Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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Digital Audio Monitor

▶ 764



The Tektronix 764 Digital Audio Monitor is an advanced monitoring tool for production and quality assessment in modern digital audio facilities. It combines the features of a phase and level meter with those of a digital audio data monitor. The 764 provides technical personnel with a setup and calibration tool and production personnel with an operational monitor capable of conventional and advanced audio assessment tasks.

The 764 is well equipped for these tasks. Easy-to-read display screens can be viewed from across a room. An auxiliary VGA output supports larger color display units. Its two AES/EBU input channels have loopthrough capability permitting the 764 to be assigned to any signal path. Operation follows an easy-to-use, menu-driven scheme.

Audio Level

Audio amplitude measurement results are displayed on up to four bar graphs. Most characteristics can be configured to user preferences. This includes the amplitude scale and ballistics, peak-hold characteristics and the value of test and peak levels. Other features include detection of digital clipping and muting and detection of system errors.

Audio Phase

A Lissajous display is augmented with a mathematical phase correlation meter. In addition, selectable Sum and Difference bars provide an additional phase assessment tool.

Time Code

The 764 features Time Code input and display capabilities. Vertical Interval and Longitudinal Time Code can be displayed for locating specific audio passages.

▶ Features & Benefits

Two Balanced or Unbalanced AES/EBU or SPDIF Loopthrough Inputs Drive Four-channel Level Meters

Adjustable Clip/Mute Indicators

Audio Phase Display

Phase Correlation Meter

Unique Session Statistics Compilation

VITC and LTC Time Code Inputs

Channel Status and User Data Decoding

AES-3 DARS Input

Optional Serial Digital Video (Embedded Audio) Input

Optional Balanced Analog Line Outputs

Supports a Pair of AES Streams Output by Professional DVTRs

Configurable Level Indicators Support a Variety of Technical Preferences

Mono Compatibility and Sound-stage Monitoring Assured via Phase Display

Clear Phase Indication Regardless of Signal Amplitude or Panning

Quality Control Certificate via Session Statistics Compilation

Time Code Stamping of Errors Pinpoints Audio Needing Correction

Simple Viewing of Encoded Channel Status and User Data

System Timing Measurements to Recognized Standard

Monitor Embedded Audio Without an External Demultiplexer

Monitor Sound via Loudspeakers Without External Converters

▶ Applications

Digital Audio Monitoring in Broadcast and Post Production Facilities

Creative Adjustments in Digital Audio Production

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Tektronix

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System Timing

A Digital Audio Reference input, conforming to AES recommendations, permits 764 users to assess timing relationships between digital audio signals. Common problems due to sample slipping and non-locked signals can easily be detected.

Status and User Data

Channel Status and User data are recovered and displayed in contiguous 24-byte blocks. This allows the content and format of these auxiliary data channels to be monitored.

Optional Embedded Audio Input

Embedded audio technology simplifies routing of video and audio signals in broadcast and post-production facilities, but places new demands on audio monitoring equipment. To eliminate the need for a separate digital audio demultiplexing step for signal monitoring, the Option 01 Embedded Audio Input adds a serial digital video input to the standard digital audio inputs of the 764. Once it extracts the digital audio signal, the 764 provides the same comprehensive monitoring capabilities as it does for discrete AES/EBU audio.

The 764's Embedded Audio Input option extracts digital audio from 270 Mb/s serial component signals and from 143 (525 line) Mb/s serial composite signals. Audio data up to 20 bits at a 48 kHz sample rate is supported.

Digital Audio Inputs 1/2, 3/4

Connector – XLR conforming to AES3-1992 and EBU 3250-E. BNC conforming to AES3-ID.
Signal Format – Balanced, 24 data bits, 4 preamble bits, C, U, V and P bits.

		MIN	TYP	MAX	UNITS
Voltage range	XLR	0.2		10	V_{p-p}
	BNC	0.05		2	V_{p-p}
Impedance (0.1 to 6 MHz)	XLR termination switched in	104.5	110	115.5	Ω
Return loss (0.1 to 6 MHz)	XLR termination switched out	25			dB
	BNC	25			dB
Sample rate range		27	52	kHz	

Digital Audio Reference Input

Connector – XLR conforming to AES3-1992. BNC conforming to AES3-ID.
Signal Format – Balanced, 24 data bits ignored, 4 preamble bits, C, U, V and P bits.

		MIN	TYP	MAX	UNITS
Voltage range	XLR	0.2		10	Vp-p
	BNC	0.05		2	Vp-p
Impedance	XLR	104.5	110	115.5	Ω
	BNC	71.25	75	78.75	Ω
Sample rate range		27		52	kHz

Optional Analog Line Outputs

Many applications require listening over loudspeakers as a part of the audio monitoring process. In digital facilities, an audio feed is typically routed to a digital-to-analog converter, which drives an amplifier and speakers. Option 02 Analog Line Output provides the digital-to-analog conversion within the 764, eliminating the space requirements and expense of external conversion devices.

The balanced line output level can be either fixed or variable (via the headphone Volume control) and calibrated output level settings are selectable by internal jumpers. Jumper settings are also available for driving unbalanced loads at low levels. Rear-panel AES/EBU balanced output capability is lost when this option is installed.

Common Applications

- Consoles and workstations
- DAT, D1, D2, D3, etc.
- Digital STL for radio
- A/D testing and alignment
- Digital audio routers
- Signal processing
- Duplication and mastering

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Vertical Interval Time Code Input

Connector – BNC, 75 Ω conforming to IEC461, NTSC and PAL specifications.
Signal format – Video with SMPTE VITC, 1 volt nominal.

Longitudinal Time Code Input

Connector – XLR.
Signal Format – Reads SMPTE and EBU LTC.
(Indicates time as hours:minutes:seconds.)

	MIN	TYP	MAX	UNITS
Voltage range	0.25		10	V_{p-p}
Impedance	5			kΩ

Level Meters

	MIN	TYP	MAX	UNITS
Range	–90		0	dBFS
Accuracy Error				
True peak, 0 to –20 dBFS, steady tone			0.05	dB
Test level range	–30		0	dB
Peak program level range	–30		0	dBFS
Dynamic Response				
True Peak	Bar indicates true peak value (no attack delay). Bar decay is same for PPM			
PPM	Bar indicates quasi-peak value; conforms to IEC 268-10A & IEEE Std 152-1991			
VU	Bar has VU dynamic characteristic conforming to IEEE Std 152-1991			

Detectors	MIN	TYP	MAX	UNITS
Clip, sensitivity range	0		99	samples
Mute, sensitivity range	0		99	samples

Phase Display

	MIN	TYP	MAX	UNITS
Automatic gain control range	–40		0	dBFS

Session Screen Display

	MIN	TYP	MAX	UNITS
Clip counter range			999	events
Mute counter range			999	events
Invalid samples			999	events
Parity errors			999	events
Code violations			999	events
Active bits			24	bits
DC offset range	–90 dBFS			

▶ Characteristics

Physical Characteristics

Dimensions	cm	in.
Height	13.3	5.25
Width	21.6	8.5
Depth	43.2	17
Weight	**kg**	**lb.**
	4.5	10

Option 01 Embedded Audio Input Specifications

Serial Digital Video Input

Input Type – 75 Ω (nominal), BNC.

Serial Digital Video Formats Accepted – Audio embedded per SMPTE 272M level B in the following video formats: 270 Mb/s component digital (625– and 525-line) complying with SMPTE 259M and CCIR 656-1.

Input Level – 800 mV_{p-p} ±10%.

Return Loss – ≥15 dB, power on.

Equalization Range – Proper operation with up to 19.0 dB loss at 135 MHz using coaxial cable having 1/f- loss characteristics with a launch amplitude of 800 mV.

Serial Digital Video Output

Output Type – 75 Ω (nominal), BNC, active loopthrough.

Output Level – 800 mV ±10%.

Return Loss – ≥15 dB.

Option 02 Analog Line Output Specifications

Output Type – Balanced XLRs (2 channels).

Output Impedance – 50 Ω, nominal.

Frequency Response, 20 Hz to 20 kHz – ±2 dB.

THD+N (20 Hz to 20 kHz, 22 kHz measurement bandwidth) – <0.05%.

THD+N (at 1 kHz, 22 kHz measurement bandwidth, fixed or variable (volume control fully CW) level outputs, 0 dBFS input, RL ≥10 kΩ) – typically <0.005%.

Output Levels (0 dBFS, RL = 600 Ω) –

Fixed: 24 dBM +1.6, –0.0 dB.

Variable (volume control fully CW): 24 dBM +1.6, –0.0 dB.

Safety – UL3111-1, CSA1010.1, EN61010-1, IEC61010-1.

EMC – UL1244.

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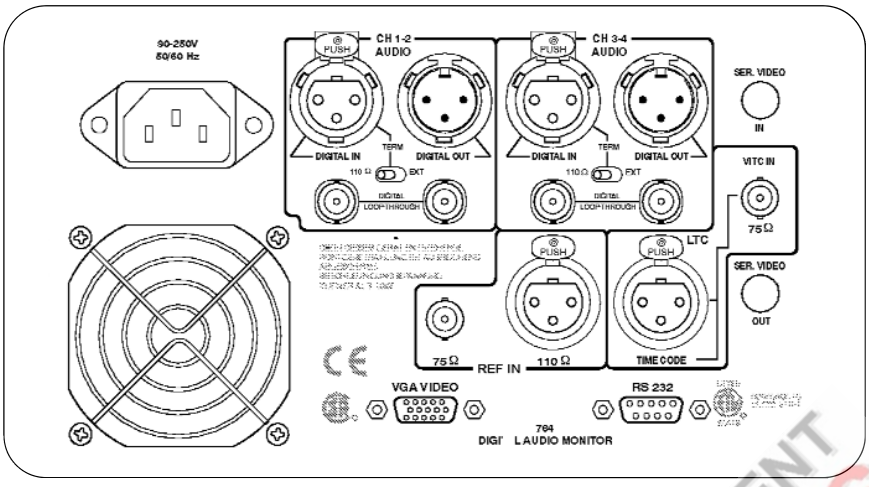

▶ *764 rear panel.*

Sample Rate Measurement

	MIN	TYP	MAX	UNITS
Range	27		52	kHz
Resolution		10		Hz
Accuracy		10		Hz

Synchronization Measurement

	MIN	TYP	MAX	UNITS
Range	±50%		frame	
		±64		U.I.

Power Supply

	MIN	TYP	MAX	UNITS
Input range	90		250	VAC
Input frequency	48		62	Hz
Consumption		56	65	Watts

▶ Ordering Information

764 DIGITAL AUDIO MONITOR

Includes instruction manual and power cord.

764 Options

Opt. 01 – Embedded audio input.

Opt. 02 – Analog line output.

764 Digital Audio Monitor Field Upgrade Kit

764F01 – Embedded audio input kit for 764s with serial numbers B020001 and higher.

Upgrades a 764 with serial number B020001 or higher with embedded audio input processing.

Recommended Accessories

Plain Case – 1700F00.

Dual Rack Adapter – 1700F05.

Portable Case with Handle – 1700F02.

764 Service Manual – 070-8810-00.

Optional Accessories

Utility Drawer – 1700F07.

Blank Panel – 1700F06.

75 Ω Terminator – 011-0102-00.

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