

The DEW Line and PINETREE radars are supplemented by a number of gap-filler radars in the United States.

These existing air space detection facilities are line-of-sight radars which provide very limited coverage at low altitudes. It would thus be possible for low-flying bombers to escape detection for much of their approach to the continent, thereby reducing the warning time available to NORAD. To overcome this problem, the United States has developed a new radar system, known as OTH-B (Over-the-Horizon-Backscatter) which is not limited by line-of-sight and provides good coverage at all altitudes and for an extremely long range. Atmospheric interference so far prevents the use of OTH-B in the Arctic, however, and NORAD plans to continue using the DEW Line radars until this problem has been resolved. If this difficult problem can be overcome, which may prove impossible an OTH-B site would probably be located in the Canadian Arctic.

The Canadian and United States governments are each in the process of developing joint civil-military radar and data assessment systems for air space surveillance and control. These sensors and computers will continue to feed into the NORAD system.

Detection of space objects is provided to some extent by the BMEWS units but primarily by SPADATS (Space Detection and Tracking System), which consists of a network of radar, radio and optical sensors concentrated in the northern hemisphere. Canada's contribution to space detection is through the Baker-Nunn optical camera, located at Cold Lake, Alberta. It was bought by the United States and is operated by the CAF.

Command and control of air activities, along with assessment of the data received, are conducted through computerized facilities located at Cheyenne Mountain and in the SAGE (Semi-automatic Ground Environment) complexes in each of the NORAD regions.

The establishment of new regions will necessitate changes in this command and control system. Tentative plans in the United States are for modified BUIC (Back-up Interceptor Control) units to be used as the main systems for civilian and military surveillance and control in each of the four new regions there. The Canadian government has not yet decided whether to rely on BUIC units or instead to develop a new system. A decision will soon have to be made, since the condition of the existing SAGE computers in North Bay is becoming acute. Their already long life can be extended, at considerable expense, only for two more years, and even this will be possible only if the requisite replacement parts can be found. If a new NORAD region is established in Western Canada, it too will have to be provided with these facilities.

The United States government has also started production of AWACS (Airborne Warning and Control System) aircraft. Even the command and control facilities protected underground at Colorado Springs and North Bay are now considered vulnerable to destruction by the new breed of larger Soviet missiles. In any case, all of the NORAD command centres could have their vital communications links destroyed in an attack. Consequently, it is proposed that these AWACS aircraft be made available in emergencies for the assumption of command and control in each of

the new NORAD regions in the United States. No plans have been announced by the Canadian government for the procurement of, or acquisition of access to, AWACS aircraft for the NORAD command centres which are now and may later be located in Canada.

The weapons available to NORAD are entirely defensive and consist of interceptor aircraft in both countries and some surface-to-air (SAM) missiles located in the United States. Canada contributes three squadrons comprising 48 CF-101 Voodoo interceptors. Over the next few months, this number will be reduced to 36 interceptors. Because of its age, the CF-101 will have to be phased out by the end of this decade, at the latest, and replaced by a new aircraft with an interception capability. In the United States, the Voodoo has already been relegated to a reserve role and will soon be phased out altogether. The Canadian government has begun a study to determine which of the several available aircraft should be procured, but has not yet reached a decision. Your Committee was told informally by General Garton at North Bay that 30 to 60 new aircraft might be required to provide adequate surveillance and control coverage in Canadian air space. The United States now has six regular forces interceptor squadrons and six Air National Guard squadrons committed to NORAD. These can be augmented in an emergency by forces assigned to the U.S. Tactical Air Command (TAC).

These forces are considered necessary for possible defence against the bomber fleet still maintained by the Soviet Union. This fleet includes about 140 truly intercontinental bombers, mostly Bears and Bisons. It also includes over 600 medium range bombers which could be used for one-way intercontinental missions or, if refuelled in flight, for return missions. These forces are maintained at a high state of operational readiness and they fairly regularly fly missions to the North American air defence perimeter, which in practice means the air borders of Canada, to test NORAD's responsiveness.

D. Cost sharing

In the original NORAD agreement, it was stipulated that supplementary agreements would be reached under which Canada and the United States would share the costs of certain common facilities. In practice, this has meant that the United States has contributed to the financing of some facilities, located in Canada, which were of value to American air defence.

Mr. Richardson told your Committee that the United States now pays \$80 million of the total \$260 million currently spent annually on air defence in Canada. This includes the full cost of operating the Canadian section of the DEW Line and about 45 per cent of the costs of the PINETREE radars.

IV NORAD'S PLACE IN FUTURE CANADIAN AIR DEFENCE POLICY

A. Alternatives for Canada

Members of the Committee believed that it was important, as part of their examination of the future of the NORAD agreement, that they should consider the alternatives open to Canada. All were agreed that some form of