FREESTATE ELECTRONICS
Incorporated

Automatic Dependent Surveillance – Broadcast (ADS-B) Test Set

Superior utility for certification and maintenance of ADS-B equipment, Air System monitoring, and RF environment simulation

Description

Forward looking concepts in Air Traffic Management, including the desire to implement aircraft free flight, depend upon a new set of GPS enabled technologies, such as ADS-B. Performance verification of these new technologies necessitates a new generation of sophisticated maintenance and certification test tools.

To meet this need, Freestate Electronics has developed the 1090 MHz ADS-B Test Set and the ADS-B Test System. These provide the test functions necessary to verify performance to the latest ICAO requirements and standards.

Features

- Easy to use scenario generator aids construction of complex signal test environments
- Complete control of squitter data content via virtual instrument panels
- Two independent RF channels enable coincident signal test environments
- Multiple ADS-B Test Set systems capable of up to 36,000 programmable events
- Record functions capture and time tag all transmission event characteristics
- Playback of saved records or saved event scenarios
- High accuracy output levels, each transmission can utilize the full amplitude range of 0 dBm to -95 dBm
- Random event timing and data functions
- Advanced error correction test functions
- LabVIEW® based control interface

Operation

ADS-B functions are controlled by use of a laptop PC loaded with FSE virtual instrument software.

The characteristics of each RF transmission are precisely controlled by digital signals from the Process Control and Communication module.

The scenario generator describes all aspects of each transmission event and allows quick review and editing of scenario configuration files.
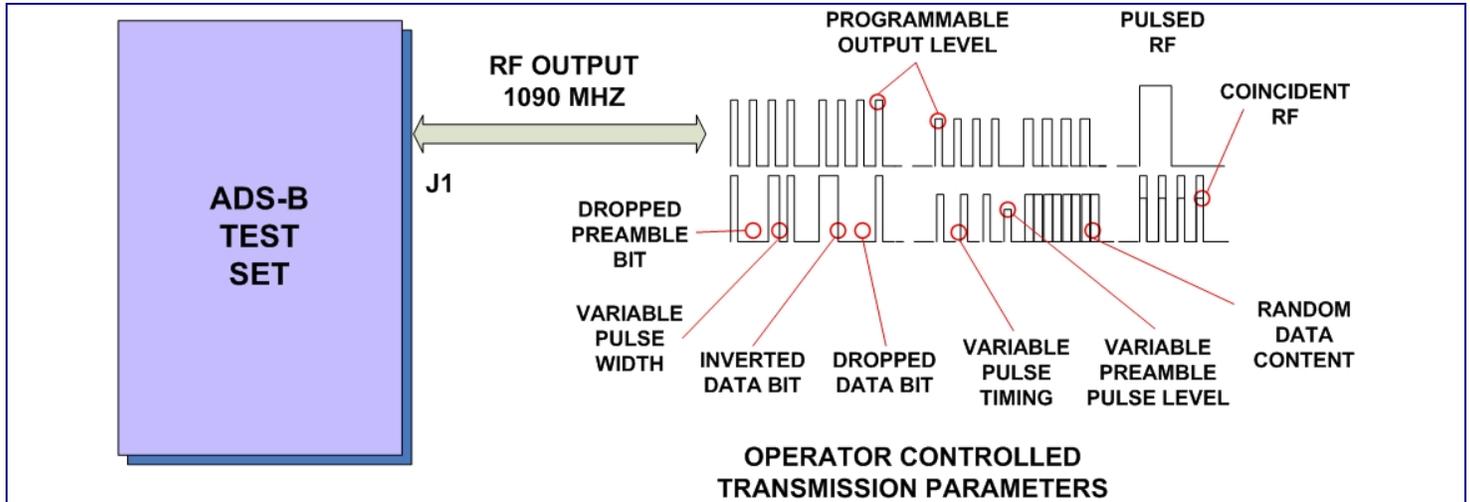
The two independent Reply Generator channels enable intricate event timing, including coincident pulsed RF transmissions.

Up to three ADS-B systems may be synchronized to maximize signal generation capability and test versatility.

Construction

The ADS-B electronics are housed in seven RF shielded VXI plug-in modules mounted in a standard 7-inch high, 19-inch wide, rackmount chassis. Typical module construction is indicated.

OPERATOR CONTROLLED
TRANSMISSION PARAMETERS

ADS-B Test Set Characteristics

Operating Modes	CW, Pulsed RF – Fruit Generation, Squitter Generation, Static Data, Special Test Signals, Scenario Playback
Signal Simulation Types	ATCRBS Fruit; static ATCRBS (static data content, X bit, SPI bit); Mode S Fruit (DF=16, 17, 18, 20, 21, or 24); Mode S Squitter (DF=17, random data); static Mode S (static data DF=4, 5, 11, 16, 17, 18, 20, 21, or 24); Mode S error correction verification and missing preamble signals
User Controlled Signal Parameters	Pulse Width; Pulse Timing; ATCRBS Data Content; Mode S Data Content; Squitter Error Correction Verification Signals; Missing Preamble Pulse; Squitter Data Content, Dropped Data Bits, Random Data, Random Trigger, Output Level
Scenario Generation	Up to 6,000 user programmable (pulse, ATCRBS, or Mode S) events per RF Channel; event resolution is 25 n Sec
Fruit Generation	Random Data and Random Timing (synchronized to squitter); or Fixed Data and Fixed Timing
Data Logging	Records up to 500 events/second continuous, burst capture up to 6,000 events; Time Tag resolution is 1 μ Second
Signal Generator RF Outputs (1080 MHz to 1100 MHz in 200 kHz Increments)	Two Independent, Non-Coherent, Signal Sources (Combined internal to the Test Set)
RF Level Control	-95 dBm to 0 dBm, 0.5 dB increments; plus 0.1 dB fine level control (independent control for each signal source);
Absolute Output Level Accuracy	+/- 0.5 dB maximum, +/- 0.2 dB typical
Test Outputs	1090 MHz – Output Channel A or B 70 MHz –IF Signal 1020 MHz - Upconverter LO TTL - Generator Derived RF Modulation and Triggers Data Logging – Record of all Fruit and Squitter signals (data logging on OCS PC)
Test Input	ADS-B Transmitter Test Port (RF in @ +20 dBm to +47 dBm, +50 dBm absolute maximum)
Control Interfaces	IEEE-488 and RS-232