JAN. 1959 SECRET

ARROW 2

SECOND LINE MAINTENANCE FACILITIES

AVRO REPORT 72/GEQ/16

SECRET

ARROW 2

A STUDY

OF

SECOND LINE MAINTENANCE FACILITIES

Report No. 72/GEQ/16

December, 1958

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PREFACE

This report was to be issued in Preliminary form with a supplementary issue to follow, as further information became available.

The subsequent issue will not now be made as the requirement has been deleted from the Statement of Work, together with the PRD study.

However, it is thought that sufficient information is contained herein to indicate the general requirements of a 2nd line Maintenance Organization together with the requirements for certain fixed test stands, not at present called up on the Ground Equipment List.

The change to Hughes MA-1/FCS and the MB-1 and Falcon Armament necessitates a revision of Chapter 4.4 and 6.1 and the cooling air and power requirements. Pending receipt of final information from Hughes, the general aspects of the ASTRA system are retained in the report to indicate the basic maintenance philosophy which is not expected to change. Presently known deviations in 400 cycle and cooling air requirements are discussed in the report together with implications affecting method of supply.

1. ABSTRACT

1.1 Outline of Report

The report presents a preliminary review of the 2nd line maintenance facilities which will be required for supporting Arrow operational squadrons.

Hangar space, hangar services, base shops and associated facilities are outlined and discussed.

The depth of maintenance established in the report is limited to the function testing of certain specified components in each system. The limitation has been arbitrarily selected on the assumption that repair will be by replacement in the initial stages, with expansion to follow with operating experience.

1.2 Conclusions and Recommendations

1.2.1 Hangars

Existing types of RCAF maintenance hangars are suitable for 2nd line maintenance of the Arrow. Two types of hangars are available; the standard cantilever type and the standard arch type. Of these, the standard cantilever type has certain distinct advantages for squadron use. These are discussed in Chapter 5.1.

Floor plan layouts of aircraft in each type of hangar are shown in Figs. 1 and 2, Chapter 5. Some modifications to existing hangars will be required to provide additional electrical power and possibly fixed industrial machinery to supply cooling air. The latter requirement must be reviewed in light of the change to the Hughes MA-1 Fire Control System as discussed in the following paragraph.

1.2.2 Cooling Air Supply

Each aircraft will require a large supply of conditioned air for cooling the electronic system during ground tests.

Static industrial machinery was recommended for this purpose in Avro Report 72/GEQ/3 (Base Facilities for Turnarounds and 1st Line Maintenance), and in Avro Report LOG 105/9 ("Arrow - Readiness Facility") based on a flow of 150 lb/min.

1.2.2 Cooling Air Supply (Cont'd)

The change to the Hughes MA-1 Fire Control System reduces the immediate quantity by 23% (Arrow/Astra 150 lb/min. Arrow/MA-1 115.5 lb/min. - see chapter 5.4.1). A further reduction to 95.5 lb/min. is made by eliminating full cockpit cooling for ground maintenance.

However, an allowance may be desirable for growth potential, depending on RCAF development of the Hughes Fire Control System. The requirement is not known but on this assumption a flow of 130 lb/min. will be required.

Consideration of individual mobile refrigeration units is also recommended in lieu of fixed industrial machinery. These could be airliftable for use in any hangar without the need for ducting.

1.2.3 400 Cycle AC Power

The immediate quantity of 400 cycle AC power required for the Hughes MA-1 Fire Control System is slightly lower than that required for Astra. However, it is recommended that the previously suggested units at 37.5 KVA still be provided for hangar use to allow a reasonable growth potential. Individual mobile units, electric motor driven are also recommended as opposed to central distribution from larger generators. This is discussed in Chapter 5.4.

1.2.4 Power Supply

A significant increase in power supply will be required to existing air bases. This will be necessary for operating the cooling air supply; 400 cycle generators; hydraulic rigs etc. as listed in Chapter 5.3.

The direct servicing power per squadron of Arrow/Astra aircraft has been estimated at 3300 KVA, made up as follows:

(a) Readiness Hangar

2 aircraft at standby - Avro Report LOG 105/9	327 KVA

(b) 1st Line Maintenance & Turnaround Hangar

2 aircraft on maintenance) Avro Report 2 aircraft in turnaround) 72/GEQ/3	1024 KVA

1.2.4 Power Supply (Cont'd)

(c) 2nd Line Maintenance Hangar

6 aircraft (4 drawing full power) Chapter 5. This report.	1180 KVA

(d) Base Shops (Estimate)

Chapter 6. This report.	600 KVA

(e) Other Support Facilities (Estimate)

Chapter 7. This report.	250 KVA
TOTAL	3281 KVA

NOTE: A reduction has been made to the figures quoted in previous reports to allow for a small reduction in services arising from the change to Hughes Fire Control System.

1.2.5 Base Shops

1.2.5.1 General Concept

The general concept of base shops has been outlined in RCAF Report S1038CH-108 ("A maintenance concept for the Arrow weapon system"). Extracts are quoted in chapter 3.6.

Certain variations/additions appear desirable. These are summarized:

(a) Breakdown of the proposed "fluid shop" into its separate component shops, mainly from the point of view of safety.

(b) Attachment of the undercarriage and brakes shop to the hydraulic shop.

(c) Separation of the liquid oxygen storage and convertor shop from the safety equipment shop.

(d) Separation of nickel-cadmium battery charging from lead acid battery charging.

1.2.5.1 General Concept (Cont'd)

(e) Separation of drag chute packing and hanging from personnel parachute packing and hanging.

(f) Addition of an aircraft paint shop to house one aircraft, if it is confirmed that the Arrow will be paint finished.

1.2.5.2 Shop Equipment

Certain minimum equipment will be required in each shop for performing pre-installation and periodic function tests, to satisfy mandatory requirements and eliminate haphazard rejection of components.

The equipment required for this purpose is outlined in Chapter 6.2 through 6.5.

Design studies are required to determine specific items of equipment. RCAF examination of the proposals and initiation of design studies is necessary.

Specific areas requiring RCAF examination are as follows:

(a) Instrument test equipment.

(b) Electrical generator and C.S.U. test stand.

(c) Miscellaneous electrical test bench.

(d) Fuel flow test rig.

(e) Differential pressure test stand - fuel system components.

(f) Universal hydraulic test stand.

(g) Air condition system component test stand.

1.2.6 Other Support Facilities

Other support facilities will be required as discussed in Chapter 7. These are summarized:

1.2.6.1 A run-up pad is required with provision for aircraft tie down.

1.2.6.1 (Cont'd)

The need for silencing apparatus can be eliminated by siting run-up pads at 4000 feet or more from inhabited areas.

1.2.6.2 Covered space of an estimated 6300 sq. feet will be required for storage and maintenance of Ground Support Equipment.

1.2.6.3 An Engine Test Facility is required. The details are to be supplied by Orenda Engines Limited. A general concept is given in Avro Report 72/GEQ/8 "Basic Concept of an Engine Run-Up Facility".

1.2.6.4 The Armament Storage and Test Facility previously outlined in Avro Report LOG 105/36 is particularly in need of revision in light of the new Arrow armament. However, no provision is made in the Statement of Work for this.

2. INTRODUCTION

2.1 Authority for the Report

The Statement of Work AD-51 (issue 2) May 1958 details certain engineering studies to be prepared by Avro Aircraft Limited, to ensure that the RCAF would be adequately prepared to support and maintain Arrow aircraft in squadron service.

Quote:

Para. 7.13 "Study of the operation and compatibility of the Arrow Weapon Systems in conjunction with the requirements for air base facilities including:

(a) Readiness Facility.

(b) First Line Maintenance & Turnaround Facility.

(c) Second Line Maintenance Facility & Workshops.

(d) Armament Storage & Test Facility.

(e) Aircraft run-up base.

(f) Iroquois engine run-up stand and test facility.

2.1 Authority for the Report

Para. 7.13 (Cont'd)

(g) Runway length and strength.

(h) Portable & mobile support test equipment, and quantities required".

The requirement for the foregoing was terminated in the Revised Statement of Work, para. 7.13, October 1958.

2.2 Scope of Study

The scope of this study is:

(1) To review the operational concept.

(2) Outline the 2nd line maintenance aspects of the aircraft.

(3) Investigate the suitability of standard RCAF maintenance hangars.

(4) Outline the base shops and suggest suitable layouts, equipment and services required.

Planned maintenance procedures, skill levels and number of personnel required are not considered in this report. This was to be the subject of a separate Personnel Requirements Data Study, now cancelled.

The proposals for base shops are preliminary and were to be finalized in conjunction with RCAF decisions on the depth of maintenance based on data from the PRD Study.

3. THE OPERATIONAL CONCEPT

The operational concept was originally specified in AIR 7-4 Issue 4. This has been superceded by the Weapon System Specification WSC-1, Issue 1 which differs only in respect to squadron strength, the difference being a reduction in strength from 14 to 12 aircraft by the deletion of the 2 trainer aircraft.

The maintenance concept for the Arrow Weapon System is amplified in RCAF Report S1038CH-180, which establishes the requirement for base shops on the assumption of greater RCAF participation in component maintenance and repair than hitherto.

3. THE OPERATIONAL CONCEPT (Cont'd)

The relevant portions of these documents are quoted:

3.1 Air 7-4 Issue 4 Para. 2.22 Quote:

"This is a series of maintenance operations that will normally be carried out on aircraft that cannot be raised to the available state within three hours. These operations will consist of:

(a) GO-NO-GO type of checking.

(b) Periodic Inspection.

(c) Fault Isolation.

(d) Fault Rectification.

(e) Special Inspection.

(f) Modifications.

(g) Alignment and Calibration of Systems.

(h) Harmonization.

3.2 Air 7-4 Issue 4 Para. 3.1.2 Quote:

"Battle State

The concept is based on one or more squadrons of 12 operational aircraft each, at a prepared all weather base. With 50% of the aircraft undergoing maintenance, each squadron will be required to maintain 2 aircraft at the state of readiness or standby at all times, and as many of the remainder as possible in a state that can be changed to available within three hours".

3.3 Air 7-4 Issue 4 Para. 3.1.1 Quote:

"The object in the operation of the Arrow in war time, will be the attainment of the highest operational potential at all times."

3.4 Air 7-4 Issue 4 Para. 3.1.4 Quote:

"Building Facilities

For each squadron the airfield shall include the following structures:

(a) Hangar(s) to house two aircraft at standby.

(b) Hangar(s) to house four aircraft undergoing turnaround or first line maintenance.

(c) Hangars to house six aircraft undergoing second or third line maintenance.

(d) A missile preparation and storage facility.

(e) An engine run-up structure capable of housing one aircraft.

(f) An engine run-up structure capable of housing one engine.

3.5 RCAF Report S1038-CH-180 (Para. 2.5) Quote:

"Basic Considerations

The costs of the component parts of the Arrow are such that every effort will be made to reduce the pipeline requirements and excessive procurement. At the same time every effort will be made to ensure that utilization of the Arrow will not be jeopardized through lack of components or parts."

3.6 RCAF Report S1038CH-108 (Para. 4.7) Quote:

"Base Shops

The base shops will be part of the second line maintenance organization etc....

The following shops will be required:

Electronic System Shop

To cater for the complete Arrow electronic system.

Engine Shop

Responsible for the build up, repair, inspection, modification, running and testing.

3.6 RCAF Report S1038CH-108 (Cont'd)

A Flight Aids Shop

Caters for flight instruments and electrical components.

Missile Maintenance Shops

Includes maintenance, assembly, test, storage of missiles plus maintenance, loading, testing and storage of missile packs.

Fluid System Shop

To cater for fuel, hydraulic, lubricating, air conditioning and de-icing systems.

An Undercarriage Shop

Includes tires, brakes and complete undercarriage maintenance.

A Components Shop

To cater for all components, including flight controls for which system shops are not established.

A Safety Equipment Shop

Includes all ejection and survival equipment plus aircraft oxygen systems.

A Workshop

Consisting of sheet metal, machine, welding and aircraft refinishing shops."

3.7 RCAF Report S1038CH-108 (Para. 3.1.6) Quote:

"Covered space is required for the maintenance of ground support equipment with power and services for functioning checks."

4. SECOND LINE MAINTENANCE ASPECTS OF ARROW

4.1 General

Brief descriptions of the aircraft sub-systems are contained in the 1st line maintenance study (Avro Report 72/GEQ/3). These are amplified in detail in the appropriate systems brochures and will not be repeated in this study.

The following discussions relate only to those main aspects of second line maintenance which influence hangar space, shop space, power requirements and items of major ground equipment.

4.2 Airframe

4.2.1 Handling

A tow arm and tractor will normally be used for ground handling. No difficulty will be experienced in positioning the aircraft in the recommended positions in the maintenance hangars, as only straight forward towing and reversing will be necessary.

No additional space will be required for the tractor and tow arm, as their overall length does not exceed the distance from the nose wheel to the tip of the nose probe.

The "Unitow" tractor type 75 CH, of 7,200 lbs. draw bar pull, is adequate for flight line use in good tractive conditions, but some vehicles of greater traction will be required for winter use. The "Unitow" type 75 CH has been modified by Avro to accommodate on intercom system, a steering angle warning device and a head guard for the driver. The modifications are shown on RCAF drawings 551628 and 551629. These should be incorporated in whichever type of tractor is chosen for squadron use.

4.2.2 Weapon Pack Maintenance

The weapon pack design is currently being revised to carry 4 Falcon missiles; the MB-1 rocket and fuel in varying quantities up to a maximum of 500 gallons.

2nd line maintenance of the pack falls into two parts:
(a) inspection and (b) repair. Inspection may be carried out in the hangar but repair and function checks on packs removed from the aircraft will require a special work stand providing access to the top and bottom of the pack. A test console will also be required to provide hydraulic and electrical services for functioning the launchers.

4.2.2 Weapon Pack Maintenance (Cont'd)

Workstands, test consoles, work benches, tools and replacement components should be accommodated in a weapon pack servicing shop. Inerting of the weapon pack fuel tanks will be necessary prior to entry to the shop.

The size of the shop will be dictated by the number of packs to be handled. This is not yet known but may be estimated from the envelope dimension of each stand. These are 21 feet long x 15 feet wide x 13 feet (RCAF Dwg. 600843).

The weapon pack will be transported to and from the servicing shop on the hoist trolley (Avro Ref. No. 112). A small tractor will be required with drawbar pull of about 1000 lbs. The overall height of this tractor should permit passage under the Arrow fuselage with the pack installed on the aircraft. The ground clearance at the mid-point of the weapon pack carrying MB-1 rockets and Falcon missiles is approximately 4 feet 7 inches.

A multi-purpose tractor of 1000 lbs. drawbar pull could also be used for towing other items of ground equipment, the heaviest of which are the "Iroquois" in its transport trailer (7000 lbs) and the air conditioner/AC-DC generator trailer (6000 lbs).

4.2.3 Scheduled Airframe Maintenance

This consists of periodic minor and major inspections of predictable recurrence.

The frequency of the inspections will not be known until some operating experience is obtained. However, the maximum number of aircraft in 2nd line maintenance as stated in specification Air 7-4 Issue 4 is six per squadron. Of these, some will be on periodic inspection; some on rectification of unscheduled defects and some completely serviceable. A number of completely serviceable aircraft are required to form a pool for immediate replacement of an unserviceable aircraft from 1st line.

An illustration is shown in Fig. 1 and 2 of the space required, assuming that a complete set of 2nd line servicing equipment will be required for three aircraft.

4.2.3 Scheduled Airframe Maintenance (Cont'd)

The three other aircraft shown in the 2nd line maintenance hangars are assumed to consist of 2 in work on unscheduled defects and one serviceable.

It is desirable that periodic inspections be performed to a planned maintenance schedule, if "down-time" is to be a minimum. For this purpose, a time and motion study was to be undertaken in phase 4 of the PRD study. If ultimate operational efficiency is to be attained at an early date, it appears essential that a representative team of RCAF tradesmen should be assigned to this task at the first opportunity.

4.2.4 Unscheduled Airframe Maintenance

This consists of the rectification of faults, repairs and modifications beyond the scope of 1st line maintenance. The scope of 1st line maintenance is defined as that which can be accomplished within 3 hours.

The extent of airframe component removal to be carried out in 2nd line maintenance will be limited to: system components, canopies, seats, radar nose, control surfaces, control boxes, undercarriages and engines. Special handling equipment as indicated in Avro Report 70/GEQ/2 will be required.

4.2.5 3rd Line Maintenance

3rd line maintenance consists of major repair, modification and salvage for which the services of specialized personnel and equipment are necessary.

No special working space is normally necessary or provided as these functions are performed in the 2nd line maintenance hangar.

Details and recommendations for salvage, dismantling and repair are not covered in this report. It is anticipated that separate submissions will be made on these subjects in the format of RCAF Engineering Orders.

4.3 Engines

4.3.1 General Description

The basic engine consists of a 3 stage low pressure compressor driven by a single stage low pressure turbine; a seven stage high pressure compressor driven by a two stage high pressure turbine; an annular combustion chamber and a close coupled afterburner fitted with a fully variable convergent nozzle.

The overall dimensions of a power unit, complete with afterburner and accessories are:
$21\frac{1}{2}$ feet long x $4\frac{1}{4}$ feet dia. and weight 4900 lbs.

For ease of transportation, the basic engine and afterburner can be shipped separately. The estimated dimensions of the separate portions being:

Basic Engine	15 feet long x $4\frac{1}{4}$ feet dia.	x 4400 lbs.
Crated Engine	18 feet long x 6 feet dia.	x 8400 lbs.
Afterburner	8 feet long x $4\frac{1}{4}$ feet dia.	x 700 lbs.
Crated Afterburner	10 feet long x 6 feet dia.	x 2000 lbs.

4.3.2 Receipt and Storage

An area will be required at each air base for receipt, storage and build-up of spare engines.

It is recommended that this should form part of the engine facility, the basic requirements of which are outlined in Avro Report 72/GEQ/8. The area should be located near the 2nd line maintenance hangar with ready access to the tarmac. This will facilitate delivery of assembled engines to the maintenance hangar and unloading of airlifted engines from support aircraft. It is proposed that airlifting engines between air bases and depots will be economic in view of the high cost of engines and the consequent reduction of number of engines required to fill the supply line.

4.3.3 Ground Handling

The ground equipment required for handling crated and or cocooned engines will consist of fork lift trucks; slings for crated components, complete engines, basic engines and separate afterburners; and an overhead monorail hoist in the receipt and storage area. Depending on the characteristics of the Iroquois air shipping stand and on the loading characteristics of the transport aircraft, special fork lift trucks and/or winching equipment will be required.

4.3.3 Ground Handling (Cont'd)

Shipment of cocooned power units on mobile airlift stands appear to be more economic than shipment of crated components. This is clear from the following:

(i) The dimensions of a cocooned power unit only exceeds the crated dimension of the basic engine by $3\frac{1}{2}$ feet.

(ii) The weight of the cocooned power units will be less than that of a crated basic engine.

(iii) The separate crated afterburner is eliminated.

(iv) Breakdown and reassembly of basic engine and matched afterburner is eliminated.

However, components should be packed in sealed crates for long term storage and shipment by road, rail or sea, where there is an increased risk of damage or deterioration.

Orenda Specification E.S.175 details the preliminary requirements and procedures for preservation of Iroquois engines when not in use.

Uninhibited engines may be stored or otherwise remain inactive for periods not exceeding 30 days provided closures are fitted to all openings and the storage conditions are warm and dry.

Inhibited engines may be stored indoors in warm dry areas for periods not exceeding 60 days. For periods in excess of 60 days, engines must be packed in sealed containers.

Equipment for inhibiting Iroquois engines is being designed by Orenda.

4.3.4 Engines Changing Equipment

Two types of engine changing equipment are under consideration for Arrow 2. These are reviewed in Avro Report LOG/105/43. A demonstration was arranged in October 1957 for RCAF evaluation.

4.3.4 Engine Changing Equipment (Cont'd)

RCAF Report S1038CH-180 (AMTS/DAEng) describes the demonstration and summarizes the findings. It was stated that the equipment designed by Avro has the prime advantage of simplicity and ease of operation, resulting in a 30% quicker engine change than that possible with the alternative equipment.

Irrespective of the type of equipment eventually chosen for squadron use, the floor space required for engine changing will amount to 30 feet at the rear of the aircraft. This dimension will permit manoeuvring of the Air Logistics transportation stand or Avro mobile gantry.

Adequate space is available for this purpose in either arch type or standard maintenance hangar. (Figs. 1 & 2).

4.3.5 Scheduled Maintenance

RCAF Engineering Order 10B-30A-7A outlines the frequency and extent of maintenance anticipated when the Iroquois enters squadron service.

The initial overhaul period is likely to be 100 hours and the initial periodic inspection every 25 hours.

The Engineering Order establishes the points requiring periodic inspection and shows that engine removal is essential at each inspection.

At each inspection, the engine can be removed and replaced by another which has been inspected and tested in the engine shop.

There is no requirement for engine inspections to be synchronized with the airframe inspections and in fact several advantages will accrue if they are divorced viz:

(i) Decrease in congestion in the work area.

(ii) Improvement in inspection times.

(iii) Complete freedom to advance or retard engine inspection times without reference to the airframe.

4.3.6 Unscheduled Maintenance

Unscheduled maintenance consists of fault isolation and rectification.

Reported faults in engine performance will require confirmation before hastily changing engines. This will necessitate running the engine still installed in the aircraft at a run-up base. Instrumentation will also be necessary for this purpose, as discussed in section 7.1.2 of this report.

Confirmed engine faults will be remedied by engine removal and replacement with a serviceable power unit. The unserviceable unit will be serviced to the extent of replacement of defective control units and adjustment in the engine test facility.

4.4 Electronics

Following are some general remarks on the anticipated second line maintenance requirements of the Arrow's electronic system. They are based on the maintenance concept outlined in RCA/Avro Report No. AR-25, which is not expected to change in principle. It is expected that the extent of second line maintenance and the hangar space requirements of the presently proposed system will not differ much from those of the Astra.

The extent of second line maintenance in the hangar will be limited to the removal and replacement of modules, and semi-automatic tests using first line maintenance test equipment. A special nose servicing dock could provide access and storage for test equipment, tools, and replacement parts.

Components for inspection or fault rectification would be removed to the second line shops where sub-system maintenance and calibration on a master mock-up would be carried out. (Ref. Fig. 6).

It is expected that harmonization of a complete system or sub-system, as may be required by periodic inspections, or as the result of component changes, will be done on the master mock-up rather than on the aircraft, leaving only a minimum of alignment to be made in the hangar.

4.5 Other Aircraft Sub-systems

The other aircraft sub-systems may be conveniently sub-divided as follows: electrical, air conditioning, fuel, hydraulics, oxygen, pneumatic, anti-icing, flight instruments, fire protection, ejection seats and drag-chutes.

4.5 Other Aircraft Sub-systems (Cont'd)

Identical items of ground servicing and access equipment will be required for 2nd line maintenance as already described in the 1st line maintenance study. Additional test and fault isolation equipment and special tools will be required compatible with the increased depth of maintenance. These are listed in the latest issue of Avro Report 70/GEQ/2-3 "Ground Support Equipment for the 37 aircraft Program".

In general, all sub-system components will be qualified with adequate lives between overhaul periods. Any interim performance checks and servicing will be specified in the maintenance schedules.

Components, subject to unscheduled defects, will be replaced with components previously checked in the sub-system shops.

5. HANGARS

5.1 Suitability of Standard RCAF Hangars

Existing types of standard RCAF maintenance hangars are suitable for 2nd line maintenanoe of the Arrow. Proposed floor plan layouts of aircraft in hangars are shown in Figs. 1 and 2.

The positions shown are derived from a consideration of the space required for maintenance equipment and engine removal.

Engine removal will be a simple operation, the installation having been designed with this in mind. Engine removal will be required at each periodic inspection for both airframe and engine examination.

On this basis, each half of the standard cantilever hangar can accommodate seven aircraft although the normal compliment is anticipated to be six. Thus, one cantilever hangar will be adequate for a 2 squadron air base. On a similar basis, one standard arch type hangar can accommodate six aircraft. Thus, two arch type hangars will be required for a 2 squadron air base, for 2nd line maintenance.

It should be noted that these requirements are in addition to the 1st line maintenance requirements outlined in Avro Report 72/GEQ/3 - "1st line Maintenance Facilities".

For 2nd line maintenance, the cantilever hangar has certain distinct advantages, viz. concentration of faoilities; a central and common work-shop area for the formation of a maintenance pool of personnel; an aircraft

5.1 Suitability of Standard RCAF Hangars (Cont'd)

accommodation potential above the minimum requirements; simplification of power and services distribution; more space for ground maintenance equipment and ability to withdraw and replace engines without interference with other aircraft.

However, consideration of these advantages will only be pertinent to air bases where a choice exists. In either case some modification will be required to provide additional electrical power; power outlet panels and possibly ducted cooling air from static industrial refrigeration machinery as discussed in the following sections.

5.2 Services Required to each Aircraft

Each aircraft undergoing 2nd line maintenance will require an external supply of various services. It is recommended that provision be made for these services at each aircraft position with a suggested load factor of 60% i.e. 4 aircraft in 6 using full supply.

The services have been specified in previous reports. ("Readiness Facility" - Avro LOG 105/9 and "First Line Maintenance and Turnaround Facilities" - Avro Report 72/GEQ/3).

These are now revised in respect of the immediate requirement for cooling air and 400 cycle AC with amplification to follow in chapter 5.4.

SERVICE		REMARKS
(1)	Cooling Air	
	Arrow/Astra	150 lb/min./4½ psig at aircraft Delivery temp. 55°F.
	Arrow/MA-1	115.5 lb/min./3 psig at aircraft Delivery temp. 70°F. (Both cases supplying full cockpit cooling).
(2)	400 cycle AC	
	Arrow/Astra	115/200V, 400 cycle, 3 phase to Avrocan Specification E-500, 40 KVA.
	Arrow/MA-1	115/200V, 400 cycle, 3 phase to Avrocan Specification E-500, 37.5 KVA.