

STS-104

\*2868424 \*

147 USA

S-10  
157

SEP 10 '01

PROCESSING OPERATIONS CONTROL OMI PLANNING SHEET	
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Wad Number <b>S6444-J01-R01</b>	SITE <b>LCC</b>	Elem CD <b>V</b>	End Item <b>10X FLT: 024</b>	DATE: <b>05/03/2001</b> TIME: <b>10:06:00</b>
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Title: <b>SSV ICE AND DEBRIS ASSESSMENT</b>	Sub Element/Zone <b>30</b>
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Project Work Order No.	Hazard: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	SFOC Safety <b>N/A TOTAL BOOK</b>	WC 150 USA	<input type="checkbox"/> Local Copy <input checked="" type="checkbox"/> Firing Room Copy
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Authorizing Document <b>ORB424-012(ADD)</b>	Material & Equipment: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	MICR Req'd <input type="checkbox"/> Yes <input type="checkbox"/> No	MAY 24 '01	OMRS: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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**PERFORM THE FOLLOWING:**

<u>Pre-Ops Setups</u>							
Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

<u>OPS Support</u>							
Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

<u>Operating Instructions</u>					
Task	Seq	Steps	Task	Seq	Steps
	010			090	
	020			100	
	030			110	
	040			120	
	050			130	
	060			140	
	070			150	
	080				

<u>Post Ops</u> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Task</th> <th>Operation Number</th> <th>Seq</th> <th>Steps</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Task	Operation Number	Seq	Steps																																									<u>Appendices</u> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Task</th> <th>Seq</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> </tbody> </table>	Task	Seq																				
Task	Operation Number	Seq	Steps																																																																
Task	Seq																																																																		

<u>Subtask WAD's</u> <b>N/A</b>
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Planner <b>LISA RUTKOWSKI</b>	WC 150 USA	Ext <b>0746</b>	QC Closure 	Date <b>SEP 7 '01</b>	Page <b>1 OF 1</b>
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USA VM 030

USA VM 011

# OMI TASK CLOSEOUT CHECKLIST

OMI No. <i>56444 J-01</i>	Run No. <i>1</i>	Task Control No. (TCN) <i>2868424</i>
Start Date <i>7/5/01</i>	Completion Date <i>8/30/01</i>	Closure Date 
		QC/Eng.      Date
1. Deviation Index: Verify total number of deviations agree with index. Verify entry is correct into OMI.		 <i>8/30/01</i>
2. Constraints List: Verify all constraints are accepted by QC or waived by Engineering. Verify that constraints list is complete and closed. <i>SUBTASKED TO 50007 P. Scale ETM 8/31/01</i>		<i>N/A</i> <i>N/A</i>
3. IPR's: Verify that all IPR's are closed or upgraded to problem reports or dispositioned as no constraint to OMI closure and incorporated in central IPR system and a copy of the central IPR sort attached.		 <i>SEP 7 '01</i>
4. Verify that material and equipment requirement list enclosed (if applicable).		<i>N/A</i> <i>N/A</i>
5. OMI: Verify that all pages or verification sheets are completed, stamped, and dated in the lower left/right hand corners.		 <i>8/30/01</i>
6. OMI: Verify that all miscellaneous documents/procedures have sequence number referenced and stamped; e.g., photos, sample results, etc.		 <i>8/30/01</i>
7. Planned task/OMI satisfactorily completed. OPR: <i>R. Scale ETM 8/30/01</i>		 <i>8/30/01</i>
8. LSS review prior to closure for CIL OMI's. MMC <u>          <i>N/A</i>          </u> Thiokol <u>          <i>N/A</i>          </u>		

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## SSV ICE AND DEBRIS ASSESSMENT

Element/End Item: ALL  
Flow/Usage: ET-103 & SUBS  
Facility: LC 39  
Design Center Concurrence: MSFC/JSC  
Category: B  
OPR: ETM  
TTL ORG: SE

**This document contains  
HAZARDOUS operations.**

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## 1.0 INFORMATION

### 1.1 Objective

Provide necessary tasks that document, monitor and evaluate ice and debris conditions to eliminate or minimize debris concerns of the integrated SSV during ET tanking, FRF, launch, and associated detanking.

#### Description

1. This OMI is performed as subtask to S0007/S0014/S0037.
2. This OMI provides documentation of ice/debris activities:
  - A. Pre-launch icing briefing
  - B. Pre-launch debris inspection
  - C. Countdown - Based timeline evaluation monitoring of ET TPS surfaces using OTV
  - D. OTV monitoring of seal/flange areas for cryogenic leakage
  - E. SSV OTV monitoring for debris conditions during countdown
  - F. Cryogenic replenish inspection for evaluation of SSV and facility debris concerns or anomalies
  - G. Evaluation of concerns/anomalies in the event of ET detanking
  - H. Review of engineering film data for SSME ignition, launch, ascent, ET separation, and orbiter landing.
3. Orbiter landing debris information is contained in the NASA publication for Ice and Debris Assessment. That report is referenced in this OMI for continuity of debris data.

## 1.2 Special Instructions All Operations

1. This OMI is run as a subtask to OMI's S0007, S0014, and S0037. All PAD clearing and controlled access operations will be performed per those OMI's.
2. Constraints will be statused by controlling OMI's S0007/S0014/S0037.
3. The OTV camera numbering scheme for PAD A/B is 0XX/1XX.
4. Task Team Leader assignment: NASA PH-H is TTL for L-20 Hour Walkdown, Final Inspection, and Post Launch/Drain Walkdown. ETM is TTL for all other operations.
5. From time stable replenish mode starts until start of final SCAN, scanning with individual cameras should be performed approximately once per hour.
6. Cameras 061/161, 063/163, and 070/170 may be released to NASA select with CICE concurrence.
7. All personnel participating in final inspection and post drain walkdown shall be current in following training:
  - A. Emergency PAD egress
  - B. Fire fighting
  - C. ELSA
8. Milestones:
  - A. MLP portion of post launch walkdown commences at approximately T + 1 hours.
  - B. PAD acreage portion of the post launch walkdown commences at approximately T + 2 hours. (may be deferred until preferred daylight hours.)
  - C. Post drain walkdown commences at approximately T + 4 hours after drain initiated (typically 1 1/2 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors dry).
9. Hands-on investigation required for all ET-TPS defects suspected of violating NSTS 08303 ice/debris inspection criteria.

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10. From time launch scrub is declared until 1.5 hours past time LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry, OTV camera scanning shall be performed approximately once per hour.
11. OTV cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171 shall be used to monitor LO<sub>2</sub>/LH<sub>2</sub> tank drain operations.
12. Excessive vapors are defined as being more severe than that described in NSTS 08303 - Ice/Debris Inspection Criteria or NSTS 16007 - Launch Commit Criteria - Hazardous Gas Subsystem.
13. Quality coverage is not required for performance of this OMI. Ref SFOC-GO0007, Ice and Debris Team Operations are exempt from quality coverage. The ROR (CTIF) performs the CMQC function for all non-hazardous operations.
14. Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in the bayonet fitting and the lithium button battery door is securely locked and taped in place.
15. Verify camera flash is deactivated.
16. Personnel using Kodak DC 50/120 camera shall verify alkaline batteries are properly installed.
17. Personnel using digital cameras shall not operate in H<sub>2</sub> leak or O<sub>2</sub> rich environment (23 percent or greater).
18. Personnel using the Sony MVC-FD91 camera shall verify the lithium ion battery is securely locked and the battery door is locked closed. Personnel shall verify that both battery doors (lithium ion and lithium button) are closed and taped shut.
19. Personnel shall verify that cameras and equipment are securely tethered when at the PAD while the SSV is present.

### 1.3 Operations List

Operation		Shop/ Cntl Rm Console	OPR	Haz (Y/N)	Duration (Hrs)
No.	Title				
10	Support Preparations	STM/ FR2	ETM	N	0.2
20	Ice Prediction Briefing	SE/ NA	ETM	N	0.5
30	Pre-launch Walkdown	SE/ NA	ETM	N	2.0
40	Ice Frost Debris Console Initial Configuration Setup	SE/ FR2	ETM	N	3.0
50	SSV Debris Assessment	SE/ FR2	ETM	N	18.0
60	Group 1 Monitoring LO2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
70	Group 2 Monitoring - LH2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
80	Final Inspection	SE/ FR2	ETM	Y	3.0
90	LO2/LH2 Drain Monitoring	SE/ FR2	ETM	N	4.0
100	Console Securing	SE/ FR2	ETM	N	0.5
110	Summary Tape	SE/ FR2	ETM	N	18.0
120	Post Drain Walkdown	SE/ NA	ETM	Y	2.0
130	Post Launch Walkdown	SE/ NA	ETM	Y	3.0
140	Film Review	SE/ NA	ETM	N	15.0
150	Final Report	SE/ NA	ETM	N	0.5

## 2.0 SAFETY INFORMATION

### 2.1 Hazards

Operation

1. Working at unprotected heights.
2. Walkdown at PAD while SSV is in stable replenish mode.

### 2.2 Safety Requirements

Operation

1. If lightning activity is forecast to be within 5 miles of launch PAD, CTC and SFOC safety shall implement provisions of adverse/severe weather and lightning policy contained in GSOP 5400 Ground Safety Operations Procedures.
2. There are no safing/shutdown or evacuation steps required in this OMI.
3. Hazardous operations within this subtask OMI will not be started until safety concurrence to proceed has been given per the integrated OMI controlling this subtask.

### 2.4 Reference Safety Documentation

<u>Number</u>	<u>Rev</u>	<u>Title</u>
KHB 1710.2	LI	KSC Safety Practices Handbook
GSOP 5400	LI	Ground Safety Operating Procedure

### 3.0 STAGING REQUIREMENTS

#### 3.1 Referenced Engineering Documentation

##### 3.1.2 Documents

###### OPERATION 120

Document No.	Rev	Title
NSTS 08303	(LI)	NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA

#### 3.2 Parts, Materials, Equipment, and Special Tools

##### 3.2.8 Personal Protective Equipment

OPERATION 30	Nomenclature safety harness lanyard
OPERATION 80	Nomenclature safety harness lanyard Nomex coveralls with gloves and hoods ELSA
OPERATION 120	Nomenclature safety harness lanyard hardhats flame retardant coveralls
OPERATION 130	Nomenclature safety harness lanyard hardhats flame retardant coveralls

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#### 4.0 PLANNING REQUIREMENTS

OIR Required Yes [ ], No [ X ]

#### 4.3 LPS Requirements

##### 4.3.1 Computer Systems

PC GOAL  
CCMS Configuration  
CDS  
CMS

##### GSE Links/HIMs

Link	FEP	Location	HIM	Octal Addr	Function
------	-----	----------	-----	------------	----------

##### DPS Configuration

OPS Mode - \_\_\_\_  
Dedicated DEU/DDU - \_\_\_\_

##### Vehicle Links and Formats

Link	FEP	Freq	Downlink	Downlist
------	-----	------	----------	----------

##### Control Room Consoles Required

##### SDC/RTIF Configuration

##### RPS Configuration

Link	Freq	Element	Downlink Format
------	------	---------	-----------------

##### ESA monitors/hot spares

##### CCS Configuration

Link	FEP	Location	HIM	Octal Addr	Function
------	-----	----------	-----	------------	----------

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**CCS Consoles Required**

**4.4 Support Services, Commodities, and Equipment**

**4.4.2 Communications**

(Per controlling OMI S0007, S0014 or S0037)

**Voice Recording:**

**Radio nets:**

**Paging:**

**Area warning:**

**Portable radios (loan pool):**

<u>Type</u>	<u>Qty</u>	<u>Net/Freq</u>	<u>Record</u>	<u>Duration/Purpose</u>
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**Portable OIS units:**

**Special communications:**

**4.4.3 OTV**

(Per controlling OMI S0007, S0014 or S0037)

**OTV Cameras required:** 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

**OTV Cameras to be recorded:** 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

**OTV Monitor:**

**Special OTV requirements:**

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#### 4.4.4 Countdown Display/Status

<u>Display Required</u>	<u>Bldg</u>	<u>Room</u>	<u>Operation Time</u>
Timing	LCC	FR2	Duration of Test
Countdown and GMT	LCC	FR2	Duration of Test

#### 4.4.8 Services

<u>Service/Special Requirements</u>	<u>Location</u>	<u>Purpose</u>
SFOC Safety	LC-39 A&B	Safety Support
ELSA'S (8)	LC-39 A&B	Inspection Team Use
Radio Net 105	LC-39 A&B	Inspection Team Use

#### 4.4.12 Propellants, Gases and Chemicals

<u>Commodity</u>	<u>Spec No.</u>	<u>Quantity</u>	<u>Rcvr</u>	<u>Location</u>	<u>Minimum Press</u>	<u>Delivery Time</u>
GN <sub>2</sub>	SES-0073 -6.3-5	Min 750 Cu ft	PH-H 861-3645	Pad 39B Camera Site 2	3000 PSI	1 week prior to T-0

## 5.0 CONFIGURATION ACCOUNTING AND VERIFICATION

### 5.1 Specific OMRS Requirements Satisfied by this TOP

OMRS NO.	NOMENCLATURE/ EFFECTIVITY	SEQ-STEP (CAP)
S00E00.021	ET TPS MON DURING DETANK TAF;C	90-005
S00E00.031	POST DETANK ET TPS INSPECT TAF;C	120-002
S00FA0.900	PRELAUNCH WEATHER BRIEFING (L-1 DAY) VAF1-90	20-001
S00FB0.005 (1 )	ET TPS SURFACE MONITORING T23,27-29,31-999	60-012 70-012
S00FB0.350 (1 )	MONITOR GO2 VENT HOOD VAF1-90	50-021
S00FB0.360 (1 )	MONITOR ET/ORB MPS FOR LEAKAGE VAF1-90	70-012
S00L00.150	HIGH WIND ET NOSE INSPECTION SAF;C	50-018 60-012
S00U00.010 (1 )	POST LAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	130-002
S00U00.011 (1 )	ENGR REVIEW & ANALYSIS OF LAUNCH FILM SAF1-999	150-002
S00U00.020-A (1 )	AN ENGINEERING PAD INSPECTION TEAM SAF1-999	80-002
S00U00.020-C (1 )	INSPECT ORBITER AFT ENGINE SAF1-999	80-002
S00U00.020-D (1 )	INFRARED SURVEILLANCE SAF1-999	80-002
S00U00.030 (1 )	PRELAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	30-001

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### 5.5 List of References

#### OPERATION 20

Reference No.	Rev	Title
NSTS 16007	(LI)	NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F

#### OPERATION 30

Reference No.	Rev	Title
80901019010	(LI)	ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

#### OPERATION 40

Reference No.	Rev	Title
79K24576	(LI)	OTV System Installation, LC 39, Pad A
79K24522	(LI)	OTV System Installation, LC 39, Pad B

#### OPERATION 50

Reference No.	Rev	Title
SPI SP-519	(LI)	OMI and OM Implementation
SFOC GO0007	(LI)	Quality Planning Requirements Document (QPRD)

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**OPERATION 10 Support Preparations**

Shop: STM  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.2

10-1 STM JYVO 138

Verify PAD OTV system is configured to support S6444 as scheduled.

Support: COMM

10-2 STM JSTC 111  
JSTC \*SCB 114

Verify eight 10-minute ELSA's available at complex J for use by Final Inspection Team (ref S0007/S0014/S0037).

Support: LS

10-3 STM TBC 136

Operation - Support Preparations complete.

\*\*\* End of Operation 10 \*\*\*

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## OPERATION 20 Ice Prediction Briefing

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### NOTE

Ref: NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F defines the ET No-Ice Zone.

#### 20-1 CICE

Conduct L-1 day ice prediction briefing with launch director.

PH-H Signature

*[Handwritten Signature]* 7/11/01

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#### 20-2 Operation - Ice Prediction Briefing complete.

\*\*\* End of Operation 20 \*\*\*

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### OPERATION 30 Pre-launch Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD  
Hazard (Y/N): N  
Duration (Hrs): 2.0

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

#### NOTE

This operation is performed at approximately L-20 hours. When this operation is performed in support of a 24 hour scrub turnaround, the preceding launch scrub post drain walkdown and this pre-launch walkdown may be performed concurrently.

Inspections may also be performed from the RSS, GO<sub>2</sub> Vent Arm (GVA), -Y OWP, or +Y OWP if still extended and accessible.

Ref: 80901019010 (LI) ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are optional walkdown participants.

NASA Engr	(4)
SFOC Engr	(2)
LMSSC - LSS	(1)
Boeing - LSS	(1)
SRB ELE	(1)
Thiokol - LSS	(1)

30-1 Debris inspection team **perform** walkdown of SSV and MLP per following:

1. Team leader **verify** S6444 pre-test briefing complete.
2. **Assemble** following essential personnel  
  
NASA PH-H Engineering - 1  
SFOC ETM Engineering - 1
3. **Inspect** following areas (as a minimum) from the MLP, RSS and FSS to identify/ resolve potential debris sources.

Areas to be inspected

A. Launch vehicle external surfaces

- Orbiter
- SRB's
- External Tank

B. MLP surfaces

- LH and RH SRB holddown posts
- Deck including deck bolts, fixtures, and edge gutters
- SSME LH and RH SRB exhaust openings, and sound suppression (SS) troughs
- TSM's and camera housings

4. Ref Table 30-1, **document** and SIM Photograph SSV and Launch PAD Configuration.

Description: Pre launch walkdown.

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56444  
STEP 30-1

## STS-104 PRE-LAUNCH PAD DEBRIS INSPECTION REPORT

KSC Debris Team

11 July 2001

The pre-launch inspection of the MLP-2, Pad B FSS and RSS was conducted on 11 July 2001 from 0800 to 1000 EDT. No flight hardware issues/anomalies were detected.

Four facility items were documented in Appendix K of S0007VL4:

1. Three loose bolts on plate cover on the East side of the raised deck of the MLP.
2. Six holding fixtures for handrails on South side of SRB exhaust holes need to be removed.
3. Six loose caps found on feed-through pipes adjacent to SRB exhaust holes at the MLP 0-level.
4. Missing and loose bolts on blast diverter in front of camera (E4) on Northwest corner of MLP deck.

All above items were in work by Pad crew at the conclusion of debris inspection.

Armando Oliu  
NASA

Robert Speece  
NASA

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- 30-2 Record all facility discrepancies in S0007. Submit copy to PAD leader and notify TBC/CTC. Verify no constraints to continue.

PH-H *J. Janssen* Date 7/11/01

ETM *R. Brewer* Date 07-11-01

- 30-3 Operation - Pre-launch Walkdown complete.

30-3

ET  
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<b>Table 30-1 Photo Requirements for SSV and Launch Pad Configuration</b>			
<b>Photos from MLP</b>			
<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET -Z	Vertical	28 mm	
Aft Dome	Horizontal	28 mm	
Aft Dome	Horizontal	35-70 mm	
LH SRB from North	Horizontal	35-70 mm	All water troughs in view
LH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
LH SRB from East	Vertical	35-70 mm	
RH SRB from North	Horizontal	35-70 mm	All water troughs in view
RH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
RH SRB from West	Vertical	35-70 mm	
SRB Heater Elec T-0	Horizontal	35-70 mm	Foam intrusion; May need flash
North HDP	Vertical	35-70 mm	Representative view
South HDP	Vertical	35-70 mm	Representative view
TSM T-0 LH <sub>2</sub>	Vertical	35-70 mm	Flash needed
TSM T-0 LO <sub>2</sub>	Vertical	35-70 mm	Flash needed
Orbiter Left & Right Wing	Vertical	35-70 mm	From below ET (1 Photo each wing)

ET  
01  
7/1/01

**135 Ft Level Photos**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LO <sub>2</sub> UMB	Vertical	35-70 mm	From OWP usually during T5401
LH <sub>2</sub> UMB	Vertical	35-70 mm	From OWP usually during T5401

**215 Ft Level Photos**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET surfaces from FSS	Vertical	35-70 mm	
LH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
RH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
Jack Pad C/O's	Horizontal	35-70 mm	Flash needed (1 each C/O)
LO <sub>2</sub> Ogive Cable Tray	Vertical	35-70 mm	From RSS roof

**255 Ft Level Photos**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET surfaces with GO <sub>2</sub> vent ducts in view	Vertical	35-70 mm	
GO <sub>2</sub> vent ducts	Horizontal	250 mm	

**\*\*\* End of Table 30-2 Photo Requirements for SSV and Launch Pad Configuration**

\*\*\* End of Operation 30 \*\*\*

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### OPERATION 40 Ice Frost Debris Console Initial Configuration Setup

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 3.0

#### NOTE

The next step sets up the photo processing laptop for use in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Network or equipment failures on the photo processing machine shall be annotated below.

- 40-1 Connect to KSC ground ops network and **configure** laptop computer to perform photo processing/ analysis.

Notes OK. DIGITAL/VCR CAPABILITY IS FUNCTIONAL.

#### NOTE

The next step verifies the setup of the infrared scanners. This is not a constraint to set up of the ice console. IR scanner condition shall be annotated below.

- 40-2 Verify IR scanner operation condition, annotate below.

RSS: NOT AVAILABLE

CS 2: OK

1-6831

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

The next step verifies the operation of console monitors in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Equipment condition shall be annotated below.

40-3 Verify console condition by powering on monitors and tape recorders.

Monitors: OK

ME
OB

 7-11-d

Tape recorders: OK

ME
OB

 7-11-d

**NOTE**

ET OTV pre-mapping/initial position of cameras may be performed in random order.

Ref: 79K24576 (LI) OTV System Installation, LC 39, Pad A and  
Ref: 79K24522 (LI) OTV System Installation, LC 39, Pad B define OTV camera locations.

FOV designates field-of view. RSS and -Y OWP must be retracted for completion of pre-mapping.

Pre-mapping steps/substeps in the remainder of this operation need not be performed if supporting a scrub turnaround and if performed during a previous run.

It is preferred to record all pre-mapping scanning on a single tape. However, multiple tapes may be used when lighting/ launch countdown constraints necessitate such.

ET
01

7/11/01

40-4 CVM1 JTV1 223

Perform OTV pre-mapping of External Tank exterior surfaces using OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, and 067/167 as follows:

- **Insert** designated pre-map tape into trouble console VCR.
- **Punch-up** camera number on trouble monitor.
- **Start** recording on pre-map tape. **Record** start time (GMT).
- **Scan** from top-to-bottom, left-to-right and right-to-left at approximately full zoom-in.
- **Stop** recording on pre-map tape. **Record** stop time (GMT).
- **Record** data in Table 40-1.
- **Repeat** with each OTV camera listed until each has been used to scan the External Tank.
- **Remove** pre-map tape from trouble console VCR.

ETM



Date 7-11-01

Not Performed: N/A

40-5 CVM1 JTV1 223

Position OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 070/170, and 071/171 to initial positions as defined in Table 40-2.

ETM



Date 7-11-01

Not Performed: N/A



7/11/01

Table 40-1 ET Pre-Mapping Data		Tape # 008
OTV Camera	Start Time (GMT)	Stop Time (GMT)
004 / 104	20:07	20:11
009 / 109	20:13	20:17
013 / 113	20:18	20:21
033 / 133	20:21	20:25
042 / 142	20:26	20:31
054 / 154	20:32	20:38
055 / 155	20:38	20:45
056 / 156	20:45	20:53
060 / 160	20:54	20:55
061 / 161	20:56	21:08
062 / 162	* 22:39	22:50
063 / 163	21:09	21:18
064 / 164	21:22	21:28
065 / 165	21:29	21:32
066 / 166	21:32	21:33
067 / 167	21:34	21:39
① 168	21:39	21:40
② 169	21:40	21:41

①②  
ME  
08  
7-11-01

Notes: \* CAM 162 LOCKED OUT TO SAFETY CONSOLE FOR  
 PHASE I/II LIGHTNING MONITORING. ADDED CAMS  
 168 & 169 FOR AMBIENT LOWERS. COMPLETED  
 RE-MAP ON CAM 162 AFTER LIGHTNING ADVISORY  
 CANCELED.

ME  
08  
7-11-01

ET  
01  
7.1a

Table 40-2 OTV Camera Initial Positions	
OTV Camera	Initial Position
004 / 104	FOV centered on GUCP
009 / 109	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 063/163 and 064/164.
013 / 113	Full zoom in. View SW GO <sub>2</sub> Vent Louver area.
033 / 133	FOV perpendicular to ET and with LO <sub>2</sub> -to-Intertank splice at frame top and LH <sub>2</sub> -to-Intertank splice at frame bottom. Then tilt down until XT2058 is in frame center.
042 / 142	FOV centered on Orbiter Access Arm-to-Orbiter interface.
054 / 154	FOV to encompass approximately 3 feet forward of XT2058 to 2 feet aft of XT2058. Orbiter wing and SRB should be in view at frame left.
055 / 155	Set FOV on north bridge LH <sub>2</sub> pipeline flange.
056 / 156	FOV with LH <sub>2</sub> Aft Dome in frame bottom and XT2058 in view at frame top.
060 / 160	Full zoom in. View SW GO <sub>2</sub> Vent Louver area.
061 / 161	Full zoom-in. Adjust FOV until ET LO <sub>2</sub> -to-Intertank splice is centered vertically and view is perpendicular to ET. Pan right until edge of the ET comes into view. Note: LO <sub>2</sub> Tank may pass out-of-view.
062 / 162	Full zoom in. View NW GO <sub>2</sub> Vent Louver area.
063 / 163	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 064/164.
064 / 164	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 063/163.
065 / 165	Full zoom out. Set FOV on aft part of ET with frame bottom approximately 2 feet below LH <sub>2</sub> Aft Dome.
066 / 166	FOV perpendicular to ET with LO <sub>2</sub> -to-Intertank splice at frame top. Then tilt down until Orbiter RH Wing/SRB intersection is in frame lower right.
067 / 167	Set FOV with LH <sub>2</sub> Aft Dome toward frame bottom and 2 <sup>nd</sup> black ring of SRB in view.
070 / 170	Select down wind camera of these two as wide angle view of the SSV.
071 / 171	Set up wind camera for close-up view of SSME's.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

40-6 Operation - Ice Frost Debris Console Initial Configuration Setup complete.

ETM  Date 7-11-01

\*\*\* End of Operation 40 \*\*\*

ET  
01

7/11/01

40-6

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 50 SSV Debris Assessment

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 18.0

#### NOTE

Steps in this operation are contingent upon progression of launch countdown operations and may not be performed if countdown is terminated.

Entire Operation Not Performed: N/A

#### NOTE

Until otherwise indicated, all times are referenced to S0007, S0014 or S0037 timelines.

No operations/steps within this subtask OMI may be performed as a stand-alone procedure. This OMI may only be performed as a subtask to S0007/S0014/S0037.

#### NOTE

Ref: SPI SP-519 (LI) OMI and OM Implementation and Ref: SFOC GO0007 (LI) Quality Planning Requirements Document (QPRD) , following step complies with requirements for ROR-as-CMQC function.

50-1

CTIF    TBC  
TBC    CMQC 136

Notify TBC that CTIF will perform the CMQC function for STS 104, S6444 run 1. Request TBC notify CMQC that the ROR-as-CMQC option will be exercised for STS 104, S6444 run 1.

ME  
08  
7-11-01

50-1

ET  
01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-2

CTC	TBC	232
TBC	CTIF	136

Perform OTV and ice/frost monitoring area setups.

ETM 

ME
08

 Date 7-11-01

50-3

CTIF	TBC	136
TBC	CTC	
CTC	STM	232

Verify Operation 10- Support Preparations complete.

ETM 

ME
08

 Date 7-11-01

50-4

CTIF

Verify Operation 20 - Ice Prediction Briefing and Operation 30- Pre-launch Walkdown complete.

ETM 

ME
08

 Date 7-11-01

ET
01

  
7/11/01

50-2

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-5

CTIF CVM1 222  
CVM1 222

Verify:

- All OTV cameras are on, tapes in recorder, and ready to commence OTV scanning, monitoring, and recording.
- Trouble tape recorder is ready.
- Ice Frost Debris Console Initial Configuration Setup complete.

ETM 

ME
08

 Date 7-11-01

50-6

CTIF CICE 222  
CVM1  
CVM2  
CIPC  
CTIF JYVR 138  
CVM1 JTV1 223  
CVM2 JTV2 225

20  
120  
220

All personnel participating in OTV operations report test ready status.

ETM 

ME
08

 Date 7-11-01

Support: COMM

50-3

ET
01

  
7/11/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-7

CTIF TBC 136  
TBC CTC 232

Ice Frost Console Area Setups for OTV scanning complete.  
Report readiness.

ETM  \_\_\_\_\_ Date 7-11-01

Not Performed: N/A

50-8

CTIF CVM1 222

From start of LO<sub>2</sub> chilldown until seal deflation/GO<sub>2</sub> vent hood retraction, monitor the +Y/-Y GO<sub>2</sub> vent seal-to-ET interface for seal fretting and continuous GO<sub>2</sub> escape.

OMRS 500FB0.350-1

ETM  \_\_\_\_\_ Date 7-12-01

Not Performed: N/A

WC 150 USA JUN 12 '01  
Dev. 50  
No. 01  
WC 150 USA JUN 12 '01

  
7/12/01  


50-4

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

GO<sub>2</sub> vent seal fretting could induce damage to ET SOFL. Continuous GO<sub>2</sub> venting could result in formation of ice in the no ice zone (ref NSTS 16007). Ultimate decision to lift the vent hood rests with CMEC.

50-9

CTIF TBC 136  
CMEC

If +Y/-Y GO<sub>2</sub> vent seal fretting or continuous GO<sub>2</sub> escape detected from start of LO<sub>2</sub> chilldown until seal deflation, **notify** CMEC for GO<sub>2</sub> vent hood removal.

ETM ME  
08 <sup>\*EIE</sup> 7-12-01 ET  
01 Date N/A

Not Performed: <sup>\*EIE</sup> ME  
08 N/A 7-12-01

50-10

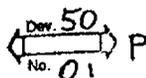
CTIF CIPC 222

**Monitor** wind speed and direction from start of LO<sub>2</sub>/LH<sub>2</sub> chill down through launch/scrub. CIPC **notify** CTIF if winds measured at 38 knots or greater from North +/-30 degrees as measured at 60 feet.

ETM ME  
08 Date 7-12-01

Not Performed: N/A

WC  
150  
USA  
JUN 12 '01



ET  
01  
7/12/01  
SEE DEV

50-5

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-11

CTIF CVM1 222

Perform Operation 60 - Group 1 Monitoring.

ETM 

ME
08

 Date 7-12-01

Not Performed: N/A

50-12

CTIF CVM2 222

Perform Operation 70- Group 2 Monitoring.

ETM 

ME
08

 Date 7-12-01

Not Performed: N/A

50-13

CTIF CVM2 222

Once per hour minimum, after start of LO<sub>2</sub>/LH<sub>2</sub> (until LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry), scan LO<sub>2</sub> feed line brackets and flange closeouts per Table 50-1.

ETM 

ME
08

 Date 7-12-01

Not Performed: N/A

ET
01

  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-14

CTIF CICE 222

As count proceeds, for concerns/ observations identified:

1. **Record** observation/concern on trouble tape per Table 50-1.
2. **Document** observed condition on Table 50-2, Observation Worksheet.

ETM 

ME
08

 Date 7-12-01

Not Performed: N/A

50-15

TBC CTIF 136  
CTIF CICE 222

**Perform** Operation 80 - Final Inspection when called by S0007/S0014/S0037.

ETM 

ME
08

 Date 7-12-01

Not Performed: N/A

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

Final SSV scan typically commences at L-2 hours.

50-16

CTIF CVM1 222  
CVM2

Perform final SSV scan.

ETM R. Seale Date 7/12/01

Not Performed: N/A

50-17

CTIF CVM1 222  
CVM2

At start of T-9 minute hold, **configure** OTV cameras for terminal count.

ETM R. Seale Date 7/12/01

Not Performed: N/A

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-18

WC 150 USA  
Dev. 50  
No. 01  
P  
JUN 12 '01

If winds are from the north (+/-30 degrees) and are 38 knots or greater: <sup>(PEAK AS MEASURED AT 60 FEET ABOVE GROUND)</sup> OR GREATER.

1. Monitor/videotape nose cone area during high winds.
2. Verify:
  - A. No ice formation on the +Y and -Y GO<sub>2</sub> vent seal footprint areas.
  - B. No damage to the ET TPS at the +Y and -Y GO<sub>2</sub> vent seal footprint areas.
  - C. No damage to the +Y and -Y GO<sub>2</sub> vent seals themselves.
  - D. No evidence of GO<sub>2</sub> leakage from +Y/-Y GO<sub>2</sub> vent seals to ET interface.

USA  
01/12/01

OMRSD S00L00.150

ETM N/A Date N/A

Not Performed: 

ET
01

  
7/12/01

50-19

CTIF

Verify launch or launch scrub (drain back). Record data.

Launch  Scrub N/A

Date 7/12/01 GMT Time 09:04 GMT

Scrub at T- N/A

ETM P. Sale Date 7/12/01

WC 150 USA  
Dev. 50  
No. 01  
P  
JUN 12 '01

SEE DEV  
7/12/01

50-9

ET 01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

When completely filled and drain is initiated, it takes approximately 1 hour until the LH<sub>2</sub> tank low level sensors read dry, and approximately 1.5 hours until the LO<sub>2</sub> tank low level sensors read dry.

50-20

CTIF CVM1 222  
CVM2

If launch scrubbed (or drain back declared) after start of LO<sub>2</sub>/LH<sub>2</sub> slow fill mode:

- Perform Operation 90 - LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring.
- Record observations/concerns on trouble tape per Table 50-1.
- Document all observations/concerns on Table 50-2 Observation Worksheet.

ETM N/A Date N/A

Not Performed:

**ET**  
**01**  
7/12/01

50-21 CTIF

GO<sub>2</sub> Vent seal to ET interface monitoring for seal fretting and continuous GO<sub>2</sub> escape complete.

OMRSD S00FB0.350-1

110  
NA  
VSN

ETM **ET**  
**01** Date 7/12/01

Not Performed: N/A

50-10

**ET**  
**01**

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-22

CTIF CVM1 222  
CVM2

Terminate scanning operations.

ETM P. Seale Date 7/12/01

50-23

CTIF CVM1 222  
CVM2

Perform Operation 100 - Console Securing.

ETM P. Seale Date 7/12/01

50-24

CTIF

If LO<sub>2</sub>/LH<sub>2</sub> tanking started, **perform** Operation 110 - Summary  
Tape.

ETM P. Seale Date 7/12/01

Not Performed: N/A

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**  
Following step may be not performed at CTIF discretion.

50-25      CTIF      TBC      136  
             TBC      STM

If Post Drain Walkdown to occur at night, request PAD xenon lighting be maintained/activated for duration of walkdown.

Not Performed: ET  
01  
7/12/01

**NOTE**  
Post drain walkdown typically commences approximately 1.5 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry.

50-26

CTIF

If launch scrubbed after start of LO<sub>2</sub>/LH<sub>2</sub> tanking, perform Operation 120 - Post-Drain Walkdown.

ETM N/A      Date N/A

Not Performed: ET  
01  
7/12/01

50-27

CTIF

If launch occurred, perform Operation 130 - Post launch Walkdown.

ETM R. Saub      Date 7/12/01

Not Performed: N/A

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-28

CTIF

If launch occurred, **perform** Operation 140 - Film Review.

ETM A. Seab Date 8/30/01

Not Performed: N/A

50-29

SSV Debris Assessment complete.

50-13

ET  
01

8/30/01

Table 50-1 Observation Documentation Procedure

1. CTIF CVM1 222 Locate anomaly/concern on pertinent OTV(s)  
CVM2
2. CTIF Punch-up pertinent OTV on trouble monitor.  
Update trouble tape log in table below.
3. CTIF Start the trouble tape.

**NOTE**

Trouble tape shall be allowed to run until sufficient OTV documentation of observation/concern has been made. OK to change OTV's while trouble tape is running.

4. CTIF After observation/concern has been documented on the trouble tape, stop the trouble tape. Update trouble tape log below.

**TROUBLE TAPE LOG**

Trouble Tape No.	Start Time (GMT)	Stop Time (GMT)	OTV	Description
154 <sup>01</sup>	1:00	1:01	154	LUX F/L SCAN
01	01:59	02:03	154	LOX F/L SCAN
01	02:00	<del>03:00</del> <sup>03:08</sup>	154	LOX F/L SCAN
01	<del>04:02</del> <sup>04:07</sup>	04:04	<del>154</del> <sup>154</sup>	LOX F/L SCAN
01	04:20	04:21	168	FROST(?) NBWST SW(-1) LOWNEP
01	04:22	04:23	169	FROST(?) NBWST NE(+1) LOWNEP
01	05:07	05:09	154	LOX F/L SCAN
01	05:30	05:31	163	"GEOLOGIC" SAMPLE
01	06:02	06:18	154	LOX F/L SCAN
01	06:35	06:40	154	FROST BALL ON ET/SRS CABLE TRAY, +Y

0301 A Senda 7/12/01

ET  
01

Table 50-1 Observation Documentation Procedure

TROUBLE TAPE LOG

Trouble Tape No.	Start Time (GMT)	Stop Time (GMT)	OTV	Description
01	0658	0659	154	LOZ F/L SCAN
	0744	0745	168	SUSPECT FRONT ABOUT SW LOUVER
	0746	0747	169	SUSPECT FRONT ABOUT NE LOUVER
Y	0800	0802	154	LOZ F/L SCAN
01	<del>0856</del> <del>0858</del> 0858	②	108 (T-07)	NASA SELECT
	<del>0858</del> <del>0858</del>		109 (T-3A) <sup>04</sup>	ELEVATION MOVE
	0900		168 (T-2) SW LOUVER	
	0901		169 (T-2m) SW LOUVER	
	0902		168 (T-1-15) SW LOUVER	
Y	0903	(T-0) <sup>①</sup>	179 (T-0) T-5:00	NASA SELECT
<p>② CONTINUOUS AT PICK-UP OF T-9 MINUTE COUNT THRU TIME VEHICLE IS OUT OF VIEW ON NASA SELECT.</p>				
<p>R. Seale ETM 7/12/01</p>				

R. Seale  
ETM  
7/12/01

\*\*\* End of Table 50-1 Observation Documentation Procedure \*\*\*

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. 1

Observed By: JORGE RIVERA

Date 7-12-01 Time 0240 GMT 06:40

Camera No. (or Walkdown) 154

Description:

SMALL FROST SPOT APPROX 1" X 2" IMMEDIATELY  
AFT OF +Z END OF +Y ET/SRB CABLE TRAY.  
THE FROST SPOT IS VENTING VAPORS.

Acceptance Rationale (or IPR/PR No.):

ACCEPTABLE AS IS PER NRTS 08303  
(REF PHOTO 2.2.7).

CICE [Signature] <sup>(OW)</sup> Date 7/12/01

CTIF [Signature] ETR Date 7/12/01

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. 2

Observed By: R. SEALE

Date 7/12/01 Time 03:48 GMT 07:48

Camera No. (or Walkdown) 168/169

Description:

THIN LAYER OF FROST ABOUT PERIPHERY  
OF SW (-4) AND NE (+1) COX VENT  
LOUVERS.

Acceptance Rationale (or IPR/PR No.):

FROST IS ACCEPTABLE FOR LAUNCH.  
NO ICE PRESENT.

CICE [Signature] (OLW) Date 7/12/01

CTIF R. Seale Date 7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. 3

Observed By: FIT

Date 7/12/01 Time 0030 GMT 0430

Camera No. (or Walkdown) FIT

Description:

OIS FEEDSTAR COMMUNICATION PIPE  
"GOOSE NECK" END CAP FOUND ON  
WEST SIDE OF THE UH2 TSM

Acceptance Rationale (or IPR/PR No.):

END CAP REMOVED BY FIT. CONDITION  
DOCUMENTED IN SOWT APP'X M.  
REMAINING END CAPS VERIFIED  
AS TIGHT.

CICE [Signature] (ALW) Date 7/12/01

CTIF [Signature] Date 7/12/01

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
N A

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
01  
2/30/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 50-2 Observation Worksheet**

**OBSERVATION DOCUMENTATION**

**Record following information for condition observed:**

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
N A

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

8/30/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
NA

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

2/30/01

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
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8/30/9



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 60 Group 1 Monitoring LO<sub>2</sub> Chill Down Thru T-0

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

#### NOTE

Do not perform this operation if launch scrub declared before LO<sub>2</sub> Chill Down commences.

Operation Not Performed: N/A

#### NOTE

This operation monitors LO<sub>2</sub> Ogive and Barrel and associated components/ areas from start of Chill Down through T-0 via OTV cameras 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164.

OTV cameras 013/113 and/or 062/162 will view -Y GO<sub>2</sub> Vent Hood Seal at all times. At no time will both cameras be positioned away from the -Y GO<sub>2</sub> Vent Hood Seal.

OTV cameras 068/168 and 069/169 view SW and NE GO<sub>2</sub> Vent Areas respectively. These are fixed FOV cameras and do not have pan, tilt, etc. capability.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

Noted requirements satisfied by completion of this operation.

~~OMRS S00FB0.005 1-~~  
~~OMRS S00L00.150 1-~~

WC  
150  
USA

JUN 12 '01

Div. 60  
No. 01  
7/12/01

ET  
01

WC  
150  
USA JUN 12 '01

ET  
01

SEP 04 2001 7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### LO<sub>2</sub> Chill Down To L-2 Hour Mark

60-1 CVM1 JYVR 138

At start of vehicle LO<sub>2</sub> Chill Down, start recorders for cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169.

ETM D. Seale Date 7/11/01

Support: COMM

60-2 Record LO<sub>2</sub> MPS Chill Down start date and time (GMT).

LO<sub>2</sub> MPS Chill Down Date 22:42 <sup>23:56</sup> GMT Time 7/11/01 GMT

ETM Tom Ford Date 7/11/01

60-3 CVM1 JTV1 223

From start of LO<sub>2</sub> Chill Down until start of LO<sub>2</sub> Fast Fill on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169 monitor/videotape ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM Tom Ford Date 7/11/01

Support: COMM

Not Performed: N/A

D. Seale  
7/11/01

ET  
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7/11/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

60-4 Record LO<sub>2</sub> Slow Fill start date and time (GMT).

LO<sub>2</sub> Slow Fill Date 00:21 GMT Time 7/12/01 GMT

ETM Tom Ford Date 7/11/01

Not Performed: N/A

60-5 Record LO<sub>2</sub> Fast Fill start date and time (GMT).

LO<sub>2</sub> Fast Fill Date 00:34 GMT Time 7/12/01 GMT

ETM Tom Ford Date 7/11/01

Not Performed: N/A

60-6 CVM1 JTV1 223

From start of LO<sub>2</sub> Fast Fill until LO<sub>2</sub> stable replenish mode is established, **monitor/videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. **Scan** LO<sub>2</sub> Tank. **Alternate** cameras and **scan** from Intertank to LO<sub>2</sub> Barrel Splice to GO<sub>2</sub> Vent Hood. No cryogenic liquid or excessive vapors allowed.

ETM R Brewer Date 7-12-01

Support: COMM

Not Performed: N/A

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

60-7 Record LO<sub>2</sub> Topping date and time (GMT).

LO<sub>2</sub> Topping Date 7/12/01 GMT Time 02:20 GMT

ETM R. Seae Date 7/11/01

Not Performed: N/A

60-8 Record LO<sub>2</sub> Stable Replenish mode start date and time (GMT).

LO<sub>2</sub> Stable Replenish Date 7/12/01 GMT Time 02:35 GMT

ETM R. Seae Date 7/11/01

Not Performed: N/A

60-9 CVM1 JTV1 223

From time LO<sub>2</sub> Stable Replenish mode is established until time for final SSV scan (approximately L-2 hours), **monitor, scan and videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. No cryogenic liquid or excessive vapors allowed.

ETM R. Brewer Date 7-12-01

Support: COMM

Not Performed: N/A

ET  
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7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### Final SSV Inspection Scan

#### NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

During Final SSV Inspection Scan the camera lights on OTV cameras 061/161 and 062/162 shall be turned "Off" when view passes over the Orbiter cockpit to preclude "distracting" the Flight Crew.

60-10 CVM1 JTV1 223

**Perform** Final SSV Inspection Scan with OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164. Scan passes shall view entire SSV with cameras at approximate full zoom in during final scan.

ETM R Brewer Date 07-12-01

Not Performed: N/A

### Terminal Count Camera Positions

#### NOTE

This step performed for SSME ignition only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute count. Cameras must be positioned for ignition no later than T-9 minutes. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM1 camera positions for SSME ignition are defined in Table 60-1.

60-11 CVM1 JTV1 223

Ref Table 60-1, position cameras 004/104, 013/113, 042/142, 054/154, 060/160, 062/162 for terminal count.

ETM R Brewer Date 7-12-01

Support: COMM

Not Performed: N/A

60-12 ~~Completion of this operation satisfies noted OMRS requirements.~~

WC 150 USA  
Dev. 60  
No. 01  
P  
JUN 12 '01  
JUN 12 '01

~~OMRSD S00FB0.005~~  
~~OMRSD S00L00.150~~

ETM \_\_\_\_\_ Date \_\_\_\_\_

60-13 Operation - Group 1 Monitoring - LO<sub>2</sub> Chill Down Thru T-0 complete.

ET 01  
7/12/01

**Table 60-1 CVM1 Camera Positions for Terminal Count**

**NOTE**

This Table defines CVM1 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition non-sequentially.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

The GO<sub>2</sub> Vent Arm (GVA) retracts at T-2m30s.

**CVM1 Camera Positions Are Defined As Follows:**

**004/104**

GUCP centered in frame so that GUCP will stay in view throughout SRB "twang".

**042/142**

At approximately T-1 hour, view and monitor Orbiter access arm while Orbiter hatch is being closed.

At **T-7m30s**, watch Orbiter access arm retract, then view bipod strut in center of frame, LO<sub>2</sub> feedline fairing in top of frame, and Orbiter hatch in right of frame.

**054/154**

At **T-3m50s**, view Orbiter right hand body flap movement, then zoom out with Orbiter/ET umbilicals at approximate frame center, Orbiter trailing edge at frame bottom, and edge of +Y (RH) SRB just in view at frame right.

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APPROVED

OMI S6444 J01  
APPROVED

**Table 60-1 CVM1 Camera Positions for Terminal Count**

**013/113**

At T-2m30s, watch lift of GO<sub>2</sub> vent arm for debris and nose cone/vent louvers for ice damage. Immediately following lift of GO<sub>2</sub> vent arm, center frame on GO<sub>2</sub> vent louver and then zoom-out so that entire ET movement is seen during SRB 'twang' at SSME ignition.

**060/160**

At approximately T-2m30s, after GO<sub>2</sub> vent arm retracts, go full zoom in for a close-up inspection of the GO<sub>2</sub> vent louver. After CICE concurrence, go full zoom out and position camera with SSV centered and ET nose cone at frame top.

**062/162**

At approximately T-2m30s, after GO<sub>2</sub> vent arm retracts, go full zoom in for a close-up inspection of the -Y GO<sub>2</sub> vent louver. After CICE concurrence, zoom out until ET nose spike is at top of frame with ET centered.

**061/161**

At approximately T-4m00s, verify camera lights are off. Then position camera to view astronaut closing visor at T-2 minutes 00 seconds.

**068/168 and 069/169**

Immediately after GO<sub>2</sub> vent hood lift, turn lights off to preclude distracting orbiter crew when the GVA rotates to its latchback position.

**\*\*\* End of Table 60-1 Camera Positions for Terminal Count \*\*\***

**\*\*\* End of Operation 60 \*\*\***

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APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 70 Group 2 Monitoring - LH<sub>2</sub> Chill Down Thru T-0

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

#### NOTE

Do not perform this operation if launch scrub declared before start of LH<sub>2</sub> Chill Down.

Operation Not Performed: N/A

#### NOTE

This operation monitors LH<sub>2</sub> Barrel and associated components/areas start of LH<sub>2</sub> Chill Down to pre-pressurization via OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

Noted requirements satisfied by completion of this operation.

~~OMRS S00FB0.005 1~~

~~OMRS S00FB0.360 1~~

WC 150 USA  
Dev. 76  
No. 01  
JUN 12 '01

150 USA  
JUN 12 '01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### LH<sub>2</sub> Chill Down To L-2 Hour Mark

70-1 CVM2 JYVR 138

At start of LH<sub>2</sub> Chill Down, start recorders for cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

ETM R. Seale Date 7/11/01

Support: COMM

70-2 Record LH<sub>2</sub> Chill Down start date and time (GMT).

LH<sub>2</sub> Chill Down Date 23:47 Time 7/11/01 GMT

ETM R. Seale Date 7/11/01

70-3 CVM2 JTV2 225

From start of propellant loading until start of LH<sub>2</sub> Fast Fill on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM R. Seale Date 7/11/01

Support: COMM

Not Performed: N/A

ET  
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7/11/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

70-4 Record LH<sub>2</sub> Slow Fill start date and time (GMT).

LH<sub>2</sub> Slow Fill Date 23:52 Time 7/11/01 GMT

ETM 

ET
01

 Date 7/11/01

Not Performed: N/A

70-5 Record LH<sub>2</sub> Fast Fill start date and time (GMT).

LH<sub>2</sub> Fast Fill Date 00:39 Time 7/12/01 GMT

ETM Scale Date 7/11/01

Not Performed: N/A

70-6 CVM2 JTV2 225

From start of LH<sub>2</sub> Fast Fill until stable replenish mode is established, scan LH<sub>2</sub> Tank. Alternate OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167 and scan/videotape from LH<sub>2</sub> Aft Dome to Intertank.

ETM 

ET
01

 Date 7/11/01

Support: COMM

Not Performed: N/A

70-3

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01

  
7/11/01

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APPROVED

OMI S6444 J01  
APPROVED

70-7

Record start date and time (GMT) for LH<sub>2</sub> Topping.

LH<sub>2</sub> Topping Date 7/12/01 Time 01:47 GMT

ET  
01  
ETM \_\_\_\_\_ Date 7/11/01

Not Performed: N/A

70-8

Record LH<sub>2</sub> Stable Replenish mode start date and time (GMT).

LH<sub>2</sub> Stable Replenish Date 7/12/01 Time 02:30 GMT

ETM D. Sae Date 7/11/01

Not Performed: N/A

70-9

CVM2 JTV2 225

During LH<sub>2</sub> Stable Replenish mode and until time for final scan (approximately L-1.5 hours), on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, monitor/videotape ET TPS surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, and TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals. No cryogenic liquid or excessive vapors allowed.

ET  
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ETM \_\_\_\_\_ Date 7/11/01

Support: COMM

Not Performed: N/A

70-4

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APPROVED

OMI S6444 J01  
APPROVED

**Final SSV Inspection Scan**

**NOTE**

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final SSV Inspection Scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

70-10 CVM2 JTV2 225

**Perform** Final SSV Inspection Scan with OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 064/164. Scan passes shall view entire SSV with cameras at full zoom in during final scan.

ETM D. Seale Date 7/12/01

Support: COMM

Not Performed: N/A

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A 11

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APPROVED

OMI S6444 J01  
APPROVED

### T-9 Minute Terminal Count

#### NOTE

Next step performed for terminal count only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute terminal count. Cameras must be positioned for SSME ignition no later than T-9 minutes. 'Spot' scanning after pick-up of the T-9 minute terminal count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM2 camera positions for terminal count are defined in Table 70-1.

70-11 CVM2 JTV2 225

Ref Table 70-1, **position** cameras 009/109, 033/133, 056/156, 065/165, 066/166 061/161, 070/170, 071/171 and 067/167 for terminal count.

ETM *R. Sando* Date 7/12/01

Support: COMM

Not Performed: N/A

70-12 ~~Completion of this operation satisfies noted OMRS requirements.~~

WC 150 USA  
Dw. 70  
No. 01  
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WC 150 USA

JUN 12 '01

JUN 12 '01

~~OMRSD S00FB0.005-1~~  
~~OMRSD S00FB0.360-1~~

ETM \_\_\_\_\_ Date \_\_\_\_\_

70-13 Operation - Group 2 Monitoring - LH<sub>2</sub> Chill Down Thru T-0 complete.

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APPROVED

OMI S6444 J01  
APPROVED

**Table 70-1 - CVM2 Camera Positions for Terminal Count**

**NOTE**

This Table defines CVM2 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

The Orbiter access arm (OAA) retracts at T-7M30S. Orbiter body flap movement occurs at T-3m50s.

Cameras may be positioned for SSME ignition non-sequentially

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Group 2 Camera Positions Are Defined As Follows:**

**033/133**

Full zoom out. LO<sub>2</sub> feed line in frame center and MLP deck at bottom.

**055/155**

View ET aft dome with MLP deck just out of view at bottom, ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

**056/156**

View ET aft dome with MLP deck just out of view at bottom. ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

**065/165**

Full zoom out. SSV centered. MLP deck edge just in view at bottom.

**066/166**

ET centered. Intertank to LO<sub>2</sub> Barrel splice at frame top with the majority of Orbiter wing in view.

**067/167**

Center on GUCP for optimum view.

**070/170 and 071/171**

At T-9m00s, zoom in on space shuttle main engine with camera providing best view. Zoom out on SSME for wide angle view with other camera.

**009/109**

At approximately T-3m50s, position to view Orbiter body flap and elevons movement. Afterwards, center on LH<sub>2</sub> umbilical with -Y vertical strut at frame top.

**061/161**

At approximately T-1m30s, tilt-up to GO<sub>2</sub> Vent Footprint. Zoom in. Pause. If footprint is acceptable, zoom out and tilt down to view Orbiter nose/cockpit through liftoff.

**\*\*\* End of Table 70-1 - CVM2 Camera Positions for Terminal Count \*\*\***

**\*\*\* End of Operation 70 \*\*\***

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APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 80 Final Inspection

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 3.0

#### NOTE

Final Inspection may not need to be performed depending on LO<sub>2</sub>/LH<sub>2</sub> tanking and launch countdown, as determined by CTC/TTL.

Final Inspection Team stay time guidelines for each level are given in Table 80-1. These guidelines are for reference only and may be deviated from at PICE discretion.

Operation Not Performed: N/A

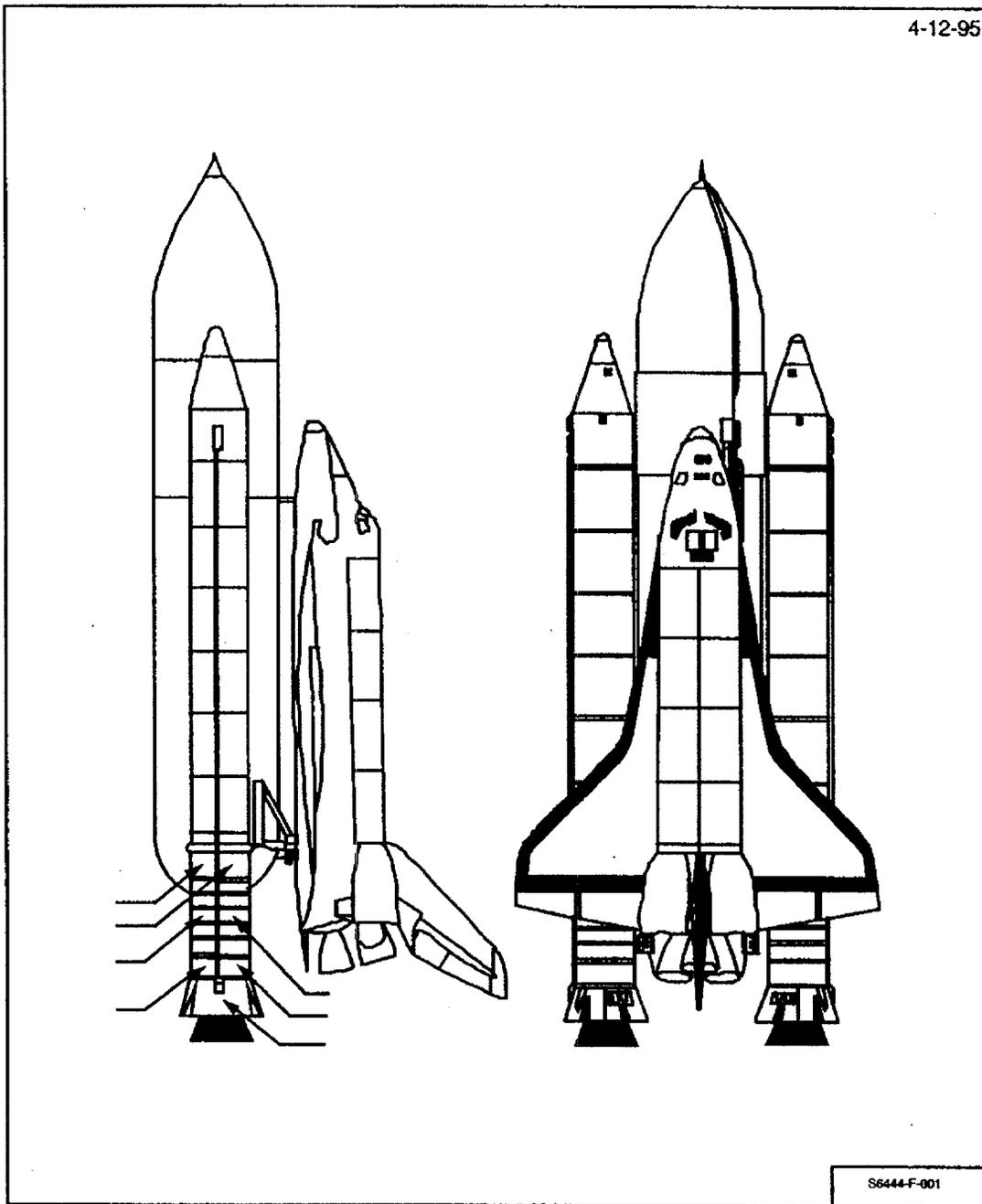


Figure 80-1: Deck (0) Level  
(For Reference Only)

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7/12/01

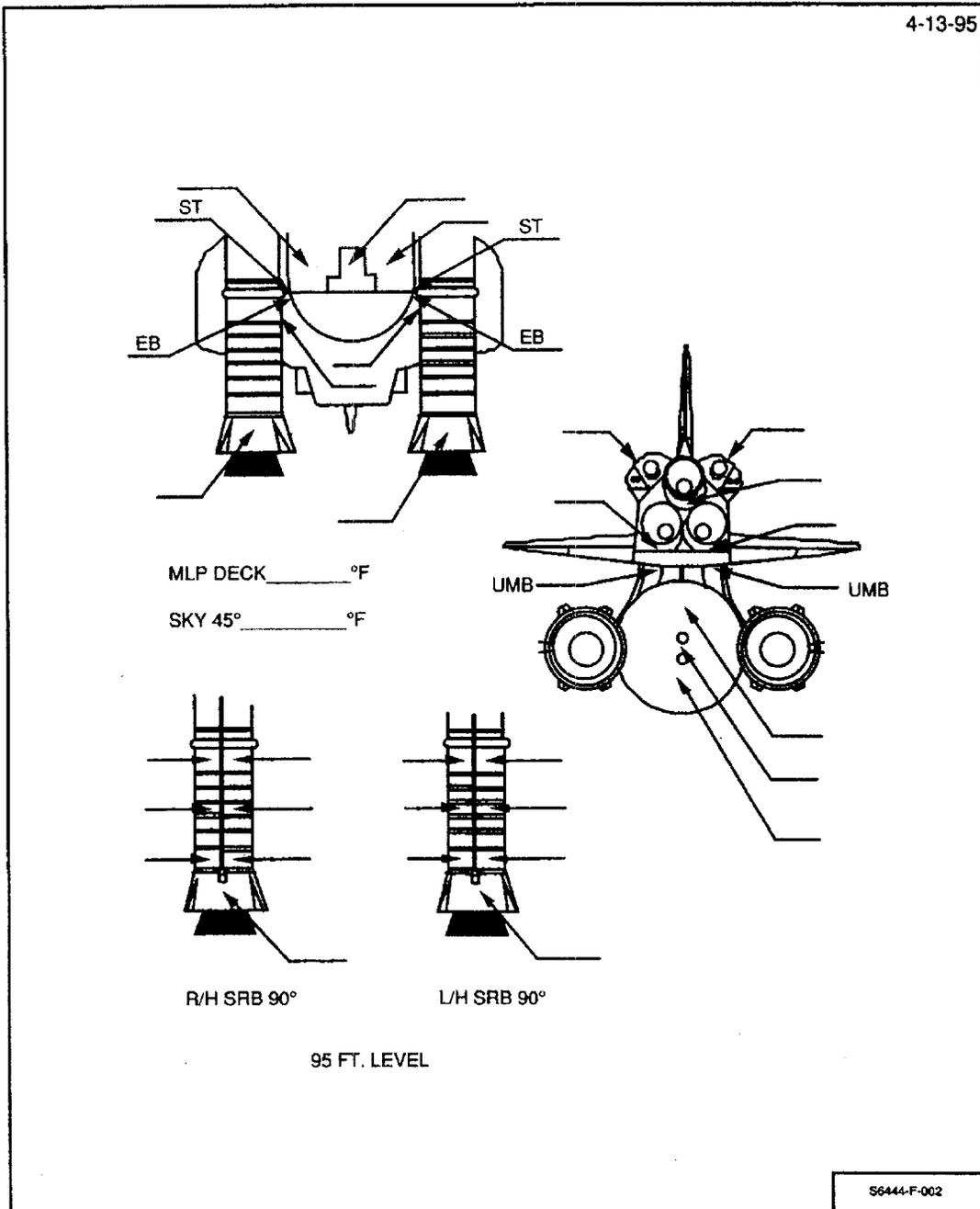


Figure 80-2: Deck (0) and 95 Ft Levels  
(For Reference Only)

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4-12-95

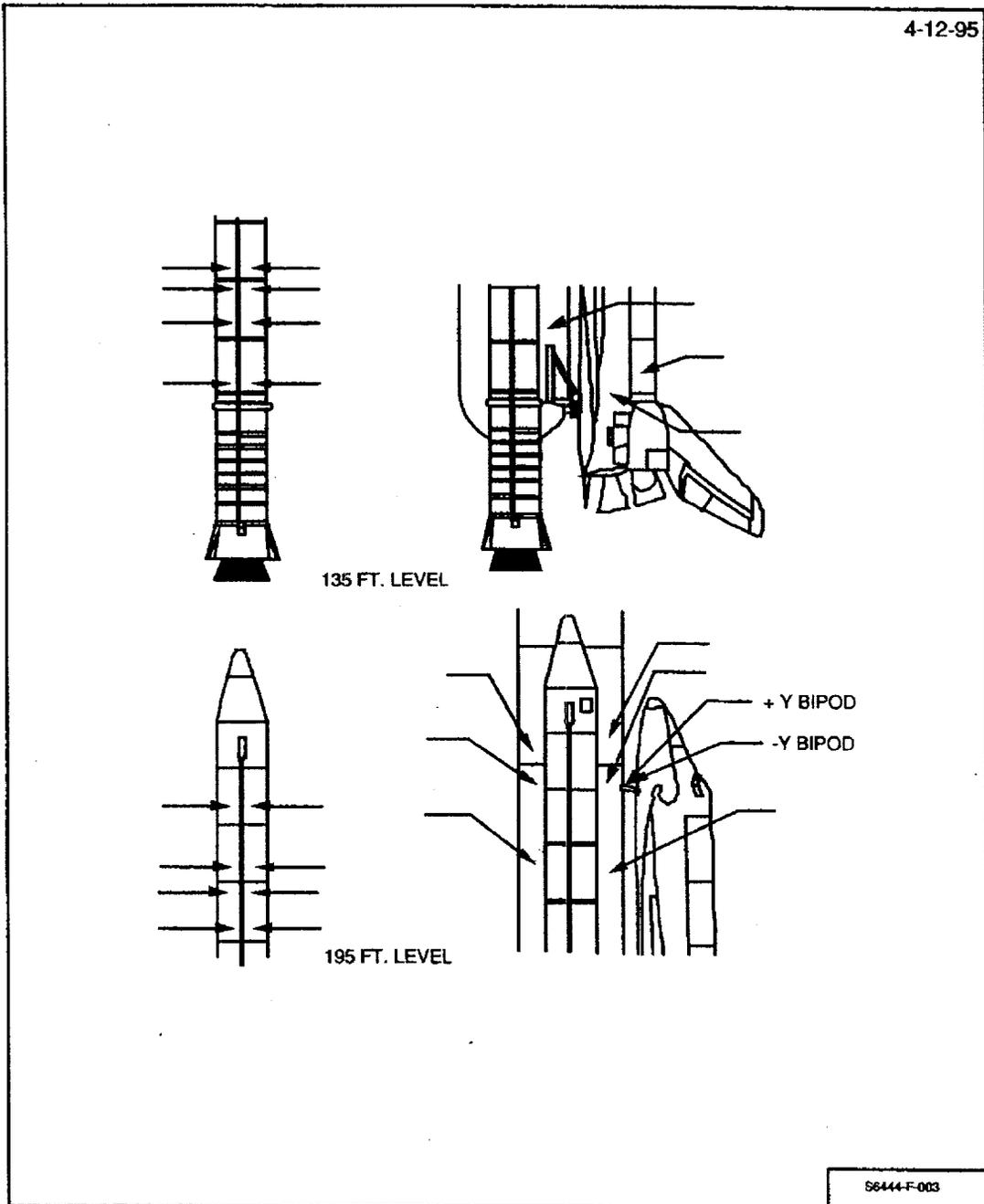


Figure 80-3: 135 and 195 Ft Levels  
(For Reference Only)

ET  
01  
7/12/01

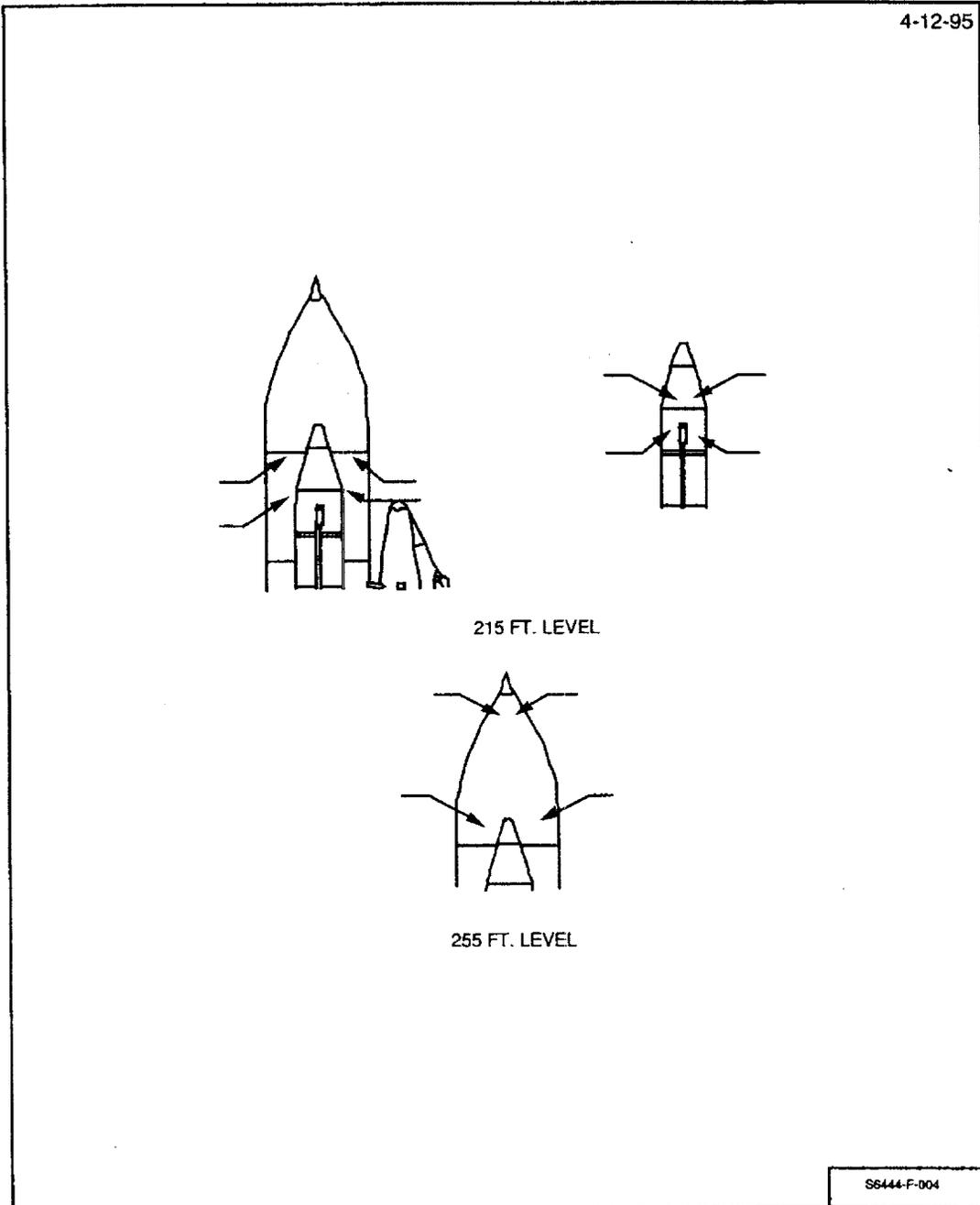


Figure 80-4: 215 and 255 Ft Levels  
(For Reference Only)

**WARNING**

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

**WARNING**

Personnel performing final inspection shall be attired in **Nomex coveralls with gloves and hoods**. Personnel shall have available gloves, hoods, and **ELSA** at all times during walkdown.

Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in bayonet connector and the lithium button battery door is locked and taped in place. Personnel shall ensure the flash is not activated on the camera.

Personnel using Kodak DC-50/120 shall verify alkaline batteries are properly installed and the flash is not active on the camera.

Personnel using digital cameras (Sony DKC ID1, Kodak DC-50/120 shall not use these cameras in the presence of a hydrogen leak or an oxygen enriched atmosphere (readings greater than 23 percent O<sub>2</sub>).

**NOTE**

Task Team Leader (TTL) for final inspection is PH-H. Additional personnel (listed below) may be added to the final inspection team with CTC, Launch Director, and Safety concurrence.

JSC Level II	(1)
PH-H	(2)
SFOC ETM	(1)

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7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

80-1 Assemble following final inspection team members:

TTL - PH-H	(1)
PH-H	(1)
SFOC ETM	(2)
LMSSC LSS	(1)
SFOC Safety	(1)

80-2 Final inspection team **perform** walkdown of SSV and associated facilities as follows:

**NOTE**

Tables 80-2 and 80-3 are reference only items. Images are to be taken of targets of opportunity. Images must be taken with 35 mm and digital cameras. Digital images shall be inputted into SIMS.

1. Ref Tables 80-2 and 80-3, photograph SSV points of opportunity during final inspection using 35 mm. **Record** data.

Roll No. 1

Negative No. 1-15

Work order No. E107

2. Reference Tables 80-2 and 80-3, **take** digital image of SSV points of opportunity using digital camera.

Description: Final Inspection Team

3. See Figures 80-1 through 80-4, **measure and record** (deg F) SSV external surface temperatures using IR gun(s)/scanners.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

The following substep references inspection areas. However, inspection shall not be limited to these areas. Inspection shall be of entire SSV and specific areas of concern as defined by the TTL, CTC, or Launch Director.

**4. Visually inspect:**

- Orbiter aft engine compartment external surfaces for condensation and ice formations.
- ET TPS surfaces which cannot be observed by the OTV system.
- Specific areas of concern as determined by the TTL, CTC, or Launch Director.

OMRSD S00U00.020-A-1

OMRSD S00U00.020-C-1

USA  
VM  
011

OMRSD S00U00.020-D-1

**80-3** Final Inspection complete. Verify no constraints to continue.

TTL (PH-H) George Quinn Date 7-12-01

SFOC-ETM Tom Ford Date 7-12-01

**80-4** Operation - Final Inspection complete.

ETM Tom Ford Date 7-12-01

ET  
01

7/12/01

**01-15-2001  
APPROVED**

**OMI S6444 J01  
APPROVED**

**Table 80-1 Final Inspection Team Walkdown Stay Times**

**255 Ft Level - 5 Minutes**

- LO<sub>2</sub> Ogive and Barrel acreage
- GO<sub>2</sub> Pressurization Line
- LO<sub>2</sub> Tank Cable Tray
- Visible LH SRB surfaces
- GO<sub>2</sub> Vent Ducts

**215 Ft Level - 20 Minutes**

- ET GH<sub>2</sub> 7 inch Vent Assembly
- ET acreage (between -Z and -Y axis)
- GO<sub>2</sub> vent area
- Orbiter tiles
- Visible SRB surfaces
- Inter tank-to-LO<sub>2</sub> Barrel splice

**195 Ft Level - 10 Minutes**

- LO<sub>2</sub> Feed Line
- ET/Orbiter Bipods (side and bottom view)
- -Y ET/SRB forward attachment (bottom view)
- -Y ET/SRB aft attachments (top view)
- Inter tank splice areas (LO<sub>2</sub> and LH<sub>2</sub>)
- ET acreage (between -Y and +Z axis)
- Orbiter tiles
- Visible LH SRB surfaces

**135 Ft Level - 10 Minutes**

- LH<sub>2</sub> ET/Orbiter Umbilical
- -Y ET/SRB C/T
- -Y Vertical Strut
- LO<sub>2</sub> Feed Line
- ET acreage between -Y axis and +Z axis
- ET/Orbiter attachments (top view)
- Visible LH SRB surfaces
- Orbiter aft fuselage

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 80-1 Final Inspection Team Walkdown Stay Times**

**0 Level - 30 Minutes**

- LH<sub>2</sub> Aft Dome
- ET acreage around +Z axis
- ET acreage around -Z axis
- LO<sub>2</sub> Feed Line
- LH<sub>2</sub> Feed Line
- ET/Orbiter attachments - Bottom view
- ET/Orbiter LH<sub>2</sub> and LO<sub>2</sub> Umbilicals
- T-0 LH<sub>2</sub> and LO<sub>2</sub> Umbilicals
- Space Shuttle Main Engines (SSME)
- Orbiter tiles
- ET/SRB aft attachments
- Visible SRB surfaces
- SRB ignition overpressure sound suppression water troughs

\*\*\* End of Table 80-1- Final Inspection Team Walkdown Stay Times \*\*\*

ET  
01  
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**Table 80-2 Final Inspection Team - Telephotos**

**TELEPHOTOS - 255 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	Horizontal	
LO <sub>2</sub> Acreage	Vertical	

**TELEPHOTOS - 215 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
-Y Bipod Ramp	Horizontal	From RSS
LO <sub>2</sub> P/L Ice Frost Ramps	Vertical	From RSS; Requires 3-4 shots
GO <sub>2</sub> Seal/Hood	Horizontal	From haunch & RSS
GUCP	Vertical	

**TELEPHOTOS - 195 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
-Y Bipod Ramp & Jack PAD C/O	Horizontal	

**TELEPHOTOS - 135 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	
-Y Longeron	Vertical	If needed
Jack Pad Closeouts	Horizontal	
LH <sub>2</sub> Acreage	Vertical	

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Table 80-2 Final Inspection Team - Telephotos

**TELEPHOTOS - MLP**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	From West
LH <sub>2</sub> UMB	Horizontal	From NW
EB-7	Horizontal	
EB-8	Horizontal	
LH <sub>2</sub> Aft Dome	Horizontal	
Third Hard Point C/O	Vertical	
LH <sub>2</sub> Barrel	Horizontal	From North
SSV Overall	Horizontal	From North
SSV Overall	Horizontal	From East
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1973
LO <sub>2</sub> F/L Bracket	Vertical	XT-1871
LO <sub>2</sub> F/L Bracket	Vertical	XT-1623
LO <sub>2</sub> F/L Bracket	Vertical	ST-1377 & XT-1129
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1129 & XT-1106 from SE
LO <sub>2</sub> P/L & C/T	Vertical	From SE

**600 MM PHOTOS - 255 FT LVL**

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	1/30	Contingency

LET  
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7/12/01

01-15-2001  
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OMI S6444 J01  
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Table 80-2 Final Inspection Team - Telephotos

TELEPHOTOS - MLP

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	From West
LH <sub>2</sub> UMB	Horizontal	From NW
EB-7	Horizontal	
EB-8	Horizontal	
LH <sub>2</sub> Aft Dome	Horizontal	
Third Hard Point C/O	Vertical	
LH <sub>2</sub> Barrel	Horizontal	From North
SSV Overall	Horizontal	From North
SSV Overall	Horizontal	From East
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1973
LO <sub>2</sub> F/L Bracket	Vertical	XT-1871
LO <sub>2</sub> F/L Bracket	Vertical	XT-1623
LO <sub>2</sub> F/L Bracket	Vertical	ST-1377 & XT-1129
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1129 & XT-1106 from SE
LO <sub>2</sub> P/L & C/T	Vertical	From SE

600 MM PHOTOS - 255 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	1/30	Contingency

ET  
01  
7/12/01

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APPROVED

OMI S6444 J01  
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Table 80-2 Final Inspection Team - Telephotos

600 MM PHOTOS - 215 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
-Y GO <sub>2</sub> Seal	1/30	
-Y Bipod Ramp	1/30	Contingency
Jack Pad C/O's	1/4	Difficult if windy
LO <sub>2</sub> F/L	1/15	
-Y Vertical Strut (Crack)	1/30	

600 MM PHOTOS - 195 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
-Y Bipod Ramp	1/30	Contingency

600 MM PHOTOS - 135 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
LH <sub>2</sub> UMB	1/30	
-Y Vertical Strut (Crack)	1/60	
LO <sub>2</sub> F/L Bellows	1/15	Contingency

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Table 80-2 Final Inspection Team - Telephotos

600 MM PHOTOS - MLP

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
LH <sub>2</sub> UMB	1/30	From West
LH <sub>2</sub> UMB	1/30	From NW
LH <sub>2</sub> UMB	1/30	From East
LH <sub>2</sub> UMB Actuator C/O	1/15 or 1/30	From North standing next to water pipe
LO <sub>2</sub> UMB	1/5	Lower Inboard
LO <sub>2</sub> UMB	1/8	Inboard
LO <sub>2</sub> F/L Bracket & Bellows	1/15	One photo to include XT-1978 & XT-1973
LO <sub>2</sub> F/L Bracket	1/15	XT-1871
LO <sub>2</sub> F/L Bracket	1/15	XT-1623
LO <sub>2</sub> F/L Bracket	1/15	XT-1377
LO <sub>2</sub> F/L Bracket	1/30	One photo to include XT-1129 & XT-1106
LO <sub>2</sub> F/L Bracket	1/30	From SE corner; One photo to include XT- 1129 & XT-1106
Jack Pad C/O's	1/15	From SE corner
Ice Frost Ramps or Pal Ramps	1/15 or 1/30	Contingency
LH <sub>2</sub> UMB Inboard	1/15	From East
+Y Longeron	1/15 or 1/30	Contingency
-Y Longeron	1/15	Contingency

ET  
01  
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APPROVED

OMI S6444 J01  
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Table 80-2 Final Inspection Team - Telephotos

WIDE ANGLE PHOTOS - 255 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LO <sub>2</sub> Tank	Vertical	35-70 mm	
GO <sub>2</sub> Vent Ducts	Horizontal	35-70 mm	

WIDE ANGLE PHOTOS - 215 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Overall GH <sub>2</sub> Vent Line	Horizontal	35-70 mm	
Orbiter Nose, ET -Y Side	Horizontal	35-70 mm	
Orbiter Nose, ET -Y, +Z Side	Horizontal	35-70 mm	From RSS
Forward Half of Vehicle	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE PHOTOS - 195 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Aft Part of SSV, LH Wing	Vertical	35-70 mm	
Orbiter Fwd Section, Upper LH <sub>2</sub> Tank	Vertical	35-70 mm	
Bipod, -Y, +Z Intertank Area	Horizontal	35-70 mm	

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APPROVED

Table 80-2 Final Inspection Team - Telephotos

WIDE ANGLE PHOTOS - 135 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Orbiter Aft Section	Vertical	35-70 mm	
Lower LH <sub>2</sub> Tank & LH SRB	Vertical	35-70 mm	

WIDE ANGLE PHOTOS - MLP

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Overall Orbiter Left Side	Vertical	28 mm	
ET -Y, +Z Quadrant	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
ET +Y, +Z Quadrant	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
ET Aft Dome	Horizontal	35-70 mm	
-Z Side of LO <sub>2</sub> T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LO <sub>2</sub> T-); RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
-Z Side of LH <sub>2</sub> T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LH <sub>2</sub> T-0; RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
Overall SSME Cluster	Horizontal	50 mm	-Y Side
SSME No. 2	Horizontal	50 mm	
SSME No. 1, -Z Side	Horizontal	50 mm	
SSME No. 3	Horizontal	50 mm	

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
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**Table 80-2 Final Inspection Team - Telephotos**

Overall SSME Cluster	Horizontal	50 mm	+Y Side
LO <sub>2</sub> UMB Area	Horizontal	35-70 mm	
LH <sub>2</sub> UMB Area	Horizontal	35-70 mm	
ET/ORB UMB & ORB Lower Surface	Horizontal	28 mm	From under ET

\*\*\* End of Table 80-2 Final Inspection Team - Telephotos \*\*\*

01-15-2001  
APPROVED

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APPROVED

Table 80-3 Reduced Final Inspection Team Photos

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 255 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	TELE	Horizontal	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 215 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
-Y Bipod Ramp	Horizontal	TELE	From RSS
LO <sub>2</sub> P/L Ice/Frost Ramps	Vertical	TELE	From RSS; 2 photos required
GO <sub>2</sub> Seal/Hood	Horizontal	TELE	From RSS
GUCP	Vertical	TELE	
Fwd Half of SSV	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 195 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
-Y Bipod Ramp & Jack Pad C/O's	Horizontal	TELE	

ET  
01

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 80-3 Reduced Final Inspection Team Photos

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 135 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	TELE	
Orbiter Aft Section	Vertical	35-70 mm	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - MLP DECK

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	TELE	From West
ET Aft Dome	Horizontal	TELE	
Aft Hard Point Closeout	Vertical	TELE	
LH <sub>2</sub> Tank	Horizontal	TELE	From North
LO <sub>2</sub> Tank	Horizontal	TELE	From North
LO <sub>2</sub> Tank	Horizontal	TELE	From East
LO <sub>2</sub> F/L Bracket Bellows	Horizontal	TELE	XT - 1978 & XT - 1973
LO <sub>2</sub> F/L Bracket	Horizontal	TELE	XT - 1871
LO <sub>2</sub> F/L Bracket	Horizontal	TELE	XT - 1623
LO <sub>2</sub> F/L Brackets	Horizontal	TELE	XT - 1377 & XT - 1129
LO <sub>2</sub> F/L Brackets & Bellows	Horizontal	TELE	XT - 1129 & XT - 1108; from SE
LO <sub>2</sub> P/L & C/T	Horizontal	TELE	From SE
Overall Orbiter Left Side	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
Overall SSME Cluster -Y Side	Horizontal	28 mm	

01-15-2001  
APPROVED

OMI S6444 J01  
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**Table 80-3 Reduced Final Inspection Team Photos**

Overall SSME Cluster +Y Side	Horizontal	28 mm	
ET/Orb UMB & Orbiter Lower Surface	Horizontal	28 mm	From under ET

\*\*\* End of Table 80-3 - Reduced Final Inspection Team Photos \*\*\*

\*\*\* End of Operation 80 \*\*\*

ET  
01

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 90 LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 4.0

#### NOTE

This operation is contingent upon progression of launch countdown and is performed after start of cryo (LO<sub>2</sub>/LH<sub>2</sub>) loading and subsequent launch scrub, FRF, or WCDDT.

Operation Not Performed:

**ET**  
**01**  
7/12/01

#### NOTE

This operation monitors the External Tank external surfaces during LO<sub>2</sub>/LH<sub>2</sub> drain operations from time of detanking until 1.5 hours after LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry via OTV 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171.

Noted requirements satisfied by this operation: OMRS S00E00.021

~~90-1 Record start date/time (GMT) of LH<sub>2</sub> and LO<sub>2</sub> Tank Drain.~~

~~LH<sub>2</sub> Drain Start Date \_\_\_\_\_ Time \_\_\_\_\_ GMT~~

~~LO<sub>2</sub> Drain Start Date **N/A** Time \_\_\_\_\_ GMT~~

~~ETM \_\_\_\_\_ Date \_\_\_\_\_~~

90-1

**ET**  
**01**  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

90-2 CVM1 JTV1 223

From start of LO<sub>2</sub> Tank Drain and LH<sub>2</sub> Tank Drain until respective LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry, **monitor** ET external surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals via OTV cameras. No cryogenic liquid or excessive vapors allowed.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

90-3 Record date/time (GMT) when LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry.

7/12/01

LH<sub>2</sub> Sensors Dry Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Sensors Dry ~~Date~~ \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

90-4 CVM1 JTV1 223

Monitor ET external surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals via OTV cameras for 1.5 hours after LO<sub>2</sub>/LH<sub>2</sub> low level sensors have read dry. No cryogenic liquid or excessive vapors allowed. Record date/time (GMT) when monitoring complete.

LH<sub>2</sub> Complete Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Complete Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

90-5 Completion of this operation satisfies noted requirements.

OMRSD S00E00.021

N/A

90-6 Operation - LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring complete.

\*\*\* End of Operation 90 \*\*\*

90-3

ET  
01

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 100 Console Securing

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

#### 100-1

CTIF	TBC	136
TBC	CTC	232

OTV support for ET thermal protection system evaluation no longer required.

#### 100-2

CTIF JYVR 138

Perform the following:

1. Turn off video recorders.
2. Remove tape cartridges.
3. OTV support no longer required.

Support: COMM

#### 100-3

CTIF	CVM1	222
	CVM2	

Secure consoles by setting all monitors to "Off" position.  
Report completion.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**  
Perform next step only after a successful launch.

100-4

CTIF

Remove photo processing laptop computer from Firing Room.

Not Performed: N/A

100-5

CTIF	TBC	136
TBC	CTC	232

Firing Room 2, ice frost monitoring area securing complete.

100-6

Operation 100 - Console Securing complete.

ETM D. Seab Date 7/12/01

\*\*\* End of Operation 100 \*\*\*

ET  
01

7/12/01

100-2

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 110 Summary Tape

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 18.0

**NOTE**

Observations/concerns observed during count are typically recorded on the summary tape real-time (trouble tape).

**110-1 CICE**

After launch or launch scrub, prepare a summary tape to include observations/concerns noted during count.

**110-2 Operation Summary Tape complete.**

ETM *P. Seal* Date 7/12/01

\*\*\* End of Operation 110 \*\*\*

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 120 Post Drain Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 2.0

#### NOTE

Post drain walkdown performed only after start of cryo (LH<sub>2</sub>/LO<sub>2</sub>) loading and subsequent launch scrub.

Operation Not Performed:

ET  
01  
7/12/01

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a safety harness with a lanyard secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel shall wear hardhats and flame retardant coveralls while performing post drain walkdown.

#### NOTE

Post drain walkdown typically commences approximately 1.5 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry.

Post drain walkdown performed in support of a 24 hour scrub turnaround is typically coincident with the L-20 hour pre-launch walkdown for the ensuing launch attempt.

**NOTE**

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(4)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(1)
SFOC Safety	(1)

- 120-1 NASA Lead ET Mechanical Systems Engineer (PH-H) verify essential personnel on station, properly attired, and ready to proceed with post drain walkdown.

**Essential Personnel**

NASA Engineering (PH-H)	1
SFOC Engineering (ETM)	1

N/A

**NOTE**

"Hands-on Investigation" is applicable only to those areas which are not understood or fully defined and which cannot be adequately evaluated otherwise.

- 120-2 Perform post drain walkdown as follows:
1. Visually inspect ET TPS exterior surfaces after detanking and warm-up (approximately T + 4 hours after drain is initiated) from the MLP, FSS, and RSS as access permits.
  2. Perform hands-on investigation of all areas suspected of violating Doc: NSTS 08303 (LI) NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA (LI)

OMRSD S00E00.031

ET  
01

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

120-3 Walkdown complete. All discrepancies identified. No constraints to continue.

PH-H \_\_\_\_\_ Date \_\_\_\_\_

ETM \_\_\_\_\_ Date \_\_\_\_\_

120-4 Operation Post Drain Walkdown complete.

\*\*\* End of Operation 120 \*\*\*

N/A

120-3

ET  
01

7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 130 Post Launch Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 3.0

ET  
01  
Acu

#### NOTE

Do not perform this operation after launch scrub.

Operation Not Performed: N/A

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel participating in walkdown shall wear **hardhats** and **flame retardant coveralls**.

#### NOTE

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(3)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(2)
SRB ELE	(1)
Thiokol-LSS	(1)
SFOC Safety	(1)

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

130-1 NASA (PH-H) **verify** following personnel on station, properly attired, and ready to proceed with post launch walkdown.

WC  
150  
USA  
JUN 12 '01

Dev: 130  
No. 01 P 7/12/01  
SEE DEV

ET  
01

Essential Personnel		
NASA	PH-H	1
SFOC	ETM	1

130-2 Perform Post Launch Walkdown as follows:

1. Ref Table 130-1, **visually inspect** post launch pad/area to identify any lost flight or ground systems hardware and debris sources.
2. Ref Table 130-2, **document/SIMS photograph** launch PAD area configuration.

Description: Post Launch Walkdown

OMRSD S00U00.010-1

USA  
07/12/01

130-3 Walkdown complete. Debris sources and lost flight hardware identified. No constraints to continue.

PH-H [Signature] Date 7-12-01

ETM R Brewer Date 7-12-01

130-4 Operation - Post Launch Walkdown complete.

130-2

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 130-1 Post Launch Walkdown Inspection Areas**

Record mission info, PAD, date, and time:

STS 104

PAD 'B'

Date 07-12-01

Time 06:30

**SRB Hold-down posts (HDP)**

Inspect for damage, stud hang-up Epon shim material, ordnance fragments, doghouse blast covers, erosion, missing hardware, debris. Record Results:

Very Little Debris & Damage Found  
HDPs 1-8, Normal Launch-erosion  
GN<sup>2</sup> Tubes(2) Intact

**MLP Deck**

SRB aft skirt purge lines  
SRB T-0 umbilicals  
Tail service masts (TSM's)  
MLP deck

**195 Ft Level**

Orbiter access arm (OAA)

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 130-1 Post Launch Walkdown Inspection Areas**

**215 Ft Level - GH2 Vent Line/GUCP**

Latch position  
Loose cables  
Damage from SRB plume  
Damage to the QD

**255 Ft Level - GO<sub>2</sub> Vent Arm, Ducts, Hood**

Seals  
Hood windows, doors, latches

**Fixed Service Structure (FSS)**

Cable tray covers  
Signs  
Hydraulic leaks  
Slidewire baskets

**PAD Apron/Acreage**

Vehicle hardware and/or flight TPS materials  
Facility debris

**Table K-1 PAD Apron/Acreage Items**

<u>Description</u>	<u>Location</u>
Several pieces of material found missing from flame deflection areas and trench	north side of flame trench

\*\*\* End of Table 130-1 - Post Launch Walkdown Inspection Areas \*\*\*

ET  
01  
7/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 130-2 Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage)**

**MLP 0-level**

1 Ea HDP No. 1, 2, 5 & 6 (HDP shoe and Epon shim)  
1 Ea HDP No. 3, 4, 7 & 8 (blast cover down to HDP base)  
1 Ea SRB T-O umbilical  
1 Ea overall view SRB exhaust cutouts\

Any unusual or debris-related damage to the facility; sound suppression water pipes, TSM's cracks in MLP deck, witness panels, handrails, etc.

Any flight hardware debris (tiles, SRB ordnance fragments)  
Any facility debris (nuts, bolts, cable tray covers, etc.)

**FSS**

Close-ups of GUCP and latching mechanism  
Overall views of GO<sub>2</sub> vent hood/ducts, if damaged  
Any flight hardware or facility debris  
Any unusual or debris-related damage to the facility

**PAD Apron/PAD Acreage**

Any flight hardware or unusual facility debris objects

Any unusual or debris-related damage to the PAD (such as missing brick in the flame trench), perimeter fence, etc.

**\*\*\* End of Table 130-2 - Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage) \*\*\***

**\*\*\* End of Operation 130 \*\*\***

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 140 Film Review

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

**NOTE**  
This operation may be not performed after launch scrub.

WC 150 USA  
JUN 12 '01  
Dev. 140  
No. 01 P

ET 01

7/12/01  
SEE DEV

Operation 140 Not Performed: N/A

- 140-1 Review engineering films for FOD issues, launch anomalies, or other discrepancies.
- 140-2 Operation - Film Review complete.

ETM ~~SEE DEV~~ Date 8/30/01  
R. Seale

\*\*\* End of Operation 140 \*\*\*

①  
A Sub  
ETM 8/30/01

WC 147 USA  
JUN 28 '01  
Dev. 140 P  
No. 02  
8/30/01  
See Dev next page

ET 01  
8/30/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 150 Final Report

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

**NOTE**

This operation may be not performed after launch scrub.

Operation 150 Not Performed: N/A

150-1 Assemble final report by attaching following reports to this OMI.  
Reference each to this step.

- Post Launch PAD Assessment
- SRB Assessment
- Launch Film Review
- Launch Day Video Review
- Orbiter Landing Assessment
- ET Separation Review

150-2 Final report assembly complete.

WC 150 USA  
Dev. 150  
No. 01  
JUN 12 '01

WC 150 USA  
JUN 12 '01

~~OMRSD S00U00.011-1~~

ETM D. Sule Date 8/30/01

150-3 Operation - Final Report complete.

\*\*\* End of Operation 150 \*\*\*

140-1

ET  
01

8/30/01

STEP 150-1

\$6444 00104/24

## STS-104 POST LAUNCH PAD DEBRIS INSPECTION REPORT

KSC Debris Team

12 July 2001

The post launch inspection of the MLP-2, Pad B FSS and RSS was conducted on 12 July 2001 from Launch + 1 to 4 hours (0600 to 0900 EDT). No flight hardware was found.

Orbiter liftoff lateral acceleration data to predict stud hang-ups received from Boeing-Huntington Beach indicated that no SRB holddown stud hang-up had occurred, the reported value was 0.095. Evaluation of the MLP 0-level was performed and the south holddown studs were visually assessed as having no indication of hang-up. Erosion was typical for the north posts with some evidence of missing RTV at the HDP haunch interface. North holddown post blast covers and T-0 umbilical exhibited minimal exhaust plume damage. Both SRB aft skirt GN2 purge lines were intact, with no protective tape layering evident.

The LO2 and LH2 Tail Service Masts (TSM) appeared undamaged and the bonnets were observed to have closed properly. The MLP deck was in generally good shape, no damage noted and minimal debris evident.

The GH2 vent line latched in the fourth of eight teeth of the latching mechanism and was off-center towards the north. The GUCP 7-inch QD sealing surface exhibited no damage. A 4-inch section of the peripheral seal was missing from the aft (bottom) location. The deceleration cable was in nominal configuration, with the vent line blanket was sooted and generally in good condition.

The OAA appeared to be intact with no evidence of plume impingement.

All slidewire baskets were secured with no evidence of damage.

The GOX vent arm, hood, ducts and structure appeared to be in good shape with no indications of plume damage. The vent seals were inspected and appeared to be in good condition with no damage evident.

### Debris findings included:

- East elevator doors were damaged at the base (pushed in and off-track) at the 175, 235, and 255 foot levels.
- No flight debris was found on the Pad apron or adjacent grass.
- No unusual debris items were found on the FSS.
- On the west side SRB flame trench (north) deflector a piece (approx. 2'x6"x6") of material was missing. Damage to metal grating 100 yards from flame deflector was noted and appeared to be inline with the missing material area.

STEP 150-1

\$6444 0V104/24

- On the east side SRB flame trench floor, near (north) deflector, a piece (approx. 3'x3'x2") was material was missing with metal banding reinforcement protruding from resultant hole.
- Control panel signs were noted on deck grating adjacent to corresponding panel mount locations, one at FSS 175 and other at 215 foot levels.
- Rubber grommets were noted on deck grating at 175 and 255 foot levels.

Overall, damage to the pad appeared to be minimal. Minimal debris was noted on pad apron and FSS.

Robert Speece, NASA-KSC  
Doug Powell, LMMSS  
Ray Brewer, USA  
Bill Atkinson, Boeing

Robert F. Speece  
NASA-KSC PH-H2 Shuttle Engineering  
ET/SRB Mechanical Systems  
Shuttle Contamination Control  
Shuttle Material & Processes  
Phone (321)861-3637 Fax(321)867-2167 Pager(321)232-5298  
E-Mail: robert.speece-1@ksc.nasa.gov

STEP 150-1

\$6444 00104/24

## STS-104 LAUNCH DAY VIDEO REVIEW

KSC Photo/Video Analysis Team

12 July 2001

### Significant Anomalies

None

### Minor Anomalies

None.

### Funnies

None.

### Observations

- Mach diamond formation sequence was 3-1-2.
- FRCS paper covers fall during roll maneuver and pass over LH OMS pod (TV-4).
- Free burning hydrogen was blown under body flap by wind (OTV 163).
- Numerous pieces of ice from the ET/ORB umbilical shook loose and contacted umbilical sill tiles, but no damage was detected (OTV 109, 163, 154).
- Nominal elevon movement was observed at SSME ignition.
- LH2 and LO2 T-0 umbilical disconnect was normal (OTV 149, 150).
- Ice/frost pieces dislodged from ice/frost ball on aft side of the ET +Y vertical strut closeout (OTV 154).
- Several ice particles observed falling from forward LOX feedline bellows.
- No evidence of contact with Orbiter lower surface (OTV 154, 161).
- Several pieces of SRB throat plug emanate from SRB exhaust hole. No evidence of vehicle contact.
- Vapor trail visible from RH and LH wing tips during roll maneuver (OTV 141, TV-21)
- Frost visible around -Y ET GOX vent louver (OTV 161).
- Pieces of aft skirt instafoam fell out of the SRB plume during flight (TV-4, TV-5)

### Notes

A total of 18 videos were made available for review. Review of long range tracking films is scheduled to begin Friday morning, July 13, 2001.

Armando Oliu  
NASA - KSC

Jorge Rivera  
NASA - KSC

STEP 150-1

\$6444 01/04/24

**STS-104 POST LAUNCH FILM REVIEW**

KSC Photo/Video Analysis Team

13 July 2001

Significant Anomalies - None

Minor Anomalies - None

Funnies - None

Observations

- Debris particle fell along the upper surface of LH wing, near the inboard/outboard elevon split. First seen at GMT 09:04:00.715 near the outboard edge of inboard elevon. There was no contact with flight hardware noted. (E-77)
- White spot/glow noted inside SSME #2 bell at approximately 6 o'clock position. (E-52)
- SSME Mach diamond formation sequence was 3-1-2; normal sequence is 3-2-1. (E-76, -77)
- Several flashes and streaks were observed in the SSME plume. (E-207, E-212)
- Free-burning GH2 blown under body flap by wind. (E-36, E-52)
- Particles of SRB aft-skirt instafoam fell along side the SRB plume. (E-207, E-212)
- Body flap and elevon movement during ascent were typical. (E-207, E-212)
- Facility debris observed passing through field of view well after the vehicle had cleared the tower. (E-34)
- Base heat shield movement during SSME ignition was typical. (E-76, E-77)
- Ice particles fell from ET/ORB umbilicals after lift-off. No impact to orbiter lower surface was noted. (E-36, E-40, E-52, E-54, E-63, E-76)
- SRB separation appeared normal. (E-207, E-212)
- Pieces GSE rain cover attach strip on LH SRB nozzle detach after fluttering during ascent. (E-207)
- Charring on the ET aft dome was typical. (E-207)
- Umbilical purge barrier baggy material fell during roll maneuver. (E-207, E-212)
- Forward RCS paper covers were observed falling aft during early ascent. Throat plug material ejected from SRB exhaust hole after T-0. No contact with vehicle. (E-52)
- Localized flow condensation was observed at various points on the vehicle. Debris particles, probably forward RCS paper cover, were observed over LH and RH wing just prior to SRB separation. (E-207)

Notes

Review of launch pad high-speed films will continue on Saturday, July 14, 2001.

Armando Oliu, NASA - KSC

STEP 150-1

\$6444  
01/04/24

**STS-104 POST LAUNCH FILM REVIEW**

KSC Photo/Video Analysis Team

14 July 2001

SIGNIFICANT ANOMALIES - None

MINOR ANOMALIES - None

FUNNIES - None.

**OBSERVATIONS**

- No stud hang up, or ordnance fragments, were observed on any of the SRB hold-down posts.
- Fraying of SSME #2 closeout blanket at 9 o'clock position visible during start-up sequence. (E-18, E-20)
- Bright flash observed inside white room of OAA prior to SSME ignition at GMT 09:03:51.860. (E-62)
- SSME #2 operation appeared nominal (E-20). There was no white spot/glow noted inside SSME #2 bell as noted Day 1 film review.
- No OMS pod flexing observed. (E-17, E-18)
- Free-burning GH2 blown under body flap by wind.
- Several ice particles fell from ET/ORB umbilical during SSME ignition.
- Vapors on ET aft dome and SRB stiffener rings were observed after T-0.
- Ice particles fell from LH2 / LO2 TSM T-0 disconnects.
- Tile surface coating material was lost from several tiles on the Orbiter base heat shield as well as from right hand RCS stinger. This is a common occurrence due to SSME ignition acoustics.
- SRB throat plug material ejected from exhaust hole. No contact with vehicle.
- The lens ports on the protective boxes on cameras E-7 and E-10 were shattered approximately 4 to 5 seconds after T-0.

**NOTES**

All delivered launch films have been reviewed at this time.

Armando Oliu, NASA - KSC

STEP 150-1

\$6444 00104/24

## STS-104 SRB POST FLIGHT/RETRIEVAL ASSESSMENT

KSC Debris Team

16 July 2001

The BI-108 Solid Rocket Boosters were inspected for debris damage and debris sources at CCAFS Hangar AF on 16 July 2001. Generally, both boosters were in excellent condition.

### ANOMALIES

None

### FUNNIES

The LH SRB +Z RSS antenna had the aft phenolic plate and most of the ablator missing. There was no evidence of ascent heating.

### OBSERVATIONS

- The TPS on both frustums exhibited no debonds/unbonds. There was minor localized blistering of the Hypalon paint.
- All eight BSM aero heat shield covers had fully opened and locked, but two RH and one LH cover attach rings had been bent at the hinge by parachute riser entanglement
- The forward skirts exhibited no debonds or missing TPS. Except for the one previously mentioned, RSS antennae covers/phenolic base plates were intact, though one layer of the RH SRB +Z antenna phenolic base plate had delaminated.
- The Field Joint Protection System (FJPS) and the System Tunnel Covers closeouts were generally in good condition with no unbonds observed.
- Separation of the aft ET/SRB struts appeared normal.
- Aft skirt external surface TPS was in good condition. Typical blistering of Hypalon paint had occurred on the BTA insulation close-outs and GEI cork runs.
- The holddown post Debris Containment Systems (DCS) appeared to have functioned normally except on HDP No. 5 which was fully obstructed by the frangible nut halves. This condition most likely happened at water impact.
- No indication of stud hang up was observed.

Armando Oliu, NASA - KSC

STEP 150-1

\$6444 00104/24

## STS-104 ORBITER POST LANDING INSPECTION

PRELIMINARY DEBRIS ASSESSMENT

25 July 2001

A runway walkdown and preliminary post landing inspection of OV-104 Atlantis was conducted at the Kennedy Space Center on SLF runway 15.

The Orbiter lower surface sustained 99 total hits, of which 23 had a major dimension of 1-inch or larger, both numbers are well within family.

Approximately 38 damage sites (with eight larger than 1-inch in length) were located in the area from the nose landing gear to the main landing gear wheel wells on both left and right chines. The majority of the hits were around the LH2 umbilical area (42 hits). Most of these damage sites around the ET/ORB umbilical were most likely caused by pieces of the umbilical purge barrier flailing in the air stream and contacting tiles before pulling loose and falling aft.

The largest lower surface tile damage site, located on the LH chine area, measured 3-inches long by 2-inches wide by 0.250-inches deep. The cause of this damage has not been determined yet.

The landing gear tires were reported to be in good condition. There was no ply under cutting on the main landing gear tires.

ET/Orbiter separation devices EO-1, EO-2, and EO-3 functioned normally. No ordnance fragments were found on the runway beneath the umbilicals. The EO-2 and EO-3 fitting retainer springs appeared to be in nominal configuration, though two of the "salad bowl" clips were missing from EO-2 and five from EO-3. The EO-2/3 pyro debris shutters were fully closed. No debris was found beneath the umbilicals.

Typical amount of tile damage occurred on the base heat shield. All SSME Dome Heat Shield closeout blankets were in good condition though some small material was torn/frayed. Engines 1 and 2 had blanket damage at the 6 and 9 o'clock positions respectively.

No unusual tile damage occurred on the leading edges of the OMS pods and vertical stabilizer. There were four tile damage sites on the leading edge of the LH OMS Pod, with two appearing to have a major dimension greater than one inch.

Damage sites on the window perimeter tiles appeared to be less than usual in quantity and size. Hazing and streaking of forward-facing Orbiter windows appears to be normal. There is one possible window hit on window #5. A more detailed inspection will be performed in the OPF.

The post-landing walkdown of Runway 15 was performed immediately after landing. All components, except the mortar cover, of the drag chute were recovered and appeared to have functioned normally.

Two pieces of AMES gap filler, 5" long by 1" wide, were found on the runway under the nose landing gear doors. Tile gap fillers have been found on previous missions and are not considered an anomaly.

STEP 150-1 \$6444 OV104/24

Preliminary, the Orbiter TPS sustained a total of 110 hits, of which 26 had a major dimension of 1-inch or larger. This total does not include the numerous hits on the base heat shield attributed to SSME vibration/acoustics and exhaust plume recirculation.

The Orbiter post landing assessment will continue in OPF on Thursday 07/26/01.

Armando Oliu, NASA - KSC  
Jorge Rivera, NASA - KSC  
Mike Payne, NASA - KSC  
Tom Wilson, Boeing-KSC

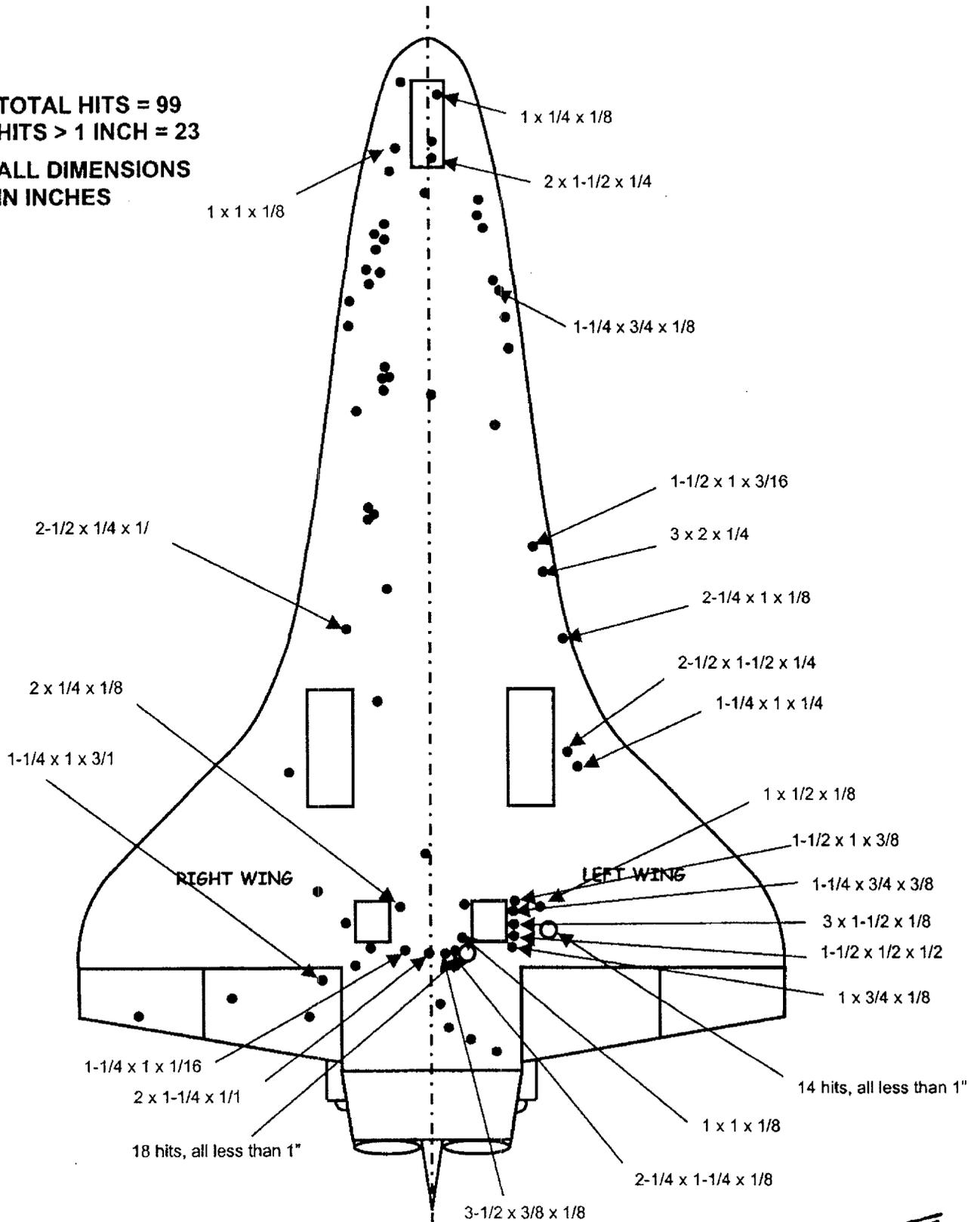
STEP 150-1

STS - 104

\$6444 00104/24

# DEBRIS DAMAGE LOCATIONS

TOTAL HITS = 99  
HITS > 1 INCH = 23  
ALL DIMENSIONS  
IN INCHES



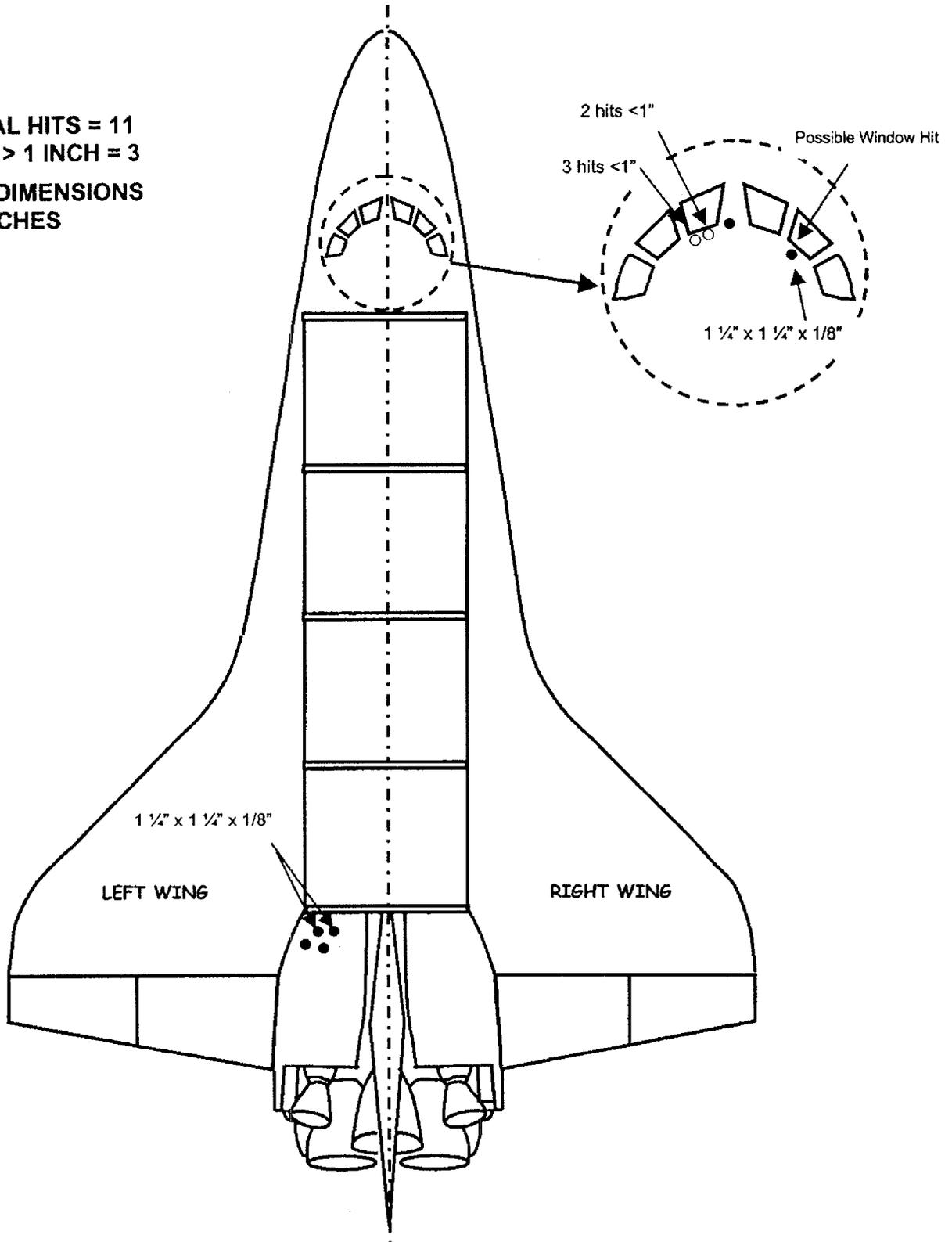
ET  
01

7/25/01

STEP 150-1  
STS - 104  
DEBRIS DAMAGE LOCATIONS

\$6444  
00104124

TOTAL HITS = 11  
HITS > 1 INCH = 3  
ALL DIMENSIONS  
IN INCHES



STS - 104

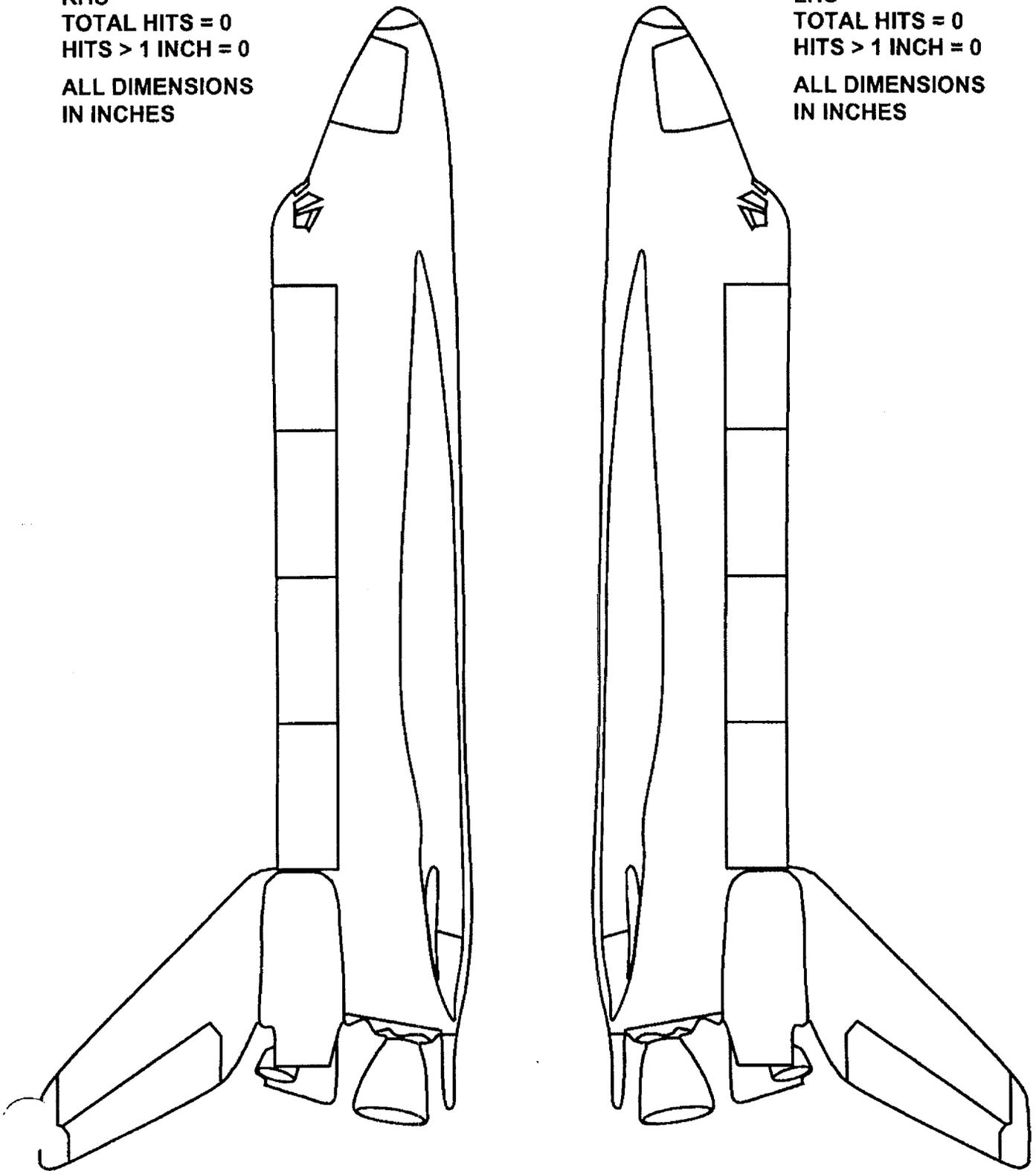
STEP 150-1

DEBRIS DAMAGE LOCATIONS

6444  
00104124

RHS  
TOTAL HITS = 0  
HITS > 1 INCH = 0  
ALL DIMENSIONS  
IN INCHES

LHS  
TOTAL HITS = 0  
HITS > 1 INCH = 0  
ALL DIMENSIONS  
IN INCHES



ET  
01

7/25/01

STEP 150-1

\$6444 0V104/24

**STS-104 ORBITER POST LANDING INSPECTION**  
**Debris Assessment**  
**26 July 2001**

After the 11:39 p.m. local/eastern time landing on 24 July 2001, a post landing inspection of OV-104 Atlantis was conducted at the Kennedy Space Center on SLF runway 15 and in Orbiter Processing Facility bay 2. This inspection was performed to identify debris impact damage and, if possible, debris sources.

The Orbiter TPS sustained a total of 126 hits of which 26 had a major dimension of 1-inch or larger. This total does not include the numerous hits on the base heat shields attributed to SSME vibration/acoustics and exhaust plume recirculation.

The following table lists the STS-104 Orbiter damage hits by area:

	<u>HITS &gt; 1-inch</u>	<u>TOTAL HITS</u>
Lower Surface	24	108
Upper Surface	0	0
Window Area	0	14
Right Side	0	0
Left Side	0	0
Right OMS Pod	0	0
Left OMS Pod	2	4
<b>TOTALS</b>	<b>26</b>	<b>126</b>

The orbiter lower surface sustained 108 total hits, of which 24 had a major dimension of 1-inch or larger. Approximately 39 damage sites (with eight larger than 1-inch in length) were located in the area from the nose gear to the main landing gear wheel wells. More damage occurred on the right-hand side of the vehicle than on the left-hand, with a typical pattern, some of these hits may be attributed to impacts from ice in the LO2 feedline bellows. ET TPS venting modifications continue to have a reducing effect on the quantity and size of the damage sites. Analysis of ET separation film may help determine the cause of these hits.

The majority of the lower surface hits were around the LH2 umbilical area (42 hits). Most of these damage sites around the ET/ORB umbilical were most likely caused by pieces of the umbilical purge barrier flailing in the air stream and contacting tiles before pulling loose and falling aft.

The largest lower surface tile damage site, located inboard of the LH2 umbilical, measured 4-1/2-inches long by 3/4-inches wide by 0.250-inches deep. A combination of umbilical ice and/or umbilical purge barrier material could have been the cause of this damage site.

ET  
01

7/27/01

STEP 150-1

\$6444 00104/24

The landing gear tires were reported to be in good condition. There was no ply under cutting on the main landing gear tires.

ET/Orbiter separation devices EO-1, EO-2, and EO-3 functioned normally. No ordnance fragments were found on the runway beneath the umbilicals. The EO-2 and EO-3 fitting retainer springs appeared to be in nominal configuration, though five of the "salad bowl" clips were missing from EO-3. The EO-2/3 pyro debris shutters were fully closed. A small piece of umbilical closeout foam (pyro can closeout) was adhered to the umbilical plate near the LO2 disconnect. No debris was found beneath the umbilicals.

Typical amount of tile damage occurred on the base heat shield. All SSME Dome Heat Shield closeout blankets were in good condition though some small material was torn/frayed. Engines 1 and 2 had blanket damage at the 6 and 9 o'clock positions respectively.

No unusual tile damage occurred on the leading edges of the OMS pods and vertical stabilizer. There were four tile damage sites on the leading edge of the LH OMS Pod, with two having a major dimension greater than one inch.

Damage sites on the window perimeter tiles appeared to be less than usual in quantity and size. Hazing and streaking of forward-facing Orbiter windows appears to be normal.

The post-landing walkdown of Runway 15 was performed immediately after landing. All components, except the mortar cover, of the drag chute were recovered and appeared to have functioned normally.

Two pieces of AMES gap filler, 5" long by 1" wide, were found on the runway under the nose landing gear doors. Tile gap fillers have been found on previous missions and are not considered an anomaly.

In summary, both the total number of Orbiter TPS debris hits and the number of hits 1-inch or larger were within established family. The potential identification of debris damage sources for mission STS-104 will be based on the laboratory analysis of Orbiter post landing microchemical samples, inspection of the recovered SRB components, film analysis, and aerodynamic debris particle trajectory analysis. The results of these analyses will be documented in the STS-104 Debris/Ice/TPS Assessment and Integrated Photographic Analysis report.

Armando Oliu  
NASA - KSC

Jorge Rivera  
NASA - KSC

ET  
01

7/27/01

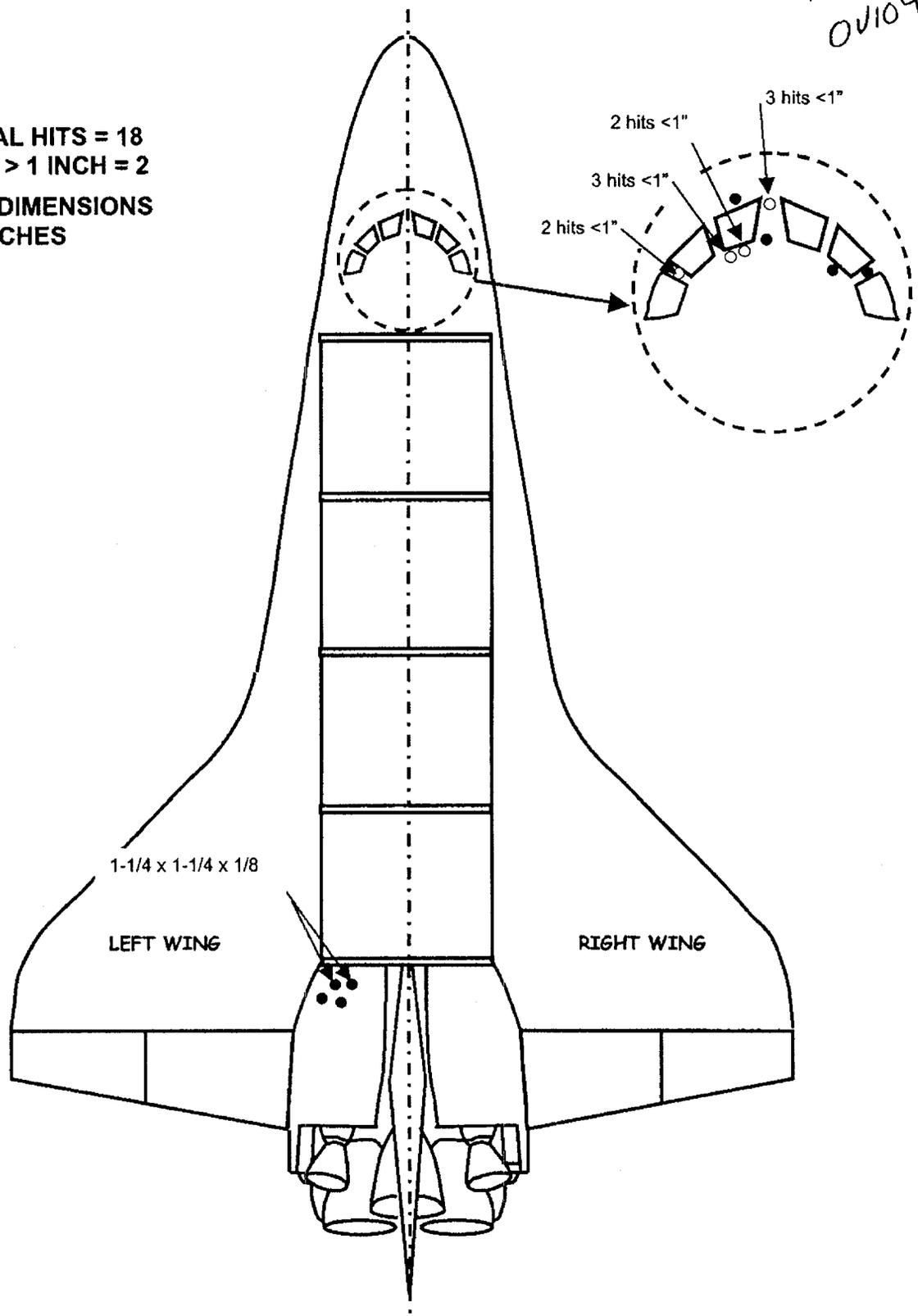


STS - 104  
DEBRIS DAMAGE LOCATIONS

STEP 150-1

6444  
00104/24

TOTAL HITS = 18  
HITS > 1 INCH = 2  
ALL DIMENSIONS  
IN INCHES



ET  
01

7/27/01

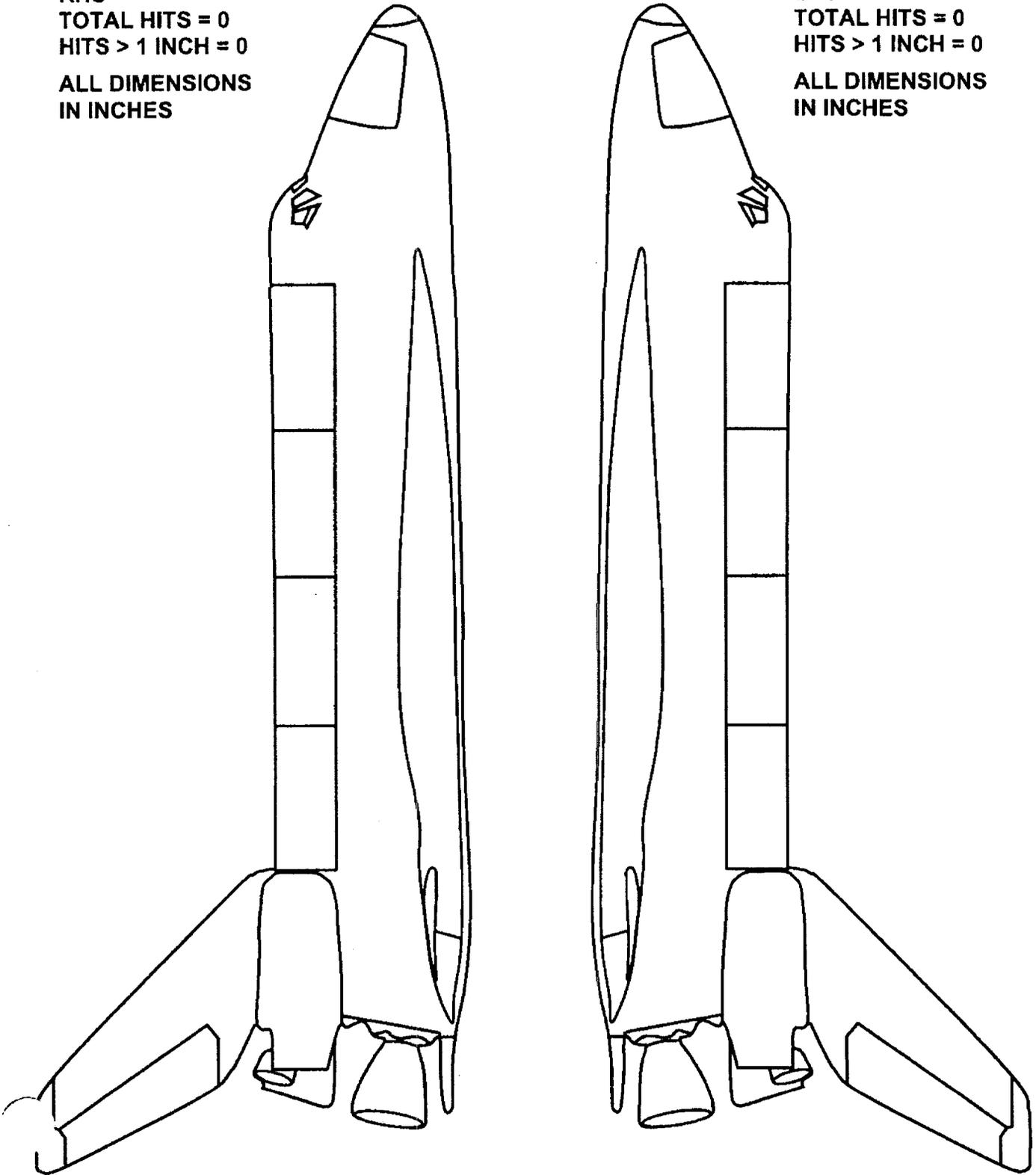
STS - 104  
DEBRIS DAMAGE LOCATIONS

STEP 150-1

\$6444  
00104/24

RHS  
TOTAL HITS = 0  
HITS > 1 INCH = 0  
ALL DIMENSIONS  
IN INCHES

LHS  
TOTAL HITS = 0  
HITS > 1 INCH = 0  
ALL DIMENSIONS  
IN INCHES



STEP 150-1

\$6444  
07/04/24

**STS-104 POST LANDING INSPECTION**  
**Debris Assessment**  
**27 July 2001**

After the 11:39 p.m. local/eastern time landing on 24 July 2001, a post landing inspection of SLF runway 15 was performed immediately after landing. On the initial walkdown all components, except the mortar cover, of the drag chute system were recovered. Due to the potential of the cover becoming a debris concern, an additional runway walkdown was performed on Friday, July 27. The mortar cover was found and recovered. It was located in the grass, approximately 40 feet east of the runway and 3500 feet from the North end of runway 15. All components of the drag chute system have now been recovered.

Armando Oliu  
NASA - KSC

ET  
01

7/27/01

STEP 150-1

\$6444  
00104/24

## STS-104 ON-ORBIT FILM SUMMARY

KSC Photo/Video Analysis Team

30 July 2001

The last film/video data, 35mm still images from the LO2 ET/ORB umbilical camera, 16mm motion picture with 5mm lens and Crew Hand-Held Still Images and video, of the External Tank after separation from the Orbiter were received and reviewed at KSC on 30 July 2001. The 35mm still images and the 16mm film provided limited data due to the poor lighting condition.

No anomalies or significant missing TPS was detected and the ET appeared in excellent condition.

### Observations:

- SRB separation from the External Tank appeared nominal.
- ET separation from the Orbiter was normal. The red-colored purge seal that normally fits around the EO-3 ball fitting had come loose and floated aft, but still secured by its tether.
- The EO-3 (LO2 side) separation bolt protrusion was noted. Protrusion appeared to be less than EO-3 bolt protrusion observed on STS-106 film.
- No damage was detected on the LO2 ET/ORB umbilical disconnect, sealing surfaces, or closeout TPS. Typical ablation and divoting was noted on the vertical portion of the umbilical cable tray.
- No anomalies were detected in the LO2 tank acreage. The BSM burn scars were typical.
- Normal amounts of TPS erosion and topcoat charring occurred on the forward ogive near the nose cone, but the presence of divots in this area could not be confirmed. The composite nose cone was in good condition.
- ET LH2 tank and intertank acreage appeared nominal. Evaluation of the thrust panel TPS was difficult due to lighting condition and image resolution.
- A shallow circular TPS divot, approximately two inches in diameter, was observed near the fwd end of the +Y thrust strut.
- The ablation/erosion of LO2 feedline flange closeouts was typical.

NASA - KSC  
Jorge Rivera

ET  
01

7/30/01

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*****
* PROGRAM PRA120 SELECTION CRITERIA
* -----
* RPT TYPE: IPR
* PR GROUP:
* WORK AREA CD:
* PR ELEM CD:
* STS NO:
* Starting RPT DT: 07/05/01
* Ending RPT DT: 08/30/01
* LRU or Non-LRU: B
* PRACA EFF CD:
* EICN:
* RPT STATUS: OP
* DETECTED DURING: S6444
* -----
* Sorted by DETECTED DURING, PR ELEM CD, and EICN
* *****

```

DATE: 09/06/01 06:14  
REPORT CODE: PRA1200A

PROBLEM REPORTING AND CORRECTIVE ACTION SYSTEM  
PROBLEMS BY DETECTED DURING

PAGE: 1



\*\*\*\*\*  
\*  
\* NO DATA FOUND ON THE DATABASE FOR THE SELECTED PARAMETERS \*  
\*  
\*\*\*\*\*

\*\*\*\*\*  
\*  
\* END OF REPORT \*  
\*

DEVIATION INDEX

PERMANENT     TEMPORARY     TEMP - RECYCLE

WAD NO. **S6444 J01**  
TASK NO./SEQ. NO. **10**

DEV NO.	SEQ/STEP	EFFECTIVITY	QC/PP&C	DATE	REMARKS
10-01	10-3	104V104 <sup>E</sup> Subs	WC 147 USA	JUN 28 01	page 10.1

ET  
01

8/30/01



TOP/WAD Deviation

Dev No. <u>10-01</u>	DILS No. <u>89333</u>	Page 1 of 5
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor QBR <i>R. Seale ETM 4/27/01</i>	Contractor Test Conductor <i>T627 6/28/01</i>	Gov't PE <i>PH-H2</i>		
Contractor Test Project Engineer	Other <i>Tom Ford 4/27/01</i>	Gov't Project Engineer		
Contractor Safety <i>R. Seale 28 Jun 01</i>	Other	Gov't Test Director or Contractor Chief TC		

Page Number: 10-1 Step Number: 10-3

Add Operation 11 as follows:

**OPERATION 11 - IR Camera Setup**

**WARNING**  
Hard hats required on the Pad when SSV is not present.

**CAUTION**  
Exercise care to avoid dropping equipment, fasteners, etc. from RSS Roof. All tools must be tethered.

11-1 Install IR Camera at RSS Roof site as follows:

**NOTE**  
IR CAMERA INSTALLATION  
MAY BE NOT PERFORMED  
AT NACA PH-H DISCRETION.

1. **Rotate** camera housing back cover to open position by removing bolts with flat washers (20 pl). **Retain** bolts/washers for reinstallation.
2. **Remove** camera housing front cover by removing fasteners (2 pl). **Reinstall** fasteners after cover removal. **Retain** cover for reinstallation after IR Camera Unit removal.
3. **Install** IR Camera Unit into camera housing. **Secure** IR Camera Unit in housing by locking spring pin at lower, left.

ET  
01

*7/1/01*

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/27/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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P.I.  
 R. Seale ETM 7/1/01



**TOP/WAD Deviation**

Dev No. <u>10-01</u>		DILS No. <u>89333</u>		Page 2 of 5	
TOP/WAD No. <b>S6444</b>		REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104		Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT		Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.	
Contractor OPR <i>R. Seale ETM 4/27/01</i>		Contractor Test Conductor <i>TO 27 6-25-01</i>		Gov't OPR <i>Vol. W. [Signature] PA #2 4/27/01</i>	
Contractor Test Project Engineer		Other <i>Tom Ford 4-27-01</i>		Gov't Project Engineer	
Contractor Safety <i>H. Seaby 28 Jun 01</i>		Other		Gov't Test Director or Contractor Chief TC	

**WARNING**

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

**CAUTION**

Do NOT allow opened back cover to exert undue force on cables once cables have been connected.

4. **Connect:**
  - OTV Coaxial cable
  - Pan & Tilt cable
  - Controller cable
  - Power cable
  
5. **Rotate** camera housing back cover into closed position. **Secure** back cover by installing bolts/flat washers (20 pl). **Tighten** bolts wrench tight.

**WARNING**

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Insure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain, eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **solovex gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 04-13-01

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>4/27/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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**ET  
01**



TOP/WAD Deviation

Dev No. <u>10-01</u>		DILS No. <u>89333</u>		Page 3 of 5
TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE		<input checked="" type="checkbox"/> Internal Review Req.		
Contractor OPR <i>R. Seale ETM 4/27/01</i>	Contractor Test Conductor <i>7027 6-28-01</i>		Gov't OPR <i>PH-H2</i>	
Contractor Test Project Engineer	Other <i>Tom Ford 4-27-01</i>		Gov't Project Engineer	
Contractor Safety <i>RR Saubey 28 Jun. 01</i>	Other		Gov't Test Director or Contractor Chief TC	

6. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl Alcohol .
7. **Perform** functional checkout of IR Camera Unit using local controller if required at Task Team Leader (TTL) discretion.

S/S 7 Not Performed: N/A

NASA PH-H: N/A Date: N/A  
 USA ETM: N/A Date: N/A

NOT PERFORMED

ET  
01

7/11/01

P+I  
 R. Seale ETM 7/11/01

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/27/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ET  
01

7/11/01



TOP/WAD Deviation

Dev No. 10-01 DILS No. 89333 Page 4 of 5

TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor OPR <i>R. Seale</i> <i>ETM</i> <i>4/27/01</i>	Contractor Test Conductor <i>T.O 27 628-01</i>	Gov't OPR <i>[Signature]</i> <i>PH-112</i> <i>4/27/01</i>		
Contractor Test Project Engineer	Other <i>Tom Ford 4.27.01</i>	Gov't Project Engineer		
Contractor Safety <i>R. Sealey</i> <i>28 Jun 01</i>	Other	Gov't Test Director or Contractor Chief TC		

PAT Tilt  
 R Sealey  
 11-2  
 11-1

Install IR Camera at Camera Site 2 as follows:

1. **Rotate** camera housing back cover to open position by removing eight ea. bolts using Phillips screwdriver. **Retain** bolts/washers for reinstallation.
2. **Remove** camera housing front cover by removing securing bolt(s). **Reinstall** bolt(s) after cover removal. **Retain** cover for reinstallation after IR Camera Unit removal.
3. **Install** IR Camera Unit into camera housing. **Secure** IR Camera Unit in housing by tightening set screw(s) wrench tight at lower, left/right.

**WARNING**

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

4. **Connect:**
  - OTV Coaxial cable
  - Pan & Tilt cable
  - Controller cable (2 pl)
  - Power cable
5. **Rotate** camera housing back cover into closed position. **Secure** back cover by installing bolts (8 pl). **Tighten** bolts using Phillips screwdriver.

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>4/27/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ET  
01

*7/1/01*



**TOP/WAD Deviation**

Dev No. 10-01 DILS No. 89333 Page 5 of 5

TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE			<input checked="" type="checkbox"/> Internal Review Req.	
Contractor QPR <i>R. Seale</i> <i>Sim</i> <i>4/27/01</i>	Contractor Test Conductor <i>T027</i> <i>6-28-01</i>	Gov't QPR <i>PH-H2</i> <i>4-27-01</i>		
Contractor Test Project Engineer	Other <i>Tom Ford</i> <i>4-27-01</i>	Gov't Project Engineer		
Contractor Safety <i>AK</i> <i>Subby</i> <i>28 Jun 01</i>	Other	Gov't Test Director or Contractor Chief TC		

**WARNING**

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Insure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain, eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **solovex gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 04-13-01

- Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl Alcohol.
- Perform** functional checkout of IR Camera Unit using local controller if required at Task Team Leader (TTL) discretion.

S/S 7 Not Performed: ET  
07-09-01

NASA PH-H: *[Signature]* Date: 07/11/01  
USA ETM: *R. Brewer* Date: 07-09-01

*Not Performed* N/A

Reason: Establish operational controls for installation of the IR Camera units on the RSS Roof and Camera Site 2.

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>4/27/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ET  
01

PH-H  
 R. Seale  
 7/11/01





TOP/WAD Deviation

Dev No. <u>50-01</u>	DILS No. <u>87031<sup>(s)</sup></u>	Page 1 of 4
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor OPR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Taylor 4-9-01</i>	Gov't OPR <i>[Signature] 4-6-01</i>		
Contractor Test Project Engineer <i>[Signature] 4/9/01</i>	Other <i>Mark Wollen 4/5/01</i>	Gov't Project Engineer <i>[Signature]</i>		
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC <i>[Signature] NTD 4/9/01</i>		

Page Number: 50-4 Step Number: 50-8

Add following (one line below end of step text):

OMRS S00FB0.350-1

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ET  
01

8/20/01



**TOP/WAD Deviation**

TOP/WAD No. <b>S6444</b>		REV/CHG/MVER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT		Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.		
Contractor OBR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Taylor 4-9-01</i>	Gov't OBR <i>PH-HZ</i>	Gov't Project Engineer <i>Robert F. ... 4/6/01</i>		
Contractor Test Project Engineer <i>Paul Kelley Connolly 4/9/01</i>	Other <i>Mark Wollam 4/5/01</i>	Gov't Test Director, or Contractor Chief, TC <i>Stephen J. ... 4/9/01</i>			
Contractor Safety					

Page Number: 50-5 Step Number: 50-10

Add steps 50-10.1 with preceding Note and 50-10.2 as follows:

**NOTE**

Excessive vapors are defined as being more severe than those described in NSTS 08303 (LI) NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA or NSTS 16007 (LI) NSTS PROGRAM LAUNCH COMMIT CRITERIA - HAZARDOUS GAS SUBSYSTEM .

50-10.1 CTIF CVM1 222  
CVM2

From start of LO<sub>2</sub> / LH<sub>2</sub> loading until Prepressurization (LO<sub>2</sub> at T-2M55s and LH<sub>2</sub> at T-1M57s):

1. Monitor following ET-Orbiter MPS areas for leakage:
  - LO<sub>2</sub> Feedline (portion external to the Intertank)
  - LH<sub>2</sub> Feedline
  - LH<sub>2</sub> Recirculation Line
  - LH<sub>2</sub> Aft Dome Manhole Cover(s)
  - ET-Orbiter LO<sub>2</sub> / LH<sub>2</sub> Umbilical Disconnects
  - LH<sub>2</sub> T-0 Umbilical
  - LO<sub>2</sub> T-0 Umbilical
2. Verify no visible cryogenic liquid of excessive vapors.

OMRS (general) S00FB0.360-1

ETM ME  
08 Date 7-12-01

Not Performed: N/A

**ET  
01**

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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7/12/01



**TOP/WAD Deviation**

Dev No. <u>50-01</u>	DILS No. <u>87031 (S)</u>	Page 3 of 4
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE			<input checked="" type="checkbox"/> Internal Review Req.	
Contractor OPR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Jaffe 4/9/01</i>	Gov't OPR <i>PH-112 4/6/01</i>		
Contractor Test Project Engineer <i>Mark Wollan 4/9/01</i>	Other <i>Mark Wollan 4/5/01</i>	Gov't Project Engineer		
Contractor Safety	Other	Gov't Test Director, or Contractor Chief TC <i>Stephen Jaffe 4/9/01</i>		

50-10.2 CTIF CVM1 222  
CVM2

Monitor and videotape record following ET TPS surface areas and GO<sub>2</sub> Vent Area during LO<sub>2</sub> / LH<sub>2</sub> loading through Prepressurization (LO<sub>2</sub> at T-2M55s and LH<sub>2</sub> at T-1M57s):

- LH<sub>2</sub> Aft Dome
- LH<sub>2</sub> Barrel
- Intertank (external)
- LO<sub>2</sub> Tank
- GO<sub>2</sub> Vent Area
- Protuberances

OMRS (general) S00FB0.005-1

ETM ME  
08 Date 7-12-01

Not Performed: N/A

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ET  
01

7/12/01



**TOP/WAD Deviation**

Dev No. <b>50-01</b>	DILS No. <b>87031 (S)</b>	Page 4 of 4
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE	<input checked="" type="checkbox"/> Internal Review Req.			
Contractor OPR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Taylor 4-9-01</i>	Gov't OPR <i>Robert Z. Seale 4-6-01</i>	PH-H2	
Contractor Test Project Engineer <i>Mark Nollen 4/5/01</i>	Other	Gov't Project Engineer		
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC <i>Stanley H. Lane 4/9/01</i>		

Page Number: 50-9 Step Number: 50-18

Change step 50-18 as follows:

was: "... are 38 knots or ..."

is: "... are 38 knots (peak as measured at 60 feet above ground) or ..."

Page Number: 50-9 Step Number: 50-19

Add step 50-19.1 as follows:

**50-19.1 CTIF**

ET-Orbiter MPS monitoring for leakage and ET TPS Surface Areas and GO<sub>2</sub> Vent Area monitoring/recording for launch complete.

OMRSD S00FB0.005-1  
OMRSD S00FB0.360-1

USA  
VM  
011

ETM

*R. Seale*

Date 7/12/01

Not Performed: N/A

Reason: Ensure text of operational instructions complies with the OMRS.

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>4/5/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ETM

7/12/01





TOP/WAD Deviation

Dev No. 60-01 DILS No. 87032 (S) Page 1 of 1

TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
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First Use  SRB BI-  ET  GSE  STS-100  
 Effectivity:  ORB /FLT  FRCS/POD /FLT  SSME /FLT

Affected:  OMRS/ACOMC/OMP  Design Req'ts  Haz Step(s)  PPE  Internal Review Req.

Contractor OBR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim [unclear] 4-9-01</i>	Gov't OBR <i>Robert F. [unclear] 4-6-01</i>
Contractor Test/Project Engineer <i>Paul Celery Conway 4/4/01</i>	Other <i>Mark Nollan 4/5/01</i>	Gov't Project Engineer
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC <i>Stephen [unclear] 4/9/01</i>

Page Number: 60-1 Step Number: 60-1

ET 01 8/30/01

Delete OMRS S00FB0.005-1 and S00L00.150-1 from Note preceding step 60-1: "Noted ... operation."

Page Number: 60-6 Step Number: 60-12

ET 01 8/30/01

Delete OMRSD S00FB0.005-1 and OMRSD S00L00.150 from step 60-12.

Reason: These OMRSD's have been moved to Operation 50.

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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ET 01 8/30/01





TOP/WAD Deviation

Dev No. <u>70-01</u>	DILS No. <u>87033 (S)</u>	Page 1 of 1
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor QRR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Javor 4/9/01</i>	Gov't OPR <i>PH-A12</i>		
Contractor Test Project Engineer <i>Paul Almy Connors 4/9/01</i>	Other <i>Mark Wollam 4/5/01</i>	Gov't Project Engineer <i>4-6-01</i>		
Contractor Safety	Other	Gov't Test Director, or Contractor Chief, TC <i>Stephen Payne 4/9/01</i>		

Page Number: 70-1 Step Number: 70-1

Delete OMRS S00FB0.005-1 and S00FB0.360-1 from Note preceding step 70-1: "Noted ... operation."  
⓪

Page Number: 70-6 Step Number: 70-12

Delete OMRSD S00FB0.005-1 and OMRSD S00FB0.360-1 <sup>and</sup> from step 70-12.  
⓪

Reason: These OMRSD's are satisfied via Operation 50.

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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12/2/01 **ETM**





**TOP/WAD Deviation**

Dev No. <u>130-01</u>	DILS No. <u>87034</u> <sup>(S)</sup>	Page 1 of 1
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor QPR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Taylor 4/9/01</i>	Gov't QPR <i>PA-H2</i>		
Contractor Test Project Engineer <i>Paul Casey Conway 4/9/01</i>	Other <i>Mark Wollan 4/5/01</i>	Gov't Project Engineer <i>Edith Lopez 4-6-01</i>		
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC <i>Stephen Payne 4/9/01</i>		

Page Number: 130-2 Step Number: 130-2

Add following Note prior to step 130-2:

**NOTE**

Post Launch Walkdown must be performed prior to washdown and Pad being opened for normal work.

Reason: Ensure text of operational instructions complies with OMRS S00U00.010-1.

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>4/5/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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7/12/01

# DEVIATION INDEX

WAD NO.

PERMANENT     TEMPORARY     TEMP RECYCLE

S6444 REV: J CHG:01 (OMI)

DATE/TIME: 04/10/2001 05:39:28

TASK NO./SEQ. NO. 140

DEV NO.	SEQ/STEP	EFFECTIVITY	QC/PP&C	DATE	REMARKS
140-01	140 1		*	2001-04-09	
140-02	140 2	SS104	WC 147 JUN 28 2001	JUN 28 01	Page 140.1

E1  
01



TOPWAD Deviation

Dev No. <u>140-01</u>	DILS No. <u>87035</u> <sup>(S)</sup>	Page 1 of 1
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TOPWAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor ORR <i>R. Seale ETM 4/5/01</i>	Contractor Test Conductor <i>Jim Saylor 4-9-01</i>	Gov't APPR <i>PH-HZ</i>		
Contractor Test Project Engineer <i>Mark Kelly comply 4/9/01</i>	Other <i>Mark Wollan 4/5/01</i>	Gov't Project Engineer <i>460</i>		
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC <i>Stephen Payne 4/9/01</i>		

Page Number: 140-1 Step Number: 140-1

Add following Note and change step 140-1 to read as follows:

**NOTE**

Analysis of Pad Debris Inspection Results determines priority for film review. All critical film (as determined by the Debris Team) must be reviewed as soon as possible after launch and no later than 36 hours prior to entry (of the Orbiter into the earth's atmosphere).

- 140-1** Review and analyze all engineering launch (and flight film) to:
- Identify any debris damage to the SSV
  - Identify flight vehicle or ground system damage that could affect Orbiter flight operations or future SSV launches.

OMRSD S00U00.011-1

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VM  
071

ETM: R. Seale Date 8/30/01

Reason: Ensure text of operational instructions complies with the OMRSD S00U00.011-1.

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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8/30/01



**TOP/WAD Deviation**

Dev No. 140-02 DILS No. 89334 Page 1 of 5

TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE			<input checked="" type="checkbox"/> Internal Review Req.	
Contractor OPR <i>R. Seale ETM 6/27/01</i>	Contractor Test Conductor <i>[Signature] T027 6-28-01</i>	Gov't OPR <i>[Signature] PH-112</i>	Gov't Project Engineer <i>[Signature]</i>	
Contractor Test Project Engineer	Other <i>[Signature]</i>	Gov't Test Director or Contractor Chief TC		
Contractor Safety <i>A. Saubey 28 Jun. 01</i>	Other CF Check <i>[Signature] Richards 6-27-01</i>			

© R. Seale ETM 7/18/01  
 SEE PFI LOG

Page Number: 140-1 Step Number: 140-2

Add Operation 141 as follows:

**OPERATION 141 - IR Camera Removal**

NOTE  
 IR CAMERA REMOVAL(S) MAY  
 BE NOT PERFORMED IF IR  
 CAMERA(S) NOT INSTALLED.

**WARNING**  
 Hard hats required on the Pad when SSV is not present.

**CAUTION**  
 Exercise care to avoid dropping equipment, fasteners, etc. from RSS Roof. All tools must be tethered.

141-1  
 11-1

Remove IR Camera from RSS Roof site as follows:

1. Remove fasteners (2 pl) from camera housing front. Retain fasteners for reinstallation when front cover is installed.
2. Install camera housing front cover using previously removed fasteners (2 pl). Tighten fasteners (2 pl) wrench tight.

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 6/27/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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**TOP/WAD Deviation**

Dev No. 140.02 DILS No. 89334 Page 2 of 5

TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE		<input checked="" type="checkbox"/> Internal Review Req.		
Contractor OPR <i>R. Seale ETM 6/27/01</i>	Contractor Test Conductor <i>T027 6-28-01</i>	Gov't OPR <i>[Signature] PA-HL 6-28-01</i>	Gov't Project Engineer	
Contractor Test Project Engineer	Other	Gov't Test Director or Contractor Chief TC		
Contractor Safety <i>KK Saubey 28 Jun. 01</i>	Other <i>SE Check [Signature] 6-27-01</i>	Gov't Test Director or Contractor Chief TC		

**WARNING**

Power cable is live. Care should be exercised when disconnecting power cable to avoid electric shock.

**CAUTION**

Do NOT allow back cover to exert undue force on cables when opening/rotating back over.

3. **Rotate** camera housing back cover to open position by removing bolts with flat washers (20 pl). **Retain** bolts/washers for reinstallation.
4. **Disconnect:**
  - Power cable
  - Pan & Tilt cable
  - Controller cable
  - OTV Coaxial cable
5. **Unlock** spring pin at lower, left to release IR Camera Unit in camera housing. **Remove** IR Camera Unit from camera housing by carefully sliding it out the back opening of the camera housing. **Support** IR Camera Unit during removal.
6. **Rotate** camera housing back cover into closed position. Do not pinch cables. **Secure** back cover by reinstalling bolts/flat washers (20 pl). **Tighten** bolts wrench tight.

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 6/27/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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TOP/WAD Deviation

Dev No. <u>140-02</u>	DILS No. <u>89334</u>	Page 4 of 5
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB Bl- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE		<input checked="" type="checkbox"/> Internal Review Req.		
Contractor OPR <u>R. Seale ETM 6/27/01</u>	Contractor Test Conductor <u>7027 6-28-01</u>		Gov't OPR <u>[Signature]</u>	
Contractor Test Project Engineer	Other		Gov't Project Engineer <u>[Signature]</u>	
Contractor Safety <u>R. Sealey 28 Jun. 01</u>	Other <u>SE Check</u>		Gov't Test Director or Contractor Chief TC <u>[Signature]</u>	

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11-1

Remove IR Camera from Camera Site 2 as follows:

1. Remove bolt(s) from camera housing front. Retain bolt(s) for reinstallation when front cover is installed.
2. Install camera housing front cover using previously removed bolt(s). Torque bolt(s) wrench tight.

**WARNING**

Power cable is live. Care should be exercised when disconnecting power cable to avoid electric shock.

**CAUTION**

Do NOT allow back cover to exert undue force on cables when opening/rotating back over.

3. Loosen screws (8 pl) securing camera housing back cover using Phillips screwdriver. Rotate camera housing back cover to open position. Retain bolts/washers for reinstallation.
4. Disconnect:
  - Power cable
  - Pan & Tilt cable
  - Controller cable (2 pl)
  - OTV Coaxial cable
5. Unscrew set screw(s) at lower, left/right to release IR Camera Unit in camera housing. Remove IR Camera Unit from camera housing by carefully sliding it out the back opening of the camera housing. Support IR Camera Unit during removal.

①  
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R. Seale ETM 7/18/01

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 6/27/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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TOP/WAD Deviation

Dev No. <u>140-02</u>		DILS No. <u>89334</u>		Page 5 of 5
TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J 01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>20</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-104	Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT			
Affected: <input type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE		<input checked="" type="checkbox"/> Internal Review Req.		
Contractor DPR <u>R. Seale ETM 6/27/01</u>	Contractor Test Conductor <u>To 27 6-28-01</u>		Gov't DPR <u>PH-HZ 6-28-01</u>	
Contractor Test Project Engineer	Other		Gov't Project Engineer	
Contractor Safety <u>H. Stribby 28 Jun. 01</u>	Other <u>Richards 3rd check 6-27-01</u>		Gov't Test Director or Contractor Chief TC	

- Coat camera housing back cover O-ring with a single coat of (1) tube / jar 6505-00-133-8025 Petroleum Jelly, Vaseline (or equivalent).
- Rotate camera housing back cover into closed position. Do not pinch cables. Secure back cover by installing screws (8 pl). Tighten screws wrench tight using Phillips screwdriver.

**WARNING**

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Insure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain, eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear solvex gloves and chemical splash goggles. When working at eye level or above wear a face shield over goggles.

WS002.a 04-13-01

- Clean IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl Alcohol.
- Route IR Camera Unit to VAB 3K1 for refurb/checkout.

NASA PH-H: [Signature] <sup>PH-HZ</sup> Date: 7-18-01  
 USA ETM: R Brewer Date: 7-18-01

① Not Perform N/A

**Reason:** Establish operational controls for removal of IR Camera units from the RSS Roof and Camera Site 2.

Originator (print) <b>R. Seale</b>	SPDMS ID <b>T08011</b>	Phone <b>1-3348</b>	Organization <b>ETM</b>	Date <b>6/27/01</b>	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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(SEE P&I LOG)  
 R. Seale ETM 7/18/01

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**TOP/WAD Deviation**

Dev No. <u>150-01</u>	DILS No. <u>87036<sup>(S)</sup></u>	Page 1 of 1
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TOP/WAD No. <b>S6444</b>	REV/CHG/VER <b>J01</b>	<input type="checkbox"/> In Family <input checked="" type="checkbox"/> Out of Family	Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V) <b>E</b>	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite <b>30</b>
First Use <input type="checkbox"/> SRB BI- <input type="checkbox"/> ET <input type="checkbox"/> GSE <input checked="" type="checkbox"/> STS-100				
Effectivity: <input type="checkbox"/> ORB /FLT <input type="checkbox"/> FRCS/POD /FLT <input type="checkbox"/> SSME /FLT				
Affected: <input checked="" type="checkbox"/> OMRS/ACOMC/OMP <input type="checkbox"/> Design Req'ts <input type="checkbox"/> Haz Step(s) <input type="checkbox"/> PPE <input checked="" type="checkbox"/> Internal Review Req.				
Contractor OPR <i>R. Seale Film 4/5/01</i>	Contractor Test Conductor <i>Jim Taylor 4/9/01</i>	Gov't OPR <i>PH-12</i>		
Contractor Test Project Engineer <i>Calley Connolly 4/9/01</i>	Other <i>Mark Wollan 4/5/01</i>	Gov't Project Engineer <i>PH-6-01</i>		
Contractor Safety	Other	Gov't Test Director or Contractor Chief, TC <i>Stephen Payne 4/9/01</i>		

Page Number: 140-1 (s/b 150-1) Step Number: 150-2

Delete following from step 150-2:

"OMRSD S00U00.011-1"

Reason: OMRSD S00U00.011-1 pertains to Film Review (Operation 140).

Originator (print) R. Seale	SPDMS ID T08011	Phone 1-3348	Organization ETM	Date 4/5/01	<input checked="" type="checkbox"/> Perm <input type="checkbox"/> Temp <input type="checkbox"/> Temp-Recycle
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2/2/01