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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 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 sporkling 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 metropoltan imports, 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 "his 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 m 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 typs 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 discorded weapons. Those stainless steel explorers and scolers 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-Heavlett-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 \$ 8.00	
15 pin, 15 connectors (common each side)	5060-6038		
22 pin, 22 conductors (common each side)	5060-6037	\$10.00	
15 pin, 30 conductors	5060-5902	\$15.00	



#### CIRCUIT BOARD PULLER

Here us 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 pullexs 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 handlest 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 Customet 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 5½ inch mirror firme fits nicely over the CRT bezel ring. Two 5/32 inch holes are drilled in the end of each lucit 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.



#### Quicker'n You Can Soy It, the Solder's Gone

Did you ever ity to remove from a printed cricuit a soldered-in multi-terminal device like a transformer? Or, a component from a terminal to which momy other components are soldered? This can be a firstrating experience, usually requiring the finesse of a cerd shark.



Here's the answer to your needs - the "Soldapull"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



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

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

#### SERVICE HINT !!

If you don't have a BNC wrench available, here is a hundy way of installing or removing a female BNC connector. Just 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. Lary Skeim of Customer Service Center coutions, "Phillips screw drivers will fit Pozidriv screws, but Pozidrivers 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 port 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" diameterpins. there could be an intermitten 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 of. 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 menual 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 0.8551–6147. The correct number is 0.8551–6017. Stock No. 08551–6147 con 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.



#### CIRCUIT SHORTS

The location of crucut 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 unsoldening a number of wires from a common the 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 unlacky 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.

- 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.
- 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 cartier - save the evidence, don't throw out the carton or packing material! Pictures are also helpful.

- 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.
- Make a claim on the delivering carrier to recover the repair charges.

#### ATTENTION 419A OWNERS'

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 accidently 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 nean 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 stone of non coupling



lamps for noise without lifting a single piglail. Just pick up the nearest decade resistance box (or high resistance variable resistor) and set it oseveral megohars. 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 !!

Didyou ever measure a source you knew damed well should be 10.000 MV but your high accuracy voltmeter said was 10.030 MV<sup>3</sup> 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 themo 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 Certoil used heat from his fingers to genernet the EMF, you may get similor results from a normally warm instrument front panel and connectors. With a little immegnation and enough dissimilar materais you could probably develop a inghtnare of thermo EMF's, all adding to or subtracting from one another!

#### SERVICE HINT



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

simply clip the leads in the Fahnestock 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, dnit-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 temperatuture 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:

Editor, Bench Briefs 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





#### From:

Ryeeson Polytechnical Institute 50 Gould Street Toronta, Ontario, Canada Mr. 1.A. Morgulis H. Lub 6200B Power Supplies (3) Senial S61-0823 Serial S61-0920 Senial 707-00140 HP 400E AC VTVM Serial S36-03687

#### From:

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

#### From:

Hewlett-Packard Company Neely Sales Division 393 Lankershim Boulevard North Hollywood, California 91604 Mr. Hal Jackson Delcon 4900A Cable Fault Locator Serial 04173 Delcon 4901A Cable Fault Locator Serial 40039 H. Lab 6209B Power Supply Serial S6J 0288 HP 8616A Signal Generator Senial 406-00239 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 Ktohn-Hite Model 3103-4.

- 140A <u>STORAGE OSCILLOSCOPE</u> 140A-11 Modification kit 00141-69505 permits operation on 50, 60 and 400-Hz power.
- 141A <u>STORAGE OSCILLOSCOPE</u> 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 ceromic stator mount.

- 2021 FM SIGNAL GENERATOR 608F SIGNAL GENERATOR 2021-4 Change shims in tuning capacitor 608E/F-1 Serials 710-00500 and below. Preferred replacement for Q7 is 1853-0012 stator mounting from copper to fiber to prevent cracking of the ceramic stator with heat sink 1205-0011. mount. 651B TEST OSCILLATOR 222A PULSE GENERATOR 651B-2 Modification to convert to 75-ohm 222A-2 Serials 740-1375 and below. output (Option 02). Add diode to permit applying up to 1 vdc to output terminals with damaging output 851A SPECTRUM ANALYZER circust. 851A/B-7 Preferred replacement for A6Q21 is 1854-0071 (2N3391) for better 214A PULSE GENERATOR reliability. 214A-5 Serials 722-04075 and below. Simple modification to prevent loss of 1104A TRIGGER COUNTDOWN trigger output pulses, ritter and variations 1104A-1 New bias adjustment procedure in rise time, particularly at low line to replace the procedure given in the voltage. 1104A Operating Note. 312A WAVE ANALYZER 312A-3 Serial prefix 706- and below. 1300A X-Y DISPLAY MONITOR Preferred replacement for A903.4.5 and 6 1300A-1 Preferred replacement for Q1 is 1853-0034 for better reliability. and Q2, or for Q7 and Q8 is a matched 312A-4 Serial 720-00360 and below. pair, 5080-0472. Preferred replacement on A20 for RC optimization, on A19 for increasing diode 1402A DUAL TRACE AMPLIFIER breakdown voltage and on A1 for increas-1402A-7 Some serials between 716-02450 ing reliability of Fault Amplifier. and 716-02625, must change R460 from 1/2 watt to 1 watt resistor (2100-0750). 331A DISTORTION ANALYZER 331A/332A-7 Serials 716-02300 and 1402A-8 Serials below 709-02076. Replacement for R149 and R249 is kit below. Replacement to reduce zero offset. 01402-69501. 332A DISTORTION ANALYZER 331A/332A-7 Setials 605-01060 and 1405A DUAL TRACE AMPLIFIER below. Replacement to reduce zero offset. [405A-1 Serial 450-00760 and below. Replacement for R155 and R255 is kit 410C ELECTRONIC VOLTMETER 01405-69501-410C-9 Serial 550-08750 and below. Modification kit 00410-68701 adds carry-1406A DIFFERENTIAL AMPLIFIER ing handle. 1406A-1 Senals 704-00200 and below. Modification to increase life of Q1 and 463A PRECISION AC AMPLIFIER Q2 (protection from turn-on transients), 463A-4 Serial 738-00340 and below. 1406A-2 Seriels 704-00250 and below. For greater reliability replace A304, and A3Q6 with HP Part No. 1853-0202 . Preferred replacement for O1, O2, O201 and Q202 is 5080-0473 for greater reliability. 493A TWT AMPLIFIER
  - 1407A <u>DIFFERENTIAL ANPLIFIER</u> 1407A-4 Serials 740-00325 and below. Preferred replacement for QL Q2. Q201 and Q202 is 5080-0473 for greater reliability.
  - 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.

493A/495A-3 Preferred replacement for

V403 and V404 is 1933-0014 (6GH8A).

493A/495A-3 Preferred replacement for V403 and V404 is 1933-0014 (6GH8A).

608E/F-1 Serials 710-00571 and below.

Preferred replacement for O7 is 1853-0012

TWT AMPLIFIER

SIGNAL GENERATOR

with heat sink 1205-0011.

495A

608E

Page 7

- 1430A <u>SAMPLER</u> 1430A-1 Serials 715-00325 and below. When replacing CR110 or CR111, replace both, use Part No. 1901-0050.
- 1431A-1 <u>SAMPLER</u> 1431A-1 Serials 707-00205 and below. When replacing CR110 or CR111, replace both, use Part No. 1901-0050.
- 2116A <u>COMPUTER</u> 2116A-2 Modification to prevent receiving double print command (causing all zero readout) when connected to 2401C Volimeter.
- 2401C DIGITAL VOLTMETER 2401C-6 Senal Prefix 739 and below. Modification that prevents oscillation in 12V power supply (causing ±2 noise count).
- 2410A <u>AC/OHMS CONVERTER</u> 2410A-2 serials 750-01216 and below. Replacement for K23 is relay 0490-0715 plus bracket 02410-0002.
- 2410B AC/OHMS CONVERTER 2410B-1 serials 750-01216 and below. Replacement for K23 is relay 0490-0715 plus bracket 02410-0002.
- 3211A <u>SWEEP OSCILLATOR</u> 3211A-1 Serials prefixed 805- and below. Preferred replacement for A2CR3 is 1902-3180, for A1ICR1 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 Senai 637'-08325 and below. Preferred replacement for A9Q7 and A9Q8 is 1853-0062.
- 3535A FM RECORD AMPLIFIER 3535A-1 For greater reliability change AIR11 from 1/8W to 1/2W resistor 0757-1078.
- 4800A VECTOR IMPEDANCE METER 4800A-1 Serial's prefixed 630 thru 805. Adjustment procedures, trouble-shooling procedures and circuit modifications to improve operation (with schematic diagrams.).

- 4801A <u>DIRECT MEASUREMENT PLUG-IN</u> 4801A-1 Serials prefixed 640 and below. Preferred replacement for Q3 is 1853-0016 (2N3638) used without ferrite bead L6.
- 8051A <u>LOUDNESS ANALYZER</u> 8051A-2 Explanation of Drift Specification as applied to Peak-Mode operation (CRT trace drif after 2 minutes is normal).
- 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 C60S to 0160-0182.
- 8405A VECTOR VOLTMETER 8405A-4 Illustrated olignment procedures.
- 8414A <u>POLAR DISPLAY</u> 8414A-I Corrected specification for Output is "Two DC outputs provide horizontial and vertical components or Polar Quantity. Maximum output is <u>12</u>, 5 volts, source impedance less then 100 ohms, bendrudh 10 kHz (nominal).
- 8551A <u>SPECTRUM ANALYZER</u> 8551A-6 Modification to add Preselector Drive Output for use with the 8441A Preselector.

8551A/B-9 Procedure for measuring relative conversion loss.

8551A/B-11 Scrials 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 not extend BWO warranty period, which is based on filament operating time.

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.



8551A/B-12 Scrials below 720-01261; Replacements for C7 and C8 require new mounting brackets.

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

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