

The board reports

In the wake of the Apollo 13 abort, some officials of the National Aeronautics and Space Administration remain confident that the corrections can be made to the Apollo spacecraft in time to meet the earliest launch possibility for Apollo 14 in December.

But the findings and recommendations presented to NASA Administrator Thomas Paine this week by the Apollo 13 Review Board chairman, Edgar M. Cortright, are so extensive and would require such a thorough review of all systems, subsystems and procedures, that no one is publicly prophesying the final effect on the Apollo schedule.

Decisions affecting Apollo's future, based on the board's recommendations, will not be made until next month. By then, says Dr. Paine, the space agency will have had time to study in addition reports from the Office of Manned Space Flight and the agency's Safety Board, as well as all other possible manned space flight schedule options Dr. Paine has requested from the NASA research and flight centers.

Verbatim adoption of the Cortright recommendations would almost invariably mean a lengthy stretch-out.

Central to the report's recommendations was the need not only for correction of the cause of the Apollo 13 failure, but for a review of the entire spacecraft. The NASA officials are adamant in their determination not to fly another crew to the moon with the present design of the equipment.

To correct for the specific cause of the Apollo 13 failure, the service module's oxygen tank, the board recommended the removal from contact with oxygen of wiring, unsealed motors and other materials that could short-circuit and ignite adjacent materials. And the use of Teflon, aluminum and other materials that are relatively combustible in the presence of oxygen should be minimized. Although NASA officials have not decided on the resulting design of the tank, or even whether what must go can actually be eliminated, the oxygen tank changes have top priority.

The board's findings revealed that failure of the thermostatic switches to open could have been detected at the Cape if switch operation had been checked by observing heater current readings on the oxygen tank heater control panel. Since tank temperature readings indicated that the heaters had reached their temperature limit (switch opening should have been expected had these readings been observed) the board recommended improvements in the caution and warning systems, both on board the Apollo craft and in the Mission Control centers at Cape Ken-

nedy and Houston. Changes to eliminate unnecessary alarms, adjustments in the caution and warning logic systems to prevent an alarm from blocking another in the same system, and visual or audible alarms that could not be overlooked were advised.

Reassessment of lifeboat possibilities, consumables and emergency equipment in the lunar and command modules, under way since the abort itself, was also recommended. The study panel also wants changes in the launch procedures at Cape Kennedy when malfunctions of a major system or subsystem are involved.

Perhaps the most time-consuming task recommended, and the one that could most affect future schedules, involves management re-evaluation and reassessment of all Apollo spacecraft systems and the engineering organizations responsible for them at the Manned Spacecraft Center. This is to include both the prime and subcontractors.

One malfunction not related to the actual abort explosion, but which would be related to the general review and tests, was an abnormal current flow which was detected in the lunar module's power system while the LM was supplying the power to return the Apollo 13 crew to earth. The board recommended continuation of testing of the LM power system already under way at MSC in Houston.

The Apollo 13 report, a million-dollar study involving some 300 scientists and engineers and including over 100 simulated tests, describes the Apollo accident as "not the result of a

NEW COMMISSION

Compromise on drugs

An Administration-sponsored drug bill passed the Senate in January by an 82-0 vote (SN: 4/4, p. 339). The bill, introduced by Sen. Thomas Dodd (D-Conn.), would give the Attorney General the power to classify drugs, according to their potential for abuse, in schedules that in turn control research and medical use of the substances. The Secretary of Health, Education and Welfare would be relegated to an advisory position in regard to drug classification.

What raised the ire of scientists and the medical profession were the powers effectively given to the Attorney General to regulate drug research and to impose extensive record-keeping tasks on physicians who dispense any scheduled substances, including barbiturates and amphetamines.



NASA

Teflon burning: Redesign necessary.

chance malfunction in a statistical sense, but rather resulting from an unusual combination of mistakes, coupled with a somewhat unforgiving design." The review panel indicted all parties—the subcontractor for the oxygen tanks, Beech Aircraft Corp., Denver, Colo.; the prime spacecraft contractor, North American Rockwell Corp., Downey, Calif.; and the NASA personnel from top management on down.

The trigger of the near disaster appears to have been the failure of Beech Aircraft to follow design specifications for the thermostat switches whose failure led to all the subsequent events (SN: 6/13, p. 571). Switches with a 65-volt capability had been ordered, to make them compatible with ground-support equipment; Beech installed 28-volt switches, according to an outdated specification, instead. The application of ground-support voltage to the 28-volt switches welded the switches shut.

Critics have argued that the bill takes away authority that appropriately belongs in HEW. "The Attorney General is given broad powers in areas which have traditionally been the domain of the medical and scientific community and the representative of these communities, the Department of Health, Education and Welfare," says Neil A. Chayet, lecturer in Legal Medicine at the Boston University School of Medicine. Chayet is executive secretary of the Committee for Effective Drug Abuse Legislation, many of whose scientist-members testified against the bill.

Since the Senate action, attempts to reach a compromise on the control of drug classification have centered in the House Subcommittee on Public Health and Welfare. After being submerged in subcommittee rewrite sessions for six