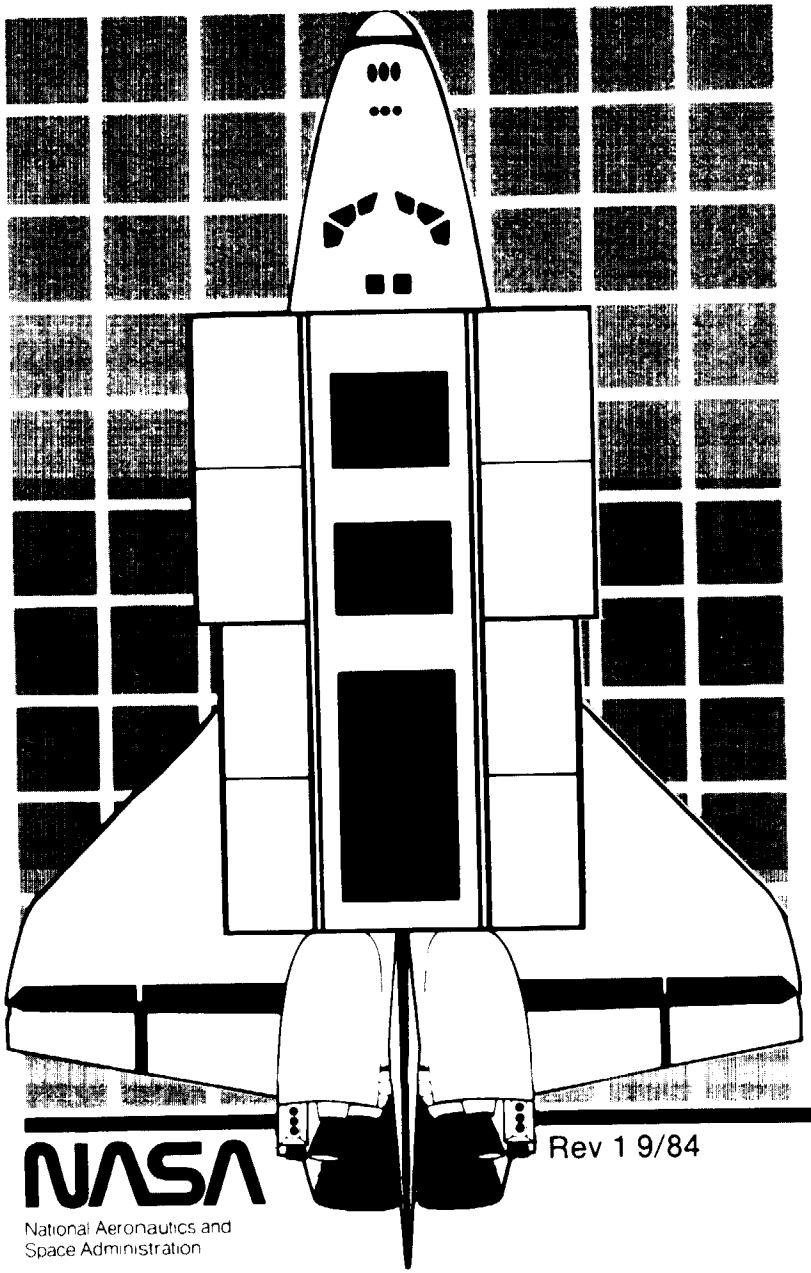
NASA-TM-108763



SPACE SHUTTLE PAYLOAD

DESIGN AND DEVELOPMENT

JSC-20052
VOLUME 5

P-43

(NASA-TM-108763) SPACE SHUTTLE PAYLOAD DESIGN AND DEVELOPMENT. VOLUME 5: MANAGEMENT DOCUMENTATION (NASA) 43 p

N94-70369

Unclas

Z9/16 0167301

MANAGEMENT DOCUMENTATION

Rev 1 9/84

NASA
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center

CONTENTS

SECTION	PAGE
DOCUMENTATION HIERARCHY	4
LAUNCH SERVICES AGREEMENT	7
PAYLOAD INTEGRATION PLAN (PIP)	8
INTERFACE CONTROL DRAWING	14
PIP ANNEXES	16
GENERIC INTEGRATION SCHEDULE	44

PRECEDING PAGE BLANK NOT FILMED

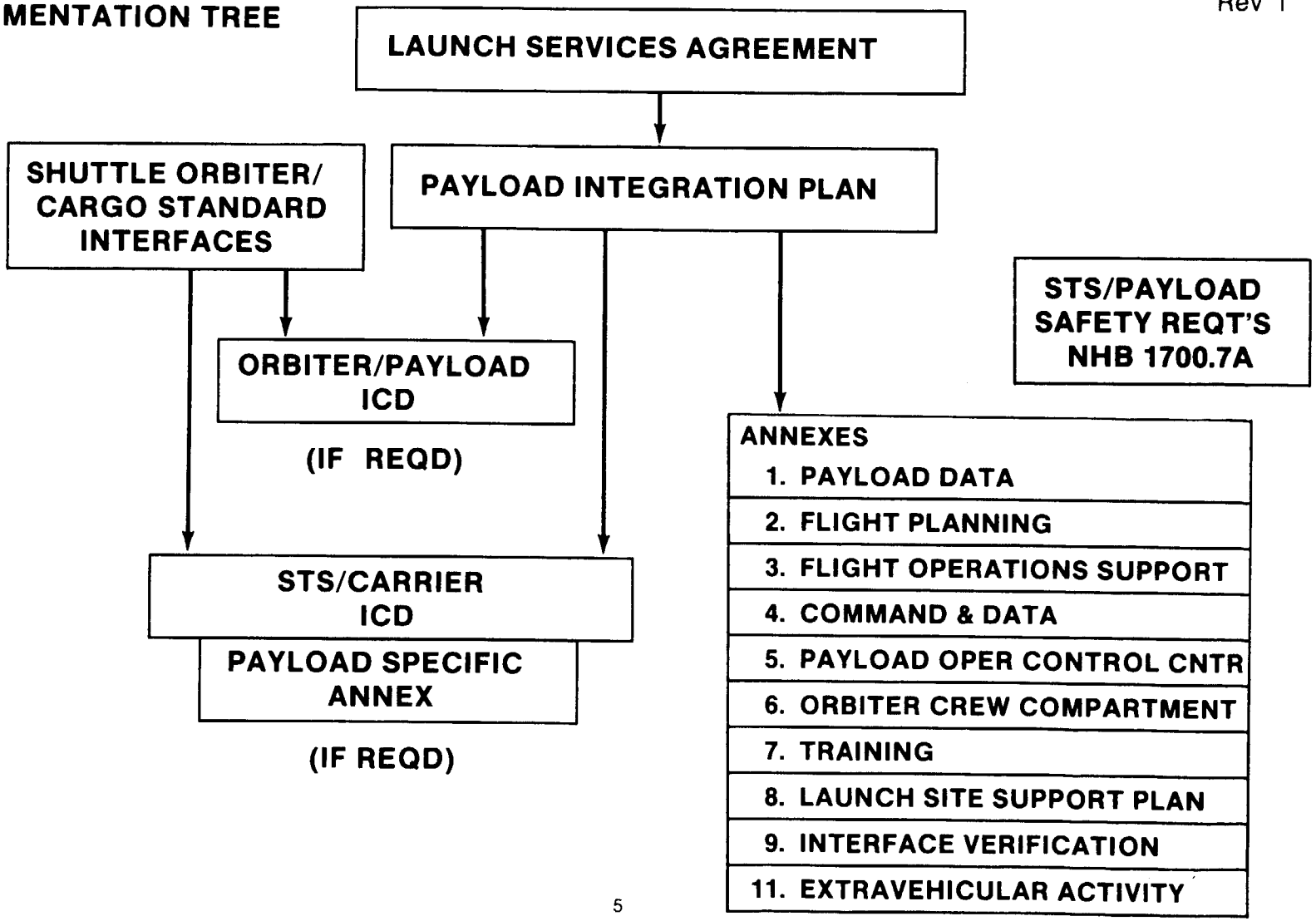
DOCUMENTATION APPROACH

S-84-02067

- ESTABLISH THE PROGRAMMATIC AND TECHNICAL AGREEMENTS AND BASELINES — THE "PAYLOAD INTEGRATION PLAN" (PIP)
- DEFINE THE INTERFACE SPECIFICATIONS FOR THOSE INTERFACES SPECIFIED IN THE PIP — THE "INTERFACE CONTROL DOCUMENT" (ICD)
- DEFINE THE DATA IN THE PIP ANNEXES NECESSARY TO CONFIGURE STS FLIGHT AND GROUND SYSTEMS TO PROVIDE THE SERVICES REQUESTED IN THE PIP

CUSTOMER INTEGRATION
DOCUMENTATION TREE

S-84-01086
Rev 1



SPACE
SHUTTLE
PAYLOAD

DESIGN AND DEVELOPMENT

NASA

LAUNCH SERVICES AGREEMENT (LSA)

S-84-02077

- PRIMARY CONTRACTUAL DOCUMENT
- DETAILED TERMS AND CONDITIONS UNDER WHICH NASA WILL FURNISH LAUNCH AND ASSOCIATED SERVICES
- SIGNED BY USER AND NASA

PRECEDING PAGE BLANK NOT FILMED

PAGE 6 INTENTIONALLY BLANK

STS/PAYLOAD INTEGRATION

S-84-01081

- PAYLOAD INTEGRATION PLAN
  - PRIMARY DOCUMENT USED IN THE INTEGRATION PROCESS
    - — IDENTIFIES ROLES AND RESPONSIBILITIES
    - — IDENTIFIES TASKS/WORK TO BE ACCOMPLISHED
    - — ESTABLISHES BASELINES, GUIDELINES, AND CONSTRAINTS FOR INTEGRATION AND PLANNING
    - — ESTABLISHES SCHEDULE FOR ALL INTEGRATION ACTIVITIES
  - NASA PREPARES DRAFT VERSION FOR INITIAL INTEGRATION MEETING USING PAYLOAD INPUTS
  - DOCUMENT IS REVIEWED WITH CUSTOMER AND REVISED AS REQUIRED
  - FINAL VERSION IS PREPARED BY NASA AND SUBMITTED TO NASA AND CUSTOMER FOR SIGNATURE
  - DOCUMENT IS PLACED UNDER CONFIGURATION CONTROL AFTER SIGNATURE

PIP CONTENT

S-84-02087

- REVISION RECORD
  - REVISION LETTER
  - CHANGE NUMBER
  - DESCRIPTION
  - DATE
  - CHANGE PAGE EFFECTIVITY
- TITLE SHEET
  - STS AND USER PROGRAM NAME
  - DATE OF ISSUE
  - APPROVALS: NASA AND USER
- PREFACE
  - TBR = ISSUE TO BE RESOLVED
  - TBD = TO BE DETERMINED BUT NOT AN ISSUE
- INTRODUCTION
  - INDICATION OF MULTIPLE LAUNCHES AND RETRIEVAL
  - LSA APPROVAL PREREQUISITE TO PIP IMPLEMENTATION
  - NASA BEST-EFFORT STATEMENT

PIP CONTENT (CONT)

S-84-02097

- MANAGEMENT RESPONSIBILITIES
  - DOCUMENT CONTROL
  - JOINT RESPONSIBILITIES
  - STS RESPONSIBILITIES
  - PAYLOAD ORGANIZATION RESPONSIBILITIES
- PAYLOAD DESCRIPTION
  - MODULES
  - TYPES OF PROPULSION OR CONTROL SYSTEM
  - ILLUSTRATION (LAUNCH CONFIGURATION)
- MISSION OPERATIONS
  - PRELIMINARY MISSION SCENARIO
  - ORBITAL REQUIREMENTS AND PAYLOAD CONTROL PARAMETERS
  - OPERATIONAL REQUIREMENTS AND CONSTRAINTS

PIP CONTENT (CONT)

S-84-04040

- PAYLOAD TO STS INTERFACES
  - STRUCTURAL/MECHANICAL INTERFACES
  - CABLE INTERFACES
  - DISPLAY AND CONTROL INTERFACES
  - ELECTRICAL POWER INTERFACES
  - COMMAND INTERFACES
  - TELEMETRY AND DATA INTERFACES
  - FLUID INTERFACES
  - ORBITER GENERAL PURPOSE COMPUTER SOFTWARE SERVICES
- ENVIRONMENTAL ANALYSIS AND INTERFACES
  - STRUCTURAL LOADS AND DEFLECTIONS
  - THERMAL ENVIRONMENTS AND INTERFACES
  - ELECTROMAGNETIC INTERFACE/ELECTROMAGNETIC COMPATIBILITY
  - CONTAMINATION
  - SHOCK, VIBRATION, AND ACCOUSTIC ENVIRONMENTS
  - GROUND ENVIRONMENTAL REQUIREMENTS

PIP CONTENT (CONT)

S-84-04030

- INTEGRATION HARDWARE
  - STS-PROVIDED HARDWARE
  - PAYLOAD-PROVIDED HARDWARE
- FLIGHT OPERATIONS
  - FLIGHT DESIGN
  - FLIGHT ACTIVITY PLANNING
  - TRAINING
  - FLIGHT OPERATIONS CONTROL
  - COMMAND AND CONTROL SUPPORT
- LAUNCH AND LANDING SITE SUPPORT
  - PAYLOAD PROCESSING FACILITY
  - HAZARDOUS PROCESSING FACILITY
  - VERTICAL PROCESSION FACILITY
  - PAD OPERATIONS
  - POSTFLIGHT PROCESSING
  - ABORTED FLIGHT
  - TRANSPORTATION OF OVERSIZE PAYLOADS

PIP CONTENT (CONT)

S-84-04020

- SAFETY
- INTERFACE VERIFICATION
- POSTFLIGHT DATA REQUIREMENTS
- OPTIONAL SERVICES
- PIP ANNEXES
- SCHEDULE
- APPLICABLE DOCUMENTS

INTERFACE CONTROL DOCUMENTS (ICD's)

S-84-04019

- ICD-2-19001 SHUTTLE ORBITER/CARGO STANDARD INTERFACES
  - DEFINES ALL STANDARD INTERFACES AVAILABLE
  - CONTROLLED BY LEVEL I
- ICD-A-XXXXX UNIQUE ICD
  - FOR SPECIFIC CARGO ELEMENT
  - SAME NUMBER AS PIP
  - SELECTS REQUIRED INTERFACES FROM ICD-2-19001
  - ESTABLISHES NONSTANDARD INTERFACES
  - STRUCTURE SAME AS ICD-2-19001

INTERFACE CONTROL DOCUMENT

S-84-04010

- CONTENT
  - INTRODUCTION
  - DOCUMENTATION
  - PHYSICAL INTERFACES
  - STRUCTURAL INTERFACES
  - FLUID INTERFACES
  - ENVIRONMENTAL CONTROL INTERFACES
  - ELECTRICAL POWER INTERFACES
  - AVIONICS INTERFACES
  - SOFTWARE INTERFACES
  - INDUCED ENVIRONMENTS
  - MISSION EVENT TIMES
  - CARGO WEIGHT CHARGEABLE ITEMS

S-84-01670

STS/PAYLOAD INTEGRATION

- PIP ANNEXES
  - DOCUMENT DATA NECESSARY FOR THE STS ELEMENTS TO CONFIGURE FLIGHT AND GROUND SYSTEMS AND TO IMPLEMENT OTHER INTEGRATION FUNCTIONS AS REQUIRED
    - — ANNEX 1 — PAYLOAD DATA PACKAGE
    - — ANNEX 2 — FLIGHT PLANNING
    - — ANNEX 3 — FLIGHT OPERATIONS SUPPORT
    - — ANNEX 4 — COMMAND AND DATA
    - — ANNEX 5 — POCC REQUIREMENTS
    - — ANNEX 6 — CREW COMPARTMENT
    - — ANNEX 7 — TRAINING
    - — ANNEX 8 — LAUNCH SITE SUPPORT PLAN
    - — ANNEX 9 — INTERFACE VERIFICATION
    - — ANNEX 11 — EXTRAVEHICULAR ACTIVITY
  - NASA HAS A PREPARED FORMAT AND MAINTAINS A SET OF STANDARD DOCUMENTS
  - CUSTOMER IS REQUIRED TO PROVIDE DATA VIA ANNEXES
  - WORKING GROUP SESSIONS MAY BE REQUIRED TO RESOLVE ANY ISSUES
  - DOCUMENT WILL BE BASELINED AND PLACED UNDER CONFIGURATION CONTROL AFTER SIGNATURE BY THE CUSTOMER AND NASA

PIP ANNEXES

S-84-04039

- SINGLE AUTHORITATIVE SOURCE FOR PAYLOAD DATA
- DATA SUPPLIED AND VERIFIED BY CUSTOMER
- UPDATES MADE AS NECESSARY
- PIP SHALL TAKE PRECEDENCE IN EVENT OF ANY VARIATION WITH ANNEXES
- REQUIREMENTS SUBMITTED IN AN ANNEX THAT ARE NOT WITHIN SCOPE OF THE PIP WILL NOT BE CONSIDERED BINDING ON NASA FOR IMPLEMENTATION
- JOINTLY APPROVED BY THE CUSTOMER AND NASA EXCEPT AS STATED IN THE LAUNCH SERVICE AGREEMENT

ANNEX 1 — DATA PACKAGE

S-84-04029

- PURPOSE
  - SPECIFY PAYLOAD MASS PROPERTIES
  - PREPARE CONFIGURATION DRAWINGS
  - PROVIDE RADIO FREQUENCY (RF) RADIATION DATA
  - IDENTIFY PAYLOAD PHYSICAL FUNCTION DATA

SPACE
SHUTTLE
PAYLOAD

DESIGN AND DEVELOPMENT

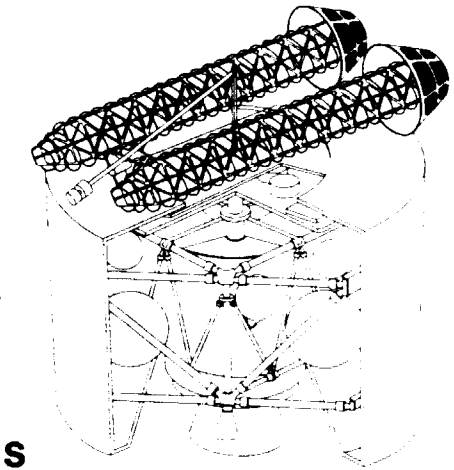
NASA

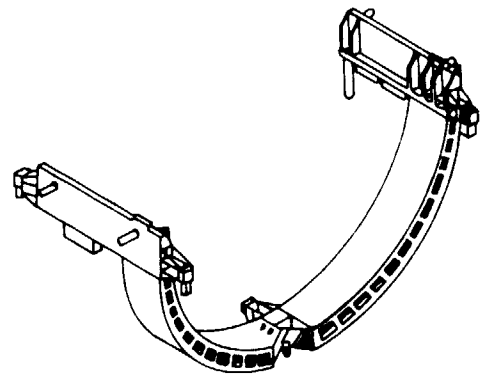
PAYLOAD MASS PROPERTIES

S-84-04016

ELEMENTS

SYNCOM IV SPACECRAFT





SYNCOM IV CRADLE

MASS PROPERTIES

CONFIGURATION (AS APPLICABLE)	PAYLOAD ELEMENT	CONTROL WEIGHT	WEIGHT	WT BREAKDOWN PERCENT			CENTER OF GRAVITY			MOMENTS OF INERTIA SLUG-FT^2			PRODUCTS INERTIA SLUG-FT^2		
				EST	CALL	ACT	X	Y	Z	I_x	I_y	I_z	I_{xy}	I_{zx}	I_{zy}
LAUNCH	CRADLE														
	SPACECRAFT														
	COMBINED CRADLE & SC														
CHECKOUT															
DEPLOYMENT															
RETURN															

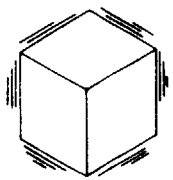
SPACE
SHUTTLE
PAYLOAD

DESIGN AND DEVELOPMENT

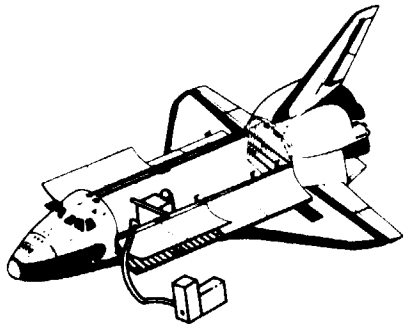
NASA

CONFIGURATION DRAWINGS

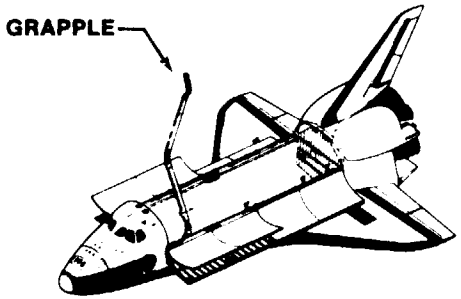
S-84-04026



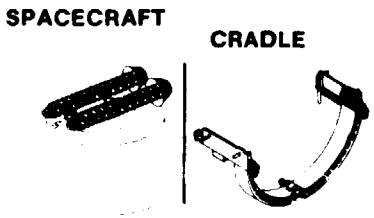
PAYLOAD STATIC/DYNAMIC ENVELOPE



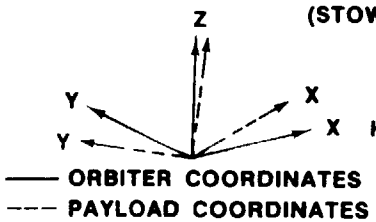
DRAG-ON CABLES



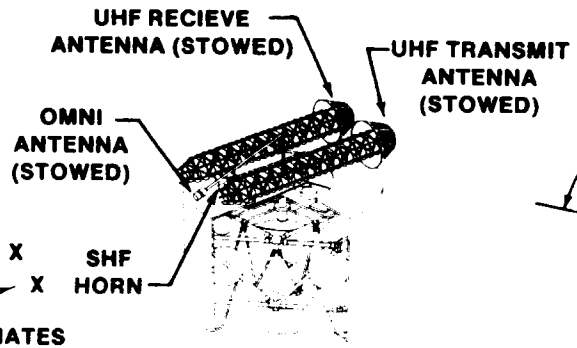
HANDLING DEVICES



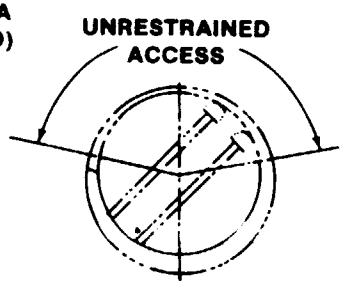
PAYLOAD ELEMENTS & STS INTERFACES



MASS PROPERTIES COORDINATE SYSTEM



ANTENNAS & LOCATIONS



PAYLOAD ACCESS/REMOVAL ENVELOPES

ORIGINAL PAGE IS OF POOR QUALITY NOT FILMED

RF RADIATION DATA

S-84-04032

TRANSMITTING SYSTEM

- TRANSMITTER PERFORMANCE
  - TYPE, FREQ, τ, PRF, POWER
- NO. OF ANTENNAS
- CABLE LOSSES - TRANSMITTER/ANTENNA

RECEIVING SYSTEM

- RECEIVER PERFORMANCE
  - FREQ, BW, SENSITIVITY, INTERFACES FILTER TYPE/ATTENUATION, ETC.
- NO. OF ANTENNAS
- CABLE LOSSES - RECEIVER/ANTENNA
- RECEIVER/ANTENNA ISOLATION
- RECEIVER SIGNAL POWER CONSTRAINTS

ORBITER RF LINKS VERIF
OPTIONAL SERVICE

ANTENNA SYSTEM

- NAME, & LOCATION, X, Y, Z
- INTERFACES & ASSOCIATION
- ANTENNA GAIN, POLARIZATION, EFFECT DIA, POINTING, EFFICIENCY, RADIATION PLOT, PATTERN AXIAL RATIO
- OPERATIONS REQUIRED RELATED TO TIME & DISTANCE FROM ORBITER DURING ON-ORBIT CHECKOUT, DEPLOYMENT, STATION-KEEPING, MANUEVERS, & RETRIEVAL AS APPLICABLE

- TRANSMITTING
  - MOD, FREQUENCY STABILIZATION, PHASE NOISE, & TELEMETRY CHARACTERISTICS
- RECEIVING
  - MOD, FREQ STAB, NOISE TEMP, SWEEP RANGE, SUBCARRIER FREQ, ETC.
- ACQUISITION
  - SEQUENCE, TIME & FALSE LOCK SUSCEPTIBILITY

PAYLOAD PHYSICAL FUNCTION DATA

S-84-04005
Rev 1

- STS RETRIEVAL
- SPECIAL HANDLING BY PAYLOAD DEPLOYMENT AND RETRIEVAL SYSTEMS (PDRS)
- OPERATIONS IN CARGO BAY
- CREW SIMULATION/TRAINING
- STS POSTDEPLOYMENT OPERATIONS

- PAYLOAD RETRIEVAL
  - RF & OPTICAL SIGNATURES
  - MARKINGS/PAINT PATTERNS
  - TRACKING AIDS
  - ATTITUDE DATA
  - PDRS TRANSLATION REQUIREMENTS
  - PLUME IMPINGEMENT CONSTRAINTS
  - PAYLOAD ELEVATION MECH DATA
  - TIME HISTORY PAYLOAD FUNCTIONS
- FREE-FLYING PAYLOADS
  - PAYLOAD TRANSLATION REQUIREMENTS
  - I_{SP} & THRUST TIME HISTORY

- PAYLOAD DEPLOYMENT
  - PDRS TRANSLATION REQUIREMENTS
  - PAYLOAD ELEVATION MECH DATA
  - SEPARATION MECH FORCES
  - PAYLOAD SPIN MECH DETAILED DATA
  - SPECIAL DEVICES DETAILED DATA
  - ORBITER ATTITUDE INITIALIZATION
  - TIME HISTORY PAYLOAD FUNCTIONS
- UNIQUE FUNCTIONS REQUIRING CREW TRAINING IN A SIMULATOR

ANNEX 2 — FLIGHT PLANNING

S-84-02068

- PURPOSE
  - PART I — FLIGHT DESIGN
    - — DEFINE PAYLOAD REQUIREMENTS ON STS FLIGHT DESIGN
      - LAUNCH WINDOW AND ORBITAL PARAMETER DATA
      - ELECTRICAL POWER CHARACTERISTICS DATA
      - COOLING LOADS DATA
      - DEPLOYMENT/RETRIEVAL/PROXIMITY OPERATIONS
  - PART II — FLIGHT ACTIVITY PLANNING
    - — DEFINE FLIGHT ACTIVITY REQUIREMENTS
      - CREW ACTIVITY REQUIREMENTS
      - ATTITUDE AND POINTING REQUIREMENTS
      - CONTAMINATION AVOIDANCE
      - PHOTO/TV REQUIEMENTS
      - EVA SCHEDULE

TABLE I. LAUNCH/INJECTION WINDOW REQUIREMENTS

S-84-04007

(a) LAUNCH INTERVAL PERIOD

LAUNCH WINDOW	
BEGINNING DAY, MONTH, YEAR	ENDING DAY, MONTH, YEAR

(b) CONTINUOUS LAUNCH SEGMENTS DURING LAUNCH INTERVAL

SEGMENT ID	BEGINNING MONTH, DAY, YEAR	ENDING MONTH, DAY, YEAR
1		
2		

(c) FIRST STAGE IGNITION - ASCENDING WINDOW

SEGMENT ID	LAUNCH DATE DAILY WINDOW	PARKING ORBIT RIGHT ASCENSION INERTIAL NODE AT IGNITION, DEG	
		OPENING	CLOSING

(d) FIRST STAGE IGNITION - DESCENDING WINDOW

SEGMENT ID		PARKING ORBIT RIGHT ASCENSION INERTIAL NODE AT IGNITION, DEG

(e) LAUNCH/INJECTION WINDOW LIGHTING & OCCULTATION REQUIREMENTS

[redacted]

[redacted]

ELECTRICAL POWER REQUIREMENTS

S-84-04009

- SPECIFY PAYLOAD TIMELINES FOR kWs REQUIRED (TABLE II)
  - X_O ~ 645 CONNECTION
  - X_O ~ 1307 CONNECTION
  - AFT FLIGHT DECK (AFD)

  FOR

  - PRIMARY DC
  - AUXILIARY BUS A (DC)
  - AUXILIARY BUS B (DC)
  - PRIMARY AC (AFD ONLY)
- LIST POWER-CONSUMING ORBITER SUPPORT EQUIPMENT (TABLE III)
  - TV CAMERAS
  - LIGHTS
  - RECORDER
  - SWITCH PANEL
  - AFT MULTIFUNCTION CATHODE RAY TUBE DISPLAY SYSTEM
  - PAYLOAD DATA INTERLEAVER
  - REMOTE MANIPULATOR SYSTEM

[redacted]

SHOW TIME OF EACH* POWER LEVEL CHANGE REFERENCED TO A FLIGHT EVENT (E.G., LAUNCH; TIME OF NTH NODE CROSSING, ETC.

*WHERE A SIGNIFICANT CHANGE IN POWER LEVEL OCCURS

[redacted]

TABLE IV. PAYLOAD THERMAL REQUIREMENTS

S-84-04017

PHASE TIME REFERENCE EVENT	PHASE TIME HR:MIN	THERMAL LOAD BTU/HR STS INTERFACE 1	THERMAL LOAD BTU/HR STS INTERFACE 2	THERMAL LOAD, BTU/HR CABIN/LAB ATMOSPHERE

GENERALLY PARALLELS THE POWER PROFILE

PAYLOAD SEQUENCE OF EVENTS (PART II)

S-84-04006

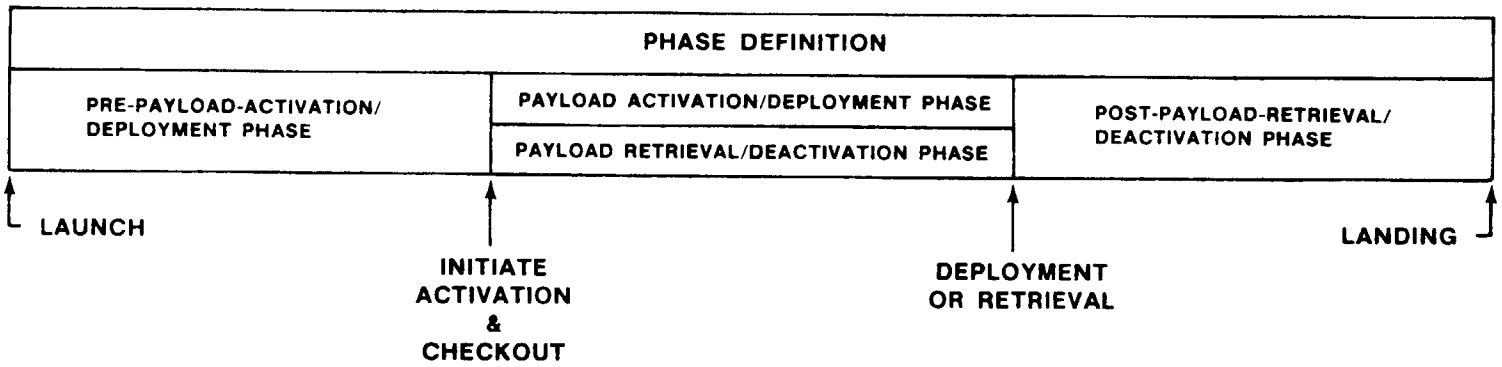


TABLE V. PAYLOAD OPERATIONS SEQUENCE

1 EVENT DES-CRIPTION	2 PHASE EVENT REF	3 PHASE ELAPSED TIME EVENT START HR:MIN: SEC	4 EVENT DURATION HR:MIN: SEC	5 COMMAND RESPON-SIBILITY	6 OPS SUPPORT REQUIREMENT							7 COMMENTS
					COMM & DATA	ATT & POINT	NAV	PROX OPS	ENVIRONMENT			
									CONTAM	THERM	ACCEL	
SPIN-UP ERECTED S/C	LAUNCH	04:30: XX	00:10:00 ± 00:02: 00	PAYLOAD SPECIALIST	*SEE ATTACH	INERTIAL HOLD 135° RA 119° F&F	IMU ±0.5° ACCUR	1 FT/ SEC SEP VEL	SHUTTLE STD ACCEPT ABLE	*SEE ATTACH	MIN DURING SPIN •	MUST BE COMPLETE FOR RELEASE AT SIXTH UP-NODE PROCESSING

● ADDITIONAL DETAILS ON CONSTRAINTS IDENTIFIED IN MAIN BODY OF PIP ALSO GO IN THIS PART

ANNEX 3 — DATA REQUIREMENTS FOR FLIGHT OPERATIONS

S-84-04038

- PURPOSE
  - IDENTIFY PAYLOAD OPERATIONS SUPPORT PLANS
  - DEFINE FLIGHT OPERATIONS DECISIONS
  - DEFINE JOINT OPERATIONS INTERFACE PROCEDURES
  - DEFINE PAYLOAD OPERATIONS PROCEDURES
  - DEFINE PAYLOAD MALFUNCTIONS PROCEDURES
  - PAYLOAD ELECTRICAL POWER AND COMMAND INTERFACE DRAWINGS

TABLE 3-1. FLIGHT OPERATIONS DECISIONS (3.0)

S-84-04021

PAYLOAD:_____
REVISION:_____

NO.	OPERATIONS DECISIONS	CRIT	RATIONALE
	DECISIONS THAT NEED PREFLIGHT CONSIDERATION EXAMPLES ● ALTERNATE/BACKUP MISSION PLAN IMPLEMENTATION ● MANAGEMENT OF OFF-NOMINAL CONDITIONS/OPERATIONS ● GO/NO-GO CRITERIA FOR • LAUNCH • DEPLOY • RETRIEVAL • OPERATIONS	●	● JUSTIFY/CLARIFY DECISION CREW SAFETY = 1 STS VEHICLE INTEGRITY = 2 PRIMARY PAYLOAD OBJECTIVE = 3

USED TO DEVELOP STS FLIGHT RULES & FLIGHT DATA FILE

PRECEDING PAGE BLANK NOT FILMED

TABLE 4-1. PAYLOAD OPERATING PROCEDURES (4.0)

S-84-04027

SYSTEM: _____ PAYLOAD: _____

TITLE: (PROCEDURE DESCRIBED - CONSISTENT WITH FLIGHT PLAN ANNEX) REVISION: _____

STEP (NO.)	OPERATION	DSM	SPEC/ITEM	PANEL/SW	COMMENTS
	• FUNCTION PERFORMED AT EACH STEP	• DIGITAL UPLINK SELECT MATRIX (DSM) NUMBER TO PERFORM FUNCTION (JSC DEFINES OR SUPPLIES BLOCK OF DSM'S)		• AFD PANEL & SWITCH TO PERFORM FUNCTION	
					• ANY CONSTRAINT OR VERIFICATION REQUIREMENT OR HELPFUL DATA
			• CREW DISPLAY NUMBER & CORRESPONDING COMMAND TO PERFORM FUNCTION		
	• PROCEDURES APPLICABLE ONLY TO COMMANDER-PILOT-MS-JSC/POCC (PAYLOAD-PS-REMOTE POCC PROCEDURES SUBMITTED FOR STS INFORMATION ONLY)				
	• USED TO DEVELOP STS PAYLOAD SYSTEM OPERATING PROCEDURES (PSOP) (WHICH SUPPORT THE FLIGHT RULES & FLIGHT DATA FILES)				

PRECEDING PAGE BLANK NOT FILMED

TABLE 4-II. PAYLOAD MALFUNCTION PROCEDURES (4.0)

S-84-04025

SYSTEM: _____ PAYLOAD: _____

TITLE: _____ REVISION: _____

SYMPTOM	PROCEDURE	REMARKS
• CUE THAT ALERTS FLIGHTS CREW OF OFF-NOMINAL CONDITION		
	• STEP-BY-STEP LISTING • TO GAIN CONTROL • DETERMINE SOURCE/NATURE OF PROBLEM • ESTABLISH ALTERNATE OPERATIONS	
	APPLICABLE ONLY TO EXTENT THAT STS RESPONSE IS REQUIRED	• EXPLAIN AND QUALIFY SO CREW CAN USE JUDGMENT IN ACTUAL CASE & UNDERSTAND URGENCY/RELATIVE IMPORTANCE

• FLOW CHARTS SHOULD ALSO BE PROVIDED, SYMPTOM TO CONCLUSION

PRECEDING PAGE BLANK NOT FILMED

TABLE 5.1 DATA COLLECTION REQUIREMENTS/CONSTRAINTS (5.0)

S-84-04031

SYSTEM: _____ PAYLOAD: _____

REVISION: _____

EVENT	PAYLOAD DATA TYPE & SOURCE	CORRELATIVE SUPPORTING DATA	DATA COLLECTION CONSTRAINTS	DATA CRITICALITY	ONBOARD RECORDING	DATA CROSS-CORRELATION

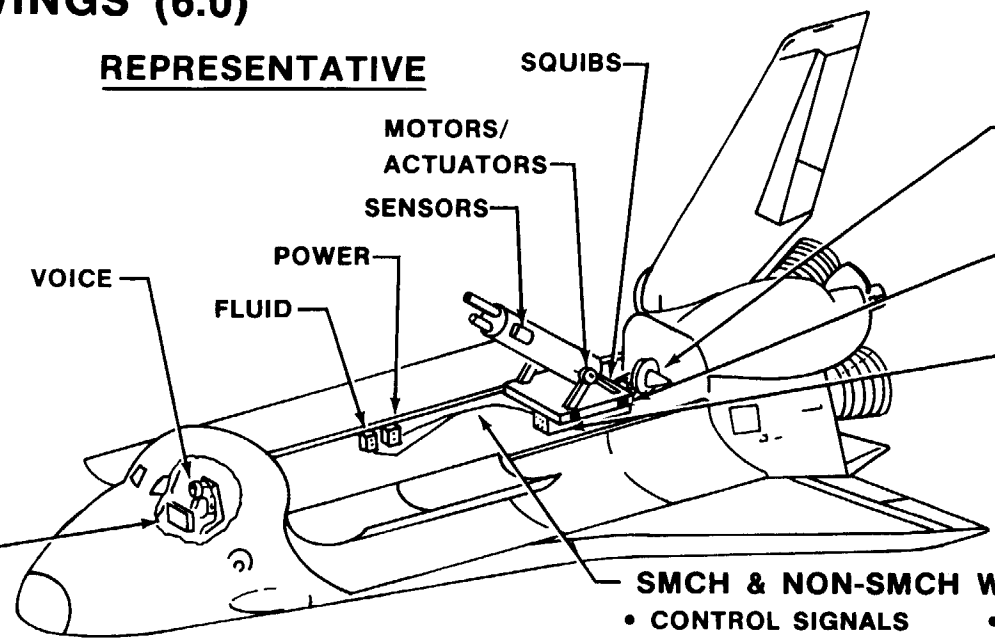
- USED TO DEVELOP MISSION CONTROL CENTER (MCC) DATA ACQUISITION & RECORDER FILL-AND-DUMP PLANS
- KEY TO EVENT SEQUENCE OF FLIGHT PLANNING ANNEX

PRECEDING PAGE BLANK NOT FILMED

PAYLOAD DRAWINGS (6.0)

S-84-04046

- DRAWINGS
- DIAGRAMS
- ETC.



PANEL DETAILS
- SWITCHES & CIRCUIT BREAKERS
- INTERLOCKS
- INDICATORS
- POWER/COOLING
- LOCATION
- ETC.

- CIRCUIT BREAKERS & TRIP LEVELS
- RELAYS
- CONVERTERS
- VALVES
- ETC.

SMCH & NON-SMCH WIRING
- CONTROL SIGNALS
- POWER
- THERMAL CONTROL
- DATA SIGNALS
- STATUS
- TIMING
- ETC.

- CRITERIA FOR LEVEL OF DETAIL
  - END ITEM IS CONTROLLED OR MONITORED BY FLIGHT OR MCC CREW
    - NORMAL
    - CONTINGENCY
    - EMERGENCY
- UTILIZATION
  - INPUT TO STS CARGO SYSTEMS MANUAL (CSM)

PRECEDING PAGE BLANK NOT FILMED

ANNEX 4 — ORBITER COMMAND AND DATA

S-84-02098

- PURPOSE
  - IDENTIFY INDIVIDUAL COMMANDS TO OPERATE THE PAYLOAD
  - IDENTIFY MEASUREMENTS FOR STATUS AND HEALTH OF PAYLOAD
  - IDENTIFY MEASUREMENTS FOR OBJECTIVE ACCOMPLISHMENT
  - PROVIDE NECESSARY INFORMATION PROCESS AND INTERPRETATION DATA

PAYLOAD DATA REQUIREMENTS

S-84-04015

SPECIFIED BY PAYLOAD USER IN FOLLOWING TABLES OF APPENDIX A

TABLE 1	MEASUREMENT REQUIREMENTS
TABLE 2	COMMAND/STIMULI REQUIREMENTS
TABLE 3	FAULT DETECTION & ANNUNCIATION (ONBOARD DISPLAY)
TABLE 4	PRECONDITION STEERING (ONBOARD DISPLAY)
TABLE 5A	SUBSYSTEM MEASUREMENT MANAGEMENT (ONBOARD DISPLAY)
TABLE 5B	GROUND DISPLAY CALIBRATION
TABLE 6A	COMMAND SPECIFICATION - DIGITAL (ONBOARD)
TABLE 6B	COMMAND SPECIFICATION - DIGITAL (GROUND)
TABLE 7A	COMMAND SPECIFICATION - ANALOG/DISCRETE (ONBOARD)
TABLE 7B	COMMAND SPECIFICATION - ANALOG/DISCRETE (GROUND)
TABLE 7C	COMMAND SPECIFICATION - MULTIPLE REAL-TIME COMMANDS (UPLINK)
TABLE 8A	INDEPENDENT DATA STREAM CHARACTERISTICS
TABLE 8B	PAYLOAD DATA INTERLEAVER (PDI) DECOMMUTATION FORMATS
TABLE 8C	PDI DECOMMUTATION REQUIREMENTS
TABLE 9	DECOMMUTATION DATA
TABLE 10A	BUS TERMINAL UNIT CHANNELIZATION REQUIREMENTS (MEASUREMENTS)
TABLE 10B	BUS TERMINAL UNIT CHANNELIZATION REQUIREMENTS (COMMANDS)

DATA/TABLE USE MATRIX

S-84-04035

REQUIRED BY PAYLOAD SUPPLIER	APPLICABLE TABLES																
	1	2	3	4	5A	5B	6A	6B	7A	7B	7C	8A	8B	8C	9	10A	10B
DATA TO BE TELEMETERED TO GROUND:																	
ENCRYPTED DATA OR BLOCK MODE													X	X			
DATA TO BE PROCESSED BY JSC (MCC OR POCC) OR KSC	X					X						X	X	X	X		
DATA TO BE DISPLAYED ONBOARD ORBITER	X				X												
GROUND CALIBRATION						X											
GROUND UPLINK COMMANDS		X						X	X	X							
ONBOARD CCS DIGITAL COMMANDS		X					X										
ONBOARD CCS ANALOG/ DISCRETE COMMANDS		X							X								
FAULT DETECTION & ANNUNCIATION	X		X	X													
FLEX MDM (OR EQUIVALENT)	X															X	X
SPECIAL GPC PROCESSING	X	X															

ANNEX 5 — DATA REQUIREMENTS FOR THE PAYLOAD OPERATIONS CONTROL CENTER (POCC)

S-84-04028

- PURPOSE
  - DEFINE AND DETAIL THE USER REQUIREMENT LEVIED ON THE STS FOR PAYLOAD OPERATIONS CONTROL CENTER (POCC), REMOTE POCC, AND COMMUNICATIONS RESOURCES
- FORMAT
  - VOL. I — JSC ATTACHED POCC CAPABILITIES DESCRIPTION
    — VOL. I — JSC ATTACHED POCC REQUIREMENTS
  - VOL II — MCC/REMOTE POCC INTERFACE CAPABILITIES DESCRIPTION
    — VOL. II — MCC REMOTE POCC INTERFACE REQUIRMENTS

ANNEX 6 — CREW COMPARTMENT

S-84-04018

- **PURPOSE**
  - DESCRIBE PAYLOAD-SUPPLIED EQUIPMENT STOWED OR INSTALLED IN THE CREW COMPARTMENT
  - DEFINE REQUIREMENTS AFFECTING STOWAGE, INSTALLATION, HANDLING, OR FLIGHT CREW USE
  - DEFINE PROPOSED STOWAGE/INSTALLATION

ANNEX 7 — TRAINING

S-84-02088

- PURPOSE
  - IDENTIFY USER-PROVIDED TRAINING OF STS PERSONNEL
  - IDENTIFY POCC TEAM TRAINING REQUIREMENTS
  - DETERMINE INTEGRATED SIMULATION REQUIREMENTS
  - ESTABLISH TRAINING SEQUENCE FLOW
  - PREPARE PAYLOAD TRAINING SCHEDULES

ANNEX 8 — LAUNCH SITE SUPPORT PLAN

S-84-04008

- PURPOSE
  - DEFINE PAYLOAD PROCESSING FLOW
  - DEFINE USER LAUNCH AND LANDING REQUIRMENTS/ KSC COMMITMENTS
  - KSC REQUIREMENTS TO FULFILL COMMITMENTS
- FORMAT
  - KSC PREPARES DOCUMENT BASED ON PAYLOAD INPUTS VIA THE GROUND OPERATIONS WORKING GROUP AND SUBMITTAL BY THE CUSTOMER ON SUPPORT REQUIREMENT DATA SHEETS

ANNEX 9 — PAYLOAD INTERFACE VERIFICATION SUMMARY

S-84-02078

- PURPOSE
  - IDENTIFY PROJECT LEVEL INTERFACE VERIFICATION AGREEMENTS
  - IDENTIFY PAYLOAD-TO-STS ICD INTERFACES TO BE VERIFIED
  - IDENTIFY METHOD OF VERIFICATION
  - IDENTIFY RESPONSIBLE PARTICIPANTS
  - IDENTIFY LOCATION OF VERIFICATION

ANNEX 11 — EXTRAVEHICULAR ACTIVITIES

S-84-02089

- PURPOSE
  - DEFINE SPECIFIC DESIGN CONFIGURATION DETAILS FOR EACH HARDWARE-TO-HARDWARE INTERFACE ASSOCIATED WITH THE EXTRAVEHICULAR ACTIVITIES (EVA) SUPPORT OF A PARTICULAR PAYLOAD
    - — PLANNED EVA
    - — UNSCHEDULED EVA
    - — CONTINGENCY EVA

SUMMARY

S-84-02079

- EARLY CONTACT WITH CUSTOMER PROVIDES FOR MINIMUM EFFORT TO GENERATE AND BASELINE PAYLOAD INTEGRATION PLAN (PIP)
  - PAYLOAD INTEGRATION MANAGER WILL VISIT CUSTOMER TO OBTAIN INFORMATION REQUIRED TO GENERATE PIP
- DIRECT INTERFACE WITH PIP ANNEX MANAGER DURING ANNEX PREPARATION REDUCES MISUNDERSTANDINGS AND ITERATIONS REQUIRED TO GENERATE AND BASELINE ANNEXES
- REPEAT CUSTOMERS OR CUSTOMERS WHO UTILIZE A CARRIER HAVING GENERIC STS INTEGRATION DOCUMENTATION REQUIRE LITTLE IF ANY NEW DOCUMENTATION
- DOCUMENTATION IS MATURE AND IN PLACE. MINIMUM DIRECT INTERFACE WITH THE STS IS REQUIRED OF THE CUSTOMER

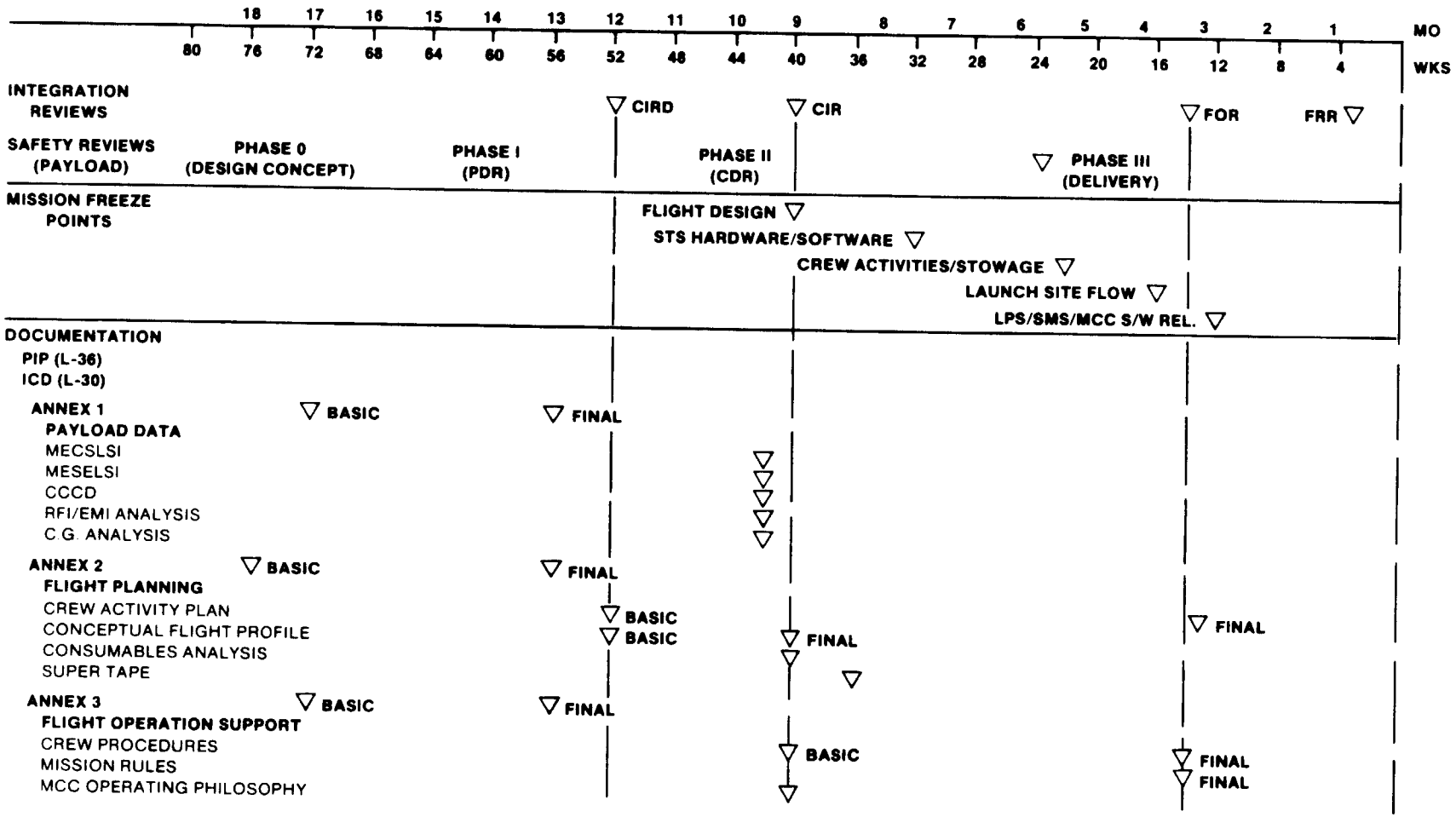
SPACE
SHUTTLE
PAYLOAD

DESIGN AND DEVELOPMENT

NASA

GENERIC INTEGRATION SCHEDULE

S-84-05037



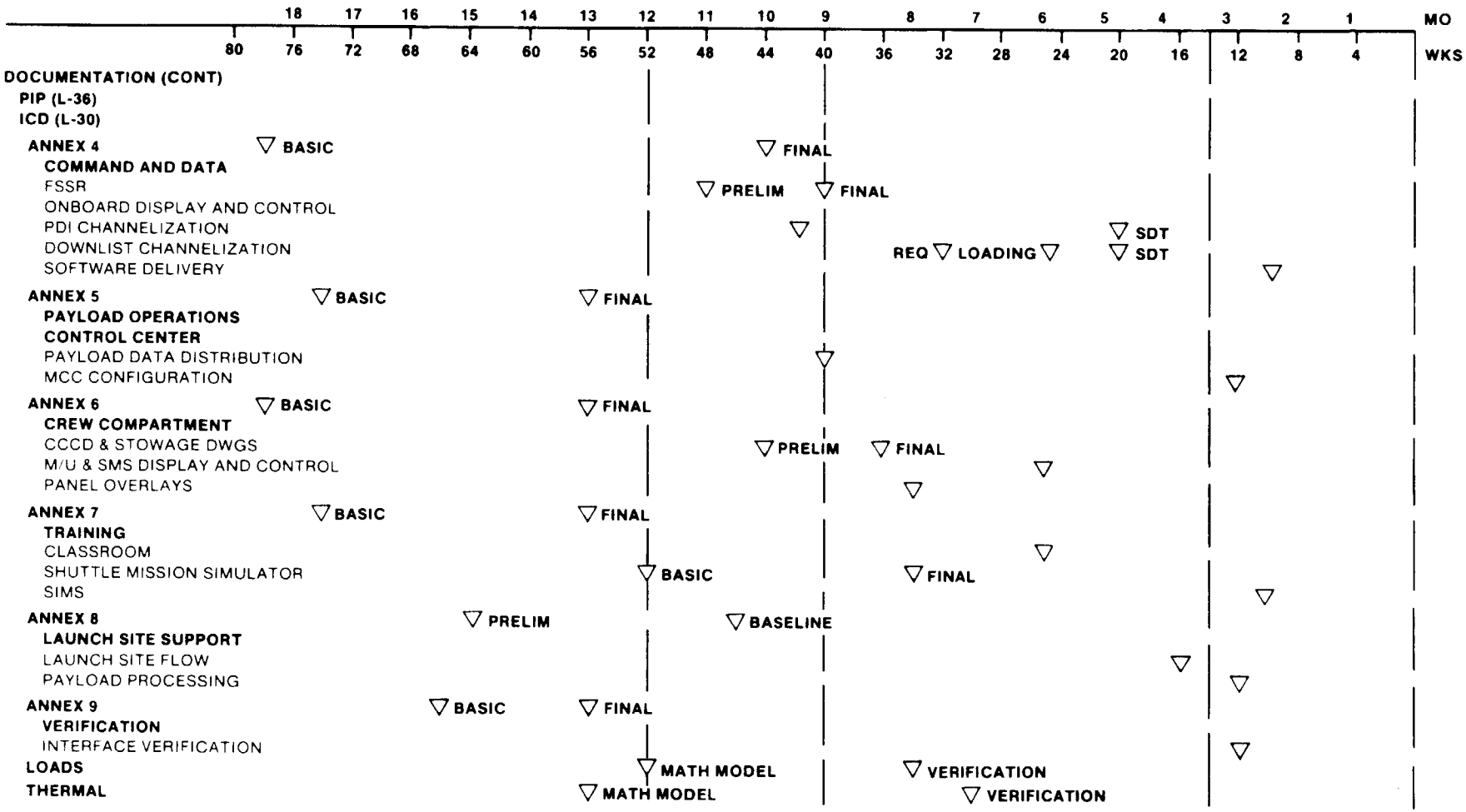
SPACE SHUTTLE PAYLOAD

DESIGN AND DEVELOPMENT

NASA

GENERIC INTEGRATION SCHEDULE (CONT)

S-84-05038



* U.S. GOVERNMENT PRINTING OFFICE: 1984—769-013/7679