

Build Instructions for the GKnet Kit v2

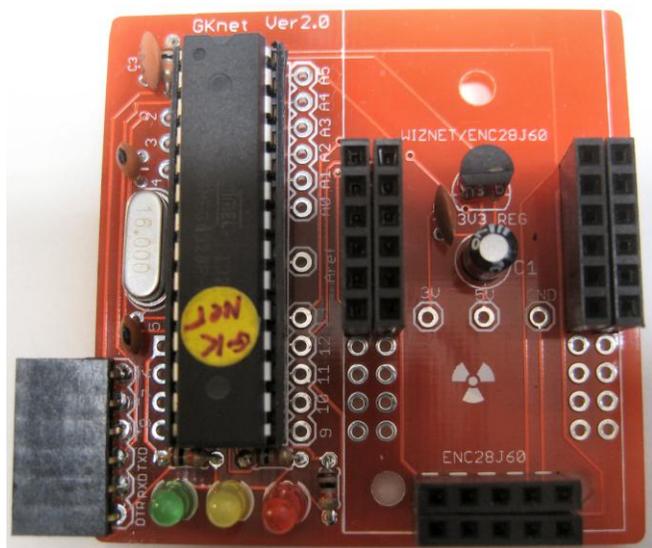
Step 1 - Building the Kit:

Use the table below as your guide to building the kit. Its approach is to build the board by height – starting with the shortest components. It's easier to work on a board that lays flat and holds the parts in place when you flip it over to solder. **While working, refer to images to double check orientations of parts, etc.**

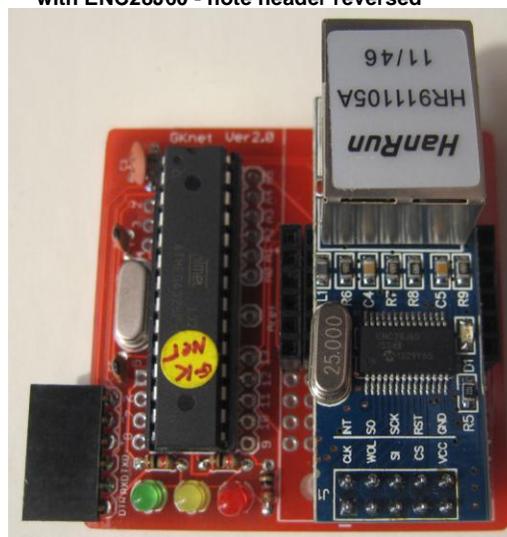
Build Sequence and Parts List					
Ref #	Qty	Value	Description	Notes	polarized? ->
PCB	1		1.95" x 1.95" (~5 x 5 cm)	Orientation: "Geiger Kit Network Board" is top of board.	N
R1	1	10kΩ	BN,BK,OR	Be sure last band is orange – not red	N
R2, R3, R4	3	1kΩ	BN,BK, RD	Be sure last band is red – not orange	N
header	1	6 pin fem.	serial connector	Before soldering the serial connector, bend over to 90° so it lays flat.	N
OSC	1	16MHz	crystal		N
C4, C5	2	22pF	#220 / #22 ceramic cap		N
socket	1	28 pin	IC socket	notch up	Y
LEDs	3	GRN, YEL, RED	3mm	Green on the left, yellow middle and red right. polarity: Small flat on side, or shorter lead , goes down.	Y
C2, C3	2	.1uF	#104 ceramic capacitor	(C2 is unmarked - near REG and C1)	N
REG	1	L4931CZ33-AP	3.3V / 250mA LDO regulator	Reform leads as necessary.	Y
C1	1	4.7uF	50V electrolytic capacitor	polarity: "-" stripe towards top.	Y
headers	4	6 pin fem.	WIZnet connector	Solder the headers for the WIZnet in the top set of holes on each side leaving a set of 4 rows empty towards the bottom as shown in the image below. (Headers for the unused I/O pins on the Atmega328P not supplied.)	N
headers	2	5 pin fem.	ENC28J60 connector	Solder on bottom right of board - optional if ENC28J60 not used.	N
header	1	2x5 male	for ENC28J60	If using ENC28J60 if the pins are facing up on the module, you must remove the header and solder on this header so the pins are facing down. See the note below.	N
IC3	1	ATmega328P	AVR microcontroller	Bend all pins inward a bit on a flat surface. polarity: Notch up	Y

Assembly Images:

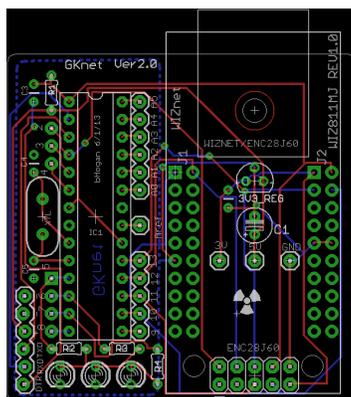
Completed board



with ENC28J60 - note header reversed



PCB layout . . .



For the ENC28J60: To remove the header that comes with it, you might try cutting the plastic between the pins with a wire cutter and removing the pins one at a time. Then remove the solder from the holes and solder the included male header in from the other side.

Step 2 – Create Accounts:

The software supports connecting to the three sites listed below. With the WIZnet module, it is possible to connect and send readings to *all three* of these sites simultaneously with each update cycle. Using the ENC28J60 module, the software may only support some combinations of these sites. Use the steps below to create accounts for the sites you will be connecting to.

For Radmon.org:

- Open an account with Radmon.org - [here](#). Note the **Username** and **Password** you choose.
- You may also wish to download RadLog program for the PC. It's not required for directly connecting but it has some handy features. It's in the "Downloads" section of the Radmon.org site.

For Xively:

- Open an account with Xively - [open a free personal account here](#).
- After you create the account, click the **DEVELOP** tab and click **Add Device**.
- Give it a name and description and decide if you want your "feed" to be public or private. (You can change it later, but I saw no harm in "going public".)
- Click **Add Device** and a new screen will come up. On the right side under **API Keys** you will see the **Feed ID** (~10 digits), and beneath it, a big character string called a **Device Key**. There are lots of other big strings on that page, but these are all you need. Bookmark this page.

For data.sparkfun.com:

- Create a free datastream - [here](#). During this process you will list the **Field Types** that you want. In order to use the sketch "as is" you must use the same Field Types that the sketch is providing data for. These are:
CPM, Dose, Vcc, MaxCPM (case sensitive)
NOTE: v6.7 of phant converts field names to all lowercase when creating a new account. When phant v7.0 comes out it will convert transmitted mixed case field names to lower case. If you are creating an account with phant v6.7, you must change the field names in the sketch to all lowercase. The 4 lines to change are commented in the sendToPhant() section of the current sketch. v7.0+ of phant is expected to work with the field names currently provided in the sketch.
- You will be given a set of keys - a public key, a private key, and a delete key. You will also be provided with the URL for your feed. (It contains the public key.) You have the option of emailing this info to yourself which is suggested.
- You will use the public key and private key in setting up your sketch. You can use your delete key to remove a datastream by going to [this page](#).
- You may find the CSV export to be a handy feature.

Step 3 – Program the ATmega328:

- Get the latest sketch from the bottom of the [GKnet page](#). These instructions assume you are using v4.0 or above.
- To select either the WIZnet or ENC28J60 Ethernet module comment out the other line at the beginning of the sketch . . .

```
#include <Ethernet.h>           // Use this if WIZnet ethernet module
//#include <UIPEthernet.h>      // Use this if ENC28J60 ethernet module
```

If you are going to use the ENC28J60 you need the [UIPEthernet](#) library. Unzip it and add it to your library folder under your sketchbook. It's also in the Geiger Kit Library package on the [Software page](#).
- The next 3 #defines (SEND_TO_RADMON, etc.) determine what site or sites you are going to send to. If you are using the WIZnet you can pick all 3. With the ENC28J60 you can likely pick only 2. Then set the credentials for the sites selected . . .
- **For Xively:**
 - At the beginning of the sketch you will see a line that looks like this:

```
#define FEED_ID      ?????? // FEED ID FROM XIVELY - ABOUT 9-10 DIGITS
```

Replace the question marks with the **Feed ID** you got from Xively
 - Right below that, you will see a line that looks like this:

```
char xivelyKey[] = "??????"; // BIG STRING GOES HERE
```

Replace the question marks with the **Device Key** you got from Xively. Be sure to keep quotes.
- **For radmon.org:**
 - At the beginning of the sketch you will see two lines that look like this:

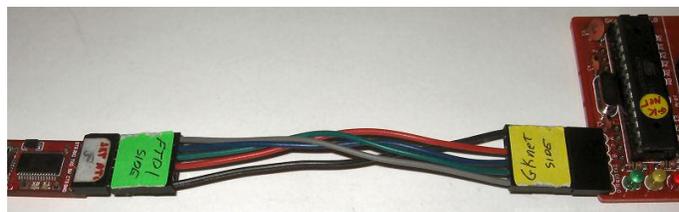
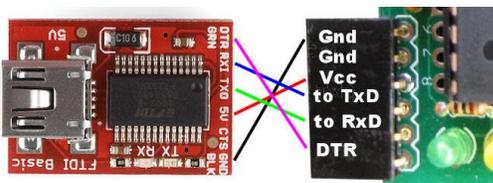
```
char UserName[] = "??????";
char PassWord[] = "??????";
```

Replace the question marks with your username and password. *Note: username is case sensitive.*
- **For data.sparkfun.com:**
 - At the beginning of the sketch you will see two lines that look like this:

```
const String publicKey = "?????";
const String privateKey = "?????";
```
 - Replace the question marks with your public key and private key.
- There are 5 additional #defines.
 - STATIC_IP should be used only if needed as it consumes more memory. If used, enter your IP in the **IPAddress** field. You can get your IP by setting DEBUG to true.
 - TEST_COUNTS is intended to be used when you have the GKnet board connected directly to your FTDI - without the Geiger kit. To do this you need to make the "crossover cable" described below.
 - TEST_POST_PERIOD determines how often to send the TEST_COUNTS.
 - MAX_CPM_PERIOD is the period (beginning at startup) when the max CPM is reset for the next period.
 - Since DEBUG outputs to serial, it must be used when the GKnet board is connected directly to your FTDI.
- Upload the sketch to the ATmega328 on the GKnet board. Note that the serial connector on the board is made to plug into the FTDI port on the Geiger kit, and the Tx and Rx lines are crossed as well. Therefore it does not directly mate with your FTDI board.

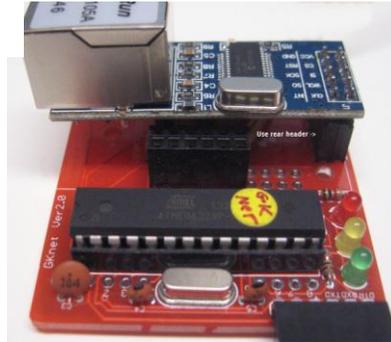
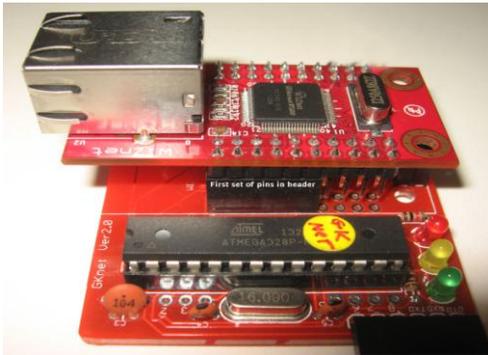
The easiest thing to do is to use the Geiger kit to program the chip, and then move it to the GKnet board.

Or you can make a "crossover cable" to connect the wires from your FTDI board directly to the GKnet board. This will allow you to quickly reprogram and test your board with less plugging and unplugging. See below.



Step 4 – Connecting everything:

- If you need to get a WIZnet W5100 Network Module, I recommend [this one from Sparkfun](#).
- Plug in the WIZnet W5100 or ENC28J60 as shown below. **Be sure to plug the WIZnet board in correctly** - the first 6 rows of pins nearest the Ethernet jack plug into the header. See Appendix II if you are using the WIZ550io.



- Connect GKnet board to the FTDI port on the Geiger kit. should look like this (with WIZnet) . . .



- Connect an Ethernet cable from the WIZnet board to your home network.

Step 5 – Power Up:

The GKnet board gets its 5V power from the Geiger Kit and makes the 3.3V needed for the Ethernet module.

Please note: The GK-B5 with the GKnet uses ~165mA. Prior to v5.4 of the PCB, the GK-B5 used a 78L05 voltage regulator rated at 100mA. (The v5.4 board and above, as well as the GK-Plus, now use a L493150 LDO regulator with 240mA max.) You may not experience a problem using the 78L05, but it's best to avoid it. The easiest way is to run the kit from the 4 pin user power block at 5V or short the REG_JMP and use the screw terminals. In both cases, be sure to use 5V charging adaptor. You can also replace the 78L05 with a 7805 or similar. In that case you should use a 6V or 9V charging adaptor if the regulator is not a low drop out type. The 3.3V regulator on the GKnet boards currently shipping can provide up to 240mA for the Ethernet module.

- Power up the Geiger kit and GKnet.
- On the Geiger kit, go into the setup menu and set the LOGGING PERIOD for the period that you want to send data at. For radmon.org no less than 30 seconds is recommended.
- **On the GK-B5**, make sure you have the “USE RADLOGGER” option turned off.
On the GK-Plus, set the SERIAL OUTPUT MODE to the “GK-B5” option.

Step 6 – You should see:

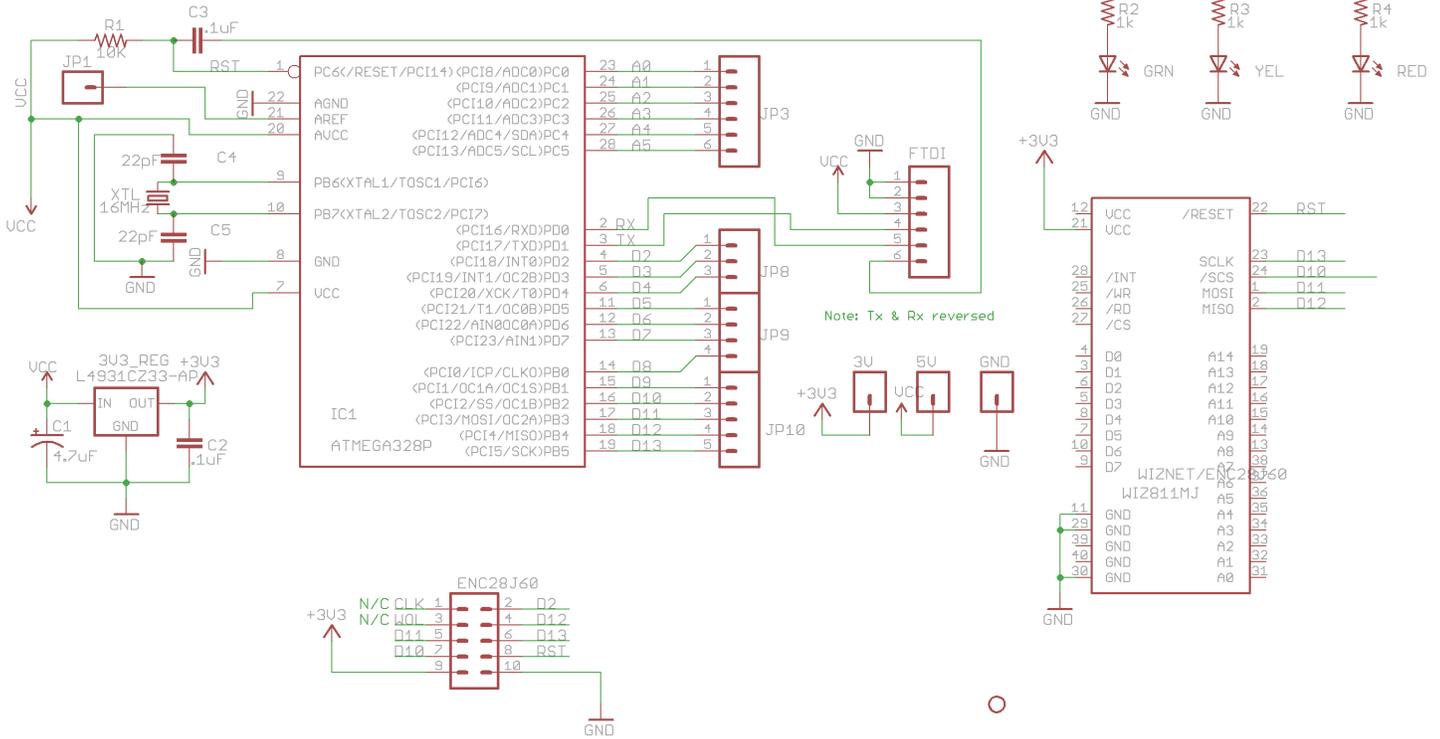
- When you first power up the red and green led should light for a second and then turn off when you get a network connection.
- The yellow will light for several seconds until the Geiger kit sends its data to the GKnet board.
- The green led will flash when data is sent to internet.
- The yellow led will flash when data is being sent to the GKnet board.
- You should see your data on the sites you are connected to.

Enjoy the kit!

Appendix I - Schematic:

Geiger Kit WIZnet Interface - v2.0

<https://sites.google.com/site/diygeigercounter/home>



Appendix II - Wiring Diagram for WIZ550io:

Please note I have not personally tested the WIZ550io with GKnet, however I have used it with the GKnet board for another project which worked fine. Also note that the WIZ550io requires a different version of the Ethernet library - which can be found [here](#). So you are more on your own if you use the WIZ550io.

It is not possible to support the WIZ550io along with the other two Ethernet modules by using the existing headers. Therefore it must be wired to various points on the GKnet board. The diagram below shows these connections. The colored boxes are alternate connections that you can use.

