ARROW WEAPON SYSTEM CO-ORDINATING CONTRACTOR

PRELIMINARY REPORT NO. 11 UNCLASSIFIED

NOVEMBER 1958

INTERIM REPORT ON TRAINING REQUIREMENTS AVRO AND OBENDA PERSONNEL

CONFIDENTIAL.

Issued: ***

Arrow Weapon System Co-ordinator Approved:

Vice-President Sales & Service

SIMMARY

Auro requirements for training on the electronic and damper systems, and Auro and Orenda requirements for cross-training, as defined herein, have been reviewed by the ANSC Department.

The varying requirements have been reduced to a manageable program, by defining three levels of training: (a) familiarization (b) basic and (c) complete. The approximate dates for completion of training and, where possible, the length of courses have been detailed.

The proposed contractual arrangements for effecting the program are included.

This report supersedes AWSCC Report No. 5.

1. INTRODUCTION

1.1 Requirement for Formal Training

In order to satisfactorily carry out the Arrow engineering, manufacture and test program defined by AD-53 Issue 2, Statement of Work, Revised Arrow Program, it is necessary that engineers and technicians employed by Avro Aircraft Limited be trained on the theory and operation of equipment manufactured by Associate Contractors and sub-contractors. Four of the sub-systems, the Irequois engine, the MA-1C integrated electronic system, the Falcon missile, and the Y6-339B damper system, are of sufficient complexity to make formal training courses mandatory.

1.2 Training on Electronic, Missile and Danner Systems

Avre is responsible (with technical assistance from Hughes Aircraft Company) for compatibility of airframe and electronics, and for preinstallation testing, installation, primary function, calibration,
and repairs (to the first and second line maintenance level) of the
MA-IC electronic system. Experience with the MA-2 system has shown
that a formal training course including practical work, or a lecture
course followed by on-the-job training, is essential to enable
personnel to carry out their duties in an efficient manner. The
number of people required is based on MG-2 experience with a factor
to allow for the added complexity of the MA-IC system.

Similar requirements exist for training on the Falcon missile.

In the case of the damper system, Auro responsibilities are the same as in the MA-IC system, but the assistance provided by the sub-contractor will be on an es-required basis rather than full time.

1.3 Auro-Oranda Cross-Training

Avro is responsible for installation, run-up, and first line maintenance and removal of the Iraquois in the Arrow. Orenda is responsible for second and higher line maintenance of all Iraquois engines up to RCAF acceptance of the mircraft, including build-up of Orenda-supplied accessories and all adjustment and fault rectification requiring a check-out and run-up facility. In order to accomplish these tasks efficiently, and particularly to ensure that no unnecessary removals of engines take place, it is necessary that a limited number of both Avro and Orenda personnel receive training on the related systems of both the mirrame and the engine.

In addition, Orenda aircrew must receive conversion training for the Arrow in order to carry out flight operations on aircraft allocated to Iroquois test programs. Training of Avro personnel on the engine, and Orenda personnel on the airframe, will be referred to hereafter as "contractor cross-training".



1.4 Score of this Report

This report deals with contractor cross-training and training of Avro personnel on the electronic, missile and damper systems, but excludes training of Avro and Orenda personnel on their own products.

2. REQUIREMENTS

2.1 Preliminary Estimate of Program

In order to form an estimate of the nature of the training required, and the number of people to be trained, Avro and Orenda were asked to submit requirements for training under the headings of type of training, required date of completion, and the number of people involved. Replies received indicated that 52 different training courses would be required, extending from the present time to December 1960. This is obviously impracticable, but the requirements, exactly as received, are summarized, for reference only, in Table 1.

2.2 Program Planning

To reduce the information contained in Table 1 to a manageable program, three arbitrary levels of training were selected as follows:

2.2.1 Familiarization

Short courses for those (usually senior personnel) who need to have an appreciation of the problems involved, but who will not be engaged at any time in actual operations.

2.2.2 Basic Course

More detailed than the familiarization courses, basic courses are directed at those who require a background in theory, operation and maintenance, but who will not be engaged directly in operation or testing. These courses, supplemented by manuals or EO's, should enable an experienced engineer or technician to supervise the handling of problems as they arise.

2.2.3 Complete Course

These courses are detailed and are designed to train engineers and technicions who are to be engaged in actual testing, calibration and trouble-shooting.

The information in Table I has been re-grouped into these three general classifications as shown in Table 2. Dates for conducting these courses are included, together with the length of course where this information is available.

The organization of trained personnel to support the electronics, missile, and damper systems in aircraft allocated to test programs at Avro, and aircraft being prepared for delivery to RCAF bases for



test programs or squadron service, is shown in Table 3. The peak load is 13 aircraft; the organization shown is marginally adequate to handle this load.

2.3 Location of Schools

Avro and Oranda will conduct courses on the airframe and engine respectively at their Halton facilities. Initial training on the integrated electronic system and the Falcon missile will be given by Hughes Aircraft Company at Culver City, under sub-contract to Avro. Training on the YG-339B damper will be given by Honeywell Controls Limited at its Toronto facility, similarly under sub-contract.

During 1960, it may be possible to send a limited number of contractor personnel to the RCAF training school at Camp Borden.

3. CONTRACTUAL COMPRAGE

- 3.1 The following items are covered by paragraph 12.4 of AD-53 Issue 2 Statement of Work, Revised Arrow Program:
 - (a) Procurement of training courses and instructors under subcontract from Hughes Aircraft Company and Honeywell Controls Limited,
 - (b) Labor costs of Avro personnel attending courses on the engine. electronic, and damper systems.
- 3.2 The preparation and presentation of airframe courses for Orenda personnel are covered in paragraph 12.19(a) of AB-53 Issue 2.
- 3.3 The co-ordination of contractor cross-training is covered in paragraph 12.19(a) of AD-53 Issue 2.
- 3.4 The preparation and presentation of engine courses for Avro personnel is covered in Orenda Engines Limited Statement of Work.



TABLE I

(a) Training Requirements on Electronic, Missile, and Damper Systems as stated by Avro.

Dates given are for completion of training.

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		Service Analyst (Basic course)			A last grant and the design of the state of	Aug. 59	Wild regard procedure years or years
		Service Engineers (Detailed course)		Padagoniko egitigi padagona na na		Aug. 59	
		Technical Writer (Detailed course)		Propropertues Personal Page 1		Mor. 59 1	
		Engineers			(Apr. 59 (3 (Sept 59		
		Technicians			Sept 59 12	W Sylver Vision Addition Control	
		Supervision, Radar (Complete course)		(Apr. 59 (1 (Sept 59 (2 (Feb. 60 (2 (Aug. 60	оснутрую на без подделят в населению регипписьмення в населения в	All the state of t	(Mar. 59 (1 (Sept 59 (1



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TABLE 1 (CONT'D)

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TABLE 1 (CONT'D)

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	Service Representatives (Basic course)				Dec. 59	
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	Service Engineers (Detailed course)		Tables of Tables		Aug. 59	
	Technical Writer (Detailed course)	·		r	Har. 59	
	Engineers			Nov. 58		
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TABLE 1 (CONT'D)

(b) Personnel Cross-Training Requirements as stated by Avro and Orenda.

Dates given are course completion dates.

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3.	Sub-foreman		Mar. 59	Mar. 59		Thurst action in a season
4.	Engine mechanics	The Target State of the State o	Mar. 59	Mar. 59		- Terrandoministrative and account
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6.	Engineers - Equipment Design	No. of the second secon		Mar. 59		Yan dalifyrania Cu
7,	Engineers - Flight Test	THE STATE OF THE S		Mar. 59		
8.	Briefing	of characteristics	Dec. 58	Petri Companya (Contantantan Contantantan Contantan Cont	Accell To	
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10.	Engineers - Service		DAY DECAME	OLC FIRE PHYSIC	(1 (Dec 60	
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TABLE 1 (CONT'D)

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2.	Pilot indoctrination and conversion training Observer - flight engineer Sub-foreman, airframe		April '59 April '59 2 April '59	
4.	Aircraft mechanic, airframe Electricians		April *59 April *59	
	Inspectors Service representatives		April *59 2 April *59 2	



TABLE 2

(a) Avro Training Requirements Summary

Southern control of the section of t	LEVEL	DURATION	With the second section and the second section of the section of th	A THE STATE OF PRINCIPLE OF THE STATE OF THE
TYPE OF COURSE	(see para 2, 2)	(weeks) (approx.)	COMPLETION DATE	NUMBER OF TRAINEES
NA-1C Integrated Electronic System				10
Briefing	1	1	Mar. 59	14
Basic course	2 2	10 10	Sept 59 Aug. 60	2 2
Complete course	3 3	20 20	* Apr. 59 Sept 59	14 40
	3 3	20 20	Feb. 60 Aug. 60	32 26
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Falcon Bissile				
Briefing	je saj	1	Sept 59	8
Basic course	2	Not known	Sept 59 Aug. 60	2 2
Complete course	3	11	Mar. 59 • Nov. 59	1 16
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1G-339B Damer	documents.			
Briefing	1	1	Mar. 59	12
Basic course	2 2	4	Dec. 59 Dec. 60	1 2
Complete course	300	8	Nov. 58 Mar. 59	11
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[•] These courses given by HAC at Culver City; all other NA-1C and Falcon courses are expected to be given at Avro by HAC instructor.

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TABLE 2 (CONT'D)

(b) Avro and Orenda Cross-Training Requirements Summary

TYPE OF COURSE	LEVEL (see para 2, 2)	DURATION COMPLETION (weeks) DATE		NUM TRA	er of Iners
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Basic course	2	2	Dec. 50		15
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Iroquois				and insertion of particular	
Briefing	- Jan	3	Dec. 58	9	
Complete course	3	2	Dec. 58	13	
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TABLE 2 (CONT'D)

(c) Recapitulation

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Falcon missile	To the second se	der verschafter
YG-339B damper	45 65	diversity of the control of the cont
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Iroquois engine	© Seed	- Section of the Control of the Cont
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TABLE 3

FULLY TRAINED PRODUCTION PERSONNEL REQUIRED TO SUPPORT ELECTRONIC, MISSILE AND DAMPER SYSTEMS

The following is required to support a peak load of 13 aircraft. The actual distribution of people will change from day to day to suit requirements.

First Shift

MA-1C Electronic System:-

Beach Test Positions:

Supervision Rader and computer C & N mechanics	mechanics		6 2
C & N mechanics	and directly All		

Hangar Floor:

Supervision		0
Radar and computer	mechanics	3 70
C & N mechanics		77

Falcon Missile:-

Supervision	1			3
Electrical	and	electronic	mechanics	2

Damper:-

Bench Test Positions:

Mechanics

Hanger Floor:	
muder aron:	
Supervision Mechanics	1
	8
	with appropriate
	53

Second Shift

Same as	first shift			53
				- The transfer to the transfer
				106