HEWLETT PACKARD

BENCH BRIEFS

SERVICE INFORMATION FROM HEWLETT-PACKARD

2nd, 3rd, & 4th Quarters 1992

Instrument Service Notes For HP Trade Customers

Jim Bechtold/Hewlett-Packard

Introduction

Test and Measurement (T&M) service notes contain product-specific service information about Hewlett-Packard products. Subjects include product improvements, modifications, and procedures for troubleshooting, maintenance, and repair. Service notes are published as appropriate throughout the life of a product and are imperative for customers that service their own HP products.

The Problem

Customers have always been able to obtain T&M service notes free of charge, but the process has never been timely or convenient. The most common method was for the customer to read about service notes in *Bench Briefs* and then order them. The problem occured in the time lag between when the service note was published and when the customer read about it in *Bench Briefs*. It was common for many months to elapse before customers become aware of a crucial service note that improved the performance or affected the operation of their instrument.

The Solution

Customers can now receive T&M service notes in several ways:

- Automatic – by subscription service
- By FAX (HP FIRST)
- From the editor of *Bench Briefs*, but for only a few copies.

Note: HP is no longer providing large quantities of service notes at no charge.

Subscription Services

There are two subscription services available; microfiche and paper. Refer to Table 1.

Microfiche

The microfiche library and subscription service are ordered through the hardware support administration person at your local HP sales/service office. Be sure and note the following items to help your order coordinator place the order.

- The subscription service is effectively a "support contract" and not an orderable "part."
- The subscription service is ordered through HP's IBS system and not through any sales system.
- The subscription service price shown in Table 1 is an approximate price for one year.
- The subscription service price shown on the HP IBS system is for one month.
- The library is not a contractual service, and therefore should not be ordered through the support systems. It may be ordered directly through OMS or local equivalent by the sales order processing group.

The microfiche library is exactly that — a library of all T&M service notes for older as well as the most up-to-date products. You should purchase the library and subscription service at the same time. This will ensure that your library is automatically kept up-to-date on a quarterly basis.

Paper

The most timely way for you to receive service notes on a regular basis is to subscribe to the paper subscription service. Once a month all of the current T&M service notes that HP prints will be sent to you. For some customers this will be more service notes than you need. We hope you will recycle the paper you do not use. For other customers servicing a large and wide variety of HP instruments, this subscription service will keep you up-to-date on all T&M product changes.

As a special bonus for those customers that order the subscription service before January 4, 1993, HP will include in the first shipment all back

(See "Service Notes," page 6)

Table 1. Available Service Note Programs

Description	Delivery	New HP P/N	Old HP P/N	Cost – U.S.
Paper Subscription Service	Monthly	H5299A + 22R-AV6	None	~$600.00
Microfiche Subscription Service	Quarterly	H5299A + 22R-AV5	5951-6517	~$800.00
Microfiche Library	Any Time	H5320A	5951-6511	$1,000.00

Pub. No. 5952-3462

A Description of Hewlett-Packard Service Notes

Introduction

As products continue to be produced, modifications are made to their design or to the manufacturing process. Some of these modifications may be judged significant enough that they are documented in a service note and communicated to the Hewlett-Packard support organization and to Hewlett-Packard customers. These modifications may include hardware changes, firmware changes, or simple information.

There are five classes of service notes used to communicate the modifications. The class of service note is determined by the scope of the modification. Each class of service note and the type of information it may contain is described below.

Service Note Classification

Priority Safety (PS): This class of service note denotes a serious operator hazard concerned with the normal operation of the product. These service notes require immediate repair action and involve a special effort to contact all customers that own the product. The repairs must be completed by HP-qualified personnel either on-site or at an authorized HP repair center.

Safety (SA): This class of service note denotes a minor or marginal safety hazard. It can also apply when noncompliance to a safety related standard, license, or testing agency evaluation has been discovered. Safety service notes are implemented during the normal course of providing support. The repairs can sometimes be implemented by the customer.

Modification Recommended (MR): These service notes are developed to correct manufacturing or design problems that affect product performance or reliability. This includes modifications that correct a product's performance to meet its published specifications. This type of service note is also applicable if the modification to replacement parts results in a compatibility problem with units in the installed base.

Modification Available (MA): These service notes communicate performance enhancements. The enhancements typically improve the performance, serviceability, reliability or operation that extends the usefulness of the product.

Information Only (IO): The information only service note is used to communicate information about the product (i.e., manual changes, recommended replacement parts, parts that are no longer available and have been replaced by a new HP part number, etc.). In some cases, modifications are necessary when a new replacement component is not an exact fit.

Table A. Customers With HP On-Site Service Contracts

Service Note Type	Location Category			No Charge Period
	Repair On-Site	Return To HP	Customer-Installable	
Priority Safety	1	2	NA	Always
Safety	1	2	3	Always
Mod. Rec.	1	2	3	4
Mod. Available-Serviceability/ Reliability	5	5	5	1 year minimum
Mod. Available - Performance	6	6	6	NA

Notes

1. The responsible entity is charged for all support charges.
2. Service will be performed on site. Parts and labor will be charged to the responsible entity. Travel will be charged to the service contract.
3. The modification can normally be completed by the customer; however, if the customer requests HP to perform the service, labor will be charged to the responsible entity (contact responsibile entity first to preauthorize charges). Travel will be charged to the service contract.
4. If administration block action category is marked "on specified failure," the "no-charge" period is a minimum of two years; all others are a minimum of one year.
5. Parts, labor, and travel are charged to the service contract.
6. Customer may purchase the modification.

Service Note Administrative Block

Each service note contains administrative information that provides the HP support organization details that include when to perform the modification, where to perform the modification, and how long the modification will be available at no charge.

Action Category

Immediately: Typically, this category is used for priority safety service notes, but may also be checked on a modification recommended note. Modifications will usually be performed by the HP support organization. The "No-Charge" period is a minimum of one year from the date that is printed on the service note, which is called the "publication date."

On Specified Failure: The modification will be performed by the HP sup-

Table A. Customers Without HP On-Site Service Contracts

Service Note Type	Location Category			No Charge Period
	Repair On-Site	Return To HP	Customer-Installable	
Priority Safety	1	2	NA	Always
Safety	1	2	3	Always
Mod. Rec.	1	2	3	4
Mod. Available-Serviceability/ Reliability	5	6	5	NA
Mod. Available - Performance	5	5	5	NA

Notes

1. The responsible entity is charged for all support charges.
2. Parts and labor will be charged to the responsible entity. If the customer requests on-site service, travel will be charged to the customer.
3. The responsible entity pays for parts. The modification can normally be completed by the customer; however, if the customer requests HP to perform the service, labor will be charged to the responsible entity (contact responsibile entity first to preauthorize charges). Service will be performed as routine support and travel will be charged to the customer.
4. If administration block action category is marked "on specified failure," the "no-charge" period is a minimum of two years; all others are a minimum of one year.
5. Customer may purchase the modification.
6. If the customer has a return-to-HP service contract, labor and parts are charged to the contract when the customer returns the unit to an HP Customer Service Center for repair.

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port organization only if the specified failure occurs. These modifications will normally be performed as routine support. The "No-Charge" period is a minimum of two years from the service note publication date.

Agreeable Time: The modification is made by the HP support organization at a time agreeable to HP and the customer. A mutually agreed upon time may occur as part of preventative maintenance, calibration, or in response to a general failure condition. Product safety and modification recommended service notes for products covered by an HP on-site agreement are to be provided by HP support personnel during the next visit to the customer's site, or by the recommended completion date. The maximum expected time to complete the modification is one year from the service note publication date.

Location Category

On-Site: The modification is performed by HP-qualified support personnel at the customer's site.

HP Location: The customer is responsible for returning the product to the nearest HP Customer Service Center. The modification is performed by HP-qualified support personnel.

Customer-Installable: Modifications may be performed by the customer. Parts and modification instructions may be provided at no charge, depending on the service note classification.

Availability (PS, SA, MR Only)

This is the defined period of time that all resources (parts, documentation, expertise) will be available for the modification. This is **not** the "No Charge" period. Note that the modification may be incorporated into updated versions of the product.

Author and Entity

This is the person that wrote the service note and the manufacturing division.

Labor Standards (PS, SA, MR Only)

This is the expected amount of time it will take to complete the repair.

Serviceability/Reliability Enhancement (MA Only)

The modification improves reliability or allows HP to service the product more efficiently. If the product is covered by an HP support contract, the modification is charged to the contract. Otherwise the customer may purchase the modification.

Performance Enhancement (MA Only)

The modification will enhance the performance of the product over and above what it was originally designed to do. This modification is available for customer purchase.

Service Inventory/Used Parts

Self explanatory.

Responsible Entity

This is the support-responsible HP entity. This is **not** the entity that performs the service.

Until

This is the last date that HP will provide the modification to the customer at no charge. This is called the "No-Charge" period. □

Using RS-423 and RS-422 for Terminal Connections: A Field Guide

Mark Kroot/Hewlett-Packard, Grenoble

As the demand grows for terminal-to-SPU connections supporting greater baud rates and greater distances, the use of RS-422 and RS-423 will become much more prevalent. This paper will familiarize the reader with those electrical standards, making it easier to sell, install, service, and support them in the field. We will start with a description and comparison of the RS-232, RS-422, and RS-423 electrical standards. Next, we will discuss some specifics of wiring for the RS-422 and RS-423 standards. Finally, we will take a brief look at some of the Hewlett-Packard products using this standard.

A Note on the Standards

The RS-422 and RS-423 standards are electrical standards: they specify only the electrical characteristics of the digital interface circuit. RS-232, on the other hand, consists of three standards:

- Electrical — electrical characteristics
- Physical — connector dimensions and pinouts
- Logical — communication protocol

The reader must remember that the comparison of RS-232 to RS-422 and RS-423 can only be a comparison of the respective electrical standards.

Guidelines for Application

Neither the RS-422 nor the RS-423 standards specifically state requirements for interconnecting cables, maximum distance, or maximum data transmission rate. Each standard does, however, include an appendix, "Guidelines for Application." These appendices give conservative maximum values for cable length and data rates based on the following cabling:

- Twisted pair, copper
- 52.5 pF/meter shunt capacitance
- 24 AWG

The following information is based on these guidelines. Actual performance is likely to differ from that given by the guidelines. It will depend on the actual configuration as well as its environment.

Single-Ended versus Differential

In data processing systems, there are two basic means used for sending a digital signal between components (i.e., SPU, terminal, printer): single-ended data transmission, which uses one signal line, and differential data transmission, which uses two. The first of these two means, single-ended data transmission, has been employed in the RS-232 and the RS-423 standards developed by the Electronics Industry Association (EIA). The RS-422 standard, on the other hand, uses differential data transmission.

RS-232

Introduced in 1962, the RS-232 single-ended data transmission standard is used widely throughout the industry. However, RS-232 is the most restrictive when considering data rates (20 kBaud maximum) and distances (up to 50 feet/15 meters). The advantages of using RS-232 terminal connections are:

- Its familiarity in the industry.
- Fewer wires are used — three wires for direct terminal connection.

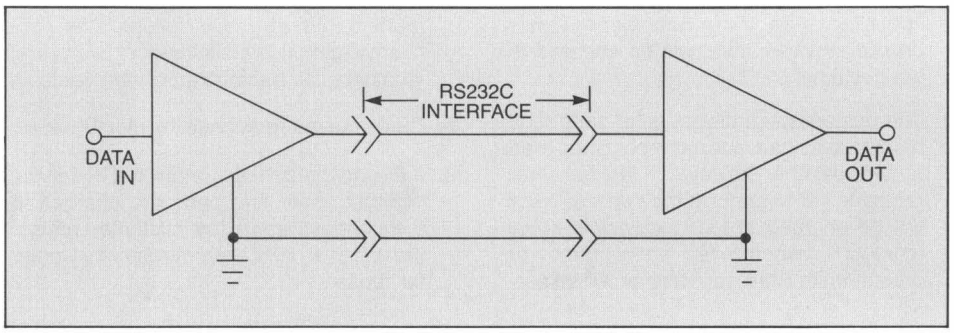

Figure 1. RS-232C Application

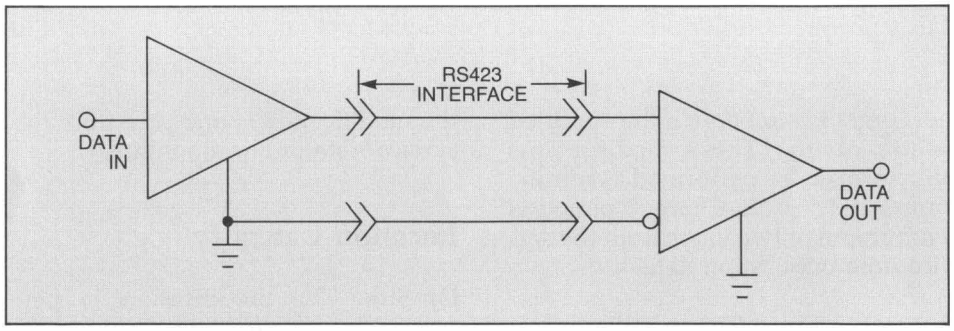

Figure 2. RS-423 Application

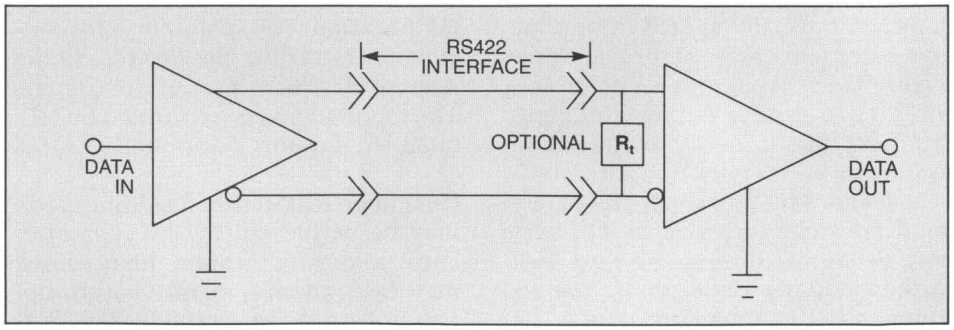

Figure 3. RS-422 Application

RS-423

The RS-423 (also known as CCITT V.10) standard also uses single-ended data transmission. It has the advantage of an extended maximum data rate of 100 kBaud (up to 250 feet/80 meters) and an extended maximum distance of 4000 feet/1200 meters (up to 5 kBaud). It should be noted that the maximum cable length and maximum data rate are functions of the rise time of the signal transmitting the digital data. For example, a fast rise time is needed for the higher baud rates while a slow rise time allows longer cable lengths. The rise time is defined by the hardware and cannot usually be changed outside the factory. Consequently, an individual RS-423 driver can be tuned for high data rates or long cable lengths, but not for both. Refer to the specifications or supported configurations of the concerned equipment. Because RS-423 is a newer standard, it is not as common as RS-232. However, superior baud rate and distance capabilities are helping the RS-423 electrical standard win rapid popularity.

RS-422

Single-ended transmission is often inadequate when transmitting at very high data rates, over long distances or through noisy environments. In these applications, differential transmission offers superior performance by nullifying the effects of ground shifts and induced noise. Ground shifts and induced noise simply become common mode noise on a differential transmission line. The RS-422 (also known as CCITT V.11) standard incorporates differential transmission and allows data rates up to 10 MBaud (up to 40 feet/12 meters) and line lengths up to 4000 feet/1200 meters (up to 100 kBaud).

RS-422/RS-423 Compatibility

Because both RS-422 and RS-423 specify the exact same receiver, the two are compatible. However, when connecting devices with differing baud rate/distance capabilities, we are limited to the baud rate/distance of the device with the slower/shorter distance specifications.

Terminal Connections

Direct terminal connections are commonly made using either the RS-232, RS-423, or RS-422 electrical standards. The table below summarizes the details of each possibility. The distance, data rate, and distance/data rate product given are all maximum values. The wires column shows the number of wires required for a full-duplex direct connection.

	Transmission	Wires	Data Dist	Max Dist* Data Rate Rate	Product
RS-232	Single-ended	3	50ft	20 kBaud	100 kBaud-ft
RS-423	Single-ended	4	4000ft	100 kBaud	4 MBaud-ft
RS-422	Differential	4	4000ft	10 MBaud	400 MBaud-ft

Wiring

The higher data rates and longer distances allowed by the RS-422 and RS-423 standards make it possible for the component wavelengths of the digital signals to be shorter than the electrical length of the cable. As a result, the connection should be treated as a transmission line.

The characteristic impedance of the interconnecting cable should be in the general range of 100 Ohms for frequencies greater than 100 kHz. In addition, the DC series loop resistance of the cable should be less than 240 Ohms. The cable may be either twisted pair or untwisted pair (flat cable) possessing the following characteristics:

- Conductor size of the wires shall be 24 AWG or larger with wire resistance not to exceed 30 Ohms per 1000 feet for each conductor.
- Mutual pair capacitance between one wire in the pair to the other shall not exceed 20 pF per foot.
- Stray capacitance between one wire in the pair with all other wires connected to ground shall not exceed 40 pF per foot.

Terminals and printers, when connected by RS-422 or RS-423 to an SPU, generally use direct connections. This means that both the peripheral and the individual SPU port each have a single driver and a single receiver. Since a two-wire pair is needed to connect a driver to a receiver, a total of four wires are needed to make the direct connection.

RS-423 connections using more than one signal driver can benefit from its single-ended nature by using a common ground return line for all signals. This is common for connections using hardware flow control in which each device has both a data signal and a flow control signal, and a shared ground return.

RS-422/RS-423 is intended for long distance connections in datacommunication applications. These long distances make the use of prefabricated cables difficult and uneconomical. Consequently, there are no "off the shelf" RS-422/RS-423 datacommunication cables available from Hewlett-Packard as of this writing. Instead, connections must be individually wired according to the wiring instructions given in the appropriate installation and reference manual.

Environmental Concerns

Environmental parameters such as device-to-device ground shifts and conducted emissions can affect the reliable operation of RS-422 and RS-423 interfaces. The best measure of the effects of these parameters is expressed in the common-mode voltage. Note that common mode voltage is defined differently for RS-422 and RS-423.

- RS-422: According to the standard, the common mode voltage at the receiver must be less than 7 volts to assure reliable operation. The common mode voltage is defined by the sum of:
  - ground potential difference between the driver and receiver grounds,
  - common mode noise,
  - common mode offset (drivers common mode voltage).
- RS-423: The standard specifies 4 volts. The common mode voltage

is defined by the sum of:

- ground potential difference between the driver and receiver grounds,
- common mode noise.

- Shielded cables are useful in two respects:
  - They increase the immunity of the data communications cable to electro-magnetic energy, thus reducing common mode noise seen by the receiver.
  - They decrease the emissions of the data communications cable.

  When using shielded cables, it is usually best to connect the shield to the chassis on the system side only.

  Shielded cables are not required by the RS-422 or RS-423 standards. However, they are required by some regulating bodies such as the German VDE (Verband Deutscher Elektrotechniker) organization.

As mentioned above, limiting the difference between the grounds at the system and the peripheral is important to assure that the common mode range of the receiver is not exceeded. Of course, this becomes more difficult as distances become greater and is highly dependent on the particular environment. In general, it is best and often necessary that the system and the peripheral be connected to the same ground point. If not, large differences in ground potential may exist.

It must also be noted that large ground potential differences have the potential of causing permanent damage to either system or peripheral. While Hewlett-Packard equipment is protected against this type of damage, no such protection can be one hundred percent effective.

RS-422/RS-423 Peripherals

Listed below are some of Hewlett-Packard's peripheral products with either the RS-422 or RS-423 digital interface standard. No such list can be expected to be complete as new products are constantly being introduced. Consult your local sales representative for the latest information on supported interfaces. □

Product Number	Description
HP 98638A Opt. 1C8	DIO 8-channel MUX, RS-422
HP 98190A Opt. 1C8	CIO 16-channel MUX, RS-422
HP 40299B Opt. 1C8	NIO 8-channel MUX, RS-422
HP 2345 Opt. 805	DTC, Eight RS-422 Connections
HP 2346B	Eight Add-on RS-422 Connections for DTC
HP 2346G	DTC/X.25 Add-on for RS-422
HP 700/32	DEC VT320 Compatible Terminal
HP 700/92,94	Display Terminal
HP 2392A, 2394A	Display Terminal
HP 33471A	LaserJet IIP printer
HP 33440A	LaserJet Series II printer
HP 33447A	LaserJet Series IID printer
HP 33449A	LaserJet Series III printer
HP 33459A	LaserJet Series IIID printer
HP 2684A/D/P	LaserJet 2000 printer
HP 2934A	Impact Printer
HP 7595A	DraftMaster I Plotter
HP 7596A	DraftMaster II Plotter

("Service Notes," continued from page 1)

issues of service notes that have been printed since the 1st Quarter 1992 issue of *Bench Briefs*. That includes service note packages 049 through 063.

HP FIRST

HP FIRST (FAX Information Retrieval Support Technology) is a new and exciting way to order service notes from Hewlett-Packard. It is fast and efficient. You can immediately order and receive the notes you want for the price of a phone call to Boise, Idaho. The database is currently over 200 service notes and growing. All new service notes are placed in the system the first of each month, and we are going back in history to include older service notes. In the future you will have access to a library of instrument-related service notes going back through 1989.

If you want to order a service note through the HP FIRST system, you will need to call from a Group 3 FAX machine. Refer to the list of notes in this issue of *Bench Briefs* to find the service note number you want. Note the document ID number and then follow the instructions below. If the service note is not listed, you can call the HP FIRST system and obtain a complete index of service notes.

Note: A Group 3 FAX machine has both a hand receiver and touch-tone capability.

1. Enable your FAX machine to dial out and dial (208) 344-4809 from the FAX keypad.
2. Select the Test and Measurement section by pressing 4. The Test and Measurement prologue will tell you to enter a document identification number at this time. Ignore this message.
3. Press 3 to move into the password service note section. The password is SNOTE (76683). You will hear the service note prologue.
4. The prologue will tell you that if you already have the document identification number of the service note, press 1 and then enter that document ID number.
5. The prologue will also tell you that you can press 2 to obtain an index of the available service notes, their ID numbers, and the number of pages of each document.
6. After you have entered your selection, HP FIRST will prompt you to press the start/copy or receive button on your FAX machine and hang up the handset.

There is a wealth of information available through the HP FIRST system. Please browse through the menus and try some of the selections. □

1992 Bench Briefs' Instrument Service Note Index

HP FIRST (208)344-4809
T&M Section - Press 4
Password Section - Press 3
Password - 76683

SN Type	SN No.	Abstract	HP FIRST Document ID No.
IO	346A-03	Change in ENR accuracy specification	5422
IO	346B-07	Change in ENR accuracy specification	5423
IO	346C-01	Change in ENR accuracy specification	5424
IO	M60	Recommended replacement of overstressed carrying handles	5351
SM	2804-0992-01	Mainframe support strategy	5374
MR	3235A/E-16A	Recommended AC switch replacement eliminates intermittent failures	5341
MR	3235A/E-16	Replacement AC power switch eliminates intermittent failures	5278
IO	3245A-04	10X high voltage option, Opt 002, requires different source and backplane assys	5239
IO	3457A-15	Service Manual correction - 90-day ACV test card limits correction	5255
MR	3458A-07A	Modification to fix intermittent error "Multislope Rundown Conversion"	5240
IO	3458A-10	Operating, Programming, and Configuration manual update	5223
MA	3562A-05A	Firmware upgrade path	5273
MA	3582A-17	Modification to A13 Rev. D board for use in older 3582As	5338
MR	3589A-01	Firmware update to improve instrument performance	5254
MR	3764A-28	Preferred replacement of FETs Q1 & Q2 on A0 assy increases reliability	5245
IO	3764A-29	Option J34 Specification changes	5312
IO	3789B-03A	Retrofitting printer opt 010 or disk drive opt 011	5268
IO	4142B-11	Repair strategy of 41420A SMU, 41423A HVU, and power supply module	5237
IO	4194A-11	Updated CRT repair parts list for older HP 4194As	5387
IO	4194A-12	Updated CRT repair parts list for newer HP 4194As	5388
MR	4195A-12A	Mod cures problem of "No signal for spans less than 2.4MHz"	5406
IO	4195A-13	New shield case may be required when replacing A20 board	5407
IO	4274A-33	Troubleshooting tip when Capacitance Accuracy test deviates slightly from test limits	5355
IO	4275A-29	Troubleshooting tip when Capacitance Accuracy test deviates slightly from test limits	5356
MR	4278A-08	Modification prevents dust from clogging memory card socket	5272
IO	4339A-01	Troubleshooting tip for intermittent E11 ADC failures	5284
MA	4349A-01	Firmware upgrade to Rev. 02.00 is available	5408
IO	4936A-16	List of parts needed when replacing battery pack	5269
MR	4948A-09	Modification fixes measurement hang-up with error code 2000	5313
MA	4957PC-01A	Hi-speed Option 001 retrofitting	5253
MR	4957PC-04	Modification correct MASS STORE or LOAD APPLICATION features	5221
IO	4980A-01	Modifying older 4980A units	5352
MR	4980A-03A	Modification to eliminate bad sectors on hard disk drive	5233
MR	4980A-05A	Modification to resolve "Service Request Timeout on Port XXX" error	5234
MR	4980A-06A	Modification to resolve "Hardware/Software Watchdog Timeout Errors"	5281
MA	4980A-07	Directions on upgrading hard disk drive to 105 MByte	5262
MA	4980A-08	Directions on upgrading capture buffer to 16 MByte	5263

SN Type	SN No.	Abstract	HP FIRST Document ID No.
MR	4980A-09	Modification resolves "bootup/timeout errors"	5426
IO	4981A-01	Modifying older 4981A units	5353
MR	4981A-05A	Modification to resolve "Service Request Timeout on Port XXX" error	5235
MR	4981A-06A	Modification to resolve "Hardware/Software Watchdog Timeout Errors"	5282
MA	4981A-07	Directions on upgrading hard disk drive to 105 MByte	5264
MA	4981A-08	Directions on upgrading capture buffer to 16 MByte	5265
MR	4981A-09	Modification resolves "bootup/timeout errors"	5427
IO	4982A-01	Modifying older 4981A units	5354
MR	4982A-05A	Modification to resolve "Service Request Timeout on Port XXX" error	5236
MR	4982A-06A	Modification to resolve "Hardware/Software Watchdog Timeout Errors"	5283
MA	4982A-07	Directions on upgrading hard disk drive to 105 MByte	5266
MA	4982A-08	Directions on upgrading capture buffer to 16 MByte	5267
MR	4982A-09	Modification resolves "bootup/timeout errors"	5428
MR	5089A-02	Modification changes location and type of primary fuse	5375
MR	5335A-26B	Modification corrects power supply relay problem	5117
MR	5372A-06	Modification corrects Histogram self-test failures	5376
MR	5372A-06	Modification corrects histogram failure	5232
IO	5381A-05	New replacement for 1906-0028 A1CR1 diode, 1906-0096	5420
IO	6010A-07A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5409
IO	6010A-07	Recommended replacement for A1U1 rectifier bridge	5207
IO	6011A-08A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5410
IO	6011A-08	Recommended replacement for A1U1 rectifier bridge	5332
IO	6012B-06A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5411
IO	6012B-06	Recommended replacement for A1U1 rectifier bridge	5333
MR	6015A-03	Modification prevents spurious high frequency down programmer FET oscillations	5224
IO	6015A-04A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5412
IO	6015A-04	Recommended replacement for A1U1 rectifier bridge	5334
MA	6024A-03	Recommended Main Line RFI Filter (FL1) replacement kit	5277
IO	6024A-04	New replacement for A1C2,A1C3,A1C4 and A1C5 capacitors	5413
IO	6030A-14A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5414
IO	6030A-14	Recommended replacement for A1U1 rectifier bridge	5335
IO	6031A-16A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5415
IO	6031A-16	Recommended replacement for A1U1 rectifier bridge	5336
IO	6032A-15A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5416
IO	6032A-15	Recommended replacement for A1U1 rectifier bridge	5337
MR	6035A-04	Modification prevents spurious high frequency down programmer FET oscillations	5225
IO	6035A-05A	New replacement for 1906-0028 A1U1 rectifier, 1906-0389	5417
IO	6035A-05	Recommended replacement for A1U1 rectifier bridge	5338
IO	6060A-03	Service manual correction - initialization program command correction	5257
IO	6060B-01	Service manual correction - initialization program command correction	5258
IO	6063B-01	Service manual correction - initialization program command correction	5259
MR	6641A-01A	Mod corrects relay link operation (pwr supply error 240)	5429
MR	6641A-01	Modification corrects relay link operation (pwr supply error 240)	5296
MR	6642A-01A	Mod corrects relay link operation (pwr supply error 240)	5430
MR	6642A-01	Modification corrects relay link operation (pwr supply error 240)	5297
MR	6643A-01A	Mod corrects relay link operation (pwr supply error 240)	5431
MR	6643A-01	Modification corrects relay link operation (pwr supply error 240)	5298
MR	6644A-01A	Mod corrects relay link operation (pwr supply error 240)	5432

SN Type	SN No.	Abstract	HP FIRST Document ID No.
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MR	6645A-01A	Mod corrects relay link operation (pwr supply error 240)	5433
MR	6645A-01	Modification corrects relay link operation (pwr supply error 240)	5300
MR	6651A-02A	Mod corrects relay link operation (pwr supply error 240)	5434
MR	6651A-02	Modification corrects relay link operation (pwr supply error 240)	5301
MR	6652A-02A	Mod corrects relay link operation (pwr supply error 240)	5435
MR	6652A-02	Modification corrects relay link operation (pwr supply error 240)	5302
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MA	8116A-10	New firmware avoids EOI problems	5348
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IO	8561B-06A	Oven-controlled crystal oscillator upgrade	5227
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MR	8563A-18	Modified YTO adjustment	5248
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MR	8642M-03A	Procedure to resolve A11 and A12 module failures	5286
MR	8657D-01	Modification corrects DC offset at buffer output of the Pi/4 DQPSK I/Q Mod assy	5287
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MR	8665A-02	I/O assy replment requires modification to reference assy	5445
MR	8665B-01	I/O assy replment requires modification to reference assy	5446
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IO	8720B-02	Change to ALC OFF adjustment in the service manual	5244
MR	8902A-14	Mod corrects problem with TRFL measurements using track-mode tuning	5339
MR	8920A-02A	Notification of firmware upgrades	5270

SN Type	SN No.	Abstract	HP FIRST Document ID No.
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MR	8920A-04	Modification to resolve low sensitivity problem of antenna input	5271
MR	8920A-05	New A18 assy corrects intermittent oscillation in specific Opt. 002 instruments	5288
MR	8920A-06	New firmware corrects intermittent operation of CRT display	5340
IO	8970A-14	Spurious response and jitter specification changed due to 8614A becoming obsolete	5379
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MR	E1445A-01	Modification corrects unit failure due to reverse-biased capacitors	5386
IO	E1650A-03	Notification of a potential Command Module hang-up problem; re: S/N 1405A/B-01	5366
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IO	E2500B-04A	Trblshtng cause of system error 00227: bad detector voltage	5450
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MR	E3612A-01	Replacing output binding posts improves mechanical performance	5391
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MA	OT3000-01	Tightening nuts on ac line filter during maintenance increases system reliability	5345
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SM	18111-0992-01	Temperature probe support strategy	5378
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IO	37722A-01	Recommended replacement of A2U2, U57 to solve "continuously gating" problem	5368
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IO	37732A-01	Recommended replacement of A2U2, U57 to solve "continuously gating" problem	5369
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MR	54506B-01	Line filter replacement eliminates failure in Line Sync Trigger Mode	5326
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MR	54510B-02	Line filter replacement eliminates failure in Line Sync Trigger Mode	5328
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SN Type	SN No.	Abstract	HP FIRST Document ID No.
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SA	54600A-07-S	New insulator inside cover prevents potential shock hazard after handle is removed	5349
MR	54601A-06	New filter attenuates displayed emitted signal to the required level	5280
SA	54601A-07-S	New insulator inside cover prevents potential shock hazard after handle is removed	5350
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MR	54656A-01	Firmware upgrade to prevent checksum failure	5276
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MR	70001A-15	Rec repl of mainframe pwr supply electrolytic caps & repair of loose inductor	5252
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IO	70612A/C-01	Instructions on replacing the MMS interface module fuse	5322
IO	70613A/C-01	Instructions on replacing the MMS interface module fuse	5323
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MA	85644A-01	Firmware upgrade kit improves performance	5364
MA	85645A-01	Firmware upgrade kit improves performance	5365
MR	86790B-01	Modification eliminates ground bounce and clock line reflections	5383
–	HP-IB(A)	List of Test and Verification Programs, Maintenance Kits and firmware Upgrades	5178

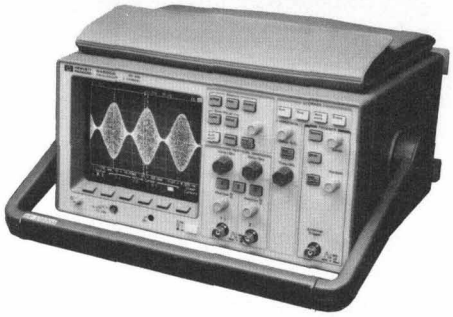
Service Note Types

IO	Information Only	MA	Modification Available
MR	Modification Recommended	SA	Safety
PS	Priority Safety	SM	Interoffice Service Memo (IOSM)

Safety-Related Service Notes

Service Notes from Hewlett-Packard relating to personal safety and possible equipment damage are of vital importance to our customers. To make you more aware of these important notes, they are printed on paper with a red border, and the service note number has an "-S" suffix. In order to make you immediately aware of any potential safety problems, we are highlighting safety-related service notes here with a brief description of each problem. Also, in order to draw your attention so safety-related service notes in the service note index, each safety-related service note is highlighted with a contrasting color.

HP 54600A Oscilloscope
HP 54601A Oscilloscope



HP 54600A Serial Numbers Affected
0000A00000 / 3220A06532
HP 54601A Serial Numbers Affected
0000A00000 / 3220A04667

The condition exists only if the cabinet handle has been removed, exposing a small hole, which allows access to the interior of the display unit. Because of this, a shock hazard is possible. Contact your nearest HP sales/service office to obtain a free insulator kit, HP P/N 54600-68714.

Order Safety Service Note 54600A-07-S for more information.

HP 70004A Display

Serial Numbers Affected
0000A00000 / 3040A01050

The right side strap handle, situated on the side of the HP 70004A which accepts modules, may not support the weight of certain configurations. The right side strap handle must be removed and replaced with replacement kit 70004-60032. Order Safety Service Note 70004A-08-S for more information.

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