TB-2100

ATC/DME/MODE S Test Set

Datasheet

Description

The TB-2100 is a modern, easy to use bench test set designed for testing Mode A, C, and S transponders and distance measuring equipment (DME).

The TB-2100 allows testing of Mode S transponders with new capabilities including, Extended Squitter, ADS-B, TIS, Elementary (ES) and Enhanced Surveillance (EHS), and including evolving European requirements.

The TB-2100 with IEEE-488 option uses the same IEEE-488 commands as older generation ATC/DME and Mode S test sets used in current generation ATE.

P/N – 90 000 106

Features

- Two independent, non-coherent, RF channels for Mode S testing
- Tests the latest Mode S Capabilities
  - Automatic Dependent Surveillance Broadcast (ADS-B)
  - Extended Squitter
  - Elementary (ES) and Enhanced Surveillance (EHS)
  - Traffic Information Systems (TIS)
- Easy to Use
  - Modern front-panel provides simple, intuitive, interface
  - Multiple, variable rate slew knobs control pulse width, power, repetition rates, and position
  - Keypad supports direct test parameter entry
  - Large color, touch-pad display, which continuously presents critical measurement information and permits immediate test parameter selection
  - Quick recall of standard test conditions using CAL button
- Additional Benefits
  - Provides video and RF signal feeds plus scope triggers
  - Can be connected to spectrum analyzers and other bench equipment
  - Flash memory provides easy update/upgrade path
  - Standard 2 year limited warranty; extended warranty available

Product Specifications

The TB-2100 features test capability for DME and transponders ATCRBS and Mode S).

Specifications

Signal Generator

Frequency Range	952.00 to 1223.00 MHz
Frequency Accuracy	± 0.001%
Frequency vs. Level Flatness	<1.0 dB
Signal Level Range	0 to -100 dBm into 50 Ω, 1 dB resolution
Signal Level Accuracy	0 to -50 dBm ± 0.75 dB -51 to -79 dBm ± 1.0 dB -80 to -89 dBm ± 1.1 dB -90 to -100 dBm ± 1.2 dB
On/Off Ratio	> 60 dB
Suppressor Pulse Amplitude	Variable from 9 to 28 V
Suppressor Pulse Width	35 ± 5 µs

UUT Measurements

Frequency	1020 to 1155 MHz; ± 20 kHz for ATC; ± 50 kHz for DME
Power	0 to 4000 W pk; ± 0.7 dB 1 to 99 W; ± 0.5 dB 100 to 4000 W

Transponder Modes

Mode	ATCRBS and Mode S

Pulse Characteristics

Rise time (P1)	75 ± 25 ns
Fall time (P1)	150 ± 50 ns

ATCRBS Mode A/C

Pulse Width (P1/P2/P3)	0.80 ± .05 µs, variable -0.3 to 1.4 µs in 50 ns steps
P2 Position (Relative to P1)	2.00 ± .05 µs, variable ± 1.00 µs in 50 ns steps
Mode C P3 Position (Relative to P1)	21.00 ± .05 µs, variable ± 1.00 µs in 50 ns steps
Interference Pulse Width	0.30 to 3.00 µs ± 1%, variable in 50 ns steps
Interference Pulse Position (Relative to P1)	-5 to +45 ± .05 µs , variable in 50 ns steps
Interference Pulse RF source	Selectable for coherent or non-coherent
Interference Pulse/SLS Level (relative to P1)	-15 to +3 dB ± 0.25 dB, variable in 1 dB steps
PRF	0.1 to 2500 Hz
Scope Sync Width	0.8 to 1.2 µs
Scope Sync Position (Relative to P1)	0 to 175 µs in 1 µs steps
A/C Interlace Mode Interrogation Spacing	1.00 ± 0.20 ms
Double Mode Interrogation Interrogation Spacing	3 to 500 µs

Mode S

Pulse Width (P1/P2/P3)	0.80 ± .05 µs, variable -0.3 to 1.4 µs in 50 ns steps
P2 Position (Relative to P1)	2.00 ± .05 µs, variable ± 1.00 µs in 50 ns steps
Mode A P3 Position (Relative to P1)	8.00 ± .05 µs, variable ± 1.00 µs in 50 ns steps
Mode C P3 Position (Relative to P1)	21.00 ± .05 µs, variable ± 1.00 µs in 50 ns steps
P4 Position (Relative to P3)	2.00 ± 0.5 µs, variable ± 1.00 µs in 50 ns steps
P4 Width	0.80 or 1.60 ± 0.5 µs, variable -0.50 to 1.00 µs
Sync Phase Reversal (SPR relative to P2)	2.75 ± 0.05 µs, variable -0.50 to +0.50 µs
P5 Position (Relative to SPR)	0.40 ± 0.05 µs before SPR, variable -1.00 to +1.00 µs
P6 Position (Relative to SPR)	1.25 ± 0.50 µs before SPR, variable -0.40 to +3.00 µs
Interference Pulse Position (Relative to P1)	-1.40 to +45 ± .05 µs , variable in 50 ns steps
Interference Pulse Width	0.30 to 3.00 µs ± 1%, variable in 50 ns steps
Interference Pulse/P5 Level (relative to P1)	-15 to +3 dB ± 0.25 dB, variable in 1 dB steps

DME Mode

Mode	VOR Pair, TACAN Channel, MHz

Pulse Characteristics

P1 Rise time	2.0 +/- 0.5 us
P1 Fall time	2.5 +/- 0.5 us
P1 Width	3.5 +/- 0.2 us
P2 Rise time	2.0 +/- 0.5 us
P2 Fall time	2.5 +/- 0.5 us
P2 Width	3.5 +/- 0.2 us
P2 Position (Relative to P1)	X Mode – 12.0 ± 0.2 µs, variable -6.00 to +6.00 in 0.1 µs steps Y Mode – 30.0 ± 0.2 µs, variable -6.00 to +6.00 in 0.1 µs steps
Echo Position (30 nmi)	426.65 +/- .25 us
Scope Sync Width	0.8 to 1.2 µs
PRF	1 to 5000 Hz
15/135 Hz Modulation	
Percent Modulation	30 to 50 %
15 Hz Modulation	15 +/-1 Hz
135 Hz Modulation	135 +/-2 Hz
Reply Efficiency	0 to 100% ± 5%, selectable in 10% increments
Range	0 to 998 nmi. ± 0.02 nmi. Plus ± 0.005% of selected range
Velocity	0 to 9990 kts. ± 0.05%, selectable in 0.01 nmi. Increments
Echo Level	-12 to +3 dB ± 0.25 dB, variable in 1 dB steps
Front Panel BNC Connectors	Spectrum Analyzer (Top and Main) UUT Video (Top and Main) Test Set Video (Top and Main) Scope Sync Suppressor Pulse (ATC and DME)
Rear Panel BNC Connectors	RS-232 (Calibration and Software Update) IEEE-488 Connector DPSK Modulation Input External SLS Video Input for Mode S Interrogation Low Power Input External Trigger Calibration Marks

General

Power	100 to 120 VAC, 60 Hz; 220 to 240 VAC, 50 Hz
Dimensions	14.5 in. W x 11.0 in. H x 14.25 in. D 368 mm W x 279 mm H x 362 mm D
Weight	28 lbs. (12.7 kg.)
Temperature	5 to 40°C

Tel-Instrument Electronics Corp.
728 Garden Street
Carlstadt, NJ 07072
(201) 933-1600
www.telinstrument.com