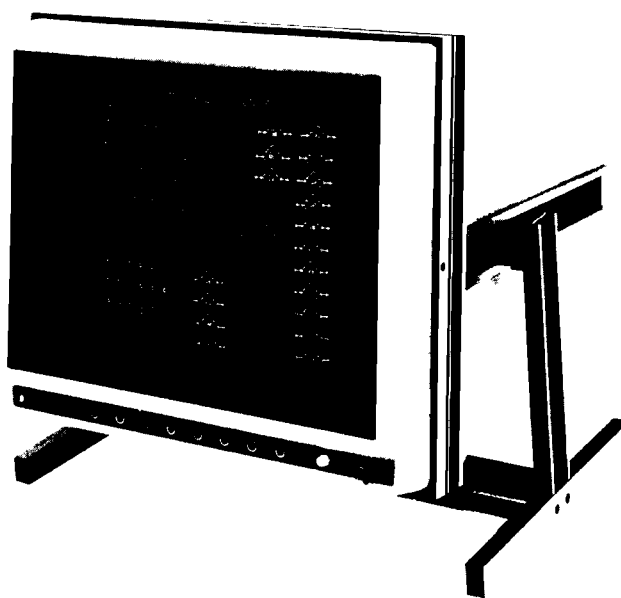


**INTER - OFFICE SERVICE MEMO****Date:** DECEMBER 5, 1980**TO:** ALL PT-01, PT-02 AND PT-11 SERVICE MANAGERS**FROM:** RAY UBERECKEN, COLORADO SPRINGS DIVISION**SUBJECT:** PRODUCT SUPPORT PLAN FOR 1310B

RMU/mh

**HEWLETT  
PACKARD**

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## SECTION I

### GENERAL

#### DESCRIPTION.

The 1310B is a high speed electrostatically deflected directed beam large screen display. The 1310B features a new CRT exhibiting greatly improved spot size and corner performance. Contrast enhancement is provided by a new screen filter. The power supplies have been beefed up for the demanding graphics market.

#### SPECIAL FEATURES.

**DYNAMIC FOCUS-ASTIGMATISM.** Voltages proportional to the position of the CRT beam are applied to the focus and astigmatism elements of the CRT. This causes spot size and shape to remain constant over the CRT viewing area. Focus is also corrected for changes in intensity level.

**PHOSPHOR PROTECTION.** A protection circuit senses slow or static deflection signals and limits beam intensity to prevent burning of the CRT phosphor and mesh.

**INPUT MODIFICATIONS.** The input circuits to the X, Y, and Z amplifiers are designed to permit easy modification for single ended or differential operation. Additionally, the input termination resistance and the input attenuation ratio for the X and Y amplifiers can be changed.

#### PANEL FEATURES.

The instrument is intended for use as a general purpose graphic display. It is an X, Y, Z display with analog voltage inputs for X, Y, and Z-axis controls. All signals must be externally supplied through rear-panel connections. Intensity, focus, X-position, Y-position, astigmatism, X-gain, Y-gain and trace align controls are screwdriver adjustments accessible from the front panel.

#### INTERNAL CONTROLS.

#### WARNING

Dangerous voltages capable of causing serious injury or death are present in this instrument. The following internal switches should be set by qualified personnel only.

**INPUT IMPEDANCE SWITCHES.** The input impedance selector switches permit selection of either 50 $\Omega$  or 10 K $\Omega$  for the X, Y, and Z axis amplifiers. A1S1 controls the X amplifier, A3S1 controls the Y axis amplifier, and A5S1 controls the Z axis amplifier.

**PHOSPHOR PROTECTION.** The Phosphor Protection switch (A5S1) is located on the right connector board (A8). This switch either enables or disables the phosphor protection circuit.

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## **INTERFACING CONSIDERATIONS.**

**GENERAL.** Standard sensitivities of the X and Y deflection amplifier are 1 V p-p for full screen deflection. Front panel gain controls for each axis reduce sensitivity to 1.75 V p-p for full screen deflection. X-Y deflection amplifiers may be configured for either single ended or differential operation. Input polarity may also be reversed by interchanging the input cable connections on the rear edge of the input amplifier board (A1 for X amplifier and A3 for Y amplifier). The input impedance selector switches permit selection of either 50Ω or 10KΩ for the X, Y, and Z axis amplifiers. A1S1 controls the X amplifier, A3S1 controls the Y amplifier, and A5S1 controls the Z axis amplifier.

### *Standard Options*

<b>Option</b>	<b>Description</b>
639	P39 phosphor, aluminized, open graticule CRT in lieu of P31.
001	Delete tilt stand and add a rack mount kit.
003	Delete contrast control and add brightness control.
604	P4 phosphor, aluminized, open graticule CRT in lieu of P31.
002	Delete tall tilt stand and add a short tilt stand.

## **ACCESSORIES SUPPLIED.**

The following accessories are supplied with the 1310B.

- One Operating and Service Manual
- One AC line cord
- One Application Note (Application Note No. 166)
- One Tilt Stand

## **EQUIPMENT AVAILABLE.**

The following equipment is available for the 1310B:

- 1 metre four-coax cable HP Model 52126A
- 3.6 metre three-coax cable HP Model 10488A
- Rack mount slide kit, HP Stock No. 01310-68701
- Fixed slide kit, HP Stock No. 01310-68704.

## **DOCUMENTATION.**

Operating and Service Manual 01310-90903

## **WARRANTY**

**A. INSTRUMENT SALES IN WARRANTY (01 SALES FORCE).**

Customer must return unit to HP service office for repair by 01 service people. The warranty period is one year from date of shipment. COL will be billed for labor and parts. Labor and parts may be based on S.T.R.E.P. (Fixed Price Repair) where applicable.

**B. INSTRUMENT SALES OUT OF WARRANTY (01 SALES FORCE).**

Instrument is repaired by 01 service group and labor and parts charges are paid by the customer.

**C. INSTRUMENT (COMPUTER PERIPHERAL) WITHIN FIRST NINETY DAYS AFTER INSTALLATION (02/11 SALES FORCE).**

Instrument will be serviced by 02/11 service force on site and COL will be billed on warranty for labor and parts.

**D. INSTRUMENT (COMPUTER PERIPHERAL) AFTER FIRST NINETY DAYS FOLLOWING INSTALLATION AND IF CUSTOMER BUYS A SERVICE CONTRACT.**

Service will be handled by 02/11 service group and COL will not be charged for repair because the customer has already paid for parts and service with travel via a basic monthly maintenance charge (B.M.M.C.).

**E. INSTRUMENT (COMPUTER PERIPHERAL) AFTER NINETY DAYS AND UP TO TWELVE MONTHS FOLLOWING INSTALLATION WHERE CUSTOMER DID **NOT** BUY A SERVICE CONTRACT (02/11) SALES FORCE).**

On site service will be handled by 02/11 service force. COL will be billed on warranty for parts only and the customer pays travel and labor.

If the customer returns the instrument to a service office the standard twelve months warranty applies and service will probably be performed by 01 personnel.

**F. INSTRUMENT (COMPUTER PERIPHERAL) AFTER TWELVE MONTHS AND CUSTOMER DOES **NOT** HAVE A SERVICE CONTRACT (02/11) SALES FORCE).**

For on site service the customer pays travel, labor and parts with 02/11 performing the service.

If the customer delivers the instrument to a service office, 01 will probably service the unit and the customer pays labor and parts. Parts and labor may be on S.T.R.E.P. (Fixed Price Repair) where applicable.

### **Note**

The on site service refers to normal HP service travel areas as set forth by C.S.D. An additional charge will be assessed for travel outside the travel area and will be negotiated.

## CERTIFICATION

*Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.*

## WARRANTY

**This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.**

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

## LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

**NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HP SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

## EXCLUSIVE REMEDIES

**THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.**

## ASSISTANCE

*Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.*

*For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.*

## Specifications

### VERTICAL AND HORIZONTAL AMPLIFIERS

**RISE TIME:** <75 ns, 10% to 90% points for full screen deflection.

**BANDWIDTH:** dc to 5 MHz (3 dB down at 5 MHz) with 8.9 cm (3.5 in.) deflection.

**LINEAR WRITING SPEED:** >25.4 cm/ $\mu$ s (>10 in./ $\mu$ s).

**SETTLING TIME:** signal settles to within 1 spot diameter of final value in <500 ns for any on screen movements.

**REPEATABILITY:** <0.15% of full screen error in re-addressing any point on screen from any point on screen.

**CROSSTALK:** <0.38 mm (<0.015 in.) with one input terminated in 50 $\Omega$  and the other input driven by 1 V, 500 kHz signal.

**X-Y INPUT:** rear panel BNC female connectors with floating shield.

**X-Y INPUT IMPEDANCE:** 50 $\Omega$ , switchable to 10 k $\Omega$  shunted by 40 pF.

**MAXIMUM INPUT:**  $\pm$ 50 V (dc + peak ac) with 10 k $\Omega$  internal termination.  $\pm$ 5 V (dc + peak ac) with 50 $\Omega$  internal termination.

**LINEARITY:** 1% of full scale display (along major axes).

**DRIFT:** 1.27 mm/hr (0.05 in./hr) and 2.54 mm/hr (0.10 in./hr) in 24 hours with covers installed.

**DEFLECTION FACTOR:** front panel adjustable through the range indicated below:

Vertical	Horizontal
from approx 35.8 mV/cm (90 mV/in.) to 60.9 mV/cm (153 mV/in.)	from approx 26.2 mV/cm (67 mV/in.) to 45.9 mV/cm (117 mV/in.)

**SPOT JITTER AND MOTION:** 0.13 mm (0.005 in.) with X INPUT and Y INPUT disconnected.

**POSITION:** zero input can be set to any on-screen position.

**POLARITY:** positive vertical input moves the beam up; positive horizontal input moves the beam right. Polarity can be changed by changing internal lead connections.

### Z-AXIS AMPLIFIER

**RISE TIME:** <25 ns.

**SENSITIVITY:** -1 V signal blanks trace; +1 V signal (INTENSITY at maximum) provides maximum intensity. Polarity may be reversed by changing internal lead connections.

**GAIN ADJUST:** adjustable by INTENSITY control over 5:1 attenuation ratio.

**BALANCE:** internal adjustment provides  $\pm$ 1 V offset.

**Z-INPUT:** rear panel BNC female connector with grounded shield.

**Z-INPUT IMPEDANCE:** 50 $\Omega$  switchable to 10 k $\Omega$  shunted by 60 pF.

**TTL BLANKING:** high state blanks CRT. (POLARITY REVERSIBLE)

**MAXIMUM INPUT:**  $\pm$ 50 V (dc + peak ac) with 10 k $\Omega$  internal termination.  $\pm$ 5 V (dc + peak ac) with 50 $\Omega$  internal termination.

### CATHODE-RAY TUBE

**VIEWING AREA:** 28 x 38 cm (11 x 15 in.)

**TYPE:** post-accelerator, 28.5 kV accelerating potential, P31 aluminized phosphor is standard. Electrostatic focus and deflection.

**SPOT SIZE:** 0.51 mm (0.020 in.) center screen and  $\leq$ 0.70 mm (0.0275 in.) in the corners.

### RESOLUTION:

$\geq$ 20 lines/cm (50 lines/in.) center screen and  $\geq$ 14 lines/cm (36 lines/in.) in the corners over a 28 x 38 cm (11 x 15 in.) viewing area.

**BRIGHTNESS:** at least 84 cd/m<sup>2</sup> (50 fl) measured at 2.54 mm/ $\mu$ s (0.1 in./ $\mu$ s), 60 Hz rate, with spot size of 0.5 mm (0.020 in.).

**CONTRAST RATIO:** 4:1 or greater.

**X-RAY EMISSION:** CRT emission <0.2 mR/hr; not measurable in background noise using Victoreen Model 440RF/C.

**IMPLOSION PROTECTION:** rim and tension banding prevents implosive devacuation. (UL/IEC348).

**PHOSPHOR PROTECTION:** circuit detects absence of deflection signals and limits beam current.

## Supplemental Characteristics

**POWER:** selectable to 100 Vac, 120 Vac, 220 Vac, and 240 Vac +5%-10%, 48 Hz to 440 Hz, 115 Va maximum.

### ENVIRONMENT:

**ALTITUDE:** 4600m (15000 ft) operating at 25 $^{\circ}$  C 7600m (25000 ft) non-operating.

**TEMPERATURE:** 0 $^{\circ}$  C to +55 $^{\circ}$  C operating; -40 $^{\circ}$  C to +70 $^{\circ}$  C non-operating.

**HUMIDITY:** to 95% at 40 $^{\circ}$  C.

**VIBRATION:** 10-55 Hz at .38 mm (0.015 in.) peak to peak excursion.

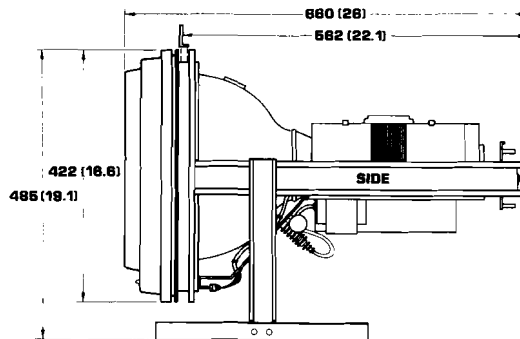
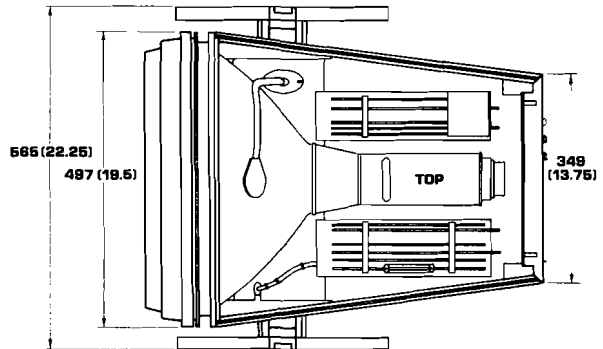
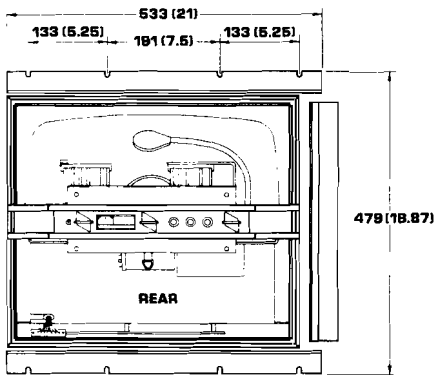
**SHOCK:** level 30g; duration 11 ms; shape 1/2 sine wave.

**X, Y, and Z INPUT CONNECTORS:** BNC type mounted on rear rail.

**WEIGHT:** net, 32.4 kg (71.5 lb); shipping 45 kg (99 lb).

**DIMENSIONS:** refer to figure 1-1 for complete details.

**NOTES: 1. DIMENSIONS ARE FOR GENERAL INFORMATION ONLY. IF DIMENSIONS ARE REQUIRED FOR BUILDING SPECIAL ENCLOSURES, CONTACT YOUR HP FIELD ENGINEER.**  
**2. DIMENSIONS ARE IN MILLIMETRES AND (INCHES).**



*Dimensional Detail, 1310B*



**SECTION II**  
**PT 01 SUPPORT**

**REPAIR STRATEGY.**

The repair strategy for the 1310B is bench repair to the component level. Because of instrument complexity, if the faulty part cannot be diagnosed within two hours, a COMSYSTEM MESSAGE or telephone call to Rich Larson at Colorado Springs Customer Service should be made to help locate the problem.

**RECOMMENDED TEST EQUIPMENT.**

Equipment required to test the 1310B performance is listed below. Other equipment may be substituted if it meets or exceeds the critical specifications listed in the table.

*Recommended Test Equipment*

<b>Instrument Type</b>	<b>Recommended Model</b>	<b>Required Characteristics</b>	<b>Required For</b>
Monitor Oscilloscope	HP Model 1740A	Bandwidth: 100 MHz	Adjustments
50:1 Divider Probe	HP Model 10002A	Shunt Capacitance: 2.5 pF or less Resistance 9 MΩ dc Volts >250	Adjustments
Function Generator	HP Model 3312A	Output Waveforms: sine, square, ramp Frequency Range: 1 Hz-10 MHz Square Wave Rise Time: 10% to 90% <18 ns Sine Wave Distortion: <.5% Output Impedance: 50Ω Output Level: 10 V p-p into 50Ω	Adjustments Performance Checks
Pulse Generator (Qty 2)	HP Model 8013B	Rep Rate: 1kHz to 100kHz Output Impedance: 50Ω Output Level: app. 10 V across 50Ω	Adjustments Performance Checks
Digital Voltmeter	HP Model 3465B	Voltage Range: -15 V to 250 V Accuracy: 0.1% Input Resistance: 10 MΩ	Adjustments
1000:1 Divider Probe	HP Model 34111A	Voltage Rating: 10 kV	Adjustments
*Power Supply	HP Model 6234A	Output Voltage: -5 V to +5 V Output Current: 100 ma	Adjustment Performance Checks

\*Power supply is not required if the function generator has DC offset of ±5 V.

*Optional Equipment for Dynamic Focus/Astigmatism*

<b>Instrument Type</b>	<b>Recommended Model</b>	<b>Required Characteristics</b>	<b>Required For</b>
HP-IB Controller	HP Model 9825A	23K byte R/W memory Equipped with: 98210A String/ Advance Program ROM 98214 Extended I/O ROM	Adjustments
HP-IB Interface	HP Model 98034A	IEEE Std. 488-1975 Interface	
Graphics Translator	HP Model 1350A	Input Interface: HP-IB	Adjustments

**ESTIMATED SALES DISTRIBUTION.**

Sales distribution within the instrument group follows. This information will help in estimating regional repair volumes. The 1310B was introduced replacing the 1310A.

Estimated Sales for January 1981:

<b>U.S.</b>		<b>Outside U.S.</b>	
Neely	8	Europe	3
Midwest	3	Japan	3
Southern	3	ICON	1
Eastern	<u>6</u>	Canada	<u>1</u>
<b>Total</b>	20 ±10%	<b>Total</b>	8 ±10%

These figures are good for January through June 1981.

**SERVICE TRAINING.**

A service training seminar for bench level repair is available twice a year at Colorado Springs facility. The seminar can be given at service offices by contacting Jerry Murphy at Colorado Springs Displays Customer Service. The seminar will last 1 day and will include trouble isolation to the component level.

**BASIC SERVICE INFORMATION.**

- MTBF (mean time between failures) based on 3500 hrs/year ..... 11,150 hrs.
- MTTR (mean time to repair) ..... 4.5 hrs.
- ARC (average repair cost)..... \$ 316.00

Calibration Period — Periodic calibration is not required. Calibration should be performed on the affected areas after repair or board replacement.

**SECTION III**  
**PT 02 SUPPORT**

**REPAIR STRATEGY.**

The repair strategy for on site service will be a board exchange program administered by CSD.

A diagnostic tape and manual will accompany shipments. The diagnostic program and accompanying manual will help isolate a problem down to the board level. Isolation to a single board is not always possible and when it is not, the manual will instruct the CE on the proper substitution sequence. A considerable effort has been put forth on the diagnostics to make trouble isolation and alignment fast and require a minimum of support test equipment. The procedure for using the diagnostic tape is contained in the manual.

*Recommended Field Service Test Equipment*

Instrument	Critical Specifications	Recommended Model	Use
Digital Voltmeter	+ or - 100 Vdc range, 0.3% accuracy	HP 3476A	A,T
Dual Channel Oscilloscope	50 MHz BW min	HP 1740A	T

**ESTIMATED SALES DISTRIBUTION.**

Sales distribution within the computer group follows. This information will help in estimating regional repair volumes.

Estimated Sales for January 1981:

U.S.		Outside U.S.	
Neely	2	Europe	2
Midwest	1	Japan	1
Southern	1	ICON	1
Eastern	2	Canada	1
<b>Total</b>	<b>6 ±10%</b>	<b>Total</b>	<b>5 ±10%</b>

These figures are good for January through June 1981.

**SERVICE TRAINING.**

Service training for the field service (02) people will be a program based on fault isolation to the board level. Instruction will also be given on field adjustment. Training on the 1310B will be held in conjunction with the normal CE training.

A Sound-on-Slide program will be available as a refresher for the CE prior to going on a service call.



EXCHANGE INFO.			CROSS REFERENCE		QTY. RECOM- MENDED OF EACH			DIVISION				
REBUILT PART NO.	DESCRIPTION	NEP	NEW P/N	NEW PRICE	CSC	PCE	SLS OFF	MFG	MKT	REB RPR	RPR TAT	REMARKS
01310-69508	X-Y OUTPUT AMPLIFIER	\$87.50	01310-66530	\$125	—	—	—	08	50	08	7D	
01310-69509	L.V. POWER S.	\$75	01310-66533	\$115	—	—	—	08	50	08	7D	
01311-69510	Z-AXIS AMP	\$150	01311-66502	\$200	—	—	—	08	50	08	7D	
01311-69509	HIGH VOLTAGE	\$150	01311-66504	\$240	—	—	—	08	05	08	7D	
01317-69504	FOCUS/ASTIG	\$110	01317-66501	\$160	—	—	—	08	50	08	7D	
01317-69505	X-Y INPUT AMPLIFIER	\$100	01317-66503	\$150	—	—	—	08	50	08	7D	

## **CRT ORDERING INFORMATION.**

Order CRTs (Cathode Ray Tube) on HEART or COCHISE in the normal way. The order comes direct to Colorado Springs, the supplying division, and shipment is made from there. If you need a CRT immediately (shipment made the same day) use a "HOTLINE" call to Chris Sanborn at Colorado Springs (303) 598-1900, X-2639.