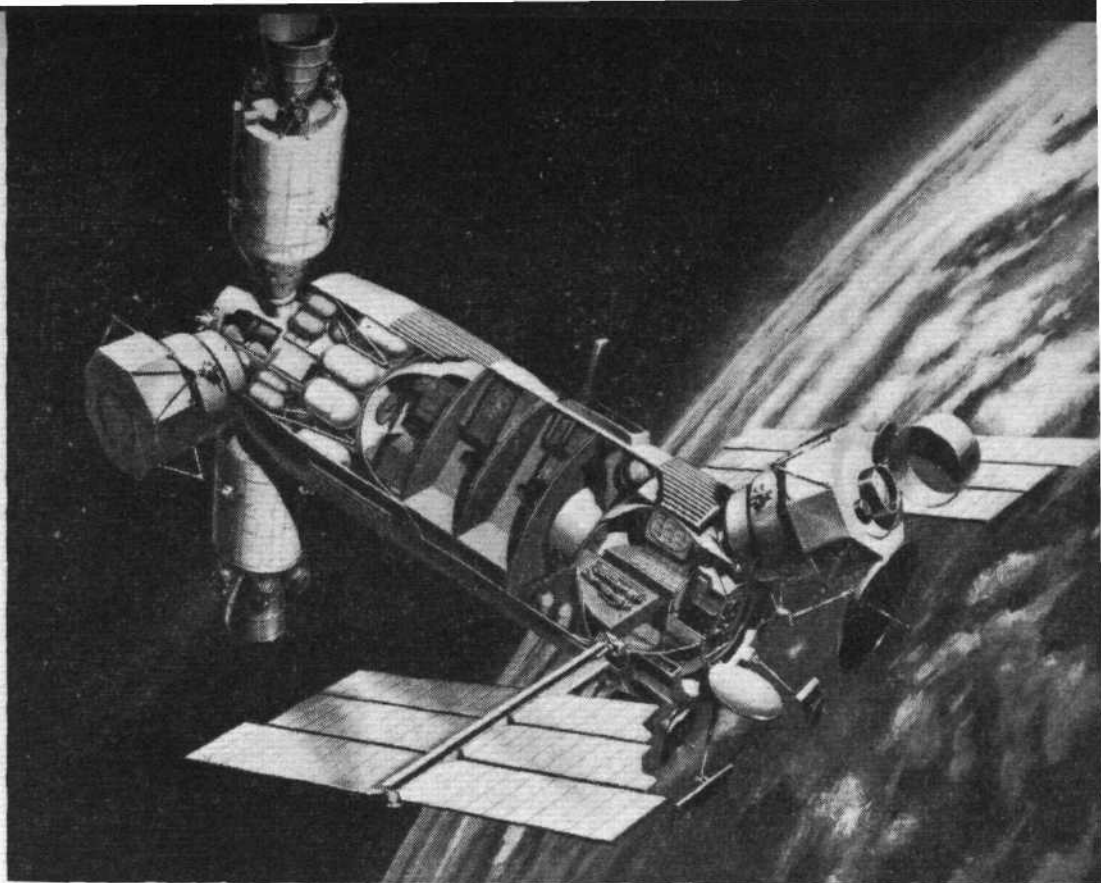


Orbital space station concept developed by McDonnell Douglas Corp missile and space systems division in a study for NASA, depicted in this artist's impression. Basic vehicle is a Saturn S-IVB; the engine is not installed and the propellant tank is converted into a multi-storey laboratory. Solar cell panels provide electric power and Apollo spacecraft will deliver crew members to the station



Spaceflight

APOLLO SITUATION

"All three spacecraft sections have passed unmanned flight tests. The rest of 1968 will be devoted to testing them with men aboard."

This is perhaps the key sentence in a recent news feature received from Cape Kennedy, summing-up the Apollo programme situation in mid-May 1968. The writer comments that, for the first time since the Apollo 1 disaster 15 months ago, America's Apollo Moon project is back on the track and taking a cautious new aim at a manned lunar landing next year. The programme includes two three-man flights later this year.

All the project's Moon flight machinery has been cleared—at least tentatively—for manned flight, and the Apollo launch timetable is more definite than it has been since the three Apollo 1 astronauts died in a spacecraft fire on January 27 last year.

Three sets of three-man Apollo crews are training for definite missions and, for the first time, they know what rockets and what spacecraft they will ride into space. The astronauts for the actual lunar mission have yet to be named, but their landing sites on the surface of the Moon have been selected.

"I think on balance the Apollo programme is in good shape," said its director, Major-General Samuel C. Phillips, after the last unmanned test flight of the rocket being groomed to send men to the Moon.

Despite the troubles that tarnished that Saturn 5 launch on April 4, Phillips told a group of spacecraft engineers later: "I think we have a very good opportunity of carrying out the manned lunar landing before the end of next year."

As the programme now stands, six men will be launched into Earth orbit before the end of this year and they will spend a total of up to 20 days in space. One astronaut is scheduled to carry out the first space walking in two years. The first three-man flight is now targeted for September and the second manned Apollo mission is expected about two months later.

Five, and possibly six, more manned Apollo launchings are planned for 1969. Apollo officials hope one will be the long-awaited Moon landing mission, and it may be preceded by a flight into a lunar orbit and back without landing.

Not everything is rosy, however. There are still questions to be answered and major hurdles to be crossed.

Ground testing is under way to confirm that the engine troubles that marred the last Saturn 5 flight have been corrected, and other testing is in progress to confirm that the Apollo spacecraft is ready to carry men.

Two of the biggest hurdles are the initial manned flight tests later this year of all the rockets and spacecraft developed in the \$24 billion drive to land men on the Moon before the end of the decade. But before the epochal lunar mission can be attempted, astronauts must perfect Moon flight operations in orbit around Earth. They must erase all doubt that they and their equipment can accomplish the feat.

The last milestone passed came on April 27 when space agency administrator James E. Webb ordered the start of preparations to fly men on the next Saturn 5 (*Flight*, May 9). That signalled the end of the unmanned testing in project Apollo and the start of the manned phase.

The initial manned Apollo hopefully will be launched in September on the Saturn 1B rocket. Mercury and Gemini veteran Walter M. Schirra, 45, and space newcomers Donn F. Eisele, 37, and Walter Cunningham, 36, will fly into Earth orbit to give the moonship a ten-day shakedown. This mission will be Apollo 7.

Next comes the first manned flight of the 363ft (111m) Saturn 5. James McDivitt, 38, David Scott, 36, and Russell Schweickart, 32, will ride the powerful rocket into Earth orbit in November or December. McDivitt and Scott are Gemini veterans; Schweickart has yet to make his initial venture into space.

Their mission, to be designated Apollo 8, will mark the first manned flight of all three spacecraft sections that make up a complete 98,000lb Apollo moonship. These are the command module, the cone-shaped cabin section that houses three astronauts, their instruments and controls and their oxygen, food and water and the only part of the entire Saturn-Apollo space machine that will return to a gentle landing on Earth. The service module, the cylindrical section that supports the command ship and is mounted behind it; it carries the Apollo's fuel cell electrical powerplant and has a 20,000lb thrust rocket engine that will be used as a space brake to get the moonship in orbit around the Moon and as an accelerator to blast it from lunar orbit back to Earth; it also houses Apollo's main control engines. The lunar module, the four-legged "moon bug" spacecraft that will ferry two men on a round trip from a command module in orbit around the Moon to a landing on the lunar surface and back. It has two main engines—one to lower men gently to the Moon and one to launch the lunar explorers and fly them back to a rendezvous and hook-up with the mothership.

All three spacecraft sections have passed unmanned flight tests. The rest of 1968 will be devoted to testing them with men aboard.