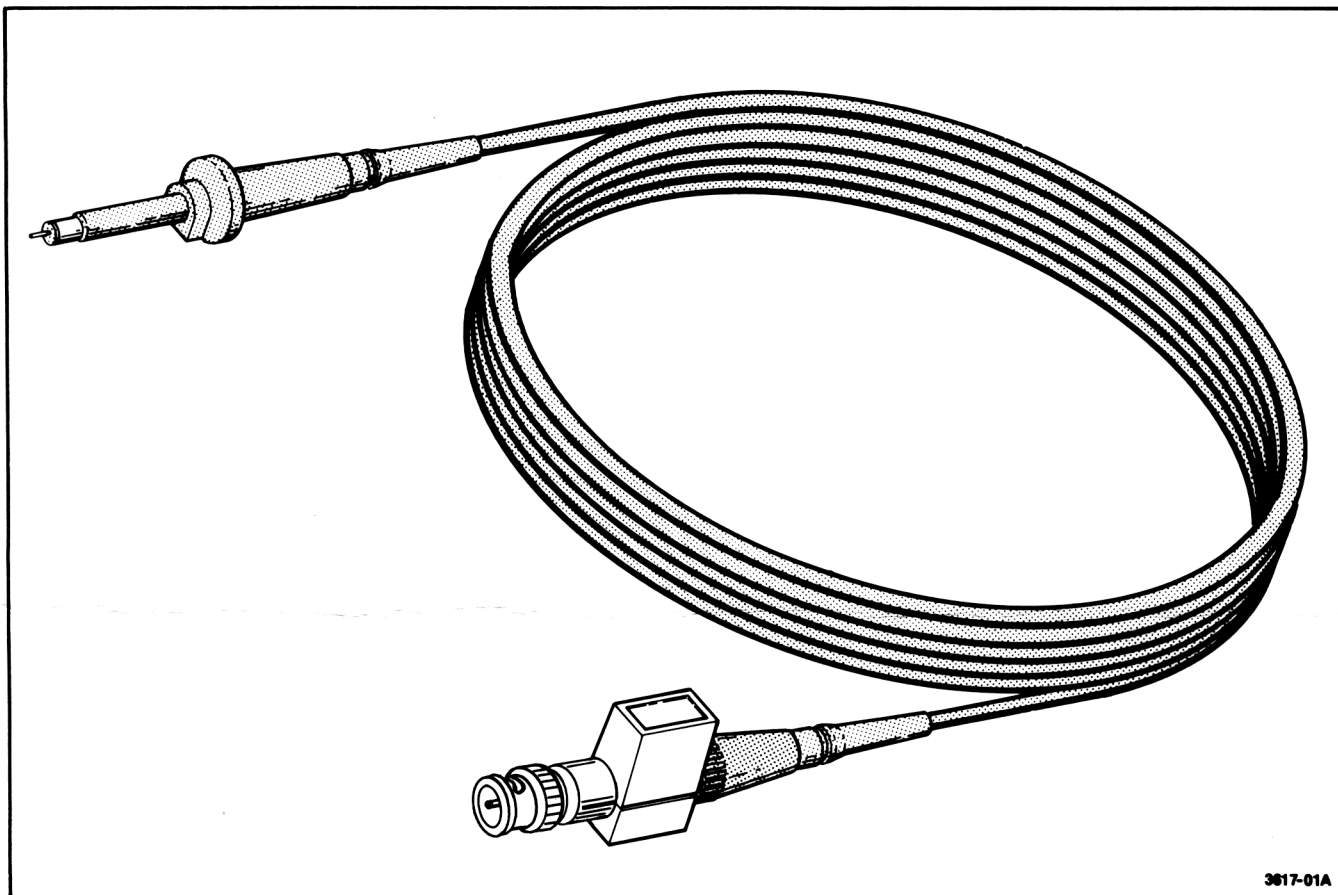


# Instructions

010-6125-01  
**P6125 MODULAR  
COUNTER PROBE**

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3617-01A

**Fig. 1. P6125 Modular Counter Probe.**

The P6125 Probe is a modular, 5X, passive probe 1.5 meters in length for use with dc to 250 MHz digital counters having input capacitance range from 15 to 33 pF and input resistance of 1 M $\Omega$ .

The compensating box houses a network that provides optimum transient response when used with digital counters having bandwidths up to 250 MHz. The probe

low frequency compensation is adjusted by the variable capacitor located in the compensating box, through the adjustment opening.

Modular construction of the probe simplifies repairs. The probe body and compensating box can be disconnected from the cable assembly.

## Specification

Table 1

### ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Attenuation	5X $\pm 3\%$ .	5X, $\pm 1.2\%$ as measured with dc or 1 kHz squarewave on an oscilloscope with 1M $\Omega$ 20 pF, $\pm 1\%$ input.
Input Resistance		5 M $\Omega$ $\pm 0.5\%$ when connected to instrument with an input resistance of 1 M $\Omega$ $\pm 2\%$
Input Capacitance		Approximately 20 pF. With probe compensated to 22 pF, $\pm 5\%$ .
Compensation		22 pF $\pm 5\%$ (calibrated at factory) range 15 to 33 pF.
Bandwidth (+3 dB counter sensitivity for DC 510)	200 MHz. (risetime $\leq 1.8$ ns) with 25 $\Omega$ source impedance.	
Aberrations		$\pm 5\%$ (p-p).
Maximum Input Voltage		250 V (dc + peak ac) to 1.7 MHz derated linearly to 35 V at 100 MHz to 200 MHz.

Table 2

### ENVIRONMENTAL

Characteristics	Description	
Temperature Range		
Operating	$-15^{\circ}\text{C}$ to $+75^{\circ}\text{C}$	Exceeds MIL-T-288800B, class 5.
Non-operating	$-55^{\circ}\text{C}$ to $+75^{\circ}\text{C}$	Meets MIL-T-28800B, class 5.
Humidity	95% to 97% RH for 5 cycles (120 hours total).	Exceeds MIL-T-28800B, class 3.
Altitude		
Operating	4.6 km (15,000 ft).	Exceeds MIL-T-28800B, class 3.
Non-operating	15 km (50,000 ft).	
Shock	500 g's (1/2 sine, 1/2 ms, and 1 ms.	Meets or exceeds MIL-T-28800B, class 3.
Electrical Discharge	20 kV maximum	Charge applied to each protruding area of the product under test except the Output terminals.
Transit Drop Test	10 drops from 762 mm (30 in.)	
Cable		
Flex Life	10,000 cycles at $120^{\circ}$ flex with 0.68 kg (1.5 lbs) weight.	
Pull Test	9.05 kg (20 lbs) axial pull at 1 minute duration.	

**Table 3**  
**PHYSICAL CHARACTERISTICS**

Characteristics	Description
Finish	Black, Comp Box grey
Overall Dimensions	Cable, 1.5 m (4.95 ft); probe head, 85 mm (3.8 in)
Net Weight	124 gms (4.4 oz)

Ground leads and probe tip connections should be kept as short as possible to maintain the best waveform fidelity.

### Probe Compensation Using a Digital Counter

#### Note

*Due to slight variations in the digital counter input capacitance, it is usually necessary to compensate the probe whenever it is transferred between instruments or when connecting the probe from one channel to another.*

Proper probe compensation is achieved using the counter input-trigger circuit as a peak detector.

## OPERATING INSTRUCTIONS

A passive probe is a capacitive divider for high-frequency signal components. Inductance introduced by a long signal lead forms a series resonant circuit that will "ring" if driven by a signal containing significant frequency components at or above the circuit resonance. This ringing (oscillation) can distort the true waveform.

## PERFORMANCE CHECK

**Table 4**  
**LIST OF TEST EQUIPMENT REQUIREMENTS**

Description	Minimum Specification	Perf. Check	Adj. Proc.	Example
Power Module		X	X	TEKTRONIX TM 503
Leveled Sine Wave Generator	0—3 V p-p, 250 kHz to 250 MHz sine wave	X		TEKTRONIX SG 503 <sup>a</sup>
Coaxial, 50 $\Omega$ Precision, 36 inch	Bnc Connectors	X	X	Tektronix Part Number 012-0482-00
Digital Counter		X	X	TEKTRONIX DC 503A <sup>a</sup>
Function Generator	100 Hz to 100 kHz		X	TEKTRONIX FG 501A <sup>a</sup>
Power Supply	5 V to 10 Vdc	X		TEKTRONIX PS 501-1 <sup>a</sup>
50 $\Omega$ feedthrough termination	Bnc Connectors	X		Tektronix Part Number 011-0049-01
Probe tip to bnc adapter		X	X	Tektronix Part Number 013-0084-02
Bnc female to dual banana jack (2)		X		Tektronix Part Number 103-0090-00
Digital Multimeter	Range $\geq \pm 20$ Vdc, 4 1/2 digits	X		TEKTRONIX DM 501A <sup>a</sup>
Bnc T Connector		X		Tektronix Part Number 103-0030-00

<sup>a</sup> Requires TM 500-Series Power Module.

## 1. Check Probe Attenuation Accuracy

Refer to Fig. 2 check setup.

a. Connect a bnc female-to-dual banana adapter with a  $50\ \Omega$  termination from the power supply OUTPUT terminals through a coaxial cable to another bnc-to-dual banana adapter. Connect this jack to the digital multimeter INPUT terminals (observe proper polarity).

b. Adjust the power supply voltage source for a 5.00 V display readout on the digital multimeter. Remove the coaxial cable.

c. Connect a bnc T connector from the digital counter INPUT connector.

d. Connect the probe compensating box to one side of the T. Attach the probe to a probe tip-to-bnc connector and connect to the  $50\ \Omega$  termination from the power supply.

e. Connect a coaxial cable from the other T connector end to the banana jack connection from the digital multimeter.

f. CHECK—that the digital multimeter displays between +.954 and +.898 (input volts  $\div$  5.4  $\pm$  3%).

### NOTE

*The meter reading in step 1f is the result of the parallel input resistance combination of the digital counter ( $1\ \text{M}\Omega$ ) and digital multimeter ( $10\ \text{M}\Omega$ ). The resulting attenuation factor is equal to 5.4.*

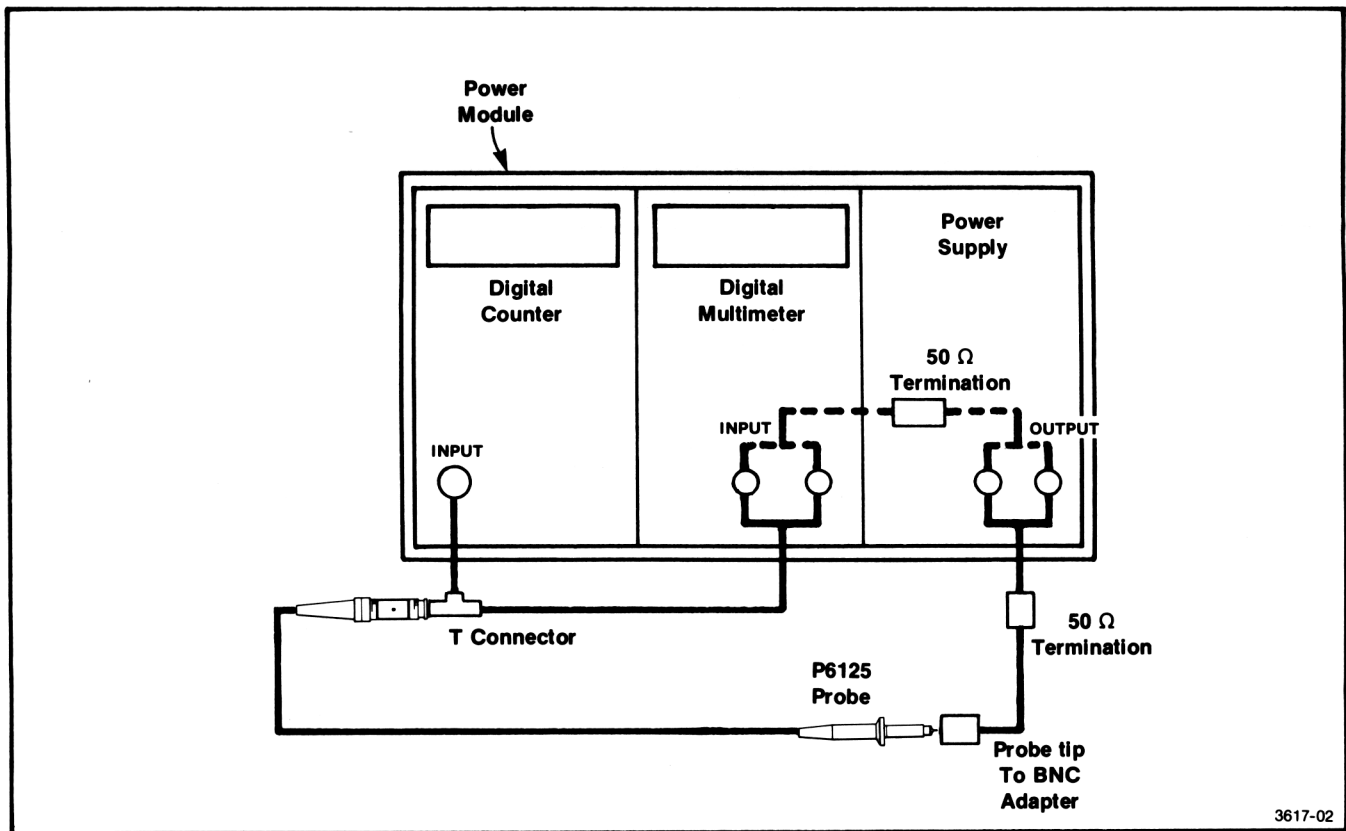


Fig. 2. Check setup for probe attenuation accuracy.

## 2. Check Probe Bandwidth

Refer to Fig. 3 check setup.

a. Connect the probe from the digital counter INPUT connector through the probe tip to bnc connector to a 50  $\Omega$  termination.

b. Connect a precision coaxial cable from the 50  $\Omega$  termination to the sinewave generator OUTPUT.

c. Use the following formula to determine the reference setup voltage for the sinewave generator:

1 X sensitivity of the selected counter at  $F_{max}$  ( $\approx 70$  mV) X 1.41 (+3 dB) X Attenuation factor (5) = generator reference setup voltage.

( $F_{max}$  = the counter maximum frequency)

d. Set the determined generator reference voltage and adjust the sinewave frequency for the maximum specified frequency limits of the selected counter ( $F_{max}$ ).

e. CHECK—for a stable digital counter display readout at the source frequency.

## ADJUSTMENT PROCEDURE

### 1. Probe Compensation Using a Manual Counter (No Probe Comp Function)

Refer to Fig. 4 check setup.

#### Preliminary Control Settings

##### Digital Counter

FUNCTION	Any mode for signal trigger indication
FREQ A (PER B)	
INPUT (CH A or CH B)	
TERM	1 M $\Omega$
SLOPE	+
ATTEN	X1
COUPL	DC
SOURCE	EXT
LEVEL	cw (positive max)

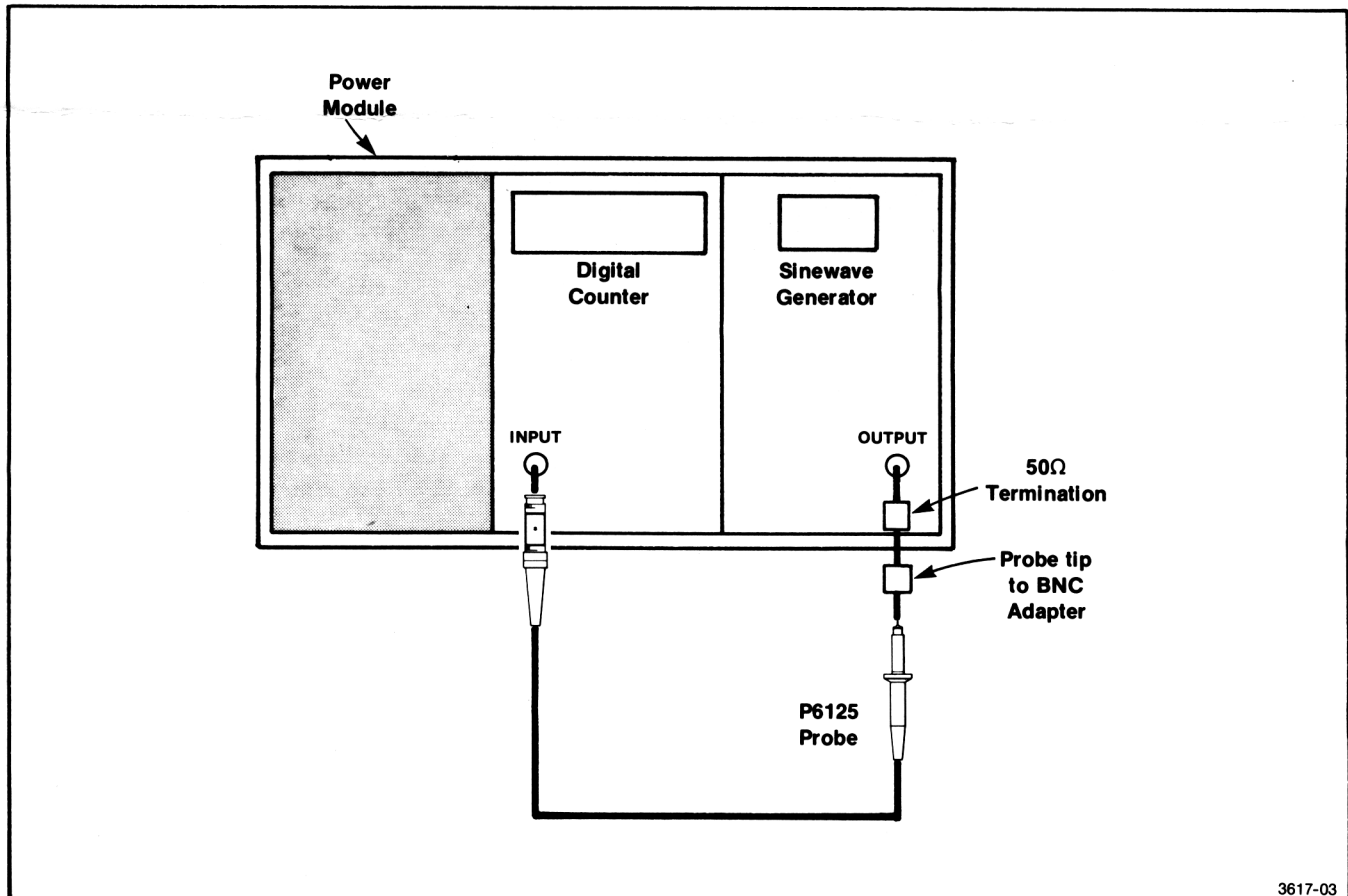


Fig. 3. Check setup for probe bandwidth.

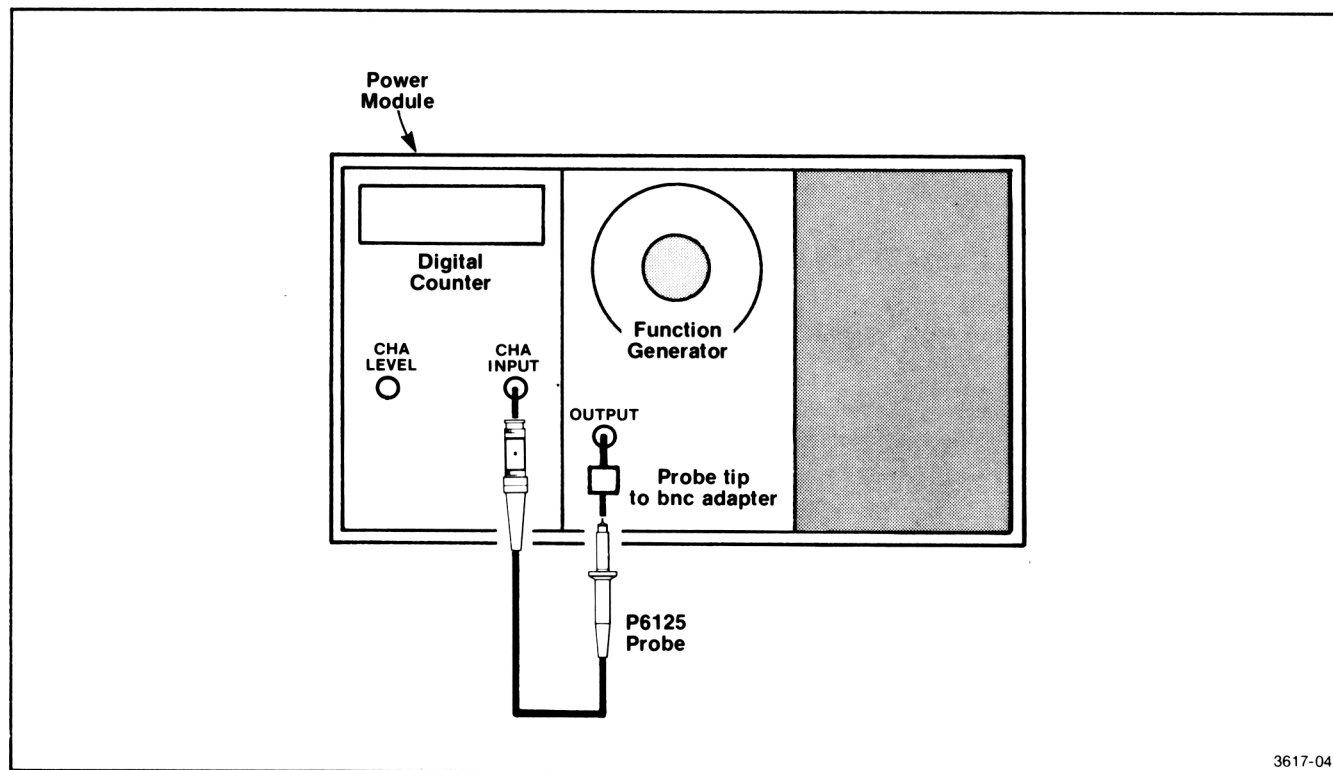


Fig. 4. Check setup for probe compensation using a manual digital counter.

#### Function Generator

FUNCTION	$\sim$ (sine wave)
FREQ VERNIER	1
MULTIPLIER	$10^2$ (100 Hz)
AMPLITUDE	2 V to 5 V

a. Connect the probe bnc connector to the counter input connector.

b. Connect the probe tip to the probe tip to bnc adapter and connect the adapter to the function generator OUTPUT.

c. Rotate the digital counter LEVEL control slowly counterclockwise (decreasing trigger level from + maximum) until the DISPLAY GATE light just starts flashing indicating proper triggering (trigger point at peak of sinewave).

d. Change the function generator FREQ VERNIER MULTIPLIER switch to  $10^5$  or  $10^6$  (100 kHz or 1 MHz). Do not change amplitude or trigger level settings.

e. Adjust the probe compensating capacitor until the digital counter DISPLAY GATE light just starts or stops flashing. The probe is now properly compensated.

## 2. Probe Compensation Using An Automatic Counter (Probe Comp Function)

Refer to the Automatic Counter manual for procedure.

#### NOTE

If a compensation signal source is not available at the counter (PROBE COMP), a 4 V to 5 V peak-to-peak squarewave signal at 1 kHz frequency range with rise and fall time of  $\leq 100$  ns is required.

## MAINTENANCE

### WARNING

*To avoid shock, do not disassemble probe when connected to voltage source. Only qualified service personnel should use the following service instructions. Unless you are qualified to do so, perform no servicing except that contained in the preceding operating instructions.*

### Replacing a Probe Assembly

The P6125 Probe is designed to withstand normal operation and handling. However, if the coaxial cable, probe head, or compensation box should fail, the assemblies are available. See Replaceable Parts List for part numbers.

#### 1. Separating the Cable from the Compensating Box Assembly.

See Fig. 5.

a. Grasp the retainer cover and pull back towards the compensating box (the locking sleeve must be in the locked position).

b. With the retainer cover pulled back, the cable end is released and may be pulled free.

#### 2. Removing the Compensating Box Top Cover

See Fig. 5.

a. Turn the locking sleeve counterclockwise until the top cover is released.

b. Carefully remove the top cover.

#### 3. Probe Tip Removal and Replacement

See Fig. 6.

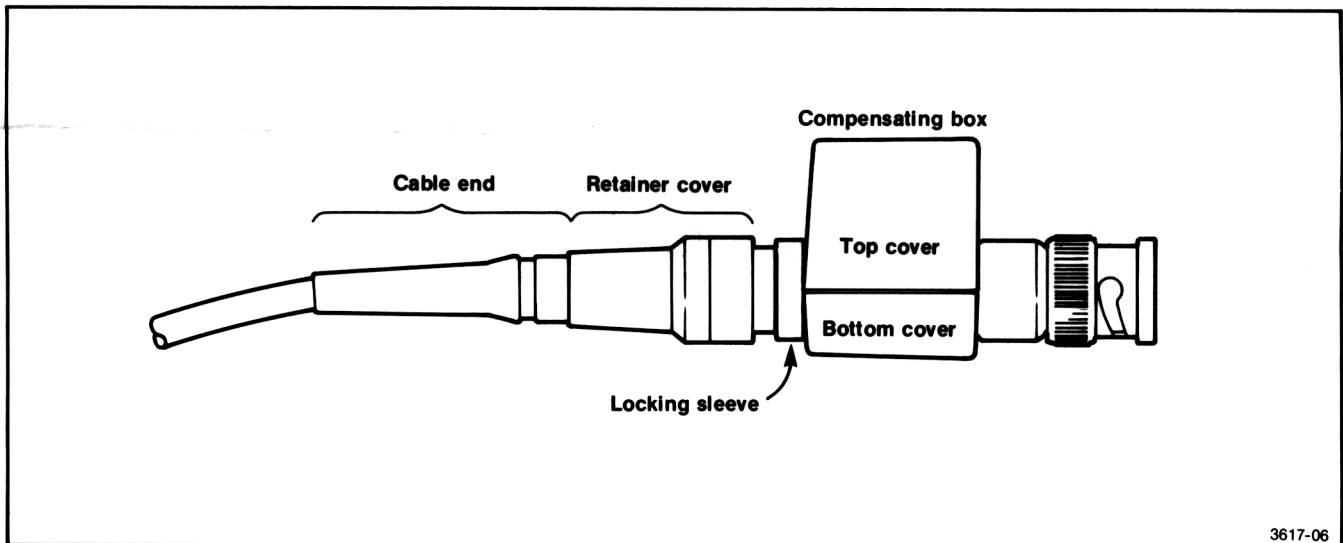
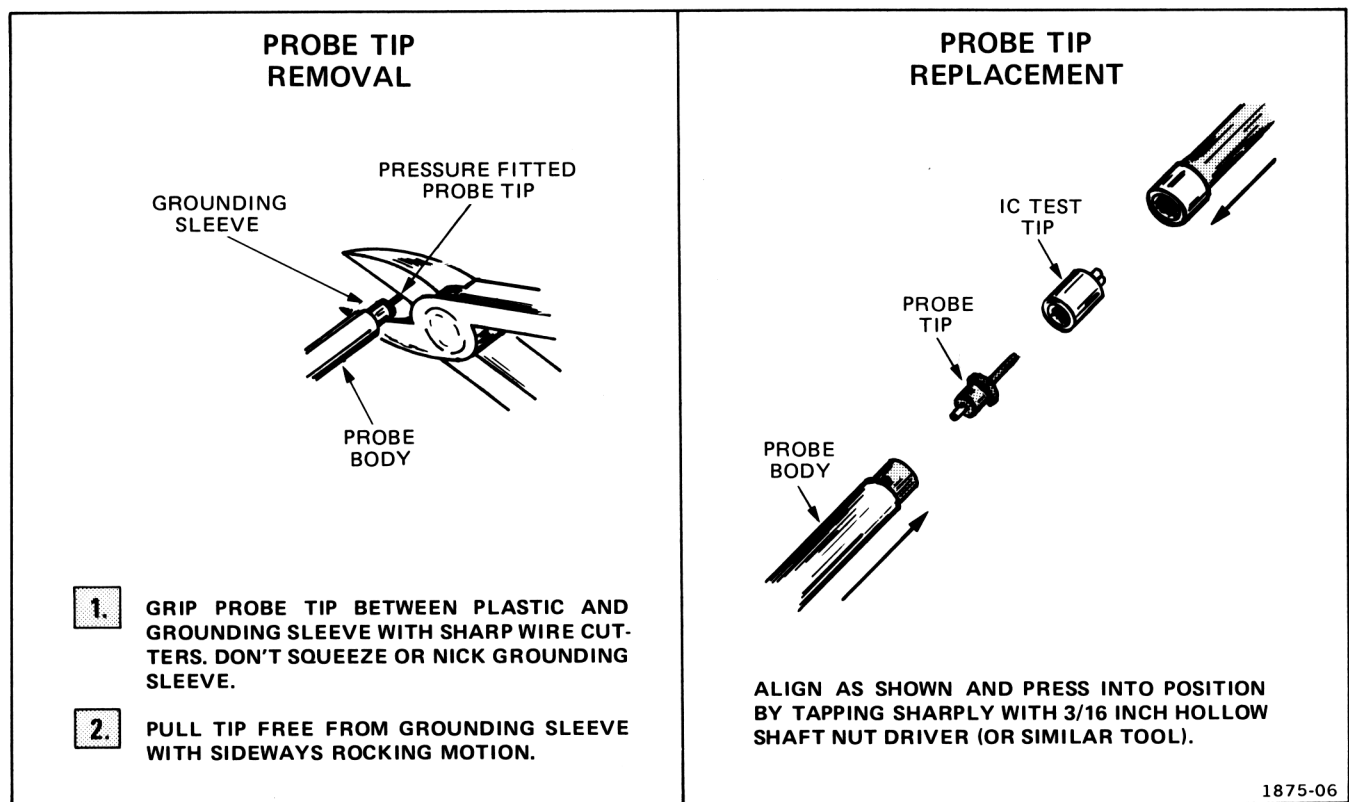


Fig. 5. Probe compensating box assembly.



1875-06

Fig. 6. Probe tip removal and replacement.



## REPLACEABLE PARTS LIST

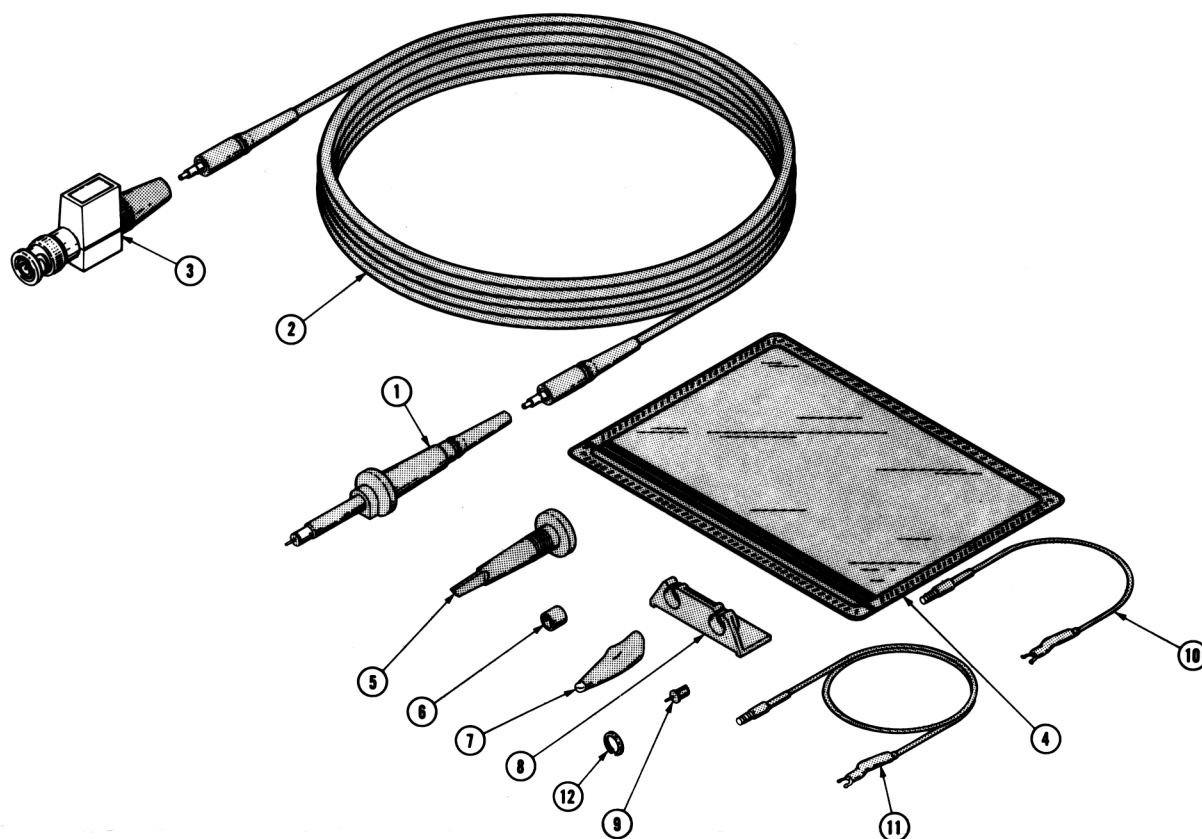


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-	010-6125-01		1						PROBE,COUNTER:1.5 METER 5X,W/ACCESSORIES	80009	010-6125-01
	010-6125-00		1						. PROBE COUNTER:1.5 METER 5X,PROBE ONLY	80009	010-6125-00
-1	206-0256-00		1						. PROBE HEAD 1.5 METER,5X	80009	206-0256-00
-2	175-1661-03		1						. CA ASSY SP.ELEC:39 OHM COAX,39.37 LONG	80009	175-1661-03
-3	206-0257-00		1						. . COMP BOX:1 METER,5X,BLUE	80009	206-0257-00
ACCESSORIES											
-4	016-0521-00		1						. POUCH,ACCESSORY:	05006	OBD
-5	013-0107-03		1						. TIP,TEST PROD:RET HOOK ASSY	80009	013-0107-03
-6	166-0404-01		1						. INS SLV,ELEC:FOR 0.188 DIA PROBE BSHG	80009	166-0404-01
-7	344-0046-00		2						. CLIP,ELECTRICAL:ALLIGATOR TYPE,W/COVER	80009	344-0046-00
-8	352-0351-00		1						. HOLDER PROBE:BLACK	80009	352-0351-00
-9	-----		2						. TIP PROBE:		
	206-0191-03		-						. TIP,PROBE SET OF 10,W/EXTRACTOR	80009	206-0191-03
-10	175-0263-01		1						. LEAD ELECTRICAL PROBE GND,3 INCHES LONG	80009	175-0263-01
-11	175 0124-01		1						. LEAD,ELECTRICAL:PROBE GND,5 INCHES LONG	80009	175-0124-01
-12	334-2794 00		2						. BAND,MARKER 0.371 DIA,BLACK,PLASTIC	80009	334-2794-00
	334-2794-01		2						. BAND,MARKER:0.371 DIA WHITE,PLASTIC	80009	334-2794-01
	334-2794-02		2						. BAND,MARKER:0.371 DIA,SILVER GRAY PLASTIC	80009	334-2794-02
	062-1803-00		1						. PROBE CARD:	80009	062-1803-00
	-----		-						. (NOT SHOWN)		
	070-3617-00		1						. SHEET,TECHNICAL:INSTRUCTION	80009	070 3617-00

# P6125 Modular Counter Probe

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
ELECTRICAL PARTS					
C1	-----	-----	CAP., FXD, CER DI:22PF, 5%, 500V	72982	374005C0G0220J
C1	-----	-----	(REPLACEABLE AS PART OF 206-0256-00)		
C3	-----	-----	CAP., VAR, PLSTC:4-65PF, 100V	80031	2810CSR565QJ02F0
C3	-----	-----	(REPLACEABLE AS PART OF 206-0257-00)		
C2010	-----	-----	CAP., FXD, CER DI:53PF, 5%, 50V	72982	8035BC0G330J
C2010	-----	-----	(REPLACEABLE AS PART OF 206-0257-00)		
R1	-----	-----	RES., FXD, FILM:4M OHM, 0.1%, 0.25W	07716	CCAT2 4M OHM 0.1
R1	-----	-----	(REPLACEABLE AS PART OF 206-0256-00)		
R1010	-----	-----	RES., FXD, CMPSN:430 OHM, 5%, 0.25W	01121	CB4315
R1010	-----	-----	(REPLACEABLE AS PART OF 206-0257-00)		
R3010	-----	-----	RES., FXD, CMPSN:24 OHM, 5%, 0.25W	01121	CB2405
R3010	-----	-----	(REPLACEABLE AS PART OF 206-0257-00)		
R4010	-----	-----	RES., FXD, CMPSN:10 OHM, 5%, 0.25W	01121	CB1015
R4010	-----	-----	(REPLACEABLE AS A PART OF 206-0257-00)		

## CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
05006	TWENTIETH CENTURY PLASTICS, INC.	415 E WASHINGTON BLVD.	LOS ANGELES, CA 90015
07716	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, BURLINGTON DIV.	2850 MT. PLEASANT	BURLINGTON, IA 52601
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80031	ELECTRA-MIDLAND CORP., MEPCO DIV.	22 COLUMBIA ROAD	MORRISTOWN, NJ 07960

