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1. General

1.1 Purpose

This paragraph shall describe the purpose of the Software Maintenance Manual in the following words or appropriate modifications thereto:

The purpose of this Maintenance Manual for (Project Name/Project Number) is to provide maintenance programmer personnel with the information necessary to effectively maintain the system.

1.2 Project References

This paragraph shall provide a brief summary of the references applicable to the history and development of the project. The general nature of the system developed shall be specified including a brief description of its purpose and uses. Also indicated shall be the project sponsor and user as well as the information processing center(s) that will run the completed Information System. As a minimum, the following documents, when applicable, shall be specified by author or source, data request number, title, and date.

- Users Manual
- End User Manual
- Computer Operation Manual
- Other pertinent documentation

1.3 Terms and Abbreviations

This paragraph shall list or include in an appendix a list of any terms, definitions, or acronyms unique to this document and subject to interpretation by the user of the document. This list will not include item names or data codes. For the purpose of this document the following definitions are provided:

- Information System – a combination of information, computer and telecommunications resources and other information technology, and personnel resources that collects, records, processes, stores, communicates, retrieves, and displays information.

- Software Module – an independent piece of software or a logical grouping of instructions to a computer that forms part of one or more larger programs.
2. **System Description**

2.1 **System Overview**

This paragraph shall describe the purpose of the system and the functions it performs. For example, a particular application system might serve to control financial or personnel processing by accepting specific inputs, extracting items of data, and deriving other items of data in order to produce both information about specific financial or personnel functions for inclusion in reports. These system functions shall be related to specific elements the System Functional Description (where this document exists).

2.2 **System Organization**

This paragraph will provide a comprehensive description of the system, subsystem, communications, jobs, etc., in terms of their overall functions. A chart depicting the interrelationships of the major components of the system will accompany this description. Communications shall be depicted in the charts for systems that are networked or perform distributed processing. Options provided to support operation in degraded modes or at alternate/catastrophic backup sites shall be described. The description provided in this paragraph shall be supplemented with a flow diagram depicting the software modules and files.

2.3 **Security**

This paragraph shall contain an overview and discussion of the security considerations associated with the system. This description shall include specifications of constraints on user access and user restrictions. Where a requirement exists, a log of user access will be provided.

2.4 **System Requirements Cross-Reference**

This paragraph shall provide a cross-reference between the overall functions described in the Functional Description and the System Specification (where these documents exist).

3. **Environment**

3.1 **Equipment Environment**

This paragraph shall discuss the equipment configuration and its general characteristics as they apply to the system.
3.2 Operating System

This paragraph shall identify the operating system(s) to be used by this application system.

3.3 Support Software

This paragraph shall list the various support software used by the system and identify the version or release number under which the system was developed.

3.4 Databases/Files

This paragraph shall include a complete description of the nature and content of each database/file used by the system including security considerations.

3.4.1 General Characteristics

This paragraph shall provide a general description of the characteristics of the databases/files, including:

3.4.1.1 Database/File System Structure

This paragraph shall specify the names of the directories/folders/databases/files and a list of names and directories/folders/files indicating where system/module code is stored.

3.4.1.2 Identification

This paragraph shall specify name and mnemonic reference. List the software modules utilizing the databases/files.

3.4.1.3 Permanency

This paragraph shall indicate whether the databases/files contain static data that a software module can reference, but may not change, or dynamic data that can be changed or updated during system operation. Indicate whether the change is periodic or random as a function of input data. This paragraph shall also include a description of any review and approval procedures relative to changed data.
3.4.1.4 Storage

This paragraph shall specify the media for the databases/files (e.g., tape, disk, internal storage) and the amounts of storage required.

3.4.1.5 Restrictions

Explain any limitations on the use of this database/file by the software modules that comprise the system.

3.4.2 Organization and Detailed Description

This paragraph will serve to define the internal architecture of the database/file. A description will be included that identifies data structures, elements, and entities, accompanied by a brief narrative explanation of the database/file and tables, if applicable. This paragraph shall include, if available, computer-generated or other listings of this detailed information may be referenced or included herein. The following items indicate the type of information desired:

3.4.2.1 Layout

This paragraph shall depict the composition of the databases/files including elements, sets, entities, i.e., logical schema.

3.4.2.2 Structures

This paragraph shall indicate whether the physical record is a logical record or one of several that constitutes a data structure. Identify the structure parts, such as headers or control segments (keys) and the body of the record, i.e., physical storage schema.

3.4.2.3 Elements

This paragraph shall identify each element in the structure and, if necessary, explain its purpose. Include for each data element the following items:

3.4.2.3.1 Labels

This paragraph shall indicate the label assigned to reference each data element.
3.4.2.3.2 Description

This paragraph shall provide a full description of the data element.

3.4.2.3.3 Source

This paragraph shall indicate the source of the data element to include if it is a input or calculated value.

3.4.2.3.4 Size

This paragraph shall indicate the length and number of bits/characters that make up each data element.

3.4.2.3.5 Range

This paragraph shall indicate the range of acceptable values for each element that may be used for editing purposes.

3.4.2.4 Expansion

This paragraph shall include provisions, if any, for adding to the structure.

4. System Maintenance Procedures

This section shall provide information on the specific procedures necessary for the programmer to maintain the software modules that comprise the system.

4.1 Conventions

This paragraph shall explain all rules, schemes, and conventions that have been used within the system. Information of this nature could include the following items:

4.1.1 Variable Names

This paragraph shall describe the design of variable identifiers and their application to the labeling of software modules, sub-modules, data structures, data elements, storage areas, etc. Provisions for unique naming or renaming at different sites shall be described if contingency processing at alternate sites requires separation of the resources named by the identifiers.
4.1.2 Procedures and Standards

This paragraph shall describe the procedures and standards for charts, listings, serialization of cards, abbreviations used in statements and remarks, and symbols appearing in charts and listings. The appropriate standards, fully identified, may be referenced in lieu of a detailed outline of conventions.

4.1.3 Data Elements

This paragraph shall describe the data elements and related features.

4.2 Verification Procedures

This paragraph will include those requirements and procedures necessary to check the performance of software following its modification. Included may also be procedures for periodic verification of the software.

4.3 Error Conditions

This paragraph shall include a consolidated list of all error messages produced by the software module. This list shall include the identification of the error, a description of the error, an explanation of the source of the error, and recommended methods to correct the error.

4.4 Maintenance Software and Procedures

This paragraph shall contain an inventory and description of any special software (such as purging history files and deleting log files) and the associated processes used to maintain the system. These software modules should be described in the same manner as those described in paragraph 2.2 of this document.

4.4.1 Input-Output Requirements

This paragraph shall include the requirements concerning the software and workstation information needed to support the necessary maintenance tasks. Information may include names and locations of libraries containing control language for maintenance software, and information concerning location and content of test systems for testing of software changes. Workstation information may include definitions of keyboard control keys for predefined functions. When a support system is being used, this paragraph shall reference the appropriate manual.
4.4.2 Procedures

This paragraph shall describe the method and step-by-step procedures of preparing the inputs, such as structuring and sequencing of inputs. The operations or steps to be followed in setting up, running, and terminating the maintenance task on the equipment shall be given.

4.5 Maintenance Procedures

This paragraph shall contain any special procedures required which have not been delineated elsewhere in this section. Specific information that may be appropriate for presentation would include:

- Requirements, procedures, and verification that may be necessary to maintain the system Input-output components, such as the databases/files.
- Requirements, procedures, and verification methods necessary to perform a special maintenance run.

4.6 Backup and Restore Procedures

This paragraph shall provide a description of backup and restore procedures to include ensuring system integrity subsequent to a system failure.

5. Software Module Maintenance Procedures

This section shall provide the information and the procedures necessary to maintain the individual software modules that make up the system.

5.1 Identification

This paragraph shall identify the software module to be described.

5.1.1 Description

This paragraph shall provide details and characteristics of the software module and its relationship to other software modules. Information to be provided includes the following:

5.1.1.1 Functions
This paragraph shall list and describe the functions being performed by the software module.

5.1.1.2 Input

This paragraph shall describe the input including the following:

- Input data format, e.g., data record layout or database schema.
- Source and medium of each input described above.

5.1.1.3 Processing

This paragraph shall describe the processing methodology of the software module, including:

5.1.1.3.1 Initiation procedures

This paragraph shall describe initiation procedures such as software calls and parameters as well as job control statements.

5.1.1.3.2 Major operations of the software module

This paragraph shall include a description of the major operations of the software module and may reference charts and diagrams included in an appendix. These charts and diagrams will show the general logical flow of operations, such as accepting input, accessing a databases/files, making a decision, and producing output that would be represented by segments or modules within the software module. Reference may be made to included charts and diagrams that present each major operation in more detail. The description provided in this paragraph shall be supplemented with a flow diagram depicting the functions of the software module and associated files.

5.1.1.3.3 Major Branching Conditions

This paragraph shall describe major branching conditions provided in the software module.

5.1.1.3.4 Restrictions
This paragraph shall describe restrictions that have been designed into the system with respect to the operation of this software module, any limitations on the use of the software module, and any timing requirements.

5.1.1.3.5 Exit Requirements

This paragraph shall describe exit requirements concerning termination of the operation of the software module.

5.1.1.3.6 Communications or linkage

This paragraph shall describe communications or linkage to the next logical software module.

5.1.1.3.7 External System Interfaces

This paragraph shall describe all interfaces provided by the software module with any other systems, and the procedures and controls for assuring data security and integrity relative to the source system, the interface processing, and the receiving system.

5.1.1.3.8 Hidden Processing

This paragraph shall describe any major processing by the software module that is not initiated by user actions.

5.1.1.4 Output

This paragraph shall describe format and medium of each output produced by the software module including any for use by related software modules. This description shall include a description of all screen and report formats.

5.1.1.5 Storage

This paragraph shall describe the amount and types of storage required to use the software module, the broad parameters of the storage locations needed, and any algorithm used to determine that amount.
5.1.1.6 Internal Interfaces

This paragraph shall describe the interfaces to and from this software module.

5.1.1.7 Data Structures

This paragraph shall provide details and characteristics of the data structures used within the software module. If the data description of the software module provides sufficient information, the software listing may be referenced to provide some of the information. As a minimum, the following will be included:

- Structure name or label or symbolic name.
- Purpose.
- Other software modules that use this data structure.
- Logical divisions within the data structure.
- Data structure description access paths. A graphic presentation may be used.
- For elementary items within the data structure not described under inputs, outputs, or database/files provide at least the following:
  - Name
  - Synonymous names
  - Definition
  - Unit of measure
  - Format and acceptable range of values
  - Data item names, abbreviations, and codes
  - Unique features for running this software module such as diagnostic modes

5.1.2 Software Module Requirements Cross-Reference

This paragraph shall provide a cross-reference between the functions of this software module as outlined in paragraph 5.1.1 and those cross-referenced in paragraph 2.4.

5.1.3 Conventions

This paragraph shall describe all rules, schemes, and conventions used within the software module unless they have been included in paragraph 4.1.
5.1.4 Verification Procedures

This paragraph shall describe those requirements and unique procedures necessary to check the performance of the software module. Included may also be procedures for periodic verification of the software module.

5.1.5 Error Conditions

This paragraph shall describe any unique error conditions not previously documented. This description shall include an explanation of the source of the error and recommended methods to correct it.

5.1.6 Listings

This paragraph shall contain or provide a reference to the location of the software listings. Comments appropriate to particular instructions may be made to understand and follow the listing.

5.1.7 Other Information

This paragraph shall provide other information as deemed appropriate to aid in the maintenance of the software module.

5.1.8 Commented Code

In addition to the requirements contained herein, code shall be commented to the extent practical to aid in the maintenance process.

5.2 Additional Software Modules

This paragraph shall describe the second software module using the same structure as outlined in paragraph 5.1. Additional software modules shall be described in paragraphs 5.2 through 5.n.