

571
CURVE TRACER

OPERATORS MANUAL

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

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Serial Number

4700-477

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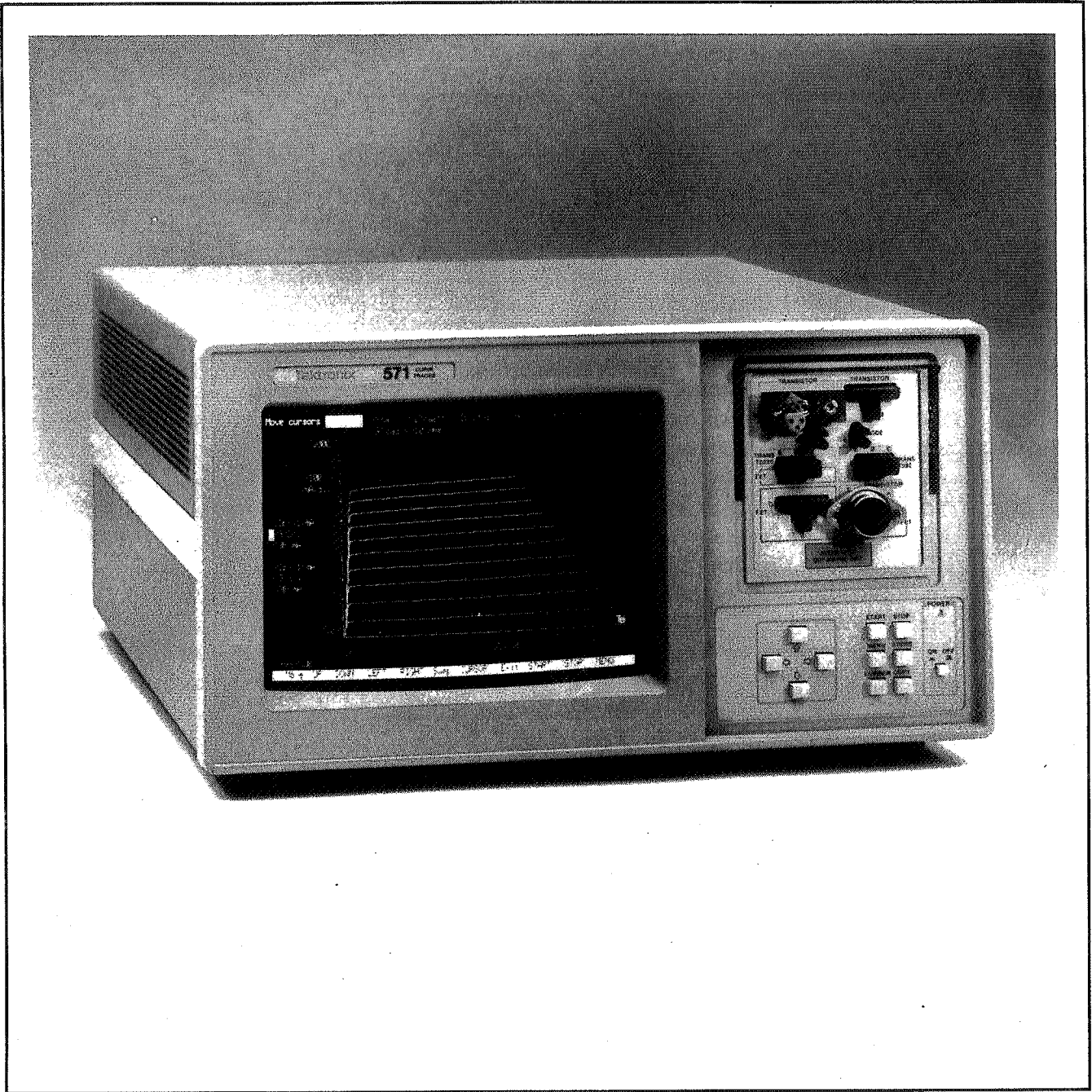
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The TEKTRONIX 571 CURVE TRACER

Operators Safety Summary

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply and do not appear in this summary.

TERMS

In this manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

As marked on equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property including the instrument itself.

DANGER indicates a personal injury hazard immediately as one reads the markings.

SYMBOLS

In this manual



This symbol indicates where applicable cautionary or other information is to be found.



This symbol indicates static sensitive devices, that are subject to be damaged by static electricity.

As marked on equipment



DANGER - High voltage



Protective ground (earth) terminal.



ATTENTION - Refer to manual.

Operators Safety Summary (cont.)

POWER CONDITIONS

Use the proper power Cord.

Use only the power cord and connector as specified for the instrument.

Power source

Use the proper power source. Before switching on, make sure the instrument is set to the voltage of the power source. This product is intended to operate from a power source that will not apply more than 250 Volts RMS between the supply connectors or between either supply connector and ground. A protective ground connection by way of the grounding connector in the power cord is essential for safe operation.

Grounding the product

This product is grounded through the grounding connector of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before making any connections to the product input or output terminals. A protective ground connection by way of the ground connection is essential for safe operation.

Danger arising from loss of ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulated) can render an electrical shock.

Use the proper fuse

To avoid fire hazard, use only the fuse specified for the instrument in the instrument part list. A replacement fuse must meet the type, voltage rating, and current rating specifications for the fuse that it replaces.

GENERAL WARNINGS

Do not operate in explosive atmospheres

To avoid explosions, do not operate this instrument in an atmosphere of explosive gasses.

Do not remove covers or panels

To avoid personal injury, the instrument covers or panels should only be removed by qualified service personnel. Do not operate the instrument without covers and panels properly installed.

Heating of the DUT

Testing at high power settings can cause the device under test (DUT) to get hot enough to cause injury. Avoid touching the DUT until cooled.

GENERAL INFORMATION

INTRODUCTION

The 571 CurveTracer is a semiconductor tester with a set of attractive specifications.

It is a menu-driven, digital, microprocessor controlled instrument, designed to easily make DC-measurements on several types of semiconductors.

The 571 has the capability of testing the following types of semiconductors:

- Bipolar Transistors NPN and PNP
- Diodes
- F.E.T.'s
- Thyristors and Triac's

Product Description

The 571 consists of one unit. At the front panel there are :

- 1 9" C.R.T. screen monochrome green
- 10 Keys
- 7 Array test sockets with a protection cover
- 1 L.E.D. for power on indication
- 1 Power on switch

The C.R.T. is used for the presentation of the menu's and the test results.

The 10 keys are used for selecting the desired function and parameters from the menu.

The functions of the keys are:

UP START CURSOR STORE MENU COPY
DOWN STOP
LEFT
RIGHT

in section 2 of this manual, the functions of the keys are explained in detail.

The device under test (DUT) is placed in the test socket during acquisition.

At test voltages that exceed 20 Volts, the protection cover must be in the closed position.

At the rear panel there are :

- 1 Power inlet with EMI filter / Fuseholder / Line Selector Switch.
- 1 Norm/Test switch
- 1 Printer output for an IBM® / EPSON® (compatible) printer.
- 1 Intensity Control

Functional Description

The 571 Curve Tracer consists of the following functional modules:

1. Vce power supply (stimulus for DUT)
2. Compensation amplifier/A.D. Converter
3. Basedrive/Gatedrive (stimulus for DUT)
4. DUT test socket's and keypad
5. Micro controller
6. Video controller
7. Power supply
8. Video monitor

The units 2, 3, 5, 6 and 7 are located on the mainboard. Unit 4 is located at the frontpanel.

Unit 1 is located on a separate board (electrical floating).

Unit 8 is a complete monitor.

Features

The 571 Curve Tracer offers a number of features, such as :

1. Acquisition of:
 - NPN and PNP transistors.
 - Diodes
 - JFET`s, MOSFET`s, both N-channel and P-channel.
 - Thyristors (and Triacs)
2. A Store mode that is capable of :
 - Storing 1 picture of a tested device in the volatile memorl. (RAM)
3. An EEROM utility that is capable of :
 - Storing 12 different menu setup`s in the non-volatile memory. (EEROM)
4. The intensity can be set by the intensity control on the rear panel.
5. A print-out of the screen can be made by connecting the Centronics parallel output at the rear to an IBM® / EPSON ® (compatible) printer.
6. A cursor mode, where two cursors can be moved along the displayed curves.
The x and y value of the cursor will be displayed on the left side of the screen.
This feature gives you the possibility of making accurate measurements (within 2.5%) in a set of displayed curves.
7. The possibility of making a verification test.
Diagnostic firmware is available in the standard ROM.
The function NORM or TEST is selectable by a switch on the rear panel.

POWER REQUIREMENTS

The instrument can be operated from an external power source of 100 VAC, 120 VAC, 220 VAC or 240 VAC.

The requirements for the power source are as follows:

Nominal Voltage	High Line Voltage	Low Line Voltage	Fuse 250 V type Slow Blow
100 V	110V	95 V	1 A
120 V	130 V	110 V	1 A
220 V	230 V	200 V	0.5 A
240 V	250 V	230 V	0.5 A

- Line frequency : 50 to 60 Hz \pm 5%.
- Power input insulation : 1500 V RMS at 50 Hz for 3 seconds minimum duration.
- Power input ground continuity : Less than 0.1 Ω between safety ground and instrument.

Changing the Line Voltage

The procedure to change the line voltage is as follows:

- Remove the power cord.
- Open the cover of the lineselector.
- Pull-out the actuator.
- Reinstall the actuator in the desired position.
- Pull-out the fuseholde.
- Install a correct rated fuse. (See Table 1-1)
- Reinstall the fuseholder.
- Close the cover. The desired line voltage is readable now on the voltage selector.
- Reinstall the power cord.

ACCESSORIES and OPTIONS

Standard Accessories include :

- 1 Operators Manual 070-7723-00
- 1 Test Socket Board 671-1577-00

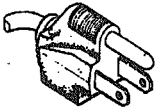
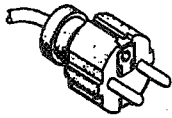

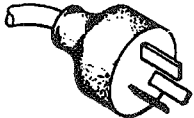
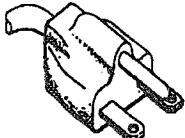
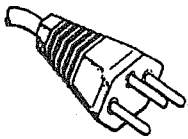
Optional Accessories include :

- Service Manual 070-7722-00
- Printer Cable 012-0555-00

Available power cord options :

- Option A 1 (see Table 1-1)
- Option A 2 (see Table 1-1)
- Option A 3 (see Table 1-1)
- Option A 4 (see Table 1-1)
- Option A 5 (see Table 1-1)

Table 1-1.
Voltage, Fuse, and Power-Cord Data

Plug Configuration	Category	Power Cord and Type	Line Voltage Selector Setting	Voltage Rating (AC)	Factory installed Instrument Fuse
	U.S. Domestic Standard	US 120 V 15 A	120 V	110 V to 130 V	1 A, 250 V Slow Blow
	Option A1	EURO 240 V 10-16 A	220 V	200 V to 230 V	0.5 A 250 V Slow Blow
	Option A2	UK 240 V 6 A	220 V	200 V to 230 V	0.5 A 250 V Slow Blow
	Option A3	Australian 240 V 10 A	220 V	200 V to 230 V	0.5 A 250 V Slow Blow
	Option A4	North American 240 V 15 A	240 V	230 V to 250 V	0.5 A 250 V Slow Blow
	Option A5	Switzerland 220 V 6 A	220 V	200 V to 230 V	0.5 A 250 V Slow Blow

PERFORMANCE CONDITIONS

The characteristics in Table 1-2 and Table 1-3 are valid under the following conditions:

- The instrument must have been calibrated at an ambient temperature between +22 °C and +24 °C.
- The instrument must be in a non-condensing environment whose limits are described under Environmental.
- Allow 30 minutes warm-up time for operation to the specified accuracy, and two hours after exposure to or storage in high humidity (condensing) environment.
- Specifications are valid only with those connections to the instrument that are required to verify each specification.

Items listed in the Performance Requirement Column of the following tables (Table 1-2 and Table 1-3) are verified by completing the Performance Check in the Service Manual.

Items listed in the Supplemental Information column may not be verified in the manual; they are explanatory.

ELECTRICAL CHARACTERISTICS

**Table 1 - 2
Electrical Characteristics**

Characteristics	Performance Requirements				Supplemental Information
Power transformer primary					
Nominal	100 V	120 V	220 V	240 V	
High line	110 V	130 V	230 V	250 V	
Low line	95 V	110 V	200 V	230 V	
Fuse	1 A slow blow	1 A slow blow	0.5 A slow blow	0.5 A slow blow	
Maximum power consumption	240 VA				
Line frequency	50 to 60 Hz, $\pm 5\%$.				
Power input insulation	1500 V RMS, at 50Hz for 3 seconds minimum duration.				
Power input ground continuity	$\leq 0.1 \Omega$ between safety ground and instrument.				

**Table 1 - 2
(cont.)**

Characteristics	Performance Requirements	Supplemental Information
Vce Supply		
Voltage Range	0.5 Volt - 100 Volt both positive and negative	Selectable in 8 ranges (1-2-5 sequence).
Resolution	1/250 of the selected end value.	
Accuracy	Better than 2% over the entire range.	Temp. range 18°C to 28°C
Max. current	2 A in the 0.5V through 50V ranges. 1 A in the 100V range.	
Load resistor	Selectable at : 0.25 Ω \pm 6%, 10 Ω \pm 1%, 100 Ω \pm 1% 1 k Ω \pm 1% 10 k Ω \pm 1%	Maximum power dissipation in D.U.T. can be programmed independent of the selected load resistor.
Vce Display		
Accuracy	\pm (2.5 % of FS + 30 mV) In 2A scale of I _c \pm (2.5 % of FS + 15 mV) In 1A scale of I _c \pm (2.5 % of FS + 7.5 mV) In .5A scale of I _c \pm (2.5 % of FS) In all other scales of I _c	Temp. range 18°C to 28°C Temp. range 18°C to 28°C Temp. range 18°C to 28°C Temp. range 18°C to 28°C
Basedrive (I_b)		
Step Generator	0.5 μ A / step - 20 mA / step (20 mA/step excluded in the 100 V range)	Source and sink, selectable in 15 ranges. (1-2-5 sequence)
Number of steps	1 to 10	Selectable
Resolution	1/100 of the selected end value.	
Accuracy	\pm 2% over entire range.	Temp. range 18°C to 28°C

Table 1 - 2
(cont.)

Characteristics	Performance Requirements						Supplemental Information
Gate drive (Vg)							
Step Generator	0.1V/step - 1 V/step positive and negative.						Selectable in 4 ranges. (1-2-5 sequence)
Offset		Vg/Step	0.1V	0.2V	0.5V	1V	
	P-FET	Offset min. max.	-3.75V +2.5V	-7.5V +5V	-5V +10V	-5V +10V	
	N-FET	Offset min. max.	-2.5V +3.75V	-5V +7.5V	-10V +5V	-10V +5V	
Offset Increment	25 mV, 50 mV, 100 mV						Depends on Vg/step
Output Resistance							50 Ω
Output accuracy	2% over the entire range						Temp. range 18°C to 28°C
Ic measure (Ic)							
Sensitivity	5 μA - 200 mA per division						Selectable in 15 ranges (1-2-5 sequence)
Resolution	8 bits.						
Accuracy	Better than 2% over the entire range.						
Overcurrent Protection							150 % Of full scale
Power limits							Selectable from 0.1- 100 W in six ranges

Table 1 - 2
(cont.)

Characteristics	Performance Requirements	Supplemental Information
Cursors		
Total Accuracy	$\leq \pm 2.5\%$ of full scale	Temp. range 18°C to 28°C
Hfe accuracy	$\leq \pm 4\%$ at center of the scale	Temp. range 18°C to 28°C
Monitor		
Video Area		640 x 336 pixels
Line Rate		17.8 kHz
Frame Rate		50.6 Hz non interlaced.
Video Bandwidth		15 MHz
Miscellaneous		
Net Weight		19.8 Lbs (9 kg)
Size		14.6 in. (37 cm) Width 13.8 in. (35 cm) Depth 8.1 in. (20.5 cm) Height
Shipping Carton		
Gross Weight		25 Lbs (11 kg)
Dimensions		18.5 in. (47 cm) Width 17.7 in. (45 cm) Depth 14.2 in. (36 cm) Height

ENVIRONMENTAL CHARACTERISTICS

**Table 1 -3
Environmental Characteristics**

Characteristics	Performance Requirements	Supplemental Information
Temperature		
Non-Operating	- 55 °C to +75 °C	
Operating	0 °C to +50 °C	
Humidity		
Operating/Non Operating	90% to 95% relative humidity	For 5 days and derated above 25 °C
Altitude		
Operating	to 15,000 feet (4.5 Km)	
Non-operating	to 50,000 feet (15 Km)	
Vibration	.38 mm(0.015 inch) P-P at resonance , during 10 min. at 3 axis. 2G at 55 Hz	Freq. 5 -55 Hz Mil T28800 D class 5, or better.
Shock	30 G, Half sine,11 ms duration,18 shocks	Mil T28800 D class 5, or better.
Bench handling	45 degrees or 4 " drop, or equilibrium, whichever occurs first.	Mil T28800 D class 5, or better.
Packaged product vibration and shock	Excursion of 1 " (25.4 mm) p.p. at 4.63 Hz (1.1 G) for 30 min..	
Packaged drop	91 cm (3 ft), 10 Drops	

Table 1 -3
(cont.)

Characteristics	Performance Requirements	Supplemental Information
Electrostatic immunity	Will withstand a discharge through 1 K Ω resistor of a 500 pF capacitor charged to 10 KV or less.	Charge applied to each protruding area of the frontpanel, except the input test sockets.
Electromagnetic compatibility	VDE 0871 class "B" CISPR 22	
Product conformance to safety standards	IEC 348 Class 1 UL 1244 CSA C22.2 no. 231	