03 - RouteTrack Pi — gpsd Installation & GPS Validation

Date: December 24th, 2025
Category: Raspberry Pi / GPS / Linux Services

Backlink: RouteTrack Pi — Connecting GPS Hardware

Goal

This page covers:

- Installing `gpsd` and GPS tools (Global Positioning Satellite Daemon Tools)
- Confirming the USB GPS receiver is outputting raw NMEA sentences
- Creating a stable `/dev/gps0` device symlink via udev rules
- Running `gpsd` reliably as a **standalone systemd service**
- Validating that GPS data is readable through `gpspipe`
- I had to use a stand alone service because `gpsd` wouldn't work out of the box with my GPS Reciever.
- This is a workaround for that on this page.
- Some GPS units will work without bypassing TTP and using a seperate standalone systemd service.
- This page is specific to the GPS I used that needed a workaround.

Device: GlobalSat BU-353N USB GPS Receiver

Install gpsd + tools

Run:

```
sudo apt update
sudo apt install -y gpsd gpsd-clients
```

This installs:

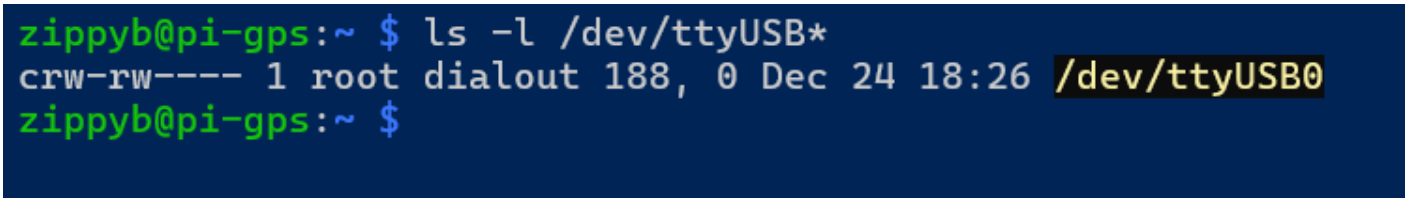
- `gpsd` (daemon)
- `gpspipe`, `cgps` (client tools)

Confirm the GPS receiver is detected

Plug in the USB GPS receiver, then verify the device appears:

```
ls -l /dev/ttyUSB*
```

example:



Linux sees the GPS receiver.

Validate raw NMEA output from the GPS

Before involving gpsd, verify the GPS is actually transmitting:

```
sudo stty -F /dev/ttyUSB0 4800 cs8 -cstopb -parenb -ixon -ixoff -crtscts -echo
sudo timeout 8 cat /dev/ttyUSB0 | head -n 20
```

Expected output should look like:

```
$GPGGA,...
$GPGSA,...
$GPRMC,...
```

If you see NMEA sentences, the receiver is working at **4800 baud**.

Create a stable GPS symlink `/dev/gps0` (udev rule)

The GPS device may sometimes appear as a different tty device, so we create a stable symlink called `/dev/gps0`.

Create the udev rule

```
sudo nano /etc/udev/rules.d/10-gps-pl2303.rules
```

Paste:

```
SUBSYSTEM=="tty", ATTRS{idVendor}=="067b", ATTRS{idProduct}=="23a3", SYMLINK+="gps0"
```

These id's come from udev's info:

- `idVendor=067b`
- `idProduct=23a3`

Reload udev and trigger:

```
sudo udevadm control --reload-rules
sudo udevadm trigger
sudo udevadm settle
```

Verify:

```
ls -l /dev/gps0
```

Expected:

```
zippyb@pi-gps:~ $ ls -l /dev/gps0
lrwxrwxrwx 1 root root 7 Dec 24 18:26 /dev/gps0 -> ttyUSB0
zippyb@pi-gps:~ $
```

Disable gpsd.socket and build a standalone gpsd service

Socket activation can cause inconsistent behavior during testing, so this project uses a dedicated standalone systemd service.

Disable/mask the socket unit

```
sudo systemctl disable --now gpsd.socket
sudo systemctl mask gpsd.socket
```

Create `gpsd-standalone.service`

Create the service:

```
sudo nano /etc/systemd/system/gpsd-standalone.service
```

This is the code for setting up the new service:

```
[Unit]
Description=GPSD Standalone (RouteTrack)
After=network.target
Wants=network.target

[Service]
Type=simple
User=gpsd
Group=dialout
```

```
ExecStart=/usr/sbin/gpsd -N -n -b -s 4800 -S 2947 /dev/gps0
Restart=on-failure
RestartSec=2

[Install]
WantedBy=multi-user.target
```

Important Notes

- `-s 4800` forces correct baud rate
- `-S 2947` binds gpsd to port 2947 (localhost)
- We intentionally **do not use** `-F /run/gpsd.sock` because it caused permission errors for the `gpsd` user under systemd.
- This service uses `/dev/gps0` so the device name stays consistent.

Enable + start:

```
sudo systemctl daemon-reload
sudo systemctl enable --now gpsd-standalone.service
```

Check status:

```
systemctl status gpsd-standalone.service --no-pager -l
```

Notice it is enabled, active and running the line from the ExecStart:

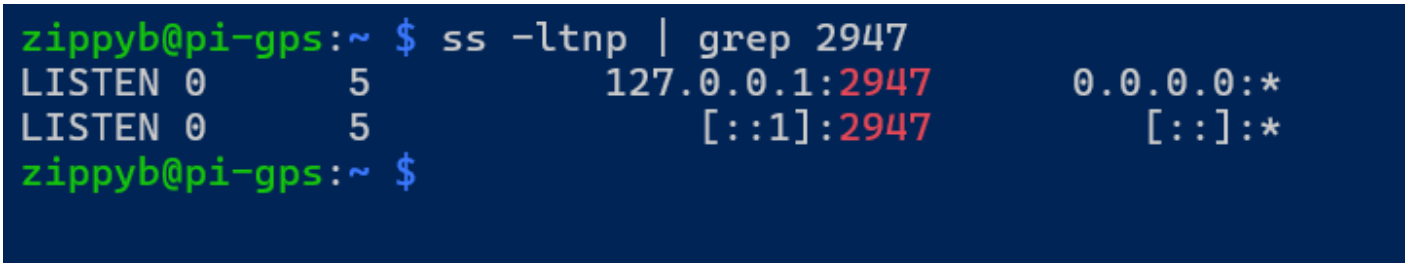
```
zippyb@pi-gps:~ $ systemctl status gpsd-standalone.service --no-pager -l
● gpsd-standalone.service - GPSD Standalone (RouteTrack)
     Loaded: loaded (/etc/systemd/system/gpsd-standalone.service; enabled; preset: enabled)
     Active: active (running) since Wed 2025-12-24 18:37:15 CST; 13min ago
 Invocation: 4ea7a82250e94280ab2ce67e06478b50
   Main PID: 6690 (gpsd)
      Tasks: 2 (limit: 759)
        CPU: 19.017s
     CGroup: /system.slice/gpsd-standalone.service
             └─6690 /usr/sbin/gpsd -N -n -b -s 4800 -S 2947 /dev/gps0

Dec 24 18:37:15 pi-gps systemd[1]: Started gpsd-standalone.service - GPSD Standalone (RouteTrack).
zippyb@pi-gps:~ $
```

Confirm gpsd is listening on port 2947

Run:

```
ss -ltnp | grep 2947
```

It is listening on ipv4 and ipv6 ports:



Validate GPS data through gpsd (JSON output)

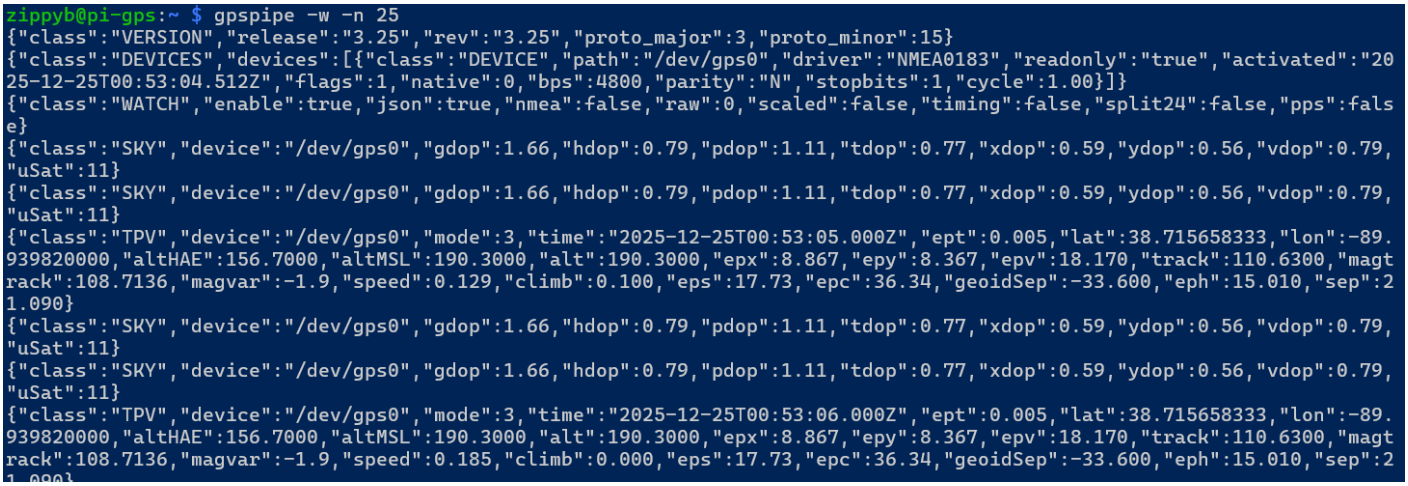
Run:

```
gpspipe -w -n 25
```

Expected:

- `TPV` messages
- `SKY` messages
- `mode: 3` when a fix is established
- latitude/longitude values updating

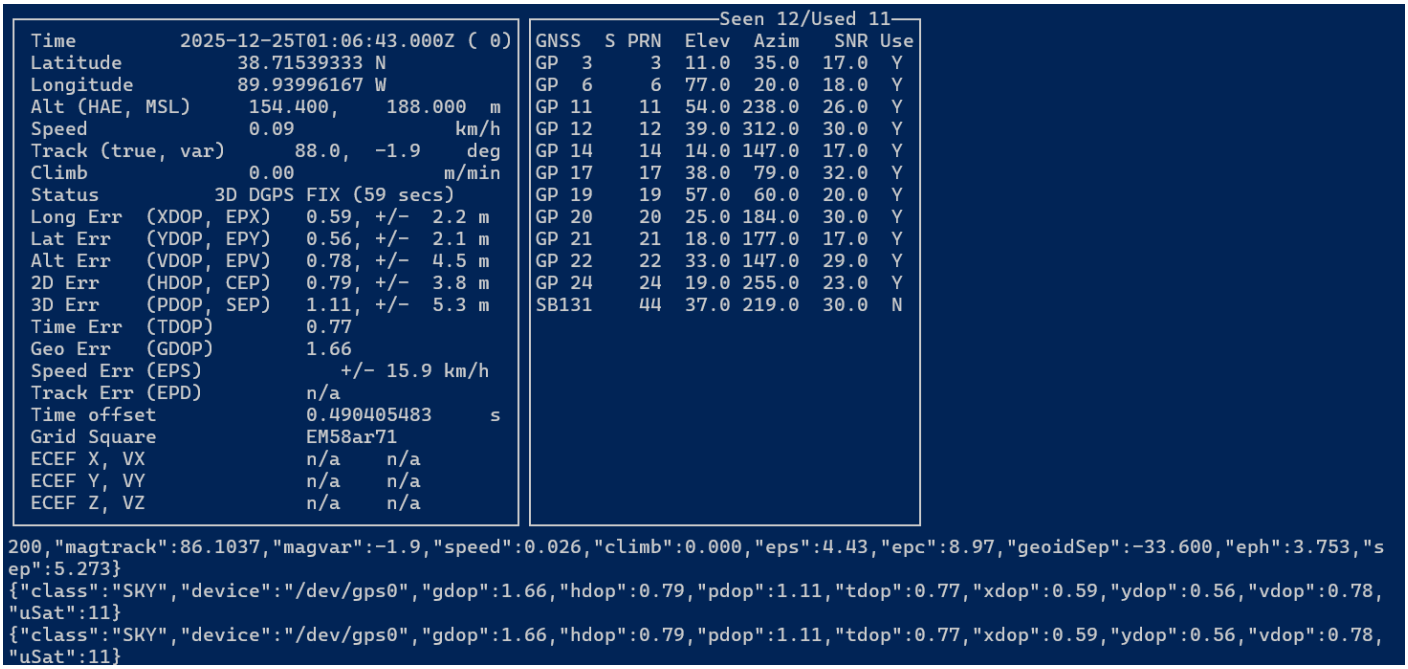
Example indicators showing some GPS coordinates:



Verifying Satellites and that everything is working:

use:

```
cgps
```



Next Steps

The GPS subsystem is now stable, validated, and running as a dedicated systemd service. Upcoming work will build on this foundation:

- **Integrate gpsd with RouteTrack**
  - Consume GPS data via localhost port `2947`
  - Parse TPV updates for real-time position tracking
- **Add health checks**
  - Monitor gpsd service status
  - Alert if GPS fix drops below `mode: 3`
- **Visualization**
  - Map GPS coordinates to a live or logged route view
  - Export NMEA or JSON logs for later analysis

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