

## ROCKETS AND MISSILES

# U. S. Hopes Pinned on Saturn

A communications satellite system and manned flight plans depend on the Saturn rocket. So does America's hope of passing the USSR in payload size and weight.

By W. T. M. GRIGG

## See Front Cover

ABOUT A HALF HOUR before the big test, engineers in coveralls and yellow or blue helmets gathered on a hill about 2,000 feet from the first stage of the Saturn rocket. Before them, held by a tower of steel and concrete, stood the booster.

Eighty feet tall, 22 feet in diameter, the booster dwarfed a full-sized Jupiter rocket standing nearby. The Saturn booster, in fact, dwarfs any of the free world's rockets and is more powerful than anything the USSR is known to have tested.

The Saturn test would be static. A sturdy tower of steel and concrete would do what seemed impossible: hold the booster to the ground.

As the crowd gathered, the hill at Huntsville, Ala., began to look like a picnic. Dr. Wernher von Braun, director of Huntsville's Marshall Space Flight Center, joined the group.

Bells rang at the booster area. Finally, a siren screamed.

Dr. von Braun was called to a mobile telephone.

"They've found a man in there," a photographer joked.

Within a few years, it is planned, there will be not one man but two or three in a capsule atop the completed Saturn. The rocket will be able to carry a team of astronauts into orbit around the earth or on a trip around the moon and back to earth. (Two of America's Mercury Astronauts, Air Force Captains Leroy Gordon Cooper Jr. and Donald K. Slayton, flew in to witness earlier static firings.)

But if there was a man "in there" at this test, Dr. von Braun did not mention it as he returned from his call.

## Area Soaked Before Test

Thousands of gallons of water began to spray the area the booster's exhaust would hit. The water would moderate the exhaust's heat.

Then, the count-down.

At zero, a roar. The trembling booster shot flame. Deflected, the flame shot 200 feet into the air at an elbow angle to the rocket.

The observers felt their insides shake. The whole hillside trembled.

For more than two minutes, the booster roared on. The test was only the second in which all eight engines were used. The first had been stopped after 110 seconds.

The flame petered out and the test was over. Dr. von Braun, his blond hair ruffled, said, "We're in the money."

He said the booster had been run until its fuel—liquid oxygen and kerosene—was exhausted. None of the couple of hundred monitoring devices had revealed a danger that required the test to be stopped.

The duration of the test was announced by loudspeaker: 122 seconds.

The exhausted Saturn was now quiet. An 80-foot booster like this one will be only the first stage of the Saturn rocket. But this one stage can develop 1,500,000 pounds of thrust—equivalent to 30,000,000 horsepower.

Each of this stage's eight engines is a modified version of the Jupiter-Thor engine. They are powered by kerosene fuel and oxygen in nine massive tanks.

The completed Saturn C-1 will stand nearly 200 feet tall, about a third as high as the Washington Monument. Yet it will, hopefully, take off.

On its flight depend U. S. hopes for beating the USSR in payload and the accomplishment of a soft landing on the moon, several flights by man and an advanced system of communications satellites capable of instantaneous transmission of television, telephone or telegraph signals to any point on earth.

The Saturn rocket could also place sizable payloads on Mars or Venus. The Saturn C-1 will be able to orbit payloads of 23,000 to 25,000 pounds.

With the first series of static firings now complete, the Saturn booster is now being

modified to make it more like a rocket for flight. Skirts, pressurization equipment and other hardware are being added.

About the end of July, a second series of static firings will begin.

Dr. von Braun expects the booster to meet this schedule:

1. There will be a sub-orbital flight test of the first stage in the summer of 1961. In this test and in two in 1962, the first stage will be real, but top stages will be dummy models of the second and third stage rockets to be added later.

2. In late 1962, the first of three sub-orbital shots will be made using the first stage, an active second stage and a dummy third.

3. In the latter part of 1963, the first of three test flights of the three-stage Saturn will take place. These flights will be orbital and will be in support of the National Aeronautics and Space Administration's manned space flight program.

4. After a tenth flight test in 1964, the Saturn will be operational.

## Reusable Booster Saves Money

In the early flight tests a system of parachutes and retro-rockets will permit recovery of the first-stage booster. After rust is removed and damage repaired, the booster will be used again—a major saving to the taxpayer.

The first-stage booster of the Saturn launch vehicle and 188,000-pound Rocketdyne H-1 engine in the Fabrication and Assembly Laboratory at Huntsville, Ala., are seen on the front cover of this week's SCIENCE NEWS LETTER.



*GOING NOWHERE*—The free world's mightiest booster, the Saturn, roars and thunders but is held to the ground in a test of its eight engines. Additional hardware, such as skirts and pressurization equipment, are now being added for a second series of static tests. Then—flight.

Recovery and re-use of a rocket is not completely new, but the U. S. has not attempted it on a booster even approaching the size of Saturn.

The Saturn project, begun in August, 1958, has so far cost about \$100,000,000. Over a year's work has already gone into developing a digital computer to go on board the Saturn. It will be a small box about two feet high with magnetic drum memory.

It will direct Saturn's actions, correcting deviations that might prevent the rocket from continuing on its proper flight path. The computer will be versatile enough to handle all the different flights now being planned for the rocket.

A bigger computer, the first IBM 7090, has just been put into use at Huntsville for Dr. von Braun's team.

Known data about the Saturn rocket and space conditions can be so combined in the computer that it produces simulated flight tests for studies of the Saturn's potential. A second 7090 is planned and, later, a giant Stretch computer not yet built may be used.

Without these giants, rocket development would be greatly slowed, Dr. von Braun has indicated. They are helping speed Saturn to the launching pad.

A second booster is already being built at Huntsville for the flight tests. It will be assembled and static-fired here and then transported to Cape Canaveral for that first test next summer.

Right now, the Huntsville experts say the schedule will be met. With such satisfactory static firings as those already made, this is likely.

Thus, the U. S. may be able to pull ahead of the USSR in terms of payload

weight and size within a few years, unless the USSR is willing to spend time and money on extremely large rocket boosters with little military usefulness. But the USSR may be willing.

Here are Dr. von Braun's observations on the booster race:

"From the information I have, I must conclude that the Russian large rocket program started solely as a military program, with Stalin himself making the decision that he did not care how big the rocket would be to carry an atomic warhead across the ocean, he just wanted one and he wanted it quick.

"The scientists apparently tried to get some of the new rockets for their purposes and were turned down. Apparently they were turned down time and again because the military felt this space science project would distract from the military effort.

"But at the end the scientists got a rocket and Sputnik I went into orbit.

"The payoff in political propaganda was so high that now the scientists can get anything they want."

The Russians have already fired several rockets with about half the thrust of the Saturn (one and a half million pounds). Dr. von Braun believes they are at work on bigger ones:

"Now, whether their new rocket will have a million and a half or two million or three million pounds of thrust or only one million, this I don't know, but I consider it very likely that they are busy at this very time developing a rocket at least the size of Saturn."

Science News Letter, July 16, 1960

## PSYCHOLOGY

# Personalities and Smoking

A STUDY of 2,360 men reveals that the average cigarette smoker, pipe smoker, non-smoker and ex-smoker have personalities that differ from each other. Cigarette smokers, for instance, are more outgoing than pipe smokers and non-smokers.

The authors of the study say the results do not prove that smoking does not cause lung cancer, but they make more reasonable the proposition that both smoking and cancer may be related to certain underlying hereditary factors.

The study was made by Dr. H. J. Eysenck of the Institute of Psychiatry in London and research workers of Mass-Observation Ltd. They report that their study lends support to the idea that extroverts may "live at an accelerated rate, drinking harder, smoking harder, living more irregular lives, staying up longer and generally 'living it up' more.

"They may thus lower their resistance to disease and expose themselves more to conditions which may directly cause the disease in question."

In the study, reported in the British Medical Journal, May 14, 1960, 31 questions were asked the men. These included:

1. Would you rate yourself a lively individual?

2. Are you frequently lost in thought,

even when you are supposed to be taking part in a conversation?

3. Do you always prefer the familiar, the safe and sure, to taking chances with the new and untried?

4. Do you have any habits like chewing pencils or biting fingernails or things like that?

The answers showed a pattern of extroversion among the cigarette smokers, the researchers found. The answers also "weakly confirmed" the idea that smokers had less rigid personalities than others.

From the study, "ex-smokers emerge as the most neurotic; smokers as a whole do not appear to be more neurotic than non-smokers."

Among smokers, heavy smokers were more extroverted than medium smokers (15 to 24 cigarettes daily). The medium smokers, in turn, were more extroverted than the light smokers.

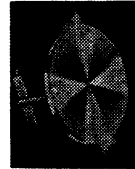
Ex-smokers' extroversion averaged between that of light smokers and medium smokers. Non-smokers averaged out as less extroverted than even the light smokers. And pipe smokers were more introverted, on the average, than any of the other groups studied.

Science News Letter, July 16, 1960

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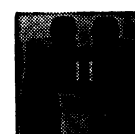
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