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PROJECT: UNMANNED GEMINI (GT-2)

SCHEDULED LAUNCH: December 7, 1964

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FOR RELEASE: FRIDAY AM's
December 4, 1964

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SECOND UNMANNED GEMINI LAUNCH SET FOR DEC. 7

The National Aeronautics and Space Administration will launch an unmanned Gemini spacecraft this month on a suborbital flight and ram it back through the atmosphere at 16,600 miles per hour to test the spacecraft under maximum reentry heating conditions.

In addition, the spacecraft will carry all Gemini systems required to qualify it and the launch vehicle for two-man orbital flight.

The flight, designated GT-2, scheduled for no earlier than Dec. 7 will last about 20 minutes with the spacecraft reaching an altitude of about 106 miles and traveling approximately 2,150 statute miles downrange from Cape Kennedy.

U.S. Naval forces will be deployed along the flight path and will recover the spacecraft about 800 miles east of San Juan.

A successful flight will insure a margin of safety on later manned Gemini missions where normal reentry heating will be substantially below the severe rates planned for this flight.

GT-2 is a crucial mission. If all goes well, NASA can proceed with confidence toward launching the first manned Gemini early in 1965. If the test shows major deficiencies in the spacecraft or booster, it could set the program back four to six months for incorporation and testing of design changes and conceivably reconfiguring another spacecraft for an unmanned flight.

This will be the second flight test of the two-man Gemini spacecraft. The first was conducted April 8, 1964, and demonstrated the structural compatibility of the spacecraft and the launch vehicle from liftoff through orbital insertion, launch vehicle and spacecraft heating conditions during launch, and qualified certain spacecraft systems, among other objectives.

The launch was an unqualified success. Liftoff occurred only one second later than scheduled, following a smooth countdown.

Gemini is the nation's second manned space flight program. Dr. George E. Mueller, NASA Associate Administrator for manned space flight, is acting Gemini program director. William C. Schneider is deputy director.

The program is managed by the Manned Spacecraft Center's Gemini Program Office, headed by Charles W. Mathews. Col. Richard C. Dineen, USAF Space Systems Division; and Lt. Col. John G. Albert, 6555th Aerospace Test Wing, Patrick Air Force Base, Fla.; are responsible for the development and launch, respectively, of the Gemini Launch Vehicle (GLV), a modified Titan II rocket.

Overall responsibility for conducting the GT-2 mission rests with Christopher C. Kraft, Jr., MSC Assistant Director for Flight Operations, who has been designated GT-2 Mission Operations Director.

A wide range of Department of Defense support for this mission, including tracking, recovery ships and launch services, is under the direction of Lt. Gen. Leighton I. Davis, USAF, National Range Division commander ana DOD Manager for Manned Flight Support Operations.

Prime contractor for the manufacture of the Gemini spacecraft is McDonnell Aircraft Corp., St. Louis. The Martin Co., Baltimore, manufactures the Gemini Launch Vehicle, which is supplied to NASA through the Space Systems Division of the Air Force Systems Command.

-End-

(End of general news release. Background information follows.)

TEST OBJECTIVES

The GT-2 mission is designed to flight-qualify the total spacecraft as an integrated system for manned space flight. A major item is the afterbody heat protection. Flow patterns over the spacecraft during reentry cannot be fully simulated in ground testing. The ballistic trajectory for this flight was selected to provide the maximum reentry heating rate for this spacecraft.

Thermal design temperatures are:

Equipment	Nominal Design Reentry	Spacecraft 2 Reentry
Rene' shingles	1725 degrees F	1740 degrees F
Heat Shield Bondline	620 degrees F	680 degrees F

PRIMARY MISSION OBJECTIVES

Satisfactory completion of the prime objectives is mandatory for a successful mission. These objectives are to demonstrate and evaluate:

a. Adequacy of the reentry module's heat protection equipment during a maximum heating rate reentry.

b. Spacecraft structural integrity and compatibility of the spacecraft from lift-off through landing.

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c. Satisfactory performance of the following spacecraft systems: reentry control, retrograde rocket, parachute recovery, pyrotechnics, communications, electrical, sequential, environmental control, spacecraft displays, orbital attitude and maneuver and associated electronics, inertial measuring unit (during launch and reentry), inertial guidance (during turn-around and retro maneuvers), spacecraft recovery aids, and tracking and data transmission.

d. Check-out and launch procedures.

e. Backup guidance steering signals throughout launch.

SECONDARY MISSION OBJECTIVES

Secondary mission objectives are desirable, but not mandatory, for mission success. These objectives include:

a. Obtain test results on the cryogenics and fuel cell systems.

b. Demonstrate Gemini Launch Vehicle (GLV) and spacecraft compatibility through the countdown and launch sequence.

c. Provide training for flight controllers.

d. Further qualify ground communications and tracking systems in support of future manned missions.

e. Further flight qualify the launch vehicle and demonstrate its ability to insert the spacecraft into a prescribed flight path.

CRITICAL SYSTEMS

Performance of the following systems will be watched carefully:

a. Spacecraft:

Orbit attitude and maneuver system; reentry control system; retrorockets.

Guidance and control system - computer attitude control and maneuver electronics, inertial measuring unit, horizon scanner (one for GT-2), manual data insertion unit and attitude display.

Electrical system - sequential, power, and crewman simulators.

Environmental control system; coolant system; communications system - ultra high frequency voice transmitter/receiver, high frequency voice transmitter/receiver, digital command system, voice control center, C-band beacon, UHF recovery beacon, telemetry transmitters, antenna systems, electronic timer, event timer.

Data acquisition system - PCM multiplexer encoder, tape recorder (data playback), sensors and conditioners, on-board recording frequency data system, display panel and window cameras. Landing systems - main and pilot parachutes; pyrotechnics systems; crew station - water system (minus drinking water dispenser) to collect fuel cell water, cabin displays, and switches.

b. Gemini Launch Vehicle:

Flight control, guidance, electric, hydraulic, structures, propulsion, instrumentation, range safety, ordnance, and malfunction detection system (MDS).

FLIGHT PLAN

The unmanned GT-2 spacecraft will be launched from Complex 19 at Cape Kennedy on an azimuth of 105 degrees. Spacecraft separation will be followed by a turn-around and a maneuver to retroattitude. The retrorockets, though not needed to perform this mission, will be sequence fired 62 seconds after spacecraft separation.

Total range from lift-off to touchdown is programed for approximately 2,150 statute miles. The mission should take about 20 minutes from lift-off to touchdown.

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A nominal GLV flight will consist of two guidance phases. In the first phase, the GLV will be programed in roll to establish the required azimuth reference plane, and then in pitch to follow the desired trajectory. This is to be accomplished by a programer contained in the three-axis reference system (TARS). The second phase will begin several seconds after staging and is to last throughout the remainder of second stage powered flight. This phase will be under the control of the GE/Burroughs radio guidance system.

LAUNCH DAY

T minus one day	GLV propellant loading complete.
T minus 420 minutes	Begin countdown.
T minus 400 minutes	Spacecraft power on.
T minus 380 minutes	GLV and spacecraft systems check.
T minus 330 minutes	Spacecraft command checks with Mission Control Center
	Spacecraft computer on.
T minus 265 minutes	Spacecraft and GLV siumlated flight test. Fuel cell activation.
T minus 220 minutes	Spacecraft/computer memory loading.
T minus 190 minutes	Pad clear for GLV ordnance and range command checks.
T minus 160 minutes	GLV tanks to launch pressure.
T minus 145 minutes	Ground test of launch program.

T minus 120 minutes	Spacecraft fuel cell, Go/No Go.
T minus 75 minutes	Spacecraft hatch closure. White Room dismantle.
T minus 35 minutes	Erector lowering.
T minus 30 minutes	Activate all spacecraft communication links.
T minus 20 minutes	Spacecraft to internal power.
T minus 13 minutes	Spacecraft RCS-OAMS static fire.
T minus 6 minutes	GLV-spacecraft final status check.
T minus 3 minutes	Update GLV launch azimuth.
T minus 3 minutes	Spacecraft update computer.
T minus 0	Engine start signal
T plus 1.8 seconds	Thrust chamber pressure switch -- calibrated for 77 percent of rated engine thrust -- is activated, starting a two-second timer.
T plus 3.8 seconds	Spacecraft umbilicals release.
	GLV tiedown bolts fire.
T plus 4 seconds (lift-off)	Lift-off begins.
T plus 155 seconds	First stage engines shutdown - BECO.
	Second stage engine ignites. Stage separation explosive nuts explode.
T plus 156 seconds	Fire-in-the-hole staging accomplished.
T plus 201 seconds	Horizon scanner and nose fairing jettison.
T plus 337 seconds	Terminate radio guidance command steering.
T plus 339 seconds	Second stage engine cutoff (SECO).

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T plus 361 seconds	Spacecraft separation. Initiate OAMS thrusting.
T plus 361 seconds	Initiate roll to zero degrees roll, pitch and yaw attitude.
T plus 375 seconds	Terminate OAMS thrusting.
T plus 389 seconds	Initiate spacecraft turnaround.
	Activate RCS system.
T plus 404 seconds	Establish retroattitude pitch down.
T plus 421 seconds	Separate equipment adapter section.
	Initiate automatic retrograde rocket firing sequence.
T plus 466 seconds	Jettison retrograde adapter section.
T plus 570 seconds	Initiate 15 degrees per second roll rate.
T plus 855 seconds	At 21,000 feet - open cabin vent valve inlet snorkel, and cabin recirculation valve. Energize suit compressor.
T plus 883 seconds	Deploy pilot parachute at 10,600 - feet altitude.
T plus 885 seconds	Separate R and R section at 9,600 feet.
T plus 886.5 seconds	Deploy main parachute at 9,000 ft.
T plus 907 seconds	Release single point suspension at 6,700 feet. Spacecraft reorients to landing attitude.
T plus 915 seconds	Energize recovery beacon.
T plus 1119 seconds	Close cabin water seal at 1,500 feet.
T plus 1153 seconds	Touchdown.

MAJOR MISSION PARAMETERS

Launch azimuth - 105 degrees.

Launch angle - vertical.

Range to touchdown - about 1,870 nautical or 2,150 statute miles.

Relative velocity at separation - about 24,400 feet per second (16,600 mph).

Altitude at separation - about 87 nautical miles; 100 statute miles.

Landing point - Atlantic Ocean, several hundred miles NE of Trinidad.

LAUNCH WINDOW

GT-2 will not be launched before one hour after sunrise nor after four hours before sunset. A minimum of three daylight hours is desirable for spacecraft recovery after landing.

WEATHER

Weather conditions along the ground track will be continuously evaluated prior to and during countdown. Launch site weather conditions must be satisfactory for optical coverage through staging. Weather which results in unsatisfactory recovery conditions will be cause for launch hold or postponement if it extends beyond the launch window.

The following weather conditions in the recovery zone will serve as guidelines:

A. Surface winds - 30 knots maximum.

B. Wave height - eight feet maximum.

C. Clouds - no cloud base below 1,500 feet.

D. Visibility - five miles minimum.

GT-2 SPACECRAFT CONFIGURATION

The spacecraft for this mission is a production configuration of all systems and structures necessary for launch, retrograde, reentry and recovery.

Although the spacecraft is unmanned, crewman simulators will be flown to perform the sequential functions normally performed by the flight crew. These include signals for launch vehicle-spacecraft separation, spacecraft turnaround, retrofire, and retroadapter separation.

SPACECRAFT STRUCTURE

The spacecraft consists of two major assemblies -- the reentry module and the adapter module. Both structures together measure 18.89 in length, seven and one-half feet in diameter at the base of the reentry module, and 10 feet in diameter at the base of the adapter module. The spacecraft weight at launch will be approximately 6900 pounds and the reentry module weight at landing will be about 4700 pounds.

REENTRY MODULE

The reentry module is comprised of three primary structural sections -- cabin section, reentry control system (RCS) section, and the redezvous and recovery (R&R) section. For this mission, the reentry module is ballasted to simulate the maximum design reentry weight of a manned Gemini spacecraft.

ADAPTER MODULE

The adapter module consists of two primary structural sections -- equipment section and retrograde section.

SPACECRAFT SYSTEMS

In general, the only spacecraft components omitted from the GT-2 craft are those which would have no significance on the unmanned ballistic mission and can be qualified by other means for subsequent flights. Deleted components include the redezvous radar, the docking system, food containers, the 8.3-foot drogue parachute, drinking water dispensers, waste disposal system, the personal hygiene system, biomedical tape recorder, voice tape recorder, the survival kit, egress kit, and one of the UHF and HF transceivers, (two of each will be normally carried).

CREW STATION

The basic configuration of the crew station is identical to later manned spacecraft. All controls, displays, and switch panels -- except those for the Agena target vehicle -- are incorporated.

Two crewman simulators are installed in the ejection seats. These simulators consist of sequencers, batteries, cameras, lights, instrumentation components, a timer, and a tape recorder which are installed to perform essential functions normally performed by the crew and to record special vibrations and temperature measurements during launch and reentry.

In addition, four cameras will record the instrument displays and the pilot's view from the left window.

Spacecraft coolant is circulated through coldplates on the crewman simulators, and there is normal oxygen flow through them. They have no metabolic functions.

GUIDANCE AND CONTROL SYSTEM

This mission is intended to qualify the necessary spacecraft systems, including secondary guidance and control, for a manned flight. It is intended to demonstrate critical system safety of flight modes of operation under launch, orbit, and reentry environments. The design of the manned system depends upon the astronauts to select operating modes as well as provide redundancy.

Since the spacecraft is unmanned, a crewman simulator provides the necessary signals to accomplish mode and attitude selection; however, no provisions are made to switch to redundant critical components. The automatic mode connecting the attitude control and maneuver electronics (ACME) system to the inertial measurement unit has been activated (for horizontal control, small end forward) to provide the attitude reference capability to the ACME system.

The guidance and control system will be used to provide automatic control of the spacecraft attitude or attitude rates from spacecraft separation until pilot parachute deployment. During countdown and launch, GLV automatic programing and radio guidance system will generate the necessary commands for the GLV.

After the post-SECO correction is computed and displayed, the inertial guidance system will receive the spacecraft separation signal; the system will then enter the launch abort reentry control mode. The launch terminal conditions, as calculated by the inertial guidance system at SECO, will be transferred to the reentry control system as initial conditions commands to insure landing at the predicted landing point.

The inertial guidance system will monitor the separation and retrofire maneuvers and generate reentry control signals; however, for reentry these signals will not be transmitted to the control system. The reentry is a fixed-rate ballistic type.

The turn-around maneuver will be initiated by the crewman simulators and controlled by the attitude control system which will be referenced to the inertial platform. The platform will remain inertial from lift-off until the 10,000 foot altitude barostat signal is received after reentry when the inertial guidance system will be turned off. Reentry navigation and the control commands will be monitored to demonstrate the reentry control suitability and accuracy.

Backup attitude reference will be established by a camera which will record left window views of the horizon during entire flight; however, the first priority is to determine the horizon sighting capabilities throughout reentry heating.

The spacecraft attitude control system is required on the GT-2 spacecraft to perform damping of spacecraft rates during and after separation; to roll the vehicle to, and maintain the vehicle at, a horizontal attitude so that the horizon scanner and the horizon view cameras may obtain suitable data; to control turn-around and pitch maneuvers to achieve retroattitude; to control retroattitude during retro-fire; to establish and control spacecraft attitude during reentry; and to control the fixed reentry rate to achieve a high-heating rate trajectory.

The attitude control system for GT-2 consists of the attitude control and maneuvering electronics, and associated controls and displays.

PROPULSION

The reentry control system (RCS) will provide thrust impulse to complete the turn-around for proper retrofire attitude, will hold the spacecraft attitude during retrofire, and will stabilize the spacecraft during reentry until main parachute deployment.

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Redundant RCS rings A and B are incorporated into the spacecraft. Each ring contains eight 25-pound thrusters. During final countdown minutes, one ring of the RCS will be activated; upon verification of system performance through a monitoring of source and regulated pressures, two thrusters will be fired for a visual verification that the system is operable. The RCS will then remain inactive until 30 seconds after spacecraft-GLV separation when the second ring (second subsystem) will be activated. The RCS will continue its operation until main parachute deployment.

The orbit attitude maneuver system (OAMS) will be used for spacecraft separation from the GLV and for initiation of turn-around prior to the retrofire maneuver. For this flight, only two 100-pound-thrust aft-firing engines and two 25-pound-thrust yaw-right firing engines will be used in flight.

All thrustors burn monomethyl hydrazine and nitrogen tetroxide in Gemini in contrast to the hydrogen peroxide system employed in Mercury.

Gemini retrorockets are installed for check-out of their capability to withstand launch, for operation in space, for check-out of spacecraft structure to withstand the temperatures and loads imposed by retrofire, and for an inflight demonstration of satisfactory alignment. All four retrorockets will be used. Each successive engine will be fired at 5.5-second intervals after the first ignition. Each retrorocket produces approximately 2500 pounds of thrust for about 5.5 seconds.

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COMMUNICATIONS SUBSYSTEMS

The communications subsystems include: voice (HF, UHF, voice control center); telemetry transmitters (low frequency for real time and high frequency for delayed time); tracking subsystem (C-band and S-band transponders and acquisition aid beacon); recovery subsystem (UHF recovery beacon, flashing light); antenna subsystem (recovery antenna, UHF stub antenna, descent antenna, C-band helices, phase shifter, power divider, HF and UHF whip antennas, C-band and S-band slots, quadriplexer, and coaxial switches); time reference subsystem (electronic timer, event timer, and clock).

LANDING AND RECOVERY SYSTEM

The pilot parachute is an 18-foot-diameter ringsail parachute deployed by a mortar. The function of this parachute is to separate the R&R canister from the reentry module and to prevent recontact of the R&R section with the main parachute canopy.

The main parachute is an 84-foot-diameter ringsail parachute designed to provide stable descent at a vertical velocity of 30 feet per second at sea level.

The parachute deploys from the open end of the R&R section and supports the spacecraft vertically from a single point for 22 seconds. Then the single point suspension is released, which permits the spacecraft to reposition to a two-point bridle suspension. This orients the spacecraft in the proper landing attitude, with the nose 35 degrees above the horizon. Prior to use, the forward bridle strap is folded and retained on the parachute assembly, and the aft strap is stowed in a trough that extends along the spacecraft between the hatches.

EJECTION SEATS

Two ejection seat assemblies have been reworked for mounting of the two crewman simulators. Although operating elements of the ejection system will be flown, these seats will not be armed for ejection. Both seats are clamped to the seat rails to minimize vibration damage to the crewman simulators.

PYROTECHNICS

This spacecraft will flight test all Gemini pyrotechnic devices except the docking bar, emergency docking release, and landing gear devices.

Functional pyrotechnics include:

A. Flexible linear-shaped charges for separating the GLV forward skirt interface section from the adapter equipment compartment; adapter equipment section from the adapter retrograde section; and all tubes, wire bundles, and titanium straps between the adapter retrograde section and the reentry module.

B. Mild detonating fuse for breaking the attachment bolts between the R&R and RCS sections.

C. Guillotines for severing various wire bundles and cables.

D. Tubing cutter sealers to cut the OAMS fuel and oxidizer lines between the equipment and retro sections of the adapter prior to retrofire.

E. Horizon scanner fairing and horizon scanner release.

F. Several electric circuit dead facing switches.

G. Valves in the OAMS fuel and oxidizer systems.

H. Landing system devices.

FUEL CELL

The fuel cell, located in the equipment section, will be flown to establish prelaunch activation and check-out procedures and to confirm its ability to function properly after launch.

The Gemini fuel cell power system consists of two sections, each section containing three stacks of 32 cells each. Each cell contains two catalytic electrodes which enclose an ion exchange membrane. Each fuel cell section is cylindrical in shape, about 13 inches in diameter and 25 inches long. The weight of each section is about 70 pounds.

Hydrogen is passed to one side of each cell, then passed through the membrane where it reacts with oxygen to form water. This water is collected by a series of wicks and is transported to the water collection system of the environmental control system.

Coolant passes through tubes in two loops in each cell and is used to control the fuel cell temperature. The coolant passes through the stacks in each section in series and through both sections in parallel.

The electrical output from each stack will be fed into a dummy load onboard the spacecraft. The fuel cell wi. provide no power to the spacecraft electrical system.

ENVIRONMENTAL CONTROL SYSTEM

The environmental control system (ECS) for GT-2 is a completely operational system. The crewman simulators provide the required manual controls for the ECS. These controls (a) actuate oxygen high-rate for reentry, (b) open snorkel valve and recirculation valve at approximately 21,000 feet altitude during reentry, and (c) close water seal in cabin relief valve at approximately 1,500 feet altitude.

The pressure drop of the pressure suits will be simulated by an orifice in the crewman simulator.

THERMAL PROTECTION

The GT-2 reentry trajectory has been planned to qualify the spacecraft's heat protection materials. For this mission, the heat shield has been reduced to approximately one-half the thickness of the production design in order to achieve maximum heating rate reentry test conditions and high total heat rate on the bondline of the afterbody.

As a further aid in the evaluation of heat protection materials, the spacecraft has been heavily instrumented with thermocouples. They are generally located on the inside surface of the outer structure. In addition eight static pressure transducers are installed on the afterbody to assist in the definition of the thermal environment and heating rates; an additional primary purpose of these transducers is to compare the flight pressures with those obtained from earlier wind tunnel tests.

CAMERAS

Three 16mm black and white motion picture cameras are mounted on the crew simulator pallets to monitor the panel instruments during the GT-2 mission.

In addition, a 16mm miniature color motion picture camera is mounted on the left pallet assembly to photograph the view from the spacecraft commander's window. This camera will start operating at retrofire and run for 12 minutes.

GEMINI LAUNCH VEHICLE (GLV)

The Gemini Launch Vehicle is a modified Titan II. Its overall length, including the spacecraft, is 109 feet. The spacecraft is 19 feet long; GLV stage I is 63 feet; and stage II is 27 feet. Fueled weight, including spacecraft, is 340,000 pounds.

Propulsion is provided by two stage I and one stage II liquid propellant engines which burn a 50-50 blend of monomeythl hydrazine and unsymmetrical-dimethyl hydrazine as fuel, with nitrogen tetroxide as oxidizer. Stage I engines produce about 430,000 pounds of thrust at lift-off, and the stage II engine produces about 100,000 pounds of thrust at altitude. Fuels are storable for easy handling and hypergolic (ignite on contact with each other), which eliminates the need for an ignition system.

GLV modifications include:

A. Malfunction Detection System to sense problems in any of the booster systems and transmit this information to the flight crew.

B. Redundant flight control system.

C. Redundancy in the electrical system.

D. Substitution of radio guidance for inertial guidance to provide a weight reduction and a more responsive system during critical orbital injection.

E. Elimination of retro and vernier rockets.

F. New truss in second stage to hold new flight control, MDS, and guidance equipment.

G. New stage II forward oxidizer skirt assembly to mate the launch vehicle with the spacecraft.

H. Simplification of trajectory tracking requirements necessary for range safety by use of MISTRAM (Missile Tracking Measurement) system.

I. Redundancy in hydraulic systems where desirable for pilot safety, such as hydraulic actuators for engine gimballing.

J. Instrumentation to provide additional data during preflight check-out and flight.

GLV program management for NASA is under the direction of the Space Systems Division of the Air Force Systems Command. Contractors include: air frame and system integration, Martin, Baltimore (Md.) Division; propulsion systems, Aerojet-General Corp., Sacramento, Calif.; radio command guidance system, General Electric Co., Syracuse, N. Y.; ground guidance computer, Burroughs Corp., Paoli, Pa.; systems engineering and technical direction, Aerospace Corp., El Segundo, Calif.

RANGE SAFETY

GLV-2 contains a range safety flight-termination system which permits the Range Safety Officer to track the launch vehicle, terminate engine thrust, and physically destroy the vehicle if necessary to protect property and personnel from an uncontrolled vehicle.

NETWORK OPERATIONS

Tracking network support for this mission is limited to Cape Kennedy and the Eastern Test Range stations, supplemented by ships and aircraft.

Computers at the Goddard Space Flight Center, Greenbelt, Md., will process flight data to be displayed in the Mission Control Center.

Data will be gathered in both delayed and real time. Data gathering consists of radar and telemetry recording capability plus command control and guidance check-out throughout the flight phase.

Radars at Cape Kennedy and Patrick Air Force Base will track the vehicle during launch. Stations at Grand Bahama Island and Grand Turk will have radar, telemetry and command control capability; Eleuthera will provide MISTRAM track; San Salvador will track by radar; and Antigua will provide terminal phase information. The tracking ship Rose Knot Victor will be stationed north of Grand Turk and will record telemetry from SECO through adapter retrograde section jettison.

Playback of telemetry recorded onboard the spacecraft will begin at an altitude of about 62,000 feet during descent and will continue after the spacecraft has landed. This "dump" telemetry will be recorded by ETR data gathering ships and aircraft in the landing area.

EC-121 radar aircraft will provide tracking data during the flight, also.

OPTICAL TRACKING

Tracking cameras and other optical instruments will be located at False Cape, Williams Point, Patrick AFB, Melbourne Beach, Cocoa Beach, and Vero Beach. In addition, camera-equipped jet aircraft and will attempt to photograph the early part of the booster flight.

RECOVERY

Gemini recovery procedures are based on techniques proved in Project Mercury. Recovery forces are provided by the Department of Defense.

For this flight, the launch site recovery force will be exercised in preparation for upcoming manned missions.

Shortly before lift-off, Air Rescue Service recovery helicopters will proceed parallel to the GLV flight azimuth and will be immediately available in case of an abort on the pad or during early launch phases. Surface ships will also be in the area.

Air Rescue Service aircraft and pararescue men will be available in areas along the ground track outside the planned landing area. Crews and equipment will be available at Cape Kennedy, Grand Turk, and Piarco, Trinidad. Fixed wing aircraft to be used include HU-16's, HC-54's and HC-97's.

The launch abort area originates 15 nautical miles seaward of the launch pad, extends 50 nautical miles either side of the ground track, and continues along the ground track to the planned landing area. Aircraft can reach any point in the area within two hours. Surface recovery ships are stationed so that any point in the area can be reached by ship within 12 hours.

Prime recovery ship is the aircraft carrier, USS Intrepid. Navy swimmers will be taken to the spacecraft area by helicopters from the Intrepid to install a flotation collar around the spacecraft. This will provide additional buoyancy until the spacecraft can be lifted aboard the Intrepid by a crane.

USAF pararescue men will install a flotation collar if the landing is in a contingency area.

Two destroyers, the USS Ault and the USS Massey, have been fitted with NASA-designed cranes and will be available for spacecraft recovery in contingency areas. Other recovery forces deployed along the ground track will consist of four other destroyers, an ARS and various aircraft for weather recconnaissance, photo observation and telemetry dump.

Following completion of post landing procedures after recovery, the spacecraft will be returned to Cape Kennedy by aircraft.

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