

AVIONIC SYSTEMS STANDARDISATION COMMITTEE
PROCESSING WORKING GROUP



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REAL-TIME OPERATING SYSTEMS*

0 EXECUTIVE SUMMARY

This is a report brings together two reports written on RTOS in order to provide a covering document to preserve their original date and content. The reports covered are Real Time Operating Systems. (ASSC/330/2/136) dated April 1996 and Evaluation of Real Time Operating Systems: The Role of Standards (ASSC/330/2/141) dated March 1997.

Details are also included of possible future work in this area.

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Table of contents		Page no.
0	Executive summary	1
1	Introduction	3
2	Further Work	3

1 INTRODUCTION

This ASSC publication includes two reports for the ASSC concerning Real-Time Operating System (RTOS) products. The first report (ASSC/330/2/136) presented a survey of the available products, selecting the subset applicable to military embedded applications including avionics. Some caution should be exercised regarding the continuing accuracy of the information given in this report, which was current in April 1996. Some of the products described are being actively developed and it is likely that additional features will have been added. Other products may have been superseded. Nevertheless, it is felt that the report will provide a useful starting point for those seeking to select an RTOS product for an avionics application.

The second report (ASSC/330/2/141) proposed criteria for the selection of RTOS products. Since compliance with standards is an important selection criteria, the operating system standards applicable to embedded systems were examined. It was shown that there are different classes of operating system standard to be considered. The most important distinction is between standards which apply only within a particular systems architecture and standards which do not require a specific system architecture. The former class of standards includes those relating to integrated modular avionics (IMA).

The standards applicable to real-time embedded systems which are not architecture specific are POSIX and Ada95, including the Ada95 annexes. An avionics application may make explicit calls to an operating system or may, if the application is written in Ada, implicitly access RTOS functions in the Ada runtime system using Ada language constructs only. Some Ada compiler vendors are now using an RTOS product to implement the runtime system. As a result, despite the very different nature of the Ada 95 and POSIX standards, both can be used to ensure that the interface between avionics application software and the functions of an RTOS conforms to international standards.

2 FURTHER WORK

The work reported here has been undertaken towards the goal of producing technical guidance for the selection of RTOS products in military avionics. It is considered that such guidance is necessary because the interface between avionics application software and an RTOS will effect the portability and maintainability of the software, in turn influencing the management of equipment obsolescence.

It is noted that guidance on the selection of RTOS products would be unnecessary for systems conforming to an IMA standard, since IMA standards encompass the interface between the application software and the RTOS. However, RTOS products are already being used in military avionics and are likely to continue to be used for many years after the introduction of IMA. For these reasons, the guidance should address the selection of RTOS products and compliance with standards which do not specify the system architecture. The product information of ASSC/330/2/136 and the selection criteria of ASSC/330/2/141 could be used in such a guidance document. To complete the preparation of a guidance document, further work is needed :

1. To determine the characteristics of the latest available products: for example, POSIX compliance cannot be recommended unless POSIX compliant products exist
2. To assess the nature of the information available when a selection is to be made: in particular, it is necessary to distinguish between information which is freely available from that which can only be gathered by experimental evaluation.