RF Target Injection for (M)SSR Mode-S and ADS-B-1090 ES | RES

The RES28x simulates a radar's environment, including up to 2000 SSR or Mode-S targets, reflectors and LVA antenna behavior on RF level. This is done by injecting the required RF signals that would occur in real life situations into the antenna connectors of a radar. This causes the radar to react as it would to real-world targets.

The aim of this is to present a known reference environment to the radar and compare the radar output data with the input scenario. This is where the RASS kit fits in, since it includes radar data recording, video signal recording, and (Mode-S) interrogation recording, plus a wide range of analysis tools. These tools allow a user to visually compare the input data (input scenario) against the output radar data and calculate the performance parameters from the data. They also provide statistical result-data on measured radar accuracy, biases, measured Pd, reflection elimination, false plot rate, etc...

Why Do You Need a RES?

If you are involved in radar or ADS-B-1090 ES sensor acceptance or development, this is the tool to own!

The RES28x can test all the difficult specifications of a radar:
load testing, Mode-S performance, Mode 1 and 2 performance, resolution behavior, accuracy, probability of reply, performance when using low PRF, etc.

RF Target Injection for PSR | RTG

The Radar Target Generator (RTG1002) is designed to generate primary radar returns.
The RTG will detect and preserve the radar pulse, apply a fixed and highly precise delay, and retransmit the pulse with the appropriate power, frequency, and Doppler shift.

The RTG can accomplish the following with minimal knowledge or presumptions of the Radar Under Test (RUT):

- Reproduce the stored signal with controlled amplitude to produce accurately known clutter at some fixed delays.
- Reproduce the stored signal with controlled amplitude and variable delay determined by the target position to a resolution of around 21.4 millimeter in distance to provide a moving target.
- Work independently of the radar as a remote target or be deployed on-site.
- Generation of Doppler modulation: the Doppler shift is the result of changing the delay produced by a moving target in combination with a vector modulator.

GLOBAL PRESENCE

Intersoft Electronics NV
Head Office

www.intersoft-electronics.com
support@intersoft-electronics.com

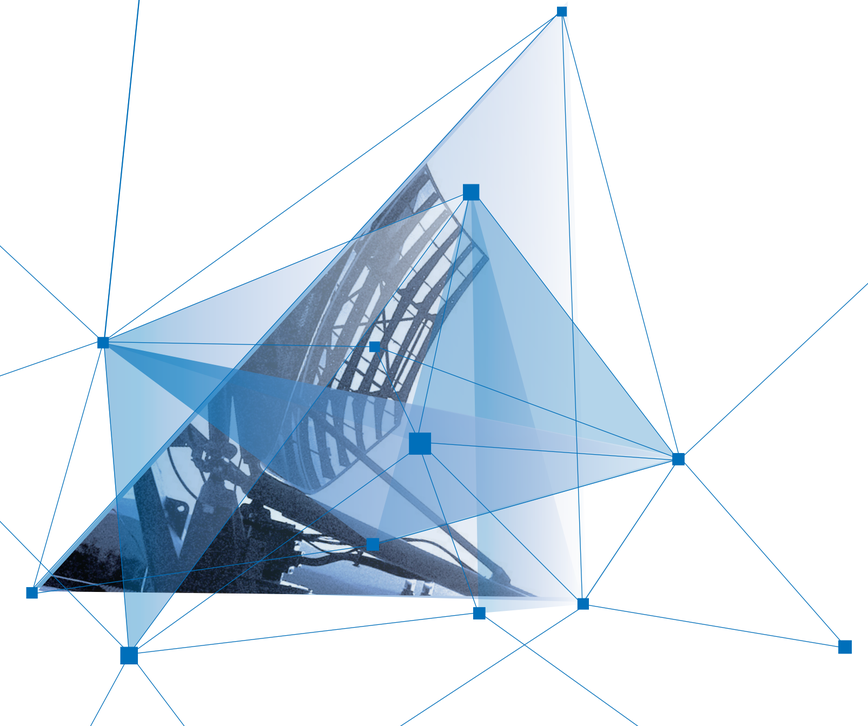
Intersoft Electronics USA
US Office, Florida

www.intersoft-electronics.com
support@intersoftelectronics-usa.com

IE-CD-01073-004 RASS Measurement solutions leaflet

INTERSOFT ELECTRONICS

RADAR SUBSYSTEM EVALUATION RASS® Measurement Tools



RASS® Measurement Solutions

The RASS® (Radar Analysis Support System) system provides a complete solution for measuring the performance of a radar system on-site, from the RF signals at the antenna down to the serial radar data output.

Intersoft Electronics developed this system independently from any radar manufacturer to offer an all-round radar analysis tool. Evaluation of an entire radar system can be completed quickly and with little interference to the controllers as RASS can be connected to signals that are available during operational conditions.

RASS users comprise civil and military ATC organizations, radar and radome manufacturers, ANSP's, and ADS-B ground station manufacturers.

With a few days training, radar operators or technicians can learn to utilize RASS tools to measure and/or analyze a radar's signals and data.
The scientific approach of the RASS system produces a top-down analysis of all elements in the radar chain, verifying the performance of each element separately in the operational environment of the radar.

Measuring the mechanical quality of antenna systems | RGI

The Radar Gyroscope-and-Inclinometer (RGI1193) and the Radar Timing Interface (RTI966) enable a user to evaluate the mechanical and structural design of the antenna support and tower under wind-loads, temperature, etc.

The RGI measures the angular velocity and planar angle of the antenna.The rotational information data combined with the encoder signal provide essential information on encoder accuracy and platform leveling.

Measuring the antenna system | RFA

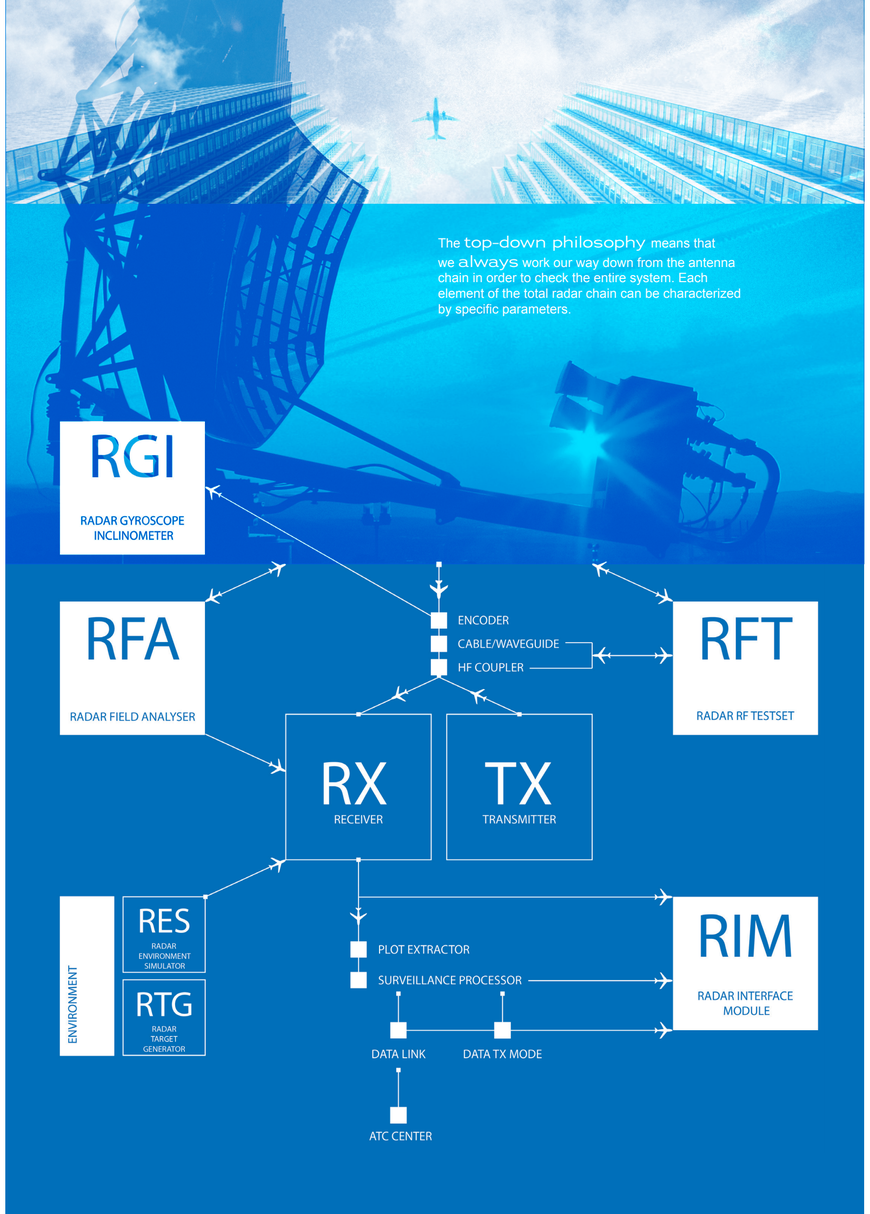
The first vital part of the radar chain is the antenna. Possible errors in this element can be characterized using the Radar Field Analyzer (RFA641), the RASS instrument designed to perform antenna and RF receiver measurements.

The RFA641 is intended for on-site performance checks of (M)SSR ATC radars and primary radars in L and S band. For this purpose, the radar does not have to be taken out of its operational mode.

The RFA641 can perform the following measurements:

- Uplink (transmission) antenna diagram
- Generation of test pulses for downlink (reception) antenna diagram
- Receiver measurements: Rx sensitivity sweeps, Rx bandwidth sweeps and (sectorial) STC or DSTC sweeps
- Transmitter power, spectrum, pulse shape recording, timing, mode and stagger verification
- FRUIT generation for environment simulation
- ADS-B scenario generation
- Mode-S interrogation generator for transponder verification
- Transponder quality verification
- Target injection for non-pulse-compression primary radars
- Remote Field Monitor function for SSR (A/C).

The top-down philosophy means that we always work our way down from the antenna chain in order to check the entire system. Each element of the total radar chain can be characterized by specific parameters.



Measuring the RF Parts | RFT

A large part of the radar transmission/reception chain is formed by RF components: starting at the transmitter, a signal passes through a circulator; low loss cables convey it through a rotary joint to the antenna.
In the LVA (Large Vertical Aperture) antennas of modern MSSR and 3D PSR, RF signals are split and distributed along the different elements of the array antenna. Possible errors in these elements can be measured by the RF Testset. Special software enables pinpointing of problem areas in the antenna.

The Radar RF Testset (RFT646) can perform the following measurements:

- General Vector Network Analysis (VNA): Measurement of VSWR, Reflective power, Forward and Reverse transmission
- Vector Network Analysis function for LVA near field antenna measurement to identify faulty antenna columns
- Far field antenna pattern simulation from measured LVA tapering table
- Dedicated VNA with scanning software for 3D PSR antenna
- Pulse Vector Volt meter
- Q alignment measurement for PSR receivers

Radar video en data recording | RIM

After a checkup of the antenna, transmitter and receiver, the signal processing should also be checked. To do this, both the video input and the resulting processor data output need to be recorded. Additionally, dedicated software allows emulating the plot extraction process and comparing with the radar output.

The radar processor produces several trigger and azimuth signals, and receives the video input (up to three channels) from the receivers. This data will pass an intermediate video stage. The radar system will process this data and produce plot data, available as serial LAN messages.

Data at those two stages can be intercepted by the Radar Interface Module (RIM782), which can be divided in two parallel running systems:

- Video Recorder, which is intended for detailed recording of video level reply signals and digital trigger signals.
- Data Recorder that is capable of recording serial plot and track data, independent of the data format. It connects directly to the modem lines.

RIM782 recording functions:

- Direct digital recording to PC with time stamps
- Recording of (M)SSR/PSR Downlink Antenna diagrams
- PSR VPD Solar recording function
- Sectorial Video Recording for detailed reply recording
- Environment Recordings (FRUIT determination)
- Live monitoring of recordings
- Recording of SSR replies, Mode-S replies/interrogations and PSR returns
- Modify / add data to files, data manipulation on video levels
- On-screen playback of files for simulation & test purposes
- Embedded multi-level linking between radar data and video data
- Primary Clutter recording with clutter analysis software
- Converting and analyzing recorded data
- Serial Data Recording
- LAN Data Recording