

Appendix 3

PITOT-STATIC TRANSDUCER, TYPE B, Ref. No. 6A/6435

SERVICING

TESTS AND ADJUSTMENTS

LIST OF CONTENTS

	<i>Para.</i>		<i>Para.</i>
<i>General</i>	1	<i>Adjustable cam setting</i>	14
<i>Setting of RV5</i>	7	<i>Setting up of MSW1</i>	15
<i>Setting of RV1</i>	10	<i>Calibration of IAS (synchro CX1)</i>	16
<i>Capacitor C1</i>	11	<i>Servo amplifier checks</i>	17
<i>Calibration of RV3 (log (P-S) potentiometer)</i>	13	<i>Switching off and disconnecting equipment</i>	25

LIST OF TABLES

	<i>Table</i>
<i>Pick-off sensitivity</i>	1

LIST OF ILLUSTRATIONS

	<i>Fig.</i>
<i>Pitot-static transducer, Type B - underside view</i>	1
<i>Test connections for log(P-S) calibration</i>	2
<i>Adjustment of IAS cam CU8</i>	3

General

1. The tests detailed in this appendix are additional to the standard serviceability test (Appendix 1) and are necessary either when certain components are replaced (Appendix 4) or during fault diagnosis (Appendix 2). Unless instructed to the contrary, these tests are to be performed with the transducer connected to the test set, Type 9B, and either the pitot/static test set, Mk. 3 or the air data test set, Type B as shown in Appendix 1, fig. 1, and the cover removed. The procedures detailed in Appendix 1, para. 4 to 15, must all have been carried out.

2. The transducer is illustrated in Chap. 12 and a circuit diagram is given at fig. 12 of that chapter.

3. Should a fault develop in any sub-unit or component for which spares are not held (i.e. shown in Appendix 4, Table 1 as not to be serviced) the transducer will be declared unserviceable and returned for repair in accordance with current servicing instructions.

4. On adjustment or replacement of a faulty sub-unit or component, the transducer will be subjected to the standard serviceability test to ensure that only this sub-unit/component is at fault.

5. The conditions under which servicing is to be carried out must be closely controlled regarding freedom from dust and dirt and temperature environment.

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6. Appendix 1, Table 1 gives a list of abbreviations used for test equipment components. Additional test equipment to that of Appendix 1, para. 2 is required as follows:—

- (1) Insulation resistance tester Type C, Ref No. 5G/1621.
- (2) Voltage divider box, 4 dial to an accuracy of 0.1%, Ref. No. 6C/2352.

Note . . .

Instruments of similar range and accuracy to those of sub-para. (1) and (2) will be accepted.

- (3) Pneumatic supplies, as follows:—
 - (a) Vacuum supply, capable of simulating 50 000 ft (3.425 in. Hg) standard conditions.
 - (b) Pressure supply not exceeding 20 lb/in².

Note . . .

Should a "tapped" station or ship supply be used, periodic checks of its state of cleanliness should be made, and pressure is to be controlled with safety valve, Ref. No. 6C/1017.

Setting of RV5

7. Connect the valve voltmeter set to the 300 mV range across capacitor C2 with the earth terminal of the meter connected to the earth terminal of C2 (fig. 1). Set the PCU mains switch and switch S1 (test set, Type 9B) to ON. Reduce the range of the valve voltmeter as necessary and check that the null indicated on the meter is not greater than 2mV r.m.s.; if necessary, adjust RV5 (Chap. 12, fig. 2) to achieve this. If the smallest null obtained is greater than 2mV, carry out the checks of Appendix 2, para. 10. If these are correct, then declare the transducer un-serviceable.

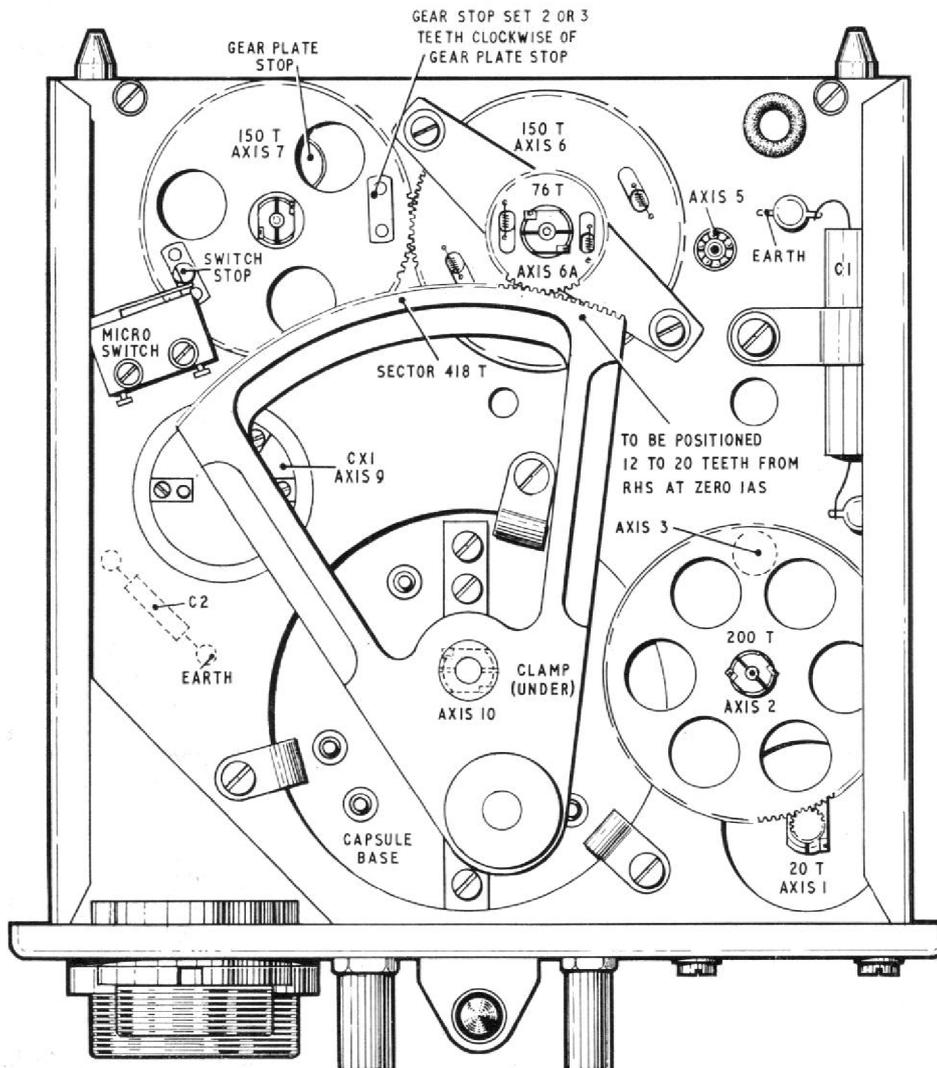


Fig. 1. Pitot-static transducer, Type B - underside view

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Note . . .

If the servo runs away and does not tend to null, disconnect pin A of the magnetic amplifier and proceed to the servo amplifier checks.

8. Wind the 200T gear of axis 2 five revolutions clockwise away from the null and note the valve voltmeter reading at every revolution. These readings should agree with the value shown in col. (c) of Table 1 within the tolerances given in col. (d).

TABLE 1
Pick-off sensitivity

Item (a)	200T gear (revolutions) (b)	Required output (mV) (c)	Tolerance (d)
1	1	24.4	± 5.5 mV
2	2	48.6	
3	3	73.2	
4	4	97.7	
5	5	122.0	

9. If the required figures of para. 7 and 8 cannot be achieved by the adjustment of RV5 then the transducer will be declared unserviceable.

Setting of RV1

10. With switches set as in para. 7 displace the 200T gear of axis 2 (fig. 1) one turn against the servo action and release it; it should make one overshoot in either direction before coming to rest. Repeat displacing the servo in the opposite direction. RV1 should be adjusted, if necessary, to achieve the required conditions.

Note . . .

If the conditions of para. 10 cannot be obtained, measure the resistance value of R6 and RV1 and check for smooth wiper operation. Change R6 or RV1 if out of tolerance. Change motor-tachogenerator if R6 and RV1 are within tolerance and retest. If the conditions still cannot be obtained, replace the original motor-tachogenerator and proceed to the servo amplifier checks.

Capacitor C1

11. Connect the valve voltmeter set to the 10V range across capacitor C1, with the meter earth terminal connected to the capacitor earth terminal (fig. 1). Set the PCU mains switch and switch S1 (test set, Type 9B) to ON. The voltage as read on the valve voltmeter should not exceed 5V r.m.s.

12. Rotate the 200T gear of axis 2, three revolutions clockwise against the servo action. Release the gear and mark the position at which it comes to rest; repeat the manoeuvre counter-clockwise. The difference between the two positions at which the gear comes to rest should not be greater than 5°.

Note . . .

If this test fails then change C1 and repeat. If the test still fails, replace the original capacitor, change the motor-tachogenerator and repeat. If the test still fails, replace the original motor-tachogenerator and proceed to the servo amplifier checks.

Calibration of RV3 (log (P-S) potentiometer)

13. (1) Switch S1 (test set, Type 9B) to OFF.
(2) Connect a shorting link between the junction of RV3 and RV2 and the 20V(X) side of RV2.
(3) Connect up subsidiary equipment as shown in fig. 2.
(4) Set the dividing box to a ratio of 1814, switch S1 (test set, Type 9B) to ON and adjust RV4 until the valve voltmeter indicates a null.
(5) Remove the shorting link across RV2 and disconnect the wander lead.
(6) Connect the wander lead to the junction of RV3/RV2, set the dividing box to 8270 and adjust RV2 until the valve voltmeter indicates a null, which must be less than 2mV.

Note . . .

If the indicated null of 2mV as required by sub-para. (6) cannot be obtained, then the 20V(X) supply must be checked, permitted tolerances being shown in Appendix 1, Table 2; if correct, the values of RV2 and R8 must be checked and, if either is out of tolerance, must be replaced and sub-para. (6) repeated. If the indicated null is still in excess of 2mV, check the value of RV3 and, if out of tolerance, replace and repeat from sub-para. (1). When all component values are within tolerance and if the null is still too high, replace the original components and declare the transducer unserviceable.

- (7) Disconnect the wander lead from the junction of RV3 and RV2 and connect it to TI INPUT on the ADTP of test set, Type 9B and set S4 to LOG(P-S).
(8) Set the controlled P-S pressure to 16.33 mb (100kt) and the dividing box to 2961.

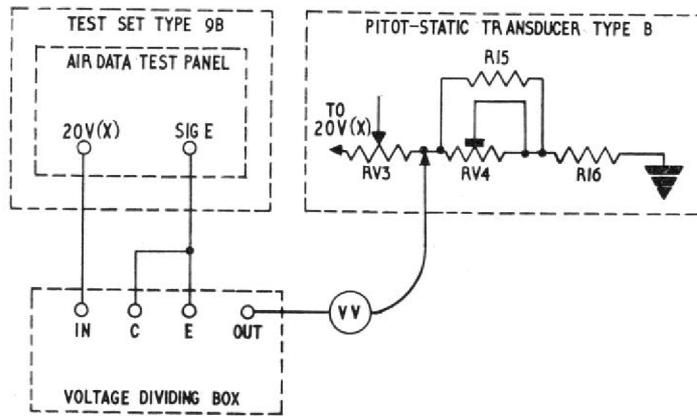


Fig. 2. Test connections for log (P-S) calibration

(9) Slacken off the split clamp on the spindle of RV3 (Chap. 12, fig. 6), and without disturbing the gear train turn the spindle of RV3 until the valve voltmeter indicates a null.

(10) Repeat the procedure of sub-para. (6) to (9).

(11) Refasten the split clamp to the correct torque loading, ensuring that the valve voltmeter remains at the null whilst doing so.

(12) Carry out the ranging tests of Appendix 1 in respect of LOG (P-S).

(13) If the results obtained are not within the permitted tolerance, set the P-S pressure to the point at which the largest error occurred and adjust RV3 as per sub-para. (9) until the G1 reading is within tolerance.

(14) Repeat sub-para. (12) and (13) until all figures are within tolerance.

Note . . .

If these conditions cannot be satisfied carry out the checks of Appendix 2 para. 5, 6 and 7, and repeat the ranging test.

Adjustable cam setting

Note . . .

The ensuing adjustments should be made only by specially trained personnel.

14. If the provisions of para. 13(14) cannot be met, even after potentiometer RV3 has been changed, the following procedure may be adopted as a final check before the transducer is declared unserviceable.

(1) Ensure that the power is switched on for at least fifteen minutes before commencing the procedure of sub-para. (3).

(2) Remove the transistor amplifier (App-

endix 4) without unsoldering the connections to the nine pins, lift clear, together with the plinth and locate conveniently. This will give access to all the cam adjusting screws.

(3) Set switch S4 (test set, Type 9B) to LOG (P-S) and the controlled P-S pressure to the point at which the largest error of the test of para. 13(13) occurred and adjust RV3 as per para. 13(9), until the G1 reading is correct.

(4) Reduce the controlled P-S pressure in steps of 50kt to an air speed of 100kt and at each point, if necessary, adjust the inner ring of screws to bring the G1 reading towards the required value. Repeat this process working from the starting point (sub-para. (3)) to 750kt. Do not attempt to correct completely the readings on the first adjustment; adjust each screw no more than one turn before proceeding to the next one.

(5) Continue to adjust the inner ring of screws, working backwards and forwards towards 100kt in one direction and 750kt in the other, until all G1 readings are about 20 divisions above the true readings in Appendix 1, Table 3. It will be necessary for the cam to take up a steep slope in the range 100kt to 150kt to obtain the required readings.

(6) Set the controlled P-S pressure to 100kt, and increase to 750kt in the increments given in Appendix 1, Table 3. Adjust the outer ring of screws to bring all G1 readings to the required figures of Appendix 1, Table 3 within the permitted tolerances. To achieve this, it should not be necessary to screw down any of the outer ring of screws more than one turn beyond the point where it touches the cam.

(7) To check the condition of sub-para. (6) set the controlled P-S pressure to bring the cam follower beneath a particular screw. Upward movement of the screw should cause the G1 pointer to deflect.

(8) Carry out the ranging test of Appendix 1 in respect of LOG P-S. If the G1 readings obtained are not within the permitted tolerances, re-adjust the cam screws where necessary, ensuring that each of the outer screws still bears against the cam track.

(9) Repeat sub-para. (8) until all G1 readings are within the permitted tolerances. Replace the transistor amplifier.

(10) If the conditions of sub-para. (9) cannot be obtained, the transducer should be declared unserviceable.

Setting up of MSW1

15. (1) Set the P-S pressure to 8.44mb (72kt) and check that the stop on the 150T gear of axis 7 is almost operating the actuator of MSW1: if it is not, release the two 8BA screws locking the microswitch about 1 turn and set the microswitch and actuator to the required position.

(2) Increase the P-S pressure to approximately 36.99 mb (150 kt), allow the servo-mechanism to settle and then slowly decrease the P-S pressure. The switch should be operated between 8.44 mb (72kt) and 6.87 mb (65 kt). Readjust the position of the microswitch and actuator in relation to the stop as in sub-para. (1) above to achieve this if required.

(3) Gradually reduce the P-S pressure to zero and check that the servo oscillates slowly on and off the switch actuator over the range from initial actuation to zero.

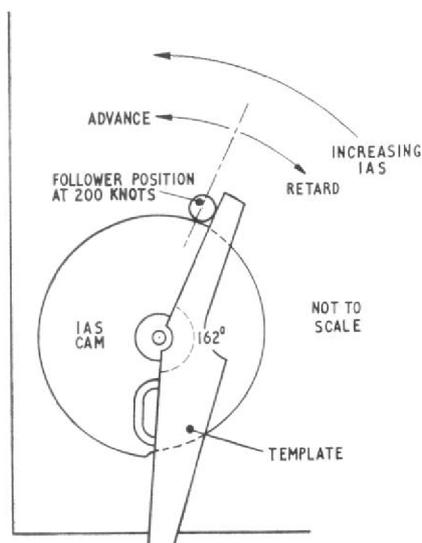


Fig. 3. Adjustment of IAS cam CU8

Note . . .

If the conditions of sub-para. (1) above cannot be satisfied, check the microswitch for continuity. If incorrect, change the microswitch and repeat the setting-up procedure. If the test still fails, proceed to the servo amplifier checks.

Calibration of IAS (synchro CX1)

16. (1) Switch S1 (test set, Type 9B) to ON, S4 to TEST 4 and check that the G1 reading is 00000 ± 1 division.

(2) Switch S4 to IAS and set the P-S pressure to 66.43 mb (200kt). Check that the G1 reading is 02002 ± 35 divisions.

(3) If the G1 reading is not within the permitted tolerance, check that the CU8 cam follower is in the required position (Appendix 2, para. 7), as shown in fig. 3, using a suitable template constructed of a thin rigid material.

(4) If the cam follower is incorrectly positioned, release the clamp locking CU8 (fig. 1) and set the cam follower to the correct position without disturbing the gear train. Refasten the clamp to the correct torque loading and check the G1 reading.

(5) Reduce the P-S pressure to 16.33 mb (100kt) and check that the G1 reading is 00350 ± 2 divisions. If this is incorrect, release the three 6BA screws clamping CX1 and without disturbing the gear train, turn the synchro until the G1 reading is correct. Refasten the clamp, ensuring that the G1 reading remains constant whilst doing so.

(6) Carry out the ranging test of Appendix 1.

(7) If the IAS results obtained are not within the permitted tolerances, repeat the procedure of sub-para. (2), (3) and (4), retarding the cam a fraction if the errors are positive and advancing the cam if the errors are negative.

(8) Repeat sub-para. (6) and (7) until all readings are within tolerance.

Note . . .

If the permitted tolerances cannot be achieved, change the synchro (Appendix 4) and repeat from sub-para. (1). If the IAS results of the ranging test are still outside tolerance and the log (P-S) figures are within tolerance, carry out the checks of Appendix 2, para. 5, 6 and 7, and repeat from sub-para. (5). If still incorrect replace the original synchro and declare the transducer unserviceable.

Servo amplifier checks

17. Note . . .

Detailed servicing of the transistor amplifier is covered in Chap. 7, Appendix 4.

- (1) Switch S1 (test set, Type 9B) to OFF.
- (2) Disconnect pin N on the magnetic amplifier.
- (3) Connect the multimeter set to the 10mA d.c. range between pin N and the loose lead and switch S1 (test set, Type 9B) to ON.
- (4) Rotate the 200T gear of axis 2 (fig. 1) against the action of the servo until the multimeter indicates 4mA; to achieve this, the gear should not rotate through more than one third of a revolution.

Note . . .

If the conditions of the note to para. 7 have been implemented, i.e. pin A of MA1 disconnected, there will be no servo action. Under these conditions the 200T gear of axis 2 will simply be rotated just in one direction, and then in the other.

- (5) Repeat sub-para. (4) in the opposite direction.

18. If the test of para. 17 fails, check the power supplies to the transistor amplifier and demodulator as follows:—

Between pins	Voltage range
j and c	$-5\frac{1}{2}$ V to -9 V d.c.
h and c	$-5\frac{1}{2}$ V to -9 V d.c.
d and c	$+8$ V to $+11$ V d.c.

(pin c should connect to signal earth)

PT2/J and MA1/H $25\text{V} \pm 1.5\text{V}$ a.c.

(pin MA1/H should connect to bias earth)

19. If the power supplies are satisfactory, switch S1 (test set, Type 9B) to OFF and measure the resistance of MR1 and MR2. With the multimeter set to $\div 100$ range the resistance should be 15 to 25 ohm in one direction and 40 to 50 ohm in the other.

20. At this stage, if the test of para. 17 has failed and the test of para. 19 proved satisfactory, the transistor amplifier should be changed and the routines of para. 17 to 19 repeated.

21. Connect the valve voltmeter set to the 100V range across capacitor C1 with the meter earth terminal connected to the capacitor earth terminal (fig. 1). Repeat the test of para. 17, noting the valve voltmeter reading and the multimeter reading. When the multimeter reads 4mA, the valve voltmeter should read greater than 30V in each direction of revolution of the gear.

22. If this test fails, check the power supplies to the magnetic amplifier as follows:—

Between pins	Voltage range
J and H	80V to 90V a.c.
G and H	80V to 90V a.c.
K and H	-32 V to -25 V d.c.

(pin H should connect to bias earth)

23. At this stage, if the test of para. 21 has failed and the test of para. 22 proved satisfactory, the magnetic amplifier should be changed, and the routines of para. 21 and 22 repeated.

24. Disconnect the meter and resolder the connection to pin. N.

Switching off and disconnecting equipment

25. Carry out the procedure of Appendix 1, para. 18.



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