

What happens next

With the dramatic return of James Lovell, Fred Haise and Jack Swigert last week (SN: 4/18, p. 387) the United States' space program passed a rugged test of the flexibility of its systems.

The real test of the nation's commitment to manned space exploration may yet be to come. It hangs on the ensuing investigation of the causes of eruption of an oxygen tank that blew the side off Apollo 13's service module and brought the lunar landing mission to an abrupt end.

A foretaste of the questioning that began to emerge following the emergency came in mid-flight, only 12 hours after the tragedy, from the crewmen themselves: Apollo 13 commander, James Lovell, soon after the nightmare of emergency had passed and the moon was behind him, radioed: "I'm afraid this is going to be the last moon mission for a long time."

And once the crew was safely on board the carrier Iwo Jima, other people's thoughts turned to the future as well; whether Apollo 14, scheduled for October, would get off on schedule became an open question.

Dr. Thomas Paine, Administrator of the National Aeronautic and Space Administration, and Dr. George Low, deputy administrator, appointed Edgar M. Cortright, director of NASA's Langley Research Center, to chair an investigating board to review the abort. Cort-

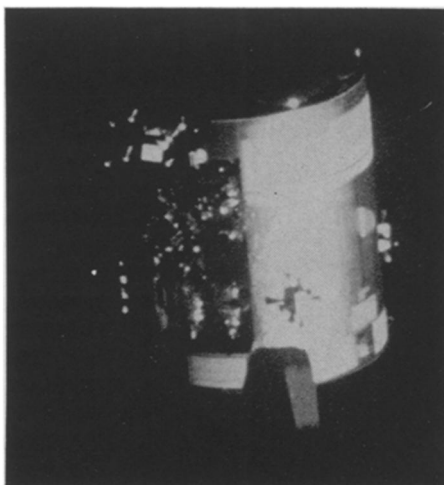
AS LOVELL SAID

"At least something worked. . . ."

The only scientific experiment of any consequence to come out of the aborted Apollo 13 flight set seismologists crowing with excitement: the crash of the Saturn S4-B stage into the moon (SN: 4/4, p. 353).

Typical of most of the scientific results to come from the Apollo experiments this one contradicted, in some part, the conclusions of the previous experiments. The crash of Apollo 12's lunar lander set off a gradually increasing series of seismic signals that led scientists to suggest a sandwich-like formation of the moon in which two fairly solid layers were separated by rubble (SN: 11/29, p. 493).

Apollo 13's S4-B, crashing into the surface 73 nautical miles from the Apollo 12 seismometer with an impact equivalent to 11.5 tons of TNT, suggests otherwise. It set up signals that imply that the outer shell of the moon, to the depth of



Service module: Source of disaster.

right said he hoped for some results in three or four weeks.

How much, if any, the review will delay the Apollo program is a question space officials answer with varying degrees of optimism. Dale Myers, associate NASA administrator for manned space flights, believes that corrective action can be taken without major delay in the Apollo schedule.

His optimism is based on preliminary evidence that the eruption involved a single system only, the oxygen tank, a relatively simple system compared to the others in the spacecraft and one that could be modified and tested fairly rapidly.

The best guessing in Houston this week was that if the cause of the

at least 20 to 40 kilometers, may be formed of the same crystalline rock material as is found on the surface. No evidence of a lower boundary to this material has been found in the seismic signal, says Dr. Gary Latham, the experiment's principal investigator, although it is too dense to form the entire moon.

Although the character of the Apollo 13 signal was identical to that of the Apollo 12 lunar lander impact, says Dr. Latham, there was an unexpectedly rapid build-up of the signal from the beginning to its maximum. This part of the signal, at least, cannot be satisfactorily explained by scattering of seismic waves in a rubble material, he says. He suggests tentatively that the early quick build-up of the signal might come from the expanding cloud of material thrown up by the impact as it sweeps across the lunar surface.



Photos: NASA

Paine: A message from the President.

Apollo 13 abort can be located and insured against, Apollo 14 would go with no more than 30 to 60 days delay. Expectations are that Apollo 14 will be assigned 13's mission—the Fra Mauro Highlands—and that as a consequence the original Apollo 13 crew, Lovell, Haise and Thomas K. Mattingly, could be aboard.

Dr. Paine refused to declare Apollo 14 was either off or on for October of this year, though he did insist that a single setback, no matter how dangerous, would not set the entire program back.

His optimism was endorsed by President Nixon. After he and Dr. Paine flew to Hawaii to meet the astronauts, Dr. Paine returned with a message of support: "We will press on," the President told Dr. Paine. "We have set a good course, a forward course and we will not falter in our resolve." He gave emphasis to manned lunar flights.

The space agency faced another hurdle this week, when the NASA budget authorization was scheduled to go before the House of Representatives for a two-hour debate. Opposition to manned flights, with the abort as fodder, gathered support from critic-members of the House Science and Astronautics Committee who had drawn up proposed revisions, shifting emphasis to the Viking Mars probe and to earth applications satellites, from the Apollo effort.

Meanwhile the explanation of the tragedy lay in miles of telemetry data containing a millisecond-by-millisecond account of what happened aboard the spacecraft before and during the eruption. The data measured temperature, pressure and the condition of each of the parts of the 21 major subsystems of the spacecraft.

Also of value in the investigation are photographs taken of the damaged service module as it separated from the command module before reentry. □