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Journey to the Moon

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HE PRIMARY OBJECTIVE of Apollo 11 can be stated more shortly than that of any other American manned space flight. It is simply. "To perform a manned lunar land-
ing and return," and was defined by President Kennedy in his speech to Congress on May 25, 1961. In accordance with this directive, Apollo 11 (the first American manned landing flight to the Moon, and the fifth manned Apollo flight to date) lifted from Cape Kennedy almost exactly on schedule at 1432 BST on July 16 after a typically Apollonian near-faultless count-down.

The history of Apollo 11 properly began with the arrival
of the various rocket and spacecraft sub-assemblies at Cape Kennedy last January, starting with the lunar module, at the time when Apollos 9 and 10 were just undergoing their check-out procedures. While the LM was being tested, manned and unmanned, in the altitude-chamber, the command module arrived and was put through the same procedure. In early April the LM and the command and service modules were removed from their test chambers and assembled in the final spacecraft configuration; and on April 14 the space-craft was mated to the Saturn V rocket in the vehicle assembly building. Assemblies for the rocket itself began to arrive in the VAB in mid-January, and by March 5 all three stages, together with the instrument unit, were erected on the mobile launcher.

In accordance with NASA philosophy, as much of the test work as possible was done in the VAB before the vehicle was moved to Launch Pad A, Complex 39, on May 21 (at which time Apollo 10 was en route to the Moon for the full-scale dress-rehearsal flight). This procedure occupies the launch site for the least possible time, and enables a rapid launch rate to be maintained. The flight-readiness test, the final overall demonstration of the complete vehicle, was conducted between June 4 and June 6.

After hypergolic fuel had been brought aboard the space-craft, and first-stage fuelling had been completed, the final major test of the rocket took place. This was a countdown demonstration test, divided into "wet" and "dry" operations (where the vehicle was, respectively, fuelled and then drained of cryogenic propellants). During the first part the entire countdown, including propellant-loading, was performed down to T—8.9sec, at which time the ignition sequence was due to

The three astron-
auts, Armstrong lead-
ing, with their hand-
held environmental-
control units (for
Earth-transport only)
move out towards the
launch area

begin. The astronauts did not participate in this operation, due to the risk involved, but did so on the "dry" run. By the time that Apollo 11 was beginning the final part of its checkout schedule, Apollos 12 and 13 had begun to be inspected such is the impetus of the American manned space-flight programme.

The demonstration countdown began on June 27, and the ievitable minor snags were cleared up quickly. The biggest
fault to be rectified was a leaking valve supplying liquid hydrogen to the S-IVB stage, discovered only lhr 50min before the simulated launch, and which took 3hr 18min to clear. This demonstration included 93hr of work, together with 40hr 32min of rest periods, which could be used to investigate and clear any problems which might have arisen.
Meanwhile, on June 2, a de-briefing conference took place between Thomas Stafford, John Young and Eugene Cernan (the crew of Apollo 10), and Neil Armstrong, Edwin Aldrin and Michael Collins. The purpose of this was to familiarise the Apollo 11 crew with the previous flight, in which the spacecraft circled the Moon for 61hr while the lunar module was twice flown to within ten miles of the surface.

A record influx of sightseers had already started flooding into Florida to witness the launch. Here, at least, was on benefit of the space programme to confound the Apollo critics: the tourist wealth which these flights bring to the

depressed South. On July 7 the three astronauts said farewells to their families in Houston and flew back to the

astronaut quarters at the Cape for a final nine days of training before launch, a period of separation due to last until
the post-flight quarantine period ends on August 12.

As they arrived (flying in Northrop T.38s) the rocket was being re-cycled from the demonstration countdown in pre-paration for the final pre-count. A faulty inertial-measure-ment unit in the lunar module was replaced on July 6 and the batteries for the LM were installed during that evening. There was still much for the astronauts to do. A lot of time was being spent in studying the area around site 2 and the alternative selected areas which would be used if the

launch schedule slipped. Also scheduled were several simulations, including the Moon-ascent and rendezvous segment, an
an exercise of the trans-lunar injection procedure.

On their return a strict pre-flight quarantine procedure was instituted by Dr Charles Berry, Director of Medical Re-search and Operations. All social life was to be cut out. This was even extended to prohibit a dinner which President Nixon had planned to give the astronauts on the eve of their departure. The purpose of this was to maintain the health of the three men by isolating them as far as possible from infection. Isolation would allow a better biological compari-son to be made after the flight, to determine what, if any, lunar organisms had been acquired. Already a penultimate check, lasting the entire morning of July 1, had satis-fied Berry that the three men were in excellent health. During a press conference on July 5, the astronauts were separate from the audience by a plate-glass shield. They had spen the previous two days in a command-module simulator, practising launch and emergency procedures, monitored (on the second day) by Mission Control at Houston, some 900 miles away.

Back at launch pad A, the final 93hr pre-count began at 0100 BST on July 10. The first major step in the operation of this phase was the installation of the explosive devices in the first, S.-1C, stage which are used to open the fuel line and star the fuel pumps of the five Rocketdyne F-l engines. On the