MICRO LAMBDA WIRELESS, INC.

YIG based Products

MLBS Series User Manual

MLBS Series, Bench Test Synthesizer

User Manual

Table of Contents

1.0   Introduction

This manual describes the setup and operation of the MLBS Series, Bench Test Synthesizer. The Model and Serial numbers are located on the rear panel; they may also be displayed on the front panel via the memory recall function and they we be shown on the display on power-up. Each unit has a separate, custom specification sheet for the particular model defining the Synthesizer's frequency range and RF characteristics. General operating/programming instructions are located herein. The CD Rom supplied with the package contains a **SetupMLBS.msi** file, when executed, will create a folder named "MLBS Support Files" on the desktop containing short cuts to the manual, documentation and programs for interfacing the product with a personal computer. This **SetupMLBS.msi** file is compatible with Windows XP, Windows Vista and Windows 7. The most current versions of these files, new offerings and Synthesizer specifications can be downloaded at our web site: http://www.microlambdawireless.com
For interfacing with Apple or Linux PC's; The HTTP and UDP protocols can be used when connected to an Ethernet network.

2.0   Package Contents

Item	Quantity
MLBS Series Bench Test Synthesizer	1
AC Power Cord	1
Ethernet CAT5 cable	1
USB A to USB Mini-B cable	1
CD Rom (Contains manual, quick start guide and PC software)	1
MLBS Quick Start Guide (Printed)	1

3.0   General Overview of Product Capabilities

The MLBS Series Bench Test Synthesizer can be supplied with frequency ranges between 600 MHz and 20 GHz, in bands ranging from very narrow to very wide. Typical, standard frequency ranges are: 0.6 to 2.5 GHz, 2.0 to 8.0 GHz, 4.0 to 16.0 GHz, 8.0 to 20.0 GHz and 2.0 to 20.0 GHz. Any custom frequency range within or crossing most of these bands can be ordered. A simple block diagram is shown in Figure 1. An optional reference input (i.e. 10.0 MHz) is applied to (J1) Ref. Input if system frequency coherency is required. An internal OCXO reference with 1.0 ppm stability is standard. The RF output (J2) supplies the microwave frequency signal at power levels >10.0 dBm. The Synthesizer is tuned via the front panel, USB interface or the Ethernet interface. The Bench Test Synthesizer is LabVIEW compatible and drivers can be downloaded at National Instruments' website.

Figure 1.
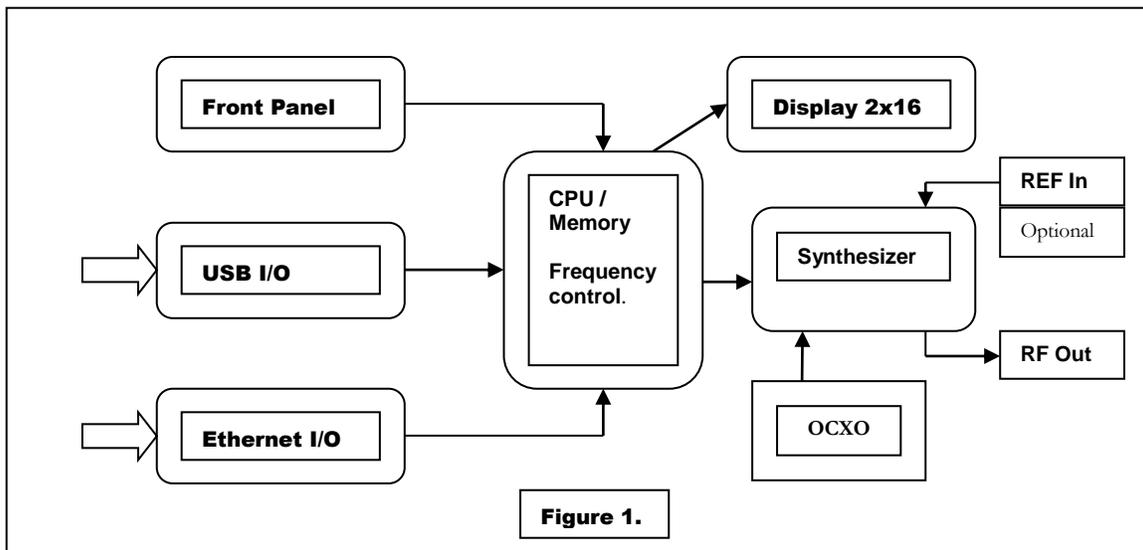
4.0   Setup and Operation

This product is designed for **LABORATORY WORKBENCH USE ONLY** and should not be subjected to humidity >95%. Use proper ESD handling procedures. Allow proper intake and venting of the fan at the rear panel of the unit. Verify that all external RF/microwave cables and components connected to the unit are in good working condition. A grounded, three socket AC power receptacle should be used to connect power to the unit. It is recommended that the front panel ON/OFF switch be used to interrupt the power to the unit, interrupting power to the unit by pulling out the AC cord may cause personal injury or damage to the unit.

Before product use, the following steps must be completed
See Figure 2 for reference.

1. Connect the AC power cable to the unit.
2. Connect the AC power cable to an appropriate 3 socket AC receptacle. The power switch will glow RED.
3. Connect the unit REF In / RF Out connectors to the peripheral equipment using SMA compatible connectors as required.
4. If required, connect the USB or Ethernet connectors to the Host PC or equivalent.
5. Turn ON the unit using the front panel power switch. The power switch will now glow GREEN after a short warm-up. (Unit will be set to last frequency setting)
6. A 15-minute warm up is recommended before use.
7. Verify the front panel display is illuminated and displaying the current frequency setting in MHz, model number, serial number, and the fan is producing air flow at the rear panel. The power switch LED will flash RED if the PLL is unlocked.
8. The unit is now ready for use via the front panel control or the peripheral interfaces.
9. Note: When the AC power cable is removed from the unit, the unit will remember its current power state and store it in nonvolatile memory for recall when the AC voltage is reapplied.

5.0   Rear Panel Connections

The rear panel of the unit is shown in Figure 2. It contains an RJ-45 plug style Ethernet connector for interfacing to a 10/100 Mbit wired LAN, a USB Mini-B connector for connection to a host PC USB port, and a standard 88-264 VAC, fused male input connector for AC power input. The fuse type is a 2 amp, 250 VAC, 5x20 mm, slow blow fuse, quantity = 2; Littlefuse part number 0213002.MRET1P or equivalent. The fuses are accessible with the line cord removed, inside the fuse tray at the bottom of the line Synthesizer input module. A fan input and output vent are also present and must be kept clear of obstructions for proper operation.

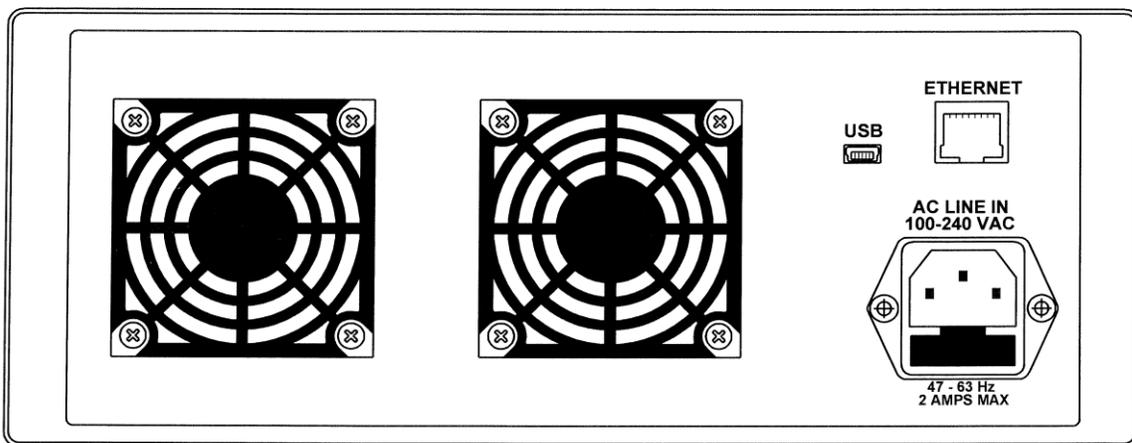The Ethernet interface is 10/100 Base-T and the USB interface is USB 1.1 and 2.0 compatible.

Figure 2

6.0   Front panel operation

The front panel of the unit contains a two-line, sixteen digit per line alphanumeric display, a multi-function rotary knob, a numeric 16 key keypad, the ON/OFF power switch and the RF input and output connectors (See Figure 3.).

6.1 Display format

Under normal operation the alphanumeric display shows the current Synthesizer frequency setting on the top display line (Line 1), the bottom display (Line 2) is blank. A cursor is positioned under one of the digits on Line 1. This cursor can be positioned using the ◄ or ► arrow keys. By pressing +/- keys or rotating the knob clockwise or counter clockwise, the user can increment or decrement the highlighted digit as required to change the frequency. Entering a new frequency via the keypad will display the numbers as they are entered on Line 2. The new frequency is selected by pressing the MHz key on the keypad. If a resolution less than 1 MHz is to be set, the decimal point must be used.
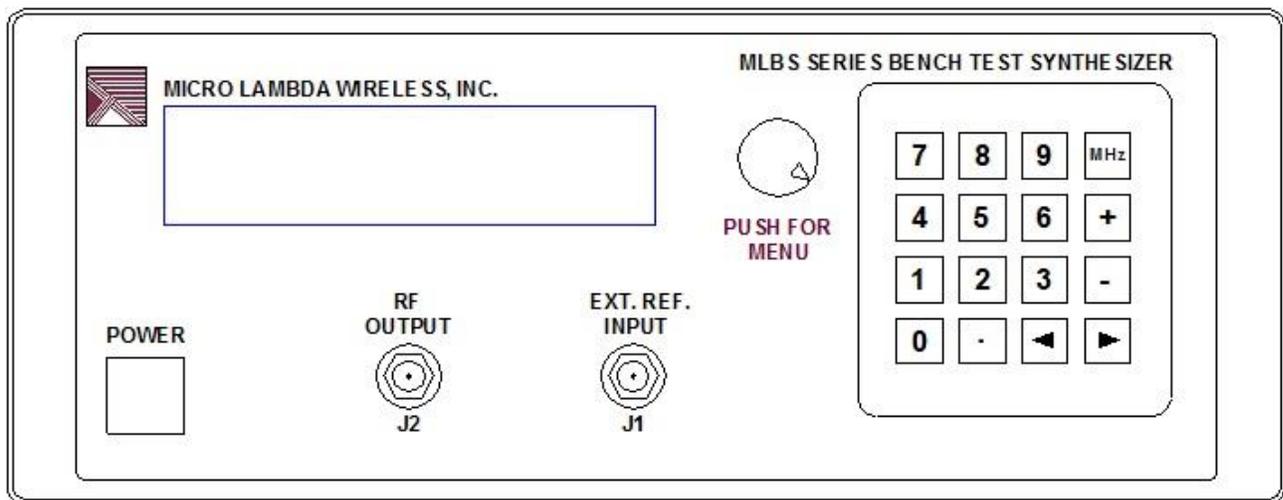
Figure 3

6.2 Keypad function

Press the ► key on the front panel to move cursor right or when in the settings menu, go to the next menu selection.

Press the ◄ key on the front panel to move cursor left, to backspace data entry, or when in the settings menu, go to the previous menu selection.

Press the **+** key on the front panel to increment cursor position or enable a menu option.

Press the **-** key on the front panel to decrement cursor position or disable a menu option.

Enter numbers and decimal point via the keyboard as needed.

The MHz key is also used as the data entry key.

6.3 Special keypad functions

1. Displaying a nonvolatile memory location

Press the decimal point key on the keypad, the display will show R_ (for recall). Enter the desired NOVO location using the number keys and press the MHz key. The information located at the requested NOVO location will be displayed on line #2 of the front panel display. Valid NOVO locations are: 0 to 2047. See the list of NOVO locations in section 8.0, Programming.

2. Saving and recalling a user preset frequency from memory (0-99)

The user can store up to 100 preset frequencies in memory for later recall. To save a frequency, enter a frequency on the front panel to store in memory and press MHz. Line #1 of the display will show the frequency entered and the unit will be set to this frequency. Press the MHz key again to enter the Save / Recall menu. The display will show "Save = + Recall = -". Press the "+" key to enter save mode or press the "–" key to enter recall mode. Pressing the "+" key will display on Line #2 "Save Setting ?". Enter the memory location you would like to store this frequency in (0-99). The display will show the memory location numbers as you enter them. Press the MHz key to save your frequency

in the desired location. To recall a frequency from a stored location, press the MHz key. The display will show "Recall Setting ?" on Line #1 of the display. Enter the number for the memory location you would like to recall (0-99), the numbers you have entered will be displayed on Line #2. Press the MHz key to recall the frequency setting from memory. The unit will be set to the recalled frequency. If a memory location is recalled where no frequency has been stored, the display will not change and the unit will stay at the current frequency setting. Note: The frequencies stored in memory 0 to 99 can be viewed by recalling NOVO locations 200 to 299.

6.4 Multi-function rotary knob operation

The knob, when rotated clockwise = increment; counter clockwise = decrement (equivalent to + or - key press).
Press the encoder knob on the front panel to enter the SETTINGS MENU.
Press the encoder knob again if you wish to exit the SETTINGS MENU. Upon exit, the changes made while in the settings menu mode, will be enabled.

6.5 RF Level Control (Option G)

To enter the RF Level Control mode (if equipped), push in the rotary knob (it will click like a switch). Press a second time to enter the Settings menu.
Once in RF Level Control mode, you will see the current power setting in the display. Using the left and right arrow keys, select the resolution you want to adjust by (underlined number). Then You can turn the knob, and adjust in the resolution setting selected. You can also enter a number directly using the keypad: Press the + or – key, then enter the desired number (i.e. -5.5), then press the MHz key (= enter key) to set the requested RF power level. Press the rotary knob to exit the RF Level Control mode. Now you are back to frequency setting mode. Note: Any RF level setting >+10.0 dBm will set the RF output level to maximum. This will produce the highest possible RF power output the unit is capable of, at any given frequency setting.

For remote RF level control use Command examples:

L+6.3 to set the RF level to +6.3 dBm
L-10.0 to set RF level to -10.0 dBm
L+15.0 to set RF level to maximum RF level output for any frequency selected (Anything >+10.0 will set ACL to MAX output power).

6.6 Settings menu operation

Pressing the Multi-function knob enters the SETTINGS MENU. The following functions can be set:

1.
Ethernet DHCP:
ON

2.
IP Address:
192.168.1.48

3.
Subnet Mask:
255.255.255.0

4.
Gateway:
192.168.1.1

5.
DNS1:
192.168.1.1

6.
DNS2:
0.0.0.0

7.
MAC Address:
0004A31210EE

8.
Host Name:
MLBS0001

9.
UDP Port:
30303

Press the encoder knob on the front panel to enter the SETTINGS MENU.
Display #1. On the left will be visible.
Press the encoder knob again if you wish to exit the SETTINGS MENU.

Press the ► key on the front panel for the next menu selection.
Press the ◄ key on the front panel for the previous menu selection or data entry backspace.
The knob, when rotated clockwise = increment; counter clockwise = decrement.
Press the **+** key on the front panel to enable an option.
Press the **-** key on the front panel to disable an option.
Enter numbers and decimal point via the keyboard as needed.
MHz key is also used as the enter key.

Note:
1. MAC address cannot be changed.
2. Host name cannot be changed.
3. All fields can be edited via the web interface (http://(units IP Address).
4. When DHCP mode is ON, IP Address, Subnet mask, Gateway and DNS settings cannot be changed.

7.0 Controlling the MLBS using a personal computer

7.1 Installing the documentation and control software

The CD ROM supplied with the MLBS contains the file named **SetupMLBS.msi**. Execute this file to install the manual, documentation and control programs for PC interface. The setup file, when run, will create a folder named "MLBS Support Files" on the computer desktop with short cuts to the documentation and interface programs.

7.2 HTTP Control Interface

This HTTP interface is accessed using a PC running a standard web browser (IE8, Firefox 3.6). The PC must be physically connected to the same TCP/IP network as the MLBS unit and have the correct Ethernet configuration (same "IP" range and subnet mask). The Ethernet settings can be accessed through the settings menu as mentioned in the previous section. To access the MLBS unit, point your web browser to the IP address or use the host name of the unit (e.g. http://192.168.1.48 or e.g. http://MLBS0001). The **"MLBS Settings Page"** will be displayed. This web page contains general information about the unit and allows the configuration of the Ethernet settings. Also available is the function to send and receive a command to and from the unit. An example of the page is shown in Figure 4. Links at the bottom of this page direct your browser to the following web pages.

Links to two other web pages are available as follows: Located at the lower left of the settings page is a link to the **"MLBS Diagnostics Page".** Here you can view many of the unit's internal variables like temperature, power supply voltages, self test status, cal status, miscellaneous technical data, and contact information for Micro Lambda Wireless, Inc. Commands may also be sent to the unit from this web page.

The last web page accessible is the **"MLBS Commands List Page".** This page lists all of the commands accepted by the MLBS unit and the NOVO locations that can be read using the "R" command. The ability to send and receive commands is also available on this page. These commands can be used under USB control as well.

MICRO LAMBDA WIRELESS, INC.

Welcome to the `MLBS0001` Bench Test Synthesizer Home Page.

Firmware Version: `1.0  Dec 19 2012`   **Firmware Build Time:** `15:09:45`
TCP/IP Stack Version: `v5.20`

Personality:
Model Number: `MLBS-2020B`   Serial Number: `0001`
Current Frequency: `2100.000000` MHz Min. Frequency: `2000` MHz Max. Frequency: `20000` MHz
Frequency Resolution.: `0.000025` MHz (Min. Step Size)
Minimum RF Level: `10.0` dBm Maximum RF Level: `18.0` dBm
Minimum Temperature: `0.0` Deg. C Maximum Temperature: `50.0` Deg. C

RF Level Control Option: `No`
Current RF Level: `N/A` dBm Minimum RF Level: `N/A` dBm Maximum RF Level: `N/A` dBm

Specifications:
Spurious: `-60.0` dBc Harmonics: `-12.0` dBc Switching Speed: `6.0` mS
Phase Noise dBc/Hz < : 100 Hz: `-70.0`   1 kHz: `-79.0`   10 kHz: `-72.0`   100 kHz: `-95.0`   1 MHz: `-125.0`

TCP/IP Settings: **CAUTION:** Incorrect settings may cause the unit to lose network connectivity.

Save Configuration	☑ Enable DHCP
IP Address:	`192.168.1.59`
Gateway:	`192.168.1.1`
Subnet Mask:	`255.255.255.0`
Primary DNS:	`192.168.1.1`
Secondary DNS:	`0.0.0.0`

MAC Address: `00:04:A3:15:84:A8`   **Note:** The above settings can be changed from the front panel.
Host Name: `MLBS0001`
Socket Port: `30303`

Command: [_____] Send
Received: [_____]

Diagnostics Page   Commands List Page   Micro Lambda Wireless, Inc. Home Page (Internet)

Figure 4

7.3 UDP Interface program

The MLBS (Host) may be controlled remotely over an Ethernet network using the supplied "MLBS UDP interface.exe" program. Please note: Windows firewall may warn that a new program is trying to access the network, please click "Allow", to continue using the MLBS UDP interface program. The PC used to connect to the unit is considered the "Client". The unit must be physically connected to the network as mentioned in section 7.2 above. In the lower left corner of the program screen as shown in Figure 7, type in the Host name or I.P. address of the unit you wish to communicate with, also input the socket port number that your unit is set to. See section 6.5 to find the unit's network settings information. Click the "Test Connection" button and the program should connect to the unit stated and the display should read connected. On the program screen you will see some limited information about the unit. Commands may be sent to and received from the unit. The unit can also be stepped up and down in frequency using the "Step Up" and "Step Down" buttons. The frequency will increment and decrement based on the frequency shown in the step size box. This number can be changed to any valid step size within the frequency range limits of the unit. Sweep modes of Auto (Continuous), Single, Manual and List are available. Dwell Time is the amount of time, in milliseconds, that the unit will pause at each frequency before stepping to the next frequency. The current frequency setting is also shown. The program can be used to connect to multiple units (one at a time). As connections are made, the unit Host names will be added to the pull down list in the Host Name/IP Address box.
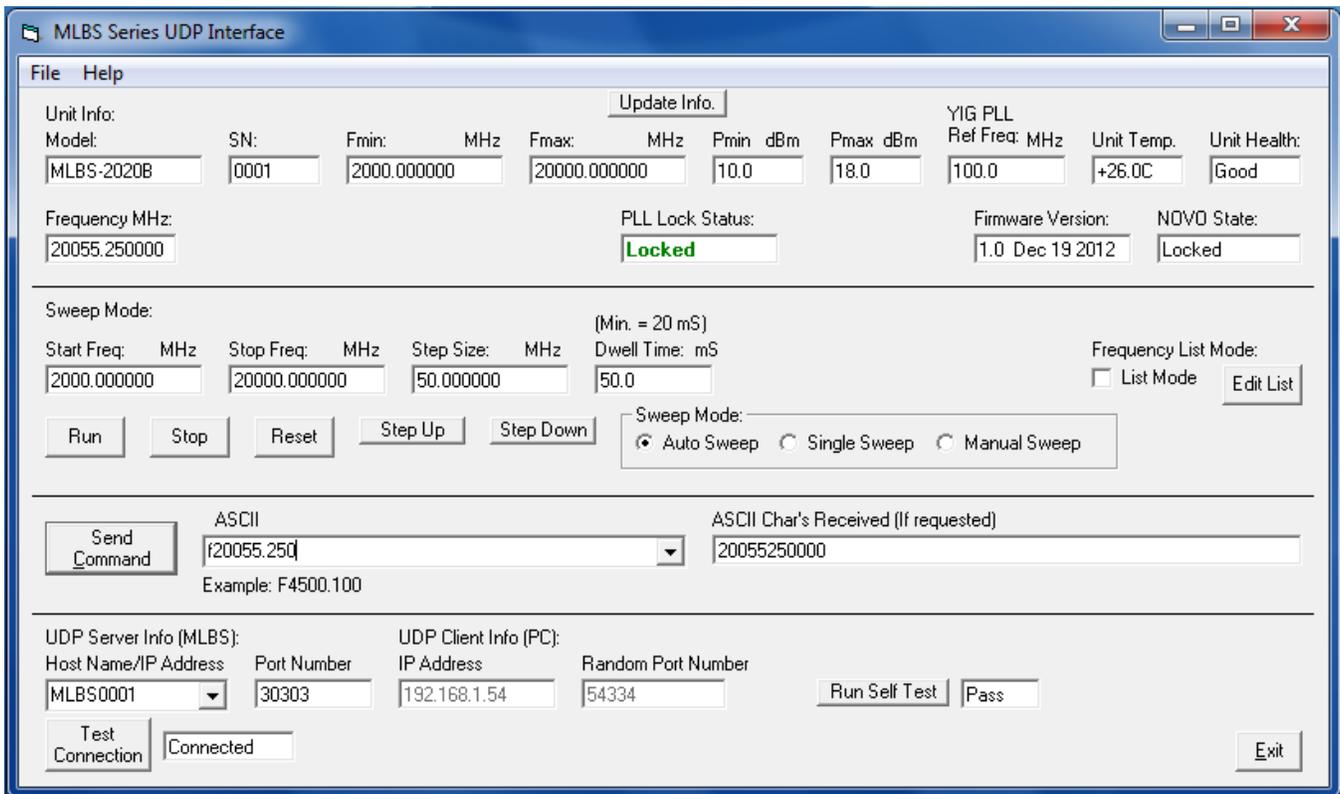

Figure 7

7.4 USB Interface program

The MLBS product, when connected using the USB interface appears as a USB HID device (Human Interface Device) to the Windows operating system. The USB HID driver is supplied with the windows operating system, and is installed automatically when the unit is connected to the PC's USB port.

 The MLBS may be controlled remotely via a USB connection using the supplied "MLBS PC interface.exe" program. A screen capture of this program is shown in Figure 8. On the program screen you will see some limited information about the unit. Commands may be sent to and received from the unit. The unit can also be stepped up and down in frequency using the "Step Up" and "Step Down" buttons, the frequency will increment and decrement based on the frequency shown in the step size box. This number can be changed to any valid step size within the frequency range limits of the unit. The current frequency setting is also shown along with Start and Stop frequencies for sweep mode. Sweep modes of Auto (Continuous), Single, Manual and List are available. Dwell Time is the amount of time, in milliseconds, that the unit will pause at each frequency before stepping to the next frequency. The program can be used to connect to multiple units; all units that are connected to the PC's USB ports will show up in the pull down list in the "Choose Unit #" box. If units are added after the program has been initiated, press the "Refresh" button to update the list. Sweep mode only supports connection to one unit at a time.
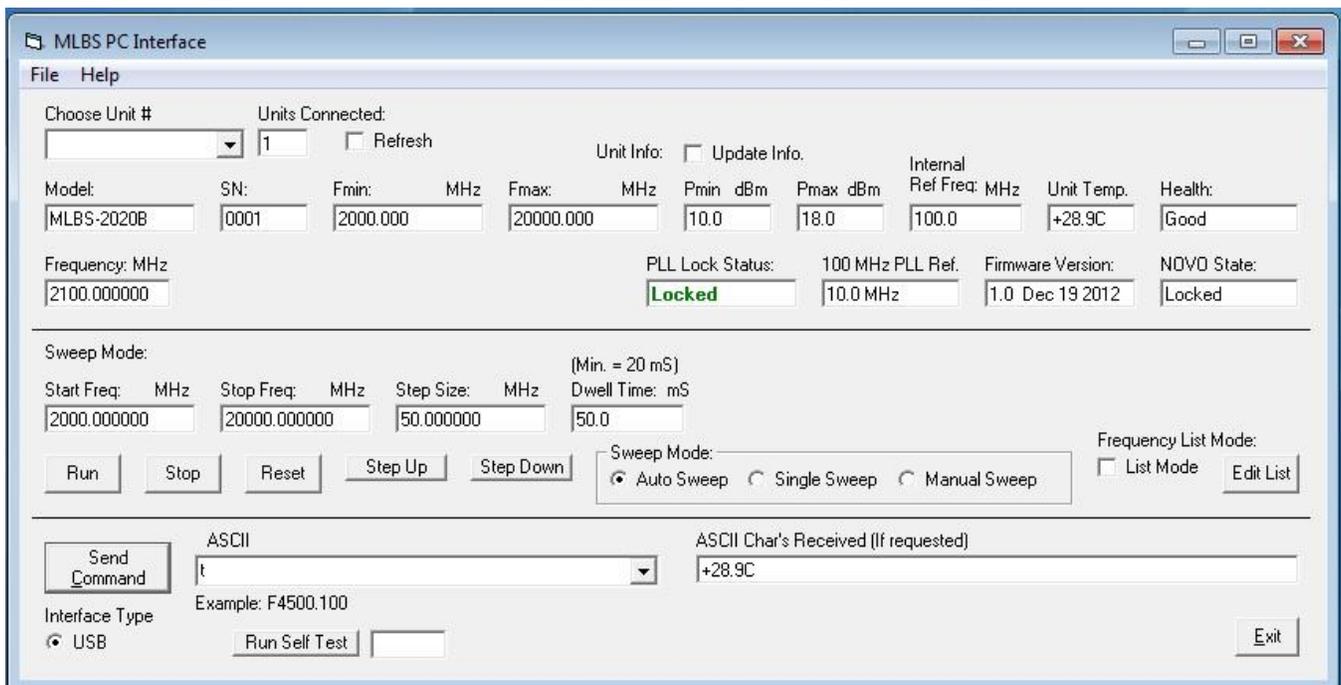

Figure 8

7.5 Telnet Interface

Built into most computer operating systems is a command line interface for communicating with network peripherals; TELNET is a network protocol used on the Internet or local area networks to provide a bidirectional, interactive text-oriented communication facility via a virtual terminal connection. In the Microsoft Windows environment, Telnet is invoked via the command prompt mode (Note: In Windows 7 Telnet is not enabled by default, to enable it, go to control panel, programs and features, on the upper left of the screen select "Turn Windows features on and off", check "Telnet Client" and click OK.). At the DOS prompt type "telnet". The following information will appear:

Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet>

Type ?/help for a list of Telnet commands. Using Telnet, you can send commands to the unit and receive information requested from the unit. A typical session would be: Send – "o MLBS0005 23", this opens a telnet connection to the unit MLBS0005 on port 23 (Typical comm. Port for telnet). Send – "F2000", this would set the unit to a frequency of 2000.0 MHz. Send "T", the internal temperature of the unit will be returned.

8.0 Programming

The following table describes the commands that the MLBS supports. This is a custom syntax created by Micro Lambda Wireless, Inc. All commands are sent and received in ASCII format. The commands are NOT case sensitive. These commands can be used with all forms of communication (USB, UDP, HTTP and Telnet). Note: All Non-volatile memory locations below may be recalled from the front panel and displayed on the LCD by pressing the decimal key **(.)** followed by the memory location number (leading zero's are not required). The information will be displayed on line 2 of the front panel display. Example: press **(.) 0** to recall Model number.

	Available when NOVO is locked: Commands are not case sensitive.	All Data is stored in locations and Sent / Received is in ASCII format
Command	Function	Comments (PW) = PIC writes to this or another NOVO location.
?	Report Status	D0 = 100 MHz lock, D1 = YIG PLL lock, D6 = self test, D7 = NOVO lock
""	Display the message between the quotes on LCD display, line 1 & 2.	"Have a nice day!": Displays Have a nice day! (up to 32 characters)
DI	Display Personality information on lines 1 and 2 (Takes 15 seconds to disp)	DI
DR	Display recalled NOVO memory location on FP readout, line 2	(i.e. DR0012), display firmware version and date
DT	Display current internal temperature on FP readout, line 2	DT
EP	Set Ethernet Port (Socket Port); i.e. EP30303, stored at NOVO Loc. 108	UDP, TCP Socket Port
F	Frequency (ASCII) (Dec. #)	ASCII freq in MHz: xxxxx.xxxxxx; (example: F12345.678910)
L	Set Level for the RF Power control option	Sets the Leveling Circuit to a specific Level (L-0.5)
LR	Level Cal NOVO Read	Leveling NOVO read
MR	Recall a user saved frequency setting from memory location (MR25)	0-99, stored @ NOVO location 200-299
MS	Save current frequency setting of unit to memory location (MS75)	0-99, stored @ NOVO location 200-299
R	Read NOVO location (Example = R1 = read serial #)	returns info @ memory location requested (0-2047)
SP	Synthesizer preset to factory settings.	Copy NOVO Loc. 900-960 to 0-60
SR	Soft PIC Reset	Reset PIC, clear var. run PIC code from start; (example: SR)
ST	Self Test	Read status byte D2; 1 = Pass; (example: SR, then read data)
T	Read internal temp.	Returns ASCII chars, reading in Deg. C; (example: T, then read data)
V1	Read Power Supply +3.0V	3.00V = normal; (example: V1, then read data)
V2	Read Power +3.3V	3.30V = normal; (example: V2, then read data)
V3	Read Internal +5.0V	5.00V = normal; (example: V3, then read data)
V4	Read internal +15.0V voltage	15.00V = normal; (example: V4, then read data)
V5	Read internal -15.0V voltage	-15.00V = normal; (example: V5, then read data)
R 0000	Model Number (Example = W0001 or R1) Write or Read Location.	MLBS-2080C ("W" blocked with NOVO locked.) (R/W = 16 Bytes)
R 0001	Serial Number ("W" command requires 4 numeric digits), R1 reads Loc. 1	1125
R 0002	Product type: Filter or Oscillator or Synthesizer	Defines how PIC will talk to internal, connected device
R 0003	Fmin, in MHz	2000 (unit is tunable 100.0 MHz below Fmin.)
R 0004	Fmax, in MHz	8000 (unit is tunable 100.0 MHz above Fmax.)
R 0005	Current YIG PLL Chip Input - Reference Frequency Setting - MHz	Ref# = 1 – 200 MHz (typically 100.0 MHz, OCXO)
R 0006	RF min, in dBm	10.0
R 0007	RF max, in dBm	15.0
R 0008	Temp min, in Deg. C	0
R 0009	Temp max, in Deg. C	60

R 0010	Highest Temp reached, in Deg. C	35.7C
R 0011	NOVO State - Locked/Unlocked	Locked
R 0012	Firmware Version & date	1.5 Nov 16 2011
R 0013	Unit Health Status – "Good" or Self test failure information	"Good" or "Fail V5" as example
R 0014	Unit Calibration Status - Yes/No	Yes
R 0015	Self Test Results - Pass/Fail	Pass
R 0016	Current Output Frequency setting - MHz	2500
R 0017	Internal Xtal Setting – Int or Ext or ExtXtal	ExtXtal (3 modes; Internal Xtal, External and External with Xtal.)
R 0029	External reference freq. In MHz for 100 MHz PLL (ExtXtal mode)	i.e.: 10 = 10 MHz external reference. 1.0 MHz increments only
R 0031	Customer part number, if shown on P.O.	123-45-6789 (Shown on unit label as PN:)
R 0032	Frequency resolution in MHz (or Step Size)	0.001 = 1.0 kHz
R 0033	Spurious Spec., in dBc	-60
R 0034	Harmonics Spec., in dBc	-12
R 0035	Phase Noise Spec. @ 100 Hz Offset, in dBc/Hz	-80
R 0036	Phase Noise Spec. @ 1 kHz Offset, in dBc/Hz	-95
R 0037	Phase Noise Spec. @ 10 kHz Offset, in dBc/Hz	-95
R 0038	Phase Noise Spec. @ 100 kHz Offset, in dBc/Hz	-117
R 0039	Phase Noise Spec. @ 1 MHz Offset, in dBc/Hz	-140
R 0040	Switching Speed, any step, in mS	5.0
R 0041	TCP/IP stack version	v5.20
R 0042	Firmware build time	16:30:30
R 0043	Level Control Option installed?	Yes / No / Fixed (mode select) If fixed, min, max and set level = same (10 dBm)
R 0044	Level Control Maximum Power Limit, in dB	10.0
R 0045	Level Control Minimum Power Limit, in dB	-10.0
R 0048	Current RF Level Setting, in dBm	9.5
R 0050	Level Control CAL Status (Is Level option calibrated)	Yes / No
R 0051	Level flatness Spec. in +/- dB (+/- 2.0 = 4.0 total)	2.0
R 0056	Internal Synthesizer Model Number	MLSP-2020BD
R 0057	Internal Synthesizer Serial Number	2255
R 0058	MLWI Sales (Job) number	20-0024
R 0059	MLWI Product Outline Drawing # and Revision	201-001 A
….		
R 0100	DHCP Status: ON / OFF	Static = OFF / Auto = ON TCP/IP Ethernet settings (config_dhcpchecked)
R 0101	IP address: (i.e.; 192.168.1.25)	TCP/IP Ethernet protocol settings (config_ip)
R 0102	Subnet mask: (i.e.; 255.255.255.0)	TCP/IP Ethernet protocol settings (config_subnet)
R 0103	Gateway: (i.e.; 192.168.1.1)	TCP/IP Ethernet protocol settings (config_gw)
R 0104	DNS1: (i.e.; 192.168.1.1)	TCP/IP Ethernet protocol settings (config_dns1)
R 0105	DNS2: (i.e.; 192.168.1.1)	TCP/IP Ethernet protocol settings (config_dns2)
R 0106	MAC Address: (i.e. 0025F169AC1B)	TCP/IP Ethernet protocol settings (config_mac)
R 0107	Host Name (i.e.; MLBF0001)	TCP/IP Ethernet protocol settings (config_hostname)
R 0108	Socket Port (i.e.; 30303)	TCP/IP UDP, TCP, Telnet Ethernet protocol settings (socketport)
….		
R 200-299	User Save / Recall Frequency setting locations (100 Total)	Frequency stored in MHz (ASCII), save and recall using MS & MR commands

8.1 HTTP/HTML Variables

Many of the internal variables can be accessed through the HTTP/HTML protocol.
Below is a list of these variables for reference:

Command	HTML variable name	Read/Write?	Notes
?	status	Read	Report Status, D2-D5 not used
T	temp	Read	Internal temperature
V1	volt1	Read	Read power supply: +3.0V voltage
V2	volt2	Read	Read Power supply: +3.3V voltage
V3	volt3	Read	Read Power supply: +5.0V voltage
V4	volt4	Read	Read Power supply: +15.0V voltage
V5	volt5	Read	Read Power supply: -15.0V voltage
R0000	model	Read	Model Number
R0001	serial	Read	Serial Number
R0002	product	Read	Product type: Synthesizer / Oscillator / Synthesizer
R0003	minimum	Read	Frequency minimum
R0004	maximum	Read	Frequency maximum
R0006	rfmin	Read	RF min, in dBm
R0007	rfmax	Read	RF max, in dBm
R0008	tempmin	Read	Temp min, in Deg. C
R0009	tempmax	Read	Temp max, in Deg. C
R0010	hitemp	Read	Highest Temp reached, in Deg. C
R0011	novostate	Read	NOVO State - Locked/Unlocked
R0012	firmver	Read	Firmware Version & date
R0013	health	Read	Unit Health Status – "Good" or Self test failure information
R0014	cal	Read	Unit Calibration Status - Yes/No
R0015	selftest	Read	Self Test Results - Pass/Fail
R0016	frequency	Read	Current Output Frequency setting - MHz
R0029	version	Read	TCP/IP Stack Version
R0030	builddate	Read	Firmware Build Time
R0032	freqres	Read	Frequency resolution in MHz (or Step Size)
R0033	spurs	Read	Spurious Spec., in dBc
R0034	harmonics	Read	Harmonics Spec., in dBc
R0035	pn100	Read	Phase Noise Spec. @ 100 Hz Offset, in dBc/Hz
R0036	pn1k	Read	Phase Noise Spec. @ 1 kHz Offset, in dBc/Hz
R0037	pn10k	Read	Phase Noise Spec. @ 10 kHz Offset, in dBc/Hz
R0038	pn100k	Read	Phase Noise Spec. @ 100 kHz Offset, in dBc/Hz
R0039	pn1m	Read	Phase Noise Spec. @ 1 MHz Offset, in dBc/Hz
R0040	speed	Read	Switching Speed, any step, in mS
R0041	version	Read	TCP/IP stack version
R0042	builddate	Read	Firmware build time
R0043	lvlopt	Read	Level Control Option installed?
R0044	lvlmin	Read	Level Control Maximum Power Limit, in dB
R0045	lvlmax	Read	Level Control Minimum Power Limit, in dB
R0100	config_dhcpchecked	Read	DHCP Status: ON / OFF
R0101	config_ip	Read	IP address: (i.e.; 192.168.1.25)
R0102	config_subnet	Read	Subnet mask: (i.e.; 255.255.255.0)
R0103	config_gw	Read	Gateway: (i.e.; 192.168.1.1)
R0104	config_dns1	Read	DNS1: (i.e.; 192.168.1.1)
R0105	config_dns2	Read	DNS2: (i.e.; 192.168.1.1)
R0106	config_mac	Read	MAC Address: (i.e. 0025F169AC1B)
R0107	config_hostname	Read	Host Name: (i.e. MLBS0001)
R0108	socketport	Read	UDP Socket Port: (i.e. 30303)
	cmd (=)	Write	Send any of the commands in table from section 8.0
	receive	Read	Receive data from unit after requesting data

9.0   Technical Support

For Technical support please contact:

Micro Lambda Wireless, Inc.
46515 Landing Pkwy.
Fremont, CA 94538
Ph: (510) 770-9221
Fax: (510) 770-9213

Email: sales@microlambdawireless.com

You can visit our website at http://www.microlambdawireless.com for updated
information, specifications and downloads.

10.0 Warranty

Seller warrants for a period of twelve (12) months from the date of original shipment that
the products will be free from defects in material and workmanship and design (if of
Micro Lambda Wireless, Inc. design) and will be in conformity with applicable
specifications and drawings and all other contractual requirements.   However, this
warranty shall not apply to any product which that has been subjected to misuse,
misapplication, accident, improper installation, neglect, unauthorized repair, alteration,
adjustment, inundation or fire.   See the complete warranty and return policy document
number 201-005 Rev- at our website at http://www.microlambdawireless.com.