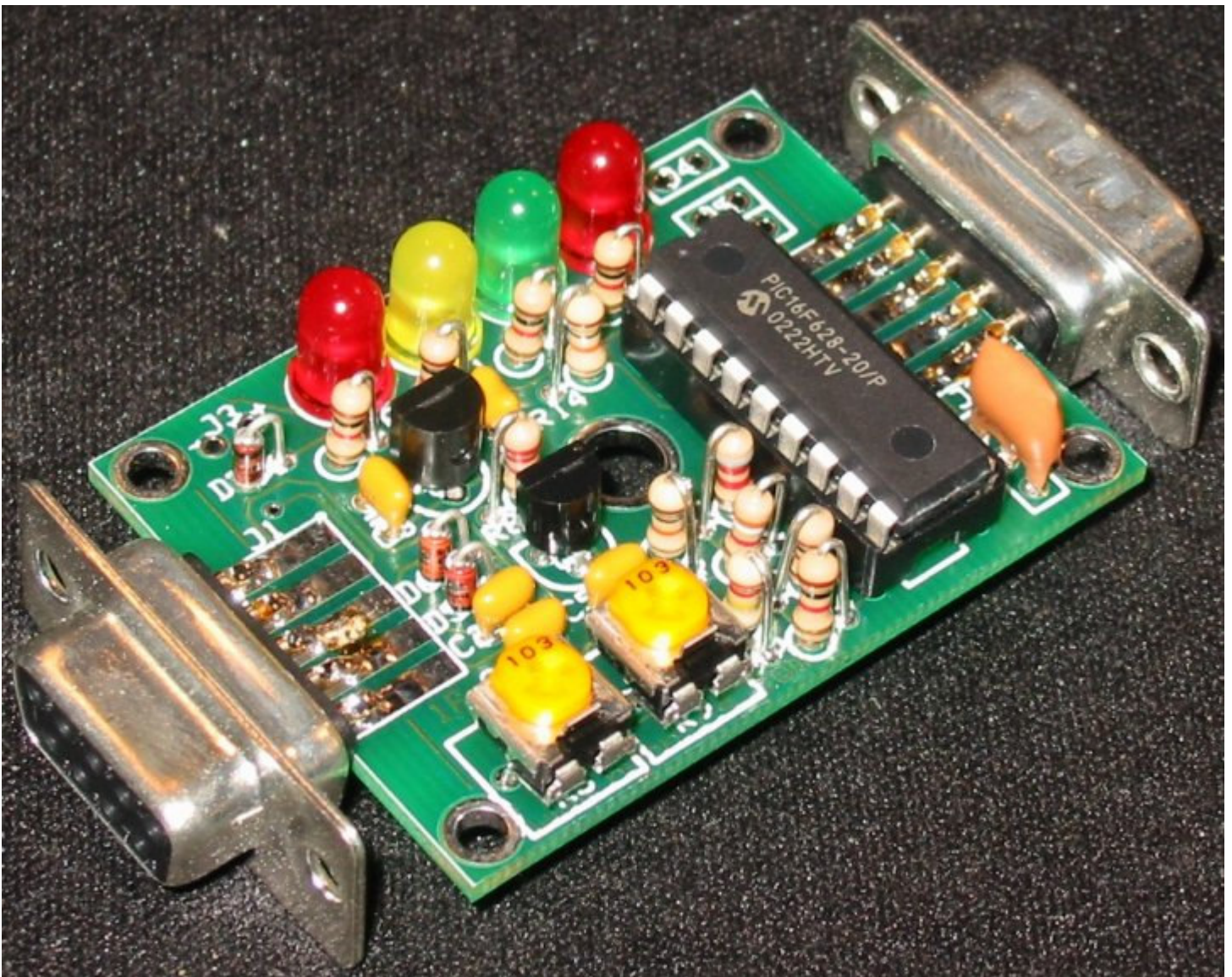


BYONICS

WXTrak Owner's Manual

Version 1.2

<http://www.byonics.com/wxtrak>



Overview.....	2
Acknowledgments.....	2
Construction.....	3
Schematic.....	3
Parts List.....	3
Printed Circuit Board.....	4
Upgrading a TinyTrak.....	4
Case.....	4
Assembly Instructions.....	5
Assembly Completion.....	6
Interfacing.....	7
Radio – J1.....	7
Serial – J2.....	7
Power – J3 (also J1 and J2).....	7
LED Control – J4.....	8
Primary/Secondary Switch SW 1 – J5.....	8
Power Switch – J6.....	8
Serial Power Enable – J7.....	8
Operations.....	8
Configuration Software.....	8
Callsign.....	8
Digi Path.....	8
Status Beacon.....	9
Mode.....	9
Timing.....	9
Configure.....	9
Tone Test.....	10
WXTrak Adjustment.....	10
Troubleshooting.....	11
Frequently Asked Questions.....	12
Hints, Tricks, & Notes.....	13

Overview

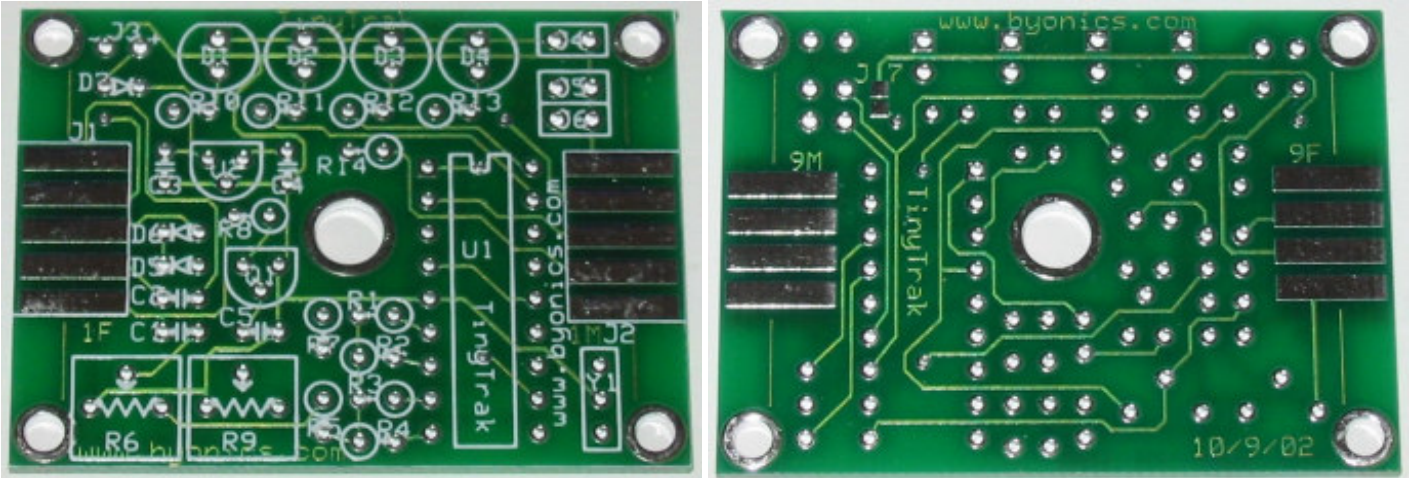
WXTrak is a small, inexpensive radio controller designed to receive and broadcast weather information. It removes the need for a full TNC (terminal node controller) in an APRS weather transmitter. When connected to a compatible weather station, and a radio transmitter, WXTrak will key the radio at user-defined intervals, and transmit the current weather data, and station location. It currently supports the Radio Shack WX200, the Oregon Scientific WM-918, and the Peet Brothers Ultimeter 100, Ultimeter 800, Ultimeter 2000, and Ultimeter 2100. The Peet Brothers stations can be in Data Logging Mode, or Complete Record Mode. Packet Mode is not officially support, but does mostly work. All WXTrak operating parameters are stored in the internal EEPROM, and will persist even when power is removed. WXTrak was created by Byon Garrabrant, N6BG, and is based on the TinyTrak3. More information can be found at the Byonics web site at <http://www.byonics.com>.

Acknowledgments

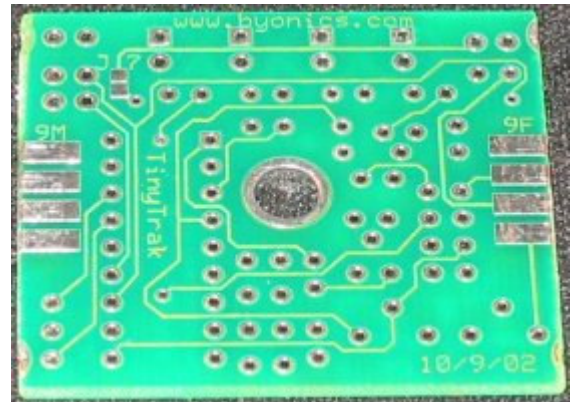
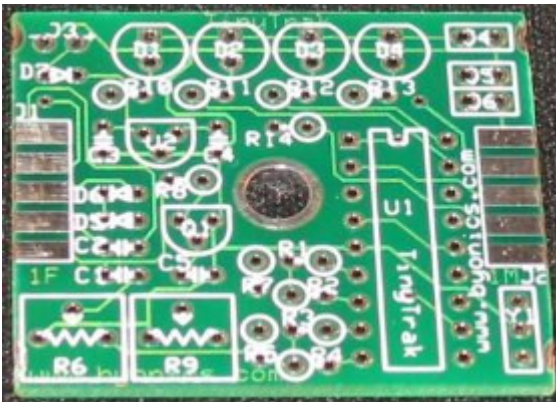
Thanks must go to all those who helped test WXTrak: John Mc Hugh, KU4GY; Jim Wooddell, WA6OFT; Scott Currie, NS7C; Charlie Kunz, AA5QJ; Darryl Smith, VK2TDS; John Neeley, K6YDW; Alan Cook, N7CEU; Chris Devine, KK5XF; Stan Horzepa, WA1LOU; Andrew Wollin, VE3UIN; and James Stewart, WB2SCX. In addition, thanks to the testers and users of TinyTrak, TinyTrakII and TinyTrak3, and my wife, Lara Garrabrant, KD6AYO. Thank you to everyone for helping make WXTrak all that it is.

Printed Circuit Board

The TinyTrak3 printed circuit board (PCB) is double sided, silk-screened, and solder masked. There are 4 mounting holes in the corners, and another mounting hole in the center.



If desired, 0.15 inch can be cut or sheared off each end of the PCB to allow an alternate case fitting.



Upgrading a TinyTrak

WXTrak can run on the same circuit board as a TinyTrak, TinyTrakII, or TinyTrak3. Owners of these can change to WXTrak functionality by simply replacing the microcontroller, and using the WXTrakConfig program.

Case

WXTrak was designed to fit in a Serpac brand C6 plastic case (2 1/4" x 1 5/8" x 3/4"). Cases are available from www.byonics.com. If 0.15 inch is cut off either end of the PCB before building, as shown above, the DB-9 connectors will fit inside the case, as shown in the first image. If not, the DB-9 connectors will fit outside the case, as shown in the second image. There are 4 flanges on the case center post, which should be trimmed to allow the PCB to fit.

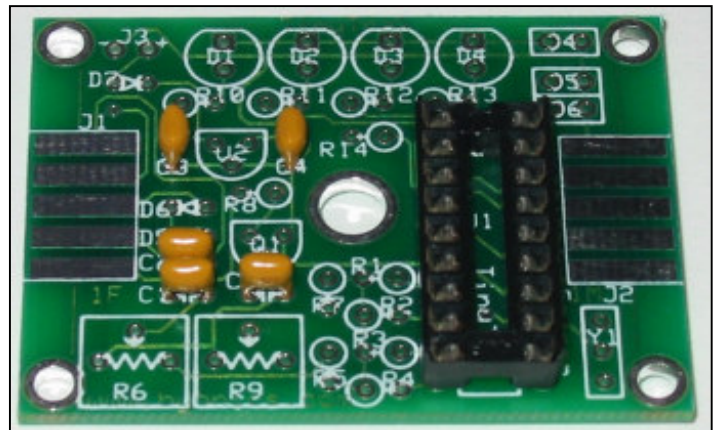


Assembly Instructions

WXTrak is a fairly simple construction project that can usually be built in less than an hour. You will need a low wattage pencil-type soldering iron with a small tip, some thin solder, and a pair of diagonal cutters. The microcontroller (U1) is static sensitive, so use standard precautions. For each item, insert on the component side (white silk-screened side), then turn the board over and solder the leads to the pads on the trace side. Be sure to only solder the correct pad, and do not let any solder touch any other pad or trace. Trim any excess leads with diagonal cutters after soldering each component. The following checklist will be useful to insure all components are properly assembled.

- ❑ Before beginning, consider how the WXTrak will be mounted. If mounting with the DB-9 connectors inside the case, it will be easier to cut the PCB before inserting components. See Case section for more information.

- ❑ Install the 18-pin IC socket for U1. Be sure to align the notched end of the socket with the marked end on the silk screen. It may help to temporarily slide J1 into position without soldering to make the socket sit flat on with the PCB. First solder just two diagonally opposite pins of the socket, and check that the socket sits flat on the PCB. Then solder the remaining socket pins. Do not insert the chip into the socket at this time.



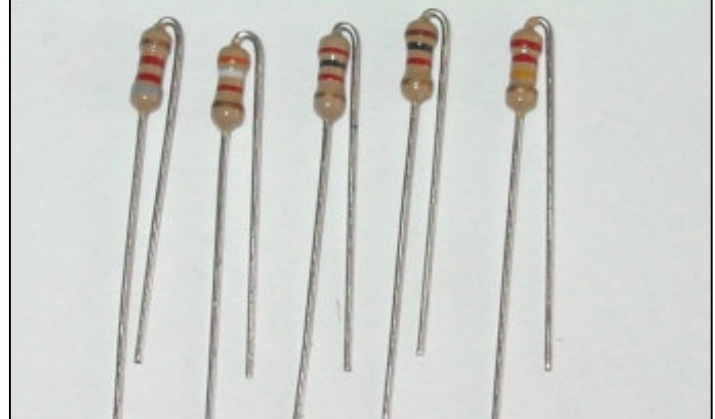
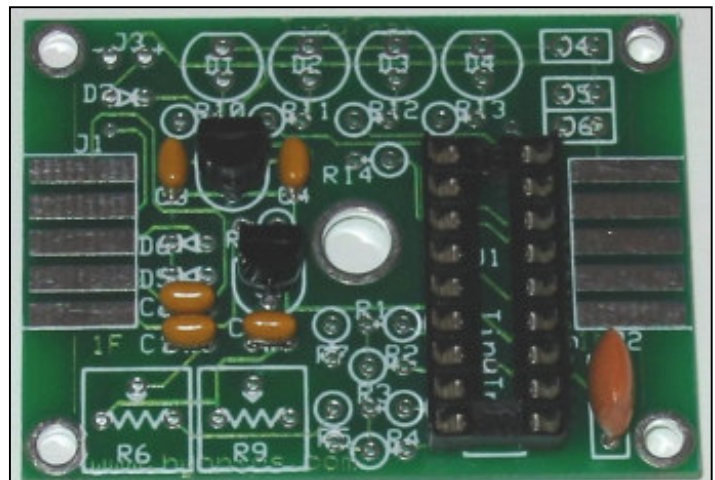
- ❑ Install capacitors C1 – C5. (0.1uf, 104). Direction does not matter. If the leads need to be formed to 0.1 inch spacing, be careful not to bend too close to the yellow ceramic material. Bend the leads apart slightly after insertion to prevent them from falling out when the PCB is upside-down for soldering.

- ❑ Install transistor Q1 (2N2222A), which provides Push-To-Talk (PTT) for the radio transmitter. Be sure to orient flat side to match the flat side shown on the silk-screen pattern. Q1 is just above C5.

- ❑ Install voltage regulator Q2 (78L05). Be sure to orient flat side to match the flat side shown on the silk-screen pattern.

- ❑ Install ceramic resonator Y1 (10 Mhz), which provides the clock oscillation for the chip. Direction does not matter.

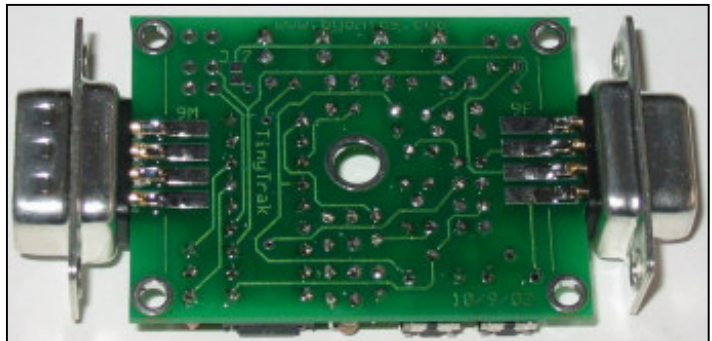
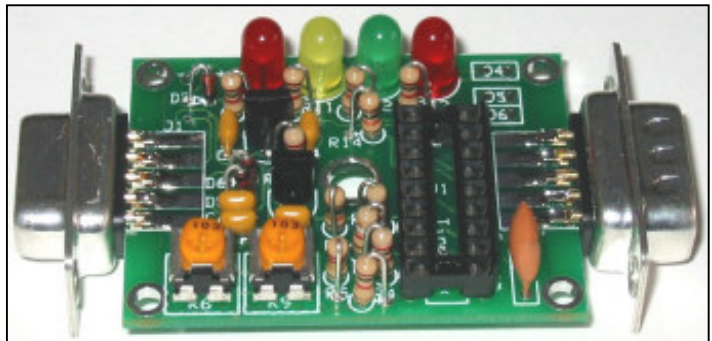
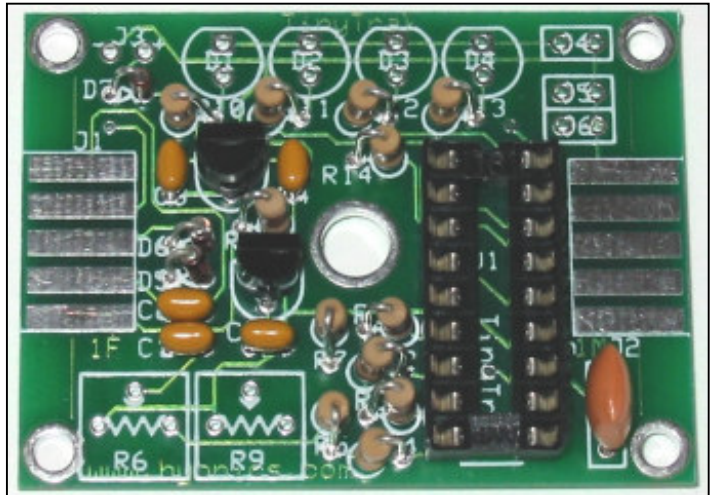
- ❑ Install resistors R1 (8.2K gry-red-red), R2 (3.9K, org-wht-red), R3 (2K, red-blk-red), R4 (1K, brn-blk-red), & R5 (220K, red-red-yel) which create the 4-bit digital to analog resistor ladder. For each resistor, bend one of the leads 180 degrees at the bulb of the resistor so that both leads are parallel and 0.1 inch apart. See the image to the right. Install vertically on the board. Polarity does not matter. Bend the leads apart once inserted to hold in place.



- ❑ Install resistors R7 and R14 (10K, brn-blk-org) using resistor instructions above.

- ❑ Install resistor R8. (2.2K, red-red-red). Use instructions for resistors above. Note: If WXTrak will be used with a radio that does not key via current through the microphone line, such as mobile radios and Kenwood handhelds, R8 will not be needed. If R8 is used, you should not wire PTT OUT to the radio.

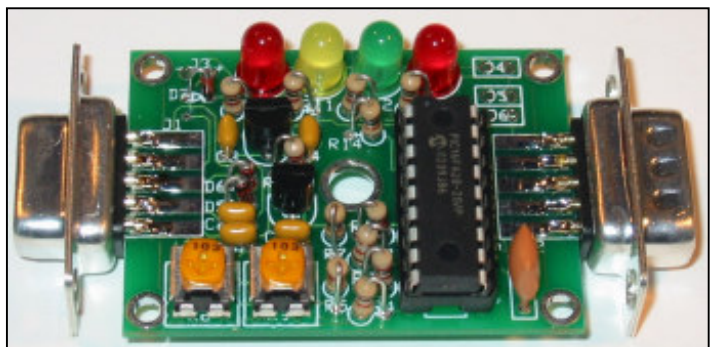
- ❑ Install resistors R10 – R13 (1K, brn-blk-red). These limit the current flowing into LEDs D1 – D4.
- ❑ Install glass diodes D5 & D6. (1N4148) The black stripes should be nearest J1. Bend like resistors.
- ❑ Install glass diode D7. (1N4148) The black stripe should be nearest LED D1. Bend like resistors.
- ❑ Install potentiometer R6, (10K, 103) which adjusts audio output level.
- ❑ Install potentiometer R9, (10K, 103) which adjusts carrier detect sensitivity.
- ❑ Install Power Display LED D1 (red). This LED will light when device is powered. Be sure to align the flat side of all LEDs with the shape on the silk-screen, nearest the top edge of the PCB.
- ❑ Install Carrier Detect LED D2 (yellow). This LED will light constant when audio is detected from the radio receiver, and flash during the quiet time before transmitting.
- ❑ Install weather station state LED D3 (green). This LED will light when receiving good weather data, and will be off when no weather data is received.
- ❑ Install PTT LED D4 (red) and resistor R12. This LED will light when the radio is keyed via PTT.
- ❑ Install female DB-9 radio connector J1. This is the connector with the holes. Wedge the board in between the two rows of solder cups, with the 5 pins aligned with the 5 pads on the PCB. Solder just one pin first, and insure the connector is on straight. Then solder on both sides of the PCB, all nine cups to the pads.
- ❑ Install male DB-9 serial connector J2 as you did for J1. This is the connector with the pins.



Assembly Completion

After all components have been installed, inspect the solder side of the board for poor or cold solder joints. All pads should be shiny and smooth. Inspect for any undesired solder bridges. Use an ohmmeter or multimeter to be sure power (socket pin 14) and ground (socket pin 5) are not connected. It would even be a good idea to power the board (see below), and confirm +5 volts between socket pins 14 and 5. If the board looks ready, complete the assembly as follows.

- ❑ Insert programmed microprocessor U1. The chip is static sensitive, so ground yourself by touching a large metal object before touching the chip. The rows of pins may need to be bent slightly. Be sure to align the notch on the chip with the notch on the socket, as well as the notch on the silk-screen (nearest connector J1). An improperly inserted chip may become permanently damaged. When powered, the green and yellow LEDs should flash 3 times, which means the WXTTrak is running.



Interfacing

The following are the interface connections for the WXTrak, which are needed before operation.

Radio – J1

Female DB-9 connector J1 is used to interface WXTrak to a radio transceiver. It is compatible with the radio connector on Kantronics TNC, such as the KPC-3. Connect AUDIO OUT (J1 pin 1) to the radio's mic input. If the transmitter transmits when the microphone input is grounded (most handheld (HT) radios do, except the Kenwood brand), resistor R8 must be installed, but PTT OUT (J1 pin 3) will not need to be connected to the transmitter. For all other transmitters, PTT OUT (pin 3) will be needed, and should be connected to the transmitter's PTT input. PTT OUT is grounded when the transmitter is to be keyed. To prevent transmissions over other stations, connect the receiver's squelched audio out (earphone) jack to the AUDIO IN (pin 5). Also connect J1 GROUND (pin 6) to the radio's ground. Note: WXTrak cannot decode the incoming packet data. Instead, it just watches for audio energy (voice, data, or static) to hold off transmitting over other stations. Refer to the transceiver's manual for more information, and look for a section on installing a terminal-node controller (TNC) for packet operation, as WXTrak is interfaced in a similar manner. J1 can also be used to supply or receive WXTrak's power, via pin 7 and pin 6.

Serial – J2

WXTrak must be connected to a computer for configuration of call sign and other operating parameters, and then connected to a compatible weather station to receive weather data. The male DB-9 J2 serial connector is used for this purpose. J2 pin 3 is used to transfer serial data from the WXTrak to the computer. J2 pin 2 is used to transfer serial data from the computer or weather station to the WXTrak. J1 pin 5 is serial ground. Both a gender-changer (female-to-female) AND a null-modem adapter will be needed to interface the computer to WXTrak. A null-modem adapter swaps pins 2 and 3, and connects pin 5. Use a DB-9 serial extension cable if it is difficult to connect the gender-changer, null-modem adapter, and WXTrak directly to the computer 9-pin serial port. Due to the TTL voltage levels used, some laptop computers may not be able to communicate with the WXTrak.

If using a weather station cable that plugs directly into a computer serial port, it can be plugged directly into WXTrak's J2 serial connector. If using a RadioShack WX-200 or Oregon Scientific WM-918, be sure to note the special serial requirements below. If the station does not connect directly into a computer's serial port, an interface will need to be built. The weather station should have a female DB-9 with serial data out wired to pin 2, and ground to pin 5. Weather station serial input is not used. J2 can also be used to supply or receive WXTrak's power. If this is desired, short J7 on the back of the PCB by dropping a bead of solder across the two square pads. After this, J2 pin 4 will be connected to J3 and J1 pin 7.

Note for interfacing to a Radio Shack WX-200 or an Oregon Scientific WM-918: These weather stations have special circuitry in their serial sections that use the incoming serial voltage to drive the outgoing serial line. If the station's incoming serial is not hooked to a true RS-232 signal, the serial output will be disabled. Since WXTrak does not output a true RS-232 level, this is a problem. To overcome this problem, a negative voltage (-7 to -15 volts) needs to be sent to the weather station's serial input pin, DB-9 pin 3. This can be done in a few different ways.

- A 9 - 12 battery can be wired to the stations serial port. Wire the negative battery terminal to pin 3, and the positive to the serial ground, pin 5. Make sure this battery does not come in contact with any other circuitry.
- A 9 – 12 volt DC wall-wart can be used to provide the negative voltage. Wire the negative side of the wall-wart to the weather station serial DB-9 pin 3, and the positive side to the serial ground, pin 5. Make sure this wall-wart does not come in contact with any other circuitry.
- A MAX232 or similar level converter can be wired to send the negative voltage to the weather station.

Note: The corresponding pin on the WXTrak (J2 pin 3) should not be connected to the weather station or to this negative voltage.

Power – J3 (also J1 and J2)

WXTrak should be powered with 7-35 volts DC. Power can be applied via J1, J2, or J3. J1 is the most common way to power the WXTrak. To use J1, connect pin 7 to positive voltage and pin 6 to ground. To use J2, connect pin 4 to positive voltage and pin 5 to ground. Also, short J7 on the back of the PCB by dropping a bead of solder across the two square pads. To use J3, apply positive voltage to the plus (+) hole, nearest the LEDs, and ground to the minus (-) hole. Only one of the three jacks J1, J2, and J3 should be used to supply power to the WXTrak. If power is applied via J2 or J3, the same power will be available on J1 to power a radio. If power is supplied via J1 or J3, the same power can be retrieved via J2 to power the weather station, if J7 is shorted. Be sure not to draw more current than your supply can handle. At 12 volts, current draw is 6.6ma + 3ma for each LED lit. If desired, the 4 1K LED resistors can be replaced with 10K resistors, which will cause the LED to only draw about 0.5 ma each.

LED Control – J4

This optional jumper is normally bridged on the PCB, but if desired, can be cut, and replaced with a true jumper. This will allow easy disconnection of the LEDs if current saving is important. If desired, cut the trace between the two J4 holes, and insert a 1x2 header.

Primary/Secondary Switch SW 1 – J5

This switch input is not used for WXTrak, and should be left unconnected.

Power Switch – J6

This switch input is not used for WXTrak, and should be left unconnected.

Serial Power Enable – J7

To bridge serial power J2 pin 4 to WXTrak power J3 and J1 pin 7, this jumper on the bottom of the PCB should be shorted by dropping a bead of solder across the two square pads. This will allow the GPS to receive power from the WXTrak power source, or let the WXTrak be powered from the serial connector. If serial power is not needed, leave this jumper open.

Operations

Configuration Software

To set user options, such as call signs and transmit rates, use the WXTrakConfig.EXE program, available from www.byonics.com. First, power WXTrak and connect it to a computer serial port. Be sure to use a gender-changer, and a null-modem adapter. Launch WXTrakConfig.EXE, and select the connected serial port. Click "Read Version" to confirm the config program can communicate with WXTrak. If a firmware version number is reported, the software and circuit are communicating. If not, re-check all previous steps. Click "Read Configuration" to get the current configuration, edit all fields for desired options, and click "Write Configuration" to download options to the chip.

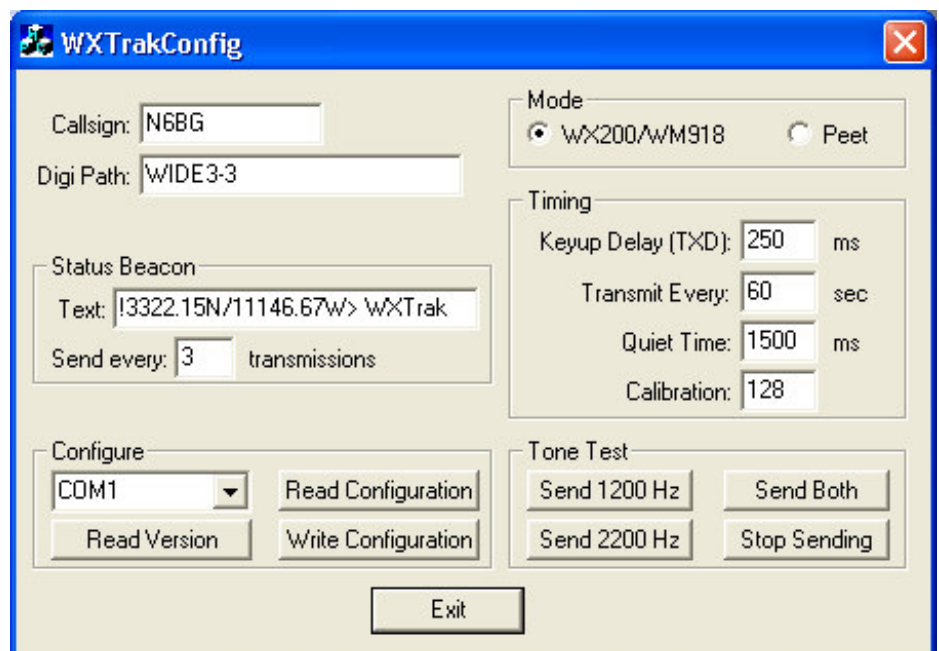
Reading the Configuration is always performed twice and compared in the program to insure correct data. Writing the configuration is always followed by a read and compared to insure correct data. A dialog will notify the user when the read or write is complete, and if it was successful. A read or write operation may fail if the unit is transmitting. If this happens, simply try again. Detailed information about each configuration parameter is included below.

Callsign

This is the identification of the transmitting station. It can be an amateur radio call sign such as N6BG, or a tactical call such as BUS. No more than 6 characters (excluding SSID) may be used. If a tactical call is used, an amateur radio call sign should be included in the status beacon for compliance with FCC identification requirements. As with normal packet radio, an optional SSID between 1 and 15 can be included, such as N6BG-2 or BUS-15.

Digi Path

This optional path will allow the transmission to be repeated by digipeaters. It should be entered in the form of call signs or aliases with optional SSIDs, separated by commas, such as RELAY,WIDE,WIDE. WIDEn-n format is also supported, such as WIDE3-3. More call signs in the digipeater path will limit the space available for the status beacon.



Status Beacon Text

Status Beacon Text

WXTrak can send a text beacon message after periodic weather transmissions. This is typically used to send the station's position. This setting sets the beacon text. A fixed position can be entered here in the form "!3612.34N/11512.34W_". The number of digipeaters in the path limits the length of the beacon message.

Status Beacon Send Every

This setting controls how often a status beacon is sent, in units of normal position transmissions. A setting of 1 would send the beacon with every position transmission, a setting of 2 would beacon with every other position transmission.

Mode

This sets the type of weather station connected to the WXTrak. Current options are a Radio Shack WX-200 and an Oregon Scientific WM-918, or a Peet Brothers weather station, models Ultimeter 100, Ultimeter 800, Ultimeter 2000, and Ultimeter 2100.

Timing

Keyup Delay (TXD)

This sets the delay in milliseconds after the transmitter is keyed, until the data begins. It is similar to the TXD setting in most TNCs. A value of 200 ms would be equal to 1/5 second. Maximum delay is about 1700 milliseconds.

Transmit Every

This setting controls how often, in seconds, a position transmission will occur. Valid range is between 1 second and 65535 seconds (18.2 hours).

Quiet Time

This setting controls the approximate delay in milliseconds that must occur after the receiver squelches, before a transmission will occur. It can keep transmissions from occurring on a busy channel. During the quiet time, the CD LED will flash quickly.

Calibration

This setting is included to help compensate for inaccuracies in the ceramic resonator. By adjusting the value, packet rates can be sped up or slowed down. A value of 128 represents no correction. Experiment with different values to see which has the best results on a receiving TNC.

Configure

Com Port

This setting selects which communication port the WXTrak is connected to during configuration. Currently only the first four serial ports are supported.

Read Version Button

This button will get the current firmware version from the connected WXTrak. This is a useful, simple test to confirm the computer and WXTrak can communicate.

Read Configuration Button

This button will upload all configuration settings from the connected WXTrak, and populate the settings field in the software interface. This step is useful to change a single setting on the WXTrak configuration.

Write Configuration Button

This button will download all configuration settings entered in the software interface into the WXTrak. The settings are stored in non-volatile memory, so they will persist when power is removed from WXTrak.

Tone Test

These buttons will cause WXTrak to transmit a 1200 Hz tone, a 2200 Hz tone, or alternate between the two on a connected radio. This is useful for setting transmission levels, and measuring audio frequencies when adjusting calibration.

WXTrak Adjustment

There are only a few adjustments required for proper operation of WXTrak. First, the transmit audio level should be adjusted at R6 for proper deviation. Use the transmit tones buttons (1200 Hz/2200 Hz/Send Both) in the configuration software to cause the WXTrak to transmit while adjusting. You can listen on a separate receiver, and start the potentiometer at maximum drive. Lower the drive level until there is a noticeable change in the receiver. Overdriving the transmitter is a common cause of failure to decode. WXTrak was designed for hand held radios. Some mobile radios require more audio drive than WXTrak puts out. If audio levels are too low, even with the R6 pot set to maximum, consider replacing the 220K R5 with a 100K resistor or shorting jumper. This should allow for about double the audio range.

The next adjustment point is R11, which is used to adjust the carrier detect base level. This should be adjusted such that Carrier Detect LED is usually off, but turns on when the radio opens squelch. Radio receiver volume should be set to maximum, and the radio can NOT have a constantly open squelch.

The last adjustment is the calibration value. This adjusts timing slightly to compensate for ceramic resonator error. Try a few different values while monitoring the decoding on a TNC, and set to the value which gives the best decoding. Usually the default 128 works best.

After setting the desired configuration options, WXTrak should be connected to a radio, weather station, and power supply, and will be ready for use. When power is applied, the carrier detect and valid LEDs should flash three times to show proper firmware operation and proper LED wiring. If carrier is not detected, PTT LED D4 should light for about a second. Power LED D1 should always be lit.

If a radio is connected, it should transmit periodically and a packet burst should be heard on a receiving radio. When the receiver's squelch is opened, the carrier detect LED should light, and all transmissions will be delayed. If a radio receiver and TNC is available, packets should be able to be monitored.

Troubleshooting

Problem	Possible Solutions
The WXTrakConfig.exe program cannot communicate with the WXTrak. The config program reports "WXTrak not found".	Be sure to use a null-modem adapter. Be sure WXTrak is powered. Be sure to use the correct configuration program, WXTrakConfig.exe. Test serial by running a terminal program, such as HyperTerm at 4800 baud N81. When WXTrak is first powered up, it will send a version message. If it doesn't, serial output is not working. If it does, send ESC V, which will make it send the version again. If it doesn't, serial input is not working. Try a different computer.
The WXTrakConfig program reports "Cannot open COM port"	Be sure to use the correct COM port. Be sure no other programs are also currently using the COM port.
The transmitter keys up, even when no power is applied to WXTrak	Perhaps the radio doesn't key via current through the microphone line. If so, resistor R8 should be removed. Check for shorts or opens on the solder side of the PCB. Check the radio manual. Perhaps a different value of R8 is needed.
The power LED D1 is not lit.	Check for 5V across LED D1. Check for shorts or opens on the solder side of the PCB. Be sure the LEDs are inserted in the proper direction. Confirm the battery is fully charged, and delivering 7 – 35 volts.
The green and yellow LEDs do not flash 3 times at powerup.	Be sure the LEDs are inserted in the proper direction. Check for shorts or opens on the solder side of the PCB. Check for 5 volts across socket pins 5 and 14 with the PIC removed.
WXTrak keys the transmitter, sends a packet, but fails to un-key the transmitter.	WXTrak is probably receiving too much local RF energy. Lower transmitter power, move the transmitting antenna further away, or try shielding the WXTrak in a metal case. Try re-configuring the settings.
Sent packets sound distorted on a receiver.	Be sure the calibration value is around 128. Be sure there is not too much RF energy near the WXTrak.
Sent packets are not being decoded by a receiver (TNC, digipeater, etc)	Make sure your TXD time is high enough. Start it high (500 ms) and lower it as long as it keeps working. 250ms – 300ms is a good setting. Make sure the transmitted audio level is correct. It should be near, or just below, other transmitters received. Adjust with R6 Try slightly different calibration values. Try re-configuring the settings.
No audio is heard on a receiver.	Check for shorts or opens on the solder side of the PCB. Raise transmit audio level with R6. If R6 doesn't give enough range, try lowering the value of R5, or even shorting it.
WXTrak is stuck in transmit mode, or transmitting too often, and it cannot be re-configured.	Rotate R9 to the extreme so the WXTrak will think there is a carrier. Then cycle power, and it should not transmit. It should then be able to be configured.
WXTrak never transmits.	Be sure the yellow LED is off. Adjust R9 if necessary. Check for shorts or opens on the solder side of the PCB. Be sure the cable is built correctly. Grounding PTT should make the radio transmit.

Frequently Asked Questions

Is the firmware .HEX file available so I can burn my own chips?

No. The only way to get a WXTrak chip is preprogrammed from www.byonics.com.

Can you add feature XXX to WXTrak?

I don't know. Ask at tinytrak@byonics.com. Many of the features of WXTrak came as requests from users. However, only features that are desired by a reasonable number of users are likely to be added. Code space, data space, and programming effort required must also be considered.

Can I get the source to WXTrak so I can add my own features?

No, the source to WXTrak is not public. However, consider Son of TinyTrak (SOTT), available at the TinyTrak Yahoo! Group (<http://groups.yahoo.com/group/TinyTrak/>). It is an open source project that runs on the TinyTrak3 hardware. Also look at the PIC-E programs available at <ftp://ftp.tapr.org/picsig/software/>.

What language is WXTrak written in?

All WXTrak and TinyTrak programs were written in PIC assembly.

Can the WXTrak implement a true DCD, output received packet data to the serial port, or be a digipeater?

No. That would require a modem chip to decode the actual packet tones.

Can I hook a GPS to the WXTrak to send my moving position?

No. WXTrak only receives weather station data. However, TinyTrak3 will interface to a GPS and send that information. Details are at www.byonics.com

Is there a surface mount WXTrak available?

Not at this time. One is currently in the planning stages, however.

Can I replace the ceramic resonator Y1 with a crystal?

Sure. You should add two small capacitors (about 6 pf) from each lead to ground, also.

I want to sometimes use WXTrak with an HT, and sometimes with a mobile radio. What should I do about R8?

Leave R8 off the board, and then add it back into the cables for the radios that need it (like HTs). All R8 does is go between the PTT OUT line and the AUDIO OUT line, so it is very easy to add into a cable. Then, for the mobile, run the PTT line separate.

Is the WXTrakConfig program available for DOS, Linux, Palm, Mac, etc?

Only the Windows version was initially released. In the future, as new versions are created, they will be made available at www.byonics.com. If you would like to receive information on writing your own config program, contact tinytrak@byonics.com.

I have other questions. Where do I go?

There is a TinyTrak mailing list at Yahoo! Groups. (<http://groups.yahoo.com/group/TinyTrak/>). There are over 500 members who have probably already asked and answered your question. Check out the message archive. Questions can also be addressed to tinytrak@byonics.com

Hints, Tricks, & Notes

- The WXTrak uses inverted TTL levels (0 & 5 volts) for serial communication, rather than true RS-232 levels (-12 & +12 volts). This may cause communication problems with some computers, especially laptops. An RS-232 level converter, such as a MAX232, may be used, but inverters will also be needed.
- WXTrak's carrier detects circuit detects all audio energy, not just packet audio tones. Therefore, it will not transmit over received voice audio. Be sure NOT to run an open squelch, as this will prevent all transmissions. The receiver should be set for maximum volume.
- If you enter a small Transmit Every value, you may find it difficult to write new configuration settings, since the WXTrak will be too busy transmitting to monitor serial. To resolve this, turn the R9 pot such that the CD LED turns on. This will prevent WXTrak from transmitting, and all the new settings can then be written.
- WXTrak was designed for hand held radios. Some mobile radios require more audio drive than WXTrak puts out. If audio levels are too low, even with the R6 pot set to maximum, consider replacing the 220K R5 with a 100K resistor. This should allow for about double the audio range. R5 can even be replaced with a jumper (0 ohm resistor) for maximum audio.
- WXTrak can be affected by local RF energy. To avoid this, run the transmitter at low power and keep WXTrak away from the transmitting antenna. It may also help to use shielded cables and case, and toroid filters.
- Some users have reported that a 4.7K resistor between J2 pins 2 and 3 fixes a problem with Peet Bros stations being undecodeable by the WXTrak.

