BYONICS TinyTrak4
Quick-Start Guide

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Introduction

This Quick-Start Guide is intended to help new users get up and running with a Byonics TinyTrak4.

What is needed?

Most users will need the following items to setup and operate the TinyTrak4:

- **TinyTrak4** – Either the TinyTrak4 Built and Tested unit, or a TinyTrak4 Kit. See the TinyTrak4 Hardware Manual for information on building the kit version before using this guide.
- **Radio** – 2-meter amateur radio, along with radio power and antenna. Either a mobile radio or a hand-held (HT) will work, as long as it has a microphone jack and an earphone/speaker jack.
- **Radio/Power Interface Cable** – This cable is needed to connect the TT4 to a power supply, and to the radio's mic and speaker connections. These can be purchased at www.byonics.com/cables or built from the wiring diagrams at that site.
- **Serial GPS** – If TinyTrak4 will be used as an APRS^{TM} position tracker, a serial GPS sending NMEA sentences is needed. A USB only GPS cannot be used. The TinyTrak4 can be configured to power a 5V GPS, such as the Byonics GPS2.
- **Computer with RS-232 (DB-9) serial port** – If the computer doesn't have a serial port, a USB-to-serial adapter can be used. If the TT4 will only be used as a tracker, the computer is only needed during initial configuration.
- **Female-Female Null Modem adapter or cable** – An adapter is needed to connect the TinyTrak4 to the computer serial port or USB-to-serial adapter. These are available from www.byonics.com or can be built with 2 female DB-9 connectors. Just connect pin 5 on each, and swap pins 2 & 3. The TinyTrak4 Serial Splitter cable can also be used for this.
- **TinyTrak4 Power Supply** – A 6V-15V power supply is needed to operate the TinyTrak4. Most users will use a 12V battery, or vehicle cigarette lighter plug. The power supply is connected to the TT4 with the Radio/Power interface cable.

Set the TinyTrak4 Jumpers

The TinyTrak4 has two user jumpers on the circuit board. JP8 is used to set the Radio PTT type, and JP6 is used to set the GPS power. To access these, remove the screw on the back center of the TT4 case.

JP8 is located on the left side, near the DB-9 connector. If using a hand-held made by a company other than Kenwood, this jumper should be installed on both pins, shorting them together. If using a Kenwood radio, or a mobile radio, this jumper should just be removed, or stored on only 1 post. TinyTrak4 is normally shipped with the jumper installed. If this jumper is installed when it shouldn't be, mobile radios may be constantly tranmitting. If the jumper is not installed when it should be, hand-helds will not transmit.

JP6 is located on the top of the PCB, near the right DB-9 connector. It has 3 posts. If a jumper is installed on the left two posts, 5V will be sent to the GPS/Computer port to power a GPS, such as the Byonics GPS2. If a jumper is installed on the right two posts, the supply voltage (usually 12V) will be sent to the J2 port. If the jumper is left off, or just stored on a single post, no power will be sent to the J2 port. TinyTrak4 is normally shipped with the jumper installed on the left 2 posts, providing 5V to

J2. **Warning:** Sending 12V to a 5V GPS, such as the Byonics GPS2, will destroy the GPS. Having this jumper on either the 5V or the 12V setting will not effect or harm the connection to the computer.

Make the connections

Connecting all the above elements together is fairly simple. Connect the F-F Null Modem between the computer serial port and the TinyTrak4 J2 Male DB-9 connector, marked "GPS/Computer". Then connect the Radio/Power Interface cable to the TinyTrak4 J1 Female DB-9 connector, marked "Radio/Power". Connect the other ends of that cable to the radio mic and speaker/ear jack, and to the power supply.

Run Diagnostic Tests

This step is optional. A new TinyTrak4 usually comes with a diagnostic firmware installed, to test the hardware. When power is applied, you should be able to test the following:

- **LED Test** – The 4 LEDs on the TT4 should lighting, one at a time, from left to right, then right to left, and repeating.
- **Radio Test** – If the radio is on, it should be transmitting a rising siren tone that repeats every 1.5 seconds.
- **Serial Test** – If the computer is running a terminal program, such as Hyperterminal or TeraTerm Pro, and is set to the correct serial port, and to 19200 baud, the following should be seen with the last line continuously being sent:

```
?
Byonics TinyTrak4 Diagnostics v0.4b

Press S for serial tests.

PTT In:1 CD:1 Audio:49%-49%/48%-49% Batt:12.51V Temp:026A:75.62F JP1:52% JP2:44% JP3:38% JP4:36% JP5:99% =01
PTT In:1 CD:1 Audio:49%-49%/49%-49% Batt:12.54V Temp:026A:75.62F JP1:51% JP2:45% JP3:40% JP4:36% JP5:99% =01
```

This will show that serial output is working, and will also show the state of some of the inputs and sensors. Pressing s will enter the serial menu, and confirm serial input is working. Flow Control in the terminal program should be set OFF.

Choose the desired firmware

The TinyTrak4 has a firmware bootloader installed, so users can install firmware upgrades, and different firmware programs as needed. Since a new TinyTrak4 usually comes with a diagnostic firmware installed, the user will need to update the firmware to the desired functionality. Some of the possible firmware options are:

- **Alpha** – This is the latest and most featured firmware. It supports tracking, digipeating, telemetry, KISS and text computer connection, display and keyboard, and more. Byonics recommends the Alpha firmware, and this guide will instruct on how to setup the Alpha firmware. The Alpha firmware is configured with a terminal program and command line options.
- **Tracker** – This is an older tracking firmware. It does support telemetry and basic digipeating, but not a display, keyboard, or a computer connection. The Tracker firmware is configured with a Windows GUI Config program.
- **KISS TNC** – This firmware converts the TT4 to a full KISS TNC. It has more buffer space than the KISS support in the Alpha firmware

Firmware can be freely downloaded from the TinyTrak4 website, www.byonics.com/tinytrak4 . Firmware filenames end with a .TT4 extension

Install the firmware

There are two methods to install firmware files into a TinyTrak4. The easiest is the Windows based Firmware Loader program, available from the TinyTrak4 website, www.byonics.com/tinytrak4 . The other method is done with the TeraTerm Pro terminal program, and instructions can be found in the TinyTrak4 Firmware Manual. This guide will guide you through the first option. New firmware can be reloaded at any time. Note that previous settings may be lost when changing firmware code.

1. Download the firmware file you wish to install, such as `tt4_alpha_v054.TT4` and unpack it from the .ZIP file.
2. Connect the TinyTrak4 to the computer serial port through the F-F null modem, and close any terminal program that was in use on the port.
3. Download and start the firmware loading program `TinyTrak4 Firmware Loader.exe.`
4. Click the Select TT4 Firmware File button, and select the firmware file, such as `tt4_alpha_v054.TT4`, from the directory it was stored in.
5. Choose the COM port the TT4 is connected to from the pull down COM port list.
6. Click Update Firmware.
7. Remove power from the TT4 if powered, and then reconnect to the power supply.
8. A green progress bar should appear, and make steady progress towards completion.
9. After the firmware upload is complete, quit the firmware loader program, and cycle power on the TT4 to begin running the new code.

Configure the Alpha firmware

After loading the firmware, the next and final step is to configure the TinyTrak4 with your desired options. To do this, the TT4 should still be connected to the computer serial port via the F-F null modem adapter. Start a terminal program such as Hyperterminal or TeraTerm Pro, set for the proper COM port, set the baud rate to 19200 and turn off flow control. Then apply power to the TT4. In the terminal program, you should see:

```
?
Press ESC 3 times to enter TT4 Options Menu
```

When you see this, press the ESC key 3 times quickly within about one second, and you should see:

```
Byonics TinyTrak4 Alpha v0.54
Options Menu


:
```

at which point you are in the Alpha config menu, and you can configure the TinyTrak4. You can type text commands such as

- **HELP** – to display a list of all commands and descriptions
- **DISPLAY** – to display all currently set options
- **RESTORE** – to restore all settings to factory defaults
- **QUIT** – to quit the config menu, and allow the TT4 to start operating

Typing any command without a parameter will display its current setting. Refer to the Alpha Firmware Manual for details on all the commands. Simply disconnect the computer, and connect the GPS if needed, and cycle power to begin TT4 Alpha operation.

Setting Alpha audio levels

The TT4 needs to have the outgoing and incoming audio levels set to work with the particular radio you will be connecting to it.

To set the outgoing audio level, you will need a second radio to listen to your transmitted audio. Use the menu `CALIBRATE` command. This will cause the radio to transmit test audio. Press `B` to send both the high and low tones, and while listening on the receiver, press the `1` and `2` keys to adjust the transmit audio level. You should start the level high, and then bring it down until you hear a noticeable level drop on the receiver. You can also use the R1 pot on the TT4 PCB to adjust the transmit audio level.

To set the incoming audio level you will use the `MONITOR` and `RXAMP` command. The `MONITOR` command will cause the TT4 to display the received audio level to the terminal. Start with the radio volume at the center position, if connected to the speaker jack. While listening with a second receiver, notice the value displayed when a packet is received. The value should be between 50 and 80. If it is not, press any key to quite the `MONITOR` command, and use the `RXAMP` command to adjust the incoming audio gain, and then re-check the level with the `MONITOR` command.   If needed, adjust the radio volume, but be sure the volume is left in the position found suitable for the selected `RXAMP` setting.

Recommended Alpha configuration

Below are some recommendations for basic settings. These assume you begin with all parameters at their default settings (as set with the `RESTORE` command.)

Required initial configuration
- `MYCALL <your callsign>` – to setup your callsign, i.e.: `MYCALL N6BG-1`

Basic tracker configuration – GPS connected directly to the TT4
- `AMODE GPS` – to setup the TT4 port the GPS is connected on
- `ABAUD 4800` – to set the GPS baud rate
- `PPERIOD 120` – to set the position report rate to 2 minutes
- `DIGI1 WIDE1-1` – to set the first digipeater in your requested path
- `DIGI2 WIDE2-1` – to set the second digipeater in your requested path

Basic tracker configuration – GPS connected through the TT4 Serial Splitter cable
- `BMODE GPS` – to setup the TT4 port the GPS is connected on
- `BBAUD 4800` – to set the GPS baud rate
- `PPERIOD 120` – to set the position report rate to 2 minutes
- `DIGI1 WIDE1-1` – to set the first digipeater in your requested path
- `DIGI2 WIDE2-1` – to set the second digipeater in your requested path

Basic Digipeater configuration
- `ALIAS1 WIDE1` – to setup the Digipeater call to repeat

Basic telemetry configuration
- `TPERIOD 300` – to set the telemetry report rate to 5 minutes

Additional Resourses

Hopefully, this guide has helped to get you started using the Byonics TinyTrak4. If you need additional assistance, here are some resources:

- www.byonics.com/tinytrak4 – The TinyTrak4 website contains all Byonics TinyTrak4 documentation, firmware, and software available.
- groups.yahoo.com/group/tinytrak4 – This TinyTrak4 user mailing list is a great place to ask questions, and read how others are using the TinyTrak4. There are many experienced TinyTrak4 users here.
- www.vk7hse.hobby-site.org/wiki/index.php/Main_Page – Scott Evans' TinyTrak4 wiki is a resource all can use and add to for all things TinyTrak4 related.
- tinytrak@byonics.com – You can email any TinyTrak4 questions to Byonics.