

ABSTRACT

TAILORING AND TEST EFFECTIVENESS

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The U.S. has been building and testing spacecraft for thirty-five years. The results of the many tests performed are often lost in the archives of individual company records. It is these mostly unanalyzed results that provide the intelligence about effective tailoring of requirements.

JPL has been performing a study, entitled "Environmental Test Effectiveness Analyses (ETEA)", to uncover the messages that JPL test history yields. This ongoing study is funded by NASA Headquarters Code QT with the express purpose of better understanding which aspects of the testing program yield the necessary qualifications and which aspects of testing have the lower yield. In other words, where and how should testing be performed to maximize cost effective return.

The information is contained in a document available for dissemination within the test community for consideration in test tailoring. This document contains twenty-two specific topics as of November 1993 and will be continually updated as new topics are studied and/or new information alters the conclusions. Each topic could be the subject for a paper in its own right; however, the content of this paper will be summaries of the topics contained in the book as of April 1994. A list of the topics to be addressed in the paper is attached. Presentation in the symposium will limit the number and time available to discuss each topic. However, exposure to the total list of available information and discussion of six or seven of the topics of most interest would be achievable. This study is very focused on test results and the validation of test techniques currently employed or determining appropriate shifts in the test program to more appropriate approaches. There is a possibility that several hundred copies of the document might be made available to attendees if the study effort sponsor agrees.

ENVIRONMENTAL TEST EFFECTIVENESS ANALYSIS TREND REPORTS (ETEAs)
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TETA No.	RELEASE DATE	TITLE
TO-0001 Rev A	January 20, 1992	Powered on Assembly Level Vibration Testing on the Voyager and Galileo Projects
TO-0002	January 20, 1992	Comparison of JPL Procured Flight Hardware with System Contractor Procured Flight Hardware
TO-0003	January 24, 1992	Environmental Test Effectiveness as indicated by Voyager and Galileo Anomalies
TO-0004	February 10, 1992	Comparison of Voyager and Galileo Problem/Failures on Electrical and Electronic Subsystems
TO-0005	April 15, 1992	EMC Testing Significance
TO-0006	April 28, 1992	Effectiveness of Galileo Assembly Level Dynamic Tests
TO-0007	April 15, 1992	Relationship of Engineering Changes to Waivers in the Resolution of EMC-Test-Related Problems
TO-0008	April 15, 1992	Problem/Failure Cause
TO-0009	April 15, 1992	Test Effectiveness and Reliability Growth in JPL Programs
TO-0010	December 14, 1992	Distribution of the Causes of Anomalies Occurring During Thermal/Vacuum Tests
TO-0011	December 14, 1992	Effectiveness of Vacuum Environment in the Thermal/Vacuum Test
TO-0012	December 14, 1992	Assessment of EMI Grounding Problems Encountered in Flight Hardware Prior to System Level EMI Tests
TO-0013	December 14, 1992	Impact of Hardware Complexity on Problem Failures
TO-0014	December 14, 1992	Problem/Failure History vs. Origin of Flight Hardware
TO-0015	December 14, 1992	Closure Time for Design Related PFRs
TO-0016	July 6, 1993	Adequacy of Prelaunch Testing Based on Early Flight Anomalies

TO-0017	September 9, 1993	Correlation of Advances in Spacecraft Digital Technology with EMC Test Failure Rate
TO-0018	July 6, 1993	Trend of Defects Observed During Galileo Assembly-Level Dynamics Tests
TO-0019	July 6, 1993	Effectiveness of Galileo Vibration Assembly-Level Tests Vs. Number of Axes Tested
TO-0020	September 9, 1993	EMC Testing Failures - Waivers Versus Design Changes
TO-0021	September 9, 1993	The Use of Ground Testing to Reduce Potential Inflight Anomalies
TO-0022	September 9, 1993	EMI Anomalies Encountered Prior to Acceptance Testing