732

PRESENTATION 3.3.1

N91-17045

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SPACE SHUTTLE

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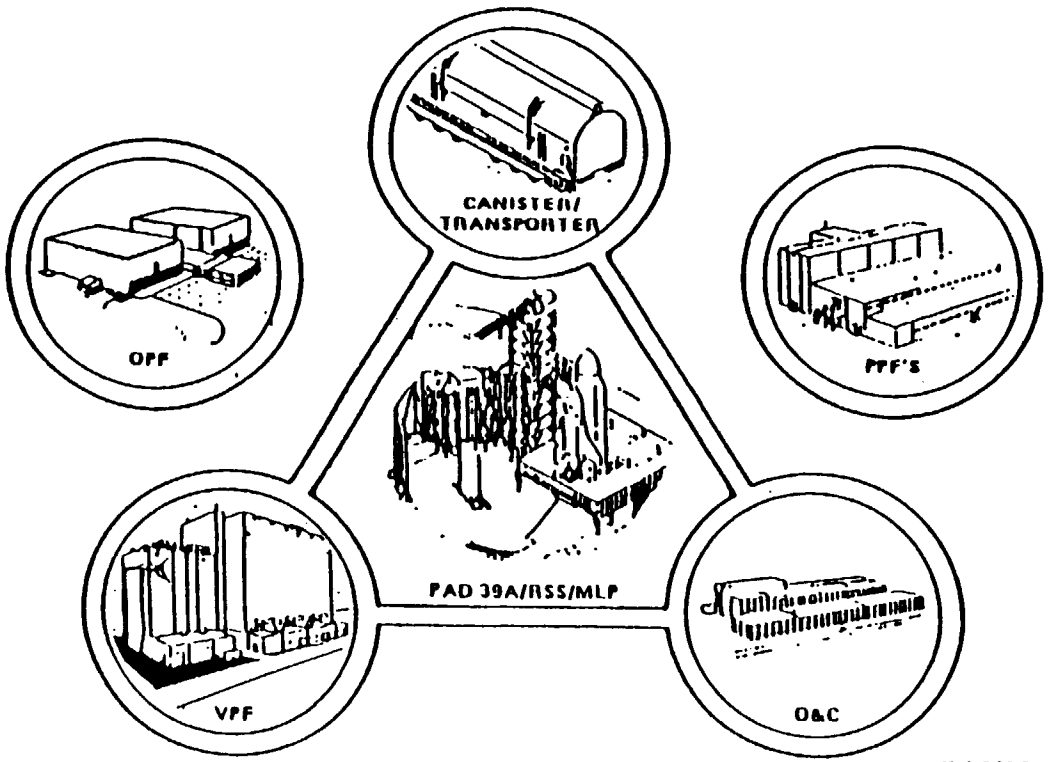

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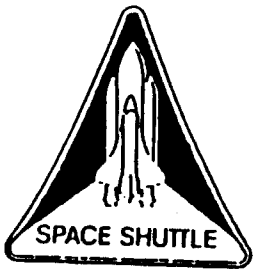

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PURPOSE

THIS PRESENTATION IS INTENDED TO PROVIDE A BASIC UNDERSTANDING OF THE NSTS PAYLOAD PROCESSING OPERATIONS PERFORMED AT JOHN F. KENNEDY SPACE CENTER (KSC) AND TO DESCRIBE THE PAYLOAD FACILITIES, SUPPORT SERVICES, AND GROUND SUPPORT EQUIPMENT USED TO SUPPORT THAT PROCESS.

CONTENTS

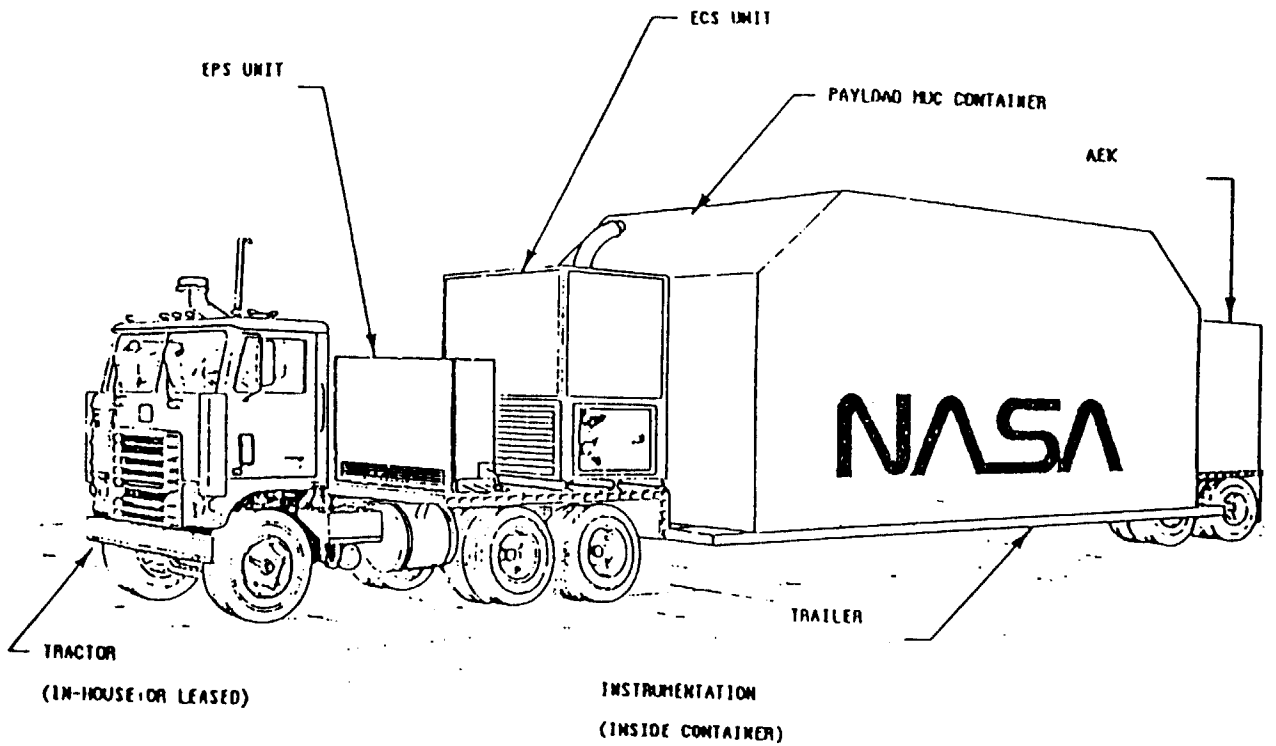
- SCENARIO OF PAYLOAD PROCESSING FLOW AND OPERATIONS AT KSC ALONG WITH A DESCRIPTION OF THE FACILITIES WHICH KSC PROVIDES TO SUPPORT THE LAUNCH PREPARATION OF PAYLOADS
- LIST OF PAYLOAD FACILITY HANDBOOKS
- LIST OF ACRONYMS

KSC OPERATIONS

- KSC IS THE PRIMARY NASA LAUNCH SITE
  - RESPONSIBLE FOR THE MANAGEMENT AND DIRECTION OF:
    - ASSEMBLY AND PROCESSING OF THE TDRS, MAGELLAN, GALILEO, SPACELAB, AND SIMILAR TYPE PAYLOADS
    - SUPPORT OF PAYLOAD PROCESSING AND FINAL PREPARATION FOR LAUNCH
    - FINAL TEST AND INTEGRATION OF PAYLOADS IN THE ORBITER BAY BEFORE LAUNCH
    - FINAL TEST AND INTEGRATION OF PAYLOADS WITH EXPENDABLE VEHICLES
    - DEINTEGRATION OF PAYLOADS FROM THE SPACE TRANSPORTATION SYSTEM (STS) UPON THEIR RETURN FROM SPACE

ARRIVAL/DEPARTURE

- PAYLOAD AND ASSOCIATED GROUND SUPPORT EQUIPMENT CAN BE DELIVERED TO KSC VIA:
  - LAND: FLORIDA EAST COAST RAILWAY
    INTERSTATE HIGHWAY 95
  - AIR: ORLANDO INTERNATIONAL AIRPORT
    MELBOURNE REGIONAL AIRPORT
    KSC'S SHUTTLE LANDING STRIP
    CAPE CANAVERAL AIR FORCE STATION (CCAFS) SKID STRIP
    SPACEPORT EXECUTIVE AIRPORT (TICO)
  - SEA: INTERNATIONAL SEAPORT OF ENTRY AT PORT CANAVERAL
    INTERCOASTAL WATERWAY



NOTE: PETS MUC HEIGHT CAN BE INCREASED BY INSTALLING TWO OPTIONAL SPACERS.

Payload Environmental Transportation System (PETS)

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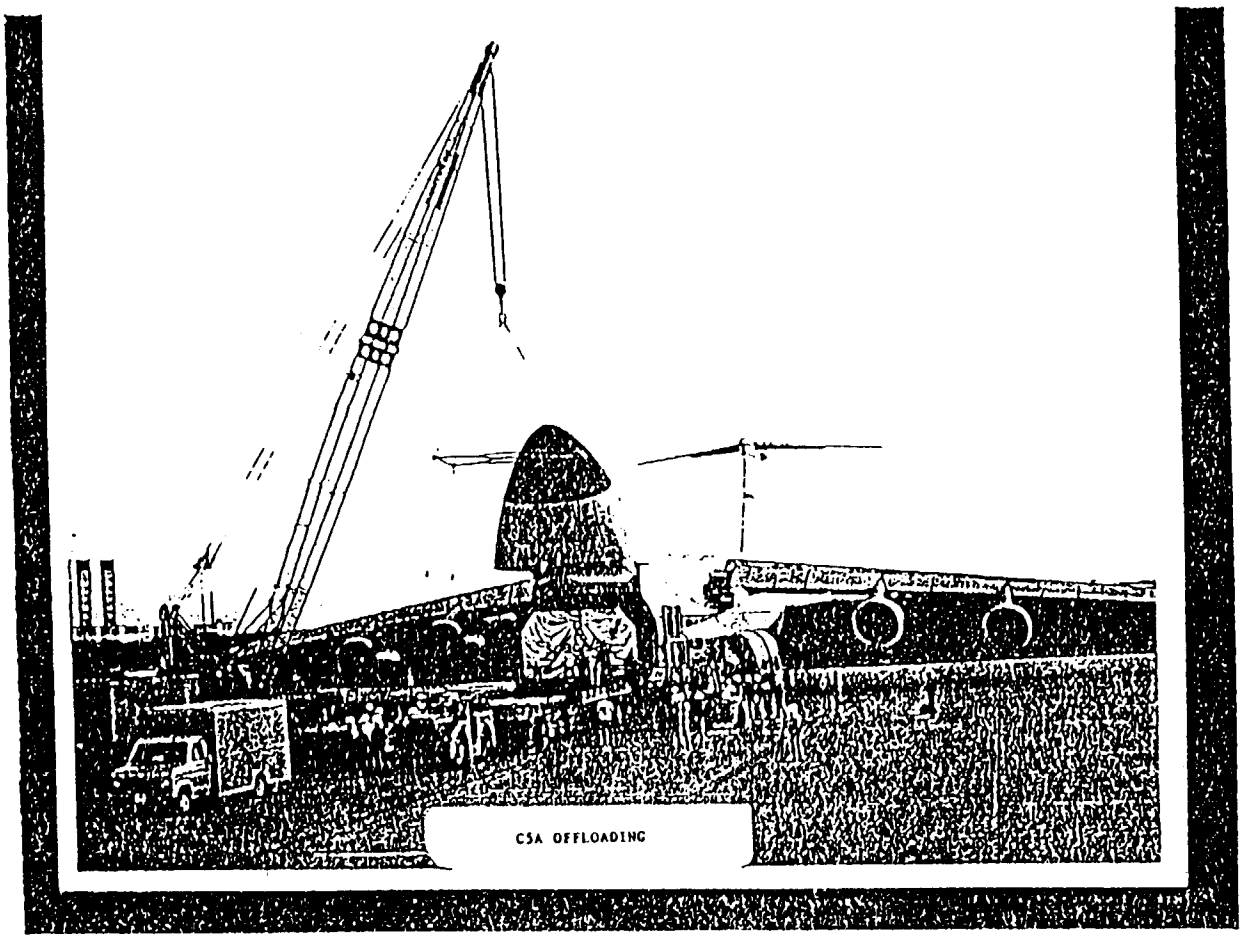
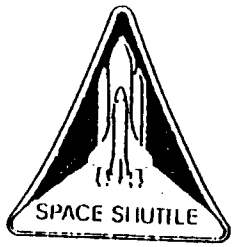


CSA OFFLOADING



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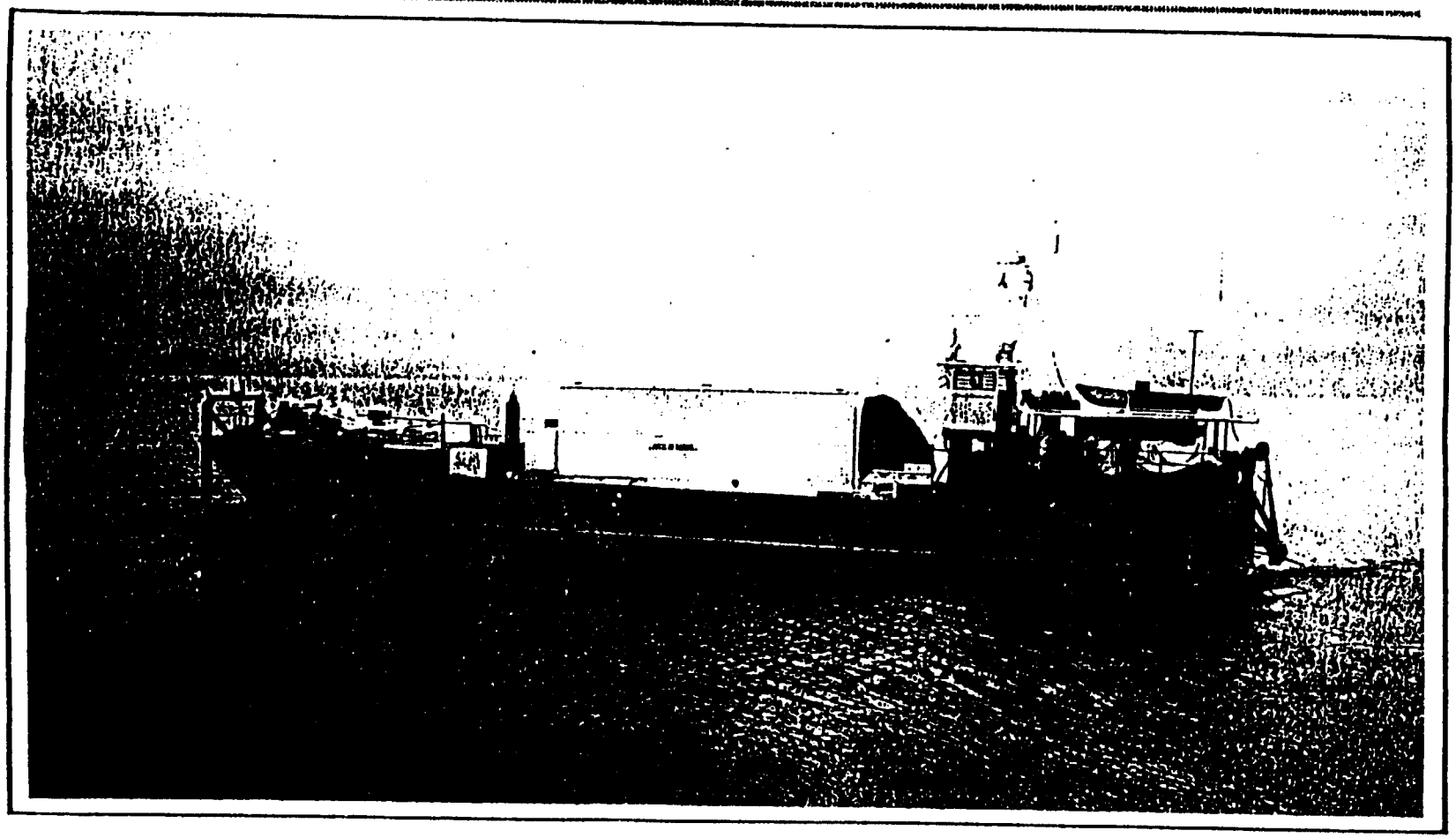

ARRIVAL BY CUSTOMER LEASED SHIP

600

PAYLOAD CLASSIFICATIONS

- HORIZONTAL - PAYLOADS WHICH ARE PLACED INTO THE ORBITER CARGO BAY WHILE THE ORBITER IS IN THE HORIZONTAL IN THE ORBITAL PROCESSING FACILITY (OPF)
- VERTICAL - PAYLOAD WHICH ARE PLACED INTO THE ORBITER CARGO BAY WHILE THE ORBITER IS IN THE VERTICAL IN THE PAYLOAD CHANGEOUT ROOM (PCR)
- MIXED
- SPECIAL
  - STUDENT INVOLVEMENT PROJECTS
  - GET-AWAY SPECIALS (GAS)
  - MIDDECK EQUIPMENT
  - MIDDECK LOCKERS

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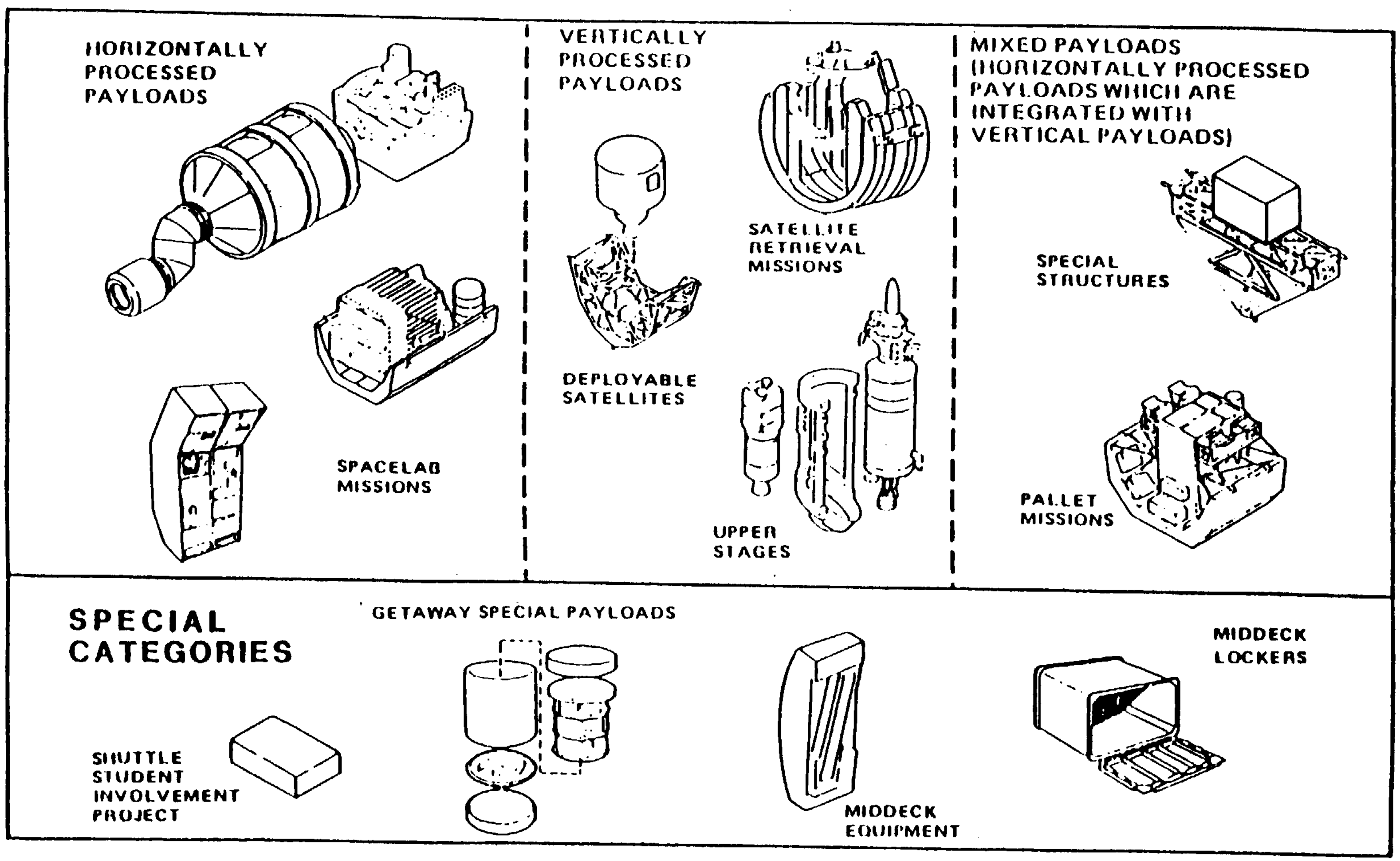
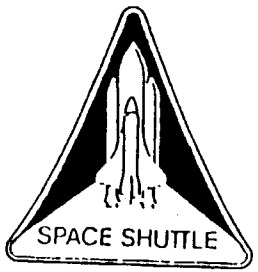


STS PAYLOADS PROCESSING CLASSIFICATIONS



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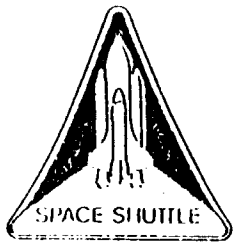
PAYLOAD PROCESSING FLOWS AT KSC

- STS PAYLOADS
  - HORIZONTAL
    - PROCESSED AND INTEGRATED IN THE O&C BUILDING
      - SPACE CORE AND EXPERIMENT MODULES
      - PALLETS, RACKS, SPECIAL STRUCTURES
  - VERTICAL
    - PROCESSED THROUGH THE PAYLOAD PROCESSING FACILITY (PPF) AND THE HAZARDOUS PROCESSING FACILITY (HPF) AND/OR INTEGRATED IN THE VPF
      - SCIENTIFIC
      - PLANETARY
- EXPENDABLE LAUNCH VEHICLE (ELV) PAYLOADS
  - PROCESSED THROUGH THE PPF AND HPF THEN TRANSPORTED DIRECTLY TO THE LAUNCH VEHICLE



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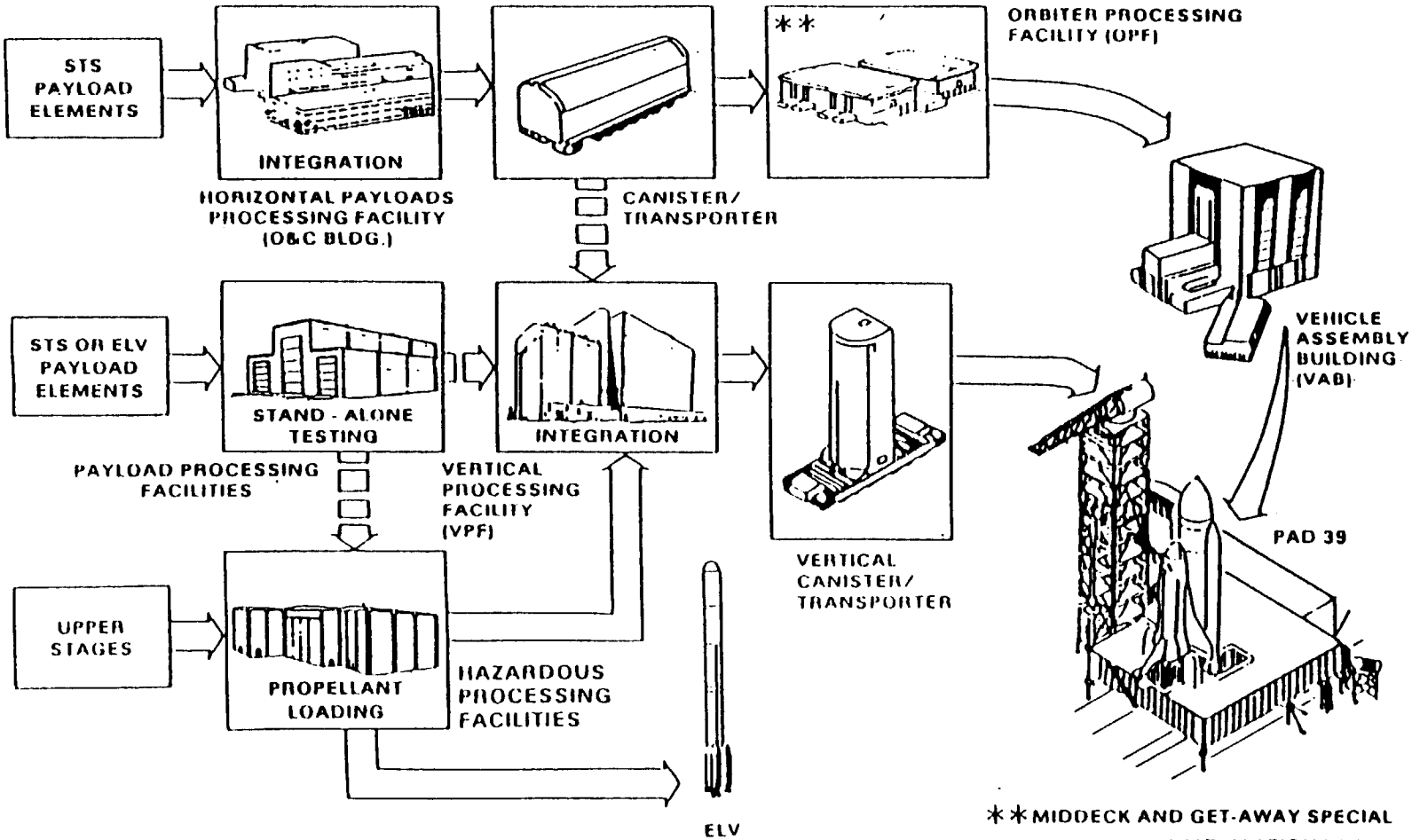
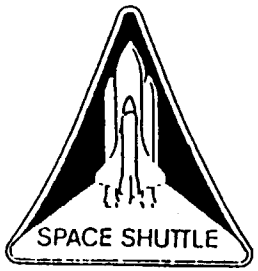


**MIDDECK AND GET-AWAY SPECIAL INSTALLATION IN OPF

PAYLOAD PROCESSING FLOWS AT KSC



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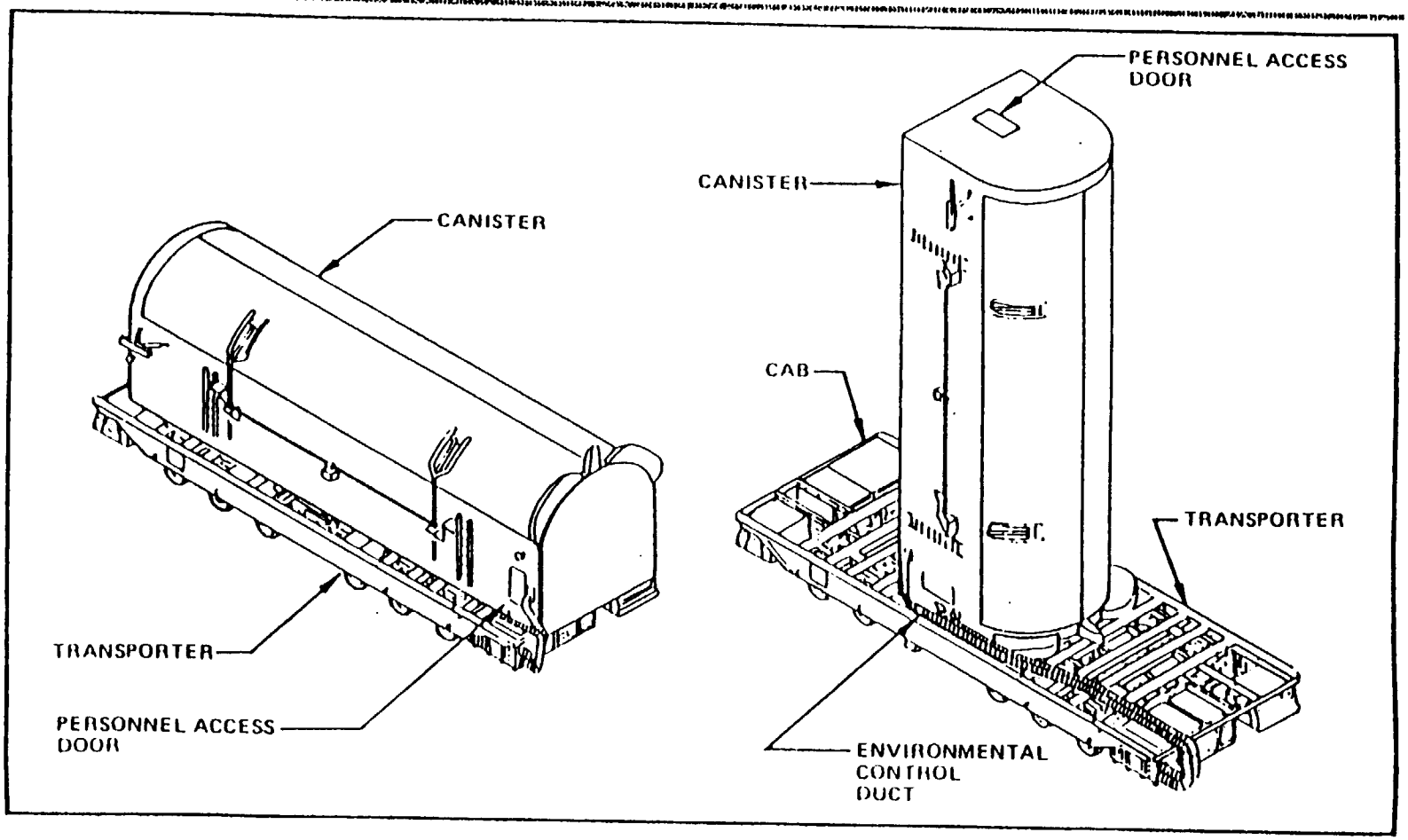
MULTI-USE MISSION SUPPORT EQUIPMENT (MMSE)

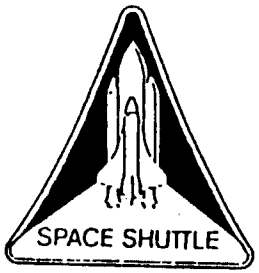
- PAYLOAD CANISTER (2 EACH)
- PAYLOAD CANISTER TRANSPORTER (2 EACH)
- PAYLOAD STRONGBACK
- PAYLOAD HANDLING FIXTURE

CANISTER/TRANSPORTER

- AN ENVIRONMENTALLY CONTROLLED, TRANSPORTATION CONTAINER USED TO TRANSPORT ALL SHUTTLE PAYLOADS BETWEEN FACILITIES
- WEIGHS APPROXIMATELY 107,000 POUNDS
- MOUNTED ON THE TRANSPORTER IN THE VERTICAL OR HORIZONTAL POSITION
- PROVIDES ESSENTIALLY THE SAME MECHANICAL SUPPORT TO PAYLOAD ELEMENTS AS THE ORBITER
- PAYLOAD RESTRAINED IN THE "Y" DIRECTION BY MEANS OF A SINGLE OR DOUBLE "Y" RESTRAINT SYSTEM (KSC DRAWING 79K20001) WHICH RESTRAINS LONGERON TRUNNION (KEEL TRUNNION FREE)
- DESIGN TO SUPPORT A 65,000 POUND PAYLOAD ASSEMBLY
- SPECIFICATION DOCUMENT FOR CANISTER IS "PAYLOAD CANISTER STANDARD INTERFACE DOCUMENT," 79K12170



CANISTER/TRANSPORTER CONFIGURATIONS



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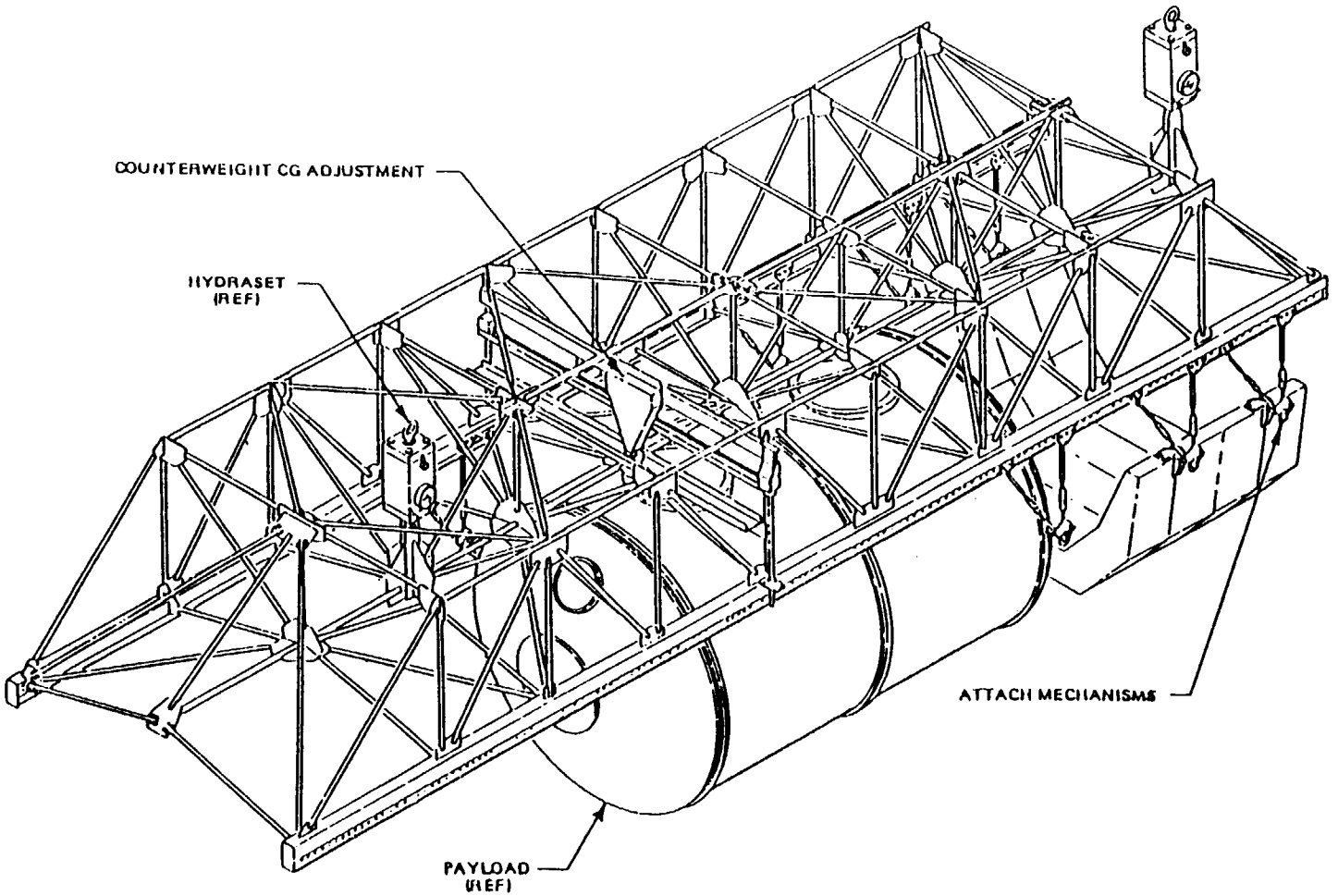
PAYLOAD STRONG BACK

- SUPPORTS HORIZONTALLY PROCESSED PAYLOAD SECTIONS AND POST FLIGHT PAYLOAD AND AIRBORNE SUPPORT EQUIPMENT (ASE) REMOVAL

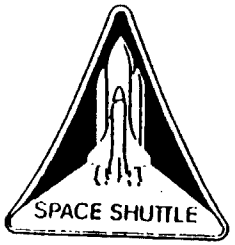
809

PAYLOAD HANDLING FIXTURE

- DESIGNED TO HANDLE SHUTTLE PAYLOADS AT THE CONTINGENCY LANDING SITES. CAN BE AIRLIFTED BY C-5A AIRCRAFT



PAYLOAD STRONGBACK



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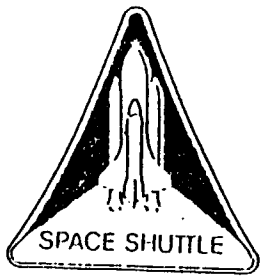
PAYLOAD PROCESSING FACILITIES

KSC FACILITIES

- RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG) STORAGE BUILDING
- VERTICAL PROCESSING FACILITY (VPF)
- PAYLOAD HAZARDOUS SERVICING FACILITY (PHSF)
- SPACECRAFT ASSEMBLY AND ENCAPSULATION FACILITY (SAEF-2)
- OPERATIONS AND CHECKOUT (O&C) BUILDING
- ORBITER PROCESSING FACILITY (OPF)
- ROTATING SERVICE STRUCTURE/PAYLOAD CHANGEOUT ROOM (RSS/PCR)

CCAFS FACILITIES

- PAYLOAD SPIN TEST FACILITY (PSTF)
- HANGAR S - A PPF
- AE BUILDING - A PPF
- AM BUILDING - A PPF
- AO BUILDING - A PPF
- LIFE SCIENCES SUPPORT FACILITY (LSSF)/HANGAR L
- EXPLOSIVE SAFE AREA (ESA 60)



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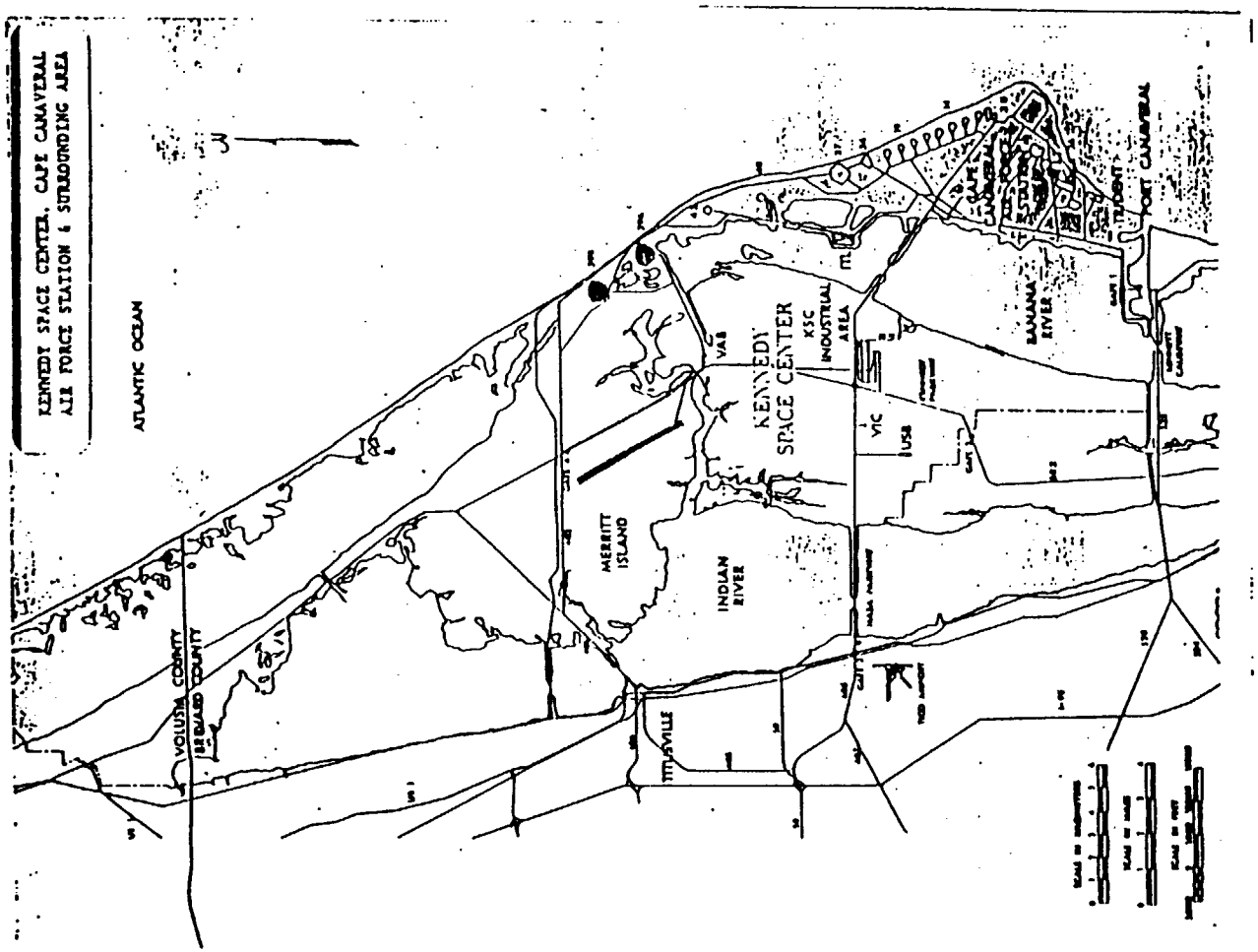

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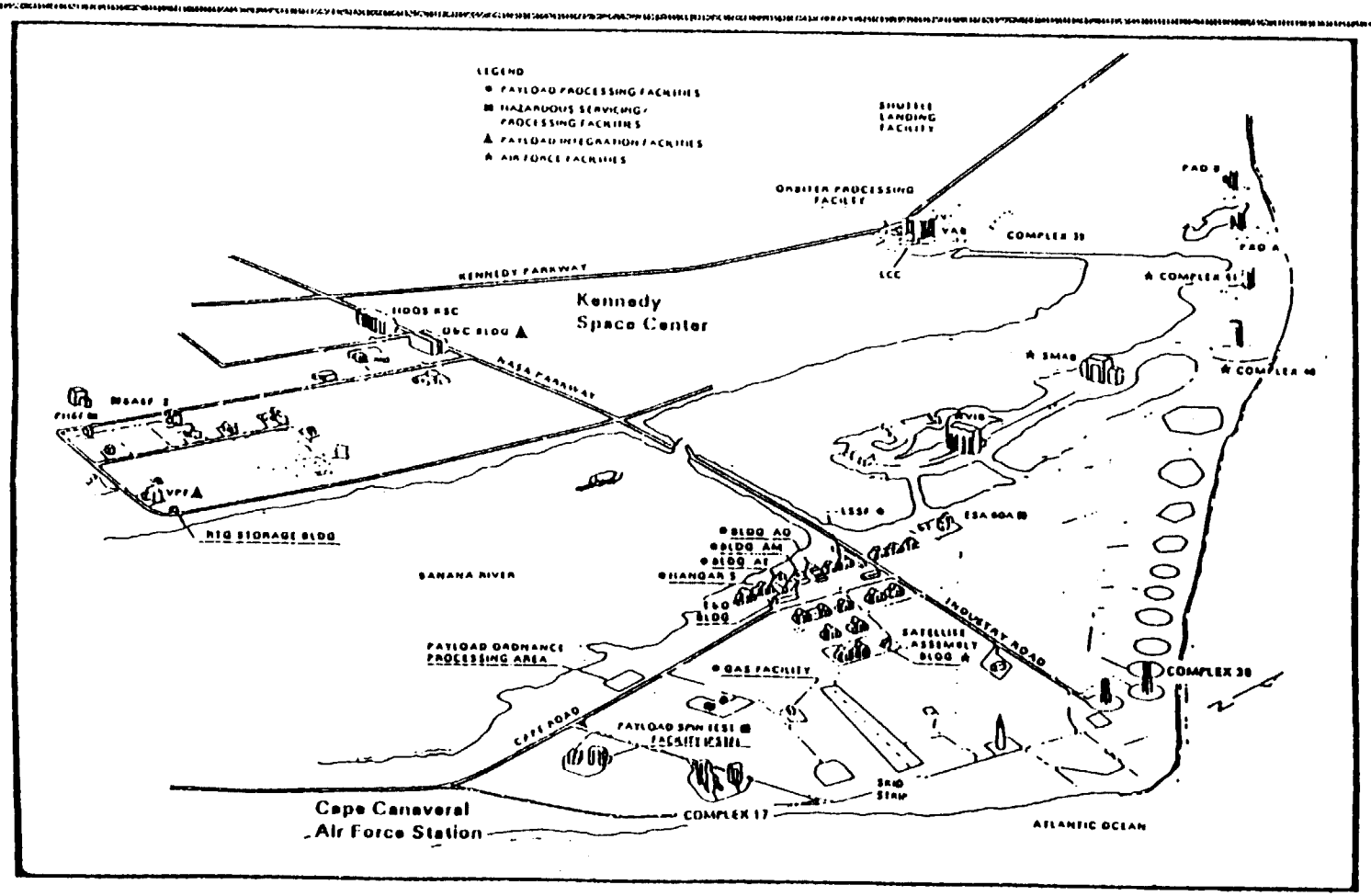
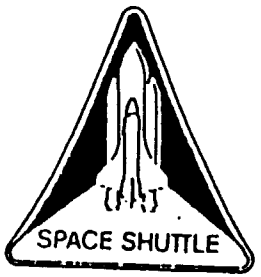


PAYLOAD FACILITIES



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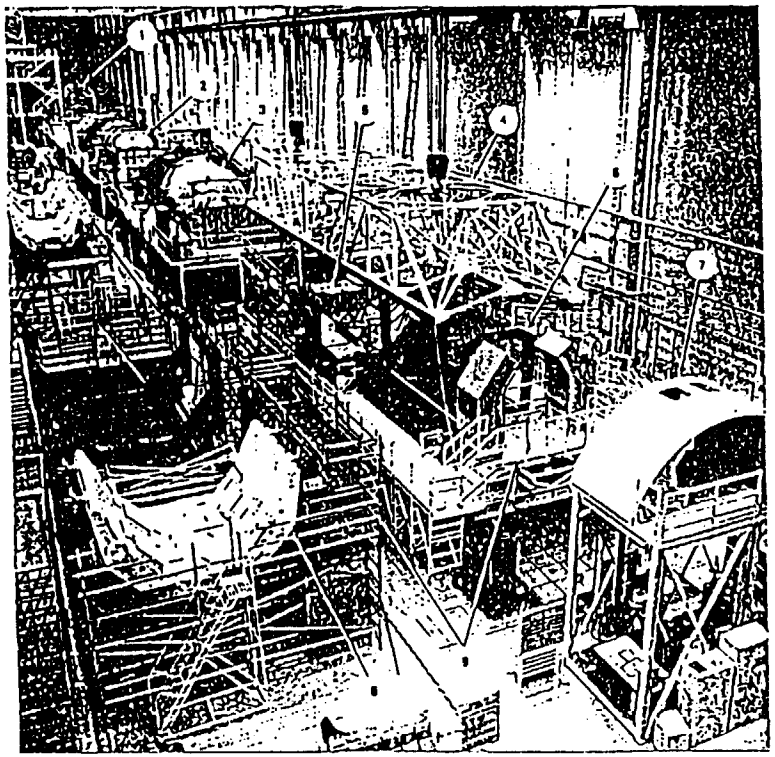
EXAMPLES OF HORIZONTAL PAYLOAD FLOWS

- SPACELAB MODULES
- IGLOOS
- PALLETS
- MISSION PECULIAR EXPERIMENT SUPPORT STRUCTURES THAT CARRY SCIENTIFIC EXPERIMENTS ARE PROCESSED AND INTEGRATED IN THE O&C BUILDING

HORIZONTAL (PAYLOAD) PROCESSING FACILITY AND GSE

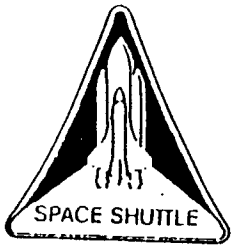
OPERATIONS AND CHECKOUT BUILDING
(LOOKING EAST – MAY 16, 1983)



1. PAYLOAD CANISTER
2. SPACELAB MODULE (ENGINEERING MODEL)
3. SPACELAB 1 IN INTEGRATION STAND
4. MMSE STRONGBACK LIFTING OSTA-2
5. OSTA-2 PAYLOAD IN LEVEL IV SHORT TRUNNION SUPPORT FIXTURE
6. SPACELAB RACKS EXTERNAL BRACES KIT
7. LEVEL IV AFT FLIGHT DECK SIMULATOR
8. SPACELAB 2 PALLET IN NORTH LEVEL IV WORKSTAND
9. LEVEL IV ACCESS EQUIPMENT

LEGEND:

YELLOW – ACCESS EQUIPMENT
BLUE – SELECTED SPACELAB GSE



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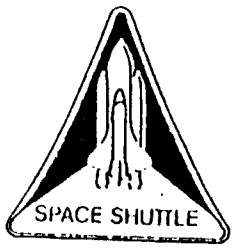
HORIZONTAL PAYLOAD FACILITIES
KSC O&C BUILDING
ASSEMBLY AND TEST AREA

- EXPERIMENT INTEGRATION STANDS
  - PROVIDE FOR PALLET AND RACK TRAIN ASSEMBLY AND EXPERIMENT INTEGRATION
- SPACELAB INTEGRATION STANDS
  - PROVIDE FOR SPACELAB MODULE PREPARATION AND EXPERIMENT RACK TRAIN INTO THE MODULE, PALLET-TO-MODULE MATING, AS WELL AS SYSTEMS CHECKOUT AND VERIFICATION
- CITE STAND
  - PROVIDES FOR HORIZONTAL PAYLOAD TESTING AND CHECKOUT IN AN ELECTRONIC ENVIRONMENT USING ORBITER AVIONICS



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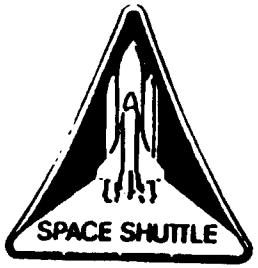
PAYLOAD-TO-ORBITER INTERFACE VERIFICATION

- INTERFACE VERIFIED OFF-LINE WITH PAYLOAD INTERFACE TEST EQUIPMENT (CITE):
  - LOCATED IN THE O&C BUILDING (HORIZONTAL PAYLOAD) AND IN THE VPF (VERTICAL PLAYLOAD)
  - CONTAINS OVER 100 RACKS OF ELECTRONIC/COMPUTER EQUIPMENT TO PROVIDE HIGH FIDELITY SIMULATION OF THE PAYLOAD-TO-ORBITER INTERFACE
  - VERIFIES ORBITER AFT FLIGHT DECK CONTROL OF PAYLOADS
  - PROVIDES ORBITER POWER FOR PAYLOADS
  - ENABLES FAULT DETECTION/CAUTION AND WARNING
  - VERIFIES PAYLOAD ENGINEERING AND SCIENCE DATA AND COMMAND/CONTROL
- INTERFACE VERIFIED ON-LINE WITH PAYLOAD IN THE ORBITER
  - REQUIREMENTS IDENTIFIED IN PAYLOAD INTEGRATION PLAN (PIP) ANNEX 9
  - PAYLOAD INTERFACE VERIFICATION PER OPERATIONAL MAINTENANCE REQUIREMENTS SPECIFICATION DOCUMENT (OMRSD) FILE II

ORBITER OPERATIONS

- ORBITER PROCESSING FACILITY
  - PRELAUNCH
    - INSTALL PAYLOADS AS APPLICABLE
    - WEIGH AND DETERMINE CENTER OF GRAVITY
    - DISCONTINUE PAYLOAD BAY ENVIRONMENTAL CONTROL DURING ROLL OVER TO VERTICAL ASSEMBLY BUILDING
  - POSTLANDING
    - REMOVAL OF PAYLOADS AND/OR PAYLOAD AEROSPACE SUPPORT EQUIPMENT



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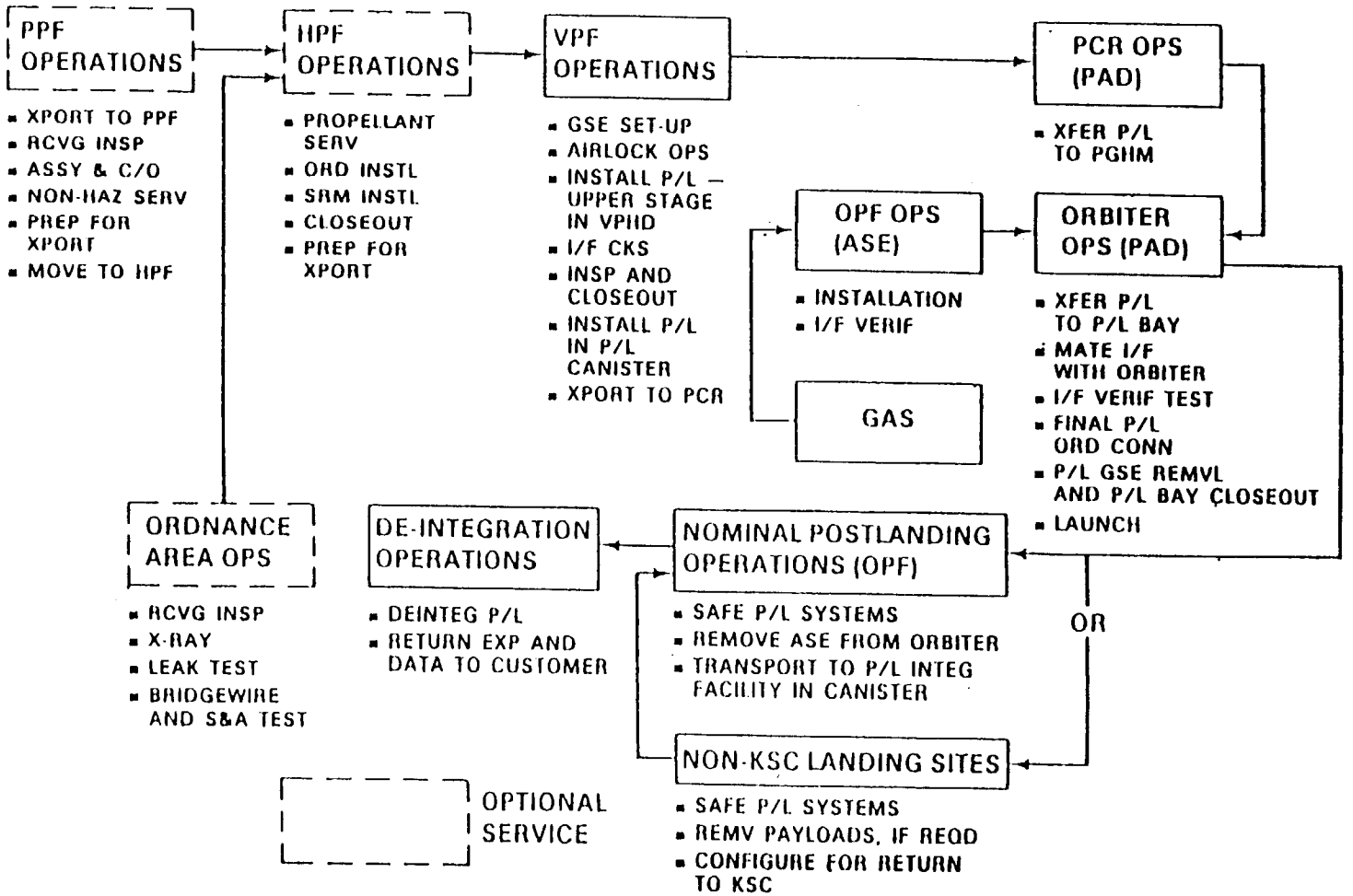
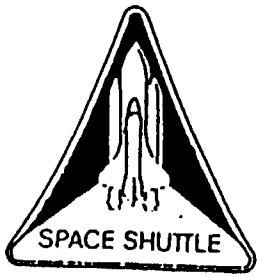
EXAMPLES OF VERTICAL PAYLOAD FLOWS

SPACECRAFT SUCH AS THE TDRS, MAGELLAN, GALILEO, SYN COM-IV, AND INMARSAT II ARE PROCESSED AND INTEGRATED IN THE VPF.

EXAMPLE OF VERTICAL PAYLOAD FLOW FOR VPF INTEGRATION





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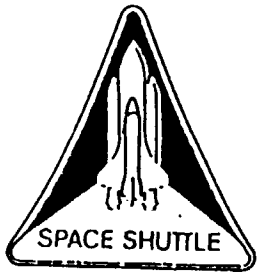
PAYLOAD PROCESSING FACILITY (PPF) ACTIVITIES

- PAYLOAD PROCESSING BEGINS UPON ARRIVAL OF THE PAYLOAD AND GROUND SUPPORT EQUIPMENT AT ONE OF THE EXISTING PPFs
- SET UP ELECTRICAL GROUND SUPPORT EQUIPMENT STATION
  - TO MONITOR AND CONDUCT PAYLOAD CHECKOUT VIA HARDLINES AND OPEN LOOP RADIATION DURING THE ASSEMBLY AND VERIFICATION PROCESS
- FINAL ASSEMBLY/BUILDUP OF PAYLOAD TO LAUNCH CONFIGURATION
  - INITIAL PRESSURE AND PROPELLANT SYSTEMS LEAK TESTS
  - ASSEMBLY OF PAYLOAD SECTIONS
  - INSTALLATION OF SOLAR PANELS, ANTENNAS, INSULATION, ETC.
  - PAYLOAD FUNCTIONAL TESTING WITH PAYLOAD-UNIQUE GROUND SUPPORT EQUIPMENT



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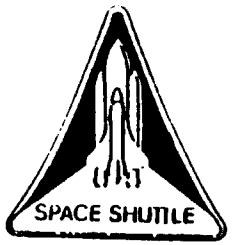
PAYLOAD HAZARDOUS SERVICING FACILITY

- USED FOR HAZARDOUS FUEL LOADING AND ORDNANCE SERVICING
- CAN ACCOMMODATE THE LARGEST VERTICAL OR HORIZONTALLY LOADED SPACECRAFT, INCLUDING THE PAYLOAD CANISTER



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HAZARDOUS PROCESSING FACILITY (HPF) ACTIVITIES

- PAYLOAD PROCESSING CONTINUES WITH THE TRANSFER OF THE PAYLOAD TO A HPF FOR THE INSTALLATION AND SERVICING OF POTENTIALLY HAZARDOUS SYSTEMS (WHERE APPLICABLE).

- TYPICAL HAZARDOUS OPERATIONS INCLUDE:
  - SERVICING OF LIQUID PROPELLANT SYSTEMS:
    - HYDRAZINE (N_2H_4) AND UNSYMMETRICAL DIMETHOL HYDRAZINE ($N_2H_2 \cdot (CH_3)_2$)
    - NITROGEN TETROXIDE (N_2O_4) AND MONOMETHYL HYDRAZINE ($N_2H_3 \cdot CH_3$)
  - INSTALLATION OF:
    - SOLID PROPELLANT APOGEE MOTORS
    - ORDNANCE SEPARATION DEVICES
    - OTHER POTENTIALLY EXPLOSIVE OR HAZARDOUS ITEMS

- FINAL CLOSEOUT AND TESTS WITH REMOTE GROUND SUPPORT EQUIPMENT

UPPER STAGE PROCESSING OPERATIONS

- SOLID UPPER STAGE (SUS) PROCESSING INVOLVES PREPARATION OF THE SOLID MOTOR, THE TURNAROUND OF THE CRADLE/AIRBORNE SUPPORT EQUIPMENT (ASE), AND PAYLOAD MATING

- SOLID MOTOR PREPARATIONS:
  - STORAGE
  - COLD SOAK
  - X-RAY
  - BUILDUP TO FLIGHT CONFIGURATION

- DYNAMIC SPIN BALANCE OPERATIONS

- TURNAROUND OF THE CRADLE/ASE/PAYLOAD MATE
  - TEST AND RECERTIFY CRADLE/ASE
  - MATE SOLID MOTOR TO CRADLE/ASE
  - TEST FINAL STAGE /CRADLE ASSEMBLY
  - MATE STAGE WITH PAYLOAD
  - INSTALL SUNSHIELD
  - PERFORM PAYLOAD INTERFACE VERIFICATION

HANGARS AE, AO, AM

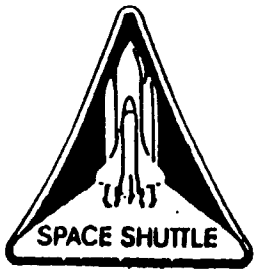
- USED TO PROCESS LARGE NON HAZARDOUS AUTOMATED SPACECRAFT

HANGAR S

- USED TO PREPARE FREE FLYER PALLETS

HANGAR L

- USED TO HOUSE LIVE SPECIMENS FOR LIFE SCIENCES PAYLOADS



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PAYLOAD SPIN TEST FACILITY (PSTF)

- PRIMARILY USED TO PROCESS DELTA AND AGENA STAGES

EXPLOSIVE SAFE AREA (ESA 60)

- USED TO INTEGRATE UPPER STAGES FOR GEOSYNCHRONOUS SATELLITES, SUCH AS THE PAYLOAD ASSIST MODULE (PAM)
- ALSO USED TO PROCESS ATLAS/CENTAUR ELV'S

- RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG) STORAGE BUILDING
  - USED FOR STORAGE OF RTG's USED FOR SPACECRAFT POWER GENERATING SYSTEMS

SPACECRAFT ASSEMBLY AND ENCAPSULATION FACILITY (SAEF-2)

- USED TO ASSEMBLE, TEST, ENCAPSULATE AND STERILIZE HEAVY MID-SIZED PAYLOADS

VERTICAL PROCESSING FACILITY (VPF) ACTIVITIES

- PAYLOAD INTEGRATION WITH ORBITER SYSTEMS AND OTHER PAYLOADS ALSO TAKES PLACE IN THE VPF

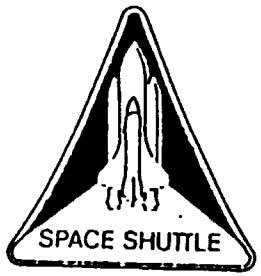
- DELIVERY CONFIGURATION VARIES DEPENDING ON THE UPPER STAGE:
  - PAM ALREADY MATED WITH PAYLOAD
  - IUS/TDRS AND PAYLOAD ARRIVE SEPARATELY
  - SYNCOM CLASS AND ITS PERIGEE KICK MOTOR (PKM) ARRIVE SEPARATELY

- PAYLOAD ELEMENTS STACKING AND TESTS INVOLVE:
  - MATING WITH UPPER STAGE AS NECESSARY AND INSTALLATION INTO WORKSTAND IN PAYLOAD BAY SEQUENCE
  - STANDALONE HEALTH AND STATUS TESTS
  - INTEGRATION TESTS
    - ORBITER-TO-PAYLOAD INTERFACE VERIFICATION WITH PAYLOAD INTEGRATION TEST EQUIPMENT (CITE)
    - MISSION SEQUENCE TEST

PAYLOAD CHANGEOUT ROOM (PCR)

628

- THE PCR ATTACHED TO THE ROTATING SERVICE STRUCTURE (RSS) AT THE LAUNCH PAD IS AN ENVIRONMENTALLY CONTROLLED FACILITY WHERE THE SHUTTLE PAYLOAD IS DELIVERED AND VERTICALLY INSTALLED IN THE PAYLOAD BAY.



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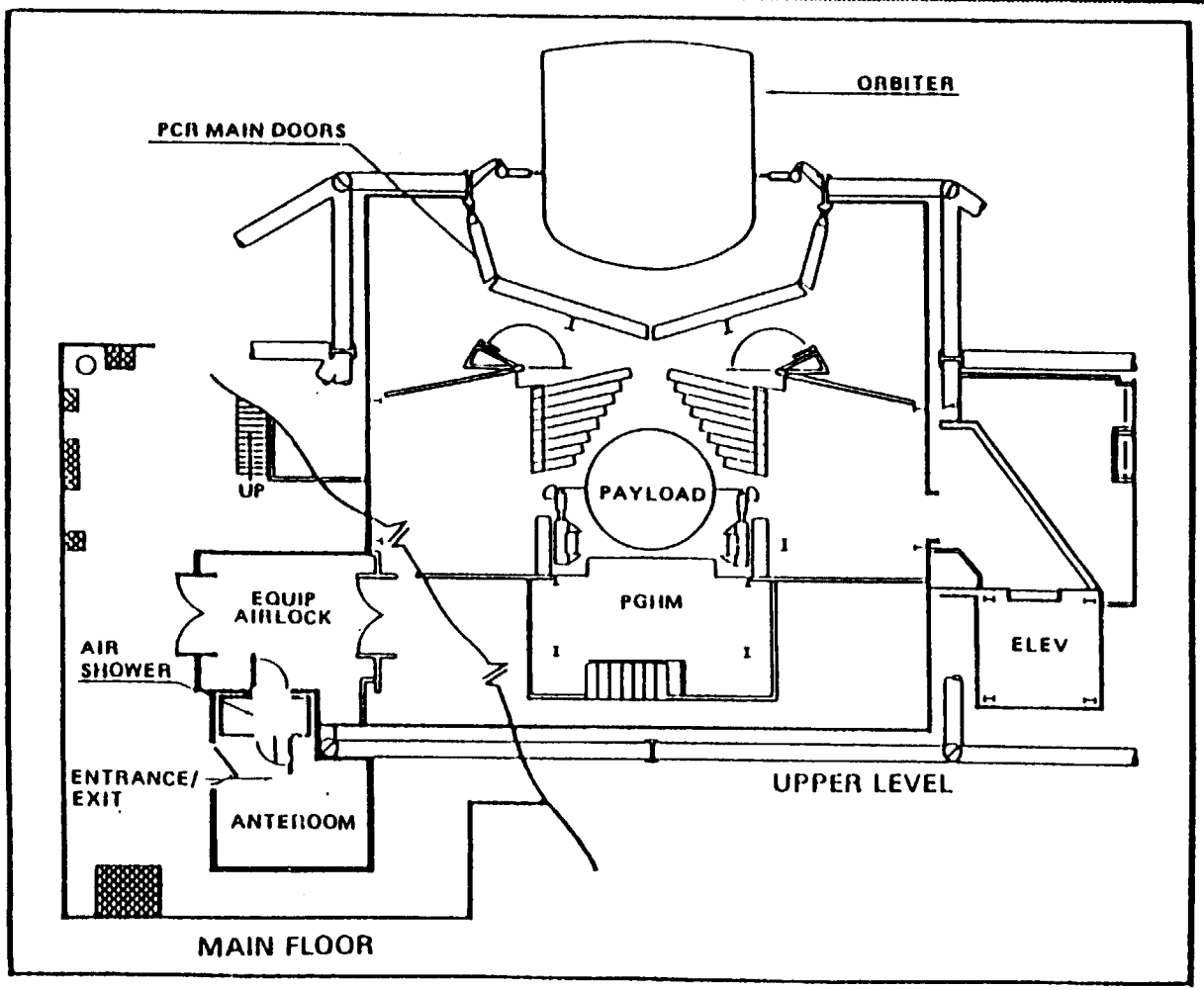
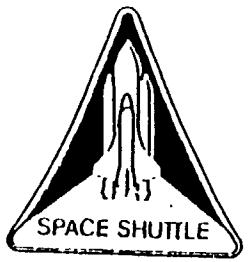
PAYLOAD CHANGEOUT ROOM (PCR) OPERATIONS

- ENVIRONMENTAL MONITORING AND CONTAMINATION CONTROL PER K-STSM-14.2.1, KSC PAYLOAD FACILITY CONTAMINATION CONTROL REQUIREMENTS/PLAN
- PAYLOAD INSTALLATION IN PAYLOAD GROND HANDLING MECHANISM (PGHM)
- PAYLOAD STAND ALONE-ACTIVITIES
- ORDNANCE OPERATIONS
- PREPARATIONS FOR ORBITER INSTALLATION
- PAYLOAD INSTALLATION INTO ORBITER
  - ACCESS IS CONTROLLED
  - TRAINING IS REQUIRED
  - TOOL TETHER OPERATIONS MANDATORY



PLAN VIEW OF THE PCR



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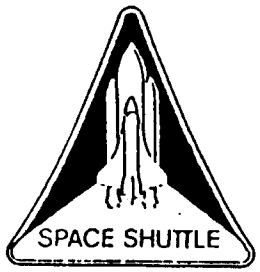
POSTLANDING OPERATIONS

- AFTER KSC OR DRYDEN FLIGHT RESEARCH FACILITY (DFRF) LANDING AND CREW EGRESS:
  - PAYLOAD BAY ENVIRONMENTAL LIMITS ARE MAINTAINED BY EXTERIOR UNITS
  - ORBITER IS TOWED TO A PROCESSING FACILITY FOR SAFING
  - REMOVAL OF RETURNING PAYLOADS AND AIRBORNE SUPPORT EQUIPMENT - APPROXIMATELY 3 DAYS AFTER LANDING AT KSC (EITHER DIRECT LANDING OR SHUTTLE CARRIER AIRCRAFT LANDING AT KSC)
  - PAYLOADS CAN BE TURNED OVER TO PAYLOAD OWNERS AS FOLLOWS:
    - SOME MIDDECKS CAN BE REMOVED PRIOR TO ORBITER TOW (LANDING + 2 HOURS)
    - REMAINING MIDDECK LOCKERS CAN BE REMOVED WITHIN 24 HOURS
    - OTHER PAYLOADS/ASE ARE REMOVED AFTER THE PAYLOAD BAY DOORS ARE OPENED (LAND AT KSC + 3 DAYS)
- NON-KSC/DFRF LANDINGS ARE COVERED BY KVT-PL-0014 AND APPROPRIATE ANNEX, KSC OFF-SITE OPERATIONS PLAN AND KSC-PL-0012,.02, PAYLOAD OPERATIONAL LOGISITCS PLAN



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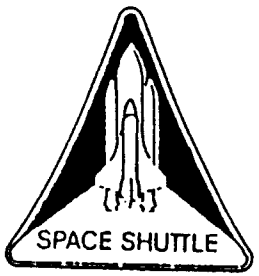
THIS CONCLUDES A BRIEF PRESENTATION OF KSC'S BROAD ROLE IN STS PAYLOAD PROCESSING, INTEGRATION, AND LAUNCH. MORE DETAILED MATERIAL IS AVAILABLE FROM JOHN MORIAN, OPERATIONS UTILIZATION DIRECTORATE.



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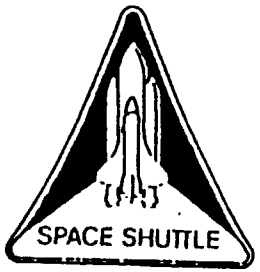
APPENDICES



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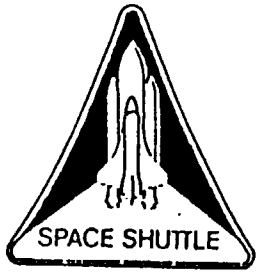
FACILITY HANDBOOKS

K-STSM-14.1.1	FACILITIES HANDBOOK FOR BUILDING AE
K-STSM-14.1.2	FACILITIES HANDBOOK FOR BUILDING AO
K-STSM-14.1.3	FACILITIES HANDBOOK FOR BUILDING AM
K-STSM-14.1.4	FACILITIES HANDBOOK FOR HANGAR S
K-STSM-14.1.5	FACILITIES HANDBOOK FOR PSTF
K-STSM-14.1.6	FACILITIES HANDBOOK FOR ESA-60A
K-STSM-14.1.7	FACILITIES HANDBOOK FOR SAEF-2
K-STSM-14.1.8	FACILITIES HANDBOOK FOR RTG STORAGE BUILDING
K-STSM-14.1.9	FACILITIES HANDBOOK FOR LSSF
K-STSM-14.1.10	PAYLOAD ACCOMMODATIONS AT THE RSS
K-STSM-14.1.11	FACILITIES HANDBOOK FOR PAYLOAD ORDNANCE PROCESSING AREA AT CCAFS
K-STSM-14.1.12	FACILITIES HANDBOOK FOR VPF
K-STSM-14.1.13	OPF PAYLOAD PROCESSING AND SUPPORT CAPABILITIES
K-STSM-14.1.14	O&C BUILDING PAYLOAD PROCESSING AND SUPPORT CAPABILITIES
K-STSM-14.1.15	FACILITIES HANDBOOK FOR PHSF



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ACRONYMS LIST

AEK	-	ACCESSORY EQUIPMENT KIT
ASE	-	AIRBORNE SUPPORT EQUIPMENT
CCAFS	-	CAPE CANAVERAL AIR FORCE STATION
CITE	-	CARGO INTEGRATION TEST EQUIPMENT
C/O	-	CHECKOUT
DFRF	-	DRYDEN FLIGHT RESEARCH FACILITY
DOD	-	DEPARTMENT OF DEFENSE
ECS	-	ENVIRONMENTAL CONTROL SUBSYSTEM
EGSE	-	ELECTRICAL GROUND SUPPORT EQUIPMENT
ELV	-	EXPENDABLE LAUNCH VEHICLE
EPS	-	ELECTRICAL POWER SUBSYSTEM
ESA-60	-	EXPLOSIVE SAFE AREA-60
GAS	-	GET-AWAY SPECIAL
GSE	-	GROUND SUPPORT EQUIPMENT
HPF	-	HAZARDOUS PROCESSING FACILITY
I/F	-	INTERFACE
IUS	-	INERTIAL UPPER STAGE
KSC	-	KENNEDY SPACE CENTER
LCC	-	LAUNCH CONTROL CENTER
LSSF	-	LIFE SCIENCES SUPPORT FACILITY
MMSE	-	MULTI-USE MISSION SUPPORT EQUIPMENT
MUC	-	MULTI-USE CONTAINER
OMRSD	-	OPERATIONAL MAINTENANCE REQUIREMENTS SPECIFICATION DOCUMENTS
O&C	-	OPERATIONS AND CHECKOUT BUILDING
OPF	-	ORBITER PROCESSING FACILITY
OSTA	-	OFFICE OF SPACE AND TERRESTRIAL APPLICATIONS

ACRONYMS LIST (CONTINUED)

PAM	-	PAYLOAD ASSIST MODULE
PCR	-	PAYLOAD CHANGEOUT ROOM
PETS	-	PAYLOAD ENVIRONMENTAL SYSTEMS (PETS)
PGHM	-	PAYLOAD GROUND HANDLING MECHANISM
PHSF	-	PAYLOAD HAZARDOUS SERVING FACILITY
PKM	-	PERIGEE KICK MOTOR
P/L	-	PAYLOAD
PPF	-	PAYLOAD PROCESSING FACILITY
PSTF	-	PAYLOAD SPIN TEST FACILITY
RSS	-	ROTATING SERVICE STRUCTURE
RTG	-	RADIOISOTOPE THERMOELECTRIC GENERATOR
SAEF	-	SPACECRAFT ASSEMBLY AND ENCAPSULATION FACILITY
SMAB	-	SOLID MOTOR ASSEMBLY BUILDING
SPIF	-	SHUTTLE PAYLOAD INTERFACE FACILITY
SRM	-	SOLID ROCKET MOTOR
SR&QA	-	SAFETY RELIABILITY & QUALITY ASSURANCE
STS	-	SPACE TRANSPORTATION SYSTEM
SUS	-	SOLID UPPER STAGE
TDRS	-	TRACKING AND DATA RELAY SATELLITE
VAB	-	VEHICLE ASSEMBLY BUILDING
VIB	-	VERTICAL INTEGRATION BUILDING
VPF	-	VERTICAL PROCESSING FACILITY