



PAST AND FUTURE: The Canadian-designed and produced air-to-air guided missile test vehicle, "Velvet Glove" is shown on the left on display with the centuries old artillery which it has now apparently joined as a showpiece. Heritage of the "Velvet Glove" project is a Canadian missile industry potential which official sources indicate will now be turned to production of a modification of the U. S.-designed "Sparrow" carried by the U. S. Navy twin-jet Douglas F3D on the right.

Canada plays it cozy in the

Missile Marathon

Topsy "just grew"! Not so Canada's missile industry
"Velvet Glove" provided the bedrock for full production.

By A. L. Cole

(This is the second in a series of articles prepared exclusively for Canadian Aviation by A. L. Cole, an engineer on the staff at Canadian Westinghouse Co.)

The previous article in this series showed the future necessity for Canada to be well armed with missiles, both the hardware and know-how.

It was also shown how young the industry is in Canada. But not so young that Canada has not made a good start in the business.

Recently the Air Force took the wraps off Velvet Glove—even to the extent of humiliating it by displaying it laid out cold beside a muzzle-loading cannon—and so opened the first chapter of Canada's new venture.

The humiliation was justified, if unkind, for Velvet Glove is now but a training exercise for Sparrow and more warlike weapons to come.

► **Germans First.** The Germans showed the practical advantages of this new trend in war weapons, and the Americans were quick to set the new pace after catching up on the art.

Britain, France, Switzerland, and of course Russia, were soon as busy as they could be. Suddenly, Canada realized where warfare was going. With obligations to NATO and a huge northern border to protect it had none of these new master weapons.

CARDE—the Canadian Armament Research and Development Establishment—was given the task of developing something which could be stamped "Made in Canada." With only limited financial resources available, it was decided that it was too late to start from scratch and catch up with the rest of the world.

The conclusion was that missile hardware would be produced to fit Canada's needs—in this case primarily the new long-range all-weather fighter by Avro Canada, the CF-100 and that the working components would be bought out from experts in each field in an effort to cut development time on individual items.

An excellent idea! Its successful conclusion would have produced a fully operational Velvet Glove at the same time as Falcon, Sparrow I and Nike of the U. S., and before like missiles of the United Kingdom.

But in practice it was found a little more difficult than planned. It was not easy to collect odds and ends and make a good missile — too many changes had to be made—and changes meant laborious development and test programs.

► **Discarded Glove.** The result is common knowledge. Velvet Glove in 1956 lies in state awaiting burial. Its successor, the Sparrow II may possibly be stamped "Made in Canada," but very

clearly written inside will be "Designed in U. S. A."

However, it is as well to take into account the fact that war has not yet been declared. Canada can smile slyly and take stock of its blessings. For such they really are.

Had Velvet Glove been successfully tested on schedule many would by now have been built and, as with the U. S. Nikes, thrown away unused.

Preparing for a war is always a gamble. If you play slowly and economically and the war comes quickly you are liable to lose all. But if war takes its time, you end up with more advanced operational weapons, without the waste of having had to throw things away.

Canada can smile because war has not yet come. If it should come now, Canada can in short order put the newest of the weapons industries on a production schedule.

Velvet Glove set up the missiles making industry in this country. There is now enough knowledge, plus test and manufacturing, to have Canada carry out production, if need be, independent of its allies.

Sparrow II, proven operational in early versions, will give the RCAF one of the better weapons of the day by present standards. Profit from its

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Missiles

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manufacture, both in money and in brains, will swell Canada's young industry, putting some fat on it.

► **Improvements Seen.** One can be sure too that in making Sparrow II Canada will aim for a better missile, showing a few tricks to its instructor.

Canadians have shown themselves astute in the design and construction of electronic components. Electronic know-how advances much more rapidly than that of basic hardware, so that nearly all the electronic work done in

this country has of necessity been completely original.

Government policy has been to keep missile work separate so that talent would organize as a team. Canadian Westinghouse's Electronics Division has shown considerable initiative and this company is likely to make a strong challenge for leadership in the future. The future will be big.

Sparrow II is to be manufactured in considerable numbers and work will have to start on Sparrow's successor as an air-to-air weapon. The Navy, like the USN, will want something to protect its ships. This means a different type of missile, fired from the surface

and so allowably larger and with a greater possible range.

Coming between the two, the RCAF's Maritime Command has ordered 25 Canadair CL-28 (Bristol Britannia) reconnaissance aircraft at a cost of \$185,000,000. A mere eight per cent, or \$15,000,000, would pay for an air-to-underwater missile better than the USN Petrel and make the Britannia the most potent of airborne submarine killers.

The army is not likely to sit back and watch, so it is certain some funds will be diverted to flow into this new field of missiles.

When the tide comes in it will not bring sea-weed, but the prototype of a monster far more terrible than even the more imaginative science fiction writers have conceived — the Inter-Continental Ballistics Missile — whose might, from the adage "attack is the best defence," may allow Canada to lead the way into a world of peace.

► **Immediate Potential.** For a conclusion let the known and allowable facts be collected and repeated.

In Canada today the Missile Industry consists of a body of experienced engineers and willing machines:

- Within the Canadian Armament Research and Development Establishment is an experienced, all-encompassing group capable of doing everything from thinking to flight testing in the missile field.

- Within the RCAF are full testing facilities for actual firing and flight testing of missiles.

- Canadair provides ample facilities for manufacturing any missile in quantity—any quantity.

- Canadian Westinghouse provides an experienced and well recognized original design and quantity-manufacturing group covering electronics.

- Other firms, such as Avro Aircraft, de Havilland Aircraft, Fairy Aviation, Computing Devices of Canada, etc., have experience in various fields of the design and test of components—and there are many other small firms anxiously awaiting the starter's gun.

This year Canada is increasing spending on missiles from \$52,000,000 to \$79,000,000. Much as this may seem, the United States is now spending more on missiles than Canada has for her entire Defence Budget.

This is the future.

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Battle Surveillance

A system which will permit battlefield surveillance up to 200 miles behind enemy lines is said to be under development by the U. S. Army. The surveillance units would be all-weather drones.

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