# LUMISTAR

## LS-11-F Portable FM Test Transmitter
### Data Sheet

## Description:

The LS-11-F portable FM test transmitter is designed for checkout and troubleshooting of telemetry receiving systems operating with FM modulation.  For applications with any of the ARTM modulations (Tier 0, Tier I, or Tier II), please refer to the LS-11-M Data Sheet.



Complete ground stations including the antenna with LNA, RF down-converter, IF receiver, bit synchronizer, and PCM decommutator can be tested and bit error tests performed.  The design allows secure links to be tested with an external encryptor.  The Test Transmitter contains an internal PCM Simulator with Pseudorandom generator that operates in a BERT mode when used with the Lumistar LS-50 Decom or LS-24-RTR Range Telemetry Receiver allowing bit error numbers to be displayed through software.   Full flexibility allows the use of the simulator only (without transmitter) or transmitter only with an external source modulating the transmitter.  Complete setup can be achieved locally through the keypad and display or remotely through the RS-232 Interface.  Operational parameters include the PCM format information, pre-modulation filter selection, transmitter frequency, transmitter deviation, and output power level.  Output power can be selected from -60 to +10 dBm in 5 dB steps.  The Test Transmitter contains an internal lead-acid battery and battery charger and will operate for twelve hours on a full charge.

## Key Features:

- Hand-Held FM test transmitter with internal simulator
- Fully Programmable through RS-232 for PCM format, pre-modulation filter, transmitter frequency, transmitter deviation, and output power.
- Local Display and Keypad
- Memory contains 4 format capability
- Simulator allows common, unique, and waveform words
- Pseudo-random burst generator for BERT mode allows forced errors
- Output power level control in 5 dB steps from -60 to +10 dBm (nominal)
- Used for checkout and/or troubleshooting of complete RF data links
- Available in L-Band or S-Band (other bands are optional)
- AC power or battery operated
- Internal battery charger
- Supports data rates to 15 Mbps NRZ-L
- Accepts modulation input from external PCM Encoder or Simulator
- On/off switch, transmitter control switch, and transmitter status indicator

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*Specifications are subject to change.  Please verify the latest specifications at time of order.*          *11-1-13*

# LS-11-F Simulator with FM Modulator
## Data Sheet

| | |
|---|---|
| Temperature (Operating) | 0 to 50 $^{o}$C |
| Temperature (Non-Operating) | -25 to +70 $^{o}$C |
| Host Interface | RS-232 19200 baud, 8-bit, 1 stop, ASCII without parity<br>Optional: 600, 1200, 2400, 4800, 9600, 38400, 115200 baud |
| Input Power (Switchable) | 110 VAC 60Hz or 220 VAC 50 Hz |
| Transmitter Output Connector | Type N-Female |

## PCM Simulator Specifications

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|---|---|
| Format Selection | Four format definitions in non-volatile memory |
| Front Panel Outputs | NRZ-L and PCM Data, 0-degree clock & minor frame strobe |
| Output Levels | Single-ended TTL |
| Output Data Rate | 175,000 bps to 15 Mbps (NRZ codes)<br>87,500bps to 7.5 Mbps (all other codes) |
| PCM Codes | NRZ-L/M/S; Bi-Phase -L/M/S; DM-M/S; M$^{2}$, RNRZ-L11/15, k=7 Convolutional Rate 1/2, 1/3 |
| Word Length | Variable from 3 to 16 bits per word on a word-by-word basis |
| CRC Generator | CRC16/CCITT Forward/Reverse |
| Minor Frame Length | 2 to 8,192 words per minor frame |
| Major Frame Length | Up to 1024 minor frames per major frame |
| Bit Order | MSB or LSB-first |
| Frame Sync Pattern | Up to 256 words (any series of 0s or is 1s may be used) |
| Major Frame Sync | FCC (FAC), SFID |
| Common Words | May be a single value or selected from a group of one minor frame |
| Unique Words | Seven may be programmed in any mainframe, super-commutated, or subcommutated channel. |
| Test Output | 32,767-bit PRN pattern |
| Waveform Words | Five may be programmed to appear in every frame at the same location. |
| Pseudo-random Generator | $2^{11}$ or $2^{15}$ PRN bit pattern |
| Forced Error | On or Off, one error per pattern |

## PCM Transmitter Specifications

| | |
|---|---|
| RF Bands | S-Band (2200-2400MHz.) Model LS-11-FS<br>L-Band (1435-1540 MHz) Model LS-11-FL |
| Tuning Resolution | 0.5 MHz |
| Modulation Type | Wideband FM |
| Modulation Source | PCM Simulator or Front-Panel input |
| Output Power | -60 to +10dBm Max *(approximate)* in 5dB steps |
| Output Power (during tuning) | Transmitter output is inhibited during tuning |
| Spurious Outputs | <50 dBc |
| Pre-Modulation Filter | Four selectable 4-Pole Bessel Filters with standard cutoffs at 0.5 MHz, 1 MHz, 2.5 MHz, 5MHz. Other cutoffs may be specified on order. |
| FM Deviation | Up to 7MHz |