NASA

SECTION 33

UNEXPLAINED ANOMALIES ENGINE #1 PREVALVE INDICATION DROP OUT (CONT'D)

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Possible Causes
  - Mechanical failure of the micro switch
    - Intermittent mechanical failure is highly unlikely
    - Improper switch adjustment would result in multiple occurrences
    - No previous switch failures
  - An intermittent short or open in the indicator electrical circuit
    - All occurrences have been during high traffic periods in aft fuselage or during ascent
- Most Probable Cause
  - An intermittent short or open in the indicator electrical circuit

UNEXPLAINED ANOMALIES ENGINE #1 PREVALVE INDICATION DROP OUT (CONT'D)

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Flight Rationale
  - The open indication is only required at T-7 prior to engine start
    - Only 1 of 2 indications required
    - Failure of both (redundant) open indications is highly unlikely
    - Prevalve open indication is not monitored for on-orbit propellant dump or re-entry inerting
  - No history of failures during cryogenic load or terminal count
  - Proper valve operation will be verified after Aft close out

- Risk Assessment
  - No risk to Flight and Crew's safety or Mission success

ENGINEERING TOPICS

Presenter:
Mike Young

Organization/Date:
Ground Ops/01-09-03

- STS-107 Potential Hold Down Post Pyro Failure (T-0 Connectors)
- Orbiter Access Arm (OAA) Lower Actuator Hydraulic Leakage
- Payload Bay Purge Configuration with EDO Pallet

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Observation
  - During STS-112 the Ground Launch Sequencer (GLS) issued "Cut Off" at T+ 3 Seconds
    - Post launch review indicated that the Pyrotechnic System A Hold Down Post (HDP) and ET Vent Arm System (ETVAS) Pyrotechnic Initiator Controllers (PICs) did not discharge

- Concerns
  - Potential for a similar loss of one level of system redundancy for HDP and ETVAS pyrotechnics for STS-107

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Discussion
  - The most probable cause for the STS-112 failure was attributed to the failure of a single wire path at the T-0 interface
  - A recurrence control plan was enacted for STS-113 and STS-107
  - The STS-107 action plan is consistent with the STS-113 action plan
    - The T-0 carrier plate, T-0 electrical connections and all ordnance functioned nominally for STS-113

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Actions Taken
  - On the Orbiter
    - Replaced all orbiter T-0 connector savers
      - J71, J53, J59 and J63 connector savers were safety wired due to loose bayonet pins
    - Videoscope of the orbiter T-0 connector savers performed prior to T-0 mate. Verified all three bayonet pins engaged
  - On MLP #1
    - Replaced and tested the 8' T-0 carrier plate interface cables prior to orbiter mate
    - Long-run cables recently replaced (LDB issue)
    - The Pyro Ground Cables from the TSM bulkhead plate to the Terminal Distributor and from the Terminal Distributor to the PIC rack have been checked for insulation resistance, electrical isolation and continuity

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Actions Taken (Cont'd)
  - During T-0 Mate
    - Videoscope performed during orbiter T-0 connector mate. Verified at least two bayonet pins engaged following mate
  - Standard Shuttle Integrated Testing (S0008)
  - Shuttle/Pad Interface Testing (S0009)

- Actions in Work
  - Ordnance Installation and Test (S5009)
    - ARM, Fire 1, and Fire 2 command path verification
    - PIC Capacitor discharge verification

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Risk Assessment
  - Based on the current data from the STS-112 investigation, the action taken to mitigate the most probable cause means that there is no increased risk for STS-107 launch as a result of the STS-112 HDP/ETVAS Pyro Failure

- Flight Rationale
  - The Orbiter T-0 electrical connector savers have been replaced and inspected
  - The T-0 connector mate was videoscoped
  - The T-0 carrier plate interface cables have been replaced and tested
  - The MLP wire paths have been tested and inspected
  - Pyro System checkout will be performed prior to launch

ENGINEERING TOPIC
ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Observation
  - Orbiter Access Arm (OAA) console personnel noted a higher than expected hydraulic pressure decrease in the standby system during the final STS-113 tanking on 11-23-02. (Ref IPR 113V-0079)

- Concerns
  - Excessive OAA internal hydraulic system leakage could cause a slow OAA retraction when commanded at T-7:30
  - Failure to meet the requirements of LCC GSE-12 could cause a launch scrub

ENGINEERING TOPIC
ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Discussion
  - The Pad A OAA lower actuator hydraulic leakage has been documented, quantified and accepted by MR since 2000
    - PR U70-0503-00-001-0821 documents a 35 cc/min leak at 2700 psi(max allowable is 0.5 cc/min)
      - Leakage changes each time the OAA is cycled
  - The STS-113 observed leakage appears to have increased to 50 cc/min at standby pressure
    - During STS-113 scrub T/A console personnel documented a slope change on the hydraulic standby pressure indicating an increase in leakage
  - Pad A OAA extend and retract times have remained consistent throughout the leak history
    - Extend: 16 seconds (30 sec max allowed)
    - Retract: 100 seconds (140 sec max allowed)

ENGINEERING TOPIC
ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE

Presenter:
Mike Young
Organization/Date:
Ground Ops/01-09-03

- Actions Taken
  - A spare actuator was authorized in 2000 and delivered Spring 2002. The spare is being validated at LETF
  - Post STS-113 Pad A validation has cycled the arm and quantified the lower actuator leakage
    - 50 cc/min at standby pressure (70-80 psi)
    - 75 cc/min at operating pressure (2700 psi)
  - An OAA extension test was run after S0009 Shuttle/Pad Integration test to quantify and baseline leakage for S0007
    - 50 cc/min at standby pressure (70-80 psi)
    - 80 cc/min at operating pressure (2700 psi)

ENGINEERING TOPIC ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Actions Planned
  - Establish a standardized monitoring routine and working limits to be checked after OAA/GVA/HCU system activations to assure system integrity prior to T-11H and counting. Formalize through use of checklist
  - Utilize PC Goal plotting capabilities to define system data profiles not readily discernable from LPS
    - Determine system data and trend profiles required for performance acceptance
    - Develop and maintain baseline (reference) configuration plots for each pad
    - Establish PC Goal workstation configuration to download for all subsequent missions

ENGINEERING TOPIC ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Risk Assessment
  - Based on the leak and timing data obtained to date, there is no increased risk for STS-107 launch as a result of the STS-113 OAA lower actuator leakage

- Flight Rationale
  - No safety of flight impact

FUEL CELL RUNTIME

Presenter: Mike Young

Organization/Date: Ground Ops/01-09-03

- Fuel Cell (FC) Runtime Contingency
  - Present Runtime Hours
    - FC1 s/n 117 1709
    - FC2 s/n 111 1419
    - FC3 s/n 103 1702
  - Planned Runtime Usage - 447 hours
    - 16 day mission + 2 weather contingency days + 15 hours FC start/landing
  - Available Contingency Runtime
    - FC1 344 hours
    - FC2 634 hours
    - FC3 351 hours

STS-107

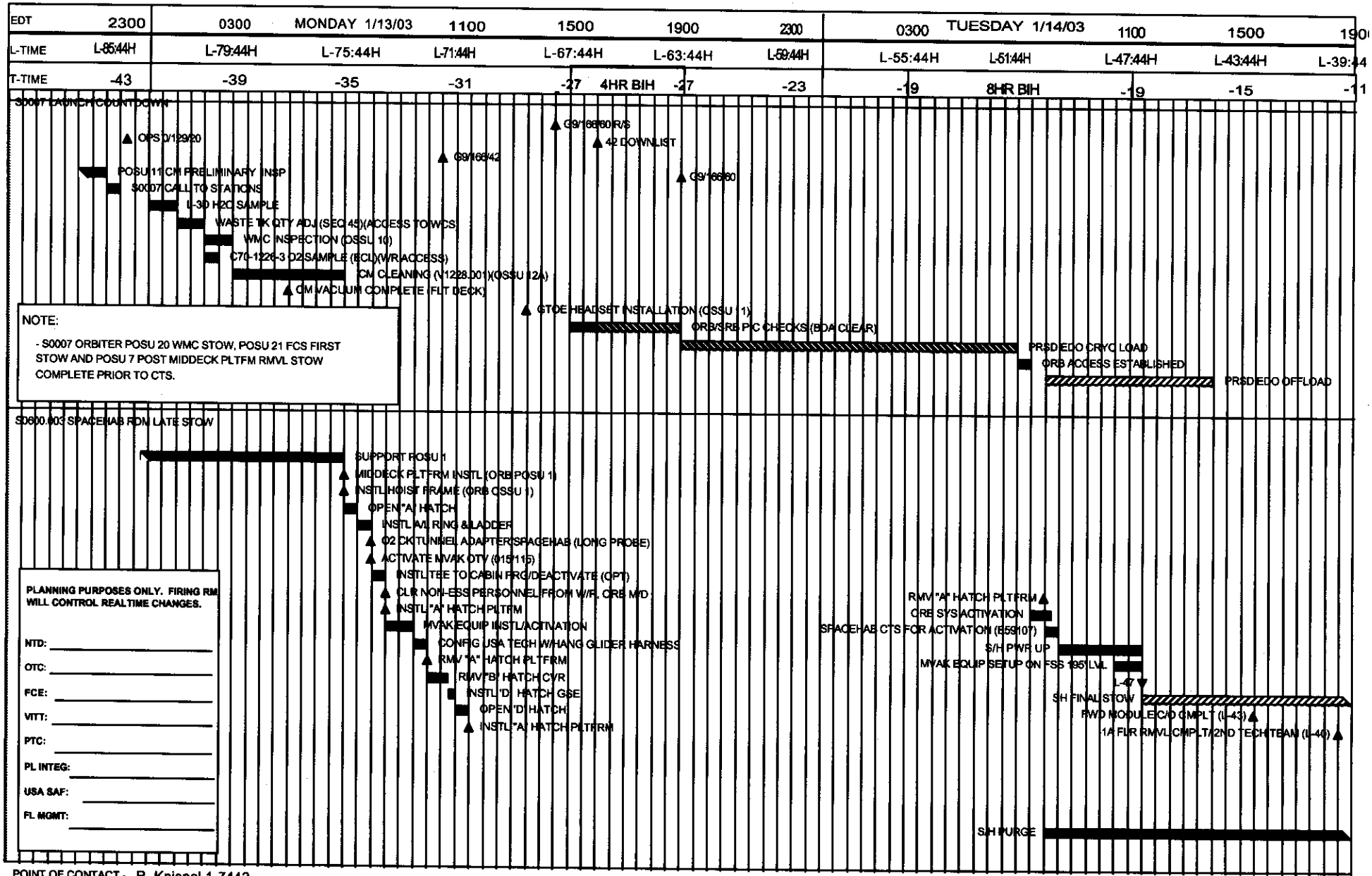
FLIGHT READINESS REVIEW

BACKUP

Launch and Landing

STS-107 S0007/S06[illegible].003/TPS-FCS-XXX
Crew Module Interface Chart

30 MINUTE INCREMENTS



POINT OF CONTACT - R. Knispel 1-7442

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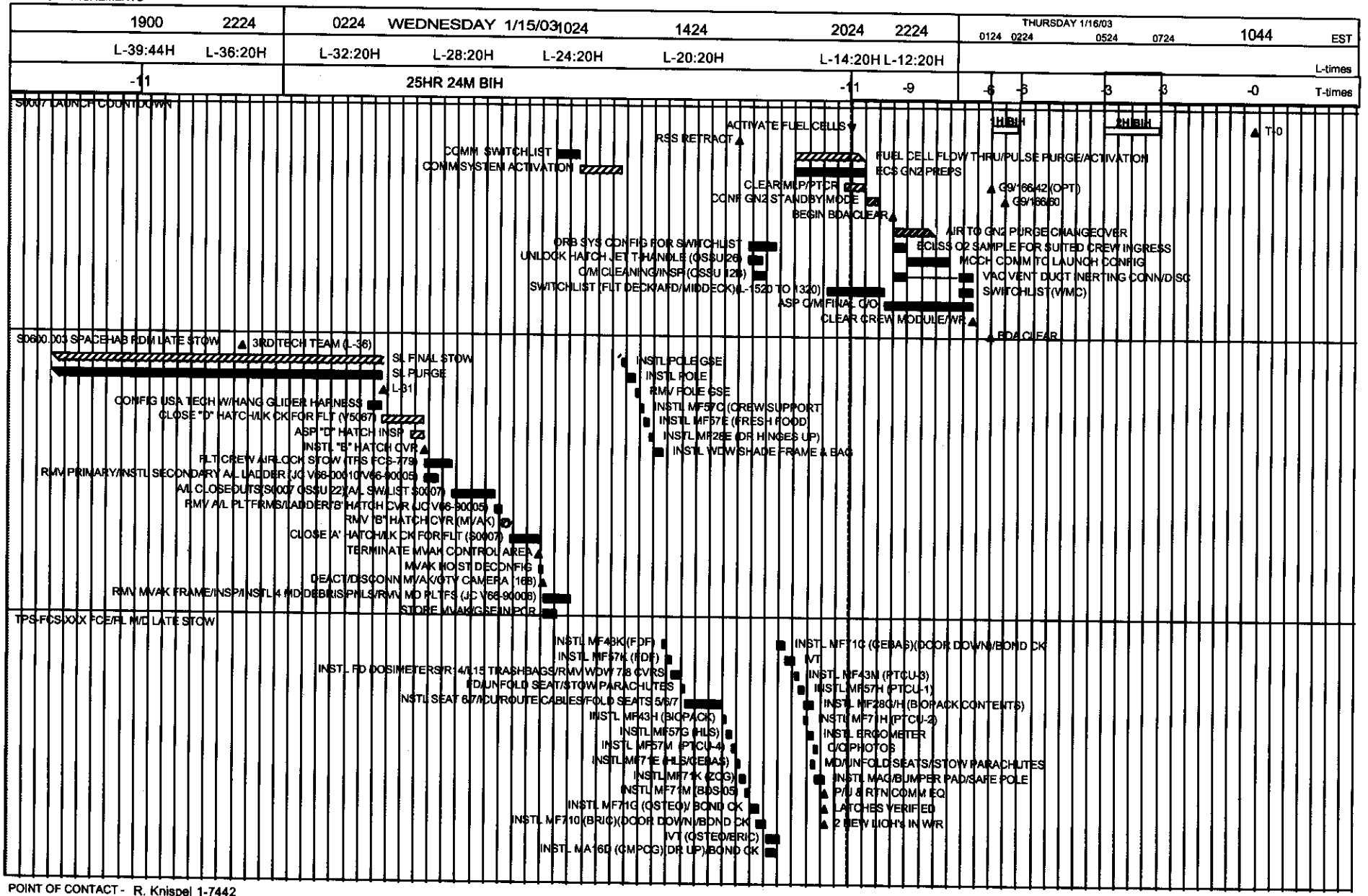
DATE: 25OCT02

TIME: 09:57

STS-107 S0007/S0600.003/TPS-FCS-XXX
Crew Module Interface Chart



POINT OF CONTACT - R. Knispel 1-7442

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DATE: 25OCT02

TIME: 09:59

STS-107

FLIGHT READINESS REVIEW

January 9, 2003

Eastern Range

90 Day Range Forecast

A/O 08/1955Z Jan 03

Opnr	Operation	Pad	Date / Time "Z"	Local "T" Time
F1120	STS-107 FREESTAR/SH-DM	39A	16 Jan 1539-1809Z	16 Jan 10:39 AM
F9101	Titan IV B-35 MILSTAR	40	21 Jan 2125-0125Z	21 Jan 4:25 PM
F8451	Pegasus SORCE	Air	25 Jan 2009-2109Z	25 Jan 3:09 PM
A7957	Delta II GPS IIR-8 / XSS-10	17B	29 Jan 1806-1820Z	29 Jan 1:06 PM
(CD) L1121	STS-107 Land KSC		01 Feb 1356Z	01 Feb 8:56 AM
F7265	Delta IV DSCS#1	37B	02 Feb 2300-0300Z	02 Feb 6:00 PM
(CD) F6155	Comm Atlas IIIB AsiaSat-4	36B	Indef	
R1313	RSA ISCF Cutover Period		10 Feb through 4 Mar	03
F3485	STS-114 ISS U & LF #1	39B	06 Mar 0745-0759Z	06 Mar 2:45 AM
G4402	Comm Atlas V HELLAS-SAT	41	11 Mar 2100-2300Z	11 Mar 4:00 PM
L3486	STS-114 Land KSC		17 Mar 1300Z	17 Mar 8:00 AM
A7962	Delta II GPS IIR-9 / ProSeds	17A	29 Mar TBD	29 Mar
(PP) F8170	Pegasus GALEX	Air	04 Apr 2000-2100Z	04 Apr 3:00 PM
(PP) F6155	Comm Atlas IIIB AsiaSat-4	36B	10 Apr 2300-0100Z	10 Apr 7:00 PM
F8615	Comm Delta II SIRTF	17B	15 Apr 1535:39Z	15 Apr 11:35 AM

POC: 45 RANS/DOUS A. F.
RANGE SCHEDULING

(CD) = CHANGED DATA (PP) = PROPOSED (CF) = CONFLICT

January 03

A/O 08/1955Z Jan 03

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2 R5156 ISCF FDE DELTA IV MED LNCH SIM 1500Z-2300Z	3 G4036 MDR F-1 1300Z-2100Z R1315 ISCF FDE STS BKGRND FILE BLD 1300Z-2100Z R1316 ISCF FDE STS CONFIG FILE BLD 1300Z-2100Z	4 G4013 TITAN B-35 MDR 1445Z------0600Z R5157 ISCF FDE LOG SCEN 1230Z-2100Z
5	6 R5343 ISCF FDE BGND BLD 1300Z-2100Z	7	HOLIDAY 8 G3791 DELTA IV F-1 MDR 1300Z-1700Z R5344 ISCF FDE LNCH 1500Z-2300Z G3655 STS-107 FIN ORD 0500Z-1000Z R5345 ISCF FDE TLM TNG/CK OUT 1100Z-1500Z	9 G3792 DELTA IV MDR 1700Z-0300Z G4168 ATLAS SIM FLT 1200Z-1600Z R6392 ISCF FDE ATLAS R/S TNG 1700Z-2100Z R6391 ISCF FDE ATLAS BKGR VER 1300Z-1700Z	10 G3156 TITAN CERT 1100Z-2300Z G3165 TITAN LCST 1100Z-2300Z	11 R5157 ISCF FDE LOG SCEN 1230Z-2100Z
12 G2377 DELTA IV SIM FLT/CODE LOAD 1300Z-0500Z	13 R1250 RSA FDE ATLAS IIAS SIM 1500Z-2300Z R5418 RSA FDE ATLAS TLM C/O 1100Z-1500Z	14 R5346 ISCF FDE ATLAS FILE BLD 1300Z-2100Z G1660 DELTA IV SIM ENG EVAL 1300Z-2100Z R5347 ISCF FDE FILE BLD ATLAS V 1300Z-2100Z	15 R6398 ISCF FDE STS THEO 1700Z-1800Z R1317 ISCF FDE STS FLT SFTY VER 1300Z-1700Z RECONFIG STS-107	16 F1120 STS-107 FREESTAR W=1539Z-1809Z P=1539Z-1939Z	17 R5372 ISCF FDE BKGR VER ATLAS V 1300Z-1700Z R5349 ISCF FDE TNG ATLAS V 1800Z-2100Z R5348 ISCF FDE THEO TRAN ATLAS V 1400Z-1500Z	18 R5157 ISCF FDE LOG SCEN 1300Z-2100Z
19 RECONFIG TITAN	20 G1235 B-35 PAD F-1 1300Z-2100Z G2278 PEGASUS MDR 1430Z-1830Z HOLIDAY	21 F9101 TITAN IV B-35 CENT / MILSTAR 2125Z-0125Z	22 R5374 ISCF FDE ATLAS V LNCH SIM 1500Z2300Z R5371 ISCF FDE TLM TRK C/O ATLAS V 1100Z-1500Z	23 G2279 PEGASUS CST 1300Z-1700Z	24 RECONFIG SORCE	25 F8451 PEGASUS SORCE 2009:30Z-2108:58Z
26 G5492 DELTA II MDR 1300Z-1900Z RECONFIG GPS IIR-8	27	28	29 A7957 DELTA II GPS IIR-8 / XSS-10 1806Z-1820Z	30 A7957 DELTA II GPS IIR-8 / XSS-10 1801Z-1816Z	31	

February 03

A/O 08/1955Z Jan 03

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1 L1121 STS-107 LAND KSC 1356Z
2 F7265 DELTA IV DSCS#1 2300Z-0300Z	3	4	5	6	7	8 RECONFIG DSCS#1
9	10 G5817 PEGASUS FERRY FLIGHT 1900Z-2300Z	11 R1313 RSA ISCF CUTOVER PERIOD	12 G2086 STS-114 TCDT 1000Z-1700Z T=1600Z	13	14	15
16	17 HOLIDAY	18 R1313 RSA ISCF CUTOVER PERIOD TESTING AND CERTIFICATION	19	20	21	22
23	24	25 R1313 RSA ISCF CUTOVER PERIOD TESTING AND CERTIFICATION	26	27	28	

READINESS CERTIFICATION

The Eastern Range and the DOD Shuttle Network are ready to support STS-107 Launch Operations

SIG. Pavlovich

G. PAVLOVICH
Brigadier General, USAF
Commander, Eastern Range

STS-107

FLIGHT READINESS REVIEW

January 9, 2003

Department of Defense

SUPPORT POSTURE	Presenter: Lt Col Youngs
	Organization/Date: DDMS/01-09-03

- Augmented Landing Site (ALS) Contingency Support
  - No known shortfalls
- Emergency Landing Site (ELS) Contingency Support
  - No known shortfalls
- DOD General Support
  - No known shortfalls

DOD READINESS CERTIFICATION

DOD contingency forces are ready to support Launch Program Requirements

S/David K. Dingley

DAVID K. DINGLEY
Colonel, USAF
Commander, DOD Manned Space Flight Support Office

STS-107

Flight Readiness Review

Approach and General Description

S&MA held reviews in preparation for the STS-107 Flight Readiness Review on 20 December 2002, and 7 January 2003 and is ready to proceed toward launch countdown.

FRR Briefing Overview

- **Significant assessments - *discuss***
- **Special topics**
  - **NASA Safety Reporting System (NSRS) - *discuss***
  - **Space Shuttle Hazard Analysis - *discuss***
  - **Space Shuttle FMEA/CIL – *discuss***
- **Significant open work - *discuss***
- CoFR exceptions - *none*
- Open action items - *none*

Significant Assessments

Orbiter

- OV-103 BSTRA Crack ** significant open work*

SRB

- Amphenol Connector Pin Lack of Retention
- BSM Paint Chip FOD

SSME

- STS-113 Engine #1 Nozzle Leak

ADDITIONAL ASSESSED ITEMS ARE IN THE BACKUP CHARTS

NSRS Summary

There are no NASA Safety Reporting System reports open that are applicable to STS-107.

Hazard Analysis Summary

There are no new Accepted Risk hazards identified for STS-107.

FMEA/CIL Summary

There are no new Criticality 1 failure modes identified for STS-107.

STS-107 Concurrence Statement

S&MA has reviewed the status of preparation for this mission and has performed an independent assessment of the readiness of the Space Shuttle program for the conduct of this mission. We are in concurrence with proceeding with this mission.

/s/ Yolanda Marshall
SR&QA Director, JSC

/s/ Amanda Goodson
S&MA Director, MSFC

/s/ Mark Erminger
SS SR&QA Manager

/s/ Shannon Bartell
Director, KSC Safety, Health and Independent Assessment

/s/ Bill Higgins
Chief, Shuttle S&MA, KSC

/s/ Mike Smiles
S&MA Manager, SSC

STS-107

Flight Readiness Review

Backup Package

Additional Assessments

Orbiter/GFE

- First Flight of Two Advanced Master Events Controllers (AMECs)
- Flight Rule Changes in Landing Site Selection Priority
- STS-109 Freon Coolant Loop (FCL) 1 Degraded Flow
- STS -113 Prelaunch Gaseous Oxygen (GO2) Leak in the Orbiter Mid-fuselage
- STS -113 Flash Evaporator System (FES) Shut Down on Primary B Controller
- Right Orbital Maneuvering System (OMS) Bi-propellant Ball Valve Open Indication
- Cracks in a CRES 321 Flowliner on the OV-102 Engine 2 (E2) Liquid Hydrogen (LH2) Propellant Feedline
- OV-104 Body Flap Actuator Corrosion

EVA

- STS-113 EMU Boot Fit
- EMU Frayed Bio-Medical Cable

Payloads

- Spacehab Hull Damage and Repair

Additional Assessments

SSME

- First Flight of Main Engine Controller Coolant Duct Redesign

External Tank

- LO2 LWT Normal Mission and RTLS Ullage Pressure Curves Waiver
- Vent Valve Relief Pressure

RSRM

- STS-113 Postflight Observation – Foreign Material in RSRM Nozzle-to-Case Joint Radial Bolt Hole
- STS-113 Postflight Observation – Flashing on RSRM Nozzle-to-Case Joint Packing-with-Retainers

SRB

- BSM Lead Shot FOD
- First Flight of Pacific Scientific Separation Bolts
- Cleaning Solvent Modification

KSC Safety, Health and Independent Assessment

- Spacehab & Experiment Package Configuration Management