brightness data, and 5) other classified tasks. The first site has a main telescope with a 31-inch mirror which is a f/5 unit with a one-degree field on a 80-mm plate. The auxiliary telescope is a 14-inch, f/1.7 Schmidt with a seven-degree field.

The operation of the system begins after dusk with calibration on a star near the probable search area using data on file. After corrections are made, if necessary, data are obtained on night-sky brightness and the atmospheric extinction coefficient (necessary for accurate brightness measurements). This procedure takes about fifteen minutes, after which a specific satellite is called up from the computer file. Slewing is done rapidly, so that the target should be in position in about one second. If the desired satellite is detected immediately, its
5 position is recorded and the catalog is updated. If desired, the satellite can be automatically tracked and its movement recorded, either from its video output alone or using a GaAs photomultiplier.

If the satellite is not detected, search programs are initiated and continued until it is found. The programs are stored in the hardware at the site, namely a MODCOMP IV-25 which has 256 kilobytes of core memory and 25 megabytes on disk. Two major files can be easily accessed: one is a 400-element satellite catalog and the other, the SAO star catalog, has over 250,000 entries. The catalogs and the hardware are continuously updated and modified.

The system uses two types of Moving Target Indicator (MTI) hardware: one semi- and one fully automatic (MTI and AMTI). In the MTI, a video disk recorder records and plays back the incoming signal with a delay of 1 to 4 seconds so that moving satellites are readily apparent. With AMTI, a software program called ASTROSO automatically compares successive frames and determines "threats" which are identified by their movement against the background.

The type of detector used for the GEODSS system is an Ebsicon, which is a generic name for any camera tube containing a silicon diode target that produces an electronic signal under photon bombardment. Coupled to the Ebsicon for increased sensitivity is a single-stage image-converter tube that typically increases the detection capability by a significant factor.

The signature of a satellite, used by Space Object Identification (SOI) systems, is obtained from its pattern of varying brightness as it rotates and moves around the Earth. These signatures are stored and can be called up for comparison when needed. A change in signature is an alert to its reorientation and/or reactivation. The use of this information will be explored in a later section.

Sites other than that at White Sands have a slightly larger series of optics, each with two 1-metre main telescopes having 2.2-metre focal lengths and 2.1-degree fields. As well, each site has a third auxiliary 0.4-metre telescope with a 6-degree field. Each telescope has an 80-mm Ebsicon tube with a 32-mm target. These main telescopes have a normal limiting magnitude of $m = 16$, although they can be "pushed" to $m = 18.5$. The auxiliary systems have a limit of only $m = 14.5$ but, because of their wider field and more rapid slewing capability, they are used selectively for observations of low-altitude reconnaissance satellites.

In addition, each site has a video zoom feature which can centre on a particular section of the screen output for operator assistance. Of particular interest is the inclusion of a radiometer to monitor infrared emission from satellites. This enables satellites to be differentiated from one another and classified as payloads, boosters or fragments.[13]

[13] McNamara, F.L. and Krag, W.E. "Radiometers for Measurements of Space Objects", MIT Electronic Systems Division, TR-79-9.