Instruction Manual

P6033 PROBE

070-0341-01

Tektronix, Inc.
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WARRANTY

All Tektronix instruments are warranted against defective materials and workmanship for one year. Tektronix transformers, manufactured in our own plant, are warranted for the life of the instrument.

Any questions with respect to the warranty mentioned above should be taken up with your Tektronix Field Engineer.

Tektronix repair and replacement-part service is geared directly to the field, therefore all requests for repairs and replacement parts should be directed to the Tektronix Field Office or Representative in your area. This procedure will assure you the fastest possible service. Please include the instrument Type and Serial number with all requests for parts or service.

Specifications and price change privileges reserved.

SECTION 1
CHARACTERISTICS

General

The P6033 Trigger Probe is a trigger-coupling device for externally triggering Tektronix sampling system time-base plug-in units.

The P6033 Probe responds to triggering signals with a risetime of about 1.2 nsec, (nanosecond), and an upper sine-wave response of about 300 megacycles. When used with a 50-ohm external trigger circuit, it provides a nominal 1000-ohm input impedance, reducing signal circuit loading.

Characteristics

(When probe is terminated in 50 ohms.)

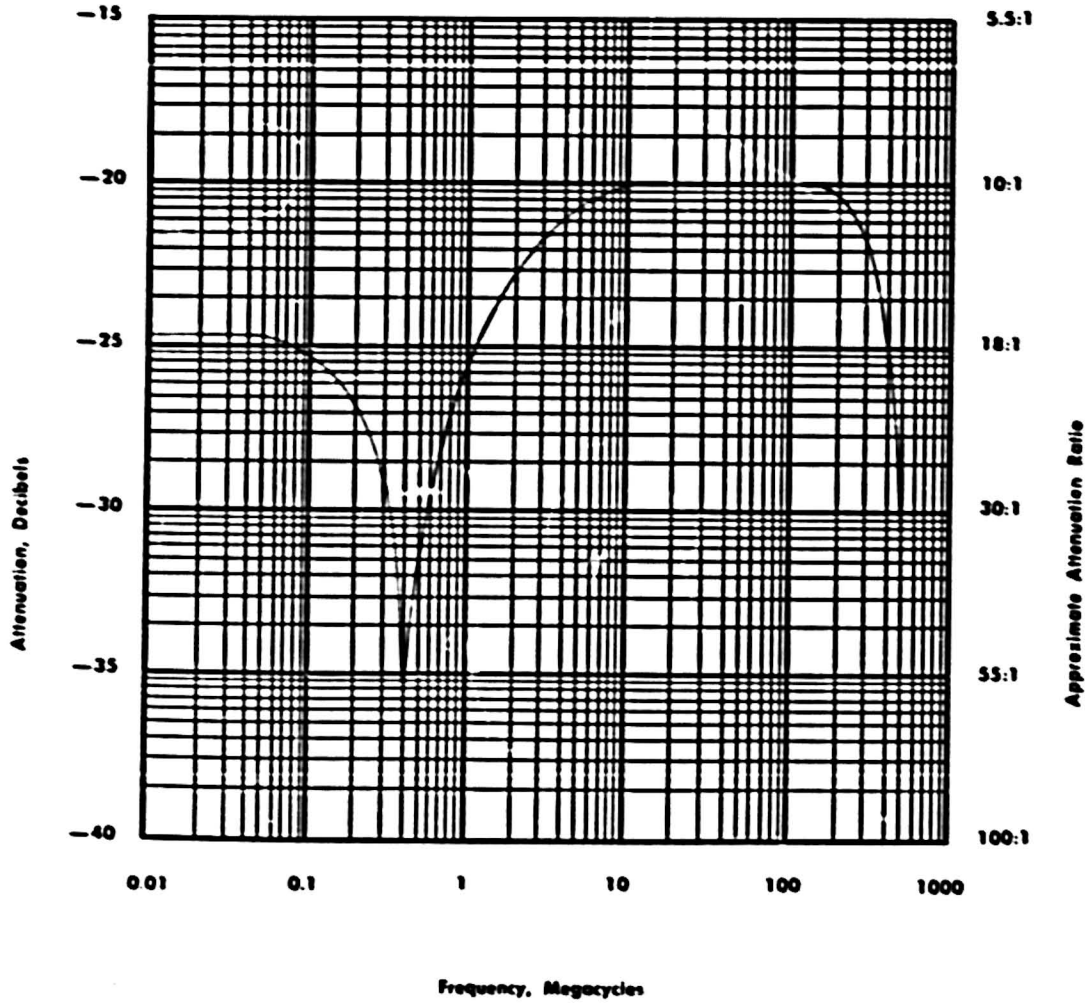


Fig. 1-1. P6033 Probe typical attenuation vs frequency.

Characteristics—P6033

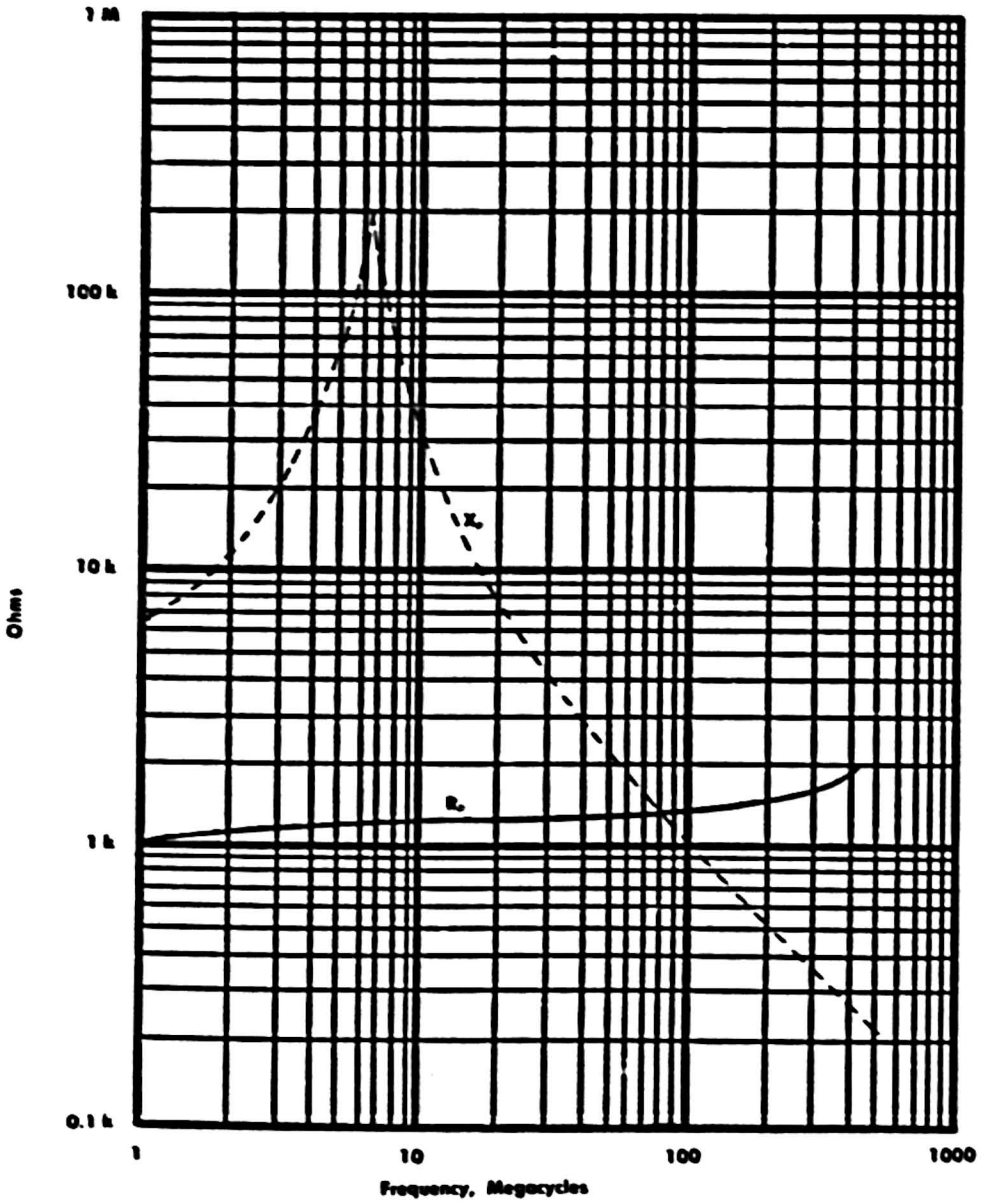


Fig. 1-2. P6033 Probe typical input reactance and resistance vs frequency. Solid line = R_c, dashed line = X_c.

Attenuation—See Fig. 1-1.

1.5 mc to 300 mc—Nominally 10X.

100 kc to 1.5 mc—Varies to 50X maximum.

Dc to 100 kc—About 17X.

Input Impedance—See Fig. 1-2.

Dc—Nominally 870 ohms.

At 250 mc—Nominally 1200 ohms, paralleled by 2 pf.

Risetime (When driven by a 25-ohm source)

Typically 1.2 nsec.

Trigger Delay

About 10 nsec.

Voltage Ratings (Probe only)

With probe output dc-coupled: ±15 volts dc or 15 volts rms.

With probe output ac-coupled: ±400 volts dc or 15 volts rms.

Cable

Characteristic impedance—nominally 50 ohms.

Length—5 feet.

Connector—GR Type 874.

SECTION 2
OPERATING INSTRUCTIONS

General Precautions

The P6033 Trigger Probe has been constructed as ruggedly as possible, consistent with extremely good high-frequency response. However, as with all devices handling signals in the nanosecond range, small changes in capacitance and inductance produce pronounced changes in response. For this reason, observing a few precautions in the handling of the probe and cable will insure optimum performance and reliability. Do not drop or roll equipment on the probe or cable, kink the cable, close doors or drawers on the cable, drop the probe or attenuator heads or pull on the probe or cable.

Operation

Connect the P6033 Probe to the external trigger input of the time-base plug-in unit used. If the trigger input connector is unterminated, use a feed-through 50 ohm termination (Tektronix Part number 010-313 with adapters) between the probe cable and the time-base plug-in unit. If the trigger input is internally terminated in an impedance other than 50 ohms, use a matching adapter. For example, with a 125 ohm trigger input, use the T50/N125 Adapter (Tektronix Part Number 017-055).

Obtain a trigger of correct amplitude from a point in the circuit. This point should have about the same impedance as, or a lower impedance than, the P6033 Probe. Usually, a good low-impedance source is the cathode of a tube or the emitter of a transistor. Do not connect the P6033 Probe to the vertical signal source as it may distort the signal.

The P6033 Probe attenuates the trigger signal between 10 and 50 times, depending on the trigger-signal frequency. (See Fig. 1-1 for Probe attenuation from 0.01 to 1000 megacycles.) Therefore, the trigger signal must be 10 to 50 times the amplitude needed to trigger the time-base plug-in unit.

CAUTION

The specified ac voltage ratings apply only when the P6033 Probe is ac-coupled to the trigger input connector. If terminations or matching adapters are used between the P6033 Probe cable connector and the time-base plug-in unit external trigger input connector, the dc voltage rating applies. For ac-coupled triggering, the external trigger input connector of the time-base plug-in unit must be ac-coupled without internal termination between the connector and the coupling capacitor.

When touching the P6033 Probe to a high-voltage point (but under 400 volts), the sudden application of voltage may damage components within the time-base plug-in unit external-trigger system. ALWAYS place a 1-megohm, ½-watt, resistor between the probe tip and the high-voltage trigger takeoff point, to allow a slow charge of the system capacitors. After the capacitors have charged, remove the external resistor, and connect the probe tip directly to the trigger takeoff point. Observe the individual time-base plug-in unit trigger-signal voltage limits.

When finished with the high-voltage trigger takeoff, use the 1-megohm resistor to discharge the capacitors in the probe and time-base plug-in unit. Do not ground the charged probe tip without limiting the discharge current.

Operation Checkout

The P6033 Probe does not require calibration adjustments. However, the probe operation

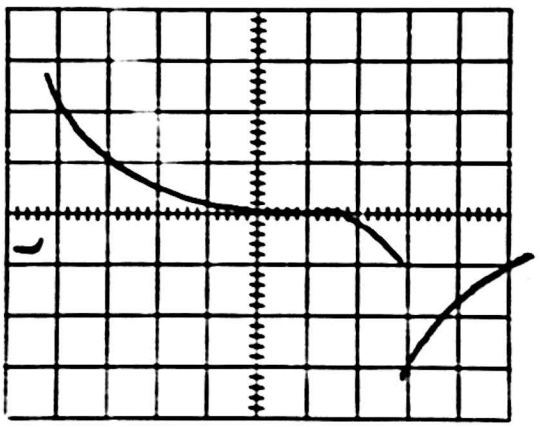


Fig. 2-1. P6033 Probe driven by Type 661 DELAYED PULSE. Sweep Time per cm is 0.1 μsec.

▲

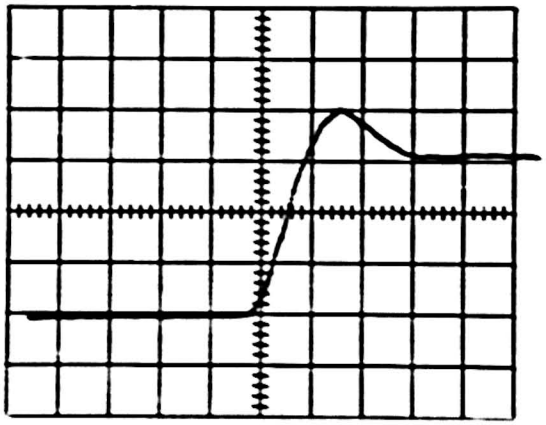


Fig. 2-2. P6033 Probe risetime measurement when driven by Type 661 DELAYED PULSE. Sweep Time per cm is 1 nsec.

should be checked at regular intervals to be sure it is operating properly. Two general types of Tektronix sampling systems can require use of the P6033 Probe. They are the Type 661 Oscilloscope and one of its sampling systems, and the Type 561A (or Type 567) Oscilloscope and its sampling system. The method of checkout is different for a Type 661 sampling system than for the 560 Series sampling systems.

TYPE 661 CHECKOUT

No external signal generators are required. However, two adapters and one termination are needed to connect the probe to the Type 661 DELAYED PULSE output terminal.

Equipment Required: Tektronix Part Number

1. Probe-to-BNC Adapter; (made by Tektronix): 013-020

2. GR Type 874-QBJ Adapter; (GR-to-BNC Jack): 017-064

3. BNC 50-ohm in-line termination; (made by Tektronix): 011-049

Procedure

Install the P6033 Probe onto one of the Type 661 vertical unit input connectors. Free run the timing unit at 0.1 μsec/cm.

Using the GR-to-BNC adapter, the BNC 50-ohm in-line termination, and the probe-to-BNC adapter, connect the input end of the probe to the Type 661 DELAYED PULSE. The display should be similar to Fig. 2-1. If the display does not have a sharp spike at the first rise, set the timing unit SAMPLES/CM switch for a gigadot display. (Fig. 2-1 and 2-3 were taken with the vertical unit inverting the display.)

To check the probe risetime, change the timing unit to 1 nsec/cm, and the display should be similar to Fig. 2-2. The risetime will be about 1.2 or 1.3 nsec, (measured from 10% to 90% points).

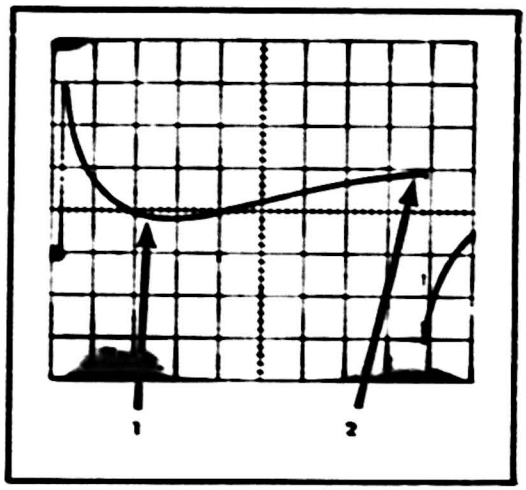


Fig. 2-3. P6033 Probe driven by Type 107. Measurement made by Type 3S76, 3T77 in a Type 561A Oscilloscope.

TYPE 560 SERIES CHECKOUT

An external, fast-rise, 50-ohm signal generator is required to check out the P6033 Probe on a 560 Series sampling system. The generator should have a risetime less than 3 nsec, at least ½-volt output, and a repetition rate sufficiently high for the sampling system to reproduce it. Tektronix Type 107 recommended, operated at about 400 kc. (Replace the Type 107 output tube with a 6AK5 for this test.)

Equipment Required: Tektronix Part Number

1. Probe-to-BNC Adapter; (made by Tektronix): 013-020

2. UHF-to-BNC Adapter. Amphenol 31-028-1000. 103-015

Procedure:

Install the P6033 Probe onto one of the 560 Series vertical unit input connectors.

Install the Probe-to-BNC adapter on the tip of the probe and the UHF-to-BNC adapter on the square-wave generator output. (If other than the Type 107 is used, be sure the generator output impedance is 50 ohms.)

Connect the probe to the square-wave generator output, and obtain a stable display with the 560 Series time-base plug-in unit operating at 0.2 μsec per division. (If stable triggering is difficult to obtain, either increase the output of the square-wave generator, or externally trigger the time-base plug-in unit.) The display should be similar to Fig. 2-3.

Adjust the vertical unit sensitivity to produce a 4-division display at the first fast rise of Fig. 2-3. Check for:

Point 1. A minimum deflection of about 0.9 vertical divisions, corresponding to a maximum attenuation of 50X at about 2.0 horizontal divisions from the start of the leading edge. This indicates that maximum attenuation occurs at about 350 kc.

Point 2. A vertical deflection of about 2 divisions, indicating that the attenuation of the P6033 Probe is about 17X at frequencies under 100 kc.

To check the probe risetime, change the time-base plug-in unit to 1 nsec per division. The display should now be similar to Fig. 2-4 with a risetime of about 3.2 nsec (10% to 90%).

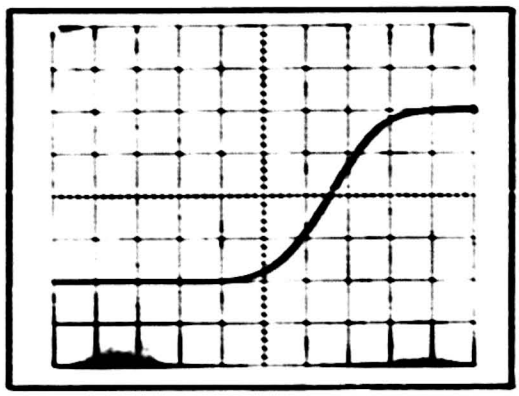


Fig. 2-4. P6033 Probe risetime measurement when driven by Type 107. Sweep Time per cm is 1 nsec.

SECTION 3
MAINTENANCE

General

The P6033 Trigger Probe is ruggedly constructed for long trouble-free service with normal use and care. However, if trouble develops in the probe, the following paragraphs may help to locate the cause.

No Signal At Output

If there is no signal at the probe output, check for continuity between the probe tip and the output connector center conductor. The resistance between these two points should be about 820 Ω. Also, check for a short between the output connector braid and center conductor; a short indicates that the 0.008 μf capacitor in the probe may be shorted.

Probe Repair

To replace components inside the probe, loosen the two set screws and pull off the probe body. The input lead is not soldered to the probe tip. Replacement of the disc capacitor should not be attempted. Instead, replace the entire Etched Circuit Board Assembly. See Fig. 4-1 for replaceable parts information.

Cleaning

Use a soft, lint-free cloth to wipe the P6033 Probe clean of accumulated dust. Remove stubborn dirt with a cloth dampened in a mild solution of water and liquid detergent. Allow the probe to dry thoroughly before operating.

CAUTION

Do not use solvents to clean the plastic parts of the probe. These solvents dissolve plastics, and may damage the probe.

Section 4
Parts List and Schematic

HOW TO ORDER PARTS

Replacement parts are available from or through your local Tektronix Field Office.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, for your order to contain the following information: Part number including any suffix, instrument type, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, you local Field Office will contact you concerning any change in part number.

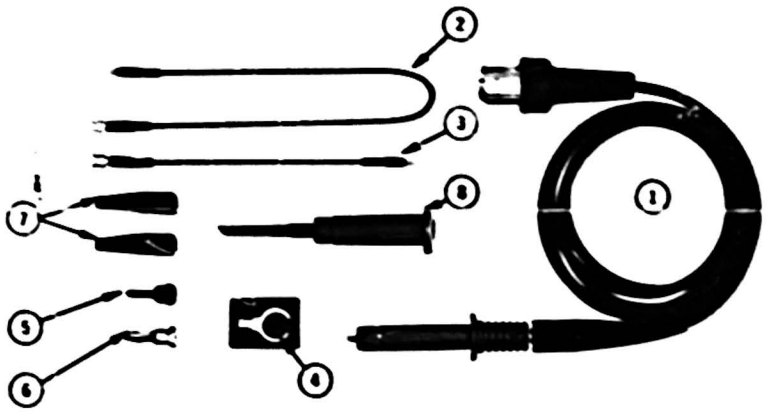
ABBREVIATIONS

BHS	Binding Head Steel	p	Pico, or 10^{-12}
f	Farad	PHS	Pan Head Steel
K or k	Kilohms, or kilo (10^3)	Var.	Variable
M or meg	Megohms, or mega (10^6)	w	Watt
Ω	Ohm	w/	With

SPECIAL NOTES AND SYMBOLS

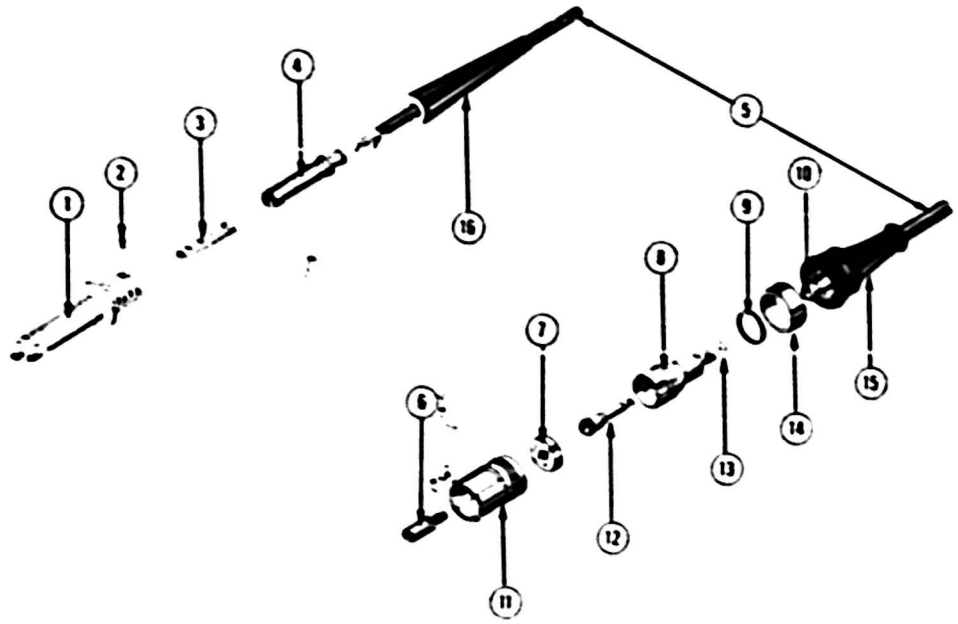
X000	Part first added at this serial number.
000X	Part removed after this serial number.
*000-000	Asterisk preceding Tektronix Part Number indicates manufactured by or for Tektronix, also reworked or checked components.
Use 000-000	Part number indicated is direct replacement.
	Internal screwdriver adjustment.

PROBE WITH ACCESSORIES



REF. NO.	TEKTRONIX PART NO.	SERIAL/MODEL NO. EFF.	SERIAL/MODEL NO. DISC.	QTY.	DESCRIPTION
PROBE PACKAGE					
1—8	010-0100-00			1	PROBE PACKAGE, P6033
	. . . . .			.	probe package includes
PROBE ONLY					
1	010-0099-00			1	PROBE, P6033
STANDARD ACCESSORIES					
2	175-0125-00			1	CABLE, ground lead, 12 inches
3	175-0124-00			1	CABLE, ground lead, 5 inches
4	352-0068-00			1	HOLDER, probe
5	206-0105-00			1	TIP, probe
6	134-0013-00			1	PLUG, banana
7	344-0046-00			2	CLIP, probe
8	013-0071-00			1	PINCHER TIP
	070-0341-01			1	MANUAL, instruction (not shown)

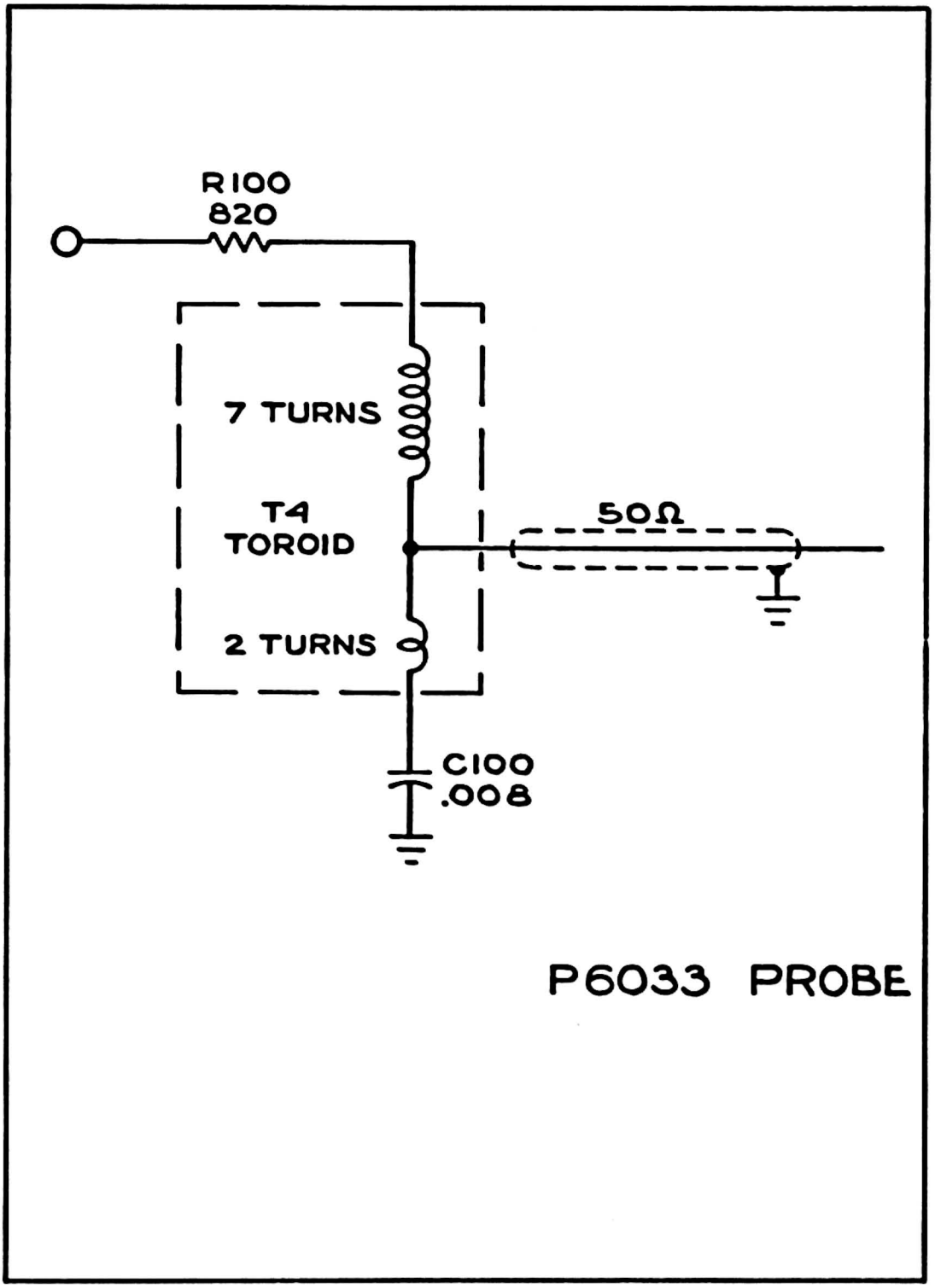
REPLACEABLE PARTS



REF. NO.	TEKTRONIX PART NO.	SERIAL/MODEL NO. EFF.	SERIAL/MODEL NO. DISC.	QTY.	DESCRIPTION
	010-0099-00			1	PROBE, P6033
	. . . . .			-	probe includes:
1	204-0119-00			1	BODY, probe
2	213-0075-00			1	SCREW, set, 4-40 x 3/32 inch, HSS
3	388-0543-00			1	ASSEMBLY, circuit board
	. . . . .			-	assembly includes:
	388-0518-00			1	BOARD, circuit
	. . . . .			1	TOROID
4	358-0170-00			1	BUSHING, center
5	175-0227-00			FT.	CABLE, 5 250 Feet, w/gray vinyl jacket
6	132-0029-00			1	CONDUCTOR, inner
7	132-0028-00			1	INSULATOR
8	132-0115-00			1	TRANSITION, outer
9	132-0007-00			1	RING, snap
10	166-0246-00			2	TUBE, brass
11	132-0002-00			1	SLEEVE, conductor, outer
12	132-0116-00			1	TRANSITION, inner
13	132-0119-00			1	DISC, plastic
14	132-0001-00			1	NUT, coupling
15	132-0043-00			1	GUARD, cord, rubber
16	200-0378-00			1	COVER, cable relief

ELECTRICAL PARTS

Ckt. No.	Tektronix Part No.	Description	S/N Range
		Capacitor	
C100	*283-0072-00	0.01 μF Cer w/tin plates	20%
		Resistor	
R100	315-0821-00	820 Ω ¼ W	5%
		Transformer	
T4	*120-0270-00	Torroid, 2 windings	


R100
820
7 TURNS
T4
TOROID
2 TURNS
50Ω
C100
.008
P6033 PROBE