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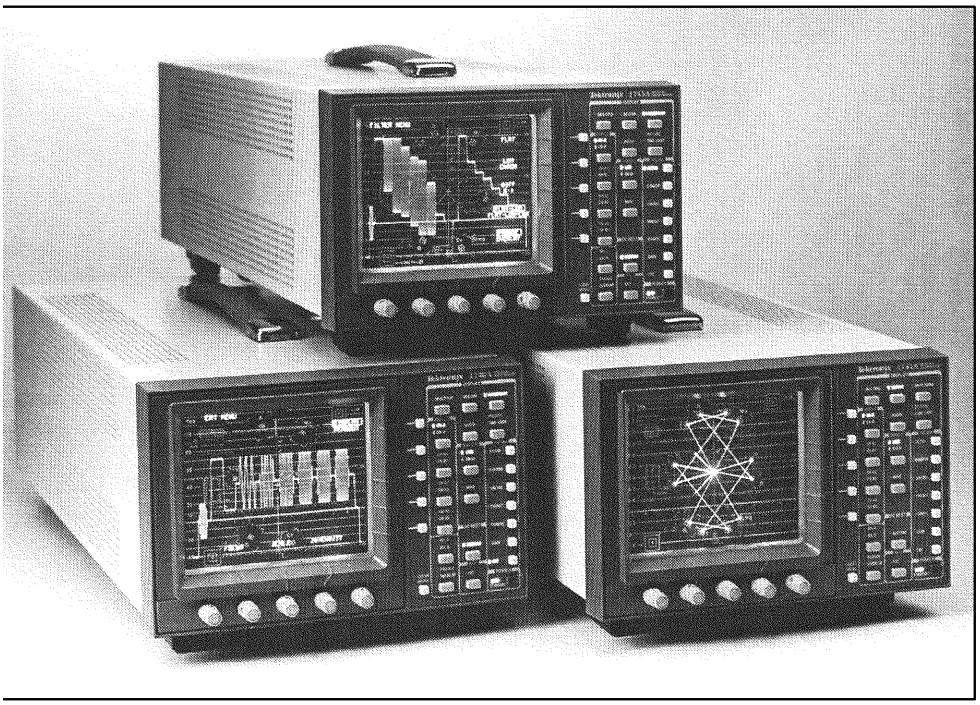
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Find the *Tektronix 1760* at our website: *Click HERE*

Tektronix

1740A/1750A/1760 Series Combination Waveform/ Vector Monitors



1740A Series NTSC, PAL, and dual standard models in accessory 1700F02 portable cases.

The 1740A/1750A/1760 Series make up a family of new analog video waveform/vector monitors with progressive features in support of today's demanding television environmemt.

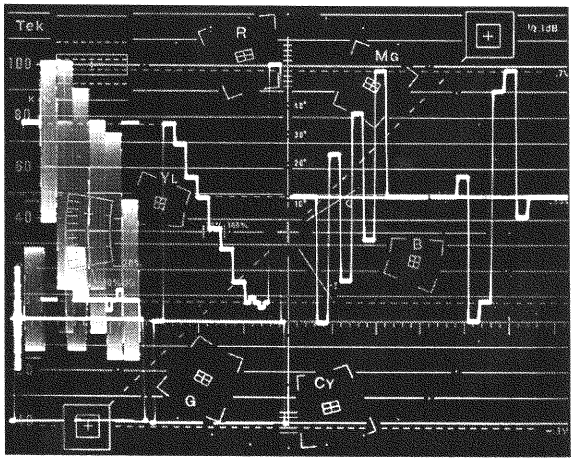
Each model in the series provides improved video performance and ease of operation and incorporates application specific features. The family includes the 1740A Series composite analog waveform/vector monitors, the 1750A Series, which adds SCH and color frame verification capabilities, and the 1760 Series for mixed format component/composite applications. (While the 1740A and 1750A do provide basic component waveform monitoring capabilities with parade and overlay displays, only the 1760 provides full component monitoring capabilities.)

Product Applications	1740A Series	1750A Series	1760 Series
Composite or Component Waveform Monitoring	✓	✓	✓
Composite Vector Display	✓	✓	✓
Picture Display	✓	✓	✓
Stereo Audio Display	✓	✓	✓
Time Code Phasing & Amplitude	✓	✓	✓
SCH & Color Framing Display		✓	Opt SC
Component Vector, Lightning & Bowtie			✓

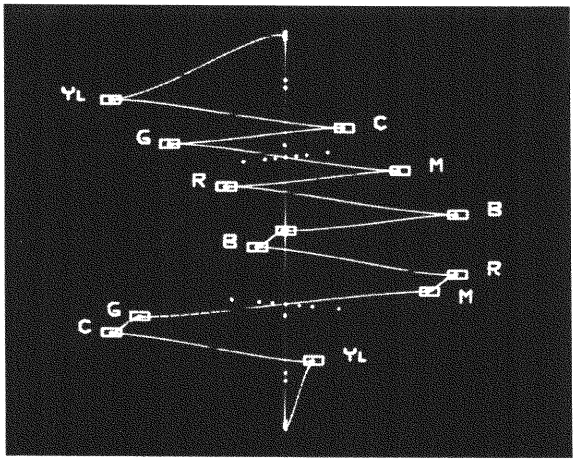
Each series includes models for NTSC, PAL, or dual standard NTSC/PAL operation. For NTSC models, the last digit of the model number is '0' (1740A, 1750A or 1760); '1' for PAL (1741A, 1751A, or 1761); and '5' for dual standard NTSC/PAL (1745A, 1755A, or 1765).

The family features a common, straight-forward operator interface, allowing the operator to take immediate advantage of the instrument's extensive feature set. Each operating mode provides a full set of operating controls, clearly labeled and within easy reach. Key controls are always available, with bezel buttons and knobs identified by intuitive on-screen labels.

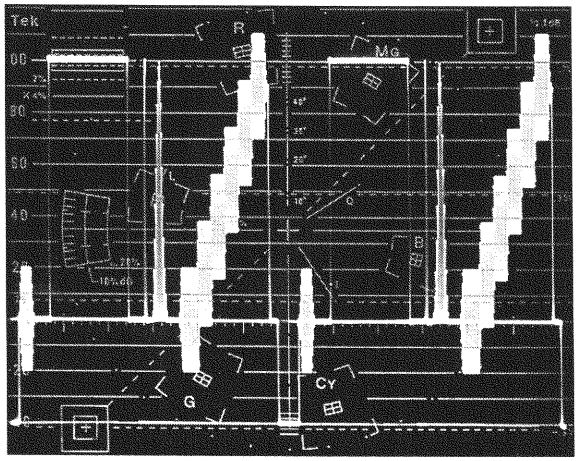
Even hookup of the instrument into the system is easy. Eight loop-through video inputs allow direct connection of the monitor into different points of a system without the requirement of an external routing switcher. For the 1760 Series, the eight inputs may be configured for individual composite, or two composite plus two three-wire component signals. A ninth loop-through input accepts an external system reference signal.



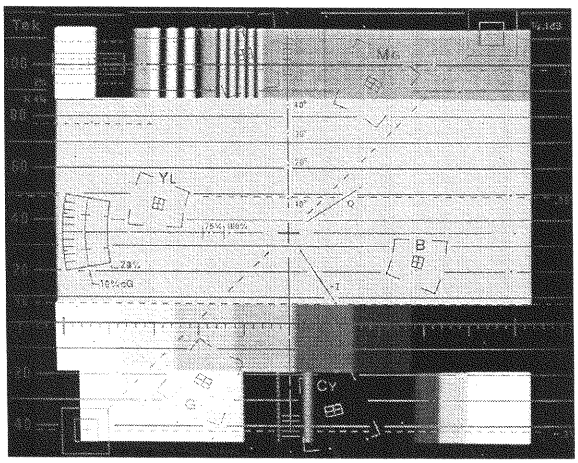
Multi-input waveform parade may be offset to display component signals.



1760 Series Lightning display allows observation of key component values using just color bars.



1750A, 2H waveform display.



Picture display is a standard feature of all models.

Applications

The 1740A Series is the basic composite signal monitor and serves as a platform for the enhanced 1750A/1760 Series family members. The 1740A is ideal for portable applications where a single, small, lightweight monitor can speed equipment setup and adjustment. Where the 1740A is the only monitor on site, its picture display may be used to verify the feed to the recorder or transmission link. Longitudinal time code amplitude and synchronization may be checked to avoid later editing problems. The camera white and black balance and video levels may be checked using the 1740A Series' waveform and vector displays. Stereo audio may be checked for correct phase and levels using the audio display.

The 1740A Series is a good choice for the camera control position. RGB parades and single channels may be selected at the camera control or the monitor's front panel. A multi-filter display provides convenient monitoring and adjustment of encoded composite signal levels. Magnified waveform and vector displays allow critical setup of channel DC levels and encoded color balance.

The 1740A Series is the monitor of choice for many VTR bridge applications, when SCH capability is not required. The small size of this monitor, and its full range of audio and video monitoring functions, reduce overall system size. The 1740A is designed with VTR applications in mind, including remote control and 90/100 Hz sweeps for D-2 servo observation.

In the composite edit suite, the 1750A Series provides all 1740A Series features, plus the Tektronix polar SCH display to match color subcarrier-to-horizontal sync timing and color framing among edit sources.

Its compact half-rack size, rugged construction, bright full size display, and available portable carrying case make the 1750A Series an ideal setup and maintenance tool. It provides complete monitoring of the television signal in a single hand-carried package.

The 1750A Series is a natural for mobile production applications. All composite signal parameters may be observed on a single compact monitor with a full size display. The 1750A Series is used anywhere a compact, full-feature signal monitor is required.

The 1760 Series is a deluxe component monitor with all composite waveform and vector monitoring features of the 1740A Series for checking the input and output of the edit suite.

Component features include the patented Tektronix Lightning display for quick, accurate setup of component sources. Using off-tape color bars, the Lightning display provides all of the information needed to adjust setup, video gain, chroma gain, and inter-channel timing for standardized playback of a video recording.

A new component Diamond display clearly illustrates RGB gamut limits for graphics and color correction applications. The Diamond graticule provides an infallible indication of RGB gamut limit. Gamut violations can be easily evaluated by the brightness of the trace outside the diamond.

A bowtie mode allows precise timing measurements critical for component system installation and maintenance. The 1760 Series also displays the component signal channels in parade and overlay modes, and component color vectors for a preview of how the encoded signal will appear in composite form. A component picture monitor output set allows display of the desired signal on an RGB monitor.

For component/composite video monitoring applications, the 1760 Series may be ordered with the SCH option when needed.

All family members provide the following standard features:

Eight video inputs eliminate the requirement for external input selectors, reducing total system cost in many applications. Since all eight inputs are connected directly to the instrument, signals may be paraded, overlaid, or displayed in comparison modes not normally available with a simple external switcher.

Waveform monitoring is analog for maximum waveform fidelity. There is no digital processing of the displayed signal. The selected input may be displayed in one or two line or one or two field sweeps on a continuous basis or identified lines of any field may be selected and displayed. Multiple inputs may be displayed at the same time, or multiple filters may be applied to one input for signal analysis. Time and voltage cursors may be activated and positioned for reference or measurement.

Composite Vectorscope functions demodulate and display the color components of the NTSC or PAL signal. A microprocessor controlled phase shifter provides accurate vector positioning and eliminates readjustment when switching between internal and external reference modes. Phase and amplitude cursors with on-screen readout allow system setup to reproduce specific chroma values, and specific colors when luminance is similarly set using the waveform display voltage cursors.

A **Picture monitor** mode is provided for easy signal identification. This is particularly useful when the instrument is used to monitor many sources, as in a production suite or outside production vehicle. In waveform or vector line select mode, a line bright-up marker in the picture display identifies the selected line.

Stereo audio amplitude and phase are monitored using a calibrated L/R Lissajous display. The operator can quickly see that the program audio will be properly reproduced on both monaural and stereo receivers. Correct phasing between two audio channels is quickly verified by the direction of the display; signal level (left + right) is confirmed relative to the CRT graticule; and stereo separation (left – right) is displayed in quadrature to the level display.

Audio frequency –3 dB bandwidth is 200 kHz. Phase match between the left and right channels is better than 1 degree at 20 kHz. Input is high impedance bridging, either balanced or unbalanced, to allow signal monitoring of existing audio circuits.

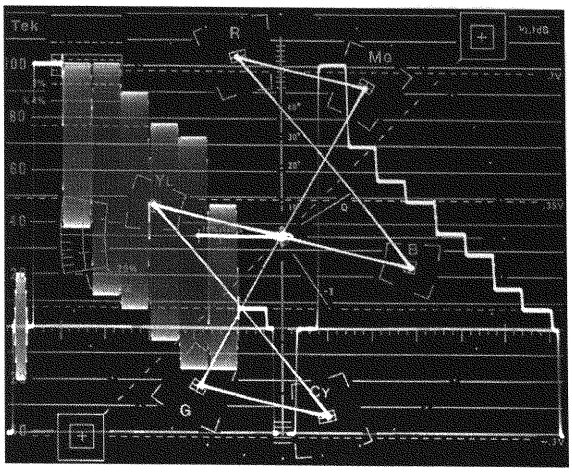
This display of stereo audio is intuitive and easy to use, and has gained wide acceptance in new generation Tektronix vectorscopes.

Longitudinal time code is monitored in a frame rate display to allow observation of amplitude, synchronization and phase with respect to reference vertical. Synchronization is confirmed by the stationary display and time code phase is easily determined by horizontal position of the time code sync word on the CRT.

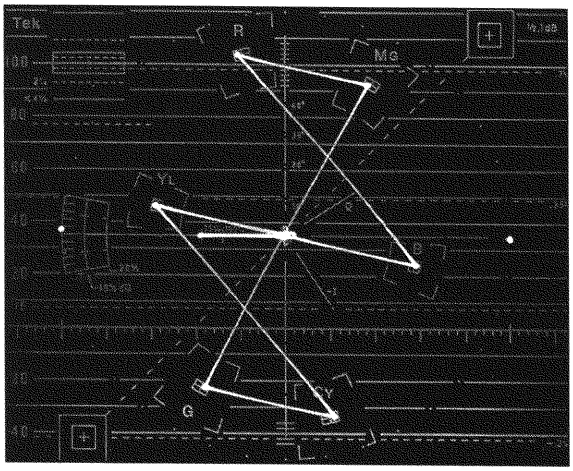
These monitors provide **multiple display modes**, allowing simultaneous observation of the many important parameters that make up a television signal. For example, vector, waveform, and audio may be displayed together for an indication of signal quality without operator intervention.

In the 1750A, or 1760 with SCH option, **Subcarrier/Horizontal phase and color framing** are displayed graphically in the patented Tektronix polar SCH display. Sync jitter over the field is displayed as a moving sync vector dot, or displayed as a timing error at a vertical rate to identify the relationship over the field time. Correct color framing is quickly verified by the position of the single sync vector dot relative to the color subcarrier vector when the monitor is externally referenced.

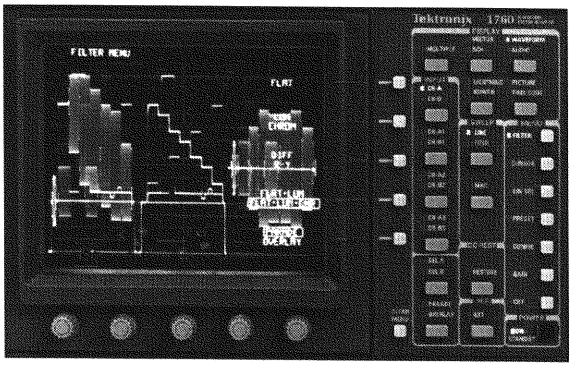
The SCH phase of the reference signal is separately sensed to allow reliable SCH and color framing comparison. Using this method of determining relative SCH phase and color framing eliminates the requirement for a precise horizontal timing match between the reference and measured signals, and an external color-field identification input is not required.



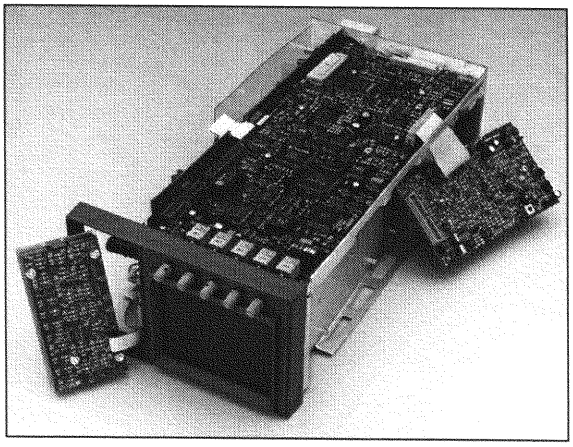
Signals may be displayed in combination modes.



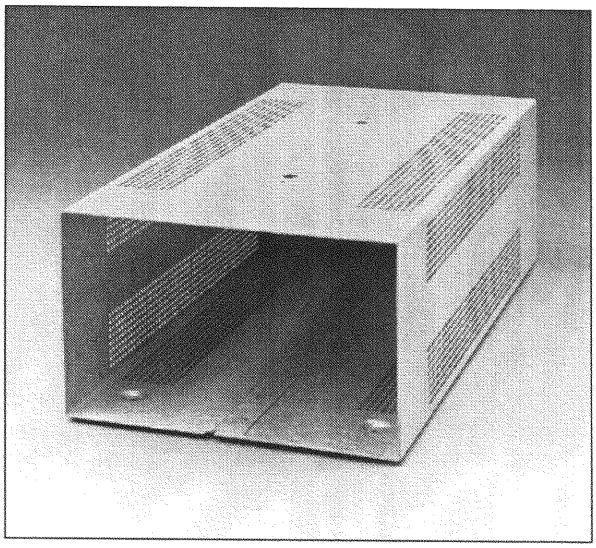
Polar display allows quick, accurate indication of SCH phase and jitter.



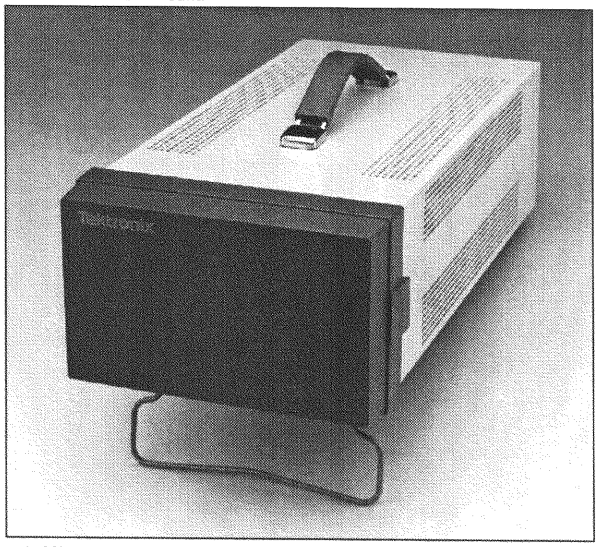
Appropriate operating controls are immediately available.


Clean interior design provides high performance and reliability.

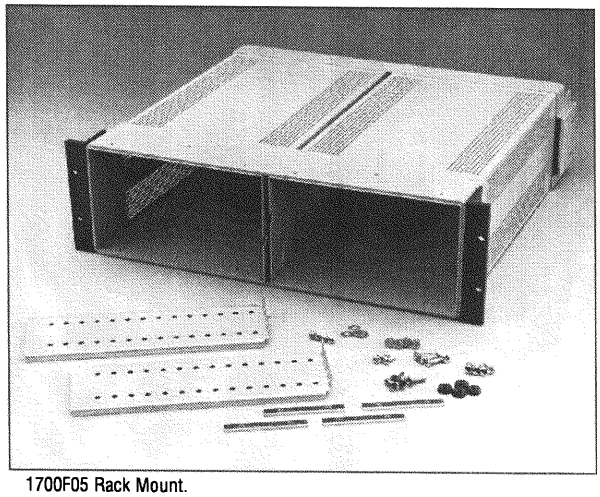
Accessory cabinets meet safety listing requirements.



1700F00 Custom Mount.



1700F02 Portable Case.



1700F05 Rack Mount.

User Interface

Characteristic of current generation Tektronix instruments, an intuitive operator interface allows full instrument utilization with minimal reference to the provided user and maintenance manuals. Operating modes, any of eight video inputs, and key control knobs and buttons are always available for direct access from the front panel.

To keep operation easy and straight-forward, the 1740A, 1750A and 1760 family "learns" the user's preferences for waveform, vector and picture modes (and SCH in the 1750A and 1760 with the SCH option). Returning to one of these modes restores the previous configuration. Changes to a mode configuration are easily made using front panel buttons, supplemented by screen-labeled buttons and knobs. Knob operations such as position, gain, phase, etc., are stored as well.

The 1740A/1750A/1760 family is easily configured for special monitoring applications, which may be stored in user presets for easy recall. For example, a program line or off-air VITS may be set up as preset number 3. Preset number 3 could be named and later recalled to display line 19 of the selected input in 2H sweep, with voltage cursors marking proper signal levels. Other presets could be used to immediately access and display signals from other points in the system. Different operators could quickly return to preferred monitoring setups after specialized signal checks.

With eight loop-through video inputs, the 1740A/1750A/1760 family is a versatile central point system monitor. This capability is particularly useful in the production studio, where several machines, cameras, and composite input/output feeds are in use.

As a machine monitor, the instrument may be operated from a central control panel, with waveform, vector (SCH and color framing with the 1750A Series and 1760 Series with SCH), audio, time code and servo signals easily observed.

In portable applications, or in applications where signals are constantly being reconfigured, the picture monitor mode may be used for input identification.

These monitors are self contained, with features easily accessed in a useful manner. Both experienced and casual users can make the checks and measurements to assure the creation and maintenance of accurate, standardized video.

High performance design

The control system, based on Motorola's rugged MC68332 32 bit microprocessor with internal coprocessing, facilitates instrument control and timing functions. Flash EPROMs simplify updating the instrument to the latest firmware configuration.

The 1740A/1750A/1760 family is based on completely new, high performance analog video system electronics. Application Specific Integrated Circuits (ASICs), developed by Tektronix specifically to maintain signal fidelity in a television test instrument, handle internal signal routing and amplification. Video performance is tightly controlled providing confidence that the signal display accurately represents the signal under test.

As an example of this new video performance level, the series permits observation of the video signal at up to x10 vertical and x25 horizontal magnification. Any part of the signal may be positioned on screen in any magnification. Overscan performance at any gain setting is virtually distortion-free.

DC Offset (position match) between two or more displayed channels is within 1 IRE or 7 mV. Loop-through return loss is better than 40 dB to 10 MHz.

Product safety and performance certification

Every Tektronix 1700 Series instrument is safety and performance certified, and the 1740A/1750A/1760 family is no exception. These instruments are listed by UL and CSA, and comply with FCC, VDE, ANSI, and IEC requirements. NIST traceability certification may be specified as an option for new instruments, and may be kept current by periodic Tektronix factory calibration.

Operational flexibility

Eight loop-through video inputs may be connected to the rear panel of the 1740A/1750A/1760 Series, eliminating the need for a dedicated routing switcher bus in many applications. Any of these inputs may be selected singly, or in combination from the front panel or via the RS232 interface. Input selection may also be included in preset configurations recalled via remote control connector.

A separate external input may be selected to synchronize the display, allowing relative SCH and color framing comparison between two input signals or with the house reference. Because a separate SCH evaluation is done on the reference signal, SCH and color framing displays are accurate over a wide input range.

Signal standards can be automatically selected, NTSC 525/60 or PAL 625/50, in dual standard 1745A/1755A/1765 models. A CRT graticule suitable for both standards is provided in dual standard instruments. A microprocessor controlled phase shifter may be activated to rotate the vector display to the correct position on the display. Once set for each standard, the instrument displays the correct vector rotation when the video standard is changed.

A new universal input power supply is a part of these monitors. AC mains in the range of 90-250 V, 50 or 60 Hz, are accommodated automatically. This new power supply will also operate from a non-sinusodial supply, allowing battery operation using an external, high efficiency switching inverter. A snap-lock power cord appropriate to the country of use is supplied with each instrument.

A variety of mounting configurations is available for the series. The 1700F00 cabinet is a metal cover for mounting in custom consoles. For rack mounting, the 1700F05 dual half-rack cabinet allows side-by-side mounting of two instruments. A utility drawer, 1700F07, or plain cover, 1700F06, is available to fill the open side of the dual half-rack cabinet. For portable applications the 1700F02 cabinet provides an enclosure with feet, carrying handle, tilt stand and snap-on front cover.

Every Tektronix cabinet provides the proper ventilation and protection for the instrument and operator, and meets the requirements for safety listing.

Economy of ownership

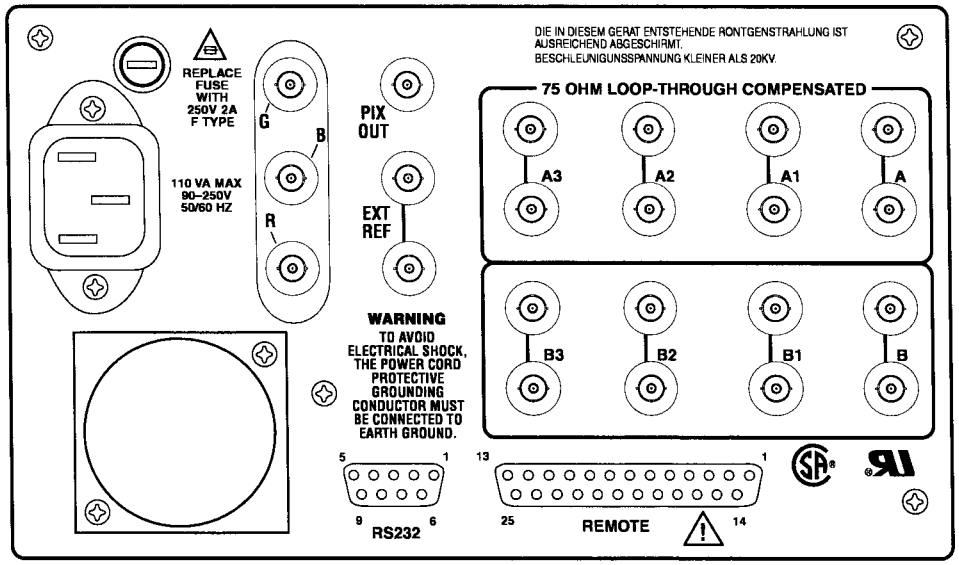
In addition to providing an instrument which is economical in terms of real usefulness, Tektronix designs emphasize low cost of ownership. Complete manuals provide installation, operation, calibration and maintenance information, as well as circuit theory, parts lists and complete schematics and assembly information.

Routine calibration of the monitor can be done without opening the instrument case. Internal calibration signals and standard television test signals provide the reference for many checks.

Tektronix maintains complete service centers providing calibration and repair services and stands ready to assist customers who wish to perform in-house maintenance.

Three year warranty

To help fix cost of ownership at an even better value, Tektronix warrants to its Customers that 1740A/1750A/1760 Series instruments will be free from defects in materials and workmanship for three years from date of shipment. If the product proves defective during the warranty period, Tektronix, at its option, will either repair the defective product without charge for parts and labor or provide a replacement in exchange for the defective product. The entire warranty including instructions for obtaining service, and limitations ia available upon request.



1760 Series rear panel. Eight loop-through inputs may eliminate need for a separate routing switcher bus.

Characteristics

Waveform Vertical Deflection

Deflection Factor — 1.0 V (0.2 V x5 gain, 0.1 V x10 gain) input displayed within 1% of 140 IRE (1.00 V) graticule.

Overscan — <7mV variation in base line of chroma when positioned anywhere between sync tip and 100% white.

Variable Gain Range — 0.2x to 1.4x.

DC Offset Between Channels — <1 IRE (7 mV).

Maximum Operating Signal Input Voltage — –1.8 V to +2.2 V, dc + peak AC.

Absolute Maximum Input Voltage — –8.5 V to +8.5 V, dc + peak AC.

Signal Input Impedance — ≥ 20 k ohms.

75 Ohm Loop Through Return Loss — ≥ 40 dB to 6 MHz.

Frequency Response —
Flat within ± 2% to 10 MHz (x1 Gain).
Luminance filter gain within 1% of Flat response @ 50 kHz, <3 dB attenuation @ 1 MHz, ≥ 34 dB attenuation @ F_{sc}.
Chrominance filter, bandwidth 1.5 MHz ± 0.3 MHz, gain within 1% of flat response @ F_{sc}, attenuation >25 dB @ 2 x F_{sc}.
Differentiated Step filter >40 dB attenuation @ F_{sc}.

Transient Response —
Preshoot, Overshoot, Ringing, Field Rate Tilt, Line Rate Tilt, Differential Gain, all 1% or better.
Pulse-to-Bar ratio 0.99:1 to 1.01:1.

Pix Out —
Gain Unity ± 3%.
Frequency Response ± 3% to 6 MHz when terminated in 75 ohms.
Differential Gain ≤ 1 %.
Differential Phase ≤ 1 degree.
Return Loss >30 dB to 6 MHz.

DC Restorer —
Slow ≤ 10%, Fast ≥ 95% attenuation at 50 Hz and 60 Hz.
Offset error <1 IRE (7 mV).
Fast settling time ≤ 6 video lines.
Blanking shift with 10% to 90% APL change ≤ 1 IRE (7 mV).
Blanking shift with presence or absence of burst ≤ 1 IRE (7 mV).

Waveform Horizontal Deflection

Sweep —
Synchronization triggered by Horiz and Vert sync pulses. Freeruns without input.
Timing accuracy 1 line, 5 µS/div ± 1%; 2 line, 10 µS/div ± 1%.
Linearity 1 or 2 line, ± 1%.
Magnified sweep accuracy 1 line x25, 0.2 µS/div ± 1%; 2 line x10, 1.0 µS/div ± 1%.
Magnified sweep Linearity, 1 or 2 line magnified ± 1%.
Horizontal position range, any portion of the synchronized sweep can be positioned on screen in any sweep mode.
External Horizontal 0.5 V/div ± 2%.

RGB/YRGB —
Staircase input amplitude 12 Vpp maximum, DC + peak AC not to exceed –12 V or +12 V, 10 V = 9 div ± 1 div display.
Field or line rate front panel selectable.

Cursor Signals

Waveform Mode Accuracy —
Voltage ± 0.5%.
Timing ± 0.5%, for line rate sweeps.

Vector Mode Accuracy —
Amplitude ± 0.5 IRE (0.5%).
Phase ± 0.5 degrees.

Calibrator Signals

Waveform Squarewave —
Amplitude 1.0 V ± 0.5%.
Frequency 100 kHz ± 0.1%.

Waveform Sinewave —
Amplitude 1.0 V ± 0.5%.
Frequency nominal subcarrier for standard in use.

Vector Mode

Input Requirements — 1 Vpp ± 6 dB composite video signal or black burst.

Chrominance Bandwidth —
1 MHz ± 200 kHz.

Display —
Phase accuracy within 1.25 degrees.
Gain accuracy within 2.5%.
Quadrature Phasing within 0.5 degrees.

Subcarrier Regenerator —
Pull-in range NTSC ± 50 Hz, PAL ± 10 Hz.
Pull-in time ≤ 2 S.

Phase shift with ± 50 Hz NTSC or ± 10 Hz PAL F_{sc} change ≤ 2 degrees.

Phase shift with ± 6 dB burst amplitude change ≤ 2 degrees.

Phase shift with video input change ≤ 1 degree.

Phase shift with variable gain +3 dB to –6 dB ≤ 0.5 degrees.

Burst jitter ≤ 0.5 degrees RMS.

Clamp stability ≤ 1/64 inch (0.4mm).

Phase control range 360 degrees continuous rotation.

Differential Gain ≤ 1%.

Differential Phase ≤ 1 degree.

SCH Mode (1750A Series)

Absolute Accuracy — ± 5 degrees at 25° C.

Relative Accuracy — Typically within 2 degrees.

Acquisition Time — <1 S.

Stable Display — With displayed video to external reference timing from –2 µS to +1 µS.

Display Range — ± 70 degrees internal reference, 360 degrees external reference.

Component Vector Mode (1760 Series)

Vertical Bandwidth — –3 dB at ≥ 1.0 MHz.

Horizontal-to-Vertical Bandwidth Matching — No eye opening at 500 kHz or 2 MHz.

Display-to-Graticule Registration — ≤ 0.25 box.

Component Lightning Mode (1760 Series)

Y — Displayed vertically.

P_B — Displayed horizontally on top half of display.

P_R — Displayed horizontally on bottom half of display.

Component Diamond Mode (1760 Series)

B+G — Displayed vertically vs. B-G horizontally on top half of display.

–(R+G) — Displayed vertically vs. R-G horizontally on bottom half of display.

Component Bowtie Mode (1760 Series)

Common Mode Rejection Ratio — ≥ 34 dB at 3 MHz.

Y – P_B (CH1 – CH2) — Displayed on left half of display.

Y – P_R (CH1 – CH3) — Displayed on right half of display.

Component Transcoded GBR Outputs (1760 Series)

Input Format — GBR, SMPTE, MII, or Betacam, menu selected.

GBR Output Impedance — Nominally 75 Ω.

DC Level — Back porch clamped to 0 V.

Gain Accuracy — Unity ± 3%.

Audio Mode

Full Scale — 0, 4, 8, & 12 dBm, menu selectable.

Full Scale Accuracy — ± 0.5 dB @ 1 kHz.

Maximum Input Voltage — ± 8 Vpp.

Bandwidth — –3 dB, 200 kHz.

X&Y Input Phase Matching — <1 degree @ 20 kHz.

Input Impedance — 20k ohms nominal.

Time Code Mode

Input — Longitudinal timecode, differential.

Full Scale — 0, 4, 8, & 12 dBm, menu selectable.

Maximum Input Voltage — ± 8 V p-p.

Input Impedance — >20 k ohms.

CRT Display

CRT Viewing Area — 80 mm x 100 mm.

Accelerating Potential — Nominally 13.75 kV.

Trace Rotation Range — >1 degree from horizontal.

Graticule — Internal with variable illumination.

Power Source

Mains Voltage Range — 90-250 VAC.

Mains Frequency Range — 50 or 60 Hz.

Power Consumption — 110 VA maximum.

Environmental Characteristics

Temperature —
Nonoperating –55°C to +75°C.
Operating 0°C to +50°C.

Altitude —
Nonoperating to 50,000 ft. (15 km).
Operating to 15,000 ft. (4.5 km).

Vibration — Meets the sine vibration test condition requirements for environmental class 3 of military specification MIL-T-28800D.

Shock (nonoperating) — 50 g's, 1/2 sine, 11 ms duration, 3 shocks per surface.

Transportation — Qualified under NSTC Test Procedure 1A, Category II (24 inch drop).

Humidity — Will operate at 95% relative humidity for up to 5 days. Do not operate with visible moisture on the circuit boards.

Safety

Designed to meet or exceed —
UL1244
CSA Bulletin 556B
Factory Mutual 3820
IEC 348
FCC EMI Compatibility (FCC Rules Part 15, Subpart J, Class A)
VDE 0871.5 (Class B)

Physical Characteristics

Dimensions —
Height: 5.25 inches (133.4 mm).
Width: 8.5 inches (215.9 mm).
Length: 18.125 inches (460.4 mm).

Weight —
Net: Approximately 8 lb (3.8 kg).
Gross Shipping Weight: Approximately 15.7 lb. (7.2 kg).

Ordering Information

1740A NTSC Waveform/Vector Monitor
1741A PAL Waveform/Vector Monitor
1745A NTSC/PAL Waveform/Vector Monitor
1750A NTSC Waveform/Vector/SCH Monitor
1751A PAL Waveform/Vector/SCH Monitor
1755A NTSC/PAL Waveform/Vector/SCH Monitor
1760 NTSC/Component Waveform/Vector Monitor
1761 PAL/Component Waveform/Vector Monitor
1765 NTSC/PAL/Component Waveform/Vector Monitor
Each monitor is supplied with a user manual, spare fuse, and air filter. To meet safety listing requirements, order a cabinet or rack mount from Optional Accessories list.

Options

Option 74 — White CRT Phosphor for any model
Option SC — SCH/Color Framing option for 1760/1761/1765

Optional Accessories

1700F00 — Plain cabinet, no handle or feet
1700F02 — Portable cabinet with handle, feet, tilt bail and front panel cover
1700F05 — Dual rack mount, adjustable front panel depth
1700F06 — Blank panel for unused half of dual rack mount
1700F07 — Drawer for unused half of dual rack mount
C9 Option 20 — Camera

For further information, contact Tektronix:

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