Chapter 9 PITOT-STATIC SYSTEMS

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(Amendments to annotations)

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Introduction

1. Two independent pitot-static systems are installed in the aircraft. In this Chapter the systems are referred to as the nose pitot-static system and the wing pitotstatic system. Much of the basic information is, however, common to both systems. Information regarding the location of components together with a list of associated Air Publications is in Table 1.

Modification standard

2. This Chapter includes Mod 1085B, 1468, 1517 and 1589.

DESCRIPTION

Pipelines

3. Rigid light-alloy pipes are used throughout each system except at certain positions where it is impracticable to install them. Pitot pressure pipes are 3/16 in. outside diameter × 22 s.w.g. and static pressure pipes are 3/8 in. outside diameter × 24 s.w.g. Flexible Maricon hoses are employed at connections to instruments and other positions where movement occurs. The pipes are run together, i.e. pitot pressure with static pressure, and are supported at intervals in metal-sprayed clamps secured to the aircraft structure. Electrical bonding, with the structure, is maintained through these clamps; pipes and clamps must, therefore, be tested periodically in accordance with the instructions in Cover 1. Sect. 6, Chap. 1. Water traps are fitted at the lowest points in the pipelines to collect any moisture which may result from condensation, and to enable the moisture to be removed.

Pipeline identification

4. Throughout the systems the two supply lines are identified by white bands, marked INSTRUMENT AIR, placed at intervals along the pipes, with PRESSURE and STATIC on the appropriate pipes; where the pipes run horizontally, the PRESSURE pipe is always the upper.

Nose pitot-static system (fig 1) General

5. The nose pitot-static system serves the pilot's standby air speed indicator and standby altimeter (*Chap.* 2A, *this Section*), together with several items of control equipment. The installation is contained between station 52 in the folding nose and station 180 in the accessories bay.

System arrangement

6. Static pressure is sensed by two externally-mounted static vents positioned one on each side of, and low down on, the folding nose. Balance pipes connect the vents together and a common pipeline is routed upward and rearward, across the nose fold hinge-line, to a union on the front pressure bulkhead and thence into the cabin. From a three-way union in the cabin, a short pipe is connected to a second union on the pressure bulkhead which admits static pressure to the cabin pressure controller (A.P. 101B-1202-1A, Cover 2, Sect. 3, Chap. 8), via a special flexible hose supplied with the controller, and also to an altitude switch in the windscreen rain clearance system (Cover 1, Sect. 6, Chap. 8B).

7. Within the cabin the static pressure pipeline is joined by a pitot-pressure pipeline rising from a union on the cabin pressure floor. The system is then routed accordingly to serve the components illustrated.

8. Below the cabin pressure floor, pitot pressure pipes extend forward and down-

ward to connect with a pressure head on the port side of the fuselage. Into this pipe run is fitted a three-way union to which a further run of pipes is connected. This pipeline admits pitot pressure to the rudder and tail plane artificial feel simulators (A.P.101B-1202-1A, Cover 2, Sect. 3, Chap. 4A) in the accessories bay. Passing alongside the nose wheel bay, between the bay and the outer skin plating, the pipeline is secured to the structure by P-clips and is accessible through detachable panels (Chap. 1, this Section) on the port side of the fuselage nose.

Pressure head

9. Pitot pressure for the system is obtained from a pressure head, mounted low down on the port side of the fuselage nose at station 87. The pressure head is electrically heated by an element surrounding the nose of the tube. A description of the heating circuit is in Cover 1, Sect. 6, Chap. 8C.

Wing pitot-static system (fig 2) General

10. This system operates from a wingmounted pressure head to serve the airdata system and observer's combined speed indicator (Mod 1589) (Chap. 8, this Section), the air speed switch (Chap. 6B, App. 6, this Section, pre-Mod 1468, or Cover 1, Sect. 6, Chap. 7, post-Mod 1468) and the deck landing air speed indicator (Chap. 2A, this Section).

Pressure head

11. Pitot and static pressures are sensed by a pressure head installed in a mounting on the underside of the port wing. The pressure head incorporates, at its root end, a location hole which aligns with a screwed boss on the mounting tube. A special set-screw in the boss, when tightened,

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positively retains the pressure head in the airframe mounting. The pressure head is electrically heated by an element surrounding the nose of the tube and a description of the heating circuit is in Cover 1, Sect. 6, Chap. 8C.

System arrangement

12. The pipelines from the pressure head pass into the port outer plane, through conduits and, via flexible hoses at the wing fold joint, into the inner plane. Extending inboard to the port wheel bay. the run of pipes is broken by a test valve assembly mounted on the undercarriage diaphragm. A two-way test valve, incorporating a ground test connection, is fitted in each pipeline and the method of operation is described in subsequent paragraphs dealing with servicing. The system continues rearward, passing under the port jet pipe and entering the fuselage between frames 402 and 417. A four-way union in each pipeline then directs the system forward, to the observer's combined speed indicator, the deck landing air speed indicator in the pilot's cabin and the air speed switch in the bomb bay, and rearward. to the air data transducers in the radio bay, as illustrated.

Location of water traps

13. The water traps provided for each pitot-static system are located as detailed in the following paragraphs.

14. Nose pitot-static system (fig 1)

- Between the static vents in the folding nose (accessible with nose in folded position).
- (2) On the port side of the cabin pressure floor adjacent to frame 105 (accessible via cabin).
- (3) In the forward compartment of the accessories bay adjacent to the arti-

ficial feel simulators (access panel 98).

- 15. Wing pitot-static system (fig 2)
- (1) Under the pressure head fairing (access panel 259).
- (2) At the wing fold joint; for wing folded or wing spread conditions.
- (3) In the inner plane (access panel 136).
- (4) Under the port jet pipe (accessible : from the undercarriage bay).
- (5) In the bomb bay aft port side between frames 455 and 471 (accessible via bomb door).
- (6) In the accessories bay at frame 228.45 (access panel 463).
- (7) In the accessories bay immediately aft of frame 186 (access panel 98).

SERVICING

Caution...

- Post-Mod 1468. When the wing pitotstatic system is pressurized for ground test purposes to simulate an air speed exceeding 95 ± 5 knots, the attention of all personnel must be drawn to the fact that the safety provisions normally provided by the circuit protection relays (Cover 1, Sect. 6, Chap. 7) are not effective.
- (2) When the outer plane pitot line water traps are disturbed at the wing fold position a check should be made to ensure that they are re-installed correctly (para 27).

Draining the water traps

16. Remove the traps and examine for evidence of water. If water is present in the traps proceed as follows:-

(1) Disconnect all instruments and transducers from both pressure lines. respective positions and connect the lines to the pressure heads.

(2) Disconnect the pressure heads from

(3) Apply a supply of warm air to the

the lines at the pressure head fairings.

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(5) Proceed with a pressure test of both pipelines.

Pressure testing

General

17. Information under this heading is concerned only with proof pressure tests. A portable pitot-static test set Mk. 3 (Ref No. 6C/1042139) is available for in-situ testing and calibration of instruments; descriptive and operating information is in A.P.112T-0155-1. The limitations of this equipment will not, however, permit its use for proof pressure tests of the pipelines and, consequently, other arrangements must be made.

Pitot pressure pipelines

18. The following test is applicable to the pitot pressure pipeline of either system.

- Disconnect all instruments and transducers from the pitot pressure line and blank off all the pipes.
- (2) Connect pressurizing equipment to the open end of the pitot line in the pressure head.
- (3) Pressurize the line to 20 p.s.i.
- (4) The system must remain pressurized without leakage for ten minutes. If leaks occur the joints must be tested with soap solution and the leak eliminated.
- (5) Examine the pipes for distortion and damage.

A.P.101B-1202-1B, Cover 2, Sect. 7, Chap. 9 A.L.69, Aug.72



TABLE 1 List of components

ltem F	-ig	Component	Type or Part No.	Ident	Access panel	A.P. Ref
1 2 3 4 5 6 7 8 9 Chap. 1 Chap. 1 Chap. 1 10 11 12 13 Chap. 1	33333333 33333 33333 33333	Static vent (two off) Pressure head Test valve (pitot-static) Test valve (static) Pressure head Air speed switch Pitot-static transducer Static transducer Height lock transducer Altimeter, Mk. 27 ASI, Mk. 18 ASI, Mk. 19 Altitude switch Pressure controller Rudder feel simulator Tail plane feel simulator Combined speed indicator (Mod 1589)	Type F Mk. 8S, SU/130/27 Type B Type B Mk. 9M, KPF0208/A Chap. 6B Chap. 8 Chap. 8 Chap. 7 Chap. 2A Chap. 2A Chap. 2A TP 5912 512480/1 CHA 117998/2 CHA 117990/2 Chap. 8	N-UT P-G B-CY R-SM R-SP R-SN N (panel C-B) V (panel C-E) K (panel C-K/1)	- 28 - 259 244 238 238 238 238 - - - - 98 98 -	1275A, Vol. 1, Sect. 27 112G-0102-1 1275A, Vol. 1, Sect. 27 112G-0102-1 - - - - - - - - - - - - -

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(6) Remove the blanking caps, disconnect pressurizing equipment and connect all instruments and transducers.

Static pressure pipelines

19. The following test is applicable to the static pressure pipeline of either system.

- (1) Disconnect all instruments and transducers from the static line and blank off the pipes.
- (2) (a) In the case of the nose system connect pressurizing equipment to one static vent and blank off the other.
 - (b) In the case of the wing system plug the open end of the pitot line in the pressure head and connect pressurizing equipment over the static slots in the head.
- (3) Pressurize the line to 20 p.s.i.
- (4) The system must remain pressurized without leakage for ten minutes. If leaks occur the joints must be tested with soap solution and the leak eliminated.
- (5) Examine the pipes for distortion and damage.
- (6) Remove the blanking caps, disconnect pressurizing equipment and connect all instruments and transducers.

Using the test valves

20. When the wings are folded and the wing-mounted pressure head is out of ground reach, the air data system and the air speed switch can be tested from the port wheel bay by use of the test valve assembly. Each valve has two marked positions, NORMAL and TEST, and is secured in the NORMAL position with tinned copper wire. When the pitot and static pressure lines of a test set are connected to the test values and the latter are selected to TEST, simulated flight pressures are fed from the test set to the instruments, by-passing the pressure head and the pipes leading therefrom.

21. At the conclusion of the tests the valves must be selected to NORMAL before the lines of the test set can be disconnected. The test valves must then be secured in the NORMAL position with tinned copper wire.

REMOVAL AND INSTALLATION

General

22. Instructions for removing and installing instruments fitted in the pilot's cockpit are contained in Chap. 1 of this Section. Unless otherwise stated the procedures detailed in the following paragraphs relate to removal; in general, therefore, installation is a reversal of the sequence described.

Pressure heads

Fuselage pressure head

- 23. (1) Remove fuse E12 (panel C-Q).
- (2) Disconnect and release from the cable loom the heater cables at terminal block N-US (access panel 28).
- (3) Disconnect the pipe from the pressure head (access panel 29).
- (4) Unscrew and remove the two bolts and nuts which secure the pressure head in the streamlined fairing and withdraw the pressure head.

Wing-mounted pressure head (fig 4)

24. Instructions for removing and installing the pressure head and its mounting, as a complete unit, are contained in A.P.101B-1202-1A, Cover 2, Sect. 3, Chap. 2. The following instructions refer to the separation of the pressure head from its mounting:-

- (1) Remove fuse F6 (panel C-Q).
- (2) Remove the access panel 259 to gain access to the pipe and cable connections.
- (3) Disconnect the forward pipe connections at the three-way unions 5.
- (4) Disconnect the two pressure head heater cables 4 from the terminal block 6 (P-H) and attach a draw-wire to the free ends of the cables.
- (5) Remove the two bolts 7 securing the split fairlead to the mounting tube end-plug.
- (6) Break the locking wire at the rear of the streamlined clamping nut 1; draw back the tabbed locking washer 2 and, using a C-spanner (Ref No. 26NA/95012), unscrew the clamping nut from the mounting tube 3.
- (7) Detach the forward portion of the pressure head fairing 10 to gain access to the front of the mounting tube.
- (8) Break the locking wire and release the set-screw 8; withdraw the pressure head until the forward unions 9 become visible (approximately 12 in.).
- (9) Pull out the heater cables 4, disconnect the draw-wire and leave it in the mounting for use during installation.
- (10) Disconnect the unions 9 and remove the pressure head.

Air speed switch

25. Initially this unit must be removed complete with its mounting plate:-

(1) Disconnect the pipelines and stow them on the two spigots provided on



View on arrow

Fig.4. Wing-mounted pressure head - removal (Amendments to annotations)

the adjacent stringer flange. (The pipelines may be tightened onto these spigots during pressure testing, or any period when the air speed switch is not fitted).

(2) Disconnect the cable loom socket and remove the three hexagon-headed bolts from the anti-vibration mountings. De-

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tach the unit, complete with mounting plate, from the support bracket on frame 417.

Note ...

On installation ensure that the bonding lead is reconnected.

(3) Separate the air speed switch from its

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mounting plate by removing the four round-headed screws.

Air data transducers

26. Each of these units can be removed from its anti-vibration mountings, after the pipelines and cable loom sockets have been disconnected, by releasing the single centrally-mounted captive screw.



Fig. 5. Outer main plane water traps - assembly

Water traps

27. Special care must be exercised when replacing the water traps in the pitot pipe line at the port wing fold position; damage to wrongly positioned drain pipes, due to fouling with adjacent structure when the wings are spread, could result in malfunctioning of the pitot system. To ensure adequate clearance of the drain pipes when the wings are spread, the pitot drain trap assembly must be positioned as detailed in fig 5.