

The high power levels required, particularly for pulse doppler systems designed to detect small moving targets, are difficult to generate in space without recourse to compact nuclear reactors. The synthetic aperture technique, which is well suited to ground imaging, requires lower power levels (within the capability of solar arrays), but the ability to accurately detect targets moving at more than a few kilometres per hour is not well developed.<sup>51</sup> Should this capability be proven feasible in the future, a system with the ability to switch between the functions of ground imaging and moving target detection would be ideally suited for Canadian requirements.<sup>52</sup> Modern technology, in large part pioneered by Canadian industry, appears adequate to handle the data processing requirements generated by this task. Information can be electronically transmitted from a remote location to a central processing facility (as currently done for the North Warning System), for display and control. The more initial processing that can be done at the sensor location, the better, as this reduces the vulnerability of the communications link and the physical quantity of data to be carried. This is somewhat more difficult to achieve on orbit.

The role most demanding of sensor technology at this time, is the detection and subsequent tracking of cruise missiles. A system capable of performing this very difficult task would be able easily to meet the requirements of other functions.

The uncertainty facing anyone rash enough to forecast the cost of an enormous programme involving the first major application of new surveillance technology have been well demonstrated by AWACS and OTH radar. Both programmes were initiated in the 1960s, encountered unforeseen setbacks, and eventually cost an order of magnitude more than originally expected. Today a single AWACS aircraft costs approximately \$US 200

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<sup>51</sup> At this point, moving targets are processed by SAR, but end up being displaced in position when displayed. If the return is moving with a relative velocity of more than a few kilometres per hour, it will be badly misplaced with respect to the remainder of the image.

<sup>52</sup> G.N. Toandoulas, "Space Based Radar," *Science*, Volume 237, 17 July 1987, p. 257: This article states that both moving target indication and synthetic aperture modes can be incorporated into a space based radar sensor, with the mode being invoked selectively as the need arises.