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17 JAN 1961

DISCOVERER PROGRAM

~~CONFIDENTIAL~~. The purpose of the DISCOVERER is the design, development, and flight test of 41 two-stage satellite vehicles. In the early phase of the program, the flight configuration employed consisted of the THOR IRBM with slight modifications and the Lockheed AGENA "A" second stage. The present and future flight configuration will employ the DM 21 booster, an improved THOR with reduced weight and increased thrust, and the AGENA "B" orbital stage. The AGENA "B" satellite vehicle represents a number of improvements over the earlier AGENA "A". The most important of these improvements include double propellant capacity, double engine burn time, improved engine specific impulse (45:1 expansion ratio), and an engine restart capability. The first flight utilizing both the final DM-21 configuration and the final AGENA "B" configuration occurred on 7 December 1960 with the launch of DISCOVERER XVIII.

~~CONFIDENTIAL~~. The DISCOVERER Program is not designed to be developed into a military weapons system; however, it is ~~designed to develop~~ designed to develop and flight test many of the components common to future satellite systems. Specific program objectives include:

- a. Flight test of the satellite vehicle airframe, propulsion, guidance and control systems, auxiliary power supply, and telemetry, tracking and command equipment.
- b. Attaining satellite stabilization in orbit.
- c. Obtaining satellite internal thermal environment data.
- d. Testing of techniques for recovery of a capsule ejected from the orbiting satellite.

DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
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e. Testing of ground support equipment and development of personnel proficiency.

f. Conducting bio-medical experiments with mice and small primates, including injection into orbit, re-entry and recovery.

~~CONFIDENTIAL~~ This program has provided much valuable data concerning the program objectives. Of the eleven DISCOVERERS launched during CY 1960, seven attained orbit; six of these had recovery as an objective; five of the recoverable capsules were properly ejected from orbit; four of the capsules were recovered after extended exposure to the space environment, three of these were air-recovered, and one sea-recovered. One other was located in the sea but lost due to severe weather conditions. This program has provided three very significant firsts in the conquest of space; the first recovery of a capsule after extended exposure to the space environment, the first air recovery of a capsule from outer space, and the first return and recovery of living tissue exposed to solar flares.

~~CONFIDENTIAL~~ The data acquired from past flights would classify this among the most successful space programs, and future flights will be equipped with new developments providing greater altitude/payload capability, and more precise orbital parameters, provided by the Bell Aircraft model 8096 engine for the AGERA vehicle, coupled with the improved performance of the DM-21. In the near future the boosters will be equipped with the Bell Telephone Laboratories Series 400 guidance system, which will increase the accuracy of the orbital altitude and period.

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~~CONFIDENTIAL~~ Significant contributions toward military space systems during the year included the development of the following capabilities:

- a. Reorientation and stabilization of satellites on orbit.
- b. The flight test and refinement of the AGENA satellite vehicle and subsystems.
- c. Development of a capability for recovery in undamaged condition of a capsule ejected from a satellite on orbit.
- d. Delivery of an improved and more capable AGENA vehicle.
- e. Exercise of the communications, control, tracking, and data acquisition network.
- f. Training and exercise of the Air and Sea Recovery Forces.
- g. Establishment of a sound base of experienced personnel and manufacturing facilities directly applicable to future satellite programs.

~~CONFIDENTIAL~~ The most significant problem area encountered during the past year was that of securing the proper ejection of the recovery capsule from the orbiting satellite vehicle. This problem was solved by accomplishing several design changes including lengthening the distance between the main satellite vehicle and the recovery body during separation before initiating the firing of the spin rockets. Also the solid propellant spin rocket system on the recovery body was replaced by a more reliable stored gas spin system. These changes, coupled with intensive testing of recovery system components, have made possible the successful recoveries to date.

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~~CONFIDENTIAL~~ This program will provide further advances in the Air Force progress into the aerospace environment during the next year. The more powerful and precisely guided DISCOVERER vehicles will fly equipment designed to collect background information for MIDAS, continue testing of AGEMA components for other satellite programs, collect selected geophysical and biomedical data, and will further perfect the technique of reliable recovery of capsules from space vehicles.

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