



AP 112B-0201-13A

Formerly AP 1275B, Vol 1,
Sect 10, Chap 8

► COMPASSES STANDBY MAGNETIC ◀

GENERAL AND TECHNICAL INFORMATION ILLUSTRATED PARTS CATALOGUE

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence

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To record the incorporation of an Amendment List in this publication, sign against the appropriate A.L.No. and insert the date of incorporation

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52		
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56		
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58		
59		
60		
61		
62		
63		
64		
65		
66		

CONTENTS

Preliminary material

Title page
Amendment record
Contents/List of associated publications (this leaf)
Modification state

GENERAL AND TECHNICAL INFORMATION (-1)

Chapters

- 1 Description and operation
- 2 Standard serviceability test
- 3 Check calibration swing

ILLUSTRATED PARTS CATALOGUE (-3A)

Preface
Parts List

LIST OF ASSOCIATED PUBLICATIONS

Standby compass calibrator (6C/5895)

AP 112T-01354-1

▶ MC2 Magnetic compass calibrator set

AP 112T-0154-13

Compasses magnetic standby

AP 112B-0201-2

General orders and modifications

MODIFICATION STATE

The information given in this publication relates to units incorporating the modifications shown in the following table.

Mod. No.	Types Affected	Brief Description
01	All codes except E2C	Extension of the upper limit of the operating range. This is effected by reducing the volume of damping fluid in the compass so that the expansion chamber can function over the extended range. A compensating ring is fitted as a substitute for the fluid removed.
SIC A795	INTRODUCTION OF NEW PART NUMBER	
	Bowl assembly 1003KCA1 (6B/0270415) Lighting assembly CE2-A81 (6B/0079830)	Lighting assembly fitted with NV-2B filter material to achieve GEN 3 Night Vision Goggle (NVG) compatibility.
SIC 5088	Introduction of new compass bowl assembly and lighting assemblies in lieu and by conversion of standby compasses as detailed below:	
Standby Compass	Lighting Assembly	Compass Bowl Assembly
KCA0101W or E2A (6B/4343605)	-	} 1003KCA1 (6B/0270415)
KCA0104W or E2B (6B/1048857)	CE2-A82 (6B/2821593)	
KCA0105W or KCA0109W or E2C (6B/1140600)	CE2-A83 (6B/9623371)	
KCA0110W or E2D (6B/1173134)	CE2-A84 (6B/5510284)	
KCA0112W or E2E (6B/6400571)	CE2-A85 (6B/5178341)	

Chapter 1DESCRIPTION AND OPERATION

CONTENTS

	Para.
Introduction	1
Description	2
Operation	9
Installation	10
SERVICING	13

TABLES

No.		Page
1	Compasses data	6
2	Two part compasses	7/8

ILLUSTRATIONS

Fig.		Page
1	Standby magnetic compass - typical	2
2	Exploded view (pre mod 01)	4

LEADING PARTICULARS

Manufacturer: Smiths Industries

Manufacturers Part No.	Type	Ref. No.	Weight
KCA0102W	E2	6B/2174	3.5 oz (0.1 kg)
KCA0101W	E2A	6B/4343605	3.5 oz (0.1 kg)
KCA0104W	E2B	6B/1048857	4 oz (0.11 kg)
KCA0109W	E2C	6B/1140600	4 oz (0.11 kg)
KCA0105W	-	6B/7192554	4 oz (0.11 kg)
KCA0110W	E2D	6B/1173134	4 oz (0.11 kg)
KCA0112W	E2E	6B/6400571	4 oz (0.11 kg)
Bowl assembly 1003-KCA1		6B/0270415	-
Lighting assemblies CE2-A81		6B/0079830	-
CE2-A82		6B/2821593	-
CE2-A83		6B/9623371	-
CE2-A84		6B/5510284	-
CE2-A85		6B/5178341	-

Dimensions: 2 1/4 in x 2 1/16 in x 2 9/32 in
(57.15 mm x 52.39 mm x 57.94 mm)

Introduction

1 The magnetic compasses are miniature instruments used as emergency or stand-by compasses, where lack of space precludes the installation of the normal stand-by compass of the P type; they also provide a rough check on the functioning of the main compass, if desired. The compass card is graduated every 10 degrees (5 degree dots for some variants); it is therefore necessary for values between the graduations to be estimated by interpolation. This is considered sufficient to enable the compass to be read within the accuracy expected from a compass of this type. All the compasses included are similar in construction but have minor variations as detailed in Table 1.

2 The newer two part compasses are manufactured with improved materials and enable faulty lighting assemblies to be replaced at first line. The compass bowl assembly is common to all applications while the lighting assemblies vary to suit applicability. The new compasses are fully interchangeable with equivalent pre-mod variant (Refer table 2).

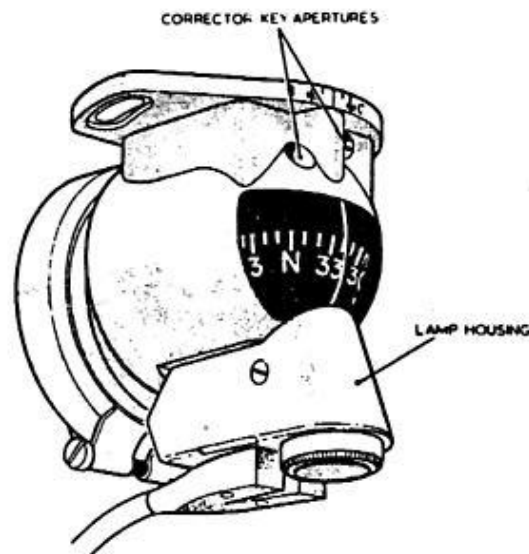


Fig.1 Standby magnetic compass - typical

DESCRIPTION

2 The compass bowl is of plastic material and the bracket which carries the stem supporting the compass system is located in a channel moulded in the base of the bowl and secured by two non-magnetic screws.

3 The compass card and dome of the system are aluminium and nickel silver pressings riveted together, and the magnet, which is a complete ring of magnetic steel, is riveted to the card assembly. The pivot screws into the centre of the dome, the radiused pivot tip resting in a sapphire cup secured to the stem by the cup holder. The card is prevented from falling off the stem when the compass is inverted, by making contact with the ceiling of the bowl. In the normal attitude the clearance between the top of the pivot and the ceiling is considerably less than that between the sapphire cup and the top of the cup holder.

4 The compass bowl is completely filled with silicone fluid chosen because it has no detrimental effect on the material used in the manufacture of the bowl, and because its temperature viscosity changes are small. A bellows at the rear of the bowl caters for change of volume of the liquid with variation of temperature.

5 Two pairs of adjustable correctors are fitted to a metal plate secured to the top of the bowl. The correcting heads are positioned one on either side of the filler plug. When the corrector magnets are in the neutral position, index lines engraved on the small circular rotatable plate above the magnet needles are aligned with fixed lines on the main plate. The disposition of the magnets can be understood by reference to Fig.2, the letters B and C denoting the coefficients for which correction is being made; the positions of the appropriate heads are marked on the rim of the top plate in a similar manner. The Type E2 compass only, has component R correction and the head for this correction is at the base of the compass, the index lines indicating the position of the magnet needle connected with this head being to the left of the other lines as shown in Fig.2. Two radial slots in the mounting plate of all compasses permits azimuth adjustment for correction of coefficient A.

6 Some of the compasses (see Table 1) incorporate direct lighting of the compass bowl by a miniature, non-magnetic lamp, the colour of the lighting being determined by a filter. Connection to the aircraft electrical system is by means of a socket and lead assembly (Smiths Industries part no. CE2A26) via a built-in resistor. The intensity of the lighting may be varied by the operation of a remotely positioned dimmer switch.

7 A small corrector key (Smiths Industries part no. CE2-40 Ref No 6B/1042081) is available for use with the compasses.

8 The compass is packed in a sponge-rubber lined transit case and the lighting assembly in a bubble packed carton.

INDEX LINES FOR CORRECTION OF COEFFICIENTS
B AND C

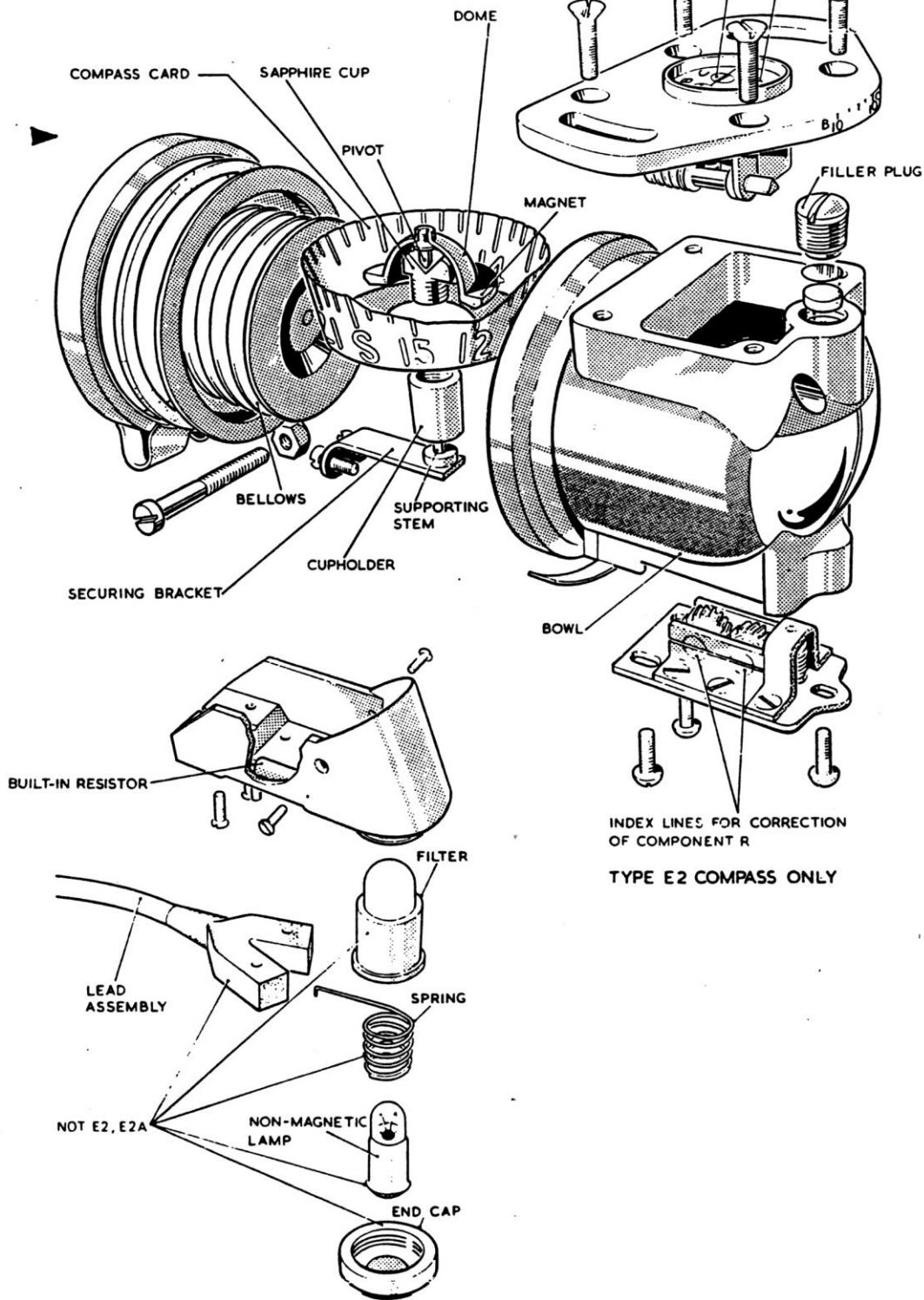


Fig.2 Exploded view (pre mod 01)

OPERATION

9 As the compass turns, the magnet and therefore the compass card remains stationary to show the compass heading, marked on the card against the vertical lubber line engraved on the inside of the compass bowl.

INSTALLATION

10 The compasses are to be installed in the aircraft as detailed in the relevant Air Publication, and the full compass-swinging procedure must be followed.

11 When a Type E2 compass (with component R correction) is installed in an aircraft, the compass-swinging procedure must include a check for component R even if it is known to be negligible for the particular aircraft. This ensures that the corrector itself is not introducing a deviation due to its magnets not being in the neutralized position.

12 The non-magnetic lamp used in the compasses have been especially developed and are identified by a separate part number; and also by a red spot. As these lamps are more costly than the magnetic variety, they should be used only in the appropriate compass. Conversely magnetic lamps, which are dimensionally interchangeable, must not be used in the compasses. The lamp details are as follows:

Lamp, non-magnetic, 28 V, 0.04 A (Smiths Industries Part No.40-621-170-44)

SERVICING

13 The compass should be periodically checked for damage, corrosion, cleanliness, security of mounting and, if applicable security of electrical connections.

14 If the serviceability is suspect a check compass-swing should be carried out as given in Chapter 3.

CAUTION...

The four screws securing the horizontal corrector assembly to the bowl must be locked only with Knipping VC3 Vibratite. Use of other lockants has previously caused cracking of the bowl.

Pre SIC 5088 The four screws securing the lamp housing to the bowl must be locked only with Knipping VC3 Vibratite. Use of other lockants may cause cracking of the bowl.

Knipping VC3 Vibratite (Ref. No. 6B/5462)

TABLE 1 COMPASSES DATA - PRE MOD SIC5088

Type No.	Correction for Coefficients	Compass Card Marking	Illumination	Supply Voltage	Lamp Series Resistor	Exterior Paint Colour	Remarks
E2	B, C & R	White	None	None	None	Matt Black	
E2A	B and C	White	None	None	None	Matt Black	
E2B	B and C	White	Red	28	330 Ω	Matt Black	Similar to Type E2A
E2C	B and C	White	White	28	330 Ω	Matt Black	Similar to Type E2B
KCA0105W	B and C	White	White	28	330 Ω	Matt Black	
KCA0110W	B and C	White	White	28	47 Ω	Matt Black	Similar to Type KCA0105W
KCA0112W	B and C	White	White	28	820 Ω	Matt Black	Similar to Type KCA0105W
Bowl assembly 1003-KCA1 (6B/0270415)	B and C	White	NVG	28	330 Ω	Matt Black	GEN 3 Night Vision Goggle (NVG) compatible. 5 degree dots marked on compass card.
Lighting assembly CE2-A81 (6B/0079830)							

TABLE 2 TWO PART COMPASSES

Notes ...

1. For data on two part compasses, establish pre-mod equivalent then refer to table 1.
2. Compass bowl assembly 1003KCA1 (6B/0270415) is common to all applications.

Lighting Assembly	Pre Mod Equivalent Compass
Not applicable	KCA0101W or E2A (6B/4343605)
CE2-A81 (6B/0079830)	No equivalent - NVG variant
CE2-A82 (6B/2821593)	KCA0104W or E2B (6B/1048857)
CE2-A83 (6B/9623371)	KCA0105 or KCA0109W or E2C (6B/1140600)
CE2-A84 (6B/5510284)	KCA0110W or E2D (6B/1173134)
CE2-A85 (6B/5178341)	KCA0112W or E2E (6B/6400571)

Chapter 2

STANDARD SERVICEABILITY TEST

Introduction

1. The tests detailed in this chapter are to be applied before installing a standby magnetic compass in an aircraft and at any time when serviceability is suspect.

Test equipment

2. The following test equipment is required:-

- (1) Test set multirange No.1 (Ref. No. 5QP/1057049)
- (2) Magnet, bar (Ref. No. 6E/490)
- (3) Stopwatch (Ref. No. 6B/9101001)

PROCEDURE

CAUTION...

The four screws securing the horizontal corrector assembly to bowl must be locked only with Knipping VC3 Vibratite. Use of other lockants has previously caused cracking of the bowl.

3. Examine the compass for damage and deterioration. Ensure that the compass liquid is clear and that no flaking of the fluorescent compound has occurred. Check that the screws securing the main plate are tight and set the corrector magnets to their neutral position. Turn the compass so that the viewing part of the bowl is uppermost and check that no bubbles are present.

Electrical inspection (compasses with direct lighting)

4. Check that the socket of the lead assembly is a good fit on the pins and with the lead assembly fitted, using the multimeter check the lighting circuit for continuity. Replace defective components as necessary. Check the lamp assembly cap for security.

Friction test

5. With the compass top plate horizontal, allow the magnet system to settle aligning the lubber line with a cardinal heading. Using the bar magnet deflect the compass system 10 deg and hold it in this position for 30s. Remove the bar magnet, allow the compass system to settle and record the settled position. Deflect the system, as above, 10 deg in the opposite direction and hold it in this position for 30s. Remove the magnet, allow the compass system to settle and again record the settled position. The difference between the two positions recorded must not exceed 3 deg.

Chapter 3

CHECK CALIBRATION SWING

CONTENTS

Para.

- 1 Introduction
- 2 Conditions of test
- 3 Test equipment
- 4 Preparation of standby compass calibrator
- 5 Aircraft compass check calibration swing
- 7 Compass 'A' error correction
- 8 Compass 'B' and 'C' error correction
- 9 Compass calibration swing

ILLUSTRATIONS

- | Fig. | Page |
|--|------|
| 1 Aircraft misalignment nomograph | 6 |

Introduction

1 This chapter details the check calibration swing procedure that should be carried out on a standby magnetic compass in situ in an aircraft using the standby compass calibrator.

Conditions of Test

2 The setting-up procedure for the standby compass calibrator and check calibration swing of the compass in the aircraft is to be carried out at the same site. This is either an authorised compass swinging base on which a North-South line has been marked, or a site which has been surveyed using the MS2-8 Magnetic compass calibrator set and marked with the North-South line.

Test Equipment

- 3 The following test equipment and tools are required:
 - 3.1 Standby compass calibrator (SCC) Ref.No.6C/5895
 - 3.2 Standard compass
 - 3.3 Turntable Ref.No.6C/6605-00-782-0234
 - 3.4 Tripod Ref.No.6C/6675-00-247-5129
 - 3.5 Non-magnetic screwdriver Ref.No.1C/1204771
 - 3.6 Compass corrector key Ref.No.6B/1042081

Notes

- (1) The standard compass is a standby magnetic compass with 'B' and 'C' compensators and lighting removed that has been calibrated with recorded values of error on East, 135 deg and North.
- (2) The turntable and tripod are items of the MC2-8 Magnetic compass calibrator set.
- (3) The compass corrector key is a locally made tool which is made by removing approximately 1 inch from blade of non-magnetic screwdriver, drilling along blade to allow insertion of compass corrector key 6C/2056 and then cementing key securely in position.

PREPARATION OF STANDBY COMPASS CALIBRATOR

4 The following procedure cancels the horizontal component of the Earth's magnetic field at the position of the standard compass fitted to the calibrator and is preparatory to its operation with the compass that is to be checked in the aircraft.

4.1 Place tripod vertically over the North-South line (plumb bob on edge of line) at the South end. Mount the turntable on the tripod.

4.2 Open SCC case, remove standard compass and calibrator. Locate and secure compass in calibrator with clamp screws finger tight. Remove stand from SCC case and mount calibrator on stand. Mount stand on top plate of turntable using the three screws provided with the turntable. Ensure that complete assembly is horizontal.

4.3 Remove field rotation magnet from calibrator. Remove clamp screw from rear hinge of calibrator and detach calibrator rear portion (housing field cancelling magnet). Take field rotation magnet and calibrator rear portion at least 6 feet from the calibrator.

4.4 Rotate turntable so that compass reads exactly East (allowing from the error on the calibrator calibration curve).

4.5 Refit the rear portion on the calibrator, ensuring that its index line is central with respect to associated scale on calibrator central portion. Ensure that calibrator front hinge is also central.

4.6 Slacken adjustment screw for field cancelling magnet on side of calibrator rear portion and slide along until compass reads 135 deg (allowing for the error on the calibrator calibration curve). Set adjustment screw finger tight.

Note ...

To use the calibrator sight in the following operation, shut one eye and position the other eye approximately 30 mm to 50 mm (1 in to 2 in) from the sight. A bright spot will be seen and by moving the eye it is possible to 'float' this spot just above the sight. In this position the sight and spot can then be aligned onto the target.

4.7 Rotate the turntable and using the sight on the calibrator align it with the North-South line by sighting at a point 65 mm to the left of the far end of the line i.e. a set marker pole.

4.8 Offset the compass reading by bringing the field rotation magnet towards and then away from the compass. The compass reading should remain constant at this offset position when the magnet is moved away from the compass vicinity. Repeat this action with the magnet to obtain a further offset reading of the compass and if both readings remained constant the field cancelling magnet in the calibrator is correctly set. If a compass reading tends to alter and read North each time when the field rotation magnet is moved away then move the adjustment screw for the field cancelling magnet a very small amount towards the compass. If the compass reading tends to alter and read South each time then move the adjustment screw a very small amount away from the compass. When the field cancelling magnet is correctly set 'finger' tighten the adjustment screw. It may be necessary to lightly tap the compass with a finger to ensure that it is not sticking during this operation.

4.9 Remove the stand-calibrator from the turntable. Remove the calibrator from the stand and locate the stand in the SCC case. Remove the standard compass from the calibrator and locate the compass in the SCC case. Remove all equipment from the North-South line.

AIRCRAFT COMPASS CHECK CALIBRATION SWING

5 Determine the aircraft misalignment as follows:

5.1 Attach the calibrator to the standby magnetic compass in the aircraft cockpit and ensure that calibrator and compass are horizontal.

5.2 With the aircraft heading North, align it as accurately as possible along the North-South line.

5.3 Measure the misalignment of the aircraft from the North-South line by dropping the plumb bob from measured points along the aircraft centre line. Apply these measurements to the aircraft's misalignment nomograph (reference fig.1) to obtain the angular displacement. Establish the correct sense for the displacement and set in this angle on the calibrator by offsetting the field cancelling magnet using the rear hinge and the scale provided. If the aircraft heading is to the right of the North-South line the rear hinge is moved to the right. If the aircraft heading is to the left of the North-South line the rear hinge is moved to the left.

5.4 Measure the lateral distance (d) of the aircraft compass from the North-South line and place a mark or pole about 20 yards ahead of the aircraft and at a position d-65 mm from the North-South line (d is positive to the right of the North-South line, looking North, and negative to the left of the line).

6 Align the calibrator field cancelling magnet to the North-South line as follows:

Note ...

To use the sight in the following operation, shut one eye and position the other eye approximately 30 mm to 50 mm (1 inch to 2 inch) from the sight. A bright spot will be seen and by moving the eye it is possible to 'float' this spot just above the sight. In this position the spot can then be aligned onto the target.

6.1 Using the sight on the calibrator, adjust its elevation and by loosening the front hinge align the spot of the sight with the mark or pole. Secure front hinge.

Compass 'A' Error Correction

7

7.1 Locate the field rotation magnet in the central hole in the calibrator and rotate it to each of its four detent positions in turn, noting the standby magnetic compass reading at each cardinal position. Using the calibration curve supplied with the calibrator and the four compass readings, calculate the error at each heading and the compass 'A' error.

7.2 Remove the field rotation magnet from the calibrator.

7.3 Slacken the two mounting screws of the compass with the non-magnetic screwdriver and using the scale on the compass rotate the whole compass to correct the 'A' error calculated in operation 7.1. Carefully retighten the screw ensuring that compass position does not change.

Compass 'B' and 'C' Error Correction

8

8.1 Slacken the front hinge on the calibrator and realign the sight onto the mark or pole.

8.2 Locate the field rotation magnet in the central hole in the calibrator and rotate it to each of its four detent positions in turn. Calculate the 'A' error and check that it is within the required limits. If it is out of limits repeat para.7.1 to 7.3. If satisfactory, calculate the 'B' and 'C' errors. Apply corrections to the compass as necessary by using the corrector key in the respective keyway.

Compass Calibration Swing

9 Carry out a 12 point calibration swing using the field rotation magnet in each of its three locations and four detent positions in the calibrator. Using the data obtained plot the graph and complete the compass deviation card in accordance with relevant procedure and requirements.

10 Remove the calibrator from the compass and return it to the SCC case.

11 Remove all compass swinging equipment from the aircraft and the site and complete relevant aircraft documentation.

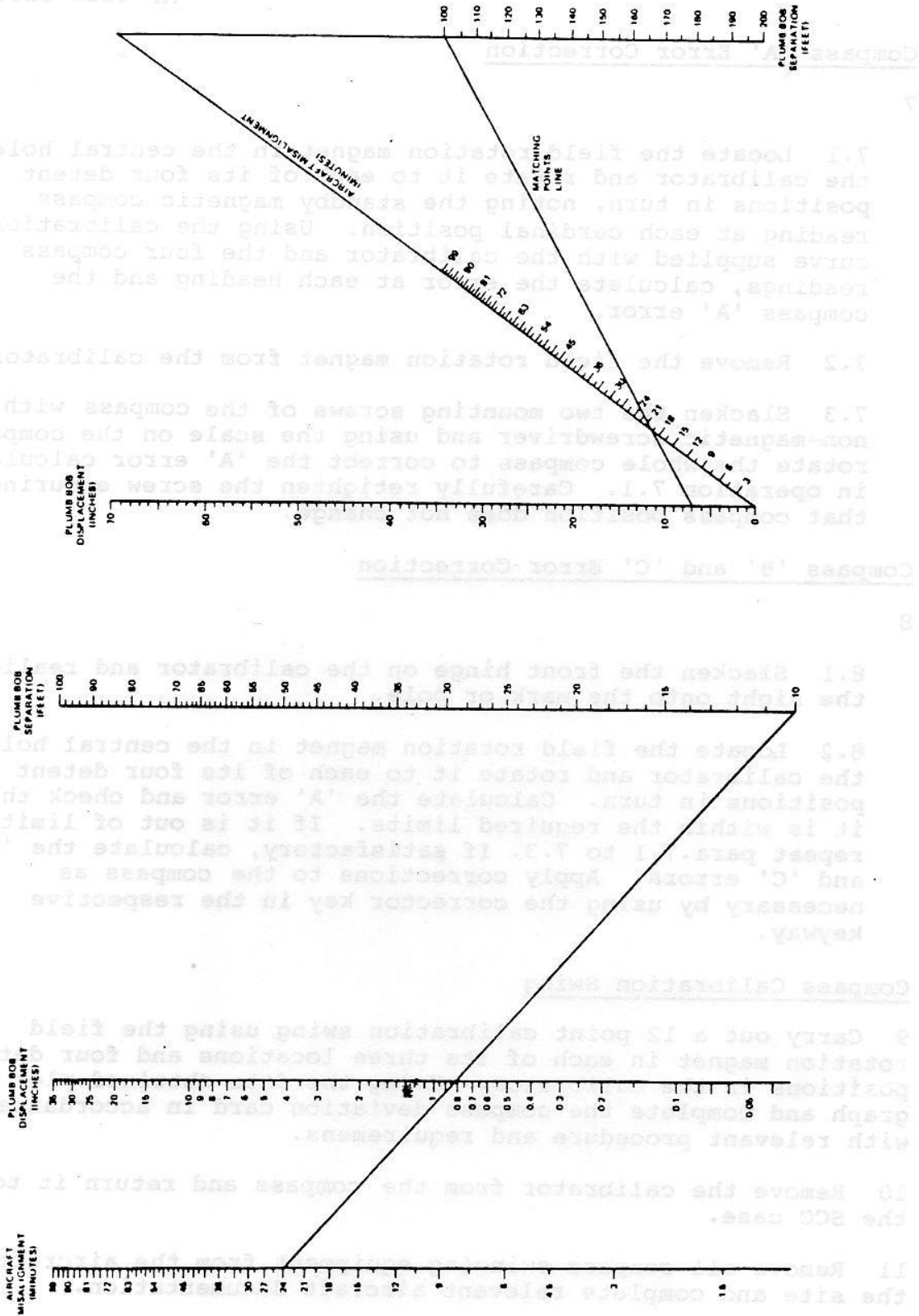


Fig.1 Aircraft misalignment nomograph

PARTS CATALOGUE AND RELATED INFORMATION (TOPIC 3)

PREFACE

Demands

1. Requirements for demands are:

1.1. The demand must quote the appropriate Vocabulary Section and Reference Stock Number for each item. Unreferenced parts are not normally provided as spares and demands for such items must quote the Vocabulary Section, Maker's Part Number, and the name and type of the equipment. The location of each part within the equipment should be clearly indicated.

1.2. Demands are to be prepared in accordance with the procedure laid down in AP 830 Volume 1 or BR4.

Local Manufacturer

2. Parts annotated 'LM' are to be manufactured from local resources. If the manufacturer of such items is beyond the capacity of the Unit, the demand is to be endorsed 'Unable to manufacture locally'.

ILLUSTRATED PARTS LIST

Major Repair

3. 'MR' indicates that an item is required for major repair purposes only and will not normally be held in store by Units other than those authorised to undertake major repair of the equipment.

Units per Assembly

4. The number quoted in the quantity required per next higher assembly in the position shown except 'attaching parts' which quote the quantity required to attain one item. The letters 'AR' in the 'Units per Assy' column indicate that the quantity is 'as required'. Where applicable the quantity normally fitted is shown as a nominal figure, e.g. (Nom 3). Where an item is listed only for reference purposes the letters 'R' are quoted.

Classification of Equipment

5. The Class of Store is indicated by a single letter as laid down in AP 830 Volume 1 or BR4.

PARTS CATALOGUES AND RELATED INFORMATION (TOPIC 3)

PREFACE

Demands

1 Requirements for demands are:

1.1 The demand must quote the appropriate Vocabulary Section and Reference/Stock Number for each item. Unreferenced parts are not normally provisioned as spares and demands for such items must quote the Vocabulary Section, Maker's Part Number, and the name and type of the equipment. The location of each part within the equipment should be clearly indicated.

1.2 Demands are to be prepared in accordance with the procedure laid down in AP 830 Volume 1 or BR4.

Local Manufacturer

2 Parts annotated 'LM' are to be manufactured from local resources. If the manufacture of such items is beyond the capacity of the Unit, the demand is to be endorsed 'Unable to manufacture locally'.

Major Repair

3 'MR' indicates that an item is required for major repair purposes only and will not normally be held in store by Units other than those authorised to undertake major repair of the equipment.

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Classification of Equipment

5 The Class of Store is indicated by a single letter as laid down in AP 830 Volume 1 or BR4.

Condition of Supply (Interchangeability Code)

6 Condition of Supply is indicated by one of the following letters and is only quoted against parts which are not directly interchangeable:

- V Open up holes on assembly
- W Partially assembled
- X Ream or machine on assembly
- Y Drill or drill and tap on assembly
- Z Trim on assembly

Obsolescent Stock

7 An asterisk in the 'Part No.' column indicates that no further purchases of the item will be made but the part is to be used until stocks are exhausted.

Modifications

8 When items are affected by a modification the 'Mod.No.' is quoted in the Nomenclature. Modifications incorporated in the catalogue are listed in the Modification Record.

MAIN EQUIPMENT COMPASS STANDBY TYPE E2B REF No 6B/1048857													
(1) Item No.	(2) Ref. No.	(3) Part No.	(4)							(5) No. Off	(6) Remarks	(7) C of E	(8) Plate/ Cct Ref
			1	2	3	4	5	6	7				
1	6B/1048857									1		P	
2	6B/6605-99- 114-0600									1		P	
3	6B/6600-99- 434-3782	CE2-A25								1		2C	
4	0584/6240- 99-995-9121									1		2C	
5	6B/103-8551	CE2-A26								1		2C	