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POSITION TRANSMITTERS, S132 SERIES

GENERAL AND TECHNICAL INFORMATION

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FOR USE IN THE NAVAL SERVICE AND
ROYAL AIR FORCE

(Prepared by the Ministry of Aviation)

AMENDMENT RECORD SHEET

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A.L. No.	Pages affected	Date	Incorporated by
1	5		INCORPORATED
2			
3			
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5			
6			
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8			
9			
10			
11			
12			
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19			
20			

MODIFICATION RECORD

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POSITION TRANSMITTERS, S132 SERIES

Introduction

1. The transmitter S132 is designed to provide information to a remote indicator, reference the rotary movement of a shaft, or angular movement of a control. Electrical output from the transmitter, proportional to mechanical movement, is conducted to a suitable current monitoring indicator calibrated in units of degrees deflection or control position.

2. All models of the S132 transmitter may be adjusted to give full-scale deflection of the associated indicator, for any required range within limits of 30 to 300 degrees.

DESCRIPTION

3. A three-part moulded bakelite casing (*fig.* 1) houses the transmitter electrical equipment, the separate compartments of the casing being held together by four tie-bolts, assembled longitudinally through each compartment and secured with circular slotted nuts. The front portion of the casing accommodates the wiper arm (*fig.* 2), directly coupled to, but insulated from a stainless steel operating spindle; the spindle, which is free to rotate through 360 deg. is mounted in two phosphor-bronze bearings. An insulated boss on the wiper arm, houses a spring-loaded contact engaged with a slip-ring on one side and a toroidal resistance winding on the other.

4. The centre portion of the casing houses the toroidal resistance winding; the outer surfaces engaging with the spring-loaded contacts on each side.

5. The rear section of the casing houses a segmented slip-ring and two adjustable wiper arms in contact with the slip-rings and toroidal winding. The wiper arms, electrically insulated from each other, are adjusted vectorially by a gear mechanism mounted externally. Terminals 1 and 2 are connected to the wiper arms via the segmented slip-ring. After initial setting, the

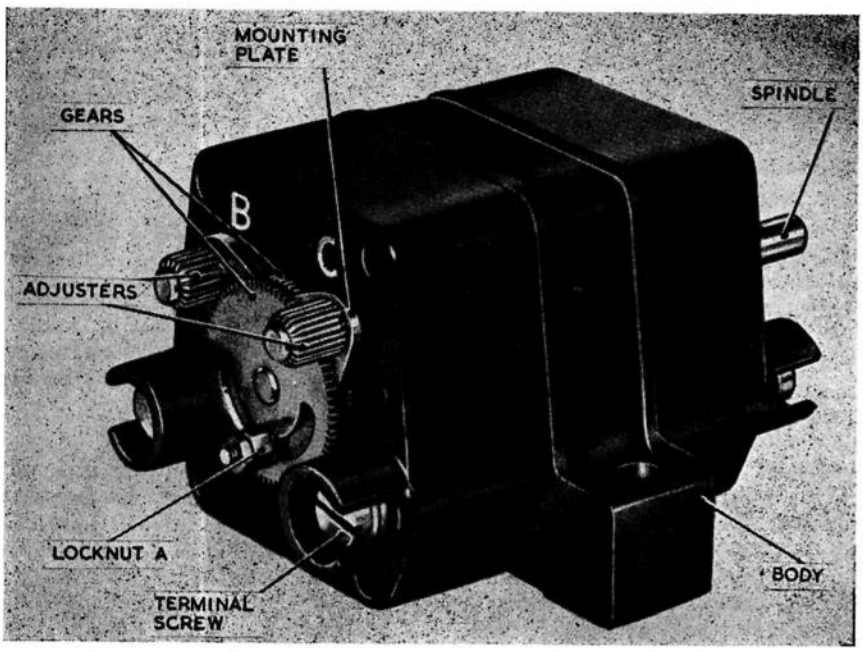

Fig. 1. Transmitter, S132, general view

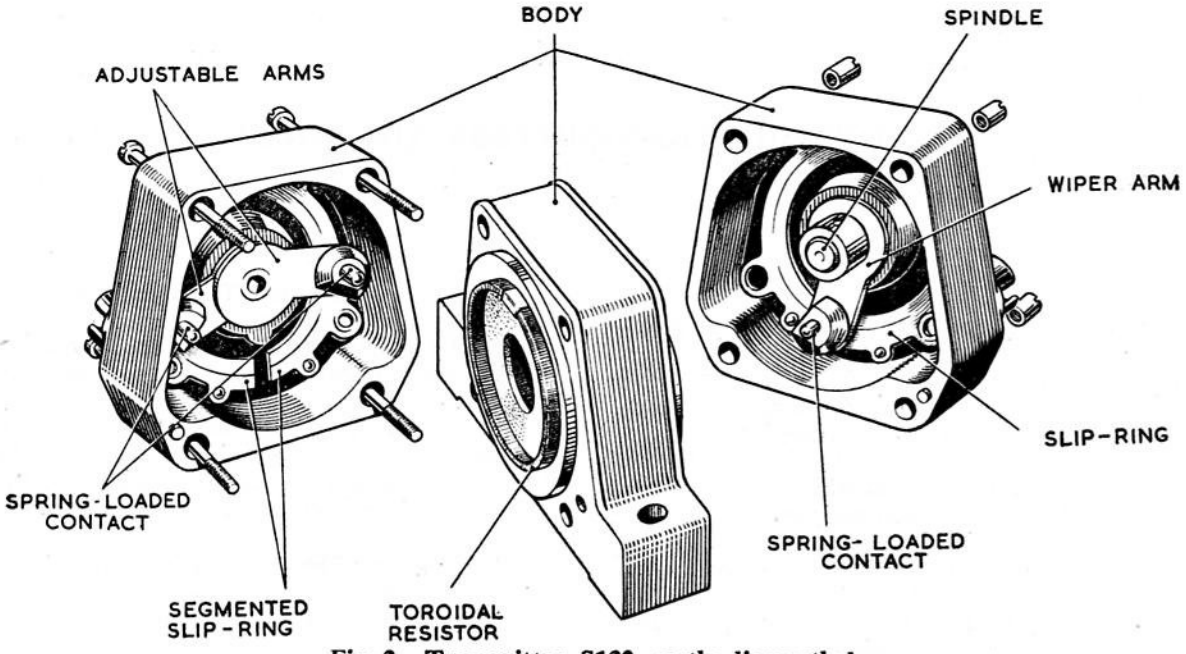

Fig. 2. Transmitter, S132, partly dismantled

positions of the wiper arms are locked by a nut and screw passing through the two gears.

6. To facilitate initial alignment, a datum point on the transmitter spindle may be aligned with an engraved marking on the transmitter body; in this position the wiper arm is centrally disposed to give maximum deflection in either direction.

Operation

7. Position transmitters may be used with either ratiometer type indicators or with indicators embodying normal moving coil ammeter movements. The operation of each system is separately described in the following para. 8 to 10.

Transmitter with ratiometer type indicator

8. A theoretical diagram of the transmitter connected to a ratiometer movement is shown in fig. 3. The transmitter spindle, operated by the aircraft control mechanism, rotates the wiper arm in contact with the toroidal resistance winding. This arm is connected to terminal No. 3, which is in turn connected to the aircraft negative supply. The two fixed arms, connected to terminals No. 1 and 2, also in contact with the resistance winding, complete the circuit to the moving coils of the indicator.

9. Thus, movement of the aircraft control mechanism produces unequal currents between terminals 1 and 3, and beween terminals 3 and 2 (fig. 3); the resulting change in current through the moving coils of the indicator cause deflection of the pointer proportional to control movement.

Transmitter with non-ratiometer type indicator

10. In this application (*fig.*4) terminal 3 is connected to the positive supply. With the wiper arm set at its electrical centre, the p.d. across each toroidal resistance arm will be equal, no pd. will exist across the moving coil of the associated indicator and the pointer will remain stationary. When the wiper arm is rotated by the aircraft control mechanism, a difference in potential will be created across the moving coil of the indicator and a current will flow. The direction of the current, and hence the direction of pointer deflection is determined by the direction of rotation of the wiper arm.

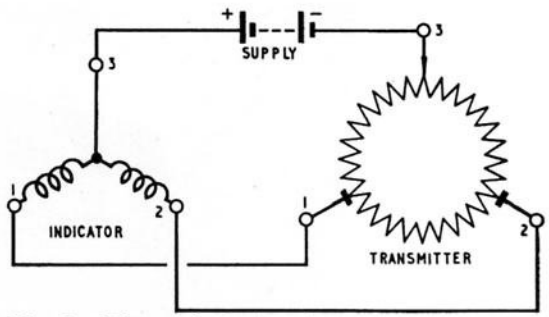

Fig. 3. Theoretical circuit of transmitter with ratiometer type indicator

Installation

11. The transmitter is secured in position by two 2 B.A. bolts; its operating spindle is connected to the aircraft control mechanism which it is required to simulate. When a new transmitter is installed, the operating spindle should be so connected that, with the aircraft control centralized, the pointer on the transmitter spindle is adjacent to the engraved marking on the transmitter body.

12. Having ensured that the electrical circuit is correctly connected, rotate the spindle over

its full travel in one direction and see that the indicator pointer moves in the required direction. To change direction of rotation, reverse the connections of leads 1 and 2.

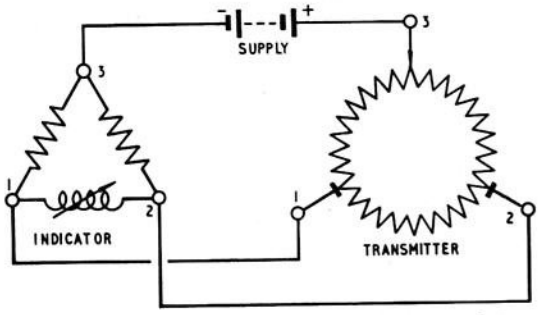

Fig. 4. Theoretical circuit of transmitter with non-ratiometer type indicator

13. After installation, the transmitter is ranged to the control movement by the adjustment of the gear mechanism at B and C (*fig.* 1); the procedure is described in the following sub-para :—

(1) Loosen locknut A, rotate control B fully clockwise and C fully counter-clockwise. With the aircraft control at its limit of travel, rotate B or C to bring the pointer of the associated indicator to the appropriate end scale position. Now move the aircraft control mechanism to the other limit and operate B or C until the indicator pointer coincides with the other end scale position.

(2) Repeat the operation, adjusting as required until the correct readings are obtained. Lock the gear mechanism at A.

(3) For positions other than end scale, details are given in the appropriate aircraft handbook. All adjustments involving aircraft controls should be effected in conjunction with the tradesmen concerned.

Servicing

14. Routine servicing of the transmitter should be confined to a periodical external examination for damage, cleanliness and security, including security of electrical connections. Particular attention should be given to the locknut A (*fig.* 1); if it has become loose and it is suspected that the positions of adjusters B and C have been altered, the transmitter must be realigned in accordance with the procedure detailed in para. 12.

Insulation test

15. For this test a 250-volt insulation resistance tester (Ref. No. 5G/152) is required. Test between each terminal and the spindle, and between each terminal and the two adjusting gears; the insulation resistance should not be less than 20 megohms for each test.

Transmitter variants

16. Basically, all S132 position transmitters are identical but minor variations exist between methods of electrical connection. Variants may be identified as follows :—

Transmitter	Ref. No.	Variation	Range
S132.1.11 } S132.1.13 }	6A/4102	3 4 B.A. terminal screws	30 to 330 deg.
S132.1.16	6A/7895	3, unified threaded terminal screws	30 to 330 deg.
S132.2.18	6A/8388	Terminals 1 and 3, 4BA Screws, terminal 2, 2BA Screw.	30 to 300 deg.

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