SPECIFICATION

INTRODUCTION

The TEKTRONIX 2225 Oscilloscope is a rugged, lightweight, dual-channel, 50 MHz instrument that features a bright, sharply defined trace on an 80 by 100-mm cathode-ray tube (crt).

The low-noise vertical system of the 2225 has calibrated deflection factors from 5 mV to 5 V per division at full bandwidth. A vertical magnification feature extends the vertical sensitivity to 500 μV per division. This same magnification feature permits independent bandwidth limiting for each channel. With it, a user can limit the bandwidth of one channel to 5 MHz without affecting the bandwidth of the other channel.

Stable triggering is achieved over the full bandwidth of the vertical system. The very flexible trigger system of the 2225 features hands-free triggering with the peak-to-peak automatic mode, independent selection of TV Line and TV Field triggering at any sweep speed, single-sweep triggering, and a variable holdoff control to facilitate triggering on complex waveforms. Along with the standard AC and DC signal coupling methods, the 2225 provides HF REJ and LF REJ trigger coupling. These added coupling features give the user the ability to filter out the high-frequency or low-frequency components of a trigger signal that can interfere with stable triggering. An external trigger signal may be supplied to the trigger system via a front-panel connector. That front-panel connector may also be used to supply an external Z-axis signal for intensity modulation of the displayed signals.

The horizontal system provides calibrated sweep speeds from 0.5 s to 50 ns per division. For greater measurement accuracy, a horizontal magnifier circuit extends the maximum sweep speed to 5 ns per division. Magnification is selected in three levels—X5, X10, and X50—and the magnified trace can be displayed either alone or together with its associated unmagnified trace. Displaying both the magnified and unmagnified traces together—called Alternate Magnification mode—lets the user perform types of timing measurements that previously were only possible on oscilloscopes having dual time bases.

ACCESSORIES

The instrument is shipped with the following accessories: operators manual, two probe kits, a power cord, and a power-cord clamp. The probes supplied with the 2225 have sturdy replaceable tips. Probe compensation is accomplished through a closeable window on the probe body. Part numbers for the standard accessories and for the suggested optional accessories are located in Section 7, Options and Accessories.

FOR MORE INFORMATION

Should you need additional information about your 2225 Oscilloscope or about other Tektronix products, contact the nearest Tektronix Sales Office or Distributor or consult the Tektronix product catalog. In the United States you may call the Tektronix National Marketing Center toll free at 1-800-426-2200.

RECOMMENDED RECALIBRATION SCHEDULE

To ensure accurate measurements, check the performance of this instrument every 2000 hours of operation, or, if used infrequently, once each year. Replacement of components in the instrument may also necessitate readjustment of the affected circuits.

PERFORMANCE CONDITIONS

The electrical characteristics given in Table 1-1 are valid when the instrument has been adjusted at an ambient temperature between +20°C and +30°C, has had a warm-up period of at least 20 minutes, and is operating at an ambient temperature between 0°C and +40°C (unless otherwise noted).

Items listed in the Performance Requirements column are verifiable qualitative or quantitative limits that define the measurement capabilities of the instrument.

Environmental characteristics are given in Table 1-2. This instrument meets the requirements of MIL-T-28800C, paragraphs 4.5.5.1.3, 4.5.5.1.4,

and 4.5.5.1.2.2 for Type III, Class 5 equipment, except where noted otherwise.

Physical characteristics of the instrument are listed in Table 1-3.

Table 1-1
Electrical Characteristics

Characteristics	Performance Requirements
VERTICAL DEFLECTION SYSTEM	
Deflection Factor	
Range	5 mV per division to 5 V per division in a 1-2-5 sequence of 10 steps. Sensitivity increases to 500 μV per division with X10 vertical magnification.
Accuracy	
Without vertical magnification	±3%.
With X10 vertical magnification	±5%.
Variable Control Range	Continuously variable between settings. Increases deflection factor by at least 2.5 to 1.
Step Response	Rise time is calculated from: $Tr = \frac{0.35}{BW}$
Rise Time	
+5°C to +35°C	7 ns or less.[a]
0°C to +5°C and +35°C to +40°C	8.8 ns or less.[a]
Aberrations	
5 mV per division	+6%, -6%, 6% p-p.
10 mV per division to 0.2 V per division	+4%, -4%, 4% p-p.
0.5 V per division	+6%, -6%, 6% p-p.
Bandwidth (-3 dB)	
+5°C to +35°C	50 MHz or more.
0°C to +5°C and +35°C to +40°C	40 MHz or more.[a]
X10 Vertical Magnification	5 MHz or more.
Ac Coupled Lower Cutoff Frequency (-3dB)	10 Hz or less.[a]
CHOP Mode Switching Rate	500 kHz ±30%.[a]
Input Characteristics	
Resistance	1 MΩ ±2%.[a]
Capacitance	25 pF ±2 pF.[a]

[a]Performance requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
Maximum Safe Input Voltage (DC or AC Coupled)	400 V (dc + peak ac) or 800 V ac p-p at 10 kHz or less.[a] (See Figure 1-1 for frequency derating curve.)
Common-mode Rejection Ratio (CMRR)	
Without Vertical Magnification	At least 10 to 1 at 10 MHz.
With X10 Vertical Magnification	At least 10 to 1 at 1 MHz.
Trace Shift with VOLTS/DIV Switch Rotation	0.75 division or less; VOLTS/DIV Variable control in the CAL detent.[a]
Trace Shift as the VOLTS/DIV Variable Control is rotated.	1 division or less.[a]
Trace Shift with CH 2 INVERT	1.5 division or less.[a]
Trace Shift with X10 Vertical Magnification	2.0 divisions or less.[a]
Channel Isolation	Greater than 100:1 at 10 MHz.
Position Control Range	10.5 divisions above and below the center graticule line at 25°C with the cabinet installed.
Trace Separation Range	At least ±3 divisions.
TRIGGERING	
Trigger Sensitivity	
P-P AUTO/TV LINE and NORM Modes	**5 MHz** / **50 MHz**
Internal Signal	0.3 div / 1.0 div
External Signal	40 mV / 200 mV
TV FIELD	1 division of composite sync.[a]
Lowest Usable Frequency in P-P AUTO Mode	A 1.0 division internal signal or 100 mV external signal of 20 Hz or higher frequency will trigger.
External Input	
Input Resistance	1 MΩ ±10%.[a]
Input Capacitance	25 pF ±2.5 pF.[a]
Maximum Input Voltage	400 V (dc + peak ac) or 800 V ac p-p at 10 kHz or less.[a] (See Figure 1-1 for frequency derating curve.)
AC Coupled Lower Cutoff Frequency (-3dB)	
Internal Signal	10 Hz or less.[a]
External Signal	20 Hz or less.[a]

[a]Performance requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
Trigger Level Range	
NORM Mode	Level may be set to any point of trace that can be displayed.
EXT Source	At least ±1.2 V, 2.4 V p-p.
EXT/10 Source	At least ±12 V, 24 V p-p.
Variable Holdoff Range	Increases sweep holdoff time by at least a factor of 8 at maximum holdoff.[a]
LF REJ Lower 3 dB point	30 kHz ±25%.[a]
HF REJ 3 dB point	30 kHz ±25%.[a]
HORIZONTAL DEFLECTION SYSTEM	
Sweep Rates	
Calibrated Range	
Sweep	0.5 s per division to 0.05 µs per division in a 1-2-5 sequence of 22 steps. The X10 magnifier extends maximum sweep speed to 5 ns per division.[a]
Accuracy	

	Unmagnified	Magnified		
	X1	X5	X10	X50
+15°C to +35°C	±3%	±4%	±4%	±5%
0°C to +40°C	±4%[a]	±5%[a]	±5%[a]	±8%[a]

Sweep accuracy applies over the center eight divisions. Exclude the first 25 ns of the sweep for magnified sweep speeds and anything beyond the 100th magnified division.

SEC/DIV Variable Range	Continuously variable and uncalibrated between calibrated step settings of the SEC/DIV switch. Decreases calibrated sweep speeds by at least a factor of 2.5.

Sweep Linearity

Unmagnified	Magnified		
X1	X5	X10	X50
±5%	±7%	±7%	±9%

POSITION Control Range	Start of sweep to 10th division in X1, to 50th division in X5, to 100th in X10, and to 500 division in X50 will position past the center vertical graticule line.
Registration between Unmagnified and Magnified traces	0.2 division or less, aligned to center vertical graticule line.[a]
Trace Shift between ALT and MAG Modes	Less than 1 division.[a]

[a]Performance requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements	
Z-AXIS		
Sensitivity	5 V causes noticeable modulation. Positive-going input decreases intensity.	
Usable frequency range	Dc to 5 MHz.[a]	
Maximum Safe Input Voltage	400 V (dc + peak ac) or 800 V p-p ac at 10 kHz or less.[a] (See Figure 1-1 for frequency derating curve.)	
X-Y OPERATION (X1 MODE)		
Deflection Factors	Same as vertical deflection system with variable controls in the CAL detent.[a]	
Accuracy		
X-Axis	±5%.	
Y-Axis	Same as vertical deflection system.[a]	
Bandwidth (-3 dB)		
X-Axis	Dc to at least 2 MHz.	
Y-Axis	Same as vertical deflection system.[a]	
Phase difference between X-Axis and Y-Axis Amplifiers	±3° from dc to 150 kHz with DC input coupling.[a]	
PROBE ADJUST SIGNAL OUTPUT		
Voltage into 1 MΩ Load	0.5 V ±5%.	
Repetition Rate	1 kHz ±20%.[a]	
POWER SUPPLY		
Line Voltage Ranges		
115 V Setting	95 Vac to 128 Vac.[a]	
230 V Setting	185 Vac to 250 Vac.[a]	
Line Frequency	48 Hz to 440 Hz.[a]	
Maximum Power Consumption	70 watts (80 VA).[a]	
Line Fuse	UL 198.6 3AG (1/4 X 1 1/4 inch)	1EC127 (5 x 20 mm)
115 Setting	1.0 A, Slow.	0.8 A, Slow.
230 Setting	0.5 A, Slow.	0.4 A, Slow.
CATHODE-RAY TUBE		
Display Area	8 X 10 cm.[a]	
Standard Phosphor	GH (P31).[a]	
Nominal Accelerating Voltage	12,600 V ±60 V.[a]	

[a]Performance requirement not checked in manual.

Table 1-2
Environmental Characteristics

Characteristics	Performance Requirements
Temperature	
Operating	0°C to +40°C (+32°F to +104°F).[a]
Nonoperating	-55°C to +75°C (-67°F to +167°F).[a]
Altitude	
Operating	To 4,570 meters (15,000 feet). Maximum operating temperature decreased 1°C per 300 m (1000 feet) above 1500 m (5,000 feet).[a]
Nonoperating	To 15,250 meters (50,000 feet).[a]
Relative Humidity	
Operating (+30°C to +40°C)	95%, +0%, -5%.[a]
Nonoperating (+30°C to +60°C)	95%, +0%, -5%.[a]
Vibration	
Operating	15 minutes along each of three major axes at a total displacement of 0.015 inch p-p (2.4 g at 55 Hz) with frequency varied from 10 Hz to 55 Hz to 10 Hz in one minute sweeps. Hold for 10 minutes at 55 Hz in each of three major axes. All major resonances must be above 55 Hz.[a]
Shock	
Operating and Nonoperating	30 g, half-sine, 11-ms duration, three shocks per axis each direction, for a total of 18 shocks.[a]
Radiated and conducted emission requirements	Meets VDE 0871, Class B and FCC Docket 20870, part 15, subpart J.[a]

[a]Performance requirement not checked in manual.

Table 1-3
Physical Characteristics

Characteristics	Description
Weight	
With Power Cord	6.9 kg (15.2 lbs) or less.
Domestic Shipping Weight	9.0 kg (19.8 lbs) or less.
Height	138 mm (5.42 in). (See Figure 1-2 for a dimensional drawing).
Width	
With Handle	385 mm (15.2 in).
Without Handle	327 mm (12.9 in).
Depth	
Without Front Cover	443 mm (17.3 in).
With Handle Extended	511 mm (20.1 in).

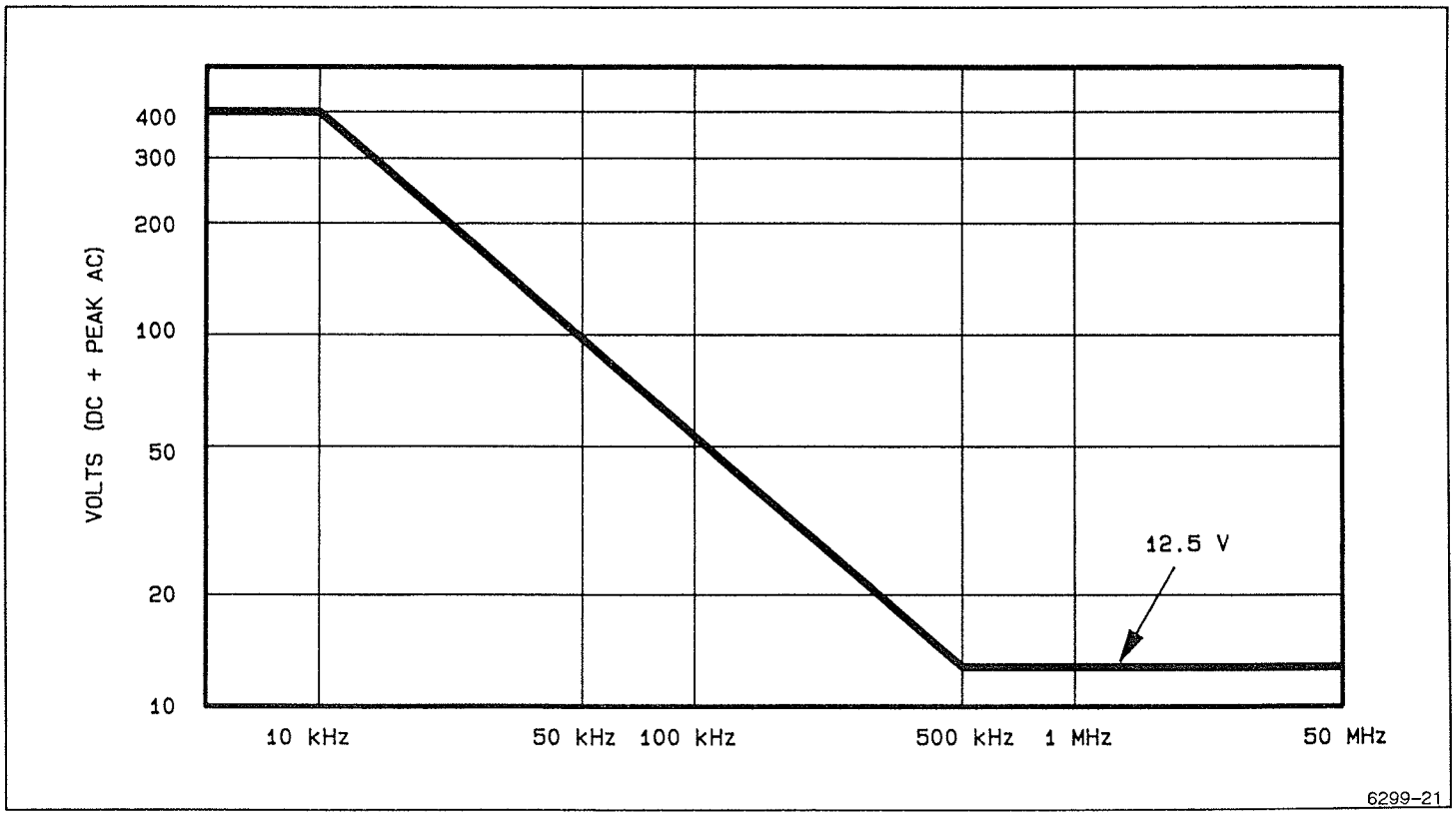

Figure 1-1. Max Input Voltage Vs Frequency Derating Curve.

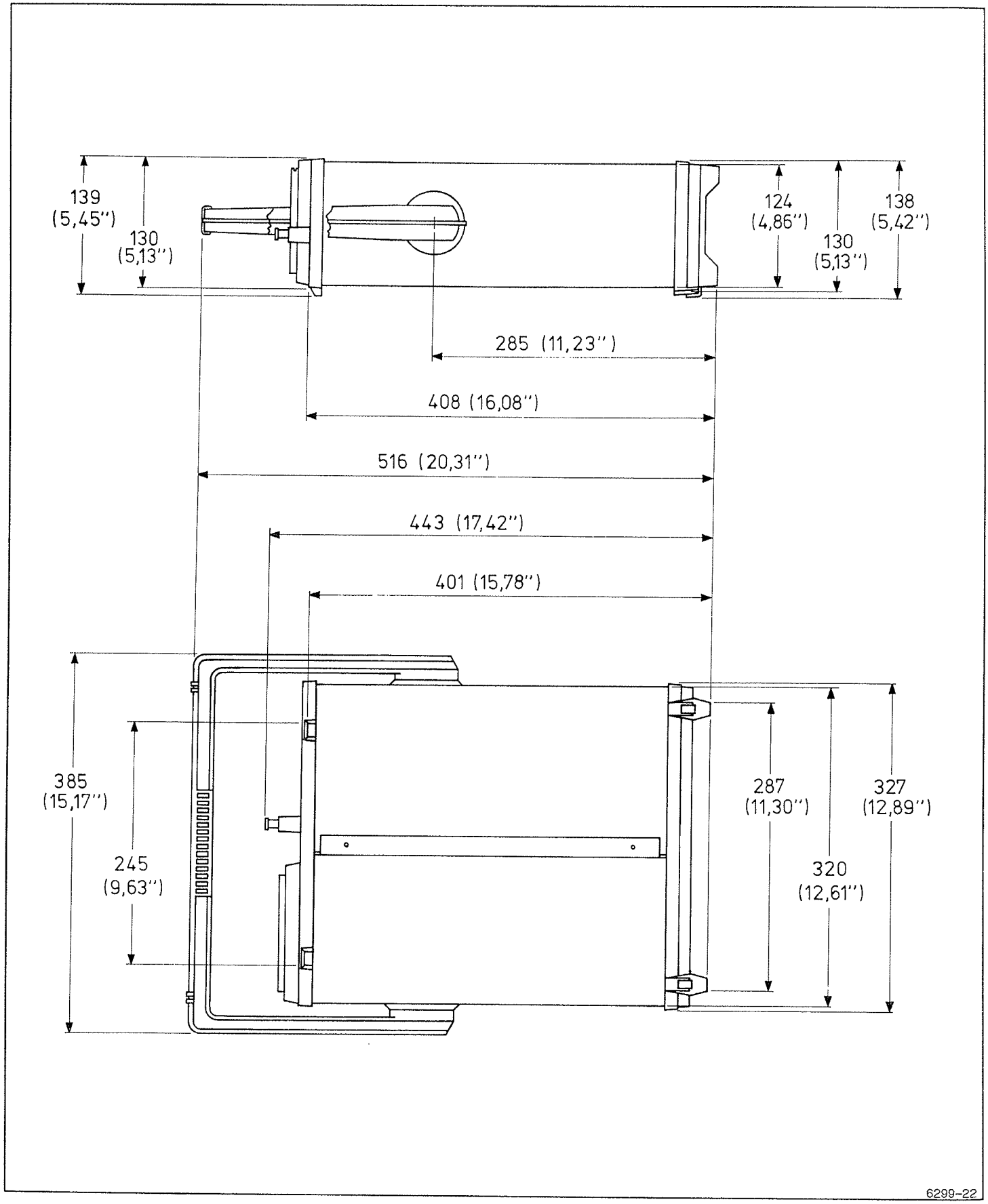

Figure 1–2. Instrument dimensional drawing.