**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

# SPACE SHUTTLE MISSION
# STS-7

**PRESS KIT**
**JUNE 1983**


**SEVENTH SPACE SHUTTLE MISSION**

## STS-7 INSIGNIA

*S83-28355 – The orbiter appears in the center, circling the Earth, with the remote manipulator arm positioned such that, the number 7 is formed, representing the seventh mission of the space shuttle program. Likewise, seven stars are visible against the black sky. Within the sun's center are representations for the five crew members, including, for the first time in NASA's space program, a woman, Dr. Sally K. Ride, mission specialist, whose name, along with the other crewmembers, appears in the border of the insignia.*

*The NASA insignia design for space shuttle flights is reserved for use by the astronauts and for other official use as the NASA Administrator may authorize. Public availability has been approved only in the form of illustrations by the various news media. When and if there is any change in this policy, which we do not anticipate, it will be publicly announced.*

*PHOTO CREDIT: NASA or National Aeronautics and Space Administration.*

**RELEASE NO: 83-87** **June 1983**

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**IMMEDIATE**

**RELEASE NO: 83-87** **June 1983**

## AMBITIOUS STS-7 MISSION TO FEATURE FIRST LANDING AT KENNEDY

The seventh flight of the Space Shuttle will be the most ambitious to date with orbiter Challenger scheduled to deploy two commercial communications satellites and perform the first landing on the 3-mile long runway located at NASA's Kennedy Space Center in Florida.

Challenger will carry a five-person crew on its second trip into space. Launch of STS-7 is planned for June 18 at 7:33 a.m. EDT from Complex 39's Pad A at Kennedy. Mission duration will be approximately 5 days 23 hours and 20 minutes, which would put the landing on June 24 at about 6:53 a.m. EDT.

Robert L. Crippen will be commander of the six-day mission. Crippen was pilot on the historic 54 1/2 hour maiden flight of the orbiter Columbia in April 1981 and will become the first astronaut to make two flights aboard the Shuttle. The STS-7 pilot is Frederick H. Hauck. Mission specialists on this flight are John M. Fabian, Dr. Norman E. Thagard and Dr. Sally K. Ride, who will become America's first woman in space.

Dr. Thagard was not originally a member of the STS-7 crew, but was added in December 1982 to conduct medical tests and collect additional data on several physiological changes that are associated with astronauts' adaptation to space.

Challenger will haul the Telesat Canada Anik C and the Indonesian Palapa B communications satellites into low earth orbit for deployment and eventual insertion into geosynchronous orbit. The Anik C satellite will be deployed approximately 9 1/2 hours after launch. Palapa B will be ejected from Challenger's cargo bay on the second day of the mission as the Shuttle makes its 19th revolution of the earth.

A McDonnell Douglas Astronautics Co., St. Louis, developed Payload Assist Module (PAM) will be used to boost each of the satellites into an elliptical transfer orbit.

Challenger will carry the Canadian-built Remote Manipulator System (RMS) or arm back into orbit on STS-7 to perform the first deployment and retrieval exercise with the Shuttle Pallet Satellite (SPAS) - a space platform that can operate either inside or outside the payload bay. On the fourth day of the mission, the robot arm will place the SPAS outside Challenger's cargo bay where it will free-fly for approximately 9 1/2 hours while Challenger performs a variety of grapple and rendezvous activities.

Carried in the cargo bay will be the first U.S./German cooperative materials science payload called OSTA-2 for NASA's Office of Space and Terrestrial Applications, now called Office of Space Science and Applications.

The crew will operate the Continuous Flow Electrophoresis System (CFES) and Monodisperse Latex Reactor (MLR) -- two middeck mounted experiments flown on previous Shuttle missions designed to evaluate the gravity-free space environment for developing materials with potential pharmaceutical and medical uses.

Seven small self-contained payloads, "Getaway Specials," will he flown aboard Challenger.

Landing will be on the 5,180-meter (17,000 foot)-long, 91-m (300-foot)-wide runway at Kennedy Space Center's Shuttle Landing Facility.

Plans currently call for Commander Crippen to use the north-to-south runway 15 for landing. Facilities at Edwards Air Force Base, Calif., will serve as backup sites if weather conditions prevent a landing in Florida.

Configuration of the STS-7 Shuttle is very similar to that of the STS-6 vehicle when Challenger became the second in NASA's fleet of reusable spacecraft.

Crew size will require an additional seat which will be installed down on the middeck. The other four crewmembers will be seated on the flight deck for launch and landing.

The external tank for this mission will be the last of the standard heavyweight tanks. Lighter weight solid rocket booster casings, like those on STS-6, will be used, and Challenger's main engines will perform at 104 percent of rated power level.

The Anik C and Palapa B spacecraft were both built by Hughes Aircraft Co., El Segundo, Calif., and are similar in design.

Anik C-2 is the second of three Anik C satellites that will eventually be put into operation. The first Anik C was placed into low earth orbit by Columbia on STS-5, in November 1982, the Shuttle's first operational mission.

The Anik C spacecraft are Canada's first totally dedicated commercial satellites to use the 12/14 GHz band frequencies, allowing a 100 percent increase in telecommunications capacity of the first Anik satellite. This Anik C will be stationed at 112.5 degrees west longitude and has a design life of 10 years.

Palapa B is the second generation of satellites for Indonesia. Two of the communications satellites are being built for PERUMTEL, Indonesia's state owned telecommunications company.

With its 24 transponders, Palapa B will be able to deliver voice, video, telephone and high speed data services electronically linking Indonesia's many islands and bringing advanced telecommunications to the nation's 130 million inhabitants. Palapa will operate at 108 degrees east longitude.

The deployment sequence for both spacecraft will be nearly identical. During the final pre-ejection sequence, the orbiter will be maneuvered into a deployment attitude with the open payload bay facing the direction desired for firing the PAM motor. A clamp is released by explosive bolts and a set of springs pops the spinning payload out of the bay at about .8 m (2.5 ft.) per second.

The Payload Assist Module is automatically set to fire its solid propellant motor 45 minutes after deployment. About 15 minutes after the spacecraft is ejected from the payload bay, the orbiter will perform an evasive maneuver to make sure it is at least 14.8 to 18.5 km (8 to 10 miles) away from the satellite when the motor ignites.

This firing will punch the satellite into an egg-shaped transfer orbit with a high point 36,000 km (22,300 mi.) above the equator. On a selected apogee, a solid propellant motor on the spacecraft is fired to circularize the orbit at the geosynchronous altitude.

The 15-m (50-ft.) long remote manipulator system returns to space aboard Challenger to deploy and retrieve a unique space platform developed by the West German aerospace firm Messerschmitt-Bolkow-Blohm (MBB).

Called the Shuttle Pallet Satellite (SPAS), the $13 million platform will carry 10 experiments, furnished by the government of the Federal Republic of West Germany, European Space Agency and NASA. Some of the experiments will operate continuously for approximately 24 hours with the SPAS in the attached mode beginning on flight day three.

The others will be turned on during the 9.5 hours the SPAS is free-flying outside the orbiter's cargo bay.

Detached operations with the SPAS on flight day four will enable NASA to carry out objectives related to testing of the arm, plume disturbance, proximity operations and rendezvous, all of which are important for future flights involving use of the Shuttle to retrieve actual satellites.

Elements of the OSTA-2 payload will be located in Challenger's cargo bay on a specialized support structure. The NASA developed Materials Experiment Assembly (MEA) will carry out three experiments in the disciplines of crystal growth/transport phenomena, metallurgy and containerless glass technology.

OSTA-2 experiments provided by the West German Ministry for Research and Technology are housed in three Getaway Special canisters and will study fluid dynamics, transport phenomena and metallurgy.

The Continuous Flow Electrophoresis System (CFES) developed by McDonnell Douglas Astronautics Co., and operated with NASA as a joint endeavor, will continue its demonstration of separating biological materials according to their surface electrical charge.

The device, previously flown on STS 4 and 6, could prove that pharmaceuticals of marketable purity can be produced in quantity in the zero gravity of space.

The Monodisperse Latex Reactor (MLR), a materials processing in space experiment designed to continue the development of large, identical-sized (monodisperse) latex particles, will make its fourth trip into space on STS-7.

The seven Getaway Special canisters mounted inside Challenger's cargo bay, will contain an assortment of experiments that will study the effects of zero gravity in many scientific disciplines. The canisters represent private, institutional and government concerns.

A West German canister will contain four experiments designed to study crystal growth in a liquid solution, the manufacture of metallic catalysts, plant contamination by heavy metals and exposure of plant seeds and eggs of lower animals to cosmic radiation.

Purdue University, West Lafayette, Ind., will fly three experiments to study seed germination, fluid dynamics and trace the movement of high energy particles.

Camden, N.J., High School will record on motion pictures and video tape the effects of weightlessness on a colony of carpenter ants.

Two experiments furnished by the California Institute of Technology will measure the relation of temperature in mixing non-soluble liquids, and plant sensitivity to weightlessness.

The firm Engineering Design to Suit Your Needs (EDSYN), Inc. Van Nuys, Calif., will provide nine experiments in a single canister all related to soldering in zero gravity.

The Naval Research Laboratory, Washington, D.C., will fly two canisters, including the first with an opening lid to measure ultraviolet light emissions. The other NRL payload will measure the effects of the Shuttle bay environment on ultraviolet-sensitive film.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS.)

# STS-7 PRESS BRIEFING SCHEDULE

**T-2 Days**

| EST | CST | PST | Briefing | Origin |
|---|---|---|---|---|
| 9:00 a.m. | 8:00 a.m. | 6:00 a.m. | Countdown Status | KSC |
| 9:30 a.m. | 8:30 a.m. | 6:30 a.m. | Mission Summary/Timeline | KSC |
| 10:30 a.m. | 9:30 a.m. | 7:30 a.m. | Anik C/Palapa B | KSC |
| 1:00 p.m. | 12 Noon | 10:00 a.m. | SPAS-01 | KSC |
| 1:45 p.m. | 12:45 p.m. | 10:45 a.m. | OSTA-2/MLR | KSC |
| 2 :30 p.m. | 1:30 p.m. | 11:30 a.m. | CFES | KSC |
| 3:00 p.m. | 2:00 p.m. | 12 Noon | Getaway Specials | KSC |
| **T-1** | | | | |
| 9:00 a.m. | 8:00 a.m. | 6:00 a.m. | Countdown Status | KSC |
| 9:30 a.m. | 8:30 a.m. | 6:30 a.m. | Overview -- Vandenberg Shuttle Operations | KSC |
| 10:00 a.m. | 9:00 a.m. | 7:00 a.m. | Air Force Launch Team | KSC |
| 1:30 p.m. | 12 :30 p.m. | 10 :30 a.m. | Prelaunch Press Conference | KSC |
| **T-Day** | | | | |
| 8:30 a.m. | 7:30 a.m. | 5:30 a.m. | Post Launch Conference | KSC |
| **Launch Thru EOM** | See Change of Shift Schedule | | | JSC |
| **T+6** | | | | |
| 8:00 a.m. | 7:00 a.m. | 5:00 a.m. | Post Landing Press Conference | KSC |
| 10:00 a.m. (approx.) | 9:00 a.m. | 7:00 a.m. | Crew Ceremony | KSC |
| **T+7** | | | | |
| 10:00 a.m. | 9:00 a.m. | 7:00 a.m. | Orbiter Status Briefing | KSC |

# NASA SELECT TELEVISION SCHEDULE

The schedule for television transmissions from Challenger and for the change of shift briefings from the Johnson Space Center will be available during the mission at the Kennedy, Marshall Space Flight Center, Johnson Space Center, Dryden Flight Research Facility, Goddard Space Flight Center and NASA Headquarters news centers. The television schedule will be updated on a daily basis to reflect any changes dictated by mission Operations.

## LAUNCH PREPARATIONS, COUNTDOWN AND LIFTOFF

STS-7 processing has been the fastest to date. For a launch on June 18, a total of 60 working days, or 64 calendar days, will have been spent preparing the STS-7 vehicle for launch. The previous record was 77 working (82 calendar) days, achieved on STS-4.

Challenger was returned from California piggyback on the 747 Shuttle Carrier Aircraft and arrived at Kennedy Space Center on April 16. The orbiter was taken off the jumbo carrier jet and delivered to the Orbiter Processing Facility (OPF) on April 17, kicking off an around-the-clock schedule that enabled the reusable vehicle to be processed for its next flight in only 35 days. Prior to this, the fastest turnaround in the Processing Facility had been 41 days on STS-4.

Residual hypergolic propellants remained in Challenger's maneuvering system tanks, and some testing of systems that operated perfectly in flight was deleted from the schedule, permitting the faster turnaround.

Damaged areas of the twin Orbital Maneuvering System pods covered with the advanced felt reusable insulation were replaced with approximately 170 white thermal protection tiles. Another 120 tiles were installed to replace ablative panels located on the elevons, and approximately 60 tiles were replaced as a result of damage from flight or as a result of normal turnaround operations.

Regular post-flight maintenance included leak and functional checks of the main propulsion system, subsystem checkout and servicing of consumables such as nitrogen, ammonia and potable water.

The Payload Assist Modules for the Anik and Palapa spacecraft arrived at Cape Canaveral Air Force Station on Nov. 4 and Jan. 3, respectively. The Anik and Palapa spacecraft both arrived on Nov. 30. The four elements went through separate inspections and processing schedules. The satellites were mated to their upper stages in the Delta Spin Test Facility and then installed in their support cradles.

The SPAS-01 payload arrived on Jan. 15. It completed its assembly and checkout operations in Hangar S, Cape Canaveral, and was moved to the Vertical Processing Facility on April 26 for integration with other STS-7 payload elements and checkout.

The Palapa/PAM was moved to the VPF on April 7, and the Anik/PAM followed on April 21. Following integration with the Shuttle Pallet Satellite, the three major cargo elements underwent Cargo Integrated Test Equipment checkout.

The OSTA-2 payload arrived Jan. 3 and was assembled and checked out in the Operations and Checkout Building. Because it did not require cargo integration testing in the processing facility, OSTA-2 was the first payload put in the payload canister. It was installed May 16. The canister moved to the facility on May 18 and the remaining STS-7 payloads were installed.

The STS-7 cargo was moved to the launch site on May 23. It was then transferred into the Payload Changeout Room to await the Shuttle's arrival at the pad.

The Getaway Special experiments arrived on various dates, were checked out and mounted inside their respective canisters. All seven GAS cans were installed in Challenger's cargo bay on May 8.

Assembly of the STS-7 vehicle began on Feb. 9 with the stacking of the twin solid rocket boosters on Mobile Launcher Platform-1. Stacking of the two 45.7-m (150-ft.) tall boosters was completed on Feb. 23 and the external tank was mated on March 2.

Challenger was moved to the Vehicle Assembly Building on May 21 and attached to its external tank and twin booster rockets.

The Shuttle Interface Test, designed to verify electrical, mechanical and data paths between mated Shuttle elements, was performed on May 24-25, followed by less than one day of preparations for the vehicle's 5.6 km (3.5 mi.) journey to the pad.

On May 26, the Space Shuttle vehicle was moved to Complex 39-A by the massive Crawler-Transporter and checks of critical pad-to-vehicle connections began that same day.

Transfer of the STS-7 payload into the orbiter's cargo bay was accomplished on May 28, and was followed by a series of electrical interface checks to make sure the payload was properly linked to the spaceship.

The Terminal Countdown Demonstration Test with the STS-7 crew members was scheduled for June 3 as a final demonstration of vehicle, flight software and flight crew readiness for launch.

Shuttle vehicle ordnance activities, such as power-on stray voltage checks and resistance checks of firing circuits, were scheduled to pick up on June 3. Ordnance activities were to be suspended from June 6 through June 7 to load hypergolic propellants aboard the vehicle. The period from June 8-10 was reserved as contingency.

Work was to resume on June 11 with a major cleared pad activity -- a final functional check of the range safety and SRB ignition. safe and arm devices -- scheduled to be performed.

Pressurization of OMS and RCS propellant and helium tanks, and servicing of orbiter fuel cell liquid hydrogen and oxygen storage tanks, which were countdown activities on previous flows, were to be conducted on June 13, followed by servicing of the Continuous Flow Electrophoresis System on June 14. Closeout of OMS and RCS systems was scheduled to conclude on June 15.

The 40-hour Launch Countdown was scheduled to pick up June 16. The STS-7 launch will be conducted by a joint NASA/industry team from Firing Room 1 in the Launch Control Center.

# MAJOR COUNTDOWN MILESTONES

| Count Time | Event |
|---|---|
| T-40 Hours | Perform the call to stations. |
| T-39 Hours | Begin configuration of pad-to-MLP sound suppression/SRB overpressure water systems for launch. |
| T-34 Hours | Install Monodisperse Latex Reactor. Start external tank loading preparations. |
| T-32 Hours | Checkout orbiter navigation aids. |
| T-27 Hours | Begin orbiter and ground support equipment closeouts for launch. |
| T-19 Hours | Perform interface check with Houston Mission Control and activate orbiter navigation aids. |
| T-18 Hours | Activate communications systems and Inertial Measurement Units |
| T-15 Hours | Perform pre-ingress switch list and rotating service structure move preparations. |
| T-12 Hours | Remove flight deck platforms and start GOX vent hood preparations for launch. |
| T-11 Hours | 10 hour and 13 minute hold begins. |
| T-11 Hours (counting) | Retract rotating service structure. |
| T-8 Hours | Configure mission control communications for launch. |
| T-7 Hours | Activate orbiter fuel cells and perform Eastern Test Range open loop test . Switch from air to GN2. |
| T-6 Hours | Start external tank chilldown and propellant loading. |
| T-5 Hours | Begin IMU pre-flight calibration. |
| T-3 Hours | 1 hour hold begins. External tank loading is complete. Wake flight crew (launch - 4 hours 20 minutes). |
| T-2 Hours, 50 minutes | Flight crew suits up (launch - 3 hours, 10 minutes) |
| T-2 Hours, 30 minutes | Crew departs for pad (launch -2 hours, 50 minutes) |
| T-1 Hour, 55 minutes | Crew enters orbiter vehicle (launch - 2 hours, 15 minutes). |
| T-61 minutes | Start pre-flight alignment of Inertial Measurement Units. |
| T-20 minutes | 10 minute built-in-hold begins. |
| T-20 minutes (counting) | Configure orbiter computers for launch. |
| T-9 minutes | 10 minute built-in hold begins. Perform status check and receive Launch Director "go". |
| T-9 minutes (counting) | Start ground launch sequencer. |
| T-7 minutes | Retract orbiter access arm. |
| T-5 minutes | Start orbiter Auxiliary Power Units. Arm range safety, SRB ignition systems. |
| T-3 minutes, 30 seconds | Orbiter goes on internal power. |
| T-2 minutes, 55 seconds | Pressurize liquid oxygen tank and retract gaseous oxygen vent hood. |
| T-1 minute, 57 seconds | Start SRB hydraulic power units. |
| T-31 seconds | "Go" from ground computer for orbiter computers to start automatic launch sequence. |
| T-28 seconds | Start SRB hydraulic power units. |
| T-6 .6 seconds | "GO" for main engine start. |
| T-3 seconds | Main engines at 90 percent thrust. |
| T-0 | SRB ignition, holddown post release and liftoff. |
| T+7 seconds | Shuttle clears launch tower and control switches to Houston. |

# LAUNCH WINDOW

STS-7 will be launched from Complex 39's Pad A at Kennedy Space Center no earlier than June 18, 1983. The launch opportunity opens for two brief periods on that date.

The first window extends from 7:33 until 7:38 a.m. EDT, for a launch opportunity of 5 minutes in duration.

The second window on that day opens at 8:24 a.m. EDT and closes at 8:26 a.m. EDT, for a launch opportunity of 2 minutes in duration.

The opening of the first segment of the launch window is driven by the earth horizon sensor (EHS) sun "cutout" constraint on the Palapa B spacecraft for a revolution 19A injection. This opening time also roughly corresponds to the revolution 113 Edwards Air Force Base landing lighting constraint. This first segment is closed by an earth horizon sensor constraint on the Anik C spacecraft for a revolution 8A injection.

The opening of the second segment is driven by an earth horizon sensor Palapa B constraint for a revolution 19A injection. The second segment is closed by the aft thermal constraint on the Anik C for a revolution 8A injection.

STS-7 will be launched on an azimuth of 92.25 degrees, resulting in an inclination to the equator of 28.45 degrees.

Two burns of the twin Orbital Maneuvering System engines, the first at 10 minutes, 13 seconds mission elapsed time (MET) and the second at 44 minutes, 23 seconds MET will circularize Challenger's orbit at 160 nautical (185 statute) miles.

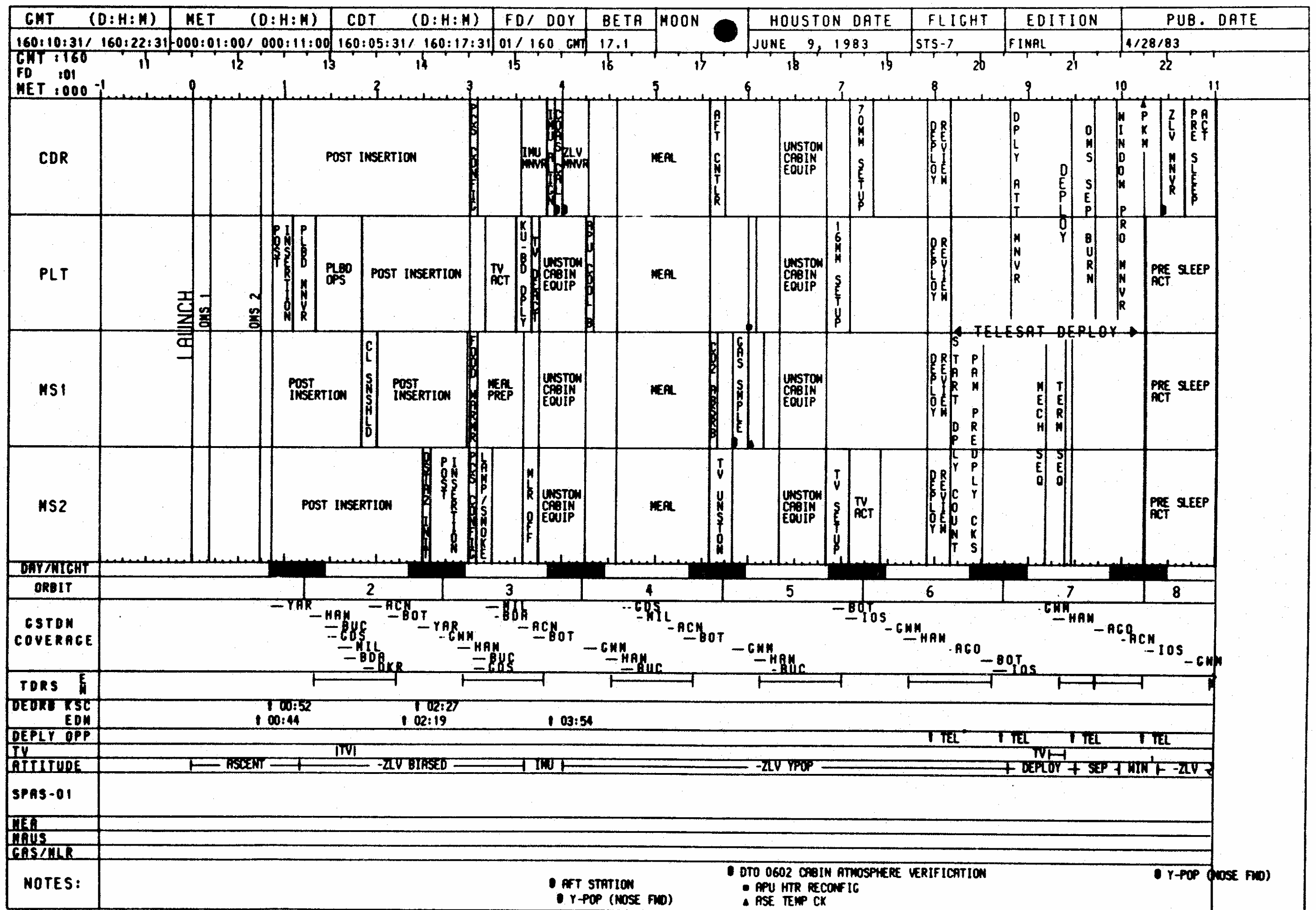
## STS-7 FLIGHT SEQUENCE OF EVENTS

| Event | MET (h:m:s) | Delta v | Perigee/ Apogee (n.m.) |
|---|---|---|---|
| Launch | 00:00:00 | | |
| MECO | 00:08:20 | | -1/82 |
| ET separation | 00:08:38 | | -1/82 |
| OMS-1 TIG | 00:10:14 | 240 | 52/160 |
| Burn duration | 00:02:31 | | |
| OMS-2 TIG | 00:44:24 | 194 | 160/160 |
| Burn duration | 00:01:59 | | |
| Anik C deploy | 09:29:00 | | |
| OMS-3 TIG | 09:44:00 | 10.0 | 160/165 |
| Burn duration | 00:00:06 | | |
| Anik PAM TIG | 10:14:00 | | |
| Palapa B deploy | 26:03:00 | | |
| OMS-4 TIG | 26:18:00 | 10.0 | 160/170 |
| Burn duration | 00:00:06 | | |
| Palapa PAM TIG | 26:48:00 | | |
| Backup deployment opportunity for both deployable satellites | 47:54:00 | | 160/165 |
| OMS-5 TIG | 51:16:00 | 6.4 | 157/170 |
| Burn duration | :04 | | |
| OMS-6 TIG | 52:02:00 | 22.5 | 157/157 |
| Burn duration | :13 | | |

## LANDING TIMELINE

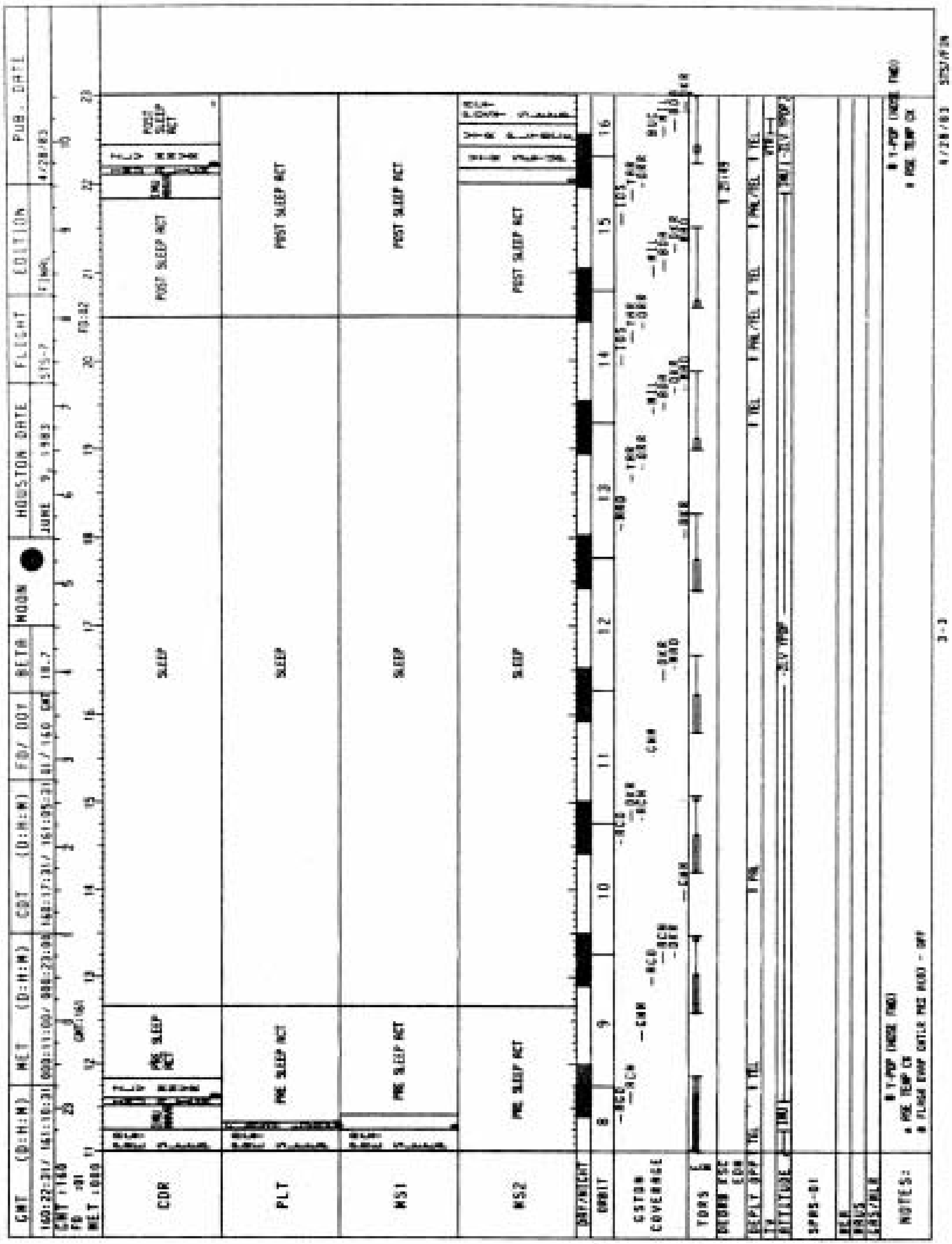
| Event | MET (h:m:s) |
|---|---|
| Deorbit TIG | 142:23:00 |
| Burn duration | 000:02:36 |
| Entry Interface | 142:50:00 |
| **Nominal landing** | |
| KSC-15 | 143:20 |
| EAFB-2 | 146:21 |
| Nominal +1 Day | |
| KSC-15 | 157:24 |
| EAFB-22 | 168:50 |
| Nominal +2 Days | |
| KSC-15 | 191:29 |
| EAFB-22 | 192:56 |

SUMMARY
TIMELINE




3-2

4/28/83 STS7/FIN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HOUSTON DATE
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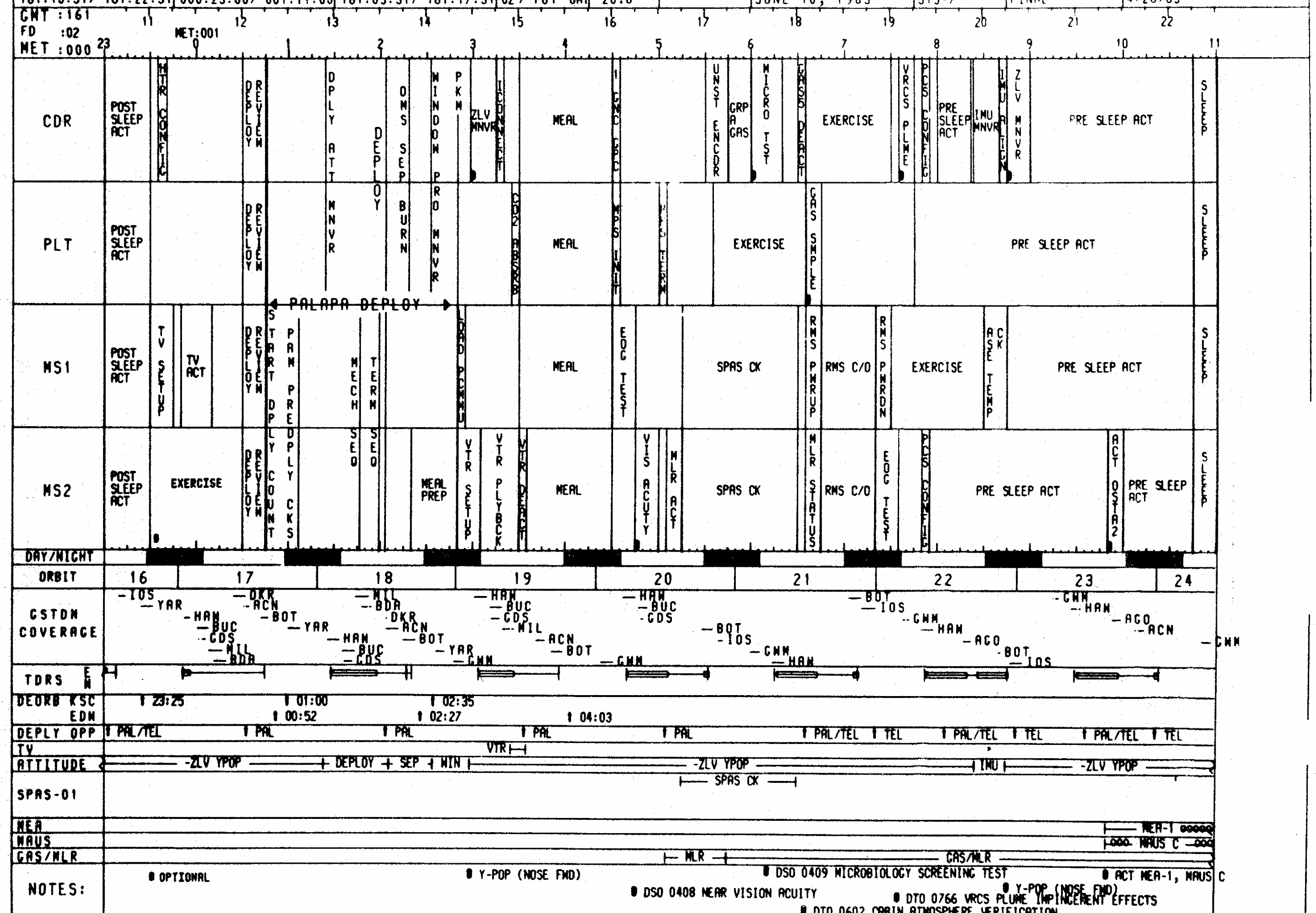
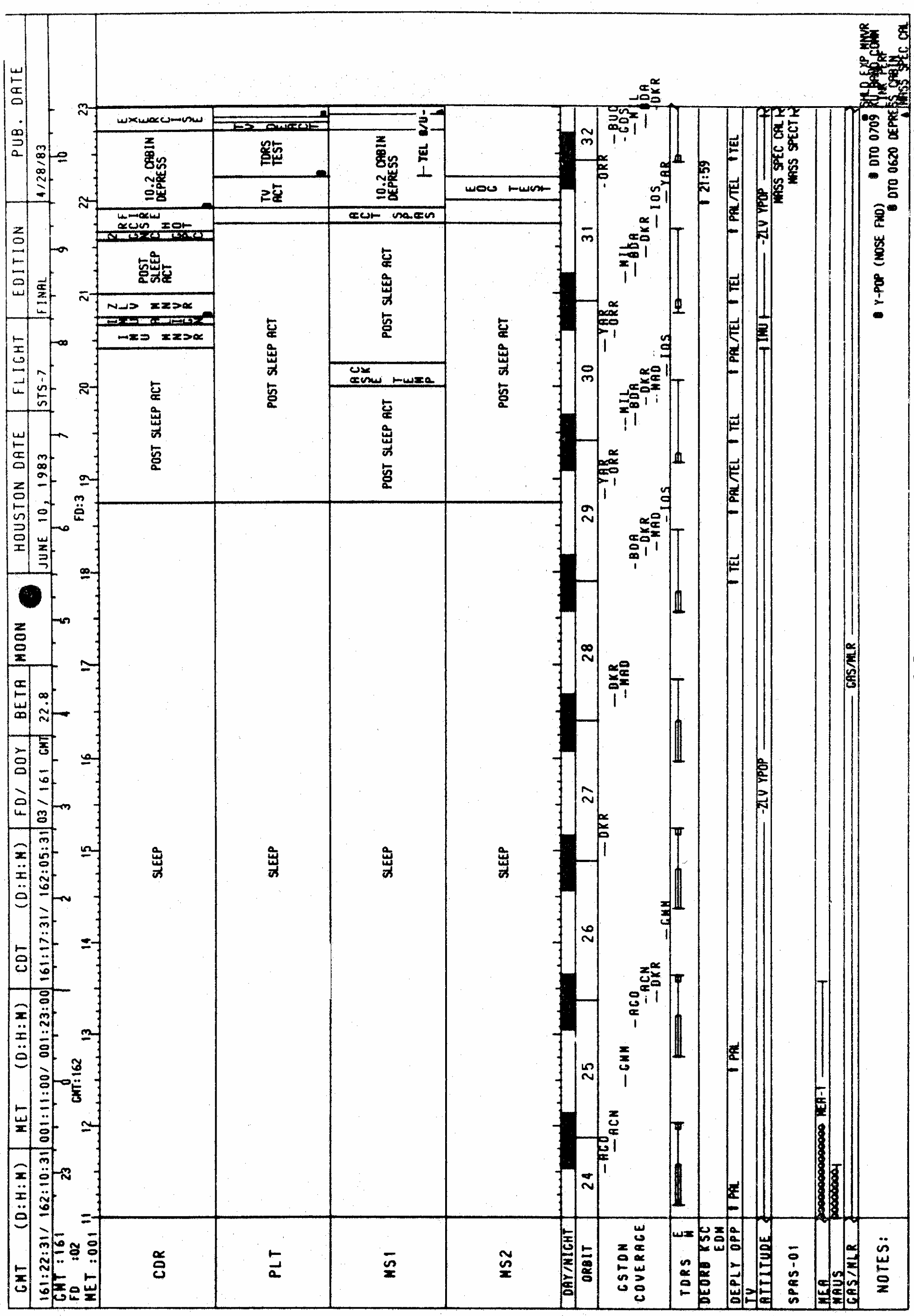
FLIGHT
STS-7
EDITION
FINAL
PUB. DATE
CDR
PLT
MS1
MS2
SLEEP
PRE SLEEP ACT
POST SLEEP ACT
DAY/NIGHT
ORBIT
GSTDN COVERAGE
TDRS
NOTES:

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|---|---|---|---|---|---|---|---|---|
| 161:10:31/ 161:22:31 | 000:23:00/ 001:11:00 | 161:05:31/ 161:17:31 | 02 / 161 GMT | 20.8 | | JUNE 10, 1983 | STS-7 | FINAL | 4/28/83 |




3-4

4/28/83 STS7/FIN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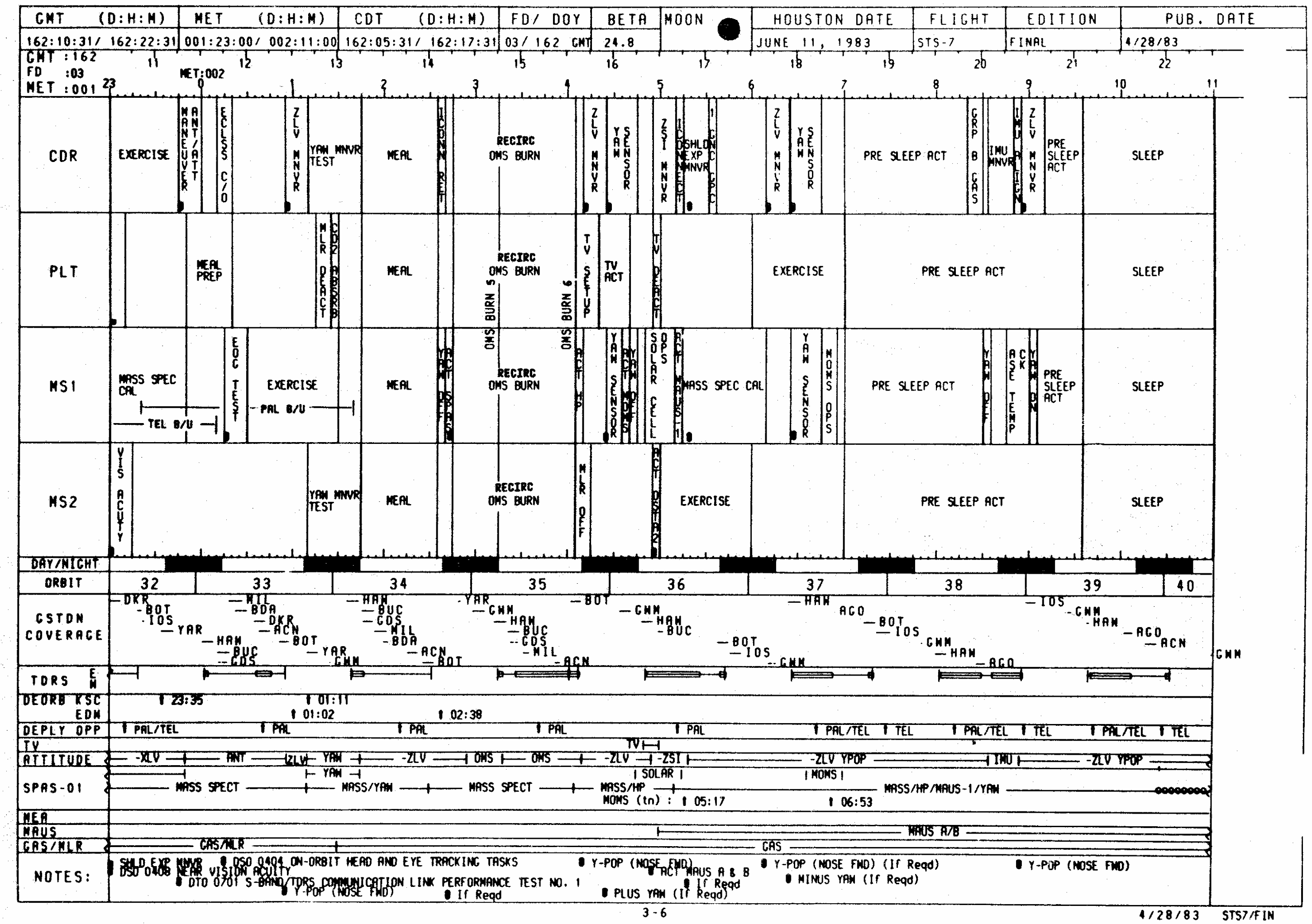
FD:3
CDR
PLT
MS1
MS2
SLEEP
POST SLEEP ACT
10.2 CABIN DEPRESS
TDRS TEST
TV ACT
DAY/NIGHT
ORBIT
GSTDN COVERAGE
TDRS
DEORB KSC EDW
DEPLY OPP
TV
ATTITUDE
SPAS-01
MEA
MAUS
GAS/MLR
NOTES:
-ZLV YPOP
MASS SPEC CAL
MASS SPECT
Y-POP (NOSE FWD)
DTO 0709
DTO 0620 DEPRESS CABIN
3-5
4/28/83 STS7/FIN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HOUSTON DATE JUNE 11, 1983
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EDITION FINAL
PUB. DATE 4/28/83
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MET:002
CDR
PLT
MS1
MS2
EXERCISE
MEAL
MEAL PREP
YAW MNVR TEST
RECIRC OMS BURN
OMS BURN 5
OMS BURN 6
PRE SLEEP ACT
SLEEP
MASS SPEC CAL
TEL B/U
PAL B/U
EOC TEST
TV ACT
DAY/NIGHT
ORBIT
32
33
34
35
36
37
38
39
40
GSTDN COVERAGE
TDRS E W
DEORB KSC EDW
23:35
01:11
01:02
02:38
DEPLY OPP
PAL/TEL
PAL
TEL
TV
ATTITUDE
-XLV
-ZLV
OMS
-ZSI
-ZLV YPOP
IMU
SPAS-01
MASS SPECT
MASS/YAW
MASS/HP
MASS/HP/MAUS-1/YAW
SOLAR
MOMS
MOMS (tn) : 05:17
06:53
MEA
MAUS
MAUS A/B
GAS/MLR
GAS
NOTES:
SHLD EXP MNVR
DSO 0404 ON-ORBIT HEAD AND EYE TRACKING TASKS
DSO 0408 NEAR VISION ACUITY
DTO 0701 S-BAND/TDRS COMMUNICATION LINK PERFORMANCE TEST NO. 1
Y-POP (NOSE FWD)
If Reqd
ACT MAUS A & B
PLUS YAW (If Reqd)
Y-POP (NOSE FWD) (If Reqd)
MINUS YAW (If Reqd)
3-6
4/28/83 STS7/FIN

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
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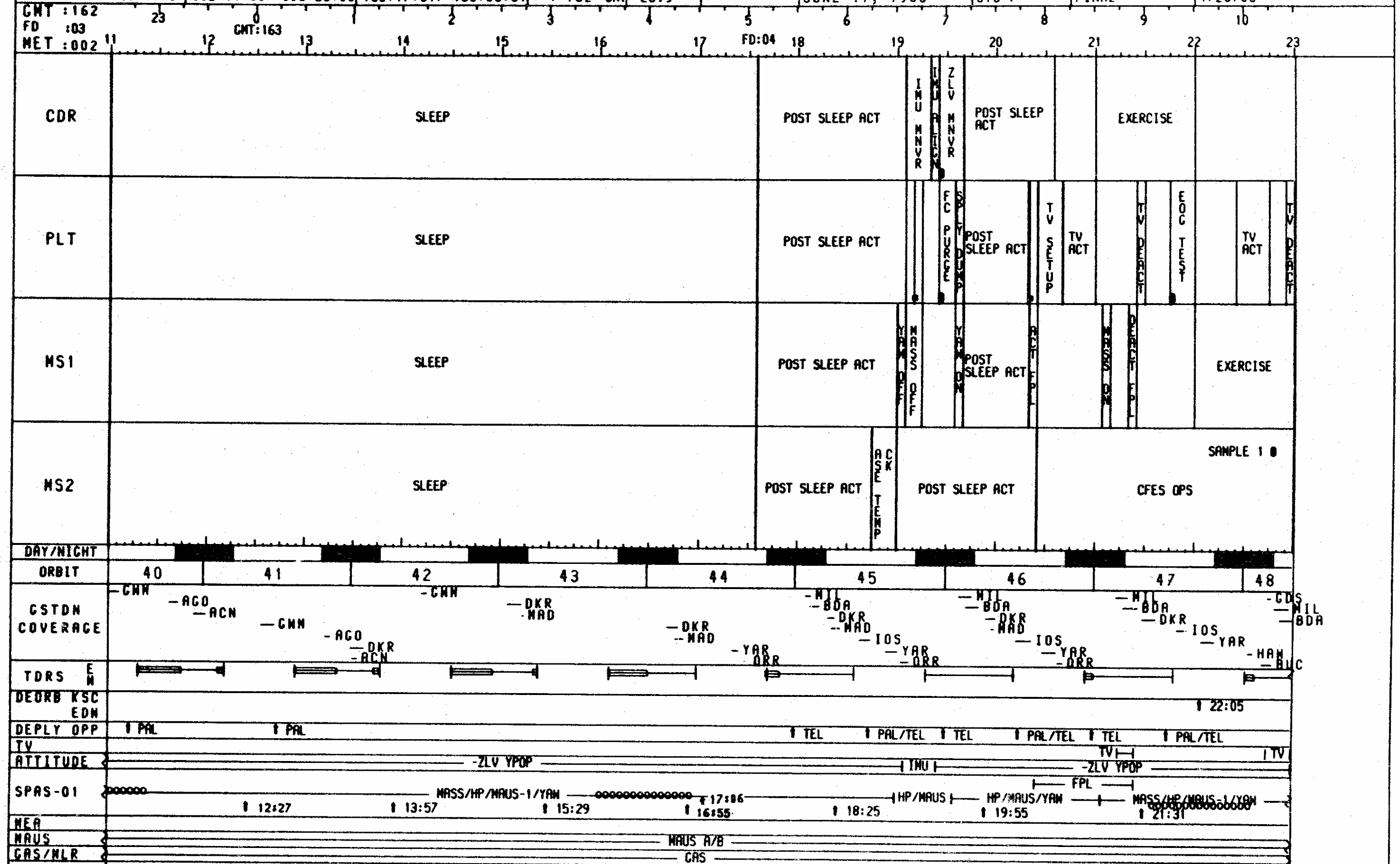
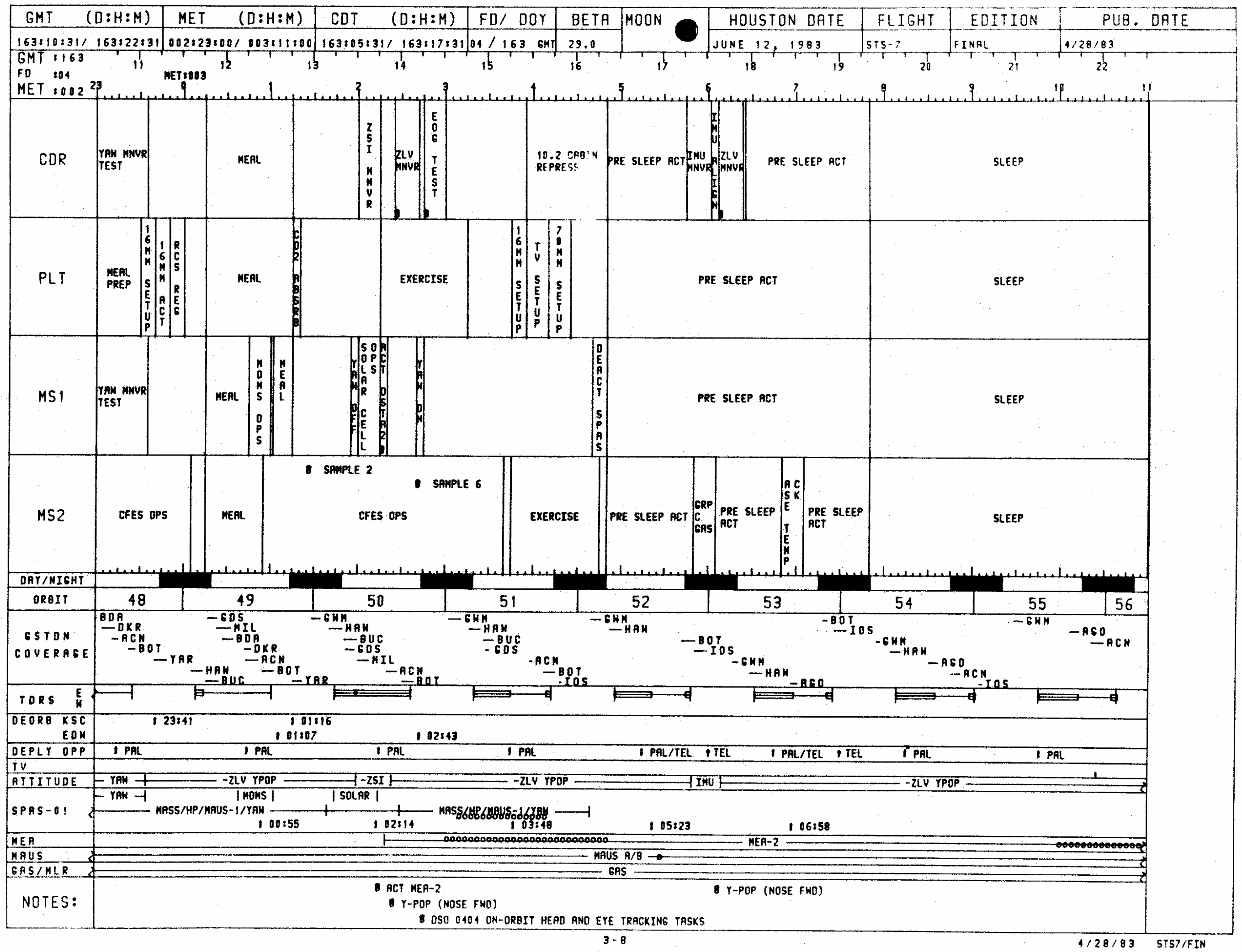
| 162:22:31/ 163:10:31 | 002:11:00/ 002:23:00 | 162:17:31/ 163:05:31 | 04 / 162 GMT | 26.9 | | JUNE 11, 1983 | STS-7 | FINAL | 4/28/83 |




NOTES:
● FC PURGE HTR ON
▮ Y-POP (NOSE FWD)
▮ MANUAL ● FC PURGE HTR OFF
▮ DSO 0404 ON-ORBIT HEAD AND EYE TRACKING TASKS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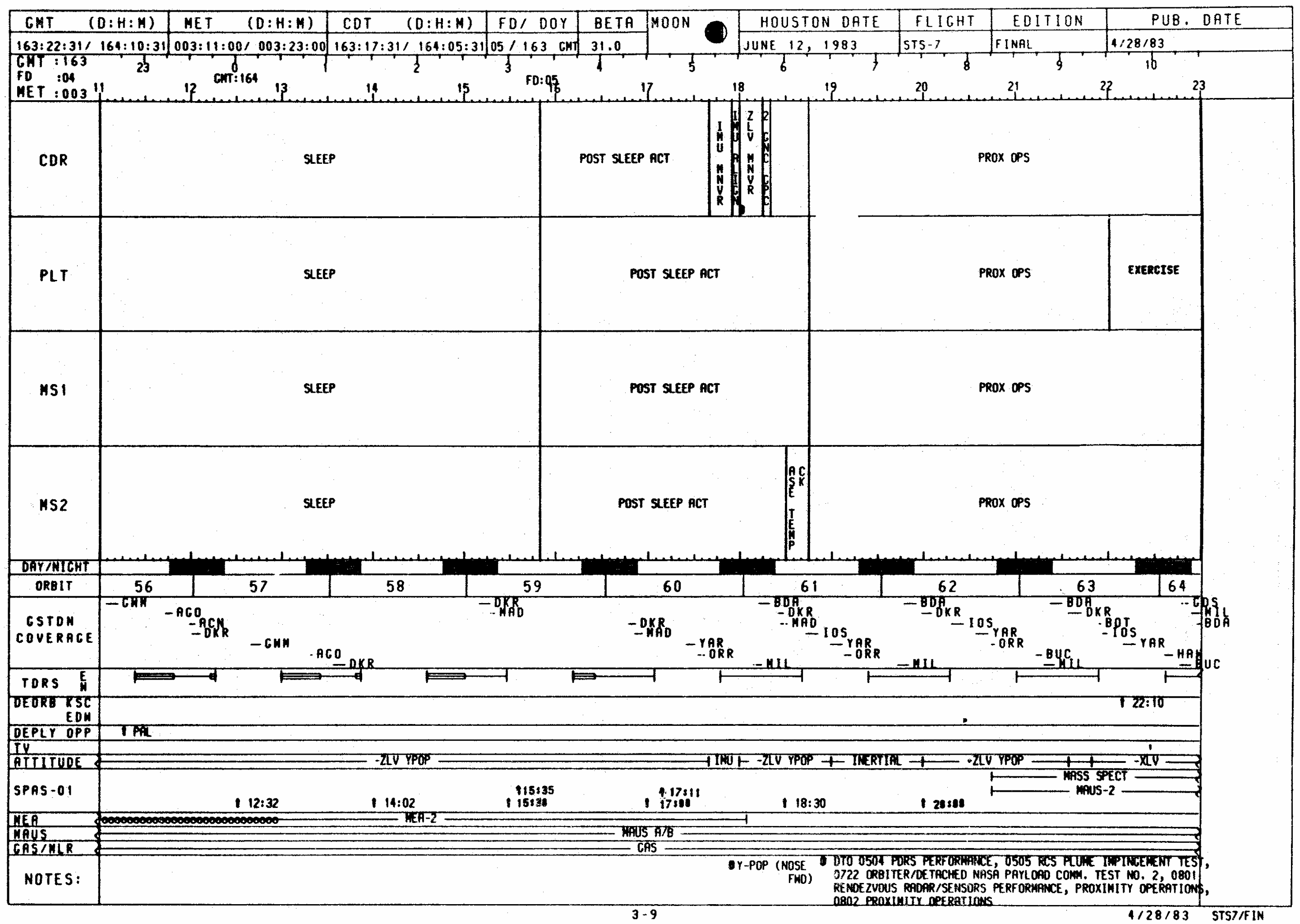
FD/ DOY 04 / 163 GMT
BETA 29.0
MOON
HOUSTON DATE JUNE 12, 1983
FLIGHT STS-7
EDITION FINAL
PUB. DATE 4/28/83
CDR
YAW MNVR TEST
MEAL
ZSI MNVR
ZLV MNVR
EOG TEST
10.2 CABIN REPRESS
PRE SLEEP ACT
IMU MNVR
ZLV MNVR
PRE SLEEP ACT
SLEEP
PLT
MEAL PREP
16MM SETUP
16MM ACT
RCS REG
MEAL
CO2 ABSORB
EXERCISE
16MM SETUP
TV SETUP
70MM SETUP
PRE SLEEP ACT
SLEEP
MS1
YAW MNVR TEST
MEAL
MOMS OPS
MEAL
YAW OFF
SOLAR CELL
OPS
ACT DSTR2
YAW ON
DEACT SPAS
PRE SLEEP ACT
SLEEP
MS2
CFES OPS
MEAL
SAMPLE 2
SAMPLE 6
CFES OPS
EXERCISE
PRE SLEEP ACT
GRP C GAS
PRE SLEEP ACT
ASK C TEMP
PRE SLEEP ACT
SLEEP
DAY/NIGHT
ORBIT 48 49 50 51 52 53 54 55 56
GSTDN COVERAGE
TDRS E W
DEORB KSC EDW
23:41 01:16 01:07 02:43
DEPLY OPP
PAL PAL PAL PAL PAL/TEL TEL PAL/TEL TEL PAL PAL
TV
ATTITUDE
YAW -ZLV YPOP -ZSI -ZLV YPOP IMU -ZLV YPOP
SPAS-01
YAW MOMS SOLAR
MASS/HP/MAUS-1/YAW MASS/HP/MAUS-1/YAW
00:55 02:14 03:48 05:23 06:58
MEA MEA-2
MAUS MAUS A/B
GAS/MLR GAS
NOTES:
ACT MEA-2
Y-POP (NOSE FWD)
DSO 0404 ON-ORBIT HEAD AND EYE TRACKING TASKS
Y-POP (NOSE FWD)
3-8
4/28/83 STS7/FIN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FD/ DOY 05 / 163 GMT
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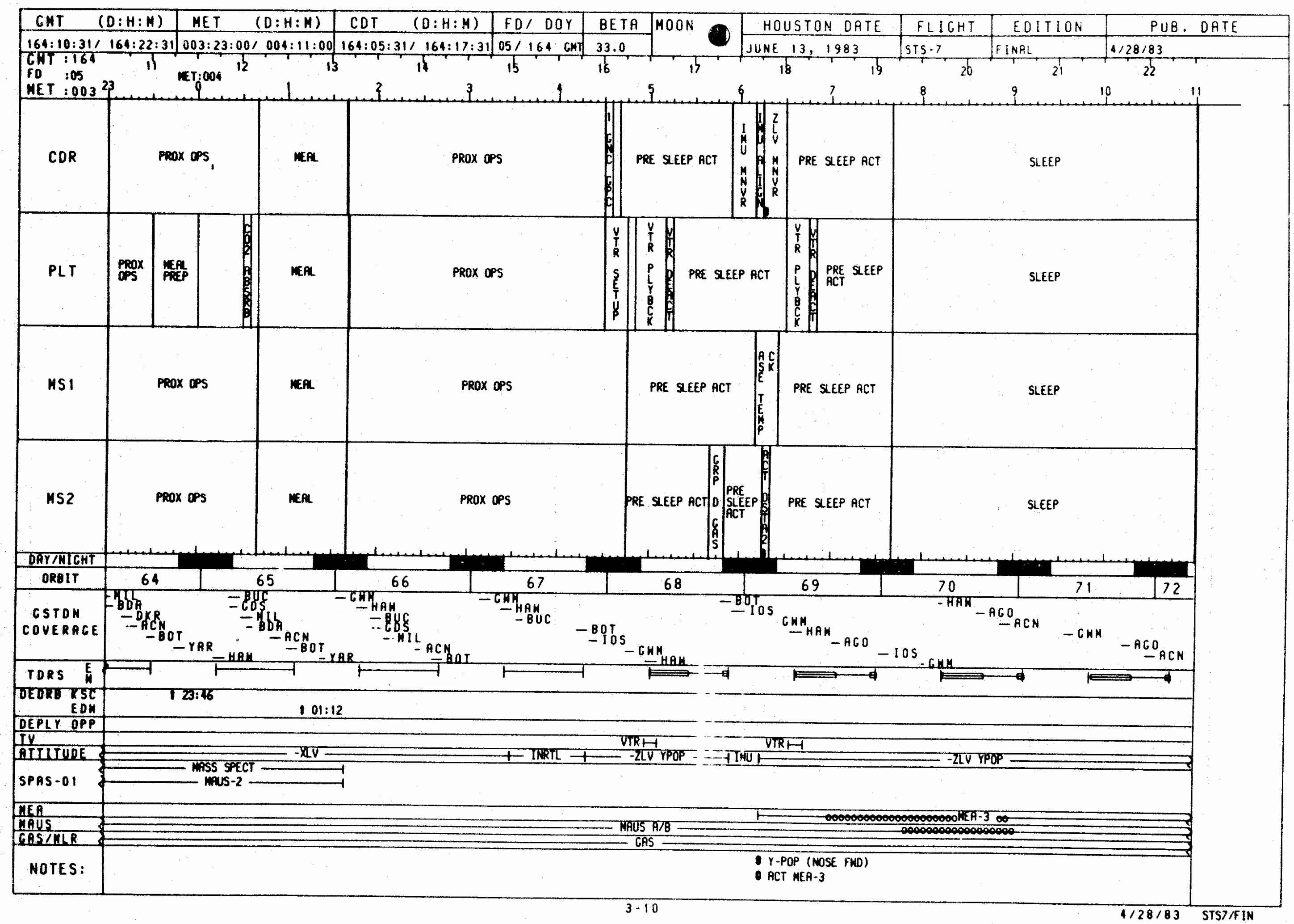
MOON
HOUSTON DATE JUNE 12, 1983
FLIGHT STS-7
EDITION FINAL
PUB. DATE 4/28/83
GMT :163
FD :04
MET :003
GMT:164
FD:05
CDR
SLEEP
POST SLEEP ACT
IMU MNVR
IMU ALIGN
ZLV MNVR
2 CNC GPC
PROX OPS
PLT
EXERCISE
MS1
MS2
ACK ASE TEMP
DAY/NIGHT
ORBIT
56
57
58
59
60
61
62
63
64
GSTDN COVERAGE
TDRS E W
DEORB KSC EDW
DEPLY OPP
PAL
22:10
TV
ATTITUDE
-ZLV YPOP
IMU
INERTIAL
-XLV
SPAS-01
MASS SPECT
MAUS-2
12:32
14:02
15:35
15:38
17:11
17:00
18:30
20:00
MEA
MAUS
GAS/MLR
MEA-2
MAUS A/B
GAS
NOTES:
Y-POP (NOSE FWD)
DTO 0504 PDRS PERFORMANCE, 0505 RCS PLUME IMPINGEMENT TEST, 0722 ORBITER/DETACHED NASA PAYLOAD COMM. TEST NO. 2, 0801 RENDEZVOUS RADAR/SENSORS PERFORMANCE, PROXIMITY OPERATIONS, 0802 PROXIMITY OPERATIONS
3-9
4/28/83
STS7/FIN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CDT (D:H:M)
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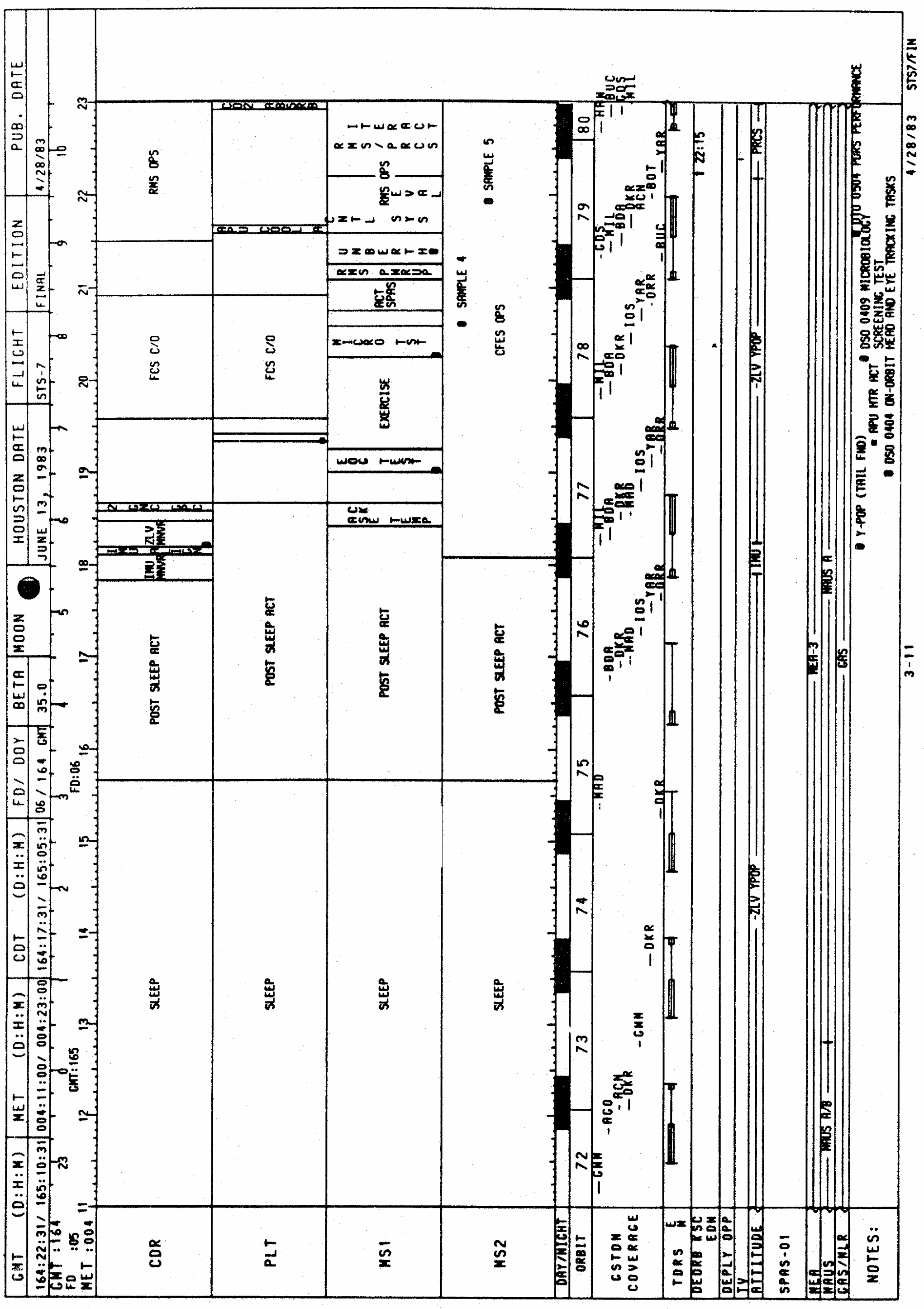
FD/ DOY
05/ 164 GMT
BETA
33.0
MOON
HOUSTON DATE
JUNE 13, 1983
FLIGHT
STS-7
EDITION
FINAL
PUB. DATE
4/28/83
GMT :164
FD :05
MET :003
MET:004
CDR
PLT
MS1
MS2
PROX OPS
MEAL
MEAL PREP
PRE SLEEP ACT
SLEEP
VTR SETUP
VTR PLYBCK
IMU MNVR
ZLV MNVR
GRP D GAS
DAY/NIGHT
ORBIT
64
65
66
67
68
69
70
71
72
GSTDN COVERAGE
TDRS E W
DEORB KSC
EDW
23:46
01:12
DEPLY OPP
TV
VTR
ATTITUDE
-XLV
INRTL
-ZLV YPOP
IMU
SPAS-01
MASS SPECT
MAUS-2
MEA
MAUS
GAS/MLR
MAUS A/B
GAS
MEA-3
NOTES:
Y-POP (NOSE FWD)
ACT MEA-3
3-10
4/28/83 STS7/FIN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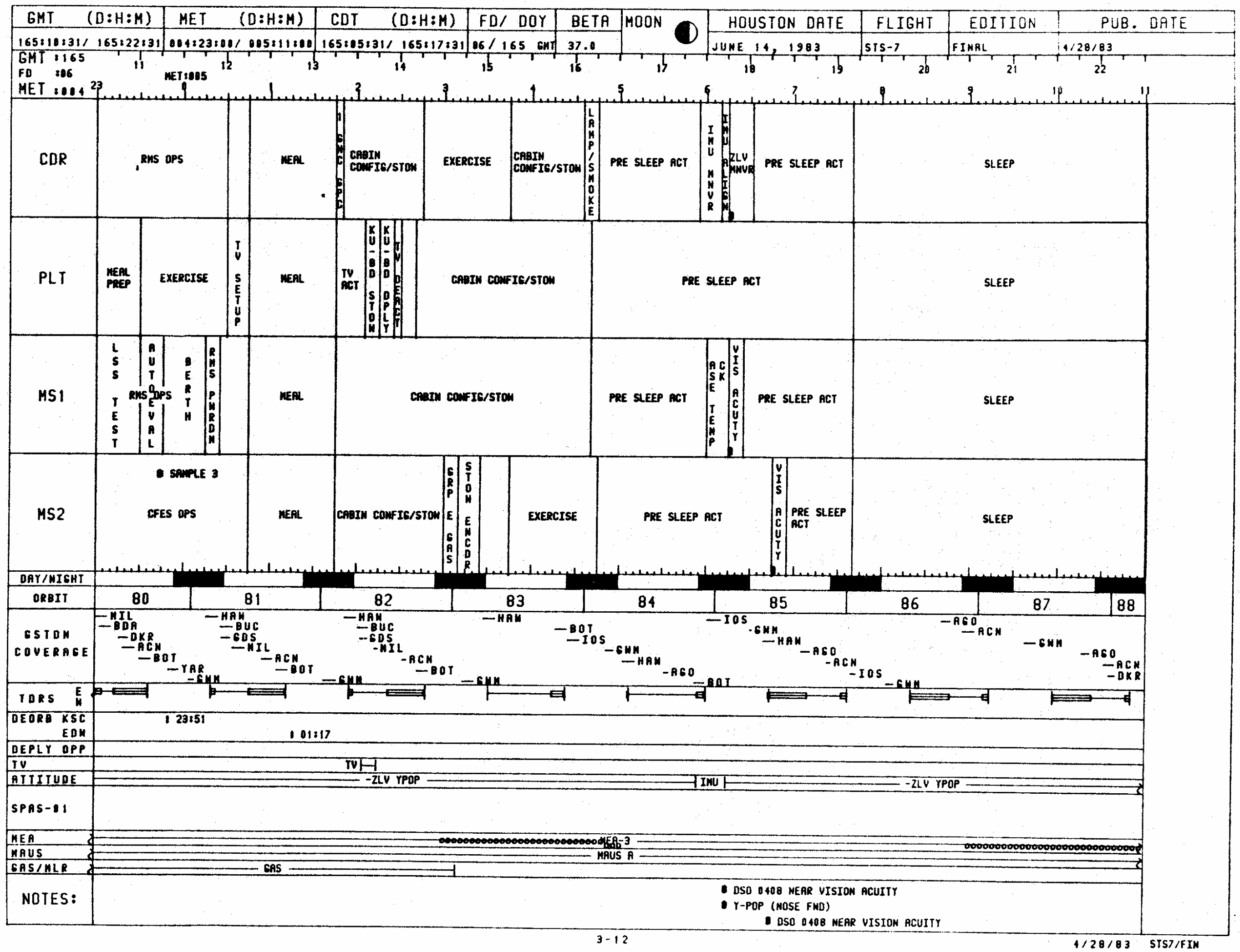
FD/ DOY 06/ 164 GMT
BETA 35.0
MOON
HOUSTON DATE JUNE 13, 1983
FLIGHT STS-7
EDITION FINAL
PUB. DATE 4/28/83
CDR
PLT
MS1
MS2
SLEEP
POST SLEEP ACT
FCS C/O
RMS OPS
EXERCISE
CFES OPS
SAMPLE 4
SAMPLE 5
DAY/NIGHT
ORBIT
CSTDN COVERAGE
TDRS
DEORB KSC EDW
DEPLY OPP
TV
ATTITUDE
-ZLV YPOP
SPAS-01
NEA
MAUS
GAS/NLR
NOTES:
Y-POP (TAIL FWD)
APU HTR ACT
DSO 0404 ON-ORBIT HEAD AND EYE TRACKING TASKS
DSO 0409 MICROBIOLOGY SCREENING TEST
3-11
4/28/83
STS7/FIN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MOON
HOUSTON DATE JUNE 14, 1983
FLIGHT STS-7
EDITION FINAL
PUB. DATE 4/28/83
GMT :165
FD :06
MET :004
MET:005
CDR
RMS OPS
MEAL
CABIN CONFIG/STOW
EXERCISE
CABIN CONFIG/STOW
LAMP/SMOKE
PRE SLEEP ACT
IMU MNVR
ZLV MNVR
PRE SLEEP ACT
SLEEP
PLT
MEAL PREP
EXERCISE
TV SETUP
MEAL
TV ACT
KU-BD STOW
KU-BD DPLY
TV DEACT
CABIN CONFIG/STOW
PRE SLEEP ACT
SLEEP
MS1
LSS TEST
AUTO EVAL
RMS OPS
BERTH
RMS PWRDN
MEAL
CABIN CONFIG/STOW
PRE SLEEP ACT
ASE TEMP
CK
VIS ACUITY
PRE SLEEP ACT
SLEEP
MS2
SAMPLE 3
CFES OPS
MEAL
CABIN CONFIG/STOW
GRP E GAS
STOW ENCDR
EXERCISE
PRE SLEEP ACT
VIS ACUITY
PRE SLEEP ACT
SLEEP
DAY/NIGHT
ORBIT
80
81
82
83
84
85
86
87
88
GSTDN COVERAGE
MIL
BDA
DKR
ACN
BOT
YAR
GWM
HAW
BUC
GDS
MIL
ACN
BOT
GWM
HAW
BUC
GDS
MIL
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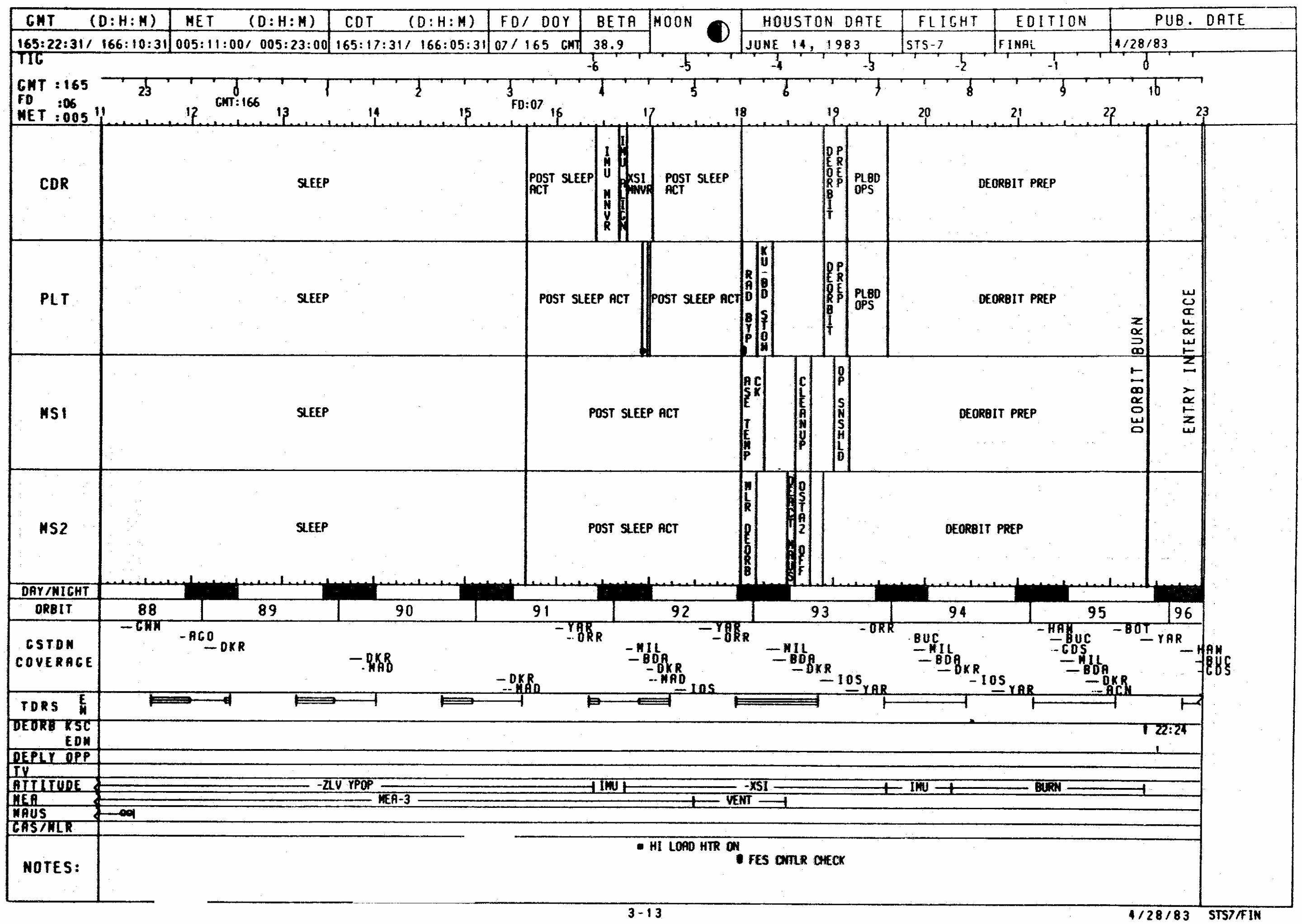
DKR
TDRS E W
DEORB KSC
EDW
23:51
01:17
DEPLY OPP
TV
ATTITUDE
-ZLV YPOP
IMU
-ZLV YPOP
SPAS-01
MEA
MAUS
GAS/MLR
MEA-3
MAUS A
GAS
NOTES:
DSO 0408 NEAR VISION ACUITY
Y-POP (NOSE FWD)
DSO 0408 NEAR VISION ACUITY
3-12
4/28/83 STS7/FIN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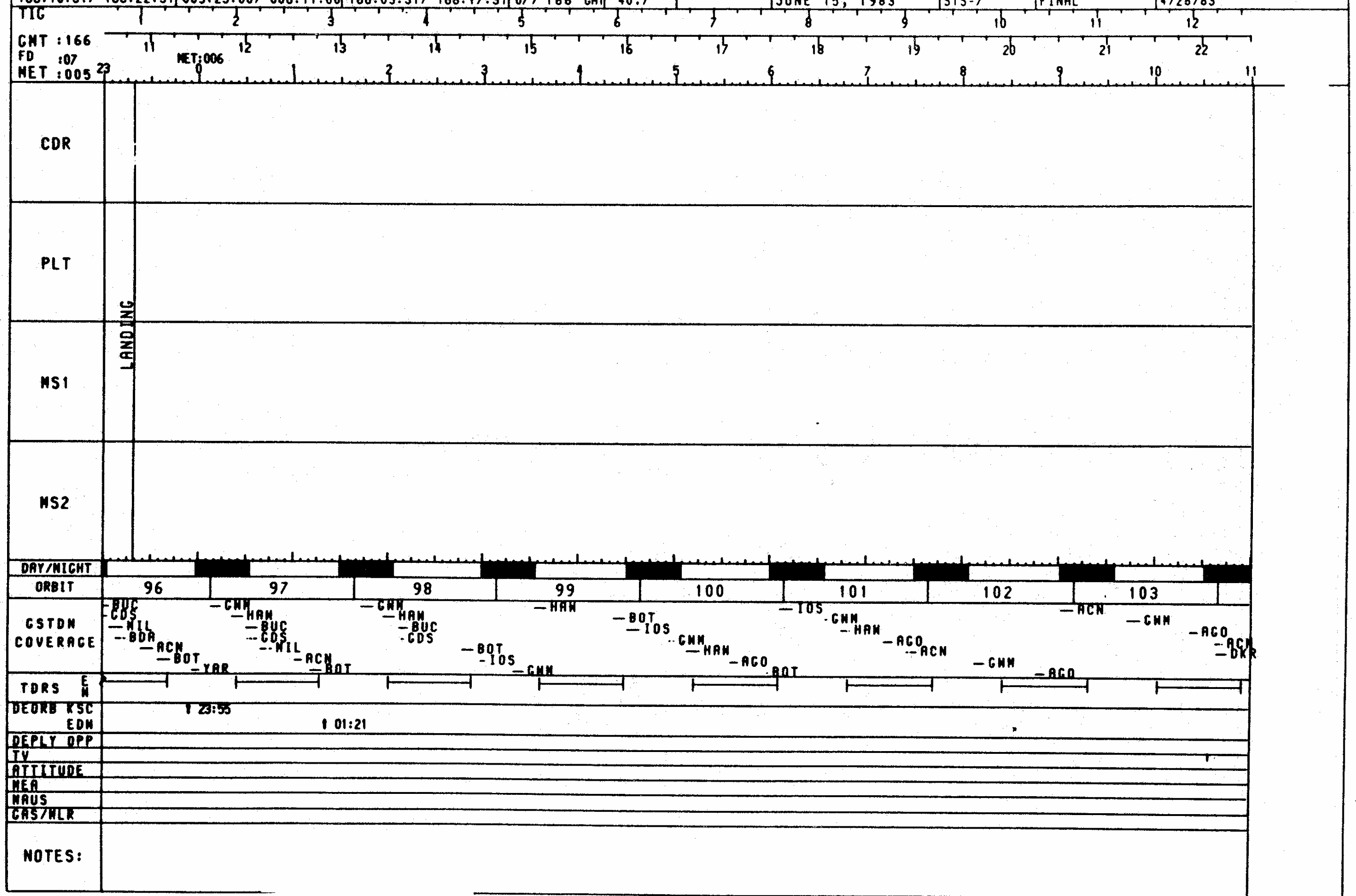
FD/ DOY 07/ 165 GMT
BETA 38.9
MOON
HOUSTON DATE JUNE 14, 1983
FLIGHT STS-7
EDITION FINAL
PUB. DATE 4/28/83
TIG
GMT :165
FD :06
MET :005
GMT:166
FD:07
CDR
SLEEP
POST SLEEP ACT
IMU MNVR
XSI MNVR
POST SLEEP ACT
DEORBIT PREP
PLBD OPS
DEORBIT PREP
PLT
SLEEP
POST SLEEP ACT
POST SLEEP ACT
RAD BYP
KU-BD STOW
DEORBIT PREP
PLBD OPS
DEORBIT PREP
MS1
SLEEP
POST SLEEP ACT
ASE TEMP
CK
CLEANUP
OP SNSHLD
DEORBIT PREP
MS2
SLEEP
POST SLEEP ACT
WLR DEORB
OSTA2 OFF
DEORBIT PREP
DEORBIT BURN
ENTRY INTERFACE
DAY/NIGHT
ORBIT
88 89 90 91 92 93 94 95 96
GSTDN COVERAGE
GWM AGO DKR DKR MAD DKR MAD YAR ORR MIL BDA DKR MAD IOS YAR ORR MIL BDA DKR IOS YAR ORR BUC MIL BDA DKR IOS YAR HAW BUC GDS MIL BDA DKR ACN BOT YAR HAW BUC GDS
TDRS E W
DEORB KSC EDW
22:24
DEPLY OPP
TV
ATTITUDE
-ZLV YPOP
IMU
-XSI
IMU
BURN
MEA
MEA-3
VENT
MAUS
CAS/MLR
NOTES:
HI LOAD HTR ON
FES CNTLR CHECK
3-13
4/28/83 STS7/FIN

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|---|---|---|---|---|---|---|---|---|
| 166:10:31/ 166:22:31 | 005:23:00/ 006:11:00 | 166:05:31/ 166:17:31 | 07/ 166 GMT | 40.7 | ◐ | JUNE 15, 1983 | STS-7 | FINAL | 4/28/83 |



# LANDING AND POST LANDING OPERATIONS

The Kennedy Space Center is responsible for ground operations of the orbiter vehicle once it has rolled to a stop on the runway at Kennedy. Convoy activities will be identical to those performed at Edwards Air Force Base, Calif. The tow from the runway to the Orbiter Processing Facility is scheduled to be completed approximately three hours after touchdown.

After Challenger has rolled to a stop, the flight crew will begin safing vehicle systems. At the same time, the recovery convoy will be making its way toward the vehicle.

Specially-garbed technicians will first determine that residual hazardous vapors are below significant levels in order for other safing operations to proceed. A mobile wind machine is positioned near the vehicle to disperse highly concentrated levels of explosive vapors.

Once the initial safety assessment is made, access vehicles will be positioned at the rear of the orbiter so that lines from ground purge and cooling vehicles can be connected to the T-O umbilical Panel s on the aft end of the orbiter.

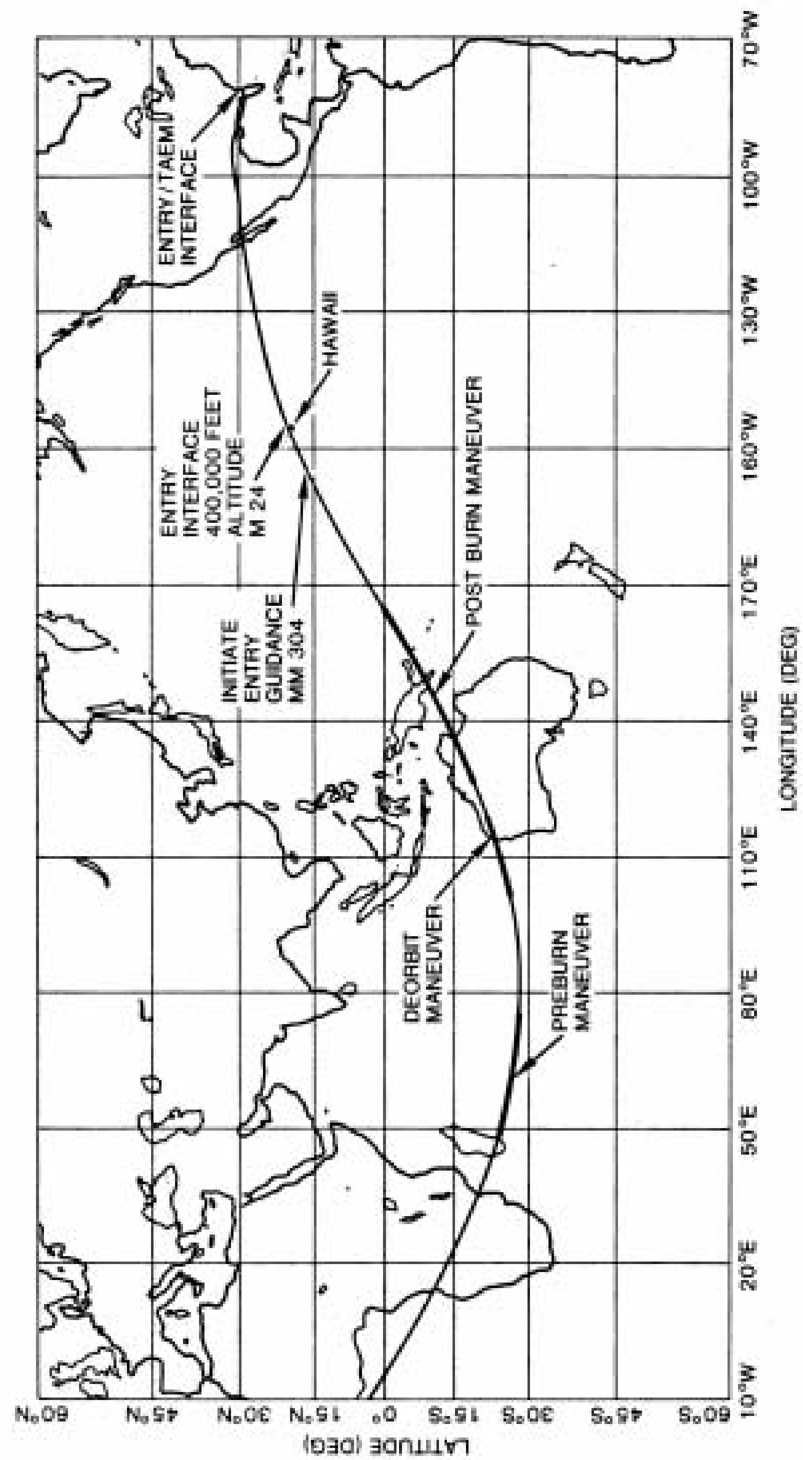
Freon line connections will be completed and coolant will begin circulating through the umbilicals to aid in heat rejection and protect the orbiter's electronic equipment. Other lines will provide cool, humidified air through the umbilicals to the orbiter's cargo bay and other cavities to remove any residual explosive or toxic fumes and provide a safe, clean environment inside the Challenger.

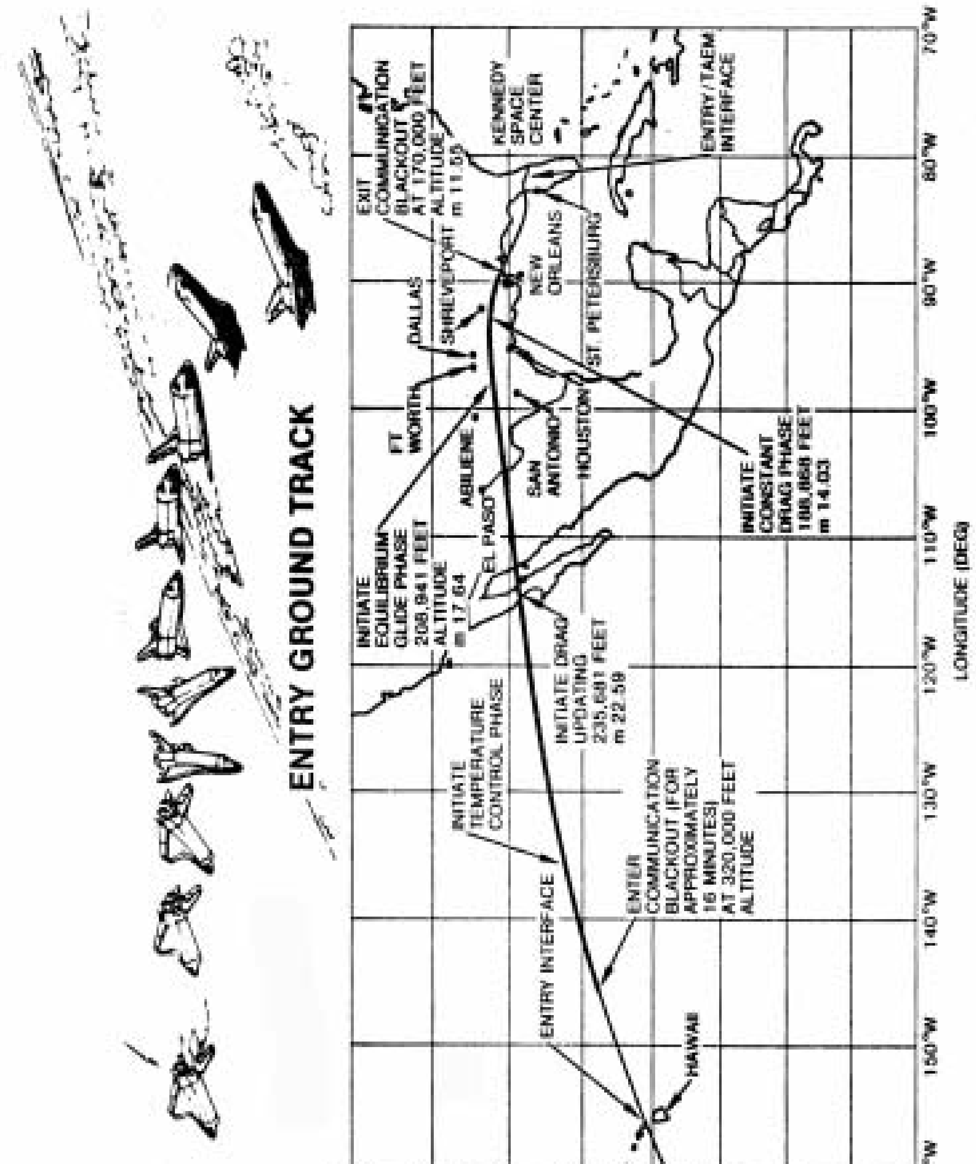
The mobile white room will be moved into place around the crew hatch once it is verified there are no concentrations of toxic gases around the forward part of the vehicle. The hatch will be opened approximately 30 minutes after landing and the flight crew will leave the orbiter about 10 minutes later. Technicians will replace the flight crew in the cockpit and complete the vehicle safing activity.

A tow tractor will be connected to the Challenger and the vehicle will be pulled down the 2-mile long towway leading to High Bay 1 of the Orbiter Processing Facility.

Challenger will be pulled inside the hangar-like facility, jacked and leveled in the OPF workstands and facility power and cooling lines will be connected to the vehicle. Post-flight inspections and in-flight anomaly troubleshooting will begin the following day, in parallel with the start of routine systems reverification to prepare Challenger for the STS-8 mission.

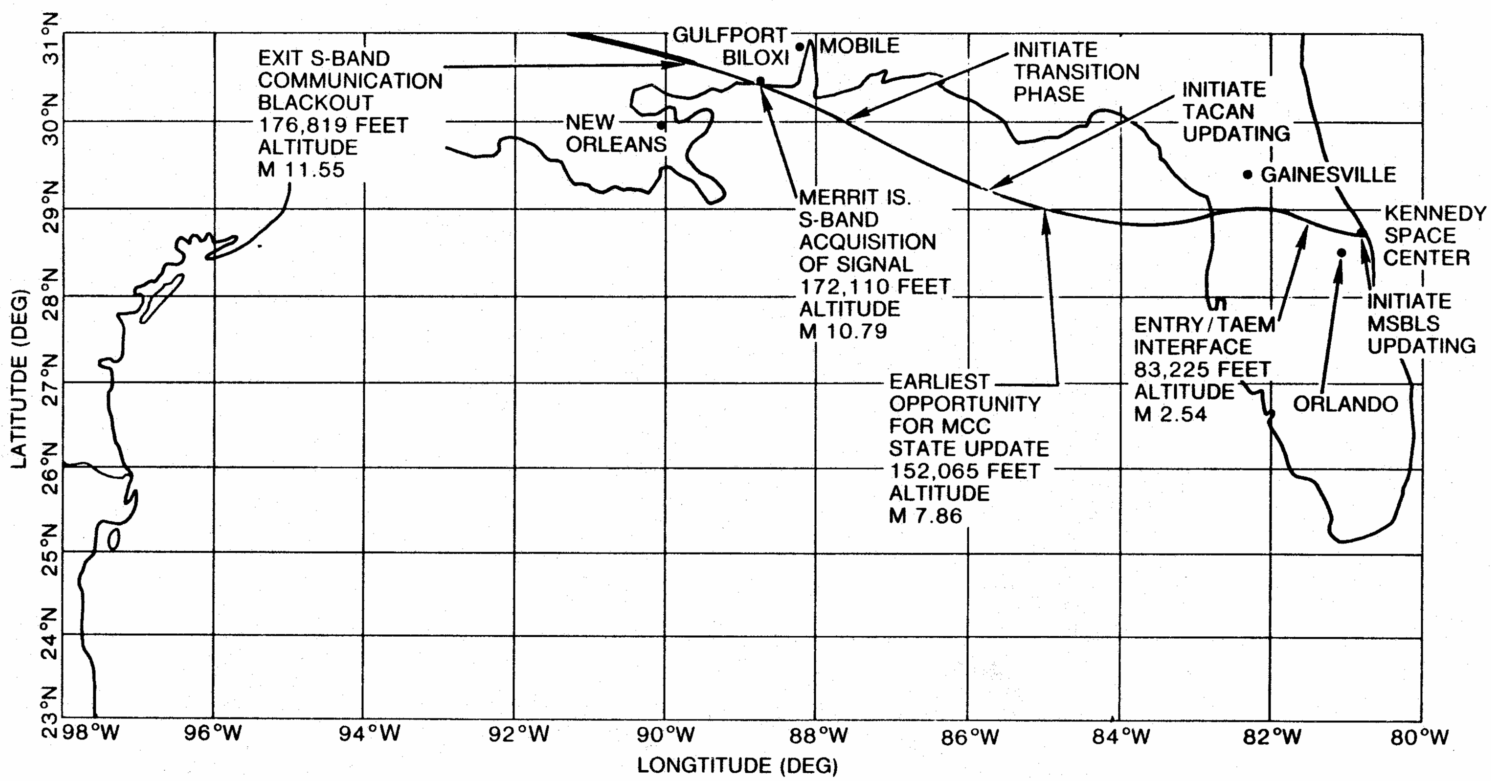
## DEORBIT AND ENTRY TRACK





ENTRY GROUND TRACK
ENTRY INTERFACE
HAWAII
ENTER COMMUNICATION BLACKOUT (FOR APPROXIMATELY 16 MINUTES) AT 320,000 FEET ALTITUDE
INITIATE TEMPERATURE CONTROL PHASE
INITIATE DRAG UPDATING 235,681 FEET m 22.58
INITIATE EQUILIBRIUM GLIDE PHASE 208,941 FEET ALTITUDE m 17.64
EL PASO
ABILENE
FT WORTH
DALLAS
SAN ANTONIO
HOUSTON
SHREVEPORT
INITIATE CONSTANT DRAG PHASE 188,868 FEET m 14.03
ST. PETERSBURG
NEW ORLEANS
EXIT COMMUNICATION BLACKOUT AT 170,000 FEET ALTITUDE m 11.55
KENNEDY SPACE CENTER
ENTRY / TAEM INTERFACE
LATITUDE (DEG)
LONGITUDE (DEG)

## POSTBLACKOUT DESCENT GROUND TRACK



# APPROACH AND LANDING
# RUNWAY 15
## KENNEDY SPACE CENTER, FLA

### SHUTTLE LANDING FACILITY

**RUNWAY 15 APPROACH FROM NORTHWEST TO SOUTHEAST, RUNWAY 33 APPROACH FROM SOUTHEAST TO NORTHWEST**

A. APPROXIMATELY 60 NAUTICAL MILES RANGE TO RUNWAY THRESHOLD, 83,347 FT ALTITUDE, MACH 2.54, APPROXIMATELY 7 MINUTES FROM TOUCHDOWN

B. APPROXIMATELY 26 NAUTICAL MILES RANGE TO RUNWAY THRESHOLD, 50,000 FT ALTITUDE, MACH 0.99, APPROXIMATELY 5 MINUTES FROM TOUCHDOWN

C. INITIATE MICROWAVE SCAN BEAM LANDING SYSTEM (MSBLS) UPDATING, APPROXIMATELY 8.5 NAUTICAL MILES (NMI) TO RUNWAY THRESHOLD, 15,498 FT ALTITUDE, 356 KNOTS, APPROXIMATELY 2 MINUTES FROM TOUCHDOWN

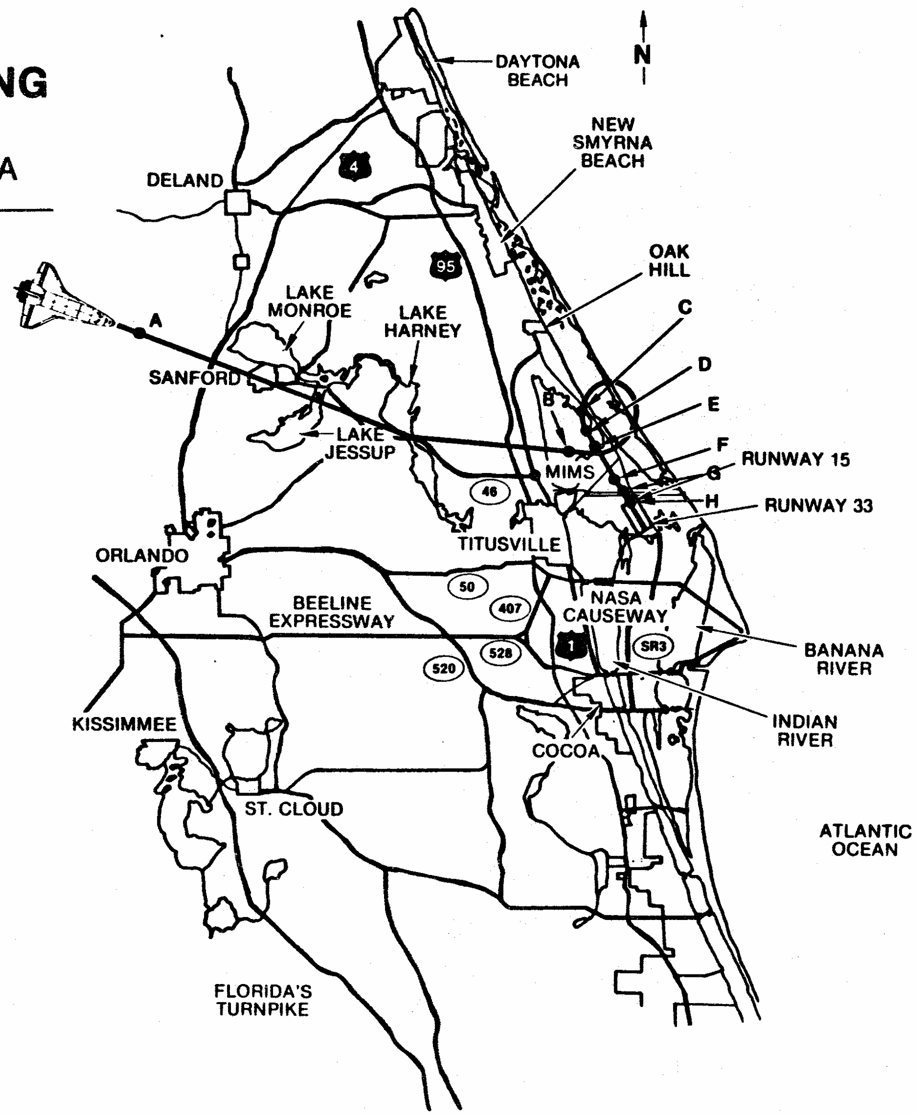
D. INITIATE PREFINAL PHASE 7.8 NMI TO RUNWAY THRESHOLD, 13,973 FT ALTITUDE, 353 KNOTS

E. TERMINAL AREA ENERGY MANAGEMENT (TAEM)/APPROACH AND LANDING INTERFACE, APPROXIMATELY 9912 FT ABOVE RUNWAY, 36,137 FT TO RUNWAY THRESHOLD, 334 KNOTS, APPROXIMATELY 1 MINUTE TO TOUCHDOWN

F. INITIATE PREFLARE, APPROXIMATELY 1990 FT ABOVE RUNWAY, 13,291 FT TO RUNWAY THRESHOLD, 298 KNOTS

G. INITIATE LANDING GEAR DEPLOYMENT, APPROXIMATELY 195 FT ABOVE RUNWAY, 5,088 FT TO RUNWAY THRESHOLD, 277 KNOTS

H. WEIGHT ON MAIN LANDING GEAR, APPROXIMATELY 2759 FT FROM (BEYOND) RUNWAY THRESHOLD, 190 KNOTS



# APPROACH AND LANDING
# RUNWAY 33
## KENNEDY SPACE CENTER, FLA

### SHUTTLE LANDING FACILITY

**RUNWAY 15 APPROACH FROM NORTHWEST TO SOUTHEAST, RUNWAY 33 APPROACH FROM SOUTHEAST TO NORTHWEST**

A. APPROXIMATELY 60 NAUTICAL MILES RANGE TO RUNWAY THRESHOLD, 83,347 FT ALTITUDE, MACH 2.54, APPROXIMATELY 7 MINUTES FROM TOUCHDOWN

B. APPROXIMATELY 26 NAUTICAL MILES RANGE TO RUNWAY THRESHOLD, 50,000 FT ALTITUDE, MACH 0.99, APPROXIMATELY 5 MINUTES FROM TOUCHDOWN

C. INITIATE MICROWAVE SCAN BEAM LANDING SYSTEM (MSBLS) UPDATING, APPROXIMATELY 8.5 NAUTICAL MILES (NMI) TO RUNWAY THRESHOLD, 15,498 FT ALTITUDE, 356 KNOTS, APPROXIMATELY 2 MINUTES FROM TOUCHDOWN

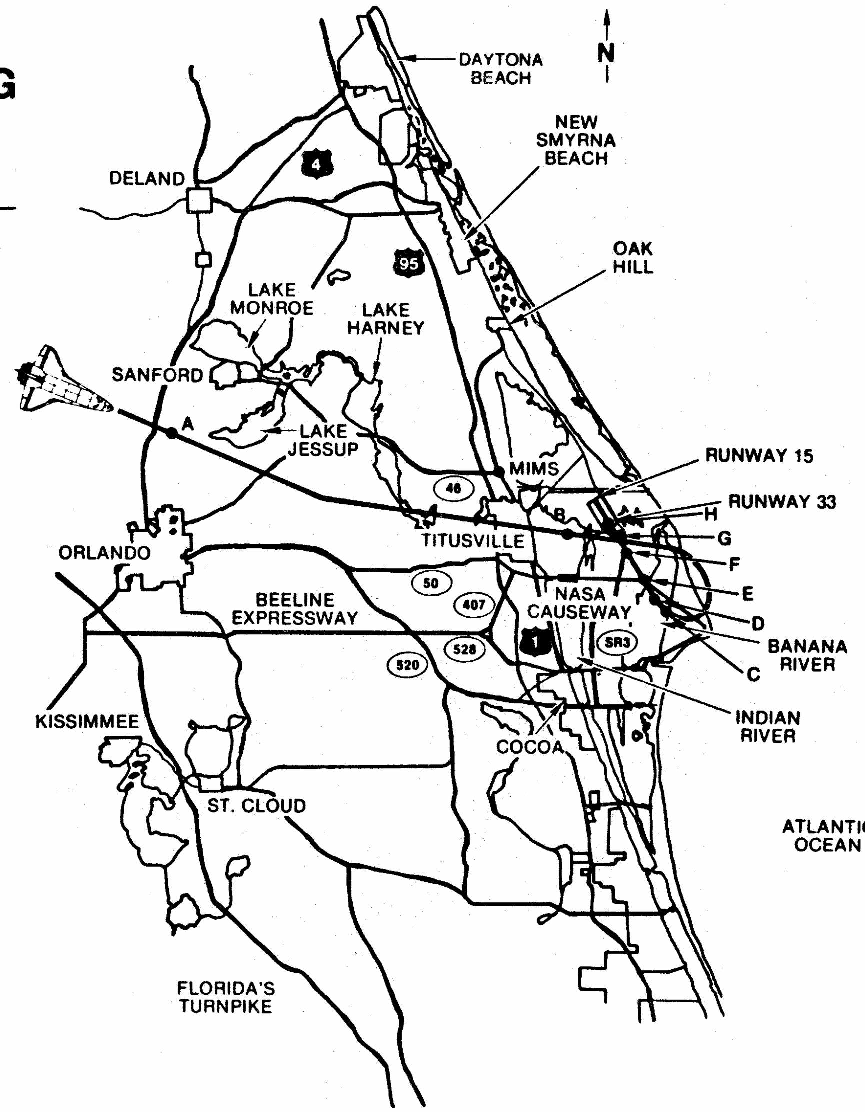
D. INITIATE PREFINAL PHASE 7.8 NMI TO RUNWAY THRESHOLD, 13,973 FT ALTITUDE, 353 KNOTS

E. TERMINAL AREA ENERGY MANAGEMENT (TAEM)/APPROACH AND LANDING INTERFACE, APPROXIMATELY 9912 FT ABOVE RUNWAY, 36,137 FT TO RUNWAY THRESHOLD, 334 KNOTS, APPROXIMATELY 1 MINUTE TO TOUCHDOWN

F. INITIATE PREFLARE, APPROXIMATELY 1990 FT ABOVE RUNWAY, 13,291 FT TO RUNWAY THRESHOLD, 298 KNOTS

G. INITIATE LANDING GEAR DEPLOYMENT, APPROXIMATELY 195 FT ABOVE RUNWAY, 5,088 FT TO RUNWAY THRESHOLD, 277 KNOTS

H. WEIGHT ON MAIN LANDING GEAR, APPROXIMATELY 2759 FT FROM (BEYOND) RUNWAY THRESHOLD, 190 KNOTS



## FLIGHT OBJECTIVES

Deployable payloads loaded aboard Challenger for STS-7 are the Republic of Indonesia's Palapa B-1 and Telesat Canada, Ltd. Anik C communications satellites. Both will be boosted to a 22,300 nautical-mile circular geosynchronous orbit by solid rocket Payload Assist Modules (PAM-D) of the same type used for the Satellite Business Systems (SBS) and Anik satellites deployed from STS-5 in November 1982.

Sharing the cargo bay with the two communications satellites will be the Office of Space Science and Applications' OSTA-2 -an array of space science experiments, the German-built Shuttle Pallet Satellite (SPAS-1) multi-experiment package which will be deployed and later retrieved from free flight with the remote manipulator arm, and seven Get-Away Special (GAS) self-contained payload canisters.

Orbiter middeck experiments included the twice-flown Continuous-Flow Electrophoresis system (CFES) and the Monodisperse Latex Reactor (MLR).

Payloads and experiments are described in detail elsewhere in this press kit.

Mission specialist Dr. Norman E. Thagard will gather information during the flight on motion sickness and cardiovascular deconditioning countermeasures. Further data on remote manipulator robot arm Performance will also be gathered.

No extravehicular activity, or spacewalk, is planned for STS-7.

# WHAT IF THINGS GO WRONG

Shuttle launch abort philosophy aims toward safe and intact recovery of the flight crew, the orbiter and the payloads.

In descending order of desirability, abort modes are as follows:

- Abort-to-orbit (ATO) - partial loss of main engine thrust late enough to permit reaching a minimal 194-km (105-nm) orbit with orbital maneuvering system engines.

- Abort-once-around (AOA) - earlier main engine shutdown, but near enough orbital speed to allow one orbit around to the Shuttle Landing Facility at Kennedy Space Center.

- Trans-Atlantic abort landing (TAL) - loss of two main engines midway through powered flight, forcing a landing at Dakar, Senegal International Airport.

- Return to launch site (RTLS) - early shutdown of one or more engines and without enough energy to make Dakar; pitch-around and thrust back toward Kennedy Space Center until within gliding distance of Shuttle runway. STS-6 contingency landing sites are Kennedy; Edwards Air Force Base, Calif.; White Sands Missile Range, N.M.; Hickam Air Force Base/Honolulu International, Hawaii; Kadena Air Force Base, Okinawa; and Rota Naval Air Station, Spain.

## COFIGURATION

Except for the installation of the 15.2-m (50-ft.) Canadian-built remote manipulator arm on the left mid-fuselage longeron, and the addition of a fifth crew seat on the middeck, Orbiter Challenger is not greatly different than on STS-6. Challenger is fitted with three sets of cryogenic oxygen and hydrogen tanks for supplying fuel cell reactants.

The STS-7 payloads are arranged, starting from the aft bulkhead, with the Indonesian Palapa B-1, Telesat Canada Anik C, OSTA-2, and SPAS-01, six Get-Away Special experiment canisters are attached along the left longeron forward of the SPAS and the seventh canister bolted amidships on the right longeron.

Orbiter performance data packages, the Mini-Modular Auxiliary Data System (Mini-MADS) and the Aerodynamics Coefficient Identification Package (ACIP), are nested in the "bilge" below the payload bay between transverse fuselage frames.

The Monodisoperse Latex Reactor (MLR) and the Continuous Flow Electrophoresis System (CFES) are on Challenger's crew compartment middeck.

Challenger and its external tank and solid rocket boosters will have a total liftoff weight of 2,034,666 kg (4,485,597 lb.) compared to an STS-6 liftoff weight of 2,036,592 kg (4,489,843 lb.). Without cargo, crew, consumables, equipment, or "dry," Challenger will weigh 67,273.4 kg (148,310 lb.).

Broken down by satellites, experiment package and other payload related hardware, STS-7 payloads weights are as follows:

| | | | |
|---|---|---|---|
| **In payload bay:** | | | |
| | Palapa B-1 Satellite & PAM-D | 3,436.0 kg | 7,575 lb. |
| | ASE (Cradle) | 1,085.5 kg | 2 ,393 lb. |
| | **Palapa B-1 total** | **4,521.5 kg** | **9,968 lb.** |
| | | | |
| | Telesat-F Anik Satellite & PAM-D | 3,344.8 kg | 7,374 lb. |
| | ASE | 1,098.6 kg | 2,422 lb. |
| | **Telesat total** | **4,443.4 kg** | **9,796 lb.** |
| | | | |
| | OSTA-2 | 1,447.9 kg | 3,192 lb. |
| | GAS experiment canisters | 1,334.9 kg | 2,943 lb. |
| | SPAS-01 | 2,278.0 kg | 5,022 lb. |
| | **Payload Bay Total** | **346.5 kg** | **764 lb.** |
| | | | |
| **In crew compartment:** | | | |
| | MLR | 14,025.7 kg | 30,921 lb. |
| | CFES | 77.1 kg | 170 lb. |
| | **Crew compartment total:** | **423.6 kg** | **934 lb.** |
| | | | |
| | **All payload totals** | | |
| | | | |
| | Instrumentation in payload bay | 14,449.3 kg | 31.985 lb. |
| | Mini-MADS | 296.2 kg | 653 lb. |
| | ACIP | 83.0 kg | 183 lb. |

# TELESAT'S ANIK-C2

Telesat Canada's Anik-C2 communications satellite will be ejected from the orbiter Challenger on the first day of the STS-7 mission.

The Anik-C series are the most powerful communications satellites available to North Americans until the middle of this decade, offering revolutionary new kinds of broadcasting, business network and other satellite telecommunications services to Canadians through new technology in both spacecraft and earth station design.

Initially Anik-C2 will be used by the GTE Satellite Corp. of Stamford, Conn., for one of the world's first direct-to-home pay TV services. It will provide service to the continental United States until new American communications satellite capacity is available in 1985. Anik-C2 will also act as a back-up to Anik C3, which was launched last November and is currently used by Canadian pay-TV operators, educational broadcasters, cablecasters and the TransCanada Telephone System.

Telesat Canada's three identical Anik-C communications satellites are cylindrical, spin-stabilized spacecraft that operate exclusively in the "high frequency" (14 and 12 GHz) satellite radio bands, with 16 transponders (communications repeaters) each .

Each of these 16 satellite channels is capable of carrying two color TV signals, together with their associated audio and cue and control circuits, for a total TV signal capacity of 32 programs per satellite.

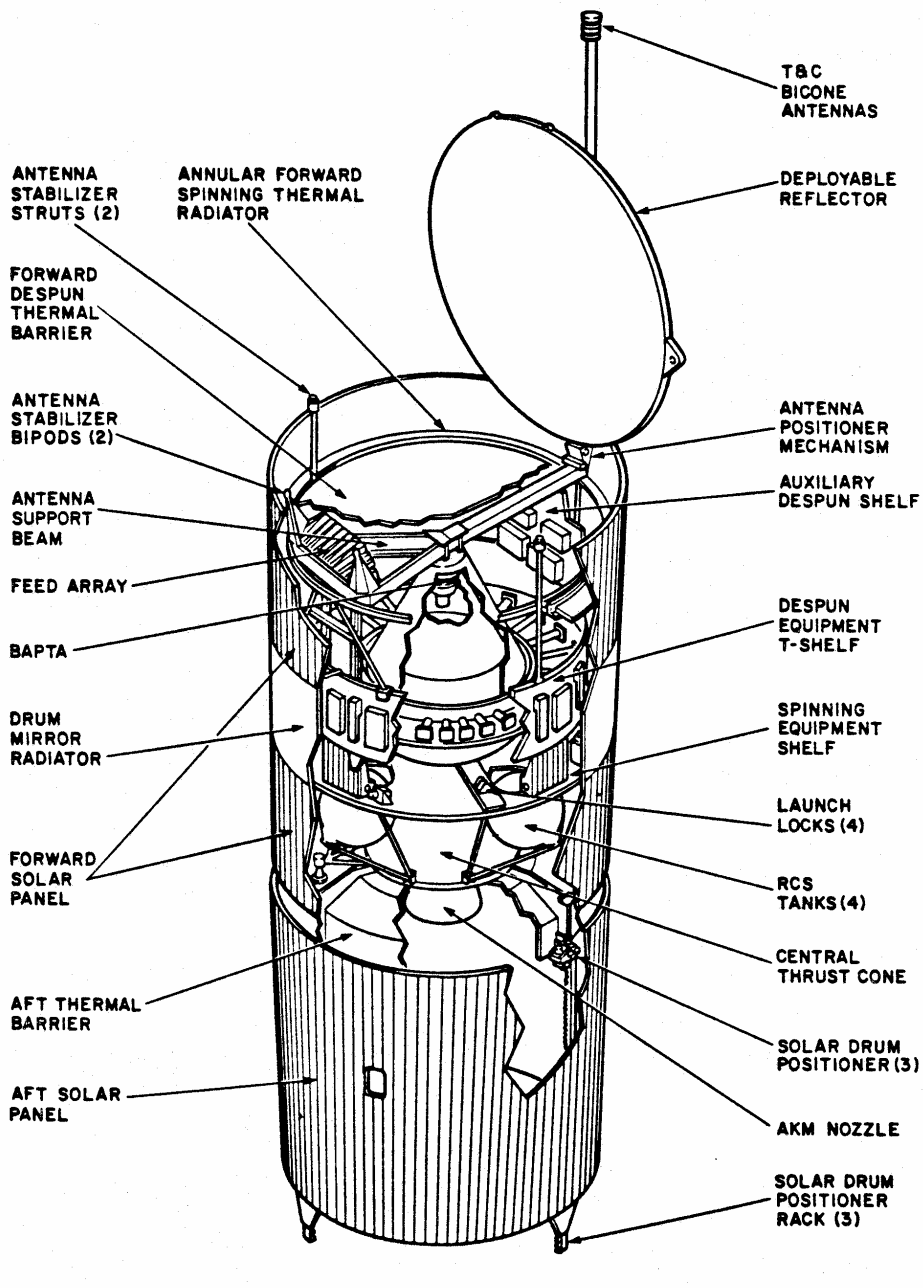
The combination of higher transmit power (from 15-watt output tubes), spot-beam antenna design and use of the 14/12 GHz bands means Telesat's Anik-C satellites are able to work with much smaller earth stations than conventional satellites, which operate with less power and at lower, more interference-prone frequencies.

Because of their smaller size, and the fact the higher frequencies in use will not interfere with (or be interfered with) existing terrestrial microwave communications that share the lower frequencies used by older satellites, the Anik-C earth terminals can be located easily in relatively crowded spaces. They can be placed in city centers, or mounted on rooftops of individual homes. Anik-C can deliver a high quality TV picture to a private earth terminal equipped with a dish antenna as small as 1.2 m (3.9 ft.) in diameter, making it ideal for direct broadcast satellite services.

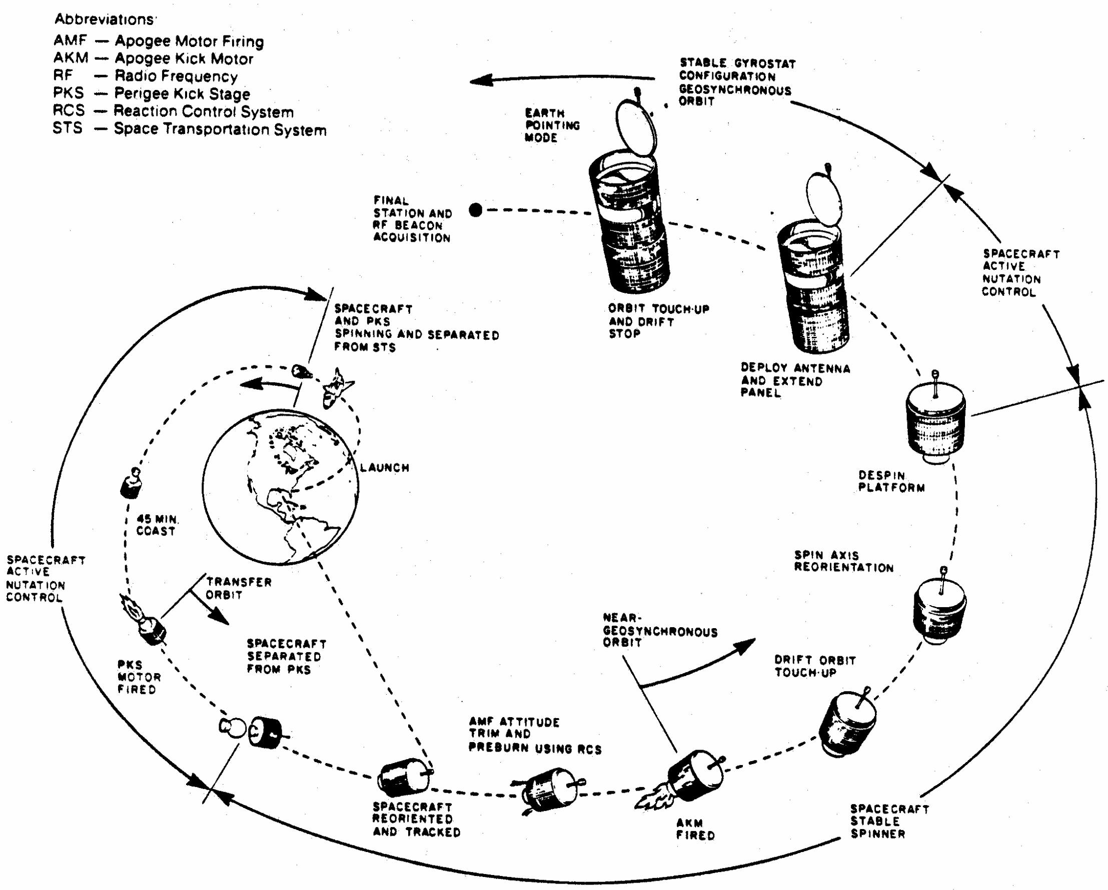
Telesat Canada was the world's first operator of a domestic, geostationary satellite telecommunications system. Since launching its first Anik satellite Nov. 9, 1972, Telesat has provided Canadians with flexible, reliable services through one of the world's largest, most technologically advanced satellite systems.

Hovering over the equator, between 104.5 and 117.5 degrees, west longitude, Telesat's four operational satellites cover virtually all of Canada. They can, in fact, "see" about one third of the earth's surface from their operation altitude of 36,000 km (22,300 mi.)but their antennas are focused on Canada. They operate in both the conventional 6 and 4 GHz radio bands as well as the higher frequency 14/12 GHz range. The low frequency satellites employ broad antenna beams that cover the whole country. The high frequency Anik-C series employ spot-beam antenna systems which focus radio energy into four regional coverage patterns that blanket most of populated Canada in an east-west fashion. Telesat Canada will gain a fifth operational satellite with Anik C2 and it plans to launch two more by the end of 1984, including Anik-C1.

Canada's only commercial satellite communications corporation, Telesat is jointly owned by the Canadian government and Canada's major telephone and telegraph companies.


T&C BICONE ANTENNAS
DEPLOYABLE REFLECTOR
ANTENNA STABILIZER STRUTS (2)
ANNULAR FORWARD SPINNING THERMAL RADIATOR
FORWARD DESPUN THERMAL BARRIER
ANTENNA STABILIZER BIPODS (2)
ANTENNA SUPPORT BEAM
FEED ARRAY
BAPTA
DRUM MIRROR RADIATOR
FORWARD SOLAR PANEL
AFT THERMAL BARRIER
AFT SOLAR PANEL
ANTENNA POSITIONER MECHANISM
AUXILIARY DESPUN SHELF
DESPUN EQUIPMENT T-SHELF
SPINNING EQUIPMENT SHELF
LAUNCH LOCKS (4)
RCS TANKS (4)
CENTRAL THRUST CONE
SOLAR DRUM POSITIONER (3)
AKM NOZZLE
SOLAR DRUM POSITIONER RACK (3)

A N I K C




STS-7/Anik C2 Mission Scenario

# PALAPA-B

The Indonesian national telecommunications satellite, Palapa-B, will be ejected from Challenger on the second day of the STS-7 mission. Palapa-B is the first in a new series of communication satellites.

These new satellites are more than twice as large and four times more powerful than the previous Palapa-A series, which enabled Indonesia to first link its many islands by space age communications.

Palapa will operate on C-band (6/4 GHz) and will have 24 transponders compared to 12 on the A series. Palapa-B's transponders will have 10-watt power outputs compared to 5 in use now. These improvements will increase capability coverage to small rural terminals in remote locations.

The Palapa-B satellites will provide improved quality and efficiency to voice, video, telephone, telegraph and high speed data transmissions.

The new satellite will have outer cylindrical sleeves which, along with folding antennas, deploy in space. The vehicle's cylindrical body and extensions are covered with solar cells. With a height of 2.73 m (9 ft.) stowed, a diameter of 2.16 m (7 ft.) and an orbit weight of 630 kg (1,400 lb.), Palapa will have an eight-year mission in space.

Palapa-B will serve Indonesia and ASEAN (the Association of Southeast Asia Nations) which includes the Philippines, Thailand, Malaysia, Singapore and Papua, New Guinea.

Similar in design to the SBS and Anik-C satellites, Palapa will provide 24 channels of C-band service. Built by Hughes Communications International, Inc., the name Palapa signifies Indonesian national unity and commemorates the unification of the nation by advanced satellite communications.

# PALAPA-B STATISTICS

**Spacecraft Statistics (with antennas deployed)**

Height: 6.83 m (22.4 ft.)

Diameter: 2.16 m (7 ft.)

Weight:

Liftoff (STS Payload with Perigee Stage): 4,366 kg (9,625 lb.)
In orbit: Beginning of Life (BOL) - 630 kg (1,400 lb.) End of Life (EOL) - 515 kg (1,135 lb.)

Orbit:

Stationary Geosynchronous
On-station locations - 108, E to 118, E longitude

**Communications Payload**

Frequency Range - C-Band (4/6 GHz)

Antenna - Dual aperture, 1.83 m diameter vertical and horizontal linear polarization

Repeater - 24 operational channels, 10 W output per channel (34 dbw minimum ERP over Indonesia)
5 for 4 traveling wave tube amplifier redundancy

**Control System**

Redundant hydrazine; minimum eight years station-keeping capability

**Power System**

Dual solar drum array, extendible; maximum power (BOL) 100 w. Redundant nickel cadmium batteries.

## STS-7 EXPERIMENTS

### SHUTTLE PALLET SATELLITE

The Shuttle Pallet Satellite (SPAS) is a reusable platform built by the German aerospace firm Messerschmitt-Bolkow-Blohm {MBB) that Challenger will deploy in space and retrieve after approximately 9 1/2 hours of free flight, and bring it back to earth. The satellite is designed to operate-either inside or outside the orbiter's cargo bay.

MBB built the versatile platform to demonstrate how space flights can be used for private enterprise purposes. Customers will be able to fly their experiments into space on the satellite for a fee. The West German Federal Ministry of Research and Technology (BMFT) is supporting the SPAS-01 pilot project and has contributed substantially to the funding.

Six scientific experiments from BMFT, the primary customer, and two from the European Space Agency (ESA) will be the first European passengers. NASA is the third user with three experiments and several cameras onboard.

NASA is carrying the SPAS on STS-7 as part of an agreement with MBB. The agreement provides that, in return for MBB's equipping the SPAS-01 for use in testing the deployment and retrieval capabilities of the Remote Manipulator Arm, NASA will substantially reduce the launching charge for SPAS-O1.

Operations associated with the SPAS will consist of two major Phases.

Several objectives are planned with the SPAS in the Sortie mode (in the cargo bay). It will demonstrate the system performance of the versatile satellite, and serve as a mounted platform for operation of scientific experiments while remaining in Challenger's cargo bay. Seven scientific experiments, furnished by BMFT and ESA, will be turned on during the third day of the flight and will run continuously for about 24 hours.

In the Free-flyer mode (outside of the cargo bay), the SPAS will be used as a test article to demonstrate the orbiter's capability to deploy and retrieve satellites in low earth orbit, and to validate MBB's concept for the SPAS. During the free-flight phase of the mission, two German and three NASA experiments will be operated for limited periods of time.

Five hours of detached activities, related to testing of the arm, plume disturbance, STS proximity operations and rendezvous are planned. spread over a period of about 9.5 hours.

Free-flight activities will begin with the release of the SPAS on flight day four about 93 hours and 7 minutes into the flight. A series of plume disturbance tests, performed by firing various orbiter primary Reaction Control System thrusters in the direction of the SPAS from 10.7 to 61 m (35 to 200 ft.) away, will be conducted at the start of the proximity operations. Angular accelerometers on the detached SPAS will measure and record rates induced by the orbiter thrusters.

Next, the orbiter will perform a variety of stationkeeping activities from both short and long distances, up to 304.8 m (1,000 ft.), away from the free-flying pallet.

Finally, a series of Remote Manipulator tests will be performed with the astronauts releasing and capturing the SPAS with the robot arm. Free-flying activities with the SPAS will conclude about 120 hours, 30 minutes into the mission, when the arm grapples the pallet and pulls it back into the payload bay for return to earth.

The SPAS-01 configuration, with experiments, will be 4.8 m (15.7 ft.) across, 3.4 m (11 ft.) high and 1.5 m (4.9 ft.) wide and weigh 2,278 kg (5,022 lb.). Subsystems are of modular design, such as power supply, data processing and attitude stabilization, and it is equipped with interchangeable mounting panels for subsystems and experiments. The orbiter provides the power and data interfaces via hardware in the attached mode. Communications with the SPAS in the free-flyer mode is by Reactor F. The pallet is non-active during ascent and descent. It has a 40-hour free-flying lifetime; 9.5 hours of that at full operational power.

NASA has equipped the SPAS with a Hasselblad still camera, a 16 mm motion picture camera and a color/black and white video camera to record the deployment and retrieval operations. These cameras will enable NASA to record for the first time the operational capabilities of the orbiter from a platform outside the vehicle's cargo bay. The television pictures are scheduled to be transmitted live to earth.

## OSTA-2 PAYLOAD

The OSTA-2 payload, which will be aboard STS-7, is comprised of four instrument packages containing six experiments. It will be the first in a series of planned orbital investigations of materials processing in space.

The payload, managed by the Marshall Space Flight Center, is among the first cooperative international research projects to be conducted on the Space Shuttle. The materials processing mission was developed by NASA and the Federal Republic of Germany. It is sponsored by NASA's Office of Space Science and Applications, and named for the acronym of that office's predecessor organization, the Office of Space and Terrestrial Applications.

The payload is located in the Shuttle orbiter cargo bay and consists of the Materials Experiment Assembly (MEA), developed and managed by the Marshall Center, and the Materialwissenschaftliche Autonome Experimente unter Schwerelosigkeit (MAUS), developed by the German Ministry for Research and Technology.

### Materials Experiment Assembly

The MEA is a desk-sized, self-contained package designed to accommodate a range of materials processing experiments. It provides subsystems to record experiment data and provide thermal control, power distribution and structural support for the experiments. The top of the rectangular package is a passive thermal radiator attached by a hinge to allow access to the experiments and subsystems.

The primary objective of this flight is to verify the MEA flight hardware for future space operations. Obtaining qualitative and quantitative science data is the secondary objective.

The principal advantage of the automated materials experiment assembly package is its ability to accommodate a large variety of experiments while requiring a minimum amount of attention by the orbiter crew.

Experiment payload on/off command switches to be activated by the astronaut crew are located in the orbiter aft flight deck.

For the STS-7 flight, the MEA package will carry two experiment furnaces and an acoustic levitator, each contained inside individual experiment containers. The experiments are: Vapor Growth of Alloy-type Semiconductor Crystals, Liquid Phase Miscibility Gap Materials, and Containerless Processing of Glass Forming Melts.

A brief description of the objectives of each of the MEA experiments follows:

<u>Vapor Growth of Alloy-type Semiconductor Crystals</u>: The objective of this experiment is to grow crystals of alloy semiconductors (electronic materials) and to provide data for a better understanding of the fluid dynamics of vapor transport systems in space. Vapor transport is a process used in growing crystals at low temperatures.

To conduct the experiment, a substance (germanium selenide) is placed in a sealed glass tube. Both ends of the tube are heated at different temperatures. In a process similar to fog condensing to form ice crystals on a cold day, the substance turns into a vapor when heated and moves to the cooler end of the tube where it crystallizes - thus vapor transport.

Practical benefits and applications that could result from this type of research include improved semiconductor technology for the electronics industry.

The Principal Investigator for the experiment is Dr. Herbert Wiedemeier of Rensselaer Polytechnic Institute, Troy, N. Y. Co-investigators are Dr. E.A. Irene Of IBM and Dr. C.C. Wang of RCA.

Experiment hardware was developed in the Marshall Center's Space Science Laboratory and Test Laboratory.

Liquid Phase Miscibility Gap Materials: This experiment will produce space-formed alloys difficult to obtain on earth for analysis of their physical, chemical, and electrical properties.

The experiment process is analogous to mixing water and oil on earth. Even though the liquids mix initially, over a period of time they separate due to gravity, convection and other influences. In space, however, two liquid metals can be heated, mixed, and cooled down to produce a new solid metal alloy containing the qualities of both materials.

Improving the understanding of the structural, electrical, and magnetic properties of such materials is among the potential benefits of this experiment. The data will be used in the study of metallurgy.

The Principal Investigator is Dr. S.H. Gelles of S.H. Gelles Associates. Co-investigator is Dr. A.J. Markworth of Battelle Columbus Laboratory.

Experiment hardware was developed in Marshall's Space Science Laboratory.

Containerless Processing of Glass Forming Melts: The objective of this experiment is to gain further knowledge of high-temperature, containerless processing of various compositions of glass-forming substances. The experiment is designed to eliminate impurities and flaws in the space-made glass samples and to produce glass from substances that do not form glass on earth.

The experiment utilizes acoustic levitation; that is, suspending the sample in a sound wave to melt and purify a specimen. The sample is then cooled and collected.

Possible applications of this experiment include improvements in glass technology.

Principal Investigator for the experiment is Dr. Delbert E. Day of the University of Missouri-Rolla.

The acoustic levitator for the experiment was developed by Intersonics Inc., Northbrook, Ill.

**MAUS**

Materialwissenschaftliche Autonome Experimente unter Schwerelosigkeit consists of experiments contained in three "Getaway Special" (GAS) canisters. Each cylindrical canister carries an experiment furnace, which is thermally insulated and has its own service module containing experiment hardware, electrical power, experiment controls, data gathering and processing equipment, and general housekeeping sensors.

The MAUS experiments are: two Metallic Dispersions, and a Solidification Front experiment.

A brief description of the objectives of each of the MAUS experiments follows:

Stability of Metallic Dispersions: This experiment occupies two of the GAS canisters. It is designed to develop a technique for taking X-Ray photographs of the melting and solidification of metals.

The experiment configuration is identical in each canister, but the experiments have different heating and cooling cycles.

The photographs will be used to evaluate the physical processes (diffusion, convection, sedimentation) that occur in liquid metal alloys shortly before or during solidification.

The investigator for this experiment is Dr. Guenther H. Otto of DFVLR Institut fur Raumsimulation.

Solidification Front: This experiment, using a general purpose rocket furnace, is designed to help determine particle movement during the melting and solidification of metal alloys.

This knowledge is of value in the fabrication of composite materials.

The principal investigator of this experiment is Dr. Hermann Klein of DFVLR Institut fur Raumsimulation. Co-investigators are Dr. Axel Bewersdorff, DFVLR Institut fur Raumsimulation; Dr.-Ing. Jurgen Potschke of Krupp Forschungdindtitut, Essen, and Dr. Hans U. Walter of DFVLR Institut fur Werkstoff-Forschung.

## MISSION PECULIAR EQUIPMENT SUPPORT STRUCTURE

The OSTA-2 payload is being carried in the cargo bay on a specially designed Mission Peculiar Equipment Support Structure (MPESS), developed by the Marshall Center. In addition to providing mechanical support for the OSTA-2 payload, the MPESS elevates the MEA package to a height above the level of the cargo bay so that the MEA thermal radiator can dissipate heat from the package into space when the cargo bay doors are open.

Beginning with the STS-12 mission, the designation of this series of materials processing flights will be changed from OSTA to Materials Science Laboratory (MSL) to more closely identify the payload designation with the science activity being conducted. There are five scheduled MSL flights.

## MONODISPERSE LATEX REACTOR EXPERIMENT

A materials processing experiment designed to develop large, identical-sized (monodisperse) latex particles, is making its last scheduled voyage into space on the seventh Shuttle flight.

The Monodisperse Latex Reactor, which was operated in space on three previous Shuttle missions, was developed at NASA's Marshall Space Flight Center, and Lehigh University, Bethlehem, Pa.

The experiment package, which is placed in the Shuttle orbiter crew compartment locker area, consists of four, .3-m (1-ft.) tall reactors, each containing a chemical latex-forming recipe, housed in a .6 m (2-ft.) high metal cylinder. The recipe consists of tiny latex beads suspended in water with other chemical ingredients that cause the beads to "grow" larger when the experiment is activated on orbit.

The experiment worked perfectly on its first mission in space on STS-3, producing latex particles of five-microns in diameter. Because of a hardware malfunction during the STS-4 flight, only 55 percent of the chemical process was completed.

Engineers identified the malfunction and made modifications to prevent a similar incident. The experiment produced large quantities of 10-micron-sized latex particles during the STS-6 mission and is expected to produce particles in the 20-micron range on this flight.

In space, because of the absence of the effects of gravity, a higher degree of monodispersity can be achieved in the larger sizes. The experiment series was designed to help determine whether much larger (perhaps as large as 40 microns) monodisperse beads can be produced practically and economically in space.

These latex particles may have major medical and industrial research applications. Some possible applications for the latex beads include measuring the size of pores in the wall of the human intestine, in cancer research; measuring the size of pores in the human eye, in glaucoma research; and measuring blood flow in humans. in heart and cancer research.

The National Bureau of Standards has also indicated its interest in using the beads as calibration standards in medical and scientific equipment.

Prior to launch, each of the reactors is loaded with 100 cc of the chemical latex-forming recipe. A small onboard computer will control the experiment after the Shuttle crew turns it on.

In orbit, the latex mixture is heated to a constant 70 degrees Centigrade (158 degrees Fahrenheit), which initiates a chemical reaction to form the larger plastic beads. A recorder will store all data produced during operation of the experiment. After 20 hours, the experiment turns itself off.

The reactor will be removed from the Shuttle at the landing site and returned to the experimenters for sample and data analysis.

The principal investigator on the experiment is Dr. John W. Vanderhoff of Lehigh University. The three co-investigators are Drs. Fortunato J. Micale and Mohamed S. El-Aasser, also of Lehigh, and Dale M. Kornfeld of Marshall.

Responsibility for providing the experiment elements and hardware as well as flight-testing the experiment lies with Marshall's Spacelab Payload Project Office, supported by the its Space Science Laboratory. Marshall's Spacelab Payload Project Office is also responsible for experiment safety and ensuring that the experiment can be conducted properly on the Shuttle flights.

Design support for the experiment was provided by General Electric Co. Valley Forge, Pa., and Rockwell International, Downey, Calif.

During the mission, members of the investigative team will monitor the performance of the experiment hardware from a specially equipped room at the Huntsville Operations Support Center at the Marshall Center.

## CONTINUOUS FLOW ELECTROPHORESIS SYSTEM

The Continuous Flow Electrophoresis System (CFES), a pharmaceutical refining device developed by the McDonnell Douglas Astronautics Co., St. Louis, Mo., and operated by NASA aboard the Space Shuttle, makes its third trip into space on STS-7.

On this flight, scientists in the Space Science Laboratory at the Marshall Space Flight Center, Huntsville, Ala., will be using the electrophoresis device for the second time to continue NASA's research in the field of fluid separation science. The NASA use of the device is provided under terms of the NASA-McDonnell Douglas Joint Endeavor agreement.

According to McDonnell Douglas, a cell culture fluid that has commercial potential will be separated on this flight as the company enters into the development stage of its venture.

The electrophoresis system, the first commercial experiment flown aboard the Space Shuttle, is designed to separate biological materials according to their surface electrical charge as they pass through an electric field.

Initially carried into space on the fourth Shuttle mission, the experiment device has the potential for separating biological materials for both research and the production of pharmaceuticals. Unlike previous electrophoresis experiments conducted in space on the APOLLO-SOYUZ Test Project and on STS-3, this device processes large quantities of materials carried in a continuous stream.

Biological materials are inserted into the bottom of the experiment chamber which is filled with a conducting fluid. The separation occurs as the samples move through the chamber's electric field. The samples then flow into collection ports at the top of the chamber.

NASA first used the electrophoresis system on STS-6 to separate a sample containing only hemoglobin and a second sample containing a mixture of hemoglobin and polysaccharide (a complex sugar). The separations were designed to expand the understanding of the electrophoretic separation process and the effects Of gravity On this process. The hemoglobin sample, at 10 times the concentration that can be processed in an earth-based laboratory, was designed to explore the concentration limits of electrophoresis in space. Although the results from the experiment are still being analyzed, scientists did note some unexpected broadening of the sample flow.

The sample of a mixture of hemoglobin and a polysaccharide was separated to determine the quality of separations in a space-based electrophoresis device. The sample, with a lower concentration of hemoglobin, provided data showing a good separation of the biological materials.

On this flight, scientists will use polystyrene latex particles to further investigate the concentration limitations of continuous flow electrophoresis in space and to calibrate the experiment hardware.

The NASA experiments are carried out under the direction of Dr. Robert Snyder, chief of the Separation Processes Branch in the Marshall's Space Science Laboratory.

NASA's use of the system for its own research is part of the consideration provided to the space agency under the terms of the NASA/McDonnell Douglas Joint Endeavor Agreement.

This agreement provides a vehicle for private enterprise and NASA to work together to promote the utilization of space where a technological advancement is needed and there is a potential commercial application. The agreement also provides that general performance data and the results from NASA's experiments using the device will be made public. The Commercial Materials Processing in Low Gravity Office at Marshall manages NASA's effort under the joint endeavor agreement.

On STS-4 and STS-6, McDonnell Douglas separated samples of rat and egg albumin and a cell culture fluid.

During the next two years, the 240-kg (550-lb.), 18-m (6-ft.)-high electrophoresis device is scheduled to be flown three more times in the middeck section of the Space Shuttle to identify materials that might be candidates for commercial development. Provided these experimental operations prove successful, the next step would be for a 2,270-kg (5,000-lb.) prototype production unit to be carried in the cargo bay on two future Shuttle flights. This fully automated system will have 24 times the capacity of the present unit.

After completion of work under the joint endeavor, it is expected that McDonnell Douglas will develop a system to carry out production of pharmaceuticals on a long-duration orbital facility. The orbital-based unit would be designed to operate, unattended, for periods of up to six months and be serviced by Space Shuttle crews who would deliver raw materials and collect the separated products for return to earth.

**GETAWAY SPECIAL (GAS) EXPERIMENTS**

Seven Getaway Special (GAS) canisters will be flown on the STS-7 Space Shuttle mission, the largest number yet to be carried into space in one orbiter.

The seven canisters, containing 22 different experiments, bring to 12 the number of GAS payloads carried aboard Challenger and Columbia. One payload was on Columbia's STS-4 and STS-5 flights, and three were on Challenger's maiden flight, STS-6.

Six of the payloads require active participation by the crew, while a Goddard Space Flight Center-developed canister will be turned on by a barometric switch, making it truly a "self-contained payload." Six payloads will be attached to the port (left) sill of the Challenger's cargo bay, and one to the starboard (right) sill.

The seven payloads represent the inherent diversity of the GAS community. They have been conceived, designed and built by people who range from high school to college students and teachers as well as engineers, and technicians from small business and large corporations.

One payload is a result of the combined energies of five college students, one high school student, and an experienced West German industrial firm. The other six payloads are from the United States. Two are from U.S. Government civilian and military agencies.

While preparing these seven payloads for the STS-7 missions, the Getaway Special team has inaugurated a new facility dedicated to the preparation of GAS payloads. The facility is located in the old Delta third-stage facility on the Cape Canaveral Air Force Station.

The seven payloads on STS-7 include:

* A series of five experiments selected in a nationwide competition among high school students in West Germany, sponsored by KayserThrede, a small aerospace company, and Jugend Forscht, a non-profit organization that organized the competition. The GAS canister is .14 cu. m (5 cu. ft.) with a 90.7 kg (200-lb.) capacity, costing $10,000.

The five experiments in the West German payload include a crystal growth experiment (Michael Pascherat, 22); nickel catalysts (Herbert Riepl, 21); plant contamination by heavy metals (Heinz Katzenmeier, 19); Biostack, designed to determine the influence of cosmic radiation on plant seeds (Marcus Buchwald, 17); and a microprocessor-controlled sequencer as a new approach to payload control (Gunnar Possekel, 24).

* Three experiments from Purdue University. This canister is .074 cu. m (2.5 cu. ft.) with a 45.4 kg (100-lb.) capacity, costing $5,000.

The Purdue University experiments will be in space science, biological science, and fluid dynamics. Dr. Harold Ritchey, an alumnus and long-time benefactor of the university, donated the payload for use by Purdue. The program to develop the payload was established within the School of Science. The space science experiment is to detect nuclear particles that may be encountered in the near-earth environment and to record their subsequent paths as they penetrate a stack of sensitive plastic sheets. The biological science experiment will have sunflower seeds flown to orbit and allowed to germinate in a low-gravity environment for a period of 72 hours. The fluid dynamics experiment will study the motion in a very low gravity Of a drop of mercury immersed in a clear liquid.

* Two experiments by the California Institute of Technology. Canister is .14 cu. m (5 cu. ft.), 90.7 kg (200-lb) capacity, costing $10,000.

The two experiments by the California Institute of Technology will test how newly-sprouted radish seeds respond when they are subjected to simulated gravity conditions ranging from l/10,000th to l/32nd those on earth in one and, in the second, oil and water will be mixed and photographed over a 96-hour period to see how they separate. The results of the latter investigation will allow predictions to be made about the possibilities of manufacturing materials such as improved metal alloys and semi-conductors in zero gravity.

* Observation of a live ant colony by students from Camden and Wilson High Schools in Camden, N.J., sponsored by RCA Corp. Canister is .14 cu. m (5 cu. ft.), 90.7 kg (200-lb.) capacity, costing $10 ,000 .

In the ant colony experiment, the ants will be housed in a special farm and placed in the GAS canister, along with TV and movie cameras, to see whether weightlessness affects the colony's social structure. Sponsored by the RCA Corp., which also supplied technical guidance, the experiment is designed to provide data useful to the humans who may colonize space some day.

* Nine experiments on soldering and desoldering in space by Edsyn, Inc., an engineering firm in Van Nuys, Calif. Canister is .14 cu. m (2.5 cu. ft.) with a 27.2 kg (60-lb.) capacity, costing $3,000.

The soldering/desoldering experiments will investigate those processes in a space environment, looking to the day of space stations when repair techniques will be necessary to maintain highly sophisticated electronic equipment and payloads. The nine experiments include flux behavior, to determine the best flux to be used in space; wetting and surface tension I, in which four wires will be connected to a heating element and bent in a manner that will allow solder to flow across; wetting and surface tension II, to determine the solder wetting and surface tension characteristics that relate to the ability of solder to bridge gaps; metallurgical properties, designed to remelt solder in eyelet and twisted pairs for later cross-sectioning and analysis; desoldering I, to determine if contamination resulting from the use of conventional solder and desoldering tools can be controlled by surface tension/wicking; desoldering II, to determine if solder can be removed from a printed circuit board hole by use of air pressure; general contamination, to determine if basic operation of a soldering tool in space will produce any significant contamination; solder removal, to determine if an integrated circuit can be removed with a multiple head desoldering tool that applies heat then absorbs solder into a braid mesh and for each solder hole in a circuit board; and static, to determine if basic solder tools can be used in space without the requirement of remaining pressurized as they are transported from one spacecraft to another or, if personnel must repair a satellite in space, when the repair must be made outside a repair shop environment.

* An experiment by the NASA Goddard Space Flight Center to measure the effect of the Shuttle bay environment on ultraviolet sensitive film. Canister is .14 cu. m (5 cu. ft.) with a 90.7 kg (200-lb.) capacity.

In the experiment to analyze the Shuttle-induced effects on EUV-sensitive film, being conducted by Dr. Werner Neupert of NASA's Goddard Space Flight Center, 12 stainless steel canisters, each containing unexposed strips Of film will be flown. Seven canisters will be located inside a large stainless steel cylinder which is initially sealed off from the outside environment by means of a motor-driven valve located between the central purge port Of the GAS cover and the large stainless steel cylinder.

* A payload by the U.S. Air Force Space Division's Space Test Program/ Naval Research Laboratory, which will be the first to use the motorized door assembly on a GAS canister. Canister is .14 cu. m (5 cu ft.) with a 90.7 kg (200-lb.) capacity.

Initially, each of the seven cylinders is open to the interior of the large container. After the experiment timer opens the large container valve, the valves of the individual film canisters are closed at various intervals SO film strips are exposed to the Shuttle bay environment for varying periods of time. One canister within the large container remains sealed throughout the flight as a control unit. Five canisters mounted on the Outside of the large container will be used for a variety of film tests. The U.S. Air Force Space Division’s Space Test Program/Naval Research Laboratory experiment will be the first to use the motorized door assembly on the GAS canister, which will allow the door to be opened.

**ORBITER EXPERIMENTS PROGRAM**

The NASA Headquarters Office of Aeronautics and Space Technology, through its Orbiter Experiments Program, is providing experiments onboard the Shuttle orbiter to record specific, research-quality data. The primary objective is to increase the technology reservoir for development of future space transportation systems.

STS-7 Orbiter Experiments include:

**Aerodynamic Coefficient Identification Package:**

* To collect aerodynamic data during the launch, entry, and landing phases of the Shuttle;

* To establish an extensive data base for verification of the Shuttle's aerodynamic performance and the verification and correlation with ground-based data, including assessments of the uncertainties of such data;

* To provide flight dynamics data in support of other technology areas, such as aerothermal and structure dynamics.

This package has flown on STS-1 through 6. Principal technologists is Doug Cooke of the Johnson Space Center.

**High Resolution Accelerometer Package:**

The High Resolution Accelerometer Package measures changes in vehicle accelerations caused by aerodynamic forces acting on the Shuttle orbiter during the high altitude portion of atmospheric reentry (above 45 mi./73 km). The triaxial accelerometer package is 100 times more sensitive than accelerometer packages previously flown on the Shuttle.

These measurements will aid in the design of aeroassist orbit transfer vehicles (OTV), which will carry payloads from the low-earth orbit to geosynchronous orbit and return for reuse. On its return trip, the OTV will briefly dip into the earth's upper atmosphere for aerodynamic braking and maneuvering before rendezvousing with the Shuttle or a space station.

Principal technologist is Robert C. Blanchard of NASA's Langley Research Center., Hampton, Va.

# SPACEFLIGHT TRACKING AND DATA NETWORK

One of the key elements in the Shuttle mission is the capability to track the spacecraft, communicate with the astronauts and obtain the telemetry data that informs ground controllers of the condition of the spacecraft and the crew.

The hub of this network is NASA's Goddard Space Flight Center (GSFC) in Greenbelt, Md., where the Spaceflight Tracking and Data Network (STDN) and the NASA Communications Network (NASCOM) are located.

STDN is a complex NASA worldwide system that provides real-time communications with the Space Shuttle orbiter and crew, as well as with other earth-orbiting satellites. The network is managed and operated by Goddard. Approximately 2,500 people are required to operate the system.

The network consists of 15 ground stations equipped with 4.3-, 9-, 12-, and 26-m (14-, 30-, 40- and 85-ft.) S-band antenna systems and C-band radar systems, augmented by 15 DOD geographical locations providing C-band support and one DOD 18.3-m (60-ft.) S-band antenna system.

In addition, there are six major computing interfaces located at the Network Operations Control Center and the Operations Support Computing Facility, at Goddard; Western Space and Missile Center, Calif.; Air Force Satellite Control Facility, Colo.; White Sands Missile Range, N.M.; and Eastern Space and Missile Center, Fla., providing real-time network computational support.

The network has agreements with the governments of Australia, Spain, Senegal, Botswana, Chile, United Kingdom and Bermuda to provide NASA tracking station support to the Space Transportation System program.

Should the Johnson Mission Control Center be seriously impaired for an extended period of time, the Goddard Network Operations Control Center becomes an emergency mission center manned by Johnson personnel with the responsibility of safely returning the orbiter to a landing site.

The Merritt Island, Fla. S-band station provides the appropriate data to the Launch Control Center at Kennedy and the Johnson Mission Control Center during prelaunch testing and the terminal countdown. During the first minutes of launch and during the ascent phase, the Merritt Island and Ponce de Leon, Fla., S-band and Bermuda S-band stations, as well as the C-band stations located at Bermuda; Wallops Island, Va.; Grand Bahama; Grand Turk; Antigua; Cape Canaveral and Patrick Air Force Base, Fla., provide appropriate tracking data, both high speed and low speed, to the Kennedy and Johnson control centers.

During the orbital phase, all the S-band and some of the C-band stations that see the Space Shuttle at three degrees above the horizon support and provide appropriate tracking, telemetry, air-ground and command support to the Mission Control Center. at Johnson through Goddard.

During nominal entry and landing phase planned for Runway 15 at Kennedy Space Center, Fla., C-band stations at San Nicholas Island, off the California coast; Vandenberg Air Force Base; White Sands, N.M.; Stallion Station, Ariz.; Scotts Peak, Ariz.; and Mt. Lemmon, Ariz., will provide highly critical tracking data on the orbiter before it comes into view of the Eastern Test Range (ETR) C-band radars at Merritt Island and Patrick Air Force Base, Fla., and the GSFC Merritt Island S-band station will provide highly critical telemetry, command and air-ground support as well as tracking data to the Johnson and Kennedy Control Centers.

## NASA TRACKING STATIONS

| Location | Equipment |
|---|---|
| Ascension Island (ACN) | S-band, UHF A/G |
| Bermuda (BDA) | S-band, C-band, UHF A/G |
| Buckhorn (BUC) | S-band, C-band |
| Goldstone (GDS) | S-band, UHF A/G |
| Guam (GWM) | S-band, UHF A/G |
| Hawaii (HAW) | S-band, UHF A/G |
| Merritt Island (MIL) | S-band, UHF A/G |
| Santiago (AGO) | S-band |
| Ponce de Leon (PDL) | S-band |
| Madrid (MAD) | S-band, UHF A/G |
| Orroral (ORR) | S-band |
| Botswana (BOT) | UHF A/G |
| Dakar (DKR) | UHF A/G |
| Wallops (WFF) | C-band |
| Yarragadee (YAR) | UHF A/G |

Personnel:

Tracking Stations: 1,100*
Goddard Space Flight Center: 1,400

* more than 500 of whom are local residents

# HUNTSVILLE OPERATIONS SUPPORT CENTER

The Huntsville Operations Support Center is a facility at the Marshall Space Flight Center in Huntsville, Ala., which supports launch activities at the Kennedy Space Center, Fla. The operations center also supports powered flight and payload operations at the Johnson Space Center, Houston.

During pre-mission testing, countdown, launch, and powered flight toward orbit, Marshall and contractor engineers and scientists man consoles in the support center to monitor real-time data being transmitted from the Shuttle.

Their purpose is to evaluate and help solve problems that might occur with Marshall-developed Space Shuttle propulsion system elements, including the Space Shuttle main engines, external tank, and solid rocket boosters. They will also work problems with the overall Main Propulsion System and the Range Safety System.

The data providing information on the "health" of these systems are gathered by sensors aboard the Shuttle and are instantaneously transmitted from the launch site to the two-story Huntsville Operations Support Center.

There the information is processed by computers and displayed on screens and other instruments at l2 stations in the Engineering Console Room on the second floor. More than-3,000 temperature, pressure, electrical voltage and other measurements are made every second. During the 10 hours of peak activity before and during launch, more than 11 million measurements are assessed by teams of experts in the support center.

Support center personnel view the Shuttle via two closed circuit television lines. They also have access to more than 25 direct communications lines that link them with the launch site at Kennedy Space Center, Mission Control at Johnson Space Center, and with Shuttle propulsion system contractor plants.

If a problem is detected by the experts at one of the stations in the support center console room, engineers on the consoles immediately alert appropriate individuals at the Kennedy and Johnson centers, and operations center managers in the Shuttle action center, a conference room adjacent to the console room. They also pass the information to the appropriate teams of specialists in the operations center working area nearby. There are separate teams to work Space Shuttle Main Engine, External Tank, Solid Rocket Booster, Main Propulsion System, and Range Safety System difficulties.

In addition to launch support, payload services are provided by teams of scientists operating out of specially equipped payload support rooms.

## STS-7 CREWMEMBERS

*S83-29016 – The STS-7 crewmembers include bottom row left to right: Astronauts Sally K. Ride, mission specialist; Robert L. Crippen, crew commander; and Frederick H. Hauck, pilot. Standing from left to right: Mission specialists John M. Fabian and Norman E. Thagard. Behind them is a photo of the shuttle about to land.*



*PHOTO CREDIT: NASA or National Aeronautics and Space Administration.*

# BIOGRAPHICAL DATA

NAME: Robert L. Crippen (Captain, USN), NASA Astronaut. STS-7 Commander

BIRTHPLACE AND DATE: Born in Beaumont, Texas, on Sept. 11, 1937. He grew up in Porter, Texas.

PHYSICAL DESCRIPTION: Brown hair; brown eyes; height: 5 ft., 10 in.; weight: 160 lb.

EDUCATION: Graduated from New Caney High School in New Caney, Texas; received a bachelor of science degree in aerospace engineering from the University of Texas in 1960.

MARITAL STATUS: Married to the former Virginia E. Hill. Her parents, Mr. and Mrs. James D. Hill, reside in Corpus Christi, Texas.

CHILDREN: Ellen Marie, June 14, 1962; Susan Lynn, Dec. 24, 1964; Linda Ruth, May 10, 1967.

NASA EXPERIENCE: Crippen became a NASA astronaut in September 1969. He was a crew member on the highly successful Skylab Medical Experiments Altitude Test (SMEAT) -- a 56-day simulation of the Skylab mission, enabling crewmen to collect medical experiments, baseline data and evaluate equipment, operations, and procedures.

Crippen was a member of the astronaut support crew for the Skylab 2, 3, and 4 missions, and he served in this same capacity for the Apollo-Soyuz Test Project (ASTP) mission which was completed successfully in July 1975.

Crippen completed his first space flight as pilot of STS-1, the first orbital test flight of the Shuttle Columbia, April 12-14, 1981. He was accompanied by John W. Young, spacecraft commander, on this 54-1/2 hour 36 orbit engineering test flight to evaluate and verify Shuttle systems performance during launch, on-orbit, and landing operations. STS-1 achieved a nominal 270 km (146 nm) circular orbit. Tests included evaluation of orbiter hardware and software systems, investigation of the orbiter thermal response while in orbit, evaluation of orbiter attitude and maneuvering thruster systems and guidance navigation system performance, and evaluation of orbiter crew compatibility. Columbia was the first true manned spaceship. It was the first manned vehicle to be flown into orbit without benefit of previous unmanned "orbital" testing; the first to launch with wings using solid rocket boosters.

It is also the first winged reentry vehicle to return to a conventional runway landing, weighing more than 99 tons as it was braked to a stop on the dry lakebed at Edwards Air Force Base, Calif.

CURRENT ASSIGNMENT: Captain Crippen is spacecraft commander for STS-7--a planned six-day mission of the orbiter Challenger; and is commander of STS-13, a five-day flight to deploy the Long Duration Exposure Facility (LDEF) and capture and repair the orbiting Solar Maximum satellite.

# BIOGRAPHICAL DATA

NAME: Frederick (Rick) H. Hauck (Captain, USN) NASA, astronaut, STS-7 Pilot

BIRTHPLACE AND DATE: Born April 11, but considers Winchester, Mass., his hometowns. His mother, Mrs. Winchester, Mass. His father was Hauck, USN.

1941, in Long Beach, Calif., and Washington, D.C., to be Virginia Hauck, resides in the late Captain Philip F.

PHYSICAL DESCRIPTION: Blond hair; blue eyes; height: 5 ft., 9 in.; weight: 175 lb.

EDUCATION: Graduated from St. Albans High School in Washington, D.C., in 1958; received a bachelor of science degree in physics from Tufts University in 1962 and a master of science degree in nuclear engineering from Massachusetts Institute of Technology in 1966.

MARITAL STATUS: Married to the former Dolly Bowman of Washington, D.C. Her father, Joseph E. Bowman, resides in Silver Spring, Md.

CHILDREN: Whitney Irene, March 6, 1963; Stephen Christopher, Dec. 17. 1964.

NASA EXPERIENCE: Captain Hauck was selected as an astronaut candidate by NASA in January 1978. In August 1979, he completed a One-year training and evaluation period making him eligible for assignment as a pilot on future Space Shuttle flight crews. He was a member of the support crew for STS-1, the first shuttle orbiter mission, and was the reentry capsule communicator (CAPCOM) on the support crew for STS-2.

CURRENT ASSIGNMENT: Hauck has been selected to serve as pilot for STS-7--a planned six-day flight in the orbiter Challenger.

# BIOGRAPHICAL DATA

NAME: John M. Fabian (Colonel, USAF) NASA astronaut. STS-7 Mission Specialist (MS-1)

BIRTHPLACE AND DATE: Born Jan. 28, 1939, in Goosecreek, Texas, but considers Pullman, Wash. to be his hometown. His parents, Dr. and Mrs. Felix M. Fabian, Sr., reside in Longview, Texas.

PHYSICAL DESCRIPTION: Brown hair; green eyes; height: 6 ft., 1 in.; weight: 175 lb.

EDUCATION: Graduated from Pullman High School, Pullman, Wash., in 1957; received a bachelor of science degree in mechanical engineering from Washington State University in 1962; a master of science in aerospace engineering from the Air Force Institute of Technology in 1964; and a doctorate in aeronautics and astronautics from the University of Washington in 1 974

MARITAL STATUS: Married to the former Donna Kay Buboltz of Spokane, Wash.; her parents, Mr. and Mrs. Ted Buboltz, are residents of Seattle.

CHILDREN: Michael K., Aug. 6, 1962; Amy L., Nov. 15, 1965.

NASA EXPERIENCE: Colonel Fabian was selected as an astronaut candidate by NASA in January 1978. In August 1979, he completed a one-year training and evaluation period making him eligible for assignment as a mission specialist on future Space Shuttle flight crews.

CURRENT ASSIGNMENT: Colonel Fabian has been selected to serve as a mission specialist for STS-7 -- a planned six-day flight of the orbiter Challenger.

## BIOGRAPHICAL DATA

NAME: Sally K. Ride, (PhD) NASA Astronaut, STS-7 Mission Specialist (MS-2)

BIRTHPLACE AND DATE: Born May 26, 1951, in Los Angeles, Calif., and considers Encino, Calif., to be her hometown. Her parents, Mr. and Mrs. Dale B. Ride, reside in Encino, Calif.

PHYSICAL DESCRIPTION: Brown hair; blue eyes; height: 5 ft., 5 in.; weight: 115 pounds.

EDUCATION: Graduated from Westlake High School, Los Angeles, in 1968; received from Stanford University a bachelor of science in physics and bachelor of arts in English in 1973, and master of science and doctorate degrees in physics in 1975 and 1978 respectively.

MARITAL STATUS: Married to Dr. Steven A. Hawley, an astronaut, of Ottawa, Kans. His parents, Dr. and Mrs. Bernard Hawley, reside in Salina, Kans.

NASA EXPERIENCE: Dr. Ride was selected as an astronaut candidate by NASA in January 1978. In August 1979, she completed a one-year training and evaluation period making her eligible for assignment as a mission specialist on future Space Shuttle flight crews. She subsequently performed as an on-orbit capsule communicator (CAPCOM) for the STS-2 and STS-3 missions.

CURRENT ASSIGNMENT: Dr. Ride has been selected to serve as a mission specialist for STS-7 -- a planned six-day flight of the orbiter Challenger.

# BIOGRAPHICAL DATA

NAME: Norman E. Thagard (M.D.) NASA Astronaut, STS-7 Mission Specialist (MS-3)

BIRTHPLACE AND DATE: Born July 3, 1943, in Marianna, Fla., but considers Jacksonville, Fla., to be his hometown. His father, James E. Thagard, is deceased; his mother, Mrs. Mary F. Nicholson, is a resident of St. Petersburg, Fla.

PHYSICAL DESCRIPTION: Brown hair; blue eyes; height: 5 ft., 9 in.; weight: 159 lb.

EDUCATION: Graduated from Paxon Senior High School, Jacksonville, Fla., in 1961; attended Florida State University where he received bachelor and master of science degrees in engineering science in 1965 and 1966, respectively, and subsequently performed pre-med coursework; received a doctor of medicine from the University of Texas Southwestern Medical School in 1977.

MARITAL STATUS: Married to the former Rex Kirby Johnson of Atlanta, Ga. Her mother, Mrs. Rex Johnson, resides in Dallas, Texas.

CHILDREN: Norman Gordon, May 15, 1968; James Robert, Nov. 29, 1970; Daniel Cary, Nov. 22, 1979.

NASA EXPERIENCE: Dr. Thagard was selected as an astronaut candidate by NASA in January 1978. In August 1979, he completed a one-year training and evaluation period, making him eligible for assignment as a mission specialist on future Space Shuttle flight crews.

CURRENT ASSIGNMENT: Dr. Thagard has been designated to serve as a mission specialist for STS-7--a planned six-day flight in the orbiter Challenger.

# SPACE SHUTTLE PROGRAM MANAGEMENT

## NASA HEADQUARTERS

| | |
|---|---|
| James M. Beggs | Administrator |
| Dr. Hans Mark | Deputy Administrator |
| Lt. Gen. James A. Abrahamson | Associate Administrator for Space Flight |
| Jesse W. Moore | Deputy Associate Administrator for Space Flight |
| Neil B. Hutchinson | Director, Space Shuttle Operations Office |
| Chester M. Lee | Director, Customer Services |
| Robert E. Smylie | Associate Administrator for Space Tracking and Data Systems |

## GODDARD SPACE FLIGHT CENTER

| | |
|---|---|
| Dr. Noel Hinners | Director |
| Gary A. Morse | Network Director |
| J. M. Stevens | Network Support Manager |
| James S. Barrowman | Project Manager, Getaway Special Program |

## JOHNSON SPACE CENTER

| | |
|---|---|
| Gerald D. Griffin | Director |
| Clifford E. Charlesworth | Deputy Director |
| Glynn S. Lunney | National Space Transportation Systems Program Office |

## KENNEDY SPACE CENTER

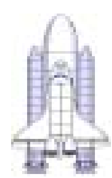
| | |
|---|---|
| Richard G. Smith | Director |
| George F. Page | Deputy Director |
| Thomas E. Utsman | Director, Shuttle Management and Operations |
| Thomas S. Walton | Director, Cargo Management and Operations |
| Alfred D. O'Hara | Director, Launch and Landing Operations |

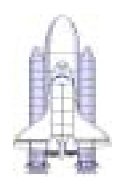
## MARSHALL SPACE FLIGHT CENTER

| | |
|---|---|
| Dr. William R. Lucas | Director |
| Robert E. Lindstrom | Manager, Shuttle Projects Office |

# SHUTTLE FLIGHTS AS OF JUNE 1983

**6 TOTAL FLIGHTS OF THE SHUTTLE SYSTEM**





| | |
|---|---|
| STS-5<br>11/11/82 - 11/16/82 | |
| STS-4<br>06/27/82 - 07/04/82 | |
| STS-3<br>03/22/82 - 03/30/82 | |
| STS-2<br>11/12/81 - 11/14/81 | |
| STS-1<br>04/12/81 - 04/14/81 | STS-6<br>04/04/83 - 04/09/83 |
| **OV-102**<br>**Columbia**<br>**(5 flights)** | **OV-099**<br>**Challenger**<br>**(1 flight)** |