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MEMORANDUM

21 Jul 58

- Ref (a) AVRO Report 72/Systems 26/165, "Installation of Two Genie Missiles in the AVRO Arrow"
- (b) AVRO Report 72/Eng.Plan/20, "Program Proposal for Genie Rocket Installation in Arrow Aircraft"
- (c) Meeting in AWS 3 office, 18 Jul, of RCAF, AVRO and RCA to Discuss the Radome Requirements
- (d) Memo SE 3-8 to SE 3 "Tactics for the Use of Two MB-1 as Armament for the CF100 and Arrow Interceptors" - ZED 58/5
- (e) Information Sheet on Charts concerning kill probabilities vs Launch Range for CF100 and Arrow Aircraft armed with Genie - ZED 58/18
- (f) Memo DSE/SC to VCAS, "The Use of the MBI Missile as Armament for the CF100 Interceptor" - ZED 57/24
- (g) Report USAF "Special Technical Memorandum Report - Compatibility of RCAF Aircraft with USAF Atomic Weapons" - ZED 56/56
- (h) Memo DADR to COR, "Arrow Weapon System - Genie Capability", dated 25 Feb 58 and minutes thereto
- (i) "Brief for the Chiefs of Staff Committee on Weapons for the Arrow Aircraft" dated 2 Jun 58.

DADR

Arrow Weapon System - Installation of Genie

1 At the present time there are no nuclear warheads in existence for the Sparrow family of guided missiles and there is no known programme designed to provide this capability. The only means at present of providing the nuclear capability called for in OCH 1/1-63, therefore, is to install the Genie unguided rocket in the Arrow. This memorandum outlines the present status of this latter armament and points up the pressing requirement for a firm decision as to whether or not the contractors should proceed further or abandon the installation entirely.

Airframe

2 Reference (a) above was delivered to DSE by hand early in May. This report indicates that a reasonable installation could be made in the Arrow using the F101B launcher mechanism and the existing pack concept to carry two Genie rockets; there would be a general weight saving over the four Sparrows, which would allow extra fuel of the order of 410 gallons to be carried in the pack.

3 Reference (b) above outlines the programme involved in producing a prototype T.I.; this involves technical design studies and analyses, product design, equipment design, ground test, and flight test. This would involve about 2½ years to the flight test stage, 6 months or more flight testing and, in the prototype basis, 4 or more years from go-ahead to manifestation in the production line.

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4 If, however, the installation were considered primary, and a Cook-Craigie approach were taken commencing 1 Oct 58, the lead time to T.I. could be about 1½ years, to coincide with Aircraft No. 13, with a working installation based on 6 months flight test in Aircraft 38 and subsequent, and a retrofit programme commenced for those aircraft required in the 37 aircraft programme.

#### Radome

5 By Oct 58, the general areas of inadequacy of the present radome as regards MB-1 will be known; a further 3 months to the end of Dec 58 would be required to establish the correction programme required, followed by 3 months to implement the correction programme on a hand- correction basis. Therefore, the radome should not, except financially, become a lead item for the T.I.; however, if a production run is contemplated, 18 months would be required, as a minimum to re-tool so as to produce radomes by the filament-wind method.

#### AES

6 Although the ASTRA computer has been mechanized for the MB-1 capability and has been shown adequate in simulation, many areas, of necessity, have been held in abeyance; for example, it would be necessary to wind many hi-grade potentiometers to the specification for Genie. Additionally, since the steering accuracy required is of an order of 2 or 3 times that of Sparrow, system analysis would be required to ensure stability at the high gains required. Pending an RCA-AVRO study not now authorized, the total magnitude of the job is not known but it is thought to be relatively small compared to the installation requirements.

#### Costs

7 The prototype installation programme described in paras 2 and 3 above, including the analysis, detail design, modifications to one aircraft, provision of 3 packs, GSE, ground test and flight test would be on the order of \$2 million. The additional requirements of the radome and ASTRA cannot be estimated without further authorization to RCA and AVRO to study the problem but previously the total programme has been estimated at 5.5 million, including the above.

#### Conclusions

8 The only means by which the required nuclear capability for the Arrow Weapon System can be provided in a reasonable time scale is with the Genie rocket, the implications of which are described above. A critical stage has now been reached where it is no longer practical to hold the programme in abeyance; from a technical point of view, we must now have the following decisions:

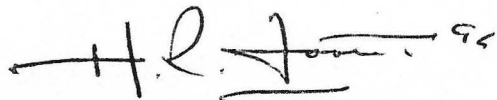
- (a) Does the Genie meet the requirements of OCH 1/1-63?
- (b) Is an installation programme to be implemented with the contractors?
- (c) If so, which approach is to be taken:
  - (i) Prototype installation;
  - (ii) Accelerated (Cook-Craigie) approach?

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- (d) If not, may the present restrictions imposed by holding in abeyance be removed completely.



(HR Footitt) G/C

AAWS

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cc: AWS 2  
AWS 4  
DADO  
DAME  
DSE  
DAPR/RPO/Arrow