

**A STUDY EXAMINING THE POSSIBILITY OF OBTAINING TRACEABILITY  
TO UK NATIONAL STANDARDS OF TIME AND FREQUENCY USING GPS-  
DISCIPLINED OSCILLATORS**

J. A. Davis and J. M. Furlong

Centre for Time Metrology,  
National Physical Laboratory,  
Queens Road, Teddington, Middlesex, TW11 0LW, UK

**ABSTRACT**

In the UK there is considerable interest in using GPS-Disciplined Oscillators (GPSDOs) as standards traceable to UTC(NPL). However, UK accreditation bodies are somewhat reluctant to accept GPSDOs as traceable standards, without a detailed study of the practical issues involved in establishing traceability. NPL has undertaken an extensive study, examining the performance of 15 GPSDOs loaned by 11 UK suppliers and manufacturers, to address this traceability issue. In this paper a detailed account is presented of the results obtained from the NPL study. A preliminary set of recommendations on the use of GPSDOs as standards traceable to UTC(NPL) have been produced. The progress made on implementing a mechanism enabling GPSDOs to be recognized as standards traceable to UTC(NPL) is outlined.

**1) INTRODUCTION**

GPS-Disciplined Oscillators (GPSDOs) are widely used in the United Kingdom as standards of time and frequency. GPSDOs combine the long-term stability of the timing signals available from the GPS with the short and medium-term frequency stability available from quartz or rubidium oscillators. The growth of the use of GPSDOs in calibration laboratories in the UK has been limited because GPSDOs have not been recognized as standards traceable to the UK national time scale UTC(NPL). GPSDOs offer many advantages over other time and frequency standards. The global nature of the GPS enables GPSDOs to be used anywhere in the world. The quality of the timing signals results in an improved accuracy over frequency standards disciplined by terrestrial standard frequency transmissions. GPSDOs do not require periodic recalibrations, they are not excessively expensive, costing typically between £2,000 and £12,000. GPSDOs have many applications world-wide, in particular within the telecommunications industry.

NPL has responded to the growing interest in using GPSDOs as traceable standards, by













