

# 60 KHz Standard Frequency & Time Service

National Physical Laboratory, 60KHz Standard  
Frequency & Time Service  
From the BT MSF Transmitter at Rugby Radio Station



# History of the NPL 60KHz Standard Frequency & Time Service

- MSF Broadcasts the NPL Time & Frequency Signal from Rugby Radio Station, Hillmorton Rugby.
- First broadcast in 1949 on 2.5, 5 & 10 MHz. 1 hour per day on 60KHz.
- Broadcast now on 60KHz only.



# History of the NPL MSF 60KHz Standard Frequency & Time Service

- Caesium beam oscillator introduced in 1976.
- 100Hz Fast code introduced in 1974.
- 1Hz slow code introduced in June 1977.
- Major Transmitter equipment revision in 1998.



# NPL Time and Frequency Standard Service Delivery

- BT provide the amplification of the NPL MSF 60KHz Standard Frequency & Time Service to all parts of the UK including northern Ireland.
- 24 hours per day 7 days per week.
- Day to day stability of 2 parts in  $10^{12}$ .
- Average availability of 99.97% for 2004.
- Service Enhancements



# Rugby Radio Station



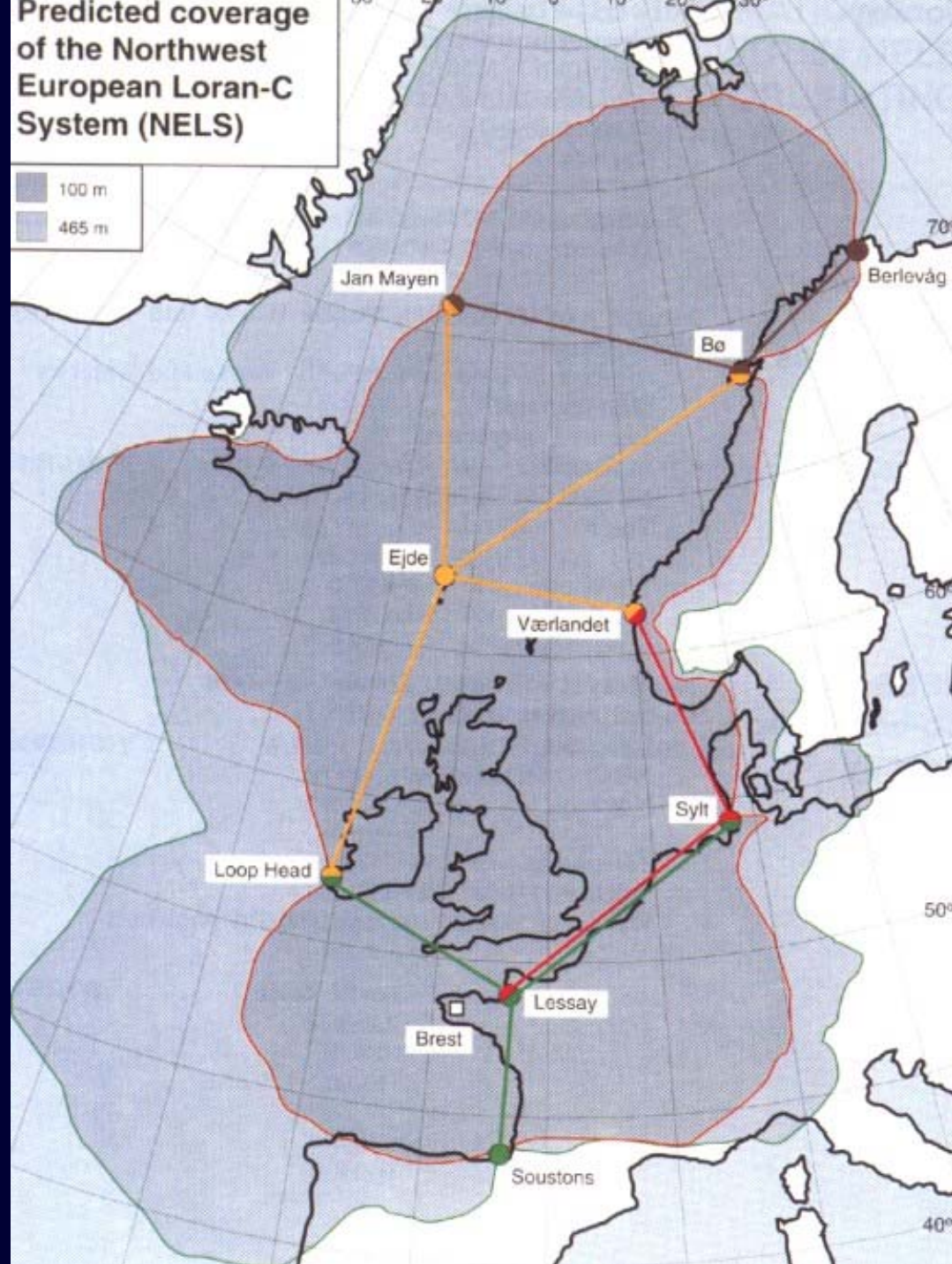
# New Loran 'T' antenna at Rugby RS



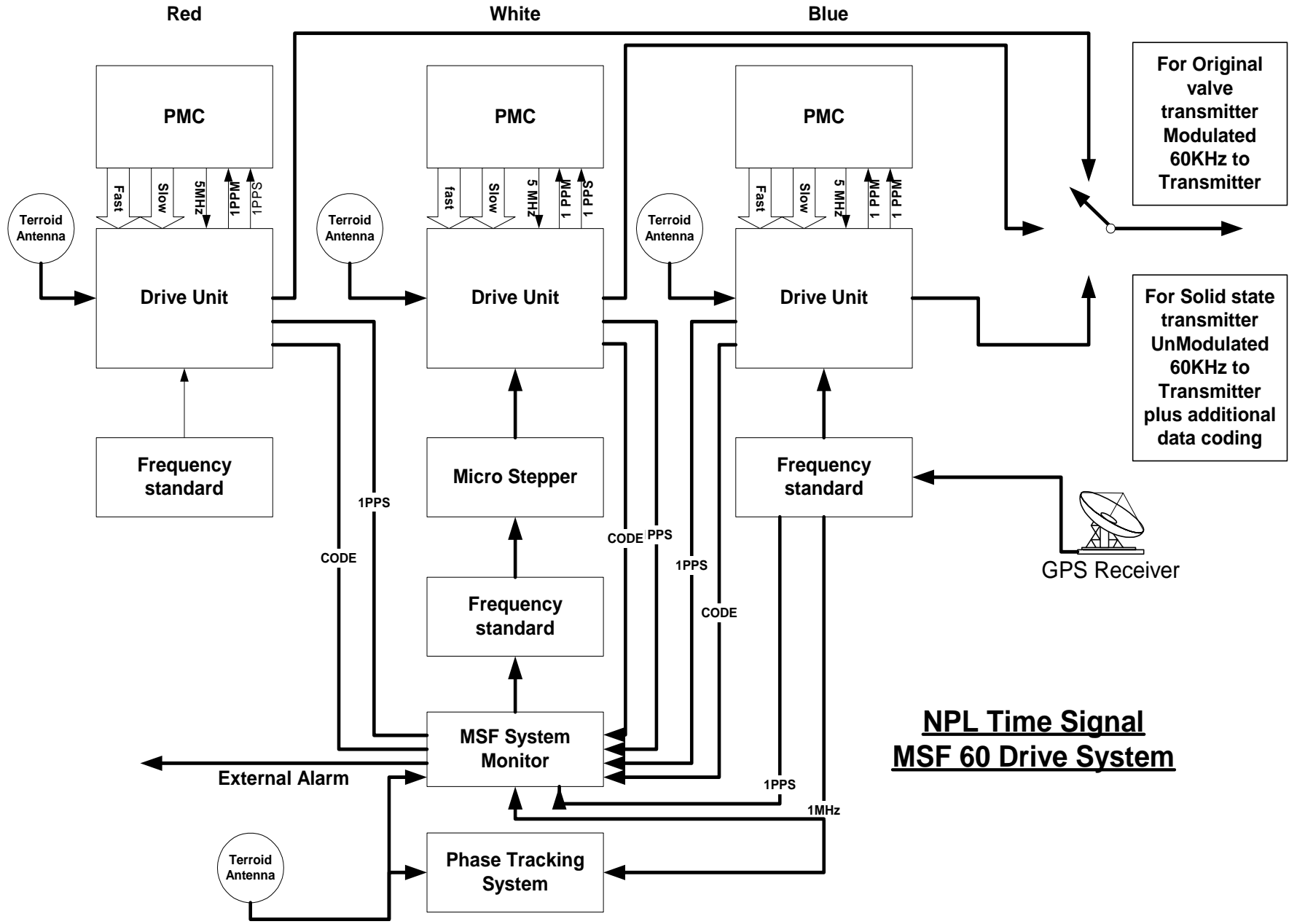
# Loran - C Transmitter



# European Loran Coverage

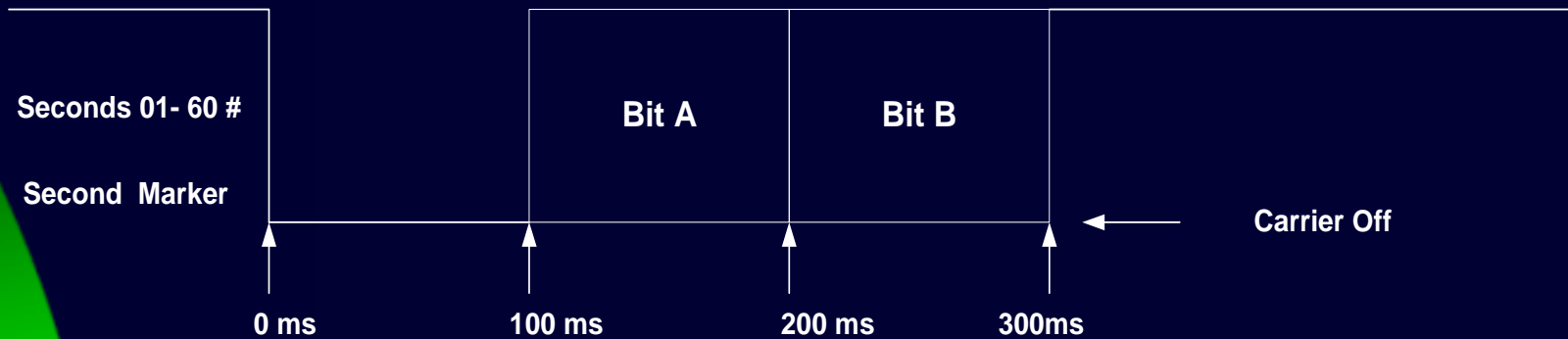






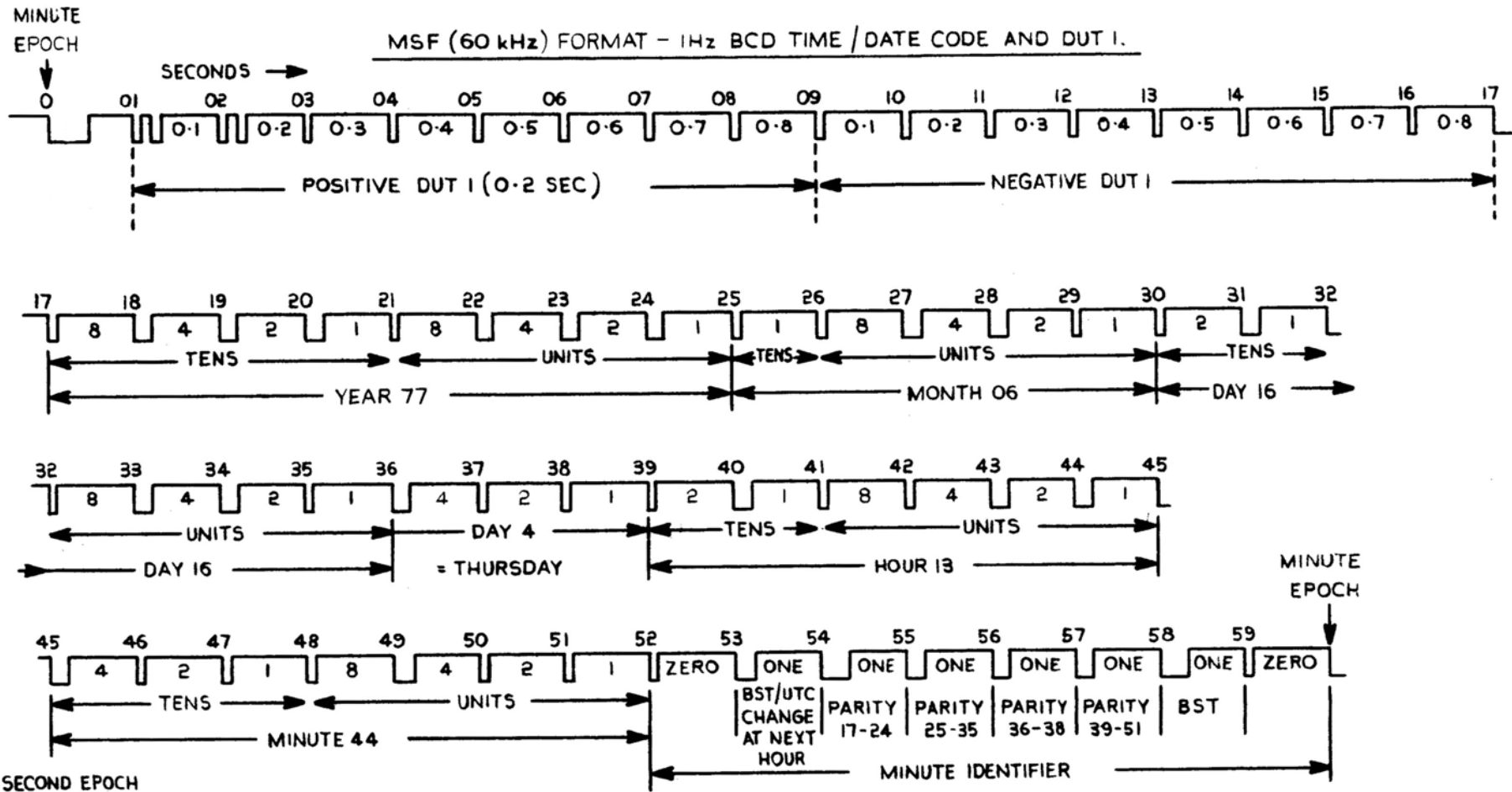
**NPL Time Signal  
MSF 60 Drive System**

## MSF 60 KHz Time and Date code (Slow Code)

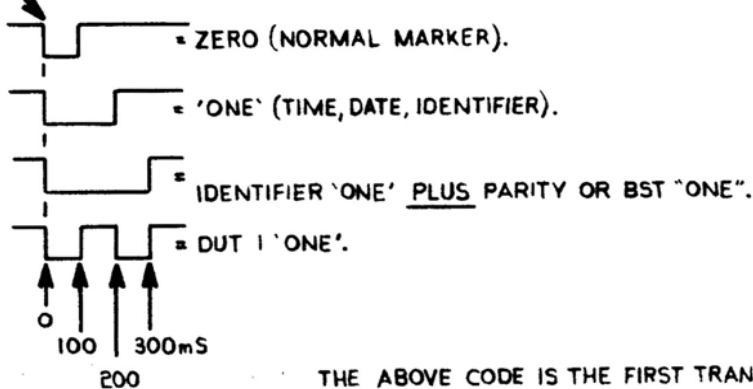


# most minutes have seconds numbered 00 - 59, second 60 is a leap second for UTC

MSF (60 kHz) FORMAT - 1Hz BCD TIME / DATE CODE AND DUT 1.



SECOND EPOCH



NOTES.

1. 1 Hz DATA APPLIES TO THE FOLLOWING MINUTE.
2. WHEN BST IN FORCE, BIT 58 IS 300ms AND DATA IS 61 MINUTES FAST OF UTC. BIT 53 IS 300ms FOR THE HOUR PRECEDING (0100 UTC) CHANGES TO AND FROM BST.
3. DAY '0' IS SUNDAY.
4. PARITY SENSE IS ODD.

RUGBY  
RADIO  
STATION

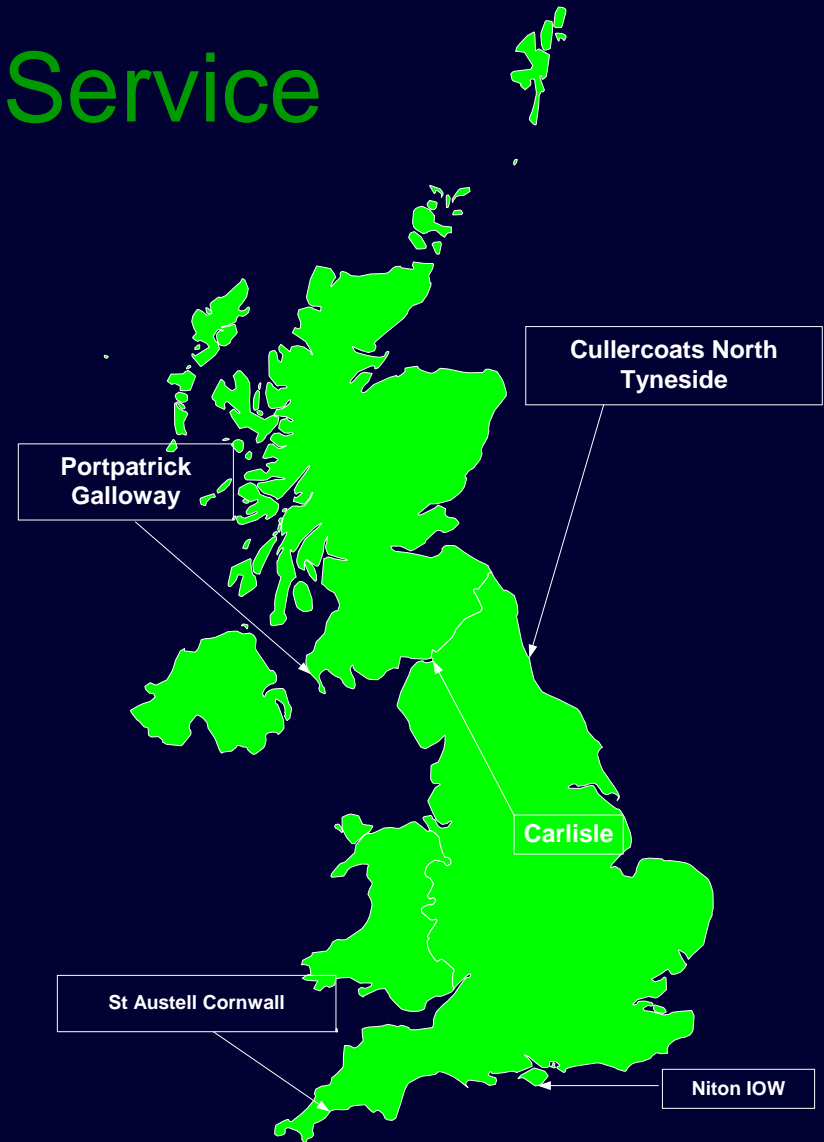
THE ABOVE CODE IS THE FIRST TRANSMITTED AT 1Hz, IN UTC MINUTE 1243, 16 JUNE 1977.

ETE 15615 SHT 1

# BT MSF Monitoring Service

NPL Signal levels monitored across the UK using calibrated equipment.

- Portpatrick. 13 mv / m
- Cullercoats. 12.6 mv / m
- Carlisle 4.5 mv / m
- Niton IOW. 8.5 mv / m
- St Austell. 13.8 mv / m



# 60 KHz Standard Frequency & Time Service



<http://www.bt.com>

<http://www.npl.co.uk/time/msf.html>

## Questions