

Table 1-1
Electrical Characteristics

Characteristics	Performance Requirements
ACQUISITION SYSTEM—CHANNEL 1 AND CHANNEL 2	
Resolution	8 bits. ^a Displayed vertically with 25 digitization levels (DL) ^b per division.
Dynamic Range ^a	
SEC/DIV	
100 or slower	– 128 to + 127 DL's.
50 to 500 ns	– 124 to + 123 DL's.
200 ns	– 121 to + 120 DL's.
100 ns	– 113 to + 112 DL's.
50 ns to 2 ns	
Repet OFF	– 113 to + 112 DL's.
Repet ON	121 to 120 DL's.
Record Length	1024 samples. ^a Displayed horizontally with 50 samples per division, 20.48-division trace length. ^a
Sample Rate	10 samples per second to 500 megasamples per second (5 s per division to 100 ns per division).
Sensitivity	
Range	80 μ V per DL to 0.2 V per DL in a 1-2-5 sequence of 11 steps (2 mV per division to 5 V per division).
Accuracy	
Normal and Average Modes	Within $\pm(2\% + 1 \text{ DL})$ at any VOLTS/DIV setting for a signal 1 kHz or less contained within $\pm 75 \text{ DL}$ (± 3 divisions) of center when a SELF CAL has been performed within $\pm 15^\circ\text{C}$ of the operating temperature. Measured on a four- or five-division signal with VOLTS or V@T cursors; UNITS set to delta volts.
Envelope Mode	Add 1% to Normal Mode specifications.
Variable Range	Continuously variable between VOLTS/DIV settings. Extends sensitivity to 0.5 V per DL or greater, 12.5 V per division or greater.

^aPerformance Requirement not checked in the manual.


^b"DL" is the abbreviation for "digitization level." A DL is the smallest voltage level change that can be resolved by the internal 8-bit A-D converter, with the input scaled to the VOLTS/DIV setting of the channel used. Expressed as a voltage, a DL is equal to 1/25 of a division times the VOLTS/DIV setting.

Table 1-1 (cont)

Characteristics	Performance Requirements
ACQUISITION SYSTEM—CHANNEL 1 AND CHANNEL 2 (cont)	
Bandwidth	<p>Bandwidth is measured with a leveled, low distortion, 50-Ω source, sine-wave generator, terminated in 50 Ω. The reference signal is set to 6 divisions or to the maximum leveled amplitude obtainable if the Volt/Div setting is too high to yield 6 div's on screen.</p> <p>Bandwidth with probe is checked using a probe-tip-to-GR termination adaptor (017-0520-00).</p> <p>Bandwidth with external termination is checked using a BNC 50-Ω feed-through terminator (011-0049-01).</p>
<p>—3 dB Bandwidth</p> <p>Normal or Average Modes. Envelope Mode at SEC/DIV settings of 0.2 μs or faster.</p> <p>–15°C to +30°C +30°C to +55°C</p>	<p>Using standard accessory probe or internal termination (not checked with probe in manual).</p> <p>Dc to 300 MHz. Upper Bandwidth Limit reduced by 2.5 MHz for each °C above 30°C.^a</p>
Envelope Mode at SEC/DIV settings of 0.5 μs or slower.	Dc to 150 MHz using standard accessory probe, internal 50-Ω termination, or external 50-Ω termination on 1-MΩ input. ^a
<p>—4.7 dB Bandwidth</p> <p>Normal or Average Mode. Envelope Mode at SEC/DIV settings of 0.2 μs or faster.</p> <p>+30°C to +55°C</p>	<p>Using 50-Ω external termination on 1-MΩ input.</p> <p>Upper Bandwidth Limit reduced by 2.5 MHz for each °C above 30°C.^a</p>
<p>Single Event Useful Storage Bandwidth</p> <p>Normal or Average Mode, SEC/DIV at 0.1 μs or Faster; Repet OFF</p>	<p>DC to 200 MHz (calculated).</p> $USB = \frac{F_{(\text{sample freq max})}^c}{2.5}$
AC Coupled Lower —3 dB Point	
1X Probe	10 Hz or less. ^a
10X Probe	1 Hz or less. ^a
<p>Step Response, Repet and Average On; Average Set to 16</p> <p>Rise Time</p>	<p>1.17 ns or less (calculated).^a</p> $T_r (\text{in ns}) = \frac{350}{BW (\text{in MHz})}$


^aPerformance Requirement not checked in the manual.^cSample freq. max. is 500 MHz.

Table 1-1 (cont)

Characteristics	Performance Requirements
ACQUISITION SYSTEM—CHANNEL 1 AND CHANNEL 2 (cont)	
Envelope Mode Pulse Response	
Minimum Single Pulse Width for 50% or Greater Amplitude Capture at 85% or Greater Confidence	2 ns. ^a
Minimum Single Pulse Width for Guaranteed 50% or Greater Amplitude Capture	8 ns. ^a
Channel Isolation	Measured with a 10-division, sine-wave input and equal VOLT/DIV settings on both channels. 100:1 or greater at 100 MHz for VOLT/DIV settings from 2 mV/DIV and 500 mV/DIV; 50:1 or greater at 300 MHz for VOLT/DIV settings from 20 mV/DIV to 500 mV/DIV. 25:1 or greater at 300 MHz for VOLT/DIV settings of 5 mV/DIV and 10 mV/DIV.
Acquired Channel 2 Signal Delay with Respect to Channel 1 Signal at Full Bandwidth	± 250 ps. ^a
Input R and C (1 M Ω)	
Resistance	1 M $\Omega \pm 0.5\%$. ^a In each attenuator, the input resistance of all VOLTS/DIV positions is matched to within 0.5%. ^a
Capacitance	15 pF ± 2 pF. ^a In each attenuator, the input capacitance of all VOLTS/DIV positions is matched to within 0.5 pF. ^a
Input R (50 Ω)	
Resistance	50 $\Omega \pm 1\%$. ^a
VSWR (DC to 300 MHz)	1.3:1 or better. ^a
Maximum Input Voltage 	5 V rms; 0.5 W-sec for any one-second interval for instantaneous voltages from 5 V to 50 V.

^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
ACQUISITION SYSTEM—CHANNEL 1 AND CHANNEL 2 (cont)	
Maximum Input Voltages 	
Input Coupling Set to DC, AC, or GND	400 V (dc + peak ac); 800 V p-p ac at 10 kHz or less. ^a
Common-Mode Rejection Ratio (CMRR); ADD Mode with Either Channel Inverted	At least 10:1 at 50 MHz for common-mode signals of 10 divisions or less with VARIABLE VOLTS/DIV adjusted for best CMRR at 50 kHz.
POSITION	
Range	\pm (9.3 to 10.4) div., at 50 mV per division with INVERT off, when Self Cal has been done within $\pm 5^{\circ}\text{C}$ of the operating temperature.
Gain Match between NORMAL and SAVE	± 3 DLs for positions within ± 5 divisions from center.
Low-Frequency Linearity	
Normal or Average Mode	3 DLs or less compression or expansion of a two-division, center-screen signal when positioned anywhere within the acquisition window.
20-MHz Bandwidth Limiter	
–3 dB Bandwidth	13 MHz to 24 MHz.
100-MHz Bandwidth Limiter	
–3 dB Bandwidth	80 MHz to 120 MHz.
Rise Time	2.9 ns to 4.4 ns. ^a
	With a five-division, fast-rise step (rise time of 300 ps or less) using 50- Ω dc input coupling and VOLTS/DIV setting of 10 mV. ^a


^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
TRIGGERING—A and B	
Minimum P-P Signal Amplitude for Stable ^a Triggering from Channel 1, Channel 2, or ADD Source	
A Trigger	
DC Coupled	0.35 division from DC to 50 MHz, increasing to 1.0 division at 300 MHz; 1.5 divisions at 300 MHz in ADD mode.
NOISE REJ Coupled	1.2 divisions or less from DC to 50 MHz; increasing to 3 divisions at 300 MHz; 4.5 divisions at 300 MHz in ADD mode.
AC Coupled	0.35 division from 60 Hz to 50 MHz; increasing to 1.0 division at 300 MHz; 1.5 divisions at 300 MHz in ADD mode. Attenuates signals below 60 Hz.
HF REJ Coupled	0.50 division from DC to 30 kHz. Attenuates signals above 30 kHz.
LF REJ Coupled	0.50 division from 80 kHz to 50 MHz; increasing to 1.0 division at 300 MHz; 1.5 divisions at 300 MHz in ADD mode. Attenuates signal below 80 kHz.
B Trigger	Multiply all A Trigger specifications by two.
A.B Selected	Multiply all A Trigger specifications by two.
Minimum P-P Signal Amplitude for Stable Triggering ^a from EXT TRIG 1 or EXT TRIG 2 Source	
A Trigger	
EXT Gain = 1	
DC Coupled	17.5 mV from DC to 50 MHz, increasing to 50 mV at 300 MHz.
NOISE REJ Coupled	60 mV or less from DC to 50 MHz; increasing to 150 mV at 300 MHz.
AC Coupled	17.5 mV from 60 Hz to 50 MHz; increasing to 50 mV at 300 MHz. Attenuates signals below 60 Hz.
HF REJ Coupled	25 mV from DC to 30 kHz.
LF REJ Coupled	25 mV from 80 kHz to 50 MHz; increasing to 50 mV at 300 MHz.
EXT Gain = $\div 5$	Amplitudes are five times those specified for Ext Gain = 1.
B Trigger	Multiply all A Trigger amplitude specifications by two.
A.B Selected	Multiply all A Trigger amplitude specifications by two.

^aA stable trigger is one that results in a uniform, regular display triggered on the selected slope (\pm). A stably-triggered display should NOT have the trigger point switch between opposite slopes on the waveform, nor should it "roll" across the screen, as successive acquisitions occur. At TIME/DIV settings of 2 ms/DIV and faster, the TRIG'D LED is constantly lit if the display is stably triggered (the LED can flash for SEC/DIV settings of 10 ms/DIV and slower).

Table 1-1 (cont)

Characteristics	Performance Requirements
TRIGGERING—A and B (cont)	
Maximum P-P Signal Rejected by NOISE REJ Coupling Signals within the Vertical Bandwidth Channel 1 or Channel 2 Source	0.4 division or greater for VOLTS/DIV settings of 10 mV and higher. Maximum noise rejected is reduced at 2 mV per division and 5 mV per division.
EXT TRIG 1 or EXT TRIG 2 Source	20 mV or greater when Ext Trig Gain = 1. 100 mV or greater when Ext Trig Gain = $\div 5$.
EXT TRIG 1 and EXT TRIG 2 Inputs	
Resistance	1 M Ω \pm 1%. ^a
Capacitance	15 pF \pm 3 pF. ^a
Maximum Input Voltage 	400 V (dc + peak ac); 800 V p-p ac at 10 kHz or less. ^a
LEVEL Control Range	
Channel 1 or Channel 2 Source	± 18 divisions \times VOLTS/DIV setting. ^a
EXT TRIG 1 or EXT TRIG 2 Source	
EXT GAIN = 1	± 0.9 volt. ^a
EXT GAIN = $\div 5$	± 4.5 volts. ^a
LEVEL Readout Accuracy (for triggering signals with transition times greater than 20 ns) Channel 1 or Channel 2 Source	
DC Coupled +15°C to +35°C	Within \pm [3% of setting + 3% of p-p signal + (0.2 division \times VOLTS/DIV setting) + 0.5 mV + (0.5 mV \times probe attenuation factor)].
-15°C to +55°C (excluding +15°C to +35°C)	Add (1.5 mV \times probe attenuation) to +15°C to +35°C specification. ^a
NOISE REJ Coupled	Add \pm (0.6 division \times VOLTS/DIV setting) to DC Coupled specifications. Checked at 50 mV per division.

^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements		
TRIGGERING—A and B (cont)			
LEVEL Readout Accuracy (for triggering signals with transition times greater than 20 ns)			
(continued)			
EXT TRIG 1 or EXT TRIG 2 Source			
EXT GAIN = 1			
DC Coupled	Within \pm [3% of setting + 4% of p-p signal + 10 mV + (0.5 mV \times probe attenuation factor)].		
NOISE REJ Coupled	Add \pm 30 mV to DC Coupled specifications.		
EXT GAIN = \div 5			
DC Coupled	Within \pm [3% of setting + 4% of p-p signal + 50 mv + (0.5 mV \times probe attenuation factor)].		
NOISE REJ Coupled	Add \pm 150 mV to DC Coupled specifications.		
Variable A Trigger Holdoff	A SEC/DIV ^a	MIN HO ^a	MAX HO ^a
	2 ns	2-4 μ s	9-15 μ s
	5 ns		
	10 ns		
	20 ns		
	50 ns		
	100 ns		
	200 ns		

Table 1-1 (cont)

Characteristics	Performance Requirements		
TRIGGERING—A and B (cont)			
Variable A Trigger Holdoff (cont)	A SEC/DIV ^a	MIN HO ^a	MAX HO ^a
	500 ns	5-10 μs	
	1 μs	10-20 μs	100-150 μs
	2 μs	20-40 μs	
	5 μs	50-100 μs	
	10 μs	0.1-0.2 ms	1-1.5 ms
	20 μs	0.2-0.4 ms	
	50 μs	0.5-1.0 ms	
	100 μs	1-2 ms	10-15 ms
	200 μs	2-4 ms	
	500 μs	5-10 ms	
	1 ms	10-20 ms	90-150 ms
	2 ms	20-40 ms	
	5 ms	50-100 ms	
	10 ms	0.1-0.2 s	0.9-1.5 s
20 ms	0.2-0.4 s		
50 ms	0.5-1.0 s		
100 ms	1-2 s	9-15 s	
200 ms	2-4 s		
500 ms	5-10 s		
1 s			
2 s			
5 s			
SLOPE Selection	Conforms to trigger-source and ac-power-source waveforms.		
Trigger Position Jitter (P-P)	Checked in NORMAL ACQUIRE mode with a 5-division step having less than or equal to 1 ns rise time.		
A Mode, B Mode (TRIG AFTER)			
SEC/DIV 100 ns and slower	0.04 x SEC/DIV setting ^{a,b}		
SEC/DIV 50 ns and faster	(0.04 x SEC/DIV setting) + 200 ps ^{a,b}		
B Mode (RUNS AFTER)			
SEC/DIV 50 ns and faster	(0.04 x B SEC/DIV + 200 ps ^a		
SEC/DIV 50 μs to 100 ns	0.04 x B SEC/DIV ^a		
SEC/DIV 100 μs and slower	0.08 x B SEC/DIV ^a		

^aPerformance Requirements not checked in the manual.^bUse B SEC/DIV setting if mode is B; otherwise, use A SEC/DIV setting.

Table 1-1 (cont)

Characteristics	Performance Requirements
TIME BASE	
Sample Rate Accuracy Average Over 100 or More Samples	$\pm 0.0015\%$. ^a
External Clock Repetition Rate	
Minimum	1 MHz. ^a
Maximum	100 MHz. ^a
Events Count	1 to 65,536 ^a
Events Maximum Repetition Rate	100 MHz. ^a
Signal Levels Required for EXT Clock or EVENTS Channel 1 or Channel 2 SOURCE	
DC Coupled	0.7 division from DC to 50 MHz; increasing to 2.0 divisions at 100 MHz; 3.0 divisions at 100 MHz in ADD mode. ^a
NOISE REJ Coupled	2.4 divisions or less from DC to 50 MHz; increasing to 6.0 divisions at 100 MHz; 9.0 divisions at 100 MHz in ADD mode. ^a
AC Coupled	0.7 division from 60 Hz to 50 MHz; increasing to 2.0 divisions at 100 MHz; 3.0 divisions at 100 MHz in ADD mode. Attenuates signals below 60 Hz. ^a
HF REJ Coupled	1.0 division from DC to 30 kHz. Attenuates signals above 30 kHz. ^a
LF REJ Coupled	1.0 division from 80 kHz to 50 MHz; increasing to 2.0 divisions at 100 MHz; 3.0 divisions at 100 MHz in ADD mode. Attenuates signals below 80 kHz. ^a
EXT TRIG 1 or EXT TRIG 2 Source Ext Gain = 1	
DC Coupled	35 mV from DC to 50 MHz; increasing to 100 mV at 100 MHz. ^a
NOISE REJ Coupled	120 mV or less from DC to 50 MHz; increasing to 300 mV at 100 MHz. ^a
AC Coupled	35 mV from 60 Hz to 50 MHz; increasing to 100 mV at 100 MHz. Attenuates signals below 60 Hz. ^a
HF REJ Coupled	50 mV from DC to 30 kHz. ^a
LF REJ Coupled	50 mV from 80 kHz to 50 MHz; increasing to 100 mV at 100 MHz. ^a
Ext Gain = $\div 5$	Amplitudes are five times those specified for Ext Gain = 1. ^a

^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
TIME BASE (cont)	
Delay Time Range	
B RUNS AFTER DELAY	
SEC/DIV 50 ns and faster	
REPET ON	$(0.08 \times B \text{ SEC/DIV})$ to 1.05 ms. ^a
REPET OFF	$(0.08 \times B \text{ SEC/DIV})$ to 524 μs . ^a
SEC/DIV 50 μs to 100 ns	$(0.08 \times B \text{ SEC/DIV})$ to $(65,536 \times 0.08 \times B \text{ SEC/DIV})$. ^a
SEC/DIV 100 μs and slower	$(0.04 \times B \text{ SEC/DIV})$ to $(65,536 \times 0.04 \times B \text{ SEC/DIV})$. ^a
B TRIGGERABLE AFTER DELAY	
SEC/DIV 50 ns and faster	
REPET ON	16 ns to 1.05 ms. ^a
REPET OFF	8 ns to 524 μs . ^a
SEC/DIV 50 μs to 100 ns	$(0.08 \times B \text{ SEC/DIV})$ to $(65,536 \times 0.08 \times B \text{ SEC/DIV})$. ^a
SEC/DIV 100 μs and slower	$(0.04 \times B \text{ SEC/DIV})$ to $(65,536 \times 0.04 \times B \text{ SEC/DIV})$. ^a
Delay Time Resolution	
B RUNS AFTER DELAY	
SEC/DIV 50 μs and faster	$(0.08 \times B \text{ SEC/DIV})$. ^a
SEC/DIV 100 μs and slower	$(0.04 \times B \text{ SEC/DIV})$. ^a
B TRIGGERABLE AFTER DELAY	
SEC/DIV 50 ns and faster	
REPET ON	16 ns. ^a
REPET OFF	8 ns. ^a
SEC/DIV 50 μs to 100 ns	$(0.08 \times B \text{ SEC/DIV})$. ^a
SEC/DIV 100 μs and slower	$(0.04 \times B \text{ SEC/DIV})$. ^a
Delay Time Accuracy	$\pm 0.0015\%$. ^a

^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
NONVOLATILE MEMORY	
Front-Panel Setting, Waveform Data, Sequencer, and Calibration Data Retention Time	Greater than 3 years.
Battery	<p>3.6-volt, 1.6-Amp Hour, Lithium Thionyl Chloride; Manufacturer EAGLE PICHER, Type LTC16P/P, TEK Part Number 146-0062-00; UL Listed. (See Warning below.)</p> <div data-bbox="1029 531 1211 590" style="border: 1px solid black; padding: 2px; text-align: center;">WARNING</div> <p><i>To avoid personal injury, observe proper procedures for handling and disposal of lithium batteries. Improper handling may cause fire, explosion, or severe burns. Don't recharge, crush, disassemble, heat the battery above 212°F (100°C), incinerate, or expose contents of the battery to water. Dispose of battery in accordance with local, state, and national regulations.</i></p> <p><i>Typically, small quantities (less than 20) can be safely disposed of with ordinary garbage in a sanitary landfill.</i></p> <p><i>Larger quantities must be sent by surface transport to a hazardous waste disposal facility. The batteries should be individually packaged to prevent shorting and packed in a sturdy container that is clearly labeled "Lithium Batteries—DO NOT OPEN".</i></p>

Table 1-1 (cont)

Characteristics	Performance Requirements			
SIGNAL OUTPUTS				
CALIBRATOR	CALIBRATOR output amplitudes at 5 MHz are at least 50% of output amplitudes at 1 ms SEC/DIV setting. ^a			
Voltage (with A SEC/DIV switch set to 1 ms)				
1 MΩ Load	0.4 V ± 1%. ^a			
50 Ω Load	0.2 V ± 1.5%. ^a			
Current (short circuit load with A SEC/DIV switch set to 1 ms)	8 mA ± 1.5%. ^a			
Repetition Period	A SEC/DIV Setting ^a	Calibrator Frequency ^a	Calibrator Period ^a	Div/ Cycle ^a
	2 ns	5 MHz	200 ns	100
	5 ns			40
	10 ns			20
	20 ns			10
	50 ns			4
	100 ns			2
	200 ns			1
	500 ns	1 MHz	1 μs	2
	1 μs			1
	2 μs			0.5
	5 μs	50 kHz	20 μs	4
	10 μs			2
	20 μs			1
	50 μs	5 kHz	200 μs	4
	100 μs			2
	200 μs			1
	500 μs	500 Hz	2 ms	4
	1 ms			2
	2 ms			1
	5 ms	50 Hz	20 ms	4
	10 ms			2
	20 ms			1
	50 ms			0.4
	100 ms			0.2
	200 ms			0.1
	500 ms			0.04
	1 s			0.02
	2 s			0.01
	5 s			0.004

^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
SIGNAL OUTPUTS (cont)	
CH 2 SIGNAL OUTPUT	
Output Voltage	20 mV per division $\pm 10\%$ into 1 M Ω . 10 mV per division $\pm 10\%$ into 50 Ω .
Offset	± 10 mV into 50 Ω , when dc balance has been performed within $\pm 5^\circ\text{C}$ of the operating temperature.
–3 dB Bandwidth	DC to greater than 50 MHz.
A TRIGGER, RECORD TRIGGER, and WORD RECOGNIZER Output	
Logic Polarity	Negative true. Trigger occurrence indicated by a HI to LO transition. ^a
Output Voltage HI	
Load of 400 μA or Less	2.5 V to 3.5 V. ^a
50 Ω Load to Ground	0.45 V or greater. ^a
Output Voltage LO	
Load of 4 mA or Less	0.5 V or less. ^a
50 Ω Load to Ground	0.15 V or less. ^a
SEQUENCE OUT, STEP COMPLETE Outputs	
Logic Polarity	Negative true. HI to LO transition indicates the event occurred.
Output Voltage HI	
Load of 400 μA or less	2.5 V to 3.5 V. ^a
50- Ω Load to Ground	0.45 V or greater. ^a
Output Voltage LO	
Load of 4 mA or less	0.5 V or less. ^a
50- Ω Load to Ground	0.15 V or less. ^a
SEQUENCE IN Input	
Logic Polarity	Negative true. HI to LO transition restarts a paused sequence. ^a
High-Level Input Current	20 μA maximum at $V_{\text{in}} = 2.7 \text{ V}$. ^a
Low-Level Input Current	–0.4 mA maximum at $V_{\text{in}} = 0.4 \text{ V}$. ^a
High-Level Input Voltage	2.0 V minimum. ^a
Low-level Input Voltage	0.8 V maximum. ^a
Absolute Maximum Ratings	
V_{in} max	+7.0 V. ^a
V_{in} min	–0.5 V. ^a

^aPerformance Requirements not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
DISPLAY	
Graticule	80 mm × 100 mm (8 × 10 divisions). ^a
Phosphor	P31. ^a
Nominal Accelerating Potential	16 kV. ^a
Waveform and Cursor Display, Vertical	
Resolution, Electrical	One part in 1024 (10 bit). Calibrated for 100 points per division. ^a
Gain Accuracy	Graticule indication of voltage cursor difference is within 1% of CRT cursor readout value, measured over center 6 divisions.
Centering; Vectors OFF	Within ±0.1 division.
Offset with Vectors ON	Less than 0.05 division.
Linearity	Less than 0.1 division difference between graticule indication and crt cursor readout when active volts cursor is positioned anywhere on screen and inactive cursor is at center screen. ^a
Vector Response	
NORMAL Mode	
Step Aberration	+4%, -4%, 4% p-p.
Fill	Edges of filled regions match reference lines within ±0.1 division.
ENVELOPE Mode	
Fill	Less than 1% change in p-p amplitude of a 6-division, filled ENVELOPE waveform when switching vectors ON and OFF.
Waveform and Cursor Display, Horizontal	
Resolution, Electrical	One part in 1024 (10 bit). Calibrated for 100 points per division. ^a
Gain Accuracy	Graticule indication at time cursor difference is within 1% of crt cursor readout value, measured over center 6 divisions.
Centering; Vectors OFF	Within ±0.1 division.
Offset with Vectors ON	Less than 0.05 division.
Linearity	Less than 0.1 division difference between graticule indication and crt cursor readout when active time cursor is positioned anywhere along center horizontal graticule line and inactive cursor is at center screen. ^a

^aPerformance Requirement not checked in the manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
AC POWER SOURCE	
Source Voltage	
Nominal Ranges	
115 V	90 V to 132 V. ^a
230 V	180 V to 250 V. ^a
Source Frequency	48 Hz to 440 Hz. ^a
Fuse Rating	5 A, 250 V, AGC/3AG, Fast Blow; or 4 A, 250 V, 5 × 20 mm Time-Lag (T). ^a Each fuse type requires a different fuse cap. ^a
Power Consumption	
Typical (standard instrument)	160 watts (250 VA). ^a
Maximum (fully optioned instrument)	200 watts (300 VA). ^a
Primary Grounding ^c	Type test 0.1 Ω maximum. Routine test to check grounding continuity between chassis ground and protective earth ground. ^a

^aPerformance Requirement not checked in the manual.

^cRoutine test is with ROD-L/EPA Electronic Model 100AV Hi-Pot Tester. This tests both the Primary Circuit Dielectric Withstand and Primary Grounding in one operation. Contact Tektronix Product Safety prior to using any other piece of equipment to perform these tests.

Table 1-2
Environmental Characteristics

Characteristics	Performance Requirements
STANDARD INSTRUMENT	
Environmental Requirements	This Oscilloscope meets the environmental requirements of MIL-T-28800C for Type III, Class 3, Style D equipment, with the humidity and temperature requirements defined in paragraphs 3.9.2.2, 3.9.2.3, and 3.9.2.4.
Temperature	
Operating	–15°C to +55°C.
Nonoperating (storage)	–62°C to +85°C.
Altitude	
Operating	To 15,000 feet (4500 meters). Maximum operating temperature decreased 1°C for each 1000 feet (300 meters) above 5000 feet (1500 meters).
Nonoperating (storage)	To 50,000 feet (15,000 meters).
Humidity	
Operating and Storage	Stored at 95% relative humidity for five cycles (120 hours) from 30°C to 60°C, with operation performance checks at 30°C and 55°C.
Vibration	
Operating	15 minutes along each of three axes at a total displacement of 0.025 inch (0.64 mm) p-p (4 g at 55 Hz), with frequency varied from 10 Hz to 55 Hz in one-minute sweeps. Hold 10 minutes at each major resonance, or if none exist, hold 10 minutes at 55 Hz (75 minutes total test time).
Shock	
Operating and Nonoperating	50-g, half-sine, 11-ms duration, three shocks on each face, for a total of 18 shocks.
Transit Drop (not in shipping package)	12-inch (300-mm) drop on each corner and each face (exceeds MIL-T-28800C, paragraphs 3.9.5.2 and 4.5.5.4.2).
Bench Handling	
Cabinet On and Cabinet Off	MIL-STD-810C, Method 516.2, Procedure V (MIL-T-28800C, Paragraph 4.5.5.4.3).
Topple (cabinet installed)	
Operating	Set on rear feet and allow to topple over onto each of four adjacent faces (Tektronix Standard 062-2858-00).
Packaged Transportation	
Drop	Meets the limits of the National Safe Transit Assn., test procedure 1A-B-2; 10 drops of 36 inches (914 mm) (Tektronix Standard 062-2858-00).
Vibration	Meets the limits of the National Safe Transit Assn., test procedure 1A-B-1; excursion of 1 inch (25.4 mm) p-p at 4.63 Hz (1.1 g) for 30 minutes (Tektronix Standard 062-2858-00).

Table 1-2 (cont)

Characteristics	Performance Requirements
STANDARD INSTRUMENT (cont)	
Environmental Requirements (cont)	
EMI (electromagnetic interference)	Meets MIL-T-28800C; MIL-STD-461B, part 4 (CE-03 and CS-02), part 5 (CS-06 and RS-02), and part 7 (CS-01, RE-02, and RS-03—limited to 1 GHz); VDE 0871, Category B; Part 15 of FCC Rules and Regulations, Subpart J, Class A; and Tektronix Standard 062-2866-00.
Electrostatic Discharge Susceptibility	Meets Tektronix Standard 062-2862-00. The instrument will not change control states with discharges of less than 10 kV.
X-Ray Radiation	Meets requirements of Tektronix Standard 062-1860-00.
RACKMOUNTED INSTRUMENT	
Environmental Requirements	Listed characteristics for vibration and shock indicate those environments in which the rackmounted instrument meets or exceeds the requirements of MIL-T-28800C with respect to Type III, Class 5, Style D equipment with the rackmounting rear-support kit installed. Refer to the Standard Instrument Environmental Specification for the remaining performance requirements. Instruments will be capable of meeting or exceeding the requirements of Tektronix Standard 062-2853-00, class 5.
Temperature (operating)	–15°C to +55°C, ambient temperature measured at the instrument's air inlet. Fan exhaust temperature should not exceed +65°C.
Vibration	15 minutes along each of three major axes at a total displacement of 0.015 inch (0.38 mm) p-p (2.3 g at 55 Hz), with frequency varied from 10 Hz to 55 Hz to 10 Hz in one-minute sweeps. Hold 10 minutes at each major resonance, or if no major resonance is present, hold 10 minutes at 55 Hz (75 minutes total test time).
Shock (operating and nonoperating)	30-g, half-sine, 11-ms duration, three shocks per axis in each direction, for a total of 18 shocks.

Table 1-3
Mechanical Characteristics

Characteristics	Description
STANDARD INSTRUMENT	
Weight	
With Front Cover, Accessories, and Accessories Pouch	≈12.8 kg (28.1 lbs).
Without Front Cover, Accessories, and Accessories Pouch	≈10.9 kg (23.9 lbs).
Domestic Shipping Weight	≈16.4 kg (36 lbs).
Overall Dimensions	See Figure 1-1 for a dimensional drawing.
Height	
With Feet and Accessories Pouch	190 mm (7.48 in).
Without Accessories Pouch	160 mm (6.3 in).
Width (with handle)	330 mm (13.0 in).
Depth	
With Front Cover	479 mm (18.86 in).
With Handle Extended	550 mm (21.65 in).
Cooling	Forced air circulation; no air filter.
Finish	Tektronix Blue vinyl-clad material on aluminum cabinet.
Construction	Aluminum-alloy/plastic-composite chassis (spot-molded). Plastic-laminate front panel. Glass-laminate circuit boards.
RACKMOUNTING	
Rackmounting Conversion Kit	
Weight	4.0 kg (8.8 lbs).
Domestic Shipping Weight	6.3 kg (13.8 lbs).
Height	178 mm (7 in).
Width	483 mm (19 in).
Depth	419 mm (16.5 in).
Rear Support Kit	
Weight	0.68 kg (1.5 lbs).
OPTION 1R	
Rackmounted Instrument (Option 1R)	
Weight	≈15.8 kg (34.9 lbs).
Domestic Shipping Weight	≈18.1 kg (39.9 lbs).
Height	178 mm (7 in).
Width	483 mm (19 in).
Depth	419 mm (16.5 in).

Table 1-4
Option 05 (TV Trigger) Electrical Characteristics

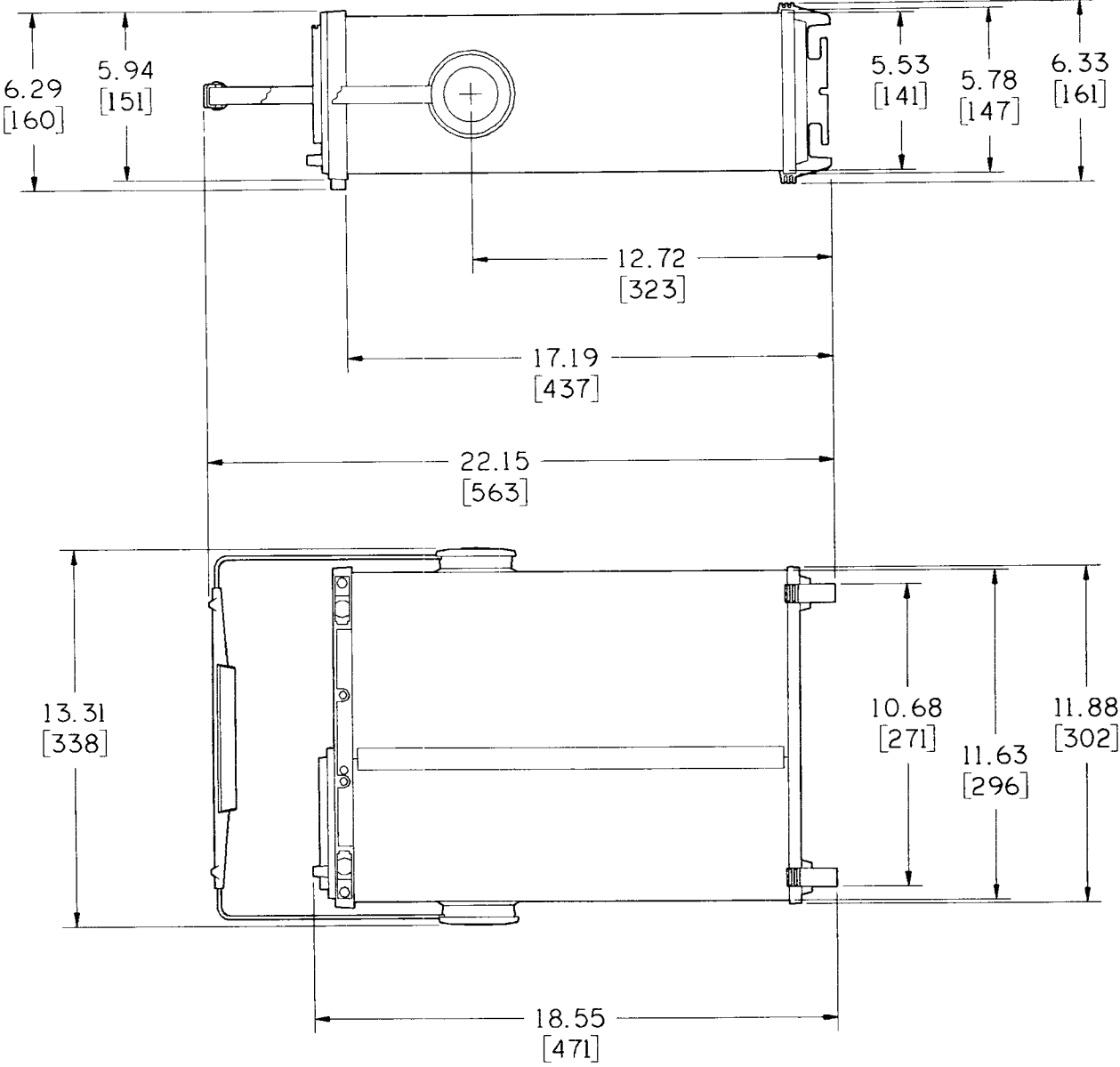
Characteristics	Performance Requirements
VERTICAL—CHANNEL 1 AND CHANNEL 2	
Frequency Response	
Full Bandwidth	
50 kHz to 5 MHz	Within $\pm 1\%$.
Greater than 5 MHz to 10 MHz	Within $+1\%$, -2% .
Greater than 10 MHz to 30 MHz	Within $+2\%$, -3% . For VOLTS/DIV switch settings between 5 mV and 0.2 V per division with VARIABLE VOLTS/DIV set to CAL. Five-division, 50 kHz reference signals from a 50 Ω system. With external 50 Ω termination on a 1 M Ω input.
20 MHz Bandwidth Limit	
50 kHz to 5 MHz	Within $+1\%$, -4% .
Square Wave Flatness	
Field Rate	
5 mV/div to 20 mV/div	$\pm 1\%$, 1% p-p at 60 Hz with input signal of 0.1 V.
50 mV/div	$\pm 1\%$, 1% p-p at 60 Hz with input signal of 1.0 V. With fast-rise step (rise time 1 ns or less), 1 M Ω dc input coupling, an external 50 Ω termination, and VARIABLE VOLTS/DIV set to CAL. Exclude the first 20 ns following the step transition and exclude the first 30 ns when 20 MHz BW LIMIT is set.
Line Rate	
5 mV/div to 20 mV/div	$\pm 1\%$, 1% p-p at 15 kHz with input signal of 0.1 V.
50 mV/div	$\pm 1\%$, 1% p-p at 15 kHz with input signal of 1.0 V.
TV (Back-Porch) Clamp (CH 2 Only)	
60 Hz Attenuation	18 dB or greater. For VOLTS/DIV switch settings between 5 mV and 0.2 V with VARIABLE VOLTS/DIV set to CAL. Six-division reference signal.
Back-Porch Reference	Within ± 1.0 division of ground reference.

Table 1-4 (cont)

Characteristics	Performance Requirements
TRIGGERING	
Sync Separation	Stable video rejection and sync separation from sync-positive or sync-negative composite video, 525 to 1280 lines, 50 Hz or 60 Hz, interlaced or noninterlaced systems.
Trigger Modes	
A Horizontal Mode	<p>All lines:</p> <p>Field 1, selected line (1 to n),</p> <p>Field 2, selected line (1 to n),</p> <p>Alt fields, selected line (1 to n).</p> <p>n is equal to or less than the number of lines in the frame and less than or equal to 1280.</p>
B Horizontal Mode	Delayed by time.
Minimum Input Signal Amplitude for Stable Triggering ^{a,b}	
Channel 1 and Channel 2	
Composite Video	2 divisions.
Composite Sync	0.6 divisions.
	Peak signal amplitude within 18 divisions of input ground reference.
EXT TRIG 1 or EXT TRIG 2	
EXT GAIN = 1	
Composite Video	60 mV.
Composite Sync	30 mV.
	Peak signal amplitude within ± 0.9 V from input ground reference.
EXT GAIN = $\div 5$	
Composite Video	300 mV.
Composite Sync	150 mV
	Peak signal amplitude within ± 4.9 V from input ground reference.

^aPerformance Requirement not checked in manual.

^bA stable trigger is one that results in a uniform, regular display triggered on the selected slope (\pm). A stably-triggered display should NOT have the trigger point switch between opposite slopes on the waveform, nor should it "roll" across the screen, as successive acquisitions occur. At TIME/DIV settings of 2 ms/DIV and faster, the TRIG'D LED is constantly lit if the display is stably triggered (the LED can flash for SEC/DIV settings of 10 ms/DIV and slower).



Dimensions are in inches [mm]

4918-39

Figure 1-1. Dimensional drawing.