

BYONICS

Micro-Fox PicCon Manual

Version 0.61

The Micro-Fox PicCon (MF-PC) is a 700mW fox hunting/hidden transmitter hunt transceiver. It can be configured and remotely controlled via DTMF tones, and also be configured via a serial cable and Windows software. It runs off 3 AA batteries for approximately 12 hours continuous, and 20 hours at a 50% duty cycle.

The hardware is based on the Byonics MT-1000 High Altitude Balloon tracker, and the firmware based on the Byonics PicCon fox hunt controller.

Transmissions

The Micro-Fox PicCon sends transmissions intended for hidden transmitter hunts. The transmissions consists of a looping sequence as follows:

- **a pre-tones delay** - This delay allows for multiple units, each programmed with a different pre-tones delay, to be all started simultaneously, and operate in sequence. The DTMF command A1mmss sets the pre-tones duration. During the pre-tones delay, the MF-PC is off the air.
- **a looping tones transmission** - This is the primary transmission for hunting. It consists of a looped tone sequence, set by the DTMF command C2, which are played at the speed set by the DTMF command B1xx. The DTMF command A2mmss sets the tones transmission duration.
- **a Morse code ID** - After the tones transmission, a Morse code callsign ID is sent to keep the transmitter legal. The Morse code ID or message is set with the DTMF command C1, plays at the speed set by DTMF command B2xx, and in the tone set by the DTMF command B3xx. The duration of the code ID depends on the speed and characters used in the ID.
- **an off the air delay** - Finally, the MF-PC stops sending for the remainder of the sequence until it begins again. When the transmitter is not sending, it is able to listen to new DTMF commands. The duration of this delay depends on the durations all all the elements above, subtracted from the DTMF loop time command A3mmss.

The total time for all 4 elements above is set by the DTMF command A3mmss. The sequence is restarted from the beginning at this rate.

In addition to the timing settings above, there are two other timing commands:

- **an initial delay** set with the DTMF command A4hhmm. When this is set, the first transmission will be delayed by the given time. This allows for a MF-PC to be hidden well before the start of the hunt, and then to come on the air after the set time.
- **a total runtime** set with the DTMF command A5hhmm. When this is set, the MF-PC will only run the transmissions for the given time, and then stop.



LED

The MF-PC has a multi-function LED. On powerup, it will flash 3 times. If it detects a TTL serial cable, it will flash 3 more times. If it is jumpered settings settings restore, it will flash 3 more times. Then, during operation, the LED will indicate the current status as follows:

- **On solid** during transmissions
- **Flashing quickly** when receiving DTMF tones
- **Flashing medium speed** during a DTMF programming command
- **Flashing slowing** when running a transmission, but currently off the air.

DTMF Commands

The following DTMF commands can be sent from another radio to configure and control the MF-PC. This other radio should be set to transmit on the MF-PC receive frequency, by default, 146.565MHz and only when the MF-PC is not transmitting, so it can receive. The MF-PC LED will flash quickly when DTMF is being received. If having trouble controlling the MF-PC via DTMF, try changing the controlling transmitter to wide rather than narrow bandwidth.

Note: the control radio must have all 16 DTMF keys, including 0-9, #, *, and A, B, C, D. Sometimes the A, B, C, D keys are not labeled.

DTMF commands can be locked out by entering DTMF D. After this, all DTMF tones will be ignored until the MF-PC receives the 4 digit DTMF unlock code. The unlock code defaults to 1234 and can be changed with the A6xxxx command. The LED will not flash quickly when DTMF commands are locked.

DTMF Control Codes

DTMF	Function
1	Begin transmission, or initial delay if set.
2	Toggle transmission state (if transmitting, stop, if not transmitting, begin)
3	Stop transmission
D	Lockout DTMF commands

DTMF Configuration Codes

DTMF	Function
A1mmss	Set pre tones delay to mm minutes and ss seconds. This sets a pre-tones off the air delay for each transmission. To set the MF-PC to delay 15 seconds before sending tones after being started, send A10015.
A2mmss	Set tones duration to mm minutes and ss seconds. To set the tones to play for 30 seconds, send A20030.
A3mmss	Set loop time to mm minutes and ss seconds. For example, to set the MF-PC to repeat the tone sequence every minute, send A30100 or A30060.

A4hhmm	Set the initial delay to hh hours and mm minutes. For example, to delay the transmission until 2 hours and 30 minutes after being started, send A40230.																																																																								
A5hhmm	Set the total runtime to hh hours and mm minutes. For example, to only send transmissions for 1 hour, send A50100 or A50060.																																																																								
A6xxxx	Set transmit frequency to 14x.xxx MHz. For example, send A66565 to set the transmit frequency to 146.565MHz.																																																																								
A7xxxx	Set receive frequency 14x.xxx MHz. For example, send A76565 to set the receive frequency to 146.565MHz.																																																																								
A8xxxx	Set the 4 digit unlock code. For example, send A81234 set the unlock code to 1234, which is also the default.																																																																								
B1xx	Set tone sequence speed in 5ms units. So to set a fast tone sequence speed of 25ms per tone, send B105.																																																																								
B2xx	Set morse speed in words per minute. For example, send B213 to set the ID speed to 13 word per minute.																																																																								
B3xx	Set morse ID audio tone. Use the 2 digit codes in the C2 Set Tone Sequence below. For example: B322.																																																																								
B4xx	<p>Set flags. The possible flags are:</p> <ul style="list-style-type: none"> • 1 for random tones, instead of the C2 sequence. • 2 for random tone speed for each tone, instead of the B1xx setting. • 4 for random morse tone each ID, instead of the B3xx setting. • 8 for auto-start, to force MF-PC to begin transmitting right after powerup, rather than waiting for a DTMF 1 or 2. Auto-start is on by default. <p>To set more than 1, just add the numbers. For example: to disable all flags, send B400. To enable random tones speed, send B402. To enable random tone speed and auto start (2+8=10), send B410.</p>																																																																								
C1 xx xx xx ... #	<p>Set morse callsign. Use the table below to find 2 digit code for letter and numbers. End with the pound # key. Up to 60 characters may be entered. For example, to set the callsign to N6BG, send C1 14 36 02 07 #.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>00</td><td>space</td> <td>10</td><td>J</td> <td>20</td><td>T</td> <td>30</td><td>0</td> <td>40</td><td>!</td> <td>50</td><td>AR</td> </tr> <tr> <td>01</td><td>A</td> <td>11</td><td>K</td> <td>21</td><td>U</td> <td>31</td><td>1</td> <td>41</td><td>"</td> <td>51</td><td>,</td> </tr> <tr> <td>02</td><td>B</td> <td>12</td><td>L</td> <td>22</td><td>V</td> <td>32</td><td>2</td> <td>42</td><td>SK</td> <td></td><td></td> </tr> <tr> <td>03</td><td>C</td> <td>13</td><td>M</td> <td>23</td><td>W</td> <td>33</td><td>3</td> <td>43</td><td>\$</td> <td></td><td></td> </tr> <tr> <td>04</td><td>D</td> <td>14</td><td>N</td> <td>24</td><td>X</td> <td>34</td><td>4</td> <td>44</td><td>%</td> <td></td><td></td> </tr> <tr> <td>05</td><td>E</td> <td>15</td><td>O</td> <td>25</td><td>Y</td> <td>35</td><td>5</td> <td>45</td><td>AS</td> <td></td><td></td> </tr> </table>	00	space	10	J	20	T	30	0	40	!	50	AR	01	A	11	K	21	U	31	1	41	"	51	,	02	B	12	L	22	V	32	2	42	SK			03	C	13	M	23	W	33	3	43	\$			04	D	14	N	24	X	34	4	44	%			05	E	15	O	25	Y	35	5	45	AS		
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06	F	16	P	26	Z	36	6	46	'
07	G	17	Q	27	-	37	7	47	(
08	H	18	R	28	.	38	8	48)
09	I	19	S	29	/	39	9	49	*

SK, AS, and AR are procedural signs.

C2 xx xx xx ... #

Set tone sequence. Enter as many 2 digit tone codes as desired, up to 160, and then enter the pound # key to complete. 01 is silence, 02 is the lowest tone, 49 is the highest tone.

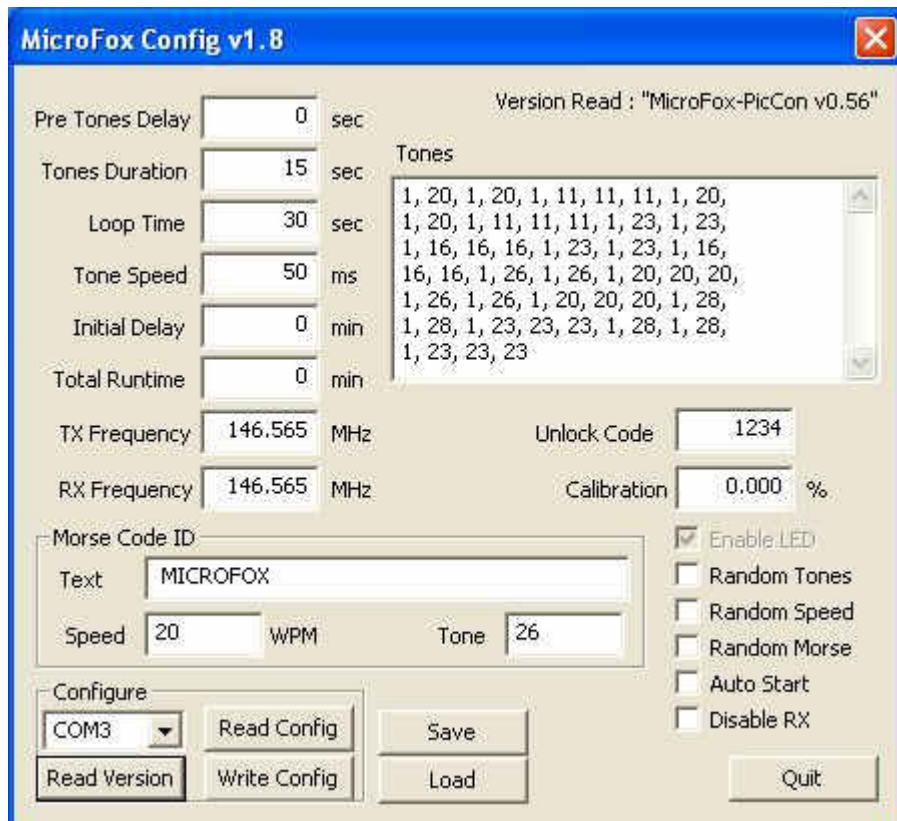
code	note	frequency
01	silence	
02	A ₃	220
03	A [#] ₃	233
04	B ₃	247
05	C ₄	262
06	C [#] ₄	277
07	D ₄	294
08	D [#] ₄	311
09	E ₄	330
10	F ₄	349
11	F [#] ₄	370
12	G ₄	392
13	G [#] ₄	415
14	A ₄	440
15	A [#] ₄	466
16	B ₄	494
17	C ₅	523

code	note	frequency
18	C [#] ₅	554
19	D ₅	587
20	D [#] ₅	622
21	E ₅	659
22	F ₅	698
23	F [#] ₅	740
24	G ₅	784
25	G [#] ₅	831
26	A ₅	880
27	A [#] ₅	932
28	B ₅	987
29	C ₆	1046
30	C [#] ₆	1109
31	D ₆	1175
32	D [#] ₆	1244
33	E ₆	1318
34	F ₆	1397

code	note	frequency
35	F [#] ₆	1480
36	G ₆	1568
37	G [#] ₆	1661
38	A ₆	1760
39	A [#] ₆	1864
40	B ₆	1975
41	C ₇	2093
42	C [#] ₇	2218
43	D ₇	2350
44	D [#] ₇	2489
45	E ₇	2636
46	F ₇	2793
47	F [#] ₇	2960
48	G ₇	3136
49	G [#] ₇	3323

Configuration Program

In addition to being able to be configured from DTMF tones, the MF-PC can be configured via a computer serial port and a Windows Configuration program called MicroFoxConfig.EXE. Using this program requires a 2.5mm stereo serial interface cable, such as the Bionics AIO USB or AIO Serial cable. Connect this cable between the computer USB or DB-9 serial port, and the 2.5mm jack on the MF-PC. It may require a little force to get the cable fully seated into the jack. Power up the MF-PC, launch the MicroFoxConfig.EXE program, select the COM port, and click Read Version to confirm a valid connection.



The settings in the Config program are similar to the DTMF settings above. There are two options that are available in the Config program but not via DTMF commands:

- Calibration can be used to tweak the long term timing of a MF-PC. Positive calibration numbers make the unit run faster. If you determine that the MF-PC is running 0.03% slow, set the calibration to +0.03% to correct.
- Disable RX can be used to turn off the internal radio when the MF-PC is not transmitting. This will save battery life, but will not allow DTMF remote control of configuration.

Notes

- The MF-PC can be reset to factory settings by shorting PIC pin 6 to ground and cycling power. These connections can be found on the edge of the PCB labeled J4, pins 2 (ground) and 7 (PIC pin 6). When powered up with these shorted, there will be an extra 3 flashes of the LED signifying that the restore has happened.

Specifications

Dimensions	Case is 13.5 x 7 x 2.5 cm not including the SMA RF connector, LED and switch which extend from the case
Weight	3.5 ounce without 3 AA batteries
Serial Jack	2.5mm 3 conductor jack. Tip : serial from MF-PC, Ring : serial to MF-PC, Sleeve : ground
Power	3 AA batteries. 4.5 to 5 Volts DC. DO NOT EXCEED 5 VOLTS INPUT!
Current	During transmissions the current consumption is approximately 180 mA. During receive mode the current draw is about 17mA, and with the receiver disabled, about 5mA. Power output and current draw will increase with a supply voltage of not more than 5 Volts, and will decrease as batteries decay.

MicroFox-PicCon Schematic (OMEGA Board)

