

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SPACE SHUTTLE MISSION STS-8

PRESS KIT
AUGUST 1983



INSAT-1B DEPLOYMENT

STS-8 INSIGNIA

S83-30608 -- The night launch of Challenger heading toward its third Earth-orbital mission is featured in the official insignia for STS-8. The eight flight of the shuttle program is represented by eight stars of the constellation of Aquila, "The Eagle."

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.

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CONTACTS

David Garrett/Jim Kukowski
Headquarters, Washington, D.C.
(Phone: 202/755-3090)

Dick Young
Kennedy Space Center, Fla.
(Phone: 305/867-2468)

Terry White/Betty Johnson
Johnson Space Center, Houston, Texas
(Phone: 713/483-5111)

John Taylor
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/453-0031)

Ralph B. Jackson
Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/453-8381)

Jim Elliott
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/344-6256)

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NIGHT LAUNCH AND LANDING SET FOR STS-8

A spectacular pre-dawn liftoff from NASA's Kennedy Space Center, Fla., will herald the start of the eighth Space Shuttle mission. orbiter Challenger will conclude its five-day mission with the first ever landing in darkness at Edwards Air Force Base, Calif. The mission is scheduled to last five days, one hour and 29 minutes.

STS-8 will be commanded by Richard H. Truly, who was the pilot on the second Shuttle mission conducted in November 1981. Joining Truly will be pilot Daniel C. Brandenstein and three mission specialists: Dale A. Gardner, Dr. Guion S. Bluford Jr., who will become America's first black astronaut in space, and Dr. William E. Thornton .

Launch of STS-8 is scheduled for Aug. 30 at 2:15 a.m. EDT from Complex 39's Pad A. The launch opportunity on that day extends 34 minutes from 2:15 a.m. EDT until 2:49 a.m. EDT. Challenger will be launched into a circular 277.6-kilometer (172.5 statute mile) orbit with an inclination to the equator of 28.45 degrees .

Mission specialists Bluford and Gardner will deploy the Indian National Satellite, INSAT-1B, from Challenger's cargo bay on the second day of the mission. A Payload Assist Module (PAM) will boost the satellite to a geosynchronous transfer orbit.

Flight days three and four will involve operations with the Payload Flight Test Article (PFTA) using the Canadian-built Remote Manipulator System (RMS). The 3,855.6-kilogram (8,500-pound) test article (3,383.8-kg -- 7,460 lb. test weight in flight) will be used to evaluate the robot arm while handling its largest payload to date, and simulate procedures to be used on a future Shuttle mission. The test article will not be released from the arm during the flight.

Testing of the Tracking and Data Relay Satellite System (TDRSS) also will be conducted during the mission. If necessary the mission could be extended a day to allow for more extensive checkout of the TDRSS.

Experiments mounted on a U-shaped pallet fixed in the cargo bay will record the effects on various Shuttle materials of oxygen atoms which bombard the vehicle in orbit, and the first living cells will be separated on the fourth flight of the Continuous Flow Electrophoresis System (CFES).

Of the 12 Getaway Special (GAS) canisters that will fly inside Challenger's cargo bay, eight GAS cans will contain specially-stamped postal covers. Experiments contained in the other four canisters will study making snow in space, gather contamination data, record exposure levels from Challenger's cargo bay on ultraviolet sensitive film, and determine if high energy particles encountered in space can cause errors in memory-type integrated circuits.

A Shuttle Student Involvement Project to evaluate whether or not biofeedback training learned on earth can be successfully implemented in the zero gravity of space will also be conducted on this mission.

Six rats will be carried aboard the orbiter in a specially designed cage, called the Animal Enclosure Module (AEM).

Thornton will conduct medical tests to collect additional data on several physiological changes that are associated with the space adaptation syndrome.

Challenger is scheduled to end its 5-day, 1-hour, 29-minute flight with a landing at approximately 3:44 a.m. EDT on Sept. 4 at Edwards Air Force Base. High intensity xenon-arc lamps will illuminate the runway for Challenger's first pre-dawn landing.

Commander Truly is the only member of the STS-8 crew who has previously flown in space.

Three of the astronauts -- Brandenstein, Bluford and Gardner -- were among the group of 35 astronaut candidates picked by NASA in January 1978 for the Shuttle program.

Thornton was added to the crew following the original announcement of the astronauts selected to fly the STS-8 mission.

INSAT-1B will be deployed from Challenger's cargo bay in the same manner as other commercial satellites released by Columbia and Challenger on previous missions. About 45 minutes after the satellite has been ejected from the cargo bay, the Payload Assist

Module will be fired to raise the high point of the satellite to 22,300 miles above the equator. INSAT ground controllers will fire an onboard solid-propellant kick motor on a selected apogee to circularize the orbit at the geosynchronous altitude.

Once in orbit at its operating location of 94 degrees east longitude, the multi-purpose telecommunications/meteorology spacecraft will have a capability for nationwide direct broadcasting to community TV receivers in rural areas.

The spacecraft was built by Ford Aerospace and Communications Corp., Dearborn, Mich., under a joint venture with the Government of India's Department of Space.

Twelve channels operating in the C-band frequency will provide telephone, television or other forms of telecommunications throughout India. Two extra-powerful channels will provide direct broadcast capability for television transmissions straight from the satellite to small home antennas.

Meteorological data is supplied by a data collection system which gathers information from platforms located throughout India. And a very high resolution radiometer will take infrared and visible photographs of the complete disk of the earth every 30 minutes for meteorological analysis.

Demonstration of the Remote Manipulator System's ability to handle heavier and heavier objects will be made with the 3,855.6 kg (8,500-lb.) (deployable weight of 3,383.8 kg -- 7,460 lb.) Payload Flight Test Article. The dumbbell-shaped object will be used to simulate operations required to deploy the 9,752.2 kg (21,500-lb.) Long Duration Exposure Facility (LDEF) and for the Solar Maximum Repair Mission, both currently slated for STS-13.

The test article, originally planned to be carried aboard Challenger on STS-11, was substituted for the second Tracking and Data Relay satellite.

The aluminum and stainless steel structure is a passive payload, having no power or command interfaces with the orbiter. It is approximately 4.6 meters (15 feet) long and 3.96 m (13 ft.) high and is equipped with two grapple fixtures to accommodate the arm. It will not be deployed.

A U-shaped Development Flight Instrumentation (DFI) pallet, similar to those carried on Shuttle flights 2 and 3, laden with earth resources and space science experiments, will be carried in the payload bay on STS-8. It will be located in the forward part of the bay.

Mounted on the pallet will be the Oxygen Interaction with Materials (OIM) experiment, and a heat pipe experiment.

It is a passive array experiment that will test the reaction of various spacecraft materials to bombardment by molecular or atomic oxygen particles which exist at the Shuttle's orbital altitudes.

A heat pipe experiment will also be attached. Scientists are studying heat pipe technology for application on future satellites. The system, which has proven itself on earth, could serve as a means of managing temperature extremes to which spacecraft components are exposed in space.

Making its fourth flight into space will be the Continuous Flow Electrophoresis System (CFES). The basic object of the system is to understand and baseline the advantages of manufacturing pharmaceuticals in the zero-gravity of space.

On STS-8, live cell samples will be used for the first time in the experiment rather than the simple protein samples used on past missions. A new, upgraded buffer will be flown in order to nourish and sustain the live cells during processing. Six different samples will be flown.

The system is located on Challenger's middeck and weighs approximately 760 pounds at liftoff.

Challenger will carry 12 Getaway Special canisters in its cargo bay on STS-8. Eight of the canisters will contain postal covers bearing a special \$9.35 postage stamp, intended primarily for Express Mail.

Following the flight, each of the covers will be placed in a specially designed folder and sold for \$15.35 each, by mail order only, from the Postal Service's Philatelic Sales Division.

GAS No. G-0346 will carry an experiment called CRUX, for Cosmic Ray Upset Experiment, sponsored and developed by NASA's Goddard Space Flight Center, Greenbelt, Md.

Its objective is to resolve questions about the probability of highly charged particles causing errors in memory-type integrated circuits.

The Ultraviolet-Sensitive Photograph Emulsion Experiment, GAS No. G-0347, is similar to an experiment flown on STS-7. Sponsored by the Goddard Space Flight Center, the experiment will evaluate the effects of exposure to the Shuttle cargo bay on ultraviolet sensitive film. Six sets of emulsions will be exposed for varying amounts of time for the experiment.

GAS No. G-0475 will repeat the Crystal Growth of Artificial Snow experiment that was carried aboard STS-6, but with improved equipment. Sponsored by one of Japan's leading newspapers, Asahi Shimbun, this experiment is designed to observe the crystal growth of artificial snow in the weightlessness of space. Snow crystals will be made in two small cold chambers and the process of crystal growth will be recorded on video tape.

The Contamination Monitor Package to be flown as GAS No. G-0348 is similar to the experiment successfully flown as one of the OSS-1 experiments on STS-3. It will be the first GAS payload mounted on the outside of the canister lid. Batteries and experiment container will be carried inside the canister.

The experiment is designed to measure the effects of atomic oxygen on two materials known to readily oxidize -- carbon and osmium. Information gained from this experiment will help future Shuttle missions and provide insight into material behavior and environmental effects at altitudes that will be flown on future missions.

A Shuttle Student Involvement Project Experiment will be conducted on STS-8. Designed by Wendy A. Angelo of Poughkeepsie, N.Y., this experiment will determine whether or not biofeedback training learned on earth can be successfully implemented in zero gravity of space. The experiment is being sponsored by the USAF School of Aerospace Medicine at Brooks Air Force Base, Texas.

Six rats will be carried in a special enclosure in a middeck locker. The Animal Enclosure Module is a self-contained system that can support the rodents up to seven days without special attention. The cage will be used in a later Shuttle Student Involvement Project experiment.

Dr. William Thornton will perform medical measurements and observations throughout the course of the mission in an effort to better understand the biophysiological effects of spaceflight.

Thornton's studies will encompass seven basic disciplines:

- Audiometry -- testing of aural sensitivity thresholds.
- Bio Monitoring -- monitoring of crew health and medical status.
- Electro-oculography -- recording and measuring of electrical signals generated by eye movement.
- Kinesymmetry -- study of the repeatability of physical motion.
- Photography -- photo records of leg volume changes, if any.
- Plethysmography -- volume of limbs measured in circumference.
- Tonometry -- measurement of external tissue pressure.

Challenger will touchdown on the hard surface runway at Edwards Air Force Base very early on the morning of the fifth day of the mission marking the Shuttle's first landing in darkness.

Reentry will begin, as on earlier Shuttle flights, with the firing of both orbital maneuvering system engines over the Indian ocean as Challenger makes its 81st revolution of the earth.

High-intensity xenon-arc lamps will light the runway. In the event of cloudless skies over the airfield, the 800-million candlepower beams produced by each of the searchlights will be seen by the flight crew well before the orbiter enters the landing pattern.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS.)

STS-8 BRIEFING SCHEDULE

EDT	CDT	PDT	Briefing	Origin
T-2 Days				
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 and PDRS/PFTA	KSC
10:30 a.m.	9:30 a.m.	7:30 a.m.	INSAT-1B	KSC
11:00 a.m.	10:00 a.m.	8:00 a.m.	TDRSS Testing	KSC
1:00 p.m.	12 Noon	10:00 a.m.	CFES	KSC
1:30 p.m.	12:30 p.m.	10:30 a.m.	Getaway Specials	KSC
2:30 p.m.	1:30 p.m.	11:30 a.m.	SSIP (Student Program)	KSC
3:00 p.m.	2:00 p.m.	12 Noon	USPS (Postal Covers)	KSC
T-1 Day				
9:00 a.m.	8:00 a.m.	6:00 a.m.	Countdown Status	KSC
10:00 a.m.	9:00 a.m.	7:00 a.m.	Pre-Launch Press Conference	KSC
T-Day				
3:30 a.m.	2:30 a.m.	12:30 a.m.	Post Launch Press Conference	KSC only
Launch Through EOM			See Change of Shift Schedule	JSC
T+6				
5:00 a.m.	4:00 a.m.	2:00 a.m.	Post Landing Press Conference	DFRF
7:00 a.m. (approx.)	6:00 a.m.	4:00 a.m.	Crew Ceremony	DFRF
T+7				
2:00 p.m.	1:00 p.m.	11:00 a.m.	Orbiter Status Briefing	DFRF

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

Processing by the NASA/industry team in preparation for the eighth flight of the Space Shuttle has been the fastest to date.

For a launch on Aug. 30, preflight processing will have totaled 53 working days, or 62 calendar days. The previous record was 60 working (63 calendar) days, achieved on STS-7.

Challenger was returned from California piggyback on the 747 Shuttle Carrier Aircraft and arrived at Kennedy Space Center on June 29. The orbiter was taken off the jumbo carrier jet and delivered to the orbiter Processing Facility (OPF) on June 30.

Working around the clock shifts, seven days a week, the reusable vehicle was processed in 26 days. Prior to this, the fastest turnaround in the facility had been 34 days on STS-7.

During that time, approximately 76 tiles were replaced as a result of damage from flight or as a result of normal turnaround operations. Other major components replaced included all main landing gear brakes and tires, one forward window, the No. 3 Auxiliary Power Unit and the orbiter's Waste Management System.

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 Getaway Special experiments arrived on various dates, were checked out and mounted inside their respective canisters. The 12 GAS cans were installed in Challenger's cargo bay on July 15 and 16.

The PFTA payload and the DFI pallet arrived on July 12. The two payloads were stored in the processing facility until they were installed in Challenger's payload bay on July 21.

The Indian National Satellite (INSAT) arrived at the Cape Canaveral Air Force Station on May 2. The satellite was mated to its Payload Assist Module upper stage and installed in its support cradle in facilities at Area 60-A on Cape Canaveral Air Force Station.

The INSAT/Payload Assist Module combination was moved to the Vertical Processing Facility on July 19. There, the payload underwent checkout in the Cargo Integrated Test Equipment stand which exercises all orbiter-to-payload interfaces as they will be operated in flight.

Assembly of the STS-8 vehicle began on June 3 with the stacking of the twin solid rocket boosters on Mobile Launcher Platform-2. Stacking of the two 150-foot tall boosters was completed on June 20 and the external tank was mated on June 23.

Challenger was moved to the Vehicle Assembly Building on July 27 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 July 29-30, followed by preparations for the vehicle's 3.5 mile journey to the pad.

On Aug. 2, 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.

The Terminal Countdown Demonstration Test with the STS-8 crew members was conducted on Aug. 4 as a final demonstration of vehicle, flight software and flight crew readiness for launch.

The INSAT/PAM cargo was scheduled for delivery to Pad 39-A on Aug. 8 for placement in the Payload Changeout Room.

Transfer of the STS-8 payload into the orbiter's cargo bay was scheduled for Aug. 9, to be followed by a series of electrical interface checks to make sure the payload was properly linked to the spaceship.

Shuttle vehicle ordnance activities, such as power-on stray voltage checks and resistance checks of firing circuits, were scheduled to pick up on Aug. 13. ordnance activities were to be suspended from Aug. 15 through Aug. 24 to load hypergolic propellants aboard the vehicle.

Pressurization of OMS and RCS propellant and helium tanks, was to be conducted on Aug. 18, followed by the closeout of OMS and RCS systems, scheduled to conclude on Aug. 20. The period from Aug. 21-24 was to be reserved as contingency.

Work was to resume on Aug. 24 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. Servicing of orbiter fuel cell storage tanks was scheduled for Aug. 26, or as late in the processing as possible, to maximize the amount of reactants onboard in the event the mission was extended one day.

The 46-hour Launch Countdown was scheduled to pick up 3 p.m. on Aug. 27. The STS-8 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-46 Hours	Perform the call to stations.
T-42 Hours T-30 Minutes	Perform a patch and comparison of the Mass Memory Units.
T-34 Hours	Start external tank loading preparations. Begin orbiter and ground support equipment closeouts for launch.
T-28 Hours	Service the Continuous Flow Electrophoresis System
T-23 Hours	Activate orbiter navigation aids.
T-19 Hours	Activate orbiter communication systems and perform air-to-ground voice checks with Mission Control.
T-17 Hours 30 Minutes	Activate Inertial Measurement Units and begin warm up period.
T-16 Hours	Perform pre-ingress switch list and prepare service tower for retraction.
T-12 Hours	Start GOX vent hood preparations for external tank loading.
T-11 Hours (holding)	Start built-in hold for 10 hours and 55 minutes.
T-11 Hours (counting)	Retract rotating service structure. Stow time critical flight crew equipment items.
T-8 Hours 40 Minutes	Activate fuel cells.
T-8 Hours	Configure mission control communications for launch.
T-7 Hours 15 Minutes	Switch from air to GN2.
T-6 Hours	Start external tank chilldown and propellant loading.
T-5 Hours	Begin IMU preflight calibration and perform open loop checks of the Shuttle Range Safety system.
T-3 Hours	2 hour hold begins. loading is complete. External tank loading is complete. Wake flight crew (launch -4 hours ,20 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 preflight 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 30 seconds	Retract orbiter access arm.
T-5 minutes	Start orbiter Auxiliary Power Units. Arm ET and SRB range safety devices.
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	Pressurize liquid hydrogen tank.
T-31 seconds	"Go" from ground computer for orbiter computers to start automatic launch sequence.
T-28 seconds	Start SRB hydraulic power units.
T-10 seconds	Ground computers give "go" for main engine start.
T-6.6 seconds	Start orbiter main engines.
T-3 seconds	Main engines at 90 percent thrust.
T-0	Holddown post release, SRB ignition and liftoff.

STS-8 FLIGHT SEQUENCE OF EVENTS

Event	MET (h:m:s)	Delta V (fps)	Apogee/Perigee (n m)
Launch	00:00:00		
MECO	00:08:45		59.7 x -1
OMS-1 Tig (2 min, 25 sec)	00:10:19	238.1	160 x 50.6
OMS-2 (1 min, 55 sec)	00:44:49	194.2	160 x 160
INSAT/PAM Deploy 18D	25:16:58		
OMS sep burn	25:31:58	10	165.8 x 159.7
PAM perigee kick motor ignition	50:01:58		
Orbit adjust burn (46 sec)	69:56:39	67.3	166.2 x 120.9
Orbit adjust burn 2 (2 min, 23 sec)	70:42:00	80.1	121.4 x 120.6
Deorbit burn (2 min, 23 sec)	120:36:38	260.9	-21 x 118
Landing, EAFB	121:28:44		

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE		FLIGHT	EDITION	PUB. DATE
						12, 1983	STS-8			
224:18:21 / 225:06:21	000:12:00 / 001:00:00	224:13:21 / 225:01:21	01 / 224 GMT	42.7		AUGUST 12, 1983	FINAL			6/29/83
GMT: 224	FD: 01									
MET: 000 12										
CDR	SLEEP							POST SLEEP ACT		
PLT	SLEEP							POST SLEEP ACT		
MS1	SLEEP							POST SLEEP ACT		
MS2	SLEEP							POST SLEEP ACT		
DAY/NIGHT										
ORBIT										
CUSTOM COVERAGE										
TORS										
TV DEORB EDN										
ATTITUDE										
ENVIS										
EXP										
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CMT (D:IM:R)	MET (D:IM:R)		CDT (D:IM:R)		FD/DOY		BETA MOON		HOUSTON DATE		FLIGHT		EDITION		PUB. DATE	
	226:06:21/	226:18:21/	002:00:00/	002:12:00/	226:01:21/	226:13:21/	03/	226:04/	43.0	AUGUST 14, 1983	SIS-8	FINAL	10	11	12	13
CDR	PTN	REAL	PTN	REAL	TV ACT	EXERCISE	PTN	PTN	PTN	PTN	PRE SLEEP ACT	PRE SLEEP ACT	SLEEP	SLEEP	SLEEP	SLEEP
PLT	TV ACT	REAL	TV ACT	REAL	TV ACT	EXERCISE	TV ACT	TV ACT	TV ACT	TV ACT	PRE SLEEP ACT	PRE SLEEP ACT	SLEEP	SLEEP	SLEEP	SLEEP
MS1	EXERCISE	REAL	EXERCISE	REAL	EXERCISE	EXERCISE	EXERCISE	EXERCISE	EXERCISE	EXERCISE	PRE SLEEP ACT	PRE SLEEP ACT	SLEEP	SLEEP	SLEEP	SLEEP
MS2	EXERCISE	REAL	EXERCISE	REAL	EXERCISE	EXERCISE	EXERCISE	EXERCISE	EXERCISE	EXERCISE	PRE SLEEP ACT	PRE SLEEP ACT	SLEEP	SLEEP	SLEEP	SLEEP
EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP	EXP
NOTES:	<p>0 DTD 503 PDS PAYLOAD HANDLING</p> <p>0 DTD 502 ORIN ATTENDANCE VEN</p> <p>0 DTD 432 CMT-ON INCUBATOR</p> <p>0 DTD 704 TMS HW INIT</p> <p>0 DTD 503 PDS PAYLOAD HANDLING</p> <p>0 TV/03 PTH OPS</p> <p>0 DTD 405 MSSEL DETECTION SENSITIVITY</p> <p>0 TV/04 MS/PTH OPS</p> <p>0 TV/04 STUDENT EXP</p>															

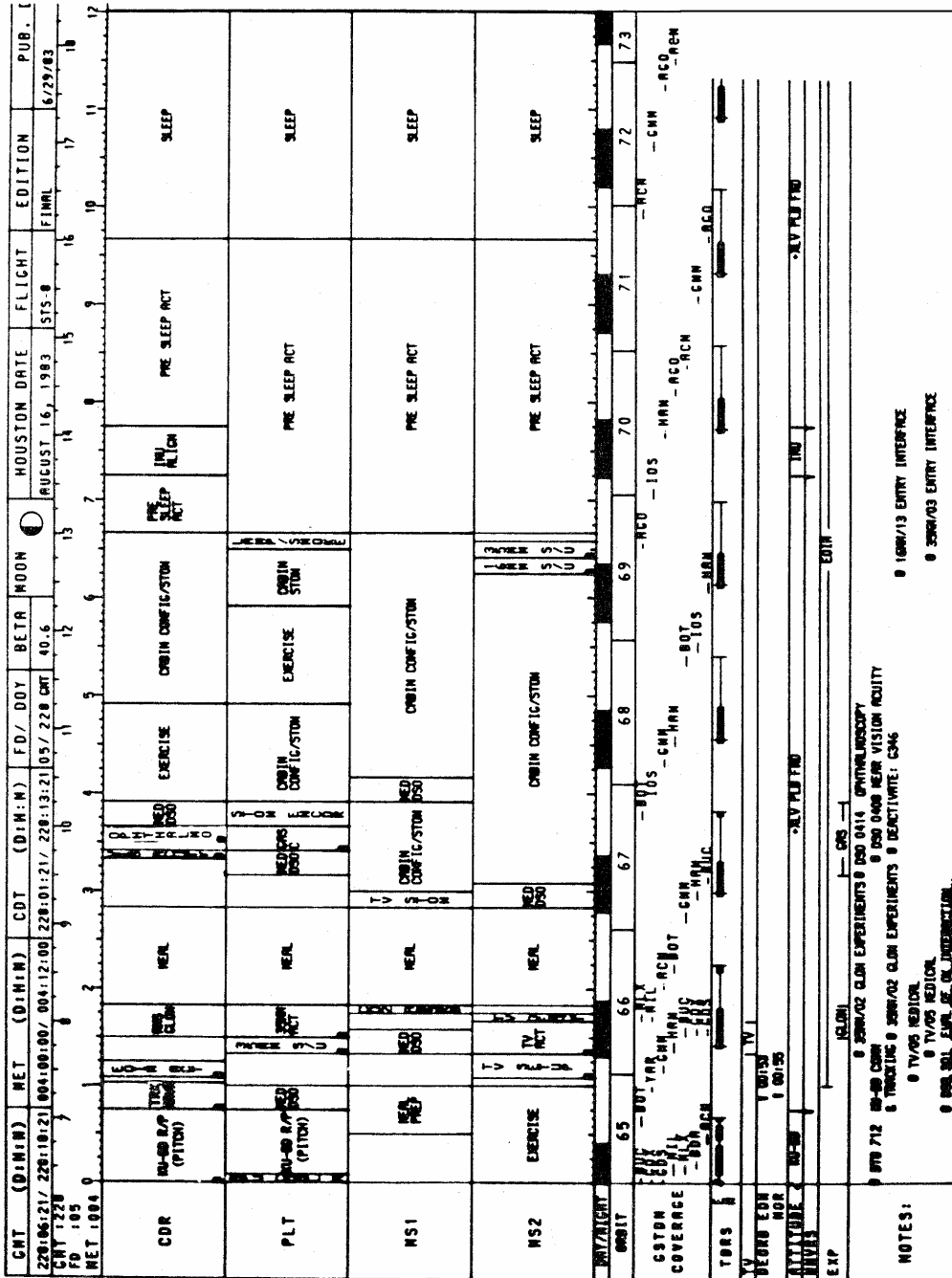
GMT (D:M:S)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE																
226:18:21	227:06:21	003:00:00	226:13:21 / 227:01:21	03 / 226 GMT	42.7	AUGUST 14, 1983	STS-8	FINAL	6/29/83																
GMT 7:226	FD 103	MET 1:002	23	22	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
CDR		SLEEP																							
PLT		SLEEP																							
MS1		SLEEP																							
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ATTITUDE																									
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NOTES:																									

0 1600/05 EXERCISE
 0 1600/05 EXERCISE
 0 070 710 01-00 COMM
 LINK
 0 070 710 01-00/T000
 6/29/83 STS-8/FIN

GMT (D:M:W)	MET (D:M:W)	CDT (D:M:W)	FD/DOY	BETA	MOON	HOUSTON DATE		FLIGHT	EDITION	PUB. DATE
						15, 1983	STS 8			
227:06:21 / 227:18:21	003:00:00 / 003:12:00	227:01:21 / 227:13:21	04 / 227 GMT	42.2		AUGUST 15, 1983	STS 8	FINAL		6/29/83
FD 104										
MET 1003										
CDR	EXERCISE	MEAL								
PLT	RU-40 R/P (ROLL)	MEAL								
MS1	RU-40 R/P (ROLL)	MEAL								
MS2	MEAL	MEAL								
DAY/NIGHT										
ORBIT	49	50	51	52	53	54	55	56		
ESTBN	-MAN -RCH -BOT -LCH	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN		
COVERAGE	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN	-RCH -LCH -BOT -MAN		
TORS										
TV										
BEATS FOR MOR	1 0111	1 0113								
AVIATION										
EXP										
NOTES:	<ul style="list-style-type: none"> 0 DTG 503 & 742 HAS DYNAMIC INTERACTION 0 DIVERGENCE 0 (MONITOR RCH) 0 DTG 712 RU-40 CHN 0 70M/02 HAS PFR OPS 0 TV/03 PFR OPS 0 TV/03 PFR OPS 0 TV/03 PFR OPS 0 TV/03 PFR OPS 0 TV/03 PFR OPS 0 DTG 704 TORS HWY INIT 									

6/29/83 STS-8/FIN

Timeline 3-10



GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	(D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE		FLIGHT	EDITION	PUB. DATE										
							AUGUST 16, 1983	STS-8													
228:18:21 / 229:06:21	004:12:00 / 005:00:00	228:13:21 / 229:01:21	05 / 228 GMT	39-5					FINAL		6/29/83										
GMT 1228	FD 105	MET 1004	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
CDR		SLEEP				POST SLEEP ACT															DEORBIT PREP
PLT		SLEEP				POST SLEEP ACT															DEORBIT PREP
WS1		SLEEP				POST SLEEP ACT															DEORBIT PREP
WS2		SLEEP				POST SLEEP ACT															DEORBIT PREP
ORBIT																					
CUSTOM COVERAGE																					
TORS																					
DEORB EDN																					
EXP																					

6/29/83 STS-8/FIN

FLIGHT OBJECTIVES

The only STS-8 deployable payload is the Indian National Satellite (INSAT-1B) which will be sprung out of the payload bay during the 18th orbit and boosted to geosynchronous altitude by a Payload Assist Module (PAM-D).

Non-deployable payloads include a large "dumb" metal structure ballasted with lead to act as a large-mass load for the Canadian-built 50-ft. remote manipulator arm, and experiments mounted on the development flight instrumentation (DFI) pallet recycled from the orbital flight test series with orbiter Columbia. The McDonnell Douglas/Johnson & Johnson Continuous-Flow Electrophoresis System again will be in the middeck. These and other STS-8 experiments are described elsewhere in this press kit.

Bolted along both payload bay longerons and on the DFI pallet are a dozen Getaway Special (GAS) canisters -- two for NASA's Goddard Space Flight Center, two for Asahi Shimbun, Tokyo, and eight loaded with postal covers for the U.S. Postal Service.

Another major mission objective will be to test the Ku-band link between Challenger and TDRS-A and the TDRSS ground station at White Sands, N.M.

An extensive shopping list of detailed test and supplementary objectives -- ranging from biomedical observations to orbiter performance measurements -- will be used in planning flight crew activities.

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 Edwards, including preparations for returning the vehicle to Kennedy Space Center to be readied for its next mission.

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.

A mini-convoy, which does not provide for orbiter cooling or purging on the runway, may be used on STS-8. The standard recovery convoy will be on station at Edwards prior to launch to support an abort once around contingency landing, and would be available at Edwards to support a nominal end of mission landing.

The mini-convoy, used for the first time following Challenger's unscheduled landing at Edwards at the end of the STS-7 mission, consists of only six vehicles and 24 people. A normal convoy consists of about 24 vehicles and 110 people.

After rollout, 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 panels 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 off the runway at Edwards and positioned inside the Mate Demate Device at the nearby Dryden Flight Research Facility.

Challenger will be jacked and leveled in the Mate Demate Device workstands. Residual fuel cell cryogenics will be drained and unused pyrotechnic devices will be disconnected. After the aerodynamic tail cone has been installed over the three main engines, the orbiter will be bolted on top of the 747 Shuttle Carrier Aircraft for the ferry flight back to Florida.

The 747 is scheduled to leave California about six days after landing. There will be a stop to refuel the 747. Weather permitting, the ferry flight may continue on the same day.

EDWARDS AFB RUNWAY 22 DIAGRAM

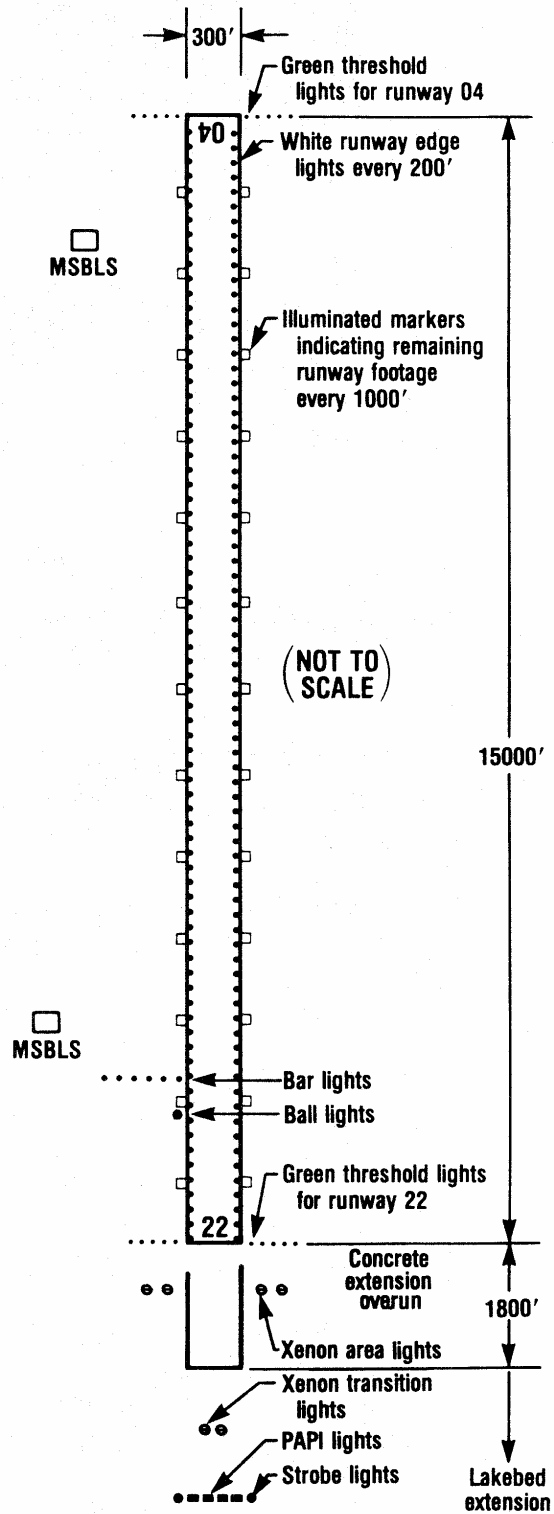
The precision approach path indicator (PAPI) is a electronic visual system that tells the pilot if he is on the correct outer glide path of 19 degrees, by projecting a beam of half white, half red light. Above glide slope is all white and below is all red. The PAPI lights are located 7500 feet from the end of the runway and 10,000 feet from the touchdown. There is a strobe light on either side of the PAPI lights for location purposes. The transition and area lights are xenon lights which are capable of producing 800 million candlepower each and are used to illuminate the area.

Ten green lights indicate the end of the runway. The ballbar is another visual system that indicates the inner glide slope of 11/2 degrees. The correct flight path is determined by centering a white light on a band of red lights. There are white lights o located every 200 feet on both sides of the runway. Illuminated markers off the edge of both sides of Runway 22 and placed a 1,000 ft intervals indicate remaining footage. Blue lights are used to illuminate the taxiways.

Edwards AFB Runway 22 Diagram

The precision approach path indicator (PAPI) is an electronic visual system that tells the pilot if he is on the correct outer glide path of 19 degrees, by projecting a beam of half white, half red light. Above glide slope is all white and below is all red. The PAPI lights are located 7500 feet from the end of the runway and 10,000 feet from the touch-down. There is a strobe light on either side of the PAPI lights for location purposes. The transition and area lights are xenon lights which are capable of producing 800 million candlepower each and are used to illuminate the area.

Ten green lights indicate the end of the runway. The ball-bar is another visual system that indicates the inner glide slope of 1½ degrees. The correct flight path is determined by centering a white light on a band of red lights. There are white lights located every 200 feet on both sides of the runway. Illuminated markers off the edge of both sides of Runway 22 and placed a 1000 ft intervals indicate remaining footage. Blue lights are used to illuminate the taxiways.



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 (RTL) - 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-8 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.

CONFIGURATION

Challenger retains the 15.2-m (50-ft.) Canadian-built remote manipulator arm, a fifth crew seat on the middeck, and three sets of cryogenic oxygen and hydrogen tanks for fuel cell reactants that were aboard for STS-7.

STS-8 payloads are loaded in the payload bay with INSAT-1B near the aft bulkhead, the payload flight test article midway in the bay, and the Development Flight Instrumentation pallet about a quarter of the bay length aft of the forward bulkhead. Getaway Special canisters are mounted along port and starboard longerons below the payload bay door hinge lines.

The Continuous-Flow Electrophoresis System (CFES), student experiments and other crew-operated equipment are stowed in middeck lockers.

Challenger and its booster stages will have a total liftoff weight of 2,037,400 kg (4,491,622 lb.) compared to an STS-7 liftoff weight of 2,034,913 kg (4,486,141 lb.). Challenger's "dry" weight is 67,113 kg (148,200 lb.).

Major STS-8 payload component weights are: INSAT-1B/PAM, 3,377 kg (7,445 lb.); PAM cradle, 1,102 kg (2,243 lb.); PFTA, 3,379 kg (7,450 lb.); DFI and attached experiments/instruments, 1,570 kg (3,330 lb.); 12 Getaway Special canisters and contents, 2,230 kg (4,916 lb.); and CFES, 353 kg (779 lb.).

PAYLOAD FLIGHT TEST ARTICLE (PFTA)

The Payload Flight Test Article (PFTA), an aluminum, lead-ballasted test structure weighing 3,855.6 kg (8,500 lb.) on earth, will be used for the first time during STS-8. It will be carried into orbit near the center of the payload bay, and maneuvers involving the Remote Manipulator System (RMS) or arm will take place on flight days 3 and 4.

The test article simulates a large-mass payload for flight testing the arm. The purpose of the tests is to evaluate elbow, wrist and shoulder joint reaction to higher loads and to gain crew experience in operating the 15.2-m (50-ft.)-long mechanical arm.

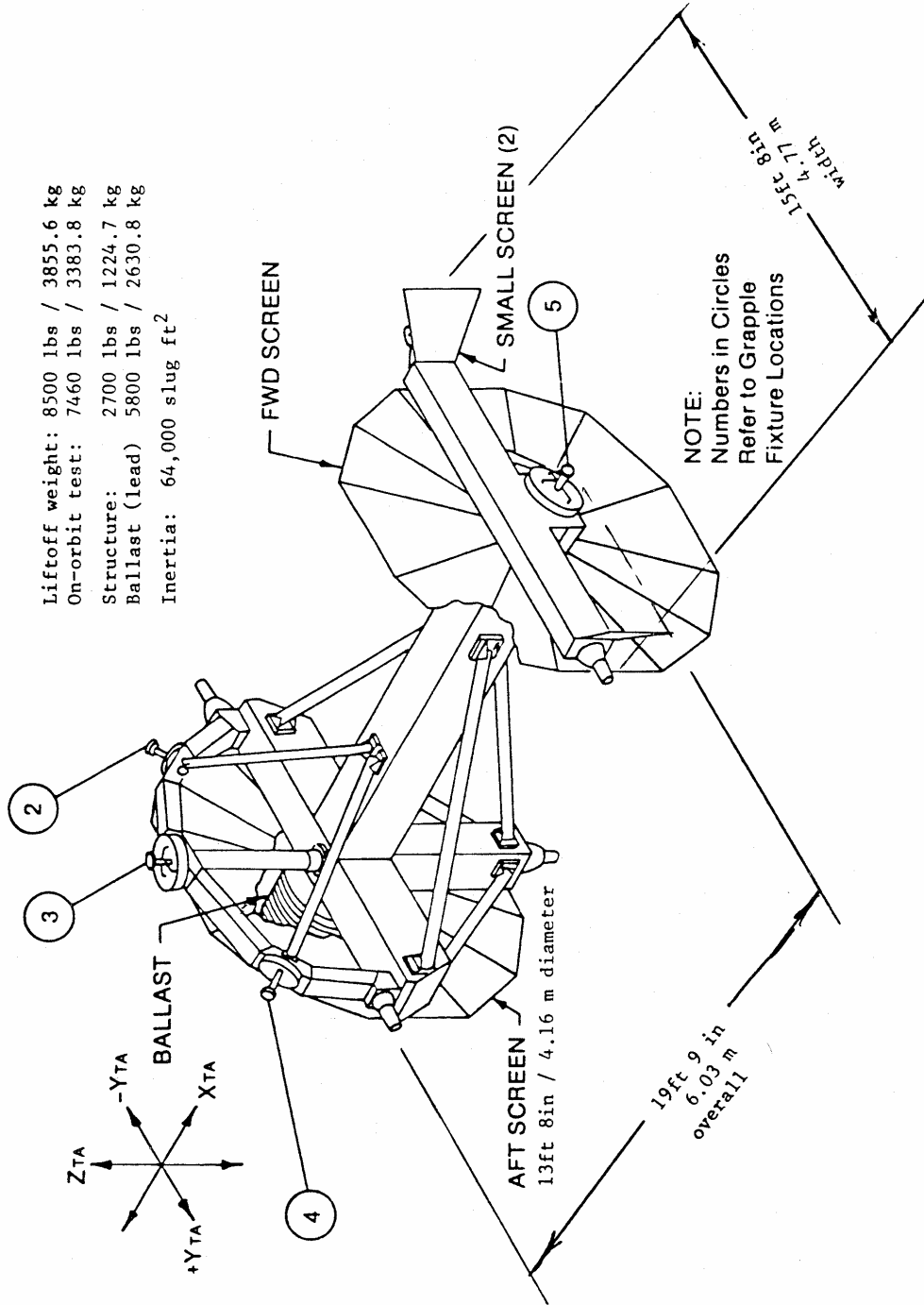
The test article, which is 6 m (19 ft., 9 in.) long and 4.7 m (15 ft., 6 in.) wide, will be equipped with two grapple fixtures for the purposes of this mission and will be lifted out of the payload bay by the robot arm. However, it will not be released from the arm, as the test article is a passive satellite, having no control system of its own. When the mechanical arm has lifted the article from the cargo bay, forces will be applied through use of the orbiter's reaction control system thrusters.

During previous STS missions the capabilities of the arm have been tested alone and with various articles. The first test occurred during STS-2, when the robot arm was operated in all of its modes, ranging from fully automatic to fully manual, although no loads were moved. The STS-3 crew used the arm to grasp an experiment called a Plasma Diagnostic Package, move that unit around both outside and inside the payload bay and return it to its stowed position. The crew on STS-4 utilized the huge arm in the cargo bay twice to lift and swing the Induced Environment Contamination Monitor (IECM) around the payload area to obtain information about particles and gases in the bay that could affect experiments. The arm was tested most spectacularly during the STS-7 mission when it was used to deploy and retrieve the SPAS-01 platform. The SPAS-01 pallet of experiments weighed approximately 1,500 kg (3,300 lb.) The test article, weighing 3,383.8 kg (7,460 lb.) on orbit, more than doubles the weight deployed by the arm on Shuttle flights to date.

The STS-8 test will provide further experience useful in planning for the STS-13 mission. During that flight the arm will be used for two purposes: to deploy the 20,000-lb. Long Duration Exposure Facility (LDEF) and to retrieve the presently orbiting but malfunctioning Solar Maximum Satellite, place it in the payload bay of the orbiter, and redeploy it when repairs have been completed.

PAYLOAD FLIGHT TEST ARTICLE

Liftoff weight: 8500 lbs / 3855.6 kg
 On-orbit test: 7460 lbs / 3383.8 kg
 Structure: 2700 lbs / 1224.7 kg
 Ballast (lead) 5800 lbs / 2630.8 kg
 Inertia: 64,000 slug ft²



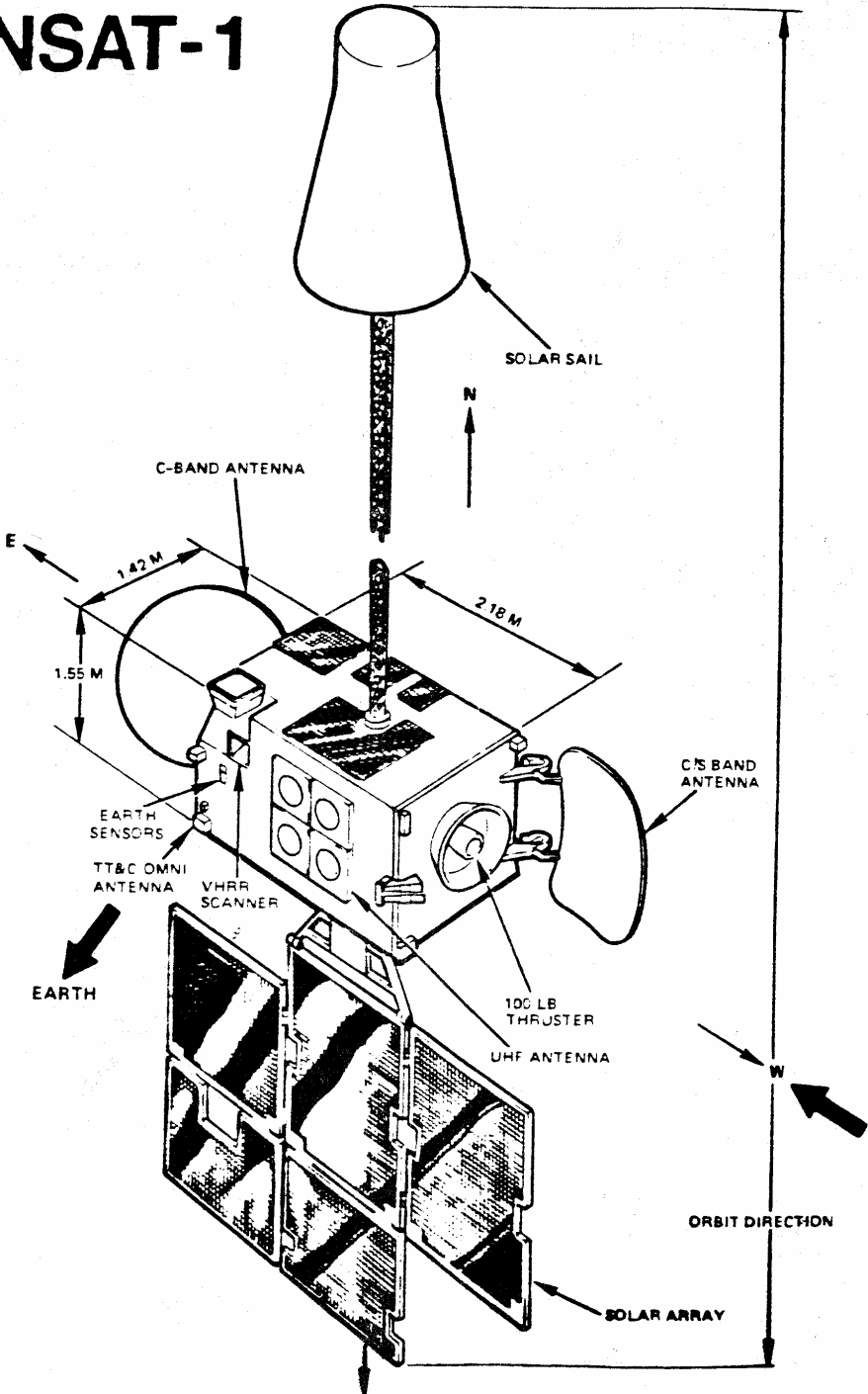
INSAT-1B

Indian National Satellite (INSAT) 1B, the second in a series of Indian National multi-purpose, attitude controlled satellites, will be ejected from Challenger on flight day 2. INSAT is built by Ford Aerospace's Western Development Laboratories Division in Palo Alto, Calif. Prior to deployment it will be carried inside a 3 m (10-ft.)-long sun shield identical to those used on STS-5 and 7 in the aft payload bay of Challenger. A Payload Assist Module (PAM-D) booster built by McDonnell Douglas, of the same type credited with four successes to date, will be used to elevate INSAT-1B into geosynchronous orbit at 74 degrees east longitude.

In addition to C-band communications capabilities and S-band TV links, INSAT-1B will carry a data collection platform to provide weather surveillance and forecasting data and a Very High Resolution Radiometer for additional weather surveillance data.

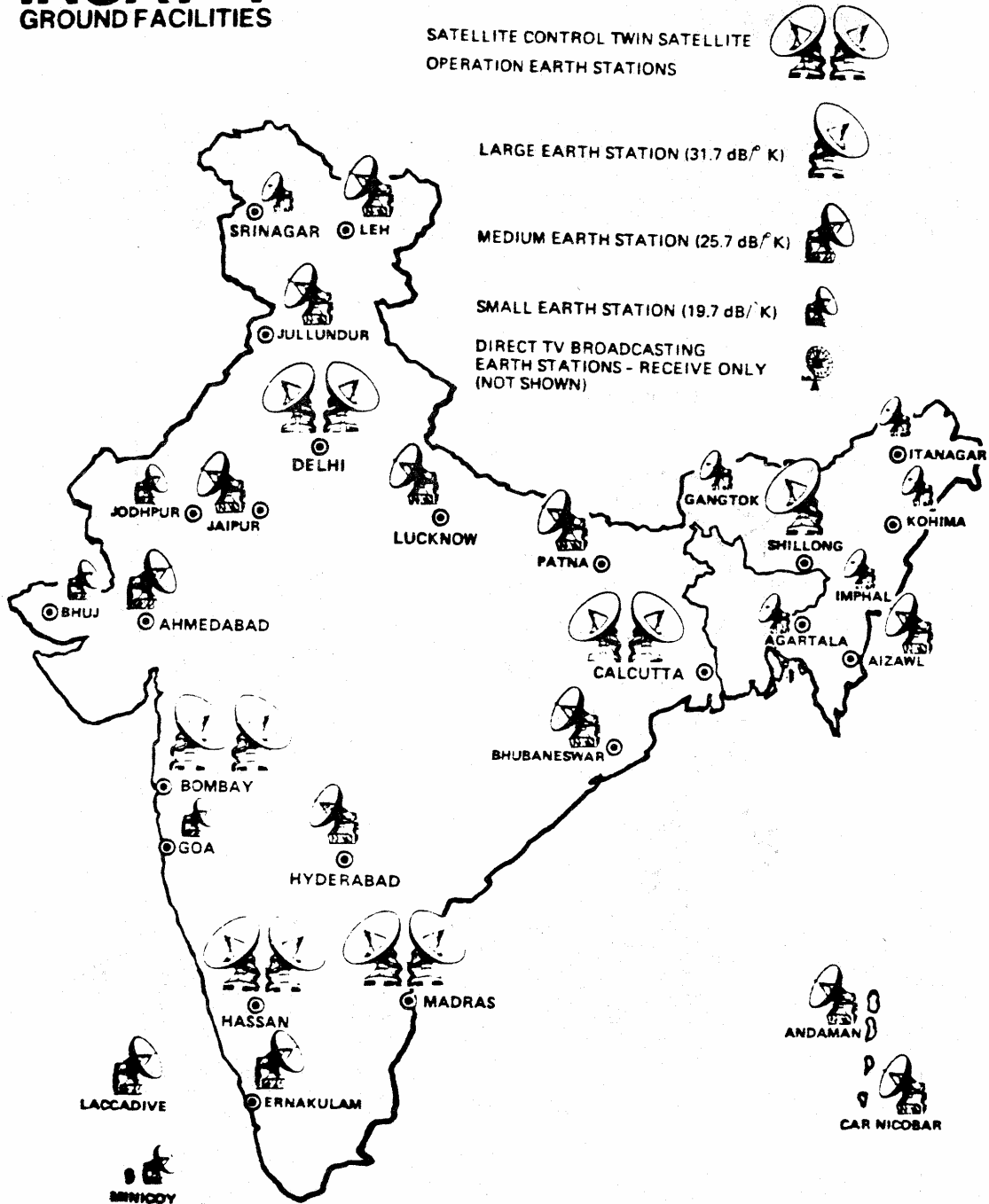
INSAT-1B, which has a seven-year lifetime, will be controlled by the Satellite Control Center located in Hassan, India. The first in this series of satellites, INSAT-1A, was launched into orbit by a Delta booster on April 8, 1982, but was shut down due to failure of the reaction control system.

INSAT-1



INSAT-1

GROUND FACILITIES



PHILATELIC COVERS TO FLY ON PALLET AND IN GAS CANS

Approximately 260,000 U.S. Postal Service philatelic covers will be carried into orbit aboard the Challenger.

The cover will bear the recently announced \$9.35 postage stamp, intended primarily for Express Mail. The cachet design on the front of each cover will be a full color replica of the NASA STS-8 crew patch. on the back will be a cachet of NASA's 25th anniversary logo.

Following the STS-8 flight, each of the covers will be placed in a specially designed folder and sold for \$15.35 each, by mail order only, from the USPS Philatelic Division.

The pictorial cancellation on the front of each cover will carry the originally scheduled STS-8 launch date of Aug. 14, which is also the issue date of the stamp. Upon completion of the flight, the actual date of launch will be noted on the cover. Another cancellation will be applied to each cover, indicating the landing date and site.

Mail orders only for the item (Item Number C572) will be accepted no earlier than the date -- still to be determined - when Challenger returns from the mission. orders postmarked prior to that date will be returned to the sender unopened.

Two large storage boxes of covers are mounted aboard the DFI pallet while other covers are in eight Getaway Special canisters in the payload bay. The containers have been sealed and pressurized with nitrogen.

Each cover is imprinted with a special serial number.

When the covers are brought back to earth they will be placed in souvenir folders featuring photographs of the Challenger before they are sold.

Proceeds (exclusive of the postage affixed) from the sale of the Shuttle Flight Folder will be divided equally between NASA and the Postal Service.

orders and remittances should be sent to: Shuttle Flight Folders, Philatelic Sales Div., Washington, D.C. 20265. Personal checks in the exact amount will be accepted for orders up to two folders per order; no cash or postage stamps.

STS- 8 EXPERIMENTS

CONTINUOUS FLOW ELECTROPHORESIS SYSTEM (CFES)

STS-8 marks the fourth time the Continuous Flow Electrophoresis System (CFES) experiment has been flown. CFES, the first commercial project ever carried on the Shuttle, is sponsored by McDonnell Douglas Astronautics Co., St. Louis, Mo., in conjunction with Ortho Pharmaceuticals, an affiliate of Johnson and Johnson.

Continuous Flow Electrophoresis is a process of separating biological materials in solution according to their surface electrical charge by passing them through an electrical field.

Results of three previous Shuttle flights have shown the device has the ability to separate more than 700 times more material in the weightlessness of space than is possible on earth. NASA furnishes flight time for experimental and precommercial prototype operations as part of its joint endeavor policy, designed to encourage private investment in space industrialization.

For the Continuous Flow Electrophoresis experiments on STS-4, STS-6 and STS-7, mixtures of proteins in culture were used. The STS-8 mission is significant because, instead of proteins, live cells will be used in the operation for the first time.

Six samples will be carried: two for the McDonnell Douglas Corp., two for NASA's Johnson Space Center, and two for Pennsylvania State University in conjunction with the NASA project.

The samples for McDonnell Douglas, under the terms of a new agreement with Washington University School of Medicine, St. Louis, are pancreas cells to be used in research for purification techniques that could lead to new treatments for diabetes. NASA's Johnson Space Center is sending two samples of kidney cells; and two pituitary cell samples will be used by Pennsylvania State University.

Because of the difficulties in maintaining the viability of live cells, one of the goals of STS-8 is to demonstrate handling techniques for keeping these cells alive before and after separation. The experiment hardware, situated in the orbiter's middeck, remains the same as in previous flights, except for the addition of a tray on which samples are carried aloft on the surface of microcarrier beads in a fluid compatible with the live cells. Mission specialists will transfer the cells to syringes before insertion into the separation chamber.

An additional requirement for maintenance of live materials is activation of the Continuous Flow Electrophoresis System operation soon after Challenger has reached orbit.

Plans are for seven hours of experiment operation by Mission Specialist Bluford on flight day 1 and another seven hours on flight day 2 by Mission Specialist Gardner. The samples will be removed and checked for viability shortly after landing.

DEVELOPMENT FLIGHT INSTRUMENTATION PALLET

Although no Development Flight Instrumentation (DFI) will be flown during STS-8, the DFI pallet which carried that instrument panel on early flights of the Shuttle Columbia will be used to mount two experiments and two boxes of postal covers in Challenger's forward payload bay. The two experiments are the Evaluation of oxygen Interaction with Materials (DSO 0301) and the High Capacity Heat Pipe Demonstration (DSO 0101).

The Evaluation of oxygen Interaction with Materials (DSO) was carried on the instrumentation pallet during earlier missions but was passive, with incident atomic oxygen flux dependent on vehicle attitude. Tests during STS-8 will obtain quantitative rates of oxygen interaction with materials used on the orbiter and advanced payloads.

Atomic oxygen within the low earth orbital environment is known to be extremely reactive when in contact with solid surfaces. Chemical changes can occur for spacecraft materials at orbital altitudes which alter optical and electrical properties and, in some cases, even remove layers of material.

If the atoms impinge with kinetic energy of orbital speed, chemical reactions are accelerated and the mass loss for many materials becomes more pronounced. Advanced payloads, such as Space Telescope and Space Station, will use materials which react chemically with oxygen. Although the reaction rates are low at altitudes where these advanced spacecraft will operate, long duration missions may result in significant mass erosion for solar arrays, optical overcoatings, light baffles and thermal control coating films. one objective of this experiment is to obtain quantitative rates of atomic oxygen interaction with these materials.

The second objective of the experiment is to flight test specimens of Advanced Flexible Reusable Surface Insulation (AFRSI) and Thermal Protection System (TPS) tiles in an atomic oxygen environment. Advanced Flexible Reusable Surface Insulation on the Shuttle's orbital Maneuvering System (OMS) pods failed during STS-6 reentry, and orbiter thermal protection system tiles show significant loss of waterproofing and strength after each Shuttle mission. These anomalies may result from atomic oxygen interacting with waterproofing agents on the insulation outer quartz fabric and the tile interior. The results of these flight tests and subsequent laboratory tests will enable technologists to resolve these issues.

DSO 0101, High Capacity Heat Pipe Demonstration, will provide an in-orbit demonstration of the thermal performance of a high capacity heat pipe designed for future spacecraft heat rejection systems. Support requirements are the instrumentation pallet and a 35 mm camera with telephoto lens, intervalometer and mounting bracket. one crewmember inside the crew station will activate the heater power switch, photograph temperature sensitive tape through aft flight deck windows and then deactivate the heater power switch. Heater power switches will be turned on during the tail-to-sun orbiter attitude, and time of operation will be a minimum of 45 minutes and a maximum of two hours.

SHUTTLE STUDENT INVOLVEMENT PROGRAM

A Shuttle Student Involvement Program experiment will be conducted by Mission Specialist Thornton. In addition, a small rat cage will fly in a middeck locker aboard the Challenger to test it prior to its use on a future flight. The student experiments are supervised by NASA and the National Science Teachers Association..

The experiment is called Biofeedback Mediated Behavioral Training in Physiologic Self Regulator: Application in Near Zero G Environment.

The objective of the experiment is to determine whether or not biofeedback training learned in one-g (on earth) can be successfully implemented in zero-g (in orbit).

Thornton was given pre-flight training on biofeedback techniques. During the STS-8 flight he will use the techniques during four 15-minute periods to determine if they work in the near weightlessness of space. Skin surface temperature, heart rate, galvanic skin response and muscle activity will be measured and recorded.

The student experimenter is Wendy Angelo, of Franklin D. Roosevelt High School, Hyde Park, N.Y. The experiment is sponsored by the U.S. Air Force School of Aerospace Medicine, Brooks Air Force Base, Texas. NASA advisor is Dr. Ted Lefton of Johnson Space Center. Angelo's teacher advisor is Jan L. Stoutenburgh, Pine Plains, N.Y.

ANIMAL ENCLOSURE MODULE

The Animal Enclosure Module (AEM) will be carried aloft on the STS-8 flight with six rats as residents. The module, built by Convair Div. of General Dynamics Corp., will first be used in a Space Shuttle Student Involvement Project on a later mission.

The purpose of the test is to demonstrate that the enclosure module is capable of supporting six healthy rats on orbit without compromising the health and comfort of either the astronaut crew or the rats. The enclosure is a self-contained system which can support six rats for more than seven days. Air flows from the orbiter middeck environment into the enclosure by use of fans and is filtered back into the middeck. Food is provided by nutrient bars developed at the NASA Ames Research Center, Mountain View, Calif. Water is provided by raw potatoes.

GETAWAY SPECIAL EXPERIMENTS

Four small, self-contained payloads are scheduled for the STS-8 Space Shuttle Mission.

The four bring to 16 the number of Getaway Special (GAS) payloads that will have flown on Shuttle missions.

The Cosmic Ray Upset Experiment (G-0346), or CRUX, on STS-8 is the first flight experiment designed to resolve many of the questions concerning upsets caused by single particles. An upset, or change in logic state, of a memory cell can result from a single, highly energetic particle passing through a sensitive volume in a memory cell. In doing so, it deposits or loses energy, and if enough energy is deposited, the memory cell can change state. In some technologies, enough energy can be deposited to cause another effect, called "latchup," which can result in the device destroying itself by drawing excessive current.

Positive determination of the cause of an upset in flight is difficult because a number of other influences, such as electromagnetic interference (EMI), noise on power supply lines, or voltage dropouts, can result in the same device behavior as if induced by cosmic rays.

Principal investigator is John W. Adolphson of Goddard Space Flight Center.

The ultraviolet-sensitive photographic emulsion experiment (G-0347) on STS-8 is similar to the one flown on the last Shuttle mission. In evaluating the effect of the orbiter's gaseous environment, the experiment is paving the way for the High Resolution Telescope and Spectrograph (HRTS) being built by the Naval Research Laboratory for Spacelab 2 and for the Solar Extreme Ultraviolet Telescope and Spectrograph (SEUTS) from Goddard, being planned for a future Shuttle flight.

The STS-8 flight is particularly well suited for this test because the flight pattern provides an opportunity to face an instrument in the direction of the velocity vector (direction of travel), producing a ram effect, while the vehicle is in sunlight.

That will permit better studies into the extent of film degradation due to an ion (charged particles) environment. Laboratory tests have shown that the presence of ions produces chemical reactions that can blacken these emulsions, as if they were exposed to light. Clouds of ions that can produce this effect can be produced in space through the action of solar ultraviolet radiation on a residual cloud of gas emanating from the payload or vehicle. If, in addition, an instrument opening, such as telescope apertures, face the direction of motion of the spacecraft, these ions can be scooped up and "rammed" into the interior portions of an instrument where they can interact with sensitive photographic materials.

Six sets of emulsions will be exposed for varying amounts of time for the experiment. The shortest exposure allowed by the electronics is three minutes. Longer exposures of 9, 27 and 50 minutes will examine the effects of longer duration exposures.

Principal investigator is Dr. Werner M. Neupert of Goddard.

The Japanese snow crystal experiment (G-0475) will repeat what was attempted on STS-6 in April but with improved equipment. Post-flight investigation of the STS-6 experiment showed that the temperature of the upper endplate of the GAS canister went down to minus 7 Centigrade (19 Fahrenheit), much lower than engineers had expected.

The engineers had designed the equipment to warm up the water in two tanks up to 20 C (68 F) to get enough water vapor to make snow crystals.

With the colder endplate, however, and the colder temperatures inside the canister, the water had frozen and the heaters in the water tanks could not warm up the water enough to generate water vapor.

For the STS-8 mission, engineers have increased the power of the heaters three-fold. They suspect that the weightlessness in space resulted in no convection current in the cold chamber, causing the water vapor supplied from the water tanks not to be transported efficiently to the fields of view of the TV cameras.

As a result, the engineers have added a small auxiliary fan to stir up the gas in the cold chambers. The fan will be changed in every snow-making experiment, which will be repeated four times. In the first experiment, the fan will be activated for the first third of the time. In the second experiment, the fan will be turned on from the beginning to the end of the experiment. In the third, the fan will be activated for the latter half, and in the final one, it will be on just for a short time at the beginning and a short time at the end of the experiment.

The principal investigator is Shigeru Kimura of Asahi Shimbun, Tokyo.

The Contamination Monitor Package G-0348) is similar to the one successfully flown on the OSS-1 pallet on STS-3. It will be the first GAS payload mounted on the outside of the canister lid. The experiment is designed to measure the atomic oxygen flux. Atomic oxygen, found at Shuttle altitudes, tends to be reactive, more readily causing oxidation. In this experiment, the rate of mass loss of two materials known to be readily oxidized, carbon and osmium, will be measured.

The package contains four temperature-controlled quartz crystal microbalances (TQCM) as its only sensors. one microbalance will be left uncoated for reference. The uncoated microbalance, along with one coated with carbon and one coated with osmium, will face out of the cargo bay, and a fourth one, coated with carbon. will face aft.

The principal investigator is Jack Triolo of Goddard.

COMMUNICATIONS

TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS)

The STS-8 mission will be used as a test flight to establish the ability of the Tracking and Data Relay Satellite to maintain communications with an orbiting Space Shuttle. The test will be a precursor to the operational use of the system for the STS-9/ Spacelab-1 mission, now scheduled for Oct. 28, 1983.

All modes of TDRSS communications will be exercised during the flight. The S-band link will be used for voice, commands and Shuttle housekeeping telemetry data. The Ku-band link will be demonstrated to verify system compatibility.

Testing of the various systems will begin in the first orbit of the mission, shortly after the Challenger passes Bermuda only minutes after lift off

The TDRS spacecraft is presently located in geosynchronous orbit at 67 degrees west longitude. Following the STS-8 system testing, the TDRS will be moved to a position of 41 degrees west longitude in preparation for the STS-9/Spacelab-1 mission.

TDRS-1 was deployed from the Space Shuttle orbiter Challenger during the STS-6 mission in April 1983. The satellite failed to reach geosynchronous orbit when the upper stage of the two-stage Inertial Upper Stage malfunctioned leaving the TDRS in an unsatisfactory elliptical orbit several thousand miles short of its required altitude of 22,300 statute miles

A recovery program was instituted by NASA; Spacecom, which owns and operates the satellite and leases it to NASA; and TRW, builder of the satellite.

Using tiny, one-pound thrusters which have nozzles no larger than a thimble, the engineering team devised a series of firings that ultimately raised the TDRS into geosynchronous orbit. The program of thruster firings took 58 days before the desired orbit was reached.

Since attaining geosynchronous orbit, testing has proceeded at a deliberate pace with some delays caused by a variety of software and equipment problems.

The Tracking and Data Relay Satellite System when completed will be comprised of three identical satellites, the current one placed over the Atlantic ocean, the second TDRS over the Pacific ocean and the third to serve as an in-orbit spare.

When fully operational the system will be able to relay data from nearly two dozen satellites simultaneously and provide nearly continuous data flow without interruption as a spacecraft orbits the earth.

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.

The Space Tracking and Data Network 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 Department of Defense (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 U.S. government has agreements with the governments of Australia, Spain, Senegal, Botswana, Chile, United Kingdom and Bermuda to allow NASA tracking station support to the Space Transportation System program and unmanned satellites from host country locations.

Should the Johnson Mission Control Center be seriously impaired for an extended period of time, the Goddard Network operations Control Center would become 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

For the first time, the Tracking and Data Relay Satellite System (TDRSS) is scheduled for pre-operational testing with the Shuttle. During STS-8 testing, the satellite is in geostationary orbit at 67 degrees west longitude. From this location, it can provide continuous coverage of the Shuttle from Hawaii eastward to Dakar.

After completion of the STS-8 mission testing, the satellite will move to its operational location at 41 degrees west longitude.

The Development Test objectives to be conducted with the TDRSS during the STS-8 mission will be in preparation for the extended support of the TDRSS with the STS-9/ Spacelab-1 mission.

During the nominal entry and landing phase planned for Edwards Air Force Base, Calif., the Goldstone and Buckhorn, Calif., S-band and C-band stations at the Pacific Missile Test Center, Vandenberg Air Force Base, Edwards Air Force Base and Dryden Flight Research Facility, Calif., will provide highly critical tracking, telemetry, command and air-to-ground support to the orbiter and send appropriate 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
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)	S-band, 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 12 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-8 CREWMEMBERS



S83-31724 -- Official STS-8 crew portrait in flight suits. Seated from left to right are Daniel C. Brandenstein, pilot; Richard H. Truly, commander; and Guion S. Bluford Jr., Mission specialist. Standing from left to right are Dale A. Gardner, mission specialist; and William E. Thornton, mission specialist.

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BIOGRAPHICAL DATA

NAME: Richard H. Truly (Captain, USN) NASA Astronaut, STS-8 Commander

BIRTHPLACE AND DATE: Born in Fayette, Miss., on Nov. 12, 1937. His father, James B. Truly resides in Alexandria, Va.

PHYSICAL DESCRIPTION: Brown hair; brown eyes; height: 5 ft. 8 in.; weight: 150 lb.

EDUCATION: Attended schools in Fayette and Meridian, Miss.; received a bachelor of aeronautical engineering degree from Georgia Institute of Technology in 1959.

MARITAL STATUS: Married to the former Colleen Hanner of Milledgeville, Ga. Her mother, Mrs. Daniel M. Hanner, resides in Rutledge, Ga.

CHILDREN: Richard Michael, May 10, 1961; Daniel Bennett, Aug. 9, 1963; Lee Margaret, Sept. 8, 1964.

NASA EXPERIENCE: Truly became a NASA astronaut in September 1969. He was a member of the astronaut support crew and a capsule communicator for all three of the manned Skylab missions and the Apollo Soyuz mission.

Truly and Joe H. Engle were one of the two two-man crews that flew Space Shuttle Approach and Landing Test (ALT) flights during the period June through October 1977. This series of critical orbiter flight tests initially involved Boeing 747/orbiter captive-active flights, followed by air-launched, unpowered glide, approach, and landing tests (free flights). There were three captive tests with the orbiter Enterprise carried atop the Boeing 747 carrier aircraft allowing inflight test and checkout of orbiter systems, and five free flights which permitted extensive evaluations of the orbiter's subsonic flying qualities and performance characteristics during separation, up-and-away flight, flare, landing and rollout -- providing valuable real-time data duplicating the last few minutes of an operational Shuttle mission. Truly and Engle flew the second and fourth free flights, with Free Flight 4 being the first flight in the orbital configuration (with the tailcone removed).

He was backup pilot for STS-1, the first orbital flight of the Shuttle Columbia.

Truly was the pilot on the second orbital test flight of the Space Shuttle Columbia, launched from Kennedy Space Center, Fla., on Nov. 12, 1981. His spacecraft commander for this flight was Col. Joe H. Engle, USAF.

Despite a mission shortened from five days to two days because of a failed fuel cell, the crew accomplished more than 90 percent of the objectives set for STS-2 before returning to a landing on the dry lakebed at Edwards Air Force Base, Calif., Nov. 14, 1981. Major test objectives included the first unloaded tests in space of a 50-foot remote manipulator arm designed to remove payloads from the orbiter payload bay, as well as to retrieve satellites for repair or return to earth. STS-2 demonstrated the orbiter's capability to support attached payloads and provide a stable platform for the conduct of earth surveys. Extensive data was obtained for the OSTA-1 payload which was comprised of seven scientific experiments designed to test advanced techniques and instruments to survey earth from space and gather data on earth resources and earth's environment.

Twenty-nine flight test maneuvers were performed during the entry at speeds from Mach 24 (18,500 mph) to subsonic. These maneuvers were designed to most efficiently extract aerodynamic and aerothermodynamic data to verify the orbiter performance, stability and control, and heating characteristics during its hypersonic entry into the earth's atmosphere .

CURRENT ASSIGNMENT: Truly is spacecraft commander for STS-8, the third flight of the orbiter Challenger.

BIOGRAPHICAL DATA

NAME: Daniel C. Brandenstein (Commander, USN) NASA Astronaut, STS-8 Pilot

BIRTHPLACE AND DATE: Born Jan. 17, 1943, in Watertown, Wis. His parents, Mr. and Mrs. Walter Brandenstein, are residents of Watertown.

PHYSICAL DESCRIPTION: Brown hair; blue eyes; height: 5 ft., 11 in.; weight: 185 lb.

EDUCATION: Graduated from Watertown High School, Watertown, Wis., in 1961; received a bachelor's degree in mathematics and physics from the University of Wisconsin (River Falls) in 1965.

MARITAL STATUS: Married to the former Jane A. Wade of Balsam Lake, Wis. Her parents, Mr. and Mrs. Albert Wade, reside in Balsam Lake.

CHILDREN: Adelle, Jan. 7, 1972.

NASA EXPERIENCE: Brandenstein 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 ascent capsule communicator and a member of the astronaut support crew for STS-1, the first flight of the Space Shuttle Columbia. He was subsequently assigned to the STS-2 astronaut support crew and was the ascent capsule communicator for the second Space Shuttle flight.

CURRENT ASSIGNMENT: Brandenstein is pilot for STS-8.

BIOGRAPHICAL DATA

NAME: Dale A. Gardner (Lieutenant Commander, USN) NASA Astronaut, STS-8 Mission Specialist (MS-1)

BIRTHPLACE AND DATE: Born Nov. 8, 1948, in Fairmont, Minn., but grew up in Sherburn, Minn., and Savanna, Ill. Now considers his hometown to be Clinton, Iowa, where his parents, Mr. and Mrs. William R. Gardner, currently reside.

PHYSICAL DESCRIPTION: Brown hair; brown eyes; height: 6 ft.; weight: 160 lb.

EDUCATION: Graduated from Savanna Community High School, Savanna, Ill., in 1966; received a bachelor's degree in engineering physics from the University of Illinois in 1970.

MARITAL STATUS: Married to the former Sue Grace Ticusan of Indianapolis, Ind. Her father, John Ticusan, resides in Indianapolis.

CHILDREN: Lisa Amanda, Dec. 18, 1977; Todd Allan, Dec. 19, 1982.

NASA EXPERIENCE: Gardner 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. He served as a support crew astronaut for STS-4.

CURRENT ASSIGNMENT: Gardner is a mission specialist for STS-8.

BIOGRAPHICAL DATA

NAME: Guion S. Bluford Jr. (Lieutenant Colonel, USAF) NASA Astronaut, STS-8 Mission Specialist (MS-2)

BIRTHPLACE AND DATE: Born in Philadelphia, Pa., on Nov. 22, 1942.

PHYSICAL DESCRIPTION: Black hair; brown eyes; height: 6 ft.; weight: 180 lb.

EDUCATION: Graduated from Overbrook Senior High School in Philadelphia, Pa., in 1960; received a bachelor's degree in aerospace engineering from the Pennsylvania State University in 1964; a master's degree with distinction in aerospace engineering from the Air Force Institute of Technology in 1974; and a doctorate in aerospace engineering with a minor in laser physics from the Air Force Institute of Technology in 1978.

MARITAL STATUS: Married to the former Linda Tull of Philadelphia, Pa.

CHILDREN: Guion Stewart III, June 12, 1964; James Trevor, Oct. 25, 1965.

NASA EXPERIENCE: Bluford 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. He has worked with the remote manipulator system, Spacelab-3 experiments, Shuttle systems, Shuttle Avionics Integration Laboratory (SAIL), and the Flight Systems Laboratory (FSL) while completing various assignments within the Astronaut office at the Johnson Space Center.

CURRENT ASSIGNMENT: Bluford is a mission specialist for STS-8.

BIOGRAPHICAL DATA

NAME: William Edgar Thornton (M.D.) NASA Astronaut, STS-8 Mission Specialist (MS-3)

BIRTHPLACE AND DATE: Born in Faison, N.C., on April 14, 1929.

PHYSICAL DESCRIPTION: Blond hair; blue eyes; height: 6 ft.; weight: 200 lb.

EDUCATION: Attended primary and secondary schools in Faison, N.C.; received a bachelor's degree in physics and a medical doctor's degree from the University of North Carolina in 1952 and 1963, respectively.

MARITAL STATUS: Married to the former Elizabeth Jennifer Fowler, of Hertfordshire, England.

CHILDREN: William Simon, March 15, 1959; James Fallon, Jan. 4,

NASA EXPERIENCE: Thornton was selected as a scientist-astronaut by NASA in August 1967. He completed the required flight training at Reese Air Force Base, Texas. Thornton was physician crew member on the highly successful Skylab Medical Experiments Altitude Test (SMEAT) -- a 56-day simulation of a Skylab mission enabling crewmen to collect medical experiments baseline data and evaluate equipment, operations, and procedures. He was also the mission specialist on SMD III, a simulation of a Spacelab life sciences mission.

He was a member of the astronaut support crew for the Skylab 2, 3 and 4 missions, and principal investigator for Skylab experiments on mass measurement, anthropometrical measurements, hemodynamics, and human fluid shifts and physical conditioning.

As a member of the astronaut office's operations missions development group, Thornton was responsible for developing crew procedures and techniques for deployable payloads, and for maintenance of crew condition in flight. He has developed advanced techniques for and made studies in kinesiology and kinesymmetry related to space operations.

During STS operations he has continued physiological investigations in the cardiovascular and musculoskeletal and neurological areas. He developed the Shuttle treadmill for in-flight exercise and several other onboard devices. His recent work has been concentrated on the Space Adaptation Syndrome, with relevant investigations on STS-4, STS-5 and STS-6.

CURRENT ASSIGNMENT: Thornton is a mission specialist for STS-8.

DO-IT-YOURSELF ORBITAL DISTANCE CALCULATIONS

To calculate mission distance flown-after any number of orbits, multiply average orbital altitude by 2; add earth diameter, 6888 nm, 7921 sm, 12,757 km; multiply by x (3.1416) to get orbit circumference; multiply orbit circumference by number orbits flown.

$$\begin{array}{r}
 \text{Example: } 160 \text{ nm average altitude} \times 2 = \quad 320 \text{ nm} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 6888 \text{ nm} \\
 + \text{ earth diameter} = 7208 \text{ nm} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \times \pi \quad 3.1416 \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{-----} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 22,645 \text{ nm} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \times \text{ number orbits } 96 \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{-----} \\
 = 2,173,886 \text{ nm flown.}
 \end{array}$$

Or, using the table below, find the circumference of an orbit corresponding to the average mission altitude and multiply by number of orbits flown.

Avg Alt	Orb Circum	Avg Alt	Orb Circum	Avg Alt	Orb Circum
130 nm	22,456 nm	155 nm	22,613 nm	185 nm	22,802 nm
149 sm	25,928 sm	178 sm	26,005 sm	213 sm	26,222 sm
241 km	41,588 km	287 km	41,879 km	343 km	42,229 km
135 nm	22,488 nm	160 nm	22,645 nm	190 nm	22,833 nm
155 sm	25,861 sm	184 sm	26,042 sm	218 sm	26,258 sm
250 km	41,648 km	296 km	41,938 km	352 km	42,287 km
140 nm	22,519 nm	170 nm	22,676 nm	195 nm	22,865 nm
161 sm	25,897 sm	195 sm	26,077 sm	224 sm	26,295 sm
259 km	41,705 km	315 km	41,996 km	361 km	42,346 km
145 nm	22,550 nm	175 nm	22,739 nm	200 nm	22,896 nm
167 sm	22,932 sm	201 sm	26,150 sm	230 sm	26,330 sm
268 km	41,763 km	324 km	42,113 km	370 km	42,346 km
150 nm	22,582 nm	180 nm	22,770 nm	285 nm*	23,430 nm
172 sm	25,969 sm	207 sm	26,185 sm	328 sm	26,944 sm
278 km	41,822 km	333 km	42,170 km	528 km	43,392 km

All figures rounded off to nearest whole number.

* Solar Maximum repair altitude

SPACE SHUTTLE PROGRAM MANAGEMENT

NASA Headquarters

James M. Beggs	Administrator
Dr. Hans Mark	Deputy Administrator
Maj. General J. A. Abrahamson	Associate Administrator for Space Flight
Jesse W. Moore	Deputy Associate Administrator for Space Flight
Neil B. Hutchinson	Director, Space Shuttle Operations Office
Robert E. Smylie	Associate Administrator for Space Tracking and Data Systems
Robert O. Aller	Program Director, TDRSS

Ames Research Center

C. A. Sylvertson	Director
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Dryden Flight Research Center

John A. Manke	Facility Manager
Gary Layton	Shuttle Project Manager

Goddard Space Flight Center

Dr. Noel Hinners	Director
John J. Quann	Deputy Director
Richard S. Sade	Director of Networks
Gary A. Morse	Network Operations Director
J. M. Stevens	Network Support Manager

Johnson Space Center

Gerald D. Griffin	Director
Robert C. Goetz	Deputy Director
Clifford E. Charlesworth	Director of Space Operations
Henry E. Clemente	Associate Director
Glynn S. Lunney	Manager, National Space Transportation Systems Program Office

Kennedy Space Center

Richard G. Smith	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
Robert B. Sieck	STS-8 Flow Director

Marshall Space Flight Center

Dr. William R. Lucas	Director
Thomas J. Lee	Deputy Director
Robert E. Lindstrom	Manager, Shuttle Projects Office
James E. Kingsbury	Director, Science and Engineering

SHUTTLE FLIGHTS AS OF AUGUST 1983

7 TOTAL FLIGHTS OF THE SHUTTLE SYSTEM



STS-5 11/11/82 - 11/16/82	
STS-4 06/27/82 - 07/04/82	
STS-3 03/22/82 - 03/30/82	
STS-2 11/12/81 - 11/14/81	STS-7 06/18/83 - 06/24/83
STS-1 04/12/81 - 04/14/81	STS-6 04/04/83 - 04/09/83

OV-102
Columbia
(5 flights)

OV-099
Challenger
(2 flights)