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Colin Hinson

In the village of Blunham, Bedfordshire.



AP 116E-1762-0

July 1986

18 JAN 1990

VHF GROUND ANTENNA (RA 957)

**TECHNICAL DESCRIPTION, MODIFICATIONS,
PARTS LIST AND SCHEDULED SERVICING**

Ministry of Defence

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**Prepared by Datascript Ltd. Bishop's Stortford Herts
Publications authority ATP/MOD(PE).**

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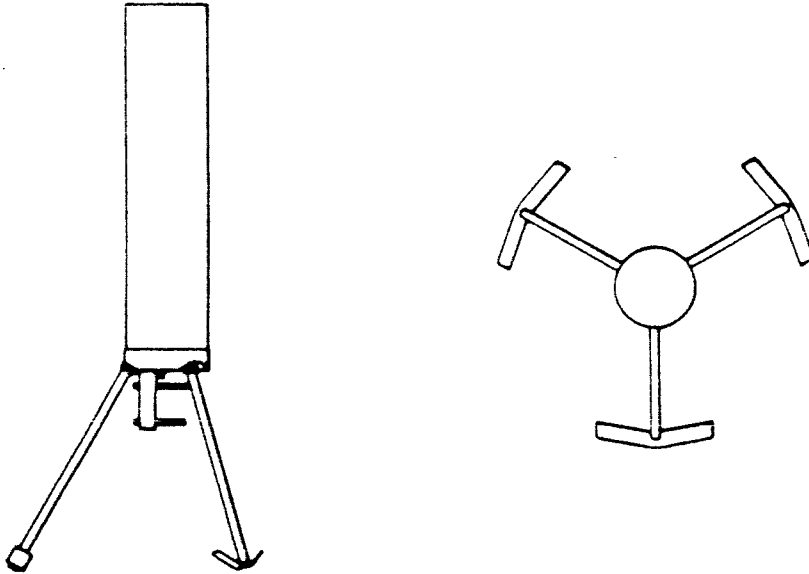
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ASSOCIATED PUBLICATIONS

AP 116E-1702-45 Ground Station VHF antenna systems

TOPIC 1
GENERAL AND TECHNICAL INFORMATION

Chapter 1LEADING PARTICULARS

Title VHF ground antenna.

Ref. No. RA957 (Nato Stock No. TBA).

Purpose To provide omni-directional horizontal radiation in the VHF band 115 to 155 MHz.

Brief description The antenna is a VHF quarter-wave folded monopole. The radiating element is bonded to the inside of a cylindrical, glass fibre radome. The counterpoise consists of three, quarter-wave radial elements mounted below the radome.

Physical characteristics

Height	0.998 m (3.28 ft)
Maximum diameter (including counterpoise)	0.53 m (1.78 ft)
Weight	3.2 kg (7.06 lb)

Electrical characteristics

Impedance	50 ohms
Azimuth radiation pattern	Omni-directional
Polarization	Vertical
VSWR	1.7 at 115 MHz; 1.92 at 155 MHz
Power-handling capacity	1 kW pep
Frequency range	115 MHz to 155 MHz

Climatic conditions

Operating temperature range	-40° to +60°C
Maximum humidity	100%
Maximum wind-speed	55 m/s

Chapter 2TECHNICAL DESCRIPTION

CONTENTS

Para

- 1 General
- 2 Electrical
- 3 Mechanical

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- 1 Vertical radiation pattern at 139 MHz 2

General

1 The RA 957 antenna is a VHF quarter-wave folded monopole designed for fixed, mobile or tectical ground operations and covering the frequency range 115 MHz to 155 MHz. The radiating element is bonded to the inside of a glass fibre cylindrical radome. The counterpiece consists of three, quarter-wave radial elements mounted below the radome.

Electrical

2 The RA 957 antenna is designed to radiate vertically polarised electromagnetic waves, providing an omni-directional radiation pattern in the horizontal plane. The vertical pattern is similar to that of a dipole antenna (see fig 1).

Mechanical

3 The antenna may be mounted at the top of a vertical pole or pipe whose outside diameter is between 35 mm and 60 mm. Concentric clamp bolts attach the antenna to the pole.

4 However the antenna is deployed, RF connection is made through an N-type connector in the base. The antenna design provides a DC static discharge path to ground.

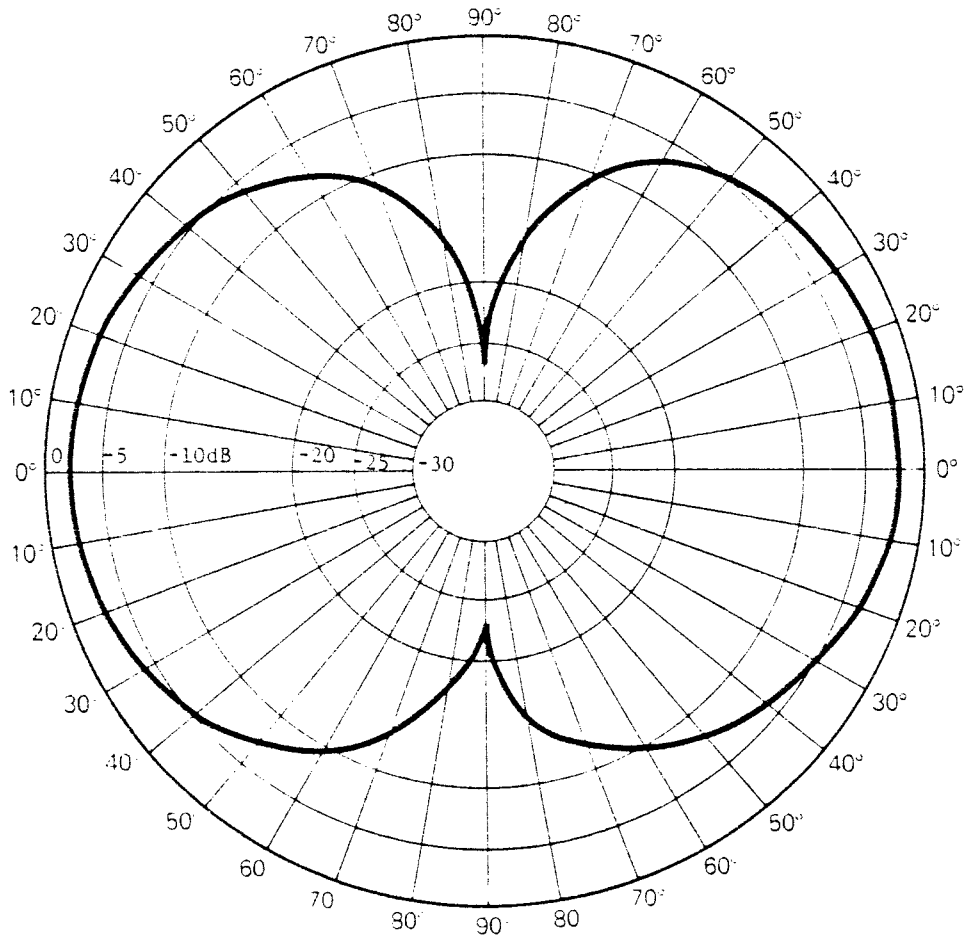


Fig 1 Vertical radiation pattern at 139 MHz

Chapter 3OPERATION

CONTENTS

Para

- 1 Assembling the free-standing antenna
- 2 Coaxial cable connections
- 4 Mast mounting
- 5 Manpower
- 6 Safety precautions

Fig

- 1 Mast mounting

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2

Assembling the free-standing antenna

1 The antenna is supplied with the three ground-plane elements separated from the main unit. To assemble the elements to the main unit, proceed as follows:

- 1.1 Screw the nuts onto the threaded ends of the ground-plane elements as far as possible.
- 1.2 Screw the ground-plane elements into the threaded holes in the main-unit casting as far as possible.
- 1.3 Slightly unscrew the ground-plane elements (as required) so that the feet are symmetrically orientated.
- 1.4 Tighten the M12 nuts to retain the ground-plane elements in their positions. Torque the nuts to 35 Nm(309 lb in). A suitable open-ended torque spanner is available from Norbar Ltd.

Coaxial cable connections

2 For low power or short cable runs, a small coaxial cable such as URM43 and URM76 may be used for its light weight and ease of installation. It is suitable for use up to about 100 W when supported in air, but its relatively high attenuation should be taken into account.

3 For higher power or longer cable runs, a larger cable such as URM67 should be used for its higher power-handling capability and lower attenuation. It has, however, the disadvantages of higher weight and greater stiffness.

Mast mounting

4 The antenna may be mounted on a pole, as shown in Fig 1, by means of a stub tube. Since the weight of the coaxial cable is taken by the clamp on the coaxial plug, the length of the stub tube should not exceed three metres. The coaxial cable should be supported close to the point where it emerges from the bottom of the stub tube.

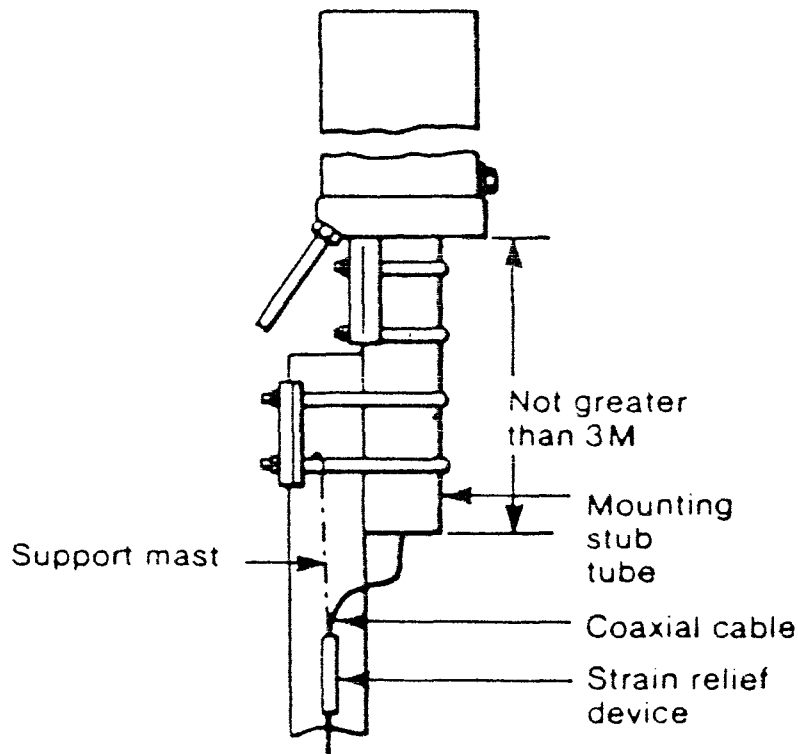


Fig 1 Mast mounting

Manpower

5 A supervisor and two men are required to assemble and erect the antenna on a mast.

Safety precautions

6 All safety precautions are to be taken when mounting the antenna; these must not be compromised in any way. Safety precautions laid down in Engineering Staff Instructions Volume 1 Part 3 Sect 1/2 and Health and Safety at Work Etc Act 1974 Chapter 37 are to be strictly adhered to.

TOPIC 2

GENERAL ORDERS AND MODIFICATIONS

PREFACE

1 Material issued for inclusion in this Topic 2 should be filed in the following order:

1.1 Prefacè (this page).

1.2 General orders. These leaflets are identified by the letters 'GO' and should be filed in numerical order.

1.3 Equipment modification list. This list shows all MOD-approved modifications affecting the subject of this Topic 2, including those for which leaflets will not be issued. The list will be reissued periodically. As modification leaflets are inserted, suitable entries should be recorded in the applicable columns of this list.

1.4 Modification leaflets. Leaflets bear numbers allotted in sequence as the leaflets are sent to press and should be filed in numerical order.

2 When a complete leaflet or individual leaf is reissued in amended form the alterations are indicated by triangles thus ►-----◄ to show where text has been changed.

Equipment Modification List

MOD Mod. No.	Contractor Mod. No.	Mod. plate strike No.	Modification title	Class	Leaflet No.

TOPIC 3

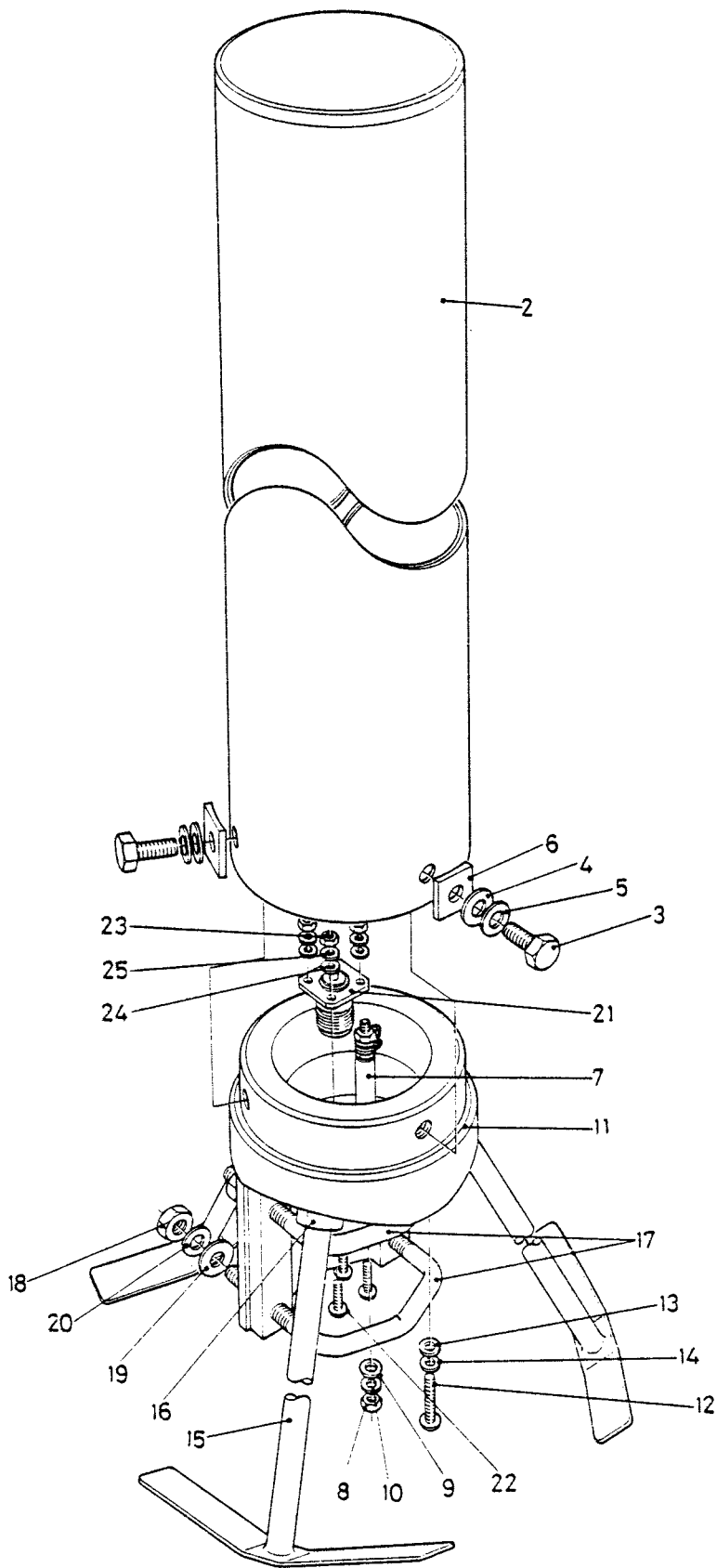
PARTS LIST

PARTS LIST

ANTENNA

5985-99-788-6272

(RACAL TYPE RA957)



Item 1

Fig. 1, Antenna

FIG ITEM	MAN CODE NAVY-N ARMY-A RAF-R	NATO STOCK NUMBER	INDET	ITEM NAME AND DESCRIPTION	PART NO./ DRAWING NO.	NO. OFF	CoS AND LoS	CCT REF
1-1		5985-99-788-6272	A	ANTENNA VHF monopole; 3 antenna elements	RA957-000	1 RF	-	
2	R	5985-99-788-6273	B	ANTENNA ELEMENT assembly of screen, strip, strap, tube, cap, bracket and connector; paint finish NATO green	RA957-001	1	C 2/3	
3	R	5305-99-139-6068	Z	SCREW, MACHINE ISO metric; corrosion resistant steel; hex hd; 3.00mm by 1.25mm pitch; 20.00mm lg; class 5g thk	BS3692	3	C 2/3	
4	R	5310-99-136-2753	Z	WASHER, FLAT corrosion resistant steel; rd; rd hole; M8 nom bolt hole; 17.00mm od, 1.00mm thk	BS4320-1968	3	C 2/3	
5	R	5310-99-624-4059	Z	WASHER, LOCK corrosion resistant steel; single coil; 3.00mm nom bolt size; 12.75mm max od, 2.00mm thk	BS4464 table 1 type A	3	C 2/3	
6	R	5310-99-788-6277	B	WASHER, SADDLE aluminium alloy; alocrom, paint green; 20.00mm square; 5mm o/a thk; 3.30mm hole; 53.00mm radius saddle	RA957-011	3	C 2/3	
7	R	5950-99-788-6274	B	INDUCTOR, RADIO FREQUENCY single turn coil on insulator; copper enamelled wire 18 SWG 100mm lg; unscreened	RA957-002	1	C 2/3	
8	R	5310-99-713-2622	Z	NUT, PLAIN, HEXAGON ISO metric; corrosion resistant steel; chamfered bearing surface; 5mm by 5mm w A/F; 4mm h o/a	BS3692-1967 table 7	1	C 2/3	
9	R	5310-99-138-8359	Z	WASHER, FLAT corrosion resistant steel; rd shape; rd hole; 5mm nom bolt size; 10.00mm od, 1.00mm thk	BS4320-1968 table 1	1	C 2/3	

FIG ITEM	MAN CODE NAVY-N ARMY-A RAF-R	NATO STOCK NUMBER	INDENT	ITEM NAME AND DESCRIPTION	PART NO./ DRAWING NO	NO. OFF	CoS AND LoS	CCT REF
1-10	R	5310-99-624-4058	Z	WASHER, LOCK corrosion resistant steel; single coil; 5mm screw size, 3.55mm max od; 1.5mm thk	BS4464-1969	1	C 2/3	
11	R	5985-99-788-6275	B	BASE, ANTENNA ELEMENT aluminium alloy; alocrom 1200; paint NATO green; 112.00mm dia; 50.00mm thk; 125.00mm o/a lg; 3 holes equispaced for antenna elements	RA957-003	1	C 2/3	
12	R	5305-99-135-0426	Z	SCREW, MACHINE ISO metric; corrosion resistant steel; flat fillister hd; slot drive; 4mm, 0.70mm pitch by 25mm lg, class 6g thd	BS4133:1967 table 5	1	C 2/3	
13	R	5310-99-136-2750	Z	WASHER, FLAT corrosion resistant steel; rd; rd hole; M4 nom bolt hole; 9.00mm od; 0.80mm thk	BS4320-1968	1	C 2/3	
14	R	5310-99-624-4048	Z	WASHER, LOCK corrosion resistant steel; single coil; M4 nom bolt size; 6.95mm od; 1.30mm thk	BS4464-1969	1	C 2/3	
15	R	5985-99-788-6275	B	ANTENNA ELEMENT aluminium rod and aluminium bar; alocrom, paint finish NATO green	RA957-004	3	C 2/3	
16	R	5310-99-136-4879	Z	NUT, PLAIN, HEXAGON ISO metric; corrosion resistant steel; chamfered bearing surface; 12.00mm by 1.75mm pitch; 19.00mm A/S; 10.00mm h o/a	BS3692-1967 table 7	3	C 2/3	
17	R	5306-99-788-6278	B	BOLT, U corrosion resistant steel; chemical black; 72.00mm inside lg; 40.00mm w; 3.00mm thds	RA957-021	2	C 2/3	

FIG ITEM	MAN CODE NAVY-N ARMY-A RAF-R	NATO STOCK NUMBER	INDENT	ITEM NAME AND DESCRIPTION	PART NO./ DRAWING NO.	NO. OFF	CoS AND LoS	CCT REF
1-18	R	5310-99-136-4877	B	NUT, PLAIN, HEXAGON ISO metric; corrosion resistant steel; chamfered bearing surface; 8.00mm by 1.25mm pitch; 13.00mm w A/F; 6.50mm h o/a	BS3692-1967 table 7	4	C 2/3	
19	R	5310-99-136-2753	B	WASHER, FLAT corrosion resistant steel; rd; rd hole; M8 nom bolt hole; 17.00mm od, 1.00mm thk	BS4320-1968	4	C 2/3	
20	R	5310-99-624-4059	B	WASHER, LOCK corrosion resistant steel; single coil; 8.00mm nom bolt size; 12.75mm max od, 2.00mm thk	BS4464 table 1 type A	4	C 2/3	
21	R	5935-99-774-0592	B	CONNECTOR, FIXED, ELECTRICAL straight shape; thd coupling 28mm o/a lg; 25.4mm sq flange; gold or silver plated contact; nickel plate shell; 1 mating end; 1 contact; 1000V ac; PTFE insert; brass shell; ext thd shell	RL61 404	1	C 3	
22	R	5305-99-139-8133	Z	SCREW, MACHINE ISO metric; corrosion resistant steel; pan hd; slot drive; black nickel plated; 3.00mm by 0.50mm pitch, 12.00mm lg; class 6g thd	BS4183	4	C 3	
23	R	5310-99-136-4875	Z	NUT, PLAIN, HEXAGON ISO metric; corrosion resistant steel; chamfered bearing surface; 3mm by 0.5mm pitch; 5.5mm w A/F; 2.4mm h o/a	BS3692-1967 table 7	4	C 3	
24	R	5310-99-136-2749	Z	WASHER, FLAT corrosion resistant steel; rd; rd hole; M3 nom bolt size; 7.00mm od; 0.50 mm thk	BS4320	4	C 3	
25	R	5310-99-137-0207	Z	WASHER, SPRING TENSION corrosion resistant steel; 3.0mm nom bolt size; 6.40mm od; 0.61mm o/a h	BS4463-1969	-	C 3	