Appendix 3

HEIGHT LOCK TRANSDUCER, Type B, Ref. No. 6TD/812

SERVICING

TESTS AND ADJUSTMENTS

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Introduction

1. This appendix describes the tests and adjustments for the height lock transducer, Type B, Ref. No. 6TD/812, and has been written to a standard of second line servicing only. The tests are in addition to the S.S.T (App. 1) and provide special checks on individual components or sections of the transducer which are suspected of being faulty. The adjustments are those to be made when setting-up a transducer after component replacement, or to bring the transducer within the tolerances specified in the serviceability tests. After completing a test or the adjustments, the tranducer cover must be refitted and the transducer subjected to the complete S.S.T detailed in App. 1. Unless otherwise stated, all tests and adjustments will be carried out with the transducer in the normal position. The procedures for removal of components from the transducer are detailed in App. 4.

Test equipment

2. The following test equipment is required:—

(1) Height lock transducer, Type B test panel (Ref. No. 6C/4531) fitted into the test set, Type 9B (Ref. No. 6C/2868), as shown in App. 1, fig. 3.

(2) Pitot-static test set Mk. 3 (Ref. No. 6C/2106) or air data test set, Type B (Ref. No. 6C/3720)

(3) Multimeter, Type 12889 (Ref. No. 5QP/17447).

(4) Valve voltmeter, range 0 to 5V, calibrated to an accuracy of 0·5 per cent (2 off).

(5) Insulation resistance tester, Type C (Ref. No. 5G/152).

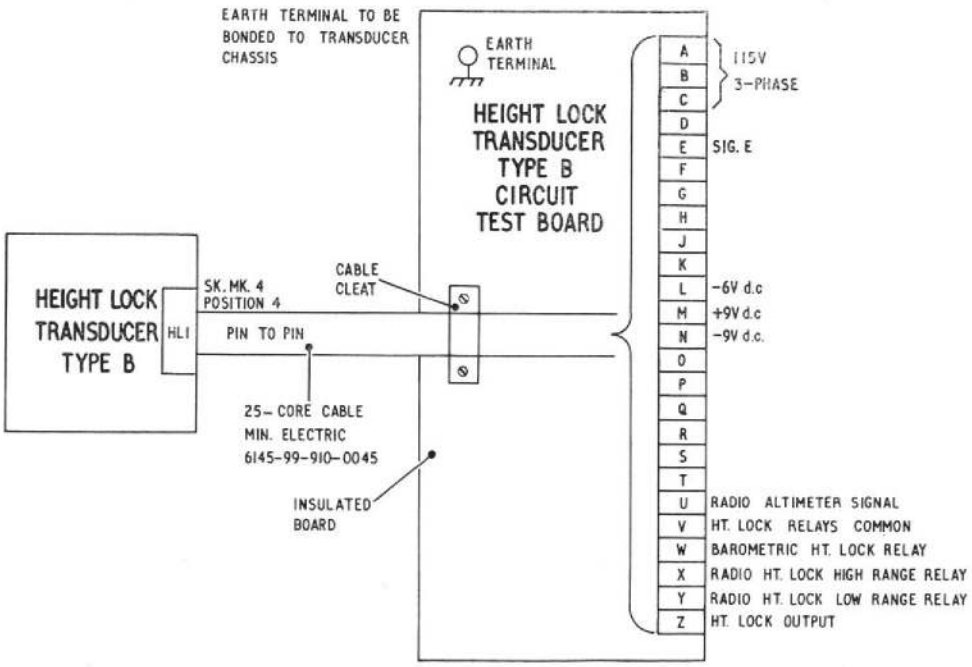

Fig. 1. Transducer connected to circuit test board

(6) Portable pressure/vacuum test set (Ref. No. 6C/3154).

(7) Gramme gauge, 0 to 50 gm.

(8) Stop watch, G.S. 1/5th second (Ref No. 6B/9101001)

(9) Vibrator, 115V, producing 3,200 c/s (Ref. No. 6A/7041), described in A.P 1275A, Vol. 1, Sect. 22, Chap. 17

(10) Locally manufactured distance piece to fig. 4, for setting distance between capsule unit sector and motor plate.

Note . . .

Test equipment abbreviations used in this appendix are given in Table 1.

Power supplies

3. The following power supplies are required:—

(1) 115V ±3V, 400 c/s ±20 c/s, 3-phase, phase rotation A — B — C with B phase earthed

(2) 28V ±1·5V d.c.

Pneumatic supply

4. A vacuum supply capable of simulating 52,000 ft standard conditions, obtainable from the portable pressure/vacuum test set.

TABLE 1

Test equipment abbreviations

Components		Abbreviation
Power control unit		PCU
Power supply test panel		PSTP
Height lock transducer, Type B test panel		HLTP
ON/OFF supply switch (PSTP)		S1
ON/OFF-SUPPLY switch (HLTP)		S1
OPERATING MODE switch		S2
RADIO HEIGHT SIMULATOR	FEET	S3
	INCREASE	S4
	DECREASE	
Pitot-static test set, Mk. 3		Mk. 3 PS
Air data test set, Type B		ADTS

Preparation of test equipment

5. Prepare the test set, Type 9B and the pneumatic test equipment for use and carry out the setting-up and testing procedures on the equipment as detailed in Preparation for tests, App. 1.

TESTS

Plug HL1

6. The following wiring checks on plug HL1 are to be carried out if the plug has been changed

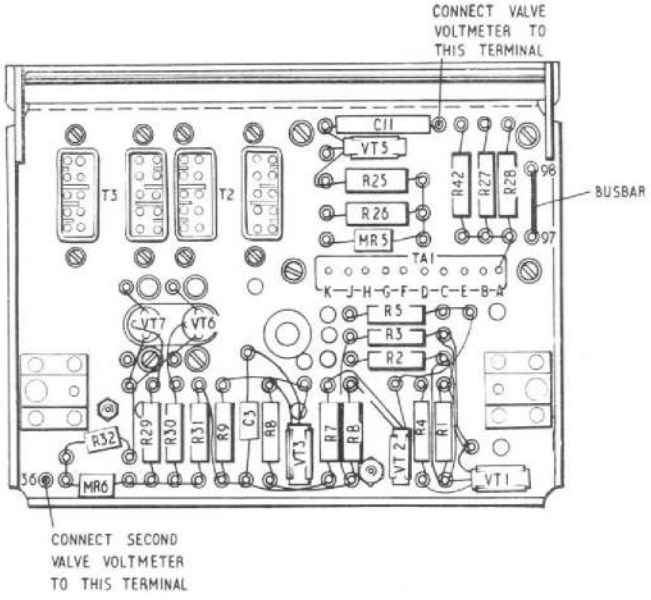

Fig. 2. Rear of chassis assembly — valve voltmeter connecting points

or if the input connections are suspected of being faulty. To facilitate the checks a locally manufactured test board as shown in fig. 1 may be used.

(1) Remove transducer cover (App. 4).

(2) Remove chassis assembly (App. 4).

(3) Check that each pin or plug on HL1 is connected to the required points as shown on the circuit diagram (chap. 4, fig. 9) using the multimeter set to the ohms ÷ 100 range. The resistance must not exceed 2 ohms.

(4) Refit chassis assembly.

Gear train

7. If the servomechanism does not drive, or if the servo action is sluggish or erratic, check the gear train for freedom of operation as follows: —

(1) Remove cover (App. 4).

(2) Turn the transducer onto its side and insert a gramme gauge into one of the holes in the 192T gear at axis 2 (fig. 3).

(3) Measure the force required to move the gear train ensuring that the slip clutch does not slip. The force required should not exceed 8 gm.

(4) If the setting of the slip clutch is suspected of being incorrect, remove the slip clutch from its spindle (axis 7), in accordance with the removal instructions given in App. 4.

(5) Inspect the slip clutch for damage. If satisfactory check the setting of the clutch by holding the slip clutch boss between finger and thumb, and applying a load tangentially to the teeth of the split gear, using the gramme gauge, so that slipping occurs. The load must be 30 ±5 gm If incorrect, bring the slip clutch setting within the figure specified by adjusting the split clamp (adjusting), see chap. 4, fig. 7.

(6) Refit slip clutch and gears (App. 4).

(7) Repeat sub-para (2) and (3).

(8) Refit chassis assembly.

Relay operation

8. To check the operation of the relays proceed as follows: —

(1) Remove cover (App 4).

(2) If checking RLWA3 or RLAJA1-2, remove chassis assembly (App. 4).

(3) Connect the transducer to the height lock transducer test panel as detailed in App. 1, leaving the static input connection open to atmosphere.

(4) Set the test set and test panel switches as follows: —

MAINS switch (PCU) to ON
S1(PSTP) to OFF
S1(HLTP) to ON
S2(HLTP) to SERVO
S3(HLTP) to 0 FEET
S4(HLTP) to INCREASE

(5) Relay RLW1-2. Check that when S2 (HLTP) is switched from SERVO to BAROMETRIC, RLWA1-2 operates, producing continuity between busbar 112-113 on the side of the chassis assembly and the end of C6 nearest the rear of the chassis, see chap. 4, fig. 1

Note . . .

*Continuity will only be obtained if the contacts of relay RLJA*1-2 *are satisfactory. Therefore, if relay RLJA*1-2 *is suspected, it must be checked* (sub-para. (7)) *before relay RLWA*1-2 *is tested.*

(6) Relay RLWA3. Check that when S2 (HLTP) is switched from SERVO to BAROMETRIC, RLWA3 operates, removing the 50V 400 c/s supply to the motor as measured at terminal 4 (brown wire) and terminal 5 (orange wire) on the terminal board assembly TB1 mounted on the gear plate.

(7) Relay RLJA1-2. Set S2 (HLTP) to RADIO H L. LOW and check that RLJA1-2 operates, replacing the 50V 400 c/s supply to the motor as measured at terminal 4 (brown wire) and terminal 5 (orange wire) on the terminal board assembly TB1 mounted on the gear plate.

(8) Relay RLJA3-4. Set S2 (HLTP) to RADIO H.L. LOW and check that RLJA3-4 energizes, producing continuity between busbar 112-113 on the side of the chassis assembly and RV6 yellow spot connection.

(9) Relay RLZA1. Set S2 (HLTP) to RADIO H.L HIGH and check that RLZA1 energizes, breaking continuity between RV4 red spot connection and the end of R35 nearest the front of the transducer.

(10) If necessary, refit chassis assembly.

ADJUSTMENTS

General

9. Setting-up the height lock transducer involves the adjustment of seven variable resistors. As some of these interact, adjusting one resistor may necessitate the readjustment of one previously set-up. The following paragraph details the progression through the stages of initially setting-up the transducer. The vibrator should be used for sub-para. (11) to (18)

Setting-up transducer

10. (1) Remove cover (App. 4)

(2) Set RV2, RV3, RV4, RV6 and RV7 to approximately their mid-position. Set RV1 and RV5 fully clockwise.

(3) Connect the transducer for test as shown in App. 1, fig. 3, with the test set and test panel switches set as in para. 8, sub-para. (4). Allow transducer three minutes warm-up period

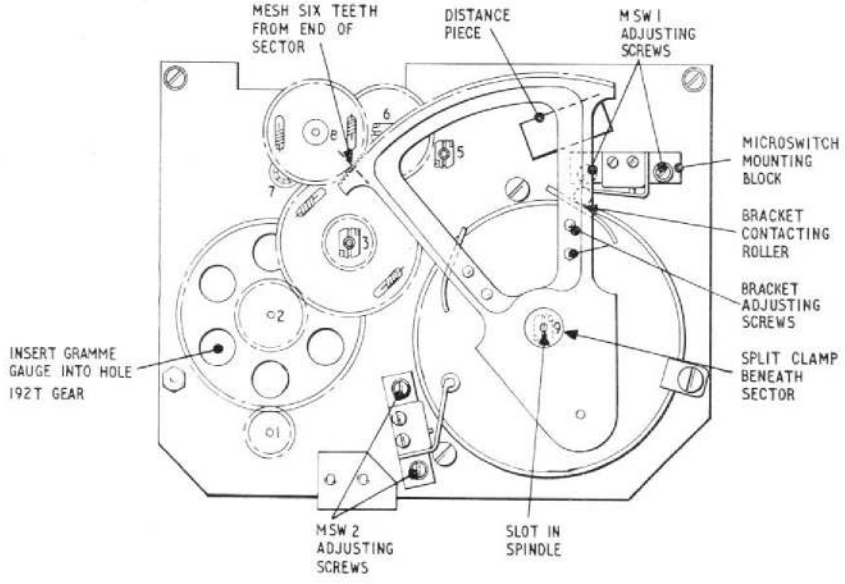

Fig. 3. Underside of gear train — sector positioning

(4) Set the switches and controls of the Mk. 3 pitot-static test set, or the air data test set, Type B, to the operating positions as detailed in A.P.1275T, Vol. 1, Sect. 3, Chap. 38 or Chap. 42 respectively

(5) Set the pressure on the static input connection to the transducer to 1013.5 mb.

(6) Connect one valve voltmeter between the right-hand end of C11 and busbar 97-98, and a second valve voltmeter between terminal 36 (C12) and busbar 97-98 (fig. 2).

(7) Turn the gear train by hand until a signal of 1mV r.m.s is seen on the first valve voltmeter. Adjust RV5 until the signal on the second valve voltmeter is 25V r.m.s.

(8) Disconnect valve voltmeters and connect one voltmeter to the test panel (TE3 O/P and TE2 SIG.E)

(9) Set S2 (HLTP) to BAROMETRIC and note the reading on the valve voltmeter. This must be a null of less than 0·3V r.m.s. If not, set S2 (HLTP) to SERVO and adjust RV2. Return S2 (HLTP) to BAROMETRIC and check the valve voltmeter reading. Repeat until the null is obtained

(10) With S2 (HLTP) at BAROMETRIC, reduce the pressure on the static input to 1009·5 mb. Adjust RV1 to obtain a reading on the valve voltmeter of approximately 2·5V r.m.s.

(11) Set S2 (HLTP) to SERVO and adjust the pressure on the static input to approximately 1006 mb. Set S1 (HLTP) to OFF and slowly increase static pressure to 1013·5 mb.

(12) Set S1 (HLTP) to ON and observe the 192T gear (fig. 3) on the tachogenerator shaft. The gear should make one overshoot and one undershoot before coming to rest. If not, adjust RV6 as necessary.

(13) Set S2 (HLTP) to BAROMETRIC and adjust the pressure on the static input connection to 1009·5 mb. Note the reading on the valve voltmeter. Return the pressure 1013·5mb and S2 (HLTP) to SERVO.

(14) Set S2 (HLTP) to BAROMETRIC and adjust the pressure on the static input connection to 1017 mb. Note the reading on the valve voltmeter This reading and that obtained in sub-para. (13) must be 2·5V r.m.s. ±5 per cent. The readings must not differ by more than 5 per cent. Adjust RV7 to decrease the difference and re-adjust RV2 as in sub-para. (9) Check the outputs again on the valve voltmeter at 1017 mb and 1009·5 mb. Repeat the procedure as necessary.

(15) Set the switches on the (HLTP) as follows: —

S2 to SERVO
S3 to 100 FEET
S4 to INCREASE

(16) Place S2 (HLTP) to LOW RADIO H.L. and let the servomechanism run for approximately ten seconds. Return S2 (HLTP) to SERVO.

(17) Set S3 (HLTP) to 25 FEET Place S2 to the LOW RADIO H.L. position and observe the pointer on the valve voltmeter. When this reaches 1V start stop watch and measure the time taken for the pointer to reach 3V. Set S2 (HLTP) back to the SERVO position. The recorded time must be 32 seconds ±20 per cent. Adjust RV3 to obtain the correct servo rate

(18) Set S4 (HLTP) to DECREASE and repeat sub-para. (16) and (17).

(19) Repeat sub-para. (16) to (18) with switch S2 (HLTP) set to the HIGH RADIO H.L. position. Adjust RV4 to obtain the correct servo rate.

Note . . .

RV3 will affect both LOW and HIGH range calibration, therefore, do not adjust RV3 once low range has been calibrated.

(20) Set the pressure on the static input connection to the prevailing atmospheric pressure and place the test set and test panel switches as follows: —

MAINS switch (PCU) to off position
S1 (HLTP) to OFF

(21) Disconnect the cable assembly CA1 from the height lock transducer and the test panel.

(22) Disconnect the static pipeline from the transducer and from the Mk. 3 PS, or the ADTS. Close down the test set as detailed in A.P.1275T, Vol. 1, Sect. 3, Chap. 38 or Chap. 42.

Setting-up capsule unit sector

11. If the capsule unit sector has been removed, or if the sector was found to be loose on the capsule unit spindle during inspection, it must be set-up correctly as follows, to ensure the correct positioning of the sector with respect to the E-coils of the capsule unit assembly.

(1) If the gear train has not been removed from the transducer, remove in accordance with the removal instructions in App. 4.

(2) Slacken the sector split clamp screws and position the sector so that it meshes with the 84T split gear (axis 8), six teeth from the left-hand end of the sector as shown in fig. 3. Load the split gear $\frac{1}{2}$ to 1 tooth before meshing.

(3) Place the distance piece, fig. 4, beneath the sector in the position shown on fig. 3, and position the sector on the spindle so that it rests on the distance piece.

(4) Place a screwdriver in the slot of the capsule unit spindle and carefully rotate the spindle fully clockwise to bring the E-coils within the capsule unit against their stop.

(5) Torque tighten the sector split clamp screws in accordance with the instructions for tightening split clamps given in App. 4.

(6) Remove distance piece.

(7) Slacken microswitch adjusting screws and place microswitch mounting blocks in the central position.

(8) Turn the sector counter-clockwise, allowing the slip clutch to slip, then clockwise until the sector is brought up against microswitch MSW1. If necessary, adjust the sector bracket to obtain a smooth pick-up with MSW1 roller and check that it operates the microswitch.

(9) Repeat the operation for microswitch MSW2. If necessary, tighten and lock the bracket securing screws using a recommended sealant.

(10) Adjust the microswitches for correct operation in accordance with para. 12.

Note . . .

The microswitch adjusting screws must be locked with a sealant after completing the setting-up procedure. Remove one screw at a time, apply the sealant and replace screw.

(11) Carry out a range test and a microswitch operation test as detailed in App. 1.

(12) Refit gear train and chassis assembly (App. 4).

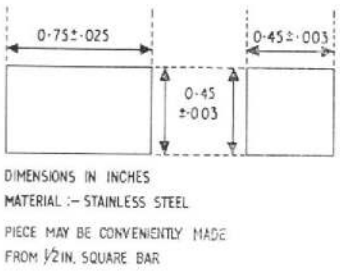

Fig. 4. Distance piece

Microswitch operation

12. (1) Remove cover (App. 4).

(2) Turn transducer onto its top and connect to the test equipment as shown in App. 1, fig. 3.

(3) Set the test set and test panel switches as in para. 8, sub-para. (4).

(4) Set the switches and controls of the Mk. 3 pitot-static test set, or the air data test set, Type B, to the operating positions as detailed in A.P.1275T, Vol. 1, Sect. 3, Chap. 38, or Chap. 42, respectively.

(5) Set MSW1 and MSW2 to positions furthest from the sector. Strap the vibrator to the transducer and switch on vibrator.

(6) Apply a pressure to the static input connection on the transducer to 1058 mb. Adjust MSW1 until it just operates. Tighten the adjusting screws.

(7) Reduce the pressure to 1013·5 mb. Check the correct operation of the microswitch by slowly increasing the pressure until MSW1 operates and causes the servomechanism to reverse direction. Note the pressure reading on the test set. Slowly adjust the pressure towards 1013·5 mb until the gear train becomes steady. Again note the reading on the test set. Both pressure readings should be within the range 1058 mb to 1050·5 mb. Slowly return the pressure to 1013·5 mb.

(8) Reduce the pressure on the static connection to 105·5 mb. Adjust MSW2 until it just operates. Tighten the adjusting screws.

(9) Increase the pressure to 116 mb. Check the correct operation of the microswitch by slowly decreasing the pressure until MSW2 operates and causes the servomechanism to reverse direction. Note the pressure reading on the test set. Slowly adjust the pressure towards 1013·5 mb until the gear train becomes steady. Again note the reading on the test set. Both pressure readings should lie within the range 105·5 mb to 116 mb.

(10) Set the pressure on the static input connection to the prevailing atmospheric pressure and place the test set and test panel switches as follows: —

MAINS switch (PCU) to off position

S1 (HLTP) to OFF.

(11) Switch off vibrator and unstrap from transducer.

(12) Disconnect the cable assembly CA1 from the height lock transducer and test panel.

(13) Disconnect the static pipeline from the transducer and the Mk. 3 PS or the ADTS. Close down the test set as detailed in A.P. 1275T, Vol. 1, Sect. 3, Chap. 38, or Chap. 42.