

## AEROMEDICINE

# 56 Hours in Jet Planes

**Airmen remained in cockpit for almost two and a half days in full flying gear without signs of major stress. Crew claimed that "g" suits kept muscles from getting stiff.**

► MEN CAN stay in the cockpits of present jet aircraft for 56 hours without major stress. Four men have already done this, thus exceeding the time of the 47-hour non-stop flight of a B-47 bomber in December, 1954.

The 56-hour trial was made in a grounded F-84 plane. Results were reported to the Aero Medical Association meeting in Washington by scientists of the U. S. Air Force Aero Medical Laboratory at Wright-Patterson Air Force Base, Ohio.

With the development in recent years of in-flight refueling technique, it was pointed out, the success of future combat missions will be measured by how long the crew can stay continuously in the plane without losing efficiency as well as how long the aircraft can be kept continuously aloft.

Although the men came through the 56-hour trial without showing signs of major stress, their condition and mental performance deteriorated during the last four hours. This is the period demanding high performance for survival.

The test was divided into three periods of low, high and low performance, representing take-off and long cruise to the target area, period of active combat, and cruise home from the target area. During the first and last periods, of low performance, the man in the test operated test equipment for 15 minutes in each hour and was allowed to sleep if he wished. During these two low-performance periods, three emergency tests of 10 minutes each were given to check the man's ability to operate at full efficiency on short notice.

During the middle period of high performance, the man operated the test equipment continuously and was required to remain as alert as possible.

Brain waves, muscle electric potentials, heart rate, and skin resistance to show emotional changes and nervous system response were measured during the various test periods. Psychological tests to measure reaction time and alertness were also given.

Fruit and vegetable juices, peppermint candy, fruit drops and jelly beans and pre-

chilled water were stored where the man could reach them. Typical personal equipment consisted of long cotton underwear, Air Force-Navy "g" suit, Mark IV liner and outer shell, P-3 helmet, winter flying gloves, wool socks, A-13A oxygen mask, B-5 parachute and A-1 survival kit.

The "g" suit was considered "quite remarkable" by the men in keeping muscles from getting stiff and cramped. One man said it was equal to "getting out of the cockpit and running a good way." This was because it helped keep blood circulating in the legs and buttocks.

Helpful modifications of present standard equipment included:

A tiltable insert liner in the standard F-84 ejection seat that allowed the man independently to change the angle of the seat back and pan, thus relieving fatigue.

An experimental dynamic cushion. This is an inflatable pneumatic cushion that cycles at a specific rate. Compressed air is supplied to the cushion through an adjustable valve so the man sitting on it can vary the total volume of air and control the rate of inflation and deflation. This also helped reduce fatigue and soreness from the long sitting.

The study was reported by industrial designer Charles A. Dempsey, Capt. Theodore H. Greiner, USAF (MC), Lieut. Dean Chiles, USAF (MSC), Capt. Neil R. Burch, USAF (MC), Lieut. Darrell Warren, USAF (MSC), Lieut. Norman E. Schmitt, USAF (MSC) and Capt. Jack E. Steele, USAF (MC).

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**TOOTHLESS SHARK**—It might not seem so from this snarling portrait, but the basking shark is harmless as sharks go. A puzzled fisherman hauled the strange fish in in his shad net off the northern coast of Florida and it was identified by scientists at the oceanarium at Marineland, Fla. The 12-foot-long shark feeds on plankton, minute creatures in the sea. It spends much of its time lying at the surface with its back awash. These sharks mature when they reach a length of 15 feet.

## ELECTRONICS

## Direct TV Signals Sent Over Horizon

See Front Cover

► DIRECT TELEVISION and 12-channel telephone transmission through space for 200 miles, without relay stations, ultra-high frequencies has been accomplished by scientists of the Massachusetts Institute of Technology and Bell Telephone Laboratories.

Signals are sent over the horizon by using 10-kilowatt transmitters and antennas 60 feet in diameter. This is 20,000 times the power and 30 times the antenna area used in the present trans-continental microwave system, in which the stations are about 30 miles apart. The new antenna is shown on the cover of this week's SCIENCE NEWS LETTER. At left in the photograph is the antenna now used in such transmissions.

The technique is expected to provide longer communications bridges over water and rugged terrain, a supplement to but not a replacement for line-of-sight transmission.

Scientists have known that ultra-high frequencies travel beyond the horizon, but have thought the transmission too weak and undependable for practical use.

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