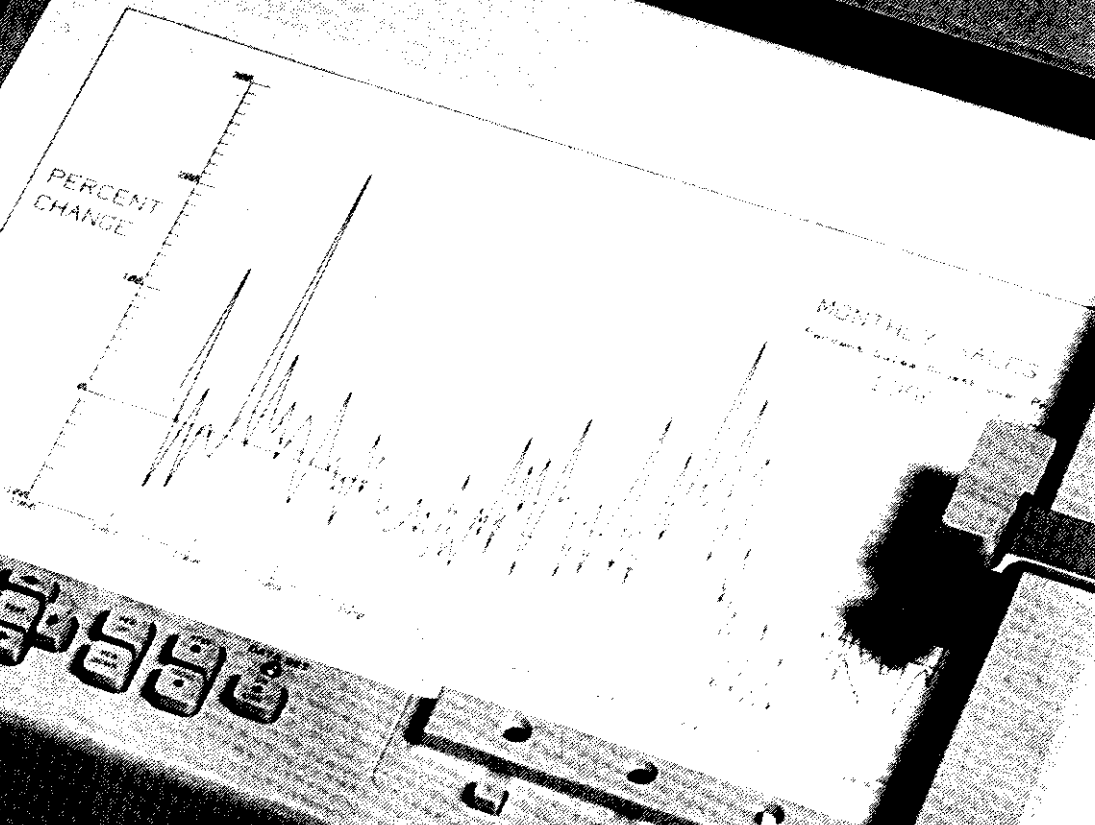


PERCENT
CHANGE

MONTHLY SALES
Continental Division, General Motors Corp.
1968

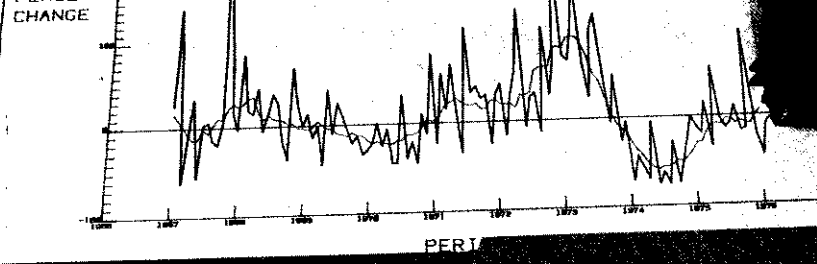


Control panel with several buttons and a dial.

- Buttons: **OFF**, **STOP**, **START**, **PAUSE**, **REVERSE**, **FORWARD**
- Dial: **100**

Adjustable mechanism with a sliding bar and several knobs.

- Knobs: **1**, **2**, **3**, **4**



Convenient Operation

ACTIVE FRONT PANEL CONTROLS

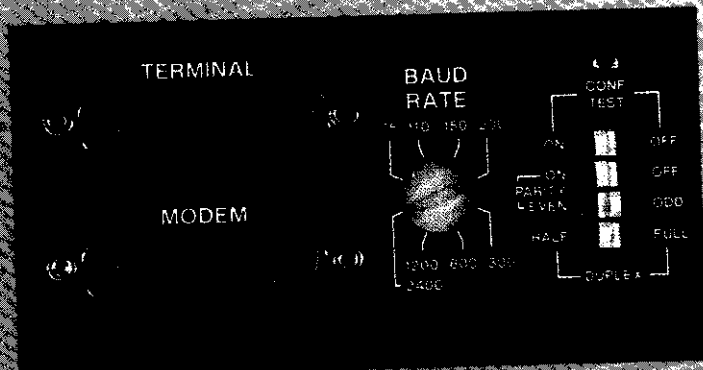
Front panel controls are active during plotting.

Depressing the chart hold pushbutton during a plot will lift and move the pen to the upper right position in order to closely check the plot. After checking, the pen will move back to the last plotted position and will continue to plot without loss of incoming data.

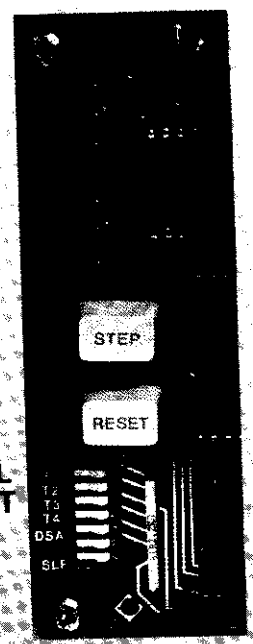
The pen color may be changed during a plot by simply depressing the pen select pushbutton for the desired pen. Incoming data are not lost during the pen change.

PROGRAMMABLE SELECTION OF ANY OF FOUR COLORED PENS

Through the use of a single program command or manual selection, any of four colored pens — black, blue, red, and green, can be quickly chosen. The pen stable located on the front panel stores and caps the pens, keeping them ready for the next selection. A unique damping mechanism gently lowers the pen onto the chart retaining the fine line characteristics of the pens and extending the pen life.



ACCESSIBLE REAR PANEL CONTROLS



INTERNAL SELF-TEST

Three parity checks — ODD, EVEN, or OFF provide wide versatility in parity selection.

An eight-position switch provides selection of eight baud rates ranging from 75 to 2400 baud.

Full and half duplex operation provides the capability of switching the plotter echo mode to meet terminal operational needs.

A confidence test switch is provided for a user triggered self-diagnostic test of the plotter. This self-test reads the confidence bit which indicates the operational condition of the plotter.

Internal switches and displays are provided to enable service personnel to perform detailed fault isolation. This troubleshooting aid can quickly isolate a malfunction to a circuit board and in some cases to a faulty component thereby reducing instrument down time and service costs.

Versatile Plotting



<p>PROGRAMMABLE TRACE DIFFERENTIATION <i>In Black & White or Color!</i></p>	<p>MACRO-INSTRUCTIONS</p>	<p>EXCELLENT LINE QUALITY <i>Retrace & Pen-to-Pen Repeatability</i></p>
<p>ARCS & CIRCLES</p>	<p>The 7221A</p> <p><i>From Hewlett Packard</i></p>	<p>USER-DEFINED LINE STYLES</p>
<p>RS232C / CCITT V.24 INTERFACE</p> <p>***** *****</p> <ul style="list-style-type: none"> * 75 to 2400 Baud * With Efficient Data Communications Protocol * And Simultaneous Terminal/Computer Communication. 	<p>PROGRAMMABLE GRAPH LIMITS</p>	<p>INTERNAL CHARACTER GENERATION <i>With Programmables:</i></p> <p>SIZE SLANT and Direction</p> <p>96 ASCII CHARACTERS A B C D E F G H ...</p> <p>14 European and Latin American Symbols £ ¤ Å Æ ...</p> <p>41 Mathematical and Centered Symbols □ × = ± Σ Δ</p>

PROGRAMMABLE TRACE DIFFERENTIATION

Using the multicolor plotting, programmable dashed-line fonts, and macro capabilities of the 7221A, individual traces can be readily identified for ease of chart interpretation.

MACROINSTRUCTIONS

Frequently used shapes defined by the user such as the arrowhead and acme thread shown here can be stored as macroinstructions and invoked at any time by a single command.

EXCELLENT LINE QUALITY AND REPEATABILITY

Through program control, the pen can be set to any of 36 speeds from 1 to 36 cm/s. The excellent line quality is retained at all pen speeds. This feature enables the same high quality graphics that are produced on standard chart paper to be produced on mylar, acetate, or other media. Pen-to-pen repeatability assures accurate plotting with all pens.

ARCS AND CIRCLES

Arcs and circles can be defined by a single command in either direction, at any radius, starting, and stopping angle.

PROGRAMMABLE GRAPH LIMITS

Graph limits may be established independent of the lower left and upper right boundaries by program control. The desired graph is then mapped into this space with plotting continuing as long as data remain within the limits. When off-scale data are received, the plotter proceeds to the off-scale point, calculates the intercept point, then continues to plot when on-scale data are again received.

SIX RESIDENT CHARACTER SETS

The six resident character sets include ANSI ASCII as well as three European and Latin American sets. Combined with miscellaneous mathematical and centered symbols, the character sets provide optimum flexibility and application throughout much of the world. Character size, slant, and rotation can be changed as necessary to suit each application.

Powerful Built-in Plotter Instructions

Plotter instructions are easily executed through the use of one to three ASCII characters. Two categories of instructions are recognized by the plotter: device control and graphic instructions.

DEVICE CONTROL INSTRUCTIONS

Device control instructions are used to control the plotter as a peripheral device. These instructions are acted upon immediately by the plotter and are never stored in the plot data buffer. Two groups of commands make up the device control instructions.

I/O CONTROL GROUP

The I/O Control Group consists of six instructions to turn the plotter on and off, set the handshake and output modes, and erase plot data currently contained in the data buffer.

OUTPUT GROUP

The Output Group consists of nine instructions to transmit information to the external system. These instructions are: plotter identification, status, total buffer storage bytes, number of currently available buffer storage bytes, location of present upper right and lower left graphic limits, current page location, an error report, and two instructions to interface with the computer and provide definition of graphic instructions.

GRAPHIC INSTRUCTIONS

Graphic instructions are, in general, anything that affects the graphics being constructed. These instructions are never flushed to the buffer and are accessed on a first-in, first-out basis. Four groups of commands make up the graphic instructions.

SETUP GROUP

The Setup Group consists of five instructions to establish operating conditions in the plotter. These instructions initialize the plotter, establish the number of graphic units for the X and Y axes, establish the grid limits, set the maximum velocity of the pen, and set the arc tolerance.

PLOT GROUP

The Plot Group consists of eleven instructions to create graphic marks on paper. These instructions move the pen either relative to its previous position or to an absolute position, cause the pen to draw to a position either relative to its previous position or to an absolute position, draw an arc in either clockwise or counterclockwise direction, perform an incremental axis rotation, rotate to the angle of the last vector, select a new pen, invoke a user-defined dashed line with either fixed or floating pattern length, and cause a NOP condition to complete execution of the last instruction.

LABEL GROUP

The Label Group consists of five instructions to draw alphanumeric characters. These instructions draw the requested ASCII characters, set the character size and spacing, define the character set used, set the character slant angle, and define the label string terminator.

MACROINSTRUCTION GROUP

The Macroinstruction Group consists of four instructions to allow repeated execution of commonly used graphic command sequences. These instructions define the beginning of a macro string, terminate the macro string, initiate execution of a previously defined macro, and cause a specified macro to be automatically invoked upon completion of each vector or arc.

Expandable Buffer

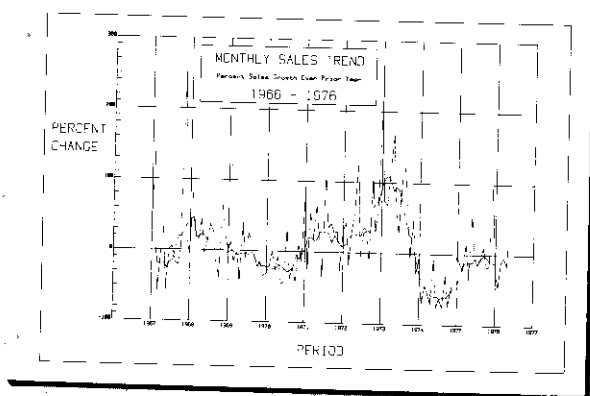
Plotter instructions are processed as they are received. The plotter does not wait for the plotter to be ready to receive more data. The buffer will store up to 64 instructions and can be expanded to 256 instructions.

Portions of the buffer storage can be dynamically reallocated to store macroinstructions as defined by the user program. A series of instructions for a particular set of arcs, circles, and moves that must be repeated several places on the plot can be stored in the buffer as a macroinstruction to be invoked by program command. A total of 64 macroinstructions can be stored within the buffer at a single time. At any time during plotter operation, the buffer can be interrogated to determine the remaining buffer size.

Portions of the buffer storage can be dynamically reallocated to store macroinstructions as defined by the user program. A series of instructions for a particular set of arcs, circles, and moves that must be repeated several places on the plot can be stored in the buffer as a macroinstruction to be invoked by program command. A total of 64 macroinstructions can be stored within the buffer at a single time. At any time during plotter operation, the buffer can be interrogated to determine the remaining buffer size.



Wide Ranging Applications

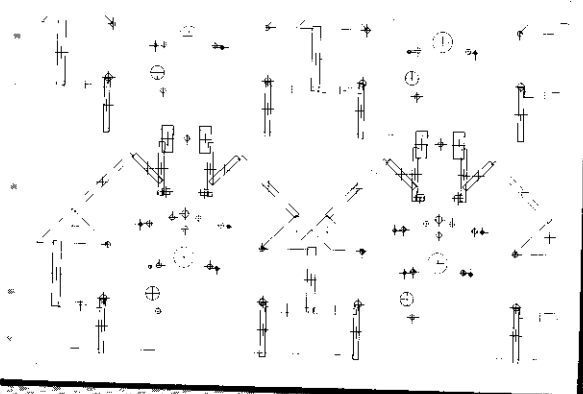
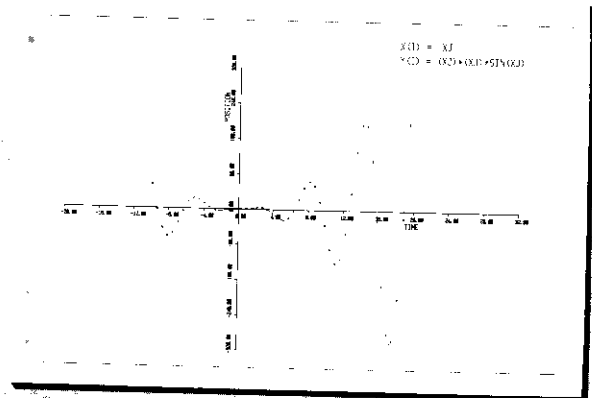


Business Plotting

Multicolored plots of complex data can be easily prepared through the versatility of the HP-PLOT/21 GRAPHIC PACKAGE. For example, the monthly sales trend plot shown used a single program statement of the high level language to draw and label both axes.

Engineering Plotting

The HP-PLOT/21 GRAPHIC PACKAGE is compatible with commonly used incremental plotter subroutines. With only minor changes to existing application programs, the package can be used to provide enhanced graphic display using the features of the HP 7221A. The $(XJ)^2 \sin(XJ)$ plot shows the automatic positioning of the origins with intersecting axes, all with a single program statement for each axis.



Numerical Control Verification

The 7221A provides a significant reduction in data transfer time when performing numerical control plotting. The NC Plot shown was produced using only 1/10 the data transfer time required by other plotters. Macroinstructions and single command arc and circle generation find wide application in producing low cost, high quality numerical control plots.

Specifications

PLOTTING AREA

Y-axis: 260 mm (11 in.)
 X-axis: 400 mm (15.75 in.)
 Accommodates up to ISO A3 and 280 x 432 mm (11 x 17 in.) chart paper.

PLOTTING ACCURACY

±0.2% of deflection ±0.2 mm (0.008 in.) [indicates linearity and repeatability and assumes the plotter has been "zeroed" exactly to the lower left (0,0) coordinates]

REPEATABILITY

For a given pen: 0.10 mm (0.004 in.)
 Pen-to-pen: 0.20 mm (0.008 in.)

ADDRESSABLE RESOLUTION

Smallest addressable move: 0.025 mm (0.001 in.)

SPEED

Maximum: 360 mm/s (14 in./s) in each axis, 509 mm/s (20 in./s) on 45° angle.
 Programmable: pen speed may be adjusted to any one of 36 speeds from 10 mm/s (0.4 in./s) to 360 mm/s (14 in./s) in 10-mm/s (0.4-in./s) increments under program control.

VECTOR LENGTH

No limit — any length vector within the plotter's mechanical limits will be plotted to within the previously mentioned accuracy.

OFFSCALE PLOTTING

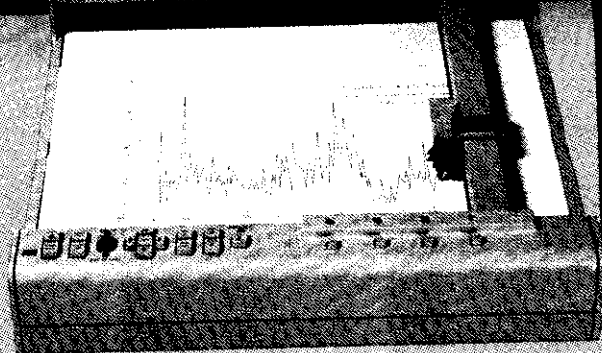
When offscale data are received by the plotter, the plotter will automatically calculate the intercept of that vector and the currently defined plotting area and proceed to that point. As additional offscale data are received, the plotter will monitor the location of these data and resume plotting, once on-scale data are received, by again calculating the new intercept point along the vector to be drawn and the currently defined plotting area then plotting from that intercept to the on-scale data point. Plotting accuracy and repeatability specifications are preserved.

CHARACTER PLOTTING SPEED

3 characters/s typically for 2.5 mm (0.10 in.) characters

PEN POSITION CONTROLS

Remote control by program commands; local control by front-panel switches; capable of > 20 operations/s. Local control provides vector rates of 4.2 mm/s (slow) and 93.2 mm/s (fast) (0.167 ips and 3.67 ips).



POWER REQUIREMENTS

Source:	100V -10%, +5%	} switch selectable
	120V -10%, +5%	
	220V -10%, +5%	
	240V -10%, +5%	
Frequency:	48 - 66 Hz	
Consumption:	160 V/1.7 A	
	120 V/1.6 A	
	220 V/1.1 A	
	240 V/1.0 A	
	240 W max.	

ENVIRONMENTAL RANGE

Temperature: 0°C to 55°C
 Relative humidity: 5% to 95% (below 40°C)

SIZE/WEIGHT

Height: 189 mm (7.5 in.)
 Width: 497 mm (19.5 in.)
 Depth: 455 mm (18 in.)
 Net weight: 18.2 kg (40 lb)
 Shipping weight: 25.4 kg (56 lb)
 Cube: 0.21 m³ (7.4 ft³)

INTERFACE

Standard RS-232C/CCITT V.24 asynchronous serial ASCII with switch selectable baud rates of 75, 110, 150, 200, 300, 600, 1200, or 2400 baud.

OPTIONS

Option No.	Description
001	Additional 2048 bytes of input buffer

Accessories

ACCESSORIES SUPPLIED

	Part No.
1. Accessory Kit 4-Pkg Disposable Pen, 4-Color Pack (Red, Blue, Green, Black) 1 Digitizing Sight	09872-60070
2. Operating and Programming Manual	07221-90001
3. Dust Cover	9222-0564
4. Power Cord (appropriate cord supplied)	—
5. Mate-to-Mate Interface Cable, RS-232C/CCITT V.24	07261-90390
6. Graph Paper, Standard Grid, English, 10 Sheets	9270-1004
7. Graph Paper, Standard Grid, Metric, 10 Sheets	9270-1024

ACCESSORIES AVAILABLE

	Part No.
1. Disposable Pens, Pkg of 5	
Red	5060-6784
Blue	5060-6785
Green	5060-6786
Black	5060-6787
4-color pack	9090-6810
2. Graph Paper, Box of 100 Sheets	
Plot Area	
Linear	
10 x 15 in.	9270-1004
26 x 38 cm	9270-1024
7 x 10 in.	9270-1008
18 x 25 cm	9270-1023
Semi- Log	
10 in. x 2 cycle	9280-0189
10 in. x 3 cycle	9280-0180
2 cycle x 18 in.	9280-0189
3 cycle x 15 in.	9280-0188
Log- Log	
2 cycle x 3 cycle	9280-0187

Log- Log	3 cycle x 2 cycle	9280-0185
	3 cycle x 4 cycle	9280-0171
Blank	10 x 15 in.	9280-0180
Smith Chart (50 Box Min)	7.25 in. Diameter 7.15 in. Diameter, Expanded	9280-0137 9280-0147
3. Manuals Operating and Service Manual		07221-90000
	HP PLOT/21 Software User Manual	07221-90002

SOFTWARE AVAILABLE

HP PLOT/21 GRAPHIC PACKAGE consists of a user's manual and a set of FORTRAN subroutines to enable operation of the PLOT/21 plotter with the following systems:

Application	Part No.
HP 3000 Series II	07221-14001
GE MARK III	07221-14002

For More Information, Call Your Local HP Sales Office or, in U.S., East (301) 948-0370, Midwest (312) 677-0460, South (404) 434-4060, West (213) 977-1281. Or Write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, Post Office Box 85, CH-1211 Meyrin 2, Geneva, Switzerland. In Japan, YHP, 1-58-1, Yayoi, Shibuya-KU, Tokyo, 151.