Basic information for satellite reception

- **Callsign:** OK0PLA
- **UHF Downlink frequency:** 436.680 MHz +/- Doppler shift
- **VHF Downlink frequency:** 145.925 MHz +/- Doppler shift
- **Modulation:** GFSK, CW
- **Encoding:** G3RUH 9k6 baud
- **Protocols:** AX.25, Morse
- **Transmitting power:** 1W (30dBm)
- **Onboard antenna:** Dipole
- **Antenna polarization:** Linear

Recommended TNC modem setup:

PACLEN 255

TXDELAY 15

MYCALL [Your call sign]

UNPROTO CQ (or callsign)

Orbital parameters / Preliminary TLE

Orbit: 500km SSO

```
Planetum1
1 11111U 22999A   22145.81112100  .00000000  00000-0  00000-0 0 00007
2 11111  97.3620 258.5631 0005768  37.7809 329.2548 15.09638145100000
```

Message types

1. AX.25 TRX beacon packet
2. AX.25 OBC beacon packet
3. AX.25 PSU beacon packet
4. AX.25 message
5. CW data beacon
6. CW message beacon
7. Ground Station communication

Transmission interval

The packet and CW transmission intervals are following:

- OBC AX.25 beacon every **90s** (UHF)
- PSU AX.25 beacon every **90s** (UHF)
- TRX UHF AX.25 beacon every **60s**
- TRX UHF AX.25 message every **300s**

- TRX VHF AX.25 beacon every **180s**
- TRX VHF Morse beacon every **180s**

There are offsets applied between transmissions.

Example of decoded AX.25 TRX beacon packets

Data in AX.25 TRX beacon packet values are comma-separated.

```
1:Fm OK0PLA To CQ <UI R Pid=F0 Len=49> [16:02:13R] [AA] [+++++++]
U,406,1094958,75,2976,3205,3018,0,,0,43529,119,0
```

Explanation:

1. Beacon identification [U - UHF, V - VHF]
2. Uptime since reset [in seconds]
3. Uptime total [in seconds]
4. Radio resets [count]
5. Radio MCU act. temperature [0.01°C]
6. RF chip act. temperature [0.01°C]
7. RF power amplifier act. temperature [0.01°C]
8. Digipeater forwarded message count
9. Last digipeater user sender's callsign [ASCII, 6 spaces means nobody yet]
10. RX data packets (AX25 with CRC matched, includes CSP and digipeater packets)
11. TX data packets (includes CSP and digipeater packets)
12. Actual RSSI, ((value / 2) – 134)[dBm]
13. Value of RSSI when carrier detected – after preamble ((value / 2) – 134)[dBm]

Note: [0.01°C] means e.g. -1234 -> -12.34C

Example of decoded AX.25 OBC beacon packets

Data in AX.25 OBC beacon packet values are comma-separated.

```
1:Fm OK0PLA To CQ <UI R Pid=F0 Len=64> [16:05:29R] [AA] [+++++++]
OBC,22,89,728388,7973,2902,2913,nan,nan,nan,2756,2756,2862,3930
```

Explanation:

1. OBC – Packet identification
2. rst – OBC reset number
3. uptime – Current uptime since last reset [s]
4. totalUptime - Total OBC uptime cumulative [s]
5. bat – Measured battery voltage [mV]
6. tempMCU – OBC MCU temperature [0.01°C]
7. tempBrd – OBC Board temperature [0.01°C]

8. tempZn – Solar panel Z- temperature [0.01°C]
9. tempXp – Solar panel X+ temperature [0.01°C]
10. tempYp – Solar panel Y+ temperature [0.01°C]
11. tempYn – Solar panel Y- temperature [0.01°C]
12. tempXn – Solar panel X- temperature [0.01°C]
13. tempZp – Solar panel Z+ temperature [0.01°C]
14. freemem – OBC free storage [512B]

Example of decoded AX.25 PSU beacon packets

Data in AX.25 PSU beacon packet values are comma-separated.

```
1:Fm OK0PLA To CQ <UI R Pid=F0 Len=46> [16:05:59R] [AA] [+++++++]
PSU,20,121,728429,7970,3207,2706,211,131,7f,1
```

Explanation:

1. PSU – Packet identification
2. rst – PSU reset number
3. uptime – Current uptime since last reset [s]
4. totalUptime - Total uptime cumulative [s]
5. bat – Battery voltage [mV]
6. tempSys – System temperature [0.01°C]
7. tempBat – Battery temperature [0.01°C]
8. curIn – Battery current in [mA]
9. curOut– Battery current out [mA]
10. chStat – Bit-Masked channel status *
11. sysState – System state **

* Bit 0 - Channel 0, 0/1 - Off/On (channels from 0 to 6)
** 1 - Okay, 2 - Power saving, 3 - Power critical

Example of decoded AX.25 message beacon packet

```
1:Fm OK0PLA To CQ <UI R Pid=F0 Len=33> [16:01:38R] [AA] [+++++++]
Planetum-1 greets you from SPACE!
```

Example of CW data beacon

According to radio amateur standards, every CW beacon (no matter if data or message beacon) starts with `"DE ok0pla = "` and ends with `"ar"`.

```
de ok0pla = u5433r126t29p30 ar
```

Explanation:

1. Total uptime [minutes]
2. Reset number
3. Temp MCU [*C]
4. Temp Radio PA [*C]

u5433 = Uptime 5433 minutes
r126 = 126 resets of downlink radio
t29 = 29 degree of Celsius on DL radio MCU
p30 = 30 degree of Celsius on DL radio PA

Example of CW message beacon

```
de ok0pla = morse test from earth ar
```