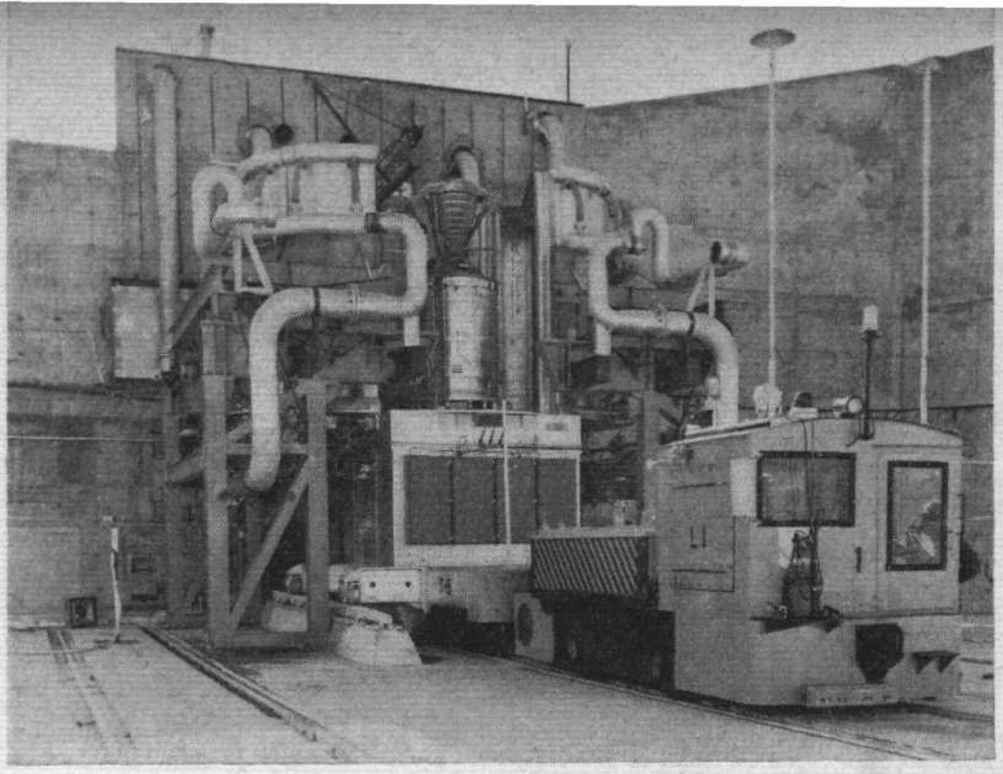
Spaceflight



The newest reactor technology. The Phoebus 1B reactor, run in February, has demonstrated high power-density levels approaching the figure desirable for use with flight engines. It has operated for 20min at above 1,250MW

danger from possible explosions of fuel or of reactors while they are running, and the high temperatures involved, all serve to raise the requirements for test facilities to a very high level. Two widely separated engine test cells, "A" and "C," and a reactor maintenance and disassembly building, plus a control building, are to be joined by a new engine test stand and another engine facility, beginning in 1968. All test areas and maintenance/disassembly areas are joined by a common rail line.

By adapting one of the test cells and the addition of a new engine test stand, the station will be able to handle two Nerva engines simultaneously. The facilities will provide for downward firing of a nuclear rocket for the first time in America (usual firing position has been with the exhaust upwards), and enlarged hydrogen capacity so as to allow longer runs. To the two 55,000gal Dewars at the former test cell are being added two more with a capacity of 550,000gal each. A large, water-washed deflector and flow-away ditch has been constructed beneath and to the side of this cell to take the exhaust gas which will emerge from Nerva at about 4,000°C. Previously, hot reactor engine gas has been exhausted upwards and has shown clear flow patterns visible to the naked eye to a height of some 600ft. Temperatures in the general area have usually risen to about 150°C.

About 3,000 instrument and control channels will run from this test cell to the control centre of the station; included are some eight closed-circuit television sets.

Assembly of engines before test, and disassembly after, will be conducted at the station. The present maintenance and disassembly building features a high bay into which complete engines can be brought in an upright position on railway trucks. The large disassembly bay is completely shielded, with cement walls 5ft thick. Three windows (each consisting of layers of lead glass with oil filters between) on each of two sides look into the bay. Mechanical arms, controlled by operators working from behind the glass windows and by monitored television cameras, assemble or disassemble "hot" engines here in complete safety. Also included is an area in the building for working on smaller assemblies for the Nerva engine.

NASA ORDERS CHANGES TO LUNAR MODULE

The prime contractor for the Apollo lunar excursion module, the Grumman Aircraft Company, has been requested by NASA to incorporate a number of changes in the module to render it more fireproof. These changes involve materials, procedures and tests, and arise from the investigation into the fire associated with the Apollo capsule in January.

The following modifications have been specified: substitution of non-inflammable or less-inflammable items in the module; installation of a fire hose; manufacture of a dummy module to fire-test materials under realistic ground and flight conditions; improved wiring insulation and installation; the use of switches to avoid overheating cables and the use of excessively large looms; the use of television to monitor the interior of the lunar lander during manned ground tests; and more stringent inspection procedures during all stages of manufacture and before ground tests.

Other changes, such as the new quick-release hatch in the command module, have already been implemented.

The first lunar module, LM-1, was due to arrive at Cape Kennedy from Grumman on June 24. This is due to be test-flown by an uprated Saturn 1 later this year, and will not have the above changes made. LM-2, the second module, will be fully modified in preparation for flight aboard Saturn V next year.

These changes are expected by NASA to raise the combined weight of the lunar module (consisting of the lander and the ascent stage, which at present weigh 22,380lb and 10,106lb respectively) by between 25lb and 125lb. Design weight for the two lunar modules is 32,500lb and the effect of a possible overweight condition is being investigated by NASA.

BOEING TO INTEGRATE APOLLO SYSTEMS

NASA has awarded a contract to Boeing, worth about $20 million, for the integration of the command, service and lunar modules with the Saturn V launch vehicle.

Boeing will assist NASA with technical integration for Apollo flights AS-501 to AS-515 inclusive. The firm is, of course, responsible for the S-IC first stage (which develops 7.5 million pounds of thrust at launch) and has about 12,000 people engaged on Apollo/Saturn work.

SECOND ANNIVERSARY FOR TITAN VEHICLE

Titan 3C, America's largest military launch vehicle, is due in the next few days to place six communications and research satellites into orbit. These include three more satellites in the Defence Department's Initial Defence Communications Satellite Programme (IDCSP) which will join 15 others flown during 1965 and 1966 and complete a network of stations. Also aboard will be three further research satellites.

This launch will be the ninth for Titan 3C, which began a test programme on June 18, 1965, with the placing of a 21,000lb dummy payload in orbit. Since that date, 30 satellites have been orbited with this vehicle, including two 750lb Vela nuclear detection satellites and more than 12 others for research and test purposes. Other payloads have included the Gemini 2 spacecraft, flown to assess the performance of a modified heat shield, and a Titan 2 propellant tank.

The vehicle, which can launch a 25,000lb payload into Earth orbit, is still in the development stage.