SPEDIS-RATS

Radar altimeter test system

SPEDIS-RATS takes the altimeter's transmission through antenna coupling units or by direct injection and returns it with the delay and attenuation of the altitude the scenario sets. The full configuration follows dynamic flight profiles with ground return and multipath models; the C-band configuration returns one echo at a fixed range. Both use the same 2U unit and the same operator software, on the aircraft and in HWIL and SIL set-ups.



Figure 1. SPEDIS-RATS echo simulator unit with the operator software on a laptop

Key Features

- Flight profiles
- Ground return models
- Multipath reflections
- Altimeter signal measurement
- Testing on the aircraft
- Built-in test and self-calibration

AT A GLANCE

CONFIGURATIONS
Full: flight profiles, ground return and multipath; C band: one echo at a fixed range

FREQUENCY RANGE
3–18 GHz and 24–30 GHz, adjustable centre frequency; C-band configuration: 4.0–4.5 GHz

INSTANTANEOUS BANDWIDTH
500 MHz

SUPPORTED SIGNALS
FMCW (sawtooth up, sawtooth down, triangular up/down, triangular down/up; sweep up to 500 MHz, sweep time ≥ 1 µs) and pulsed

INPUT SIGNAL LEVEL
−30 to 0 dBm; maximum safe input +10 dBm

APPLICATIONS

- Radar altimeter testing on rotary-wing and fixed-wing aircraft
- Radar altimeter verification in HWIL and SIL test set-ups
- Fault finding and acceptance testing of radar altimeters

Capabilities

Flight profiles

Altitude follows a sequence of steps with vertical velocity, acceleration and hold times, or stays at one fixed range. Scenarios are saved, reloaded and played back on a timeline, and applied values are logged.

Ground return models

Swerling 0–IV radar cross-section models with fixed or two-way path loss. Optional Doppler follows the altimeter frequency measured by IFM.

Multipath reflections

Fixed path difference, double bounce or random ground points that change during the scenario, each with its own relative amplitude.

Altimeter signal measurement

Shows the spectrum around the set centre frequency, finds the altimeter signal before a run and measures its frequency, amplitude, PRI and pulse rate.

Testing on the aircraft

Receive and transmit antenna coupling units stand under the altimeter antennas on tripods, adapted to the fuselage and antenna size. The operator tablet connects over Ethernet, so one person runs the test from the cockpit.

Built-in test and self-calibration

Checks its own hardware and calibrates internal delay automatically, with no external test equipment. Test logs and fault reports support fault finding.



Figure 2. Echo simulator unit front panel with RF status indicator, debug port and power switch

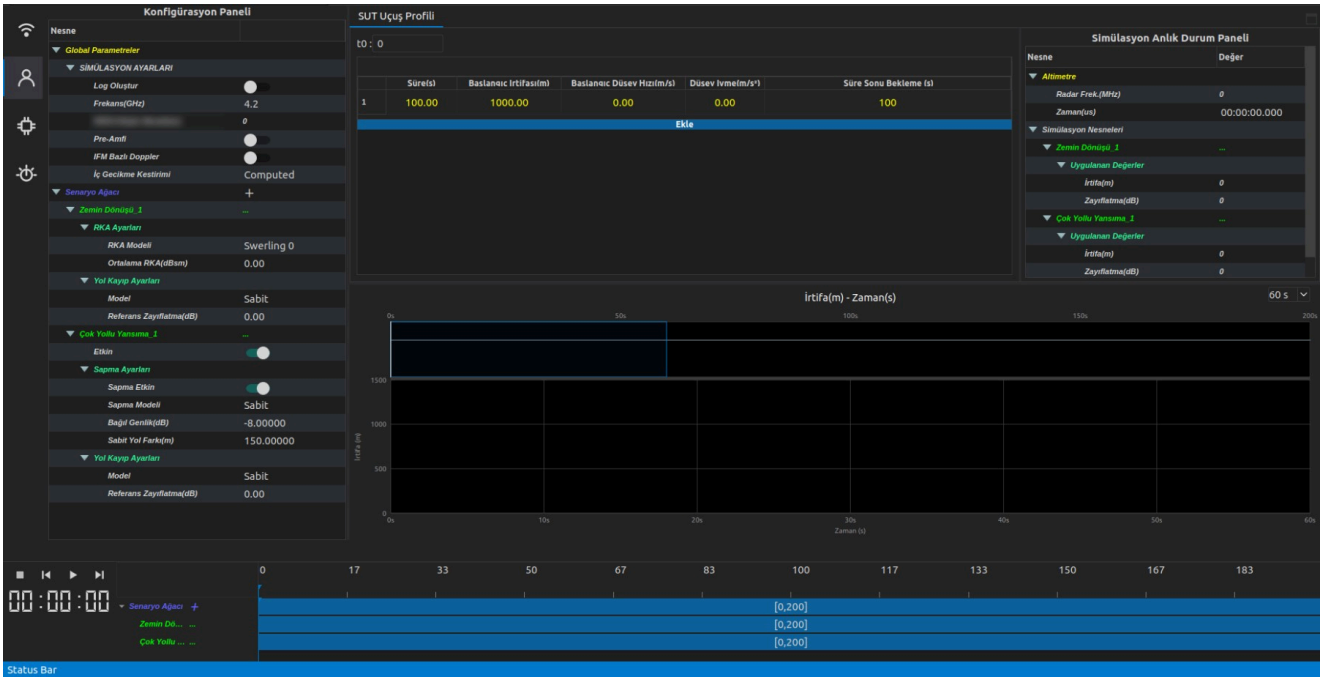

Figure 3. Operator mode: scenario tree with ground return and multipath settings, flight profile table, simulation status panel and altitude–time graph

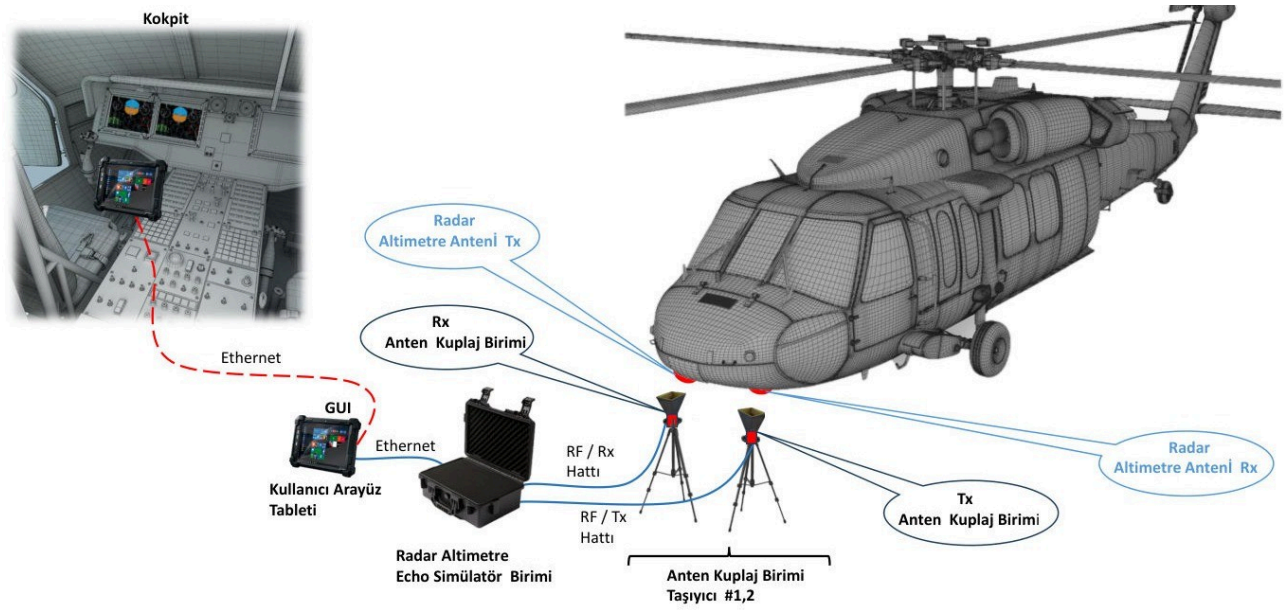

Figure 4. Usage concept on the aircraft: echo simulator unit, antenna coupling units on tripods and operator tablet connected to the cockpit

Specifications

General	
Configurations	Full: flight profiles, ground return and multipath; C band: one echo at a fixed range
Frequency range	3–18 GHz and 24–30 GHz, adjustable centre frequency; C-band configuration: 4.0–4.5 GHz
Instantaneous bandwidth	500 MHz
Supported signals	FMCW (sawtooth up, sawtooth down, triangular up/down, triangular down/up; sweep up to 500 MHz, sweep time ≥ 1 µs) and pulsed
Input signal level	−30 to 0 dBm; maximum safe input +10 dBm
Output level	Up to −30 dBm; attenuation 60 dB in 1 dB steps
Output dynamic range	80 dB block (40 dB instantaneous)
Simulated altitude	1–1500 m along a flight profile; C-band configuration: 5–1500 m, fixed
Range resolution	1 m
Vertical velocity	0–30,000 m/s, 1 m/s resolution
Hold time	0–1000 s
Radar cross section	−60 to +60 dBsm, 1 dB resolution
Multipath	Relative amplitude −40 to −10 dB, path difference 1–5000 m
Doppler	Follows the measured altimeter frequency (IFM, optional)
Connections	SMA 50 Ω for direct injection, or receive and transmit antenna coupling units
Control	Operator software on Windows or Linux; 1 Gigabit Ethernet
Form factor	19-inch rack, 2U
Power	220 V AC, 50 Hz
Weight	< 20 kg
Operating temperature	0–50 °C

Warranty

All hardware and software procured from Zeta is under warranty against manufacturing or design failures for 2 years. Customer-specific warranty terms may be arranged.

Disclaimer

Due to ongoing research and development, Zeta reserves the right to change product specifications without notice.

About Zeta

Zeta Defence develops electronic intelligence (ELINT) and communication intelligence (COMINT) equipment and radar / electronic warfare simulators. Its capabilities include RF transceiver system design, digital design and large-scale software development.

Contact

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