HEALTH/EDUCATION TELECOMMUNICATIONS EXPERIMENT

Albert A. Whalen

Being criminally verbose and being restricted to only five minutes, I'm going to have to talk rather quickly.

In June of 1971, the Department of Health, Education, and Welfare, the Corporation for Public Broadcasting, and the National Aeronautics and Space Administration jointly announced the agreement to use the ATS-F spacecraft to test various educational and health delivery experimental applications of communications satellites.

The Communication and Navigation Division (CND), because of its involvement in very similar communication experiments, and because of its small ground terminal background, was selected to coordinate the technical aspects of the experiment.

CND's involvement grew to include acting as technical advisor to the various user communities, and also to providing general assistance and experiment planning. I also deal with the general system coordination among the myriad agencies involved in such bureaucracies.

The telecommunication links which are used in this experiment are shown in Figure 1. We have the master station on the left, where they generate a wideband color TV signal with its associated aural channels, transmit it up to the spacecraft (in this case, the ATS-F) and into the earth coverage horn in a wideband FM mode.

The signal is then retransmitted over the 9.1-meter (30 ft) diameter antenna at one or two of the S-band frequencies (2569.2 and 2670 megahertz) down to the user ground system complex. And today, we're going to direct our limited discussion to the small receiver-only terminal over in the extreme right of Figure 1.

Whereas this may not be advancing the state-of-the-art, it is certainly an application of the technology that has been funded and developed at NASA over the years. Such works as the Ascend study, the Edustat studies, some of the hardware work done at Washington University (in St. Louis), at Stanford, at General Electric, and some of the work done here at Goddard have demonstrated over the years that small ground terminal technology can be a reality. It does not have to be expensive or sacrifice performance. These efforts have certainly stimulated the users to propose experiments utilizing these technologies.

Figure 2 shows an artist's conception in one of our northern climes of the small ground terminal, consisting of a ten-foot diameter antenna located on a three-legged mount. The terminal is capable of 0 to 70 degrees elevation, course adjustment, and a plus or minus 5 degree elevation vernier adjustment.

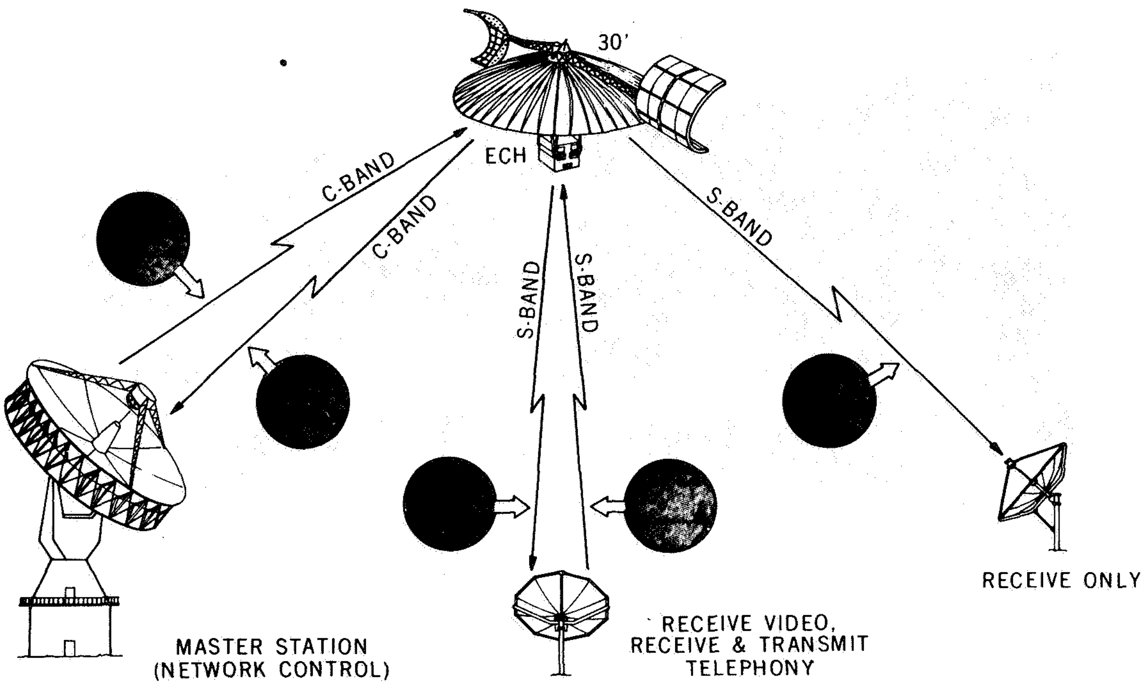

Figure 1. This general telecommunication link does not advance the state-of-the-art, but is a real application of technology.

In the azimuth, you have the capability of picking up the entire mount after loosening the guy wires, and use that for your coarse azimuth adjustment. Then there is a plus or minus five degrees vernier adjustment.

The ten-foot diameter antenna utilizes a cavity back dipole feed. Behind the cavity is located the preamplifier with 60 decibels of gain coupled through a 30.5-meter (100 ft) cable into an indoor unit.

One unique feature of this receiver, I'd like to point out, is that we have finally gone full circle again; we're back to the tuned radio frequency receiver. There is no local oscillator in this unit.

The indoor unit, mounted on top of a conventional TV set or an educational TV monitor, provides further RF gain; it drives a wideband limiter-discriminator. The entire system bandwidth without channel select filters is 190 megahertz. The channels are selected by 23 megahertz bandwidth filters prior to limiting and demodulation.

At the present time, six of these terminals are being developed under a prototype contract to Hughes Aircraft Company.

So we're now past artists' conceptions, and we're getting down to the real hardware. Figure 3 shows the first unit, which was delivered three days ago to Hughes Aircraft Company by Hewlett-Packard, subcontractor for the electronics. Note that the system is a very simple one to operate, consisting of an off-on switch, and a signal-strength meter.

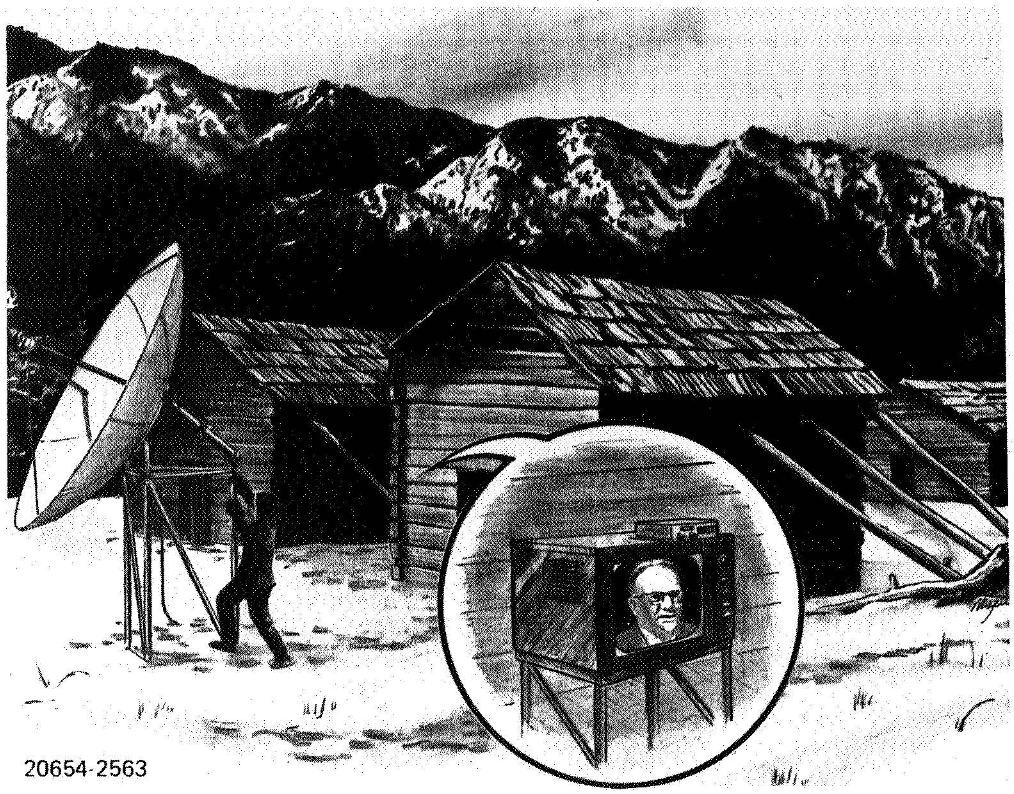

Figure 2. NASA-funded studies and hardware development programs stimulated this experiment by proving that small, inexpensive ground terminals, such as the one sketched here, are a reality.

I might add that previous works that have been done have always been in sort of a prototype, one-of-a-kind quantity. They have been done by specialists, and here we have our first real preproduction model of something that will be built in quantities of 300 to 500 to support this experiment.

This unit currently is undergoing tests; the first test results I heard were "Wow, the pictures come through it very fine," and now they're getting to be a little more quantitative in their evaluation.

I might add, another concern of most people in the use of small ground terminals is not only the performance, but the cost. It turns out the cost of this ground terminal in quantities of 300 to 500 will be approximately $2000. That includes the antenna, the pedestal, 30.5 meters of cable, the entire outdoor-indoor unit right down to base band and to interface with the TV monitor.

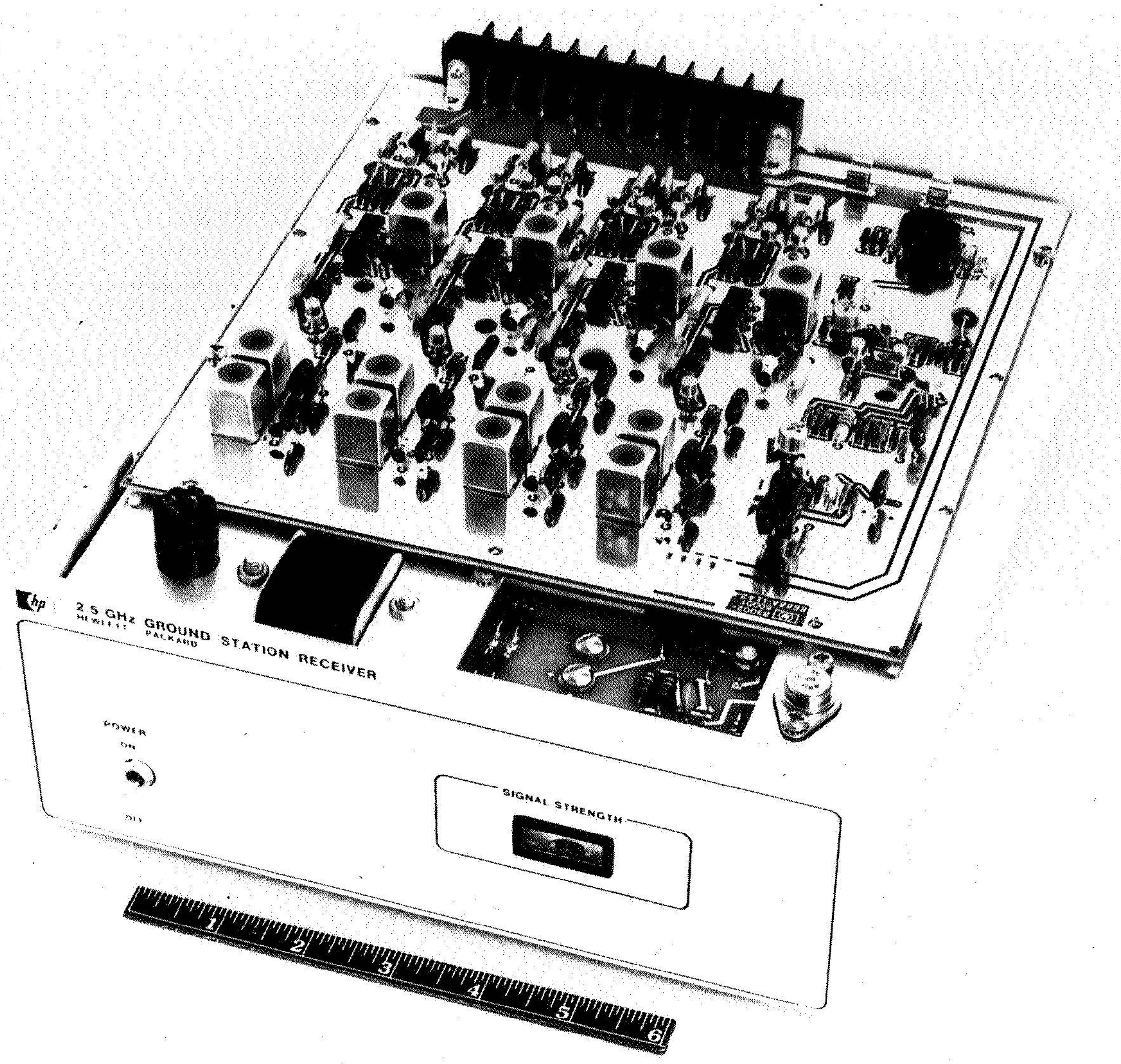

Figure 3. This prototype receiver is the first commercially built preproduction unit.

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