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AUTHORITY

SAMSO ltr 16 Aug 1973

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laboratory

ITEM TEST PLAN (COMPUTER PROGRAMS) COMPUTER PROGRAM, COMPILER, MANNED ORBITING LABORATORY, TEST ORIENTED LANGUAGE

SEQUENCE NUMBER B294

DOUGLAS
MISSILE & SPACE
SYSTEMS DIVISION

MOL

MANNED ORBITING LABORATORY

30 JANUARY 1967

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Prepared under Contract Number FO4695-67-C-0029
for MOL System Program Office,
Headquarters Base Systems Division
Air Force Systems Command
United States Air Force

IN COMPLIANCE WITH THE REQUIREMENTS OF
EXHIBIT B, DATA ITEM NUMBER

By the MOL Subdivision
Missile and Space Systems Division
Douglas Aircraft Company, Inc.
Huntington Beach, California

DOUGLAS

DATA ITEM NO. UT-109

ITEM TEST PLAN (COMPUTER PROGRAMS) COMPUTER PROGRAM, COMPILER, MANNED ORBITING LABORATORY, TEST ORIENTED LANGUAGE

Sequence No. B294

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APPROVED BY:

S. M. ROBINSON
DOUGLAS AIRCRAFT COMPANY, INC.

CONTENTS

1. Purpose

This plan establishes the detailed requirements, criteria, general methods, responsibilities, and overall planning (in accordance with Section 4 of the Part I Specification for the MOLTOL Compiler, CEI 207270A), to confirm that CEI 207270A fulfills the requirements of Section 3 of the Part I Specification, No. CG00488.

2. References

The following documents, of the exact issue shown, are referenced in this plan and relate significantly to the Item Test Effort.

a. Computer Program, Compiler, Manned Orbiting Laboratory, Test Oriented Language, Part I CEI No. 207270A, Specification No. CG00488.

b. Computer Program, Operational, All Systems Test Equipment Group, Part I CEI No. 207269A, Specification No. CG00487.

c. IFS-MOL-TBD MOL Test Oriented Language (MOLTOL) Definition.

d. All Systems Test Equipment Group, Part I CEI No. 207187 A, B, C, and D, Specification No. CP00362A, CP00378A, CP00363, CP00364.

3. Test Concepts

3.1 Background

The MOLTOL Compiler consists of two phases which may be operated separately or in tandem as a single program. The first phase (Translation) performs conversion of MOLTOL source language programs into an intermediate form suitable for later input to the second phase (Pre-execution). The Pre-execution phase will accept multiple programs and convert their intermediate forms to a form suitable for execution under control of the ASTEG Operational System Program.

3.2 Translation Phase

Testing of this phase will focus in two areas: input/output, and source language translation. In the input/output category, compatibility with external inputs will be established using typical sample inputs in each of the possible operating modes. Detailed output forms and contents are established by the Milestone 4 Data and compliance will be verified by examination.

Language translation functions of this phase are dependent upon the machine-independent portions of the Statement Definition Tables. Testing will be based on exhaustive exercise of the logic of these tables.

3.3 Pre-execution Phase

Testing will be conducted to validate:

a. Conversion to object machine language.

b. Conversion to assembly language.

c. Implementation of multiprogramming features.

d. Compatibility with external inputs and with the requirements of the ASTEG Operational System Program.

The language conversion operations will exhaustively exercise the Statement Definition Tables. Multiprogramming features and compatibility aspects of this phase are, in part, closely related to the Operational System Program and will be validated by demonstration of proper interfacing with requirements of that program.

4. Qualification Requirements and Criteria

The requirements of the Part I CEI Specification are listed by paragraph number in Table 1 opposite identification of test criteria and verification method. The referenced criteria, also listed in Table 1, are as follows:

a. Proper processing of a representative set of legal MOLTOL statements.

b. Detection of all errors in a representative set of illegal MOLTOL statements.

c. Proper processing of all possible types of change options available under control of the ASTEG Operational System Program.

d. Operation of appropriate program phases under direct control of the SDS Real-Time Monitor.

e. Operation of appropriate program phases under control of the ASTEG Operational System Program.

f. Proper processing of a representative set of MOLTOL Programs through Pre-execution phase.

g. Program listings in assembly language exhibit desired characteristics.

Table 1

REQUIREMENTS OF PART I CEI SPECIFICATION BY PARAGRAPH NUMBER

PARAGRAPH NO.	CRITERIA	VERIFICATION METHOD	TEST PHASE
3.1.1.1a through e, g	1, 2	EX	FQ
3.1.1.1f	3	EX, Obs	SY
3.1.2a (1)	4	EX	FQ
3.1.2a (2), b	5	EX	SY
3.1.2.1	1, 2	EX	PQ
3.1.2.1.1a, c, d, e	1, 2	EX	PQ
3.1.2.1.1b	1, 2	EX	SY
3.1.2.1.2	1, 2	EX	PQ
3.1.2.1.3	4	EX	PQ
3.1.2.2a	4, 6	EX	FQ
3.1.2.2b	5, 6	EX	SY
3.1.2.2.1	4, 6	EX	PQ
3.1.2.2.2	4, 6	EX	PQ
3.1.2.2.3	4, 6	EX	PQ
3.1.3	1, 2, 4	EX	TE
3.1.4	1, 2, 4	Obs	FQ
3.2.1a, c	1, 2, 4	EX	FQ
3.2.1b	1, 2, 5	EX	SY
3.2.1.2	7	EX	TE
3.3	7	EX	TE

Verification Method:

EX = Examination of program listings and/or computer output data.
Obs = Observation of operator action.

Test Phase:

TE = Test and evaluation data.
PQ = Preliminary qualification.
FQ = Formal qualification.
SY = Systems test.

Test Criteria:

1. Proper processing of a representative set of legal MOLTOL statements.
2. Detection of all errors in a representative set of illegal MOLTOL statements.
3. Proper processing of all possible types of change options available under control of the ASTEG Operational System Program.
4. Operation of appropriate program phases under control of the SDS Real-Time Monitor.
5. Operation of appropriate program phases under control of the ASTEG Operational System Program.
6. Proper processing of a representative set of MOLTOL programs through Pre-execution phase.
7. Program listings in assembly language exhibit desired characteristics.

5. Qualification Objectives/Test Phase Summary

5.1 Requirements to be Satisfied by Computer Programming Test and Evaluation Data

Requirements of Specification Paragraphs 3.1.3, 3.2.1.2, and 3.3 will be satisfied by the use of program listings, disc and tape dumps, and normal outputs from sample source language programs.

5.2 Requirements to be Satisfied by Preliminary Qualification Testing

a. Specification Paragraphs

(1) Functional (3.1.2.1).

(2) Source and Type of Inputs (3.1.2.1.1 a, c, d, e).

(3) Destination and Type of Inputs (3.1.2.1.2).

(4) Information Processing (3.1.2.1.3).

(5) Source and Type of Inputs, Pre-execution Phase (3.1.2.2.1).

(6) Destination and Type of Outputs, Pre-execution Phase (3.1.2.2.2).

(7) Information Processing, Pre-execution Phase (3.1.2.2.3).

5.3 Requirements to be Satisfied by Formal Qualification Testing

a. Specification Paragraphs

(1) System Requirements (3.1.1. a-e, g).

(2) Operating Requirements (3.1.2, partial).

(3) Functional, Pre-execution Phase (3.1.2.2, partial).

(4) Human Performance (3.1.4).

(5) Interface Requirements (3.2.1 a, c).

5.4 Requirements to be Satisfied by System Testing

a. Specification Paragraphs

(1) System Requirements (3.1.1 f).

(2) Operating Requirements (3.1.2, partial).

(3) Functional, Pre-execution Phase (3.1.2.2, partial).

(4) Interface Requirements (3.2.1b).

6. Item Qualification Test Implementation

6.1 Preliminary Qualification Tests

a. Location and Schedule

These tests shall be performed at the System Integration Laboratory, Douglas Aircraft Co., MSSD, Huntington Beach, California, and shall be completed prior to completion of Milestone 5.

b. Limitations and General Comments

The standard ASTEG configuration of the SDS 9300 computer and peripheral equipment in the System Integration Laboratory (SIL) shall be used for all testing. (See ASTEG CEI Specification.)

c. Preparation of Inputs

Inputs shall be prepared by the Contractor using existing interfacing programs where applicable, and using normal operational procedures where manually prepared inputs are required. In those cases where criteria 1, 2, 4, 5, and 6 of Table 1 are employed, the inputs shall be in the form of series of MOLTOL source language statements whose content is based on the provisions of the MOLTOL language description. When criterion 3 is employed, the inputs will be made manually from a pre-established list of statements formulated as in the above case. The necessity and sufficiency of the inputs for the testing task shall be open to review by the MOL/SPO and General Electric Company.

d. Conduct of Tests

The tests shall be conducted by the Contractor, who will supply all directing, operating, and data recording personnel. The Contractor will attest to the proper conduct of the tests in accord with the Item Test Procedures. MOL/SPO and General Electric Company personnel may observe any phase of test conduct.

e. Analysis of Results

The Contractor shall analyze the test results and provide personnel for this activity. Data and analytical tools shall be available for review by MOL/SPO and General Electric Company personnel. In general, since compiler outputs

interface with the ASTEG Operational System Program, the input requirements of the OSP will provide the standard formats and contents sought in the compiler output.

f. Summarization of Equipment and Computer Program Requirements

The SIL equipment complement and normal EAM support equipment will be required. No separate additional programs, other than those forming parts of the SIL software complement, will be required. The ASTEG Operational System Program is the major element of the SIL software required for testing. The ASTEG Operational System Program will not be in final configuration at the time of this testing, but interfacing details will be identified at the time of testing to insure proper change control.

g. Summarization of Personnel Requirements

In addition to the normal complement of SIL operating personnel, two data recording personnel/inspectors will be required to record and verify certain test data, where observation and identification of test results are necessary.

6.2 Formal Qualification Tests

All subparagraphs are identical with those under Subparagraph 6.1.

7. Control and Reporting Procedures

7.1 Control of the Item Test Program

Formal control of the Item Test Program shall be in accordance with Paragraph 4.2 of Computer Program Development and Configuration Management Exhibit (SAFSL Exhibit 20012) dated 18 August 1966.

In the event a test failure occurs during the sequence of Formal Qualification, the test shall be stopped and the SPO notified in writing of plans for test continuation. The contractors plan may be implemented if no disapproval by SPO is expressed within 72 hours of receipt of contractors plans. Another test specimen may be substituted with SPO approval provided all previously conducted tests which may have contributed to the failure are repeated on the substituted test specimen.

7.2 Documentation of Test Procedures

The item test procedures shall be prepared and provided as specified in SAFSL Exhibit 20012 dated 18 August 1966.

7.3 Documentation of Test Reports

Test reports shall be in conformance with the format and control specified in SAFSL Exhibit 20012 dated 18 August 1966.

After completion of testing, coincident with the Item delivery, Douglas shall provide a Version Description Document in accordance with SAFSL Exhibit 20012 dated 18 August 1966.

First Article Configuration Inspection shall begin approximately 26 December 1967.