GENERAL INFORMATION & SPECIFICATION

General Information

Product Description

The Tektronix 1503B Metallic Cable Time Domain Reflectometer is a cable test instrument that uses radar principles to determine the electrical characteristics of metallic cables.

The 1503B generates a ½ sine wave signal, applies it to the cable under test, and detects and processes the reflected voltage waveform from the cable. These reflections are displayed on the 1503B's liquid crystal display (LCD) where distance measurements may be made using a cursor technique. Impedance information may be obtained through interpreting waveform amplitude.

The waveform may be temporarily stored within the 1503B and recalled; or may be printed using the optional dot matrix strip chart recorder, which installs into the front panel Option Port.

Battery Pack

The 1503B may be operated from AC power or a battery pack consisting of nine C-cells supplying a minimum of five hours operating time (see specification, *Table 1-1*).

Options

Options available for the 1503B are explained in the *Accessories and Options* section of this manual.

Standards, Documents, and References Used

Terminology used in this manual is in accordance with industry practice. Abbreviations are in accordance with ANSI Y1.1-1972, with exceptions and additions explained in parentheses in the text. Graphic symbology is based on ANSI Y32.2-1975. Logic symbology is based on ANSI Y32.14-1973 and manufacturer's data books or sheets. A copy of ANSI standards may be obtained from the Institute of Electrical and Electronic Engineers, 345 47th Street, New York, NY 10017.

Change and History Information

Changes that involve manual corrections and/or additional data will be incorporated into the text and that page will show a revisions date (e.g. REV OCT 1988) on the inside bottom edge. History information is included in diagrams in grey.

Specification

The tables on the following pages list the characteristics and features that apply to this instrument after the instrument has had a 20 minute warm-up time.

The Performance Requirement column describes the limits of the Characteristic. Supplemental Information describes features and typical values or other helpful information.

In this section is an *Operator Performance Check* that contains procedures that check many of the functions of the 1503B. This check is recommended for incoming inspections to verify that the instrument is performing properly. Procedures to verify the Performance Requirement are provided in the *Calibration* section of the Service Manual (070-6269-00).

Table 1-1

ELECTRICAL CHARACTERISTICS

The following characteristics apply to the 1503B after a warm-up period of at least 5 minutes.

Characteristics	Performance Req'd	Supplemental Information
Test Pulse		
Width		Selected: 2ns, 10ns, 100ns, 1000ns. Measured at half amplitude point, with matching termination.
Accuracy	2ns ±1ns; 10ns, 100ns, 1000ns, ±10%	
Pulse Amplitude		
Terminated	−2.5V, ±10% for 10ns, 100ns, 1000ns 2ns ±20%	
Unterminated	−5.0V, ±10% for 10ns, 100ns, 1000ns	Internal cable length prevents 2ns pulse from reaching full unterminated voltage
Pulse Shape		½ sine
Pulse Output Impedance		Selected: 50Ω, 75Ω, 93Ω, 125Ω
Accuracy	1%	
Pulse Repetition Time		350 µs nominal
Vertical		
Scales	0 dB to 63.75 dB gain	256 values at 0.25 dB increments
Accuracy	±3%	
Set Adjustment		Set incident pulse within ±3%.
Vertical Position		Any waveform point movable to center screen. Combined with vertical scale control.
Displayed Noise		With matching terminator at panel. Beyond three test pulse widths after test pulse.
Random	≤ ±1.0 division peak with 57 dB gain, filter set to 1 ≤ ±1.0 division peak with 63 dB gain, filter set to 8	
Aberrations	≤ −30 dB peak-to-peak for 10ns, 100ns, 1000ns test pulse ≤ −25 dB peak-to-peak for 2ns test pulse	Within three test pulse widths after test pulse. dB is relative to test pulse.

Table 1-1
ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Performance Req'd	Supplemental Information
Cable Connection		
Coupling		Capacitively coupled
Maximum Input Susceptibility	±400 volts (DC + peak AC at maximum frequency of 440 Hz). No damage with application for up to 30 seconds (may affect measurement capability).	
Distance Cursor Resolution		1/25 of 1 major div.
Cursor Readout		
Range		–2 feet to ≥50,000 ft
Resolution		0.04 ft
Accuracy	Within 2% ±0.02 ft at 1 FT/DIV	V_P must be set ±0.5%
Horizontal		
Scales		1 Ft/Div to 5000 Ft/Div *METRES: .25 M/Div to 1000 M/Div* 12 values; 1,2,5 sequence
Ranges		0 to 50,000 Ft/Div *METRES: 25 metres to 10,000 metres*
Horizontal Position		Any distance to full scale may be moved on screen.
V_P		
Range		0.30 to 0.99 Propagation Velocity relative to air.
Resolution		0.01
Accuracy		Within ± 1%

Table 1-1
ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Performance Req'd	Supplemental Information
Custom Option Port		Tek YT-1 chart recorder is designed to operate with the 1503B. Produces a high resolution thermal dot matrix recording and waveform and control values.
Line Voltage	115 VAC (90 to 132 VAC), 45 to 440Hz 230 VAC (180 to 250 VAC), 45 to 440 Hz 12 VDC through battery pack connector	Fused at 0.3A Fused at 0.15A
Battery Pack Operation	5 hours minimum, 20 chart recordings maximum. 15° C to 25° C charge and discharge temp.	
Full Charge Time		20 hours maximum
Overcharge Protection		Limited to 10 days of continuous charge. Battery will charge whenever instrument is plugged in. Battery may be removed during AC operation.
Discharge protection		Operation terminates prior to cell reversal
Typical Charge Capacity		2 amp/hours
Battery Charge Indicator		"Bat/low" will be indicated on the LCD when capacity reaches approx 10%
Temperature Operating	–10° C to +55° C	Battery capacity reduced at other than 15° C to 25° C.
Non-operating	–62° C to +85° C.	With battery pack removed. Storage temp with battery pack is –20° C to +55° C. Contents on non-volatile memory (stored waveform) may be lost at temperatures below –40°C.

Table 1-2
ENVIRONMENTAL CHARACTERISTICS

Characteristics	Performance Req'd	Supplemental Information
Humidity	To 100%	Internal desiccant with cover on and option port cover installed
Altitude		
Operating	To 15,000 feet	Mil-T-28800C, Class 3
Non-operating	To 40,000 feet	
Vibration	5 to 15Hz, 0.06 inch peak-to-peak 15 to 25Hz, 0.04 inch peak-to-peak 25 to 55Hz, 0.013 inch peak-to-peak	Mil-T-28800C, Class 3
Shock,Mech		
Pulse	30g, 11ms 1/2 sine waveform Total of 18 shocks	Mil-T-28800C, Class 3
Bench Handling		Mil-Std -810, Method 516 Procedure V
Operating	4 drops each face at 4 inches or 45° with opposite edge as pivot.	Cabinet off, front cover on
Non-operating	4 drops each face at 4 inches or 45° with opposite edge as pivot. Satisfactory operation after drops.	Cabinet off, front cover off.
Loose Cargo Bounce	1 inch double-amplitude orbital path at 5 Hz, 6 faces	Mil-Std-810 Method 514, Procedure XI, Part 2
Water Resistance		Mil-T-28800C, Style A
Operating	Splashproof and drip-proof	Front cover off.
Non-operating	Watertight with three feet of water above top of case.	Front cover on

Table 1-2
ENVIRONMENTAL CHARACTERISTICS

Characteristics	Performance Req'd	Supplemental Information
Salt Atmosphere	Withstand 48 hours, 20% solution without corrosion	
Sand and Dust	Operates after test with cover on, non-operating	Mil-Std-810, Method 510 Procedure I
Washability	Capable of being washed	
Electromagnetic Comp	VDE 0871 Class B	
Fungus Inert	Materials are fungus inert	

Table 1-3
PHYSICAL CHARACTERISTICS

Characteristic	Description
Weight	
Without cover	14.5 lb
With cover	16 lb
With cover, YT-1 Chart Recorder and Battery Pack	20 lb
Shipping Weight	
Domestic	25.5 lbs
Export	25.5 lbs
Height	5.0 inches
Width	
With handle	12.4 inches
Without handle	11.8 inches
Depth	
With cover	16.5 inches
With handle extended	18.7 inches