Features

- Composite or Component Waveform Monitoring
- Composite Vector Display
- Menu-Assisted Operation allows expanded feature set.
- Assignable cursors for time and voltage.
- Picture monitor mode for verifying signal source
- Stereo Audio Display
- Longitudinal time code display mode for editing applications
- SCH and Color Framing Display (1750A-Series only)
- External staircase from a camera control unit can be selected remotely.
- Internal video filters provide specialized measurements, with dual or triple filter modes available in PARADE or OVERLAY.
- Eight video inputs can be individually displayed or selected in various combinations.
- Remote interface and serial RS232 interface.

Description of Features

Menu

A notable feature of these monitors is the menu-assisted operation. An expanded feature set is possible through the use of menus and multi-use controls and buttons. When the operator selects a menu item, such as VOLTAGE/TIMING CURSORS, VARIABLE GAIN, or LINE SELECT, an on-screen label shows the current function of the controls.

Many instrument configurations that required moving internal jumpers or wire straps in the 1740/1750-Series monitors are made through an on-screen menu in the 1740A/1750A-Series. The operator can also recall up to 10 front-panel setups through the RECALL menu; 9 recalls are user-program-

Electrical Specifications

Table A-1: Waveform Vertical Deflection

CATEGORY	DESCRIPTION
Deflection Factor	***Req:*** 1 V full scale (X1): 1 volt input displayed within 1% of 140 IRE (1.00 V PAL) X5 Gain: 0.2 volt input displayed within 1% of 140 IRE (1.00 V PAL) X10 Gain: 0.1 volt input displayed within 1% of 140 IRE (1.00 V PAL) ***RI:*** Any one of the 8 inputs
Variable Gain Range	***Req:*** 0.2X to 1.4X
Overscan	***Req:*** ≤1% variation in baseline of chroma when positioned anywhere between sync tip and 100% white ***RI:*** X1, X5, or X10 with any variable gain setting
Video Maximum Operating Input Voltage	***RI:*** -1.8 V to +2.2 V, (all inputs, A - B3) dc+peak ac
Absolute Video Input Voltage	***RI:*** -8.5 V to +8.5 V (dc+peak ac)
Video Input DC Impedance	***RI:*** ≥ 20kΩ
Video Input Return Loss	***RI:*** Typically ≥ 40 dB to 6 MHz
Video Input DC Offset Between Channels	***Req:*** ≤ 1 IRE (7 mV PAL) ***RI:*** Typically ≤ 1 mV
Video Input Offset Range	***RI:*** CHA2, A3, B2, & B3 can be offset from CHA1 or CHB1 by ± 350 mV
Video Input Loop-Through Isolation	***RI:*** Typically ≥ 70 dB

Table A-1: Waveform Vertical Deflection (Cont.)

CATEGORY	DESCRIPTION
Video Input Crosstalk Between Channels	***RI:*** Typically ≥60 dB
Frequency Response (Flat)	***Req:*** ±2% to 10 MHz (X1 Gain) ±4% to 10 MHz (X5 and X10 Gain), on screen signal (0.2 V or 0.1 V) ***RI:*** All inputs ac or dc coupling
Luminance Filter Gain	***Req:*** 1 ±1% ***RI:*** Reference is FLAT at 50 kHz
Luminance Filter Response	***Req:*** ≤3 dB attenuation at 1 MHz ≥40 dB attenuation at F_{SC}
Luminance Filter Chrominance Rejection (1745A & 1755A only)	***Req:*** ≤34 dB
Chrominance Filter Gain	***Req:*** 1 ±1% ***RI:*** Ref. is flat at F_{SC} (3.58 or 4.43 MHz)
Chrominance Filter Bandwidth	***Req:*** 1.5 MHz ±0.3 MHz ***RI:*** Centered at F_{SC}. Passband is typically F_{SC} + and - 750 kHz
Chrominance Filter Attenuation at 2X F_{SC}	***RI:*** ≥25 dB
Differentiated Step Filter Attenuation at 2X F_{SC}	***RI:*** ≥40 dB

Table A-1: Waveform Vertical Deflection (Cont.)

CATEGORY	DESCRIPTION
Transient Response	***Req:*** Pulse-to-Bar Ratio 0.99:1 to 1.01:1 ***RI:*** Preshoot ≤ 1% ***RI:*** Overshoot ≤ 1% ***RI:*** Ringing ≤ 1% ***Req:*** Field-Rate Tilt ≤ 1% ***Req:*** Line-Rate Tilt ≤ 1% ***RI:*** Differential Gain ≤ 1%
Pix Out Gain	***Req:*** 1 ± 3%
Pix Out Frequency Response	***Req:*** ± 3% to 6 MHz
Pix Out Differential Gain	***RI:*** ≤ 1%
Pix Out Differential Phase	***RI:*** ≤ 1°
Pix Out Output Impedance	***RI:*** 75Ω
Pix Out Return Loss	***Req:*** ≥ 30 dB to 6 MHz
Pix Out Line Select Strobe	***RI:*** A dc offset is added to output in line select to bright up the selected line or lines.
DC Restorer 60 Hz (50 Hz) Attenuation	***Req:*** Slow Mode ≤ 10% Fast Mode ≥ 95% ***RI:*** Back porch or sync tip clamp point is selected through menu.
DC Restorer Offset Error	***Req:*** ≤ 1 IRE (7 mV PAL) ***RI:*** Typically 3 mV
Fast Settling Time	***RI:*** ≤ 6 video lines
Blanking Shift with 10 to 90% APL Change	***Req:*** ≤ 1 IRE (7 mV PAL)

Table A-1: Waveform Vertical Deflection (Cont.)

CATEGORY	DESCRIPTION
Blanking Shift with Presence and Absence of Burst	***Req:*** ≤1 IRE (7 mV PAL) ***RI:*** Typically 3 mV

Table A-2: External Reference

CATEGORY	DESCRIPTION
Input	***RI:*** Composite video or black burst
Maximum Operating Input Voltage	***RI:*** -1.8 V to +2.2 V, dc + peak ac
Absolute Maximum Input Voltage	***RI:*** -8.5 V to +8.5 V, dc + peak ac
DC Input Impedance	***RI:*** ≥20 kΩ
Return Loss	***RI:*** Typically ≥40 dB to 6 MHz

Table A-3: Waveform Horizontal Deflection

CATEGORY	DESCRIPTION
Sweep	***Req:*** Synchronization: Sweep triggered by horizontal and vertical sync pulses ***RI:*** Sweep Length: ≈12 divisions ***RI:*** Sweep freeruns without input
Sweep Timing Accuracy	***Req:*** 1 Line: 5 µs/division ±1% 2 Line: 10 µs/division ±1% ***RI:*** 1 Field: displays one full field, including field rate sync 2 Field: displays two full fields and the field rate sync between them
Sweep Linearity	***Req:*** 1 line: ±1% 2 line: ±1%
Magnified Sweep Accuracy	***Req:*** 1 Line: 0.2 µs/division ±1% 2 Line: 1.0 µs/division ±1%
Magnified Sweep Linearity	***Req:*** 1 line: ±1% 2 line: ±1%
Horizontal Position Range	***Req:*** Any portion of the synchronized sweep can be positioned on screen in all sweep modes.
External Horizontal Input	***Req:*** 2 divisions/volt, ±2% ***RI:*** Menu is selected and enabled by REMOTE connector ground closure.
Remote Sync	***RI:*** Input Amplitude: TTL level ***RI:*** Frequency: 25 Hz to 100 Hz positive edge-triggered sweep ***RI:*** Enabling Signal: TTL low or ground closure

Table A-4: Measurement Cursors

CATEGORY	DESCRIPTION
Waveform Accuracy	***Req:*** Voltage: 0.5% Timing: 0.5%, for line rate sweeps ***RI:*** Typically 0.5% for field rate sweeps
Vector Accuracy	***Req:*** Gain: ±1.5% Phase: ±1° ***RI:*** Measured with respect to the Color Bar signal

Table A-5: RGB/YRGB

CATEGORY	DESCRIPTION
RGB/YRGB	***Req:*** Staircase input gain: 0.8 V/division ±10% ***RI:*** RGB Sweep Length: 1 Field ≈30% of normal 1 Line ≈ 30% of normal ***RI:*** YRGB Sweep Length: 1 Field ≈ 25% of normal 1 Line ≈ 25% of normal ***RI:*** Maximum staircase operating signal: DC signal plus peakacnotto exceed –12 V to+12 V. Line or field rate sweep. ***RI:*** Peak-to-peak acsignal not to exceed 12 V. ***RI:*** Sweep Repetition Rate: Field or line rate of displayed video or external sync signal as selected by the front-panel sweep selection.

Table A-6: Calibrator

CATEGORY	DESCRIPTION
Waveform Square Wave	***Req:*** Amplitude: 1.0 V ±0.5% ***Req:*** Frequency: 100 kHz ±0.1% ***RI:*** Crystal controlled 10 µs square wave
Waveform Sine Wave	***Req:*** Amplitude: 1.0 V_{p-p}, ±1%
Vector Circle	***RI:*** Circle that approximates the graticule compass rose

Table A-7: Vector Mode

CATEGORY	DESCRIPTION
Input Requirements	***Req:*** 1 V_{p-p} ±6 dB ***RI:*** Instrument freeruns with no input ***RI:*** External Reference: Black burst or composite video
Nominal Subcarrier Frequency (F_{SC})	***RI:*** NTSC 3.579545 MHz PAL 4.43361875 MHz
Chrominance Processing Bandwidth (–3 dB)	***Req:*** 1 MHz ±200 kHz
PAL +V	***RI:*** V Axis is inverted at 1/2 video line rate.
Display Phase Accuracy Error	***Req:*** ≤1.25°
Display Gain Accuracy Error	***Req:*** ≤2.5% with 75% amplitude color bars
Quadrature Phasing Error	***Req:*** ≤0.5° ⟨Bursts set to targets)
Subcarrier Regenerator Pull-in Range	***Req:*** NTSC: ±50 Hz PAL: ±10 Hz

Table A-7: Vector Mode (Cont.)

CATEGORY	DESCRIPTION
Subcarrier Regenerator Pull-in Time	***RI:*** ≤2 seconds
Phase Shift with F_{SC} Change	***Req:*** NTSC: ≤2° (F_{SC} to F_{SC} ±50 Hz) PAL: ≤2° (F_{SC} to F_{SC} ±10 Hz)
Phase Shift with Burst Amplitude Change of ±6 dB	***Req:*** ≤ 2°
Phase Shift With Video Input Channel Change	***Req:*** ≤1° ***RI:*** With external reference selected. Typically ≤0.5°
Phase Shift With Variable Gain Control +3 dB to -6 dB.	***Req:*** ≤0.5°
Burst Jitter	***RI:*** ≤0.5° rms
Clamp Stability	***Req:*** ≤1/64 inch (0.4 mm) ***RI:*** Center spot movement with rotation of the phase control
Phase Control Range	***RI:*** 360° continuous rotation
Phase Control Quantization	***RI:*** ≤0.2°
Position Control Range	***Req:*** ≥0.236 inch (6 mm) from center
Differential Phase	***Req:*** ≤1°
Differential Gain	***Req:*** ≤1%

Table A-8: Audio Mode

CATEGORY	DESCRIPTION
Input	***RI:*** DC coupled, differential input
Input Impedance	***RI:*** 20 kΩ
Full Scale Selection	***RI:*** 0, 4, 8, & 12 dBm full scale. Menu selected
Full Scale Accuracy	***Req:*** ±0.5 dB ***RI:*** Measured at 1 kHz
Maximum Input Voltage	***RI:*** ±8 V peak ***RI:*** Measured to chassis ground
Bandwidth (–3 dB)	***Req:*** –3 dB ≥200.0 kHz
X & Y Input Phase Matching	***Req:*** ≤1° ***RI:*** Measured at 20 kHz

Table A-9: Time Code

CATEGORY	DESCRIPTION
Input	***RI:*** Longitudinal Time Code. DC coupled, differential input
Input Impedance	***RI:*** 20 kΩ.
Input Amplitude	***RI:*** 0, 4, 8, & 12 dBm full scale. Menu selectable for 140 IRE (1.0 V) deflection
Maximum Input Voltage	***RI:*** –10 V to +10 V peak
Bandwidth (–3 dB)	***Req:*** ≥200.0 kHz

Table A-10: SCH Phase Mode (1750-Series Only)

CATEGORY	DESCRIPTION
Absolute Accuracy	***Req:*** ≤5° ***RI:*** Applies over a temperature range of 0 - 50° C ***RI:*** Calibrated at 25° C. ±3 dB input amplitude. Typically ≤5° with ±6 dB input amplitude
Relative Accuracy	***RI:*** 2°
Acquisition Time	***RI:*** ≤1 Second
Displayed Phase Error Caused by CRT Geometry Variations	***RI:*** ±1.25°
Input Timing	***RI:*** Stable display with Video to External Reference timing
Color Frame Range	***RI:*** ±70° (Color frame correctly identified when applied external reference signal is ≤70° of 0° SCH.)

Table A-11: CRT Display (PAL Values in Parentheses)

CATEGORY	DESCRIPTION
CRT Viewing Area	***RI:*** 80 X 100 mm Horizontal: 12.5 divisions Vertical: 170 IRE (1.19 V)
Accelerating Potential	***RI:*** Nominally 13.75 kV
Trace Rotation Range	***Req:*** < + and -1° from horizontal ***RI:*** Total adjustment range is typically ≥8°.
Graticule	***RI:*** Internal with variable illumination

Table A-12: Power Source

CATEGORY	DESCRIPTION
Mains Voltage Range	***Req:*** 90–250 V ***RI:*** Continuous range from 90 to 250 Vac
Mains Frequency	***RI:*** 50 or 60 Hz.
Power Consumption	***RI:*** 110 VA (67 watts) maximum; 102 VA (60 watts) typical

Table A-13: Environmental Characteristics

CATEGORY	DESCRIPTION
Operating Temperature	***Req:*** 0° to 50° C (+32° to 122° F)
Storage Temperature	***Req:*** -40° to 75° C (-40° to 158° F)
Operating Altitude	***Req:*** To 15,000 feet (4572 meters)
Storage Altitude	***Req:*** To 50,000 feet (15,240 meters)
Vibration	***Req:*** 5 minutes at 5 - 15 Hz with 0.060 inch displacement 5 minutes at 15 - 25 Hz with 0.040 inch displacement 5 minutes at 25 - 55 Hz with 0.020 inch displacement Military Specification: Mil-T-28800D, Paragraph 1.2.2, Class 3
Mechanical Shock	***Req:*** Non Operating: 50 g 1/2 sine, 11 ms duration 3 shocks per surface (18 total)
Transportation	***Req:*** Qualified under NSTA Test Procedure 1A, Category II (24 inch drop)
Humidity	***Req:*** Will operate at 95% relative humidity for up to five days. Do not operate with visible moisture on the circuit boards.

Table A-14: Physical Characteristics

CATEGORY	DESCRIPTION
Dimensions	***Req:*** Height: 5 1/4 inches (133.4 millimeters) Width: 8 1/2 inches (215.9 millimeters) Depth: 18 1/8 inches (460.4 millimeters)
Weight	***Req:*** Net: 8 pounds (3.8 kilograms) Shipping: 15.7 pounds (7.2 kilograms) *approximate*

Certifications and Compliances

Table A-15: Certifications and compliances

CATEGORY	STANDARDS OR DESCRIPTION
EC Declaration of Conformity - EMC [1]	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Union: EN 50081-1 Emissions: EN 55022 Class B Radiated and Conducted Emissions EN 50082-1 Immunity: IEC 801-2 Electrostatic Discharge Immunity IEC 801-3 RF Electromagnetic Field Immunity IEC 801-4 Electrical Fast Transient/Burst Immunity 1 High-quality shielded cables must be used to ensure compliance to the above listed standards. This product complies when installed into any of the following Tektronix instrument enclosures: 1700F00 Standard Cabinet 1700F02 Portable Cabinet 1700F05 Rack Adaptor AS/NZS 3548 Information Technology Equipment: 1995
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.

Table A-15: Certifications and compliances (cont.)

CATEGORY	STANDARDS OR DESCRIPTION
Installation (Overvoltage) Category	Terminals on this product may have different installation (overvoltage) category designations. The installation categories are: CAT III Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location. CAT II Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected. CAT I Secondary (signal level) or battery operated circuits of electronic equipment.
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated. Pollution Degree 1 No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms. Pollution Degree 2 Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service. Pollution Degree 3 Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind. Pollution Degree 4 Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Table A-15: Certifications and compliances (cont.)

CATEGORY	STANDARDS OR DESCRIPTION
Safety Standards	
U.S. Nationally Recognized Testing Laboratory Listing	UL1244 Standard for electrical and electronic measuring and test equipment.
Canadian Certification	CAN/CSA C22.2 No. 231 CSA safety requirements for electrical and electronic measuring and test equipment.
European Union Compliance	Low Voltage Directive 73/23/EEC, amended by 93/69/EEC EN 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Compliance	IEC61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use.
Safety Certification Compliance	
Temperature, operating	+5 to +40° C
Altitude (maximum operating)	2000 meters
Equipment Type	Test and measuring
Safety Class	Class 1 (as defined in IEC 1010-1, Annex H) - grounded product
Overvoltage Category	Overvoltage Category II (as defined in IEC 1010-1, Annex J)
Pollution Degree	Pollution Degree 2 (as defined in IEC 1010-1). Note: Rated for indoor use only.