LETTER FROM FRANKFURT

AZUR: satellite landmark

Germany's recent success is a foot in the door of international space

by Ted Shoemaker

Few people outside of West Germany took much note of the launching in November of the research satellite AZUR. It was sent into orbit from Vandenberg AFB, Calif., at a time when the Apollo 12 moon mission was getting the near undivided attention of space watchers. Yet this satellite, the first ostensibly all-German one, is a minor milestone of the Space Age.

The Germans certainly admit that AZUR isn't much as satellites go these days. It is small—157 pounds—and is examining a field that has already been investigated rather thoroughly by the U. S. Explorer and Geophysical Observatory satellites: AZUR will extend earlier work in the examination of radiation belts, auroras and solar particle events.

Neither is the satellite really all-German. It is part of a jointly financed program with the U.S. National Aeronautics and Space Administration and the German Science Ministry. The payload itself was definitely made in Germany, designed, tested, built and paid for in the Federal Republic. Now that it is in orbit., the Germans are also handling data reduction and analysis.

But they drew heavily on American experience in designing the satellite. They also depended on NASA for launching, tracking and—as it turned out—much of the data acquisition.

It was planned to have German and European Space Research Organization ground stations receive most of the satellite's signals. But AZUR's tape recorder memory failed shortly after launching. This meant that all signals had to be received in real time, as the data were being taken by the satellite and transmitted. Only NASA has the global network of ground stations required for this job.

What, then, is the significance of AZUR? It gave another country experience in Space Age teamwork.

Germany has all of the requirements for an integrated space program of its own: financial resources, qualified scientists, technologically advanced industry. But never before have these things been harnessed for one project.

The job got done, but there were plenty of problems. The satellite's 37 pounds of instruments were the work of seven scientific institutions and six large industrial corporations. All of the familiar strains developed: disgruntled scientists whose projects were excluded by weight limitations, unsympathetic politicians who balked at the $40 million cost, demands for precision, cooperation and rigid delivery schedules.

There was even a handicap the Germans believe is unique: The launch vehicle, a four-stage American-built Scout rocket, which precast the maximum payload weight, was decided on at the time of a 1965 agreement with the United States, before there had even been a feasibility study.

Within those limits, high-energy particles seemed a natural field for Germany's first satellite. This is an explored field, yet one in which AZUR could still make an important contribution without novel designs.

Furthermore, German scientists have done a lot of work in the particle field, using ground-based and balloon-borne instruments. It seemed only fair to provide them with a satellite.

AZUR follows what is called a magnetic polar orbit, passing over both magnetic poles and following the lines of magnetic force; satellites with true polar orbits follow the lines of longitude. The orbit is elliptical, ranging from some 250 to 2,000 miles above the earth, a path that keeps it bobbing in and out of the radiation belts.

The primary mission of AZUR is to correlate auroral phenomena with activity in the radiation belts. This could bear on the question of whether the northern and southern lights result from the interaction of the earth's atmosphere with electrons in the energy region above 40 kilo-electron-volts.

It will also continue the task of charting the radiation regions for the benefit of future space missions. And it will observe the effects of solar flares on such phenomena as the earth's radiation belts.

These studies will only add to a fund of knowledge already gathered. But the AZUR experience ought to lead to much more ambitious German space efforts in the future. The most imaginative ones now on the planning boards are two HELIOS probes, slated for launching in 1974 and 1975. These are intended for pioneer exploring inside the orbit of Venus.

Germans know of the strong sentiment in America these days for curtailing such prestige programs as space exploration, spending money instead on domestic needs. They thus see hope for an internationalizing of Western space research, with the United States remaining dominant, but with other countries increasing in relative importance. In a way, the real mission of AZUR is to see that Germany is among those countries.