

BENCH BRIEFS

SERVICE INFORMATION FROM HEWLETT-PACKARD

SEPTEMBER-DECEMBER, 1975

SPECIAL
COMBINED
ISSUE

TRAINING SEMINARS OFFERED

Hewlett-Packard is offering a series of seminars for service technicians. Some of these are very general (such as Digital Troubleshooting), while others apply to a specific product. Since this is of such significance to service personnel, the September-October and November-December issue of BENCH BRIEFS has been combined into a special double issue on service training.

A number of locations have been chosen for seminars in January and February, 1976. See the following pages for details of course offerings and locations.

Most seminars include laboratory time to allow hands-on experience with the hardware. To ensure individual attention for the attendees, all seminars are limited in size. We suggest registering early to avoid disappointment. Registration will be handled on a first-come first-served basis.

Many of these seminars are available at your facility at reduced rates for large groups. Please inquire for details.

NOTE: While these seminars are being held only in the U.S. and Canada, readers in other countries will be interested to know that service training seminars are being planned for several additional locations throughout the world. We encourage your comments. Please contact your local HP sales engineer or write directly to the BENCH BRIEFS Editor at the address on the last page.

DIGITAL TROUBLESHOOTING VIDEOTAPES AVAILABLE

A series of fourteen videotapes is available to help train service personnel on the increasingly encompassing area of digital electronics. Each of the videotapes is less than 30 minutes in length. The tapes were prepared by Dick Gasperini, BENCH BRIEFS Editor, who has repeatedly presented and revised the material in live seminars throughout the world. The information in the videotape series and in the textbook is very similar to the first two days of the Digital Troubleshooting seminar described on the next page.

The individual tapes are:

1. Digital vs Analog (17 min)
2. RTL and DTL (16 min)
3. TTL (21 min)
4. ECL and MOS (25 min)
5. Troubleshooting Techniques (26 min)
6. Logic Symbols (27 min)
7. Number Systems and Decoders (26 min)
8. Flip-flops (29 min)
9. Counters and Shift registers (30 min)
10. Display Technologies (27 min)
11. IC Manufacturing (27 min)
12. Methods of Removing ICs from boards (18 min)
13. Other Symbologies (20 min)
14. Memories (30 min)



The textbook for the series, which is available separately, is DIGITAL TROUBLESHOOTING by Richard E. Gasperini. The text size is 8½x11 inches and it has 180 pages.

The videotape series is available in ½ inch open reel and ¾ inch videocassettes. The part number is 90500C for open reel and 90500D for videocassettes. One copy of the textbook is sent with the set of tapes. Additional copies are available by ordering HP part number 90500E.

As a convenience to BENCH BRIEFS readers, we also might mention that the textbook can also be purchased from the publisher: Movonics Company, 1922 Annette Ln., Los Altos, California 94022. The publisher's price is \$9.95 plus 45¢ shipping and handling. California residents should include sales tax.

DIGITAL TROUBLESHOOTING

(4-Day Seminar)

OBJECTIVES:

To present an introduction to digital technology for electronic technicians.

To gain a familiarity with tools and techniques available to troubleshoot digital circuits.

To develop an understanding of current instrument design method (algorithmic or state design) that is very widely used and is sufficiently different from past methods to be a challenge for service personnel.

To present an introduction to microprocessors to prepare for future products.

To develop an appreciation for an international standard for interconnecting instruments to form systems (HP Interface Bus).

PRESTUDY: Application Note 163-1

COURSE OUTLINE:

First Day:

1. Digital vs. Analog
2. Review of transistors and transistor circuits — bipolar, MOS
3. Gate Circuits — AND, NAND, OR, NOR, XOR
4. IC Technologies — RTL, DTL, TTL, Schottky TTL, HTL, ECL, EECL, PMOS, CMOS, IIL
5. Tools and techniques for troubleshooting gates
6. Logical troubleshooting techniques
7. Laboratory — Three hours of hands-on experience experimenting with gates and troubleshooting tools

Second Day:

8. Octal and binary number systems



9. Flip flops (D, R-S, J-K) and one shots
10. Counters, dividers, shift registers
11. Decoders and encoders
12. Display technologies
13. Data Transfer techniques
14. Logic Symbols — MIL STD 806, other symbologies, and the new world standard ANSI 432.14 - 1973
15. Demonstration — Methods of removing ICs from boards
16. Laboratory — Three hours of experiments with flip-flops, counters, shifters, and decoders. Students will also be able to try any of the IC removal techniques demonstrated.

Third Day:

17. Memories — RAMs, ROMs
18. Understand and troubleshooting Algorithmic State Machines. This technique (ASM) is a new and powerful design method that is being widely used today.
19. Demonstration — Troubleshooting techniques and tools to diagnose failures in ASM instruments
20. Laboratory — Data storage and retrieval on RAMs and ROMs

Fourth Day:

21. A brief look at microprocessors
22. Hewlett-Packard Interface Bus

TUITION: \$300 per student

LOCATION:

Hewlett-Packard Sales Office
6305 Arizona Place
Los Angeles, California 90045

DATES: January 6-9, 1976

Hewlett-Packard Sales Office
W120 Century Road
Paramus, New Jersey 07652

DATES: January 27-30, 1976

The instructor for this seminar is:

DICK GASPERINI—Dick has been with HP for six years and is currently Service Training Manager for the Instrument section of the company. This job entails coordination of service training for HP personnel and customers.

Dick, who received his BSEE in 1969 from Michigan Tech, has presented this material over 20 times in eight countries.

1722A OSCILLOSCOPE

(2-Day Seminar)

OBJECTIVE:

To give service technicians a detailed circuit description so they may make component level repairs. The microprocessor and related digital oscilloscope circuitry will be discussed at a component level along with the traditional oscilloscope circuitry. The traditional oscilloscope circuitry will also apply directly to the 1710B, 1712A, and 1722A oscilloscopes.

The course describes the microprocessor and the digital circuitry from the viewpoint of how the circuit functions and related troubleshooting. General microprocessor theory is not discussed in detail.

COURSE OUTLINE:

1. Introduction
 - Features and specifications
 - Front panel controls
 - How to use the microprocessor functions
2. Traditional oscilloscope circuit theory
 - Block diagram
 - Individual circuits
 - Troubleshooting considerations
3. Microprocessor and digital circuit theory
 - Block diagram
 - Individual circuits
 - Troubleshooting considerations
4. Calibration
 - Discussion
 - Demonstration
5. Laboratory
 - Troubleshoot digital and microprocessor problems

TUITION: \$200 per student

LOCATION:

Hewlett-Packard Sales Office
450 Interstate North
Atlanta, Georgia 30339

DATES: January 29 and 30, 1976

Hewlett-Packard Sales Office
6877 Goreway Drive
Mississauga, Ontario, Canada

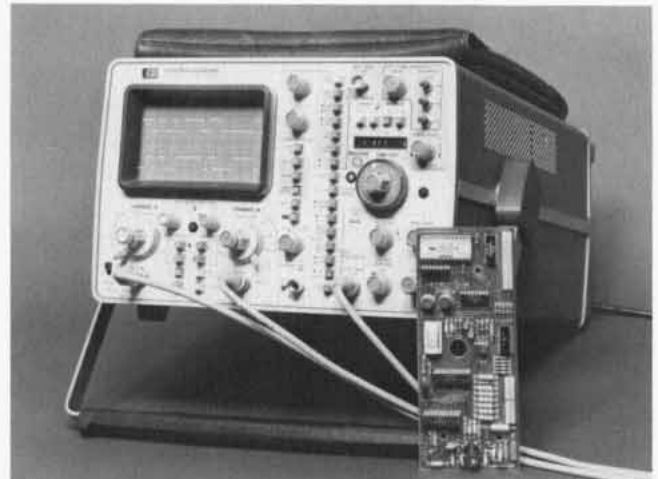
DATES: February 12 and 13, 1976

Hewlett-Packard Sales Office
W120 Century Road
Paramus, New Jersey 07652

DATES: February 16 and 17, 1976

The instructor for this seminar is:

GARY ROBERSON—Gary has been with HP for 10 years. He worked in Customer Service for 3 years and 2 years in Plant Computer Maintenance. Gary is a graduate of Central Technician Institute with a 2 year associates degree.



3450 A/B MULTI-FUNCTION METER

(2-Day Seminar)

OBJECTIVE:

To teach efficient calibration and troubleshooting techniques needed to repair a 3450 A/B Multi-Function Meter, such that a technician can diagnose failures to the component level.

COURSE OUTLINE:

1. Introduction
2. Theory of Operation
 - Dual Slope Integration
 - Definition of Options
 - Guarding
3. Troubleshooting
 - Power Supplies
 - Half-split method for determining a defective Digital or Analog section
 - Digital section
 - Analog section
 - Input Amplifier
 - Polarity Amplifier
 - % Amplifier
 - Integrator
 - Relay Channel
 - Common failure and their probable causes
4. Calibration
5. Discussion of Options
 - 001 AC
 - 002 ohms
 - 003 Limit Test
 - 004 Digital Output
 - 005 Remote Control
6. Laboratory

TUITION: \$200 per student

**LOCATION:**

Hewlett-Packard Sales Office
450 Interstate North
Atlanta, Georgia 30339

DATES: February 2 and 3, 1976

Hewlett-Packard Sales Office
W120 Century Road
Paramus, New Jersey 07652

DATES: February 5 and 6, 1976

Hewlett-Packard Sales Office
5500 Howard Street
Skokie, Illinois 60076

DATES: February 9 and 10, 1976

Hewlett-Packard Sales Office
6877 Goreway Drive
Mississauga, Ontario, Canada

DATES: February 12 and 13, 1976

The instructors for this seminar are:

LES LOTZ—For the past five years, Les has been a Customer Engineer in DVM Systems Group at the HP factory in Loveland, Colorado. Prior to that, he spent six years in the field as a Service Manager at the HP Service Center in North Hollywood, California. Les has a degree in Computer Science.

BILL WILLOUGHBY—Bill is presently a Technician on the 3450 production line in the factory in Loveland, Colorado. He has been working there for 3 years. Prior to joining HP he was an instructor in the air force for 12 years.

5300 A/B COUNTER

(2-Day Seminar)

OBJECTIVE:

To teach at a technical level the circuit theory and general troubleshooting methods to allow component level repair on the 5300A, 5300B, 5302A, and 5303B.

PREREQUISITES:

A basic technician level knowledge of analog and digital electronics.

PRESTUDY:

"The Fundamentals of Electronic Frequency Counters", Application Note 172, pages 1-17 and 23-30.

COURSE OUTLINE:

1. Introduction to 5300 Family
2. 5300A
 - Front and Rear Panel Operation
 - Block Theory
 - Circuit Theory
 - Power Supply
 - Time Base
 - Counter Section
 - Data Control
 - Display Section
 - Troubleshooting Methods
 - Test Cards (10548A)
 - Logic Troubleshooters
 - Troubleshooting Laboratory
3. 5300B
 - Front and Rear Panel Operation
 - Block Theory
 - Circuit Theory
 - Power Supply
 - Time Base
 - Counter Section
 - Data Control
 - Display Section
 - Troubleshooting Methods
 - Test Cards (10548A)
 - Logic Troubleshooters
 - Troubleshooting Laboratory
4. 5302A
 - Front and Rear Panel Operation
 - Block Theory
 - Circuit Theory
 - Totalize Mode
 - Frequency B Mode
 - Auto Gate Selection
 - Frequency A Mode
 - Period B Mode
 - Period Average B Mode
 - Ratio Mode
 - Time Interval Mode
 - Self Check
 - Troubleshooting Methods — Flow Charts
 - Troubleshooting Laboratory

5. 5303B

- Front and Rear Panel Operation
- Block Theory
- Circuit Theory
 - 80 MHz Input
 - 525 MHz Input
- Counter Section
- Time Base
- Data Transfer
- Troubleshooting Methods
- Troubleshooting Laboratory

TUITION: \$200 per student

LOCATION:

Hewlett-Packard Sales Office
W120 Century Road
Paramus, New Jersey 07652

DATES: February 2 and 3, 1976

Hewlett-Packard Sales Office
450 Interstate North
Atlanta, Georgia 30339

DATES: February 5 and 6, 1976

Hewlett-Packard Sales Office
6877 Goreway Drive
Mississauga, Ontario, Canada

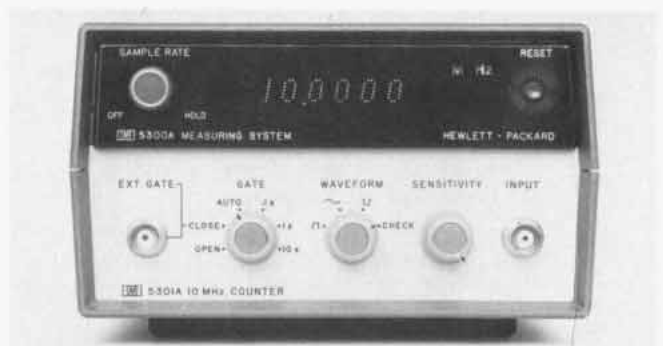
DATES: February 9 and 10, 1976

Hewlett-Packard Sales Office
5500 Howard Street
Skokie, Illinois 60076

DATES: February 12 and 13, 1976

The instructor for this seminar is:

REX CHAPPELL—Rex joined the Santa Clara, California manufacturing division of HP in August 1973 in International Sales Engineering where he was the factory liaison for International Sales. He then moved into Service Engineering where he now handles the 5300 thru 5312 Economy Counters along with the 5380 series Economy Counters and the HP-IB series.





5345A ELECTRONIC COUNTER

(4-Day Seminar)

OBJECTIVE:

To provide technicians with specific methods and procedures for calibration, troubleshooting, and component level repair of the 5345A Electronic Counter.

PRESTUDY: Application Note 172 and 5345A Users Handbook

COURSE OUTLINE:

1. Introduction to the 5345A
2. Instrument Familiarization
3. Overall Block Diagram Theory (Measurement Phase)
 - Block Diagrams on Assembly A3, A4, A8, A9, A10, A11
 - Board Theory - A9, A10, and A11
4. Laboratory - Overall Troubleshooting

5. Overall Block Diagram Theory (Processor Phase)
 - Block Diagram on Assemblies A13, A14, and A15
 - Board Theory on A13, A14, and A15
6. Processor Troubleshooting Aids (ASM Tester and Scaler Test Board)
7. Laboratory Session - Processor Troubleshooting with the HP1601A and 5345 ASM Tester
8. Processor Flow Chart Theory
9. Laboratory — Troubleshooting the Processor
10. Option 11 General Purpose Interface

TUITION: \$300 per student

LOCATION:

Hewlett-Packard Sales Office
6305 Arizona Place
Los Angeles, California 90045

DATE: January 12-15, 1976

The instructor for this seminar is:

DICK HOLMES—A Hewlett-Packard employee for 15 years, Dick is presently a Product Support Engineer at the HP Santa Clara, California manufacturing division. Prior to going to Santa Clara, Dick worked at another HP division for 5 years as a Product Systems Engineer and Systems supervisor, in addition to working in the Product Support Group supporting Systems.

8555A AND 8552 A/B MICROWAVE SPECTRUM ANALYZERS

(2-Day Seminar)

OBJECTIVE:

Provide the electronic repair technician with the training needed to:

- Understand all panel control operations as they relate to the functional block diagram.
- Interpret signal waveforms and voltage levels at test points.
- Efficiently perform critical adjustments.
- Isolate troubles to the individual circuits.

PREREQUISITES:

These seminars are designed for service personnel who will be repairing or calibrating the HP 8555A and HP8-52A/B Spectrum Analyzers. Prerequisite is a two-year degree in electronics or equivalent experience in servicing electronic instrumentation.

PRESTUDY: Application Notes AN150, pages 1-34, and AN136, pages 1-24.

COURSE OUTLINE:

First Day:

1. Introduction to HP140 Series Displays, HP8552A/B IF Sections, HP8555A RF Sections
 - System block diagram

- Front panel controls related to the instruments detailed block diagrams.
- Laboratory - Front Panel Operation, check-out and calibration.
- Objective - Operate spectrum analyzer in all normal modes and complete the "Front Panel Check" procedure, understanding its relationship to the functional block diagram.

2. 8555A detailed circuit descriptions:

- Input attenuator and driver
- First, second, third mixers and IF
- YIG drivers
- Laboratory - Perform first L.O., 2nd L.O. (1500 MHz), and 3rd L.O. (500 MHz) adjustments.
- Objective - Calibrate the local oscillators in this spectrum analyzers in less than one hour.

3. Continued detailed circuit descriptions: IF Amplifiers, and phase-lock loop.

- Objective - Understanding normal operation of each of these circuits and be able to isolate a trouble to the circuit level in less than one hour.

Second Day:

4. HP8555A and HP8552A/B System Block Diagram and Check-out Review

5. HP8552B detailed circuit descriptions:

- 50 MHz converter
- Automatic phase control and 2 MHz voltage tuned oscillator
- 2 MHz VTO shaping
- Laboratory - Reinforce circuit theory and operation with hands-on measurements of signal waveforms and voltage levels in these converter circuits.
- Objective - Isolate any converter trouble to an individual circuit in less than one hour.

6. Continued detailed circuit descriptions:

- 3 MHz amplifier
- LC bandwidth filters and Crystal bandwidth filters
- Laboratory - Make signal waveform and voltage measurements on the 3 MHz amplifier and perform bandwidth filter adjustments.
- Objective - Properly align the high resolution bandwidth filters & understand how these adjustments affect circuit operation.

7. Continued detailed circuit descriptions:

- Log-linear and deflection amplifiers
- Scan generator and trigger circuit
- Scan driver and penlift driver
- Laboratory - HP8552B and 8555A system troubleshooting - common failures inserted.
- Objective - Isolate these problems to an individual circuit within 30 minutes.

TUITION: \$200 per student

LOCATION:

Hewlett-Packard Sales Office
6305 Arizona Place
Los Angeles, California 90045

DATES: January 19 and 20, 1976

Hewlett-Packard Sales Office
201 East Arapaho Road
Richardson, Texas 75080

DATES: February 9 and 10, 1976

Hewlett-Packard Sales Office
W120 Century Road
Paramus, New Jersey 07652

DATES: February 12 and 13, 1976

Hewlett-Packard Sales Office
6877 Goreway Drive
Mississauga, Ontario, Canada

DATES: February 16 and 17, 1976

Hewlett-Packard Sales Office
5500 Howard Street
Skokie, Illinois 60076

DATES: February 19 and 20, 1976

The instructors for this seminar are:

JIM BOYER—Jim has been with HP for 5 years at HP Microwave division in Santa Rosa, California working on Spectrum Analyzers. Jim has a BSEE and is continuing his educational program working towards his MBA degree. Prior to joining HP, Jim worked as a Design Engineer at Boeing in Seattle.

JIM ARNOLD—Jim joined HP 13 years ago at Microwave division in Santa Rosa, California. Most of his experience lies in Production areas and 4 years in Product Support. He taught several seminars on the 8620/8690 family. Jim is a graduate from Oregon Technical Institute (OTI).



8640 A/B AM-FM SIGNAL GENERATOR

(2-Day Seminar)

OBJECTIVE:

To acquaint the technician with front panel operation, theory of operation on block diagram level, instrument layout and disassembly, and some basic troubleshooting and calibration.

PREREQUISITES:

This seminar is intended for repair and calibration technicians who have basic knowledge of analog circuits and acquaintance with digital counter circuits.

PRESTUDY: Block theory in 8640 manual.

COURSE OUTLINE:**First Day:**

1. Introduction
 - Description
 - Options
 - New Features
 - Operating and Service Manual
2. Instrument Operation
 - Front Panel
 - Video Tape
 - Specifications
3. Block Diagram Theory
 - RF Generation
 - Leveling, AM, and Pulse Modulation
 - FM
 - Counter and Phase Lock
4. Fault Isolation
 - RF Circuits
 - Leveling Circuits
 - Counter
5. Instrument Repair
 - Oscillator Replacement
 - Divider/Filter Access
 - Counter Access

Second Day:

6. Selected Circuit Theory
 - FM
 - Leveling, AM, and Pulse Modulation
 - Counter



7. Troubleshooting Laboratory
 - RF Circuits
 - AM and Leveling Circuits
 - Counter

8. Instrument Calibration
 - AM
 - FM

TUITION: \$200 per student

LOCATION:

Hewlett-Packard Sales Office
6305 Arizona Place
Los Angeles, California 90045

DATES: January 26 and 27, 1976

Hewlett-Packard Sales Office
W120 Century Road
Paramus, New Jersey 07652

DATES: February 9 and 10, 1976

Hewlett-Packard Sales Office
201 East Arapaho Road
Richardson, Texas 75080

DATES: February 12 and 13, 1976

Hewlett-Packard Sales Office
5500 Howard Street
Skokie, Illinois 60076

DATES: February 16 and 17, 1976

Hewlett-Packard Sales Office
6877 Goreway Drive
Mississauga, Ontario, Canada

DATES: February 19 and 20, 1976

The instructor for this seminar is:

JIM HARMON—Jim joined HP 8 years ago at Stanford Park division in Palo Alto, California and has spent 5 years in R & D and 3 years in Product Support. He has presented seminars 20 times in training personnel in five countries. Jim received a BSEE from Utah State in 1967 and an MSEE from Stanford in 1970.

8660 SYNTHESIZED SIGNAL GENERATOR

(3-Day Seminar)

OBJECTIVE:

To acquaint technicians with front panel operation, block diagram level theory, instrument layout, disassembly, troubleshooting and calibration.

PREREQUISITES:

This seminar is intended for repair and calibration technicians who have some knowledge of analog circuits, phase lock loops and digital circuitry.

PRESTUDY:

8660 data sheet, 8660 manual, general theory.

COURSE OUTLINE:

First Day:

1. Introduction
 - Description of Products
 - General Specifications
 - Service Accessories
2. Instrument Operation
 - Front Panel Operation
 - Performance Test Methods (General)
3. System Block Diagram
 - Basic Signal Flow in High Frequency Low Frequency Systems



4. Block Diagram Theory
 - Mainframe Sections Basic Understanding
 - Sum Loop, and Divider Phase Lock Loops Service, Calibration Information in Mainframe Sections

Second Day:

5. Basic Laboratory
 - Measuring, Analyzing Section Output Signals
 - Troubleshooting to Section and to Assembly
 - Service and Calibration Aids
6. Modulation Plug-Ins
 - General Information & Specifications
 - Basic Block Diagram Understanding
7. High Frequency Circuits
 - 11661A/B Block Diagram Understanding and Servicing
 - 86602/86603 Block Diagram Understanding and Servicing

Third Day:

8. Laboratory
 - Troubleshooting - Start with front panel to Assembly level
 - Calibration - Practice calibration in unusual and more complex areas
9. Digital Control Unit
 - Basic Block flow discussion
 - Servicing

TUITION: \$250 per student

LOCATION:

Hewlett-Packard Sales Office
6305 Arizona Place
Los Angeles, California 90045

DATE: January 21-23, 1976

The instructor for this seminar is:

JIM McGRATH—Jim has been with HP a total of 8 years where he has spent 2 years as a Product Support Engineer at Colorado Springs division in Colorado Springs, Colorado. The past 6 years have been spent as a Product Support Engineer at the Stanford Park division in Palo Alto, California where he is involved with the Synthesizers and Signal Generators. Jim has been the instructor for the 8660 for 5 years and has taught it repeatedly in Europe and around the U.S. for HP people and customers.

COURSE, DATES AND TUITION

LOS ANGELES AREA

- Digital Troubleshooting
Jan. 6-9, 1976 \$300
- 5345A—Electronic Counter
Jan. 12-15, 1976 \$300
- 8555A/8552A/B—Microwave
Spectrum Analyzers
Jan. 19-20, 1976 \$200
- 8660—Synthesized Signal Gen.
Jan. 21-23, 1976 \$250
- 8640—AM-FM Signal Generator
Jan. 26-27, 1976 \$200

Mail registration to:

Mr. Ralph Helper
Hewlett-Packard Company
6305 Arizona Place
Los Angeles, California 90045
(213) 649-2511

ATLANTA

- 1700 Family
Jan. 29-30, 1976 \$200
- 3450A/B—Multi-Function Meter
Feb. 2-3, 1976 \$200
- 5300 Family
Feb. 5-6, 1976 \$200

Mail registration to:

Mr. Don Lutz
Hewlett-Packard Company
P.O. Box 28234
Atlanta, Georgia 30328
(404) 434-4000

DALLAS

- 8555A/8552A/B—Microwave
Spectrum Analyzers
Feb. 9-10, 1976 \$200
- 8640—AM-FM Signal Gen.
Feb. 12-13, 1976 \$200

Mail registration to:

Mr. Harrison Chenault
Hewlett-Packard Company
P.O. Box 1270
Richardson, Texas 75080
(214) 231-6101

PARAMUS

- Digital Troubleshooting
Jan. 27-30, 1976 \$300
- 5300 Family
Feb. 2-3, 1976 \$200
- 3450A/B—Multi-Function Meter
Feb. 5-6, 1976 \$200
- 8640—AM-FM Signal Gen.
Feb. 9-10, 1976 \$200
- 8555A/8552A/B—Microwave
Spectrum Analyzers
Feb. 12-13, 1976 \$200
- 1700 Family
Feb. 16-17, 1976 \$200

Mail registration to:

Mr. Pete Johnson
Hewlett-Packard Company
W120 Century Road
Paramus, New Jersey 07652
(201) 265-5000

SKOKIE

- 3450A/B—Multi-Function Meter
Feb. 9-10, 1976 \$200
- 5300 Family
Feb. 12-13, 1976 \$200
- 8640—AM-FM Signal Gen.
Feb. 16-17, 1976 \$200
- 8555A/8552A/B—Microwave
Spectrum Analyzers
Feb. 19-20, 1976 \$200

Mail registration to:

Mr. Bob Chandler
Hewlett-Packard Company
5500 Howard Street
Skokie, Illinois 60076
(312) 677-0400

TORONTO

- 5300 Family
Feb. 9-10, 1976 \$200
- 1700 Family
Feb. 12-13, 1976 \$200
- 3450A/B—Multi-Function Meter
Feb. 12-13, 1976 \$200
- 8555A/8552A/B—Microwave
Spectrum Analyzers
Feb. 16-17, 1976 \$200
- 8640—AM-FM Signal Gen.
Feb. 19-20, 1976 \$200

Mail registration to:

Mr. Dave Lansley
Hewlett-Packard Company
6877 Goreway Drive
Mississauga, Ontario, Canada

To enroll in any of the above courses, please fill out the registration form and mail it to the location you will be attending. Also enclose a check or purchase order. Please use separate registration forms for each student. Any prestudy literature will be mailed directly to you.

Name		
Title		
Company		
Address		
City	State	Zip
Telephone		

supplement to
BENCH BRIEFS
 SERVICE NOTE INDEX

NEED ANY SERVICE NOTES?

Here's the latest listing of Service Notes available for Hewlett-Packard products. To obtain information for instruments you own, remove the order form and mail it to the HP distribution center nearest you.

410C ELECTRONIC VOLTMETER

410C-14. Revisions to minimize shock potentials.

414A AUTOVOLTMETER

414A-7. Revisions to minimize shock potential.

435A POWER METER

435A-2. Serial prefix 1527A and below. Range switch selection knob.

463A PRECISION AC AMPLIFIER

463A-7A. Revisions to minimize shock potentials.

606A SIGNAL GENERATORS

606A-11. Serial numbers 1352A13896 through 1433A13910. Elimination of potential shock hazard.

618C SHF SIGNAL GENERATOR

618C-9. Serial numbers 1311A02341 through 1518A02657. Elimination of potential shock hazard.

618C-10. Serial numbers 1441A02411 through 1518A02616. Regulator transistor substitution for improved reliability.

620B SHF SIGNAL GENERATOR

620B-12. Serial numbers 1312A02131 through 1517A02425. Elimination of potential shock hazards.

620B-13. Serial numbers 1443A02191 through 1517A02401. Regular transistor substitution for improved reliability.

651B/652A TEST OSCILLATOR

651B-7A. 651B serials 1230A07800 and below. 652A serials 1226A03820 and below. Replacement part numbers for A2Q11 and A2Q12.

653A AND 654A TEST OSCILLATORS

653A-3. Serial numbers 0960A00586 through 0960A00589, 0960A00576 and below. Improved oscillator and output assembly.

653A-4/654A-2. 653A serials 0960A00650 and below. 654A serials 0951A02355 and below. Recommended replacement for A2C42.

735A DC TRANSFER STANDARD

735A-3. Revisions to minimize shock potentials.

741A/B AC-DC DIFFERENTIAL VOLTMETER DC STANDARD

741B-2C. 741B serial numbers 634-00514 and below. Modification to increase reliability of Q1-Q2 (Power Switch).

745A AC CALIBRATOR

745A-12. Serial numbers 1319A01250 and below. Revisions to minimize shock potentials.

745A-13. Serial numbers 1319A01251 to 1319A-01670. Elimination of counter output connector incompatibility.

745A-14A. All serials. Long lead transistor replacement.

745A-15. All serials. Overloads when 746A turned on.

746A HIGH-VOLTAGE AMPLIFIER

746A-8. Serials 0990A01225 and below. Modifications to eliminate turn-on oscillation.

1220A/1221A OSCILLOSCOPES

1220A-3/1221A-1. All serials. Service procedures for removal and replacement of A1, A2, A3 and A4 assemblies.

1310A, 1311A, 1317A, 1321A DISPLAYS

1310A-15/1311A-15/1317A-3/1321A-4. All serials. Noise bar in display.

H06-1330A DISPLAY

H06-1330A-1. Serial number 1340A01260 and below. Preferred components for improved reliability.

HP MODEL 1331A/C DISPLAY

1331A/C-16. 1331A serial prefix 1319A and below. 1331C serial prefix 1318A and below. Preferred components for improved reliability.

1331A/C-17. 1331A serial number 1424A thru 1513A; 1331C serial number 1426A thru 1520A. Preferred components for improved reliability.

1645A DIGITAL ERROR ANALYZER

1645A-2. Serial prefix 1506A and below. Modification to add power connector for 10235A.

3304A SWEEP/OFFSET PLUG-IN

3304A-1A. All serials. Long lead transistor replacement (A1Q1 and A1Q2).

3420A/B DC DIFFERENTIAL VOLTMETER/RATIOMETER

3420A/B-6. Serial numbers 09502A00980 and below. Reduction of noise at recorder output especially for 50 Hz, 230 V AC operation.

3420A/B-7. Serials 1524A00995 and below. Recommended replacements for insulators on decade switch A1S6-A1S11.

3450B DIGITAL MULTIMETER

3450B-3. Intermittent ohms converter failures.

3460A/B DIGITAL VOLTMETER

3460A-16/3460B-6. Revisions to minimize shock potentials.

3465A MULTIMETER

3465A-1. Serial numbers 1521A00100 to 1521A-00200. Modifications to reduce temperature sensitivity.

3465A-2. Serial numbers 1521A00100 and above. Precautionary procedures.

3485A SCANNING UNIT

3485A-2. Serials 1119A00599 and below. Modification for proper scanning under remote control.

3485A-3. All serials. Optional modification to disable monitor function when in remote mode.

3551 AND 3552A TRANSMISSION TEST SET

3551A-2/3552A-2. 3551A serial number 1425A-00355 and below; 3552A serial numbers 1435A00140 and below. Modification to reduce susceptibility to RFI.

5308A 75 MHz TIMER/COUNTER

5308A-1. Serial prefix 1440A and below. Modifications to reduce crosstalk between input A and B. Also recommended replacement for the High Speed Decade Counter.

5308A-2. Serial prefix 1524A and below. Modifications for improved attenuator accuracy.

7035B X-Y RECORDER

7035B-2. All serials. A change in common mode rejection test procedure.

8403A MODULATOR

8403A-8. Serial prefix 1413A and below. Modification for improved external pulse operation and suppression of double triggering.

8558B SPECTRUM ANALYZER

8558B-9. All serials. Intensity control of HP 8558B spectrum analyzer and 180-series oscilloscope mainframe with an external horizontal input.

8620A SWEEP OSCILLATOR

8620A-6B. Serial prefix 1332A and below. Modification required for compatibility with 86290A, 2.0-18.0 GHz RF plug-in or 8410B network analyzer.

8660A SYNTHESIZED SIGNAL GENERATOR

8660A-22C. Serials 1445A00691 and below. Recommended changes on power supply fuses.

8660B SYNTHESIZED SIGNAL GENERATOR

8660B-20C. Serials 1439A00950 and below. Recommended changes on power supply fuses.

8690A/B SWEEP OSCILLATORS

8690A-14/8690B-10. All serials on 8690A. 8690B serial prefix 1349A and below. Recommended modification to install thermal protection in case of a fan failure.

11661A FREQUENCY EXTENSION MODULE

11661A-9B. Serial prefixes 1426A and below. Modification to improve lock stability.

11661B FREQUENCY EXTENSION MODULE

11661B-3. Serial prefix 1533A and below. Modification to increase YIG loop pretune adjustment range.

34703A DCV/DCA/OHM METER

34703A-11. All serials. Comments on apparent erratic behavior in DCV and ohms, manual ranging mode when input terminals open.

59306 RELAY ACTUATOR

59306A-1. Serial number 1332A00200 and below. Modification to prevent loss of remote control when subjected to mechanical shock.

59307A VHF SWITCH

59307A-1. Serials 1332A00180 and below. Modification to prevent loss of remote control when subjected to mechanical shock.

62605J MODULAR SWITCHING DC POWER SUPPLY

62605J-1. Serial numbers below 1523A01314. Modification to reduce repair cost.

86603A RF SECTION

86603A-3. Serials 1505A00146 and below. Eliminations of short in the attenuator 80 dB step.

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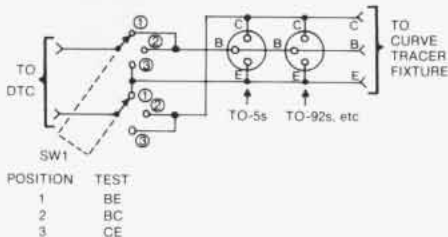
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If there is something you have to share with other *Bench Briefs* readers, let us hear from you.

Dear Editor:

The diode/transistor checker (DTC) shown in the Sept.-Oct. 1974 issue of *Bench Briefs* can be made more useful with a simple accessory. We often service old equipment for which no schematics are available. When the active devices (transistors or diodes) are socketed a rapid check of their condition can be made with the switcher test box and DTC.

Fig. 1 Switcher Test Box



The switcher test box is simple in design and operation. (see schematic Fig. 1). The test leads from the DTC are alternately switched between base emitter, base collector, and collector emitter junctions of the device under test (DUT).

SW1 can be a wafer switch or a DPDT center off toggle switch. In our tester we wired two sockets in parallel one for TO-5 and one for TO-92 and other small cased transistors. Also, included were three banana jacks spaced in line on 0.75 inch centers so standard curve tracer fixtures can be utilized for TO-3 and TO-220 testing.

Neil B. McCleery
MAC-LAB
Santa Clara, CA

7402A RECORDER HANDLE MODIFICATION

There is the possibility of the handle assembly of the 7402A becoming loose if it is not properly installed. On all units up through serial number 01760 the handle assembly was fastened with two 6-32x $\frac{1}{2}$ inch posi-driv screws which fit into two 6-32 fasteners located in the top rail assembly. Because there was a chance of either stripping the threads or not having enough threads in the fastener, the present screws should be replaced with 6-32x.625 screws, HP P/N 2360-0203, and a 6-32 lock nut, HP P/N 0590-0381, should be tightened onto the end of the screw protruding through the top rail.

This modification takes less than thirty minutes to perform and service note 7402 A-5 gives step by step instructions. If for any reason it is inconvenient to perform this modification, the instrument may be returned to your nearest HP office where it will be done at no cost.

HEWLETT-PACKARD COMPANY

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