# T-30D

## CAT III NAV Ramp Test Set

## Datasheet

## Description

- Permits ICAO Annex 10 CAT III ILS ramp check certification
- Checks VOR, GS, LOC, MB, Flight Director, and Autopilot
- Dual VOR/LOC/GS frequencies
- Separate and simultaneous MB/ILS
- Dual extended-range variable ILS
- Quick, easy one-man operation from the cockpit
- Lightweight and portable – weighs only 18 lbs.
- Built-in NICAD battery and charger
- Two year limited warranty; five & ten year available
- Rugged, reliable, affordable
- Backed by 40 years manufacturing experience
- CE Compliant
- Available non standard VOR/ILS frequencies with local agency approval

The T-30D Ramp Test Set is designed for one-man operation of the VOR, MB, GS, LOC, flight director, and autopilot from the cockpit or flight deck. Built into a rugged and durable case, the T-30D will permit compliance with CAT III periodic ramp check certification in all weather conditions.

## Features

VOR

- Allows selection of VOR bearing in 45º steps from 0 - 315°
- Manual slewing provides capability for checking full-scale deflection for “sticky” analog meter movement (±10º)
- Permits deletion of the REF 0, VAR 0, 30 and 9960 Hz modulation to check flag operation
- 1020 Hz tone enable switch
- Manual slewing of VOR bearing ± 10° left and right of course

LOC and G/S

- Allows selection of preset DDM deflections of: On Course, one and 2 dots off center
- Full-scale deflection can be tested using manual slewing
- Allows 90 and 150 Hz tones to be deleted
- Simultaneous LOC/GS/MB Mode
- 1020 Hz tone enable switch
- Variable attenuator calibrated in 1 dB steps
- Two preset paired frequencies available

Marker Beacon and ILS

- User selection of inner, middle, and outer marker
- Simultaneous MB and ILS output signals
- Variable and Preset DDM settings
- Variable attenuator to control output

Additional Features

- Rugged Mil-Spec case
- Built in battery and charger
- 100/220 volt operation 40 – 400 Hz
- Simple to understand front panel and controls that requires minimal training
- Built-In diagnostic Self Test

# Specifications

## VOR Operation

| | |
|---|---|
| Frequency | 108.05 MHz ± 0.025%<br>108.00 MHz ± 0.025% |
| | |
| Power | +17/ ± 2 dB |
| | |
| Attenuation | 110 dB in 1 dB steps |
| | |
| Modulation | |
| Audio Frequency | 30/9960 Hz |
| Audio Frequency Accuracy | ± 0.01% |
| AM Depth | 30 ± 2% |
| FM Deviation | 480 ± 30 Hz |
| Distortion | < 5% |
| | |
| Indicator Deflection/Bearing | 0-315° /± 0.1º in 45° Steps/Variable ±10 º- 15° |
| | |
| Tone | 1020 Hz ± 2% |

## LOC Operation

| | |
|---|---|
| Frequency | 108.15 MHz ± 0.025%<br>108.10 MHz ± 0.025% |
| | |
| Power | +17 ±2 dB |
| | |
| Attenuation | 110 dB in 1 dB steps |
| | |
| Modulation | |
| Audio Frequency | 90/150 Hz |
| Audio Frequency Accuracy | ±0.01% |
| AM Depth | 20 ± 2% |
| Distortion | < 5% |
| Phase Accuracy | 90 to 1150 Hz ±10º |
| | |
| Indicator Deflection | |
| On Course | 0.0 ± 0.01DDM/0.155 ± .02 DDM |
| Variable | -0.155 to +0.155 DDM |
| Step | Left and Right; 1 & 2 Dots |
| | |
| Tone | 1020 Hz ± 2% |

## GS Operation

| | |
|---|---|
| Frequency | 334.70 MHz ± 0.0025%<br>334.55 MHz ± 0.0025% |
| | |
| Power | +11 ±2 dB |
| | |
| Attenuation | 110 dB in 1 dB steps |
| | |
| Modulation | |
| Audio Frequency | 90/150 Hz |
| Audio Frequency Accuracy | ± 0.01% |
| AM Depth | 40 ± 3% |
| Distortion | < 5% |
| Phase Accuracy | 90 to 150 Hz ± 10º |
| | |
| Indicator Deflection | |
| On Course | 0.0 ± 0.01DDM/0.175 ± .025 DDM |
| Variable | -0.175 to + 0.175 DDM |
| Step | Up and Down; 1 & 2 Dots |
| Delete | 90 and/or 150 Hz |

## MB Operation

| | |
|---|---|
| Frequency | 75.0 MHZ ± 0.005% |
| | |
| Power | +18 ± 2dB |
| | |
| Attenuation | 110 dB in 1 dB steps |
| | |
| Modulation | |
| Audio Frequency | 400/1300/3000 Hz |
| Audio Frequency Accuracy | ± 2% |
| AM Depth | 95 ± 4% |
| Distortion | < 10% |

## Physical Characteristics

| | |
|---|---|
| Size | 14.5 x 9.4 x 6.5 in. |
| | |
| Weight | 18 lbs. |
| | |
| Power | Internal Battery or external 120/220 VAC 50-400 Hz |
| | |
| Environmental | Storage- -51° to + 71° C<br>Operating -30° to +55ºC |

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# T-36C

## NAV/COMM Test Set

## Datasheet

## Description

The T-36C is a rugged-designed, user-friendly, high-precision instrument for rapid functional testing of VOR, LOC/GS, MB, and VHF COMM (AM/FM) avionic equipment.

With an intuitive and simple operator interface and battery operation of up to 8 hours on one charge, the T-36C navigation and communication capabilities allows the user to quickly, test, troubleshoot, and isolate problem systems on the ramp and in the shop.

The T-36C RF output allows testing from the flight deck of most large aircraft using an expandable, omni-directional antenna. Testing of all functions can also be performed with the unit-under-test (UUT) directly connected to Test Set.

## Features

- Tests VOR, LOC, GS, MB, VHF, and UHF COMM
- Pre-programmed test scenarios and settings
- Simultaneous LOC, G/S and MB output
- Allows testing at 25 kHz and 8.33 kHz spacing
- Compliant with European CE requirements
- Large easy to read backlit display
- Simple user interface and clearly identified switches
- Key board entry of nearly limitless parameters
- Internal battery charger included
- Standard 2 year limited warranty included

### VOR

- Accurate generation of 30 Hz variable, reference, and 9960 Hz sub-carrier.
- Preset bearing simulation in 45° or slew in 1° increments.
- 30 Hz and 9960 Hz modulation can be deleted to check flag operation.
- Covers the entire VOR band of 108.00 to 117.95 MHz.
- 1020 Hz IDENT tone

### LOC and GS

- Precise simulation of LOC/GS ground station signals.
- Allows selection of preset DDM deflections or manual slew in 0.001 increments.
- Simultaneous LOC/GS/MB Mode.
- Allows 90 and 150 Hz tones to be deleted

### Communications (COMM))

- AM or FM with variable modulation and deviation settings.
- VSWR measurement allows testing of antenna system.
- Direct Connect and Antenna methods add versatility and accuracy.
- 25 MHz and 8.33 kHz channel selection.
- Accurate measurement of VHF/UHF frequency, power, and modulation.

### Marker Beacon and ILS

- Easy user selection of 400, 1300, and 3000 Hz signals.
- Simultaneous MB and ILS output signals.
- Separate adjustment of DDM values, either preset or slew, in ILS.

# Specifications *

* Standard Condition Values – As specified in Maintenance Manual and at selected Cal Positions.

## TRANSMITTER Characteristics

| RF FREQUENCIES | | PRESET FREQUENCY VALUES*** | | | KEYPAD ENTRY FREQUENCY CAPABILITY | | |
|---|---|---|---|---|---|---|---|
| FUNCTION | KNOB | LO | MID | HI | FROM | TO | ACCURACY |
| Marker | MB | 74.50 MHz | 75.00 MHz | 75.50 MHz | 74.5000 MHz | 75.5000 MHz | ± 150 Hz |
| VOR OMNI | VOR | 108.00 MHz | 108.05 MHz | 117.95 MHz | 108.0500 MHz | 117.9500 MHz | ± 150 Hz |
| Localizer** | LOC | 108.10 MHz | 108.15 MHz | 110.15 MHz | 108.1000 MHz | 119.9500 MHz | ± 150 Hz |
| Glide Slope** | GS | 334.70 MHz | 334.55 MHz | 334.25 MHz | 329.1500 MHz | 335.0000 MHz | ± 300Hz |
| COMM | 108-174 | 108.00 MHz | 113.00 MHz | 174.95 MHz | 108.0000 MHz | 118.0000 MHz | ± 150 Hz |
| **FREQUENCY SPACING IS IN 25 KHZ AND 8.33 KHZ STEPS** | | | | | | | |
| ** Localizer and Glideslope Frequencies are Automatically Paired | | | | ***All preset values can be user modified and saved to memory | | | |

## Power Output

| FREQUENCY | RANGE | TOLERANCE |
|---|---|---|
| **DIRECT CONNECT (RT Port)** | | |
| 108 to 117.95 MHz | -25 to -100 dBm | ± 2 dB |
| 118 to 156 MHz | -25 to -90 dBm | ± 2 dB |
| 156 to 174MHz | -25 to -90 dBm | ± 2 dB |
| **Selectable in 1 dB steps** | | |

| FREQUENCY | RANGE | TOLERANCE |
|---|---|---|
| **ANTENNA** | | |
| 108 to 118 MHz | 0 to -70 dBm | ± 2.5 dB |
| 118 to 156 MHz | 0 to -60 dBm | ± 2.5 dB |
| 156 to 174 MHz | 0 to -60 dBm | ± 2.5 dB |
| **Selectable in 1 dB steps** | | |

## NAVIGATIONAL Characteristics

| FUNCTION | FREQUENCY | CONDITIONS | DEFAULT | ACCURACY | RANGE | RESOLUTION | SWITCH NAME |
|---|---|---|---|---|---|---|---|
| Marker | 0.4, 1.3, 3.0 kHz | ----- | 95 % mod | +/- 5 % | ----- | ----- | TONES |
| Tone Frequency Accuracy ± 8 Hz @ 0.4, 1.3, 3.0 kHz | | | | | | | |
| VOR OMNI | 9960 Hz & 30 Hz | 0° Bearing | 30 % mod | +/- 2 % Mod. | 0° to 360° | 1° | ILS/VOR VAR |
| | Bearing Accuracy | ± 1° at 0° degree bearing | | | | | |
| | FM Modulation | 30 Hz reference at ± 480 Hz Peak deviation on 9960 Hz Sub carrier | | | Accuracy ± 30 Hz at peak deviation | | |

| VOR Presets | 0° | 45 | 90 | 135 | 180 | 225 | 270 | 315 | 360 | Key Pad Variable - 0°to 360° in 1° inc. |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Glide Slope | 90 Hz & 150 Hz ± 1% | @ 0.0 DDM | 40 % mod | +/- 2 % Mod. | 0 to 0.400 DDM (U/D) | 0.001 DDM | ILS/VOR VAR |
| Localizer | 90 Hz & 150 Hz ± 1% | @ 0.0 DDM | 20 % mod | +/- 2 % Mod. | 0 to 0.200 DDM (L/R) | 0.001 DDM | ILS/VOR VAR |

| PRESETS | | | U1/R1 | U2/R2 | FS | 0C | FS | D2/L2 | D1/L1 | | Accuracy at "ON COURSE" (OC) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOC | DDM | | 0.093 | 0.155 | 0.200 | 0.000 | 0.200 | 0.155 | 0.093 | | LOC | ± 0.002 DDM |
| GS | DDM | | 0.091 | 0.175 | 0.400 | 0.000 | 0.400 | 0.175 | 0.091 | | GS | ± 0.002 DDM |
| Key Pad Variable DDM in .001 DDM increments to full scale | | | | | | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| IDENT | 1020 Hz | VOR | 10% Fixed | +/- 5 % Mod ± 50 Hz. | ----- | ----- | MB/NAV ID |

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## COMMUNICATIONS Characteristics

| FOR FREQUENCY RANGES – SEE TRANSMITTER CHARACTERISTICS SECTION | | | |
|---|---|---|---|
| | | | |
| Communication Modes | AM, FM, UHF and VHF in Amplitude Modulation (AM) and Frequency Modulated (FM) | | |
| Communication AM | | | |
| Communication Tones AM | 1020 Hz | Accuracy ± 50 Hz | Modulation ± 5% @ 120 MHz |
| Variable Range - 0 to 95% AM | 150 Hz | Accuracy ± 50 Hz | Modulation ± 5% @ 120 MHz |
| Audio Output Level | 100 – 900 mv in 100 mv steps | Accuracy ± 50 mv | |
| Communication FM | | | |
| FM Modulation Variable | Range from 1 kHz - 10 kHz Deviation in 1 kHz steps | ± 2 kHz Deviation / 1020 Hz @ 120 MHz | |
| Tone | 1020 Hz | Accuracy ± 50 Hz | |
| Output Level | 100 – 900 mv in 100 mv steps | Accuracy ± 50 mv | |

## RECEIVER Characteristics

| | | | |
|---|---|---|---|
| Frequency Range | Same as COMM Ranges | Frequency Counter Measurement Accuracy | +/-500 Hz of selected Frequency |
| | | | |
| Maximum Input Level (RT port) | 25 W | Power Measurement Range | 0 dBW to +14 dBW (1 to 25 W) Direct Connect (CW Only) |
| Power Measurement Accuracy | +/-20 % (CW Only) | | |
| | | | |
| AM Measurement Range | 0 to 100% Modulation | AM Measurement Tolerance | +/- 5% @ 120 MHz |
| FM Measurement Range | 0 to 15 kHz | FM Measurement Tolerance | +/- 2 kHz @ 120 MHz |
| Sensitivity (Antenna port) | -10 dBm AM; -30 dBm FM | | |
| VSWR Measurement | 1.0 to 5.0; +/- 1 | | |

## MISCELLANEOUS SPECIFICATIONS & Characteristics

| | | | |
|---|---|---|---|
| Size | 15.5 X 9.4 X 6.5 inches | Operating Temperature | -28° C to +55° C |
| Weight | 20 pounds | Storage Temperature | -50°C to +70°C |
| Case Style | MIL-PRF-28800, Class 2 | Case Color | Yellow |
| Input Power Requirements | 100 to 240 VAC+/- 10% | Input Power Consumption | 20 Watts |
| Input Power Frequency | 50 to 400 Hz | Input Current | 0.17 Amps AC |
| AC Fuse Requirements | 1.0 A SB (2 req.) | DC Fuse Requirements | 5.0 A SB (2 req.; internal to Test Set) |
| Note: Input power specified for battery charging simultaneously with Test Set operation. | | | |

## Standard Accessories and Options

- Standard 2 Year Limited Warranty included
- Multi Band Omni Antenna
- Operational and Maintenance Manual
- AC Power Cord
- Direct Connect Cable
- All Accessories store in Test Set cover
- 5 & 10 Year Warranty Plans available

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## TB-2100 ATC/DME Bench Test Set

- Test Transponder, ATCRBS, and Mode S with unrivaled accuracy
- Color LCD touch display features wide viewing angle
- Continuous display of critical measurements including power, pulse parameters, percent reply, and frequency
- Easy to navigate menus require minimal training to operate
- IEEE Compatible

## TR-220 Multi-Function Test Set

- Test TCAS, DME, and Transponder
- Transmits and receives ADS-B (1090 MHz squitter)
- Transmits Traffic Information System (TIS) intruder flight data
- Meets test requirements for European Mode S Elementary and EHS
- Performs test requirements per FAR Part 43, Appendix F
- Allows DME testing on all channels (108.00 to 117.95 MHz)
- Compliant with European CE requirements

## TR-211 Multi-Function Test Set

- Test DME and Transponder with Elementary and EHS
- Receives and displays ADS-B (1090 MHz squitter)
- Transmits TIS intruder flight data for 4 intruders
- Performs test requirements per FAR Part 43, Appendix F
- Allows DME testing on all channels (108.00 to 117.95 MHz)
- Compliant with European CE requirements

## T-30D Navigation Test Set

- Test VOR, Localizer, Glideslope, and Marker Beacon
- Easy to use, one-man operation
- Full range of tests to comply with CAT III periodic ramp certification
- Fully adjustable functions allow precise testing and measurement
- Allows testing from flight deck

## FlexiBus Databus Analyzers

- Displays ARINC 429 data in Engineering and /or Hex formats
- Up to 60 user tables permit storage and recall of commonly used transmitted words
- Receive 1024 label/SDI combinations
- Trap and store 3500 ARINC 429 labels
- Rechargeable NI-MH batteries permits up to 24 hours of operation

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# 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<br>-51 to -79 dBm ± 1.0 dB<br>-80 to -89 dBm ± 1.1 dB<br>-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<br>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)<br>UUT Video (Top and Main)<br>Test Set Video (Top and Main)<br>Scope Sync<br>Suppressor Pulse (ATC and DME) |
| Rear Panel BNC Connectors | RS-232 (Calibration and Software Update)<br>IEEE-488 Connector<br>DPSK Modulation Input<br>External SLS<br>Video Input for Mode S Interrogation<br>Low Power Input<br>External Trigger<br>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<br>368 mm W x 279 mm H x 362 mm D |
| Weight | 28 lbs. (12.7 kg.) |
| Temperature | 5 to 40°C |

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# TR-220

## Multi-Function Test Set

## Datasheet

## Description

The TR-220 provides test capability for Traffic and Collision Avoidance Systems (TCAS), Distance Measuring Equipment (DME), and Transponders (Modes A, C, and S). The TR-220 features state-of-the art design technology. Microprocessor control results in easy-to-use operation that requires minimum amounts of training. Setup menu allows storage of various test parameters to facilitate quick recall of test conditions.

- Tests TCAS, DME, and Transponder
- Transmits and receives ADS-B (1090 MHz squitter)
- Transmits Traffic Information System (TIS) intruder flight data
- Performs test requirements per FAR Part 43 Appendix F
- Meets European test requirements for Mode S Elementary and Enhanced Surveillance
- Compliant with European CE requirements
- 2 year limited warranty; Extended warranty available
- P/N 90 000 088

## 

- Test Set automatically determines capability of transponder being tested (ATCRBS or Mode S) and selects appropriate tests
- Testing can be done over-the-air, using directional antenna, or directly connected to transponder
- Test Set can be configured for automatic sequencing or manual control of individual transponder tests

## 

- Test set allows storage of 10 intruder scenarios, to simplify TCAS testing
- Allows simulation of ATCRBS or Mode S intruder
- User selection of velocity, starting distance, starting altitude, and vertical speed
- Measures UUT power and frequency

## DME

- Allows testing on all channels (108.00 to 117.95 MHz)
- Measures DME power, frequency, and PRF
- Transmits DME Morse-Code I.D.
- User selection of DME distance and velocity

## Transponder Test Specifications *

The TR-220 performs the following tests based on the capabilities of the transponder:

- Mode A - 4096 code, IDENT, percent reply, pulse spacing, pulse width
- Mode C - Altitude (feet and grey code), percent reply, pulse spacing, pulse width
- Side-lobe suppression (SLS)
- Mode A/S and C/S All Call - Mode S address, percent reply
- Mode A Only and Mode C Only
- Mode S Surveillance I.D. (DF5) – Mode S address, percent reply, flight status (Air, Ground, Alert, SPI), Mode S/Mode A 4096 code compare (automatic mode)
- Mode S Surveillance Altitude (DF4) – Mode S altitude, percent reply, Mode S/Mode C altitude compare (automatic mode)
- Mode S Surveillance Short (DF0) – Mode S address, vertical status (Air, ground), percent reply, decoded country code, decoded tail number (if applicable)
- Mode S Comm. I.D. (UF5/DF21) – Mode S ID code, percent reply
- Mode S Comm. Altitude (UF4DF20) – Mode S altitude, percent reply
- Undesired replies (UF11) – Checks for reply to incorrect Mode S interrogation
- Acquisition squitter – Pass/Fail indication of squitter duration, decoded Mode S address, interrogator code
- Extended squitter – Pass/Fail indication of squitter duration, decoded Mode S address
- Max Airspeed – Decodes and displays maximum airspeed
- Diversity – Displays Pass/Fail indication and measured value of RF leakage through Mode S transponder antenna ports
- Sensitivity (MTL) – Measures and displays MTL for Modes A, C, and S
- Measures and displays transponder power (dBm or watts), frequency, and receiver sensitivity (dBm)
- Decodes and displays Flight I.D.
- Decodes and displays Mode S address in Octal and Hex
- Mode S Enhanced Surveillance parameters, including Selected Altitude (BDS4); Roll Angle, True Track Angle, Ground Speed, Track Angle Rate, and True Airspeed (BDS5); Magnetic Heading, Indicated Airspeed, Mach #, Barometric Altitude Rate, and Inertial Vertical Velocity (BDS6)
- Receives and decodes 1090 MHz ADS-B data, including squitter type (airborne position, surface position, aircraft identification/category, and airborne velocity), latitude/longitude, N/S velocity, E/W velocity, Flight I.D., Mode S address, altitude (GNSS or barometric), and airspeed
- Transmits 1090 MHz ADS-B data for four intruder aircraft (airborne or surface position)
- Transmits TIS data for four intruder aircraft

| | | |
|---|---|---|
| Transmitter | Frequency | 1030 MHz ± 100 KHz |
| | Power | ≥ 4 dBm |
| | Modes | A, C, S |

| | | | |
|---|---|---|---|
| Receiver | Frequency | Range | 1086.5 to 1093.5 MHz |
| | | Accuracy | ± 200 KHz |
| | Power | Range | 47 to 64 dBm |
| | | Accuracy | ± 2 dB (direct connect) |
| | | | ± 3 dB (radiated) |
| | Sensitivity | Range | -50 to -87 dBm |
| | | Accuracy | ± 2 dB (direct connect) |
| | | | ± 3 dB (radiated) |
| | Reply Percent | Range | 0 to 100% |
| | | Accuracy | ± 1% |
| | | | |
| | | | |

## TCAS Test Specifications *

The TR-220 allows testing of TCAS I, TCAS II, and Traffic Advisory Systems by simulating either ATCRBS or Mode S intruders. The Setup menu allows operator to configure and store 10 TCAS scenarios, including Distance (1 to 50 NMI), Altitude (-1000 to +99,900 ft.), Vertical Speed (-7,500 to +7,500 fpm) and Velocity (100 to 1200 KTS.). The TR-220 provides a relative measurement of TCAS power and frequency.

| | | |
|---|---|---|
| Transmitter | Frequency | 1090 MHz ± 100 KHz |
| | Power | ≥ 4 dBm |
| | Modes | C, S |

| | | |
|---|---|---|
| Receiver | Frequency | 1026.5 to 1033.5 MHz |
| | Power | 47 to 64 dBm |
| | | |

## DME Test Specifications *

The TR-220 provides test capability for DME by allowing operator to select test parameters, including Channel (108.00 to 117.95 MHz) and Velocity (120 to 1200 KTS.).

The TR-220 measures and displays DME PRF (scan rate), power, and frequency. Also, the TR-220 transmits a Morse Code I.D.

| | | |
|---|---|---|
| Transmitter | Frequency | 962 to 1213 MHz ± 100 KHz |
| | Power | ≥ 4 dBm |
| | | |
| Receiver | Freq. Range | Channel Freq. ± 3.5 MHz |
| | Freq. Accuracy | ± 200 KHz |
| | Sensitivity Range | ≤ -35 dBm |

## Accessories

Directional antenna (hand-held or mounted on side of case)
AC Power Cord
Direct Connect Cable
Directional Antenna Cable
Operators Manual
TAP-200 Anti-Radiation Coupler (Optional)

## Physical

Packaging - MIL-PRF-28800, Style C
Size: 14.5x9.4x6.5 in. (36.8x23.9x16.5 cm.)
Weight: 20 lbs. (9.1 kg.)
Operating Temperature: -28 to +55 C
Battery Operation; 8 hours at 20% Duty Cycle
AC Operation/Charging: 100-240 VAC, 50-400 Hz

* Standard condition values

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