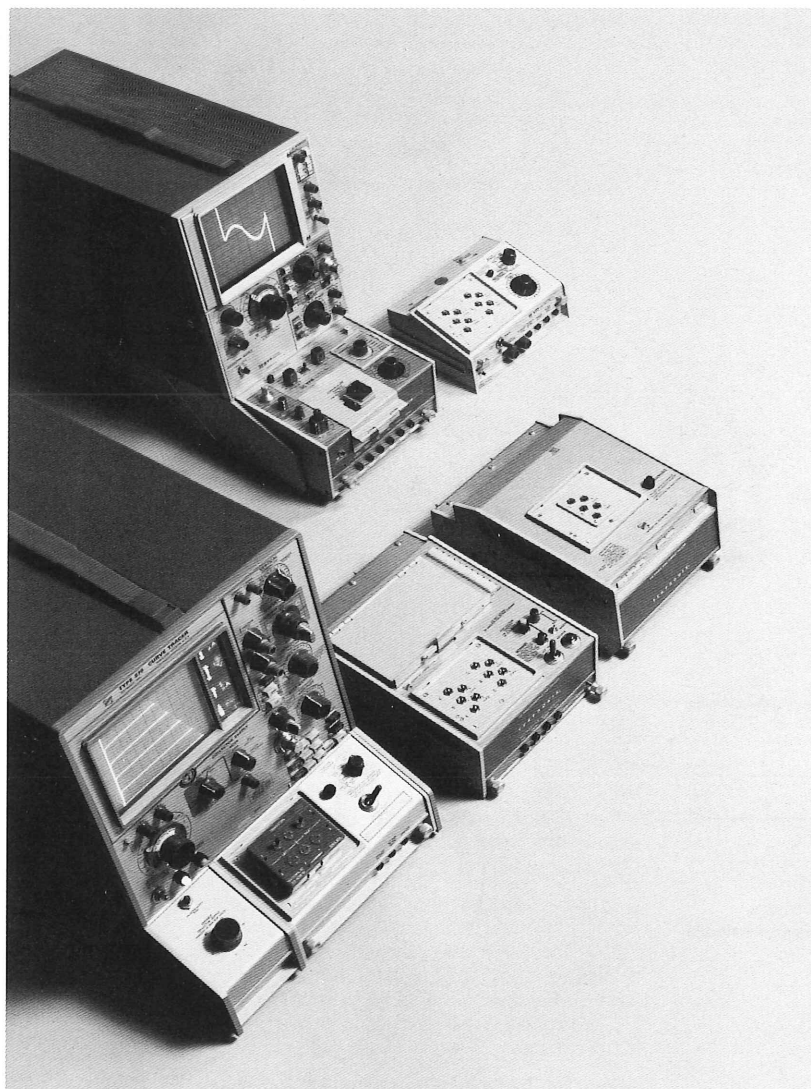


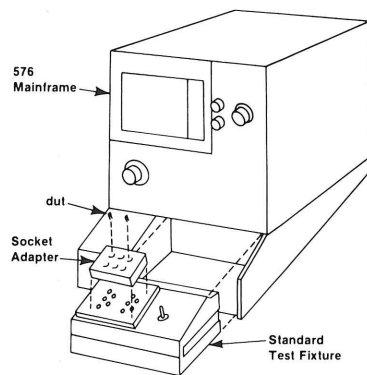
MAKING THE CORRECT SEMI-CONDUCTOR MEASUREMENTS TIME AFTER TIME.



TEK CURVE TRACER SYSTEM

Curve Tracers can deliver comprehensive information about a multitude of semiconductor devices and integrated circuits. . . from two- and three-terminal devices through the full range of linear integrated circuits. . . from transistors and diodes to optoisolators, thyristors, and operational amplifiers.

These versatile measurement tools give you more than pinpointed parameters. A curve tracer can show you what happens between specified points in a quickly graphed curve, thus providing the valuable performance data necessary for accurate design, analysis, and evaluation.



576

Tests Two- and Three- Terminal Discrete Semiconductors

Power Capability up to 220 W

Convenient Scale Factor Readout

Other Test Fixtures for Testing Power Devices and Semi-Automated Testing

The TEKTRONIX 576 Curve Tracer System continues to hold the title "standard of the industry." The 576 accepts three different test fixtures: the Standard Test Fixture, 172 Programmable Test Fixture (described on p 4) and the 176 Pulsed High-Current Fixture (described on p 5). The 576 is an excellent general purpose curve tracer system that performs well in applications where high current testing is required.

With the Standard Test Fixture, the collector supply of the 576 delivers up to 220 watts peak to the device under test. The step generator can deliver up to 2 A in both its current and voltage modes of operation. Of course, with the 176, the 576 is capable of pulsed collector operation up to 200 amps peak.

One of the features that sets the 576 apart from the 577 is the display area READ-OUT. Adjacent to the 576's CRT are alphanumeric indicators of vertical and horizontal deflection factors, step amplitude, and Beta/div or g_m /div. The Beta or g_m readout saves the operator from the arithmetic usually necessary to arrive at these parameters. The READ-OUT also provides a permanent record of major knob settings in 576 CRT photographs.

Another unique feature of the 576 is the Calibrated Display Offset. Combining a calibrated position control and a display magnifier, the Display Offset increases resolution and allows the operator to make more precise measurements.

Other features of the 576 Curve Tracer are: adjustable current limiting in the step generator, either 300 μ s or 80 μ s pulse width in pulsed base operation, pushbuttons to check display zero and calibration, and illuminated graticule.

CHARACTERISTICS

COLLECTOR SUPPLY

Modes — NORM: positive or negative full wave rectified ac (line frequency); dc: positive or negative dc; LEAKAGE: emitter current rather than collector current measurements with an increase in the basic vertical deflection factor to 1 nA/div.

Voltages — Peak open circuit voltages within +35% and -5% of indicated range.

Range	15 V	75 V	350 V	1500 V
Max Continuous Peak Current	10 A	2 A	0.5 A	0.1 A
Peak Pulse Mode Current	≥20 A	≥4 A	≥1 A	≥0.2 A

Series resistance is from 0.3 Ω to 6.5 MΩ in 12 steps, all within 5% or 0.1 Ω. Peak power limit setting: 0.1 W, 0.5 W, 2.2 W, 10 W, 50 W, 220 W.

Safety Interlock — Protects operator from 75 V, 350 V, and 1500 V collector voltages.

STEP GENERATOR

Current Mode — Step/offset amplitude range is 5 nA/mV/step (with X0.1 MULT) to 2 V/step, 1-2-5 sequence. Max current (steps and aiding offset) is X20 AMPLITUDE setting, except X10 (2 A) at 200 mA/step and X15 (1.5 A) at 100 mA/step. Max voltage (steps and aiding offset) is at least 10 V. Max opposing offset current is X10 AMPLITUDE switch setting or 10 mA, whichever is less. Max opposing voltage is limited at 1 V to 3 V.

Voltage Mode — Step/offset amplitude range is 5 mV/step (with X0.1 MULT) to 2 V/step, 1-2-5 sequence. Max voltage (steps and aiding offset) is X20 AMPLITUDE switch setting, 40 V max. Max current (steps and aiding offset) is at least 2 A at 10 V, derating linearly to 10 mA at 40 V. Short circuit current limiting is 20 mA, 100 mA, 500 mA +100%, -0%; 2 A +50%, -0%. Max opposing offset voltage; X10 AMPLITUDE switch setting. Max opposing current; limited at 5 mA to 20 mA.

Accuracy — Incremental; within 5%, between steps, within 10% with X1.0 MULT. Absolute; within 2% of total output including offset, or 1% of AMPLITUDE setting, whichever is greater. Offset multiplier; 0 to X10 the AMPLITUDE setting, continuously variable. Polarity AID(s) or OPPOSE(s) the step polarity.

Step Rates — X0.5, X1 (NORM), and X2 the collector supply rate. The collector supply rate is twice line frequency.

Pulsed Steps — ≈80 μs or 300 μs width, at NORM or X0.5 rates.

Step/Offset Polarity — The STEP GEN polarity is the same as the COLLECTOR SUPPLY polarity, and positive in the ac position. Step polarity may be inverted by actuating the INVERT pushbutton.

Step Family — REPETITIVE or SINGLE FAMILY (manually actuated).

Number of Steps — Digitally selectable between 1 and 10.

DEFLECTION CONTROLS

Display Accuracies — As a percentage of highest on-screen value.

NORM and DC MODES	NORM	OFFSET and MAGNIFIED with CENTERLINE VALUE from:		
		100-40 div	35-15 div	10-0 div
Vert Collector Current	3%	2%	3%	4%
Horiz Collector Volts	3%	2%	3%	4%
Horiz Base Volts	3%	2%	3%	4%
LEAKAGE MODE				
Vert Emitter Current/div:				
10 nA-2 mA/div	3% ± 1 nA			
1 nA-200 μA/div (magnified)		2% ± 1 nA	3% ± 1 nA	4% ± 1 nA
5, 2, 1 nA/div	5% ± 1 nA			
Horiz Collector or Base Volts with Emitter Current/div of:				
≥1 μA	3%	2%	3%	4%
100, 10, or 1 nA	3% plus 25 mV/vert div	NOT APPLICABLE		
200, 20, or 2 nA	3% plus 50 mV/vert div			
500, 50, or 5 nA	3% plus 125 mV/vert div			
VERT STEP GEN POSITION	4%	3%	4%	5%
HORIZ STEP GEN POSITION	4%	3%	4%	5%

Vertical Deflection Factor — Collector current is 1 μA/div to 2 A/div, 20 steps in 1-2-5 sequence (0.1 μA/div with X10 magnification). Emitter current is 1 nA/div to 2 mA/div, 20 steps in 1-2-5 sequence. Step generator is 1 step/div.

Horizontal Deflection Factor — Collector volts; 50 mV/div to 200 V/div 12 steps (5 mV/div with X10 magnification). Base volts; 50 mV/div to 2 V/div, 6 steps (5 mV/div with X10 magnification). Step generator; 1 step/div.

Displayed Noise — 1% or less or:

RANGE	15 V	75 V	350 V	1500 V
Vertical—Collector	1 μA	1 μA	2 μA	5 μA
Vertical—Emitter	1 nA	1 nA	2 nA	5 nA
Horizontal—Base	5 mV	5 mV	5 mV	5 mV
Horizontal—Collector	5 mV	5 mV	20 mV	200 mV

Calibrator (CAL) — Dc voltage (accurate within 1.5%) provided to check and adjust vertical and horizontal gain.

Position Controls — Fixed 5 div increments within 0.1 div. Continuous fine control over 5 div or less.

Display Offset — 21 calibrated positioning increments, vertically or horizontally, of 0.5 div or 5 div with X10 MAGNIFIER.

CRT and READOUT

CRT — 6.5 in rectangular with parallax-free, illuminated graticule in centimeters. The calibrated area is 10 cm vertical by 10 cm horizontal (12 cm usable horizontal). P31 Phosphor normally supplied.

Readout — The readouts, adjacent to CRT, are digital indicators of the following parameters: PER VERT DIV from 1 nA/div to 2 A/div; PER HORIZ DIV from 5 mV/div to 200 V/div; PER STEP from 5 nA/step to 2 A/step, 5 mA/step to 2 V/step; β (BETA) or g_m, PER DIV from 1 μ to 500 k calculated from CURRENT/DIV, X10 MAG, STEP AMPLITUDE, and X0.1 MULT.

STANDARD TEST FIXTURE

Description — A plug-in fixture with two sets of 5 pin test terminals, the EMITTER GROUNDED or BASE GROUNDED switch, LEFT-OFF-RIGHT switch, STEP GEN OUTPUT EXT BASE or EMITTER input and the OPERATOR PROTECTION BOX. The test terminals accept either the 6 pin universal adapters, 3 pin adapters, or the high-power transistor adapters with KELVIN contacts.

OTHER CHARACTERISTICS

Power Requirements — Power source; operates only with an unbalanced-to-ground power source. For safe operation, the power line neutral (white or "identified" conductor) must be connected to the instrument neutral (unfused), and the power plug safety ground (green conductor) must return to ground through a different path than the power line neutral. Voltage Ranges; the quick-change line-voltage range selector accommodates 90 V ac to 136 V ac or 180 V ac to 272 V ac (six positions), at 48 Hz to 66 Hz line frequency. Max power consumption is 305 W, stand by power is ≈60 W.

Ambient Temperature — Performance characteristics are valid over an ambient temperature range of +10°C to +40°C.

PHYSICAL CHARACTERISTICS

Dimensions	cm	in
Height	38.1	15.0
Width	29.2	11.5
Depth	58.4	23.0
Weights	kg	lb
Net	32.0	70.5
Shipping	≈48.5	≈107

INCLUDED ACCESSORIES

Transistor adapter (013-0098-02), FET adapter (013-0099-02), TO3 adapter (013-0100-01), TO66 adapter (013-0101-00), axial lead diode adapter (013-0111-00), stud diode adapter (013-0110-00), Kelvin sensors for large and small plastic transistors (013-0138-01), and protective cover (337-1194-00).

ORDERING INFORMATION

576 Curve Tracer with Standard Test Fixture

The 576 Option 01 deletes the parameter readout module but maintains provisions for insertion of the module (020-0031-00) at any time.

Option 01

Auto Scale-Factor Readout Module
020-0031-00

INTERNATIONAL POWER CORD AND PLUG OPTIONS

Option A1 Universal Euro 220 V/16A
Option A2 UK 240 V/13A
Option A3 Australian 240 V/10A
Option A4 North American 240 V/15A

OPTIONAL ACCESSORIES

Camera — See Oscilloscope/Camera Adapter chart in Camera section of this catalog.

Test Set-up Chart — Package of 250.

Order 070-0970-01

172 Test Fixture See page 4
176 Test Fixture See page 5
Socket Adapters See page 10

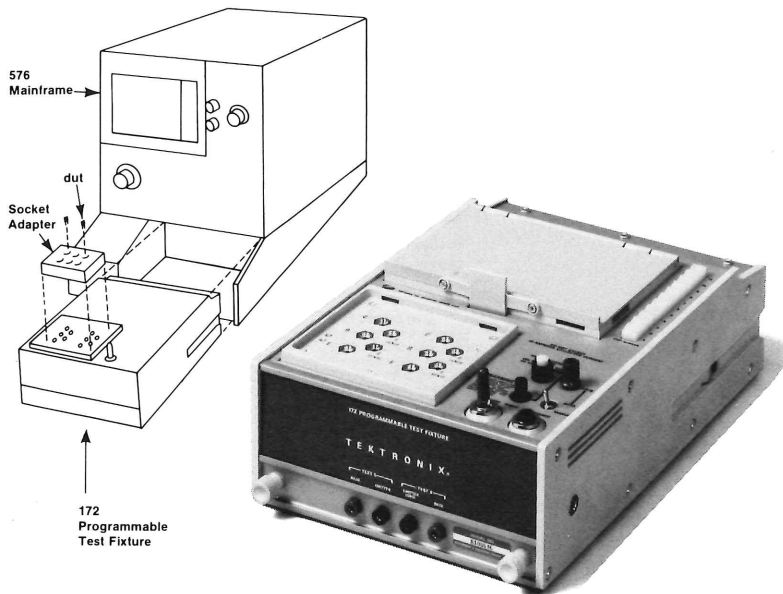
TEK CURVE TRACER PROGRAMMABLE TEST FIXTURE

172

Semi-Automated Test Fixture

Tests up to 11 Parameters

Reduces Total Test Time



The 172 Programmable Test Fixture, when used with the TEKTRONIX 576 Curve Tracer, permits the operator to program a sequence of tests of J FETs, transistors, and diodes.

The 172 can greatly reduce total test time in applications when more than one measurement is made on a batch of many devices. Without the 172 all devices in the batch must be repeatedly inserted in the test fixture, once for every measurement. However, the 172 Programmable Test Fixture performs as many as eleven different tests on each device.

The 172 sequences through the various tests either automatically or manually. A variable RATE control is provided to set the test sequence at a

rate which is best for the operator. New operators require more time per test, but with experience they will want to test at a faster rate. A front-panel switch or an optional foot switch advances the test in the manual mode.

CHARACTERISTICS

VERTICAL AND HORIZONTAL AMPLIFIERS

Display Accuracies — The same as the 576 Curve Tracer with its included Standard Test Fixture.

Vertical Deflection Factor — Tests 1 and 2 (Collector or Emitter Current): 1 μ A to 2 A/div in 20 steps. Tests 3, 4, and 8, 9, 10, 11 (Collector or Breakdown Current): 1 μ A to 0.5 A/div in 18 steps. Tests 5, 6, 7 (Leakage Current): 1 nA to 0.5 A/div in 27 steps. All steps are in a 1-2-5 sequence.

Horizontal Deflection Factor — Test 1: 0.05 V/div to 20 V/div in 12 steps. Test 2 (Base Voltage): 100 mV/div to 2 V/div in 5 steps. Input Z for Test 2, at least 100 MHz at 100 mV/div and 200 mV/div. 1 M Ω (within 2%) at 0.5 V/div, 1 V/div, and 2 V/div. Tests 3 and 4 (Collector Voltage): 100 mV/div to 2 V/div in 5 steps. Tests 5 through 11 (Breakdown or Leakage Voltage): 100 mV/div to 50 V/div in 9 steps. All steps are in a 1-2-5 sequence.

Collector Sweep Voltage — At least 2 V open circuit, or 1.5 A short circuit, at 100 mV/div and 200 mV/div. At least 5 V open circuit, or 2 A short circuit, at 500 mV/div. At least 20 V open circuit, or 150 mA short circuit, at 1 V/div and 2 V/div.

Current Supply Accuracy — 0.1 μ A to 11 mA, accurate within 2% \pm 30 nA with up to 500 V compliance. 10 mA to 110 mA, accurate within 2% \pm 30 nA with up to 50 V compliance. Increments of current are: 0.1 μ A (from 0.1 μ A to 11 μ A), 1 μ A (from 10 μ A to 110 μ A), 10 μ A (from 100 μ A to 1.1 mA), 100 μ A (from 1 mA to 11 mA) and 1 mA (from 10 mA to 110 mA).

Voltage Supply Accuracy — 1 V to 500 V, accurate within 3% \pm 300 mV with at least 0.5 mA compliance.

Test Display Time Range (Automatic) — 300 ms or less to at least 2 s continuously variable. Manual operation from a front-panel switch or optional foot switch.

OTHER CHARACTERISTICS

Ambient Temperature — Performance characteristics are valid over an ambient temperature range of +10°C to +40°C.

PHYSICAL CHARACTERISTICS

Dimensions	cm	in
Height w/cover	16.5	6.5
Width	19.8	7.8
Depth	31.5	12.4
Weights	kg	lb
Net	5.2	11.5
Shipping	≈8.2	≈18.0

Included Accessories — One protective cover, five programming cards, 250 programming card pins, five CRT overlay limit cards.

Order 172 Programmable Test Fixture

TESTS THAT CAN BE PERFORMED ON:

Test	Xstr	J FETs	Diodes	PROGRAMMABLE CAPABILITIES
*1	HFE, VCE(sat)	VP	VF	PEAK CURRENT up to 10 A PEAK VOLTS up to 350 V.
2	VBE			Horiz range is 100 mV/div to 2 V/div (other conditions same as Test 1).
3	HFE, VCE(sat)	IDSS, RDS(on)		Base Drive: 100 nA to 110 mA. When testing J FETs the base terminal is shorted to the emitter terminal. Collector Sweep: three fixed ranges; 2 V, 5 V, and 20 V peak. Short circuit currents on these ranges are 1.5 A, 2 A, and 150 mA, respectively.
4		Same as #3.		
5		ICBO or ICES, ICER with external short or resistor		Voltage Supply: 1 V to 500 V dc. Leakage current measurements to 0.5 mA. The most sensitive deflection factor is 1 nA/div.
6	ICBO	IGSS		Same as #5.
7	IEBO		IR	Same as #5.
8	V(BR)CEO or V(BR)CER with external resistor		VF	Current Supply: 100 nA to 11 mA dc for breakdown voltage measurements to 500 V. Up to 100 mA dc for breakdown voltage measurements to 50 V.
9	V(BR)CES			Same as #8.
10	V(BR)CBO	BVGSS		Same as #8.
11	V(BR)EBO		VR	Same as #8.

*All of the test conditions for Test 1 are controlled by the 576 front-panel controls. Test 2 has the same conditions as for Test 1 except the horizontal amplifier is connected to the emitter-base terminals, and the horizontal deflection factor is controlled by the programming card.

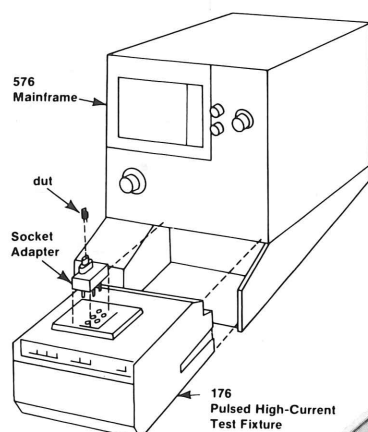
For the remaining tests the only 576 controls that are functional are the Polarity and CRT controls such as INTENSITY, FOCUS, DISPLAY OFFSET.

176

Tests Power Transistors

Tests up to 200 Amps in Pulsed Mode

1000 Watt Capability



The 176 Pulsed High-Current Fixture provides the 576 Curve Tracer with pulsed collector operation to 200 amps peak and pulsed base steps to 20 amps peak. The step offset, when selected, is also pulsed. The pulsed operating mode allows many tests previously considered impossible. For example, small signal transistors can be tested under pulsed collector breakdown conditions without overdissipation. The 176 Test Fixture fits in place of the 576 Standard Test Fixture. The collector pulse is slaved to the 576 in regard to width and repetition rate.

The pulse width is selected by depressing the 300 μ s or 80 μ s pushbutton on the 576 Mainframe (usually, 300 μ s should be selected). The rep rate is automatically set when the 176 is inserted in the mainframe. Rep rate is also dependent on power-line frequency. The five highest VERTICAL CURRENT/DIV (0.1 A/div to 2 A/div) of the 576 can be multiplied X10 by actuation of the X10 VERT pushbutton on the 176. This feature enables viewing of up to a 200 amp peak display. The five highest STEP GENERATOR AMPLITUDE base current steps of the 576 (10 mA to 200 mA) can be multiplied X10 by actuation of the X10 STEP pushbutton on the 176. This feature enables the pulsed base step generator on the 176 to provide up to a 20 amp base step (tenth step). Both X10 VERT and X10 STEP pushbuttons provide inputs to the fiberoptic readout to display actual values.

CHARACTERISTICS

COLLECTOR SUPPLY (PULSED)

Width — 300 μ s or 80 μ s determined by 576.

Repetition Rate — Power-line frequency.

Polarity — + or — determined by 576 polarity control.

Amplitude — Ranges are 15, 75, 350 V nominal, controlled by MAX PEAK VOLTS switch on 576. Current (minimum available at low line into shorted load) is 15 V range, 200 A; 75 V range, 40 A; 350 V range, 8 A.

Max Peak Watts — Three illuminated pushbuttons select 10, 100, 1000 W max peak power.

STEP GENERATOR

Current Ranges (X10 STEP selected) — Step-Offset Amplitude Range is 100 mA to 2 A, 5 steps in a 1-2-5 sequence. Max Current (Steps and Aiding Offset) is X200 576 AMPLITUDE setting or 20 A, whichever is less. Max Voltage (Steps and Aiding Offset) is at least 5 V up to 10 A and 2 V up to 20 A.

576 Offset Multiplier — 0 to X100 576 AMPLITUDE switch setting.

Step Rate — Power-line frequency.

Pulsed Steps — 300 μ s or 80 μ s wide.

Step/Offset Polarity — The STEP GEN polarity is the same as the COLLECTOR SUPPLY polarity. Step polarity may be inverted by actuating the INVERT pushbutton.

Accuracy (Current steps including offset) — Incremental is within 5% between any two steps; within 10% with X0.1 STEP MULT. Absolute is within 3% of total output \pm 1% of one step or within 3% of one step, whichever is greater.

VERTICAL AMPLIFIER

Deflection Factor (X10 VERT selected) — 1 A/div to 20 A/div, 5 steps in a 1-2-5 sequence.

OTHER CHARACTERISTICS

Ambient Temperature — Performance characteristics are valid over a temperature range of 0°C to +40°C.

PHYSICAL CHARACTERISTICS

Dimensions	cm	in
Height	11.7	4.6
Width	20.1	7.9
Depth	29.0	11.4
Weights	kg	lb
Net	5.8	12.8
Shipping	8.2	18.0

Included Accessories — TO36 adapter (013-0112-00); stud diode adapter (013-0110-00); protective shield (337-1194-00).

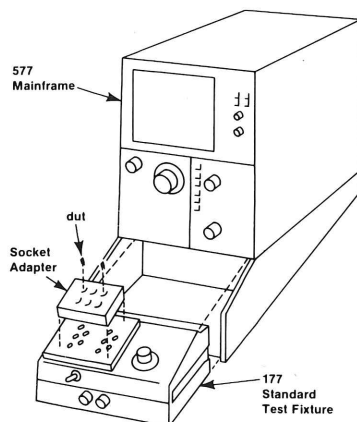
Order 176 Pulsed High-Current Fixture

577

Test Two- and Three- Terminal Discrete Semiconductors

Storage Capability

Power Capability up to 100 Watts



The 577 Curve Tracer System, when used with the 177 Standard Test Fixture, is a smaller and lighter configuration that retains many of the important features and performance of the 576. The 577 also accepts the 178 Linear IC Test Fixture. The major features that separate the 577 from the 576 are storage and the emphasis on low current measurements.

The 577's storage CRT may be used to overlay the characteristic curves of one device on top of the stored characteristics of another. Dot displays (generated during high current pulsed testing or during very low current testing under dc conditions) can be transformed into complete characteristic curves by simply moving them across the CRT while in the storage mode. A good example of a dot display occurs in op amp testing because the open-loop 3 dB bandwidth of many op amps is so low that the curves must be plotted slowly. Linear ICs such as op amps may be tested with the 577 by using the 178 Linear IC Test Fixture (see page 8).

In the 577/177 Curve Tracer System several features facilitate low current measurements. They include: small current sensing resistors (which result in less capacitive looping), current sensing that always takes place in the collector supply lead (which permits measurements on three-terminal active devices at the lowest current ranges and eliminates the need for a correction to the horizontal deflection factor), and a display filter (which reduces vertical deflection noise).

Although the 577/177 Collector Supply has lower power capability (the 576 can deliver approximately 2.2 times as much power to the device under test), approximately the same test current is available, 10 A continuous peaks at line frequency. The 577/177 provides its highest currents at a lower voltage than does the 576.

Other innovations in the 577/177 Curve Tracer are an emitter-base breakdown position on the lead selector switch, availability of approximately 95 steps from the step generator, an uncalibrated bias supply, independent magnifiers that increase resolution on either or both CRT axes, and a beam finder.

CHARACTERISTICS

All characteristics are for the 577 Curve Tracer Mainframe operating with a 177 Standard Test Fixture.

COLLECTOR SUPPLY

Modes — Five modes of collector supply operation are selectable. These are: ac at line frequency, positive full wave rectified, negative full wave rectified, positive dc, or negative dc.

Voltage — The voltage is variable to the max peak volts selected.

Max Peak Volts Open Circuit	6.5 V	25 V	100 V	400 V	1600 V
Continuous Current, Peak	10 A	2.5 A	0.6 A	0.15 A	0.04 A
Peak Pulse Current	20 A	5 A	1.25 A	0.30 A	0.08 A

Series Resistance — 14 values from 0.12 Ω to 8 M Ω . Coupling of series resistance and voltage controls maintains max peak power to the device under test when changing voltage ranges.

Safety Interlock — Protects operator from 100, 400, and 1600 volt ranges. Momentary button provides for overriding interlock.

STEP GENERATOR

Current Mode — Step amplitude range is 5 nA/step (with STEP X0.1) to 200 mA/step, in a 1-2-5 sequence. Available current is at least 2 A on the highest amplitude setting with 5 V or more compliance. For opposing offset, available current is at least 10 mA with voltage limited between 1 V and 5 V.

Voltage Mode — Step amplitude range is 5 mV/step (with STEP X0.1) to 2 V/step, in a 1-2-5 sequence. Current is limited between 100 mA and 200 mA. For opposing offset, available current is at least 10 mA (at 0 V) derating to 0 mA at 20 V.

Accuracy — Incremental; within 2% between steps. Absolute; within 3% of total output or AMPLITUDE setting, whichever is greater. When STEP X0.1 is actuated the absolute step accuracy is 4%.

Step Rate — Selectable at X1 (SLOW), X2 (NORM), or X4 (FAST) line frequency.

Pulsed Steps — Steps can be gated for a duration of $\approx 300 \mu\text{s}$ for testing at low duty cycle.

Step/Offset Polarity — With NORM POLARITY selected, the Step Generator polarity is the same as the Collector Supply polarity, and positive in the ac position. Polarity can be independently inverted with STEP/OFFSET POLARITY control or from the test fixture.

Offset — The amplitude of the entire set of steps can be offset in a continuously variable and calibrated manner to either AID or OPPOSE steps. Max range of offset is 10 full-amplitude steps.

Step Family — Repetitive or single family.

Number of Steps — Selectable from 1 to 10 full-amplitude steps. Selectable up to ≈ 95 steps when using STEP X0.1 multiplier.

DEFLECTION CONTROLS

Display Accuracies — As a percentage of highest on-screen value.

Display Mode	Normal	Magnified
Vert Collector Current	3% ± 1 nA	4% ± 1 nA
Horiz Collector Volts	3%	4%
Horiz Base Volts	3%	4%
Horiz Step Gen	4%	5%

Vertical Deflection Factor — Collector current is 2 nA/div to 2 A/div, 28 steps in 1-2-5 sequence (0.2 nA/div to 0.2 A/div with X10 magnification).

Horizontal Deflection Factor — Collector volts; 50 mV/div to 200 V/div, 12 steps in a 1-2-5 sequence (5 mV/div to 20 V/div with X10 magnification). Base volts; 50 mV/div to 2 V/div, 6 steps in a 1-2-5 sequence (5 mV/div to 0.2 V/div with X10 magnification). Step generator; 1 step/div (0.1 step/div with X10 magnification).

Automatic Scale Factor Readout — Change in deflection factor is indicated by lights behind the knob skirt when using X10 MAG.

Automatic Positioning — Trace (or spot) is automatically positioned when Collector Supply polarity is changed when using the 177.

Display Invert — Single control inverts display and repositions trace.

Display Filter — Selectable low pass filter reduces vertical noise for easier high sensitivity measurements.

CRT

CRT — Rectangular 6.5 in with an 8 x 10 div (1.27 cm/div) parallax-free internal graticule. Two display modules are available for the 577. The D1 display unit has a split-screen storage CRT with phosphor similar to P1. The D2 display unit has a nonstorage CRT with P31 Phosphor. Accelerating potential is 3.5 kV.

Beam Finder — Compresses off-screen trace to within graticule area.

Ambient Temperature — Performance characteristics are valid over an ambient temperature of $+10^\circ\text{C}$ to $+40^\circ\text{C}$.

PHYSICAL CHARACTERISTICS

Dimensions	577/D1 or 577/D2		177	
	cm	in	cm	in
Height	50.3	19.8	10.2	4.0
Width	22.4	8.8	20.1	7.9
Depth	58.4	23.0	15.2	6.0
Weights	kg	lb	kg	lb
	18.1	40	1.1	2.5
Shipping	22.7	50	2.7	6

Note: When the 577 and 177 are ordered together their combined shipping weight is: domestic ≈ 53 lb or ≈ 24 kg.



177 TEST FIXTURE

Device Lead Selection — Switch provides six different lead configurations. Three positions for EMITTER GROUNDED measurements provide STEP GEN, OPEN (OR EXT), and SHORT base terminal connections. Two positions for BASE GROUNDED measurements provide STEP GEN and OPEN (OR EXT) emitter terminal connections. One position provides for EMITTER BASE BREAKDOWN or leakage measurements up to 25 volts.

Left-Right Switch — Selects left or right test connections. Off in center position. Test connection area accepts all TEKTRONIX Curve Tracer adapters and protective cover. Kelvin connections are provided for emitter and collector terminals.

Looping Compensation — Reduces display loops due to test adapter capacitance and some device capacitance.

Variable Voltage Supply — Continuously variable bias supply from -12 V to $+12$ V. Source resistance is 10 k Ω or less.

OTHER CHARACTERISTICS

Power Requirements — 100, 110, 120 V ac or 200, 220, 240 V ac, all within $\pm 10\%$. 50 to 60 Hz, 155 W max at 110 V ac and 60 Hz.

INCLUDED ACCESSORIES

Transistor adapter for most bipolar transistors and some MOS FETs (013-0098-02) axial lead diode adapter with Kelvin sensing terminals (013-0111-00), protective shield for test connection area (337-1194-00).

ORDERING INFORMATION

577/D1 Storage Curve Tracer Mainframe

577/D2 Nonstorage Curve Tracer Mainframe

Option 10, 10 x 10 cm Graticule; available with either storage or nonstorage mainframe

177 Standard Test Fixture

OPTIONAL ACCESSORIES

178 Linear Test Fixture; see following page for complete description

Camera — C-5C

Cart — Tek Lab Cart, Model 3

Order Model 3

Test Set-up Chart — Package of 250

Order 070-1639-00

Device Adapter Sockets: see page 10 for complete description.

178

**Tests Single, Dual, or Quad:
Operational Amplifiers, Comparators
Differential Amplifiers, Regulators and more**



Since linear ICs are typically tested under very low current conditions, the 577/178 Curve Tracer System is ideally suited to the task. The 178 Linear IC Test Fixture provides the necessary accurate low current measurement capability, test cards set up the measurement function, and the 577's storage CRT allows the operator to transform the dot display (usually seen under low current dc conditions) into a complete characteristic curve by slowly sweeping the dot across the CRT while in the Storage Mode.

A 577/178 Curve Tracer System is composed of a 577 Mainframe, 178 Linear IC Test Fixture, appropriate test cards (choose from three op amp cards and two regular cards), and the proper socket adapter (see page 10) that interfaces the system to the device under test.

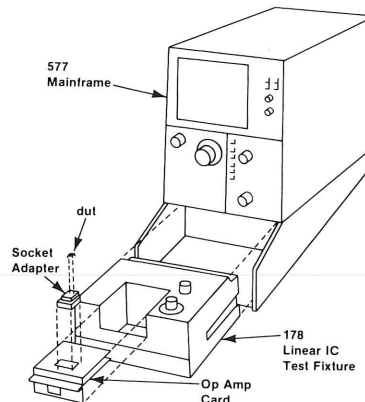
Test cards, which slide into the 178, define the measurement function of the 178 Test Fixture. Two families of test cards are available: op amp cards and regulator cards. Op amp cards are used for testing standard and special op amps, comparators, differential amplifiers, video amplifiers, etc. Regulator cards are used for testing positive and negative three-terminal voltage regulators.

OP AMP CARDS

The **Standard Op Amp Card** is designed to test devices that require single or dual power supplies, have two (differential) high-impedance inputs, and a single output. Common measurements include: offset voltage, positive and negative input current, cmrr, gain, positive and negative psrr, positive and negative supply current, and collector supply current.

The **Hardwire Card** is designed for those applications where there is an advantage in preparing individual cards for specific devices so that they may be quickly switched to accommodate a change in the type of device under test. The Hardwire Card also offers a greater degree of freedom to the knowledgeable designer in testing special devices.

The **Multiple Op Amp Card** allows the operator to test up to four devices in a single package by simply operating a four-position switch. The four-position switch selects the op amp (in a multiple op amp package) or the selection of a linear IC to be tested. The measurements performed are the same as those available with the Standard Op Amp Card.



Socket Adapters for Op Amp Cards — The device under test socket on the Standard and Multiple Op Amp Cards accepts several types of socket adapters using the Amphenol-Barnes adapter system. This system accepts most of the standard package configurations (TO5, DIP, flat pack, etc). Sockets for these cards are shown on page 10.

REGULATOR CARDS

There are two types of Regulator Cards, positive and negative. These cards are used primarily in measuring parameters of three-terminal voltage regulators. Parameters measured include: output voltage, load regulation, line regulation and ripple regulation, and quiescent and common terminal current.

Socket Adapters for Regulator Cards — Socket adapters for both positive and negative three-terminal regulators are the same as the Kelvin Sensing Adaptors used on the standard curve tracer (see page 10).

CHARACTERISTICS

VERTICAL DEFLECTION (1-2-5 Sequence)	NORMAL	MAGNIFIED
Input Voltage or Δ Input Voltage	10 μ V/div to 50 mV/div	1 μ V/div to 5 mV/div
Accuracy	3%	4%
Input Current	50 pA/div to 0.2 mA/div	5 pA/div to 20 μ A/div
Accuracy	3% \pm 50 pA	4% \pm 50 pA
Power Supply Current	0.1 μ A/div to 50 mA/div	10 nA/div to 5 mA/div
Accuracy	3% \pm 0.1 μ A	4% \pm 0.1 μ A
Collector Supply Current	1 nA/div to 50 mA/div	0.1 nA/div to 5 mA/div
Accuracy	3% \pm 1 nA	4% \pm 1 nA

Accuracies are a percentage of highest on-screen values.

Power Supplies — Positive and negative supplies are adjustable from 0 to 30 V, available current is at least 150 mA with adjustable current limiting. The voltage of both supplies can be adjusted from a single calibrated control; accuracy is within 2% \pm 100 mV. Negative supply can be independently adjusted by an uncalibrated control.

Sweep Generator — A sinusoidal signal controls the output, common-mode input, or the power supply voltages of the device under test. The frequency is adjustable from 0.01 Hz to 1 kHz; amplitude is adjustable up to 30 V peak.

Source Resistance — For input resistor pairs, selectable 50 Ω , 10 k Ω , 20 k Ω , and 50 k Ω , or external resistors may be used. When the vertical deflection factor is in one of the less sensitive positions, 1 mV through 50 mV/div, the input resistance values are 550 Ω greater.

Load Resistance — Six selectable load resistors, 100 Ω , 1 k Ω , 2 k Ω , 5 k Ω , 10 k Ω , 20 k Ω , and 50 k Ω , or external resistors may be used.

Collector Supply — The 25 V and 100 V ranges of the Collector Supply (located on 577 Mainframe) are available to the 178 Test Fixture. Supply output is located on the 178 front-end panel and on the device card. Automatic positioning with supply polarity is inoperative when using the 178 Test Fixture. (See 577/177 characteristics for Collector Supply performance.)

Step Generator — All the capabilities of the Step Generator (located on 577 Mainframe) are available to the 178 Test Fixture. Generator output is located on the 178 front-end panel and on the device card. (See 577/177 characteristics for Step Generator performance.)

DUT Supplies Disconnect — A single switch disconnects all power to the device under test: both plus and minus Power Supplies, Collector Supply, and Step Generator.

Function Switch — Selects vertical and horizontal deflection signals and connection of the test signal to the device under test.

Zero — Single pushbutton provides a zero reference to the CRT display and in certain functions, nulls out offset voltage in order to measure Δ input V on the vertical display axis.

THREE-TERMINAL REGULATOR TEST CARD CHARACTERISTICS

Device Under Test Input Supply

Input Voltage — Two ranges 0-30 V and 0-60 V. 0-30 V is within \pm 2% \pm 200 mV of dial setting, and 0-60 is within \pm 2.5% \pm 300 mV of dial setting.

Regulation — Within 200 mV.

Input Sweep Frequency — Dc to 1 kHz.

300 μ s Pulsed Current — 5 mA to 2 A.

Short Duration DC Current (One minute)

Supply Voltage	Current
0 - 10	700 mA
10 - 20	350 mA
20 - 40	300 mA
40 - 60	120 mA

Device Under Test Current Load — 5 mA to 2 A within \pm 3% of 0 to 1.25 mA.

Device Under Test Comparison Output Dc Voltage Accuracy — 0-10 V range within \pm 1% \pm 20 mV; 0-100 V range within \pm 1% \pm 150 mV.

PHYSICAL CHARACTERISTICS

Dimensions	cm	in
Height	11.4	4.5
Width	20.1	7.9
Depth	19.8	7.8
Weights	kg	lb
Net	1.5	3.3
Shipping	3.6	8.0

Included Accessories — Dual-in-line 16 pin IC socket (136-0442-00). Standard Op Amp Card with cover and ten patch cords (013-0149-01), interchangeable nomenclature panel for function switch (333-1770-00).

ORDERING INFORMATION

178 Linear IC Test Fixture

Standard Op Amp Card — (One included with 178)

013-0149-01

Hardwire Card

013-0150-01

Multiple Op Amp Card (013-0155-00)

Positive Regulator Card

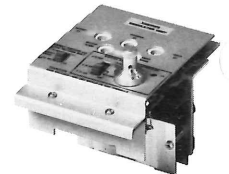
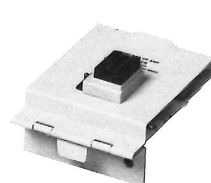
013-0147-00

Negative Regulator Card

013-0148-00

Standard Op Amp Card

Positive Regulator Card



5CT1N and 7CT1N

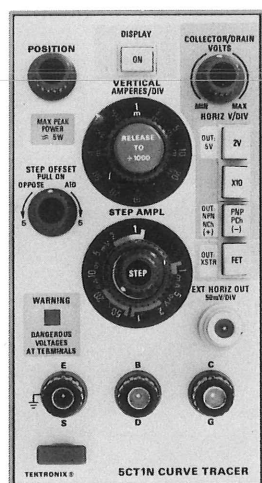
Tests Semiconductor Devices
to 0.5 W

10 nA/div to 20 mA/div Vertical
Deflection Factors

0.5 V/div to 20 V/div Horizontal
Deflection Factors

Easy to Operate

5CT1N



Curve Tracer

7CT1N



Curve Tracer

The 7CT1N Curve Tracer is a plug-in unit for use in TEKTRONIX 7000 Series Oscilloscope Systems and the 5CT1N Curve Tracer is a plug-in unit for use in TEKTRONIX 5000 Series Oscilloscope Systems. Both are for displaying characteristic curves of small-signal semiconductor devices to power levels up to 0.5 watts. The plug-ins operate in a vertical compartment of the respective mainframes. The 7CT1N also operates in the horizontal compartments of the 7000 Series Oscilloscope Systems.

CHARACTERISTICS

COLLECTOR/DRAIN SUPPLY

	X1		X10	
Horizontal Volts/Div	0.5	2	5	20
Voltage Range	0 - 7.5 V	0 - 30 V	0 - 75 V	0 - 300 V
Maximum Current	240 mA	60 mA	24 mA	6 mA

Max Open Circuit Voltage — Within $\pm 20\%$. Max short circuit current, within 30%.

Series Resistance — Automatically selected with horizontal V/div switches. Peak power is 0.5 W or less depending upon control settings.

High Voltage Warning — When the horizontal V/div switch is in the X10 position, a flashing warning light appears on the front panel indicating that dangerous voltages may exist at the test terminals.

STEP GENERATOR

Transistor Mode — Step amplitude range is 1 μ A/step to 1 mA/step, 1-2-5 sequence. Max current (steps plus aiding offset) is X15 amplitude setting. Max voltage (steps plus aiding offset) is at least 13 V. Max opposing offset current is at least X5 amplitude setting.

FET Mode — Step amplitude range is 1 mV/step to 1 V/step, 1-2-5 sequence. Voltage amplitude (steps plus aiding offset) is X15 amplitude setting, 13 V max. Source impedance is 1 k Ω \pm 1%.

Accuracy — Incremental; within 3% between steps. Absolute; within $\pm (3\% + X0.3$ amplitude setting.)

Step Polarity — The step generator polarity is the same as the collector/drain supply in the transistor mode and opposing in the FET mode.

Number of Steps — Selectable in one-step increments between 0 and 10.

Offset — Selectable from 0 to 5 steps. Polarity aids or opposes the step polarity.

Vertical Deflection Factors — 10 nA/div to 20 μ A/div with the $\div 1000$ control activated. 10 μ A/div to 20 mA/div in the X1 mode.

Vertical Display Accuracy — Within 5% in the X1 mode. Within 5% ± 0.2 nA per displayed horizontal V when in the $\div 1000$ mode.

Horizontal Deflection Factors — Selectable: 0.5 V, 2 V, 5 V, or 20 V.

5CT1N Horizontal Display Accuracy — Within 5% plus the deflection factor accuracy of the plug-in being driven. The plug-in would be a vertical or horizontal amplifier (such as the TEKTRONIX 5000 Series Plug-ins) with a 50 mV/div deflection factor and an input R of at least 50 k Ω and would be used in the horizontal compartment of the 5000 Series Oscilloscope Mainframe.

7CT1N Horizontal Display Accuracy — Within 5% plus the deflection factor accuracy of the plug-in being driven. The plug-in would be a vertical or horizontal amplifier (such as the TEKTRONIX 7000 Series Plug-ins) with a 100 mV/div deflection factor and an input R of at least 50 k Ω and would be used in the horizontal compartment of the 7000 Series Oscilloscope Mainframe.

OTHER CHARACTERISTICS

Ambient Temperature — Performance characteristics are valid from 0°C to +50°C.

PHYSICAL CHARACTERISTICS

	5CT1N		7CT1N	
Dimensions	cm	in	cm	in
Length	30.5	12.0	36.8	14.5
Width	6.6	2.6	7.1	2.8
Height	12.7	5.0	12.7	5.0
Weight	kg	lb	kg	lb
Net	0.8	1.8	1.1	2.5
Shipping	1.8	4.0	2.7	6.0

Included Accessories — Test Adapter (013-0128-00) with two sets of test terminals, one with TO5 basing and the other with TO18 basing.

ORDERING INFORMATION

5CT1N Curve Tracer

7CT1N Curve Tracer



A



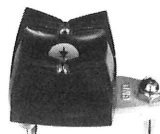
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D



E

3 PIN ADAPTERS

The following accessories may be used with any of the TEKTRONIX Curve Tracer products. They do not have Kelvin sensing contacts.

A. TO5 or TO18 Transistor Adapter — Order (013-0128-00)

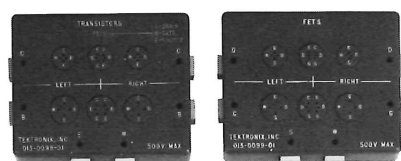
B. Blank Adapter — For mounting special sockets. Order (013-0073-00)

C. TO3 or TO66 Transistor Adapter — Order (013-0070-01)

D. Diode Test Adapter — Holds axial-lead diodes. Order (013-0072-00)

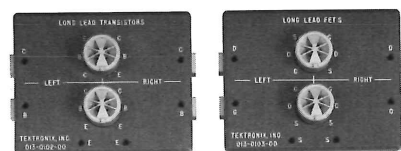
E. Diode Test Adapter — Magnetically holds steel axial-lead diodes. Order (013-0079-00)

TEK CURVE TRACER SOCKET ADAPTERS



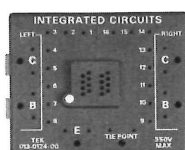
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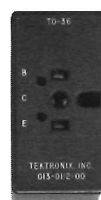
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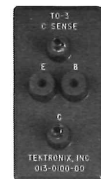
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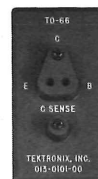
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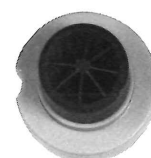
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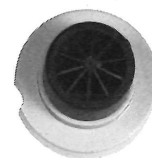
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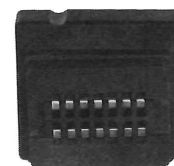
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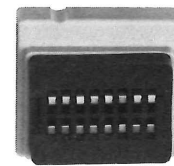
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D

DUAL WIDTH ADAPTERS

The following accessories fit the side-by-side terminals on test fixtures of the 576, 576/172, and 577/177 Curve Tracers.

A. Transistor Adapter — Useful for most single and dual bipolar transistors and some MOS FETs.
Order (013-0098-02)

B. FET Adapter — Useful for most single and dual FETs.
Order (013-0099-02)

C. Long Lead Transistor Adapter — Accepts dual or single transistors with untrimmed leads.
Order (013-0102-00)

D. Long Lead FET Adapter — Accepts dual or single FETs with untrimmed leads.
Order (013-0103-00)

E. Integrated Circuit Adapter — Allows connection to multipin device packages. The appropriate multilead socket is plugged into the integrated circuits adapter. The pins are then connected to the collector, base, or emitter terminals by means of the patch cord. A tie point is also provided so that an external power supply or signal source may conveniently be patched to the IC pins. Order the appropriate multilead socket listed separately.

Order (013-0124-01) Includes
8 each 4 inch test leads

KELVIN SENSING ADAPTERS

The following accessories fit the test fixtures of the 576, 576/172, 576/176, and 577/177 Curve Tracers.

A. Transistor Adapter — Accepts long or short transistors. Can be rewired to accommodate nonstandard configurations.
Order (013-0127-01)

B. In-Line Adapter — Accepts large and small transistors with in-line leads. The adapter will accept devices with approx spacing between terminals of 0.06 in up to 0.18 in. It is wired for a B-C-E terminal configuration but may be easily rewired for the C-B-E configuration.
Order (013-0138-01)

C. TO36 Adapter — **Order (013-0112-00)**

D. TO3 Adapter — Can be rewired to accommodate nonstandard configurations.
Order (013-0100-01)

E. TO66 Adapter —
Order (013-0101-00)

F. Axial Lead Diode Adapter —
Order (013-0111-00)

G. Stud Diode Adapter —
Order (013-0110-00)

H. Blank Adapter — For mounting special sockets.
Order (013-0104-00)

I. Power Transistor Adapter —
Order (013-0163-00)

MULTILEAD SOCKETS

These sockets are used with the Integrated Circuit Adapter (013-0124-01) listed under Dual Width Adapters, and with the 178 Test Fixture.

A. 8 Lead TO Package —
Order (136-0444-00)

B. 10 Lead TO Package —
Order (136-0441-00)

C. 14 Lead Dual-in-line Package —
Order (136-0443-00)

D. 16 Lead Dual-in-line Package —
Order (136-0442-00)

(These four sockets are the most commonly required in curve tracer applications. Additional socket configurations, including zero insertion style, are available from Textool Products, Inc., 1410 W. Pioneer Dr., Irving, TX 75061.)

The sockets you will receive have the same electrical characteristics as shown A-D above, but similar in appearance.

For further information,
contact:

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
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