SWI 1.10
Testing Process

May 2009

Approved by:

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Revision Record

Version	Date	Author(s)	Section(s) Affected/Reason for Revision
Baseline	9/1/98	A. Spinler, O. Vela	Original Document.
A	12/04	L. Stokes	Updates throughout document to reflect current process.
B	04/05	C. Fritz	Added section 9.0 for SDTS EVA Trainer TRRB requirements and board membership.
C	05/09	C. G. Fritz	Updates throughout document to reflect current process.

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1 PURPOSE

This procedure establishes a system for performing testing in the Six-Degree-Of-Freedom Dynamic Test System (SDTS). Testing includes development and verification testing of customer supplied Test Articles (TAs) and other testing requirements, as requested.

2 SCOPE

This procedure applies to all SDTS testing operations and equipment. The procedure provides an overview of testing performed in the SDTS including test identification requirements, test planning and procedure development, test and performance inspection, test data analysis, and test report generation.

3 ACRONYMS

ANR	Audit Nonconforming Records
SR&SD	Software, Robotics, & Simulation Division
CB	Crew Office
CR	Change Request
DCS	Digital Control System
DR	Discrepancy Report
DSTB	Dynamic Systems Test Branch
DTP	Detailed Test Procedure
FMEA	Failure Modes & Effects Analysis
GSE	Ground Support Equipment
HA	Hazard Analysis
ISO	International Organization for Standardization
JCAR	JSC Corrective Action Request
JSA	Job Safety Analysis
JSC	Johnson Space Center
MOU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
NASA	National Aeronautics & Space Administration
OIR	Open Items Review
QAS	Quality Assurance Specialist

SDTS	Six-Degrees-Of-Freedom Dynamic Test System
SLP	System Level Procedures
SR&QA	Safety, Reliability and Quality Assurance
SM	SDTS Test Manager
TA	Test Article
TD	Test Director
TPS	Task Performance Sheet
TR	Test Requester
TRE	Test Requirement Evaluation
TREB	Test Requirement Evaluation Board
TRR	Test Readiness Review
TRRB	Test Readiness Review Board
TSO	Test Safety Officer
WI	Work Instructions

4 DEFINITIONS

Customer Agreement: the agreement formed between Software, Robotics, and Simulation Division (SR&SD) concerning SDTS testing services and the test requester (TR). This may be in any form such as a Memorandum of Understanding (MOU) as determined by the SR&SD Chief.

SDTS Manager: Manager responsible for supplying the test product. The SDTS Manager (SM) provides technical leadership in reviewing the Test Plan, creating DTPs, and ensuring the successful delivery of the TR requested testing. The SM coordinates and communicates with the TR to define test requirements, funding, and any other related items in obtaining the SDTS for testing purposes.

Six-Degree-Of-Freedom Dynamic Test System: Ground Support Equipment (GSE) used for testing, training, and technology development. The SDTS is a closed loop dynamic testing system that combines high fidelity test articles and software models to produce an integrated simulation of two-body contact in free space.

Test Article: Item being tested; includes hardware, software, procedures, etc.

Test Director: Central authority with overall responsibility for all aspects of the test. The test director (TD) leads the testing activity insuring procedures are carried out per the DTPs and SDTS Work Instructions (WIs). The SM may function as a TD when limited personnel are available. The TD performs the coordination of activities with the TR, Digital Control System Operator (DCS) and SDTS Technicians.

Testing Product: A safe and effective test which produces test data and operational experience that meets or exceeds the TR requirements. The results of activities or processes in the SDTS. The SDTS provides a testing service, support for operation of the SDTS, review of Test Plan, DTPs, development and expansion of capabilities, testing data that meets or exceeds the TR requirements, data to meet quality standards and demonstrations.

Test Readiness Review: Review in which testing organization, TR, and test support organizations demonstrate the readiness of their equipment (including software), personnel, and procedures for test operations and for the risk involved in performance of the test.

Test Requester: The customer requesting use of the SDTS facility.

Test Requirements Evaluation: Evaluation in which testing organization, requester, and supporting organizations, as required, review the test requirements including hazards, the scope of work, resources required to respond to the requirements, and schedule.

Test Safety Officer: The Quality Assurance (SR&QA) Office or JSC/NASA designated safety representative for the test activities.

Test Team: The operators of SDTS equipment, the test safety representative, and the TD.

Verification: Confirmation by examination and provision of objective evidence that specified requirements have been fulfilled. Verification concerns the process of examining the result of a given activity to determine conformity with the stated requirements for that activity.

Validation: Validation follows successful verification. Validation concerns the process of examining a product to determine conformity with user needs. Validation may consist of calculations, analysis, simulation, inspection, and testing. Multiple validations may be carried out if there are different intended uses.

5 RECORDS, REPORTS AND FORMS

EA-004 Requirements Change Sheet
JSC Form 90 Test Request
JSC Form 90ACSTD Test Requirements Worksheet

JSC Form 1225	Task Performance Sheet
JSC Form 1225a	Task Performance Sheet-Instructions
JSC Form 2176	Discrepancy Report/Material Review Record
JSC Form 2176a	Discrepancy Report/Material Review Record-Continuation Sheet
SDTS Form 10.1	SDTS Test Customer Survey
STB-4	Test Readiness Review Board (Approval Sheet)
STB-14	Test Procedure Deviation Sheet

The Test Plan, DTP, and Test Report are identified by a unique document number for each particular test.

Other records may also be generated in the course of SDTS testing operations such as design review records, "As-run" TA drawing/records, test instrumentation records, and test facility configuration records.

6 REFERENCES

EA-WI-024	General Operating Procedures Manual For EA Testing Facilities
JPG 1700.1	JSC Safety and Health Handbook
JPR 5335.3	Quality Manual
JSC SLP 4.10	Inspection & Testing
SWI 1.13	Control of Non-conforming Product and Corrective Action
SWI 1.7	Control of Customer Supplied Product
SWI 10.1	SDTS EVA Trainer Test Rules
SWI 5.3	SDTS DCS Operations
SR&SD-05-001	Integrated Hazard Analysis for SDTS EVA Trainer
SVMF-OCC-F0064	Facility Utilization Request (FUR)
SR&SD-01-035	SDTS Hazard Analysis

7 RESPONSIBILITIES

The TR is generally responsible for the following as agreed to in the customer agreement and/or Test Plan:

a) JSC Form 90, *Test Request* and detailed test requirements
b) Test Plan
c) TA and related equipment , Interface Control Drawings and/or schematics including checkout, operating procedures, and handling instructions as well as delivery to and from SDTS
d) Provide a technical expert who has a thorough knowledge of the TA and how it will respond to the test environment.

e) Funding
f) TA and related equipment Failure Modes & Effects Analysis (FMEA) and Hazard Analyses (HA)
g) Structural diagram of any equipment to be manufactured
h) Completion of SDTS Test Customer Survey

The TR is responsible for all discrepancies as well as the disposition of those discrepancies concerning the TA meeting test objectives or design requirements. The process for Control of Nonconforming product, Corrective and Preventive action, Inspection and Test Status concerning the TA lies solely with the TR.

The SDTS is generally responsible for the following as agreed to in the customer agreement and/or Test Plan:

a) Test Plan Support
b) DTPs
c) Hardware setup
d) Facility support setup
e) Equipment modifications
f) Test Readiness Review (TRR)
g) Facility operations
h) Test verification and validation
i) Test Report including test data
j) Test data analysis
k) Coordination of SR&QA support

The SM coordinates and communicates with the TR to define test requirements, funding, schedule, safety, and any other related items in obtaining the SDTS for testing purposes. The SM assigns a TD for technical review of the request, chairs the Test Requirement Evaluation Board
(TREB), provides approval to begin test operations and approves the Test Report.

The SM interacts with the TR and provides technical leadership in reviewing the Test Plan, creating DTPs, and ensuring the successful and safe operation and delivery of the TR requested testing.

The TD coordinates all test personnel during the safe performance of SDTS operations insuring procedures are carried out per the DTPs and SWIs. The TD ensures certified personnel are at all duty stations requiring certification during all operations. The SM may function as the TD when limited personnel are available.

The test team is responsible for the safe performance of their duties in compliance with the SWIs and the DTPs. All test team personnel have the responsible and authority for calling an abort when some aspect of operation threatens the safety of the TA, test equipment, or test team.

When performing coordinated operations, the test team will be available via the SDTS communication system.

8 PROCEDURE

8.1 Request Phase

1. After completion of a signed customer agreement with SR&SD, the TR submits JSC Form 90, *Test Request*, to the SM. The SM logs the request in the SDTS log-book with a unique number. Parties shall use the unique number for all communication during all test phases, anomalies discovered, and in any reporting about the test.

2. The SM forwards the TR a template Test Plan for the TR to complete. The Test Plan details the basic test methodology including operational considerations; test article description including drawings and parts lists; safety considerations; instrumentation and data processing requirements; facilities requirements; test schedule, constraints, requirements, objectives, and report requirements.

3. The SM and TR meet as required for an initial requirement review and, if necessary, complete the Test Plan. During the development of the Test Plan, the SM evaluates the test request for feasibility. The SM evaluates the test objective, schedule, hazards and special test requirements for adequate definition.

4. The SM reviews the Test Plan to re-evaluate the scope of required resources, availability of the test facility and hazards that relate to the test requirements. Their effort serves to ensure all test requirements defined in the Test Plan are clear and attainable.

5. Conduct a TREB with membership consisting of the SM, TR, and others as necessary. The board reviews the test impacts, resources required, potential hazards, as well as hazards that have not been approved in previous test operations, and the proposed schedule. The Test Plan will serve as a quality record of this step. The TREB will make one of the following determinations:

a) Approve the proposed Test Plan. The Test Plan is approved by the SM which provides the authority to proceed, empower resources, release of as-scoped

funding, permit the project schedule to enter division schedule and start test preparation phase.

b) Modify/Redefine the Test Plan after deliberation with the requester. This decision should be based on specific safety, performance, cost, or schedule requirements that can not be met or that are unclear. Once the agreed upon revisions are made, the SM may approve the Test Plan without holding another TREB.

c) Reject the Test Plan. Again, this decision should be based on the fact that the required service to the TR could not be met. The SM files a copy of a memo describing the decision and reasons in the project files. The TR may decide to seek alternate approaches and submit a revised request.

6. Following release of the Test Plan, amendments to the Test Plan and all changes impacting the test requirements shall be noted in the EA-004, *Requirements Change Sheet*. The form is signed by the TR and the SM to authorize implementation. Any changes to testing requirements that cause 'substantial-revision' to the test, require a new TREB approval.

8.2 Test Preparation Phase and Work-site Integration

1. The SM serves as the point of contact, schedules test status meetings with test team, requesters and safety. The SM coordinates test planning and implementation of test requirements. Steps 2 through 5 in section 8.2 are carried out simultaneously.

2. Arrange delivery of the TA. Once the TA is delivered, follow SWI 1.7, *Control of Customer Supplied Product*, concerning the TA.

3. The SM in conjunction with the TD and test team write the DTP necessary to carry out the testing objectives outlined in the Test Plan. The DTP shall specify details pertaining to test execution and reference applicable SDTS procedures. It includes:

a) Step by step TA and system operating procedures.
b) Test configuration, including diagrams and schematics as applicable.
c) Test conditions, constraints, and prerequisites.
d) Provisions for quality assurance of specified steps.
e) Abort or back-out procedures as applicable.
f) Data acquisition and processing procedures.

The DTP shall require concurrence from the TR, TD, SM, JSC safety representative (if applicable) with approval and release by SDTS SM.

4. The SM verifies the configuration of software and hardware for verification and testing.

5. Demonstrate the test systems function as planned using approved procedures as applicable. The results of this step is documented in the DTP or a report, and saved as a quality record. Any system failure is documented in a discrepancy report (DR) per SWI 1.13, *Control of Non-conforming Product and Corrective Action.*

6. Conduct a TRR: The TRR includes the Facility Manager, SM, TD, TR, the JSC safety representative, and others as applicable prior to the initiation of testing to assure that the test preparations are adequate to meet the test objectives specified by the customer TR. The SM will provide the TRR the following information concerning the SDTS for their review:

    a) Status of TA: This includes test article receiving inspection, configuration, integration, condition, storage, and handling.
    b) Status of any open DRs
    c) Status of any open JSC Corrective Action Request (JCARs) and/or Audit Nonconforming Records (ANRs)
    d) Status of any open CRs.
    e) Status of any open Task Performance Sheets (TPSs)
    f) The current revision number of running software. If there are no software changes in work, then the current software revision will be defined as the baseline by the TRR board. If there are still software changes being made, then the TRR board must decide if they want to proceed with the current revision or wait until software modifications are complete.
    g) Results of system verification testing.
    h) Work Site setup status including pressure system certification, test measurement equipment calibration, camera positioning, test article, etc.
    i) Status of SDTS operator certification.
    j) Any additional information which may affect the quality of the test such as status of SWIs and Operating Procedures.
    k) An Integrated Hazard Analysis (HA) is an identification of any open hazards.

The TR will provide the TRR the following information concerning the TA:

    a) Status of any open DRs
    b) Status of any open JCARs and/or ANRs
    c) Status of any open CRs
    d) Status of any open TPSs
    e) The current revision number of running software. If there are no software changes in the works then the current software revision will be defined as the

baseline by the TRR board. If there are still software changes being made, then the TRR board must decide if they want to proceed with the current revision or wait until software modifications are complete.

f) Any additional information which may affect the quality.
g) A TA HA is an identification of any open hazards.

Special consideration will be given to assure that specified test objectives can be achieved and that the procedures are adequate concerning all risks involved. The TRR Record will document the concurrence of the TRR Chair and participants that the SDTS is ready to conduct testing and identify any risks associated with testing which may be waived or accepted by the all interested parties. Any discrepancies at the time of the TRR must be specifically waived by the TRR board or resolved prior to testing. The SM shall certify on the TRR Record that all items required to be accomplished prior to test initiation have been completed. The chair then verifies the final closure of the issues on the TRR Record. At this time, the test is approved to commence.

8.3 Test Phase

1. The TD initiates the test phase per the approved DTP. Testing is conducted in compliance with the JPG 1700.1, *JSC Safety and Health Handbook*.

2. Changes to the DTP made during testing require the use of STB-14, *Test Procedure Deviation Sheets*. These forms require the signature of the SM with a concurrence signature provided by the TR. Any revision to the DTP will be documented in the Test Report.

3. Any discrepancies noted during testing concerning the SDTS equipment will be documented and dispositioned in a DR per SWI 1.13, *Control of Non-conforming Product and Corrective Action*. Discrepancies concerning the TA meeting test objectives will be documented in the test report and dispositioned by the TR per their processes.

8.4 Post-Test Phase

1. TD reviews test anomalies identified during the test and verify that all have been documented. Make an initial determination of the effect of the anomalies on test results.

2. TD provides a test debriefing. An informal test debriefing for the TR and SM may be conducted within 30 minutes after testing has been completed. The purpose of the debriefing is to summarize observed results from hardware testing.

3. TD performs test verification. Review test results to determine whether the test objectives were met. Review test data with the TR and determine whether corrections are necessary. If test results or data are not satisfactory, determine whether it is necessary to repeat the test. TD notifies the SM and TR of test re-run and obtains approval using form STB-14, *Test Procedure Deviation Sheet.* SM adjusts testing schedule to accommodate the test.

4. Within two weeks after testing has been completed, a quick look will be performed by the SM before any documented results are released to inform the TR of any issues or concerns that arose during the test series. The quick look may be conducted by phone or e-mail.

5. TD performs test validation. The TD will prepare a Test Report following the completion of testing activities to the extent requested in the Test Plan. At a minimum, the Test Report contains all test data. Upon completion of the report, the TD and SM sign that Test Report.

6. Whenever practical, package the TA per SWI 1.7, *Control of Customer Supplied Product* and notify the TR to remove the TA from the SDTS area.

7. TD delivers the test report to the TR. Test Data is maintained at SDTS for one year after completion of the testing, or as requested by the TR.

8. The TR signs their concurrence to the information provided in the Test Report and returns it to the SM along with a completed SDTS Test Customer Survey.

9. The SM approves and distributes the Test Report. The Test Report is maintained as a quality record of the product delivered to the TR.

9 TEST/TRAINING READINESS REVIEW BOARD CRITERIA

9.1 Purpose

This procedure establishes the TRR policy for the SDTS. It defines when a formal or informal TRR is required; identifies the personnel and functional organization representation comprised by the TRRB; specifies the duties and responsibilities of the TRRB; and determines the TRRB documentation requirements.

9.2 Scope

This procedure is applicable to all hardware evaluations, software evaluations, tests, training exercises, training articles, and hardware/software modifications performed in or used with the SDTS located in the JSC building 9NE.

9.3 General

A TRR will be conducted in the SDTS to ensure readiness of the facility and/or test articles relative to established test requirements and objectives. The TRRB must give approval before conducting test/training activities using a new or revised training article or configuration.

The TRRB reviews the status of the test article/payload, test facility and test documentation and assures they are in conformance with all applicable management instructions, safety standards, and test requirements.

The Test/Training Readiness Review Board

- Assures that the test facility and test article are ready for test/training before authorizing the test team to proceed.
- Assures that all controls to mitigate risk are in place at start of test/training operations.
- Assures that all critical data is adequately displayed in an easily comprehended graphic format.
- Assures that adequate visual/video coverage exists to readily recognize and assess test problems. The degree of coverage shall be commensurate with potential risk.

9.4 Informal TRRB

An informal TRR may be used prior to routine test and training sessions or to review minor modifications completed on previously TRR payloads. The informal TRR consists of a pretest/training briefing. The pre-test/training briefing will include appropriate TRRB members (e.g., TD, SDTS Lead Engineer, Contractor Safety Representative, Contractor QAS Representative, ER/SDTS Manager, and NS/Safety Representative). The pretest briefing will determine that the test/training and safety procedures are in place, hazards are identified and understood, deviations are explicit, and hardware and software configurations are proper to support the test/training event.

Documentation requirements for the informal TRR consist of:

- A completed TRRB Agenda/Checklist that verifies all contents of the TRR request have been adequately reviewed and accepted (ATTACHMENT 2).

- A completed TRRB Approval form that signifies the test has been successfully reviewed and approved and the SDTS is ready to support. (ATTACHMENT 3).

9.5 Formal TRRB

The TRRB is responsible for examining the data presented, evaluating the issues, assigning action items for additional information, documentation, etc., verifying that all action item requirements are met and action items closed, and certifying that the upgraded, modified, or new facility training article, evaluation, or training exercise is either ready for training or acceptable for testing/training. A formal TRR must be conducted under the cognizance of a TRRB before the functional implementation of the following:

- Addition of new hardware, software, or procedures.

- Modification of existing SDTS hardware and/or software.

- First-time use of new payloads and major modified payloads.

- Activities not listed in the integrated HA.

- An unforeseen circumstance or test/training requirement not listed in the SDTS integrated hazard analysis that is determined to be hazardous by NASA or contractor safety representatives.

Documentation requirements for the formal TRR consist of:

- A completed TRRB Agenda/Checklist that verifies all contents of the TRR request have been adequately reviewed and accepted (ATTACHMENT 2).

- A completed TRRB Approval form that signifies the test has been successfully reviewed and approved and the SDTS is ready to support (ATTACHMENT 3).

- All updated facility documentation and software rebaselines affected by the TRRB.

9.6 TRRB Preparation Phase

Test/training status meetings shall be held for formal TRRs during the pretest phase to facilitate preparation of required documentation and the facility.

An Open Items Review (OIR) will be held to identify outstanding quality control paperwork, whether TPSs or DRs, that may be constraints to test/training operations. The TD will conduct the OIR. All areas under test consideration will have the status of open paperwork for that area checked to determine whether it is a constraint to testing, not a constraint to testing or not applicable to the test/training event.

The OIR will include the following members:

- Test Director (chair)
- Contractor SDTS Lead Engineer
- Facility mechanical engineer
- Facility electrical engineer
- Facility software engineer
- Contractor Safety and Quality Assurance Specialist (QAS) representative

9.7 TRRB Member Duties and Responsibilities

TRRB CHAIRPERSON: The TRRB Chairperson is responsible for defining the TRR agenda, for providing notification to all TRRB members. The TRRB chairperson is also responsible for completion of the TRRB Agenda/Checklist, ATTACHMENT 2 of this document during the TRRB. The TRRB Chairperson is responsible for the issue of TRRB action items and for verification of closure for Open actions assigned during the TRRB prior to the associated test/training event.

TEST DIRECTOR: The TD is responsible for coordinating with the ER/SDTS Manager, NS/Safety Representative, Contractor Safety, Contractor Quality as well as facility software and hardware engineers to support Informal TRRBs. The TD is responsible for completion of the SDTS Pretest Checklist per SDTS SWI 5.3, *SDTS DCS Operations*. The TD is also responsible for verification of closure for Open actions assigned during the TRRB prior to the associated test/training event per ATTACHMENT 3.

FACILITY USER REPRESENTATIVE: The Facility User Representative is responsible for compiling the following documentation throughout the pretest/training preparation phase:

- Facility Utilization Form (SVMF-OCC-F0064) detailing facility training and configuration setup requirements.

- For providing a DTP or TPS including test/training objectives, operating procedures to accomplish the test, hazards and controls, equipment and operating limits.

NASA TEST SAFETY OFFICER (TSO): The NASA TSO serves as an advisor to the board and ensures by reviewing the associated HA and TRRB data package that proper controls are in place to conduct the test/training event. The safety officer approves all hazardous operations regarding safety issues.

Contractor QUALITY ASSURANCE SPECIALIST REPRESENTATIVE: The QAS representative has the responsibility to verify that the test article and the facility are ready for the test by assuring that any constraining DRs or TPSs are closed. He maintains the official list of Open items to be addressed prior to start of test/training operations. The Contractor QAS representative serves as an advisor to the board and ensures all data is in compliance with International Organization for Standardization (ISO) Quality requirements.

CONTRACTOR SDTS LEAD ENGINEER: The Contractor SDTS Lead Engineer will serve as the single point of contact for all test meeting activities and will perform the following functions related to the test/training event:

- Assure the required documentation listed above is compiled into a package and distributed to TRRB members for review 3-5 working days prior to planned TRR.

- Coordinate and conduct test status meeting(s) with test team personnel to ensure all members understand test objectives, normal and emergency operations, and associated hazards and controls.

- Ensure adequate resources are available to support test/training objectives and schedules.

CONTRACTOR SAFETY REPRESENTATIVE: The Contractor Safety representative shadows the NASA Safety representative.

FACILITY MANAGER REPRESENTATIVE: The Bldg 9NE facility manager representative supports the board as an advisor by ensuring that all planned test/training events are coordinated with Facility policies, overall operations, and safety guidelines. If the TRRB involves BNE facility modifications, the Facility Manager Representative coordinates the SDTS and NASA Facilities schedules.

CONTRACTOR ENGINEERING REPRESENTATIVE:

- The Contractor Engineering representative provides expert advice for the new hardware and/or payload to be used in the test/training event. Software engineers provide details on the software modification and explain the test data and results in detail

- The Contractor Engineering representative is responsible for coordinating with the Contractor SDTS Safety Representative to ensure that the integrated HA documents those hazards unique to the installation and operation of the test article, procedures and/or those hazards resulting from an interaction between the test article and facility equipment or environment.

- The Contractor Engineering representative is responsible for providing the Lift plan and/or lift procedures as well as Job Safety Analysis (JSA) (as applicable) for new payloads and/or new training configurations to be used in the test/training event.

ATTACHMENT 1

SDTS
Session Summary Form
Page 1 of 2

Date:			
Instructor:		**Organization:**	
SDTS Operator:		**Flight / Mission:**	
Schedule Start Time:		**Session Title:**	

Session Objective:	**Additional Components Used:**
❍ Demo / Familiarization ❍ Lesson Development ❍ Payload Checkout ❍ Generic Training ❍ Flight Specific Training	❍ Payload Readiness ❍ Facility Camera ❍ Configuration Setup ❍ Audio Communication ❍ Other: _____

Session Summary:

_____
_____
_____
_____
_____
_____
_____
_____

Overall Rating (sponsor only)

When rating your session in the SDTS, please use the following criteria:

10: Sim performed with no problems: required support was excellent
8-9: Minor sim problems (down time <10% of session) or support at only acceptable level
6-7: Objectives not completed due to sim problems: objectives accomplished but sim downtime of >10% of session: or unacceptable support
1-5: Session of little or no use due to sim problems (hardware or software)

Overall Rating (sponsor only)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Discrepancies Resulting In Loss of Time:

_____
_____
_____
_____
_____
_____

SDTS Session Summary Form *Page 2 of 2*
Session Notes:
Action Items:

		PREP Start Time	
TDC		PREP End Time	
		SESSION Start Time	
		SESSION End Time	
		Facility Down Time	

ATTACHMENT 2

SDTS TRR Agenda/Checklist

Test Title:
TRR Date:
TRR Chairperson:

Background

Primary, Secondary Objectives (Detailed Test Plan) _____

- What are test requirements?
- What training procedures are to be utilized?
- What is test setup requirement?
- How will requirement be met/used?
- What is the purpose of change (performance, maintenance, safety, etc)?

Test Matrix, Test Procedure Review (Detailed Test Plan) _____

- Are test procedures and objectives clearly defined?

Test Article Readiness

Payload Specific Hazard Analysis (Structural Analysis, Weld Certs, Weld Inspections, Fastener Certs, as required) _____

- Has the hardware been inspected visually and by hand?
- Are there sharp edges or pinch points, is structure is sound?
- Obtain all possible record/certification information being used in the facility.
- Ensure that all pinch points, keep out zones, or potential hazardous user interfaces are clearly labeled

Lifting Diagram & Lift Plan Procedure _____

- Verify that all lift points have been torqued to mfg. specifications and are identified
- Discuss lifting and handling procedures in/around Bldg 9.
- Verify signature approval for Lift Plan and Procedures.
- Discuss structural analysis and delivery of full documentation of structural analysis
- Discuss records of certificate of compliance for: bolts, casters, welding inspections, and lifting hardware
- Were labeling requirements satisfied?
- Discuss Payload Hazard Analysis and delivery of full documentation of hazard analysis for payload or hardware
- What are hazards resulting from an interaction between a payload and facility equipment or environment?

Facility & Support Systems Readiness

Test Setup Readiness _____

- What is combination of previously approved TRR hardware to be used in support of this TRR event?
- Verification that SDTS personnel and user functions of payload are safe.
- Verification that a JSA been performed for test buildup requirements.
- Verification and review of configuration setup checklist, (what are camera requirements, lighting requirements, secured doors, signs posted, test in progress, implementation of exclusion zone.
- Are all facility subsystems (Audio comm., CCTV, HPS, DCS, load cells, Control systems, motion table, actuators, etc) performing nominally?

Pretest Functional Checkout _____

- Verification of Software checkout results (if applicable for modified software).
- Verification that Pre-test checklists are up to date (Software Version Control).

Configuration Control & Documentation _____

- Delivery of payload HA, drawings, lift diagrams, configuration setup checklist, JSA, structural analysis, etc
- Updated drawings for facility hardware changes
- Updated Software Files and verification of latest Version running on computers
- Verification of affected updated Operations Procedures and checklists
- TRR/CCB/CR action log tracking and closeout

Contingency Plan _____

- What is backup plan in the event of software or hardware anomaly relative to this test?
- What is planned response of team for anomalies associated with conducting this test or training event?

Emergency Procedures _____

- What are applicable Emergency procedures associated with this training event or facility mod. Verify affected Operations Procedures have been updated?
- Does test team clearly understand their responsibility?
- Has HA adequately addressed potential failures of SDTS relative to payload interface, and hardware/software potential failures?

Special Procedures Required _____

- How will payload be transported from Bldg 9 to Bldg 29 per handling procedures in/around the Bldg.?
- Are there any special tools required to support this TRR event?
- Are there any special precautions associated with use of the payload? If so, specify

Problem Tracking System

Open Items Review _____

- Are there any open items from previous TRRs or the Configuration Control Board relative to this training run or facility modification that constrain conducting this event?
- What impacts are there to this training run or facility mod relative to TRR, CRs completed within the past 6 months?
- Are there lessons learned (Close call, mishaps, etc) from previous SDTS events that apply to this TRR event?
- How does this TRR affect the operational baseline?

Constraints to Testing (Open DRs, CRs, IDRs, TPS, ARs) _____

- Conduct review of all "Open" constraint Work Authorizing Documents (WADs) relative to conducting this training event

Test Team & External Support Readiness

Team Staffing & Certification _____

- Are all test team members currently certified to support the event?
- Is there adequate staffing to allow rotation in test team positions if necessary?
- Verify certifications per Training Database
- Is test team cognizant of all recent changes that may affect facility data?
- Has test team been briefed on training or test event?

Safety/Quality _____

- Are there comments from Safety/Quality that would be constraints to this event?
- Does the Integrated Hazard Analysis include the controls for the payload, facility, hardware/software modification?
- Are the hazards adequately addressed and proper controls in place?
- Are controls sufficient?

Other (Center Operations, etc) _____

- Does this event require NASA rigging support?
- Are there planned power shutdowns within the timeframe of the event?

Test Schedule _____

- When is the test planned/date, duration?
- Is there sufficient time to work off open action items in support of planned schedules?

TRRB – Approvals

Action Items Assigned _____

- Verify that actions are clearly documented/recorded, understood and assigned for closure.
- Does a TRR action assignment affect Test Schedule?

Board Member Approvals _____

- TRRB approves or rejects TRR. If approved and follow-on actions have been assigned, the TD and NASA/ER Manager verify assigned actions are complete prior to utilization of the tested product, modification, or procedure.

ATTACHMENT 3
TEST READINESS REVIEW BOARD APPROVAL

Page 1 of 2 Date:

Test Title:
TRRB Type: (Formal) (Informal *)

*Denotes those signatures required for Informal TRRB

Approvals

The SDTS Test Readiness Review Board approves conduct of this test/training upon completion of the listed open items prior to start of test.

NASA/Dynamic Test Systems Branch Chief (Chair)* _____

NASA/ER SDTS Manager _____

Contractor Lead Engineer* _____

SDTS Test Director* _____

NASA Safety Representative/NS* _____

NASA Software Safety/NC (As Required) _____

Contractor Quality Representative/ESCG* _____

Facility User Representative _____

Contractor Safety Representative/ESCG* _____

Bldg 9 Facility Manager (Alt. B9NE) _____

Only personnel participating in the review are authorized to sign this statement. A blank signature line requires an "N/A".

OPEN ACTIONS

 Date:

Test Title:
TRRB Type: (Formal) (Informal *)

Action No.	Action Description	Assignee	Date Closed

2. OPEN ITEMS CLOSURE APPROVALS

TEST DIRECTOR

_____

SDTS TRRB CHAIRPERSON

_____