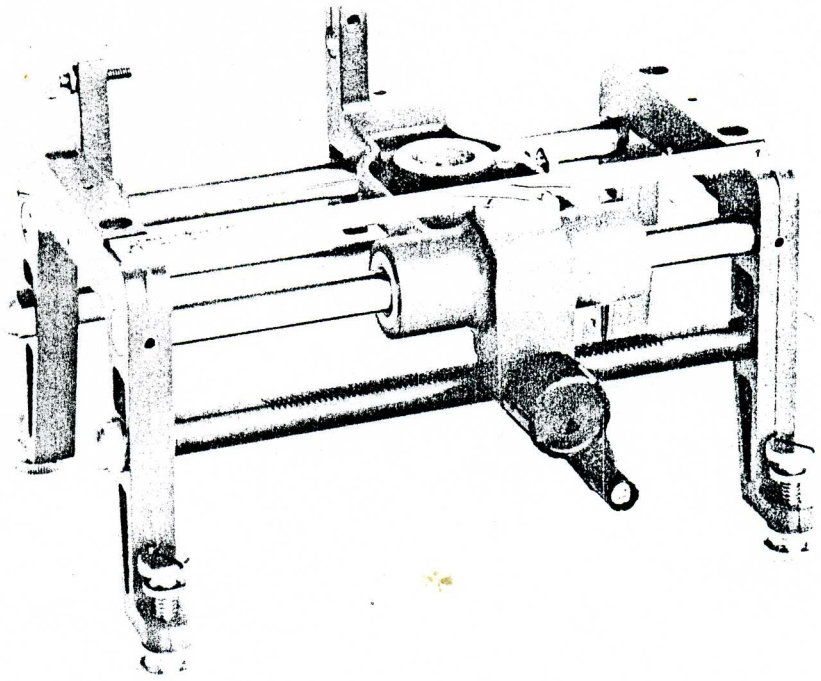
OPERATING NOTE

UNIVERSAL PROBE CARRIAGE

809C



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HEWLETT hp PACKARD

Table 1. Specifications

Carriage: Mounts all HP 810B Waveguide Slotted Sections and HP 806B and 816B Coaxial Slotted Sections.
Probe Required: HP 447B Untuned Probe or HP 448A Slotted Line Sweep Adapter for the 816A Slotted Line; HP 444A Untuned Probe or 442B Broadband Probe for 810B Waveguide Slotted Sections or HP 806B Coaxial Slotted Section.
Probe Travel: 10 cm.
Calibration: Metric. Vernier permits readings to 0.1 mm. Provision for dial gauge installation.
Leveling Screws: Knurled thumbscrews provided on all four carriage legs.
Accuracy: When used with waveguide sections, standing wave ratios to 1.02 can be read easily. Slope error of slotted sections can be eliminated by adjustment.
Dimensions (maximum envelope): 8-7/8 in. long, 6-13/16 in. wide, 5-13/16 in. high (226 x 174 x 148 mm).
Weight: Net, 4 lb. (1, 8 kg).

1. DESCRIPTION.

2. The Model 809C Universal Probe Carriage is a precision mechanical assembly which mounts HP slotted sections and detector probes for precision slotted line measurements. The carriage accepts either coaxial or waveguide slotted sections. These slotted sections can be easily interchanged, and their slope error eliminated with simple setscrew adjustments. Hewlett-Packard waveguide slotted sections, used in conjunction with HP detector probes, permit measurements across the frequency range of 3.95 to 18 GHz. A single Hewlett-Packard coaxial slotted section, used in conjunction with HP detector probes, permits measurements across the frequency range of 1.8 to 18 GHz. Table 2 lists the HP slotted sections, probes, and detectors which can be used with the 809C.

3. For making probe-position measurements, such as wavelength, high SWR, or impedance, the carriage has a centimeter scale with a vernier that reads to an accuracy of 0.01 cm. There is also a provision for mounting a dial indicator when more precise probe-position measurements are required.

4. The probe mount moves on ground stainless steel rods. Its three point suspension system includes two permanently lubricated linear-motion bushings and a conventional ball bearing. Specifications for the Model 809C are given in Table 1.

5. ITEMS FURNISHED.

6. Four (4) socket head cap screws (HP part number 3030-0024) are supplied for mounting HP slotted sections to the Model 809C.

7. ACCESSORIES AVAILABLE.

8. SLOTTED SECTIONS, PROBES, AND DETECTORS. HP slotted sections, probes, and detectors which can be used with the Model 809C are listed in Table 2.

Table 2. HP Slotted Sections, Probes, and Detectors for Use with the 809C

Slotted Section	Compatible HP Probes and Detectors
Coaxial: 816A (1.8 - 18 GHz)	447B Untuned Probe 448A Slotted Line Sweep Adapter[1]
806B (3 - 12 GHz)	440A/442B Detector Mount and Broadband Probe 423A/442B Crystal Detector and Broadband Probe 444A Untuned Probe
Waveguide: 810B Series (3.95 - 18 GHz)	Same as for 806B

[1] For swept slotted line measurements.

9. DIAL INDICATORS. Any standard dial indicator (e.g., L. S. Starrett Co., Model 25-881; Federal Products Corp., Model P61-S) which meets the following requirements can be used with the Model 809C.

a. Spindle housing with a diameter of 3/8".

b. Spindle travel of 2.54 cm (1 inch).

c. Dial display of 0.001 cm.

10. INITIAL INSPECTION.

11. VISUAL.

12. If external damage to the shipping container is evident, ask the carrier's agent to be present when the carriage is unpacked.

13. UNPACKING AND MECHANICAL INSPECTION.

14. Check the cushioning material and note any signs of severe stress as an indication of rough handling in transit. Check the carriage for external damage, such as broken controls, dents, or surface scratches. If external damage is evident, refer to paragraph 17 for the recommended claim procedure and packaging information.

15. MECHANICAL CHECK.

16. CARRIAGE ALIGNMENT CHECK. Incoming inspection should check carriage alignment using the procedures given in Figure 4 (Check and Adjustment Procedures).

17. CLAIMS.

18. If the carriage is damaged or a deficiency is noted, notify the nearest Hewlett-Packard office immediately. HP regional sales and service offices are listed in Table 5. The HP office will arrange for repair or replacement without waiting for the claim against the carrier to be settled. In the event of mechanical damage, retain the shipping container and packing material for the carrier's inspection.

19. PACKAGING FOR RESHIPMENT.

20. PREPACKAGING INFORMATION. When the Model 809C carriage is being returned to HP for claims or servicing, the probe mount (16) should be properly secured before packaging. (See Figure 7 for identification of parts mentioned in paragraphs 20 and 21).

21. To secure probe mount:

a. Move the probe mount to the extreme right of its travel and secure it with the moveable stop (9).

b. Wrap a piece of 4" wide corrugated cardboard around the bearing rods (6, 37). Tape one end of the cardboard to the left end frame (1) and the other to the probe mount.

NOTE

Do not apply tape to the rods. The adhesive will stick to the rod and interfere with the sliding action of the probe mount.

22. USING ORIGINAL PACKAGING. The same containers and materials used in factory packaging can be obtained through the Hewlett-Packard offices. HP regional sales and service offices are listed in Table 5.

a. If the Model 809C carriage is being returned to HP for servicing, attach a tag indicating the type of service required, return address, and model number. Also, mark the container FRAGILE to assure careful handling.

b. In any correspondence, refer to the carriage by its model number.

23. USING OTHER PACKAGING. The following general instructions should be used when packaging with commercially available materials:

a. Wrap the carriage in heavy paper or plastic. If shipped to a Hewlett-Packard service office or center, attach a tag indicating the type of service required, the return address, and full model number.

b. Use a strong shipping container. A double-wall carton made of 350 pound test material is adequate.

c. Use enough shock-absorbing material (3 to 4 inch layer) around all sides of the carriage to provide a firm cushion and prevent movement inside the container.

d. Seal the shipping container securely, and mark it FRAGILE to assure careful handling.

e. In any correspondence refer to the carriage by its full model number.

24. OPERATION.

25. FEATURES.

26. Carriage operating features are shown and described in Figure 1. Description numbers match the numbers on the illustration.

27. PREPARATION FOR USE.

28. The carriage operating features mentioned in paragraphs 29 and 30 are identified in Figure 1.

CAUTION

Avoid damaging the detector probe; always mount it AFTER the slotted section has been mounted.

29. MOUNTING A SLOTTED SECTION. To mount a slotted section:

a. With tool #1 (Table 3), loosen both slope adjust setscrews, so that the leveling blocks can slip into the slots on the end frames.

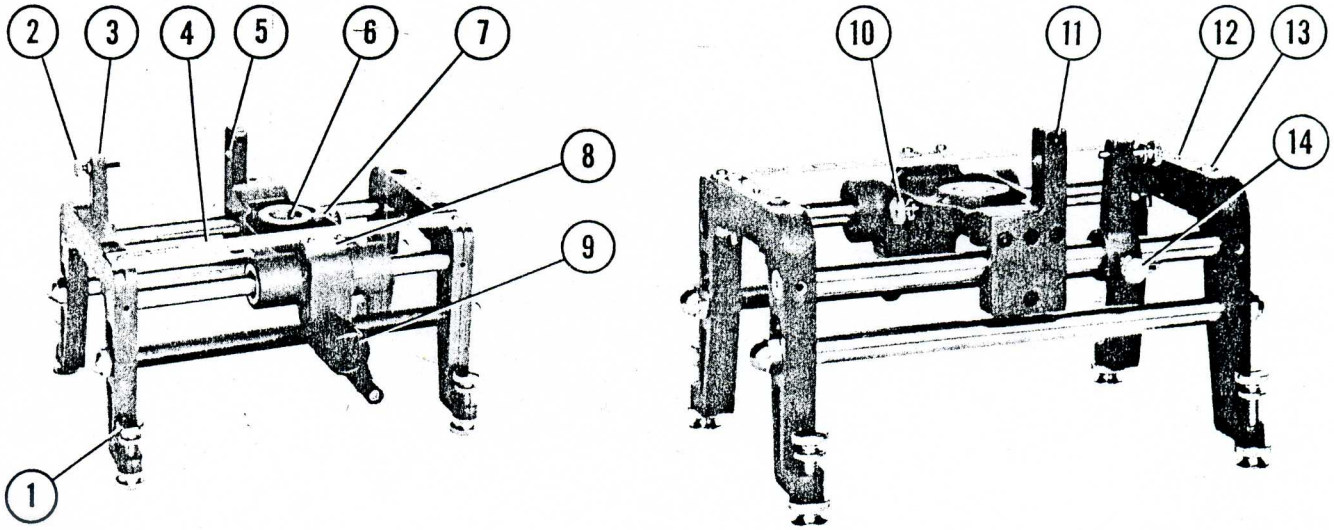
b. With the slot-side of the slotted section up and the four mounting holes aligned with the four mounting holes of the carriage, carefully slide the slotted section into the end frame shoulders. The end frame shoulders normally have a clearance of about 0.001" so the slotted section will fit snugly.

CAUTION

Do NOT force the slotted section into the end frame shoulders. The end frame and/or the slotted section may be damaged (nicked, burred, scratched, etc.).

c. Four socket head cap screws are provided for fastening the slotted section to the main carriage. With tool #2 (Table 3), tighten these screws in a cross-diagonal order taking care not to bind the slotted section in the carriage as the screws are set.

CARRIAGE OPERATING FEATURES



1. LEVELING SCREW. Adjusts the height of the 809C so that it is level with respect to the interconnecting equipment. For lowest reflection connection, it is important that the connectors/flanges mate precisely.

2. VERNIER STOP THUMBSCREW. Fine adjust for the moveable stop.

3. MOVEABLE STOP. A moveable stop which sets the reference for dial indicators when making probe position measurements.

4. SCALE.[1] Graduated in centimeters and tenths of centimeters, the scale is primarily used for making probe position measurements over a physical range of 10 cm (8.5 to 18.5 on scale). The right flange face of HP waveguide slotted sections (810B series) is the reference plane for this scale. This enables the scale to be used to measure the distance, in centimeters, that the probe is from the reference plane.

5. DIAL INDICATOR RECEPTACLE. Dial indicator holder.

6. PROBE RECEPTACLE. Refer to Table 2 for a list of the recommended probes.

7. PROBE MOUNT. Mounts the probe detector and enables it to detect SWR peaks over a physical range of 10 cm.

8. VERNIER SCALE.[1] Used in conjunction with the main scale for making higher resolution probe position measurements.

9. CRANK KNOB. Moves probe mount over its travel.

10. PROBE MOUNT THUMBSCREW. Secures probe in probe receptacle.

11. CLAMP SCREW. Adjusts diameter of dial indicator receptacle.

12. SLOPE ADJUST SETSCREW. Compensates for slope error in slotted section.

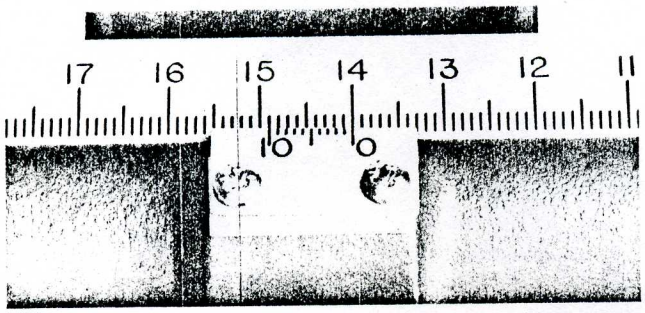
13. SLOTTED SECTION MOUNTING SCREWS. Four socket head cap screws that secure slotted section to the 809C Carriage.

14. STOP THUMBSCREW. Secures moveable stop at desired position for setting the dial indicator reference.

[1] Information on how to read the scales is given in Figure 2.

Figure 1. Carriage Operating Features

READING THE CARRIAGE SCALES



As shown in the photograph above, the main scale is graduated in centimeters (1 cm/division) and tenths of centimeters (0.1 cm/minor division). Ten divisions on the vernier scale occupy the same space as 9 minor divisions on the main scale (0.9 cm). This means that each division on the vernier scale is equal to 0.09 cm, and the difference between a main scale minor division and a vernier scale division is 0.01 cm.

This difference is accumulative and over the 10 divisions of the vernier scale reaches a maximum of 0.1 cm. That is, with the vernier 0-line set opposite a major division on the main scale, the first line to the left of the vernier 0-line differs from the first line to the left of the main scale major division by 0.01 cm, the second line to the left of the vernier 0-line differs from the second line to the left of the main scale major division by 0.02 cm, and so on until the 10th line to the left of the vernier 0-line coincides exactly with the 9th line to the left of the main scale major graduation, indicating a difference of 0.1 cm.

To read carriage position:

a. Note how many centimeters and tenths of centimeters the vernier 0-line indicates on the main scale.

b. Add the number of hundredths, indicated by the line on the vernier scale which coincides exactly with a line on the main scale. In the picture below, the vernier 0-line indicates a reading of 14.2 plus cm. The number of hundredths is 3, because the 3rd line of the vernier scale exactly coincides with a line on the main scale. Therefore, the carriage position is 14.2 cm plus the 0.03 cm, or 14.23 cm.

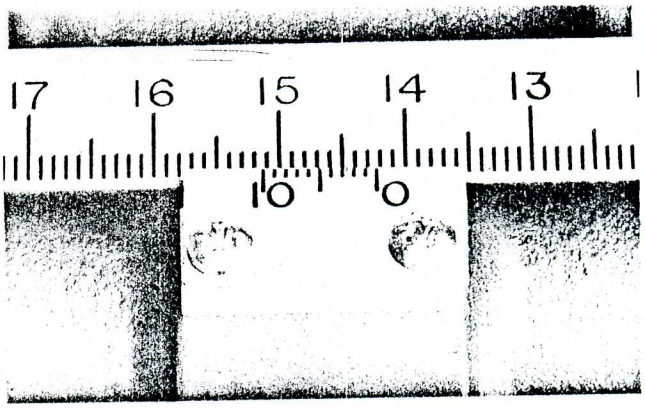


Figure 2. Reading the Carriage Scales

30. MOUNTING A PROBE. To mount a probe:

CAUTION

When handling probes, always take hold of the probe body first.[1] This enables the probe body to acquire the same static charge as the person handling it and eliminates the possibility of the static charge discharging through the detector and burning it out.

a. Loosen the probe's knurled locknut and retract the probe tip until it is shielded by the probe body.

b. Loosen the probe mount thumbscrew and insert the probe into the probe receptacle.

c. Finger tighten the probe mount thumbscrew to secure probe.

d. Check slotted section's slope and irregularities specification with the procedure given in the operating note for the slotted section being used (Coaxial or Waveguide).

31. MOUNTING A DIAL INDICATOR. The recommended procedure for mounting and using a standard dial indicator is given in Figure 3.

32. MAINTENANCE.

33. PREVENTIVE MAINTENANCE. To ensure smooth operation of the 809C Universal Probe Carriage, the bearing rods and gear rack should be kept clean. All bearings are permanently lubricated and no routine lubrication is required.

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[1] Static Charge is an electric charge accumulated on an object or person, usually due to friction.