# Apollo CM-007/007A

CM-007/007A is a North American Aviation[1] production-line Apollo Command Module (CM) spacecraft designated as a ground test vehicle for water impact, acoustic and vibration, and postlanding tests[2]. The CM was skinned with cork on the aft and crew compartment heat shields to simulate the flight ablator. CM-007 was in the Block I[3] configuration and initially used in impact and acoustic testing at the manufacturer in Downey, California. It was the first Apollo Command Module delivered to the NASA-Manned Spacecraft Center[4] (NASA-MSC) and was assigned to be used in manned postlanding tests to be conducted by the Landing and Recovery Division. These tests included systems operational and crew compatibility tests for uprighting, postlanding ECS, postlanding communications systems and recovery.

After delivery to Houston in April, 1966[5], CM-007 (Photo #1) was prepared for open water tests in the Gulf of Mexico to operationally qualify the Block I CM postlanding systems. The manned Block I 48-hour open water tests[6] in the Gulf of Mexico were successfully conducted with a NASA test subject crew (Harry Clancy, Tex Ward, Lou DeWolf) onboard CM-007 on September 30-October 2, 1966 (Photos #2, #3, #4).

Following completion of the Block I tests, CM-007 was shipped back to North American Rockwell in 1967 for modification to Block II[7] (CM-101/Apollo 7 had a two-hatch configuration in the tunnel as compared to subsequent missions which had a single unified tunnel hatch configuration.) After modification, CM-007 was designated CM-007A and returned to NSAS-MSC for testing.

After the modifications, the manned Block II 48-hour open water tests in the Gulf of Mexico were successfully conducted with an astronaut crew (James A. Lovell, Jr., Stuart A. Roosa, and Charles M. Duke, Jr.) onboard CM-007A on April 5-7, 1968[8] (Photo #5, #6). After returning to NASA/MSC, the tunnel hatch was reconfigured to the single unified hatch[9] by a contractor team. Additional static water testing of the uprighting system bag failure modes continued in 1968 in NASA-MSC Building-260 water tank.

To support Skylab, CM-007A was used in extreme postlanding environment by simulating equatorial summer heat/humidity and higher latitude cold conditions to test the performance of the Skylab command

module postlanding and recovery systems. Skylab flights were launched on a 50-degree inclination with the spacecraft passing over regions of the Earth considerably warmer/colder than experienced before. The equatorial conditions were achieved in the Building-260 water tank with an enclosure. The cold conditions were achieved in Eglin Air Force base's Climatic Laboratory in September, 1971 in Florida[10,11].

Following the cold environment tests, CM-007A was returned to MSC and stored[12] until being restored by SpaceWorks at the Kansas Cosmosphere and Space Center in 1988 for museum static display purposes. CM-007A is currently displayed at The Museum of Flight in Seattle, Washington (Photo #7).

July 22, 2011

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**Notes/References**:

**1**. The contractor for the Apollo Command Module was North American Aviation, which became North American Rockwell in 1967, then Rockwell International in 1973; Ref: Centennial of Flight Commission website (http://www.centennialofflight.gov/essay/Aerospace/NorthAmerican/Aero37.htm)

**2**. Table of Block I - Major Ground Test Programs; Ref: "The Apollo Spacecraft - A Chronology. Vol. IV. Appendix 8" (http://www.hq.nasa.gov/office/pao/History/SP-4009/v4app8.htm)

**3.** Apollo Block I Command Modules carried no rendezvous and docking equipment and were to be used for manned earth-orbital missions only. The Apollo 1 fire caused the program to not fly any manned Block I Command Modules.

**4.** NASA Manned Spacecraft Center was renamed NASA Johnson Space Center in 1973.

**5.** Ref: "News Release MSC 66-26 dated April 14, 1966" (http://www.nasa.gov/centers/johnson/pdf/83118main_1966.pdf)

**6.** Ref: NASA Manned Spacecraft Center Space News Roundup, Dated October 14, 1966, "Apollo Spacecraft Makes Good 'Boat' In Sea Trials" (http://www.jsc.nasa.gov/history/roundups/issues/66-10-14.pdf)

**7.** Apollo Block II Command Modules carried rendezvous and docking equipment for manned lunar missions. The Block II Command Modules were substantially redesigned after the Apollo 1 fire and flew all manned Apollo, Skylab and ASTP missions.

**8.** Ref: NASA Manned Spacecraft Center Space News Roundup, dated April 26, 1968, "Down to the Sea in Spacecraft" (http://www.jsc.nasa.gov/history/roundups/issues/68-04-26.pdf)

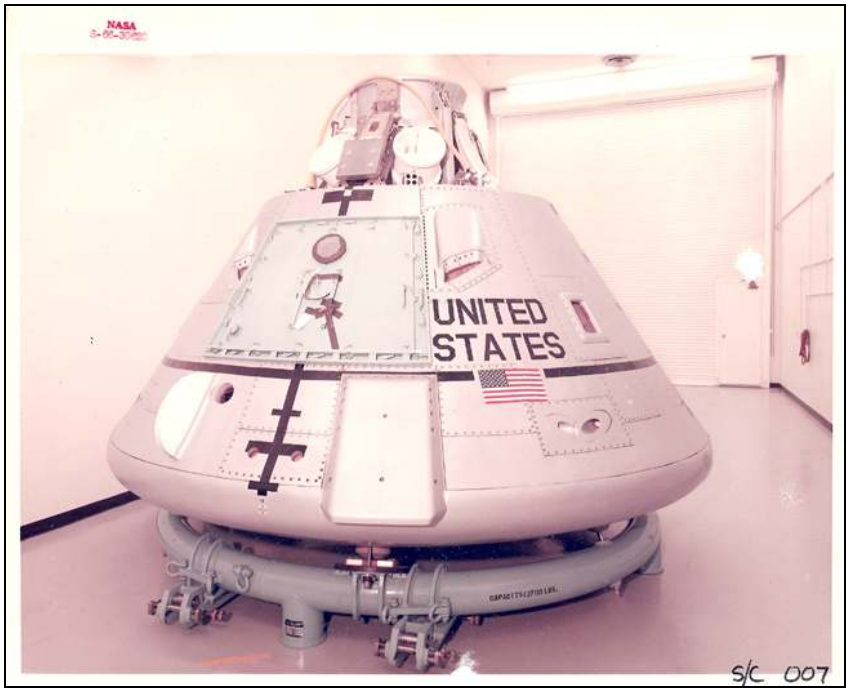
**9.** The Command Module single unified tunnel hatch was the configuration for Apollo 8 and subsequent missions.

**10.** Ref: NASA Press Release, MSC 71-70, September 17, 1971, "Cold Weather Environment Tests On Skylab Command Module Get Underway At Eglin AFB" (http://www.nasa.gov/centers/johnson/pdf/83121main_1969.pdf)

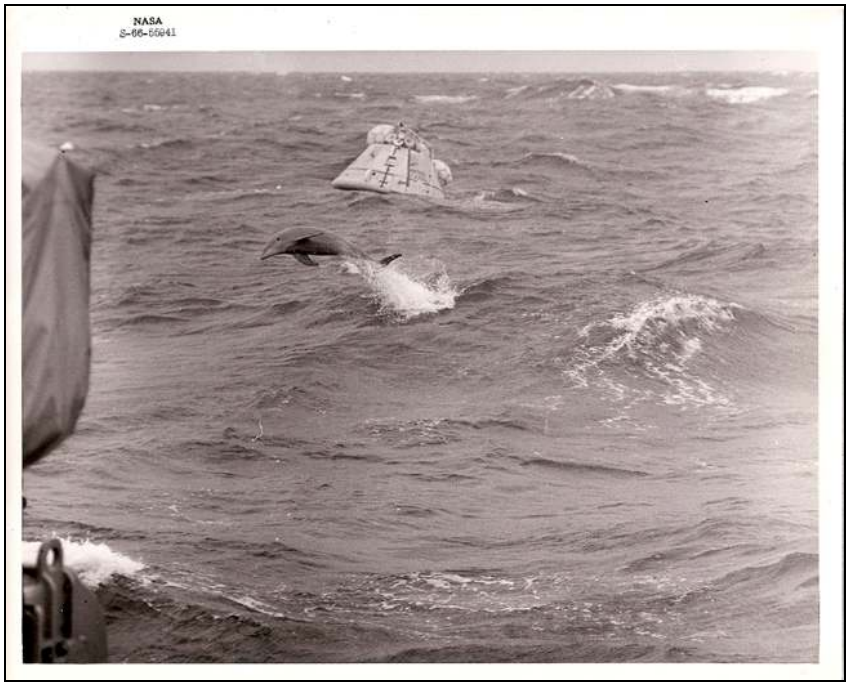
11. Ref: MSC Roundup, September 24, 1971, "Skylab Could Make Cold Water Landing" (http://www.jsc.nasa.gov/history/issues/71-09-24.pdf)

12. Ref: JSC-03600, "Apollo/Skylab ASTP and Shuttle Orbiter Major End Items", March 1978 (CM-007A noted as located at JSC and stored in lot adjacent to Building 259. Offered to the Smithsonian 4-76.) (http://klabs.org/history/history_docs/mit_docs/1690.pdf)

**Photos:**



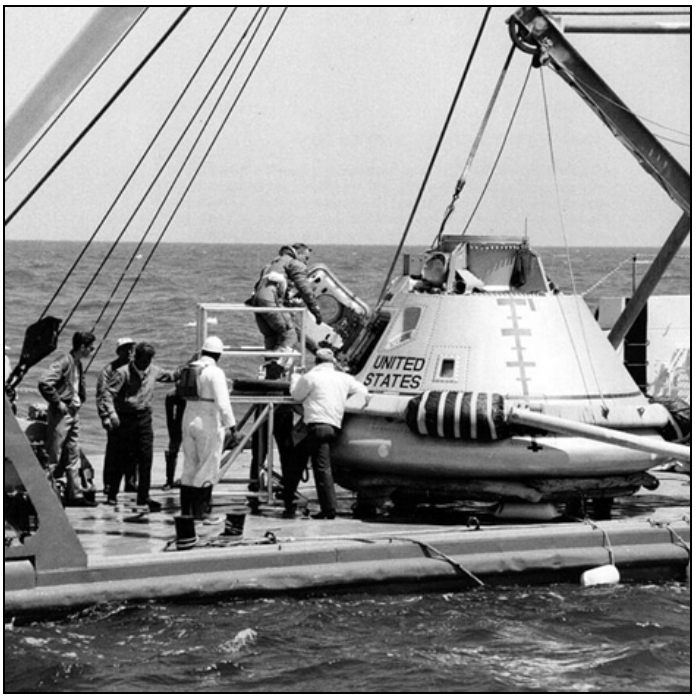

**1.** CM-007 in NASA-MSC Building 260 clean room following delivery from North American Aviation/Downey, California on April 18, 1966 (Photo Credit: NASA S-66-30620)




**2.** CM-007 in Gulf of Mexico during Block I 48-hour manned postlanding systems qualification test on September 30 - October 2, 1966 (Photo Credit: NASA S-66-55941)

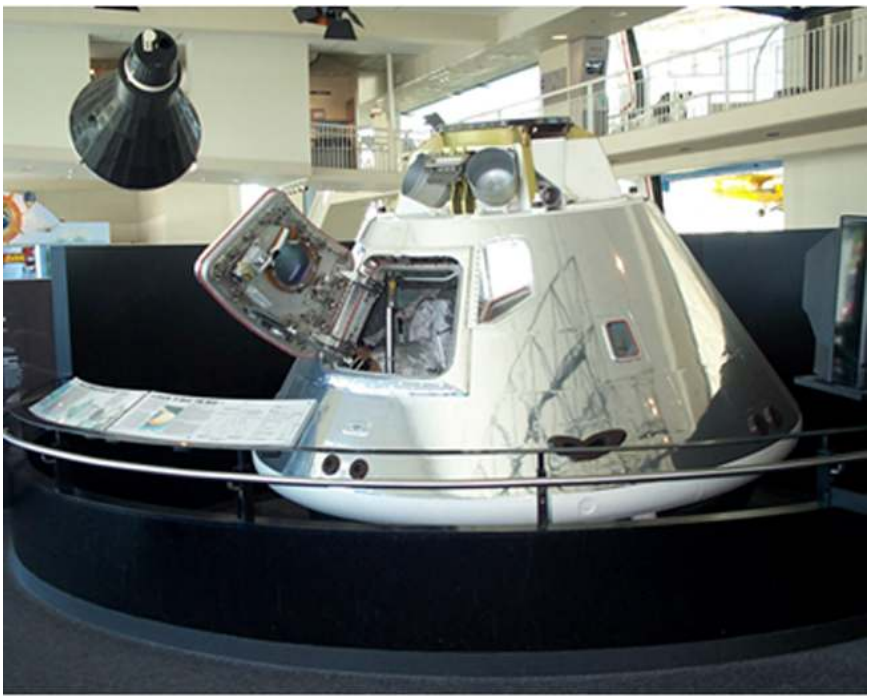
**3.** CM-007 in Gulf of Mexico during Block I 48-hour manned postlanding systems qualification test on September 30 - October 2, 1966 (Photo Credit: NASA S-66-55668)


**4.** CM-007 and test crew (l to r: Jim Shannon-Test Conductor, Tex Ward-Test Subject, Lou DeWolf-Test Subject, Harry Clancy-Test Subject, Larry Bell-Test Conductor; top: Coye Mac Jones- Vehicle Project Engineer) following Block I 48-hour manned postlanding systems qualification test on September 30 - October 2, 1966 (Photo Credit: NASA S-66-55668)




**5.** CM-007A onboard M/V Retriever in Gulf of Mexico prior to Block II 48-hour manned postlanding systems qualification test with astronaut crew (James A. Lovell, Jr., Stuart A. Roosa, and Charles M. Duke, Jr.,) on April 5-7, 1968
(Photo Credit: NASA S-68-31882)


**6.** CM-007A in Gulf of Mexico next to M/V Retriever during Block II 48-hour manned postlanding systems qualification test with astronaut crew on April 5-7, 1968
(Photo Credit: NASA S-68-30160)



**7.** CM-007A on display at The Museum of Flight in Seattle, Washington
(Photo Credit: Jim Gerard from *A Field Guide to American Spacecraft* website)