# Lumistar LS-11-M

# Portable Telemetry Test Transmitter/Simulator

# Quick Start Guide



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# 1 Introduction

## 1.1 General Information

This guide was created to familiarize the user with the operations of the LS-11-M Telemetry Test Transmitter/Simulator. It is primarily focused on providing a quick guide to interconnections with the device and to provide a simple overview of connecting and using the provided host software application. This manual should be used in conjunction with the LS11B Technical Manual for descriptions of operations of the stand-alone front-panel display and keyboard.

## 1.2 Hardware Description

The LS-11-M family of Telemetry Test Transmitter/Simulators provides a means of generating a static IRIG-106 style PCM telemetry stream or a common PRN pattern and then transmitting that data at an specified RF frequency. There are several configuration options that include various modes of modulation (including PCM FM, SOQPSK, and MHCPM) and various RF bands. There are options for multiple bands if required.

The device is a low output wattage device (<100mW/20dBm). It does contain a variable attenuator for decreasing the output level during system test.

The LS-11-M can operate in a stand-alone mode via an on-board rechargeable battery or via an 115VAC/230VAC (switch selectable) power source. The anticipated battery life of a fully charged battery is approximately 6 hours. The AC power cord for 115VAC plugs is included and can be located on the Velcro strip lining the cover of the container.

Figure 1 contains a picture of the operational panel of the LS-11-M test transmitter. The operational controls are depicted in this figure and will be described further:

**Power Control** – A toggle switch that applies power (either from the AC source or the internal battery) to the system components. From a power cycle state, the unit will not transmit a signal regardless of the position of the transmit switch. At power-up, the transmit switch will need to be transitioned from ENABLE to DISABLE and back to ENABLE to initiate a transmission cycle. This mechanization is provided as a safety against unwanted transmission after power cycles.

**Transmit Switch** – A toggle switch that enables and disables RF transmissions. From a power cycle state, the unit will not transmit a signal regardless of the position of the transmit switch. At power-up, the transmit switch will need to be transitioned from ENABLE to DISABLE and back to ENABLE to initiate a transmission cycle. This mechanization is provided as a safety against unwanted transmission after power cycles.

**RF Output** – An N-Style RF connector that contains the modulated RF signal source.
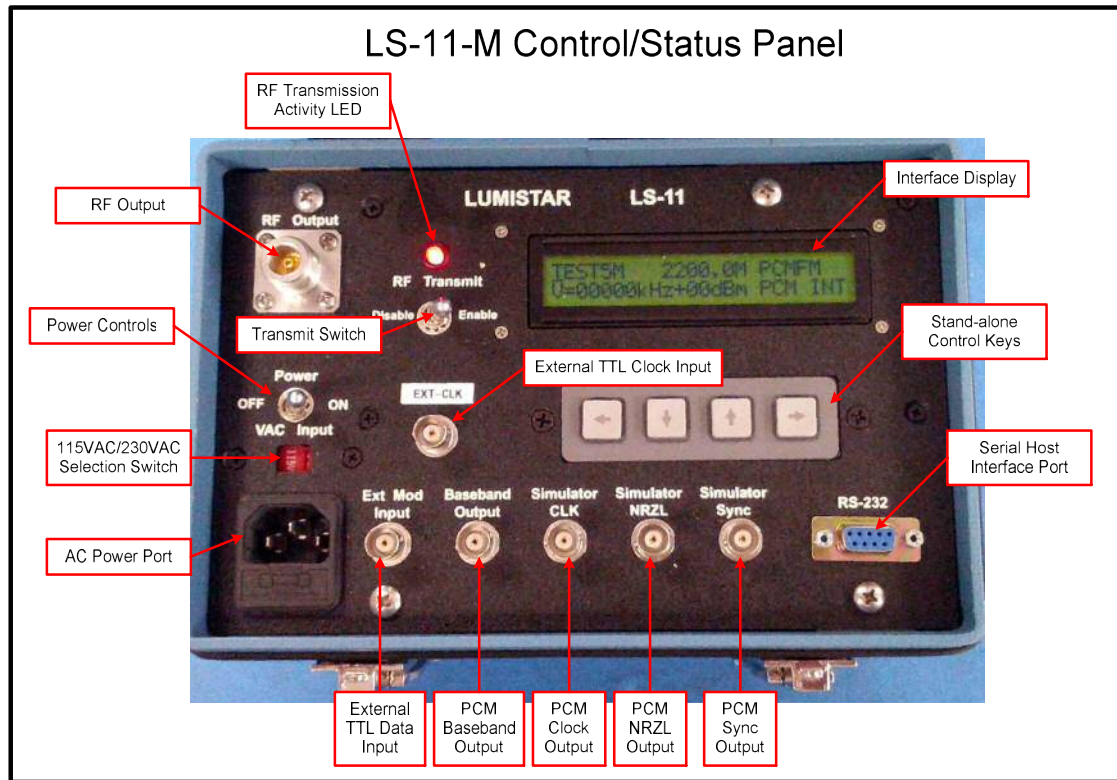
Figure 1.   LS-11-M Control and Status Panel

**AC Power Port –** An IEC style interface for facility 115VAC/230VAC.

**115VAC/230VAC Selection Switch –** This switch selects the expected AC line voltage. Extreme caution should be used in the setting of this switch.  Selecting the AC line voltage incorrectly will result in damage to the unit.

**RF Transmission Activity LED –** This LED indicates that the transmission source is active. In some firmware releases, this LED may flash for several seconds before achieving a steady state.  The transmission is active when the LED is in a steady state.

**Interface Display –** A two-line LCD display that provides information concerning the modulation source data, the data rate, the modulation type, the attenuation level, and the RF transmission frequency.  Refer to the LS11B manual for additional details.

**Stand-alone Control Keys –** Four directional keys that allow the user in a stand-alone mode to select between pre-loaded PCM formats, the internal PRN generation source, or the external TTL Clock/Data sources to the RF modulation source.  These keys also allow the ability to select and change the RF frequency and the attenuation levels. Refer to the LS11B manual for additional details.

**Serial Host Interface Port –** An RS232 port for interconnection to the provided host software application. In most cases, the unit is provided to the user with a USB-to-RS232 adapter for host interfaces. This is described further in the software section of this guide.

**External TTL Clock Input –** A TTL level RF modulator clock input port. This source is necessary for external modulation capabilities in addition to the external TTL data input.

**External TTL Data Input –** A TTL level RF modulator data input port.

**PCM Baseband Output –** This BNC connector supplies a bandwidth limited baseband output when the internal PRN generation or PCM simulator sources are active. This port will not be active during the use of external TTL clock and data source.

**PCM Clock Output –** This BNC connector contains the simulator clock source as a TTL level signal.

**PCM NRZL Output –** This BNC connector contains the simulator NRZL data source as a TTL level signal.

**PCM SYNC Output –** This BNC connector provides a sync pulse for pattern correlation in the case where the internal PRN or simulator is active. The pulse will be located at the sync pattern in a standard IRIG-106 simulation frame and once per PRN data cycle.

### 1.3 Antenna hardware provisions (optional)

Some customers request that an optional passive antenna be provided. Figure 2 shows an example of such an antenna hardware.
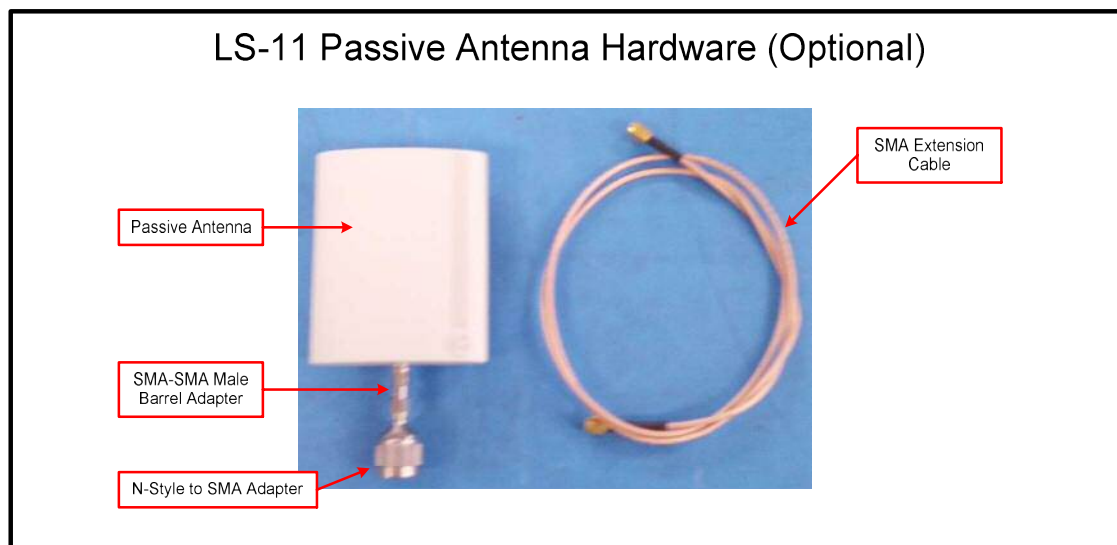


Figure 2. Optional Passive Antenna Hardware

The passive antennas can be provided with support for various bands and beam configurations. The antenna can be mounted directly to the RF output port by using an N-Style to SMA adapter and an SMA-SMA Male barrel. It should be noted that the beam then needs to be directed manually. Also, the antenna provides some minimal gain and thus will affect the actual power being transmitted.

If it is more appropriate to move the antenna to a better transmission location, a cable can be provided. In this case, it should again be noted that the cable loss characteristics along with the antenna gain characteristics need to be factored in for a final power output rating.

## 1.4    Software Description

In most modern host computer platforms, the availability of a USB port is common. Conversely, the availability of an RS232 port is becoming uncommon. To accommodate for this fact, the unit can be shipped with a USB-to-RS232 adapter. If the unit is shipped with this adapter, a cable assembly will be found containing a USB host interface adapter and a serial extension cord on the Velcro strip in the unit's cover.

The following procedure will step through the proper installation of the user software applications and then explain general operations of the host software.

### 1.4.1    Installation of the USB-to-Serial Adapter drivers

Before installing the Lumistar host software package, the USB adapter drivers need to be installed. On the CD provided, copy the driv_win_uport1p_v1.7_build_13052117.exe application to a Windows (Win2K, WinXP, Win7) host desktop and run the application. Answer "yes" and select all default options at all installation prompts.

Once the USB adapter drivers are installed, plug the provided USB adapter cable assembly into the Windows host. Go to the control panel and open the system device manager and take note of the serial port COM number that has been assigned to the USB adapter. This number will be necessary for proper configuration after the installation of the host application software. Figure 3 shows a typical device manager report of serial port assignments.
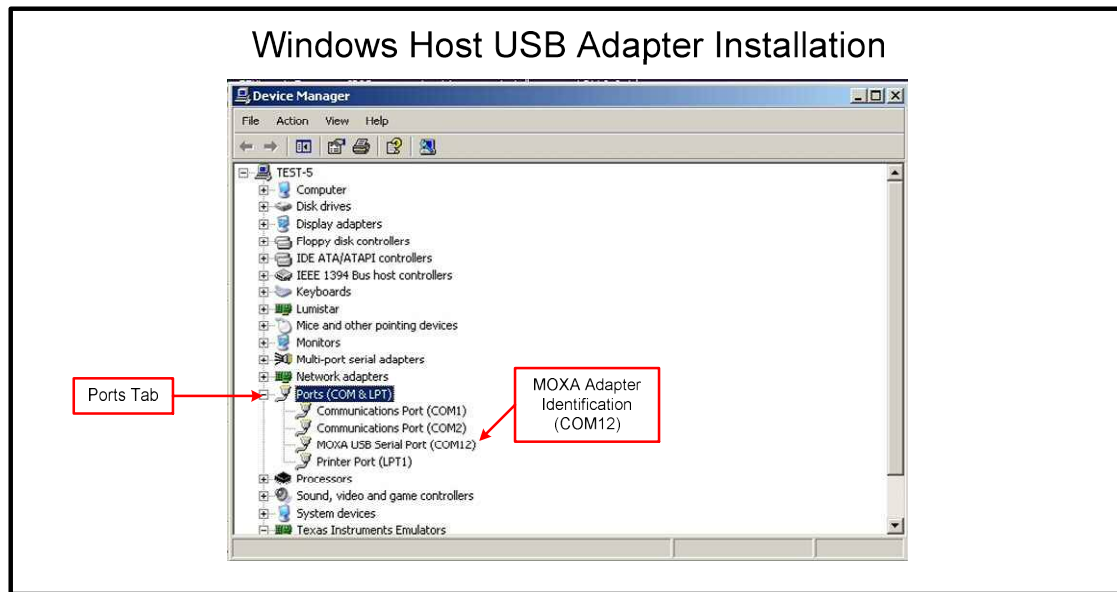
Figure 3.   Device Manager report of USB adapter COM port

### 1.4.2    Installation of the LS-11-M Host application software

Once the USB adapter has been properly identified by the host system, copy the Setup_Ls11Q_ver1_51.exe application software from the provided CD to the host desktop and run the application.  Answer "yes" and select all defaults at installation.

### 1.4.3    Configuring and operation of the LS-11-M Host application software

Launch the LS11Q application software by selecting the desktop icon.  The application software will first attempt communications to the LS11 unit on the COM1 serial port.  This will likely fail if the USB adapter did not install as COM1.  If this is the case, select the **Config** menu option and then enter the appropriate COM port from the pull-down options list. See Figure 4 for details. At this point it will be necessary to close the application and relaunch the application to establish communications.

Once communications is established, the main menu will populate as shown in Figure 5.  The operational controls depicted in this figure and will be described further:

**Import Decom Setup –** The main menu contains a FILE button that allows an additional menu option to IMPORT a standard LS50 static simulator frame setup.  Selecting this menu option allows the user the ability to browse to a location containing the desired frame format. Alternately, the user application allows the user to set up any frame format, in a manner similar to the LS50 application, directly through user selections.

**User PCM Format Number –** Once a frame has been defined, a number can be assigned so that the user can reference this via the standalone LCD display.
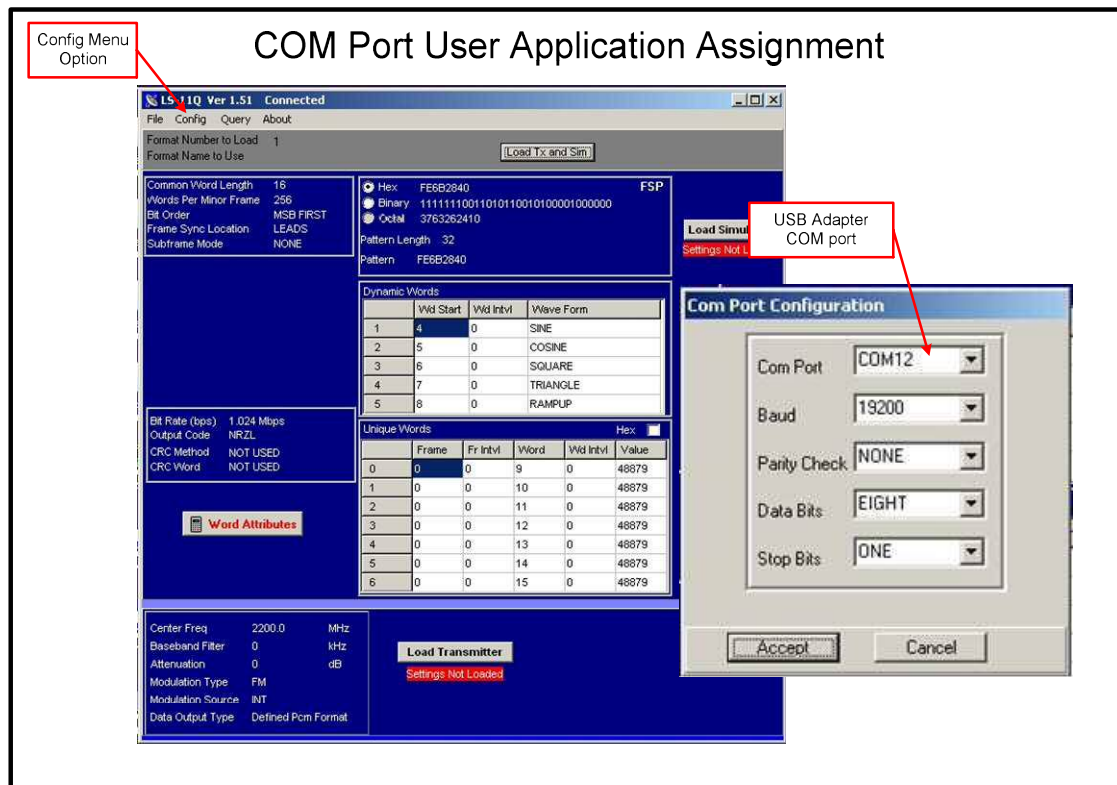
Figure 4.   COM Port Assignment

**User PCM Format Name –** Once a frame has been defined, a brief mnemonic name can be assigned so that the user can reference this via the standalone LCD display.

**Modulator Control Window –** In this area, the modulation and transmission characteristics are assigned.  Controls in this window include settings for the output power level, modulation type (PCM FM, SOQPSK, MHCPM), and modulation source (Internal or external).  If the source of modulation is selected as *Internal* then an output data type selection will select between the user defined PCM formats or the various PRN options.  The baseband filtering options are not required for the proper operation of the LS-11-M device so they may all be described as "0".

**Load Buttons –** There are three load buttons on the main menu:  the transmitter load button, the simulator load button, and the Load TX and SIM button.  Once the applicable settings have been completed in the software, the appropriate button should be selected to send the information to the LS-11-M device.  Once changes in any of these areas have been made, the user will be warned via a red "Settings Not Loaded" flag.  These flags will be extinguished once the loaded parameters have been sent.
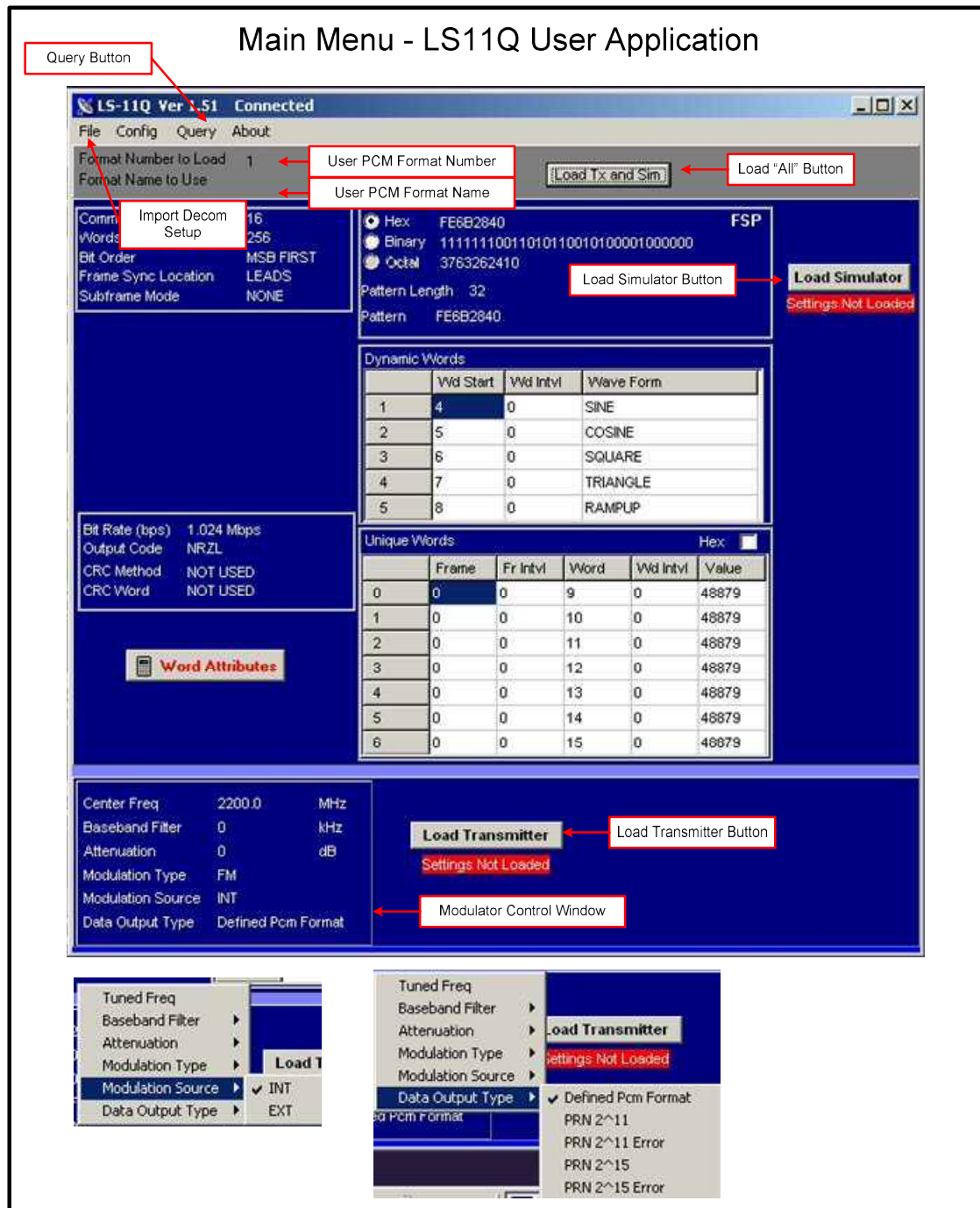
Figure 5.   Main Menu – LS11Q User Application