ARROW 2

COMMENTS ON PROPOSED ALTERATIONS TO RCAF READINESS HANGARS

Report 72/GEQ/6.

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CONTENTS PAGE

AVRO AIRCRAFT - PROPOSAL - ALTERATIONS TO
DRAWING NO. 7-4427-114 - READINESS HANGARS

As requested in RCAF letter S-36-38-105(ACE-1) of 5th December, herewith our comments on RCAF drawings No. 1410 and S-10-1020-14. Our comments are illustrated on Avro Drawing No. 7-4427-114, a copy of which is attached.

1. COOLING AIR DUCTS

1.1 The position of the cooling air duct is not specified on the RCAF drawings.

The position of this duct should be 35' 6" from the hangar front door in order to obtain a nominal clearance between the aircraft and the doors of 8 foot at front, and 8 foot at rear, with the duct directly below the quick disconnects on the aircraft.

The length of the flexible hose shown on our drawing will permit an aircraft positioning tolerance of ± 2 feet fore and aft and ± 1 foot laterally.

Lines painted on the hangar floor to indicate wheel track and nominal stopping position will be necessary.

1.2 The cooling air ducts shown on RCAF Drawing S10-1020-14 exceed the half width of the hangar by 2 feet.

This should be approximately 5' 6" to permit the outlets from the duct to be at 4' 6" from the hangar centre line. i.e. 9' apart, thus ensuring adequate space for passage of the aircraft nose wheel and tow tractor.

1.3 The position of the inlet to the cooling air duct has been specified in detail "X" on RCAF Drawing No. S10-1020-14. This presupposes that the manufacturer of the cooling air machinery will be able to route his outlets to suit. It is desirable that a firm proposal for a cooling air plant be received before finalizing the design of the inlets to the duct. An alternative form of duct inlet is shown on our drawing. This permits cooling air to be directed simultaneously from two cooling air units to two aircraft, or alternatively, to each aircraft in turn from any one unit.

1.4 The sump shown in detail "X" (RCAF drawing No. S10-1020-14) appears to be adequate in size but this should be considered in conjunction with the air-cooling equipment manufacturer, who may require a water trap and drain incorporated in the delivery pipe at this point.

1.5 It is recommended that the delivery pipe should be of stainless steel preferably of suitable composition to permit welding of the pipe outlets. 18/8 (chromium-nickel) would be satisfactory. Six inch seamless pipes are available in this material. The pipe should have a fall to the

1.5 (continued)

drain point to permit periodic drainage of accumulated moisture.

1.6 The flexible pipes from the duct outlets to aircraft connections must be sufficiently long and flexible to permit easy engagement. The proposed design and material shown on our drawing for the cooling air supply should meet this requirement. A quick disconnect may be fitted to each end of the flexible pipes to facilitate removal for repair. A dust cap will be required for closing the entry to the steel pipe when the flexible pipe is removed.

1.7 The duct cover plates should be readily removable for inspection purposes and firmly secured to withstand the jet exhaust streams illustrated in AVRO report LOG/105/9. (Fig. 14). The duct cover plates must be designed to withstand the presently used Arrow type pressure of 260 psi with an adequate factor to permit possible increases.

1.8 The outlets from the ducts should have hinged doors which can be closed to allow passage of other vehicles.

2. ENGINE STARTING AIR DUCT

2.1 This duct should be located 34' 6" aft of the cooling air duct. This will position the duct directly under the connections on the aircraft. The flexible feed pipe to the aircraft should permit aircraft positioning tolerances similar to those of the air cooling hose. It is desirable that a test be arranged to establish this point.

2.2 The floor duct will require another inlet in addition to that shown in the RCAF drawing. This will permit the installation of feed pipes from the starter units to perform the following functions:-

(a) Start two engines in either aircraft simultaneously.
(b) Start one engine at a time in either aircraft, when one starter unit is out of commission.

A line diagram to illustrate this feature is shown on the drawing herewith. Details cannot be resolved until the specification for the mobile starter unit has been approved. Our proposals in respect of this area will follow at a later date.

2.3 Other remarks contained in paragraph 1 applicable to the cooling air duct and pipe also apply to the engine starting duct and pipes.

The pipe material should be stainless steel to withstand the starting air temperatures which may be up to 500°F. depending on the ambient temperature. It is not recommended that this duct be used for electrical wiring.

3. QUICK-DISCONNECT LANYARDS

The following ground connections to the aircraft are of the lanyard operated quick release type and floor attachments will be needed.

(a) Nose leg electrical supply
(b) Cooling air supply
(c) 400 cycle AC power supply
(d) Engine starting air supply

It is desirable that some adjustment be available to allow for aircraft positioning. A suitable arrangement is shown on the enclosed drawing which will permit the optimum pull-off angles to be maintained.

4. A.C. ELECTRICAL POWER 400 CYCLE

RCAF Sketch No. 1410 refers to the A.C. electrical power as 220/115 volt. This should be 200/115 volt which is the voltage required at the aircraft. The nominal generator rating is 208/120 volt.

It was recommended in AVRO Report LOG/105/9 "Readiness Facility" that the A.C. electrical power should be supplied by an aircraft generator complete with voltage regulator and control panel. However, commercial units are now available using a less expensive generator and these will be suitable providing they meet the Avrocan Specification E-500 (Electrical System Aircraft A.C. and D.C.)

Protection against over-voltage, under-voltage and excessive frequency variation will be required. An interlock connection with a pressure sensing device on the cooling air supply will also be required to switch off A.C. power in the event of failure of the cooling air supply.

5. CONTROL ROOM

It is noted on the Sketch RCAF No. 1410 that the control room is to be of poured concrete with armour plate glass, and no door. As the entrance to the control room is open to the jet stream of the outgoing aircraft, a door is essential if the control room is to be kept clean and the operator protected.

An alternative layout is proposed and illustrated on the sketch returned herewith. This has additional windows permitting a wider field of view and two access doors. It is also suggested that the control room be constructed in metal clad sound proof material similar to the sound proof rooms offered by the Industrial Acoustics Company Inc. New York, and Koppers Company Inc. Baltimore, 3. These vendors offer what appear to be suitable sound proof rooms with attenuation of better than 40 db particularly in the frequency ranges which would affect voice communication.

5. CONTROL ROOM (continued)

"Noise lock" windows and doors are also available plus "quiet duct" ventilators for use when the doors are closed. As sound pressure levels of 120 decibels may be expected in the Alert hangar during taxying away, a reduction in sound pressure levels to 80-85 is essential if communication is to be maintained.

6. ALUMINUM SHEETING

Sufficient Aluminum sheeting should also be removed from the centre dividing wall to permit passage for personnel between hangars in addition to that to be removed for accomodating machinery.

7. TAXI STRIP

It is noted that no reference is made to the proposal contained in Avro Report LOG/105/9 (Recommendation No. 3) for a taxi-strip from the maintenance area to the rear of the readiness hangar. It is pointed out that under the present arrangement the approach to the main runway will be blocked while a replacement aircraft is being positioned and reversed into the Readiness hangar.

8. HANGAR THERMAL INSULATION

It is believed that some additional protection will have to be made to secure the existing hangar thermal insulation blanket against the Arrow jet stream. We suggest that provision be made in the specification to meet this point.

9. WIRING DIAGRAMS

A wiring diagram is being prepared by the company showing the circuits for engine starting, intercom and telescramble. This will include suggestions for an interlock between the cooling air supply and A.C. power.

It is recommended that starting and controls for the A.C. generators and cooling air units be retained in the hangar and not in the control room. The only controls which should be necessary in the control room are those for intercom and starter units.

10. SPECIFICATION FOR COOLING AIR UNITS - AMENDMENT

The aircraft requirements for cooling air specified in Avro LOG/105/9 should be amended as follows:-

Supply conditioned air at the rate of 150 lb/min. per aircraft at $4\frac{1}{2}$ psig at the aircraft.

The air is to be delivered at the aircraft within a temperature range 50-55°F. with a dew point not to exceed 55°F. when the ambient air has

10. (continued)

a temperature of 0 to 95°F. (This ambient temperature range assumes that the hangars will be heated and that the maximum will not exceed 95°F.).

It should be noted that no wet bulb temperature or altitude condition is specified although these parameters will be required by the manufacturer. It is felt that RCAF should specify this requirement in respect of these conditions as they vary with hangars and air base location.

Drawing No
7-4427-114
for this report.
filed with drawings
W.F.C.

National Research Council Canada
Canada Institute for Scientific and Technical Information
J.H. Parkin Branch

Conseil national de recherches Canada
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