

# OUTLINE

## FOR

### REFORMATTED 450-601-NOSP/SPACE SHUTTLE

---

## Section 1. Mission Operations

### 1.1 Introduction (N General data on STS Program and Network)

### 1.2 Mission Description

#### 1.2.1 General

#### 1.2.2 Space Shuttle System

##### 1.2.2.1 Space Shuttle System Flight Hardware

Figure 1-1. Space Shuttle Launch Configuration

Figure 1-2. Space Shuttle Orbiter Vehicle

##### 1.2.2.2 Flight Profile

Figure 1-3. Typical Space Shuttle Flight Profile

#### 1.2.3 Launch Operations (N)

##### 1.2.3.1 General (N)

ET Impact Area Notification (R old Pa 1.3.1.17)

##### 1.2.3.2 Supporting Stations (N descriptive data on Facilities)

##### 1.2.3.3 Operations Control Positions (N descriptive data on GC, DFE, SMM, etc)

##### 1.2.3.4 Voice Callsigns (N ref Tab 1-4 & Pa above for position descriptions)

Table 1-1. Voice Callsigns (3 pages) (R old table 1-4)

#### 1.2.4 Abort Modes

Return to Launch Site Abort (R old Pa 1.3.1.14)

#### 1.2.5 Landing Operations (N)

##### 1.2.5.1 General (N)

##### 1.2.5.2 Landing Sites (R old Pa 1.1.5)

Table 1-2. Planned Recovery (Contingency Landing) Sites and Site Usage (R

old table 1-1)

1.2.6 Shuttle Refurbishment (N general process discussion)

Figure 1-4. Space Shuttle Carrier Aircraft and KSC Landing-to-Launch  
Refurbishment Flow (N)

1.2.7 Space Shuttle Ground Communications and Tracking System

1.2.7.1 General

1.2.7.2 Radio Frequency Interfaces

Figure 1-5. Space Shuttle SN Support Elements Data Flow (R update Fig 1-12  
from TNOSP)

Figure 1-6. Space Shuttle GN Support Elements Telemetry Data Flow (R)

Table 1-3. S-band RF Interfaces (3 sheets) (R old table 1-2)

Table 1-4. S-band Station Support Capabilities (R old table 1-3)

Figure 1-7. Real-time OD Telemetry Data via the JSC OD (R)

Table 1-5. Antenna Allocations (R)

**1.3 Mission Preparation**

1.3.1 Minus Day Schedule

1.3.2 Launch (Terminal) Count

1.3.2.1 Purpose

1.3.2.2 Participants

1.3.2.3 Procedures

1.3.2.4 Station Interface

1.3.3 Landing Count

1.3.3.1 Purpose

1.3.3.2 Participants

1.3.3.3 Procedures (N ref to current ISI)

1.3.4 Summary of Space Network and Ground Network Anomalies Requiring  
Post-mission Followup/Analysis Report

1.3.4.1 Purpose

1.3.4.2 Participants

1.3.4.3 Procedure

**1.4 Station Operations**

1.4.1 Station Supervisor

1.4.1.1 Station Capability Reporting

1.4.1.2 Station Readiness Testing (R ref to SS for specifics)

1.4.1.3 Radio Frequency Interference (R)

Table 1-6. Launch Configuration

Table 1-7. Orbit Configuration (R old table 1-8)

Table 1-8. Landing Configuration (R old table 1-7)

1.4.1.4 Liftoff Time Reporting

1.4.1.5 Ground Station Reporting Following Launch Abort Initiation

1.4.1.6 S-band Pass Event Reporting (R intro & ref to SS)

Table 1-9. Tracking Pass Announcements (2 sheets)

(Table 1-10. MIL/PDL/DFRC/WPS Announcements for Loss of Carrier/Modulation – M SS)

(1.3.1.7 UHF Pass Event Reporting –M SS)

(1.3.1.8 UL Carrier Handovers – M SS)

(1.3.1.9 Ascent Phase UL Carrier Handover – M SS)

(1.3.1.10 H Minus Time I/F Activity – M SS)

1.4.1.7 Typical Station Support Count – Intro & ref to SS (R old Pa 1.3.1.11)

(Table 1-11. MIL/PDL/DFRC/WPS Station H-35 Interface – M SS)

(Table 1-12. MIL/DFRC Station TV H-30 Interface – M SS)

(Table 1-13. C-band H-45 Interface and Pass Time Reporting–M SS)

(Table 1-14. MIL/PDL/DFRC/WPS Station Postpass Activities-M SS)

1.4.1.8 Reporting of Spacecraft Anomalies – Intro & ref to SS (R old Pa 1.3.1.12)

(1.3.1.13 Pre-launch/Ascent Contingency Procedures – M SS)

(Table 1-15. Nominal Prelaunch/Launch Configuration –M SS)

[Figure 1-8. MIL/PDL Pre-launch/Launch Configuration

(Simplified Block Diagram) (M SS)]

(New Pa JSC to DFRC UHF Communications Failure – N M SS)

1.4.1.9 GN Support in a Backup to TDRS Configuration (R old Pa 1.3.1.15)

1.4.1.10 TDRS/GN S-band H/Os (R old Pa 1.3.1.16)

1.4.2 Telemetry Destination Codes (R intro & ref to SS & Appen C)

1.4.3 Command (R intro & ref to SS)

(1.3.3.1 UL Data Rate Change via MIL/PDL M SS)

(1.3.3.2 CMD System SAFE/OPERATE Configuration M SS)

(1.3.3.3 CMD Circuit Restoration M SS)

[Shuttle Forward Link (32/72 kbps Commands) Data to KSC/RPS M SS)

#### 1.4.4 Communications (R intro & ref to SS)

[1.3.4.1 Tone Keying Failure (UHF) M SS]

(1.3.4.2 Postlanding Support from DFRC M SS)

(1.3.4.3 Contingency Landing Communications M SS)

#### 1.4.5 Range Safety (R intro & ref to SS)

##### 1.4.5.1 Purpose

##### 1.4.5.2 Participants

##### 1.4.5.3 Procedures (R)

Figure 1-8. Space Shuttle Range Safety Support (R simplify old Fig 1-9)

#### 1.4.6 Meteorological Interactive Data Display System

(1.3.6.1 Pa number deleted)

[1.3.6.2 MIDDS Fault Isolation Procedure (Metosat Data) M SS ]

### **1.5 Radio Frequency Interference (R ref to CSOC-WSC-PRO-002904 & Appen B)**

### **1.6 Station Configurations (R intro & ref to SS)**

(Figure 1-10. WFF MIDDS Data Flow M SS)

### **1.7 Space Shuttle Program Mission Contingencies (N )**

Discuss mission emergencies briefly & ref to:

STDN Contingency Action Plan, 534-CAP-Space Shuttle

GSFC SSP Contingency Support Plan, 534-CAP-GSFC

SSP Emergency Mission Control Center Activation and Operations

Procedures, 540-CAP-EMCC

### **1.8 References (N )**

#### 1.8.1 Referenced Abbreviations and Acronyms (N intro to Appen A)

#### 1.8.2 Supporting Documents and Related Web Sites (N intro to Appen B)

#### 1.8.3 Data Stream Assignments (N intro to Appen C)

(Move Figures 1-11 thru 1-19 to SS)

## Section 2. Dryden

### (Typical Station Section N - Combined old sections 1, 4, 5, 6, 12, 14, & 26)

#### 2.1 Introduction

#### 2.2 Telemetry

##### 2.2.1 General

##### 2.2.2 Launch and Landing Support

###### 2.2.2.1 Station Support Requirements/Configurations

###### 2.2.2.2 Link Description

Table 2.2-1. Launch Support Requirements

Table 2.2-2. Landing and Postlanding Requirements

Table 2.2-3. FM DL, 2250.0-MHz Real-time DL Characteristics

Table 2.2-4. FM DL, 2250.0-MHz Dump Configuration

###### 2.2.2.3 Data Systems Configuration

Table 2.2-5. Nominal Launch and DL Configuration

###### 2.2.2.4 Data Conditioning Subsystem

###### 2.2.2.4.1 General

###### 2.2.2.4.2 Bit Synchronizers

Table 2.2-6. OD DL (2217.5/2287.5 MHz) Bit Synchronizer Setup

Table 2.2-7. FM DL (2250.0 MHz) Bit Synchronizer Setup

###### 2.2.2.4.3 PSK Demodulators

Table 2.2-8. PSK Demodulator Setup for Launch

###### 2.2.2.4.4 Launch bit Sync Assignments

###### 2.2.2.4.5 SSME Data Flow

###### 2.2.2.5 Bit Synchronizers, Launch Phase

Figure 2.2-1. SSME Data Flow

###### 2.2.2.6 Phase Shift Key Demodulator FM DL

Table 2.2-9. FM DL SSME Bit Sync/Frame Sync Setup

Table 2.2-10. CCX Launch Configuration

2.2.2.7 Data Communications Switch

2.2.2.7.1 General

2.2.2.7.2 Launch Super Group Setup for DCS

2.2.2.7.3 STS Data Quality Monitor Assignments for Launch

2.2.2.7.4 Data Quality Monitor

Table 2.2-11. DQM Setups for MIL Launch

2.2.2.7.5 DQM Setup for PDL Launch

Table 2.2-12. DQM Setup for PDL Launch

2.2.2.7.6 Shuttle Status Display Unit

Table 2.2-13. Transponder Lock Indicator

Table 2.2-14. Network Signal Processor (NSP) Indicator

2.2.2.7.7 OD Downlink Configuration

Table 2.2-15. Bit Sync Setup

Table 2.2-16. Frame Sync Setup

Table 2.2-17. DMS Program Formats

Table 2.2-18. DMS Bit Sync Setup

Table 2.2-19. 403 Frame Sync Setup

2.2.2.7.8 Remote Controller

2.2.2.7.9 DL/UL Signal Processing and UL Monitoring

2.2.2.8 Shuttle Launch Support System

Figure 2.2-2. SLSS Simplified Telemetry Block Diagram

2.2.2.8.1 General

2.2.2.8.2 Bit Synchronizer

2.2.2.8.3 Demodulator

2.2.2.8.4 Verterbi Decoder

2.2.2.8.5 Frame Synchronizer

2.2.2.8.6 SLSS Return Link Control Panels

2.2.2.9 Shuttle Return Link Data System

2.2.2.9.1 General

2.2.2.9.2 Prime System

2.2.2.9.3 Alternate System

2.2.2.9.4 403 Frame Sync (or equivalent)

2.2.2.10 Recorder Configuration

2.2.2.10.1 Magnetic Tape Recorder

2.2.2.10.2 Digital Recorder Subsystem

Table 2.2-20. Launch Recorder Setup

Table 2.2-21. Analog Channel Setup for Launch

Table 2.2-22. Events Parallel Input

Table 2.2-23. Launch Phase Support MTR Track Assignments

Table 2.2-24. Postlanding Recorder Setup

Table 2.2-25. Postlanding Analog Channel Setup

Table 2.2-36. Events Parallel Input for Postlanding

Table 2.2-27. Landing and Postlanding Phase Support MTR Track  
Assignment

Figure 2.2-3. Range Safety Configuration

2.2.2.11 SSME Dump Data Monitoring

2.2.2.12 Best Source Select

Table 2.2-28. BSS DQM and Channels

2.2.3 Orbital Support

2.2.3.1 Station Support Requirements/Configuration

2.2.3.2 Link Description

2.2.3.2.1 Transmitter Characteristics

2.2.3.2.2 DL Characteristics

Table 2.2-29. Orbit/Landing Recorder Configuration

Table 2.2-30. Orbit/Landing Analog Channel Configuration for Recorders

Table 2.2-31. Events Parallel Input Orbit

Table 2.2-32. Orbit Support Requirements

Figure 2.2-4. TV Support Configuration for Space Shuttle (M old Fig 1-11)

Figure 2.2-5. Launch Support Configuration (M old Fig 1-13)

Figure 2.2-6. Orbital Support Configuration (M old Fig 1-15)

Figure 2.2-7. Landing Support Configuration (M old Fig 1-16)

Figure 2.2-8. UHF/VHF Configuration (M old Fig 1-17)

2.2.3.3 Receiver Configuration

2.2.3.3.1 Multifunction Receiver

2.2.3.3.2 Microdyne Receiver

2.2.3.4 Data Systems Configuration

2.2.3.4.1 General

2.2.3.4.2 Bit Synchronizers

2.2.3.4.3 403 Frame Sync

2.2.3.4.4 403 Frame Sync, Dump Monitoring

Table 2.2-33. Orbital Throughput Support

Table 2.2-34. Bit Synchronizer Setup for Orbit Phase

Table 2.2-35. 403 Frame Sync Dump Monitor Program

2.2.3.4.5 FM Dump Data Monitoring

2.2.3.4.6 Operations 2 Recorder Dump Playback Coordination

2.2.3.4.7 Orbit Super Group Setup for DCS

2.2.3.4.8 FM Dump Data Flow

Figure 2.2-9. MIL FM Dumps Data Flow Configuration

2.2.3.5 Delta Modulation System

2.2.3.6 Magnetic Tape Recorder Configuration

2.2.3.6.1 General

2.2.3.6.2 Orbital Record Requirements

Table 2.2-36. Orbit Phase Support MTR Track Assignments

2.2.3.7 High-Speed Data Transmission

2.2.3.7.1 Station

2.2.3.7.2 JSC-GSFC

2.2.4 Station Playback Procedures

2.2.4.1 General

2.2.4.2 Playback Requests

2.2.4.3 Station Playback Procedures

2.2.4.4 Station Playback Recorder Configuration

2.2.4.5 Space Shuttle Main Engine Dump Data Playback

2.2.4.5.1 General

2.2.4.5.2 ME Identification

2.2.4.5.3 Postlaunch Playbacks

Figure 2.2-10. Postlaunch Playbacks

Table 2.2-37. WBMTR Nonstandard Playback Speed Setup

**2.3 S-band** (M old section 4)

2.3.1 General

2.3.2 Station Support

2.3.2.1 General

2.3.2.2 Launch Pad Support

2.3.2.3 Scheduling/Predicted Coverage

2.3.2.4 Link Description and MOD Indices

2.3.2.4.1 OD DL (2217.5/2287.5 MHz PM Ops)

2.3.2.4.2 FM DL (2250.0 MHz FM Ops)

2.3.2.4.3 PM UL

2.3.2.4.4 Shuttle Uplink Mod Index Procedures

2.3.2.4.5 Space Shuttle Verification Receiver Alignment

2.3.2.5 Support Configuration

Table 2.3-1. OD DL, 2217.5-/2287.5-MHz PM Ops Downlink Mod Indices

Table 2.3-2. FM DL, 2250.0-MHz FM Ops Downlink Mod Indices

Table 2.3-3. 2041.9-/2106.4-/1831.8-/1775.7-MHz UL Description and Mod Indices

Table 2.3-4. Space Shuttle RER Preset Assignments

2.3.3 Operational Support Procedures

2.3.3.1 Equipment Prepass Checklist

2.3.3.1.1 MFR

2.3.3.1.2 Exciter and PA Control

2.3.3.1.3 RER Upgrade Range Equipment

Table 2.3-5. MFR Configuration for FM DL - 2250.0 MHz

2.3.3.2 Acquisition Sources and Procedures

2.3.3.2.1 GN

2.3.3.2.2 Procedures

2.3.3.2.3 Station H/O

Figure 2.3-1. Typical Prepass Checklist (RER) Master Controller

Figure 2.3-2. Typical Prepass Checklist (RE) Slave Controller

Figure 2.3-3. RER Slave Controller Interface

Figure 2.3-4. RF Acquisition and Reacquisition Throughput Operations

Figure 2.3-5. Acquisition/Reacquisition Procedure Flow Diagram

2.3.3.3 Systems Configuration and Operations for Space Shuttle Launch and Ascent

2.3.3.3.1 Space Shuttle on Launch Pad (Pre-launch)

2.3.3.3.2 Space Shuttle Lift-off (Launch)

2.3.3.3.3 Space Shuttle Ascent

2.3.3.4 Configuration and Operations for KSC Landings

Table 2.3-6. Launch Ascent Exciter Frequency Offsets

Table 2.3-7. Launch Phase Receiver Configuration

2.3.3.5 Contingency Procedures

2.3.3.5.1 Loss of Exciter

2.3.3.5.2 Loss of Power Amplifier

2.3.3.5.3 Loss of Autotrack

2.3.3.5.4 Contingency UL Sweep Procedures

2.3.3.5.5 Space Shuttle Transponder Frequency Switch (Low Frequency to High Frequency or High Frequency to Low Frequency)

Figure 2.3-6. Suggested GN S-band Receiver Configuration (Prior to Frequency Switch)

Figure 2.3-7. Suggested GN S-band Receiver Configuration (RER Systems)

Figure 2.3-8. Suggested GN S-band Receiver Configuration (After

Frequency Switch)

2.3.3.5.6 Loss of PCM Decom/Transponder/NSP Lock Select Box

2.3.3.5.7 Exciter to Exciter H/O (Station Contingency Command Link H/O)

2.3.4 Modulation on Technique Acquisition Sources and Procedures

2.3.4.1 Sources

2.3.4.2 Procedures

2.3.4.2.1 General

2.3.4.2.2 Two-way Acquisition Procedures (SBE MFR)

2.3.4.2.3 Station H/O

2.3.5 Tracking System Requirements (S-band Tracking Processor System)

2.3.5.1 Real-time Support

2.3.5.2 Playback Support

Table 2.3-8. High-speed Tracking Data Octal Destination Codes

2.3.6 S-band Pass Event Reporting (N)

Table 2.3-9. MIL/PDL/DFRC/WPS Announcements for Loss of Carrier/Modulation (M old Tab 1-10)

2.3.7 UL Carrier Handovers (M old Pa 1.3.1.8)

2.3.8 Ascent Phase UL Carrier Handover (M old Pa 1.3.1.9)

2.3.9 H Minus Time I/F Activity (M old Pa 1.3.1.10)

Table 2.3-10. Station H-35 Interface (M old Tab 1-11)

Table 2.3-11. Station TV H-30 Interface (M old Tab 1-12)

Table 2.3-12. C-band H-45 Interface and Pass Time Reporting (M old Tab 1-13)

Table 2.3-13. Station Postpass Activities (M old Tab 1-14)

2.3.10 Pre-launch/Ascent Contingency Procedures (M old Pa 1.3.1.14)

Table 2.3-14. Nominal Prelaunch/Launch Configuration (M old Tab 1-15)

Figure 2.3-11. Pre-launch/Launch Configuration (Simplified Block Diagram) (M old Fig 1-8)

## 2.4 Computer Systems (M old section 5)

- 2.4.1 General
- 2.4.2 Remote Site Data Processor Requirements
  - 2.4.2.1 Telemetry Processing - PM Operational DL
  - 2.4.2.2 FM Operational DL Support Requirements
    - Figure 2.4-1. GSFC to JSC NISN Block
    - Table 2.4-1. Message Type Codes
  - 2.4.2.3 Site Status Message
  - 2.4.2.4 Remote Control Interface
- 2.4.3 NISN Blocker/Deblocker
  - 2.4.3.1 General
  - 2.4.3.2 Blocker
  - 2.4.3.3 Debblocker
- 2.4.4 Blocker/Deblocker Setup Files for Launch
- 2.4.5 Blocker/Deblocker Setup Parameters for Launch
- 2.4.6 Orbit Configuration Setup Files
- 2.4.7 Blockers/Deblockers
- 2.4.8 Multiplexer
  - Table 2.4-2. MUX Configuration for Launch
  - Table 2.4-4. MUX Configuration for Orbit Support
  - Table 2.4-5. Demux Settings to Demux PDL Main Engine Data
  - Table 2.4-6. Demux Channel Assignments and Parameters
- 2.4.9 Telemetry Blockers
  - 2.4.9.1 Communications Data Formatter Debblocker
  - 2.4.9.2 Operations
  - 2.4.9.3 Programmable Telemetry Processor Debblocker
  - 2.4.9.4 Operations
    - 2.4.9.4.1 General
    - 2.4.9.4.2 CDF Debblocker Header Parameters
    - 2.4.9.4.3 Initialization Procedures CDF Debblocker
    - 2.4.9.4.4 CDF Debblocker Rate Change Procedures
  - Table 2.4-7. Station Default Parameters for CDF Debblocker

Table 2.4-8. Operator Option Menu for CDF Deblocker

Table 2.4-9. Parameter Change Menu for CDF Deblocker

Table 2.4-10. CDF Destination Codes

#### 2.4.10 Front End Processor

2.4.10.1 General

2.4.10.2 Input

2.4.10.3 Initialization Procedures

2.4.10.4 System Description

2.4.10.5 Operations

2.4.10.5.1 General

2.4.10.5.2 Telemetry

2.4.10.5.3 Operating Procedures

2.4.10.5.4 Site Status Message

Figure 2.4-2. NISN Header Setup

Figure 2.4-3. System Status

Figure 2.4-4. Operator Interface Screen

Figure 2.4-5. WFEP Telemetry Formats

Figure 2.4-6. Card Download Options

Table 2.4-11. Destination Codes

## 2.5 Command [\(M old section 6\)](#)

2.5.1 General

2.5.2 SFL System Description

2.5.2.1 Introduction

[2.5.2.2 UL Data Rate Change via MIL/PDL \(M old Pa 1.3.3.1\)](#)

2.5.2.3 Input Data Modes

2.5.2.4 SFL/CMD Verification

[2.5.2.5 Shuttle Forward Link \(32/72 kbps Commands\) Data to  
KSC/RPS \(M old Pa 1.3.3.4\)](#)

Figure 2.5-1. JSC Command Block Format

- 2.5.3 SFL Initialization
- 2.5.4 Type III Command Histories
- 2.5.5 CSS
- 2.5.6 NCPS System Description
  - 2.5.6.1 General
    - 2.5.6.1.1 Introduction
    - 2.5.6.1.2 Input Data Modes
    - 2.5.6.1.3 NCPS/CMD Echo/Status
      - Figure 2.5-2. NCPS Command Echo Block
      - Figure 2.5-3. NCPS Status Block
      - Figure 2.5-4. Throughput Commands
  - 2.5.6.2 NCPS Description
  - 2.5.6.3 Operational Configuration Display Area
    - 2.5.6.3.1 Operational Configuration Display
    - 2.5.6.3.2 Dynamic Status Display Area
  - 2.5.6.4 Menu Display Area
    - 2.5.6.4.1 General
    - 2.5.6.4.2 [CMD System SAFE/OPERATE Configuration \(M old Pa 1.3.3.2\)](#)
    - 2.5.6.4.3 JSC SAFE MODE Menu
      - Figure 2.5-5. JSC Mode Menu Display
      - Figure 2.5-6. Tape Mode Menu Display
      - Figure 2.5-7. EVCF Mode Menu Display
    - 2.5.6.4.4 JSC Operate Mode Menu
    - 2.5.6.4.5 Tape Mode
    - 2.5.6.4.6 EVCF SAFE Mode
    - 2.5.6.4.7 Utilities Menu
    - 2.5.6.4.8 Unprompt Type-INS
- 2.5.7 [CMD Circuit Restoration \(M old Pa 1.3.3.3\)](#)

## **2.6 Station Communications Support** [\(M old section 12\)](#)

2.6.1 General

2.6.2 Operating Procedures

2.6.2.1 General

2.6.2.2 Voice Recorder Configuration

Table 2.6-1. Digital Voice Recorders Configuration

[2.6.2.3 Postlanding Support from DFRC \(M old Pa 1.3.4.2\)](#)

[2.6.2.4 Contingency Landing Communications \(M old Pa 1.3.4.3\)](#)

## **2.7 Air-to-Ground Communications** [\(M old section 14\)](#)

2.7.1 General

2.7.2 Voice Communication Modes

2.7.2.1 Space Shuttle Definition

2.7.2.2 S-band

Table 2.7-1. Station A-G Equipment Allocations

Table 2.7-2. Shuttle Communications Modes

2.7.2.3 UHF

2.7.2.4 Technical Characteristics

2.7.3 Operations Procedures and Configurations

2.7.3.1 Procedures

2.7.3.2 Equipment Configurations

2.7.3.3 A-G Configurations

2.7.3.3.1 ALPHA; Pre-launch (Throughput) Until SRB Ignition

2.7.3.3.2 BRAVO; Ascent Throughput A-G

2.7.3.3.3 CHARLIE; Flight Operations (Orbit) UHF

2.7.3.3.4 DELTA; Flight Operations, Orbit (Throughput)

- 2.7.3.3.5 FOXTROT; FlightOperations, EVA
- 2.7.3.3.6 GOLF; GN EVA/EMU (Throughput)
- 2.7.3.3.7 HOTEL; Landing
- 2.7.3.3.8 INDIA; Ground Operations, Post-landing
- 2.7.3.3.9 JULIET; WSSH Landing/Post-landing
- 2.7.3.3.10 KILO; Contingency Landing
- 2.7.3.3.11 LIMA; RTLS/KSC Landing/Post-landing
- 2.7.3.3.12 Pre-launch/Landing Weather Aircraft Configuration
  - Figure 2.7-1. Prelaunch (Throughput) Until SRB Ignition A-G Configuration ALPHA
  - Figure 2.7-2. Ascent (Throughput) A-G Configuration BRAVO
  - Figure 2.7-3. Flight Ops UHF Configuration CHARLIE
  - Figure 2.7-4. Flight Ops A-G Configuration DELTA
  - Figure 2.7-5. Flight Operations (EVA) Ops A-G Configuration FOXTROT
  - Figure 2.7-6. Flight Ops UHF Configuration GOLF
  - Figure 2.7-7. DFRC Landing A-G Configuration HOTEL
  - Figure 2.7-8. DFRC Postlanding A-G Configuration INDIA
  - Figure 2.7-9. WSSH Contingency Landing/Postlanding A-G Configuration JULIET
  - Figure 2.7-10. Contingency Landing A-G Configuration KILO
  - Figure 2.7-11. RTLS/KSC Landing/Postlanding Configuration LIMA
  - Figure 2.7-12. Prelaunch/Launch Weather Aircraft Configuration

- 2.7.3.4 UHF Pass Event Reporting (M from 1.3.1.7)
- 2.7.3.5 JSC to DFRC UHF Communications Failure (N )
- 2.7.3.6 Tone Keying Failure (UHF) (M old Pa 1.3.4.1)

## **2.8 Testing and Simulations** [\(M old section 26\)](#)

2.8.1 General

2.8.2 Mission Readiness Test

2.8.3 Prelaunch Simulations

2.8.3.1 Network Simulations

2.8.3.2 GSFC Simulations

2.8.4 Timeline for MRT for Space Shuttle

2.8.4.1 General

2.8.4.2 Events

2.8.5 [MIDDS Fault Isolation Procedure \(Metosat Data\)](#) [\(M old Pa 1.3.6.2\)](#)

[Figure 2.8-1. WFF MIDDS Data Flow](#) [\(M old Fig 1-10\)](#)

## Section 3. Meritt Island/Ponce De Leon

(USE SAME PARA, TABLES AND FIGURES AS IN SECTION 2 – DRYDEN)

### 3.1 Introduction

### 3.2 Telemetry

#### 3.2.1 General

#### 3.2.2 Launch and Landing Support

##### 3.2.2.1 Station Support Requirements/Configurations

##### 3.2.2.2 Link Description

Table 3.2-1. Launch Support Requirements

Table 3.2-2. Landing and Postlanding Requirements

Table 3.2-3. FM DL, 2250.0-MHz Real-time DL Characteristics

Table 3.2-4. FM DL, 2250.0-MHz Dump Configuration

##### 3.2.2.3 Data Systems Configuration

Table 3.2-5. Nominal Launch and DL Configuration

##### 3.2.2.4 Data Conditioning Subsystem

###### 3.2.2.4.1 General

###### 3.2.2.4.2 Bit Synchronizers

Table 3.2-6. OD DL (2217.5/2287.5 MHz) Bit Synchronizer Setup

Table 3.2-7. FM DL (2250.0 MHz) Bit Synchronizer Setup

###### 3.2.2.4.3 PSK Demodulators

Table 3.2-8. PSK Demodulator Setup for Launch

###### 3.2.2.4.4 Launch bit Sync Assignments

###### 3.2.2.4.5 SSME Data Flow

##### 3.2.2.5 Bit Synchronizers, Launch Phase

Figure 3.2-1. SSME Data Flow

##### 3.2.2.6 Phase Shift Key Demodulator FM DL

Table 3.2-9. FM DL SSME Bit Sync/Frame Sync Setup

Table 3.2-10. CCX Launch Configuration

3.2.2.7 Data Communications Switch

3.2.2.7.1 General

3.2.2.7.2 Launch Super Group Setup for DCS

3.2.2.7.3 STS Data Quality Monitor Assignments for Launch

3.2.2.7.4 Data Quality Monitor

Table 3.2-11. DQM Setups for MIL Launch

3.2.2.7.5 DQM Setup for PDL Launch

Table 3.2-12. DQM Setup for PDL Launch

3.2.2.7.6 Shuttle Status Display Unit

Table 3.2-13. Transponder Lock Indicator

Table 3.2-14. Network Signal Processor (NSP) Indicator

3.2.2.7.7 OD Downlink Configuration

Table 3.2-15. Bit Sync Setup

Table 3.2-16. Frame Sync Setup

Table 3.2-17. DMS Program Formats

Table 3.2-18. DMS Bit Sync Setup

Table 3.2-19. 403 Frame Sync Setup

3.2.2.7.8 Remote Controller

3.2.2.7.9 DL/UL Signal Processing and UL Monitoring

3.2.2.8 Shuttle Launch Support System

Figure 3.2-2. SLSS Simplified Telemetry Block Diagram

3.2.2.8.1 General

3.2.2.8.2 Bit Synchronizer

3.2.2.8.3 Demodulator

3.2.2.8.4 Verterbi Decoder

3.2.2.8.5 Frame Synchronizer

3.2.2.8.6 SLSS Return Link Control Panels

3.2.2.9 Shuttle Return Link Data System

3.2.2.9.1 General

3.2.2.9.2 Prime System

3.2.2.9.3 Alternate System

3.2.2.9.4 403 Frame Sync (or equivalent)

3.2.2.10 Recorder Configuration

3.2.2.10.1 Magnetic Tape Recorder

3.2.2.10.2 Digital Recorder Subsystem

Table 3.2-20. Launch Recorder Setup

Table 3.2-21. Analog Channel Setup for Launch

Table 3.2-22. Events Parallel Input

Table 3.2-23. Launch Phase Support MTR Track Assignments

Table 3.2-24. Postlanding Recorder Setup

Table 3.2-25. Postlanding Analog Channel Setup

Table 3.2-36. Events Parallel Input for Postlanding

Table 3.2-27. Landing and Postlanding Phase Support MTR Track  
Assignment

Figure 3.2-3 Range Safety Configuration

3.2.2.11 SSME Dump Data Monitoring

3.2.2.12 Best Source Select

Table 3.2-28. BSS DQM and Channels

3.2.3 Orbital Support

3.2.3.1 Station Support Requirements/Configuration

3.2.3.2 Link Description

3.2.3.2.1 Transmitter Characteristics

3.2.3.2.2 DL Characteristics

Table 3.2-29. Orbit/Landing Recorder Configuration

Table 3.2-30. Orbit/Landing Analog Channel Configuration for Recorders

Table 3.2-31. Events Parallel Input Orbit

Table 3.2-32. Orbit Support Requirements

Figure 3.2-4. TV Support Configuration for Space Shuttle (M old Fig 1-11)

Figure 3.2-5. Launch Support Configuration (M old Fig 1-13)

Figure 3.2-6. Orbital Support Configuration (M old Fig 1-15)

Figure 3.2-7. Landing Support Configuration (M old Fig 1-16)

Figure 3.2-8. UHF/VHF Configuration (M old Fig 1-17)

- 3.2.3.3 Receiver Configuration
  - 3.2.3.3.1 Multifunction Receiver
  - 3.2.3.3.2 Microdyne Receiver
- 3.2.3.4 Data Systems Configuration
  - 3.2.3.4.1 General
  - 3.2.3.4.2 Bit Synchronizers
  - 3.2.3.4.3 403 Frame Sync
  - 3.2.3.4.4 403 Frame Sync, Dump Monitoring
    - Table 3.2-33. Orbital Throughput Support
    - Table 3.2-34. Bit Synchronizer Setup for Orbit Phase
    - Table 3.2-35. 403 Frame Sync Dump Monitor Program
  - 3.2.3.4.5 FM Dump Data Monitoring
  - 3.2.3.4.6 Operations 2 Recorder Dump Playback Coordination
  - 3.2.3.4.7 Orbit Super Group Setup for DCS
  - 3.2.3.4.8 FM Dump Data Flow
    - Figure 3.2-9. MIL FM Dumps Data Flow Configuration
- 3.2.3.5 Delta Modulation System
- 3.2.3.6 Magnetic Tape Recorder Configuration
  - 3.2.3.6.1 General
  - 3.2.3.6.2 Orbital Record Requirements
    - Table 3.2-36. Orbit Phase Support MTR Track Assignments
- 3.2.3.7 High-Speed Data Transmission
  - 3.2.3.7.1 Station
  - 3.2.3.7.2 JSC-GSFC
- 3.2.4 Station Playback Procedures
  - 3.2.4.1 General
  - 3.2.4.2 Playback Requests
  - 3.2.4.3 Station Playback Procedures
  - 3.2.4.4 Station Playback Recorder Configuration
  - 3.2.4.5 Space Shuttle Main Engine Dump Data Playback

3.2.4.5.1 General

3.2.4.5.2 ME Identification

3.2.4.5.3 Postlaunch Playbacks

Figure 3.2-10. Postlaunch Playbacks

Table 3.2-37. WBMTR Nonstandard Playback Speed Setup

## 2.3 S-band (M old section 4)

3.3.1 General

3.3.2 Station Support

3.3.2.1 General

3.3.2.2 Launch Pad Support

3.3.2.3 Scheduling/Predicted Coverage

3.3.2.4 Link Description and MOD Indices

3.3.2.4.1 OD DL (2217.5/2287.5 MHz PM Ops)

3.3.2.4.2 FM DL (2250.0 MHz FM Ops)

3.3.2.4.3 PM UL

3.3.2.4.4 Shuttle Uplink Mod Index Procedures

3.3.2.4.5 Space Shuttle Verification Receiver Alignment

3.3.2.5 Support Configuration

Table 3.3-1. OD DL, 2217.5-/2287.5-MHz PM Ops Downlink Mod Indices

Table 3.3-2. FM DL, 2250.0-MHz FM Ops Downlink Mod Indices

Table 3.3-3. 2041.9-/2106.4-/1831.8-/1775.7-MHz UL Description and Mod Indices

Table 3.3-4. Space Shuttle RER Preset Assignments

3.3.3 Operational Support Procedures

3.3.3.1 Equipment Prepass Checklist

3.3.3.1.1 MFR

3.3.3.1.2 Exciter and PA Control

3.3.3.1.3 RER Upgrade Range Equipment

Table 3.3-5. MFR Configuration for FM DL - 2250.0 MHz

3.3.3.2 Acquisition Sources and Procedures

3.3.3.2.1 GN

3.3.3.2.2 Procedures

3.3.3.2.3 Station H/O

Figure 3.3-1. Typical Prepass Checklist (RER) Master Controller

Figure 3.3-2. Typical Prepass Checklist (RE) Slave Controller

Figure 3.3-3. RER Slave Controller Interface

Figure 3.3-4. RF Acquisition and Reacquisition Throughput Operations

Figure 3.3-5. Acquisition/Reacquisition Procedure Flow Diagram

3.3.3.3 Systems Configuration and Operations for Space Shuttle Launch and Ascent

3.3.3.3.1 Space Shuttle on Launch Pad (Pre-launch)

3.3.3.3.2 Space Shuttle Lift-off (Launch)

3.3.3.3.3 Space Shuttle Ascent

3.3.3.4 Configuration and Operations for KSC Landings

Table 3.3-6. Launch Ascent Exciter Frequency Offsets

Table 3.3-7. Launch Phase Receiver Configuration

3.3.3.5 Contingency Procedures

3.3.3.5.1 Loss of Exciter

3.3.3.5.2 Loss of Power Amplifier

3.3.3.5.3 Loss of Autotrack

3.3.3.5.4 Contingency UL Sweep Procedures

3.3.3.5.5 Space Shuttle Transponder Frequency Switch (Low Frequency to High Frequency or High Frequency to Low Frequency)

Figure 3.3-6. Suggested GN S-band Receiver Configuration (Prior to Frequency Switch)

Figure 3.3-7. Suggested GN S-band Receiver Configuration (RER Systems)

Figure 3.3-8. Suggested GN S-band Receiver Configuration (After Frequency Switch)

- 3.3.3.5.6 Loss of PCM Decom/Transponder/NSP Lock Select Box
- 3.3.3.5.7 Exciter to Exciter H/O (Station Contingency Command Link H/O)
- 3.3.4 Modulation on Technique Acquisition Sources and Procedures
  - 3.3.4.1 Sources
  - 3.3.4.2 Procedures
    - 3.3.4.2.1 General
    - 3.3.4.2.2 Two-way Acquisition Procedures (SBE MFR)
    - 3.3.4.2.3 Station H/O
- 3.3.5 Tracking System Requirements (S-band Tracking Processor System)
  - 3.3.5.1 Real-time Support
  - 3.3.5.2 Playback Support
    - Table 3.3-8. High-speed Tracking Data Octal Destination Codes
- 3.3.6 S-band Pass Event Reporting (N)
  - Table 3.3-9. MIL/PDL/DFRC/WPS Announcements for Loss of Carrier/Modulation (M old Tab 1-10)
- 3.3.7 UL Carrier Handovers (M old Pa 1.3.1.8)
- 3.3.8 Ascent Phase UL Carrier Handover (M old Pa 1.3.1.9)
- 3.3.9 H Minus Time I/F Activity (M old Pa 1.3.1.10)
  - Table 3.3-10. Station H-35 Interface (M old Tab 1-11)
  - Table 3.3-11. Station TV H-30 Interface (M old Tab 1-12)
  - Table 3.3-12. C-band H-45 Interface and Pass Time Reporting (M old Tab 1-13)
  - Table 3.3-13. Station Postpass Activities (M old Tab 1-14)
- 3.3.10 Pre-launch/Ascent Contingency Procedures (M old Pa 1.3.1.14)
  - Table 3.3-14. Nominal Prelaunch/Launch Configuration (M old Tab 1-15)
  - Figure 3.3-11. Pre-launch/Launch Configuration (Simplified Block Diagram) (M old Fig 1-8)

## 3.4 Computer Systems (M old section 5)

- 3.4.1 General

- 3.4.2 Remote Site Data Processor Requirements
  - 3.4.2.1 Telemetry Processing - PM Operational DL
  - 3.4.2.2 FM Operational DL Support Requirements
    - Figure 3.4-1. GSFC to JSC NISN Block
    - Table 3.4-1. Message Type Codes
  - 3.4.2.3 Site Status Message
  - 3.4.2.4 Remote Control Interface
- 3.4.3 NISN Blocker/Deblocker
  - 3.4.3.1 General
  - 3.4.3.2 Blocker
  - 3.4.3.3 Deblocker
- 3.4.4 Blocker/Deblocker Setup Files for Launch
- 3.4.5 Blocker/Deblocker Setup Parameters for Launch
- 3.4.6 Orbit Configuration Setup Files
- 3.4.7 Blockers/Deblockers
- 3.4.8 Multiplexer
  - Table 3.4-2. MUX Configuration for Launch
  - Table 3.4-4. MUX Configuration for Orbit Support
  - Table 3.4-5. Demux Settings to Demux PDL Main Engine Data
  - Table 3.4-6. Demux Channel Assignments and Parameters
- 3.4.9 Telemetry Blockers
  - 3.4.9.1 Communications Data Formatter Deblocker
  - 3.4.9.2 Operations
  - 3.4.9.3 Programmable Telemetry Processor Deblocker
  - 3.4.9.4 Operations
    - 3.4.9.4.1 General
    - 3.4.9.4.2 CDF Deblocker Header Parameters
    - 3.4.9.4.3 Initialization Procedures CDF Deblocker
    - 3.4.9.4.4 CDF Deblocker Rate Change Procedures
  - Table 3.4-7. Station Default Parameters for CDF Deblocker
  - Table 3.4-8. Operator Option Menu for CDF Deblocker

Table 3.4-9. Parameter Change Menu for CDF Deblocker

Table 3.4-10. CDF Destination Codes

- 3.4.10 Front End Processor
  - 3.4.10.1 General
  - 3.4.10.2 Input
  - 3.4.10.3 Initialization Procedures
  - 3.4.10.4 System Description
  - 3.4.10.5 Operations
    - 3.4.10.5.1 General
    - 3.4.10.5.2 Telemetry
    - 3.4.10.5.3 Operating Procedures
    - 3.4.10.5.4 Site Status Message

Figure 3.4-2. NISN Header Setup

Figure 3.4-3. System Status

Figure 3.4-4. Operator Interface Screen

Figure 3.4-5. WFEP Telemetry Formats

Figure 3.4-6. Card Download Options

Table 3.4-11. Destination Codes

## 3.5 Command [\(M old section 6\)](#)

- 3.5.1 General
- 3.5.2 SFL System Description
  - 3.5.2.1 Introduction
  - [3.5.2.2 UL Data Rate Change via MIL/PDL \(M old Pa 1.3.3.1\)](#)
  - 3.5.2.3 Input Data Modes
  - 3.5.2.4 SFL/CMD Verification
  - [3.5.2.5 Shuttle Forward Link \(32/72 kbps Commands\) Data to KSC/RPS \(M old Pa 1.3.3.4\)](#)

Figure 3.5-1. JSC Command Block Format

- 3.5.3 SFL Initialization

- 3.5.4 Type III Command Histories
- 3.5.5 CSS
- 3.5.6 NCPS System Description
  - 3.5.6.1 General
    - 3.5.6.1.1 Introduction
    - 3.5.6.1.2 Input Data Modes
    - 3.5.6.1.3 NCPS/CMD Echo/Status
      - Figure 3.5-2. NCPS Command Echo Block
      - Figure 3.5-3. NCPS Status Block
      - Figure 3.5-4. Throughput Commands
  - 3.5.6.2 NCPS Description
  - 3.5.6.3 Operational Configuration Display Area
    - 3.5.6.3.1 Operational Configuration Display
    - 3.5.6.3.2 Dynamic Status Display Area
  - 3.5.6.4 Menu Display Area
    - 3.5.6.4.1 General
    - 3.5.6.4.2 [CMD System SAFE/OPERATE Configuration \(M old Pa 1.3.3.2\)](#)
    - 3.5.6.4.3 JSC SAFE MODE Menu
      - Figure 3.5-5. JSC Mode Menu Display
      - Figure 3.5-6. Tape Mode Menu Display
      - Figure 3.5-7. EVCF Mode Menu Display
    - 3.5.6.4.4 JSC Operate Mode Menu
    - 3.5.6.4.5 Tape Mode
    - 3.5.6.4.6 EVCF SAFE Mode
    - 3.5.6.4.7 Utilities Menu
    - 3.5.6.4.8 Unprompt Type-INS
- 3.5.7 [CMD Circuit Restoration \(M old Pa 1.3.3.3\)](#)

## **3.6 Station Communications Support** [\(M old section 12\)](#)

- 3.6.1 General

### 3.6.2 Operating Procedures

#### 3.6.2.1 General

#### 3.6.2.2 Voice Recorder Configuration

Table 3.6-1. Digital Voice Recorders Configuration

#### 3.6.2.3 Postlanding Support from DFRC (M old Pa 1.3.4.2)

#### 3.6.2.4 Contingency Landing Communications (M old Pa 1.3.4.3)

## 3.7 Air-to-Ground Communications (M old section 14)

### 3.7.1 General

### 3.7.2 Voice Communication Modes

#### 3.7.2.1 Space Shuttle Definition

#### 3.7.2.2 S-band

Table 3.7-1. Station A-G Equipment Allocations

Table 3.7-2. Shuttle Communications Modes

#### 3.7.2.3 UHF

#### 3.7.2.4 Technical Characteristics

### 3.7.3 Operations Procedures and Configurations

#### 3.7.3.1 Procedures

#### 3.7.3.2 Equipment Configurations

#### 3.7.3.3 A-G Configurations

3.7.3.3.1 ALPHA; Pre-launch (Throughput) Until SRB Ignition

3.7.3.3.2 BRAVO; Ascent Throughput A-G

3.7.3.3.3 CHARLIE; Flight Operations (Orbit) UHF

3.7.3.3.4 DELTA; Flight Operations, Orbit (Throughput)

3.7.3.3.5 FOXTROT; Flight Operations, EVA

3.7.3.3.6 GOLF; GN EVA/EMU (Throughput)

3.7.3.3.7 HOTEL; Landing

- 3.7.3.3.8 INDIA; Ground Operations, Post-landing
- 3.7.3.3.9 JULIET; WSSH Landing/Post-landing
- 3.7.3.3.10 KILO; Contingency Landing
- 3.7.3.3.11 LIMA; RTLS/KSC Landing/Post-landing
- 3.7.3.3.12 Pre-launch/Landing Weather Aircraft Configuration
  - Figure 3.7-1. Prelaunch (Throughput) Until SRB Ignition A-G Configuration ALPHA
  - Figure 3.7-2. Ascent (Throughput) A-G Configuration BRAVO
  - Figure 3.7-3. Flight Ops UHF Configuration CHARLIE
  - Figure 3.7-4. Flight Ops A-G Configuration DELTA
  - Figure 3.7-5. Flight Operations (EVA) Ops A-G Configuration FOXTROT
  - Figure 3.7-6. Flight Ops UHF Configuration GOLF
  - Figure 3.7-7. DFRC Landing A-G Configuration HOTEL
  - Figure 3.7-8. DFRC Postlanding A-G Configuration INDIA
  - Figure 3.7-9. WSSH Contingency Landing/Postlanding A-G Configuration JULIET
  - Figure 3.7-10. Contingency Landing A-G Configuration KILO
  - Figure 3.7-11. RTLS/KSC Landing/Postlanding Configuration LIMA
  - Figure 3.7-12. Prelaunch/Launch Weather Aircraft Configuration

- 3.7.3.4 UHF Pass Event Reporting (M from 1.3.1.7)
- 3.7.3.5 JSC to DFRC UHF Communications Failure (N)
- 3.7.3.6 Tone Keying Failure (UHF) (M old Pa 1.3.4.1)

## 3.8 Testing and Simulations (M old section 26)

- 3.8.1 General
- 3.8.2 Mission Readiness Test
- 3.8.3 Prelaunch Simulations

- 3.8.3.1 Network Simulations
- 3.8.3.2 GSFC Simulations
- 3.8.4 Timeline for MRT for Space Shuttle
  - 3.8.34.1 General
  - 3.8.34.2 Events
- 3.8.5 [MIDDS Fault Isolation Procedure \(Metosat Data\) \(M old Pa 1.3.6.2\)](#)
  - [Figure 3.8-1. WFF MIDDS Data Flow \(M old Fig 1-10\)](#)

## Section 4. Wallops

(USE SAME PARA, TABLES AND FIGURES AS INSECTION 2 – DRYDEN)

### 4.1 Introduction

### 4.2 Telemetry

#### 4.2.1 General

#### 4.2.2 Launch and Landing Support

##### 4.2.2.1 Station Support Requirements/Configurations

##### 4.2.2.2 Link Description

Table 4.2-1. Launch Support Requirements

Table 4.2-2. Landing and Postlanding Requirements

Table 4.2-3. FM DL, 2250.0-MHz Real-time DL Characteristics

Table 4.2-4. FM DL, 2250.0-MHz Dump Configuration

##### 4.2.2.3 Data Systems Configuration

Table 4.2-5. Nominal Launch and DL Configuration

##### 4.2.2.4 Data Conditioning Subsystem

###### 4.2.2.4.1 General

###### 4.2.2.4.2 Bit Synchronizers

Table 4.2-6. OD DL (2217.5/2287.5 MHz) Bit Synchronizer Setup

Table 4.2-7. FM DL (2250.0 MHz) Bit Synchronizer Setup

###### 4.2.2.4.3 PSK Demodulators

Table 4.2-8. PSK Demodulator Setup for Launch

###### 4.2.2.4.3 Launch bit Sync Assignments

###### 4.2.2.4.4 SSME Data Flow

##### 4.2.2.5 Bit Synchronizers, Launch Phase

Figure 4.2-1. SSME Data Flow

##### 4.2.2.6 Phase Shift Key Demodulator FM DL

Table 4.2-9. FM DL SSME Bit Sync/Frame Sync Setup

Table 4.2-10. CCX Launch Configuration

##### 4.2.2.7 Data Communications Switch

4.2.2.7.1 General

4.2.2.7.2 Launch Super Group Setup for DCS

4.2.2.7.3 STS Data Quality Monitor Assignments for Launch

4.2.2.7.4 Data Quality Monitor

Table 4.2-11. DQM Setups for MIL Launch

4.2.2.7.5 DQM Setup for PDL Launch

Table 4.2-12. DQM Setup for PDL Launch

4.2.2.7.6 Shuttle Status Display Unit

Table 4.2-13. Transponder Lock Indicator

Table 4.2-14. Network Signal Processor (NSP) Indicator

4.2.2.7.7 OD Downlink Configuration

Table 4.2-15. Bit Sync Setup

Table 4.2-16. Frame Sync Setup

Table 4.2-17. DMS Program Formats

Table 4.2-18. DMS Bit Sync Setup

Table 4.2-19. 403 Frame Sync Setup

4.2.2.7.8 Remote Controller

4.2.2.7.9 DL/UL Signal Processing and UL Monitoring

4.2.2.8 Shuttle Launch Support System

Figure 4.2-2. SLSS Simplified Telemetry Block Diagram

4.2.2.8.1 General

4.2.2.8.2 Bit Synchronizer

4.2.2.8.3 Demodulator

4.2.2.8.4 Verterbi Decoder

4.2.2.8.5 Frame Synchronizer

4.2.2.8.6 SLSS Return Link Control Panels

4.2.2.9 Shuttle Return Link Data System

4.2.2.9.1 General

4.2.2.9.2 Prime System

4.2.2.9.3 Alternate System

4.2.2.9.4 403 Frame Sync (or equivalent)

4.2.2.10 Recorder Configuration

4.2.2.10.1 Magnetic Tape Recorder

4.2.2.10.2 Digital Recorder Subsystem

Table 4.2-20. Launch Recorder Setup

Table 4.2-21. Analog Channel Setup for Launch

Table 4.2-22. Events Parallel Input

Table 4.2-23. Launch Phase Support MTR Track Assignments

Table 4.2-24. Postlanding Recorder Setup

Table 4.2-25. Postlanding Analog Channel Setup

Table 4.2-36. Events Parallel Input for Postlanding

Table 4.2-27. Landing and Postlanding Phase Support MTR Track  
Assignment

Figure 4.2-3 Range Safety Configuration

4.2.2.11 SSME Dump Data Monitoring

4.2.2.12 Best Source Select

Table 4.2-28. BSS DQM and Channels

4.2.3 Orbital Support

4.2.3.1 Station Support Requirements/Configuration

4.2.3.2 Link Description

4.2.3.2.1 Transmitter Characteristics

4.2.3.2.2 DL Characteristics

Table 4.2-29. Orbit/Landing Recorder Configuration

Table 4.2-30. Orbit/Landing Analog Channel Configuration for Recorders

Table 4.2-31. Events Parallel Input Orbit

Table 4.2-32. Orbit Support Requirements

Figure 4.2-4. TV Support Configuration for Space Shuttle (M old Fig 1-11)

Figure 4.2-5. Launch Support Configuration (M old Fig 1-13)

Figure 4.2-6. Orbital Support Configuration (M old Fig 1-15)

Figure 4.2-7. Landing Support Configuration (M old Fig 1-16)

Figure 4.2-8. UHF/VHF Configuration (M old Fig 1-17)

- 4.2.3.3 Receiver Configuration
  - 4.2.3.3.1 Multifunction Receiver
  - 4.2.3.3.2 Microdyne Receiver
- 4.2.3.4 Data Systems Configuration
  - 4.2.3.4.1 General
  - 4.2.3.4.2 Bit Synchronizers
  - 4.2.3.4.3 403 Frame Sync
  - 4.2.3.4.4 403 Frame Sync, Dump Monitoring
    - Table 4.2-33. Orbital Throughput Support
    - Table 4.2-34. Bit Synchronizer Setup for Orbit Phase
    - Table 4.2-35. 403 Frame Sync Dump Monitor Program
  - 4.2.3.4.5 FM Dump Data Monitoring
  - 4.2.3.4.6 Operations 2 Recorder Dump Playback Coordination
  - 4.2.3.4.7 Orbit Super Group Setup for DCS
  - 4.2.3.4.8 FM Dump Data Flow
    - Figure 4.2-9. MIL FM Dumps Data Flow Configuration
- 4.2.3.5 Delta Modulation System
- 4.2.3.6 Magnetic Tape Recorder Configuration
  - 4.2.3.6.1 General
  - 4.2.3.6.2 Orbital Record Requirements
    - Table 4.2-36. Orbit Phase Support MTR Track Assignments
- 4.2.3.7 High-Speed Data Transmission
  - 4.2.3.7.1 Station
  - 4.2.3.7.2 JSC-GSFC
- 4.2.4 Station Playback Procedures
  - 4.2.4.1 General
  - 4.2.4.2 Playback Requests
  - 4.2.4.3 Station Playback Procedures
  - 4.2.4.4 Station Playback Recorder Configuration
  - 4.2.4.5 Space Shuttle Main Engine Dump Data Playback
    - 4.2.4.5.1 General

4.2.4.5.2 ME Identification

4.2.4.5.3 Postlaunch Playbacks

Figure 4.2-10. Postlaunch Playbacks

Table 4.2-37. WBMTR Nonstandard Playback Speed Setup

## 4.3 S-band (M old section 4)

4.3.1 General

4.3.2 Station Support

4.3.2.1 General

4.3.2.2 Launch Pad Support

4.3.2.3 Scheduling/Predicted Coverage

4.3.2.4 Link Description and MOD Indices

4.3.2.4.1 OD DL (2217.5/2287.5 MHz PM Ops)

4.3.2.4.2 FM DL (2250.0 MHz FM Ops)

4.3.2.4.3 PM UL

4.3.2.4.4 Shuttle Uplink Mod Index Procedures

4.3.2.4.5 Space Shuttle Verification Receiver Alignment

4.3.2.5 Support Configuration

Table 4.3-1. OD DL, 2217.5-/2287.5-MHz PM Ops Downlink Mod Indices

Table 4.3-2. FM DL, 2250.0-MHz FM Ops Downlink Mod Indices

Table 4.3-3. 2041.9-/2106.4-/1831.8-/1775.7-MHz UL Description and Mod Indices

Table 4.3-4. Space Shuttle RER Preset Assignments

4.3.3 Operational Support Procedures

4.3.3.1 Equipment Prepass Checklist

4.3.3.1.1 MFR

4.3.3.1.2 Exciter and PA Control

4.3.3.1.3 RER Upgrade Range Equipment

Table 4.3-5. MFR Configuration for FM DL - 2250.0 MHz

4.3.3.2 Acquisition Sources and Procedures

- 4.3.3.2.1 GN
- 4.3.3.2.2 Procedures
- 4.3.3.2.3 Station H/O

Figure 4.3-1. Typical Prepass Checklist (RER) Master Controller

Figure 4.3-2. Typical Prepass Checklist (RE) Slave Controller

Figure 4.3-3. RER Slave Controller Interface

Figure 4.3-4. RF Acquisition and Reacquisition Throughput Operations

Figure 4.3-5. Acquisition/Reacquisition Procedure Flow Diagram

#### 4.3.3.3 Systems Configuration and Operations for Space Shuttle Launch and Ascent

- 4.3.3.3.1 Space Shuttle on Launch Pad (Pre-launch)
- 4.3.3.3.2 Space Shuttle Lift-off (Launch)
- 4.3.3.3.3 Space Shuttle Ascent

#### 4.3.3.4 Configuration and Operations for KSC Landings

Table 4.3-6. Launch Ascent Exciter Frequency Offsets

Table 4.3-7. Launch Phase Receiver Configuration

#### 4.3.3.5 Contingency Procedures

- 4.3.3.5.1 Loss of Exciter
- 4.3.3.5.2 Loss of Power Amplifier
- 4.3.3.5.3 Loss of Autotrack
- 4.3.3.5.4 Contingency UL Sweep Procedures
- 4.3.3.5.5 Space Shuttle Transponder Frequency Switch (Low Frequency to High Frequency or High Frequency to Low Frequency)

Figure 4.3-6. Suggested GN S-band Receiver Configuration (Prior to Frequency Switch)

Figure 4.3-7. Suggested GN S-band Receiver Configuration (RER Systems)

Figure 4.3-8. Suggested GN S-band Receiver Configuration (After Frequency Switch)

- 4.3.3.5.6 Loss of PCM Decom/Transponder/NSP Lock Select Box

4.3.3.5.7 Exciter to Exciter H/O (Station Contingency Command Link H/O)

4.3.4 Modulation on Technique Acquisition Sources and Procedures

4.3.4.1 Sources

4.3.4.2 Procedures

4.3.4.2.1 General

4.3.4.2.2 Two-way Acquisition Procedures (SBE MFR)

4.3.4.2.3 Station H/O

4.3.5 Tracking System Requirements (S-band Tracking Processor System)

4.3.5.1 Real-time Support

4.3.5.2 Playback Support

Table 4.3-8. High-speed Tracking Data Octal Destination Codes

4.3.6 S-band Pass Event Reporting (N)

Table 4.3-9. MIL/PDL/DFRC/WPS Announcements for Loss of Carrier/Modulation (M old Tab 1-10)

4.3.7 UL Carrier Handovers (M old Pa 1.3.1.8)

4.3.8 Ascent Phase UL Carrier Handover (M old Pa 1.3.1.9)

4.3.9 H Minus Time I/F Activity (M old Pa 1.3.1.10)

Table 4.3-10. Station H-35 Interface (M old Tab 1-11)

Table 4.3-11. Station TV H-30 Interface (M old Tab 1-12)

Table 4.3-12. C-band H-45 Interface and Pass Time Reporting (M old Tab 1-13)

Table 4.3-13. Station Postpass Activities (M old Tab 1-14)

4.3.10 Pre-launch/Ascent Contingency Procedures (M old Pa 1.3.1.14)

Table 4.3-14. Nominal Prelaunch/Launch Configuration (M old Tab 1-15)

Figure 4.3-11. Pre-launch/Launch Configuration (Simplified Block Diagram) (M old Fig 1-8)

**4.4 Computer Systems** (M old section 5)

4.4.1 General

4.4.2 Remote Site Data Processor Requirements

4.4.2.1 Telemetry Processing - PM Operational DL

4.4.2.2 FM Operational DL Support Requirements

Figure 4.4-1. GSFC to JSC NISN Block

Table 4.4-1. Message Type Codes

4.4.2.3 Site Status Message

4.4.2.4 Remote Control Interface

4.4.3 NISN Blocker/Deblocker

4.4.3.1 General

4.4.3.2 Blocker

4.4.3.3 Deblocker

4.4.4 Blocker/Deblocker Setup Files for Launch

4.4.5 Blocker/Deblocker Setup Parameters for Launch

4.4.6 Orbit Configuration Setup Files

4.4.7 Blockers/Deblockers

4.4.8 Multiplexer

Table 4.4-2. MUX Configuration for Launch

Table 4.4-4. MUX Configuration for Orbit Support

Table 4.4-5. Demux Settings to Demux PDL Main Engine Data

Table 4.4-6. Demux Channel Assignments and Parameters

4.4.9 Telemetry Blockers

4.4.9.1 Communications Data Formatter Deblocker

4.4.9.2 Operations

4.4.9.3 Programmable Telemetry Processor Deblocker

4.4.9.4 Operations

4.4.9.4.1 General

4.4.9.4.2 CDF Deblocker Header Parameters

4.4.9.4.3 Initialization Procedures CDF Deblocker

4.4.9.4.4 CDF Deblocker Rate Change Procedures

Table 4.4-7. Station Default Parameters for CDF Deblocker

Table 4.4-8. Operator Option Menu for CDF Deblocker

Table 4.4-9. Parameter Change Menu for CDF Deblocker

Table 4.4-10. CDF Destination Codes

- 4.4.10 Front End Processor
  - 4.4.10.1 General
  - 4.4.10.2 Input
  - 4.4.10.3 Initialization Procedures
  - 4.4.10.4 System Description
  - 4.4.10.5 Operations
    - 4.4.10.5.1 General
    - 4.4.10.5.2 Telemetry
    - 4.4.10.5.3 Operating Procedures
    - 4.4.10.5.4 Site Status Message

Figure 4.4-2. NISN Header Setup

Figure 4.4-3. System Status

Figure 4.4-4. Operator Interface Screen

Figure 4.4-5. WFEP Telemetry Formats

Figure 4.4-6. Card Download Options

Table 4.4-11. Destination Codes

## 4.5 Command [\(M old section 6\)](#)

- 4.5.1 General
- 4.5.2 SFL System Description
  - 4.5.2.1 Introduction
  - [4.5.2.2 UL Data Rate Change via MIL/PDL \(M old Pa 1.3.3.1\)](#)
  - 4.5.2.3 Input Data Modes
  - 4.5.2.4 SFL/CMD Verification
  - [4.5.2.5 Shuttle Forward Link \(32/72 kbps Commands\) Data to KSC/RPS \(M old Pa 1.3.3.4\)](#)

Figure 4.5-1. JSC Command Block Format

- 4.5.3 SFL Initialization
- 4.5.4 Type III Command Histories

- 4.5.5 CSS
- 4.5.6 NCPS System Description
  - 4.5.6.1 General
    - 4.5.6.1.1 Introduction
    - 4.5.6.1.2 Input Data Modes
    - 4.5.6.1.3 NCPS/CMD Echo/Status
      - Figure 4.5-2. NCPS Command Echo Block
      - Figure 4.5-3. NCPS Status Block
      - Figure 4.5-4. Throughput Commands
  - 4.5.6.2 NCPS Description
  - 4.5.6.3 Operational Configuration Display Area
    - 4.5.6.3.1 Operational Configuration Display
    - 4.5.6.3.2 Dynamic Status Display Area
  - 4.5.6.4 Menu Display Area
    - 4.5.6.4.1 General
    - 4.5.6.4.2 [CMD System SAFE/OPERATE Configuration \(M old Pa 1.3.3.2\)](#)
    - 4.5.6.4.3 JSC SAFE MODE Menu
      - Figure 4.5-5. JSC Mode Menu Display
      - Figure 4.5-6. Tape Mode Menu Display
      - Figure 4.5-7. EVCF Mode Menu Display
    - 4.5.6.4.4 JSC Operate Mode Menu
    - 4.5.6.4.5 Tape Mode
    - 4.5.6.4.6 EVCF SAFE Mode
    - 4.5.6.4.7 Utilities Menu
    - 4.5.6.4.8 Unprompt Type-INS
  - 4.5.7 [CMD Circuit Restoration \(M old Pa 1.3.3.3\)](#)

## **4.6 Station Communications Support** [\(M old section 12\)](#)

- 4.6.1 General
- 4.6.2 Operating Procedures

4.6.2.1 General

4.6.2.2 Voice Recorder Configuration

Table 4.6-1. Digital Voice Recorders Configuration

4.6.2.3 Postlanding Support from DFRC (M old Pa 1.3.4.2)

4.6.2.4 Contingency Landing Communications (M old Pa 1.3.4.3)

## 4.7 Air-to-Ground Communications (M old section 14)

4.7.1 General

4.7.2 Voice Communication Modes

4.7.2.1 Space Shuttle Definition

4.7.2.2 S-band

Table 4.7-1. Station A-G Equipment Allocations

Table 4.7-2. Shuttle Communications Modes

4.7.2.3 UHF

4.7.2.4 Technical Characteristics

4.7.3 Operations Procedures and Configurations

4.7.3.1 Procedures

4.7.3.2 Equipment Configurations

4.7.3.3 A-G Configurations

4.7.3.3.1 ALPHA; Pre-launch (Throughput) Until SRB Ignition

4.7.3.3.2 BRAVO; Ascent Throughput A-G

4.7.3.3.3 CHARLIE; Flight Operations (Orbit) UHF

4.7.3.3.4 DELTA; Flight Operations, Orbit (Throughput)

4.7.3.3.5 FOXTROT; Flight Operations, EVA

4.7.3.3.6 GOLF; GN EVA/EMU (Throughput)

4.7.3.3.7 HOTEL; Landing

4.7.3.3.8 INDIA; Ground Operations, Post-landing

- 4.7.3.3.9 JULIET; WSSH Landing/Post-landing
- 4.7.3.3.10 KILO; Contingency Landing
- 4.7.3.3.11 LIMA; RTLS/KSC Landing/Post-landing
- 4.7.3.3.12 Pre-launch/Landing Weather Aircraft Configuration
  - Figure 4.7-1. Prelaunch (Throughput) Until SRB Ignition A-G Configuration ALPHA
  - Figure 4.7-2. Ascent (Throughput) A-G Configuration BRAVO
  - Figure 4.7-3. Flight Ops UHF Configuration CHARLIE
  - Figure 4.7-4. Flight Ops A-G Configuration DELTA
  - Figure 4.7-5. Flight Operations (EVA) Ops A-G Configuration FOXTROT
  - Figure 4.7-6. Flight Ops UHF Configuration GOLF
  - Figure 4.7-7. DFRC Landing A-G Configuration HOTEL
  - Figure 4.7-8. DFRC Postlanding A-G Configuration INDIA
  - Figure 4.7-9. WSSH Contingency Landing/Postlanding A-G Configuration JULIET
  - Figure 4.7-10. Contingency Landing A-G Configuration KILO
  - Figure 4.7-11. RTLS/KSC Landing/Postlanding Configuration LIMA
  - Figure 4.7-12. Prelaunch/Launch Weather Aircraft Configuration

- 4.7.3.4 UHF Pass Event Reporting (M from 1.3.1.7)
- 4.7.3.5 JSC to DFRC UHF Communications Failure (N)
- 4.7.3.6 Tone Keying Failure (UHF) (M old Pa 1.3.4.1)

## 4.8 Testing and Simulations (M old section 26)

- 4.8.1 General
- 4.8.2 Mission Readiness Test
- 4.8.3 Prelaunch Simulations
  - 4.8.3.1 Network Simulations

4.8.3.2 GSFC Simulations

4.8.4 Timeline for MRT for Space Shuttle

4.8.4.1 General

4.8.4.2 Events

4.8.5 [MIDDS Fault Isolation Procedure \(Metosat Data\) \(M old Pa 1.3.6.2\)](#)

[Figure 4.8-1. WFF MIDDS Data Flow \(M old Fig 1-10\)](#)

## Section 5. White Sands Space Harbor

(USE SAME PARA, TABLES AND FIGURES AS IN SECTION 2 – DRYDEN)

### 5.1 Introduction

### 5.2 Telemetry

#### 5.2.1 General

#### 5.2.2 Launch and Landing Support

##### 5.2.2.1 Station Support Requirements/Configurations

##### 5.2.2.2 Link Description

Table 5.2-1. Launch Support Requirements

Table 5.2-2. Landing and Postlanding Requirements

Table 5.2-3. FM DL, 2250.0-MHz Real-time DL Characteristics

Table 5.2-4. FM DL, 2250.0-MHz Dump Configuration

##### 5.2.2.3 Data Systems Configuration

Table 5.2-5. Nominal Launch and DL Configuration

##### 5.2.2.4 Data Conditioning Subsystem

###### 5.2.2.4.1 General

###### 5.2.2.4.2 Bit Synchronizers

Table 5.2-6. OD DL (2217.5/2287.5 MHz) Bit Synchronizer Setup

Table 5.2-7. FM DL (2250.0 MHz) Bit Synchronizer Setup

###### 5.2.2.4.3 PSK Demodulators

Table 5.2-8. PSK Demodulator Setup for Launch

###### 5.2.2.4.4 Launch bit Sync Assignments

###### 5.2.2.4.5 SSME Data Flow

##### 5.2.2.5 Bit Synchronizers, Launch Phase

Figure 5.2-1. SSME Data Flow

##### 5.2.2.6 Phase Shift Key Demodulator FM DL

Table 5.2-9. FM DL SSME Bit Sync/Frame Sync Setup

Table 5.2-10. CCX Launch Configuration

5.2.2.7 Data Communications Switch

5.2.2.7.1 General

5.2.2.7.2 Launch Super Group Setup for DCS

5.2.2.7.3 STS Data Quality Monitor Assignments for Launch

5.2.2.7.4 Data Quality Monitor

Table 5.2-11. DQM Setups for MIL Launch

5.2.2.7.5 DQM Setup for PDL Launch

Table 5.2-12. DQM Setup for PDL Launch

5.2.2.7.6 Shuttle Status Display Unit

Table 5.2-13. Transponder Lock Indicator

Table 5.2-14. Network Signal Processor (NSP) Indicator

5.2.2.7.7 OD Downlink Configuration

Table 5.2-15. Bit Sync Setup

Table 5.2-16. Frame Sync Setup

Table 5.2-17. DMS Program Formats

Table 5.2-18. DMS Bit Sync Setup

Table 5.2-19. 403 Frame Sync Setup

5.2.2.7.8 Remote Controller

5.2.2.7.9 DL/UL Signal Processing and UL Monitoring

5.2.2.8 Shuttle Launch Support System

Figure 5.2-2. SLSS Simplified Telemetry Block Diagram

5.2.2.8.1 General

5.2.2.8.2 Bit Synchronizer

5.2.2.8.3 Demodulator

5.2.2.8.4 Verterbi Decoder

5.2.2.8.5 Frame Synchronizer

5.2.2.8.6 SLSS Return Link Control Panels

5.2.2.9 Shuttle Return Link Data System

5.2.2.9.1 General

5.2.2.9.2 Prime System

5.2.2.9.3 Alternate System

5.2.2.9.4 403 Frame Sync (or equivalent)

5.2.2.10 Recorder Configuration

5.2.2.10.1 Magnetic Tape Recorder

5.2.2.10.2 Digital Recorder Subsystem

Table 5.2-20. Launch Recorder Setup

Table 5.2-21. Analog Channel Setup for Launch

Table 5.2-22. Events Parallel Input

Table 5.2-23. Launch Phase Support MTR Track Assignments

Table 5.2-24. Postlanding Recorder Setup

Table 5.2-25. Postlanding Analog Channel Setup

Table 5.2-36. Events Parallel Input for Postlanding

Table 5.2-27. Landing and Postlanding Phase Support MTR Track  
Assignment

Figure 5.2-3 Range Safety Configuration

5.2.2.11 SSME Dump Data Monitoring

5.2.2.12 Best Source Select

Table 5.2-28. BSS DQM and Channels

5.2.3 Orbital Support

5.2.3.1 Station Support Requirements/Configuration

5.2.3.2 Link Description

5.2.3.2.1 Transmitter Characteristics

5.2.3.2.2 DL Characteristics

Table 5.2-29. Orbit/Landing Recorder Configuration

Table 5.2-30. Orbit/Landing Analog Channel Configuration for Recorders

Table 5.2-31. Events Parallel Input Orbit

Table 5.2-32. Orbit Support Requirements

Figure 5.2-4. TV Support Configuration for Space Shuttle (M old Fig 1-11)

Figure 5.2-5. Launch Support Configuration (M old Fig 1-13)

Figure 5.2-6. Orbital Support Configuration (M old Fig 1-15)

Figure 5.2-7. Landing Support Configuration (M old Fig 1-16)

Figure 5.2-8. UHF/VHF Configuration (M old Fig 1-17)

- 5.2.3.3 Receiver Configuration
  - 5.2.3.3.1 Multifunction Receiver
  - 5.2.3.3.2 Microdyne Receiver
- 5.2.3.4 Data Systems Configuration
  - 5.2.3.4.1 General
  - 5.2.3.4.2 Bit Synchronizers
  - 5.2.3.4.3 403 Frame Sync
  - 5.2.3.4.4 403 Frame Sync, Dump Monitoring
    - Table 5.2-33. Orbital Throughput Support
    - Table 5.2-34. Bit Synchronizer Setup for Orbit Phase
    - Table 5.2-35. 403 Frame Sync Dump Monitor Program
  - 5.2.3.4.5 FM Dump Data Monitoring
  - 5.2.3.4.6 Operations 2 Recorder Dump Playback Coordination
  - 5.2.3.4.7 Orbit Super Group Setup for DCS
  - 5.2.3.4.8 FM Dump Data Flow
    - Figure 5.2-9. MIL FM Dumps Data Flow Configuration
- 5.2.3.5 Delta Modulation System
- 5.2.3.6 Magnetic Tape Recorder Configuration
  - 5.2.3.6.1 General
  - 5.2.3.6.2 Orbital Record Requirements
    - Table 5.2-36. Orbit Phase Support MTR Track Assignments
- 5.2.3.7 High-Speed Data Transmission
  - 5.2.3.7.1 Station
  - 5.2.3.7.2 JSC-GSFC
- 5.2.4 Station Playback Procedures
  - 5.2.4.1 General
  - 5.2.4.2 Playback Requests
  - 5.2.4.3 Station Playback Procedures
  - 5.2.4.4 Station Playback Recorder Configuration
  - 5.2.4.5 Space Shuttle Main Engine Dump Data Playback

5.2.4.5.1 General

5.2.4.5.2 ME Identification

5.2.4.5.3 Postlaunch Playbacks

Figure 5.2-10. Postlaunch Playbacks

Table 5.2-37. WBMTR Nonstandard Playback Speed Setup

## 5.3 S-band (M old section 4)

5.3.1 General

5.3.2 Station Support

5.3.2.1 General

5.3.2.2 Launch Pad Support

5.3.2.3 Scheduling/Predicted Coverage

5.3.2.4 Link Description and MOD Indices

5.3.2.4.1 OD DL (2217.5/2287.5 MHz PM Ops)

5.3.2.4.2 FM DL (2250.0 MHz FM Ops)

5.3.2.4.3 PM UL

5.3.2.4.4 Shuttle Uplink Mod Index Procedures

5.3.2.4.5 Space Shuttle Verification Receiver Alignment

5.3.2.5 Support Configuration

Table 5.3-1. OD DL, 2217.5-/2287.5-MHz PM Ops Downlink Mod Indices

Table 5.3-2. FM DL, 2250.0-MHz FM Ops Downlink Mod Indices

Table 5.3-3. 2041.9-/2106.4-/1831.8-/1775.7-MHz UL Description and Mod Indices

Table 5.3-4. Space Shuttle RER Preset Assignments

5.3.3 Operational Support Procedures

5.3.3.1 Equipment Prepass Checklist

5.3.3.1.1 MFR

5.3.3.1.2 Exciter and PA Control

5.3.3.1.3 RER Upgrade Range Equipment

Table 5.3-5. MFR Configuration for FM DL - 2250.0 MHz

5.3.3.2 Acquisition Sources and Procedures

5.3.3.2.1 GN

5.3.3.2.2 Procedures

5.3.3.2.3 Station H/O

Figure 5.3-1. Typical Prepass Checklist (RER) Master Controller

Figure 5.3-2. Typical Prepass Checklist (RE) Slave Controller

Figure 5.3-3. RER Slave Controller Interface

Figure 5.3-4. RF Acquisition and Reacquisition Throughput Operations

Figure 5.3-5. Acquisition/Reacquisition Procedure Flow Diagram

5.3.3.3 Systems Configuration and Operations for Space Shuttle Launch and Ascent

5.3.3.3.1 Space Shuttle on Launch Pad (Pre-launch)

5.3.3.3.2 Space Shuttle Lift-off (Launch)

5.3.3.3.3 Space Shuttle Ascent

5.3.3.4 Configuration and Operations for KSC Landings

Table 5.3-6. Launch Ascent Exciter Frequency Offsets

Table 5.3-7. Launch Phase Receiver Configuration

5.3.3.5 Contingency Procedures

5.3.3.5.1 Loss of Exciter

5.3.3.5.2 Loss of Power Amplifier

5.3.3.5.3 Loss of Autotrack

5.3.3.5.4 Contingency UL Sweep Procedures

5.3.3.5.5 Space Shuttle Transponder Frequency Switch (Low Frequency to High Frequency or High Frequency to Low Frequency)

Figure 5.3-6. Suggested GN S-band Receiver Configuration (Prior to Frequency Switch)

Figure 5.3-7. Suggested GN S-band Receiver Configuration (RER Systems)

Figure 5.3-8. Suggested GN S-band Receiver Configuration (After Frequency Switch)

5.3.3.5.6 Loss of PCM Decom/Transponder/NSP Lock Select Box

5.3.3.5.7 Exciter to Exciter H/O (Station Contingency Command Link H/O)

5.3.4 Modulation on Technique Acquisition Sources and Procedures

5.3.4.1 Sources

5.3.4.2 Procedures

5.3.4.2.1 General

5.3.4.2.2 Two-way Acquisition Procedures (SBE MFR)

5.3.4.2.3 Station H/O

5.3.5 Tracking System Requirements (S-band Tracking Processor System)

5.3.5.1 Real-time Support

5.3.5.2 Playback Support

Table 5.3-8. High-speed Tracking Data Octal Destination Codes

5.3.6 S-band Pass Event Reporting (N)

Table 5.3-9. MIL/PDL/DFRC/WPS Announcements for Loss of Carrier/Modulation (M old Tab 1-10)

5.3.7 UL Carrier Handovers (M old Pa 1.3.1.8)

5.3.8 Ascent Phase UL Carrier Handover (M old Pa 1.3.1.9)

5.3.9 H Minus Time I/F Activity (M old Pa 1.3.1.10)

Table 5.3-10. Station H-35 Interface (M old Tab 1-11)

Table 5.3-11. Station TV H-30 Interface (M old Tab 1-12)

Table 5.3-12. C-band H-45 Interface and Pass Time Reporting (M old Tab 1-13)

Table 5.3-13. Station Postpass Activities (M old Tab 1-14)

5.3.10 Pre-launch/Ascent Contingency Procedures (M old Pa 1.3.1.14)

Table 5.3-14. Nominal Prelaunch/Launch Configuration (M old Tab 1-15)

Figure 5.3-11. Pre-launch/Launch Configuration (Simplified Block Diagram) (M old Fig 1-8)

**5.4 Computer Systems** (M old section 5)

5.4.1 General

5.4.2 Remote Site Data Processor Requirements

- 5.4.2.1 Telemetry Processing - PM Operational DL
- 5.4.2.2 FM Operational DL Support Requirements
  - Figure 5.4-1. GSFC to JSC NISN Block
  - Table 5.4-1. Message Type Codes
- 5.4.2.3 Site Status Message
- 5.4.2.4 Remote Control Interface
- 5.4.3 NISN Blocker/Deblocker
  - 5.4.3.1 General
  - 5.4.3.2 Blocker
  - 5.4.3.3 Deblocker
- 5.4.4 Blocker/Deblocker Setup Files for Launch
- 5.4.5 Blocker/Deblocker Setup Parameters for Launch
- 5.4.6 Orbit Configuration Setup Files
- 5.4.7 Blockers/Deblockers
- 5.4.8 Multiplexer
  - Table 5.4-2. MUX Configuration for Launch
  - Table 5.4-4. MUX Configuration for Orbit Support
  - Table 5.4-5. Demux Settings to Demux PDL Main Engine Data
  - Table 5.4-6. Demux Channel Assignments and Parameters
- 5.4.9 Telemetry Blockers
  - 5.4.9.1 Communications Data Formatter Deblocker
  - 5.4.9.2 Operations
  - 5.4.9.3 Programmable Telemetry Processor Deblocker
  - 5.4.9.4 Operations
    - 5.4.9.4.1 General
    - 5.4.9.4.2 CDF Deblocker Header Parameters
    - 5.4.9.4.3 Initialization Procedures CDF Deblocker
    - 5.4.9.4.4 CDF Deblocker Rate Change Procedures
  - Table 5.4-7. Station Default Parameters for CDF Deblocker
  - Table 5.4-8. Operator Option Menu for CDF Deblocker
  - Table 5.4-9. Parameter Change Menu for CDF Deblocker

Table 5.4-10. CDF Destination Codes

- 5.4.10 Front End Processor
  - 5.4.10.1 General
  - 5.4.10.2 Input
  - 5.4.10.3 Initialization Procedures
  - 5.4.10.4 System Description
  - 5.4.10.5 Operations
    - 5.4.10.5.1 General
    - 5.4.10.5.2 Telemetry
    - 5.4.10.5.3 Operating Procedures
    - 5.4.10.5.4 Site Status Message

Figure 5.4-2. NISN Header Setup

Figure 5.4-3. System Status

Figure 5.4-4. Operator Interface Screen

Figure 5.4-5. WFEP Telemetry Formats

Figure 5.4-6. Card Download Options

Table 5.4-11. Destination Codes

## 5.5 Command (M old section 6)

- 5.5.1 General
- 5.5.2 SFL System Description
  - 5.5.2.1 Introduction
  - 5.5.2.2 [UL Data Rate Change via MIL/PDL \(M old Pa 1.3.3.1\)](#)
  - 5.5.2.3 Input Data Modes
  - 5.5.2.4 SFL/CMD Verification
  - 5.5.2.5 [Shuttle Forward Link \(32/72 kbps Commands\) Data to KSC/RPS \(M old Pa 1.3.3.4\)](#)

Figure 5.5-1. JSC Command Block Format

- 5.5.3 SFL Initialization
- 5.5.4 Type III Command Histories

- 5.5.5 CSS
- 5.5.6 NCPS System Description
  - 5.5.6.1 General
    - 5.5.6.1.1 Introduction
    - 5.5.6.1.2 Input Data Modes
    - 5.5.6.1.3 NCPS/CMD Echo/Status
      - Figure 5.5-2. NCPS Command Echo Block
      - Figure 5.5-3. NCPS Status Block
      - Figure 5.5-4. Throughput Commands
  - 5.5.6.2 NCPS Description
  - 5.5.6.3 Operational Configuration Display Area
    - 5.5.6.3.1 Operational Configuration Display
    - 5.5.6.3.2 Dynamic Status Display Area
  - 5.5.6.4 Menu Display Area
    - 5.5.6.4.1 General
    - 5.5.6.4.2 [CMD System SAFE/OPERATE Configuration \(M old Pa 1.3.3.2\)](#)
    - 5.5.6.4.3 JSC SAFE MODE Menu
      - Figure 5.5-5. JSC Mode Menu Display
      - Figure 5.5-6. Tape Mode Menu Display
      - Figure 5.5-7. EVCF Mode Menu Display
    - 5.5.6.4.4 JSC Operate Mode Menu
    - 5.5.6.4.5 Tape Mode
    - 5.5.6.4.6 EVCF SAFE Mode
    - 5.5.6.4.7 Utilities Menu
    - 5.5.6.4.8 Unprompt Type-INS
- 5.5.7 [CMD Circuit Restoration \(M old Pa 1.3.3.3\)](#)

## **5.6 Station Communications Support** [\(M old section 12\)](#)

- 5.6.1 General
- 5.6.2 Operating Procedures

5.6.2.1 General

5.6.2.2 Voice Recorder Configuration

Table 5.6-1. Digital Voice Recorders Configuration

5.6.2.3 Postlanding Support from DFRC (M old Pa 1.3.4.2)

5.6.2.4 Contingency Landing Communications (M old Pa 1.3.4.3)

## 5.7 Air-to-Ground Communications (M old section 14)

5.7.1 General

5.7.2 Voice Communication Modes

5.7.2.1 Space Shuttle Definition

5.7.2.2 S-band

Table 5.7-1. Station A-G Equipment Allocations

Table 5.7-2. Shuttle Communications Modes

5.7.2.3 UHF

5.7.2.4 Technical Characteristics

5.7.3 Operations Procedures and Configurations

5.7.3.1 Procedures

5.7.3.2 Equipment Configurations

5.7.3.3 A-G Configurations

5.7.3.3.1 ALPHA; Pre-launch (Throughput) Until SRB Ignition

5.7.3.3.2 BRAVO; Ascent Throughput A-G

5.7.3.3.3 CHARLIE; Flight Operations (Orbit) UHF

5.7.3.3.4 DELTA; Flight Operations, Orbit (Throughput)

5.7.3.3.5 FOXTROT; Flight Operations, EVA

5.7.3.3.6 GOLF; GN EVA/EMU (Throughput)

5.7.3.3.7 HOTEL; Landing

5.7.3.3.8 INDIA; Ground Operations, Post-landing

5.7.3.3.9 JULIET; WSSH Landing/Post-landing

5.7.3.3.10 KILO; Contingency Landing

5.7.3.3.11 LIMA; RTLS/KSC Landing/Post-landing

5.7.3.3.12 Pre-launch/Landing Weather Aircraft Configuration

Figure 5.7-1. Prelaunch (Throughput) Until SRB Ignition A-G Configuration ALPHA

Figure 5.7-2. Ascent (Throughput) A-G Configuration BRAVO

Figure 5.7-3. Flight Ops UHF Configuration CHARLIE

Figure 5.7-4. Flight Ops A-G Configuration DELTA

Figure 5.7-5. Flight Operations (EVA) Ops A-G Configuration FOXTROT

Figure 5.7-6. Flight Ops UHF Configuration GOLF

Figure 5.7-7. DFRC Landing A-G Configuration HOTEL

Figure 5.7-8. DFRC Postlanding A-G Configuration INDIA

Figure 5.7-9. WSSH Contingency Landing/Postlanding A-G Configuration JULIET

Figure 5.7-10. Contingency Landing A-G Configuration KILO

Figure 5.7-11. RTLS/KSC Landing/Postlanding Configuration LIMA

Figure 5.7-12. Prelaunch/Launch Weather Aircraft Configuration

[5.7.3.4 UHF Pass Event Reporting \(M from 1.3.1.7\)](#)

[5.7.3.5 JSC to DFRC UHF Communications Failure \(N\)](#)

[5.7.3.6 Tone Keying Failure \(UHF\) \(M old Pa 1.3.4.1\)](#)

## **5.8 Testing and Simulations** (M old section 26)

5.8.1 General

5.8.2 Mission Readiness Test

5.8.3 Prelaunch Simulations

5.8.3.1 Network Simulations

5.8.3.2 GSFC Simulations

5.8.4 Timeline for MRT for Space Shuttle

5.8.4.1 General

5.8.4.2 Events

5.8.5 MIDDS Fault Isolation Procedure (Metosat Data) (M old Pa 1.3.6.2)

Figure 5.8-1. WFF MIDDS Data Flow (M old Fig 1-10)

## **Section 6. Flight Dynamics Facility** (M old section 7)

### **6.1 Introduction**

### **6.2 Operational Communications**

6.2.1 Introduction

6.2.2 Operational Systems

### **6.3 Mission Participation**

6.3.1 Planning Phase

6.3.2 Planning Data

6.3.3 Terminal Count Support

6.3.4 Displays

6.3.5 Data Validation

6.3.6 Fault Isolation

### **6.4 Acquisition Data**

6.4.1 General

6.4.1.1 Space Shuttle Flights

6.4.1.2 Acquisition Data Responsibilities

6.4.2 Pre-mission Phase

6.4.2.1 Nominal Acquisition Data

6.4.2.2 Contingency Acquisition Data

6.4.3 Mission Phase Acquisition Data

6.4.3.1 General

6.4.3.2 Onorbit Phase

6.4.3.3 Maneuvers

6.4.3.4 Entry/Landing Phase

6.4.3.5 Retransmission of Acquisition Data

### **6.5 C-Band and S-Band Station Antenna Identification**

Figure 6-1. Space Shuttle PDL Station Communications (M old Fig 8-1)

Table 6-1. Space Shuttle Station Identification

Table 6-2. Prime Acquisition Message Distribution by Mission Phase (1, 2, 3)

Table 6-3. Contingency and Landing Acquisition Data Trajectory Codes

Table 6-4. Ground Network Facility Vehicle Contingencies

Table 6-5. Ground Network Facility Contingencies

## **6.6 GSFC Bypass Acquisition Data Plan**

## **Section 7. Communications – NISN** (M old section 8)

### **7.1 General**

- 7.1.1 Introduction
- 7.1.2 NISN Systems
- 7.1.3 NISN Data Systems
- 7.1.4 Voice Systems
  - 7.1.4.1 General
  - 7.1.4.2 PDL T-1/ Voice Communications for Space Shuttle Support
  - 7.1.4.3 Voice Coordination

Table 7-1. Space Shuttle Voice Circuit Description

- 7.1.5 Tracking Data Systems
- 7.1.6 Video System
- 7.1.7 Meteorological Interactive Data Display System

Figure 7-2. Space Shuttle Orbital Phase Acquisition and Tracking Data System

- 7.1.8 Transoceanic Abort Landing Communications

### **7.2 Operations**

- 7.2.1 General
- 7.2.2 Documentation

Figure 7-3. TAL 4-Wire Voice Circuit Distribution

- 7.2.3 NISN Communications Manager
- 7.2.4 NISN Network Scheduling Group
- 7.2.5 Operations Tests
- 7.2.6 Communications Configurations
- 7.2.7 Operational Failures or Deficiencies
- 7.2.8 IP Network
  - 7.2.8.1 General
  - 7.2.8.2 Internet Protocol

7.2.8.3 User Datagram Protocol

Figure 7-4 NISN IP Transition Configuration

7.2.8.4 Real-time Transport Protocol

7.2.8.5 Multicast Open Shortest Path First

7.2.8.6 Simple Network Management Protocol

7.2.8.7 Infrastructure Components

Figure 7-5. IP Transition Infrastructure

7.2.8.8 Basic Data Transport Scenarios

7.2.8.9 IP Multicasting Routing

7.2.8.10 Conversion Device Data Routing

7.2.8.11 Modified MDMs

7.2.8.12 IP Conversion Device Management

7.2.8.13 Self Encapsulation

7.2.8.14 Self Managed

7.2.8.15 Space Shuttle Configurations

7.2.8.16 Johnson Space Center

7.2.8.17 MIL/PDL (KSC)

Figure 7-6. JSC SCD Configuration for 192K OD Smoothing

Figure 7-7. 72K Shuttle Command

Figure 7-8. Shuttle GN Contingency Return

7.2.8.18 Onizuka Air Force Station

7.2.8.19 Dryden Flight Research Center

7.2.8.20 Wallops Island

7.2.8.21 Marshall Space Flight Center

7.2.9 Circuit Description

7.2.9.1 Wideband Data Circuits

7.2.9.2 Narrowband Data Circuits

Figure 7-9. Space Shuttle Wideband Circuits

Figure 7-10. Space Shuttle FCO Circuiting

Figure 7-11. Space Shuttle Landing Phase Tracking Data System (EAFB Landing/  
WSMR Landing)

Figure 7-12. WSSH Landing Tracking System

Figure 7-13. Space Shuttle Launch and Return to Launch Site Phase Tracking Data System

7.2.9.3 Video Circuits

7.2.9.4 Video Troubleshooting Procedures

7.2.9.5 Contingency Landing Sites

Figure 7-14. Space Shuttle Video Circuits

Table 7-2. Television Circuit Troubleshooting Procedures

## **Section 8. NIC/Station Interface** (M old section 16)

### **8.1 NIC/Network Standard Operating Procedures**

### **8.2 Documentation, Scheduling, and Reporting Standard Operating Procedures**

### **8.3 Message Formats and Method of Delivery**

8.3.1 General

8.3.2 Four-Letter Designators

8.3.3 Interim Support Instruction (ISI) Message

8.3.4 Request for Information or Clarification (RIC)

8.3.5 Documentation Change Notice (DCN) General Header Format

8.3.6 Operations (OPN) Message

[\[Station Equipment Status Report \(ESR\) ...deleted\]](#)

[\[Problem Report \(PRT\) Message ....deleted\]](#)

[\(Computer Software, Hardware Anomaly Message ....deleted\)](#)

8.3.7 Radio Frequency Interference (RFI) Report Message

8.3.8 Spacecraft/Vehicle Anomaly (SVA) Report

8.3.9 Space Shuttle Contingency Plan (SCP) (Sample)

[\(Data Shipment Advisory Message ...deleted\)](#)

8.3.10 Support Request Message

8.3.11 Briefing Message Request

8.3.12 Tracking Summary Message (Teletype) - C-band Message Format

8.3.13 MIL-originated S-band CRF Message (Non-nominal) (Teletype)

8.3.14 Space Shuttle Launch Count Status

8.3.15 Space Shuttle Liftoff Time

8.3.16 DOD Weather Report

8.3.17 Station Postmission Reporting Message

8.3.17.1 General

8.3.17.2 Message Format

## **Section 9. Radar** [\(M old section 3\)](#)

### **9.1 General**

### **9.2 Launch Phase**

### **9.3 Orbit Phase**

### **9.4 Landing Phase**

#### 9.4.1 General

Table 9-1. Launch Phase Data Identification Parameters

Table 9-2. Vehicle Identification Codes for Space Shuttle

Figure 9-1. Launch Phase C-band Metric Data System

Figure 9-2. Orbit Phase C-band Metric Data System

Figure 9-3. Landing Phase C-band Metric Data System (KSC Landing)  
LTAS (TEFG-smooth) 2400 b/sec

Figure 9-4. Landing Phase C-band Metric (High Rate) Data System for Space Shuttle  
(Northrup Strip or EAFB Landings)

Figure 9-5. Landing Phase C-band Metric Acquisition Data System for Space  
Shuttle (WSSH or EAFB Landings)

Figure 9-6. Landing Phase C-band Metric (Low Rate) Acquisition Data System for  
Space Shuttle (Northrup Strip or EAFB Landings)

Figure 9-7. AOA Landing Phase C-band Metric (High Rate) Data System for Space  
Shuttle Northrup Strip Landings

#### 9.4.2 Landing Phase Computing Center Support

#### 9.4.3 Landing Phase Acquisition

### **9.5 Tracking Coordination Voice Communications Circuit**

### **9.6 DOD Radars**

#### 9.6.1 General

#### 9.6.2 Phasing

#### 9.6.3 Atmospheric Refraction Correction

#### 9.6.4 Onsite Weather Observations/Reporting

#### 9.6.5 Frequencies

9.6.6 Data Disposition

**9.7 Wallops Island Support Procedures**

9.7.1 Documentation

9.7.2 Requirements

9.7.3 Tracking Data

9.7.3.1 Launch Support

9.7.3.2 Launch/Ascent Radar Requirements and Preferences

9.7.3.3 Wallops Island Launch/Ascent Contingency Main Engine Failure Support

9.7.3.4 Orbital Support

9.7.4 Acquisition Data

9.7.5 Support Configuration

9.7.5.1 C-band Support

9.7.5.2 PRF

9.7.6 Low-Speed Data Header

9.7.7 C-Band Acquisition Procedures

9.7.8 System Recorders

9.7.9 Data Disposition

9.7.10 Phasing

9.7.11 Atmospheric Refraction Correction

9.7.12 Reporting

**9.8 United States Space Command ET Support**

9.8.1 Launch Phase Support

9.8.2 Orbital Support

## **Section 10. Data Management**

### **10.1 General**

### **10.2 Data Requirements and Disposition**

#### 10.2.1 Testing

##### 10.2.1.1 Pre-launch Testing

##### 10.2.1.2 Validation Testing

#### 10.2.2 Launch Through Mission Termination

#### 10.2.3 DOD Data Disposition

#### 10.2.4 Post-mission Data Requirements and Disposition

### **10.3 Data Requests**

### **10.4 Data Retention**

### **10.5 Data Labels**

### **10.6 Shipping**

#### 10.6.1 General

#### 10.6.2 STDN Stations Shipments

#### 10.6.3 Shipping Addresses

### **10.7 Tape Numbering**

### **10.8 Data Identification**

### **10.9 Space Shuttle Private Conversations**

Figure 10-1. STDN Label 2166, Space Shuttle Private Conversations

Table 10-1. MIL Data Requirements and Disposition

Table 10-2. PDL Data Requirements and Disposition

Table 10-3. WFF Data Requirements and Disposition

Table 10-4. WSMR Data Requirements and Disposition

## **Section 11. Television** (M old section 25)

### **11.1 General**

11.1.1 Space Shuttle Closed-Circuit Television System

11.1.2 Station Television Systems Station Configuration

### **11.2 Operating Procedures**

11.2.1 Pre-pass Validation

11.2.2 Video Recording Requirements for VO-5600 VCRs

11.2.3 Audio Recording Requirements for VCR Audio Track

11.2.4 Video and Audio Recording and Playback Procedures

11.2.5 VTR Dump at STDN Station Procedures

### **11.3 Remoting Requirements**

### **11.4 Typical Pass Activities**

### **11.5 Handover Procedures**

Table 11-1. Typical Pass Activities

### **11.6 MIL TV Configuration**

### **11.7 Pilot's Point of View Television**

### **11.8 External Tank Television System (TBS)**

## **Section 12. Equipment Modifications** (M [old section 17](#))

### **12.1 General**

### **12.2 STDN Implementation Schedule**

#### 12.2.1 General

#### 12.2.2 Configuration Freeze

#### 12.2.3 Exemptions

### **12.3 Engineering Changes**

### **12.4 Request for Modification**

### **12.5 Other Equipment Modifications**

### **12.6 Status Reports**

**Appendix A – Referenced Abbreviations and Acronyms (R)**

**Appendix B – Supporting Documents and Related Web Sites (N)**

**Appendix C – Data Stream Assignments (N)**