Chapter 1–0

TEMPERATURE INDICATORS, TYPE S63 SERIES

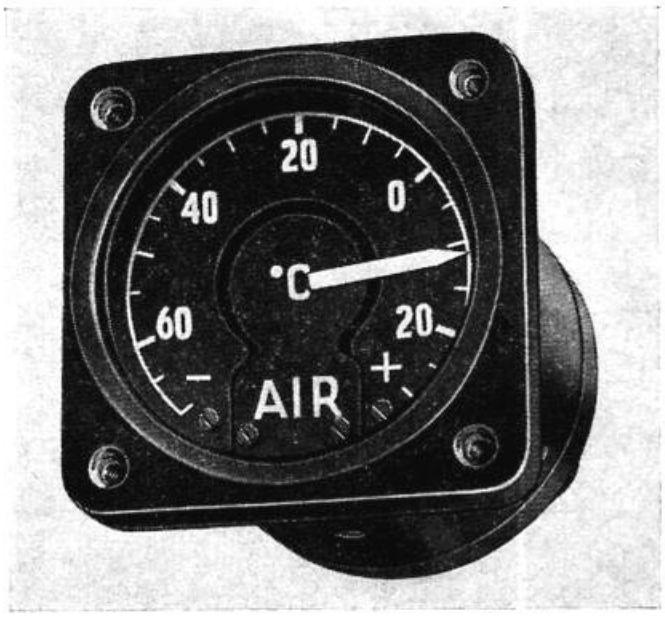


Fig. 1. Typical indicator

Introduction

1. The information contained within this chapter deals with basic Type S63 temperature indicators. Each instrument (*fig.* 1) has a manufacturer's code number which is made up of three parts. A typical code is S63.4.454 where S63 is the model number, .4 is the "form" (i.e. type of case etc.) and .454, the suffix number, represents the application to which the instrument is adapted.

2. A sub-chapter is given for each suffix number, and each contains information appertaining to dial presentation, testing and circuit details.

Principle

3. The principle employed in these indicators is that of the ratiometer, which measures the ratio of two currents. The magnetic circuits are so arranged that the field in the gap between the core and the pole-piece, in which the coils rotate, is not uniform. This non-uniformity is achieved by the shaping of the centre cores. Two coils mounted on a common former are connected so that the torques produced in each coil are in opposition.

4. Due to the shaping of the centre cores, the coil in which the greater current flows is in a weaker part of the field than that in which the lesser current flows. Therefore, the assembly will always rotate until the coils are in that part of the field where the torques produced in the coil are equal and opposite. In this position a state of equilibrium is reached.

5. Theoretically, the instrument is independent of the supply voltage, since any change in voltage will not alter the ratio of the currents in the two coils on the former. Assuming that the ligament which conduct the current into and out of the coils exert no controlling torque, then no change in indication will occur. In practice the ligaments exert a small torque, but this has little effect on the pointer. This type of indicator is required to operate with a maximum current of 40 mA which precludes the use of return springs for off-scale pointer position. To resolve this requirement an electro-magnet sweep-off mechanism is employed; a description of this mechanism is given in para. 13. The off-scale position may be at either end of the scale according to the dial presentation, and in this type of indicator there is no external adjustment for the zero position of the pointer.

DESCRIPTION

6. The indicator consists of the following main units:—

(1) Casing.

(2) Base.

(3) Rear cover.

(4) Magnet and movement assembly.

Casing

7. A moulded casing, which is complete with a mounting flange, having four tapped self locking inserts for mounting the indicator on the instrument panel of the aircraft, houses the indicator mechanism. The cover glass is inserted from the rear of the casing and is secured by a retaining ring held in place by Bostik cement. The casing is secured to the base by three screws disposed around the periphery, one screw is sealed.

Base

8. The base (*fig.* 2) on which is mounted four pillars, threaded, and accommodating nuts which secure the magnet and movement assembly, also supports four spool wound resistance windings which are connected as an Anderson bridge network, in series with the moving coils. The ohmic value of these spools vary with individual indicator calibration. In addition to the resistance spools, a limiting resistor is also provided and is connected in series with the positive supply.

Rear cover

9. Secured to the base by a centrally-disposed screw, the rear cover accommodates three shrouded terminal screws marked V+, R and RV— from which pass three leads to the base assembly. A projection and slot registers the base with the rear cover.

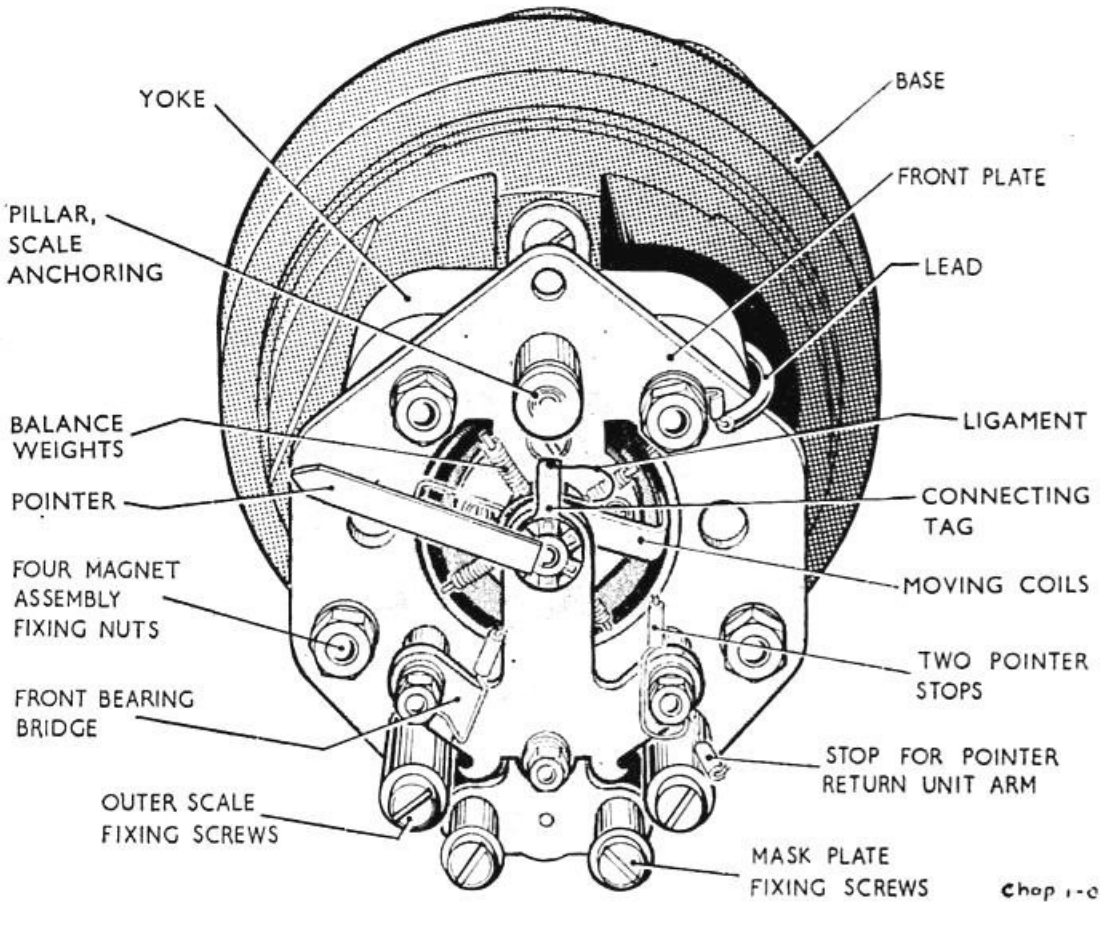


Fig. 2. Indicator movement, front view

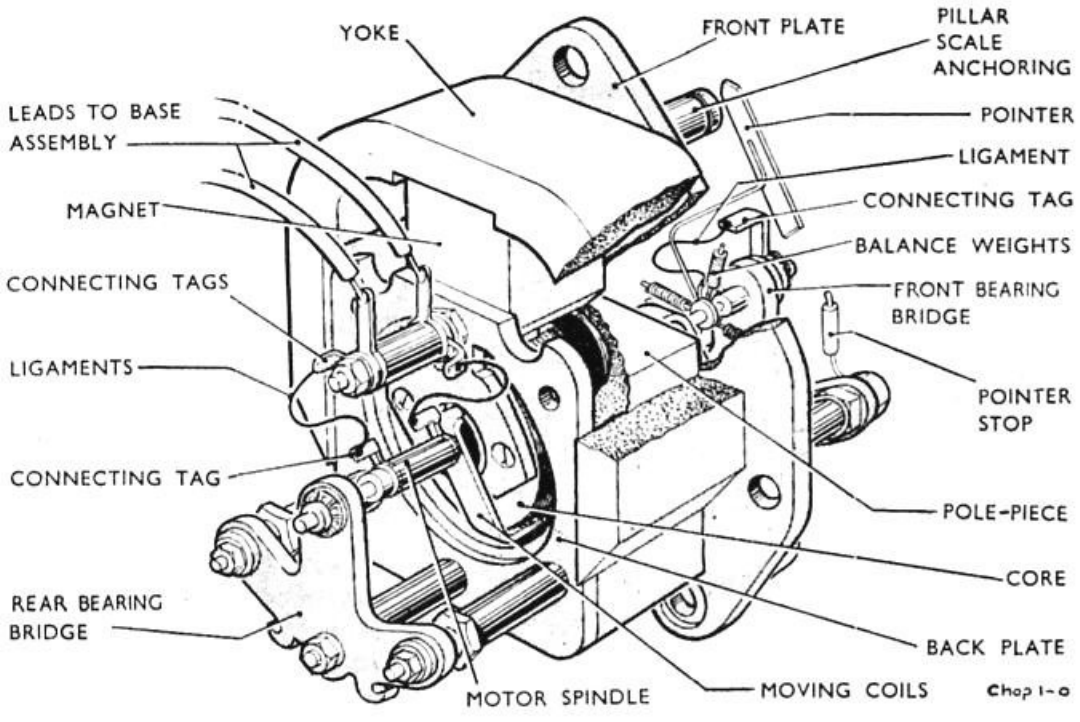


Fig. 3. Indicator movement, rear view

Magnet and movement assembly

10. This assembly (*fig.* 3) consists of a permanent magnet and yoke, two moving coils mounted on a common former, a rear bearing bridge, front bearing bridge and a pointer return unit. The block magnet, over which is fitted the U-shaped soft iron yoke, is of high field strength, the south pole face of the magnet being in contact with the yoke.

11. Each of the two bearing bridges are supported by three pillars secured to the soft iron pole piece. The coils are pivotally mounted between spring-loaded jewel screws located in the bridges. The pointer, attached to the coil former, is balanced by two weights and limit of travel is governed in both directions by spring stops set at approx. 0·07 in. beyond the scale limits.

12. The scale is secured in position by the pillar riveted to the front plate and also by two screws at the bottom of the scale. At the rear of the movement the current is transferred from the two leads to the moving coil by two ligaments; these ligaments exert a small torque which tends to return the pointer to zero when the applied voltage falls to zero. This torque is not sufficient however, and a pointer return unit is incorporated.

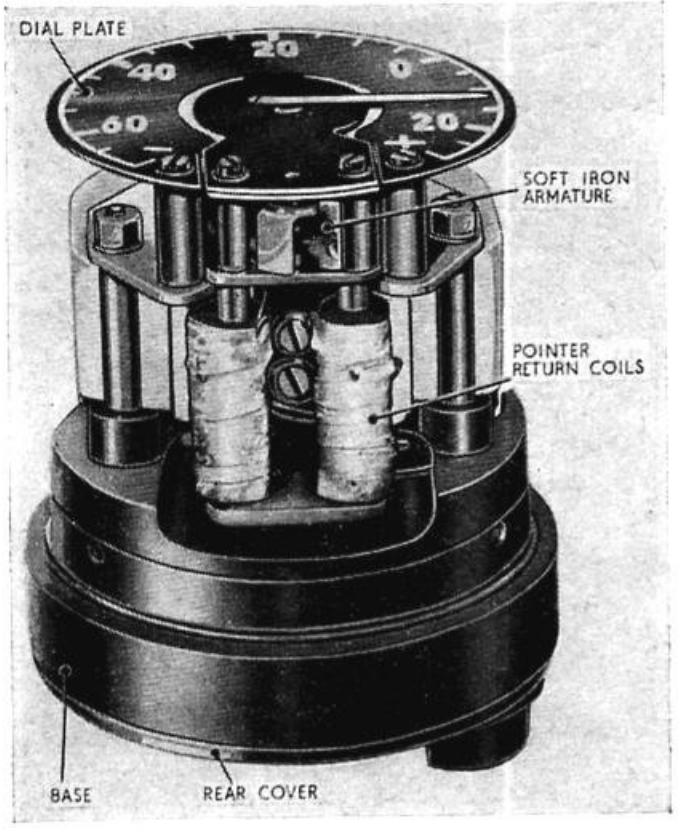


Fig. 4. Indicator movement, side view

13. The pointer return unit consists of an electro-magnetic device incorporating two iron cored coils (*fig.* 4), connected in parallel, and a soft iron armature. The pivoted armature is connected by quadrant and pinion gearing to a fine copper-beryllium arm which bears against the vertical arm of the pointer when the unit is de-energized.

14. When the indicator is energized, the coils of the pointer return unit provide a field which attract the armature thus withdrawing the copper-beryllium spring arm from contact with the pointer mechanism; the pointer is thus free to travel over the scale in response to current variations from temperature sensitive equipment. When the indicator is de-energized (no current flows) or the voltage falls to approx. 18 volts, the pointer is swept off the scale in a direction according to the application of the indicator.

Form

15. As stated in para. 1, the centre figure of the three part code number is the "form" or type of case and connections. The Type S63 temperature indicators have three forms viz:—4, 5 and 6, fig. 5.

(1) Form 4 has a small SAE casing $2\frac{5}{8}$ in. overall diameter measured across the face of the instrument, and $2\frac{15}{16}$ in. in length. The connections consist of four 4 BA terminal screws.

(2) Form 5 has a large SAE casing $3\frac{1}{4}$ in. overall diameter measured across the face of the instrument, and is $3\frac{1}{4}$ in. in length. Connections are made by means of a Mk. 4 plug or a 6-way, 4 BA, terminal block according to the application of the instrument.

(3) Form 6 also has a large SAE casing but the length of the case is approx. $4\frac{5}{8}$ in. Connections are made by means of a Mk. 4 plug or a 6-way terminal block according to the application of the instrument.

Suffix number

16. The suffix number represents the instrument application; each instrument will have a different number if used for more than one purpose. The relevant information is contained in the sub-chapters. It should be noted that where indicators have been provided by the aircraft contractor, the relevant spare indicator provided by Service Stores will bear a different suffix number. Both suffix numbers for interchangeable indicators are shown in the list of chapters.

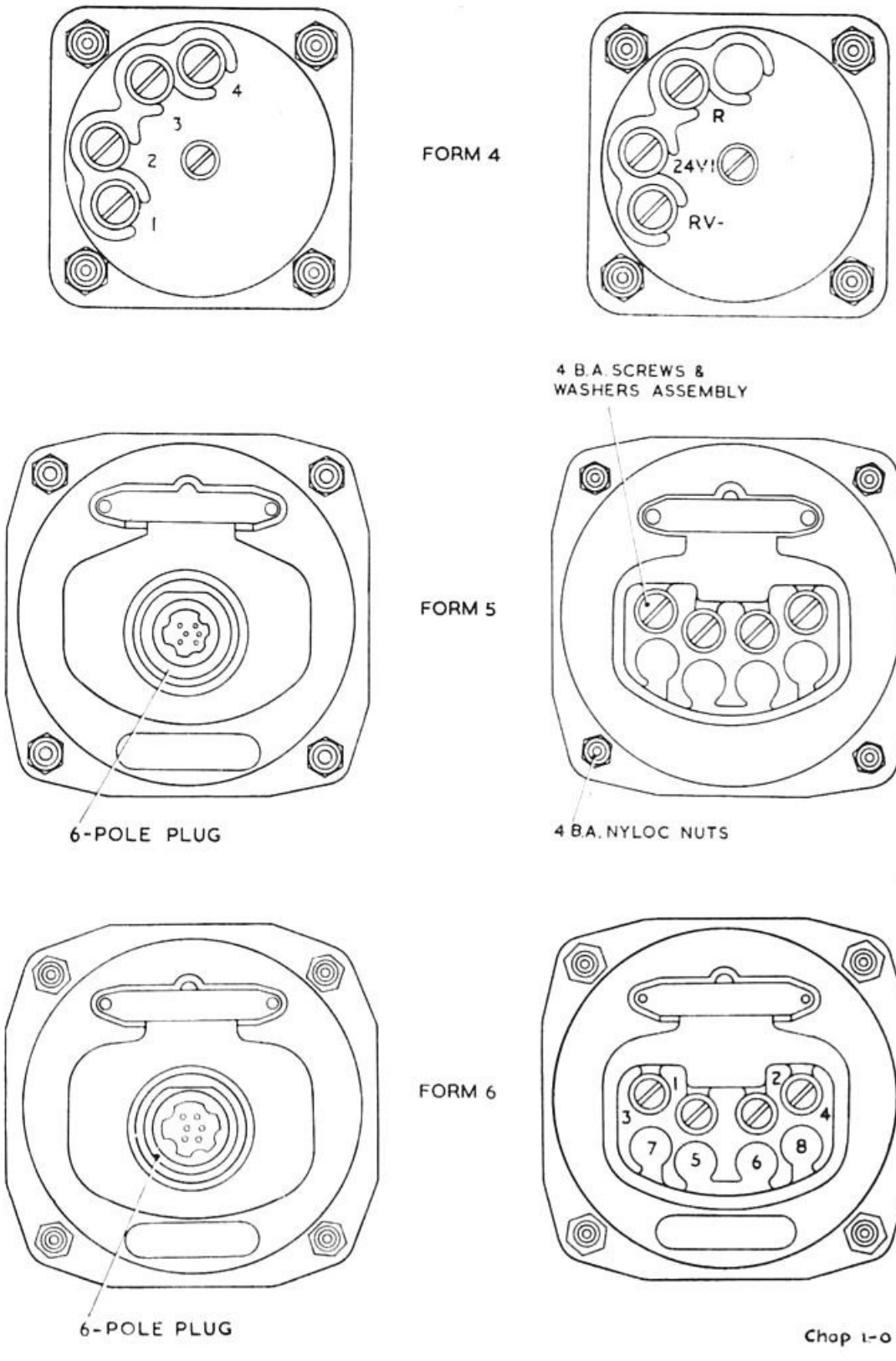


Fig. 5. 'Form' details

Chapter 1-1

STANDARD SERVICEABILITY TEST FOR TEMPERATURE INDICATORS, TYPE S63 SERIES

Introduction

1. The following tests must be made on indicators, Type S63 (temperature indicators) immediately prior to installation in an aircraft and at any time that serviceability is suspect.

TEST EQUIPMENT

2. The following equipment is required:—

(1) Tester, insulation resistance, Type C (Ref. No. 5G/152).

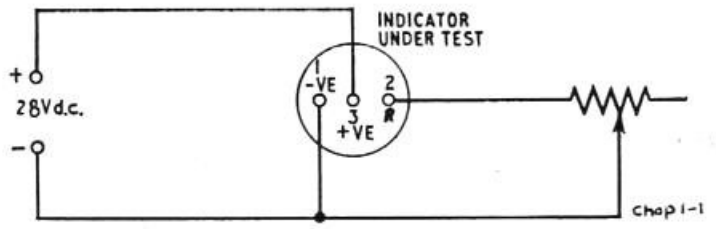
(2) Boxes, Cambridge resistance, 111110 ohms (Ref. No. 10S/16237).

(3) 28V d.c. supply.

TESTS

Insulation resistance test

3. Test the insulation resistance by connecting the Tester insulation resistance Type C between each terminal and the indicator casing. Insulation resistance to be not less than 20 megohms.



Functional test

4. (1) Set the Cambridge resistance box to the lowest value given in the relevant Chapter for the indicator under test.

(2) Connect the equipment in circuit as shown in fig. 1.

(3) Compare the indicator pointer reading, for given resistance value, with that specified in the appropriate Chapter for the indicator under test.

(4) Test the indicator at all the cardinal points on the scale both ascending and descending. Accuracy to be in accordance with that specified in the appropriate Chapter for the indicator under test.

General

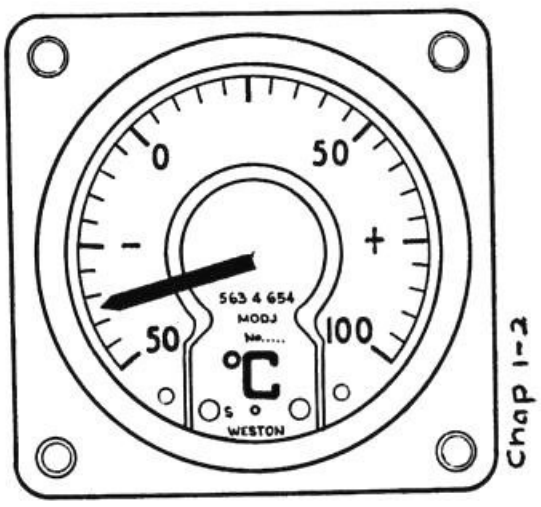
5. Light tapping of the indicator is permissible prior to taking readings.

Chapter 1–2

INDICATOR, TYPE S63.4.654 or 887

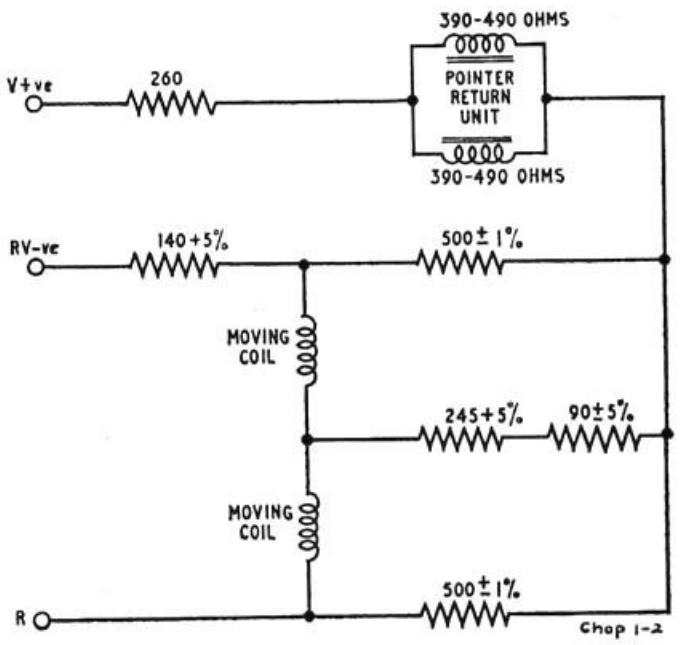
Dial presentation

1. These indicators (Ref. No. 6A/5307) are calibrated in degrees C from −50 to +100; indicators are controlled by variation of temperature in a resistance bulb which obeys a platinum law.



Circuit and connections

2. The circuit diagram is shown in fig. 2 and connection to the indicator is made via three terminal screws.



Testing

3. When testing this indicator for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Calibration values

Scale reading (deg. C)	Resistance (ohms)
−50	104·47
−40	109·69
−30	114·89
−20	120·08
−10	125·25
0	130·40
+10	135·54
+20	140·66
+30	145·77
+40	150·86
+50	155·94
+60	161·00
+70	166·05
+80	171·08
+90	176·10
+100	181·10

Accuracy to be within 2 per cent of full-scale deflection.

General information

4. These indicators bear the inscription MOD J which designates that it has a special pole-piece.

Chapter 1–3

INDICATOR, TYPE S63.4.385 or 811

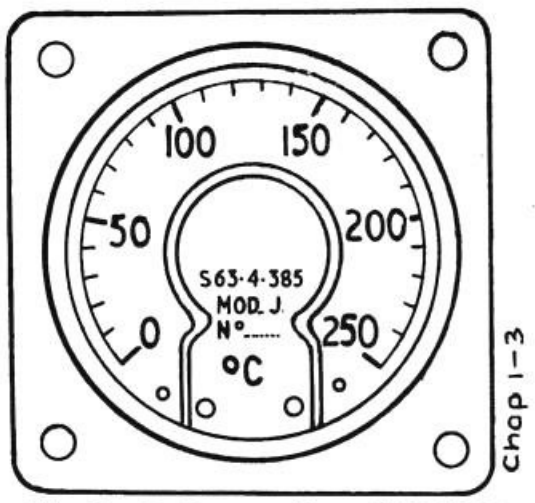


Fig. 1. Indicator, Type S63.4.385

Dial presentation

1. This indicator (Ref. No. 6A/4703) (*fig.* 1) is calibrated in degrees C from 0 to 250; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

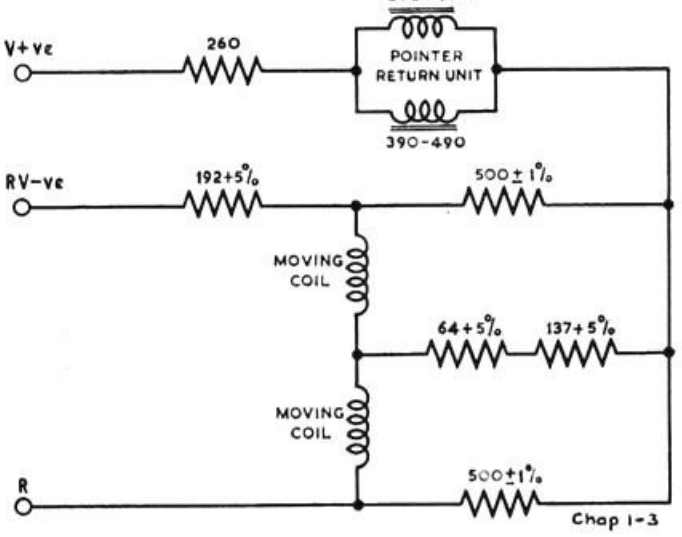


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections are made via three terminal screws V+, RV— and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
0	130·40
50	155·94
100	181·10
150	205·88
200	230·28
250	254·31

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–4

INDICATOR, TYPE S63.4.386 or 901 or 502

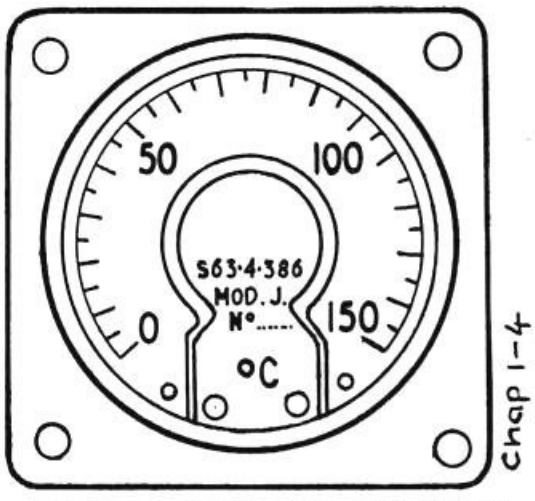


Fig. 1. Indicator, Type S63.4.386

Dial presentation

1. This indicator (Ref. No. 6A/4701) (*fig.* 1) is calibrated in degrees C from 0 to 150; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

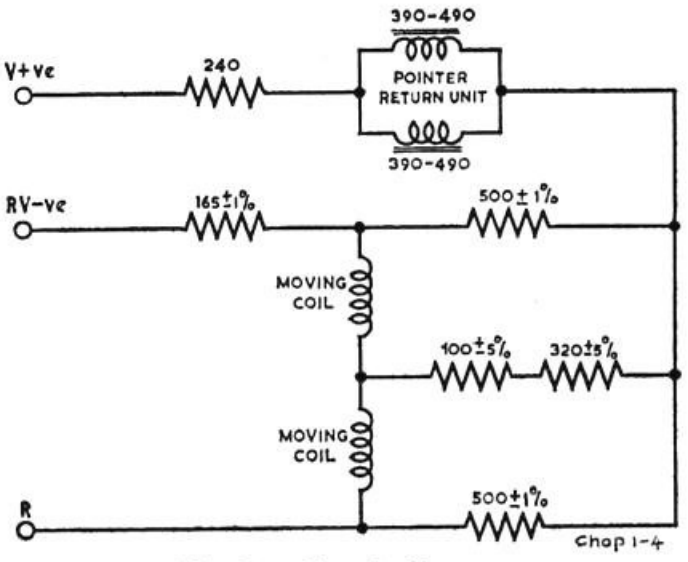


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
0	130·40
50	155·94
100	181·10
150	205·88

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–5

INDICATOR, TYPE S63.5.388 or 872 or 366

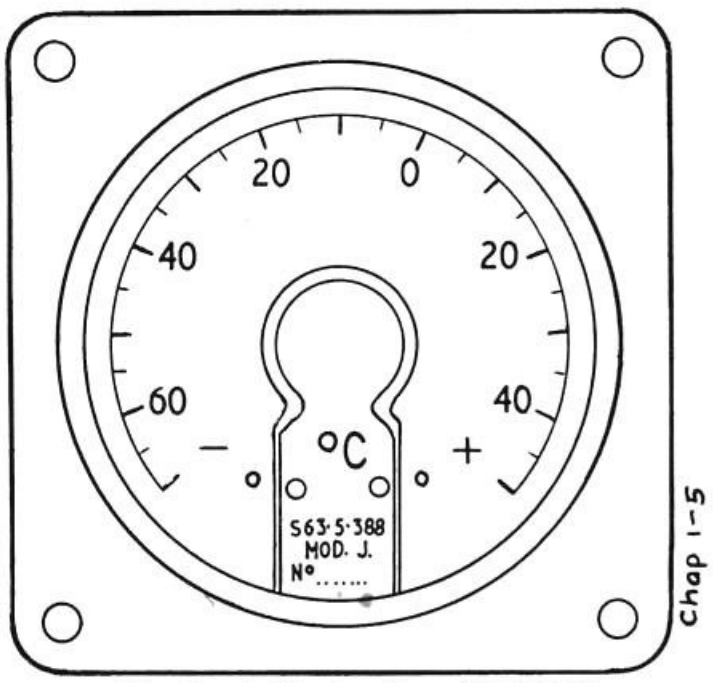


Fig. 1. Indicator, Type S63.5.388

Dial presentation

1. This indicator (Ref. No. 6A/4697) (*fig.* 1) is calibrated in degrees C from −70 to +50; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

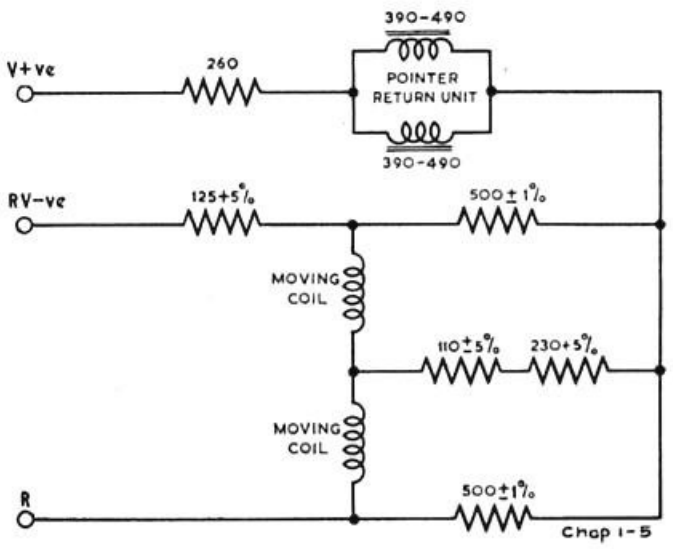


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

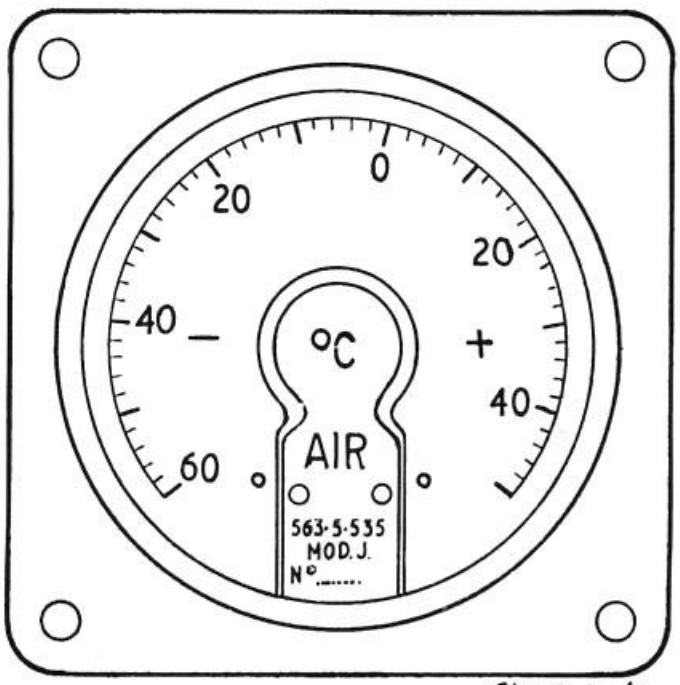
Temperature (deg. C)	Resistance (ohms)
−70	93·98
−60	99·23
−40	109·69
−20	120·08
0	130·40
+20	140·66
+40	150·86
+50	155·94

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–6

INDICATOR, TYPE S63.5.535 or 859 or 834 or 4.747



Chap 1-6

Fig. 1. Indicator, Type S63.5.535

Dial presentation

1. This indicator (Ref. No. 6A/7117) (*fig.* 1) is calibrated in degrees C from −60 to +50; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

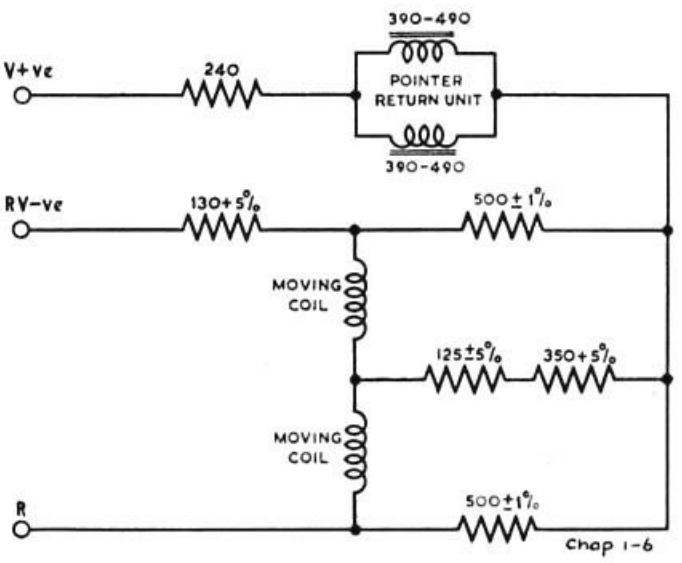


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−60	99·23
−40	109·69
−20	120·08
0	130·40
+20	140·66
+40	150·86
+50	155·94

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–7

INDICATOR, TYPE S63.4.591

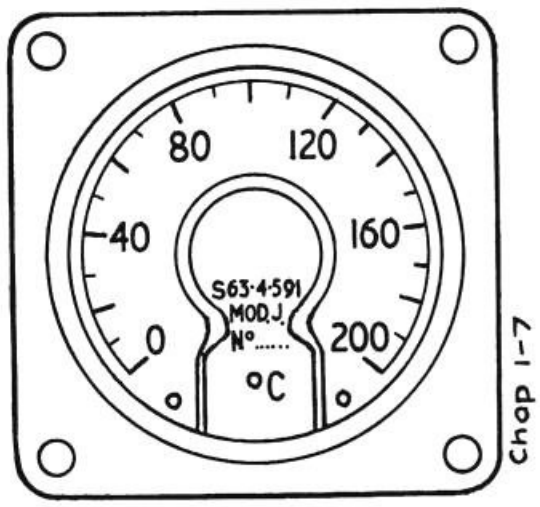


Fig. 1. Indicator, Type S63.4.591

Dial presentation

1. This indicator (Ref. No. 6A/3927) (*fig.* 1) is calibrated in degrees C from 0 to 200; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

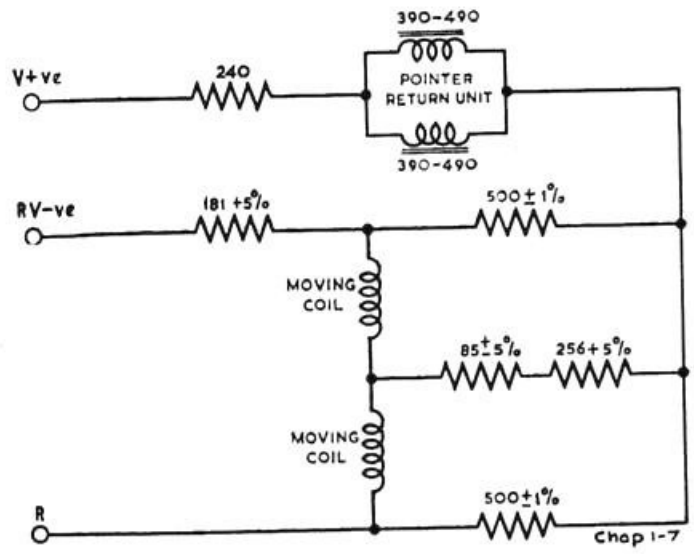


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
0	130·40
40	150·86
80	171·08
120	191·06
160	210·79
200	230·28

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–8

INDICATOR, TYPE S63.4.676

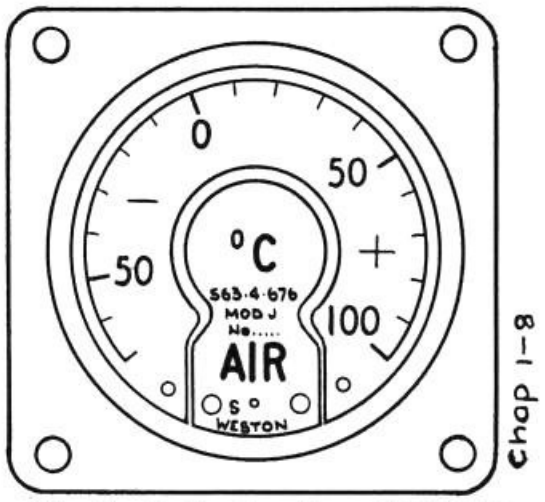


Fig. 1. Indicator, Type S63.4.676

Dial presentation

1. This indicator (Ref. No. 6A/3303) (*fig.* 1) is calibrated in degrees C from −70 to +100; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

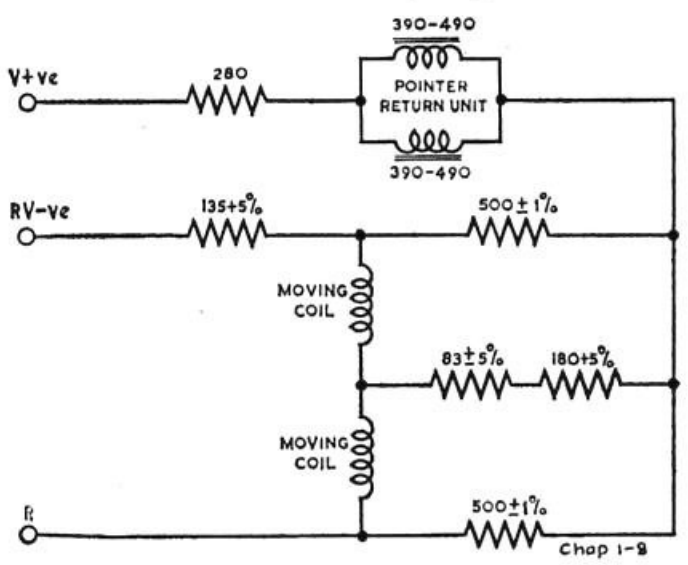


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−70	93·98
−50	104·47
0	130·40
+50	155·94
+100	181·10

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–9

INDICATOR, TYPE S63.5.530

DIAL PRESENTATION

1. This temperature indicator (Ref. No. 6A/3681) (fig. 1) is calibrated in degrees C from −80 to +80; the indicator is controlled by the variation of resistance with temperature of a resistance thermometer element which obeys a platinum law.

2. The dial figures, cardinals and caption °C are fluorized on a matt-black background; the lance pointer is also fluorized.

CIRCUIT AND CONNECTIONS

3. The combined test and indicator circuit is shown in Fig. 2 and connection to the indicator is made via three terminal screws, 1, 2 and 3, which are shrouded and secured to the base of the indicator.

TESTING

4. When testing these indicators for serviceability, the SST given in Chapter 1–1 must be used, but connect two, decade resistance boxes in parallel as shown in fig. 2, and use the calibration values given overleaf in Table 1.

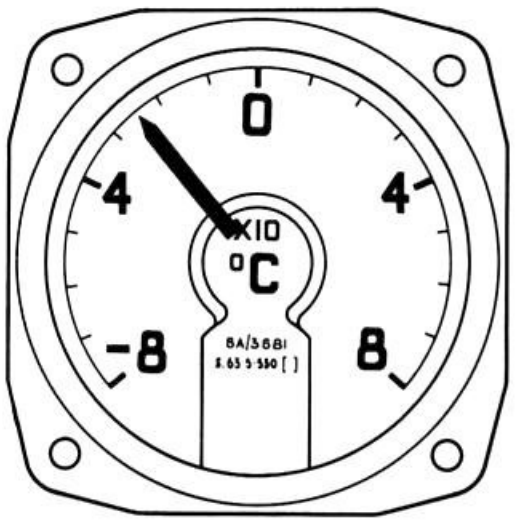


Fig. 1. Indicator, Type S63.5.530

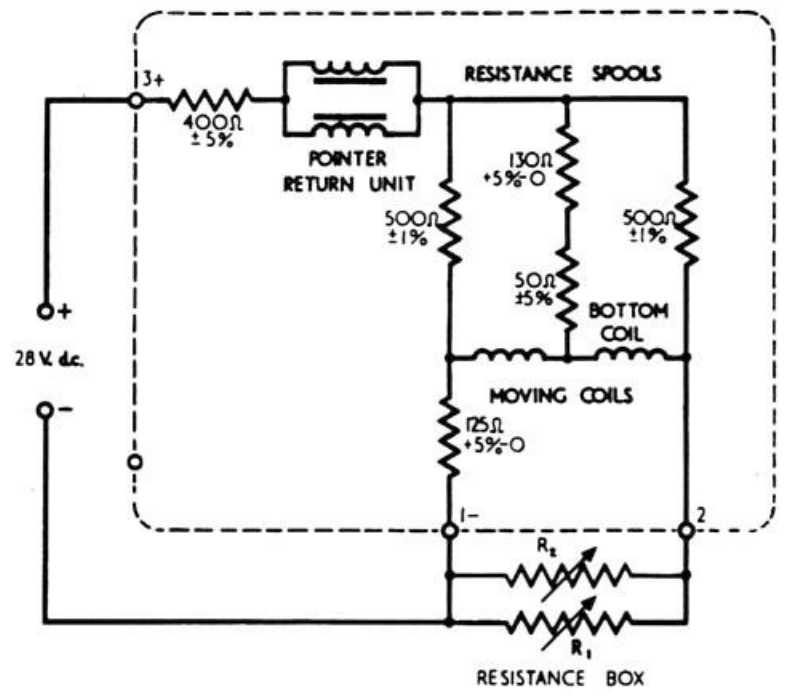


Fig. 2. Circuit and test circuit

GENERAL INFORMATION

5. (1) When the indicator is unenergised its pointer is deflected clear of the scale in a clockwise direction, which is contrary to normal practice.

(2) Maximum current of indicator circuit at mid-scale and 26V d.c. is 40 mA.

TABLE 1

Calibration values

Resistance (ohms)		Indicator °C	
R1	R2	Tolerance	Nominal
89	26314	−83 to −77	−80
100	12400	−63 to −57	−60
110	40223	−43 to −37	−40
121	16147	−23 to −17	−20
131	28470	− 3 to 3	0
142	15368	17 to 23	20
152	20852	37 to 43	40
162	26082	57 to 63	60
172	32699	77 to 83	80

Chapter 1–10

INDICATORS, TYPE S63.4.731

Dial presentation

1. This indicator (Ref. No. N.I.V.) (*fig.*1) is calibrated in degrees C from −60 to +50; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−60	99·20
−50	104·50
−40	109·70
−30	114·90
−20	120·10
−10	125·20
00	130·40
+10	135·50
20	140·70
30	145·80
40	150·90
50	155·90

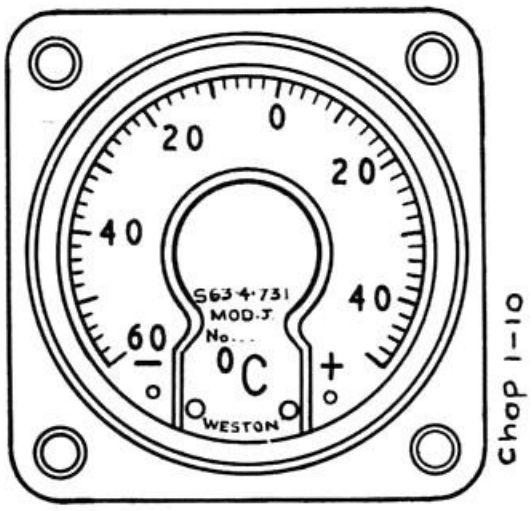


Fig. 1. Indicator, Type S63.4.731

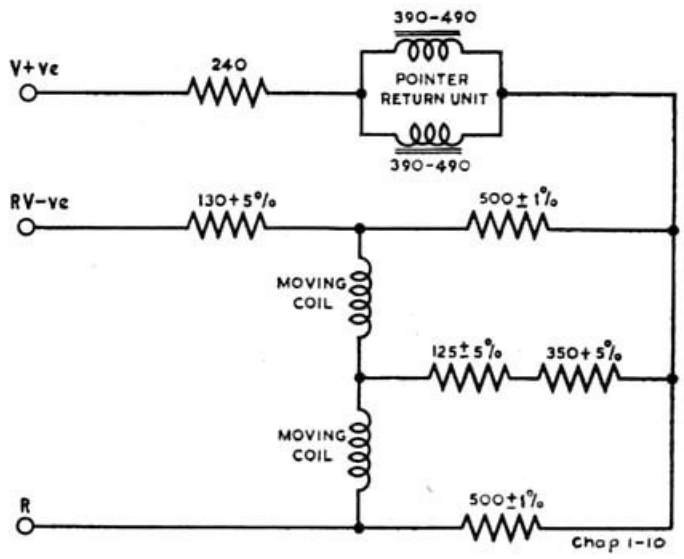


Fig. 2. Circuit diagram

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–11

INDICATORS, TYPE S63.4.454 or 112 or 400

Dial presentation

1. This indicator (Ref. No. 6A/2769) (*fig.* 1) is calibrated in degrees C from —70 to +30; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV— and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

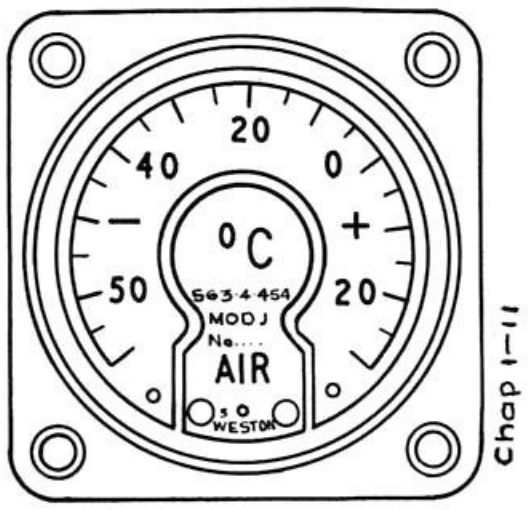


Fig. 1. Indicator, Type S63.4.454

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
—70	94·00
—60	99·20
—50	104·50
—40	109·70
—30	114·90
—20	120·10
—10	125·20
00	130·40
+10	135·50
20	140·70
30	145·80

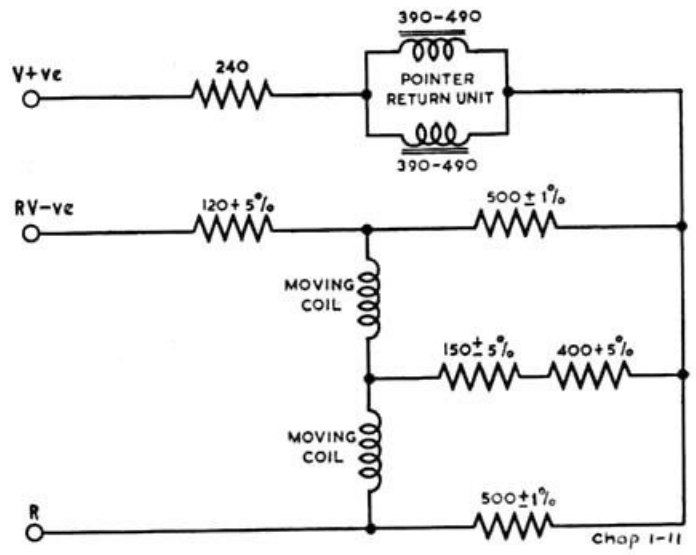


Fig. 2. Circuit diagram

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–12

INDICATORS, TYPE S63.4.379

Dial presentation

1. This indicator (Ref. No. 6A/5896) (*fig.* 1) is calibrated in degrees C from 0 to 100; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

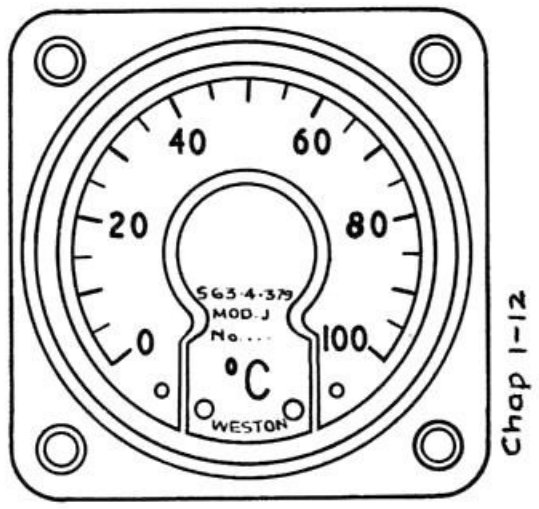


Fig. 1. Indicator, Type S63.4.379

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

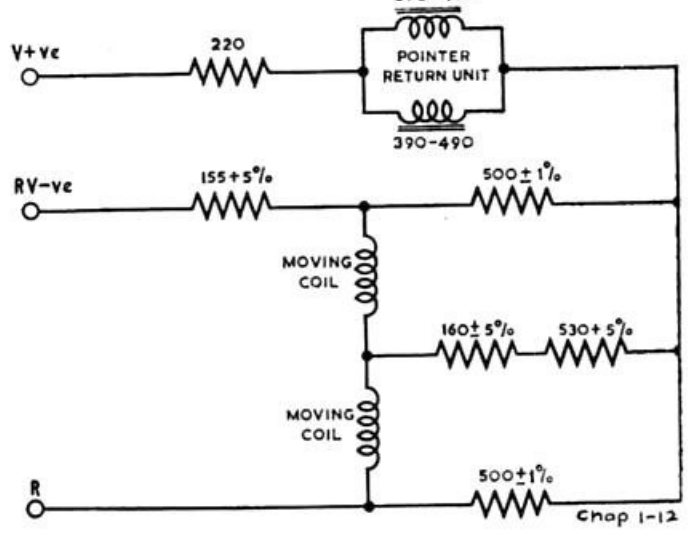


Fig. 2. Circuit diagram

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
0	130·40
20	140·70
40	150·90
60	161·00
80	171·10
100	181·10

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–13

INDICATORS, TYPE S63.4.371 or 881

Dial presentation

1. This indicator (Ref. No. N.I.V.) (*fig.* 1) is calibrated in degrees C from −70 to +60; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

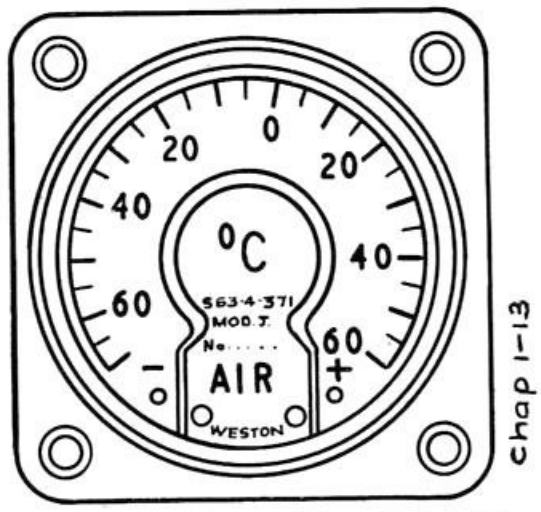


Fig. 1. Indicator, Type S63.4.371

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

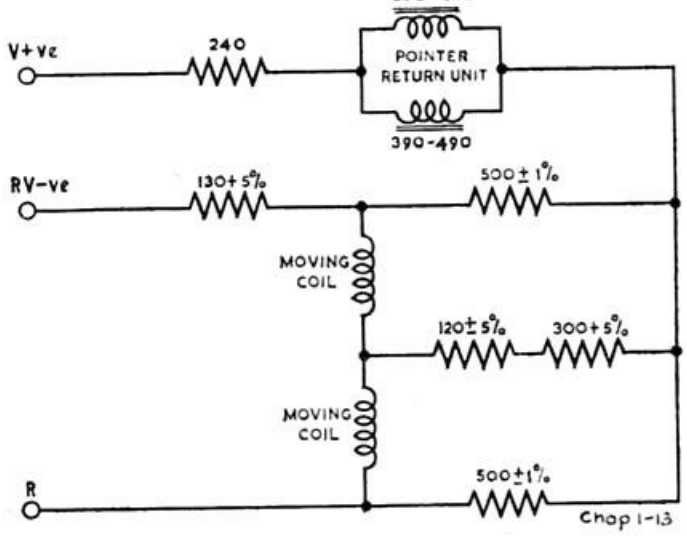


Fig. 2. Circuit diagram

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−70	93·90
−60	99·30
−40	109·70
−20	120·10
00	130·40
+20	140·70
40	150·90
60	161·00

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–14

INDICATORS, TYPE S63.5.668 or 802

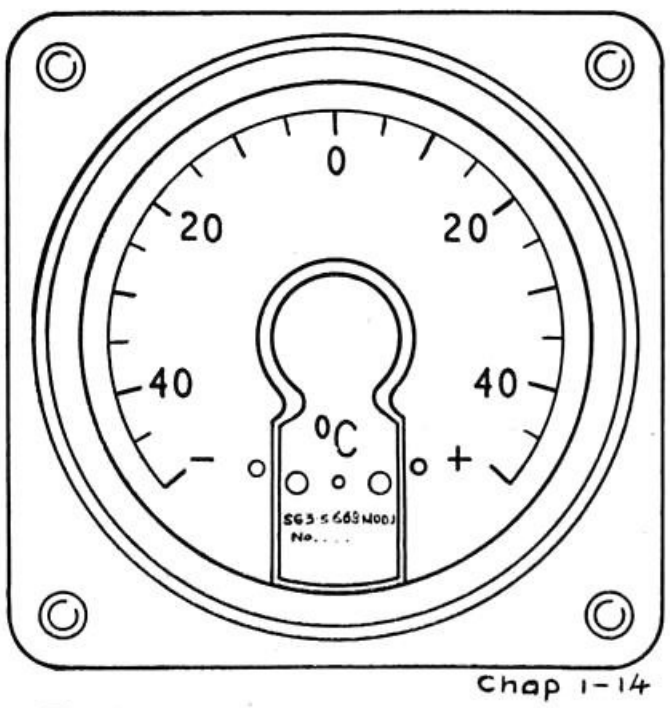


Fig. 1. Indicator, Type S63.5.668 or 802

Dial presentation

1. This indicator (Ref. No. 6A/4800) (*fig.* 1) is calibrated in degrees C from −50 to +50; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

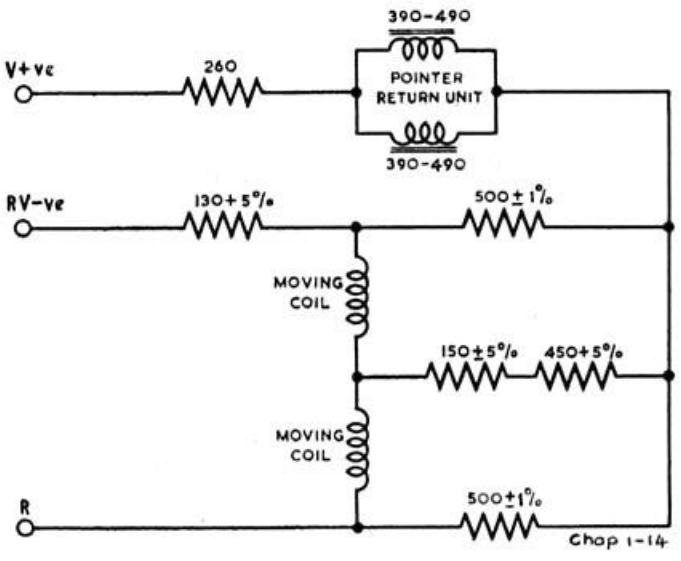


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV— and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−50	104·50
−40	109·70
−20	120·10
00	130·40
+20	140·70
40	150·90
50	155·90

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–15

INDICATORS, TYPE S63.4.482

Dial presentation

1. This indicator (Ref. No. N.I.V.) (*fig.* 1) is calibrated in degrees C from 0 to 200; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

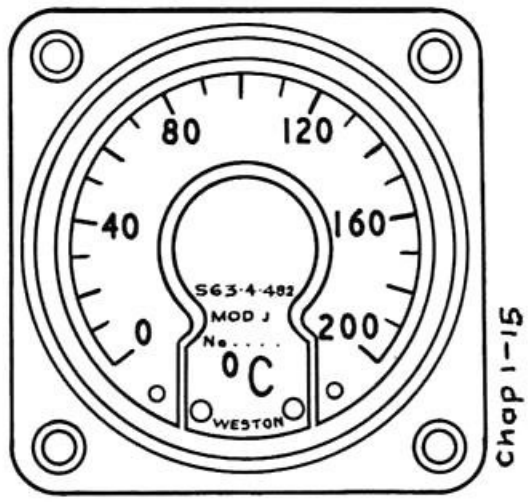


Fig. 1. Indicator, Type S63.4.482

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV— and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
0	130·40
40	150·90
80	171·10
120	191·10
160	210·80
200	230·30

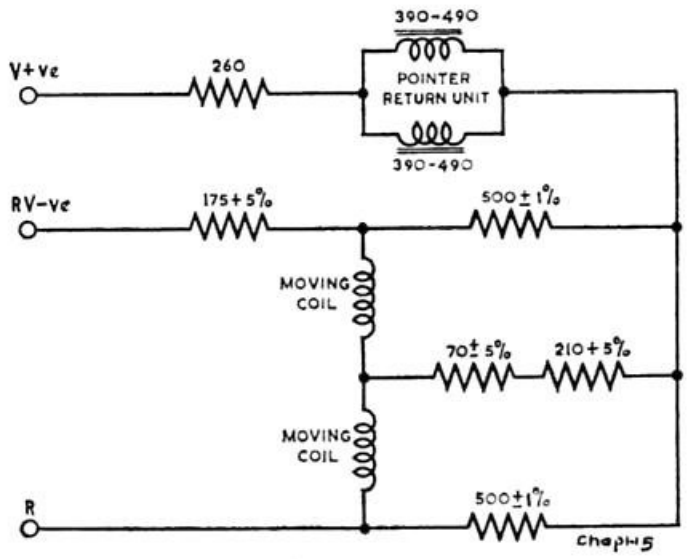


Fig. 2. Circuit diagram

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–16

INDICATOR, TYPE S63.5.185

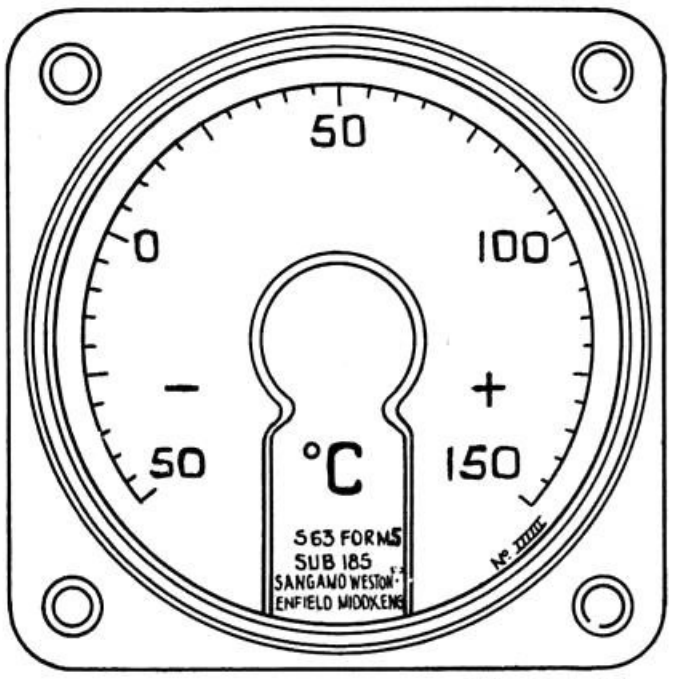


Fig. 1. Indicator, Type S63.5.185

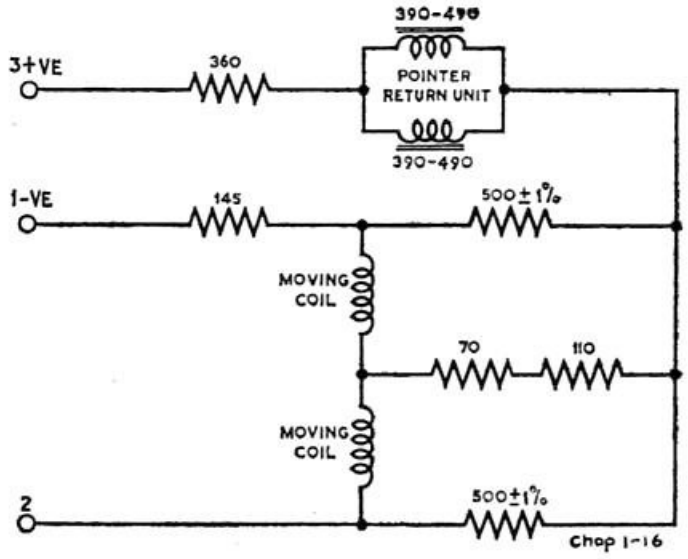


Fig. 2. Circuit diagram

Dial presentation

1. The indicator (*fig.* 1), Ref. No. 6A/N.I.V. is calibrated in degrees C from −50 to +150; the indicator is controlled by variation of temperature in a resistance bulb, which obeys a non-standard law.

Circuit and connections

2. The circuit is shown in fig. 2 and connections to the indicator are made via three terminal screws.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
−50	86·2
−30	95·0
−10	104·2
0	109·2
+10	114·7
30	125·2
50	136·7
70	148·2
90	160·2
110	173·3
130	186·7
150	201·2

Chapter 1–17

INDICATOR, TYPE S63.4.848 or 748

Dial presentation

1. This indicator (Ref. No. 6A/5082) (*fig.* 1) is calibrated in degrees C from −60 to +50; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

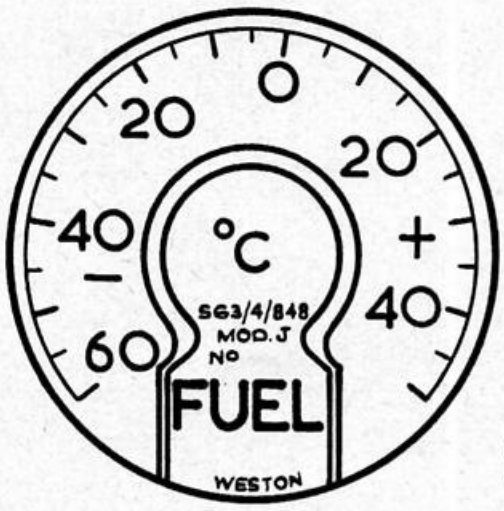


Fig. 1. Indicator, Type S63.4.848

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

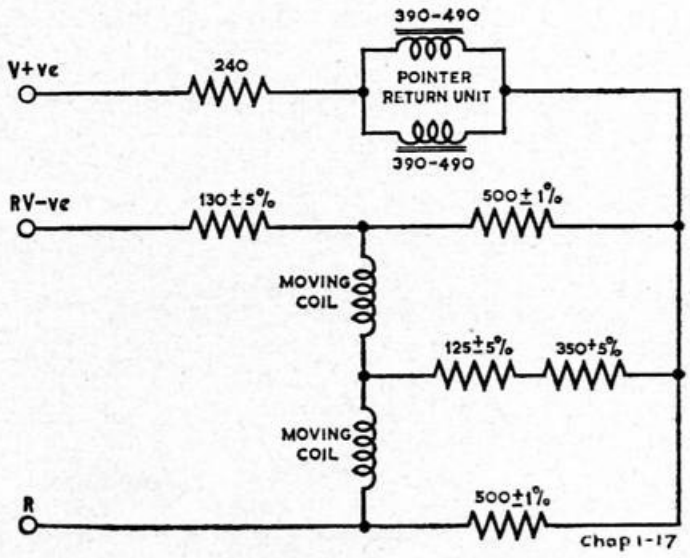


Fig. 2. Circuit diagram

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
−60	99·2
−40	109·7
−20	120·1
0	130·4
+20	140·7
40	150·9
50	155·9

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–18

INDICATOR, TYPE S63.4.642

Dial presentation

1. This indicator (Ref. No. 6A/5218) (*fig.* 1) is calibrated in degrees C from −30 to +70; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

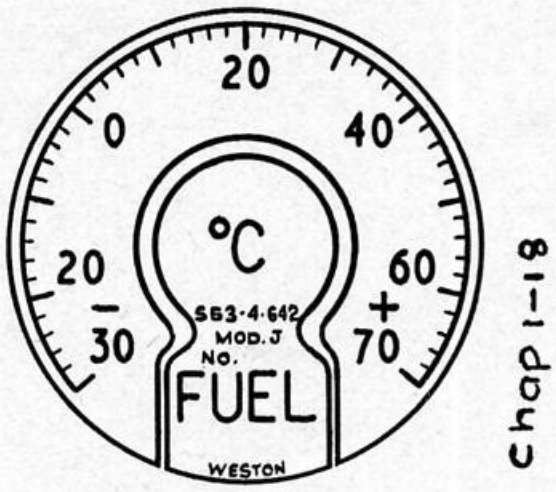


Fig. 1. Indicator, Type S63.4.642

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

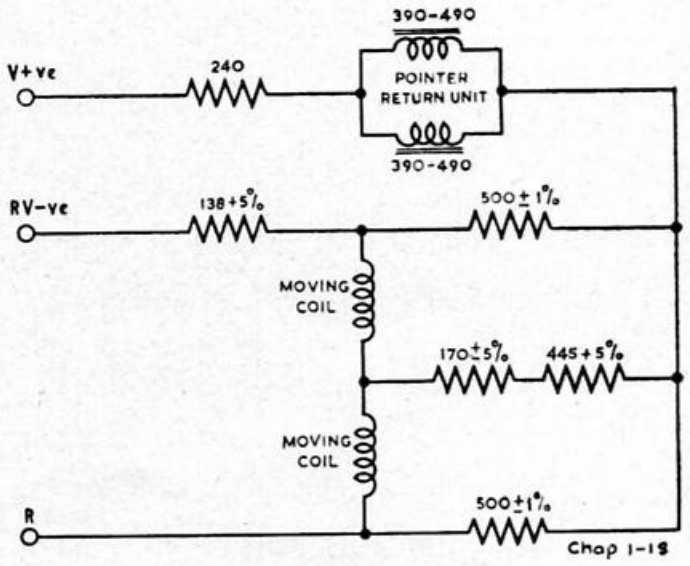


Fig. 2. Circuit diagram

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
−30	114·9
−20	120·1
−10	125·2
0	130·4
+10	135·5
20	140·7
30	145·8
40	150·9
50	155·9
60	161·0
70	166·0

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–19

INDICATOR, TYPE S63.4.1032

Dial presentation

1. This indicator, (Ref. No. 6A/6569) (*fig.* 1), is calibrated in degrees C from −20 to +80; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

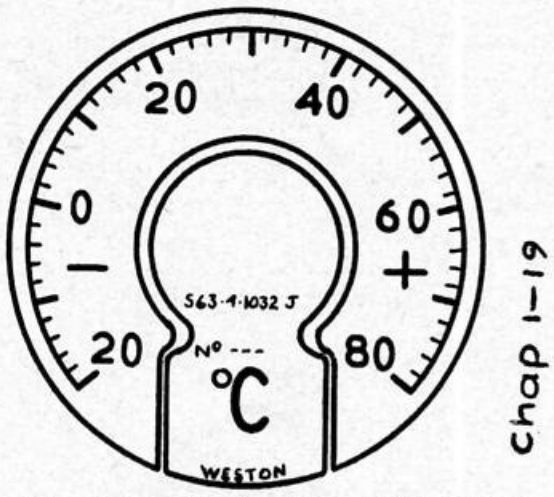


Fig. 1. Indicator, Type S63.4.1032

Circuit and connections

2. The circuit diagram is shown in fig. 2, and connections are made via three terminal screws V+ve, RV−ve and R.

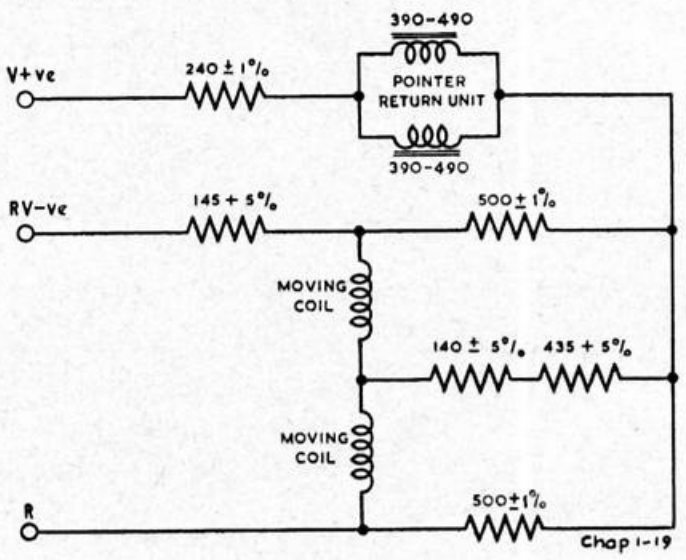


Fig. 2. Circuit diagram

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−20	120·10
−10	125·20
0	130·40
+20	140·70
40	150·90
60	161·00
80	171·10

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–20

INDICATOR, TYPE S63.4.532

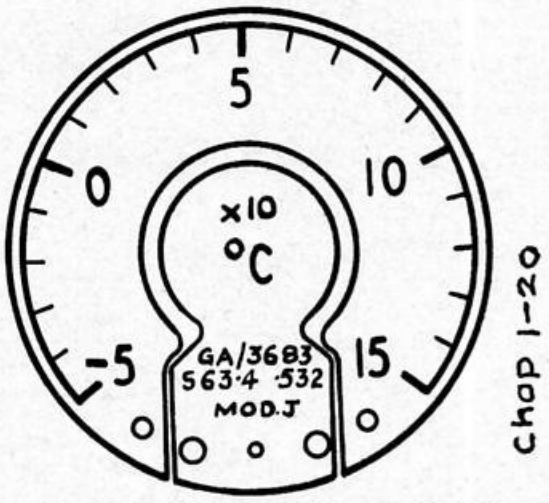


Fig. 1. Indicator, Type S63.4.532

Dial presentation

1. This indicator (*fig.* 1) (Ref. No. 6A/3683) is calibrated in degrees C from −50 to +150; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

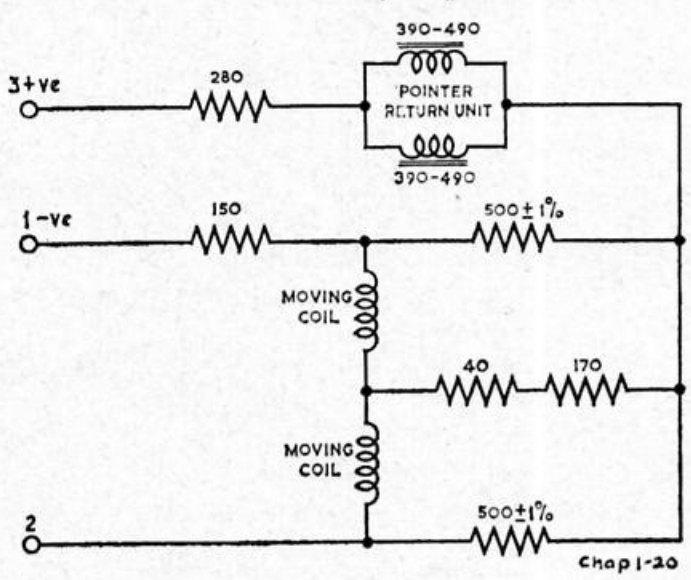


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2, and connections to the indicator are made via 3 terminal screws.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
−50	104·5
0	130·4
+50	155·9
100	181·1
150	205·9

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–21

INDICATOR, TYPE S63.4.494

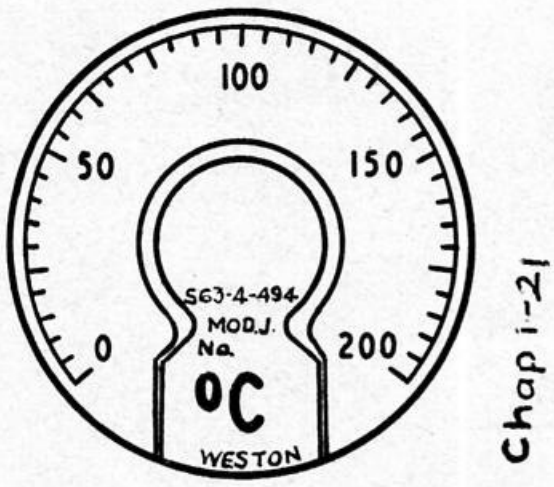


Fig. 1. Indicator, Type S63.4.494

Dial presentation

1. This indicator (Ref. No. 6A/7135) (*fig.* 1) is calibrated in degrees C from 0 to 200; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

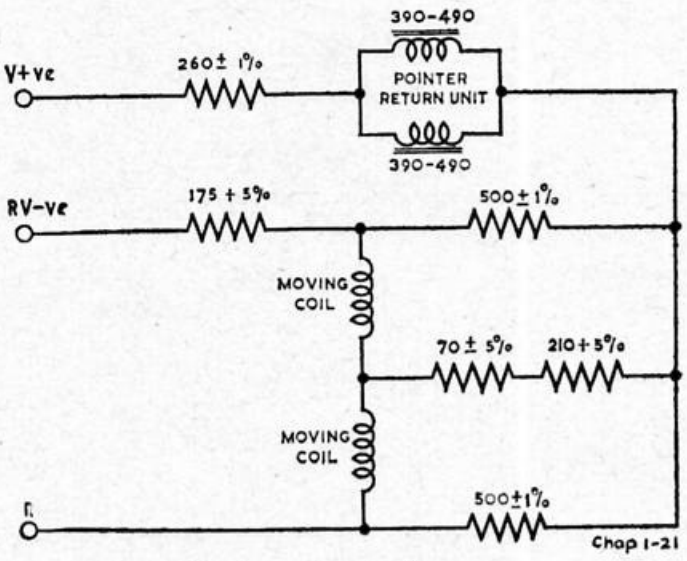


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections are made via three terminal screws V+ve, RV−ve and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
0	130·4
50	155·94
100	181·10
150	205·88
200	230·3

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–22

INDICATOR, TYPE S63.4.496

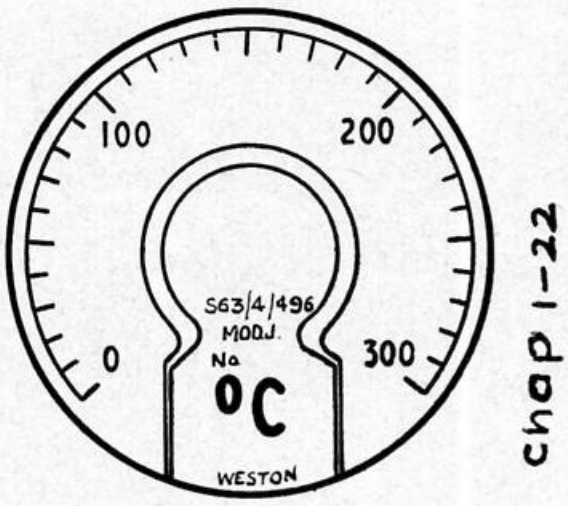


Fig. 1. Indicator, Type S63.4.496

Dial presentation

1. This indicator (Ref. No. 6A/7130) (*fig.* 1) is calibrated in degrees C from 0 to 300; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

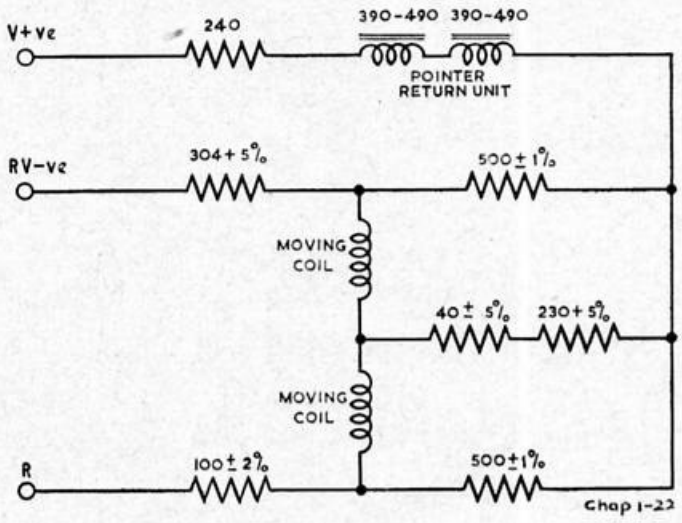


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections are made via three terminal screws V+ve, RV—ve and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
0	130·4
50	155·9
100	181·1
150	205·9
200	230·3
250	254·3
300	278·0

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–23

INDICATOR, TYPE S63.4.696

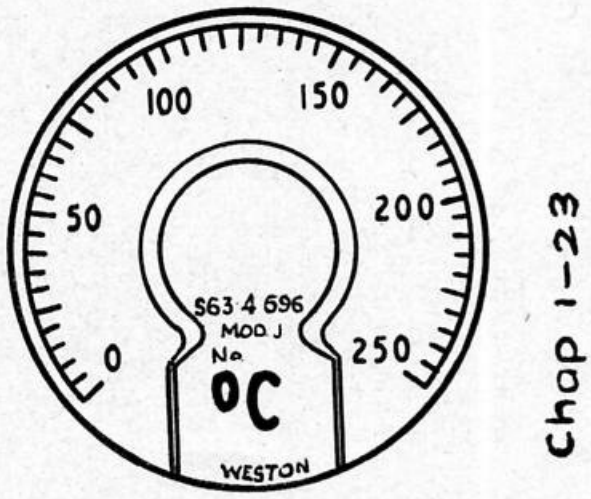


Fig. 1. Indicator, Type S63.4.696

Dial presentation

1. This indicator (Ref. No. 6A/7131) (*fig.* 1) is calibrated in degrees C from 0 to 250; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

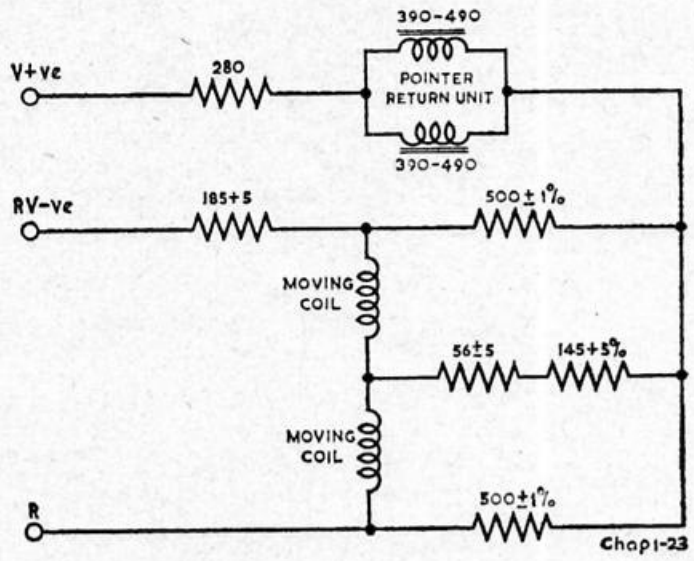


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections are made via three terminal screws V+ve, RV−ve and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Calibration values

Temperature (deg. C)	Resistance (ohms)
0	130·4
50	155·9
100	181·1
150	205·9
200	230·3
250	254·3

Accuracy

4. Accuracy to be within 2 per cent of full-scale deflection.

Chapter 1–24

INDICATORS, TYPE S63.4.431

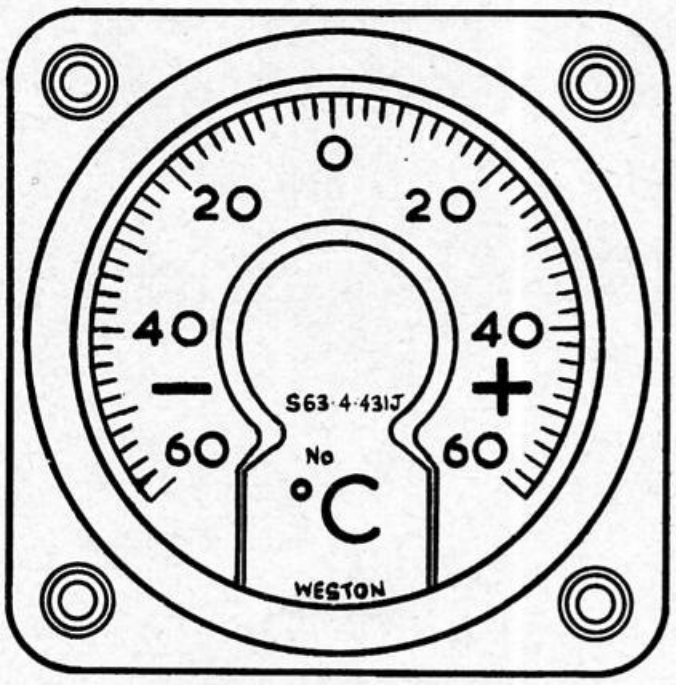


Fig. 1. Indicator, Type S63.4.431

Dial presentation

1. This indicator (Ref. No. 6A/7836) (fig. 1) is calibrated in degrees C from −60 to +60; the indicator is controlled by variation of temperature in a resistance bulb which obeys a platinum law.

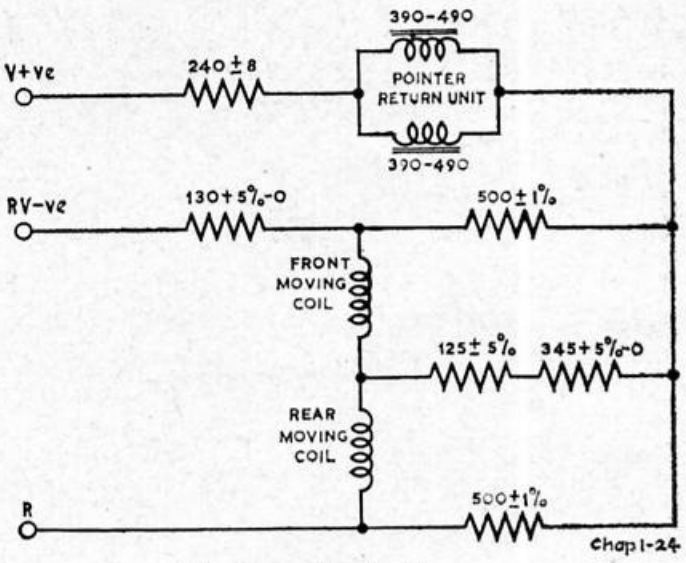


Fig. 2. Circuit diagram

Circuit and connections

2. The circuit diagram is shown in fig. 2 and connections to the indicator are made via three terminal screws V+, RV− and R.

Testing

3. When testing these indicators for serviceability the calibration values given in Table 1 must be used in conjunction with the SST given in Chap. 1–1.

TABLE 1

Temperature and resistance values

Temperature (deg. C)	Resistance (ohms)
−60	99·2
−40	109·7
−20	120·1
0	130·4
+20	140·7
40	150·9
60	161·0

General information

4. (1) Maximum current at mid-scale (26V applied) 40mA.

(2) The accuracy of the indicator is within ±2% of scale span (120° C).

(3) The resistance values given in the calibration table include an additional amount of resistance to simulate actual conditions under which the indicator will operate, they are not merely the standard platinum law values.

Chapter 1-25

INDICATOR, TYPE S63.4.756

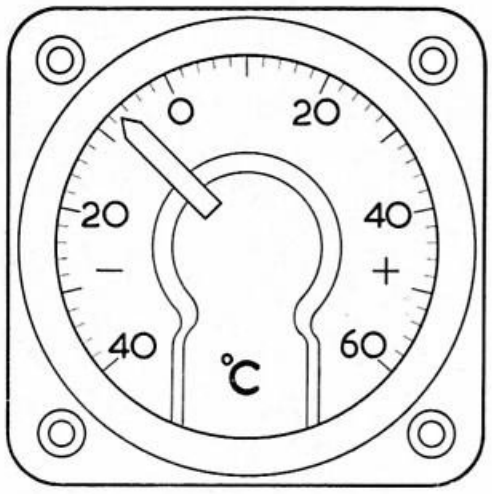


Fig. 1. Indicator, Type S63.4.756

Dial presentation (fig. 1)

1. The indicator, Type S63.4.756 (Ref. No. 6A/8639) is calibrated in degrees C from −40 to 60. The instrument is controlled by a platinum law temperature sensitive resistance bulb.

Circuit

2. The indicator has a ratiometer type movement as shown in the circuit diagram (fig. 2). Connections to the indicator are made via three terminal screws.

STANDARD SERVICEABILITY TEST

3. The following paragraphs detail the tests to be applied to the indicator immediately before installation in an aircraft and at any time the serviceability is suspect.

Test equipment

4. The following test equipment is required:—

(1) Tester, insulation resistance, Type C (Ref. No. 5G/152).

(2) Decade resistance box (Ref. No. 10S/16237) 2 off.

Power supplies

5. A 28V d.c. power supply is required.

TESTING

Insulation resistance test

6. Using the insulation resistance tester, measure the resistance between terminal screw and the case of the indicator. In each instance the resistance is to be not less than 20 megohms.

Accuracy test

7. (1) Set the resistance boxes to the values shown for −40 deg. C in Table 1.

(2) Connect the indicator to the test circuit; mount the indicator with the dial vertical and in the normal viewing position.

(3) Set R1 and R2 to each set of values shown in Table 1, in turn. Tap the indicator lightly at each setting and check that, for both increasing and decreasing scale values, the indicator pointer indicates within the limits shown in Table 1.

(4) Remove the indicator from the test circuit.

TABLE 1

Calibration values

Resistance (ohms) R1	Resistance (ohms) R2	Indictator degrees C
110	40 223	−42 to −38
121	16 147	−22 to −18
131	28 471	− 2 to 2
141	68 796	18 to 22
152	16 679	38 to 42
162	26 082	58 to 62

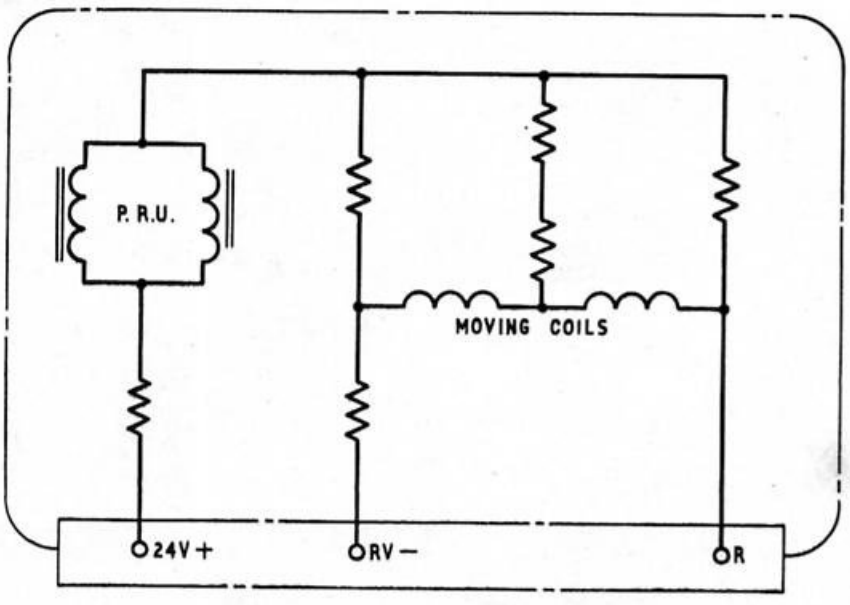


Fig. 2. Circuit diagram

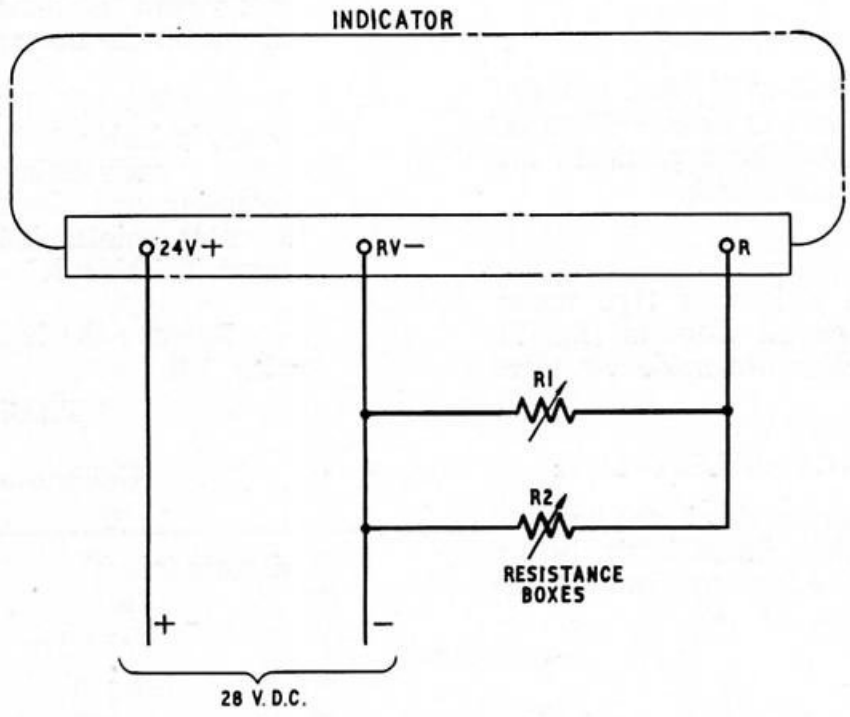


Fig. 3. Test circuit

Chapter 1-26

INDICATOR, TYPE S.63.4.1302

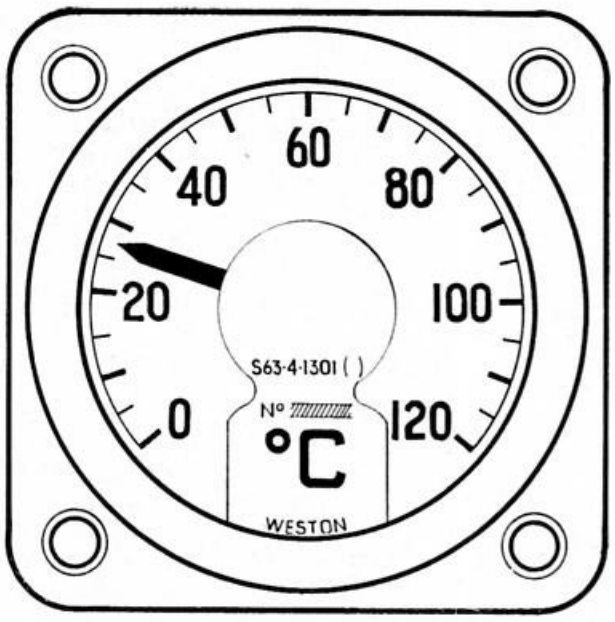


Fig. 1. Indicator, Type S63.4.1301

Presentation

1. The temperature indicator, Type S63.4.1301 (fig. 1) is calibrated in degrees C from 0 to 120, the pointer deflection being controlled by the variation of resistance with temperature of an externally connected platinum law resistance thermometer element. The indicator movement is designed as a ratiometer. The indicator incorporates a pointer return unit which positions the pointer below the 0 degrees C cardinal when the indicator is unenergized.

2. The combined indicator and test circuit diagram is shown in fig. 2. Connection to the indicator is made by means of three unified thread (6-32 UNC) terminal screws, 1, 2 and 3 (fitted with captive washers) at the rear of the indicator.

STANDARD SERVICEABILITY TEST

3. The following paragraphs detail the tests to be applied to the indicator immediately before installation in an aircraft, and at any time serviceability is suspect.

Test equipment

4. The following test equipment is required:—

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

(2) Decade resistance boxes (Ref. No. 10S/16237) 2 off.

Power supplies

5. A 28V d.c. power supply is required.

TESTING

Insulation resistance test

6. Using the insulation resistance tester, measure the resistance between each terminal screw in turn and the case of the instrument.

Accuracy test

7. (1) Set the resistance boxes to be used as R1 and R2 in the test circuit (fig. 2) to 131 ohms and 28 470 ohms respectively.

(2) Connect the indicator to the test circuit; mount the indicator with the dial vertical in the normal viewing position.

(3) Set R1 and R2 to each set of values shown in Table 1, in turn. Tap the indicator lightly at each setting and check that, for both increasing and decreasing scale values, the indicator pointer indicates within the limits shown in Table 1.

(4) Disconnect the indicator from the test circuit.

TABLE 1

Calibration values

Resistance (ohms)		Indicator (degrees)	
R1	R2	Tolerance	Nominal
131	28 470	−2·4 to 2·4	0
137	12 376	7·4 to 12·4	10
142	15 368	17·4 to 22·4	20
147	21 194	27·4 to 32·4	30
152	12 072	37·4 to 42·4	40
157	22 251	47·4 to 52·4	50
162	26 081	57·4 to 62·4	60
167	27 722	67·4 to 72·4	70
172	32 699	77·4 to 82·4	80
177	34 866	87·4 to 92·4	90
182	36 622	97·4 to 102·4	100
187	38 666	107·4 to 112·4	110
192	42 990	117·4 to 122·4	120

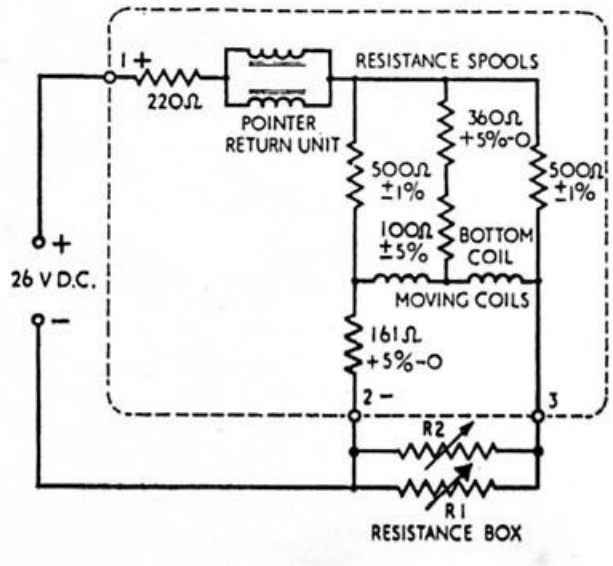


Fig. 2. Combined circuit and test circuit

Chapter 1-27

INDICATOR, TYPE S63.4.1202

Presentation

1. The indicator, Type S63.4.1202 is calibrated in degrees C from —50 to 100. The pointer deflection is controlled by the variation of resistance with temperature of a platinum law thermometer element. When the indicator is de-energized the pointer pulls off below the —50 degree mark.

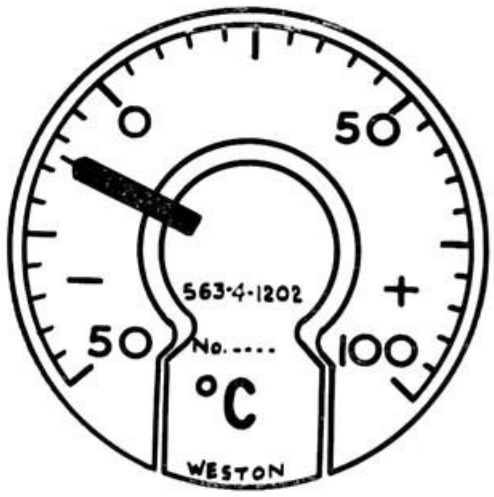


Fig. 1. Indicator, Type S63.4.1202

Circuit and connections

2. The combined circuit and test circuit diagram is shown in fig. 2. Connections to the indicator are made via three 6-32 U.N.C. screws with captive washers.

STANDARD SERVICEABILITY TEST

3. The following paragraphs detail the tests to be applied to the indicator immediately before installation in an aircraft and at any time the serviceability is suspect.

Test equipment

4. The following test equipment is required:—

(1) Tester insulation resistance, Type C (Ref. No. 5G/152)

(2) Decade resistance boxes (Ref. No. 10S/16237) — 2 off.

Power supplies

5. A 28V d.c. power supply is required.

TESTING

Insulation resistance test

6. Using the insulation resistance tester, measure the resistance between each terminal screw in turn and the case of the instrument. In each instance the resistance is to be not less than 20 megohms.

Accuracy test

7. Set the resistance boxes to be used as R1 and R2 to 105 ohms and 21945 ohms respectively.

Caution . . .

During the following tests, the values of R1 and R2 are not to fall below 100 *ohms and* 10000 *ohms respectively.*

8. Connect the indicator to the test circuit. Mount the indicator in the normal viewing position, with the dial vertical.

9. Set R1 and R2 to each set of values shown in Table 1, in turn. Tap the indicator lightly at each setting and check that, for both increasing and decreasing scale values, the indicator pointer indicates within the limits shown in Table 1.

10. Disconnect the indicator from the test circuit.

TABLE 1
Calibration values

Resistance (ohms) R1	R2	Indicator (degrees) Tolerance	Nominal
105	21945	—53 to —47	—50
110	40223	—43 to —37	—40
121	16152	—23 to —17	—20
131	28470	—3 to 3	0
142	15368	17 to 23	20
152	12072	37 to 43	40
162	26081	57 to 63	60
172	32699	77 to 83	80
182	36622	97 to 103	100

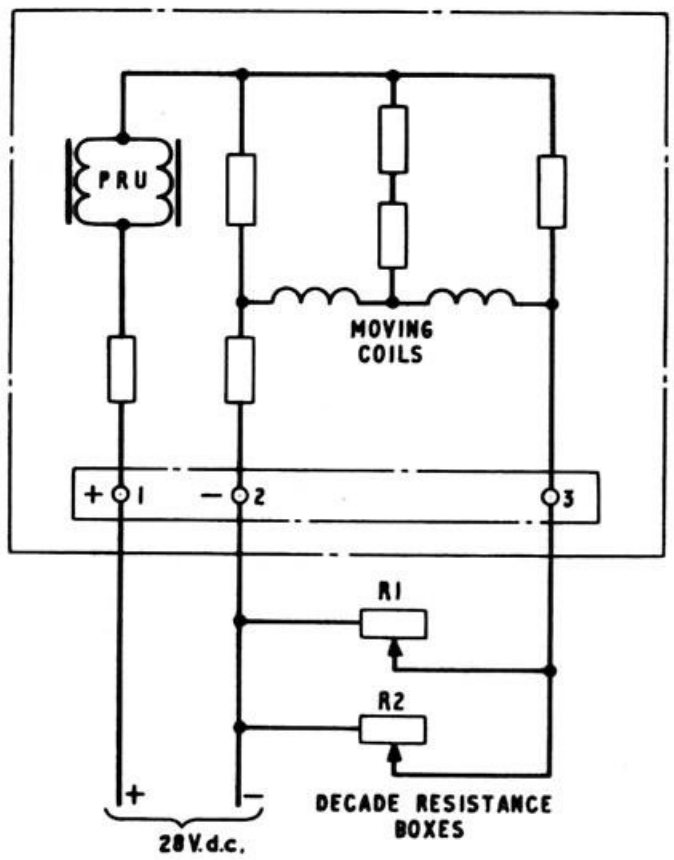


Fig. 2. Circuit and test circuit diagram

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Chapter 1–28

INDICATORS, TYPE S63.4.1143

DIAL PRESENTATION

1. This temperature indicator (Ref. No. 6A/N.I.V.) (fig. 1) is calibrated in degrees F from −30 to +120; the indicator is controlled by the variation of resistance with temperature of a resistance thermometer element, which obeys a platinum law.

2. The dial markings are white on a matt-black background; the arc of the dial subtends an angle of 200°.

CIRCUIT AND CONNECTIONS

3. The combined test and indicator circuit is shown in fig. 2 and connection to the indicator is made via three terminal screws, V+, RV− and R, which are shrouded and secured on the base of the indicator.

TESTING

4. When testing these indicators for serviceability, the SST given in Chapter 1–1 must be used, but connect two, decade resistance boxes in parallel as shown in fig. 2 and use the calibration values given in Table 1.

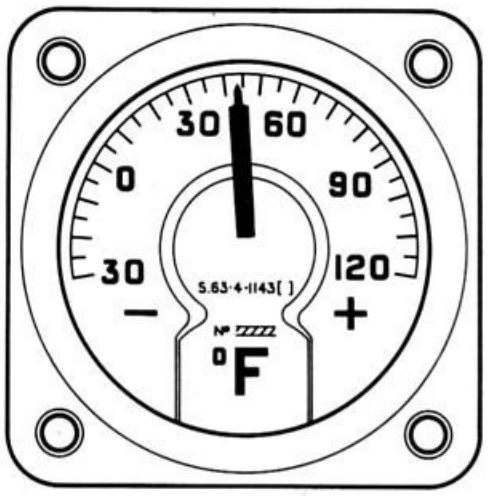

Fig. 1. Indicator, Type S63.4.1143

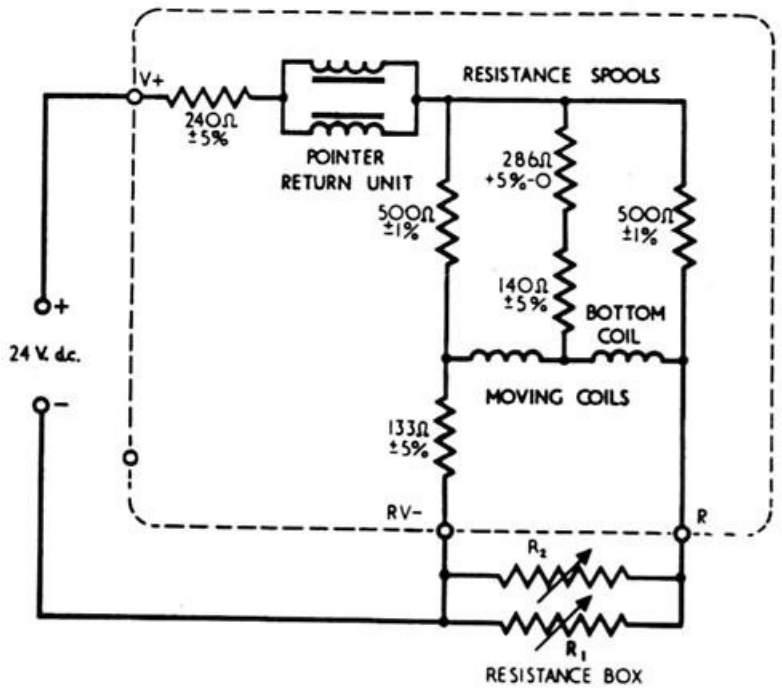

Fig. 2. Circuit and test circuit

GENERAL INFORMATION

5. (1) When the indicator is unenergised its pointer deflects below −30.

(2) Maximum current of indicator circuit at mid-scale and 26V d.c. is 40 mA.

TABLE 1

Calibration values

Resistance (ohms)		Indicator (°F)	
R1	R2	Tolerance	Nominal
113	31809	−33 to −27	−30
122	18483	− 3 to 3	0
131	14170	27 to 33	30
140	12110	57 to 63	60
148	19765	87 to 93	90
157	15249	117 to 123	120

Chapter 1–29

INDICATORS, SANGAMO WESTON TYPE S63.4.1485

DIAL PRESENTATION

1. This temperature indicator (Ref. No. 6A/N.I.V.) (fig. 1) is calibrated in degrees C from 0 to 120; the indicator is controlled by the variation of resistance with temperature of a resistance thermometer element which obeys a platinum law.

2. The dial markings are white on a matt-black background; the arc of the dial subtends an angle of 260°.

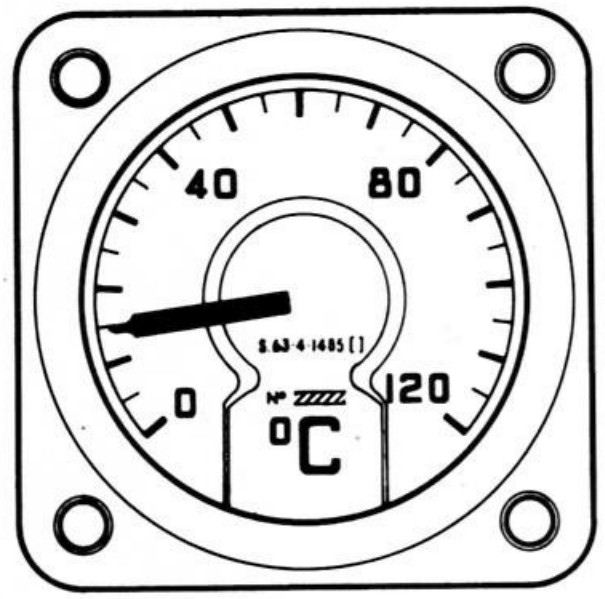

Fig. 1. Indicator, Type S63.4.1485

CIRCUIT AND CONNECTIONS

3. The combined test and indicator circuit is shown in fig. 2. Connection to the indicator is made via three terminal screws, 1, 2 and 3 which are shrouded and secured to the base of the indicator.

TESTING

4. When testing these indicators for serviceability, the SST given in Chapter 1–1 must be used, but connect two, decade resistance boxes in parallel as shown in Fig. 2, and use the calibration values given in Table 1.

TABLE 1

Calibration values

Resistance (ohms)		Indicator (°C)	
R1	R2	Tolerance	Nominal
131	28470	−2·4 to 2·4	0
142	15368	17·6 to 22·4	20
152	20852	37·6 to 42·4	40
162	26081	57·6 to 62·4	60
172	32699	77·6 to 82·4	80
182	36622	97·6 to 102·4	100
192	40768	117·6 to 122·4	120

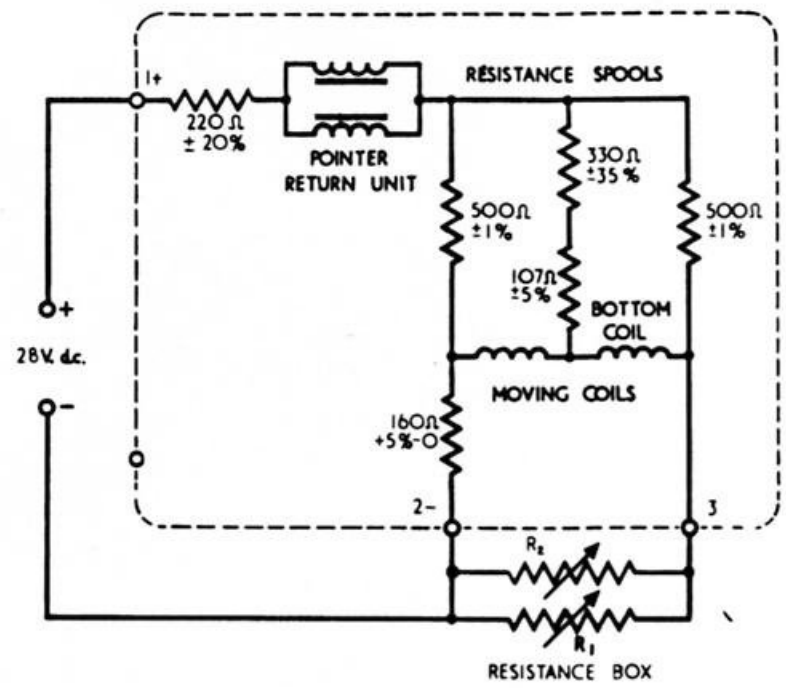

Fig. 2. Circuit and test circuit diagram

GENERAL INFORMATION

5. (1) The mounting position of indicators is 26° from the vertical, face down; indicators must be tested in this position.

(2) When the pointer is unenergised its pointer deflects below the zero cardinal.

(3) Maximum current of indicator at mid-scale and 26V d.c. is 40 mA.

Chapter 1–30

INDICATOR, TYPE S63.4.531

DIAL PRESENTATION

1. This temperature indicator (Ref. No. 6A/3682) (fig. 1) is calibrated in degrees C from −80 to +80; the indicator is controlled by the variation of resistance with temperature of a resistance thermometer element which obeys a platinum law.

2. The dial figures, cardinals and caption °C are fluorized on a matt-black background; the lance pointer is also fluorized.

CIRCUIT AND CONNECTIONS

3. The combined test and indicator circuit is shown in fig. 2 and connection to the indicator is made via three terminal screws, V+, RV− and R, which are shrouded and secured on the base of the indicator.

TESTING

4. When testing these indicators for serviceability, the SST given in Chapter 1–1 must be used, but connect two, decade resistance boxes in parallel as shown in fig. 2, and use the calibration values given overleaf in Table 1.

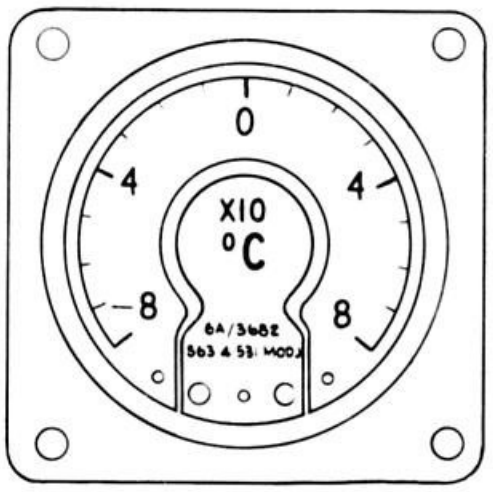

Fig. 1. Indicator, Type S63.4.531

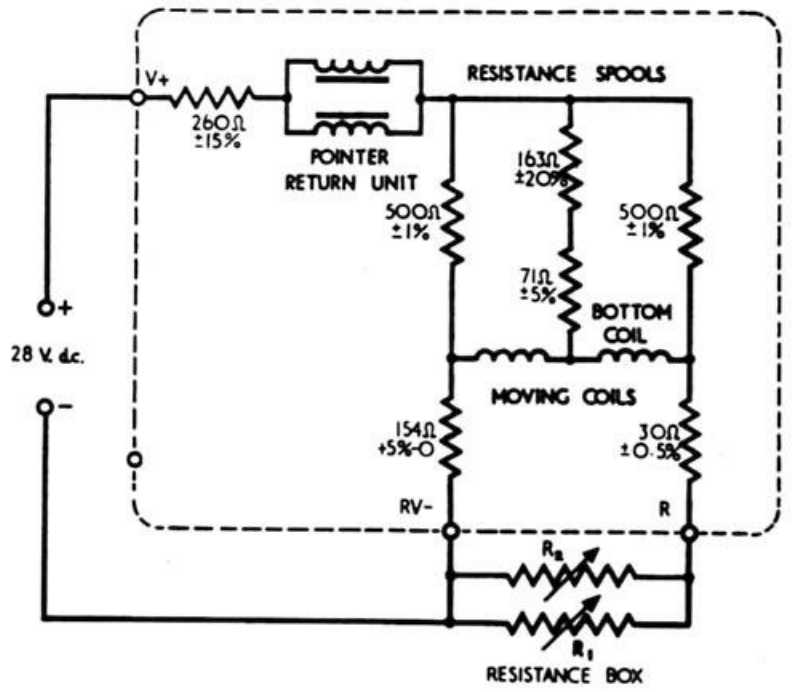

Fig. 2. Circuit and test circuit

GENERAL INFORMATION

5. (1) When the indicator is unenergised its pointer is deflected clear of the scale in a clockwise direction, which is contrary to normal practice.

(2) Maximum current of indicator circuit at mid-scale and 26V d.c. is 40 mA.

TABLE 1

Calibration values

Resistance (ohms)		Indicator °C	
R1	R2	Tolerance	Nominal
89	26314	−83 to −77	−80
100	12400	−63 to −57	−60
110	40223	−43 to −37	−40
121	16147	−23 to −17	−20
131	28470	− 3 to 3	0
142	15368	17 to 23	20
152	20852	37 to 43	40
162	26082	57 to 63	60
172	32699	77 to 83	80

Chapter 1-31

INDICATOR, TYPE S63.5.1213

DIAL PRESENTATION

1. The temperature indicator (Fig.1), Type S63.5.1213 is calibrated in degrees C from 0 to 150; the pointer deflection is controlled by the variation of resistance of an externally connected platinum law resistance thermometer element.

2. The dial markings are white on a matt-black background; the lance type pointer is also finished white.

CIRCUIT AND CONNECTIONS

3. The circuit diagram is shown in Fig.2.
Connection to the indicator is made via three unified-thread terminals 1, 2 and 3, which are shrouded and secured to the base of the indicator.

TESTING

4. When testing these indicators for serviceability, the SST given in Chapter 1-1 must be used, but connect two resistance boxes in parallel, as shown in Fig.2, and use the calibration values given overleaf in Table 1.

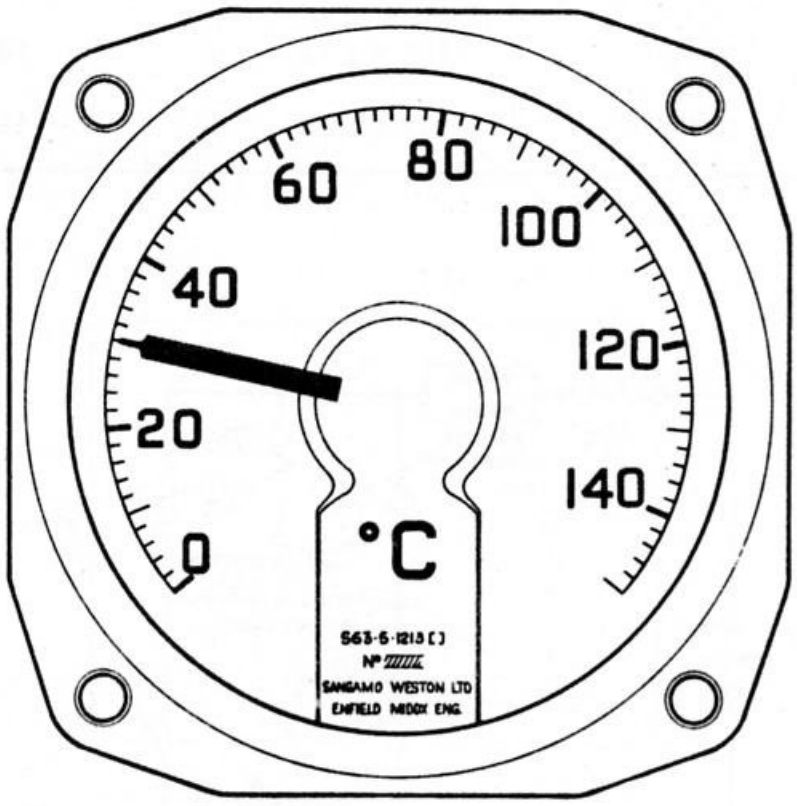

Fig.1. Indicator, Type S63.5.1213

GENERAL INFORMATION

5. (1) When the indicator is unenergised the pointer is deflected below the 0° cardinal.

(2) Maximum current of indicator circuit at mid-scale and 26V d.c. is 40 mA.

TABLE 1

Calibration values

Resistance (ohms) R1	R2	Indicator °C Tolerance	Nominal
131	28470	- 3 to 3	0
142	15368	17 to 23	20
152	20852	37 to 43	40
162	26082	57 to 63	60
172	32699	77 to 83	80
182	36622	97 to 103	100
192	40768	117 to 123	120
202	40604	137 to 143	140
207	38746	147 to 153	150

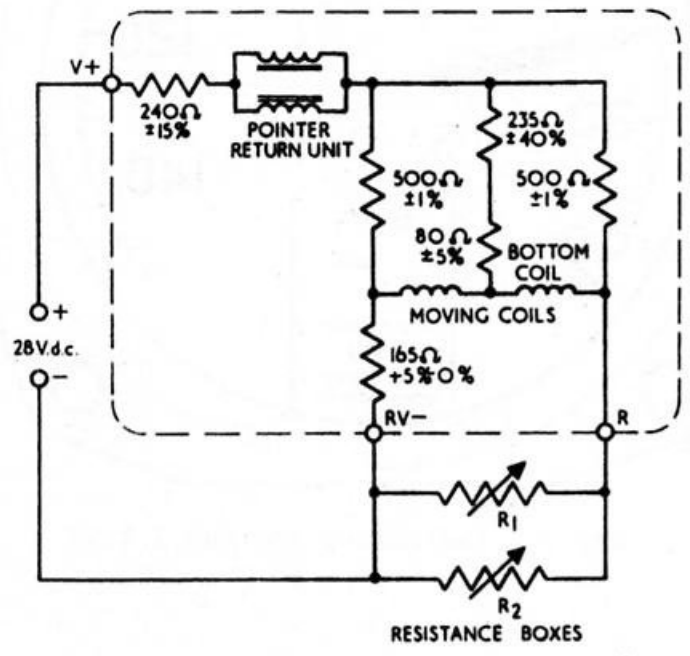

Fig.2. Circuit and test circuit