

## DATA ITEM DESCRIPTION

**Title:** THEORY OF DESIGN & OPERATION (TDO)

**Number:** DI-MISC-81608

**AMSC Number:** G7438

**DTIC Applicable:**

**Office of Primary Responsibility:** G-C12

**Applicable Forms:**

**Approval Date:** 9 May 01

**Limitation:**

**GIDEP Applicable:**

**Use/relationship:** The Theory of Design & Operation provides information about the architectural design of an information assurance system and its intended operation. It provides enough detail to determine the adequacy of the design approach.

- a. This Data Item Description (DID) contains the format and content preparation instructions for the data product generated by the specific and discrete task requirements as delineated in the contract.
- b. This DID is applicable to information assurance (IA) systems<sup>1</sup>.
- c. This DID is related to DI-MISC-81609, Theory of Compliance
- d. This DID is related to the system security requirements supplied with the contract.
- e. This DID supersedes DI-ADMN-81598, Theory of Equipment Operation.

### Requirements:

1. Format. The Theory of Design and Operation (TDO) shall be in the contractor's format with the following exceptions:

1.1 Page size. The size of each finished page shall be on 8 1/2" x 11" paper (metric size A4). Fold-outs shall be kept to a minimum; when used they shall not exceed the 8 1/2" x 11" limits when folded. Photo reduction of oversized pages is preferred, provided such reductions are easily readable and reproducible.

1.2 Binding. The Theory of Design and Operation (TDO) shall be bound in such a manner that pages can be removed without damage or mutilation.

1.3 Paragraph identification. Each paragraph shall have a unique contractor specified paragraph identifier.

2. Content. The report shall contain front matter as follows:

2.1 Cover and title page. The following information shall be included on the cover and title page:

- a. Report Title.
- b. Date of Issue.
- c. Report number/revision number or letter.
- d. Contract number.
- e. Contractor name and address.

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<sup>1</sup> Throughout this DID, system is meant in a generic sense to apply to any functionally related group of elements composing the targeted design and its implementation. As examples, that group of elements may form a component, as is the case for a hardware or software embeddable cryptomodule; or it may form an equipment, as is the case for a secure radio; or it may form a hybrid of various equipment and interconnections, as is the case for a worldwide communications network.

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- f. Program title, including program name.
- g. Security classification, if classified.
- h. Distribution statement.

2.2 Revision control page. The revision control page shall list the following information:

- a. Each revision number or letter.
- b. Date of each revision.
- c. Pages affected by each revision.

2.3 Table of contents. The table of contents shall identify the following:

- a. The title of the starting page of each major section and paragraph of the report.
- b. The page, identifying number, and title of each drawing, illustration, figure and table.

2.4 Chapters. The report shall contain the following chapters of information

2.4.1 General Information.

The Theory of Design & Operation (TDO) is a report providing information about the architectural design of an information assurance system and its intended operation. At a high level this document describes the functional and physical design of the system, the interrelationships of the system, and the security requirements and goals to be met by the system. The TDO answers four basic questions about the system: 1) What are the top level requirements? 2) What functions are to be designed into the system? 3) Where are the system functions physically performed? and 4) What specific design features will satisfy each security requirement and goal?

The TDO is divided into four chapters. The first chapter describes the top level requirements of the system, the system's operational environment, and the top level security requirements of the system. The second chapter breaks the system down into functional blocks. The third chapter describes the physical configuration of the system and where each function described in chapter 2 is performed. The fourth chapter identifies the design features of the system which satisfy each security requirement and goal.

The TDO answers the "what" and "where" questions associated with a preliminary system design. The report describes the design architecture in enough detail to enable a reader to make decisions about the adequacy of the design approach. The more detailed "how" questions describing the specific details of design implementation are addressed subsequently in an associated document, the "Theory of Compliance".

The report is written so that a reader will be able to trace top level functions to top level requirements and goals, to understand the hierarchy of functions that are performed by the system, to identify where each function is performed in the system's physical architecture, and to understand the design approach for satisfying each security requirement and goal identified in the system security requirements.

Diagrams and charts are included in this report for clarity to support the written description.

2.4.2 Chapter 1. System Requirements and Operational Environment:

The first chapter of the TDO provides a concise description of the top level requirements and goals of the system design, a description of the operational environment and constraints (e.g. airborne, command post, access by cleared personnel only), and a statement of the top level system security requirements and goals. This chapter tells the reader what the system is supposed to do, in what environment the system must operate, and what the system's operational security concerns are.

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### 2.4.3 Chapter 2. Functional Architecture

The second chapter of the TDO provides a functional description of the system being designed. It provides the reader with an explanation of the hierarchy of functions within the system and how this functional architecture satisfies the top level requirements and goals identified in Chapter 1. The description logically flows from the system's top level functions, down through several layers of functional partitioning, to a functional design level where each function represents an individual task that is identified as occurring within or by a specific physical element of the system.

### 2.4.4 Chapter 3. Physical Architecture

The third chapter of the TDO provides a physical description of the system being designed. It provides the reader with an explanation of the physical elements of the system (i.e. hardware, software, databases, communication paths, etc.) and their relationships to each other (e.g. Master/Slave, sub element, etc.). It associates the functions identified in Chapter 2 with specific elements, explaining the interdependencies among the elements in achieving the functionality.

### 2.4.5 Chapter 4. Security Architecture.

The fourth chapter of the TDO assures that the security requirements and goals identified for the system have been addressed, and that an adequate design approach has been proposed. Each requirement and goal in the system security requirements is addressed separately and the design approach proposed for satisfying that requirement or goal is described. This description provides system specific detail on how the design (built with custom or off-the-shelf components) and configuration satisfies the requirement or goal. The description is not just a restatement of the requirement or goal. It describes how various elements of the system work together to carry out a requirement, and what each element relies on from the others to do so. If that requirement or goal applies to more than one area of the design, the design approach for each area is addressed separately.

## 3. End of DI-MISC-81608