

GENERAL INFORMATION & SPECIFICATION

General Information

Product Description

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

The 1503C generates a $\frac{1}{2}$ 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 1503C'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 1503C and recalled; or may be printed using the optional dot matrix strip chart recorder, which installs into the front panel Option Port.

Battery

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

Options

Options available for the 1503C 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 contains other helpful information.

In this section is an *Operator Performance Check* that contains procedures that check many of the functions of the 1503C. 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 *Operator Performance Check* section of the Service Manual.

Table 1-1
ELECTRICAL CHARACTERISTICS

The following characteristics apply to the 1503C 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 \pm 1ns; 10ns, 100ns, 1000ns, \pm 10%	
Pulse Amplitude		
Terminated	-2.5V, \pm 10% for 10ns, 100ns, 1000ns 2ns \pm 20%	
Unterminated	-5.0V, \pm 10% for 10ns, 100ns, 1000ns	Internal cable length prevents 2ns pulse from reaching full unterminated voltage
Pulse Shape	$\frac{1}{2}$ sine	
Pulse Output Impedance Accuracy	Selected: 50 Ω , 75 Ω , 93 Ω , 125 Ω 1%	
Pulse Repetition Time	350 μ s nominal	
Vertical Scales	0 dB to 63.75 dB gain	256 values at 0.25 dB increments
Accuracy	\pm 3%	
Set Adjustment	Set incident pulse within \pm 3%.	Combined with vertical scale control.
Vertical Position	Any waveform point movable to center screen.	
Displayed Noise		With matching terminator at panel. Beyond three test pulse widths after test pulse.
Random	$\leq \pm$ 1.0 division peak with 57 dB gain, filter set to 1 $\leq \pm$ 1.0 division peak with 63 dB gain, filter set to 8	
Aberrations	\leq 30 dB peak-to-peak for 10ns, 100ns, 1000ns test pulse \leq 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 $\geq 50,000$ ft -.61 m to $\geq 15,230$ m	5 digit readout
Resolution	0.04 ft	
Accuracy	Within 2% ± 0.02 ft at 1 FT/DIV	V_p must be set $\pm 0.5\%$
Horizontal Scales	1 Ft/Div to 5000 Ft/Div <i>METRIC: .25 m/Div to 1000 m/Div</i> 12 values; 1,2,5 sequence	
Ranges	0 to 50,000 Ft <i>METRIC: 0 meters to 10,000 meters</i>	
Horizontal Position	Any distance to full scale may be moved on screen.	
V_p Range	0.30 to 0.99	Propagation Velocity is relative to air.
Resolution	0.01	
Accuracy	Within $\pm 1\%$	

Table 1-1
ELECTRICAL CHARACTERISTICS (con't)

Characteristic	Performance Req'd	Supplemental Information
Custom Option Port		Tek YT-1 chart recorder is designed to operate with the 1503C. 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 440Hz	Fused at 0.3A Fused at 0.15A
Battery Operation	8 hours minimum, 30 chart recordings maximum.	15°C to 25°C charge and discharge temp. LCD backlight turned off. Operation of instrument with backlight on, or at temperatures below 10°C, will degrade battery operation specification.
Full Charge Time	20 hours maximum	
Overcharge protection	Charging discontinues once full charge is attained.	
Discharge protection	Operation terminates prior to battery damage.	
Typical Charge Capacity	3.4 amp/hours typical.	
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 removed. Storage temp with battery is -35°C to +65°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
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	Mil-T-28800C, Class 3	30g, 11ms 1/2 sine waveform Total of 18 shocks
Bench Handling		Mil-Std -810, Method 516 Procedure VI
Operating	4 drops each face at 4 inches or 45° with opposite edge as pivot.	Cabinet on, front cover off.
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.

Table 1-2
ENVIRONMENTAL CHARACTERISTICS (con't)

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 (6.57 Kg)
With cover	16 lb (7.25 Kg)
With cover, YT-1 Chart Recorder and Battery	20 lb (9.07 Kg)
Shipping Weight	
Domestic	25.5 lbs (11.57 Kg)
Export	25.5 lbs (11.57 Kg)
Height	5.0 inches (127 mm)
Width	
With handle	12.4 inches (315 mm)
Without handle	11.8 inches (300 mm)
Depth	
With cover	17.2 inches (436 mm)
With handle extended	19.3 inches (490 mm)