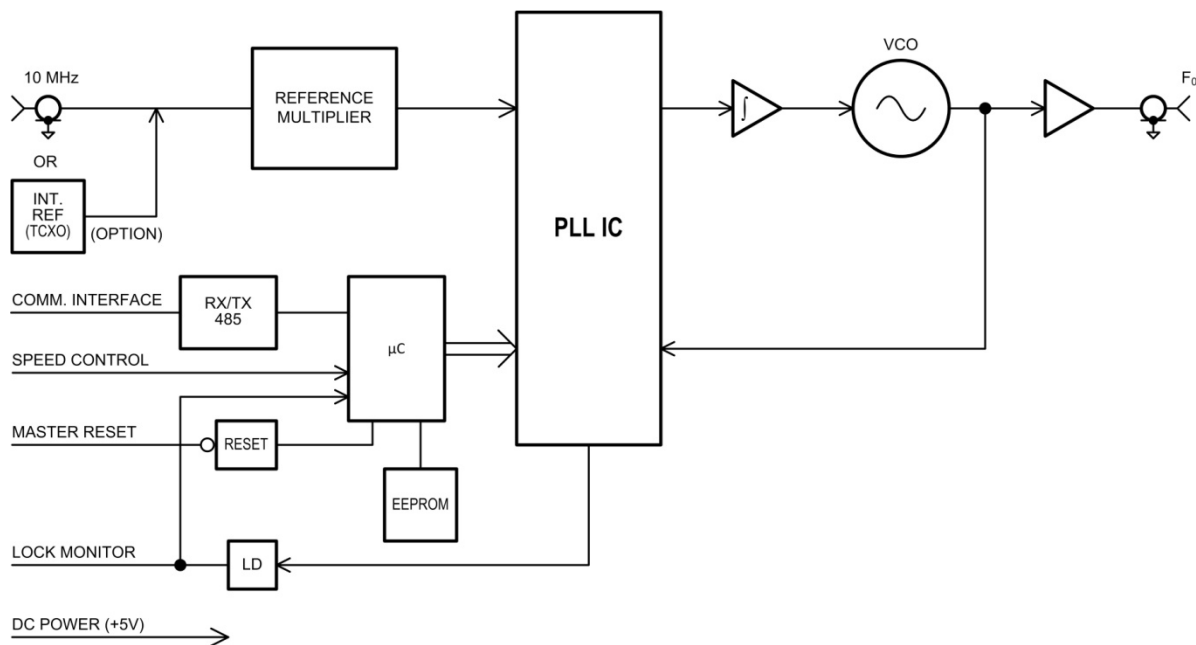


## SLSM5 SYNTHESIZER INTERFACE DEFINITION

### GENERAL

The SLSM5 employs the latest fractional N technology to realize a high performance versatile frequency source. This architecture allows very small step size without sacrificing spectral quality. That is the phase noise and spurious are very low. The SLSM5 is ideal for many applications in communications, radar and instrumentation. This synthesizer provides outstanding performance and reliability in a high quality compact unit.

Luff Research's Model SLSM5 frequency synthesizers are monitored and controlled through an asynchronous serial interface (UART). The electrical interface is RS485 and can be wired in two or four wire mode. The serial communications operates at either 9600 Baud or 115200 Baud selectable through the interface connector. Additional specifications for the interface are 8 data bits, 1 stop bit, no parity, and no flow control. The protocol is addressable allowing multi-drop communications. The address is selectable through a rotary switch on the unit.



### 10 MHz REFERENCE SIGNAL

The external 10 MHz reference signal should be a good quality signal at a level of 0 dBm  $\pm$ 3dB.

An optional configuration (SLSM5-xxxx-INT) provides an internal 10 MHz TCXO ( $\pm$ 1ppm -10°C TO +70°C). In this configuration the synthesizer will operate on the internal reference only.

## DC POWER AND FREQUENCY CONTROL

The DC power and frequency control is via P1, a 9 pin (MALE) D-SUB connector. The pin-out for this connector is given below. The synthesizer has an internal LDR and filtering however the supplied DC voltage should be from a quality power supply source capable of supplying 650 mA.

CONNECTOR P1	
Pin Number	Description
1	TX+ (out of synthesizer)
2	TX- (out of synthesizer)
3	RX- (into synthesizer)
4	RX+ (into synthesizer)
5	Speed Select Internal pull-up (0=115.2K, 1=9600)
6	+5.0 Vdc (min.) +5.5 Vdc (max)
7	(LD) Lock Detect (Open collector) 0=Alarm
8	/MR (Master Reset)
9	GND

For 2-wire mode tie together pins 1+4 and 2+3.

## LOCK DETECTOR

The synthesizer status monitoring for phase lock can be done in one of two ways as shown below:

- LD Pin 7 of P1, this lock detector indicates a failed condition and is low when a failure is sensed. The LD is configured as an open collector and is valid for all fault conditions including no reference signal.
- Through polling via the serial interface. However this would not be responsive if the reference is removed.

Please note that monitoring pin 7 does not add noise to the output, while polling via the serial interface can result in spectral degradation.

## NON-VOLATILE MEMORY

The unit has an internal non-volatile memory device which retains the settings of the last commanded state. The frequency and mute state are saved to this memory. At power turn on the synthesizer will be restored to the saved state.

## SERIAL INTERFACE PROTOCOL

Serial communication occurs **only** with either an external 10 MHz reference or an internal TCXO. The synthesizer serial interface shall operate in a command/response mode. The remote host shall provide the desired frequency setting in ASCII values and the synthesizer shall respond with a command accepted or rejected response. An ASCII 'A' shall be returned if the command is accepted and an ASCII 'R' shall be returned if the command is rejected. The ACK/NACK response shall be followed by a carriage return. The synthesizer output can be turned off or on (mute) through the serial interface. Current status of the synthesizer can also be obtained via the serial interface. Two ASCII characters representing the address setting allow multiple synthesizers to be connected together in RS-422/RS-485 mode. The synthesizer shall only accept & respond to commands that include address values that match the rotary switch (S1) setting (Refer to Figure 2).

Address FF is used as a global address and the unit will always respond to this address. The address in the response will correspond to the actual setting. This feature allows the user to determine the rotary switch setting via the serial interface. This feature cannot be used in multi-drop mode. The unit is shipped with the address set to 01. Care should be taken in setting S1 since it is a plastic screw and can be damaged with an inappropriate metal screw driver.

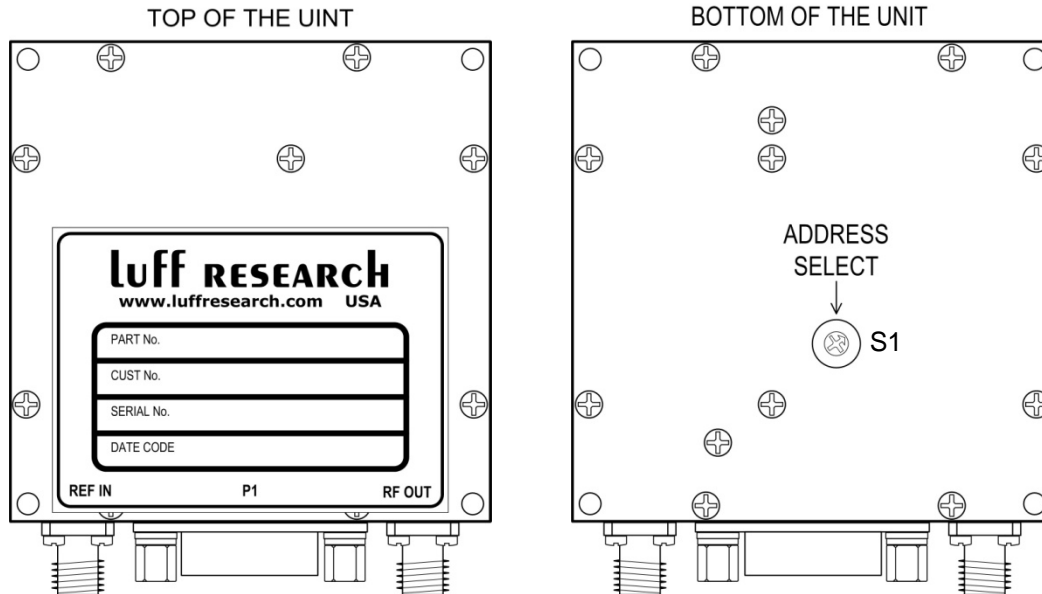


FIGURE 1

There are three independent commands available to control the synthesizer. Please note that at power turn-on, the synthesizer returns to the last state saved in the non-volatile memory.

### DEFINITIONS:

All characters are ASCII characters

- >Start of Message HOST to SYNTH
- <Start of message SYNTH to HOST
- ? is the status
- F is the frequency command
- n1n2 represents address '00' to '0F' as set by S1
- fffffff represents the current frequency in 1 kHz steps.
- L is the lock/unlock condition of the synthesizer, 'L'=Locked; 'U' = Unlocked; 'M' =Muted
- ↵ is the carriage return.
- M is the mute command
  
- m is a value of '0' or '1'
  - '0'=synthesizer output is OFF
  - '1'= synthesizer output is ON
- A = accepted
- R = rejected

## **FREQUENCY COMMAND:**

Command: >n<sub>1</sub>n<sub>2</sub>Fffffff.␣  
Response: <n<sub>1</sub>n<sub>2</sub>A

Examples:

Tune to 3.3 GHz and at address 01:

Command: >01F3300000.␣  
Response: <01A

Error Frequency:

Command: >01F3300.␣  
Response: <01R

## **MUTE COMMAND:**

Command: >n<sub>1</sub>n<sub>2</sub>Mn.␣  
Response: <n<sub>1</sub>n<sub>2</sub>A

Example:

Command: >01M1.␣  
Response: <01A

## **STATUS REQUEST:**

Command: >n<sub>1</sub>n<sub>2</sub>?␣  
Response: < n<sub>1</sub>n<sub>2</sub>FffffffL

Example:

Command: >01?␣  
Response: <01F3300000L

## **SUPPLIED TUNER SOFTWARE**

The synthesizer can be supplied with a windows based graphic user interface (GUI) that allows the user to execute frequency control of the synthesizer. The .Net Framework is required for operation of the GUI. Since most PC's and Laptops are provided with a RS232 COM port or USB port the user must provide an appropriate adapter for the RS485 transceiver.

Please call the Luff Research directly at:

Phone: 516-358-2880 or E-mail to: [sales@luffresearch.com](mailto:sales@luffresearch.com)