

# CONTROL SYSTEM SPECIFICATION

## A NEW SPECIFICATION GUIDE—SSCP 27

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*This article summarizes a paper by M. I. Hawken and T. McClean, 'Cost-effective Specification of Complex Machinery Control and Surveillance Systems', presented at the Ninth Ship Control Systems Symposium, Bethesda, USA, in September 1990.*

### ABSTRACT

The specification guide (SSCP 27) provides guidance to MOD and Industry specifiers, in writing specifications for Machinery Control and Surveillance Systems. It provides direct guidance for these systems and is also applicable to a wide range of other defence equipment. This article provides a description of the guide and summarizes the reasons for its development.

### The Problem

The value of a good specification within ship and equipment procurement programmes has been recognized for some time, although very little guidance has been provided on the approach required. Whilst the qualities of a good specification may be easily stated, they are much more difficult to put into practice. The move towards competitive tendering and fixed price contracts in equipment procurement has placed even more emphasis on the need for complete, unambiguous, concise and well-presented specifications.

Poor specifications frequently result in poor tenders in which the vendor offers inappropriate solutions because he has not realized the scope of his responsibilities, or because the specification has been misinterpreted. As a result, the evaluator finds difficulty in assessing inadequate tenders against inadequate specifications.

It follows that the majority of errors within the procurement process for naval systems are introduced at the specification and design stages rather than during system build and test. This has resulted in the acceptance of less than ideal systems and cost and time overruns, with potential risks to ship in-service dates. Identification of problems at the outset and action to avoid them, will lead to more cost-effective and technically acceptable designs.

Three major areas have been identified where errors and problems can be introduced and remain undetected:

- (a) Preparation of a specification by the specifier.
- (b) Generation of a tender by potential system vendors.
- (c) Evaluation of tenders by an evaluator who compares the tenders with the specification and determines the preferred solution.

Following changes in ship procurement procedures and recognition of the inadequacies of previous Machinery Control and Surveillance (MCAS) specifications, it was decided to produce a guide which would set a standard for both MOD and Industry specifiers with varying levels of expertise and

experience. The guide would need to take account of varying procurement processes from whole ship procurement to the procurement of replacement systems during mid-life updates. It would be independent of the selected tendering process, machinery selection and configuration. The resulting specifications would also need to be capable of being applied at early stages of system design and procurement as well as at the later more detailed stages.

### The Solution

The solution has been to produce a Sea Systems Controllerate Publication (SSCP) 27 which provides guidance to the specifier, vendor and evaluator (FIG. 1). Guidance has been provided in a clear, consistent and co-ordinated manner for each of these groups. Information can be located by both experienced and inexperienced specifiers without the need to read through the whole guide. The principal factor ensuring consistency and a co-ordinated approach is that the guide imposes a structure for the specification. This structure smooths the specification process and helps the vendor and evaluator complete their tasks by guiding them through known specification formats. Developed in this way, all specifications will have the same format. In this respect, parallels may be drawn with the Haynes car manuals. Haynes recognized the similarities between different makes and models of cars, i.e. engine, transmission system, electrical system, etc. The manuals were written in such a way that all were structured in a similar manner, each holding individual relevant information. In the same way future MCAS specifications will have a common structure.

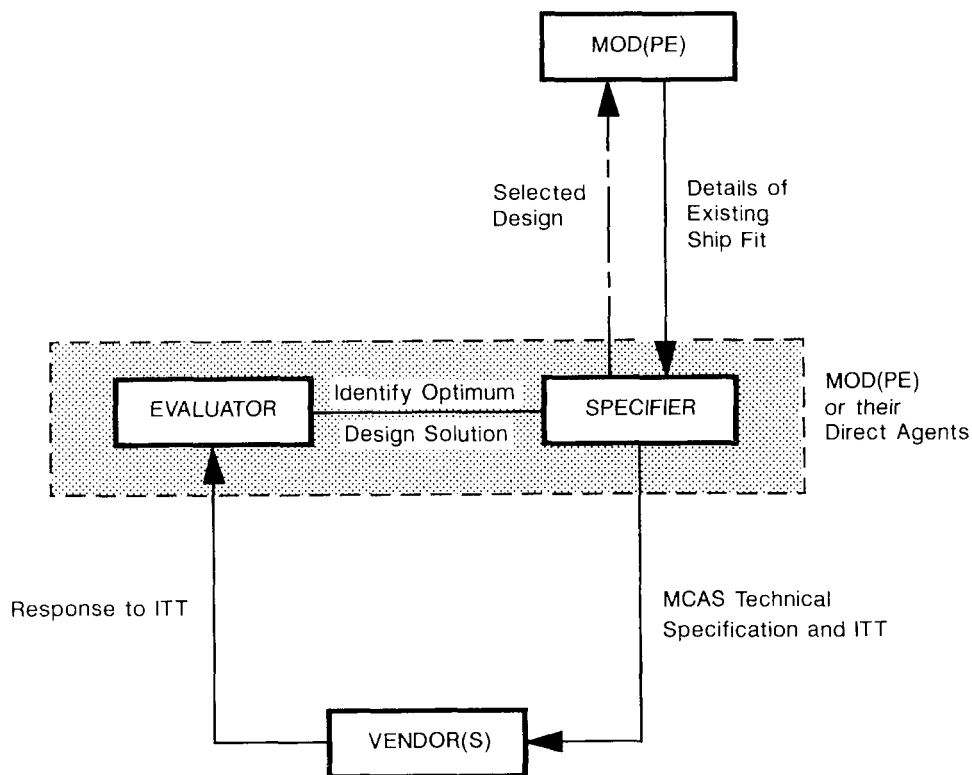


FIG.1—THE SPECIFICATION PROCESS FOR AN MCAS SYSTEM  
ITT: invitation to tender

## The Guide

The guide is divided (FIG. 2) into five easy-to-use parts to aid specifier, vendor and evaluator. They will use the appropriate parts of the guide to complete their tasks and to generate the relevant documentation. User-friendliness has been a prime aim in developing the guide. The specialist Parts 2, 3 and 4 share a common structure (FIG. 3) and each outlines the requirements of the document to be generated.

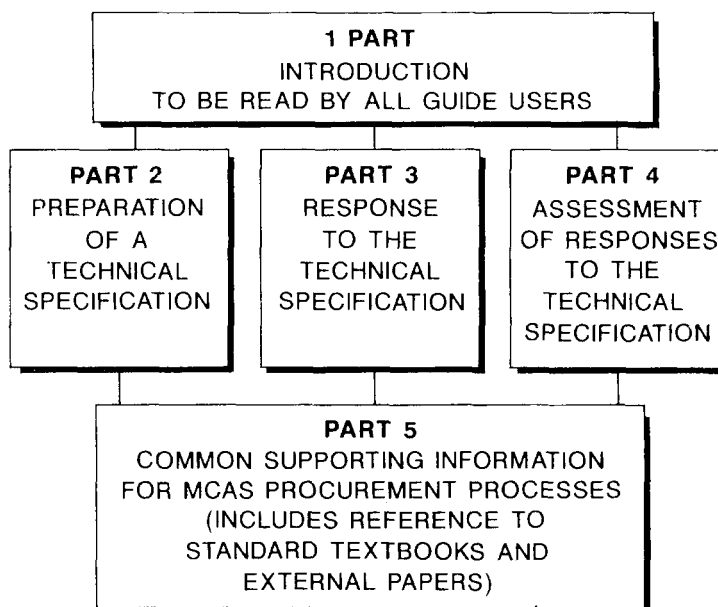


FIG. 2—STRUCTURE OF SSCP 27

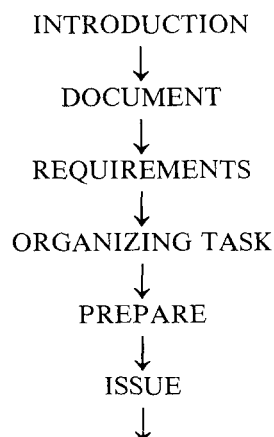


FIG. 3 THE COMMON STRUCTURE OF PARTS 2, 3 AND 4

### *Part 1—Introduction*

Part 1 is addressed to all guide users. It:

- (a) provides an overview of the procurement process for new construction ships;
- (b) identifies the need for consistency in the specification processes;
- (c) defines the necessary minimum qualifications for guide users;
- (d) states that the guide must be followed to generate specifications, tenders and evaluation reports in defined, compatible, structured formats.

### *Part 2—Specification Preparation*

The specification must be arranged logically. It must be functional, i.e. define 'what a system has to do' without imposing 'how it must do it'. A top down approach is adopted for the specification task and formal structured methods are used to support this. The specification must be flexible to accommodate changes that will inevitably occur in operational aspects, machinery fit and technical development during the procurement process.

The guide also specifies that a Human Factors programme should be carried out to ensure a user-friendly MCAS system.

### *Part 3—Tender Preparation*

Part 3 of the guide instructs the MCAS system vendor how to generate his response to the invitation to tender.

### *Part 4—Tender Assessment*

This part of the guide is directed at the evaluator who will systematically compare the tender with the original specification requirements and determine/recommend the most cost-effective MCAS system solution.

### *Part 5—Supporting Information*

The objective of part 5 is not to restate information that is readily available in standards, textbooks or well publicized technical documents but to interpret topics in the context of MCAS system application (e.g. availability in terms of Bridge Control if the Ship Control Centre facilities fail). A complete list of abbreviations for SSCP 27 is given in this part.

## **Summary**

Requirement Specifications for MCAS systems has often been fragmented and incomplete. As a result, contradictory statements have been made in tender responses, causing delay and confusion. Owing to these problems and following changes in the procurement process it was decided to produce a guide (SSCP 27) which would set a common specification structure and provide a suitable guide and reference for future specifiers.

The document is arranged in five parts. Commonality is maintained between the parts, and recommended specification and tender structures are provided. A top down approach to the specification task and the use of formal structured methods is advised. The importance of generating and specifying the necessary human factors requirements for operator interaction is also addressed in the guide.

The guide is primarily a reference document to be consulted as appropriate during the MCAS system specification process. It is independent of the chosen tendering process, machinery selection and configuration. Although the guide is aimed at the specification of MCAS systems the principles may be applied to other Ministry of Defence systems and equipment procurement processes.