MANUFACTURING HISTORY - LM-5

The Lunar Module (LM-5), scheduled to land the first men on the moon, began its manufacturing life at Grumman Aerospace Corporation, Bethpage, New York, on June 16, 1966 when welding began on the ascent stage structure.

Other milestones in the construction of the ascent stage include:

ASSEMBLY - The ascent stage moved into assembly (Plant 2) in mid-February, 1967 where these installations were made: helium pressurization module, helium tanks, propellant tanks and feed lines, RCS tanks, manifold lines, water tanks (ECS), oxygen tank, cabin pressure relief and dump valve, suit circuit assembly and water control module, avionics, electrical harnesses and cable assemblies, relay junction box, power failure relay and ECS relay box, and tracking light. One of the last installations at Plant 2 was the RCS engines, installed in late December 1967.

COLD FLOW TESTING - LM-5 ascent stage underwent tests at Grumman's High Pressure Test Facility where substitute gases and liquids were used to test propulsion systems, environment control systems and the cabin proof pressure and leak rate. The checkouts began in January 1968 and were conducted periodically during final assembly and check-out.

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FINAL ASSEMBLY AND TEST - The ascent stage was moved into the final assembly area "clean room", located in Plant 5 at Grumman's main Bethpage facility on January 29, 1968. The ascent stage was fitted onto the Rotate and Clean fixture where it was prepared for final assembly. Installations performed here include: controls and displays, rendezvous radar, attitude and translation control assembly, stowage compartments, thermal blankets and skins. Electronic and communications tests were conducted during this phase of buildup.

The Ascent Propulsion System was completed with the installation of the engine on October 29, 1968, followed by engine leak tests on November 1, and engine functional tests on November 4.

CLEAN AND INSPECT - The ascent stage was again rotated and cleaned on December 30, 1968 and began pre-ship inspections on January 3, 1969.

DELIVERY - The ascent stage, crated in a pressurized container, was flown to the NASA Kennedy Space Center aboard a Super Guppy aircraft on January 8, 1969 from our Grumman airfield.

DESCENT STAGE

The descent stage for LM-5 began taking shape on December 3, 1966, when welding began in the main fixture at Grumman's Plant 2. During descent stage manufacture, the separate spacecraft stages came together, or were "mated" several times. These times were: June 13 to August 21, 1968; September 28 to October 25, 1968; November 11 to December 12, 1968.

Milestones in buildup of the descent stage for LM-5 are:

ASSEMBLY - The ascnet stage moved into Plant 2 Assembly on February 23, 1967 where the following installations were made: helium pressurization module, helium tanks, propellant tanks, fluid lines, heat exchanger, electrical harness and cable assembly, explosive devices relay box and electrical control assembly.

COLD FLOW TESTING - LM-5 descent stage was moved to the High Pressure Test facility on January 18, 1968 and underwent a series of tests including interconnecting water main valve assembly verification, harness and propellant pressure test, tank and flow-proof pressure and descent stage propellant feed section dry and sample tests.

On April 19, 1968 another series of cold flow tests including water management proof leak and proof press.

The final descent stage cold flow testing started on September 13, 1968 for propulsion system verification.

FINAL ASSEMBLY AND TEST - On February 19, 1968 the descent stage left cold flow and went to Plant 2 in preparation for installation of ALSEP AND MESA stowage bays. The descent stage then arrived in Plant 5 final assembly and test area on March 18, 1968. The installations performed in Plant 5 include gimbal drive actuator, descent engine control assembly, landing radar antenna assembly and base thermal shield and blanket and skin assembly.

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Tests performed included electrical circuit interpreter operation, landing radar interface check, ECI pin depth check, and descent stage HTS Structure integrity.

The descent engine was installed on March 12, 1968 and a descent stage engine interface leak check performed on March 14, 1968

The landing gear was installed on December 3, 1968 through January 3, 1969 and removed for shipping on January 9, 1969.

CLEAN AND INSPECT - The descent stage was then rotated and cleaned on December 13, 1968 and pre-ship inspection occurred on January 8, 1968.

DELIVERY - The descent stage, crated in a pressurized container, was flown to NASA KSC aboard a Super Guppy aircraft on January 12, 1969.

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