test stands are operated from the same blockhouse. This is a water pump facility to cool the jet deflectors. This is the headquarters area of our Test Laboratory. Here are some older test stands and these are our dynamic test stands where the rockets are not fired up but are subjected to shaking tests to learn their structural behavior under vibration. This, by the way, is an old technique, developed originally for aircraft. You oscillate an airplane or a large space rocket with an eccentric mass, for instance, to see what the resonance pattern is. This gives you a very good clue on structural damping and general structural integrity. It also pinpoints soft spots in the structure. We have evaluated all our space vehicles in this facility.

You will have an opportunity to see the Saturn V full scale in this facility tomorrow and actually see how such a shake test works. We will also see an F–1 engine firing in this test stand. When we visit the test area tomorrow, you will first go into the bottom of this facility where we will see a dynamic test of Saturn V and then we will drive up to the roof of this blockhouse and you will see a test in this test stand. This, Mr. Chairman, ends my presentation.

Mr. PETTIS. Dr. von Braun, one question. May I have the slide back again. The large Saturn V dynamic stand that you indicated was where you subjected it to the vibration, could that also be designed to point up any molecular fatigue in the structural design of the metal? From time to time we have a molecular fatigue which develops in certain types of metal. Now will this particular design of the Saturn V dynamic stand show this up likewise?

Dr. VON BRAUN. It might. But fatigue failures are more likely to show up in our structural load testing program, which is conducted on another facility. The main purpose of the dynamic stand is to learn about the dynamic behavior of the vehicle. How does it vibrate? How does it respond to control forces? How does the space vehicle bend and vibrate, for example, as it penetrates a jet stream in flight, and how does its structure dampen out these oscillations? We need this information not only to check on the integrity of the structure but also to see whether our controls are stable throughout the flight. You can very easily run into a situation where the control system starts "hunting" and may rip a rocket to pieces. One cannot simulate this completely in model tests and so full-scale dynamic testing is necessary.

Mr. PETTIS. Doctor, you made note of a patent office which is a new department at Huntsville. Does this indicate that there is a—maybe this isn't a correct word—commercial or industrial fallout from the research and development that is being done here which has a utilization on the ground for immediate application?

Dr. VON BRAUN. Very much so.

Mr. PETTIS. Which is of benefit not only to the Government but to the people? How does this work?

Dr. VON BRAUN. The problem you just mentioned has quite a few aspects. One is, of course, that some of the things that develop in the program can indeed be patented, either by an employee of the Government, or by a contractor. But since a contractor is under a Government contract the Government has almost unlimited use for our specific applications. But the contractor can, in certain cases, say, "Well, I would like to use this particular patent in connection with something that has nothing to do with Saturn V. Would you release it for my commercial use?"