INTER-DEPARTMENTAL MEMORANDUM

Ref 9777/02A/J
Date July 23, 1957
To S. E. Harper - Chief of Experimental Engineer
From J. D. Hodge, - Technical Flight Test Coordinator
Subject ARROW 1 INSTRUMENTATION F&R/C105/1 - PART 3, ISSUE 9

Herewith Issue 9 of Part 3 of F&T/C105/1, "CF-105 Instrumentation - J75 Engine Installation", superseding all previous issues of Part 3.

The Major changes from Issue 8 are as follows:-

1. Items 17 to 20 incl. have been deleted.

2. Items 58a and 63 have been added.

3. The ranges of Items 3, 4, 9 - 12, 25, 26, have been amended, and all temperature ranges have been made to conform where possible with the ranges proposed in Flight Test Dept. Memo Ref: 6360/22/J dated 25 March 1957.

All changes from Issue 8 are shown underlined in this issue.

J. D. Hodge,
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FAR/C105/1
Part 3, Issue 9

CF105 Instrumentation (A/C Nos. 1, 2 & 3)
Part 3: J75 Engine Installation
Issue No. 9 July 23rd 1957

Note: 1. All changes introduced since Issue No. 8 are shown underlined.

2. Items 17 to 20 incl. have been deleted.

3. Items 58a and 63 have been added.

4. The majority of temperature ranges have been amended to reduce the number of different instrument ranges in the interest of simplicity and ease of calibration between flights.

LUBRICATION (No Sketch)

	Item	Range	Accuracy	Accuracy % of full range	Sampling Frequency
1.	Port engine oil pressure	0 to 80 psi	± 2 psi	±4%	5/min
2.	Stbd.engine oil pressure	0 to 80 psi	± 2 psi	±4%	5/min
3.	Oil Temp at port engine inlet	-75 to +250°F	±6.5°F	±2%	2/min
4.	Oil temp at Stbd.engine inlet	-75 to +250°F	±6.5°F	±2%	2/min
5.	Port engine gearbox air/oil heat exchanger inlet temperature	-75 to +500°F	±10°F	±2%	2/min
6.	Stbd.engine gearbox air/oil heat exchanger inlet temperature	-75 to +500°F	±10°F	±2%	2/min

2. ENGINE CONDITIONS (No Sketch)

7.	Port engine power lever position+	0 to 100 deg.	± 1 deg.	±1%	2/min
8.	Stbd.engine power lever position+	0 to 100 deg.	± 1 deg.	±1%	2/min
9.	Port engine L.P. compressor R.P.M.‡	0 to 110%		±0.5%	12/min
10.	Stbd.engine L.P. compressor R.P.M.‡	0 to 110%		±0.5%	12/min
11.	Port engine H.P. compressor R.P.M. &	0 to 110%		±0.5%	12/min
12.	Stbd.engine H.P. compressor R.P.M. &	0 to 110%		±0.5%	12/min
13.	Port engine intake static pressure (P_{s_2})	0 to 30 psia	±0.3 psi	±1%	20/sec
14.	Stbd.engine intake static pressure (P_{s_2})	0 to 30 psia	±0.3 psi	±1%	20/sec
15.	Port engine intake total head pressure (P_{t_2})	0 to 30 psia	±0.3 psi	±1%	12/min
16.	Stbd.engine intake total head pressure (P_{t_2})	0 to 30 psia	±0.3 psi	±1%	12/MIn

+ To be measured at the engine end of the flexible drive to the engine.

‡ Visual indication of both L.P. compressor speeds is required in pilot's cockpit if possible

& Visual indication of both H.P. compressor speeds is a definite requirements in the pilot's cockpit.

2. ENGINE CONDITIONS (cont'd)

	Item	Range	Accuracy	Accuracy % of full range	Sampling Frequency
17. 18. 19. 20.	DELETED				
21.	Turbine discharge press. (P_{t_7}) Port	0 to 45 psia	±0.45 psi	±1%	12/min
22.	Turbine discharge press. (P_{t_7}) Stbd.	0 to 45 psia	±0.45 psi	±1%	12/min
23.	Turbine discharge temp. (T_{t_7}) Port.	0 to 1400° F	±14F°	±1%	12/min
24.	Turbine discharge temp. (T_{t_7}) Stbd.	0 to 1400° F	±14F°	±1%	12/min
25.	L.P. compressor inlet temp. (T_{t_2}) Port	-75 to+350°F	±4F°	±1%	12/min
26.	L.P. compressor inlet temp. (T_{t_2}) Stbd.	-75 to+350°F	±4F°	±1%	12/min
26a	Bleed valve shut indication++				Cont. ind.

++Wiring provision only, to auto observer. For ground test only.

3. FUEL FLOW (no sketch)

27.	Fuel weight flow to port engine	600 to 25,000 lb/hr	±125 lb/hr	±0.5%	12/min
28.	Fuel weight flow to Stbd.engine	600 to 25,000 lb/hr	±125 lb/hr	±0.5%	12/min
29.	Fuel temp. at inlet to port engine burner	-75 to +350°F	±8°F	±2%	2/min
30.	Fuel temp. at inlet to stbd.engine burner	-75 to +350°F	±8°F	±2%	2/min

4. COOLING (see fig. 1)

(Port engine only except item no. 58 q.v.)

Unless otherwise stated, structural temperatures are required at the locations listed.

Item	Range	Accuracy	Accuracy % of full range	Sampling Frequenc
31. Centre rear mount, station 711	0 to 1000°F	± 10°F	± 1%	1/min
32. Former below turbine (on upper flange)	0 to 500°F	± 5°F	± 1%	1/min
33. On hat section at T1-24ST shroud joint at Stn. 698	0 to 500°F	± 5°F	± 1%	1/min
34. Top inboard shroud (on outer surface of shroud) at Stn.742	0 to 500°F	± 5°F	± 1%	1/min
35. Top inboard shroud (on outer surface of shroud) at Stn.780	0 to 500°F	± 5°F	± 1%	1/min
36. Top of titanium former (shroud) at Stn. 803	0 to 500°F	± 5°F	± 1%	1/min
37. Shroud at bolt from lower latch at Stn. 803	0 to 500°F	± 5°F	± 1%	1/min
38. Top of shroud inner flange at Stn. 803	0 to 500°F	± 5°F	± 1%	1/min
39. Top of shroud inner flange at kink, Stn.803	0 to 500°F	± 5°F	± 1%	1/min
40. Inner surface of slitter on slitter ℄ Stn.855	0 to 1000°F	± 20°F	± 2%	5/min
41. Inboard, shroud (on outer surface, on engine ℄) Stn. 836	0 to 500°F	± 10°F	± 2%	5/min
42. Air temp. top rear compressor, zone 1	0 to 500°F	± 5°F	± 1%	1/min
43. Air temp. under turbine, zone 2	0 to 500°F	± 5°F	± 1%	1/min
44. Air temp. above turbine, zone 2	0 to 500°F	± 5°F	± 1%	1/min
45. Air temp. above engine, zone 2, stn. 803	0 to 500°F	± 5°F	± 1%	1/min
46. Air temp. below engine, zone 2, stn. 803	0 to 500°F	± 5°F	± 1%	1/min
47. Ambient air temp. forward of parachute bay (not shown in fig)	0 to 500°F	± 5°F	± 1%	1/min
48. Engine can next centre rear mount, Stn. 710	0 to 1000°F	± 10°F	± 1%	1/min
49. Lower side of engine can, Stn. 710	0 to 1000°F	± 10°F	± 1%	1/min
50. Top flange of I-beam on ℄ through heat exchangers Stn. 592¥	0 to 500°F	± 5°F	± 1%	1/min
51. Top flange of former directly below firewall, stn. 663	0 to 500°F	± 5°F	± 1%	1/min
52. Structure 3 1/2" aft of aux. ejector (inner surface of lower skin) Stn. 663	0 to 500°F	± 50F	± 1%	1/min

¥ On beam, as near to top as possible

4. COOLING (cont'd)

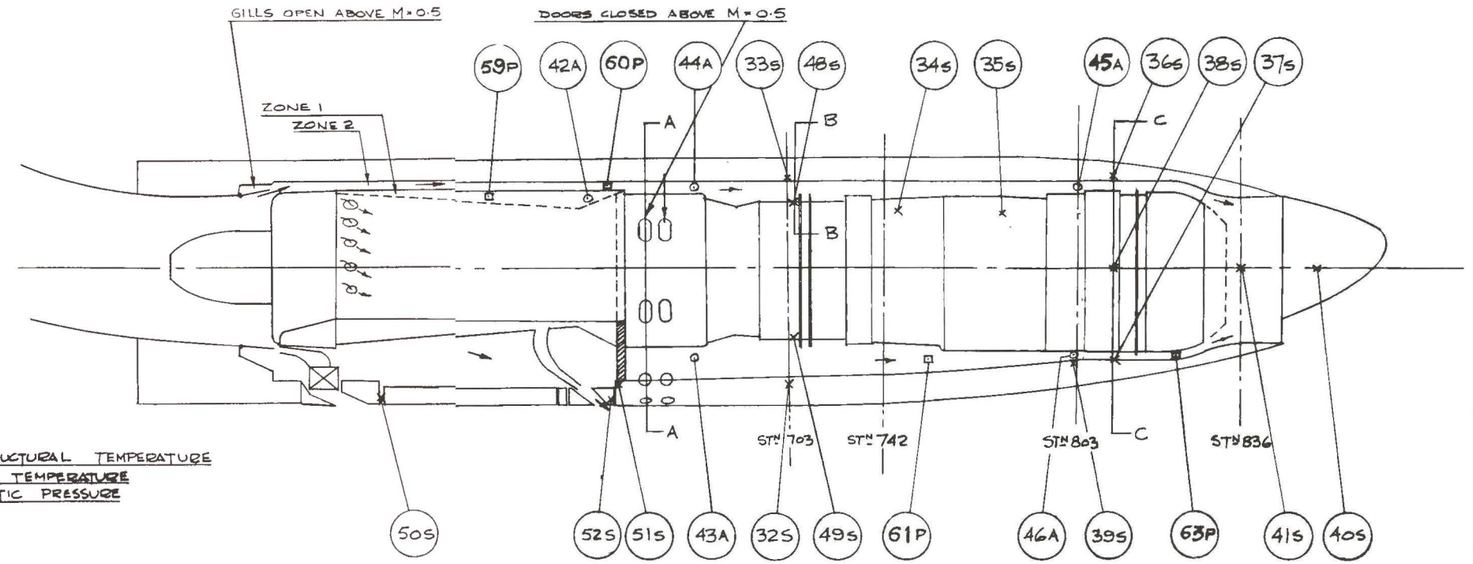
Item	Range	Accuracy	Accuracy % of full range	Sampling Frequency
53. Blow-in doors outside of bend of lower hose, at Stn. 673	0 to 1000°F	± 10°F	± 1%	1/min
54. Lower longeron engine bay, Stn. 591 (Not shown in fig.)	0 to 500°F	± 5°F	± 1%	1/min
55. Bottom of light frame (on web) at Stn. 586 (Not shown in fig.)	0 to 500°F	± 5°F	± 1%	1/min
56. Bottom of light frame (on web) at Stn. 656 (Not shown in fig.)	0 to 500°F	± 5°F	± 1%	1/min
57. Gills shut indication lights, port, 2 * per engine	* One on side gills indicating "shut - not shut"; one on oil cooler gill, at the bottom, indicating "shut - fully open"			Cont.
58. Gills shut indication lights, stbs. 2 * per engine				Cont.
58a Air temperature, alternator exhaust (Not shown in fig.)	75 to 500°F	± 6°F	± 1%	5/min

5. STATIC PRESSURES (see fig. 1.)

(Port engine only)

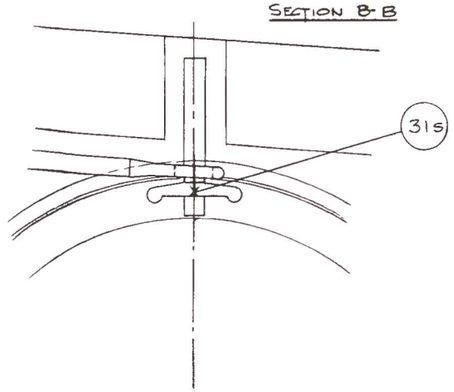
59. Top centre compressor, differential between zone 1 and 2.	5 to 20 psid	±0.25 psi	± 1%	6/min
60. Zone 2, top rear compressor	0 to 35 psia	±0.35 psi	± 1%	6/min
61. Zone 2, bottom mid section of tailpipe	0 to 35 psia	±0.35 psi	± 1%	6/min
62. Differential between zone 2 and parachute bay at centre fuselage (not shown in fig.)	5 to 5 psid	±0.1 psi	± 1%	6/min
63. Differential in ejector shroud, rel. to ambient. Between Stns. 820 & 825 at bottom of shroud	3 to 0 psig‡	±0.05 psi	± 2%	6/min

‡ Actual differential pressure range may be -3 to +18 psi.

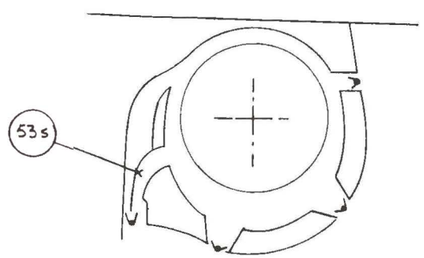


X S - STRUCTURAL TEMPERATURE
O A - AIR TEMPERATURE
□ P - STATIC PRESSURE

SECTION B-B



SECTION A-A



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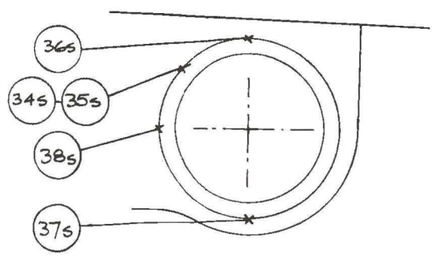

COOLING SYSTEM INSTRUMENTATION FOR J-75 ENGINE INSTALLATION

Fig. 1