

# Case Study

## Royal Navy

### The Challenge



The Royal Navy submarine fleet's timing system, 'Outfit FSE', was becoming outdated and was also difficult to support.

This was due to the complex nature of the system: each class of submarine had a different configuration and supporting these systems was inordinately difficult and costly.

TFS was contracted by Babcock (Prime Contractor to the Royal Navy) to provide a 'one size fits all' system that would effectively eradicate the logistical problems of the old system.

### The Solution

We developed and supplied twenty-two specially configured TFD8000 Ultra Precision Modular Time & Frequency Distribution Systems with identical option modules to serve as the master clock on each vessel.

This special configuration meant that the unit was compatible with all classes of submarine in the Royal Navy's fleet. Part of this configuration included an innovative cable changing box (CCB) which enabled the system to interface with different types of vessel.

As all the units were identical, the range of spares required to support them was vastly reduced. The hot-swappable nature of the modules also meant that maintenance could be carried out with no system down-time.

Moreover, built-in redundancy and an integral battery unit meant that in the event of a power failure, the caesium or rubidium reference units would remain operational, ensuring consistency and reliability.



# TFD8000

## Military-Grade Time & Frequency System

### Configuration for the Royal Navy Submarine Fleet: 'Outfit FSG'

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#### Main Features of Outfit FSG

- Dual redundant Rubidium or Caesium Oscillators disciplined to GPS
- Both powered continuously – no warm up period required in the event of change over
- High level of redundancy
- Dual power supplies
- Dual battery backup units
- Low-noise phase locked loop oscillator to provide high quality frequency outputs
- Any Frequency, Pulse rate or Time-code can be generated and distributed from the system
- 10/100BaseT Ethernet network interface and asynchronous RS232 port providing status information and ToD in a manner suitable for network timing (NTP, SNMP)
- Comprehensive monitoring & alarm management to enable rapid fault isolation to LRU level and rectification
- Output modules are hot swappable
- Provides the capacity for future expansion with 3 spare module slots within the current distribution chassis. Further expansion is available with the provision of a second 3U distribution chassis
- 9U space envelope, system comprises of a 2U battery unit, 3U distribution chassis and 4U dual Cs/Rb reference chassis. May be located in alternative rack positions rather than a single 9U space

The TFD8000 is a ruggedised, ultra-precision time and frequency distribution system. It provides high-precision analogue and digital time and frequency signals to other equipment.

The TFD8000 is particularly suited to high-end mission-critical military systems in naval or airborne applications including secure communications, encryption, weapons systems and navigation.

The use of separate earth planes for digital and analogue signals allows both high-speed pulse rates and timecodes to be processed together with low phase noise frequencies in a single instrument.

The proprietary backplane system is designed around the generation of any frequency, pulse rate or timecode from just three core signals. This allows dual or triple redundancy to be processed with the minimum amount of switching, thus improving the availability of the system without significantly reducing reliability.

TFD8000 Rear View

