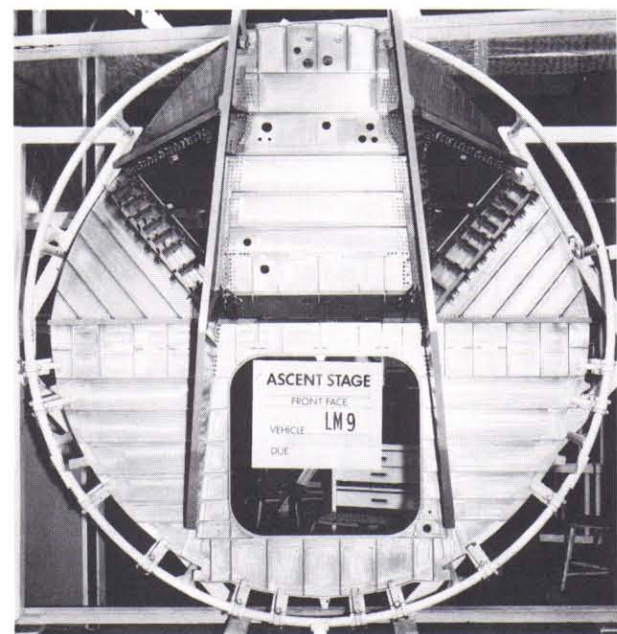


LM MANUFACTURING

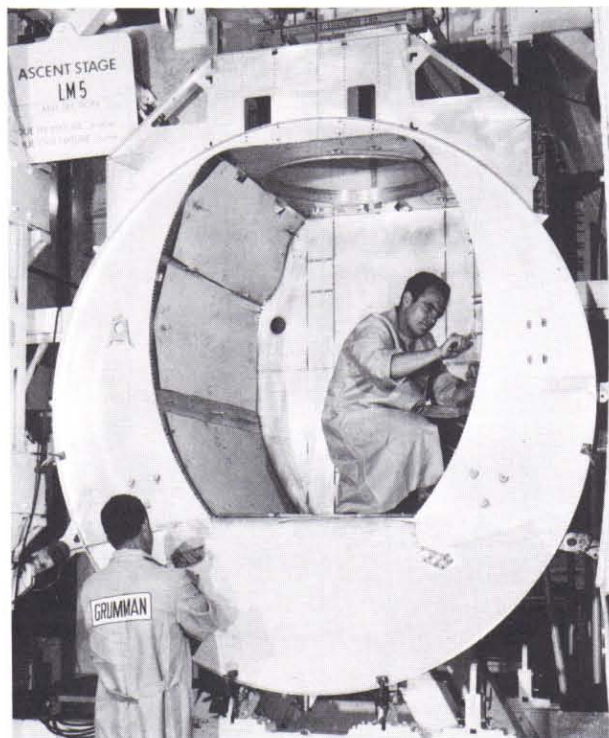
The ascent stage of the Apollo Lunar Module (LM) is the control center and manned portion of the space vehicle. Its three main sections are the crew compartment, midsection, and aft equipment bay and tank section. The crew compartment and midsection make up the cabin. The ascent stage

structure consists of the following subassemblies: front face, cabin skin, midsection, and aft equipment bay. The cabin skin subassembly is fabricated from formed chem-milled skin panels that are welded and mechanically fastened.



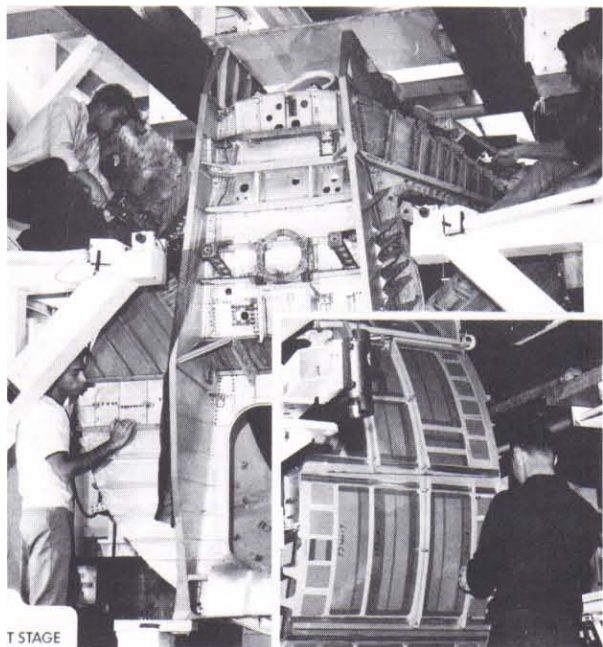
R-122

The front face of the ascent stage is fabricated from chem-milled skin panels that are welded and mechanically fastened. Sealing the mechanical joints, trimming the forward face contour, and adding formed longerons and stringers complete the operations for this assembly.



R-123

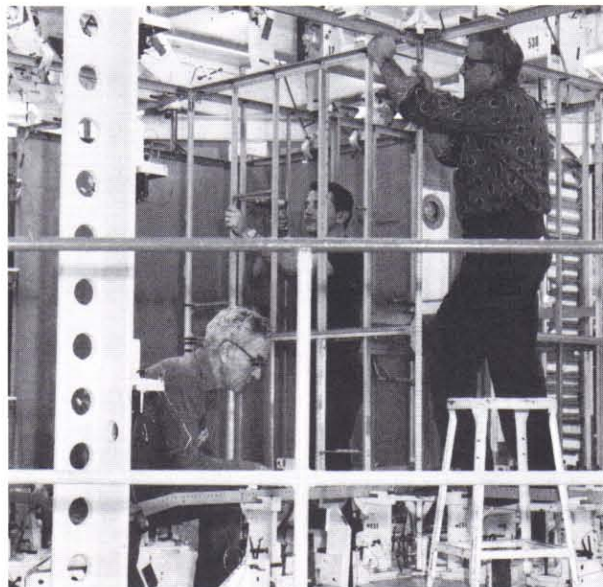
The midsection consists of two machined bulkheads, an upper deck tunnel weldment, a lower engine deck weldment, and chem-milled skins.



T STAGE
R-124

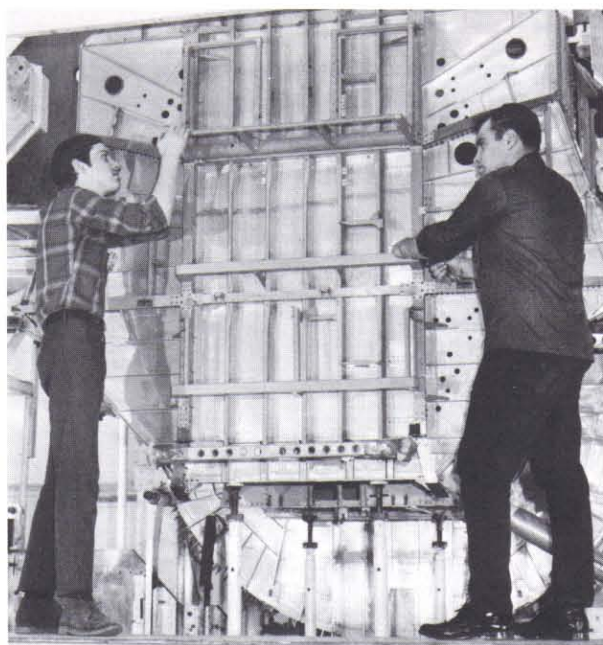
The front face assembly and cabin skin subassembly are mechanically joined with the midsection and are sealed to form the cabin pressure shell of the ascent stage.

The descent stage is the unmanned portion of the LM. It consists primarily of machined parts and chem-milled panel/stiffener assemblies that are mechanically fastened. Compartments formed by the structural arrangement house the descent engine, and propellant, helium, oxygen, and water tanks.



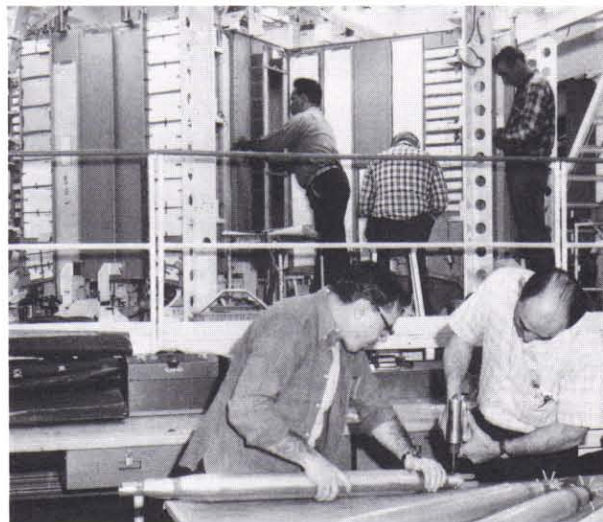
R-126

Fabrication of the descent stage begins with the joining of the machined "picture frames" and the chem-milled panel/stiffener assemblies to form the engine compartment.



R-125

Cold rails, chem-milled beams, struts, and machined fittings comprise the major structural components in the aft equipment bay.



R-127

After the outrigger bulkhead assemblies are attached to the engine compartment with machined cap strips, the eight remaining panel/stiffener assemblies are added.

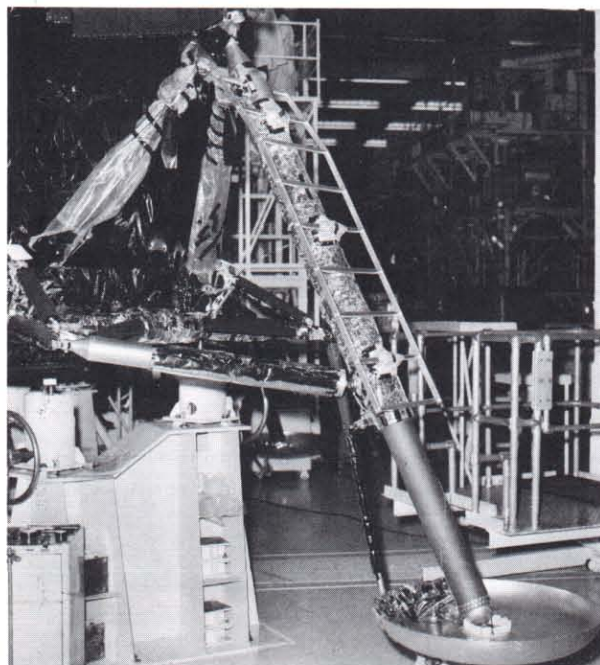
The cantilever-type landing gear is attached externally to the descent stage and folds inward to fit within the shroud of the Saturn V aerodynamic shell. The landing gear consists of four sets of legs connected to outriggers that extend from the ends of the descent stage structural beams.



R-128

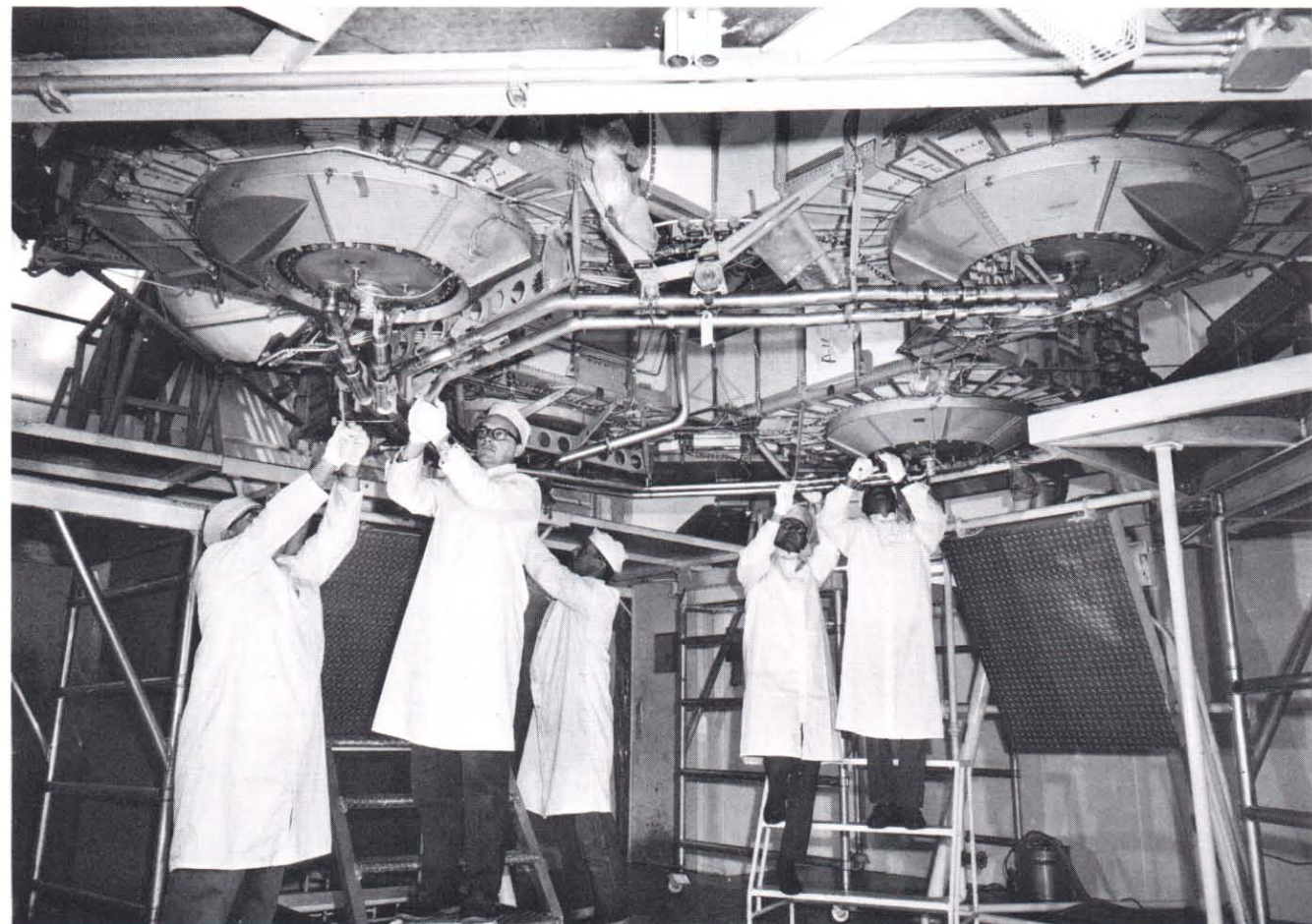
With the addition of the upper and lower machined decks and the machined interstage fittings, the completed descent stage structure is moved to the clean room facility.

Each landing gear consists of a primary strut and foot pad, two secondary struts, an uplock assembly, two deployment and downlock mechanisms, a truss assembly, and a lunar-surface sensing probe. A ladder is affixed to the forward leg assembly. The struts are machined aluminum with machined fittings mechanically attached at the ends.



R-129

The Descent Propulsion Section consists of two fuel and two oxidizer tanks centered about a deep-throttling ablative rocket engine which has restart capabilities.

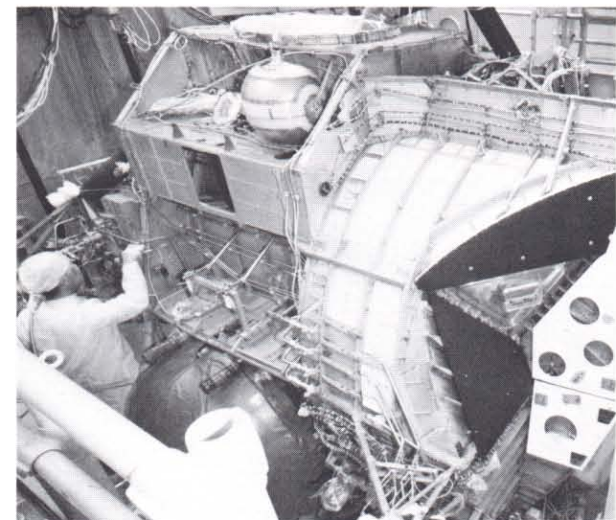


R-130

After the descent stage has been moved to the clean room facility, interconnecting gas and liquid balance lines for like tanks are installed.

The Ascent Propulsion Section uses a fixed, constant-thrust rocket engine. The section includes the associated ambient helium pressurization and propellant supply components.

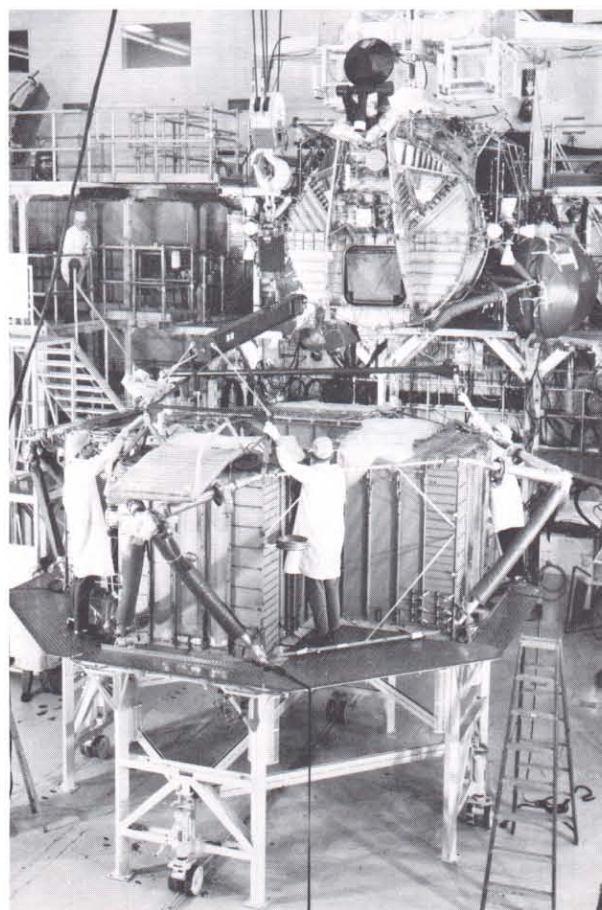
With the installation of the various electrical and electronics components and associated wiring, the two stages of the LM are tested and checked out separately.



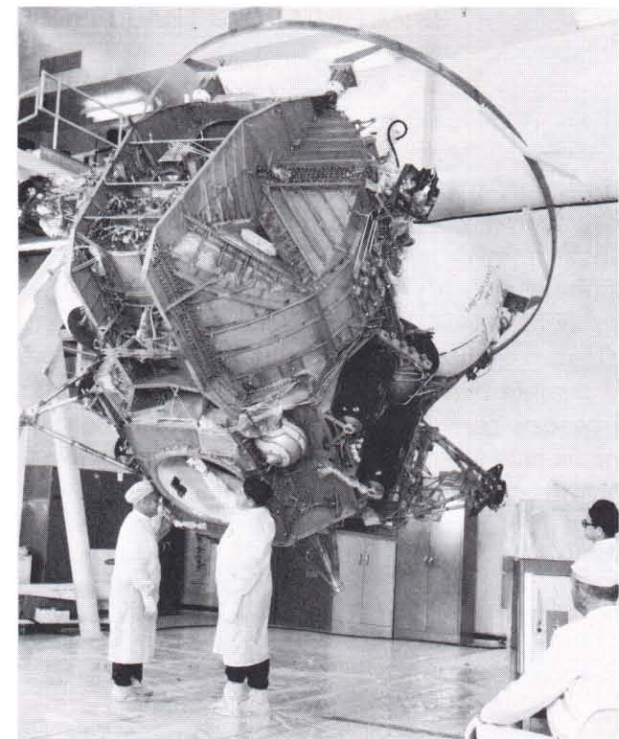
R-131

Two main propellant tanks are used; one for fuel, the other for oxidizer. The tanks are installed on either side of the ascent stage structure.

The ascent and descent stages are then mated and further checks are made on the entire spacecraft.



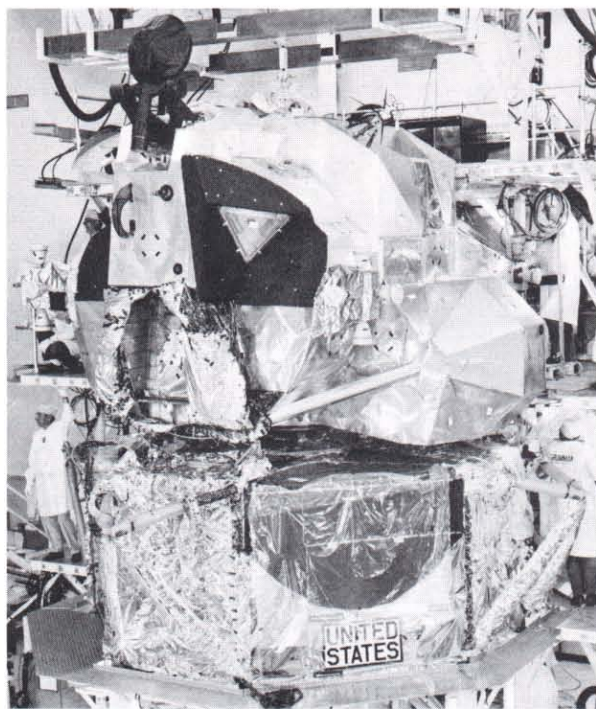
R-132



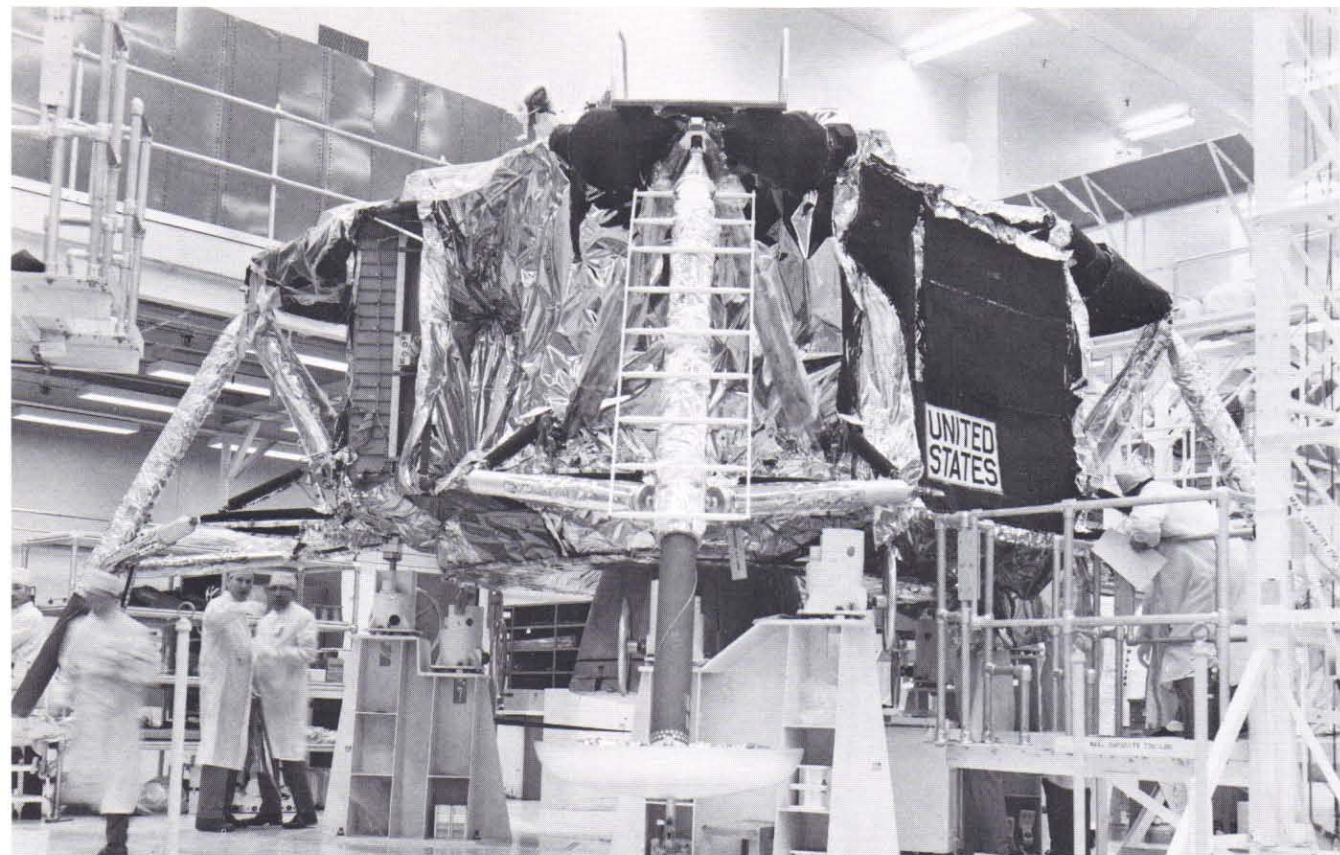
R-133

Although strict cleanliness procedures are followed while the LM is under construction and test, one last clean and rotate check is made. Loose material overlooked by the quality control teams will be dislodged and removed during this process.

When all components of the LM subsystems have been verified, the installation of thermal blankets and micrometeoroid shielding begins. The spacecraft is now ready for Final Engineering and Acceptance Testing.

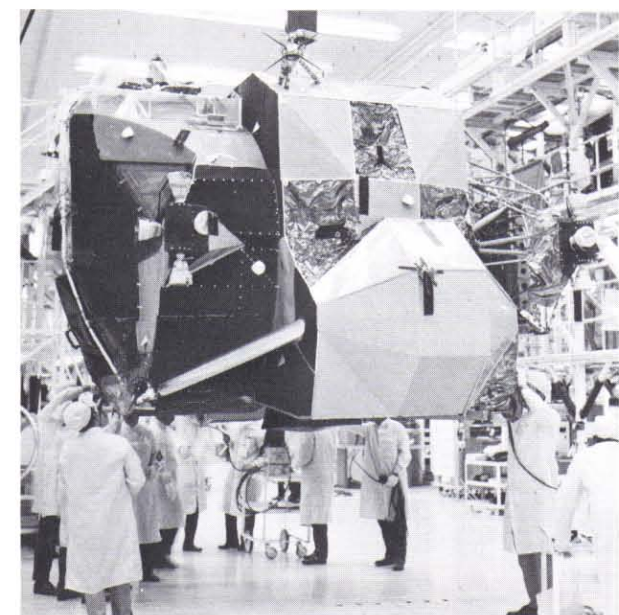


R-134



R-135

Prior to shipment, the stages of the Lunar Module are separated and a landing gear deployment check is made. The landing gear is then removed prior to the LM being put into a protective container.



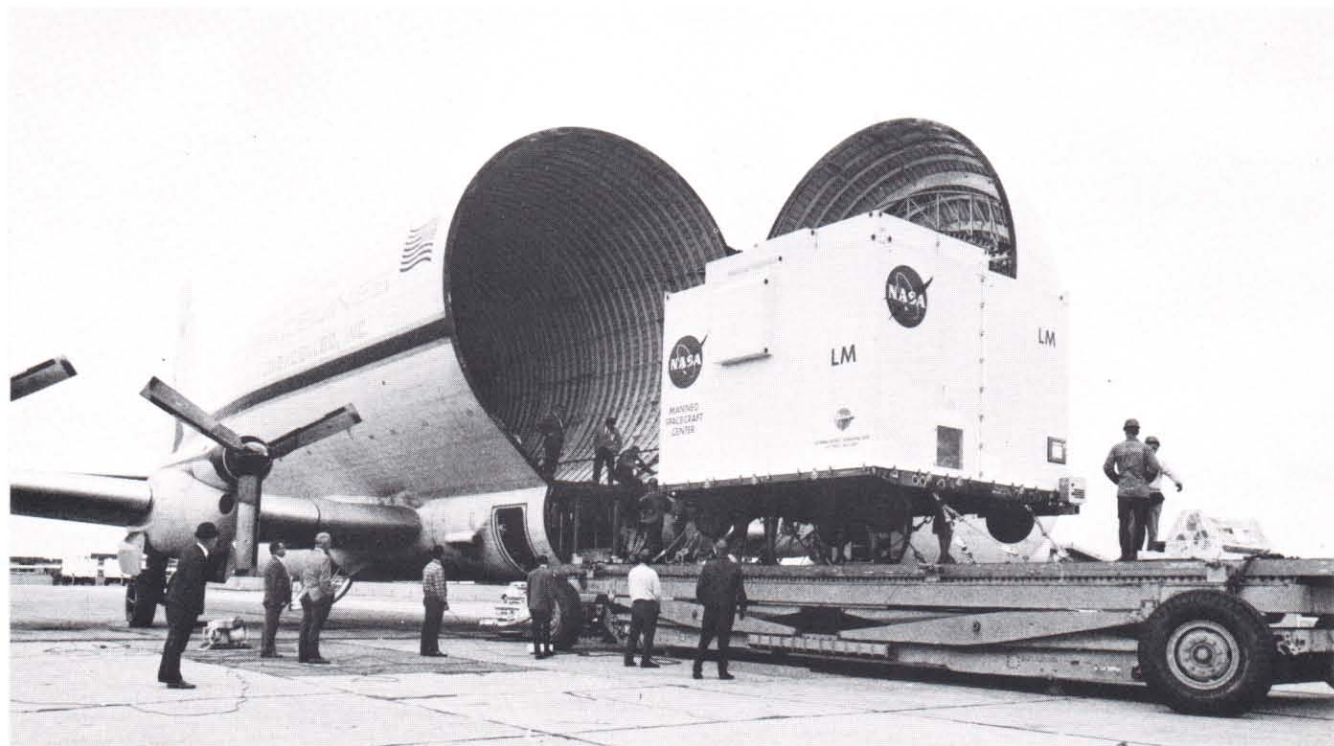
R-136

The Lunar Module ascent stage is then prepared for shipment. Technicians verify that all components are properly secured.



R-137

The stages are put into protective containers. When the entire stage has been encased, dry nitrogen is pumped into the container and maintained at positive pressure during the flight to NASA Kennedy Space Center.



R-138

The separately packaged Lunar Module stages are placed aboard the Super Guppy aircraft for the flight to NASA Kennedy Space Center.