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MARSHALL IN THE SPACE EFFORT

by

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Ladies and gentlemen, ----------

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It is a privilege to visit with you tonight and discuss the program of the National Aeronautics and Space Administration and, in particular, the role being played by the Marshall Space Flight Center, Huntsville, Alabama. First, I would like to describe some of the effort of the NASA and to indicate the complexity of the scientific and engineering endeavor now being undertaken by this agency. It will probably be obvious as we run through the group of slides depicting the space program planned during this decade that tremendously complicated mathematical problems must be solved. It may also be obvious that mathematics is taking a somewhat different turn due to its use and the requirements of the space age.

I need not remind you that we are comparatively new in the area of outer space. As you recall, it is just about eight years since Explorer I was placed into orbit and launched this country into a space exploration program. Remarkable progress has been made during these years. Now that we are able to build on the knowledge already gained, I predict that the events accomplished within the next five years will be even more astonishing to us as we look back on them a few years from now.

The role played by the Marshall Space Flight Center has so far been to design and build the large launch vehicles necessary to carry large payloads into space. It has been said many times that if our country lags the Soviet Union in the so-called space race it will be due to our inability to deliver large payloads into orbit or into a space probe. Work now being completed at Huntsville gives our country a capable and versatile launch vehicle system which will allow us to explore space with large and complicated spacecraft.

The NASA has several goals and programs, but the one which is being given most emphasis at the present time-and the one that has gained more interest from the public standpoint-is that of a manned exploration of the moon. The late President Kennedy asked this country to accept the obligation of a manned lunar exploration during this decade. President Johnson has re-emphasized these goals; therefore, the NASA expects to realize manned lunar exploration before 1969 expires. The following series of slides gives some indication of how NASA expects to accomplish this mission.

Slide 1 - MSFC Primary Mission

Slide 2 - Saturn I Mission

Slide 3 - Saturn I (Block II) Characteristics

Slide 4 - Saturn IB mission

Slide 5 - Saturn IB characteristics

Slide 6 - Saturn V proposed mission

Slide 7 - Saturn V characteristics

Slide 8 - Vehicles for manned space flight

Slide 9 - F-1 engine

Slide 10 - J-2 engine

Slide 11 - Comparison - RL-10, H-1, J-2, & F-1

Slide 12 - Saturn program elements (Map of U. S.)

Slide 13 - S-1 in fabrication

Slide 14 - S-1 stage static firing

Slide 15 - Saturn I on launch pad 37 - KSC

Slide 16 - Saturn I after lift-off

Slide 17 - Saturn/Apollo launch vehicles

Slide 18 - Apollo Spacecraft

Slide 19 - Command Module

Slide 20 - Sat V Pad Complex 39

Slide 21 - Launch-to-injection sequence

Slide 22 - Saturn V in flight

Slide 23 - Saturn V first stage separation

Slide 24 - Saturn V second stage separation

Slide 25 - Injection into lunar trajectory

Slide 26 - Earth orbit docking test

Slide 27 - Docking in transit

Slide 28 - LEM entering lunar orbit

Slide 29 - Surveying lunar landing area

Slide 30 - landing maneuver

Slide 31 - LEM on lunar surface

Slide 32 - Apollo lunar lift-off

Slide 33 - Lunar orbit rendezvous

Slide 34 - Apollo leaving lunar orbit

Slide 35 - Midcourse correction

Slide 36 - Earth re-entry corridor

Slide 37 - Apollo re-entry sequence

Slide 38 - Apollo re-entry and landing

Slide 39 - Systems possible mission

These slides depict the tremendous effort and the expenditure of a considerable amount of this country's resources. I am quite certain each of you has asked the question "why do we explore space, and in particular, what benefit will fall to our nation through an exploration of the moon?" I have also asked this question and in many cases have been called upon to explain the reasons for such a program. There are many arguments one can give ranging all the way from the discovery of some unknown valuable resource to that of national prestige in competition with a dictator controlled government. I am certain that the best answer to the question of "why explore space?" can be given in just three words -- <u>because it is there</u>. In the words of explorer George Mallory, who was once asked why he wanted to climb Mt. Everest. "Because it is there," said Mallory, who died on Everest.

If we look back through much of our history we find a reluctance on the part of most men to question those things which are accepted by the masses. An individual is always pressured into conforming to the society in which he lives. In most cases, it is necessary that he does conform in order to have a productive life and to fit into his environment. Our society is so complex that individuals must conform to a certain extent in order to maintain an orderly society. However, it is that ability of certain individuals, particularly in the scientific area, to become non-conformists, and to, if necessary, chart their own course and strike out as an individual. Each child is born with an extreme curiousity and it is this curiousity that permits him to fit into the world around him. As all of us with children know, the searching questions asked by these youngsters, such as "why is grass green - and - how far is up?" indicates a desire to uncover those things which

are unknown. I have sometimes wondered if our educational system has in some way discouraged the student to think and to question those things which are unknown. It is my strong feeling that the most important single thing that the school should do is to nurture and encourage this basic curiousity which each student brings into the class room when he is six years old.