

A second approach is replacement of the glycol in the cabin by water while leaving the mixture of water and glycol in the service module.

A third approach involves the examination of the flammability characteristics of other mixtures of water and glycol.

Finally, the design of the environmental control system is being reviewed with a view to improving its maintainability and serviceability.

With regard to spacecraft atmosphere we are continuing tradeoff studies on spacecraft atmosphere for each operational phase of the Apollo program. These studies include one versus two gas tradeoffs, evaluation of the prelaunch atmosphere and a fire resistant oxygen system.

Question 8. What have been the major contributions of the Apollo engine development program in the past 4 years?

Answer 8:

F-1 Engine:

1. Successfully developed the largest thrust engine fired to date in the free world (1,522,000 pounds thrust) enabling United States to launch significant payloads.
2. Completed flight rating test qualifying the engine for flight test.
3. Completed tests qualifying the engine for manned flight and continued intensive reliability analysis and test.
4. Successfully solved the high frequency combustion oscillation problem which has long-range benefits for other programs as well as the Apollo program.
5. Successfully completed three S-IC acceptance stage firings where all five engines are fired for the full duration of 150 seconds.
6. Advanced state of the art: (a) achievement of combustion stability of a large rocket engine, and (b) development of the turbopump machinery to pump the large volume of lox and RP-1 required.

J-2 Engine:

1. Successfully completed flight rating tests qualifying the engine for flight.
2. Successfully completed tests qualifying the engine for manned flight and continued reliability testing.
3. Successfully flight tested this engine.
4. Solved the problem of testing at sea level, conditions that exist at altitude.
5. Solved the fuel pump stall problem by prechilling the pump and chamber and to limit the temperature conditions of each under which a start will be effected. This will have long-range benefits for other programs.
6. Largest hydrogen fueled engine in the free world with long-range benefits for future programs due to high performance demonstrated during static and flight tests.
7. Exceeded specific impulse and thrust to allow greater payload (2,200 pounds in Saturn IB, 4,700 pounds in Saturn V).