

OPERATING NOTE/FEBRUARY 1972

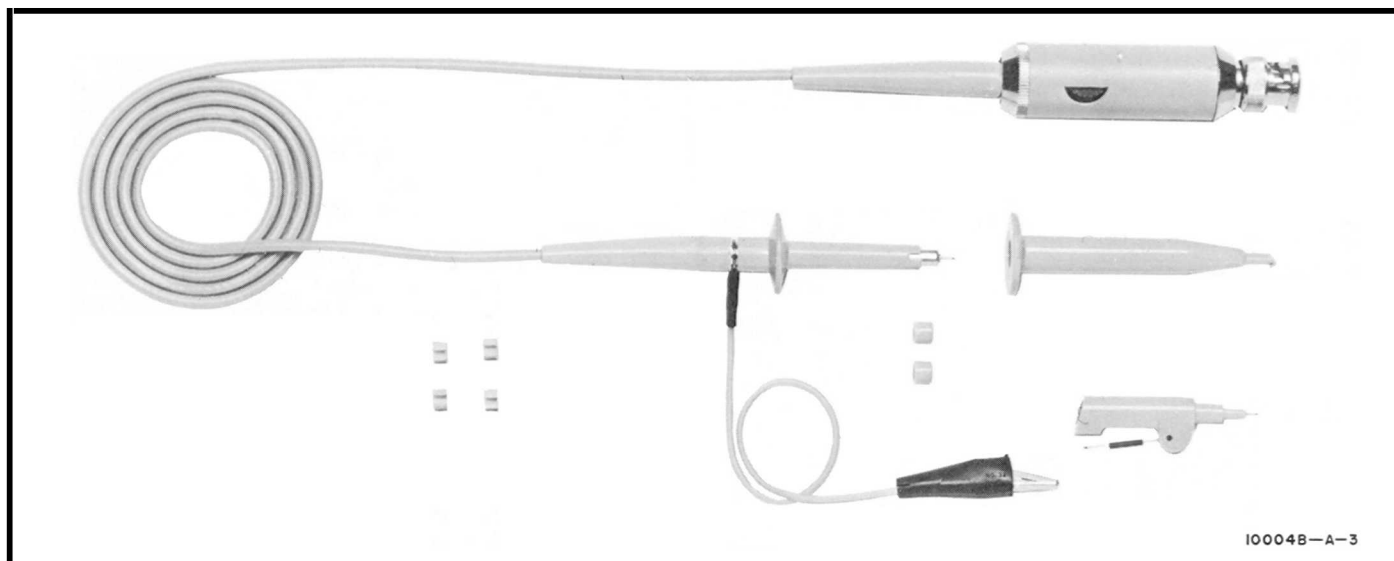


Figure 1. Model 10004B, 10005B, 10006B, 10012B Probes

## 1. INTRODUCTION.

2. The HP Models 10004B, 10005B, 10006B, and 10012B 10:1 Voltage Divider Probes (Figure 1) provide the low input capacitance and high input resistance required for accurate signal measurements. These probes are designed for use with oscilloscopes having an input resistance of 1 megohm shunted by a capacitance of 17 to 30 pF (30 to 55 pF for Model 10012B). The improved

long-life assembly is easily maintained and provides simple spin-off spin-on cable assembly replacement that requires no additional high frequency compensation procedures after cable replacement. Refer to Table 1 for complete specifications.

3. A number of accessories are supplied with each probe to provide greater usefulness and versatility. The ground lead can be quickly and easily snapped on or off the probe.

Table 1. Specifications

(When compensated to an oscilloscope having an input resistance of one megohm shunted by 17 to 30 pF for Models 10004B, 10005B, 10006B; or 30 to 55 pF for Model 10012B.)	Compensation range: Models 10004B, 10005B, and 10006B will compensate oscilloscope inputs having a capacitance between 17 and 30 pF; Model 10012B between 30 and 55 pF.
Probe input RC: 10 megohms shunted by approx:	Approx. Overall Length:
10 pF (Model 10004B)	3-½ ft (Model 10004B)
17 pF (Model 10005B)	10 ft (Model 10005B)
14 pF (Model 10006B)	6 ft (Model 10006B)
16 pF (Model 10012B)	6 ft (Model 10012B)
Division Ratio: 10:1 ±3%.	Output Connector: BNC
Risetime and Bandwidth: maintains the specified risetime and bandwidth performance of associated HP equipment.	Accessories Supplied: A retractable hook tip, an 8-inch ground lead, two insulator caps, and four indicator sleeves. Models 10004B, 10005B, and 10006B also have a press-on spanner tip.
Voltage Rating: 500 volts peak.	Weight: net, 4 oz.; shipping 1 lb.

5951-2695



For more information, call the local HP Sales Office or East (201) 265-5000. Midwest (312) 677-0400. South (404) 436-6181 West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, Cable "HEWPACKSA" Tel (022) 41.54.00 or write Hewlett-Packard, 1217 Meyrin-Geneva, Switzerland.

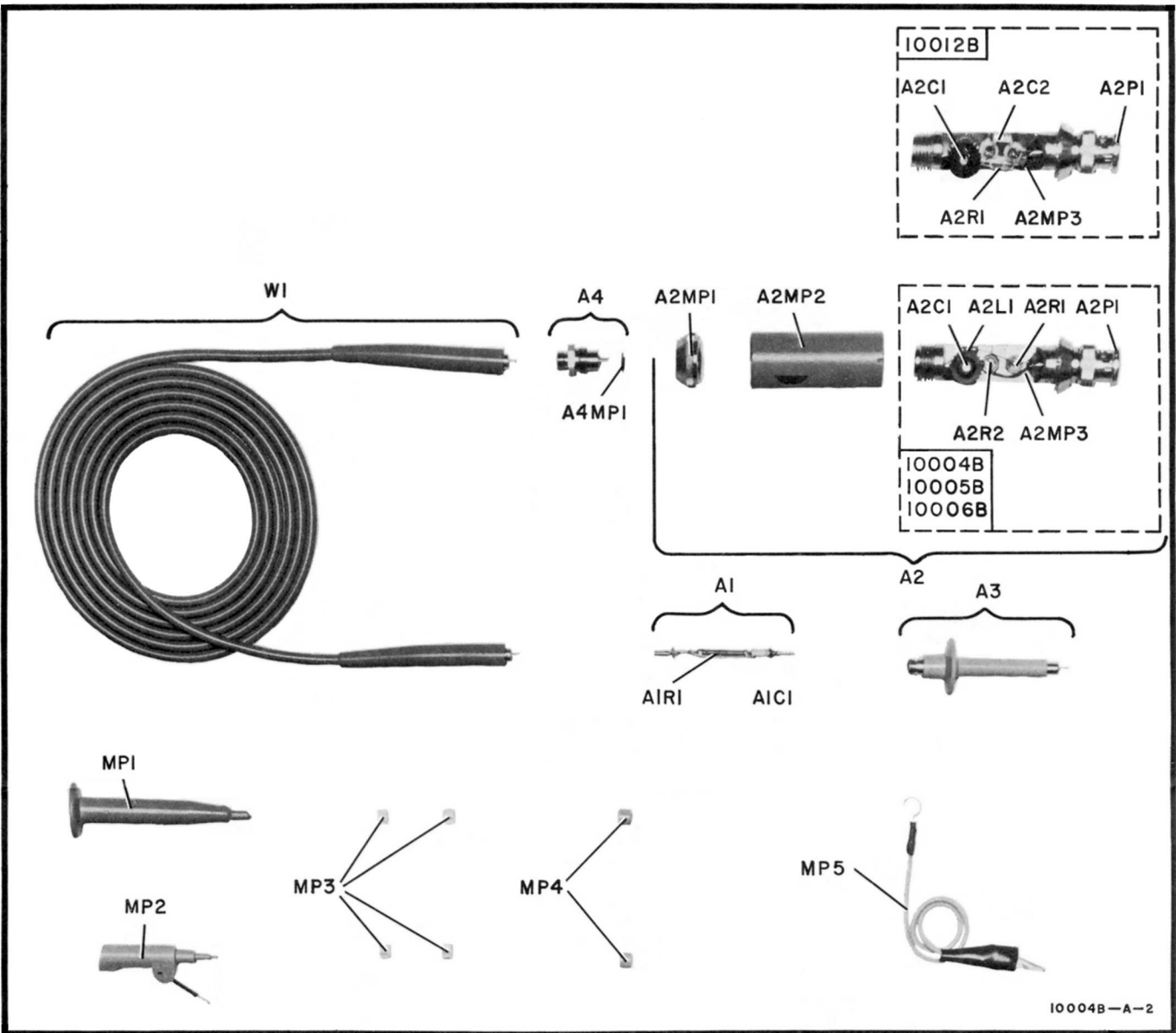


Figure 2. Probe Assembly and Accessories

A press-on retractable hook tip provides a convenient method of connecting to a signal source. Press-on insulator caps insulate the exposed ground near the probe tip. Indicator sleeves are useful for identifying a particular probe. In addition, Models 10004B, 10005B, and 10006B have a press-on spanner tip to aid in signal measurements.

#### 4. OPERATION.

5. Probes must be compensated to obtain accurate waveform measurements. Normally, compensation adjustment will be required only when the probe is first attached to the instrument. If, however, the input capacitance of the instrument varies as ranges are switched, the probe

should be recompenated. For probe compensation procedures, refer to paragraph 7.

6. The retractable hook tip and the spanner tip for the probe are attached by slipping them over the probe and pressing them on. Rotate the spanner tip to make certain the lugs of the tip are seated in the probe notches. The hook tip can be rotated on the probe without removal. Indicator sleeves snap onto the probe cable for rapid probe identification. A spring snap-on ground lead fits on the exposed ground connection of the probe barrel. When not in use, the probe tip can be protected from damage by placing the hook tip or spanner tip on the probe.

Table 2. Recommended Test Equipment

Type	Model	Required Characteristics	Ref Para
Oscilloscope (10004B, 5B, 6B)	HP Model 180A/AR w/1801A & 1820A	Input RC: 1 megohm shunted by 17-30 pF, 0.1 V/div, 50 nsec/div.	10, 11
Oscilloscope (10012B)	HP Model 180A/AR w/1806A & 1820A	Input RC: 1 megohm shunted by 30-55 pF, 0.1 V/Div, 50 nsec/div.	10
Pulse Generator	HP Model 8004A	Risetime: < 1.5 nsec, 100 kHz.	11-a
Probe-tip to BNC adapter	HP Model 10011A		11-c
50-ohm Feed-through Termination	HP Model 10100A	±1 ohm	11-c

**7. ADJUSTMENT.**

8. Table 2 lists test equipment recommended to perform the adjustments. See Figure 2 for adjustment locations and Figures 3 and 4 for the probe schematics.

**NOTE**

When adjusting the Model 10012B, replace the Model 1801A plug-in with the Model 1806A.

**9. LOW FREQUENCY COMPENSATION.**

10. Connect the probe BNC to the Vertical plug-in input.

a. Set:

Magnifier ..... X1  
 Time/div ..... 0.5 msec/div  
 Volts/div ..... 0.2

b. Connect the probe tip to the 10V, 1 kHz square-wave output signal from the calibrator.

c. Obtain a stable display.

d. Adjust A2C1 (thumbwheel adjustment) for a flat-topped waveform.

**11. HIGH FREQUENCY COMPENSATION. (Models 10004B, 10005B, and 10006B only).**

**NOTE**

When cable assembly W1 is replaced, do not perform the following procedures.

a. Connect the probe through the probe-tip to BNC adapter and the 50-ohm feed-through termination to the Pulse Generator output. Unscrew knurled ring A2MP1

and remove chassis tube A2MP2 for access to the following adjustments.

b. Set:

Magnifier ..... X1  
 Time/div ..... 0.05 usec/div  
 Volts/div ..... 0.1

c. Set the Pulse Generator for a repetition rate of 100 kHz and set the amplitude to give a minimum vertical deflection of 5 divisions.

d. Set A2R2 fully cw.

e. Adjust A2R1 for best flat-top response without overshoot and with minimum leading edge rounding.

f. Adjust A2R2 to obtain a sharp corner with little or no leading edge spike.

g. Adjust A2R1 to obtain a leading edge amplitude equal to remainder of flat-top pulse.

**12. MAINTENANCE.**

13. Figure 2 shows an exploded view of the probe with its accessories. Do not disassemble the probe any further than shown. If a faulty part is located in a part of the probe that cannot be disassembled, it should be returned to the nearest Hewlett-Packard Sales/Service Office for repair or replacement.

**14. REPLACEABLE PARTS.**

15. Replaceable parts for the probes are illustrated in Figure 2 and listed in Table 3. When ordering a part, address the order to your nearest Hewlett-Packard Sales/Service Office. Provide the model number of the probe and a complete description (including the HP Part No.) of the required components.

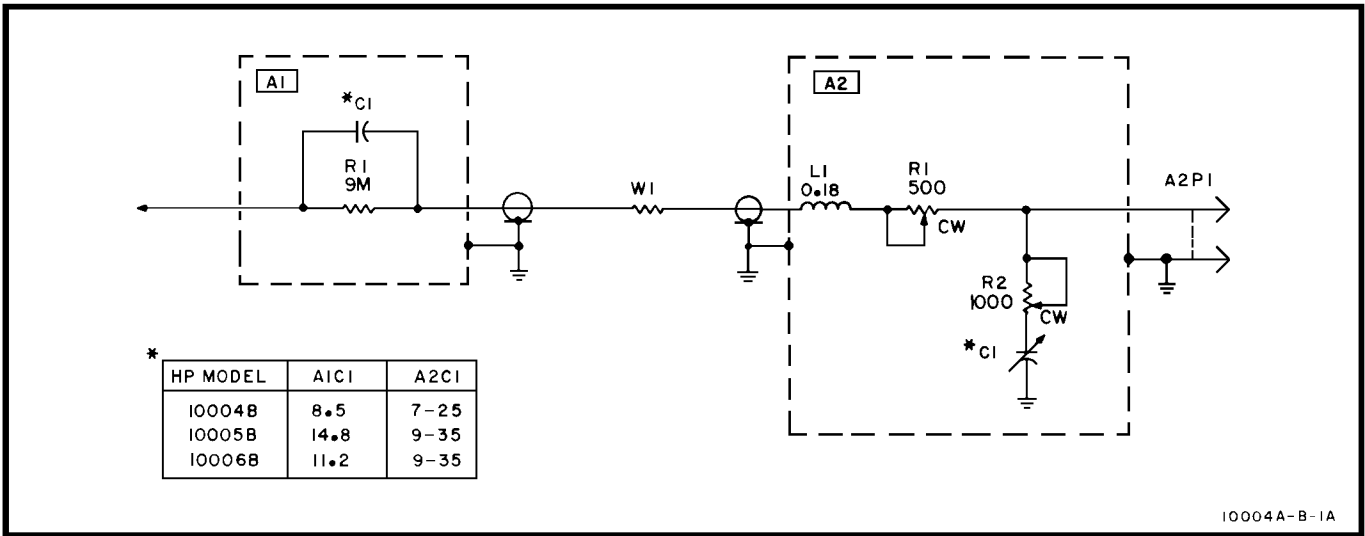


Figure 3. Models 10004B, 10005B, 10006B Schematic

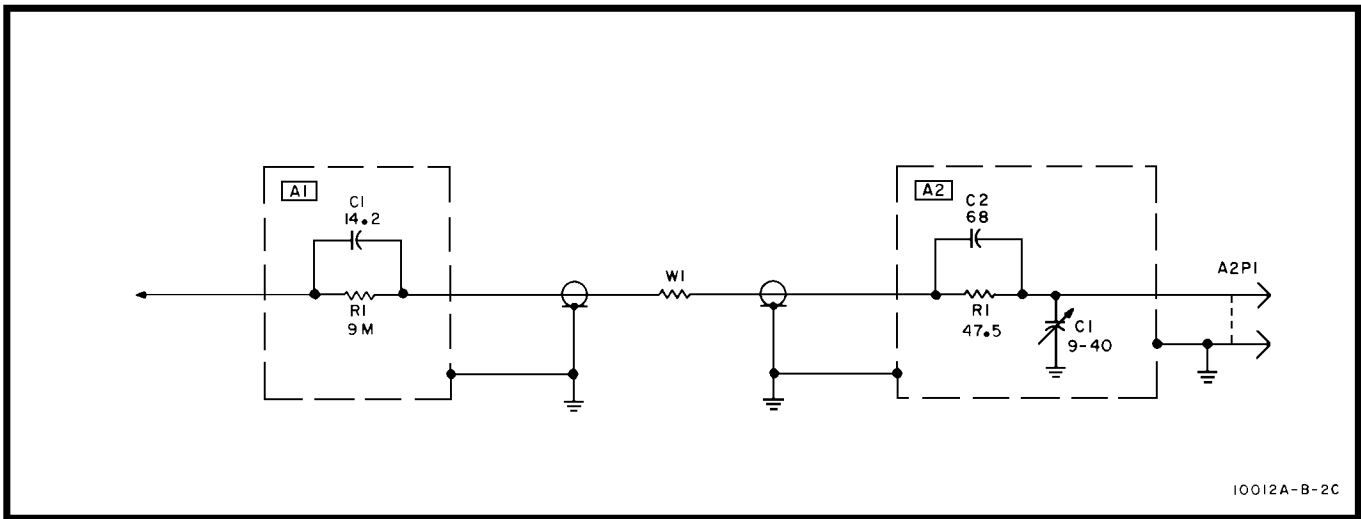


Figure 4. Model 10012B Schematic

Table 3. Replaceable Parts

Ref Desig	HP Part No.	TO	Description
A1	10004-69503	1	Assy: attenuator, includes C1 and R1 (Model 10004B)
	10005-69502	1	Assy: attenuator, includes C1 and R1 (Model 10005B)
	10006-69502	1	Assy: attenuator, includes C1 and R1 (Model 10006B)
	10012-69502	1	Assy: attenuator, includes C1 and R1 (Model 10012B)
A2	10004-62102	1	Assy: compensation (Model 10004B)
	10005-62101	1	Assy: compensation (Model 10005B)
	10006-62101	1	Assy: compensation (Model 10006B)
	10012-62102	1	Assy: compensation (Model 10012B)
A2C1	0121-0408	1	C: var cer 7-25 pF (Model 10004B)
	0121-0409	1	C: var cer 9-35 pF (Models 10005B, 10006B)
	10012-69530	1	Assy: capacitor 9-40 pF (Model 10012B)
A2C2	0160-3328	1	C: fxd cer 68 pF 10% 200 wVdc (Model 10012B)
A2L1	9100-2250	1	L: inductor (Models 10004B, 10005B, 10006B)
A2MP1	10004-22501	1	Ring: knurled
A2MP2	10004-69510	1	Tube: chassis
	10005-69506	1	Tube: chassis
	10006-69506	1	Tube: chassis
	10012-69505	1	Tube: chassis
A2MP3	10004-20101	1	Assy: chassis
A2P1	1250-0045	1	P: BNC
A2R1	2100-2803	1	R: var 500 ohms 30% 1/2W (Models 10004B, 10005B, 10006B)
	0757-0393	1	R: fxd metflm 47.5 ohms 1% 1/8W (Model 10012B)
A2R2	2100-2804	1	R: var 1000 ohms 30% 1/2W (Models 10004B, 10005B, 10006B)
A3	10004-67701	1	Assy: probe
A4	10004-69511	1	Assy: spin off adapter
A4MP1	2190-0469	1	Washer: int lock, I.D. 0.116 in., O.D. 0.265 in.
W1	10004-61604	1	Assy: cable, 3'6" (Model 10004B)
	10005-61601	1	Assy: cable, 10' (Model 10005B)
	10006-61601	1	Assy: cable, 6' (Models 10006B, 10012B)
			Accessories
MP1	10004-67604	1	Assy: hook tip
MP2	10004-67601	1	Assy: spanner tip
MP3	7124-2020	1	Sleeve: indicator, A
	7124-2021	1	Sleeve: indicator, B
	7124-2022	1	Sleeve: indicator, C
	7124-2023	1	Sleeve: indicator, D
MP4	10004-45401	2	Cap: insulator
MP5	10004-61301	1	Assy: ground lead

## **CERTIFICATION**

*The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.*

## **WARRANTY AND ASSISTANCE**

This Hewlett-Packard product is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the operating manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

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