NEW-PRODUCT SUPPLEMENT TO TEKTRONIX CATALOG 26

AUGUST 1967

TEKTRONIX WILL DISPLAY THESE NEW PRODUCTS AT

WESCON '67
AUGUST 22-25
BOOTHS #2818-23
COW PALACE, SAN FRANCISCO

TYPE 410 PHYSIOLOGICAL MONITOR—Portable, solid-state, designed specifically for medical applications. Monitors patient's ECG, EEG, or other functions.

TYPE 284 PULSE GENERATOR—One small generator supplies all of the signals required to verify the performance of sampling oscilloscopes.

TYPE 3S1 PLUG-IN UNIT—New Dual-Trace Sampling Unit for Tektronix Type 560-Series Oscilloscopes.

TYPE 81A ADAPTER—Provides full bandwidth capabilities for all 1-Series and Letter-Series Plug-In Units when used with 580-Series Oscilloscopes.

P6042 DC CURRENT PROBE—DC-to-50 MHz current measurements with Tektronix wide-band oscilloscopes.

P6046 DIFFERENTIAL PROBE—New differential capabilities for the Type 1A5 Differential Plug-In Unit . . . greater than 1000:1 CMRR at 50 MHz.

TYPE S-3100 MEASUREMENT SYSTEM—Programmable system for nanosecond switching-time measurements, capable of over 100 measurements per second.

ALSO ON DISPLAY AT WESCON

- Type 453 DC-to-50 MHz Portable Oscilloscope
- Type 454 DC-to-150 MHz Portable Oscilloscope
- Type 647A DC-to-100 MHz Oscilloscope with Type 10A2A Dual-Trace Plug-In Unit and Type 11B2A Sweep-Delay Time-Base Unit
- Type 568 Readout Oscilloscope with Type 230 Digital Unit
- Type 491 10 MHz-to-40 GHz Spectrum Analyzer
- Type 1A4 DC-to-50 MHz Four-Trace Plug-In Unit
- Type 1A5 DC-to-50 MHz Differential Plug-In Unit
- Type 1S2 Reflectometer and Sampling Plug-In Unit
- Type 3T2 Random-Sampling Sweep Plug-In Unit
- S-3200 Digital System
- Probes, Cameras, Oscilloscope Carts

Attach this supplement to your Tektronix Catalog 26. See back cover for instructions.

Specification and price change privileges reserved.

TEKTRONIX, INC.

Revised Price List

Effective Sept. 4, 1967

These prices supersede all other published prices, including those currently appearing in advertisements, catalogs, booklets, and all other literature.

OSCILLOSCOPES

TYPE	PRICE
310A	$ 725
317	925
RM17	1000
321A	950
360	290
410	825
422	1425
422 MOD 125B	1775
422 MOD 146B	1400
R422	1500
R422 MOD 150B	2900
R422 MOD 150E	1500
453	1950
R453	2035
454	2600
454 MOD 163D	2700
R454	2685
R454 MOD 163D	2785
491	4400
R491	4500
502A	1125
RM502A	1225
503	650
RM503	665
RM503 MOD 171A	715
504	550
RM504	560
RM504 MOD 171A	610
507	3100
515A	925
RM15	1000
516	1125
519	4100
524AD	1350
526	1725
526 MOD 158M	1810
529	1085
529 MOD 188A	1085
RM529	1135
RM529 MOD 188A	1135
*531A	1050
*RM31A	1150
*533A	1175
*535A	1400
*RM35A	1500
*536	1150
*543B	1375
*RM543B	1475
*544	1550
*RM544	1650
*545B	1625
*RM545B	1725
*546	1750
*RM546	1850
*547	1875
*RM547	1975
*549	2475
*551	1970
*555	2800
*556	3250
*R556	3350
*561A	530

OSCILLOSCOPES

TYPE	PRICE
*RM561A	580
*RM561A MOD 171A	630
*564	925
*RM564	1025
*RM564 MOD 171A	1075
*565	1475
*RM565	1575
*567	750
*RM567	850
*568	875
*R568	925
575	1100
575 MOD 122C	1365
*581A	1500
*585A	1775
*RM585A	1875
*647A	1550
*R647A	1675
*661	1200

PLUG-IN UNITS

TYPE	PRICE
B	$ 165
CA	275
D	185
E	200
G	200
H	195
K	150
L	230
M	550
O	550
Q	340
T	250
W	550
Z	550
1A1	625
1A2	340
1A4	780
1A5	550
1A6	240
1A7	440
1L5	1000
1L10	1150
1L20	1925
1L30	1925
1S1	1175
1S2	1375
2A60	110
2A61	400
2A61 MOD 156M	400
2A63	165
2B67	225
3A1	500
3A2	520
3A3	825
3A5	790
3A6	525
3A7	660
3A8	625
3A72	295

PLUG-IN UNITS

TYPE	PRICE
3A74	625
3A75	190
3B1	575
3B2	675
3B3	625
3B4	425
3B5	925
3C66	425
3L5	1100
3L10	1260
3S1	1150
3S3	1575
3T2	990
3T4	1380
3T77A	690
4S1	1475
4S2A	1495
4S3	1495
5T3	850
6R1A	2760
10A1	935
10A2A	805
11B1	675
11B2A	885
21A	290
22A	300
81A	150
82	675
86	375

AUXILIARY INSTRUMENTS

TYPE	PRICE
106	$ 625
106 MOD 146B	600
109	380
111	390
113	260
114	310
114 MOD 146B	285
R116	1650
122	145
FM122, RM122	150
125	295
FM125, RM125	300
127	700
129	675
130	235
132	480
133	460
160A	215
161	145
162	145
163	145
175, 175 MOD 167C	1570
184	700
184 MOD 146B	675
191	425
191 MOD 146B	400
230	2965
R230	3015
261	700

AUXILIARY INSTRUMENTS

TYPE	PRICE
262	1600
263	325
281	95
282	95
283, R283	375
284	525
284 MOD 146B	500
292	340
R293	1040
1121	490

SPECTRUM ANALYZERS

TYPE	PRICE
1L5	$1000
1L10	1150
1L20	1925
1L30	1925
3L5	1100
3L10	1260
491	4400
R491	4500

CAMERAS

TYPE	PRICE
C-12, C12 R	$460
C-12 S, C-12 RS	615
C-12-547, C-12-547 R	480
C-12-547 S, C-12-547 RS	635
C-12-549, C-12-549 R	500
C-12-549 S, C-12-549 RS	655
C-12-608, C-12-608 R	575
C-12-608 S, C-12-608 RS	730
C-12-662, C-12-662 R	625
C-12-662 S, C-12-662 RS	780
C-27, C-27 R	430
C-27 S, C-27 RS	585
C-27-547, C-27-547 R	450
C-27-547 S, C-27-547 RS	605
C-27-549, C-27-549 R	470
C-27-549 S, C-27-549 RS	625
C-27-608, C-27-608 R	545
C-27-608 S, C-27-608 RS	700
C-27-662, C-27-662 R	595
C-27-662 S, C-27-662 RS	750
C-30	420
C-40	560
C-40 S, C-40 SB	715

SCOPE-MOBILE® CARTS

TYPE	PRICE
200-1	$ 75
200-2	75
201-1	125
201-2	135
202-1	125
202-1 MOD 52	160
202-2	135
205-1	125
205-2	135
205-3	135

*Prices do not include Plug-in Units

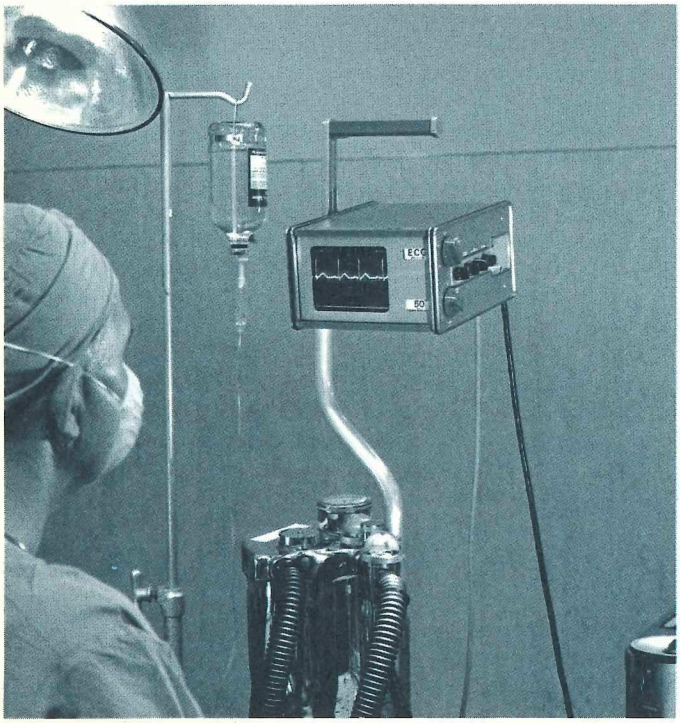
TYPE 410 PHYSIOLOGICAL MONITOR

- ***DISPLAYS ECG, EEG, OR PULSE WAVEFORMS***
- ***EASY OPERATION***
- ***SOLID-STATE RELIABILITY, QUICK TURN ON***
- ***PORTABLE, BATTERY POWERED***
- ***HEART RATE BEEP***
- ***RAPID OVERLOAD RECOVERY***

The Type 410 is designed for patient monitoring during surgery, recovery, and intensive care. Of special use to the anesthesiologist, it displays on a cathode-ray tube waveforms of the electrocardiogram (ECG), electroencephalogram (EEG), or pulse. During surgery, the Type 410 can give early warning of a developing problem. Other applications of the Type 410 include measurements of fetal ECGs, using the high-gain input (EEG) and electrodes supplied with the Monitor.

The Monitor can be conveniently positioned (using the optional mounting fixture) at the five-foot level on the anesthesiologist's gas machine for easy viewing, then lifted off and carried with the patient to the recovery room. The 12½-pound weight and battery operation permit easy mobility and continuous operation without disconnecting leads or power.

Ease of operation, with a minimum of controls, contributes to the usability of the Type 410, as do its other features: 4-second recovery after overdrive by defibrillator or cauterizer, output for strip-chart recorder, and a cabinet finish that is durable and washable.



ECG MEASUREMENTS

Heart rates from 35 beats/min to 180 beats/min can be directly read by observing the point on the CRT graticule scale where the second repetition of the ECG waveform occurs. A beep sound coincident with each repetition of the ECG waveform provides an audible indication of heart rate, in addition to the waveform display. Thus a sudden change in heart rate can be quickly detected, even without constant observation of the display. Loss of signal to the Monitor for 2 to 4 seconds automatically increases the rate of the beep to an alarm level, and also provides a baseline on the CRT. Bandwidth in the ECG mode is $\leq$0.1 Hz to 250 Hz $\pm$15%. Deflection sensitivity is 20 mm/mV, accurate within 5%. Seven commonly-used leads can be selected: I, II, III, aV_R, aV_L, aV_F and V. Silver-silver chloride non-polarizing electrodes are supplied as standard accessories. The Type 410 is also compatible with common needle electrodes and inexpensive disposable surface electrodes.

EEG MEASUREMENTS

EEG input accepts the included silver-silver chloride ECG electrodes supplied with the Monitor. Optional EEG electrodes (identical except for color coding) are also available. Bandwidth in the EEG mode is $\leq$0.1 Hz to 100 Hz $\pm$15%. Deflection sensitivity is 10 mm/50 μV, accurate within 5%.

PULSE MEASUREMENTS

Auxiliary input accepts the optional photoelectric pulse sensor. The pulse sensor, containing a light source and photoelectric cell, is attached to the patient's finger. As the pulse occurs, the amount of blood in the finger changes the amount of light reaching the photoelectric cell. The resulting display provides a quick indication of heart rate. A beep sounds coincident with each pulse, giving an audible as well as visible indication of the patient's heart activity. Loss of signal to the Monitor for 2 to 4 seconds automatically increases the rate of the beep to an alarm level, and provides a base line on the CRT. Bandwidth at the Auxiliary mode input is $\leq$0.1 Hz to 250 Hz $\pm$15%. Deflection sensitivity is 2 mm/mV, accurate within 5%.

HIGH COMMON-MODE REJECTION

$\geq$500,000:1 throughout bandwidth with a balanced, low-impedance source. $\geq$150,000:1 at 60 Hz with 5-kΩ source impedance unbalance between properly-applied electrodes. High common-mode rejection, with corresponding reduction of interference is obtained under actual operating conditions.

COMMON-MODE DYNAMIC RANGE

+3 V to −3 V.

DIFFERENTIAL DYNAMIC RANGE

Monitor characteristics are valid with an input terminal DC potential difference (offset) of up to 20 mV. Typically less than 10 mV difference exists between the non-polarizable silver-silver chloride electrodes supplied with the Type 410. At least 100 mV of either polarity can be applied with no more than 5% reduction in amplifier gain.

DIFFERENTIAL INPUT RESISTANCE

2 MΩ $\pm$15% in EEG and ECG mode, 20 MΩ $\pm$15% in Auxiliary mode.

DRIFT

$\leq$0.5 cm per hour after 10-second warm-up.

NOISE

$\leq$0.1 cm in the calibrated EEG mode, input shorted.

SWEEP SPEEDS

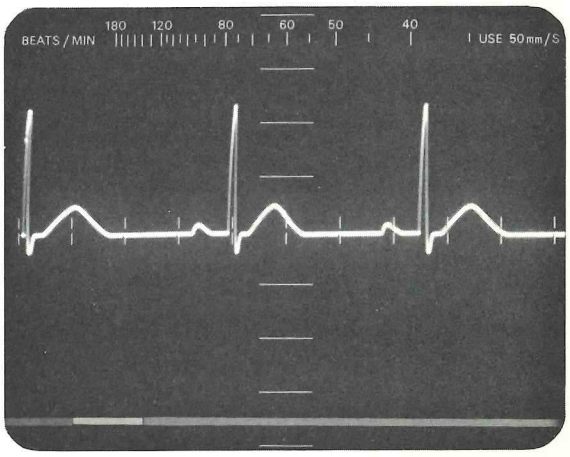
25, 50, and 100 mm per second; accurate within 5%.

AUDIO SIGNAL

Beep sounds at heart rate, providing audible indication of normal or arrhythmic heart rate. Automatic alarm sounds if there is a loss of signal for 2 to 4 seconds. Loudness is adjustable. Using the audio output jack disconnects the internal speaker.

WAVEFORM SIZE

Vertical size of ECG, EEG, and pulse waveforms is continuously variable from 1/3 to 3 times the height of the calibrated display.



CRT

5-inch rectangular CRT has 8 x 10-cm viewing area. P-7 phosphor has long decay time for convenient viewing at slow sweep speeds. The external graticule has a graduated heart-rate scale at the top, a battery-condition scale at the bottom, and a vertical and horizontal center-line scale marked in centimeters.

BATTERY OPERATION

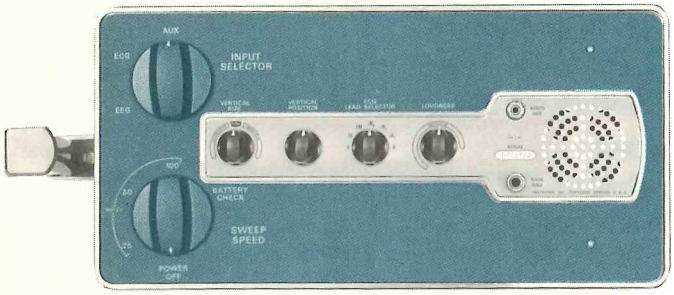
Removable battery pack contains 10 size "C" NiCd cells, provides 8 to 12 hours operation with maximum accessory load at +20°C to +25°C. Operating time depends on temperature. Maximum time is achieved at 22°C. Internal charger provides recharge in 14 to 16 hours, operates from 90 V to 136 VAC or 180 V to 272 VAC, 48 Hz to 440 Hz, requires ≤7 W at 115 V, 60 Hz. Monitor can also be operated from line (with reduced charge to battery pack).

ENVIRONMENTAL CAPABILITIES

Ruggedly designed to withstand temperature and altitude variations, vibration, shock, and transportation. Listed instrument characteristics are valid over a temperature range of +10°C to +40°C ambient, if Monitor is calibrated at +25°C ±5°C ambient, except as noted (i.e., running time).

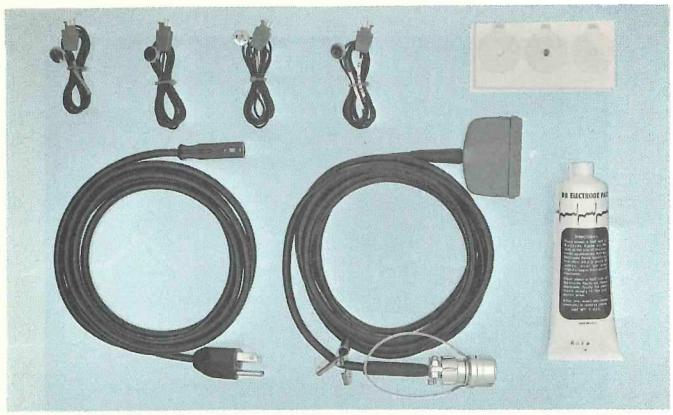
CLEANING

Monitor and accessories can be damp wiped with mild soap and water.



DIMENSIONS AND WEIGHTS

Height	5⅜ in	13.7 cm
Width without handle	8½ in	21.6 cm
Width with handle	9⅛ in	23.2 cm
Depth without handle	10¾ in	27.4 cm
Depth with handle	12⅞ in	32.7 cm
Weight without accessories	12½ lbs	5.6 kg
Domesic shipping weight	~25 lbs	~11.4 kg
Export packed weight	~30 lbs	~13.6 kg



INCLUDED STANDARD ACCESSORIES

Power cable assembly (161-0037-00); patient cable assembly (012-0120-00); electrode LA black (012-0121-00); electrode LL red (012-0121-02); electrode RL green (012-0121-05); electrode RA white (012-0121-09); package adhesive electrode rings (006-1099-00); tube electrode paste (006-1098-00), three 3-cable electrode adapter kits (012-0122-00), instruction manual (070-0658-00); operator's manual (070-0753-00). Last three items not shown.

TYPE 410 PHYSIOLOGICAL MONITOR $825

OPTIONAL ACCESSORIES

MOUNTING STAND

Mounts Type 410 at the five-foot level, permits swivelling and tipping the Monitor for convenient viewing. Hardware supplied with the fixture attaches to gas machine, bed, flat or round surface up to 1½ inch diameter.
Order 016-0110-00 ..... $ 35

MOUNTING CUP

Mounts Type 410 to flat surface, permits tipping the Monitor for convenient viewing. Mounting screws not included;
Order 407-0393-01 ..... $ 2

CHEST ELECTRODE

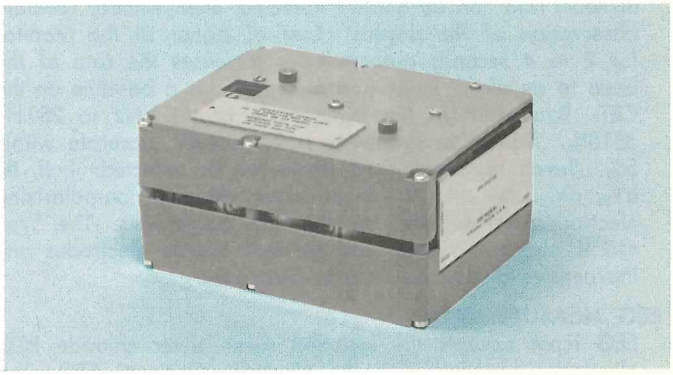
Brown color code.
Order 012-0121-01 ..... $ 15

EEG ELECTRODE

Yellow color code, 2 required
Order 012-0121-04 (each) ..... $ 15

PULSE SENSOR ASSEMBLY

Photoelectric sensor for pulse measurements, used with Type 410 Auxiliary input.
Order 015-0104-00 ..... $ 60



BATTERY PACK

Extra battery pack, in addition to the one supplied with the Type 410, allows one pack to charge while the other is powering the Monitor. Pack contains 10 size "C" NiCd cells and battery charger.
Order 016-0107-00 ..... $ 90

U.S. Sales Prices FOB Beaverton, Oregon

TYPE S-3100

PROGRAMMABLE MEASUREMENT SYSTEM

- *>100 MEASUREMENTS PER SECOND*
- *PROGRAMMABLE SUB-NANOSECOND MEASUREMENTS*
- *PROGRAMMABLE VERTICAL AMPLIFIER UNIT*
- *PROGRAMMABLE TIME-BASE UNIT*
- *DIGITAL PROGRAMMING*
- *REAR-PANEL INPUT SIGNAL CONNECTORS*
- *PARALLEL BCD DATA OUTPUT (1 2 4 8)*
- *FOUR AVAILABLE OPTIONS:*
  - *PROGRAMMABLE SELF-CALIBRATION (±1%)*
  - *PROBE REFERENCE CHOPPERS*
  - *PROGRAMMABLE PROBE ATTENUATORS*
  - *REAL-TIME MEASUREMENT CAPABILITY*

The Tektronix Type S-3100 is a high-speed programmable system designed to satisfy dynamic switching time measurements. It features digital programming, measurement speeds greater than 100 measurements per second, and programmable vertical and horizontal sampling units.

The system is comprised of a special Type 568 Oscilloscope, Type 230 Digital Unit, an Auxiliary Unit, a special programmable sampling time-base and special programmable sampling vertical units, with either a 50-Ω input or a 100-kΩ, 2-pF input.

The Type S-3100 measurement system is designed to be externally programmed for use in high-speed measurement systems. All of its measurement functions can be programmed by means of parallel ground closures or logic levels. The programming is achieved with a maximum of 175 program lines using negative logic (true equals ground or less than 2 V, and false equals open or greater than 6 V).

The typical accuracy of the Type S-3100 is within 3%. A self-calibration option is available (ordered with the Type S-3100) that can be programmed to verify and/or adjust sweep rates and vertical deflection factors to within 1%. Other optional accessories available with the Type S-3100 system include programmable probe attenuators, probe choppers for absolute voltage measurements, and the R283 Real-Time Adapter that extends the system's measurement capabilities to 1 s/div.

WIDE RANGE OF MEASUREMENT CAPABILITY

Type S-3100 Digital System measures nanosecond and microsecond signals by means of equivalent-time sampling; millisecond and slower signals by real-time sampling.

Measurement rates greater than 100 measurements/second are achieved when using equivalent sweep rates of 100 ns/div or faster, and through the use of programming techniques designed to optimize the measurement rates. Measurement rates can be dependent upon programming devices. For example, some mechanical programmers are limited to approximately 4 measurements per second. While using a computer, or other high-speed programming device, the Type S-3100 can make in excess of 100 measurements per second.

At slower equivalent sweep rates, measurement rates decrease because of sampling limitations. However, measurement rates at all sweep rates are significantly increased as a result of improved measurement and sampling techniques.

The system can be programmed to make sampling measurements from 1 ns/div to 200 μs/div (10 ns to 2 ms full scale). If slower sweep rates are required, the optional Type R283 Real-Time Adapter can be integrated into the system, thereby extending the system's capability to 1 s/div.

Amplitude measurements from 5 mV/div to 100 mV/div (40 to 800 mV full scale) are also programmable. In addition, programmable probe attenuators with a range of X2 to X100 are available, which extend the input deflection factor range to 10 V/div (80-V full scale).

TYPICAL MEASUREMENTS

Typical measurements include risetime, delay time, storage time, fall time, pulse width, pulse amplitude and other specific time and voltage measurements. With the probe-chopper option, the system can make DC and/or pulse voltage measurements with respect to ground and start or stop timing measurements referenced to a specific voltage level.

TYPE 568 OSCILLOSCOPE

The Type 568 Oscilloscope used in the Type S-3100 System has vertical signal inputs and trigger signal inputs on the rear panel. The oscilloscope provides analog displays of signals to be measured by the digital system and is used in setting up measurement programs and in verifying measurements.

TYPE 230 DIGITAL UNIT

The Type 230 Digital Unit used in the Type S-3100 System is modified to provide increased measurement speeds when used with the special programmable sampling time-base unit. This modification resets the time-base unit at the end of the measurement or at the end of the reference zone. This feature permits the increased measurement speed of the Type S-3100.

PROGRAMMING

All of the Type 230's measurement functions can be programmed by means of ground closures or logic levels. The programming is achieved with 104 parallel program lines using negative logic (true = gnd or <2 V; false = open or >6 V).

DATA OUTPUT

Data outputs available on the rear-panel of the Type 230 permit the recording of measurement polarity, displayed digits, units of measure, decimal point, and measurement limit results. The information is parallel BCD code (1 2 4 8; true = ground; false = +12 Volts).

PROGRAMMABLE TIME-BASE UNIT

The programmable sampling time-base has calibrated and programmable sweep ranges from 1 ns/div to 200 μs/div in a 1-2-5 sequence. It accepts trigger signal inputs via a rear connector on the Type 568. A measurement speed-up modification allows the Type 230 to reset the sweep at the end of the measurement or at the end of the reference zone.

PROGRAMMING

The Auxiliary Unit provides common programming logic for programming the time/div range and a digital to analog converter for programming the delay time control. The sweep range requires 5 program lines with negative logic. The delay time is programmed with 12 lines and provides from 1 through 999 steps in 1-ns steps (1-ns/div to 100-ns/div range); 100-ns steps (200-ns/div to 10-μs/div range); 1-μs steps (20-μs/div to 100-μs/div range).

Samples per sweep can be programmed to provide 100 samples/div or 10 samples/div. The Type 230 Digital Unit can program the time-base unit to sweep at 10 samples/div during the non-measurement part of the sweep and then switch to 100 samples/div for maximum resolution during measurement time.

PROGRAMMABLE DUAL-TRACE VERTICAL AMPLIFIER UNITS

Two programmable dual-trace vertical sampling units are available offering you a choice of input impedance and risetime capabilities. The sampling probe unit with the P6038 sampling probes has 100 kΩ paralleled by 2-pF input impedance and a 350-ps risetime. The 50-Ω input impedance unit has a 450-ps risetime.

The vertical amplifier units accept signal inputs via rear connectors on the Type 568 Oscilloscope, and have programmable mV/div and programmable DC offset. The vertical deflection factor range of both amplifier units is 5 mV/div to 100 mV/div.

PROGRAMMING

The Auxiliary Unit provides two digital to analog converters for programming the DC offset. DC offset is programmed with 7 program lines, (50-Ω vertical amplifier — 10 mV to 850 mV range in 10-mV steps; 100-kΩ vertical amplifier — 5 mV to 455 mV range in 5-mV steps) and one line for + or — DC offset. The mV/div range is programmed with 6 program lines, 3 lines per channel.

AUXILIARY UNIT

The Auxiliary Unit is an integral part of the Type S-3100 Programmable Measurement System. The Auxiliary Unit provides common negative logic for the time-base unit and the optional Type R283 Real-Time Adapter and provides digital to analog converters for DC offset and time delay. The Auxiliary Unit also provides the power supplies and accepts the circuit cards for the optional self-calibration feature.

MECHANICAL CHARACTERISTICS

The three instruments in the Type S-3100 System have identical dimensions of 7" high by 19" wide by 22¾" deep, providing a system height of 21 inches. They mount in a standard 19-inch rack on slideout tracks, and can be pulled out, tilted and locked in any one of seven positions for convenient access.

TYPE S-3100 SYSTEM

Includes a modified Type R568 Oscilloscope, Type R230 Digital Unit, an Auxiliary Unit, a special programmable time-base and a programmable vertical amplifier unit (specify 50-Ω input or 100-kΩ, 2-pF input).

OPTIONS

PROBE CHOPPER

Probe choppers are available for the P6045 probe or P6038 sampling probe. With the probe chopper option, the Type S-3100 System can make DC and pulse voltage measurements with respect to ground and start or stop timing measurements referenced to a specific voltage level.

PROGRAMMABLE PROBE ATTENUATORS

Programmable attenuators for the P6038 and P6045 probes are available which extend the input deflection factor range up to 10 V/div (80-V full scale). Select any combination of four attenuators (X2, X5, X10, X20, X50 or X100). Probe choppers are built-into and included with the programmable probe attenuators.

SELF-CALIBRATION

The self-calibration option checks and adjusts, when necessary, the vertical deflection factor and horizontal sweep rates to within 1%.* This option adds cards to the auxiliary unit and modifies the vertical and horizontal units to permit automatic adjustment of the vertical deflection factor and the horizontal sweep rates.

*Accuracy of the 1 ns/div, 5 mV/div and 10 mV/div positions are within 3%, 5% and 2% respectively.

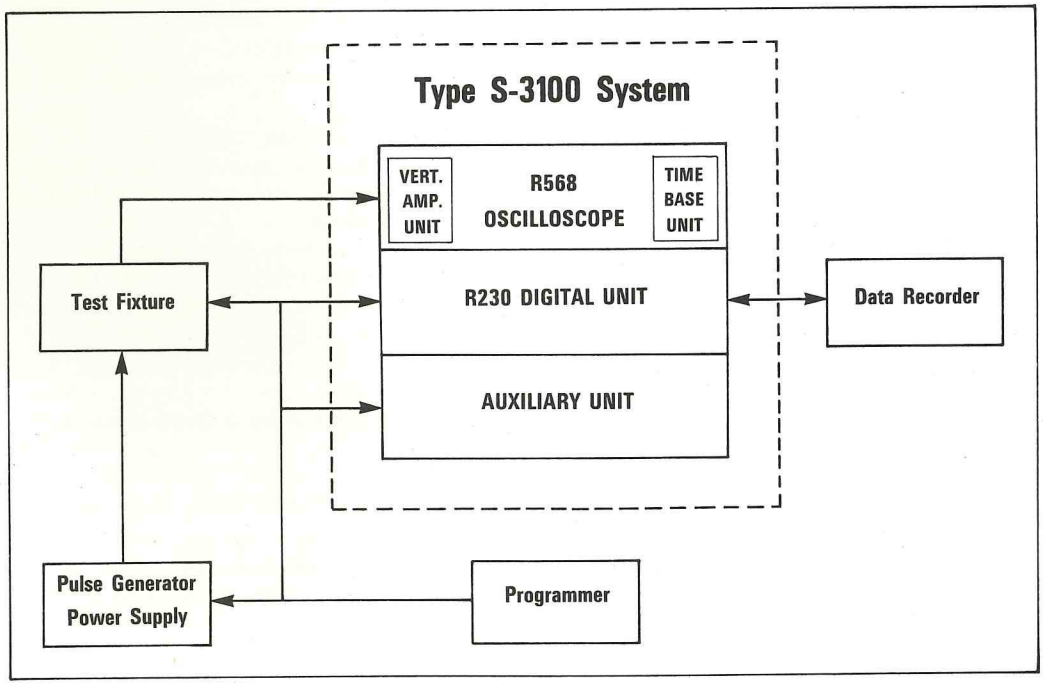
REAL-TIME ADAPTER

If sweep rates slower than 200 μs/cm are required, a Type R283 Real-Time Adapter can be added to the system, thereby extending its measurement capabilities from 1 ms/div to 1 s/div (10 s full scale). An interface card in the Auxiliary Unit converts the Type R283 program logic from positive logic to the standard Type S-3100's negative logic.

For price and availability information, contact your nearby Tektronix Field Engineer.

TYPICAL AUTOMATIC MEASUREMENT SYSTEM

(For further information, consult your Field Engineer)



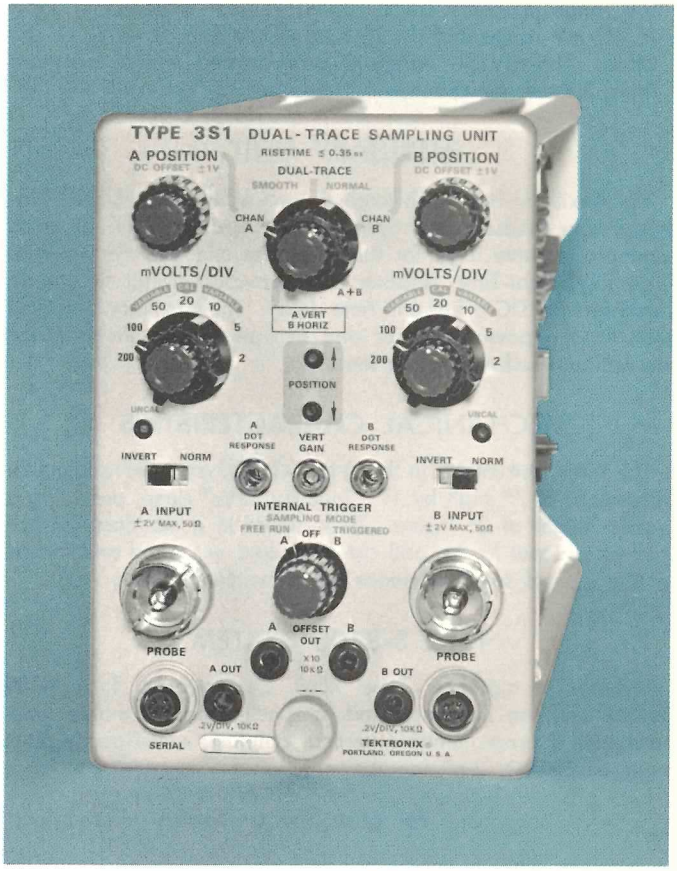
TYPE 3S1 DUAL-TRACE SAMPLING UNIT

- **2 IDENTICAL CHANNELS**
- **350-ps OR LESS RISETIME**
- **INTERNAL TRIGGERING AND DELAY LINES**
- **RECORDER OUTPUTS**

The Type 3S1 Plug-In Amplifier is a dual-trace sampling unit designed for use in the Type 561A, 564, 567 or Type 568 Oscilloscope. The unit can be used with sampling sweep units, or in a real-time sampling mode with real-time time base units.

The Type 3S1 features fast-rise, low-noise performance coupled with excellent transient response. The unit has two identical channels, each with internal trigger takeoff and a signal delay line. It can be operated in any of five modes for a variety of single, dual-trace, or X-Y displays. A DC-Offset provision allows the display of signals with DC voltages up to ±1 volt. Power is provided at the front panel for use with probes and other accessories.

The Type 3S1 is a direct replacement for the Type 3S76 Dual-Trace Sampling Unit.



CHARACTERISTICS

BANDWIDTH
Equivalent to DC-to-1 GHz at 3-dB down.

RISETIME
350 ps or less.

TRANSIENT RESPONSE
±2% or less aberrations in the first 5 ns, ±1% or less after 5 ns (as observed with a Tektronix Type 281 TDR Pulser).

DEFLECTION FACTOR
2 mV/div to 200 mV/div in 7 calibrated steps, 1-2-5 sequence. All steps accurate within 3% with input polarity switch in NORMAL position; within 5% in the INVERTED position. A variable control permits continuous adjustment between steps and to approximately 0.8 mV/div.

INPUT IMPEDANCE
50 ohms. GR 874 input connectors.

DYNAMIC RANGE
Signals through ±2 V may be displayed. Safe overload is ±5 V.

DISPLAY MODES
Channel A only; Channel B only; Dual-Trace—Channels A and B switched electronically on alternate samples; Channels A and B added algebraically; A Vertical/B Horizontal—Channel A deflected vertically and B horizontally for X-Y displays. Independent controls for each channel provide for trace positioning and polarity inversion.

DC-OFFSET RANGE
±1 V or greater. The offset permits the viewing of signals with off-screen amplitudes, or signals riding on a DC voltage, up to ±1 V. An OFFSET OUT is provided for monitoring the voltage at 10X the actual offset, through 10-kohms.

RANDOM NOISE
Equivalent to an input signal of 2 mV or less (tangential) unsmoothed, or 1 mV smoothed.

SIGNAL DELAY
Internal delay line for each channel allows viewing the leading edge of input waveform.

INTERNAL TRIGGER
Front panel switch selects trigger takeoff signal from either channel.

RECORDER SIGNAL OUTPUTS
200 mV/div, DC-coupled through 10-kohms (both channels). Zero volt level corresponds to center of screen.

PROBE POWER
Available at front-panel connectors for accessories such as P6032 Cathode-Follower Probes, Type 281 TDR Pulser, and Type 282 Adapters for high-impedance probes.

STANDARD ACCESSORIES INCLUDED
Two 5-ns 50-Ω cables (017-0502-00); two instruction manuals (070-0632-00).

TYPE 3S1 DUAL-TRACE SAMPLING UNIT $1150

OPTIONAL ACCESSORIES

P6034 10X Probe Package, order 010-0110-00 ..... $35
P6035 100X Probe Package, order 010-0111-00 35
50-Ω X10 Attenuator, order 017-0078-00 30

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TYPE 284 PULSE GENERATOR

- ***PULSE OUTPUT WITH ≤70-ps RISETIME***
- ***SINE WAVE AND SQUARE WAVE OUTPUTS***
- ***COMPACT, SOLID-STATE DESIGN***

The new Type 284 Pulse Generator provides the facility for verifying the performance of Sampling Oscilloscopes. This new generator offers, in one small instrument, all of the signals required to check the risetime, vertical deflection factors, and horizontal sweep rates. A pre-trigger output is also incorporated.

In addition to checking the transient response of sampling oscilloscopes, the fast-rise step of the pulse output is an excellent signal source for TDR measurements. The Type 284 is available in a cabinet version, or modified for rackmounting in standard 19-inch rack using the optional Rack Adapter.

OUTPUT CHARACTERISTICS

PULSE OUTPUT

70 ps or less ristime with a pulse width of 1 μs and a repetition rate of 50 kHz. Aberrations immediately following positive-going transitions are less than ±3%, 3% total peak-to-peak; after 2 ns, less than ±2%, 2% total peak-to-peak. Pulse amplitude is approx +200 mV into 50 ohms. Source impedance is 50 ohms.

SQUARE WAVE OUTPUT

Periods of 10 μs, 1 μs or 100 ns. Output amplitude is 10 mV, 100 mV or 1 V into 50 ohms.

SINE WAVE OUTPUT

Periods of 10 ns or 1 ns. Output amplitude is 100 mV into 50 ohms.

TRIGGER OUTPUT

Amplitude is 200 mV. With PULSE OUTPUT, trigger risetime is 3 ns and occurs either 5 ns or 50 ns before positive-going transition.

TIMING AND AMPLITUDE ACCURACY

OUTPUT	PERIOD	TIMING ACCURACY	AMPLITUDE ACCURACY		
			1 V	100 mV	10 mV
Pulse	20 μs	±10%			
Square Wave	10 μs	±0.5%	±0.5%	±1%	±1.5%
	1 μs				
	100 ns	±0.05%*	±2%†	±2.5%†	±3%†
Sine Wave	10 ns	±1%		±20%	
	1 ns				

* crystal controlled † 20 ns after transition

OTHER

POWER REQUIREMENTS

6.5 watts, 45 Hz to 440 Hz. Quick-change line-voltage selector permits operation from 90 V to 136 V or 180 V to 272 V.

DIMENSIONS AND WEIGHTS

Height	6¾ in	17.2 cm
Width	4½ in	11.4 cm
Depth	15 in	38.1 cm
Net Weight	8½ lbs	3.8 kg
Domestic Shipping Weight	~15½ lbs	~7.1 kg
Export-Packed Weight	~20 lbs	~9.1 kg

INCLUDED STANDARD ACCESSORIES

BNC cable (012-0057-01); right angle 3-conductor power cord (161-0024-00); 3 to 2-wire adapter (103-0013-00); instruction manual (070-0754-00).

TYPE 284 PULSE GENERATOR **$525**
TYPE 284 MOD 146B **$500**
As above, but less cabinet for mounting in Rack Adapter.

RACK ADAPTER FOR TYPE 284

Adapts the Type 284 MOD 146B for rackmounting in a 19-inch rack, in only 5¼ inches of panel height. The Type 284 occupies ¼-rack width. Up to four Type 284's can be mounted side-by-side, or two Type 284's can be mounted along side one ½-rack width generator, such as the Type 106 Squarewave Generator, 114 Pulse Generator, 184 Time-Mark Generator, or 191 Constant-Amplitude Generator. The Adapter provides forced-air ventilation and shielding between compartments. Blank panels are available to cover the unused openings when the adapter is not filled. A divider kit and special power cord are required for each Type 284 installed. Blank panels, divider kits, and special power cords are not included with the Rack Adapter.

RACK ADAPTER (016-0086-01)	$120.00
½-WIDTH BLANK PANEL (016-0081-00)	$ 7.50
¼-WIDTH BLANK PANEL (016-0109-00)	$ 5.00
DIVIDER KIT (016-0089-00)	$ 10.00
SPECIAL POWER CORD (161-0031-00)	$ 2.55

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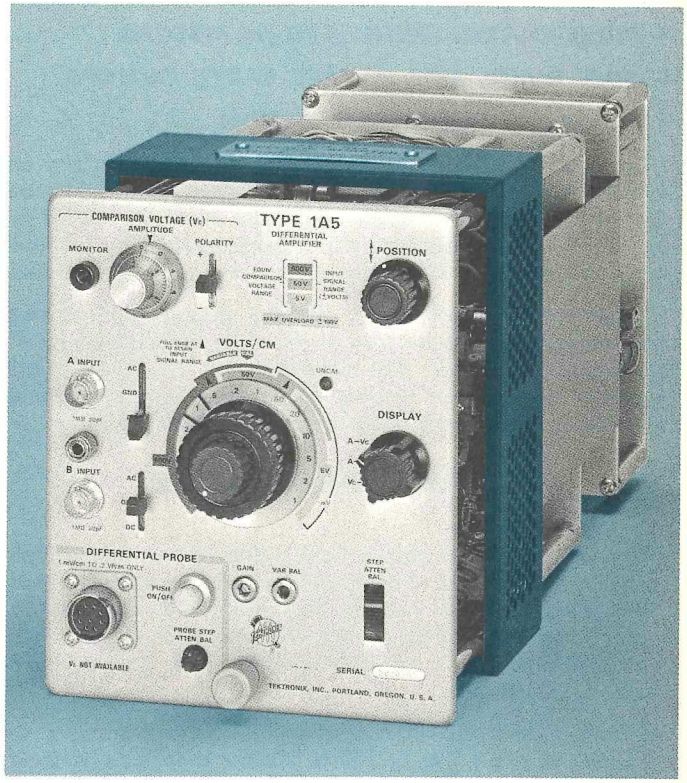
TYPE 81A PLUG-IN UNIT ADAPTER



The Type 81A Adapter allows use of all 1-Series and Letter-Series Plug-In Units with 580-Series Oscilloscopes. The full bandwidth capabilities of the plug-in units are realized. For example, the Type 1A5 Differential Amplifier provides DC-to-50 MHz displays at 5 mV/cm.

No cabling or switching is required; the Type 81A is simply inserted into the oscilloscope, then the plug-in unit is inserted into the adapter.

WEIGHTS

Net weight	4 lbs	1.8 kg
Domestic shipping weight	~ 6 lbs	~3 kg
Export-packed weight	~11 lbs	~5 kg

INCLUDED STANDARD ACCESSORIES

Instruction manual (070-0751-00).

TYPE 81A PLUG-IN ADAPTER $150

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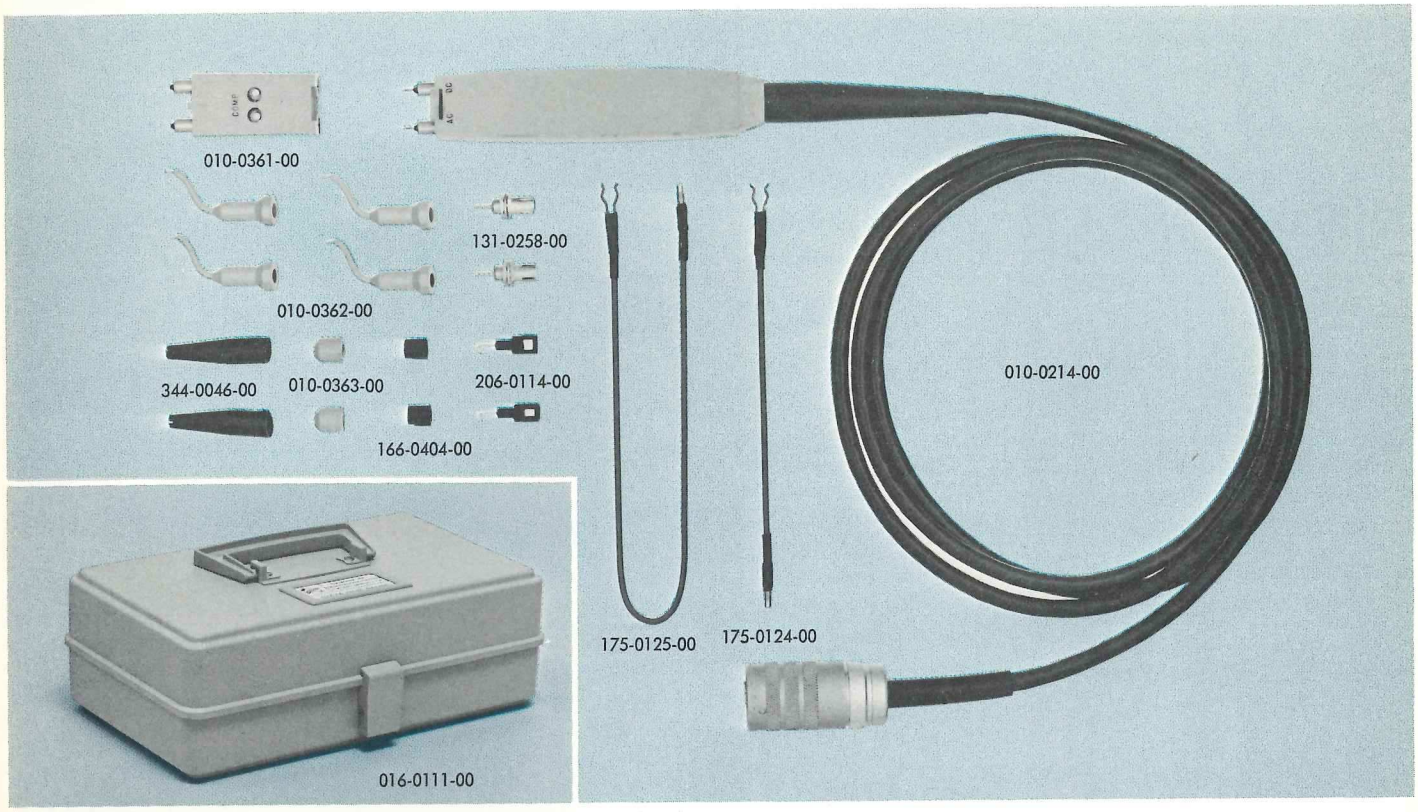
EXTEND CAPABILITIES OF TYPE 580-SERIES OSCILLOSCOPES TO THESE AREAS

VERTICAL PLUG-IN UNITS

PLUG-IN UNIT	MINIMUM DEFLECTION FACTOR	BANDWIDTH (—3 dB)	T_R
MULTIPLE TRACE			
1A1 Dual-Trace	50 mV/cm 5 mV/cm ≈500 μV/cm	DC to 50 MHz DC to 28 MHz 2 Hz to 15 MHz	7 ns 13 ns 24 ns
1A2 Dual-Trace	50 mV/cm	DC to 50 MHz	7 ns
CA Dual-Trace	50 mV/cm	DC to 24 MHz	15 ns
1A4 Four-Trace	10 mV/cm	DC to 50 MHz	7 ns
M Four-Trace	20 mV/cm	DC to 20 MHz	18 ns
SINGLE TRACE			
B	50 mV/cm 5 mV/cm	DC to 20 MHz 2 Hz to 12 MHz	18 ns 30 ns
H	5 mV/cm	DC to 15 MHz	24 ns
K	50 mV/cm	DC to 30 MHz	12 ns
L	50 mV/cm 5 mV/cm	DC to 30 MHz 3 Hz to 24 MHz	12 ns 15 ns
SPECIAL PURPOSE			
O Operational	50 mV/cm	DC to 25 MHz	14 ns
Q Strain Gage	10 μstrain/div	DC to 6 kHz	60 μs

PLUG-IN UNIT	MINIMUM DEFLECTION FACTOR	BANDWIDTH (—3 dB)	T_R
DIFFERENTIAL			
1A5 Comparator	5 mV/cm 2 mV/cm 1 mV/cm	DC to 50 MHz DC to 45 MHz DC to 40 MHz	7 ns 8 ns 9 ns
1A6	1 mV/cm	DC to 2 MHz	0.18 μs
1A7 High-Gain	10 μV/cm	DC to 500 kHz Selectable	0.7 μs
D	1 mV/cm (to 50 mV/cm)	DC to 300 kHz (DC to 2 MHz)	0.18 μs
E	50 μV/cm (to 10 mV/cm)	0.06 Hz to 20 kHz (to 60 kHz) Selectable	6 μs
G	50 mV/cm	DC to 20 MHz	18 ns
W Comparator	1 mV/cm 50 mV/cm	DC to 8 MHz DC to 23 MHz	44 ns 16 ns
Z Comparator	50 mV/cm	DC to 13 MHz	27 ns
SPECTRUM ANALYZERS			
1L5	10 μV/cm	10 Hz to 1 MHz	
1L10	—100 dBm	1 MHz to 36 MHz	
1L20	—110 to —90 dBm	10 MHz to 4.2 GHz	
1L30	—105 to —75 dBm	925 MHz to 10.5 GHz	
WIDE-BAND SAMPLING			
1S1	2 mV/cm	DC to 1 GHz	350 ps
1S2 TDR	5 mρ/cm	140 ps system risetime	
	5 mV/cm	DC to 3.9 GHz	90 ps

P6046 DC-TO-50 MHz DIFFERENTIAL PROBE



The P6046 expands the differential measurement capabilities of the Type 1A5 Plug-In Unit. With this new probe, the differential-signal-adding takes place in the probe itself, resulting in high common-mode signal rejection at higher frequencies. This differential probe-tip performance minimizes the measurement errors caused by differences in probes, cable lengths, and input attenuators. In addition, the wide-band capability of the P6046 assures DC-to-50 MHz performance at the probe tip where the measurements are made.

The probe circuitry utilizes 13 semiconductors including dual FET's for the balanced input. A switch on the probe selects AC or DC input coupling. Accessories include a plug-on 10X attenuator for extending the differential input, and a ground tip for applications requiring single-ended input. Swivel tips provide variable spacing to accommodate the distance between test points.

CHARACTERISTICS

Probe with Type 1A5 Plug-In Unit

ATTENUATION is 1X.

INPUT RESISTANCE is 1 megohm.

INPUT CAPACITANCE is approx 10 pF.

INPUT COUPLING is AC or DC, selected by a switch on the probe. Low frequency response AC-coupled is 3-dB down at 20 Hz, at 2 Hz with 10X attenuator.

COMMON-MODE LINEAR DYNAMIC RANGE is ±5 V (DC + peak AC), ±50 V with 10X attenuator.

COMMON-MODE REJECTION RATIOS with deflection factors of 1 mV/cm to 20 mV/cm are 10,000:1 at DC, 1,000:1 at 50 MHz.

BANDWIDTH/RISETIME

TYPE 1A5 DEFLECTION FACTOR	BANDWIDTH* (—3 dB)	RISETIME*
200 mV/cm to 5 mV/cm	DC to 50 MHz	7 ns
2 mV/cm	DC to 45 MHz	8 ns
1 mV/cm	DC to 40 MHz	9 ns

*With Oscilloscope Types 544, 546, 547, 556, or 581A, 585A with Type 81A Adapter.

MAXIMUM INPUT VOLTAGE is ±25 V (DC + peak AC), ±250 V with 10X attenuator.

NOISE (periodic and random deviation) is 190 μV or less.

THERMAL DRIFT at the probe head is 250 μV/°C or less.

PROBE CABLE is 6 feet long, terminated with a special nine-pin connector.

P6046 PROBE PACKAGE (010-0213-00) **$390**
Package includes: P6046 Probe (010-0214-00); dual 10X attenuator head (010-0361-00); four swivel tip assemblies (010-0362-00); special ground tips (010-0363-00); 5-inch ground lead (175-0124-00); 12-inch ground lead (175-0125-00); two alligator clips (344-0046-00); two hook tips (206-0114-00); two test jacks (131-0258-00); two insulating tubes (166-0404-00); two ground clips †(214-0283-00); carrying case (016-0111-00); instruction manual (070-0745-00).

† not shown

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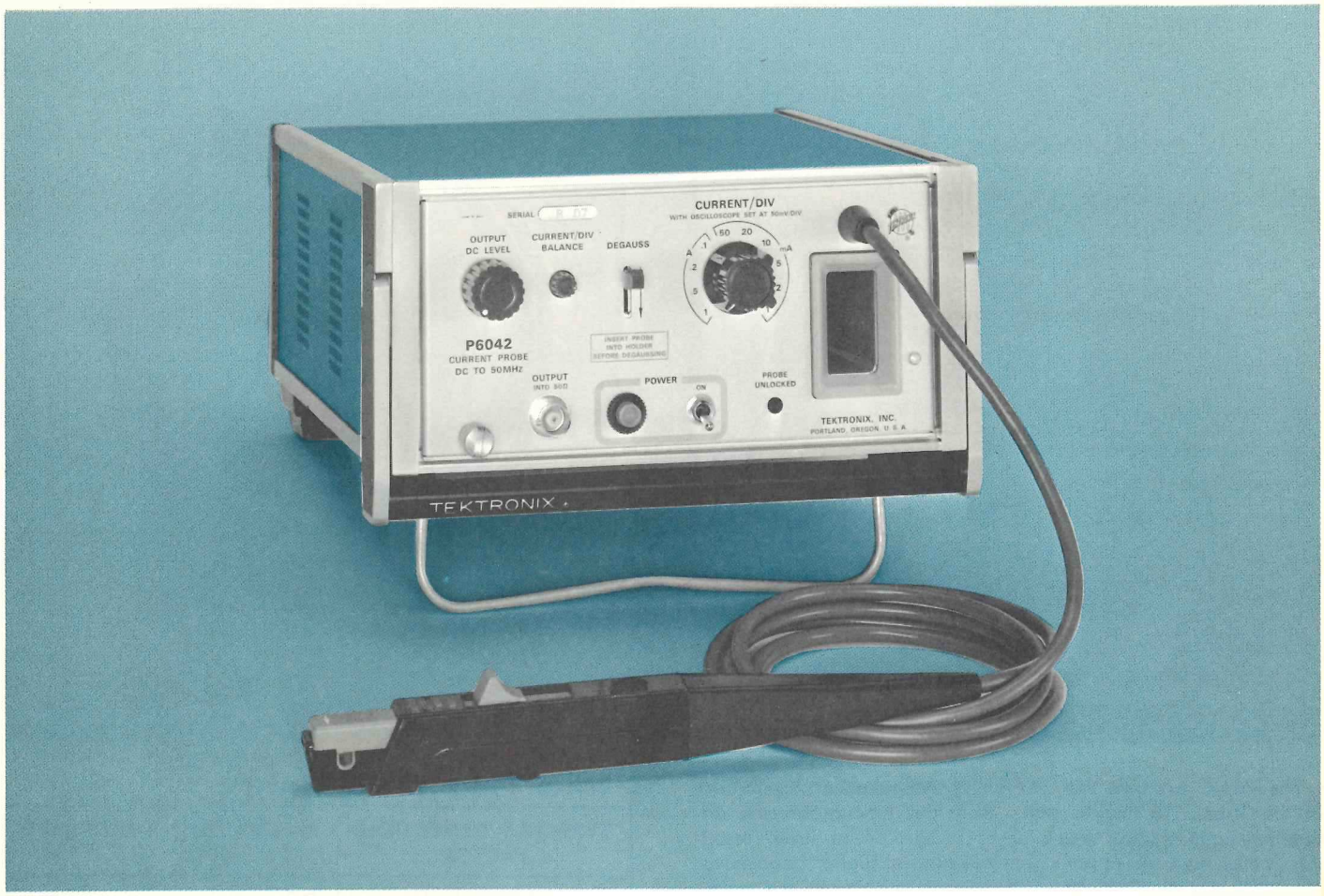
P6042 DC CURRENT PROBE



The new P6042 is a DC-to-50 MHz current probe designed for use with all Tektronix oscilloscopes. Utilizing a variation of the Hall effect, the P6042 offers new capabilities for making both high-frequency and DC current measurements. AC Signals with DC components can be displayed on the oscilloscope with true waveform presentation. The probe is particularly useful for evaluating the performance of semiconductor circuits where a wide range of parameters exist. Fast switching transients, low-frequency response, and DC level can all be displayed simultaneously.

The probe can also be used to measure the sums or differences of currents in separate wires. When the probe is clipped around two wires carrying current in the same direction, the sum is displayed. By reversing one of the wires, the difference is displayed. For increased sensitivity, several loops can be placed through the probe, increasing the sensitivity by the number of loops.

The P6042 consists of an amplifier with built-in power supply, 6-foot probe cable, and probe head. The probe is easy to use. Simply place the conductor* in the slot of the probe head and close the spring-loaded slide . . . no need to break the circuit under test. A warning light on the front panel of the amplifier indicates when the slide is in the unlocked position. A compartment is provided in the front panel for use in degaussing, and for convenient storage of the probe head when the system is not in use.

*up to 0.150 inch diameter.

CHARACTERISTICS

Probe and Amplifier

SENSITIVITY is 1 mA/div to 1 A/div in 10 calibrated steps, 1-2-5 sequence, accurate within 3% (with an oscilloscope deflection factor of 50 mV/div).

BANDWIDTH is DC to 50 MHz at 3-dB down.

RISETIME is 7 ns or less.

DYNAMIC RANGE is + and — 10 divisions of display.

NOISE (periodic and random deviation) is 0.5 mA or less, plus 0.2 or less major divisions of display. Random trace shift is 1.5 mA or less.

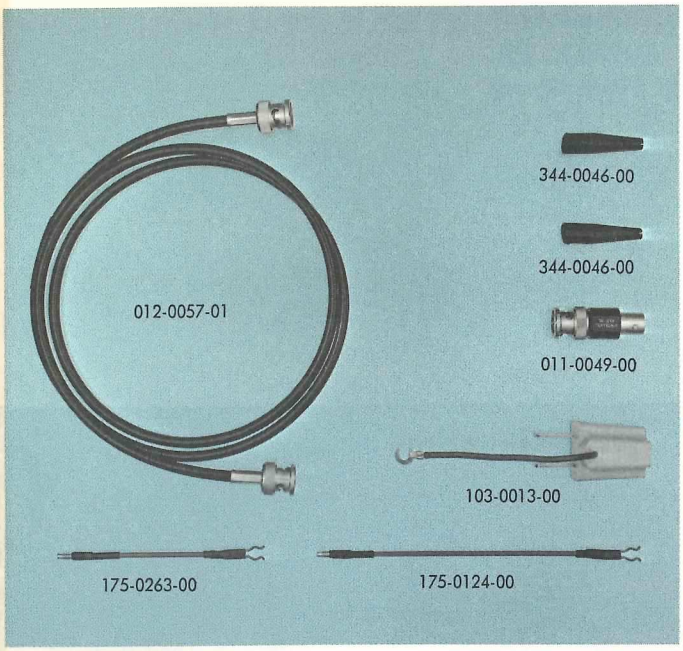
THERMAL DRIFT is 2 mA/°C or less, plus 0.2 or less major division of display per °C.

MAXIMUM INPUT CURRENT is 10 A (DC plus Peak AC).*

MAXIMUM VOLTAGE OF CIRCUIT UNDER TEST is 600 V (DC plus Peak AC).

OUTPUT IMPEDANCE is 50 Ω through a BNC-type connector. A 50-Ω termination is supplied with the probe for use with 1-megohm systems.

*Peak-to-peak current derating is necessary for CW frequencies higher than 2 MHz. At 50 MHz, the maximum allowable current is 2 A.



AMPLIFIER POWER REQUIREMENT is approximately 10 W, 50 Hz to 400 Hz. Quick-change line-voltage selector permits operation from 90 V to 136 V or 180 V to 272 V.

DIMENSIONS AND WEIGHT of the amplifier are 4½ in (11.4 cm) high by 7½ in (19.2 cm) wide by 9¾ in (24.8 cm) deep; 6½ lbs. (3.1 kg).

PROBE CABLE is 6 feet long, permanently connected between the probe head and amplifier.

P6042 DC CURRENT PROBE PACKAGE (010-0207-00) . **$600**
Includes: 50-Ω BNC cable (012-0057-01); 50-Ω BNC termination (011-0049-00); 3-inch ground lead (175-0263-00); 5-inch ground lead (175-0124-00); two alligator clips (344-0046-00); 3-wire to 2-wire adapter (103-0013-00); instruction manual (070-0629-00).

OPTIONAL ACCESSORIES

BNC-to-GR Adapter (017-0063-00) $5.25

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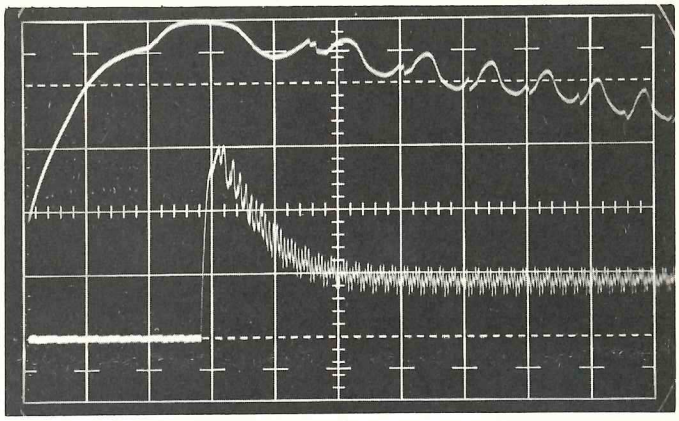
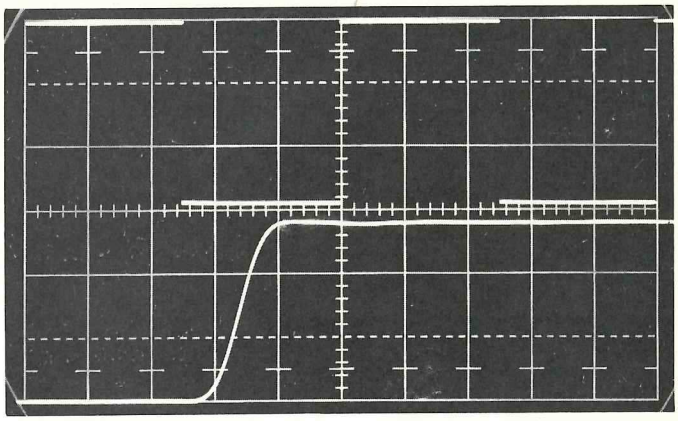


Double exposure photograph using the P6042 and a Type 547/1A5 Oscilloscope to display the current characteristics of a small DC motor. Lower display shows the zero current level, starting current, and running current. Current/div setting is 0.2 A/div with a sweep rate of 50 ms/cm. In the upper display, the sweep rate is increased to 5 ms/cm to show the current change as the commutator bars pass the brushes.



Upper display is a 60 Hz square wave demonstrating the DC response of the P6042. The lower display is the same waveform at 10 ns/div. Double exposure photograph.

FOR FUTURE REFERENCE, ATTACH THIS SUPPLEMENT TO PAGE ONE OF YOUR CATALOG. SIMPLY REMOVE ADHESIVE BACKING AND PRESS FIRMLY IN PLACE.