

# **Space Flight Technical Language Handbook**

---

**Mission Operations Directorate  
Space Flight Training Division  
Systems Training Branch**

**January 1995**




National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas

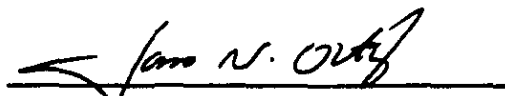
MISSION OPERATIONS DIRECTORATE  
SPACE FLIGHT TECHNICAL LANGUAGE HANDBOOK

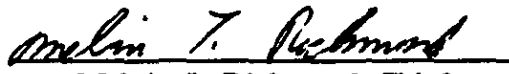
December 1994

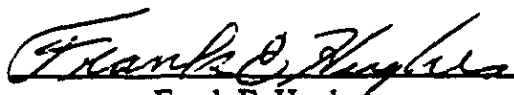
Prepared by

  
Hanh Nguyen-Xuan, Book Manager  
Space Station Systems Section

Approved by

  
James N. Ortiz, Lead  
Space Station Systems Group

  
Melvin L. Richmond, Chief  
Systems Training Branch

  
Frank E. Hughes  
Chief, Space Flight Training Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
LYNDON B. JOHNSON SPACE CENTER  
HOUSTON, TEXAS

## FOREWORD

The content of this document was provided by the Space Station Systems Group, Systems Training Branch, Space Flight Training Division (SFTD), Mission Operations Directorate (MOD), Lyndon B. Johnson Space Center (JSC), National Aeronautics and Space Administration (NASA) Houston, Texas. Technical documentation support provided by the Integrated Documentation Support Department (IDS), Space Station Information Support (SSIS) group, Hernandez Engineering, Inc. (HEI).

If there are changes you would like to see as a user of this document or in future revisions, please call the book manager or send in proposed changes or additions to, DT47/Hanh Nguyen-Xuan, at (713) 244-7458.

This document will be revised as required by the changes suggested and needed.

## ACKNOWLEDGMENTS

The author would like to acknowledge NASA management and the many colleagues for their assistance and contributions to this handbook. In addition, the many helpful suggestions from the astronaut office, flight controllers, and training communities are especially appreciated.

Special thanks goes to Training Manager, Tommy Capps for providing the Shuttle Program-critical terminology and video tapes, Astronaut, Koichi Wakata for the cassette tapes; and Tom Kaiser and Jerry Swain for a list of Space Station and Training Facility (SSTF) definitions and their support of this effort. Finally, the author would like to thank Miriam Smith and Tori Scott of Hernandez Engineering, Inc. (HEI) for their assistance in the preparation and publishing of this book.

## TABLE OF CONTENTS

Section	Page
<b>1</b>	<b>SPACE FLIGHT TECHNICAL LANGUAGE . . . . . 1-1</b>
1.1	INTRODUCTION . . . . . 1-3
1.2	PURPOSE . . . . . 1-3
1.3	SCOPE . . . . . 1-3
<b>2</b>	<b>STANDARDIZED VOICE COMMUNICATIONS . . . . . 2-1</b>
2.1	PHONETIC ALPHABET . . . . . 2-3
2.2	NUMERALS . . . . . 2-3
2.3	STANDARD VOICE CHECKS . . . . . 2-3
2.4	VOICE COMMUNICATIONS . . . . . 2-4
<b>3</b>	<b>GENERAL TERMS . . . . . 3-1</b>
3.1	ACRONYMS AND ABBREVIATIONS USED AS WORDS . . . . . 3-3
3.2	IDIOMS AND COLLOQUIALISMS USED AT NASA . . . . . 3-19
3.3	SPACE FLIGHT TERMS AND ACRONYMS . . . . . 3-38
3.4	GENERAL TRAINING TERMS AND ACRONYMS . . . . . 3-76
<b>4</b>	<b>FLIGHT AND APPROACH/LANDING (A/L) SHUTTLE TERMS AND ACRONYMS . . . . . 4-1</b>
4.1	TECHNICAL TERMS AND ACRONYMS . . . . . 4-3
<b>5</b>	<b>COMMUNICATION/INSTRUMENTATION TERMS AND ACRONYMS . . . . . 5-1</b>
5.1	TECHNICAL TERMS AND ACRONYMS . . . . . 5-3
<b>6</b>	<b>COMPUTER AND NAVIGATION TERMS AND ACRONYMS . . . . . 6-1</b>
6.1	TECHNICAL TERMS AND ACRONYMS . . . . . 6-3
<b>7</b>	<b>SPACELAB AND PAYLOAD TERMS AND ACRONYMS . . . . . 7-1</b>
7.1	TECHNICAL TERMS AND ACRONYMS . . . . . 7-3
<b>8</b>	<b>ROBOTICS AND EXTRAVEHICULAR ACTIVITY (EVA) TERMS AND ACRONYMS . . . . . 8-1</b>
8.1	TECHNICAL TERMS AND ACRONYMS . . . . . 8-3

<b>Section</b>		<b>Page</b>
<b>9</b>	<b>SHUTTLE SYSTEMS AND SPACE STATION SYSTEMS TERMS AND ACRONYMS .....</b>	<b>9-1</b>
9.1	TECHNICAL TERMS AND ACRONYMS .....	9-3
<b>10</b>	<b>ENGINEERING DEVELOPMENT TERMS AND ACRONYMS .....</b>	<b>10-1</b>
10.1	TECHNICAL TERMS AND ACRONYMS .....	10-3

**SECTION 1**  
**SPACE FLIGHT TECHNICAL LANGUAGE**

This page intentionally left blank



## **1.1 INTRODUCTION**

This book is organized to present technical terms and meanings used in Space Shuttle and Space Station operations. The book is divided into ten sections allowing the user to locate specific terms easily. This approach is essential to fully develop a strong understanding of the system terms and their meanings.

Section 1 provides an introduction to the Space Flight Technical Language Handbook. Section 2, Standardized Voice Communications, illustrates the terminology used to communicate between the Astronaut and ground personnel during a mission and simulations. Section 3, General Terms, has been divided into four parts in order to better demonstrate the many levels of Space Flight terminology: 3.1 Acronyms and Abbreviations Used as Words, 3.2 Idioms and Colloquialisms Used at NASA, 3.3 Space Flight Terms and Acronyms, and 3.4 General Training Terms and Acronyms.

The technical portion of the handbook begins with Section 4, Flight/Approach and Landing Shuttle Terms and Acronyms, and continues with Section 5, Communication/Instrumentation Terms and Acronyms. Section 6 defines Computer and Navigation Terms and Acronyms and Section 7 describes Spacelab and Payload Terms and Acronyms. Other technical sections include Section 8, Robotics and Extravehicular Activity Terms and Acronyms, Section 9, Shuttle Systems and Space Station Systems Terms and Acronyms, and Section 10 Engineering Development Terms and Acronyms.

## **1.2 PURPOSE**

The purpose of the Space Flight Technical Language Handbook is to provide the International Partners (IPs) with a desk reference for communication in the NASA/JSC environments. It also could be used as a training reference for individuals studying technical space flight language.

## **1.3 SCOPE**

The handbook is designed to help bridge the gap between standard English meanings and space flight technical meanings by providing definitions and, in some cases, pronunciation.

This page intentionally left blank

**SECTION 2**  
**STANDARDIZED VOICE COMMUNICATIONS**

This page intentionally left blank

## 2.1 PHONETIC ALPHABET

When use of phonetic letter equivalent is required due to poor receiving conditions or for other reasons, the phonetic alphabet, as given below, is used

A – Alpha	H – Hotel	O – Oscar	V – Victor
B – Bravo	I – India	P – Papa	W – Whiskey
C – Charlie	J – Juliet	Q – Quebec	X – X-ray
D – Delta	K – Kilo	R – Romeo	Y – Yankee
E – Echo	L – Lima	S – Sierra	Z – Zulu
F – Foxtrot	M – Mike	T – Tango	
G – Golf	N – November	U – Uniform	

## 2.2 NUMERALS

Numerals are pronounced as

1 – Wun	4 – Fower	7 – Seven
2 – Two	5 – Fi-yiv	8 – Ate
3 – Tha-ree	6 – Six	9 – Niner
		0 – Zero

Examples: 15 is pronounced as wun-fi-yiv

150 is pronounced as wun-fi-yiv zero

1500 is pronounced as wun-fi-yiv zero zero.

## 2.3 STANDARD VOICE CHECKS

When testing voice circuits, a standard short count (1, 2, 3, 4, 5, 5, 4, 3, 2, 1) should be spoken directly into the microphone at normal voice level. Voice checks provide the means in which to ensure that the circuit is operating, to check the intelligibility and quality of the speech on the circuit, and to verify that the speech is clearly understood and is of normal tonal quality for the type of circuit under test. The degree of signal strength and readability of the transmission are expressed in the following terms or combinations

### Signal Strength

Loud

Good

Weak

Barely audible

Noise

### Readability

Clear

With distortion

With background noise

With fading but readable

Unreadable

## 2.4 VOICE COMMUNICATIONS

The following procedure words and their meanings have been established

### 2 Engine TAL

With the failure of one main engine, abort to a landing site in Africa or Spain is possible.

### Affirmative

Yes.

### All after . . .

I refer to all the transmission following XXX. For example: "GC GOLDSTONE, say again all after XXX."

### AOS

Acquisition of signal/good communication. Sometimes used to mean star/object in view.

### Approach and Land, BF Trail

A mission specialist call at approach and landing phase.

### Arm the Gear

A commander call at 4000 ft. to let the pilot know to be prepared to lift the cover to depress the "Gear" arm, pushbutton.

### Bailout

Command to commence to leave (abandon) from the Shuttle.

### Boards \_\_\_\_\_ %

A mission specialist call at 3000 feet, to tell the pilot or commander the percentage of speed brake position.

### Break Break

I wish to interrupt a transmission in progress.

Note: These words are not used except to interrupt with urgent traffic.

### Capture

A flight crew call made when the Remote Manipulator System (RMS) effector snares (tip of the RMS arm) make initial contact with a free flyer, i.e., a payloads Grapple Fixture.

### Check DAP

Ensure the DAP mode matches the mode mentioned in call.

### Check switches

Verify position of switches.

**Chute**

Parachute. Call made to deploy orbiter's drag parachute.

**Coming up on MECO**

A commander call made at MECO-30 seconds to let crewmembers verify the engine status before cut-off engine.

**Comm Check**

Voice communication check, acknowledge and describe quality of transmission.

**Contact**

Docking adapters in contact with each other.

**Copy**

I understand.

**Crash**

Simulation or computer system is down.

**Disregard**

Cancel my transmission in progress, or cancel my last transmission. For example: "Disregard my last transmission."

**EVAP OUT T Coming Down**

A Mission Specialist 2 (MS2) call at 3 minutes after the vehicle lifts off when the Flash Evaporator System (FES) cooling begins after Solid Rocket Booster (SRB) separation. This call is made to notify the rest of the crew and ground control.

**Expect ratty comm due to \_\_\_\_\_**

Expect degraded communication due to \_\_\_\_\_.

**\_\_\_\_\_ in the Blind**

We cannot hear you, but we're transmitting, hoping that you can hear us.

**Figure**

Numerals are to follow.

Note: This term need not be used in requesting or giving parameter readouts, or when transmitting times.

**Freeze**

Stop the execution of the simulator.

**Gear Coming**

A pilot call after the gear deploy button has been pushed and the gear is making its way to full down position.

**Gear Down**

A pilot call at 300 feet when the orbiter's landing gear is down and locked.

**Gear is Armed**

A pilot call at 2000 feet after pushing the "arm" button.

**Go (pitch) Auto**

Return to auto pitch and/or yaw/roll flight control on the eyebrow panel. For orbit ops, select auto Digital Auto Pilot (DAP) (e.g., pitch, yaw, and roll).

**Go (pitch) CSS**

Take pitch and/or roll/yaw Control Stick Steering (CSS) as called (e.g., pitch, yaw, and roll).

**Go At Throttle Up**

All systems are nominal, proceed after main engine throttle up (approximately 1 min. 15 sec. after launch).

**Go to run**

Start simulation.

**Good Read Back**

The information just repeated was correct.

**High Z**

All upfiring jets are used for emergency braking or separation from payload, so no contact occurs with orbiter.

**Hold**

Stop executing the mentioned procedure at the current step.

**Hooks Closed**

Hard docking has occurred.

**Hooks Moving**

Docking hooks are moving.

**I Spell**

I will spell the following phonetically. For example: "Cislunar, I spell, Charlie India Sierra Lima Uniform November Alpha Romeo Cislunar."



**Jettison Hatch**

Command from Commander to Mission Specialist 3 (MS3), if a bailout is required, to jettison the side hatch in preparation for bailout. Accomplished at 30,000 ft. Bailout commences immediately following hatch jettison. This is a contingency procedure on entry.

**Kick the DIG (Digital Image Generator)**

Fix the visual.

**Lift-off/102**

A commander calls at Solid Rocket Booster (SRB) ignition event. At the same time, the Major Mode (MM) 101 changes to MM 102.

**LOS**

Loss of signal/without communication. Sometimes used to mean star/object no longer in view.

**Lost Data**

Mission Control Center (MCC) has lost vehicle downlink data, expect reduced MCC troubleshooting assistance.

**LO Z**

LO Z is orbiter braking mode with no up-firing jets used when flying very close to payload on satellite.

**Manual Phase**

Period during which commander is flying manually during rendezvous or landing.

**MC1**

Midcourse correction burn (approximately 1-1/2 hours to target). It is a rendezvous burn phasing.

**MC2**

Midcourse correction burn (approximately 1 hour to target). It is a rendezvous burn phasing.

**MC3**

Midcourse correction burn (approximately 50 minutes to target). It is a rendezvous burn phasing.

**MC4**

Midcourse correction burn (approximately 40 minutes to target). It is a rendezvous burn phasing.

**MECO, MECO Confirm, ET SEP, 104, Check Targets**

A commander call which is a normal event after Main Engine Cutoff (MECO). When the GPCs know MECO has occurred, external tank has separated, GPCs have mode 104 and the vehicle is on the correct orbit.

**Microwave Landing System (MLS)**

A Mission Specialist call made when incorporating range, bearing, and elevation data from the Microwave Landing System (MLS) into the navigation state.

**Midfield**

A pilot call to let commander know the vehicle is halfway down the runway.

**MLS incorporation**

Call made by the Mission Specialist (MS) at 15K ft. to indicate that Microwave Landing System (MLS) is available.

**NCC**

NCC is Corrective Combination (NCC) maneuver. NCC is the first onboard burn (approximately 3 hours to target). NCC is one of the rendezvous burn phases.

**Negative**

No.

**Negative Return**

Call made when a return to Kennedy Space Center (KSC) landing site is no longer possible.

**NORM Z**

Braking mode that only fires up-firing jets.

**On Energy**

Call indicating the Shuttle is located on the correct trajectory with the proper amount of energy during approach.

**On Glideslope**

Call made when the Shuttle is located on the correct trajectory (glideslope) for final approach to the runway.

**On My Mark**

An event is to take place. A countdown will be at 1-second intervals. The countdown may start with 10, 5, or 2, but the count should be at 1-second intervals toward zero and should end 1 second after "one" with word "Mark." Used for synchronization of clocks.

**On the V Bar**

Spacecraft in the same orbit with the objects, such as Mir, Space Station, etc. Shuttle is on velocity vector axis.

**PAPI's and HUD overlay on runway**

Commander (CDR) and Pilot (PLT) calls at 15,000 ft. The call indicates they can see the Precision Approach Path Indicator (PAPI) light on runway on the Heads-Up Display (HUD).

**Pc Less Than 50**

A commander call made when the Solid Rocket Booster (SRB) chamber pressure (Pc) is less than 50 psi during SRB separation.

**Performance Nominal (low)**

Performance during first stage ascent (with Solid Rocket Boosters (SRBs)) was nominal or low.

**Pitch rate XXX**

A Pilot call to repeat rate at regular cadence during derotation.

**PNL Test**

A general call made to adjust a given Panel as required.

**Press to ATO (Abort-to-Orbit)**

Abort to a lower than nominal orbit is possible when one of the main engines fails. The crew must abort to orbit by dumping OMS propellant to continue uphill.

**Press to MECO (Main Engine Cutoff)**

No abort will take place, even if one of the main engines is lost.

**Purple cursor**

Simulation crash.

**Put Mal**

Input malfunctions in the system.

**Radar Altimeter, 1 & 2 check good**

A call made by the pilot at 5K ft. to announce that the Radar Altimeter data is valid.

**Read back**

Repeat all, or the specified portion of my last transmission. For example: "MADRID, RTC. Carrier-on time, zero four two one five six, read back all after time." "RTC, MADRID. I read back, zero four two one five six."

**Regained Data**

Mission Control Center (MCC) has regained downlink data.

**Reset Mal**

Restart the malfunctions in the system.

**Roger**

I have received your transmission.

Note: Never say "Roger" when you mean affirmative or negative.

**Roll Program**

Maneuver that occurs after the orbiter clears the launch tower. Roll from tail south to head down attitude.

**Say again**

Repeat all, or the following portion of your last transmission. For example: "Say again all after XXX," or "Say again word after XXX."

**Single Engine Press**

With failure of two main engines, abort to near nominal orbit is possible. The call that is made when the failure of two main engines requires an abort to a near nominal orbit.

**Single Engine TAL**

Name of boundary after which you can perform a TAL with only one engine. The call that is made when with the failure of two main engines, an abort to a landing site in Africa or Spain is possible.

**Speak slower**

You are talking too fast.

**SRB SEP**

Acknowledgment when the Solid Rocket Boosters (SRBs) separate from the orbiter.

**Standby**

I must pause for a few seconds.

**Standby on the XX Procedure**

Wait, we will have a plan of procedure/action soon, do not execute the XX procedure.

**Strapped in**

Seat belt is on.

**Sync-Up**

Setting the time so that all involved simulators are in agreement.

**Take Air Data**

A general call made to incorporate air data parameters into the navigational state (accomplished late in entry phase at Mach less than 3.5).

**Take TACAN**

A general call made to incorporate range and bearing information from the tactical air navigation system into the navigation state (normally accomplished later in entry phase at a range of 300 to 400 miles from the landing site).

**The xx System is go**

The xx system is working adequately.

**Three at 104**

A call made by the pilot. Main engines have returned to full throttle.

**Throttle Down**

A pilot call when the main engines have throttled down to reduce the peak dynamic pressure on the vehicle during ascent.

**Touchdown**

A call made by the Pilot when the orbiter's main landing gear has touched the runway.

**Transition to Intercept (TI)**

The last phase of onboard burn. It is a rendezvous burn phase.

**UHF Only**

Mission Control Center (MCC) or orbiter transmitting or receiving on Ultrahigh Frequency (UHF) only. May also mean loss of orbiter downlink data.

**Unknown Station or Station Calling**

I do not know the identity of the station calling me. For example: "Unknown station, HOUSTON, say again," or "Station calling HOUSTON, say again."

**Vent Cabin**

Command given by Commander to Mission Specialist 3 (MS3) to depressurize (vent) cabin in preparation for hatch jettison if a bailout is required.

**Vertical Situation (VERT SIT) Display**

An orbiter display that primarily provides the crew with a cross check for the vehicle's energy state through the Energy to Weight (E&W) scale and the altitude versus range guidelines. Used during the Terminal Area Energy Management (TAEM) phase.

**Wheels Stop**

A commander call made when the orbiter has stopped after landing rollout.

**Wilco**

I have received your message; I understand it and will comply. For example: "RTC, MADRID, Wilco."

Note: "Roger" is never used with "Wilco."

**Word after**

I refer to the word after XXX. For example: "GOLDSTONE, RTC, say again word after XXX;" "RTC, GOLDSTONE, say again word after XXX;" "RTC, GOLDSTONE, I say again XXX."

**Word before**

I refer to the word before XXX.

**Words twice**

Communications are difficult. Transmit, or I will transmit each word, or group twice.

**WOW Set**

Weight-on-Wheels, a call when the main gear touchdown has occurred.

**WOWLON**

Weight-on-Wheels Lock On (WOWLON). A call made by the pilot when landing occurs and the GPCs change the Heads Up Display (HUD) format.

**You are Go For . . .**

You have permission to execute . . .

**SECTION 3  
GENERAL TERMS**

This page intentionally left blank



### 3.1 ACRONYMS AND ABBREVIATIONS USED AS WORDS

**A/D** \a to d\  
Analog-to-Digital

**Ada** \a-da\  
Computer Programming Language

**ADCO** \add-co\  
Attitude Determination and Control Officer

**AERO** \air-o\  
Aerometer

**AI** \a-i\  
Action Item  
Artificial Intelligence

**AIMS** \aimz\  
Automated Information Management  
System

**Algo** \al-go\  
Algorithm

**Alt** \alt\  
Altitude

**Amp** \amp\  
Ampere (or A)

**ANSI** \an-see\  
American National Standards Institute

**APAR** \a-par\  
Authorized Program Analysis Report

**APAS** \a-paz\  
Attached Payload Accommodation System  
Attached Payload Attachment Structure

**ARMS** \armz\  
Automated Requirements Management  
System

**ASAP** \ay-sap\  
As Soon As Possible

**ASCAN** \as-kan\  
Astronaut Candidate

**ASIP** \a-sip\  
Administrative Systems Information  
Planning Group

**ATO** \a-tee-oh\  
Abort-to-Orbit

**AUTO** \au-to\  
Automatic

**BAC** \bak\  
Boeing Aerospace Company

**BAD** \b-a-d\  
Budget Application Database

**Bal** \bal\  
Ballistic

**BER** \b-e-r\  
Bit Error Rate

**BERT** \bert\  
Bit Error Rate Tester

**BIM** \bim\  
Burn Initialization Maneuver

**BIT** \bit\  
Basic Instructor Training  
Built-in Test

**BITE** \byte\  
Built-in Test Equipment

**BLIM \b-lim\**  
Berthing Latch Interface Mechanism

**BOP \bop\**  
Baseline Operations Plan

**BOST \bost\**  
Baseline Operational Systems Test

**BOTS \bots\**  
Botswana, STDN

**Bps \b-p-s\**  
Bits per Second  
Bytes per Second

**BRIMS \b-rimz\**  
Budget and Resources Information  
Management System

**CAB \kab\**  
Cabin

**CAL\kal\**  
Calibration

**CAM \kam\**  
Computer-Aided Manufacturing  
Computer Annunciation Matrix

**CAPS \kapz\**  
Crew Activity Planning System

**CAS \kas\**  
Calibrated Ancillary System

**CAT \kat\**  
Category

**CATE \kate\**  
Consortium for Aerospace Technology  
Education

**CATO \kay-toe\**  
Communications and Tracking Officer

**CD-ROM \cee-dee-rom\**  
Compact Disk-Read Only Memory

**CDR \C-D-R\**  
Commander

**CERT \sert\**  
Certification

**CET \c-e-t\**  
Combined Environmental Test

**CETA \see-tah\**  
Crew and Equipment Translation Assembly

**CHAMPS \champz\**  
Characteristics and Mass Properties

**CheCS \cheks\**  
Crew Health Care System

**CIS \sis\**  
Communication Interface System

**CITO \see-toe\**  
Communications, Instrumentation, and  
Tracking Office

**CLIP \klip\**  
Crew Loads Instrumentation Pallet

**CLIPS \klipz\**  
C Language Integrated Production System

**CLIST \c-list\**  
Check List  
Command List

**CMIP \see-mip\**  
Common Management Information Protocol

**CMIS \see-miss\**  
Console Monitoring and Isolation System

**CNTRLR \kon-troller\**  
Controller

**COAS \ko-as\**  
Crew Optical Alignment Sight

**COAX \ko-ax\**  
Coaxial Cable

**COMBO \kom-bo\**  
Computation of Misses Between Orbits

**COMNET \kom-net\**  
Communication Network

**COMP \komp\**  
Computation

**COMP SUP \komp-sup\**  
Computer Supervisor

**COMSAT \kom-sat\**  
Communications Satellite

**CONIS \kon-is\**  
Console Interfacing Subsystem

**CONUS \kon-us\**  
Continental United States

**COORD \koord\**  
Coordination

**COP \kop\**  
Console Operations Procedures

**COSW \kaus-w\**  
Checkout Software

**COTS \kots\**  
Commercial Off-The-Shelf

**COU \koo\**  
Concept of Operations and Utilization

**COUP \koop\**  
Consolidated Operations and Utilization Plan

**CREAM \kreem\**  
Cosmic Radiation Effects and Activation Monitor

**CRISTA \kris-ta\**  
Cryogenic Infrared Spectrometer Telescope for Atmosphere

**CSA \see-sa\**  
Canadian Space Agency

**C-SAR \see-sar\**  
Consortium for Space Automation and Robotics

**CSIL \see-sil\**  
Central System Integration Lab

**CRYO \kry-o\**  
Cryogenic

**DACH \dash\**  
Direct Access Channel Log

**DACON \da-kon\**  
Data Control Engineer

**DACUM \day-kum\**  
Developing a curriculum

**DAP \dap\**  
Digital Auto Pilot

<b>DAPS \da-pz\</b> Decommutation and Preprocessing System	<b>DISP \disp\</b> Display
<b>DARTS \dartz\</b> Dump and Reload the System	<b>DIST \dist\</b> Distribution
<b>DASD \das-di\</b> Direct Access Storage Device	<b>DIU \dee-i-u\</b> Data Interface Unit
<b>DCIM \dee-sim\</b> Display Computer Input Multiplexer	<b>DKRS \d-krs\</b> Dakar, Senegal
<b>DECOM \dee-kom\</b> Decommutate Decommutator	<b>DL, DLST \d-l\</b> Downlist
<b>DEMO \dem-o\</b> Demonstration	<b>DOFF \doff\</b> Take off (the EVA suit)
<b>DEMOS \dee-mos\</b> Distributed Earth Model Orbital System	<b>DOLILU \do-li-lu\</b> Day-of-launch I-load update
<b>DEMUX \dee-mux\</b> Demultiplexer	<b>DOMSAT \dom-sat\</b> Domestic Satellite
<b>DEP \d-ep\</b> Dedicated Experiment Processors	<b>DON \don\</b> Put on (the Extravehicular Activity (EVA) suit)
<b>DEPRESS \de-press\</b> Depressurize	<b>DOS \doz\</b> Disk Operating System
<b>DFL \dif-ful\</b> Decomputation Format Load	<b>DPS \dipz\</b> Data Processing System
<b>DICE \diz\</b> Call sign for Satellite Test Center (STC) of AFSCF	<b>DRAM \d-ram\</b> Dynamic Random Access Memory
<b>DID \did\</b> Data Item Description	<b>DRTS \dertz\</b> Data Relay and Tracking Satellite Discrepancy Report and Tracking
<b>DIP \dip\</b> Display interface processor	<b>DSCIM \d-scim\</b> Display Select Computer Input Multiplexer

**DU \dee-u\**

Demarcation Unit

**Dup \dooop\**

Duplex

Duplicate

**DVIS \dee-vis\**

Digital Voice Intercommunication System

**EAR \ear\**

Engineering Analysis Report

**EASE \eez\**

Electrical Automatic Support Equipment

**ECLSS \ee-kliis\**

Environmental Control and Life Support System

**ECOS \ee-kos\**Experiment Computer Operating System  
(for Spacelab)**EECOM \ee-kom\**Electrical, Environmental, and  
CommunicationsElectrical, Environmental, and  
Communications Engineer

Emergency, Environmental, and

Consumables Management engineer

**EEE \triple-ee\**Electrical, Electronic, and  
Electromechanical**EEEU \triple-ee-u\**

End Effector Electronics Unit

**EEPROM \ee-prom\**Electrically Erasable Programmable  
Read-Only Memory**EGIL \ee-gl\**Electrical, Generation, and Integrated  
Loading Engineer**EHOSC \ee-hosc\**Enhanced Huntsville Operations Support  
Center**EITAG \eye-tag\**Eccentrically Intercept Targeting and  
Guidance**ELEC \e-lek\**

Electrical

**EMADS \ee-madz\**

Emergency Monitor and Detection

**EPROM \ep-rom\**Erasable Programmable Read-Only  
Memory**EPSAT \ep-sat\**

Entry Predicted Site Acquisition Table

**EPSOP \ep-sop\**Electrical Power System On-orbit  
Performance**EREP \ee-rep\**

Earth Resources Package

**ESA \ee-sa\**

European Space Agency

**ESS \s\**

Energy Storage Subsystem

**ESTL \es-ti\**

Electronic System Test Lab

**EVAS \ee-vis\**

Extravehicular Activity System

**EXEC \ex-ek\**

Execute

**EXP \expl\**

Experiment

**EXPRESS \ex-press\**

Expedite the Processing of Experiments Station

**FACT \fakt\**

Flight Address Control Table

**FACTS \faktz\**

Flight Data File Automated Control and Tracking System

**FADS \fads\**

Flight Analysis and Design System

**FAM \fam\**

Familiarization

**FAR \far\**

Final Acceptance Review

**FAST \fast\**

Folding Articulated Square Truss (Solar Array Mast)

**FAX \faks\**

Facsimile

**FCOS \f-koss\**

Flight Computer Operating System

**FDDI \fee-dee-ih\**

Fiber-optic Distributed Data Interface

**FCR \fik-er\**

Flight Control Room, front room

**FDO/FIDO \fi-doe\**

Flight Dynamics Officer

**FEAT \feet\**

Failure Effects Analysis Tool

**FED \fed\**

Federal

**FET \fet\**

Field Effect Transistor

**FICHE \fish\**

Microfiche

**FIM \fem\**Facility Integration Manager  
Fault Isolation Message**FIMS \femz\**

Fault Isolation Monitoring System

**FIP \fip\**

Flight Increment Plan

**FIPS \fipz\**

Federal Information Processing Standards

**FLOATZONE \flote-zone\**

Office of Commercial Programs Equipment

**FLOPS \flopz\**

Floating Point Operations Per Second

**FLT \flite\**

Flight

<b>FOIG</b> \foy-ig\ Flight Operations Integration Group	<b>GHz</b> \gig-ga-hertz\ Gigahertz
<b>FOM</b> \fom\ Facility Operations Manager	<b>G-MEM</b> \jee-mem\ General Memory
<b>FORTTRAN</b> \fore-tran\ Formula Translation	<b>GOM</b> \jee-o-em\ Ground Operations Manager
<b>FOSO</b> \fo-so\ Flight Operations Scheduling Office	<b>GOSIP</b> \gos-sip\ Government Open System Interconnection Profile
<b>FREQ</b> \freek\ Frequency	<b>GPO</b> \jee-poe\ Guidance and Procedure Officer
<b>FSSR</b> \fizz-er\ Flight Systems Software Requirements	<b>GPOC</b> \jee-pock\ Goddard Payload Operations Center
<b>FTAM</b> \f-tam\ File Transfer, Access, and Management	<b>GPTOOLS</b> \jee-pee-toolz\ General Purpose Tools
<b>GAO</b> \jee-ay-o\ General Accounting Office	<b>GUIDO</b> \gui-do\ Guidance Officer
<b>GAP</b> \gap\ Guidance and Propulsion	<b>gyro</b> \jy-ro\ Gyroscope
<b>GAS</b> \gaz\ Get-Away Special	<b>Hab or HAB</b> \hab\ Habitation Habitation Module
<b>GAUSS</b> \gaus\ Galactical Ultrawide-Angle Schmidt System	<b>HAP</b> \hap\ Hardware Allocation Panel
<b>GCIL</b> \jee-sil\ Ground Control Interface Logic	<b>HAT</b> \hat\ Hardwired Audio Terminal
<b>GEN</b> \jen\ Generation	<b>HAW</b> \h-a-w\ Hawaii (Kauai, STDN Site)
<b>GEO</b> \jee-o\ Geosynchronous Earth Orbit	

**HEAD \hed\**

High Energy Astronomy Observer

**HERCULES \her-ku-leez\**

Hand Held, Earth Oriented, Real time, Cooperative, User Friendly, Location Targeting and Environmental System

**HIP \hip\**

Hardware Interface Program

**HIST \hist\**

History

**HIT \hit\**

Hardware Interface Test

**HIU \U\**

Headset Interface Unit

**HOU \h-o-u\**

Houston

**HUD \hudd\**

Heads-up display

**HUM \hoom\**

Humidity

**HUP \hup\**

Horizontal Ultraviolet Program

**HUT \hut\**

Hard Upper Torso

**ICOM \i-kom\**

Intercommunications

**I-Load \i-lode\**

Initial Program Load for Onboard Software

**INCO \in-ko\**

Instrumentation and Communication Officer

**INIT \i-nit\**

Initial/Initiate

**INSTR \inst-r\**

Instrumentation

**IRAMS \i-ramz\**

Inertial Referenced Alignment Monitoring System

**IRIG \i-rig\**

Interrange Instrumentation Group

**IRS \i-r-s\**

Information Retrieval System

**ISA \i-sa\**

Inertial Sensor Assembly

**ISSA \i-s-s-a\**

International Space Station Alpha

**JANS \janz\**

Joint Army Navy Space

**JAT \jat\**

Jet Availability Table

**JEM \jem\**

Japanese Experiment Module

**JES \jez\**

Job Entry Subsystem

**JESNET \jes-net\**

Johnson Engineering Support Network

**JET \jet\**

Joint Evaluation Team

**JIS \jiz\**

Joint Integrated Simulation



**L- \l-minus\**

Launch minus (counts through hold points)

**LAN \lan\**

Local Area Network

**LED \led\**

Light Emitting Diode

**LOC \lok\**

Local Operating Console

**LOS \l-o-s\**

Loss Of Signal

**LOX \lox\**

Liquid Oxygen

**LPOT \l-pot\**

Low Pressure Oxidizer Turbopump

**MAC \mak\**Macintosh  
Mission Control Center (MCC) Action  
Center**MAIL \mail\**

Mockup and Integration Laboratory

**MAINT \maint\**

Maintenance

**MAL \mal\**

Malfunction

**MAP \map\**

Mission Activity Plan

**MAPS \mapz\**Measurement of Air Pollution in Satellites  
Measurement/Stimulus Identification  
Multipurpose Attitude and Pointing System**MAR \mar\**

Mission Action Request

**MASSCOMP \mass-komp\**

Massachusetts Computer

**MAST \mast\**

Measurement and Stimulus

**MAT \mat\**

Model Assessment Team

**MATS \matz\**

Message and Timeline Support

**Max \max\**

Maximum

**MCAT \m-kat\**

Mission Controller Advanced Training

**MDM \m-dee-m\**

Multiplexer/Demultiplexer

**MECO \mee-koe\**

Main Engine Cutoff

**MECH \mek\**

Mechanical

**MED \med\**

Manual Entry Device

**MER \mer\**

Mission Evaluation Room

**MET \met\**Mission Elapsed Time  
Mission Events Timer**MHz \me-ga-hertz\**

Megahertz

**MIC \myk\**

Management Information Center

**MIDDS \middz\**Meteorological Information Data  
Distribution System**MILA \my-la\**

Merritt Island Launch Area

**MILP \milp\**Maintenance, Inventory, and Logistics  
Planning**MIP \mip\**

Mission Integration Plan

**MIPS \mipz\**

Million Instructions Per Second

**MIR \meer\**

Russian Space Station

**MITS \mitz\**

MOD IPS TACAN Subsystem

**MMACS \m-makz\**Maintenance, Management, and Control  
System**MOC \mok\**

Mission Operations Computer

**MOCR \moe-ker\**

Mission Operations Control Room

**MOD \mod\**

Modification

**MODIS \mod-iz\**Mission Operations Directorate Information  
System**MOODS \moods\**Multiple Objects Orbital Dynamics  
Simulation**MOPO \moe-poe\**

Mission Operations Program Office

**MOPS \mopz\**

Mission Operations Planning System

**MOT \mot\**

MER Operations Team

**MPSR \mip-sir\**

Multipurpose Support Room, back room

**MSG \mes-sij\**

Message

**MSID \m-s-i-d\**

Measurement/Stimulus Identification

**MUX \mux\**

Multiplex

**N/A \n-a\**

Not acceptable

**NASCOM \nas-kom\**NASA Communication  
NASA Communication Network**NASTRAN \nas-tran\**

NASA Structural Analysis

**NAV \nav\**

Navigation

**NAVSTAR \nav-star\**Navigation Satellite for Tracking and  
Reconnaissance

**NEMS \nemz\**

NASA Equipment Management System

**NETCOM \net-kom\**

Network Communications

**NIP \nip\**Network Input Processor  
Network Interface Processor**NIP SUP \nip-sup\**

Network Interface Processor Supervisor

**NOAA \no-ah\**National Oceanic and Atmospheric  
Administration**NOM \nom\**

Network Output Multiplexer or nominal

**NOP \nop\**

Network Output Processor

**NORAD \nor-ad\**

North American Air Defense command

**NORM \norm\**

Normal

**NRT \nert\**Near Real Time  
Near Real Time Telemetry**OMS \ohms\**

Orbital Maneuvering System (shuttle)

**O-NAV \o-nav\**

Onboard Navigation

**OPER \op-r\**

Operator

**Ops \ops\**Operations  
Operations, POCC Operations Officer**OT \o-tee\**

Overtime

**PAD \pad\**Preadvisory Data or Portable Foot Restraint  
(PFR) Attachment Device**PADD \padd\**

Power Architecture Description Document

**PADI \pad-ee\**Professional Association of Diver  
Instructors**PAM \pam\**

Payload Assist Module

**PAPAS \pa-paz\**Prelaunch Alignment Performance Analysis  
Subsystem**PASS \pass\**

Primary Avionics Software System

**PAYCOM \pa-kom\**Payload Command  
Payload Command Controller**PCMMU \puk-a-moo\**

Pulse-Code Modulation Master Unit

<b>PDIS</b> \p-dee-i\ Payload Data Interleaver Serializer	<b>PLT</b> \p-l-tee\ Pilot
<b>PEG</b> \peg\ Powered Explicit Guidance	<b>PLUM</b> \p-lum\ Parameter List Update Message
<b>PEM</b> \pee-e-m\ Payload Equipment Multiplexer	<b>PMAS</b> \p-mass\ Propulsion Module Attach Structure
<b>PEP</b> \pep\ Payload Experiment Processor Performance Entry Panel	<b>PMIS</b> \pee-miz\ Planning Management Information System
<b>PERT</b> \pert\ Program Evaluation Review Technique	<b>POC</b> \pok\ Payload Operations Center
<b>PET</b> \pet\ Phase-elapsed Time	<b>POCC</b> \pok\ Payload Operations Control Center
<b>PHALCON</b> \fal-con\ Power, Heating, Articulation, Lighting Control Officer	<b>POD</b> \pod\ Payload Operations Director
<b>PI</b> \p-eye\ Principal Investigator	<b>POMT</b> \p-o-m-t\ Planning Operations Management Team
<b>PIM</b> \pim\ Payload Integration Manager	<b>POP</b> \pop\ Payload Operations Procedure Polar Orbiting Platform Proposed Operating Plan
<b>PIMS</b> \pimz\ Payload Information Management System	<b>POST</b> \post\ Power On Self-Test
<b>PIN</b> \pin\ Personal Identification Number	<b>POT</b> \p-o-t\ Payload Operations Team
<b>PIP</b> \pip\ Payload Integration Plan	<b>PRIM</b> \prim\ Primary
<b>PIT</b> \pit\ Preintegrated Truss	<b>PRLA</b> \purr-la\ Payload Retention Latch Assembly
<b>PLNR</b> \pln-nr\ Planner	<b>PRO</b> \pro\ Proceed

**PROJ \proj\**

Project

**PROM \prom\**

Programmable Read-Only Memory

**PROP \prop\**Propellant, Propulsion Systems Engineer,  
Propulsion**PROX \proks\**

Proximity

**PSAT \p-sat\**

Predicted Site Acquisition Tables

**PSIV \pee-siv\**

Payload Software Integrational Verification

**P-TUBE \pee-toob\**

Pneumatic Tube

**RACF \rac-fl\**

Resource Access Control Facility

**RAM \ram\**

Random Access Memory

**Recon \ree-kon\**

Reconfiguration

**REF \reff\**

Reference

**REFSMMAT \reffs-mat\**

Reference Stable Member Matrix

**REM \rem\**

Rocket Engine Module

**REV \rev\**

Revision, Review, or Revolution

**RID \rid\**

Review Item Disposition

**RISC \risk\**

Reduced Instruction Set Computer

**R-OUT \r-owt\**

Rollout

**ROM \rom\**Read-Only Memory or Rough Order of  
Magnitude**RT \ar-tee\**

Real Time

**SAC \sak\**

Status and Control

**SAIL \sayl\**

Shuttle Avionics Integration Lab

**SAMCA \sam-ka\**

Stand-Alone Major Constituent Analyzer

**SAMMI \sam-me\**SSI (Company name) Advanced  
Man-Machine Interface**SAR \sar\**

Synthetic Aperture Radar

**SARJ \sarz\**

Solar Alpha Rotary Joint

**SAW \sau\**

Solar Array Wing

**SCAP \s-kap\**

Shuttle Configuration Analysis Program

**SCAPE \s-cape\**

Self-Contained Atmospheric Protection Ensemble

**SCR \skirt\**

Strip Chart Record

**SCUBA \s-koo-ba\**

Self-Contained Underwater Breathing Apparatus

**SEECOM \see-kom\**

Space Station End-to-End Communications Officer

**SEQ \seck\**

Sequence

**SHO \s-h-o\**

Satellite Handover  
Schedule Operations Messages

**SHUTDOWN \shut down\**

Shut Down

**SID \sid\**

Simulation Interface Device

**SIM \sim\**

Simulate/Simulation

**SIMO \sim-o\**

Simultaneously

**SIR \sir\**

Spaceborne Imaging Radar

**SKR \s-kir\**

Separator-Key Generator-recombiner

**SLAPS \s-lapz\**

Systems Logic and Processing Section

**SLASER \s-laser\**

Space Laser

**SLOC \slok\**

Source Lines of Code

**SMARTS \s-martz\**

Spacecraft Mission Analysis Real-Time Simulator

**SOAR \soar\**

Space Operations, Applications, and Research

**SOC \sok\**

Space Operations Contract

**SOP \sop\ or \s-o-p\**

Standard Operating Procedures

**SOT \sot\**

System Operational Test

**SOW \s-o-w\**

Statement of Work

**SPACECOM \space-kom\**

Space Communications Network

**SPAN \span\**

Space Physics Analysis Network  
Spacecraft Analysis

**SPAS \spaz\**

Shuttle Pallet Satellite

**SPEC \spek\**

Specification

**SPF \s-piff\**

Software Production Facility  
Spacelab Processing Facility

**SPIDPO \spid-po\**

Shuttle Payload Integration and  
Development Program Office

**SPOC \spawk\**

Shuttle Portable Onboard Computer

**SPF \spif\**

Software Production Facility

**SSSR \si-sur\**

Space Station Support Room, back room

**SSOIG \soy-ig\**

Space Station Operation Integration Group

**STAR \star\**

Shuttle Turnaround Analysis Report  
Space Transportation Automated  
Reconfiguration

**STARCOM \star-kom\**

Station Radio Frequency (RF)  
Communications

**SUP \supel\**

Supervisor

**SWCO \swat-ko\**

Software Checkout

**SYNC \singk\**

Synchronize

**SYS \sis\**

System

**T- \tee-mynus\**

Terminal Count minus (stops at each hold  
point)

**TACAN \tak-an\**

Tactical Air Navigation

**TACO \tau-ko\**

Translation and Attitude Control Officer

**TAEM \tame\**

Terminal Area Energy Management

**TAGS \tagz\**

Text and Graphics System

**TAL \tow\**

Transatlantic Abort Landing  
Transoceanic Abort Landing

**TCAS \t-kas\**

Terminal Control Access Subsystem

**TCATS \t-kats\**

Trajectory, Command, Analysis, and  
Timeline System

**TCOS \t-kos\**

Telemetry Processing Computer (TPC)  
Checkout System

**TDRSS \tee-dress\**

Tracking and Data Relay Satellite System

**TEC \tek\**

Time Execute Command

**TECH \tek\**

Technician

**TFL \tif-ful\**

Telemetry Format List

**THRIFT \thur-ift\**

Telemetry History Reports in Formatted  
Tabulations

**TIEP \t-i-e-p\**

Technical and Management Information System (TMIS) Information Engineering Plan

**TIG \tig\**

Time of Ignition

**TIM \tim\**

Technical Interchange Meeting

**TIPS \tipz\**

Thermal Impulse Printer System

**TIRF \turf\**

Transmittal/Information Request Form

**TLM \tel-em\**

Telemetry

**TMIS \tee-mis\**

Technical and Management Information System

**TOL \tee-o-l\**

Telemetry Objects List

**TOP \top\**

Test Operations Plan

**TOPO \toe-poe\**

Trajectory Operations Office

**TRAJ \traj\**

Trajectory

**USSPACECOM \U-S-spays-kom\**

United States Space Command

**VAFB \v-a-f-b\**

Vandenberg Air Force Base, California

**VICI \vi-ki\**

Video Isolation Control Interface

**VID \vi-d\**

Vehicle Identification Code

**VIDD \vi-dd\**

Vertical Internal Data Detector

**VIP \v-i-p\**

Very Important Person

**VIS \viz\**

Visual

**VITT \v-i-t\**

Vehicle Integration Test Team

**VORTAC \vor-tak\**

VHF Omnirange Tactical Air Navigation

**VTAM \v-tam\**

Virtual Telecommunications Access Method

**WETF (wet-eff)**

Weightless Environment Training Facility

**XMIT \trans-mit\**

Transmit



### 3.2 IDIOMS AND COLLOQUIALISMS USED AT NASA

#### **20–20 hindsight**

Perfect perception of the nature and demands of an event after it has already occurred.

#### **Ace in the hole**

Someone or something important that is kept as a surprise until the right time so as to bring victory or success.

#### **Across the board**

Including everyone or everything.

#### **Add insult to injury**

To make worse.

#### **After all**

Any way (used with emphasis on all).

#### **Against time or against the clock**

In order to beat a time limit.

#### **Agree completely**

To be in total agreement.

#### **All along (or right along)**

During; all the time (I knew all along he was a good man.)

#### **All bent out of shape**

Not happy; severely irritated.

#### **All but**

Very nearly.

#### **All ears**

Listen attentively.

#### **All eyes**

Watching very closely.

#### **All hands**

Informational meeting with management and all employees, everybody is invited.

#### **All out**

With all one's strength, power, determination.

#### **All over**

At an end; nothing remains (It's all over for the plan.)

#### **All over but the shouting**

Finally decided or won and not able to be changed.

#### **All thumbs**

Clumsy and awkward.

#### **All set**

All ready; completed.

#### **All systems go**

Everything is complete and ready for action or operation.

#### **All the way**

From start to finish; 100 percent.

#### **All's well that ends well**

A successful outcome is worth the effort.

#### **Arm and a leg**

An exorbitantly high price that must be paid.

#### **Around the clock**

Without stopping; without taking time off (The crews work around the clock.)

**At all**

In any way or respect. (I do not like that at all.)

**At the end of one's rope**

At the limit of one's ability to cope.

**At all costs**

Regardless of the results; at any expense of time or effort.

**At loose ends**

Undecided, unsettled, restless.

**At stake**

Depending, like a bet, on the outcome of something uncertain.

**At the drop of a hat**

Without waiting, immediately, promptly.

**Axe to grind**

Something to gain for yourself; a selfish reason.

**Back off (Back down)**

To give up a claim or position.

**Back out**

Withdraw.

**Back up**

Support, extra

**Bad news**

Dangerous or unwanted news (He's bad news.)

**Ballpark figure**

Not an exact figure but within a definite area.

**Bark worse than one's bite**

Not as bad-tempered as one appears.

**Be my guest**

Help yourself. Feel free to use what I have.

**Bean counter**

Someone who is responsible for budgeting.

**Beat around the bush**

To talk about things without giving a clear answer; avoid the question or the point.

**Beef up**

Make more powerful, stronger.

**Beggars can't be choosers**

One that lives by asking for gifts should not be selective about the gifts.

**Bend over backwards**

Try very hard.

**Big deal**

Unimportant; unimpressive matter (used in a sarcastic tone).

**Bite the bullet**

Endure in a difficult situation.

**Black and white**

Easily comprehended. Divided into only two sides that could be either right or wrong.

**Black out**

Lose communication, silence information; lose electrical power.

**Blast off**

To begin a rocket fire.

**Blow it**

Fail at something.

**Blow one's mind**

An unbelievable situation.

**Blow this popstand**

To leave and go somewhere else.

**Blow up**

Break; destroy; speak loudly in anger.

**Bogged down**

Buried under a lot of work; not making progress.

**Boil down**

To simplify.

**Bone of contention**

Something to fight over, a point of disagreement.

**Boogie**

Let's go.

**Boondoggle**

Trivial, useless, or wasteful but pleasant trip.

**Bopping around**

Going from place to place.

**Bottle up**

To hide or hold back. Trap.

**Bottle neck**

A hindrance to production or progress.

**Bottom line**

A final decision. The last word on the controversial issue.

**Break down**

To separate into parts. Failure. Collapse of structure.

**Break the ice**

Start a conversation in an awkward or uncomfortable situation. Games or techniques to get social situations or group meetings started.

**Break through**

To be successful after overcoming a difficulty.

**Brown bagger**

A person who brings his lunch from home.

**Brown nose**

To flatter a superior in an exaggerated way so as to gain favor.

**Buckle down (knuckle down)**

Stop what one is doing to give complete attention to something else.

**Bug off or butt out**

Go away; do not interfere..

**Burned out**

Worn out by using all energy, strength, power.

**Burn the candle at both ends**

To work or play too hard without enough rest.

**Bury the hatchet**

To settle a quarrel and make peace.

**Buzz-off**

Go away.

**Buzz-word**

An important sounding word or phrase, usually technical, often of little meaning used to chiefly impress laymen.

**By a long shot**

By a big difference.

**By chance**

By accident, by coincidence (The apple fell by chance on Bob's head.)

**By heart**

By memorizing, by memory (Tom knows how to do it by heart.)

**By the book**

Strictly follow rules.

**Call board**

Bulletin board.

**Call in**

Notification to supervisor of delay or absence from work.

**Call it a day**

Go home.

**Call off**

Cancel.

**Call on**

Visit.

**Call on the carpet**

To call before an authority for a reprimand.

**Call the shots**

To give orders; to be in charge.

**Can of worms**

A complicated situation or complex problem.

**Can't believe my ears**

Surprise at what one is hearing. (I can't believe my ears.)

**Can't believe my eyes**

Surprise at what one is seeing. (I can't believe my eyes.)

**Can't see the forest for the trees**

Unable to understand (see) the big part of a situation due to the detail paid to the small parts of the situation.

**Carte blanche**

Full authority; freedom to do as one thinks best.

**Cat got your tongue?**

Cannot talk?

**Catch-22**

A paradoxical situation. A regulation or situation that conflicts with another situation.

**Catch on**

Understand.

**Catchy**

Pleasing and easily remembered.

**Cats and dogs**

("It's raining cats and dogs") – it's raining very hard  
 ("They are fighting like cats and dogs") – cats and dogs do not like each other.

**Caught with finger in the pie**

Get caught doing something you should not be doing. Get in trouble.

**Cheapskate**

A stingy person.

**Cheat sheet**

A piece of paper with summarized information written on it.

**Chain of command**

Management structure.

**Chime in**

Join in.

**Chip in**

To contribute money.

**Chip on one's shoulder**

Carrying a grudge.

**Chit chat**

Informal conversation.

**Climb the wall**

Frustrated; anxious.

**Close knit**

Closely joined together by ties of love, friendship, family, or group.

**Close the loop**

Coordinate with everybody involved.

**Cold shoulder**

Ignore.

**Come alive**

Brighten up and become active.

**Come down hard on**

To scold or punish harshly.

**Come hell or high water**

No matter what happens.

**Computer geek**

Someone good with computers.

**Copy cat**

Imitate someone's behavior or style.

**Corny**

Countrified; trite.

**Couch potato**

A sedentary person; sits around watching television all the time.

**Cough up**

Give unwillingly.

**Crash land**

To make a forced landing.

**Cream of the crop**

The best of the group.

**Cross your fingers**

To cross two fingers of one hand for luck.

**Cry wolf**

Sound a false alarm so many times that no one believes you when something really happens.

**Cut and dried**

Decided or expected beforehand, obvious.

**Cut corners**

To save cost.

**Cut the mustard**

Succeed or meet expectations.

**Dangling a carrot at the end of a stick**

To bait someone, to offer an incentive.

**Dead giveaway**

Obvious.

**Dig up**

To look for, to research.

**Ditch it**

Get rid of it, throw it away.

**Dog and pony show**

A presentation or briefing that is presented to several groups.

**Double talk**

Something that is worded so that it may be understood in two or more different ways.

**Down to Earth**

Practical, not fancy.

**Down to the wire**

Running out of time; nearing a deadline.

**Dressed to kill**

Wear one's finest clothing.

**Dressed to the teeth**

Dressed elegantly.

**Drive someone up a wall (crazy, nuts)**

Annoy someone greatly.

**Drop dead date**

A definite, final due date.

**Drop the ball**

Fail to fulfill one's commitments without notice.

**Dry as a basket (Dry as a bone)**

Very thirsty.

**Dutch treat or go dutch**

Everyone pays their own way when going out.

**Eavesdrop**

Listen secretly to another's private conversation.

**Early bird catches the worm**

Arriving early gives one an advantage.

**Eat crow**

To admit you are mistaken.

**Eyes are bigger than one's stomach**

Take more food than one can eat.

**Eye for an eye**

A blow or action should be given back as hard as it was received.

**Face the music**

Accept the consequences.

**Face-to-face**

Within each other's sight or presence; in or into direct contact or confrontation.

**Fair-haired boy**

Someone favored by management.

**Fall from grace**

To do something to take you out of favor.

**Family tree**

Genealogical record in the form of a diagram.

**Feather one's nest**

To use money or power, especially from a public office or job for yourself in preparation for the future.

**Feed someone a line**

Deceive someone.

**Feel like a million dollars (bucks)**

Feel wonderful.

**Ferret out**

To bring out in the open. Figure out.

**Fighter jockey**

Fighter pilot.

**Fine-toothed comb**

Careful attention paid to an object or situation so as not to miss anything.

**Fishy**

Strange and suspicious.

**Flack**

Strong opposition.

**Flake**

A person who acts unintelligently.

**Flip-flop**

To change around.

**Fly-by-night operation**

A company that sells inferior merchandise for a big profit and then disappears.

**Fly off the handle**

To become extremely angry.

**For a song**

For very little money.

**For the birds**

Uninteresting and meaningless. Silly, foolish.

**Fork over**

Hand over, give.

**Forty winks**

A short period of sleep. A nap.

**Free hand**

Done without mechanical aids or devices.

**Free rein**

Unrestricted liberty of action or decision.

**Full-fledged**

Fully developed. Having attained complete status.

**Game plan**

Strategy for achieving an objective.

**Get away clean**

Escape punishment.

**Get a life**

Get involved in your own project, leave me alone.

**Get by**

To make ends meet; to survive; to succeed with the least possible effort or accomplishment; to proceed without being discovered or punished.

**Get on one's nerves**

To annoy someone.

**Get one's goat**

To annoy or exasperate someone.

**Get one's nose out of joint**

To get upset or irritated.

**Get the ball rolling**

Initiate action, start activity.

**Get the gist of**

To get the essence of or the main point of a topic.

**Get the jump on someone**

To get ahead of; have an advantage over someone.

**Getting down to brass tacks**

To begin the most important part of work or business.

**Get up on the wrong side of the bed**

To wake up in a bad mood.

**Get wind of**

To hear about something before it happens.

**Give it your best shot**

Try and do one's very best.

**Go haywire**

To lose control; to go crazy.

**Good ol' boy network**

Social and business connections.

**Goof off**

To loaf or be lazy.

**Go to bat for someone**

Help out and support someone.

**Go to pieces**

To crumble or fall apart emotionally.

**Go to the dogs**

Become rundown.

**Go through the motions**

To pretend to do something by moving or acting as if one were really doing it.

**Got it cold**

Completely understand.

**Grapevine**

Informal lines of communication at work.

**Green thumb**

A talent for gardening. An ability to make plants grow.

**Ground rule**

A rule, usually not written, of what to do or how to act in a situation.

**Guardian angel**

One who protects another with the purest of motives.

**Guinea pig**

Someone who acts as the subject of an experiment.

**Gung ho**

Enthusiastic.

**Gut check**

Make sure of what one is doing.

**Gut feeling**

Intuition.

**Half baked idea**

Not thought out or studied thoroughly; not worth considering or accepting.

**Hammer out**

To write or produce work by working hard.

**Hands down**

Without question or doubt.

**Handwriting on the wall**

A situation in which the outcome or decision appears to be predictable.



**Hang loose**

Relaxed; casual, not tense.

**Hang on**

Persevere, to wait. Example, "I will hang on until you get here."

**Hang up**

To keep delayed, suspended, or held up. (The negotiations were hung up for over a week.)

**Happen upon**

To meet or find someone (something) by chance or accident.

**Happy hour**

A period early in the evening, when restaurants offer beverages at less than normal price.

**Hard, fast rule**

A rule that cannot be changed.

**Hard nosed**

Stubborn.

**Hard shell**

Uncompromising.

**Haste makes waste**

When one does something too fast, too many mistakes may be made, resulting in having to do it over again.

**Have a hand in**

To have a part in or influence over.

**Have the world by the tail**

Be successful and happy.

**Head**

Military term for bathroom; supervisor (section head).

**Head honcho**

Leader of the group.

**Head in the sand**

To keep from seeing, knowing, or understanding something unpleasant; to refuse to face up to a situation.

**Heads up**

Give status, provide information.

**Heap of trouble**

Large quantity of problems.

**Heebie jeebies**

The jitters; to be made uncomfortable.

**High and mighty**

Feeling more important or superior to someone else.

**Hit it off**

To enjoy one another's company; be happy and comfortable with one another.

**Hold your horses**

Wait a moment, don't do anything rash.

**Horse around**

To join in rough teasing; play around.

**Horse of a different color**

Quite a different matter.

**Hot air**

Bombastic nonsense; nonsense exaggerated talk, wasted words characterized by emotion rather than intellectual content.

**Hot potato**

A question or a situation that causes strong argument and is difficult to settle.

**Hot under the collar**

Extremely angry or irritated.

**If the shoe fits, wear it**

If the situation is as it should be, then go ahead with it but be prepared to face the consequences if it is not.

**In full swing**

Actively going on; in full action.

**In hot water**

To be in serious trouble.

**In light of**

As a result of new information; by means of new ideas.

**In stitches**

Laughing so hard that one's side hurts.

**In the cards**

To be expected; likely to happen; foreseeable; predictable.

**In the doghouse**

In trouble.

**In the hole (in the red)**

To be operating at a loss; deficit funds; in an unprofitable way; to lose money.

**In the long run**

In the end; in the final results.

**In the nick of time**

At the very last moment with no time to spare.

**In your court**

One's responsibility, one's turn to take action.

**Intense**

Serious.

**In toto**

As a whole; in its entirety; totally; altogether.

**Iron out**

To discuss and reach an agreement about a difference of opinion; to find a solution to a problem; to remove a difficulty; to smooth things over.

**It's about time**

Finally.

**Jack of all trades, master of none**

A person who is knowledgeable in many areas; but not an expert in anything.

**Jump down someone's throat**

To verbally attack someone.

**Jump the gun**

Start before it is time; to start before anyone else.

**Just around the corner**

Soon to come or happen (the payload deployment is . . .).

**Keep one's nose clean**

To stay out of trouble.

**Keep the ball rolling**

To keep up an action or activity; not allow something to slow down or stop.

**Keep under one's hat**

Keep something a secret.

**Keep your shirt on**

Be patient, don't be in such a hurry.

**Kick up one's heels**

Celebrate.

**Kick-off**

Begin.

**Knock on wood**

A superstitious belief that one should knock on something made of wood to keep from having their good fortune taken away.

**Knock someone's socks off**

To be greatly impressed with someone or something.

**Know the ropes**

To be completely familiar with the operation.

**Lackadaisical**

Showing lack of interest; listless; spiritless.

**Last straw; straw that broke the camel's back**

Small troubles that follow other troubles and makes one lose patience and be unable to bear anymore; beyond the limit; the breaking point.

**Lay one's cards on the table**

To let someone know one's position and interest openly; deal honestly; act without trickery or secrets.

**Leave someone high and dry**

To abandon someone and leave them without money or other necessities.

**Let bygones be bygones**

Look to the future and let the past be forgotten.

**Let the cat out of the bag**

Inform beforehand; to tell about something that is supposed to be kept a secret.

**Let the chips fall where they may**

Take an action and not worry about the consequences.

**Lickety-split**

At great speed.

**Like looking for a needle in a haystack**

Looking for something that is impossible to find.

**Lip service**

Support shown by words only and not by actions; a show of loyalty that is not proven in action.

**Loaded for bear**

Ready for action; prepared and eager.

**Long winded**

Someone who talks for a long time.

**Loose ends**

Something left hanging loose. A fragment of unfinished business.

**Lose one's shirt**

Lose a great deal of money.

**Louse up**

To make a mess of, spoil, or ruin something.

**Luck out**

Suddenly get lucky when in fact the odds are against one's succeeding.

**Limelight**

To be in the spotlight; the center of attention.

**Lunatic**

A crazy person.

**Make a monkey of**

Make a fool of.

**Make a mountain out of a mole hill**

To think a small problem is a big one; try to make something unimportant seem important.

**Make ends meet**

To have enough money to pay one's bills, but with little money left over.

**Make heads or tails of**

Find the meaning of; understand the why of.

**Make no bones about**

To have no doubts; not to worry about right or wrong.

**Make the grade**

To make do well; succeed.

**Mark time**

Waiting for something to happen.

**Massage data**

Get the data into a usable condition.

**Mind reader**

To know what someone else is thinking.

**Money talks**

Money can influence people.

**Name of the game**

The crux of the matter; what is really happening.

**Neck and neck**

Equal or nearly equal in competition.

**Neither here nor there**

Not important to the subject being discussed; off the subject; not mattering.

**Nip and tuck**

Being so close that the lead or advantage shifts rapidly from one opponent to another.

**No sweat**

Something easily done.

**Not a leg to stand on**

No good proof or excuse; no good evidence or defense to offer.

**No use crying over spilled milk**

Don't cry or complain about something that has already happened and cannot be changed.

**Offline meeting**

A small meeting after a main meeting in order to further discuss a topic of the meeting without taking up other attendees' time.

**Off the hook**

Dismissed as part of an awkward or embarrassing situation.

**Off the record**

Comments given or made in confidence and not for publication.

**Off the top of one's head**

Without thinking hard; a spontaneous response.

**On a shoe string**

On a very low budget.

**On call**

Stand by to be called in to report for duty.

**On cloud nine**

Extremely happy.

**On ice**

On hold; set aside for future use.

**On the record (For the record)**

To make public.

**On the line**

Something at stake or risk.

**Once in a blue moon**

Very rarely; very seldom.

**On pins and needles**

Waiting nervously.

**On the ball**

Paying attention and doing a job well.

**On the band wagon**

To join a popular cause or movement in order to support.

**On the fence**

Undecided, not able to choose.

**On the tip of one's tongue**

Almost spoken; trying to remember something but just cannot get it out.

**On the top of the world**

Feeling pleased, happy, successful.

**Other fish to fry**

Other things to do; other plans; other projects.

**Out to lunch**

Not paying attention or gone out to eat the mid-day meal.

**Overcome by events**

No longer important or necessary because conditions have changed.

**Overload**

Providing too much of something.

**Parting of the ways**

A mutual decision made to sever a relationship, partnership, or friendship.

**Pass along**

To send.

**Pass muster**

To be good enough.

**Pass out**

Faint. Black out.

**Pass the buck**

To shift or escape responsibility or blame; put the duty or blame onto someone else.

**Pay through the nose**

Pay too much.

**Pecking order**

The way people are ranked in relation to one another.

**Pet peeve**

Something that is very irritating; favorite thing to complain about.

**Pick the brains of**

To get ideas or information about a particular subject by asking an expert.

**Piece of cake**

Very easy.

**Pipe down**

Shut up, be quiet.

**Pipe dream**

An unrealistic plan.

**Play it by ear**

Improvise as one goes along. To make adjustments as the changing circumstances demand. Go with the flow.

**Playing devil's advocate**

Bringing up the worst case scenario.

**Play phone tag**

Call someone, leave a message. They return the message but you are not available. This routine continues.

**Poker face**

An inscrutable face that reveals no hint of a person's thoughts or feelings.

**Press on**

Continue with original plan.

**Pull one's leg**

To get someone to accept a ridiculous story as true; to fool someone.

**Pull strings**

To secretly use influence and power, especially with people in important jobs to do or get something for you; make use of friends to gain favor. Exert influence.

**Pull the plug**

To terminate a project.

**Pull the rug out from under**

To withdraw support unexpectedly from a project; to spoil a plan.

**Pull the wool over one's eyes**

To fool someone into thinking well of someone, or a project; to deceive.

**Push one's luck**

To take a risk.

**Put all one's eggs in one basket**

To place all of your efforts, interests, or hopes in a single thing.

**Put down**

To degrade, reject.

**Put me in**

Let me join in. Count me in.

**Put on airs**

To behave as if one were socially superior.

**Put one's foot down**

To take a decided stand.

**Put one's foot in one's mouth**

To speak carelessly; hurt another's feelings without meaning to.

**Put one's money where one's mouth is**

Follow through with action after a stated intention.

**Put two and two together**

To make decisions from the seeming proof; conclude.

**Put up or shut up.**

To bet money on what one says or stop saying it.

**Put up with**

To accept patiently, bear.

**Put words into one's mouth**

To try to say an idea or make a stand for someone else.

**Raincheck**

A promise to do something at a later time.

**Rake over the coals**

To criticize harshly.

**Rat on**

To fool (someone); to betray.

**Rat race**

A frenzied scramble for success in the workplace.

**Read between the lines**

To understand the unwritten or unspoken meaning in a communication.

**Read the riot act**

To give someone a strong warning or scolding.

**Resign oneself**

To stop arguing; accept something that cannot be changed.

**Red lines**

Corrections to be made to text, usually made in red ink.

**Red tape**

Bureaucratic formality usually involving a lot of paperwork.

**Rest on one's laurels**

To be satisfied with the success one has already won; not working hard.

**Rigamarole**

Rambling or meaningless; complicated process.

**Ring a bell**

When someone remembers something they had not thought of in a while; sound familiar.

**Rip off**

An act of stealing or not giving a fair value.

**Rock bottom**

The lowest possible point.

**Roll out the carpet**

To welcome a person with great respect and honor.

**Rope in**

To lure or entice.

**Rule out**

To decide not to do something.

**Run of the mill**

Ordinary.

**Run this by management**

Present this to the boss.

**Run this up the flag pole**

Present this and see how it is accepted.

**Russian roulette**

Doing or saying something that has a high probability of hurting the one doing or saying.

**Sanity check**

Consider the viability of something.

**Save face**

To save one's good reputation, popularity, or dignity when something has happened to him/her; hide something that may cause shame.

**Save one's neck or skin**

To save from danger or trouble.

**Scratch someone's back**

Return a favor.

**Sell someone down the river**

Betray someone.

**Sell someone short**

Underestimate someone.

**Shake a leg**

Hurry.

**Shape up or ship out**

Behave properly or leave.

**Sharp guy**

Smart man.

**Shoot off one's mouth**

Express one's opinion loudly.

**Shoot the breeze**

Chat informally; to engage in idle conversation.

**Short fuse**

Quick temper.

**Sitting pretty**

In a fortunate position.

**Sit tight**

To make no move or change; to wait patiently.

**Sleep like a log**

Sleep soundly.

**Slip of the tongue**

The mistake of saying something not wanted or planned.

**Sloppy**

Inefficient, careless.

**Smack-dab**

Exactly, squarely.

**Smell a rat**

Feel that something is wrong.

**Snafu**

Situation normal all fouled up.

**Snap back**

Recover quickly.

**Sneeze at**

To think of as important.

**Snow job**

Insincere talk, mislead, fool someone.

**Speak of the devil**

To be talking about someone when he suddenly appears.

**Spick and span**

Very clean.

**Spill (one's) guts**

Confess.

**Spill the beans**

Reveal a secret.



**Spread oneself too thin**

Become involved in too many activities; to try to do too many things at one time.

**State-of-the-art**

Newest and greatest. Most current.

**Step on one's toes**

To do something that embarrasses or offends someone.

**Stick out one's neck**

Take a risk.

**Stick to your guns**

Maintain one's position.

**Stomping ground**

A favorite gathering place.

**Straight from the horse's mouth**

To get information directly from the person who is the best source.

**String someone along**

Lead someone on dishonestly.

**Tag up**

Briefing meeting; informal.

**Tailgate**

When two people with security clearance enter a secured area on one person's badge.

**Take for a ride**

To play a trick on; to take unfair advantage of.

**Take for granted**

To suppose or understand to be true; to accept or become used to something.

**Take the bull by the horns**

Grapple fearlessly with a problem

**Take the cake**

To the limit; to have a lot of nerve.

**Talk down to**

To use very simple words or ideas that belittles the other person.

**Talk through one's hat**

Make foolish statements.

**Tch-tch**

Used to express mild disapproval.

**Thanks a million**

Thank you very much.

**That's how the cookie crumbles**

That is how life is.

**The ball's in your court**

It is your responsibility.

**The ropes**

Special techniques or procedures (show him the . . .).

**The whole ball game**

The whole situation; the whole thing.

**Think tank**

A group of researchers who spend their time developing ideas and concepts.

**Throw in the sponge (towel)**

To admit defeat.

**Throw one's hat in the ring**

To announce that one is a candidate.

**Thumbs down**

Disapproval.

**Tickled to death**

To be extremely pleased.

**Tighten one's belt**

To live on less money or spend less money.

**Tip of the iceberg**

A great deal more exists but remains hidden.

**Tit for tat**

Equal treatment in return.

**To a tee**

Just right; perfect.

**To get across**

To make it clear or inform.

**To the nth degree**

To the greatest degree possible.

**To the tune of**

To the amount of or extent of.

**Tongue-in-cheek**

Not serious.

**Touch and go**

Very dangerous or uncertain situation.

**Turn over a new leaf**

Repent, make a fresh start.

**Turn the other cheek**

To let someone do something to someone else and not expect it to be done in return.

**Turn the table**

Make something happen just the opposite of how it was supposed to be.

**Twist one's arm**

To force or coerce someone.

**Two-edged sword**

A situation which has strong positive, but also strong negative results.

**Under one's thumb**

Obedient to someone; controlled by someone.

**Up a creek or up a creek without a paddle**

In trouble or difficulty and unable to do anything about it.

**Up a tree**

In a difficulty that is hard to escape from.

**Up in arms**

Very angry and wanting to fight.

**Up one's sleeve**

Concealed.

**Upset the applecart**

To ruin a plan or what is being done, often by surprise or accident.

**Uptight**

Worried, irritated, excessively eager or anxious.

**Up to par**

As good as usual; up to the usual level of quality.

**Wait on hand and foot**

To serve in every possible way.

**Waiting for the other shoe to drop**

Waiting for a second unpleasant or troublesome thing to happen.

**Walk on air**

To feel happy and excited. Elated.

**Water over the dam or water under the bridge**

Something that happened in the past and cannot be changed, but can be forgotten.

**We had a big time**

A very enjoyable time. (Everybody had a big time at the party.)

**Wear thin**

To anger or annoy; tire.

**Weed out**

To remove what is unwanted.

**Wet blanket**

Dull or boring person who spoils the happiness of others.

**What the heck?**

Does not matter, who cares?

**What's digging you?**

What is the matter with you?

**Wheel and deal**

To propose several big schemes, especially in business; plan or negotiate business matters in a smart or skillful way, but not always sincere.

**When the cat's away, the mice will play**

When the person in authority is absent, the subordinates play around and don't do their work.

**When the chips are down**

At the most important time.

**Whitewash something**

To explain a situation so as to assure that things are under control; to cover up. To be less than forthright and complete.

**Widget**

Gadget. An unnamed article considered for purposes of hypothetical examples.

**Wild goose chase**

Being sent to find something without clear directions; will lead nowhere.

**Windfall**

An unexpected fortune.

**Wink at**

To shut one eye briefly as a signal or in teasing.

**Witch hunt**

Looking for someone to blame.

**With bells on**

With enthusiasm; eager or ready and in the best of spirits.

**Without holding back**

To give openly, without regrets.

**Work it out**

Fixing a problem.

**Worth one's salt**

Being a good worker or a productive person; worth one's salary or cost.

**Write off**

To remove (an amount) from a business record; cancel a debt; accept a loss.

**Wrongdoing**

An instance of doing wrong, evil, immorality.

**Yes man**

Someone who always agrees with the boss or the one with power.

**Zero in on**

To converge on a solution; focus on a solution.

### **3.3 SPACE FLIGHT TERMS AND ACRONYMS**

#### **Abort**

To terminate an operation or procedure before completion. A major change in the nominal flight plan. An abort is usually caused by some malfunction or emergency.

#### **Abort Once Around (AOA)**

AOA is an abort mode which is used when one or two main engines fail after the Solid Rocket Boosters (SRBs) burn out and before an abort to orbit is possible.

#### **Abort to Orbit (ATO)**

ATO is an abort mode which is used if a main engine fails late in the ascent.

#### **Acceptance Tests (AT)**

Tests to determine whether a part, component, subsystem, or facility is capable of meeting performance requirements prescribed in purchase specifications or in other documents that specify what constitutes the adequate performance capability for the item.

#### **Activity**

A group of one or more operations performed within definable beginning and ending times. These operations accomplish some identifiable goal in association with resources and constraints.

#### **Aft Flight Deck (AFD)**

The part of the orbiter cabin on the upper deck where payload controls are located. AFD is a crew station. The station comprises the necessary controls to manage the orbiter and its payload in space.

#### **Airlock**

A compartment, capable of being depressurized without depressurization of the orbiter cabin, used to transfer crewmembers and equipment. A similar compartment in the Spacelab module is used to expose experiments to space.

#### **Announcement of Flight Opportunity**

The process by which proposed investigations are solicited for a specific space flight.

#### **Ascent**

One of the flight phases. It starts at Solid Rocket Booster (SRB) ignition and continues through Orbital Maneuvering System (OMS)-2 cutoff.

#### **Assembly**

A number of parts or subassemblies (and/or any combination, thereof) joined together to perform a specific function and are capable of disassembly. Space Station phase of the program where Station hardware elements are brought to orbit and assembled to the Space Station.

**Assembly and Checkout Officer (ACO)**

A Station MCC console position. This position is responsible for procedures, realtime monitoring, task documentation and revision of Station procedures.

**Astronaut Proficiency Level**

The proficiency required of an astronaut for the execution of a specific task.

**Attached Payloads**

Payloads located on the Space Station or Shuttle structure outside the pressurized station modules. Attached payloads may be unpressurized or may be directly attached to pressurized nodes to allow Intravehicular Activity (IVA) access by crew members.

**Attaching Part**

An item used to attach subassemblies or parts to the equipment or to each other.

**Attitude Determination and Control Officer (ADCO)**

A Station MCC console position. This position is responsible for operation of Station guidance, navigation and propulsion systems.

**Automated Payloads**

Payloads that are supported by an unmanned spacecraft capable of operating independently of the Space Shuttle.

**Automated Procedure**

A Space Station procedure in which each command statement is time-tagged and executed by onboard software.

**Auxiliary Power Unit (APU)**

Hydrazine-powered units that drive the hydraulic pumps for the Space Shuttle.

**Auxiliary Stage**

A small propulsion unit used with a payload, when required. One or more of these units may be used with a payload to provide the additional velocity required to place a payload in the desired orbit or trajectory. Also, a propulsion system that is used to provide midcourse trajectory corrections, braking maneuvers, and/or orbital adjustments.

**Azimuth**

The angle between a fixed point on the horizon and the direction of motion.

**Barbecue Mode**

Orbiter in slow roll for thermal conditioning.

**Berthing**

The linkup of one orbiting object with another, wherein the closing energy is provided in a closely controlled fashion by an intermediate mechanism (e.g., Space Station Remote

Manipulator System (SSRMS), Remote Manipulator System (RMS)) attached between the two. (See docking.)

**Beta Angle**

Minimum angle between the Earth-Sun line and the plane of the orbit.

**Booster**

A Shuttle MCC console position. This position is responsible for monitoring and evaluating Main Engine (ME), Solid Rocket Booster (SRB), and External Tank (ET) performance during the prelaunch and ascent phases.

**Capsule Communicator (CAPCOM)**

A Shuttle MCC console Position. The CAPCOM is the principal interfacing position for any communication with the orbiter crew and governs the use of the Air-To-Ground (A/G) voice loops.

**Capture**

The event of the Remote Manipulator System (RMS) End Effector (EE) making contact with and firmly attaching to an object grappling fixture. If an object is captured at any time it is firmly attached to the RMS.

**Cargo**

The total complement of payloads (one or more) on any one flight. The cargo includes everything contained in the orbiter payload bay plus other equipment, hardware, and consumables located elsewhere in the orbiter that are user-unique and are not carried as part of the basic orbiter payload support.

**Cargo Bay Liner**

Protective soft material used to isolate sensitive payloads from the bay structure.

**Cargo Integration Review (CIR)**

Part of the Space Shuttle Program planning process that results in a cargo manifest, cost per flight, and billing schedule.

**Cargo Integration Test Equipment (CITE)**

Setup that can provide testing of both payload-to-payload and cargo-to-orbiter interfaces.

**Caution and Warning (C&W) Message**

A message displayed or annunciated to the flight or ground crew indicating that a fault, failure, or resource conflict has occurred. The level of severity is determined by the type of annunciation.

**Central Mission Control Centre (CMC)**

European center for coordinating the planning and execution of In-Orbit Infrastructure (IOI) operations.

**Certificate of Compliance**

Documentation prepared by the user confirming that a payload has successfully completed interface verification.

**Certification**

The process which ensures that crewmembers, Ground Support Personnel (GSP), and Ground Processing Personnel (GPP) meet the quality standards for acceptable performance to operate/maintain the systems payloads, Space Station, and in-flight and ground support facilities.

**Code M**

NASA Headquarters. Office of Space Flight.

**Command**

An executable instruction performed by the onboard software to accomplish an identified task or objective. Commands may be initiated by the ground, crew, or onboard software.

**Command and Data Handling (C&DH)**

A network of onboard computational resources, data storage, and man-machine interface devices to provide onboard command and control, data transmission, computation/processing, operating software, and workstation resources to support Space Station users, crew, and subsystems.

**Command Controller (HOUSTON COMMAND)**

A Shuttle MCC console position. The HOUSTON COMMAND is responsible for operational configuration and operational status of two major ground support systems, the Space Shuttle Ground Command system, and the Tracking and Data Relay Satellite System (TDRSS).

**Commander**

This crewmember has ultimate responsibility for the safety of embarked personnel and has authority throughout the flight to deviate from the flight plan, procedures, and personnel assignments as necessary to preserve crew safety or vehicle integrity. The commander is also responsible for the overall execution of the flight plan in compliance with NASA policy, mission rules, and Mission Control Center (MCC) directives.

**Common Payload Support Equipment (CPSE)**

Spacelab-provided mission-dependent equipment that consists of a top airlock and a viewport/window assembly.

**Communication and Tracking (C&T) System**

A system for the transmission, reception, signal processing, control, and distribution of audio, telemetry, commands, user data, video, text and graphics, and tracking/area traffic control for Space Station Program elements, interfacing vehicles, and ground systems.

**Communication and Tracking Officer (CATO)**

A Station MCC console position. This position is responsible for systems management of onboard communication equipment.

**Communications Controller (COMM CONTROL)**

A Shuttle MCC Console position. This position is responsible for the operational management and control of the communications system and circuitry that is interfaced with Johnson Space Center (JSC); he/she conducts communications validation testing and coordinates with commercial carriers for circuit activation, restoration, upkeep, and repair.

**Communications Technician (COMM TECH)**

A Shuttle MCC console position. The COMM TECH is responsible for the voice links between the spacecraft and the ground users, the status and configuration of the digital voice system interface with the spacecraft, and the analog voice recording and playback. COMM TECH is also responsible for Air-to-Ground (A/G) circuit restorations, troubleshooting, and validation testing of the A/G system. The COMM TECH performs the technical functions to enable/disable the A/G-1 talk capability of the Payload Operations Control Center (POCC) (if applicable).

**Component**

An assembly or any combination of parts, subassemblies and assemblies, and assemblies mounted together and normally capable of independent operation in a variety of situations.

**Configuration Management (CM)**

An established process for identifying the composition of any program element (for example, the Space Station), approving its configuration, and controlling changes to establish baseline and supporting documentation.

**Consumables (CONSUMABLES)**

A Shuttle MCC console position. This position is a Propulsion System Engineer (PROP) support position which assists PROP in determining propellant consumption and assuring the capability to change the planned consumption by adding/changing orbiter maneuvers or attitudes.

**Contingency Abort**

Abort caused by the failure of two or three main engines in which a spacecraft cannot reach the runway. (Bailout is required.)

**Contingency Support**

A support situation in which Network resources may be scheduled on short notice to provide support requirements in case of a Safety Critical (SC) functional or mission operational anomaly.

**Core (or Core Data)**

Data derived from and pertaining to Space Station Manned Base (SSMB) systems functioning. The data includes payload health and status data necessary to ensure proper system operation.



**Core Segment**

A section of the pressurized Spacelab module that houses subsystem equipment and experiments.

**Countdown**

Counting down of the number of days/hours/minutes/seconds to go before a spacecraft is launched.

**Crew**

A generic reference to all personnel onboard the Shuttle or Space Station.

**Crew Activity Planning (CAP)**

The analysis and development of activities to be performed in flight by the crew, resulting in a timeline of these activities and reference data for each flight.

**Crew Quarters**

This area of the Station provides a private, personal space for each crew member onboard the Station and isolates light and noise from other open areas. This area provides crew members with space to sleep, rest and relax, and don/doff clothing.

**Crew Systems**

A distributed system that includes equipment necessary for crew accommodations and habitability throughout the Space Station. The system also includes internal contamination detection and control for toxicology, microbiology, and radiation.

**Cupola**

An appendage located on a node, affording its occupants hemispherical viewing capability from a single vantage point.

**Data Control Engineer Coordinator (DACON COORD)**

A Shuttle MCC console position. The DACON COORD is responsible for all coordination of the Payload Operations Control Center (POCC) Communications Interface System (CIS) data flow. DACON COORD is the focal point for monitoring and tracking of data quality within the Johnson Space Center (JSC) POCC.

**Data Flow (DF)**

Movement of data or commands to or from manned base or ground stations for processing by Space Station (SS), Mission Control Center (MCC), Payload Operations Integration Center (POIC), users, and/or others.

**Data Flow Engineer (DFE)**

A Shuttle MCC console position. The DFE position is responsible for operational status/control of data flow from the Space Tracking and Data Network (STDN)/Satellite Control Facility (SCF)/Tracking and Data Relay Satellite System (TDRSS) network through the Network Interface Processor (NIP) to the Mission Operations Computer (MOC). DFE is also responsible

for all real-time Payload Data Interleaver (PDI), Payload Parameter Frame (PPF), and ancillary data flow to the Payload Operations Control Center (POCC).

**Data Processing**

Computer-based operations on data in accordance with a specified or implied set of rules.

**Data Processing System Engineer (DPS)**

A Shuttle MCC console position. The DPS is responsible for determining the status of the data processing system; specifically, the General Purpose Computers (GPCs), the flight critical and launch data buses and associated Multiplexers/Demultiplexers (MDMs), the Multifunction Cathode-Ray Tubes (CRTs) Display Systems (MCDs), the Mass Memories (MMs), and the systems level software.

**Data Transmission**

Transfer of data between the original source and end user, using space-to-space links; space-to-ground and ground-to-space links; and ground-to-ground links.

**Deadband**

The attitude and rate control region in which no orbiter reaction control subsystem or vernier correction forces are being generated.

**Dedicated Spacelab**

An extension module devoted to a single discipline. The module may fly more than once a year for several years and may be assigned to a payload development center.

**Deep Space Network (DSN)**

A communications network managed by the Jet Propulsion Laboratory (JPL) for command and control of all planetary flights.

**Delta Class**

Payloads weighing approximately 2000 to 2500 lb (900 to 1100 kg).

**Deorbit**

Process of deceleration to go from Earth orbit to entry phase of flight.

**Deorbit Burn**

The firing of Retro-Rocket to slow the spacecraft to a speed lower than that required to maintain orbit. On the orbiter, this is accomplished with these Orbital Maneuvering System (OMS) engines.

**Deployment**

The process of removing a payload from a stowed or berthed position in the payload bay and releasing that payload to a position free of the orbiter.

**Docking**

The coupling of two or more orbiting objects, establishing a physical connection between two spacecraft wherein their kinetic energy brings the objects into contact.

**Downweight**

Landing weight. It refers specifically to payloads and all items required by specific payloads.

**Drift Orbit**

An orbit with an orbital period of slightly more or less than one sidereal day (23 hours, 56 minutes, 4.09 seconds of mean time) and which allows for a System Control (SC) longitudinal position to be changed.

**Electrical, Generation, and Integrated Loading (EGIL)**

A Shuttle MCC console position. The EGIL (pronounced eagle) position has overall operational management and control responsibility for the Space Shuttle electrical systems. The EGIL manages the overall power and cryogenic (CRYO) consumables.

**Electrocardiograph**

Instrument for recording electrical changes of a heartbeat.

**End Article/End Item**

A physical element of the Space Shuttle. It is a functional physical entity related to and selected for the purpose of system development, procurement, and logistics.

**End Item (EI)**

A final combination of end products, components, parts, or materials that is ready for its intended use; for example, orbiter, receiver, amplifier, recorder, ground support equipment, and so forth.

**Engineering Support Center (ESC)**

The ESC provides engineering data and analysis for Space Station hardware and software. ESC personnel determine performance envelopes; perform systems trend analysis; and provide real-time, near real-time; or on-call support, as required to support the Mission Control Center (MCC) for assembly, verification, operations, and anomaly analysis of their systems and elements.

**Entry**

One of the flight phases. It starts at deorbit burn ignition and continues through landing and roll-out.

**Environmental Control and Life Support (ECLSS)**

A system that maintains the orbiter's thermal stability and provides a pressurized, habitable environment for the crew and onboard avionics. ECLSS also manages the storage and disposal of water and crew waste.

**Environmental Engineer and Consumables Manager (EECOM)**

A Shuttle MCC console position. The EECOM has overall operational management and control responsibility for the orbiter environmental systems. The EECOM manages the life support and thermal systems, including H<sub>2</sub>O dumps and Flash Evaporator System (FES) operations.

**European Space Agency (ESA)**

An international organization acting on behalf of its member states (Belgium, Denmark, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, and the United Kingdom). The ESA directs a European industrial team responsible for the development and manufacture of Spacelab, and a research module for the International Space Station Alpha (ISSA).

**Experiment**

The system of hardware, software, and procedures for performance of a scientific or applications investigation undertaken to discover unknown phenomena, establish the basis of known laws, and evaluate applications processes and/or equipment.

**Experiment Integration**

Activity, including appropriate preparatory training, performed before launch and consisting of experiment-to-carrier installation of hardware and software and verification using simulations. This integration includes installation into carrier (rack or specialized carrier), verification, calibration, alignment, servicing, and closeout.

**Experiment Racks**

Removable and reusable assemblies in the Spacelab module that provide structural mounting and connections to supporting subsystems (power, thermal control, data management, and so forth) and experiment equipment.

**Experiment Segment**

A section of the pressurized Spacelab module that houses experiments and sensors.

**Experimenter**

A user of the Space Shuttle, ordinarily an individual whose experiment is a part of the total payload.

**External Tank (ET)**

An element of the Space Shuttle system that contains liquid propellant for the orbiter main engines. It is jettisoned after main engine cutoff and before orbit insertion.

**Extravehicular Activity (EVA)**

Activities by crewmembers that are conducted outside the spacecraft pressure hull or within the payload bay when the payload bay doors are open.

**Extravehicular Activity Officer (EVA)**

A Shuttle MCC console position. This position is responsible for leading safe and successful planning/execution of EVA tasks.

**Extravehicular Mobility Unit (EMU)**

A self-contained (no umbilicals) life support system as well as an anthropomorphic pressure garment for use by crewmembers during Extravehicular Activity (EVA). The EMU provides thermal and micrometeoroid protection.

**Facility Class Payloads**

Payloads that are designed to be installed for extended periods of time while onboard, such as, refrigerator, furnace, centrifuge.

**Failure**

A state of inability to perform a required function.

**Failure Cause**

The physical, electrical, or chemical process which is the basic reason for failure. Deterioration or degradation is also a basic reason for failure.

**Failure Detection, Isolation, and Recovery (FDIR)**

The process of determining that a failure has occurred, identifying which Orbital Replaceable Unit (ORU) has failed, preventing failure propagation, and regaining operational functionality.

**Failure Mode**

A description of the manner in which an item can fail.

**Flight (FLT)**

The portion of a mission that encompasses the period from launch to landing, or launch to termination, of the active life of a spacecraft. The term shuttle “flight” means that a single Shuttle took a round-trip (from launch, to orbital activity, and to return). One flight may deliver more than one payload. More than one flight may be required to accomplish one mission. “Flight” is also short for Flight Director (see Flight Director).

**Flight Activities Officer (FAO)**

A Shuttle MCC console position. The primary role of the FAO is to make scheduling adjustments to the Flight Plan and to provide flight procedures expertise. The FAO is responsible for crew activity planning and crew support as required. The FAO is also responsible for the development and maintenance of the Flight Plan (FP) (alternates and contingencies), Flight Data File (FDF) change request processing, spacecraft attitude, pointing information, crew activity planning, and crew support as required. The FAO coordinates update messages to the crew via the Thermal Impulse Printer System (TIPS).

**Flight Control Team (FCT)**

The group of Mission Control Center (MCC) personnel who are on duty to provide real-time support for the duration of each Space Shuttle flight.

**Flight Data File (FDF)**

The onboard complement of crew activity plans, procedures, reference material, and test data available to the crew for flight execution.

**Flight Data File Coordinator (FDF COORD)**

A Shuttle MCC console position. The FDF COORD is a Flight Activities Officer (FAO) support position. The FDF COORD acts as a prelaunch point-of-contact with the FDF team at Kennedy Space Center (KSC) and supports the launch minus 1 day briefing to answer questions regarding the Flight Data File (FDF) errata package. The FDF COORD serves in an on-call capacity during the flight to assist with real-time FDF and Entry Switch List changes and problems.

**Flight Design (FD)**

The trajectory, consumables, attitude and pointing, and navigation analysis necessary to support the planning of a flight.

**Flight Director (FD)**

A Shuttle MCC console position. The FD is the on-duty controlling authority for a given flight control team and for all Space Shuttle Program (SSP) real-time operations. All decisions made regarding the safe and expedient conduct of the flight are the FD's responsibility.

**Flight Dynamics Officer (FDO)**

A Shuttle MCC Console position. The FDO position (pronounced FI-DOE) overall responsibility for orbiter maneuver planning, trajectory determination and monitoring, and ensures the optimization of ephemerides from which intercenter state vectors are retrieved in conjunction with the Guidance Officer (GDO).

**Flight Kit**

Optional hardware (including consumables) that provides additional, special, or extended services to payloads. Kits are packaged so that they can be installed and removed easily.

**Flight Manifest**

The designation of a flight, assignment of the cargo to be flown, and specific implementation instructions for Space Shuttle operations personnel.

**Flight Operations Planning**

The controlling document of Space Shuttle flight planning required to prepare for a given flight. This planning includes allocation of consumables, analyses and preparation of flight rules, assembly of consoles, handbooks, and contingency recovery procedures.

**Flight Phases**

Prelaunch, launch, onorbit, deorbit, entry, landing, and postlanding are flight phases.

**Flight Readiness Firing (FRF)**

The Shuttle vehicle is stacked on the launch pad, and a Countdown Demonstration Test (CDDT) performed (designed to duplicate to the fullest possible extent an actual launch countdown).

Propellant loading occurs in a normal launch sequence, culminating a 20-second FRF, then engine shutdown after 20 seconds of sustained firing completes this milestone.

**Free Flyer**

A spacecraft with a specific dedicated mission that may require servicing and maintenance by the Station but not associated with one of the platforms. They may have a translation capability.

**General Purpose Computer (GPC)**

A GPC is one of five computers which receive and transmit to and from interfacing hardware via the data bus network. GPC also contains the software that provides the main on-board processing capability.

**Geosynchronous/Geostationary Satellite**

A Spacecraft in Earth orbit with a period of one sidereal day is considered geosynchronous. If its eccentricity and inclination approach zero, the satellite is further defined as geostationary.

**Green Run**

Hot-fire acceptance test of a rocket engine component; for example, turbopump.

**Ground Control (GC)**

A Shuttle/Station MCC console position. This position directs the implementation of all Maintenance and Operation (M&O) activities affecting the Mission Control Center (MCC) hardware, software, and supporting facilities. This position is also responsible for coordinating the Spaceflight Tracking and Data Network (STDN) and the Tracking and Data Relay Satellite System (TDRSS) network operations with the Goddard Space Flight Center (GSFC) network operations.

**Ground Data Systems Manager (GDSM)**

Personnel in this Multipurpose Support Room (MPSR) are responsible for maintaining cognizance of all ground resources.

**Ground Operations**

Operations at the launch and landing sites that are the total of all functions required to accept Space Station (SS) and/or Shuttle hardware and software to prepare them for launch and recovery.

**Ground Processing Personnel (GPP)**

- (1) Ground-based personnel who support the launch and landing site functions for launch and recovery.
- (2) Personnel associated with Space Station Program prelaunch/postlanding operations and logistics support regardless of which NASA center/International Partner they represent.



**Ground Support Equipment (GSE)**

Nonflight equipment, implements, and devices required for the handling, servicing, inspection, testing, maintenance, alignment, adjustment, checking, repairing, and overhauling of an operational end item, or component of subsystem.

**Ground Support Personnel (GSP)**

Ground-based personnel who directly support the onboard operation of the Space Station. GSP consist of Mission Control Center (MCC) controllers, Payload Operations Integration Center (POIC) controllers, International Partner (IP) control center personnel, Engineering Support Control (ESC) personnel, users, and instructors.

**Growth**

The evolution from the initial configuration to achieve the necessary scarring of the initial design to provide increased capacity in features such as crew size, power level, number of modules, and addition of new capability.

**Guidance, Navigation, and Control System (GN&C)**

An integrated system that provides the capability for guidance, navigation, attitude stabilization control, orbit adjustment, and support to proximity operation/vehicle control.

**Guidance, Navigation, and Control (GNC) Systems Engineer**

A Shuttle MCC console position. The GNC System Engineer is responsible for vehicle guidance, navigation and control systems. GNC monitors the thrust vector control system and navigation sensors, notifies FLIGHT of impending aborts, and recommends malfunction procedures to the flight crew which are not acted upon by onboard vehicle autonomously.

**Guidance Officer (GDO)**

A Shuttle MCC console position. The GDO (pronounced “gido”) is responsible for onboard navigation. Primarily, this officer provides expertise in the area of guidance equations used by onboard software.

**Habitation Module (HM)**

A pressurized, environmentally-controlled module to accommodate Space Station crewmember crew-systems equipment such as the galley/wardroom, health maintenance/exercise and personal hygiene equipment, a command/control workstation, equipment containers and restraints, and miscellaneous storage systems.

**Handover**

The transfer of operational responsibility from one entity to another; for example, handover between arriving and departing crews from the Station between work shifts onboard the Space Station (SS) or between Ground Support Program (GSP) shifts on the ground.

**Horizontal Situation Indicator (HSI)**

A Shuttle instrument that displays a pictorial view of the vehicle’s position with respect to various navigation points.



**Housekeeping Equipment**

The materials and equipments are used for cleaning operations in the waste management compartment, the dining area, and the cabin air filters.

**Houston TV Coord (HOUSTON TV)**

A Shuttle MCC console position. This position is the focal point for video distribution to the Mission Control Center (MCC) and the Payload Operations Control Center (POCC). By working with the building 8 video facility, HOUSTON TV supports downlink video capture, video distribution requirements, and actual video distribution.

**Huntsville Spacelab Support Manager (SMGR)**

A Shuttle MCC console position. The SMGR is responsible for overall Spacelab Systems support, including the Huntsville Support Room (HSR) activities. The SMGR is located in the Mission Action Center (MAC) and controls the decisions and commits support resources relative to Spacelab systems.

**Inactive Support**

Support not currently scheduled because of technical and/or administrative factors, but formally committed for an orbiting Spacecraft. This condition exists when network resources provide less than one scheduled contact per 90 days.

**Inclination**

An inclination is the angle between the plane of the orbit and the equatorial plane.

**Increment Operations Plan (IOP)**

An increment is an intercenter execution-level plan. The plan defines the Space Station (SS) on-orbit system and user payloads operations required to satisfy the increment-specific goals and objectives as defined by the Technical Operations Plan (TOP) and Increment Definition Requirements Document (IDRD). Three releases (preliminary, basic, and final) are planned.

**Indenture**

A method of showing relationships to indicate dependence and an order of dependence. Indenturing provides a top-down breakdown of an item into its assemblies, subassemblies, components, and parts.

**Independent Operations**

Those periods when a space vehicle downlink and command uplink are through a communications system separate from that of the shuttle or Space Station Manned Base (SSMB).

**Inertial Upper Stage (IUS)**

Solid propulsive upper stage designed to place spacecraft on high Earth orbits or on escape trajectories for planetary missions.

**In-Flight Maintenance Checklist**

This Flight Data File (FDF) document contains the approved In-Flight Maintenance (IFM) list and procedures. It provides an accessible fuse list and equipment and tool locations as well as hardware graphics.

**In-Flight Maintenance/Crew Systems (IFM)**

A Shuttle MCC console position. The In-Flight Maintenance/Crew Systems console maintains a database (drawings, photos, wiring, plumbing, and avionics information) on all Space Shuttle Program (SSP) systems in the orbiter crew module. The IFM position develops IFM procedures during preflight and real-time operations based on known or suspected failures, and coordinates IFM efforts within the Mission Control Center (MCC). IFM is also responsible for orbiter standard stowage equipment.

**Initial Delivery**

The initial delivery is the date of delivery for the first item of equipment to be delivered under terms of the contract. Acceptance of the equipment by the site activation office completes this milestone.

**Initial Operational Capability (IOC)**

The point in time at which the first operational configured Space Shuttle vehicle is prepared for flight. Successful completion of Design, Development, Test, and Evaluation (DDT&E) and certification of flight hardware completes this milestone.

**In Situ**

Literally “in place.”

- (1) Refers to performing maintenance and servicing of Free-Flyers (FF) in their operational orbit. In situ operations require the delivery of maintenance or servicing elements via a maneuvering vehicle such as the Shuttle.
- (2) Refers to performing maintenance and servicing of space components at their operating location in the Space Station using the Mobile Servicing Center (MSC).

**Instrument Pointing Subsystem (IPS)**

Spacelab hardware and software for precision pointing and stability for experiment equipment.

**Instrumentation and Communications Officer (INCO)**

A Shuttle MCC console position. The INCO is charged with monitoring and managing the combined Space Transportation System communications and data systems during all flight phases. INCO also manages the payload recorder and Modular Auxiliary Data System (MADS) recorder operations.

**Integration**

A combination of activities and processes to assemble payload and Space Shuttle components, subsystems, and system elements into a desired configuration and to verify compatibility among them.

**Interface Control Document (ICD)**

A document containing the design implementation of the interface requirements in the Space Station mission and ground systems specifications. Both sides of the interface are described. Interfaces are mechanical, structural, electrical, avionics, radio frequency, environmental, functional, or operational.

**Interface Verification**

The testing of flight hardware interfaces by an acceptable method that confirms that those interfaces are compatible with the affected elements of the Space Shuttle.

**International Partner (IP)**

Any of the partners participating in the design, development, and operation of the Space Station Program (SSP), that is, National Aerospace and Space Administration (NASA), Canadian Space Agency (CSA), National Aeronautics Space Development Agency (NASDA), European Space Agency (ESA), and Russian Space Agency (RSA).

**Laboratory Module (LM)**

A pressurized module designed to accommodate research in scientific, technological, and commercial areas.

**Laboratory Support Equipment (LSE)**

Program supplied equipment such as multimeters, microscopes, cameras, etc.

**Landing**

One of the flight phases. Landing begins at the Terminal Area Energy Management (TAEM) interface and continues to guidance lock-on to the steep outer glide slope, and ends at wheels stop.

**Launch**

One of the flight phases. Launch starts as the flight crew ingress into the Shuttle.

**Launch Pad**

The area at which the stacked Space Shuttle or any other rocket undergoes final prelaunch checkout and countdown and from which it is launched.

**Launch Processing System (LPS)**

The LPS is a high-speed digital computer-operated checkout system used to support test, checkout, launch control, and operational management of launch site ground operations.

**Launch-Readiness Verification**

This verification process ensures the continuing operational capability of the Space Shuttle system, upper stages, and spacelab before launch.

**Launch Site Support Manager (LSSM)**

An individual at the launch site center who is the single point-of-contact for users in arranging payload processing at the launch site.

**Launch/Entry Suit (LES)**

Suit used to protect crewman from environmental extremes during launch and entry.

**Life Support (LIFE SUPPORT)**

A Shuttle MCC console position. LIFE SUPPORT reports to Environmental Engineer and Consumables Manager (EECOM) and is responsible for all orbiter life support systems, including fire/smoke detection, Aft Reaction Control System (ARCS), galley, and waste water systems.

**Load Factor (LF)**

The percentage of the orbiter's total capability (for payload length or weight) required by a shared-flight user.

**Logistics**

The management, engineering, and support activities required to provide personnel and materials, consumables and expendables to the spacecraft elements reliably and in a cost-effective manner.

**Long Duration Exposure Facility (LDEF)**

A free-flying retrievable satellite designed primarily for small passive or self-contained active experiments that require prolonged exposure to space. The LDEF is launched in the orbiter payload bay and deployed and retrieved by the remote manipulator system.

**Maintainability**

The design, installation, and operating characteristics of an item that enable it to be retained in or returned to a specified operational condition by expending resources at an acceptable rate using prescribed procedures.

**Maintenance**

The actions taken to retain an item in a specified condition by providing systematic inspection, detection, and servicing for the prevention of incipient failure, and the action taken to restore an item to a specified operational condition. This action includes fault isolation, item replacement, repair, and verification that the item is serviceable.

**Maintenance, Mechanical Arm, and Crew Systems (MMACS)**

A Shuttle MCC console position. The MMACS position provides real-time technical and management support for the Remote Manipulator System (RMS), Auxiliary Power Unit (APU)

hydraulics, payload bay doors, and Extravehicular Activity (EVA) airlock to ensure that mission objectives are accomplished.

**Maneuver (burn)**

Change in attitude or translation of the orbiter, generally using the Orbital Maneuvering System (OMS) or Reaction Control System (RCS).

**Manipulator Arm**

A kind of crane, jointed like a human arm, used in space for moving objects.

**Manned**

A word used to describe a vehicle that contains people. A manned spacecraft contains astronauts.

**Manned Maneuvering Unit (MMU)**

A self-contained, propulsive backpack device designed to supplement astronaut EVA for Extravehicular Activity (EVA). The MMU uses a low-thrust dry, cold nitrogen propellant to maneuver outside the confines of the orbiter P/L bay.

**Manned Space Laboratory Control Centre**

European center for monitoring and control of operations, for supporting monitoring and control of Columbus Attached Laboratory (CAL) operations, and for coordinating European-sponsored Space Station (SS) and payload operations.

**Manual Control**

The control or movement of a vehicle or machine by a person.

**Manual Procedure**

A procedure in which each step, action, or command statement is executed by the crew or ground personnel.

**Mature Operations Phase**

The continuous period of activity beginning with the establishment of the configuration of the International Space Station Alpha (ISSA) that provides a permanently manned capability in space, and continuing thereafter throughout the lifetime of the program. Mature operations embodies the management and operation of all subsequent growth and evolution.

**Mechanical Systems Support (MECHANICAL)**

A Shuttle MCC console position. The MECHANICAL position is responsible for assisting the Maintenance, Mechanical Arm, and Crew Systems (MMACS) in real-time monitoring, analysis, and control of the orbiter mechanical systems.

**Message and Timeline Support (MATS)**

A Shuttle MCC console position. The MATS console is a Flight Activities Officer (FAO) support position that is responsible for preparing data for uplink to the crew via the TAGS

Interface Router (TIR). MATS is also responsible for downlink and uplink of Portable Audio Data Modem (PADM) files and assists with generation of timeline updates.

**Mission**

The performance of a coherent set of investigations or operations in space to achieve program goals. A single mission might require more than one flight, or more than one mission might be accomplished on a single flight.

**Mission Control Center (MCC)**

Central area at Johnson Space Center (JSC) for command and control and support of all phases of manned space flights.

**Mission-Dependent Equipment**

Optional equipment that can be added to a flight if needed for the mission involved.

**Mission-Independent Equipment**

Support equipment that is carried on every flight.

**Mission Manager (MISSION MANAGER)**

This is a Customer Support Room (CSR) Console position. The Mission Manager (MM) is the controlling authority for all payload decisions and commitments. The MM exercises approval authority for issues concerning the payload.

**Mission Orbit**

That orbit into which a spacecraft is placed for the purpose of meeting mission objectives.

**Mission Planning (MP)**

The preparation and updating of plans both before and during a mission for operations and resource utilization. Within the definition, resources means on-ground and all onboard resources, including payload time, crew time, time in microgravity.

**Mission Planning System (MPS)**

The execution planning system used by the Payload Operations Integration Facility (POIF) planning teams, developed and housed by Marshall Space Flight Center (MSFC).

**Mission Preparation**

All activities required to set up a functioning operations system from the early project inception until liftoff.

**Mission Simulation**

Rehearsal of the parts of the mission, utilizing real procedures, timeline, ground facilities, and personnel.

**Mission Specialist (MS)**

This crewmember is responsible for coordination of overall payload/Space Transportation System (STS) interaction and, during the payload operations phase, directs the allocation of the STS and crew resources to the accomplishment of the combined payload objectives. The MS has prime responsibility for any experiments to which no payload specialist has been assigned and/or assists the payload specialist when appropriate.

**Mission Station**

A location on the orbiter Aft Flight Deck (AFD) from which payload support operations are performed, usually by the Mission Specialist (MS).

**Mixed Payloads**

Cargo containing more than one type of payload.

**Mobile Launch Platform (MLP)**

The structure on which the elements of the Space Shuttle are stacked in the Vehicle Assembly Building (VAB) and are moved to the launch pad.

**Mobile Remote Servicer (MRS)**

A part of the Canadian-provided Mobile Servicing Center (MSC) for International Space Station (ISSA), which consists of one manipulator arm and supporting structure for this arm and for electronics, payload, and Extravehicular Activity (EVA) support equipment.

**Mobile Servicing Center (MSC)**

- (1) The Station's mobile Remote Manipulator System (RMS) facility, consisting of one or more Canadian-provided manipulator systems and a U.S.-provided transport mechanism.
- (2) The combination of the Mobile Transporter (MT) and the Mobile Remote Servicer (MRS) viewed as an entity.

**Mobile Transporter (MT)**

An International Space Station Alpha (ISSA) flight element whose primary function is to provide the Mobile Remote Servicer (MRS) with mobility. This transporter also provides the capability for movement of supplies, materials, and personnel independent of the MRS.

**Mobility Aid**

Handrails or footrails to help crewmembers move inside/outside the spacecraft.

**Mockup**

A full-size physical replica of flight hardware or ground system hardware. The mockup usually provides a visual/geometric representation but little or no functional fidelity. Compare with simulator and trainer.

**MOD Payload Representative (SPAN OPS)**

This is a Customer Support Room (CSR) Console position. The Mission Operations Directorate (MOD) Payload representative serves as the MOD/SPAN interface for payload problems

requiring Space Shuttle Program (SSP) engineering support and is the MOD management contract for the Cargo Management Team (CMT) Chairman.

**Module**

Pressurized manned laboratory suitable for conducting science, applications, and technology activities.

**MSFC Representative (MSFC REP)**

This is a Customer Support Room (CSR) Console position. The MSFC REP is responsible for providing the interface between the MSFC Spacelab (SL) office and the Space Radar Lab (SRL) Mission Manager.

**Multilateral**

Referring to functions performed by consolidating inputs provided separately by each partner. The Multilateral Control Board (MCB), System Operations Panel (SOP), and User Operations Panel (UOP) are examples of multilateral functions.

**Multimission Modular Spacecraft**

Free-flying system built in sections so that the system can be adapted to many missions requiring Earth-orbiting remote-sensing spacecraft. The spacecraft is launched in the orbiter payload bay and deployed and retrieved by the Remote Manipulator System (RMS).

**Multiple Payloads**

More than one separate payload carried in the payload bay.

**Multipurpose Support Rooms (MPSR)**

The primary function of each MPSR is to provide a control center back room where other flight controllers are located to give direct support to the flight control team in the front room on both a routine and on-call basis.

**Multistage Rocket**

A large rocket made up of several separate rockets mounted one on top of the other.

**Multiuse Mission Support Equipment**

Hardware available at the launch site for handling payloads, or common flight hardware used by various payload disciplines.

**Nadir**

The point on the celestial sphere vertically below the observer, or 180 degrees from the zenith.

**NASA Space Station Program**

The part of the Space Station Program directly managed and funded by NASA. Similarly, each partner has its own Space Station Program (names to be provided by each partner).



**Node**

A Cylindrical Space Station element. Contains hatches and other equipment to interconnect the modules, airlocks, and pressurized attached payloads. Contains distributed systems and may provide control station functions.

**Nominal Mission Profile**

The profile begins at launch, Solid Rocket Booster (SRB) separation, orbit insertion and circularization, orbital operations, and deorbit then ends at landing.

**Non-Integrated Mission Simulations**

Mission simulations involving at least one training facility but not simulating the control center involved.

**Nonquiescent Periods**

These periods include orbiter proximity, docking and undocking operations, Space Station reboost and attitude control operations, Space Station vent/dump operations, and crew Extravehicular Activity (EVA) operations.

**Off-Line**

An activity conducted by a payload owner independent of any Space Shuttle element (for example, tug or spacelab). Normally, the activity is conducted in a separate facility.

**OMS 2**

Orbit insertion burn performed at the apogee of the first orbit.

**On-Orbit**

One of the flight phases. On-orbit starts at Orbital Maneuvering System (OMS)-2 cutoff and continues through deorbit burn ignition.

**Operating Center**

A major facility for carrying out spacecraft operations.

**Operational Readiness Date (ORD)**

The date that a facility, including all systems and equipment, is operationally ready and is turned over to the user/operator for operational training and systems familiarization before first use in support of flight hardware checkout.

**Operations Planning**

The Ops Planner performing those tasks that must be done to ensure that vehicle systems and ground-based flight control operations support flight objectives.

**Operations Support Officer (OSO)**

A Station MCC console position. This position is responsible for systems and procedures pertaining to maintenance, logistics and structure.

**Operations Window (OW)**

A scheduled period during which all required resources are available and all constraints and environmental rights are satisfied such that an activity or set of activities may be executed.

**Opportunity Mission**

A payload revisit option for retrieval or servicing done at NASA's convenience when an orbiter is near the orbiting payload requiring revisit.

**Optional Flight Systems**

Hardware and items that can be integrated into the orbiter, at additional cost to the user, to launch payloads to geosynchronous transfer orbits (upper stages), to extend basic orbiter capabilities (flight kits), or to provide a general-purpose laboratory in near-Earth orbit (spacelab).

**Orbit**

One of the flight phases. Orbit starts at Orbital Maneuvering System (OMS)-2 cutoff and continues through deorbit burn ignition.

**Orbital Maneuvering Subsystem (OMS)**

Two orbiter engines that provide the thrust to perform orbit insertion, circularization, or translation; rendezvous; and deorbit.

**Orbiter**

Manned orbital flight vehicle of the Space Shuttle system.

**Orbiter Processing Facility (OPF)**

A building near the Vehicle Assembly Building (VAB) at Kennedy Space Center (KSC) with two bays in which the orbiter undergoes postflight inspection, maintenance, and premate checkout before payload installation. Also, payloads are installed horizontally into the orbiter in this building.

**Orbit Replaceable Unit (ORU)**

The lowest level of hardware that can be removed and replaced on location under orbital conditions.

**Pallet**

An unpressurized platform, designed for installation in the orbiter payload bay, for mounting and carrying instruments and equipment requiring direct space exposure to and from the Space Station.

**Pallet Train**

More than one pallet rigidly connected to form a single unit.

**Parking Orbit**

A preliminary orbit into which a spacecraft is injected prior to maneuvers placing the spacecraft into its mission orbit or intermediate orbit.

**Partner**

Any participant involved in the design, development, and operation of the International Space Station Alpha (ISSA). See also International Partner (IP).

**Payload Bay**

The unpressurized mid part of the orbiter fuselage behind the cabin aft bulkhead where most payloads are carried. Its maximum usable payload envelope is 15 ft (4.6 meters) in diameter and 60 ft (18.3 meters) long. Hinged doors extend the full length of the bay.

**Payload Canister**

An environmentally controlled transporter for use at the launch site. It is the same size and configuration as the orbiter payload bay.

**Payload Changeout Room**

An environmentally controlled room at the launch pad for inserting payloads vertically into the orbiter payload bay.

**Payload Command Controller (PAYCOM)**

A Shuttle MCC Console Position. The PAYCOM reports to PAYLOADS and is responsible for coordination and control of all payload commands, including commands originating from the Payload Operations Control Center (POCC) and payload commands originating from the Mission Control Center (MCC). PAYCOM coordinates with C-COMMAND/X-COMMAND, Measurement of Air Pollution in Satellites (MAPS) ENGINEERING, HOUSTON COMMAND, COMM SUPPORT and INCO on all commanding activities and anomalies.

**Payload Data Engineer (PAYLOAD DATA)**

A Shuttle MCC Console position. The PAYLOAD DATA reports to PAYLOADS and has in-flight responsibility for payload data systems interface with the orbiter, though support may be provided by ancillary personnel as determined by the complexity of the flight. PAYLOAD DATA is also responsible for coordinating Payload Operations Control Center (POCC) facility problems with Ground Control (GC).

**Payload Development Center**

NASA science payload/payload facilities are developed at or under the direction of NASA field centers chosen by the Office of Space Science and Applications (OSSA). The development center has overall responsibility for the design fabrication, assembly, test, and verification of the payload/facility hardware and software. The development is performed under the specifications designated by the development center to ensure that the science objectives are met. It is at these development centers that the onboard crew and other users receive the science background and individual payload operations training related to the payload/facility.

**Payload Officer (PLO)**

A Shuttle MCC Console position. The PLO is the principal Johnson Space Center (JSC) interfacing authority in the Flight Control Room (FCR) for Payload Operations Control Center (POCC) operations.

**Payload Operations Control Center (POCC)**

A central area, located at any of the three NASA centers, from which payload operations are monitored and controlled. The user, in many instances, has direct command of a payload from this control center.

**Payloads Operations Director (POD)**

A POCC Console Position. The POD is located at the Space Radar Lab (SRL) Payload Operations Control Center (POCC). The POD coordinates payload operations inputs from and resolves conflicts between the Spaceborne Imaging Radar-C (SIR-C)/X-band Synthetic Aperture Radar (X-SAR) and Measurement of Air Pollution in Satellites (MAPS) Operations Directors. The POD serves as the controlling authority for all payload communication activities. The POD also serves as the operational counterpart of the SRL Mission Manager and coordinates payload-related recommendations and GO/NO-GO calls with the Space Radar Laboratory-1 (SRL-1) Mission Manager. This person is the customer's primary authority for payload operations and has a direct interface to the launch and flight teams on matters involving payload operations. Direct payload readiness calls through operational channels are coordinated with the Mission Manager. The POD is responsible for the integration/resolution of SIR-C/X-SAR/Applied Physics Lab (APL)/MAPS joint operational issues. Support is provided by an Assistant Payload Operations Director.

**Payload Operations Integration Center (POIC)**

(1) The facilities and capabilities required to perform the user (payload) operation integration function. (2) The content of (1) plus the organization and personnel who use this content to perform these functions, including the personnel provided by all the partners. While these personnel administratively belong to their respective partner agency, they are part of the integrated POIC-based teams, fulfilling team roles in function management and execution. (3) The portion of the Huntsville Operations Support Center (HOSC) facility at Marshall Space Flight Center (MSFC) used for Space Station payload operations integration.

**Payload Procedure Development System**

The system for developing and managing International Space Station Alpha (ISSA) payload procedures in electronic form and printing hard copies of the procedures. Manual, automatic, and semiautomatic procedures can be created and stored in this system.

**Payloads Safety**

A Shuttle MCC console position. The MER PAYLOADS SAFETY is responsible for assessing the safety impacts of in-flight anomalies, payload flight rules, and launch commit criteria. PAYLOADS SAFETY accommodates SPAN-Mission Evaluation Room (MER) requests as related to safety impacts.

**Payload Scientist (PS)**

A crewmember whose primary responsibility and skills are the operation and servicing of a specific payload or set of related payloads. A PS is not a career astronaut position.

**Payload Specialist (PS)**

This Shuttle crewmember, who may or may not be a career astronaut, is responsible for the operation and management of the experiments or other payload elements that are assigned to him or her, and for the achievement of their objectives. The Shuttle payload specialist is an expert in experiment design and operation. An individual(s) other than a NASA astronaut whose presence is required onboard the Space Shuttle to perform specialized functions or other essential mission activities.

**Payload Station**

Location on the orbiter aft flight deck from which payload-specific operations are performed, usually by the payload or mission specialist.

**Payload Supplier**

Owner/operator of any Space Shuttle payload.

**Payload Support Equipment**

Standard laboratory equipment such as microscopes, low temperature freezers, and mass measuring units, employed for the specific purpose of supporting the operation of a payload or the conduct of a specific experiment. (This term is used synonymously with the term Payload Support Systems (PSS)).

**Payload Systems Engineer (PAYLOAD SYSTEMS)**

A Shuttle MCC console position. The PAYLOAD SYSTEMS is responsible for supporting PAYLOADS and is responsible for assisting PAYLOADS in providing configuration and status in support of the payload support systems and orbiter interfaces.

**Peculiar Part**

Any part that must be produced to order in accordance with a particular drawing and/or specification. Any part requiring a flight certification is classified peculiar. Also, normally standard parts that must be selectively accepted (to criteria different from the usual standard part requirements) is considered peculiar.

**Permanent Human Presence Configuration (PHC)**

A Space Station configuration allowing continuous habitation by the crew.

**Pilot (PLT)**

This Shuttle crewmember is second in command of the flight and assists the commander as required in the conduct of all phases of orbiter flight.

**Planning Center**

An entity with an interface between the Payload Operations Integration Center (POIC) and user to support pre-increment and increment payload operations planning.

**Playback Data Flow Engineer (PLAYBACK)**

A Shuttle MCC console position. PLAYBACK is responsible for operational status/control of playback data from the Ground Spacecraft Tracking and Data Network (GSTDN) through the Network Interface Processor (NIP) to the Mission Operations Center (MOC). PLAYBACK is also responsible for Mission Control Center (MCC) playback of all orbiter telemetry data.

**POCC Communicator (POCC COMM)**

A POCC console position. POCC COMM is responsible for direct Payload Operations Control Center (POCC) to crew communications. Payload communications are controlled by the Payload Operations Director (POD). POCC COMM responds to the crew during payload activities. POCC COMM cannot assume answers to specific questions from the crew without the POD having coordinated payload team concurrence.

**POGO**

A situation of coupled oscillations between a vehicle propellant feed system and the propulsion system.

**Pointing (POINTING)**

A Shuttle MCC console position. The POINTING console is a Flight Activities Officer (FAO) support position responsible for all attitudes and attitude maneuvers performed by the orbiter vehicle. POINTING monitors the real-time execution of the attitude timeline and computes new attitudes and maneuvers as need to support Space Shuttle Program (SSP) and payload requirements.

**Post Mission**

Activities required to formally complete and evaluate the mission with respect to space and ground segment performance and technological feedback.

**Power, Heating, Articulation, Lighting Control Officer (PHALCON)**

A Station MCC console position. This position is responsible for all aspects of the Station electrical system.

**Prelaunch**

The activity begins at Kennedy Space Center (KSC) with start of the launch countdown and ends at liftoff.

**Pressurize**

To alter the air inside the cabin of a spacecraft or inside a space suit to make it the same as the air on the ground.

**Principal Investigator**

Research scientist who is in charge of the conduct of an experiment carried by any Space Shuttle element.

**Probe**

An unmanned spacecraft sent to examine something at close range.

**Procedure**

An approved method of attaining an objective through the execution of a predetermined sequence of steps, actions, or commands.

**Program**

An activity involving manpower, material, funding, and scheduling that is necessary to achieve desired goals (for example, Shuttle Program, International Space Station Alpha (ISSA) Program, etc.).

**Propulsion Systems Engineer (PROP)**

A Shuttle MCC console position. The PROP position has overall responsibility for orbiter maneuver and attitude control propellant budgeting. PROP determines whether propellant exists to perform additional maneuvers not scheduled in the preflight published Flight Plan. PROP is responsible for monitoring and evaluating the performance of the Orbital Maneuvering System (OMS) and Reaction Control System (RCS) systems.

**Proximity Operations**

The operations of one spacecraft in the vicinity of another with the relative positions stabilized and the rate small enough to preclude the requirements for re-rendezvous.

**Public Affairs Office (PAO) Audio Control Room (ACR)**

A Shuttle MCC console position. The PAO ACR controls the selection of audio program sources available at Johnson Space Center (JSC) for transmission on NASA select, mission audio, and other programmable release circuits. ACR is responsible for switching of audio sources in support of the TV circuit as well as the remote Payload Operations Control Center (POCC) Support Audio circuit.

**Public Affairs Officer (PAO)**

A Shuttle MCC console position. The PAO controls the direction and selection of video program sources available at Johnson Space Center (JSC) for transmission on National Aeronautics and Space Administration (NASA) select and other programmable release circuits. PAO also releases announcements about the status of the flight.

**Quiescent Period**

A duration of time during which a low-vibration (microgravity) environment is imposed.



**Reaction**

Movement that comes as a result of an earlier action. When the fuel in a rocket burns, a jet of gases shoots out of the back. The reaction in this instance is when the rocket is pushed in the opposite direction in which the gases are moving.

**Reaction Control System (RCS)**

Attitude and translation jets on the nose and tail of the orbiter (38 primary and 6 vernier). Thrusters on the orbiter that provide attitude control and three-axis translation during orbit insertion, on-orbit, and entry phases of flight.

**Ready to Support**

The date that equipment/facilities are required to support a project/facility milestone. First operational use of the equipment/facilities completes the milestone.

**Reboost**

Raising the Station's orbital altitude to compensate for atmospheric drag or station-induced factors, such as propulsive venting. Reboost is accomplished using Station propulsion by near-continuous thrusting or with discrete burns at regular intervals.

**Reconfiguration**

The process of changing the operational status of a system such that its functionality is provided by alternate strings of equipment.

**Recovery**

The process of restoring a system capability following a failure. This includes restoration of all redundancy levels.

**Remote Manipulator System (RMS)**

Mechanical arm on the payload bay longeron. It is controlled from the orbiter aft flight deck to deploy, retrieve, or move payloads.

**Remote Manipulator and Mechanical Systems Engineer (RMU)**

A Shuttle MCC console position. The RMU position monitors the latching, unlatching, and general operation of the remote manipulator arm; and the orbiter structural and mechanical systems, including the APU/hydraulics system. RMU operates the specialist console during the mature operations phase.

**Remote Sensing**

The use of instruments, such as radar, cameras and heat sensors, to obtain information about the surfaces and atmospheres of distant objects, such as planets or Earth, by recording the different types of radiation coming from them.

**Rendezvous**

The process of bringing two spacecraft together.



**Resource Allocation**

An assignment quantity of a particular resource to a system and/or designated groups or individuals (system/payload users).

**Retrieval**

The process of using the Remote Manipulator System (RMS) and/or other handling aids to return a captured payload to a stowed or berthed position. A payload is not considered retrieved until it is fully stowed for safe return or berthed for repair and maintenance tasks.

**Retro-rocket**

A rocket used for slowing down a spacecraft. It fires in the opposite direction from the main rocket engines.

**Return to Launch Site (RTLS)**

Abort in which the orbiter returns to the runway at the Kennedy Space Center (KSC).

**Robotics Operations and Systems Officer (ROSO)**

A Station MCC console position. This position is responsible for all activities involving U.S. robotic systems.

**Rotating Service Structure (RSS)**

An environmentally controlled facility at the launch pad used for inserting payloads vertically into the orbiter payload bay.

**Sample Return Probe**

A special type of space-probe that soft-lands on another body, such as a planet, scoops up some rocks or soil, and then returns to Earth with the sample.

**Scheduled Maintenance**

Any repetitive maintenance action deemed necessary to ensure the functional success of equipment, including periodic servicing and replacement of time/cycle components.

**Scientific Discipline**

Field of specific scientific research activities.

**Secondary Payload Representatives**

A Shuttle CSR position. Shuttle Amateur Radio Experiment (SAREX OPS), Getaway Special (GAS RED), and DOD REP. These are representatives from Shuttle.

**Semi-Automated Procedure**

A Space Station procedure which consists of (1) steps, actions, or command statements that are executed by crew or ground personnel and (2) time-tagged command statements executed by onboard software.

**Service Module**

Part of the Apollo spacecraft, attached to the command module until just before entry. It contained instruments, fuel cells, food for the crew, a main rocket motor and fuel tanks.

**Short Term Plan (STP)**

The overall product of the short-term planning process that contains the data required to support and execute Space Station system and payload operations during a given week of an increment.

**Shuttle Data Processor (SDP) TLM History (HISTORY)**

A Shuttle MCC console position. The HISTORY controller is responsible for controlling Near Real-Time (NRT) telemetry resources and ensuring that NRT is used with maximum efficiency. HISTORY also oversees NRT troubleshooting procedures with Payload Operations Control Center (POCC) users.

**Snoopy Hat**

A communication carrier which connects helmet to the Extravehicular Mobility Unit (EMU) suit's communications umbilical.

**Soft Dock/Soft Capture**

An initial temporary attachment made between two or more pieces of equipment that prevents inadvertent release prior to permanent attachment.

**Soft-Lander Probe**

A type of space probe that lands gently on the surface of another body, such as a planet, so that it is undamaged.

**Solid Rocket Booster (SRB)**

An element of the Space Shuttle that consists of two solid rocket motors to augment ascent thrust at launch. They are separated from the orbiter soon after liftoff and are recovered for reuse.

**SRB Descent and Recovery**

The Solid Rocket Booster (SRB) descent and splashdown phase to recover the SRB.

**Spacelab**

A general-purpose laboratory for manned and automated activities in near-Earth orbit. Spacelab includes both module and pallet sections, which can be used separately or in several combinations and are mounted on the Shuttle payload bay.

**Spacelab Chief Engineer (H-S-C-E)**

An HOCC position responsible for overall management of the Huntsville Support Room (HSR), provides a focal point for communications via external interfaces, and responds to actions/issues concerning Spacelab systems. The H-S-C-E provides real-time consultation and coordination with PAYLOAD SYSTEMS for anomaly resolution and workaround processing.

**Spacelab Operations Engineer (H-S-O-E)**

An HOCC position responsible for the Spacelab support team personnel, Huntsville Operations Support Center (HOSC) data systems/hardware assistance, and administrative activities in the HSR. H-S-O-E manages daily activities of HSR support personnel to ensure that tests are being accomplished as required by the H-S-C-E.

**Spacelab Operations Manager (H-SOM)**

An HOCC position responsible for providing direct assistance to H-S-C-E in problem resolution and development of technical responses. H-SOM is the primary interface to the Customer Support Room (CSR) and coordinates with H-S-C-E and subsystem personnel to ensure that spacelab problems are properly resolved and that an integrated response has been developed.

**Spacelab Representative (SL REP)**

An HOCC position responsible for acting as the interface between the Huntsville Operations Support Center (HOSC) and the Johnson Space Center (JSC) Customer Support Room (CSR). If communications are lost between the HOSC and the JSC CSR, the SL REP represents the Huntsville Support Team (HST).

**Spacelab Subsystem Support (HUNTSVILLE E-P-D-S, HUNTSVILLE E-C-S, and HUNTSVILLE C-D-M-S)**

An HOCC positions responsible for Spacelab subsystem discipline support provided in the Huntsville Support Room (HSR) for Electrical Power Distribution Subsystem (EPDS), Environmental Control System (ECS), and Command and Data Management Subsystem (CDMS). A subsystem engineer and support engineer are provided for each subsystem and either may answer to the call signs shown above. Subsystem engineers are responsible for providing expertise on specific technical disciplines. These engineers maintain a constant awareness of current subsystem status, monitor voice loops, and report developments as they occur. Subsystem engineers provide immediate subsystem status and coordinate with fellow subsystem engineers regarding total system status. They are engineering experts who are available for problem resolution.

**Space Operations**

All the operations conducted onboard Space Station and Space Shuttle plus the ground-based operations conducted in direct support of these onboard activities, including the operation of vehicle systems, network data systems, control centers, and training facilities, up to and including the interfaces with the users.

**Space Radiation Analysis (RADIATION)**

A Shuttle MCC console position. RADIATION evaluates solar flare activity and terrestrial radiological events, and establishes impacts for flight in low Earth orbit.

**Space Shuttle**

A spacecraft used to transport payloads into near Earth orbit 100 to 312 nautical miles (n.m.) above the Earth. The Space Shuttle system has the following elements: orbiter, external tank, solid rocket boosters, and three Space Shuttle Main Engines (SSMEs).

**Space Shuttle Main Engines (SSMEs)**

The reusable, high-performance, liquid propellant rocket engines with variable thrust. Three SSME engines use liquid hydrogen for fuel and cooling and liquid oxygen as an oxidizer.

**Space Shuttle Spacecraft Analysis (SPAN)**

The Space Shuttle Spacecraft Analysis (SPAN) is a mission support room, connected to the Mission Operations Control Room (MOCR) and Staff Support Rooms (SSRs) through consoles manned by flight controllers. (See SPAN MANAGER.)

**Space Station Information System (SSIS)**

The system of data networks and processing used to support real-time International Space Station Alpha (ISSA) operations.

**Space Suit**

A completely sealed suit of clothing, including helmet, gloves, and shoes. This suit is used for space travelers.

**Space Tracking and Data Acquisition Network**

A number of ground-based stations that have direct communications with NASA flight vehicles.

**Space Transportation System Associated Payload**

A specific complement of instruments, space equipment, and support hardware carried into space to accomplish a mission (or discrete activity).

**Space Tug**

An upper stage installed in the payload bay of the orbiter for the payload launch or for recovery and landing. Developed specifically with the capability for delivery, retrieval, and servicing of payloads in orbits and trajectories beyond the capability of the Shuttle alone. It is intended to be retrievable for refurbishing and multiple reuse.

**Spacecraft Analysis (SPAN) Manager (SPAN MANAGER)**

A Shuttle MCC console position. The SPAN MANAGER responds to questions from the flight controllers concerning operations of the Space Shuttle system, engineering experiments, and payload interfaces. The SPAN MANAGER receives recommendations, as required from the Space Shuttle Program Office (SSPO).

**Spin Table**

An assembly, on which is mounted the deployable payload, that contains the mechanisms for deploy which can be spun at the desired revolutions per minute for deploy from the orbiter.

**Spinning Solid Upper-Stage**

A propulsive upper-stage designed to deliver spacecraft of the Delta and Atlas-Centaur classes to Earth orbits beyond the capabilities of the Space Shuttle.

**SSP Flight Integration Manager (FIM CSR REP)**

A Shuttle CSR position. The FIM CSR REP serves as principal coordinator of Cargo Management Team (CMT) activities and acts for the CMT chairman in his/her absence.

**SSP Payload Integration Manager(s) (PIM CSR REP)**

A Shuttle CSR position. The Payload Integration Manager(s) (one for each comanifested payload) serves as the principal advisor(s) to the Cargo Management Team (CMT) for their respective payloads.

**SSP Replanner (HOUSTON REPLAN)**

A Shuttle MCC console position. The SSP Replanner is a Flight Activities Officer (FAO) support position during dual-shift flights that coordinates the replanning effort of the Mission Control Center (MCC) team and the Payload Operations Control Center (POCC).

**Station Flight Director**

A Station MCC console position. Responsible for all decisions made regarding the safe and expedient conduct of the mission.

**Station Ground Controller (GC)**

Responsible for operations and integration of the MCC and Space Network/Ground Network resources.

**Station Operator (SO)**

A crewmember whose primary responsibility is the operation and maintenance of Space Station core systems. The SO is a career astronaut position.

**Station Scientist (SS)**

The prime science and Extravehicular Activity (EVA) astronaut who performs a wide range of payload operations and servicing. In addition, the SS backs up the Station Operator (SO) in systems operation and maintenance. The SS is a career astronaut position.

**Stowing**

The process of placing a payload in a retained position in the payload bay for ascent or return from orbit.

**Strategic**

Referring to long range planning and top-level policy making functions. The focus of activity is 5-years out and beyond.

**Study Mission**

That phase of project or program planning effort in which payload content and mission objectives are initially defined.

**Sun-synchronous**

A type of orbital condition, typically between 80 and 120 degrees inclination, where the ascending node crosses the equator daily at a specified local Sun-time.

**Support Equipment**

Support items that are not an integral part of an end item but are required in the operation of the end item.

**Surgeon (SURGEON)**

A Shuttle MCC console position. The Surgeon provides medical consultation in real time and Flight Plan inputs regarding crew health and safety, monitors the physiological status of the crew, and participates in a daily review of medical data and reports. The surgeon conducts the day-to-day monitoring activities and provide operational direction and coordination for the Medical Operations Flight Control Team (MOFCT). The surgeon is on console during launch, entry, Extravehicular Activity (EVA), and all critical mission phases. During other mission phases the surgeon is on call and the biomedical engineer in Aeromed Multipurpose Support Room (MPSR) acts as medical representative.

**Suspended Support**

A mission status involving formal notification that support is not required for a specified period of time or until further notice. This is generally issued if the duration of inactivity is expected to be lengthy or permanent.

**System Control**

System Control is the central function of ground operations. System Control comprises the control and monitoring of all the elements of a spacecraft and the ground that provide support functions to enable successful operation of the platform and the payload. System control does not include specific payload control but is responsible for overall mission integrity.

**Telemetry Database Development System**

Payload Operations Integration Facility (POIF) tool for the development of the database(s) Station or Shuttle needed to support ground data processing at the Payload Operations Integration Center (POIC).

**Thermal Operations and Resources Officer (THOR)**

A Station MCC console position. THOR is responsible for Station thermal system including internal and external coolant loops.

**Thermal Support (THERMAL)**

A Shuttle MCC console position. The THERMAL position reports to the Environmental Engineer and Consumables Manager (EECOM) and is responsible for all thermal control

systems in the orbiter, including all coolant loops, the Flash Evaporator System (FES), ammonia boilers, and the supply water system.

**Thruster**

A small gas jet that works like a tiny rocket. As the gas rushes out, the thruster pushes in the opposite direction.

**Tilt Table**

An assembly, on which the deployable payload is mounted, that contains the mechanisms for deploy and can be pivoted to the desired angle for deploy from the orbiter.

**Timeline (HOUSTON TIMELINE)**

A Shuttle MCC console position. The HOUSTON TIMELINE console is a Flight Activities Officer (FAO) support position which is responsible for monitoring real-time execution of crew activities, assessing changes to the timeline, generating updated timelines, and maintaining a current list of all changes required to the Entry Flight Data File (FDF). On a dual-shift flight, TIMELINE also supports the customer's Science Ops Planning Meeting during the replanning cycle.

**Time of Ignition (TIG)**

Time of any Orbital Maneuvering System (OMS) or Reaction Control System (RCS) burn.

**Torque Equilibrium Attitude (TEA)**

The TEA is defined as the Space Station attitude where the average external disturbance torques are in balance (i.e., momentum storage requirements for control are bounded). The TEAs are established by the on-orbit Space Station configuration and the atmospheric density conditions.

**Tracking and Data Relay Satellite System (TDRSS)**

A communication system providing principal coverage from geosynchronous orbit for all Space Shuttle and Station flights.

**Transients**

Impulse accelerations or accelerations of short time duration, characterized by broad frequency content which may excite modes of various structures. Typical transients are thruster firing, crew push-offs, drawer and door closings, machinery startups, etc.

**Trajectory Support (TRAJECTORY)**

A Shuttle MCC console position. The TRAJECTORY position (referred to as TRAJ) provides support to the Flight Dynamics Officer (FDO) for orbiter maneuver planning, monitoring, and trajectory determination. The TRAJ is the primary point of contact between the FDO and personnel external to the Mission Control Center (MCC).

**Transatlantic Landing (TAL)**

Space Shuttle Flight abort to a landing site in Africa or Spain.

**Transfer Orbit**

An intermediate orbit into which a Spacecraft is placed prior to its final mission orbit.

**Unmanned**

A word used to describe a vehicle that does not contain a crew.

**Upper State**

Spinning solid upper stage or inertial upper stage. Both are designed for launch in the orbiter payload bay and have propulsive elements to deliver payloads into orbits and trajectories beyond the capabilities of the shuttle.

**Upweight**

Launch weight. Upweight refers specifically to payloads and all items required by specific payloads.

**User**

Any organization, group, or individual who uses or plans to use a Space Station element for the operation of a payload or related mission.

**Vehicle Assembly Building (VAB)**

High-bay building near the Kennedy Space Center (KSC) launch pad in which the shuttle elements are stacked onto the mobile launch platform. The building is also used for vertical storage of the external tanks.

**Voice Controller (VOICE)**

A Shuttle MCC console position. The VOICE position provides testing, configuration, and restoral action for all voice communication interfacing with the Mission Control Center (MCC).

**Zenith**

That point of the celestial sphere vertically overhead. The point 180 degrees from the zenith is called the nadir.



### **3.4 GENERAL TRAINING TERMS AND ACRONYMS**

The following procedure words and their meanings have been established:

#### **Advanced Instructor Training (AIT)**

A follow-on NASA Mission Operations Directorate (MOD) instructor training course that builds on what instructors learned in Basic Instructor Training (BIT) and introduces them to planning, conducting, and evaluating skill and procedure lessons.

#### **Advanced Training**

Generic training that covers general Space Station systems, capabilities, and ground support networks. This type of training builds on the basic knowledge and skills developed during Basic Training while laying the foundation for Increment Specific Training.

#### **Affective Domain**

Major area of learning which deals with attitudes, values, beliefs, motivation, feelings, and commitment.

#### **ASCAN Training**

Astronaut candidate (ASCAN) goes through generic Shuttle system training, referred to as 2000 level. This training includes Shuttle system overviews and trainings on all Shuttle systems. This training is generally analogous to Station advanced training.

#### **Basic Instructor Training (BIT)**

A NASA Mission Operations Directorate (MOD) instructor training course that introduces new instructors to general instructional procedures, the instructing and learning process, effective communication techniques, cognitive lesson planning, and lesson evaluation.

#### **Basic Training**

Generic training for newly selected astronauts in basic and applied sciences (such as astronomy, physiology, etc.), as well as introductory lessons in space systems design and operation. At this time crews also receive survival training and any necessary flight training.

#### **Cognitive Domain**

Major area of learning which deals with acquiring intellectual knowledge.

#### **Combined Training**

A training configuration that involves two or more mockups/trainers/simulators within one facility or between two or more training facilities, but with no control center involved.

#### **Comprehension**

Level of the cognitive domain in which students begin to develop understanding and are able to translate, interpret, and extrapolate subject matter under study.

**Computer-Aided Instruction (CAI)**

A self-paced instructional method whereby a student (usually individually) receives instruction via a workstation. This instructional method provides the student with immediate feedback on his/her progress. See also Computer-Based Training (CBT).

**Computer-Based Training (CBT)**

A self-paced instructional method whereby a student (usually individually) receives instruction via a personal computer. Generally speaking, Computer-Based Training (CBT) is the student's first exposure to systems behavior and procedures. CBT also provides the student with immediate feedback on his/her progress.

**Curriculum**

A sequenced set of courses each with a particular training objective or objectives.

**Data Store**

A set of data values defining the configuration and conditions of a system(s) at a particular point in a mission profile being simulated. This point in the simulation can be stored permanently or used temporarily.

**Degraded Time**

The duration during which the facility is usable, but planned objectives are compromised due to degraded facility performance.

**Demonstration-Performance**

A teaching method in which students observe and then practice a sequence of events designed to teach a procedure, technique, or operation. It combines oral explanation with the operation or handling of systems, equipment, or materials.

**Domain of Learning**

A broad classification of learning types. The three widely accepted domains that are used in NASA training are the cognitive (thinking, understanding), affective (attitudes, values), and psychomotor (physical skills).

**Evaluation**

The systematic process of measuring or observing and judging how well individuals, procedures, or programs have met training objectives.

**Feedback for Learning**

Information students receive from their instructors about their performance which causes them to accept guidance and take corrective action to attain the goals of training.

**Flight-Dependent Training**

Preparation of a mission or payload specialist for a specific flight, depending on the mission goals. Part of the training involves integrated simulations with the rest of the flightcrew and ground teams.

**Flight-Independent Training**

Standard preparation of a mission or payload specialist for any flight.

**Formative Evaluation**

An evaluation of student progress toward training objectives during the learning experience that is not used to record a final assessment of student achievement.

**Full Task Training (FTT)**

Training that covers all significant part-tasks within an operation or set of operations. It is flexible and versatile in terms of lesson objectives but generally focuses on the interaction of multiple systems and overlap of multiple operations.

**Generic Training**

All training that is not increment specific. Consisting of Basic Training and Advanced Training, Generic Training is received by unassigned astronauts, ground support personnel, and ground processing personnel.

**Green card**

A written failure signature provided to the student during a simulation session.

**Guided Discussion Method**

A training method in which students participate in an instructor-controlled interactive process of sharing knowledge and interpreting experiences in order to achieve a training objective.

**Increment-Specific Training**

This term applies to training for a specific increment and includes instruction in the systems, elements, and payloads specific to that increment.

**Initial Training**

Instruction designed to introduce the student to a task, discipline, or position for the first time.

**Integrated Simulation**

Simulations which involve training facilities and control centers at more than one site.

**Instructional Media**

All forms of instructional aids which give audible or visual support in a learning environment.

**Instructor**

A highly qualified individual responsible for developing instructional material and teaching crew, Ground Support Personnel (GSP), and Ground Processing Personnel (GPP) the skills, knowledge, and attitudes necessary for Space Station operation and support.

**Integrated Training**

A training configuration that involves at least one training facility plus one or more control center, all at one center. The purpose of this training is to integrate the crew and mission controllers.

**Joint Integrated Simulation**

A training session in which the Mission Control Center (MCC) and one or more Johnson Space Center (JSC) training facilities are electronically interfaced with non-JSC operations support facilities.

**Joint Integrated Training**

A training configuration that involves facilities at more than one center and includes one or more control center. This training is used to practice teamwork among crew and payloads Ground Support Personnel (GSP) as well as among crew and systems GSP.

**Knowledge**

The lowest level of the cognitive domain in which students have the ability to recall or recognize material in essentially the same form as it was taught.

**Lesson**

A class, assignment, or exercise in the training curriculum; the smallest schedulable entity of training.

**Lesson Plan**

A teaching-learning plan which includes student-centered training objectives, detailed content outline, and significant details describing the instructional elements such as media, teaching method, and length of the period.

**Level of Learning**

The degree to which a student is expected to internalize (master) a mental subject, values, or the ability to perform psychomotor skills.

**Maintenance Training**

Detailed work-oriented instructions on servicing, maintenance, overhaul, and repair of product end items, including support and facilities equipment.

**Media**

Various means of communicating or transmitting knowledge. Examples of media used in the Space Station training program are workbooks, lectures, and simulations.

**Mission Training**

Training that includes instruction in the systems, elements, and payloads specific to a mission. The crew officially begin Mission Training upon assignment to a mission. For Space Station (SS) missions, this training is identical to Increment-Specific Training.

**Onboard Training (OBT)**

Training provided to astronauts onboard the Spacecraft. The training is performed either to refresh crew skills for certain operations or to provide access to information needed for unplanned or infrequently encountered activities.

**On-The-Job Training (OJT)**

A planned program that augments other training through self-study and supervised instruction to provide expanded knowledge and job proficiency while the trainee is actually working in a duty assignment.

**Part-Task Trainer (PTT)**

A training facility (usually in the form of an “operable” trainer) designed to fulfill the training objectives of one or more parts of a larger, more complex task.

**Part-Task Training**

Training that covers a subset of the overall task or operation. Subject matter is usually limited and the lesson focused to allow the student to master the activity before advancing to the full-task training level. This is a Space Station training term.

**Payload Discipline Training**

Preparation of a mission or payload specialist for handling a specific experiment. This training is usually the responsibility of the user.

**Performance Objective**

A statement of student behavior that, if performed correctly, indicates to the instructor that the students have attained the lesson objective.

**Post test**

A test given to students upon completion of a learning experience to measure achievement.

**Pretest**

A test given to students prior to entry into a learning environment to determine entry skills or knowledge; can be used to identify portions of the instruction the students can bypass.

**Proficiency Training**

Training for the crew or Ground Support Personnel (GSP) who have achieved competence in a position or discipline initially but require some ongoing training to maintain proficiency.

**Psychomotor Domain**

A major area of learning which deals with acquiring the ability to perform discrete physical skills requiring dexterity, coordination, and muscular activity.

**Rating Scales**

Any of a number of instruments upon which instructors record their assessments of student performance through a process of observation or measurement and judgment.

**Refresher Training**

Training for astronauts and Ground Support Personnel (GSP) that occurs while they are awaiting assignment to an increment. Refresher Training includes Proficiency Training and involvement in development and test activities in order to maintain competence.

**Single System Training (SST)**

Training that covers a subset of the overall task or operation. Subject matter is usually limited and the lesson focused to allow the student to master the activity before advancing to Integrated Training. This is a Space Shuttle training term.

**Specialized Training**

Training that provides the astronauts with knowledge and skills related to specific space elements and specific types of missions. This training builds upon Basic Training and is still independent of a specific mission or increment. Upon successful completion of Specialized Training, an astronaut is eligible for assignment to a specific type of mission. See Advanced Training.

**Stand-alone Training**

Training conducted using a single training device (mockup, trainer, or simulator).

**Summative Evaluation**

An evaluation of student achievement of training objectives at the end of the learning experience. The evaluation is used to measure and report the student's standing or success in achieving the objective.

**Trainer**

A representation of flight hardware that can have a fairly high functional fidelity. It falls between a mockup and a simulator in terms of physical and functional fidelity.

**Training Script**

A preplanned sequence of events and/or activities, that may or may not be timed, supported by a set of conditions and values defining situations necessary to accomplish desired training objectives. For training and simulator testing, conditions include malfunctions and discrete inputs with values being system responses and simulator configuration.

This page intentionally left blank

**SECTION 4  
FLIGHT AND APPROACH/LANDING (A/L) SHUTTLE  
TERMS AND ACRONYMS**



This page intentionally left blank

## 4.1 TECHNICAL TERMS AND ACRONYMS

### **Aim Point Identification Light Systems (APILS)**

Equipment used to aid in the visual acquisition of the aim point when the Shuttle is landing.

### **Alpha/Mach Indicator (AMI)**

The instrument shows angle of attack (ALPHA), Vehicle Acceleration (ACCEL), Vehicle Velocity (M/VEL), and Equivalent Airspeed (EAS).

### **Altitude/Vertical Velocity Indicator (AVVIs)**

Instrument that shows the vertical acceleration (ACT ACCEL), vertical velocity (ALT Rate), Altitude (ALT), and Radar Altitude (RDR ALT).

### **Approach and Landing (A/L)**

The Shuttle approach to the runway beginning at an altitude of approximately 34,000 ft on the Heading Alignment Cone (HAC) and ending at touchdown.

### **Attitude Direction Indicator (ADI)**

An instrumentation device that provides attitude, rate, and error information to every phase of Shuttle flights.

### **Backup Flight System (BFS)**

A redundant system has capability to perform all of the primary flight system functions during Terminal Area Energy Management (TAEM), approach, and landing.

### **Body Flap (BF)**

The body flap thermally shields three Space Shuttle Main Engines (SSMEs) during entry and provides orbiter with pitch control trim during its atmospheric flight after entry.

### **Control Stick Steering (CSS)**

This CSS is a manual flight control mode. The flight crew makes manual inputs by using the Rotational Hand Controller (RHC) to fly the Shuttle.

### **Cross range**

The lateral distance that can be attained by an object from a specific point in its flight path.

### **Derotation**

A maneuver to decrease the pitch of the orbiter at a controlled rate until the nose gear is on the ground.

### **Down range**

Forward distance that can be attained by an object from a specific point in its flight path.

### **Drag Chute**

A parachute used to enhance landing and rollout margins at all landing facilities.

**Flare and Shallow Glideslope (FSGS)**

The flight phase that transitions the trajectory from Outer Glideslope Slope (OGS) to the Inner Glide Slope (IGS).

**G-Meter**

A self-contained accelerometer.

**Heads Up Display (HUD)**

A visual device in the line of vision provides the commander (CDR) and Pilot (PLT) with the guidance and vehicle configuration information required to accomplish precise and repeatable orbiter approach and landing.

**Horizontal Situation Indicator (HSI)**

The equipment shows a pictorial view of the vehicle's position with respect to various navigation points the flight crew uses to control or monitor vehicle performance. The HSI is active during the entry and landing and ascent/return to launch site phases.

**Inner Glide Slope (IGS)**

A reference path that the vehicle is near after the preflare and before the final flare.

**NORM Z**

Braking mode that fires up-firing jets.

**Nosewheel Steering (NWS)**

Used to provide lateral directional control to the orbiter.

**Outer Glide Slope (OGS)**

The OGS is an equilibrium glide path that provides sufficient energy for a safe landing.

**Orbital Maneuvering System (OMS)**

The OMS provides propulsion for orbiter vehicle during the orbit phase of flight such as orbit insertion, orbit circularization, orbit transfer, rendezvous, and deorbit.

**Post Contact Thrusting (PCT)**

Jets are fired to ensure capture.

**Precision Approach Path Indicator (PAPI) Lights**

PAPI light is visual aids for Shuttle landing. The PAPI lights are installed 6500 ft and 7500 ft from the threshold of the runway. The PAPI system has the capability to vary the light intensity to day, dawn/dusk, and night settings.

**Return to Launch Site (RTL)**

Abort in which the orbiter returns to the runway at Kennedy Space Center (KSC).

**Rollout**

Start at touchdown of main gear shuttle until the complete stop of the wheels. There are four phases of the rollout; altitude hold, derotation, coasting, and braking.

**Roll Program**

Maneuver that occurs when the orbiter clears the launch tower.

**Rotational Hand Controller (RHC)**

Controls the orbiter roll, pitch, and yaw.

**Rudder Pedal Transducer Assembly (RPTA)**

RPTA is equipment that transfers crews' input into the computer system. The RPTA contains three transducers, each generating an electrical signal proportional to the rudder pedal deflection.

**Shuttle Orbiter Arresting System (SOAS)**

System used to prevent the orbiter from rolling off the runway surface.

**Space Shuttle Main Engines (SSME)**

A high performance, liquid propellant rocket engine with variable thrust. The engine uses liquid hydrogen for fuel and cooling, and liquid oxygen as an oxidizer.

**Speed Brake/Thrust Controller (SBTC)**

Equipment that allows manual control of the speed brake.

**Surface Position Indicator (SPI)**

An indicator device displays the actual and commanded positions of the elevons, body flap, rudder, aileron, and speed brake during entry phase.

**Tailscape**

The maximum pitch altitude at which the vehicle can land and not scrape the body flap.

**Terminal Area Energy Management (TAEM)**

TAEM is a process of conserving energy required to pilot the orbiter from a velocity of 2500 ft per second all the way from approach, landing, and rollout on the runway.

**Transatlantic Landing (TAL)**

Abort to a landing site in Africa or Spain. The purpose of TAL is to provide an intact abort capability for single engine failures between 2 ENGINE TAL and PRESS TO MECO.

**Translational Hand Controller (THC)**

Controls the vehicle vertical, lateral, and longitudinal.

**Transition Initiate (TI)**

Onboard burn that starts final revolution (docking in approximately 2 hours).

**Vector Administration Table (VAT)**

Has a capacity of 93 vector slots for one flight.

**SECTION 5**  
**COMMUNICATION/INSTRUMENTATION TERMS AND ACRONYMS**

This page intentionally left blank

## 5.1 TECHNICAL TERMS AND ACRONYMS

### **Audio Central Control Unit (ACCU)**

The central switchboard of the audio distribution system for the Shuttle. It routes the voice Tactical Air Navigation (TACAN) and Caution and Warning (C&W) to the different Audio Terminal Units (ATUs) and speaker unit.

### **Air-to-Ground Voice System (AGVS)**

Equipment that processes the air voice in Ultrahigh Frequency (UHF) voice in the Mission Control Center (MCC).

### **Acquisition of Signal (AOS)**

Spacecraft is within the coverage of Tracking and Data Relay Satellite System (TDRSS).

### **Audio Terminal Unit (ATU)**

Control panels at crew stations that permit crewmembers to select audio talk/listen and control external/internal communication keying modes, as well as listen volume levels.

### **Communications Carrier Assembly (CCA)**

A communication equipment that has a headphone and microphone together in one unit.

### **Consolidated Communication Recording Facility (CCRF)**

A facility provides a historical recording of all data entering and leaving the Mission Control Center (MCC).

### **Communication Security (COMSEC) Equipment**

Equipment that provides the capability for encryption/decryption of operational data aboard the orbiter.

### **Crew Communication Umbilical (CCU) jack**

Individual panel-mounted jack at crew stations where mating headset plugs give the crew access to audio buses.

### **Deployed Electronics Assembly (DEA)**

A device that contains the transmitter. DEA is transmitted to Tracking and Data Relay Satellite (TDRS) through the Ku-band antenna.

### **Digital Voice Intercom System (DVIS)**

Communication device is used in the Mission Control Center (MCC) and training facilities.

### **Domestic Communication Satellite (DOMSAT)**

DOMSAT is a U.S. Satellite. This Satellite is used to relay data between the ground stations on the Earth.

**Downlink**

The process that sends download data from orbiter to the ground.

**Ground Command Interface Logic (GCIL)**

A system that controls selected functions of the S-band Phase Modulation (PM), the S-band Frequency Modulation (FM), Ku-band and payload communication.

**Ground Receiving and Routing Equipment (GRARE)**

A device that receives the Orbiter Downlink (OD) telemetry and various antenna drive/control signals.

**Ground Spacecraft Tracking and Data Network (GSTDN)**

Ground Network Communication used to support a ground station.

**Head Set Interface Unit (HIU)**

A communication device that has separate Push-To-Talk (PTT) buttons for transmit and intercom modes.

**HOT MIC**

A microphone that is always keyed.

**Intercom A (ICOM A) or Intercom B (ICOM B)**

A box that connects the control unit of flight crew headset. These boxes are used to communicate from Station-to-Station within the orbiter.

**Ku-band System (KU-BD)**

A communication system used to transmit information to and receive information from the ground through Tracking and Data Relay Satellite System (TDRSS). Also, Ku-band is used as a radar system for target tracking.

**Loss of Signal (LOS)**

Spacecraft is outside Tracking and Data Relay Satellite System (TDRSS) coverage.

**MADS/OEX**

A system that is used to record the engineering data during flight.

**MAN SLEW Mode**

The Man Slew Mode is one of four modes of the Ku-band system. At this mode, the antenna is allowed to be controlled manually with maximum automatic range search.

**Multiplexer and Demultiplexer (MDM)**

An electronic service that performs two functions. As multiplexers, they take data from several sources, convert the data to serial digital signals, and interleave the data into a single data stream. As demultiplexers, they take interleaved serial digital information, separate and convert it to analog and send it to appropriate destination.



**Merritt Island Launch Area (MILA)**

A ground tracking site located at Kennedy Space Center (KSC).

**NASA Ground Terminal (NGT)**

A communication interface between Tracking and Data Relay Satellite System (TDRSS) and NASA facilities at Johnson Space Center (JSC) and Goddard Space Flight Center (GSFC).

**Network Output Multiplexer (NOM)**

A subsystem designed to provide the output interface between the Mission Control Center (MCC) and Goddard Space Flight Center (GSFC), White Sands Ground Terminal (WSGT).

**Orbiter Operational Instrumentation (OI)**

A system that collects, routes, and processes information from transducers and sensors throughout the orbiter and its payloads.

**Payload Communication System (PAYLOAD-COM)**

A system used to transfer information between the orbiter and its payloads.

**Portable Audio Data Modem (PADM)**

A system designed to link the Payload General Support Computer (PGSC) to the Network Signal Processor (NSP).

**Pulse Code Modulation Master Unit (PCMMU)**

A device that takes three telemetry sources and interleaves them together in format.

**Push-to-Talk (PTT)**

A button phased on communications hardware that enables voice signal to be transmitted when depressed.

**S-band FM Systems (S-BD-PM)**

A communication system on the orbiter used to transmit the real-time data to the ground during ascent.

**S-band PM Systems (S-BD-PM)**

Communication system on the orbiter that is used to transmit information to and/or receive information from the ground.

**Speaker/Microphone Unit (SMU)**

SMU is one of major elements of the audio distribution system. SMU is a two-way unit with associated controls for adjustment of microphone sensitivity and speaker volume.

**Space Ground Link System (SGLS)**

Ground tracking station sites.

**Telemetry Format Load (TFL)**

TFL is the format of the telemetry data from the orbiter.

**Teleprinter**

Teleprinter is an interim system designed to transmit text dates to the flight crew in orbit.

**Text and Graphics System (TAGS)**

A system used for Tracking and Data Relay Satellite (TDRS) uplink through the Ku-band system to the text and graphics hardcopies in the orbiters.

**Tracking and Data Relay Satellite (TDRSS)**

TDRSS is a space-based communications relay that links the flight controller on Earth with the orbiting spacecraft.

**Transceiver (XCVR)/Transmitter (XMTR)**

TDRSS is a space-based communication relay that links flight controllers on Earth with orbiting spacecraft.

**Transponder (XPNDR)**

A device that can simultaneously transmit and receive, transmit only, or receive only.

**Uplink**

The process that sends a signal from the ground to the orbiter.

**Ultra High Frequency (UHF) System**

Communication system on the orbiter that is used for voice communication only. It is also used as a backup for the S-band Phase Modulation (S-BD PM) and S-band Frequency Modulation (S-BD FM). It's is primarily used for communications with Extravehicular Activity (EVA) astronauts.

**Voice Operated Transmit (VOX)**

A communications system that needs voice to be activated.

**White Sands Ground Terminal (WSGT)**

The single point controlling ground station located in New Mexico.

This page intentionally left blank

**SECTION 6**  
**COMPUTER AND NAVIGATION TERMS AND ACRONYMS**

This page intentionally left blank

## 6.1 TECHNICAL TERMS AND ACRONYMS

?

This symbol on the Cathode-Ray Tube (CRT) of Shuttle indicates a redundancy management dilemma.

\*

The (\*) symbol on the CRT of Shuttle indicates an active state or the selected item of mutually exclusive items.

### **1553 bus**

Twisted pair of shielded copper wire used in the implementation of the MIL-STD-1553B data buses. The Command and Data Handling (C&DH) has three classes of 1553B buses: control bus, local bus, and user bus.

### **Address**

To refer to a device or an item of data.

### **Alias**

An additional name for an item of data.

### **Architecture Design**

The process of defining a collection of hardware and software and their interfaces to establish a system.

### **Automated Payload Switch (APS)**

This APS is a high rate fiber optic data interface to high rate frame multiplexer. APS provides an optical switching mechanism for routing optical signals from optical input ports to optical output ports.

### **Backup Flight System (BFS)**

Name of software used to back up the Primary Avionics Software System (PASS) software. The BFS is used only during dynamic mission phases.

### **Built In Test (BIT)**

An automated test capability used to detect, diagnose, and isolate failures and verify a maintenance action.

### **Bus Interface Unit (BIU)**

Equipment used to control data transfer between Multiplexers/Demultiplexers (MDMs).

### **Command and Control Processor (CCP)**

Also known as Command and Control (C&C) Multiplexer/Demultiplexer (MDM). An enhanced MDM that handles global functions for Station such as Zone of Exclusion (ZOE) processing, crew interface, and Station moding.

**Command and Data Handling (C&DH) System**

Computer system for International Space Station Alpha (ISSA). C&DH provides Space Station systems and payloads with a means to acquire, process, distribute, manage, and store both data and commands.

**Common Set (CS)**

One or more Shuttle General Purpose Computers (GPCs) share basic status information which these computers need to know about each other.

**Computer Annunciation Matrix (CAM)**

A matrix shows the failure of a General Purpose Computer (GPC) and indicates the failure of a GPC.

**Computer Network**

A complex consisting of two or more interconnected computers.

**Control Bus**

The 1553 bus that links the Command and Control (C&C) Multiplexer/Demultiplexer (MDM) with local bus.

**Data Processing System (DPS)**

A Shuttle system that processes Guidance, Navigation, and Control (GNC) data, manages telemetry for transmission to the Mission Control Center (MCC), and enables the MCC to remotely command many of the orbiter systems.

**Display Driver Unit (DDU)**

An electronic mechanism that connects the General Purpose Computer (GPC) and the primary flight displays.

**Display Functions (DISPs)**

The lowest level of Shuttle software. Each DISP has an associated display that presents the status of a predefined set of parameters.

**Down Arrow (↓)**

This symbol indicates that a parameter value is equal to or less than the operational low limit.

**Dynamic Random Access Memory (DRAM)**

Type of memory used as working memory of the Multiplexer/Demultiplexer (MDM). Software executes out of Dynamic Random Access Memory (DRAM).

**Electrical Erasable Programmable Read-Only Memory (EEPROM)**

One type of memory in the Station Multiplexer/Demultiplexer (MDM) used as a holding area for all operating programs on MDM, including bootup software. The only nonvolatile memory of MDM.

**Enhanced Multiplexer/Demultiplexer (MDM)**

An MDM that performs the same functions as Remote Terminal (RT) Multiplexer/Demultiplexer (MDM) but different from RT MDM for two reasons: (1) more memory —8M, (2) math coprocessor chip —387 chip.

**Firmware**

Computer programs and data loaded in a class of memory that cannot be dynamically modified during program execution.

**General Purpose Computer (GPC)**

A computer that is used for processing data and operating the shuttle. It is an International Business Machines (IBM) AP101S.

**General Purpose Computer (GPC) driver**

The particular General Purpose Computer (GPC) (1, 2, 3, 4, or 5) that is commanding the Cathode-Ray Tube (CRT).

**H**

This symbol on the Shuttle CRT display indicates that a parameter is off-scale high. This indicates a transducer limit has been reached, and the scale is registering its highest possible value.

**High Rate Data Link (HRDL)**

Fiber optic interface to Ku-band (used for payloads).

**Input/Output Controller Unit (IOCU)**

Multiplexer/Demultiplexer (MDM) card that controls operation of the MDM. IOCU houses the processor chip(s), memory, and peripheral chips.

**L**

This symbol on the Shuttle CRT display indicates off-scale low parameters. This means that the parameter value displayed is the lowest possible reading due to transducer limitations.

**Local Bus**

The 1553 bus that links enhanced Multiplexers/Demultiplexers (MDMs) (not Command and Control Multiplexers/Demultiplexers (C&C MDMs) with user bus.

**M**

This symbol on the Shuttle CRT display indicates missing data. It is displayed directly to the right of the affected parameter.

**Mass Memory Unit (MMU)**

The hardware unit that stores all the Shuttle software on tape for later use.



**Mass Storage Device (MSD)**

The device that stores Zone of Exclusion (ZOE) recording, payload software, procedures, and data files. MSD is housed in Command and Control Multiplexer/Demultiplexer (C&C MDM).

**Master Timing Unit (MTU)**

A system that provides precise frequency outputs for various timing and synchronization purposes to the General Purpose Computers (GPCs) and many other orbiter system.

**Memory Dump**

The main memory data is downloaded via the downlist.

**Multiplexer/Demultiplexer (MDM)**

Computer that interfaces with system sensors and effectors for Station. MDM provides distributed computer resources to applications and subsystems providing utilities and services to International Space Station (ISS). MDM also provides for gathering of data from sensors and effectors through standardized digital and analog hardware instrumentation interfaces and for the control and data interface to firmware controllers.

**Nominal Bus Assignment Table (NBAT)**

A table that is displayed whenever a memory configuration is entered, and it tells which General Purpose Computers (GPCs) are to be in command of a data bus.

**Payload Data Multiplexer**

Medium/low rate data interface to high rate link.

**Power-on Self-test (POST)**

Read-Only Memory (ROM)-based function which ensures that all hardware components are running and that the Central Processing Unit (CPU) and memory are functioning properly at startup.

**Primary Avionics Software System (PASS)**

Name of the primary orbiter operations software that runs on four General Purpose Computers (GPCs). Primary Avionics Software System (PASS) GPCs are used throughout a mission to fly the Shuttle.

**Redundant Set (RS)**

Two or more General Purpose Computers (GPCs) that receive the same inputs, execute the same Guidance Navigation and Control (GNC) software, and produce same outputs at the same time.

**Remote Terminal Multiplexer/Demultiplexer (RT MDM)**

MDM that performs same functions as enhanced Multiplexer/Demultiplexer (MDM) but is different from enhanced MDM in two respects: (1) less memory —2M, (2) only has standard 386 processor chip.

**Simplex**

Any General Purpose Computer (GPC) that is running, but not in the redundant set.

**Static Random Access Memory (SRAM)**

Memory in Station Multiplexer/Demultiplexer (MDM) used to receive variable updates such as sensor and effector data. Also used for command and data storage. Also known as Input/Output Random Access Memory (I/O RAM).

**String**

Refers to all the hardware connected to a pair of flight critical data buses.

**System Health and Status Report**

A system-level performance report that indicates the general state of the system by identifying performance parameter violations.

**System Software Load (SSL)**

The operating system of a General Purpose Computer (GPC).

**Up Arrow (↑)**

Displayed on the Shuttle display to the right of the affected parameter, indicates a parameter driven out-of-limits high.

**User Bus**

1553 bus which links Remote Terminal Multiplexers/Demultiplexers (RT MDMs) to sensors and effectors.

This page intentionally left blank

**SECTION 7**  
**SPACELAB AND PAYLOAD TERMS AND ACRONYMS**

This page intentionally left blank

## 7.1 TECHNICAL TERMS AND ACRONYMS

### **Airborne Support Equipment (ASE)**

The mechanical, avionics and structural equipment, located in the orbiter.

### **Autonomous Payload Control System (APCS)**

Onboard handheld payload discrete communication device.

### **Getaway Special (GAS)**

Officially titled small self-contained payload (SSCPS) is offered by NASA to provide anyone who wishes to fly a small experiment aboard the Space Shuttle.

### **Igloo**

A pressurized container for Spacelab pallet subsystems when no module is used.

### **Inertial Upper Stage (IUS)**

To be used with the Shuttle to transport NASA Tracking and Data Relay Satellite (TDRS) and other satellites destined for much higher orbits than Shuttle.

### **Instrument Pointing System**

A system that provides precision pointing for a wide range of payloads, including large single instruments or clusters of instruments.

### **Measurement Stimulation Identification (MSID)**

Computer addressing command and telemetry parameters.

### **Module**

A structure attached to the orbiter payload bay by four attach fittings.

### **Multipurpose Spacelab**

An extension module involving a variety of disciplines, usually for specific flights, and which may require the services of a payload integrator or agent.

### **Pallet**

A platform for mounting instrumentation, with an igloo attached.

### **Payload (P/L)**

An aggregate of hardware and software for performance of specific scientific or applications investigations or for commercial production. Payloads may be internal to pressurized modules, attached to the Station structure, attached to a platform, tethered to Space Station, or on free flyers.

### **Payload and General Support Computer (PGSC)**

Hardware and software that supports the payload.

**Payload Canister**

An environmentally controlled transporter for use at the launch site. The canister is the same size and configuration as the orbiter payload bay.

**Payload Changeout Room**

An environmentally controlled room at the launch pad for inserting payloads vertically into the orbiter payload bay.

**Payload Control Supervisor (PCS)**

A software package execute predefined command sequences on-orbit to reduce the number of critical crew work hours.

**Payload Deployment and Retrieval System (PDRS)**

A system designed to hold and control the movement of specified objects, usually a payload or monitor object.

**Payload Development Center**

The development center has overall responsibility for the design fabrication, assembly, test, and verification of the payload hardware and software.

**Payload Discipline Training**

Preparation of a mission or payload specialist for handling a specific experiment. This training is usually the responsibility of the user.

**Payload Interrogator (PI)**

Orbiter S-band antenna used for Radio Frequency (RF) command and Telemetry (TLM) of detached payloads.

**Payload Operations Control Center (POCC)**

A central area, located at any of the three NASA centers, from which payload operations are monitored and controlled. The user, in many instances, has direct command of a payload from this control center.

**Payload Preparation Room**

Facility at the Vandenberg Air Force Base (VAFB) launch pad for processing and checking payloads.

**Payload Operations Integration Center (POIC)**

The portion of the Huntsville Operations Support Center (HOSC) facility at Marshall Space Flight Center (MSFC) used for Space Station payload operations integration.

**Payload Procedure Development System**

The International Space Station Alpha (ISSA) system for developing and managing payload procedures in electronic form and printing hard copies of the procedures. Manual, automatic, and semiautomatic procedures can be created and stored in this system.

**Payload Scientist (PS)**

A crewmember whose primary responsibility and skills are the operation and servicing of a specific payload or set of related payloads. A PS is not a career astronaut position.

**Payload Station**

Location on the orbiter aft flight deck from which payload-specific operations are performed, usually by the payload or mission specialist.

**Payload Supplier**

Owner/operator of any Space Shuttle payload.

**Payload Support Equipment**

Standard laboratory equipment such as microscopes, low temperature freezers, and mass measuring units, employed for the specific purpose of supporting the operation of a payload or the conduct of a specific experiment.

**Pressurized Tunnels**

A cylindrical structure with an internal unobstructed diameter of 40 in. This tunnel is provided for equipment and crew transfer between the orbiter's crew compartment and the module.

**Principle Investigator (PI)**

Chief Engineer/Scientist for an experiment.

**Rotating Service Structure (RSS)**

An environmentally controlled facility at the launch pad used for inserting payloads vertically into the orbiter payload bay.

**Simulated Spacelab Systems (SSS)**

The simulation of various Spacelab subsystems accomplished by mathematical models that closely approximate real-world performance.

**Spacelab**

A general purpose orbiting laboratory for manned and automated activities in near-Earth orbit. Spacelab includes both modules and pallet sections, which can be used separately or in several combinations.

**Spacelab D&C Procedural Nomenclature**

This document provides standard nomenclature reference source. This document contains graphics of all the Spacelab panels and related controls.

**Spacelab Operational Data Book (S/L ODB)**

A document that contains real-world specifications on Spacelab equipment.



**Spacelab Simulator (SLS)**

A simulator is composed of an instructor station and a mockup of the Spacelab module or crewstation.

**Spacelab Systems Handbook**

A book that contains Spacelab system drawings. This handbook is frequently referred to in developing training scripts and during simulations.

**Space Transportation System Associated Payload**

A specific complement of instruments, space equipment, and support hardware carried into space to accomplish a mission (or discrete activity).

**SECTION 8  
ROBOTICS AND EXTRAVEHICULAR ACTIVITY (EVA) TERMS  
AND ACRONYMS**

This page intentionally left blank

## 8.1 TECHNICAL TERMS AND ACRONYMS

### Arm Configurations

#### *Berth*

Return a payload to a stowed position.

#### *Cradle*

Maneuver the Remote Manipulator System (RMS) to latch position.

#### *Grapple*

Capture a payload by rigidizing the end effector snares against the grapple fixture attachment.

#### *Low hover*

Position for a loaded Remote Manipulator System (RMS) which is used as an intermediate position due to Digital Auto Pilot (DAP) stability.

#### *Poise-for-capture*

Position the Remote Manipulator System (RMS) in a predetermined position for payload capture.

#### *Precradle*

Maneuver the Remote Manipulator System (RMS) into a position for a safe stowage of the RMS.

#### *Pregrapple*

Position the Remote Manipulator System (RMS) end effector 4 to 5 ft above grapple fixture.

#### *Release*

Derigidize the end effector snares which will release the payload grapple fixture from the end effector.

#### *Unberth*

Remove a payload from the stowed position to a deployed position.

### Arm Rates

#### *Actual*

Actual angular velocity of a joint shaft as determined by the tachometer.

#### *Coarse*

Limits the maximum rate to a higher speed.

#### *Commanded*

Desired angular velocity of joint motor shafts as commanded by the hand controllers.

*Vernier*

Limits the maximum rate to a low speed.

**Bends Treatment Adapter (BTA)**

An adapter for conversion of an Extravehicular Activity (EVA) suit to a bends treatment device in the orbiter cabin.

**Body Seal Closure (BSC)**

An interfacing pressure seal ring with two halves connecting the upper and lower portions of a space suit.

**Caution and Warning (C&W)***Reach limit*

The extent of the distance to which a robot's arm joint can travel.

*Release*

The load End Effector (EE) lets go of the payload.

*Singularity*

Arm is approaching a singularity condition which means loss of a degree of freedom.

*Soft stop*

A point is 2 degrees beyond its reach limit.

**Control***Backup control*

Provides the capability of driving the Remote Manipulator System (RMS) if the arm is using backup power.

*Position hold control*

Allows the Remote Manipulator System (RMS) to hold the joint angles at constant values.

*Rate hold control*

Maintains the Point of Reference (POR) translational and rotational rates to their commanded values.

*Single joint control*

Allows the operator to move the arm on a joint by joint basis.

*Auto control*

The computer drives the arm through a preprogrammed set of points.

**Display and Control Module (DCM)**

Space suit control device in chest area for control and monitoring of Extravehicular Mobile Unit (EMU).

**Disposable Absorption Containment Trunk (DACT)**

Diaper-like device worn by female Extravehicular Activity (EVA) astronauts for urine collection.

**Electrocardiogram (ECG) Sensor**

In-suit bioinstrumentation for heart rate monitoring.

**EMU Ancillary Equipment***EVA cuff checklist*

A set of reference cards bound by an aluminum alloy bracket attached to a wrist band. The reference cards, approximately 4 in. by 5 in. in size, contain procedures and reference data for performing Extravehicular Activity (EVA) tasks and for aiding in the diagnosis and resolution of Extravehicular Mobility Unit (EMU) malfunctions.

*Maintenance kit*

Additional equipment necessary for routine Extravehicular Mobility Unit (EMU) maintenance, including valsalva devices, stericide wipes, lubricant wipes, antifog wipes, and urine collection device roll-on cuffs.

*Mini-workstation*

A mechanical device that mounts on the front of the Extravehicular Mobility Unit (EMU) to stow tools and to provide a means of tether restraint for an Extravehicular Activity (EVA) crewmember at a worksite.

*Prep kit*

Items necessary for preparing the Extravehicular Mobility Unit (EMU) for Extravehicular Activity (EVA), such as antifog wipes, tissue-type wipes, scissors, and urine collection device clamps.

*Thermal mittens*

A seven-layer thermal blanket with a layer of Nomex felt on the palm and undersides of the fingers that fit conformally around the Extravehicular (EV) glove to provide greater thermal hand protection at high temperature worksites. The thermal mittens extend the contact temperature up to 350° F.

**EMU Electrical Harness (EEH)**

In-suit electrical harness.

## **EVA Support Equipment**

### *Airlock latch disconnect tool*

A common, Extravehicular Activity (EVA)-modified, crescent wrench used to force open a jammed latch and/or latches disconnected from the rotary actuator. The other contingency airlock disconnect tool is a drive ratchet with a hex socket.

### *Centerline latch tool*

Used to compensate for a failed payload bay door centerline latch. The tool consists of a fixed-load and a spring-loaded pickup point, plus a reversible ratchet with a stowable handle and a pair of trigger release buttons with a safety that prevents an accidental release.

### *Crewmember safety tether*

Ensures the crewmember is positively tethered to the orbiter while providing access to all areas of the payload bay. Before airlock egress, this 55-ft safety tether is attached to a waist tether and remains attached at all times during Extravehicular Activity (EVA), while the crewmember translates from one area of the payload bay to another.

### *EVA lights*

Used to illuminate the payload bay for crew visibility during payload bay door operations, Extravehicular Activity (EVA) activities, Remote Manipulator System (RMS) operations, payload deployment, and station keeping/docking. Seven floodlights are installed strategically in the payload bay, while one floodlight is positioned on the RMS end effector.

### *Handrails*

Aluminum tubing strategically located to aid in crewmember translation or restraint to accomplish a specific task. Handrails are located on the forward and aft bulkheads, the hingeline of the payload bay doors, and the Remote Manipulator System (RMS) end effector. Handrails are designed with tether attach points.

## **Extravehicular Activity (EVA)**

Astronaut activity conducted outside the pressurized cabin in space vacuum conditions.

## **Extravehicular Communicator (EVC)**

Extravehicular Mobility Unit (EMU) radio system for contact with spacecraft and flight controllers. It is composed of two parts, the orbiter-based equipment and the EMU-based equipment. It provides communication with the Extravehicular Activity (EVA) crewmembers and relay between EVA crewmembers and the ground (including downlink Electrocardiogram (ECG) and Real-Time Data System (RTDS) telemetry).

## **Extravehicular Mobility Unit (EMU)**

Space suit and attached life support system for astronaut use in space vacuum and environment.

**Extravehicular Visor Assembly (EVVA)**

Special Ultraviolet (UV) visor system fitted over space suit helmet for astronaut use in bright Sun conditions.

**Hand Controllers***Rotational Hand Controller (RHC)*

The RHC is a three-axis controller that provides electrical control signals for pitch, yaw, and roll control of the Remote Manipulator System (RMS).

*Translation Hand Controller (THC)*

THC is the three dimensional linear motion controller that provides three independent electrical input to the Manipulator Controller Interface Unit (MCIU).

**Hard Upper Torso (HUT)**

Upper space suit “hard shell” for mounting life support system, arms, and lower “soft torso” assembly components.

**In-Suit Drink Bag (IDB)**

Water bag mounted inside a space suit with a “straw” device for astronaut use during Extravehicular Activity (EVA).

**Intravehicular Activity (IVA)**

All astronaut activity conducted inside pressurized cabin shell.

**Jettison***Arm*

Release the arm from the orbiter in the event that the arm cannot be cradled.

**Life Support System (LSS)**

Provides a safe living environment inside the Extravehicular Mobility Unit (EMU).

**Liquid Cooling and Ventilation Garment (LCVG)**

LCVG is a one-piece affair made from Spandex mesh. LCVG system is used to remove excess body heat when crewmembers wear the Extravehicular Activity (EVA) suits.

**Lower Torso Assembly (LTA)**

Soft “pants-like” component of space suit that mounts to upper torso assembly.

**Manipulator Retention Latches (MRLs)**

The arm is a device that hooks on to three locations (aft, mid, and forward) along the orbiter longeron to secure it for launch and entry loads.



**Manned Maneuvering Unit (MMU)**

The MMU is a self-contained, propulsive backpack mobility system designed to supplement astronaut Extravehicular Activity (EVA).

**Motion***Stop*

Stop an auto sequence or Operator Command Auto Sequence (OCAS).

**Operating Modes***AUTO Modes*

The System Management (SM) General Purpose Computer (GPC) controls the arm trajectory.

*Direct Drive Mode*

A single joint mode that is hardwired from the Display and Control (D&C) panel to the arm.

*Manual Augmented Modes*

Computer supported modes and using the Remote Manipulator System (RMS) hand controllers (HCs) to control the arm trajectories.

*Single Joint Modes*

Allow only one joint at a time to be driven.

**Operational Bioinstrumentation System (OBS)**

The system in a space suit that senses an astronaut's heart rate and breathing during Extravehicular Activity (EVA) and routes the signal through the Extravehicular Mobility Unit (EMU) radio.

**Operations (EVA)***Airlock depressurization*

Configuration and checkout of the Extravehicular Mobility Unit (EMU), airlock depressurization to vacuum, and opening of the outer hatch.

*Airlock repressurization*

Airlock repressurization and opening of the inner hatch.

*Cabin depressurization to 10.2 psi*

Reducing the cabin pressure from 14.7 psi to 10.2 psi.

*EMU check*

Configuration and checkout of the Extravehicular Mobility Unit (EMU) prior to EMU purge.

*EMU checkout*

Preliminary checkout of the Extravehicular Mobility Unit (EMU) systems prior to EMU donning.

*Prebreathe*

Crewmember acclimation to lower chamber pressure, over a period of 40 to 70 minutes.

*Suit donning*

Crewmember putting on the Extravehicular Mobility Unit (EMU) and ancillary components, approximately 40 minutes duration.

**Operator Commanded (or Operator Command Auto Sequence (OCAS))**

Control mode in which the operator inputs end position and attitude and the computer drives the arm.

**Orbiter Loaded Control Mode**

Loaded arm drives relative to the orbiter.

**Orbiter Unloaded Control Mode**

Unloaded arm drives relative to the orbiter.

**Orbiter/RMS Hardware***Grapple fixture*

Attachment to payload which is picked up by the end effector.

*Grapple pin*

Pin protruding from the grapple fixture which is snared by the cables in the end effector rotating ring.

*Target*

Visual aid in the payload grappling process.

**Payload Identified Number (PL ID)**

A predetermined number that defines Payload Point of Resolution (POR)

**Position Hold Control**

A control submode that maintains joint angles.

**Provisions Stowage Assembly (PSA)**

Shuttle orbiter “tool box” just outside the airlock in the payload bay.

**Remote Manipulator System (RMS)**

The mechanical arm portion of the Payload Deployment and Retrieval System (PDRS). The arm maneuvers a payload from the payload bay to its deployment position, and then releases it.

**Restraints and Mobility Aids**

This restraints and mobility aids subsystem provides the hardware common to all pressurized elements for crew restraint and translation and equipment restraint. This hardware includes handholds, foot restraints, portable and stationary equipment restraints.

**Secondary Oxygen Pack (SOP)**

Emergency backup oxygen supply included in the Extravehicular Mobility Unit (EMU) for suited Extravehicular Activity (EVA) astronaut. This is also the backup assembly to the primary oxygen system. The SOP provides a minimum of 30 minutes of emergency oxygen in the purge mode.

**Service and Cooling Umbilical (SCU)**

Umbilical inside orbiter airlock that furnishes electrical power, “hard-line” communications, and cooling to suited Extravehicular Activity (EVA) astronaut before and after EVA.

**Servo Mechanism Terms***Uncommanded motion*

Motion of the Remote Manipulator System (RMS) which, due to failure or error, is not the desired output from the commands.

**Shoulder Brace Release**

A toggle switch that enables the operator to clean the arm shoulder brace which maintains the shoulder pitch joint torque below load limit during ascent.

**Space Suit Assembly (SSA)**

Multilayered garment with Hard Upper Torso (HUT) and soft Lower Torso Assembly (LTA). Outside layers protect from extreme temperatures and micrometeoroids, while inner layers provide pressure sealing and comfort lining. Also the anthropomorphic pressure vessel that encloses the crewmember’s torso, limbs, and head.

**Thermal Micrometeoroid Garment (TMG)**

Outer layers of space suit for protection of Extravehicular Activity (EVA) astronaut from micrometeoroids and extreme temperatures.

**Urine Collection Device (UCD)**

A disposable, flexible container that has the capacity to hold up to 32 fluid ounces of urine.

This page intentionally left blank

**SECTION 9  
SHUTTLE SYSTEMS AND SPACE STATION SYSTEMS  
TERMS AND ACRONYMS**

This page intentionally left blank

## 9.1 TECHNICAL TERMS AND ACRONYMS

### **Atmosphere Control and Supply (ACS)**

The ACS is a subsystem of ECLSS system. This subsystem provides oxygen and nitrogen to maintain the Space Station atmosphere at the correct pressure and composition for human habitation.

### **Active Redundancy**

Multiple items operating at the same time and performing the same function.

### **Active Thermal Control System (ATCS)**

Provides orbiter heat rejection during all phases of the mission.

### **Active Vent System**

A Shuttle system equalizes the unpressurized compartment of the orbit to the ambient environment as the orbiter travels from the pressurized atmosphere of Earth to the vacuum of space.

### **Atmosphere Revitalization (AR)**

International Space Station Alpha (ISSA) equipment used to revitalize and monitor the Space Station (SS) atmosphere, to provide a safe and habitable environment for its crew. This is accomplished by monitoring atmospheric composition, removing and venting Carbon Dioxide (CO<sub>2</sub>), and removing trace contaminants.

### **Atmospheric Revitalization System (ARS)**

A Shuttle system used to control relative humidity between 30 and 75 percent, maintains Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO) at non-toxic level, controls temperature and ventilation in the crew compartment, and provides cooling for avionic system.

### **Auxiliary Power Unit/Hydraulics (APU/HYD)**

A hydrazine-fueled, turbine driven power unit that generates mechanical shaft power to drive a hydraulic pump.

### **Battery Charge/Discharge Unit (BCDU)**

An International Space Station Alpha (ISSA) bidirectional power converter which controls and conditions battery charging and discharging.

### **Beta Gimbal Assembly (BGA)**

An International Space Station Alpha (ISSA) structural link between the Integrated Equipment Assembly (IEA) and the Photovoltaic (PV) solar array wing. The Beta Gimbal Assembly (BGA) allows rotational freedom of the PV array about the Station beta axis while maintaining structural strength and stiffness for the remaining five degrees of freedom.

**Blanket**

A flat surface that mounts the International Space Station Alpha (ISSA) solar cells so that these cells can be held perpendicular to the Sun.

**Brownout**

When output voltage drops below operational envelope equation due to overload of source.

**Bus Tie**

The electrical buses that connect to another bus in the event of an electrical failure through the use of the BUS TIE switch.

**Clear**

Removal of a fault from the power source.

**Clearing Time**

The time elapsing from the beginning of an overcurrent to the final circuit interruption.

**Control Bus**

A bus supplies control power to the display and control panel switches on the flight deck and in the middeck area.

**Continuous Power**

A power output that can be sustained during both insolation and eclipse phases of an orbit without exceeding any Orbital Replaceable Unit (ORU) design or operational limits.

**Criticality**

The relative measure of the consequences of a failure mode.

**Critical System**

A system is assessed as critical if loss of overall system function or improper performance of a system function could result in loss of life, loss of flight hardware, or damage to a flight system.

**Detection**

The process of determining that a failure has occurred.

**Effector**

A device that responds to a physical stimulus by moving or changing its position or state.

**Electrical Power Distribution and Control**

A Shuttle system that controls and distributes alternating current (ac) and direct current (dc) electrical power to the orbiter system.

**Electrical Power System (EPS) Shuttle**

A system that consists of the equipment and reactants that produce electrical power for distribution throughout the orbiter during all flight phases.



**Emergency Hardware Item**

Any hardware item which is used only after a life-threatening situation that has occurred because of prior failures or events and does not perform a function during normal operations.

**Environmental Control and Life Support System (ECLSS)**

A system to maintain a safe and habitable crew environment, including carbon dioxide removal, oxygen regeneration, contamination control, and the monitoring and regulation of modules for pressure ventilation, temperature, and humidity control.

**Essential Buses (ESS Bus)**

The electrical buses supply power to switches that are necessary to restore power to a failed main direct current (dc) or alternate current (ac) bus.

**External Thermal Control Subsystem (ETCS)**

International Space Station Alpha (ISSA) equipment that provides external ammonia cooling by rejecting heat acquired from Internal Thermal Control Subsystem (ITCS).

**Fail Safe**

The ability to sustain a failure without causing loss of life/flight hardware or damage to a flight system. (Includes the capability to safe the systems and successfully terminate operations.)

**Fault**

An abnormality of the Electrical Power System (EPS) that causes the system to operate outside of expected conditions.

**Feeder**

A cable or combination of cables sized to deliver power from source to distribution units, distribution units to conversion devices (these being primary feeders), and conversion devices to users (these being secondary feeders) via required protection devices.

**Fire Detection and Suppression (FDS)**

International Space Station Alpha (ISSA) equipment that detects the presence of smoke or flame within the pressurized volumes of the Space Station, notifies the crew and Mission Control Center (MCC) through the Caution & Warning (C&W) system, and facilitates fire suppression.

**Folding Articulated Square Truss (FAST) mast**

An International Space Station Alpha's (ISSA's) stowable, hinged truss structure used to support the solar array blanket during normal wing operation.

**Fuel Cell System (FCS)**

A Shuttle system used to generate heat and water as by-products of electrical power generation. Each fuel cell weighs 255 lb.

**Galley/Food Management**

A subsystem that provides the facilities, supplies, and consumables for nutritional support of the crew during all mission phases including Extravehicular Activity (EVA) and safe haven periods.

**Gas Trap (GT)**

A device that removes noncondensable gases from the Space Station internal Thermal Control System (TCS) fluid coolant loops.

**Hard Fault**

A low impedance line fault that should result in hardware tripping due to overcurrent.

**Hazard**

The presence of a potential risk situation caused by an unsafe act or condition.

**Housekeeping/Trash Management**

A Station subsystem that includes provisions for routine cleaning of the habitable element interiors and their contents.

**Fault Isolation**

The process of identifying which system component has failed.

**Integrated Equipment Assembly (IEA)**

Station hardware component that conditions and stores the electric power collected by the Photovoltaic (PV) arrays for use in Space Station operations. Provides the framework to structurally, electrically, and thermally integrate the PV power module for launch and on-orbit operations.

**Load Controllers**

A solid-state switching device (no mechanical parts) used as logic switches at low power.

**Loop Crossover Assembly (LCA)**

Station equipment that provides capability to operate internal low and moderate temperature loops either independently or as a single loop.

**Main Bus**

A bus distributes direct current (dc) electrical power from the fuel cells to locations throughout the orbiter.

**Main Propulsion System (MPS)**

The system is comprised of the three main engines, and associated hardware that is used to supply liquid oxygen and hydrogen to main.

**Manual Override**

The capability of inhibiting or terminating an automatic process or procedure.

**Mast Canister**

An activation device is used for deploy on retract and support the array during on-orbit operations.

**Off-normal Operating Conditions**

The condition of the electric system after a malfunction or failure in the electrical system has taken place and the protective devices of the electrical system are operating to isolate the malfunction or failure from the remainder of the system.

**Operational Envelope**

The power utilization profiles that define Electrical Power System (EPS) power operating points and/or ranges for the Station and comprises items such as the load power envelope (range), expected power usage (projected total load demand), load variance/duty cycles, expected start time and duration of load demand, and load priority classification.

**Orbiter Passive Thermal Control System (PTCS)**

A system is designed to help maintain the temperature of the orbiter and their components within their temperature limits.

**Orbital Replaceable Unit (ORU)**

The lowest level of hardware that can be removed and replaced on location under orbital conditions.

**Passive Thermal Control System (PTCS)**

Provides heat rejection without electrical or fluid interfaces.

**Peak Power**

The load power in excess of the continuous power rating for the Electrical Power System (EPS).

**Personal Hygiene**

Station equipment that provides the hardware and provisions for body waste collection and personal body cleansing and grooming.

**Photovoltaic Control Unit (PVCU)**

Station devices that contain the hardware and software necessary to control all the Photovoltaic (PV) module internal functions.

**Photovoltaic Module (PVM)**

A module contains two solar arrays and associated hardware.

**Popped Circuit**

Circuit breaker open.

**Portable Emergency Provisions (PEP)**

The PEP subsystem consists of the crew provisions and equipment which permanently reside in the pressurized elements for support of the crew in an emergency, such as fire, environmental contamination and loss of pressure, and to ensure survival in the event that one of the pressurized elements becomes inhabitable.

**Power Balancing**

A condition when the Electrical Power System (EPS) provides equal power across all channels of Space Station.

**Power Channel**

One array with all associated hardware.

**Power Controller**

A device that controls and distributes ground-supplies 28 V dc power to the orbiter through the T-10 umbilical.

**Power Operating Table (POT)**

Data that allows the Electrical Power System (EPS) to supply/plan power at the output of secondary switching units while maintaining battery charging/discharging. The Power Operating Table (POT) lists planned load power profiles by identifying their power envelope, expected power usage, variance/duty cycle, expected start time and duration, and load priority classification.

**Power Rating**

The power capability that the configuration would achieve if all its components were operated for 5 years (Beginning of Life (BOL) + 5).

**Power Reactants Storage and Distribution System (PRSD)**

Orbiter hardware that stores the reactants (Cryogenic hydrogen and Oxygen) and supplies them to three fuel cells that generate all the electrical power for the vehicle.

**Power System Control**

Devices that provide for the management and control of power generation and distribution.

**Pressure Control System (PCS)**

An orbiter system that pressurizes the crew cabin at 14.7 psia and provides breathing oxygen directly to the launch and entry suit helmets.

**Pump and Flow Control Subassembly (PFCS)**

A Station system that provides controlled flow for transferring the heat from the Integrated Equipment Assembly (IEA) cold plates to the Photovoltaic (PV) radiator.

**Pump Package Assembly (PPA)**

A device that circulates coolant fluid throughout the Station internal Thermal Control Subsystem (TCS) loops.

**Rack Flow Control Assembly (RFCA)**

Regulates and monitors coolant flow to specific racks for removal of waste heat.

**Radiator (RAD)**

A device that rejects heat acquired from External Thermal Control Subsystem (ETCS) to space.

**Remote Power Controllers (RPC)**

A solid-state switching devices used for loads requiring current in a range of 3 to 30 amps.

**Remote Power Controller Module (RPCM)**

A remotely-controlled power switching assembly. It controls the distribution of secondary power to user equipment on the Integrated Equipment Assembly (IEA) and the nodes.

**Sequential Shunt Unit (SSU)**

A Station device that provides control of the solar array voltage by shunting array current that exceeds the load demand.

**Short**

A condition that causes an over current in an electrical circuit.

**Single Failure Point**

A single item of hardware, the failure of which would lead directly to loss of life or critical mission support capability.

**Soft Fault**

An out-of-tolerance condition that is detected by overcurrent.

**Solar Power Module (SPM)**

The Solar Power Module is a house of Station hardware and software required to collect, store, convert, and distribute electrical power to load. A SPVM consists of two beta gimbal and PV arrays assemblies in Integrated Equipment Assembly (IEA) and miscellaneous hardware.

**Standby Redundancy**

Redundant hardware items that are nonoperative until they are switched into the system upon failure of the primary item.

**Supply Water System**

A Shuttle system that stores potable water generated by the fuel cells.

**System Protection**

Hardware/software that protects and limits the power system and its users from the effects of faults.

**Temperature and Humidity Control (THC)**

A part of the Station life support system that provides temperature, humidity, circulation, and air control functions. The THC also maintains avionics air cooling, cabin and standoff ventilation, intermodule air flow, and airborne bacteria/particulate control.

**Thermal Control System (TCS)**

A system to acquire, transport, and reject excess heat from all station elements and external equipment to maintain equipment within specified limits.

**Thermal Protection System (TPS)**

A passive thermal control system consisting of materials selected for stability at high temperatures and weight efficiency.

**Thermal Radiator Rotary Joint (TRRJ)**

Rotates Station hardware that the Thermal Control System (TCS) radiators to the most efficient heat rejection.

**Trip**

A condition when a specific circuit is to protect equipment for an overcurrent.

**Unlike Redundancy**

Nonidentical hardware items that perform the same function and the use of either of which results in equivalent functional performance.

**Wardroom**

The Space Station subsystem that provides facilities, provisions, and equipment for eating, crew meetings, recreational activity, and viewing.

**Waste Management System (WMS)**

An integrated, multifunctional Station system used primarily to collect and process crew biological wastes.

**Waste Water System**

A system that stores waste from the crew cabin humidity separator and from the crew.

**Water Recovery and Management (WRM)**

WRM is a subsystem of the ECLSS Station system. This subsystem processes the waste water into the usable water for the crewmembers. WRM is responsible for the processing, storage, and distribution of Space Station water including both potable water and the flush water from the commode/urinal. This subsystem processes the waste water into the useable water for the crewmembers.

**SECTION 10**  
**ENGINEERING DEVELOPMENT TERMS AND ACRONYMS**

This page intentionally left blank



## 10.1 TECHNICAL TERMS AND ACRONYMS

### **Access Control**

Limitations placed on data, processes, automated information systems, facilities, computer applications, and other information processing assets. The limits can be enforced with physical, procedural, or electronic methodologies.

### **Automated Information Security (AIS)**

A defined set of protective measures provided to data, information, processes, hardware, and software, in a Data Processing Installation (DPI) or between DPIs over networks.

### **Analog Event Distribution System (AEDs)**

The MCC system that receives data from Telemetry Processing Computer (TPC) and processes this data to Strip Chart Recorders.

### **Applications**

A program or series of programs which covers the processing of related records in one area of work.

### **Aydin System**

The fix-base Aydin alpha-numeric Cathode-Ray Tube (CRT) display system provides the simulation user an interface with the software.

### **Bias**

To impart a displacement from the sensor's (or effector's) model calculated value. Bias's can be positive or negative and are algebraically added to the model's calculated value or to a display device's/meter's reflection of that specific parameter.

### **Capability Build Release (CBR)**

A CBR is a composition of Space Station Training Facility (SSTF) software entities and/or hardware/software entities. CBRs are built incrementally to provide Space Station training simulation capabilities.

### **Central Timing Equipment (CTE)**

A unified timing source synchronized to incoming reference signals from the Mission Control Center (MCC) to the building 5 simulation complex.

### **Change Control**

The process by which a change is proposed, evaluated and approved or rejected, scheduled, and tracked.

### **Change Request (CR)**

Documentation to request a change to controlled documents, Hardware (H/W) elements, and/or Software (S/W) elements. They are approved or disapproved by the designated configuration control authority.

**Cold Start**

The process of recompiling all source code and linking to build an executable load.

**Command Group**

Sequentially arranged single commands grouped together for the purpose of transmitting them as one command.

**Commonality**

The use or replicated use of modules, systems, and technical approaches to reduce costs or development time in one or more associated programs or projects.

**Communications Interface System (CIS)**

A Mission Control Center (MCC) system comprised of various voice, data, teletype, and facsimile equipment in the MCC that are utilized for conferencing, routing, distribution, encryption/decryption, filtering, testing, and preprocessing functions.

**Confidentiality**

Confidentiality applies to data that must be held in confidence and describes the degree of protection that must be provided for such data. Included in confidentiality are authentication and access control.

**Configuration**

A specific set of equipment units interconnected and programmed to operate as a system.

**Configuration Control**

The identification of components, change control, and change history maintenance for both input data and reconfiguration products.

**Configuration Control Board (CCB)**

The authority responsible for evaluating and approving or disapproving proposed engineering changes and for ensuring implementation of the approved changes.

**Configuration Item (CI)**

An aggregation of hardware or software or both that is designated for Configuration Management (CM) and treated as a single entity in the configuration management process.

**Configuration Management (CM)**

The process of identifying and defining configuration items in a system, controlling the release and change of these items throughout the the system life cycle, recording and reporting the status of configuration items and change requests, and verifying the completeness and correctness of configuration items.

**Consoles**

A device utilized by flight, mission, Operation Support Team (OST), and Maintenance and Operations (M&O) controllers to perform both preflight and real-time operations support. A

typical console consists of a housing, up to three display media devices, one or more keyboards, two voice keysets, and electronic communication interfaces. The console may also include computer processors and hardcopy devices.

**Control Devices**

Mechanisms for preventing unwanted actions, or for initiating corrective action to remedy adverse conditions detected by monitoring devices.

**Critical Information**

NASA Sensitivity Level 3 – Information for which inaccuracy, alteration, disclosure, unavailability, (1) could cause irreparable damage, including possible loss of the crew, the Station, or the associated capability to process vital data; and/or (2) has the potential for an adverse cost impact greater than \$10 million.

**Critical Time Period**

Scheduled time period requiring mandatory support for specified functions.

**Cyclic Data**

Data that is generated in a predictably periodic fashion. Examples of this type of data include downlink telemetry, some trajectory tracking data, and many real-time computations.

**Database**

Data items that must be stored in order to meet the information processing and retrieval needs of an organization.

**Data File**

A collection of related data records organized in a specific manner for a particular application.

**Data Release**

A formal controlled notification to all applicable organizations that the approved data or documentation is available for use in design, procurement, fabrication, testing, coding, and inspection of an item.

**Data Retrieval System (DRS)**

The Mission Control Center (MCC) system that provides the format output telemetry data in support of a particular flight.

**Data Set**

A collection of related data elements; this data may be a file of conventional records, a program library, or a table of values.

**Discretionary Access**

A means of restricting access to data based on the identity and need to know of the user, process and groups to which they belong.

**Display and Control System (DCS)**

A System of Mission Control Center (MCC). The Display and Control System (DCS) provides mission and support personnel with the capability to request and monitor computer generated display data.

**Discrepancy Report (DR)**

Documentation written to record discrepancies for a particular software load after Quality Test Review (QTR) and for a particular hardware element after installation. DRs are approved or disapproved by the designated configuration control authority at each phase of the delivery.

**Downtime**

A period of time that starts when a facility becomes unavailable for user operations and ends when user operations may be restarted.

**Dual Integrated Simulation**

An operation that integrates Shuttle and Space Station simulations/Mission Control Center (MCC) into a single training exercise. Other simulation resources and/or external Johnson Space Center (JSC) elements may also be involved.

**Encryption**

A means of protecting and attaining secure telecommunications over insecure channels by encoding data bit streams so that the meaning is not obvious.

**Front End Data Capture Function**

The Mission Control Center (MCC) function for Space Station Manned Base (SSMB) operations which records all incoming and outgoing data at the MCC front end.

**Group Display Subsystem (GDS)**

The Mission Control Center (MCC) Subsystem that provides mission status, flight dynamics, and reference information on displays suitable for group viewing.

**Hardware Change Request (HCR)**

A written request to revise a released engineering drawing when design deficiencies or documentation errors are found or when drawing clarification is needed.

**Highly Desirable Function**

Functions that are utilized at any random time, and possibly for a specified time period to enhance probability of mission success. Random temporary outages do not jeopardize crew or vehicle safety or prevent accomplishment of high-priority flight objectives.

**History File**

File that contains information about components, such as origin, creation, modification, and processing information; that is, where a component came from, who accessed the component and why, what happened during the life of the component, etc.

**Host**

A computer which is the primary or controlling computer in a computer network, generally involving data communications or a local area network.

**Host Processor Complex (HPC)**

Refers to Mission Operations Computer (MOC) and Dynamic Standby Computer (DSC) process and validates both telemetry and command Data.

**Human/Computer Interface**

The mechanism for providing meaningful communications between the user, the computer, and the computer application.

**Initialization Data**

Data used to define the initial state of flight software and simulation software variables.

**Initialization Point**

A set of pre-defined initial conditions and data values defining the configuration and a condition of a system(s) at a particular point in a mission profile being simulated.

**Interlock**

A design feature that ensures that any conditions prerequisite for a given function or event are met before the function or event can proceed.

**Interoperability**

The ability of two or more systems or parts of a single system to exchange information and to mutually use information which has been exchanged.

**Lost Time**

Time the user cannot accomplish any of the scheduled tasks for whatever reason.

**Magnetic Media**

Hard disks, removable disks, magnetic tapes, tape cartridges, etc.

**Mass Storage Device (MSD)**

A device used to store electronic data such as data files, software executable loads, source code, and intermediate libraries.

**Near Real-Time (NRT)**

Pertaining to processing of information, after the actual time the related physical process, event, or phenomenon has transpired. Thus NRT processing results need not be available in time to influence the related process that is under way, but to provide analysis of transpired activities.

**Network**

A telecommunications capability with all components to assure transfer of all data and information between workstations, sensors, host computers, file servers, file printers, and other

networks. Components include packet switches, routers, bridges, gateways, repeaters, concentrators, digital access cross connect switches, multiplexers, controllers, and technical control devices.

**Node**

Any point on the Local Area Network (LAN) which is capable of being assigned a unique or separate identifier.

**Noncritical Function**

Functions utilized at any random time for an unspecified period, but do not enhance probability of mission success nor jeopardize crew or vehicle safety.

**Non-Cyclic Data**

Data that is generated only upon the specific request of a user or application. Examples of this type of data include command histories, advisory and fault annunciation message histories, user-generated files, word processing documents, and spreadsheets.

**Off-Line**

Pertaining to equipment or devices that are not in direct communication with the central processor of a computer system. Off-line devices cannot be controlled by a computer except through human intervention.

**On-Line**

Descriptive of a data processing system where peripheral devices are under the control of a central processing unit and information reflecting current activity is introduced into the system as soon as it occurs.

**Operating System**

An organized collection of routines and procedures for operating a computer.

**Operator Error**

An inadvertent action by flight crew or ground operator that could eliminate, disable, or defeat an inhibit, redundant system, containment feature, or other design features that is provided to control a hazard.

**Problem Report**

Generic term referencing Trouble Report (TR) and/or Discrepancy Report (DR).

**Raw Telemetry Data**

Telemetry parameters that have been extracted from the telemetry downlink, but not calibrated.

**Real-Time**

Pertaining to the performance of computation during the actual time that the related physical process, event or phenomenon transpires. Thus, for computations to be considered as taking

place in real-time, they must proceed fast enough so as to permit the results to influence the related process that is underway.

**Real-World Flight Software (FSW)**

Space Station Program flight software developed for the Space Station vehicle and Station Program supporting facilities.

**Reconfiguration**

The process of collecting, integrating, and baselining requirements for changing the hardware, software, and data products.

**Regression Testing**

A type of testing that verifies that all previous requirements are still met by the current configuration under test.

**Remote Status and Control**

The capability of an element to send status to a remote location, and to be controlled from a remote location.

**Reset**

To initialize the simulation to a set of pre-defined initial conditions defining the configuration and condition of the system(s) being simulated.

**Scale**

To increase or decrease according to a fixed ratio, proportion, or percentage. Scale change requests can be applied to a sensor's modeled output, an effector's modeled response, or to a display device's/meter's reflection of that specific parameter.

**Scheduled Time**

The time the facility was scheduled for use. This time is recorded automatically.

**Shall**

Indicates a requirement to provide a function. "Shall" indicates that the requirement is mandatory and is the subject of specific acceptance testing and compliance verification.

**Should**

Indicates a requirements desired goal for which there is no objective test.

**Single Stage Command**

Commands that are executed (i.e., routed to their final destination) immediately after being received by the space vehicle software.

**Status and Control (SAC)**

Refers to the basic services required by and applicable to the successful operation of any control center requiring the reception, verification, distribution, and processing of complex data types and rates while supporting multiple/changing operational configurations.

**Support Request (SR)**

Service Requests (SRs) are the sustaining engineering counterparts of Change Requests (CRs). SRs are written after Ready for Training (RFT) and require NASA Change Control Board (CCB) change approval.

**System Application**

Software provided by the facility development community. Pertaining to software applications that provide the fundamental capabilities described by the system requirements definition. These applications, whether procured or developed, require rigorous certifications, sustaining engineering.

**Terminal**

A device connected to a computer, either locally or by a means of a communication facility, that is used to enter or retrieve data from the computer.

**Test Script**

A document that is used to test the contractual unit/subassembly/assembly/subsystem/system. This document includes actions, expected responses, and actual hardware and software model responses. This document may include tables describing whether responses are acceptable from a hardware and/or software testing point of view.

**Text and Graphics Subsystem (TAGS)**

The Mission Control Center (MCC) system that provides the capability to accept, format, and transmit the text, map, diagram, and photographs to the Shuttle vehicle.

**Timing System (TS)**

The Mission Control Center (MCC) system used for generating, receiving, and distributing Greenwich Mean Time (GMT) in various formats and timing pulses at numerous pulse rates at real-time or simulated sources.

**Transaction**

A unit of data which triggers processing. The processing may be a response to a query; an update of various files.

**Trouble Report (TR)**

A standard form with an accompanying procedure, used to report internal problems and effect changes to any software or hardware Configuration Item (CI) associated with Space Station Training Facility (SSTF).



**Two Stage Command**

Commands that are processed by the space vehicle flight software and stored in a buffer, down linked to the ground for verification, executed after ground verification is complete and an execute command is sent to the space vehicle.

**Validation**

Assurance that the end product is consistent with the initial request.

**Variable Command**

A command that contains variable or modified data.

**Verification**

This is the process of ensuring that the product of a given phase of the life cycle meets all design, performance, and safety requirements.

**Video Function**

The Mission Control Center (MCC) function responsible for the processing, distribution control, storage, playback, and display capabilities.

This page intentionally left blank