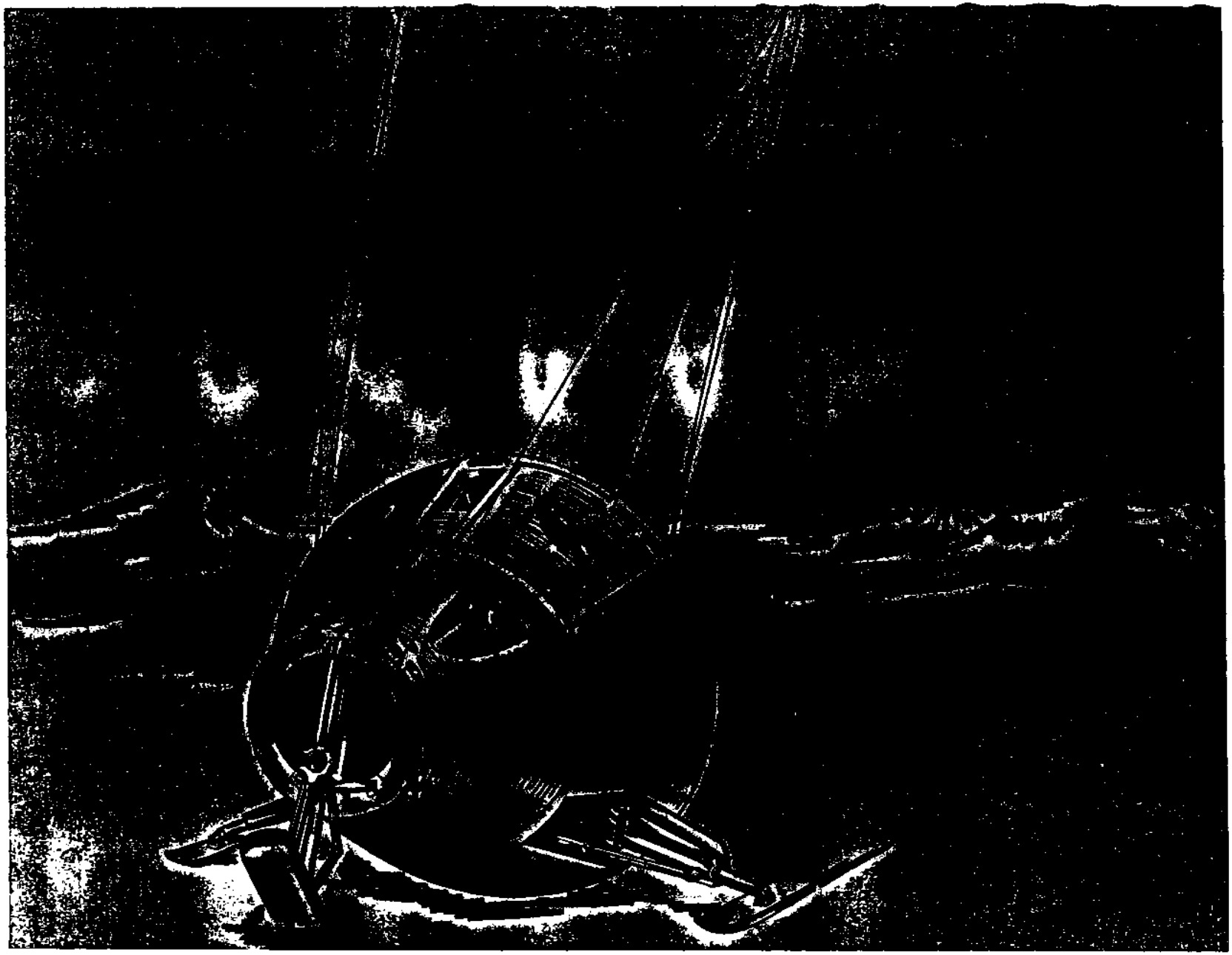
BIG G

20 DEC 1967



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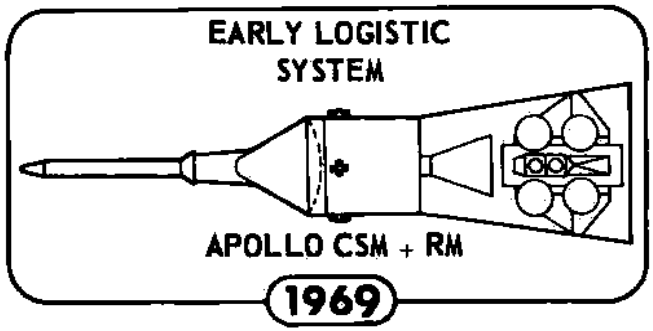
CONSIDERATIONS

Current published NASA plans encompass the development of the space technology and hardware for long duration earth orbital space stations and for later interplanetary spacecraft. The space stations being studied for use in developing this technology have accommodations for larger crews and have provisions for long duration experiments conducted by astronauts and scientists. However, the capability of existing spacecraft to provide economical support to these stations is severely limited. A need exists, therefore, for a versatile spacecraft which can provide economical logistic support on a time schedule compatible with NASA needs. Big G can provide this capability by 1971, using Gemini technology applied to Gemini and Apollo hardware, and with minimum interference to the mainline lunar landing program.

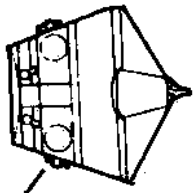
SAA EARTH ORBITAL FLIGHT SCHEDULE

In the 1970-1980 period, it appears that least a dozen launches will be required for logistic purposes. This is an estimate of the AAP schedule based on our knowledge of the Airlock Module delivery and published NASA documents. Since the logistics requirement is a significant one, it deserves major attention to assure that the launches are cost effective and that the best available resources are utilized. Although the flights in 1970 can be supported by the Apollo CSM, it would be economically advantageous to introduce a logistics system with improved crew and cargo versatility for Orbital Workshop No. 2 (1971).

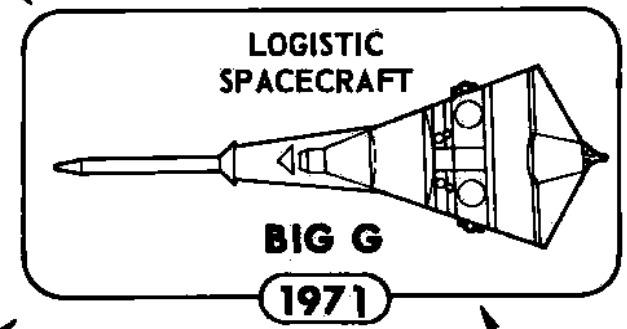
LOGISTIC SYSTEM EVOLUTION

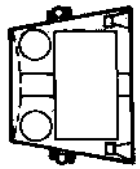


RETROGRADE MODULE PLUS
MANEUVERING & CARGO MODULE



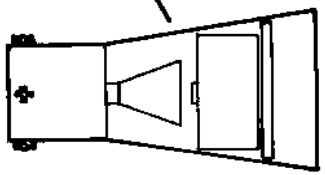
BIG "G"
2–12 MAN





ALSS MANEUVERING & CARGO
MODULE
LOW & HIGH ORBIT

APOLLO
3–6 MAN



SERVICE MODULE +
MULTI-MISSION MODULE
LOW & HIGH ORBIT

ADVANCED LOGISTIC
SPACECRAFT

197?

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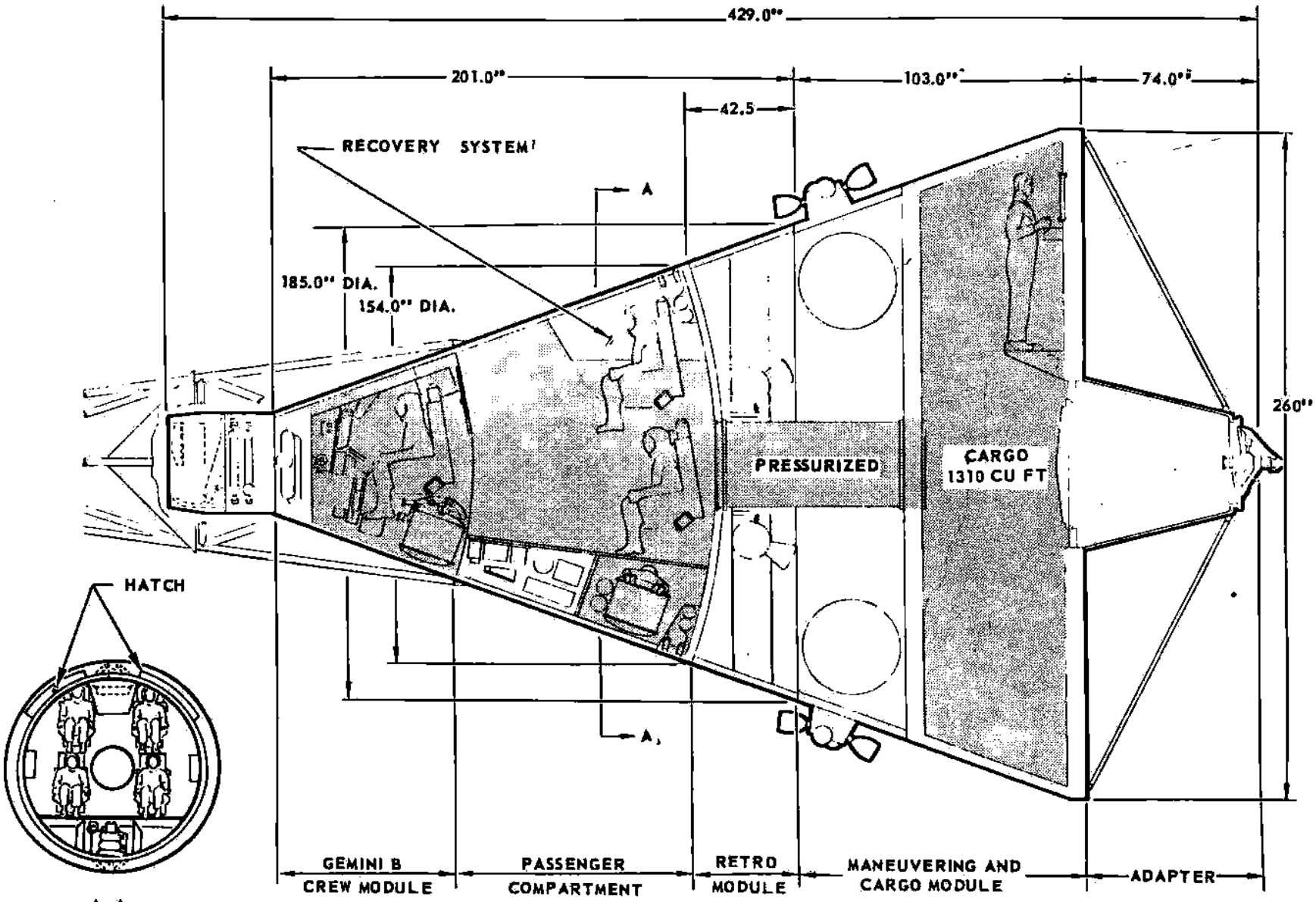
GENERAL ARRANGEMENT

The heart of the system is the Gemini B re-entry module which contains a fully integrated flight cockpit, environmental control, and electronic subsystem installations. The Apollo tower is used for escape. A passenger compartment is provided by extending the Gemini conical structure to a 154 inch diameter (same as the Apollo service module). A retrograde module is provided for de-orbit. The module contains retrograde motors, separation rockets, and water and oxygen supplies. A maneuvering and cargo module provides propulsion for orbital maneuvering, electrical power, a pressurized and unpressurized volume for cargo, a pressurized pass-through tunnel, an Apollo Docking Probe Assembly, and a station for controlling the docking maneuver. The aft-diameter is chosen to match the S-IVB stage. The Apollo docking probe is utilized for attachment to a space station. Through use of the existing hatch in the Gemini B bulkhead, a pressurized tunnel from the passenger compartment to the cargo area, and a pressurized tunnel to the docking probe, it is possible to transfer crew and cargo without EVA. The configuration shown carries a crew of six and is arranged to provide growth in both crew and cargo capability. The environmental control system for the passengers and the communication system are located under the floor of the passenger compartment.

The configuration employs the "packaged return capability" utilized in Gemini. A "sealed-until-needed" oxygen supply, RCS system, and retrograde motor and separation rockets enhance crew safety.

GENERAL ARRANGEMENT
6 MAN

BIG G



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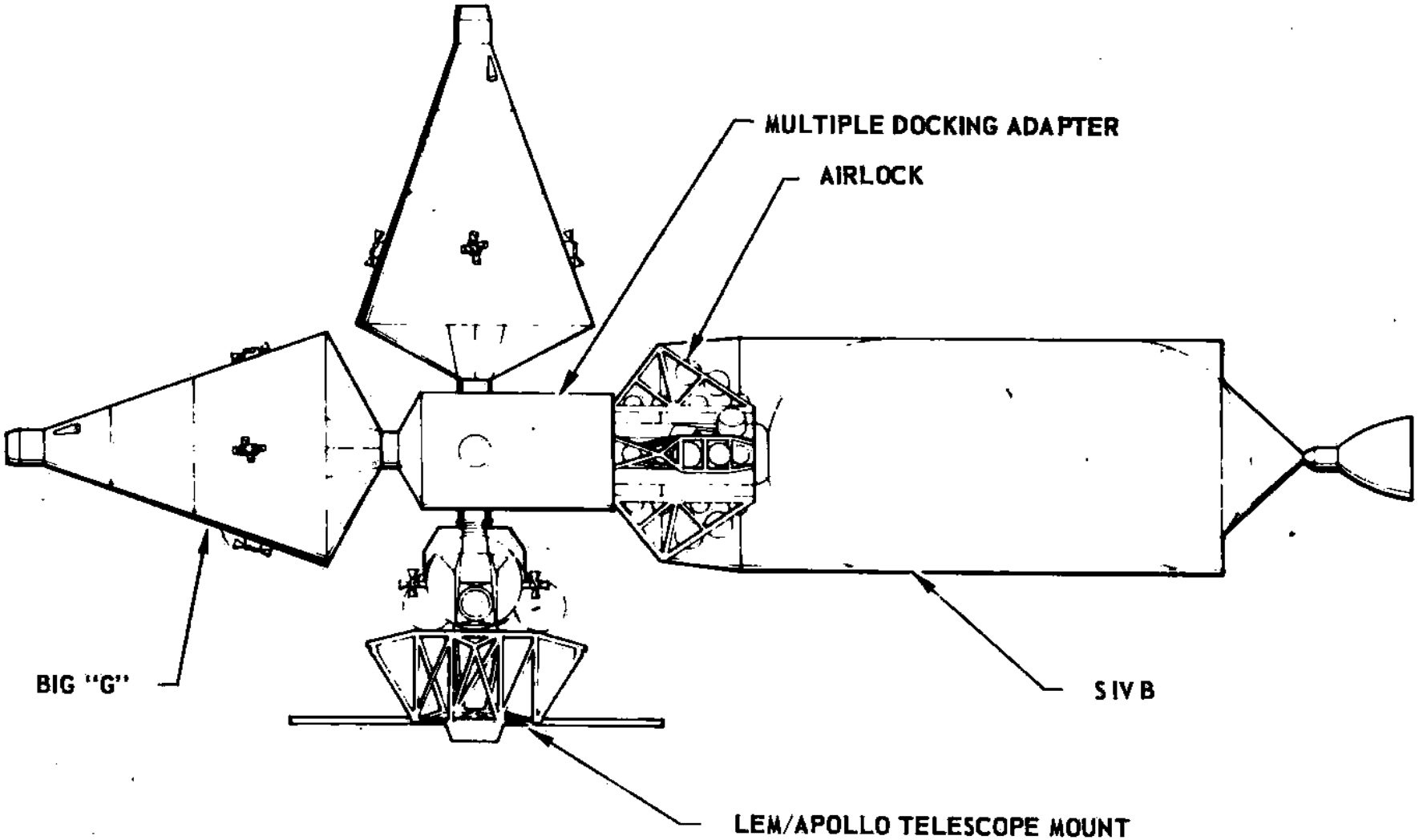
APOLLO APPLICATIONS UTILIZATION

BIG G



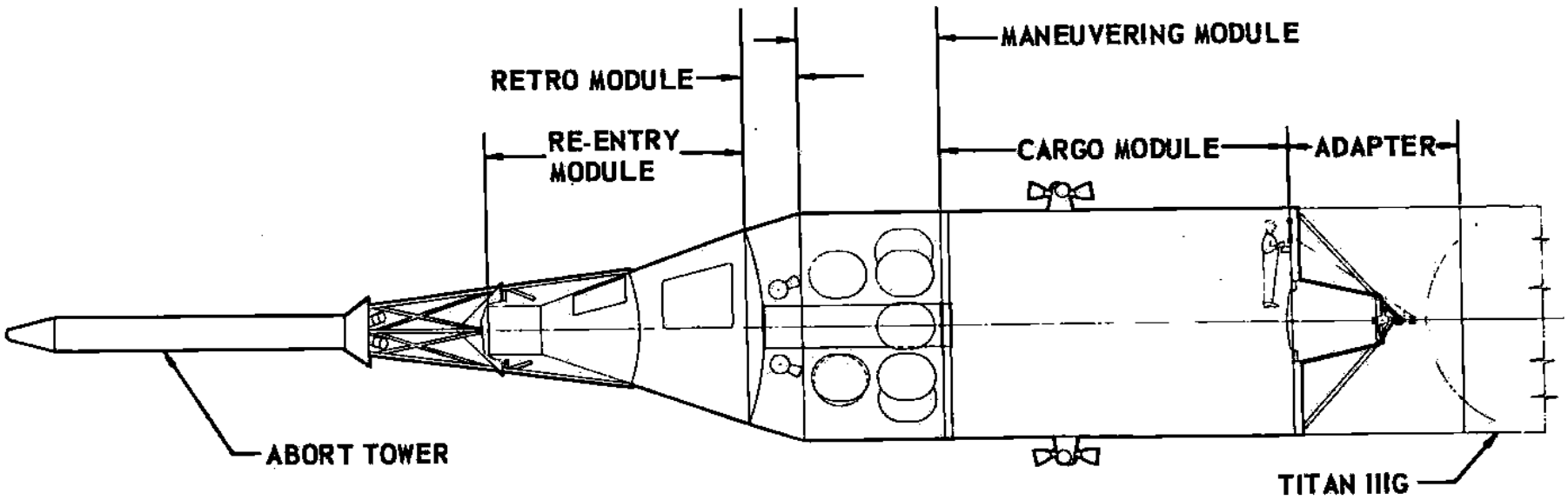
ALTERNATE CONFIGURATIONS

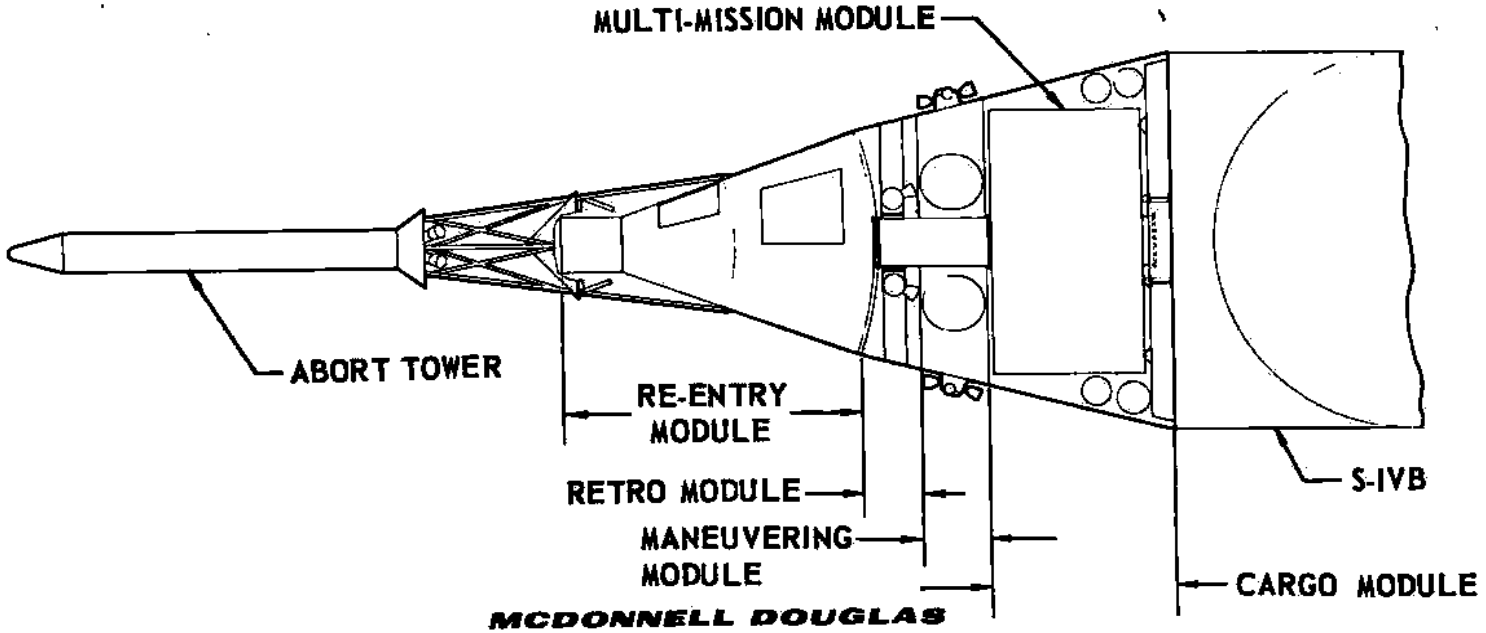
The basic Big G crew and passenger module (154 inch diameter) is compatible with the Apollo service module and with future planned equipment such as the Multi-Mission Module.

The versatility of the Big G re-entry vehicle is demonstrated in the configurations shown with different launch vehicles. The first configuration depicts the Big G mounted to a 180 inch diameter Titan III G booster. Also included are an abort tower, a retro module, a maneuvering module, a pressurized tunnel, and a pressurized cargo module with a rear docking station and an Apollo Docking Probe. Cargo and men can be transferred to a space station without EVA. This configuration can launch a payload of 130,000 pounds into a 28.5° inclination, 81 x 120 N.M. orbit.

The second configuration depicts the Big G mounted on a 260 inch diameter Saturn booster. Included are an abort tower, a retro module, a maneuvering module, a pressurized tunnel, and a cargo module incorporating a multi-mission module. This is the type of module which has been studied by several aerospace companies under NASA advanced study programs.

ALTERNATE CONFIGURATION





MCDONNELL DOUGLAS

BIG G

SUMMARY

The NASA SIVB workshop space station will generate a demand for logistics support that will be initiated with Flight 209 airlock/cluster configuration. The evolution of the Apollo Applications Program will place a demand for change and growth upon the logistics support vehicle that can best be met by a versatile ferry/resupply system with sufficient growth potential. The Big G vehicle, evolving from existing hardware and technology and with the growth potential presented, would be a reliable vehicle that could be adapted to advanced logistic space system missions.

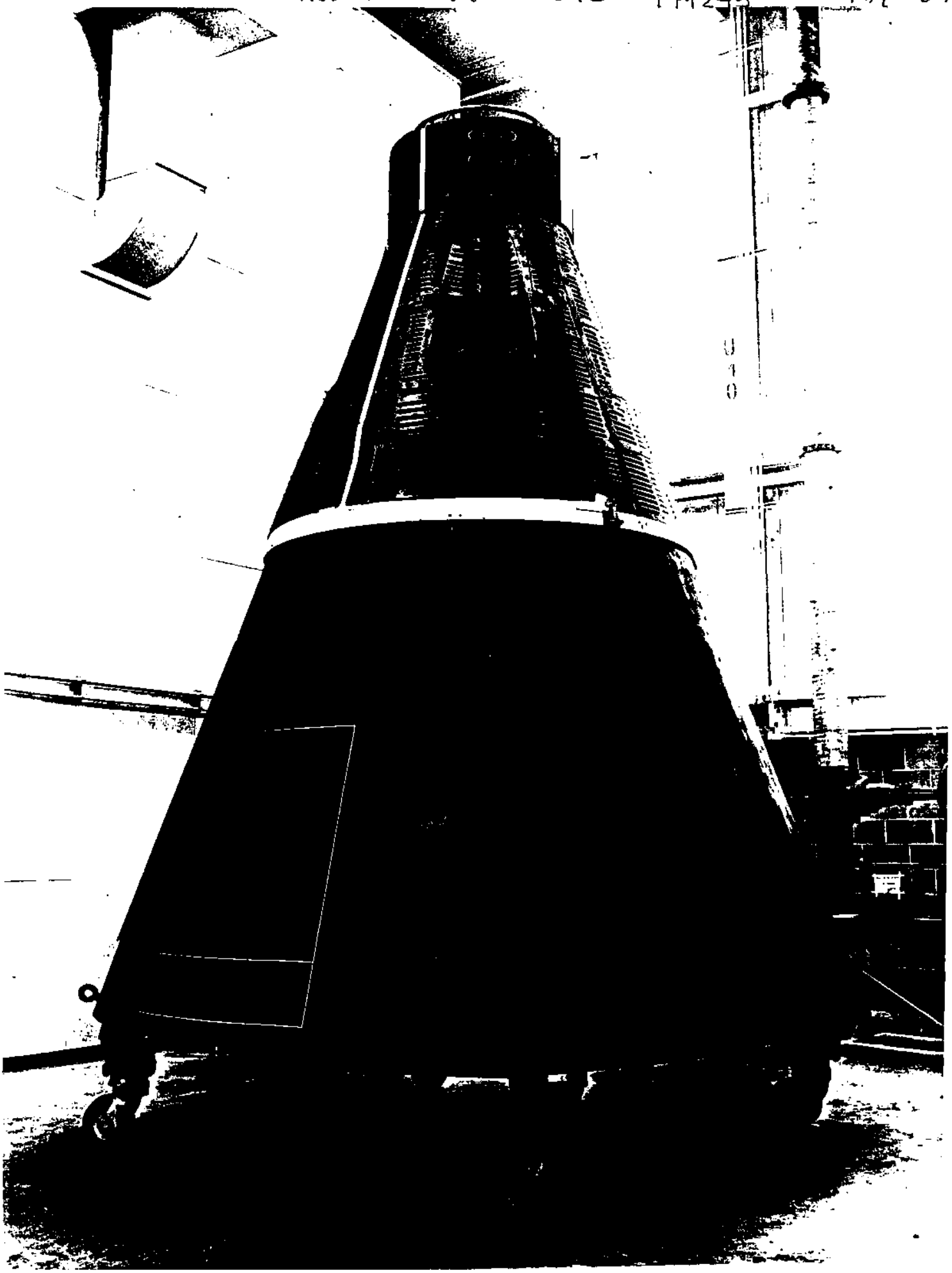
The Big G logistics vehicle concept is consistent with the NASA policy of maximum utilization of existing developed hardware to expand near-earth space operations for the benefit of the nation.

Use of the Gemini Crew Module as the "heart" of the Big G vehicle, along with Gemini subsystem hardware, will allow early availability of this versatile logistic vehicle.

SUMMARY

BIG G

- NASA NEEDS AN ECONOMICAL LOGISTICS VEHICLE FOR AAP
- AF IS INTERESTED IN A LOGISTICS VEHICLE FOR MOL
- BOTH NASA AND AF HAVE STUDIES IN WORK FOR ADVANCED LOGISTIC SYSTEMS IN THE LATE 1970'S BUT
- NOTHING NOW EXISTS TO COVER 1971 AND 197? FLIGHTS
- MODIFIED APOLLO AND BIG G ARE THE ONLY LOGICAL CONTENDERS
- BIG G LOGISTICS VEHICLE WILL
  - NOT INTERFERE WITH HIGH PRIORITY LUNAR PROGRAM
  - ECONOMICALLY ACCOMPLISH PROJECTED AAP LOGISTICS REQUIREMENTS BY UTILIZING EXISTING DEVELOPMENTS
  - BENEFIT BOTH NASA AND AF IN COST SHARING AND COMMONALITY
  - UTILIZE AN EXPERIENCED, AVAILABLE, AND SUCCESSFUL INDUSTRIAL TEAM



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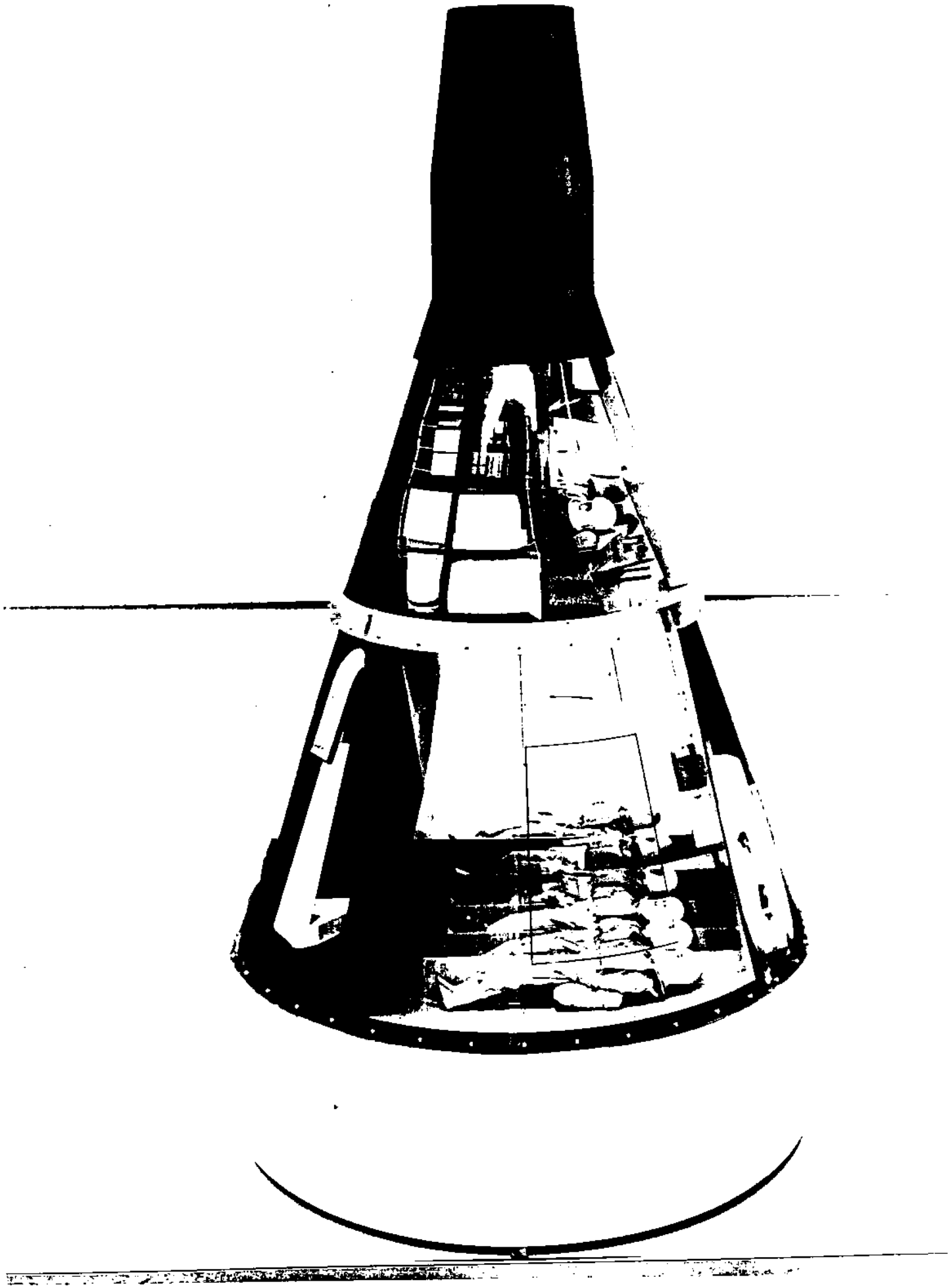

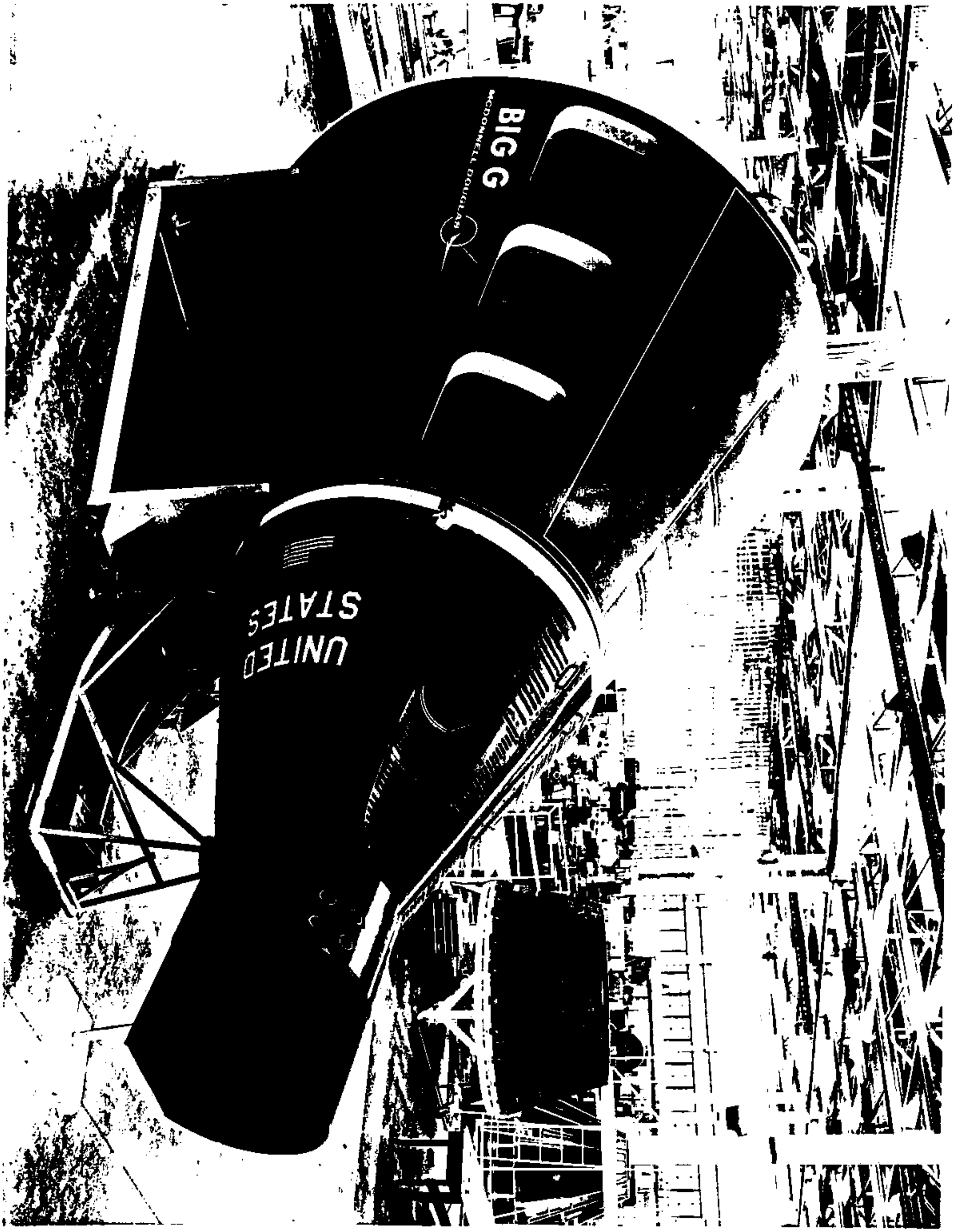

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APRIL 69

LONG DURATION MISSION CONFIGURATION

45 DAYS

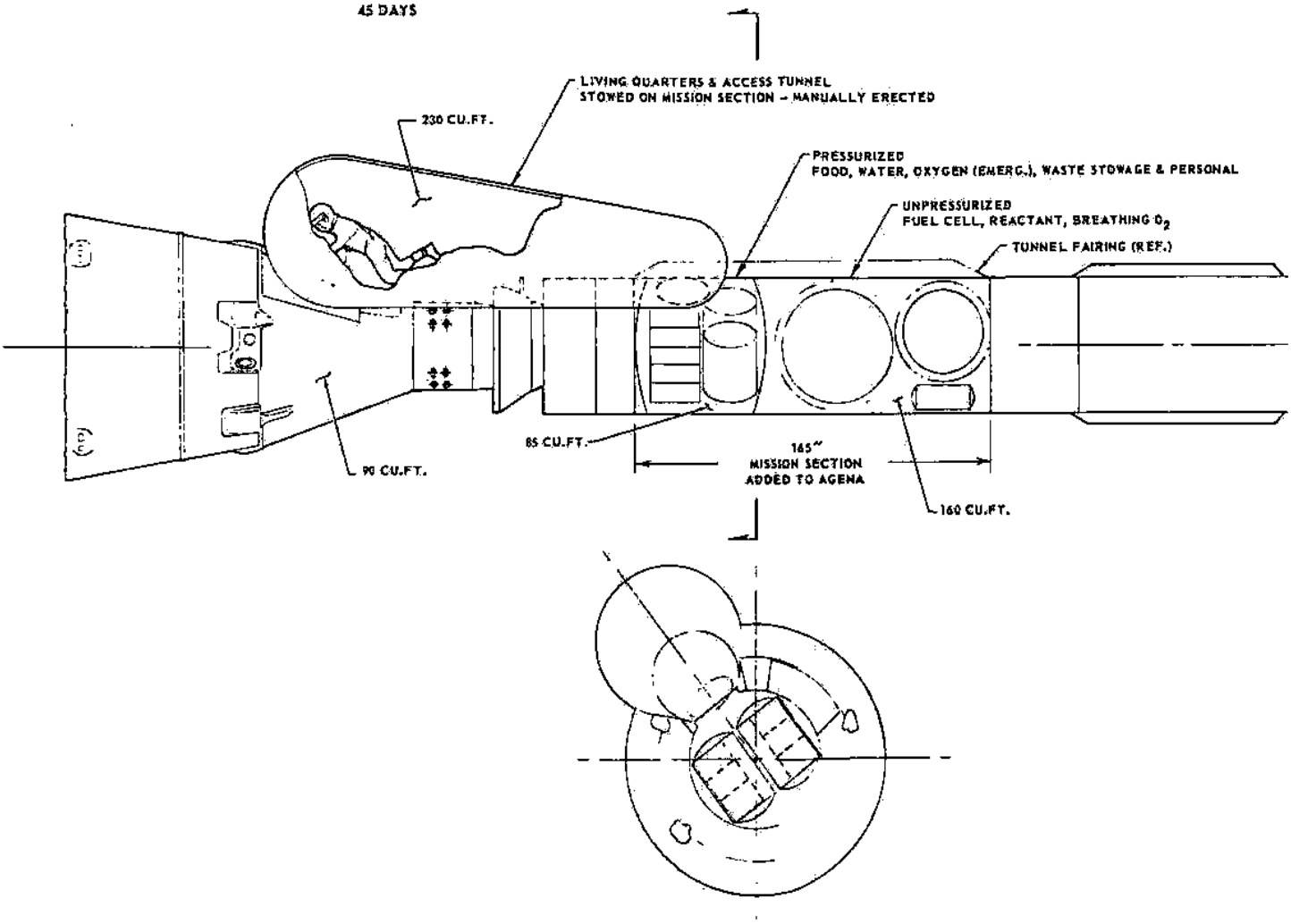

FIGURE E 3.8-1