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**PLEASE CHECK FOR CHANGE INFORMATION AT THE REAR OF THIS MANUAL.**

# CT-5
# HIGH-CURRENT TRANSFORMER

## INSTRUCTION MANUAL

**Tektronix, Inc.**
**P.O. Box 500**
**Beaverton, Oregon 97077**

070-1130-00
Product Group 60

Serial Number ______________

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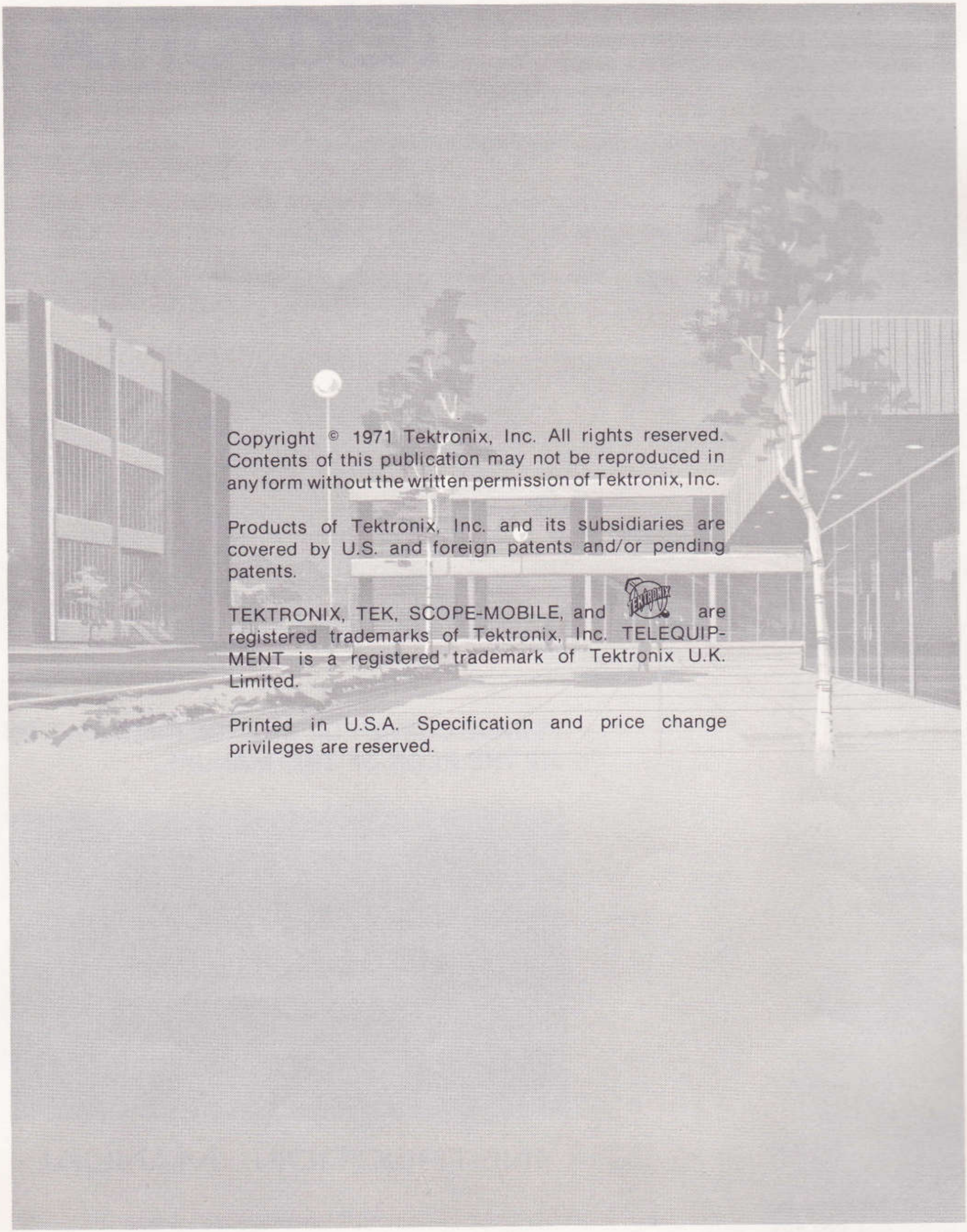

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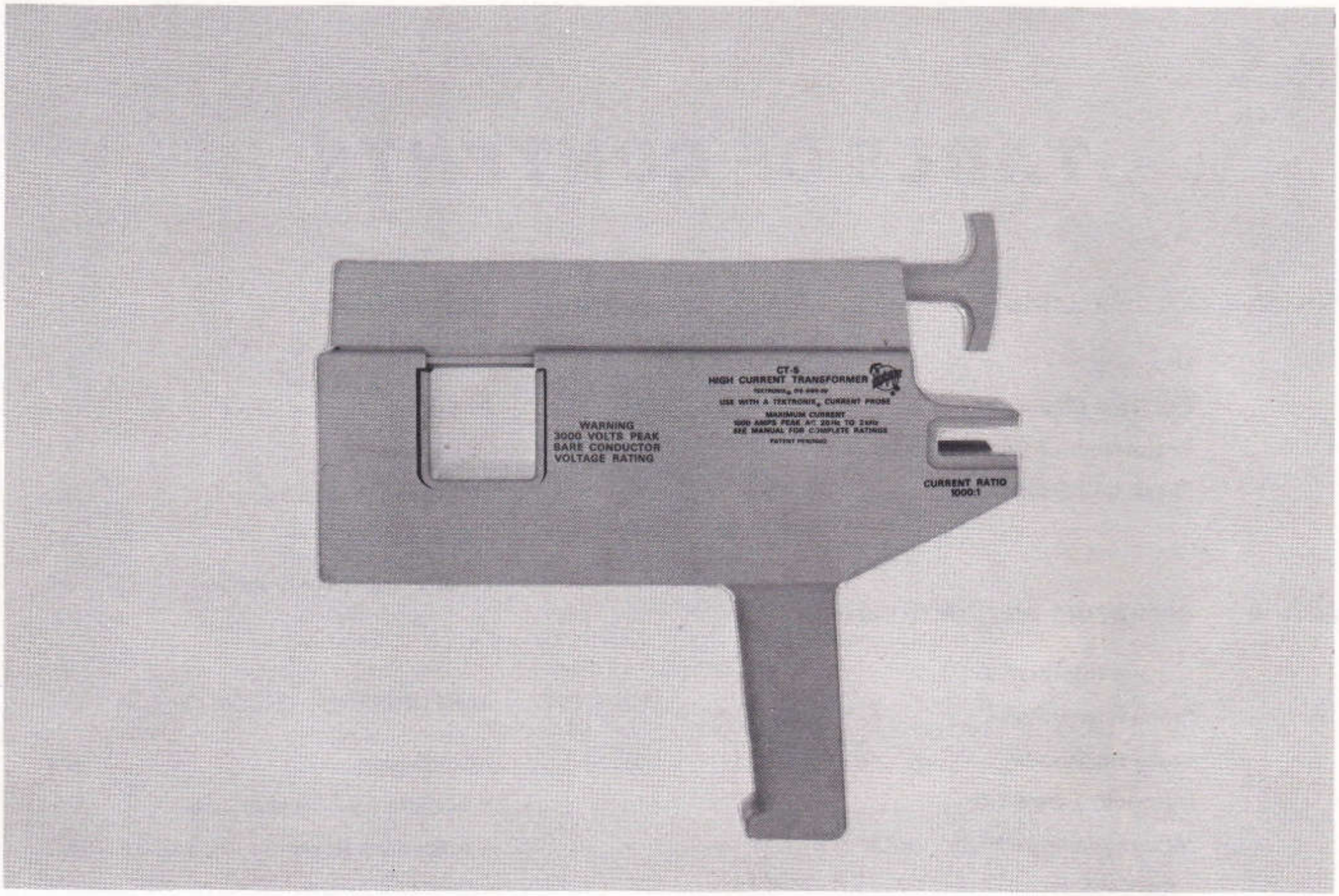


| Tektronix Part No. | Description |
|---|---|
| 015-0189-00 | TRANSFORMER, HIGH CURRENT, CT-5 |
| | STANDARD ACCESSORIES (not shown) |
| 015-0194-00 | HIGH-VOLTAGE INSULATION, 12"W X 3'L X 1½" dia. (roll) |
| 016-0191-00 | CARRYING CASE |
| 070-1130-00 | MANUAL, INSTRUCTION |
| | OPTIONAL ACCESSORIES (not shown) |
| 015-0190-00 | DC BUCKING COIL |
| 015-0194-01 | HIGH-VOLTAGE INSULATION, 4'W X 3'L X 1½" dia. (roll) |

**Fig. 1-1. CT-5 High Current Transformer.**

# SECTION 1
# SPECIFICATION

## Description

The CT-5 High-Current Transformer is designed to extend the current measuring capability of the Tektronix P6042 DC Current Probe and the P6021 AC Current Probe with the 134 Current Probe Amplifier. With each of these probes, the CT-5 extends the measurement range by a factor up to X1000.

The CT-5 includes a pistol-grip type handle with receptacles to accept the P6021 or P6042 in either of two positions, providing a choice of two current ranges. A sliding jaw on the transformer permits insertion of the current-carrying conductor without breaking the circuit under test.

The core and shield assembly is insulated from the windings and the handle, allowing measurements on bare conductors with potentials to 3000 volts. The accessory high-voltage insulation may be used to extend the allowable voltage by several times. Use of an optional DC bucking coil assembly, which slips over the front of the CT-5, nullifies the saturating effects of DC currents to 300 amperes without appreciably degrading the transformer characteristics.

## ELECTRICAL CHARACTERISTICS

The following characteristics are valid when the CT-5 is used with a calibrated P6042 or P6021 (with a 134 Amplifier) and a calibrated oscilloscope, and operated within the limitations stated in this Specification section.

**TABLE 1-1**

**ELECTRICAL CHARACTERISTICS**

| Characteristic | Performance | Supplemental |
|---|---|---|
| Bandwidth (−3 dB) | | |
| CT-5 with P6042 | 0.5 Hz to 20 MHz | |
| CT-5 with P6021/134 | 12 Hz to 20 MHz | |
| CT-5/P6042/DC Bucking Coil | 1 Hz to 1 MHz | |
| Transient Response | | |
| Risetime | (With P6042 or P6021/134) 17.5 ns (calculated from bandwidth) | |
| Aberrations | | |
| 20:1 Receptacle | | ±5%, total less than 7% P-P within 100 ns of 50% amplitude point. ±4% after this interval. |
| 1000:1 Receptacle | | ±9%, total less than 15% P-P within 100 ns of 50% amplitude point. ±4% after this interval. |
| Current Ranges | | |
| 20:1 Receptacle | 20 mA/div to 20 A/div | |
| 1000:1 Receptacle | 1 A/div to 1000 A/div | |

TABLE 1-1 (cont.)

| Characteristic | Performance | Supplemental |
|---|---|---|
| Accuracy | | Within 4% (when less than 20 A DC current is present). Accuracy deteriorates with higher DC current. See Fig. 2-8. |
| Maximum Continuous Input Current (25°C ambient) | 1000 A peak from 20 Hz to 1.2 kHz | Derated with frequency. See Fig. 2-4. |
| Maximum Pulse Current | 50,000 A peak | Derated with repetition rate and pulse duration. See Section 2. |
| Ampere-Second Product | 8 ampere seconds | |
| Insertion Impedance | 20 $\mu\Omega$ at 60 Hz, increasing to 30 m$\Omega$ at 1 MHz. | See Fig. 2-6. |
| Maximum Input Voltage | 3000 V peak with bare conductor. | |
| With H.V. Insulation | 10 kV (RMS) or 14 kV (peak). | |
| External Magnetic Field Susceptibility | | 35 mA/Gauss (20:1 Receptacle) |
| Voltage Feedthrough Susceptibility | | Less than 3 mA/V up to 5 MHz. Less than 30 mA/V at 20 MHz |
| Maximum DC Bucking Current | 300 ampere turns by optional slip-on accessory coil | (300 mA, 1000 turns) |
| Power Supply Requirement (for DC Bucking Current) | 1 V for 20 A bucking, 300 mA 15 V maximum. | |
| Aberrations (with DC Bucking Coil) | | ±30% for the first 5 $\mu$s. Within 4% thereafter with up to 320 A DC (300 mA bucking current applied) |
| External Magnetic Field Susceptibility (with DC Bucking Coil) | | 500 mA/Gauss. May be improved by selecting physical placement |

TABLE 1-2

ENVIRONMENTAL CHARACTERISTICS

| Characteristic | Information |
|---|---|
| Temperature | |
| Non-operating | |
| In Carrying Case | −40°C to +60°C |
| CT-5 only | −40°C to +130°C |
| Bucking Coil | −40°C to +60°C |
| Operating | 0°C to +50°C |
| Altitude | |
| Non-operating | To 50,000 feet |
| Operating | To 15,000 feet |
| Vibration (operating) | 15 minutes along each axis to .015 inch total displacement with frequency varied from 10-50-10 cycles per second in 1-minute cycles. Three minutes at any resonant point or at 50 cycles per second. |
| Shock (Non-operating) | 30 g's, ½ sine, 11 ms duration, 2 shocks per axis. |
| Transportation | |
| Package Vibration | 1 hour at 1 g. (Package just leaves vibration surface) |
| Package Drop | 36 inches on 1 corner, all edges radiating from that corner, and all flat edges. |

TABLE 1-3

PHYSICAL CHARACTERISTICS

| Characteristic | Information |
|---|---|
| Dimensions | 10.5 inches L x 2.2 inches W x 9.7 inches H (includes handle) |
| Maximum Conductor Size | 1.5 inch x 1.6 inch rectangle |
| Weight | 4 lbs, 4 oz. |
| DC Bucking Coil (Optional) | |
| Dimensions | |
| Coil | 3 inches L x 3.5 inches W x 1.6 inches H |
| Base | 5.4 inches L x 3.6 inches W x 1.7 inches H |
| Maximum Conductor Size | |
| CT-5 Opening | 0.89 inch W x I.6 inches H |
| Weight | 2 lbs, 5 oz. |
| Carrying Case | |
| Dimensions | 15 inches L x 11.6 inches W x 6 inches H |
| Weight | 6 lbs. |

# SECTION 2
# OPERATING INSTRUCTIONS

## General

The CT-5 High-Current Transformer may be used with either the P6042 DC Current Probe or the P6021 AC Current Probe with the 134 Current Probe Amplifier. Characteristics and use of the CT-5 are the same with either probe, except the low-frequency response extends to 0.5 Hz with the P6042 (vs. 12 Hz with the P6021/134).

## Probe Receptacles

At the rear of the CT-5 are two probe receptacles, providing a choice of current ranges. With a current probe installed in the receptacle labeled 20:1, the current range is 20 mA/Div to 20 A/Div (assuming the current probe normal range is 1 mA/Div to 1 A/Div). The 1000:1 receptacle provides a current range of 1 A/Div to 1000 A/Div. See Fig. 2-1.

The 20:1 receptacle is recommended for all current measurements within the dynamic range of the associated current probe (200 A peak with P6042). One advantage for using the 20:1 receptacle is that the stray field susceptibility of the associated current probe is less noticeable when operated in the higher current/div ranges. For measurements where large DC currents are present, refer to "DC Bucking Coil" in this section.

## Probe Installation

To install either the P6021 or P6042 in the CT-5, first select the appropriate receptacle, considering the anticipated current magnitude. Then, open the thumb-controlled probe slider and insert the probe into the selected receptacle, hooking the probe jaw over the enclosed conductor. Press the probe slider fully forward to assure that the core is closed. See Fig. 2-2. The current probe should always be inserted so that the probe slider faces outward from the CT-5. This will assure correct current polarity.

## Connecting the CT-5

With a current probe installed in one of the receptacles, turn the CT-5 Locking Lever ¼ turn ccw to unlock and pull the sliding jaw back to the stop. Hook the test conductor into the CT-5 transformer opening and push the sliding jaw **fully** closed. Then, turn the Locking Lever ¼ turn clockwise to lock. Fig. 2-3 shows the effect on low-frequency response when the CT-5 sliding jaw is not properly closed.

## Measurements on High-Voltage Conductors

The CT-5 is insulated to withstand bare test conductor voltages to 3000 V peak. For measurements on conductors

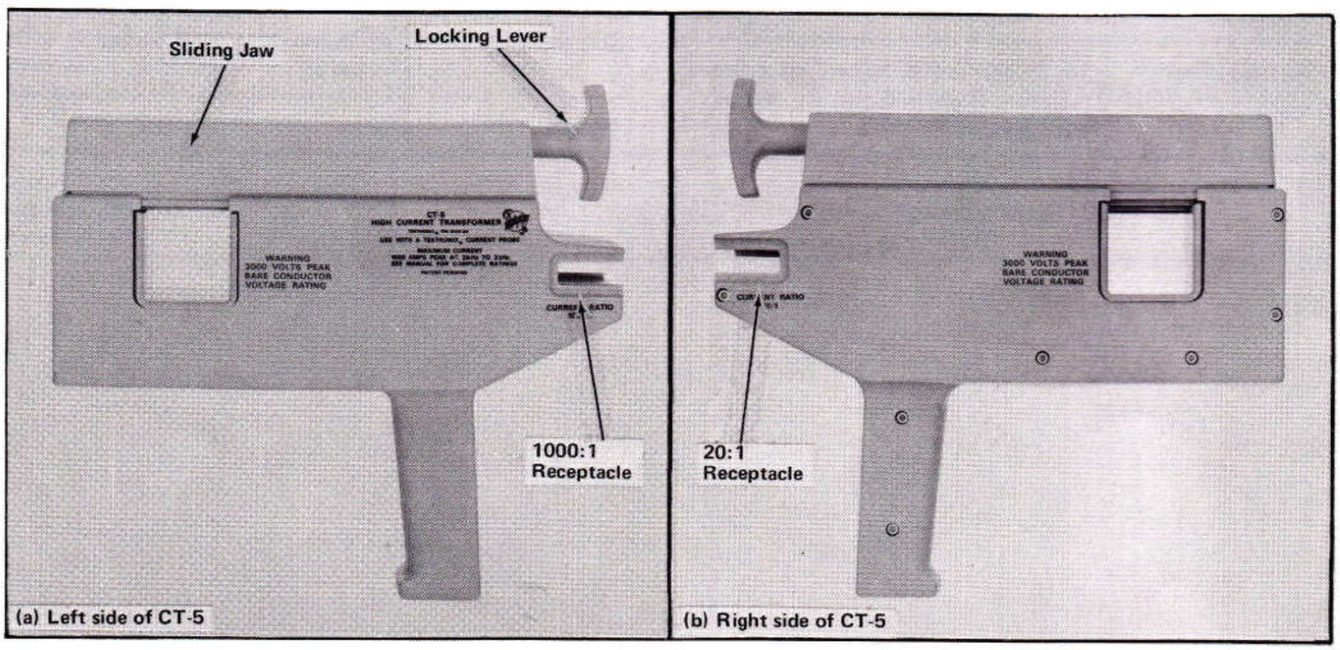


**Fig. 2-1. CT-5, showing 1000:1 and 20:1 Current Ratio receptacles.**



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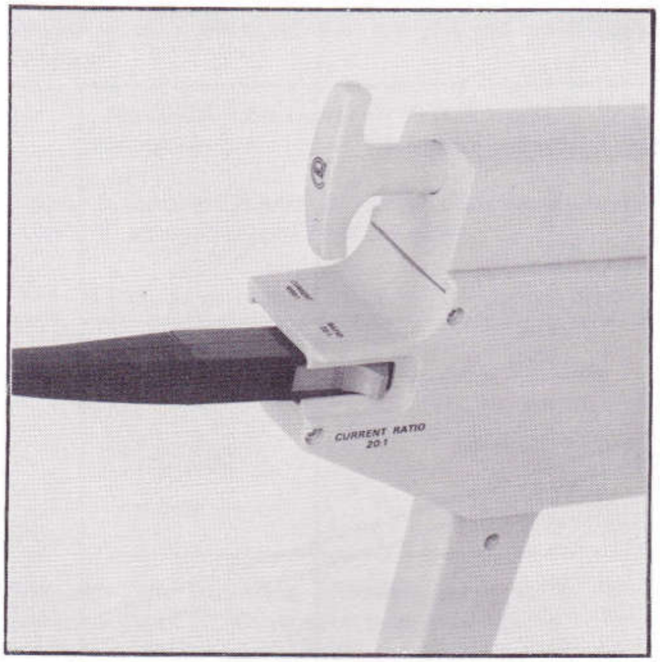


Fig. 2-2. CT-5 with P6042 attached to the 20:1 Current Ratio receptacle.

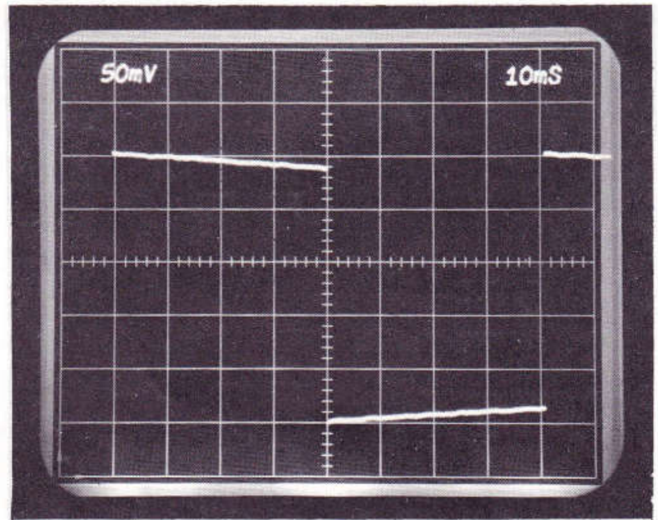
at higher potentials, a length of high-voltage insulation is provided. This insulation should be wrapped around the test conductor at the test point before attaching the CT-5. To assure protection, the insulation should be wrapped around the conductor at least three turns or a minimum insulation length of six inches. The length supplied as a standard accessory will provide approximately three layers when wrapped around the largest conductor that the CT-5 will accept. When attaching the CT-5, it should be centered on at least a six-inch width of insulation.

When wrapped around a large conductor, the natural coiling tendency of the insulation will usually hold it in place on the conductor. On smaller conductors, it may be necessary to tape the insulation to prevent sliding.

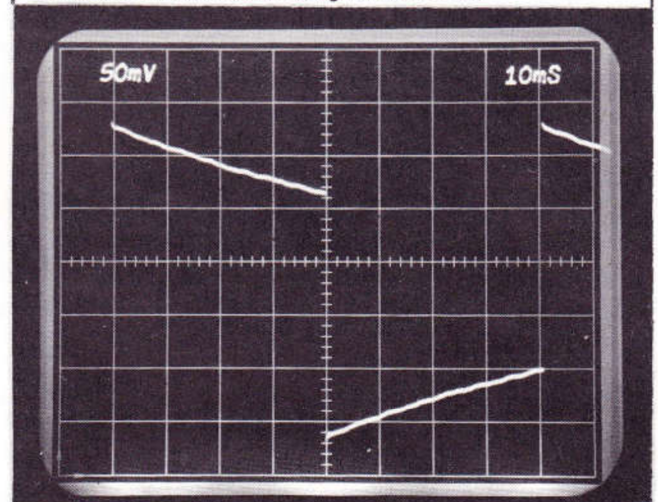
With the insulation wrapped around a bare test conductor, current measurements may be made with the conductor at potentials up to 14 kV peak. The CT-5 must be centered on the insulation.

## Maximum Continuous Input Current

The main factor limiting the maximum continuous input current which may be applied to the CT-5 is heating effect. This is, of course, affected by ambient temperature and signal frequency. Fig. 2-4 shows the derating curves over a broad range of frequencies at 25°C and 50°C ambient. The solid lines of the curves represent tests which have been made under actual operating conditions. The dashed lines are projections of the measured data, indicating performance to be expected.




(A) Low-frequency response with the sliding jaw fully closed and locked. Current range is 40 mA/div.




(B) Same signal as (A), with the sliding jaw locked in a position just short of fully closed.

Fig. 2-3. CT-5 response to a 12.5 Hz square wave.

The maximum continuous current rating may be exceeded, provided that measurement time is held to certain limits. Heating of the core and transformer windings takes a finite time, depending on the magnitude and frequency of the current signal. Fig. 2-5 shows the permissible measurement durations versus frequency at twice the normal maximum continuous current rating, or 2000 A peak. For CW signals, 2000 A peak (4000 A P-P) represents a practical limitation of maximum current for saturation considerations.

## Maximum Pulse Current

The maximum pulse current that can be measured using the CT-5 is limited by transformer core saturation. The Ampere-Second Product specification provides a basis for calculating the current limitation with any given pulse

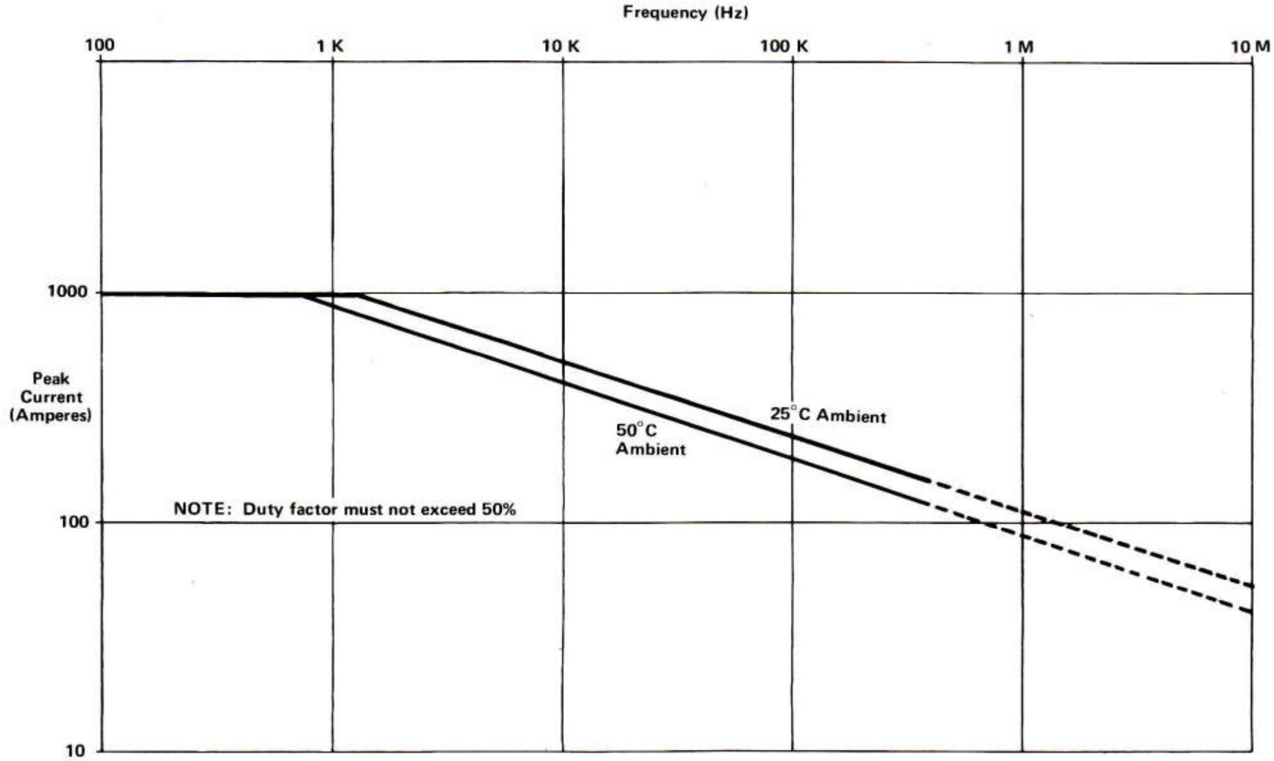



Fig. 2-4. Maximum continuous input current, derating with frequency.

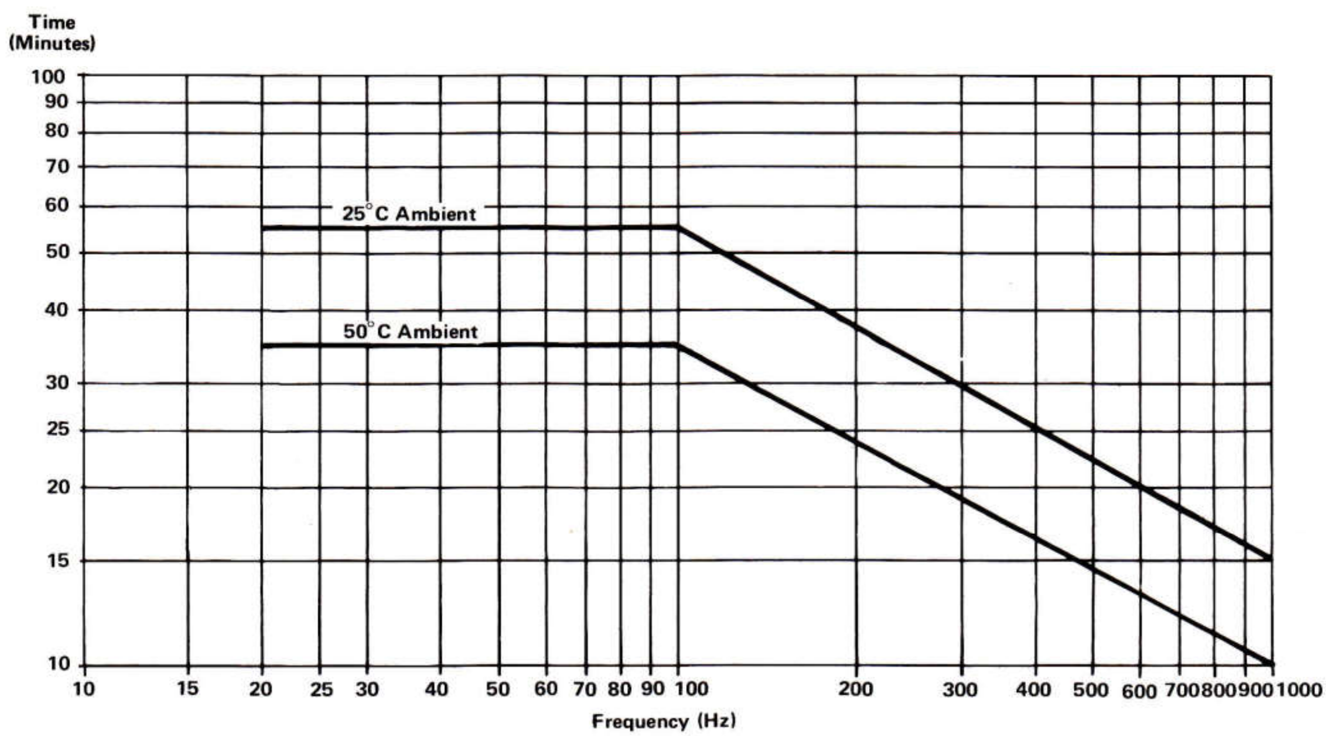



Fig. 2-5. Maximum recommended measurement duration at 2000 A peak or 4000 A P-P versus frequency for CW signals.

width. The CT-5 has an Ampere-Second Product of 8 ampere seconds. An example of applying this specification follows:

Maximum Pulse Current = 50,000 A peak
Ampere-Second Product = 8 ampere seconds

Problem: Calculate maximum pulse width for a current pulse with an amplitude of 50,000 A peak.

$$8 \text{ (ampere seconds)} = I \times t$$

I = current in amperes

$$t = \frac{8}{I}$$

t = pulse width in seconds

$$t = \frac{8}{50{,}000}$$

$$t = 160\ \mu s$$

Solution: The maximum allowable pulse width for a current pulse of 50,000 amperes peak is 160 $\mu$s.

The ampere-second product normally refers to a single, nonrepetitive current pulse. Another factor that must be considered in measuring high-current pulses is repetition rate. Repetition rate for pulses which exceed the Maximum Continuous Input Current rating must be limited to provide a maximum RMS equivalent of 700 amperes (20 Hz to 1.2 kHz). See Fig. 2-4 for derated current at higher frequencies.

If the peak pulse current and pulse duration are known, the maximum repetition rate without exceeding the RMS current limitation can be determined using the following formula:

$$f_p = \frac{(I_{RMS})^2}{(I_p)^2\ (T_p)} \quad \text{where}$$

$f_p$ = repetition rate ($H_z$)
$I_p$ = peak pulse current (amperes)
$T_p$ = pulse duration (seconds)
$I_{RMS}$ = 700 amperes (20 Hz to 1.2 kHz)

Obviously, the formula may be transposed to solve for any of the listed factors.

Example problem: Calculate the maximum repetition rate for a current pulse of 8000 amperes peak with a pulse width of 250 $\mu$s.

$$f_p = \frac{(700)^2}{(8000)^2\ (250 \times 10^{-6})} = 30.6 \text{ Hz}$$

## Insertion Impedance

In measuring high current amplitudes with the CT-5, especially at higher frequencies, insertion impedance may be a factor to consider. Voltage drop due to insertion impedance could represent a significant percentage of the source voltage when working with a low-voltage source. For example, at 100 kHz the insertion impedance is approximately 4 m$\Omega$. If a peak current of 250 amperes is to be measured, approximately 1 volt will be dropped across the section of the test conductor passing through the CT-5. Fig. 2-6 shows the typical insertion impedance versus frequency.

## External Magnetic Field Susceptibility

This characteristic is affected by physical position of the CT-5 in relation to the external magnetic field. The specification of 35 mA/Gauss covers the most susceptible position. Best position can be determined by placing the CT-5 in various positions in relation to the field (without inserting the test conductor) while observing the oscilloscope display. In practice, the induced current may be too small to be of concern.

## Minimizing Loading Effect

To minimize loading of critical circuits, connect the CT-5 at the low or ground end of the system being tested wherever possible. This will minimize the voltage feedthrough.

## Increasing Sensitivity

To measure low current levels in conductors too large for the P6042 core opening, two or more loops may be passed through the CT-5. Sensitivity increases directly with the number of turns.

## DC Current Distortions

The CT-5 will tolerate up to approximately 20 amperes of DC current without appreciable effect on the frequency-response characteristics. Above this level, saturation increasingly affects the low-frequency performance. Fig. 2-7 illustrates the effect of DC current on low-frequency response. Measurement error also increases with DC currents above 20 amperes over the full bandwidth of the CT-5. Fig. 2-8 shows the typical measurement error with increasing DC current. Use of the optional DC Bucking Coil is recommended for applications where significant DC currents are present in the test conductor.

## DC Bucking Coil

The DC Bucking Coil (Tektronix Part No. 015-0190-00), which is available as an optional accessory, is useful for nullifying the effects of moderately high DC currents on

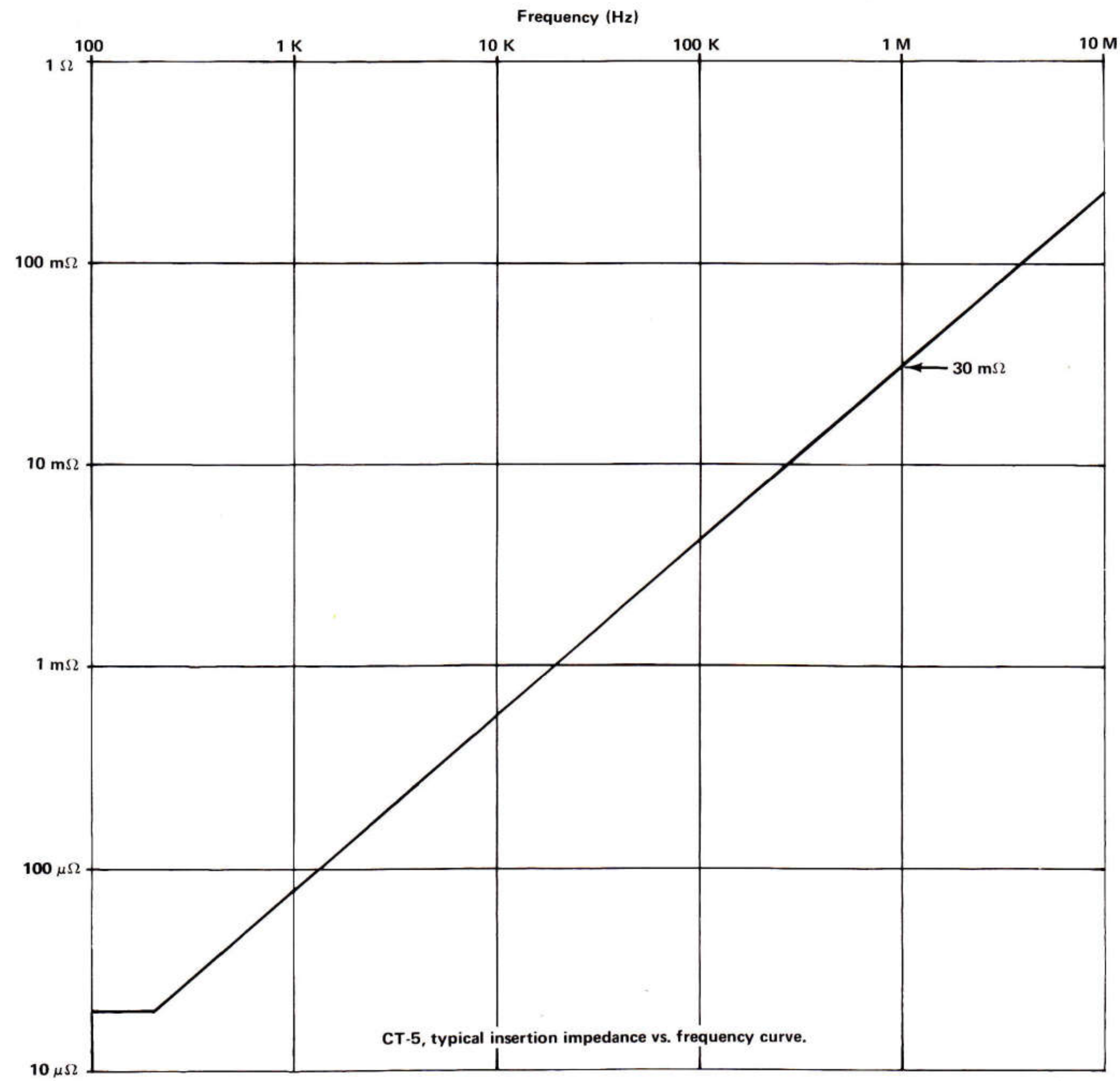



**Fig. 2-6. CT-5, typical insertion impedance vs. frequency curve.**

the CT-5 transformer core. Normally, distortions due to core saturation occur when attempting to observe and/or measure AC signal currents in the presence of DC currents exceeding approximately 20 amperes. The DC Bucking Coil can negate saturating effects of DC currents up to 300 amperes, extending the maximum DC current tolerance of the CT-5 to 320 amperes.

The bucking coil assembly includes a 1000-turn coil which slides over the stationary core section of the CT-5, and a base unit which contains current-limiting resistors and a compensation network. An external DC power supply is required, with a variable output of 0 to 15 V, capable of supplying output current to 300 mA. The DC Bucking Coil requires 1 volt per 20 amperes bucking current, presenting a 50-ohm load to the power supply.

Only the 1000:1 Current Ratio receptacle should be used when using the DC Bucking Coil. When the bucking coil is mounted on the CT-5, a sample of the AC signal current is internally coupled back to the 1000:1 loop, compensating for objectional aberrations which would otherwise be present. See the rear of this manual for circuit diagrams.

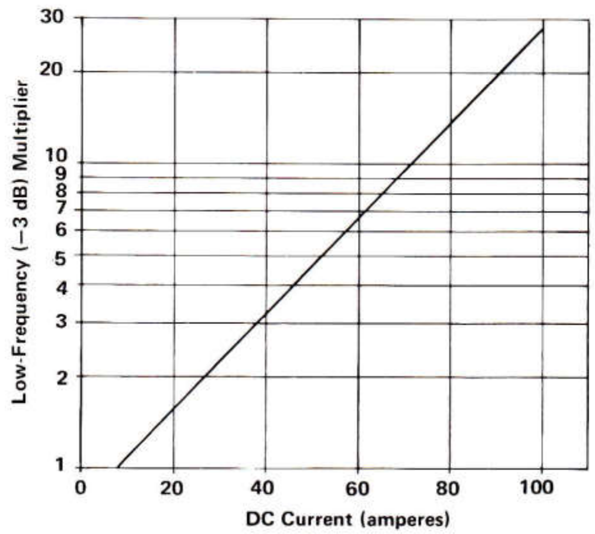



**Fig. 2-7. Movement of low-frequency response (−3 dB) with DC current present in the test conductor. For example, the low-frequency response has moved up by a factor of 10 with 72 amperes of DC current.**

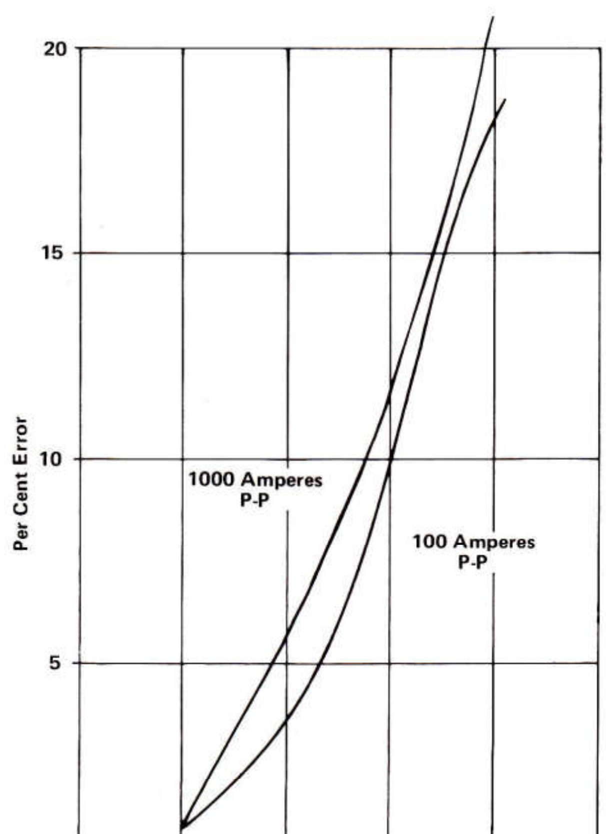
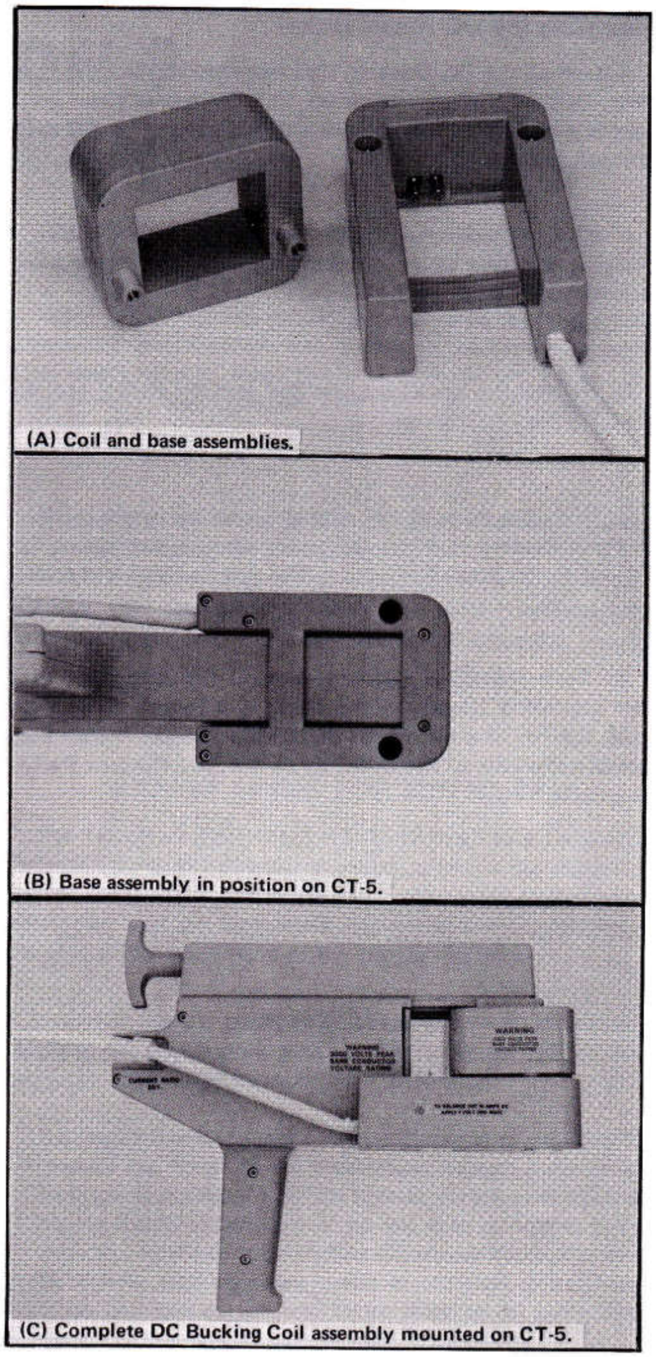



**Fig. 2-8. CT-5, typical error introduced vs. DC current in test conductor.**



(A) Coil and base assemblies.

(B) Base assembly in position on CT-5.

(C) Complete DC Bucking Coil assembly mounted on CT-5.

**Fig. 2-9. DC Bucking Coil assembly.**

## Adjusting for Optimum DC Bucking Current

When measuring sinusoidal signals, optimum DC bucking current is determined by adjusting the bucking current for maximum amplitude of the sine wave display. For low-frequency flat-topped pulses, the bucking current should be set for minimum tilt of the pulse.

## Mounting the DC Bucking Coil

Attaching the DC Bucking Coil assembly to the CT-5 is a very simple process, requiring only a screwdriver and approximately two minutes. To attach, refer to Fig. 2-9 and proceed as follows:

a. Slide the base over the lower front of the CT-5 core, engaging the two plugs on the base with the connector sockets on the front of the CT-5.

b. Release the Locking Lever and pull the sliding jaw of the CT-5 back to the stop.

c. Slide the bucking coil over the stationary core section so the mounting studs on the coil mate with the mounting screws on the base. Push the sliding jaw forward and lock.

d. Turn the CT-5 upside-down and firmly tighten the two mounting screws in the base. If a torque wrench is used, tighten to a maximum of 15 inch-pounds. Attach the power cable clip to the outer lip of the 20:1 Current Ratio receptacle.

*NOTE*

*The power cable clip serves the dual functions of supporting the cable and preventing use of the 20:1 Current Ratio receptacle while using the DC Bucking Coil.*

## Measuring DC Currents

The CT-5 with the DC Bucking Coil can be used to determine an approximation of the DC current in a test conductor. To perform this measurement, proceed as follows:

1. Connect the CT-5 to a current loop which is driven by a low-frequency square wave generator (10 to 15 Hz). The Tektronix Type 106 as used in Section 4 of this manual provides a good example. Note the amount of tilt in the square wave.

2. With the square wave current loop still connected in the CT-5, also connect the test conductor. Apply current to the DC Bucking Coil and increase until the square wave displays the same degree of tilt noted in Step 1. The DC current in the bucking coil may be metered directly at the power supply, or can be determined from the source voltage (20 amperes per volt). Accuracy of this method is greater at higher DC current levels.

# SECTION 3
# MAINTENANCE

### Introduction

The CT-5 is a very rugged device and should give many trouble-free hours of operation when used within the specified limits. However, if the CT-5 becomes damaged, replacement parts are available. Refer to the exploded view and parts list in the rear of this manual for Tektronix Part Numbers.

## PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, and lubrication of sliding surfaces. The environment in which the CT-5 is used will determine how frequently it should be cleaned and lubricated. For typical conditions, the unit should be serviced every 12 months or 2000 hours of use, whichever comes first.

### Disassembly

To clean and lubricate the CT-5, it must first be completely disassembled. To perform this operation, remove the DC Bucking Coil (if used). Referring to the exploded view in the rear of this manual, remove the 7 exterior and 4 interior screws, using 7/64 inch and 3/32 inch hex wrenches. To separate the stationary transformer subassembly from the left body half, the conductor held in the 1000:1 loop should be removed by uncrimping the loop. Disassemble the individual components as indicated in the exploded view.

### Cleaning Procedure

Use a soft bristle brush to dislodge the dust and wipe clean with a lint-free cloth. An alcohol-type cleaner may be used to remove persistent dirt. Avoid use of chloride cleaning agents, as they may craze or discolor the plastic. No abrasives should be used in areas containing printing.

### Lubrication

Areas requiring lubrication are indicated by the small diamond-shaped symbols and arrows on the exploded view. The recommended lubricant is Lubriplate A Type 105 (Tektronix Part Number 006-0617-00). This type is commonly available at your local hardware store.

Reassemble, again using the exploded view as a guide. Don't forget to replace the conductor in the 1000:1 loop and recrimp the loop. If a torque wrench is available, tighten all assembly screws to 15 inch-pounds (over-tightening may crack the plastic components).

## REPACKAGING FOR SHIPMENT

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

> Surround the instrument with polyethylene sheeting to protect the finish of the instrument. Obtain a carton of corrugated cardboard of the correct carton strength and having inside dimensions of no less than six inches more than the instrument dimensions. Cushion the instrument by tightly packing three inches of dunnage or urethane foam between carton and instrument, on all sides. Seal carton with shipping tape or industrial stapler.

The carton test strength for your instrument is 200 pounds.

# SECTION 4
# PERFORMANCE CHECK

## Introduction

Characteristics of the CT-5 are fixed, no calibration adjustments are needed. High-frequency response, current-handling capability, breakdown voltage, and other characteristics should remain unchanged with time or normal usage.

The only moving parts on the CT-5 are the sliding core segment and the locking lever. If foreign material, such as a small piece of insulation or wire clipping becomes lodged in the jaw area, or if the locking lever fails to work properly, the low-frequency response of the CT-5 will be adversely affected. Since either of these conditions could occur without being obvious, it is recommended that the low-frequency response be checked occasionally.

## PROCEDURE For Checking Low-Frequency Response

The following procedure describes a method of checking the low-frequency performance of the CT-5, using a minimum of test equipment. All test equipment is assumed to be correctly calibrated and operating within the given specifications. If equipment is substituted, it must meet or exceed the specifications of the recommended equipment.

## Test Equipment

1. Test oscilloscope. DC coupled; calibrated deflection factor, 50 mV/div; calibrated sweep rate, 10 ms/div; linear vertical viewing scan, 6 major divisions. A Tektronix 7503 Oscilloscope with a 7A15 Amplifier plug-in and a 7B50 Time Base plug-in was used in this procedure.

2. Square wave generator. Output current capability, 240 mA, variable; repetition rate, 10 Hz to 100 Hz, continuously variable. A Tektronix Type 106 Square Wave Generator was used in this procedure.

3. DC current probe, Sensitivity, 1 mA/div to 1 A/div in 10 calibrated steps. The Tektronix P6042 DC Current Probe is required.

4. Adapter. GR-to-BNC male. Tektronix Part No. 017-0064-00.

5. Adapter. BNC female-to-Clip leads. Tektronix Part No. 013-0076-00.

## Procedure (CT-5 only)

(a) Connect the CT-5 and test equipment as shown in Fig. 4-1. Clip the alligator clips of the BNC female-to-Clip

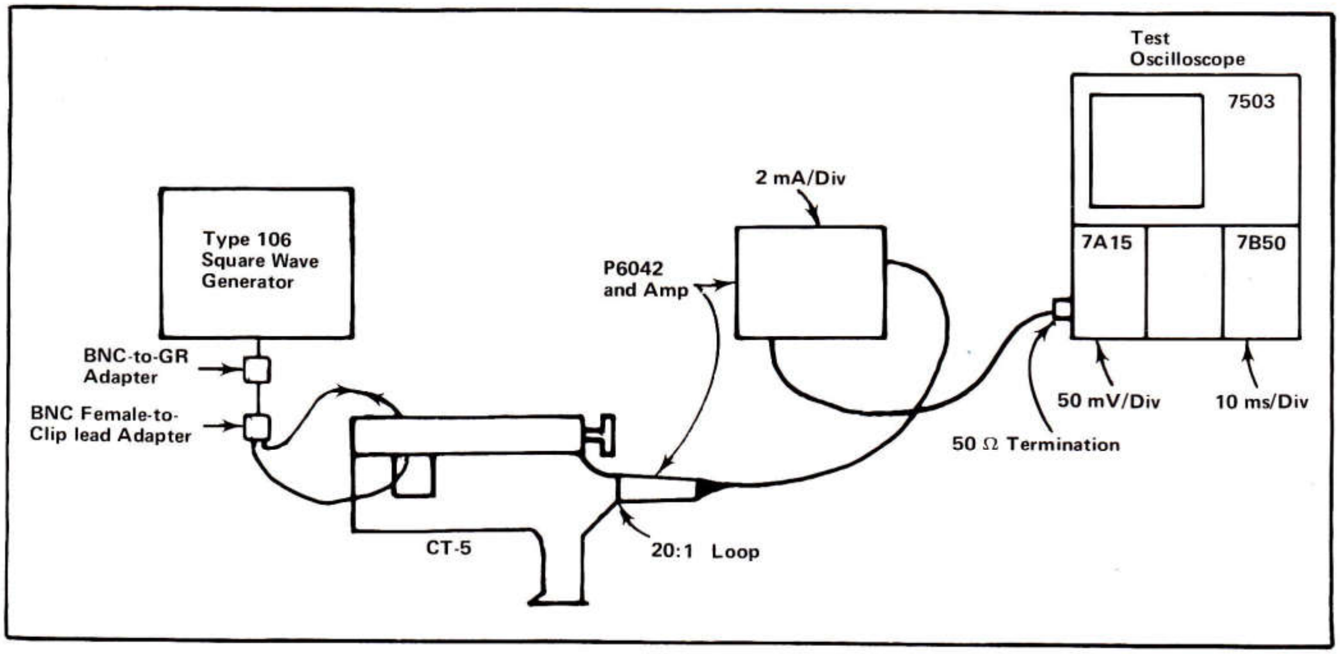



**Fig. 4-1. Equipment setup for checking low-frequency response.**



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lead Adapter together, forming a loop, and place the loop through the CT-5 core center.

(b) On the test oscilloscope, set the Time/Div to 10 ms, the Volts/Div to 50 mV, and the input coupling to DC.

(c) Set the Current/Div on the P6042 amplifier to 2 mA. The P6042 should be clamped onto the 20:1 CURRENT RATIO loop of the CT-5.

(d) The BNC-to-GR Adapter should be connected to the Hi Amplitude Output on the Type 106. Set the Repetition Rate Range switch to 10 Hz and adjust the Amplitude control for 5 divisions of vertical deflection on the screen.

(e) Set the test oscilloscope triggering controls for a stable triggered display. The display should start with the rise of the positive half-cycle. Adjust the Type 106 Multiplier variable control so that one complete cycle of square wave occurs in 8 major divisions on the screen (80 ms).

(f) Position the display horizontally so that the positive half-cycle ends on the graticule centerline. Position the display vertically to place the start of the top of the square wave on the scale line 2 major divisions above the center line.

(g) Measure the tilt of the positive half-cycle. The tilt should be 0.7 division or less, indicating a low-frequency response of 0.5 Hz or lower. (See Fig. 4-2).

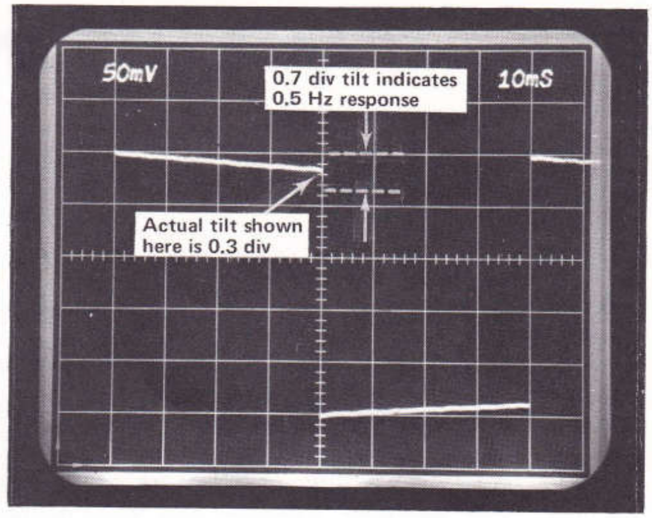



**Fig. 4-2. Typical response of the CT-5 with P6042 to a low-frequency square wave signal. A tilt of 0.7 div indicates a −3 dB response of 0.5 Hz.**

## Procedure (CT-5 with DC Bucking Coil)

Attach the DC Bucking Coil assembly to the CT-5. The bucking coil power leads should be connected to a DC power supply with the voltage set to 0 V, or the leads should be shorted together with a jumper.

The low-frequency response is checked in the same manner as for the CT-5 (previously described). The tilt should be 1.1 division or less, indicating a low-frequency response of 1 Hz or lower.

lead Adapter together, forming a loop, and place the loop through the CT-5 core center.

(b) On the test oscilloscope, set the Time/Div to 10 ms, the Volts/Div to 50 mV, and the input coupling to DC.

(c) Set the Current/Div on the P6042 amplifier to 2 mA. The P6042 should be clamped onto the 20:1 CURRENT RATIO loop of the CT-5.

(d) The BNC-to-GR Adapter should be connected to the Hi Amplitude Output on the Type 106. Set the Repetition Rate Range switch to 10 Hz and adjust the Amplitude control for 5 divisions of vertical deflection on the screen.

(e) Set the test oscilloscope triggering controls for a stable triggered display. The display should start with the rise of the positive half-cycle. Adjust the Type 106 Multiplier variable control so that one complete cycle of square wave occurs in 8 major divisions on the screen (80 ms).

(f) Position the display horizontally so that the positive half-cycle ends on the graticule centerline. Position the display vertically to place the start of the top of the square wave on the scale line 2 major divisions above the center line.

(g) Measure the tilt of the positive half-cycle. The tilt should be 0.7 division or less, indicating a low-frequency response of 0.5 Hz or lower. (See Fig. 4-2).

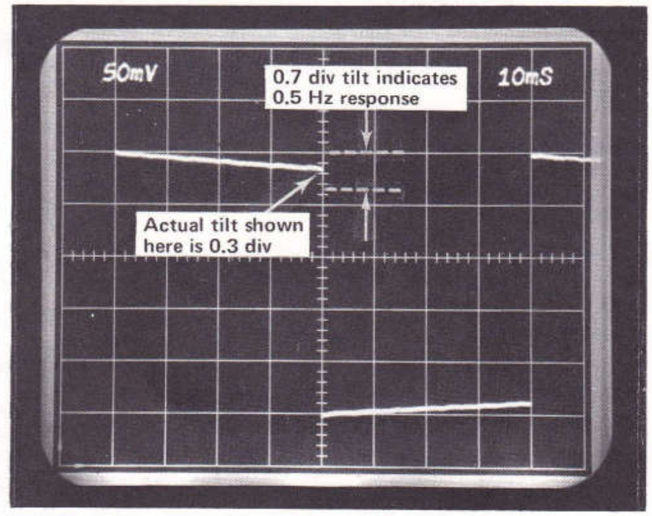



**Fig. 4-2. Typical response of the CT-5 with P6042 to a low-frequency square wave signal. A tilt of 0.7 div indicates a −3 dB response of 0.5 Hz.**

## Procedure (CT-5 with DC Bucking Coil)

Attach the DC Bucking Coil assembly to the CT-5. The bucking coil power leads should be connected to a DC power supply with the voltage set to 0 V, or the leads should be shorted together with a jumper.

The low-frequency response is checked in the same manner as for the CT-5 (previously described). The tilt should be 1.1 division or less, indicating a low-frequency response of 1 Hz or lower.

# SECTION 5

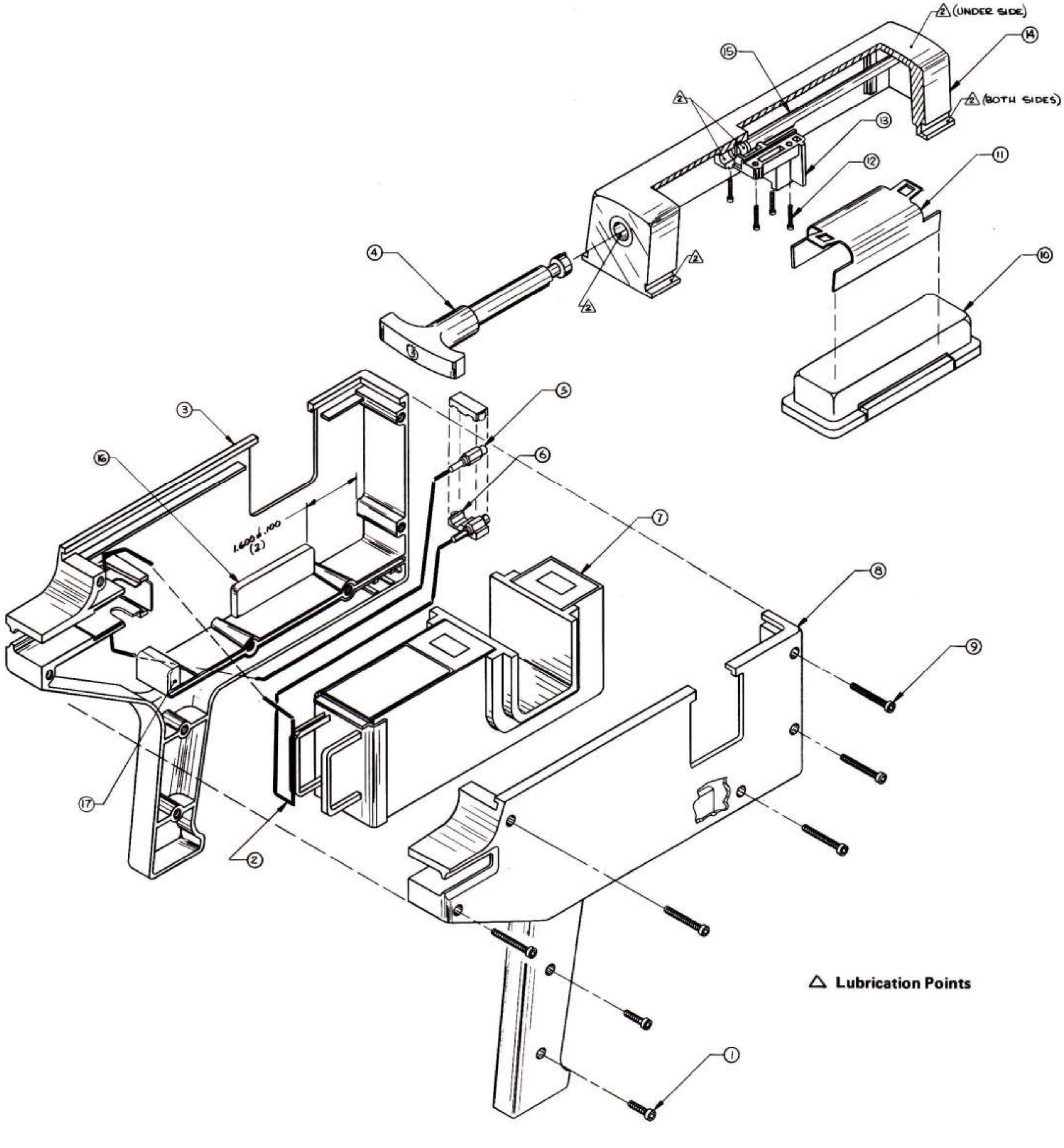
# PARTS LIST AND DIAGRAMS

## PARTS ORDERING INFORMATION

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, to include the following information in your order: Part number including any suffix, instrument type, serial number, and modification number if applicable.

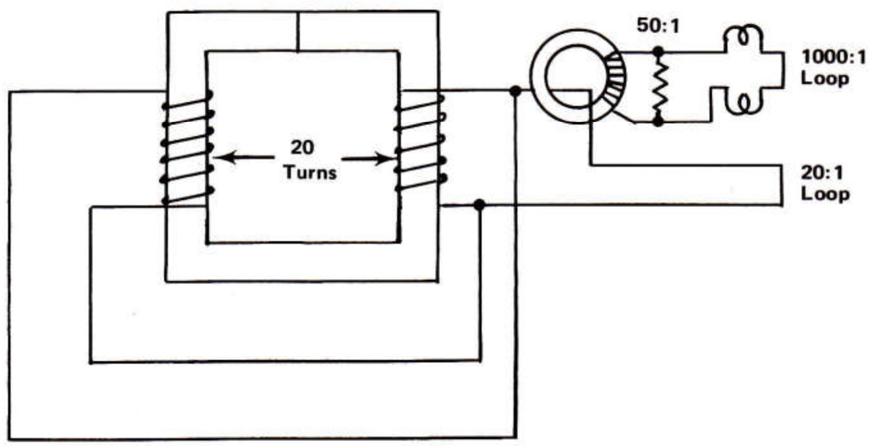
If a part you have ordered has been replaced with a new or improved part, your local Tektronix Field Office will contact you concerning any change in part number.



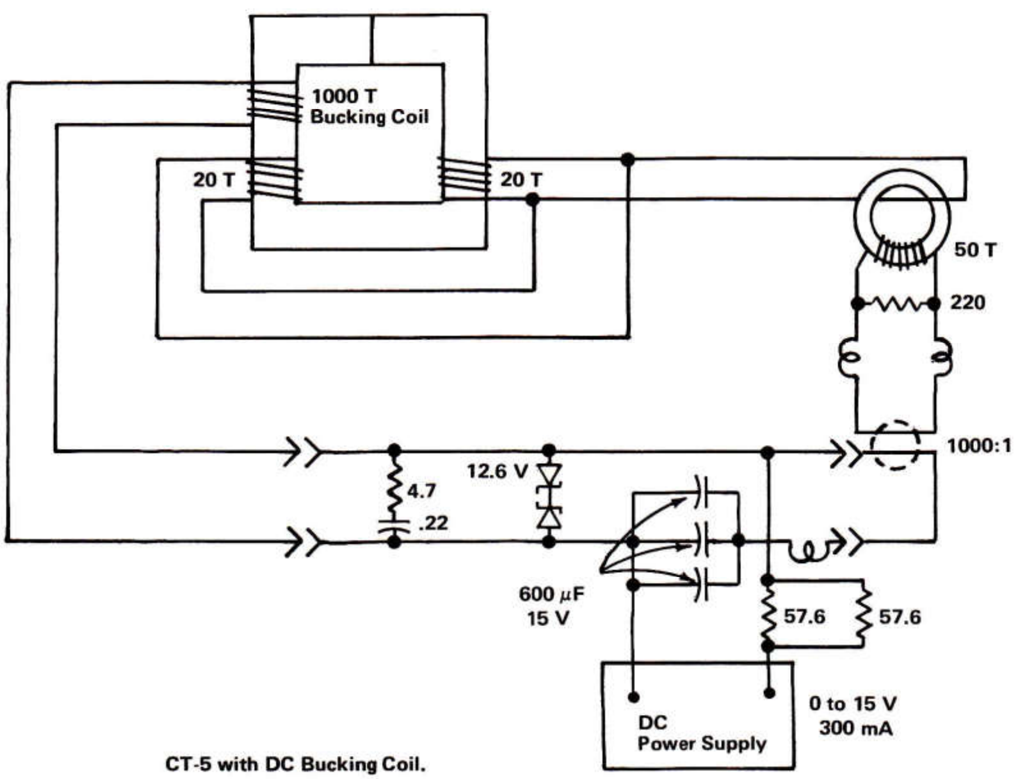

**CT-5 MECHANICAL PARTS**

# MECHANICAL PARTS LIST

| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff | Disc | Qty | 1 2 3 4 5 Description |
|---|---|---|---|---|---|
| | | | | | **CT-5 REPLACEMENT PARTS** |
| | 015-0189-00 | | | 1 | TRANSFORMER, HIGH CURRENT, CT-5 |
| | - - - - - - - - - - | | | - | transformer includes: |
| 1 | 211-0627-00 | | | 2 | SCREW, 6-32 x 0.50 inch, SHS |
| 2 | 175-0602-00 | | | ft | WIRE, 24 AWG, 19 inches long |
| 3 | 204-0449-01 | | | 1 | BODY HALF, left side |
| 4 | 367-0137-00 | | | 1 | HANDLE, release |
| 5 | 131-1014-00 | | | 2 | CONTACT, electrical, 1.06 inches long |
| 6 | 343-0319-00 | | | 2 | RETAINER, contact |
| 7 | 120-0733-00 | | | 1 | TRANSFORMER SUBASSEMBLY, stationary half |
| 8 | 204-0448-01 | | | 1 | BODY HALF, right side |
| 9 | 211-0592-00 | | | 5 | SCREW, 6-32 x 1.00 inch, SHS |
| 10 | 120-0732-00 | | | 1 | TRANSFORMER SUBASSEMBLY, upper half |
| 11 | 214-1500-00 | | | 1 | SPRING, transformer locating |
| 12 | 211-0183-00 | | | 4 | SCREW, 4-40 x 0.50 inch, SHS |
| 13 | 343-0300-00 | | | 1 | RETAINER, handle |
| 14 | 351-0277-00 | | | 1 | SLIDE, current transformer |
| 15 | 384-0791-00 | | | 1 | SHAFT, release, handle |
| 16 | 348-0070-01 | | | 2 | CUSHION, sponge |
| 17 | 348-0090-01 | | | 1 | CUSHION, sponge |
| | | | | | **STANDARD ACCESSORIES** |
| | 015-0194-00 | | | 1 | HV INSULATION |
| | 016-0191-00 | | | 1 | CARRYING CASE |
| | 070-1130-00 | | | 1 | MANUAL, instruction |
| | | | | | **CARRYING CASE REPLACEMENT PARTS** |
| | 016-0191-00 | | | 1 | CARRYING CASE, CT-5 |
| | - - - - - - - - - - | | | - | carrying case includes: |
| 1 | 334-1818-00 | | | 1 | PLATE, identification |
| 2 | 213-0120-00 | | | 2 | SCREW, thread forming, 2-32 x 0.25 inch, PHS |
| 3 | 200-1257-00 | | | 1 | LID, carrying case |




CT-5 High-Current Transformer




Clip-On Current Probe Can Measure Signal Current or Signal Plus Bucking Current

CT-5 with DC Bucking Coil.