MicroFox-50 Manual

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Overview

The Byonics MicroFox-50 (MF-50) is a small, frequency agile 2-meter transmitter designed for short range, on-foot hidden transmitter hunts, also called T-hunts, foxhunts, and ARDF. It is very similar to the popular MicroFox-15, but gives a user adjustable RF power output between 0.05 and 50 mW and includes a USB chargeable LiPo battery. It also includes the small Byonics V4 whip antenna, but any VHF antenna with an SMA connector will work. Using a directional antenna, it can typically be received from about 1-2 miles away, line of sight. It is user programmable to any frequency between 144 MHz and 148 MHz in 5 KHz steps, can be adjusted to many tones, durations, and duty cycles, and can transmit an amateur radio callsign and battery voltage in Morse code.

The MF-50 transmissions consist of a looping user defined tone sequence, followed by a Morse code identification. The transmitter will then be off the air for a moment, and then the entire process begins again.

Configuration

An included micro-USB cable is required to configure the settings of the MF-50. A CH340 driver may be needed if the computer doesn't already have one. The settings can be updated in any serial terminal program (TeraTerm Pro is recommended for Windows), or using the byonics.com website. Do not use a power only micro USB cable as these do not pass data to the computer.

To use a serial terminal program, connect the USB cable between the MF-50 and the computer, turn on the MF-50 power switch, and set the terminal program to use the corresponding COM port, at 115200 baud, N81. In the terminal program, send 3 asterisks (*) followed by Enter. The MF-50 should respond with the firmware version, and show the value for the first setting. Enter a new value for the setting, or just press Enter to keep the existing one. Repeat this process for each setting until the MF-50 responds with "Settings Done".

To configure with the Byonics MFConfig website, use the Chrome web browser and navigate to https://byonics.com/mfconfig/. Connect the USB cable between the MF-50 and the computer, turn on the MF-50 power switch, click the Connect to MF-50 button and select the corresponding COM port. Click the Update MF-50 Settings button, and you should see all current settings presented. Make any desired changes, and again press the Update MF-50 Settings button.

The default settings that appear when the configuration program is started are recommended for a basic hunt with the MF-50 transmitting tones for 15 seconds, and then a Morse code ID. It then will stop transmitting, and repeats every 30 seconds. The only setting users must change is the Morse Message to be their assigned amateur radio callsign.

Settings

This section describes each of the MF-50 user settings.

Tone Speed: The time, in ms, for each tone sent in the tone sequence. A smaller number will make the tone sequence play faster. Default is 50 (ms).

Tone Duration: The time, in seconds, the tone sequence will be repeated.

Loop Time: The time, in seconds, the transmission sequence will be repeated.

Initial Delay: The time, in seconds, before the first tone sequence is sent. The MF-50 will be off the air during this time. This is usually set to 0, but may be used to sequence multiple transmitters, or to hide a transmitter long before the first transmission begins..

TX Freq: The RF transmit frequency, in kHz. For example, to transmit on 146.565MHz, enter the value "146565".

Morse Message: The morse code text sent after the tone sequence. This is usually the operator's amateur radio callsign to keep the transmissions legal.

Morse Speed: The speed of the Morse Message, in words per minute (WPM).

Morse Tone: The audio frequency of the Morse message, in Tone sequence code numbers (2-49). See table below. A large number is higher pitch. The default is 25 which represents 831Hz.

Tone Sequence: The description of the tone sequence to be repeated during transmissions. This is a string of characters listed below. For example, the default tone sequence is described by the following string of characters (shown between square braces, which are not entered):

```
[ 3 3 *** 3 3 *** 6 6 /// 6 6 /// 9 9 333 9 9 333 ; ; 666 ; ; 666]
```

This sequence is equivalent to the tone code sequence below as used in the Byonics PicCon3 and BFoxCon:

```
01, 20, 01, 20, 01, 11, 11, 11, 01, 20, 01, 20, 01, 11, 11, 11, 01, 23, 01, 23,
01, 16, 16, 16, 01, 23, 01, 23, 01, 16, 16, 16, 01, 26, 01, 26, 01, 20, 20, 20,
01, 26, 01, 26, 01, 20, 20, 20, 01, 28, 01, 28, 01, 23, 23, 23, 01, 28, 01, 28,
01, 23, 23, 23
```

code	note	freq	char	code	note	freq	char	code	note	freq	char	code	note	freq	char
01	silence		space	14	A_4	440	-	27	$A^{\#}_5$	932	:	40	B_6	1975	G
02	A_3	220	!	15	$A^{\#}_4$	466	.	28	B_5	987	;	41	C_7	2093	H
03	$A^{\#}_3$	233	"	16	B_4	494	/	29	C_6	1046	<	42	$C^{\#}_7$	2218	I
04	B_3	247	#	17	C_5	523	0	30	$C^{\#}_6$	1109	=	43	D_7	2350	J
05	C_4	262	$	18	$C^{\#}_5$	554	1	31	D_6	1175	>	44	$D^{\#}_7$	2489	K
06	$C^{\#}_4$	277	%	19	D_5	587	2	32	$D^{\#}_6$	1244	?	45	E_7	2636	L

07	D_4	294	&	20	$D^{\#}_5$	622	3	33	E_6	1318	@	46	F_7	2793	M
08	$D^{\#}_4$	311	'	21	E_5	659	4	34	F_6	1397	A	47	$F^{\#}_7$	2960	N
09	E_4	330	(	22	F_5	698	5	35	$F^{\#}_6$	1480	B	48	G_7	3136	O
10	F_4	349	)	23	$F^{\#}_5$	740	6	36	G_6	1568	C	49	$G^{\#}_7$	3323	P
11	$F^{\#}_4$	370	*	24	G^5	784	7	37	$G^{\#}_6$	1661	D				
12	G_4	392	+	25	$G^{\#}_5$	831	8	38	A_6	1760	E				
13	$G^{\#}_4$	415	,	26	A_5	880	9	39	$A^{\#}_6$	1864	F				

Power: The transmitted RF output power level in the range 0 to 50. See the table below for what each level produces in approximate RF output and current draw. A lower power level may be easier for hunters without receiver attenuators. Higher power will result in less total battery runtime. At the highest power (50) and full duty cycle, the 650mAh battery should last over 8 hours.

level	RF output	current	level	RF output	current
0	0 mW	7 mA			
1	0.05 mW	20 mA	15	9.5 mW	40 mA
2	0.19 mW	21 mA	20	16.2 mW	47 mA
4	0.72 mW	24 mA	30	33.1 mW	60 mA
7	2.2 mW	29 mA	40	46.8 mW	70 mA
10	4.4 mW	33 mA	50	53.7 mW	76 mA

Send Battery: When set to 1, the MF-50 will send the battery voltage in morse code before the Morse Message. Set to 0 to disable.

LED

The blue LED shows the stage of the transmitter. When first powered up, it will flash quickly for 2 seconds while checking for bootloader entry. Then it will flash 3 times as it starts the MF-50 firmware. It will be on solid then transmitting, and off when off the air.

Battery

The internal 650mAh LiPo battery will power the MF-50 for 8 - 50 hours, depending on duty cycle and power output. It is charged by connecting the micro USB cable to a 5V supply. The red LED near the USB jack will be lit when charging, and the green LED lit when fully charged. The MF-50 will also operate from a USB power source when connected via the Micro-USB cable.

Bootloader

The MF-50 includes a bootloader to facilitate updating the firmware as new features are developed. To update the firmware via a terminal program, connect as adjusting settings above, cycle power on the MF-50 and when the ? appears, press the b key. If the MF-50 returns “M328P BL v1.0” or similar, it is in the bootloader mode. Press the s key, wait for it to respond with “|”, then upload or paste the text of the new MF-50 firmware file from the byonics.com website. It will respond with a series of periods(.) then an asterisk (*) if successful. Cycle power to run the new code. If it responds with an exclamation point (!), there was a problem, so try the full process again.