WESTON
Schlumberger

WESTON INSTRUMENTS
GREAT CAMBRIDGE ROAD, ENFIELD,
MIDDLESEX, EN1 3RX, ENGLAND

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

VARIANTS:

S.542-1-14
S.542-1-15
S.542-1-16
S.542-1-17
S.542-1-18
S.542-1-20
S.542-1-31
S.542-1-42
S.542-1-44

COMPONENT MAINTENANCE MANUAL

WITH

ILLUSTRATED PARTS LIST

STATEMENT OF INITIAL CERTIFICATION

This manual complies with British Civil Airworthiness Requirements, Section A, Chapter A6-2.

Signed: Research & Engineering Manager

.....

Date: September 1985

CAA Approval No: DAI/1198/39

NOTE: The above certification does not apply to revisions or amendments made after the date of initial certification by other Approved Organisations. Revisions or amendments made by other Approved Organisations must each be separately certified, and recorded on separate record sheets.

THIS MANUAL HAS BEEN COMPILED AND PRINTED BY THE ENGINEERING DEPARTMENT, WESTON INSTRUMENTS

PRINTED IN ENGLAND
(Revision 2)
Sept. 1985

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

This manual complies with British Civil Airworthiness Requirements, Section A, Chapter A6-2

Signed 

Date 15th March 1978

CAA Approval No. DAI/1198/39

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

REV. NO.	INSERTION DATE	INCORPORATED BY
1	March 1978	Sangamo Weston Ltd.
2	Sept. 1985	Weston Instruments
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		

REV. NO.	INSERTION DATE	INCORPORATED BY
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

LIST OF EFFECTIVE PAGES

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

TABLE OF CONTENTS

ILLUSTRATIONS

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

INTRODUCTION

This manual contains shop maintenance instructions for the Weston Instruments Model S.542 Form 1.

The servicing procedures given are consistent with those accomplished by the manufacturer.

Differences between indicators such as range, scale presentation and pointer finishes are defined by Variant numbers (refer to Introduction-Illustrated Parts List) and details specific to Variants are listed separately-refer to the TABLE OF CONTENTS.

To accommodate additions of Variants to the manual, which could also require additions to other sections of the manual, the block system as outlined in A.T.A.100 has been used. The Variants are listed in the Description and Operation section of the manual.

Disassembly of parts of an indicator beyond that given in the manual is not recommended nor considered economical.

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

MODIFICATION STANDARDS

Modification standards listed on this page are applicable to all variants of the Model S.542 Form 1 indicators.

A modification standard relevant only to a particular variant of the model, will be listed in the related variant information.

A designated modification letter (or letters) which is marked on the scale of the model indicates that the modification has been embodied, this embodiment also applies to a following letter (or letters) of the modification standard.

Modification letter(s)	Service Bulletin No.

A. Description

The Model S542 Form 1 consists of a moving coil indicator housed in a cylindrical steel case. The model is provided with integral illumination from long-life 5V bulbs. The model is sealed after the injection of dry nitrogen.
Connections are made to a multi-way plug or a 10-way radial terminal block. The model can be adjusted for use as a temperature, pressure or liquid-level indicator. Whichever application is required, the indicator is calibrated for use with the appropriate external transducer.
Detailed information of circuit values is given in the pages containing information relevant to a particular variant - refer to the Table of Contents.
Some variants are provided with non-reflecting cover glasses.

Detail (Refer to Fig.301)

The two lamps are cemented to the cover glass and connected via leads to the lower board of the printed-circuit assembly (320).
The movement complete (220) comprises a moving element, (moving coil, pivot bases, pointer and control springs) which is pivoted in adjustable, jewelled bearings inset into top and bottom bridges which form part of the movement complete.
The coil of the moving element swings in a gap formed between a soft-iron core and a pole piece which partially surrounds the core. One end surface of a block magnet fits into a recess in the core and the other end surface fits into a recess in a yoke. The yoke encloses the core and pole piece.
An upper plate which is secured to the yoke, supports the pillars of the top bridge; the pillars of the bottom bridge are supported by a plate secured to the lower end of the pole piece. A heatsink is also secured to the plate. Two pointer-stops (230/240) are secured to the top bridge with nuts. The upper scale (130) and lower scale (140) are mounted on three pillars which are staked to the upper plate. A clip on the underside of the upper scale engages in a groove on its locating pillar. Two screws (110) secure both scales to the other two support pillars. The movement complete (220) is mounted on four spacers (250) which fit over the pillars of the ruggedized ring (280) and assembly (220) is secured to the ruggedized ring (280) with nyloc nuts (150). The printed-circuit board (320) and the ring (280) are secured to the projecting threads of the end plate (340).
Some variants are provided with a terminal flange which is secured to an alternative form of end plate (340A) provided with external projecting pillars to accommodate the flange (50).

B. Operation

Temperature Indicator

The moving element of movement complete (220) is connected across a bridge network which is energised from a voltage stabilised circuit which consists of a zener diode. Two arms of the bridge have identical resistance values, the other two arms consist of a wire-wound spool and the external transducer, which is generally a resistance thermometer element. The resistance of the element varies with varying temperature and causes an out-of-balance current to flow through the moving element. The current variations through the moving element can be related to temperature changes and used to design a preprinted scale for a chosen temperature range of the indicator.

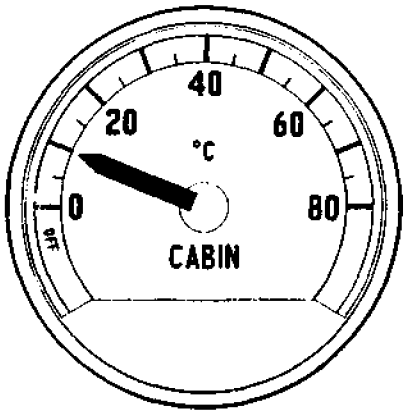
DESCRIPTION AND OPERATION

All the components of the bridge network are preadjusted by the manufacturer and are assembled on a printed circuit board assembly (320).

Pressure Indicator

The moving element of movement complete (220) is connected across a bridge network which is energised from a constant current, temperature compensated, circuit. The constant current circuit consists of two transistors, two zener diodes and associated components.
The bridge network consists of a resistor in each of two arms; the other two arms are formed by the external transducer and the resistance of each arm varies as the pressure, although their combined resistance remains constant.
A series resistor is connected in the moving coil circuit to improve the temperature coefficient of the bridge circuit.

MODEL S.542.1.14



Description

Model S.542.1.14 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge network that is energised by a voltage stabiliser circuit. The circuit is designed for use with a resistance thermometer element as the sensor. The temperature resistance law of the sensor is as defined in MIL-B-7990A specification and the range of the indicator is 0°C to 80°C. In the event of a power failure, the indicator pointer is deflected to the word 'OFF' printed on the indicator scale.
The scale presentation is illustrated. The caption °C is finished in light blue; the caption CABIN, the word OFF, the scale dividing lines, figures and the pointer are finished in white. The scale background is matt black.
Connections to the indicator are made by use of a 6-pin connector fitted to the endplate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	50 - 71 ohms
Zener Diode	9.1V ± 5%
Moving-coil Sensitivity (in Case)	0°C - approx. 0.066mA 80°C - approx. 1.06mA
Maximum circuit current at 26V	45mA
Lamps	5V, Total current (nominal) - 230mA

Test and Calibration

1. Connect the indicator into the circuit given in Fig.(101) in the Testing Section of the Manual.
   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table, and check the accuracy of the indicator.

Calibration Table

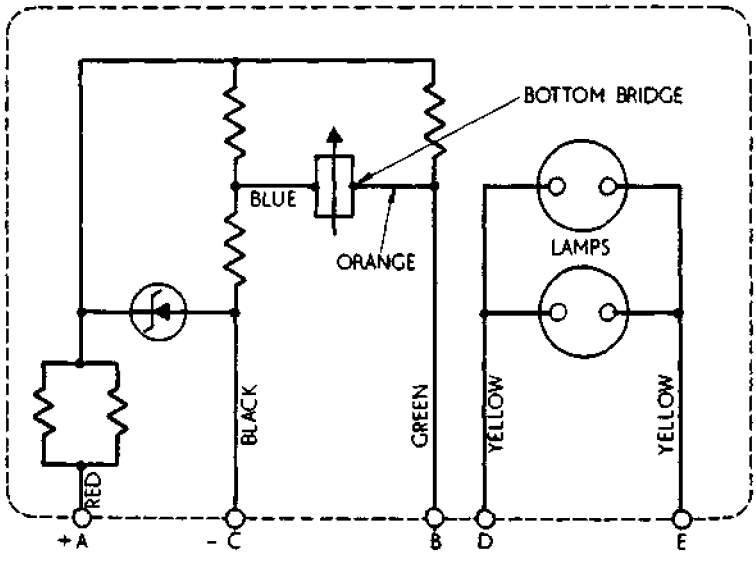
°C	R1 ohms
80	120.8
70	116.7
60	112.7
50	108.8
40	105.0
30	101.3
20	97.7
10	94.2
0	90.8

NOTE: The resistance values of the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible resistance.

MODEL S.542.1.14

Accuracy

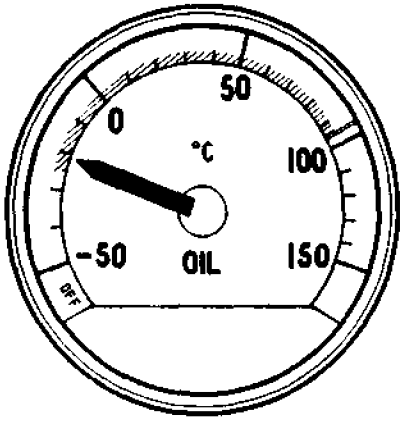
The accuracy of the indicator is ± 2.5% of full scale deflection, that is, ± 2°C.



Circuit diagram of S.542.1.14

MODEL S.542 FORM 1 - TEMPERATURE INDICATOR -50/150°C

MODEL S.542.1.15



Description

Model S.542.1.15 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge network that is energised from a voltage stabiliser circuit.
The circuit is designed for use with a Weston Insts. platinum-law resistance thermometer element as the sensor, Model S110G, to indicate temperature over the range -50° to +150°C.
In the event of a power failure, the indicator pointer is deflected to the word 'OFF'.
The scale presentation is illustrated, the caption °C is finished in light blue; the caption OIL, the word OFF, the scale dividing lines, figures and the pointer are finished in white; the scale background is matt black. The scale also has a green coloured band which extends from -25°C to 95°C, and a red major mark is positioned at 95°C.
Connections to the indicator are made by use of a 6-pin connector fitted to the end plate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	95 - 129 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity (in Case)	-50°C - approx. 0.06mA 150°C - approx. 1.2mA
Maximum circuit current at 26V	45mA
Lamps	5V, Total current (nominal) 230mA

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/Trouble Shooting section of the manual.
The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

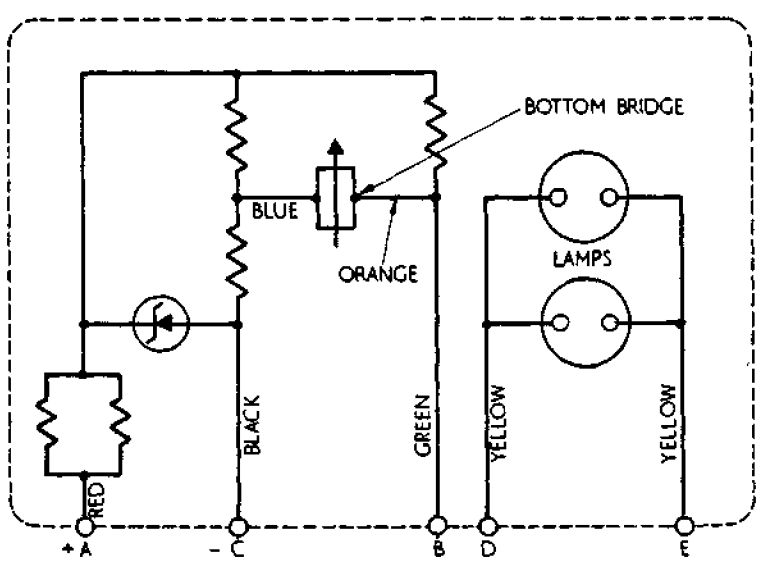
Calibration Table

°C	R1 ohms	°C	R1 ohms	°C	R1 ohms	°C	R1 ohms
150	205.9	100	181.1	50	155.9	0	130.4
140	201.0	90	176.1	40	150.9	-10	125.3
130	196.0	80	171.1	30	145.8	-20	120.1
120	191.1	70	166.1	20	140.7	-30	114.9
110	186.1	60	161.0	10	135.5	-40	109.7
						-50	104.5

NOTE: The resistance values in the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible

Accuracy

The accuracy of the indicator is ± 2% of full scale deflection, that is, ± 4°C.

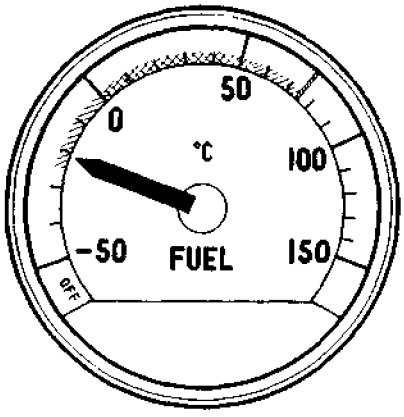


Circuit diagram of S.542.1.15

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - TEMPERATURE INDICATOR -50/150°C

MODEL S.542 1.16



Description

Model S.542.1.16 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge network that is energised from a voltage stabiliser circuit.
The circuit is designed for use with a Weston Insts. platinum-law resistance thermometer element as the sensor, Model S110G, to indicate temperature over the range -50°C to +150°C.
In the event of a power failure, the pointer is deflected to the word 'OFF'.
The scale presentation is illustrated. The caption °C is finished in light blue; the caption FUEL, the word OFF, the scale dividing lines, figures and the pointer are finished in white; the scale background is matt black. The scale also has three coloured bands. A yellow band extends from -25°C to +2°C and also from +55°C to +75°C; a green band extends from +2°C to +55°C and a red major mark is positioned at 75°C.
Connections to the indicator are made by use of a 6-pin connector fitted to the end-plate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	95 - 129 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity (in Case)	-50°C - approx. 0.06mA 150°C - approx. 1.2mA
Maximum circuit current at 26V	45mA
Lamps	5V, Total current (nominal) - 230mA

MODEL S.542.1.16

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/Trouble Shooting section of the manual.
   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

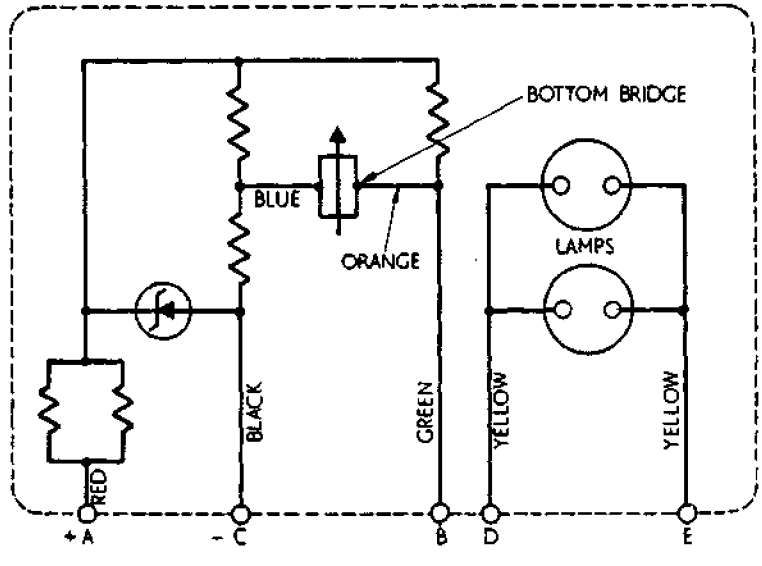
Calibration Table

°C	R1 ohms	°C	R1 ohms	°C	R1 ohms	°C	R1 ohms
150	205.9	100	181.1	50	155.9	0	130.4
140	201.0	90	176.1	40	150.9	-10	125.3
130	196.0	80	171.1	30	145.8	-20	120.1
120	191.1	70	166.1	20	140.7	-30	114.9
110	186.1	60	161.0	10	135.5	-40	109.7
						-50	104.5

NOTE: The resistance values in the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible resistance.

Accuracy

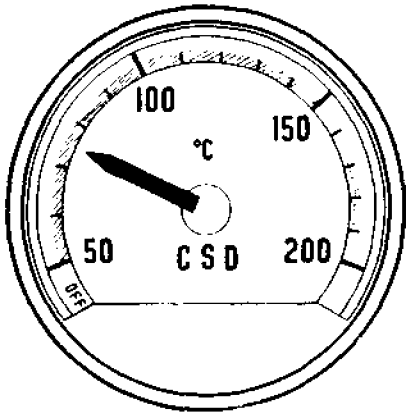
The accuracy of the indicator is ± 2% of full scale deflection, that is, ± 4°C.



Circuit diagram of S.542.1.16

MODEL S.542 FORM 1 - TEMPERATURE INDICATOR +50/200°C

MODEL S.542.1.17



Description

Model S.542.1.17 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge network that is energised from a voltage stabiliser circuit. The circuit is designed for use with a Weston Insts. platinum-law resistance thermometer element as the sensor, Model S110G, to indicate temperature over the range +50°C to +200°C.
In the event of a power failure, the indicator pointer is deflected to the word OFF.
The scale presentation is illustrated.The caption °C is finished in light blue;the letters CSD the word OFF, scale figures and lines are finished white on a matt black background. The pointer is also finished white. The scale also has a green coloured band from 50° to 150°C and a red coloured band from 150°C to 200°C.
Connections to the indicator are made via a 6-pin connector fitted to the endplate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	50 - 71 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity	50°C - approx. 0.06mA 250°C - approx. 1.2mA
Maximum circuit current at 26V	45mA
Lamps	5V, Total current (nominal) 230mA

MODEL S.542.1.17

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing Section of the Manual.
   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table, and check the accuracy of the indicator.

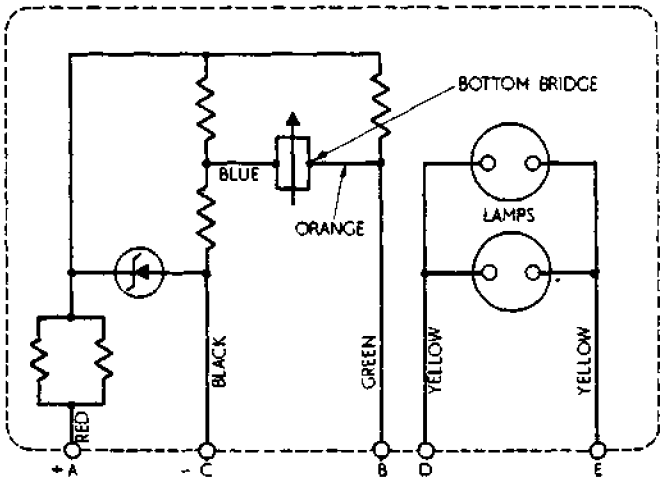
Calibration Table

°C	R1 ohms	°C	R1 ohms
200	230.3	120	191.1
190	225.4	110	186.1
180	220.6	100	181.1
170	215.7	90	176.1
160	210.8	80	171.1
150	205.9	70	166.1
140	201.0	60	161.0
130	196.0	50	155.9

NOTE: The resistance values in the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible resistance.

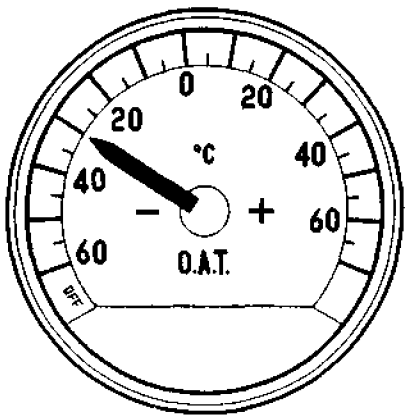
Accuracy

The accuracy of the indicator is ± 2% of full scale deflection, that is, ± 5°C.



Circuit diagram of S.542.1.17
(Revision 2)
Sept. 1985

MODEL S.542.1.18



Description

Model S.542.1.18 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge network that is energised by a voltage stabiliser. The circuit is designed for use with a resistance thermometer element as the sensor. The temperature resistance law of the sensor is as defined in MIL-B-8598 specification and the range of the indicator is -60°C to +70°C.
In the event of a power failure, the indicator pointer is deflected to the word OFF.
The scale presentation is illustrated. The caption °C is finished in light blue; the caption OAT, the word OFF, the scale dividing lines, and the figures are finished white. The pointer is also finished white.
Connections to the indicator are made via a 6-pin connector fitted to the endplate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	50 - 71 ohms
Zener Diode	9.1V + 5%
Moving coil Sensitivity (in Case)	-60°C - approx. 0.06mA +70°C - approx. 1.3mA
Maximum circuit current at 26V	45mA
Lamps	5V, Total current (nominal) - 230mA

MODEL S.542.1.18

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/Trouble Shooting section of the manual.
   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

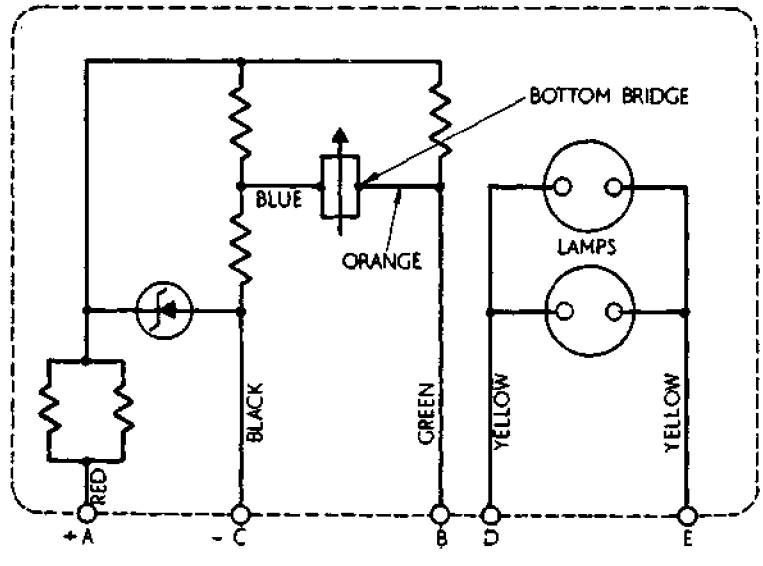
Calibration Table

°C	R1 ohms	°C	R1 ohms
70	116.7	0	90.8
60	112.7	-10	87.4
50	108.8	-20	84.2
40	105.0	-30	81.0
30	101.3	-40	77.8
20	97.7	-50	74.6
10	94.2	-60	71.6

NOTE: The resistance values in the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible resistance.

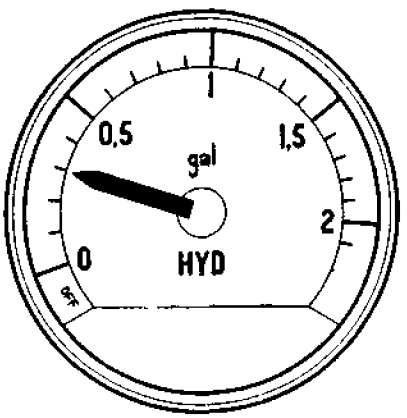
Accuracy

The accuracy of the indicator is ± 2% of full scale deflection, that is, ± 2.6°C.



Circuit diagram of S.542.1.18

MODEL S.542.1.20



Description

Model S.542.1.20 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge network that is energised by a voltage stabiliser. The circuit is designed for use with an external transducer which consists of a variable resistance.
In the event of a power failure, the pointer of the indicator is deflected to the word OFF. The scale presentation is illustrated. The caption 'gal' is finished in light blue, the caption HYD and the word OFF, the scale dividing lines and the figures are finished white; the pointer is also finished white.
Connections to the indicator are made via a 6-pin connector fitted to the endplate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram. A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	50 - 71 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity (in Case)	0 gal - approx. 0.08mA 2.1gal - approx. 1.5mA
Maximum current at 26V	35mA
Lamps	5V, Total current (nominal) - 230mA

MODEL S.542.1.20

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/Trouble Shooting section of the manual.

   The resistance box R1 is adjusted to simulate the resistance changes of the external transducer.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

Calibration Table

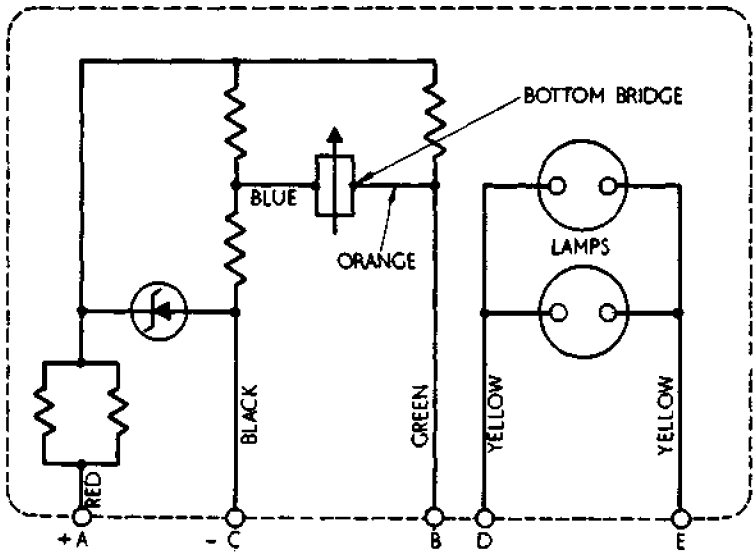
Scale Value	R1 ohms	Scale Value	R1 ohms
2.1	80.0	1	38
2	76.0	0.9	34.2
1.9	72.2	0.8	30.4
1.8	68.4	0.7	26.6
1.7	64.6	0.6	22.8
1.6	60.8	0.5	19.0
1.5	57.0	0.4	15.2
1.4	53.2	0.3	11.4
1.3	49.4	0.2	7.6
1.2	45.6	0.1	3.8
1.1	41.8	0	0

NOTE: Use connecting leads of negligible resistance from the resistance box R1 to the indicator.

MODEL S.542.1.20

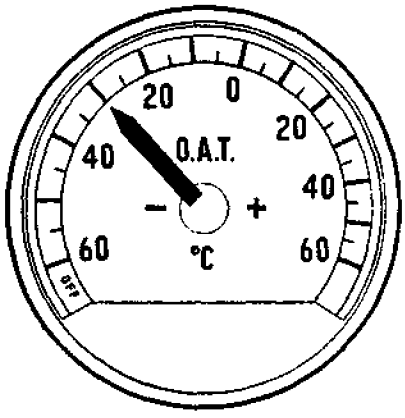
Accuracy

The accuracy of the indicator is ± 2%, that is, ± 0.042 gal.



Circuit diagram of S.542.1.20

MODEL S.542.1.31



Description

Model S.542.1.31 is a direct current, permanent magnet, moving coil milliammeter, used in a bridge circuit that is energised from a voltage stabiliser circuit. The circuit is designed for use with a Weston Insts. platinum-law resistance thermometer element as the sensor, Model S110G, to indicate temperature over the range -60°C to +60°C.
In the event of a power failure, the indicator pointer is deflected to the word 'OFF'.
The scale presentation is illustrated. The captions °C, OAT, OFF and all the scale dividing lines and figures are finished white on a matt black background; the pointer is also finished white.
Connections to the indicator are made via a 10-way, radial terminal block fitted to the end-plate of the indicator. The connecting screws have 4-40 UNC threads.
The internal connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	50 - 71 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity	-60°C - approx. 0.08mA +60°C - approx. 1.48mA
Maximum circuit current at 26V	35mA
Lamps	5V, Total current (nominal) - 230mA

MODEL S.542.1.31

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/Trouble Shooting section of the manual.

   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

Calibration Table

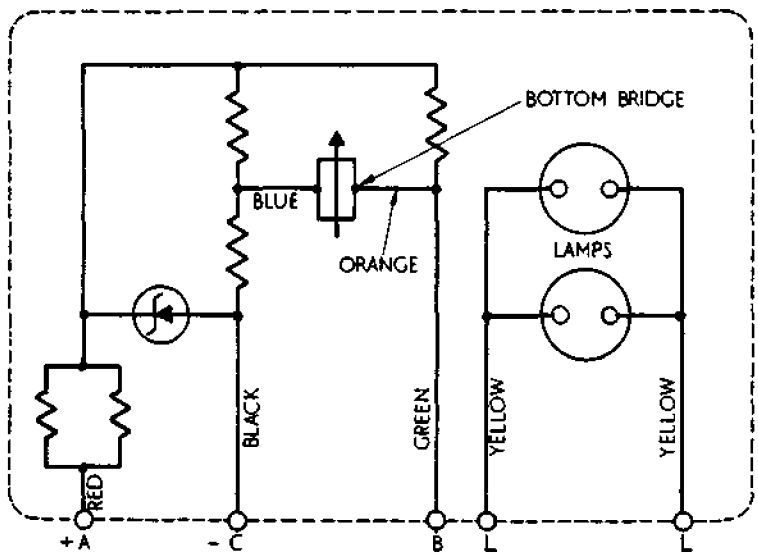
°C	R1 ohms	°C	R1 ohms
60	161.2	-10	125.5
50	156.1	-20	120.3
40	151.1	-30	115.1
30	146.0	-40	109.9
20	140.9	-50	104.7
10	135.7	-60	99.4
0	130.6		

NOTE: The resistance values in the Calibration Table include 0.5 ohm for lead resistance and 0.1 ohms for self-heating errors; use connecting leads of negligible resistance.

MODEL S.542.1.31

Accuracy

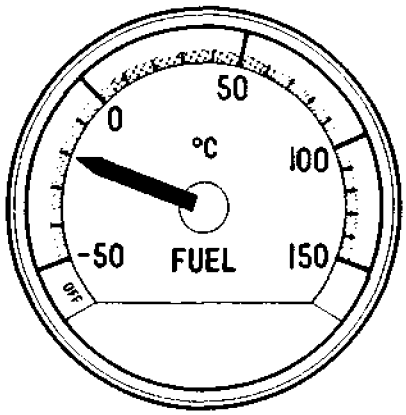
The accuracy of the indicator is ± 2% of full scale deflection, that is ± 2.4°C.



Circuit diagram of S.542.1,31

MODEL S.542 FORM 1 - TEMPERATURE INDICATOR -50°C/150°C

MODEL S.542-1-42



Description

Model S.542-1-42 is a direct current, permanent magnet, moving coil milli-ammeter, used in a bridge network that is energised from a voltage stabiliser circuit.
The circuit is designed for use with a WESTON INSTS. platinum-law resistance thermometer element as the sensor, Model S.110G, to indicate temperature over the range -50°C to +150°C.
In the event of a power failure, the pointer is deflected to the word 'OFF'.
The scale presentation is illustrated. The caption °C is finished in light blue; the caption FUEL, the word OFF, the scale dividing lines, figures and the pointer are finished in white; the scale background is matt black. The scale also has three coloured bands. A yellow band extends from -50°C to +5°C and also from +65°C to 150°C; a green band extends from +5°C to +65°C.
Connections to the indicator are made by use of a 6-pin connector fitted to the end-plate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	95 - 129 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity (in Case)	-50°C - approx. 0.06mA 150°C - approx. 1.2mA
Maximum circuit current at 26V	35mA
Lamps	5V, Total current (nominal) - 230mA

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/ Trouble Shooting section of the manual.
   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

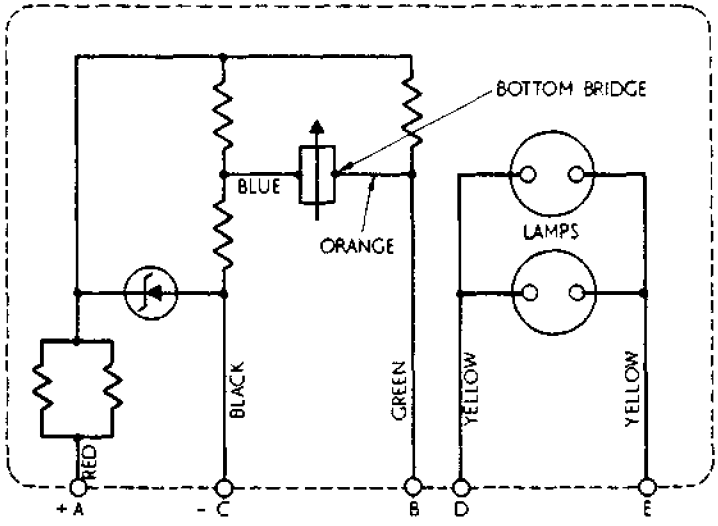
Calibration Table

°C	R1 ohms	°C	R1 ohms	°C	R1 ohms	°C	R1 ohms
150	205.9	100	181.1	50	155.9	0	130.4
140	201.0	90	176.1	40	150.9	-10	125.3
130	196.0	80	171.1	30	145.8	-20	120.1
120	191.1	70	166.1	20	140.7	-30	114.9
110	186.1	60	161.0	10	135.5	-40	109.7
						-50	104.5

NOTE: The resistance values in the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible resistance.

Accuracy

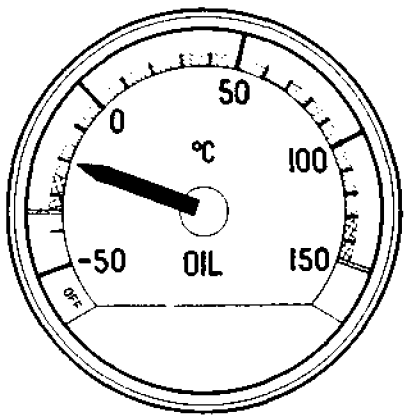
The accuracy of the indicator is ± 2% of full scale deflection, that is, ± 4°C.



Circuit diagram of S.542-1-42

MODEL S.542 FORM 1 - TEMPERATURE INDICATOR -50°C/150°C

MODEL S.542-1-44



Description

Model S.542-1-44 is a direct current, permanent magnet, moving coil milli-ammeter, used in a bridge network that is energised from a voltage stabiliser circuit.
The circuit is designed for use with a WESTON INSTS. platinum-law resistance thermometer element as the sensor, Model S.110G, to indicate temperature over the range -50°C to +150°C.
In the event of a power failure, the pointer is deflected to the word 'OFF'.
The scale presentation is illustrated. The caption °C is finished in light blue; the caption FUEL, the word OFF, the scale dividing lines, figures and the pointer are finished in white; the scale background is matt black. The scale also has three coloured bands. A yellow band extends from -35°C to -25°C and also from +130°C to +150°C; a green band extends from -25°C to +130°C, red major marks are positioned at -35°C and +150°C.
Connections to the indicator are made by use of a 6-pin connector fitted to the end-plate of the indicator. The internal circuit connections of the indicator are shown in the circuit diagram.
A non-reflecting glass is fitted to the case of the indicator.

Data

Resistance of moving element (including springs)	95 - 129 ohms
Zener Diode	7.5V ± 5%
Moving-coil Sensitivity (in Case)	-50°C - approx. 0.06mA 150°C - approx. 1.2mA
Maximum circuit current at 26V	35mA
Lamps	5V, Total current (nominal) - 230mA

Test and Calibration

1. Connect the indicator into the circuit given in Fig. (101) in the Testing/ Trouble Shooting section of the manual.
   The resistance box R1 is adjusted to simulate the resistance changes of the thermometer element.

2. Use the resistance values given in the Calibration Table and check the accuracy of the indicator.

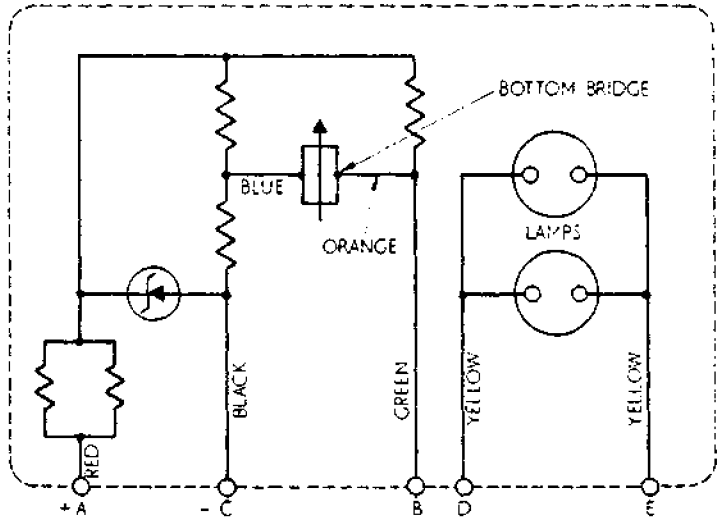
Calibration Table

°C	R1 ohms	°C	R1 ohms	°C	R1 ohms	°C	R1 ohms
150	205.9	100	181.1	50	155.9	0	130.4
140	201.0	90	176.1	40	150.9	-10	125.3
130	196.0	80	171.1	30	145.8	-20	120.1
120	191.1	70	166.1	20	140.7	-30	114.9
110	186.1	60	161.0	10	135.5	-40	109.7
						-50	104.5

NOTE: The resistance values in the Calibration Table include 0.4 ohm for lead resistance and self-heating errors; use connecting leads of negligible resistance.

Accuracy

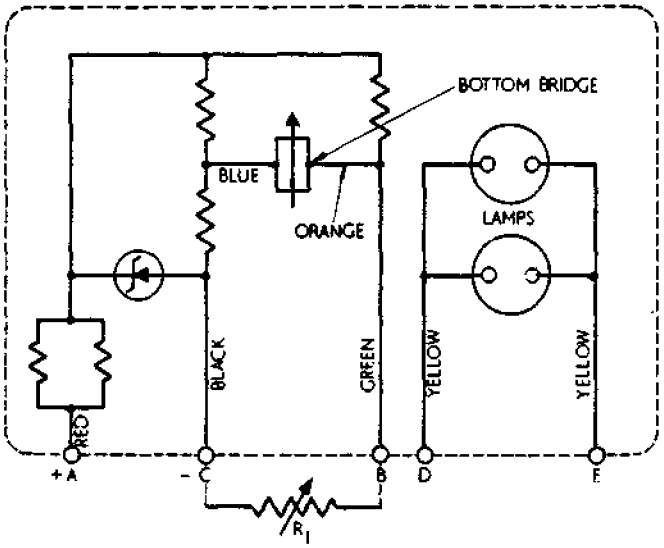
The accuracy of the indicator is ± 2% of full scale deflection, that is, ± 4°C.



Circuit diagram of S.542-1-44

1. General

The procedure given presumes that the indicator has been removed from the aircraft because of a fault condition. However, the numerical testing sequence follows a step-by-step procedure which combines with diagnosis of faults that can occur at the Assembly and Testing levels.



Test Circuit Diagram - Temperature Indicator
Fig. 101

2. Testing and Trouble Shooting Procedure - Temperature Indicator

The figure of Fig.101 is used for Testing purposes and the isolation of faults.

The Test/Fault flow diagram, Fig.102, gives a step-by-step procedure to isolate faults.

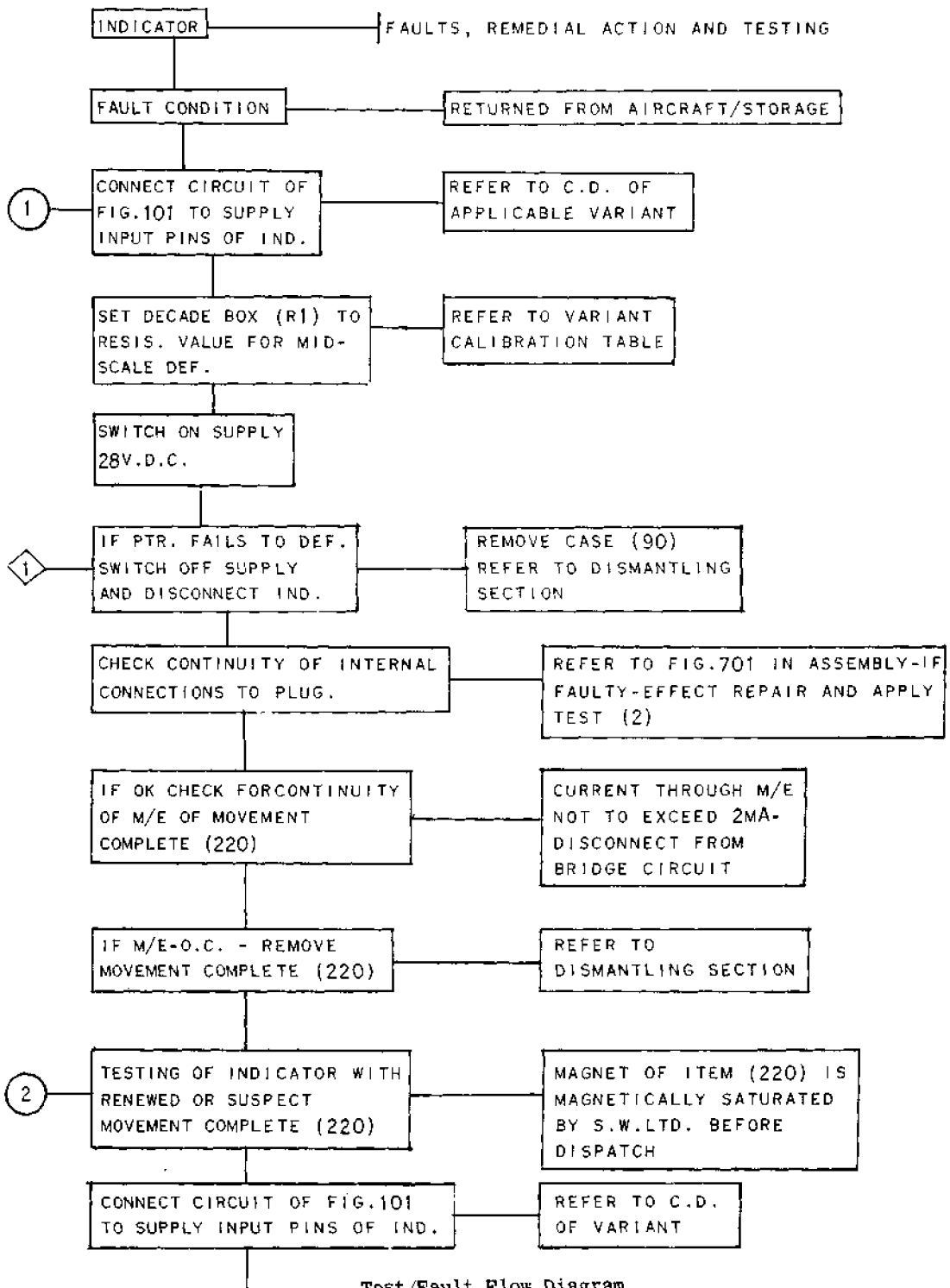
LEGEND:

O.C.	.. .. OPEN CIRCUIT	P.C.B.A.	.. .. PRINTED CIRCUIT BOARD ASSY.
M/E	.. .. MOVING ELEMENT	MA.	.. .. MILLIAMPERES
IND.	.. .. INDICATOR	L.H.	.. .. LEFT-HAND
W.D.	.. .. WIRING DIAGRAM	R.H.	.. .. RIGHT-HAND
C.D.	.. .. CIRCUIT DIAGRAM	DEF.	.. .. DEFLECTION
PTR.	.. .. POINTER	V.D.C.	.. .. VOLTS DIRECT CURRENT
RESIS.	.. .. RESISTANCE	F.S.D.	.. .. FULL SCALE DEFLECTION
CAL.	.. .. CALIBRATION		

Faults are indicated with diamond patterns ◇ and Tests with circles ○

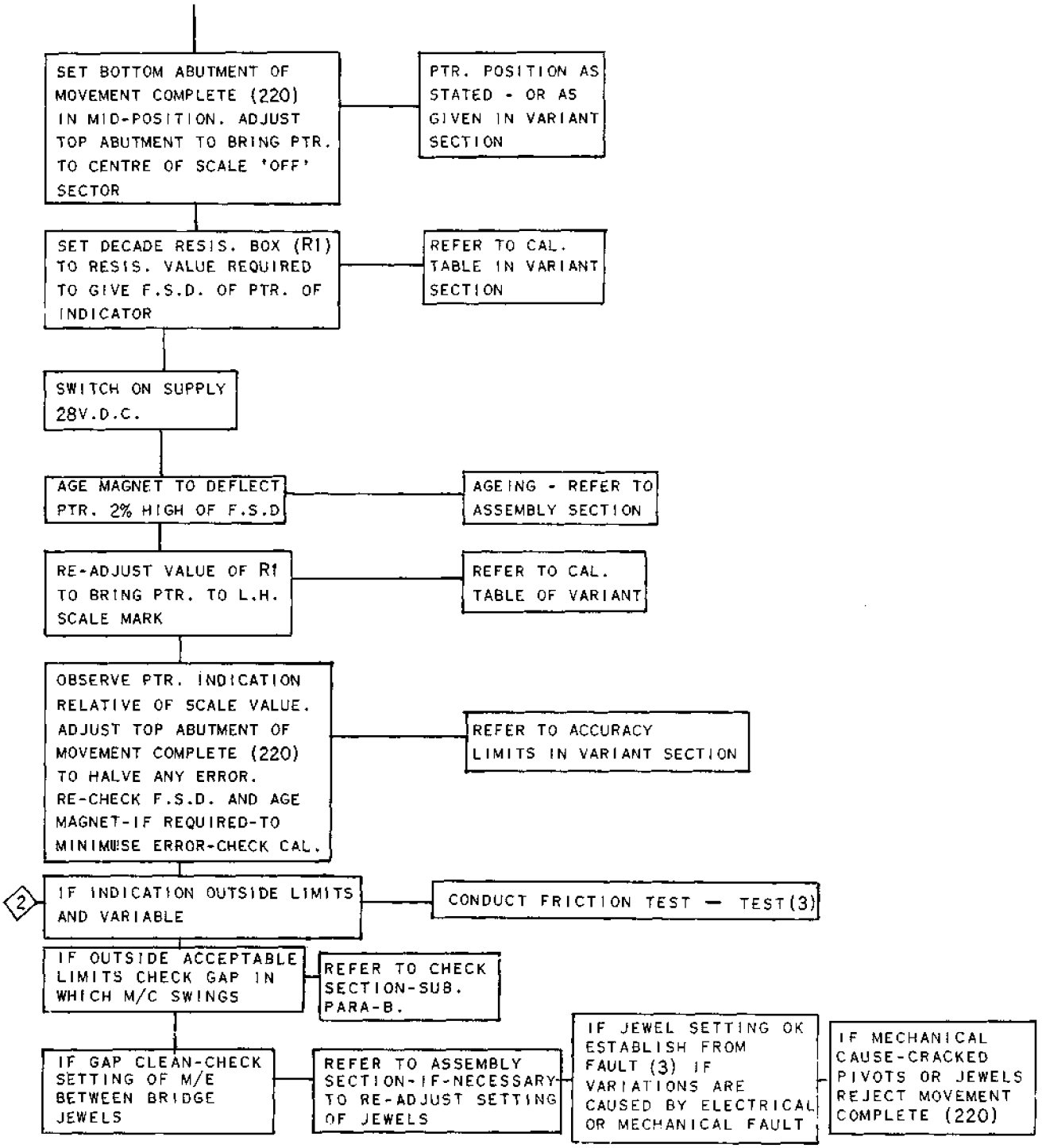
TESTING AND TROUBLE SHOOTING

Temperature Indicator



Test/Fault Flow Diagram
Fig. 102 (Sheet 1 of 4)

TESTING AND TROUBLE SHOOTING



Test/Fault Flow Diagram
Fig. 102 (Sheet 2 of 4)

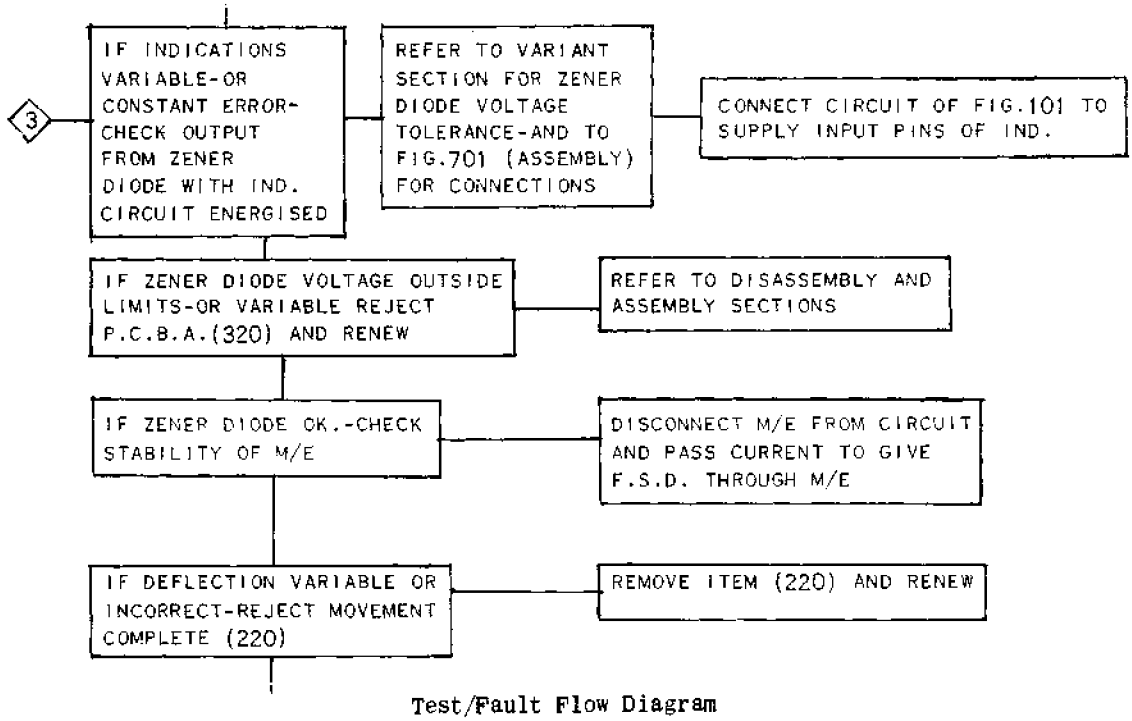
3 FRICTION TEST

1. CONNECT THE INDICATOR INTO THE CIRCUIT OF FIG.101 THE RESISTANCE BOX-R1 MUST BE OF A CONTINUOUSLY VARIABLE TYPE-NOT IN DECADE STEPS.
   MOUNT THE INDICATOR WITH ITS SCALE IN A VERTICAL PLANE.

2. ENERGISE THE INDICATOR (26V.D.C.) WITH BOX R1 SET TO DEFLECT THE PTR. TO THE L.H. SCALE CARDINAL-LIGHTLY TAP INDICATOR GRADUALLY VARY R1 TO BRING PTR. TO VERTICAL POSITION AND ALIGNED WITH A SCALE CARDINAL OR DIVISION LINE-DO NOT OVERSHOOT LINE. NOTE VALUE OF R1.

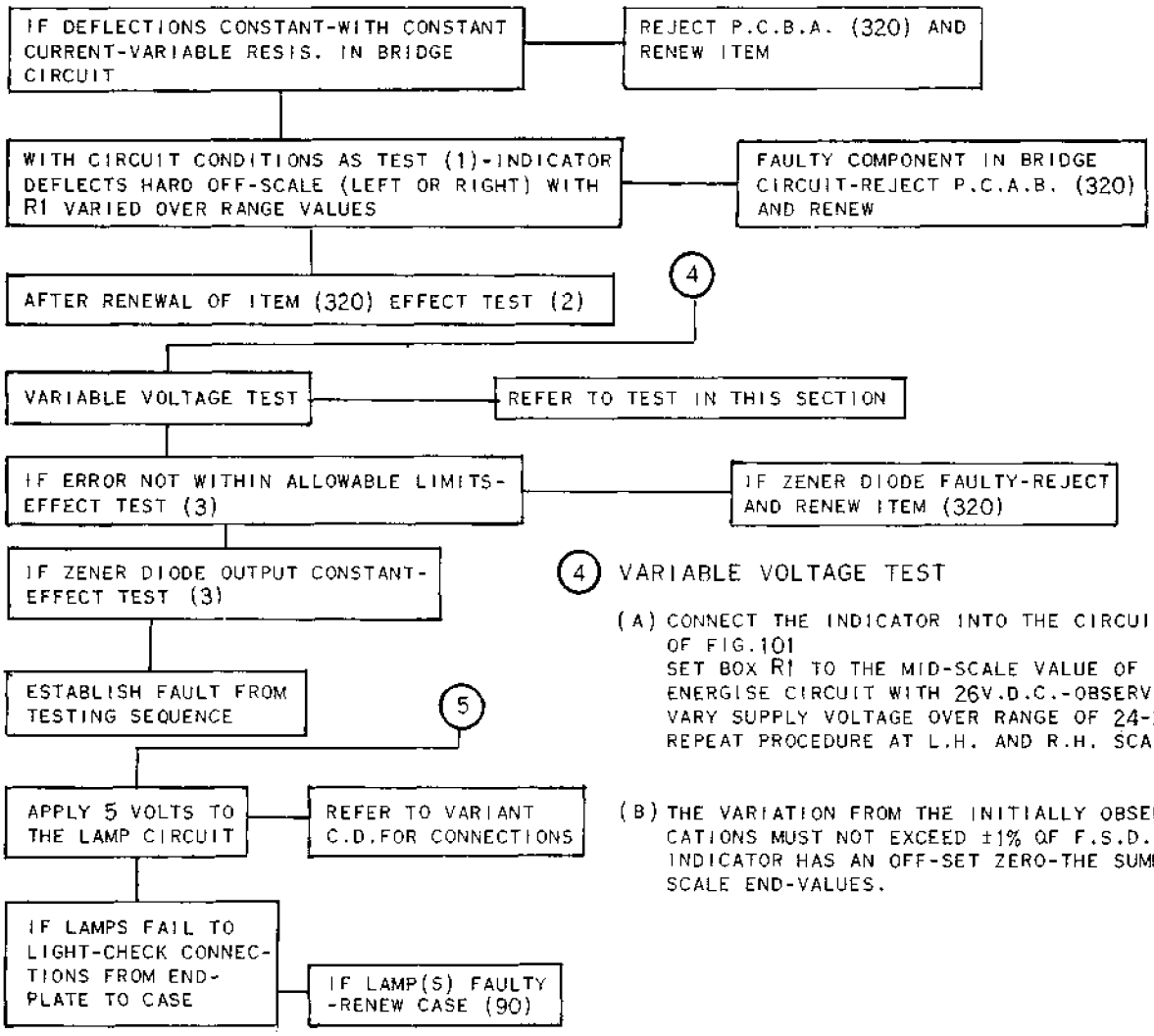
3. GRADUALLY VARY R1 TO DEFLECT PTR. TO R.H. SCALE CARDINAL-LIGHTLY TAP INDICATOR. GRADUALLY VARY R1 UNTIL ITS VALUE IS AS NOTED IN 2. OBSERVE THE ERROR (IF ANY) IN THE PTR. DEFLECTION AS CHOSEN IN 2.

THE ERROR IS THE DIFFERENCE (IF ANY) BETWEEN THE TWO NOTED PTR. INDICATIONS AS A % OF F.S.D.- OR IF THE INDICATOR HAS AN OFF-SET ZERO, THE SUMMATION OF THE SCALE END VALUES. THE ERROR MUST NOT EXCEED ±2%.



Test/Fault Flow Diagram
Fig. 102 (Sheet 3 of 4)

TESTING AND TROUBLE SHOOTING



(4) VARIABLE VOLTAGE TEST

(A) CONNECT THE INDICATOR INTO THE CIRCUIT OF FIG.101
SET BOX R1 TO THE MID-SCALE VALUE OF INDICATOR.
ENERGISE CIRCUIT WITH 26V.D.C.-OBSERVE INDICATION.
VARY SUPPLY VOLTAGE OVER RANGE OF 24-29 VOLTS.
REPEAT PROCEDURE AT L.H. AND R.H. SCALE CARDINALS.

(B) THE VARIATION FROM THE INITIALLY OBSERVED INDICATIONS MUST NOT EXCEED ±1% OF F.S.D.-OR IF THE INDICATOR HAS AN OFF-SET ZERO-THE SUMMATION OF SCALE END-VALUES.

NOTE: EFFECT THE HIGH VOLTAGE AND INSULATION TESTS IMMEDIATELY BEFORE AND AFTER SEALING THE INDICATOR.

(6) HIGH VOLTAGE AND INSULATION TESTS

(A) HIGH VOLTAGE

APPLY 500 VOLTS R.M.S. BETWEEN THE INDICATOR CIRCUITS BONDED TOGETHER AND ITS CASE FOR A PERIOD OF 1 MINUTE.
THERE MUST BE NO INSULATION BREAKDOWN.

(B) INSULATION RESISTANCE

IMMEDIATELY FOLLOWING THE HIGH VOLTAGE TEST, CHECK THE INSULATION OF THE INDICATOR BETWEEN THE CIRCUITS:

(1) BETWEEN ALL CIRCUITS BONDED TOGETHER AND THE CASE.

THE INSULATION RESISTANCE MUST NOT BE LESS THAN TWENTY MEGOHMS AFTER THE APPLICATION OF 500 VOLTS D.C. FOR NOT LESS THAN 15 SECONDS.

Test/Fault Flow Diagram
Fig. 102 (Sheet 4 of 4)

DISASSEMBLY

A. General

Ascertain if the indicator has been returned with a history sheet, which may indicate any part needing particular attention.
Complete disassembly details are not given as such action is not generally necessary nor considered economical.

NOTE: Connect the indicator into a circuit as shown in the Testing and Trouble Shooting section to establish the electrical condition of the indicator or most probable cause of its malfunction. This action will determine the extent of the required disassembly.

B. Procedure (Refer to Fig.301)

(1) If the indicator is of the radial-terminal block type, remove round nuts (10), 3 off; collect flange cover (20) and cover plates (41). Carefully withdraw terminals (40) with connection wires and screw and washer assemblies (30) attached; collect drilled flange (50) and pillar (60) from end-plate (340A).

(2) Remove sealing wire (70) from the end-plate; pull it clear with a pair of pliers.

(3) Carefully withdraw the indicator from its cover until it is possible to prise out seating ring (80).
Exercise care in withdrawing the indicator to avoid breaking connections from the printed-circuit board assembly (320).

(4) Unsolder the lamp connections from the lower board-assembly (320); withdraw the indicator from its case (90) and remove moulded collar (100).

(5) Remove scale screws (110) and lockwashers (120), 2 off each item; remove the upper scale (130) and lower scale (140).
Exercise care and avoid damage to the pointer when withdrawing the scales.

(6) Unsolder from movement complete (220) its top bridge connection. Remove nyloc nuts (150), 4 off; carefully withdraw assembly (220) and unsolder the connection from its bottom bridge.

(7) If fitted, and if the movement complete is being renewed, remove the following items from the movement complete (220).
Screws (160), lockwashers (170), spool (180), screws (190), lockwashers (200) and collect spool mounting bracket (210).

NOTE: Disassembly of movement complete (220) is not recommended as special techniques are used to determine the relative final positions of the core, magnet and pole piece to enable a pre-printed scale to be provided with the required accuracy when the indicator is used.

DISASSEMBLY

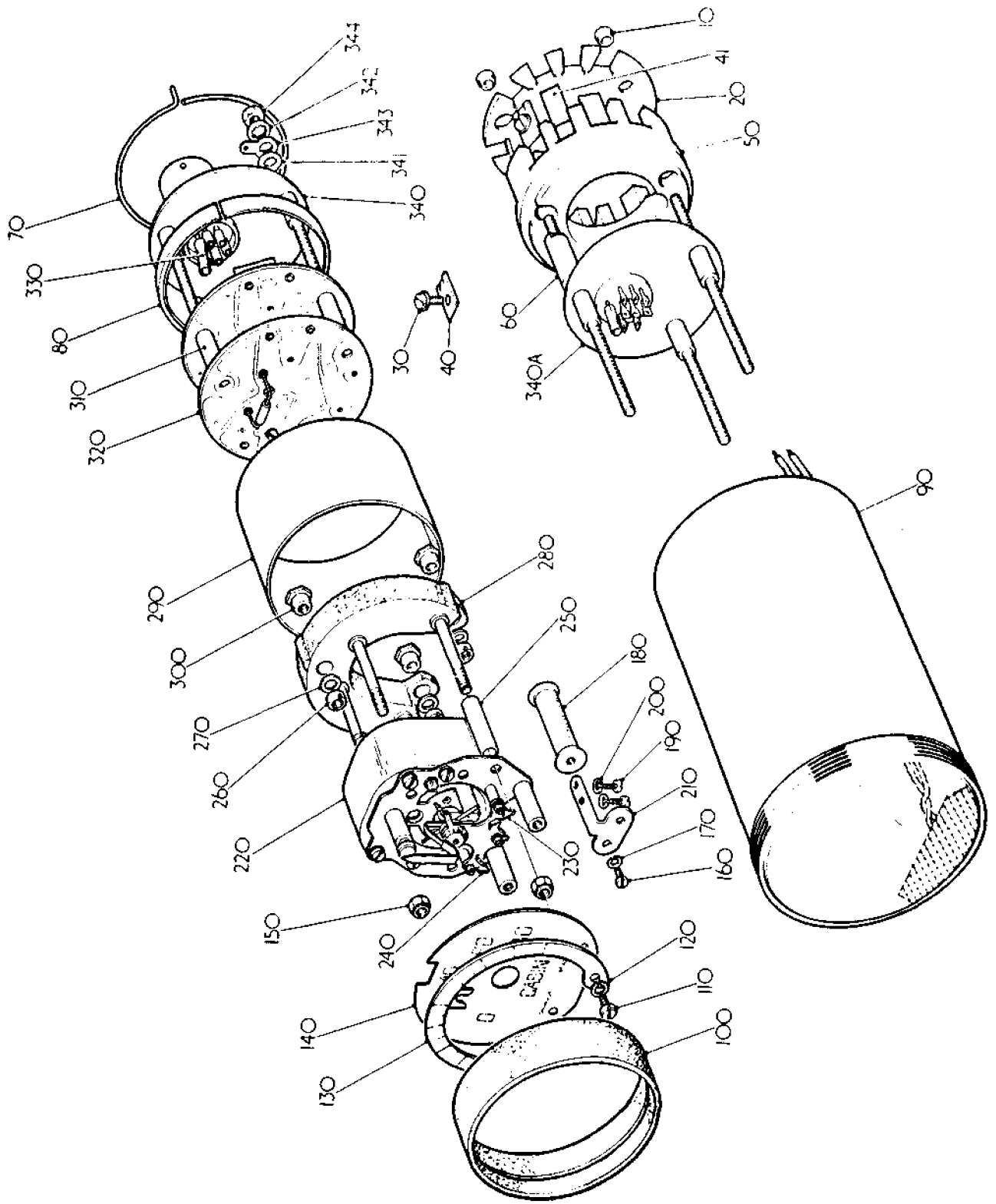
(8) Collect spacers (250), 4 off, and then remove round nuts (260), lockwashers (270), 3 off each item; collect ruggedized ring (280) and insulator (290).

(9) Unscrew and remove shouldered nuts (300), 3 off, and spacers (310), 3 off, remove printed circuit board (320) from the studs of the end plate (340).

KEY TO FIG. 101

10	Nut, Round, 6 B.A.	200	Lockwasher, 10 B.A.
20	Cover, Flange	210	Bracket, spool
30	Screw and Washer assembly	220	Movement complete
40	Terminal	230	Pointer stop - R.H.
41	Cover plate	240	Pointer stop - L.H.
50	Flange, drilled	250	Spacer
60	Pillar	260	Nut, Round, 6 B.A.
70	Wire, Sealing	270	Lockwasher, 6 B.A.
80	Seating ring	280	Ring, ruggedized
90	Case, Assembled	290	Insulator
100	Collar, moulded	300	Nut, shouldered, 6 B.A.
110	Screw, scale	310	Spacer
120	Lockwasher, scale	320	Printed-circuit board assembly
130	Upper scale & Clip assembly	330	Sleeve
140	Lower scale	340	End-plate assembly
150	Nut, 6 B.A. nyloc	340A	End-plate for Flange
160	Screw, 10 B.A.	341	Plain washer, 4 B.A.
170	Lockwasher, 10 B.A.	342	Lockwasher, 4 B.A.
180	Spool, wound	343	Terminal tag, 4 B.A.
190	Screw, 10 B.A.	344	Nut, 4 B.A.

DISASSEMBLY



Exploded view of S.542 Form 1
Fig. 301

(Revision 2)
Sept. 1985

CLEANING

A. Procedure

(1) Use acetone to remove all Bostik adhering to threads of screws and nuts, or any other component secured with Bostik which is being removed.

CAUTION: ENSURE THAT THE ACETONE DOES NOT COME INTO CONTACT WITH VARNISHED SURFACES INSULATION MATERIALS AND PLASTIC PARTS.

(2) Use a soft brush to remove dust from the case and clean the glass with a chamois leather.

(3) Clean plastic items with methylated spirits; clean off surplus spirit immediately.

(4) Remove excess solder from the rim of the case (90).

(5) Remove surplus flux from all metal surfaces and edges with methylated spirits.

B. Schedule of cleaning materials

(1) Good quality brush

(2) Acetone, B.P.C.

(3) Industrial methylated spirits

(4) Chamois leather

CHECK

A. General Procedure

Apply the following procedure throughout to specified components of the indicator. Any necessary additional checks are given under B.

Metal Components

Examine for:

(a) Corrosion

(b) Serviceability of Threads

(c) Distortion

(d) Cracks

(e) Evidence of wear

(f) Security of sub-components not dismantled

B. Detail Procedure

Examine:

(1) The gap in which the moving coil swings. Remove any particles adhering to the coil, magnetic core and surface of the return ring using a shaped piece of wood or suitable non-metal tool.

CAUTION: UNDER NO CIRCUMSTANCES MAY A METALLIC NEEDLE BE USED FOR THIS PURPOSE. AVOID DAMAGE TO THE CONTROL SPRINGS.

(2) The glass of the case for security of mounting, cracks and cleanness.

(3) The surface of the scale for good finish; the scale markings must not be broken or defaced; check the finish of the pointer for blemishes or cracked paint.

REPAIR

Case Assembly (90)

If either the glass or case is damaged the assembly must be renewed. The assembly must also be renewed if a lamp fails, or indicates poor light omission.

Movement complete (220)

This item is not repairable but damaged pointer stops (230 and 240) can be renewed.

CAUTION: THE BEADS OF THE POINTER STOPS MUST NOT BE HANDLED.

End-plate assembly (340)

Damaged parts: (341), (342), (343) and (344) can be renewed as required.

ASSEMBLY

A. Preparation

Prior to assembly obtain the following items:-

B.S.104	Bostik No.722 thinned with Acetone B.P.C. to a brushable consistency.
Thermolene Lacquer	Messrs. Canning's Red Thermolene Lacquer No.185
Dubois 50/50 Solder	Local supply
B.S.308 Lubricant	'Mr.Sheen' Messrs. Reckitt & Colman
Lint-free cloth	Local supply
Coraline Flux	British Insulated Callender's Cables Ltd.,
Methylated Spirits	Local supply.

The materials against B.S. numbers are to British Sangamo specifications and can be ordered directly from Weston Instruments or from the quoted manufacturers.

B. Procedure (Refer to Figs. 301, 701 and 702)

During assembly coat with B.S.104 all nuts, threaded holes and screw heads to lock these items against vibration. Also apply B.S.104 to the jewel screws and bridge abutments after these items have been finally adjusted. Coat all solder joints with red Thermolene lacquer.

CAUTION: USE GREAT CARE AND PREVENT THE FINISHING MATERIALS FROM COMING INTO CONTACT WITH THE MOVING PARTS.

(1) If the plate (340) has been renewed, assemble the spacers (310), 3 off, to the printed circuit board assembly (320).
Locate assembly over the projecting supports of the end plate; leave sufficient space to resolder connections to the connector of end plate (340).

(2) Refer to Fig.(701) and solder the wires as directed to the pins of the end-plate connector; ensure that an insulating sleeve (330) is fitted over each soldered connection.
After completion of the soldering process, press assembly (320) against the shoulders of the projecting studs of the end-plate.

(3) Secure printed-circuit board assembly (320) with 6 B.A. shouldered nut (300), 3 off. Tighten the nuts evenly as the heatsinks of resistors make contact with end-plate (340), and then place ruggedized ring (280) in position, located over the studs of end-plate (340) and resting against the shouldered nuts (300). Secure ring (280) with 6 B.A. lockwashers (270) and 6 B.A. round nuts (260), 3 off each item.
Place spacers (250), 4 off, over the studs of ruggedized ring (280).

(4) Before securing the movement complete (220) to the studs of ring (280), complete the following procedures:

(a) Ensure that the gap in which the moving coil swings is free from obstructions; refer to the 'CHECK' section of the manual for the necessary action.

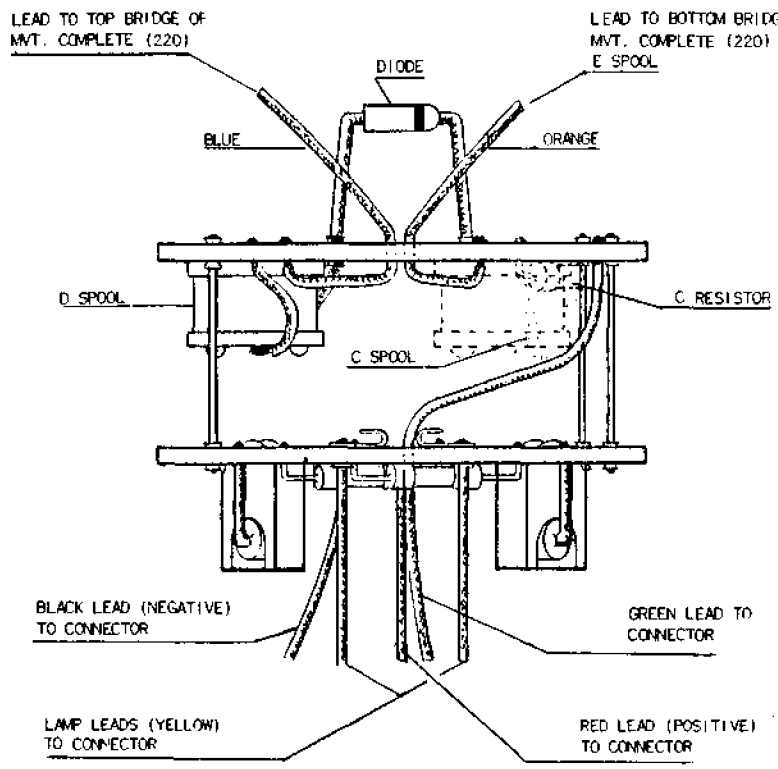
(b) Adjust, if necessary, the jewelled bearings to centralize the position of the moving coil relative to the pole piece.

(c) Adjust the jewelled bearings to just obtain discernible flop of the pointer. Pointer flop is the movement of the pointer caused by the pivots moving laterally in their bearings.
If the bearings need adjustment, check that the coil is evenly centred and then adjust the jewel screws, in the top and bottom bridges, in increments of one tenth of a turn until pointer flop is just eliminated. Then back off the top jewel screw by between one tenth and one eighth of a turn until slight pointer flop is just perceptible. Maintain the requirements of (b) when making the adjustment.

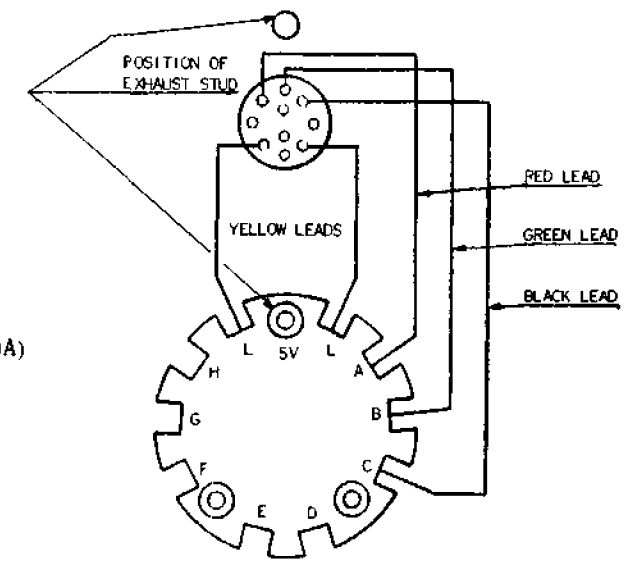
NOTE: *Before placing the movement complete (220) in position, secure spool and bracket assembly (parts 160, 170, 180, 190, 200 and 210) to the underside of the movement complete. The spool (E) is a non-standard requirement - refer to the variant circuit diagram.*

Complete the procedure and secure the movement complete (220) with 6 B.A. Nyloc nuts (150) - 4 off.

ASSEMBLY



Connections on Printed Circuit Board Assembly and from Assembly to End Plate (340)



Connections from End Plate (340A) to Cover Flange (20)

Connections to End Plates and Printed Circuit Board Assembly
Fig. 701

(5) Solder the connecting leads to the movement complete (220), the blue lead to the tag of the top bridge and the orange lead to the bottom bridge - or the E spool if used.

(6) Clip upper scale (130) to lower scale (140) and then carefully ease the pointer through the hole in the lower scale. Ensure that the clip of the upper scale engages in the groove of its location stud on the movement complete.
Secure the scale to the studs of the movement complete (220) with 10 B.A. lockwashers (120) and 10 B.A. screws (110), 2 off each item.

(7) Check the balance of the moving element as instructed in C.

(8) Refer to the Testing and Trouble Shooting section if the movement complete (220) and/or printed-circuit board assembly (320) have been renewed.

(9) If a new movement complete (220) has been fitted, age and stabilise the magnet as described in D and E respectively. Recheck the balance of the moving element after the Temperature stabilising procedure.

(10) After the completion of all Testing and adjustments place insulator (290) in position over the printed-circuit board assembly (320); the front edge of insulator (290) must rest against the ruggedized ring (280).

(11) Prior to fitting moulded collar (100) in position, apply the recommended lubricant to lint-free cloth and wipe around the outer periphery of the collar; polish the treated surface with clean cloth - do not allow the lubricant to dry before polishing.
Fit the collar over the movement complete; the internal channel in the collar must locate over the peripheries of the scales.

(12) Insert the indicator sufficiently into its case (90) to enable the lamp connections (yellow leads) to be soldered to the lower printed-circuit board of assembly (320). The leads from the lamps must pass through the two holes in the upper circuit board of assembly (320).

(13) Fit the seating ring (80) with its ridged periphery towards the end-plate.
Check prior to sealing, that the sealing wire (70) fits into the recess between the end-plate (340) and case (90), and that no gap is evident in the sealing wire.

(14) Effect the pre-sealing and sealing procedures given in F and G.

(15) Indicators fitted with radial terminal block.

(a) Screw pillar (60) to the exhaust stud on end-plate (340A)
Check that the sealing pin soldered into the exhaust stud is straight and does not foul the pillar (60) when screwed in place.

(b) If the end-plate (340A) has been renewed, solder connecting wires from the tags of the end-plate to terminals (40).
Locate the drilled flange (50) over the studs of the end-plate and then locate the terminals in their positions to align with the markings on flange cover (20). The wire colours and positions of terminals to be as in Fig.(701).

(c) Insert cover plates (41) into unused terminal positions. Place flange cover (20) in position and secure with round nuts (10), 3 off.

C. Balancing the moving element of Movement Complete (220)

Prior to balancing the moving element, check that it is correctly adjusted between the jewelled bearings - refer to (B), sub-para. (4).

(1) Adjust the balance weights of the moving element with the pointer in the positions given below. After adjustments the weights must not project beyond the ends of the cross arms of the pointer.
The accuracy of adjustment must not exceed ± 2% of full scale deflection in the stated positions.

(a) Set the pointer to a cardinal line at or near mechanical zero with the indicator in the horizontal plane.

(b) With the pointer horizontal and its pointer tip to the left.

(c) With the pointer horizontal and its pointer tip to the right.

(d) With the pointer vertically upwards.

NOTE: The scale must be kept in the horizontal plane and turned to give the correct positions (b) to (d) before gently raising the scale to the vertical plane.

D Ageing the magnet of Movement Complete (220)

(1) Use a coil which is designed for connection to an alternating current supply and age the magnet until the pointer indicates the required deflection. The ageing process may be accomplished by the gradual approach and recession of the coil or by slowly increasing and decreasing the current in the magnetising coil. The process must be continued until the correct pointer deflection is obtained.

(a) Age the magnet to give the required sensitivity as stated in the variant section and with circuit conditions as given in the Testing and Trouble Shooting section of the Manual.

NOTE: If the required ageing is accidentally exceeded, the magnet must be resaturated with a magnetising force of not less than 20,000 ampere turns.

E. Temperature stabilisation of Indicator

(1) The stabilisation procedure follows the ageing process of the magnet.

(a) Subject the indicator to a temperature of +93°C ±2°C for at least 8 hours.

(b) Check the balance, adjustment of moving element between the jewels and the accuracy of the indicator after the stabilisation procedure. Allow a minimum period of 12 hours after stabilisation before checking.

F. Pre-sealing procedure

(1) Check that all the required finishes to nuts, soldered joins and screws have been applied.

(2) Examine the case interior (which will be in contact with the sealing wire) to ascertain that it is free from excess solder.

(3) Withdraw the end-plate assembly approximately half-an-inch from the case and place the indicator in an oven to dry out for a period of 8 hours at a temperature of +60°C.

G. Sealing Procedure (Refer to Fig.702)

The indicator must be sealed within one hour of its removal from the drying oven. If this is not possible the indicator must be kept in a dry atmosphere, failure to keep the indicator dry will necessitate re-drying as described in F above.

(1) Push in the end-plate assembly so that the end-plate rests firmly on the seating ring (80).

(2) Fit the sealing wire (70) in the gap between the end-plate (340/340A) and the case (90). The sealing wire must fit into the gap without leaving a space.

(3) Solder the sealing wire into position and ensure that the end-plate is completely sealed to the case. The wire must overlap at the split and must not be embedded in solder at this junction. Facilitate soldering with the use of Coraline Flux; clear surplus flux with Methylated Spirits.

(4) Connect the exhaust stud on the indicator's end-plate to the pumping equipment in order to remove air from the case.

(5) Ensure that a tight seal is made between the exhaust stud and the manifold.

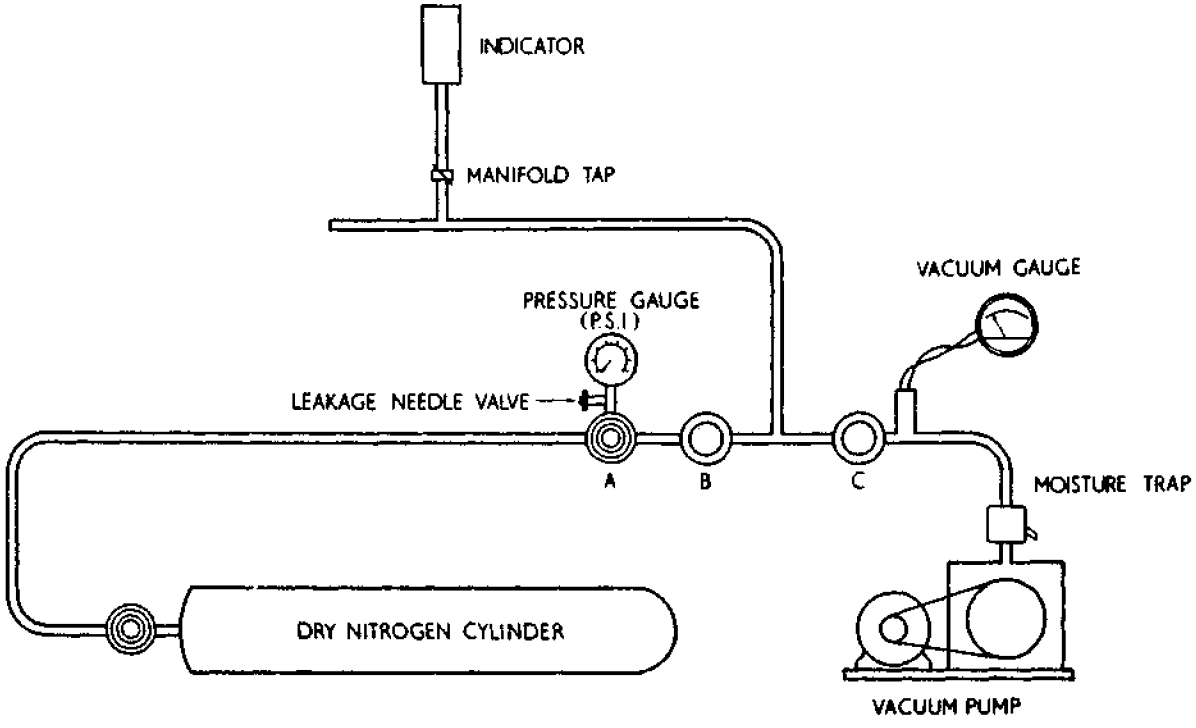
CAUTION: PLACE THE INDICATOR IN A SAFETY TANK TO AVOID POSSIBLE INJURY TO PERSONNEL IN THE EVENT OF THE CASE GLASS DISINTERGRATING.

(6) Check that the manifold tap connected to the indicator is closed; and also that the dry nitrogen and admittance valve taps A and B are closed.

(7) Start the vacuum pump motor and obtain the required degree of vacuum which is 0.1mm of mercury.

(8) When the correct vacuum is indicated, open valve C and the manifold tap and allow the system to regain the required vacuum.

NOTE: If it is not possible to maintain the vacuum, close the manifold tap; remove the indicator and check for leakage. Inspect and if necessary reseal the indicator. Re-connect indicator to the system; open manifold tap and regain required vacuum.



Sealing Procedure - Equipment
Fig. 702

(9) Close valve C and open valve B to admit dry nitrogen into the indicator. Adjust control valve A to obtain a pressure of 15 lb per square inch gauge.

(10) After a lapse of 30 seconds, manipulate control valve A and the leakage needle valve to reduce the indicator pressure to 10 lb per square inch gauge.

(11) The indicator, still under pressure, must now be completely immersed in a tank containing 99.50% distilled water and 0.5% wetting agent.

NOTE: A suitable wetting agent is Shell 'Teepol' 514.

(12) Shake the indicator to remove any trapped air that may be present and then check over a period of 5 minutes, for any sign of leakage.

Leakage will be shown by the presence of bubbles leaving the case. In the event of leakage, mark the case at the defective part for action on removal of the indicator from the system.
Particular care must be taken to check for leakage at the sealing join on the end-plate and the case glass.

(13) At the completion of the test for leakage, reduce the dry nitrogen pressure to zero by operating control valve A and the needle valve.

(14) Close the manifold tap and remove the indicator from the tank and dry with a clean piece of muslin.

(15) Disconnect the indicator from the manifold, and seal as instructed below:

(a) Indicator case fitted with a sealing tube:
Crimp the tube in a suitable fixture and seal the end of the tube with solder.

(b) Indicator case fitted with a sealing stud:
Place a sealing pin in the stud aperture and complete the sealing process by carefully soldering the pin to the stud.

NOTE: The final sealing of the indicator must be made immediately after its removal from the tank.

H. Storage

(1) If the original packing is not available, obtain the following:

(a) Packing for temperate areas.
(i) Oven dried silica gel.
(ii) A polythene bag to contain the indicator together with the silica gel. Heat seal the opening of the bag.
(iii) A rubberised hair mould to enclose the indicator in its polythene bag.
(iv) A cardboard box to contain the hair mould.
(v) Gummed paper strip to seal the cardboard box.
(vi) A label to be affixed to the box and giving the following information.

a - Identification e.g.S.542.1.14

b - Modification standard

c - Date of removal from aircraft

d - Date of last service

e - Details and date of any component change

f - Reason for return of indicator

(b) Packing for Tropical areas:
(i) Water resistant paper to completely enwrap the indicator; then proceed as described in (a) (i) to (iii).
(ii) A polythene bag large enough to hold the rubberised mould. Heat seal the bag and proceed as described in (a) (iv) to (v).
(iii) A wooden box of suitable dimensions to enclose the cardboard box; secure it and affix a label as in (a) (vi).

(2) If the original packing is available, repack the indicator and affix a label as in (1) (a) (vi).

(3) Indicators must be stored under conditions where humidity does not exceed 50% and the temperature is within the range - 20°C to + 50°C.

(4) Indicators which have been in store must be subjected to the calibration check given in the Data section of the Variant information,and also to the insulation resistance test detailed in the Testing/Trouble Shooting section before being put into service.

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

The special tools and equipment required to effect the repair and testing of S.542 Form 1 indicators are listed below.

The indicator should be repaired and tested in a clean atmosphere, free from corrosive fumes.

NOTE: Equivalent substitutes may be used for listed items.

TABLE 901

SPECIAL TOOLS AND EQUIPMENT

A. Special Tools

Description	Code	Supplier
Balance wrenches (11 off)	271157	Weston Instruments., Great Cambridge Road, Enfield, EN1 3RX

B. Equipment

Equipment	Code	Supplier
Portable d.c. milliammeter Range: 0-2mA to B.S.89 (1970) Part 1. (Class Index 0.5)	-	Salford Electrical Instruments Ltd., Eccles, Manchester.
Portable d.c. µAmeter Range: 0-500µA to B.S.89 (1970) Part 1. (Class Index 0.3)	-	Salford Electrical Instruments Ltd., Eccles, Manchester.
Insulation test meter 250/500V d.c.	1905L	Comark Electronics, Rustington, Sussex.

Continued

TABLE 901

SPECIAL TOOLS AND EQUIPMENT (CONT.)

Continuation

Equipment	Code	Supplier
Decade resistance box (Max. resistance 11,111 ohms)	5274/5	H. Tinsley & Co. Ltd., Stanger Road, London, SE25.
Portable Wheatstone Bridge (substitute equipment must measure to ±0.5% over 100-1000 ohms).	5785/4	H. Tinsley & Co. Ltd., Stanger Road, London, SE25.
Vacuum Pump, Speedivac 2, (220V-240V s.ph. 50Hz)	A134-51-912	Edwards High Vacuum, Crawley, Sussex.
Moisture Trap, DT20	A133-03-000	Edwards High Vacuum, Crawley, Sussex.
Vacuum Gauge, Pirani 10 100-125V/200-250V, 50Hz.	D035-15-000	Edwards High Vacuum, Crawley, Sussex.
Gauge Head, PR10 (Voltage as for Vacuum Gauge)	D034-21-000	Edwards High Vacuum, Crawley, Sussex.
Pressure Controller, VPC1	D083-01-000	Edwards High Vacuum, Crawley, Sussex.
Speedivalves, SC5 - 3 off	C330-04-000	Edwards High Vacuum, Crawley, Sussex.
Vacuum Test Nozzle	TD 26815	Weston Instruments., Great Cambridge Road, Enfield, EN1 3RX.
Cylinder - Dry Nitrogen (Capacity 1.24m^3-136 bars)	Ref.No.3	British Oxygen Co. Ltd., London
Two-stage Regulator (Delivery pressure 4.8 bars)	SRX 70	British Oxygen Co. Ltd., London
Pressure Gauge, 0-30 p.s.i.	842261	British Oxygen Co. Ltd., London

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

ILLUSTRATED PARTS LIST

VARIANTS INCLUDED

S.542.1.14
S.542.1.15
S.542.1.16
S.542.1.17
S.542.1.18
S.542.1.20
S.542.1.31
S.542.1.42
S.542.1.44

WESTON INSTRUMENTS

COMPONENT MAINTENANCE MANUAL

MODEL S.542 FORM 1 - INDICATOR - TEMPERATURE/PRESSURE

ILLUSTRATED PARTS LIST

A. Introduction

(1) This Section lists and illustrates parts for Form 1 of the Model S.542 indicator.

(2) The form and variant number is printed on the scale of the indicator.

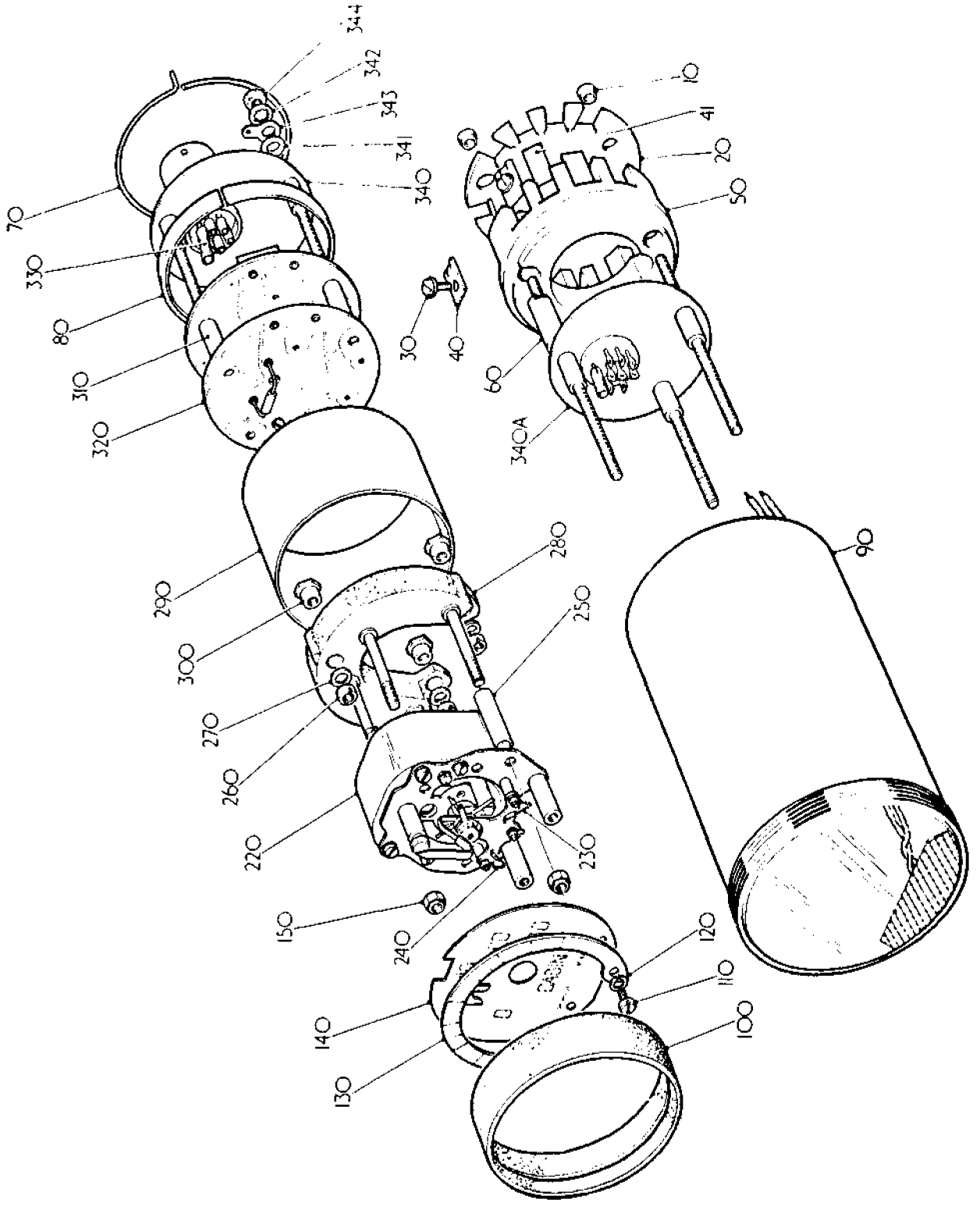
The variant number defines a particular application of the model and is not dependent on the Form number; a given variant number will never appear on another Form of the same model.

(3) The first group of numbers in the part number column identifies the model, form and variant as displayed on the scale, that is, the basic part number.

Against each basic part number is an item identity, e.g. 1A, 1B, etc.

Where a part number is applicable to all basic part numbers, the effectivity column is left blank against the part number.

Part numbers not associated with all the listed basic part numbers are shown in the effectivity column and reflect the basic part number to which they are related.



Illustrated Parts List - S.542 Form 1
Fig. 1

(Revision 2)
Sept. 1985

ILLUSTRATED PARTS LIST

FIG. ITEM	PART NUMBER	AIRLINE PART NO	NOMENCLATURE 1234567 *******	EFF CODE	UNITS PER ASSY
1- 1A	S.542-1-14		INDICATOR,TEMPERATURE,0°C/80°C	A	RF
1B	S.542-1-15		INDICATOR,TEMPERATURE,-50°C/+50°C	B	RF
1C	S.542-1-16		INDICATOR,TEMPERATURE,-50°C/+50°C	C	RF
1D	S.542-1-17		INDICATOR,TEMPERATURE,50°C/200°C	D	RF
1E	S.542-1-18		INDICATOR,TEMPERATURE,-60°C/+70°C	E	RF
1F	S.542-1-20		INDICATOR,HYDRAULIC CONTENTS, 0-2.1 gal	F	RF
1G	S.542-1-31		INDICATOR,TEMPERATURE,-60°C/+60°C	G	RF
1H	S.542-1-42		INDICATOR,TEMPERATURE,-50°C/+150°C	H	RF
1J	S.542-1-44		INDICATOR,TEMPERATURE,-50°C/+150°C	J	RF
10	173903		.NUT, ROUND, 6 B.A.	G	3
20	185645		.COVER, FLANGE	G	1
30	179793		.SCREW AND WASHER ASSY.	G	5
40	179790		.TERMINAL	G	5
41	179792		.PLATE, COVER	G	5
50	180329		.FLANGE	G	1
60	179818		.PILLAR	G	1
70	168416		.WIRE, SEALING		1
80	169908		.RING, SEATING		1
90	185606		.CASE, NON-REFLECTING GLASS	A,B,C,D, E,F,H,J	1
-90	186054		.CASE, BLACK BEZEL, NON-REFLECTING GLASS	G	1
100	185607		.COLLAR, MOULDED		1
110	169910		.SCREW, SCALE, 10 B.A.		2
120	159306		.WASHER, LOCK, 10 B.A.		2
130	185647-542-1-14		.SCALE FINISHED, UPPER	A	1
-130A	185647-542-1-15		.SCALE FINISHED, UPPER	B	1
-130B	185647-542-1-16		.SCALE FINISHED, UPPER	C	1
-130C	185647-542-1-17		.SCALE FINISHED, UPPER	D	1
-130D	185647-542-1-18		.SCALE FINISHED, UPPER	E	1
-130E	185647-542-1-20		.SCALE FINISHED, UPPER	F	1
-130F	185647-542-1-31		.SCALE FINISHED, UPPER	G	1
-130G	185647-542-1-42		.SCALE FINISHED, UPPER	H	1
-130H	185647-542-1-44		.SCALE FINISHED, UPPER	J	1

- Items not illustrated

FIG. ITEM	PART NUMBER	AIRLINE PART NO	NOMENCLATURE 1234567	EFF CODE	UNITS PER ASSY
1					
140	185609-542-1-14		.SCALE FINISHED, LOWER	A	1
-140A	185609-542-1-15		.SCALE FINISHED, LOWER	B	1
-140B	185609-542-1-16		.SCALE FINISHED, LOWER	C	1
-140C	185609-542-1-17		.SCALE FINISHED, LOWER	D	1
-140D	185609-542-1-18		.SCALE FINISHED, LOWER	E	1
-140E	185609-542-1-20		.SCALE FINISHED, LOWER	F	1
-140F	185609-542-1-31		.SCALE FINISHED, LOWER	G	1
-140G	185609-542-1-42		.SCALE FINISHED, LOWER	H	1
-140H	185609-542-1-44		.SCALE FINISHED, LOWER	J	1
150	178510		.NUT, NYLOC, 6 B.A.		4
220	220-542-1-14		.MOVEMENT COMPLETE	A	1
-220A	220-542-1-15		.MOVEMENT COMPLETE	B	1
-220B	220-542-1-16		.MOVEMENT COMPLETE	C	1
-220C	220-542-1-17		.MOVEMENT COMPLETE	D	1
-220D	220-542-1-18		.MOVEMENT COMPLETE	E	1
-220E	220-542-1-20		.MOVEMENT COMPLETE	F	1
-220F	220-542-1-31		.MOVEMENT COMPLETE	G	1
-220G	220-542-1-42		.MOVEMENT COMPLETE	H	1
-220H	220-542-1-44		.MOVEMENT COMPLETE	J	1
230	162558		.POINTER STOP, RIGHT-HAND		1
240	162557		.POINTER STOP, LEFT-HAND		1
250	176247		.SPACER, MOVEMENT		4
260	92356		.NUT, ROUND, 6 B.A.		3
270	156976		.WASHER, LOCK, 6 B.A.		3
280	185620		.RING, RUGGEDIZED		1
290	185633		.INSULATOR		1
300	170056		.NUT, SHOULDERED, 6 B.A.		3
310	176247		.SPACER, PRINTED CIRCUIT ASSY.		3
320	185624		.PRINTED-CIRCUIT BOARD ASSY.	A,D,G	1
-320A	185622		.PRINTED-CIRCUIT BOARD ASSY.	B,C,E,F, H,J.	1

- Items not illustrated

FIG. ITEM	PART NUMBER	AIRLINE PART NO	NOMENCLATURE 1234567 *******	EFF CODE	UNITS PER ASSY
1					
330	M.P.S.92-10-4		.SLEEVE, END PLATE		AR
340	185634		.PLATE, END	A,B,C,D, E,F,H,J	1
340A	185858		.PLATE, END	G	1
341	90031		.WASHER, PLAIN, 4 B.A.	A,B,C,D, E,F,H,J.	1
342	150404		.WASHER, SHAKEPROOF, 4 B.A.	A,B,C,D, E,F,H,J.	1
343	156746		.TAG, TERMINAL, 4 B.A.	A,B,C,D, E,F,H,J.	1
344	150174		.NUT, LOCK, 4 B.A.	A,B,C,D, E,F,H,J.	1

- Items not illustrated