

Instruction Manual



CT-1/P6040

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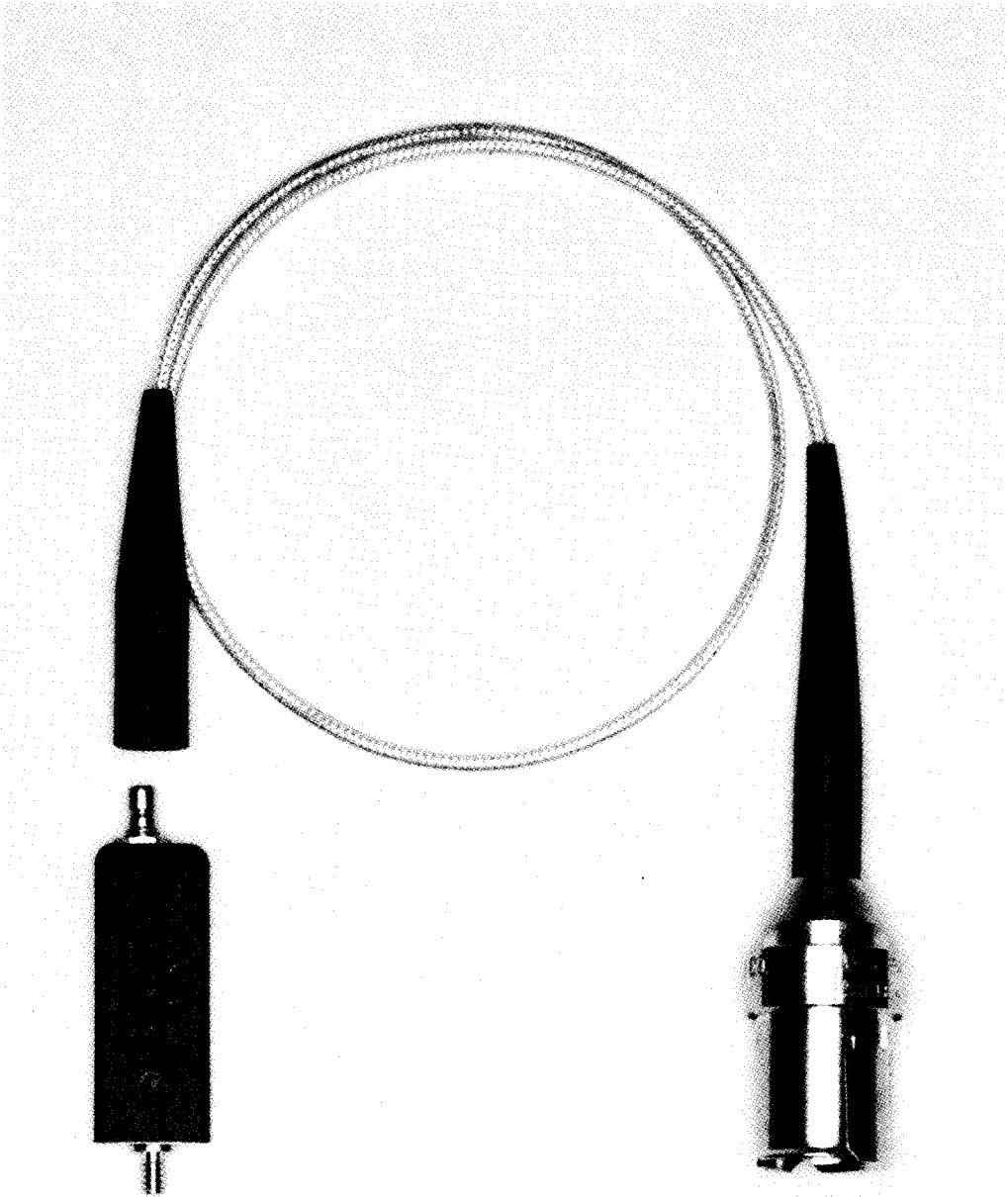
WARRANTY

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.



CT-1 Nanosecond Current Transformer and P6040 Probe.

CT-1/P6040

CHARACTERISTICS

General Information

The CT-1 Nanosecond Current Transformer, with the P6040 Probe, is particularly useful for measuring high-frequency signal currents in transistorized circuitry without modifying the circuit under test. The CT-1 inductively meters current through a conductor and develops a voltage proportional to the current. The CT-1 has an internal terminating resistor that reduces reflections so that the CT-1 can be left in the circuit without external connections. The LR time constant of the CT-1/P6040 system is approximately 5 μ sec. The CT-1 is designed to use with high-frequency oscilloscopes and is directly compatible with all Tektronix sampling plug-in units, such as the Type 3S76, 4S1 and 4S2. A simplified circuit diagram of the CT-1 is shown in Fig. 1.

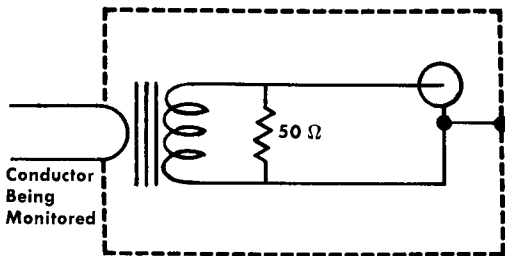


Fig. 1. CT-1 simplified circuit.

The P6040 Probe provides a flexible plug-in interconnecting cable for the CT-1. The P6040 Probe can also be used with Amphenol series 27 Sub-Minax or Sealectro Sub-Miniature RF test-point connectors.

CT-1 With P6040 Probe

- Sensitivity 5 mv/ma into a 50 Ω load.
- Pulse Response Risetime equal to or less than 0.35 nsec, 10% to 90%. Aberrations less than 5% during first 5 nsec. Decay.*
- Frequency Response See Fig. 2.

* $\pm 3\%$ at 100 mc. For pulses, LR decay may be approximated by the linear expression $\pm 3\% - (t/50)\%$ where (t) is in nsec (limit, 1000 nsec). For example, output of the CT-1 decays 10% in 500 nsec.

Insertion Impedance 50 Ω termination: 1 Ω shunted by approximately 5 μ h. Underterminated: 2 Ω shunted by approximately 5 μ h.

Capacitive Loading** No. 14 bare wire, typically 1.5 pf. No. 20 bare wire, typically 0.6 pf.

Maximum Voltage on Circuit Under Test 1000 vdc.

Signal Delay Approximately 2.8 nsec measured from 50% points on leading edge of the current step and output voltage. CT-1 only: 0.4 nsec.

Effect of Direct Current 0.6 amp dc changes pulse response to $\pm 3\% - (2t/50)\%$. (See Fig. 2 and Fig. 4).

Pulse Current Rating 100 amps peak, with an amp-sec product of 1 amp- μ sec. When this product is exceeded, the core saturates and the CT-1 output drops to zero.

Rms Current Rating 500 ma maximum.

Output Connector . Amphenol Sub-Minax No. 27-3.

Dimensions $\frac{3}{8} \times \frac{9}{16} \times 1\frac{13}{16}$ inches plus $\frac{1}{4}$ " x 6-32 mounting stud.

P6040 Probe Only

Impedance 50 Ω , $\pm 5\%$.

Attenuation X1

Signal Loss 0.7 db at 1000 mc.

Risetime Less than 0.2 nsec, 10% to 90%.

Voltage Rating 500 vdc.

Length 18 inches, 2.4 nsec.

Input Connector .. Sealectro No. 3110.

Output Connector . GR-874.

** Capacitance added to a conductor when passed through the CT-1. With No. 14 wire, this capacitance and the inductance of the conductor form a transmission line with a Z_0 of approximately 50 ohms; No. 20 wire produces a Z_0 of about 100 ohms.

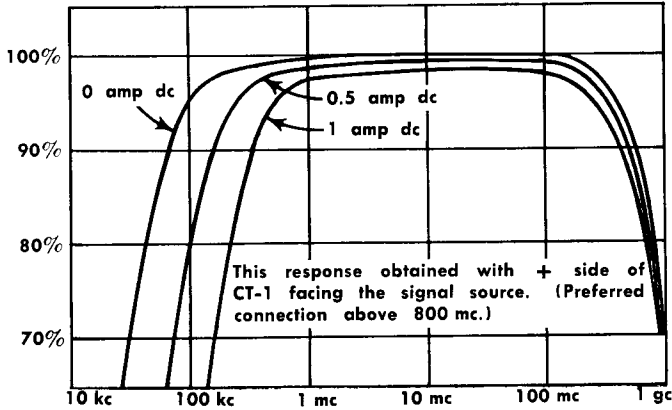


Fig. 2. Typical frequency response.

OPERATING INFORMATION

Introduction

A number of CT-1 transformers can be placed on a chassis or circuit board to meter the current in transistors, diodes, or other components. The P6040 Probe is used to connect the CT-1 to the oscilloscope. Coaxial cable can be added to the P6040 Probe. For cable lengths under 5 nsec, use RG-58A/U; under 20 nsec, use RG-8A/U so that the CT-1 high-speed characteristics are not altered significantly. The CT-1 can be connected to monitoring jacks through either RG-174A/U or RG-178A/U cable. Use an Amphenol Sub-Minax No. 27-1 or Sealectro Sub-Miniature No. 3100 RF connectors with RG-174A/U cable. For RG-178A/U cable, use Sealectro No. 3110 RF connectors.

When observing the output of the CT-1, the P6040 Probe should be working into 50 ohms. If the input of the oscilloscope is not 50 ohms, use suitable matching adapters.

If the CT-1 is connected so that the + side faces the signal source, the input current and output voltage will be in phase. This is the preferred connection. For pulses with a risetime slower than 1 nsec, the CT-1 may be connected in either polarity.

Care and Maintenance

Only normal handling considerations are necessary with the CT-1 and P6040 Probe.

The CT-1 is a sealed unit and should not be disassembled. If damaged, replace as a unit. (See "Replaceable Parts" at the rear of this manual.)

Output Waveforms

Fig. 3 illustrates the output of the CT-1 compared with the input pulse from a Tektronix Type 109 Pulse Generator. The decay characteristics of the CT-1 are shown in Fig. 4.

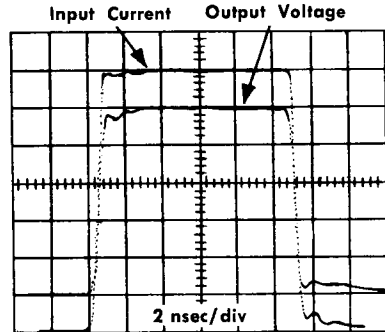


Fig. 3. CT-1 typical output with 10 nsec, 120 ma input pulse.

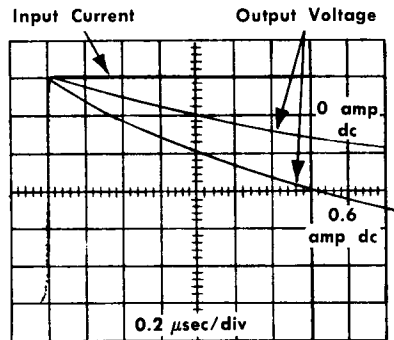
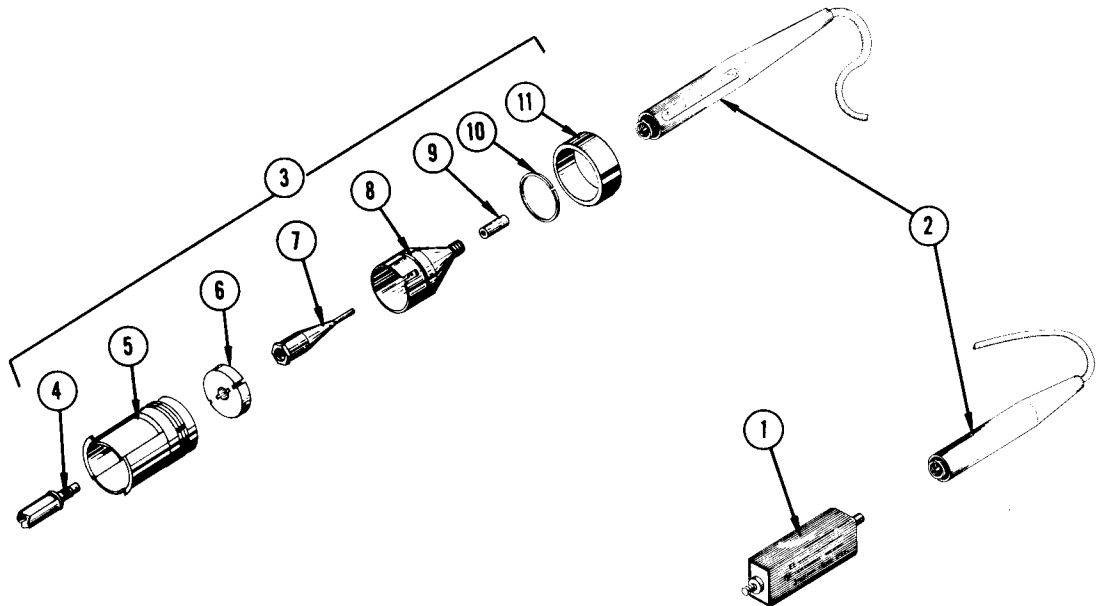


Fig. 4. CT-1 typical output showing decay characteristics.

REPLACEABLE PARTS



REF. NO.	TEKTRONIX PART NO.	SERIAL/MODEL NO.		Q T Y.	DESCRIPTION
		EFF.	DISC.		
PROBE PACKAGE					
1—11	015-0041-00			1	PROBE PACKAGE, CT-1/P6040
				-	probe package includes:
1	015-0040-00			1	CT-1 NSEC CURRENT TRANSFORMER
PROBE ONLY					
2—11	010-0133-00			1	PROBE, P6040
				-	probe includes:
2	175-0269-00			1	CABLE ASSEMBLY
3	132-0105-00			1	ADAPTER ASSEMBLY
				-	adapter includes:
4	132-0029-00			1	CONDUCTOR, inner
5	132-0002-00			1	SLEEVE, outer conductor
6	132-0028-00			1	INSULATOR
7	132-0104-00			1	CONDUCTOR, center
8	132-0103-00			1	ADAPTER
9	166-0281-00			1	INSULATOR, sleeve
10	132-0007-00			1	RING, snap
11	132-0001-00			1	NUT, coupling
STANDARD ACCESSORIES					
	070-0375-00			1	MANUAL, instruction (not shown)