CHAPTER 9

CRITICAL ITEM

CONTENT

1. INTRODUCTION

Critical items are those items or process which because of the significance and/or likelihood of failure, need to be identified and managed.

2. SCOPE

This chapter considers the following aspects of critical items:

- Purpose of critical items management in particular that relating to R&M;
- Criteria;
- Procedure.

3. PURPOSE OF CRITICAL ITEM MANAGEMENT

The purpose of critical items management is to provide a procedure for bringing critical items to the attention of project management and other stakeholders in order to implement action to eliminate them or reduce their effects. The identification of critical items is the responsibility of all those participating in the development and manufacturing process; but the activity needs to be coordinated at project management level. The identification of critical items contributes nothing to improving the reliability of the product. The aim of critical items management in respect of R&M engineering should be to reduce the effect of any specific item or process having a detrimental affect on R&M prior to the commencement of production. Critical items management should commence during the early stages of the design and should continue throughout all the programme phases.

4. CRITERIA

4.1 All hardware, firmware, software, designs and products, should be examined as part of the management process for critical items.

4.2 A critical item is an item or process that satisfies one or more of the following criteria:

a) Is safety and/or mission critical;

b) Has stringent performance requirements with respect to the technology employed, that is, there is a high design risk;

c) Is stressed in excess of specified derating or margin of safety criteria;

d) Has a known operating life, shelf life or environmental exposure or other limitation which warrants monitoring under specified conditions;

e) Requires special handling or test precautions;

f) Has a history of poor reliability;

g) Is of radical or evolutionary design used in a novel application and, therefore, there is little confidence in its reliability;

h) Any aspect of its past history shows a deficiency which warrants special control or monitoring;

i) Where failure could cause extensive/expensive maintenance.

4.3 This list is not exhaustive and circumstances may dictate additional criteria. The rules for criticality should be carefully established at the start of the development programme.

5. PROCEDURE

5.1 The procedure for the management of critical items is an iterative process and needs to be carried out continuously throughout all programme phases. Critical items may be identified through the various activities including as part of the R&M programme; FTA, FMECA, trials testing etc.

5.2 The basic elements of the procedure are:

a) All project personnel are aware of the criteria and system of reporting reliability critical items;

b) A database line of R&M critical items is maintained;

c) Appropriate action to eliminate or reduce the effects of the critical items.

5.3 Reliability critical items should be monitored throughout subsequent phases. Critical items may be subjected to detailed analyses such as stress analysis or sneak analysis, testing and other techniques to identify failure modes and provide information on which to base design change decisions or by which the R&M risks may be mitigated.