

Appendix 2

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

SERVICING

FAULT DIAGNOSIS

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Introduction

1. This appendix discusses the method of fault diagnosis for the height lock transducer, Type B, Ref. No 6TD/812. The diagnosis investigates the faults to the depth of second line servicing, which is, in general, limited to locating the faulty component and replacing it with a serviceable one. The transducer is to be rejected as unserviceable however, if the fault lies within the capsule unit or gear train. The test and adjustments for the height lock transducer are described in App. 3 to Chapter 4 and the removal and replacement of components in App. 4.

2. The first step in fault diagnosis is to locate the faulty section of the transducer. This may be achieved by subjecting the transducer to the S.S.T. (App. 1), since each test which is satisfied will eliminate that section of the transducer which is associated with the test; conversely, a test which fails will point to the section to be investigated. When the transducer fails a test, one of the following symptoms may be experienced and this symptom used to determine the likely cause of the failure:—

(1) Servomechanism does not drive.

(2) Servo run away.

(3) Sluggish servo follow-up.

(4) Erratic servo follow-up.

(5) Failure of the servo system to null.

(6) Incorrect height lock output for both increasing or decreasing heights or one direction only.

(7) No height lock output

3. When fault tracing, look for the straightforward simple faults first before carrying out detailed electrical checks. For example, if the servomechanism fails to drive, first check to see if the motor pinion is loose on the motor spindle allowing the motor only to rotate. If this is satisfactory, check the gear train for damage, and then the supplies to the motor. If all are correct a check on the capsule unit and servo amplifier may then be made. Should the serviceability of a component be suspected, the supplies and wiring to the suspect component must be checked, and the continuity and resistance of wiring within the component tested before removal, to avoid mistakenly removing a serviceable component.

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4. When the fault has been rectified the associated test which faulted the transducer is to be repeated. If this test is now satisfactory the transducer is to be subjected to the complete S.S.T. If the test is still incorrect, the next stage in the diagnosis is to be investigated. This progression is to be continued until either the transducer is repaired or a point is reached beyond which the depth of servicing allows no further investigation whereupon the unit is rejected as unserviceable.

5. The failure of each test on the transducer is discussed in turn in the following paragraphs, and to simplify fault tracing, Table 1 supplementing the discussion has been produced. The table lists the symptoms, the possible faulty component, and in some cases, the probable fault.

Visual examination

6. Visual examination of the transducer will reveal the obvious physical faults such as defects in or damage to the gear train, broken or loose connections, and overheated or damaged components. Loose clamps of the gear train may be torque tightened in accordance with Table 1, App. 4. If the clamp holding the sector on the capsule spindle is loose, the sector must be set-up on the spindle in accordance with App. 3 before tightening the clamp. If the gear train between the gear plate and motor plate is found to be damaged, the transducer is to be rejected.

Wiring checks

7. Failure of the transducer to satisfy a resistance or continuity test is most likely to be due to the open circuit or short circuit type of fault. Should the test have been preceded by fault rectification however, a check on the reconnections must be made. The wiring checks on plug HL1 are detailed in App. 3, Tests and Adjustments

Leak test

8. Failure of the leak test is most likely to be caused by a faulty rubber 'O' ring sealing the capsule unit, or a leak through a base terminal seal. The capsule unit cover sealing ring may be changed, but if the spindle 'O' rings or the base terminal seals are suspected, the transducer must be rejected.

Barometric height lock tests

9. A probable cause of an incorrect barometric height lock output is the maladjustment of potentiometers RV1, RV2 or RV7. The symptom experienced whilst testing however, and the resultant graph plotted from the output readings will indicate the type of fault, i.e. all outputs incorrect, or output incorrect in one direction only, and

reference to Table 1 will give alternative checks to be made. If the oscilloscope check shows that the output is more than 20° out of phase with reference voltage, check capacitor C5 and the coupling capacitors of the pre-amplifier.

Position attitude tests

10. Should the transducer fail a position attitude test in any one direction it must be rejected, since the error will be due to a fault in the capsule unit linkage or the compensating balance weights.

Servo follow-up tests

11. If the servo system makes more than one overshoot and one undershoot before coming to rest the velocity feedback resistor RV6 should be adjusted (App. 3). Should the servo system stabilize correctly but take more than 35 seconds to come to rest consult Table 1 for checks on possible servo fault.

Range test

12. Should the servo system fail to stabilize at the selected heights, a check on the capsule null output should be made in accordance with the relevant test of the S.S.T. (App. 1). If the capsule unit is satisfactory, the cause may lie in the attenuator network, RV6, R23, R20.

Microswitches operation tests

13. Should the sector fail to operate either microswitch, or operate a microswitch before the correct height setting, adjust the microswitches as detailed in App. 3. If the sector is operating the microswitch correctly but the servomechanism fails to reverse, check the supply at the microswitches (+9V MSW1 and -9V MSW2), and the connections. If the supplies and connections are satisfactory, change the microswitch (App. 4).

Hysteresis test

14. This test provides a check on the hysteresis of the capsule and loss of movement in the linkage system. Therefore, a faulty capsule unit should be suspected if this test is not satisfactory, and the transducer rejected.

Discrimination test

15. Failure of the transducer to discriminate between the applied pressures would indicate the lack of sensitivity of the capsule unit, and the transducer must be rejected.

TABLE 1
Height lock transducer, Type B — fault tracing

	Capsule unit	Servo amplifier	Pre-amplifier	Motor	D.C. tachogenerator	Velocity feedback resistor RV6	Gear train	Relays	Attenuator network	Probable faults
Servomechanism does not drive	X	X	X	X			X	X		
Erratic servo follow-up	X			X	X	X	X		X	
Sluggish servo follow-up	X	X		X		X	X			
Hunting around null	X				X (see probable faults column)	X			X	Check the leads to the tachogenerator for reversal
Servo run away	X	X		X (see probable faults column)			X			Check the motor leads for reversal
No height lock output	X		X					X		
No radio height lock output		X (see probable faults column)							X	RV3
Height lock outputs incorrect	X		X							
Output correct in one direction only	X (see probable faults column)									Adjustment of RV7 and RV2 may be necessary
Radio height lock output incorrect									X	

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