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Bench Briefs

VOLUME 8 NO. 2

February - March 1968



WATTS NEW?

SERVICE NOTE INDEX

The March 1968 issue of the Service Note Index is now available. The Index is a summary of Service Notes with a handy order form. To get your copy, circle Service Note Index on the Service Note Order Form on page 11.

EASTERN REGIONAL REPAIR CENTER

Marsh Hiner opened the doors of our new Eastern Regional Repair Center this morning

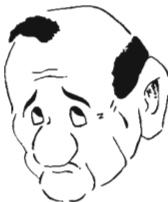
(January 22, 1968) in our sparkling new headquarters building at Paramus, New Jersey, hub of the Great Eastern Sales Region. Located Geographically convenient to all major Eastern arterials and with easy access to the metropolitan airports, this new Customer Service facility occupies approximately 7000 sq. ft. Laid out for maximum planned loading, the Center boasts many new features including 40 new "hi efficiency" service benches along with separate Standards Lab and cleaning room.

The advantages of this move are clear to our seasoned repair center personnel on whose performance the rest of us in the region so greatly depend. This move is much more than one of just relocation to them. The new facilities will enable our people to provide a real step function in service to our customers in behalf of our local sales office service facilities.

By the same token, the increased personal involvement gained through total integration into the Great Eastern Sales Region will move each of our repair center personnel one step closer to the customer, thereby spotlighting his efforts toward realizing greater growth and opportunity.

BACK ISSUES

The demand for back issues of Bench Briefs has exceeded our supply. Since we can't fill the many requests we get, we are doing the next best thing. In this issue of Bench Briefs you will find, repeated, the best service tips from past issues.



SERVICE TOOLS AND TIPS

OPEN WIDE.

If you see your dentist twice a year, you might ask him for some of his discarded weapons. Those stainless steel explorers and scalers are just the thing when you need a strong, but small-tipped tool.



Here are a few uses; you're sure to find more:

1. Scraping chores.
2. Installing, retrieving, or positioning tiny parts.
3. Serving pickles during the coffee break.

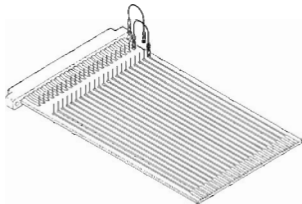
Your private line to Hewlett-Packard Customer Service

PROGRAMMABLE EXTENDER BOARDS

Open circuits and change connections without a soldering iron! One handy tool holds that plug-in printed circuit board where you can work on it, provides easy access to test points and allows you to open, short, or change circuit connections easily.

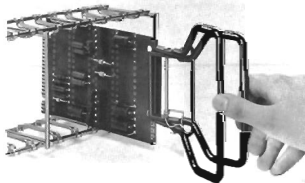
Three different boards are now available through your local HP Sales and Service Office.

Description	Part Number	Price
15 pin, 15 connectors (common each side)	5060-6038	\$ 8.00
22 pin, 22 conductors (common each side)	5060-6037	\$10.00
15 pin, 30 conductors (not common each side)	5060-5902	\$15.00



CIRCUIT BOARD PULLER

Here is a mate to the plug-in circuit board, WIRE-GRIP, an ideal circuit board puller. A particularly excellent performer where circuit boards are nested closely, vinyl-covered (shock-resistant) WIRE-GRIP carefully but firmly grips only 1/8 inch of the circuit board - well away from delicate components.



The pullers are available in two sizes - one with a 1-1/2 inch jaw, the other (illustrated) with a 2-7/8 inch jaw (about \$6.00). For further information contact E.H. Titchener & Co., 9 Titchener Place Binghamton, N.Y., 13903

ATTENTION OSCILLOSCOPE OWNERS

Here is one of the handiest oscilloscope servicing hints we've come across in quite a while. This device will allow you to view the face of the CRT from any angle. The idea is passed on to you by Ted Rowan of HP Customer Service Department. The sketch below shows Ted's idea in action . . .

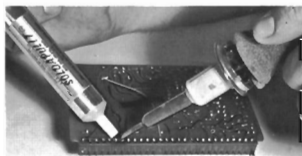


The mirror shown is a modified five inch shaving mirror, a product of the Royal Optical Specialty Co., 748 Coleman Ave., San Jose, California. The 5 1/2 inch mirror frame fits nicely over the CRT bezel ring. Two 5/32 inch holes are drilled in the end of each lucite bracket and rubber bands installed. Once mounted on the bezel ring, it can be easily positioned to any angle. As an additional bonus, the mirror may be reversed to magnify the oscilloscope trace for easy detection of minor trace shift or noise problems.

"SOLDAPULLT"

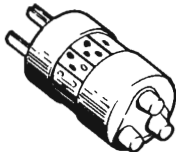
Quicker'n You Can Say It, the Solder's Gone

Did you ever try to remove from a printed circuit a soldered-in multi-terminal device like a transformer? Or, a component from a terminal to which many other components are soldered? This can be a frustrating experience, usually requiring the finesse of a card shark.



Here's the answer to your needs - the "Soldapullt" - literally a solder vacuum cleaner. The device is a hand tool that works by simply sucking away molten solder from the solder joint. HP Part No. 8690-0060 (about \$12.00).

CIRCUIT TESTER

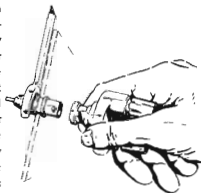


wires. These are now available; order part number 0960-0040 (about \$10.00).

Here is a circuit tester for an instant check of three wire, 115 volt, single phase polarized receptacles for proper connection of ground wire, correct polarity, or fault in any of the three

SERVICE HINT!!

If you don't have a BNC wrench available, here is a handy way of installing or removing a female BNC connector. Just use a BNC to Dual Banana Jack Adapter to hold the female BNC connector firmly while tightening or loosening the nut as illustrated.



SOMETHING NEW IN MACHINE SCREWS

Machine screws with Pozidriv recesses are recommended by the Industrial Fasteners Institute because of positive engagement of the driver, the reduction of driver cam-out, and the ability to accept and transmit high torque. Hewlett-Packard is now using Pozidriv machine screws in many new instruments. Larry Skeim of Customer Service Center cautions, "Phillips screw drivers will fit Pozidriv screws but Pozidrivs are too large to fit Phillips screws."

A BIG .002"

Si Sanders of our Loveland Division points out a mighty big .002". There are two different pin sizes (.122" and .124") available in the type of power receptacle used by HP. Our part number 1251-0148 calls out the AC3G type with pins .122" diameter. Our power cords are made to accept this pin size. However, if a customer uses a power cord not supplied with our instrument and it happens to be for the .124" diameter pins, there could be an intermittent connection.

ATTENTION 608C/D OWNERS!



There's no need to replace the Stator Turret Contacts in your 608C/D Signal Generators when the silver plating wears off. These contacts are made of silver and the plating is merely a *Bonus* that is a result of plating the Stator (flashed with copper, then silver plated). When the copper

flashing appears, ignore it, for this is normal and in time the flashing will disappear exposing the solid silver contact.

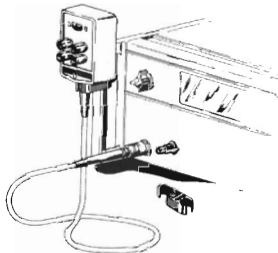
ATTENTION 8551B OWNERS!

The manual covering prefix 613- printed March 1966 and the manual covering prefix 625- printed June 1966 listed erroneously in Section VI, Table 6-1 that the Stock No. for R6 was 08551-6147. The correct number is 08551-8017. Stock No. 08551-6147 can be used only in the 8551A and is still the recommended replacement part for that model.

Two Service Notes, 8551A-8 and 8551B-1, correctly list the recommended replacement stock number for R6 in each model.

HP MODEL 740A DC STANDARD, DIFFERENTIAL VOLTMETER.

Maybe you've already thought of this handy idea... If you use your 740A with the INPUT and OUTPUT boxes close to the front panel, a convenient way to manage the two boxes and cables is to secure them to the 740A handles with plastic probe holders (HP Part No. 5040-0404). The holders are black plastic and simply press onto the 740A handles - no hardware needed. See sketch below.



The location of circuit shorts can be simplified by using a DC clip-on milliammeter (HP Model 428A) and a low voltage supply (HP Model 721A) or a battery. Here's the procedure. Instead of unsoldering a number of wires from a common tie point and using an ohmmeter to determine which line is giving you trouble, simply use a low voltage supply to pump a few milliamps into the common point. Clip the DC milliammeter around each line and measure to see which one has the most current through it. The line having maximum current will generally lead you to the short. This technique has saved our people considerable time and effort in servicing.

SHIPPING DAMAGE

We are happy to report that shipping damage problems are a rare event with instruments shipped from HP. On an average, if you were to order 5,500 instruments from HP, only one would arrive damaged! A good record, but we're still trying to improve it. If you should be the unlucky person to receive that one damaged instrument, the following are the steps you should take to see that you get reimbursed by the carrier - as quickly as possible.

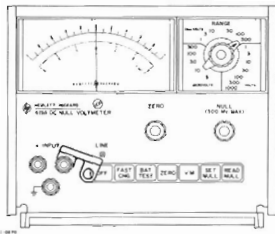
- 1) When the instrument arrives, inspect the carton for visible or concealed damage. If the carton is crushed or contents rattle, make a note of this on the carrier delivery receipt.
- 2) If, upon opening the carton, you do find damage, obtain a "Damage Inspection Report" (in the case of insured Parcel Post shipments no damage inspection report is necessary) from the delivering carrier - save the evidence, don't throw out the carton or packing material! Pictures are also helpful.
- 3) Contact the nearest office of the delivering carrier and ask for an inspection of damages.
- 4) After the inspection has been made, you may repair the damaged item or have it repaired. Your nearest HP Field Office will be glad to repair your instrument for you.
- 5) Make a claim on the delivering carrier to recover the repair charges.



Here is an idea for keeping your HP Model 419A turned off during shipment so that its batteries will not run down.

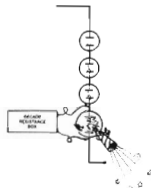
The OFF pushbutton can easily become disengaged during shipment if one of the other buttons accidentally strikes the carton or pushes against the packing material. There is also a possibility that this button may "pop out" if the carton is dropped too hard.

Connect a binding post strap (such as HP Part No. 5000-0635) to the minus INPUT binding post and position it as shown in the figure below. This will hold the OFF button in until your 419A arrives at its destination.



NOISY NEONS

Have you ever found yourself changing a neon coupling lamp in your oscilloscope (or other instrument) because you *thought* it might be noisy? If you haven't, read no further ... but if you have, here is a method to quickly check one, or a whole string of neon coupling lamps for noise without lifting a single pigtail. Just pick up the nearest decade resistance box (or high resistance variable resistor) and set it to several megohms. Bridge across the "suspect" with the box, and while watching the presentation on the scope (noise), decrease the resistance until the lamp goes out. If the noise disappears, you can reach for your soldering iron and put in a new lamp. If the noise persists, you have exonerated the lamp and should move on to more fertile pastures.



WATCH THOSE DISSIMILAR METALS!!

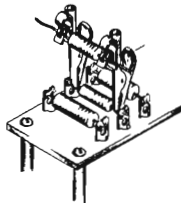
Did you ever measure a source you knew darned well should be 10.000 MV but your high accuracy voltmeter said was 10.030 MV? Better double check the interconnecting cable material between source and meter; you may have a thermocouple adding to or subtracting from (and drifting to boot, just to make life interesting) your source.



Carroll Smith of HP sent us this reminder along with a specific example: In measuring a 10 mv voltage on a 5 figure read-out instrument (such as the Dymec 2401 Digital Voltmeter) a junction between an alligator clip and a nickel-plated banana plug generated a thermo voltage, due to finger contact temperature, of from 20-30 microvolts. This resulted in a readout change of 2-3 figures in the fourth column of the digital voltmeter.

Although Carroll used heat from his fingers to generate the EMF, you may get similar results from a normally warm instrument front panel and connectors. With a little imagination and enough dissimilar materials you could probably develop a nightmare of thermo EMF's, all adding to or subtracting from one another!

SERVICE HINT



On occasion you will find it necessary to temporarily install a component in circuit while testing or calibrating an instrument. When this occasion arises, a gadget that's worth its weight in gold is a Fahnstock clip soldered to an alligator clip. To temporarily install a component,

simply clip the leads in the Fahnstock clips and attach the alligator clips to the desired points in the circuit.

ATTENTION 431A/B POWER METER OWNERS!!!

If you have an HP Model 431A/B Power Meter in your shop for repair because it won't zero properly -- don't start repairing since it may not be necessary. Check the power applied to the thermistor mounts in the system using your Power Meter. HP Thermistor Mounts are carefully matched during production, assuring stable, drift-free operation with your HP Model

431A/B Power Meter. Excessive Power may shift the match of these thermistors and prevent proper zero control of your Power Meter.

COOLING GREASE



Heat is the greatest single factor in reducing transistor and diode useful life. Anything that can be done to lower junction temperature will greatly improve reliability of the device. One method of reducing junction temperature is to lower the case-to-sink temperature differential. To accomplish this, silicone grease, available under HP Stock No. 8500-0059, can be applied to the insulating washer between the diode or transistor and the heat sink. Recent tests here at HP indicate that reductions in case-to-sink temperature differential in the order of 3.1 can be expected through use of this grease. The increased device reliability due to cooler operation makes the small cost of the grease a good investment.

Do you have a service tip you'd like to share with us and our readers? If so, address your suggestion to:

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Hewlett-Packard Company
333 Logue Avenue
Mountain View, California 94040

LIBRARY CORNER

Here is a "must" for the Technician's book shelf

TRANSISTOR BASICS:
A Short Course by
George C. Stanley, Jr.

An expanded version of the material used in Hewlett-Packard Training Seminars. This book presents a wealth of easy to read, useful information. This is down-to-earth transistor troubleshooting information for today's technician.

To order, write: Hayden Book Company, Inc.
116 West 14th Street
New York, New York 10011
Attn: Carl E. Mischka
Price: \$2.75



- MISSING INSTRUMENTS -
LOST, STRAYED, OR STOLEN

From:

New Jersey Turnpike Authority,
Maintenance Dept.
Hightstown, New Jersey 08520
Mr. R.J. Houston
HP 5212A Electronic Counter
Serial No. 247-00311
Inventory Tag No. 5910



From:

Ryerson Polytechnical Institute
50 Gould Street
Toronto, Ontario, Canada
Mr. I.A. Morgalis

H. Lab 6200B Power Supplies (3)
Serial S6J-0823
Serial S6J-0920
Serial 707-00140
HP 400E AC VTVM
Serial 536-03687

From:

Dr. Don Gardner
450 Sutter Street
San Francisco, California
Sanbom Model 100 Electrocardiograph
Serial 1640
Sanbom Model 300 Electrocardiograph
Serial 5671

From:

Hewlett-Packard Company
Neely Sales Division
3939 Lankershim Boulevard
North Hollywood, California 91604
Mr. Hal Jackson
Delcon 4900A Cable Fault Locator
Serial 04173
Delcon 4901A Cable Fault Locator
Serial 410329
H. Lab 6209B Power Supply
Serial S6J 0288
HP 8616A Signal Generator
Serial 426-00239

SERVICE NOTES



Here are the latest Service Notes...all designed to insure top-notch performance from your HP family instruments. Service Note topics typically include items such as modifications, new or special calibration techniques, and special repair procedures. If you would like to receive a complimentary copy of any note, circle the appropriate number of each under the SERVICE NOTE ORDER FORM.

MAGNETIC TAPE UNITS

M42 List of tools for servicing HP digital tape units.
3950 & 3955-1 Recommended noise filter for these systems is Krohn-Hite Model 3103-4.

140A

STORAGE OSCILLOSCOPE

140A-11 Modification kit 00141-69505 permits operation on 50, 60 and 400-Hz power.

141A

STORAGE OSCILLOSCOPE

141A-13 Modification kit 00141-69505 permits operation on 50, 60 and 400-Hz power.

175A

OSCILLOSCOPE

175A-15 Modification kit 175A-95F, replacement thermal switch that must be manually reset.

202H

FM SIGNAL GENERATOR

202H-6 Change shims in tuning capacitor stator mounting from copper to fiber to prevent cracking of the ceramic stator mount.

202J	<u>FM SIGNAL GENERATOR</u> 202J-4 Change shims in tuning capacitor stator mounting from copper to fiber to prevent cracking of the ceramic stator mount.	608F	<u>SIGNAL GENERATOR</u> 608E/F-1 Serials 710-00500 and below. Preferred replacement for Q7 is 1853-0012 with heat sink 1205-0011.
222A	<u>PULSE GENERATOR</u> 222A-2 Serials 740-1375 and below. Add diode to permit applying up to 1 vdc to output terminals with damaging output circuit.	651B	<u>TEST OSCILLATOR</u> 651B-2 Modification to convert to 75-ohm output (Option 02).
214A	<u>PULSE GENERATOR</u> 214A-5 Serials 722-04075 and below. Simple modification to prevent loss of trigger output pulses, jitter and variations in rise time, particularly at low line voltage.	851A	<u>SPECTRUM ANALYZER</u> 851A/B-7 Preferred replacement for A6Q21 is 1854-0071 (2N3391) for better reliability.
312A	<u>WAVE ANALYZER</u> 312A-3 Serial prefix 706- and below. Preferred replacement for A9Q3,4,5 and 6 is 1853-0034 for better reliability. 312A-4 Serial 720-00360 and below. Preferred replacement on A20 for RC optimization, on A19 for increasing diode breakdown voltage and on A1 for increasing reliability of Fault Amplifier.	1104A	<u>TRIGGER COUNTDOWN</u> 1104A-1 New bias adjustment procedure to replace the procedure given in the 1104A Operating Note.
331A	<u>DISTORTION ANALYZER</u> 331A/332A-7 Serials 716-02300 and below. Replacement to reduce zero offset.	1300A	<u>X-Y DISPLAY MONITOR</u> 1300A-1 Preferred replacement for Q1 and Q2, or for Q7 and Q8 is a matched pair, 5080-0472.
332A	<u>DISTORTION ANALYZER</u> 331A/332A-7 Serials 605-01060 and below. Replacement to reduce zero offset.	1402A	<u>DUAL TRACE AMPLIFIER</u> 1402A-7 Some serials between 716-02450 and 716-02625, must change R460 from 1/2 watt to 1 watt resistor (2100-0750). 1402A-8 Serials below 709-02076. Replacement for R149 and R249 is kit 01402-69501.
410C	<u>ELECTRONIC VOLTMETER</u> 410C-9 Serial 550-08750 and below. Modification kit 00410-68701 adds carrying handle.	1405A	<u>DUAL TRACE AMPLIFIER</u> 1405A-1 Serial 450-00760 and below. Replacement for R155 and R255 is kit 01405-69501.
463A	<u>PRECISION AC AMPLIFIER</u> 463A-4 Serial 738-00340 and below. For greater reliability replace A3Q4, and A3Q6 with HP Part No. 1853-0202.	1406A	<u>DIFFERENTIAL AMPLIFIER</u> 1406A-1 Serials 704-00200 and below. Modification to increase life of Q1 and Q2 (protection from turn-on transients). 1406A-2 Serials 704-00250 and below. Preferred replacement for Q1, Q2, Q201 and Q202 is 5080-0473 for greater reliability.
493A	<u>TWT AMPLIFIER</u> 493A/495A-3 Preferred replacement for V403 and V404 is 1933-0014 (6GH8A).	1407A	<u>DIFFERENTIAL AMPLIFIER</u> 1407A-4 Serials 740-00325 and below. Preferred replacement for Q1, Q2, Q201 and Q202 is 5080-0473 for greater reliability.
495A	<u>TWT AMPLIFIER</u> 493A/495A-3 Preferred replacement for V403 and V404 is 1933-0014 (6GH8A).	1425A	<u>SAMPLING TIME BASE</u> 1425A-3 Preferred replacement for A2VR1 is 1902-0684, for R10 is 2100-2064 and for A2T1, A3T1 is 01425-66003.
608E	<u>SIGNAL GENERATOR</u> 608E/F-1 Serials 710-00571 and below. Preferred replacement for Q7 is 1853-0012 with heat sink 1205-0011.		

1430A	<u>SAMPLER</u> 1430A-1 Serials 715-00325 and below. When replacing CR110 or CR111, replace both, use Part No. 1901-0050.	4801A	<u>DIRECT MEASUREMENT PLUG-IN</u> 4801A-1 Serials prefixed 640 and below. Preferred replacement for Q3 is 1853-0016 (2N3638) used <u>without</u> ferrite bead L6.
1431A-1	<u>SAMPLER</u> 1431A-1 Serials 707-00205 and below. When replacing CR110 or CR111, replace both, use Part No. 1901-0050.	8051A	<u>LOUDNESS ANALYZER</u> 8051A-2 Explanation of Drift Specification as applied to Peak-Mode operation (CRT trace drift after 2 minutes is normal).
2116A	<u>COMPUTER</u> 2116A-2 Modification to prevent receiving double print command (causing all zero readout) when connected to 2401C Voltmeter.	8403A	<u>MODULATOR</u> 8403A-4 Serials below 736-00873. To improve general purpose pulse output and reduce minimum pulse width, change C604 to 0140-0190 and C605 to 0160-0182.
2401C	<u>DIGITAL VOLTMETER</u> 2401C-6 Serial Prefix 739 and below. Modification that prevents oscillation in +12V power supply (causing ± 2 noise count).	8405A	<u>VECTOR VOLTMETER</u> 8405A-4 Illustrated alignment procedures.
2410A	<u>AC/OHMS CONVERTER</u> 2410A-2 serials 750-01216 and below. Replacement for K23 is relay 0490-0715 plus bracket 02410-0002.	8414A	<u>POLAR DISPLAY</u> 8414A-1 Corrected specification for Output is "Two DC outputs provide horizontal and vertical components or Polar Quantity. Maximum output is ± 2.5 volts, source impedance less than 100 ohms, bandwidth 10 kHz (nominal).
2410B	<u>AC/OHMS CONVERTER</u> 2410B-1 serials 750-01216 and below. Replacement for K23 is relay 0490-0715 plus bracket 02410-0002.	8551A	<u>SPECTRUM ANALYZER</u> 8551A-6 Modification to add Preselector Drive Output for use with the 8414A Preselector. 8551A/B-9 Procedure for measuring relative conversion loss. 8551A/B-11 Serials 613-00510 and below. Improved replacement A3 coax mixes 08551-6229 permits replacement of diode only. 8551A/B-12 Replacements for C7 and C8 require new mounting brackets. 8551A/B-13 Standby operation does <u>not</u> extend BWO warranty period, which is based on filament operating time.
3211A	<u>SWEEP OSCILLATOR</u> 3211A-1 Serials prefixed 805- and below. Preferred replacement for A2CR3 is 1902-3180, for A11CR1 is 1901-0347.		
3439A	<u>DIGITAL VOLTMETER</u> 3439A-2 Serial 640-01450 and below. Preferred replacement for A9Q7 and A9Q8 is 1853-0062.		
3440A	<u>DIGITAL VOLTMETER</u> 3440A-16 Serial 637-08325 and below. Preferred replacement for A9Q7 and A9Q8 is 1853-0062.		
3535A	<u>FM RECORD AMPLIFIER</u> 3535A-1 For greater reliability change A1R11 from 1/8W to 1/2W resistor 0757-1078.	8551B	<u>SPECTRUM ANALYZER</u> 8551A/B-9 Procedure for measuring relative conversion loss. 8551A/B-11 Serials 618-00510 and below. Improved replacement for A3 coax mixes 08551-6229 permits replacement of diode only.
4800A	<u>VECTOR IMPEDANCE METER</u> 4800A-1 Serials prefixed 630 thru 805. Adjustment procedures, trouble-shooting procedures and circuit modifications to improve operation (with schematic diagrams.).		

8551A/B-12 Serials below 720-01261.
Replacements for C7 and C8
mounting brackets.

8551A/B-13 Standby operating, does not
extend BWO warranty period, which is
based on filament operating time.

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