

Emergency Procedures

V3.1E

Directory

Procedure	Page	Section
Negative Orbit Insertion Abort	2	A
Low Orbit Insertion Abort	2	B
In-Orbit Abort	2	C
Return to Launch Site Abort	2	D
Smoke or Fire in the Cabin	3	A
Smoke or Fire in the Payload Bay	3	B
APU Underspeed	4	
APU Overspeed	5	
APU Temperature	6	
Hydraulic Pressure	7	
OMS Engine	8	A
AC Voltage	8	B
Forward RCS	9	A
Aft RCS	9	B
Main Engine	10	A
Solid Rocket Booster	10	B
Payload Bay Door <u>OPEN</u> Procedure Malfunction	11	
Payload Bay Door <u>CLOSE</u> Procedure Malfunction	12	

Emergency Procedures

V3.1E

Negative Orbit Insertion Abort

2A

1. Confirmation of Negative Orbit Insertion status with Mission Commander and Mission Director
2. Identify trajectory point for return
 - a. Before Negative Return:
 - 1) Perform Return To Launch Site (RTLS) abort
 - b. Post Negative Return:
 - 1) If TAL window open:
 - a. Perform Transoceanic Abort Landing (TAL)
 - 2) If TAL window closed:
 - b. Perform Abort Once Around (AOA)
3. Initiate abort procedures as indicated

Low Orbit Insertion Abort

2B

1. Confirmation of Abort To Orbit (ATO) status with Mission Commander and Mission Director
2. Evaluate orbital insertion status
 - a. Lower stable orbit possible:
 - As directed by Mission Control:
 - i. Reconfigure for possible additional OMS burn **or**
 - ii. continue operations
 - b. Lower stable orbit not possible:
 - Perform **AOA** as directed by Mission Control

In-Orbit Abort

2C

1. Confirmation of Abort status with Mission Commander and Mission Director
2. Initiate de-orbit burn procedures as directed by Mission Control

Return to Launch Site Abort

2D

1. Confirmation of Return to Launch Site Abort (RTLS) status with Mission Commander and Mission Director
2. Determine abort landing procedure options based on abort status:
 - a. KSC, East Coast Abort Landing location
 - b. Water landing
 - c. High altitude bailout

Emergency Procedures

V3.1E

Smoke or Fire in Cabin

3A

1. Mission Control confirms alarm and determines location
2. Visual inspection for smoke or fire *Confirm*
3. CAB HX IN Temp *Check*
4. O2 SYS2 CLOSE
5. FIRE SUPPRESSION
 - a. FLIGHT DECK ACTIVATE
 - b. MID DECK ACTIVATE
 - c. LOWER DECK ACTIVATE
6. CAB HX IN Temp *Check*
7. FIRE SUPPRESSION
 - a. FLIGHT DECK SAFE
 - b. MID DECK SAFE
 - c. LOWER DECK SAFE
8. O2 SYS2 OPEN
9. *Land as soon as practical*

Smoke or Fire in Payload Bay

3B

1. Mission Control confirms alarm and determines location
2. AV BAY
 - a. TEMP 1 *Check*
 - b. TEMP 2 *Check*
 - c. TEMP 3 *Check*
3. FIRE SUPPRESSION
 - a. BAY 1 ACTIVATE
 - b. BAY 2 ACTIVATE
 - c. BAY 3 ACTIVATE
4. AV BAY
 - a. TEMP 1 *Check*
 - b. TEMP 2 *Check*
 - c. TEMP 3 *Check*
5. FIRE SUPPRESSION
 - a. BAY 1 SAFE
 - b. BAY 2 SAFE
 - c. BAY 3 SAFE
6. *Land as soon as practical*

Emergency Procedures

V3.1E

APU Underspeed

- | | | | |
|-----|---|--------------|--------------|
| 1. | Mission Control confirms alarm and proceeds with <u>isolation of malfunctioning system.</u> | | |
| 2. | APU SPEED % | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 3. | APU SHUTDWN | ENABLE | |
| 4. | APU System Power Cycle | | |
| | a. APU POWER | OFF | |
| | b. APU POWER | ON | |
| 5. | APU CNTRL POWER | | |
| | a. 1 | OFF | |
| | b. 2 | OFF | |
| | c. 3 | OFF | |
| 6. | APU / HYDRAULICS | | |
| | a. 1 | OFF | |
| | b. 2 | OFF | |
| | c. 3 | OFF | |
| 7. | APU SPEED SELECT | | |
| | a. 1 | GPC | |
| | b. 2 | GPC | |
| | c. 3 | GPC | |
| 8. | APU SPEED % | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 9. | APU SPEED SELECT 1 | | HIGH |
| | APU SPEED % 1 | | <i>Check</i> |
| | APU SPEED SELECT 1 | | NORMAL |
| 10. | APU SPEED SELECT 2 | | HIGH |
| | APU SPEED % 2 | | <i>Check</i> |
| | APU SPEED SELECT 2 | | NORMAL |
| 11. | APU SPEED SELECT 3 | | HIGH |
| | APU SPEED % 3 | | <i>Check</i> |
| | APU SPEED SELECT 3 | | NORMAL |
| 12. | APU / HYDRAULICS | | |
| | a. 1 | | START/RUN |
| | b. 2 | | START/RUN |
| | c. 3 | | START/RUN |
| 13. | APU CNTRL POWER | | |
| | a. 1 | | ON |
| | b. 2 | | ON |
| | c. 3 | | ON |
| 14. | APU SHUTDWN | | INHIBIT |
| 15. | APU SPEED % | | |
| | a. 1 | | <i>Check</i> |
| | b. 2 | | <i>Check</i> |
| | c. 3 | | <i>Check</i> |
| 16. | <i>Re-assess system</i> | | |

Emergency Procedures

V3.1E

APU Overspeed

- | | | | |
|-----|---|--|--|
| 1. | Mission Control confirms alarm and proceeds with <u>isolation of malfunctioning system.</u> | | |
| 2. | APU SPEED %
a. 1
b. 2
c. 3 | <i>Check</i>
<i>Check</i>
<i>Check</i> | |
| 3. | APU SHUTDWN | ENABLE | |
| 4. | APU System Power Cycle
a. APU POWER
b. APU POWER | OFF
ON | |
| 5. | APU CNTRL POWER
a. 1
b. 2
c. 3 | OFF
OFF
OFF | |
| 6. | APU / HYDRAULICS
a. 1
b. 2
c. 3 | OFF
OFF
OFF | |
| 7. | APU SPEED SELECT
a. 1
b. 2
c. 3 | GPC
GPC
GPC | |
| 8. | APU SPEED %
a. 1
b. 2
c. 3 | <i>Check</i>
<i>Check</i>
<i>Check</i> | |
| 9. | APU SPEED SELECT 1
APU SPEED % 1 | NORMAL
<i>Check</i> | |
| 10. | APU SPEED SELECT 2
APU SPEED % 2 | | NORMAL
<i>Check</i> |
| 11. | APU SPEED SELECT 3
APU SPEED % 3 | | NORMAL
<i>Check</i> |
| 12. | APU / HYDRAULICS
a. 1
b. 2
c. 3 | | START/RUN
START/RUN
START/RUN |
| 13. | APU CNTRL POWER
a. 1
b. 2
c. 3 | | ON
ON
ON |
| 14. | APU SHUTDWN | | INHIBIT |
| 15. | APU SPEED %
a. 1
b. 2
c. 3 | | <i>Check</i>
<i>Check</i>
<i>Check</i> |
| 16. | <i>Re-assess system</i> | | |

Emergency Procedures

V3.1E

APU Temperature

- | | | | |
|-----|--|--------------|--|
| 1. | Mission Control confirms alarm and proceeds with <u>isolation of malfunctioning system</u> | | |
| 2. | APU TEMP EGT | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 3. | APU SHUTDWN | ENABLE | |
| 4. | APU System Power Cycle | | |
| | a. APU POWER | OFF | |
| | b. APU POWER | ON | |
| 5. | APU CNTRL POWER | | |
| | a. 1 | OFF | |
| | b. 2 | OFF | |
| | c. 3 | OFF | |
| 6. | APU TK VLV | CLOSED | |
| 7. | APU FUEL TNK VLV | | |
| | a. 1 | CLOSE | |
| | b. 2 | CLOSE | |
| | c. 3 | CLOSE | |
| 8. | APU TEMP EGT | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 9. | APU FUEL TNK VLV | | |
| | a. 1 | OPEN | |
| | b. 2 | OPEN | |
| | c. 3 | OPEN | |
| 10. | APU TK VLV | OPEN | |
| 11. | APU CNTRL POWER | | |
| | a. 1 | ON | |
| | b. 2 | ON | |
| | c. 3 | ON | |
| 12. | APU SHUTDWN | INHIBIT | |
| 13. | APU TEMP EGT | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 14. | <i>Re-assess system</i> | | |

Emergency Procedures

V3.1E

Hydraulic Pressure

- | | | | |
|-----|--|--------------|--|
| 1. | Mission Control confirms alarm and proceeds with <u>isolation of malfunctioning system</u> | | |
| 2. | HYD PRESS | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 3. | HYD MAIN PUMP PRESSURE | | |
| | a. 1 | LOW | |
| | b. 2 | LOW | |
| | c. 3 | LOW | |
| 4. | HYD CIRC PUMP | | |
| | a. 1 | OFF | |
| | b. 2 | OFF | |
| | c. 3 | OFF | |
| 5. | APU / HYDRAULICS | | |
| | a. 1 | OFF | |
| | b. 2 | OFF | |
| | c. 3 | OFF | |
| 6. | HYD PRESS | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 7. | APU / HYDRAULICS | | |
| | a. 1 | START/RUN | |
| | b. 2 | START/RUN | |
| | c. 3 | START/RUN | |
| 8. | HYD CIRC PUMP | | |
| | a. 1 | ON | |
| | b. 2 | ON | |
| | c. 3 | ON | |
| 9. | HYD MAIN PUMP PRESSURE | | |
| | a. 1 | NORMAL | |
| | b. 2 | NORMAL | |
| | c. 3 | NORMAL | |
| 10. | HYD PRESS | | |
| | a. 1 | <i>Check</i> | |
| | b. 2 | <i>Check</i> | |
| | c. 3 | <i>Check</i> | |
| 11. | <i>Re-assess system</i> | | |

Emergency Procedures

V3.1E

OMS Engine

AC Voltage

8A

1. Mission Control confirms alarm and proceeds with isolation of malfunctioning system
2. OMS ENGINE
 - a. LEFT OFF
 - b. RIGHT OFF
3. OMS ENGINE VLV
 - a. LEFT CLOSE
 - b. RIGHT CLOSE
4. FLT CNTRL PWR ENABLE
5. ENGINE DAP AUTO
6. *Re-assess system*
7. ENGINE DAP MANUAL
8. FLT CNTRL PWR INHIBIT
9. OMS ENGINE VLV
 - a. LEFT OPEN
 - b. RIGHT OPEN
10. OMS ENGINE
 - a. LEFT ARM
 - b. RIGHT ARM
11. *Re-assess system*

8B

1. Mission Control confirms alarm and proceeds with isolation of malfunctioning system
2. AC BUS SNSR MONITOR
3. INTERNAL SHUTTLE SYSTEM PWR
 - a. BATA CLOSE
 - b. BATB CLOSE
4. *Re-assess system*
5. INTERNAL SHUTTLE SYSTEM PWR
 - a. BATA ENABLE
 - b. BATB ENABLE
6. AC BUS SNSR AUTO
7. *Re-assess system*

Emergency Procedures

V3.1E

Forward RCS

Aft RCS

9A

1. Mission Control confirms alarm and proceeds with isolation of malfunctioning system
2. FWD RCS He PRIMARY REGULATOR
 - a. A CLOSE
 - b. B CLOSE
3. FWD RCS He TANK ISOL
 - a. A CLOSE
 - b. B CLOSE
4. *Re-assess system*
5. FWD RCS He TANK ISOL
 - a. A OPEN
 - b. B OPEN
6. FWD RCS He PRIMARY REGULATOR
 - a. A OPEN
 - b. B OPEN
7. *Re-assess system*

9B

1. Mission Control confirms alarm and proceeds with isolation of malfunctioning system
2. AFT RCS He PRIMARY REGULATOR
 - a. A CLOSE
 - b. B CLOSE
3. AFT RCS He TANK ISOL
 - a. A CLOSE
 - b. B CLOSE
4. *Re-assess system*
5. AFT RCS He TANK ISOL
 - a. A OPEN
 - b. B OPEN
6. AFT RCS He PRIMARY REGULATOR
 - a. A OPEN
 - b. B OPEN
7. *Re-assess system*

Emergency Procedures

V3.1E

Main Engine

Solid Rocket Booster

10A

1. Mission Control confirms alarm and proceeds with isolation of malfunctioning system
2. Identify Main Engine Operational Status
 - a. Left engine *Confirm*
 - b. Center Engine *Confirm*
 - c. Right Engine *Confirm*
3. Perform Manual Shutdown of Main Engine Power for Non-operating Engine identified in step 2
 - a. Main Engine Power
 - i. LEFT OFF
 - ii. CENTER OFF
 - iii. RIGHT OFF
4. Perform Manual Initialization of Main Engine Power for Non-operating Engine identified in step 2
 - a. Main Engine Power
 - i. LEFT ARM
 - ii. CENTER ARM
 - iii. RIGHT ARM
5. *Re-assess system*
6. Evaluate Statue of Orbital Insertion
 - a. Nominal **Mission Go**
 - b. Off-Nominal **Go to AOA/ATO Abort checklist**

10B

1. Mission Control confirms alarm
2. Identify SRB Operational Status
 - a. Left SRB *Confirm*
 - b. Right SRB *Confirm*
3. Evaluate Status of Orbital Insertion
 - a. Nominal **Mission Go**
 - b. Off-Nominal **Mission Abort**
4. Mission Go status
 - a. Monitor SRB operational status until SRB SEP
5. Mission Abort status
 - a. Perform Emergency SRB Jettison
 - b. Execute RTLS Abort checklist

Malfunction during Payload Bay Door **OPEN** Procedure

11

Mission Control confirms alarm during Payload Bay Open Procedure

A. If alarm is on Payload Bay Door

1. PAYLOAD BAY DOOR CLOSE
2. PAYLOAD POWER OFF
3. PAYLOAD POWER ON
4. PAYLOAD BAY DOOR OPEN
5. *Re-assess system*

B. If alarm is on Radiators

1. RADIATORS STOW
2. PAYLOAD POWER OFF
3. PAYLOAD POWER ON
4. RADIATORS DEPLOY
5. *Re-assess system*

C. If alarm is on Ku Band Antenna

1. Ku ANTENNA STOW
2. PAYLOAD POWER OFF
3. PAYLOAD POWER ON
4. Ku ANTENNA DEPLOY
5. *Re-assess system*

Emergency Procedures

V3.1E

Malfunction during Payload Bay Door **CLOSE** Procedure

12

Mission Control confirms alarm during Payload Bay Close Procedure

A. If alarm is on Payload Bay Door

1. PAYLOAD BAY DOOR OPEN
2. PAYLOAD POWER OFF
3. PAYLOAD POWER ON
4. PAYLOAD BAY DOOR CLOSE
5. *Re-assess system*

B. If alarm is on Radiators

1. RADIATORS DEPLOY
2. PAYLOAD POWER OFF
3. PAYLOAD POWER ON
4. RADIATORS STOW
5. *Re-assess system*

C. If alarm is on Ku Band Antenna

1. Ku ANTENNA DEPLOY
2. PAYLOAD POWER OFF
3. PAYLOAD POWER ON
4. Ku ANTENNA STOW
5. Re-assess system