



Public Safety

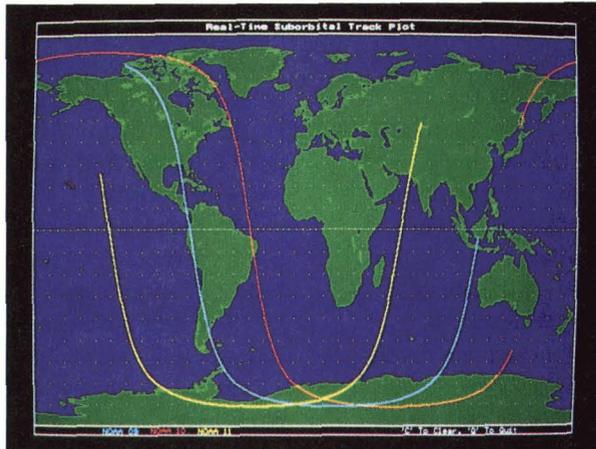
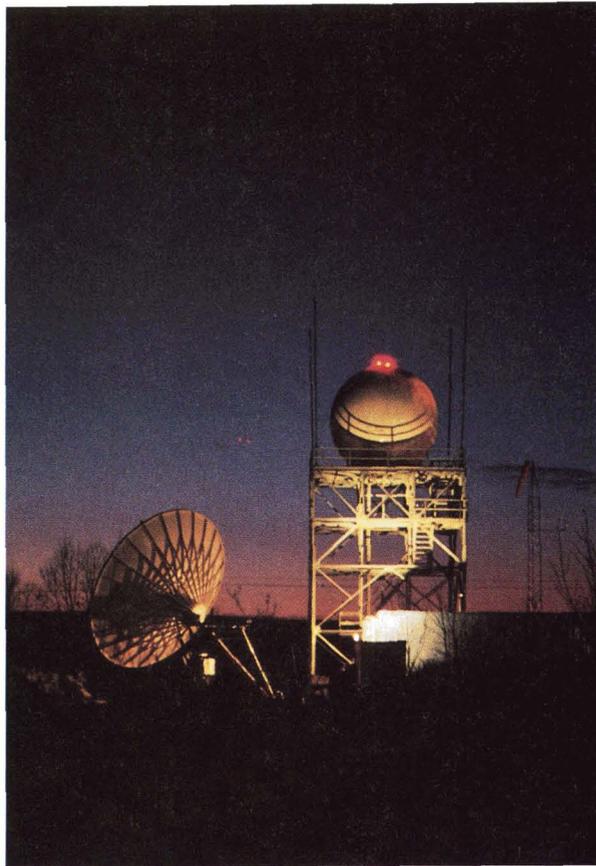
## Satellite Tracking System

The NASA-developed TIROS weather/environment satellites, now operated by the National Oceanic and Atmospheric Administration (NOAA), obtain high resolution images of Earth's atmosphere for use in such applications as cloud top temperature monitoring, hazardous weather prediction and crop monitoring.

Data from the three satellites has also enabled researchers to create infrared images of Earth's temperature, helped scientists to detect atmospheric changes — ozone depletion, global warming, acid rain — and monitor the concentration of infrared-absorbing gases in the air.

For real time utilization of the satellites' information, researchers at the Center for Aerospace Sciences of the University of North Dakota (UND), Grand Forks, North Dakota have developed a Satellite Tracking System. The system is designed to predict the satellites' location at any given time, enabling accurate computer-directed pointing of ground-based antennas at the satellites' transmitters for error-free signal reception.

In **the top photo** is UND's antenna system, which automatically picks up a satellite as it comes above the horizon and tracks it until it drops below the horizon. The computer system plots the satellite's position for any requested time. The **lower image** shows a computer-generated ground track plotted as the system tracked all three NOAA satellites simultaneously; their flight paths are shown in different colors.



Predicting future satellite locations is complex. Because of the complexity of the task and the importance of accurate calculations, UND researchers used proven NASA satellite-tracking technology: computer programs known as SANDTRACKS, ODG and NORAD in developing their system. The programs were supplied to UND by NASA's Computer Software Management and Information Center (COSMIC)<sup>®</sup> located at the University of Georgia (see page 140).

SANDTRACKS computes the time history or groundtrack of the satellite, its field of view, and the point where the satellite is visible from a ground station; the program allows estimation of the longitude, latitude and

altitude of the satellite.

ODG allows plotting a view of Earth as seen by the satellite. NORAD makes it possible to compute sighting directions, visibility times and the maximum elevation angle attained during each orbit. UND researcher Mike Hennes states that use of the NASA technology "lent validity" to the design of the Satellite Tracking System and saved UND the time, effort and money that would have been required to develop alternative software. With its new capability, UND's Earth System Science Institute will be able to routinely monitor agricultural and environmental conditions of the Northern Plains.

<sup>®</sup>COSMIC is a registered trademark of the National Aeronautics and Space Administration.

*A satellite tracking system enables accurate antenna pointing for error-free signal reception*