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# u-Blox_NEO-6-7

Warren, 9V1TD, alerted the Softock group of these modules.   "Frequency agile GPS reference for less than $30" This page is a compilation of information from this discussion.
A configurable, 0.25Hz to 10MHz GPS referenced generator. Yes, the picture below shows all you need!  Note this is NOT a GPSDO, a NCO is used. The output is accurate, ideal for a frequency reference. But the basic signal is not clean enough for a receiver local oscillator.
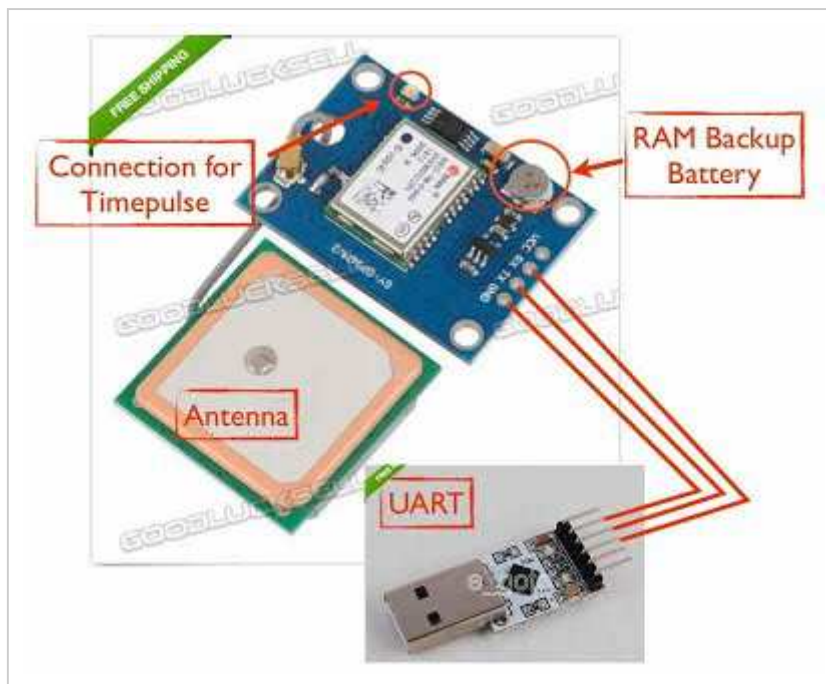


A picture from an Ebay supplier (goodlucksell). Click on it for a larger picture in a new window.

Ignore the red "wires" on the picture. Four connections:-
The 3V3 on the UART can go to VCC on the NEO-7. My NEO-7 has a regulator but it is low drop-out (Mine drops 0V1 with 3V3 input)  Provided you are certain your GPS module does have a regulator the 5V from the UART can be used.
Gnd connect together.
RXD to TXD twice. (Transmit to receive on each.) Look at Dick's picture further down this page.

WARNING Ensure the UART has a CP2102 chip. This is a 3V3 device but other UARTs may not be.

For some time the u-Blox modules have had an option to configure the pulse output.
Usually 1 PPS but the series 5 may be configured at 0.25-999Hz. The series 6T (only) and 7 0.25Hz-10MHz. So the series 6T and 7 may output any frequency up to 10MHz with GPS precision. There is likely to be a lot of jitter, a PLL will be required for use as anything other than an accurate frequency reference.

Ebay is a source of modules this is one supplier
http://www.ebay.co.uk/itm/301199083821?
_trksid=p2059210.m2749.l2649&ssPageName=STRK%3AMEBIDX%3AIT But a search will find them cheaper..

Note the UART http://www.ebay.com/itm/ws-/281348295125? This cheap USB adaptor is also available from several sellers. It will act as a cheap, simple interface for many GPS modules even supplying 3V3 or 5V to power them. In fact my ones ( http://www.ebay.co.uk/itm/400565980256?
_trksid=p2059210.m2749.l2649&ssPageName=STRK%3AMEBIDX%3AIT )
have all COM port connections available, they are full USB to serial TTL adaptors.

The SiLabs CP2102 is used in these modules. The data sheet and drivers (If Windows does not install them) may be obtained from their web site. http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.asp

After installing the u-Blox software and starting, checking configuration, the window fills with information charts.
Drag them out to view. Other information windows in "View".
If the GPS module is not locked then it will output NMEA sentences which may be seen.  "View" - Text Console.

You may find that sometimes the GPS stream is interpreted to be a serial mouse by Windows plug and play. The cursor jumps about uncontrollably. Try disconnecting the GPS from the UART while the "serial mouse" is active. Do not unplug the UART. Disable the serial mouse in Device Manager.

First setup:-
"Receiver" - Port  - If in doubt he  UART port may bee seen in "Device Manager".
"Receiver" - Baud Rate  - The default seems to be 9600
"Receiver" - Generation - NEO-7

The time pulse is set, "View" - Configuration - TP and after setting the figures - Send. (Picture at bottom of page.)

Milt:- In the Configuration tab "**Save current configuration**" with 0-BBR and 1-FLASH highlighted - save.
And, as Warren says "Receiver - Action - **Save config**" does the same.
Use "Revert to default" to start again.
All this, and much more, is in the documentation.

The default is no O/P if not locked.

The pulse take-off. A BIG enlargement! The wire is 38 gauge, the resistor 2mm. This looks really challenging but I achieved this first time with the edge of a hot bit. A touch of solder, then a quick dab soldered the ready-tinned wire. Softrock training helps:)

The print around the 2.5mm hole is not connected to anything and forms a suitable connection point. Later I scraped the paint from the ground plane next to the hole for a connection to the shield of the output cable.

For simple RX calibration the signal most likely may be picked up without any modification, just a wire close to the module.

The pulse output LED continues to work showing a constant light at higher frequencies.

My UART has 3 LEDs, USB power, RX data -flashes when receiving data from the GPS, TX data  - flashes when you command the GPS.
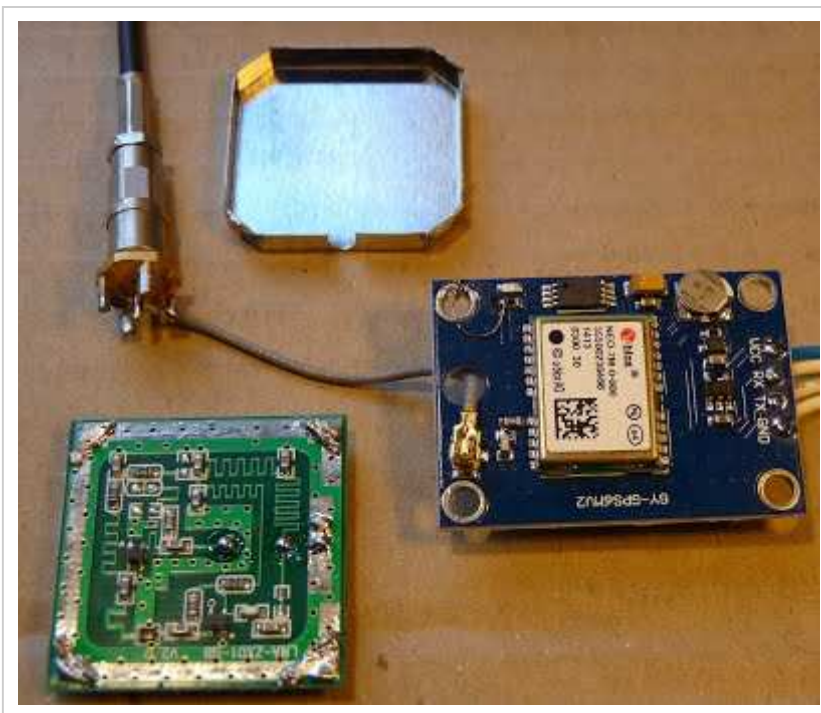
Click on this picture for full-size in a new window.
Reception on my bench was not possible.
I removed the cover from the antenna, it has an amplifier. I unsoldered the coax and connected it to a plug for an external powered antenna.
I think that the coax could probably be extended and the original antenna fixed in a suitable, sheltered position.
**Note:- My module supplies the 3V3 for an active antenna, other modules MAY need a modification.**
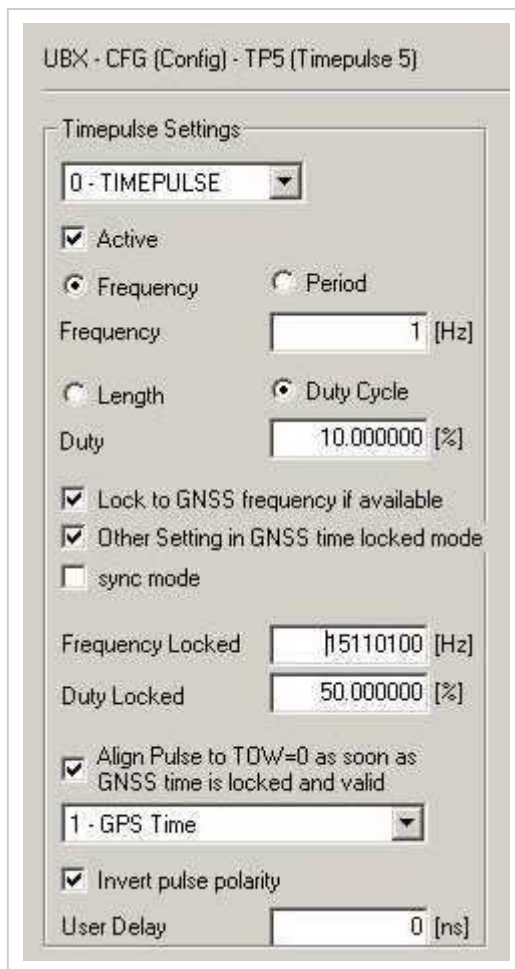
### Graham, VE3GTC  tells us how to do it properly:-
"The little connector on the GPS boards into which that wee tiny coax plugs is a U.fl or U.FL or u.FL (whatever you prefer) connector, one of the Ultra Miniature Coax Connectors (UMCC) and is the abbreviation used by the maker Hirose of Japan, also referred to as an IPX or IPEX connector by some.

The coax used is RG178 (teflon and not RG174 or RG316 which is twice the size or RG178) or 1.13 cable (not teflon). A quick search of eBay will find plenty of pigtail adapters U.FL to SMA, or BNC, or Type N, or TNC, or type F, or (whatever).  Be careful with SMA connectors, there are two types, the normal regularones and the RP ones. RP stands for reverse polarity and swaps the male for the female end and vice versa. RP connectors do not work with non-RP connectors.

A six or twelve inch U.FL to SMA connector will let you easily connect your board to an remote GPS antenna which you may already have or may wish to purchase so that you can place your antenna in a nearby window while you experiment with the GPS board on your workbench."

Note:- this module labelled GY-NEO6MV2 was originally fitted with a NEO-6M.

```
UBX - CFG (Config) - TP5 (Timepulse 5)

Timepulse Settings
[ 0 - TIMEPULSE          ▼]
☑ Active
  ● Frequency      ○ Period
Frequency                    1 [Hz]
  ○ Length       ● Duty Cycle
Duty              10.000000 [%]

☑ Lock to GNSS frequency if available
☑ Other Setting in GNSS time locked mode
☐ sync mode

Frequency Locked    15110100 [Hz]
Duty Locked         50.000000 [%]

☑ Align Pulse to TOW=0 as soon as
  GNSS time is locked and valid
[ 1 - GPS Time                      ▼]

☑ Invert pulse polarity
User Delay                   0 [ns]
```

Picture:- The Timepulse configuration setting. Note the ticks against Frequency and Duty Cycle make it easy. With settings like this saved the module will start with 1 PPS pulses, then when locked, go to the preset frequency. The NEO-7 I tested seemed to give a stable (disregarding jitter!) output up to 15MHz but only 10MHz is specified.
My NEO-5 worked a little above the specified 999Hz.
The minimum step is 1Hz.

The exact frequency setting is useful for calibrating a frequency counter. Mine, with 8 digits is difficult at 10MHz, switching from 0.1Hz to 1Hz resolution. Setting the u-Blox to 9999999Hzmakes it easy to set to 0.1Hz. (After a year or more the Isotemp OCXO was 0.2Hz in error.)

For receiver calibration harmonics will be easily detected, Warren says up to GHz. But I have found that care is required when using harmonics, many signals may be seen from the u-Blox output, the required harmonic may not be the strongest!

A use I might consider is to discipline a receiver's reference oscillator. A PLL will be required.
The basic module just requires 30mA at 3V3.

**Module Schematic From Dick, K9IVB. Includes UART connections**
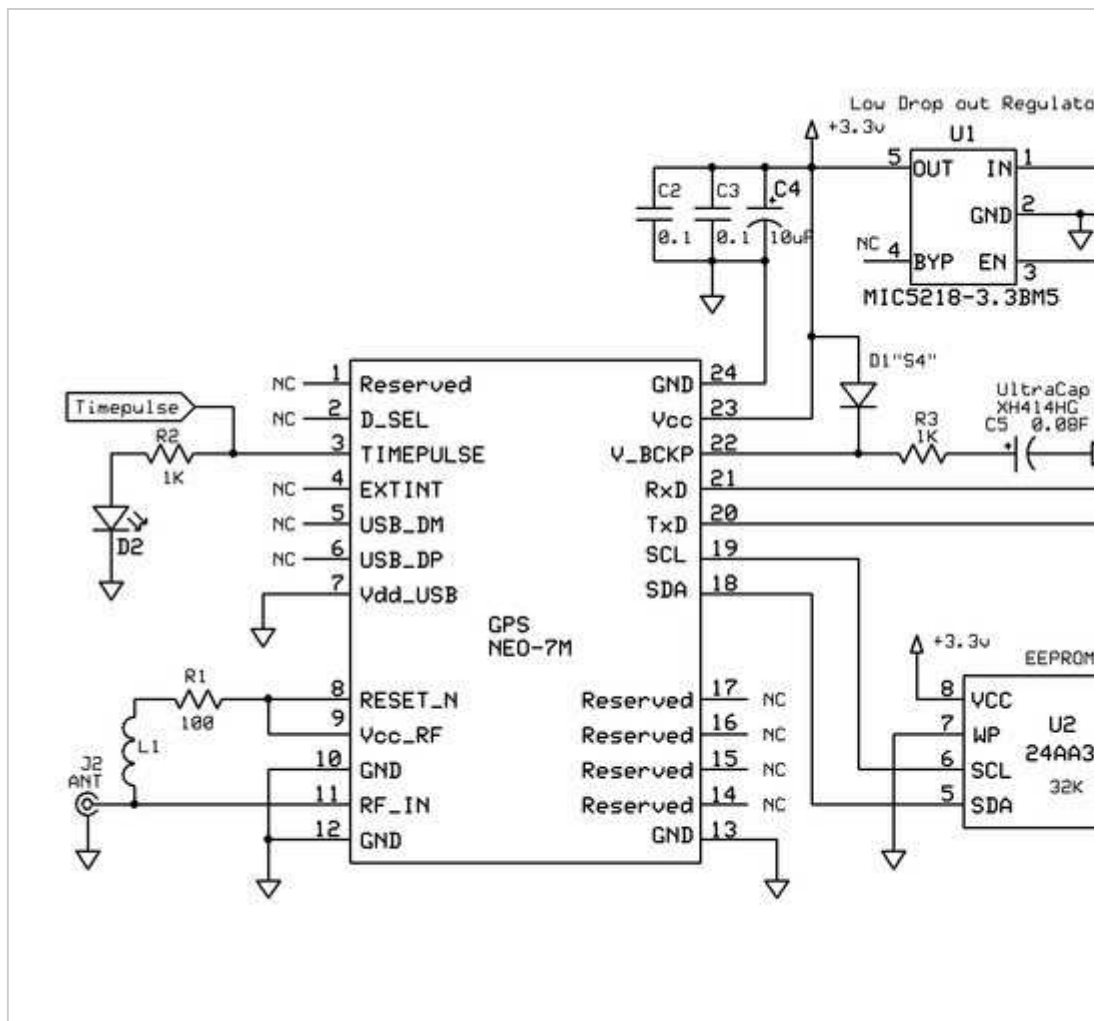
Also http://imgs.inkfrog.com/pix/ebayimage2012/25249-4.jpg Not quite the same as mine, but this is a NEO-6 schematic.

## There is a lot of documentation:- If the links below change try http://www.u-blox.com/en/download/documents-a-resources/u-blox-7-gps-modules-resources.html or Google.

**Basic Information**
http://www.u-blox.com/images/downloads/Product_Docs/NEO-7_ProductSumma (GPS.G7-HW-11003).pdf

**Module Data**
http://versalogic.com/support/Downloads/MPEu-G2/NEO-7_DataSheet_ (GPS.G7-HW-11004).pdf

**Receiver protocol, timing output, configuration.**
www.u-blox.com/images/downloads/Product_Docs/u-blox7-V14_ReceiverDescriptionProtocolSpec_Public_(GPS.G7-SW-12001).pdf

**Hardware** Connections, Power, p11 USB, p10 backup.
http://www.u-blox.com/images/downloads/Product_Docs/MAX7-NEO7_HardwareIntegrationManual_(UBX-13003704).pdf

**u-Blox:- Considerations regarding timimg pulse.** This refers to the 6T version but should be the same for the NEO-7

**Configuration utility**
http://www.u-blox.com/en/evaluation-tools-a-software/u-center/u-center.html
**Info**
http://www.u-blox.com/images/downloads/Product_Docs/ucenter_ProductSumm (UBX-13003929).pdf
**Usage**
http://www.u-blox.com/images/downloads/Product_Docs/u-Center_User_Guide_ (UBX-13005250).pdf
**Release notes**
http://www.u-blox.com/images/downloads/Product_Docs/u-center-v8.11_PublicReleaseNotes_(UBX-14002780).pdf

**Dicussion**
Here http://comments.gmane.org/gmane.comp.time.nuts/39436 is a discussion.

Other pages, I'm sure there will be many.... http://vk4zxi.blogspot.co.uk/2014/09/cheap-gps-disciplined-10-mhz-oscillator.html

This page in Russian shows **tests of the output** http://www.ra3apw.ru/proekty/ublox-neo-7m/ Use Google Chrome, it will offer a translation. As other tests have shown only 24.000 MHz 16.000 MHz 12.000 MHz 8.000 MHz 6.000 MHz 4.000 MHz 3.000 MHz 2.000 MHz provide anything like a clean signal. (The 3 higher are outside the u-Blox specification) But Karen is hopeful that a PLL willl be disciplined by other frequencies.

One device has appeared since Warren found the u-Blox. This variation on the "Ultimate" series of beacon transmitters uses the 1PPS from any GPS to "Huff puff" control a cheap Ebay DDS. It is still under development. Unmodified the version available will go up to 8MHz, a simple divider will give up to 40MHz with a possible accuracy of +/- 0.029Hz. The cheap DDS is not good in modern terms but will be much cleaner than the u-Blox. http://www.hanssummers.com/ultimate3/ultimate3gpsref.html

Another module http://www.jackson-labs.com/index.php/products/lte_lite A GPSDO 10, 19.2, 20, 26, 30.72, or 40MHz for 50$
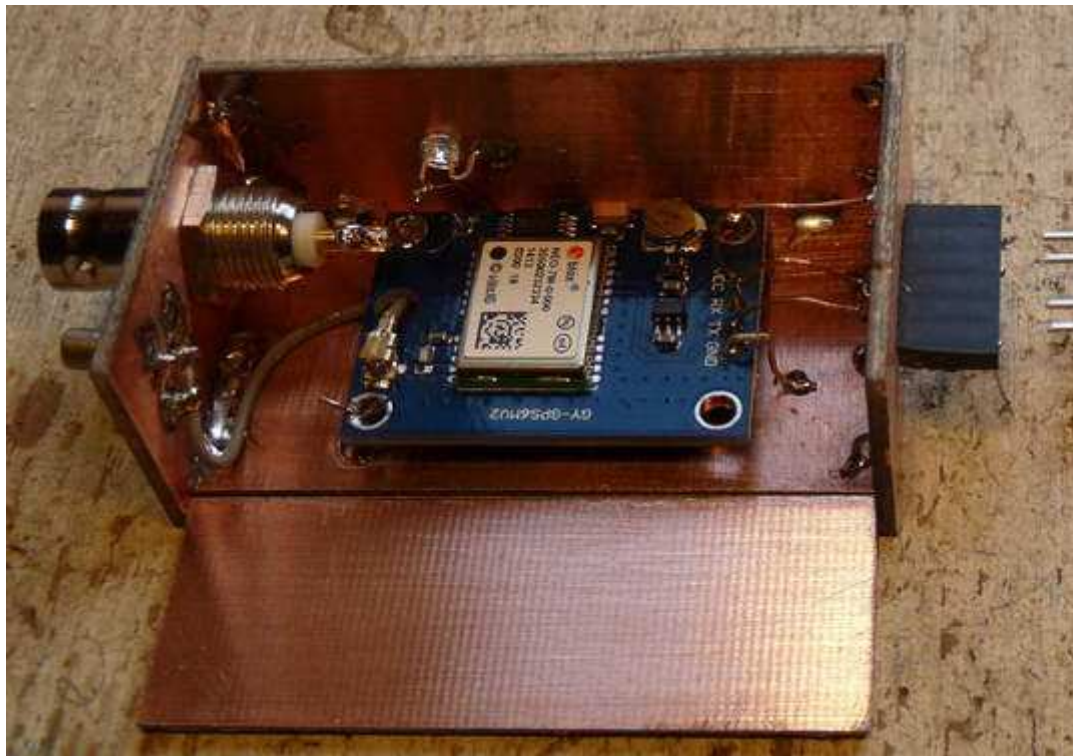
My stand-alone box. Afterwards I realised that swapping the gender of the plug/socket would have been better. I removed unwanted pins from the UART and blocked the corresponding ones on the socket to avoid incorrect assembly. I can either plug in the UART or just a power lead.
My NEO-7 module has a low-drop regulator (marked LG33) so any voltage from 3V3 may be used. But check!
I removed the on-board LED and connected one mounted on the box. It flashed brightly with the 1 PPS but did not show anything at high frequencies, something different from the original... Replacing with a red one, a lower voltage device, lit with high frequencies.

In my module the "RAM backup battery" is an 80mF 3V3 super-cap. XH414HG. On my two modules these have a high leakage current and do not save the configuration for long, maybe in time they will reform?
If the capacitor remains leaky then it will have to be removed and a lithium cell put in its place, use a series diode unless it is rechargeable. Better, remove D1 shown in the schematic above. This backup is only required if you wish to store a frequency so the module starts up on it. The backup does save recent satellite data enabling a fast lock when restarting.

I suggested the NEO-6 could be used but Andy, ZL3AG, sent this list, of U-Blox modules types along with their configurable timepulse output specs. Only the 6T goes to 10MHz.

AMY-6  ?
UC-530  1Hz
UP-501  1Hz
IT-530  1Hz
LEA-5  0.25Hz - 999Hz
LEA-6  0.25Hz - 1kHz
LEA-6T  0.25Hz - 10MHz
LEA-7  0.25Hz - 1kHz

LEA-M8F  0.25Hz - 2Hz
LEA-M8S  0.25Hz - 10MHz
MAX-M5Q  1Hz
MAX-6  0.25Hz - 1kHz
MAX-7  0.25Hz - 1kHz
MAX-M8  0.25Hz - 10MHz
NEO-6G/Q/M/P/V  0.25Hz - 1kHz
NEO-6T  0.25Hz - 10MHz
NEO-7M  0.25Hz - 10MHz
NEO-7N  0.25Hz - 10MHz
NEO-7P  0.25Hz - 10MHz
NEO-M8  0.25Hz - 10MHz
PAM-7Q  0.25Hz - 1kHz
CAM-M8Q  0.25Hz - 10MHz
EVA-7M  0.25Hz - 10MHz

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## Commentaires

Vous n'êtes pas autorisé à ajouter des commentaires.

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https://sites.google.com/site/g4zfqradio/u-blox_neo-6-7                                   17/04/2016