

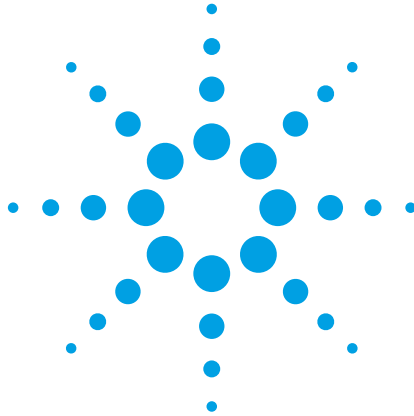
# **Agilent 3395 Integrator**

## **Reference Manual**



**Agilent Technologies**

# Agilent 3395/3396 Integrators



## Manuals

These manuals may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemicals analysis businesses are now part of Agilent Technologies. The HP 3395/3396 Integrator referred to throughout this document is now the Agilent 3395/3396 Integrator.



**Agilent Technologies**

# Reference Manual

# HP 3395 Integrator



Manual Part No.  
03395-90530

Edition 2, August 1997  
Printed in USA

# Printing History

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The information contained in this document may be revised without notice.

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HP part number  
03395-90530

Second edition—August 1997  
First edition—January 1995  
Printed in USA

# Safety Information

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The HP 3395 Integrator meets the following IEC (International Electrotechnical Commission) classifications: Safety Class 1, Transient Overvoltage Category II, and Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and designed for use indoors. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Whenever the safety protection of the unit has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard. Disconnect the AC power cord before removing covers.

## Safety Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

### WARNING

**A WARNING CALLS ATTENTION TO A CONDITION OR POSSIBLE SITUATION THAT COULD CAUSE INJURY TO THE USER.**

### CAUTION

**A Caution calls attention to a condition or possible situation that could damage or destroy the product or the user's work.**



Caution. Refer to accompanying documents.



Indicates hazardous voltages.



Indicates earth (ground) terminal.

## ***Important User Information for In Vitro Diagnostic Applications***

This is a multipurpose product that may be used for qualitative or quantitative analyses in many applications. If used in conjunction with proven procedures (methodology) by a qualified operator, one of these applications may be in vitro diagnostic procedures.

General instrument performance characteristics and instructions are included in this manual. Specific in vitro diagnostic procedures and methodology remain the choice and the responsibility of the user and are not included.

# Sound Emission Certification for Federal Republic of Germany

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## Manufacturer's Declaration

**Sound Emission:** This information is provided to comply with the requirements of the German Sound Emission Directive dated January 18, 1991.

- Sound Pressure  $L_p < 55$  dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779 (Type Test)

## Herstellerbescheinigung

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/ Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

**Schallemission:** Diese Information steht im Zusammenhang mit den Anforderungen der Maschinenlärminformationsverordnung vom 18 Januar 1991.

- Schalldruckpegel  $L_p < 55$  dB (A)
- Am Arbeitsplatz
- Normaler Betrieb
- Nach DIN 45635 T. 19 (Typprüfung)

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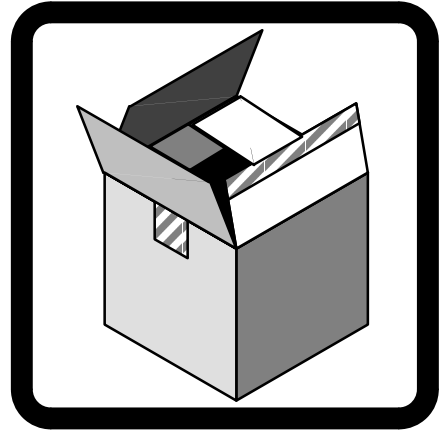
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## Preinstallation Checklists

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## Site Requirements

The HP 3395 Integrator is designed for laboratory use. Ensure that the intended operating environment for your integrator meets these requirements:

- The atmosphere is free of corrosive chemicals.
- The temperature remains between 5° and 40°C (41° to 104°F) while the unit is operating.
- An altitude up to 2000 m.
- The relative humidity is between 10 and 90% noncondensing.
- A surface area about 46 cm wide by 46 cm deep (about 18 by 18 inches) exists for the unit, and about 46 cm (18 inches) exists above the unit.
- The power line meets the following specifications:

Line voltages:            115 or 230 V ac (+15 to -22%)

Line frequency:        48 to 66 Hz

(The HP 3395 Integrator consumes a maximum of 50 VA.)

Refer to Appendix A for complete HP 3395 Integrator specifications.

---

## Unpacking and Inspecting Your Unit

- Verify that you have received all shipped containers by checking the carrier's papers.
- Inspect the exterior of the shipping container(s) for physical damage and watermarks. If damage or water is indicated, immediately contact your carrier (retain the carton and all packing materials for the carrier's inspection).
- Open the integrator box; remove the manual set and miscellaneous components from inside the container and set all of these aside.
- Unpack the HP 3395 Integrator and inspect it for damage. If you detect damage, contact your nearest Hewlett-Packard Sales and Service Office.
- Unpack any other containers.

---

## Recording Important Numbers

In any verbal or written correspondence with Hewlett-Packard concerning your integrator, you will need to know the following information:

**Instrument Model Number:**

**HP 3395B**

**Instrument Name:**

**HP 3395 Integrator**

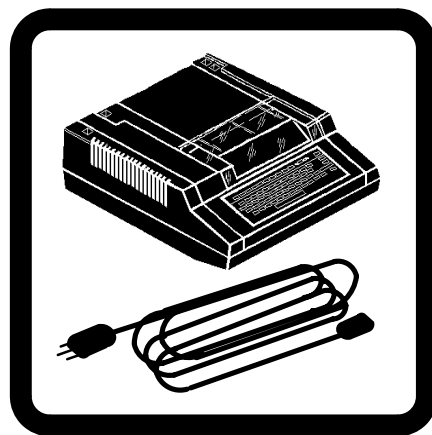
**Instrument Serial Number:**

Take a few minutes now to fill in the empty box above. The instrument's serial number can be found on the rear of the integrator.



# Installing the Integrator

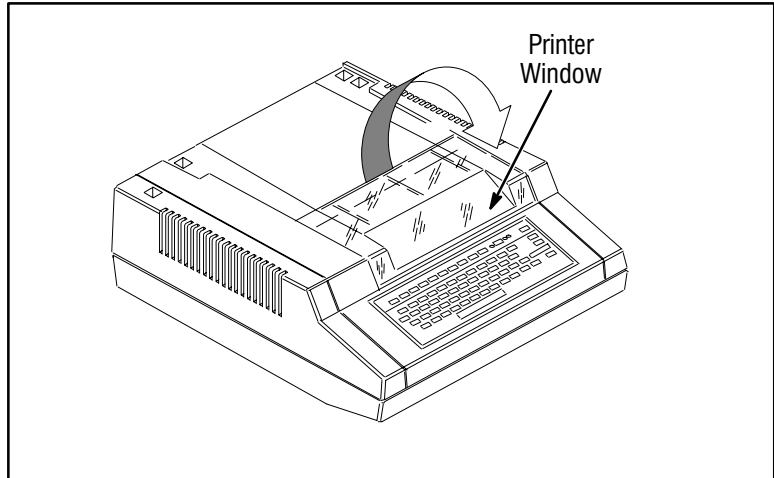
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## In this chapter....

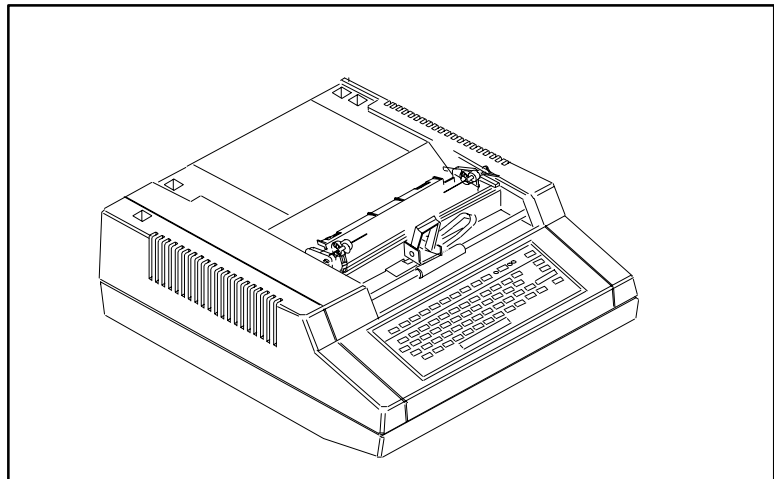
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Before installing the paper assemblies, print cartridge, or loading paper, open the printer window.



**Figure 2-1. The Printer Window**

The printer window is opened by lifting its rear edge upward and forward toward the front of the integrator.



**Figure 2-2. The Window Open**

The window can, if necessary, be removed completely. Squeeze the two hinged ends, disengaging one end from its axis tab, and then lift the window away from the integrator.

---

## Installing Paper Assemblies

Two forms of dispensing paper are available for the HP 3395 Integrator: the standard roll of paper, which has its assembly supplied in all units, and the z-fold paper, which can be ordered as an option.

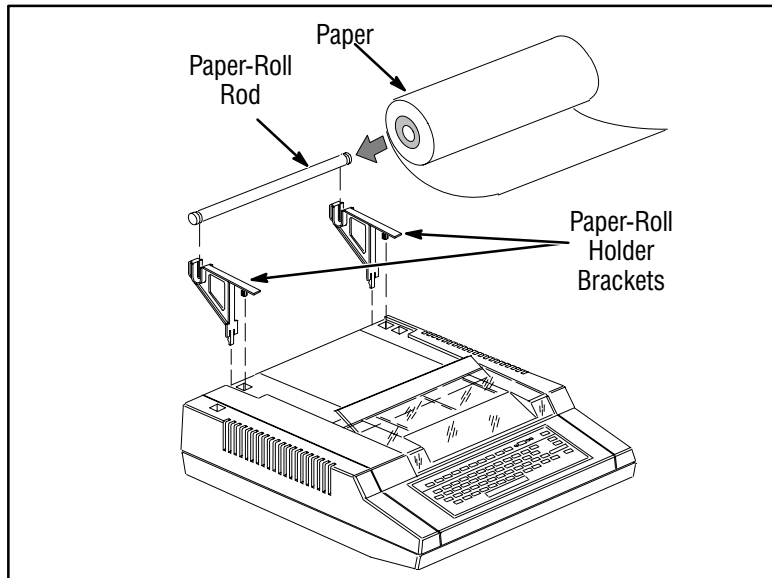
To maintain the high reliability of the printer mechanism, use only the recommended paper and print cartridges listed in chapter 8 of this manual.

## Installing the Roll Paper Mechanism

From the integrator package, remove:

- 2 paper-roll holder brackets
- 1 paper-roll rod
- 1 roll of inkjet paper

You may also want to remove the paper separator at this time, for installation later.



**Figure 2-3. Roll Paper Mechanism**

Snap the two paper-roll holder brackets into the appropriate slots on the top rear of the integrator.

Unwrap the roll of paper. Check that the edges of the roll are flat and even, and that no slack exists in the roll.

Insert the paper-roll rod through the paper roll.

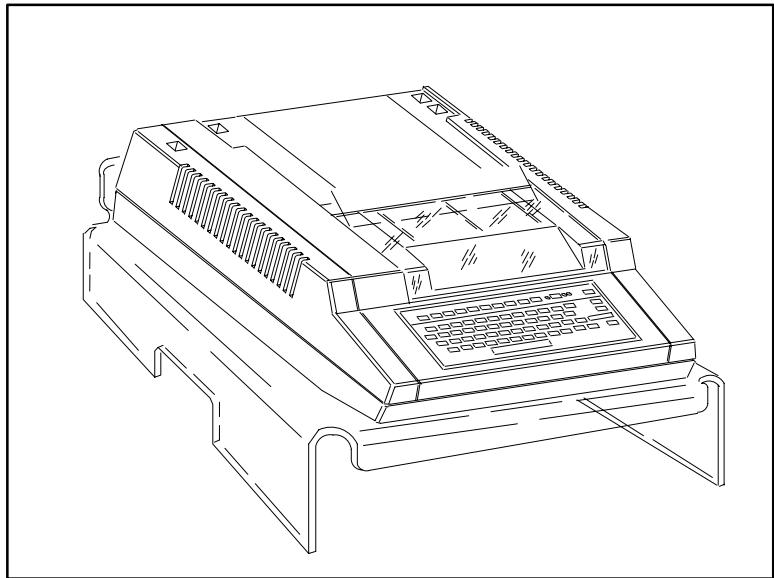
Position the roll of paper so that it unrolls from beneath the roll, towards the front of the unit (see Figure 2-3). Mount the rod and paper on the brackets.

## Installing the Z-Fold Paper Mechanism

From the accessory package, remove:

- 1 pack of z-fold paper
- 1 paper stand

You may also want to remove the paper separator from the integrator package at this time, for installation later.



**Figure 2-4. Z-Fold Paper Stand**

Unwrap the pack of paper.

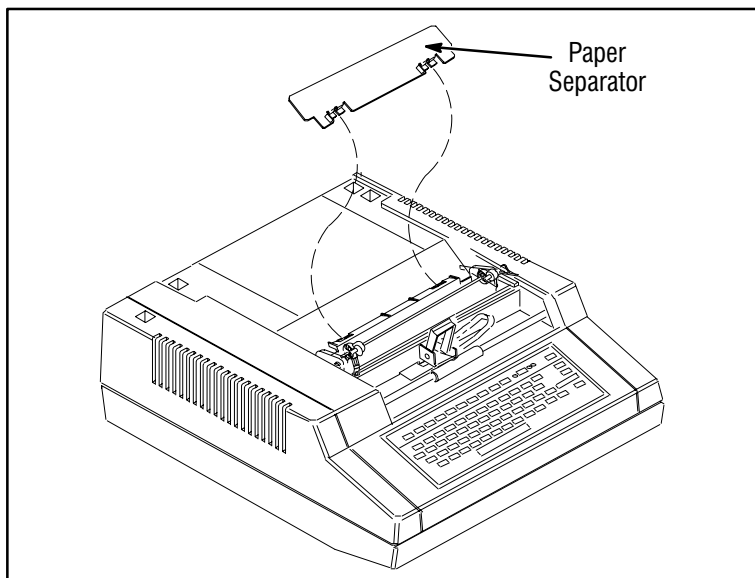
Lay the top sheet of paper (with the “PRINT THIS SIDE” facing *down*) on flat top surface of the integrator.

Position the pack of paper inside the stand so that it unfolds from the top of the pack and around the rear of the integrator and stand.

The pack of paper will have to temporarily be moved later when connecting cables. However, doing this now will assure proper paper loading.

## Installing the Paper Separator

The paper separator is used with both the roll paper and the z-fold paper.



**Figure 2-5. Installing the Paper Separator**

Insert the tabs at the bottom of the separator into the slots in the printer mechanism.

---

## Installing Print Cartridges

Check the expiration date stamped on the bottom of the print cartridge container. Be certain that the expiration date has not yet been reached.

**WARNING**

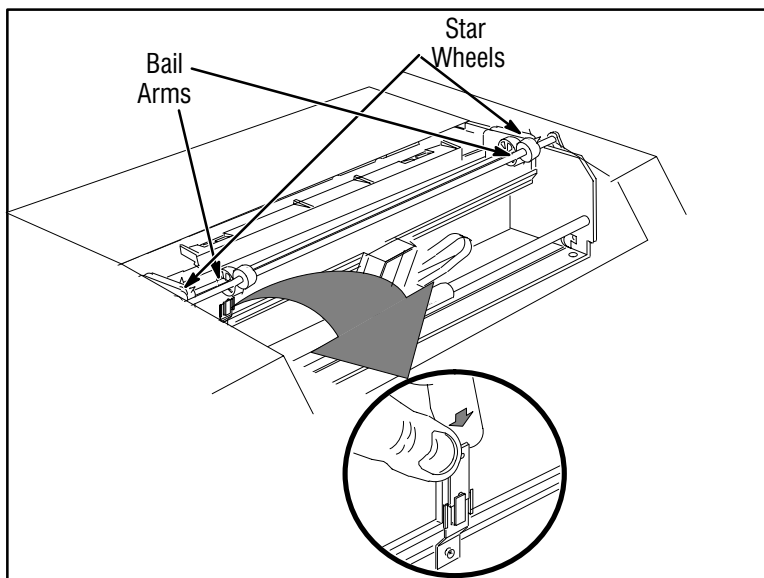
**THE INK IN THE PRINTHEAD CARTRIDGE CONTAINS DIETHYLENE GLYCOL, WHICH IS HARMFUL IF SWALLOWED. KEEP NEW OR USED CARTRIDGES OUT OF REACH OF CHILDREN.**

If the printer window is not already open, open it now.

Remove the print cartridge and the blotter from the container, taking care not to touch the face of the cartridge. (The blotter is stored under the clear plastic disk at the bottom of the container.)

## Installing the Blotter Pad

When you turn on the integrator, ink is sprayed on the blotter to clear the printhead. Blotters are provided with each print cartridge and should be replaced each time the cartridge is replaced.



**Figure 2-6. Inserting Blotter Pad**

Insert the blotter into the holder as shown below, making sure that the stiff-coated side of the blotter faces the back of the printer.



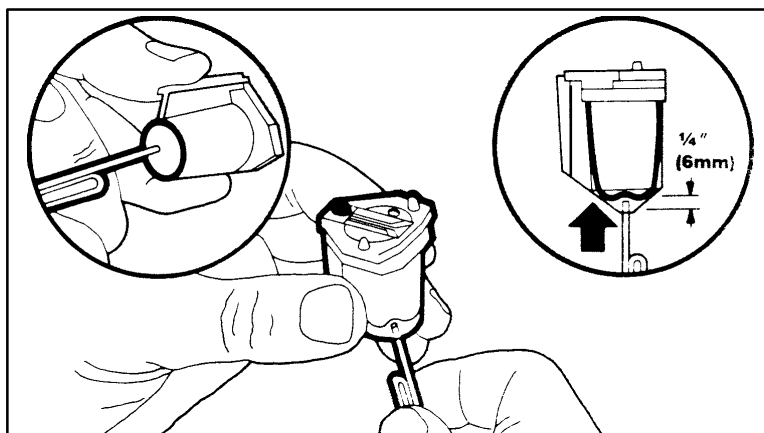
## Priming the Print Cartridge

Prime the print cartridge by gently pushing the end of a straightened paper clip or similar object about 1/4-inch (6 mm) into the hole in the rear of the print cartridge.

**CAUTION**

**Be careful. Excessive force will puncture the bladder!**

Gently push the ink bladder until a drop of ink appears on the face of the cartridge.



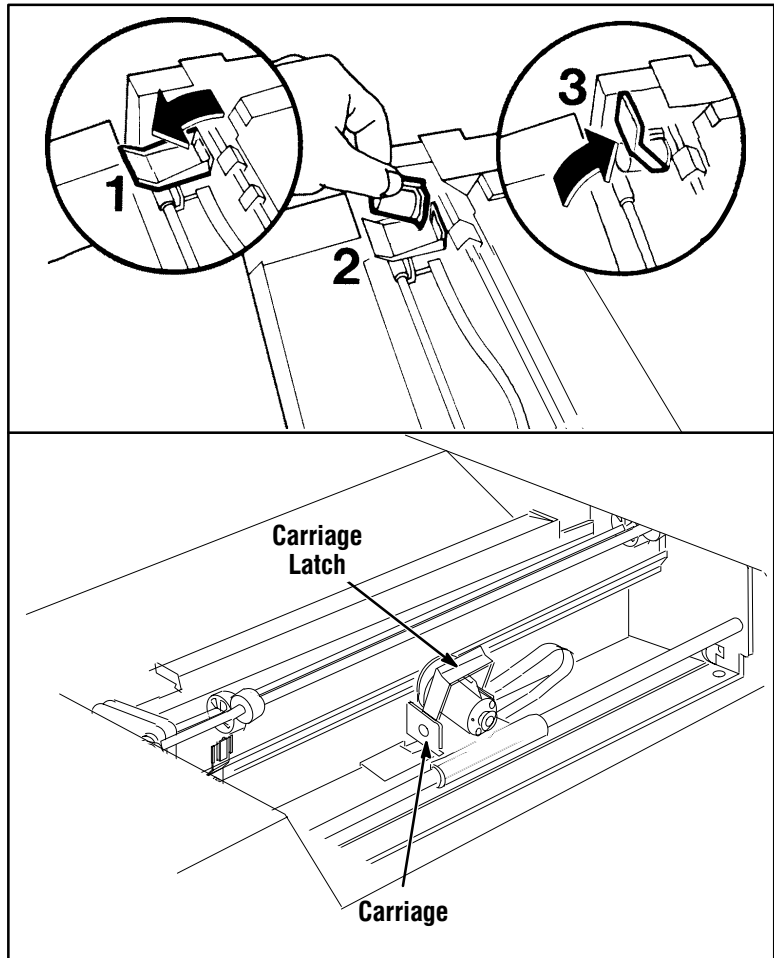
**Figure 2-7. Priming the Print Cartridge**

Wipe the print cartridge face with a soft cloth or lint-free tissue.

## Inserting the Print Cartridge

Pull the carriage cradle latch all the way down, as shown in circle 1 of the figure below.

Set the print cartridge in the cradle (the action labelled 2 below).



**Figure 2-8. Inserting the Print Cartridge**

Push the cradle latch up to lock the print cartridge in place (as shown in circle 3).

---

## Loading Paper

The paper should be positioned on the top flat surface of the integrator with the PRINT THIS SIDE facing down against the surface. After rotating around the roller, the PRINT THIS SIDE will be correctly facing up.

Pull both bail arms forward to their open positions.

Slide the paper into the slot under the paper separator. (It may be helpful to pull the paper separator forward temporarily until the paper is inserted.)

Push the paper under the roller until its edge passes above the bail arms.

Align the holes in the left edge of the paper with the sprockets of the left pin wheel.

If necessary, adjust the right pin wheel to the width of the paper. It can move sideways to accommodate for minor differences in paper widths. Align the holes in the right side of the paper with the sprockets of the right pin wheel.

Be certain that the paper is straight and that both sides are even.

Push the bail arms back to their closed positions, locking the paper in position against the roller.

Close the printer window.

Verify that the paper's PRINT THIS SIDE is correctly positioned on the side of the paper toward the print cartridge.

---

## Applying Power and Running the Self-Test

If other instruments are to be connected to the HP 3395 Integrator, see their installation instructions before attempting to apply power to the integrator.

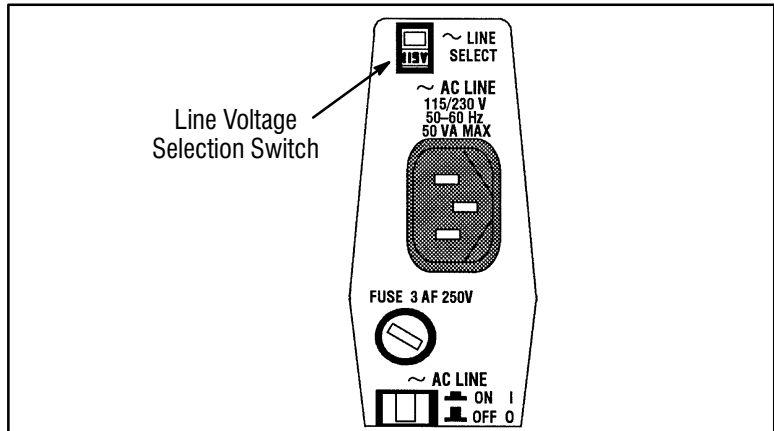
### **WARNING**

**THE POWER CORD MUST BE CONNECTED ONLY TO A LINE POWER SOURCE WITH A PROTECTIVE EARTH CONTACT. DO NOT USE AN EXTENSION CORD, POWER CABLE, OR PLUG ADAPTER WITHOUT A PROTECTIVE EARTH (GROUNDING) CONDUCTOR. PROPER GROUNDING SHOULD BE VERIFIED.**

First, ensure that voltage shown on the line voltage selection switch at the rear of the instrument matches the intended power source.

## Verifying the Voltage Setting

Locate the line voltage selection switch on the rear panel of the integrator above the power cord receptacle.



**Figure 2-9. Line Voltage Selection**

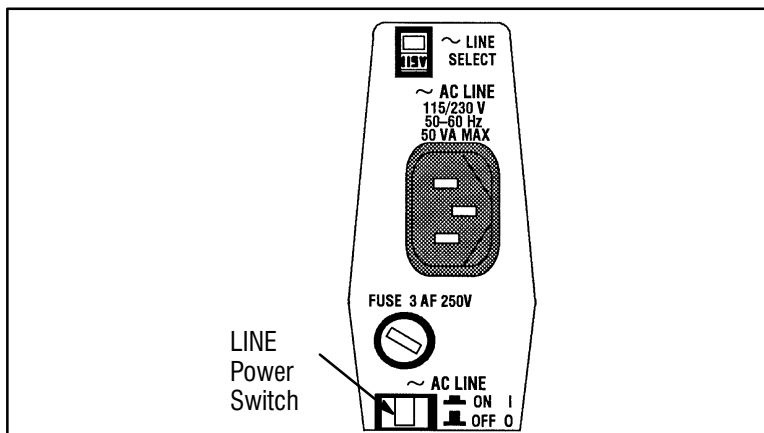
A voltage setting of 115 is compatible with sources from 90 to 132V.

A voltage setting of 230 is compatible with sources from 180 to 264V.

Make sure the selected operating voltage matches the voltage of the power source you're using. If it doesn't match, do not apply power! Contact your local Hewlett-Packard office.

## Initial Turn On

Connect the power cable **first** to the integrator and **second** to a properly grounded power source of the same voltage.



**Figure 2-10. Line Voltage Selection**

Press the LINE power switch on the rear panel of the integrator.

The symbol "O" indicates off. The symbol "I" indicates on.

The integrator performs a warm-start power-up when power is restored. Operating parameters and the memory disk M: are preserved as they were before.

```
Power failed
JAN  1, 1901  00:00:43

BREAK

*
```

**Figure 2-11. Warm-Start Power-On**

A cold-start is invoked by simultaneously pressing the [CTRL] and [DEL] keys. The operating parameters are restored to their default values and the information stored on the memory disk M: is lost during a cold-start. The integrator also performs a series of self-tests during a cold-start. When the integrator has successfully passed the self-tests (after about 30 seconds), the firmware revision numbers (Z80/HOST/INET/PP) and the installed Appack volume label (GEN02B) are printed.

```
>!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN0PQRSTUUVWXYZ[\]^_`abcde
fghijklmnopqrstuvwxyz{|}~:;<=>?@ABCDEFGHIJKLMN0PQRSTUUVWXYZ[\]^_`abcde
-----
Performing self test; unit will
accept commands when KEYBD led is ON

Model 3395B                Rev 0.00.01  09/30/94
Z80/HOST/INET/PP Rev = g/B/a/I w/ GEN003
```

**Figure 2-12. Cold-Start Self-Test**

## Setting Paper Parameters

Unless set differently, the initial physical position of the paper is assumed to be the correct top of form (TOF). Moreover, it is also assumed that US letter size paper is being used.

To set or reset the top of form (TOF) and specify either of the two size pages:

the U.S. 8.5 x 11 inch letter size (66 lines)

the ISO 297 mm A4 size (72 lines)

Press **[CTRL] [K]**

*Defines top of form (TOF) and a 66-line, 11-inch page length.*

Press **[CTRL] [V]**

*Defines top of form (TOF) and a 72-line, A4-page length.*

To simply advance the paper one full page:

Press **[CTRL] [L]**

*Advances the paper to the next top of form location, using the page length defined by either of the two preceding commands.*

To advance the paper less than a full page:

Press **[ENTER]**

*Advances the paper one line and prints out an \* with each carriage return.*

Press **[SHIFT] [ENTER]**

*Advances the paper as long as you hold the keys down.*

Press **[CTRL] [A]**

*Advances the paper one-eighth of a line. This is useful when positioning the paper before setting top of form.*



To set form feed and perforation skipping options:

Press **[OP()] [5] [ENTER]**

Most of the items in this dialog concern the report and the information to be included in it. Such items are discussed fully in the Operating Manual.

\* OP # 5

PRINT & POST-RUN LIST OPTIONS

Large font [Y\*/N]:

Store post-run report [Y/N\*]:

List run parameters [Y/N\*]:

List timetable [Y/N\*]:

List calibration [Y/N\*]:

Form-feed before report [Y/N\*]: **Y [ENTER]**

Form-feed after report [Y/N\*]: **Y [ENTER]**

Skip perforations in report [Y/N\*]: **Y [ENTER]**

Skip perforations in plot [Y/N\*]: **Y [ENTER]**

The last four items control paper feed during the plot and report.

The two form feed options cause an advance to the next top-of-page before and/or after printing a report.

Skipping perforations in the plot may only be selected when perforation skipping in the report is also selected.

*For more information about how to use this option, refer to the Operating Manual.*

## Setting the Date and Time

The HP 3395 Integrator contains a calendar and clock, which can be used to label reports and to “time stamp” files.

To list time only:

Type **[T] [I] [M] [E]** and press **[ENTER]**

To list the date and time:

Type **[D] [A] [T] [E]** and press **[ENTER]**

The clock does not run when the integrator is off. Every time you start the integrator you need to reset the date and time.

To set the calendar:

Type **[D] [A] [T] [E]** *mm/dd/yy* **[ENTER]**

where *mm/dd/yy* is the...

month	( <i>mm</i> = 01 to 12)
day	( <i>dd</i> = 01 to 31)
year	( <i>yy</i> = 00 to 99).

For example, 07/04/92 represents July 4, 1992.

To set the clock:

Type **[T] [I] [M] [E]** *hh:mm:ss* **[ENTER]**

*Note: Use individual keys to spell time.  
Do NOT use the functional [TIME] key.*

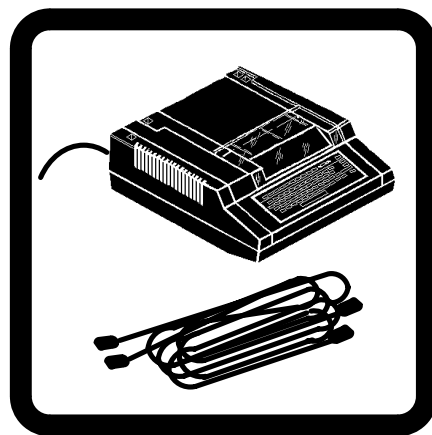
where *hh:mm:ss* represents the 24-hour clock in...

hours	( <i>hh</i> = 00 to 23)
minutes	( <i>mm</i> = 00 to 59)
seconds	( <i>ss</i> = 00 to 59).

The slash (/), colon (:), and comma (,) are all acceptable separators for both date and time.

# Cable Connections

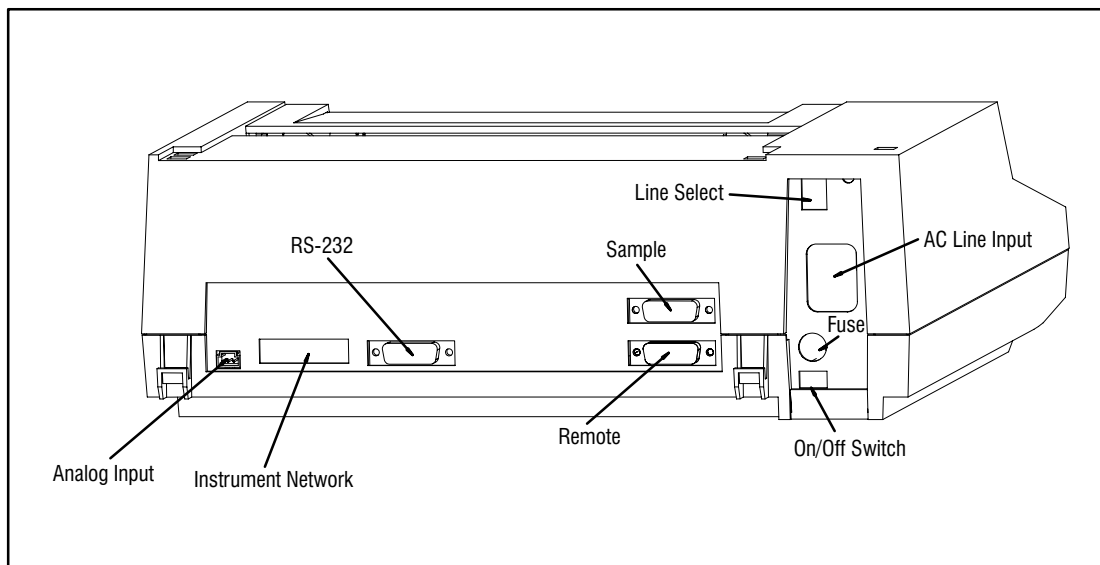
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## In this chapter....

- Installing Signal Cables ..... 3-4
- Installing Sample/Remote Devices ..... 3-6
- Connecting Multiple Devices ..... 3-10
- Installing RS-232-C Devices ..... 3-11

All of the interconnections between the HP 3395 Integrator and other devices are made at the integrator's rear panel.



**Figure 3-1. Integrator Rear Panel Cable Receptacles**

The Instrument Network (HP-IL) connector is non-functioning on the HP 3395 integrator.

Generally, using roll paper provides enough room to connect cables without removing the roll of paper. However, if the z-fold paper and stand are used, the paper will conceal the rear panel's connections. The z-fold paper pack must be removed temporarily from the lower part of the stand and placed on top of the integrator until the cables are connected. Cables should be connected and then routed inside the stand's back edge to either side of the stand. When done, return the paper pack into the lower part of the stand.

It is best to have all of the instruments and devices turned off before you connect any cables.

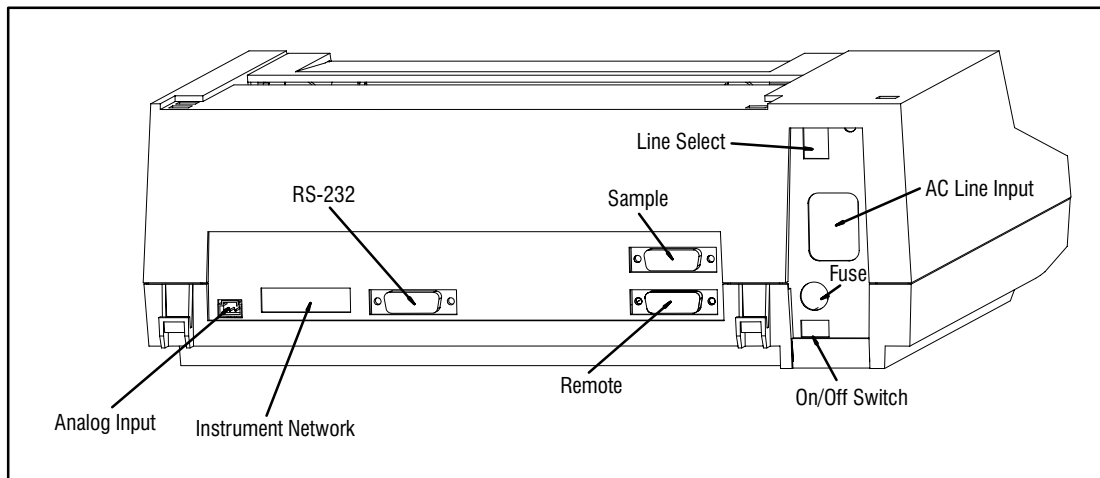
Although there are many cables that can be used to connect various devices with the HP 3395 Integrator, they generally fall into one of four types:

- **Signal Input Cables** Analog signal input cables connect the integrator to chromatographic signal voltages from various analytical instruments.
- **Sample Cables** The sample number (BCD) cable is used to connect an automatic sampler or sequencer to the integrator so that it can obtain sample number data.
- **Remote Cables** Remote control cables are used to communicate readiness to or from other instruments, start other devices, or start and stop the integrator under the control of other instruments.
- **RS-232-C Cables** Data communications RS-232-C cables can be used (when properly configured) to transmit and receive data and commands to a computer and/or other RS-232-C external devices.

*Cable diagrams can be found in part 3 of this manual.*

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## Installing Signal Cables



**Figure 3-2. Integrator Signal Cable Receptacle**

The analog signal input cable is used to connect chromatographic signal voltages from analytical instruments to the HP 3395 Integrator. Generally, the signal is supplied from the instrument's integrator output (rather than the attenuated recorder output).

### Connections to Non-Hewlett-Packard Analytical Instruments

The HP 3395 Integrator has floating (not earth-ground referenced) differential signal inputs. The maximum input signal should be limited to 1 volt.

Verify the signal voltage compatibility of the non-Hewlett-Packard instrument.

**CAUTION**

**The input signal range is -10 mV to +1000 mV. The HP 3395 Integrator is protected against signals not exceeding  $\pm 25$  volts between the + and - signal leads. Between either signal input lead and earth ground, maximum permitted potential is  $\pm 50$  volts.**

The HP general-purpose signal cable (part number 35900-60630) is supplied with the HP 3395 Integrator; however, you can use the general- or special-purpose signal cable to connect the integrator to your equipment.

<b>Connects the HP 3395 Integrator to:</b>	<b>HP Part Number</b>
Non-HP Equipment (general-purpose, spade lug terminations)	35900-60630
Non-HP Equipment (special-purpose, square pin terminations)	35900-60640

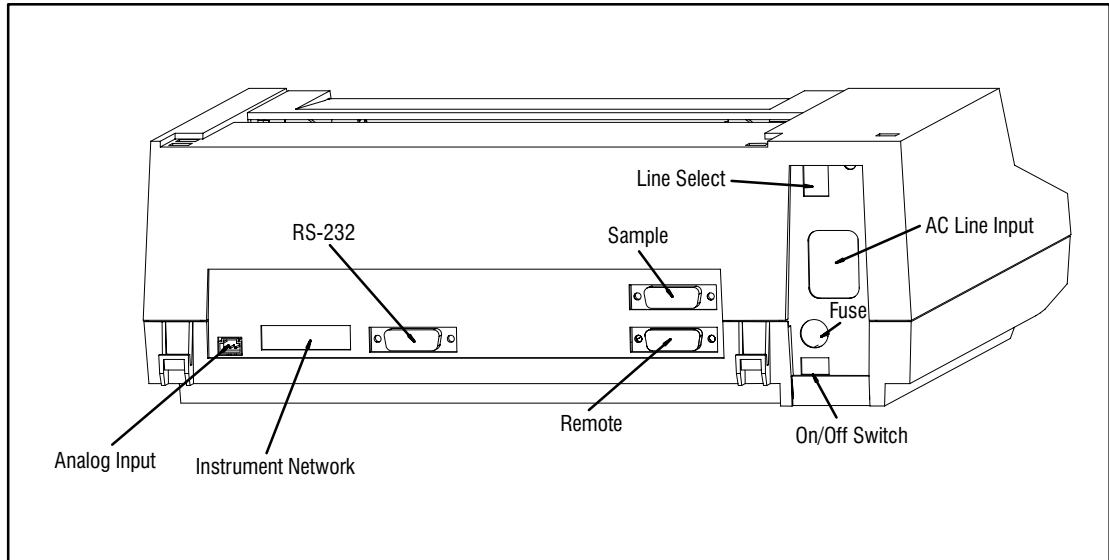
## **Connections to Hewlett-Packard Analytical Instruments**

Install the appropriate cable between the HP analytical instrument's INTEGRATOR output and the HP 3395 Integrator's INPUT receptacle.

<b>Connects the HP 3395 Integrator to:</b>	<b>HP Part Number</b>
HP 5710/30 GCs and HP 1081B UV Detector	35900-60620
HP 5880A GC	35900-60570
HP 5790A GC	35900-60590
HP 1040 Diode Detector and HP 1090A/L LC	35900-60600
HP 5890A and HP 5890 Series II GCs	35900-60610
HP 1046A Fluorescence Detector	35900-60750
HP 6890 GC	G1530-60570

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## Installing Sample/Remote Devices



**Figure 3-3. Integrator Control Cables Receptacles**

Through the remote control cable, the HP 3395 Integrator can:

- be started and stopped under the control of other instruments.
- provide readiness status to other instruments.
- sense the readiness of other instruments.
- start other instruments.

Through the Sample Number (BCD) cable, the HP 3395 Integrator can:

- accept binary coded decimal sample number data from an automatic sampler or sequencer.



## Installing the Sample Number (BCD) Cable

The sample number cable allows the HP 3395 Integrator to accept BCD (binary-coded decimal) sample number data from an automatic sampler or sequencer.

Plug one end of the BCD cable into the 15-pin SAMPLE receptacle on the rear panel of the HP 3395 Integrator.

If the instrument that supplies the BCD information is one of the optional Hewlett-Packard units indicated below, simply plug in the other end of the cable.

<b>Connects the HP 3395 Integrator to:</b>	<b>HP Part Number</b>
HP 7673 Automatic Sampler	03396-60560
HP 1090 LC Auto Sampler	03396-60580
HP 19395A Headspace Analyzer	03396-60570
General-Purpose (spade lug terminations)	03396-60500

If the general-purpose cable (supplied with the HP 3395 integrator) is to be used, refer to the cable diagram in the Service section (Part 3) of this manual. Connect the appropriate wires at the end of the cable to the BCD signal source on the sampler or sequencer.

## Connecting a Remote Control Cable to Hewlett-Packard Equipment

Install the appropriate optional cable between the REMOTE receptacle on the back of the HP 3395 Integrator and the Hewlett-Packard instrument.

<b>Connects the HP 3395 Integrator to:</b>	<b>HP Part Number</b>
HP 57XX GCs	03396-60620
HP 5890A or HP 5890 Series II (analog output)	03394-60560
HP 5890 GC with an HP 19395A (Y-cable)	03394-60610
Second HP 3394 or 3395 Integrator	03394-60580
HP 1040 Diode Detector and HP 1090A/L LC	03396-60650
HP 1046A Fluorescence Detector	03394-60600
HP 6890 6C	03396-61010

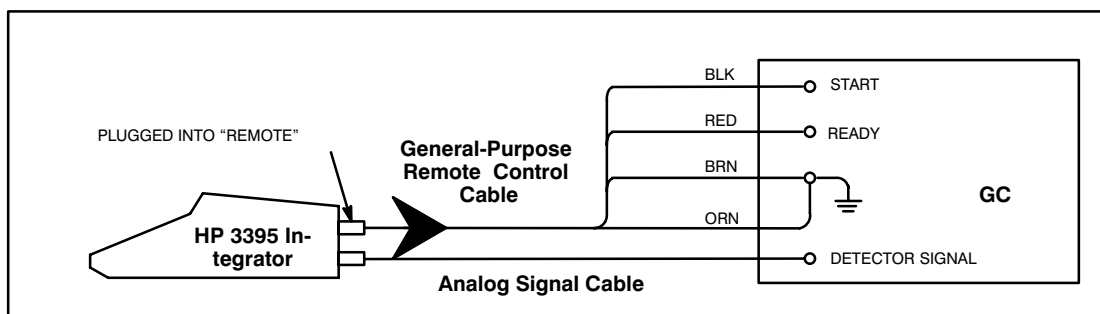
## Connecting a Remote Control Cable to Non-Hewlett-Packard Units

Install the general-purpose remote control cable (supplied with the HP 3395 Integrator) for non-HP equipment between the REMOTE receptacle on the back of the integrator and the non-HP analytical instrument.

Connects the HP 3395 Integrator to:	HP Part Number
Non-HP equipment (spade lug terminations)	03394-60540

Determine which instrument will be the “controller.”

If the HP 3395 Integrator is to supply the “start,” one example of how the cable may be installed is shown below.



**Figure 3-4. Remote Control Cabling**

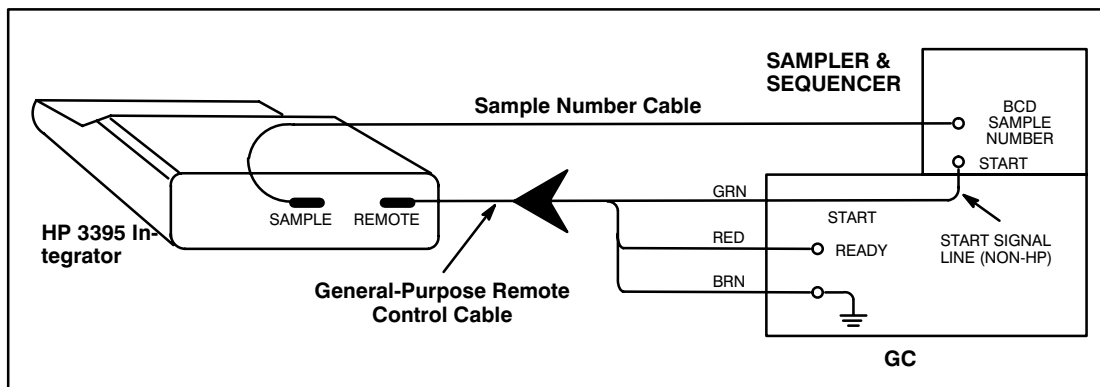
When [START] is pressed on the integrator, a one-second contact closure will be provided to the GC between the black (BLK) to orange (ORN) leads.

### NOTE

**Non-HP chromatographs used in temperature-programmed applications MUST be capable of having their oven temperature programmers started remotely by a one-second contact closure for properly automated operation under control of the HP 3395 Integrator.**

If you perform temperature-programmed analyses, the chromatograph also may be equipped with oven-ready sensing. If the oven-ready sensing function is not available, or is not used, the HP 3395 Integrator assumes the oven is *always ready*.

If the GC (or sampler) is to supply the “start” to the HP 3395 Integrator, one example of how the cable may be installed is shown below.



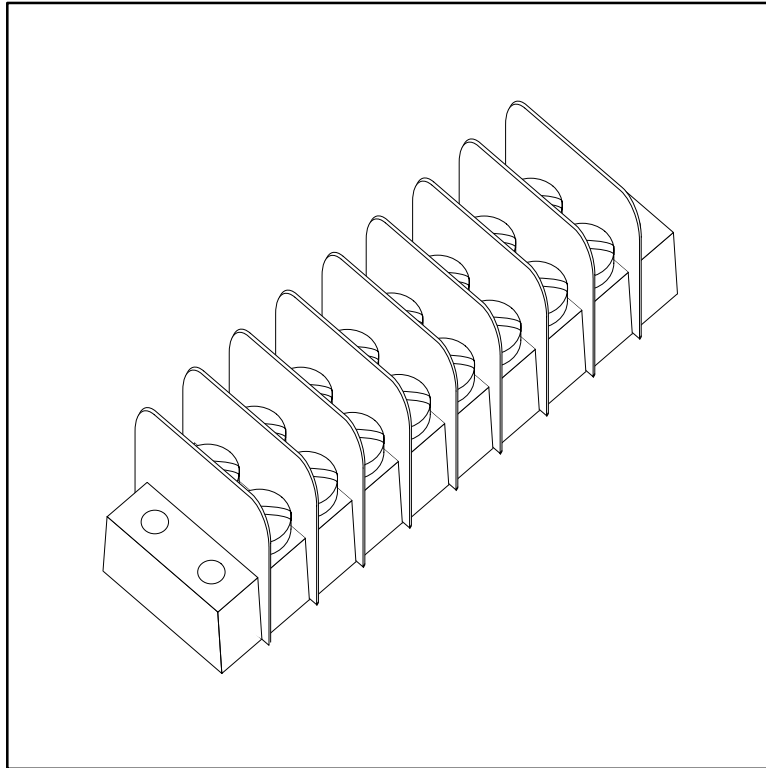
**Figure 3-5. A Simple Automated System**

Whenever the non-HP cable is to be used, refer to the cable diagram in the service section (Part 3) of this manual. Connect the appropriate wires at the end of the cable to the BCD signal source on the sampler or sequencer.

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## Connecting Multiple Devices

A ten pair terminal block is supplied with the HP 3395 integrator to be used when connecting more than one device. Simply connect individual wires from different cables to a common terminal position on the block.



**Figure 3-6. Terminal Block**

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## Installing RS-232-C Devices

The RS-232-C link is a single-cable, bidirectional interface that conforms to Electronic Industries Association (EIA) standards. The HP 3395 Integrator can be connected via RS-232-C link to a computer and other external devices to send and receive data and commands.

Communications between an HP 3395 Integrator and an external computing device require programs to be running on the host computer to operate the RS-232-C link. HP Peak-96 is the Hewlett-Packard product that allows an IBM-compatible personal computer to control the HP 3395 Integrator.

Operation in REMOTE mode gives the host potentially full control of the HP 3395 Integrator. A host device may acquire control of the HP 3395 Integrator any time except when the HP 3395 Integrator is:

- executing a command
- in the midst of a run
- printing

This chapter does not provide detailed operating and programming instructions for the range of other possible host computers. This information is contained in the *RS-232-C Programmer's Guide* (03396-90335).

The RS-232-C hardware includes the “RS232” connector on the rear panel, and the choice of the DTE (male) cable, or the DCE (female) cable. The HP 3395 Integrator can be configured to be Data Terminal Equipment (DTE), the terminal end of the RS-232-C interface, or Data Communication Equipment (DCE), the modem end of the interface, whichever is appropriate. The cable determines the mode of operation.

**CAUTION**

**The HP 3395 cannot function as a general-purpose terminal.**

RS-232-C Interface installation involves:

1. Choosing the proper cable.
2. Connecting the cable.
3. Setting the configuration switches.
4. Matching RS-232-C protocol.

## Choosing the Proper Cable

The physical connection for the RS-232-C link is made by a cable with a 15-pin male connector to the COMPUTER receptacle on the rear panel of the HP 3395 Integrator. Since the HP 3395 Integrator can be configured as either Data Terminal Equipment (DTE) or Data Communications Equipment (DCE), two different cables may be used.

### RS-232-C Cables

<b>Cable Option # (Part Number)</b>	<b>Description</b>	<b>HP 3395 Integrator Mode</b>
301 (03396-60520)	15-pin connector to 25-pin female "D" RS-232-C connector	DCE
302 (03396-60510)	15-pin connector to 25-pin male "D" RS-232-C connector	DTE
303 (03396-60530)	15-pin connector to 9-pin female "D" RS-232-C connector	DCE
304 (03396-60520) (HP 92224M)	15-pin connector to 25-pin female "D" RS-232-C connector male-to-male converter	DCE

The most straightforward way to connect two devices is to determine which device transmits its data on which connector pin. Then make sure the other device receives data on that pin. (In most cases only pins 2, 3, and 7 are used.)

The HP 3395 Integrator implements the RS-232-C functions shown below.

### RS-232-C Functions Implemented on the HP 3395 Integrator

Connector			Mnemonic	Description	Direction
25-pin (DTE)	25-Pin (DCE)	9-Pin (DCE)			
1	1	-	AA	Protective Ground (Shield)	--
2	3	2	BA	Transmitted Data	DTE → DCE
3	2	3	BB	Received Data	DCE → DTE
4	4	7	CA	Request to Send	DTE → DCE
5	5	8	CB	Clear to Send	DCE → DTE
-	6	6	CC	Data Set Ready	DCE → DTE
7	7	5	AB	Signal Common	--
-	8	1	CF	Received Line Signal Detector	DCE → DTE
-	20	4	CD	Data Terminal Ready	DTE → DCE

**CAUTION**

**Voltages applied to any RS-232-C connection must not exceed 25V peak with respect to signal common, or damage to the HP 3395 Integrator may result.**



## DTE or DCE?

The needs of the RS-232-C device being connected to the HP 3395 Integrator determine which cable and configuration are used. When a DCE device, such as a modem, is being connected, the HP 3395 Integrator is configured as DTE and uses the DTE cable. When the DCE cable is used, the HP 3395 Integrator looks like a modem to DTE devices.

The HP 3395 Integrator DTE cable has a male 25-pin “D” connector. When the HP 3395 Integrator has the DTE cable connected, it behaves as a DTE device. The connected device must be a DCE device, transmitting on pin 3 (BA) and receiving on pin 2 (BB).

There are two DCE cables for the HP 3395 Integrator. One (03396-60520) has a female 25-pin “D” connector. Use this cable to connect the HP 3395 Integrator to a DTE device, transmitting data on pin 2 (BB) and receiving on pin 3 (BA). The other DCE cable (03396-60530) has a female 9-pin “D” connector. Use this cable to connect the HP 3395 Integrator to a DTE device, transmitting data on pin 3 (BA) and receiving on pin 2 (BB).

By RS-232-C convention, all DCE devices should have a FEMALE 25-pin “D” connector associated with them, and all DTE devices should have a MALE 25-pin “D” connector associated with them. However, many manufacturers use custom connectors or, to avoid male bulkhead fittings, use female connectors on their DTE devices and provide a male-to-male cable. Therefore, just looking at the connector on the RS-232-C device is not a reliable way to determine which cable you should use. In addition not all RS-232-C devices clearly show whether they are DTE or DCE. Some may be switchable as well (such as the HP 3395 Integrator).

Consult the reference material provided with your RS-232-C device to be sure that the HP 3395 Integrator cable you received is the appropriate one. The signals shown in the table on the previous page should match so that an output from the HP 3395 Integrator is connected to the appropriate input on the RS-232-C device and vice versa. The connectors should be of opposite gender. The HP 3395 Integrator and the RS-232-C device should operate properly if these two conditions are met.

If these conditions are not met and the output and input signals do not match or the connectors are not opposite in gender, customized cables, or adapters are required.

## Customizing Cables

You may find that the signals with the same mnemonics in both instruments are matched input to output, but the connector gender is the same in both instruments (both male or both female); then you need a gender-changing adapter. Gender-changing adapters are either male-to-male or female-to-female adapters with the pins connected straight through (#1 to #1, etc.).

On the other hand, you may find that the signals with the same mnemonic in both devices are the same, i.e., both inputs or both outputs. You will need an adapter to cross-connect the devices. Such adapters for DTE devices (both devices transmitting data on Pin 2, both with male connectors) are called modem-eliminator or null-modem adapters. They cross-connect the commonly used DTE signals so that the needs of two DTE devices may be satisfied.

With the following set of adapters, you should be able to conquer almost any RS-232-C situation:

- male-to-male straight through (HP 92224M), to change gender,
- female-to-female straight through (HP 92224F), also to change gender,
- modem-eliminator or null-modem, usually female-to-female, to allow two DTE devices to be connected together.

It is also possible that you may need a combination of cross-connecting and gender-changing adapters. Similar adapters can be constructed or purchased for other combinations of connectors and device types.

## Connecting the Cable

**CAUTION**

**Connecting the HP 3395 Integrator RS-232-C cable to incompatible instruments may damage either the HP 3395 Integrator, the external device, or both. Be sure that your computer or peripheral conforms to EIA Standard RS-232-C.**

After you have determined that your external device meets EIA Standards for RS-232-C, follow the steps below to connect your cable.

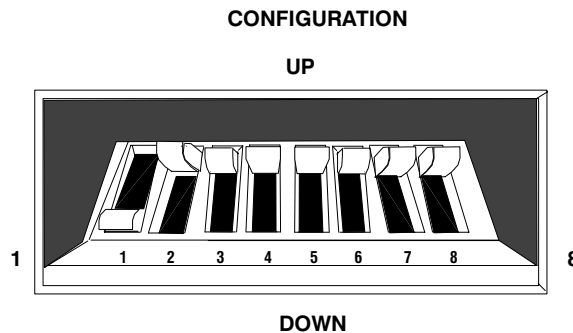
1. Choose the appropriate DCE or DTE RS-232-C interface cable.
2. Plug the DTE or DCE cable into the connector labelled “COMPUTER” on the rear panel of the HP 3395 Integrator.
3. Plug the opposite end of the cable which has a 9- or 25-pin “D” connector into the RS-232-C input jack on the external device.

## Setting the Configuration Switches

A bank of eight switches located under the keyboard allows selection of the following configuration parameters:

- data rate (from 150 to 19,200 baud),
- hardware handshaking CA/CB (Request to Send, Clear to Send), and
- duration of handshake timeouts (short—15 seconds, or long—3 minutes).

The figure below shows the switches as they are set at the factory.



RS-232-C Switch Settings				Data Rate Table			
Switch	UP	DOWN	Function	Rates	Switch		
1.	_____		Data Rate (see table)	(BAUD)	1	2	3
2.	_____		Data Rate (see table)				
3.	_____		Data Rate (see table)				
4.	Disable	Enable	Hardware Handshake	19200	UP	UP	UP
		(CA/CB)		9600	DOWN	UP	UP
				4800	UP	DOWN	UP
5.	Off	30 msec	Handshake Delay	2400	DOWN	DOWN	UP
6.	15 sec	3 m in	Timeout	1200	UP	UP	DOWN
7.			Not Used	600	DOWN	UP	DOWN
8.			Not Used	300	UP	DOWN	DOWN
				150	DOWN	DOWN	DOWN

1. Set the switches to indicate the desired data rate, to enable or disable CA/CB hardware handshaking, and to select a timeout duration as shown previously.
2. Press the [CTRL] and [BREAK] keys simultaneously to allow the integrator to recognize the new settings.

## The RS-232 Configuration Switches

The RS-232 default configuration switch settings are set at the factory. The eight switches are located under the keyboard of the HP 3395. The configuration parameters are:

- data rate (from 150 to 19,200 baud),
- hardware handshaking CA/CB (Request to Send, Clear to Send),
- duration of handshake timeouts (short—15 seconds, or long—3 minutes).

The default settings can be changed by removing the keyboard and physically changing the settings. The operating parameters can be changed with the **SSET RS232** dialog without opening the cabinet (see below), and will remain in effect until a cold start occurs.

## Changing the Default RS-232 Configuration Switches

1. Turn off and unplug the HP 3395.
2. Remove the keyboard by prying it off from the bottom. Be gentle with the keyboard. You can move it aside to locate the switches without unplugging the keyboard cable.
3. Locate the RS-232 switches. They are in a red panel at the lower right hand corner.
4. Set the switches to the desired configuration.
5. Replace the keyboard.
6. Plug in and turn on the integrator.

7. Check to be sure you have the settings you want by typing [S][Y][ENTER].

## Changing the RS-232 Settings with the SSET RS232 Command

The SSET RS232 keyboard dialog overrides the RS-232 switch settings.

To change the settings in the SSET RS232 dialog, type SSET RS232 in system command mode. (You are in system command mode whenever the \* prompt is present.) An example dialog is shown below.

**\* SSET RS-232 [ENTER]**

RS-232 PARAMETERS

BAUD [150/300/600/1200/2400/4800/9600\*/19200]: 19200 **[ENTER]**

1. Press ENTER to retain the current setting of 9600; type in the numerals for any other setting and then press ENTER.

TIMEOUT.....Long (180 sec), Short (15 sec) [L/S\*]: **L[ENTER]**

2. Press ENTER to retain the current Short setting; type L and press ENTER to change the setting to Long.

HANDSHAKE DELAY.....Enabled (30 ms), OFF [E/O\*]: **[ENTER]**

3. Press ENTER to retain the current setting of OFF; type E and press ENTER to change the setting to Enabled.

HARDWARE HANDSHAKE.....Enabled, Disabled [E/D\*]:  
**D[ENTER]**

4. Press ENTER to retain the current setting of Enabled; type D and press ENTER to change the setting to Disabled.

Remember that the settings will return to the default settings whenever a cold start occurs unless you change the physical settings of the switches (see instructions, above). BASIC can be used to change the parameters using PEEK and POKE. See the HP 3396 *BASIC Language Manual* for more information.

## Listing the Switch Settings

You may list the current setting of the RS-232-C configuration switches by pressing

**[S] [Y] [ENTER]**

Shown below is the HP 3395 Integrator listing of factory-set values for the RS-232-C switches.

RS-232-C	SWITCH SETTINGS
Baud	9600
Timeout	15 sec
Handshake Delay	Off
Hardware Handshake	Disabled

Use the descriptions below and the manual for your RS-232-C device to decide if any configuration switches need to be set.

## **Data Rate Switches 1,2,3**

The data rate is the number of bits per second (or baud) transmitted by the link. Switches 1 to 3 allow you select the rate your equipment can handle. For RS-232-C, the available rates are 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud. The HP 3395 Integrator rate must be set equal to the rate that the external device is using. For applications in which only reports, processed peak data, setpoints, methods, sequences, and calibrations are to be transmitted, any transmission rate from 150 to 19200 baud is acceptable.

If you plan to transmit raw (unbunched) data directly from the HP 3395 Integrator to the external device, you must select a rate greater than or equal to 2400 baud.

## **Hardware Handshake Switch 4**

Switch 4 enables or disables the hardware handshake—Request to Send/Clear to Send (CA/CB) for DTE operation of the HP 3395 Integrator. Handshaking is a timing feature provided to allow external devices to hold off HP 3395 Integrator transmissions in conversation mode with signals on the CB line.

If hardware handshaking is enabled, the HP 3395 Integrator turns CA ON before each buffer of data is to be transmitted. It then checks CB. If CB is ON, the HP 3395 Integrator transmits the data; otherwise it waits for the external device to turn CB ON before transmitting the data. The HP 3395 Integrator will wait only until the end of the timeout period, which is determined by switch 10, for the external device to turn CB ON. If the external device does not turn CB ON, the HP 3395 Integrator will time out and revert to default protocol. However, the HP 3395 Integrator cannot itself disable hardware handshaking, so if the remote device continues to be unresponsive, the HP 3395 Integrator will time out repeatedly. If the external device responds to the hardware handshake before the end of the timeout period, the HP 3395 Integrator turns off CA at the end of a data transmission and the process starts again.



If you wish to use this feature, you **MUST** use the DTE cable regardless of the device type of the external instrument. You may have to make an adapter to use the DTE cable and connect the correct RS-232-C signals together. (See *Customizing Cables*.) Whenever the DTE cable is used, either the external device must implement the CA/CB handshake or you must disable the handshake or, again, the HP 3395 Integrator will timeout repeatedly when host communication is attempted.

## **Handshake Delay Switch 5**

Switch 5 may be set to force the HP 3395 Integrator to wait 30 milliseconds after receiving each handshake response before actually transmitting. This provides for host computers which may acknowledge a handshake quickly but are not immediately ready to receive. This delay applies to all handshakes.

## **Timeout Duration Switch 6**

Switch 6 may be set for short (15-second) or long (3-minute) timeouts, depending upon the response time of the computer to be connected. The HP 3395 Integrator aborts unfinished communications and returns to the default protocol if it receives no handshake response from the computer before the timeout period ends. One or more of the handshake options—hardware RS-232-C CA/CB (Request to Send/Clear to Send), Remote (ENQ/ACK), or Read Sequence—must be active for the timeout to be in effect.

The timeout only applies if a handshake response is expected in conversation mode and does not arrive within the timeout window. The HP 3395 Integrator will wait indefinitely for the host computer to send messages if the pause occurs when no handshake response is expected.

## **Switches 7 and 8 are not used**

## Matching RS-232-C Protocol

For RS-232-C communications to be completed successfully, the protocol for the remote device must match the HP 3395 Integrator protocol. Protocol is the set of conventions that determines the format and relative timing of the message exchange between the remote device and the HP 3395 Integrator. When using the DTE cable, set up your remote RS-232-C device to match the HP 3395 Integrator default protocol. The default protocol is listed below:

### Default RS-232-C Protocol

Default Parameter	Setting	Meaning
Parity	OFF	The parity bit in the character frame is set to zero for transmitted characters, and is not checked for received characters.
Echo	OFF	Characters received by the HP 3395 Integrator are not returned (echoed) back to the sender.
Local Handshake	ON	When the HP 3395 Integrator receives an Enquire ( $\epsilon_0$ ) character, it transmits an Acknowledge ( $\Lambda_K$ ) character.
Remote Handshake	OFF	The HP 3395 Integrator sends no Enquire and expects no Acknowledge character. Data are sent with no handshake, one line at a time.
Maximum Buffer Size	80	The maximum number of characters the HP 3395 Integrator can send or receive in a single transmission, excluding the conversation and stage mnemonics, checksum, handshake characters, and termination sequence.
Remote Device Capabilities	MUTE	The HP 3395 Integrator does not expect the remote device to respond to messages. The remote device may send configuration commands if it is able.
Local Termination Sequence		Messages from the HP 3395 Integrator will be terminated by a Carriage Return character followed by a Line Feed character. ( $c_{R^L F}$ )
Remote Termination Sequence		The HP 3395 Integrator expects messages from the host to be terminated by a Carriage Return character followed by a Line Feed character. ( $c_{R^L F}$ )
Read Sequence	NONE	The HP 3395 Integrator does not wait for a special character sequence during a read operation before transmitting.
Checksum	NONE	The HP 3395 Integrator will not include a checksum between the text and the termination sequence.

# Routine Maintenance

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## In this chapter....

- Exterior Cleaning ..... 4-2
- Removing/Reloading Paper ..... 4-3
- Maintaining the Printer ..... 4-5

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## Exterior Cleaning

1. Periodically wipe clean the exterior of the case and printer window with a slightly damp cloth.

*Avoid using chemical spray cleansers and organic-based detergent solutions and solvents when cleaning the integrator case.*

2. At least once every six months inspect the ventilation grills along the right side of the HP 3395 Integrator and under the left-hand corner of the keyboard.

Clean the grills as necessary with a vacuum cleaner to remove dust and other obstructions.

---

## Removing/Reloading Paper

Paper must be reloaded whenever the paper supply runs out or if the paper is intentionally removed for some other reason, e.g., if it is accidentally torn.

When the instrument runs out of paper, the HP 3395 Integrator will print

OUT OF PAPER: FEED W/ENTER, RESUME W/ESC .

### Removing Paper From the Printer

1. Find a line of perforations between the roll and where it enters the printer mechanism. Tear along the perforations.
2. Open the printer window, lift the bail arms forward, and pull the remaining sheets of paper up and out of the mechanism.
3. If a low pressure air supply is readily available, it sometimes helps to blow air directly into the print mechanism to remove any small, loose particles of paper from the area. Removing the paper separator will provide improved access to the area. Replace the paper separator when completed.

## Reloading Paper

The paper should be positioned on the rear of the top flat surface of the integrator with the PRINT THIS SIDE facing down against the surface. After rotating around the roller, the PRINT THIS SIDE will be correctly positioned facing up.

1. Remove the printer window by lifting it up and toward yourself.
2. Pull both bail arms forward to their open positions.
3. Insert the paper into the slot under the paper separator. (It may be helpful to pull the paper separator forward temporarily until the paper is inserted.) Ensure that the edges of the roll of paper are flat and even.
4. Push the paper under the roller until its edge passes above the bail arms.
5. Align the holes in the left edge of the paper with the sprockets of the left pin wheel.
6. If necessary, adjust the right pin wheel to the width of the paper. It can move sideways to accommodate for minor differences in paper widths. Align the holes in the right side of the paper with the sprockets of the right pin wheel.

Be certain that the paper is straight and that both sides are even.

7. Push the bail arms back to their closed positions, locking the paper in position against the roller.

Verify that the paper's PRINT THIS SIDE is correctly positioned on the side of the paper toward the print cartridge. Replace the printer window.

8. Press **[SHIFT] [ENTER]** to feed the paper through the printer mechanism.

After paper has been reloaded, the green KEYBD indicator will continue to flash and the keyboard will be locked.

9. Press **[ESC]** to resume normal operation.

---

## Maintaining the Printer

### CAUTION

**Never move the print carriage while the power is on. Doing so may cause damage to your printer. If you need to move the carriage, turn off the power and then slowly move it to the desired position.**

## Replacing the Blotter Pad

Replacing the blotter pad is the same procedure as its installation except that the old blotter must be removed first.

1. Remove the printer window.
2. Open the bail arms.
3. Turn the power off, then move the carriage away from the blotter.
4. Insert the tip of a pencil into the hole at the top of the blotter. Pull the pad up and away from its holder. Discard the used blotter.
5. Follow the installation instructions in chapter 2 for inserting the new pad.

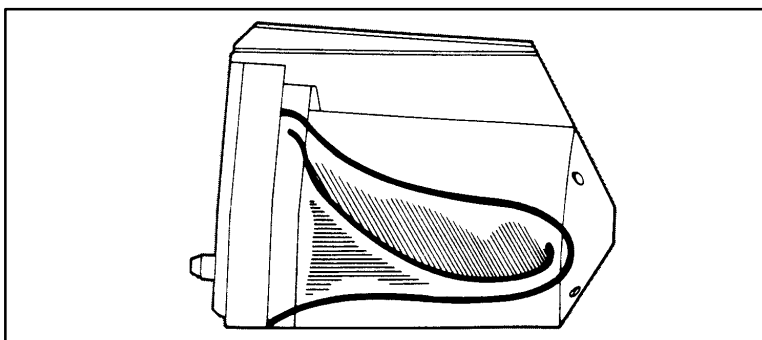
## Checking the Print Cartridge

Checking the print cartridge involves checking that the cartridge contains enough ink and that the ink flows easily. Chapter 2 of this manual provides instructions describing how to prime the cartridge and how to install a new cartridge should this prove necessary.

To check the ink level in a cartridge:

1. Remove the printer window.
2. Pull down the carriage cradle latch.
3. Remove the print cartridge.
4. Examine the print cartridge to determine the amount of ink in it.

*If the bladder looks deflated like the one in the illustration below, it is low on ink and should be replaced.*



**Figure 4-1. Empty Print Cartridge**

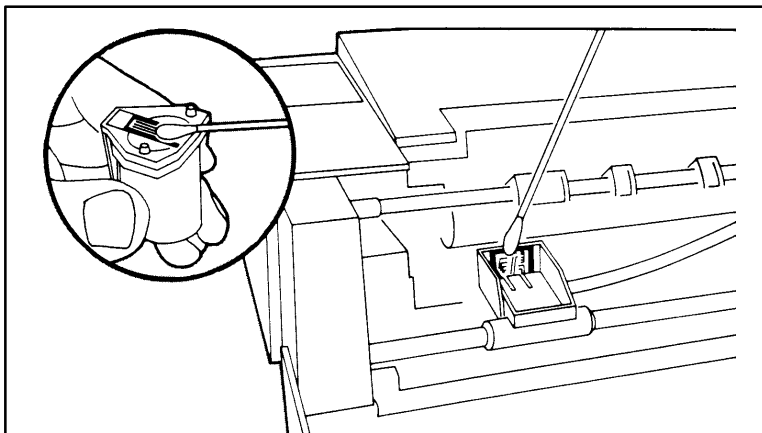
5. If the bladder is low on ink, you should install a new print cartridge; see chapter 2.

If the bladder is not empty, the cartridge may need priming. When a print cartridge is new, clogged, or has been mechanically jarred, it often requires priming. Refer to chapter 2 for the priming procedure.



## Cleaning the Carriage Contacts

If ink has seeped out of the cartridge onto the carriage, clean the carriage contact points with a swab dampened with water.



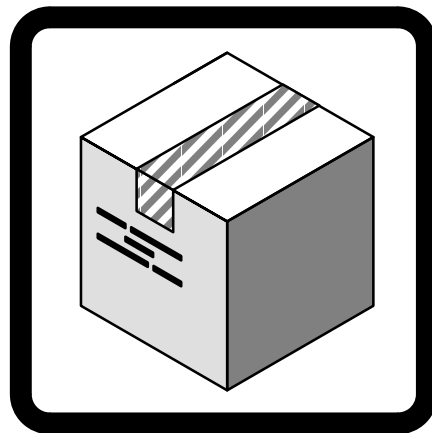
**Figure 4-2. Cleaning the Nozzles and Carriage Contacts**

Wipe the print cartridge face (nozzles) with a soft cloth or lint-free tissue.



## Obtaining HP Service

---



### In this chapter....

- Filling Out the Repair Information Form ..... 5-2
- Returning Your HP 3395 Integrator for Repair ..... 5-5
- Repacking Your Unit for Shipment ..... 5-6
- Obtaining On-Site HP Service ..... 5-7

---

## Filling Out the Repair Information Form

The Repair Information Form *must* be filled out completely and included with your HP 3395 Integrator when the unit is returned to HP for repair.

Hewlett-Packard *cannot* begin repairing your integrator without a completed Repair Information Form.

The form is included in the Customer Information Envelope when the HP 3395 Integrator is first shipped from the factory.

A new blank form will accompany your HP 3395 Integrator when it is returned to you repaired. Blank forms can also be obtained by calling your nearest HP Sales and Service Office.



HEWLETT  
PACKARD

## REPAIR INFORMATION FORM

For return-to-HP repair, please fill out this form and enclose it with your shipment.  
This information will facilitate and expedite the repair.

### WHO IS RETURNING THE EQUIPMENT?

Company/Institution \_\_\_\_\_ Date \_\_\_\_\_

Person to Contact \_\_\_\_\_ Phone \_\_\_\_\_

Alternate Contact \_\_\_\_\_ Phone \_\_\_\_\_

Return Shipping Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### HOW WILL THE REPAIR BE PAID FOR?

Check one of the three boxes and fill in the information in that section:

**Warranty:** Received/Installed Date \_\_\_\_\_

**Maintenance Contract:** Contract No. \_\_\_\_\_

**Order:** Purchase Order No. \_\_\_\_\_

*Except for contract and warranty repairs, a purchase order number and/or authorized signature must accompany your request for service. (If standard repair prices do not apply, a purchase order for the quoted price is required. Standard repair prices may be obtained by contacting the Field Repair Center.)*

Authorized Signature \_\_\_\_\_ Phone \_\_\_\_\_

Billing Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### WHAT IS BEING SENT?

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

Be sure that you have followed the troubleshooting and test procedures described in the manual.  
Enclose any printouts that help to show the failure.

*Do not ship accessories which are not required to complete the repair (power cord, manuals, cables, etc.).*

**WHAT SEEMS TO BE WRONG?**

1. Describe how the failure appears. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. Perform the confidence tests described in the manual. Which test, if any, produced a failure? \_\_\_\_\_  
\_\_\_\_\_
3. If failure is intermittent, how long does it take between failures? \_\_\_\_\_  
\_\_\_\_\_
4. List the system that this instrument is a part of. \_\_\_\_\_  
\_\_\_\_\_
5. Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**THANK YOU.**

**HP ANALYTICAL FIELD REPAIR CENTERS**

IN THE USA:  
NORTH AMERICAN FIELD REPAIR CENTER  
Hewlett-Packard Company  
Little Falls Site (4300)  
2850 Centerville Road  
Wilmington, DE 19808

IN WEST GERMANY:  
HEWLETT-PACKARD GmbH  
Reparaturzentrum Analytische Messtechnik  
Ermis-Allee  
D-7517 Waldbronn 2  
Phone: 7243-6021

ELSEWHERE:  
Contact your local HP Analytical Sales and  
Service Office for information.

35900-90200

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## Returning Your HP 3395 Integrator for Repair

- In the United States:
  1. Fill out both sides of the Repair Information Form completely.
  2. Attach a copy of the form to the HP 3395 Integrator.
  3. Pack the unit securely (see “Repacking Your Unit for Shipment” on the next page).
  4. Use the peel-off address label (also included in the customer information envelope) and affix it to the outside of the shipping carton.

**REPAIR LABEL FOR U.S.A. CUSTOMERS ONLY**

Ship To: **HEWLETT-PACKARD CO.  
LITTLE FALLS SITE (4300)  
2850 CENTERVILLE ROAD  
WILMINGTON, DE 19808**

**NORTH AMERICAN  
FIELD REPAIR CENTER**

PEEL LINER BACK TO RELEASE SHIPPING LABEL

**Figure 5-1. Return Shipping Label**

- Elsewhere:
  1. Fill out both sides of the Repair Information Form completely.
  2. Contact your nearest HP Sales and Service Office for instructions on getting your unit returned for repair. A complete list of offices is included in the back of this manual.
  3. Attach a copy of the form to the HP 3395 Integrator.
  4. Pack the unit securely (see “Repacking Your Unit for Shipment”).
  5. Send the unit to an HP-designated service facility.

---

## Repacking Your Unit for Shipment

1. To prepare the HP 3395 Integrator for shipment, remove paper from the printer mechanism and unsnap paper roll holders from the rear of the instrument. Remove the print cartridge from the print carriage.
2. To repack your HP 3395 Integrator for shipment, we recommend that you use the original shipping container. If the original packing materials are not available, be sure to use a carton of at least 250-pounds test. Pack the HP 3395 Integrator with at least two inches of padding on all sides.
3. Do not include any operating accessories (including cables) with the HP 3395 Integrator unless the problem relates to an accessory.
4. On the Repair Information Form, be sure you detail the following items when you return your HP 3395 Integrator for repair:
  - A description of the exact configuration at the time of the malfunction, including the interface cable, computer, peripherals, and software in use.
  - A brief description of symptoms for service personnel, including any printout that shows what happened.
  - The serial number of the HP 3395 Integrator (located on the lower left portion of the rear panel).
  - Include your name, address, and a phone number at which you may be reached during the day.
5. Attach the Return Shipping Label originally packed in the Customer Information Envelope to the outside of the shipping carton.
6. Since in-transit damage is not covered by the warranty, we suggest that you always insure shipments.



---

## Obtaining On-Site HP Service

On-site service of your HP 3395 Integrator is available on a time-and-material basis or under a maintenance agreement.

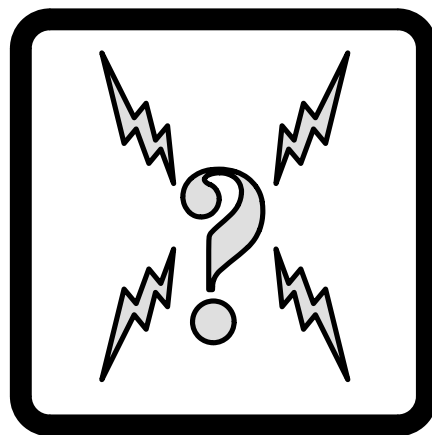
To request on-site service:

1. Fill out the reverse side of the Repair Information Form.
2. Call your local HP Sales and Service Office as listed in the back of this manual. Have the following information available
  - Model number: HP 3395
  - Instrument Name: HP 3395 Integrator
  - Serial number: From label on the rear of the instrument.
  - Information from the reverse side of the Repair Information Form.



# Troubleshooting

---



## In this chapter....

- Power Problems ..... 6-2
- Signal Problems ..... 6-6
- System Problems ..... 6-9
- Running Cold-Start Self-Tests ..... 6-13

---

## Power Problems

### No Response at Initial Power On (Unit Does Not Function)

#### *Probable Causes*

- Voltage selection switch set improperly. (Instrument set to 115 V and plugged in to a 230 V circuit.)
- Power is not available to HP 3395 Integrator.
- Fuse is blown.

#### *Suggested Actions*

1. Check that the line voltage selection switch on the rear panel is set to the proper voltage value (either 115 V or 230 V).
2. Check that the power cord is connected between the integrator and a live ac power source.

If the wall receptacle is “dead,” contact your local electrician.

3. Check that the rear panel power switch is ON.
4. Check that the integrator’s fuse is of the proper 3-ampere value and is not blown.

## Checking the Fuse

The fuse is located near the power switch on the rear panel of the HP 3395 Integrator.

1. Turn the power switch on the rear panel OFF.
2. Disconnect the line power cord from both the wall receptacle and the rear of the integrator.

### WARNING

**FAILURE TO REMOVE THE POWER CORD FROM THE INTEGRATOR COULD RESULT IN ELECTRIC SHOCK AND PERSONAL INJURY.**

3. Locate the fuse cap below the AC LINE socket.
4. Insert a small flathead screwdriver into the fusecap. Pushing in slightly, turn the fuse cap counterclockwise to free it.
5. Remove the fuse and visually inspect it. The wire inside the fuse should be unbroken. If the wire is broken, the fuse is defective.
6. If the fuse looks okay, reinstall it and look elsewhere for the problem. If the fuse is defective, replace it with a new fuse (3A, 250 VAC, IEC 127 Type F, quick-acting, 3AG).

### CAUTION

**If fuse blows a second time, contact HP service.**

## **“Power Failed” Messages Appear After Working**

### ***Probable Causes***

- Incorrect ac line voltage selection. (Integrator is set to 230 V and connected to a 115 V circuit.)
- Poor line power supplied.

### ***Suggested Actions***

1. If the line voltage selection switch on the rear panel is set improperly, change it.
2. Have an electrician check the line power for noise and/or surges.

## COMM Indicator Light Blinks After Initial Turn On Tests Are Complete

### *Probable Causes*

- DATACOMM switches set incorrectly.
- Faulty cable connection.

### *Suggested Actions*

1. Are the DATACOMM switches set correctly? If a host computer is not connected to the integrator, set the timeout duration switch to “short.” This is about 15 seconds. \*
2. Is the cable connector in the REMOTE port seated properly?

\* NOTE: If switches are changed, the integrator must either be power cycled or [CTRL] [BREAK] for the new settings to be read.

---

## Signal Problems

### Data Represents a Zero or Straight Baseline, or is Pinned at Maximum Value With Analog Signal

#### *Probable Causes*

- Signal switch on rear panel is in wrong position.
- Problem with chromatograph.
- Cabling problems.

#### *Suggested Actions*

1. Is the analog channel set correctly with the SSET ANALOG command?
2. Is the instrument supplying the signal operating properly?
3. Is the signal within the range of -10 mV to +1 V?
4. If a general-purpose signal cable is being used, are the connections to the signal source correct?
5. Disconnect the HP 3395 Integrator from other equipment, then turn to “Running the Self-Test Diagnostics” in chapter 7 of this manual.
6. Run test L, the Print/Plot test.
  - If the test passes, run A/D test.
  - If the test fails, obtain HP service.
7. Run test B, the A/D Test.
  - If test passes, run 0V and 1V tests.
  - If test fails, obtain HP service.
8. Turn to “Running the Signal Tests” and run the 0V and 1V Tests.
  - If tests pass, there is a chromatographic or cabling problem.
  - If tests fail, obtain HP service.



## Excessive Noise or Drift on Chromatogram

### *Probable Causes*

- Signal source malfunction or improper control settings.
- Signal itself drifts or is noisy (problem with chromatograph).
- Cabling problem.

### *Suggested Actions*

1. Is the instrument supplying the signal operating properly? Are the signal output controls set appropriately?
2. Is the signal from the analytical instrument drifting or noisy?
3. If a general-purpose signal cable is being used, are the connections to the signal source secure?
4. Disconnect the HP 3395 Integrator from other equipment.
5. Turn to “Running the Self-Test Diagnostics” in chapter 7 of this manual. Run Test B, the A/D test.
  - If the test passes, the cable or a connection is defective.
  - If the test fails, go to next step.
6. Turn to “Running the Signal Tests.” Run the 0V and 1V Tests.
  - If all tests pass, there is a chromatographic or cabling problem.
  - If tests fail, obtain HP service.

## Reported, Processed, or Raw Data Are Not What You Expected

### *Probable Causes*

- Signal source malfunction or improper controls settings.
- Signal itself is at fault.
- Cabling problem.
- Calculation or calibration problem.

### *Suggested Actions*

1. Is the instrument supplying the signal operating properly?
2. Is the signal being applied within the range of -10 mV to +1 V (analog only)?
3. If a general-purpose signal cable is being used, are the connections to the signal source correct?
4. Was the proper calculation chosen? Check if PKWD and THRS were properly set.
5. Turn to “Running Self-Test Diagnostics” in this chapter and run Test T, Demo Chromatogram. If demo chromatogram is okay, continue with step 7.
6. Disconnect the HP 3395 Integrator from other equipment, then run Test B, the A/D test.
  - If test passes, run 0V and 1V tests.
  - If test fails, obtain HP service.
7. Turn to “Running the Signal Tests” and run the 0V and 1V tests.
  - If the tests pass, the cable is defective or signal is at fault.

---

## System Problems

### Integrator Cannot Be Started or Stopped From an External Device

#### *Probable Causes*

- Problem with external device.
- Capability not provided by cable or external device.
- Disconnected or faulty cable.
- Signal incompatibility.

#### *Suggested Actions*

1. Is the external device working?
2. Do the instrument and cable both have the capability of starting or stopping the HP 3395 Integrator? Requires a one-second contact closure.
3. Is the remote control cable securely and properly connected?
4. Turn to “Running Self-Test Diagnostics.” Run Test 9, the remote control and sample input test. If test fails, obtain HP service.
5. For custom cable connections, verify compatibility of signals between the remote instrument and the HP 3395 Integrator.
6. If the suggestions in steps 1–5 did not help, obtain HP service.

## HP 3395 Integrator Does Not Start or Stop an External Device

### *Probable Causes*

- Problem with external device.
- Capability not provided by cable or recognized by remote unit.
- Disconnected or faulty cable.
- Signal incompatibility.

### *Suggested Actions*

1. Have any error messages been printed?
2. Is the external device working?
3. Do the external device and the cable both have the capability of being activated by the HP 3395 Integrator?

Integrator provides a one-second contact closure between SO1 and SO2 output pins on the remote cable.

4. Is the remote control cable securely and properly connected?
5. For custom cable connections, verify compatibility of signals between the HP 3395 Integrator and the external device.
6. If the suggestions in steps 1–5 did not help, obtain HP service.

## HP 3395 Integrator Does Not Communicate With RS-232-C Device

### *Probable causes*

- Host computer not properly programmed.
- HP 3395 Integrator configuration switches set incorrectly.
- Improper or faulty cables.

### *Suggested Actions*

1. Check compatibility and programming of host computer.
2. Check configuration switch settings on back panel. Are they correct?
3. Are all cables in question securely connected and operative?

## External Sample Number is Missing or Inaccurate

### *Probable Causes*

- Cabling problem.

### *Suggested Actions*

1. Is the sample number cable connected properly?
2. Is the BCD sense wire in the correct position for the application?
3. Verify the integrity of sample number cable.
4. Turn to “Running Self-Test Diagnostics” and run Test 9, remote control and sample number input test.
  - If test passes, cable is at fault.
  - If test fails, call HP service.

---

## Running the Cold-Start Self-Tests

The cold-start self-tests help you isolate problems quickly when the HP 3395 Integrator is suspected of being at fault.

1. To initiate a cold-start, hold down the [CTRL] and [DEL] keys simultaneously. The self-tests run automatically, checking that internal circuits are operational.
2. Keyboard indicators monitor the progress of the tests and freeze in a particular pattern if a failure occurs.
3. If the instrument prints firmware revision numbers (Z80/HOST/INET/PP) and the printer/plotter confidence test properly appears, the green KEYBOARD indicator is ON and an asterisk prompt prints out, the unit has passed the tests.

```
>!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUUVWXYZ[\]^_`abode
fg hijklm nopq rstuvw xyz{|}~:;<=>?@ABCDEFGHIJKLMNQRSTUUVWXYZ[\]^_`abode

*
Performing self test; unit will
accept commands when KEYBD led is ON

Model 3395B          Rev D.00.01  09/30/94
Z80/HOST/INET/PP Rev = g/B/a/I u/ GENa03
```

**Figure 6-1. Printer/Plotter Confidence Test**

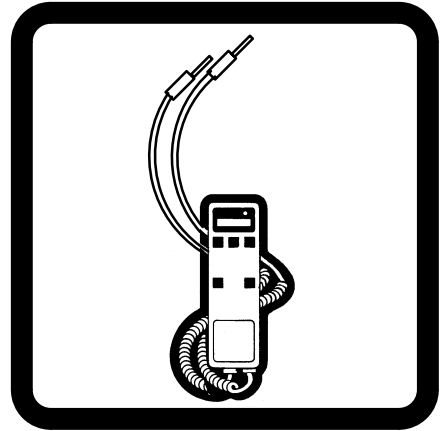
4. If two rows of a number (1, 2, 3, 4, 5, 6, or 7) occur instead of the normal alphanumeric printout before the chromatogram, an internal error has been sensed as is illustrated in Figure 6-2.





# Diagnostics

---



## In this chapter....

- Safety Information ..... 7-2
- Running the Self-Test Diagnostics ..... 7-3
- Description of Self-Test Diagnostics ..... 7-6
- Running the Signal Tests ..... 7-12
- Diagnostic Procedures ..... 7-15
- Disassembly and Reassembly Instructions ..... 7-30

## Purpose of This Section

The purpose of this section is to provide additional information about servicing your HP 3395 Integrator. This information is important for qualified service technicians or for reference by Hewlett-Packard customer engineers servicing your instrument at your location. The information presented here does not mean that these servicing procedures can be performed by you. Only qualified service engineers should attempt any of the test or disassembly procedures described here.

---

## Safety Information

### CAUTION

**Circuit cards contain static-sensitive devices. Do not remove the instrument cover or keyboard except at an approved electrostatic-free workstation.**

### WARNING

**THE POWER SUPPLY MODULE IS A DIRECT LINE-POWERED SWITCH-MODE SUPPLY. ELECTRICAL NODES ON THIS MODULE CAN BE AT POTENTIALS UP TO 370 V DC. USE EXTREME CARE WHEN MEASURING LOW-VOLTAGE DC OUTPUTS.**

---

## Running the Self-Test Diagnostics

If the HP 3395 Integrator fails to operate as expected, an instrument connected to the HP 3395 Integrator may be at fault. The HP 3395 Integrator has built-in self-test procedures that are useful in determining which instrument, if any, in the “system” is at fault. Document any information that you receive from these tests to report to your Hewlett-Packard service representative.

**CAUTION**

**Save all methods and other files, if possible, on an external disk drive before starting the self-test diagnostics. The HP 3395 Integrator memory clears when the LINE switch is pressed, resulting in the loss of all data not saved to an external disk.**

1. To start the self-test diagnostics, simultaneously press the following keys:

**[CTRL] [SHIFT] [BREAK]**

Hold them down until the instrument starts printing. If you release any of these keys too soon, the diagnostics will not start.

2. If you pressed the above three keys correctly, you’ll see this printout:

```
SELF TEST (Press (M) key for more help)
=>
```

3. Type **[M]** to list the tests available. Figure 7-1 is a printout of this list.

```
=> M

Press the keys for the tests you want to perform.  If you select
no tests, you will return to the system software.  After you have
selected the tests you want, press ENTER.  The tests will run
continuously unless an error halts them.

(0) Clear all tests and demo chromatogram
(1) ROM crc and bank select test
(2) Quick RAM test
(3) Extended RAM test (20 min)
(4) 8051 ROM and RAM test
(5) 8051 interface test
(6) RS-232-C port test
(9) Remote control and sample no. input test
(B) A/D noise test
(L) P/P test
(K) Keyboard test
(N) High speed printer test
(O) P/P ROM and RAM test
(A) Run all tests
(T) Enable demo chromatogram

(P) Print error messages
(S) Suppress error messages
(C) Continue testing if error occurs
(H) Halt testing if error occurs
    (press SPACE to continue)

=>
```

**Figure 7-1. Self-Test Diagnostic Menu**

4. Type the number or letter for the desired tests after the prompt, =>. If you strike an incorrect test number, press [0] (zero) immediately afterward to clear all previous test selections.
5. Press [P] to print all self-test error messages, or press [S] to suppress all error messages.
6. Press [H] after the appropriate test numbers to halt testing when an error occurs. Press the space bar after an error prints out to resume testing.

Press [C] after the appropriate test numbers to resume testing after an error occurs.

**Note:** If [S] is not pressed, [P] is assumed, and if [H] is not pressed, [C] is assumed.

7. Press **[ENTER]** to start the test(s).

The set of self-test diagnostics run continuously unless you press **[H]** to halt testing after the first error. The keyboard indicators (LEDs) display which diagnostic tests are being run. Information codes for an error are printed if you do not press **[S]**.

See the section titled “Interpreting Diagnostic Test Failures” in this chapter for additional information on how to interpret diagnostic messages.

Tests from this dialog can confirm a fault discovered during the power-on self-tests or determine if the HP 3395 Integrator is the instrument in a “system” that is at fault.

8. To halt all testing, turn the integrator off.

When you want to halt the demo chromatogram without turning the instrument off, press **[CTRL] [SHIFT] [BREAK]** to reinitiate the diagnostic menu, then press **[0]** to exit this menu and return to the system prompt. This method preserves internal memory.

---

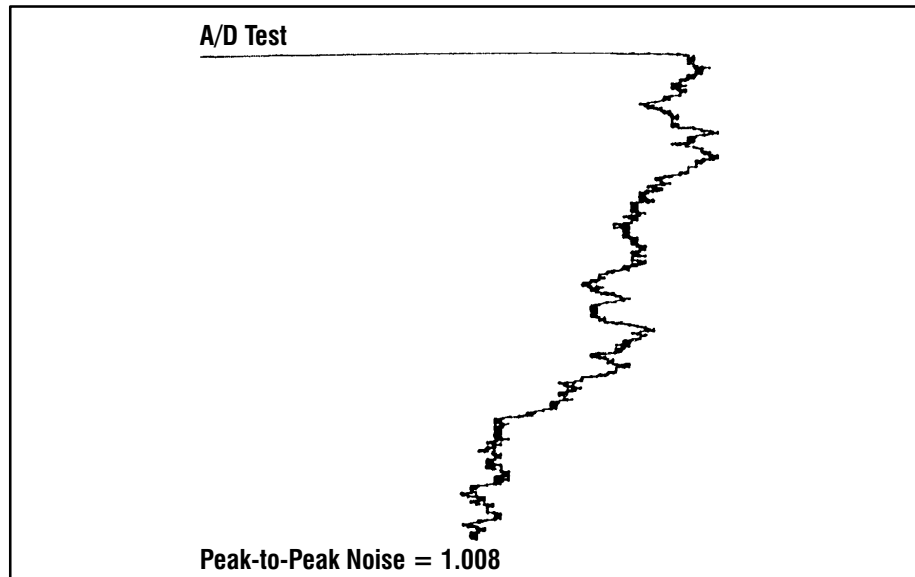
## Description of Self-Test Diagnostics

- (1) **ROM CRC and Bank Select Test**—The data contents of ROM are manipulated mathematically by a special algorithm (a cyclic redundancy check-16 routine). The resultant value after all ROM locations are operated on will be zero. If the value is not zero, the ROM is declared defective and an error message will be printed. A bank select test is also performed that checks switching between the operating system ROM and the diagnostic ROM.
- (2) **Quick RAM Test**—This test performs a walking-1s and a walking-0s test throughout RAM. An arbitrary pattern is then written into RAM by the CPU and is read back for accuracy. Any incorrect data will cause the test to fail.
- (3) **Extended RAM Test**—Permutated data is written into every location of RAM and then read back for verification.
- (4) **8051 ROM and RAM Tests**—The HOST CPU performs a CRC-16 routine to test its internal ROM. If the resultant checksum is incorrect, this test fails and a corresponding error message will be printed. The HP-IL/INET CPU also does a CRC-16 routine on the applications EPROM if installed. The Z80A main CPU then requests each I/O CPU (HOST) to test its internal RAM. Each I/O CPU will write permutated data into the internal RAM and reads the data back for verification.
- (5) **8051 Interface Tests**—Data is written into RAM by the Z80A CPU then permutated by the HOST CPU. The Z80A then checks the modification and permutates the data again. The HP-IL/INET CPU modifies the data pattern that is again checked by the Z80A. After this test has been performed for every third location in RAM, the Z80A will re-read these locations to verify the correct data.
- (6) **RS-232-C Port Test**—This test requires a jumper wire that loops back the TXD (transmit) output to the RXD (receive) input. Data is then written to the port, looped back to the input by the connector, and then read by the CPU for accuracy. Wire according to Table 7-5.

**(9) Remote Control and Sample Number Input Test**—This test verifies the remote and sample connectors by connecting a jumper wire between the pins of the connectors. The HP 3395 Integrator will print out a response which can be compared to the INFO values in tables 7-9 and 7-10 for accuracy.

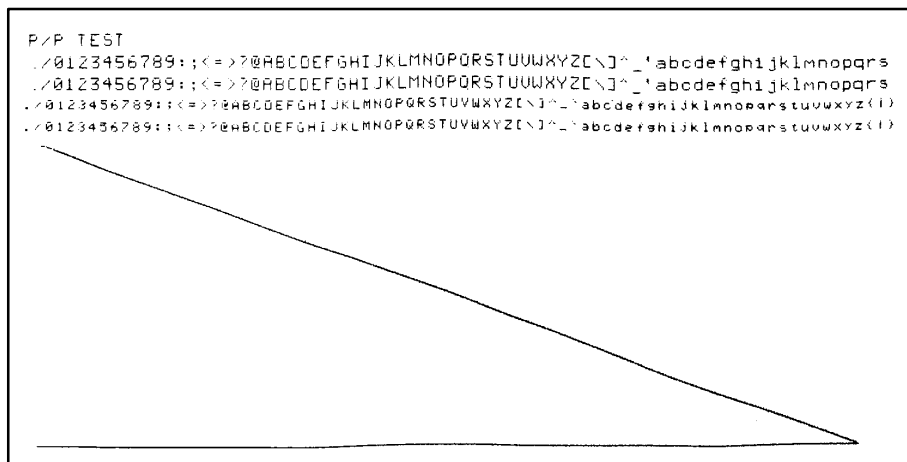
**(B) A/D Noise Test**—This test checks the HP 3395 Integrator analog-to-digital subsystem for internal noise. All operating parameters are set internally for plotting the noise signal.

An example of an A/D test is shown in figure 7-2. If the number for peak-to-peak noise on your printout is 3.0 or less, the test passes.



**Figure 7-2. A/D Test Results**

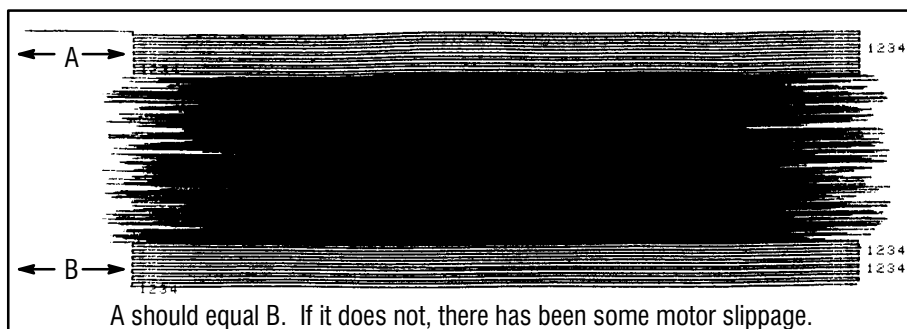
**(L) P/P Test (Print/Plot Test)**—This test will print out four lines of the entire HP 3395 Integrator character set. The first two lines will be in large font, and the second two lines will be in small font; then, a diagonal line and a horizontal line will be plotted across the full width of the paper. The printout can be checked visually for any irregularities. (See example in figure 7-3.)



**Figure 7-3. Example of Test L**

**(K) Keyboard Test**—The keyboard test will verify that the keyboard is functional by printing the key presses.

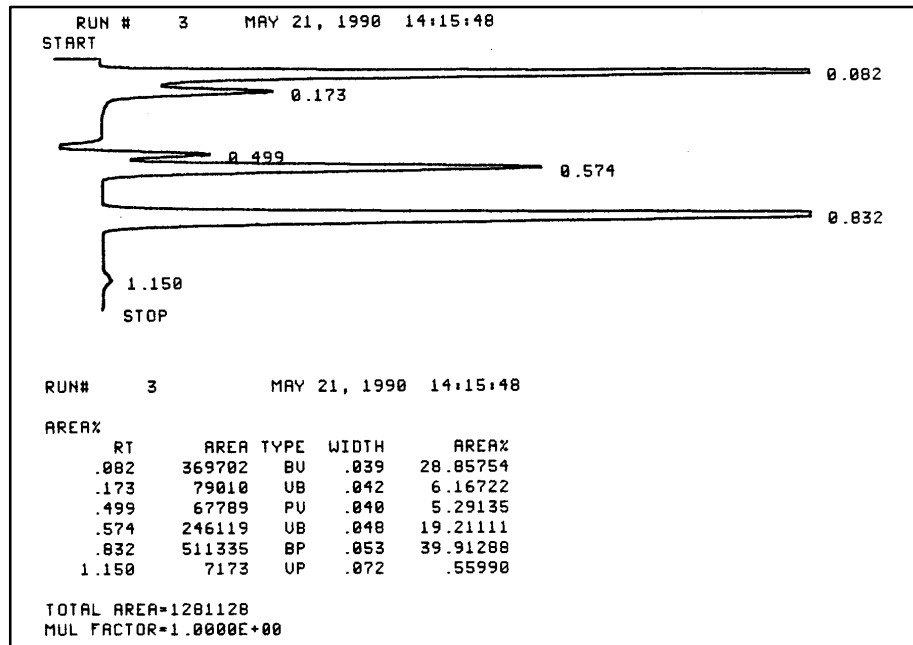
**(N) High-Speed Printer**—One possible problem in the printer/plotter subsystem is slippage of the printhead motor. This would appear as a baseline offset in a real chromatogram. The test provides an excellent means for evaluating potential motor slippage because of the rigorous test plot with annotation. The test generates 10 seconds of square wave plot followed by 110 seconds of random noise, with annotation. The noise is followed by another 10 seconds of square wave. If slippage were to occur, it would probably occur during the noise plot because of the high torque requirements on the motor. Any motor slippage would be detected by observing the square waves. The distance from the left and right edges of the paper to the edges of the plot would vary depending on whether the motor slipped. (See figure 7-4.)



**Figure 7-4. Example of Test N**







**Figure 7-6. Example of Demo Chromatogram Test T**

### Performing Test T

1. After selecting test T, set [ATT 2 ^] to 4 and [CHT SP] to 4.
2. Press the [START] key to begin the chromatogram.
3. Press the [STOP] key to end the chromatogram after the peak marked with a retention time of 1.150 has been plotted. The demo chromatogram should resemble figure 7-6.

**Keyboard status indicator sequence**—Whenever a self-test is selected, it will run continuously until the unit is turned off. The keyboard status indicators (LEDs) will indicate which test is running, according to table 7-1. At the conclusion of the test, all indicators will blink, indicating a successful completion of the test. If a test fails, an appropriate error message will be printed. (See “Interpreting Diagnostic Test Failures” in this chapter.) At cold-start (press [CTRL] and [DEL] simultaneously), the integrator runs tests 1, 2, 4, 5, and 0 as part of the power-on self-test.

**Table 7-1. Keyboard Status Indicators Sequence**

<b>Test No.</b>	<b>KYBD</b>	<b>COMM</b>	<b>READY</b>	<b>RUN</b>
1	Off	Off	Off	On
2	Off	Off	On	Off
3	Off	Off	On	On
4	Off	On	Off	Off
5	Off	On	Off	On
6	Off	On	On	Off
8	On	Off	Off	Off
9	On	Off	Off	On
B	On	Off	On	Off
L	On	Off	On	On
K	On	On	Off	Off
N	On	On	On	On
O	On	On	Off	On

Before selecting tests 6, 9, B, and T, follow the appropriate instructions below.

**Test 6** Connect the jumper wire to the rear panel “RS-232” jack according to Table 7-5.

**Test 9** Disconnect any remote control or sample number cables connected to the integrator before running the test.

**Test B** Before selecting this test:

1. Set the analog channel to zero volts with the SSET ANALOG command (see p. 7-13).
2. Make sure the unit has been powered-on for at least 30 minutes.

---

## Running the Signal Tests

In addition to the self-test diagnostics, A/D signal problems can be detected using the 0-V and 1-V tests described in this section.

<b>CAUTION</b>
----------------

**Save all methods and other files, if possible, on an external disc drive before starting the 0-V and 1-V input tests. The HP 3395 Integrator memory clears when the LINE switch is pressed, resulting in the loss of all data that were not saved to an external disk.**

### The SSET ANALOG Command

The SSET ANALOG command is used to change the A/D reference voltage for the following tests:

ONE-VOLT INPUT TEST;  
ONE-VOLT PLOT TEST;  
ZERO-VOLT INPUT TEST;  
ZERO-VOLT PLOT TEST.

The current analog input setting is shown with every SYSTEM command. The last line printed by the HP 3395 after a SYSTEM command is:

ANALOG INPUT IS NORMAL AND IS ACTIVE

If the reference voltage has been changed, the response to the SYSTEM command will reflect the change.

The reference voltage can be changed from either the system prompt (\*) or from the BASIC prompt (>). It can be set for 0 to 1 volts. To set the reference voltage to 1V, type:

SSET ANALOG R1 [ENTER]

The HP 3395's response to a SYSTEM command now ends:

```
ANALOG INPUT IS 1V AND IS ACTIVE
```

To change to a 0 volt reference, type:

```
SSET ANALOG R0
```

The last line of the SYSTEM command response is now:

```
ANALOG INPUT IS 0V REF AND IS ACTIVE
```

After conducting the test you must return the system to NORMAL operating mode using the SSET ANALOG command again. Type:

```
SSET ANALOG RN
```

If the SSET ANALOG command is used improperly, the HP 3396 prints the following error message:

```
SSET ANALOG WANTS VALUE "R0," "R1," OR "RN"
```

If you start a run with the analog input set to 0 or 1 with the SSET ANALOG command, the run header is appended to as a warning that the reference input was plotted. The following message appears.

```
*RUN # 1 JAN 1, 1901 00:01:02  ANALOG INPUT R0
```

You should set the analog input to NORMAL, and then repeat the run.

## Zero-Volt Input Test

The zero-volt input test reports the value of a 0-V input signal as measured by the HP 3395 Integrator. The reported value can be inspected to ensure that it is within acceptable limits.

1. Set the analog input to zero with the SSET ANALOG command.
2. Then press

```
[LIST] [ZERO]
```

The HP 3395 Integrator prints

```
LIST: ZERO = xx, yyyy.yyy
```

where *xx* is the plot position of the printhead as a percentage of full-scale deflection, and *yyyy.yyy* is the value (in millivolts) of the 0-V input signal as measured by the HP 3395 Integrator.

The *yyyy.yyy* value must be  $0 \pm 4$  mV.

3. Return the analog input to normal with the SSET ANALOG command.

## One-Volt Input Test

The one-volt input test reports the value of a 1-V input test signal measured by the HP 3395 Integrator.

1. Set the analog input to one volt with the SSET ANALOG command.
2. Then press

**[LIST] [ZERO]**

The HP 3395 Integrator prints

```
LIST: ZERO = xx, yyyy.yyy
```

where *xx* is the plot position of the printhead as a percentage of full-scale deflection, and *yyyy.yyy* is the value (in millivolts) of the zero input signal as measured by the HP 3395 Integrator.

The *yyyy.yyy* value should be between 800 and 1084.

3. Repeat **[LIST] [ZERO]** several times. The voltage measured should be consistently between 800 and 1084.
4. Return the analog input to normal with the SSET ANALOG command.

---

## Diagnostic Procedures

### Measuring dc Supply Voltages

The power supply module, HP part number 0950-1884, provides three regulated voltages to the main PC board. These voltages are used either directly by circuits on the board or are converted to other voltages for special purposes. The 5-V supply is used for CPUs, memory, general logic circuits, and paper motor drive. The +12-V supply is used for the print carriage motor drive, ink dot firing, and A/D converter. The -12-V supply is used for RS-232-C communication and printer analog circuits.

The dc supply voltages can be measured under three conditions: isolated, idle load, and full load. When checking these voltages, be sure that you match the test limits on the supply with the conditions of the test. Refer to table 7-4 for the test limits for each voltage under each of these conditions. The supply test points can be located at the left rear corner of the main PC board. See tables 7-3 and 7-5 and figure 7-9 for detail identifying the test points.

Equipment required:

- Voltmeter, at least 3-1/2 digits resolution
- 15-ohm 2-watt resistor (HP part number 0698-3605)

Follow the instructions in this chapter and disassemble the unit through “Remove the Print Mechanism.”

#### **WARNING**

**IT IS DANGEROUS AND UNNECESSARY TO PROBE THE POWER SUPPLY VOLTAGES AT THE POWER SUPPLY END OF THE DC CABLE. HIGH VOLTAGES EXIST ON THE HEAT SINKS AND OTHER COMPONENTS OF THE POWER SUPPLY MODULE.**

## Idle Load Measurement

To measure the voltages at idle load conditions, do the following:

1. Disconnect motor cables from P8 and P3.
2. Apply power to the unit.
3. Measure dc voltages at the P2 test points.
4. Turn off power.

## Full-load Voltage Drop Measurement

The full-load test is performed differently when looking at the 5-V supply or the +12-V supply. To test the 5-V supply at full load, do the following:

1. Connect the paper motor at P8.
2. Disconnect the print carrier motor P3.
3. Disconnect paper sensor cable at P7.
4. Connect voltmeter leads to test pins at P2.
5. Apply power to the unit.

The initial reading should be near the idle measurement, but as the confidence test proceeds (after about 9 seconds), the voltage should drop. The lowest reading obtained before the keyboard LEDs go out should be used to verify the full-load drop.

6. Turn off power.

To test the +12-V supply at full load, do the following:

1. Disconnect the paper sensor cable from P7.
2. Disconnect the paper motor from P8.
3. Connect the print carriage motor to P3.
4. Remove the print cartridge.
5. Apply power and observe the power supply voltages during the high-speed motions of the print carriage during the confidence test interval. Use the lowest reading to calculate observed full-load voltage drop.
6. Turn off power.



## Isolated Measurement

This measurement must be made with an approximately 15-ohm load on the +5-V supply.

If a load resistor is not available, either print mechanism motor can be used as a load for the +5-V supply. Use two 24-AWG solid or tinned stranded jumper wires to connect pins 3 and 9 of the dc cable to pins 1 (red) and 2 (brown) of either motor. This will provide a 14-ohm load for this test.

1. Find the dc supply cable that passes through the main sheet metal bracket and remove it from main board connector P1. (See figure 7-11 for detail on removing this connector).
2. Obtain a 15-ohm 2-watt resistor (HP part number 0698-3605) with at least 3/4-in.-long leads. Bend the leads at right angles to the body to form a U shape.
3. Insert the resistor leads directly into the dc cable between pins 3 and 9.
4. Apply power to the unit. The voltages should then be checked by probing the exposed contacts on the top of the connector body.
5. Turn off power.

**Table 7-3. Test and Interconnect Points**

<b>Item</b>	<b>Shown in Figure</b>	<b>Description</b>	<b>Test Point</b>
1	7-9	DC Secondary Connection	P1
2	7-9	DC Test Points	P2
3	7-9	Optical Sensor Connection	P4
4	7-9	Paper Drive Connection	P8
5	7-9	Print Carriage Connection	P3
6	7-9	Out-of-Paper Sense Connection	P7
21	8-1	AC Primary Connection	J1
8	7-9	Print Cartridge Connection	J3

**Table 7-4. The dc Voltage Measurement Limits**

<b>Supply</b>	<b>Isolated</b>	<b>Idle Load</b>	<b>Voltage Drop Full Load</b>
+5 V	5.16 to 5.26	5.10 to 5.19	40 to 100 mV
+12 V	10.75 to 13.75	11.30 to 13.62	50 to 200 mV
-12 V	-10.5 to -14.5	-10.98 to -14.1	Not Applicable

**Table 7-5. The dc Voltage Test Points**

<b>Supply</b>	<b>Isolated</b>	<b>Idle, Full Load</b>
Common	DC Cable pin 3 or 8	P2 pin 5
+5 V	DC Cable pin 4 or 9	P2 pin 7
+12 V	DC Cable pin 7 or 2	P2 pin 3
-12 V	DC Cable pin 6 or 1	P2 pin 1

## **Measuring Motor Windings**

This procedure is used to test for internal shorts in either the print carrier or the paper drive motor. The same procedure is used for both motors.

The equipment required is an ohmmeter with sensitive low ohms range (200 ohms or less).

Turn off power.

Follow the disassembly instructions up to and including “Remove the Top Cover.”

Do the following for each motor:

- 1.** Disconnect the motor from the main PC board from P8 or P3.
- 2.** Probe the exposed crimp contacts on the top of the connector.
- 3.** Compare the readings obtained to the limits in tables 7-6 and 7-7 for that motor.

**Table 7-6. Print Carriage Motor Winding Resistances**

Red to Brown	12.6 to 15.4 ohms
Blue to Yellow	12.6 to 15.4 ohms
<b>Note:</b> The motor has two white wires. The following measurements will show an OPEN CIRCUIT to one white wire and show indicated value to the other white wire.	
Red or Brown to White	6.3 to 7.7 ohms
Blue or Yellow to White or Black	6.3 to 7.7 ohms

**Table 7-7. Paper Drive Motor Winding Resistances**

Red to Brown	13 to 15.8 ohms
Blue to Yellow	13 to 15.8 ohms
<b>Note:</b> The motor has two white wires. The following measurements will show an OPEN CIRCUIT to one white wire and show indicated value to the other white wire.	
Red or Brown to White	6.5 to 7.9 ohms
Blue or Yellow to White	6.5 to 7.9 ohms

## Partitioning Failures

All diagnostic tests are for circuitry on the main PC board as described in chapter 5. A failure of any of these tests (resulting in an 'ERROR=' message) strongly indicates an electronic failure on this circuit card. If the Power-On Confidence Tests do not run at all, then the problem can be on the main PC board or the power supply module. Paper or pen motion failures in the confidence test or any diagnostic might indicate a printer problem but more likely a main PC board problem.

Before performing any of the troubleshooting procedures detailed below, do the following:

1. Remove any cables from the rear panel.
2. Disassemble the unit through "Remove the Top Cover."
3. Remove the print cartridge.

## Module Level Troubleshooting

The following troubleshooting tree is based on symptoms that are observed during the power-on confidence tests. Each observable symptom is followed by several potential causes. For each cause there is an action listed that will confirm the cause and indicate the recommended repair. If the cause is not confirmed, continue with the next potential cause. When you reach the last cause for the symptom, no confirmation is required. Please refer to chapter 5 for a description of the proper behavior of the power-on confidence tests. If the instrument fails to execute these tests, find the appropriate symptom from the following charts. Follow the recommended actions in the order indicated.

**SYMPTOM: LEDs do not light at power-on.**

<b>Cause</b>	<b>Action</b>
Improper ac Connection	<ol style="list-style-type: none"><li>1. Check fuse and line power connections. Correct if necessary.</li><li>2. Check for ac line voltage at ac module J1, pins 5 and 7. If line voltage is absent, double-check the fuse and line connections; replace ac module if connections are good.</li></ol>
Z-80 CPU Kernel Problem	<ol style="list-style-type: none"><li>3. Check dc voltages at main PC board test points, P2. If voltages are good, replace main PC board.</li></ol>
DC Voltage Problem	<ol style="list-style-type: none"><li>4. Carefully check main PC board and both printer motors for overheating. The power supply is capable of providing enough excess power to make an overloaded circuit heat obviously. If there are no signs of an overload, the power supply is probably defective. Replace the power supply.</li></ol>
Overload on Main PC Board	<ol style="list-style-type: none"><li>5. If both print mechanism motors do not overheat (they dissipate about 7 watts during print and plot modes) and there is an overheated circuit on the main PC board, replace the main PC board.</li></ol>
Overload on Print Mechanism	<ol style="list-style-type: none"><li>6. Disconnect the overheated motor. Refer to table 7-6 or 7-7 and measure the winding resistances. If the motor is beyond this range, replace the motor or the print mechanism. If both windings of the motor are within the specified resistance range, proceed.</li></ol>
Internal Main PC Board Failure	<ol style="list-style-type: none"><li>7. Replace the main PC board.</li></ol>

**SYMPTOM: LEDs remain on continuously after power-on.  
Print carriage motion may be erratic.**

<b>Cause</b>	<b>Action</b>
Power Supply Problem	<ol style="list-style-type: none"><li>1. See table 7-5 and measure the +5- and +12-V supplies under isolated conditions. Replace the power supply module if out of range, as per test limits in table 7-4.</li><li>2. Measure +5- and +12-V supply at idle and full load. If voltage drop is greater than the specified amount in the table, replace the power supply.</li></ol>
Defective Paper Drive Motor	<ol style="list-style-type: none"><li>3. Disconnect paper drive motor from P8 and reapply power. If LEDs go out after several seconds and indicate confidence test activity, the paper drive motor is shorted internally. Replace the motor or the print mechanism.</li></ol>
Z-80 Kernel Problem	<ol style="list-style-type: none"><li>4. Replace the main PC board.</li></ol>

**SYMPTOM: Print carriage does not move or it chatters and moves erratically. Paper feed may or may not be normal. LEDs indicate proper confidence test activity.**

<b>Cause</b>	<b>Action</b>
Power Supply Problem	<ol style="list-style-type: none"><li>1. See table 7-5 and measure the +12 and -12-V supplies under isolated and idle conditions. Check the test limits from table 7-4 and replace supply module if out of range.</li><li>2. Measure +12-V supply at full load. If voltage drop is greater than the specified amount, replace the power supply.</li></ol>
Print Carriage Motor Is Defective	<ol style="list-style-type: none"><li>3. Turn off power. Remove paper drive motor from P8. Remove print carriage motor from P3. <i>Slowly</i> move print carriage to center of mechanism. Reconnect print carriage motor to P8. Leave paper sensor connected to P7. Apply power to unit. After several seconds, the print carriage should make three or four motions to the left for a total of about 1.35 inches. If it does not move, moves erratically, or makes excessive noise, the motor is probably defective. Replace the motor or print mechanism.  Alternatively refer to table 7-6 and measure the print carriage motor winding resistance. Replace the motor or the print mechanism if out of range.</li></ol>
Drive Electronics Are Defective	<ol style="list-style-type: none"><li>4. Replace the main PC board.</li></ol>



**SYMPTOM: Paper does not feed or feeds slowly or erratically.  
Print carriage motion appears normal.**

<b>Cause</b>	<b>Action</b>
Blocked Paper Path	<ol style="list-style-type: none"><li>1. Check paper path for obstructions.</li><li>2. Check that the paper separator is installed properly.</li><li>3. If Z-fold paper was in use, switch to roll paper unless a Hewlett-Packard paper stand was used.</li></ol>
Paper Drive Motor Defective	<ol style="list-style-type: none"><li>4. Disconnect power from unit. Remove print mechanism. Set the print mechanism down on the board and rotate it so that the paper drive motor is to the rear and its shield is resting on the instrument's rear panel. Connect paper motor to P3. Connect out-of-paper sense cable to P7. Connect the optical sensor cable to P4. Apply power to unit. The paper feed grit wheels should immediately rotate "backward" for a fraction of a second and then reverse and feed smoothly for about two seconds. It will then hesitate slightly as the motor slips. Switch the power off and on again and observe the <i>initial</i> motion again. The initial two seconds of motion in both directions should be quiet and smooth. If the paper feed wheels do not move, move erratically, or make excessive noise, the motor is probably defective. Replace the motor or print mechanism.  Alternatively refer to table 7-7 and measure the paper motor winding resistance. Replace motor or print mechanism if out of range.</li></ol>
Paper Drive Electronics Defective	<ol style="list-style-type: none"><li>5. Replace main PC board.</li></ol>

## Interpreting Diagnostic Test Failures

This section will help you to understand the results of some of the self-test diagnostics.

Several diagnostic tests can identify specific defective socketed components for replacement. Table 7-8 lists these tests, the ERROR and INFO data that are printed for a failure of the test, and the action to correct the problem.

For any other diagnostic test failure, replace the main PC board.

**Table 7-8. Diagnostic Error Messages for Socketed Components**

Test	ERROR = INFO =	Action
(1)	ERROR = 01H INFO = xxyyH	If xx = FF or 00 through 06, replace U68. If xx = 07 or 08, replace U68.
	ERROR = 03H	ROM version error. Check U68 for compatibility.
(4)	ERROR = 22H or 23H	Replace U27.
	ERROR = 42H or 43H	Replace U17.
	ERROR = 44H	Replace U68. (Application EPROM)
(0)	ERROR = 0DH INFO = 003xH	If x = 1, 2, or 3, replace the print/plot processor U50.

Two of the diagnostic tests can be performed with accessory hardware to verify the unit with a greater confidence level. These tests are the remote and sample number test and the RS-232-C port test. Both tests should be performed with the instrument fully assembled.

## Remote and Sample Number Test

Equipment Required:

- Three-inch length of 20-AWG solid or tinned stranded jumper wire

Test Procedure:

1. Remove any connecting cables from the remote and sample receptacles on the rear panel.
2. Enter the self-test dialog and select test 9 and press **[ENTER]** to begin repetitive testing.
3. Connect the jumper wire to pin 9 on the sample number connector. Connect the other end of the wire as per table 7-9, and observe the printed error message. The **ERROR** part of the message should be ignored. Compare the **INFO =** value to those in the table. Only connect the jumper long enough to cause the error message to print.
4. Similarly, connect the jumper wire from pin 9 on the remote connector to other pins on the remote connector and check for **INFO =** values from table 7-10.

If no error message is printed for any pin combination listed, it may indicate a failure in U22 or U23. Replace the main PC board.

**Table 7-9. Sample Connector Test**

Sample No. Pin	INFO =
1	8002H
2	8008H
3	8004H
4	8001H
5	8100H
6	8800H
7	8400H
8	8200H
10	8040H

**Table 7-10. Remote Connector Test**

Remote Pin No.	INFO =
3	1080H
5	8010H
6	C000H
7	8020H
8	A000H

## RS-232-C Cable Testing

The RS-232-C loopback test can be used to test the integrator alone or with a communications cable attached. By testing the instrument in both configurations, you can identify which element of the system is faulty and avoid unnecessary service charges.

Testing the instrument alone is described in chapter 2 of this manual under the heading “Running the Self-Test Diagnostics.” Use table 7-11 to determine loopback jumpers according to type of connector.

To test the instrument and its RS-232-C cable, first you have to locate a compatible loopback connector for the opposite end of the cable. This may be a 25-pin or a 9-pin connector, with male or female contacts. Obtain a proper mating connector and wire it for loopback as shown in table 7-11. Test the loopback connector on a known good cable before relying on it when a failure occurs.

Loopback connectors for standard connector sizes are available from computer supply and accessory distributors. If the advertised wiring includes the connections shown in table 7-11, then it should be suitable for the diagnostic test. Additional connections, such as pins 6 to 20 in the 25-pin connector, will not affect the test.

Run Diagnostic Test 6 with the RS-232-C cable connected to the integrator and the 25- or 9-pin loopback connector on the other end. If this test fails after passing with the 15-pin alone, the cable is defective.

**Note:** The hardware handshake signals CA and CB are not wired in the DCE cables (HP part numbers 03396-50520 and 03396-60530); thus, the test cannot pass without an error message. When testing either one of these cables with a loopback connector, an ERROR = 24H indicates that the cable passes the continuity test of the transmitted data and received data lines. If ERROR = 25H is printed, it indicates a failure of these lines.

**Table 7-11. Loopback Connector Wiring**

<b>Connector Size</b>	<b>Connect Pins</b>
9-pin Male	2 to 3
15-pin Male	1 to 13 and 2 to 14
25-pin M/F	2 to 3 and 4 to 5

---

## Disassembly and Reassembly Instructions

Equipment Required:

- Small size 1 pt Pozidriv screwdriver
- Large size 2 pt Pozidriv screwdriver
- Pry tool (HP part number 8710-1347)
- Small 1/8-in. flat-blade screwdriver
- Replacement self-tapping screws (HP part number 0624-0427)

### WARNING

**DISCONNECT AC POWER SOURCE BEFORE OPENING THE CASE.**

### Remove Power from the Unit

1. Turn the unit off by depressing the line switch located in the left rear of the instrument.
2. Remove the power cord.

### Remove the Paper

1. Tear the paper at a serration before the point where it enters the print mechanism, open the printer window, lift the bail arms forward, and pull the remaining paper up and out of the mechanism.
2. Remove the roll from the paper hangers (if installed).

### Remove the Paper Hangers (if Installed)

1. Apply slight pressure to the locking tabs on the bottom of the hangers and pull up.

## **Remove the Printer Window**

1. Lift the window up.
2. With the thumb and forefinger, apply slight pressure to the left-hand side of the window to release the window from the locking tab and lift the window up. Notice that the tab on the left-hand side is slotted.

## **Remove the Paper Separator**

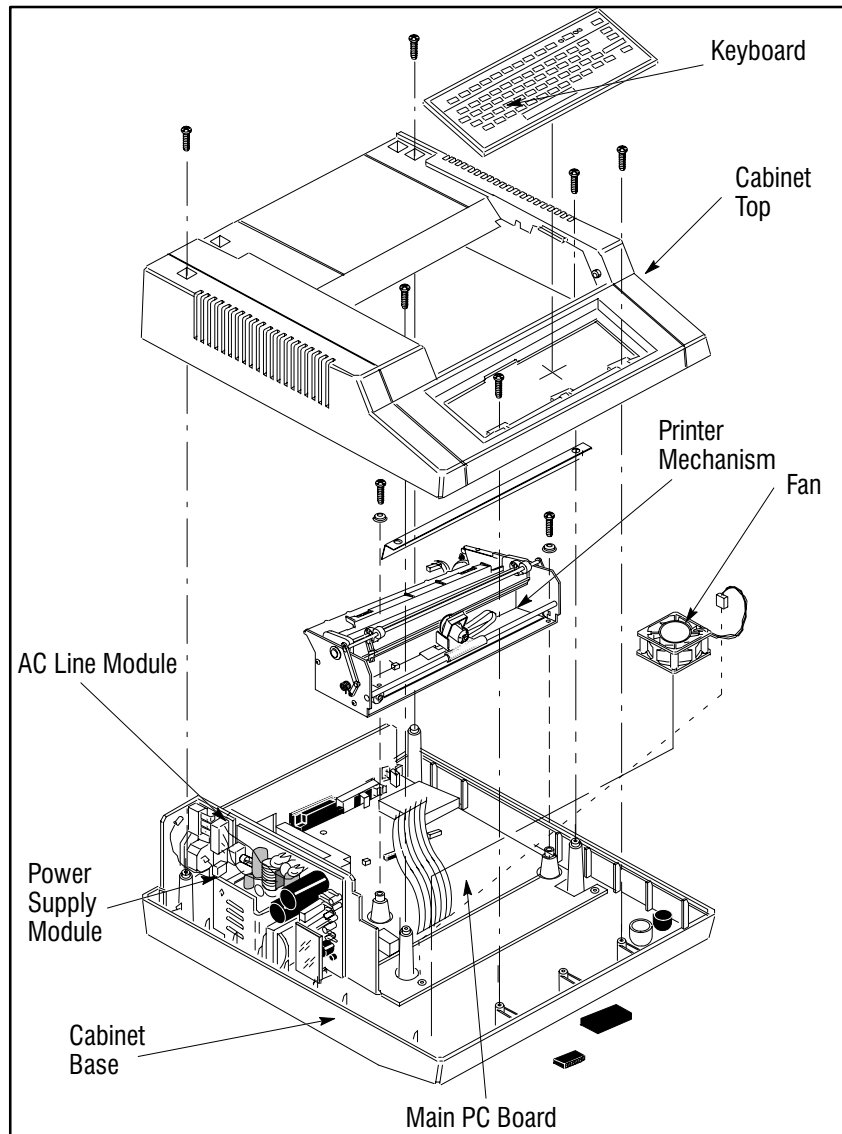
1. Pull forward and lift up.

## **Remove the Keyboard**

1. Insert the pry tool between the top of the keyboard and the case on the right-hand side, and apply slight downward pressure until the locking tab releases. Repeat the process in the middle and on the left side, and lift the keyboard up.
2. While holding the keyboard with one hand, grasp the ribbon cable with the other hand and carefully pull the cable out of the keyboard.

## **Remove the Top Cover**

1. With the large Pozidriv, remove the two self-tapping screws in the front of the unit under the keyboard. The middle hole is not used.
2. With the large Pozidriv, remove the two self-tapping screws located under the printer window.
3. With the large Pozidriv, remove the two self-tapping screws in the square openings in the rear of the unit.
4. Lift the top cover off.

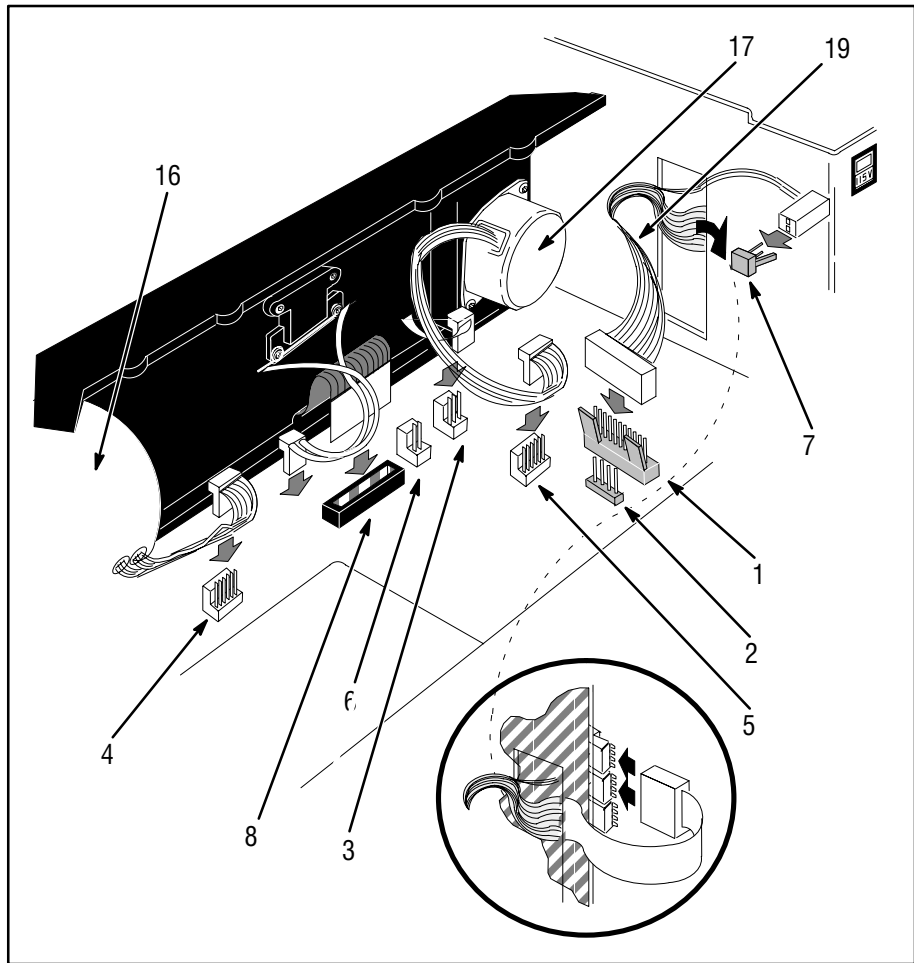


**Figure 7-8. Instrument View With Printer Removed**



## Remove the Print Mechanism

1. Remove the aluminum shield from the two posts in front of the print mechanism.
2. With the large Pozidriv, remove the two self-tapping screws in the front of the mechanism that secure the mechanism to the case. Be careful not to lose the cupped washers.
3. Turn the unit around so that you are facing the rear panel.
4. See figures 7-9 and 8-1 and table 7-3 to identify and remove the following printer cables. Remove the print carriage motor cable from connector P3. Remove the optical sensor cable from connector P4. Remove the flexible print cartridge cable from J3, noting that it only makes contact on one side. Remove the out-of-paper sensor cable from connector P7. Remove the paper drive motor cable from connector P8.

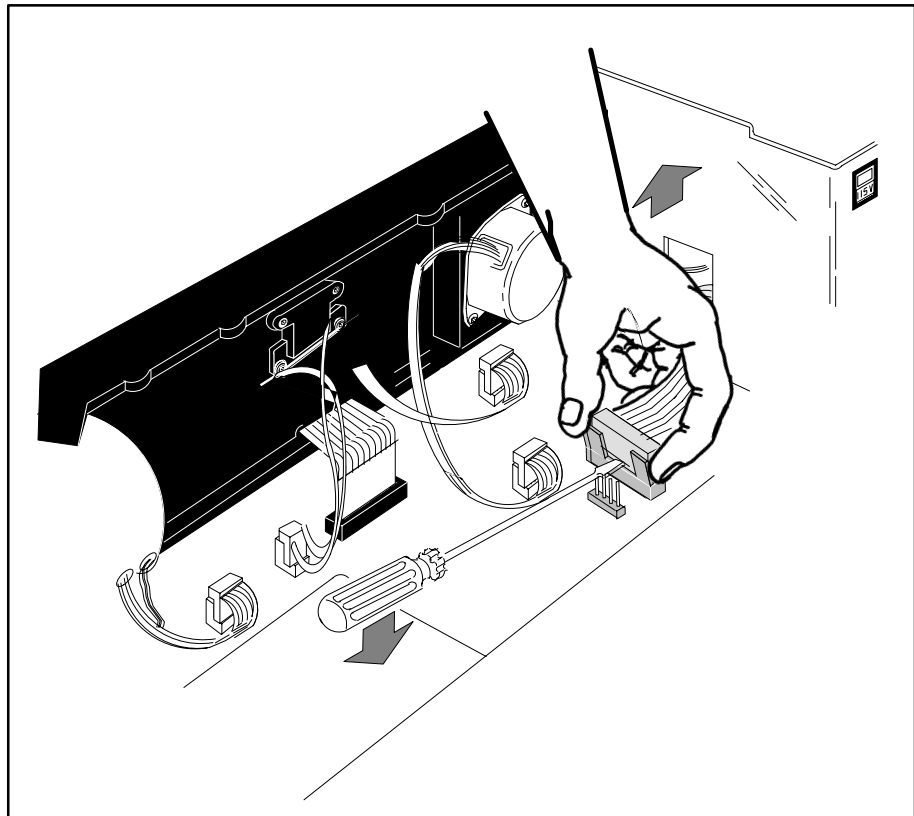


**Figure 7-9. Print Mechanism Cable Connections and Test Points**  
*(See tables 7-3 and 8-2 for parts identification.)*

5. Lift the mechanism out of the unit.

## Remove the Power Supply Board

1. Remove the cable that connects the power supply to the main board at connector P1 following this procedure.
  - a. Grasp the connector, *not the cable*, and with the small flat-blade screwdriver pull back one of the locking tabs. While holding back the locking tab, pull up slightly until that side of the connector clears the locking tab.
  - b. Refer to figure 7-10. Insert the screwdriver between the connector and P1, and twist to loosen the connector. Remove the connector.



**Figure 7-10. DC Cable Removal Detail**

2. Remove the ac primary cable that connects the power supply to the line module at connector J1 by releasing the locking tab and pulling out the cable.

3. With the small Pozidriv, remove the two screws that secure the power supply to the metal shield. They are located at the top of the board.
4. Lift the power supply board out of the unit, carefully feeding the cable through the hole in the shield.

## **Remove the Line Module**

1. With the small Pozidriv, remove the two screws that secure the line module to the metal shield. They are located on each side of the power cord socket.
2. With the small Pozidriv, remove the screw attaching the green safety ground wire to the rear panel.
3. Lift the line module out of the unit.

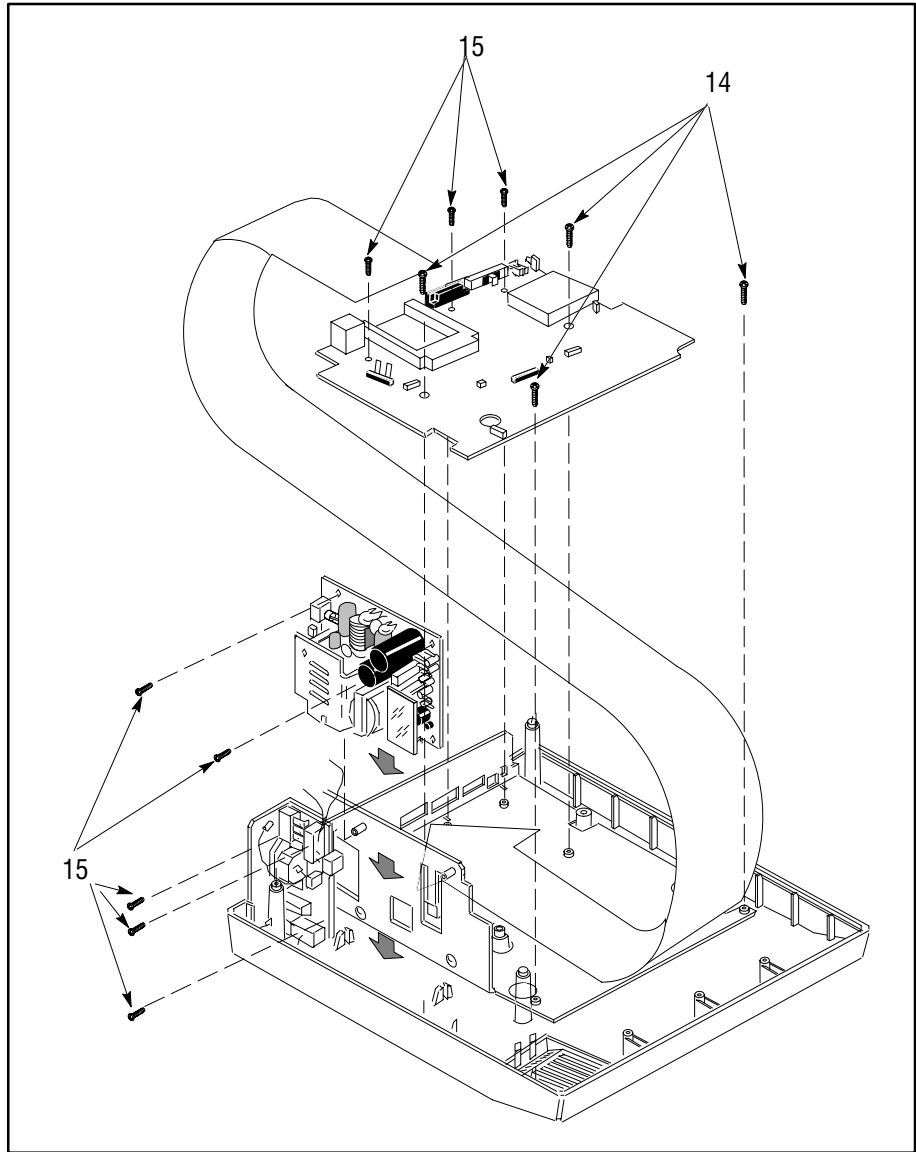
## **Remove the Cooling Fan**

1. Remove the fan cable from the connector on the main PC board by applying slight pressure to the top of the connector to release the locking tab and pull out.
2. Grasp the fan and apply pressure toward the front of the unit and up until the fan clears the locking tabs.
3. Lift the fan out of the unit.

## **Remove the Main Board**

1. Remove the six screws that secure the main PC board to the case and the metal shield. There are three pan-head screws in the rear and four self-tapping screws, two in the front on either side, and two in the middle on either side. Use the small Pozidriv to remove the pan-head screws in the rear and the large Pozidriv to remove the self-tapping screws.
2. Lift the board up from the front and lift it out of the unit being sure to clear the connectors in the rear from the shield.

LIFT THE METAL SHIELD OUT OF THE UNIT.



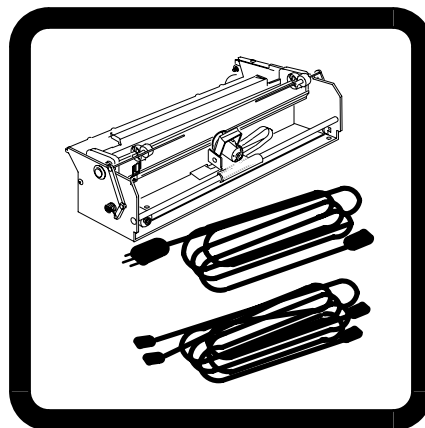
**Figure 7-11. Instrument View With Main PC Board Removed**  
(See table 8-2 for parts identification.)

The unit is now completely disassembled. To reassemble the instrument, follow this procedure in reverse. Refer to figures 7-9, 7-11, and 8-1 for parts and cable placement details. All self-tapping screws should be replaced with new screws.



# Parts and Cables

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## In this chapter....

- Replacement Parts ..... 8-2
- Cables for Obsolete HP Instruments ..... 8-4
- Cable Diagrams ..... 8-5
- Choosing the Correct Power Cable ..... 8-14

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## Replacement Parts

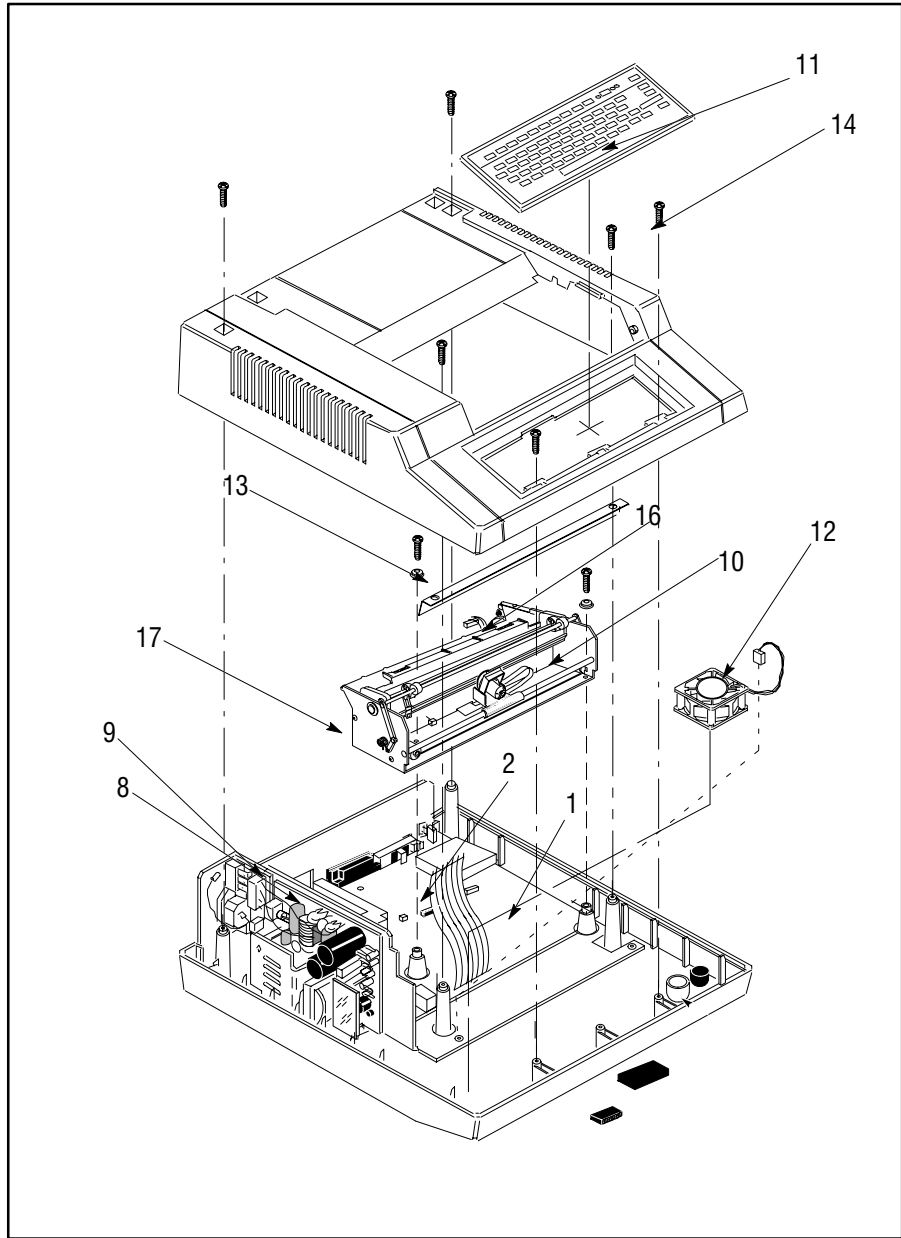
**Table 8-1. Socketed Components**

Item No.	Shown in Figure No.	Description	Reference Description	Part Number
1	8-1	Z-80 ROM	U68	03396-80300
2	8-1	INET ROM	U17	03396-80310

**Table 8-2. Other Replacement Parts**

Item No.	Shown in Figure No.	Description	Part No.	Quantity
—	Not shown	Main PC Board	03396-60115	1
8	8-1	Power Supply Module	0950-2465	1
9	8-1	AC Module Assembly	03394-60030	1
10	8-1	Printer Mechanism	03394-60625	1
11	8-1	Keyboard03395-60636	1	
12	8-1	Fan	35900-60520	1
13	8-1	Cup Washer	02225-00017	2
14	7-11, 8-1	Screw, Self-Tapping	0624-0427	12
15	7-11	Screw, Machine	0515-0912	8
16	7-9, 8-1	Paper Drive Motor	3140-0787	1
17	7-9, 8-1	Print Carriage Motor	3140-0785	1
—	Not shown	Window	03394-40100	1





**Figure 8-1. Instrument View with Printer Removed**  
(See tables 8-1 and 8-2 for parts identification.)

---

## Cables for Obsolete HP Instruments

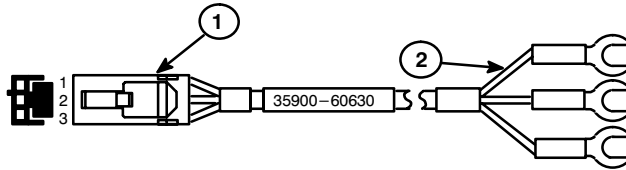
Description	Signal Cable	Remote Cable
HP 5710/5730 GC and HP 1081 UV	35900-60620	03396-60620
HP 5880A GC	35900-60570	03394-60540
HP 5790A GC	35900-60590	03396-60620
HP 1040M diode array detector	35900-60600	03396-60650

Reference the HP 3396 Series II Integrator Reference Manual, Chapter 8 for the diagrams and pin outs for the cables listed above.

# Cable Diagrams

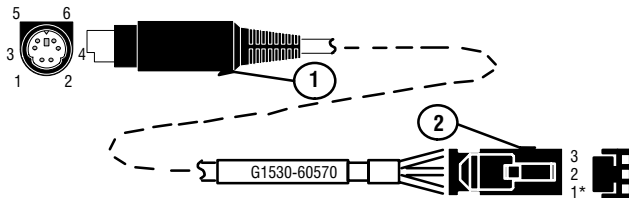
## Analog Outputs

HP part number 35900-60630 for General Purpose  
Use—Spade Lugs (standard with HP 3395)



Connector 1—HP 3395	Signal Name	Wire Color
1	Shield	Orange
2	Signal -	Black
3	Signal +	Red

HP part number G1530-60570 for use with  
HP 3395B, 3396C/M, 3397A to HP 6890

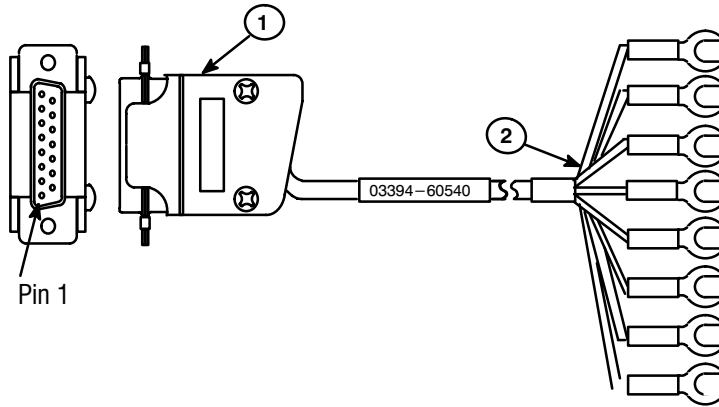


\*1 next to triangle etched on connector

Connector 1 +	Signal name	Color	Connector 2
4	1 V	black	3
2	Common	white	2
Shell	Ground	orange	1

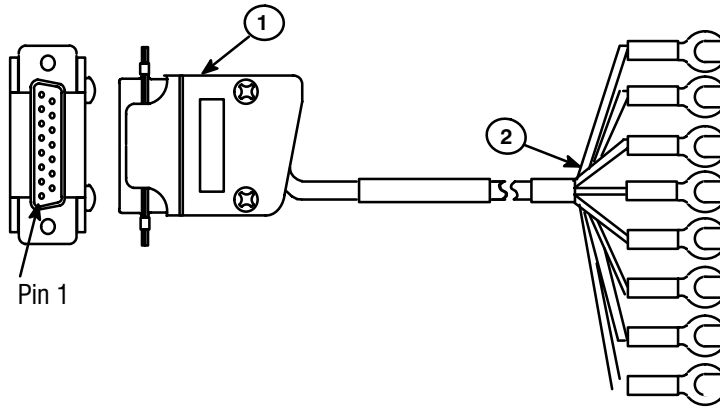
## Remote Control Cables

HP part number 03394-60540  
for General Purpose Use—Spade Lugs



Connector 1—HP 3396	Signal Name	Connector 2
1	S01	Black
3	START	Green
5	RDY IN	Red
6	STOP	White
13	S02	Orange
14	RDY OUT	Blue
15	GND	Brown
N.C.	DRAIN	Clear

HP part number 03396-61030 for HP 3396 Series III  
 (3396C/M, 3397A, 3395A) for General Purpose Use—Spade Lugs



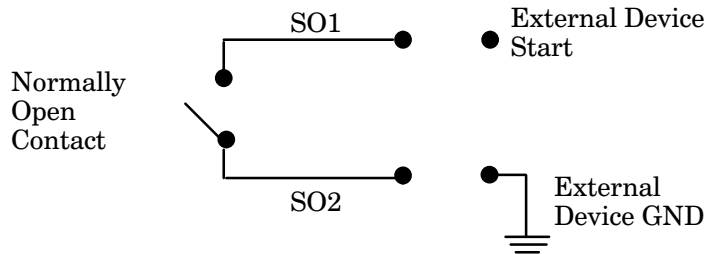
Connector 1 – HP 3396	Signal Name	Connector 2
1	S01	Black
3	START INPUT	Green
4	STOP2	Yellow
5	RDY IN	Red
6	STOP	White
9	GND	Violet
13	S02	Orange
14	RDY OUT	Blue
15	GND	Brown
N.C.	DRAIN	Clear

**Table 8-3. Remote Control Signal Function**

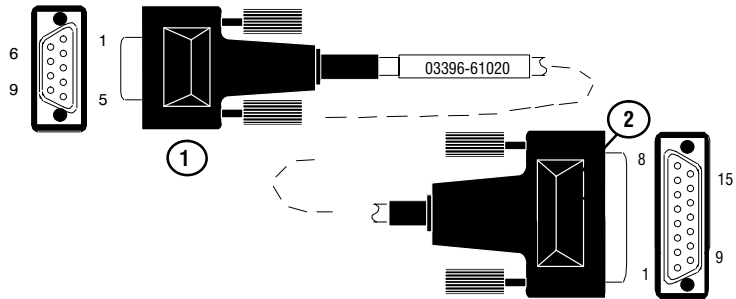
PIN	Signal Name	Signal Description	Input/Output
1.	SO1	Start Oven 1	Output
3.	START	Start HP 3395	Input
5.	RDY IN	Indicates readiness of system to HP 3395	Input
6.	STOP	Stop HP 3395	Input
9.	GRND		
13.	SO2	Start Oven 2	Output
14.	RDY OUT	Indicates readiness of HP 3395 to system	Output
15.	GRND		

SO1 and SO2 are normally open relay contacts that provide a one-second contact closure to start external devices when START is pressed on the HP 3395 Integrator or when a remote start input is received.

The proper configuration to start an external device is:

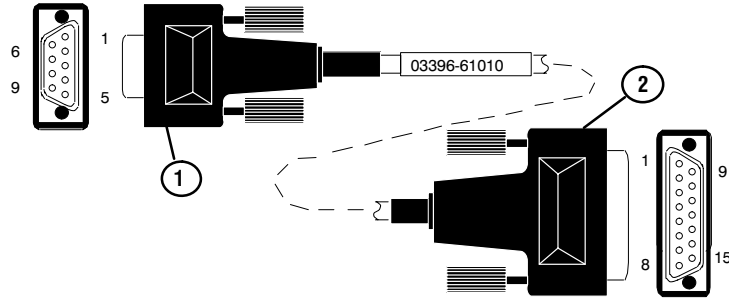


HP part number 03396-61020  
 HP6890A to HP3395A/3396B



Connector 1 9 pin male	Signal Name	Connector 2 15 pin male
1	GND	9 — Ground
2	Prepare	no connect
3	Start	3 — Start in
4	Shut down	no connect
5	Reserved	no connect
6	Power on	no connect
7	Ready	14 — Ready out
8	Stop	no connect
9	Start request	no connect

HP part number 03396-61010  
 HP6890A to HP3395A/3396C/L/3397

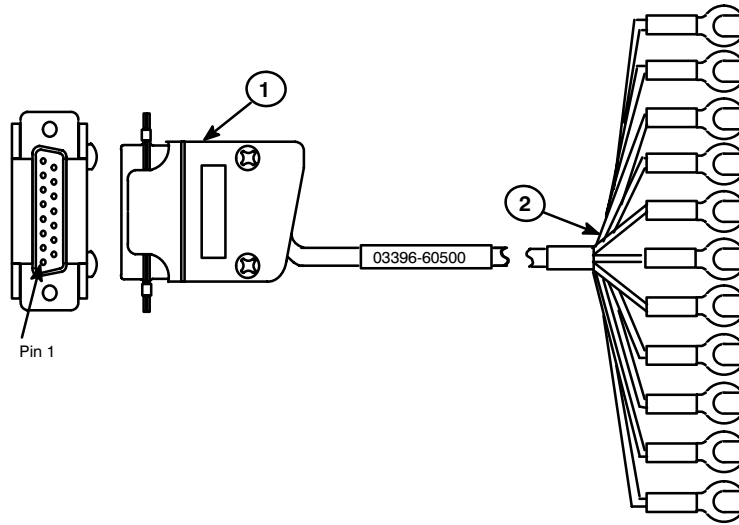


Connector 1 9 pin male	Signal Name	Connector 2 15 pin male
1	GND	9 — Ground
2	Prepare	no connect
3	Start	3 — Start in
4	Shut down	no connect
5	Reserved	no connect
6	Power on	no connect
7	Ready	14 — Ready out
8	Stop	4 — STOP2 In
9	Start request	no connect



## Sample Number Cable

HP part number 03396-60500 General Purpose  
(standard with HP 3395)

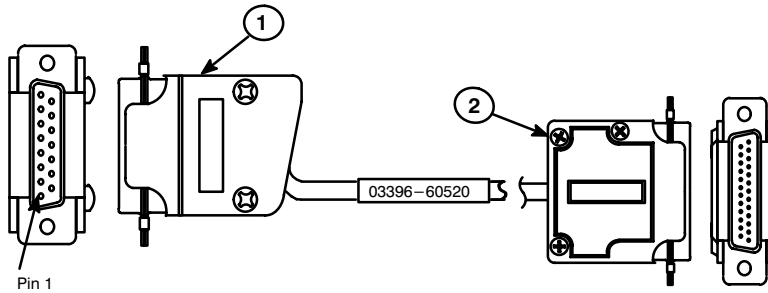


Connector 1-HP 3395	Signal Name	Connector 2—Wire Color
1	BCD 20	Yellow
2	BCD 80	Purple
3	BCD 40	White
4	BCD 10	Orange
5	BCD 1	Brown
6	BCD 8	Green
7	BCD 4	Gray
8	BCD 2	Red
9	GND	Black
10	HITR (High True)	Blue
N.C.	SHIELD	Clear

Connecting pin 10, HITR (high true), to pin 9 (GND) will change the BCD signal from high true to low true.

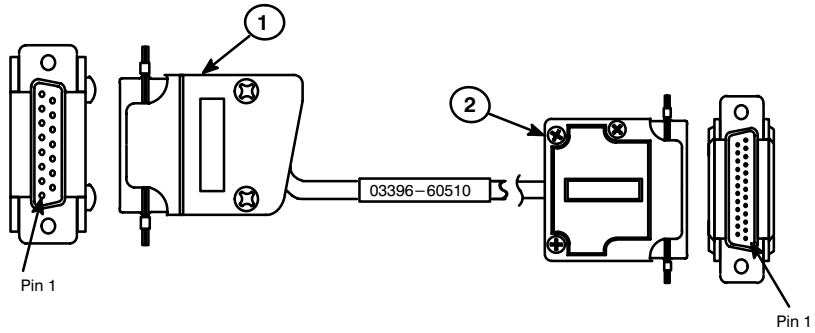
## RS-232-C Cables

HP part number 03396-60520 DCE Female (25-Pin)  
(not supplied, must be ordered if needed)



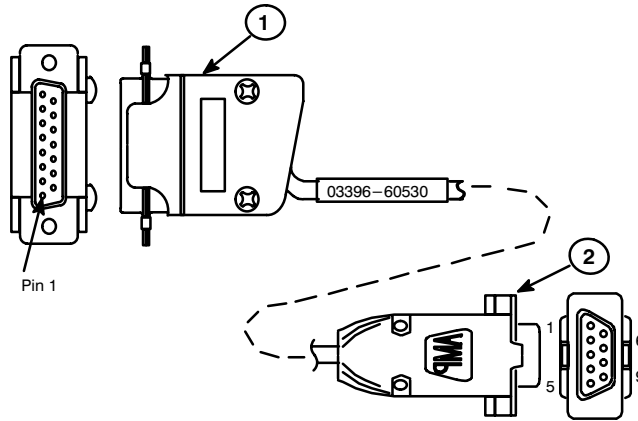
Connector 1—HP 3395	Signal Name	Wire Color	Connector 2— RS-232 Device
1	RLSD	Blue	8
2	RX DATA	Red	2
4, 5	—	Brown Jumper	N.C.
9	SIG. GND	Brown	7
14	TX DATA	Green	3
15	—	White	N.C.
N.C.	RTS/CTS		4, 5
N.C.	DSR/DTR		6, 20
N.C.	PROT. GND		1

HP part number 03396-60510 DTE Male (25-Pin)  
(not supplied, must be ordered if needed)



Connector 1—HP 3395	Signal Name	Wire Color	Connector 2— RS-232 Device
1	RTS	Blue	4
2	RX DATA	Red	3
4, 5	—	Brown Jumper	N.C.
9	SIG. GND	Brown	7
13	CTS	Orange	5
14	TX DATA	Green	2
15	—	White	N.C.
N.C.	PROT. GND		1

HP part number 03396-60530 DCE Female (9-Pin)  
(not supplied, must be ordered if needed)

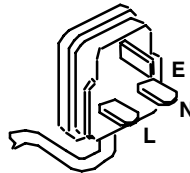
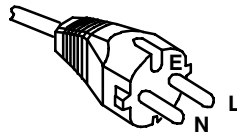
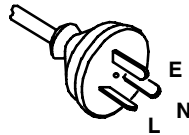
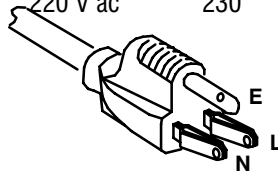


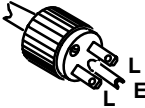
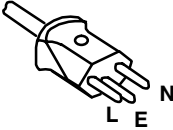
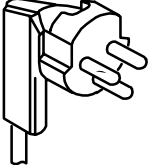
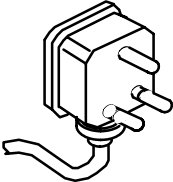
Connector 1—HP 3395	Signal Name	Wire Color	Connector 2— RS-232 Device
1	RLSD	Red	1
2	RX DATA	Green	3
4, 5	—	Brown	N.C.
9	SIG. GND	Black	5
14	TX DATA	White	2
15	—	White/Yellow	N.C.
N.C.	RTS/CTS		7, 8
N.C.	DSR/DTR		6, 4
N.C.	PROT. GND		N.C. (To Shell Only)

## Choosing the Correct Power Cable

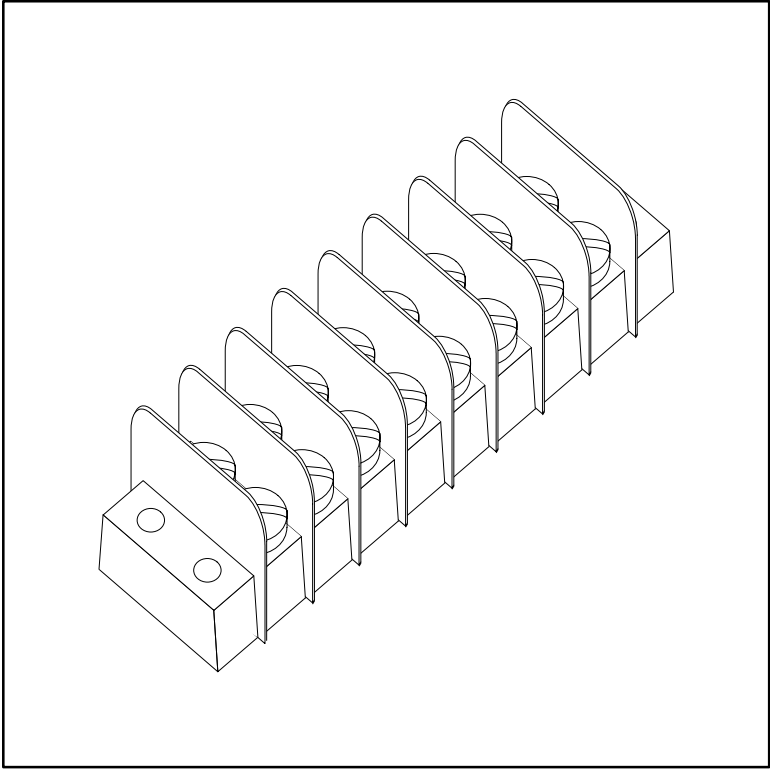
Use the following table to make sure the line voltage indicated on the switch, the power cable supplied, and the line voltage option on your order all agree with the intended power source for the unit.

Part Number	Source Voltage	Voltage Setting	Predominant Country of Usage
8120-1378	120 V ac 100 V ac 220 V ac	115 115 230	USA and Canada Japan Israel
8120-1369	240 V ac 220 V ac	230 230	Australia New Zealand
8120-1689	220 V ac	230	European Continent
8120-1351	240 V ac	230	United Kingdom



Part Number	Source Voltage	Voltage Setting	Predominant Country of Usage
8120-0698	240 V ac	230	USA and Canada
			
8120-2104	220 V ac	230	Switzerland
			
8120-2956	220 V ac	230	Denmark, Greenland
			
8120-4211	240 V ac	230	India, South Africa
			

HP part number 0360-1729 Terminal Block  
used to connect several cables together.







# HP 3395 Technical Data

Physical Specifications	
Electrical:	
Line Voltage.....	115 and 230 V ac 2
Options Provided	
Line Voltage Tolerance.....	For either voltage: +15, -22%
Frequency Range.....	60 to 66 Hz
Power Consumption.....	50 VA maximum
Safety Classification.....	JEC Safety Class I
RFI Certification.....	FPS 1046/1864 (VDE Level B)
Mechanical:	
Height, Top to Bottom.....	4.82 in. (12.5 cm)
Width, Left to Right.....	33.8 in. (85.1 cm)
Depth, Front to Back.....	14.7 in. (37.3 cm) 2
	(without paper)
Weight.....	8.5 lb. (4.31 kg) without paper loaded.
Mechanical Mounting.....	Benchtop installation on a hard, flat 2
	surface with 6-in. (14.7 cm) clearance 2
	air front, in back, and along both sides 2
	to allow for ample ventilation.
Environmental:	
Average Heat Dissipation.....	less than 120 Btu/hr
Temperature Range.....	10°C to +40°C 2
	(operating)

In this appendix....

## Standard Features

- Data Storage
- Calculations and Reporting
- Printer/Plotter Specifications
- External Control and Data Communications
- EPROM-Based Programs

## Specifications

- Data Acquisition
- Electrical
- Physical Characteristics
- Environmental Conditions

# Standard Features

---

## Data Storage

### Built-in Electronic Disk:

Size	92 K; dynamically allocated; available for method, report, calibration, sequence, signal data, and BASIC program storage
Backup Method	0.47 F Super Capacitor
Sustaining Time	Minimum: 5.8 hrs at +25°C; Typical: 150 hrs at +25°C

---

## Calculations and Reporting

Maximum Retention Time	6900 minutes
Retention Time Resolution	0.001 min (0.06 sec)
Maximum Peak Storage Capacity	Approximately 1240 peaks
Detectable Peak Width Range	Approximately 0.3 sec to 10.0 min width at half height (typical depending on [PK WD] parameter)
Methods	Area%, Height%, Normalization, External Standard, External Standard%, Internal Standard, and Internal Standard%. All calculations can be based on areas or heights.
Multilevel Calibration	Up to 63 levels possible
Curve Fits Available	Single-point, point-to-point, linear regression (least squares), nonlinear (quadratic)
Reference Peaks	Multiple reference peaks possible
Retention Time Windows	Percent or absolute time

---

## Printer/Plotter Characteristics

Printer Paper	8.5 in. x 11 in. sheets on roll or z-fold with 0.5 in. tractor margins.
Print Character Format	96 ASCII Characters (upper- and lowercase)
Printing Speed	150 characters/sec avg; bidirectional
Character Density	12 characters/in.
Plotting Sensitivity	Approx 63.7 $\mu\text{V}/\text{cm}$ at $\text{ATT } 2^{\wedge} = 0$ (analog)
Valid Plotting Range	Attenuation: $\text{ATT } 2^{\wedge} = -8$ to $+36$
With an Analog Input	1 mV full scale at $\text{ATT } 2^{\wedge} = 0$ 1 V full scale at $\text{ATT } 2^{\wedge} = 10$
Maximum Selectable Chart Speed	30 cm/min
Maximum Plotting Velocity	31.7 cm/sec
Plotting Acceleration	845 cm/sec <sup>2</sup>

---

## External Control and Data Communications

Rear Panel Connections	3, labelled: REMOTE, SAMPLE, and COMPUTER.
REMOTE (Remote Control)	Inputs: ■ START (TTL) ■ STOP (TTL) ■ READY (TTL)  Outputs: ■ START—1-second relay contact closure between SO1 and SO2 (start oven 1 and start oven 2) ■ READY (TTL)—open collector
SAMPLE	Accepts TTL BCD (binary coded decimal) (Bottle Number Sense) signals; selectable high or low input levels; bottle numbers from 0 to 99.
RS-232 (Data Communications)	RS-232-C protocol with baud rates: 150, 300, 600, 1200, 2400, 4800, 9600, 19200.

---

## EPROM-Based Programs

Postrun Baseline Drawing	Unlimited File Size
Automatic File Naming	Five-digit prefix, appended run number
Sequence Chaining	Unlimited number of methods
Postrun Program Scheduling	Up to 30 programs for realtime and buffered channels
Batch Reprocessing	Unlimited number of files

# Specifications

---

## Data Acquisition

### Analog Input Circuitry:

Input signal voltage range	-10 mV to +1 V (for specified accuracy)
Maximum differential input	-10 V to + 10 V (with no damage to integrator)
Maximum common-mode voltage	$\pm 100$ V (relative to integrator chassis)
DC input impedance	Differential: 33 Mohms, typical 8 Mohms, minimum Common mode: 500 Mohms, minimum
Input noise	40 nV rms, typical (with input shorted) 150 nV rms, maximum (with input shorted)
Analog dynamic range	>140 dB, typical
Common mode rejection	140 dB minimum, dc to 100 Hz
Thermal drift (input shorted)	1 $\mu$ V per $^{\circ}$ C, typical (0 to 35 $^{\circ}$ C) 2 $\mu$ V per $^{\circ}$ C, typical (35 to 55 $^{\circ}$ C) 4 $\mu$ V per $^{\circ}$ C, maximum (0 to 35 $^{\circ}$ C) 8 $\mu$ V per $^{\circ}$ C, maximum (35 to 55 $^{\circ}$ C)

### Analog/Digital Conversion:

Converter type	Continuously integrating dual slope, 100% area recovery
Area resolution	120 nV-sec per count ( $\pm 3\%$ )
Resolution	>24 bits @ 1 Hz typical
Conversion Rates	0.08 to 20 readings per second
Bandwidth	3 Hz
Differential nonlinearity	Monotonicity guaranteed
Integral nonlinearity	$\pm 0.02\%$ of Full Scale, maximum*

---

\*Maximum deviation from a straight line connecting the 0.0V and 1.0V response values.

**Note:** Specifications apply after a 1 hour warm-up period at an ambient temperature of 20 $^{\circ}$ C to 30 $^{\circ}$ C.

## Electrical:

Line Voltage Selections Provided	115 and 230 V ac
Line Voltage Tolerance	For either voltage: +15, -22%
Frequency Range	48 to 66 Hz
Power Consumption	50 VA maximum
Power Supply Fuse (not replaceable)	2A, 250 VAC IEC 127 Type F (quick-acting) 5x20 mm

## Physical Characteristics:

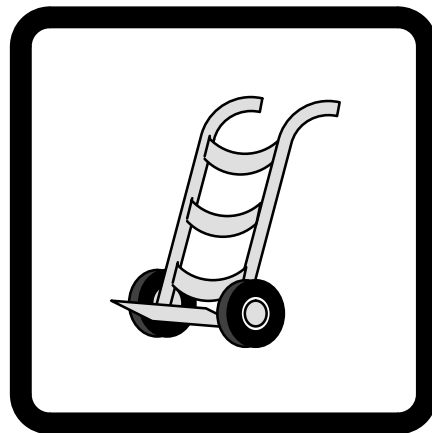
Height, Top to Bottom	4.92 in. (12.5 cm)
Width, Left to Right	13.8 in. (35.1 cm)
Depth, Front to Back (without paper)	14.7 in. (37.3 cm)
Weight	9.5 lb (4.31 kg) without paper loaded.
Mechanical Mounting	Benchtop installation on a hard, flat surface with 6-in. (14.7 cm) clearance in front, in back, and along both sides to allow for ample ventilation.

## Environmental Conditions:

Average Heat Dissipation	less than 120 Btu/hr
Temperature Range (operating)	5°C to +40°C
Temperature Range (storage)	-20°C to +60°C
Humidity Range (operating)	10% to 90% (noncondensing)

## Storing the Integrator

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### In this appendix....

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---

## Storing Your Integrator

Choose a clean environment not exceeding:

- 95% relative humidity.
- 25,000 feet above sea level in altitude.
- +60°C or below -20°C (-4° to +140°F).

If the printhead is not in front of the blotter:

- Make sure that the power is OFF.
- Manually move the carriage to this position.

When storage temperature will exceed +50°C, remove the print cartridge and store it in a normal room temperature environment (+25°C).

When removing the unit from storage after:

- Less than 6 months, prime and clean the printhead. (See chapter 4 for printhead maintenance procedures.)
- 6 months or more, replace the printhead.



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08/97

**Part Number**

**03395-90530**