

Supplemented by radars in the southern Atlantic and Pacific coasts of the USA for the purpose of detecting submarine-launched ballistic missiles, these detection systems have been adequate for the early warning requirements of the 1980s. But three developments threaten their effectiveness in future years.

One of these is the land-attack cruise missile, launched from aircraft, submarine, or surface ship. Much smaller than a long-range aircraft, and able to fly long distances at very low altitude, it offers a very difficult target for ground-based radar. It is believed that the range of Soviet ALCMs is or will soon be sufficient for them to be launched outside of the radar cover of the North Warning System and still reach most of the strategic targets in North America.<sup>3</sup>

A second development detrimental to surveillance is stealth technology, used to reduce the echo reflected from a pulse of radar energy. Stealth can be applied to an aircraft or cruise missile, and possibly to a ballistic missile. Stealth has applications against electro-optical detection as well, taking forms such as camouflage, infrared decoy flares, cooling of engine exhausts, and coatings to reduce infrared emission.<sup>4</sup>

The third development is electronic warfare, increasingly able to jam or deceive radar, or to guide a missile to home on a radar transmitter. A ground-based radar is a vulnerable target for a stealthy homing cruise missile, which would probably destroy the radar without having been detected.

Against low-flying aircraft or cruise missiles the fundamental limitation posed for conventional ground-based radars by the line of sight is so severe as to disqualify them

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<sup>3</sup> "Specifications of Soviet Missiles," *Aviation Week & Space Technology*, 19 March 1990: p. 162. This source credits the AS-15 Kent, the new air-launched cruise missile carried by the Soviet Bear-H and Blackjack strategic bombers with a range of 1,850 miles (or 2,977 kilometres).

<sup>4</sup> George Lindsey, *The Tactical and Strategic Significance of Stealth Technology*, Quebec: Dossiers Series - CQRI, 1989.