The SE-5310 Quad-Band Satellite and Range RF Exciter & Test Signal Simulator combines a state-of-the-art high data rate digital wideband waveform modulator with a high performance radio frequency (RF) upconverter to produce transmission-ready signals in the Baseband, Upper L-, Lower L-, and both Uplink and Downlink S-Band frequency bands. An advanced, digital implementation provides for the small form and fit while fully satisfying applications requiring ruggedized packaging, minimum power consumption, and high spectral purity. The design supports a multitude of complex digital formats for Satellite and ARTM Range use.

Data generation, coding, and modulation can be driven from a variety of external digital inputs or via internal pattern and waveform generation sources.

The practical design of the SE-5310 Exciter also supports link test and verification applications. A single SE-5310 can replace a BERT, waveform generator, vector modulator, upconverter, amplifier, noise source, attenuators, power meter, spectrum analyzer and a frequency converter. Combining these capabilities in one small, simple-to-use unit allows quick and accurate setup and testing without in-depth system knowledge.

An optional second, independently tunable modulated RF output may be used effectively with dual-polarized systems. Output power levels are adjustable from +10 dBm to -80 dBm in 0.1 dB steps for fine control and fade profiling.

Configurable front panel connectors provide operators with ready access to internal signals. The SE-5310 can optionally support a station clock for external frequency reference.

The SE-5310 includes support for user-configurable Doppler simulation and satellite acquisition automation functions. Additionally, up to 32 Configuration Profiles can be stored with user-defined link names and recalled with a single command, simplifying fast and accurate configuration changes.

The firmware-intensive implementation of the SE-5310 readily accommodates custom features and signal processing tasks. Using the latest generation digital signal processing techniques allows upgrades via firmware changes, even for previously fielded systems.

The SE-5310 is not based on a PC platform, avoiding the requirement for 3rd Party Operating Systems and hard drives and reducing the need for system patches and IT security concerns.

The SE-5310 RF Exciter is implemented in an industry standard 19 inch rack mountable chassis and provides full status and control capabilities. Controllable selections are accessible via a front-panel display or remotely via a standard RS-232 serial and 10/100baseT Ethernet or optional GPIB interface.
Model SE-5310 Satellite/Range RF Exciter System Specifications

**Firmware Personalities & Supported Waveforms**

Analog/Digital Satcom Personality includes Main and/or SubCarrier:
- Phase Modulation (PM) - Digital or Analog (10 Hz to 25 MHz)
- Frequency Modulation (FM) - Digital or Analog (50 Hz to 5 MHz)
- Phase Shift Keyed (PSK)
  - BPSK (50 bps to 10 Mbps)
  - QPSK, OQPSK (100 bps to 20 Mbps)
  - U/AQPSK (100 bps to 2.5 MHz low, 5 kbps to 10 Mbps high)
- PM/PSK - Configurable subcarrier frequency
- Single or Dual Viterbi Encoder
- High Rate / Range Personality includes Main Carrier:
  - Phase Shift Keyed (PSK)
  - BPSK (1 kbps to 25 Mbps)
  - QPSK, OQPSK (1 kbps to 50 Mbps)
  - ARTM Tier 0 (to 15 Mbps), 1, and 2 (to 50 Mbps)
- Other Modes or Combinations On Request

**Data Inputs**

- 2 TTL Data/Clocks: 50 bps to 20 Mbps
- 2 LVDS Data/Clocks: 50 bps to 50 Mbps
- Internal Digital Pattern Generator
- Internal Clock Generator (With Output)

**Primary RF Output**

- Frequency: 1400-2600 MHz Continuously Tunable
- Frequency Resolution: 10 Hz
- Output Level: +10 to -80 dBm or OFF
- Step Size: 0.1 dB
- Modulation Options: Unmodulated CW, Digital Modulation
  - Spurios: > -80 dBc to 1 MHz (typical)
  - > -70 dBc > 1 MHz
- Phase Noise: < -85 dBHz at 10 KHz offset
- Programmable Sweep and Frequency Decay:
  - Sweep Range: Up to ±20 MHz
  - Sweep/Decay Rate: 10 Hz to 1 MHz/sec.
  - Sweep Control: Up, Down, Bi-Directional

**Secondary RF Output (Optional)**

- Frequency: 1400-2600 MHz Continuously Tunable
- Characteristics: Identical to Primary RF Specifications
- Modulation Options: Unmodulated CW
  - Modulated with Primary RF Waveform
- Output Level: +10 to -80 dBm or OFF
- Step Size: 1 dB

**AM or ASK Waveform Specifications**

- Digital Mode: Binary ASK orOOK
- Analog Modes: External In, Digital Modulator In
- Modulation Rates: 100bps to 10Mbps or Up to 10MHz Analog
  - Mod Index: 0.1 to 100% in .1% increments

**FM or FSK Waveform Specifications**

- Digital Mode: Binary FSK
- Analog Modes: External In, Digital Modulator In
- Modulation Rates: 100bps to 20Mbps or Up to 20MHz Analog
- Deviation: 200Hz to 20MHz

**PM or PSK Waveform Specifications**

- Digital Modes: BPSK, QPSK, AQPSK, UQPSK, OQPSK, or DPM
- Analog Modes: External In, Digital Modulator In
- Shaping: Phase Transition over 0 to 100% of Baud Period
- Modulation Rates: 50bps to 50Msps or Up to 20MHz Analog
- Mod Indices: 0 to 180 degrees for DPM, Adjustable I/Q power ratios for A or UQPSK

**ARTM Waveform Specifications**

- Modulation Types:
  - ARTM Tier 0 (PCM/FM) to 25 M bit/s
  - ARTM Tier I (SOQPSK) to 50 M bit/s, 25 M baud/s
  - ARTM Tier II (Multi-h CPM) to 50 M bit/s, 25 M baud/s
- Modulation Characteristics:
  - Premodulation Filtering per IRIG 106

**Coding Formats**

- PCM: NRZ - Mark (NRZ-M), Space (NRZ-S), Level (NRZ-L)
- BiØ - Mark (BiØ-M), Space (BiØ-S), Level (BiØ-L)
- Convolutional: Bypass, Rate 1/2, or Rate 3/4 (Punctured)
- Constraint Length 7, Industry Standard Polynomials
- G1/G2, G1/-G2, G2/G1, -G2/G1 Symbol Ordering
- Scrambling:
  - Bypass, Intelsat (V.36), or CCITT (V.35), RCC 106 15-bit IRIG

**Additional Features**

- Bit-Error-Rate Testing: Monitors Bit Error Rate for Returned Data of Internally Generated Data Patterns
- AWGN Noise Generator: Adds Simulated AWGN to Output Waveform to Establish Accurate Eb/No Levels
- PN Code Generators for Industry Standard Patterns
- Bit-Synchronizer: Auto-baud detect to adapt shaped waveform and/or Modulation Indicies
- Up to 32 Stored Configuration Profiles

**Remote Status/Control Specifications**

- Serial RS-232, 10/100baseT (GPIB Optional)
- Commands: Control Over All Configurable Parameters
- Status: Lock, Self-Test, Detailed Operational Information

**Other Specifications**

- Chassis: 19" Rack Mount, 3.5" H (2U), 22" D (Excl. Connectors)
- Connectors
  - 1 Type N for Primary RF Output
  - 1 Type N for Secondary RF Output (Option)
  - 2 BNCs for Monitor Ports (Front Panel)
  - 8 BNCs For Data/Clock Inputs/Outputs
  - 1 25 PIN D for Differential Data/Clock Inputs/Outputs
  - 1 BNC For External Reference Input (Option)
  - 1 BNC for Internal Reference Output (Option)
  - 2 BNC Analog In/Out
  - 1 9 PIN D for Remote Status/Control
  - RJ-45 for 10/100baseT
  - GPIB (Option, replaces 10/100baseT)
- Standard 3 Prong Male Primary Power Input
- Primary Power: 120 VAC (+/- 10%) 50-60 Hz
- Temperature: -25° TO 60° C Operational, -45° TO +65° C Storage

* All specifications subject to change without notice or obligation to retrofit.
Consult factory for custom options and/or alternate specifications.