

APPLICATION NOTE 89

# MAGNETIC TAPE RECORDING HANDBOOK

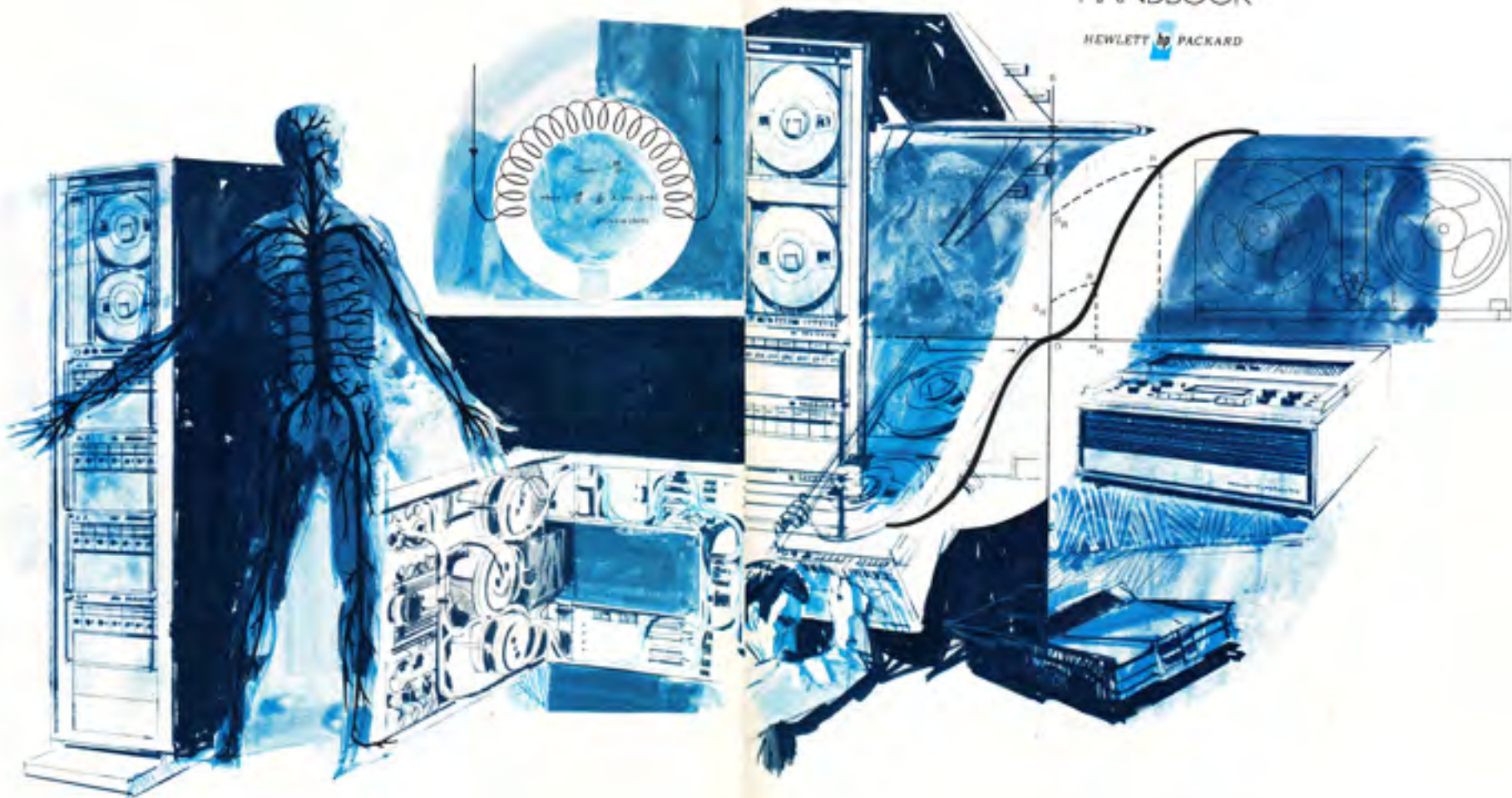
HEWLETT  PACKARD

by  
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# MAGNETIC TAPE RECORDING HANDBOOK

HEWLETT  PACKARD



APPLICATION NOTE 89



TYPICAL HP 3955A

## HP 3955 SYSTEMS

3955A, 3955B, 3955C, AND 3955D

### INSTRUMENTATION MAGNETIC TAPE RECORDING SYSTEMS

INTERMEDIATE BAND DIRECT

LOW, INTERMEDIATE & WIDEBAND GROUP I  
SINGLE-CARRIER FM

#### FEATURES:

- IRIG compatibility.
- MODULAR SYSTEM DESIGN: permits wide range of configurations.
- HIGH-PERFORMANCE OPEN-LOOP tape transport; operates at very low noise level.
- LOW JITTER and FLUTTER.
- HIGH SIGNAL-TO-NOISE ratios through use of current preamplifiers.
- CONVERTS EASILY between 1/2" and 1" tape.
- AC and DC METERS for calibrating and monitoring input and output signal levels.
- EASY to thread and clean.
- STABLE ELECTRONICS: fewer adjustments, less maintenance.
- ECONOMICAL: one of the lowest-priced high-quality instrumentation recorders available today.
- HIGH RELIABILITY.



COMPLETE SERVICEABILITY FROM  
FRONT-OF-SYSTEM

## HP 3960 SERIES

### PORTABLE INSTRUMENTATION MAGNETIC TAPE RECORDER

INTERMEDIATE BAND DIRECT  
(60 kHz at 15 ips)

INTERMEDIATE BAND FM



#### FEATURES:

- TRUE PORTABILITY/ECONOMY in a 1/4"-tape, 4-track, 3-speed, FM/Direct recorder.
- REEL SIZE: standard 5- or 7-inch.
- TIME BASE EXPANSION or contraction by either 16:1 or 10:1. TAPE SPEEDS are: any 3 of octal speeds 15/16 thru 15 ips or decade speeds of 1.5, 3, and 15 ips.
- MODIFIED ZERO LOOP tape drive with precise crystal reference speed control.
- EXCEPTIONALLY LOW FLUTTER, as exemplified by 46 dB (200:1) FM signal-to-noise ratio at 15/16 ips.
- BIDIRECTIONAL record and reproduce.
- Unique PEAK-READING METER.
- BUILT-IN FM CALIBRATION and switchable flutter compensation.
- ELECTRONICS-TO-ELECTRONICS mode.
- OPERATES from most common power sources: 115/230 VAC 40-440 Hz or 12 or 28 VDC.
- HINGED CHASSIS for simplified, quick maintenance.
- NO PERIODIC LUBRICATION REQUIRED.
- COMPLETE LINE of accessories available.

**REMOTE CONTROL - OPTION 05X**

Shown in the picture above is the modified front panel of a 3960 with full remote control capability. Instead of the standard mechanical pushbuttons for selecting tape functions, there are back-lighted touch pushbuttons. All functions can be remotely controlled except power on-off and speed selection.

**VOICE CHANNEL hp 13063A**

A plug-in unit that can be field installed. Loudspeaker, volume control, wiring, and connectors are included in all standard models of the 3960.

**REMOTE START/STOP SWITCH hp 13060A**

A foot switch for remote start/stop control.

**RACK MOUNT KIT hp 13065A**

Brackets and mounting hardware for standard 19-inch equipment racks.

**DC-AC INVERTER hp 13061A and B**

Model A for 12 VDC; B for 28 VDC. Plugs into recorder chassis. AC-DC switch in all models.

**TRANSIT CASE hp 13066A**

A sturdy, fiber-glass, foam-cushioned, custom-formed case. Compartment for accessories.

**TAPE LOOP ADAPTER hp 13062A**

Tape loop adapter will handle 5- to 30-foot tape loop.

**RACK SLIDE KIT hp 13068A and B**

For flush-mounting the 3960 portable tape recorder in cabinets and equipment racks. This accessory also allows the 3960 to be pulled away from an equipment rack and rotated 90° for easy access to all recorder adjustments.

**REMOTE CONTROL hp 3907-11A**

- Pushbutton remote control of all recorder operations except power on/off and tape speeds.
- Supplied with 25-foot cable.
- Rack mounting optional.

**AUTOMATIC TAPE DEGAUSSER hp 3603A**

- Erasure is  $\geq 90$  dB below nominal record level for common, 290 oersted tapes.
- Continuous operation.
- 15-inch reel capacity.
- Mounts in system or on tabletop.

**REPRODUCE TRACK SELECTOR hp 11539A**

- Connects a single channel of reproduce electronics to any recorded tape track.
- Accommodates up to 7 reproduce amplifiers.

**VOICE CHANNEL hp 3604A**

- Edge or data track recording.
- Microphone with retractable cable.
- Built-in loudspeaker.
- Front panel record level meter.

**TAPE SPEED SERVO hp 3681A**

- For maintaining absolute time base error within  $\pm 0.01\%$ .
- Compatible with IRIG constant wavelength and/or 17 kHz frequencies.

**AC POWER SUPPLY hp 3680A**

- Crystal-controller 60 (or 50) Hz reference for stable capstan speed.
- Power amplifier for capstan motor drive or other applications.
- All solid state electronics.

## APPENDIX

## HEWLETT-PACKARD

## INSTRUMENTATION MAGNETIC TAPE RECORDING SYSTEMS

## INTRODUCTION

All Hewlett-Packard Instrumentation Tape Recorders provide highly flexible yet easy to operate systems to record and reproduce electrical signals. Each system includes a high-performance tape transport and a number of interchangeable Record and Reproduce amplifiers, offering an extremely wide latitude in determining the exact system configuration. This "plug-in" capability is shown in the picture below.



For instance, in the larger 3950 and 3955 series, 7- or 14-track capability, in any combination of Direct or FM electronics and in either of two basic transports, is available. The smaller, portable, 3960 series also offers various combinations of interchangeable electronics, but with 4-track capability and with bidirectional record and reproduce.

However, these are fairly common features in instrumentation tape recorders. Some of the lesser-known, but highly important features, are discussed below. And on the following pages there are brief descriptions of the 3950, 3955, and 3960 systems, followed by a sample of some of the accessories available to further extend system capabilities.

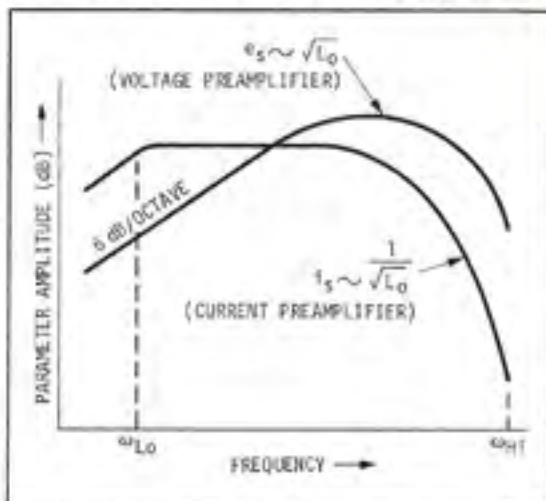
## PRECISION MILLED ALUMINUM CASTING TRANSPORT BASE PLATE

Provides mechanical stability of tape motion control components such as heads, guides, and motors, throughout the life of the system. This stability means the performance will not degrade due to warpage, which often happens with aluminum jig

plates. Precision, numerically controlled milling means easy replacement of components attached to this casting, such as heads, without precision alignment tools and without shimming.

## CURRENT PREAMPLIFIERS

FOR HIGHEST DIRECT SIGNAL-TO-NOISE RATIO WITH LEAST AMOUNT OF ENVELOPE DELAY



Current preamps are best for Direct recording requiring broad passbands, and when united with the low-jitter 3950 tape transport, you have the ideal system for recording and reproducing high-density, digital, serial PCM bit trains. For detailed information regarding current preamplifiers, request Advanced Research and Development Report No. 2 entitled "Optimizing S/N Ratio of Magnetic Tape Reproduce Systems", by Arndt B. Bergh.

## NATIONAL AND INTERNATIONAL SERVICE ORGANIZATION

Hewlett-Packard believes that as a manufacturer of measuring instruments it has an obligation to help each user get maximum usefulness from his Hewlett-Packard products. To this end, most Hewlett-Packard field offices have customer service facilities for providing repair and maintenance at a fair price. Local repair facilities are backed up by Regional Repair Centers, located in major industrial areas around the world. A list of HP sales and service offices is included on pages A-7 and A-8. If you desire more information on any of the products in this appendix, contact your nearest Hewlett-Packard Sales and Service Office.

## HP 3950 SYSTEMS

3950A AND 3950B

INSTRUMENTATION  
MAGNETIC TAPE  
RECORDING SYSTEMS

WIDEBAND (1.5 or 2.0 MHz) DIRECT

LOW, INTERMEDIATE, WIDEBAND GROUP I  
AND WIDEBAND GROUP II FM

TYPICAL HP 3950A

EASY TO THREAD AND CLEAN  
ACCEPTS 10 1/2" to 15" REELS

## FEATURES:

- IRIG compatibility.
- HIGH-PERFORMANCE OPEN-LOOP tape transport; operates very quietly.
- LOW JITTER and FLUTTER.
- LOW ENVELOPE DELAY through use of current preamplifiers.
- CONVERTS EASILY between 1/2" and 1" tape.
- AC and DC METERS for calibrating and monitoring input and output signal levels.
- COMPLETE SERVICEABILITY from front of system.
- STABLE ELECTRONICS: fewer adjustments, less maintenance.
- ECONOMICAL: both initially and during operating life.
- HIGH RELIABILITY.
- MODULAR SYSTEM DESIGN: permits wide range of configurations.