



Linear Lines

Trident Amateur Radio Club (TARC) Newsletter

August 2014

TARC Nets:

Every Tuesday, 147.27 MHz PL 123.0

- 7:30 PM CW practice
- 8:00 PM Net

Upcoming Events:

- Aug 13 Contest Club dinner
Contact: Mel W4MEL
- Aug 18 Club meeting and **ELECTIONS**
- Aug 20 License exam session
Contact: Dave AE4ZR
- Aug 21 Dinner gathering
Contact: Joe KJ4BNC
- Sep 1 Board meeting (all welcome)



Edge Of Space – We've always heard that space is Really Big, but now we've seen for ourselves. An intrepid team of TARC members and fellow enthusiasts sent a balloon into near space, tracked its location via APRS, and successfully recovered the payload. The onboard electronics captured great images all along the way.

Fun fact: From an altitude of 108,000 ft, the horizon is over 400 miles away. That 400-mile radius includes Birmingham, Orlando, Tallahassee, Knoxville, Richmond, and the "other Charleston" (WV). Check out the video and see if Cape Canaveral makes a cameo appearance. For more details about this and upcoming events, see the Club web page at www.TridentHams.org

From The President

Well, it's been two years now since I began serving as the club President. First, I am amazed at how fast the time has flown. It seems like only yesterday that we were trying to get some new things going. I think the club can be very proud of all the activities we have done in that time:

- We now have a vibrant two meter voice net again, and we have also established a CW practice net on Tuesday evenings.
- We have had several operating days where the members have had a chance to see and operate the club equipment in the trailer.
- Both Winter Field Day and the ARRL Field Day have been successful events that have established an excellent relationship with the City of Goose Creek, and have allowed members to operate on HF frequencies that are not normally available to them.
- We had two well-attended Tailgates.
- We have had several successful Fox hunts that have given many members experience in both building attenuators and antennas and in locating a RF signals with those antennas.
- We have participated in two MS walks.
- We have had several great picnics with fantastic food and great activities.
- We have established a monthly dinner meeting to allow members and their families an opportunity to gather in a non-ham atmosphere.
- We have a very active Facebook page and a revised web page.
- We have now held three Technician classes licensing over 25 new hams. We have held 24 VE testing sessions helping hundreds of hams either get their license or upgrade their licenses.

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- We have also established a builders group where many hams have constructed antennas and other ham related accessories while working with the latest technologies like Arduino and PIC. The builders group also maintains parts that local hams can purchase with no shipping or wait time and several pieces of equipment to loan to new hams to get on the air.
- And last but not least we have had two very successful balloon launches, putting payloads up to 108,000 ft and recovering them. This effort has brought the club national attention.

Tom Lufkin, W4DAX

Life is like a camera. Just focus on what's important and capture the good times, develop from the negatives and if things don't work out, TAKE ANOTHER SHOT.

From the VP Shack

I have been working on some Carolina Windom QRP antennas with some of the club members and non members. I'm currently working on a better Voltage Balun design to use with these antennas to make them more efficient at QRP levels. Watch this space for details.

73 Steve
KE4THX

"Amateur Radio Parity Act"

Good news on the H.R. 4969 front: Initial efforts to secure additional co-sponsors for "The Amateur Radio Parity Act of 2014" [H.R. 4969] are starting to produce results. As of this month, 17 co-sponsors had signed onto the bill. Additional co-sponsors are anticipated. H.R. 4969 would call on the FCC to apply "reasonable accommodation" to neighborhood covenants and other private land-use restrictions regarding antennas.

Your support is still needed. For details, see this page: <http://www.arrl.org/hr-4969>

From Your Treasurer

The August meeting is almost here, and with that we will be having **elections** for new club officers. Anyone who wants to run for an office can still run as a write-in candidate, so don't be bashful. Our last **balloon launch** was a success and much was learned for the next one. Balloon launches are a lot of fun, so find a team to join and get into some fun also. **Dues** for our club are due now. The new year starts in September so See Ron with your money. The **radio giveaway** continues to generate excitement and participation. Speaking of excitement, this club has many great opportunities to enjoy ham radio. You just have to find what you like best and support the club in that venue. If you are interested in something that we are not doing, let us know, and if we can generate enough support we can and will do it. For example, I have never used a satellite to work another station. I have not worked any DX on 432. There are many things in ham radio I have yet to do and I can't wait to try something new.

The **Shelby Hamfest** is coming up over Labor day weekend, and I encourage everyone to attend if at all possible. It's your chance to attend the largest hamfest in our local area. There are loads and loads of vendors and a flea market that will exhaust you trying to see it all.

Hoping to see everyone at the meeting...
Bob NG4R

Last, but not least, AUGUST BIRTHDAYS!

- Tom Glaab AJ4UQ
- Velma Merritts
- Wayne Norris KK4VJG
- Linda Selleck KL4EVV
- Jason Stroud KK4WBT
- David Walden KK4TLR

Happy Birthday, All!

Want to see something in Linear Lines?

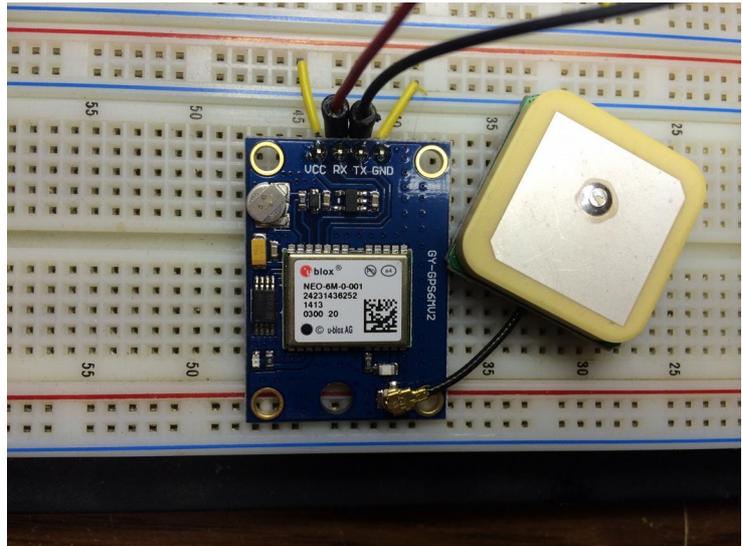
If there's something you want to see in Linear Lines, please send it to Robert KV4LV <kv4lv@arrl.net> by the second Monday of the month.

Build this.....

Connecting a GPS module to your Arduino

By Ron Davis – K4TCP
8/10/2014

This is a NEO 6M GPS module from Ublox. Let's connect it to an Arduino and see if we can read GPS data! This is the same module that is connected to the Zlog-7 High Altitude Balloon data logger that TARC sent into near space last month. This module is reliable and very easy to use. Cost for this module including the "puck" antenna was about \$15 on eBay.



The Arduino we are connecting it to is the Arduino ProMini. It has an extremely small foot print, 33mm X 18mm. The ProMini has the same Atmega 328 microcontroller in it as the Arduino Uno, runs at the same speed (16MHZ) and exposes the same pinouts that the Uno does. The only real difference is the FTDI serial controller is not on board. We don't need the serial controller except when we want to program the ProMini. Any FTDI board can be used for this. I bought a pack of 5 ProMinis for \$28 on ebay and got a free FTDI serial controller board. Bonus!

So why are we doing this? This is a great way to learn about GPS and Arduinos at the same time.

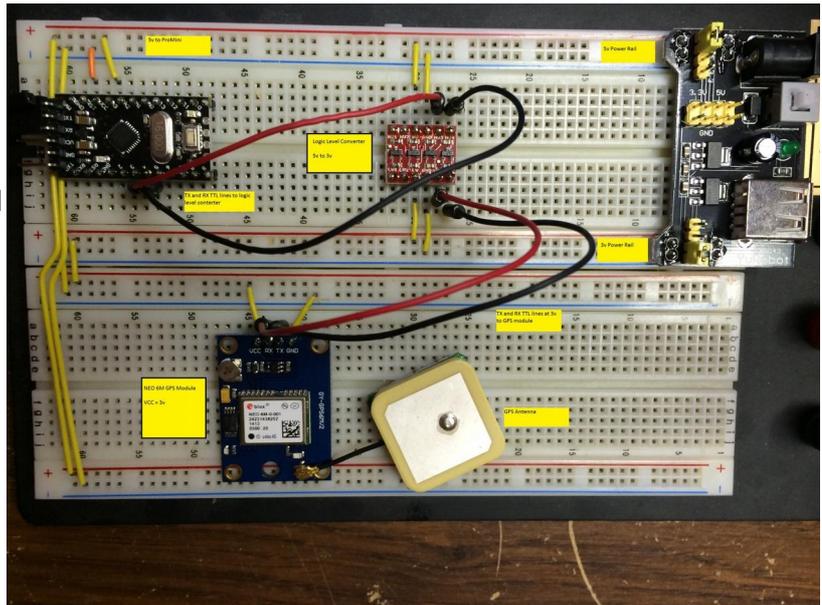
Parts needed:

- 1 – Arduino Uno or Pro Mini 5v version was used in this article.
- 1 – Ublox NEO-6M GPS module with ceramic antenna (3v version).
- 1 – 3v to 5v bi-directional Logic level converter (sparkfun part # BOB-12009)
- 1 – Breadboard
- 1 – Breadboard power supply – Dual voltage 3V and 5V
- Misc hook up wires
- FTDI serial board to connect to computer for uploading sketch to ProMini

Note: If you are using the Arduino Uno you can eliminate the breadboard dual power supply and the FTDI board. I used the ProMini because I plan on using this circuit as the base of my APRS GPS tracking device. In my prototype I will use the ProMini running at 5v so that the processor can run at 16MHZ. The other devices in my prototype will run at 3V, ie. GPS module, Log file recorder. More on the APRS GPS tracker in a later article.

Here is the layout:

In this setup the GPS TX and RX lines require TTL levels of 3v so they are routed thru the Logic Level converter which converts them between 3v and 5v. The TX and RX lines are connected to pins 3 and 4 of the ProMini. GPS RX is connected to ProMini pin 3 and GPS TX is connected to ProMini pin 4. These pins are somewhat arbitrary as you will see in the Sketch. The hardware TX and RX lines of the Arduino are not used to connect to the GPS module because they are used for serial communications with the PC. The GPS data is sent to the PC for display in the serial monitor screen within the Arduino IDE. How is the Arduino able to do this when it only has one hardware serial port? We implement a software serial port on pins 3 and 4 within the sketch; this leaves the hardware port free so we can use it for diagnostics.



So a few things to note, the NEO 6M GPS module by default communicates at 9600 baud. Keep that in mind because the library we are going to use assumes the GPS module communicates at 4800 Baud. We will make that change to the library. So if you are following along and have wired up the GPS module like above you are now ready to write the sketch.

We will be using a popular GPS library for the Arduino called Tiny GPS+ Written by Mikal Hart.

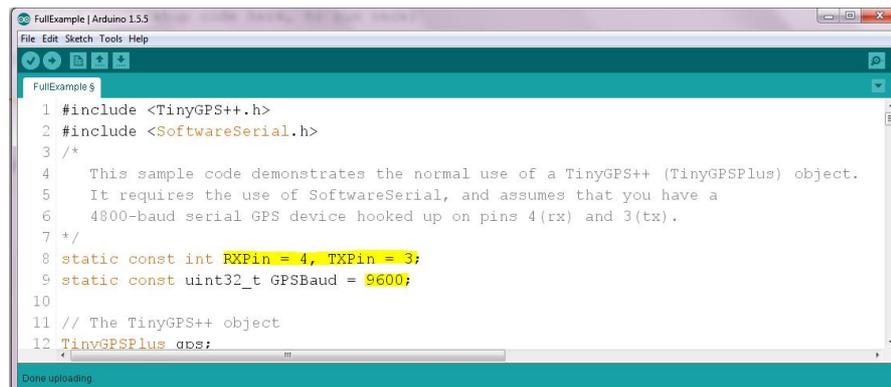
Download the library from this link: <http://arduiniiana.org/libraries/tinygpsplus/> Follow the instructions on the web page on installing the library. Like most other libraries you unzip or uncompress them into the Arduino Libraries folder on the hard drive then restart the Arduino IDE.

Once the library is installed, launch the Arduino IDE, click on **file|Examples|TinyGPS Plus|FullExample**

This will open the example sketch. Make the following changes highlighted below. Do you recall we were using a software serial port? The code for this is included at the beginning of the sketch with the line:

```
#include <SoftwareSerial.h>
```

Line 8 of this sketch shows where the software serial RX and TX lines are defined. This is Pin 3 and 4. The TX line of the GPS module is connected to the RX line of the ProMini which is defined as Pin 4. The RX line of the GPS module is connected to the TX line of the ProMini which is defined as pin 3.



Be sure to change the baud rate from 4800 to 9600. Compile and upload the sketch. Follow the directions of connecting the FTDI controller to the ProMini or if you are using the Uno just plug in your USB cable.

After compiling the code allow the GPS module to sit for 60 – 90 seconds to get a fix on the satellites. There should be a green blinking LED on the GPS module indicating a 1hz pulse and valid fix.

Open the serial monitor in your Arduino IDE and you should see this:

```

FullExample.ino
An extensive example of many interesting TinyGPS++ features
Testing TinyGPS++ library v. 0.92
by Mikal Hart

Sats HDOP Latitude Longitude Fix Date Time Date Alt Course Speed Card Distance Course Card Chars Sentences Check
(deg) (deg) Age Age (m) --- from GPS --- to London --- RX RX Fail
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9 98 32.990123 -80.004524 271 08/10/2014 22:37:16 444 6.60 0.00 0.19 N 6540 45.75 NE 228 0 1
9 98 32.990123 -80.004524 286 08/10/2014 22:37:17 457 6.50 0.00 0.09 N 6540 45.75 NE 688 2 6
9 98 32.990123 -80.004524 294 08/10/2014 22:37:18 467 6.50 0.00 0.07 N 6540 45.75 NE 1147 4 11
9 98 32.990119 -80.004524 301 08/10/2014 22:37:19 472 6.50 0.00 0.07 N 6540 45.75 NE 1605 6 17
9 98 32.990119 -80.004516 310 08/10/2014 22:37:20 483 6.50 0.00 0.06 N 6540 45.75 NE 2065 8 23
9 98 32.990119 -80.004516 321 08/10/2014 22:37:21 494 6.60 0.00 0.04 N 6540 45.75 NE 2524 10 29
9 98 32.990119 -80.004516 330 08/10/2014 22:37:22 503 6.70 0.00 0.07 N 6540 45.75 NE 2984 12 35
9 98 32.990119 -80.004516 339 08/10/2014 22:37:23 510 6.70 0.00 0.15 N 6540 45.75 NE 3445 14 41
9 98 32.990119 -80.004516 347 08/10/2014 22:37:24 519 6.70 0.00 0.15 N 6540 45.75 NE 3906 16 46
9 98 32.990116 -80.004516 354 08/10/2014 22:37:25 527 6.60 0.00 0.11 N 6540 45.75 NE 4366 18 51
9 98 32.990116 -80.004516 364 08/10/2014 22:37:26 537 6.60 0.00 0.02 N 6540 45.75 NE 4826 20 55
9 98 32.990116 -80.004516 371 08/10/2014 22:37:27 544 6.60 0.00 0.11 N 6540 45.75 NE 5287 22 59
9 98 32.990116 -80.004516 378 08/10/2014 22:37:28 550 6.50 0.00 0.19 N 6540 45.75 NE 5747 24 63
9 98 32.990116 -80.004516 388 08/10/2014 22:37:29 560 6.50 0.00 0.17 N 6540 45.75 NE 6206 26 68
9 98 32.990116 -80.004516 398 08/10/2014 22:37:30 571 6.40 0.00 0.06 N 6540 45.75 NE 6666 28 74
9 98 32.990116 -80.004516 404 08/10/2014 22:37:31 578 6.30 0.00 0.09 N 6540 45.75 NE 7126 30 80
9 98 32.990116 -80.004516 411 08/10/2014 22:37:32 585 6.20 0.00 0.11 N 6540 45.75 NE 7586 32 84
9 98 32.990116 -80.004516 414 08/10/2014 22:37:33 584 6.10 0.00 0.09 N 6540 45.75 NE 8045 34 90
9 98 32.990116 -80.004516 411 08/10/2014 22:37:33 584 6.10 0.00 0.09 N 6540 45.75 NE 8505 36 96
9 98 32.990112 -80.004516 430 08/10/2014 22:37:34 603 6.10 0.00 0.04 N 6540 45.75 NE 8965 38 101

```

The FullExample Sketch will output the above data continuously. Also note the Sketch computes the distance, course and compass (cardinal) from your current location to London. This is just an example of adding a waypoint and you can program in any point you like.

Here are some more pics of the circuit:

