PERIPHERAL MANUAL

HEWLETT-PACKARD MODEL 9862A

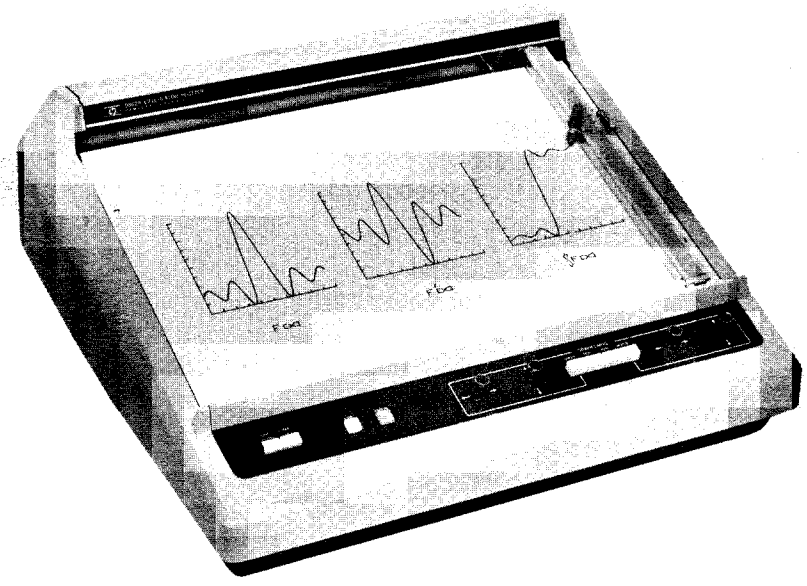


TABLE OF CONTENTS

Information about the Plotter can be divided into two classifications; general information, which is pertinent regardless of the Calculating System it is used with, and specific operating information for using the Plotter within a given system configuration. This manual provides the former type of information. Other manuals, generally supplied with an appropriate ROM for the Calculator, provide the specific operating and programming information.

EQUIPMENT SUPPLIED

The accessories and equipment supplied with each Model 62 are listed below:

ACCESSORIES

PART NO.	QTY	DESCRIPTION
09862-90012	2	Operating Manual
09862-60442	1	Signal Cable
8120-1348	1	Power Cord
8120-1655	1	Inter-Instrument Power Cord
4040-0477	1	Dust Cover
09862-90013	1	Pull-out Instruction Card
5080-3605	1	Slidewire Cleaner
5080-3635	1	Slidewire Lubricant
5080-1190	1	Pkg of 3 Red Pens
5080-1191	1	Pkg of 3 Blue Pens
5080-1193	1	Pkg of 3 Black Pens
9270-1004	10	Graph Paper (English)
9270-1024	10	Graph Paper (Metric)

PENS AVAILABLE

DESCRIPTION	PART NUMBER
Package of 3 Red Pens	5081-1190
Package of 3 Blue Pens	5081-1191
Package of 3 Green Pens	5081-1192
Package of 3 Black Pens	5081-1193

PLOTTING PAPER AVAILABLE

To gain maximum benefit from your Model 62 Calculator Plotter, you will want to use precision-ruled plotting paper. Hewlett-Packard Company offers a wide variety of papers, available through all field offices. These are 11 in. by 16.5 in. (28 cm by 42 cm) or 8.5 in. by 11 in. (21,6 cm by 28 cm) overall and are packaged 100 sheets per box.

ACCESSORIES (continued)

	PLOT AREA	PART NO.
LINEAR	10 in. x 15 in. 25 cm x 38 cm 7 in. x 10 in. 18 cm x 25 cm	9270-1004 9270-1024 9270-1006 9270-1023
SEMI-LOG	10 in. x 2 cycle 10 in. x 3 cycle 2 cycle x 15 in. 3 cycle x 15 in.	9280-0159 9280-0160 9280-0169 9280-0168
LOG-LOG	2 cycle x 3 cycle 3 cycle x 2 cycle 3 cycle x 4 cycle	9280-0167 9280-0165 9280-0171
BLANK (W/SCALING POINTS)	10 in. x 15 in.	9280-0180

This graph paper, especially made for use with the Model 62 Calculator Plotter, is manufactured with rigid control over margin tolerances and alignment. This insures that vertical and horizontal lines drawn by the Plotter will always be parallel or perpendicular to the lines on the graph paper.

SERVICE CONTRACTS

Service Contracts are recommended for your Model 62 Calculator Plotter to ensure maximum operating life. For further information contact your local Hewlett-Packard Sales and Service Office listed in the back of this manual.

INITIAL INSPECTION

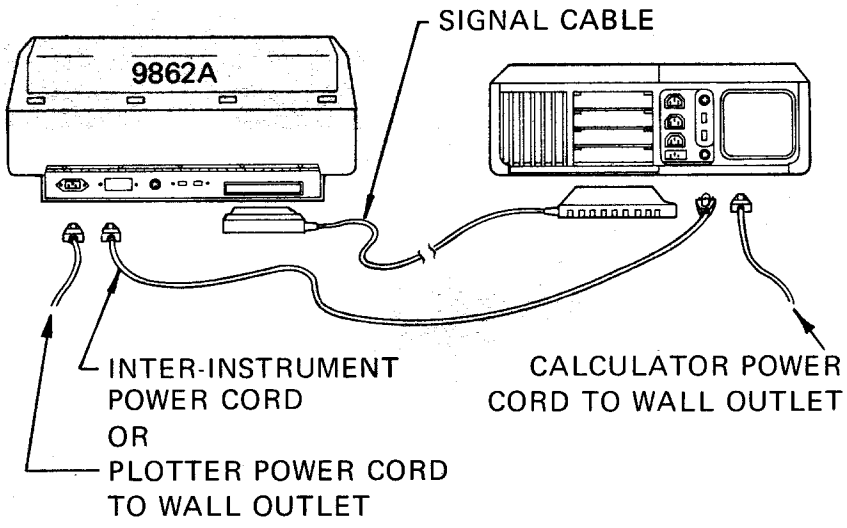
The Plotter was carefully inspected prior to shipment. It should be free of mars or scratches and in perfect operating condition when received. Inspect the Plotter for physical damage and inventory the supplied accessories listed on page 1-1. If the Plotter is damaged or if a performance deficiency is indicated, file a claim with the carrier or contact your nearest Hewlett-Packard Sales and Service Office listed in the rear of this manual.

ELECTRICAL INSPECTION

To verify proper operation of the Plotter refer to documentation supplied with your Calculator or Calculator ROM.

INSTALLATION

Turn the Calculator OFF. Place the Plotter next to the Calculator (see diagram) and insert the Signal Cable into the appropriate connector on the rear of the Plotter and into any one of the four connector slots on the rear of the Calculator. Set the line voltage selector switch on the back of the Plotter to agree with the line voltage used. Check that the proper fuse is installed. Remove the bracket securing the upper end of the carriage arm and pen carriage to the right side of the Platen. Connect the Plotter's power cord to an appropriate power receptacle.



GROUNDING REQUIREMENTS

To protect operating personnel, the National Electrical Manufacturer's Association (NEMA) recommends that the panels and cabinets of the 9800 Calculating System be grounded. The three-conductor power cables supplied provide this ground when plugged into the proper receptacle. The Model 62 meets the International Electro-Technical Commission (IEC) Specifications.

SHIPPING

Before returning the instrument for any reason, notify the local field sales office of the difficulty encountered, giving the model and serial number of the instrument. They will furnish shipping instructions. The following precautions should be taken when repackaging the Plotter.

1. Remove the ink pen.

2. Secure the upper end of the carriage arm and pen carriage to the right side of the Plotter with the bracket (5080-7834) supplied with the mainframe, to prevent movement while in transit.

3. If being returned for repair, do not send power cord, accessory kit, or other accessories.

4. Wrap the instrument in heavy paper or plastic and surround with three to four inches of shock-absorbing material to cushion and prevent movement inside the shipping container. The container should be sufficiently durable to prevent damage to the instrument during handling. If in doubt, request shipping carton (Part No. 09125-80210) from the nearest Hewlett-Packard Sales and Service Office listed in the rear of this manual.

THE PLOTTING PROCESS

The HP 9862A Calculator Plotter provides permanent graphic solutions to problems solved by an HP 9800 Series Calculator.

The Plotter plots a graph by moving a pen to the point on the paper corresponding to the coordinates specified. As each new point is entered, the Plotter moves the pen in a straight line from the old to the new point. By controlling whether or not the pen is in contact with the paper at the time the pen moves, the graph can be a solid line, a dashed line, or a series of points. Several ink colors are available and may be employed to superimpose graphs on the same sheet of paper.

The Plotter can produce graphs as large as 10 inches in the Y (vertical) direction by 15 inches in the X (horizontal) direction (25 x 38 cm on metric paper).

The plotting paper is held to the platen (plotting surface) by an electrostatic hold-down mechanism.

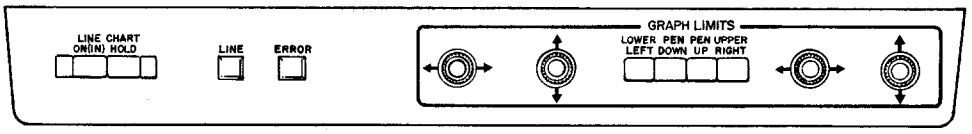
Before beginning a plot, the LOWER LEFT and UPPER RIGHT controls (these are the GRAPH LIMITS controls, see page 3-2) are adjusted to correspond to the overall size of the finished plot. This adjustment in no way affects the programmed relationship between the variables—only the physical size of the finished plot. The distance along the X axis as determined by the GRAPH LIMITS controls, is called the plotting range in X. A similar definition is made for Y.

Depending upon the specific Calculator System at your disposal, you may or may not need to concern yourself with the task of actually programming the transformation between problem variable units and units needed to define points on the plotting surface. You may only need to formulate it by telling the Calculator the range of numbers in terms of the problem variables, after which the Calculator automatically does the conversion as it gives the data to the Plotter. The extent of these and other capabilities, such as drawing axes, forming tic marks, and lettering, depends upon the specific Calculator configuration used to drive the Plotter.

Internally, the Plotter divides each plotting range into 10,000 parts, or "counts". The coordinate information that passes from the Calculator to the Plotter is in terms of these counts. For instance, to move the pen to the center of the graph, the Calculator must instruct the Plotter to move the pen to the location corresponding to 5,000 counts in the X-range and 5,000 counts in the Y-range.

> **NOTE**
>
> The actual distances in inches of the plotting ranges are determined by settings of the GRAPH LIMITS controls.

PANEL CONTROLS



LINE — When depressed, allows power to be supplied to Plotter.

CHART HOLD — When depressed, activates electrostatic paper holddown. When released, deactivates paper holddown and places unit in standby — a condition where unit is inactive.

LINE Indicator — Lights when power is applied to Plotter.

ERROR Indicator — Lights when data coordinates outside range of Plotter are received, the pen has traveled into one of the mechanical limits, or the Plotter recognizes a data transfer format error which would cause improper data to be plotted. The Calculator will continue to calculate but the pen will lift and remain stationary until plot can continue.

GRAPH LIMITS

PEN DOWN — Lowers the pen; overriding the source-input pen information while depressed.

PEN UP — Lifts the pen; overriding the source-input pen information while depressed.

LOWER LEFT Controls — Enters (X_{min}, Y_{min}) allowing the position of lower left limit to be set anywhere in a 5 in. x 10 in. area of the lower left plotting surface. Controls, as indicated by arrows, adjust the lower left graph limit after depressing of the LOWER LEFT pushbutton.

NOTE

Set LOWER LEFT controls before UPPER RIGHT controls. LOWER LEFT interacts with UPPER RIGHT.

UPPER RIGHT Controls — Enters (X_{max}, Y_{max}) allowing the position of upper right limit to be set anywhere on the plotting surface to the right of and above lower left. Controls, as indicated by arrows, adjust the upper right graph limit after depressing of the UPPER RIGHT pushbutton.

STANDBY

Standby is the condition in which the Plotter is inactive, the servos are muted, the pen is lifted, and the Plotter's arm may be moved freely. When power is applied, the Plotter automatically is placed in Standby and remains in Standby as long as CHART HOLD is released. If CHART HOLD is depressed, the Plotter may be removed from Standby by a command from the Calculator.

The Plotter may be returned to Standby by releasing CHART HOLD.

PAPER POSITIONING

To position the paper, release the CHART HOLD switch. Place the paper against the bottom guide and the left paper stop. Depress the CHART HOLD switch and smooth the paper to the platen.

ERROR INDICATIONS

The error light will come on if an attempt is made to move the pen to coordinates corresponding to a position outside of the range established by the GRAPH LIMITS controls.

If the pen is driven against one of the mechanical limits, the pen will lift. The Calculator will continue to run its program.

NOTE

The Plotter requires a recovery time of 1.3 seconds after ERROR indication is cleared.

The Model 62 must be properly maintained to obtain accurate, trouble-free operation. Proper maintenance includes periodic lubrication, performance checks, and visual and electrical checks. In accordance with good maintenance procedures for all precision instruments, your Plotter should be protected from dust by covering when not in use.

CLEANING

The Plotter should be cleaned at regular intervals determined by type of operation, local air contamination and climatic conditions.

The electrostatic platen should be cleaned as needed. Need for cleaning is indicated by the paper sliding easily or by the platen appearing dirty. Clean the electrostatic platen as follows:

1. Remove the pen and paper from the Plotter.
2. Carefully select a soap for cleaning. A mild liquid soap is preferable. Do not use any product with abrasives or corrosive chemicals.
3. Also be careful in selecting a cleaning cloth. Use a soft cloth that will not scratch the surface but will readily absorb water.
4. Saturate the cloth in warm, soapy water. Wring the cloth until the majority of the water has been removed.
5. Wipe the table surface clean with this damp cloth.

CAUTION

NEVER LET WATER STAND ON THE PLATEN.

6. Wipe any moisture from surface.
7. Allow a few minutes to dry before operating the Plotter.

BALANCE SLIDEWIRE MAINTENANCE

Irregular or "jumpy" plots on a properly adjusted Plotter may indicate worn or dirty balance slidewire or wipers. Slidewires should be cleaned at least every six months.

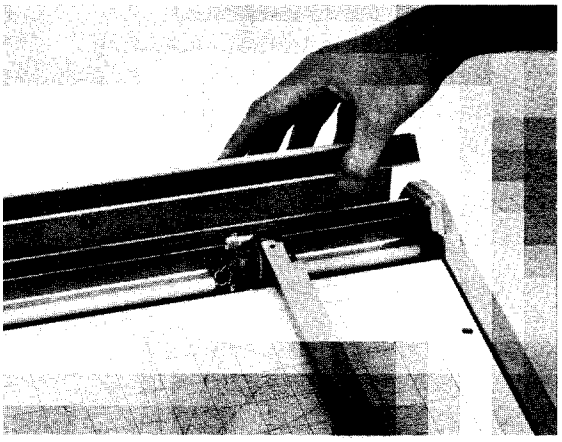
BALANCE SLIDEWIRE MAINTENANCE (continued)

X–AXIS SLIDEWIRE ACCESS

To gain access to the X–axis slidewire, the rear hood of the Model 62 must be removed.

1. Turn the two screws securing the hood one full turn counterclockwise.

2. Remove the hood.



Y–AXIS SLIDEWIRE ACCESS

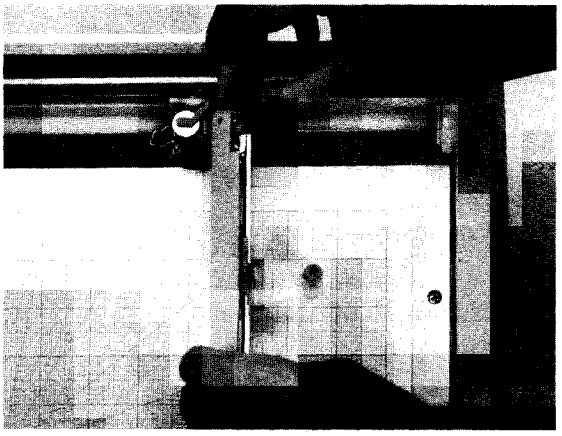
To gain access to the Y–axis slidewire, the rear hood must also be removed.

1. Remove the rear hood as described above.

2. Lift the pen holder up out of the way of the slidewire cover.

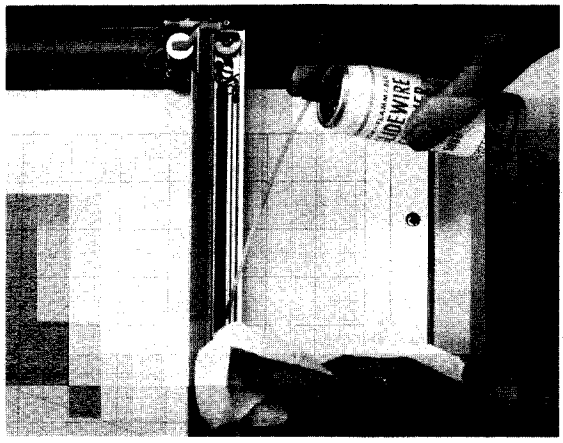
3. Turn the black plastic tab on the pen lift assembly one-quarter turn counterclockwise. This will free the slidewire cover.

4. Tilt the slidewire cover up, exposing the Y–axis slidewire.



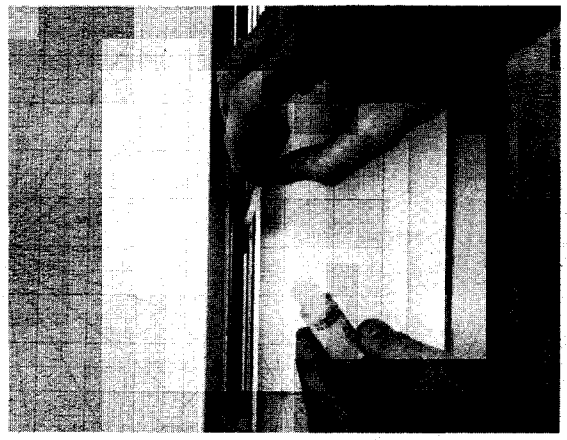
SLIDEWIRE CLEANING

To clean the slidewire, turn LINE switch off, then spray the entire slidewire with Slidewire Cleaner (Part No. 5080-3605). Move the carriage arm or pen carriage rapidly through several full-scale excursions. Again spray the wiper with Slidewire Cleaner. Saturate a Kimwipe or cotton swab with Slidewire Cleaner. Rub the slidewire (mandrel and return strip) with the moistened tissue or swab. Repeat the cleaning procedure until there is no stain on the tissue, then clean once more to ensure that all contaminants have been removed.



SLIDEWIRE LUBRICATION

After cleaning, the slidewire (mandrel and return strip) must be lubricated sparingly with Slidewire Lubricant (Part No. 5080-3635). This lubrication will reduce wear and chemical contamination of the balance slidewire assembly. After completion of cleaning and lubrication, re-install the Y slidewire cover and rear hood.



SPECIFICATIONS

Plotting Area:

10 inches on the Y Axis by 15 inches on the X Axis (25 cm by 38 cm on metric paper).

Graph Limit Controls: (Lower left limit must be set first.)

Enters (X_{min}, Y_{min}) allowing the lower left limit to be set anywhere in a 5 in. x 10 in. area of the lower left plotting surface. Also enters (X_{max}, Y_{max}) allowing the position of the upper right limit relative to (X_{min}, Y_{min}) to be set anywhere on the plotting surface to the right of and above the lower left limit.

Plotter Vector Length:

Vectors of any length (within plotting area) may be drawn between consecutive data points.

Pen Control:

Local control of electric pen lift by front panel switches. Remote control from Calculator by program commands. Maximum operations/second=12. Time required per pen command = 40 milliseconds.

Writing Method:

Ink, disposable pens.

Plot Accuracy:

Better than 0.3% of full scale at 25 degrees C + 0.005%/degrees C worst case.

Numerical Resolution:

1/10,000.

Resettability:

0.007 inch (0.18 millimeter) maximum.

Temperature Range:

5 degrees C to 45 degrees C. Lower left (origin) stability is better than 0.0025 in./degrees C (0.07 mm/degrees C). Upper right (full scale) temperature coefficient is better than 0.016%/degrees C.

SPECIFICATIONS (continued)

Power:

100V, 115V, 200V, or 230V ±10% (choice of 4 positions). 48 to 66 Hz, 100 Watts.

Weight:

Net 40 lbs (18,1 kg).
Shipping 52 lbs (23,6 kg).

Dimensions:

8½ in. high x 20 in. wide x 19⅜ in. deep (213 mm x 500 mm x 484 mm).

Plotting Time:

The actual plotting time of the 9862A will be determined by the time required by either the Calculator or the Plotter, whichever is greater. The plotting time for a 0.5 in. vector is approximately 90 ms.