SMITHS AVIATION DIVISION

MAINTENANCE MANUAL

for

Ratiometer Indicators

FOR CODE NUMBERS OF UNITS COVERED
BY THIS MANUAL, SEE PAGE 5

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This manual complies with British Civil Airworthiness Requirements, Section A, Chapter A6-2. The technical accuracy of this manual has been verified and is certified as correct.

Signed K. Tearnside

Date April 1961

A.R.B. Design Approval No. AD/1017/39

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OIL INDICATING

RATIOMETER INDICATORS

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RECORD OF REVISIONS

REV. NO.	INSERTION DATE	BY	REV. NO.	INSERTION DATE	BY	REV. NO.	INSERTION DATE	BY

The introduction of any amendment or revision not certified in accordance with British Civil Airworthiness Requirements Section A, Chapter A6-2, will invalidate the statement of certification. Amendments or revisions embodied in this manual, which have been certified under an approved authorisation other than that applicable to the initial certification must be recorded on separate record sheets.

OIL INDICATING

RATIOMETER INDICATORS

List of Codes

This manual covers units bearing the following Code Numbers:

46MV
46MV/M
46MV/SB
51MV
51MV/SB
54MV
54MV/SB
59MV
59MV/SB
61MV
61MV/SB
119MV
155MV
155MV/M
155MV/SB
156MV
156MV/M
157MV
157MV/SB
165MV
165MV/SB
169MV
169MV/SB
175MV
175MV/SB
176MV
176MV/SB
196MV/SB
196MV/SB/M
226MV
226MV/SB
227MV
227MV/SB
340MV/SB
368MV
426MV/SB
AN/D 427MV
AN/D 427MV/SB
455MV
* D/457MV/SB
PD/459MV/MB/M
* 462MV/MB
D/463MV/SB
D/463MV/SB/M
469MV
488MV/MB/M
489MV/SB
490MV/SB
* 497MV/A-Z
* 498MV

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OIL INDICATING

RATIOMETER INDICATORS

List of Effective Pages

This subject consists of the following pages:

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5	Apr. 61	13/9	Apr. 61
7	Apr. 61	13/10	Apr. 61
8	Apr. 61	13/11	Apr. 61
9	Apr. 61	13/12	Apr. 61
10	Apr. 61	13/13	Apr. 61
11	Apr. 61	13/14	Apr. 61
12	Apr. 61	13/15	Apr. 61
13/1	Apr. 61	15	Apr. 61
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13/6	Apr. 61	20	Apr. 61

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RATIOMETER INDICATORS

List of Illustrations

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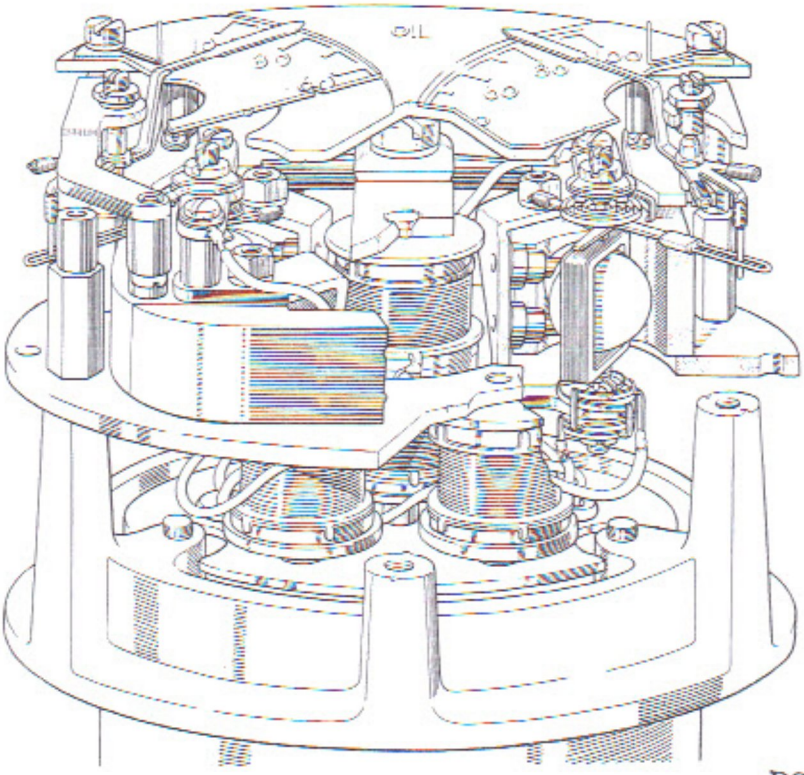

Fig. 2 Double link and pin indicator

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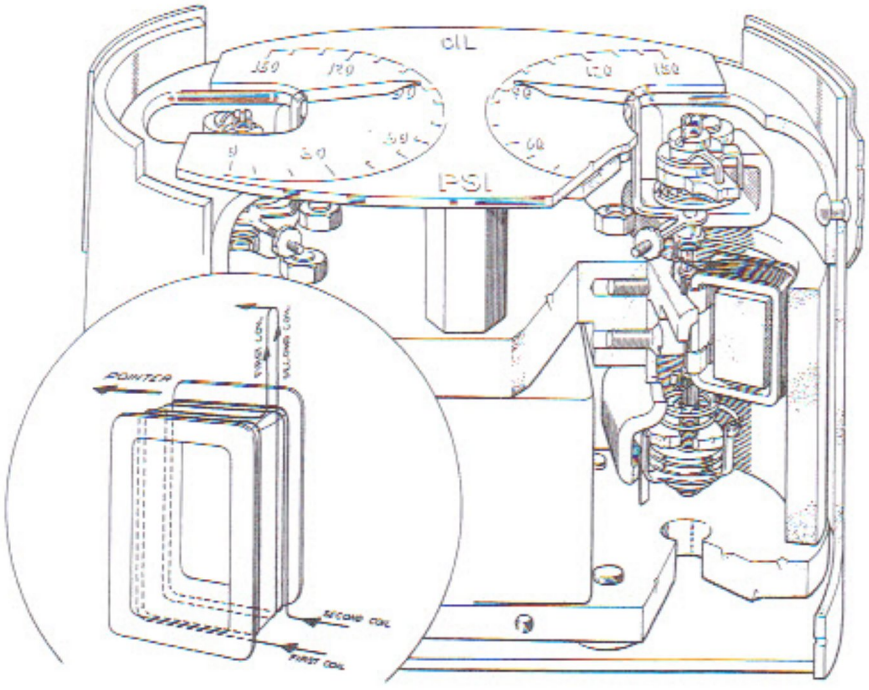

Fig. 3 Double direct indicator

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C. The Double Direct Indicator. This type also has two scales and can indicate pressure - pressure, temperature - temperature, or temperature - pressure. It is housed in a large ($3\frac{1}{4}$ in.) S.A.E. case and electrical connections are made either through a terminal block or a pin and socket of the Breeze type. It differs from the link and pin type in that the pointers are connected directly to the moving coil spindle. The movement also differs from the single and link and pin type of movement and is described, with its operation, in paragraph 3. It is illustrated in fig. 3.

3. OPERATION

A. In the direct type of indicator the moving coil consists of two windings A and B wound on a common former as illustrated in fig.4 and the connections to the windings are made so that the current in winding A flows in the opposite direction to that in winding B, as indicated by the arrows. The moving coil is pivoted on a fixed iron core-piece, the pole piece of which is specially shaped as shown in fig.5, to produce a non-uniform magnetic field across the gap in which the coil rotates, the flux being strongest at the ends of the gap and weakest in the mid-position as shown by the scale at the side of the illustration.

The principle of the operation of the movement is that a moving coil pivoted in a magnetic field will rotate when a current passes through the coil.

The rotation is produced by the torque created by the inter-action of the current and the strength of the magnetic field, torque being proportional to the product of the current and field strength. The direction in which the coil rotates depends upon the direction in which the current is flowing in the coil, relative to the magnetic field. As the current flows in opposite directions in the windings A and B, it follows that the torque produced by the winding A will tend to rotate the movement in the opposite direction to the torque produced by winding B. The two torques therefore are working in opposition to each other.

Assume that the current in winding A tends to produce a clockwise rotation of the movement and the current in winding B an anti-clockwise rotation. When the current in winding A is at its minimum and that in winding B at its maximum, the ratio of the two currents is such that the movement will be at the limit of its travel in an anti-clockwise direction. This is the zero position of the movement.

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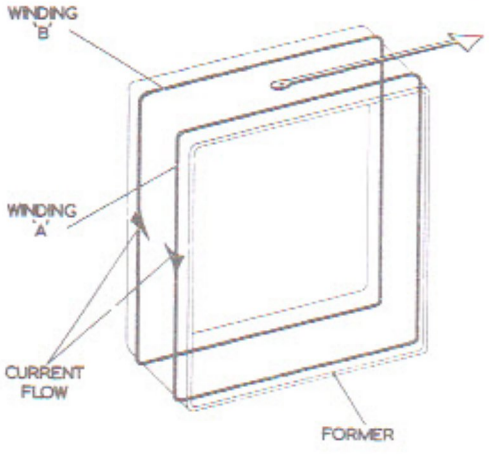

Fig. 4 Moving coil windings, direct indicator

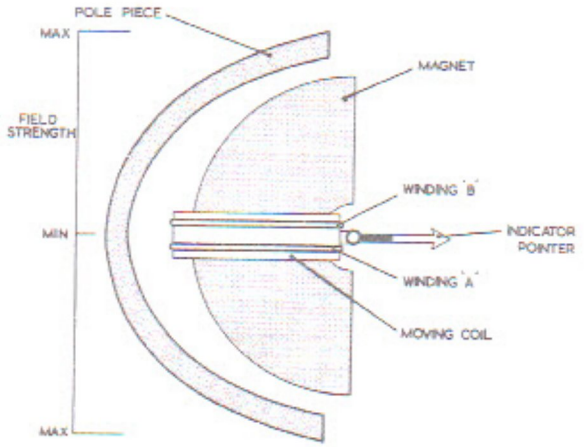

Fig. 5 Magnetic field, direct indicator

Although the two currents are unequal, the torques produced by the currents are balanced, since, due to the magnetic field being non-uniform, the winding A is in a stronger magnetic field than winding B, and the product of current A and its field strength is equal to current B and its field strength. If the current in winding A increases, the ratio of the two currents is altered and the movement will rotate clockwise until the varying field strength again produces a balanced torque. For each ratio of the two currents there is a different position of the movement. When the currents are equal the movement is in the mid-position of its rotation since this is the only position where the two windings can be in the same field strength simultaneously. It follows from this that a change in the supply voltage would affect both windings proportionately and the ratio of the two currents would remain unaltered. In practice however, a return hairspring is fitted to the movement to bring the pointer off-scale when power is switched off, and this makes the movement slightly sensitive to voltage changes.

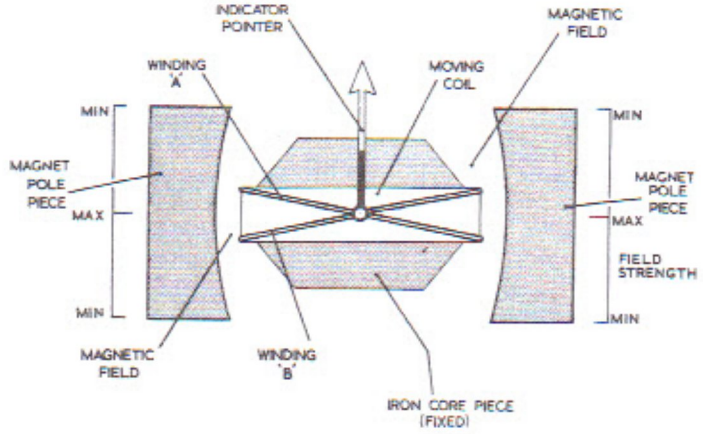

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Fig. 6 Magnetic field, single and link and pin indicators

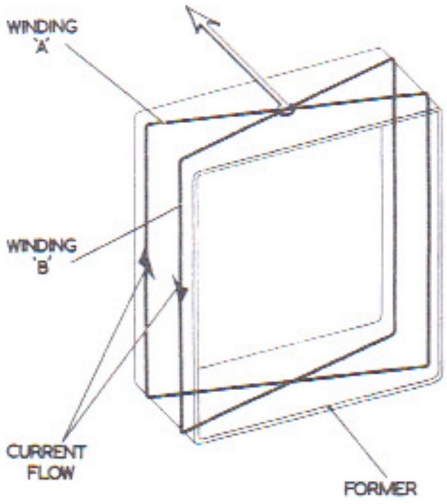

Fig. 7 Moving coil windings, single and link and pin indicators

B. The single indicator operates on the same principle as the direct type, but differs from it in that both sides of the coil rotate in a magnetic field. The core piece is shaped to produce a strong field at the mid-point with a weak field at each end of the gap as shown in fig. 6 and the two windings are wound diagonally to each other as shown in fig. 7. If the windings are lettered A and B as shown in fig. 7 then the assumption and explanation in paragraph 3. A will also be applicable to this movement. It is only necessary to consider the left hand half of the movement in fig. 7 since the other half only produces a diametrically similar balancing torque. The pointer is connected directly to the coil.

C. The link and pin indicator is a duplicated version of that described in paragraph 3. B with the exception that the pointers are connected to the moving coil by a linkage which gives this type of indicator its name. This linkage is illustrated in fig. 2.

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DATA

All indicators dealt with in this publication operate on a nominal voltage of 24V (27V aircraft supply), and all are subject to Temperature Test A.

All temperature indicators are calibrated to the Nickel Law with the exception of the following:-

Code 226)
Code 226MV/SB) Platinum Law
Code 227MV)
Code 227MV/SB)

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All pressure indicators have round bobbin transmitters with the exception of Code 462 MV/MB which has a square bobbin transmitter.

All single indicators are contained in a small ($2\frac{3}{8}$ in.) S.A.E. case

All link and pin and double direct indicators are contained in a large ($3\frac{1}{4}$ in.) S.A.E. case.

Suffixes: MV/SB = Standard Breeze MV/MB = Miniature Breeze
MV = Terminal Block /M = Metric dial marking

Code No.	(S) Single (D) Double	Range	Type of Movement	Dimensions	Internal Circuit	External Circuit
46MV	S	30°F to 120°F	Single	Panels 20 & 24	Panel 1	Panel 9
46MV/M	S	0°C to 50°C	Single	Panels 20 & 24	Panel 1	Panel 9
46MV/SB	S	30°F to 120°F	Single	Panels 20 & 24	Panel 2	Panel 9
51MV	S	-40°C to +60°C	Single	Panels 20 & 24	Panel 1	Panel 9
51MV/SB	S	-40°C to +60°C	Single	Panels 20 & 23	Panel 2	Panel 9
54MV	S	0°C to 120°C	Single	Panels 20 & 24	Panel 1	Panel 9
54MV/SB	S	0°C to 120°C	Single	Panels 20 & 23	Panel 2	Panel 9
59MV	S	-60°C to +50°C	Single	Panels 20 & 24	Panel 1	Panel 9
59MV/SB	S	-60°C to +50°C	Single	Panels 20 & 23	Panel 2	Panel 9
61MV	S	-60°C to +70°C	Single	Panels 20 & 24	Panel 1	Panel 9
61MV/SB	S	-60°C to +70°C	Single	Panels 20 & 23	Panel 2	Panel 9
119MV	S	50°C to 200°C	Single	Panels 20 & 24	Panel 1	Panel 9
155MV	D	0 to 150 lb/in.^{2}. 0°C to 120°C	Link and Pin	Panels 25 & 27	Panel 3	Panel 10

Code No.	(S)Single (D)Double	Range	Type of Movement	Dimensions	Internal Circuit	External Circuit
155MV/M	D	0 to 10kg/cm^2. 0°C to 120°C	Link and Pin	Panels 25 & 27	Panel 3	Panel 10
155MV/SB	D	0 to 150lb/in^2. 0°C to 120°C	Link and Pin	Panels 25 & 28	Panel 3	Panel 10
156MV	D	0 to 40 lb/ in^2. -60°C to + 70°C	Link and Pin	Panels 25 & 27	Panel 3	Panel 10
156MV/M	D	0 to 3 kg/cm^2. -60°C to + 70°C	Link and Pin	Panels 25 & 27	Panel 3	Panel 10
157MV	D	0°C to 120°C 0°C to 120°C	Link and Pin	Panels 26 & 27	Panel 3	Panel 13
157MV/SB	D	0°C to 120°C 0°C to 120°C	Link and Pin	Panels 26 & 28	Panel 3	Panel 13
165MV	D	0 to 150lb/ in^2. 0°C to 120°C	Link and Pin	Panels 26 & 27	Panel 3	Panel 10
165MV/SB	D	0 to 150lb/ in^2. 0°C to 120°C	Link and Pin	Panels 26 & 28	Panel 3	Panel 10
169MV	S	-20°C to +60°C	Single	Panels 20 & 24	Panel 1	Panel 9
169MV/SB	S	-20°C to +60°C	Single	Panels 20 & 23	Panel 2	Panel 9
175MV	S	-50°C to +100°C	Single	Panels 20 & 24	Panel 1	Panel 9
175MV/SB	S	-50°C to +100°C	Single	Panels 20 & 23	Panel 2	Panel 9
176MV	D	40°C to 140°C 40°C to 140°C	Link and Pin	Panels 24 & 27	Panel 3	Panel 13
176MV/SB	D	40°C to 140°C 40°C to 140°C	Link and Pin	Panels 26 & 28	Panel 3	Panel 13
196MV/SB	D	0 to 100lb/ in^2. 0°C to 120°C	Link and Pin	Panels 26 & 28	Panel 6	Panel 12
196MV/SB/M	D	0 to 7kg/ cm^2. 0°C to 120°C	Link and Pin	Panels 26 & 28	Panel 6	Panel 12
226MV	S	-60°C to +50°C	Single	Panels 20 & 24	Panel 1	Panel 9
226MV/SB	S	-60°C to +50°C	Single	Panels 20 & 23	Panel 2	Panel 9

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Code No.	(S) Single (D) Double	Range	Type of Movement	Dimensions	Internal Circuit	External Circuit
227MV	S	-20°C to +60°C	Single	Panels 20 & 24	Panel 1	Panel 9
227MV/SB	S	-20°C to +60°C	Single	Panels 20 & 23	Panel 2	Panel 9
340MV/SB	D	0 to 100 lb/in.^{2} 0° to 120°C	Link and Pin	Panels 26 & 28	Panel 6	Panel 12
368MV	D	0 to 40 lb/in.^{2} 0 to 40 lb/in.^{2}	Direct	Panels 26 & 30	Panel 7	Panel 16
*D426MV/SB	D	0 to 100 lb/in.^{2} 0°C to 120°C	Link and Pin	Panels 25 & 28	Panel 6	Panel 12
AN/D 427MV	D	0 to 100 lb/in.^{2} 0°C to 120°C	Direct	Panels 25 & 30	Panel 6	Panel 12
AN/D 427MV/SB	D	0 to 100 lb/in.^{2} 0°C to 120°C	Direct	Panels 25 & 31	Panel 6	Panel 12
455MV	D	0 to 100 lb/in.^{2} 0°C to 120°C	Direct	Panels 25 & 30	Panel 7	Panel 17
*D/457MV/SB	D	0 to 100 lb/in.^{2} 0°C to 120°C	Link and Pin	Panels 25 & 28	Panel 6	Panel 12
PD/459MV/ /MB/M	D	0 to 14kg/cm^2 0°C to 120°C	Direct	Panels 26 & 30	Panel 7	Panel 17
*/462MV/MB	D	0 to 100lb/in.^{2} 0 to 100lb/in.^{2}	Direct	Panels 26 & 30	Panel 7	Panel 16
D/463MV/SB	D	0 to 100lb/in.^{2} 0°C to 100°C	Direct	Panels 25 & 31	Panel 6	Panel 12
D/463MV/SB/M	D	0 to 7kg/cm^2 0°C to 120°C	Direct	Panels 25 & 31	Panel 6	Panel 12
469MV	S	-50°C to +150°C	Single	Panels 20 & 26	Panel 1	Panel 9
488MV/MB/M	D	0 to 14kg/cm^2. 0°C to 120°C	Direct	Panels 26 & 32	Panel 7	Panel 17
489MV/SB	D	0°C to 120°C 0°C to 120°C	Direct	Panels 26 & 29	Panel 8	Panel 15
490MV/SB	D	0 to 100 lb/in^2 0 to 100 lb/in^2	Direct	Panels 25 & 29	Panel 5	Panel 14
*497MV/A-Z	D	0°C to 120°C 0°C to 120°C	Direct	Panels 26 & 30	Panel 3	Panel 13
*498MV	D	40°C to 140°C 40°C to 140°C	Direct	Panels 26 & 30	Panel 3	Panel 13

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Tests and Tolerances

1. Insulation Resistance. When tested with a 500V insulation tester in the manner described in BENCH CHECK, the insulation resistance should not be less than 20MΩ.

2. Calibration. Each indicator should be accurate within ± 2% of the total scale range.

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TEMPERATURE/RESISTANCE CHARACTERISTIC FOR RATIOMETER AND NICKEL RESISTANCE BULB

Temperature (°C)	Resistance (ohms)
-80	58.8
-70	62.5
-60	65.9
-50	69.6
-40	73.4
-30	77.4
-20	81.5
-10	85.7
0	90.0
10	94.4
20	99.0
30	103.7
40	108.5
50	113.4
60	118.4
70	123.6
80	128.9
90	134.3
100	139.8
110	145.4
120	151.2
130	157.1
140	163.1
150	169.2
160	175.4
170	181.8
180	188.3
190	194.9
200	201.6

Table 1

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TEMPERATURE/RESISTANCE CHARACTERISTIC FOR RATIOMETER AND PLATINUM RESISTANCE BULB

Temperature (°C)	Resistance (ohms)
-70	93.6
-60	98.8
-50	104.1
-40	109.3
-30	114.5
-20	119.7
-10	124.9
0	130.0
10	135.1
20	140.3
30	145.4
40	150.5
50	155.5
60	160.6
70	165.7
80	170.7
90	175.7
100	180.7
110	185.7
120	190.7
130	195.6
140	200.6
150	205.5

Table 2

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Range and Pressures (lb/in^2.)				Resistance Values (ohms)	
0-20	0-50	0-100	0-200	R1	R2
0	0	0	0	7.8	42.2
2	5	10	20	11.5	38.5
4	10	20	40	15.2	34.8
6	15	30	60	18.5	31.5
8	20	40	80	21.8	28.2
10	25	50	100	25.0	25.0
12	30	60	120	28.2	21.8
14	35	70	140	31.5	18.5
16	40	80	160	34.8	15.2
18	45	90	180	38.5	11.5
20	50	100	200	42.2	7.8

Table 3 - Ranges 0-20, 0-50, 0-100 and 0-200 lb/in^2.

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Pressures (lb/in^2.)	Resistance Values (ohms)	
	R1	R2
0	7.8	42.2
5	12.4	37.6
10	16.9	33.1
15	21.0	29.0
20	25.0	25.0
25	29.0	21.0
30	33.1	16.9
35	37.6	12.4
40	42.2	7.8

Table 4 - Range 0-40 lb/in^2.

Pressures (lb/in^2.)	Resistance Values (ohms)	
	R1	R2
0	7.8	42.2
10	10.3	39.7
20	12.7	37.3
30	15.2	34.8
40	17.5	32.5
50	19.5	30.5
60	21.8	28.2
70	24.0	26.0
80	26.0	24.0
90	28.2	21.8
100	30.5	19.5
110	32.5	17.5
120	34.8	15.2
130	37.3	12.7
140	39.7	10.3
150	42.2	7.8

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Table 5 - Range 0-150 lb/in^2.

Range and Pressures in $kg./cm^2$.			Resistance Values (ohms)	
0-1.4	0-7	0-14	R1	R2
0	0	0	7.8	42.2
0.2	1	2	13.1	36.9
0.4	2	4	18.1	31.9
0.6	3	6	22.7	27.3
0.8	4	8	27.3	22.7
1.0	5	10	31.9	18.1
1.2	6	12	36.9	13.1
1.4	7	14	42.2	7.8

Table 6 - Ranges 0-1.4, 0-7 and 0-14 kg/cm^2.

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Pressures kg/cm^2.	Resistance Values (ohms)	
	R1	R2
0	7.8	42.2
1	11.5	38.5
2	15.2	34.8
3	18.5	31.5
4	21.8	28.2
5	25.0	25.0
6	28.2	21.8
7	31.5	18.5
8	34.8	15.2
9	38.5	11.5
10	42.2	7.8

Table 7 - Range 0-10 kg/cm^2.

Pressures lb/in^2.	Resistance Values (ohms)	
	R1	R2
0	7.8	42.2
5	10.9	39.1
10	13.9	36.1
15	16.8	33.2
20	19.6	30.4
25	22.3	27.7
30	25.0	25.0
35	27.7	22.3
40	30.4	19.6
45	33.2	16.8
50	36.1	13.9
55	39.1	10.9
60	42.2	7.8

Table 8 - Range 0-60 lb/in^2.

Percentage of Range	Resistance Values (ohms)	
	R1	R2
0	7.80	42.20
10	11.24	38.76
20	14.68	35.32
30	18.12	31.88
40	21.56	28.44
50	25.00	25.00
60	28.44	21.56
70	31.88	18.12
80	35.32	14.68
90	38.76	11.24
100	42.20	7.80

Table 9 - All square bobbin instruments

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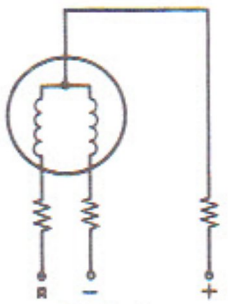

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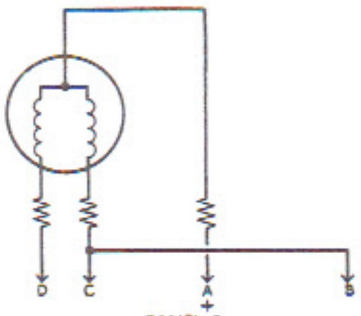

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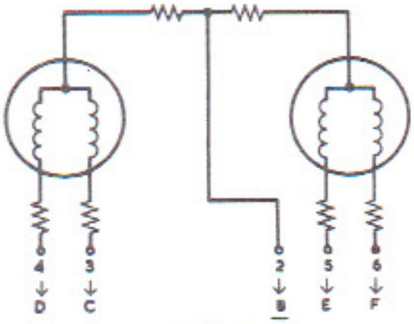

PANEL 3

PANEL 4
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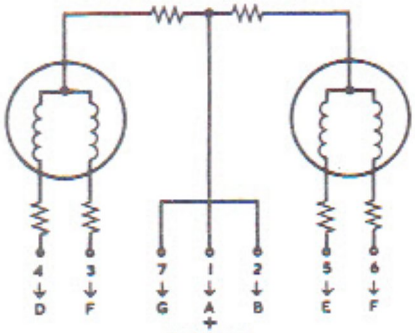

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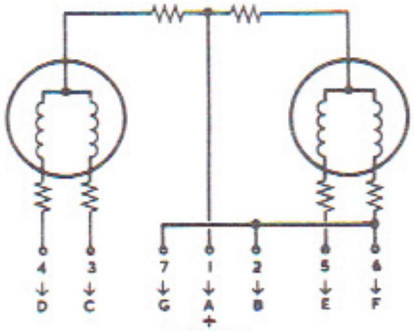

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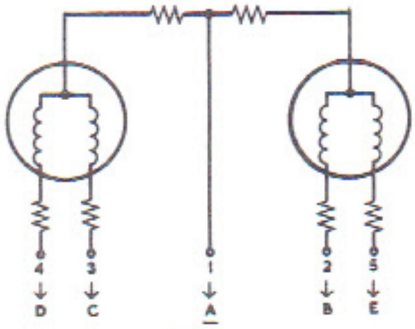
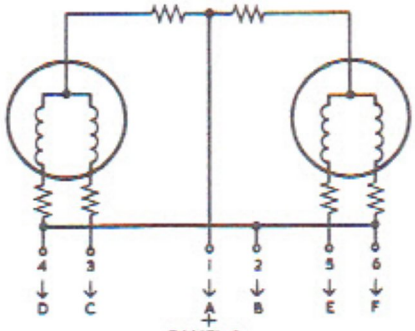


PANEL 7



PANEL 8

TERMINAL BLOCK, BREEZE OR CANNON CONNECTOR

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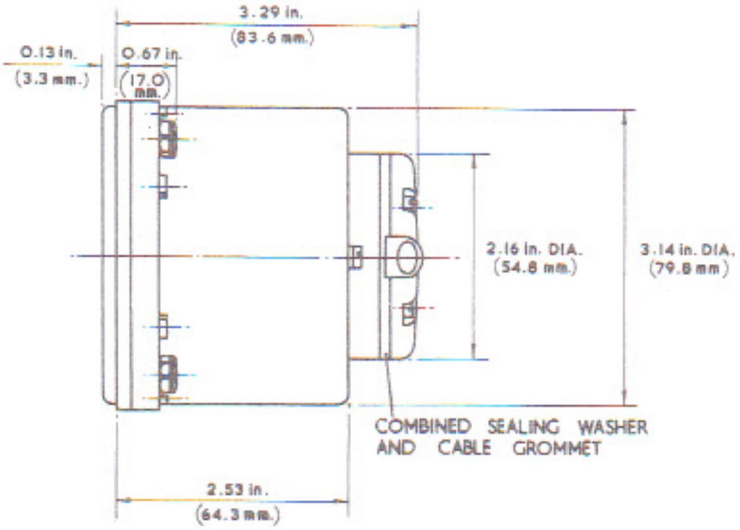

PANEL 27.

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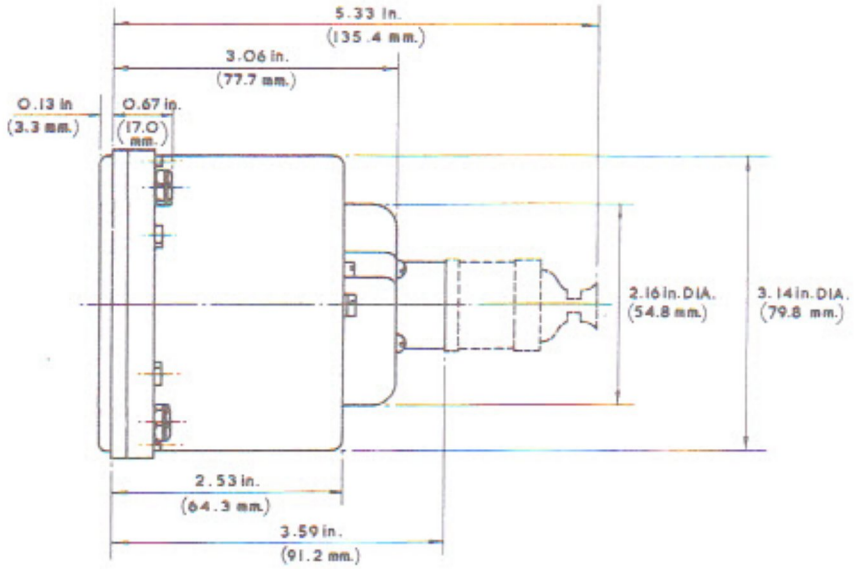

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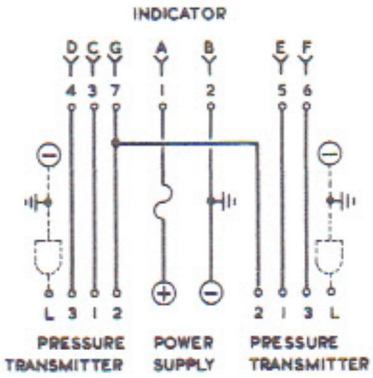

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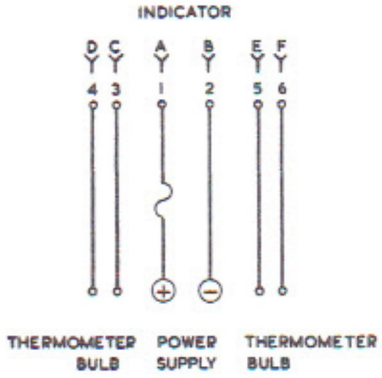

PANEL 15

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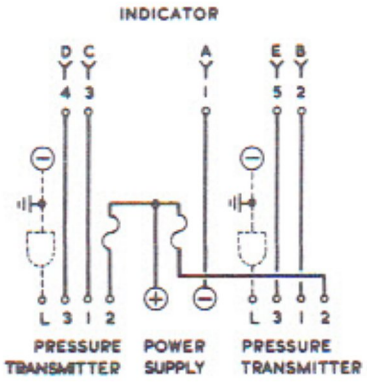

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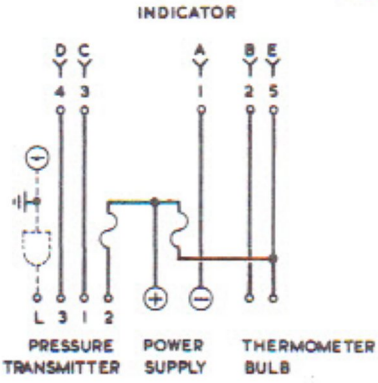

PANEL 17

ALTERNATIVE CONNECTIONS SHOWN DOTTED

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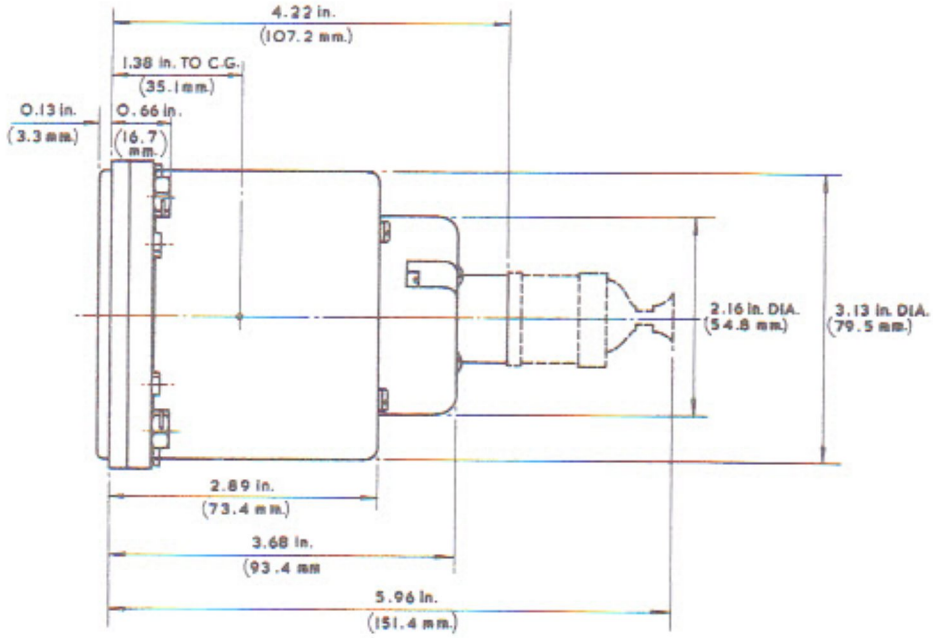

PANEL 31.

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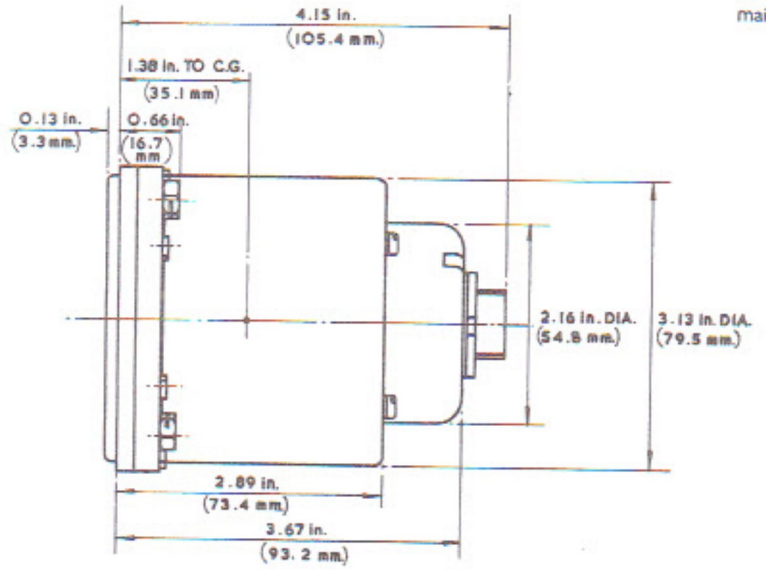
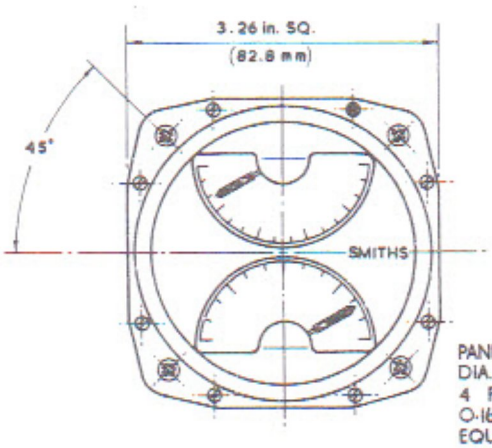
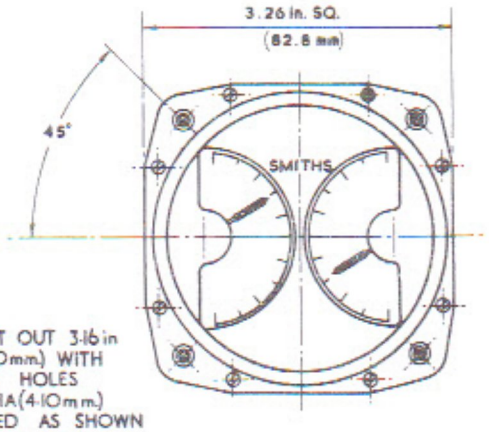


PANEL 32.



PANEL CUT OUT 3·16 in DIA. (80·20 mm.) WITH 4 FIXING HOLES 0·161 in DIA (4·10 mm.) EQUISPACED AS SHOWN ON A 3·50 in (88·90 mm.) P.C.D.

PANEL 25.



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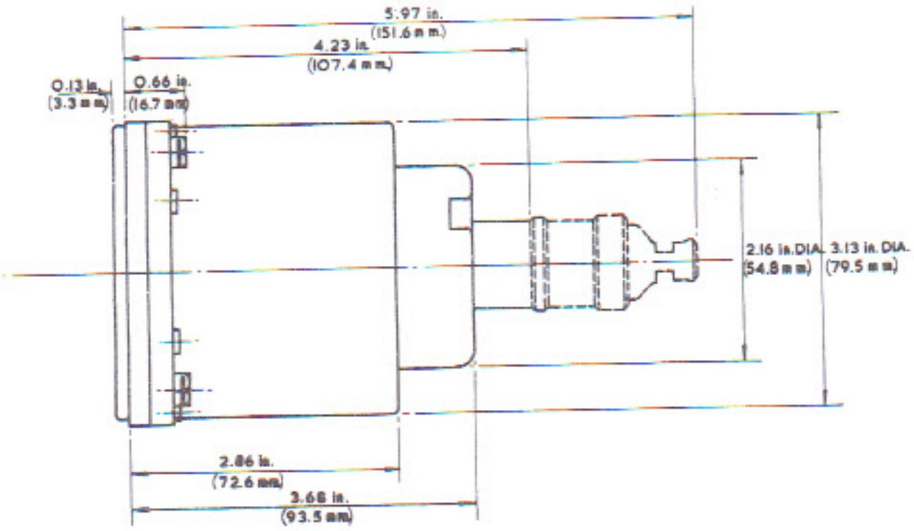

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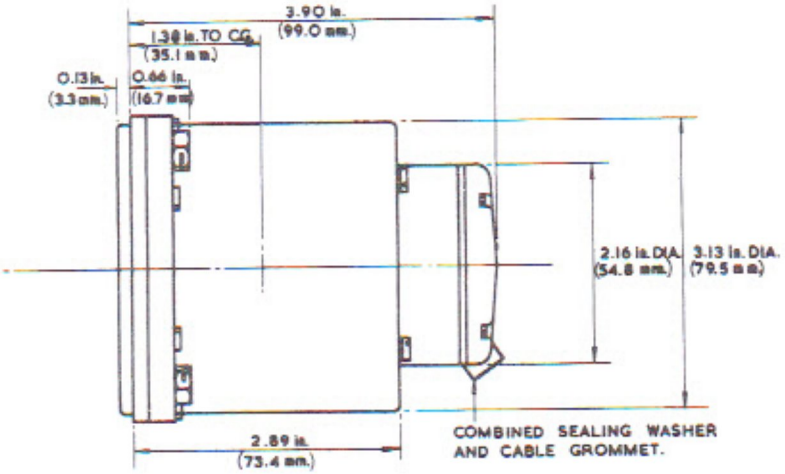

PANEL 30.

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UNPACKING

The unit is normally packed by being wrapped in waterproof paper, followed by a strip label impregnated with Vapour Phase Inhibitor. The strip label also serves as an Inspection record. The whole is then heat-sealed in a polythene bag and packed in shock-resistant moulds in a metal container. The lid of the container is sealed with adhesive polythene tape. The label attached to the container lists:-

1. Unit type and serial number.
2. Date of manufacture.
3. Inspection record.

The storage pack should be preserved for re-use when units need to be returned for overhaul. The unit should not be removed from the storage pack unless required for installation or periodic inspection. After check inspections the polythene bag should be re-sealed by a heat-sealing device. If such a device is not available adhesive polythene tape may be used. As much air as possible should be eliminated from the bag before sealing. The label is not intended to displace any requirement for Release Notes or similar certificates which may be required by the appropriate Airworthiness Authority.

ACCEPTANCE CHECKS

The indicator is a delicate instrument and may be damaged if it is roughly handled or incorrectly stored. On receipt, unpack the indicator, effect a careful visual examination for damage and check for functioning as detailed under BENCH CHECK. If satisfactory, re-pack and re-seal before placing into store.

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STORAGE CONDITIONS

The indicator must remain in its storage pack. It must be stored in a clean, dry position, away from any process area which may set up injurious fumes liable to attack the polythene sealing and promote corrosion.

STORAGE LIMITING PERIOD

Providing the storage conditions are fulfilled, the storage life of the indicator is 24 months.

On completion of 24 months in storage, the indicator should be dispatched to an approved instrument overhaul base, or to the manufacturer, for cleaning and re-lubrication followed by the standard serviceability tests. If satisfactory, the indicator can be re-certified and released for a further period of storage life.

CHECKS/TESTS BEFORE INSTALLATION

Remove the indicator from its pack, visually examine it for serviceability, then check for insulation resistance and functioning as detailed under BENCH CHECKS.

INSTALLATION

1. The indicator is suitable for installation on an anti-vibration panel in the central region of the aircraft, and is normally mounted from behind the panel. Details of the panel cut-out, and mounting details, including electrical connections, for individual Codes are given in the DATA section.

2. When installing indicators, check that they are being connected to the correct type of thermometer bulb or transmitter. The wiring should be in accordance with the external circuit diagram as listed in the DATA section. Indicators are attached to the aircraft panel by four screws.

CHECKS/TESTS AFTER INSTALLATION

After the system has been wired but before connecting into the aircraft electrical supply, test the whole circuit for continuity and insulation resistance as described in BENCH CHECK. On completion of the insulation resistance test, connect into the aircraft electrical system but do not switch on. The indicator pointer should be off-scale below zero. When the electrical supply is switched on, but the engines not running, the pointer should indicate the thermometer bulb temperature or zero pressure whichever is applicable. If the pointer should move to the full scale position or kick in the reverse direction, there is a fault in the wiring and the supply must be switched off immediately.

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MAINTENANCE

NOTE: The following schedule is recommended as a basis only and should be adjusted as necessary to suit the individual operator's type of service. The schedule covers the indicator only; the associated transmitter(s) being covered in Maintenance Manuals 79-30-176/02 or 79-30-205/40 and the associated wiring in the Aircraft Manual.

At Certificate of Maintenance, Maintenance Release or similar document time, when engine is ground run.	Check operation of system by observing indicator reading and pointer movement.
At airframe minor inspection periods.	Inspect indicator for cleanliness, security of attachment and electrical connections, and the dial and glass for cracks.

FAULTS, CAUSES AND RECTIFICATION (TROUBLE SHOOTING)

Fault	Cause	Rectification
Pointer flickering.	End contacts. Faulty transmitter.	Check contacts. Replace transmitter.
High or low reading.	Bad electrical connections.	Check connections.
Pointer sticking.	Dirty or damaged movement.	Replace indicator.

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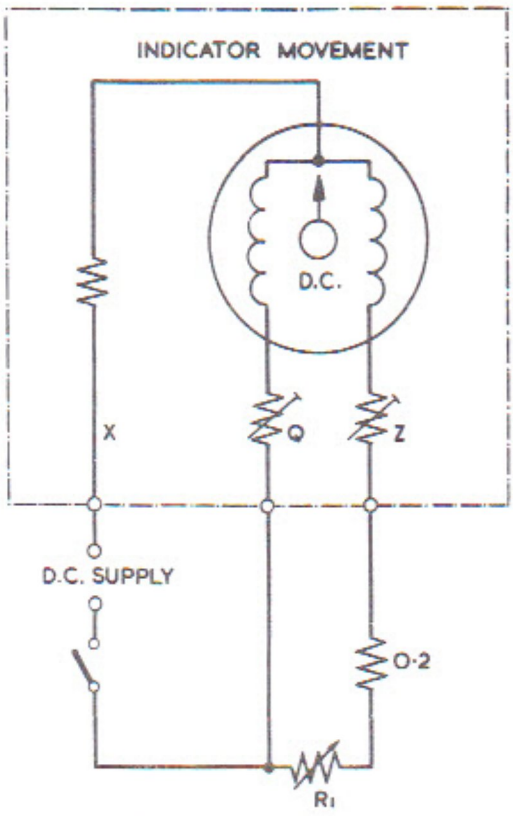

Fig. 8 Temperature test A

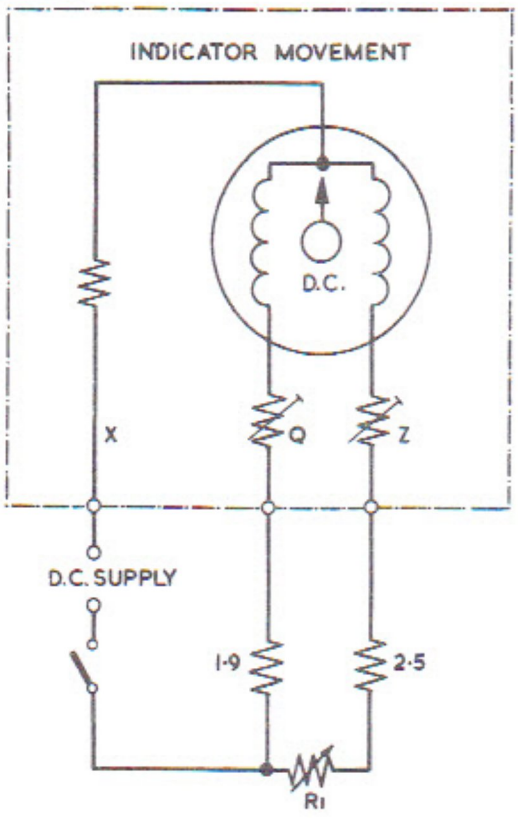

Fig. 9 Temperature test B

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(5) Repeat operation (4) at each point on the indicator scale.

(6) Double temperature indicating movements. Repeat the procedure in operations (2) to (5) with the second movement.

(7) Pressure/Temperature indicating movements. Check the pressure indicating movement by following the procedure in paragraph 3. B. below.

B. Pressure Indicating Movements

(1) Ascertain from the DATA section the following information applicable to the indicator:-

(a) The nominal voltage.
(b) The internal circuit diagram.
(c) The external circuit diagram.
(d) Whether the transmitter is of the round or square bobbin type.

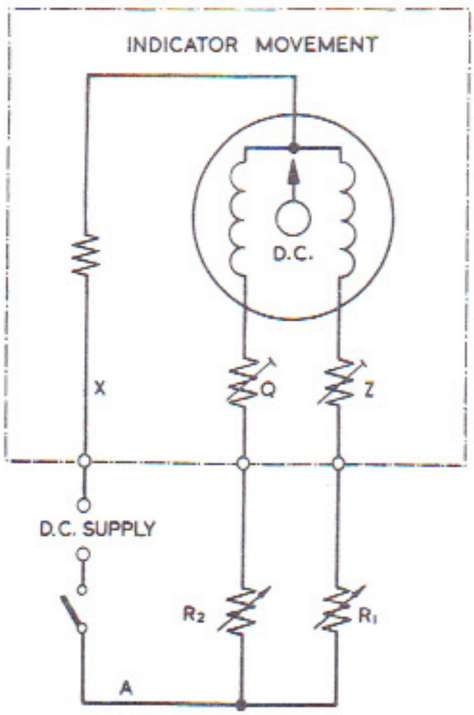

Fig. 10 Pressure test

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(2) Double movement indicators. Check one movement at a time and, if specified in the external circuit diagram, connect a resistor to the movement not being checked.

(3) From the internal circuit diagram identify wires Q, X and Z, of the movement and connect the indicator to the circuit as shown in fig.10.

(4) Round bobbin type transmitters. Refer to Tables 3 to 8 in the DATA section and select the table with the range applicable to the indicator. Set decade resistance boxes R1 and R2 to the values equivalent to the lowest reading on the indicator scale. Switch on the electrical supply. The indicator pointer should indicate the lowest reading on the dial within the tolerance laid down in Tests and Tolerances of the DATA section.

(5) Square bobbin type transmitters. Refer to Table 9 in the DATA section. Set the decade resistance boxes R1 and R2 to the values equivalent to the lowest reading on the indicator scale. Switch on the electrical supply. The indicator pointer should indicate the lowest reading on the dial within the tolerance laid down in Tests and Tolerances in the DATA section.

(6) Double pressure indicating movements. Repeat the procedure in operations (2) to (5) with the second movement.

(7) Pressure/Temperature indicating movements. Check the temperature indicating movement by following the procedure in paragraph 3.A.

4. Balance. Connect the indicator to the circuit used for calibration (see paragraphs 3.A and 3.B) and deflect the pointer to the mid-scale position. When the indicator is turned clockwise, anti-clockwise or backwards through 90 deg from the vertical, the pointer must not move from the mid-scale position by more than the amount laid down in Tests and Tolerances in the DATA section.

5. Friction. With the indicator still connected as for calibration but using variable rheostats with vernier control in place of decade resistances, deflect the pointer to the mid-scale position. Note the exact value of the resistance R1, or R1 and R2, and the exact position, then gradually adjust the value of R1, or R1 and R2 together, until the original value is reached. Again note the exact position of the pointer. Any difference between the two pointer positions should not exceed that laid down in Test and Tolerances in the DATA section.

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OVERHAUL PERIOD

1. It is recommended that the unit be removed for overhaul after the completion of:-

A. Fixed Wing Applications

Airframe mounted. 6000 hours flying or 36 months installed time, whichever is the sooner.

B. Helicopter and Vertical Take-off Applications

Airframe mounted. 3000 hours flying or 24 months installed time, whichever is the sooner.

2. The specified period of storage does not affect the installed time given, but unused storage time must not be added to the installed time.

NOTES: 1. The overhaul period is the maximum period at which it is recommended that the equipment is stripped, reconditioned and tested to specification as defined in the Overhaul Manual.

2. The equipment should be overhauled by an approved organisation with the necessary facilities at the nearest suitable period compatible with the routine maintenance cycle of the aircraft or engine.

3. (a) The periods stated are a recommendation only.

(b) If an increase in the periods quoted is sought, operators are requested to contact Smiths Aviation Division, (Technical Services Manager), to ascertain whether any additional supporting evidence exists before approaching their appropriate Airworthiness Authority for formal approval of the increase. Such consultation will assist in re-assessment of the periods quoted as these are under constant review.

(c) Recommended periods are as high as possible compatible with current operational experience, and re-assments are normally made in steps of not less than 500 hours.

RETURN TO MANUFACTURER OR BASE

Pack the indicator in waterproof paper, followed by a strip label impregnated with Vapour Phase Inhibitor. Heat-seal the whole in a polythene bag and pack in a shock resistant mould in a metal container in the same manner as originally received. If a heat-sealing device is not available, the polythene bag may be sealed with adhesive polythene tape. Included in the pack should be documentation giving a brief history of the indicator in service, together with the reason for return.

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The information normally required is:-

1. Code and serial number of indicator.
2. Date of removal from aircraft.
3. Note and date of any modifications.
4. Number of flying hours completed.
5. Date of last overhaul.
6. Reason for return of indicator.

The metal container is to be finally sealed with adhesive polythene tape.

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