AVRO AIRCRAFT LIMITED

Inter-Departmental Memorandum

Ref 7397/04/J
Date March 19, 1958
To S. E. Harper
From J. D. Hodge
Subject ENGINE HANDLING AND INSTALLATION TESTS

Herewith R.F.T. No. 5037, Engine Handling and Installation tests which details the testing and instrumentation required to assess the handling characteristics and check the installation of the J75 engines in the Arrow 1, aircraft 25201, 25202 and/or 25203.

Item 3.7. Engine igniter plug temperature is an addition to the instrumentation list FAR/C105/T and will be incorporated in the next issue of this list.

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AVRO AIRCRAFT LIMITED

MALTON, ONTARIO

REQUISITION FOR FLIGHT TEST

R.F.T. NO. 5037

SHEET NO. 1 OF

DATE: March 19, 1958

AIRCRAFT 25201 25202 25203	ASSIGNMENT NO. X73-384	WORK ORDER NO.

ENGINE HANDLING AND INSTALLATION TESTS

1. OBJECT

To assess the engine handling characteristics of the J75-P3 and J75-P5 engines and to establish that their installation is successful.

2. EQUIPMENT REQUIRED

Arrow Mk. 1. Aircraft 25201, 25202 and/or 25203.

3. INSTRUMENTATION REQUIRED

3.1 Port engine L.P. compressor R.P.M.

3.2 Stbd engine L.P. compressor R.P.M.

3.3 Port engine H.P. compressor R.P.M.

3.4 Stbd engine H.P. compressor R.P.M.

3.5 Turbine discharge temp (T_{T7}) Port.

3.6 Turbine discharge temp (T_{T7}) Stbd.

3.7 Engine igniter plug temperature at harness elbow. Port.

3.8 Static pressure, zone 2 top rear compressor.

3.9 Static pressure, zone 2 bottom mid-section of tailpipe.

3.10 Differential in ejector shroud, rel. to ambient between stn's 820 and 825 at bottom of shroud.

3.11 Port engine intake total head pressure (P_{t_2}).

3.12 Stbd engine intake total head pressure (P_{t_2}).

R.F.T. PREPARED BY:	APPROVED BY:	AUTHORIZED BY:
DATE FOR COMPLETION	PRIORITY	ESTIMATED COMPLETION DATE:

AVRO AIRCRAFT LIMITED

MALTON, ONTARIO

REQUISITION FOR FLIGHT TEST

R.F.T. NO. 5037

SHEET NO. 2 OF

DATE: March 19, 1958

AIRCRAFT 25201 25202 and/or 25203	ASSIGNMENT NO. X73-384	WORK ORDER NO.

3.13 Turbine discharge pressure(P_{t_7}) Port.

3.14 Turbine discharge pressure(P_{t_7}) Stbd.

3.15 Temp. at inboard shroud (on outer surface of engine E) Stn. 836.

4. PROCEDURE

4.1 It is required to establish for the Arrow 1 aircraft series, a relight flight envelope commencing at 10,000 ft. altitude and subsequently in increments of 5,000 ft up to 35,000 ft. The possibility of relighting above the latter altitude is to be investigated at the Test Pilot's discretion, relative to increment levels. This test should be carried out using Pratt and Whitney curve No. 17921 dated the 17th November 1955.

4.2 Tests are to be carried out at fixed throttle settings from sea level to maximum altitude to establish the possible existance of Jet Pipe temperature and R.P.M. creep.

4.3 To establish single engine windmilling rotor speeds (N_2) at varying altitudes and aircraft forward speeds. This test should be carried out in conjunction with Engine Relight Tests (Item 4.1).

4.4 To establish engine igniter plug temperatures at the harness elbow location, on the port engine and elbow connection only. This should be recorded over the full range of flight speeds at 30,000 ft.

4.5 The afterburner light up characteristics are to be established at altitudes between 30,000 ft. and maximum.

4.6 To establish engine acceleration and deceleration times from "Idle" (N_2) R.P.M. to maximum and vice versa, at altitudes between 10,000 ft. and 50,000 ft.

4.7 To investigate the Pitch and Yaw effect upon engine stability at varying altitudes at the Pilot's discretion, and within the current limited flight envelope.

R.F.T. PREPARED BY: A.F. Anderson	APPROVED BY:	AUTHORIZED BY:
DATE FOR COMPLETION	PRIORITY	ESTIMATED COMPLETION DATE:

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MALTON, ONTARIO

R.F.T. NO. 5037

SHEET NO. 3 OF

DATE: March 21, 1958

REQUISITION FOR FLIGHT TEST

AIRCRAFT and/or	ASSIGNMENT NO.	WORK ORDER NO.
25201 25202 25203	X73-384	

4.8 To investigate the engine stability during descent with both throttles at idle under the following conditions;-

a) 40,000 ft. to 18,000 ft.
b) 30,000 ft. to 18,000 ft.

4.9 The following recordings should be measured in the flight regions specified, or as close to these as possible within the scope of the flight program.

	ITEM	ALTITUDE	M	R.P.M.	ATMOS.
4.9.1	Port engine intake static pressure (P_{S2})	S.L.	Static	Full	cold
4.9.2	Stbd engine intake static pressure (P_{S2})	S.L.	Static	Full	Cold
4.9.3	Static pressure, Zone 2 Top of rear compressor	30,000 ft	2.0	Full, A/B on	Std.
4.9.4	Static pressure, Zone 2 Bottom mid-section of tailpipe	30,000 ft	2.0	Full, A/B on	Std.
4.9.5	Differential in ejector shroud relative to ambient	S.L.	1.09	Full, A/B off	Std.
	between Stn. 820 and 825 at botton of shroud.	S.L.	Static	Full, A/B on	Std.
4.9.6	Port engine intake total head pressure (P_{t2})	S.L.	Static	Full, A/B on/off	Std.
	Subsonic accel.		0.2 to .92	Full R.P.M.	A/B on, off
	Subsonic climb		.92	Full R.P.M.	A/B on, off
	Subsonic cruise	40,000 ft.	.92	Req'd R.P.M.	A/B off

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REQUISITION FOR FLIGHT TEST

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	Supersonic cruise 50,000 ft.	1.5	Full R.P.M. Partial A/B
	Supersonic speeds 50,000 ft.	1.0 to 2.0	Full R.P.M. Full A/B
4.9.7	Stbd engine intake total head pressure (P_{t_2})	as in 4.9.4	
4.9.8	Turbine discharge pressure (P_{t_7}) Port	as in 4.9.4	
4.9.9	Turbine discharge pressure (P_{t_7}) Stbd.	as in 4.9.4	
4.9.10	Turbine discharge temp. (T_{t_7}) Port	as in 4.9.4	
4.9.11	Turbine discharge temp. (T_{t_7}) Stbd.	as in 4.9.4	
4.9.12	Temp at Inboard shroud (on outer surface of engine duct) Stn. 836	as in 4.9.4	
4.9.13	L.P. and H.P. compressor R.P.M.'s Port and Stbd.	as in 4.9.4	

5. DATA REQUIRED

5.1 Pilots comments on all flights concerning these tests.

5.2 All appropriate recordings from the instrumentation listed within this R.F.T. (section 3).

R.F.T. PREPARED BY:	APPROVED BY:	AUTHORIZED BY:
DATE FOR COMPLETION	PRIORITY	ESTIMATED COMPLETION DATE: