

## DATA ITEM DESCRIPTION

**Title:** RELIABILITY AND MAINTAINABILITY TEST PLAN

**Number:** DI-SESS-81585B

**AMSC Number:** N9585

**DTIC Applicable:** Yes

Defense Technical Information Center

ATTN: DTIC-

8725 John J. Kingman Road, Suite 0944

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**Preparing Activity:** AS

**Applicable Forms:** N/A

**Approval Date:** 20151001

**Limitation:** No

**GIDEP Applicable:** Yes

GIDEP Operations Center

Naval Warfare Assessment Center

P. O. Box 8000

Corona, CA 91718-8000

**Project Number:** NDTI-2015-002

### Use/relationship:

The Reliability and Maintainability (R&M) Test Plan describes R&M tests and demonstrations at the equipment, subsystem and system levels (including Government developmental and operational tests), their purpose, and schedule. It identifies items to be tested, the test equipment and support requirements, the test conditions to be imposed, the parameters to be measured, and the criteria against which the test results will be measured. This document will be used by the procuring activity for review, approval, and subsequent surveillance and evaluation of the contractor's R&M test and demonstration program.

This Data Item Description (DID) contains the format, intended use information, and content preparation instructions for the data product generated by the specific and discrete task described in the solicitation, and should be tailored appropriately.

### Requirements:

1. Format. The R&M Test Plan shall be in contractor's format.
2. Content. The R&M Test Plan shall identify and describe the planned contractor activities for implementation of R&M (Maintainability includes Built-In-Test) testing and demonstration throughout the integrated test program. The R&M Test Plan shall include the following:
  - a. A complete listing of all tests and demonstrations to be conducted for the purpose of obtaining data for use in reliability and/or maintainability analysis and evaluation of the contract item or constituent elements thereof. This shall include all tests to be conducted by the Government, Contractor, Subcontractors, and Vendors participating in the program.
  - b. A description of the overall test schedule (including time for retest, if required) and resources, including person-months. Include a figure that displays (in contractor format) the integrated planning and timing for Government, prime contractor, and subcontractor and vendor tests. A sample schedule is shown in Figure 1.

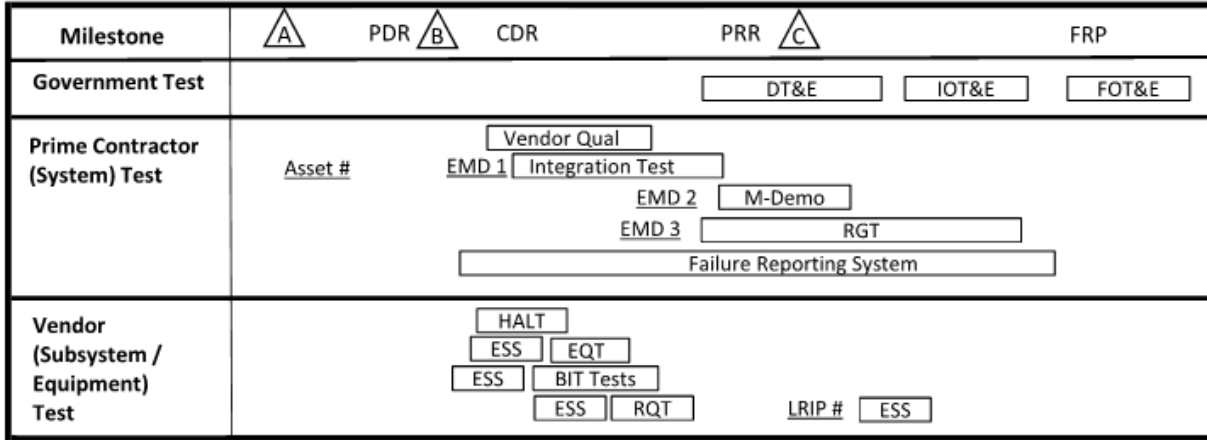
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- c. A description of the adequacy (i.e. breadth of testing, timing of testing, stress to system) of R&M test provisions for achieving requirements.
- d. Reliability growth planning curve(s) that was integrated with the program's master schedule, plotting reliability against test time (or life units) to meet the quantitative requirement(s) specified in the solicitation or contract. Also, include the rationale for the initial reliability, planned growth rate (growth rate should be tied to realistic management metrics governing the fraction of initial failure rate to be addressed by corrective actions along with the effectiveness of the corrective action), test resources and growth model used. Sample system level reliability growth planning curve is shown in Figure 2.
- e. Describe data analysis methods, analytical procedures to be employed, data reduction routines, and reliability growth techniques used to assess demonstrated and projected reliability.
- f. Summarize R&M engineering involvement in applicable tests or demonstrations from equipment (i.e. qualification, accelerated life tests, BIT demonstrations), subsystem integration tests through system-level performance tests. Delineate responsibilities with regard to R&M engineering, for test design, test plan review and approval, test performance, data reduction, data analysis, and failure reporting, analysis, and corrective action requirements.
- g. Define applicable R&M parameter measurements, operating time data, test conditions, and failure and BIT information that should be collected during existing tests in the overall test plan to achieve maximum practical integration of R&M test requirements.
- h. Attach preliminary applicable data collection sheets and R&M scoring and evaluation criteria (i.e., Failure Definition and Scoring Criteria), including the corrective action evaluation methodology that will be used to compute R&M performance based on the data collected during testing.
- i. A list of test reports to be issued as a result of planned tests or demonstrations.
- j. For each test or demonstration listed, provide a description of:
  - i. The test or demonstration objectives and quantitative goals or requirements to be demonstrated, including specific references to the applicable sections of the specification
  - ii. The quantity, configuration, and identification of items to be tested, including hardware and software design level and maturity.
  - iii. The test or demonstration methods planned
  - iv. The test conditions, including the duty cycle, and environmental, operational, and performance profiles
  - v. The mode(s) of operation of the items under test, including configuration and mission requirements
  - vi. The test duration or sample size.
  - vii. The statistical R&M test design criteria, as appropriate, including decision criteria (fail and accept criteria) if applicable.
  - viii. The measurements to be recorded and the provisions for recording measurement data required for R&M evaluation
  - ix. The test conduct ground rules and system interface boundaries
  - x. Adequacy of the item support elements and an estimate of their effect on the item maintainability.
  - xi. Description of support equipment, tools and test equipment, technical manuals to be used, spares and consumables and any applicable safety and calibration equipment. Test

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facility descriptions and requirements, including provisions for voltage, temperature, and vibration

- xii. The Government furnished property requirements and impact
- xiii. List of test procedures to be used
- xiv. Failure Reporting, Analysis and Corrective Action (FRACAS) system to be used



**Figure 1. Notional Integrated Test Plan**

**Notes:**

- ALT – Accelerated Life Test
- BIT – Built-in Test
- CDR – Critical Design Review
- DT&E – Development Test and Evaluation
- EDM – Engineering Development Model
- EQT – Environmental Qualification Test
- ESS – Environmental Stress Screening
- Flt Test – Flight Test
- FOT&E – Follow-on Operational Test and Evaluation
- FRP – Full Rate Production
- HALT – Highly Accelerated Life Test
- IOT&E – Initial Operational Test and Evaluation
- LRIP – Low Rate Initial Production
- M-Demo – Maintainability (and Built-in Test) Demonstration
- PDR – Preliminary Design Review
- PRAT - Production Reliability Acceptance Test
- PRR – Production Readiness Review
- RGT – Reliability Growth Test
- RQT – Reliability Qualification Test

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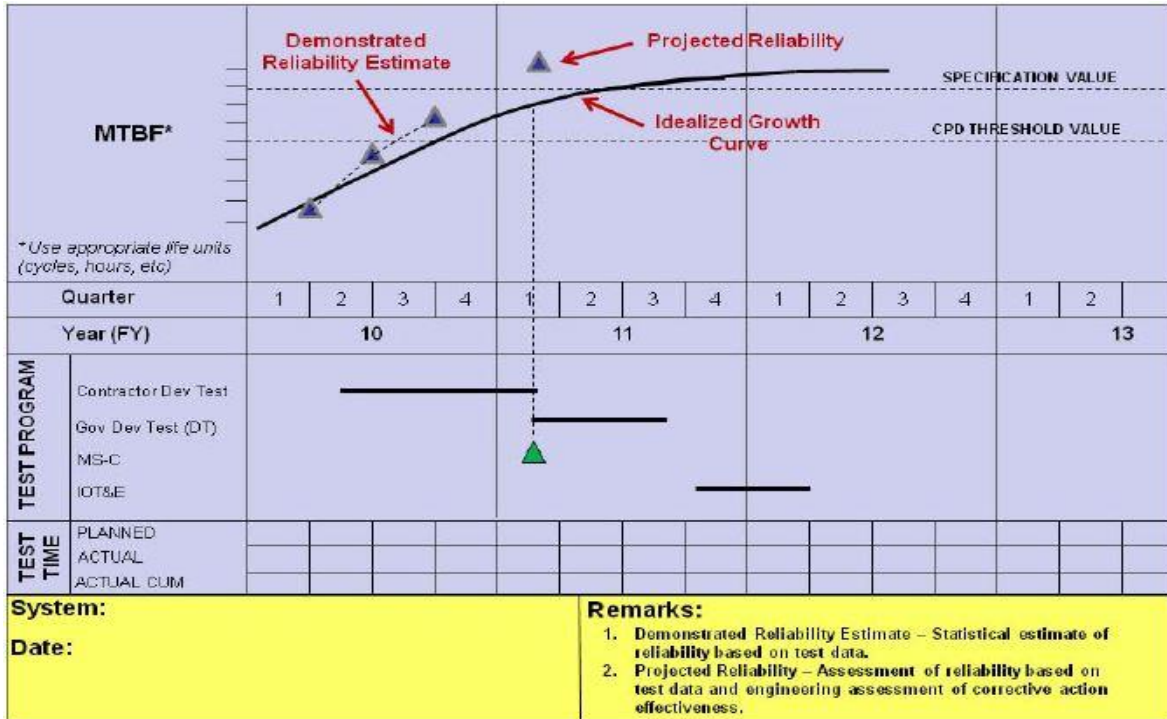


Figure 2. Sample EMD Test Sequence Growth Curve

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