



MICRO LAMBDA WIRELESS, INC.

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MLSC-232, RS232/422/485 to Serial Interface Converter:

I. General Description:

The converter allows the user to quickly implement sending ASCII commands to the MLSN/SW Synthesizer using a standard RS232, RS422 or RS485 serial interface. For basic visual status, Power and Lock (Synthesizer PLL lock indicator) LED's are available external to the converter. Access to configuration switches S1-S8 is also available.

Using the cable harness provided, connect the output (J2) male DB25 on the converter to the female DB25 on the cable. Connect the other end of the cable to the MLSN/SW synthesizer. Make the proper +15 volt, +5 volt, and ground connections. Refer to the synthesizer documentation for power requirements. Connect the serial input (J1) female DB25 on the converter to a standard serial port on a PC or other terminal type device. Refer to outline drawing 161-005 for pin outs and functionality. Apply power to the converter; the synthesizer will be powered simultaneously.

II. RS232/422 Operation:

a. Getting Started:

The serial communication setup should be; baud rate = 4.8K to 115K, 8 bits, 1 Stop Bit, No Parity, Flow Control = None. The link can be RS232, RS422, or RS485.

Internal DIP switch settings are as follows (S1-S8; ON = 0, OFF = 1):

(Default SW settings = S1-S8 ON, RS485 address = 0, Baud rate = Auto, RS232/422 mode)

S1-S5 = RS485 address settings (0-32 binary, S1=MSB, S5=LSB)

S6, S7 = Baud rate selection

S8 = RS232/422 or RS485

Mode selection (S8):

S8 on (0) = RS232/422

S8 off (1) = RS485

Baud rate selection is as follows (S6, S7):

Switch	Auto Baud	9600 Baud	19200 Baud	38400 Baud
S6	0	1	0	1
S7	0	0	1	1

With S6 & S7 set to 0:

Using a terminal program such as HyperTerminal on a Windows PC, with power supplied to the converter/synthesizer, hit the RETURN/ENTER key. The converter will use this to determine the BAUD rate you are using automatically (From 4800 baud up to 115.2 K baud).

A message will appear on the terminal screen: "If RS232 type a 1"
"If RS422 type a 2"

Enter a "1" or a "2" and hit return. The unit will be operating in the mode selected and will display the auto baud rate, synthesizers Serial Number, Model Number and other general information. When you connect at a fixed (manual) baud rate, the above message will display on power-up. Also if you have selected S8 off (1) – RS485 mode, no message will be displayed.

b. Standard Commands

The user can now begin to evaluate the synthesizer based on the commands listed at the end of this documentation. All commands will end with a RETURN/ENTER which is when the data on the screen will be sent to the synthesizer.

Some examples:

"F2500.000000<cr>" or "F2500<cr>" commands the synthesizer to the frequency 2500 MHz.

"?<cr>" returns the status of the unit. (see ? command description, 2F = normal)

"T<cr>" returns the temperature of the synthesizer in degrees C. (IE. 26°C)

c. Special Commands

Unique to the converter are the following commands:

"!<cr>" Displays the personality, lock status and PLL voltages of the synthesizer.

"@<cr>" Displays the last Frequency the synthesizer was sent to.

"&<cr>" Displays the current MLSC-232 firmware version.

"%<cr>" Displays the current MLSC-232 Baud rate.

III. MLSN/SW command syntax using MLSC-232 interface:

The user commands are as follows:

Command	Description
?	Reports Status of all internal phase locked loops; three loops are indicated by bits 0, 2, and 3. The other bits are internal variables with of no particular interest to the user. (1= locked, 0= unlocked)
>	Recalls the synthesizer state from the next location. If the last location accessed was the 99 th , the '>' would recall the 100 th location. Using this command the user can get the maximum step rate from the unit.
F	Frequency command. This accepts the frequency in MHz in straight ASCII format. i.e. 3.456789012 GHz would be commanded by F3456.789012
L	Sets the LOCK output polarity; L1 sets the unit for LOCK == positive true; L0 sets the unit for LOCK == negative true.
MW	Sets the unit for external analog sweep mode. The unit is kept 'coarse-tuned' to the last frequency and the external analog sweep input (Ext. WB FM) deviates the frequency approximately 2 GHz/volt. The external narrow-band FM is also enabled. (If option is enabled)

NR	Recalls a synthesizer state from the specified location. (one of 1000) 'NR' followed by a hex address of 0x0063 would recall the instrument state stored in the 99 th location.
NS	Stores the present state of the synthesizer in the specified location. (one of 1000); 'NS' followed by a hex address of 0x0064 would store the present state of the synthesizer in the 100 th (decimal) location.
PL	RF Power Level command. It is used to set the RF output level within the usable range of the unit, typically -20.0 to +20.0 dBm. This command accepts the RF power level setting in dBm. The characters are in ASCII format. i.e. +19.5 dBm setting would be commanded by PL+19.5 and -10.1 dBm would be PL-10.1. (Available with the RF Power control option only.)
R	Programs the Reference frequency. Range 5 to 50 MHz; 1 MHz resolution. eg. R25.0 would set the external reference frequency to 25 MHz.
SP	Synthesizer Preset – Clears all nonvolatile memory settings to factory default. (>= Version 32 Firmware)
T	Reads internal temperature information. Responds with degrees C in a one byte response (signed char). Range: -40 to +80; Note: Since the T command is only one byte long and the command needs to be processed before the unit can acquire the temperature data, the data returned is always one command behind. Thus if you want the present temperature the T command should be sent twice and the second data used.
VF	Programs the L-band (second LO) frequency. ~1/8 MHz resolution; eg VF1950.125 would set the L-band output PLL for 1950.125 MHz (If option is enabled)

Wideband Analog Sweep Mode: This mode allows the unit to be swept (unlocked) across its frequency range at a rate of up to 2 mS/GHz with a minimum retrace time of 10 mS. The unit can be swept at any lower speed and retrace time with no problem. The analog sweep input sensitivity is 2.0 GHz/volt. The unit will sweep from the last frequency it was set to (0 volts at the WB analog input) to the stop frequency (X.XX volts at the WB analog input) ie. 2-10 GHz, unit programmed to 2 GHz - analog sweep on, ramp = 0.0 to 4.0 Volts - 16 mS ramp / 10 mS retrace, unit sweeps 2.0 to 10.0 GHz. The WB analog sweep input accepts a differential ramp voltage in the range of +/- 10 volts and the voltage applied must keep the units frequency within its specified range. This mode is enabled using the external analog sweep command (MW1).

III. RS485 Operation:

The above information applies except for the following:

- Auto baud Rate is not a valid mode of operation.
 - “!<cr>” is not a valid command.
- a. To communicate in RS485 mode, connect the terminal device to J1 of the MLSC-232 as shown in the outline drawing 161-005, RS485 column.
 - b. All commands sent must have the RS485 address prefix attached.

Examples:

“00F2500.0<cr>” commands the synthesizer at address 0 to the frequency 2500 MHz.

“10T<cr>” returns the temperature of the synthesizer at address 10 in degrees C. (IE. 26°C)

Notes:

1. Pin 25 of J1 input connector is a TTL output reflecting the PLL lock status of the synthesizer. It follows the L1/L0 lock polarity setting.
2. The lock LED on the MLSC-232 will "BLINK" each time data is transmitted to the synthesizer from the MLSC-232.
3. For the RS422 connections, the J1 input connector is RS530 pin out compatible.
Refer to Micro Lambda Wireless outline drawing 161-005 for pin outs.

To connect a PC com port to the MLSC-232 converter using the RS232 mode, use the following connection lists.

PC with a male DB9, RS232 connector:

Received Data - PC DB9 pin 2 to MLSC-232 J1, DB25 pin 3

Transmit Data - PC DB9 pin 3 to MLSC-232 J1, DB25 pin 2

Signal Ground - PC DB9 pin 5 to MLSC-232 J1, DB25 pin 7

PC with a male DB25, RS232 connector:

Received Data - PC DB25 pin 3 to MLSC-232 J1, DB25 pin 3

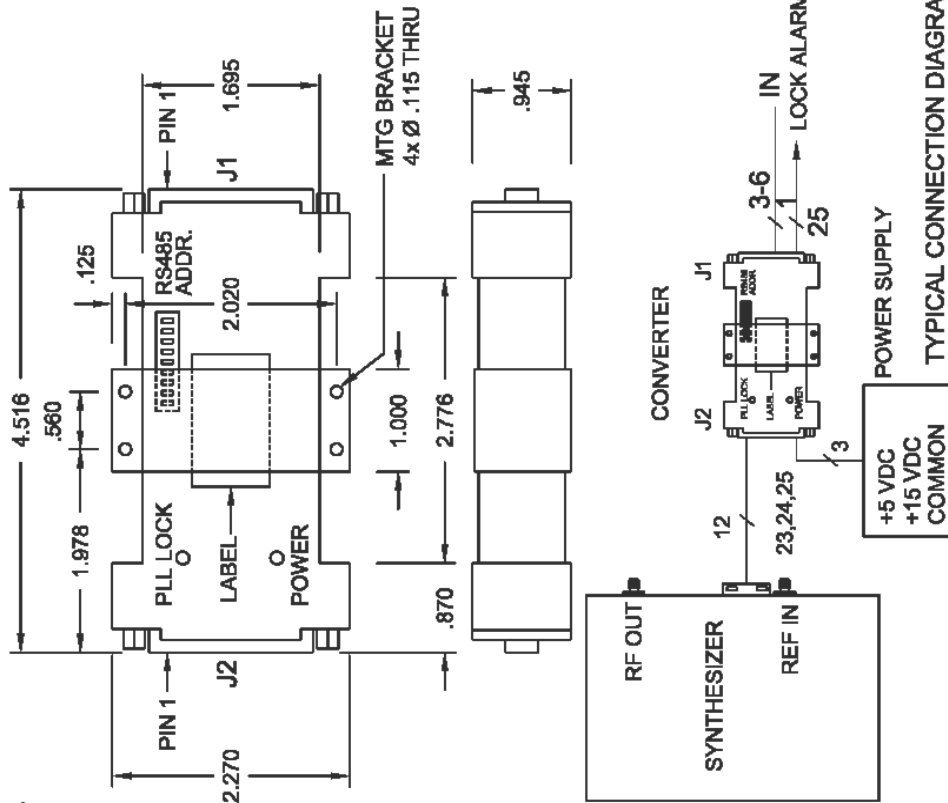
Transmit Data - PC DB25 pin 2 to MLSC-232 J1, DB25 pin 2

Signal Ground - PC DB25 pin 7 to MLSC-232 J1, DB25 pin 7

MLSC-232 Outline drawing is on the following page.

**RS232; RS422 & RS485
DB25 - FEMALE
J1 (INPUT)**

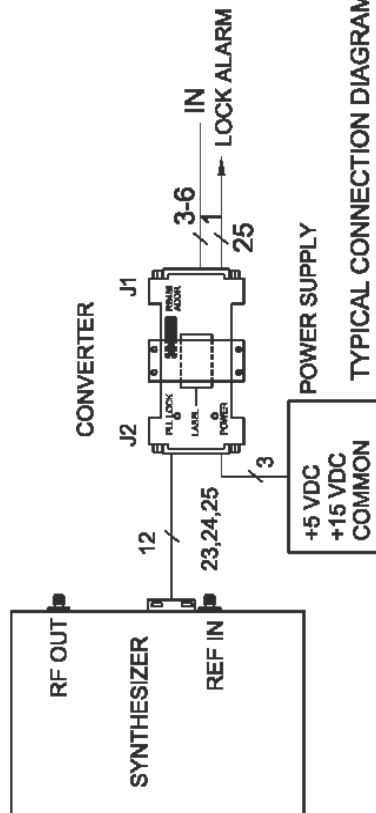
PIN#	RS232	RS422	RS485
1	GROUND	GROUND	GROUND
2	RD	RX DATA A	RX A
3	TD	TX DATA A	TX B
4	N/C	N/C	N/C
5	N/C	N/C	N/C
6	N/C	N/C	N/C
7	COMMON	COMMON	COMMON
8	N/C	N/C	N/C
9	RESERVED	RESERVED	RESERVED
10	RESERVED	RESERVED	RESERVED
11	RESERVED	RESERVED	RESERVED
12	N/C	N/C	N/C
13	N/C	N/C	N/C
14	RESERVED	RX DATA B	RX B
15	N/C	N/C	N/C
16	RESERVED	TX DATA B	TX A
17	N/C	N/C	N/C
18	N/C	N/C	N/C
19	N/C	N/C	N/C
20	N/C	N/C	N/C
21	RESERVED	RESERVED	RESERVED
22	N/C	N/C	N/C
23	N/C	N/C	N/C
24	RESERVED	RESERVED	RESERVED
25	LOCK ALARM	LOCK ALARM	LOCK ALARM



**SPI SERIAL INTERFACE
DB25 - MALE
J2 (OUTPUT)**

PIN #	FUNCTION
1	SYNTH +15 VDC
2	SYNTH +15 VDC
3	SYNTH COMMON
4	SYNTH COMMON
5	SYNTH +5 VDC
6	SYNTH +5 VDC
7	N/C
8	N/C
9	CLOCK
10	DATA OUT
11	SELECT
12	BUSY
13	LOCK
14	DATA IN
15	N/C
16	N/C
17	N/C
18	N/C
19	RESERVED
20	RESET
21	RESERVED
22	RESERVED
23	+15 VDC (IN)
24	COMMON (IN)
25	+5 VDC (IN)

TYPICAL CONNECTION DIAGRAM



NOTES:

- RECOMMENDED WIRES:
- SUPPLY & GND = AWG 20-22
- ALL OTHERS = AWG 24-26

REV	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ARE :		CONTRACT NO.
FRACTIONS	DECIMALS	
MATERIAL	APPROVALS	DATE
FINISH	CHECKED	
	ISSUED	

MICRO LAMBDA WIRELESS, INC.	
RS232 CONVERTER W/MTC BRACKET	
SIZE	DWG. NO.
0RN63	161-005
CAGE	REV.
	B

WIRE	COLOR	FROM	TO	NOTES	A.W.G	LENGTH
1	BLUE	20 PIN FEMALE - 1	25 PIN FEMALE - 1	+15 VDC	22	36"
2	BLUE	20 PIN FEMALE - 2	25 PIN FEMALE - 2	+15 VDC	22	36"
3	BLACK	20 PIN FEMALE - 3	25 PIN FEMALE - 3	GROUND	22	36"
4	BLACK	20 PIN FEMALE - 4	25 PIN FEMALE - 4	LOGIC GROUND	22	36"
5	RED	20 PIN FEMALE - 5	25 PIN FEMALE - 5	+5 VDC	22	36"
6	RED	20 PIN FEMALE - 6	25 PIN FEMALE - 6	+5 VDC	22	36"
7	ORANGE	20 PIN FEMALE - 9	25 PIN FEMALE - 9	CLOCK	26	36"
8	BROWN	20 PIN FEMALE - 10	25 PIN FEMALE - 10	DATA	26	36"
9	WHITE	20 PIN FEMALE - 11	25 PIN FEMALE - 11	ENABLE	26	36"
10	GRAY	20 PIN FEMALE - 12	25 PIN FEMALE - 12	BUSY	26	36"
11	GREEN	20 PIN FEMALE - 13	25 PIN FEMALE - 13	LOCK ALARM	26	36"
12	YELLOW	20 PIN FEMALE - 14	25 PIN FEMALE - 14	DATA OUT	26	36"
13	BLUE	BLUE BANANA - MALE	25 PIN FEMALE - 23	+15 VDC	22	36"
14	BLACK	BLACK BANANA - MALE	25 PIN FEMALE - 24	GROUND	22	36"
15	RED	RED BANANA - MALE	25 PIN FEMALE - 25	+5 VDC	22	36"
NOTES:						
1.		PLACE ONE CABLE TIE EVERY 12" OF WIRE (3 TOTAL) ON BOTH SETS OF WIRES.				
2.		KEEP BANANA PLUG WIRES SEPARATE FROM OTHER WIRES.				
3.		HEAT SHRINK WIRES ON 25 PIN FEMALE CONNECTOR.				
		Back Side View				
		Note pin "1" mark on bottom of connector				
ON THE 25 PIN FEMALE CONNECTOR, THE NUMBERS ARE NOTED ON THE BACKSIDE OF CONNECTOR.						