

## [Back to Saber](#)

By Kelvin Helmick: N7XVB and Ron Parks: WB5DYG

### Introduction:

This project started out by trying to create a small lightweight APRS tracker for use on a bicycle. The secondary use was to have a portable APRS unit that could be moved from vehicle to vehicle without having to install a great deal of equipment.

In seeking a radio to be used for the project a commercial quality radio was desired due to durability and stability. Currently Motorola Saber radios have become cheaper and cheaper and in recent years has made them available at low cost to the average ham radio operator.

During the planning stages of this project, we located a vendor selling Saber 1E radios for a mere \$25 per radio without antennas or batteries. This revelation made the Saber the obvious choice for this project.

This article does not encompass the entire project, merely the interface between the radio and the TinyTrak3. There are currently three units being built and those are being well documented for a future article of the entire completed project(s).

The tracker chosen for this project was the TinyTrak3 because of it's flexibility and small size as well as it's power consumption. More information on the TinyTrak3 can be found at:

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

### Programming:

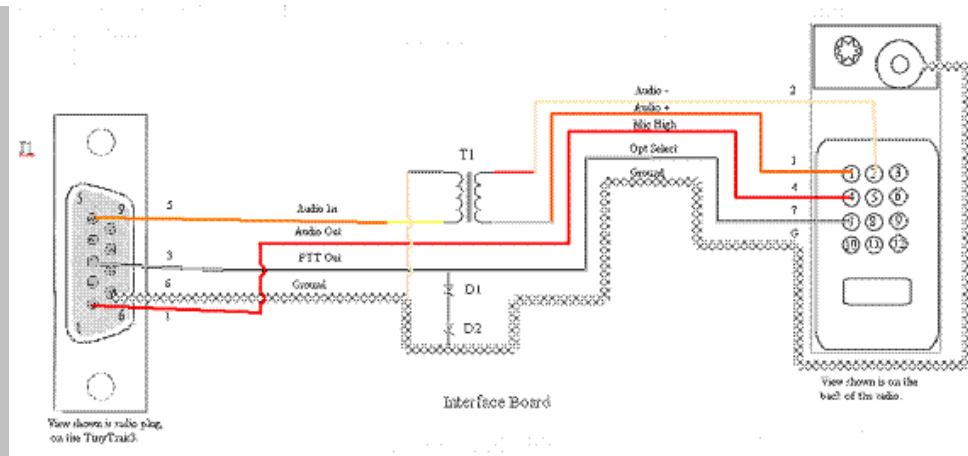
The first obstacle to overcome was making the Saber go 'out of band'. The off the shelf Saber does not want to go down to the 144.390 APRS simplex frequency. To accomplish this task required some manipulation of the programming software. An excellent article on how to accomplish this task can be found at:

[Hex Edit Saber RSS](#)

Once the programming was done and tested, the next step was to determine how to interface the TinyTrak3 board to the microphone or accessory connector on the back of the Saber radios. This article will detail how that was accomplished.

### Schematic:

The following schematic shows the wiring required to make the TinyTrak3 work with the Saber Radio, Click on it for a larger view:



The Saber needs to have two diodes in series between option select (pin 7) and ground to provide a voltage drop between the two connections. This will cause the programming in the Saber to recognize an external device.

Push to talk is accomplished by grounding pin 7 on the Saber. This however will only work when the two diodes are in place, so that the Saber is looking for a signal from an external device.

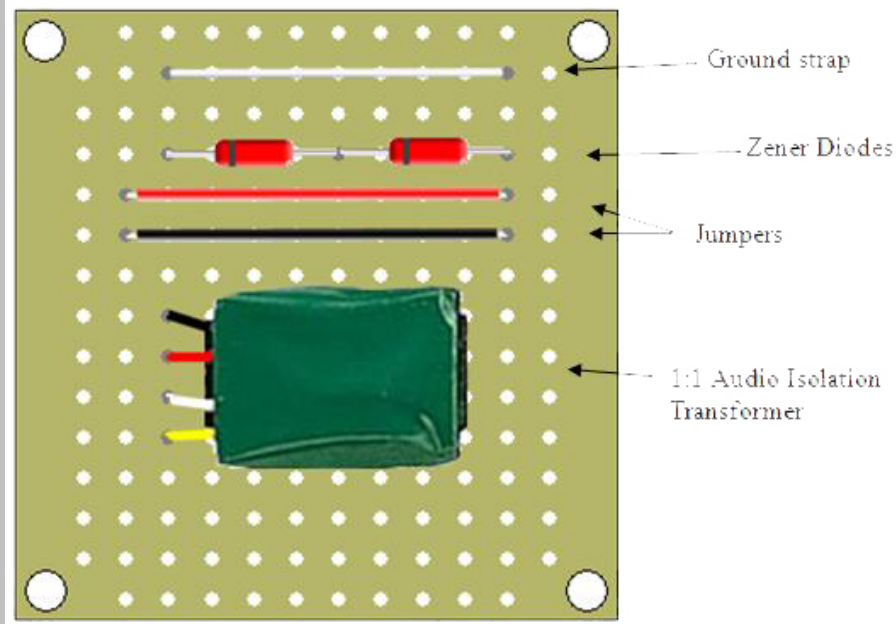
Mic High normally enters the Saber through pin 4, while audio high is on pin 1 and audio low is on pin 2. Both of the audio outputs on the Saber float and do not go to ground. Therefore a 1:1 audio isolation transformer is required to isolate audio low to ground.

For this project, zener diodes were used to provide the voltage drop between pin 7 and ground. Diodes 1N4733A from Radio Shack part #275-565 were used.

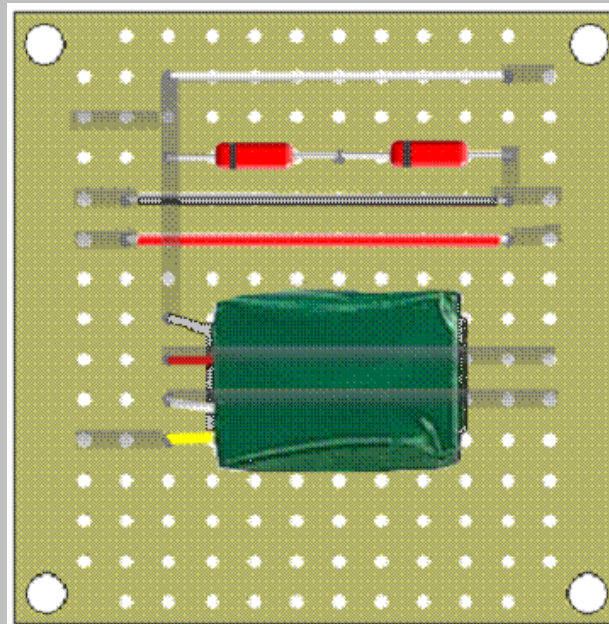
The audio isolation transformer used was a 1:1 transformer also from Radio Shack, part number 273-1374.

### Building the Interface Board:

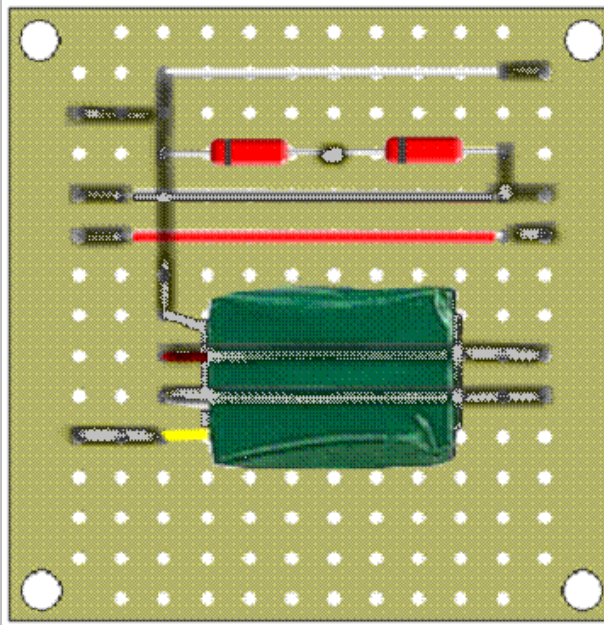
Because of the desire to keep the package as small as possible, a very small perf-board was used to build this project. The following is merely an illustration of the board. The circuit built was actually smaller, but for the purposes of this article have been made slightly larger.



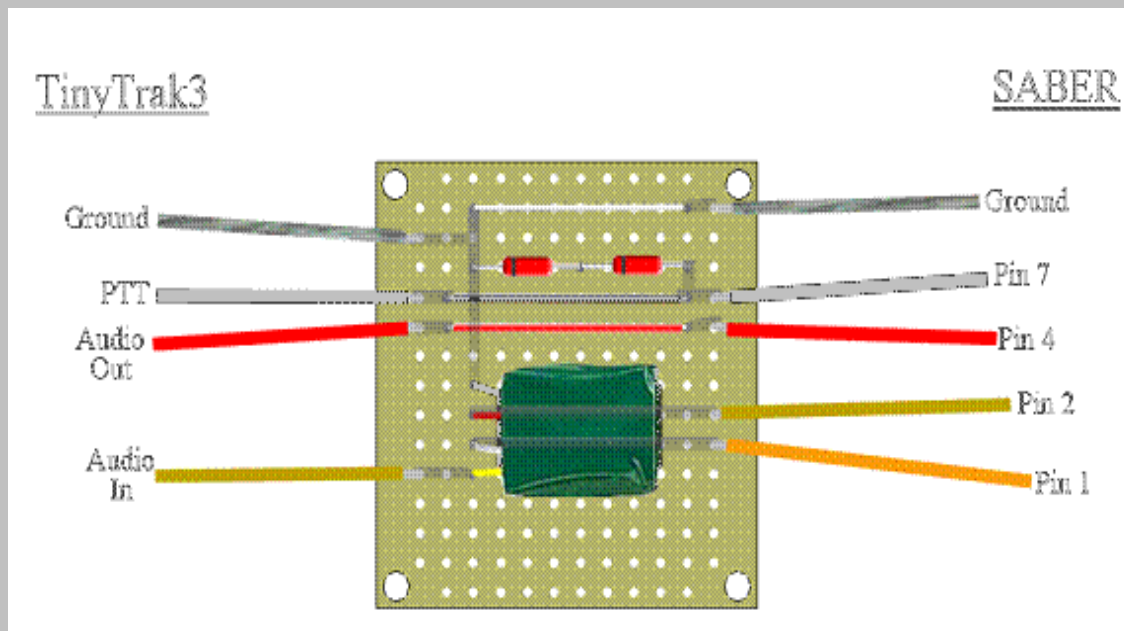
**A ground strap, a couple of jumpers, the diodes and the transformer were first mounted to the perf-board. Traces were then soldered to the bottom of the board.**



**In the diagram below, the traces have been darkened to better illustrate their path.**



Shielded computer mouse cable was used to make the connections from each component to the board. The wires indicated are the colors from that particular cable. This cable was chosen because of it's small lightweight and flexible.



To provide the connection to the Saber radio, a factory Motorola accessory plug was used.



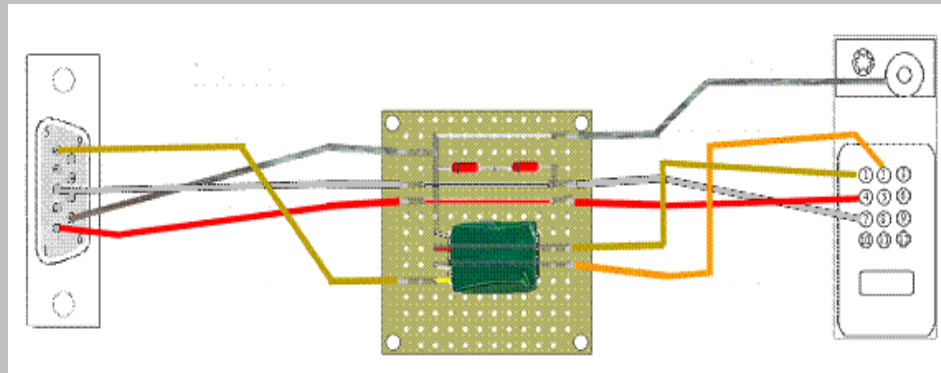
The factory accessory plug can be disassembled by removing the two screws from the unit and the rubber and plastic plate can be pulled from the housing. This will reveal a small circuit board inside the connector. This board can be cut away and discarded. The din connector on the top of the plug is threaded and can be unscrewed and discarded as well.

Trim the factory wires back from each of the individual connectors as close to the surface of the plug as possible. Then tin the surface of each pin, remembering that the pin is inserted in plastic. Keep the soldering time down to as little as possible.

Insert the mouse wire through the hole that previously held the din connector. Tin each of the wires to be used and solder on the correct pin. The tolerances inside this connector, particularly the lower pins is very tight, so make the soldered connections as flat as possible. Re-assemble the connector as it was disassembled.

A standard DB9 can be used for the interface to the TinyTrak3. Because of size constraints, on our project, we soldered directly to the TinyTrak3 board.

The diagram below illustrates the finished product:



Many thanks to Kelvin and Ron for doing the footwork and the write-up on this interface! They deserve all the credit on this one.

[Back to Saber](#)

*This site was last updated 01/25/10*