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AVRO AIRCRAFT LIMITED

Inter-Departmental Memorandum

Ref: 8566/09/J
Date: April 29, 1958
To: S. E. Harper
From: T. Roberts
Subject: Landing Gear, Speed Brake and Hydraulics System Tests

Herewith R.F.T. 5039, which specifies the flight testing required on the landing gear, speed brakes, utility and flying control hydraulics.

AA*bb

T. Roberts

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Technical Flight
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For transmittal
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AVRO AIRCRAFT LIMITED

MALTON, ONTARIO

REQUISITION FOR FLIGHT TEST

SECRET
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R.F.T. NO. 5039

SHEET NO. 1 OF 5

DATE: April 29, 1958

25201 AIRCRAFT 25202 and/or 20203	ASSIGNMENT NO. X73-384	WORK ORDER NO.
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LANDING GEAR, SPEED BRAKE, AND HYDRAULIC SYSTEM TESTS1. OBJECT

To obtain a qualitative assessment of landing gear and speed brake operation and to record hydraulic system pressures and temperatures on the Arrow 1 aircraft.

2. INSTRUMENTATION2.1 Flying Control Hydraulics

- (a) Pressure out of filter box (A & B systems)
- (b) Pressure just upstream of heat exchanger (B system)
- (c) No. 1 Heat exchanger inlet and outlet temperatures (B systems)
- (d) No. 2 Heat exchanger outlet temperature (B system)
- (e) Port engine pump inlet temperature (B system)
- (f) Accumulator piston position.
- (g) Compensator piston position.

2.2 Engines

H.P. rotor R.P.M. (both engines)

2.3 Utility Hydraulics

- (a) Pressure regulator 'system' port pressure
- (b) Pressure regulator 'return' port pressure.
- (c) Pump inlet pressure.
- (d) Pump inlet temperature.
- (e) Brake cylinder 'return' temperature.
- (f) Brake pad temperatures.

2.4 Landing Gear

- (a) Extension and retraction times
- (b) For and aft. leg acceleration (left and right U/C).

R.F.T. PREPARED BY: <i>J. Anderson</i>	APPROVED BY: <i>J. C. G. Thompson</i>	AUTHORIZED BY: <i>J. P. Little</i>
DATE FOR COMPLETION	PRIORITY	ESTIMATED COMPLETION DATE:



AVRO AIRCRAFT LIMITED

MALTON, ONTARIO

REQUISITION FOR FLIGHT TEST

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R.F.T. NO. 5039

SHEET NO. 2 OF 5

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AIRCRAFT 25201 and/or 25202 25203	ASSIGNMENT NO. X73-384	WORK ORDER NO.
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Note:- For Range of values and accuracy see FAR/C105/1, Issue 7, Sections 2, 3, 5, and 9 and IDM 6884/02A/J.

3. PROCEDURE3.1 Landing Gear

- 3.1.1 Operate recorder(s) during extension and retraction of landing gear at 250 knots.
- 3.1.2 Operate recorder(s) during normal take off (while the aircraft is accelerating from unstick speed to 250 knots I.A.S.)
- 3.1.3 Obtain continuous trace recordings of the following items.
Under Instrumentation - items 2.2 and 2.3 (a), (b), (c), and (d).
- 3.1.4 The Pilots' Comments on landing gear operation should also be reported.

3.2 Speed Brakes

- 3.2.1 Operate recorder(s) during the extension, and retraction of the speed brakes under three conditions. These conditions are 200, 300 and 400 knots E.A.S. at any altitude.
- 3.2.2 Obtain continuous traces of system pressures and temperatures, and engine H.P. rotor R.P.M.
- 3.2.3 The pilots comments on speed brake operation should also be reported.
- 3.2.4 With speed brakes selected down increase A/C speed until the speed brakes blow back. Record pressure regulator "system" port pressure and report pilots comments on this condition.

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3.3 Utility Hydraulic System Temperature Measurements.

3.3.1 Obtain continuous trace recordings of brake fluid port temperatures and brake pad temperatures, throughout twelve landings, and for 10 minutes after the aircraft parks. The landing conditions and pilots comments should also be reported.

3.3.2 Continuous trace recordings of pump inlet temperature are required under the conditions below. It is also required that the results be presented in the form of graphs vs time from engine start to shut down. The quantities shown on these graphs should be, pump inlet temperature, outside air temperature, altitude, EAS and engine HP compressor R.P.M.

The flight conditions required are:-

3.3.2.1 First engineering flight.

Stabilized Cases

- 3.3.2.2 (a) Straight and level flight at M = .92, 40,000' alt, cruise r.p.m. A/B off.
(b) Straight and level flight at M = .92, 30,000' alt, cruise r.p.m. A/B off.

3.3.2.3 Straight and level flight at M = 0.4, 5,000' alt, cruise r.p.m.

- 3.3.2.4 (a) Straight and level flight at M = 1.5, 40,000' cruise power.
(b) Straight and level flight at M = 1.5, 50,000', cruise power.

3.3.2.5 Straight and level flight at M = 1.09, 5,000' (or max. power).

- 3.3.2.6 (a) Straight and level flight M = 2.0 (or max) 30,000'.
(b) Straight and level flight M = 2.0 (or max) 40,000'.

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(c) Straight and level flight $M = 2.0$ (or max) 60,000'.

Transient Cases

3.3.2.7 Deceleration at 40,000' (const) from $M = 2.0$ (or max) to $M = .92$ cruise.

3.3.2.8 Descent from Max. alt. to sea level $M = .92$

(a) Normal Descent.

(b) Low rate of descent (as used to extend range).

3.3.2.9 Dive from 60,000' to 30,000'.

3.3.2.10 Decelerate at 5,000 ft. from max speed to minimum by reducing power on both engines to idle until more power is required to maintain safe flying speed.

NOTE:- These flight conditions are the same as those requested in R.F.T. 5031 "Engine Installation Temperatures". Section 4.

3.4 Flying Control Hydraulics

3.4.1 Pressures Continuous trace recordings are required of pressures out of filter A and B systems and the pressure on the return line B system (as per IDM 6884/02A/J) for the first engineering flight and subsequent flights that cover other parts of the flight envelope and specific manoeuvre cases.

3.4.2 Temperatures The following temperatures should be obtained on continuous trace recordings, for the same flight conditions as specified in section 3.3.2., above.

3.4.2.1 No. 1 Heat exchanger inlet temp. (B system).

3.4.2.2 No. 1 Heat exchanger outlet temp. (B system).

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3.4.2.3 No. 2 Heat exchanger outlet temp (B system).

3.4.2.4 Pump inlet temperatures.

3.4.3 Miscellaneous

3.4.3.1 Accumulator piston position should be recorded on continuous trace for 1st engineering flight plus subsequent flights covering specific manoeuvres.

3.4.3.2 Compensator piston position, should be recorded on a continuous trace, for the flight conditions as specified in 3.4.2.

3.5 Landing Gear Accelerations

Continuous trace recordings of landing gear accelerations are required during the take-off, landing and taxi of the first 12 flights.

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