP-41C or HP-71B acting as the controller.

In addition, the HP 4945A can output measurement results directly to a printer without the need for a controller. This gives you hardcopy results from any HP-IB, RS-232C, or HP-IL printer.

Complete Self-Check and Calibration

Every time the HP 4945A is powered on, it executes a self-check which assures you that all the major blocks are functioning properly. There is also a built-in self-calibration mode. With the simple press of a softkey, the HP 4945A will calibrate itself, thus avoiding costly downtime and assuring you that the HP 4945A is operating at its peak performance. In addition, built-in self diagnostics quickly isolate and identify any problems thus reducing repair time and consequently downtime.

Specifications

For detailed specifications ask your local HP Sales Office for an HP 4945A TIMS Data Brochure.

General

- Impedances:** 135Ω, 600Ω, 900Ω, 1200Ω.
- Power:** 115/230 V ac + 11%–22%, 48 to 63 Hz, 150 W max.
- Dimensions:** 18.4 cm H x 45.1 cm W x 48.9 cm D (7.25" x 17.75" x 19.25").
- Weight:** 15 kg (33 lb).
- Interfaces Available:** HP-IB, RS-232C, HP-IL.

Level and Frequency

- Transmitter**
- Frequency range:** 20 Hz to 110 kHz.
- Output level:** –60 dBm to +13 dBm; 600Ω, 900Ω, 1200Ω.
–60 dBm to +5 dBm 135Ω.

Receiver

- Range:** –60 dBm to +13 dBm.

Noise Measurements

- Transmitter:** 1004 Hz fixed or quiet termination.

Receiver Range

- Message circuit noise:** 10 to 90 dBm
- Noise-with-tone:** 10 to 90 dBm
- Noise-to-ground:** 40 to 130 dBm
- Signal-to-noise ratio:** 10 to 45 dB
- Weighting filters:** C-message, 3 kHz Flat, Program, 15 kHz Flat, 50 kbit
- Notch filter:** 50 dB rejection from 995 to 1025 Hz.

Peak to Average Ratio

- Transmitter**
- Signal spectrum:** Per BSTR 41009
- Range:** –40 to 0 dBm.
- Receiver**
- Level range:** –40 to 0 dBm.
- P/AR range:** 0 to 120 P/AR units.

Jitter

- Transmitter**
- See Noise Measurements.
- Receiver**
- Amplitude jitter:** 0 to 30% peak to peak
- Phase jitter:** 0 to 30 degrees peak to peak
- Bandwidths:** 20 to 300 Hz
4 to 300 Hz
4 to 20 Hz

Transients

- Transmitter**
- See Noise Measurements or Quiet Termination.
- Receiver**
- General:** **Count rate:** 7, 8, 100 counts per second.
Count range: 0 to 9,999.
Timer: 1 to 9,999 minutes or continuous.
- Phase hits:** thresholds: 5° to 45° in 5° steps.
- Gain hits threshold:** 2 to 10 dB in 1 dB steps.
- Drop outs:** threshold –12 dB.
- Impulse Noise Range**
- Low:** 30 to 110 dBm.
- Mid:** 2, 3, 4, or 6 dB above Low.
- High:** 2, 3, 4, or 6 dB above Mid.

Envelope Delay

- Transmitter**
- Level range:** –40 to 0 dBm
- Modulation:** 83 1/3 Hz
- Receiver**
- Level range:** –40 to +10 dBm
- Measurement range:** –3000 to 9000 microseconds.

Return Loss

- Modes:** ERL, SRL-High, SRL-Low, Sine Wave
- 2-Wire:**
- Range:** 0 to 40 dB
- Internal Hybrid 600Ω, 900Ω, in series with 2.16 μF capacitor, or external.
- 4-Wire:**
- Range:** 0 to 50 dB.
- Trans Hybrid Loss Compensation:** –10 to 30 dB.

Ordering Information

	Price
HP 4945A TIMS	\$14,950
Options	
101: adds HP 18162A HP-IB Module	\$500
102: adds HP 18163A RS-232C Module	\$500
103: adds HP 18165A HP-IL Module	\$350
104: adds HP 18169A 19" Rack Mount	\$75
105: adds HP 18170A Soft Vinyl Carrying Case	\$210
Accessories	
HP 18162A HP-IB Module	\$505
HP 18163A RS-232C Module	\$505
HP 18165A HP-IL Module	\$355
HP 18169A 19" Rack Mount	\$80
HP 18170A Soft Vinyl Carrying Case	\$210
HP 9211-2650 Hard Transit Case	

*The Non-Linear Distortion Technique is licensed under Hekimian Laboratories, Inc., USA Patent No. 3862380.