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It is my hope that you find the file of use to you personally – I know that I would have liked to have found some of these files years ago – they would have saved me a lot of time !

Colin Hinson

In the village of Blunham, Bedfordshire.

AIR PUBLICATION

116A-0101-1

(Formerly A.P.2276, Vol. 1,
(2nd Edn.) Part 1)

**CONCISE DETAILS
OF
GROUND RADIO AND TERMINAL
EQUIPMENT**

BY COMMAND OF THE DEFENCE COUNCIL

J. Dunnett

Ministry of Defence

FOR USE IN THE
ROYAL AIR FORCE

(Prepared by the Ministry of Technology)

PREFACE

1. Since the issue of the second edition of A.P.2276 and the division of the publication into two parts to segregate the radio ground equipment from the radar, considerable progress has been made in the allocation of N.A.T.O. stock numbers and designations to existing equipment and new equipment which has since been introduced into the Services. The publication is now renumbered under the Air Publication coding system and the opportunity is taken to change the layout to a logical format more suited to modern trends in the development of radio communication and radio (non-radar) navigational equipment.

2. The transition will be achieved by normal amendment action, the initial issue introducing new marker cards and preliminaries which include this Preface and a revised List of Contents giving the new layout. The method of presentation of information will follow that of the former publication, the salient characteristics of similar types of equipment being presented in as uniform a manner as possible within the appropriate Parts and Sections to enable ready comparison to be made.

3. It should be noted that the mobile and transportable installations included in Part 1 exclude those ground radio installations in which a radio vehicle forms an essential part of the installation equipment. Such installations are allotted type numbers and are separately dealt with in "Concise Details of Radio Vehicles", A.P.116A-0103. The mobile and transportable installations included in Part 1, Sections 2, 3 and 4 are complete in themselves and may be conveyed by various forms of transport.

4. Existing information sheets from the original publication dealing with current equipment have been re-issued in the appropriate Part and Section of this revised publication. Those which provide information on equipment that has become obsolete, or the anticipated Service life is too short to warrant re-issue, will be discontinued.

5. The sub-division of the publication into Parts and Sections follows the logical sequence of break-down from the composition of complete ground radio communications systems to the analysis, in concise form, of the installed radio and associated equipment.

(1) Part 1 provides the leading particulars of complete ground radio systems other than radio vehicle installations, separate sections being allotted to the various categories, viz. fixed, mobile, transportable and air transportable installations. Ground radio equipments associated with airborne radio navigation aids will be included in the appropriate Section. The information sheets will give particulars necessary to establish the type and function of the system, together with brief details of the main equipment installed and such associated and/or ancillary equipment essential to its operation and handling.

(2) Part 2, Section 1, will include radio transmitting and receiving equipment not separately classified under the radio installation numbered categories of Part 1, although self-contained and used with various communication systems e.g. radio link and relay equipment. Section 2 of this Part will provide information on antenna tuning equipment such as antenna tuning units, multicouplers and matching networks, when self-contained.

(3) Part 3 information sheets provide operational and physical characteristics of complete transmitters, including the older T-prefixed Types in current use. Section 1 contains the main transmitter details including the sub-assemblies comprising the transmitter and also associated equipment necessary for particular modes of operation. Section 2 gives the

break-down of sub-assemblies into units or sub-units. For ease of reference, the information sheet numbering of the parent transmitter in Section 1 is also used in Section 2 for the particular transmitter sub-assemblies.

(4) The receivers in Part 4 are dealt with in a manner similar to the transmitters in Part 3, with Section 1 containing leading particulars of receiver performance and physical details of sub-assemblies and associated units. Section 2 provides further details of the sub-assemblies and associated equipment.

(5) In view of the extensive range of equipment covered by the title "Frequency Generation Equipment", Part 5 will be confined to self-contained units replaceable to alter the function or mode of operation or frequency coverage of the parent equipment. Section 1 deals with the radio and intermediate frequency equipment whilst Section 2 is concerned with audio and voice frequency processing equipment used with the systems and installations covered by this Publication.

(6) Much of the equipment covered in this Publication contains sub-assemblies and units with controls and monitoring or test equipment built in as an integral part of the design. Part 6 covers self-contained or readily removable, normally rack mounted units, usually common to a particular equipment range. Section 1 covers remote control of transmitters and receivers and Section 2, monitoring equipment.

(7) Part 7, as its title implies, covers in concise form details of a.f. and d.c. terminal equipment used in conjunction with the ground radio installations detailed earlier in the Publication, to form the complete communication systems.

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- Section 3 Perforators and reperforators
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A	Part	Sect.	Sheet No.
Adaptor (see couplers)	-	-	-
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Aerial, whip, (10B/1072301)	1	2	1
(10B/1073734)	1	2	1
(10B/947025)	1	2	2
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Aerial assembly, 5985-99-933-1163	1	4	5
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A	Part	Sect.	Sheet No.
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Aerial-head, 5825-99-932-5357	1	1	5
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Aerial systems, Type 220A (10B/2454)	1	4	3
439 (10B/16648)	1	1	2
454 (16724)	1	1	3
455 (16725)	1	1	3
456 (17726)	1	1	3

A	Part	Sect.	Sheet No.
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Air blower, 4120-99-943-7142	1	1	5
Air conditioner, Type, 52 (4120-99-943-3951)	1	4	3,5,8
Alarm, monitor, 5825-99-932-5356	1	1	5
Alarm, radio, {10D/9509903}	1	1	8
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5820-99-951-0654 (Racal MA.294A-2)	5	1	1

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5820-99-911-8335 (formerly amplifying unit Type 7113, 10U/16655)	4	2	2,3
(10U/9522239) (Lustraphone)	1	2	7
Amplifier-control group, 5820-99-970-7757 (TGRI(AT)26018/1)	1	4	11
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Amplifier intermediate frequency. 5820-99-913-1497 (100 kHz i.f. amplifier)	4	2	12
5820-99-943-3455 (100 kHz i.f. amplifier)	4	2	11
5820-99-580-8359 (Racal MA.219A)	4	2	13,18,19, 20
5820-99-911-8334 (formerly amplifying unit, Type 7112, 10U/16654)	4	2	2,3
5820-99-953-2079 (Racal MA.229)	4	2	14,15
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A	Part	Sect.	Sheet No.
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5820-99-932-5691 (formerly amplifying unit, Type A7349, 10U/16658)	1 3	4 2	3 18
5820-99-932-5699	3	2	18
5820-99-943-9509 (formerly amplifying unit, Type 7111, 10U/16653)	4	2	3
5820-99-947-5258 (L.343)	1	4	11
5820-99-948-8587 (Racal DA.25005)	3	2	41
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5895-99-955-3103 (Redifon GA 406)	5	1	14
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Amplifier unit r.f.			
43D (AP.61436)	4	2	1
Amplifying unit, Type			
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453 (10U/16581)	4	2	1
472 (10U/16617)	3	2	13
474 (10U/16619)	3	1,2	13
475 (10U/16620)	3	2	13
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Antenna			
5965-99-194-1707	1	4	3
5820-99-622-9217 (Storno AN-630-UK)	1	4	19
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Log-periodic (Racal LPH-9, modified)	8	1	1
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5895-99-933-1162	1	1	7
Antenna, group			
(ITT-AN/GRN/60 or -/61)	1	1	14
Antenna, low-band			
(ITT-AS/685/URN3)	1	1	13
Antenna, high-band			
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Antenna, feeder			
10B/1765 ³ (Type 8013)	1	1	15
10B/18897 (Pye OV82 - 120ft)	1	1	15
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ITT-C/1349/URN3	1	1	13
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5935-99-618-0625	1	4	19

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Platform 5 (10B/5895-99-107-3529)	1	4	12
<hr/>			B
Base, motor generator 6125-99-933-1430	1	4	5
Base, stand (10AR/5418)	1	4	4
Battery, charger (see charger, battery)	-	-	-
Battery, re-chargeable 6140-99-111-2650	1	2	3
Deak GB type 225DKZ	1	2	4
Deak GB type 6/7/DKO	2	1	1
Battery, tester 6625-99-521-9537 (Storno BT570U)	1	4	19
Battery units			
5820-99-622-5657 (Storno BU601-7218)	1	4	19
6140-99-521-1338 (Storno BU501a)	1	4	19
Beacon set, radio 5825-99-970-5664	1	4	2

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56 (10K/17042)	3	2	13
130 (10K/20428)	3	2	3
Bracket, angle			
5340-99-971-0830	1	4	8
Buffer store, telegraph (see telegraph buffer store)	-	-	-
<hr/>			
C			C
<hr/>			
Cabinet, electrical equipment			
5820-99-972-8566 (for Racal RA.17)	4	1	11
5820-99-972-8567 (for Racal RA.102)	4	1	11
Cabinets, Type			
11 (fitted) (10AQ/167)	1	1	3
8756 (fitted) (10AG/1674)	3	1,2	32,34, 35,36, 37,38, 39
14554A (fitted) (10AQ/1584)	1	1	15
14480A (fitted) (10AG/1574)	1	1	16
14485A (fitted) (10AQ/1576)	1	1	16
14485B (fitted) (10AQ/1581)	1	1	16
14485C (fitted) (10AQ/1582)	1	1	16
Cabin, radio receiver			
5820-99-933-0822	1	4	3
Cabin, radio receiver-control, group			
10D/5895-99-954-2750	1	4	12
Cabin, radio receiver d.f.			
5820-99-933-1030	1	4	5

C	Part	Sect.	Sheet No.
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5820-99-933-0823	1	4	3
5820-99-933-0824	1	4	3
Cabin, radio transmitter, group			
10D/5895-99-954-2751	1	4	12
Cabin, spares and servicing set			
10D/5895-99-195-4541	1	4	12
Cabin, spares and stowage			
Cabin 4			
(AP) Z1/5820-99-193-4297	1	4	12
Cabin, teleprinter group			
10D/5895-99-954-2749	1	4	12
Cabin (receiver, radio)			
(Racal MAA.606)	4	2	17
Cabinet			
(ITT - CY/3163/GRN-9D)	1	1	14
Cabinet, electrical equipment			
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Cable assembly			
5995-99-932-4012	3	2	18
59 5-99-932-4014	3	2	18
5995-99-932-4015	4	2	3
(formerly cable assembly Type, 9097 (10HA/16707))			

C	Part	Sect.	Sheet No.
5995-99-932-4016 (formerly cable assembly, Type, 7804, 10HA/15277)	4	2	2
Cable assembly (composite) 5995-99-999-2601	3	2	18
Cable assembly (power, electrical) 5995-99-944-8999	1	4	10
5995-99-944-9000	1	4	10
5995-99-944-9001	1	4	10
5995-99-944-9077	1	4	9
5995-99-970-0664	1	4	3
5995-99-970-0667	1	4	3
10AH/5995-99-223-2476 (Pye)	6	1	3
Cable assembly, radio frequency 5995-99-944-8975	1	4	10
5995-99-944-9076	1	4	9
Cable assembly, special purpose 5995-99-971-0278	1	4	11
5995-99-971-0284	1	4	11
Cable assembly, special purpose, electrical 5995-99-944-9078	1	4	9
Cable, reel holder, (10AP/1735)	1	4	4
Calibrator, frequency 5820-99-943-3461 (crystal calibrator)	4	2	11
5820-99-943-6625 (crystal calibrator)	4	2	12

C	Part	Sect.	Sheet No.
Capacitors, fixed, Type 6722 (10C/19428)	3	2	13
Capacitors, Type 5071 (10C/15004)	3	2	13
Case, carrying (radio-telephone) 5820-99-525-0514 (Storno)	1	4	19
Case, receiving set, radio, sub-assembly 5820-99-944-8848	1	4	9
Case, transmitting set, radio sub-assembly 5820-99-944-8853	1	4	10
Charger unit, battery 6130-99-109-8992 (Spemby-SBC7/70) (Storno-CU-600-7218a) 5820-99-622-6555 (Storno-CU-602-7218) 6130-99-521-1341 (Storno-CU-502/4)	1 2 1 1 1	2 1 4 4 4	3 1 19 19 19
Chassis, electrical equipment 5820-99-932-4001 (formerly chassis assembly, Type, 7354, 10D/19269)	4	2	3
5820-99-932-4002 (formerly chassis assembly, Type 7805, 10D/19796)	4	2	2
Coder, indicator (ITT - KY/101/URN3) (ITT - KY/382/GRN-9D)	1 1	1 1	13 14

C	Part	Sect.	Sheet No.
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Communication system (see inductive loop or intercomms)	-	-	-
Comparator signal 5820-99-911-8324 (formerly comparator unit, Type, 7101, 10D/19229)	4	2	2
5820-99-951-0656 (Racal MA.290)	5	1	1
Connector 5995-99-911-8336 (formerly connector, Type NA/50E/R5 10HG/88)	4	2	2
Console, communication control 5820-99-951-5343 (STC TOP 21/B2)	1	4	12
5820-99-952-0403 (Racal LA.304)	1	1	9
	6	1	1
Consoles, Type 31 (10D/17833)	1	1	2
33 (10D/17835)	1	1	2
34 (10D/17836)	1	1	2
34A(10D/17895)	1	1	2

Console, telegraph, Type 10G/18441 (see teletypewriter console)

Console, telegraph set
5895-99-957-0988 (R.Veh/21261) 1 4 12

Contactor units, Type
24 (10AD/258) 3 2 13

Container, transit
5820-99-622-4368-Lid (Stormo CA600-7218/1) 1 4 19
5820-99-622-4367-Base (Stormo CA600-7218/1) 1 4 19
5820-99-622-4362-Lid (Stormo CA500-7218/1) 1 4 19
5820-99-622-4361-Base (Stormo CA500-7218/1) 1 4 19

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No.1 (A.P.) (Z1/5820-99-193-4299) 1 4 12
No.2 (A.P.) (Z1/5820-99-193-4301) 1 4 12
No.3 (A.P.) (Z1/5820-99-193-4303) 1 4 12
No.4 (A.P.) (Z1/5820-99-193-4305) 1 4 12
No.5 (A.P.) (Z1/5820-99-193-4306) 1 4 12
No.6 (A.P.) (Z1/5820-99-193-4308) 1 4 12
No.7 (A.P.) (Z1/5820-99-193-4310) 1 4 12

Control, amplifier
5820-99-947-5255 (L.348) 1 4 11

Control, duplexer
(IT - C/1236/URN3) 1 1 13
(ITT - C/2226A/GRN-9D) 1 1 14

Control, frequency convertor
5820-99-107-3801 1 4 15

C	Part	Sect.	Sheet No.
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5820-99-911-8329 (formerly selector unit, Type, 9008A, 10D/20576)	3 4	2 2	 2
5820-99-932-5709	3	2	18
5820-99-932-5710	3	2	18
5820-99-951-9295 (Elliot's ESC-3)	6	1	1
Control, group 10L/9331097 (Pye - radio - telephone)	1	1	15
Control, radio set 5820-99-950-5777 (Racal CSA.198)	1 6	1 1	9 1,2
Control, remote switching 5820-99-580-8364 (Racal LA.186A)	6	1	1
5820-99-932-5343	1	1	5
5820-99-950-5776 (Racal LA.182A)	6	1	1
Control unit, remote	(see remote control)		
Control unit, station (110L/39163) (Collins 312B-4)	1	4	11
5820-99-622-3178 (Storno 501a)	1	4	19
Control unit, radio (remote) (10L/9508918) (Pye)	1	2	1
(10L/9331289) (incl.handset) (Pye)	1	2	2

C	Part	Sect.	Sheet No.
Control units, Type			
88 (10L/37)	3	1	4
310 (10L/171)	3	1	4
323 (10L/186) AP.67933	3	3	1,13
716 (10L/272)	3	2	13
717 (10L/273)	3	2	13
12848 (10L/16710)	3	2	33
15056 (10L/16618)	4	1,2	8
16708 (10L/16754)	3	2	40
Converter, frequency			
5820-99-223-1327 (Racal RA.316 variant)	5	2	1
Converter, frequency, electrical			
5820-99-933-0846	4	2	10
Converter, independent sideband			
5820-99-954-3240	5	1	7
5820-99-142-5800	5	1	7
5820-99-618-3703	5	1	7
5820-99-618-3704	5	1	7
Converter, single sideband			
5820-99-949-4521 (Racal RA.63A)	5	1	2
5820-99-954-0538 (Racal RA.63G)	5	1	2
	6	1	2
Converter, tone-to-voltage			
5820-99-580-8363 (Racal LA.196A)	4	2	13,14,19
5820-99-950-5775 (Racal LA.195A)	3	2	41,42
Converter unit, telegraph			
5815-99-102-5582 (Plessey PV.213A)	6	1	2

C	Part	Sect.	Sheet No.
Cooler, air, electronic equipment			
5820-99-972-9816	3	2	18
5820-99-999-2381	4	2	2
(formerly fan assembly, Type, 7991, 10K/18821)			
5820-99-999-2648	4	2	2
(formerly fan assembly, Type 9672, 10K/19472)			
Cooler, dry air, electrical equipment			
5820-99-932-3995	3	2	18
(formerly air blower, Type, 7344, 10K/19476)	4	1,2	2
	4	2	3
Coupler, aerial			
5985-99-970-9228	1	4	2
Coupler, mic/tel adaptor (5820-99-112-7524) (Ultra)	1	2	4
Coupler, antenna (10B/9509944)	1	1	8
Coupler, antenna to transmitter 5820-99-624-5394 (Racal)	3	1,2	46
Coupling (aerial) Type 12961 (10B/18802)	1	1	6
Cover, access, electrical equipment, fitted, chassis			
(5820-99-932-4011	3	2	18
formerly cover front, Type, 1068, 10AP/299)	4	2	2
	4	2	3

C	Part	Sect.	Sheet No.
Cover, air conditioner 4120-99-933-15 6	1	4	8
Cover assembly, cooler, dry air, Electrical equipment 5820-99-932-4010 (formerly cover assembly, 10AP/236)	4	2	2
Cover, electrical, fitted 5820-99-999-0841 (formerly cover assembly, 10AP/273)	3 4 4	2 2 2	18 2 3
Cover, transmitter-receiver (10AP/1734)	1	4	4
<hr/>			
D			D
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Demodulator 5820-99-580-8360 (Racal MA.185A)	4	2	13,18, 19,20
5820-99-953-2073 (Racal MA.185B)	4	2	14,15
Demodulator units, Type 2 (10D/19109) 3 (10D/19110)	3 3	2 2	21 21
Demultiplexer 5810-99-222-7647	7	7	3
DF aerial switching cabinet 5820-99-932-4858	1	1	7

D	Part	Sect.	Sheet No.
Dipole, aerial (110B/30003)	1	4	8
Dipole, aerial mast, Type 24 (10B/2455)	1	4	3
Dipole units, Type 41 (10B/16647)	1	1	2
Dipole units (with co-axial connector) Type			
14535 (10B/18849)	1	1	16
8580 (10B/17817)	1	1	16
14318 (10B/18812)	1	1	16
14543 (10B/18853)	1	1	16
Display console 5975-99-932-4851	1	1	7
Display selection box 6120-99-932-4855	1	1	7
Distribution amplifier (see amplifier distribution)	-	-	-
Distribution box 6110-99-943-1567	1	1	5
Distribution box, Type S3/1 (6110-99-222-1242)	1	4	12

D	Part	Sect.	Sheet No.
Drive unit, radio 5820-99-999-1348 (formerly drive unit radio, Type 7353, 10D/19268)	4	2	3
Drive units, mechanical, Type			
9436, (10AR/3007)	3	2	19
9437 (10AR/3008)	3	2	19
9438 (10AR/3009)	3	2	19
9439 (10AR/3010)	3	2	19
9441 (10AR/3011)	3	2	19
Drive units, radio, Type			
2 (10D/17765)	3	2	1,13
4 (10D/18480)	3	1,2	11,26,27, 28,34
5 (10D/18481)	3	1,2	12,15,16, 26,27,28, 35,38,39
7 (10D/19123)	3	1,2	12,15,35, 38
7619 (10D/19442)	3	2	22,23
10159 (10D/20456) (Marconi HD21)	3	1	29,30
	5	1	11
10198 (Marconi HD26)	5	1	10
12845 (10D/21706)	3	2	33
Drive unit, transmitter			
5820-99-107-3802	1	4	13,14,15
	5	1	4
	3	1,2	45
Drive unit transmitter (synthesized)			
5820-99-624-5395 (Racal MA.1702A)	3	1,2	46
Dummy load, electrical			
5985-99-932-5350	1	1	5

E	Part	Sect.	Sheet No.
Electrical assembly, indicator 10Q/95	3	2	19
Electronic switch 5820-99-104-2312 (Marconi F3070)	6	1	2
Erection gear, mast 10B/5985-99-944-4496	1	4	12
Error detection-correction set, telegraph 5805-99-933-4079 (Mullard SL/65/20)	1	4	12
Exchange, telephone, manual 5805-99-115-1491 (Mobile) (STC Type 5101)	7	9	1
Exchange, telephone, manual 5905-99-115-1471 (Static) (STC Type 5100)	7	9	1
Exciter units, Type 9 (10D/18722)	3	2	8,14,20
11 (10K/18747)	3	2	8,14,20
12 (10D/17940)	3	2	13
Extension control (see remote control)	-	-	-

F			F
Facsimile, receiver-chart-recorder (Mifax D900)	7	5	2
Fan, vane axial 4140-99-195-4987 (Planette LD907)	6	1	2

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F	Part	Sect.	Sheet No.
Filter smoothing 5915-99-947-5733 (L.346)	1	4	11
Filter units, Type			
410 (10P/16154)	3	2	21
418 (10P/16162)	3	2	21
Fixed ground radio installations (FGRI)			
FGRI.5470 (HF D/F)	1	1	1
FGRI.18105 (Series) VHF CRDF	1	1	2
FGRI.18017 (IIS Ground)	1	1	3
FGRI.18081 (Auto-triangulation)	1	1	4
FGRI.18082 (Auto-triangulation)	1	1	4
FGRI.18119 (SRI.18118) (TACAN)	1	1	5
FGRI.23069 (MF Beacon)	1	1	6
FGRI.23078 (Series) UHF CADF	1	1	7
FGRI.23144 (Racal 7kW SSB/ISB/CW)	1	1	9
FGRI.23186 (Racal 7kW SSB/ISB/CW)	1	1	10
FGRI.23081/1A/1D/2A/2B/2C			
Pye PTC 2701/2, 20w, v.h.f., a.m., radiotelephone	1	1	16
FGRI.26002/3A			
Pye PTC 755 VD, 50w., v.h.f., a.m. radiotelephone	1	1	15
FGRI.26026/1 (VLP/MF Beacon)	1	1	8
F/MGRI.26029 (Pye AMLOB-7W v.h.f. radio telephone)	1	2	1
FGRI.23196 (Racal 1kW SSB/ISB/CW)	1	1	11
FGRI.26088 Plan 17/18 Instrument landing system, ground equipment	1	1	12
Frequency converter keyer 5805-99-933-0847	4	1,2	10
Frequency multiplier 5820-99-911-8332 (formerly drive unit, radio, Type 7110, 10D/19232)	4	2	2

F	Part	Sect.	Sheet No.
Frequency multiplier oscillator (ITT-CV/1171/GRN-9D)	1	1	14
(ITT-CV/273/URN3)	1	1	13
Frequency standard and distribution unit 5820-99-951-0655 (Racal MA.286B)	1	1	9
	5	1	1
5820-99-951-0657 (Racal MA.286A)	3	1	41
	5	1	1
<hr/>			
G			G
Generating set (42FF/200)	1	4	5
Generator, ringing, Type 3 (10G/30)	6	1	1
Generator set 30KVA a.c. trailer mounted X2/6115-99-109-2253	1	4	12
Generator, standard frequency 5820-99-948-8560 (Racal MA259G)	5	1	1
Glidepath (Madge 1)(see TGRI(AT)23253/1)	-	-	-
<hr/>			
H			H
Hose assembly, air duct 4720-99-933-1727	1	4	8
4720-99-970-1129	1	4	3
Headset (ampliguard)	2	1	1
Headset (Storno - HP501)	1	4	19

H	Part	Sect.	Sheet No.
Headset, telephone 10AH/5965-99-223-3389	6	1	3
Headset, interface unit 5820-99-622-4360	1	4	19
			I
Impedance matching unit, Type 7018 (10B/16758)	3	1	13
Indicator group 5825-99-933-1040	1	4	5
Inductive loop, communications system (Spembly) (with v.h.f. talk-back facility) Iustraphone)	2	1	1
Installation kit, electronic equipment 5821-99-933-1044	1	4	5
5840-99-933-1045	1	4	5
Instrument landing system (see FGRI.26088)			
Inter-comms equipment Hadley intercom type PO AD 5800 (series)	6	2	1
Intercom master unit, 20-line (10 G/5805-99-933-2226)	6	2	1
Intercom, master unit, 10 line (10 G/5805-99-933-2214)	6	2	1

I	Part	Sect.	Sheet No.
Intercom, master unit, 1-line (10 G/5805-99-933-3708)	6	2	1
Intercom extension unit 10G/5805-99-933-2215)	6	2	1
Intercom, a.f. amplifier module (10V/5808-99-933-2241)	6	2	1
Intercom, power supply unit (PO type 52A) (10K/5805-99-933-2216)	6	2	1
Interconnecting box 5820-99-944-9085	1	4	3
5820-99-949-1011 (J.1)	1	4	10
5820-99-951-0651 (Racal MA.603B)	3	2	41,43
	4	2	13,15, 20
			J
J			
Jack assembly, communication system 5895-99-956-0443 (R.Veh/21400)	6	1	2
Jack panels, Type 16701 (10D/22606)	3	2	40
			K
K			
Keying units, Type 26 (10K/17207)	3	2	8,14,20 22,23
16706 (10K/21342)	3	2	40
10195 (10K/120265)	3	1	29,30
Keys, morse, Type D (10F/7373)	6	1	1

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K	Part	Sect.	Sheet No.
Key, telegraph 5805-99-901-7902	6	1	2
Key, telegraph and interconnecting box 5829-99-102-5319	1	4	9
Kit, mast erection 5985-99-900-7463	1	4	8
<hr/>			L
L	<hr/>		
Lead, electrical 10HG/9522291 (Tannoy)	1	2	7
5995-99-970-0444	1	4	9
5995-99-971-3199	1	4	11
Lead, microphone extension (10HG/9522292) (Tannoy)	1	2	7
LF chokes, Type 970 (10C/19441)	3	2	13
Line switching units (see switching units)	-	-	-
Loudspeaker panel 5820-99-952-0327 (Racal MA.306)	6	1	1
Loudhailer (see MGRI.23160 - Lustraphone)	-	-	-
Loudspeaker, permanent magnet (10U/9522231)	1	2	7

L	Part	Sect.	Sheet No.
Loudspeaker unit 10V/9444305	1	2	1
<hr/>			
M			M
<hr/>			
MARGE 1 (see TGRI (AT) 23252/1)	-	-	-
Main chassis assembly 5820-99-943-3456	4	2	11,12
Man pack (see radio - telephone)	-	-	-
Mast (LR.80) 5985-99-944-4598 (SPM.30A) 5985-99-944-8850	1 1	4 4	12 9,10
Mast, aerial, Type 64 (10B/17128)	1	4	3
Mast, telescope, antenna 5985-99-102-8508 (Storno)	1	4	19
Mast accessories 5985-99-104-5804 (kit No. 3) (Storno)	1	4	19
Mast erection kit 5985-99-102-3777	1	4	3
Mast (36 ft) steel (10B/ZA.46750/1)	1	4	3

M	Part	Sect.	Sheet No.
Mast, lightweight 5985-99-900-7462 (SPM.48)	1	4	8
Meter assembly, electrical 6625-99-626-3416 (Racal MS.445)	3	2	46
Microphone assembly, Type 72, (10AH/1505)	3	1,2	36
14484 (10AH/1529)	1	1	16
Microphone dynamic (10AH/9522241) (Tannoy)	1	2	7
(10AH/39085) (Collins SM-2)	1	4	16
Microphone, ASP, (Lustraphone VC52/THSB/LV)	2	1	1
Microphone, magnetic (with SW) 5820-99-115-8583	1	2	3
5965-99-222-5773	2	1	1
Microphone (with speaker) 5820-99-622-3390 (Storno LM601)	1	4	19
Mixer stage, frequency 5820-99-911-8325	4	2	2
(formerly mixer unit, Type 7100, 10D/19228)			
5820-99-943-3464 (Racal RA.37A)	4	1,2	11
5820-99-950-5769 (Racal MA.181)	3	2	41,42, 43

M	Part	Sect.	Sheet No.
Mobile ground radio installations (MGRI)			
MRGI 23155/1 Radio-telephone packset 5820-99-951-4054 (ultra 3A4-A23)	1	2	4
MGRI 23160 Loudhailer 10V/5830-99-952-2736 (Tannoy)			
MGRI 23184 Mobile transmitter-receiver (see TGRI (AT) 23184) (Collins type AN/PRC47)	-	-	-
MGRI 23221/1 v.h.f. Radio-telephone 5W (motor-cycle) (Pye type W15-AM)	1	2	5
MGRI 23222/1 Radio-telephone packset 10D/5820-99-112-1407 (Ultra 13A4/AB3/IS)	1	2	3
F/MGRI 26029-1A/1B/2A v.h.f. 7W radio telephone (Pye type AM10B)	1	2	1
Mobile radio teletalk system (see TGRI (AT) 26086/1)		-	-
Modem line equipment (2.4 kilo-baud) (Skynet) (STC - Spec. T51293)	7	6	1
Modulator input unit (10E/971)	3	2	33
Modulator, radio transmitter			
5820-99-950-5770 (Racal MA.221A)	3	2	41
5820-99-953-2074 (Racal MA.240)	3	2	42,43
5820-99-107-3800 (Racal MA.175 & MA.202)	5	1	8

M		Part	Sect.	Sheet No.
Modulator units, Type				
28	(10D/17885)	3	2	13
57F	(AP/61535)	3	2	1
127	(10D/18482)	3	1,2	12,35
132	(10D/17936)	3	2	1
133	(10D/17941)	3	2	13
136	(10D/17962)	3	2	1
137	(10D/19122)	3	2	21
138	(10D/19124)	3	1,2	15,38
139	(10D/19127)	3	2	21
139A	(10D/19439)	3	2	21
7436	(10D/19430)	3	1,2	16,36
12841	(10D/21703)	3	2	33
Monitor, r.f.				
6625-99-943-3584		1	1	5
Monitoring units, Type				
37	(10T/13108)	3	2	8,14, 20,22
37A	(10T/13121)	3	2	8,14, 20,23
42	(10T/13112)	3	2	8,14,20, 21,22, 23,
45	(10T/13113)	3	2	21
14305	(10T/13122)	3	2	31
16710	(10T/13218)	3	2	40
16711	(10T/13219)	3	2	40
Morse key (see keys morse)		-	-	-
Multi-frequency receiver cabinet				
5820-99-932-4860		1	1	7
Multiplexer, telegraph (TDM)				
5810-99-222-7646		7	7	3

N	Part	Sect. Sheet No.	
Navigation aids (non-radar) (see under appropriate FGRI, TGRI or TGRI(AT))	-	-	-
Noise, blanker (Collins 136B2) 110D/39172)	1	4	16
0			0
Oscillator assembly 5820-99-580-8365 (Racal LA.224)	6	1	1
Oscillator, audio frequency 5820-99-951-9294 (Elliot's ESO-3)	6	1	1
Oscillator, command tone generator (TMC systems ARIZ Inc type CTG-1001)	5	1	12
Oscillator-control, frequency selector 5820-99-954-2904 (Selcal) (Elliot's 3041D2800)	6	1	1,2
Oscillator, frequency multiplier (see frequency multiplier oscillator)			
Oscillator, master 1 MHz (Marconi type H1501)	5	1	13
Oscillator, radio frequency 5820-99-911-8331 (formerly oscillator unit, Type 7106, 10V/667)	4	2	2
5820-99-950-5591 (Racal MA.275)	3	2	41,42,43
	4	2	13,14,15
			18,19,20

0	Part	Sect.	Sheet No.
Oscillator, r.f. 5820-99-943-3459 (2nd v.f.o.o.)	4	2	11,12
Oscillator, r.f. sub-assembly 5820-99-913-1498 (1st v.f.o.o.)	4	2	12
5820-99-943-3458 (1st v.f.o.o.)	4	2	11
Oscillator unit Design 7 (AP.61437)	4	2	1
Oscillator unit, Type			
165 (10V/585)	4	2	1
322 (10V/637)	3	2	2
326 (10V/640)	4	2	1
329 (10V/641)	4	2	1
350 (10V/16218)	3	2	8,14,20, 21,22,23
353 (10V/16219)	3	2	21
354 (10V/16220)	3	2	21
355 (10V/16221)	3	2	21
356 (10V/16223)	3	2	21
356A (10V/16233)	3	2	21
7069 (10V/16228)	3	2	11,12, 17,37
7169 (10V/16229)	3	2	21
7386 (10V/16231)	3	2	20
11215 (10V/16243)	3	1	29,30
12846 (10V/16421)	3	2	33
16713 (10V/16353)	3	2	40
Output units, Type			
47 (10D/17766)	3	2	1,13
Overload unit 5820-99-630-7604-(Racal MS.443)	3	2	46

P	Part	Sect.	Sheet No.
Packset	(see radio telephone)	-	-
Panel, control 5895-99-107-3533		6	1 2
Panel, control, for remote radio- telephone control 10D/5820-99-222-5321 (Pye PT, RTC and PT, RCP)		6	1 3
Panel, interconnecting and distribution 5820-99-107-5917 (Racal IA.287B)		3	1,2 44
Panel, patching, communication 5895-99-107-3532 (R.Veh/21448)		6	1 2
Panel fuse, Type 805 (10D/17897)		3	2 13
16699 (10D/22605)		3	2 40
Panels, Type 21A (10D/155)		1	4 3
820 (Indicating) (10D/17956)		1	1 3
14542C (radio repeater) (10D/22736)		1	1 16
Panel, telephone switchboard 5805-99-952-0328 (Racal IA.307)		6	1 1
Parametric amplifier (see amplifier, parametric)		-	-
Parts kit, radio trailer Z1/5820-99-102-2025		1	4 12

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P	Part	Sect.	Sheet No.
Pedestal, cabinet, electrical equipment 5820-99-932-5711	3	2	18
Petrol electric generator (42L/1500)	1	4	2
Plan 17/18 (see instrument landing system FGRI 26088)	-	-	-
Plate, mounting, telegraph key 5895-99-107-7073	6	1	2
Portable communications station (Collins)	(see TGRI(AT) 23183/1)	-	-
Positioners, single axis Sci. Atlanta models 5625, 5626 and 5109	8	3	1
Positioner, control unit Sci, Atlanta, model 4111	8	3	2
Power supply 5820-99-580-8362 (Racal PU.225A)	3	2	41,42,43
	4	2	13,14,15
			18,19,20
5820-99-622-3392 (Storno - PS-609-7218)	1	4	19
6130-99-900-6807 (SUR.28)	1	4	9
5820-99-932-4004 (formerly power unit, Type 7352, 10K/18136)	4	2	3
5820-99-932-4005 (formerly power unit, Type 7348, 10K/18134)	4	2	2

P	Part	Sect.	Sheet No.
Power supply (contd.)			
	5820-99-932-5697	3	2 18
	5820-99-932-5700	3	2 18
	5820-99-932-5707	3	2 18
	5820-99-947-5732 (L.345)	1	4 11
	5820-99-948-8589 (Racal DA.25007)	3	2 41
	5820-99-948-8590 (Racal DA.25006)	3	2 41
	5820-99-948-8591 (Racal DA.25002)	3	2 41
	5820-99-949-3603 (L.344)	1	4 10
		3	2 41,42
		4	2 13,14,19
	5820-99-950-5590 (Racal PU.238A)	6	1 1,2
	5820-99-951-0653 (Racal PU.303)	5	1 1
	5820-99-952-0326 (Racal PU.305)	6	1 1
		1	1 8
Power supply, high voltage			
	(ITT Type PP/956/URN3)	1	1 14
	(ITT Type PP/1763/URN)	1	1 13
Power supply, low voltage			
	(ITT Type PP/954/URN3)	1	1 14
	(ITT Type PP/1766/URN)	1	1 13
Power supply, medium voltage			
	(ITT Type PP/955/URN3)	1	1 14
	(ITT Type pp/1765/URN)	1	1 13
Power supply module			
	5820-99-626-4731 (Racal MS64)	3	2 46
Power supply, portable			
	(Collins PM-2)	1	4 16

P	Part	Sect.	Sheet No.
Power supply unit, receiver			
5820-99 913-2329	1	1	7
(Racal PU.1150)	4	2	17
Type 14515 (10K/21611)	1	1	16
Power supply, teleprinter (Type S69/1)			
6130-99-933-2877	7	11	1
Power supply, transformer rotary			
5820-99-949-3146	1	4	10
Power supply unit, converter			
5820-99-142-7911 (Racal PU.1151)	5	2	1
Power supply unit, radio telephone			
(10K/9542576)	1	2	1
5820-99-622-3392 (Storno PS609-7218/1)	1	4	19
Power supply unit, transmitter			
(10K/9331293)	1	1	16
Type 14514 (10K/21610)	1	1	16
Power unit,			
(AP) W8356A	4	2	1
Power unit, 5810-99-222-7648	7	7	3
Power units, Type			
234A (10D/17395)	1	4	3
	4	2	1
425 (10K/1901)	3	2	1,13
425A (AP.61607)	3	2	1
429 (10K/1492)	3	2	5

P		Part	Sect.	Sheet No.
	Power units, Type (contd.)			
	778 (10K/16569)	3	2	1
	778A (AP.61608)	3	2	1
	811 (10K/17203)	3	1,2	11,16,17, 34,37
	812 (10K/17204)	3	1,2	12,35
	821 (10K/17037)	3	2	13
	822 (10K/17038)	3	2	13
	823 (10K/17039)	3	2	13
	824 (10K/17040)	3	2	13
	825 (10K/17041)	3	2	13
	939 (10K/17260)	3	2	8,14,20, 21,22,23
	845 (10K/17094)	3	2	13
	848 (10K/17510)	3	2	21
	1003 (10K/17537)	3	1,2	15,38
	7724 (10K/NIV)	3	1,2	39
	12847 (10K/21040)	3	2	33
	14515 (10K/21610) (transmitter)	1	1	16
	14515 (10K/21611) (receiver)	1	1	16
	14552A (10K/21641) (transmitter)	1	1	15
	(10K/9331296) (receiver)	1	1	15
	14514 (10K/21610) (transmitter)	1	1	16
	16705 (10K/21341)	3	2	40
	Pre-tuned receiver and d.f. cabinet 5820-99-932-4857	1	1	7
	Pre-tuned receiver cabinet 5230-99-932-4859	1	1	7
	Pulse distribution box 5825-99-943-5897	1	1	7

R R

Rack assemblies, Type

247 (10D/17845)	1	1	2
255 (10D/18463)	3	1	21
266 (10D/18476)	3	1	8,14,20, 21,22,23
7198 (10D/19412)	3	1	20
7199 (10D/19413)	3	1	20
7200 (10D/19414)	3	1	21
7201 (10D/19415)	3	1	21
7202A (10D/21163)	3	1	21

R	Part	Sect.	Sheet No.
Rack assemblies, Type (contd.)			
7203 (10D/19417)	3	1	21
7204 (10D/19418)	3	1	20
9352 (10D/19932)	4	1,2	7
14283 (10D/22139)	3	1,2	40
Rack assemblies, channelling equipment			
5820-99-956-0164 (Plessey Type 900)	1	4	12
Rack electrical equipment			
5975-99-947-5256 (YL1180)	1	4	11
Radio, receiver			
(ITT - R/549/URN3)	1	1	13
(ITT - R/824/URN)	1	1	14
Radio set, group S1/1			
10D/23902	1	4	4
Radio repeater panel	(See panel, radio repeater)		
Radio station			
E21/R,241(AP) (Z1/5820-99-193-4290)	1	4	12
Radio-telephone, base station (pack)			
5820-99-622-4369 (Storno CQF600-7218)	1	4	19
Radio-telephone, base station			
5820-99-622-4364 (Storno CQF632-7218)	1	4	19

R	Part	Sect.	Sheet No.
Radio-telephone, portable station (pack)			
5820-99-622-4373 (Storno CQP600-7218)	1	4	19
5820-99-622-4363 (Storno CQP500-7218)	1	4	19
Radio-telephone, portable			
5820-99-622-4370 (Storno CQP-632-T02)	1	4	19
5820-99-622-4359 (Storno CQP-532-R)	1	4	19
(Pye AM10B)			(see F/MGRI 26029/1A/1B/2A)
(Pye W15-AM)			(see MGRI 23221/1)
10D/9560223 (Pye AM10P)			(see TGRI 26044/1A)
5820-99-951-4052 (Ultra 3A4-A23)			(see MGRI 23155/1)
10D/5820-99-112-1407 (Ultra 13A4/AB/1S)			(see MGRI 23222/1)
(Pye PTC 755 VD)			(see FGRI 26002/3A)
Receiver, induction loop			
5820-99-195-3381 (Spembly ILR1)	2	1	1
Receiver, radio			
5820-99-911-0850 (R.210)	1	4	9
5820-99-943-2775 (RA.17 Mk.2)	1	1,2	11
10D/5820-99-618-1034 (Racal RA.1205/8)	4	1,2	17
(Storno 623)	1	4	19
5820-99-999-9292 (RA.17L)	4	1,2	10,12
	6	1	2
5820-99-630-9620 (Racal RA.1772)	4	1	17
	4	2	17
5820-99-107-4926 (Racal RA.317)	1	4	13,14,15
	4	1,2	16
Type S5/1 (10D/9331294) (Pye)	1	1	15,16
Receiver, radio (f.m.)			
5820-99-195-3383 (Lustraphone FMR/408/AMP19)	2	1	1
Receiver, radio (tracking-skynet)			
(Defence Electronic Inc. model MTR-4B)	4	1	22
Receiver, radio (v.l.f. tracking - Omega)	4	1	23

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R	Part	Sect.	Sheet No.
Receiver set, group, cabin 2 (AP) Z1/5820-99-193-4293	1	4	12
Receivers, Type			
R.1392D (10D/17745)	1	4	3
	4	1,2	1
Receivers, Type			
R.1392E (10D/17768)	4	1,2	1
R.1392G (10D/20641)	4	1,2	1
R.1392J (5820-99-953-7424)	4	1,2	1
62H (Naval) (10D/23989)	4	1,2	1
R.7109, 5820-99-932-5695 (formerly 10D/19231)	1	4	3
	4	1,2	2
R.7351 (10D/19267)	4	1,2	3
R.8998, 5820-99-955-0769 (formerly 10D/20755)	4	1,2	4
R.10149, 5820-99-933-2369 (formerly 10D/20542)	4	1,2	5
R.10168, 5820-99-955-0771 (formerly 10D/320459)	4	1,2	6
R.10170, 5820-99-955-0770 (formerly 10D/20461)	4	1,2	7
R.14482A (10D/22258)	1	1	16
R.14487A (10D/22261)	1	1	16
R.14487B (10D/22734)	1	1	16
R.15095 (10D/20489)	4	1,2	8
R.15172 (10D/22019)	4	1,2	9
Receiver sub-assembly			
5820-99-932-5702 (formerly receiver unit, Type 9096, 10P/13247)	4	2	3
5820-99-932-5703 (formerly receiver unit, Type 9095, 10P/13246)	4	2	2

R	Part	Sect.	Sheet No.
Receiver sub-assembly (cont.)			
10P/9331295 (Pye PTC 3004 Z (or X))	1	1	15,16
Type 14538A (10P/16569)	1	1	16
Type 14519A (10P/16571)	1	1	-
Type 14519B (10P/16572)	1	1	-
Type 14515 (10K/21611)	1	1	16
(Stormo RX-632)	1	4	19
Receiving set, radio			
5820-99-107-5921 (Racal RTA.241C)	1	1	10
	4	1,2	15
5820-99-933-0813 (RA.103/1)	4	1	10
5820-99-944-5685 (TGRI(AT)26016/1)	1	4	9
5820-99-949-3256 (Racal RA.101)	6	1	2
5820-99-950-5773 (Racal RTA.191A)	1	1	9
	4	1,2	13
5820-99-953-2075 (Racal RTA.241A)	1	4	12
	4	1,2	14
5820-99-119-3981 (Racal RTA.191P)	4	1,2	18
5820-99-119-3979 (Racal RTA.191Q)	4	1,2	19
5820-99-951-0461 (Racal RTA.191K)	4	1,2	20
Receiving set, radio, sub-assembly			
5820-99-944-8411	1	4	9
Recorder, reproducer, sound			
5835-99-943-8325 (Type REH4)	6	1	2
Rectifier-control unit, sub-assembly			
5820-99-970-7760	1	4	11
Rectifier units, Type			
62 (10D/17621)	3	1,2	12,35,38
16696 (10D/22602)	3	2	40

R	Part	Sect.	Sheet No.
Regulator, voltage 6110-99-951-0381 (Racal MA.308)	1 1 3	1 4 1,2	9,10 12 41,42,43
Relay, assembly 5945-99-932-3996 (formerly relay unit, Type 7347, 10F/17961)	4	2	2
Relay units, Type 131 (10F/16894) 12850 (10F/20270)	1 3	1 2	2 33
Remote control, relay (10L/959955)	1	1	8
Remote control (pack) 5820-99-622-4366 (CB-602-7218)	1	4	19
Remote-control unit 5825-99-970-7630	1	4	2
Remote control, radio telephone (base station) (Pye PT, RTC and PT, RCP)	6	1	3
Remote-controller (or extension) unit, radio telephone base station 10J/5820-99-222-5322 (Pye) 10D/9331100 (Pye) Type 8105A (10L/16540) 5820-99-624-1622 (Storno CB-602-7218/1) 5820-99-624-1623 (Storno CB-600-7218/1)	6 1 1 1 1 1	1 1 1 4 4	3 15 15,16 19 19

R	Part	Sect.	Sheet No.
Remote-controlled, local switching unit, radio telephone base station			
10D/5820-99-222-5321 (Pye)	1	1	15
10D/9331098 (Pye)	1	1	15
10D/9331099 (Pye)	1	1	15
10D/9331096 (Pye)	1	1	15
Type 8003 (10D/19516)	1	1	15,16
Remote-control (group), radio telephone base station			
Type S1/2 (10L/9331097)	1	1	15
RF unit (10D/9704509)	1	1	8
RF units, Type			
7508 (10D/19438)	3	2	23
7508A (10D/21171)	3	2	23
12844 (10D/21705)	3	2	33
Resistor units, Type			
419 (10W/18325)	3	2	13
Running gear, transportable container			
10AS/1670-99-954-3916 (PG/CA/30/1)	1	4	12

S

S

Signal interface unit No.1			
5805-99-115-1478 (STC 5400)	7	9	4
Signal interface unit No.2			
5805-99-115-1479 (STC.5500)	7	9	5

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S	Part	Sect.	Sheet No.
Signal interface unit No.3 5805-99-115-1480 (STC.5600)	7	9	6
Single-channel d.f. cabinet 5820-99-932-4862	1	1	7
Splitter unit, 5820-99-630-7605 (Racal MS444)	3	2	46
Squelch	(see noise blanker)		
Stabilizer-amplifier module	(see amp-stab-module)		
Speaker units	(see loudspeaker units)		
Speaker, with microphone	(see microphone, with speaker)		
Stabilizer, voltage 6110-99-933-1036 5820-99-626-3419 (Racal M5440)	1 3	4 2	5 46
Store, electronic, 16-character 7440-99-952-2205	1	4	12
Stowage bag assembly 5820-99-970-7928	1	4	11

S	Part	Sect.	Sheet No.
Stowage bag, canvas			
No.1, 5820-99-944-8403	1	4	10
No.2, 5820-99-944-8404	1	4	9
No.1, 5820-99-944-8405	1	4	9
No.2, 5820-99-944-8406	1	4	10
5820-99-971-2005	1	4	11
Stowage platform assembly, generator			
Platform 6 (4K/3990/99-107-3530)	1	4	12
Platform 7 (4K/3990/99-107-3531)	1	4	12
Support, aerial, Type			
108 (10B/17131)	1	4	3
Support, antenna			
5985-99-933-1033	1	4	3
Switching unit for remote control	(see remote control)		
Switching unit, line (assembly)			
(5820-99-626-7836) (Racal MS.139)	3	1	46
Switch unit, Type			
2091 (10F/17273)	3	2	13
Synthesizer, electrical frequency			
5820-99-107-5920 (Racal MA.250E)	3	2	43
	4	3	15
	5	1	6
5820-99-950-5771 (Racal MA.250G)	3	1	41,42
	4	1,2	13,14,18
	5	1	19,20
			6
5820-99-971-7805 (Racal MA.350B)	1	4	13,14,15
	5	1	3

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T	Part	Sect.	Sheet No.
Telegraph automatic transmitter (tape reader) (Creed 6S/6) (10G/19233) (GPO No. 1C/2A/2D)	7	2	1
(Creed 6S/5)	7	2	2
(Creed 74B, 74D, S6/1, S6/2, S6/3)	7	2	3
Telegraph buffer store (16 character) (Recording Designs Ltd)	7	5	1
Telegraph tape printing reperator 10G/5815-99-618-4443 (RAF Mod) (Creed-EPRI)	7	3	1
Telegraph time division multiplex equipment	7	7	3
Telephone, radio	(see radio telephone)		
Telephone set 5805-99-954-2905 (formerly 10G/15098)	6	1	2
Teletalk system (radio-telephone)	(see TGRI(AT)26086/1)		
Teletypewriter console (10D/5895-99-107-0169 (10G/18441) Type 11413	1 7	4 9	12 1
Teletypewriter group, cabin 3 (AP) Z1/5815-99-193-4295	1	4	12

	Part	Sect.	Sheet No.
T			
Teletypewriter Type			
T100R (5915-12-134-0147)	1	4	8
(Creed 75)	7	1	7
Teletype (28-R0)	7	1	1
Tent:-			
8430-99-944-8971	1	4	9,10
8540-99-948-3534	1	4	2
5820-99-971-1548	1	4	11
Terminal, telegraph			
5820-99-956-0147 (Marconi HL.13/14)	1	4	12
5810-99-223-2737 (Racal LA.1023)	7	7	1
(Racal LA.1022B)	7	7	2
Terminal units, Type			
25 (19673)	1	1	2
Transcall	(see inter-comms)		
Trans - ceiver portable (Collins KWM-2A)			
(110D/39169)	1	4	16
Transmitter receiver set (Base station)			
5820-99-622-4369 (Storno CQF600-7218)	1	4	19
	1	4	12
Transmitter group, cabin 1			
(AP) Z1/5820-99-193-4291	1	4	12

	Part	Sect.	Sheet No.
T			
Transmitter-receiver, radio			
5825-99-932-5320	1	1	5
5820-99-970-2036 (KWT.6, Type 5)	1	4	8
10D/5820-99-971-1855	1	2	4
10D/5820-99-112-9077	1	2	3
10D/9542774	1	2	1
10D/9444306	1	2	1
10D/9331326	1	2	2
10D/9560223	1	3	4
10D/9331323	1	1	15
10D/933132	1	1	16
5820-99-622-4364 (Storno CQF632)	1	4	19
Transmitter set, automatic, telegraph tape			
5815-99-933-3103 (Plessey TAA6B)	1	4	12
Transmitter, audio (induction loop)			
5820-99-195-3380 (Spembyl 1LT50)	2	1	1
Transmitters, radio			
5820-99-195-6286	3	1	16
5820-99-911-0849 (C.11)	1	4	10
5820-99-932-5691	3	1,2	18
5820-99-932-5691	3	2	18
(10D/9331291)	1	1	16
(Storno TX 632)	1	4	19
Transmitter radio (a.m.)			
(10D/9331297)	1	1	15
Transmitter, radio (f.m.)			
5820-99-195-3382 Lustraphone FMT/6100	2	1	1

Part	Sect.	Sheet No.	Transmitters, Type
3	1,2	1	P. 1131J (10D/17746)
3	1,2	1	P. 1131K (10D/17767)
3	1,2	1	P. 1131M (10D/20638)
1	4	3	P. 1131N (10D/22718)
3	1,2	1	75C (R.N. version) (AP.61606)
3	1,2	1	P. 1278 (10D/558)
1	1	16	P. 14481A (10D/22257)
1	1	16	P. 14486A (10D/22260)
1	1	16	P. 14486B (10D/22733)
3	1	16	P. 1509 (10D/1721)
3	1	4	P. 1509A (10D/17974)
3	1	4	P. 1540 (10D/2120)
3	1,2	5	P. 1550 (10D/2244)
3	1	6	P. 1550A (10D/17409)
3	1	6	P. 1550B (10D/23655)
3	1,2	7	P. 1551 (10D/2245)
3	1,2	7	P. 1551A (10D/16966)
3	1,2	8	P. 1969 (10D/18459)
3	1,2	8	P. 1969A (10D/21172)
3	1	9	P. 1970 (10D/18460)
3	1	9	P. 1970A (10D/22230)
3	1	9	P. 1970B (10D/23699)
3	1,2	11	P. 1975 (10D/18478)
3	1,2	11	P. 1976 (10D/18479)
3	1,2	12	P. 1978 (10D/17884)
3	1,2	13	P. 1983 (10D/17910)
1	1	3	P. 1991 (10D/17948)
1	1	3	P. 1992 (10D/17955)
3	1,2	14	P. 1993 (10D/19114)
3	1,2	15	P. 1995 (10D/19125)
3	1,2	15	P. 2000 (10D/19124)
3	1	16	P. 2000A (10D/22708)
3	1,2	17	P. 7095 (10D/19188)
1	4	3	P. 7096, 5820-99-932-5691
3	1,2	18	(Formerly 10D/19225)
3	1,2	20	P. 7242 (10D/19422)
3	1,2	20	P. 7242A (10D/22231)
3	1,2	20	P. 7242B (10D/22795)
3	1,2	21	P. 7243 (10D/19423)
3	1,2	21	P. 7243A (10D/21162)
3	1,2	21	P. 7247 (10D/19424)
3	1,2	22	P. 7247A (10D/22232)

T	Part	Sect.	Sheet No.
Transmitter Type (cont.)			
T.7248 (10D/19425)	3	1,2	23
T.7248A (10D/21170)			
T.7248B (10D/22233)			
T.7355, 5820-99-932-5698 (formerly 10D/19270)	3	1,2	24
T.8994, 5820-99-933-2189 (formerly 10D/20753)	3	1,2	25
T.15074, 5820-99-933-2208 (formerly 10D/20480)			
T.9739 (10D/20610)	3	1	26
T.9740 (10D/20611)	3	1	27
T.9741 (10D/20612)	3	1	28
T.10158 (10D/20455)	3	1,2	29
T.10158A (10D/22729)			
T.10158B (10D/23678)			
T.10197 (10D/20468)	3	1,2	30
T.10197A (10D/22730)			
T.10197B (10D/22765)			
T.11768 (10D/21097)	3	1,2	31
T.11839 (10D/21109)	3	1,2	32
T.12842 (10D/21704)	1	1	6
	3	1,2	33
T.13119 (10D/21610)	3	1,2	34
T.13120 (10D/21611)	3	1,2	35
T.13121 (10D/21612)	3	1,2	36
T.13122 (10D/21613)	3	1,2	37
T.13123 (10D/21614)	3	1,2	38
T.13124 (10D/21615)	3	1,2	39
	3	1,2	40
T.15074 (see T.8994)	3	1,2	25
Transmitter, sub-assembly			
5820-99-101-5922 (Racal MA.228J)	1	1	10
	3	1,2	43
5820-99-932-5704	3	2	18
5820-99-950-5774 (Racal MA.228A)	1	1	9
	3	1,2	41
5820-99-950-5890 (Racal TA.184A)	1	1	9
	1	4	12
	3	1,2	41,42,43

	Part	Sect.	Sheet No.
T			
Transmitter sub-assembly (cont)			
5820-99-953-2076 (Racal MA.228B)	1	4	12
	3	1,2	42
Transmitter, sub-assembly (incl. cabinet)			
5820-99-624-5393 (Racal TA1810A)	3	1,2	46
Transmitter units, Type			
65 (10D/2475)	3	1	5
89 (10R/93)	3	1,2	11,12,16
			17
95 (10R/97)	3	1,2	15
13125 (10R/13101)	3	1,2	34,35,36
			37
13126 (10R/13102)	3	1,2	38,39
T.14514 (10K/21610)	1	1	16
T.14516 (10R/13105)	1	1	16
T.14517A (10K/21610)	1	1	16
T.14517B (10R/13107)	1	1	16
Type S4/1 (10R/9331292)	1	1	16
Transmitting set, radio			
5820-99-107-8223 (Racal TTA.227C)	1	1	10
	3	1,2	43
5820-99-944-5686 (TGRI(AT)26017/1)	1	4	10
5820-99-950-5772 (Racal TTA.187B)	1	1	9
	3	1,2	41
5820-99-953-2077 (Racal TTA.227)	1	4	12
	3	1,2	42
5820-99-194-6465 (Racal TTA.371C)	1	4	13,14,15
	3	1,2	44
5820-99-626-4733 (Racal TTA.1860A)	3	1,2	46
Transmitting set, radio, sub-assembly			
5820-99-944-8412	1	4	10
Transmitting terminal			
5820-99-112-0152	3	2	45

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	Part	Sect.	Sheet No.
T			
Transponder, Tacan (ground) ITT Federal Laboratories USA type AN/URN/3	1	1	13
Transponder, Tacan (ground) ITT Federal Laboratories USA type AN/GRN/93	1	1	14
Transportable ground radio installations (TGRI)			
TGRI.18153 (VHF/FM Station C42)	1	3	2
TGRI.26025/1 (Army Set BE.201)	1	3	3
TGRI.26044/1A VHF 7W, TX/RX packset (Pye AM10P)	1	3	4
Transportable ground radio installations (air transportable) (TGRI/AT)			
TGRI(AT)23123 (VLP/MF beacon)	1	4	2
TGRI(AT)23183/1 transmitter receiver (portable) comms. stn. h.f. s.s.b. c.w. (Collins)	1	4	16
TGRI(AT)23184/1 trans-ceiver (mobile) (Collins AN/PRC47)	1	4	17
TGRI(AT)23253/1 Microwave aircraft digital guidance equipment (MADGE 1)	1	4	18
TGRI(AT)26000/1 (VHF/UHF comms)	1	4	3
TGRI(AT)26005/1 (UHF ground)	1	4	4
TGRI(AT)26006/1 (UHF/CADF)	1	4	5
TGRI(AT)26009/1 (TACAN beacon)	1	4	6
TGRI(AT)26011/1 (Transponder beacon)	1	4	7
TGRI(AT)26014/1 (HF comms. terminal)	1	1	8
TGRI(AT)26016/1 (HF receiver)	1	4	9
TGRI(AT)26017/1 (HF transmitter)	1	4	10
TGRI(AT)26018/1 (HF amplifier)	1	4	11
TGRI(AT)26023/1 (HF/SSB/RTP/voice stn.)	1	4	12
TGRI(AT)26047/1 & 2 (ATC communication system)	1	4	13
TGRI(AT)26058/1 (1kW ISB/FST/RTP/voice communication station)	1	4	14
TGRI(AT)26063/1 (HF/SBB ground to air communication system)	1	4	15
TGRI(AT)26086/1 Mobile radio teletalk system (radio-telephone Stormo)	1	4	19

	Part	Sect.	Sheet No.
T			
Trolley, test equipment 5895-99-195-6416 (R.veh/21361)	1	4	18
Tuner, radio frequency			
5820-99-946-5257 (L.342)	1	4	11
5820-99-949-3147 (ATU No.7)	1	4	10
5820-99-971-8017 (Racal MA.144)	1	4	15
	2	2	2
Two-channel d.f. cabinet			
5820-99-932-4861	1	1	7
			U
U			
Unit, signalling			
AD 2644 (10G/17589)	6	1	1
AD 2645 (10G/18420)	6	1	1
Unit, speaking			
AD 2237 (10G/15743)	6	1	1
Unipole unit			
Type S3/3 (10B/20147)	1	1	16
			V
V			
Voltage stabilizer, Type			
16 (10D/17890)	1	1	2
19 (10D/17957)	1	1	3
VSWR assembly			
5820-99-630-7337 (Racal MS.447)	3	2	46

W	Part	Sect. Sheet No.	
Wheel assembly, cabin 5895-99-954-2478 (formerly 10AS/3485)	1	4	3,5,8,12

Wireless set			
BE.201 (Z1/5820-99-949-0418)	1	3	3
C.42 (Z1/5820-99-943-9362)	1	3	2

PART 1

**FIXED AND MOBILE GROUND RADIO
INSTALLATIONS
(EXCEPT RADIO VEHICLES)**

PART 1

FIXED AND MOBILE GROUND INSTALLATIONS (EXCEPT RADIO VEHICLES)

INTRODUCTION

- 1.** This Part contains general information on the complete ground radio communication systems classified as either fixed, mobile or transportable ground radio installations, other than those installed in radio vehicles as defined in the Preface to this publication. It will include the ground radio equipments associated with airborne radio navigation equipment.
- 2.** Within Sections, each information sheet includes the leading particulars necessary to establish the type and function of the particular installation, together with brief details of the main equipment and, where relevant, the associated and/or ancillary equipment essential to its operation and handling. Concise details of the individual items of main equipment are given in the appropriate Part and Section of this publication and cross-references are provided.
- 3.** Transmission and reception equipment used independently e.g. at specific transmission or reception sites or in a secondary role to the main equipment and not classified under the radio installation numbering system will be found in either Parts 2, 3 or 4 as appropriate.

SECTION 1

**FIXED GROUND RADIO INSTALLATIONS
(FGRI)**

Sheet No. 2

V.H.F. C.R.D.F. EQUIPMENT

FGRI. 18015/Series

Relevant publications:—

A.P.116C-0803-1

(formerly A.P.2530H, Vol. 1, Books 1 & 2)

A.P.116C-0806-1

(formerly A.P.2555N, Vol. 1)

Function

A two channel v.h.f. automatic cathode-ray direction finder providing an indication of the direction of arrival of any signal received. Simultaneous direction finding and traffic reception is provided on telephony and tone modulated signals with alternative direction finding or traffic working on c.w. signals. The equipment can be operated by local or remote control from points up to 20 miles from the d.f. station. Bearings are indicated on identical cathode ray oscillograph display units at the d.f. station and at the remote control position. Variants of the equipment are available to enable it to be used in conjunction with an automatic triangulation system. FGRI.18081 and 18082 provide the automatic triangulation equipment for local or remote control respectively. Also further variants of FGRI.18015 are available to enable it to be used in conjunction with U.H.F. C.A.D.F. FGRI.23078 as part of a combined V.H.F. C.R.D.F. and U.H.F. C.A.D.F. system. This system may also be used with the automatic triangulation equipment. The addition of remote control frequency selection equipment to the standard two channel equipment increases the number of spot frequencies available from two to ten, five frequencies to each channel.

Origin

Standard Telephones & Cables Ltd., Type P.V.1-B.

Operation principles

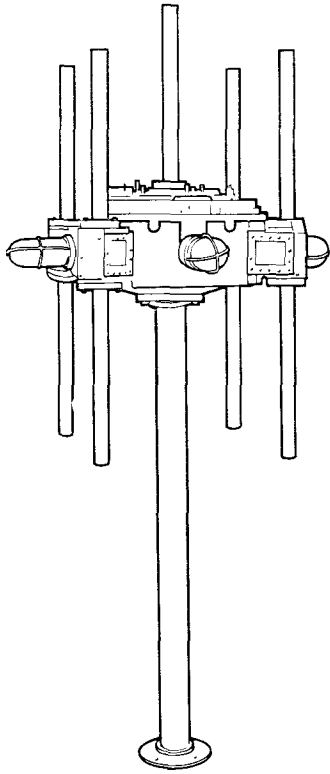
The signals from two crossed dipole pairs of the Adcock aerial system are separately 'identified' by modulation at different low frequencies (5 and 6 kHz) and are then combined, together with the unmodulated signal from the central omni-directional aerial, to yield a total signal whose envelope bears the modulating low frequencies. The strength of signal from each dipole pair, which varies according to the cosine of the bearing angle with respect to the plane of dipole pair, is recorded on the total signal strength as a depth of modulation. After amplification and detection of the signal the resultant l.f. wave contains each of the modulating frequencies. These l.f. waves are in-phase or antiphase with the modulating waves according to the particular quadrant of the signal bearing. The two l.f. waves are now applied to two separate differential detectors. The d.c. output obtained from each is proportional to the amplitude of the signal output from the corresponding dipole pair, and its polarity depends on the sense of the signal. When these outputs are applied to the X and Y plates of a cathode-ray oscillograph the spot is deflected in a direction which corresponds to the signal bearing.

Frequency range

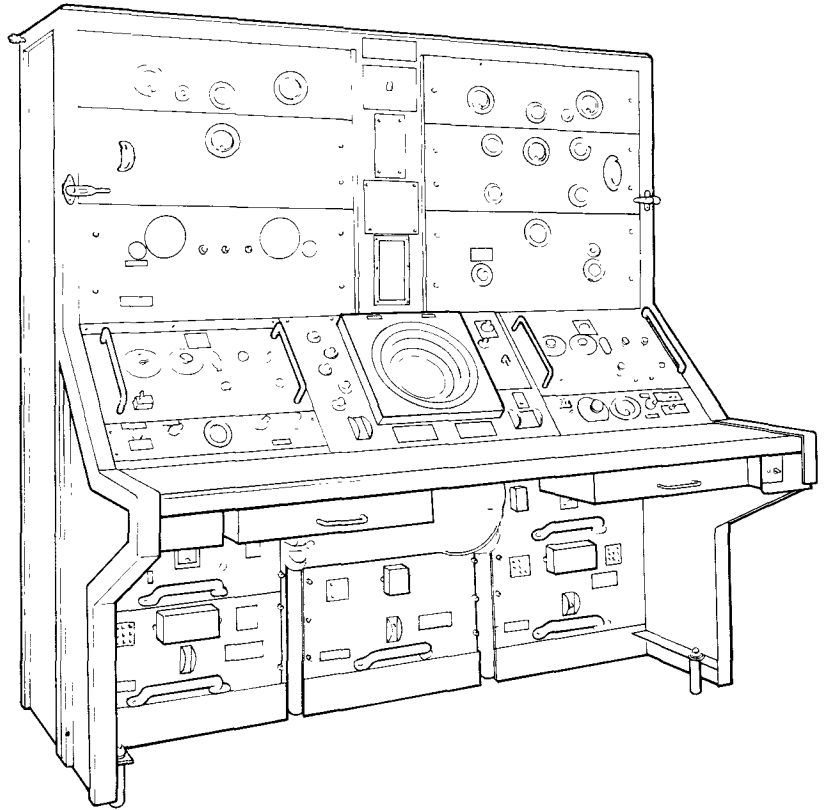
100 MHz to 156 MHz (3 to 1.92 metres).

Frequency tolerance

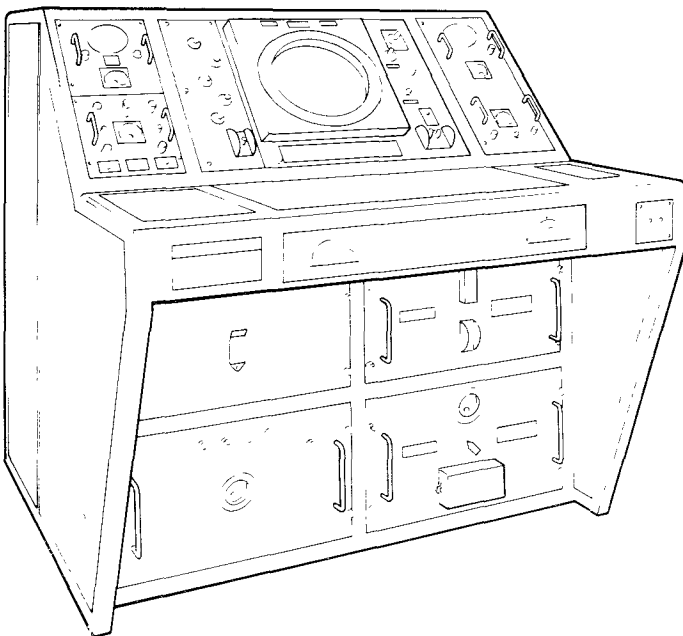
Plus or minus 0.01 per cent at 20 degrees C.



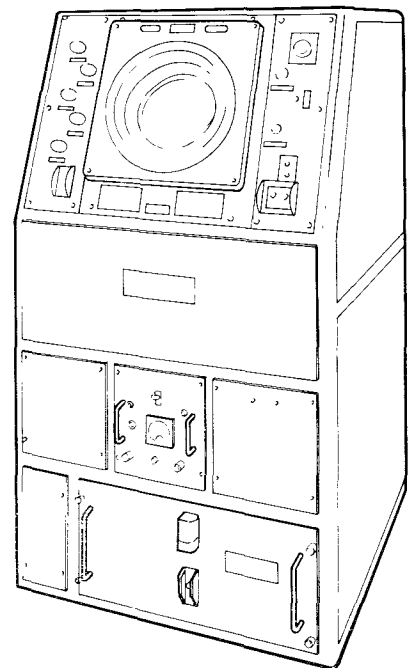
AERIAL SYSTEM TYPE 439



CONSOLE TYPE 31



CONSOLE TYPE 33

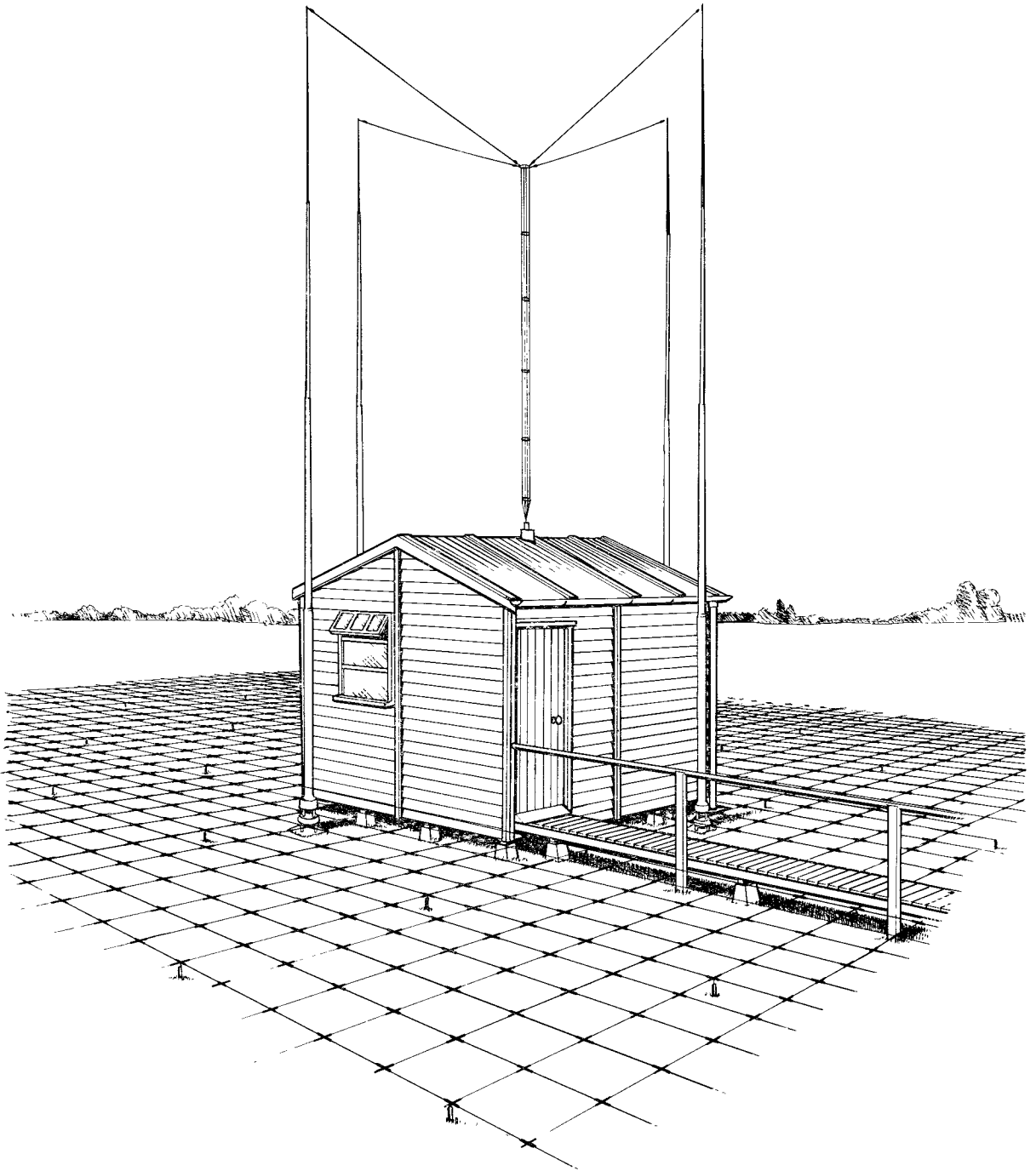


CONSOLE TYPE 34 A

Sheet No. 1
FGRI. 5470

H.F./D.F. INSTALLATION

Relevant publications:—
A.P.2883P, Vol. 1.



FGRI.5470

Function	The H.F./D.F. installation FGRI.5470 provides visual or aural d.f. facilities in the h.f. band. Two receivers (R.1932) are incorporated in the equipment so that an operator is able to maintain a listening watch on two frequencies simultaneously on an omni-directional aerial and can switch either receiver to the d.f. aerials for taking bearings. The direction finder can either be manually operated or the radio goniometer is made to rotate by push-button operation. A cathode-ray oscilloscope housed in a separate cabinet is used for visual presentation of the bearings and used as a visual indicator for sense determination.																				
Origin	The Marconi Co. Ltd., Type DFG.26.																				
Frequency range	1.5 MHz to 21 MHz in 4 switch positions Position 1 1.5 MHz to 3 MHz Position 2 3 MHz to 6 MHz Position 3 6 MHz to 12 MHz Position 4 12 MHz to 21 MHz.																				
Sensitivity	An input between 3 and 20 microvolts is required to give a 20dB signal to noise ratio on an unmodulated signal or a 10dB signal to noise ratio on a signal modulated 40 per cent to 400 Hz.																				
Intermediate frequencies	1200 kHz and 465 kHz.																				
Outputs	L.F. output for telephones 1mW. L.F. output for 600 ohm line 1mW. D.C. output for high impedance (over 0.5 megohm) 1 volt.																				
Control	Manual or mechanical.																				
Antenna system	Marconi Adcock with four 30ft masts erected at the corners of a square diagonal 20ft.																				
Power supplies	230 volt, 50 Hz single phase a.c.																				
Power consumption	<i>Equipment only:</i> 500 watts <i>Heating etc:</i> 3 Kilowatts (approx)																				
Overall dimensions	<table border="0"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Height</i></th> <th style="text-align: center;"><i>Width</i></th> <th style="text-align: center;"><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>Receiver R.1932</i></td> <td style="text-align: center;">1ft 1½in (34.2 cm)</td> <td style="text-align: center;">1ft 4½in (41.8 cm)</td> <td style="text-align: center;">1ft 5in (43.2 cm)</td> </tr> <tr> <td><i>Oscilloscope</i></td> <td style="text-align: center;">4ft 6in (137 cm)</td> <td style="text-align: center;">1ft 10in (56 cm)</td> <td style="text-align: center;">2ft 4in (71 cm)</td> </tr> <tr> <td><i>Cabinet</i></td> <td style="text-align: center;">3ft 0in (91.4 cm)</td> <td style="text-align: center;">5ft 2in (157.5 cm)</td> <td style="text-align: center;">2ft 1in (63.5 cm)</td> </tr> <tr> <td><i>Desk</i></td> <td style="text-align: center;">2ft 6in (76.2 cm)</td> <td style="text-align: center;">5ft 6in (167.6 cm)</td> <td style="text-align: center;">2ft 10in (86.4 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Receiver R.1932</i>	1ft 1½in (34.2 cm)	1ft 4½in (41.8 cm)	1ft 5in (43.2 cm)	<i>Oscilloscope</i>	4ft 6in (137 cm)	1ft 10in (56 cm)	2ft 4in (71 cm)	<i>Cabinet</i>	3ft 0in (91.4 cm)	5ft 2in (157.5 cm)	2ft 1in (63.5 cm)	<i>Desk</i>	2ft 6in (76.2 cm)	5ft 6in (167.6 cm)	2ft 10in (86.4 cm)
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Weight	<i>Receiver R.1932</i> 55 lb. (25 kg)																				

Sheet No. 2 (cont'd)

Sensitivity	Field strength required for a 1.5 in radial trace on the cathode-ray bearing indicator (half-scale deflection) varies from 5 to 10 $\mu\text{V}/\text{m}$ over the frequency band. In the absence of interference, this corresponds with a maximum angular trace fluctuation of approximately plus or minus 3 degrees for normal (medium) speed of indication. For traffic, a signal of 25 $\mu\text{V}/\text{m}$, modulated 90 per cent at 40 Hz gives an output of 4mW into headphones (or 500mW into a loudspeaker) and a signal/noise ratio of 15dB.
Services	R/T or c.w.
Control	Automatic (local or remote).
Selectivity (at i.f.)	At 25 kHz bandwidth 6dB down. At 90 kHz bandwidth 60dB down.
A.F. response	Level within 3dB from 250 Hz to 4250 Hz except for a narrow attenuation band centred on 1000 Hz to eliminate d.f. interference with speech reception.
Output impedance	600 ohms (into headphones).
Antenna system	Fixed H-type Adcock antenna system using plain dipoles and a unipole sense antenna.
Power supplies	230-volt 50 to 60 Hz single-phase a.c.
Power consumption	<i>Main equipment</i> 0.66 kilowatts. <i>Master remote indicator</i> 0.275 kilowatts. <i>Slave remote indicator</i> 0.055 kilowatts. <i>Aerial unit heater (de-icing)</i> 0.2 kilowatts. <i>Master head obstruction light</i> 0.24 kilowatts.
Main items of installation	Aerial system Type 439 10B/16648 Voltage stabilizer Type 16 10D/17890 Console Type 31 10D/17833 Relay Unit Type 131 10F/16894 Rack assembly Type 247 10D/17845 Console Type 33 10D/17835 Console Type 34 10D/17836 or Console Type 34A 10D/17895 Terminal unit Type 25 10H/19673 Dipole unit Type 41 10B/16647
Installations	<i>FGRI.18015</i> Two channel v.h.f. automatic cathode-ray direction finder, using receiver R1974. <i>FGRI.18015/2</i> Two channel v.h.f. automatic cathode-ray direction finder modified to permit it to be used in conjunction with <i>FGRI.18081 and FGRI.18082</i> to provide an automatic triangulation system for local or remote control using one branch channel cabinet (<i>FGRI.18081</i>) uses console Type 31A, (10D/21159). <i>FGRI.18015/3</i> Two channel v.h.f. automatic cathode-ray direction finder modified to permit it to be used in conjunction with <i>FGRI.18081</i> and <i>FGRI.18082</i> to provide an automatic triangulation system for local or remote control. This equipment is modified to use two branch channel cabinets (<i>FGRI.18081</i>) to supply information to two triangulation centres. Uses console Type 31B, (10D/21160). <i>FGRI.18015/4</i> Two channel v.h.f. automatic cathode-ray direction finder (<i>FGRI.18015</i>) modified to

enable a shared remote display with U.H.F./C.A.D.F. equipment (FGRI.23078). Uses console Type 31C in place of console Type 31.

FGRI.18015/5 Two channel v.h.f. automatic cathode-ray direction finder modified auto triangulation system (FGRI.18015/2) and further modified to enable it to use a shared remote display with U.H.F. C.A.D.F. equipment (FGRI.23078). Uses console Type 31D in place of console Type 31A.

FGRI.18015/6 Two channel v.h.f. automatic cathode-ray direction finder modified for auto triangulation system (FGRI.18015/3) and further modified to enable it to use a shared remote display with U.H.F. C.A.D.F. equipment (FGRI.23078). Uses console Type 31E in place of console Type 31B.

I.L.S. GROUND EQUIPMENT

Relevant publications:—

A.P.116C-0401-1
(formerly A.P.2534F, Vol. 1)

Function

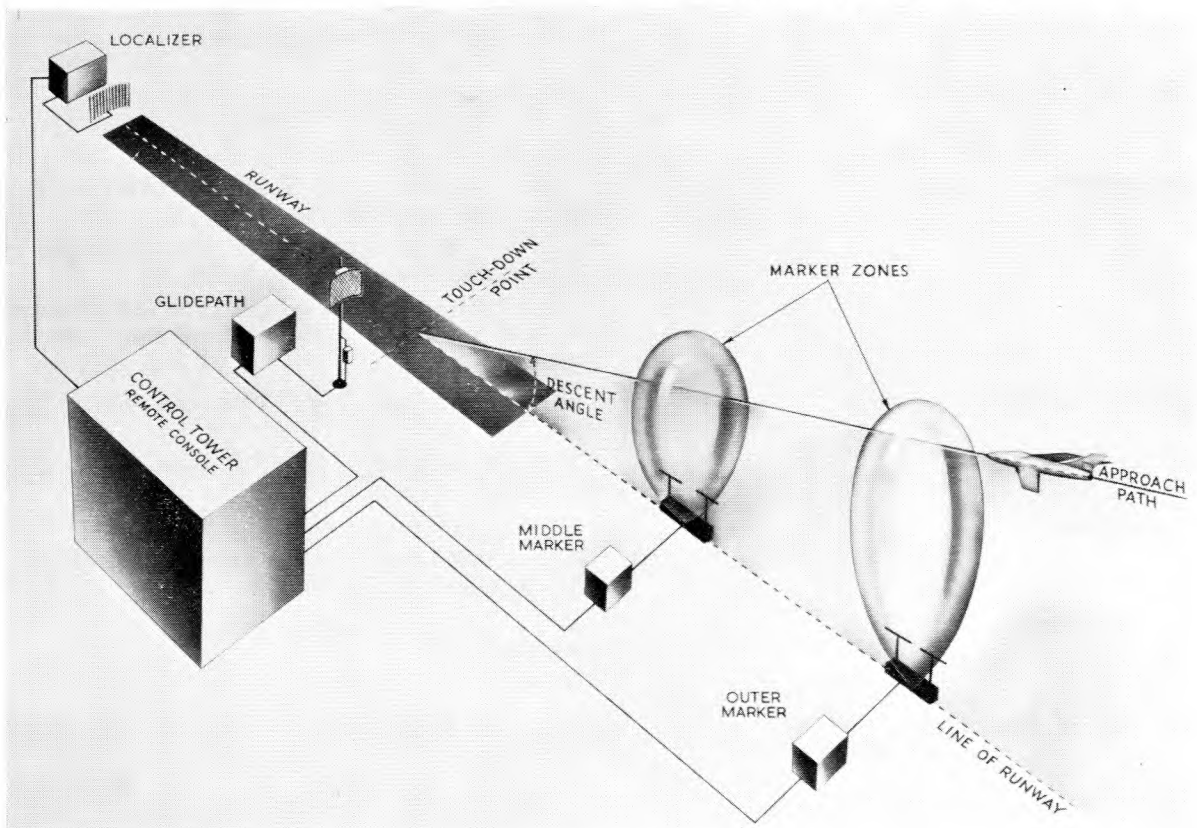
Runway approach aid for use by aircraft in conditions of bad visibility. More than one aircraft can use the system at the same time, provided they are suitably spaced by verbal instructions from the ground. Aircraft are guided to a point approximately 150 ft. above the bar lighting system; the touch down is made visually. The ground equipment consists of four permanently sited transmitters known as localizer, glidepath, outer marker and middle marker beacons respectively, together with remote control and monitoring equipment. A third (inner marker) beacon may be used if required.

Origin

Pye Telecommunications Ltd., Type PTC.1100.

Operating principles

The localizer transmitter guides the aircraft in azimuth, thus defining the runway path and also radiates an identification signal. The glidepath transmitter guides the aircraft in elevation, thus defining the angle of descent. The marker beacon transmitters are sited along the approach path at particular distances from the touch-down point. Each beacon transmits vertically upwards and produces a fan-shaped radiation pattern to give range information.



FGRI.18017 ground equipment

Frequency ranges	<p><i>Localizer:</i> 108.1 MHz to 112 MHz \pm 0.005% (2.77 to 2.69 m)</p> <p><i>Glidepath:</i> 328.6 MHz to 335.4 MHz \pm 0.005% (0.91 to 0.89 m)</p> <p><i>Marker beacons:</i> 75 MHz \pm 0.02% (4 metres).</p>						
Modulation	Amplitude on all transmitters.						
Modulation frequencies	<p><i>Localizer</i></p> <p><i>Navigational tones:</i> 90 Hz and 150 Hz at 20% modulation on course line.</p> <p><i>Identification tone:</i> 1 kHz at 10% modulation.</p> <p><i>Speech band:</i> 350 Hz to 4000 Hz at 40% modulation.</p> <p><i>Glidepath</i></p> <p>90 Hz and 150 Hz at 45% modulation on descent path.</p> <p><i>Marker beacons</i></p> <p><i>Outer:</i> 400 Hz coded two dashes per sec., at 90% modulation.</p> <p><i>Middle:</i> 1300 Hz coded dot-dash every $\frac{2}{3}$ sec. at 90% modulation.</p> <p><i>Inner:</i> 3000 Hz coded six dots per sec., at 90% modulation.</p>						
Angular coverage	<p><i>Localizer:</i> plus or minus 70° about course line.</p> <p><i>Glidepath:</i> Normally 3° descent angle; adjustable 2° to 4°.</p>						
Ranges	<p><i>Marker beacons:</i> Vertical.</p> <p><i>Localizer:</i> Maximum approximately 50 miles (80.5 km) at 2000 ft (610 m) (dependent on aircraft aerials).</p> <p><i>Glidepath:</i> Approximately 20 miles (32.2 km) at 2000 ft (610 m) (dependent on aircraft aerials).</p>						
R.F. outputs	<p><i>Localizer:</i> 50 watts.</p> <p><i>Glidepath:</i> 25 watts.</p> <p><i>Marker beacons:</i> 2.5 watts maximum.</p> <p>Attenuated as follows:—</p> <p><i>Outer:</i> no attenuation.</p> <p><i>Middle:</i> attenuated to 0.75 watt.</p> <p><i>Inner:</i> attenuated to 0.3 watt.</p>						
Aerial systems	<p><i>Localizer:</i> Aerial system Type 455, (Two horizontal dipoles with parabolic reflector).</p> <p><i>Glidepath:</i> Aerial system Type 454, (Two slot type aerial heads mounted on one mast).</p> <p><i>Marker beacons:</i> Aerial system Type 456 (Transmitting: two horizontal dipoles; Monitoring: one horizontal dipole).</p>						
Monitoring equipment	<p><i>Localizer:</i> receiver, Type 7537 and aerial system Type 7622.</p> <p><i>Glidepath:</i> receiver, Type 7621 and aerial system Type 7623.</p>						
Power supplies	<p><i>Localizer:</i> 240 volts 50 Hz (voltage regulated).</p> <p><i>Glidepath:</i> 240 volts 50 Hz (voltage regulated).</p> <p><i>Marker beacons:</i> 100-240 volts 50 Hz.</p>						
Power consumption	<p><i>Localizer:</i> 2 kW (approx).</p> <p><i>Glidepath:</i> 2 kW (approx).</p> <p><i>Marker beacons:</i> 250 watts.</p>						
Main items of installation	<table border="0"> <tr> <td>Transmitter Type T.1983 (<i>Localizer</i>)</td> <td style="text-align: right;">10D/17910</td> </tr> <tr> <td>Transmitter Type T.1991 (<i>Glidepath</i>)</td> <td style="text-align: right;">10D/17948</td> </tr> <tr> <td>Transmitter Type T.1992 (<i>Marker beacons</i>) (2 or 3 off)</td> <td style="text-align: right;">10D/17955</td> </tr> </table>	Transmitter Type T.1983 (<i>Localizer</i>)	10D/17910	Transmitter Type T.1991 (<i>Glidepath</i>)	10D/17948	Transmitter Type T.1992 (<i>Marker beacons</i>) (2 or 3 off)	10D/17955
Transmitter Type T.1983 (<i>Localizer</i>)	10D/17910						
Transmitter Type T.1991 (<i>Glidepath</i>)	10D/17948						
Transmitter Type T.1992 (<i>Marker beacons</i>) (2 or 3 off)	10D/17955						

Sheet No. 3 (cont'd)

Main items of installation (continued)

Voltage stabilizer Type 19 (2 off required)	10D/17957
Cabinets Type 11 (<i>fitted</i>) (<i>Remote control console</i>)	10AQ/167
Panels Type 820 (<i>indicating</i>) (<i>Desk panel</i>)	10D/17956
Aerial system Type 455	10B/16725
Aerial system Type 454	10B/16724
Aerial system Type 456	10B/16726

AUTO-TRIANGULATION EQUIPMENT

Sheet No. 4
FGRI. 18081, 18082

Relevant publications:—

A.P.116C-0804-1

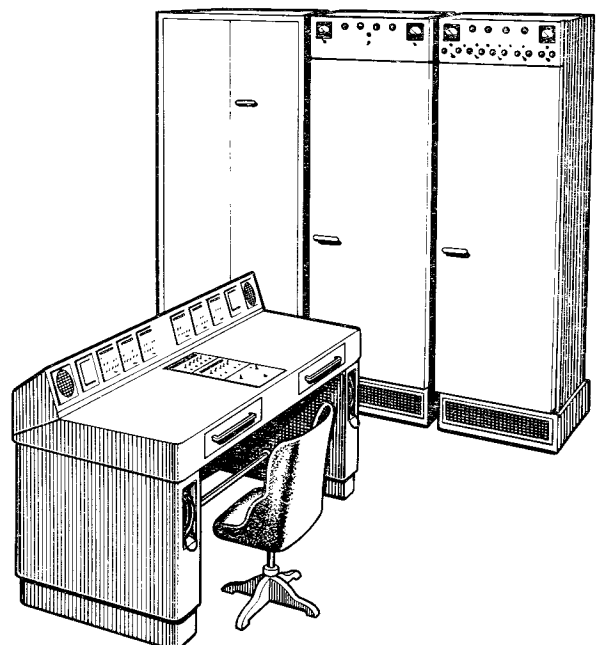
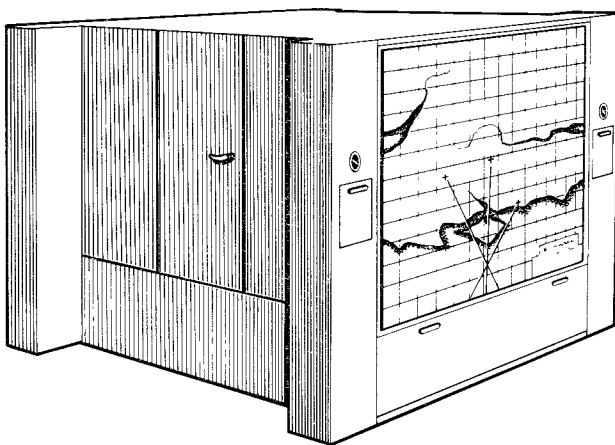
(formerly A.P.2530L, Vol. 1)

Function

FGRI.18081 and 18082 provide the equipment to enable a visual presentation to be made of the d.f. bearings received from the V.H.F. C.R.D.F. equipment FGRI.18015, or the U.H.F. C.A.D.F. equipment FGRI.23078. These take the form of a bearing trace, or line of light, projected on to a screen which has a specially prepared map printed on it, covering the service area of the d.f. fixer network. The positions of the d.f. stations forming the triangulation network are marked by compass roses on the map. The origin of each bearing trace of the stations is centred on the map position of each d.f. station. A "fix" is indicated by the intersection of two or more bearing traces for as long as the transmission lasts. The system will accommodate up to ten d.f. stations feeding their directional and speech information to a common centre. FGRI.18081 provides the branch channel cabinet and equipment which is installed at the d.f. bearing station to supply information to the triangulation centre. FGRI.18082 provides the equipment used at the triangulation centre to display the information received from the d.f. station.

Operating principles

The system is based upon a network of FGRI.18015 or FGRI.23078 d.f. stations feeding their directional and speech information concerning aircraft to a common centre where the bearings are displayed automatically on an illuminated screen. From the d.c. signals received out of the differential detectors at the d.f. station two audio frequency signals are developed;



Auto-triangulation equipment

one corresponding to the North-South signal and the other to the East-West signal. The frequency of the audio signals vary according to the direction of the bearing. The North-South audio frequency keys a 1020 Hz carrier whilst the East-West frequency keys a 2220 Hz carrier. The two keyed carriers are mixed and sent over a single communication channel to the telemeter receiver cabinet the two carriers are separated by band-pass filters and each amplified and detected to yield signals whose frequencies are those of the original keying. These frequencies operate rate counters whose d.c. output is proportional to the frequency of keying and hence to the North-South or East-West deflecting voltage at the d.f. station. The four voltages so obtained are taken to the sweep generator cabinet where they are converted to sawtooth form and applied to the projector unit.

AF. keying signal	10 Hz to 50 Hz
Bearing deflection voltage	+50V to +350V (N-S and E-W).
North-South carrier	1020 Hz
East-West carrier	2220 Hz
Speech signal	200 Hz to 4000 Hz. Two bands of frequencies are removed; one, 120 Hz wide, centred on 1020 Hz and the other 240 Hz wide, centred on 2280 Hz.
Projector screen dimensions	40 in × 40 in or 60 in × 60 in.
Power supplies	230V, 50 Hz a.c.
Main items of installation	Projection cabinet (40 <i>in screen</i>) <i>or</i> Projection cabinet (60 <i>in screen</i>) Branch channel cabinet Sweep generator cabinet Telemeter cabinet Remote control cabinet Control desk.

TACAN GROUND BEACON

FGRI. 18119

Relevant publications:—

A.P.116C-0704-1A & 1B

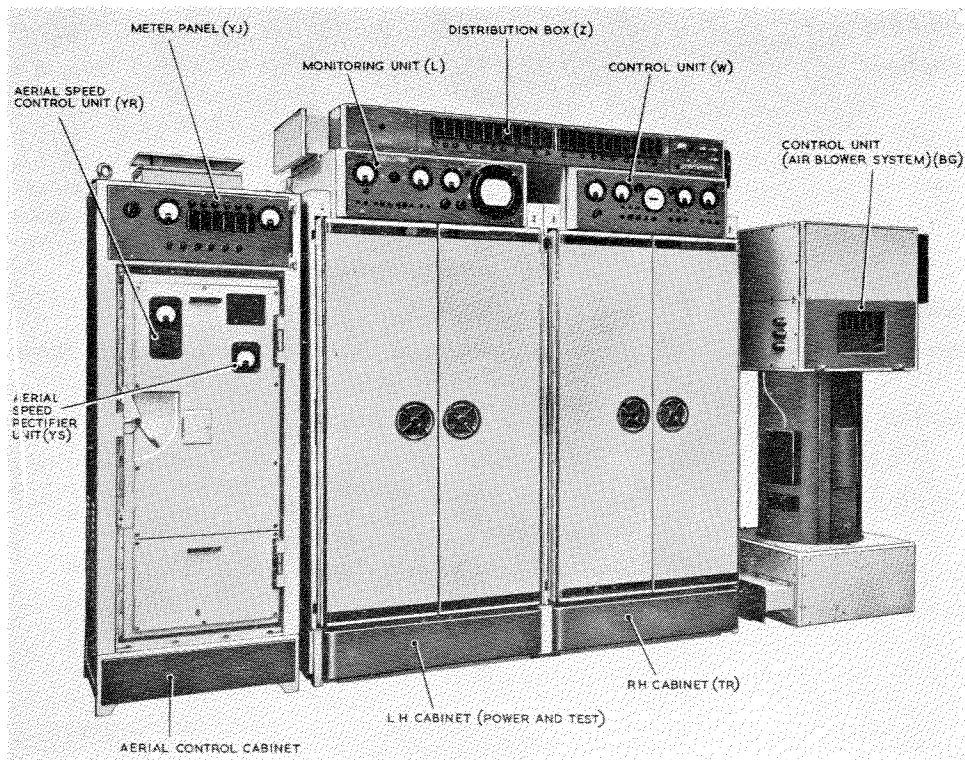
(formerly A.P.2534L, Vol. 1, Books 1 and 2)

Function

Medium range rho-theta navigational system used for tactical and general navigation purposes. The ground beacon installation provides the bearing, distance and identification information to an aircraft fitted with the complementary airborne installation ARI.18107, which conveys this information to the pilot or navigator. The ground equipment consists of a transmitter-receiver, an aerial system, an aerial control unit, an air blower and monitor equipment.

Operating principles

The distance information of an aircraft from the ground beacon is provided by an interrogator-transponder-responder circuit. The aircraft transmitter initiates the interrogating process by radiating pulse signals. These signals are detected by the ground beacon and cause its transponder to transmit the distance reply signals. The reply signals are received in the responder circuits and special circuits measure the time which elapses between the transmission of the interrogating pulses and the reception of the reply pulses. Other circuits convert this time difference into nautical miles. The bearing indication of an aircraft from the ground beacon is provided by a technique which employs a rotating amplitude modulation pattern which contains reference pulse signals.



TACAN ground beacon equipment

All pulses transmitted from the ground beacon are subjected to amplitude modulation by a set of rotating parasitic elements which are driven round the beacon aerial central array at 900 r.p.m. In the aircraft the modulated pulses are detected in the azimuth circuits and special mechanically-driven elements introduce a phase shift to the modulation waveforms so that the coded reference signals appear at a fixed point on them. The amount of phase shift introduced is a measure of the bearing of the aircraft with respect to the ground beacon; this phase shift is converted into azimuth angle which is finally displayed by the bearing pointer. The ground beacon provides identification information by transmitting at regular intervals a series of pulse-pair signals which are keyed with identifying Morse code characters.

Frequency ranges

Transmitter 962 MHz to 1024 MHz and 1151 MHz to 1213 MHz

Receiver 1025 MHz to 1159 MHz

Sensitivity

A properly coded interrogation 123dB below 1W measured at the beacon input terminal is sufficient to produce at least 70 per cent responses under conditions of light loading.

I.F. Bandwidth

3.5 MHz.

Modulation

Amplitude

Transmitter

Peak power output 5kW peak minimum Pulse coding. Pulse pairs spaced $12\mu\text{S} \pm 0.5\mu\text{S}$.

Pulse duration $3.5\mu\text{S} \pm 0.5\mu\text{S}$ at half-amplitude.

Duty cycle 3600 p.p.s. ± 90 p.p.s. average.

Receiver selectivity

The receiver will reject correctly coded interrogations on adjacent channels which are 80dB above the threshold level of an interrogation on the tuned channel.

Beacon response delay

$50\mu\text{S} \pm 0.2\mu\text{S}$.

Beacon identification

The beacon identity is derived from a keying wheel and cam assembly capable of accepting any code within a total of 60 dot lengths.

Aerial systems

Aerial system 5825-99-932-5370 (*high band*)

Aerial system 5825-99-932-5371 (*low band*).

(The aerial system consists of a central array of seven discones, surrounded by an arrangement of rotating parasitic elements).

Aerial polarization

Vertical.

Power supplies

400 volt, 416 volt or 440 volt, three-phase 3 or 4-wire supply 45 Hz to 65 Hz.

Power consumption

8 kVA (approx).

Main items of installation

Aerial system 5825-99-932-5370 (*high band*)

Aerial system 5825-99-932-5371 (*low band*)

Aerial control 5825-99-932-5319

Transmitter-receiver radio 5825-99-932-5320

Monitor, r.f. 6625-99-943-3584

Alarm monitor 5825-99-932-5356

Aerial head 5825-99-932-5357

Distribution box 6110-99-943-1567

Control, remote switching 5825-99-932-5343

Dummy load (electrical) 5985-99-932-5350

Air blower 4120-99-943-7142

M.P./M.F. BEACON (FIXED)

FGRI. 23069

Relevant publications:—

A.P.116E-0208-1
(formerly A.P.2550K, Vol. 1)

Function

FGRI.23069 is a medium power m.f. beacon, designed as a fixed aircraft beacon. It may be operated on either of two pre-selected crystal controlled spot frequencies between 200 and 550 kHz. A variable frequency oscillator covering the same frequency range in two switched bands is provided for test purposes or emergency operation. The equipment provides for keyed tone m.c.w. or keyed c.w. with either automatic or manual keying. An automatic coder is incorporated in the installation.

Origin

Redifon Ltd., Type G.91R.

Frequency range

200 kHz to 550 kHz in two bands (200-400 and 400-550 kHz), (1500 to 545 metres).

Frequency control

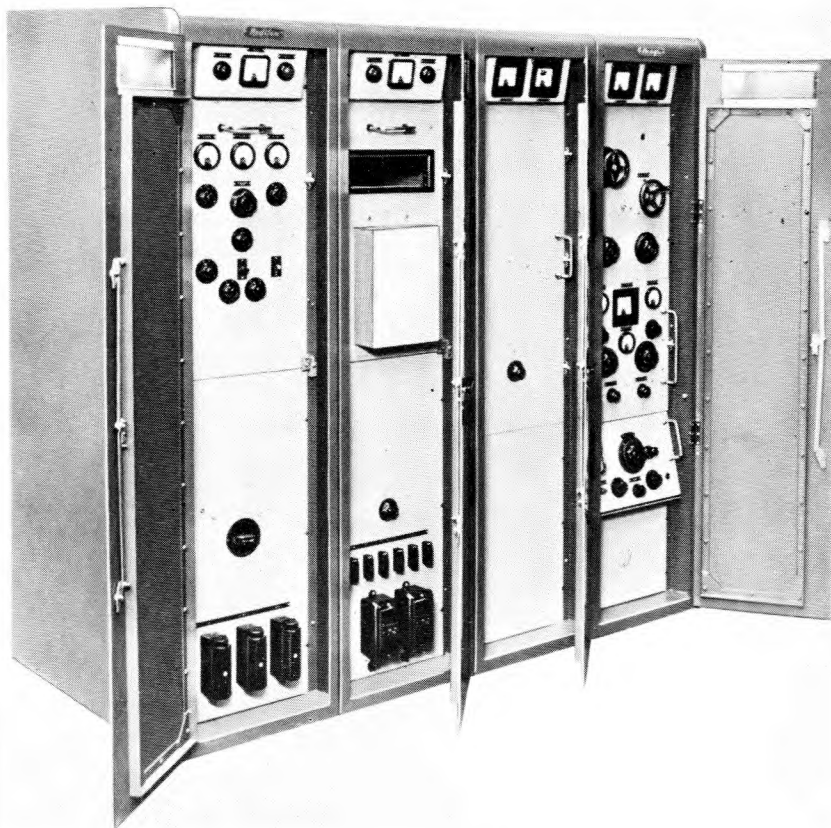
Crystal or test oscillator (emergency).

Frequency stability

Crystal plus or minus 0.01%.
Test oscillator plus or minus 0.05%.

Modulation

Frequency 1020 Hz plus or minus 20 Hz.



FGRI.23069

Keying	Automatic 7 w.p.m. or manual.
Output power	2 kW carrier; 2.8 kW 90% modulation; (provision is made for operation at $\frac{1}{2}$ or $\frac{1}{4}$ power).
Output impedance	50 ohms (unbalanced).
Antenna system	'L' or 'T' antenna maximum length less than a quarter wavelength.
Power supplies	360-440 Volt, 50-60 Hz three-phase, 4-wire input.
Power consumption	9.5 kW at 0.85 power factor.
Main items of installation	Transmitter, Type T.12842 (10D/21704) Coupling (aerial), Type 12961 (10B/18802) Alarms, radio, Type 100 (10D/22175).

Sheet No. 7

U.H.F. C.A.D.F. EQUIPMENT FGRI. 23078/SERIES

Relevant publications:—

A.P.116C-0801-1

A.P.116C-0805-1

(formerly A.P.2531P, Vol. 1 and

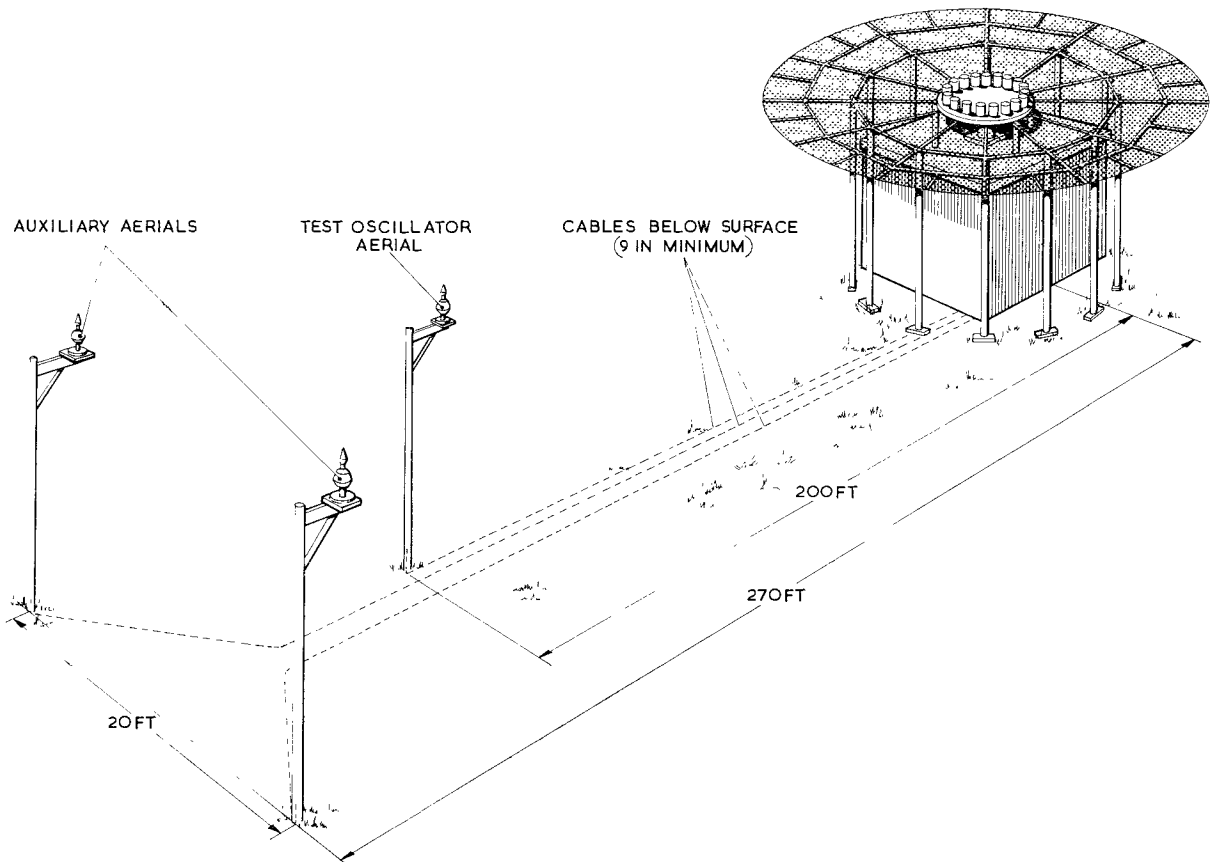
A.P.2531R, Vol. 1)

Function

U.H.F. commutated aerial direction finder system actuated by the u.h.f. R/T signal from an aircraft. The equipment gives instantaneous presentation on calibrated cathode-ray indicators of the bearing of an aircraft transmitting within its range and on one of its frequencies. The presentation takes the form of a radial trace on a screen having a linear 360° calibrated scale. Signals for automatic triangulation networks are available with certain variants of the FGRI.23078/series.

Operating principles

The radial trace giving bearing information on an azimuth indicator is developed from the phase comparison of signals received by adjacent unipole aerials in an electronically commutated circular aerial array. The commutation results in a phase



UHF/CADF equipment

modulation being imposed on the incoming signal. The resulting envelope is directly related to the signal direction. The phase modulation is converted to an l.f. waveform for comparison with a reference waveform of identical frequency in a resolver. Output from the resolver in d.c. voltages proportional to the sine and cosine components of the bearing angle, are applied directly to the azimuth indicators. The indicators are generally remote from the d.f. site.

Frequency range	225 MHz to 399.9 MHz (With a pre-tuned receiver, a single frequency in this range. With a multi-frequency receiver one of twelve pre-selected frequencies in this range).																																
Sensitivity	A field strength of approximately 3 μ V per metre gives half printer length indication with a bearing fluctuation not greater than plus or minus 3 degrees.																																
Control	Local or remote.																																
Range	At least u.h.f. communication range.																																
Bearing accuracy	Plus or minus 1 degree.																																
Response time	A received signal persisting for 0.25 second or more will provide visible d.f. indication.																																
Selectivity (at i.f.)	<i>At 23 KHz bandwidth 6db down.</i> <i>At 100 KHz bandwidth 75dB down.</i>																																
A.F. response	300 Hz -3dB to -10dB. 3 KHz 0 to -3dB.																																
Aerial system	18 unipoles (commutation), and reference unipole.																																
Multi-channel facilities	One C.A.D.F. aerial may be used with 1 to 4 d.f. receivers. These may be pre-tuned or multi-frequency types in any combination.																																
Power supplies	230 Volt, 50 Hz single-phase a.c.																																
Main items of installation	<table border="0"> <tr> <td><i>Aerial system</i></td> <td></td> </tr> <tr> <td>Auxiliary aerial</td> <td>5895-99-933-1162</td> </tr> <tr> <td>Aerial switch box</td> <td>5825-99-943-6164</td> </tr> <tr> <td>Pre-tuned receiver and d.f. cabinet</td> <td>5820-99-932-4857</td> </tr> <tr> <td><i>Twin pre-tuned and d.f. cabinet</i></td> <td></td> </tr> <tr> <td>D.F. aerial switching cabinet</td> <td>5820-99-932-4858</td> </tr> <tr> <td>Single-channel d.f. cabinet</td> <td>5820-99-932-4862</td> </tr> <tr> <td>Two-channel d.f. cabinet</td> <td>5820-99-932-4861</td> </tr> <tr> <td>Pre-tuned receiver cabinet</td> <td>5820-99-932-4859</td> </tr> <tr> <td>Multi-frequency receiver cabinet</td> <td>5820-99-932-4860</td> </tr> <tr> <td>Test oscillator</td> <td>6625-99-943-5905</td> </tr> <tr> <td><i>Test oscillator aerial</i></td> <td></td> </tr> <tr> <td>Display console</td> <td>5975-99-932-4851</td> </tr> <tr> <td>Pulse distribution box</td> <td>5825-99-943-5897</td> </tr> <tr> <td>Power supply receiver</td> <td>5820-99-913-2329</td> </tr> <tr> <td>Display selection box</td> <td>6120-99-932-4855</td> </tr> </table>	<i>Aerial system</i>		Auxiliary aerial	5895-99-933-1162	Aerial switch box	5825-99-943-6164	Pre-tuned receiver and d.f. cabinet	5820-99-932-4857	<i>Twin pre-tuned and d.f. cabinet</i>		D.F. aerial switching cabinet	5820-99-932-4858	Single-channel d.f. cabinet	5820-99-932-4862	Two-channel d.f. cabinet	5820-99-932-4861	Pre-tuned receiver cabinet	5820-99-932-4859	Multi-frequency receiver cabinet	5820-99-932-4860	Test oscillator	6625-99-943-5905	<i>Test oscillator aerial</i>		Display console	5975-99-932-4851	Pulse distribution box	5825-99-943-5897	Power supply receiver	5820-99-913-2329	Display selection box	6120-99-932-4855
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Installations	<p><i>FGRI.23078/1 (Type A)</i> Two d.f. channels using two multi-frequency receivers.</p> <p><i>FGRI.23087/2 (Type B)</i> One d.f. channel using a multi-frequency receiver.</p> <p><i>FGRI.23078/3 (Type C)</i> Two d.f. channels using two multi-frequency receivers plus one auto-triangulation channel using a single pre-tuned receiver.</p> <p><i>FGRI.23078/4 (Type D)</i> One d.f. channel using a multi-frequency receiver plus one auto-triangulation channel using a single pre-tuned receiver.</p> <p><i>FGRI.23078/5 (Type F)</i></p>																																

Sheet No. 7 (cont'd)

One auto-triangulation channel using a single pre-tuned receiver.

FGRI.23078/6 (Type J)

One d.f. channel using a multi-frequency receiver plus one auto-triangulation channel using a single pre-tuned receiver.

FGRI.23078/7 (Type K)

Two d.f. channels plus one auto-triangulation channel. One d.f. channel and the auto-triangulation channel use single pre-tuned receivers. The other d.f. channel uses a multi-frequency receiver.

FGRI.23078/8 (Type L)

One d.f. channel using a single pre-tuned receiver.

FGRI.23078/9 (Type E)

Two auto-triangulation channels. One channel uses a single pre-tuned receiver; the other channel uses a twin pre-tuned receiver.

FGRI.23078/10 (Type G)

Two d.f. channels using multi-frequency receivers plus two auto-triangulation channels. One auto-triangulation channel uses a single pre-tuned receiver; the other auto-triangulation channel uses a twin pre-tuned receiver.

FGRI.23078/11 (Type M)

Two d.f. channels plus two auto-triangulation channels. One d.f. channel uses a multi-frequency receiver; the other d.f. channel uses a single pre-tuned receiver. One auto-triangulation channel uses a single pre-tuned receiver; the other auto-triangulation channel uses a twin pre-tuned receiver.

FGRI.23078/12 (Type LL)

Two d.f. channels both channels using single pre-tuned receivers.

V.L.P./M.F. BEACON (FIXED)

FGRI. 26026/1

Relevant publications:—

A.P.116C-0705-1
(formerly A.P.4803B, Vol. 1)

Function

FGRI.26026/1 is a very low power m.f. beacon designed as a fixed aircraft automatic locator beacon and route marker. It is keyed by a self-contained unit, and includes automatic monitoring and change-over facilities to a standby unit in the event of a failure of the beacon.

Origin

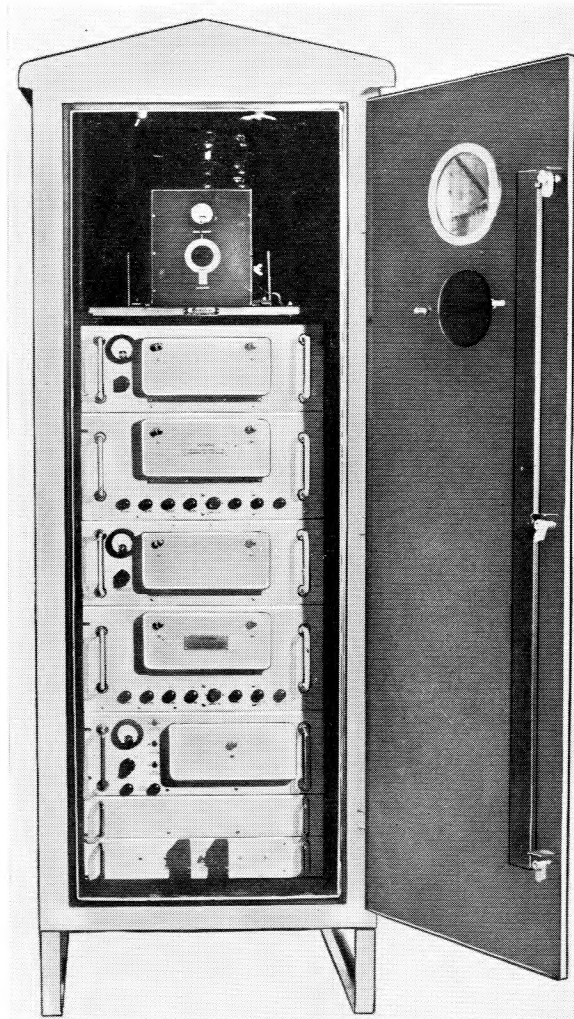
Redifon Ltd., Type G.142R.

Frequency range

200 kHz to 420 kHz (1500 to 714 metres).

Frequency control

Crystal, single spot frequency.



FGRI.26026/1

Frequency stability	Within plus or minus 0.01 per cent.			
Modulation	50-85 per cent at 400 Hz (dependent on frequency).			
Types of emission	AA1 continuous wave (<i>keyed carrier</i>). A2 modulated continuous wave (<i>keyed tone continuous carrier</i>).			
Keying	<i>Manual</i> up to 40 w.p.m. <i>Automatic</i> 7 w.p.m.			
Output power	80 watts into aerial circuit. Full, half, quarter, one eighth or one sixteenth power output may be selected.			
Aerial system	50 ft vertical radiator.			
Harmonic radiation and spurious emission	At least 45dB below carrier level.			
Tone frequency	400 Hz plus or minus 25 Hz.			
Power supplies	100-120 volts or 200-240 volts, 50 Hz single phase a.c.			
Power consumption (at 0.9 power factor)	Beacon, 540 VA. Remote control unit, 20 VA.			
Main items of installation	R.F. Unit (10D/9704509) (2 off) Coder, radio beacon (10D/9509901) Power supply (10K/9705666) (2 off) Alarm, radio (10D/9509903) Coupler, antenna (10B/9509944) Heater panel assembly Remote control, relay (10L/9509955) Aerial system.			
Overall dimensions		<i>Height</i>	<i>Width</i>	<i>Depth</i>
	<i>Complete kiosk</i>	6ft 6in	2ft 4in	2ft 2in
	<i>Installation</i>	(198 cm)	(71 cm)	(66 cm)
Weight	<i>Complete kiosk installation</i>		646 lb (293kg)	

**RACAL 7KW S.S.B./I.S.B./C.W.
TRANSMITTER AND RECEIVER
STATION**

FGRI.23144

Relevant publications:—

A.P.116E-0127-1A, 1B, 1G, 1H, 1J, 1K, 1L, 1M, 1N,
1P, 1Q, 1R, 1S, 1U, 1AC, 1AD,
(formerly part of A.P.4808C, Vol. 1)
A.P.116E-2201-1

Function

FGRI.23144 is a remotely-controlled voice and telegraph transmitter-receiver station suitable for long range communication with aircraft or between fixed ground stations. Transmission and reception are possible using either single-sideband (upper or lower sideband, suppressed or pilot carrier), compatible amplitude-modulation or c.w. telegraphy.

Brief description

The transmitter and receiver sections of the equipment are usually located at separate sites and are each controlled from a remote centre, frequency selection and both mode and state of operation all being determined from this control centre. Several receiving sets, transmitting sets or control consoles may be installed at the respective sites which can be many miles apart. The control function requires one pair of land-lines or a radio-relay link between each transmitting or receiving set and the remote control centre, a further land-line pair or radio link being required for the intelligence. Independent control of the transmitter and receiver enables them to be operated at different frequencies.

Frequency range

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

Transmitter output power

10 kW p.e.p. (7 kW r.m.s.).

Receiver sensitivity

SSB and CW: 1 microvolt for 13 dB signal/noise ratio.
AM: 5 microvolts for 13 dB signal/noise ratio (30% modulation).

Power supplies

Transmitter: from regulator, voltage, 6110-99-951-0381.
Input 400V $\pm 12\%$, 47-65Hz, three-phase, four-wire.
Receiver: 100-125V, 200-250V ($\pm 6\%$), 45-65Hz, single-phase.

Main items of installation

(1) Transmitting set, radio, 5820-99-950-5772 (Racal TTA.187B) comprising:
Transmitter sub-assembly, 5820-99-950-5890 (Racal TA.184A), Qty. 1.
Transmitter, sub-assembly, 5820-99-950-5774 (Racal MA.228A), Qty. 1.
Regulator, voltage, 6110-99-951-0381 (Racal MA.308), Qty. 1.

- (2) Receiving set, radio, 5820-99-950-5773 (Racal RTA.191A).
- (3) Console communication control 5820-99-952 0403 (Racal LA.304) housing:—
Control, radio set, 5820-99-950-5777.
Oscillator-control, frequency selector, 5820-99-954-2904 (selcal).
- (4) Frequency standard and distribution unit, 5820-99-951-0657 (Racal MA.286A) (transmitter).
- (5) Frequency standard and distribution unit, 5820-99-951-0655 (Racal MA.286B) (receiver).

Overall dimensions

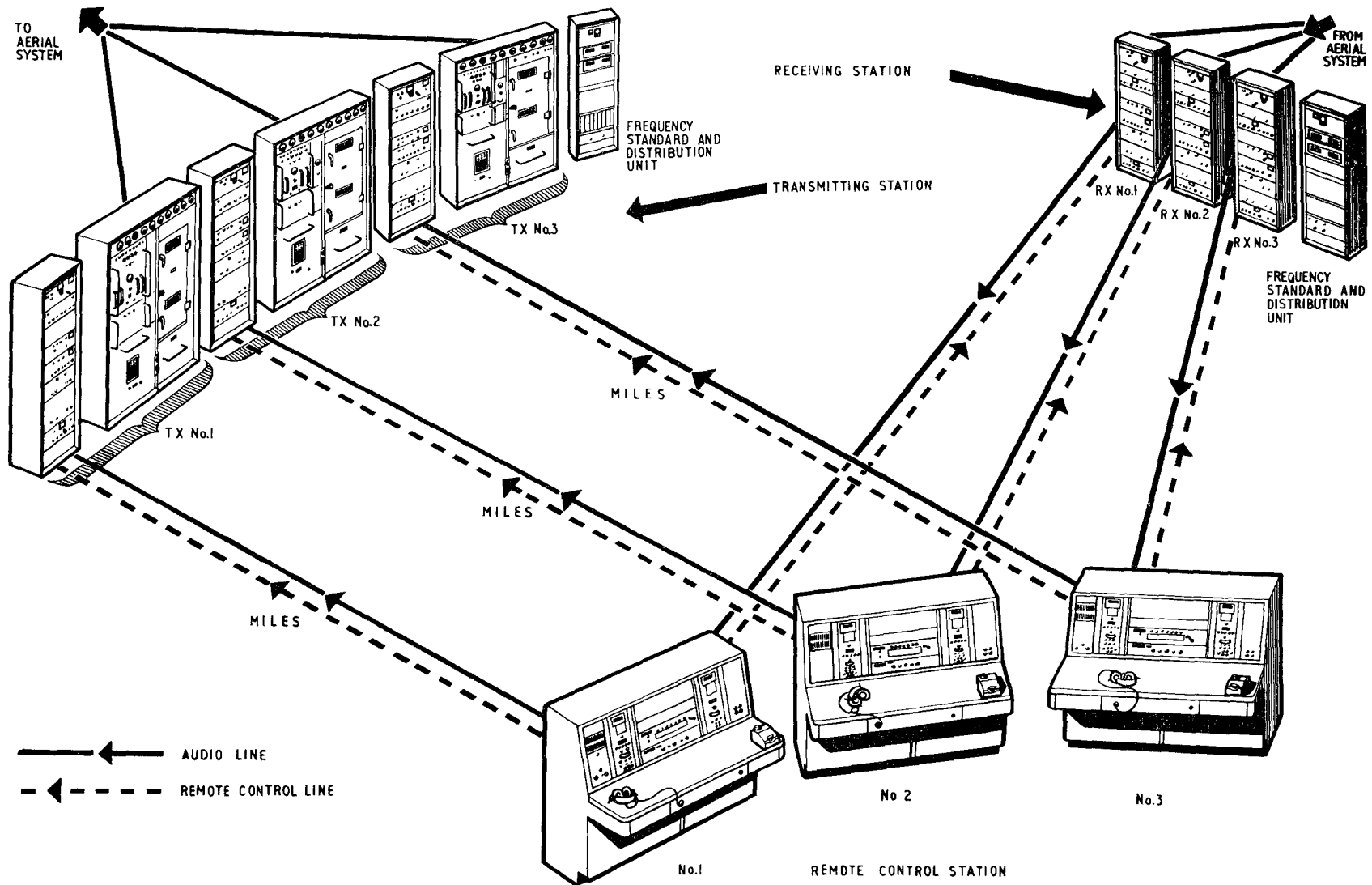
	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter sub-assembly</i> (5820-99-950-5890)	5ft 5¼in (165.7cm)	5ft 0in (152.4cm)	2ft 3in (68.6cm)
<i>Transmitter sub-assembly</i> 5820-99-950-5774	5ft 5¼in (165.7cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
<i>Regulator, voltage</i> 6110-99-951-0381	4ft 0in (122cm)	2ft 0½in (62.3cm)	1ft 11in (58.4cm)—
<i>Receiving set, radio,</i> 5820-99-950-5773	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
<i>Control, radio set,</i> 5820-99-950-5777	<i>(installed in console, communication control):—</i>		
<i>Transmitter control</i>	1ft 7in (48.3cm)	5¼in (13.3cm)	1ft 5in (43.2cm)
<i>Receiver control</i>	1ft 7in (48.3cm)	5¼in (13.3cm)	1ft 5in (43.2cm)
<i>Tone generator</i>	1ft 7in (48.3cm)	5¼in (13.3cm)	10in (25.4cm)
<i>D.C. power unit</i>	5¼in (13.3cm)	1ft 7in (48.3cm)	1ft 5in (43.2cm)
<i>Frequency standard and distribution units:—</i>			
5820-99-951-0657	5ft 5¾in (167cm)	2ft 0in (61cm)	2ft 3in (68.6cm)
5820-99-951-0655	5ft 5¾in (167cm)	2ft 0in (61cm)	2ft 3in (68.6cm)

Weights (approx.)

<i>Transmitter sub-assembly</i> (5820-99-950-5890)	2,500 lb	(1134 kg)
<i>Transmitter-sub-assembly</i> (5820-99-950-5774)	350 lb	(159 kg)
<i>Regulator, voltage</i> (6110-99-951-0381)	450 lb	(204 kg)
<i>Receiving set, radio</i> (5820-99-950-5773)	600 lb	(272 kg)
<i>Control, radio set (all units)</i> (5820-99-950-5777)	95 lb	(43 kg)
<i>Frequency standard and distribution unit</i> (5820-99-951-0657)	300 lb	(136 kg)

Remarks

For further information of particular equipment see Index. Illustrations of individual items of equipment are given in the appropriate information sheets.



FGRI.23144—typical installation

RACAL 7 KW S.S.B./I.S.B./C.W.

TRANSMITTER AND RECEIVER

STATION

FGRI.23186

Relevant publications:—

A.P.116E-0127-1A, 1C, 1G, 1M, 1N, 1Q, 1R, 1S, 1X,
1Y, 1Z, 1AA, 1AB

(formerly part of A.P.4808C, Vol. 1).

Function

FGRI.23186 is a locally-controlled h.f. voice and telegraph transmitter and receiver station intended for long range communication with TGR(AT) stations. Single-sideband, independent sideband, compatible amplitude modulation or c.w. telegraphy transmission and reception modes may be employed as required. The independent sideband facility is not switched and is obtained by feeding the intelligence into the upper and lower sideband channels via interconnections at the base of the exciter cabinet. The receiver station employs diversity reception.

Brief description

The voice and telegraph link station comprises the transmitting and receiving sets listed below (main items of installation) which employ sub-units common to other installations. The station can be controlled manually or by local automatic means).

Frequency range

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

Transmitter output power

10 kW p.e.p. (7 kW r.m.s.)

Receiver sensitivity

SSB and CW: 1 microvolt for 13dB signal/noise ratio.

AM: 5 microvolts for 13 dB signal/noise ratio (30% modulation).

Power supplies

Transmitter: from regulator, voltage, 6110-99-951-0381

Input: 400V $\pm 12\%$, 47-65 Hz, three-phase, four-wire.

Receiver: 100-125V, 200-250V ($\pm 6\%$) 45-65 Hz, single-phase.

Main items of installation

(1) Transmitting set, radio, 5820-99-107-8223 (Racal TTA.227C), comprising:—

Transmitter sub-assembly, 5820-99-950-5890 (Racal TA.184A), Qty. 1.

Transmitter sub-assembly, 5820-99-101-5922 (Racal MA.228J), Qty. 1.

Regulator, voltage, 6110-99-951-0381 (Racal MA.308), Qty. 1.

(2) Receiving set, radio, 5820-99-107-5921 (Racal RTA.241C).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter sub-assembly</i> 5820-99-950-5890	5ft 5¼in (165.7cm)	5ft 0in (152.4cm)	2ft 3in (68.6cm)
<i>Transmitter sub-assembly</i> 5820-99-101-5922	5ft 5¼in (165.7cm)	2ft 0in (61cm)	2ft 3in (68.6cm)
<i>Regulator, voltage</i> 6110-99-951-0381	4ft 0in (122cm)	2ft 0½in (62.3cm)	1ft 11in (58.4cm)
<i>Receiving set, radio</i> 5820-99-107-5921	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
<i>Two racks (each)</i>			

Weights (approx.)

Transmitter sub-assembly (5820-99-950-5890)	2,500 lb	(1134 kg)
Transmitter sub-assembly (5820-99-101-5922)	350 lb	(159 kg)
Regulator, voltage	450 lb	(204 kg)
Receiving set, radio	600 lb	(272 kg)
<i>Two racks (each)</i>		

Remarks

For further information of particular equipment see Index. Illustrations of individual items of equipment are given in the appropriate information sheets.

RACAL 1KW S.S.B./I.S.B./CW

TRANSMITTER AND RECEIVER STATION

FGRI.23196

Relevant publications:-

AP 116E-0127-1A, 1H, 1J, 1K, 1L, 1M, 1N,
 1P, 1Q, 1R, 1S, 1U, 1AC, 1AD, 1AE, 1AF, 1Z.
 (formerly part of AP 4808C, Vol.1)

FUNCTION

FGRI.23196 is a remotely-controlled voice and telegraph transmitter-receiver station. Transmission and reception are possible using either single-sideband (upper or lower sideband, suppressed or pilot carrier), compatible amplitude-modulation or c.w. telegraphy.

BRIEF DESCRIPTION

The transmitter and receiver sections of the equipment are usually located at separate sites and are each controlled from a remote centre, frequency selection and both mode and state of operation all being determined from this control centre. Several receiving sets, transmitting sets or control consoles may be installed at the respective sites which can be many miles apart. The control function requires one pair of land-lines or a radio-relay link between each transmitting or receiving set and the remote control centre, a further land-line pair or radio link being required for the intelligence. Independent control of the transmitter and receiver enables them to be operated at different frequencies.

FREQUENCY RANGE

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100Hz.

TRANSMITTER OUTPUT POWER

1kW p.e.p. (800W r.m.s.).

RECEIVER SENSITIVITY

SSB and CW: 1 microvolt for 13 dB signal/noise ratio.
 AM : 5 microvolts for 13 dB signal/noise ratio (30% modulation).

POWER SUPPLIES

Transmitter: from stabilizer, voltage, 6110-99-223-5167:-
 Input 400V \pm 12%, 47-65Hz, three-phase, four-wire.
 Receiver : 100-125V, 200-250V (\pm 6%), 45-65Hz, single-phase.

MAIN ITEMS OF INSTALLATION

(1) Transmitting terminal 5820-99-112-0152 (Racal TTA.372D) comprising:

- Transmitting set, radio (Racal TA.349 assembly), Qty. 1.
- Transmitter, sub-assembly, 5820-99-112-0153 (Racal MA.228A-1), Qty. 1.
- Stabilizer, voltage, 6110-99-223-5167 (Claude Lyons TS.222B), Qty. 1.

(2) Receiving set, radio, 5820-99-950-5773 (Racal RTA.191A).

(3) Console communication control, 5820-99-952-0403 (Racal LA.304) housing:
 Control, radio set, 5820-99-950-5777.
 Oscillator-control, frequency selector, 5820-99-954-2904 (selcal).

(4) Frequency standard and distribution unit, 5820-99-951-0657 (Racal MA.286A) (transmitter).

(5) Frequency standard and distribution unit, 5820-99-951-0655 (Racal MA.286B) (receiver).

OVERALL DIMENSIONS

	Height	Width	Depth
Transmitting set, radio (TA.349 assembly)	5ft 5 $\frac{1}{4}$ in (165.7cm)	2ft 0in (61 cm)	2ft 4 $\frac{1}{2}$ in (72 cm)
Transmitter sub-assembly 5820-99-112-0153	5ft 5 $\frac{1}{4}$ in (165.7cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
Stabilizer, voltage 6110-99-223-5167	2ft 10in (86 cm)	2ft 0in (61 cm)	1ft 1 $\frac{1}{2}$ in (34 cm)
Receiving set, radio 5820-99-950-5773	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
Control, radio set 5820-99-950-5777	(installed in console, communication control):-		
Transmitter control	1ft 7in (48.3cm)	5 $\frac{1}{4}$ in (13.3cm)	1ft 5in (43.2cm)
Receiver control	1ft 7in (48.3cm)	5 $\frac{1}{4}$ in (13.3cm)	1ft 5 in (43.2cm)
Tone generator	1ft 7in (48.3cm)	5 $\frac{1}{4}$ in (13.3cm)	10 in (25.4cm)
D.C. power unit	5 $\frac{1}{4}$ in (13.3cm)	1ft 7in (48.3cm)	1ft 5in (43.2cm)
Frequency standard and distribution units:-			
5820-99-951-0657	5ft 5 $\frac{3}{4}$ in (167 cm)	2ft 0in (61 cm)	2ft 3in (68.6cm)
5920-99-951-0655	5ft 5 $\frac{3}{4}$ in (167 cm)	2ft 0in (61 cm)	2ft 3in (68.6cm)

WEIGHTS (approx.)

Transmitting set, radio (TA.349 assembly)	750 lb	(340 kg)
Transmitter-sub-assembly (5820-99-112-0153)	350 lb	(159 kg)
Stabilizer, voltage (6110-99-223-5167)	225 lb	(102 kg)
Receiving set, radio (5820-99-950-5773)	600 lb	(272 kg)
Control, radio set (all units) (5820-99-950-5777)	95 lb	(43 kg)
Frequency standard and distribution unit (5820-99-951-0657)	300 lb	(136 kg)

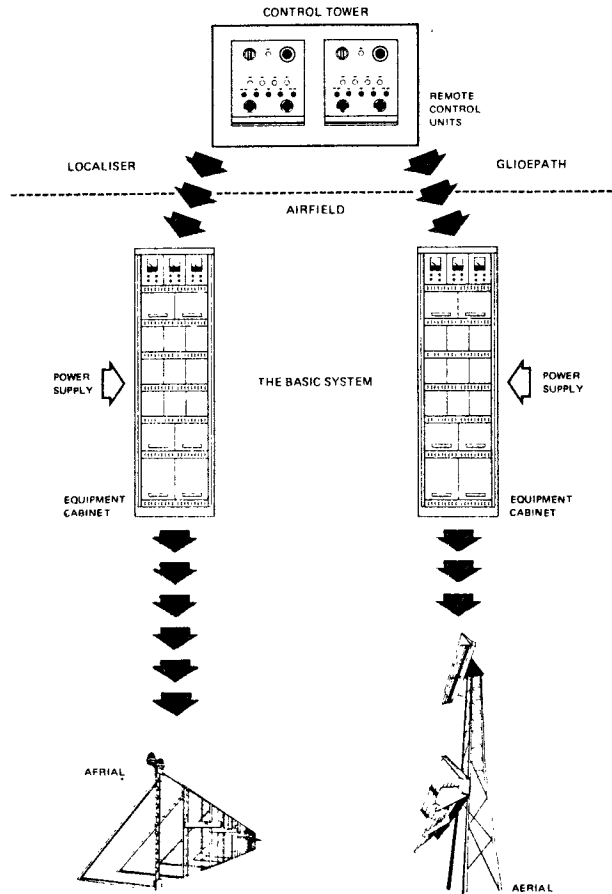
REMARKS

For further information of particular equipment see Index. Illustrations of individual items of equipment are given in the appropriate information sheets.

FGRI 26088

PLAN 17/18 INSTRUMENT LANDING SYSTEM
GROUND EQUIPMENT

RELEVANT AIR PUBLICATION
116C-0403-1A, 1B



Plan 17/18 localiser and glidepath (schematic)

FUNCTION

This is a conventional ILS Equipment providing the aircraft pilot with information enabling him to make an accurate and controlled approach to a runway in conditions of poor visibility and low cloud.

ORIGIN ITT Federal Laboratories, Nutley, New Jersey, USA.

OPERATING PRINCIPLES

The ground ILS consists of

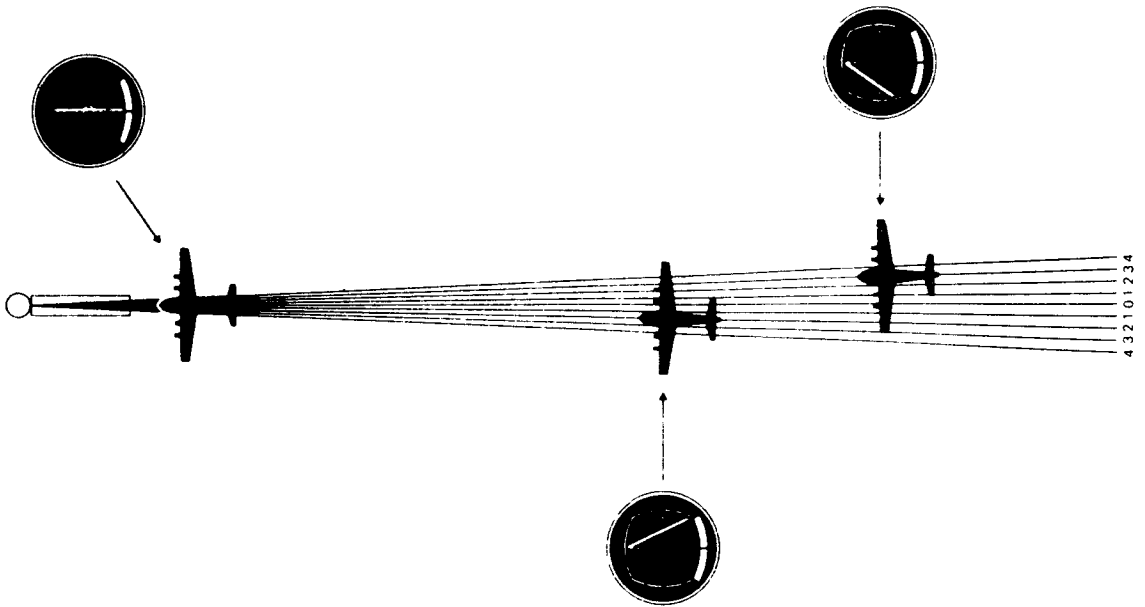
- 1) A localizer equipment which provides azimuth guidance information and also speech and identification signals.
- 2) A glide-path equipment which provides elevation guidance information and marker beacons which provide distance from threshold information.

The localizer and the glide-path may be used singly or in combination.

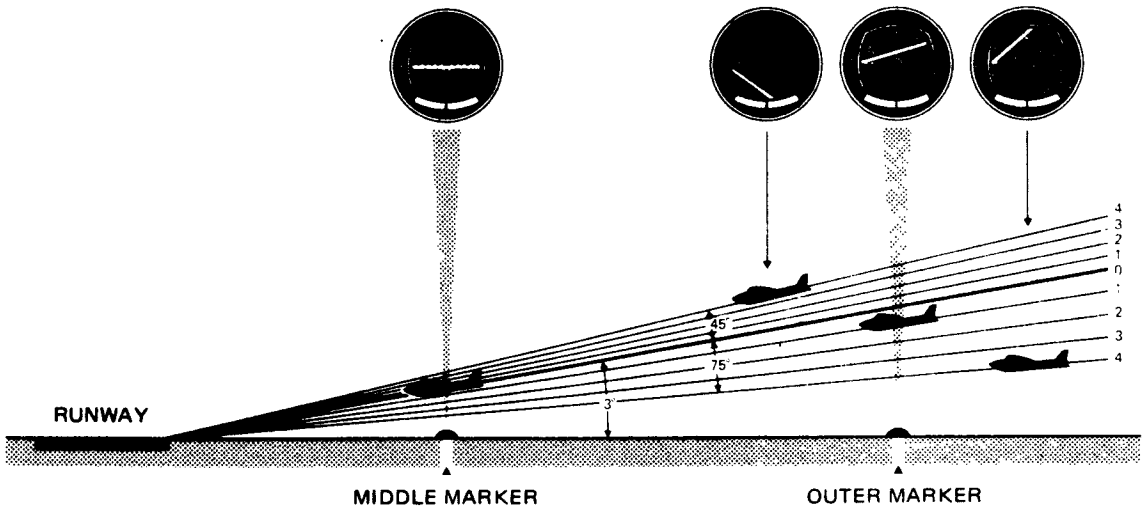
TECHNICAL DATA (LOCALIZER PLAN 17)

TRANSMITTER

Carrier frequency	108-112 MHz
Frequency stability	0.002%
Harmonics and spurious radiation	
greater than 60 dB below fundamental	
Modulation frequencies	
90 Hz and 150 Hz	
1020 Hz identity tone (keyed)	
Optional voice amplifier	
Modulation frequency stability	
90 Hz and 150 Hz $\pm 1\%$,	
1020 Hz ± 50 Hz	
Tone phase	
Relative to 150 Hz	less than 10°
Modulation depth	
90 Hz and 150 Hz	20% $\pm 1\%$
1020 Hz (identity tone)	0 to 15% adjustable
Speech	0 to 50% adjustable
Harmonic distortion	
90 Hz total harmonic content	less than 10%
150 Hz total harmonic content	less than 10%
30 Hz total harmonic content	less than 2%
60 Hz total harmonic content	less than 2%
180 Hz total harmonic content	less than 3%
240 Hz total harmonic content	less than 2%
270 Hz total harmonic content	less than 3%
300 Hz total harmonic content	less than 3%
450 Hz total harmonic content	less than 3%
All other components between 30 Hz and 4kHz	less than 2%
Keying rate	
Identity code repeated at least eight times per minute	



ILS localizer



ILS glide-path

Power	25 watts minimum
Output impedance	50 ohms unbalanced
Modulation balance control (course path adjustment)	greater than ± 0.025 d.d.m. (difference in depth of modulation)
Displacement sensitivity (sideband level) equivalent to $2\frac{1}{2}^{\circ}$ - 6° course sector ($15\frac{1}{2}$ d.d.m.points)	

MONITORS

Automatic change-over or shut-down alarms (limits adjustable)

False radiation period	1-15 seconds
Course/path position	Shift of 0.004 to 0.02 d.d.m
Displacement sensitivity	10-25% change from nominal
Power level	50% reduction maximum
Modulation levels 90 Hz and 150 Hz	2-4% change
Maintenance warnings (all functions)	50-100% of above alarm limits set.

RADIATED SIGNALS

Coverage

46 km within $\pm 10^{\circ}$

31.5 km from 10° to 35°

(at 2000 ft. above threshold or 1000 ft. above terrain whichever is greater)

Displacement sensitivity (nominal)

0.00145 d.d.m./metre for 214 m course sector width at threshold

Polarization

Horizontal

TECHNICAL DATA (GLIDEPATH PLAN 18)

TRANSMITTER

Carrier frequency	328-336 MHz
Frequency stability	0.002%
Harmonics and spurious radiation greater than 60 dB below fundamental	
Modulation frequencies	90 Hz and 150Hz
Modulation frequency stability(90Hz & 150Hz)	$\pm 1\%$
Tone phase relative to 150 Hz course	less than 10°
Modulation depth (90Hz&150Hz)	40% $\pm 2\frac{1}{2}\%$

Harmonic distortion

90 Hz total harmonic content	less than 10%
150 Hz total harmonic content	less than 10%
30 Hz total harmonic content	less than 2%
60 Hz total harmonic content	less than 2%
180 Hz total harmonic content	less than 3%
240 Hz total harmonic content	less than 3%
270 Hz total harmonic content	less than 3%
300 Hz total harmonic content	less than 3%
450 Hz total harmonic content	less than 3%
All other components between 30 Hz and 4 kHz	less than 2%

Power	10 watts minimum
Output Impedance	50 ohms unbalanced
Modulation balance control (course path adjustment)	equivalent to $\pm 0.2^\circ$

Displacement sensitivity (sideband level)
 equivalent to $0.6^\circ - 2^\circ$ path sector (17.5% d.d.m. points)

MONITOR

Automatic change-over or shut-down alarms.	(limits adjustable)
False radiation period	1-15 secs.
Course/path position	Shift of 0.08° to 0.4°
Displacement sensitivity	15-30% change from nominal
Power level	50% reduction maximum
Modulation levels (90Hz&150Hz)	2-4% change
Maintenance functions(all)	50-100% of above alarm limits set.

RADIATED SIGNALS

Coverage

18.5 km between 0.45Φ and 1.75Φ
 within $\pm 8^\circ$ front course sector ($\Phi =$ the selected glidepath angle)

Displacement sensitivity (nominal)
 0.0875 d.d.m. at $0.120^\circ \pm 0.020^\circ$

Polarization Horizontal

POWER SUPPLIES (LOCALIZER PLAN 17 AND GLIDEPATH PLAN 18)

100-125V or 200-250V a.c. at 45-65 Hz or
 d.c. battery (standby) for 2 hours equipment operation.

DIMENSIONS

	Height	Width	Depth
Localizer and glidepath cabinet	1.834 m (72.2 in)	0.557 m (22 in)	0.72 m (28.4 in)
	Length	Height	
Localizer aerial array (12 element)	26 m (85 ft)	2.1 m (7 ft)	
Glidepath aerial mast height			
Null reference	13.7 m (45 ft)		
Sideband reference	7.6 m (25 ft)		
Type M	16.7 m (55 ft)		

ENVIRONMENTAL CHARACTERISTICS

EQUIPMENT ROOM

Temperature range	-10°C to +50°C
Humidity	up to 95% at 40°C
Altitude	up to 10,00 ft above mean sea level
Duty	Continuous, unattended

OUTDOOR EQUIPMENT

Temperature range	-40°C to 60°C
Salt atmosphere	as encountered in coastal regions

REMOTE CONTROL EQUIPMENT

Indicators: Main channel operating, standby channel operating, mains or charger failure, equipment failure.
Other facilities: Aural alarm, silence alarm switch, monitoring of keyed indentivity tone, lamp test button, key to disable push button controls.

RELIABILITY

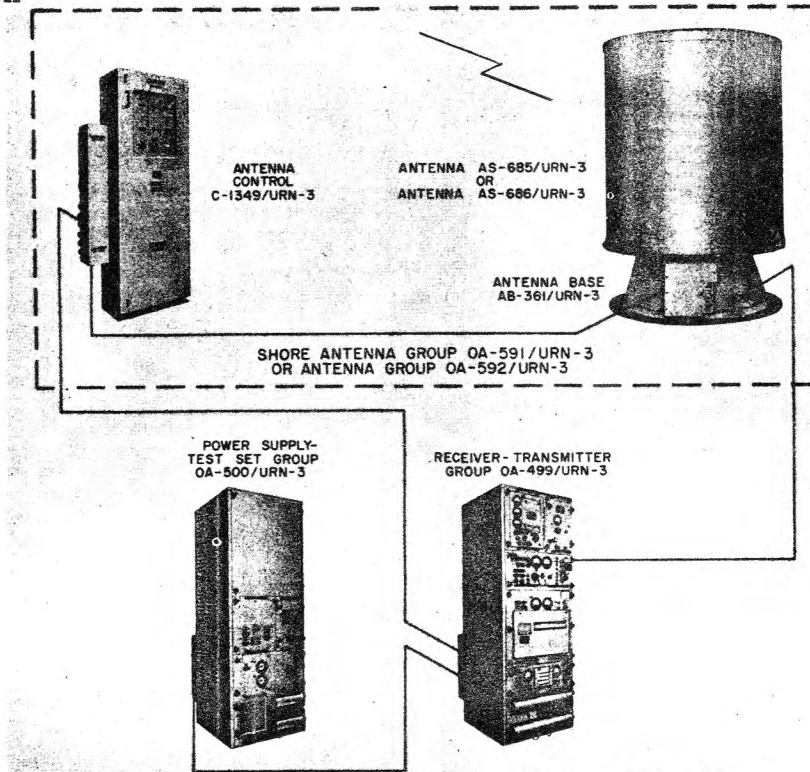
The dual version has a mean time between failure of over 10,00 hours.

INTEGRITY

In the event of a failure being detected automatic change-over to stand-by equipment is initiated.

TACAN (GROUND) TRANSPONDER
AN/URN/3

RELEVANT AIR PUBLICATIONS
116C-0708-1A6A



Tacan (ground) transponder AN/URN/3

FUNCTION

To provide radio beacon and air navigation facilities in conjunction with an aircraft-mounted AN/ARN/21 set. The ground equipment consists of a transmitter-receiver unit mounted in a standard rack, a power supply-test unit similarly mounted and associated antenna equipment.

ORIGIN ITT Federal Laboratories, Nutley, New Jersey, USA.

OPERATING PRINCIPLES

Distance information is obtained by measuring the time taken for the reply to an interrogation signal to be returned from the ground installation. Bearing information is obtained from phase differences between pulsed groups transmitted by the ground installation. Transmissions from the ground are in the form of pulsed pairs (3600 pairs/sec.) and include replies to interrogations, bearing information and station identification code repeated at regular intervals.

TECHNICAL DATA

TRAFFIC CAPACITY

Up to 100 aircraft simultaneously

FREQUENCY RANGES

Receive 1025 MHz to 1150 MHz

Transmit 962 MHz to 1024 MHz and 1151 MHz to 1213 MHz

There are 126 channels available at 1 MHz separation.

Transmit and receive frequencies are separated by 63 MHz

SENSITIVITY

A properly coded signal 125 dB below 1 watt at input will trigger the transmitter at no load.

TRANSMITTER

Power output - 5 kW peak. Pulsed pairs spaced 12 μ secs.

Pulse duration - 3.5 μ S.

Duty cycle - 3600 pairs/sec.

RECEIVER SELECTIVITY

The receiver rejects properly coded signals on adjacent channels at 80 dB above threshold level of a properly coded signal on the pass band.

BEACON RESPONSE DELAY

50 μ S

ANTENNA SYSTEMS

Either a highband or lowband antenna may be used.

The antenna consists of a central array surrounded by a rotating arrangement of parasitic elements.

POWER REQUIRED

Transmitter-receiver and power supply-test set units

208V three-phase 60 Hz a.c. 7 kVA

Antenna systems

120V single-phase 60 Hz a.c. 50 watts and

208V three-phase 60 Hz a.c. 2.9 kVA.

SUB-ASSEMBLY DETAILS

TRANSMITTER-RECEIVER RACK

Coder, indicator	KY/101/URN3
Radio receiver	R/549/URN3
Control, Duplexer	C/1236/URN3
Amplifier, modulator	AM/847/URN3
Frequency multiplier oscillator	CV/273/URN3
Electrical equipment cabinet	CY/1372/URN3

POWER SUPPLY-TEST SET RACK

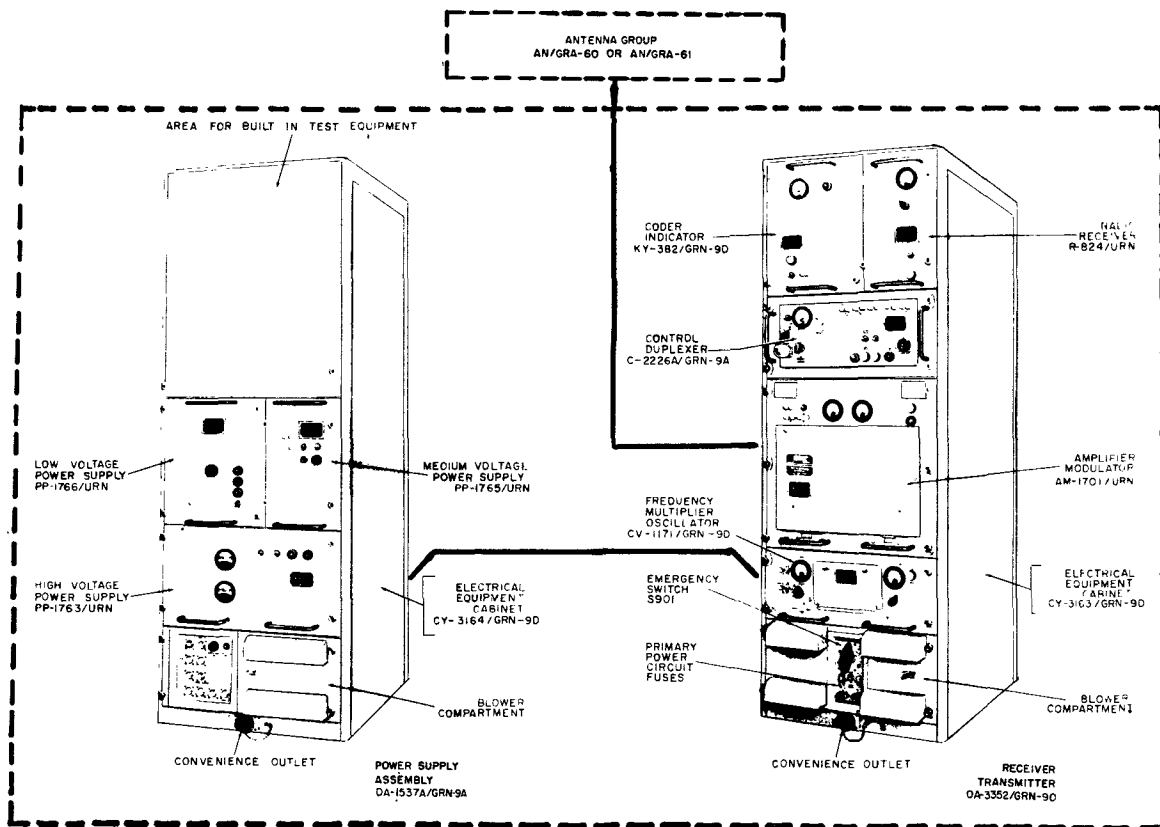
Power supply, low voltage	PP/954/URN3
Power supply, med. voltage	PP/955/URN3
Power supply, high voltage	PP/956/URN3
Electrical equipment cabinet	CY/1373/URN3

ANTENNA SYSTEMS (SHORE SYSTEMS)

Antenna base	AB/361/URN3
Antenna base control	C/1349/URN3
Antenna lowband or	AS/685/URN3
Antenna highband	AS/686/URN3

TACAN (GROUND) TRANSPONDER
 AN/GRN-9D

RELEVANT AIR PUBLICATIONS
 116C-0701-1A6A



Tacan (ground) transponder AN/GRN-9D

FUNCTION

To provide radio beacon and air navigation facilities in conjunction with aircraft mounted radio set AN/ARN/21. The ground equipment consists of a transmitter-receiver mounted in a standard rack, a power supply-test unit similarly mounted and associated antenna equipment.

ORIGIN ITT Federal Laboratories, Nutley, New Jersey, USA.

OPERATING PRINCIPLES

Distance information is obtained by measuring the time for the reply to an interrogation signal to be received from the ground installation. This function is performed by the AN/ARN/21 set in the aircraft which initiates the interrogation signal. Bearing information is obtained from phase relationships between omnidirectional reference pulses and varying amplitude

directional pulses obtained from a rotating antenna system with an asymmetric radiation pattern. The reference pulse is sent as the antenna system completes each revolution. The signal contains identification of both station and aircraft concerned as well as the bearing information and such random pulses as may be required to fill the duty cycle.

TECHNICAL DATA

TRAFFIC CAPACITY

Up to 100 aircraft simultaneously

RANGE

Up to 200 miles

FREQUENCY RANGE

Receive: 1025 MHz to 1150 MHz. Transmit: 962 MHz to 1024 MHz and 1151 MHz to 1213 MHz. There are 126 channels available at 1 MHz separation. Transmit and receive frequencies are 63 MHz apart.

SENSITIVITY

A properly coded signal 125 dB below 1 watt at input will trigger the transmitter at no load.

TRANSMITTER

Power output 7 kW minimum. Duty cycle 3600 pulsed pairs/sec.

RECEIVER SELECTIVITY

The receiver rejects signals on adjacent channels at 80 dB above threshold level of a signal on the pass band.

BEACON RESPONSE DELAY

50 μ S

ANTENNA SYSTEM

Either a high or low band antenna system may be used. The antenna system consists of a central array surrounded by a rotating arrangement of parasitic elements.

POWER SUPPLY REQUIRED

208V, 4-wire, 3-phase, 60 Hz

Power consumption 7.2 kVA

SUB-ASSEMBLY DETAILS

Transmitter-receiver rack

Coder-indicator

Radio receiver

Control, duplexer

Amplifier, modulator

Frequency multiplier oscillator

Cabinet

KY/382/GRN-9D

R/824/URN

C/2226A/GRN-9D

AM/1701/URN

CV/1171/GRN-9D

CY/3163/GRN-9D

Power supply-test unit rack

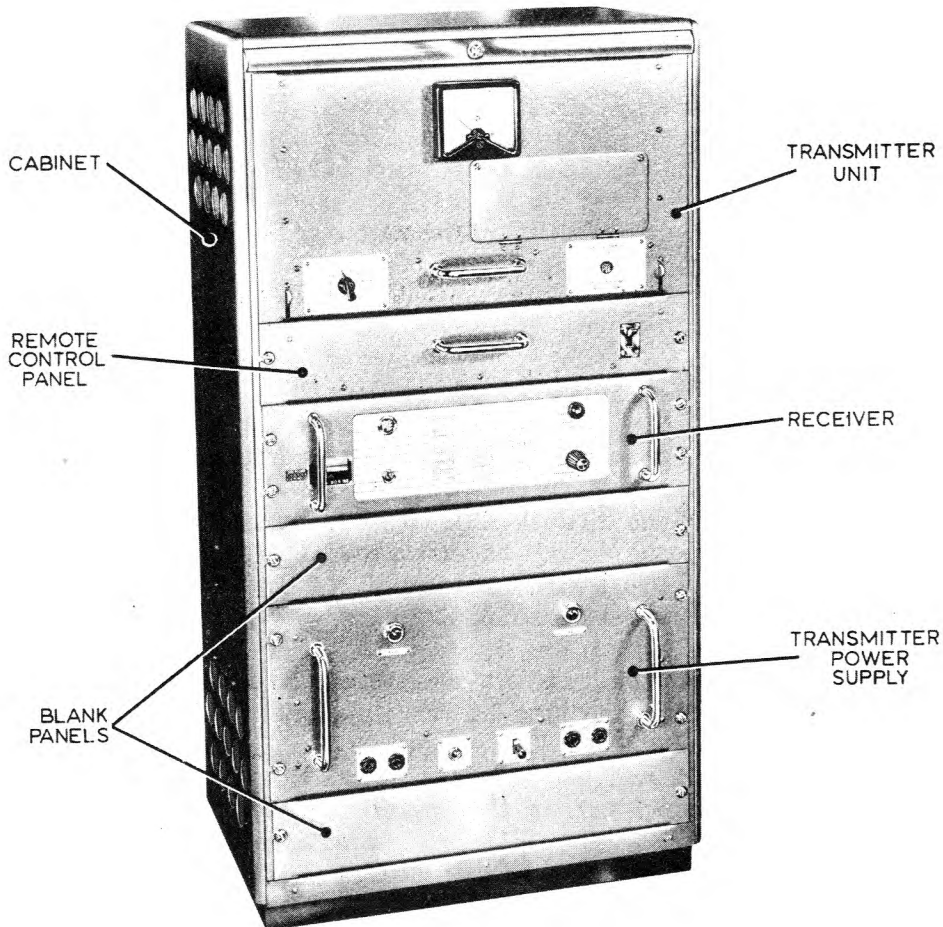
Power supply, high voltage
Power supply, medium voltage
Power supply, low voltage
Cabinet
Test equipment

PP/1763/URN
PP/1765/URN
PP/1766/URN
CY/3164/GRN-9D

Antenna group AN/GRN/60 or 61.

FGRI 26002/3A, 50 WATT VHF RADIO-TELEPHONE (68-88 MHz)
PYE PTC 755 VD

RELEVANT AIR PUBLICATION
116E-0122-1



FGRI-26002/3A, 50 watt v.h.f. a.m. transmitter-receiver

FUNCTION

Ground station amplitude modulated v.h.f. radio-telephone transmitter-receiver for general use with remote control, extension control, local control or secondary control facilities as required.

ORIGIN

Pye Co. Ltd., type PTC 755 V.D.

GENERAL DESCRIPTION

The designation FGRI 26002 covers a series of a.m. v.h.f. radio-telephone equipments, the different versions of which are identified by suffix figures and letters. These concise details describe the FGRI 26002/3A.

The radio-telephone is a single channel, remote controlled installation operating on a fixed frequency in the 68-88 MHz band. Its primary use is controlling a mobile fleet of vehicles from a fixed station but it may also be used in point to point applications. Both the transmitter and the receiver is crystal controlled and employ crystal ovens to provide the frequency stability required for its bandwidth of 25 kHz.

The transmitter receiver set includes a local switching panel consisting of remote-control-relays switching the power supply on or off and also a remote-change-over-control to transmit or receive.

The panel forms a switching part of a remote control equipment and these are further described in AP 116E-2209-1.

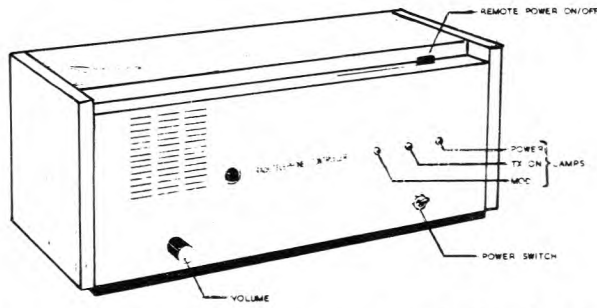
The distance of the remote control set from the main equipment depends on the quality of the line available. For satisfactory operation the d.c. loop resistance of the line must not exceed 3000 ohms which in practice means a range of 15 miles. As d.c. switching is employed the line must not include transformers, repeaters or carrier equipment.

An extension control unit Type 8105A (10L/16540) for remote control of radio-telephone (for distances of up to 200 feet) may be used, but in this case panel Type 8003 (10D/19516) replaces the local panel (relay unit) in the transmitter-receiver cabinet.

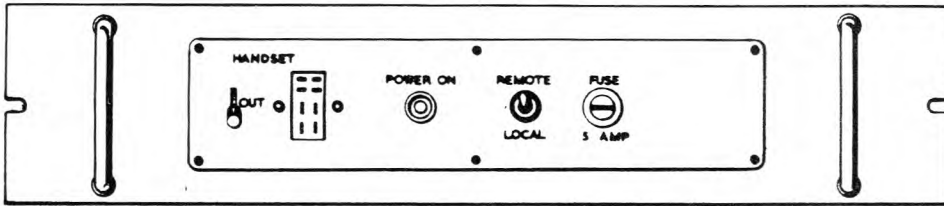
A telephone hand-set is provided at the remote control unit and also a second hand-set is provided for use at the local control panel.

The extension control unit and the special local control panel has no facility for a telephone hand-set at the local position and has a limited control facility.

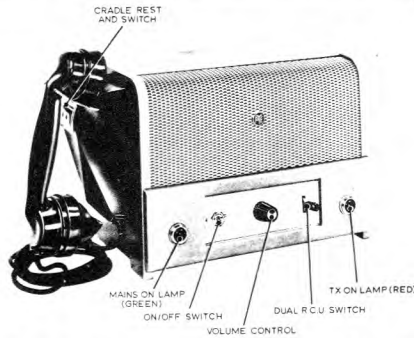
A secondary remote control unit may also be fitted with a very limited control facility.



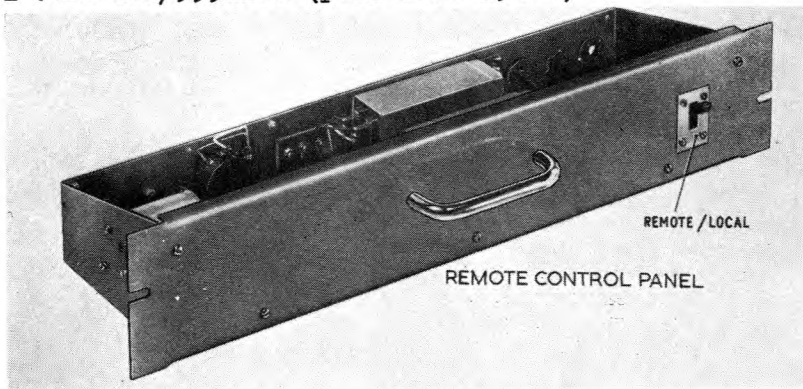
Remote radio-telephone control 10J/ 5820-99-222-5322 (post mod. A3200) control



Local panel for remote control 10D/5820-99-222-5321(post mod. A3200) switching



Remote control unit 10D/9331100 (pre. mod. A3200) control



Local control panel 10D/9331098 or 10D/9331099 (pre. mod. A3200) switching

Transmitter-receiver control group Type S.1/2 (10L/9331097) (pre. mod. A3200)

SUB-ASSEMBLY

Cabinet	Type 14554A	10AQ/1584
Transmitter-receiver radio	Type S4/1	10D/9331323
Transmitter unit	Type S5/1	10D/9331297
Power supply unit (t.x.)	Type 14552A	10K/21641
Receiver, radio	Type S5/1	10D/9331294
Receiver unit (Pye PTC 3004Z (or X)	Type S6/1	10P/9331295
Power supply unit (r.x.)	Type S53/1	10K/9331296

For remote control range of up to 15 miles (maximum line resistance of 3000 ohms for d.c. control).

Remote radio telephone controller	(control)	10J/5820-99-222-5322
Local radio telephone control panel	(switching)	10D/5820-99-222-5321

(further information on these post mod. A3260 units will be found in 116E-2209-1, Part 6, Sect.1, Sheet No.3).

For secondary control

Secondary control radio set	(control)	10D/9331100
Extension control panel (obsolete)	(switching)	10L/9331096
Panel (relay)	(switching)	10D/9331098
Panel (relay)	(switching)	10D/9331099

Note Mod. A3200 replaces 10D/9331098 with 10D/5820-99-222-5321
and 10D/9331100 with 10D/5820-99-222-5322

For extension control range of up to 200 feet

Remote controller unit Type 8105A (AP 116E-0725)	(control)	10L/16540
Panel extension control Type 8003	(switching)	10D/19516

(further information on unit Type 8105A will be found in 116E-0114)

Aerial, folded unipole with ground plane (omnidirectional quarter wave)

68-76 MHz	10B/5985-99-119-4331
76-82 MHz	10B/5985-99-119-4332

Feeder aerial	Type 8013	10B/17653
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TECHNICAL DATA

Frequency range	68 to 88 MHz
Channel spacing	Type V -25 kHz
RF power output	45 to 60 watts (depending on frequency)

Receiver i.f.

1st 10.7 MHz
 2nd 2 MHz

Frequency control

Single 10XDJ type crystal in thermostatically controlled oven

Modulation

High level voice amplitude modulation

Receiver sensitivity

1 watt a.f. output for 2 μ V input with 14 dB signal-to-noise ratio
 (test modulation is 30% at 1000 Hz, approximately).

Receiver a.f. output

1 watt into the local loudspeaker or 400 mW into 600 ohms line.

Power consumption

Radio-telephone unit 635 watts (maximum)
 Receiver on standby 50 watts
 Receiver with h.t. on 70 watts
 Transmitter on standby 142 watts
 Transmitter (unmodulated) 520 watts
 Transmitter (100% modulated) 585 watts
 (Remote control requires an additional 32 watts)

DIMENSIONS

	Height	Width	Depth
Cabinet Type 14554A	1004 mm	534 mm	305 mm
10AQ/1584	(39 $\frac{1}{2}$ in)	(21 in)	(12 in)
Transmitter-receiver, radio set	1004 mm	534 mm	304 mm
10D/9331323	(39 $\frac{1}{2}$ in)	(21 in)	(12 in)
Transmitter unit	267 mm	483 mm	254 mm
10D/9331297	(10 $\frac{1}{2}$ in)	(19 in)	(10 in)
Receiver	133 mm	483 mm	299 mm
10D/9331294	(5 $\frac{1}{4}$ in)	(19 in)	(11 $\frac{3}{4}$ in)
Power supply unit Type 14552A	210 mm	483 mm	254 mm
10K/21641	(8 $\frac{3}{4}$ in)	(19 in)	(10 in)
Controller, radio telephone	168 mm	413 mm	188 mm
10J/5820-99-222-5322 (Post mod. A3200)	(6 5/8 in)	(16 $\frac{1}{4}$ in)	(7 3/8 in)
Panel remote control	89 mm	483 mm	242 mm
10D/5820-99-222-5321	(3 $\frac{1}{2}$ in)	(19 in)	(9 $\frac{1}{2}$ in)

Control radio set 10D/9331100 (pre mod A3200)	203 mm (8 in)	406 mm (16 in)	178 mm (7 in)
Panel relay 10D/9331098 or 10D/9331099 (Pre mod A3200)	89 mm (3½ in)	483 mm (19 in)	134 mm (5¼ in)

WEIGHT

Cabinet	30.4 kg	(67 lb)
Radio-telephone (complete)	86.5 kg	(190½ lb)
Transmitter	15.5 kg	(34 lb)
Power unit (TX)	27.7 kg	(61 lb)
Receiver	9.53 kg	(21 lb)
Panel relay	3.4 kg	(7½ lb)
or		
Panel remote control	3.3 kg	(7¼ lb)
Control, radio set	7.5 kg	(16½ lb)
or		
Controller radio telephone	7.7 kg	(16¾ lb)

Crystal information

Transmitter unit	Crystal type 10XDJ (oven control)
Crystal formula	$f_x = \frac{s.f.}{6} \text{ MHz}$

Receiver unit

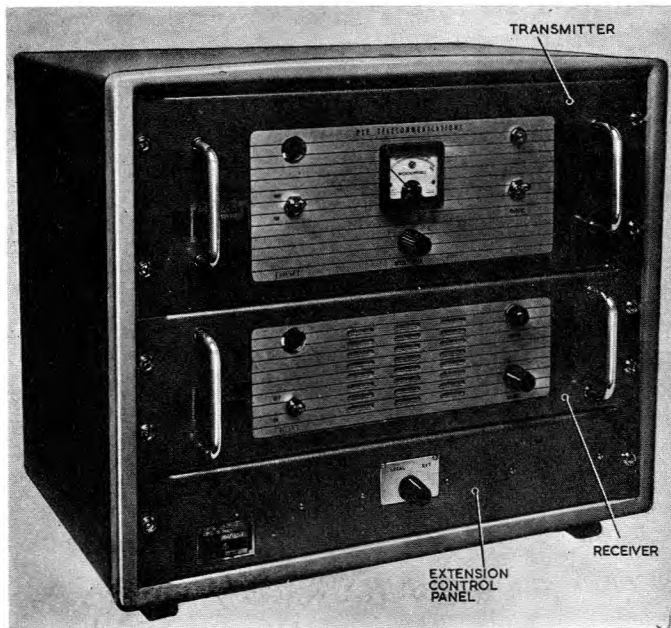
1st local oscillator	Crystal type 10XDJ (oven control)
	$f_{x.1} = \frac{s.f. + 10.7}{12} \text{ MHz}$
2nd local oscillator	Crystal type 10XDH
Crystal formula	$f_{x.2} = 12.7 \text{ MHz}$

Note

When the assigned frequency is within 100 kc/s of 72.6 MHz the crystal frequency for the second local oscillator is 8.7 MHz. There may be other assigned frequencies at which this latter frequency is preferable.

FGRI 23081 (Series), 20 WATT VHF RADIO TELEPHONE
(PYE PTC 2701/2)

RELEVANT AIR PUBLICATIONS
116E-0114



Transmitter-receiver radio type S5/1 (10D/933132)
(Pye PTC 2701/2, (Series))



Extension control unit Type 8105A (10L/16540)
FGRI 23081/1D, Transmitter-receiver with control unit and extension control

FUNCTION

The FGRI (Series) is a single channel v.h.f. a.m. fixed radio telephone station used mainly for controlling a fleet of vehicles operating in the 25 to 74 MHz band with local control, extension control, remote control and radio repeater facilities

ORIGIN

Pye Ltd., Type PTC 2701/2

GENERAL DESCRIPTION

The FGRI 23081 (series) is an amplitude-modulated, single-channel radio telephone installation operating in the 25 to 174 MHz band. Its primary use is for controlling from a fixed station, a mobile fleet of vehicles, but it may also be used as a radio repeater station enabling mobile stations to communicate directly with each other.

With the additional extension equipment the installation can be operated from another part of the same building over a distance of up to 200 feet.

Remote control equipment utilising d.c. telephone lines can be used where greater distances are involved, the maximum distance being governed by the line loop resistance which must not exceed 3000 ohms (15 miles approx.).

The basic transmitter receiver is a Pye PTC 2701/2 this code number embraces a range of equipments in which there are three (3) receivers and two (2) transmitters to cover a frequency range of 25 to 174 MHz, each receiver with a slight circuit modification offering a choice of three channel spacings. There are also several optional features such as thermostatically-controlled crystal ovens, extension or remote control and radio repeater facilities.

The transmitter power unit includes the microphone and line amplifiers with gain controls.

The receiver power unit includes the receiver squelch amplifier. The ancillary service panel may be either an extension control panel, a remote control panel or a radio repeater panel or just a blanking panel. The three frequency ranges of the three basic receivers are 25 to 68 MHz, 68 to 132 MHz and 132 to 174 MHz respectively, for each of these sets there are alternative circuit arrangements to allow for the following three ranges of channel spacing.

- 1) Type V (very narrow) 20 to 30 kHz
- 2) Type N (narrow) 40 to 60 kHz
- 3) Type W (wide) above 100 kHz.

(The letters V, N and W are used as suffix letters to the manufacturers code PTC2701/2 to denote the channel spacing of a particular equipment). Two basic transmitter units are provided, one covering 25 to 68 MHz range and the other 68 to 174 MHz range.

The radio receiver in the FGRI 23081/1D unit uses a cascode r.f. stage and the remaining installations use radio receivers with grounded grid triode r.f. stage.

Major items and their constituent units and sub-units are as follows:-

FGRI.23081/1A

(Frequency 34.3 MHz, channel spacing 40 to 60 kHz, with extension control)

Cabinet fitted	Type 14480A	10AQ/1574
Transmitter Type	Type T14481A	10D/22257
Transmitter unit	Type T14516A	10R/13105
Power unit	Type 14515	10K/21610
Receiver	Type R14482A	10D/22258
Receiver unit	Type 14538A	10P/16569
Power unit	Type 14515	10K/21611
Panel (extension control)	Type 8003	10D/19516
Control unit	Type 8105A	10L/16540
Dipole unit	Type 14535	10B/18849
	(complete with coaxial connector)	

FGRI 23081/1D

(Frequency 68 to 88 MHz, channel spacing 20 to 30 kHz, with extension control)

Transmitter-receiver radio	Type S5/1	10D/933132
Transmitter, radio	Type S3/1	10D/9331291
Transmitter, radio sub-assembly	Type S4/1	10R/9331292
Power supply	Type S52/1	10K/9331293
Receiver, radio	Type S5/1	10D/9331294
Receiver radio sub-assembly	Type S6/1	10P/9331295
Power supply	Type S53/1	
Panel (extension control))	Type 8003	10D/19516
Control unit	Type 8105A	10L/16540
Aerial (68-75 MHz) (complete with coaxial connector)		10B/9470723
Aerial (75-81 MHz) (complete with coaxial connector)		10B/9470724
Aerial (81-88 MHz) (complete with coaxial connector)		10B/9470721

FGRI 23081/2A

(Frequency 168.8 MHz, channel spacing 40 to 60 kHz, with extension control)

Cabinet fitted	Type 14485A	10AQ/1576
Transmitter	Type T14486A	10D/22260
Transmitter unit	Type 14517A	10K/21610
Power unit	Type 14514	10K/21610

Receiver	Type R14487A	10D/22261
Receiver unit	Type 14519A	10P/16571
Power unit	Type 14515	10K/21611
Panel (extension control)	Type 8003	10D/19516
Control unit	Type 8105A	10L/16540
Dipole unit (complete with coaxial connector)	Type 8580	10B/17817

FGRI 23081/2B

(Frequency 68-88 MHz, channel spacing 20 to 30 kHz, local control)

Cabinet fitted	Type 14485B	10AQ/1581
Transmitter	Type T14486B	10D/22733
Transmitter unit	Type 14514	10K/21610
Receiver	Type R14487B	10D/22734
Receiver unit	Type 14515	10K/21611
Panel (blank)		
Microphone assembly	Type 14484	10AH/1529
Unipole unit	Type S3/3	10B/20147
Aerial feeder (120 ft)	(Pye 0V82)	10B/18897

FGRI 23081/2C

(Frequency 68 to 88 MHz, channel spacing 20 to 30 kHz, radio repeater)

Cabinet fitted	Type 14485C	10AQ/1582
Transmitter	Type T14486B	10D/22733
Transmitter unit	Type 14517B	10R/13107
Power unit	Type 14514	10K/21610
Receiver	Type R14487B	10D/22734
Receiver unit	Type 14519B	10P/16572
Power unit	Type 14515	10K/21611
Panel (radio repeater)	Type 14542C	10D/22736
Microphone assembly	Type 14484	10AH/1529
Dipole unit (72-81 MHz)	Type 14543	10B/18853
Dipole unit (81-92 MHz)	Type 14318	10B/18812
	(Rx aerial complete with coaxial connector)	
	(Tx aerial complete with coaxial connector)	

TECHNICAL DATA

Frequency range of series 25-174 MHz.
Crystals Type 10XDL

TRANSMITTER

Power output 20-25 watts
Spurious and harmonic radiation Maximum 2.5 μ W at not less than 100 kHz from the carrier.
Adjacent channel radiation With modulation limiting, less than 10 μ W.
Modulation 80% at 10% distortion
Microphone Electro-magnetic (sensitivity 3.5 mV for 50% modulation)
Line sensitivity -33.7 dB for 50% modulation
A.F. response (including microphone) +1 to -3 dB from 300 to 3000 Hz with reference to 1000 Hz.

RECEIVER

Sensitivity Output approximately 1 watt for an input of 2 μ V.
Signal-to-noise ratio 14 dB at 72 MHz
11 dB at 160 MHz
Selectivity Nominal pass-band at -6 dB
Type V (very narrow) \pm 6 kHz
Type N (narrow) \pm 12 kHz
Type W (wide) \pm 24 kHz
Thermal stability AF output does not fall by more than 6 dB and distortion does not exceed 10% over the temperature range -30°C to +60°C
Spurious response attenuation 70 dB minimum.
IF frequencies
1st i.f. 10.7 MHz
2nd i.f. 2.0 MHz

AF output power 1 watt minimum
1.5 watt maximum (approx.) for 10% distortion at 1000 Hz into loudspeaker and +16 dB at 600-ohm line terminals.

AF response Within -4 dB to -10 dB at 300 Hz and -12 dB to -18 dB at 3000 Hz relative to the response at 1000 Hz.

Hum and residual noise Better than 40 dB below at 1 watt.

Radiation Less than 5 mμW into the antenna

Squelch sensitivity At maximum sensitivity the squelch will operate on the reception of a signal between 0.6 and 2.0 μV depending on the ambient site noise.

AGC Less than 8 dB change of output with signals in the range 4.0 μV to 20 mV (at maximum i.f. gain)

Noise limiter Series type to suppress ignition interference

POWER SUPPLY REQUIRED
100-150V or 190-240V
Power consumption

a.c. at 40-60 Hz mains supply
Receive 70 VA
Standby 123 VA
Transmit 300 VA

DIMENSIONS

Width	Height	Depth
510 mm (20 $\frac{1}{4}$ in)	458 mm (18 in)	343 mm (13 $\frac{3}{8}$ in)

WEIGHT 84 lb (approx.)

CRYSTAL INFORMATION

Transmitter unit

Carrier frequency (fc)

32.5-42 MHz

68-88 MHz

148-174 MHz

Crystal frequency formula (fx)

fx = fc/4 MHz

fx = fc/8 MHz

fx = fc/18 MHz

Crystal Types

carrier frequencies

32.5-42 MHz

68-88 MHz

148-174 MHz

Crystal specification

Type V

Type N

Type W

P18

P19

P19

P17*

P19

P19

P17*

P18

P19

Receiver unit

1st local oscillator

Carrier frequency
 34.3 MHz

Crystal frequency formula

$$f_x = \frac{f_c + 10.7 \text{ MHz}}{6}$$

68-88 MHz

$$f_x = \frac{f_c + 10.7 \text{ MHz}}{12}$$

168 MHz

$$f_x = \frac{f_c + 10.7 \text{ MHz}}{12}$$

Crystal types

Carrier frequencies

32.5-42 MHz

68-88 MHz

148-174 MHz

2nd local oscillator

Crystal type

Crystal specification

Type V

Type N

Type W

P18

P19

P19

P17*

P19

P19

P17*

P18

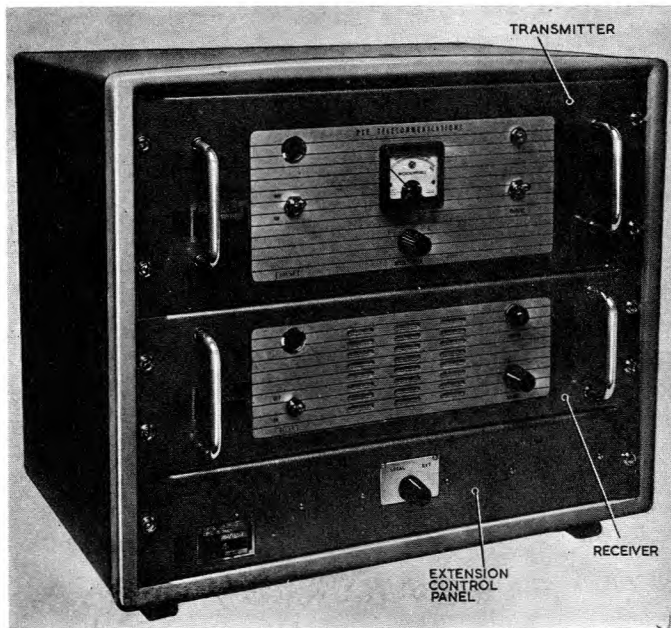
P19

P16 (for all frequencies). $f_x = 12.7 \text{ MHz}$

* = Oven temperature control required.

FGRI 23081 (Series), 20 WATT VHF RADIO TELEPHONE
(PYE PTC 2701/2)

RELEVANT AIR PUBLICATIONS
116E-0114



Transmitter-receiver radio type S5/1 (10D/933132)
(Pye PTC 2701/2, (Series))



Extension control unit Type 8105A (10L/16540)
FGRI 23081/1D, Transmitter-receiver with control unit and extension control

FUNCTION

The FGRI (Series) is a single channel v.h.f. a.m. fixed radio telephone station used mainly for controlling a fleet of vehicles operating in the 25 to 74 MHz band with local control, extension control, remote control and radio repeater facilities

ORIGIN

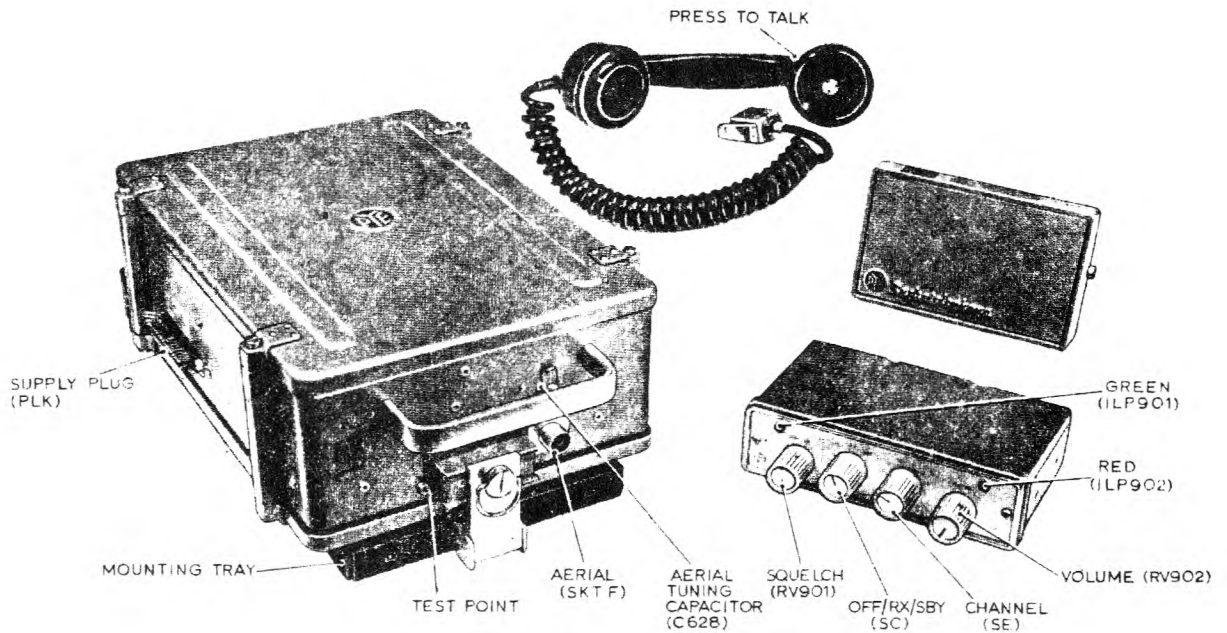
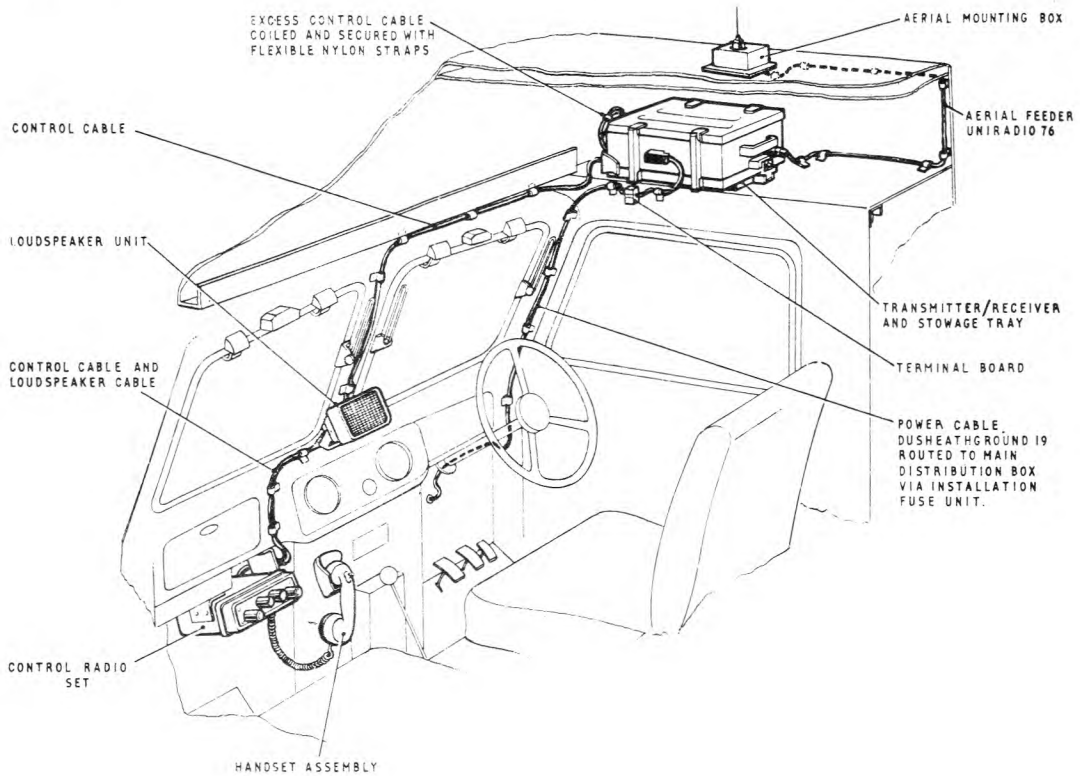
Pye Ltd., Type PTC 2701/2

SECTION 2

**MOBILE GROUND RADIO INSTALLATIONS
(MGRI)**

RADIO TELEPHONE 7W. VHF (PYE AMLOB) F/MGRI 26029-1A/1B/2A

RELEVANT PUBLICATIONS
 116E-2101-1



F/MGRI 26029 (Series) 7 watt VHF Radio-Telephone.

FUNCTION

Ground station amplitude modulated v.h.f. mobile radio-telephone transmitter-receiver.

GENERAL DESCRIPTION

The MGRI 26029 (Series) v.h.f. amplitude modulated radio-telephone is designed to provide speech communication between units of a mobile fleet of vehicles and a base station or aircraft. The equipment operates at fixed frequencies between 68-88 MHz and 112-136 MHz with a channel spacing of 25 kHz and has six switched channels. The equipment can be adapted to suit 12 or 24 volt d.c. battery supply on most road vehicles or it can be used as a fixed station (FGRI 26029/2A) using an a.c. power supply unit.

The radio telephone equipment is designed for operation in all climates and meets the relevant G.P.O. Specifications.

On the transmitter/receiver unit connections are provided to aerial, operators control unit and vehicle battery. On the control unit connections are provided from the rear of the unit to T/R handset assembly and loud-speaker unit, with the exception of press-to-talk switch which is on the handset, all the operators controls are fitted on the control unit.

ORIGIN Pye (AMLOB)

TECHNICAL DATA

Frequency range	68-88 MHz (10D/9444306) or 112-136 MHz (10D/9542774)
Channel spacing:-	25 kHz

RECEIVER

Sensitivity:-	1 μ V. emf signal input for 0.5 watts output.
Signal/noise ratio:-	12 dB for 2 μ V. emf. signal input.
Intermediate frequencies	1 st i.f. 10.7 MHz 2 nd i.f. 455 kHz.
Audio output:-	Greater than 1 watt with less than 10% distortion.
Squelch sensitivity:-	Operates with 0.5 μ V. emf signal input when preset to threshold setting.

TRANSMITTER

RF output:-	7 watts (nominal)
Modulation:-	High level amplitude modulation

DIMENSIONS

	Height	Width	Depth
Transmitter-receiver, radio (see above, under freq. range)	5.75 in. (145mm)	9.4 in. (240mm)	14.25 in. (360)
Control (radio set) (10L/9508918)	1.85 in. (50mm)	6.75 in. (170mm)	3.625 in. (90mm)
Loud-speaker (10V/9444305)	3.625 (90mm)	5.625 (140mm)	2.625 (65mm)
Power supply unit (FGRI) (10K/9542576)	4.25 (110mm)	12.25 (310mm)	5.5 (140mm)

WEIGHTS

Transmitter-receiver, radio	15.6 lb.
Control (radio set)	1.5 lb.
Loudspeaker	1 lb.
Power supply unit	12.25 lb.
Aerial (fixed) (10B/1061973)	8 lb.

Note:-

Aerial whip:- 68-88 MHz - (10B/1072301)
112-136 MHz - (10B/1073734)

POWER SUPPLY REQUIRED

12 or 24 volts d.c. vehicle battery supply.
Positive ground, negative ground, or floating supply
or
210-250V a.c. for a.c. power unit.

Power consumption (nominal)	12 volt supply	24 volt supply
Receive	0.34 A	0.35 A
Standby	1.5 A	1.1 A
Transmit	4.5 A	2.5 A

CRYSTAL INFORMATION

RECEIVER:- First local oscillator:-

Carrier frequency	Crystal frequency	Crystal Spec. No.
68-88 MHz	<u>carrier - 10.7 MHz</u>	P28C
	2	
112-136 MHz	<u>carrier - 10.7 MHz</u>	P29/C
	3	
Second local oscillator		P53J

Note:-

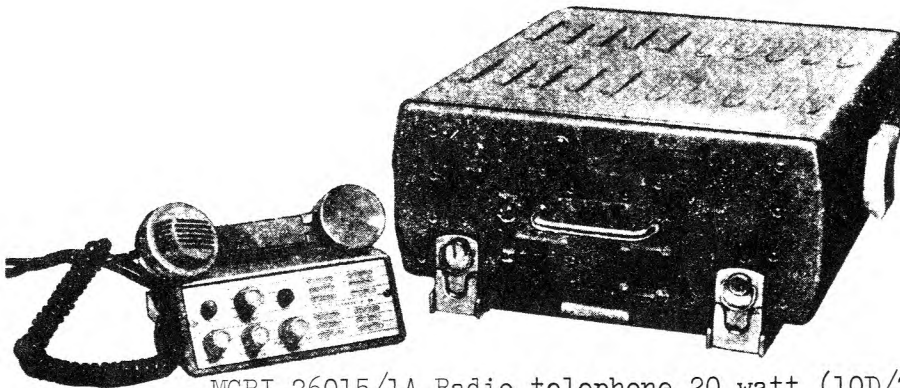
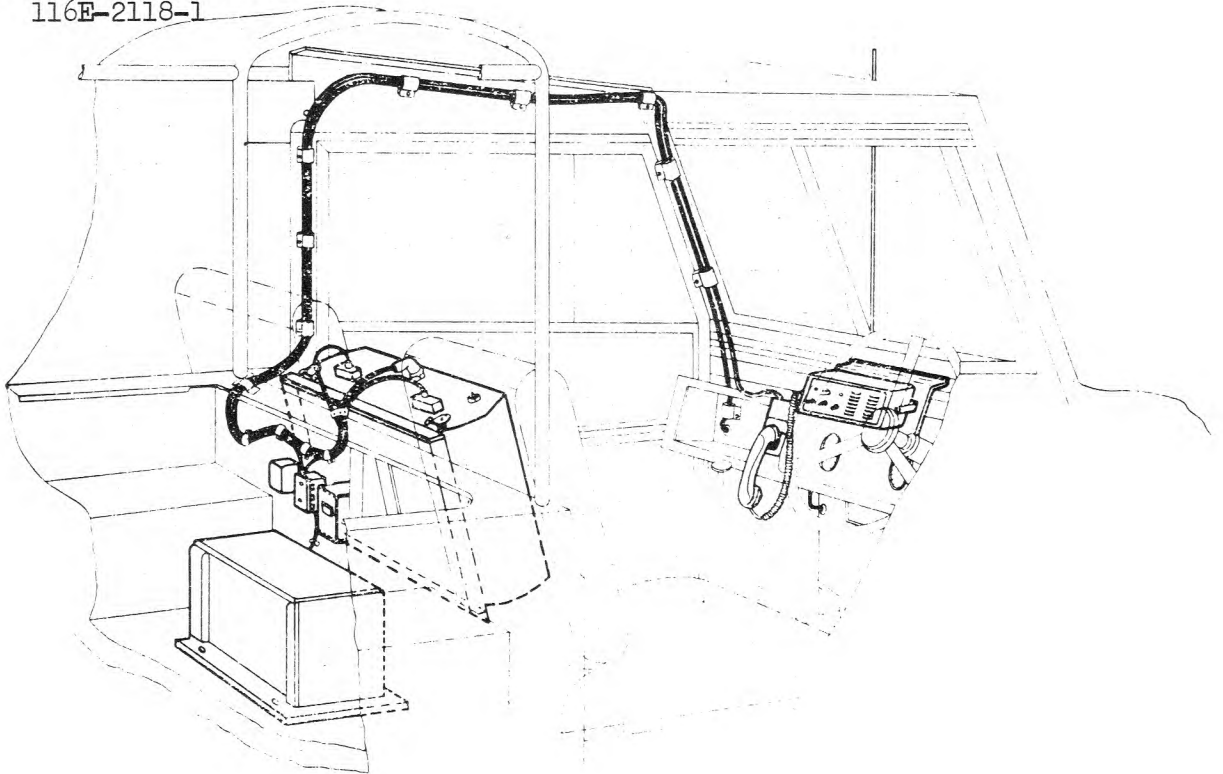
Use of a crystal of any other frequency may result in heterodynes on one or more channels.

TRANSMITTER

Carrier frequency	Crystal frequency	Crystal Spec. No.
68-88 MHz	<u>Carrier</u> MHz 8	P19
112-136 MHz	<u>Carrier</u> MHz 12	P18

RADIO TELEPHONE 20 WATT VHF. MGRI 26015/1A
(68-88 MHz) PYE PTC 6/2207V (10D/23976)

RELEVANT PUBLICATION
116E-2118-1



MGRI 26015/1A Radio telephone 20 watt (10D/23976)

FUNCTION

Medium range 6 channel v.h.f. and a.m. mobile radio telephone for use in cars, ambulances and passenger/cargo vehicles.

ORIGIN

PYE (PTC 2207V)

GENERAL DESCRIPTION

The MGRI.26015/1A (10D/23976) is a 6-channel, v.h.f. a.m. mobile radio telephone installation working from 12-volt battery supply. The equipment operates in the frequency band 68-88 MHz with a minimum channel spacing of 20 kHz and a maximum of 30 kHz, the six channels are confined to a small chosen area of the band. The control unit includes a built-in loudspeaker, while the handset is fitted with a press-to-transmit switch.

TECHNICAL DATA

Frequency range:- 68-88 MHz
Channels:- 6 crystal controlled preset channels.
Channel spacing 20-30 kHz.
Crystals:- 1D XDL type

Transmitter

Power output:- 20 watts
Modulation:- Amplitude modulation
Microphone :- Electro-magnetic
Aerial, Type:- 10B/947025

Receiver

Sensitivity:- Output approximately 1 watt for an input of 2 μ V
Signal-to-noise ratio 14 dB.
Squelch:- Adjustable
Noise limiter:- Series type to suppress ignition interference.

DIMENSIONS

	Height	Width	Depth
Transmitter-receiver unit radio Type S7/1 (10D/9331326)	18.5 cm (7 $\frac{1}{4}$ in.)	38.5 cm (15 1/8 in.)	51.5 cm (20 $\frac{1}{4}$ in.)
Mounting assembly (10J/1734)			
Control Unit radio set (incl. Handset) Type 525/1 (10L/9331289)	8.3 cm (3 $\frac{1}{4}$ in.)	23 cm (9 in.)	10.5 cm 4 1/8 in.)

WEIGHTS

Transmitter-receiver unit radio, Type S7/1 (with mounting assembly)	17.3 kg (38 lb.)
Control unit, radio set (including handset, Type S25/1)	1.8 kg (4 lb.)

POWER SUPPLY REQUIREMENTS

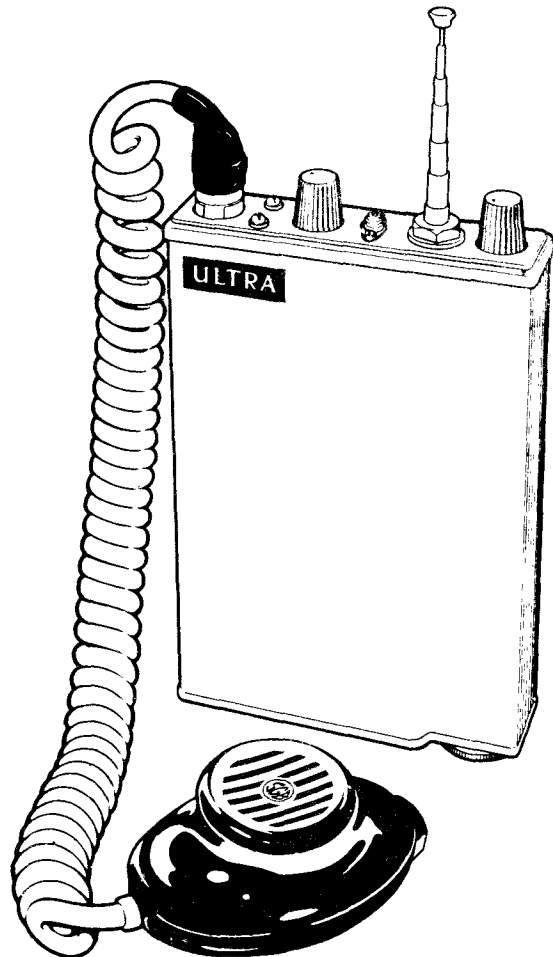
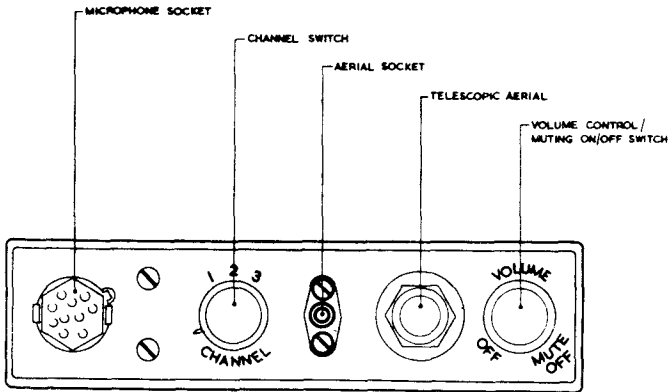
12 volts d.c.

Receive 4A
Standby 5.5A
Transmit 13.8A

VHF LIGHTWEIGHT RADIO-TELEPHONE PACKSET
(Intrinsically-safe, Ultra 13A4/AB3/IS)
10D/5820-99-112-1407, MGRI 23222/1

RELEVANT AIR PUBLICATION

116E-1909-16



VHF Packset - MGRI 23222/1 (Ultra 13A4/AB3/IS (Telescopic aerial))

FUNCTION

The v.h.f. packset provides two way (simplex) communication between either two or more packset or a packset and a base station. The packset can be carried in hand, in a pocket, or hung from a strap, slung over the shoulder in a special harness.

GENERAL DESCRIPTION

These pre-determined switched (transmit and receive) operating frequencies within the band 68-88 MHz are provided. Crystal control is applied to both the receiver and transmitter oscillators. The unit is powered by an internal re-chargeable nickel cadmium battery. An electro magnet hand unit combines the function of loudspeaker and press-to-transmit switch and microphone. A telescopic aerial or alternatively a wire aerial via a co-axial connector on the unit may be used. When signal is not being received the background noise level is reduced by muting circuits, but with the volume operated to the maximum position, muting circuits are rendered inoperative.

The packset is designed to be used in environments containing flammable products such as petroleum and high octane fuels and it conforms to BS.1259 - 1958 specifications.

Note:

This packset outwardly is similar to MGRI.23155/1, but MGRI.23155/1 is NOT intrinsically safe to use and therefore must not be used in place of MGRI.23222/1.

ORIGIN ULTRA 13A4/AB3/IS

TECHNICAL DATA

Frequency range	68-88 MHz
Number of channels (transmitter and receiver)	3 each
Range (base to packset)	2-5 miles over open site 1-2 miles in built-up areas.

TRANSMITTER

Modulation	a.m. 90-100% depth Distortion at 90% not greater than 8%.
Output power	200 mW
Channel spacing	25 kHz or 50 kHz.

RECEIVER

Sensitivity	2 μ V for signal and noise to noise ratio of 10 dB.
Intermediate frequency	10.7 MHz.
Audio frequency bandwidth	350-1800 Hz.
Output power	100 mW.
Aerial impedance	50 ohms.

POWER SUPPLY REQUIRED

15 volt nickel-cadmium rechargeable battery with a capacity of 225 mA/hour. (The battery should be charged at constant current rate of 20 mA maximum for 14 hours - Battery charger 6130-99-109-8992, AP 120C-0105-1). This is an intrinsically safe fused battery contained in a red translucent sleeve, reference No.6140-99-111-2650, (B43111-054-0).

DIMENSIONS

Length	Width	Depth
190 mm (7 $\frac{1}{2}$ in.)	127 mm (5 in.)	31.8 mm (1 $\frac{1}{4}$ in.)

WEIGHT 1.36 kg (3 lb).

Sub-assembly reference numbers

Transmitter-receiver 10D/5820-99-112-9077

Aerials

Wire aerial assembly comprising

Wire	14/.0076 p.v.c covered copper wire (grey) 6145-99-942-4109
Co-axial plug	5935-99-955-6088
Adaptor	5935-99-954-3956
Bushing	5340-99-955-6092
Plug	5935-99-950-8980

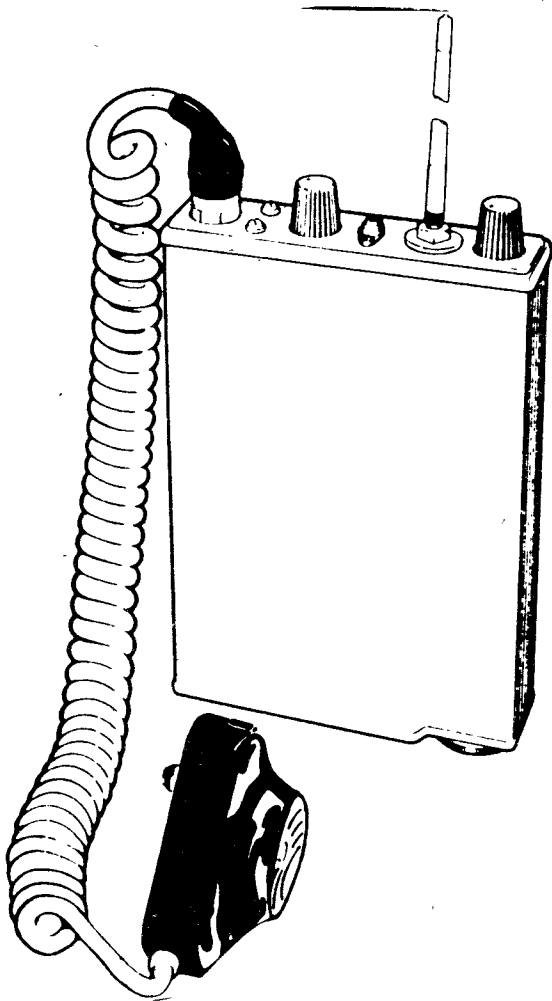
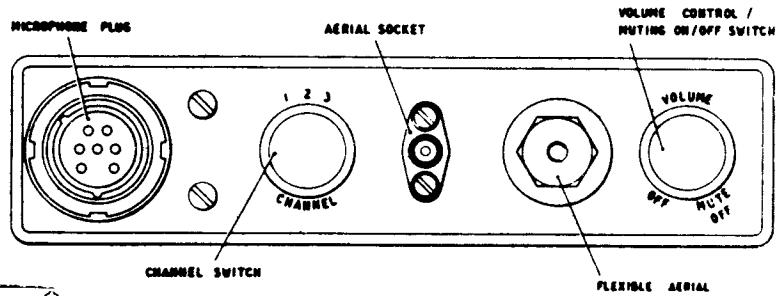
or

Telescopic aerial

Microphone magnetic (red back) (with push to transmit switch)	5820-99-115-8583
------------------------------------------------------------------	------------------

VHF LIGHTWEIGHT RADIO-TELEPHONE PACKSET
(ULTRA - 3A4-A23)
(5820-99-951-4054, MGRI.23155/1)

RELEVANT AIR PUBLICATION
116E-1906-16



VHF packset-MGRI.23155/1 (Ultra 3A4-A23) (Flexible aerial)

FUNCTION

The packset is designed to provide two way communication either between individual packsets or between one packset and a base station on any one of three switched crystal controlled channels in the frequency range of 68-88 MHz.

GENERAL DESCRIPTION

The v.h.f., a.m. lightweight packset MGRI.23155/1, 5820-99-951-4054 is a combined transmitter receiver for two way communication. The packset can be operated via the channel selection switch on any one of three channels. To transmit, the microphone press-to-talk switch is operated and to speak microphone is held at a distance of not more than six inches. The packset can be carried in hand, in a pocket or strapped to the back in a special harness. The unit is powered by an internal rechargeable nickel-cadmium battery. Crystal control is applied to both the receiver and transmitter oscillators. A flexible aerial is screwed into a threaded connector or alternatively a wire aerial is plugged into a co-axial connector. With the volume at half level when a signal is not being received the background noise level decreases appreciably (with the switch at maximum gain position, the muting circuits are rendered inoperative).

Outwardly this unit is similar to packset MGRI.23222/1 but must never be used in place of MGRI.23222/1. This packset has an addition facility to allow the use of a standard microphone/telephone head-set with the aid of a mic/tel adaptor cord assembly (5820-99-112-7524) which has a N.A.T.O. jack socket (not compatible with MGRI.23222/1) and a press-to-speak cord-switch, this facility is for use in environments of high ambient noise levels.

TECHNICAL DATA

Frequency range	68-88 MHz
Number of channels	3
Crystal frequencies	
Receiver	13.600 to 17.600 MHz
Transmitter	Overtone crystals at signal frequency
Range (base to packset)	2-5 miles over open site 1-2 miles in built up areas.

TRANSMITTER

Modulation	Amplitude modulation 90-100% depth. Distortion at 90% not greater than 8%.
RF Output power	200 mW
Channel spacing	25 kHz or 50 kHz.

RECEIVER

Sensitivity 2 μ V for signal and noise to noise ratio of 10 dB.
Intermediate frequency 10.7 MHz.
Audio frequency bandwidth 350-1800 Hz.
AF Output power 100 mW
Aerial impedance 50 Ω .

Aerials

Flexible whip aerial 75 MHz (blue marker sleeve) 5820-99-112-8661
or
Flexible whip aerial 85 MHz (yellow marker sleeve) 5820-99-119-0072.
(Normally used with equipments employed by mountain rescue teams)
or
Wire aerial comprising:-
Wire 14/.0076 p.v.c. covered copper wire (grey)
Co-axial plug
Adaptor
Ball
Plug

POWER SUPPLY

15 volt., rechargeable battery with a capacity of 225 mA/hours.
(To be recharged at constant current rate of 20 mA for 14 hours
AP 1200-0105-1).

DIMENSIONS

Length	Width	Depth
190 mm (7 $\frac{1}{2}$ in.)	127 mm (5 in.)	31.8 mm (1 $\frac{1}{4}$ in.)

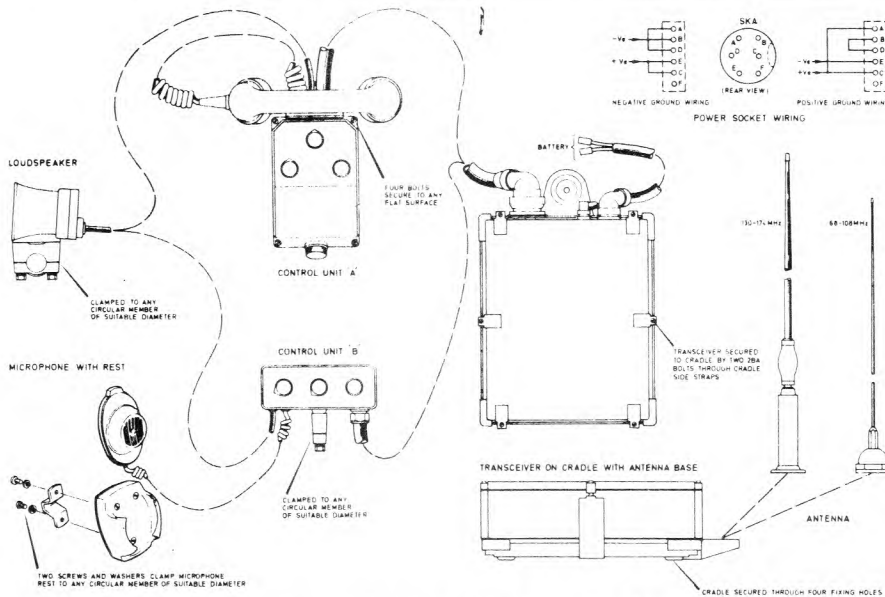
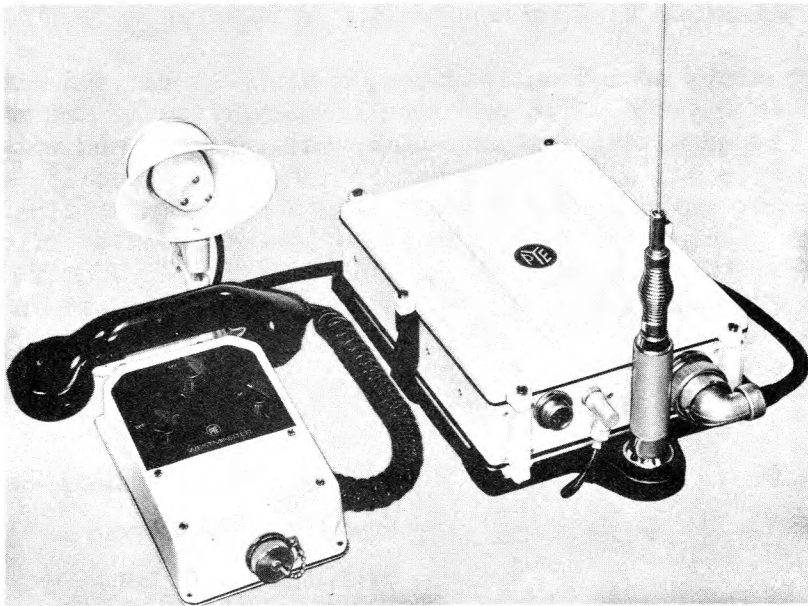
WEIGHT 1.36 kg (3 lb)

Sub-assembly reference numbers

Transmitter-receiver. 10D/5820-99-971-1855
Mic/tel adaptor cord assembly with socket (optional) 5820-99-112-7524
Battery type 225 DXZ Deak (GB) Ltd.,

MGRI.23221/1 MOTOR-CYCLE VHF RADIO TELEPHONE
 (PYE type W15 AM - 5W)

RELEVANT AIR PUBLICATION
 116E-2123-16



VHF a.m. 5W radio-telephone (Pye W15 AM) - MGRI.23222/1

FUNCTION

Designed for communication between mobile units and a base station.

ORIGIN

Pye Co. Ltd., type W15 AM.

GENERAL DESCRIPTION

The MGRI.23221/1 is an amplitude-modulated v.h.f. radio telephone with a transmitting power of five watts on fixed frequencies in the range 68-174 MHz using either single or two frequency simplex working; channel spacing can be preset at 12.5 kHz, 20/30 kHz to 40/60 kHz. Optional features are multiple channels up to a maximum of 10 channels (3,6 or 10).

The equipment consists of a transreceiver, a control unit and microphone, a loudspeaker and an antenna. Two versions of control units are made. The larger unit is fitted with a pre-amplifier board and handset with rest. The smaller unit is provided with a fist microphone, both types are fitted with a press-to-transmit switch. The function and controls are identical for both units. The radio-telephone is designed to work from a 12V d.c. supply using either positive or negative ground. External 6V/12V or 24V/12V converter units are available. All units are energized, dust and weather-proof. All channels are individually inductively trimmed overtone crystal oscillator controlled.

TECHNICAL DATA

TYPE OF SERVICE	A3; single or 2 frequency simplex
FREQUENCY BANDS	68-88 MHz E band 79-101 MHz P band 88-108 MHz D band 112-136 MHz C band 132-156 MHz B band 148-174 MHz A band
CHANNEL SPACING	1.5 kHz (S) or 20/30 kHz (V) or 40/60 kHz (N)
CHANNELS (options)	Up to 10 channel operation (3,6 or 10)
RECEIVER	
Sensitivity	500 mW for 0.5 μ V (p.d.) signal input modulated 30% at 1000 Hz.
Audio output	2 watts with less than 10% distortion
Spurious response attenuation	
2 Crystal filter	Better than 85 db except 2nd image (70 db)
4 Crystal filter	Better than 85 db.
Squelch	Electronic - adjustment threshold setting down to 0-3 μ V (p.d.)

Intermediate frequency

1 st	10.7 MHz
2 nd	455 kHz.
Current consumption	200 mA

TRANSMITTER

Power output	5 watts minimum
Spurious outputs	Less than 2.5 μ W at antenna socket
Modulation	Within ± 3 db between 300 Hz and 3000 Hz relative to 1000 Hz.
Current consumption	1.5A.

POWER SUPPLY

- 1) 12V d.c. nominal
- 2) 6V d.c. nominal (with optional 6V/12V converter unit)
- 3) 24V d.c. nominal (with optional 24V/12V converter unit)

Positive or negative ground conditions obtained via appropriately wired socket. A polarity protection facility is included so that if the leads are reversed the equipment will not switch on.

OPERATING TEMPERATURE RANGE

-30°C to +60°C ambient

DIMENSIONS

	Width	Depth	Height
Main unit	279 mm (11 in.)	229 mm (9 in.)	82 mm (3 $\frac{1}{4}$ in.)
Speaker unit	127 mm (5 in.)	50 mm (2 in.)	76.2 mm (3 in.)
Control unit B	146 mm (5 $\frac{3}{4}$ in.)	83 mm (3 $\frac{1}{4}$ in.)	57 mm (2 $\frac{1}{4}$ in.)
Control unit A (if required)	114 mm (4 $\frac{1}{2}$ in.)	203 mm (8 in.)	73 mm (3 in.)

WEIGHT

Main unit	4.3 kg (9 $\frac{1}{2}$ lb)
Speaker unit	0.73 kg (1 lb. 10 oz)
Control unit B	0.73 kg (1 lb. 10 oz) (less microphone)
Control unit A (if required)	1.5 kg (3 $\frac{1}{4}$ lb) (with handset)

MGRI 23160-LOUDHAILER
10U/5830-99-952-2736

RELEVANT AIR PUBLICATIONS
116N-0601-1

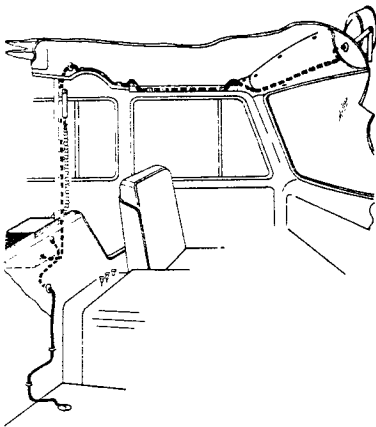


Fig. 2. Installation of MGRI.23160 in van.
passenger/cargo

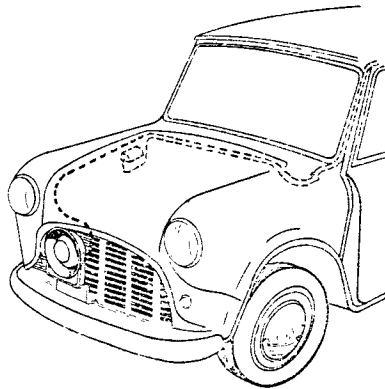
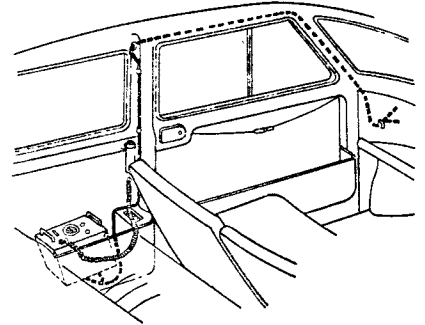


Fig. 1. Installation of MGRI.23160 in car, light, 5 cwt.



Loudhailer and associated parts- MGRI 23160.

FUNCTION

The loudhailer is designed for mounting in small mechanised ground transport vehicles. The loudhailer consists of an amplifier, hand-held microphone and a permanent magnet loudspeaker.

ORIGIN Lustraphone.

TECHNICAL DATA

POWER OUTPUT 10 watts (a.f.)

SUB-ASSEMBLIES

Amplifier, a.f. 10U/9522239
Loudspeaker, permanent magnet 10U/9522231
Microphone, dynamic 10AH/9522241
Lead, Microphone extension 10HG/9522292
Lead, electrical 10HG/9522291

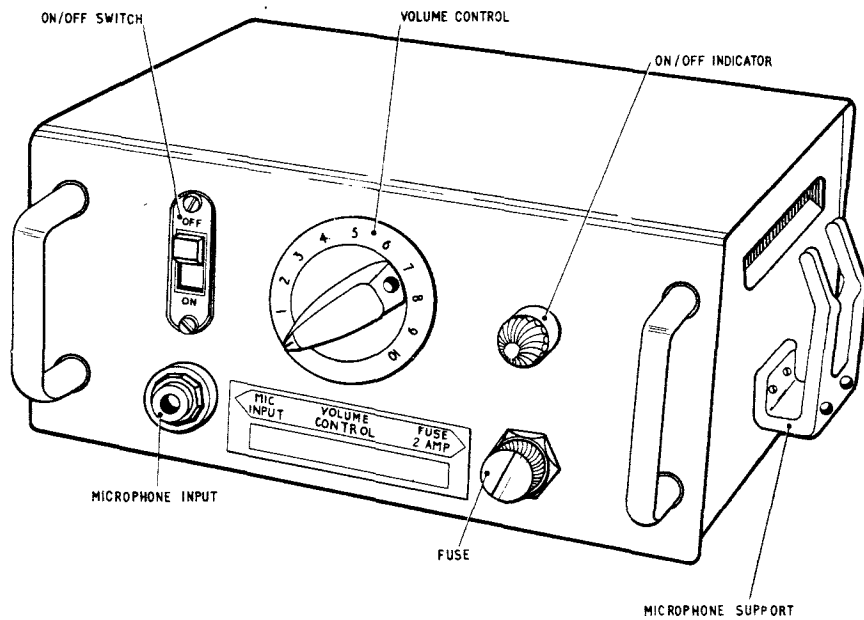
POWER SUPPLIES REQUIRED

12V d.c. at 1.7A to 1.8A
24V d.c. at 0.65A to 0.75A

DIMENSIONS

	Height	Width	Depth
Amplifier	101 mm	203 mm	165 mm

WEIGHT 2.3 kg



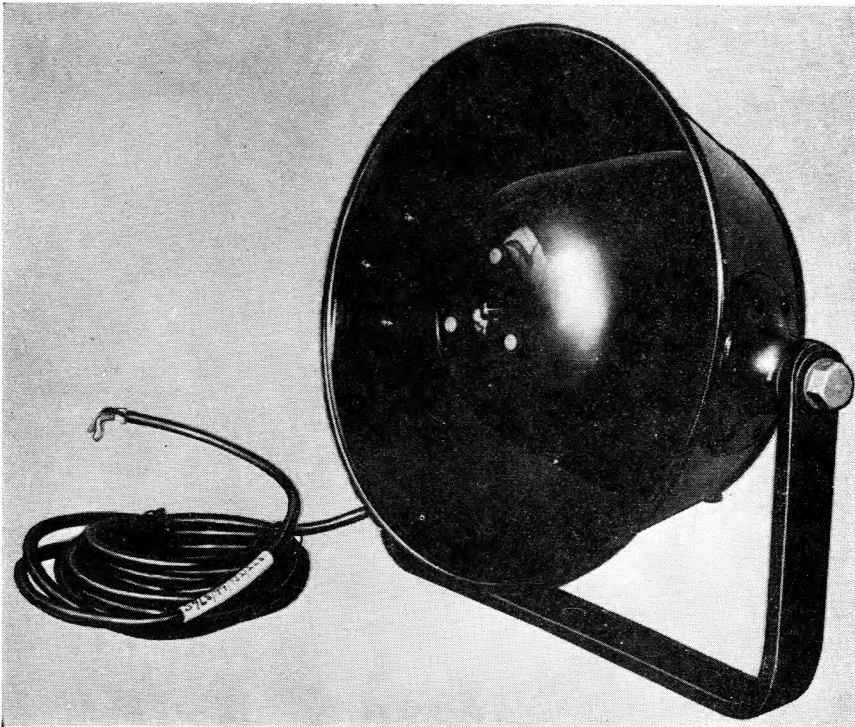


Fig. 3. Loudspeaker, permanent magnet



Fig. 4. Microphone and lead assemblies for MGRI.23160

SECTION 3

**TRANSPORTABLE GROUND RADIO
INSTALLATIONS (TGRI)**

Sheet No. 2

VHF./F.M. WIRELESS STATION C42

TGRI 18153

Relevant publications:—

A.P.116E-2110-1
(formerly A.P.2541F, Vol. 1)

Function

A transportable ground radio installation employing the Army Wireless Set C42. It is used mainly for aerodrome defence by the R.A.F. Regiment.

Brief description

The Army Wireless Set C42 is a pan-climatic v.h.f. voice-modulated f.m. transmitter-receiver. The installation, with the exception of the aerial and batteries is contained in a single packing case. In addition to the above items the installation contains a power supply unit, a 2-watt amplifier, three picket-mounted loudspeakers, an aerial tuning unit, a junction box J1, a handset and headset. Remote control operation is permitted with the use of the handset.

Frequency range

36 to 60 MHz (8.3 to 1.6 metres).

Intermediate frequency

6 MHz and 2.4 MHz.

Frequency control

Automatic (deviation ± 15 kHz).

Channels

241 spaced at 100 kHz intervals.

Transmitter output power

15 watts (*high power*).
0.3 to 1 watt (*low power*).

Receiver sensitivity

1.25 μ V for 10dB signal to noise ratio.

Receiver output

150 mW into 50 ohms.

Aerial system

Rod, antenna, Type F. Mk. 2.

Power supplies

24V d.c. from lead acid, secondary batteries, Mk. 2,
12V. 75 AH (2 off).

Power consumption

180 watts (Wireless Set C.42).

Main items of installation

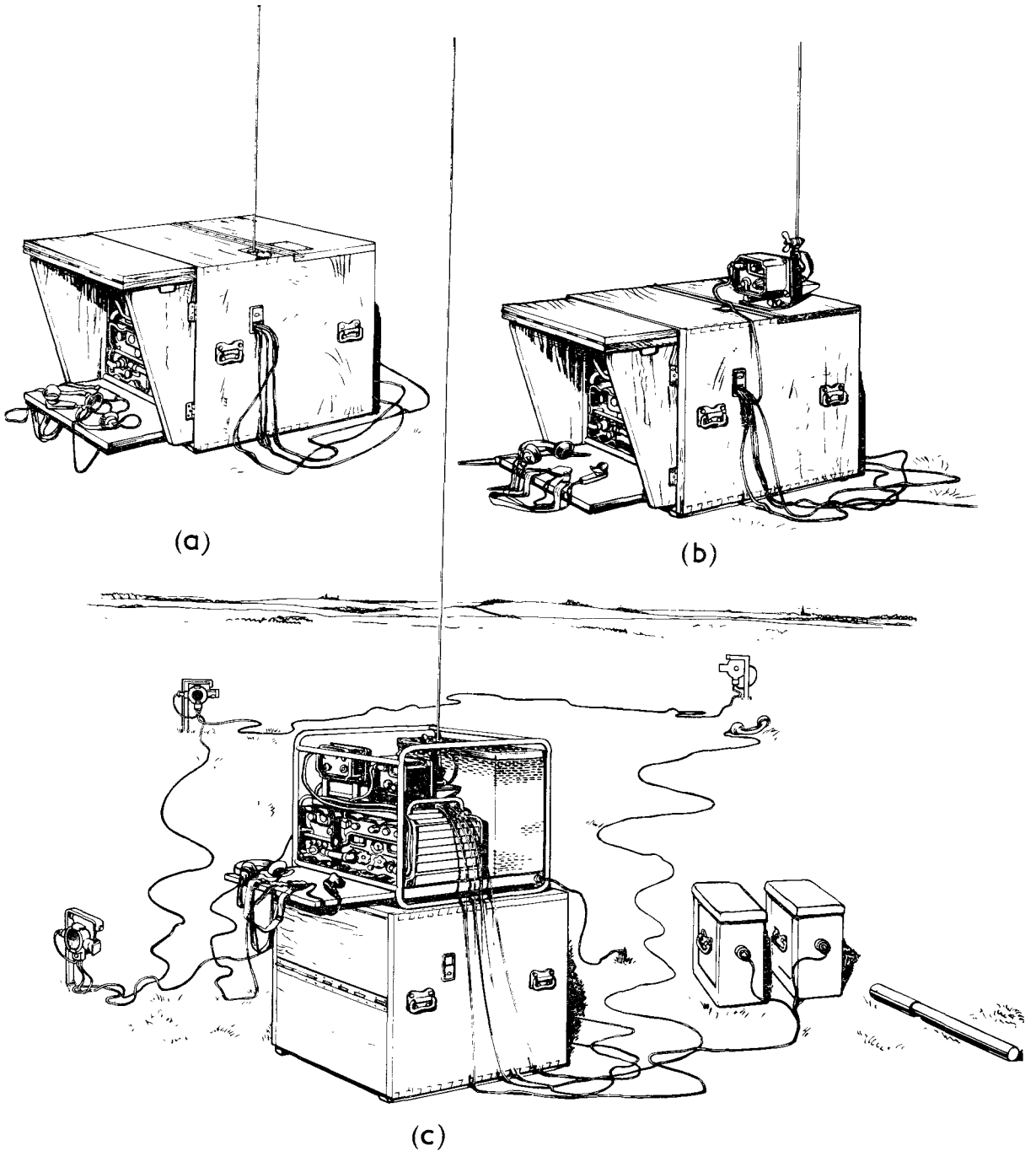
Wireless Set, C.42. (Z1/5820-99-943-9362)
Supply unit, vibratory No. 12 (24V power units)
Amplifier, AF, 2 watt sealed No. 1 (24V)
Aerial tuning unit, No. 6
Junction Box J.1
Rod, antenna, Type F. Mk. 2. Sect. 2
Rod, antenna, Type F. Mk. 2. Sect. 3
Carrying case, No. 2
Lead, acid, secondary battery, Mk. 2 (2 off)
Earth pin, No. 1.
Transit assembly containing:—
Wooden packing case
Tubular frame assembly
Waterproof moving coil loudspeakers (3 off)
Connectors
Remote control telephone handset S.1
Crew headset
Aerial base Type 28.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Wireless set, C.42</i>	8½ in (21.6cm)	1ft 2¼ in (36.2cm)	1ft 2½ in (36.8cm)
<i>Supply unit, vibratory No. 12</i>	8½ in (21.6cm)	8½ in (21.6cm)	1ft 2¼ in (36.2cm)

Weight

Wireless set, C42 45 lb (20.4 kg).



TGRI.18153 showing three methods of deployment

ARMY WIRELESS SET BE 201

TGRI. 26025/1

Relevant publications:—

A.P.116E-2107-1

(formerly A.P.2524M, Vol. 1)

Function

A transportable ground v.h.f. radio installation employing the Army Wireless Set BE 201. It is used for ground-to-air R/T communication. It can be used as a man-pack station (four men) or as a vehicle installation.

Brief description

The Army Wireless Set BE 201 is a splash proof, amplitude-modulated v.h.f. R/T transmitter-receiver. The installation also includes a power supply unit, a dipole aerial assembly, microphone and headset, batteries and a charging set.

Separate man-pack carriers are provided for the transmitter-receiver, the power unit, the charging set and the battery.

Frequency range

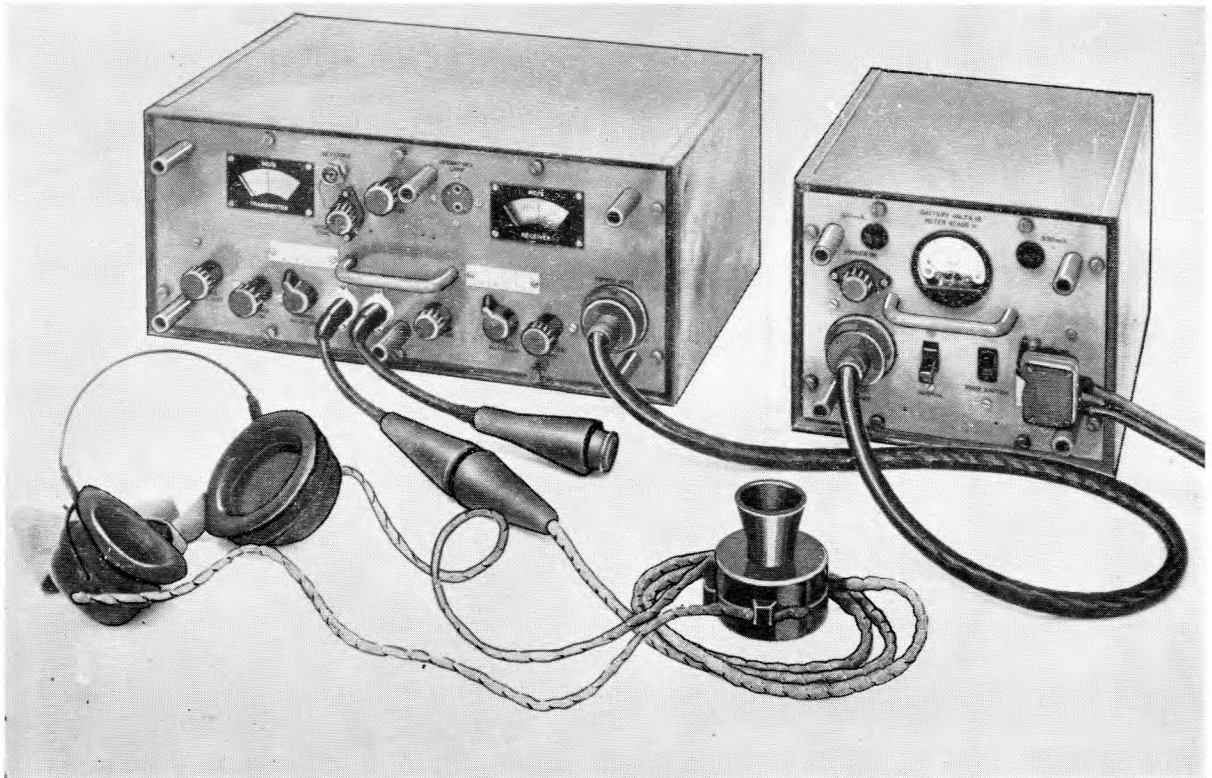
100 to 156 MHz (3 to 1.92 metres).

Frequency control

Crystal (any one of four plug-in crystals selected by a switch).

Channels

Any four channels in the frequency range, determined by crystals.

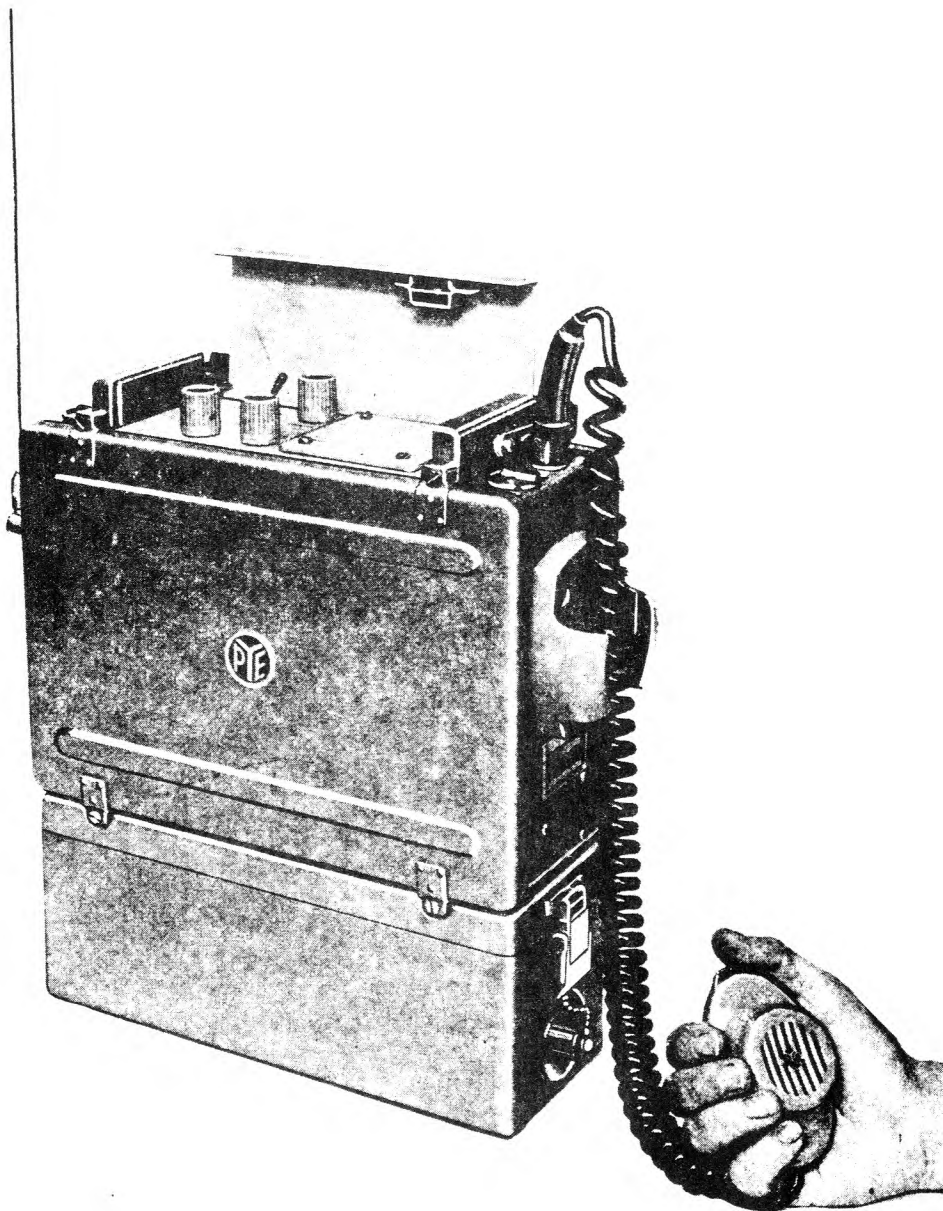


Army wireless Set BE 201

Intermediate frequency	9.72 MHz.			
Transmitter output power	4.5 watts.			
Range	50 miles (approx.) (80.5km) with aircraft at 5,000ft (1520 m).			
Receiver sensitivity	5 μ V for 1 mW output.			
Aerial systems	Vertical half-wave dipole (pole or tree mounted). Vertical quarter-wave rod (vehicle mounted).			
Power supplies	12V d.c. (from 75 AH lead-acid, secondary batteries).			
Power consumption	<i>Transmit</i> 12.5A. <i>Receive</i> 6A.			
Main items of installation	Wireless Set, BE 201 (Z1/5820-99-949-0418) Power supply unit No. 42 Aerial, dipole, No. 24 Aerial feeder No. 1 (27 ft) Antennae rods G Connectors, coaxial No. 11 Microphone and headgear assemblies No. 10 Batteries, secondary, portable, 12V (22 AH and/or 75 AH) Charging set, lightweight, 80W, 18V Spare valves.			
Overall dimensions		<i>Height</i>	<i>Width</i>	<i>Depth</i>
	<i>Wireless set BE 201</i>	7½in (19 cm)	1ft 5in (43.2 cm)	1ft 1½in (34.3 cm)
	<i>Power Supply Unit No. 42</i>	7½in (19 cm)	9in (23 cm)	1ft 1in (33 cm)
Weights	<i>Wireless set BE 201</i>	30 lb (13.6 kg)		
	<i>Power supply unit No. 42</i>	24 lb (10.9 kg)		

RADIO TELEPHONE PACK SET, 7-WATT, VHF
TGRI 26044/1A (PYE AMLOP)

RELEVANT PUBLICATIONS
116E-1904-1



TGRI 26044/1A - Radio telephone packset, 7 Watt, VHF (PYE AMLOP)

FUNCTION

Medium range packset for mobile air movement and mountain rescue teams.

GENERAL DESCRIPTION

The TGRI 26044/1A (Pye AMLOP) is a 7 watt VHF man-portable packset operating in the band 68-88 MHz. There is a choice of six fixed frequency channels each spaced 25 kHz apart and is used primarily by mobile air movement and mountain rescue teams to communicate with their parent stations. The radio telephone is a portable version of the Pye 'Cambridge' series with detachable battery compartment and an inbuilt loudspeaker panel. The unit can operate on one set of batteries up to a maximum of 30 hours (receive only) depending on the transmit/receive operating ratio. The transmitter section uses transistors in the a.f. and oscillator stages and two quick-heat valves in the final r.f. stages.

ORIGIN

Pye AMLOP, (10D/9560223- Tx and Rx only)

TECHNICAL DATA

Maximum line-of-sight range:- 5 miles

Frequency range: 68-88 MHz

Channels:- 6 channels spaced 25 kHz apart

RECEIVER

Sensitivity:- 0.5 μ V signal input for
0.5 watts audio output

Signal/noise ratio:- 12 dB for 2 μ V signal input

Intermediate frequencies:- 1 st i.f. - 10.7 MHz
2 nd i.f. - 455 kHz

Audio output:- 1 watt with less than 10% distortion
2 watt maximum.

Squelch sensitivity:- Adjustable to operate with signal
inputs between 0.5 μ V and 5 μ V.

TRANSMITTER

RF output:- 7 watts (nominal)

Microphone:- Moving coil (with press-to-talk switch).

POWER SUPPLY REQUIRED

2 x 6 volt, 6A rechargeable (via a socket) nickel cadmium batteries (FB-10256-battery), (Alternatively an external supply can be used).

Power consumption

Receive:- 200 mA

Transmit:- 3.5A

DIMENSIONS

Height	Width	Depth
44.5 cm (17.5 in.)	39.4 cm 15.5 in.)	11.7 cm (4.625 in.)

Weight 10 kg (22 lb.)

SECTION 4

**TRANSPORTABLE GROUND RADIO
INSTALLATIONS
(AIR TRANSPORTABLE) (TGRI(AT))**

Sheet No. 2

V.L.P./M.F. BEACON
(TRANSPORTABLE)

TGRI. (AT) 23123

Relevant publications:—

A.P.116C-0707-1
(formerly A.P.4803B, Vol. 1)

Function

TGRI(AT)23123 is a transportable pack-set station designed to provide a very low power m.f. fixed automatic locator beacon and route marker. It is keyed by a self-contained unit, and includes automatic monitoring. The installation is transported in eight cases.

Origin

Redifon Ltd., Type T.G.142R.

Frequency range

200 KHz to 420 KHz (1500 to 714 metres).

Frequency control

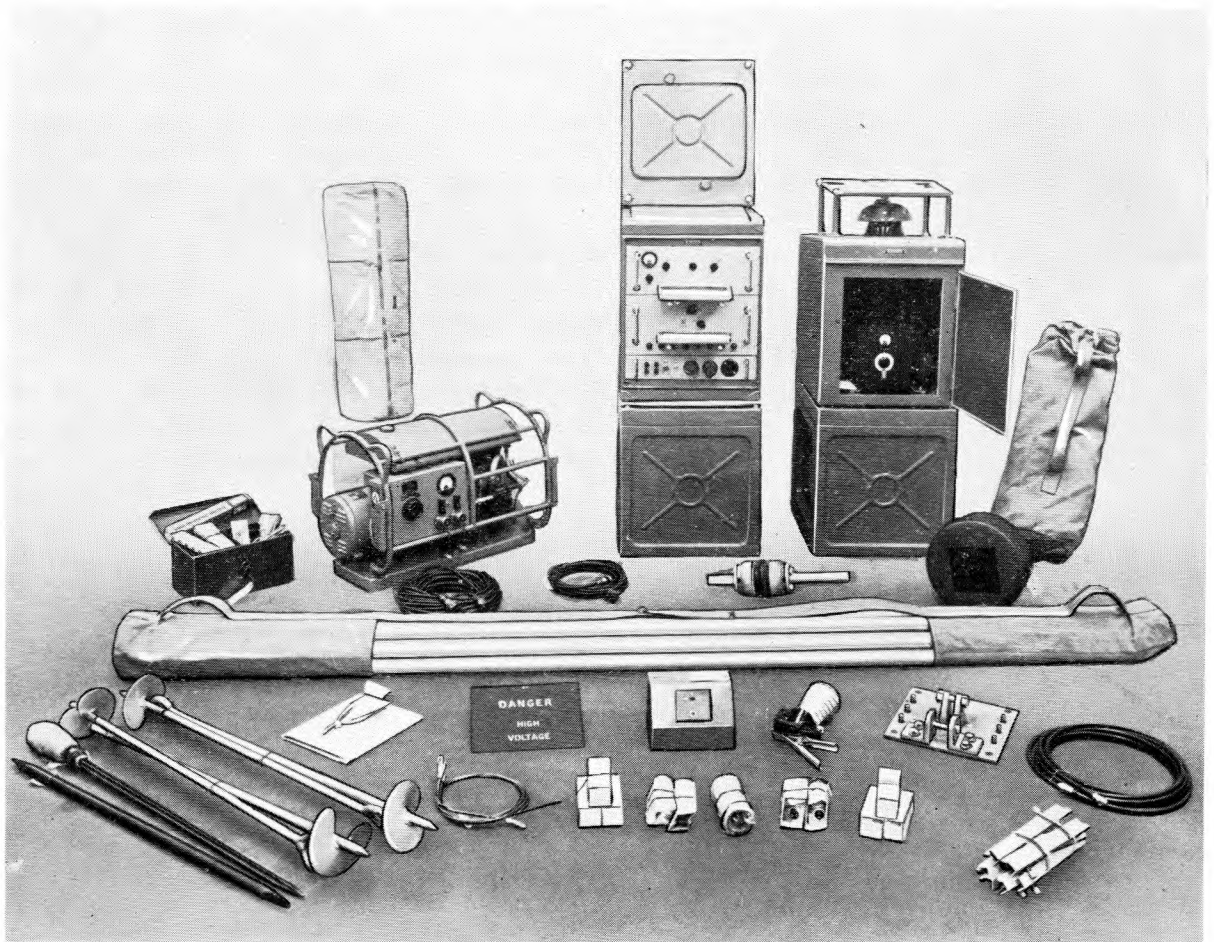
Crystal, single spot frequency.

Frequency stability

Within plus or minus 0.01 per cent between temperature limits of -10° C and $+50^{\circ}$ C and up to 100% relative humidity.

Modulation

50-85 per cent, at 400 Hz (dependent on frequency).



TGRI(AT)23123 equipment

Types of emission	A1 continuous wave (keyed carrier). A2 modulated continuous wave (keyed tone continuous carrier).			
Keying	<i>Manual</i> up to 40 w.p.m. <i>Automatic</i> 7 w.p.m.			
Output power	80 watts into aerial circuit. Full, half, quarter, one eighth, or one sixteenth power output may be selected.			
Aerial system	60 ft vertical aerial.			
Harmonic radiation and spurious emission	At least 45dB below carrier level.			
Tone frequency	400 Hz plus or minus 25 Hz.			
Power supplies	100-120 Volts or 200-240 Volts, 50 Hz, single-phase a.c.			
Power consumption (at 0.9 power factor)	520 VA.			
Main items of installation	Beacon set, radio, 5825-99-970-5664 Coupler aerial, 5985-99-970-9228 Aerial mast equipment, 5985-99-948-2483 Petrol electric generator, (42L/1500) Remote control unit, 5825-99-970-7630 Tent, 8540-99-948-3534 Tools and spares.			
Overall dimensions		<i>Height</i>	<i>Width</i>	<i>Depth</i>
	<i>Beacon set, radio</i>	2ft 8in (81.3cm)	1ft 9in (53.3cm)	2ft 0in (61cm)
	<i>Coupler aerial</i>	2ft 6in (76.2cm)	2ft 0in (61cm)	1ft 8in (50.8cm)
	<i>Remote control unit</i>	6½in (15.4cm)	9in (23cm)	5½in (12.8cm)
	<i>Petrol electric generator</i>	2ft 2in (66cm)	3ft 9in (114.2cm)	1ft 5¾in (45.1cm)
	<i>Tent (packed)</i>	2ft 0in × 7in diameter (61cm) (17.8cm)		
Weights	<i>Beacon set, radio</i>	200 lb (90.7 kg)		
	<i>Coupler, aerial</i>	60 lb (27.2 kg)		
	<i>Remote control unit</i>	6 lb (2.7 kg)		
	<i>Petrol electrical generator</i>	300 lb (131.1 kg)		
	<i>Tent (packed)</i>	5½lb (2.5 kg)		
	<i>Aerial mast equipment</i>	327 lb (148.4 kg)		
	<i>Aerial mast erection equipment</i>	169 lb (76.7 kg)		
	<i>Tools and spares</i>	28 lb (12.7 kg)		

V.H.F./U.H.F. GROUND STATION TGRI. (AT) 26000/1

Relevant publications:—

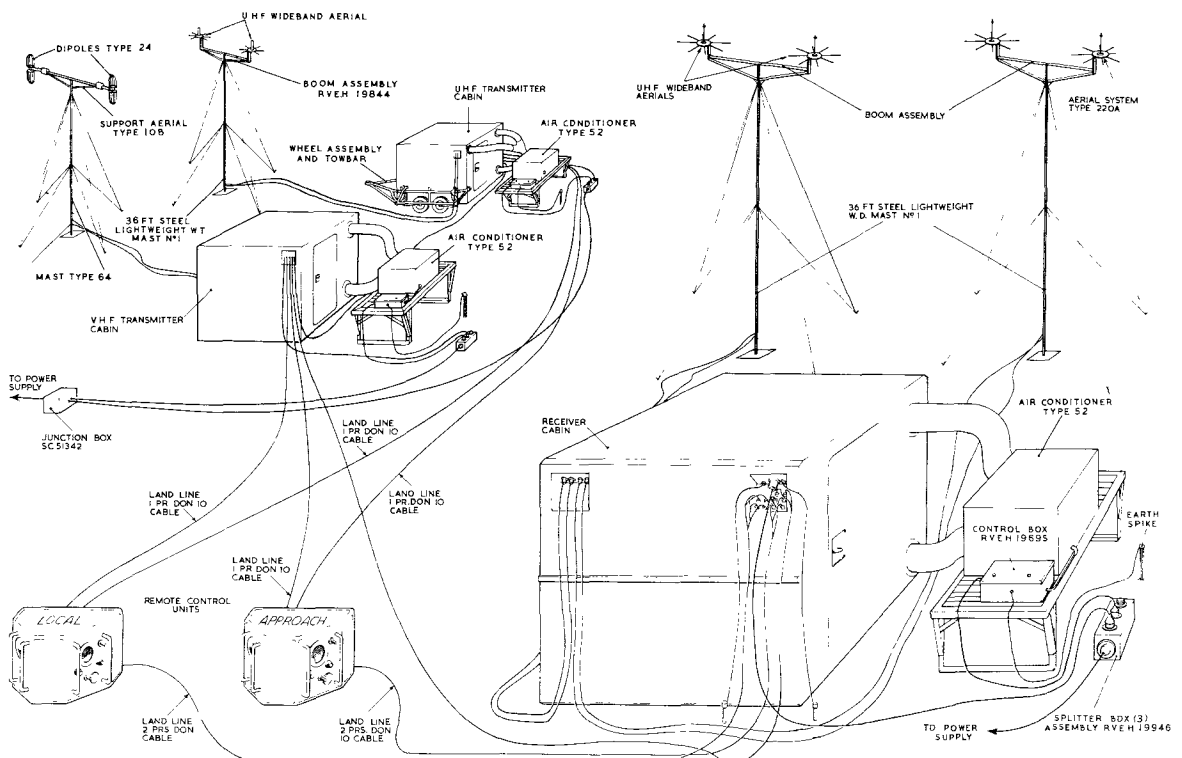
A.P.116K-0404-1
(formerly A.P.4725B, Vol. 1)

Function

A ground station for v.h.f. and u.h.f. ground/air radio communication, operating in either of two roles; (1) Supplementary in a Type U radar convoy for control and reporting purposes or (2) Air traffic control with two v.h.f. and two u.h.f. channels. When used in the radar convoy for control and reporting the receiver cabin and two transmitter cabins are interconnected with the RVT 510 mobile radar operations room. When used in the air traffic control role, the receiver and transmitter cabins are interconnected with local and approach remote control units. The installation was designed for transportation in Britannia 253 aircraft.

Brief description

The station comprises three cabins, cabin, radio transmitter, 5820-99-933-0824, housing v.h.f. transmitters, cabin, radio transmitter, 5820-99-933-0823, containing u.h.f. transmitters and cabin, radio receiver, 5820-99-933-0822, equipped with both v.h.f. and u.h.f. receivers, whilst an air conditioner platform (R.VEH/20830), provides transit stowage for air conditioner Type AC.52, 4120-99-943-3951 and associated equipment. Antenna and mast equipment is transit-stowed in the individual cabins, whilst power is



TGRI(AT)26000/1 equipment

derived from external sources according to role (See *Power Supplies*).

Frequency ranges

V.H.F. operation: 100 to 156 MHz (3 to 1.92 metres).
U.H.F. operation: 225 to 399.9 MHz (1.3 to 0.75 metres).

Channels

Two v.h.f.,
Two u.h.f.

Ground to air range

200 miles (322 km) for aircraft flying at altitudes up to 40,000ft (12.2 km).

Transmitter output powers

V.H.F. 35 watts.
U.H.F. 150 watts.

Receiver sensitivities

V.H.F. With a signal of 7 to 7.5 μ V modulated 30 per cent at 1000 Hz across 100 ohms, the output signal/noise ratio is 20dB.

U.H.F. With a signal of 1 μ modulated 30 per cent at 1000 Hz the signal/noise ratio at the output is greater than 10dB.

Aerial systems

V.H.F. Two dipole aerials Type 220A (10B/2454),
Two dipole aerials Type 24 (10B/2455).

U.H.F. Four u.h.f. wideband antennas, 5985-99-194-1707.

Power supplies

(1) *Control and reporting role:* 230V, 50 Hz single-phase a.c. supply from the Type U radar convoy power source spare capacity.

(2) *Air traffic control role:* 230V, 50 Hz single-phase a.c. supply derived from two radio vehicles Type 552 Mk. 3, one supplying the v.h.f. and u.h.f. receiver cabin and the other supplying power to both transmitter cabins. A suitable mains supply may be used as an alternative.

Power consumption

10 kVA for both roles.

Main items of installation

Cabin, radio transmitter, 5820-99-933-0824, is equipped with the transmitters and provides stowage for antenna equipment as follows:—

(1) Transmitters Type T.1131N (10D/22718), Qty. 2.

(2) Mast, aerial, Type 64 (10B/17128), Qty. 1.

(3) Dipole, aerial mast, Type 24 (10B/2455), Qty. 2.

(4) Support aerial, Type 108 (10B/17131), Qty. 1.

Cabin, radio transmitter, 5820-99-933-0823, is equipped with the transmitters and provides stowage for antenna equipment as follows:—

(1) Transmitters, radio, 5820-99-932-5691, (formerly T.7096, 10D/19225), Qty. 2, together with amplifiers, radio frequency, 5820-99-932-5691, (formerly amplifier Type A.7349, (10V/16658), Qty. 2.

(2) Mast, 36ft, steel (10B/ZA.46750/1), Qty. 1.

(3) Mast erection kit, (5985-99-102-3777), Qty. 1.

(4) Antenna, 5985-99-194-1707, Qty. 2 and support, antenna, 5985-99-933-1033, Qty. 1.

Cabin, radio receiver, 5820-99-933-0822, is equipped with the receivers and provides stowage for antenna equipment as follows:—

(1) Receiver, radio, 5820-99-932-5695, (formerly receiver Type R.7109, 10D/19231), Qty. 2, with cooler, dry air, electrical equipment, 5820-99-932-3995, Qty. 1.

Sheet No. 3 (cont'd)

- (2) Receiver, radio 5820-99-953-7424, (formerly receiver Type R.1392D, 10D/17745) Qty. 2, with power units, Type 234A (10D/17395), Qty. 2 and panel, Type 21A (10D/155), Qty. 1.
- (3) Amplifier assembly, 5820-99-933-1056 (four-channel line amplifier) Qty. 1.
- (4) Mast, 36 ft, steel (10B/ZA.46750/1), Qty. 2, with mast erection kit (5985-99-102-3777), Qty. 1.
- (5) Antenna, 5985-99-194-1707, Qty. 2.
- (6) Aerial system, Type 220A (10B/2454), Qty. 2.
- (7) Support, antenna, 5985-99-933-1033, Qty. 2.

Air conditioner platform (R.VEH/20830) includes three support frames (R.VEH/20833) and provides transit stowage for the following:—

- (1) Air conditioner, Type AC.52, 4120-99-943-3951, Qty. 3, with cover, air conditioner, 4120-99-933-1556, Qty. 3.
- (2) Hose assembly, air duct, 4720-99-970-1129, Qty. 6.
- (3) Control box, air conditioner (R.VEH/19695), Qty. 3.
- (4) Interconnecting box, 5820-99-944-9085, Qty. 3, with cable assemblies, power electrical, 5995-99-970-0664, Qty. 3 and 5995-99-970-0667, Qty. 3.

Running gear and ancillaries (PB/AP/1)

One set, comprising:—

- (1) Wheel assembly, cabin, 4K/5895-99-954-2478 (formerly 10AS/3485), Qty. 2.
- (2) Towbar, motor vehicle, 4K/2540-99-954-2477 (formerly 10AR/3420), Qty. 1.
- (3) Tool kit, wheel assembly, 4K/5180-99-933-1067, Qty. 1.
- (4) Instruction leaflet, IL 210/3, Qty. 1.

Overall dimensions

Transmitter and receiver cabins (wheel assemblies not fitted).

	<i>Length</i>	<i>Width</i>	<i>Depth</i>
<i>External dimensions:</i>	6ft 2in (188 cm)	5ft 5in (165 cm)	5ft 10in (177·8 cm)
<i>Internal dimensions:</i>	5ft 10in (177·8 cm)	5ft 1in (155 cm)	5ft 5¼in (165·6 cm)

Ground clearance (wheel assemblies fitted and fully extended) 6in (approx.) (15·2 cm).

Air conditioner platform, R.VEH/20830 (loaded)

<i>Length</i>	<i>Width</i>	<i>Depth</i>
8ft 1in (246·3 cm)	5ft 5in (165 cm)	4ft 0in (122 cm)

Wheel assemblies

<i>Overall dimensions:</i>	6ft 0in (183 cm)	1ft 7½in (over spigot) (49·5 cm) 10½in (over frame) (25·5 cm)
----------------------------	---------------------	------------------------------------------------------------------------

Note . . .

When wheel assemblies are fitted the overall width of each cabin container or open unit is increased by 21 inches (53·3 cm).

Towbar (for hooking to a suitable prime mover).
Towing eye position (above ground)

<i>High position</i>	31in ± 1in (78·7 ± 2·5 cm).
<i>Low position</i>	20in ± 1in (50·8 ± 2·5 cm).

Weights

Cabin, radio receiver (5820-99-933-0822)

Empty 900 lb approx. (408.2 kg).

Gross 2950 lb approx. (1338 kg).

V.H.F. transmitter cabin:

Empty 900 lb approx. (408.2 kg).

Gross 3350 lb approx. (1520 kg).

U.H.F. transmitter cabin:

Empty 900 lb approx. (408.2 kg).

Gross 3900 lb approx. (1769 kg).

*Air conditioner platform R.VEH/20830 (loaded)
complete assembly: 2350 lb approx. (1066 kg).*

Wheel assemblies: 400 lb (181.4 kg).

Towbar: 70 lb (31.8 kg).

Remarks

For details of the transmitters see Part 3 and details of the receivers Part 4.

Sheet No. 4

U.H.F. GROUND STATION

TGRI. (AT) 26005/1

Relevant publications:—

A.P.116K-0402-1
(formerly A.P.2531J, Vol. 1)

Function

TGRI(AT)26005/1 (10D/22794) is an air transportable ground to air u.h.f. installation capable of operating independently or augmenting existing facilities at an airfield or airstrip. Provision is made for either local or remote operation of the equipment. It incorporates a low power transmitter and is capable of R/T transmission and reception only. It can be carried in all types of transport aircraft and can be handled by a crew of four men.

Brief description

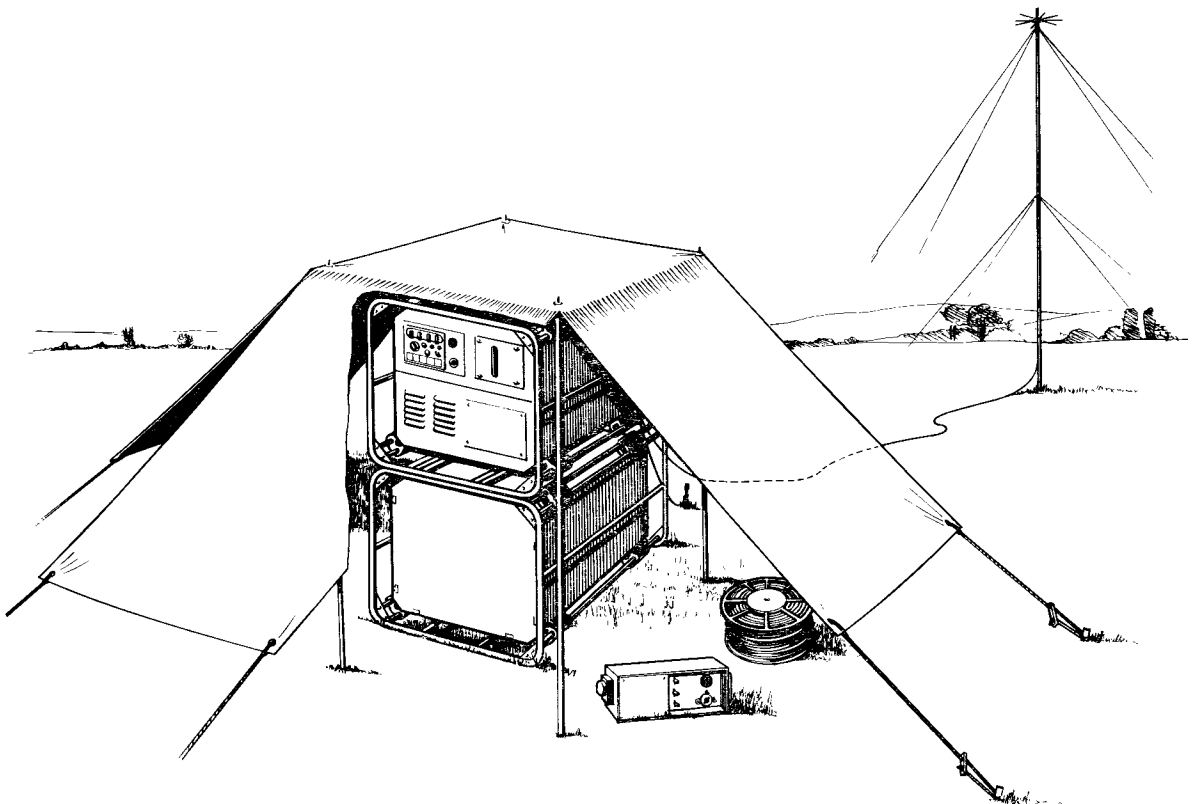
The installation incorporates an airborne multi-channel R/T transmitter-receiver TR5-ARC52, an a.c. power supply unit, remote control box and cable and u.h.f. aerial equipment. For transport the equipment stows into two main containers, two aerial haversacks and a remote control cable reel. A tent canopy is provided for adverse weather conditions.

Frequency range

225 MHz to 399.9 MHz (1.3 to 0.75 metres).

Transmitter output power

16 watts minimum.



TGRI(AT)26005/1 equipment

Receiver sensitivity

An r.f. input of $5 \mu\text{V}$ (open circuit) modulated 30% at 1000 Hz produces an audio output of at least 5 mW.

Channels

1750 at 100 kHz intervals in u.h.f. range.

Communication range

Optical range at ground or sea level 100 miles (161 km) at 20,000 feet (6.1 km) 200 miles (322 km) or more at 50,000 feet (15.3 km).

Aerial system

U.H.F. antenna 5895-99-194-1707 fitted to mast Type 64.

Power supplies

230V 50 Hz single-phase a.c.

Power consumption

1 kVA.

(If required the a.c. power unit can be removed and a d.c. power unit substituted: the d.c. unit, however, is not supplied as part of the equipment.)

Main items of installation

Radio set group S1/1 (10D/23902)

Base Stand (10AR/5418)

Aerial haversack No. 1 (10B/17129)

Aerial haversack No. 2 (10B/17130)

Cable reel holder (remote control) (10AP/1735)

Cover, transmitter-receiver (10AP/1734).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter-receiver container</i>	30in (76.2 cm)	33in (83.8 cm)	25in (63.5 cm)
<i>Accessory container</i>	30in (76.2 cm)	33in (83.8 cm)	25in (63.5 cm)
<i>Aerial haversacks</i>	Length	53in (134.6 cm)	Diameter 12in (30.5 cm).
<i>Cable reel holder (complete with remote control cable)</i>	Width	12in (30.5 cm)	Diameter 18in (45.7 cm).

Weights

Transmitter-receiver container 260 lb (118 kg)

Accessory container 260 lb (118 kg)

Aerial haversack No. 1 (complete) 85 lb (38.6 kg)

Aerial haversack No. 2 (complete) 65 lb (29.5 kg)

Cable reel holder (complete with remote control cable) 75 lb (34 kg).

U.H.F. C.A.D.F. EQUIPMENT
(TRANSPORTABLE)

TGRI. (AT) 26006/1

Relevant publications:—

A.P.116C-0801-1

(formerly A.P.2531P, Vol. 1)

A.P.116C-0805-1

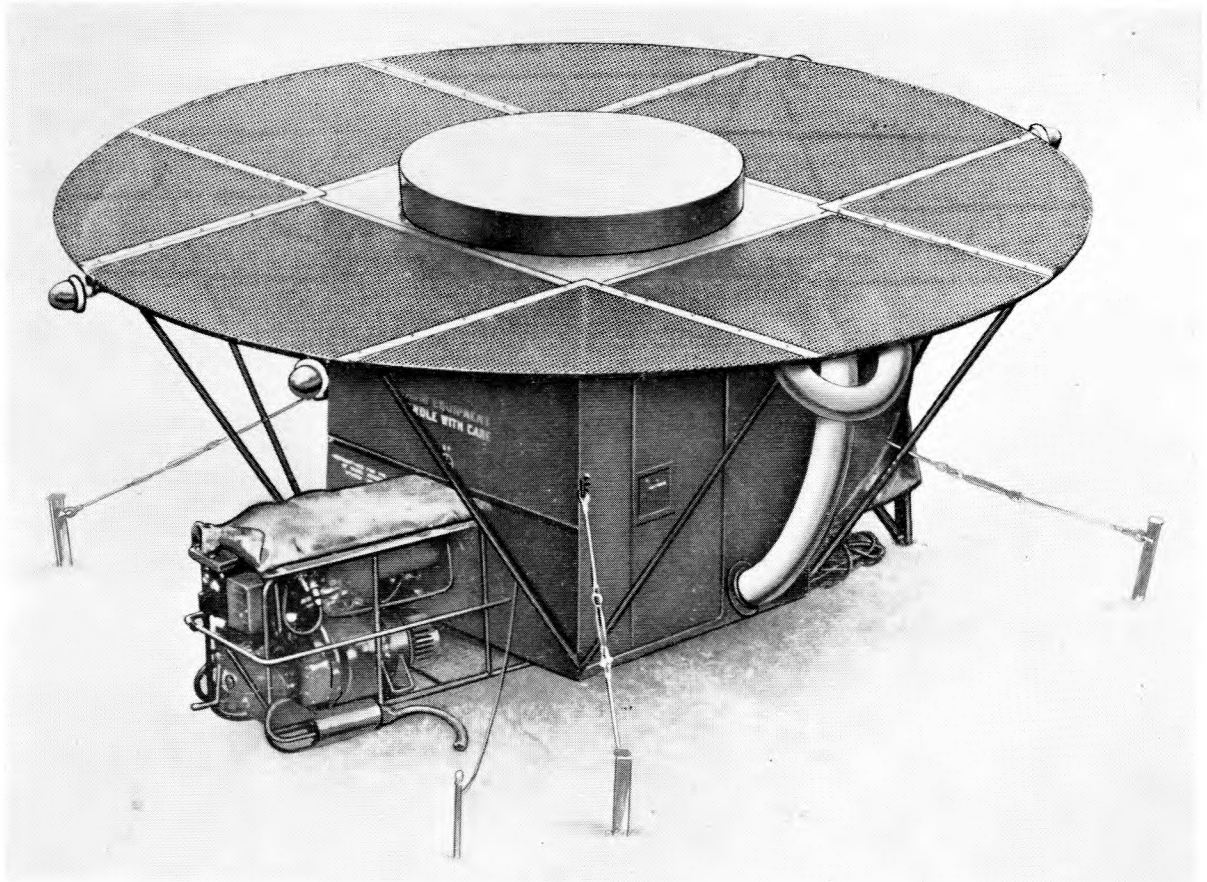
(formerly A.P.2531R, Vol. 1)

Function

Portable u.h.f. commutated aerial direction finder system designed for air transportation. The system is actuated by the u.h.f. R/T signal from an aircraft. The equipment gives instantaneous presentation on calibrated cathode-ray indicators of the bearing of an aircraft transmitting within its range and on one of its pre-set frequencies. The presentation takes the form of a radial trace on a screen having a linear 360° calibrated scale.

Operating principles

The radial trace giving bearing information on an azimuth indicator is developed from the phase comparison of signals received by adjacent unipole aerials in an electronically commutated circular aerial array. The commutation results in a phase modulation being



TGRI(AT)26006/1

imposed on the incoming signal. The resulting envelope is directly related to the signal direction. The phase modulation is converted to an l.f. waveform for comparison with a reference waveform of identical frequency in a phase meter. Output from the phase meter in d.c. voltages proportional to the sine and cosine components of the bearing angle are applied directly to the azimuth indicators.

Frequency range	225 MHz to 399.9 MHz in pre-selected spot frequencies.
Sensitivity	A field strength of approx. 3 μ V per metre gives half pointer length indication with a bearing fluctuation not greater than plus or minus 3 degrees.
Control	Local or remote.
Range	At least u.h.f. communication range.
Bearing accuracy	Plus or minus 1 degree.
Response time	A received signal persisting for 0.25 second or more will provide visible d.f. indication.
Selectivity (at r.f.)	<i>At 23 kHz bandwidth</i> 6dB down. <i>At 100 kHz bandwidth</i> 75dB down.
A.F. response	300 Hz -3 dB to -10 dB. 3 kHz 0 to -3 dB.
Aerial system	18 unipoles (commutation) and reference unipole.
Channel facilities	Two independent channels with two pre-selected frequencies to each channel.
Power supplies	4.5 kVA diesel-electric generating set.
Operating temperature	-10° C to $+55^{\circ}$ C.
Main items of installation	<i>Cabin, radio receiver, D.F.</i> , 5820-99-933-1030, contains indicator and control equipment including the following:— (1) Indicator group, 5825-99-933-1040, Qty. 1. (2) Stabilizer, voltage, 6110-99-933-1036, Qty. 1. (3) Ancillary equipment. Installation kit, electronic equipment, 5821-99-933-1044, carries counterpoise antenna equipment on carrier G.11072 and includes:— (1) Aerial assembly, 5985-99-933-1163, Qty. 1. (2) Aerial (test) (140LRU 81B). (3) Stowed ancillaries. Motor generator group includes generators, air conditioner and remote control stowed on base, motor generator, 6125-99-933-1430 as detailed:— (1) Generator, 42FF/200, Qty. 2. (2) Air conditioner, 4120-99-943-3951, Qty. 1. (3) Installation kit electronic equipment 5840-99-933-1045, Qty. 1.
Running gear and ancillaries (PB/AP/1)	One set, comprising:— (1) Wheel assembly, cabin, 5895-99-954-2478 (formerly 10AS/3485), Qty. 2. (2) Towbar, motor vehicle, 2540-99-954-2477 (formerly 10AR/3420), Qty. 1. (3) Tool kit, wheel assembly, 5180-99-933-1067, Qty. 1. (4) Instruction leaflet, 1L210/3, Qty. 1.

Sheet No. 5 (cont'd)

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Length</i>
<i>Cabin, radio receiver D.F.</i>	5ft 10in (177.8 cm)	5ft 5in (165 cm)	6ft 2in (188 cm)
<i>Installation kit electrical equipment</i>	5ft 10½in (179 cm)	5ft 5in (165 cm)	6ft 8in (203.2 cm)
<i>Motor generator group</i>	5ft 8⅞in (175 cm)	5ft 5in (165 cm)	7ft 5in (226 cm)

Weights

<i>Wheel assemblies</i>	Length 6ft 0in (183 cm)		
	Width (over spigot) 1ft 7½in (49.5 cm)		
	Width (over frame) 10½in (25.5 cm).		
<i>Cable, radio receiver D.F.</i>	2500 lb (approx.)		(1134 kg)
<i>Installation kit, electrical equipment</i>	2300 lb (approx.)		(1043 kg)
<i>Motor generator group</i>	4010 lb (approx.)		(1820 kg)
<i>Wheel assemblies</i>	400 lb		(181.4 kg)
<i>Towbar, motor vehicle</i>	70 lb		(31.8 kg)

Sheet No. 6

TACAN BEACON
(TRANSPORTABLE)

TGRI. (AT) 26009/1

Relevant publications:—

A.P.116C-0703-1

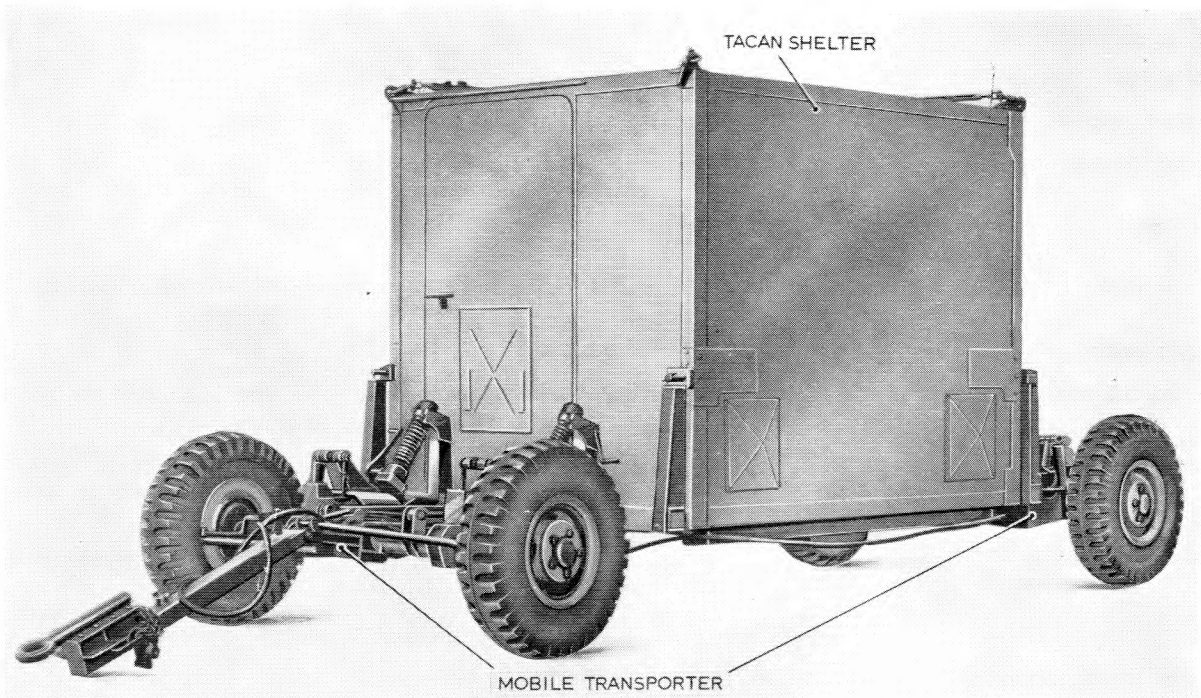
(formerly A.P.4803C, Vol. 1)

Function

TGRI(AT)26009/1 is a self-contained TACAN ground station suitable for both tactical and fixed operation. It is designed for air transportation and may be land transported using the mobility transporter supplied. It is a medium range rho-theta navigational system used for tactical and general navigation purposes. The beacon installation provides the bearing distance and the identification information to an aircraft fitter with the complementary airborne installation ARI. 18107, which conveys this information to the pilot or navigator. The equipment is provided with remote control and dual equipment is fitted in the operating cabin, for standby working.

Operating principles

The distance of an aircraft from the ground beacon is provided by an interrogator-transponder-responder circuit. The aircraft transmitter initiates the interrogating process by radiating pulse signals. These signals are detected by the ground beacon and cause its transponder to transmit the distance reply signals. The reply signals are received in the responder circuits and special circuits measure the time which elapses between the transmission of the interrogating pulses and the reception of the reply pulses. Other



TGRI(AT)26009/1

circuits convert this time difference into nautical miles. The bearing indication of an aircraft from the ground beacon is provided by the technique of employing a rotating amplitude modulation pattern which contains reference pulse signals. All pulses transmitted from the ground beacon are subjected to amplitude modulation by a set of rotating parasitic elements which are driven round the beacon aerial central array at 900 rev/min. In the aircraft the modulated pulses are detected in the azimuth circuits and special machinery driven elements introduce a phase shift to the modulation waveforms so that the coded reference signals appear at a fixed point on them. The amount of phase shift introduced is a measure of the bearing of the aircraft with respect to the ground beacon. This phase shift is converted into azimuth angle which is finally displayed by the bearing pointer. The ground beacon provides identification information by transmitting at regular intervals a series of pulse-pair signals which are keyed with identifying morse code characters.

Frequency ranges	<i>Transmitter</i> 962 MHz to 1024 MHz and 1151 MHz to 1213 MHz. <i>Receiver</i> 1025 MHz to 1150 MHz.
Transmitter	Peak power output 2 kW (nominal). Pulse repetition rate 3600 pulse pairs. Pulse duration $3.5 \mu\text{S} \pm 0.5 \mu\text{S}$ at half amplitude.
Frequency stability (transmitter)	Within 0.002% of the wanted channel frequency.
Receiver sensitivity	Receiver responds at least 60% of the time to properly coded interrogations at a power level of -90dBm .
Channels (received signal) <i>(transmitted signal)</i>	126 channels separated by 1 MHz in the band 1025 MHz to 1150 MHz. 126 channels: channels in each group of 63 separated by 1 MHz in the bands 962 MHz to 1024 MHz and 1151 MHz to 1213 MHz.
I.F. bandwidth	3.5 MHz.
Modulation	Amplitude.
Beacon response delay	$50 \mu\text{S} \pm 0.25 \mu\text{S}$.
Aerial system	Adjustable portable mast supporting the aerial, capable of adjustment to a maximum height of 35 ft, (height measured between ground and electrical centre of aerial).
Aerial gain	At least 2dB over half-wave dipole aerial for an included angle measured at horizon.
Aerial polarization	Vertical.
Remote control	A separate unit provides remote control of the system and remote monitoring facilities.
Ground transport	A mobility transport (Craig Model No. D-734 Series Type III) is included in the installation to permit land transportation.
Power supplies	95 to 125V, 50-60 Hz, 2-wire single phase supply $\pm 10\%$. 190 to 250V, 50-60 Hz, 3-wire (earthed neutral) single phase supply $\pm 10\%$.
Power consumption	10 kVA (maximum).

Sheet No. 6 (cont'd)

WARNING . . .

This equipment cannot be operated on 200-250V, 50-60 Hz single phase 2-wire a.c. supply, i.e. public mains supply, without using a mains isolating transformer.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Shelter (fully equipped)</i>	6ft 9in (205.7 cm)	6ft 9in (205.7 cm)	8ft 6in (259 cm)
<i>Transporter (front and rear dolly connected)</i>	4ft 10in (147.3 cm)	8ft 0in (243.8 cm)	9ft 0in (274.3 cm)

Weights

<i>Shelter (fully equipped)</i>	7000 lb (3175.1 kg)
<i>Transporter</i>	2600 lb (1179.4 kg).

H.F. COMMUNICATION TERMINAL TGRI.(AT) 26014/1

Relevant publications:—

A.P.116K-0408-1
(formerly A.P.4839A, Vol. 1)

Function

TGRI(AT)26014/1 is an air transportable h.f. transmitting and receiving station for upper or lower s.s.b. and d.s.b. operation. Provision is made for c.w. R/T and f.s.k. working. The transceiver is housed in a transportable container which can be transported by airfreighter, 1 ton truck or helicopter.

Brief description

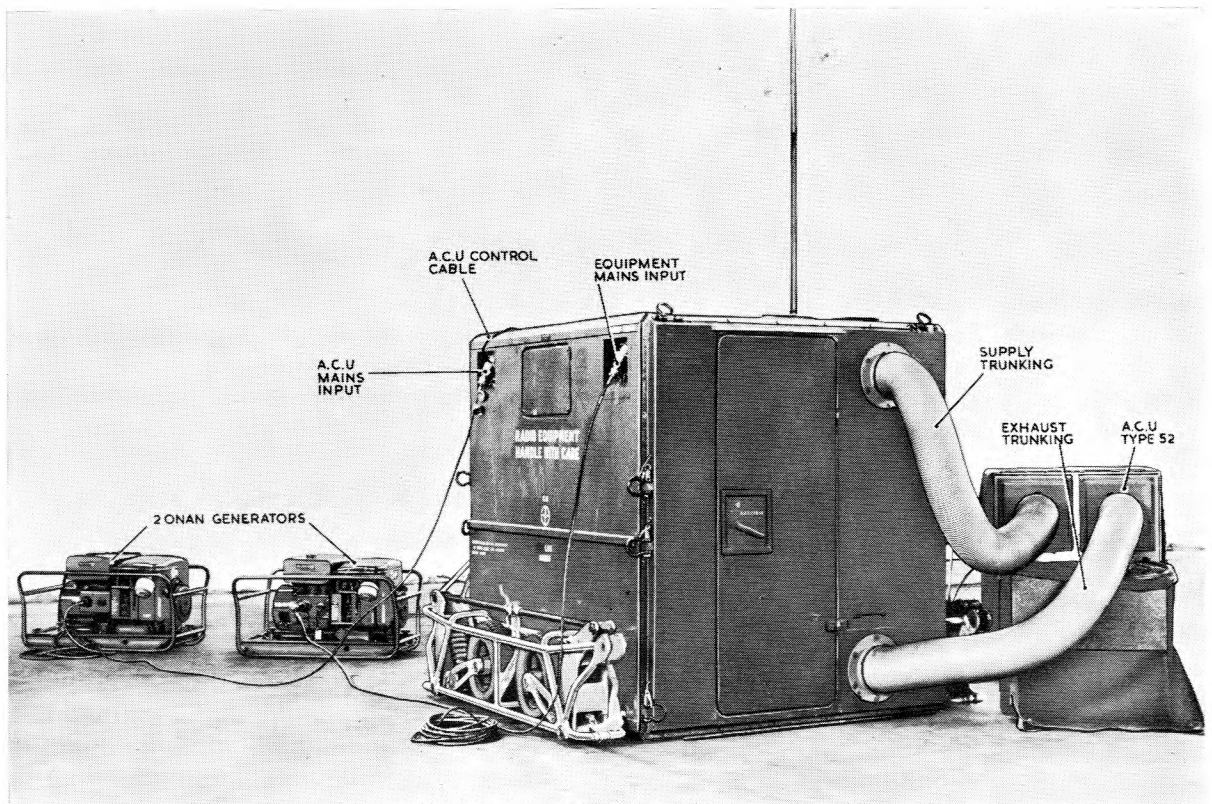
The installation comprises a cabin which houses an s.s.b. transmitter-receiver (Collins KWT.6 Type 5 modified), a two-tone keyer converter GK 189A, a teleprinter T100R, an operator's control box, a remote control box and morse key. A separate platform provides transit stowage for an air conditioner Type 52 and three petrol electric generating sets.

Frequency range

2 to 30 MHz (150 to 10 metres).

Transmitter output power

S.S.B. 50 watts p.e.p.
A.M. 1250 watts (carrier power).



TGRI(AT)26014/1 equipment

Receiver sensitivity	1 μ V for 10dB signal plus noise-to-noise ratio.												
Channels	28,000 at 1 kHz increments.												
Aerial systems	Two aerial masts Type SPM48 and equipment for delta-matched, inverted 'V' and other suitable aerials. Whip antenna Type AT.10U/U (32 feet). Adjustable braid dipole aerial.												
Power supplies	230V, 50 Hz single-phase a.c. (derived from Onan 4 CCK petrol generators).												
Power consumption	1500 watts.												
Main items of installation	The installation is housed in a cabin Type B, Mk. 1, and includes the following:— <ul style="list-style-type: none"> (1) Transmitter-receiver, radio, 5820-99-970-2036, Qty. 1. (2) Control, radio set, Type 714-Z, Qty. 1. (3) Keyer converter frequency shift, Type GK. 189A, Qty. 1. (4) Control unit, PG/CG/137, Qty. 1. (5) Teletypewriter, Type T100R, 5815-12-134-0147, Qty. 1. <p><i>Platform, generator transporting, (PG/CG/2) when stowed for transit includes the following:—</i></p> <ul style="list-style-type: none"> (1) Generator, Onan Type 4CCK-52P, Qty. 3 and covers, transit, generator (PG/CC/188), Qty. 3. (2) Hose assembly, air duct, 4720-99-933-1727, Qty. 2. (3) Air conditioner, 4120-99-943-3951, Qty. 1, and cover, air conditioner, 4120-99-933-1556, Qty. 1. <p><i>Antenna and mast equipment is individually packed and stowed in the cabin for transit. The equipment includes:—</i></p> <ul style="list-style-type: none"> (1) Mast, lightweight (SPM.48), 5985-99-900-7462, Qty. 2. (2) Kit, mast erection, 5985-99-900-7463, Qty. 1. (3) Aerial element, 5820-99-944-8974 (braid), Qty. 1. (4) Dipole aerial, 110B/30003, Qty. 1. (5) Whip aerial, 110B/30001, Qty. 1, with bracket, angle, 5340-99-971-0830. 												
Running gear and ancillaries (PB/AP/1)	One set, comprising:— <ul style="list-style-type: none"> (1) Wheel assembly, cabin, 5895-99-954-2478 (formerly 10AS/3485) Qty. 2. (2) Towbar, motor vehicle, 2540-99-954-2477 (formerly 10AR/3420) Qty. 1. (3) Tool kit, wheel assembly, 5180-99-933-1067, Qty. 1. (4) Instruction leaflet, 1L210/3, Qty. 1. 												
Overall dimensions	<i>Transmitter-receiver cabin (wheel assemblies not fitted):—</i> <table border="0" style="margin-left: 2em;"> <tr> <td style="padding-right: 1em;"><i>External dimensions</i></td> <td>Length 6ft 2in (188 cm)</td> </tr> <tr> <td></td> <td>Width 5ft 5in (165 cm)</td> </tr> <tr> <td></td> <td>Height 5ft 10in (177.8 cm)</td> </tr> <tr> <td style="padding-right: 1em;"><i>Internal dimensions</i></td> <td>Length 5ft 10in (177.8 cm)</td> </tr> <tr> <td></td> <td>Width 5ft 1in (155 cm)</td> </tr> <tr> <td></td> <td>Height 5ft 5¼in (165.6 cm)</td> </tr> </table> <p><i>Ground clearance (wheel assemblies fitted and fully extended): 6in (approx.) (15.2 cm)</i></p>	<i>External dimensions</i>	Length 6ft 2in (188 cm)		Width 5ft 5in (165 cm)		Height 5ft 10in (177.8 cm)	<i>Internal dimensions</i>	Length 5ft 10in (177.8 cm)		Width 5ft 1in (155 cm)		Height 5ft 5¼in (165.6 cm)
<i>External dimensions</i>	Length 6ft 2in (188 cm)												
	Width 5ft 5in (165 cm)												
	Height 5ft 10in (177.8 cm)												
<i>Internal dimensions</i>	Length 5ft 10in (177.8 cm)												
	Width 5ft 1in (155 cm)												
	Height 5ft 5¼in (165.6 cm)												

Sheet No. 8 (cont'd)

Platform generator transporting (wheel assemblies not fitted):

Length 8ft (243.8 cm)
Width 5ft 5in (165 cm)
Height (no load) 2ft ½in (62.3 cm)
Height (with load) 4ft (122 cm)

Wheel assemblies:

Length 6ft 0in (183 cm)
Width 1ft 7½in (49.5 cm)

Note . . .

When wheel assemblies are fitted the overall width of cabin or open unit is increased by 21 inches (53.3 cm).

Towbar (for hooking to a prime mover):

High position 31in ± 1in (78.7 ± 2.5 cm)
Low position 20in ± 1in (50.8 ± 2.5 cm)

Weights

Transmitter-receiver cabin:

Empty 900 lb (408.2 kg)
Gross 2450 lb (transit load) (1111.3 kg)

Platform generator

transporting: 258 lb (transit load) (117 kg)

Wheel assemblies: 400 lb (181.4 kg)

Towbar: 70 lb (31.8 kg)

H.F. RECEIVER STATION

TGRI. (AT) 26016/1

Relevant publications

A.P.116K-0411-1

(formerly A.P.2541K, Vol. 1, Books 1 and 2)

Function

TGRI(AT)26016/1 (receiving set, radio, 5820-99-944-5685) is an air transportable h.f. receiving station incorporating the army reception set R210. It provides for the reception of c.w. and R/T signals also frequency shift operation. When used with TGRI(AT) 26017/1 it forms a very low power h.f. ground transmitting and receiving station. Also when used with TGRI(AT)26017/1 and 26018/1 together it forms a low power h.f. ground transmitting and receiving station. The installation has been designed for air transportation and for carriage in land vehicles; it can be handled by a crew of four men.

Brief description

The installation incorporates the army reception set R210, a.c./d.c. power unit SUR28, D.10 cable for remote control, remote control box K Mk. 3, headset, hand microphone and connectors. Two aerial masts, aerial equipment, a tent canopy and poles are stowed in two stowage bags. The main items and spares are all housed in a single container for transport; this container also provides the working platform for the receiver.

Frequency range

2 to 16 MHz (150 to 18.75 metres) in seven bands.

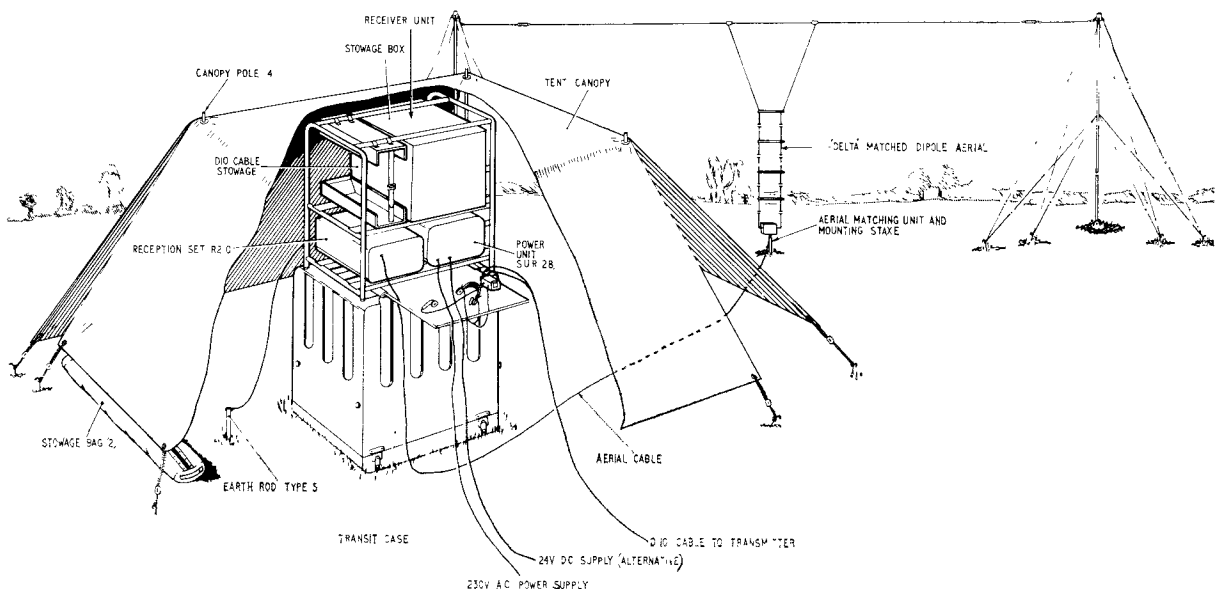
Receiver sensitivity

W/T: 4.5 μ V for 20dB signal/noise ratio.

R/T: 1.5 μ V for 20dB signal/noise ratio.

Aerial systems

Two aerial masts, 5985-99-944-8850, and equipment for the construction of various types of aerial to suit requirements.



TGRI(AT)26016/1 equipment

Power supplies	100-125V or 200-250V, 45-60 Hz single-phase a.c. or 24V d.c.
Power consumption	A.C. 0.2A. D.C. 1.7A.
Main items of installation	<p>The installation comprises four main sub-assemblies with details as follows:—</p> <p>(1) <i>Receiving set, radio, sub-assembly</i>, 5820-99-944-8411, Qty. 1, which includes:— Receiver, radio, 5820-99-911-0850 (R.210), Power supply, 6130-99-900-6807 (SUR 28), Key telegraph and interconnecting box, 5820-99-102-5319 (control unit Type K Mk. 3).</p> <p>(2) <i>Case, receiving set, radio, sub-assembly</i> 5820-99-944-8848 (transit case).</p> <p>(3) <i>Aerial and tent system</i>, 5820-99-944-8409, which includes:— Stowage bag, canvas No. 1, 5820-99-944-8405, Qty. 1. Mast (SPM 30A), 5985-99-944-8850, Qty. 1. Tent, 8340-99-944-8971, Qty. 1.</p> <p>(4) <i>Aerial group</i>, 5820-99-944-8408, which includes:— Stowage bag, canvas No. 2, 5820-99-944-8404, Qty. 1. Aerial element, 5820-99-944-8974, 300 ft. Mast (SPM 30A), 5985-99-944-8850, Qty. 1. Cable assembly, special purpose, electrical, 5995-99-944-9078, Qty. 1. Cable assembly, power, electrical, 5995-99-944-9077, Qty. 1. Cable assembly, radio frequency, 5995-99-944-9076, Qty. 1. Lead, electrical, 5995-99-970-0444, Qty. 1.</p>
Overall dimensions	<p><i>Transit case (packed for transport):</i> Depth 30 in (76.2 cm) Width 23½ in (59.6 cm) Height 34½ in (87.6 cm)</p> <p><i>Stowage bags No. 1 and 2:</i> Length 72 in (183 cm) Diameter 12 in (30.5 cm)</p>
Weights	<p><i>Transit case (packed for transport):</i> 250 lb (113.4 kg) <i>Stowage bags No. 1 and 2, each:</i> 80 lb (36.3 kg)</p>
Remarks	For details of TGRI(AT)26017/1 see Sheet No. 10 and for TGRI(AT)26018/1 see Sheet No. 11 of this Section.

H.F. AMPLIFIER STATION

TGRI. (AT) 26018/1

Relevant publications:—

A.P.116K-0413-1

(formerly A.P.2541K, Vol. 1, Books 1 and 2)

Function

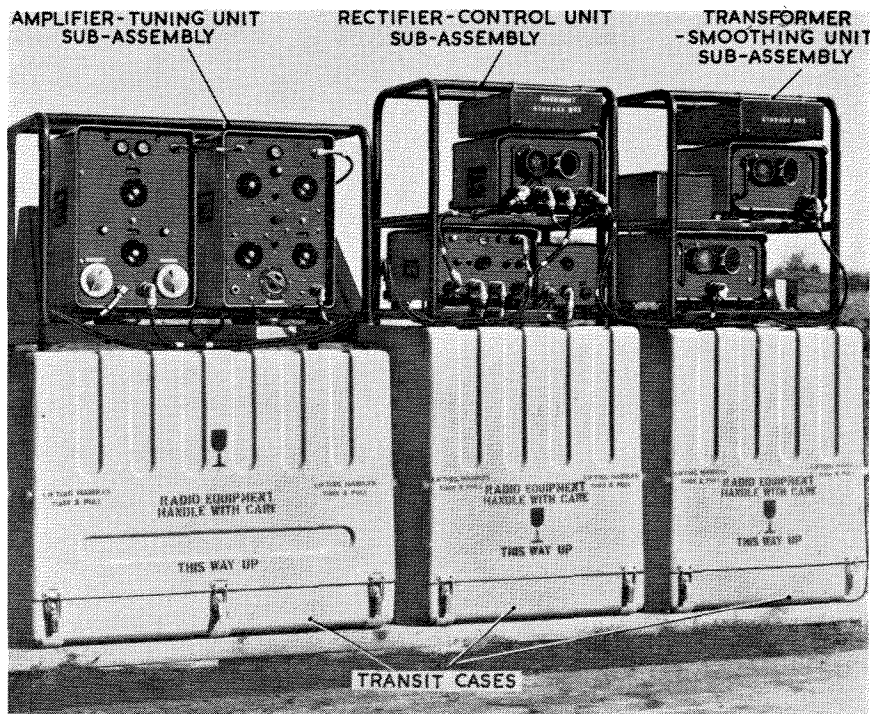
TGRI(AT)26018/1 (amplifier-control group, 5820-99-970-7757) is an air transportable h.f. amplifier station using amplifier set, 5820-99-970-7492 (amplifier S.L.56). It provides an r.f. amplifier for use in conjunction with TGRI(AT)26017/1 using the transmitter C11 as a driver stage. This converts TGRI(AT) 26017/1 from a very low power transmitting station to a low power transmitting station. Both of these stations combine with TGRI(AT)26016/1 to form a low power transmitting and receiving station. The installation has been designed for air transportation and for carriage in land vehicles; it can be handled by a crew of four men.

Brief description

The equipment comprising the station is contained in three transit cases and a stowage bag. The amplifier consists of six units built into three sub-assemblies as follows:—

- Amplifier-tuning unit*
- Rectifier-control unit*
- Transformer-smoothing unit*

The stowage bag contains the tent caopy, tent poles,



TGRI(AT)26018/1 equipment (11A)

power connector and earth rods. No aerial equipment is included in this installation. For transit the sub-assemblies are fitted into the three transit cases. When the station is in use the cases provide a working platform for each sub-assembly.

Frequency range	2 to 24 MHz (150 to 12.5 metres) continuously variable.
Output power	<i>C.W. and f.s.k. working</i> 1 kW. <i>R/T (d.s.b. telephony)</i> 500W carrier.
Power supplies	110-230V, 45-65 Hz single-phase a.c.
Power consumption	4.5 kVA.
Main items of installation	The amplifier-control group comprises four main sub-assemblies, detailed below, and includes interconnecting cables and cases, amplifier (transit) PG/DA/159 for item (1) and PG/DA/111C for items (2) and (3) below:—

(1) *Amplifier-tuning unit, sub-assembly* 5820-99-970-7758, Qty. 1, which includes:—

Amplifier radio frequency, 5820-99-947-5258 (L343), Qty. 1.

Tuner radio frequency, 5820-99-947-5257 (L342), Qty. 1.

Rack, electrical equipment, 5975-99-947-5256 (YL1180), Qty. 1.

Lead, electrical, 5995-99-971-3199, Qty. 2.

(2) *Rectifier-control unit, sub-assembly*, 5820-99-970-7760, Qty. 1, which includes:—

Power supply, 5820-99-947-5732 (L345) Qty. 1.

Control, amplifier, 5820-99-947-5255 (L348), Qty. 1.

Lead, electrical, 5995-99-971-3199, Qty. 2.

Splitter box assembly (PD/BA/186), Qty. 1.

Cable assembly special purpose, 5995-99-971-0278, Qty. 1.

Cable assembly, special purpose, 5995-99-971-0284, Qty. 1.

(3) *Transformer-smoothing unit, sub-assembly*, 5820-99-970-7759, Qty. 1, which includes:—

Filter, smoothing, 5915-99-947-5733 (L346) Qty. 1.

Transformer sets, power, step up, 5820-99-947-5734 (L347), Qty. 1.

Lead, electrical, 5995-99-971-3199, Qty. 2.

Transformer, radio frequency, 5950-99-971-0276 (HPT 26), Qty. 1.

(4) *Stowage bag assembly*, 5820-99-970-7928, Qty. 1, which includes:—

Stowage bag, canvas, 5820-99-971-2005, Qty. 1.

Tent, 5820-99-971-1548, Qty. 1.

Cable assembly (PB/BA/177-10), Qty. 2.

Cable assembly (PB/BA/177-13), Qty. 1.

Overall dimensions

Transit case (amplifier-tuning unit):

Depth 23 $\frac{1}{2}$ in (59.6 cm)

Width 43 $\frac{3}{4}$ in (111.1 cm)

Height 31 $\frac{1}{2}$ in (80 cm)

Transit case (rectifier-control unit):

Depth 23 $\frac{1}{2}$ in (59.6 cm)

Width 30 in (76.2 cm)

Height 34 $\frac{7}{8}$ in (88.6 cm)

Transit case (transformer-smoothing unit):

Depth 23 $\frac{1}{2}$ in (59.6 cm)

Width 30 in (76.2 cm)

Height 34 $\frac{7}{8}$ in (88.6 cm)

Sheet No. 10

H.F. TRANSMITTER STATION TGRI.(AT) 26017/1

Relevant publications:—

A.P.116K-0412-1

(formerly A.P.2541K, Vol. 1, Books 1 and 2)

Function

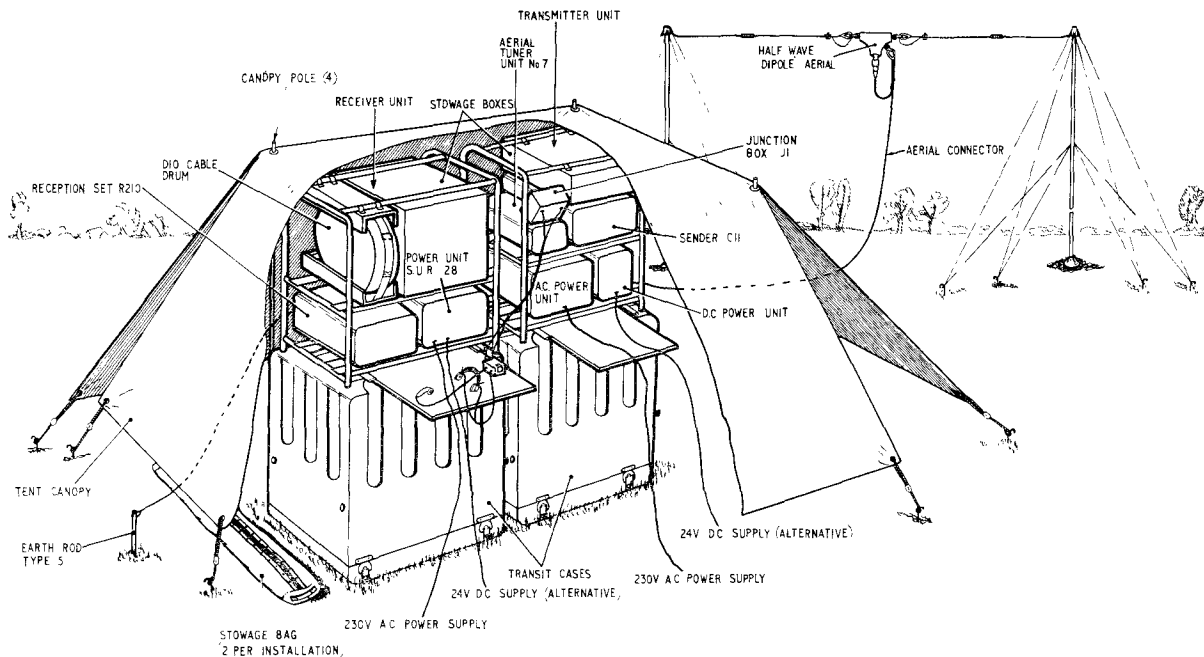
TGRI(AT)26017/1 (transmitting set, radio, 5820-99-944-5686) is an air transportable h.f. transmitting station incorporating the army wireless sender C11. It provides for c.w. hand keying f.s.k. or R/T working. It is a very low power h.f. transmitting station, when used separately, and a low power h.f. transmitting station when used with TGRI(AT)26018/1. Each of these stations will combine with TGRI(AT)26016/1 to form either a very low power or low power h.f. transmitting and receiving station. The installation has been designed for air transportation and for carriage in land vehicles; it can be handled by a crew of four men.

Brief description

The installation incorporates the army wireless sender C11, an a.c. power unit Type L344 and a 24V d.c. power unit, headset, hand microphone and connectors, aerial tuning unit No. 7, junction box J1 and a stowage box for spares. The main items and spares are all housed in a single container for transport; this container also provides the working platform for the transmitter. Two aerial masts, aerial equipment, a tent canopy and poles are stowed in two stowage bags.

Frequency range

2 to 16 MHz (150 to 18.75 metres) in three bands.



TGRI(AT)26016/1 and 26017/1 equipment

Transmitter output power*Low* 3 to 10 watts.*High* 12 to 50 watts.**Aerial systems**

Two aerial masts, 5985-99-944-8850, and equipment for the construction of various types of aerial to suit requirements.

Power supplies

100-125V or 200-250V single-phase 45-65 Hz a.c. or 24V d.c.

Power consumption{ *a.c.* 500 VA
d.c. 23A**Main items of installation**

The installation comprises four main sub-assemblies with details as follows:—

(1) *Transmitting set, radio, sub-assembly*, 5820-99-944-8412, Qty. 1 which includes:—

Transmitter, radio, 5820-99-911-0849 (C11)

Interconnecting box, 5820-99-949-1011 (J.1)

Power supply, 5820-99-949-3603 (L344)

Tuner, radio frequency, 5820-99-949-3147 (ATU. No. 7)

Power supply, transformer rotary, 5820-99-949-3146.

(2) *Case, transmitting set, radio sub-assembly*, 5820-99-944-8853 (transit case).(3) *Aerial and tent system*, 5820-99-944-8410, which includes:—

Stowage bag, canvas No. 1, 5820-99-944-8403, Qty. 1.

Mast (SPM 30A), 5985-99-944-8850, Qty. 1.

Tent, 8340-99-944-8971, Qty. 1.

(4) *Aerial group*, 5820-99-944-8407, which includes:—

Stowage bag, canvas, No. 2, 5820-99-944-8406, Qty. 1.

Aerial element, 5820-99-944-8974, 300 ft.

Mast (SPM 30A), 5985-99-8850, Qty. 1.

Cable assembly, power, electrical, 5995-99-944-9001, Qty. 1.

Cable assembly, power, electrical, 5995-99-944-8999, Qty. 1.

Cable assembly, power electrical, 5995-99-944-9000, Qty. 1.

Cable assembly, radio frequency, 5995-99-944-8975, Qty. 1.

Overall dimensions*Transit case (packed for transport):*

Depth 30 in (76.2 cm)

Width 23½ in (59.6 cm)

Height 34½ in (87.6 cm)

Stowage bags No. 1 and 2:

Length 72 in (183 cm)

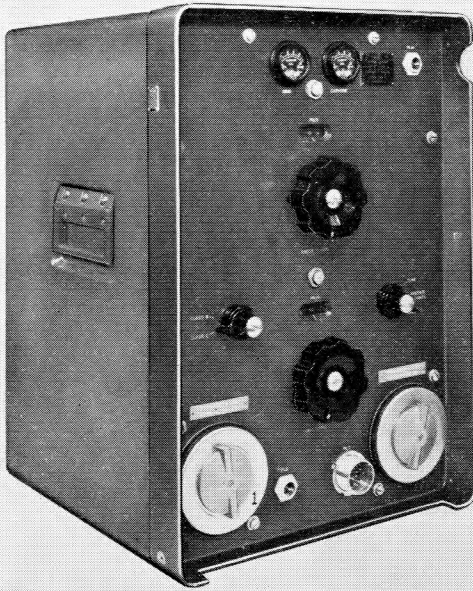
Diameter 12 in (30.5 cm)

Weights*Transit case (packed for transport):*

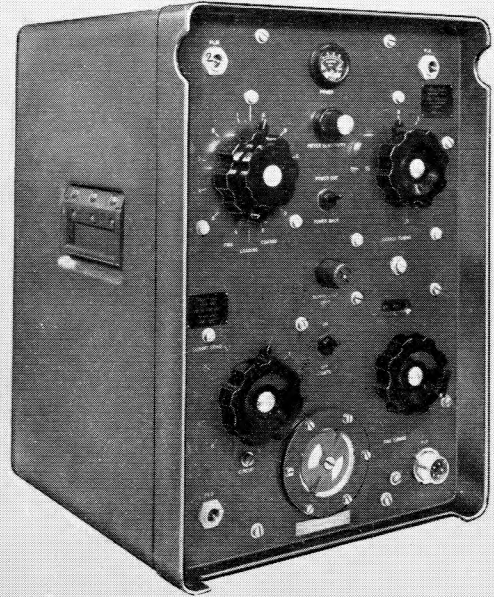
370 lb (168 kg)

Stowage bags No. 1 and 2:

80 lb (each) (36.3 kg)



AMPLIFIER R.F. 5820-99-947-5258



TUNER R.F. 5820-99-947-5257



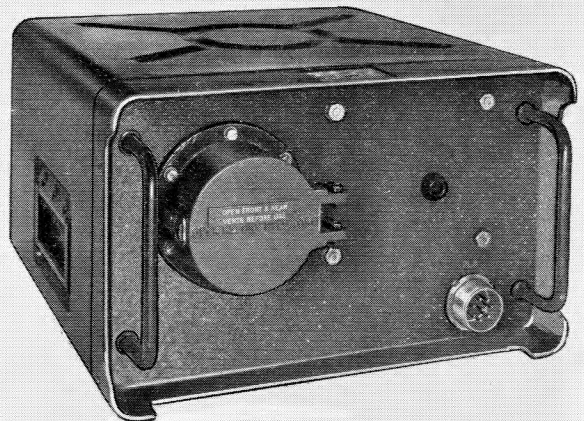
CONTROL AMPLIFIER 5820-99-947-5255



POWER SUPPLY (RECTIFIER)
5820-99-947-5732



TRANSFORMER SET, POWER, STEP UP
5820-99-947-5734



FILTER, SMOOTHING, 5915-99-947-5733

Stowage bag:
Length 33in (83·8 cm)
Width 12in (30·5 cm)
Depth 12in (30·5 cm)

Weights

Transit case (amplifier-tuning unit):
374 lb (169·7 kg)

Transit case (rectifier-control unit):
245 lb (111·1 kg)

Transit case (transformer-smoothing unit):
330 lb (149·7 kg)

Stowage bag (complete with equipment):
75 lb (34 kg)

Remarks

For details of amplifier r.f. 5820-99-970-7492 see Part 3.

**AIR TRANSPORTABLE MULTI-CHANNEL
MEDIUM POWER, H.F. SSB, RTP/VOICE
STATION**

**TGRI(AT)26023/1 10D/5895-99-954-2247,
Radio Station E.21/R.241 Z1/5820-99-193-4290
(Army version)**

Relevant publications:—

A.P.116K-0401-1 (2nd Edn.)
A.P.116E-0127-1 units
detailed in parent A.P.
(formerly part of A.P.4808C, Vol. 1)

Function

The air-transportable, multi-channel, medium power, radio teleprinter/voice station, which comprises four air-transportable containers, seven stowage platforms and additionally, two 30 kVA diesel trailers (R.V.T.553 Mk. 2) is produced in two versions:—

- (1) TGRI(AT)26023/1 (R.A.F. version)
- (2) Radio station, E.21/R.241 (Army version).

The station is used for ground-to-air and point-to-point communication in the high frequency band. It is equipped for transmission of ISB and SSB telephony, AM compatible SSB telephony, CW telegraphy and the dual-diversity reception of SSB telephony, ISB telephony and CW telegraphy with remote or local automatic control of frequency and mode of operation.

Brief description

Both versions of the station are basically similar in construction and the majority of the radio and telegraphic equipment installed is identical, differences occurring only in the terminal telegraph equipment and test apparatus arrangement in the receiver and control cabin, the mobilizing equipment for the station and the external finish. The differences are reflected in the N.A.T.O. coding variation of the cabin and platform equipment given under the appropriate headings.

Frequency range

2.0 MHz to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

Note . . .

The frequency coverage of the antenna equipment provided is of the order, 2.5 to 30 MHz.

Frequency accuracy and stability

Dependent on the generator, standard frequency (*stabilizing period 3 days*). The synthesizer, electrical frequency, incorporates a standby internal reference frequency source which includes a statement of the frequency stability and accuracy.

Transmitter output power

10 kW p.e.p. (7 kW r.m.s.)

Receiver sensitivity

SSB and CW: 1 microvolt for 13 dB signal/noise ratio.
AM: 5 microvolts for 13 dB signal/noise ratio (30% modulation).

Communication range

Ground stations: 2000 miles (3218.7 km)
(full power) (nominal)

Power supplies

Transmitter (Cabin 1):

Quantity two R.V.T.553, Mk. 2 (one standby) 30 kVA diesel generating sets, each providing outlets:—

3 × 416V, 60A, 50Hz 3-phase

3 × 230V, 30A, 50Hz single-phase

2 × 230V, 15A, 50Hz single-phase

Receiver control (Cabin 2) and Teleprinter (Cabin 3), each cabin:

Quantity two 10kVA diesel generating sets (one standby) mounted on stowage platform assembly, generator, (Platform 6 and 7) providing outlets:—

2 × 240V, 50A, 50Hz single-phase

1 × 240V, 5A, 50Hz single-phase

With the embodiment of R.M.C. Mod. No. A.2329, two Distribution Boxes Type S3/1 (6110-99-222-1242) are provided for use with Platforms 6 and 7 (one each) to enable generators to be changed over without interrupting operations.

Spares and servicing set (Cabin 4):

Supply of 240V, 50Hz at 1kVA derived from generating set of Cabin 1, 2 or 3 as convenient.

TGRI(AT)26023/1 (10D/5895-99-954-2247)

Main items of installation

1. *Cabin, radio transmitter group, 10D/5895-99-954-2751, in container Type 85D (Cabin 1).* The installation includes:—

- (1) Transmitter set, radio, 5820-99-953-2077, (Racal TTA.227) comprising:—
 - Transmitter sub-assembly, 5820-99-950-5890 (Racal TA.184A) Qty. 1.
 - Transmitter sub-assembly, 5820-99-953-2076 (Racal MA.228B) Qty. 1.
 - Regulator voltage, 6110-99-951-0381 (Racal MA.308) Qty. 1.
- (2) Rack assembly, channelling equipment, 5820-99-956-0164 (Plessey Type 900).

2. *Cabin, radio receiver control group, 10D/5895-99-954-2750, in container Type 128DS (Cabin 2).* The installation includes:—

- (1) Receiving set, radio, 5820-99-953-2075 (Racal RTA.241A).
- (2) Terminal, telegraph, 5820-99-956-0147 (Marconi HL.13/14).
- (3) Console, communication control, 5820-99-951-5343 (STC Top 21/B2).
- (4) Error detection-correction set, telegraphy, 5805-99-933-4079 (Mullard SL/65/20).
- (5) Rack assembly, channelling equipment, 5820-99-956-0164 (Plessey Type 900).
- (6) Console, telegraph set, 5895-99-957-0988 (R.Veh/21262).
- (7) Trolley, test equipment, 5895-99-195-6416 (R.Veh/21361).

3. *Cabin, teleprinter group, 10D/5895-99-954-2749, in container Type 128D (Cabin 3).* The installation includes:—

Sheet No. 12 cont'd

(1) Teleprinter console, 10D/5895-99-107-0169,
Qty. 4, each mounting:—

Teletypewriter, 5815-12-134-0147 (Siemens
T 100 R) Qty. 1.

Transmitter set, automatic, telegraph tape,
5815-99-933-3103 (Plessey Type TAA6B)
Qty. 1.

(2) BID 610, 650, 700, 710/1, 720/1, 750/1, 830/1,
830/2.

(3) Store electronic, 16-character, 7440-99-952-
2205, Qty. 2.

(4) Engineer's control panel (R.Veh/21653).

Note . . .

*Cabins 1, 2 and 3 are each fitted with Running
Gear, Transportable Container, 10AS/1670-
99-954-3916 (PG/CA/30/1) Qty. 1.*

4. *Cabin, spares and servicing set, 10D/5895-99-195-
4541, in container Type B (Cabin 4). The installation
includes built-in stowages and servicing facilities.*

5. *Antenna and stowage platform assemblies (see
antenna systems):—*

Platform 1, 10B/5895-99-107-3525

Platform 2, 10B/5895-99-107-3526

Platform 3, 10B/5895-99-107-3527

Platform 4, 10B/5895-99-107-3528

Platform 5, 10B/5895-99-107-3529.

6. *Stowage platform assemblies, generator (see power
supplies):—*

Platform 6, 4K/3990-99-107-3530

Platform 7, 4K/3990-99-107-3531.

7. *Wheel assemblies, cabin, 4K/5895-99-954-2478,
Qty. 10.*

8. *Towbars, motor vehicle, 4K/2540-99-954-2477,
Qty. 5.*

Antenna systems

Note . . .

*Erection gear, mast, (10B/5985-99-944-4496)
Qty. 1, is supplied for use with each pair of Masts,
Type LR.80 (10B/5985-99-944-4598).*

Transmitter:

One antenna h.f. transportable Type 747CA-7M carried
on Platform 1.

One cage dipole (Drg. No. SC.A63264) with two masts
LR.80, carried on Platform 2.

One sloping "vee" antenna (Drg. No. R.Veh.23910a)
when R.M.C. Mod. No. 1431 is embodied, carried on
modified Platform 2.

Receiver:

Two antennas h.f. transportable Type 747 CA-8M,
carried on Platforms 3 and 4.

Two single-wire dipoles with four masts Type LR.80,
carried on Platform 5.

Two sloping “vee” antennas (Drg. No. R.Veh.23910b) when R.M.C. Mod. No. 1431 is embodied, carried on modified Platform 5.

VHF antennas:

One Yagi six-element array mounted on one 30 ft mast Type S5/1 together with erector, mast Type S3/1 are carried in each of Cabins 1 and 2.

Monitoring antenna:

One 15 ft whip antenna, used in conjunction with receiver radio Type RA.101, is carried in Cabin 2.

External dimensions

(including running gear attachment fittings on Cabins 1, 2 and 3)

<i>Cabin 1: length</i>	11ft 1 in	(337·8 cm)
<i>width</i>	6ft 4 $\frac{5}{8}$ in	(194·7cm)
<i>height</i>	6ft 2 $\frac{3}{4}$ in	(190cm)
<i>Cabin 2: length</i>	14ft 6 $\frac{1}{8}$ in	(442·1cm)
<i>and width</i>	6ft 4 $\frac{5}{8}$ in	(194·7cm)
<i>Cabin 3: height</i>	6ft 2 $\frac{3}{4}$ in	(190cm)

Note . . .

With container running gear frames stowed flat against cabin end walls no appreciable difference in cabin length results. With wheel assemblies fitted to support tubes and in line, length is increased by 16 inches (approx.).

<i>Cabin 4: length</i>	6ft 2in	(188cm)
<i>width</i>	5ft 5in	(165·1cm)
<i>height</i>	5ft 10in	(177·8cm)

<i>Platform 1,</i>	} length	10ft 8 in	(325·1cm)	
<i>Platform 3,</i>		width	5ft 5 in	(165·1cm)
<i>and</i>		height	5ft 8 in	(172·7cm)
<i>Platform 4</i>				
<i>Platform 2:</i>	<i>length</i>	7ft 8 in	(233·6cm)	
	<i>width</i>	5ft 5 in	(165·1cm)	
	<i>height</i>	4ft 8 $\frac{1}{2}$ in	(143·5cm)	
<i>Platform 5:</i>	<i>length</i>	7ft 8 in	(233·6cm)	
	<i>width</i>	5ft 5 in	(165·1cm)	
	<i>height</i>	6ft 0 in.	(182·9cm)	
<i>Platform 6:</i>	<i>length</i>	7ft 8 in	(233·6cm)	
	<i>width</i>	5ft 5 in	(165·1cm)	
	<i>height</i>	5ft 6 $\frac{1}{2}$ in	(168·9cm)	
<i>Platform 7:</i>	<i>length</i>	7ft 8 in	(233·6cm)	
	<i>width</i>	5ft 5 in	(165·1cm)	
	<i>height</i>	5ft 2 $\frac{1}{2}$ in	(158·8cm)	

Note . . .

When wheel assemblies are fitted to Cabin 4 and/or platforms, overall width is increased by 21 inches (53·3cm).

Ground clearance (running gear, transportable container, fitted to Cabins 1, 2 and 3 and wheel assemblies fitted, with wheels extended, to Cabin 4 and all platforms)

Cabins 1, 2 and 3: 1ft 9in approx. (53·4cm)
Cabin 4 and platforms: 9in approx. (22·9cm)

Note . . .

Clearance dependent on loading and tyre pressure.

Weights – gross (Cabins and platforms in “transit stowed” condition, with running gear fitted to Cabins 1, 2, 3 but not to platforms and Cabin 4)

Cabin 1:	8220 lb (3728.5 kg)	} <i>Actual weights to be verified during airlift planning phase</i>
Cabin 2:	9320 lb (4227.5 kg)	
Cabin 3:	6886 lb (3123.3 kg)	
Cabin 4:	3380 lb (1533.2 kg)	
Platform 1:	1912 lb (916.2 kg)	
Platform 2:	3275 lb (1485.5 kg)	
Platform 3:	2232 lb (1012.4 kg)	
Platform 4:	2232 lb (1012.4 kg)	
Platform 5:	3125 lb (1417.5 kg)	
Platform 6:	4200 lb (1905.1 kg)	
Platform 7:	3400 lb (1542.2 kg)	

<i>Running gear transportable container:</i>	1060 lb (480.8 kg)
<i>Tools and accessories:</i>	112 lb (50.8 kg)
<i>Towbar:</i>	62 lb (28.1 kg)
<i>Wheel assemblies, cabin (2 off):</i>	440 lb (199.6 kg)
<i>Tools in toolbag:</i>	19 lb (8.6 kg)
<i>Towbar, motor vehicle:</i>	78 lb (34.4 kg)

Towbar, motor vehicle, towing eye position above ground level (when connected to wheel assemblies) *High position:* 31in ±1in (78.7 ±2.5cm)
Low position: 20in ±1in (50.8 ±2.5cm).

RADIO STATION E.21/R.241 (A.P.) (Z1/5820-99-193-4290)

Note . . .

As previously stated, the station is similar to TGRI(AT)26023/1 except for equipment descriptions, external finish, running gear, internal installation of Cabin 2 (receiver set group) and N.A.T.O. coding.

Frequency	} <i>range setting stability</i>	} See TGRI(AT)26023/1
Transmitter output		
Power		
Receiver sensitivity		
Power supplies		
External dimensions		

Main items of installation

1. *Transmitter group, installed in Cabin 1 (A.P.) (Z1/5820-99-193-4291).*
2. *Receiver set group, installed in Cabin 2 (A.P.) (Z1/5820-99-193-4293). Terminal telegraph (HH00-5000-21/HH00-5001-21) replaces Type HL13/14 and T.D.M.S. rack installed.*
3. *Teleprinter group, installed in Cabin 3 (A.P.) (Z1/5815-99-193-4295).*
4. *Cabin, spares and stowage, Cabin 4 (A.P.) (Z1/5820-99-193-4297).*
5. *Container, electronic equipment, No. 1 (A.P.) c/w accessories (Z1/5820-99-193-4299).*

Container, electronic equipment, No. 2 (A.P.) c/w accessories (Z1/5820-99-193-4301).

Container, electronic equipment, No. 3 (A.P.) c/w accessories (Z1/5820-99-193-4303).

Container, electronic equipment, No. 4 (A.P.) c/w accessories (Z1/5820-99-193-4305).

Container, electronic equipment, No. 5 (A.P.) c/w accessories (Z1/5820-99-193-4306).

Container, electronic equipment, No. 6 (A.P.) c/w accessories (Z1/5820-99-193-4308).

Container, electronic equipment, No. 7 (A.P.) c/w accessories (Z1/5820-99-193-4310).

6. Generator set, a.c., 30kVA, lightweight, trailer mounted, c/w repair kit, (X2/6115-99-109-2253), Qty. 2.

7. Mobilizer, A9500AV-ILM, (Airtech PD/ER/2), Qty. 2.

8. Parts kit, radio trailer, (Z1/5820-99-102-2025), Qty. 5.

Antenna systems

See TGRI(AT)26023/1.

External dimensions—running gear attached

Mobilizer A9500AV-ILM: With mobilizer attached (Cabins 1, 2 and 3) cabin lengths are increased by $128\frac{3}{8}$ inches (326cm) and widths by $22\frac{1}{2}$ inches (57.2cm).

Wheel units (Parts kit radio trailer): Overall width of cabin, spares and stowage and containers, electronic equipment is increased by 35 inches (88.9cm) when wheel units are fitted).

Ground clearances (with mobilizer A9500AV-ILM fitted to Cabins 1, 2 and 3, parts kit, radio trailer, to Cabin 4 and containers, electronic equipment: wheels fully extended)

Cabins 1, 2 and 3:

under mobilizer: 1ft $3\frac{5}{8}$ in approx. (39.7cm)

under cabin: 1ft 6 in approx. (45.7cm)

Cabin 4 and

containers: 1ft 6 in approx. (45.7cm).

Note . . .

Clearance dependent on loading and tyre pressure.

Weights—gross (Cabins and containers in “transit stowed” condition, but less running gear)

Cabin 1: 7160 lb 3247.7 kg)

Cabin 2: 7880 lb 3474.3 kg)

Cabin 3: 5826 lb (2642.7 kg)

Cabin 4: 3550 lb (1610.3 kg)

Containers, electronic equipment:

weights are identical to those of Platforms 1 to 7 under TGRI(AT)26023/1, except that 40 lb (18 kg) must be added for the difference in spare wheels.

Running gear particulars

Mobilizer A9500AV-ILM (connected as bogie):

Length (towbar vertical

pylons lowered): 9ft 4 in (284.4cm)

Length (towbar vertical

pylons raised): 10ft 3 in (312.4cm)

Width: 8ft 2½in (250·2cm)
Height (pylons lowered): 3ft 10½in (118cm)
Height (pylons raised): 5ft 2¾in (159·4cm)
 Weight: 3300 lb (1497kg)
 Payload (max.): 9500 lb (4309·1 kg)

Parts kit, radio trailer:

Wheel unit length: 6ft 10 in (208·3cm)
width: 2ft 0 in (61 cm)
height: 2ft 7 in (78·7cm)
weight: 450 lb (204·1 kg)

Towbar (spread) length: 5ft 4½in (164cm)

Towbar (folded) length: 7ft 0 in (213·3cm)

width: 1ft 4 in (40·6cm)

height: 11 in (27·9cm)

Weight (towbar c/w tools and bracing member):

186½ lb (84·6 kg)

Towing eye heights: 31in ±1in (78·7 ±2·5cm)

(above ground level): 20in ±1in (50·8 ±2·5cm)

(Selected on attachment to wheel units to suit prime mover).

Tyre pressures

Wheel assemblies: 90 lb/in² (6·327kg/cm²)
(4-wheel)

Wheel units: 55 lb/in² (3·867kg/cm²)
(2-wheel)

Running gear, transportable

container: 85 lb/in² (5·976kg/cm²)

Mobilizer

A9500AV-ILM: 45 lb/in² (3·168kg/cm²)

Remarks

For further information of particular equipment see Index. Illustrations of individual items of equipment are given in the appropriate information sheets.

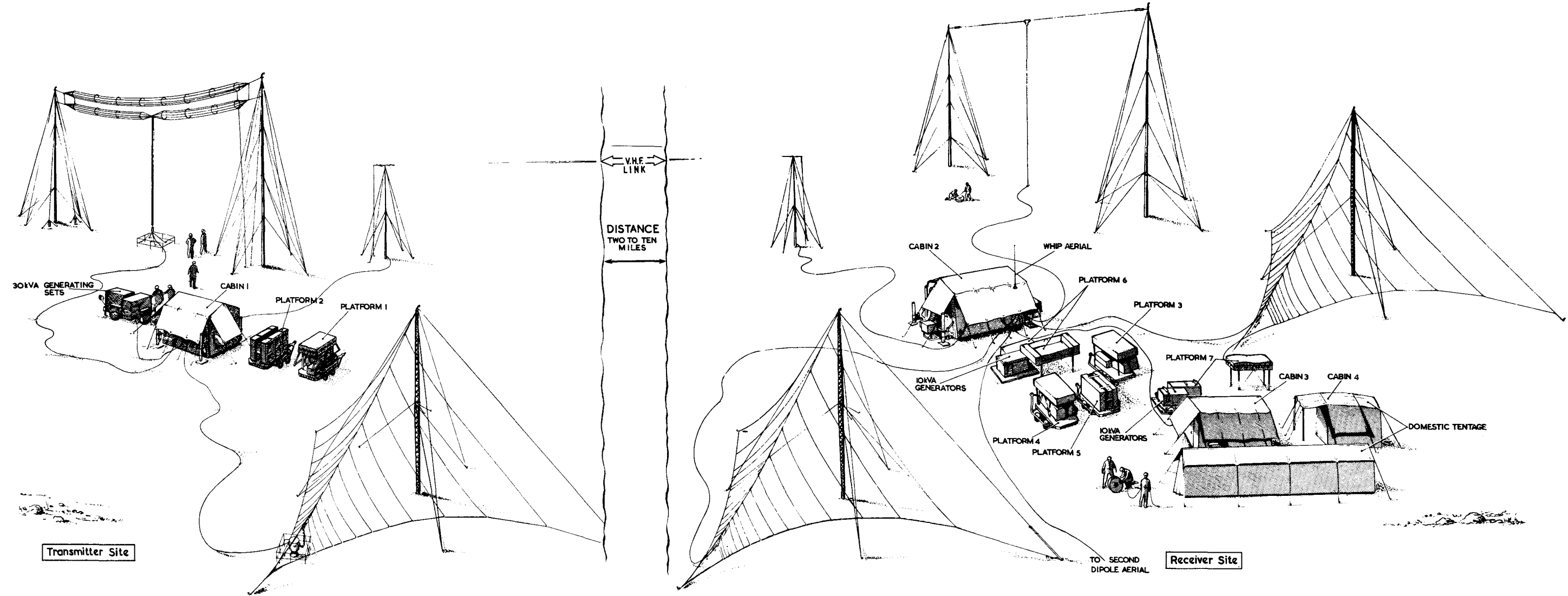


Fig.1

TGRI (AT) 26023/1 Layout of sites

Fig.1

AIR CONTROL COMMUNICATION SYSTEM

TGRI(AT)26047/1 & /2

RELEVANT PUBLICATIONS

AP 116K-0420-1, 2nd Edn.
(formerly 115B-0510-1)

FUNCTION

An ACC communication system capable of operating in temperate or tropical climates which provides:

u.h.f., a.m. voice: 10 transmit and 12 receive channels
u.h.f. voice: 1 channel transmit plus 1 standby and 1 channel receive plus 1 standby
h.f. s.s.b. voice or c.w: 6 transmit and 6 receive channels
v.h.f. radio link: 1 audio channel plus 6 carrier channels.

BRIEF DESCRIPTION

The difference between the two installations is in the h.f. transmitting equipment. TGRI(AT)26047/1 uses the KWT-6 Type 5 equipment and TGRI(AT)26047/2 uses the Racal Type TTA 371C.

The system consists of twelve operating cabins plus one workshop cabin together with ancillary power and air conditioning equipment mounted on air transportable platforms.

Designed for maximum flexibility, limited facilities may be deployed when an operational situation does not require deployment of the complete system. Ancillary units of power and air conditioning equipment are allocated to individual cabins to simplify air movement. Operational control is exercised from the controllers' key boards and mincomm units through the main switchboard in the control system. Local control is available for testing and servicing.

FREQUENCY RANGE

HF 2.0000 MHz to 29.9999 MHz
 VHF 100 MHz to 156 MHz
 UHF 225 MHz to 399.9 MHz

TRANSMITTERS POWER OUTPUT

HF 1kW (p.e.p.)
VHF 5W (carrier)
UHF 150W a.m.

POWER SUPPLIES

Transmit site Qty 6 stowage platforms, generator, each carrying:

 Qty 2 (one standby) diesel-electric generating
 sets 42PB/1 10kVA, 240V, 50 Hz, single-phase.

Receive site Qty 2 stowage platforms, generator, each carrying:

 Qty 2 (one standby) diesel-electric generating
 sets 42PB/1 10kVA, 240V, 50 Hz, single-phase.

VHF radio relay Qty 2 (one standby) petrol-electric generating
 sets 42L/820 500VA, 240V, 50 Hz single-phase.
 Transit stowed in Cabin 9.

 Qty 8 distribution boxes 10AD/6110-99-222-1242
 (splitter boxes)

MAIN ITEMS OF INSTALLATION

TGRI(AT)26047/1 only

1. Qty 3 cabins, radio transmitter group, in container Type B (cabins 6,7 and 8). Each cabin includes:
 - (1) Transmitter set, radio 5820-99-970-2036 (KWT-6 Type 5) comprising:
 - (a) Antenna network 180U-2
 - (b) Antenna coupler 180T-2
 - (c) Power amplifier 367A-3
 - (d) Frequency generator 786E-1
 - (e) Sideband generator 786F-1
 - (f) Audio control panel 159B-1
 - (g) Radio relay control panel 714Z-1
 - (h) Low voltage power supply 429B-1
 - (j) High voltage power supply 428B-1
 - (k) Blower 199G-3
 - (l) Dummy antenna 172J-1
 - (m) Junction box 153H-2
 - (2) Relay assemblies Type S12/1

TGRI(AT)26047/2 only

2. Qty 3 cabins, radio transmitter group, in container Type B (cabins 6,7 and 8).

Each cabin includes:

- (1) Transmitter set, radio 5820-99-194-6465 (Racal TTA371C) comprising:
 - (a) Synthesizer, electrical frequency 5820-99-971-7805 (Racal MA350B)
 - (b) Drive unit, 5820-99-107-3802 (Racal MA79H)
 - (c) Panel, interconnecting and distribution 5820-99-107-5917 (Racal LA287B)
 - (d) Radio frequency unit, 5820-99-107-9122 (Racal TA349C)
 - (e) Power supply unit, 5820-99-195-3840
 - (f) Aerial tuning unit, 5820-99-971-8017 (Racal MA144)

TGRI(AT)26047/1 & /2

3. Qty 5 cabins radio transmitter group, in container Type B (Cabins 1 to 5 inclusive).

Each cabin includes:

- (1) Qty 2 transmitter sub-assembly 5820-99-932-5704
 - (2) Qty 2 power supply 5820-99-932-5705
 - (3) Qty 2 amplifier sub-assembly 5820-99-932-5708
 - (4) Qty 2 power supply 5820-99-932-5707
4. Qty 2 MGRI23155/1 transit stowed in Cabin 1.
5. Cabin, radio transmitter group, in container Type B (Cabin 9).
The installation includes:
 - (1) Qty 2 transmitter Type T.1540 (10D/2120)
 - (2) Qty 2 transmitter/receiver A.T.E. 900 series. One equipment transit stowed only.
6. Qty 2 cabins, radio receiver group, in container Type B (Cabins 10 and 11).
Each cabin includes:
 - (1) Qty 6, receiver sub-assembly 5820-99-932-5703
7. Cabin, radio receiver group, in container Type B (Cabin 12).
The installation includes:
 - (1) Qty 6 receiver, Racal Type RA317
 - (2) Receiver Type R1392J (5820-99-953-7424)
 - (3) Qty 2 power unit Type 234A (10D/17395)

8. Cabin, spares and servicing set, in container Type B (Cabin 13).
The installation includes built-in stowages and servicing facilities.
9. Stowage platform assemblies generator (see power supplies).
Platforms 101 to 108 inclusive.
10. Wheel assemblies 10AS/3845
11. Towing frame 10AR/3420
12. Tool kit assembly 10AG/933-1067
13. Lifting equipment 10AS/933-0816

ANTENNA SYSTEMS

TGRI26047/1 only

1. Cabins 6,7 and 8 (each cabin)
 - (1) Qty 2 masts, 5985-99-933-2356 (Type S5/1)
 - (2) Qty 1 erector, mast, 5985-99-933-2358 (Type S3/1)
 - (3) Qty 2 dipole elements, 5820-99-102-5282
 - (4) Qty 1 coupler antenna, Type 180T-2
 - (5) Qty 1 whip antenna Type AT 1011/U
 - (6) Qty 1 centre junction 5820-99-102-5278

TGRI26047/2 only

2. Cabins 6,7 and 8 (each cabin)
 - (1) Qty 2 masts, 5985-99-933-2356 (Type S5/1)
 - (2) Qty 2 whip antenna, Type AT 1011/U
 - (3) Qty 1 multicoupler, Type MA174
 - (4) Qty 2 dipole elements 5820-99-102-5282
 - (5) Qty 1 centre junction 5820-99-102-5278

TGRI26047/1 and /2

3. Cabins 1 to 5 inclusive (each cabin):
 - (1) Qty 1 mast 5985-99-933-2356 (Type S5/1)
 - (2) Qty 2 broadband antennas 10B/999-3304
 - (3) Cabin 1 only: Qty 1 erector, mast, 5985-99-933-2358
(Type S3/1)
4. Cabin 9:
 - (1) Qty 2 antenna 10B/2454 (Type 220A)
 - (2) Qty 3 masts Type S5/1 (one mast is transit stowed only)
 - (3) Qty 2 Yagi 6-element array complete (one array is transit stowed only)

5. Cabins 10 and 11:

- (1) Qty 6 broadband antennas 10B/999-3304
- (2) Qty 3 masts Type S5/1.

6. Cabin 12:

- (1) Qty 4 dipole elements 5820-99-102-5282
- (2) Qty 2 centre junction 5820-99-102-5278

EXTERNAL DIMENSIONS

Container Aircon Type B Mk.I (Cabins 1 to 13 inclusive):	length	6 ft 2 in (188 cm)
	width	5 ft 5 in (165 cm)
	height	5 ft 10 in (178 cm)

Platform ready for transit:	length	7 ft 8 in (234 cm)
	width	5 ft 5 in (165 cm)
	height	5 ft 7 in (170 cm)

Note ...

When wheel assemblies are fitted to cabins or platforms the overall width is increased by 21 in (53 cm)

Wheel assemblies:	length	6 ft 0 in (183 cm)
	width over spigots	19 $\frac{3}{4}$ in (50 cm)
	width over frame	9 $\frac{1}{2}$ in (24 cm)
	tyre pressure	90 lb/in ² (6.3 kg/cm ²)

GROUND CLEARANCES (running gear fully extended)

Towing frame, towing eye position above ground:	high	31 ± 1 in (79 cm)
	low	20 ± 1 in (51 cm)
	Cabins and platforms	9 in (23 cm)

GROSS WEIGHTS (stowed and ready for transit)							weight per cabin
Cabin 1	...	...	...	...	...	...	3250 lb (1474 kg)
Cabins 2 to 5	...	...	...	...	...	...	3200 lb (1452 kg)
Cabin 6	) TGR126047/1	...	...	...	...	...	2850 lb (1293 kg)
Cabin 7							
Cabin 8							
Cabin 6	) TGR126047/2	...	...	...	...	...	3800 lb (1724 kg)
Cabin 7							
Cabin 8							

GROSS WEIGHTS (contd.)

weight per cabin

Cabin 9	...	...	...	...	...	...	...	3200 lb (1452 kg)
Cabin 10	...	...	...	...	...	...	...	3200 lb (1452 kg)
Cabin 11	...	...	...	...	...	...	...	3150 lb (1430 kg)
Cabin 12	...	...	...	...	...	...	...	2620 lb (1188 kg)
Cabin 13	...	...	...	...	...	...	...	2700 lb (1225 kg)

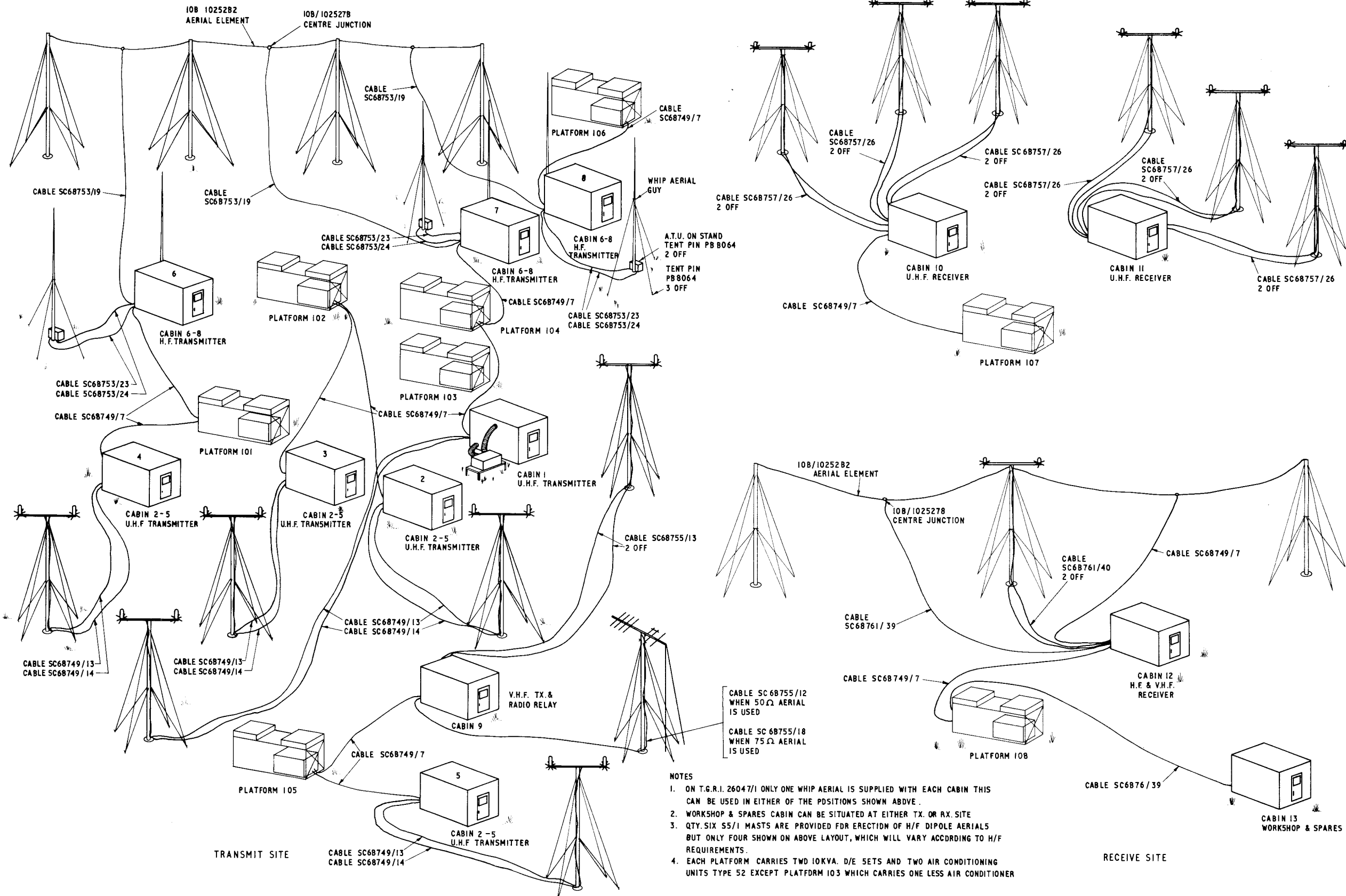
Generator platforms:

Platform No. 101	...	...	...	...	...	...	...	4425 lb (2007 kg)
102	...	...	...	...	...	...	...	4425 lb (2007 kg)
103	...	...	...	...	...	...	...	3450 lb (1565 kg)
104	...	...	...	...	...	...	...	4425 lb (2007 kg)
105	...	...	...	...	...	...	...	4425 lb (2007 kg)
106	...	...	...	...	...	...	...	4425 lb (2007 kg)
107	...	...	...	...	...	...	...	4425 lb (2007 kg)
108	...	...	...	...	...	...	...	4425 lb (2007 kg)

Wheel assemblies (1 set)	...	...	...	...	...	...	...	440 lb (200 kg)
Towing frame, complete with tools	...	...	...	...	...	...	...	80 lb (36.3 kg)
Lifting equipment	...	...	...	...	...	...	...	125 lb (56.7 kg)

Complete station ready for transit

TGRI26047/1	...	...	...	...	...	...	...	62755 lb (28465 kg)
TGRI26047/2	...	...	...	...	...	...	...	63705 lb (28896 kg)



- NOTES
1. ON T.G.R.I. 26047/1 ONLY ONE WHIP AERIAL IS SUPPLIED WITH EACH CABIN THIS CAN BE USED IN EITHER OF THE POSITIONS SHOWN ABOVE.
 2. WORKSHOP & SPARES CABIN CAN BE SITUATED AT EITHER TX. OR RX. SITE
 3. QTY. SIX 55/1 MASTS ARE PROVIDED FOR ERECTION OF H/F DIPOLE AERIALS BUT ONLY FOUR SHOWN ON ABOVE LAYOUT, WHICH WILL VARY ACCORDING TO H/F REQUIREMENTS.
 4. EACH PLATFORM CARRIES TWO 10KVA. D/E SETS AND TWO AIR CONDITIONING UNITS TYPE 52 EXCEPT PLATFORM 103 WHICH CARRIES ONE LESS AIR CONDITIONER

Fig.1

TGR I (AT) 26047/1 & 2 - Station layout, typical

Fig.1

AIR TRANSPORTABLE 1kW HF/ISB/FST
RTP/VOICE COMMUNICATIONS STATION

TGRI(AT)26058/1

RELEVANT PUBLICATIONS

AP 116K-0418-1

FUNCTION

An air transportable, multi-frequency, low power, radio teleprinter/voice station used for ground-to-air and point-to-point communication in the high frequency band.

It is equipped for transmission and reception of ISB telephony, SSB telephony, CW telegraphy and FST telegraphy with facilities for simultaneous operation of two telegraphic channels and one voice channel.

BRIEF DESCRIPTION

The station comprises two air-transportable cabins and two generating sets carried on platforms which also provide stowage for aerial masts, air conditioning units and ancillary equipment. Provision is made for a remote RTP position (secure) with two teleprinters, also an R/T position operated from the Rx cabin.

FREQUENCY RANGE

2.000MHz to 2.9999MHz in steps of 100 Hz.

TRANSMITTER OUTPUT POWER

1kW SSB; 800W CW/FSK

COMMUNICATION RANGE

2000 miles (3220 km)

POWER SUPPLIES

Transmit site

Quantity two 42PB/1 (one standby) 10kVA diesel-electric generating sets mounted on stowage platform assembly and providing 240V, 50Hz, single-phase Maximum consumption 22 amps.

Receive site

Quantity two 42JL/1 (one standby) 4.5kVA petrol-electric generating sets mounted on stowage platform assembly and providing 240V, 50 Hz, single-phase. Maximum consumption 16 amps.

MAIN ITEMS OF INSTALLATION

1. Cabin, radio transmitter group in container Type B.Mk.I. The installation includes:-
 - (1) Transmitter set radio Type 371C comprising:
 - (a) Synthesizer, electrical frequency, 5820-99-971-7805 (Type MA350B)
 - (b) Drive unit, 5820-99-107-3802 (Type MA79H)
 - (c) Radio frequency unit, 5820-99-107-9122 (Type TA 349C)
 - (d) Power supply unit, 5820-99-195-3840
 - (e) Panel, interconnecting and distribution, 5820-99-107-5917 (Type LA 287B)
 - (f) Independent sideband modulator, 5820-99-107-3800 (Type MA175)
 - (2) Aerial tuning unit, 5820-99-971-8017 (Type MA144) for use with whip aerial.
 - (3) Wattmeter directional-reflectometer 10S/18101
 - (4) Antenna coupler Type MA 108
2. Cabin, radio receiver group in container Type B Mk.I. The installation includes:-
 - (1) Receiving set radio Type RA317
 - (2) Independent sideband adaptor Type RA98
 - (3) Converter, frequency shift keying Type RA 316D
 - (4) TGS 10, 10S/6625-99-223-1709
 - (5) Telegraph distortion measuring set, TDMS 70, 10S/2224595
3. Quantity four teleprinters, T100R.
4. Voice frequency telegraph equipment Type H5002.

5. Stowage platform assemblies, generator (see power supplies).
6. Quantity two air conditioning units Type 52 Mk.I.

RUNNING GEAR

Wheel assemblies 4K/9542478
Towing frame 4K/9542477
Tool kit assembly 10AG/933-1067

TYRE PRESSURES

Wheel assemblies: 90 lb/in² (6.3kg/cm²)

AERIAL SYSTEMS

Equipment is provided for the construction of types of array to suit local transmitting conditions.

Quantity four mast Type LR80 10B/5985-99-944-4598
Quantity two erection gear, mast, (10B/5985-99-944-4496)
Quantity one whip aerial 32 ft; used in conjunction with tuning unit in transmitter cabin.

EXTERNAL DIMENSIONS (including running gear attachment fittings)

Cabins 1 and 2:	length	6 ft 2 in	(188 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 10 in	(178 cm)

Note:

With container running gear frames stowed flat against cabin end walls no appreciable difference in cabin length results. With wheel assemblies fitted to support tubes and in line, length is increased by 16 in (41 cm).

Platforms 1 and 2:	length	7 ft 8 in	(234 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 6 in	(168 cm)

Wheel assemblies (4K/9542478)	length	6 ft 0 in	(183 cm)
	width over		
	spigots	19 ³ / ₄ in	(50 cm)
	width over frame	9 ¹ / ₂ in	(24 cm)

Note:

When wheel assemblies are fitted to cabins or platforms the overall width is increased by 21 in (53 cm).

GROUND CLEARANCE (wheel assemblies fitted, with wheels extended)

Cabins and platforms	...	...	...	...	...	...	9 in (23 cm)
Towing frame (4K/9542477), towing eye position above ground							
high	...	...	...	...	...	31 ± 1 in	(79 ± 2.5 cm)
low	...	...	...	...	...	20 ± 1 in	(51 ± 2.5 cm)

WEIGHTS, GROSS (fully stowed, ready for transit)

Transmitter cabin	...	...	...	...	...	...	4250 lb (1928 kg)
Receiver cabin	...	...	...	...	...	...	3250 lb (1474 kg)
Generator platform, Tx, fully stowed	...	...	...	...	...	...	4400 lb (1995 kg)
Generator platform, Rx, fully stowed	...	...	...	...	...	...	4450 lb (2018 kg)
Towing frame (complete with tools)	...	...	...	...	...	...	80 lb (36.3 kg)
Lifting equipment 10AS/9330816	...	...	...	...	...	...	125 lb (57 kg)
Wheel assemblies 4K/9542478, 1 set	...	...	...	...	...	...	440 lb (200 kg)
Complete station ready for transit	...	...	...	...	...	...	16350 lb (7416 kg)

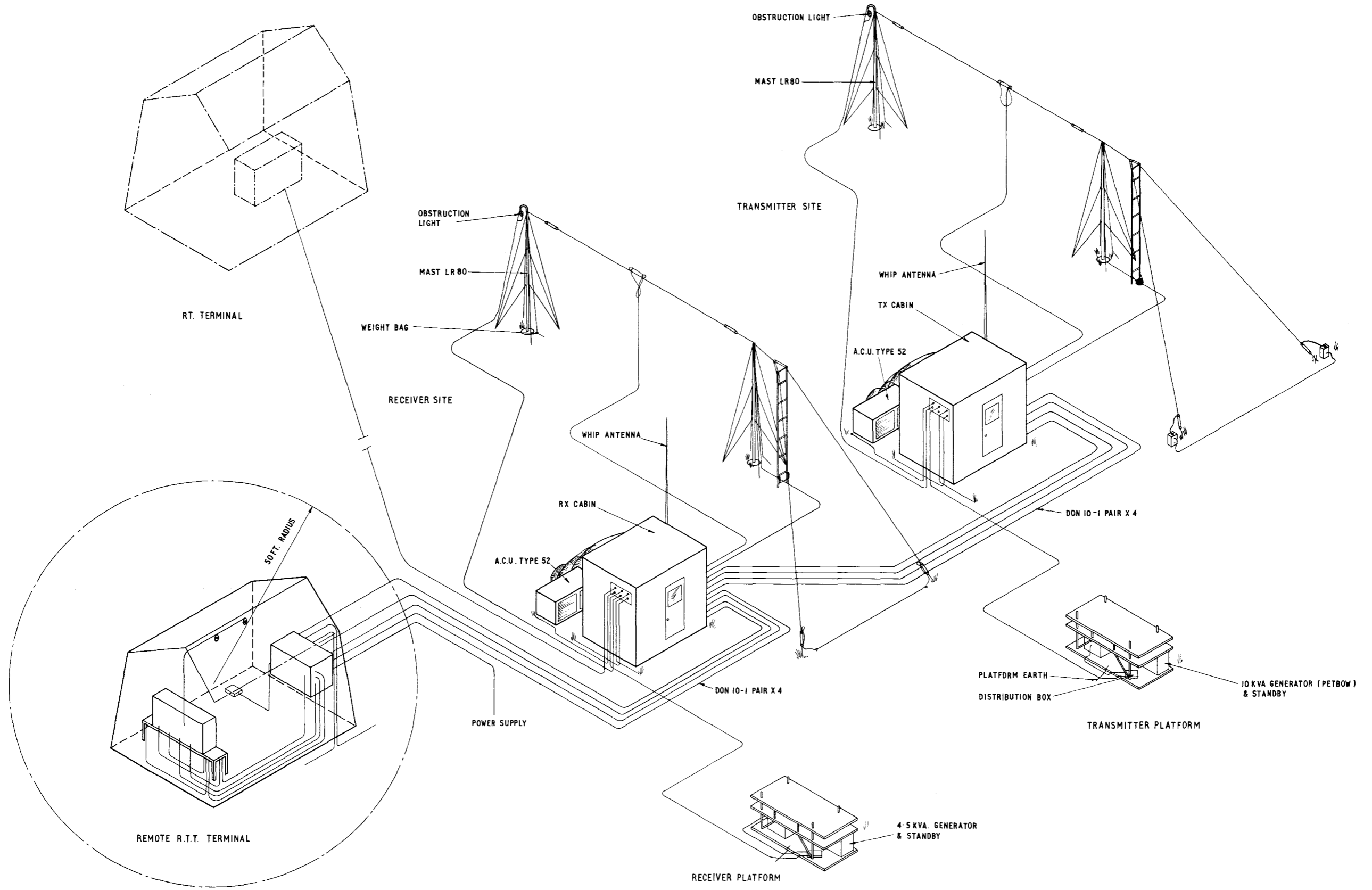


Fig. 1

TGRI(AT)26058/1 - Station layout-typical

Fig. 1

AIR TRANSPORTABLE MULTI-FREQUENCY
HF SSB RATT/VOICE/CW GROUND TO AIR STATION

TGRI(AT)26063/1

RELEVANT PUBLICATIONS

AP 116K-0425-1
AP 116E-0127 series (communication equipment)
AP 116Q-0102-1 (v.h.f. relay link)
AP 116E-1725-1 (high power monopole)

FUNCTION

The station is used for ground-to-air communication in the high-frequency band on three transmit channels, two low power and one high power, and three receive channels for RATT, voice and offset W/T. It is equipped for s.s.b. operation (only the upper sideband being used) with remote or local automatic control of frequency and mode of operation.

BRIEF DESCRIPTION

The main equipment is installed in three transmitter cabins and one receiver cabin. Generators, aerials and ancillary equipment are carried on wheeled platforms and an additional workshop cabin is provided for the stowage of spares. When deployed, the transmit and receive sites are linked by land-line (up to 1 mile) or v.h.f. radio relay (up to 10 miles) and operations are controlled from a remote complex comprising a controller's console and three operators' consoles. The air controller has push-button control of channel allocation and monitoring, remote switching of all transmitters and remote tuning of the high power transmitter.

COMMUNICATION RANGE

1200 miles maximum.

FREQUENCY RANGE

2.0000 MHz to 29.9999 MHz in steps of 100 Hz.

FREQUENCY STABILITY AND ACCURACY

Dependent on the generator, standard frequency (stabilizing period 3 days). The synthesizer, electrical frequency incorporates a standby internal reference frequency source which includes a statement of the frequency stability and accuracy.

TRANSMITTER POWER OUTPUT

Transmitter 1	10 kW p.e.p., 7kW r.m.s.
Transmitter 2	1 kW p.e.p., 800W c.w.
Transmitter 3	1 kW p.e.p., 800W c.w.

RECEIVER SENSITIVITY

SSB and CW:	1 microvolt for 13 dB signal/noise ratio
AM:	5 microvolts for 13 dB signal/noise ratio (30% modulation)

POWER SUPPLIES

1. Transmitter 1 (Cabin 1)

Quantity two 42PN/1119597 (one standby) 50 kVA diesel electric generating sets, mounted on four wheeled running gear, each providing outlets:

- (1) 3 x 415V, 60A, 50 Hz 3-phase
- (2) 3 x 240V, 25A, 50 Hz single-phase
- (3) 2 x 240V, 15A, 50 Hz single-phase
- (4) 1 x 24V, 5A, d.c.

2. Transmitter 2 (Cabin 2), Transmitter 3 (Cabin 3) and Receiver control (Cabin 4) each cabin:

- (1) Quantity two 42PB/1 (one standby) 10 kVA diesel electric generating sets, mounted on stowage platform assembly, generator, providing outlets:
 - (a) 2 x 240V, 50A, 50 Hz single-phase
 - (b) 1 x 240V, 5A, 50 Hz single-phase

3. Control complex (for remote working only) is provided with

- (1) Quantity two 42JL/1 (one standby) 4.5 kVA petrol electric generating sets mounted on ancillary stowage platform, generator providing outlets:
 - (a) 2 x 240V, 25A, 50 Hz single-phase
 - (b) 1 x 240V, 5A, 50 Hz single-phase

MAIN ITEMS OF INSTALLATION

1. Cabin, radio transmitter group 10D/5895-99-954-2751, in container type 85D (Cabin 1). The installation includes:

- (1) Transmitter set, radio, 5820-99-953-2077 (Racal TTA227) comprising:
 - (a) Transmitter sub-assembly, 5820-99-950-5890 (Racal TA184A). Qty. 1.
 - (b) Transmitter sub-assembly, 5820-99-953-2076 (Racal MA228B). Qty. 1.
 - (c) Regulator, voltage, 6110-99-951-0381 (Racal MA308) Qty. 1.
- (2) Rack assembly, channelling equipment, 5820-99-956-0164 (Plessey ATE 900).

2. Cabin, radio transmitter group in container Type B (Cabins 2 and 3).
The installation in each cabin includes:

- (1) Transmitter set, radio 5820-99-194-6465 (Racal 371C) Qty. 2 (one standby) each comprising:
 - (a) Synthesizer, electrical frequency 5820-99-971-7805 (Racal MA350B) Qty.1.
 - (b) Transmitter, sub-assembly, 5820-99-107-3802 (Racal MA79H) Qty. 1.
 - (c) Panel interconnecting and distribution 5820-99-107-5917 (Racal LA 287B) Qty. 1.
 - (d) Radio frequency unit 5820-99-107-9122 (Racal TA349C) Qty.1.
 - (e) Power supply unit 5820-99-195-3840 Qty. 1.
 - (f) Aerial tuning unit 5820-99-971-8017 (Racal MA144) Qty.1

3. Cabin, radio receiver, control group in container Type 190 (Cabin 4).
The installation includes:

- (1) Qty.2. Receiving set radio 5820-99-950-5773 (Racal RTA 191) incorporating sub-assembly Generator, standard frequency 5820-99-948-8560 (Racal MA259G)
- (2) Qty. 2 Receiving set radio 5820-99-950-5773 (Racal RTA 191) incorporating sub-assemblies:
 - (a) Convertor, tone-to-voltage 5820-99-580-8363 (Racal LA196)
 - (b) Power supply 5820-99-950-5590 (Racal PU238A)
- (3) Control, remote switching 5820-99-950-5776 (Racal LA182A) (transmitter control-panel) Qty.1.
- (4) Control, remote switching 5820-99-580-8364 (Racal LA186A).
- (5) Oscillator assembly 5820-99-580-8365 (Racal LA224) (tone generator) Qty. 1.
- (6) Power supply 5820-99-950-5590 (Racal PU238A) (+12V-0-12V supply) Qty.1.
- (7) Side tone amplifier (Racal LA223) Qty.5.

- (8) Rack assembly, channelling equipment 5820-99-956-0164 (Plessey ATE900)
4. Cabin, spares and servicing set, 10D/5895-99-195-4541, in container type B (Cabin 5). The installation includes built-in stowages and servicing facilities.
 5. Antenna and stowage platform assemblies (see antenna systems).
 6. Stowage platform assemblies generator (see power supplies.
 7. Running gear (limit 5 mph)
 - (1) Multi-trans. running gear 4K/954 3916 used on Cabins 1 and 4 (including towbar and tool kit)
 - (2) Four wheel running gear 4K/5895-99-954-2478; towing frame, 4K/2540-99-954-2477; tool kit 10AG/933 1067 used on Cabins 2,3 and 5, platforms and 50 kVA generators.
 8. Running gear for road transportation:
 - (1) Mobilizer, Type A9500 AV-IIM running gear used on Cabins 1 and 4.
 - (2) Two wheel running gear used on Cabins 2,3 and 5, platforms and 50 kVA generators.

ANTENNA SYSTEMS

1. Transmitter:
 - (1) High power, tuneable monopole, 80 ft, Racal Type 3062 Qty 1 used with transmitter (Cabin 1).
 - (2) Wide-band, omnidirectional Marconi Conifan Type RA5050-03 (2.3 MHz to 18 MHz) Qty 2.
 - (3) Type RA5050-04 (3.5 MHz to 30 MHz) Qty.2
Used with low power transmitters (Cabins 2 to 3).
 - (4) Whip antenna, 110B 30001, 8 x 4 ft sections, Qty.4.
Used with low power transmitters.
2. Receiver:
 - (1) Wide-band omnidirectional Marconi Conifan Type RA5050-02 (2.0 MHz to 30 MHz)
 - (2) VHF antennas
 - (a) Yagi six-element array 5985-99-195-5080 Qty.2
 - (b) Mast Type S5/1 5985-99-933-2356 Qty.2
 - (c) Erector, mast Type S3/1 5985-99-933-2358 Qty.2
One set carried in each of Cabins 1 and 2.

EXTERNAL DIMENSIONS (including running gear attachment fittings)

Cabin 1	length	11 ft 2 in	(341 cm)
	width	6 ft 8½ in	(205 cm)
	height	6 ft 3 in	(191 cm)
Cabins 2,3 and 5	length	6 ft 2½ in	(190 cm)
	width	5 ft 1 in	(155 cm)
	height	5 ft 5 in	(165 cm)
Cabin 4	length	14 ft 8 in	(447 cm)
	width	6 ft 8 in	(203 cm)
	height	6 ft 3 in	(191 cm)

Note:

With container running gear frames stowed flat against cabin end walls, no difference in cabin length results. With wheel assemblies fitted to support tubes and in line, length is increased by 16 inches.

Antenna platform (monopole)	length	10 ft 6½ in	(320 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 1½ in	(156 cm)
Antenna platform (low power)	length	7 ft 8 in	(234 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 1½ in	(156 cm)
Ancillary platform	length	7 ft 8 in	(234 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 1½ in	(156 cm)
Generator platform (50 kVA)	length	7 ft 8 in	(234 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 1½ in	(156 cm)
Generator platform (10 kVA)	length	7 ft 8 in	(234 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 1½ in	(156 cm)
Generator platform (4.5 kVA)	length	7 ft 8 in	(234 cm)
	width	5 ft 5 in	(165 cm)
	height	5 ft 1½ in	(156 cm)

Note:

When wheel assemblies are fitted to platforms, the overall width is increased by 21 in.

GROSS WEIGHTS

Cabin 1	...	...	...	...	...	...	...
Cabin 2	...	...	...	...	...	...	...
Cabin 3	...	...	...	...	...	...	...	This data to be issued later
Cabin 4	...	...	...	...	...	...	...
Cabin 5	...	...	...	...	...	...	...
Antenna platform (monopole)	...	...	...	...	...	...	...
Antenna platform (low power)	...	...	...	...	...	...	...
Ancillary platform	...	...	...	...	...	...	...
Generator platform (50kVA)	...	...	...	...	...	...	...
Generator platform (10kVA)	...	...	...	...	...	...	...
Generator platform (4.5kVA)	...	...	...	...	...	...	...

RUNNING GEAR (multi-trans Type HB1)

Weight per leg	...	...	...	...	...	...	...	265 lb (120 kg)
Maximum lift	...	...	...	...	...	...	...	5 ft (152 cm)
Min. ground clearance	...	...	...	...	...	...	...	20 in (51 cm)
Tyre pressure	...	...	...	...	...	...	...	85lb/in ² (5.97 kg/cm ²)

Four wheel

length	...	...	...	...	...	...	...	6 ft (183 cm)
width, over spigots	...	...	...	...	...	...	...	19 ³ / ₄ in (50 cm)
width, over frame	...	...	...	...	...	...	...	9 ¹ / ₂ in (24 cm)
weight (1 set)	...	...	...	...	...	...	...	440 lb
tyre pressure	...	...	...	...	...	...	...	90lb/in ² (6.33 kg/cm ²)

Towing eye (position above ground when connected to wheel assemblies)

		high	...	...	...	...	...	31 ± 1 in (79 cm)
		low	...	...	...	...	...	20 ± 1 in (51 cm)
Maximum towing speed	...	...	...	...	...	...	...	10 m.p.h.(16 k.p.h.)

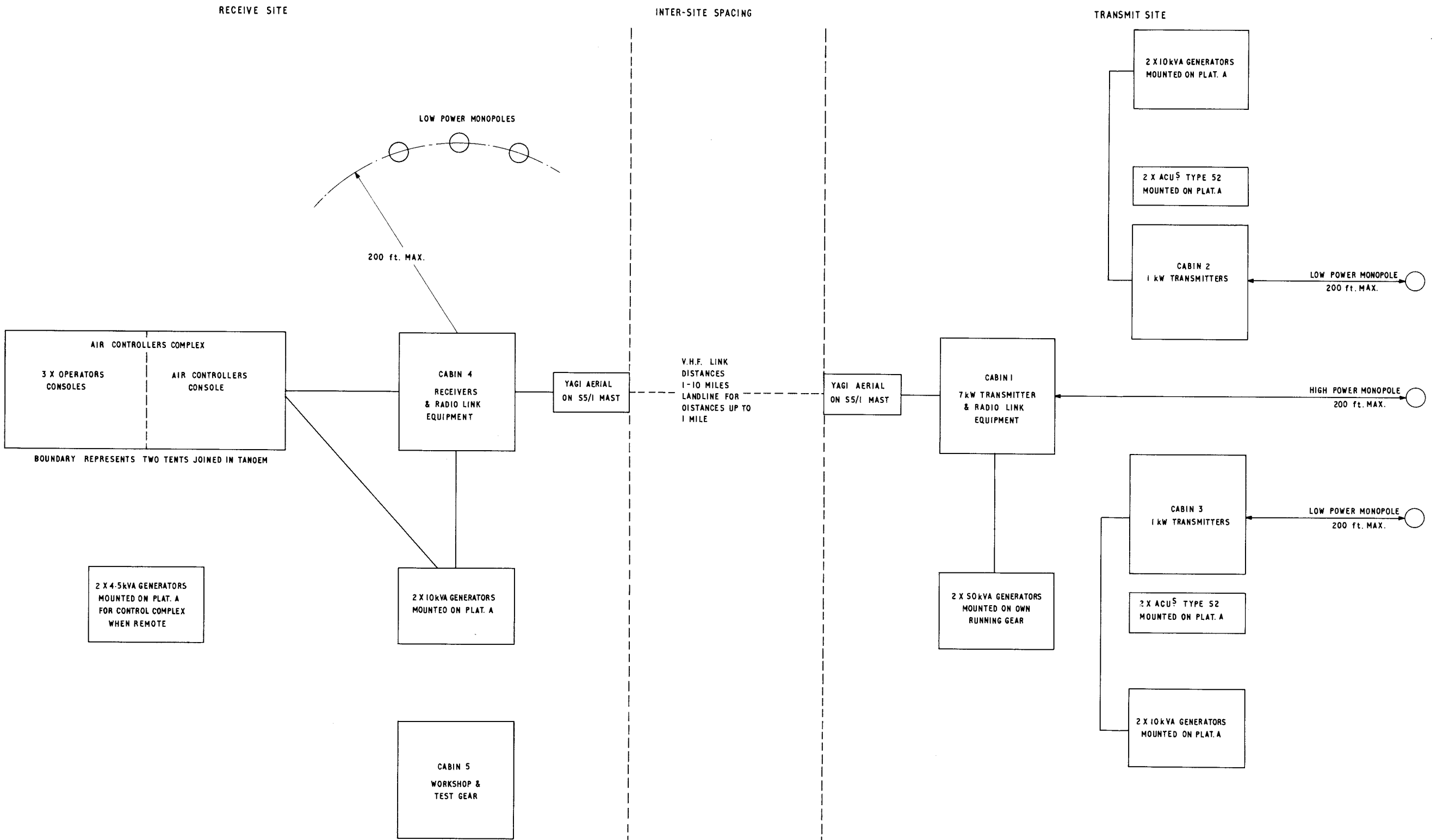


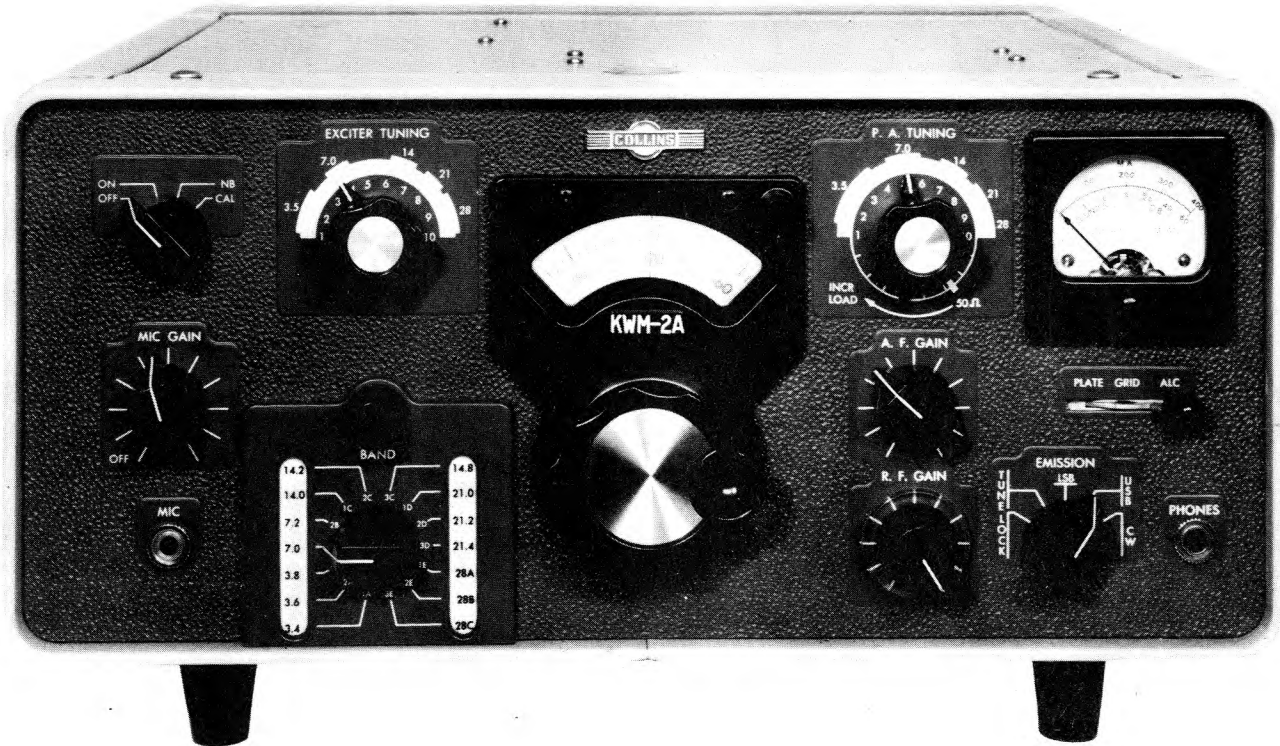
Fig. 1

TGRI (AT) 26063 I - typical site layout

Fig. 1

TGRI(AT)23183/1

PORTABLE HF SSB CW COMMUNICATIONS STATION

RELEVANT AIR PUBLICATIONS
116E-0128-1

Transceiver KWM-2A (110D / 39169)

FUNCTION

The equipment is a manually operated portable transceiver for operation on single sideband (upper or lower) and cw transmission and reception.

ORIGIN Collins Radio Company, Cedar Rapids, Iowa, U.S.A.
Type KWM -2A.

GENERAL DESCRIPTION

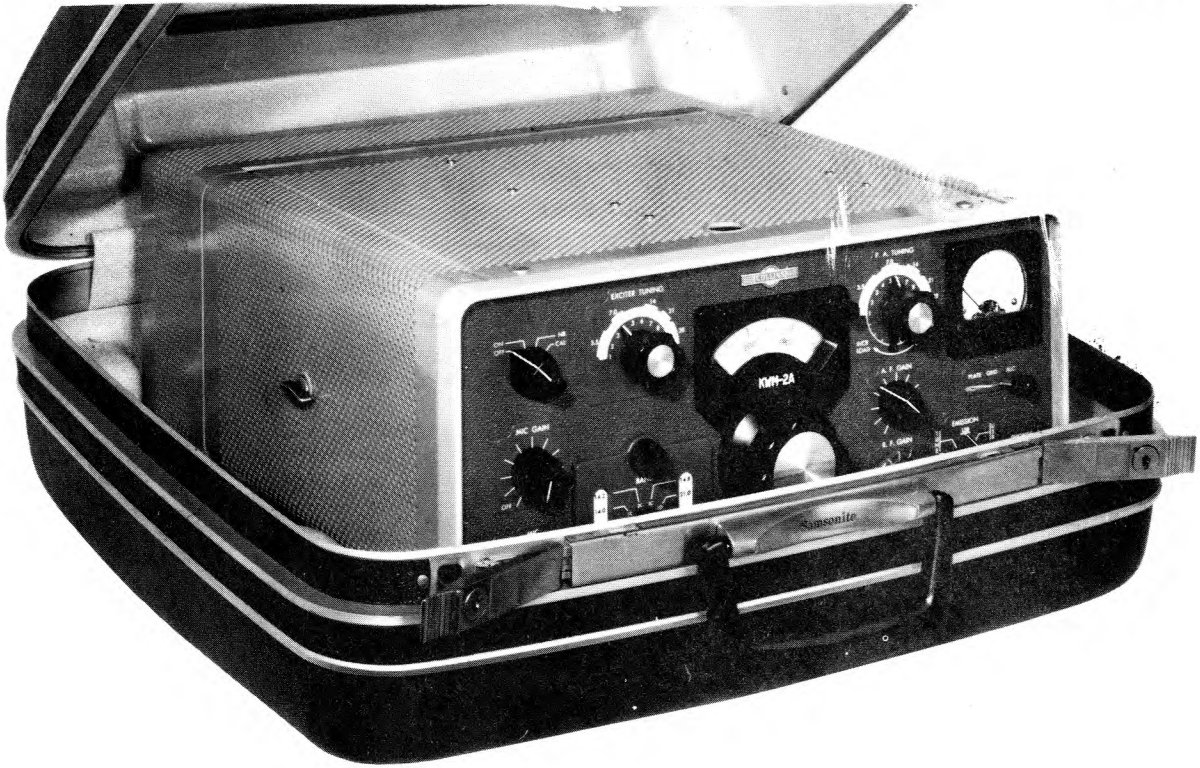
The station consists of a transceiver, noise blanker, a.c. power supply, station control, microphone, antenna and associated cables and two carrying cases. An additional unit, although not part of the TGRI may be employed to boost the output of the transceiver. This r.f. amplifier has its own carrying case.

The transceiver has a voice operated transmission facility such that when the equipment is operational its normal state is that of receive and transmission will only commence when the input level rises above a certain pre-set value. This facility may be overridden and a manual control used. The a.f. input and output from the transceiver may be coupled into a balanced 600 ohms telephone line.

TECHNICAL DATA

TRANSCEIVER KWM-2A (110D/39169)

Frequency range	3.4-5.0 MHz and 6.5-30 MHz
Frequency bands	A maximum of 28, each 200 kHz wide
Frequency calibration accuracy	± 1 kHz
Frequency stability	not more than 100 Hz variation after warm up
Modes of operation	Single sideband (upper or lower) and break-in c.w. keying.
Types of service	Single sideband. Continuous c.w. 50% duty cycle. (Keydown condition not to exceed 15 secs.)
Power consumption	Receive 235 watts. Transmit 475 watts
RF power output	100 watts p.e.p. into 50 ohms
Distortion	At least 30 dB below p.e.p. output (3rd order distortion)
Unwanted sideband suppression	50 dB below p.e.p. output
Oscillator breakthrough	
Second harmonic radiation	40 dB below p.e.p. output
Carrier suppression	50 dB below p.e.p. output
Audio frequency response	300-2400 Hz at 6 dB
Receiver sensitivity	0.5 μ V for 10 dB signal to noise ratio
Receiver selectivity	2.1 kHz band width at -6 dB, 4.2 kHz band width at -60 dB
Audio output power	1 watt maximum
Output impedances	
Loudspeaker	4 ohms
Headphones	600 ohms
Phone patch	500 ohms



Tranceiver KWM-2A with carrying case CC-2 and a.c.power unit PM-2.



Station control unit 312B-4 (110L/39168) and portable antenna TD-1 (110B/39086) with carrying case. (microphone not shown)

NOISE BLANKER (110D/39172) (Plug-in unit in the transreceiver)

Frequency	40 MHz
Bandwidth	1.5 MHz \pm 0.5 MHz
IF bandwidth	1.5 MHz to 4.0 MHz
Sensitivity	Input signal of 100 μ V peak causes at least 35 dB reduction of gain in receiver signal path.
Cross modulation	6 dB maximum deterioration in cross modulation and/or blocking characteristics in the associated transceiver.
Spurious response	Internal noise is less than 1 μ V equivalent signal

AC POWER SUPPLY PM-2 (110K/39171) (Extension behind KWM-2A)

Supply voltage	115 or 230V a.c. single-phase 50-60 Hz.
Output	+800V, +275V, -50 to -90 adjustable bias supply and 6.3V a.c.

STATION CONTROL 312B-4 (110L/39168) (included as a separate unit)

Telephone line impedance	600 ohms balanced
Phone patch impedance	
Receiver output to phone patch	500 ohms
Phone patch input to transmitter	High impedance.
Loudspeaker impedance	4 ohms

MICROPHONE Type SM-2 (110AH/39085) Pressure operated dynamic

Impedance	100 kilohms
Frequency response	250-3500 Hz at -3 dB
Output level	-50 dB below 1 V/dyne/cm.
Polarization	Omnidirectional

PORTABLE ANTENNA Type TD-1 (110B/39086)

Type	Adjustable halfwave dipole
Frequency range	3.5 to 30.0 MHz
Impedance	50 ohms
Feed system	Unbalanced coaxial cable
Maximum RF power input	1000 watts p.e.p. or 1000 watts 100% amplitude modulated

RF LINEAR AMPLIFIER 30-L (110D/39170) (not a part of TGRI (AT/23183/1))

Frequency range	3.4-30.0 MHz
Modes of operation	Single sideband or c.w.
Type of service	Single sideband: continuous 50% duty cycle (Keydown condition not to exceed 15 sec.)
Supply voltage	115 or 230V a.c. single-phase 50-60 Hz
Power consumption	1550 watts (approximate)
Input impedance	52 ohms, unbalanced
Drive power input	70 watts
RF power output	500 watts p.e.p. s.s.b. 500 watts
Harmonic radiation	c.w. (into 52 ohms) all harmonics at least 40 dB below p.e.p. output

ENVIRONMENTAL CONDITIONS

Temperature range	0°C to + 50°C
Humidity range	0% to 90% relative
Operational altitude	Sea level to 10,000 ft.

DIMENSIONS

	Height	Depth	Width
Transceiver	197 mm	356 mm	375 mm
Noise blanker (Plug in unit in KWM-2A)	121 mm	48 mm	162 mm
AC power supply (Extension behind KWM-2A)	197 mm	279 mm	375 mm
Station control unit	191 mm	298 mm	279 mm
Carrying cases	241 mm	546 mm	533 mm
RF linear amplifier (not part of TGRI)	197 mm	349 mm	375 mm

WEIGHT

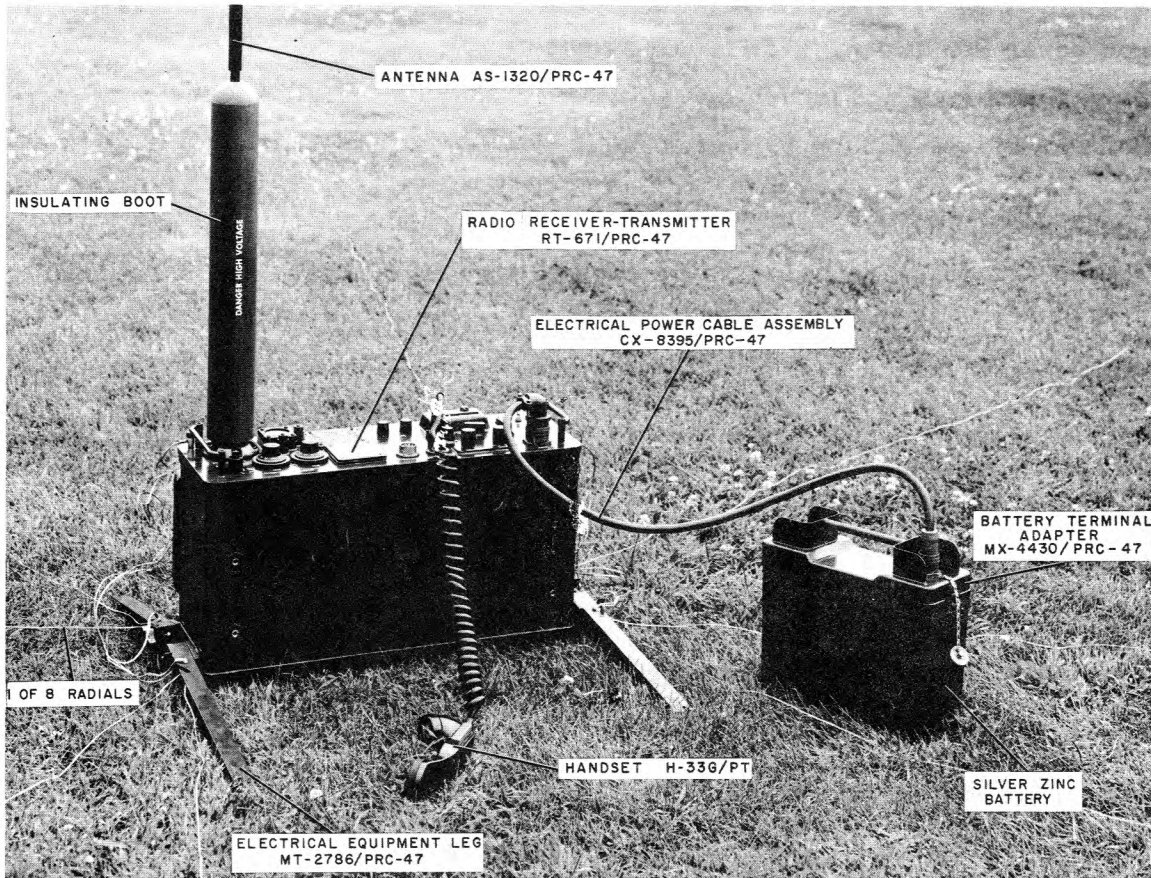
Transceiver	8.85 kg
Noise blanker	0.57 kg
AC power supply	6.13 kg
Carrying cases	4.3 kg or 4.5 kg
Case with transceiver and power supply (+ noise blanker)	19.8 kg
Case with antenna and station control	10 kg
RF linear amplifier	17.25 kg
Case with RF linear amplifier	21.6 kg



RF linear power amplifier 30-L (110D/39170) & carrying case
(not part of TGRI(AT)23183/1)

TGRI(AT)23184/1 MGRI 23184
MOBILE HF COMMUNICATIONS SYSTEM
COLLINS AN/PRC 47

RELEVANT AIR PUBLICATIONS
116E-1907-1A, 1B6



MOBILE HF COMMUNICATIONS SYSTEM

FUNCTION

To provide an h.f. s.s.b. communications facility in the frequency range 2 MHz to 11.9 MHz. The equipment is designed for use in an air transportable (TGRI AT) or mobile (MGRI) role.

ORIGIN Collins Radio Inc. Type AN/PRC 47

GENERAL DESCRIPTION

The complete system, comprising a transmitter-receiver unit, whip and long-wire aerials and associated items may be carried by two men or vehicle mounted. It is powered either from batteries or from the vehicle's d.c. generator. Alternatively a suitable mains a.c. supply could be employed.

The equipment provides c.w. and u.s.b. voice transmission. With a suitable converter FSK mode may also be employed.

TECHNICAL DATA

FREQUENCY RANGE 2 MHz to 11.9 MHz in 1 kHz increments
NUMBER OF CHANNELS 10,000

TRANSMIT POWER OUTPUT

Low power 20W p.e.p.

High power 100W p.e.p

Nominal values into a 50 ohm load.

RECEIVE SENSITIVITY

Signal and noise to noise ratio of at least 10 dB with 2 μ V r.f. input and 50 mW minimum a.f. output.

RECEIVE SELECTIVITY

Receiver overall audio response is within + 6 dB from 300 to 3000 Hz with reference to 1700 Hz and at least -60 dB at 4.6 kHz above and 1 kHz below the selected frequency,

RECEIVE IF REJECTION at least 80 dB down

RECEIVE IMAGE REJECTION

With reference to 5 μ V input signals 80 dB from 2 MHz to 5.9 MHz
60 dB from 6 MHz to 9.9 MHz
50 dB from 10 MHz to 11.9 MHz

RECEIVE AGC CHARACTERISTICS

Maximum variation of 10 dB for input signals from 5 μ V to 0.1V

RECEIVE AUDIO OUTPUT at least 500 mW for 1 mV input

RECEIVE AUDIO DISTORTION

Does not exceed 15% for 1 mV RF input signal at 500 mW output.

RECEIVE OVERALL AUDIO RESPONSE

Within \pm 6 dB from 300 Hz to 3 kHz with reference to 1.7 kHz

UNDESIREB SIDEBAND REJECTION at least 60 dB

THIRD ORDER INTERMODULATION PRODUCTS at least 30 dB down

TRANSMIT CARRIER SUPPRESSION at least 40 dB down

HARMONIC SPURIOUS EMISSION

Second harmonic is at least 35 dB down on the transmission output.
All others are at least 50 dB down.

FREQUENCY STABILITY

±25 Hz for 60 days

POWER SUPPLY REQUIRED

24V to 28V d.c. battery or vehicle generator or
115V a.c. single phase at 400 Hz

POWER CONSUMPTION

Transmit (voice)	320 watts approximately
Receive	21 watts maximum

Duty cycle

Continuous operation	1 minute transmit followed by 9 minutes receive.
High power	5 minutes transmit followed by 10 minutes receive for one hour.
Low power	2 minutes transmit followed by 9 minutes receive in continuous operation. or 10 minutes transmit followed by 5 minutes receive for 1 hour.

TEMPERATURE RANGE

-40°C to +60°C

HUMIDITY RANGE

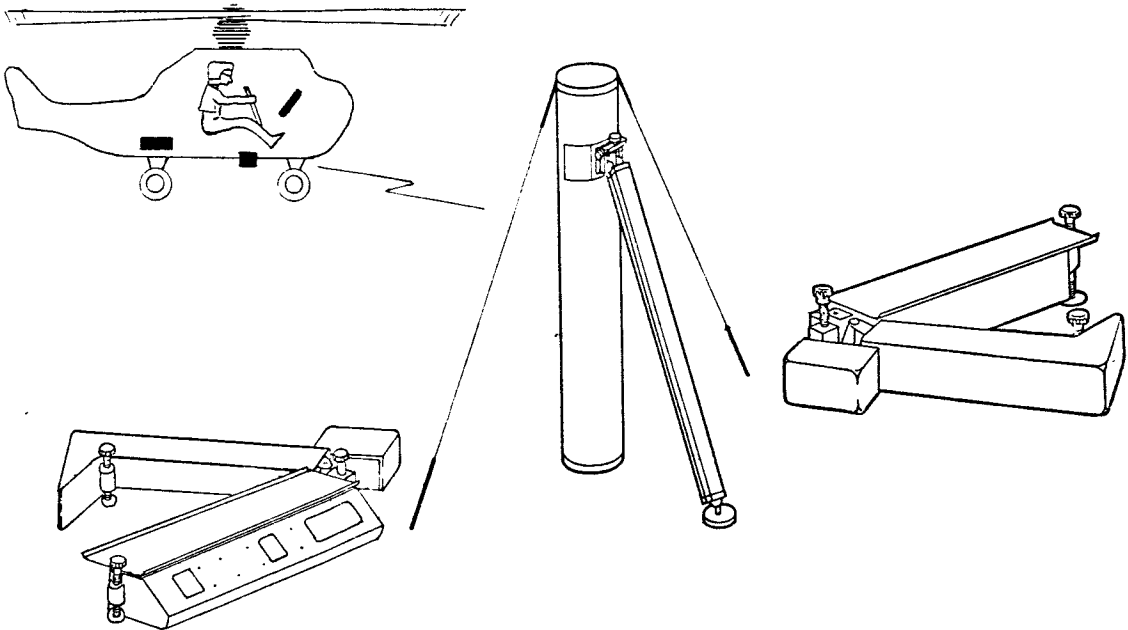
0-100% relative

ALTITUDE RANGE

Sea level to 12,000 ft.

TGRI(AT)23253/1
MICROWAVE AIRCRAFT DIGITAL GUIDANCE EQUIPMENT
(MADGE 1)

RELEVANT AIR PUBLICATIONS
116C-0404-1



Madge 1 equipment

FUNCTION

Madge 1 is a portable approach aid, providing guidance for helicopter, CTOL, STOL, and VTOL aircraft. It provides range, azimuth, elevation (glidepath) and identification information when interrogated by a suitable signal. It is suitable for use at temporary and forward airfields and at helicopter and VTOL landing pads on the ground.

ORIGIN

MEL Equipment Company Ltd. Crawley, Sussex.

GENERAL DESCRIPTION

The ground equipment consists of two azimuth units, an elevation unit and a transponder. The aircraft equipment consists of a transceiver, logic unit and a pilot's control unit. The ground equipment is in the standby mode until interrogated by the aircraft, when it transmits identification, information and azimuth and elevation angles derived by interferometer techniques. Range information is obtained from the there-and-back time of the signal in the aircraft. The ground equipment will operate unattended, and may be set up in fifteen minutes by two men.

The pilot selects the approach angle and glidepath and the information from the ground is presented as deviations from the chosen path.

TECHNICAL DATA

GROUND EQUIPMENT

TRANSPONDER

Frequency range	5.0-5.25 GHz
Transmitter power	140 watts
Receiver sensitivity	-89 dBm
Receiver dynamic range	65 dB
Bandwidth	3.0 MHz
Frequency channels	
Ground/Air TX	3 channels
Air/Ground RX	1 channel

AZIMUTH AND ELEVATION UNITS

Frequency range	5.0-5.25 GHz
Receiver sensitivity	-84 dBm
Receiver dynamic range	-65 dB
Bandwidth	3.0 MHz
Frequency channels	1 of 4 (fixed channels)

POWER SUPPLY REQUIRED

24V d.c. nominal (18-29V d.c. acceptable)

Consumption

Standby	26 watts
operating	200 watts

ENVIRONMENTAL CONDITIONS

Humidity 20% to 100% relative

Temperature -46°C to +43°C

The system will operate in a rainfall of 26mm/hour over the full path length of 15 nautical miles.

DIMENSIONS

	Height	Width	Length
Azimuth antenna unit	265mm	120mm	240mm
Elevation antenna unit	1700mm	Dia. 230mm	
Ground transponder set	265mm	Width 360mm	Depth 240mm

WEIGHT

Azimuth antenna unit	20 kg
Elevation antenna unit	24 kg
Ground transponder unit	7 kg

OPERATIONAL PERFORMANCE

OPERATIONAL COVERAGE

Azimuth (approach and overshoot)

Horizontal

0 to 15 nautical miles range	$\pm 45^\circ$
0 to 2 nautical miles range	$\pm 65^\circ$

Vertical 0° to 45°

Range

In $\pm 45^\circ$ sector:-	greater than 15 nautical miles
In $\pm 65^\circ$ sector:-	greater than 2 nautical miles

Elevation (glidepath)

Horizontal

Vertical:-

Range:-

	$\pm 45^\circ$
	From less than 1.5° to 26° above the horizontal
	Greater than 15 nautical miles

Range and range rate

Horizontal

Vertical

Range

	360°
	0° to 45°
	greater than 15 nautical miles

System range accuracy

± 15 metres or 1% of range

System minimum range:-

50 meters

Range rate accuracy

better than 2.5% of range

Pilot selectable glide-slope

2° to 20° in 9 non-equal increments

Pilot selectable approach and overshoot angle offsets:-

Zero or $\pm 10^\circ$ or $\pm 20^\circ$ either side of datum and overshoot offsets

Ground address codes

12

Air address codes

1 universal, 99 others

System aircraft capacity
(per frequency channel)

in excess of 100 aircraft

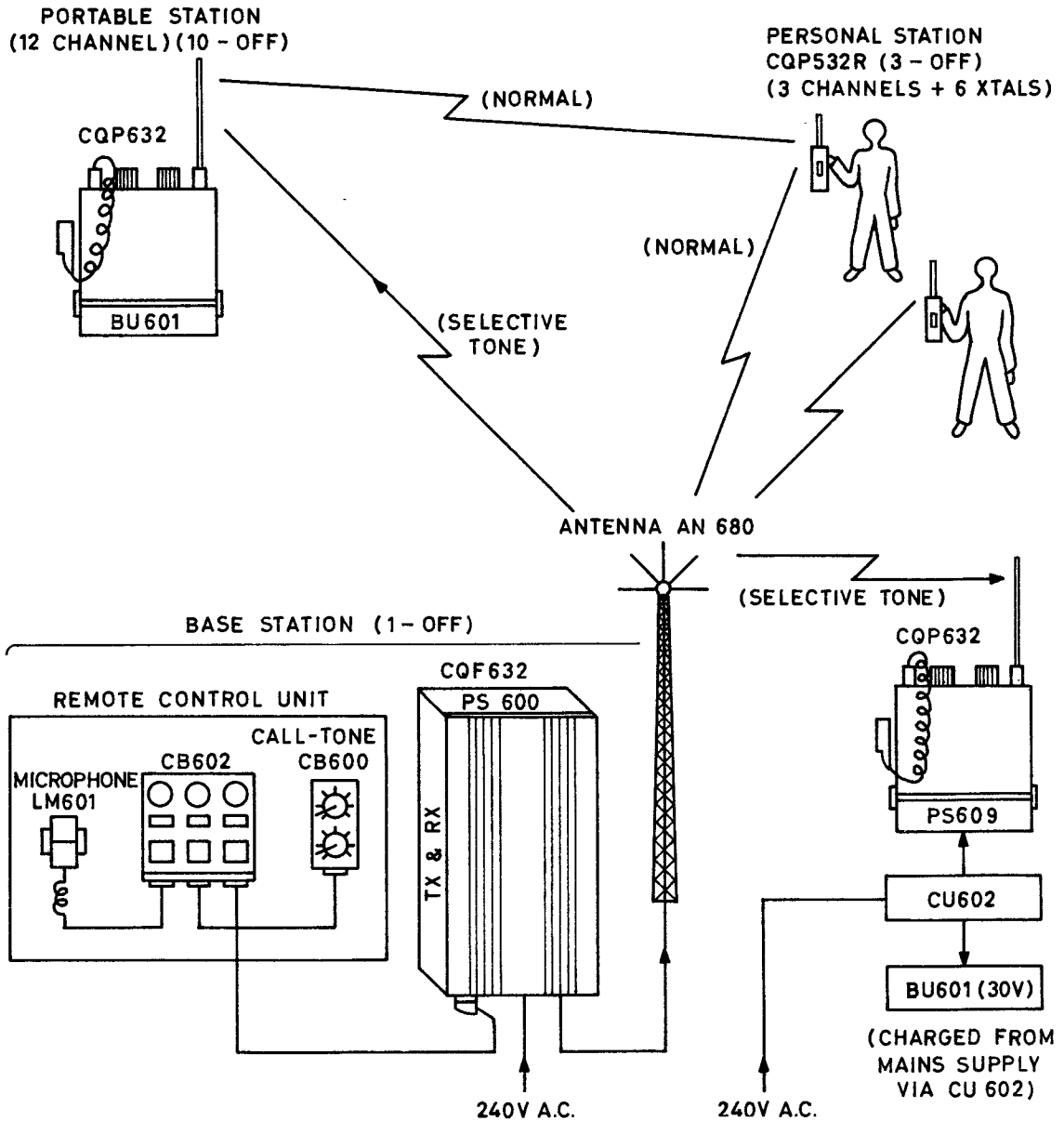
System angle and range noise

Azimuth noise	less than 0.1° r.m.s. at 15 nautical miles less than 0.02° r.m.s. at less than 1 nautical mile
Elevation noise	less than 0.07° r.m.s. at 10 nautical miles less than 0.02° r.m.s. at less than 1 nautical mile.
	50 metres at over 15 nautical miles.
Analogue range noise	Less than 30 metres at 15 nautical miles Less than 2 metres at 1 nautical mile
Range rate noise	Less than 7.5 knots at 15 nautical miles Less than 2.5 knots at less than 5 nautical miles.

Both ground transponder receiver and azimuth elevation antenna receiver are protected against pulsed signals having field strength of 25kW/m^2 at a duty cycle of 0.001 in the frequency range of 1 GHz to 12 GHz.

TGRI(AT)26086/1
MOBILE RADIO TELETALK SYSTEM

RELEVANT AIR PUBLICATIONS
116E-2125-1



Mobile radio teletalk system TGRI(AT)26086/1

FUNCTION

The system is a low power v.h.f. phase modulated radio telephone system for short range ground-to-ground communication single frequency simplex working, operating in the frequency range of 68-88 MHz with 25 kHz channel spacing.

ORIGIN Storno Co. Ltd.

GENERAL DESCRIPTION

The system consists of a base station communications pack, ten outstation equipments, one personal communications pack containing three personal communicators, and a base station antenna and accessories kit. The base station and outstations have twelve channels available while the personal communicators have only three available at any one time. The outstations are selectively called from the base station with a two-tone call signal. All other calls are made using speech only. The base station is fixed although it may be controlled from a remote site. The outstations may be either static or vehicle mounted and the personal sets may be carried in the leather case provided or in a pocket.

A) BASE STATION COMMUNICATIONS PACK CQF600-7218 (5820-99-622-4369)

MAIN ITEMS OF INSTALLATION

BASE STATION	CQF632-7218(5820-99-622-4364)
Transmitter unit	TX 632
Receiver unit	RX 632
Charging unit	CU-600-7218a
Power supply unit	PS-609-7218
Battery unit	BU-601-7218
all housed in alloy cabinet	CA 602

EXTENDED LOCAL CONTROL UNIT CB-602-7218 (5820-99-622-4366) consisting of:-

Mounting board	MB-600-7218
Control unit	CB-602-7218/1 (5820-99-624-1622)
Control unit	CB-600-7218/1 (5820-99-624-1623)
Speaker/microphone	LM 601 (5820-99-622-3390)

ANTENNA AN680-7218 and coaxial feeder (5820-99-622-4365)

TRANSIT CONTAINER CA600-7218/1 (5820-99-622-4368)-lid
(5820-99-622-4367)-base

MAST TELESCOPE (5985-99-102-8508)
Mast accessories kit No. 3 (5985-99-104-5804)

A) TECHNICAL DATA

BASE STATION CQF-632-7218 (5820-99-622-4364)

Weight	2.4 kg
Dimensions	50 mm x 36 mm x 135 mm
RF power output	10 watts
Frequency range	68-88 MHz
Number of channels	12
Modulation	Phase, 300-3000 Hz
Maximum frequency deviation	±5 kHz
Spurious radiation	0.2 μW
Receiver sensitivity	0.5 μV for 12 dB SND/ND ratio e.m.f.
Selectivity	70 dB
AF output power	1W
Hum and noise	-40 dB
AF distortion	5%
AF output impedance	35 ohms
Power supply required	24V d.c.
Power consumption	100 watts
Power supply unit	PS609-7218
Input	230V a.c.
Output (regulated)	24V d.c.
(With a standby emergency 30V battery power supply against mains supply failure only).	

EXTENDED LOCAL CONTROL UNIT CB602-7218 (5820-99-622-4366)

Weight	3 kg
Dimensions	120 mm x 320 mm x 293 mm

ANTENNA AN680-7218 (5820-99-622-4365)

Centre frequency	79.5 MHz
Coaxial feeder impedance	50 ohms
Coaxial feeder length	20 m

MAST TELESCOPE (5985-99-102-8508)

Weight	12.7 kg
Height - closed	1.5 m
Height - extended	8.43 m
Diameter	89 mm

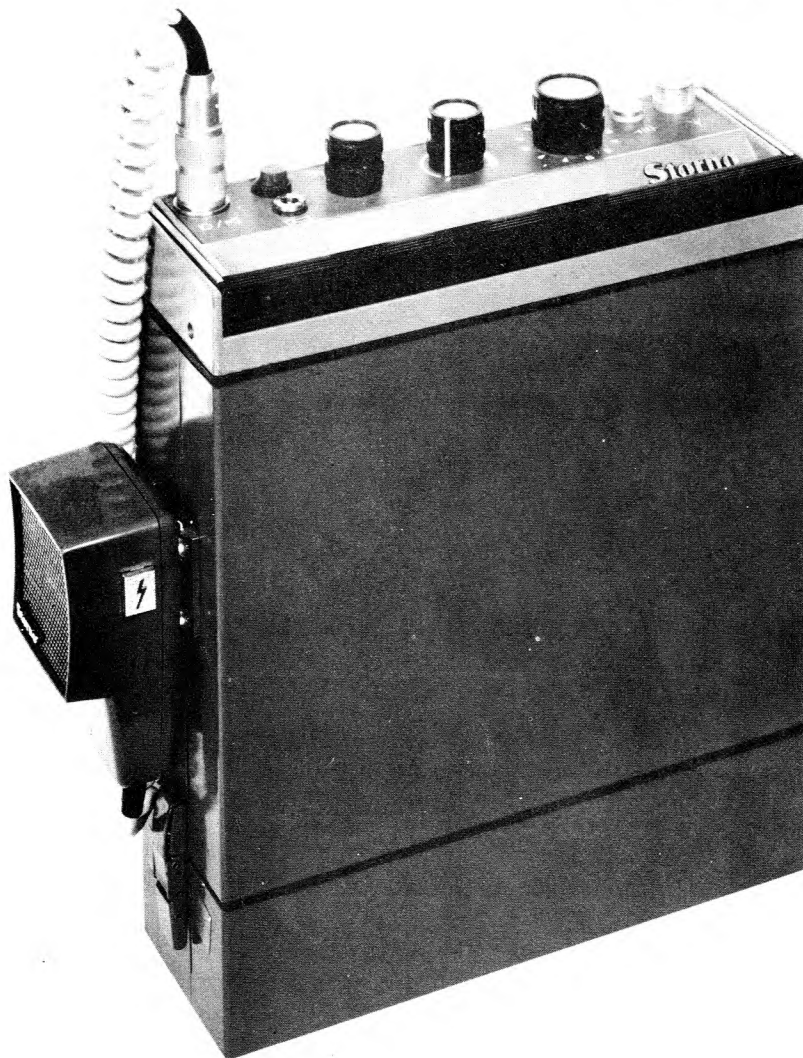
MAST ACCESSORIES KIT No. 3 (5985-99-104-5804)

Weight (full)

18.15 kg

Dimensions

724 mm a 215 mm x 230 mm



Portable station CQP632-To2(5820-99-622-4370

B) OUISTATION COMMUNICATIONS PACK (ten off) CQP-600-7218 (5820-99-622-4373

MAIN ITEMS OF INSTALLATION

Portable station	CQP-632-T02 (5820-99-622-4370)
Battery units (two-off)	BU 601 (5820-99-622-5657)
Power supply	PS-609-7218/1 (5820-99-622-3392)
Charging unit	CU-602-7218 (5820-99-622-6555)
Antenna	AN-630-UK (5820-99-622-9217)
Speaker/microphone	IM 601 (5820-99-622-3390)
Remote antenna adaptor and 10 m coaxial feed cable housed in transit container.	CA-600-7218/2

B) TECHNICAL DATA

PORTABLE STATION CQP-632-T02 (5820-99-622-4370)

Weight	3.5 kg
Dimensions	212 mm x 235 mm x 80 mm
RF power output	8W
Frequency range	68-88 MHz
Number of channels	9 (nominal 12)
Channel separation	25 kHz
Modulation	Phase 300-3000 Hz
Maximum frequency deviation	±5 kHz
Spurious radiation	0.2 μW
RF output impedance	50 ohms
Receiver sensitivity	0.8 μV
Selectivity	70 dB
AF output impedance	35 ohms
AF output power	1W
Hum and noise	-40 dB
AF distortion	5%

Power supply required

220/240V 50 Hz a.c. at 50 watts via power supply unit or
30V d.c. from 1.6 Ah battery unit (BU 601)

Power consumption	50 watts (max)
-------------------	----------------

BATTERY UNIT BU 601 (5820-99-622-5657)

Weight	3 kg
Dimensions	60 mm x 235 mm x 80 mm
Number of cells	24 (1.26V)
Output voltage (fully charged)	30V
Capacity	1.6Ah

POWER SUPPLY UNIT PS 609-7218/1 (5820-99-622-3392)

Weight	2 kg
Dimensions	72 mm x 235 mm x 80 mm
Input voltage	220-240V a.c. 50 Hz
Output voltage	25-60V d.c.
Power supply cable assembly	(5995-99-622-6554)

ANTENNA AN630UK (5820-99-622-9217)

Length 425 mm
 Centre frequency 80 MHz
 Nominal impedance 50 ohms

REMOTE ANTENNA ADAPTOR AN600-7218(5820-99-622-6553)

Coaxial feeder length 100 m

ELBOW CONNECTOR - (antenna) (5935-99-618-0625)

CHARGING UNIT CU602-7218 (5820-99-622-6555)

Dimensions 95 mm x 120 mm x 60 mm
 Input voltage 220/240V 50 Hz
 Maximum charging current 160 mA

TRANSIT CONTAINER CA600-7218/2 (5820-99-622-4377) lid
 (5820-99-622-4372) box

CALLING TONE CODES

Calling tone codes listed below are designed for use from base to a selected outstation.

Code	Frequency	Code	Frequency
A	615 Hz	1	1060 Hz
B	675 Hz	2	1160 Hz
C	735 Hz	3	1270 Hz
D	805 Hz	4	1400 Hz
E	885 Hz	5	1530 Hz
F	970 Hz	6	1670 Hz
		7	1830 Hz
		8	2000 Hz
		9	2200 Hz
		10	2400 Hz

A facility for selective calling from portable outstation to base station can be included if required.



Personal station CQP532R (5820-99-622-4359)

C) PERSONAL COMMUNICATIONS PACK CQP-500-7218 (5820-99-622-4363)

MAIN ITEMS OF INSTALLATION

Personal stations (three off)	CQP 532R (5820-99-622-4359)
Battery units (six off)	BU 501a (6140-99-521-1338)
Control units (four off)	CB 501a (5820-99-622-3178)
Headset interface units (three off)	(5820-99-622-4360)
Antennas (three off)	AN 530-UK (5820-99-622-9216)
Charging unit	CU-502/4 (6130-99-521-1341)
Battery tester	BT 570 U(6625-99-521-9537)
Headset (if required)	HP 501
Carrying case (three off) (leather)	49.139 (5820-99-525-0514)

Spare crystals and oscillators (12 off)

Transit container CA 500-7218/1 (5820-99-622-4362) lid
(5820-99-622-4361) base

Note:-A facility is provided for a built-in selective calling equipment if required.

C) TECHNICAL DATA

PERSONAL STATION CQP-532R

Weight	0.75 kg
Dimensions	196 mm x 72 mm x 33 mm
RF output power	400 mW
Frequency range	68-88 MHz
Number of channels	3
Channel separation	25 kHz
Modulation	Phase 300-3000 Hz
Maximum frequency deviation	±5 kHz
Spurious radiation	0.2 μW
RF output impedance	50 ohms
Receiver sensitivity	0.4 μV 50 ohms ($\frac{1}{2}$ emf)
Selectivity	65 dB
AF output power	180 mW
RF output impedance	40 ohms
AF distortion	7%
Power supply required	12V d.c., 225 mAh
Consumption	
Standby	10 mA
Receive	40 mA
Transmit	135 mA

BATTERY UNIT BU 501a (6140-99-521-1338)

No of cells	10
Output voltage (fully charged)	12.4V
Capacity	225 mAh

CHARGING UNIT CU 502/4 (6130-99-521-1341)

No of charging outlets	4
Power supply required	220-240V 50 Hz
Charging current output	27 mA (Max)

BATTERY TESTER BT 570 U(6625-99-521-9537))

Weight 1 kg

Dimensions 154 mm x 119 mm x 112 mm

ANTENNA AN 530 UK (5820-99-622-9216)

Centre frequency 77-88 MHz

PART 2

**TRANSMITTER-RECEIVERS AND
ANTENNA TUNING EQUIPMENT**

PART 2

TRANSMITTER-RECEIVERS AND ANTENNA TUNING EQUIPMENT

INTRODUCTION

- 1.** Section 1 of this Part covers those radio transmitters and receivers, such as radio relay or radio link equipment, associated with the main communications equipment used in the systems dealt with in Part 1, but not separately classified under any of the radio installation categories listed numerically in that Part.
- 2.** Self-contained items of antenna tuning equipment such as tuning units, multicouplers and matching networks are the subject of the information sheets issued in Section 2.

SECTION 1

TRANSMITTER-RECEIVERS

INDUCTIVE LOOP COMMUNICATION SYSTEM
(WITH VHF TALK-BACK FACILITY)
(Spemby and Lustraphone)

RELEVANT AIR PUBLICATION
116E-1908-15



Portable equipment in use on aircraft servicing perimeter area
(Induction receiver and transmitter)

FUNCTION

One way and two way very low power pocket-worn communication system between personnel on aircraft servicing perimeter area and also between personnel and local fixed base station.

ORIGIN

Title	Manufacturer	Type No.	NATO Stock No.
Controllers' microphone	Spemby	A424	5965-99-222-5773
Audio transmitter (50W)	Spemby	ILT50	5820-99-195-3380
Induction receiver	Spemby	ILR1	5820-99-195-3381
Headset	Ampliguard	-	-
Nickel-cadmium battery	Deac	6/7/DK0	-
Battery charger (Auxiliary equipment)	Spemby	SBC7/70	-
FM transmitter (25 mW)	Iustraphone	FMT/6100	5820-99-195-3382
ASP microphone	Iustraphone	VC52/THSB/ LV	
Controllers f.m. receiver	Iustraphone	FMR/408/ AMP19	5820-99-195-3383

GENERAL DESCRIPTION

The inductive loop communications system is designed to allow a controller at a base station to pass on information to personnel within an aircraft servicing perimeter area. These personnel are equipped with pocket worn induction receiver and a sound-proof headset. A secondary feature can be incorporated into the system which enables certain chosen personnel with a small 25 mW high quality transmitter to communicate with the base station (talk-back).

The pocket worn transmitter thus forms an f.m. 174.8 MHz link with the base station receiver, the output of which is fed to a loudspeaker and also to loop transmitter to provide a talk-through (re-transmission) to personnel with the inductive receivers facility whereby the crew chief can talk to any member of his team.

The controller at the base station can break-into the conversation with his own microphone press-to-talk switch.

TECHNICAL DATA

BASE STATION EQUIPMENT

LOOP TRANSMITTER Type ILT50

Output power at 1 kHz	50 watts r.m.s.
Output impedance	6-8 ohms
Range	Effective within an area of 500,000 sq. yards.
Sensitivity	10 watts output for 2.5 mV input. 50 watts output for 7.5 mV input. (for input voltages at 1 kHz measured at the microphone socket and with the gain control at maximum).
Total harmonic distortion	Not greater than 5% with 50 watts output at 1 kHz.
Frequency response	Between 60 Hz and 6 kHz, the power output variation is not greater than 3 dB relative to the output at 1 kHz.

POWER SUPPLY

100-250V, 40-60 Hz, single phase.

Consumption 170 watts.

DIMENSIONS

Width	Height	Depth
495 mm (19.5 in.)	292 mm (11.5 in.)	311 mm (12.25 in.)

WEIGHT 13.4 kg (29.5 lb)

Microphone Type A424

Impedance 300 ohms

Inductive loop cable Single core 7/.044 cable or equivalent (5E/4002)

FM RECEIVER type FMR/408/AML99

Frequency 174.6 MHz

Sensitivity/quieting (squetch) 5 μ V/30 dB

Aerial input impedance 75 ohms.

Audio frequency response \pm 2 dB over range 30 Hz to 20 kHz

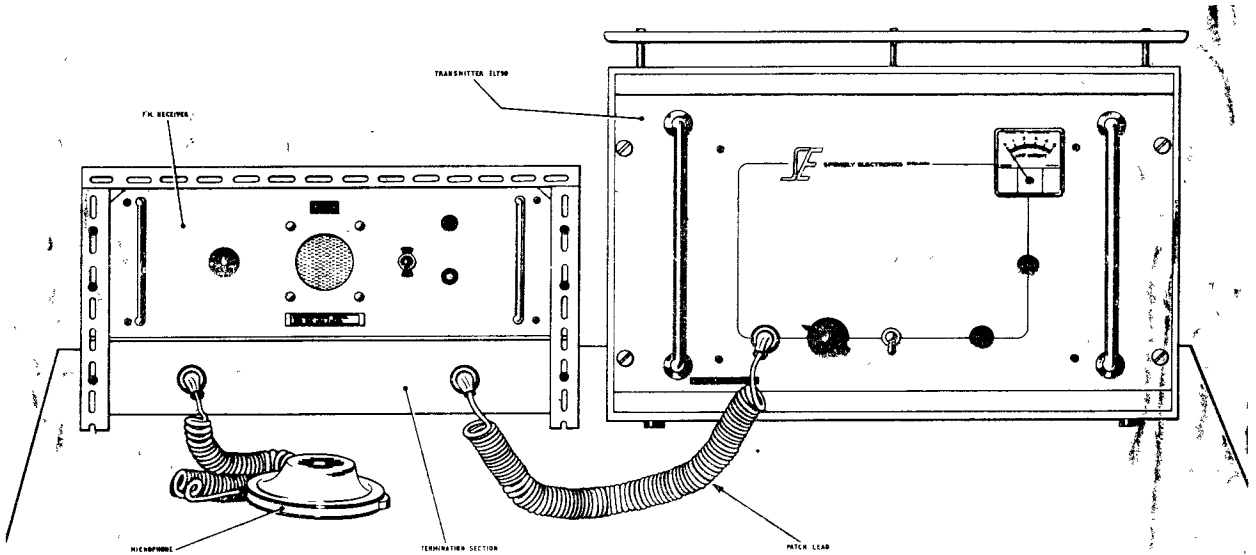
Output power 3 watts (internal loudspeaker)

Crystal frequency 54.7 MHz.

Intermediate frequency 10.5 MHz.

DIMENSIONS

	Width	Height	Depth
Front panel	483 mm (19 in.)	133 mm (5.25 in.)	
Chassis	425 mm (16.75 in.)	125 mm (4.9 in.)	108 mm (4.25 in.)
WEIGHT	3.25 kg (7 lb. 2 oz)		



174.8 MHz high quality f.m
talk-back receiver
(Lustraphone FMR/408/AMP19)

50-watt loop (audio) transmitter
(Spemby 1Lt50)

Local base station for aircraft servicing perimeter area.

PORTABLE POCKET PACKSET (for use in aircraft servicing perimeter area)

INDUCTION RECEIVER (type ILR1)

Sensitivity	With the receiver placed centrally in the magnetic field created by a current of 30 mA following in a one metre diameter single turn loop, the sensitivity should be 57 dB \pm 6 dB relative to the power level when 1mA is measured across a 600-ohm pad at 1 kHz.
Quiescent current	6 mA \pm 20%
Power supply	7V d.c. \pm 1V (Rechargeable battery)

DIMENSIONS

Width	Height	Depth
77 mm (3 in.)	125 mm (4.875 in.)	28 mm (1.125 in.)

WEIGHT 0.223 kg (7.5 oz)

Headset

Impedance 600 ohms.

FM TRANSMITTER type FMT/6100:(Wireless microphone)

Distortion	1% maximum for full modulation
Frequency	174.6 MHz
Frequency stability	\pm 0.006% over the temperature range 0°C to 40°C.
Output power	25 mW
Audio frequency response	\pm 2 dB over range 30 Hz to 18 kHz.
Microphone input	Approximately 30 ohms, noise cancelling moving coil microphone.
Aerial	Freely suspended flexible wire.
Power supply required	14V d.c. \pm 2V (batteries).

DIMENSIONS

Width	Height	Depth
93 mm (3.6 in.)	153 mm (6 in.)	22 mm (0.875 in.)

WEIGHT 0.51 kg (1 lb. 2 oz)

Microphone (type VC52/THSB/LV)

Output level.	1 mV (approximately)
Frequency response.	The response curve is flat from 1.7 kHz to 3.5 kHz.
Impedance	25 ohms.
Pattern	Moving coil, noise cancelling

DIMENSION

	Diametre	length
	25 mm (1 in.)	140 mm (5.5 in.)
Weight (Including lead and plug)		0.255 kg (9 oz)

SECTION 2

ANTENNA TUNING EQUIPMENT

Sheet No. 1

AMPLIFIER

Type A.1977 (10D/16748)

Relevant publications:—

A.P.116E-1703-1
(formerly A.P.2881D, Vol. 1)

Function

Wide band r.f. amplifier, used as a multi-coupler for feeding two banks of five receivers from two aerials or one bank of ten receivers from one aerial.

Frequency range

2 MHz to 30 MHz (150 to 10 metres).

Frequency response and insertion loss

The insertion loss is 0dB plus or minus 3dB at 1.5 MHz measured with single or dual input and all output sockets loaded.

Noise factor

Does not exceed 14dB in the frequency range 2-30 MHz.

Back coupling

The coupling between any pair of output sockets (of the same channel under dual input conditions) is a minimum of minus 30dB relative to the insertion loss in the frequency range 2-30 MHz.

Cross coupling

With dual input, the coupling between the input sockets and any output sockets in the other channel is a minimum of -50dB relative to the insertion loss in either channel in the frequency range 2-30 MHz.

Cross modulation

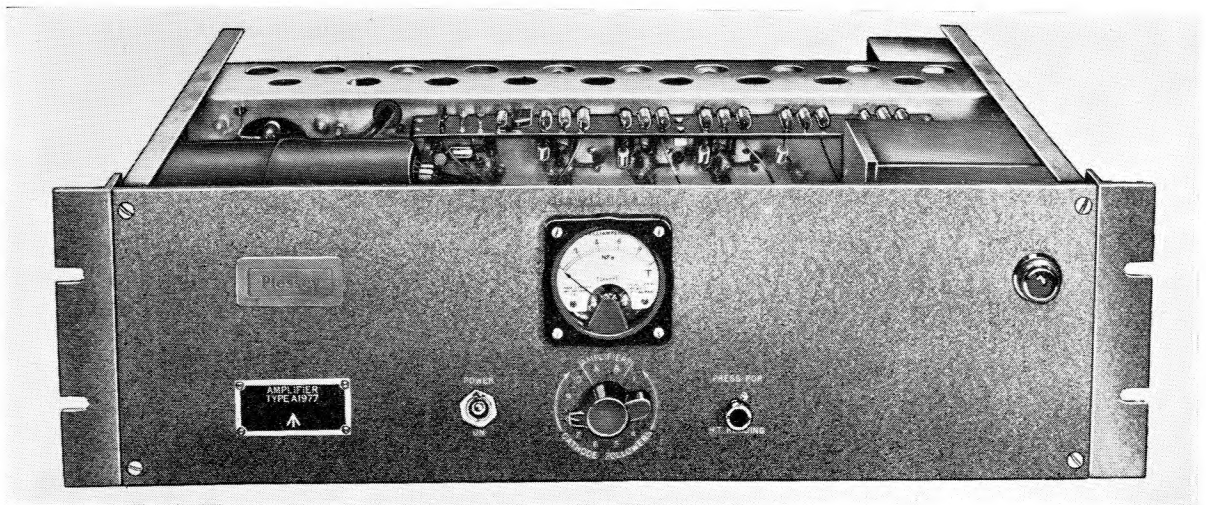
Cross modulation imposed on a 2.5 MHz signal of 1 mV unmodulated, by a carrier at 4.5 MHz of 500 mV modulated 30 per cent, is such as to produce a modulation depth of 2 per cent on the 1 mV signal.

Input impedance

75-ohm plus or minus 30 per cent. Phase angle is resistive within plus or minus 30 degrees in the frequency range 2-30 MHz.

Output impedance

75-ohm minus 0 plus 30 per cent. Phase angle is resistive within plus or minus 10 degrees in the frequency range 2-30 MHz.



Amplifier Type A.1977

Power supplies

105-115 volts or 210-250 volts, 50-60 Hz single phase a.c.

Power consumption

100 watts (approx).

Overall dimensions

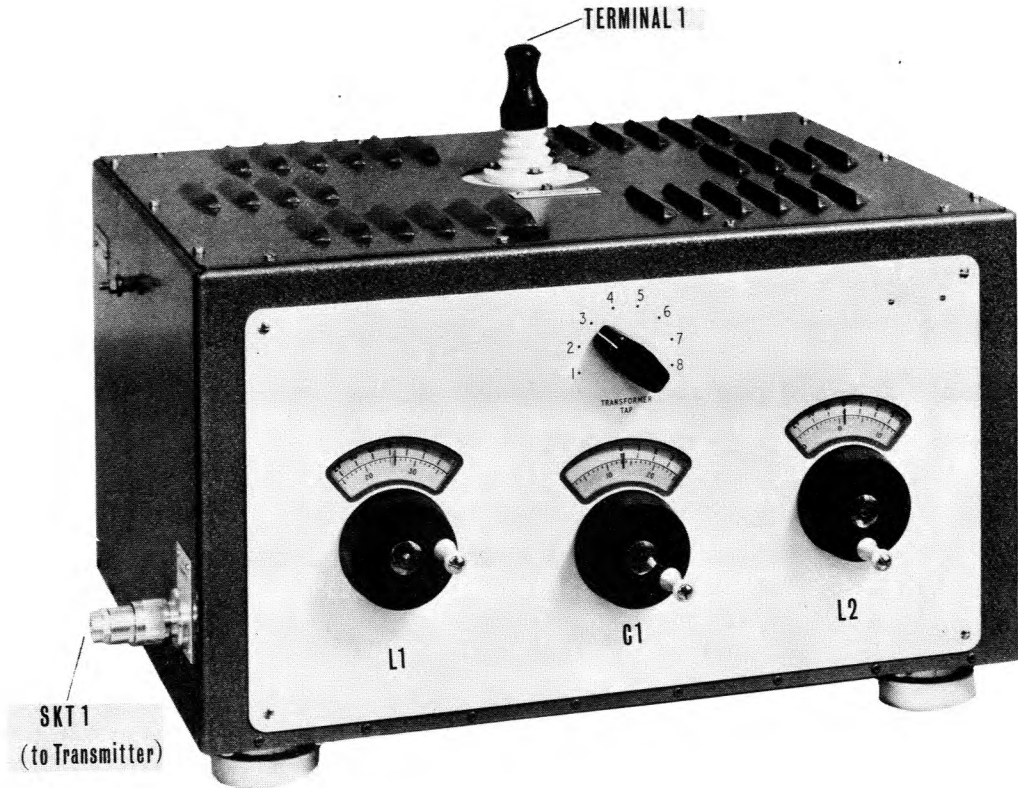
<i>Height</i>	<i>Width</i>	<i>Depth</i>
5 $\frac{1}{4}$ in	1ft 7in	1ft 0in
(15.3 cm)	(48.3 cm)	(30.5 cm)

Weight

30 lb (13.6 kg)

TUNER, RADIO FREQUENCY
(5820-99-971-8017)

RELEVANT PUBLICATION
AP 116E-1719-1



Tuner, radio frequency 5820-99-971-8017

FUNCTION

The tuner, radio frequency is designed to match whip antennas to transmitters having an output impedance of 50 ohms.

ORIGIN

Racal Communications Ltd., Type MA.144

FREQUENCY RANGE

1.5 to 25MHz (200-12 metres)

POWER RATING

1kW r.m.s.

INPUT IMPEDANCE

50Ω (P.E.T. 210 socket)

ANTENNA IMPEDANCE RANGE

From 3Ω to several thousand ohms with positive and negative phase angles.

V.S.W.R.

When fully tuned, the unit does not degrade the v.s.w.r. figure by more than 1.5:1.

TUNING

Adjustable L and C controls provide continuous tuning over the frequency range.

OVERALL DIMENSIONS

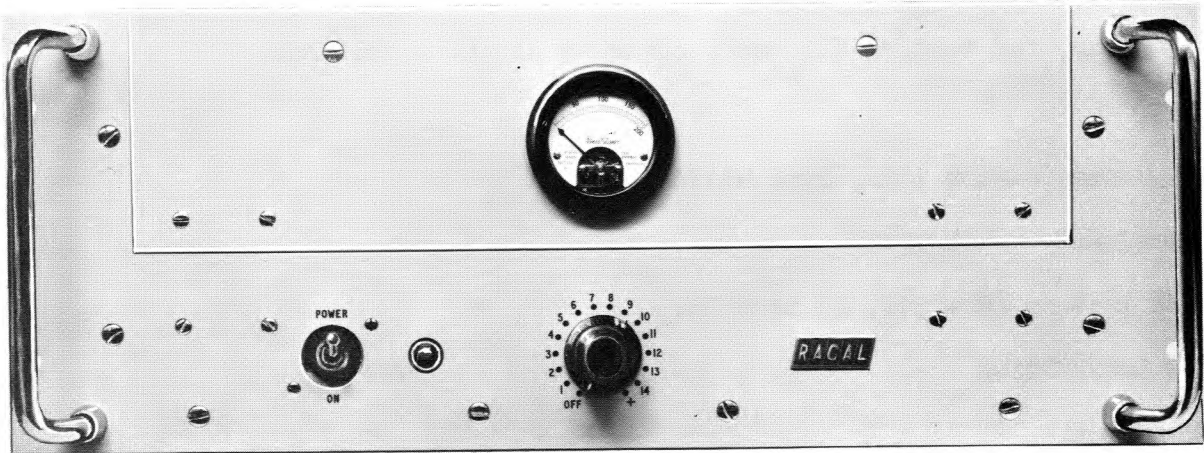
Height	Width	Depth
10 in (25 cm)	18 in (46 cm)	14.5 in (37 cm)

WEIGHT

40 lb (18.2kg).

AERIAL MULTI-COUPLER
(5820-99-971-8618)

RELEVANT PUBLICATIONS
AP 116E-1717-1A



Aerial multi-coupler 5820-99-971-8618

FUNCTION

The aerial multi-coupler enables up to eight h.f. receivers to be fed from a single aerial.

FREQUENCY RANGE

2 to 32 MHz (150 to 9.5 metres).

INPUT IMPEDANCE

75 ohms (unbalanced)

INSERTION GAIN

+4dB to -1dB.

NOISE FACTOR

Less than 8dB

ISOLATION BETWEEN OUTLETS

Better than 30dB

AL 11 Apr 73

INTERMODULATION PRODUCTS

Better than 50dB for input levels of 0.25V r.m.s.

NUMBER OF RECEIVER OUTLETS

Eight

OUTPUT IMPEDANCE

75 ohms (unbalanced)

TEST FACILITY

Panel meter, for testing all valve currents and h.t. voltage.

ORIGIN

Racal Communication Ltd., Type MA174

POWER SUPPLY

100 to 125V or 200-250V, 45 to 65Hz.

POWER CONSUMPTION

105W approx.

DIMENSIONS

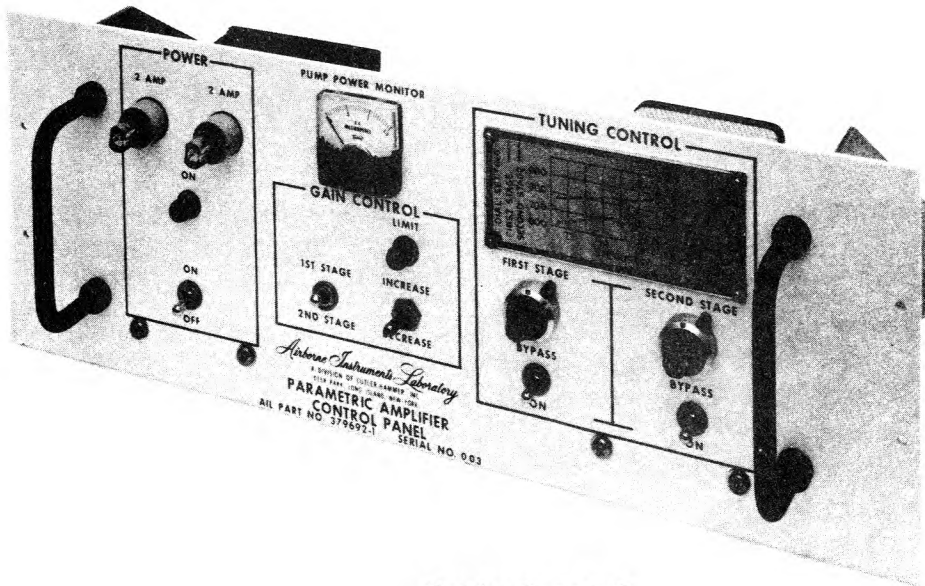
<u>Height</u>	<u>Width</u>	<u>Depth</u>
7 in (18 cm)	19 in (48 cm)	15 in (38cm)

WEIGHT

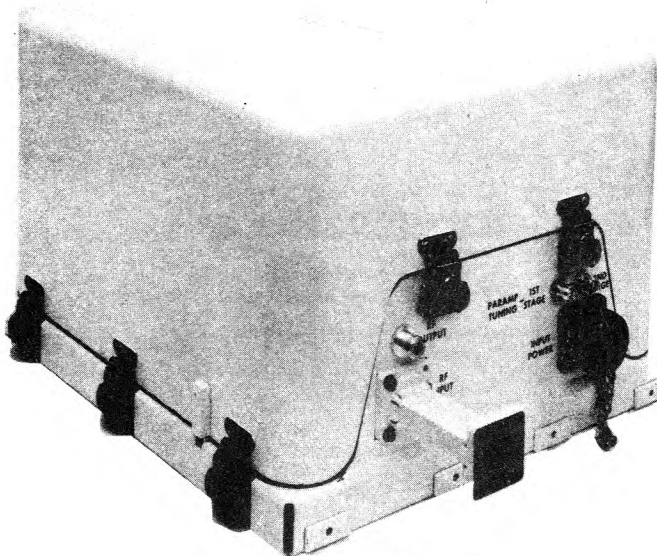
33 lb (15 kg)

PARAMETRIC AMPLIFIER
AIRBORNE INSTRUMENT LABORATORIES MODEL 4878

RELEVANT AIR PUBLICATION
116E-1205



Control panel



RF enclosure

FUNCTION

This equipment is designed as a low-noise r.f. pre-amplifier front end on satellite communication terminals for the Skynet project.

ORIGIN

Airborne Instrument Laboratories Model 4878

GENERAL DESCRIPTION

The ALL model 4878 parametric amplifier is a low-noise r.f. pre-amplifier system designed for the Marconi Company Limited. The amplifier provides 30 dB minimum gain when tuned to any frequency in the 7275 to 7725 MHz frequency band, a noise temperature of less than 120°K, and an instantaneous bandwidth of 50 MHz, minimum, at the 1 dB points at any portion of the tuning band. (a microwave amplifier whose reactance can be varied periodically by an alternating voltage)
The unit is self-contained, requiring only prime power of 240 volts a.c. at 2.0 amperes for operation.

The system consists of a weatherproof, temperature-controlled r.f. enclosure, and a rack mountable control panel. The two components may be separated by up to 200 feet.

TECHNICAL DATA

Frequency range	7275 to 7725 MHz
Minimum bandwidth	50 MHz

POWER SUPPLY REQUIRED

240 volts a.c. at 2.0 amperes

Ambient operating temperature of the r.f. enclosure of parametric amplifier at $\pm 3^{\circ}\text{C}$ with the outside temperature varying from -20 to +50°C.

DIMENSIONS

	Height	Width	Depth
RF enclosure	407 mm (16 in)	305 mm (12 in)	458 mm (18 in)

WEIGHT

RF enclosure	22.7 kg (50 lb)
--------------	-----------------

PART 3

RADIO TRANSMISSION EQUIPMENT
(GROUND)

PART 3

RADIO TRANSMISSION EQUIPMENT (GROUND)

INTRODUCTION

- 1.** The transmission equipment listed in Section 1 of this Part will include the older T-prefixed types of transmitter in current use, together with later equipment using other methods of identification. Where the transmitters are part of radio installations listed in Part 1, a suitable cross-reference will be given.
- 2.** The information sheets in Section 1 contain details of the complete transmitter, including the normal leading particulars and mention of the disposition of the transmitter sub-assemblies in the cabinets or racks comprising the complete equipment, where applicable. Equipment associated with the transmitter for particular modes of operation is also noted. Details of the units and sub-units comprising the sub-assemblies will be found in Section 2, the relevant information sheet bearing the same number in Section 2 as that of the parent equipment in Section 1. Where applicable, the appropriate cross-references to other Parts are given.

SECTION 1

TRANSMITTER SETS, RADIO

Sheet No. 1

TRANSMITTERS

Type T.1131J (10D/17746)
T.1131K (10D/17767)
T.1131M (10D/20638)
T.1131N (10D/22718)

Relevant publications:—

A.P.116E-0201-1

(formerly A.P.2555EA, Vol. 1)

Function

V.H.F. ground transmitter (R/T or c.w. working), fixed or mobile, R/T range approximately 100 miles (160.9km) with aircraft at 10000 ft (3048m). The difference between T.1131 J and K is in the heater circuits of the modulator units.

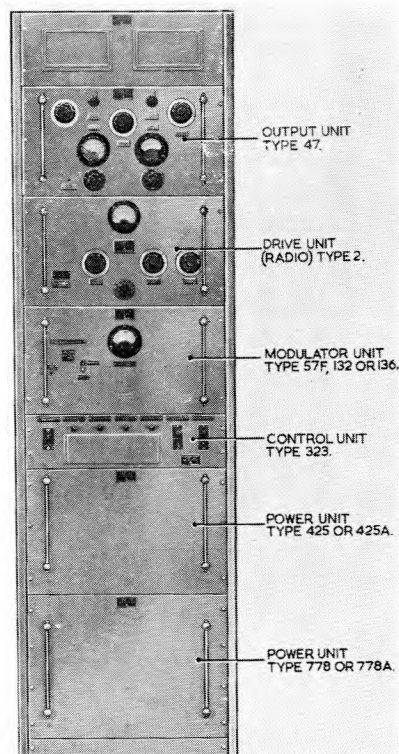
T.1131M is similar to T.1131K but covers a different frequency range, T.1131N is T.1131K modified for installation in air transportable radio cabins by height reduction. Transmitter Type 75C is T.1131K designed for use in a ship-borne or ground station role with the r.f. output circuit modified to match the common aerial working system requirement of R.N. The transmitters comprise output units Type 47, drive units radio Type 2, modulator units Types 57F, 132 or 136, control units Type 323, power units, Type 425 or 425A and Type 778 or 778A. Details of sub-assemblies are given in Section 2, Sheet No. 1.

Origin

Frequency range

100 MHz to 156 MHz (3.0 to 1.9 metres).

65 MHz to 85.375 MHz (4.6 to 3.5 metres) T.1131M only.



Transmitter Type T.1131J

Frequency control

Crystal controlled oscillator with multiplication factor of 18.

Modulation

100 per cent amplitude modulation.

Output impedance

75 ohms into coaxial transmission line.
100 ohms into CAW system (type 75C Naval transmitter only).

Output power

35 watts maximum.

Power supplies

195-250V, 40-60 Hz single-phase a.c.

Power consumption

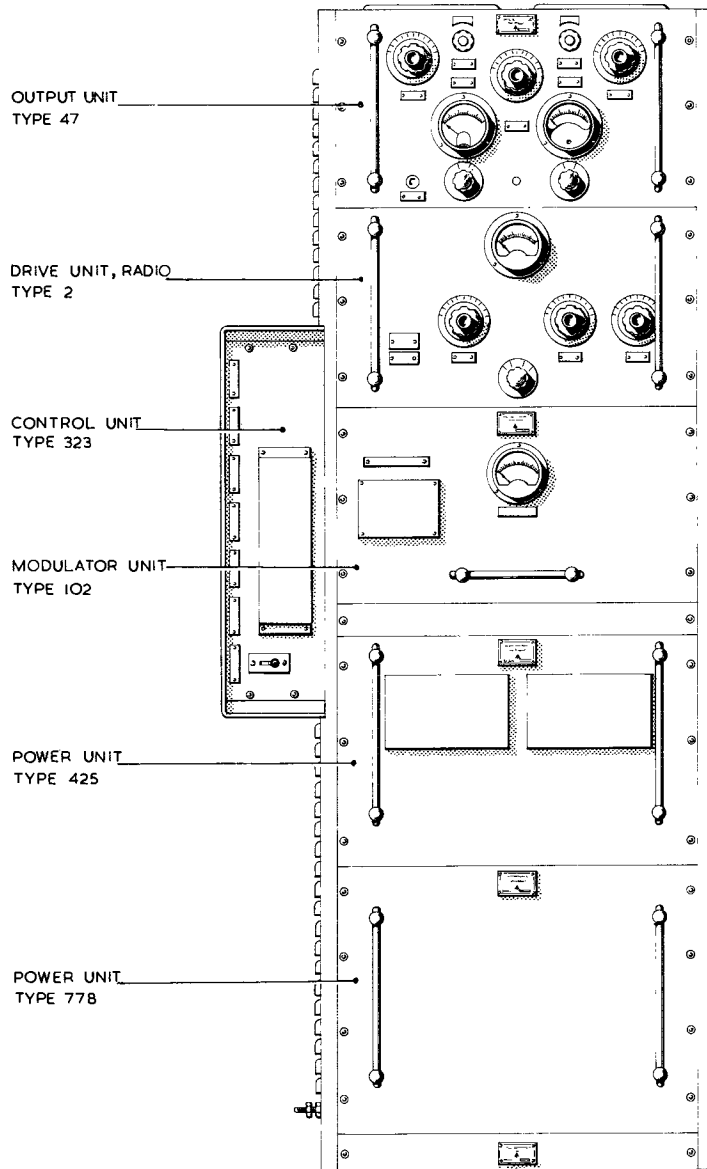
1-125 kVA.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>T.1131J, K & M</i>	6ft 0in (182.9 cm)	1ft 9in (53.3 cm)	1ft 5in (43.2 cm)
<i>T.1131N</i>	5ft 1½in (156.2 cm)	2ft 2½in (67.3 cm)	1ft 5in (43.2 cm)
<i>75C</i>	5ft 1½in (156.2 cm)	1ft 9in (53.3 cm)	1ft 5in (43.2 cm)

Weights

672 lb (304.8 kg).



Transmitter Type T.1131N

Sheet No. 2

TRANSMITTER

Type T.1278 (10D/558)

Relevant publications:—

A.P.2877B, Vol. 1

Function

Long range, high power, h.f. ground transmitter (c.w. working) for fixed or mobile operation. The transmitter comprises two self-contained units, a transmitter unit and a combined rectifier and control unit. *Details of the sub-assemblies are given in Section 2, Sheet No. 2.*

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB 11 (modified).

Frequency range

3 MHz to 22.2 MHz (100 to 13.5 metres).

Frequency control

Provided by either a Franklin master oscillator or a crystal oscillator.

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000:
Crystal oscillator to 1 part in 100,000.

Output impedance

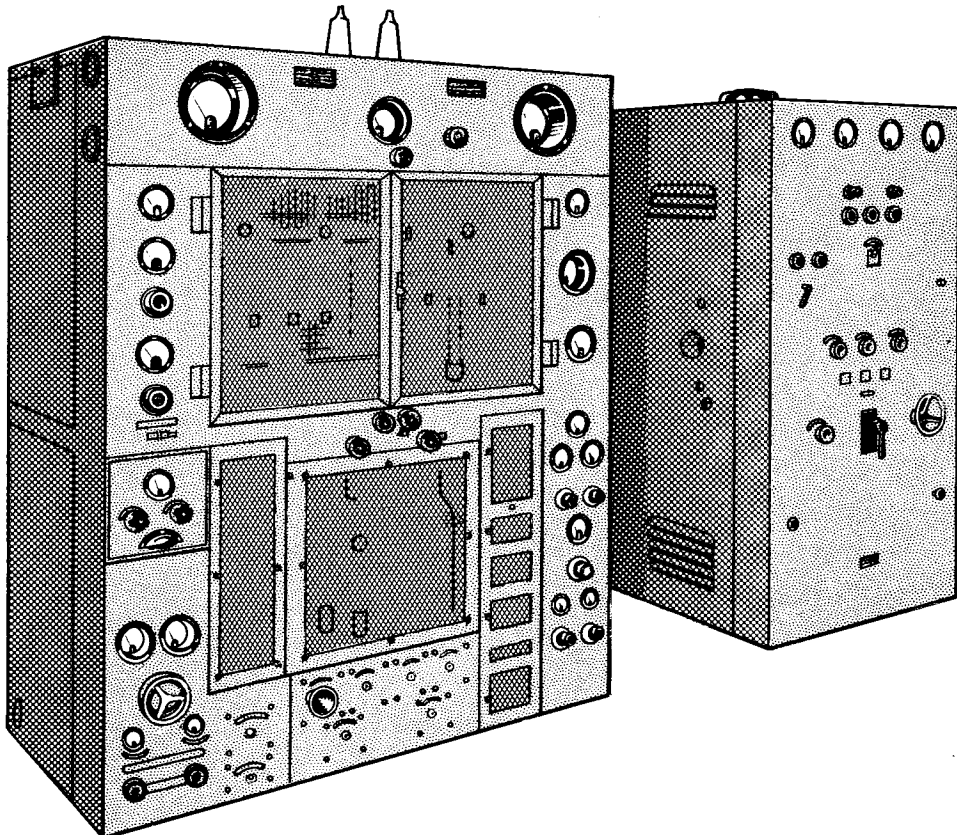
75 ohms and 600 ohms.

Output power

8.5 to 10kW.

Keying speed

200 w.p.m. maximum (on/off keying).



Transmitter Type T.1278

Power supplies

230-400V, 50 Hz, three-phase, 4-wire.

Power consumption

Mark 23 kW; Space 7.5 kW.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 10in (86.4 cm)	5ft 3in (160 cm)
<i>Combined rectifier and control unit</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)

Weights

<i>Transmitter unit</i>	20 cwt (1016 kg)
<i>Combined rectifier and control unit</i>	25 cwt (1270 kg)

Sheet No. 4

TRANSMITTERS Type T.1509 (10D/1721)
T.1509A (10D/17974)

Relevant publications:—

A.P.2550B, Vol. 1 (3rd Edition)

Function

General purpose, low power, h.f. communications transmitter (C.W., M.C.W., and R/T) for use in fixed or mobile ground stations. *Sub-assembly details are given in Section 2, Sheet No. 4.*

Transmitter T.1509A is a modified version of T.1509 using an induction fan motor in place of fan Type 52.

Origin

Frequency range

1.5 MHz to 20 MHz (200 to 15 metres).

Frequency control

Crystal or temperature compensated master oscillator.

Frequency accuracy and stability

To crystal accuracy.

Modulation

Amplitude modulation 100 per cent.

Input impedance

600 ohms (audio input).

Output impedance

50 ohms unbalanced.

Output power

300 watts carrier on all services.

Keying speed

Hand or high speed (200 w.p.m.).

Power supplies

180 to 250V, 50 Hz, single phase a.c.

Overall dimensions

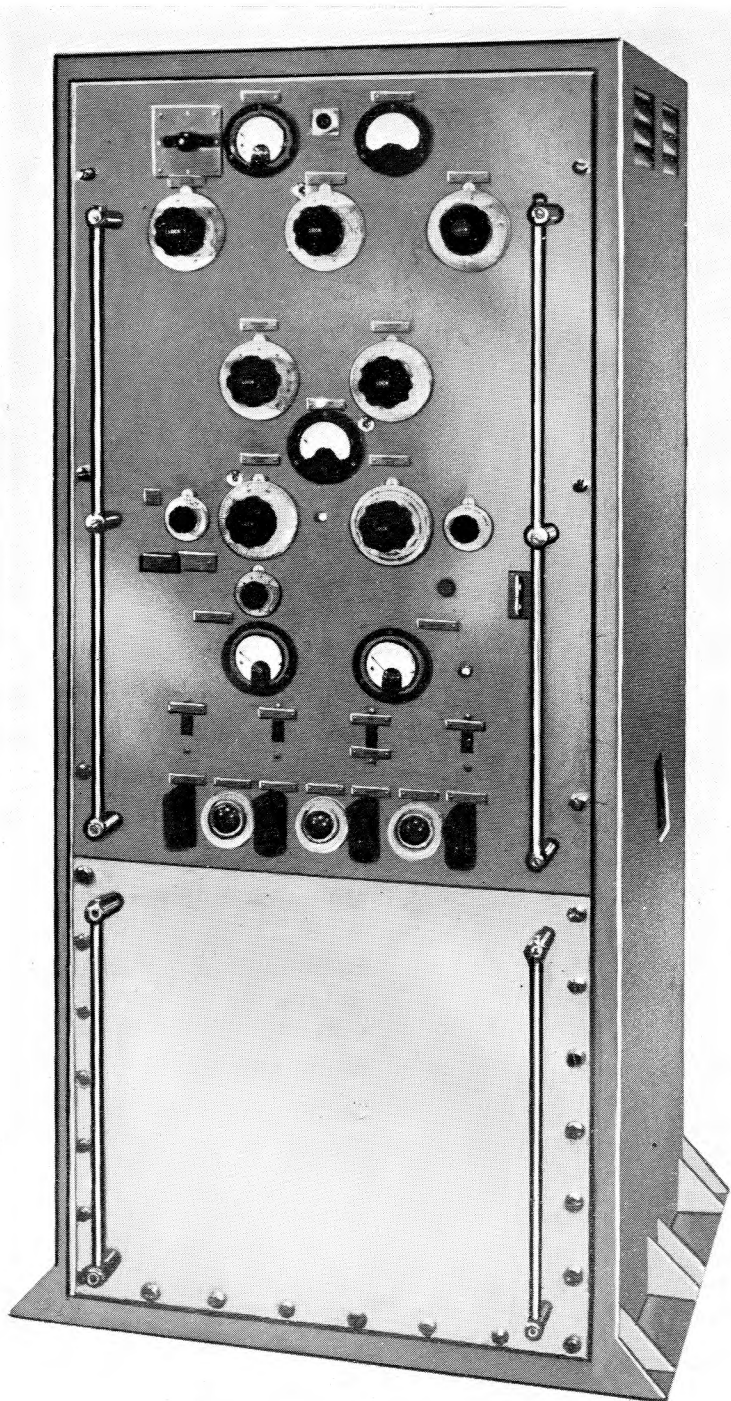
<i>Height</i>	<i>Width</i>	<i>Depth</i>
4ft 11in (150 cm)	2ft 5in (74 cm)	1ft 10½in (57 cm)

Weight

800 lb (363 kg).

Associated equipment

Control unit Type 310 (10L/171)
or Control unit Type 88 (10L/37)



Transmitter Type T.1509

TRANSMITTER

Type T.1540 (10D/2120)

Relevant publication:—

A.P.2555D, Vol. 1

Function

A very low-power fixed or mobile ground station v.h.f. transmitter for R/T only, suitable for general use and in humid conditions at tropical temperatures. The transmitter is constructed in unit form, consisting of main chassis, transmitter unit Type 65 and power unit Type 429 with dust cover. For details of sub-assemblies see Section 2, Sheet No. 5.

Origin

Developed from a modified version of U.S.A. transmitter, Type T.5017 (110D/146).

Frequency range

100 MHz to 156 MHz (3 to 1.9 metres).

Frequency control

Crystal oscillator with multiplication factor of 18 times.

Frequency accuracy and stability

To crystal accuracy.

Modulation

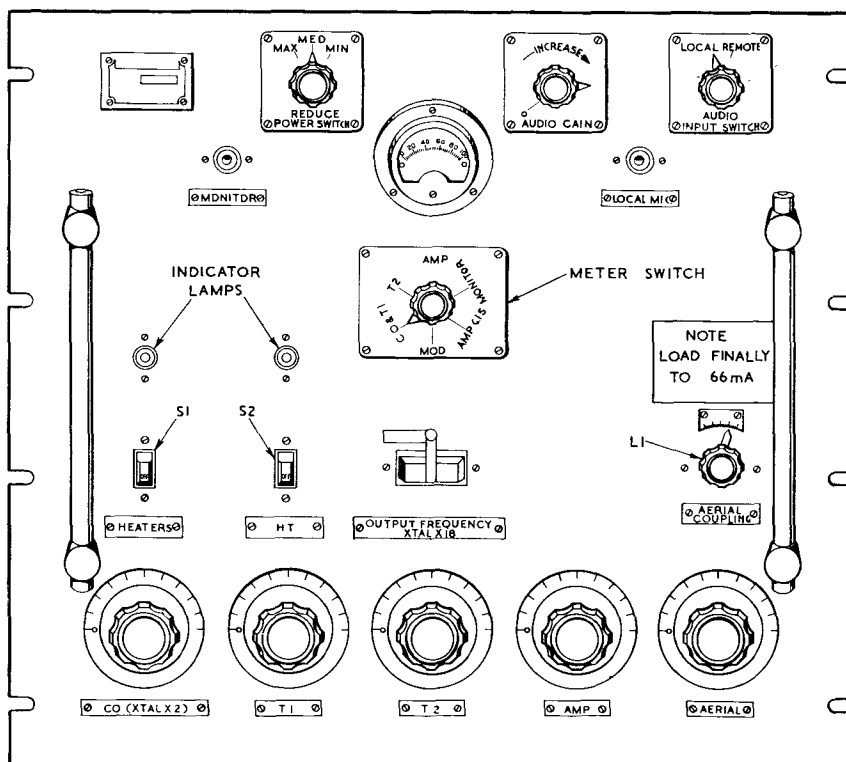
Amplitude modulation, depth variable between zero and 100 per cent.

Input impedance

Matched to 600 ohms line. For correct remote operation, resistance of line circuit should not exceed 1000 ohms.

Output impedance

Matched for unbalanced concentric feeder, 75 ohms surge impedance.



Transmitter Type T.1540

Output power	5 watts maximum, unmodulated, with provision for reducing to approximately one-third and one-thirtieth.		
Power supplies	200 to 250V, 50 Hz, single-phase supply.		
Power consumption	165 watts total.		
Overall dimensions (approximate)	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	1ft 5½in (48.3 cm)	1ft 7in (44.5 cm)	1ft 1¼in (33.6 cm)
Weight	112 lb (50.8 kg) (including dust cover).		

Sheet No. 6

TRANSMITTERS

Type T.1550 (10D/2244)
T.1550A (10D/17409)
T.1550B (10D/23655)

Relevant publications:—
A.P.2877J, Vol. 1

Function

Long range, high power h.f. single-sideband ground transmitter (C.W. and R/T s.s.b.) for fixed or mobile operations. The transmitter comprises a transmitter unit and a rectifier and control unit. *Sub-assembly details are given in Section 2, Sheet No. 6.*

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB 11E (Major) modified for single-sideband working. 4 MHz to 22.2 MHz (75 to 13.5 metres).

Frequency range

Frequency control

Provided either by a Franklin master oscillator or a crystal oscillator.

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000;
Crystal oscillator to 1 part in 100,000.

Output impedance

75 ohms and 600 ohms.

Output power

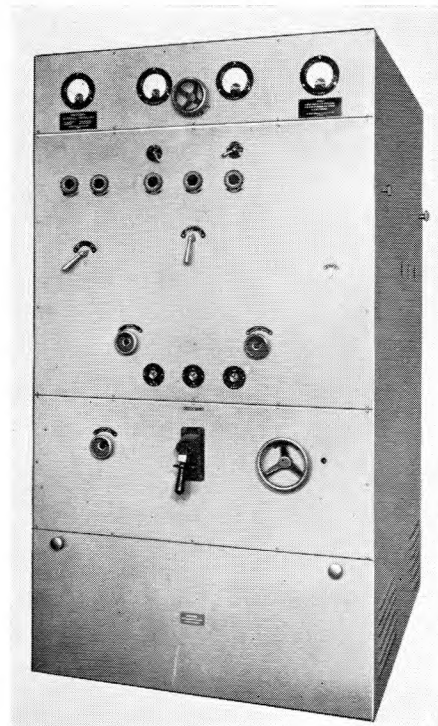
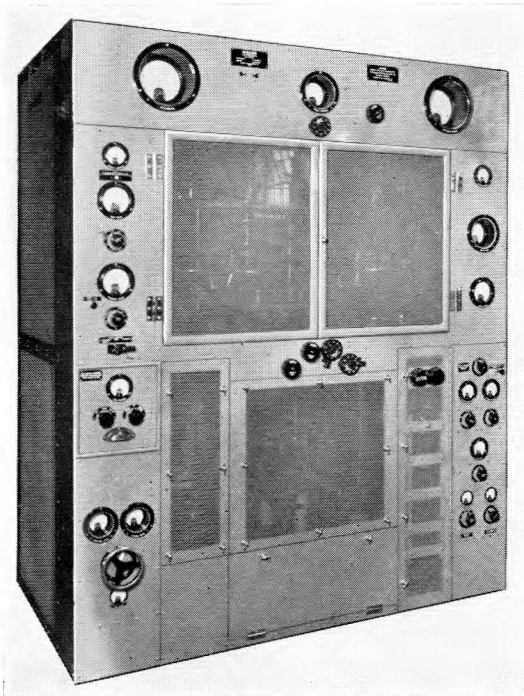
8.5 to 10kW carrier (c.w. operation)
8.5 to 10kW p.e.p. (s.s.b. operation)

Keying speed

200 w.p.m. maximum. Keying circuits set in MARK position for s.s.b. working.

Power supplies

230 to 400V, 50 Hz, three-phase, 4-wire.



Transmitter Type T.1550

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 10in (86.4 cm)	5ft 3in (160 cm)
<i>Rectifier and Control unit</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)

Weights

<i>Rectifier and control unit</i>	25 cwt (1270 kg)
<i>Transmitter unit</i>	20 cwt (1016 kg)

Associated equipment

M.3 rack, s.s.b. drive unit and monitoring rack.

Sheet No. 7

Type T.1551 (10D/2245)

TRANSMITTERS
T.1551A (10D/16966)

Relevant publications:—
A.P.2877K, Vol. 1

Function

Long range, medium power h.f. single sideband ground transmitter (C.W. or R/T (s.s.b.) working) for fixed or mobile operation. The transmitter comprises a transmitter unit and a rectifier and control unit. *Sub-assembly details are given in Section 2, Sheet No. 7.*

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB 8E, modified for single sideband.

Frequency range

4 MHz to 22.2 MHz (75 to 13.5 metres; s.s.b. working).
3 MHz to 22.2 MHz (100 to 13.5 metres; c.w. working).

Frequency control

Provided by either a Franklin master oscillator or crystal oscillator.

Frequency accuracy

Franklin master oscillator to 1 part in 20,000:
Crystal oscillator to 1 part in 100,000.



Transmitter Type T.1551

Output impedance	75 ohms and 600 ohms.		
Output power	3·5kW (c.w. operation). 3·5kW, p.e.p. (s.s.b. operation).		
Keying speed	200 w.p.m. maximum (on/off keying)		
Power supplies	230 to 400V, 50 Hz, three-phase, 4-wire.		
Overall dimensions		<i>Height</i>	<i>Width</i>
		<i>Depth</i>	
	<i>Transmitter unit</i>	6ft 5in (196 cm)	2ft 0in (61 cm)
			3ft 0in (91·4 cm)
	<i>Rectifier and control unit</i>	6ft 5in (196 cm)	4ft 0in (122 cm)
			3ft 6in (106·6 cm)
Weights	<i>Transmitter unit</i>	9 cwt (457·2 kg)	
	<i>Rectifier and control unit</i>	25 cwt (1270 kg)	
Associated equipment	M.3 rack, low power s.s.b. drive unit and monitoring unit.		

Sheet No. 8

TRANSMITTERS

Type T.1969 (10D/18459)
T.1969A (10D/21172)
T.1696B (10D/23916)
5820-99-954-2578

Relevant publications:—

A.P.116E-0216-1A and 1B
(formerly A.P.2883NF, Vol. 1
2nd Edn. Parts 1 and 2)

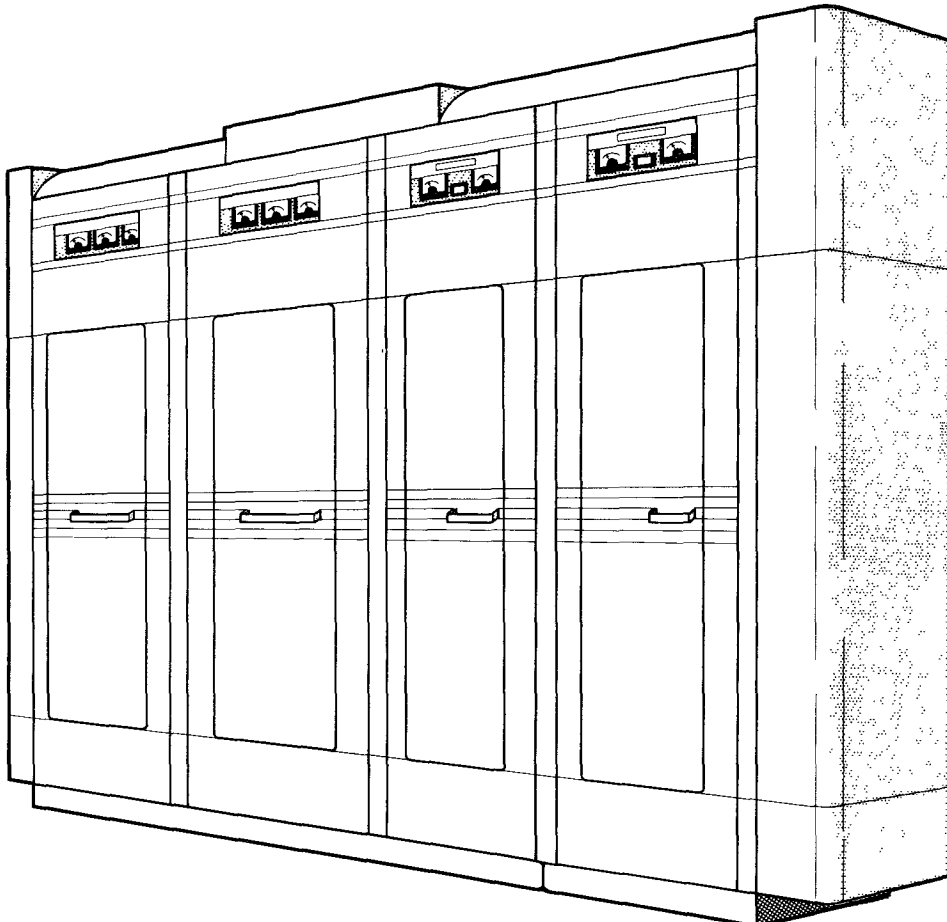
Function

Medium power, general purpose h.f. transmitter (c.w. or f.s.k. working) suitable for operation in tropical, temperate or arctic conditions, is of unit construction comprising r.f. and power cabinets combined to form a unified equipment. *For details of sub-assemblies see Section 2, Sheet No. 8.*

Transmitter T.1969 consists of two r.f. cabinets and a power cabinet (twin).

Transmitter T.1969A is similar but includes Modification No. 4880 which provides a safety device for aerial exchange.

Transmitter T.1969B is T.1969 modified to Modification No. 6356 which provides extra cooling for operation under extreme conditions.



Transmitter Type T.1969

Transmitter 5820-99-954-2578 is the transmitter T.1969 equipped for radio telephony by the embodiment of Modification No. 8646 which adds a modulator cabinet.

Origin	Standard Telephones & Cables Ltd., DS.10 transmitter, Type 4-LE. 96 Grp. 14.																												
Frequency range	2.5 to 22 MHz (13.6 to 120 metres) in three bands:— 2.5 to 5.5 MHz, 5.0 to 11.0 MHz and 10.0 to 22.0 MHz.																												
Frequency control	Crystal controlled oscillator (frequency tolerance \pm 0.003% using S.T.C. crystals Code No. PL.7065/144B).																												
Frequency accuracy and stability	To crystal accuracy.																												
Modulation (<i>applicable only to Tx.5820-99-954-2578</i>)	Amplitude modulation to depth of 100 per cent; m.c.w. tone frequencies of 500 Hz, 800 Hz and 1000 Hz available.																												
A.F. input level (<i>Tx.5820-99-954-2578</i>)	27dB below level of 1mW into 60 or 600 ohms line (at 50% modulation).																												
Output impedance	The transmitters will work into balanced (400 to 800 ohms) or unbalanced (45 to 75 ohms) loads.																												
Output power	<p><i>Single channel operation:—</i></p> <table border="0"> <tr> <td>C.W.</td> <td>5kW</td> </tr> <tr> <td>M.C.W. or R/T</td> <td>3kW (carrier)</td> </tr> </table> <p>(Tx.5820-99-954-2578)</p> <p><i>Twin channel operation:—</i></p> <table border="0"> <tr> <td>C.W. and R/T (carrier)</td> <td>2.0kW per channel</td> </tr> <tr> <td>C.W. (independent keying)</td> <td>5.0kW per channel</td> </tr> <tr> <td>C.W. (common keying)</td> <td>3.0kW per channel</td> </tr> </table> <p><i>Frequency shift operation:—</i></p> <table border="0"> <tr> <td>One channel</td> <td>5.0kW</td> </tr> <tr> <td>Two channels</td> <td>2.5kW per channel</td> </tr> </table>	C.W.	5kW	M.C.W. or R/T	3kW (carrier)	C.W. and R/T (carrier)	2.0kW per channel	C.W. (independent keying)	5.0kW per channel	C.W. (common keying)	3.0kW per channel	One channel	5.0kW	Two channels	2.5kW per channel														
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C.W. (common keying)	3.0kW per channel																												
One channel	5.0kW																												
Two channels	2.5kW per channel																												
Keying speed	Up to 600 w.p.m.																												
Power supplies	380-415V, 50-60 Hz, three-phase supply.																												
Power consumption	<p><i>Single channel 5kW c.w. telegraphy:—</i></p> <table border="0"> <tr> <td>Mark</td> <td>12.5kVA</td> <td>0.8 power factor</td> </tr> <tr> <td>Space</td> <td>5.0kVA</td> <td>0.6 power factor</td> </tr> </table> <p><i>Single channel 5kW f.s.k.:—</i></p> <table border="0"> <tr> <td></td> <td>12.5kVA</td> <td>0.8 power factor</td> </tr> </table> <p><i>Telephony (3kW carrier) (as applicable):—</i></p> <table border="0"> <tr> <td>Speaking</td> <td>15.0kVA</td> <td>0.8 power factor</td> </tr> <tr> <td>Idle</td> <td>13.0kVA</td> <td>0.8 power factor</td> </tr> </table> <p><i>Twin channel 3kW c.w. telegraphy (common keying):—</i></p> <table border="0"> <tr> <td>Mark</td> <td>18.0kVA</td> <td>0.8 power factor</td> </tr> <tr> <td>Space</td> <td>6.0kVA</td> <td>0.6 power factor</td> </tr> </table>	Mark	12.5kVA	0.8 power factor	Space	5.0kVA	0.6 power factor		12.5kVA	0.8 power factor	Speaking	15.0kVA	0.8 power factor	Idle	13.0kVA	0.8 power factor	Mark	18.0kVA	0.8 power factor	Space	6.0kVA	0.6 power factor							
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Overall dimensions	<table border="0"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Height</i></th> <th style="text-align: center;"><i>Width</i></th> <th style="text-align: center;"><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>Power cabinet</i></td> <td>6ft 5in</td> <td>4ft 0in</td> <td>3ft 3¼in</td> </tr> <tr> <td><i>(twin)</i></td> <td>(196 cm)</td> <td>(122 cm)</td> <td>(99.7 cm)</td> </tr> <tr> <td><i>R.F. cabinet</i></td> <td>6ft 5in</td> <td>1ft 6in</td> <td>3ft 3¼in</td> </tr> <tr> <td><i>(each)</i></td> <td>(196 cm)</td> <td>(45.7 cm)</td> <td>(99.7 cm)</td> </tr> <tr> <td><i>Modulator cabinet</i></td> <td>6ft 5in</td> <td>2ft 0in</td> <td>3ft 3¼in</td> </tr> <tr> <td><i>(Tx.5820-99-954-2578)</i></td> <td>(196 cm)</td> <td>(61 cm)</td> <td>(99.7 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Power cabinet</i>	6ft 5in	4ft 0in	3ft 3¼in	<i>(twin)</i>	(196 cm)	(122 cm)	(99.7 cm)	<i>R.F. cabinet</i>	6ft 5in	1ft 6in	3ft 3¼in	<i>(each)</i>	(196 cm)	(45.7 cm)	(99.7 cm)	<i>Modulator cabinet</i>	6ft 5in	2ft 0in	3ft 3¼in	<i>(Tx.5820-99-954-2578)</i>	(196 cm)	(61 cm)	(99.7 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>																										
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<i>(twin)</i>	(196 cm)	(122 cm)	(99.7 cm)																										
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<i>(each)</i>	(196 cm)	(45.7 cm)	(99.7 cm)																										
<i>Modulator cabinet</i>	6ft 5in	2ft 0in	3ft 3¼in																										
<i>(Tx.5820-99-954-2578)</i>	(196 cm)	(61 cm)	(99.7 cm)																										
Weights	<table border="0"> <tr> <td><i>Power cabinet (twin)</i></td> <td>28 cwt (1422.7 kg)</td> </tr> <tr> <td><i>R.F. cabinet (each)</i></td> <td>8 cwt (406.5 kg)</td> </tr> <tr> <td><i>Modulator cabinet</i></td> <td>10 cwt (508.8 kg)</td> </tr> </table>	<i>Power cabinet (twin)</i>	28 cwt (1422.7 kg)	<i>R.F. cabinet (each)</i>	8 cwt (406.5 kg)	<i>Modulator cabinet</i>	10 cwt (508.8 kg)																						
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<i>R.F. cabinet (each)</i>	8 cwt (406.5 kg)																												
<i>Modulator cabinet</i>	10 cwt (508.8 kg)																												
Associated equipment:	Rack assembly Type 266 (10D/18476)																												

Sheet No. 9

TRANSMITTERS

Type T.1970 (10D/18460)

T.1970A (10D/22230)

T.1970B (10D/23669)

Relevant publications:—

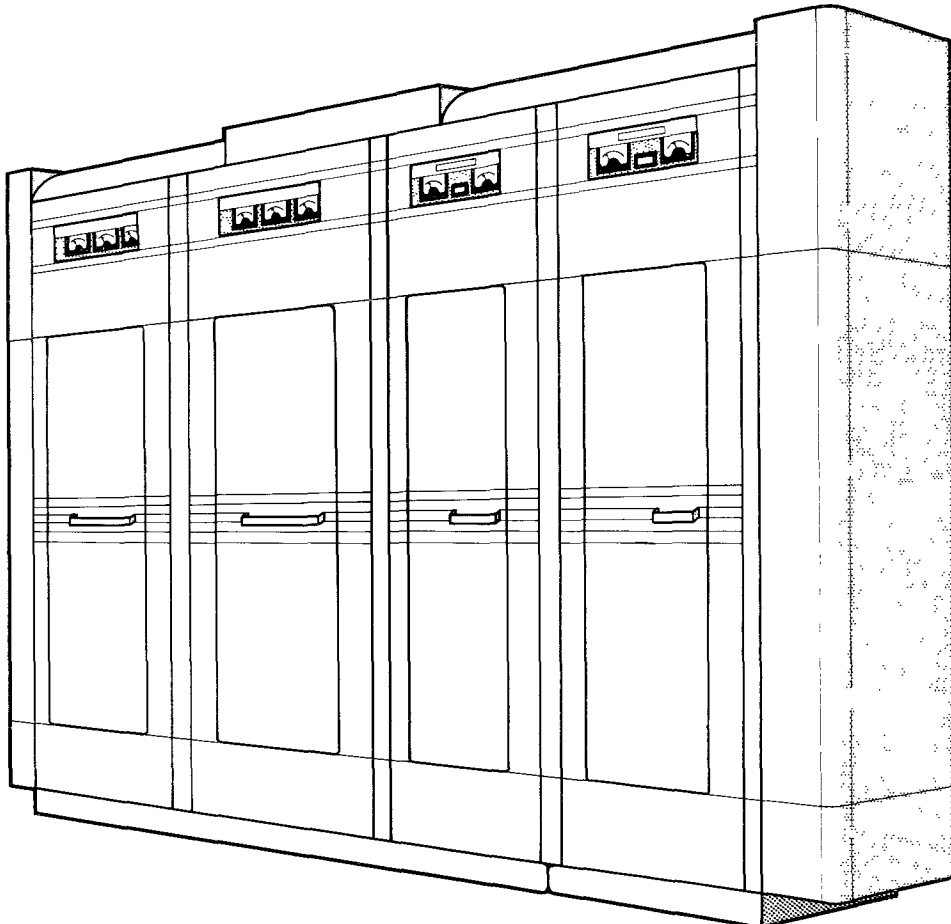
A.P.2883NC, Vol. 1

Function

Medium power, general purpose and single-sideband h.f. transmitter (c.w., on/off, f.s.k. and R/T working). Transmitter T.1970 has two r.f. cabinets for twin-channel operation, a power (twin) and modulator cabinets. *Sub-assembly details are given in Section 2, Sheet No. 9.* Used with rack assembly Type 266, the transmitter becomes a c.w. set suitable for on/off and f.s. keying and facsimile operation. The use of rack assembly Type 255 enables the transmitter to provide s.s.b. double channel working and low-level modulated d.s.b. service. The T.1970A is a modified version of T.1970 incorporating a safety indicator for aerial exchange. T.1970B is similar to T.1970 but is provided with a safety circuit for use with Marconi Type HA.16 aerial exchange.

Origin

Standard Telephones & Cables Ltd., DS.12 transmitter, Code No. 4-LC96/302.



Transmitter Type T.1970

Frequency range	4 MHz to 27.5 MHz (75 to 10.9 metres).		
Frequency control	Crystal controlled oscillator.		
Frequency accuracy and stability	To crystal accuracy.		
Output impedance	The transmitter will work into balanced (400-800 ohms) or unbalanced (45-75 ohms) loads.		
Output power	I.S.B. operation	4kW	
	C.W. operation (on/off keying)	4kW	
	C.W. f.s.k. operation	4kW	
	D.S.B. operation (100% modulation)	4.5kW	
Keying speed	600 w.p.m. maximum.		
Power supplies	380-415V, 56-60 Hz, three-phase.		
Power consumption	C.W. (4kW)	<i>Mark</i>	13.0kVA, 0.8 power factor
		<i>Space</i>	5.5kVA, 0.8 power factor
	F.S.K. (4kW)		13.0kVA, 0.8 power factor
	I.S.B. (4kW)		13.5kVA, 0.8 power factor
	D.S.B. (4.5kW)		15.0kVA, 0.8 power factor
Overall dimensions		<i>Height</i>	<i>Width</i>
		<i>Depth</i>	
	<i>R.F. cabinet</i>	6ft 3in	1ft 6in
	<i>(each)</i>	(190.5 cm)	(45.7 cm)
	<i>Power cabinet</i>	6ft 3in	4ft 0in
	<i>(twin)</i>	(190.5 cm)	(130 cm)
	<i>Modulator cabinet</i>	6ft 3in	2ft 0in
		(190.5 cm)	(66 cm)
Weight	2 tons 4 cwt (2235.2 kg) overall.		
Associated equipment	Rack assembly Type 255	(10D/18463)	
	Rack assembly Type 266	(10D/18476)	

TRANSMITTER

Type T.1975 (10D/18478)

Relevant publications:—

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

Function

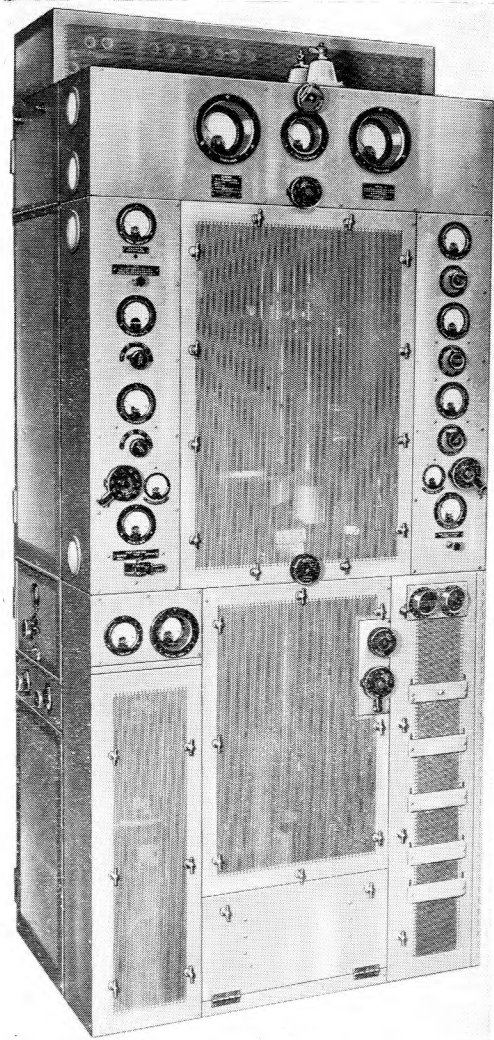
Medium power h.f. transmitter (c.w. and f.s.k. working) comprising transmitter unit Type 89, power unit Type 811 and drive unit, radio, Type 4. *Sub-assembly details are given in Section 2, Sheet No. 11.* Transmitter T.1975 provides c.w., on/off and f.s.k. telegraphy transmissions.

Origin

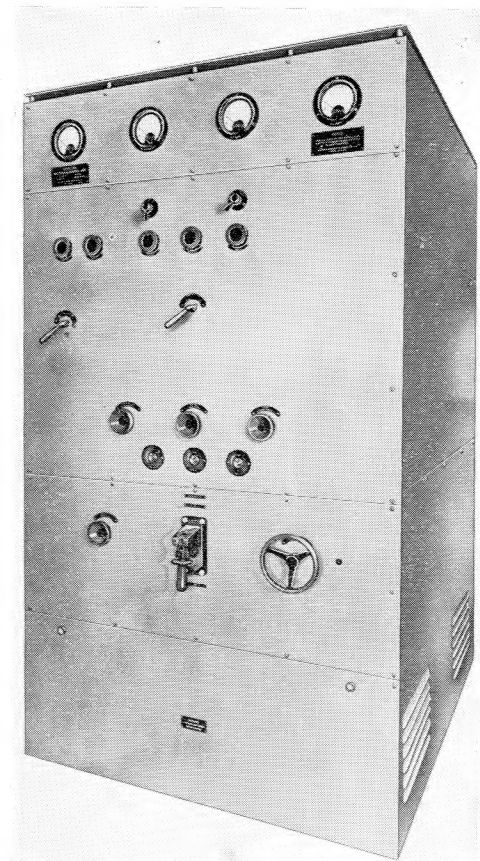
Marconi Wireless Telegraph Co. Ltd., Type SWB 8X.

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres).



Transmitter unit Type 89



Power unit Type 811 or 812

Frequency control	Franklin master oscillator (transmitter unit Type 89): Crystal controlled oscillator (drive unit radio, Type 4).		
Frequency accuracy and stability	Franklin master oscillator to 1 part in 20,000: Crystal controlled oscillator to 1 part in 100,000.		
Output impedance	77 ohms or 600 ohms.		
Output power	At 2 MHz	(150 metres)	4kW
	22.2 MHz	(13.5 metres)	3kW
	22.2 to 27 MHz	(13.5 to 11.1 metres)	2kW
Keying speed	200 w.p.m. (on/off keying). 150 bauds (f.s.k. drive unit, radio Type 4).		
Power supplies	<i>Transmitter unit Type 89 (with power unit Type 811):</i> 400V, 50 Hz, three-phase, 4-wire. <i>Drive unit, radio, Type 4:</i> 200-250V, 50 Hz, single-phase.		
Power consumption	9.6kW (total input).		
Overall dimensions		<i>Height</i>	<i>Width</i>
		<i>Depth</i>	
	<i>Transmitter unit</i>	7ft 0in	3ft 0in
	<i>Type 89</i>	(213.3 cm)	(91.4 cm)
	<i>Power unit</i>	6ft 6in	3ft 6in
	<i>Type 811</i>	(198 cm)	(106.6 cm)
	<i>Drive unit, radio</i>	3ft 1½in	9½in
	<i>Type 4</i>	(95.2 cm)	(24 cm)
Weights	<i>Transmitter unit Type 89</i>	13 cwt (660.4 kg)	
	<i>Power unit Type 811</i>	21 cwt (1066.8 kg)	
	<i>Drive unit, radio, Type 4</i>	220 lb (99.8 kg)	

TRANSMITTER Type T.1976 (10D/18479)

Relevant publications:—

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

(For illustrations of Transmitter Unit Type 89 and Power Unit Type 812, see Sect. 1, Sheet No. 11).

Function

Medium power, h.f. transmitter (c.w. and R/T (s.s.b.) working). Transmitter T.1976 provides either c.w. on/off keying telegraphy or s.s.b. R/T transmissions and comprises transmitter unit Type 89, power unit Type 812, rectifier Type 62, modulator unit Type 127, drive unit, radio Type 5 and drive unit, radio Type 7. *Sub-assembly details are given in Section 2, Sheet No. 12.* For s.s.b. R/T transmissions, drive unit, radio Type 7 and modulator unit Type 127 are used with transmitter unit Type 89. Drive unit, radio Type 5 provides the r.f. drive to the harmonic stages of the transmitter unit.

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB 8X.

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres) *c.w. operation:*
4 MHz to 27 MHz (75 to 11.1 metres) *s.s.b. operation.*

Frequency control

Franklin master oscillator (transmitter unit Type 89):
Crystal controlled oscillator (drive unit, radio Type 5).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000:
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. operation:

At 2MHz	(150 metres)	4kW
22.2 MHz	(13.5 metres)	3kW
22.2 to 27 MHz	(13.5 to 11.1 metres)	2kW

S.S.B. operation:

At 4 to 22.2 MHz	(75 to 13.5 metres)	3.4kW (p.e.p.)
22.2 to 27 MHz	(13.5 to 11.1 metres)	1.7kW (p.e.p.)

Keying speed

200 w.p.m. on/off keying.

Power supplies

Transmitter unit Type 89 (with power unit Type 812):
400V, 50 Hz, three-phase, 4-wire.
Modulator unit Type 127 and drive unit, radio Type 5:
200-250V, 50 Hz, single-phase.
Drive unit, radio Type 7:
110V or 200-250V, 50 Hz, single-phase.

Power consumption

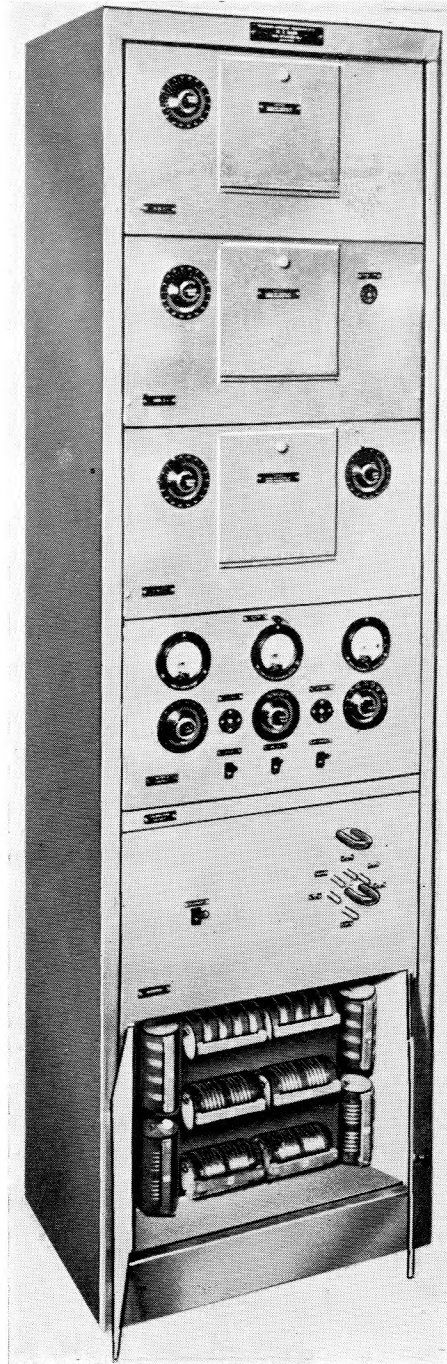
9.6kW (c.w. operation).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit Type 89</i>	7ft 0in (213.3 cm)	3ft 0in (91.4 cm)	2ft 0in (61 cm)
<i>Power unit Type 812</i>	6ft 6in (198 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Rectifier Type 62</i>	5ft 4½in (164.5 cm)	2ft 8¾in (82.3 cm)	2ft 3¾in (69.6 cm)
<i>Drive unit, radio Type 5</i>	3ft 1½in (95.2 cm)	9½in (24 cm)	2ft 6in (76.2 cm)
<i>Drive unit, radio Type 7</i>	6ft 0in (183 cm)	1ft 10½in (57.2 cm)	1ft 6¾in (48 cm)

Weights

<i>Transmitter unit Type 89</i>	13	cwt	(660.4 kg)
<i>Power unit Type 812</i>	21	cwt	(1066.8 kg)
<i>Rectifier Type 62</i>	13 $\frac{1}{4}$	cwt	(673.2 kg)
<i>Modulator unit Type 127</i>	25	cwt	(1270 kg)
<i>Drive unit, radio Type 5</i>			—
<i>Drive unit, radio Type 7</i>	576	lb	(261.3 kg)



Modulator unit Type 127

Sheet No. 13
Type T.1978 (10D/17884)

TRANSMITTER

Relevant publications:—

A.P.116E-0209-1

(formerly A.P.2555P, Vol. 1)

A.P.116E-0201-1

(formerly A.P.2555EA, Vol. 1)

Function

Medium power, V.H.F. ground transmitter (R/T only) comprising three main sub-assemblies:—

- (1) Transmitter T.1131 (modified) (10D/17940)
- (2) Amplifying unit Type 474 (10U/16619)
- (3) Modulator unit Type 28 (10D/17885)

Amplifying unit Type 474 and modulator unit Type 28 together form amplifier A.1979 (10U/16618).

Impedance matching unit Type 7018 forms part of the transmitter.

For details of sub-assemblies, see Section 2, Sheet No. 13.

Origin

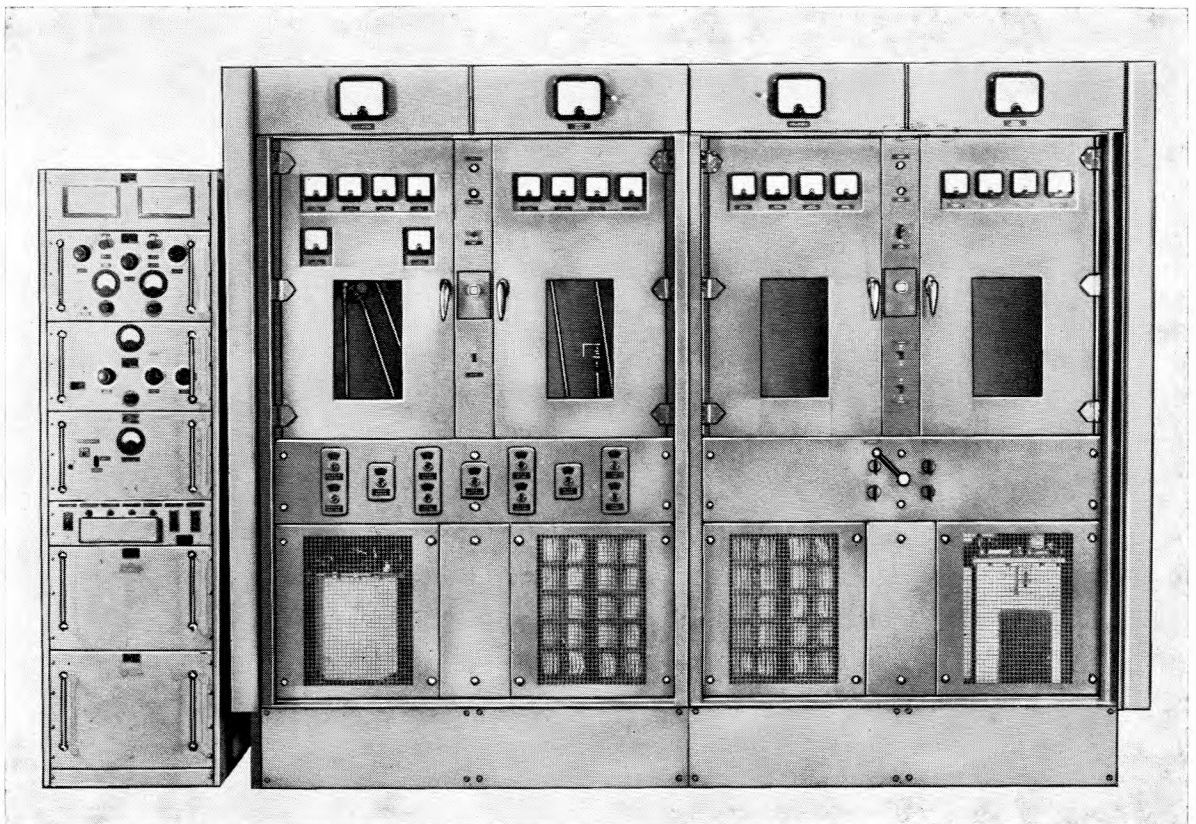
Electrical & Musical Industries Ltd., T.1131 modified, Standard Telephones & Cables Ltd., Amplifier A.1979.

Frequency range

100 to 156 MHz (3.00 to 1.92 metres).

Frequency control

Transmitter output frequency equal to 18 times crystal frequency (Transmitter Type T.1131J).



Transmitter Type T.1978

Frequency accuracy and stability

To crystal accuracy (one part in 10^6).

Modulation

Amplitude modulation 100 per cent.

Input impedance

Local microphone circuit: 100 ohms, remote microphone circuit: 600 ohms, into amplifying unit Type 472 (VOGAD).

Output impedance

71 ohms coaxial feeder.

Output power

1.6kW at 128 MHz (carrier).

Power supplies

400 \pm 4V, 50 Hz, three-phase supply.

Power consumption

Carrier, above 10kVA (approx.), 0.9 power factor.
90% modulation, 13kVA (approx.), 0.9 power factor.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter</i> <i>T.1131J</i>	6ft 0in (183 cm)	1ft 9in (53.3 cm)	1ft 5in (43.2 cm)
<i>Amplifying unit</i> <i>Type 474</i>	7ft 0in (213.3 cm)	4ft 0in (122 cm)	2ft 6in (76.2 cm)
<i>Modulator unit</i> <i>Type 28</i>	7ft 0in (213.3 cm)	4ft 0in (122 cm)	2ft 6in (76.2 cm)

Weights

<i>Transmitter Type 1131J</i> (10D/17746)	7 cwt (approx.) (355.7 kg)
<i>Amplifier A.1979</i> (10U/16618)	28 cwt (approx.) (1422.7 kg)

Associated equipment

Voltage regulator and circuit breaker (M.P.B. & W. supply and maintenance).

Test equipment:—

Dummy load Type 7020 (10S/16449)

Impedance bridge Type 7019 (10S/16448)

Transformer unit Type 7125 (10K/17692)

Sheet No. 14

TRANSMITTERS

Type T.1993 (10D/19114)

T.1993A (10D/23917)

5820-99-195-6286

Relevant publications:—

A.P.116E-0216-1A and 1B

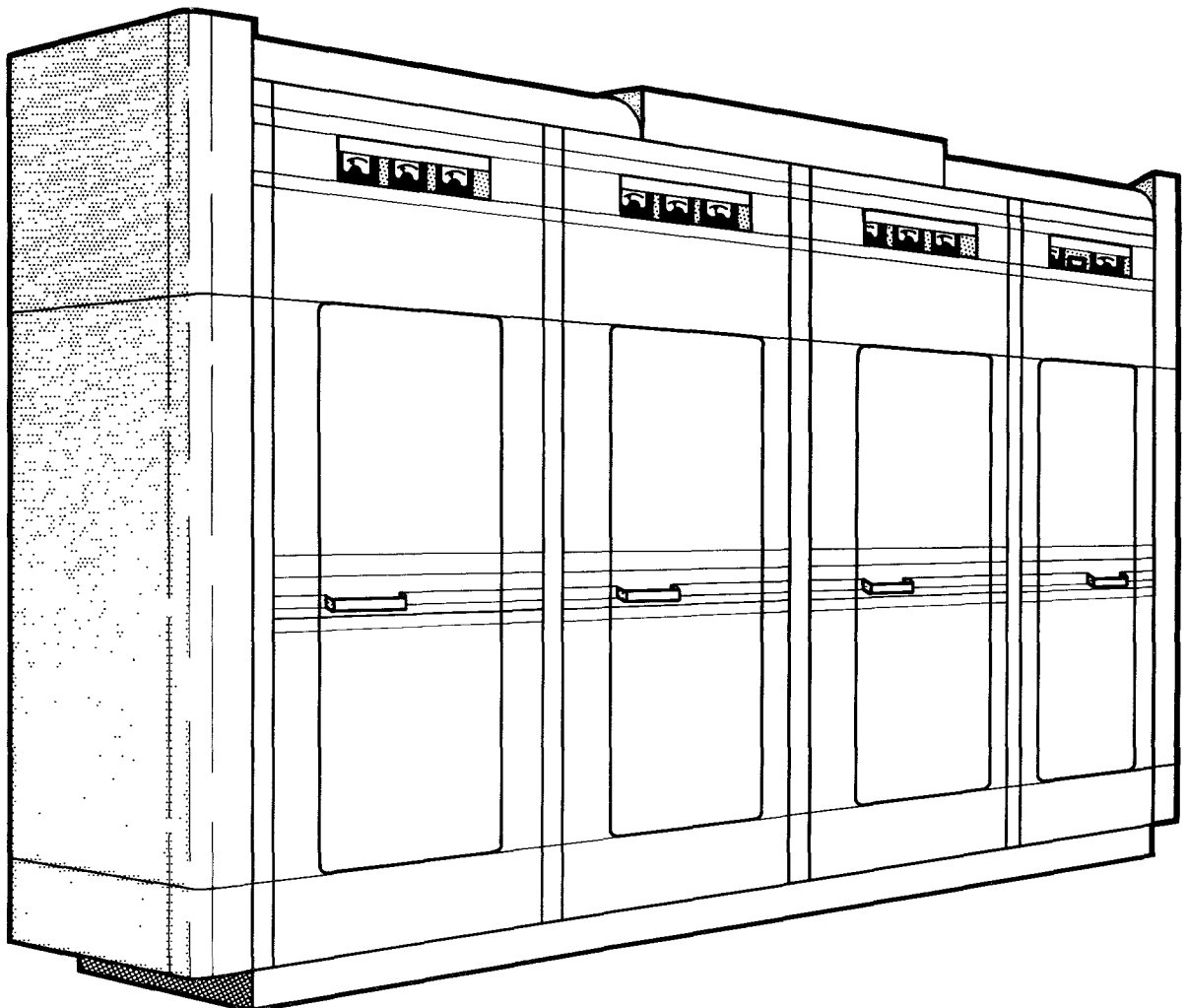
*(formerly A.P.2883NF, Vol. 1 2nd Edn.,
Parts 1 and 2)*

Function

Medium power, general purpose h.f. transmitter (c.w., m.c.w., R/T or f.s.k. working) suitable for operation in tropical, temperate or arctic conditions, is of unit construction comprising r.f., modulator and power cabinets combined to form a unified equipment. *For details of sub-assemblies see Section 2, Sheet No. 14.*

Transmitter T.1993 consists of one r.f. cabinet, one modulator cabinet and a power cabinet (twin).

Transmitter T.1993A is similar but embodies Modification No. 5663 which provides for remote selection of c.w. or R/T.



Transmitter Type T.1993

Transmitter 5820-99-195-6286 is the transmitter T.1993 with a safety device for aerial exchange (Mod. No. 4880) embodied.

Origin

Standard Telephones & Cables Ltd., D.S.10 transmitter Type 4-LE.96 Grp. 1.

Frequency range

2.5 to 22 MHz (13.6 to 120 metres) in three bands:—
2.5 to 5.5 MHz, 5.0 to 11.0 MHz and 10.0 to 22.0 MHz.

Frequency control

Crystal controlled oscillator (frequency tolerance \pm 0.003% using S.T.C. crystals Code No. PL.7065/144B).

Frequency accuracy and stability

To crystal accuracy.

Modulation

Amplitude modulation 100 per cent; m.c.w. tone frequencies of 500 Hz, 800 Hz and 100 Hz available.

A.F. input level

27dB below a level of 1mW, into 60 or 600 ohms line (at 50% modulation).

Output impedance

The transmitters will work into 40 to 75 ohms unbalanced loads or 400 to 800 ohms balanced loads.

Output power

C.W. on/off or f.s.k. operation: 5kW.
M.C.W. or R/T operation: 3kW (carrier).

Keying speed

up to 600 w.p.m.

Power supplies

380-415V, 50-60 Hz, three-phase supply.

Power consumption

C.W. on/off (5kW):
Mark 12.5kVA, 0.8 power factor
Space 5.0kVA, 0.6 power factor
C.W., f.s.k. (5kW):
12.5kVA, 0.8 power factor
M.C.W. or R/T:
15.0kVA, 0.8 power factor

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 3¼in (99.7 cm)
<i>R.F. cabinet</i>	6ft 5in (196 cm)	1ft 6in (45.7 cm)	3ft 3¼in (99.7 cm)
<i>Modulator cabinet</i>	6ft 5in (196 cm)	2ft 0in (61 cm)	3ft 3¼in (99.7 cm)

Weights

Power cabinet (twin) 28 cwt (1422.7 kg)
R.F. cabinet 8 cwt (406.5 kg)
Modulator cabinet 10 cwt (508.8 kg)

Associated equipment

Rack assembly Type 266 (10D/18476)

Sheet No. 15

TRANSMITTER

Type T.1995 (10D/19125)

Relevant publications:—

A.P.116E-0222-1

(formerly A.P.2877V, Vol. 1)

Function

Medium power h.f. transmitter (c.w. on/off telegraphy and R/T (s.s.b.) working). The transmitter comprises transmitter unit Type 95, power unit Type 1003, rectifier Type 62, modulator unit Type 138, drive unit, radio Type 5 and drive unit, radio Type 7. *Sub-assembly details are given in Section 2, Sheet No. 15.*

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB11X.

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres) *c.w. operation:*
4 MHz to 27 MHz (75 to 11.1 metres) *s.s.b. operation.*

Frequency control

Franklin master oscillator (transmitter unit Type 95).
Crystal controlled oscillator (drive unit, radio Type 5).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000:
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms and 600 ohms.

Output power

C.W. operation:

At 2.22-2 MHz (150-13.5 m) 7 to 5 kW

22.2-27 MHz (13.5-11.1 m) 5 to 4 kW.

S.S.B. operation:

At 4.22-2 MHz (75-13.5 m) 8 to 5 kW (p.e.p.)

22.2-27 MHz (13.5-11.1 m) 5 to 3 kW (p.e.p.).

Keying speed

200 w.p.m. (on/off keying).

Power supplies

Transmitter unit Type 95 (with power unit Type 1003)
400V, 50 Hz, three-phase, 4-wire,

Modulator unit Type 138 and Drive unit radio, Type 5:

200-250V, 50 Hz, single-phase.

Drive unit radio, Type 7:

110V or 210-250V, 50 Hz, single-phase.

Power consumption

C.W. operation:

Mark 19kW (0.98 power factor)

Space 11kW (0.98 power factor)

S.S.B. operation:

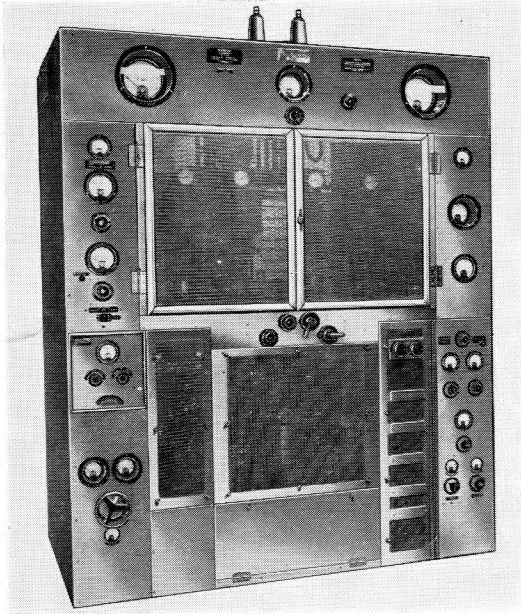
17kW (0.98 power factor)

Overall dimensions

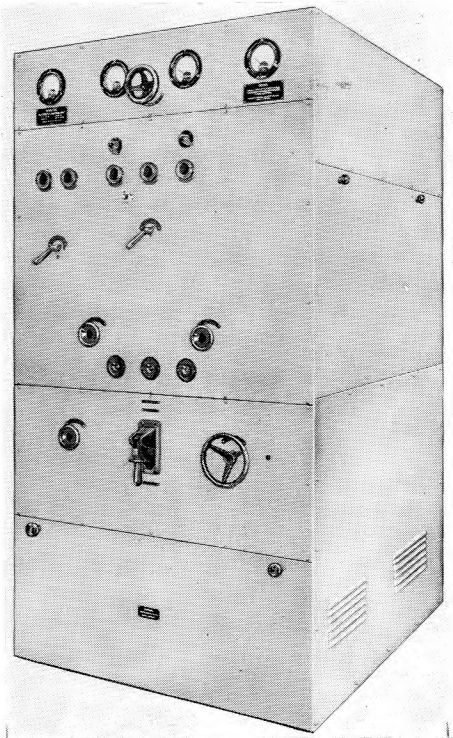
	Height	Width	Depth
<i>Transmitter unit Type 95</i>	6ft 11in (210.8 cm)	5ft 3in (160 cm)	2ft 10in (86.4 cm)
<i>Power unit Type 1003</i>	6ft 11in (210.8 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Modulator unit Type 138</i>	6ft 5in (195.6 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)
<i>Rectifier Type 62</i>	5ft 4 $\frac{3}{8}$ in (164.5 cm)	2ft 8 $\frac{3}{8}$ in (82.3 cm)	2ft 3 $\frac{3}{8}$ in (69.6 cm)
<i>Drive unit radio, Type 5</i>	3ft 1 $\frac{1}{2}$ in (95.2 cm)	9 $\frac{1}{2}$ in (24 cm)	2ft 6in (76.2 cm)
<i>Drive unit radio, Type 7</i>	6ft 0in (183 cm)	1ft 10 $\frac{1}{2}$ in (57.2 cm)	1ft 6 $\frac{7}{8}$ in (48 cm)

Weights

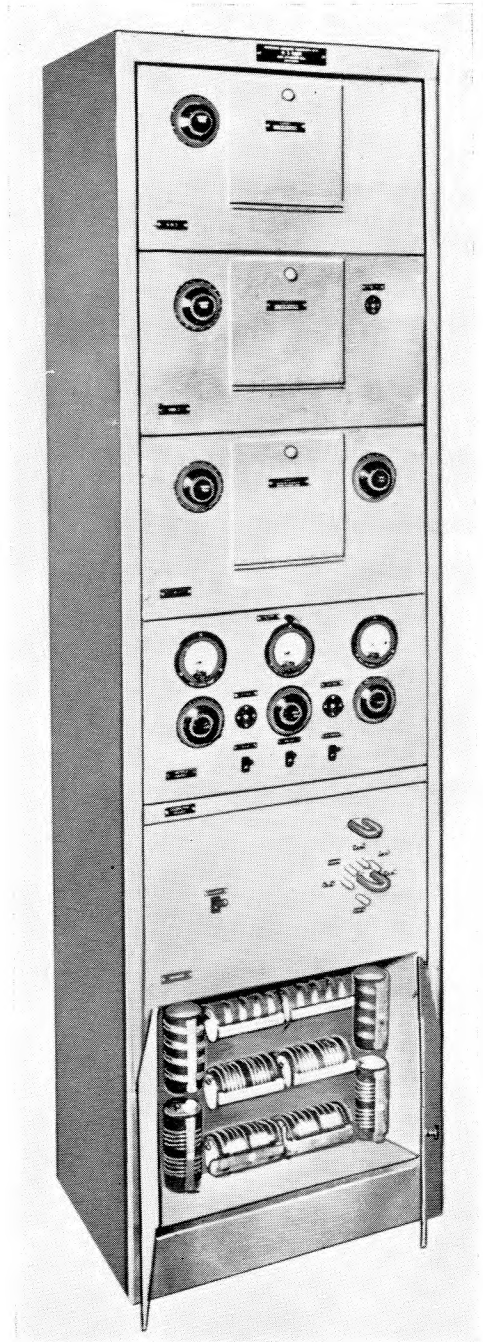
<i>Transmitter unit, Type 95</i>	25 cwt (1270 kg)
<i>Power unit, Type 1003</i>	22 cwt (1117.6 kg)
<i>Rectifier Type 62</i>	13 $\frac{1}{4}$ cwt (673.2 kg)
<i>Modulator unit, Type 138</i>	25 cwt (1270 kg)
<i>Drive unit radio, Type 5</i>	—
<i>Drive unit radio, Type 7</i>	576 lb (261.3 kg)



Transmitter unit Type 95



Power unit Type 1003 or 7724



Modulator unit Type 138

Sheet No. 16

TRANSMITTERS **Type T.2000 (10D/19142)**
T.2000A (10D/22708)

Relevant publications:—

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

(For illustrations of Transmitter Unit Type 89 and Power Unit Type 811, see Sect. 1, Sheet No. 11).

Function

Medium power h.f. transmitter (c.w. and R/T working). Transmitter T.2000 provides either c.w. on/off telegraphy or amplitude modulated R/T transmissions and comprises the following units:—

Transmitter unit Type 89, power unit Type 811, modulator unit Type 7436, drive unit radio, Type 5, amplifier Type A.7488, microphone assembly Type 72 and associated smoothing unit Type 22. *Sub-assembly details are given in Section 2, Sheet No. 16.* T.2000A is a version of T.2000 modified to obtain remote indication of the transmitter state.

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB 8X.

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres).

Frequency control

Franklin master oscillator (*Transmitter unit Type 89*):
Crystal controlled oscillator (*Drive unit radio, Type 5*).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. operation

At 2 MHz (150 metres) 4kW

22.2 MHz (13.5 metres) 3kW

22.2-27 MHz (13.5-11.1m) 2kW

R/T operation

At 2-22.2 MHz (150-13.5m) 2.5-2.0kW

2-22-27 MHz (13.5-11.1m) 1.0-0.7kW

Keying speed

200 w.p.m. on/off keying.

Power supplies

Transmitter unit, Type 89 (with power unit Type 811):
400V, 50 Hz, 3-phase 4-wire.

Drive unit radio, Type 5:
200-250V, 50 Hz single-phase.

Power consumption

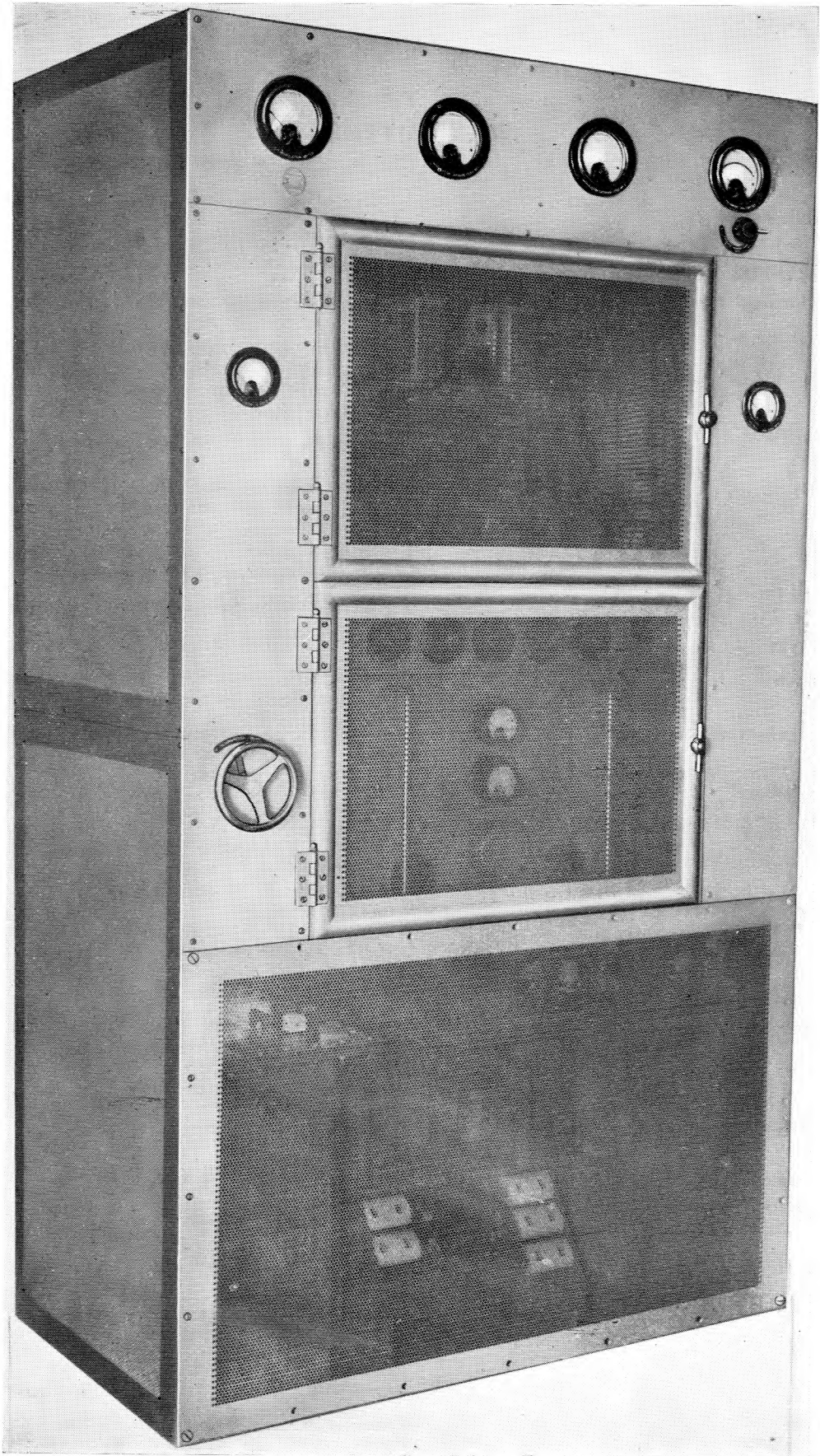
9.6kW (c.w. operation).
11.1kW (R/T operation).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit</i>	7ft 0in	3ft 0in	2ft 0in
<i>Type 89</i>	(213.3 cm)	(91.4 cm)	(61 cm)
<i>Power unit</i>	6ft 6in	3ft 6in	4ft 0in
<i>Type 811</i>	(198 cm)	(106.6 cm)	(122 cm)
<i>Drive unit radio,</i>	3ft 1½in	9½in	2ft 6in
<i>Type 5</i>	(95.2 cm)	(24 cm)	(76.2 cm)
<i>Modulator unit</i>	6ft 5in	3ft 6in	2ft 0in
<i>Type 7436</i>	(195.6 cm)	(106.6 cm)	(61 cm)

Weights

<i>Transmitter unit Type 89</i>	13 cwt (660.4 kg)
<i>Power unit Type 811</i>	21 cwt (1066.8 kg)
<i>Modulator unit Type 7436</i>	11 cwt (558.8 kg)



Modulator unit Type 7436

Sheet No. 17

TRANSMITTER

Type T.7095 (10D/19188)

Relevant publications:—

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

(For illustrations of Transmitter Unit Type 89 and Power Unit Type 811 see Sect. 1, Sheet No. 11.)

Function

Medium power h.f. transmitter (c.w. on/off telegraphy). Transmitter T.7095 comprises transmitter unit Type 89, power unit Type 811 and oscillator unit Type 7069. It functions in a manner identical with that of the transmitter Type T.1975 (Sheet No. 11) when operating on c.w. telegraphy. *Sub-assembly details are given in Section 2, Sheet No. 17.*

Origin

Marconi Wireless Telegraph Co. Ltd., Type SWB 8X.

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres).

Frequency control

Franklin master oscillator (*Transmitter unit Type 89*):
Crystal controlled oscillator (*Oscillator unit Type 7069*).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000:
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. operation:

At 2 MHz	(150 metres)	4kW
22.2 MHz	(13.5 metres)	3kW
22.2 to 27 MHz	(13.5 to 11.1 metres)	2kW

Keying speed

200 w.p.m. on/off keying.

Power supplies

Transmitter unit Type 89 (with power unit Type 811):
400V, 50 Hz, three-phase, 4-wire input.

Oscillator unit Type 7069:
200-250V, 50 Hz, single-phase.

Power consumption

9.6kW.

Overall dimensions

	Height	Width	Depth
<i>Transmitter unit Type 89</i>	7ft 0in (213.3 cm)	3ft 0in (91.4 cm)	2ft 0in (61 cm)
<i>Power unit Type 811</i>	6ft 6in (198 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Oscillator unit Type 7069</i>	8in (20.3 cm)	8in (20.3 cm)	2ft 6in (76.2 cm)

Weights

<i>Transmitter unit Type 89</i>	13 cwt (660.4 kg)
<i>Power unit Type 811</i>	21 cwt (1066.8 kg)
<i>Oscillator unit Type 7069</i>	50 lb. (22.7 kg)

TRANSMITTER, RADIO

Sheet No. 18

Type T.7096

5820-99-932-5691

(formerly 10D/19225)

Relevant publications:—

A.P.116E-0253-1

(formerly A.P.2531A & C, Vol. 1)

Function

Very low power u.h.f. multi-channel transmitter (R/T) primarily for communication between ground and aircraft in flight. It may also be used for line of sight ground communication. The transmitter comprises transmitter unit assembly, power unit assembly and set of connectors. *Sub-assembly details are given in Section 2, Sheet No. 18.*

Origin

The Plessey Co. Ltd., Type XCA 300.

Frequency range

225 MHz to 399.9 MHz divided into 1750 channels each separated by 100 kHz. Twelve of these channels can be preset to the required frequencies and any one of these 12 channels can be automatically selected by either remote or local switching.

Frequency control

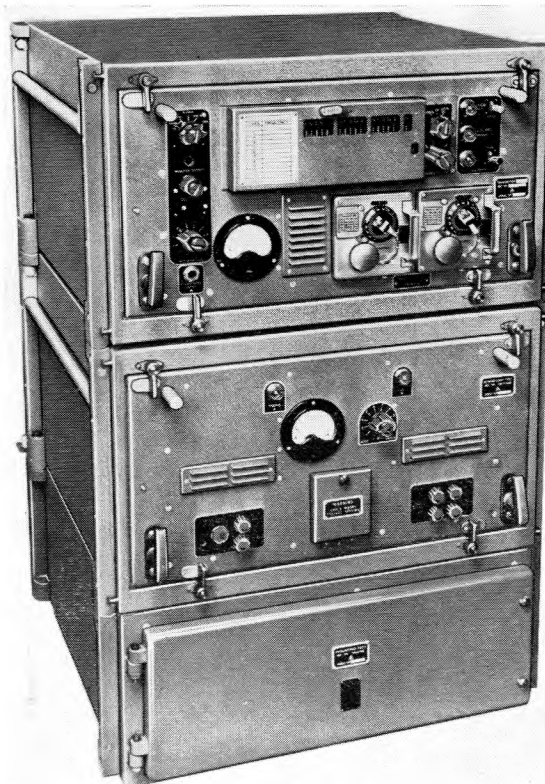
Crystal controlled master oscillator incorporating 32 built-in crystals. These crystals provide the necessary combinations to embrace all of the 1750 channels.

Frequency accuracy and stability

To crystal accuracy.

Modulation

Amplitude modulation up to 100 per cent. 12dB to 15dB clipping is available if required.



Transmitter Type T.7096

Output impedance
Output power
Power supplies
Power consumption
Overall dimensions

50 ohms (nominal).
 10 watts (nominal).
 230V or 115V, 45 to 65 Hz, single-phase.
 Transmit 430 watts (approx.).
 Stand-by 250 watts (approx.)

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit assembly</i>	1ft 1¼in (33.7 cm)	1ft 11¼in (61 cm)	2ft 0in (61 cm)
<i>Power unit assembly</i>	1ft 1¼in (33.7 cm)	(59 cm)	2ft 0in (61 cm)

Weights

Transmitter unit assembly 130 lb (59 kg)
Power unit assembly 151 lb (68.5 kg)

Ancillary equipment

Mounting plinth Type 7872
 Blower, air, Type 7344
 Panel, blanking Type 9240 and pipes, air cooling.

Associated equipment

Amplifier A.7439 is used with transmitter T.7096 to increase the power output to between 100 and 150 watts. Details of Amplifier A.7439 are given in Section 2, Sheet No. 18.



Amplifier Type A.7349

Sheet No. 20

TRANSMITTERS

Type T.7242 (10D/19422)

T.7242A (10D/22231)

T.7232B (10D/22795)

T.7242C (10D/13914)

Relevant publications:—

A.P.116E-0227

(formerly A.P.2883S, Vol. 1, Parts 1 and 2)

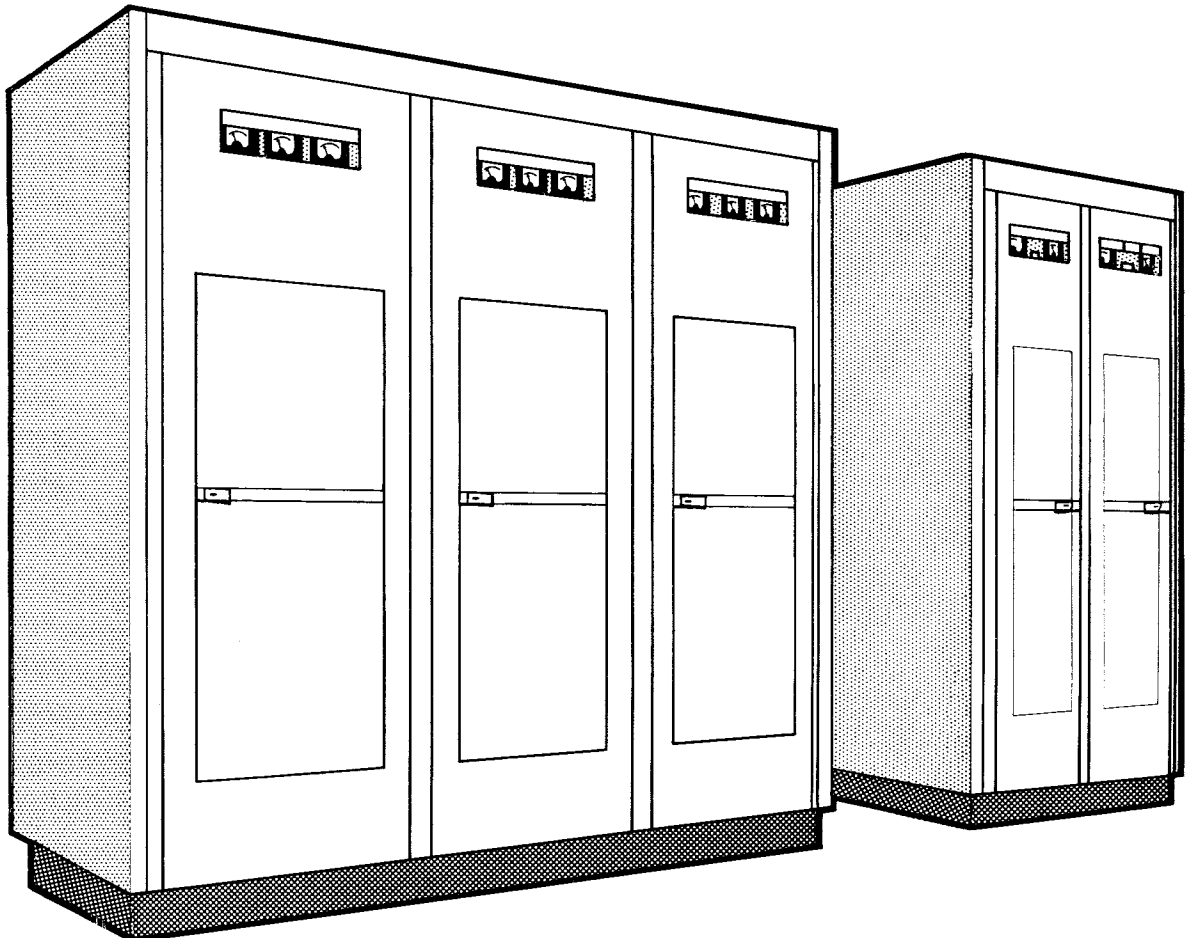
Function

Medium power, general purpose h.f. transmitter (c.w. on/off, f.s.k., m.c.w. or R/T working) suitable for operation in tropical, temperate or arctic conditions, is of unit construction comprising one r.f. cabinet containing two r.f. units for twin-channel operation and one cabinet housing the modulator and power supply equipment. The transmitter is designed specifically for mobile operation.

Transmitter T.7242A is a modified version of T.7242, embodying Mod. No. 5290 which provides a safety device for aerial exchange.

Transmitter T.7242B is a version of T.7242A further modified for the remote selection of c.w. or R/T working and r.f. truck selection (Mod. No. 6145).

Transmitter T.7242C is a modified version of T.7242 provided with additional cooling for operation under extreme conditions. For details of sub-assemblies see Section 2, Sheet No. 20.



Transmitter Type T.7242

Origin	Standard Telephones & Cables Ltd., D.S.20 transmitter, Code No. 4-LRE.134/12.																
Frequency range	2.5 to 22.0 MHz (13.6 to 120 metres).																
Frequency control	Crystal controlled oscillator (frequency tolerance $\pm 0.003\%$ using S.T.C. crystals RL.7065/144B from 2.5 to 22.0 MHz).																
Frequency accuracy and stability	To crystal accuracy.																
Modulation	Amplitude modulation 100 per cent, m.c.w. tone frequencies of 1000 Hz, 800 Hz and 500 Hz available.																
A.F. input level	27dB below a level of 1 mW, into 60 or 600 ohms line (at 50% modulation).																
Output impedance	The transmitters will work into balanced (400 to 800 ohms) or unbalanced (40 to 75 ohms) loads.																
Output power	<p><i>Single channel operation:</i></p> <table border="0"> <tr> <td>c.w. on/off or f.s.k.</td> <td>5kW</td> </tr> <tr> <td>m.c.w. or R/T</td> <td>3kW (carrier)</td> </tr> </table> <p><i>Twin-channel operation:</i></p> <table border="0"> <tr> <td>c.w. and R/T (carrier)</td> <td>2kW per channel</td> </tr> <tr> <td>c.w. (independent keying)</td> <td>5kW per channel</td> </tr> <tr> <td>c.w. (common keying)</td> <td>3kW per channel</td> </tr> <tr> <td>f.s.k.</td> <td>2.5kW per channel</td> </tr> </table>	c.w. on/off or f.s.k.	5kW	m.c.w. or R/T	3kW (carrier)	c.w. and R/T (carrier)	2kW per channel	c.w. (independent keying)	5kW per channel	c.w. (common keying)	3kW per channel	f.s.k.	2.5kW per channel				
c.w. on/off or f.s.k.	5kW																
m.c.w. or R/T	3kW (carrier)																
c.w. and R/T (carrier)	2kW per channel																
c.w. (independent keying)	5kW per channel																
c.w. (common keying)	3kW per channel																
f.s.k.	2.5kW per channel																
Keying speed	Up to 600 w.p.m. (480 bauds) tone to line, single or double current.																
Power supplies	380-415V, 50-60 Hz, three-phase supply.																
Power consumption	<p><i>Single channel (c.w. on/off, 5kW):</i></p> <table border="0"> <tr> <td>Mark</td> <td>12.5kVA (0.8 power factor)</td> </tr> <tr> <td>Space</td> <td>5.0kVA (0.6 power factor)</td> </tr> </table> <p><i>Single channel c.w., f.s.k. (5kW):</i></p> <table border="0"> <tr> <td></td> <td>12.5kVA (0.8 power factor)</td> </tr> </table> <p><i>Single channel R/T (3kW):</i></p> <table border="0"> <tr> <td></td> <td>15.0kVA (0.8 power factor)</td> </tr> </table> <p><i>Twin-channel c.w. on/off (3kW):</i></p> <table border="0"> <tr> <td>Mark</td> <td>18.0kVA (0.8 power factor)</td> </tr> <tr> <td>Space</td> <td>6.0kVA (0.6 power factor)</td> </tr> </table>	Mark	12.5kVA (0.8 power factor)	Space	5.0kVA (0.6 power factor)		12.5kVA (0.8 power factor)		15.0kVA (0.8 power factor)	Mark	18.0kVA (0.8 power factor)	Space	6.0kVA (0.6 power factor)				
Mark	12.5kVA (0.8 power factor)																
Space	5.0kVA (0.6 power factor)																
	12.5kVA (0.8 power factor)																
	15.0kVA (0.8 power factor)																
Mark	18.0kVA (0.8 power factor)																
Space	6.0kVA (0.6 power factor)																
Overall dimensions	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>Power cabinet (twin)</i></td> <td>6ft 5in (196 cm)</td> <td>4ft 4½in (133.4 cm)</td> <td>3ft 5in (104 cm)</td> </tr> <tr> <td><i>Modulator (combined with power cabinet)</i></td> <td>6ft 5in (196 cm)</td> <td>2ft 0in (61 cm)</td> <td>3ft 5in (104 cm)</td> </tr> <tr> <td><i>R.F. cabinet (2 units)</i></td> <td>6ft 5in (196 cm)</td> <td>3ft 4½in (103 cm)</td> <td>3ft 7in (109 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 4½in (133.4 cm)	3ft 5in (104 cm)	<i>Modulator (combined with power cabinet)</i>	6ft 5in (196 cm)	2ft 0in (61 cm)	3ft 5in (104 cm)	<i>R.F. cabinet (2 units)</i>	6ft 5in (196 cm)	3ft 4½in (103 cm)	3ft 7in (109 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>														
<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 4½in (133.4 cm)	3ft 5in (104 cm)														
<i>Modulator (combined with power cabinet)</i>	6ft 5in (196 cm)	2ft 0in (61 cm)	3ft 5in (104 cm)														
<i>R.F. cabinet (2 units)</i>	6ft 5in (196 cm)	3ft 4½in (103 cm)	3ft 7in (109 cm)														
Weights	<table border="0"> <tr> <td><i>Power cabinet (twin)</i></td> <td>28 cwt (1423 kg)</td> </tr> <tr> <td><i>Modulator</i></td> <td>10 cwt (508 kg)</td> </tr> <tr> <td><i>R.F. units (each)</i></td> <td>8 cwt (406.4 kg)</td> </tr> </table>	<i>Power cabinet (twin)</i>	28 cwt (1423 kg)	<i>Modulator</i>	10 cwt (508 kg)	<i>R.F. units (each)</i>	8 cwt (406.4 kg)										
<i>Power cabinet (twin)</i>	28 cwt (1423 kg)																
<i>Modulator</i>	10 cwt (508 kg)																
<i>R.F. units (each)</i>	8 cwt (406.4 kg)																
Associated equipment	Rack assembly Type 266 (10D/18476)																

Note . . .

When transmitter Type T.7242 is part of R.V.T.600 installation it operates in conjunction with the following:—

Rack assembly Type 7198	(10D/19412)
Rack assembly Type 7199	(10D/19413)
Rack assembly Type 7204	(10D/19418)

Sheet No. 21

TRANSMITTERS

Type T.7243 (10D/19423)

T.7243A (10D/21162)

Relevant publications:—

A.P.2883T, Vol. 1, Parts 1 and 2

A.P.116E-0218 (formerly A.P.2883NC)

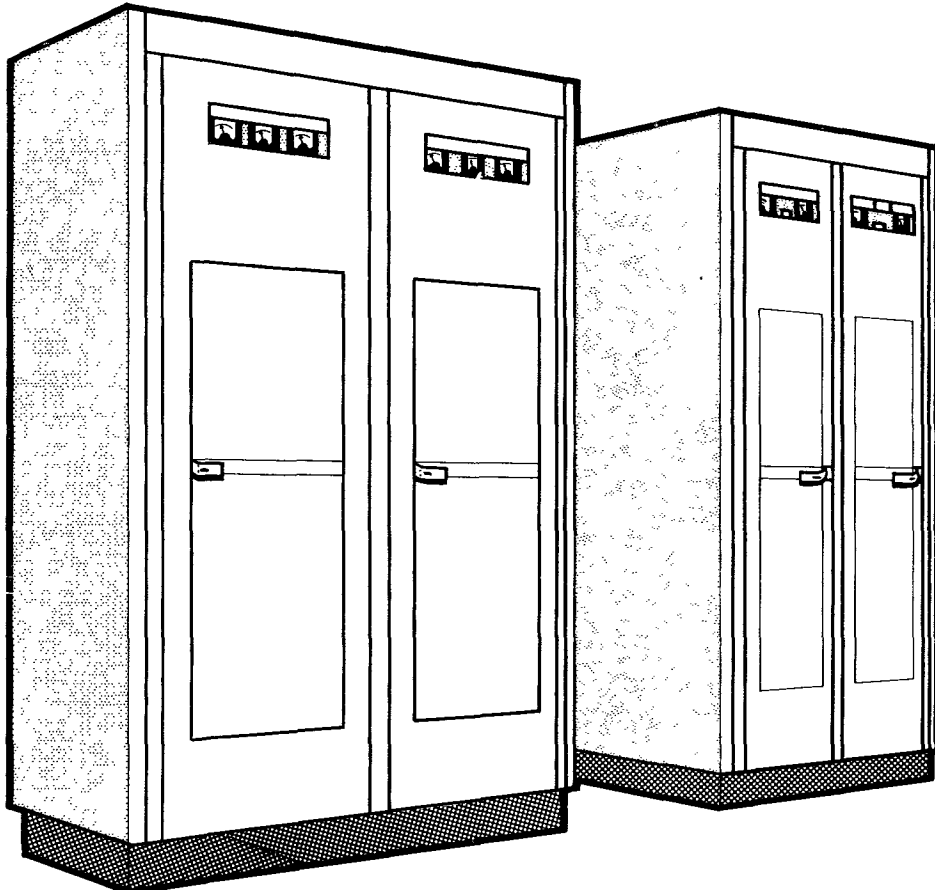
Function

Medium power, general purpose and single side-band h.f. transmitter (c.w. on/off, f.s.k., facsimile and R/T working), suitable for mobile operation in tropical, temperate or arctic conditions. The transmitter is of unit construction comprising one r.f. cabinet containing two r.f. units and a cabinet housing the power equipment. The form of transmission depends on the drive unit(s) used with the equipment and can be on/off and f.s.k. telegraphy, facsimile or s.s.b., i.s.b. or d.s.b. telephony.

Transmitter Type T.7243A is a variant of T.7243 modified to facilitate its installation as part of R.V.T. 610 Mk. 1 (Mod. No. 4838). *Sub-assembly details are given in Section 2, Sheet No. 21.*

Origin

Standard Telephones & Cables Ltd., D.S.22 transmitter, Code No. 4-LRE.135 Grp. 2.



Transmitter Type T.7243

Frequency range	4 to 28 MHz (75 to 10·7 metres).												
Frequency control	Crystal controlled oscillator (frequency tolerance within 0·003%).												
Frequency accuracy and stability	To crystal accuracy.												
Output impedance	The transmitter will work into 600-800 ohms balanced line (with s.w.r. of 1·4:1) or into 40-75 ohms unbalanced line.												
Output power	<p><i>Single r.f. unit:</i> S.S.B. or i.s.b. operation: 4kW (peak) C.W. on/off or f.s.k. operation: 4kW</p> <p><i>Two r.f. units (simultaneous operation):</i> S.S.B. or i.s.b. 4kW (peak) each C.W., f.s.k. 2·5kW each C.W., on/off 3·4kW each</p>												
Keying speed	600 w.p.m. (480 bauds), including performance of drive unit.												
Power supplies	380-415V, 50-60 Hz, three-phase supply.												
Power consumption	<p><i>Single r.f. unit:</i> C.W. on/off (mark) or f.s.k. (4kW) 13·5kVA (0·8 power factor) C.W. on/off (space) 5·5kVA (0·6 power factor) S.S.B. (single tone) (4kW) 13·5kVA (0·8 power factor) S.S.B. (tone off) 8·0kVA (0·7 power factor)</p> <p><i>Two r.f. units (simultaneous operation)</i> <i>Maximum consumption:</i> 18·0kVA (0·8 power factor)</p>												
Overall dimensions	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>R.F. cabinet (2 units)</i></td> <td>6ft 5in (196 cm)</td> <td>3ft 4½in (103 cm)</td> <td>3ft 7in (109 cm)</td> </tr> <tr> <td><i>Power cabinet (twin)</i></td> <td>6ft 5in (196 cm)</td> <td>4ft 4½in (133 cm)</td> <td>3ft 5in (104 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>R.F. cabinet (2 units)</i>	6ft 5in (196 cm)	3ft 4½in (103 cm)	3ft 7in (109 cm)	<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 4½in (133 cm)	3ft 5in (104 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>										
<i>R.F. cabinet (2 units)</i>	6ft 5in (196 cm)	3ft 4½in (103 cm)	3ft 7in (109 cm)										
<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 4½in (133 cm)	3ft 5in (104 cm)										
Weights	<p><i>R.F. units (each)</i> 8 cwt (406·5 kg) <i>Power cabinet (twin)</i> 28 cwt (1423 kg)</p>												
Associated equipment	Rack assemblies Type 255 (10D/18463) and Type 266 (10D/18476)												

Note . . .

Transmitter Type T.7243A (part of R.V.T.610 installation) operates in conjunction with the following:—

- Rack assembly Type 7200 (10D/19414)
- Rack assembly Type 7201 (10D/19415)
- Rack assembly Type 7202A (10D/21163)
- Rack assembly Type 7203 (10D/19417)

Sheet No. 22

TRANSMITTERS

Type T.7247 (10D/19424)

T.7247A (10D/22232)

Relevant publications:—

A.P.116E-0216-1A and 1B

(formerly A.P.2883NF, Vol. 1

2nd Edn., Parts 1 and 2)

Function

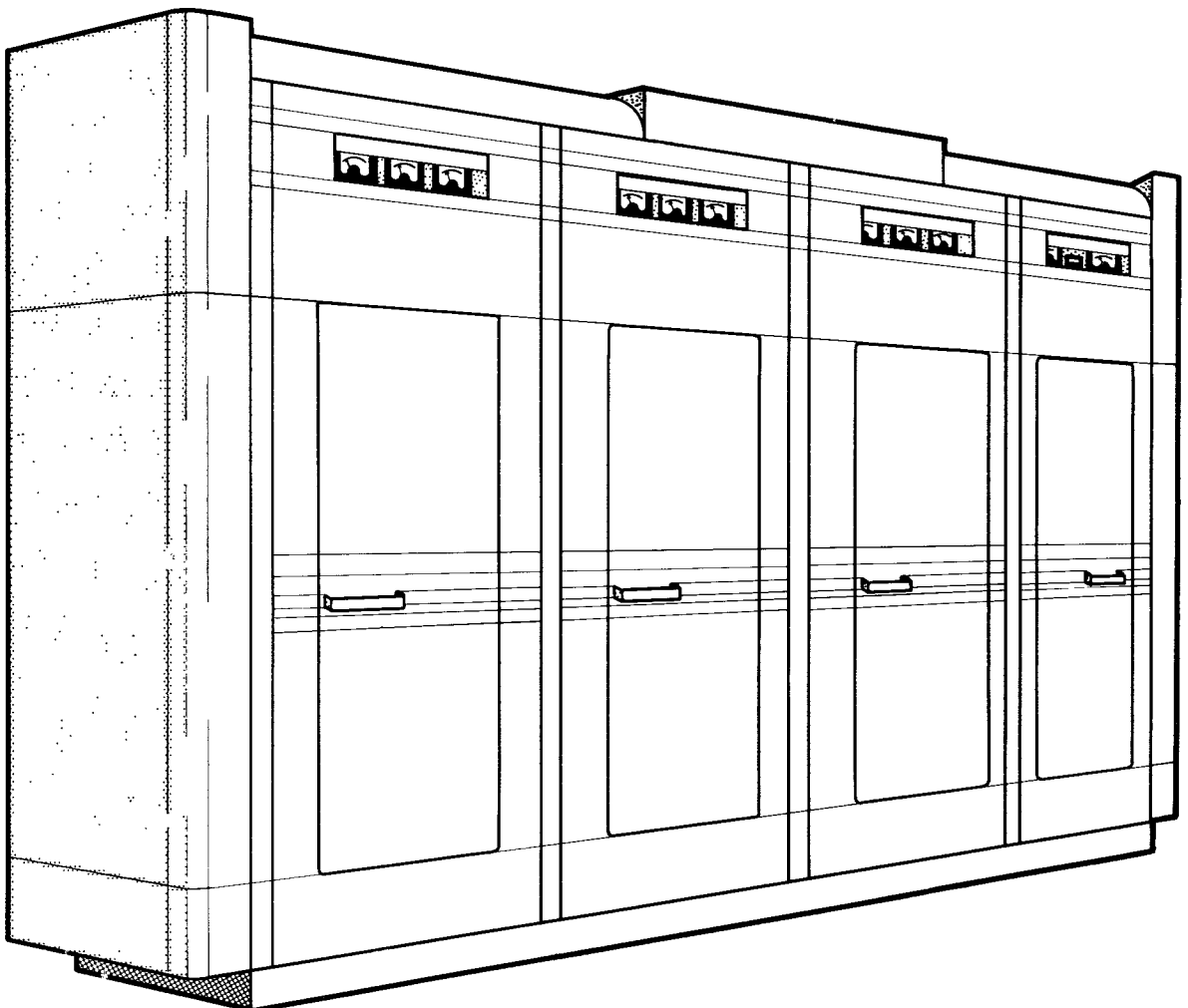
Medium power, general purpose h.f. transmitter (c.w., m.c.w., R/T or f.s.k. working) suitable for operation in tropical, temperate or arctic conditions, is of unit construction comprising r.f., modulator and power cabinets combined to form a unified equipment. *For details of sub-assemblies see Section 2, Sheet No. 22.*

Transmitter T.7247 consists of one r.f. cabinet, one modulator cabinet and a power cabinet (twin).

Transmitter T.7247A is T.7247 modified to Modification No. 5290 which provides a safety device for aerial exchange.

Origin

Standard Telephones & Cables Ltd., D.S.10 transmitter, Type 4-LE.96 Grp. 61.



Transmitter Type T.7247

Frequency range	1.6 MHz to 17.5 MHz.																
Frequency control	Crystal controlled oscillator (frequency tolerance $\pm 0.005\%$ from 1.6 to 17.5 MHz).																
Frequency accuracy and stability	To crystal accuracy.																
Modulation	Amplitude modulation 100 per cent; m.c.w. tone frequencies of 500 Hz, 800 Hz and 1000 Hz available.																
A.F. input level	27dB below a level of 1mW, into 60 or 600 ohms line (at 50% modulation).																
Output impedance	The transmitters will work into balanced (400-800 ohms) or unbalanced (40-75 ohms) loads.																
Output power	<i>C.W. on/off or f.s.k. operation:</i> 5kW <i>M.C.W. or R/T operation:</i> 3kW (carrier)																
Keying speed	Up to 600 w.p.m.																
Power supplies	380-415V, 50-60 Hz, three-phase supply.																
Power consumption	<i>C.W. on/off (5kW)</i> <i>Mark</i> 12.5kVA (0.8 power factor) <i>Space</i> 5.0kVA (0.6 power factor) <i>C.W./f.s.k. (5kW)</i> 12.5kVA (0.8 power factor) <i>M.C.W. or R/T (3kW)</i> 15.0kVA (0.8 power factor)																
Overall dimensions	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>Power cabinet (twin)</i></td> <td>6ft 5in (196 cm)</td> <td>4ft 0in (122 cm)</td> <td>3ft 3¼in (99.7 cm)</td> </tr> <tr> <td><i>R.F. cabinet</i></td> <td>6ft 5in (196 cm)</td> <td>1ft 6in (45.7 cm)</td> <td>3ft 3¼in (99.7 cm)</td> </tr> <tr> <td><i>Modulator cabinet</i></td> <td>6ft 5in (196 cm)</td> <td>2ft 0in (61 cm)</td> <td>3ft 3¼in (99.7 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 3¼in (99.7 cm)	<i>R.F. cabinet</i>	6ft 5in (196 cm)	1ft 6in (45.7 cm)	3ft 3¼in (99.7 cm)	<i>Modulator cabinet</i>	6ft 5in (196 cm)	2ft 0in (61 cm)	3ft 3¼in (99.7 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>														
<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 3¼in (99.7 cm)														
<i>R.F. cabinet</i>	6ft 5in (196 cm)	1ft 6in (45.7 cm)	3ft 3¼in (99.7 cm)														
<i>Modulator cabinet</i>	6ft 5in (196 cm)	2ft 0in (61 cm)	3ft 3¼in (99.7 cm)														
Weights	<i>Power cabinet (twin)</i> 28 cwt (1422.7 kg) <i>R.F. cabinet</i> 8 cwt (406.5 kg) <i>Modulator cabinet</i> 10 cwt (508.8 kg)																
Associated equipment	Rack assembly Type 266 (10D/18476).																

Sheet No. 23

TRANSMITTERS

Type T.7248 (10D/19425)

T.7248A (10D/21170)

T.7248B (10D/22233)

T.7248C (10D/23913)

Relevant publications:—

A.P.116E-0227

(formerly A.P.2883S, Vol. 1, Parts 1 and 2)

Function

Medium power, general purpose h.f. transmitter (c.w., m.c.w., R/T or f.s.k. working) suitable for mobile operation in tropical, temperate or arctic conditions, is of unit construction comprising one r.f. cabinet containing a single r.f. unit and a second cabinet housing both the modulator and power supply equipment. *Details of the sub-assemblies are given in Section 2, Sheet No. 23.*

Transmitter T.7248A is created by the embodiment of Mod. No. 4880 to T.7248, which provides a safety device for aerial exchange.

Transmitter T.7248B is T.7248 modified to provide a safety indicator for aerial exchange (Mod. No. 5290). Transmitter T.7248C is a modified version of T.7248 providing additional cooling for high ambient temperature operation.



Transmitter Type T.7248

Origin	Standard Telephones & Cables Ltd., D.S.20 transmitter, Code No. 4-LRE.134/31.		
Frequency range	1.6 to 17.5 MHz (17.2 to 187.5 metres).		
Frequency control	Crystal controlled oscillator (frequency tolerance \pm 0.005% from 1.6 to 17.5 MHz).		
Frequency accuracy and stability	To crystal accuracy.		
Modulation	Amplitude modulation 100 per cent; m.c.w. tone frequencies of 500 Hz, 800 Hz and 1000 Hz available.		
A.F. input level	27dB below a level of 1mW, into 60 or 600 ohms line (at 50% modulation).		
Output impedance	The transmitters will work into balanced (400 to 800 ohms) or unbalanced (45 to 75 ohms) loads.		
Output power	<i>C.W. on/off or f.s.k. operation:</i>	4.6kW	
	<i>M.C.W. or R/T operation:</i>	3.0kW	
Keying speed	Up to 600 w.p.m. (480 bauds) tone to line, single or double current.		
Power supplies	380-415V, 50-60 Hz, three-phase supply.		
Power consumption	<i>C.W. on/off (4.6kW)</i>		
	<i>Mark</i>	12.5kVA	0.8 power factor
	<i>Space</i>	5.0kVA	0.6 power factor
	<i>C.W., f.s.k. (4.6kW)</i>		
		12.5kW	0.8 power factor
	<i>R/T (3.0kW)</i>		
		15.0kVA	0.8 power factor
Overall dimensions		<i>Height</i>	<i>Width</i>
		<i>Depth</i>	
	<i>Power cabinet (twin)</i>	6ft 5in (196 cm)	4ft 4½in (133.4 cm)
	<i>Modulator (combined with power cabinet)</i>	6ft 5in (196 cm)	2ft 0in (61 cm)
	<i>R.F. cabinet (one unit)</i>	6ft 5in (196 cm)	1ft 10½in (57 cm)
	<i>Power cabinet (twin)</i>	28 cwt (1423 kg)	3ft 5in (104 cm)
	<i>Modulator</i>	10 cwt (508 kg)	3ft 5in (104 cm)
	<i>R.F. Unit (single)</i>	8 cwt (406.4 kg)	
	<i>Modulator</i>	0 scwt (508 kg)	
Associated equipment	Rack assembly Type 266 (10D/18476).		

Sheet No. 24

**TRANSMITTER,
RADIO**

**Type T.7355
5820-99-932-5698
(formerly 10D/19270)**

Relevant publications:—

A.P.116E-0252-1
(formerly A.P.2531D & E, Vol. 1)

Function

Very low power u.h.f. single-channel transmitter (R/T working) primarily for communication between ground and aircraft in flight. It may also be used for line of sight ground communication. The transmitter comprises transmitter unit Type 9231, cable assembly Type 9232, cover assembly and cover front Type 1068. *Sub-assembly details are given in Section 2, Sheet No. 24.*

Origin

The Plessey Co., Ltd.

Frequency range

225 MHz to 399.9 MHz.

Frequency control

Crystal oscillator (temperature controlled) and a frequency multiplication system.

Frequency accuracy and stability

To crystal accuracy.

Modulation

Amplitude modulation up to 100 per cent. 12dB to 15dB clipping is available if required.

Output impedance

50 ohms (nominal).

Output power

10 watts (nominal).

Power supplies

230V or 115V, 45 to 65 Hz, single-phase.

Power consumption

Transmit 330 watts (approx.).
Stand-by 130 watts (approx.).



Transmitter Type T.7355



Amplifier Type A.9365

Overall dimensions

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33·7 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

Weight

171 lb (77·6 kg).

Ancillary equipment

Mounting plinth Type 7872
Blower air, Type 7344
Pipes, air cooling.

Associated equipment

Amplifier A.9365 is used with transmitter T.7355 to increase the output power to between 100 and 150 watts. Details of A.9365 are given in Section 2, Sheet No. 24.

Sheet No. 25

**TRANSMITTERS
RADIO**

**Type T.8994
5820-99-933-2189
(formerly 10D/20753)
and T.15074
5820-99-944-2208
(formerly 10D/20480)**

Relevant publications:—

A.P.116E-0236-1
(formerly A.P.2922C, Vol. 1)

Function

Very high power, independent sideband h.f. transmitter (c.w. on/off keying, f.s.k. facsimile, multi-channel v.f. telegraphy and i.s.b. or d.s.b. R/T working). Controlled from front panels or from a remote control desk. Transmitter T.15074 is similar to T.8994 but with 50 ohms output impedance. Eight cubicles form the transmitter enclosure, details being given in Section 2, Sheet No. 25.

Origin

The Marconi Co. Ltd., Type HS.51 Drawing No. W.31300 Ed. B.

Frequency range

4 MHz to 27.5 MHz (75 to 10.9 metres).

Frequency control

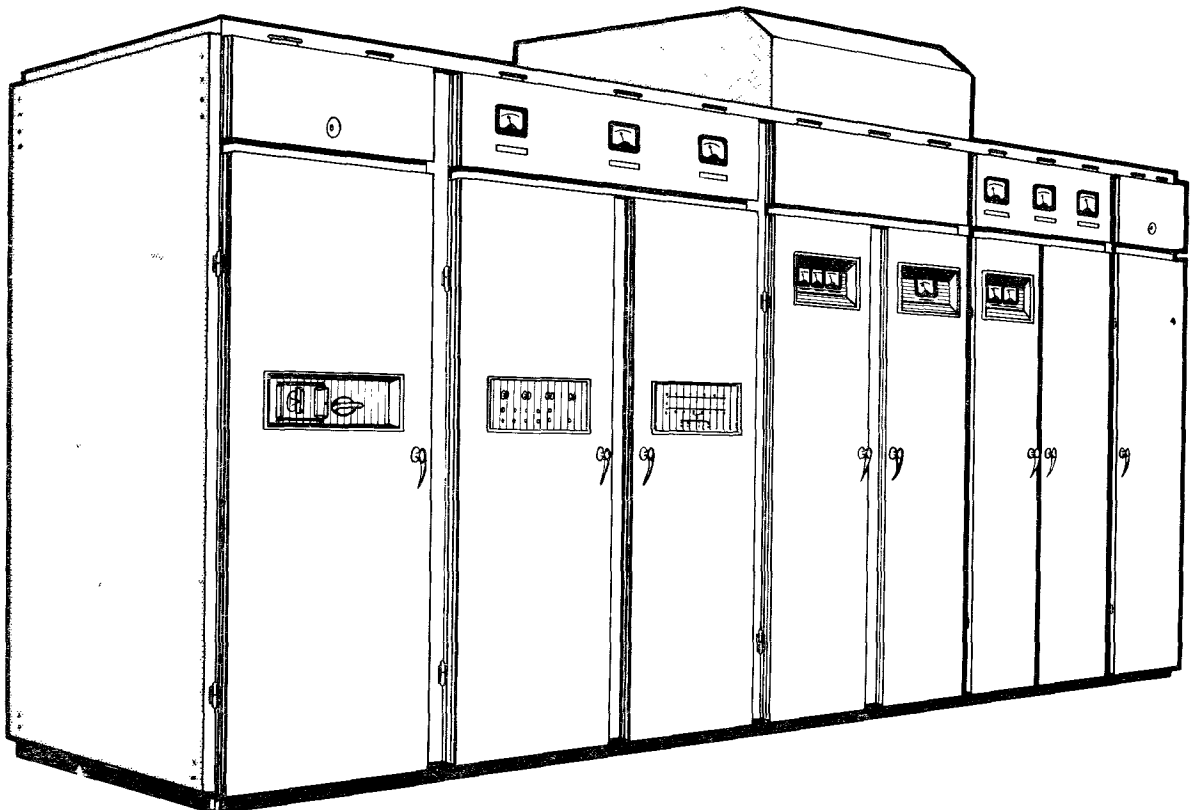
Continuous tuning over the frequency range of any one of six pre-set frequencies.

Frequency accuracy and stability

3 parts in 100,000.

Modulation

Amplitude modulation to 95 per cent depth (d.s.b. telephony operation).



Transmitter Type T.8994 or T.15074

Sheet No. 26

TRANSMITTER

Type T.9739 (10D/20610)

Relevant publications:—

A.P.2877K, Vol. 1

(For illustration of Transmitter T.9739 see Section 1, Sheet No. 7).

Function	Long range, medium power h.f. single sideband ground transmitter (c.w. f.s.k. or R/T (s.s.b.) working) fixed or mobile. Transmitter T.9739 is a version of T.1551A modified to enable it to be driven by either drive unit, radio, Type 4 (f.s.k. operation) or drive unit radio, Type 5 (c.w. and R/T working). The transmitter comprises a transmitter unit and combined rectifier and control unit. <i>Sub-assembly details are given in Section 2, Sheet No. 26.</i>												
Origin	The Marconi Co. Ltd., Type SWB 8W.												
Frequency range	4 MHz to 22.2 MHz (75 to 13.5 metres; s.s.b. working). 3 MHz to 22.2 MHz (100 to 13.5 metres; c.w. working).												
Frequency control	Provided by either a Franklin master oscillator or crystal oscillator.												
Frequency accuracy and stability	Franklin master oscillator to 1 part in 20,000. Crystal oscillator to 1 part in 100,000.												
Output impedance	75 ohms and 600 ohms.												
Output power	<i>C.W. operation</i> 3.5kW <i>S.S.B. operation</i> 3.5kW (p.e.p.)												
Keying speed	<i>F.S.K.</i> 150 bauds maximum (with drive unit Type 4). <i>C.W.</i> 200 w.p.m. maximum (on/off keying).												
Power supplies	230-400V, 50 Hz, three-phase 4-wire.												
Overall dimensions	<table><thead><tr><th></th><th><i>Height</i></th><th><i>Width</i></th><th><i>Depth</i></th></tr></thead><tbody><tr><td><i>Transmitter unit</i></td><td>7ft 0in (213.3 cm)</td><td>2ft 0in (61 cm)</td><td>3ft 0in (91.4 cm)</td></tr><tr><td><i>Rectifier and control unit</i></td><td>6ft 5in (196 cm)</td><td>4ft 0in (122 cm)</td><td>3ft 6in (106.6 cm)</td></tr></tbody></table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 0in (61 cm)	3ft 0in (91.4 cm)	<i>Rectifier and control unit</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>										
<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 0in (61 cm)	3ft 0in (91.4 cm)										
<i>Rectifier and control unit</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)										
Weights	<i>Transmitter unit</i> 9 cwt (457.2 kg) <i>Rectifier and control unit</i> 25 cwt (1270 kg)												
Associated equipment	Drive unit radio, Type 4 (10D/18480). Drive unit radio, Type 5 (10D/18481).												

Sheet No. 27

TRANSMITTER

Type T.9740 (10D/20611)

Relevant publications:—

A.P.2877B, Vol. 1

(For illustration of Transmitter T.9740, see Section 1, Sheet No. 2).

Function

Long range, high power h.f. ground transmitter (c.w. and f.s.k. working), fixed or mobile. Transmitter T.9740 is a version of T.1278 modified to enable it to be driven by either drive unit radio, Type 4, (f.s.k. operation) or drive unit radio, Type 5 (c.w. working). The Transmitter comprises a transmitter unit and combined rectifier and control unit. *Sub-assembly details are given in Section 2, Sheet No. 27.*

Origin

The Marconi Co. Ltd., Type S.W.B.11 (modified).

Frequency range

3 MHz to 22.2 MHz (100 to 13.5 metres).

Frequency control

Provided by either a Franklin master oscillator or a crystal oscillator.

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.
Crystal oscillator to 1 part in 100,000.

Output impedance

75 ohms and 600 ohms.

Output power

8 to 10 kW.

Keying speed

F.S.K. 150 bauds maximum (with drive unit Type 4).
C.W. 200 w.p.m. maximum (on/off keying).

Power supplies

230-400V, 50 Hz, three phase 4-wire.

Power consumption

Mark 23kW.
Space 7.5kW.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 10in (86.4 cm)	5ft 3in (160 cm)
<i>Rectifier and control unit</i>	6ft 5in (195.6 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)

Weights

Transmitter unit 20 cwt (1016 kg).
Rectifier and control unit 25 cwt (1270 kg).

Associated equipment

Drive unit radio, Type 4 (10D/18480).
Drive unit radio, Type 5 (10D/18481).

Sheet No. 28

TRANSMITTER

Type T.9741 (10D/20612)

Relevant publications:—

A.P.2877J, Vol. 1

(For illustration of Transmitter T.9741 see Sect. 1, Sheet No. 6).

Function

Long range, high power h.f. single sideband transmitter (c.w. f.s.k., and R/T (s.s.b.) working), fixed or mobile. Transmitter T.9741 is a version of T.1550 modified to enable it to be driven by either drive unit radio, Type 4 for f.s.k. working, or drive unit radio, Type 5 for c.w. and R/T working. The transmitter comprises a transmitter and combined rectifier and control unit. *Sub-assembly details are given in Section 2, Sheet No. 28.*

Origin

The Marconi Co. Ltd., Type S.W.B. 11E (modified).

Frequency range

4 MHz to 22.2 MHz (75 to 13.5 metres).

Frequency control

Provided by either a Franklin master oscillator or a crystal oscillator

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.
Crystal oscillator to 1 part in 100,000.

Output impedance

75 and 600 ohms.

Output power

8.5 to 10kW carrier.

Keying speed

F.S.K. 150 bauds maximum (with drive unit Type 4).
C.W. 200 w.p.m. maximum (on/off keying).

Power supplies

230-400V, 50 Hz, three-phase 4-wire.

Power consumption

(To be added later).

Overall dimensions

	Height	Width	Depth
<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 10in (86.4 cm)	5ft 3in (160 cm)
<i>Rectifier and control unit</i>	6ft 5in (195.6 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)

Weights

Transmitter unit 20 cwt (1016 kg).
Rectifier and control unit 25 cwt (1270 kg).

Associated equipment

M.3 rack, s.s.b. drive unit and monitoring rack.
Drive unit radio, Type 4 (10D/18480).
Drive unit radio, Type 5 (10D/18481).

Sheet No. 29

**TRANSMITTERS
RADIO**

Relevant publications:—

A.P.116E-0231-1
(formerly A.P.2922D, Vol. 1)

Type T.10158
5820-99-933-2372
(formerly 10D/20455)
T.10158A
5820-99-933-2182
(formerly 10D/22729)
T.10158B
5820-99-933-2195
(formerly 10D/23678)

Function

Medium power, general purpose, independent side-band h.f. transmitter (c.w. on/off keying, f.s.k. and i.s.b. or d.s.b. R/T working). The transmitter comprises two cubicles side by side with an air duct



Transmitter Type T.10158

between them, the rectifier and control unit cubicle being on the left and the radio frequency unit on the right. *Sub-assembly details are given in Section 2, Sheet No. 29.*

Transmitter T.10158A is a version of T.10158 modified to provide an output for frequency measurement and fitted with reflectometers. T.10158B is a modified version of T.10158 providing 50 ohms output impedance.

Origin	The Marconi Co. Ltd., Type HS.31 (Drawing No. W.37918 Edn. B).								
Frequency range	4 MHz to 27.5 MHz (75 to 10.9 metres).								
Frequency control	Continuous tuning over the whole frequency range or selection of any 6 pre-set frequencies.								
Frequency accuracy and stability	To crystal accuracy (external drive units).								
Input level	0.1W nominal from primary drive. 0.25W from i.s.b. or keyed telegraph drive (3.1 MHz).								
Output impedance	600 ohms balanced (T.10158). 50 ohms (T.10158B).								
Output power	<i>I.S.B. operation</i> from 4 to 21 MHz 3.5kW (p.e.p.) 21 to 27.5 MHz 2.5kW (p.e.p.) <i>C.W. and f.s.k. operation</i> from 4 to 21 MHz 3.5kW 21 to 27.5 MHz 2.5kW								
Power supplies	380-420V, 50-60 Hz, three-phase 4-wire.								
Power consumption (at 0.9 power factor)	<i>I.S.B. (2-tone modulation)</i> 7kW <i>C.W. mark</i> 9kW <i>space</i> 3.7kW <i>F.S.K.</i> 9kW								
Overall dimensions	<table><thead><tr><th></th><th><i>Height</i></th><th><i>Width</i></th><th><i>Depth</i></th></tr></thead><tbody><tr><td><i>Main unit</i></td><td>7ft 6in (228 cm)</td><td>5ft 6in (167 cm)</td><td>4ft 4in (132 cm)</td></tr></tbody></table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Main unit</i>	7ft 6in (228 cm)	5ft 6in (167 cm)	4ft 4in (132 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>						
<i>Main unit</i>	7ft 6in (228 cm)	5ft 6in (167 cm)	4ft 4in (132 cm)						
Weights	(To be added later).								
Associated equipment	Drive unit, Type 10159 (10D/20456). Keying unit, Type 10195 (10K/20265). Oscillator unit, Type 11215 (10V/16243).								

Sheet No. 30

TRANSMITTERS

Relevant publications:—

A.P.116E-0232-1

(formerly A.P.2922E, Vol. 1)

Type T.10197
5820-99-933-2173
(formerly 10D/20468)

T.10197A
5820-99-933-2177
(formerly 10D/22730)

T.10197B
5820-99-933-2165
(formerly 10D/22765)

Function

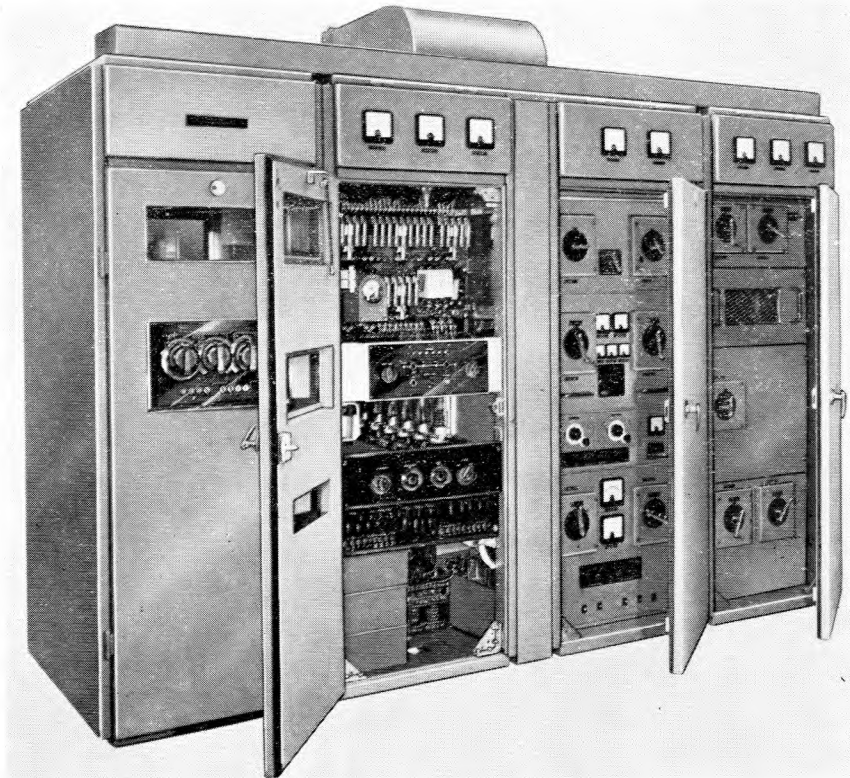
Medium power, general purpose, independent side-band h.f. transmitter (c.w. on/off keying, f.s.k. facsimile multi-channel V.F.T. and i.s.b. or d.s.b. R/T working). The transmitter comprises four cubicles mounted side by side on a plinth with two rectifier and control units on the left and two radio-frequency units on the right. *Sub-assembly details are given in Section 2, Sheet No. 30.* Provision is made for remote control switching on and off. Transmitter T.10197A is a version of T.10197 modified to provide an output for frequency measurement and fitted with reflectometers. T.10197B is a 2.5 to 20 MHz version with a fan incorporated.

Origin

The Marconi Co. Ltd., Type HS.71.

Frequency range

4 MHz to 27.5 MHz (75 to 10.9 metres) (T.10197).
2.5 MHz to 20 MHz (120 to 15 metres) (T.10197B).



Transmitter Type T.10197

Frequency control	Continuous tuning over the whole frequency range or selection of any of 6 pre-set frequencies.								
Frequency accuracy and stability	To crystal accuracy (external drive units).								
Input level	0.1W nominal from primary drive. 0.25W from i.s.b. or keyed telegraph drive (3.1 MHz).								
Output impedance	50 ohms (T.10197). 600 ohms balanced (T.10197B).								
Output power	<i>I.S.B. operation:</i> 7 to 10kW (p.e.p.) <i>D.S.B. operation:</i> 3.5 to 4kW <i>C.W. on/off or f.s.k.:</i> 6 to 7kW (using i.s.b. loading), 7 to 7.5kW (using optimum loading)								
Power supplies	380-440V, 50-60 Hz, three-phase 4-wire.								
Power consumption (at 0.9 power factor)	<i>I.S.B. (10kW) (2-tone modulation)</i> 18kW <i>C.W. (7.5kW) (on/off keying) mark</i> 21kW <i>space</i> 10kW <i>F.S.K. (7.5kW)</i> 21kW								
Overall dimensions	<table> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>Main unit</i></td> <td>7ft 6in (228 cm)</td> <td>10ft 6in (322 cm)</td> <td>4ft 4in (132 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Main unit</i>	7ft 6in (228 cm)	10ft 6in (322 cm)	4ft 4in (132 cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>						
<i>Main unit</i>	7ft 6in (228 cm)	10ft 6in (322 cm)	4ft 4in (132 cm)						
Weights	(To be added later).								
Associated equipment	Drive unit, Type 10159 (10D/20456) Keying unit, Type 10195 (10K/20265) Oscillator unit, Type 11215 (10V/16243).								

Sheet No. 31

TRANSMITTER

Type T.11768 (10D/21097)

Relevant publications:—

A.P.116E-0207-1AB

(formerly A.P.2550J, Vol. 1)

Function

High power, m.f., long range navigational beacon with the following types of emission:—

A.1. keyed carrier (beacon)

A.2. continuous carrier, keyed tone (beacon)

A.3. telephony (meterological broadcast)

The transmitter may be set on any one crystal-controlled spot frequency between 200 and 415 KHz. The facility to change frequency to a second spot frequency within the band is not instantaneous.

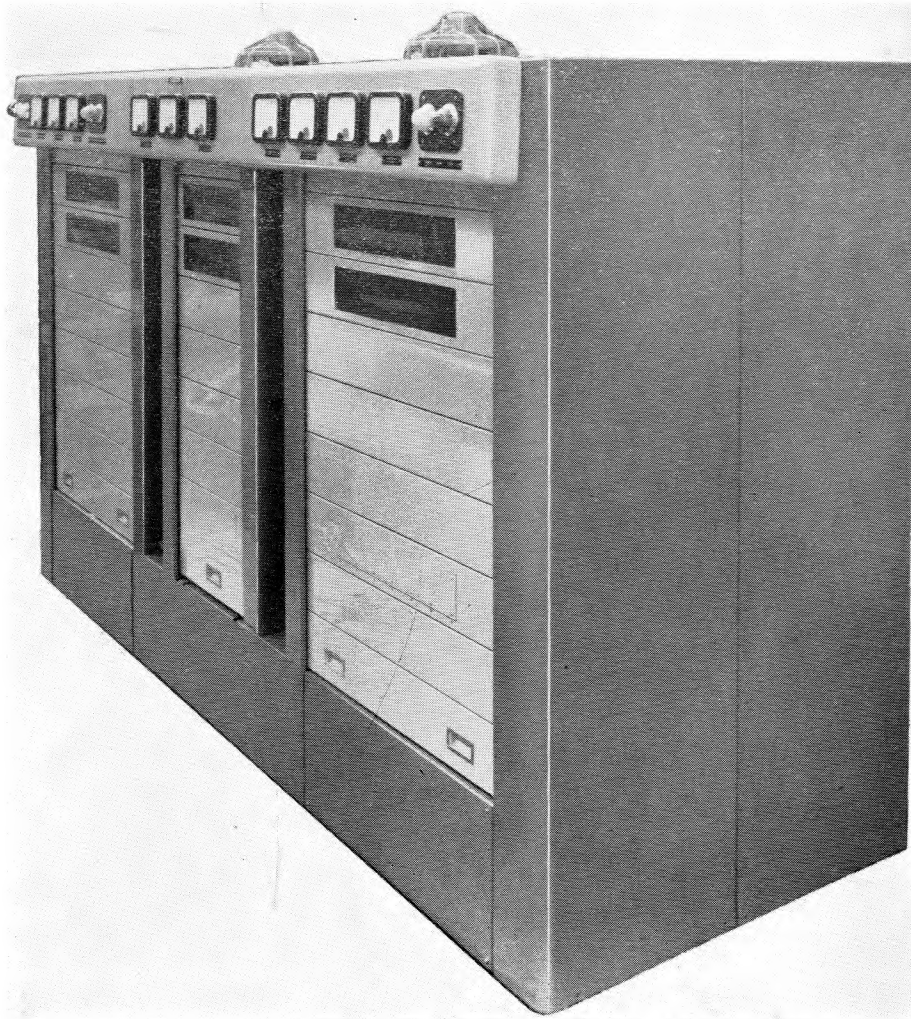
Sub-assembly details are given in Section 2, Sheet No. 31.

Origin

Redifon Ltd., Type G 192 R.

Frequency range

200 KHz to 415 KHz (1500 to 720 metres).



Transmitter Type T.11768

Frequency control

Crystal (2 plug-in crystals either selected by switch).
Internal oscillator (tunable) for test and emergency use.

Low impedance external drive socket provided.

Frequency accuracy and stability

Within plus or minus 0.01% over the ambient temperature range +20°C to +40°C.

Modulation

Audio tone for A.2 transmission:

1020 Hz \pm 50 Hz, 400 Hz \pm 25 Hz.

A.F. response on telephony:

\pm 2dB from 200 to 3500 Hz relative to 1000 Hz.

Depth: 40 to 90%.

Harmonic distortion: less than 7.5% up to 90% modulation.

Output power

10 kW unmodulated carrier (reduced power facility provided for setting up and tuning).

Output impedance

50 ohms unbalanced. (Aerial matching unit suitable for matching via concentric feeder to aerial array).

Bandwidth

A.1 emission (keying speed 7 w.p.m.):

95% of total power radiated within \pm 18 Hz of carrier frequency.

A.2 emission:

Within \pm 2158 Hz of carrier frequency.

Power supplies

360-440V, 50 Hz, three-phase 4-wire.

Power consumption (at 0.91 power factor)

38kW (approx.).

Overall dimensions

<i>Height</i>	<i>Width</i>	<i>Depth</i>
6ft 3in	10ft 0in	4ft 0in
(190.5 cm)	(304.8 cm)	(122 cm)

Weights

7500 lb (3402 kg) (oil filled components excluded).
2600 lb (1189.4 kg) (oil filled components only).

Sheet No. 32

TRANSMITTER

Type T.11839 (10D/21109)

Relevant publications:—

A.P.2877B, Vol. 1

(For illustration of Transmitter T.11839 see Sect. 1, Sheet No. 2).

Function

Long range, high power h.f. ground transmitter (c.w. and f.s.k. working) fixed or mobile. Transmitter T.11839 is a version of T.1278 modified to enable it to be driven by a f.s.k. duplex drive unit and to permit monitoring of the transmitter output. The transmitter comprises a transmitter unit and combined rectifier and control unit. *Sub-assembly details are given in Section 2, Sheet No. 32.*

Origin

The Marconi Co. Ltd., Type S.W.B.11 (modified). F.S.K. drive unit HD.61B.

Frequency range

3 MHz to 22.2 MHz (100 to 13.5 metres).

Frequency control

Provided by either a Franklin master oscillator or a crystal oscillator.

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.
Crystal oscillator to 1 part in 100,000.

Output impedance

75 ohms and 600 ohms.

Output power

8 to 10kW.

Keying speed

200 w.p.m. maximum (on/off keying).

Power supplies

230-400V, 50 Hz, three-phase 4-wire.

Power consumption

Mark 23kW: Space 7.5kW.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit</i>	7ft 0in (213.3 cm)	2ft 10in (86.4 cm)	5ft 3in (160 cm)
<i>Rectifier and control unit</i>	6ft 5in (196 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)

Weights

Transmitter unit 20 cwt (1016 kg)
Rectifier and control unit 25 cwt (1270 kg).

Ancillary equipment

Cabinet Type 8756 (fitted) (10AQ/1674).

Sheet No. 33

TRANSMITTER

Type T.12842 (10D/21704)

Relevant publications:—

A.P.116E-0208-1AB

(formerly A.P.2550K, Vol. 1)

(For illustration of T.12842, see FGRI.23069, Part 1, Section 1, Sheet No. 6).

Function

Medium power, m.f. beacon transmitter used with FGRI.23069 (Part 1, Sect. 1) providing keyed tone m.c.w. or keyed c.w. with either automatic or manual keying. An automatic coder is incorporated. The transmitter comprises two sub-assemblies, occupying four bays, with a double-bay power supply unit and a radio frequency and modulator section. *Sub-assembly details are given in Section 2, Sheet No. 33.*

Origin

Redifon Ltd., Type G.91R.

Frequency range

200 KHz to 550 KHz in two bands (200-400 and 400-550 KHz) (1500 to 750 and 750 to 545 metres).

Frequency control

Two crystal-controlled spot frequencies between 200 and 550 KHz. Variable frequency oscillator covering same range is provided for test or emergency operation.

Frequency accuracy and stability

For mains voltage variation $\pm 6\%$, temperature limits $+20$ to $+40^{\circ}\text{C}$:

Crystal within ± 0.01 per cent.

Test oscillator within ± 0.05 per cent.

Modulation

Frequency 400 Hz ± 25 Hz. Depth adjustable from 40 to 90 per cent.

Output impedance

50 ohms unbalanced.

Output power

Carrier 2kW, 90% modulation 2.8kW (provision for operation at $\frac{1}{2}$ or $\frac{1}{4}$ power).

Keying speed

Automatic 7 w.p.m. or manual.

Power supplies

360-440V, 50-60 Hz, three-phase 4-wire.

Power consumption (at 0.85 power factor)

9.5kW (approx.).

Overall dimensions

	Height	Width	Depth
Power unit	6 ft 4in (193 cm)	3ft 0in (91.4 cm)	3ft 3in (99 cm)
R.F. and modulator	6ft 4in (193 cm)	3ft 0in (91.4 cm)	3ft 3in (99 cm)

Weights

Power unit	1634 lb (741 kg)
R.F. and modulator	1228 lb (557 kg).

Sheet No. 34

TRANSMITTER

Type T.13119 (10D/21610)

Relevant publications

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

(For illustration of the units of Transmitter T.13119 see Sect. 1, Sheet No. 11).

Function

Medium power, h.f. transmitter (c.w. and f.s.k. working). Transmitter T.13119 is a version of T.1975 modified to enable it to be driven by a f.s.k. duplex drive unit, cabinet (fitted), Type 8756. The transmitter comprises transmitter unit Type 13125, power unit Type 811 and drive unit radio, Type 4. *Details of sub-assemblies are given in Section 2, Sheet No. 34.*

Origin

The Marconi Co. Ltd., Type S.W.B. 8X (modified); f.s.k. drive unit Marconi Type H.D.61B (cabinet fitted Type 8756).

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres).

Frequency control

Franklin master oscillator (transmitter unit Type 13125).
Crystal controlled oscillator (drive unit radio, Type 4).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

At 2.0 MHz (150 metres) 4kW
22.2 MHz (13.5 metres) 3kW
22.2-27 MHz (13.5 to 11.1m) 2kW

Keying speed

200 w.p.m. (on/off keying).
150 bauds (f.s.k., drive unit Type 4).

Power supplies

Transmitter unit, Type 13125 (with power unit, Type 811):
400V, 50 Hz, three-phase 4-wire.
Drive unit, radio, Type 4:
200-250V, 50 Hz, single-phase.

Power consumption

9.6kW.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit, Type 13125</i>	7ft 0in (213.3 cm)	3ft 0in (91.4 cm)	2ft 0in (61 cm)
<i>Power unit, Type 811</i>	6ft 6in (198 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Drive unit radio, Type 4</i>	3ft 1½in (95.2 cm)	9½in (24 cm)	2ft 6in (76.2 cm)

Weights

Transmitter unit, Type 13125 13 cwt (660.4 kg)
Power unit, Type 811 21 cwt (1066.8 kg)
Drive unit, radio, Type 4 220 lbs (99.8 kg)

Ancillary equipment

Cabinet (fitted), Type 8756 (10AQ/1674).

Sheet No. 35

TRANSMITTER

Type T.13120 (10D/21611)

Relevant publications:—

A.P.116E-02231-1

(formerly A.P.2877U, Vol. 1)

(For illustrations of units of Transmitter T.13120 see Sect. 1, Sheet No's 11 and 12).

Function

Medium power, h.f., s.s.b., transmitter (c.w., f.s.k. and R/T (s.s.b.) working). Transmitter T.13120 is a version of T.1976 modified to enable it to be driven by a f.s.k. duplex drive unit, cabinet (fitted), Type 8756. The transmitter comprises transmitter unit Type 13125, power unit Type 812, rectifier Type 62, modulator unit Type 127 and drive units radio Types 5 and 7. *Sub-assembly details are given in Section 2, Sheet No. 35.*

Origin

The Marconi Co. Ltd., Type S.W.B. 8X (modified); f.s.k. drive unit Marconi Type HD 61B (cabinet fitted Type 8756).

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres) *c.w.* operation.

4 MHz to 27 MHz (75 to 11.1 metres) *s.s.b.* operation.

Frequency control

Franklin master oscillator (transmitter unit Type 13125).

Crystal controlled oscillator (drive unit radio, Type 5).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.

Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. operation:

At 2 MHz (150 metres)	4kW
22.2 MHz (13.5 metres)	3kW
22.2-27 MHz (13.5 to 11.1m)	2kW

S.S.B. operation:

At 4-22.2 MHz (75-13.5m)	3 to 4kW (p.e.p.).
22.2-27 MHz (13.5-11.1m)	1.7kW (p.e.p.).

Keying speed

200 w.p.m. on/off keying.

Power supplies

Transmitter unit, Type 13125 (with power unit, Type 812):

400V, 50 Hz, three-phase 4-wire.

Modulator unit, Type 5:

200-250V, 50 Hz single-phase.

Drive unit radio, Type 7:

110V or 210-250V, 50 Hz, single-phase.

Power consumption

9.6kW (c.w. operation).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit, Type 13125</i>	7ft 0in (213.3 cm)	3ft 0in (91.4 cm)	2ft 0in (61 cm)
<i>Power unit, Type 812</i>	6ft 6in (198 cm)	3ft 6in (106.6 cm)	4ft 6in (122 cm)
<i>Rectifier, Type 62</i>	5ft 4½in (164.5 cm)	2ft 8¾in (82.3 cm)	2ft 3¾in (69.6 cm)
<i>Modulator unit, Type 127</i>	6ft 5in (195.6 cm)	4ft 0in (122 cm)	3ft 6in (106.6 cm)
<i>Drive unit radio, Type 5</i>	3ft 1½in (95.2 cm)	9½in (24 cm)	2ft 6in (76.2 cm)
<i>Drive unit radio, Type 7</i>	6ft 10in (183 cm)	1ft 10½in (57.2 cm)	1ft 6¾in (48 cm)

Weights

<i>Transmitter unit, Type 13125</i>	13 cwt (660.4 kg)
<i>Power unit, Type 812</i>	21 cwt (1066.8 kg)
<i>Rectifier, Type 62</i>	13¼cwt (673.2 kg)
<i>Modulator unit, Type 127</i>	25 cwt (1270 kg)
<i>Drive unit radio, Type 5</i>	
<i>Drive unit radio, Type 7</i>	576 lb (261.3 kg)

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674).

TRANSMITTER

Type T.13121 (10D/21612)

Relevant publications:—

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

(For illustrations of units of Transmitter T.13121 see Sheet No's 11 and 16).

Function

Medium power, h.f. transmitter (c.w. on/off and f.s.k. telegraphy and R/T working). Transmitter T.13121 is a version of T.2000 modified to enable it to be driven by a f.s.k. duplex drive unit, cabinet (fitted), Type 8756. The transmitter comprises transmitter unit, Type 13125, power unit, Type 811, modulator unit Type 7436, drive unit radio, Type 5, amplifier Type A.7488, microphone assembly, Type 72 and associated smoothing unit, Type 22. *Sub-assembly details are given in Section 2, Sheet No. 36.*

Origin

The Marconi Co. Ltd., Type S.W.B. 8X (modified); f.s.k. drive unit, Marconi Type HD.61B (cabinet fitted) Type 8756).

Frequency range

2 HMz to 27 MHz (150 to 11.1 metres).

Frequency control

Franklin master oscillator (transmitter unit Type 13125).

Crystal controlled oscillator (drive unit radio, Type 5).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.

Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. and f.s.k. operation:

At 2 MHz (150 metres) 4kW

22.2 MHz (13.5 metres) 3kW

22.2-27 MHz (13.5-11.1m) 2kW

R/T operation:

At 2-22.2 MHz 2.5-2kW

22.2-27 MHz 1.0-0.7kW

Keying speed

200 w.p.m. on/off keying.

Power supplies

Transmitter unit, Type 13125 (with power unit, Type 811):

400V, 50 Hz, three-phase 4-wire.

Drive unit radio, Type 5:

200-250V, 50 Hz, single-phase.

Power consumption

9.6kW (c.w. operation).

11.1kW (R/T operation).

Overall dimensions

	Height	Width	Depth
<i>Transmitter unit, Type 13125</i>	7ft 0in (213.3 cm)	3ft 0in (91.4 cm)	2ft 0in (62 cm)
<i>Power unit, Type 811</i>	6ft 6in (198 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Drive unit radio, Type 5</i>	3ft 1½in (95.2 cm)	9½in (24 cm)	2ft 6in (76.2 cm)
<i>Modulator unit, Type 7436</i>	6ft 5in (195.6 cm)	3ft 6in (106.6 cm)	2ft 0in (61 cm)

Weights

Transmitter unit, Type 13125 13 cwt (660.4 kg)

Power unit, Type 811 21 cwt (1066.8 kg)

Modulator unit, Type 7436 11 cwt (558.8 kg)

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674).

Sheet No. 37

TRANSMITTER

Type T.13122 (10D/21613)

Relevant publications:—

A.P.116E-0223-1

(formerly A.P.2877U, Vol. 1)

(For illustrations of the units of T.13122 see Sect. 1, Sheet No. 11).

Function

Medium power, h.f. transmitter (c.w., on/off and f.s.k. telegraphy). Transmitter T.13122 is a version of T.7095 modified to enable it to be driven by a f.s.k. diplex drive unit, cabinet (fitted), Type 8756. The transmitter comprises, transmitter unit, Type 13125, power unit, Type 811 and oscillator unit, Type 7069. *Sub-assembly details are given in Section 2, Sheet No. 37.*

Origin

The Marconi Co. Ltd., Type S.W.B. 8X (modified); f.s.k. drive unit, Marconi Type HD.61B (cabinet fitted) Type 8756).

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres).

Frequency control

Franklin master oscillator (transmitter unit, Type 13125).
Crystal controlled oscillator (oscillator unit, Type 7069).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. operation:

At 2 MHz (150 metres)	4kW
22.2 MHz (13.5 metres)	3kW
22.2-27 MHz (13.5-11.1m)	2kW

Keying speed

200 w.p.m. on/off keying.

Power supplies

Transmitter unit, Type 13125 (with power unit, Type 811):

400V, 50 Hz, three-phase 4-wire.

Oscillator unit, Type 7069:

200-250V, 50 Hz, single-phase.

Power consumption

9.6kW.

Overall dimensions

	Height	Width	Depth
<i>Transmitter unit, Type 13125</i>	7ft 0in (213.3 cm)	3ft 0in (91.4 cm)	2ft 0in (61 cm)
<i>Power unit, Type 811</i>	6ft 6in (198 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Oscillator unit, Type 7069</i>	8in (20.3 cm)	8in (20.3 cm)	2ft 6in (76.2 cm)

Weights

<i>Transmitter unit, Type 13125</i>	13 cwt (660.4 kg)
<i>Power unit, Type 811</i>	21 cwt (1066.8 kg)
<i>Oscillator unit, Type 7069</i>	50 lb (22.7 kg)

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674).

Sheet No. 38

TRANSMITTER

Type T.13123 (10D/21614)

Relevant publications:—

A.P.116E-0222-1

(formerly A.P.2877V, Vol. 1)

(For illustrations of the units of Transmitter T.13123 see Sect. 1, Sheet No. 15).

Function

Medium power, h.f., s.s.b. transmitter (c.w. on/off f.s.k. telegraphy and R/T (s.s.b.) working). Transmitter T.13123 is a version of T.1995 modified to enable it to be driven by a f.s.k. duplex drive unit, cabinet (fitted), Type 8756. The transmitter comprises, transmitter unit, Type 13126, power unit, Type 1003, rectifier, Type 62, modulator unit, Type 138 and drive unit radio, Types 5 and 7. *Sub-assembly details are given in Section 2, Sheet No. 38.*

Origin

The Marconi Co. Ltd., Type SWB. 11X (modified); f.s.k. drive unit, Marconi Type HD.61B (cabinet fitted), Type 8756).

Frequency range

2 MHz to 27 MHz (150 to 11·1 metres) c.w. operation.
4 MHz to 27 MHz (75 to 11·1 metres) s.s.b. operation.

Frequency control

Franklin master oscillator (transmitter unit, Type 13126).
Crystal controlled oscillator (drive unit radio, Type 5).

Frequency accuracy

Franklin master oscillator to 1 part in 20,000.
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms or 600 ohms.

Output power

C.W. operation:

At 2-22·2 MHz (150-13·5m) 7 to 5kW
22·2-27 MHz (13·5-11·1m) 5 to 4kW

S.S.B. operation:

At 4-22·2 MHz (75-13·5m) 8 to 5kW (p.e.p.)
22·2-27 MHz (13·5-11·1m) 5 to 3 kW (p.e.p.)

Keying speed

200 w.p.m. (on/off keying).

Power supplies

Transmitter unit, Type 13126 (with power unit, Type 1003):

400V, 50 Hz, three-phase 4-wire.

Modulator unit, Type 138 and drive unit radio, Type 5:

200-250V, 50 Hz, single-phase.

Drive unit radio, Type 7:

110V or 210-250V, 50 Hz, single-phase.

Power consumption (at 0·98 power factor)

C.W. operation: Mark 19kW

Space 11kW

S.S.B. operation: 17kW

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit, Type 13126</i>	6ft 11in (210·8 cm)	5ft 3in (160 cm)	2ft 10in (86·4 cm)
<i>Power unit, Type 1003</i>	6ft 11in (210·8 cm)	3ft 6in (106·6 cm)	4ft 0in (122 cm)
<i>Modulator unit, Type 138</i>	6ft 5in (195·6 cm)	4ft 0in (122 cm)	3ft 6in (106·6 cm)
<i>Rectifier, Type 62</i>	5ft 4½in (164·5 cm)	2ft 8¾in (82·3 cm)	2ft 3¾in (69·6 cm)
<i>Drive unit radio, Type 5</i>	3ft 1½in (95·2 cm)	9½in (24 cm)	2ft 6in (76·2 cm)
<i>Drive unit radio, Type 7</i>	6ft 0in (183 cm)	1ft 10½in (57·2 cm)	1ft 6¾in (48 cm)

Weights

<i>Transmitter unit, Type 13126</i>	25 cwt (1270 kg)
<i>Power unit, Type 1003</i>	22 cwt (1117·6 kg)
<i>Rectifier, Type 62</i>	13¼cwt (673·2 kg)
<i>Modulator unit, Type 138</i>	25 cwt (1270 kg)
<i>Drive unit radio, Type 7</i>	576 lb (261·3 kg)

Ancillary equipment

Cabinet (fitted), Type 8756 (10AQ/1674).

Sheet No. 39

TRANSMITTER

Type T.13124 (10D/21615)

Relevant publications:—

A.P.116E-0222-1

(formerly A.P.2877V, Vol. 1)

(For illustrations of units of Transmitter T.13124 see Sect. 1, Sheet No. 15).

Function

Medium power, h.f. transmitter (c.w. on/off and f.s.k. telegraphy). Transmitter T.13124 is a modified version of T.1999 (information sheet deleted) to enable it to be driven by a f.s.k. duplex drive unit, cabinet (fitted), Type 8756. The transmitter comprises, transmitter unit, Type 13126, power unit, Type 7724 and drive unit radio, Type 5. *Sub-assembly details are given in Section 2, Sheet No. 39.*

Origin

The Marconi Co. Ltd., Type SWB 11X (modified); f.s.k. drive unit, Marconi Type HD.61B (cabinet (fitted)) Type 8756.

Frequency range

2 MHz to 27 MHz (150 to 11.1 metres).

Frequency control

Franklin master oscillator (transmitter unit, Type 13126).
Crystal controlled oscillator (drive unit radio, Type 5).

Frequency accuracy and stability

Franklin master oscillator to 1 part in 20,000.
Crystal controlled oscillator to 1 part in 100,000.

Output impedance

77 ohms and 600 ohms.

Output power

At 2.22.2 MHz (150-13.5m) 7 to 5 kW
22.2-27 MHz (13.5-11.1m) 5 to 4kW

Keying speed

200 w.p.m. (on/off keying).

Power supplies

Transmitter unit, Type 13126 (with power unit, Type 7724):

400V, 50 Hz, three-phase 4-wire.

Drive unit radio, Type 5:

200-250V, 50 Hz, single-phase.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter unit, Type 13126</i>	6ft 11in (210.8 cm)	5ft 3in (160 cm)	2ft 10in (86.4 cm)
<i>Power unit, Type 7724</i>	6ft 11in (210.8 cm)	3ft 6in (106.6 cm)	4ft 0in (122 cm)
<i>Drive unit radio, Type 5</i>	3ft 1½in (95.2 cm)	9¼in (24 cm)	2ft 6in (76.2 cm)

Weights

Transmitter unit, Type 13126 25 cwt (1270 kg)
Power unit, Type 7724 22 cwt (1117.6 kg)

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674).

Sheet No. 40

TRANSMITTER

Type T.14284 (10D/22140)

Relevant publications:—

A.P.116E-0212-1
(formerly A.P.2883NN)

Function

Low-power c.w. and s.s.b. h.f. transmitter (c.w. on/off keying and f.s.k. or R/T working) for fixed or mobile operation. Transmitter T.14284 comprises, aerials, head, Type 16709, control unit, Type 16708, panels fuse, Type 16699 and rectifier units, Type 16696 all contained in one shock-mounted cabinet. The form of transmission depends on the type of drive unit used, the drive unit being housed in a separate cabinet. *Sub-assembly details are given in Section 2, Sheet No. 40.*

Origin

Standard Telephones and Cables, Ltd., Type DS.29, Code No. 4-LRE 139J.

Frequency range

2.5 MHz to 22 MHz (120 to 13.6 metres).

Frequency control

Crystal controlled oscillator.

Frequency accuracy and stability

With crystal control, $\pm 0.003\%$ below 10 MHz, $\pm 0.0015\%$ above 10 MHz.

Input power

200mW at 2.1 MHz into 75 ohms carrying required f.s.k. or on/off intelligence.

Output impedance

50 ohms (unbalanced line).

Output power

C.W. operations (on/off keying and f.s.k.): 450 watts.

Power supplies

200-250V, 50-60 Hz, single-phase a.c.

Power consumption

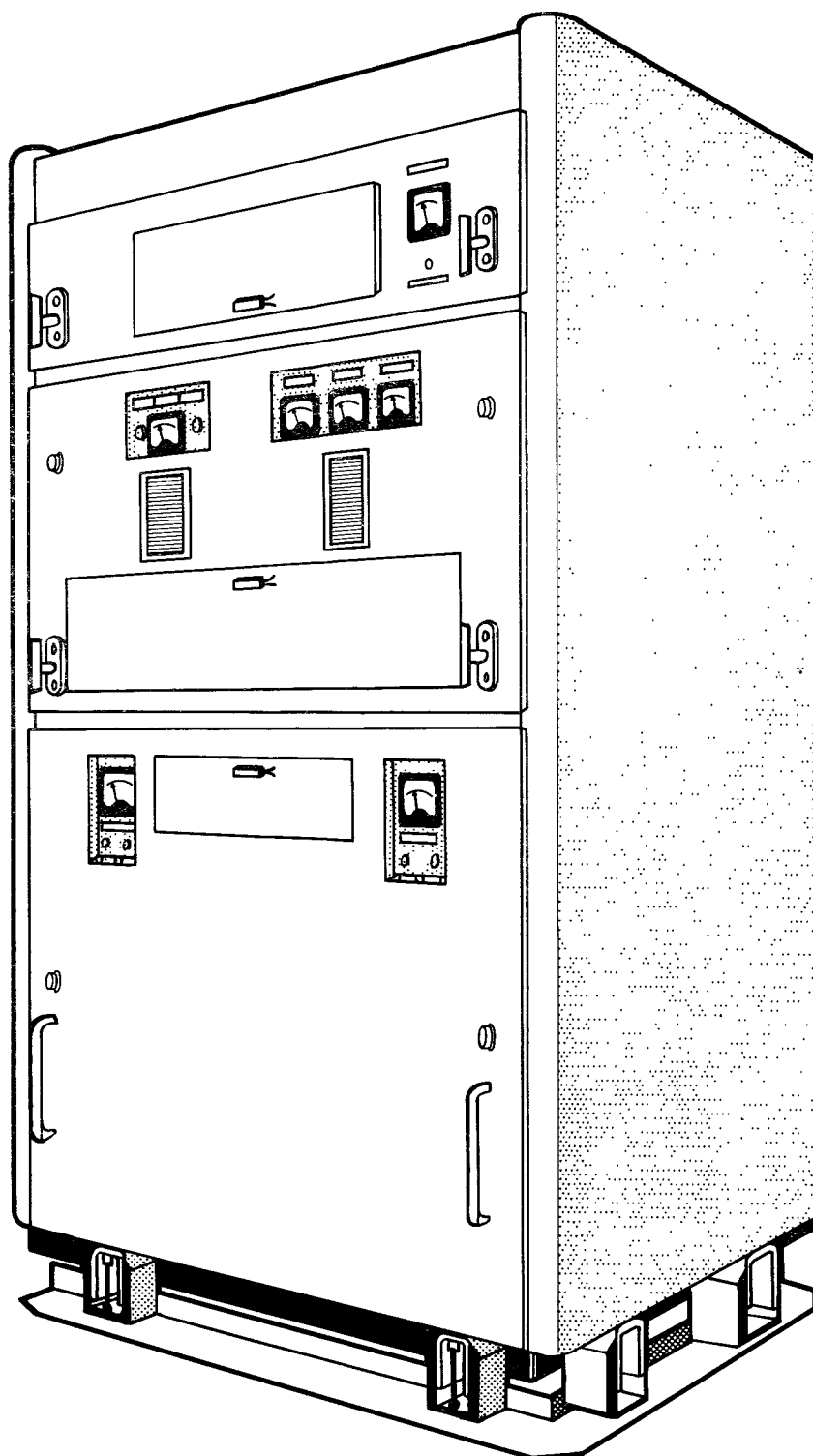
At 450W output, less than 3kVA.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Transmitter</i>	5ft 2in	2ft 9in	2ft 4½in
T.14284	(157.5 cm)	(84 cm)	(72.5 cm)

Ancillary equipment

Rack assembly, Type 14283 (10D/22139) when installed in cabin, transmitter radio, Type 14345 (part of TGRI(AT)18185/1).

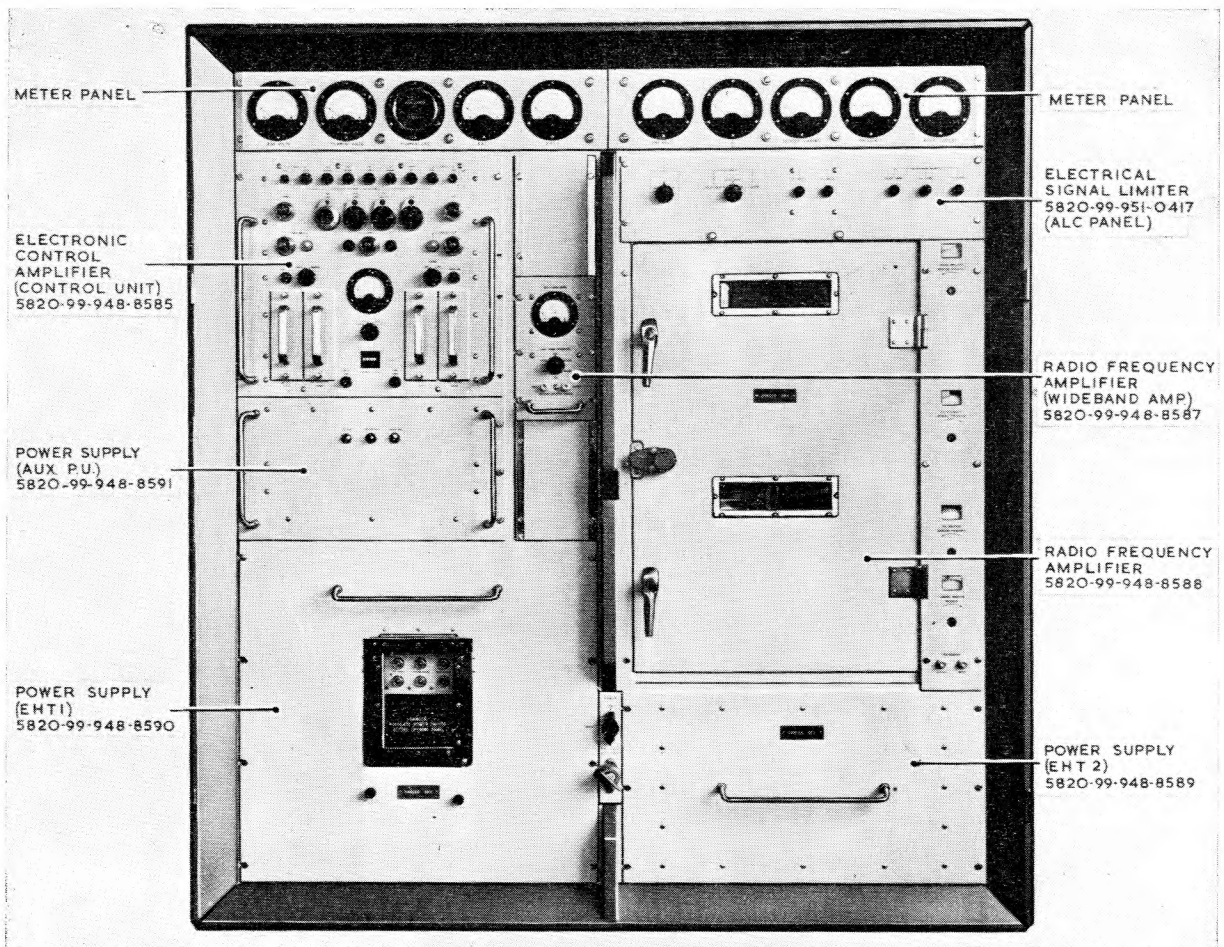


Transmitter Type T.14284

TRANSMITTING SET, RADIO (5820-99-950-5772)

Relevant publications:—

A.P.116E-0127-1A, 1B, 1G, 1H
(formerly part of A.P.4808C, Vol. 1)



Transmitter sub-assembly 5820-99-950-5890

Function

A long range, high power h.f. remotely controlled transmitter used with FGRI.23144 voice and telegraph transmitter and receiver station. The transmitter comprises three sub-assemblies:—

- (1) Transmitter sub-assembly, 5820-99-950-5774 (exciter unit)
- (2) Transmitter sub-assembly, 5820-99-950-5890 (10kW h.f. linear amplifier)
- (3) Regulator voltage, 6110-99-951-0381.

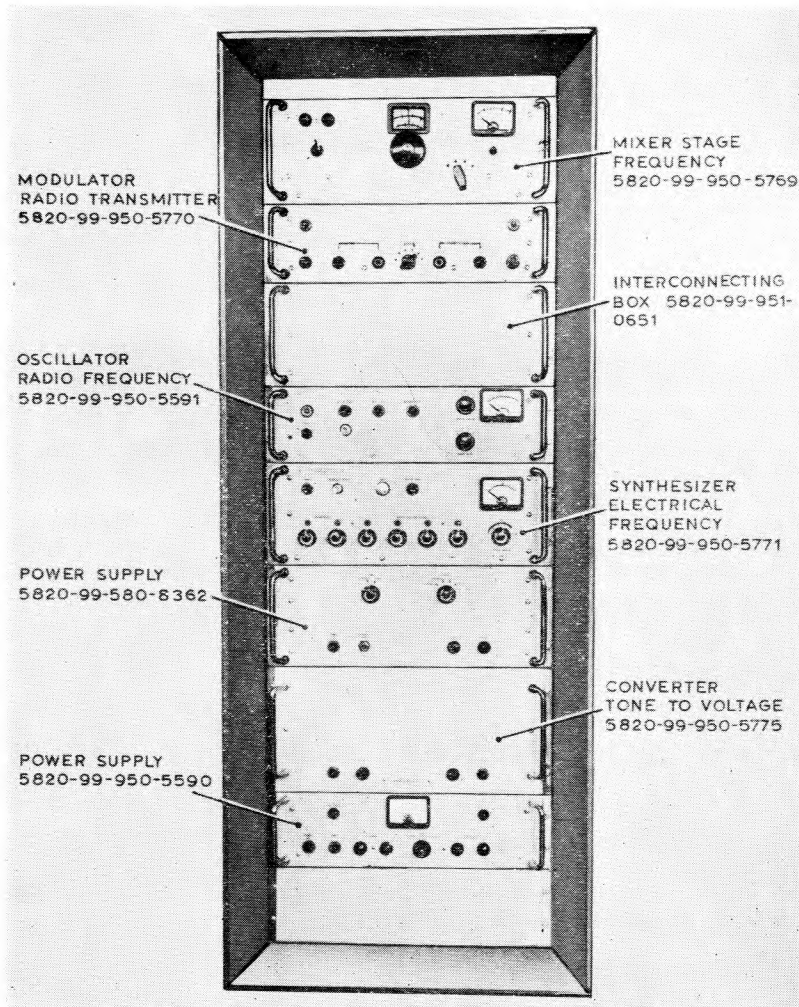
Details of the sub-assemblies are given in Section 2, Sheet No. 41.

Origin

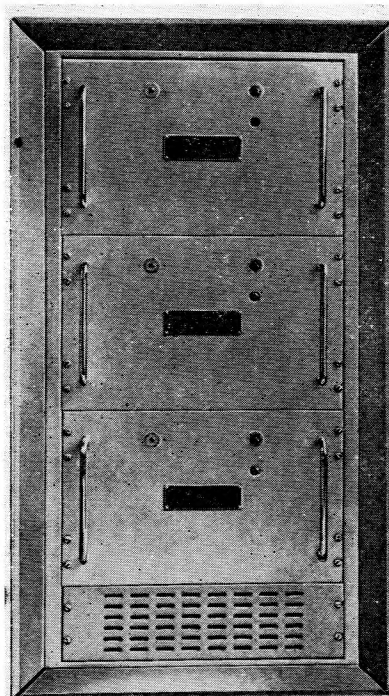
Racal Communications Ltd., Type TTA.187B.

Frequency range

2.0 to 29.9999 MHz (150 to 10 metres) in 100 Hz steps.



Transmitter sub-assembly 5820-99-950-5774



Regulator, voltage 6110-99-951-9381

Sheet No. 41 cont'd

Frequency control	Frequency standard and distribution unit, 5820-99-951-0657 (external).																
Frequency accuracy and stability	Dependent on reference standard. The synthesizer, electrical frequency, 5820-99-950-5771 incorporates a standby internal reference frequency source, a statement of the frequency accuracy and stability of which is included.																
Types of emission	<i>SSB telephone (A3a, A3j)</i> ; suppressed, pilot or voice controlled carrier (upper or lower sideband). <i>AM compatible SSB telephony (A3h)</i> ; (re-inserted carrier with lower sideband). <i>CW telegraphy (A1)</i> .																
Input level (to linear amplifier)	25-800 mW.																
Output power	10 kW p.e.p. (7 kW r.m.s.).																
Output impedance	50 ohms unbalanced (2:1 v.s.w.r.).																
Linearity	3rd order products better than 36 dB down on one of two test tones.																
Audio input level (to exciter unit)	-15 to +7dBm.																
RF output (from exciter unit)	100 mW (adjustable).																
Audio response	300-3400 Hz ± 2 dB																
Duration of tuning cycle	Average 35 seconds, maximum 60 seconds.																
CW keying input	<i>Remote</i> — VF tone <i>Local</i> — closed loop																
Tuning	(1) <i>Remote or local</i> — automatic control from synthesizer, electrical frequency. (2) <i>Manual</i> — mechanical override of automatic system.																
Power supply	Provided from regulator, voltage 6110-99-951-0381. <i>Input</i> : 400 V $\pm 12\%$, 47-65 Hz, three-phase, four-wire.																
Power consumption	21 kVA approx.																
Dimensions	<table border="0" style="width: 100%;"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Height</i></th> <th style="text-align: center;"><i>Width</i></th> <th style="text-align: center;"><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>Transmitter sub-assembly, 5820-99-950-5774</td> <td style="text-align: center;">5ft 5¼in (165.7cm)</td> <td style="text-align: center;">2ft 0½in (62.3cm)</td> <td style="text-align: center;">2ft 3 in (68.6cm)</td> </tr> <tr> <td>Transmitter sub-assembly, 5820-99-950-5890</td> <td style="text-align: center;">5ft 5¼in (165.7cm)</td> <td style="text-align: center;">5ft 0 in (152.4cm)</td> <td style="text-align: center;">2ft 3 in (68.6cm)</td> </tr> <tr> <td>Regulator, voltage, 6110-99-951-0381</td> <td style="text-align: center;">4ft 0 in (122cm)</td> <td style="text-align: center;">2ft 0½in (62.3cm)</td> <td style="text-align: center;">1ft 11 in (58.4cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	Transmitter sub-assembly, 5820-99-950-5774	5ft 5¼in (165.7cm)	2ft 0½in (62.3cm)	2ft 3 in (68.6cm)	Transmitter sub-assembly, 5820-99-950-5890	5ft 5¼in (165.7cm)	5ft 0 in (152.4cm)	2ft 3 in (68.6cm)	Regulator, voltage, 6110-99-951-0381	4ft 0 in (122cm)	2ft 0½in (62.3cm)	1ft 11 in (58.4cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>														
Transmitter sub-assembly, 5820-99-950-5774	5ft 5¼in (165.7cm)	2ft 0½in (62.3cm)	2ft 3 in (68.6cm)														
Transmitter sub-assembly, 5820-99-950-5890	5ft 5¼in (165.7cm)	5ft 0 in (152.4cm)	2ft 3 in (68.6cm)														
Regulator, voltage, 6110-99-951-0381	4ft 0 in (122cm)	2ft 0½in (62.3cm)	1ft 11 in (58.4cm)														
Weights (approx.)	<table border="0" style="width: 100%;"> <tbody> <tr> <td>Transmitter sub-assembly (5820-99-950-5774)</td> <td style="text-align: right;">350 lb</td> <td style="text-align: right;">(159 kg)</td> </tr> <tr> <td>Transmitter sub-assembly (5820-99-950-5890)</td> <td style="text-align: right;">2,500 lb</td> <td style="text-align: right;">(1134 kg)</td> </tr> <tr> <td>Regulator, voltage</td> <td style="text-align: right;">450 lb</td> <td style="text-align: right;">(204 kg)</td> </tr> </tbody> </table>	Transmitter sub-assembly (5820-99-950-5774)	350 lb	(159 kg)	Transmitter sub-assembly (5820-99-950-5890)	2,500 lb	(1134 kg)	Regulator, voltage	450 lb	(204 kg)							
Transmitter sub-assembly (5820-99-950-5774)	350 lb	(159 kg)															
Transmitter sub-assembly (5820-99-950-5890)	2,500 lb	(1134 kg)															
Regulator, voltage	450 lb	(204 kg)															

TRANSMITTING SET, RADIO

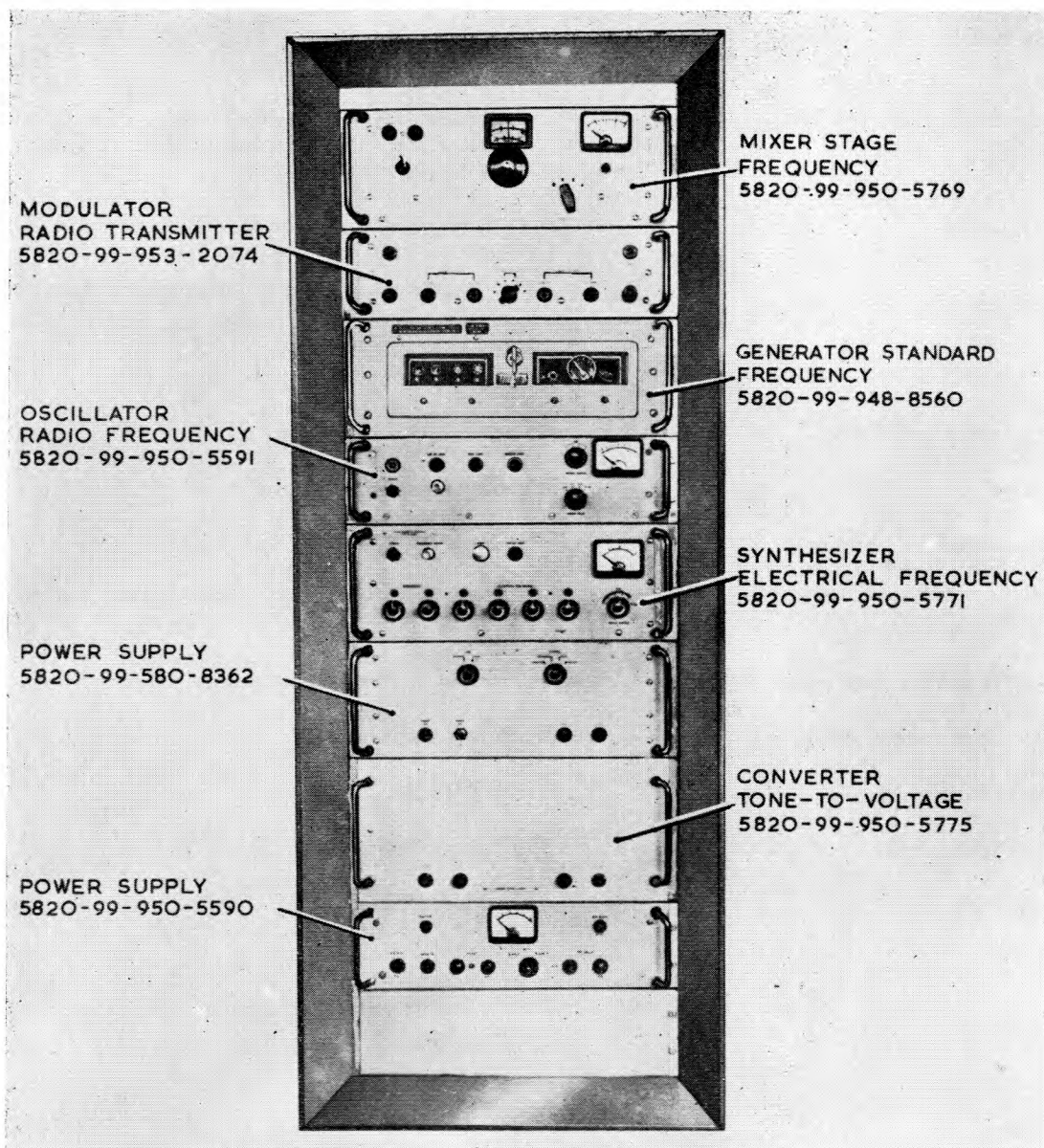
(5820-99-953-2077)

Relevant publications:—

A.P.116E-0127-1A, 1D, 1G, 1V
(formerly part of A.P.4808C, Vol. 1)

Note . . .

For illustrations of Transmitter sub-assembly, 5820-99-950-5890 and Regulator, voltage, 6110-99-951-0381, see Sect. 1, Sheet No. 41.



Transmitter sub-assembly, 5820-99-953-2076

Function	<p>A long range, high power h.f. remotely controlled transmitter used with TGRI(AT)26023/1 air transportable s.s.b., radio teleprinter/voice station. The transmitter comprises three main sub-assemblies:—</p> <p>(1) Transmitter sub-assembly, 5820-99-953-2076 (<i>exciter unit</i>)</p> <p>(2) Transmitter sub-assembly, 5820-99-950-5890 (<i>10 kW h.f. linear amplifier</i>)</p> <p>(3) Regulator voltage, 6110-99-951-0381.</p> <p><i>Details of the sub-assemblies are given in Section 2, Sheet No. 42.</i></p>
Origin	Racal Communications Ltd., Type TTA.227.
Frequency range	2.0 to 29.9999 MHz (150 to 10 metres) in 100 Hz steps.
Frequency control	Generator, standard frequency, 5820-99-948-8650 (mounted in exciter unit).
Frequency accuracy and stability	Dependent on reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
Types of emission	<p><i>SSB telephony (A3a, A3j):</i> suppressed, pilot or voice-controlled carrier (upper or lower sideband).</p> <p><i>ISB telephony (A3b, A3j):</i> suppressed or pilot carrier.</p> <p><i>AM compatible SSB telephony (A3h):</i> (re-inserted carrier with lower sideband).</p> <p><i>CW telegraphy (A1).</i></p>
Input level (<i>linear amplifier</i>)	25-800 mW
Output power	10 kW p.e.p. (7 kW r.m.s.)
Output impedance	50 ohms unbalanced (2:1 v.s.w.r.)
Linearity	3rd order products better than 36 dB down on one of two test tones.
Audio input level (<i>to exciter unit</i>)	-15 to +7 dBm (600 ohm line)
RF output (<i>from exciter unit</i>)	100 mW (adjustable)
Audio response	300-6000 Hz ± 2 dB
Duration of tuning cycle	Average 35 seconds, maximum 60 seconds.
CW keying input	<p><i>Remote</i> - VF tone</p> <p><i>Local</i> - closed loop</p>
Tuning	<p>(1) <i>Remote or local</i> - automatic control from synthesizer, electrical frequency.</p> <p>(2) <i>Manual</i> - mechanical override of automatic system.</p>
Power supply	<p>Provided from regulator, voltage, 6110-99-951-0381.</p> <p><i>Input:</i> 400V $\pm 12\%$, 47-65 Hz, three-phase, four-wire.</p>
Power consumption	21 kVA (approx.)

Sheet No. 42 cont'd

Dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
Transmitter sub-assembly, 5820-99-953-2076	5ft 5 $\frac{1}{4}$ in (165.7cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
Transmitter sub-assembly, 5820-99-950-5890	5ft 5 $\frac{1}{4}$ in (165.7cm)	5ft 0in (152.4cm)	2ft 3in (68.6cm)
Regulator, voltage 6110-99-951-0381	4ft 0in (122cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	1ft 11in (58.4cm)

Weights (approx.)

Transmitter sub-assembly (5820-99-953-2076)	370 lb	(168 kg)
Transmitter sub-assembly (5820-99-950-5890)	2,500 lb	(1134 kg)
Regulator, voltage	450 lb	(204 kg)

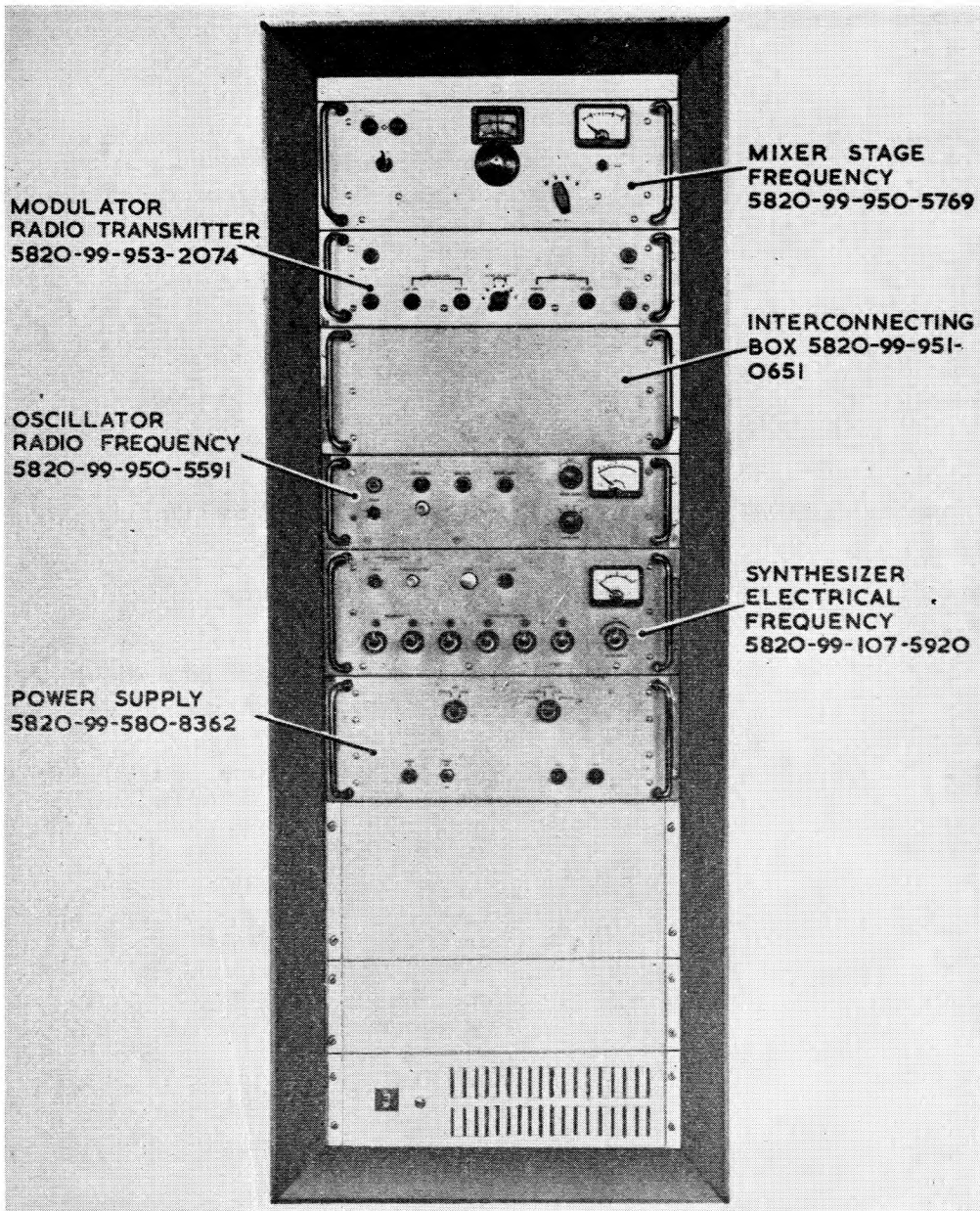
TRANSMITTING SET, RADIO
(5820-99-107-8223)

Relevant publications:—

A.P.116E-0127-1A, 1C, 1G, 1X
(formerly part of A.P.4808C, Vol. 1)

Note . . .

For illustrations of Transmitter sub-assembly, 5820-99-950-5980 and Regulator, voltage, 6110-99-951-0381, see Sect. 1, Sheet No. 41.



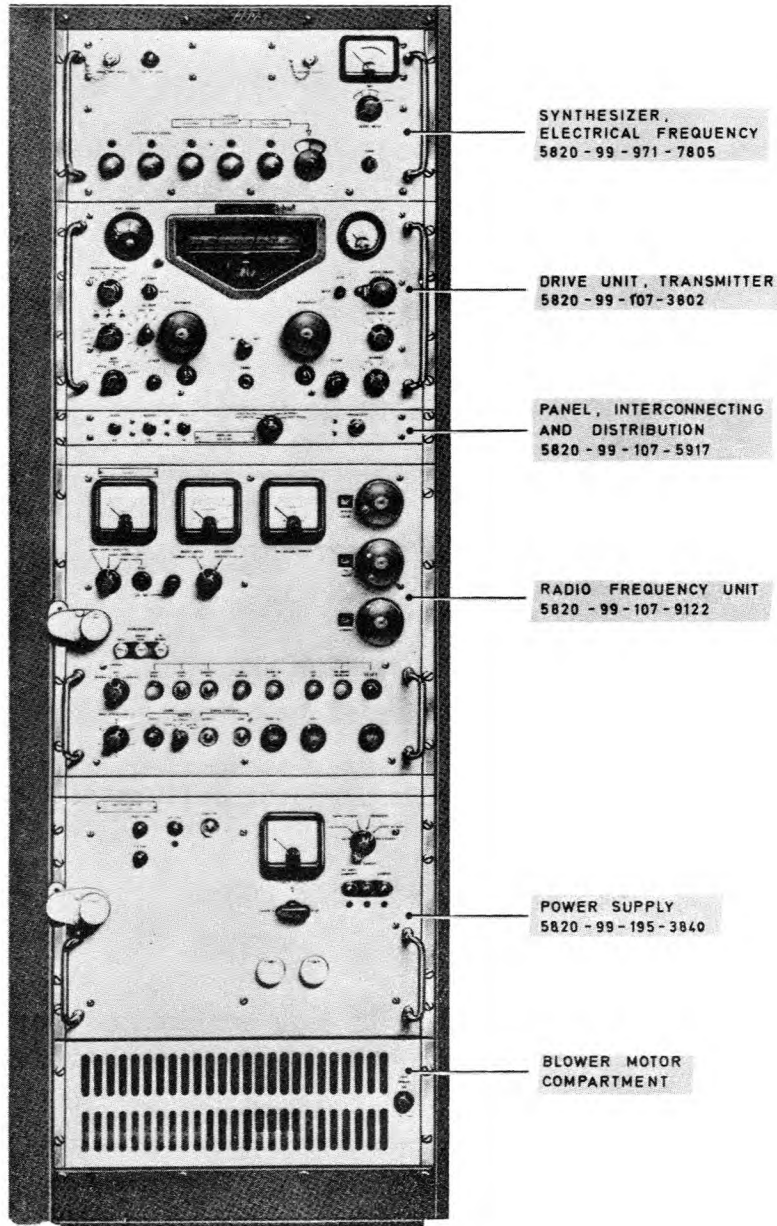
Transmitter sub-assembly, 5820-99-107-5922

Function	<p>A long range, high power h.f. locally controlled transmitter used with FGRI.23186 voice and telegraph transmitter and receiver link station. The transmitter comprises three main sub-assemblies:—</p> <p>(1) Transmitter sub-assembly, 5820-99-107-5922 (<i>exciter unit</i>)</p> <p>(2) Transmitter sub-assembly, 5820-99-950-5890 (<i>10 kW h.f. linear amplifier</i>)</p> <p>(3) Regulator, voltage, 6110-99-951-0381.</p> <p><i>Details of the sub-assemblies are given in Sect. 2, Sheet No. 43.</i></p>			
Origin	Racal Communications Ltd., Type TTA.227C.			
Frequency range	2.0 to 29.9999 MHz (150 to 10 metres) in 100 Hz steps.			
Frequency control	Synthesizer, electrical frequency, internal frequency standard source.			
Frequency accuracy and stability	<p>Including ageing over 24 hours, after 30 days operation less than 2 parts in 10^{-9}.</p> <p>With change in ambient temperature $\pm 25^{\circ}\text{C}$ from 25°C, less than ± 2 parts in 10^{-8}.</p>			
Types of emission	<p><i>SSB telephony (A3a, A3j)</i>: suppressed pilot or voice controlled carrier (upper or lower sideband).</p> <p><i>ISB telephony (A3b, A3j)</i>: suppressed or pilot carrier.</p> <p><i>AM compatible SSB telephony (A3h)</i>: (re-inserted carrier with lower sideband).</p> <p><i>CW telegraphy (A.1)</i>.</p>			
Input level (to linear amplifier)	25-800 mW.			
Output power	10 kW p.e.p. (7 kW r.m.s.).			
Output impedance	50 ohms unbalanced (2:1 v.s.w.r.).			
Linearity	3rd order products better than 36 dB down on one of two test tones.			
Audio input level (to exciter unit)	-15 to +7 dBm (600 ohms).			
RF output (from exciter unit)	100 mW (adjustable).			
Audio response	300 to 6000 Hz ± 2 dB.			
CW keying input	Local closed loop.			
Tuning	<p>(1) <i>Local</i> - automatic from synthesizer.</p> <p>(2) <i>Manual</i> - mechanical override of automatic system.</p>			
Power supply	<p>Provided from regulator, voltage, 6110-99-951-0381.</p> <p><i>Input</i>: 400V $\pm 12\%$, 47-65 Hz, three-phase, four-wire.</p>			
Power consumption	21 kVA (approx.).			
Dimensions		<i>Height</i>	<i>Width</i>	<i>Depth</i>
	Transmitter sub-assembly, 5820-99-101-5922	5ft 5¼in (165.7cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
	Transmitter sub-assembly, 5820-99-950-5890	5ft 5¼in (165.7cm)	5ft 0in (152.4cm)	2ft 3in (68.6cm)
	Regulator, voltage, 6110-99-951-0381	4ft 0in (122cm)	2ft 0½in (62.3cm)	1ft 11in (58.4cm)
Weights (approx.)	Transmitter sub-assembly (5820-99-101-5922)		350 lb	(159 kg)
	Transmitter sub-assembly 5820-99-950-5890)		2,500 lb	(1134 kg)
	Regulator, voltage		450 lb	(204 kg)

TRANSMITTING SET, RADIO
5820-99-194-6465

RELEVANT PUBLICATIONS:

- AP 116E-0127-1A, 1D, 1AF
- AP 116E-0257-1
- AP 116E-0250-1
- AP 116E-0249-1



Transmitting set, radio 5820-99-194-6465

FUNCTION

A medium range, medium power h.f. locally-controlled transmitter used with TGRI(AT)26047/2, 26058/1 and 26063/1 air-transportable-voice and telegraph transmitter and receiver station. The transmitter consists of the following sub-assemblies:

- (1) Synthesizer, electrical frequency 5820-99-971-7805
- (2) Drive unit, transmitter 5820-99-107-3802
- (3) Panel, interconnecting and distribution 5820-99-107-5917
(local control panel)
- (4) Radio frequency unit 5820-99-107-9122 (1kW linear amplifier)
- (5) Power supply 5820-99-195-3840 (for 1kW linear amplifier)

ORIGIN

Racal Communication Ltd., Type TTA.371C

FREQUENCY RANGE

1.5 to 30MHz (200 to 10 metres) in 100Hz steps

FREQUENCY CONTROL

Internal frequency standard (within synthesizer)

FREQUENCY SELECTION

Setting increments of 100kHz, 10kHz, 1kHz and 100Hz

INTERPOLATION OSCILLATOR

Variation over 10kHz, 1kHz or 100Hz decodes, calibrated 0-100 with $\pm 1\%$ accuracy.

FREQUENCY STABILITY OF INTERNAL REFERENCE SOURCE

- (1) Crystal Ageing
2 parts in 10^9 per day after 30 days continuous operation.
- (2) Temperature Variation
 - (i) A change in ambient temperature of $\pm 10^\circ\text{C}$ from 25°C , will produce a change in frequency not exceeding ± 2 parts in 10^9 .
 - (ii) A change in ambient temperature of $\pm 30^\circ\text{C}$ from 25°C , will produce a change in frequency not exceeding ± 2 parts in 10^8 .

(3) Supply Voltage Variation

A change in a.c. supply voltage $\pm 6\%$ on the nominal setting will produce a change in frequency not exceeding ± 1 part in 10^9 .

FREQUENCY STABILITY AND SETTING ACCURACY

(1) 3.6-4.6MHz without interpolation oscillator and fixed frequency outputs: In accordance with the frequency source.

(2) 3.6-4.6MHz output with interpolation between 100Hz steps: ± 1 part in 10^6 .

TYPES OF EMISSION

- (1) A1, CW telegraphy
- (2) A3h, SSB telephony with full carrier emission (DSB compatibility)
- (3) A3a, SSB telephony with pilot carrier emission
- (4) A3j, SSB telephony with suppressed carrier
- (5) F1, FSK telegraphy.

AUDIO INPUT LEVEL

+10 to -20dBm.

OUTPUT POWER

1kW for SSB mode; 800W for CW/FSK modes.

OUTPUT IMPEDANCE

50 ohms unbalanced (up to 2:1 v.s.w.r.)

LINEARITY

At 1kW p.e.p., 3rd order product better than 36dB down on one of two test tones.

AUDIO RESPONSE

300 to 3500Hz ± 2 dB.

CARRIER SUPPRESSION (SSB)

-50dB

POWER SUPPLY

230V, single-phase, 47-65Hz.

POWER CONSUMPTION

3kVA approx.

DIMENSIONS

Height

5ft 5 $\frac{1}{4}$ in
(165.7cm)

Width

2ft 0in
(62.3cm)

Depth

2ft 3in
(68.6cm)

WEIGHT

370lb (167.8kg) approx.

DRIVE UNIT, TRANSMITTER
(5820-99-107-3802)

RELEVANT PUBLICATIONS

AL 116E-0249-1

(for illustration and details see Part 5, Sect.1, Sheet No. 4)

FUNCTION

To provide a low-level r.f. output signal, in the h.f. band, suitable for driving a linear amplifier in the SSB, DSB, FSK or CW modes.

Used with transmitting set radio 5820-99-194-6465

ORIGIN

Racal Communications Ltd., Type MA.79H.

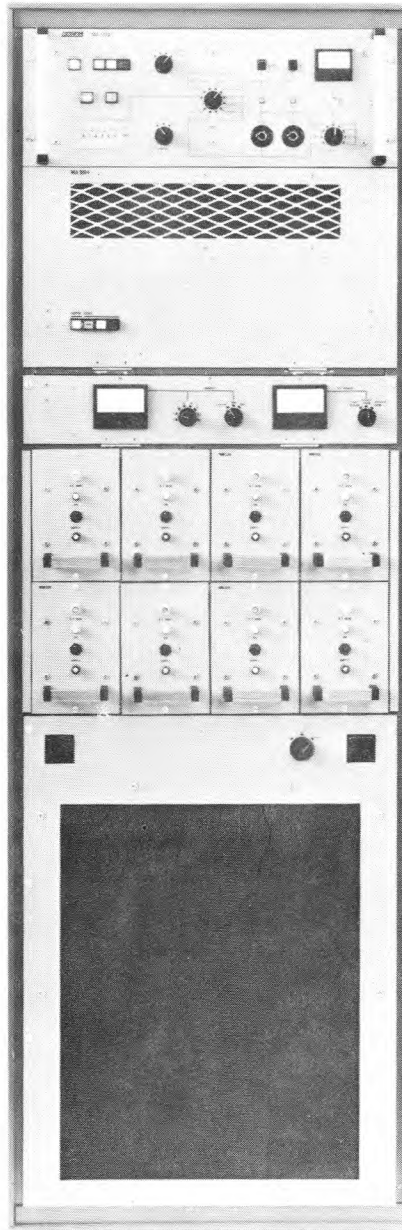
TRANSMITTING SET, RADIO

5820-99-626-4733

(Racal type TTA.1860A)

RELEVANT AIR PUBLICATION

116E-0267-1



Transmitting set, (Racal type TTA.1860A) 5820-99-626-4733

FUNCTION

H.F. Transmitter for fixed or mobile operation (u.s.b./l.s.b., compatible a.m., m.c.w or c.w.).

ORIGIN Racal Communications Ltd., Type TTA.1860A (BA 603400)

GENERAL DESCRIPTION

This is a synthesised solid-state h.f. transmitter comprising the following sub-assemblies:-

Drive unit, transmitter (synthesised)	5820-99-624-5395
Adaptor, antenna to transmitter (coupler)	5820-99-624-5394
Assembly, line switching unit	5820-99-626-7836
Transmitter sub-assembly (includes cabinet)	5820-99-624-5393

Note: details of the sub-assemblies are given in Section 2, Sheet No.46.

TECHNICAL DATA

Frequency range	1.6 MHz to 30 MHz in 100 Hz steps
Frequency control	Drive unit, transmitter (synthesised)
Frequency accuracy and stability	
a)	Frequency variation with temperature ± 1 part in 10^8 per deg. C over temperature range -10°C to $+60^\circ\text{C}$.
b)	Ageing ± 5 parts in 10^9 over a 24 hour period after 30 days.
Types of emission	s.s.b. upper or lower side band (A3J, A3A). compatible a.m. (A3H) i.s.b. (A3B) c.w. (A1) m.c.w. (A2H, A2J)
Input level (to linear amplifier)	25 mW to 200 mW nominal, ± 1.5 dB, over the frequency range.
Output power	c.w.: 1 kW nominal (continuous key down) ± 1 dB. s.s.b.: 1 kW p.e.p. nominal, ± 1 dB.
Output impedance	50 ohms unbalanced.
Audio input level (to drive unit)	-30 to +10 dBm into 600 ohms, preset.
R.F. output:(from drive unit)	Variable, 50 mW to 200 mW p.e.p.
Audio response	Within 4 dB from 300 Hz to 3000 Hz, relative to peak response.
CW/MCW keying input	Operation by closed loop, (A2J or A2H emission achieved by internally generated 1000 Hz tone in selected side-band.

Cooling system

Two built-in air blowers in linear amplifier. Filter fitted in air inlet. Axial fan on rear panel provides cooling for drive unit and line switching unit.

Power consumption

Typically 4.5 kVA with 1 kW p.e.p. output.

POWER SUPPLY REQUIRED

210-250V $\pm 6\%$, 47-65 Hz, single phase.

DIMENSIONS

Height	Width	Depth
1585 mm (62 $\frac{1}{2}$ in.)	524 mm (20 $\frac{1}{2}$ in.)	610 mm (24 in.)

WEIGHT

275 kg (600 lb) approximately.

SECTION 2

TRANSMITTER SUB-ASSEMBLIES

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.1131 VARIANTS

Transmitters T.1131J, K, M, N, 75C
(10D/17746, 17767, 20638, 22718 and
AP.61606)

Output unit Type 47 (10D/17766)
(AP.67930)

Drive unit radio, Type 2 (10D/17765)
AP.67931)

Modulator unit Type 132 (10D/17936)
Modulator unit Type 136 (10DL7962)
Modulator unit Type 57F (AP.61535)

Control unit Type 323 (10L/186)
(AP.67933)

Power unit Type 425 (10K/1901)
Power unit Type 425A (AP.61607)

The transmitters are similar in construction (Sect. 1, Sheet No. 1) and comprise the units described below:—

The r.f. output unit comprises a conventional class C push-pull amplifier employing automatic grid bias and neutralized by feed back from the anode of each valve to the grid of the other through ganged capacitors. A link is provided to open-circuit the anode supply during neutralization. The r.f. output is taken via a balun transformer which permits the use of an unbalanced feeder and, in conjunction with a variable capacitor, optimizes the output impedance to the 75 ohm coaxial transmission line. A diode is provided for use when setting up. In the Transmitter Type 75C only the r.f. output is modified to present an impedance of 100 ohms to the common aerial system.

This unit uses a crystal oscillator and three multiplying stages operating in class C. The first two stages are treblers and the last stage is a push-push doubler.

The modulators are similar and to develop the high power necessary for anode modulation of the power amplifier stage in the output unit, five amplifying stages are used. The first two are single-ended, followed by two stages of class AB1 push-pull and a final class B push-pull stage developing 75 watts of audio power with a total harmonic distortion not exceeding 10%. The 6.3V heater supply to T.1131J is earthed on one side, whereas in the T.1131K a centre-tap earth is used to reduce final hum level. Power for the modulators is provided by Power Unit Type 425 or 425A.

The control unit contains all the switches and relays for controlling the transmitter power supplies. Protective devices incorporated are a delay circuit to ensure that e.h.t. cannot be applied until one minute after the closing of the master filament switch and a power switch for tuning which when set to LOW reduces the H.T. to certain valves. The control unit provides supplies for its relays and the microphone circuit.

The modulator power units are similar, Type 425 being used with transmitter T.1131 variants and Type 425A with transmitter Type 75C. The unit supplies 1kV to the modulator output stage, 300V to the other stages and also provides for the heaters. The four transformers used each have tapped primaries to cater for differing local mains supplies (195V to 250V).

Power unit Type 778 (10K/16569)
Power unit Type 778A (AP.61608)

These r.f. power units supply e.h.t. and heater current to the r.f. drive and output units. The three transformers have tapped primaries to take input voltages from 195 to 250 volts in five-volt steps. A switch at the back of the unit breaks the mains supply to the transmitter when the cabinet door is opened.

Note . . . *Numbers prefixed AP are Admiralty Pattern numbers.*

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.1278
(10D/558)

Transmitter unit
Combined rectifier and control unit

} *Details to be issued later*

Sheet No. 4

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS T.1509 AND T.1509A
(10D/1721 and 10D/17974)

Details to be issued later

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.1540

(10D/2120)

Main chassis

The chassis carries the inter-unit wiring, front panel controls and antenna coupling system and houses the transmitter unit Type 65 and power unit Type 429, both of which are readily detachable. Electrical interconnection between units and the main chassis wiring is achieved by Jones plug and socket connections.

Transmitter unit, Type 65 (10D/2475)

The unit is crystal controlled, the output frequency being 18 times the crystal fundamental, multiplication being obtained by frequency doubling in the crystal oscillator followed by two frequency trebler stages and an r.f. power amplifier. The r.f. amplifier is anode modulated by the output from a push-pull modulator driven by a speech amplifier stage.

Power unit, Type 429 (10K/1492)

The unit contains the power transformers, rectifiers, smoothing circuits, interlocking relays and protective fuses necessary for the operation of transmitter unit. Transformer T.1 provides transmitter heater, bias and control circuit supplies in conjunction with valve rectifier (bias) and metal rectifier (control circuits). Transformer T.2 supplies the H.T. voltage in conjunction with valve rectifier and the H.T. pilot lamp. Three interlocking relays ensure that H.T. cannot be supplied to the transmitting valves unless:—

- (1) HEATERS switch is ON.
- (2) Transmitter bias supply is correct.
- (3) Control circuit is completed through microphone (local or remote).
- (4) H.T. switch is ON.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS T.1550, T.1550A, T.1550B
(10D/2T24, 10D/17409 and 10D/23655)

Transmitter unit
Rectifier and control unit

} *Details to be issued later.*

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS T.1551, T.1551A
(10D/2245 and 10D/16966)

Transmitter unit
Rectifier and control unit

} *To be issued later.*

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTERS T.1969, T.1969A, T.1969B
(10D/18459, 10D/21172, 10D/23816)
AND 5820-99-954-2578

R.F. cabinet

(S.T.C. Code No. 389-LE.1A) (Qty. 2)

R.F. truck

The cabinet houses R.F. Truck, Code No. 389-LE-2B, which can be withdrawn from the cabinet for servicing access.

R.F. truck units

The following units are mounted on the r.f. truck:—

- (1) Exciter unit Type 9 (10D/18722) Qty. 1
 - (2) Power amplifier stage
 - (3) Keying unit Type 26 (10K/17207) Qty. 1
 - (4) Relay unit (Code No. 82-LRA-3A) Qty. 1
 - (5) Isolator switch and terminal unit (Code No. 118-LU.5A) Qty. 1
- Miscellaneous switches, transformers, contactors and blower motor.
Monitoring unit Type 37 (10T/13108)
or Monitoring unit Type 37A (10T/13121)
(mounted on top of r.f. cabinet).

Power and control circuits

(S.T.C. Code No. 22-LE.15A)

All power supply apparatus is contained in two cabinets of equal size and external appearance, one cabinet containing components for 500 and 1500V supplies (Code No. 22-LE.17A) and the other, components for 6000V supplies (Code No. 22-LE.17B).

Modulator cabinet

(S.T.C. Code No. 17-LE-2A)

Contains an oil-filled modulation transformer mounted on wheels, air cooling system for the two power output valves (motor driven fan) exhausting through the cabinet roof and a.f. modulation equipment comprising a.f. oscillator, microphone input, limiter, three amplifier stages, a.g.c. rectifier and output stage.

Associated equipment

Rack assembly Type 266 (10D/18476)

Consists of a rack in which are mounted the following:—

- Exciter unit Type 11 (10K/18747) Qty. 2
- Power unit Type 839 (10K/17260) Qty. 2
- Monitoring unit Type 42 (10T/13112) Qty. 1
- Oscillator unit Type 350 (10V/16218) Qty. 2

Exciter Unit Type 11 and Power Unit Type 839 together form the Frequency-Shift Transmitter Exciter Equipment, Type A.1401, further described in Part 4, Section 1.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS T.1970, T.1970A, T.1970B
(10D/18459, 10D/21172 and 10D/23916)

R.F. cabinet (Qty. 2)
Power cabinet (twin)
Modulator cabinet

} *Details to be issued later.*

Associated equipment

Rack assemblies, Types 255 and 266
(10D/18463 and 10D/18476)

See Sheets No. 14 and 21 of this Section for rack details.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS T.1971, T.2001
(10D/18461 and 10D/19151)

Details of Transmitter sub-assemblies will be issued later.

Associated equipment

Rack assemblies, Type 255 and 266

See Sheets No. 14 and 21 of this Section for rack details.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.1975 (10D/18478)

Transmitter unit Type 89 (10R/93)

The unit consists essentially of four frequency-multiplying stages (harmonic amplifiers) followed by a buffer amplifier and push-pull power amplifier. The frequency-multiplying stages are normally driven by the external crystal oscillator, drive unit, radio Type 4, although for c.w. telegraphy the internal Franklin master oscillator may provide the drive. The two power amplifiers (stages 5 and 6) operate under class C conditions and the r.f. output from the final amplifier is fed to the antenna via an output unit which enables either coaxial or parallel-wire feeders with impedances of 77 and 600 ohms respectively to be used. The coupling unit may be adjusted to match other impedances.

Power unit Type 811 (10K/17203)

The unit operates from a 400V, 50 Hz, 3-phase, 4-wire input and delivers the following output voltages to the transmission unit:—

- (1) 240V, d.c. stabilized H.T. supply to Franklin master oscillator.
- (2) 6.3V and 18V a.c. valve heater and filament supply.
- (3) 400V negative grid bias.
- (4) 5000 to 6000V main H.T. supply.

Provision is made in the power unit for conditioning two spare mercury vapour rectifier valves for the main H.T. supply.

Drive unit, radio Type 4 (10D/18480)

The drive unit consists of a crystal-controlled oscillator Type 7069 (10V/16228) and f.s.k. equipment. The oscillator delivers output on ten selected frequencies, five of which are used for c.w. and five for f.s.k. telegraphy. The r.f. output is one volt across an impedance of 80 ohms. Further details of this equipment will be given in Part 5.

Sheet No. 12

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.1976 10D/18479)

Transmitter unit Type 89 (10R/93)

This unit is described in the previous sheet (Sheet No. 11) but the sub-amplifier and final amplifier valve filaments are heated by an 18V d.c. supply provided by rectifier Type 62.

Power unit Type 812 (10K/17204)

The power unit supplies HT, GB and LT voltages similar to the power unit Type 811 (Sheet No. 11) except that the 18V a.c. filament supply is replaced by an 18V d.c. supply derived from rectifier Type 62.

Rectifier Type 62 (10D/17621)

The rectifier comprises an oil-immersed transformer and metal rectifier which operates from a 380 to 415V, 50 Hz, 3-phase supply and delivers a maximum d.c. output of 18 to 24V at 120A. The input and output leads connect to a termination panel at the top of the unit, the panel being protected by a cover secured with four screws. Oil Type OM-16 (34D/9427822) is used in the unit.

Drive unit, radio Type 5 (10D/18481)

The drive unit consists of the 10-way crystal oscillator Type 7069 (10V/16228) mounted on a supporting framework. It provides the r.f. drive to the harmonic amplifier stages of the transmitter unit. Further details will be found in Part 5.

Drive unit, radio Type 7 (10D/19123)

The unit is a s.s.b. drive unit, the output of which consists of 3.1 MHz low level pilot carrier and upper and lower sidebands produced by audio signals applied to the two independent input channels of the unit. Provision is made in the drive unit for monitoring the signals at all stages and also for generating a d.s.b. amplitude-modulated signal for emergency use. Further details will be found in Part 5.

Modulator unit Type 127 (10D/18482)

The unit consists essentially of three stages—

- (1) Class C amplifier for amplification of the sub-carrier obtained from the third harmonic generator in the transmitter unit.
- (2) A modulator stage which mixes the output of (1) with the output from the s.s.b. drive unit.
- (3) Class A amplifier for the amplification of the s.s.b. signals at the radiated frequency. See Part 5 for further details.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.1978

(10D/17884)

Transmitter Type 1131J (modified)
(10D/17940)

Concise details are given in Part 3, Sect. 1, Sheet No. 1. The T.1131J, when modified for use with transmitter T.1978, becomes Exciter Unit Type 12, (10D/17940) and includes:—

- | | |
|-------------------------------|-------------|
| (1) Power unit Type 845 | (10K/17094) |
| (2) Power unit Type 425 | (10K/1901) |
| (3) Control unit Type 323 | (10L/186) |
| (4) Modulator unit Type 133 | (10D/17941) |
| (5) Amplifying unit Type 472 | (10U/16617) |
| (6) Drive unit, radio, Type 2 | (10D/17765) |
| (7) Output unit Type 47 | (10D/17766) |

Modulator unit Type 28 (10D/17885)

Housed in robust, channel-framed cabinet and comprises self-contained units and individual components mounted on framework and front panels, with access through half-length front and full-length rear doors. Installed units include:—

- | | |
|--------------------------------|-------------|
| (1) Blower, air, Type 56 | (10K/17042) |
| (2) Panel, fuse, Type 805 | (10D/17897) |
| (3) Contactor unit Type 24 | (10AD/258) |
| (4) Power unit Type 825 | (10K/17041) |
| (5) Power unit Type 823 | (10K/17039) |
| (6) Power unit Type 822 | (10K/17038) |
| (7) Resistor unit Type 419 | (10W/18325) |
| (8) Transformer unit Type 217 | (10K/17074) |
| (9) Capacitor, fixed Type 6722 | (10C/19428) |
| (10) Control unit Type 717 | (10L/273) |
| (11) Power unit Type 824 | (10K/17040) |

Amplifying unit Type 474 (10U/16619)

Consists of a cabinet of similar size and construction to that of modulator unit Type 28 and houses one major unit, amplifying unit Type 475, together with smaller individual units and components included below:—

- | | |
|------------------------------|-------------|
| (1) Amplifying unit Type 475 | (10U/16620) |
| (2) Blower, air, Type 56 | (10K/17042) |
| (3) Switch unit Type 2091 | (10F/17273) |
| (4) Control unit Type 716 | (10L/272) |
| (5) Power unit Type 821 | (10K/17037) |
| (6) L.F. choke Type 970 | (10C/19441) |
| (7) Capacitor Type 5071 | (10C/15004) |
| (8) Transformer Type 3244 | (10D/17634) |

SUB-ASSEMBLY DETAILS

FOR

**TRANSMITTERS T.1993, T.1993A (10D/19114 and 10D/23917)
AND 5820-99-195-6286**

R.F. cabinet

(S.T.C. Code No. 389-LE.1A) Qty. 1.

R.F. truck

The cabinet houses R.F. Truck, Code No. 389-LE.2B, which can be withdrawn from the cabinet for servicing access.

R.F. truck units

The following units are mounted on the r.f. truck:—

- (1) Exciter unit Type 9 (10D/18722) Qty. 1
 - (2) Power amplifier stage
 - (3) Keying unit Type 26 (10K/17207) Qty. 1
 - (4) Relay unit (Code No. 82-LRA.3A) Qty. 1
 - (5) Isolator switch and terminal unit (Code No. 118-LU.5A) Qty. 1
- Miscellaneous switches, transformers, contactors and blower motor.
Monitoring unit Type 37 (10T/13108)
or Monitoring unit Type 37A (10T/13121)
(mounted on top of r.f. cabinet).

Power and control circuits

(S.T.C. Code No. 22-LE.15A)

All power supply apparatus is contained in two cabinets of equal size and external appearance, one cabinet containing components for 500 and 1500V supplies (Code No. 22-LE.17A) and the other, components for 6000V supplies (Code No. 22-LE.17B).

Modulator cabinet

(S.T.C. Code No. 17-LE.2A)

Contains an oil-filled modulation transformer mounted on wheels, air cooling system for the two power output valves (motor driven fan) exhausting through the cabinet roof and a.f. modulation equipment comprising a.f. oscillator, microphone input, limiter, three amplifier stages, a.g.c. rectifier and output stage.

Associated equipment

Rack assembly Type 266 (10D/18476)

Consists of a rack in which are mounted the following:—

- Exciter unit Type 11 (10K/18747) Qty. 2
- Power unit Type 839 (10K/17260) Qty. 2
- Monitoring unit Type 42 (10T/13112) Qty. 1
- Oscillator unit Type 350 (10V/16218) Qty. 2

Exciter Unit Type 11 and Power Unit Type 839 together form the Frequency-Shift Transmitter Exciter Equipment, Type A.1401.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.1995 (10D/19125)

Transmitter unit, Type 95 (10R/97)

The unit consists basically of four harmonic amplifying stages (stages 1 to 4) and power amplifying stages (stages 5 and 6). A variable-frequency Franklin master oscillator is incorporated which may be used in lieu of the external crystal-controlled drive unit. The harmonic amplifying stages give an overall multiplication of between 2 and 18 to produce final radiated frequencies of 2 to 27 MHz from drive frequencies of 1 to 1.5 MHz. Stages 4, 5 and 6 normally operate under class C conditions but can be arranged to operate in a class B linear mode when the unit is used for s.s.b. service. The r.f. output circuit may be arranged to feed into a balanced line of 600 ohms impedance or a coaxial line of 77 ohms impedance.

Power unit, Type 1003 (10K/17537)

The unit operates from a 400V, 50 Hz, 3-phase 4-wire supply and provides the following output voltages to the transmitter unit:—

- (1) Main HT. When used with a c.w./s.s.b. transmitter this supply may be adjusted from 3kV at 1.65A to 6kV at 2.5A in 12 steps.
- (2) DC bias. Maximum 460V supply tapped to give the following bias voltages:—
 - (a) Stages 1 to 6.
 - (b) Partial absorber valve (c.w.).
 - (c) Keying valve (c.w.).
 - (d) Modulator unit Type 138 (s.s.b.).
- (3) Harmonic amplifier HT. Maximum of 425V at 800 mA.
- (4) Harmonic amplifier filament transformer. 250V, 50 Hz single-phase.
- (5) Master oscillator HT and filament supplies. 240V 35mA (stabilized) and 6.3V 2A, 50 Hz.
- (6) Air blower, 400V 50 Hz 3-phase supply to blower motor.
- (7) Modulator unit Type 138 HT and LT supplies. Two separate 230V 50 Hz supplies to primaries of HT and LT transformers.
- (8) Stage 5 and 6 valve filaments. 400V 50 Hz 3-phase supply for external rectifier Type 62.

Rectifier Type 62

Refer to Sheet No. 12 of this Section for details.

Modulator unit Type 138 (10D/19124)

The unit consists essentially of three stages:—

- (1) A class C amplifier, which amplifies the sub-carrier obtained from the drive unit radio Type 5 and harmonic generator stages.
- (2) A modulator stage, which mixes the sub-carrier from the class C amplifier and the output from the s.s.b. drive unit to provide s.s.b. signals at the final radiated frequency at the final radiated frequency.

Drive unit radio, Type 5 (10D/18481)

Includes crystal oscillator Type 7069 (10V/16228). See sheet No. 12 of this Section.

Drive unit radio, Type 7 (10D/19123)

S.S.B. drive unit details of which are given in Sheet No. 12 of this Section.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS T.2000, T.2000A
(10D/19142 and 10D/22708)

Transmitter unit Type 89
Power unit Type 811

}Details of these units will be found in Sheet No. 11
}of this Section.

Drive unit radio, Type 5

Details of this unit are given in Sheet No. 12 of this
Section.

Modulator unit Type 7436 (10D/19430)

The unit is a medium-power Class B modulator providing high-level modulation of transmitter unit Type 89 when used for telephony transmissions. The modulator unit consists basically of three push-pull stages, viz. a line amplifier, a cathode-follower driver stage and a Class B main modulator stage. The line amplifier and cathode follower stages together form amplifying unit Type 418. The input circuit of the line amplifier may be matched to lines of 80 to 100 ohms impedance or 600 ohms impedance by switching. All power supplies are derived from power unit Type 811.

Amplifier Type 7488 (10U/16882)

The amplifier is provided to match the input circuit of the line amplifier to lines having input impedance of 100 to 600 ohms and, if necessary, to increase the input level to the transmitter. An input level of approximately 1 mW is required for 100 per cent modulation of the transmitter.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.7095 (10D/19188)

**Transmitter unit Type 89
Power unit Type 811**

See Sheet No. 11 of this section for details.

Oscillator unit Type 7069

This unit is used in both drive units, radio Type 4 and Type 5, details of which are given in Sheets No. 11 and 12 of this section and also in Part 5.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER, RADIO

(5820-99-932-5691)

**Transmitter, radio (formerly T.7096,
10D/19225)**

Consists of major assemblies:—

- (1) Transmitter, radio 5820-99-932-5696 (formerly Transmitter unit assembly 10R/183).
- (2) Power supply, 5820-99-932-5697 (formerly Power unit assembly, 10K/18892).
- (3) Set of connectors for transmitter, radio, (formerly T.7096).

Transmitter, radio, 5820-99-932-5696

Comprises the following:—

- (1) Transmitter sub-assembly, 5820-99-932-5704, (formerly Transmitter unit Type 7703, 10R/179).
- (2) Cable assembly, composite, 5995-99-999-2601, (formerly Cable assembly Type 9206, 10HA/16784).
- (3) Cover, electrical, fitted, 5820-99-999-0841, (formerly Cover assembly, 10AP/273).
- (4) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011, (formerly Cover, front, Type 1068, 10AP/299).
- (5) Cooler, air, electronic equipment, 5820-99-972-9816, (formerly Fan assembly, Type 9239, 10K/18898).

Power supply, 5820-99-932-5697

- (1) Power supply, 5820-99-932-5705, (formerly Power unit Type 7097, 10K/17688).
- (2) Cable assembly, 5995-99-932-4012, (formerly Cable assembly, Type 9207, 10HA/16788).
- (3) Cover, electrical, fitted, 5820-99-999-0841, (as before).
- (4) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011 (as before).

**Ancillary items (available for use with
transmitter Type T.7096)**

- (1) Pedestal cabinet, electrical equipment, 5820-99-932-5711, (formerly Mounting (plinth) Type 7872, 10AJ/250).
- (2) Cooler, dry air, electrical equipment, 5820-99-932-3995, (formerly Blower, air, Type 7344, 10K/19476).

Note . . .

Certain accessories must be employed when using the cooler, A.P.116E-0253-1, Part 1, Sect. 4, Chap. 2 refers.

Associated equipment

**Amplifier, radio frequency, 5820-99-932-5692,
(formerly Amplifier (r.f. power), Type A.7439,
10U/16658)**

Consists of major assemblies:—

- (1) Amplifier, radio frequency, 5820-99-932-5699, (formerly Amplifier unit assembly, 10U/16686).
- (2) Power supply, 5820-99-932-5700, (formerly Power unit assembly, 10K/18897).

Amplifier, radio frequency, 5820-99-932-5699

- (1) Amplifier sub-assembly, 5820-99-932-5708, (formerly Amplifying unit Type 9201, 10U/16685).
- (2) Cable assembly, 5995-99-932-4014, (formerly Cable assembly Type 9223, 10HA/16809).

- (3) Cover, electrical, fitted, 5820-99-999-0481, (as before).
- (4) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011, (as before).
- (5) Control, frequency selector, 5820-99-932-5709, (formerly Panel, tuning Type 11784, 10D/21501).
- (6) Control, frequency selector, 5820-99-932-5710, (formerly Panel, tuning Type 11785, 10D/21502).
- (7) Controls, frequency selector, 5820-99-911-8329, (formerly Selector unit Type 9008A, 10D/20576)—Quantity 2.

Power supply 5820-99-932-5700

- (1) Power supply, 5820-99-932-5707 (formerly Power unit Type 9202, 10K/18891).
- (2) Cable assembly, composite, 5995-99-999-2600, (formerly Cable assembly Type 9224, 10HA/16810).
- (3) Cover, electrical, fitted, 5820-99-999-0481, (as before).
- (4) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011, (as before).

Leading particulars affected by use of amplifier r.f.

Items in the leading particulars of Transmitter, Radio 5820-99-932-5691 (T.7096) given in Section 1, Sheet No. 18, are affected when the transmitter is used with Amplifier, radio frequency, 5820-99-932-5692 (A.7349). Only those items affected are given.

Tuning

Tuning of the amplifier is automatic and controlled from the frequency selector of transmitter, radio (T.7096).

Output power

100 watts to 150 watts.

Power consumption

1250 watts (approx.).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Amplifier r.f.</i>	} 1ft 1¼in	1ft 11¼in	2ft 0in
<i>Power supply</i>	} (33·7 cm)	(59 cm)	(61 cm)

Weights

<i>Amplifier r.f.</i>	101 lb (45·8 kg)
<i>Power supply</i>	152 lb (68·0 kg)

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.7242 VARIANTS

Transmitters T.7242, A, B, C (10D/19422, 22231, 22795, 23914)

The transmitters are similar in construction (Sect. 1 Sheet No. 20) and comprise the following units:—

R.F. Cabinet

(S.T.C. Code No. 4-LE.96 Grp. 408).

R.F. Trucks

The cabinet houses two R.F. Trucks, Code No. 389-LE.2B, which can be withdrawn from the cabinet for servicing purposes.

R.F. Truck Units

The following units are mounted on each r.f. truck:—

- | | |
|------------------------------------------------------------------------------------------|--------|
| (1) Exciter unit, Type 9 (10D/18722) | Qty. 1 |
| (2) Power amplifier stage | |
| (3) Keying unit, Type 26 (10K/17207) | Qty. 1 |
| (4) Relay unit, Code No. 82-LRA.3A | Qty. 1 |
| (5) Isolator switch and terminal unit, Code No. 188-LU.5A | Qty. 1 |
| (6) Monitoring unit, Type 37 (10T/13108),
or
Monitoring unit, Type 37A (10T/13121) | Qty. 1 |

Power cabinet

(S.T.C. Code No. 4-LE.96 Grp. 403).

The power cabinet contains the Rectifier Equipment (S.T.C. Code No. 22-LE.15A) and also houses the Modulator (S.T.C. Code No. 17-LE.2A).

Rectifier equipment (22-LE.15A)

The overall power equipment is assembled from two sections, 22-LE.17A and B of equal size. One, (22-LE.17A) incorporates components for the 500 and 1500 volts supplies and the other, components for the 6000 volts supply.

Modulator (17-LE.2A)

Contains an oil-filled modulation transformer mounted on wheels, air cooling system for the two power output valves (motor-driven fan) exhausting through the cabinet roof and a.f. modulation equipment comprising a.f. oscillator, microphone input circuit, a v.o.g.a.d.-controlled amplifier, a v.o.g.a.d. rectifier, two amplifier stages, a cathode follower and an output stage.

Associated equipment

Rack assembly Type 266 (10D/18476)

Consists of a rack in which are mounted the following:—

- | | |
|---------------------------------------|--------|
| Exciter unit, Type 11 (10K/18747) | Qty. 2 |
| Power unit, Type 839 (10K/17260) | Qty. 2 |
| Monitoring unit, Type 42 (10T/13112) | Qty. 1 |
| Oscillator unit, Type 350 (10V/16218) | Qty. 2 |

Exciter Unit Type 11 and Power Unit Type 839 together form the Frequency-Shift Transmitter Exciter Equipment, Type A.1401.

Rack assembly, Type 7198

Consists of a rack in which are mounted:—

- | | |
|-----------------------------------|--------|
| Exciter unit, Type 11 (10D/18747) | Qty. 1 |
| Power unit, Type 839 (10K/17620) | Qty. 1 |

Rack assembly, Type 7199

Consists of a rack in which are mounted:—

Oscillator unit, Type 7386 (10V/16231) Qty. 2

Rack assembly, Type 7204

Consists of a rack in which are mounted:—

Exciter unit, Type 11 (10D/18747) Qty. 1

Monitoring unit, Type 42 (10T/13112) Qty. 1

Power unit, Type 839 (10K/17620) Qty. 1

Sheet No. 21

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTERS T.7243 AND T.7243A.

(10D/19423 and 10D/21162)

R.F. Cabinet

(S.T.C. Code No. 4-LE.96 Grp. 411).

Houses two r.f. units (S.T.C. Code No. 389-LE.1P) and monitor unit (S.T.C. Code No. 171-LU.30A) is located on top of cabinet.

R.F. Trucks

The r.f. units are mounted in r.f. trucks (Code No. 389-LE.2M) which can be withdrawn from the cabinet for servicing access.

R.F. truck units

The following units are mounted on each truck:—

- (1) Oscillator and negative feedback unit, Code No. 28-LU.234G Qty. 1
 - (2) R.F. exciter unit, Code No. 181-LU.13E Qty. 1
 - (3) Demodulator unit, Code No. 109-LRU.8A Qty. 1
 - (4) Output amplifier
 - (5) Isolator and terminal unit Qty. 1
- Miscellaneous contactors, transformers and blower motor.

Power cabinet

(S.T.C. Code No. 4-LE.96 Grp. 402).

The power cabinet contains the Rectifier Equipment (S.T.C. Code No. 22-LE.15A) which is assembled from two sections, 22-LE.17A and B of equal size. One (22-LE.17A) incorporates components for 500 and 1500 volt supplies and the other, components for 6000 volt supplies.

Associated equipment

Rack assembly, Type 255

The rack contains the following units:—

- | | |
|---------------------------------------|--------|
| Modulator unit, Type 137 (10D/19122) | Qty. 2 |
| Modulator unit, Type 139 (10D/19127) | Qty. 2 |
| Modulator unit, Type 139A (10D/19439) | Qty. 2 |
| Power unit, Type 848 (10K/17510) | Qty. 2 |
| Filter unit, Type 418 (10P/16162) | Qty. 2 |
| Amplifying unit, Type 607 (10U/16860) | Qty. 2 |
| Oscillator unit, Type 356 (10V/16223) | Qty. 2 |

Rack assembly, Type 266

See Sheet No. 14 of this section for rack details.

Rack assembly, Type 7200

This rack contains single quantities of the units duplicated in Rack Assembly Type 255, except that amplifying units Type 607 and oscillator units Type 356 are replaced by the following:—

- | | |
|----------------------------------------|--------|
| Amplifying unit, Type 607A (10U/16884) | Qty. 1 |
| Oscillator unit, Type 356A (10V/16233) | Qty. 1 |

Rack assembly, Type 7201

The rack contains the following units:—

- | | |
|---------------------------------------|--------|
| Demodulator unit, Type 2 (10D/19109) | Qty. 1 |
| Demodulator unit, Type 3 (10D/19110) | Qty. 1 |
| Power unit, Type 848 (10K/17510) | Qty. 1 |
| Filter unit, Type 410 (10P/16154) | Qty. 1 |
| Monitoring unit, Type 45 (10T/13113) | Qty. 1 |
| Oscillator unit, Type 353 (10V/16219) | Qty. 1 |
| Oscillator unit, Type 354 (10V/16220) | Qty. 1 |

Rack assembly, Type 7202A

V.F.O. rack (4 to 28 MHz) includes the following:—

Oscillator unit, Type 355 (10V/16221) Qty. 2

Rack assembly, Type 7203

Rack for 3·1 MHz drive, comprises:—

Oscillator unit, Type 7169 (10V/16229) Qty. 2

SUB-ASSEMBLY DETAILS

FOR

**TRANSMITTERS T.7247 AND T.7247A
(10D/19424 and 10D/22232)**

R.F. Cabinet

(S.T.C. Code No. 389-LE.1A) (Qty. 1).

R.F. Truck

The cabinet houses R.F. Truck, Code No. 389-LE.2B, which can be withdrawn from the cabinet for servicing access.

R.F. Truck Units

The following units are mounted on the r.f. truck:—

- (1) Drive unit, radio Type 7619 (10D/19442) Qty. 1
 - (2) Power amplifier stage
 - (3) Keying unit Type 26 (10K/17207) Qty. 1
 - (4) Relay unit (Code No. 82-LRA.3A) Qty. 1
 - (5) Isolator unit and terminal unit (Code No. 118-LU.5A) Qty. 1
- Miscellaneous switches, transformers, contactors and blower motor.
Monitoring unit Type 37 (10T/13108)
(mounted on top of r.f. cabinet) Qty. 1

Power and Control Circuits

(S.T.C. Code No. 22-LE.15A).

All power supply apparatus is contained in two cabinets of equal size and external appearance, one cabinet containing components for 500 and 1500V supplies (Code No. 22-LE.17A) and the other, components for 6000V supplies (Code No. 22-LE.17B).

Modulator cabinet

(S.T.C. Code No. 17-LE.2A)

Contains an oil-filled modulation transformer mounted on wheels, air cooling system for the two power output valves (motor driven fan) exhausting through the cabinet roof and a.f. modulation equipment comprising a.f. oscillator, microphone input, limiter, three amplifier stages, a.g.c. rectifier and output stage.

Associated equipment

Rack assembly Type 266 (10D/18476)

Consists of a rack in which are mounted the following:—

- | | |
|--------------------------------------|--------|
| Exciter unit Type 11 (10K/18747) | Qty. 2 |
| Power unit Type 839 (10K/17260) | Qty. 2 |
| Monitoring unit Type 42 (10T/13112) | Qty. 1 |
| Oscillator unit Type 350 (10V/16218) | Qty. 2 |

Exciter unit Type 11 and Power unit Type 839 together form the Frequency-Shift Exciter Equipment, Type A.1401.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.7248 VARIANTS

Transmitters T.7248, A, B, C
(10D/19425, 21170, 22233, 23913)

R.F. Cabinet
A.M. Title:
or

The transmitters are similar in construction (Sect. 1 Sheet No. 23) and comprise the following units:—

(S.T.C. Code No. 4-LE.96 Grp. 406)

R.F. Unit Type 7508 (10D/19438)

R.F. Unit Type 7508A (10D/21171)

(when Mod. No. 4880 is embodied)

R.F. Truck

The cabinet houses one r.f. truck, Code No. 389-LE.2N, which can be withdrawn from the cabinet for servicing access.

R.F. Truck Units

The following units are mounted on the truck:—

- (1) Drive unit, radio, Type 7619 (10D/19442) Qty. 1
- (2) Power amplifier stage
- (3) Keying unit, Type 26 (10K/17207) Qty. 1
- (4) Relay unit, Code No. 82-LRA.3A Qty. 1
- (5) Isolator switch and terminal unit, Code No. 108-LU.5A.
- (6) Monitoring unit, Type 37 (10T/13108) Qty. 1
or Monitoring unit, Type 37A (10T/13121)
Miscellaneous switches, transformers, contactors and a blower motor.

Power cabinet

(S.T.C. Code No. 4-LE.96 Grp. 403)

The power cabinet contains the Rectifier Equipment (S.T.C. Code No. 22-LE.15A) and also houses the Modulator (S.T.C. Code No. 17-LE.2A).

Rectifier Equipment (22-LE.15A)

The overall power equipment is assembled from two sections, 22-LE.17A and B of equal size. One, (22-LE.17A) incorporates components for the 500 and 1500 volt supplies and the other, components for the 600 volt supplies.

Modulator (17-LE.2A)

Contains an oil-filled modulation transformer mounted on wheels, air cooling system for the two power output valves (motor-driven fan) exhausting through the cabinet roof and a.f. modulation equipment comprising a.f. oscillator, microphone input circuit, a v.o.g.o.d.-controlled amplifier a v.o.g.a.d. rectifier, two amplifier stages, a cathode follower and an output stage.

Associated equipment

Rack assembly, Type 266 (10D/18476)

See Sheet No. 22 of this Section for rack details.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER, RADIO (5820-99-932-5698)

**Transmitter sub-assembly 5820-99-932-5706
(formerly Transmitter unit Type 9231,
10R/184)**

The transmitter (formerly T.7355, 10D/19270) consists of the following sub-assemblies:—

The sub-assembly includes sub-units as follows:—

- (1) Modulator radio transmitter, 5820-99-911-8326 (formerly modulator unit Type 7099, 10D/19227).
- (2) Amplifier oscillator, 5820-99-999-2332 (formerly drive unit radio Type 7358, (10D/16652).
- (3) Monitor, radio frequency, 6625-99-999-2378 (formerly monitoring unit, Type 7107, 10T/682).
- (4) Probe assembly, 6625-99-999-2147 (formerly probe assembly Type 9241, 10AE/400).
- (5) Power unit Type 7356 (10K/18137).
- (6) Cooler air electronic equipment, 5821-99-999-2382 (formerly fan assembly Type 9319, 10K/19408).
- (7) Chassis electrical equipment, 5820-99-932-3997 (formerly chassis assembly Type 7357, 10D/1927).

**Cable assembly, 5995-99-932-4013 (formerly
Cable assembly Type 9232, 10HA/16826)**

Comprises the following:—

- (1) Connector panel and air inlet for fitting to rear of cabinet.
- (2) Set of connectors for transmitter unit Type 9231.
- (3) Gate switch, indicating lamp and wiring for a.c. mains supply.

**Cover electrical fitted, 5820-99-999-0841
(formerly Cover assembly, 10AP/273)**

Steel open-fronted case $23\frac{1}{4}$ in wide by $24\frac{1}{4}$ in deep by $13\frac{1}{4}$ in high, weighing 51 lb; container for transmitter unit Type 9231.

**Cover, access, electrical equipment, fitted
chassis, 5820-99-932-4011 (formerly Cover
front Type 1068, 10AP/299)**

Front steel cover fits over open end of cover, electrical fitted, to protect equipment from dust and damage during transit or storage.

**Ancillary equipment (available for use with
transmitter, radio (T.7355))**

- (1) Pedestal cabinet, electrical equipment, 5820-99-932-511 (formerly mounting (plinth) Type 7872, 10AJ/250).
- (2) Cooler, dry air, electrical equipment, 5820-99-932-3995 (formerly Blower air Type 7344, 10K/19476).

Note . . .

Certain accessories must be employed when using the cooler. A.P.116E-0211-1, Part 1, Sect. 4, Chap. 2 refers.

Associated equipment

**Amplifier, radio frequency, 5820-99-932-5693
(formerly Amplifier (r.f. power) Type A.9365
10U/16697)**

Consists of major assemblies:—

- (1) Amplifier radio frequency, 5820-99-932-5701 (formerly amplifying unit assembly, 10U/16689).
- (2) Power supply, 5820-99-932-5700 (formerly power unit assembly 10K/18897).

Amplifier radio frequency, 5820-99-932-5701

Comprises the following:—

- (1) Amplifier sub-assembly, 5820-99-932-5708 (formerly amplifying unit Type 9201, 10U/16685).
- (2) Cable assembly, 5995-99-932-404 (formerly cable assembly Type 9223, 10HA/16809).
- (3) Cover Electrical fitted, 5820-99-999-0841 (as before).
- (4) Cover, access electrical equipment, fitted chassis, 5820-99-932-4011 (as before).
- (4) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011 (as before).
- (5) Panels tuning Type 11786 (10D/21503) and Type 11787 (10D/21504).

Power supply, 5820-99-932-5700

Comprises the following:—

- (1) Power supply, 5820-99-932-5707 (formerly power unit Type 9202, 10K/18891).
- (2) Cable assembly, composite, 5995-99-999-2600 (formerly cable assembly Type 9224, 10HA/16810).
- (3) Cover electrical fitted, 5820-99-999-0841 (as before).
- (4) Cover access, electrical equipment, fitted chassis, 5820-99-932-4011 (as before).

Leading particulars affected by use of amplifier r.f.

Items in the leading particulars of Transmitter radio, 5820-99-932-5698 (T.7355) given in Section 1, Sheet No. 24, are affected when the transmitter is used with Amplifier radio frequency, 5820-99-932-5693 (A.9365). Only those items affected are given.

Tuning

By means of manually operated controls over same frequency range as transmitter.

Output power

100 watts to 150 watts.

Power consumption

1250 watts (approx.).

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>Amplifier r.f.</i>	} 1ft 1¼in	1ft 11¼in	2ft 0in
<i>Power supply</i>	| (33.7 cm)	(59 cm)	(61 cm)

Weights

<i>Amplifier r.f.</i>	101 lb (45.8 kg)
<i>Power supply</i>	152 lb (68.0 kg)

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTERS, RADIO
(5820-99-933-2189 and 5820-99-933-2208)

Transmitter radio (T.8994)
(formerly 10D/20735)
Transmitter radio (T.15074)
(formerly 10D/20480)

The form of construction comprises self-supporting inner units surrounded closely by an enclosure, the whole standing on metal frames and a wooden plinth. Eight cubicles forming the transmitter enclosure are identified as follows:—

- (1) Unit 1. Power distribution cubicle, Drg. No. W.32154 Ed. B.
- (2) Unit 2. Low power rectifier cubicle, Drg. No. W.32186 Ed. B.
- (3) Unit 3. High power rectifier cubicle, Drg. No. W.32202 Ed. B.
- (4) Unit 4. Low power r.f. and Stage 6 cubicle, Drg. No. W.32055 Ed. H.
- (5) Unit 5. Stage 7 cubicle, Drg. No. W.32170 Ed. A.
- (6) Unit 6. Stage 8 cubicle, Drg. No. W.32171 Ed. A.
- (7) Unit 7. Output circuit cubicle, Drg. No. W.31290 Ed. F.
- (8) Unit 8. Enclosure assembly, Drg. No. W.31306 Ed. B (for enclosure access).

Auxiliary equipment

Items installed in transformer and fan rooms:—

Main HT transformer
HT smoothing choke
HT smoothing capacitor rack
Automatic voltage regulator
Motor driven fan
Air duct.
Fan motor starter
Air pressure switch
Automatic voltage regulator control box
High power valve filament rectifiers
Main isolator switch
HT voltmeter resistor.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.9739 (10D/20610)

Transmitter unit
Rectifier and control unit
Drive unit radio, Type 4
Drive unit radio, Type 5

} *Details to be issued later.*

Details of this unit are given in Sheet No. 11 of this section.

Details of this unit are given in Sheet No. 12 of this section.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.9740
(10D/20611)

Transmitter unit
Rectifier and control unit

} *Details to be issued later.*

Drive unit radio, Type 4

Details of this unit are given in Sheet No. 11 of this section.

Drive unit radio, Type 5

Details of this unit are given in Sheet No. 12 of this section.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.9741
(10D/26012)

Transmitter unit
Rectifier and control unit
Drive unit radio, Type 4
Drive unit radio, Type 5

} *Details to be issued later.*

Details of this unit are given in Sheet No. 11 of this section.

Details of this unit are given in Sheet No. 12 of this section.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTERS, RADIO

(5820-99-933-2372, 5820-99-933-2182, 5820-99-933-2195)

**Transmitters, radio, (T.10158, A, B)
(formerly 10D/20455, 22729, 23678)**

The transmitters are of similar construction and comprise the following:—

Rectifier and Control Unit (W.37908, Ed. B.)

This cubicle contains the various sub-units of the power units and is ventilated by a 6 inch extractor fan. Supplies provided include:—

- (1) 50V d.c. for control circuits.
- (2) 6.3V 5A auxiliary filaments.
- (3) 450V rectified and 280V stabilized auxiliary H.T.
- (4) 5V d.c. 30A filament (Stage 5).
- (5) 120V bias (all stages).
- (6) 12.6V a.c. 30A, filament (Stage 6).
- (7) 4 kV, 1.25A, main H.T.

Radio Frequency Unit (W.37907, Ed. C)

This cubicle contains all the radio frequency circuits and cooling fan. Various stages are contained in separate sub-units which may be withdrawn from the cabinet on runners for servicing. The sub-units are:—

- (1) Mixer unit (W.37902, Ed. D).
- (2) 4th and 5th r.f. amplifier (W.39081 Ed. B).
- (3) Aerial circuit (W.40408, Ed. B).

Associated equipment

Details to be issued later.

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTERS, RADIO

(5820-99-933-2173, 5820-99-933-2177, 5820-99-933-2165)

Transmitters, radio (T.10197, A, B)
(formerly 10D/20468, 22730, 22765)

Rectifier and Control Unit (L.H.)
(W.46471, Ed. A)

Rectifier and Control Unit (R.H.)
(WQ.12181, Ed. A)

Radio Frequency Unit (L.H.)
Radio Frequency Unit (R.H.)
(WQ.12180, Ed. A)

Associated equipment

The transmitters are of similar construction and comprise the following—

This cubicle houses the Interlock Control Panel and various power circuit components for stage 6 and stage 7 power supplies.

This cubicle is located adjacent to the left hand cubicle and contains various sub-units of the transmitter power and power control circuits. The supplies provided by both cubicles include—

- (1) 50V d.c. for control circuits.
- (2) 6.3V 5A auxiliary filament.
- (3) 450V rectified and 280V stabilized auxiliary H.T.
- (4) 5V d.c. 30A filament (stage 5).
- (5) 120V bias (all stages except 7).
- (6) 12.6V d.c., 30A filament (stage 6).
- (7) 4kV, 3.75A, main H.T.
- (8) 110V bias (stage 7).
- (9) 12.6V a.c., 60A filament (stage 7).

The unit comprises two cubicles, the left hand containing the harmonic generator, mixer and power amplifier stages 1 to 6 whilst the right hand cubicle houses stage 7, the aerial coupling circuit and the stage 6 output circuit unit feeding stage 7. The following sub-unit may be withdrawn on runners for servicing:—

- (1) Mixer unit (W.37920, Ed. D) includes harmonic generator, mixer and amplifier stages 1, 2 and 3.
- (2) 4th and 5th amplifier unit containing amplifier stages 4 and 5.

Details to be issued later.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.11768
(10D/21097)

Transmitter T.11768
(Redifon A.4475 Edn. A)

The transmitter comprises the following sub-assemblies which are not referenced:—

- (1) Aerial coupling unit (ACU-A6088 Edn. A and B).
- (2) R.F. amplifier and oscillator unit.
- (3) Power amplifier bay.
- (4) Modulator bay.
- (5) Power supply bay.
- (6) Blower air.

Alarms radio 100 (10D/22175)

This equipment is used in conjunction with T.11768 and comprises:—

- (1) Alarms radio (10D/23834 or 10D/23835 or 10D/23836).
- (2) Monitoring units, Type 14305 (10T/13122).

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.11839
(10D/21109)

Transmitter unit
Rectifier and control unit
Cabinet Type 8756 (fitted) (10AQ/1674)

} *Details to be issued later.*

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.12842
(10D/21704)

Transmitter T.12842

Comprises the following sub-assemblies:—

- (1) R.F. unit, Type 12844 (10D/21705).
- (2) Modulator unit, Type 12841 (10D/21703).
- (3) Power unit, Type 12847 (10K/21040).
- (4) Blowers air, Type 130 (10K/20428).

R.F. unit, Type 12844 (10D/21705)

Includes the following sub-units:—

- (1) Oscillator unit Type 12846 (10V/16421).
- (2) Drive unit radio, Type 12845 (10D/21706).

Modulator unit, Type 12841 (10D/21703)

Includes the following sub-unit:—

- (1) Modulator input unit (10AE/971).

Power unit, Type 12847 (10K/21040)

Includes the following sub-units:—

- (1) Control unit, Type 12848 (10L/16710).
- (2) Coding unit, Type 12849 (10D/23304).
- (3) Relay unit, Type 12850 (10F/20270).

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.13119

(10D/21610)

Transmitter unit, Type 13125 (10R/13101)

For f.s.k. duplex drive (*Further details to be added later*).

Power unit, Type 811 (10K/17203)

Drive unit radio, Type 4

} Refer to Sheet No. 11 of this section for details.

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674)

F.S.K. duplex drive unit (Marconi HD.61B). (*Further details to be added later*).

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.13120

(10D/21611)

Transmitter unit, Type 13125 (10R/13101)

For f.s.k. duplex drive. (*Further details to be added later*).

Power unit, Type 812 (10K/17204)

Rectifier, Type 62 (10D/17621)

Modulator unit, Type 127 (10D/18482)

Drive unit radio, Type 5 (10D/18481)

Drive unit radio, Type 7 (10D/19123)

} Refer to Sheet No. 12 of this section for details.

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674)

F.S.K. duplex drive unit (Marconi HD.61B). (*Further details to be added later*).

SUB-ASSEMBLY DETAILS

FOR

**TRANSMITTER T.13121
(10D/21612)**

Transmitter unit, Type 13125 (10R/13101)	For f.s.k. duplex drive. (<i>Further details to be added later</i>).
Power unit, Type 811 (10K/17203)	Refer to Sheet No. 11 of this section for details.
Modulator unit, Type 7436 (10D/19430)	Refer to Sheet No. 16 of this section for details.
Drive unit radio, Type 5 (10D/18481)	Refer to Sheet No. 12 of this section for details.
Amplifier, Type 7488 (10U/16882)	Refer to Sheet No. 16 of this section for details.
Microphone assembly, Type 72 (10AH/1505)	Transverse current carbon microphone with frame table stand, 4 yd flexible cord and plug Type 282 (10H/979). 6V d.c. supply for operation.
Smoothing unit, Type 22 (10AE/1583)	Used with microphone assembly Type 72. No longer listed in A.P.1086.
Ancillary equipment	
Cabinet (fitted) Type 8756 (10AQ/1674)	F.S.K. duplex drive unit (Marconi HD.61B). (<i>Further details to be added later</i>).

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.13122

(10D/21613)

Transmitter unit, Type 13125 (10R/13101)

For f.s.k. duplex drive. (*Further details to be added later*).

Power unit, Type 811 (10K/7203)

Refer to Sheet No. 11 of this section for details.

Oscillator unit, Type 7069 (10V/16228)

Refer to Sheet No. 17 of this section for details.

Ancillary equipment

Cabinet (fitted), Type 8756 (10AQ/1674)

F.S.K. duplex drive unit (Marconi HD.61B). (*Further details to be added later*).

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTER T.13123
(10D/21614)

Transmitter unit, Type 13126 (10R/13102)	For f.s.k. diplex drive. (<i>Further details to be added later</i>).
Power unit, Type 1003 (10K/17537) Modulator unit, Type 138 (10D/19124)	} Refer to Sheet No. 15 of this section for details.
Rectifier, Type 62 (10D/17621) Drive unit radio, Type 5 (10D/18481) Drive unit radio, Type 7 (10D/19123)	} Refer to Sheet No. 12 of this section for details.
Ancillary equipment	
Cabinet (fitted), Type 8756 (10AQ/1674)	F.S.K. diplex drive unit (Marconi HD.61B). (<i>Further details to be added later</i>).

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T. 13124

(10D/21615)

Transmitter unit Type 13126 (10R/13102)

For f.s.k. duplex drive. (*Further details to be added later*).

Power unit, Type 7724 (10K/NIV)

Similar to power unit, Type 1003 (see Sheet No. 15 for details) except that Type 7724 provides an 18V a.c. filament supply to stages 5 and 6 in the transmitter unit, whereas Type 1003 provides 18V d.c. to those valves through rectifier Type 62.

Drive unit radio, Type 5 (10D/18481)

Refer to Sheet No. 12 of this section for details.

Ancillary equipment

Cabinet (fitted) Type 8756 (10AQ/1674)

F.S.K. duplex drive unit (Marconi HD.61B). (*Further details to be added later*).

SUB-ASSEMBLY DETAILS

FOR

TRANSMITTER T.14284

(10D/22140)

Transmitter Type T.14284

The transmitter consists of one cabinet housing the following units:—

- (1) Aerials, head, Type 16709 (10B/19563) (STC. No. 24-LRU.53D).
- (2) Keying units, Type 16706 (10K/21342). (STC. No. 395-LRU.75A).
- (3) Panels fuse, Type 16699 (10D/22605) (STC. No. 81-LRU.90B).
- (4) Rectifier units, Type 16696 (10D/22602) (STC. No. 22-LRU.100A).

Ancillary equipment

Rack assembly, Type 14283 (10D/22139)

Contains the following sub-units:—

- (1) Oscillator unit, Type 16713 (10V/16453).
- (2) Keying units, Type 16706 (10K/213432).
- (3) Monitoring units, Type 16710 (10T/13218).
- (4) Monitoring units, Type 16711 (10T/13219).
- (5) Jack panel, Type 16701 (10D/22606).
- (6) Power units, Type 16705 (10K/21341).

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTING SET, RADIO
(5820-99-950-5772)

Transmitter sub-assembly, 5820-99-950-5774 (exciter unit) (Racal MA.288A)

The unit uses a system of frequency synthesis, modulation and mixing to produce, at a low level, the required r.f. signal complete with intelligence and comprises the following:—

- (1) Mixer stage, frequency, 5820-99-950-5769 (Racal MA.181).
- (2) Modulator, radio transmitter, 5820-99-950-5770 (Racal MA.221A).
- (3) Interconnecting box, 5820-99-951-0651 (Racal MA.603B).
- (4) Oscillator, radio frequency, 5820-99-950-5591 (Racal MA.275).
- (5) Synthesizer, electrical frequency, 5820-99-950-5771 (Racal MA.250G).
- (6) Power supply, 5820-99-580-8362 (Racal PU.225A).
- (7) Converter, tone-to-voltage, 5820-99-950-5775 (Racal LA.195A).
- (8) Power supply, 5820-99-950-5590 (Racal PU.238A).

Transmitter sub-assembly, 5820-99-950-5890 (10 kW h.f. linear amplifier) (Racal TA.184A)

The linear amplifier accepts the low level modulated r.f. signal from the exciter unit, at the correct transmission frequency, and amplifies the signal to produce approximately 10 kW (p.e.p.) output power to the antenna. The sub-assembly comprises the following:—

- (1) Amplifier, radio frequency, 5820-99-948-8587 (wideband amplifier, Racal DA.25005).
- (2) Amplifier, radio frequency, 5820-99-948-8588 (r.f. compartment, Racal DA.25009).
- (3) Amplifier, electronic control, 5820-99-948-8585 (control unit, Racal DA.25003).
- (4) Limiter, electrical signal, 5820-99-951-0417 a.l.c. panel, Racal CA.26504).
- (5) Power supply, 5820-99-948-8591 (auxiliary power supply, Racal DA.25002).
- (6) Power supply, 5820-99-948-8590 (e.h.t. 1 unit, Racal DA.25006).
- (7) Power supply, 5820-99-948-8589 (e.h.t. 2 unit, Racal DA.25007).

Regulator, voltage, 6110-99-951-0381 (Racal MA.308)

A three-phase mains voltage regulator comprising three separate identical chassis, one for each phase. The regulator ensures that mains variations in the power input to the transmitter do not affect its functioning.
Voltages: Input: 197-206V (340-449V) 3-phase
Output: 240V \pm 25% (415V) 3-phase.

Caution . . .

Under no circumstances should the output voltage be set higher than 254 volts.

Remarks

For further details of particular units see Index.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTING SET, RADIO
(5820-99-953-2077)

Transmitter sub-assembly 5820-99-953-2076 (<i>exciter unit</i>) (Racal MA.228B)	The unit uses a system of frequency synthesis, modulation and mixing to produce, at a low level, the required r.f. signal complete with intelligence for feeding to the linear amplifier. It is housed in a single floor-standing cabinet and comprises the following sub-units:— <ol style="list-style-type: none">(1) Mixer stage, frequency, 5820-99-950-5769 (Racal MA.181).(2) Modulator, radio transmitter, 5820-99-953-2074 (Racal MA.240).(3) Generator, standard frequency, 5820-99-948-8650 (Racal MA.259G).(4) Oscillator, radio frequency, 5820-99-950-5591 (Racal MA.275).(5) Synthesizer, electrical frequency, 5820-99-950-5771 (Racal MA.250G).(6) Power supply, 5820-99-580-8362 (Racal PU.225A).(7) Converter, tone-to-voltage, 5820-99-950-5775 (Racal LA.195A).(8) Power supply, 5820-99-950-5590 (Racal PU.238A).
Transmitter sub-assembly , 5820-99-950-5890 (<i>10 kw h.f. linear amplifier</i>) (Racal TA.184A)	The linear amplifier is identical to that used with transmitting set, radio, 5820-99-950-5772, described in Sheet No. 41 of this Section.
Regulator, voltage , 6110-99-951-0381 (Racal MA.308)	The regulator is also described in Sheet No. 41 of this Section.
Remarks	For further details of particular units, see Index.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTING SET, RADIO
(5820-99-107-8223)

Transmitter sub-assembly, 5820-99-107-5922 (<i>exciter unit</i>) (Racal MA.288J)	Basically, the exciter unit uses a system of frequency synthesis, modulation and mixing to produce its output which is fed to the linear amplifier. It is housed in a single floor-standing cabinet and comprises the following sub-units:— <ol style="list-style-type: none">(1) Mixer stage, frequency, 5820-99-950-5769 (Racal MA.181).(2) Modulator, radio transmitter, 5820-99-953-2074 (Racal MA.240).(3) Interconnecting box, 5820-99-951-0651 (Racal MA.603B).(4) Oscillator, radio frequency, 5820-99-950-5591 (Racal MA.275).(5) Synthesizer, electrical frequency, 5820-99-107-5920 (Racal MA.250E).(6) Power supply, 5820-99-580-8362, (Racal PU.225A).
Transmitter sub-assembly, 5820-99-950-5890 (<i>10 kW h.f. linear amplifier</i>) (Racal TA.184A)	The linear amplifier is identical to that described in Sheet No. 41 of this Section.
Regulator, voltage, 6110-99-951-0381 (Racal MA.308)	The regulator is also described in Sheet No. 41 of this Section.
Remarks	For further details of particular units, see Index.

SUB-ASSEMBLY DETAILS
FOR
TRANSMITTING SET, RADIO
(5820-99-194-6465)

TRANSMITTING SET, RADIO 5820-99-194-6465

The transmitter consists of one cabinet housing the following units:

- (1) Synthesizer electrical frequency 5820-99-971-7805
(Racal MA.350B)
- (2) Drive unit, transmitter 5820-99-107-3802 (Racal MA.79H)
- (3) Panel, interconnecting and distribution 5820-99-107-5917
(Racal LA.287B)
- (4) Radio frequency unit 5820-99-107-9122 (Racal TA.349)
- (5) Power supply 5820-99-195-3840 (Racal PU.349C).

For further details of particular units, see Index.

SUB-ASSEMBLY DETAILS
for
TRANSMITTING TERMINAL
(5820-99-112-0152)

TRANSMITTING SET, RADIO (RACAL TA.349 assembly, 1kW h.f. linear amplifier).

The linear amplifier accepts the low level modulator r.f. signal from the exciter unit, at the correct transmission frequency, and amplifies the signal to produce approximately 1kW (p.e.p.) output power to the antenna. The transmitting set, radio consists of the following:-

- (1) Amplifier, radio frequency 5820-99-107-9122 (Racal TA.349).
- (2) Power, interconnecting and distribution 5820-99-107-5917 (Racal LA.287B).
- (3) Power supply 5820-99-222-7762 (Racal PU.349A).

TRANSMITTER, SUB-ASSEMBLY, 5820-99-112-0153 (Racal MA.228A, exciter unit).

The unit uses a system of frequency synthesis, modulation and mixing to produce, at a low level, the required r.f. signal complete with intelligence. The sub-assembly consists of the following:-

- (1) Mixer stage, frequency 5820-99-950-5769 (Racal MA.181).
- (2) Modulator, radio frequency 5820-99-950-5770 (Racal MA 221A).
- (3) Interconnecting box 5820-99-951-0651 (Racal MA.603B).
- (4) Synthesizer, electrical frequency 5820-99-950-5771 (Racal MA 250G-3)
- (5) Power supply 5820-99-580-8362 (Racal PU.225A).
- (6) Converter, tone-to-voltage 5820-99-950-5775 (Racal LA.195A).
- (7) Power supply 5820-99-950-5590 (Racal PU.238A).

STABILIZER, VOLTAGE 6110-99-223-5167 (Claude Lyons TS.222B).

A three-phase mains voltage regulator consisting of three separate identical chassis, one for each phase. The regulator ensures that mains voltage variations do not adversely affect the performance of the transmitting terminal.

REMARKS

For further details of particular units, see Index.

SUB-ASSEMBLY DETAILS FOR TRANSMITTER SET, RADIO
(5820-99-626-4733) (RACAL TYPE TTA.1860A)

TRANSMITTER SUB-ASSEMBLY: 5820-99-624-5393.
(Racal type TA 1810A)

This sub-assembly comprises a cabinet fitted with the following:-

Amplifier-stabilizer module 5820-99-626-4730 (Racal type MM 420)

Each of which include:-

Amplifier (radio frequency) 5820-99-626-4732 (Racal type MM 320)

Stabilizer (voltage) 5820-99-626-3419 (Racal type MS 440)

Combining Unit 5820-99-626-3417 (Racal type MS 441)

Splitter Unit 5820-99-630-7605 (Racal type MS 444)

Distribution amplifier
(2 off) 5820-99-630-7603 (Racal type MS 442)

Overload unit 5820-99-630-7604 (Racal type MS 443)

VSWR assembly 5820-99-630-7337 (Racal type MS 447)

Meter assembly (electrical) 6625-99-626-3416 (Racal type MS 445)

Power supply module (2 off) 5820-99-626-4731 (Racal type MS 64)

DRIVE UNIT (transmitter) 5820-99-624-5395

Synthesized drive unit producing 289,999 frequency channels in 100 Hz steps. Output frequency is derived from a highly-stable, crystal-controlled 5 MHz source (Racal type MA1720A).

ADAPTOR (Antenna to transmitter) 5820-99-624-5394

Matches the 50 ohm linear amplifier output to a nominal 50 ohm feeder system. Full output power and performance from the linear amplifier is achieved for a v.s.w.r. of up to 3:1 (Racal type MA.1004).

LINE SWITCHING UNIT (assembly) 5820-99-626-7836

Controls the switching of co-axial relays which select the appropriate co-axial cable length, for the channel frequency selected between the linear amplifier and the adaptor, antenna to transmitter (Racal type MS 139).

PART 4

RADIO RECEIVING EQUIPMENT (GROUND)

PART 4

RADIO RECEIVING EQUIPMENT (GROUND)

INTRODUCTION

- 1.** The information sheets in this Part are concerned with reception equipment which is dealt with in a manner similar to that of the transmission equipment in Part 2, Section 1 gives the leading particulars of the receivers and particulars of units and sub-units comprising the complete equipment.
- 2.** Section 2 provides details of receiver sub-assemblies for the unit construction types of design and includes the more complex rack-mounted types together with additional units such as s.s.b. and l.f. adaptors, diversity switching units, panoramic indicators etc., used specifically with receivers. Duplication of information sheet numbers between Sections 1 and 2 assist in reconciling the sub-assemblies with the parent equipment.

SECTION 1

RECEIVING SETS, RADIO

Sheet No. 1

RECEIVERS

Type R.1392D (10D/17745)
R.1392E (10D/17768)
R.1392G (10D/20641)
R.1392J (5820-99-953-7424)
62H (Naval) (10D/23989)

Relevant publications:—

A.P.116E-0702-1
(formerly A.P.2555F (3rd Edn.), Vol. 1)

Function

V.H.F. communication and D/F receivers primarily intended for use in conjunction with the transmitters Type T.1131 series and T.1540, receiver (Naval) 62H being specifically used with transmitter Type 75C. The receivers are designed for the reception of c.w. and R/T signals. Receivers R.1392D and E are similar R.1392D being tropicalized whilst R.1392E is non-tropicalized. R.1392G is similar to R.1392D but covers a lower frequency range. R.1392J is similar to R.1392D but is more selective. Receiver 62H is designed for a ship-borne or ground station role and tropicalized. *Sub-assembly details are given in Section 2, Sheet No. 1.*

Frequency range

100 MHz to 156 MHz (3 to 1.9 metres).
65 MHz to 85.375 MHz (R.1392G only) (4.6 to 3.5 metres).

Frequency control

Crystal controlled heterodyne oscillator with a multiplication factor of 18.

Frequency accuracy and stability

To crystal accuracy.

Channel spacing

Suitable for reception of transmissions spaced by 90 kHz.

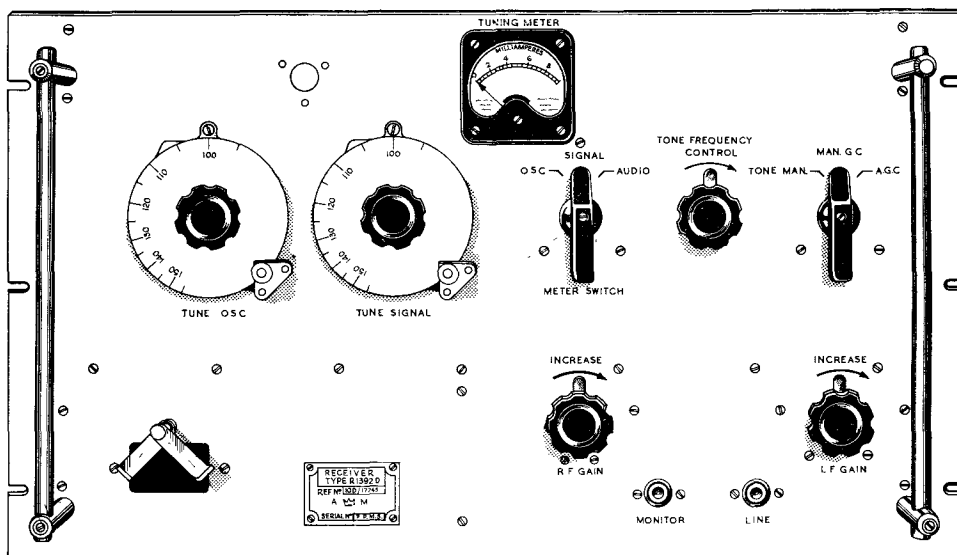
Suitable for reception of transmissions spaced by 50 kHz (R.1131J only).

Intermediate frequency

4.86 MHz.
9.72 MHz (62H only).

I.F. Bandwidth

For 6dB down: plus or minus 25 kHz
12 kHz (R.1131J).



Receiver, Type 1392D

Modulation

Input impedance

Sensitivity

Muting level

Automatic gain control

Output impedance

Output power

Antennae

Power supplies

Power consumption

Overall dimensions

Weight

Ancillary equipment

Amplitude modulated reception.

100 ohms (coaxial feeder line).

For output of not less than 100mW into 600 ohms, in each case:—

R.1392D & E require $10\mu\text{V}$ signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392J requires $8\mu\text{V}$ signal modulated to 30% depth at 1000 Hz across 100 ohms input.

62H (Naval) requires $5\mu\text{V}$ signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392D & E $7\mu\text{V}$; R.1392J $6\mu\text{V}$; 62H $4\mu\text{V}$.

Fully operative at $8\mu\text{V}$.

600 ohms (surge impedance).

5mW at plug PL1, 100mW at line jack J1
100mW (62H Naval).

Standard v.h.f. antenna.

62H (Naval): suitable for C.A.W. system.

6.3V at 4A, 240V at 80mA.

50 watts: 62H (Naval) 60W (approx.).

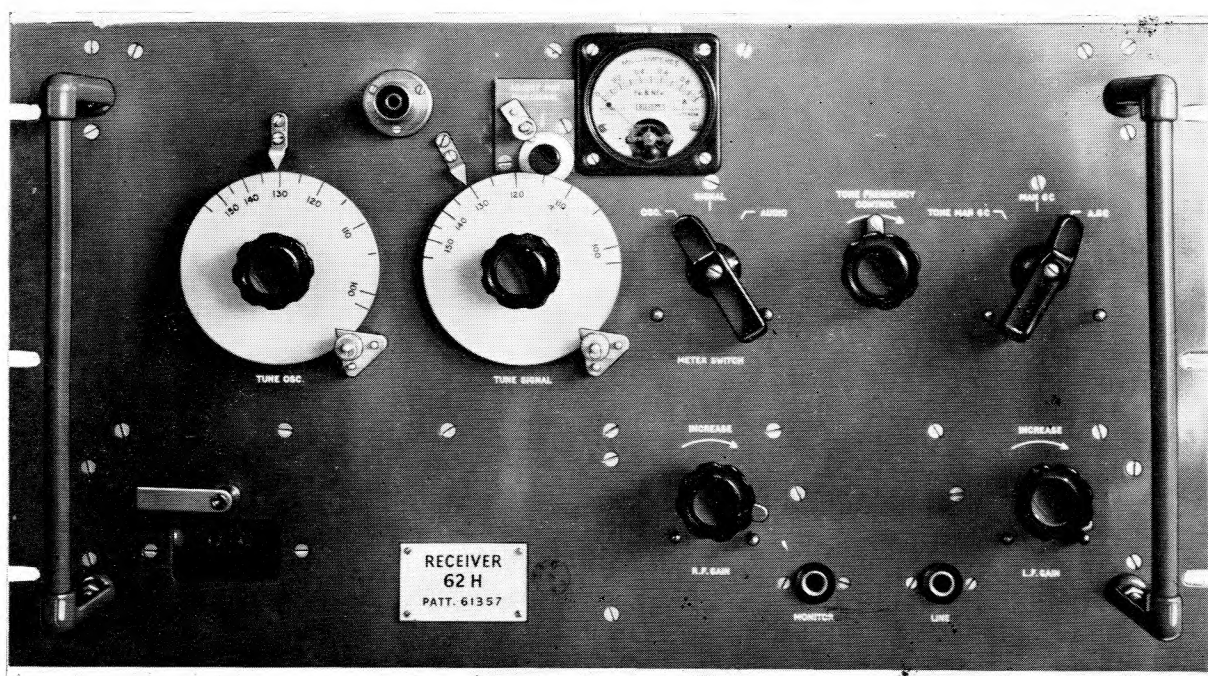
Height	Width	Depth
10½ in (26.7 cm)	1ft 7 in (48.3 cm)	1ft 0½ in (31.7 cm)

47 lb (21.3 kg).

Power unit, Type 234A (a.c. mains) (10D/17395).

Power unit, Type 138 (6V d.c. supply) (10D/17390).

Power unit, A.P.W836A (a.c. mains).



Receiver, Type 62H

Sheet No. 2

RECEIVER, RADIO

Type R.7109
5820-99-932-5695
(formerly 10D/19231)

Relevant publications:—

A.P.116E-0731-1

(formerly A.P.2531B, Vol. 1)

Function

U.H.F. multi-channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with the first local oscillator controlled by a channel selection and frequency control system. Receiver R.7109 comprises receiver sub-assembly (formerly receiver unit Type 9095), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly Type 7804) and cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068). *Sub-assembly details are given in Section 2, Sheet No. 2.*

Origin

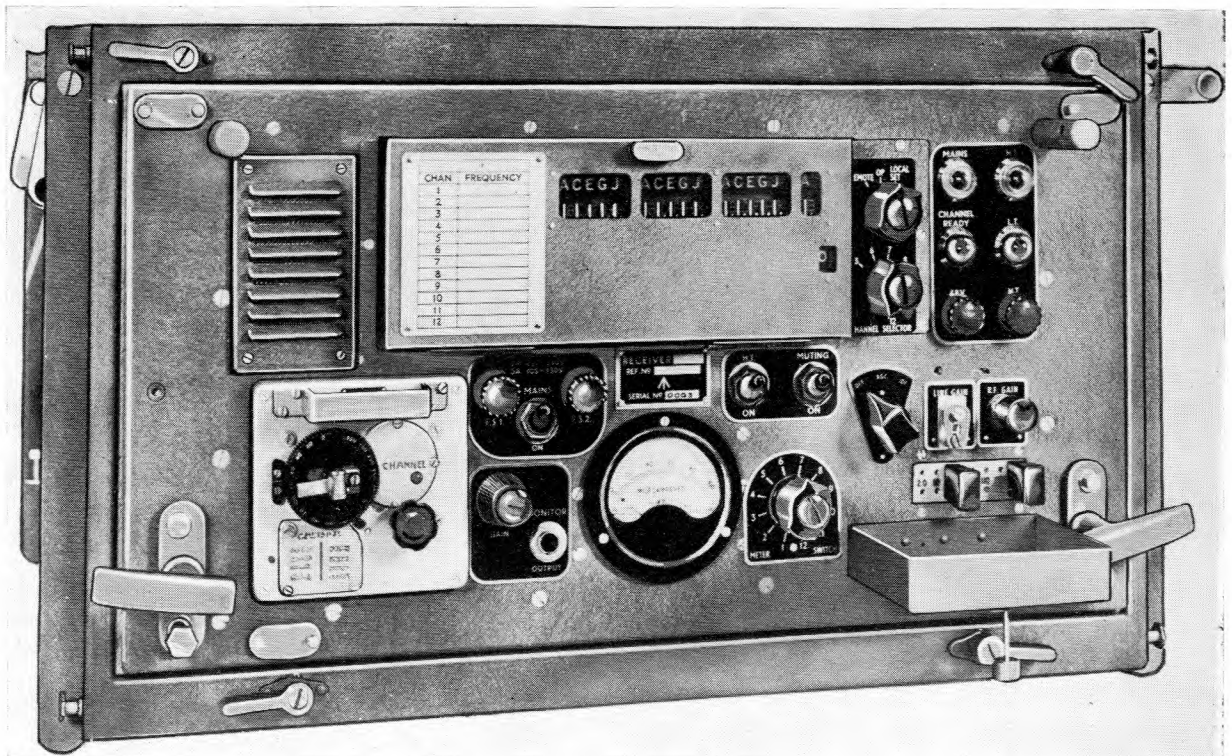
The Plessey Co. Ltd., Type XCA.200.

Frequency range

225 MHz to 399.9 MHz.

Frequency control and channel system

Frequency of the first oscillator is controlled by a channel selection and frequency control system. Frequency of the second oscillator is crystal controlled at 22.025 MHz. The receiver can be set up at any twelve channels out of the total of 1750. Any one of the twelve can subsequently be selected either locally or remotely via a remote control system.



Receiver, Type R.7109

Frequency accuracy and stability

The operating frequency of the receiver is automatically kept within 10 MHz of correct frequency after selection is made.

Channel spacing

100 kHz.

Intermediate frequencies

24 MHz and 1.975 MHz.

I.F. Bandwidth

For 6dB down: not less than 60 kHz.

For 60dB down: not greater than 140 kHz.

Modulation

Amplitude modulated reception.

Sensitivity

With an r.f. signal across the antenna terminals of $1\mu\text{V}$ modulated 30 per cent at 1000 Hz, the signal/noise ratio at the output is greater than 10dB.

Output

With an r.f. signal across the antenna terminals of $5\mu\text{V}$ modulated 100 per cent at 1000 Hz:—
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms.

Attenuated line output 1mW max. into 600 ohm G.P.O. line.

Antennae

Antenna unit, design 41, Type AJE.

Power supplies

115 or 230 volts, 45 to 65 Hz, single-phase a.c.

Power consumption

250 watts.

Overall dimensions

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

Weight

110 lb (50 kg) (*excluding cabinet*)

Cover assembly 51 lb (23 kg) (*excluding connectors*).

Ancillary equipment

Cooler, dry air, electrical equipment (5820-99-932-3995) (formerly air blower, Type 7344, 10K/19476).

Sheet No. 3

RECEIVER, RADIO

Type R.7351
5820-99-932-5694
(formerly 10D/19267)

Relevant publications:—

A.P.116E-0730-1
(formerly A.P.2531F, Vol. 1)

Function

U.H.F. single channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with both oscillators crystal controlled, and comprises receiver sub-assembly (formerly receiver unit, Type 9096), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly, Type 9097) cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068) and two external connectors. *Sub-assembly details are given in Section 2, Sheet No. 3.*

Origin

The Plessey Co. Ltd.

Frequency range

225 MHz to 399.9 MHz.

Frequency control

Crystal controlled local oscillators.

Frequency accuracy and stability

To crystal accuracy.

Channel spacing

100 kHz.

Intermediate frequencies

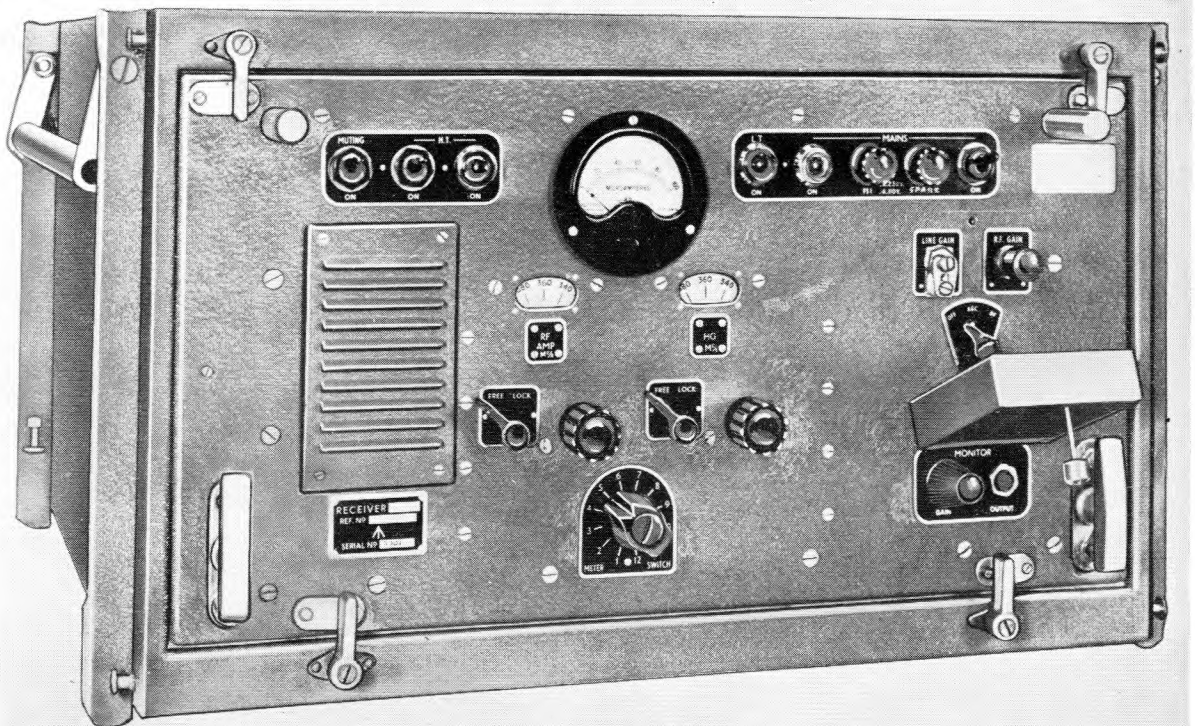
24 MHz and 1.975 MHz.

Modulation

Amplitude modulated reception.

Sensitivity

With an r.f. signal across the antenna terminals of $1\mu\text{V}$ modulated 30 per cent at 1000 Hz, the signal plus noise/noise ratio at the output is greater than 10dB.



Receiver, Type R.7351

Output

With an r.f. signal across the antenna terminals of $5\mu\text{V}$ modulated 100 per cent at 1000 Hz:—
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms. Attenuated line output: 5mW max., into 600 ohms G.P.O. line.

Antennae

Antenna unit, design 41, Type AJE.

Power supplies

115 or 230 volts, 45 Hz to 65 Hz single phase a.c.

Power consumption

160 watts.

Overall dimensions

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft $1\frac{1}{4}$ in (33.6 cm)	1ft $11\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

Weight

80 lb (36.3 kg) (*excluding cabinet*)

Cover assembly 51 lb (23 kg) (*excluding connectors*).

Ancillary equipment

Cooler, dry air, electrical equipment (5820-99-932-399) (formerly air blower, Type 7344, 10K/19476).

Sheet No. 4

RECEIVER, RADIO

Type R.8998
5820-99-955-0769
(formerly 10D/20755)

Relevant publication—
A.P.2922R, Vol. 1

Function

Double diversity h.f. receiver comprising a triple superheterodyne with a high stability variable local oscillator and six crystal controlled spot frequencies (c.w., m.c.w., on/off or f.s.k. working). *Sub-assembly details are given in Section 2, Sheet No. 4.*

Origin

The Marconi Co. Ltd., Type H.R.11.

Frequency range

3 MHz to 27.5 MHz in four ranges. (100 to 10.9 metres).

Frequency control

A variable L.C. controlled first frequency changer oscillator may be switched in place of the crystal first oscillator so that the receiver may be tuned to any desired frequency in the band. Frequency multipliers are used to provide the final frequency required for frequency changing.

Frequency accuracy and stability

Variable first oscillator: 15 parts in 10^6 per degree C.
Crystal first oscillator: 1 part in 10^6 per degree C.
Second oscillator: 15 parts in 10^6 per degree C.

Intermediate frequencies

1st i.f. 2600 kHz.
2nd i.f. 100 kHz.
3rd i.f. 10 kHz.

Sensitivity

At 27.5 MHz and using the 1 kHz passband, the minimum signal input required for recording f.s.k. (560 Hz shift) signals at a keying speed of 100 bauds is $0.25\mu\text{V}$ in 75 ohms.

Input impedance

75 ohms (coaxial feeder).

A.F.C.

The receiver will follow, with a residual mistune of less than 4 Hz, frequency drifts up to ± 3 kHz arising as the sum of drifts of the carrier frequency and of the receiver oscillator.

D.C. output

The recording unit provides a d.c. output of 30-0-30 volts at 10 kilohms impedance for keying a tone sender or any voltage operated telegraph equipment. The output unit provides two d.c. outputs of 30-0-30 mA each into an earthed load not exceeding 2 kilohms or 20-0-20 mA into an earthed load not exceeding 4 kilohms.

Max. receiving speed

300 bauds (375 w.p.m. morse code) with 3 kHz bandwidth and 850 Hz shift.
200 bauds (250 w.p.m. morse code) with 1 kHz bandwidth and 560 Hz shift.

Power supplies

200 to 250 volts, 50 Hz single phase a.c.

Power consumption

500 watts (approx.).

Overall dimensions

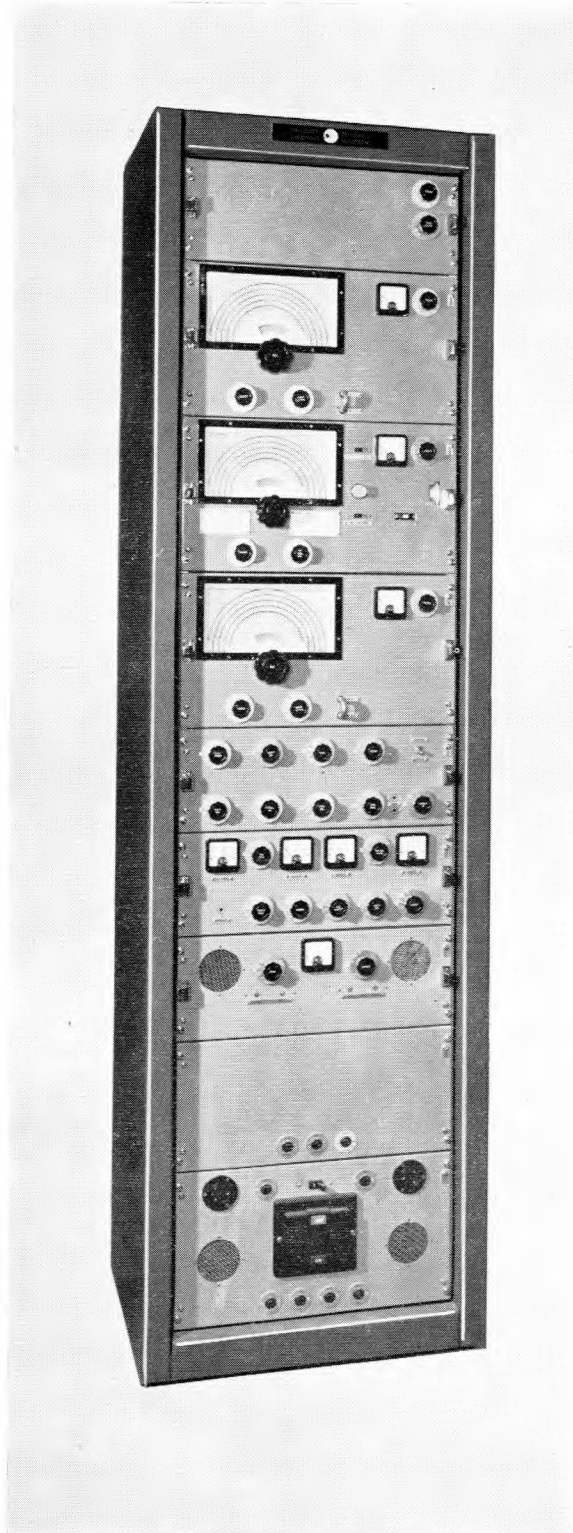
Height	Width	Depth
7ft 2 $\frac{1}{4}$ in (219 cm)	1ft 11 $\frac{1}{2}$ in (59.6 cm)	1ft 9in (53.3 cm)

Weight

743 lb (349.3 kg).

Ancillary equipment

Receiver, radio, 5820-99-955-0771 (formerly receiver, Type R.10168 10D/20459).



Receiver, Type R.8998

Sheet No. 5

RECEIVER, RADIO

Type R.10149
5820-99-933-2369
(formerly 10D/20452)

Relevant publications:—

A.P.116E-0716-1
(formerly A.P.2922H, Vol. 1)

Function

Triple diversity, independent sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or may be tuned to any required frequency by a variable oscillator incorporated in the equipment. It will receive independent sideband, single-sideband or double-sideband transmissions. The equipment comprises fifteen removable units mounted in two steel cabinets. *Sub-assembly details are given in Section 2, Sheet No. 5.*

Origin

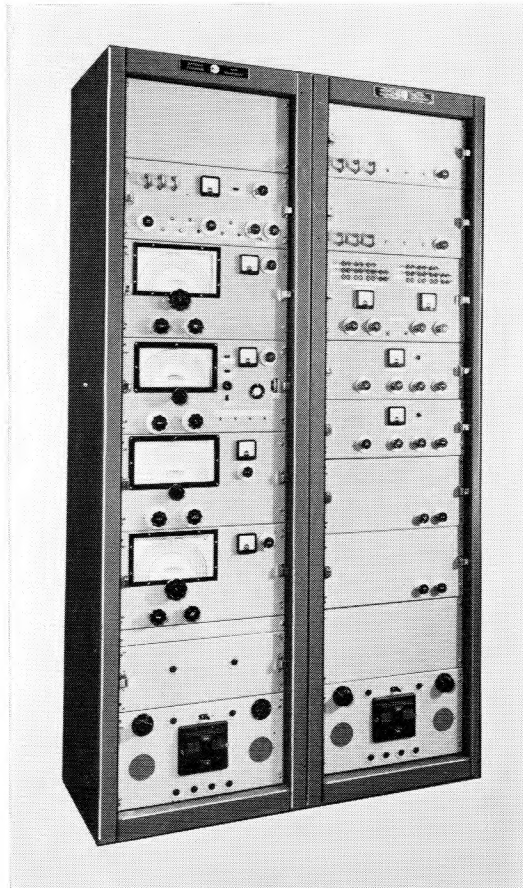
The Marconi Co. Ltd., Type HR.23.

Frequency range

3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).

Frequency control

Frequency of the first oscillator is controlled by a variable oscillator or crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100



Receiver, Type R.10149

kHz) resulting from the receiver carrier is compared with a crystal controlled 100k Hz reference frequency. Any frequency difference between the carrier and the reference frequency causes a connecting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.

The combined variations in frequency of the receiver oscillator does not exceed the following:—

	Crystal oscillator	L.C. oscillator
At 3 MHz	50 Hz per degree C	130 Hz per degree C
10 MHz	60 Hz per degree C	230 Hz per degree C
20 MHz	70 Hz per degree C	400 Hz per degree C
27.5 MHz	80 Hz per degree C	500 Hz per degree C

Frequency accuracy and stability

Selectivity

1st i.f.: plus or minus 9 kHz at 2dB attenuation.
1st i.f.: plus or minus 38 kHz at 30dB attenuation.
2nd i.f.: Discrimination against unwanted frequencies more than 520 Hz outside the passband is greater than 75dB from 4 to 10 MHz and greater than 60dB for frequencies above 10 MHz.

Frequency response

3.5 kHz passband: less than 3dB total variation from 100 Hz to 2.5 kHz.

6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.

Intermediate frequencies

1st i.f. 2600 kHz and 2nd i.f. 100 kHz.

Cross talk

Less than -60dB between sideband paths.

Input impedance

75 ohms (coaxial feeder).

Sensitivity

With a signal of 1.4µV at 3 MHz or 2µV at 27.5 MHz the output signal/noise ratio is 20dB with 6 kHz passband.

A.F.C.

Capable of following with less than 1 Hz residual mistune, frequency drifts up to plus or minus 3 kHz.

Output power

40 milliwatts (max) in 600 ohms for separate path outputs.

2.5 milliwatts for combined path outputs.

Power supplies

200-250 volts, 50 Hz single phase a.c.

Power consumption

600 watts (approx.).

Overall dimensions

Height	Width	Depth
7ft 2¼in (219 cm)	3ft 11in (119.3 cm)	1ft 9in (53.3 cm)

Weight

1350 lb approx. (612.4 kg).

Sheet No. 6

RECEIVER, RADIO

Type R.10168
5820-99-955-0771
(formerly 10D/20459)

Relevant publications:—

A.P.116E-0718-1
(formerly A.P.2922P, Vol. 1)

Function

Frequency shift diplex receiver which is used in conjunction with receiver Type R.8998 for double diversity reception of two channel frequency shift diplex signals. The equipment converts the 10 kHz i.f. signal from the receiver into d.c. voltages suitable for operating two-tone senders or a current output which may operate two teleprinters. *Sub-assembly details are given in Section 2, Sheet No. 6.*

Origin

The Marconi Co. Ltd., Type HU.14A.

Reception facilities

Two channel frequency shift keying (synchronized or unsynchronized): single channel working.

Input impedance

600 ohms.

Output impedance

10 000 ohms (approximately).

Input

10 kHz centre frequency at levels of 10 mV to 1V.

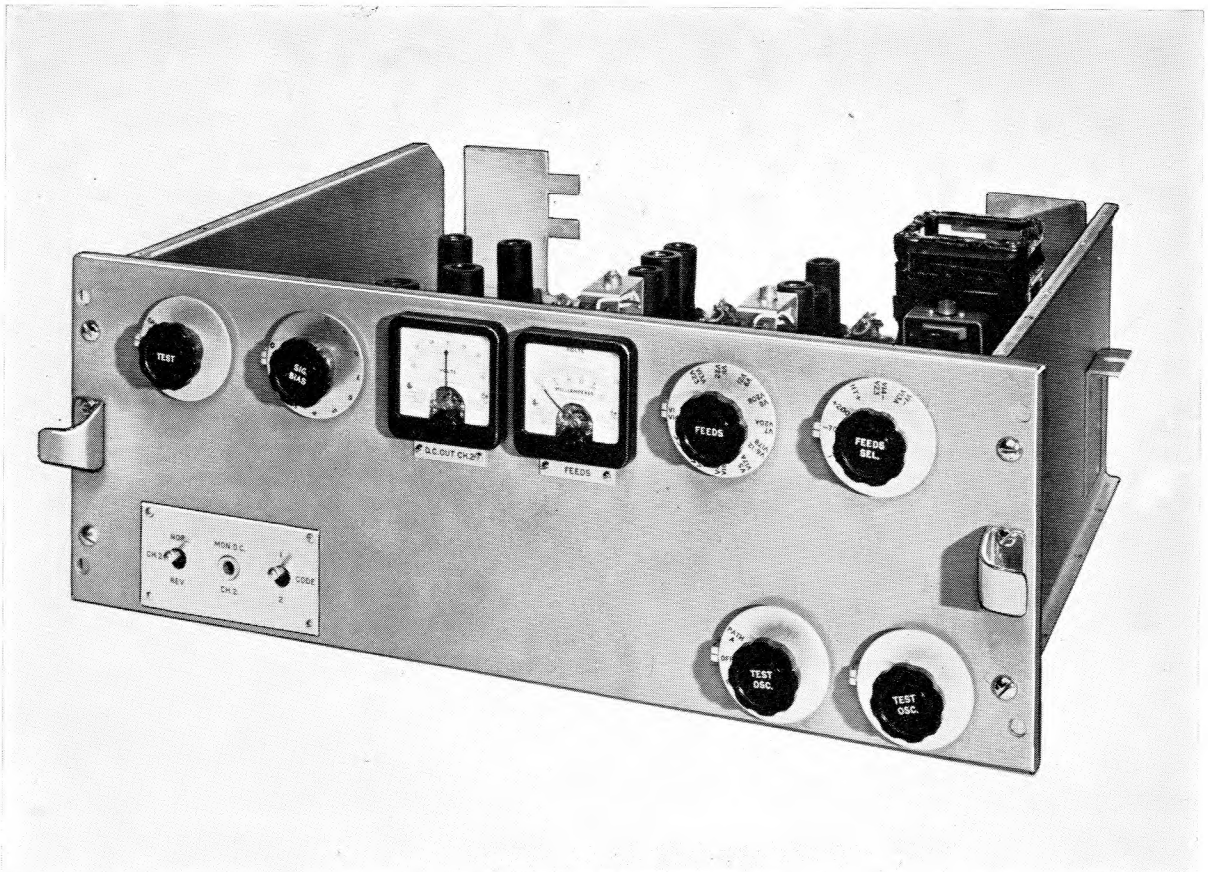
Output

30-0-30V d.c. on both channels.

Keying speed

Up to 100 bauds on Channel 1.

Up to 50 bauds on Channel 2.



Receiver Type R.10168 or R.10170

Power supplies

110-120 volts or 200-250 volts, 50 Hz, single phase a.c.

Overall dimensions

<i>Height</i>	<i>Width</i>	<i>Depth</i>
6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)

Weight

24 lb (10.9 kg).

Associated equipment

Receiver, radio, 5820-99-955-0769 (formerly receiver Type R.8998, 10D/20755).

Sheet No. 7

RECEIVER, RADIO

Type R.10170
5820-99-955-0770
(formerly 10D/20461)

Relevant publications:—

A.P.116E-0717-1

(formerly A.P.2922Q, Vol. 1)

(For illustration of Receiver, Type R.10170 see Sect.1, Sheet No. 6).

Function

Frequency shift duplex receiver which receives the two-channel f.s.k. modulated i.f. output from rack assembly, Type 9352 and converts the signals into d.c. voltages suitable for operating two-tone senders or a current output unit. The unit is designed to work from the 50 kHz output of the receiving equipment in rack assembly, Type 9352. Provision is made for reversing the phase of the d.c. output of either channel if necessary. A calibrated oscillator is incorporated to enable the unit to be tested and the discrimination to be set up. Switched metering enables all valve feeds and h.t. voltages to be monitored. The d.c. outputs are continuously monitored by centre-zero meters. *Sub-assembly details are given in Section 2, Sheet No. 7.*

Origin

The Marconi Co. Ltd., Type HU.14B.

Reception facilities

Two channel frequency shift keying (synchronized or unsynchronized). Single channel working.

Input impedance

75 ohms (coaxial feeder).

Output impedance

10 000 ohms (approximately).

Input

50 kHz centre frequency at levels of 10mV to 1V.

Output

30-0-30V d.c. on both channels.

Adjacent frequency shift

400 Hz with four shift frequencies the total shift is 1200 Hz.

Keying speed

Up to 100 bauds on Channel 1.
Up to 50 bauds on Channel 2.

Power requirements

230V, 50 Hz, single phase a.c. at 50W,
+140V d.c. at 35 mA.
+210V d.c. at 50 mA.
-140V d.c. at 5 mA.
-70V d.c. at 15 mA.

Overall dimensions

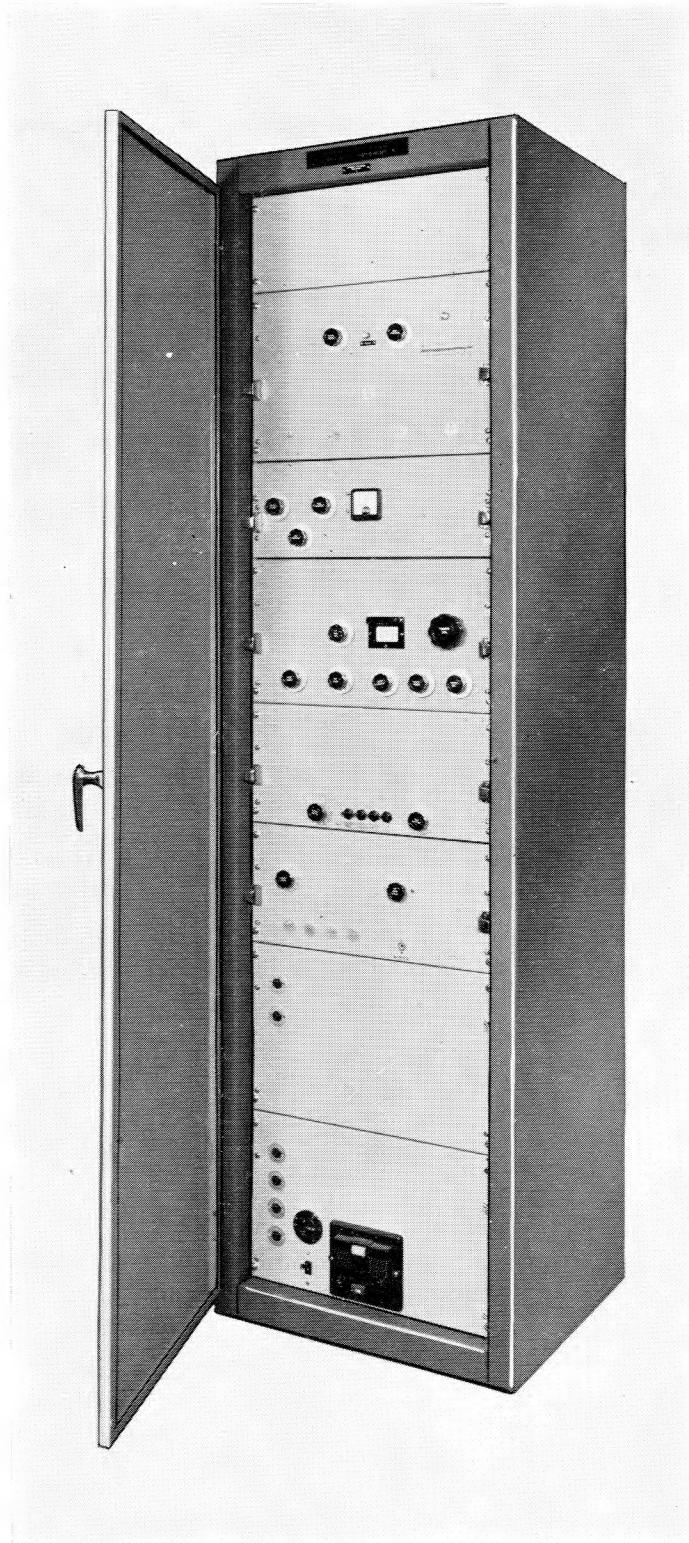
Height	Width	Depth
6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)

Weight

24 lb (10.9 kg).

Associated equipment

Rack assembly, Type 9352 (10D/19932).



Receiver Type R.15095



Control unit Type 15056

Sheet No. 9

RECEIVER

Type R.15172 (10D/22019)

Relevant publications:—

A.P.116E-0722-1

(formerly A.P.2922X, Vol. 1)

Function

Double diversity single sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or continuously tuned over the frequency range. It will receive either sideband of a double sideband transmission. *Sub-assembly details are given in Section 2, Sheet No. 9.*

Origin

The Marconi Co. Ltd., Type HR.24.

Frequency range

3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).

Frequency control

Frequency of the first oscillator is controlled by a variable oscillator, or a crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100 kHz) resulting from the received carrier is compared with a crystal controlled 100 kHz reference frequency. Any frequency difference between the carrier and the reference frequency causes a correcting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.

Frequency accuracy and stability

Variable first oscillator: 15 parts in 10^6 per degree C.
Crystal first oscillator: 1 part in 10^6 per degree C.
Second oscillator: 15 parts in 10^6 per degree C.

Frequency response

3.5 kHz passband: less than 3dB total variation from 100 kHz to 2.5 kHz.

6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.

Intermediate frequencies

1st i.f. 2600 kHz and 2nd i.f. 100 kHz.

Cross talk

Less than -50dB between diversity paths.

Input impedance

75 ohms (coaxial feeder).

Sensitivity

With a signal of $2\mu\text{V}$ the output signal/noise ratio is 20dB with 6 kHz passband.

A.F.C.

Capable of following frequency drifts up to plus or minus 3 kHz with a residual mistune of less than 1 Hz.

Output power

40 milliwatts (max.) in 600 ohms from each diversity path.

Power supplies

200-250 volts, 50 Hz, single phase a.c.

Power consumption

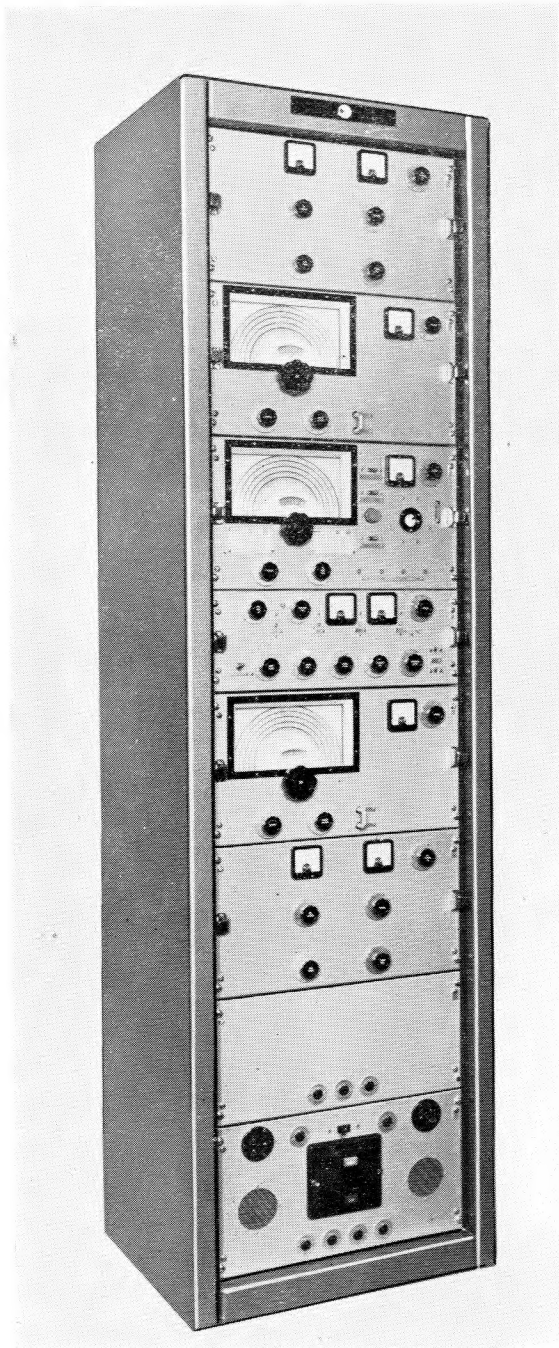
400 watts (approx.).

Overall dimensions

Height	Width	Depth
7ft 0 $\frac{1}{4}$ in (214 cm)	2ft 0in (61 cm)	1ft 8in (56 cm)

Weight

500 lb (approx.) (227 kg).



Receiver, Type R.15172

Sheet No. 10

RECEIVING SET, RADIO
(A.M. Type S5/1)

5820-99-933-0813

Relevant publications:—

A.P.116E-0712-1

(formerly A.P.4810A, Vol. 1, Books 1 and 2)

Function

The receiving set, radio 5820-99-933-0813 is a dual diversity receiving terminal. It is designed to provide frequency shift telegraphy facilities for feeding up to three teleprinters. It consists of the following units:—

Receiver Type S1/3 5820-99-999-9292 (2).

Frequency converter 5820-99-933-0846 (2).

Frequency converter/keyer 5805-99-933-0847.

Sub-assembly details are given in Section 2, Sheet No. 10.

Origin

Racal Communications Ltd., Type RA.103/1; receiver A.M. Type S1/3 (5820-99-999-9292), Type RA. 17L; frequency converter (5820-99-933-0846), Type RA. 70D.

The Plessey Co. Ltd., frequency converter/keyer (5805-99-933-0847), Type PV.78B.

Frequency range

0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of an I.f. converter (Sheet No. 11).

Sensitivity

A1 reception: bandwidth 3 kHz $1\mu\text{V}$ for 18dB signal to noise ratio.

Selectivity

Six alternative i.f. bandwidths are obtained by means of a selector switch.

Noise factor

Less than 7dB throughout entire range.

I.F. output

100 kHz at 75 ohms impedance; level 0.2V approx.

Automatic volume control

An increase in signal level of above 20dB above $1\mu\text{V}$ improves the signal to noise ratio by 18dB.

Input impedance

75 ohms unbalanced.

Diversity switching

Operating time: approximately 20 microseconds.

Switching differential: approximately 6dB.

D.C. output

Polar output: 20-60 mA (one side at earth potential). Normally positive on mark, but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.

Keying speed

Up to 300 bauds.

Power supplies

100-125 volts and 200-250 volts, 45-65 Hz.

Power consumption

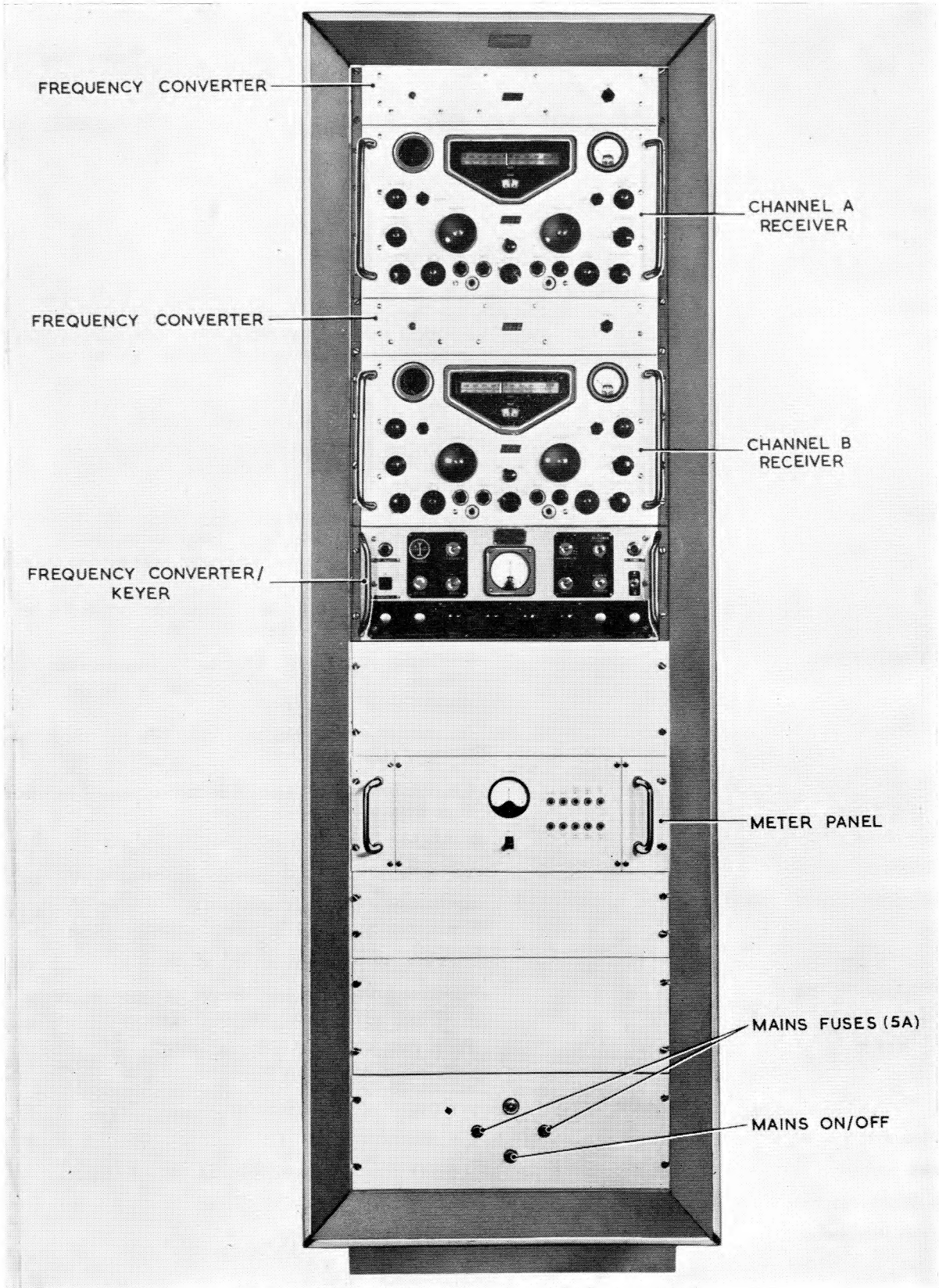
320 watts (approx.).

Overall dimensions

<i>Height</i>	<i>Width</i>	<i>Depth</i>
6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)

Weight

440 lb (201.8 kg).



FREQUENCY CONVERTER

CHANNEL A RECEIVER

FREQUENCY CONVERTER

CHANNEL B RECEIVER

FREQUENCY CONVERTER/
KEYER

METER PANEL

MAINS FUSES (5A)

MAINS ON/OFF

Receiving set, radio 5820-99-933-0813

Sheet No. 10 (cont'd)

FREQUENCY CONVERTER 5820-99-933-0846

Input frequency	100 kHz \pm 1 kHz.
Input impedance	75 ohms.
Input level	0.1 volt nominal, 0.3 volt maximum.
Attenuator level	0dB to -20 dB approx.
Output frequency	14 kHz.
Output impedance	600 ohms.
Output level	5mW \pm 3dB for an input of 0.1 volt.
Spurious output	-40 dB relative to 5mW.
Frequency stability	1 part in 10^6 .
Ambient temperature range	-26°C to $+55^{\circ}\text{C}$.
Power supply	100-125V and 200-250V, 45-60 Hz.

FREQUENCY CONVERTER/KEYER 5805-99-933-0847

Function	To convert frequency shift keying signals to polar or single sided d.c. and act as a diversity switch to select the strongest signal from two diversity receivers.		
Inputs	Two inputs of 600 ohms balanced: centre frequency of input filters 14 kHz. Nominal input level 5mW. Signalling speed up to 300 bauds.		
Outputs	Polar d.c. output: approximately 20-60 mA (one side at earth potential). Normally positive on mark but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.		
Telegraph distortion	Not greater than 5% up to 100 bauds.		
Input filters	Separate filters for each channel, centred on 14 Hz. Total bandwidth at -3 dB approximately 1000 Hz. Bandwidth at -40 dB approximately 5.5 kHz.		
Limiting	The equipment is designed to operate satisfactorily on input signals varying by ± 20 dB on nominal.		
Diversity switching	The stronger input signal is selected. Switching delay, less than 3 milliseconds. Operating time, approximately 20 microseconds. Switching differential approximately 6dB at all input levels.		
Discriminator	A linear discriminator is built into the equipment which will accept shifts between 150 Hz and 1000 Hz without adjustment.		
Power supplies	105V-115V 200V-250V a.c., 40-64 Hz.		
Power consumption	126VA at full output.		
Overall dimensions	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7in (17.8 cm)	1ft 7in (48.3 cm)	1ft 0 $\frac{3}{4}$ in (32.4 cm)
Weight	31 lb (14.1 kg).		

RECEIVER, RADIO
(A.M. Type S1/1, S1/2 and S2/1)

5820-99-943-2775

Relevant publications:—

A.P.116E-0704-1

(formerly A.P.2550M, Vol. 1)

Function

General purpose ground station h.f. communication receiver. The lower frequency limit can be extended to 12.5 kHz by the addition of an l.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and l.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

Rack mounted receiver—Receiver Type S1/1.

Bench mounted receiver—Receiver Type S1/2 (mounted in cabinet 5820-99-972-8566).

Bench mounted receiver and l.f. converter combined—Receiver Type S2/1 (mounted in cabinet 5820-99-972-8567). *Sub-assembly details are given in Section 2, Sheet No. 11.*

Origin

Racal Communications Ltd., Type RA.17, Mk. 2: mixer stage, frequency (5820-99-943-3464) RA.37A.



Receiver, radio 5820-99-943-2775

Frequency range	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.		
Calibration	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in 10^6 provides check points at 100 kHz intervals.		
Stability	During a warm-up time of three hours, overall drift is less than 1500 Hz under conditions of constant supply voltage and ambient temperature; beyond this period drift will be less than 150 Hz at all frequencies under normal operating conditions.		
Sensitivity	<i>C.W. reception:</i> bandwidth 3 kHz $1\mu\text{V}$ for 20dB signal-to-noise ratio. <i>R/T and m.c.w. reception:</i> 30% modulated: bandwidth 3 kHz $3.5\mu\text{V}$ for 20dB signal-to-noise ratio.		
I.F. output	100 kHz at 75 ohms impedance. Two outlets in parallel are provided.		
Selectivity	Six alternative i.f. bandwidths are obtained by a selector switch. Filter details are:—		
	<i>Switch position</i>	<i>−6dB</i>	<i>−66dB</i>
	100 Hz	80-120 Hz	less than 1.6 kHz
	300 Hz	270-330 Hz	less than 1.8 kHz
	750 Hz	700-800 Hz	less than 2.5 kHz
	1.2 kHz	950-1200 Hz	less than 8 kHz
	3 kHz	2.85-3.3 kHz	less than 12 kHz
	8 kHz	7.6-8.4 kHz	less than 20 kHz
Noise factor	1.5 MHz: less than 8dB. 3, 6, 12 and 24 MHz: less than 6dB.		
Image and spurious responses	With a tuned input, external image signals are at least 58dB down. Internally generated spurious responses are 2dB above noise level in all cases.		
Input impedance	75 ohms unbalanced.		
B.F.O. stability	With a constant ambient temperature and supply voltage, 30 minutes after switching on, drift does not exceed 50 Hz. For input level variations from $10\mu\text{V}$ to 1mV b.f.o. drift does not exceed 100 Hz.		
A.F. response	With 8 kHz i.f. bandwidth: response remains within 6dB from 250 Hz to 3500 Hz.		
A.F. output	<ol style="list-style-type: none"> (1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on the front panel. (3) Three independent outputs of 3mW at 600 ohms on rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control setting. (5) One output of 50mW at 3 ohms. 		
Distortion	Not greater than 5% at 50mW output.		
Hum level	46dB at 1mW (10mW output setting).		
Power supplies	100-125 volts and 200-250 volts, 45-65 Hz.		
Power consumption	85 watts (approx.).		
Overall dimensions		<i>Height</i>	<i>Width</i>
		<i>Depth</i>	
	<i>For rack mounting</i>	$10\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)
			1ft $8\frac{1}{8}$ in (51 cm)
	<i>Fitted cabinet</i>	1ft $2\frac{1}{2}$ in (36.8 cm)	1ft $8\frac{1}{2}$ in (53 cm)
			2ft $3\frac{7}{8}$ in (70.8 cm)

Sheet No. 11 (cont'd)

Weight *For rack mounting* 67 lb (30.4 kg).
Fitted cabinet 97 lb (44 kg).

MIXER STAGE, FREQUENCY 5820-99-943-3464

Function To extend the lower frequency limits of the receiver.

Frequency range 12.5 kHz to 980 kHz (24000 to 306 metres).

Stability After warm up time of 1½ hours, overall drift less than 150 Hz under conditions of constant supply voltage and ambient temperature.

Input impedance 75 ohms unbalanced.

Sensitivity C.W. reception (bandwidth 3 kHz): 1µV for 15dB signal-to-noise ratio. R/T and m.c.w. reception (30% modulated) (bandwidth 3 kHz): 3µV for 20dB signal-to-noise ratio.

Image response With tuned input, external image signals are reduced by at least 50dB.

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	1½in (4.4 cm)	1ft 7in (48.3 cm)	1ft 1in (33 cm)
<i>Cabinet containing receiver and l.f. converter</i>	1ft 2½in (36.8 cm)	1ft 8½in (52 cm)	1ft 9⅞in (55.6 cm)

Weight *For rack mounting* 11 lb (5 kg).
Cabinet containing receiver and l.f. converter 110 lb (50 kg).

Sheet No. 12

RECEIVER, RADIO
(A.M. Type S1/3, S1/4 and S2/2)

5820-99-999-9292

Relevant publications:—

A.P.116E-0704-1

(formerly A.P.2550M, Vol. 1)

Function

General purpose ground station h.f. communications receiver. This receiver is a later version of receiver, radio 5820-99-943-2775. The lower frequency limit can be extended to 12.5 kHz by the addition of an l.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and l.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

Rack mounted receiver—Receiver, Type S1/3.

Bench mounted receiver—Receiver, Type S1/4 (mounted in cabinet).

Bench mounted receiver and l.f. converter combined—Receiver, Type S2/2 (mounted in cabinet). *Sub-assembly details are given in Section 2, Sheet No. 12.*



Receiver, radio, 5820-99-999-9292

Origin	Racal Communications Ltd., Type RA.17L; mixer stage, frequency (5820-99-943-3464) RA.37A.														
Frequency range	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.														
Calibration	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in 10^6 provides check points at 100 kHz intervals.														
Stability	During a warm-up time of $1\frac{1}{2}$ hours, overall drift is less than 50 Hz under conditions of constant supply voltage and ambient temperature.														
Sensitivity	C.W. reception: bandwidth 3 kHz $1\mu\text{V}$ for 18dB signal-to-noise ratio. R/T and m.c.w. reception: 30% modulated bandwidth 3 kHz: $3\mu\text{V}$ for 18dB signal-to-noise ratio.														
I.F. output	100 kHz at 75 ohms impedance. Level 0.2V approximately with a.g.c. in operation. Two outlets in parallel are provided.														
Selectivity	Six alternative i.f. bandwidth are obtained by a selector switch. Filter details are:— <table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;"><i>Switch position</i></th> <th style="text-align: left;"><i>—6dB</i></th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>80-120 Hz</td> </tr> <tr> <td>300 Hz</td> <td>270-330 Hz</td> </tr> <tr> <td>1.2 kHz</td> <td>950-1200 Hz</td> </tr> <tr> <td>3 kHz</td> <td>2.85-3.3 kHz</td> </tr> <tr> <td>6.5 kHz</td> <td>6.5-7.8 kHz</td> </tr> <tr> <td>13 kHz</td> <td>13.0-14.3 kHz</td> </tr> </tbody> </table>	<i>Switch position</i>	<i>—6dB</i>	100 Hz	80-120 Hz	300 Hz	270-330 Hz	1.2 kHz	950-1200 Hz	3 kHz	2.85-3.3 kHz	6.5 kHz	6.5-7.8 kHz	13 kHz	13.0-14.3 kHz
<i>Switch position</i>	<i>—6dB</i>														
100 Hz	80-120 Hz														
300 Hz	270-330 Hz														
1.2 kHz	950-1200 Hz														
3 kHz	2.85-3.3 kHz														
6.5 kHz	6.5-7.8 kHz														
13 kHz	13.0-14.3 kHz														
Noise factor	Less than 7dB throughout the entire range.														
Image and spurious responses	With wideband or tuned input, external image signals are at least 60dB down. Internally generated spurious responses are below noise level in all cases.														
Input impedance	75 ohms unbalanced.														
B.F.O. range	± 8 kHz.														
B.F.O. stability	With constant ambient temperature and supply voltage 30 minutes after switching on, drift does not exceed 50 Hz. For input level variation from $10\mu\text{V}$ to 1mV , b.f.o. drift is negligible.														
A.F. response	With 13 kHz bandwidth, response remained within $\pm 4\text{dB}$ from 250 Hz to 6000 Hz.														
A.F. output	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on front panel. (3) Three independent outputs of 3mW at 600 ohms at rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control. (5) One output of 50mW at 3 ohms.														
Distortion	Not greater than 5% at 50mW output.														
Hum level	—50dB at 1mW (10mW output setting).														
Power supplies	100-125 volts and 200-250 volts, 45-65 Hz.														
Power consumption	100 watts (approx.).														

Sheet No. 12 (cont'd)

Overall dimensions

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	10½in (26·6 cm)	1ft 7in (48·3 cm)	1ft 8⅛in (51 cm)
<i>Fitted cabinet</i>	1ft 2½in (36·8 cm)	1ft 8½in (52 cm)	2ft 3⅞in (70·8 cm)

Weight

For rack mounting 67 lb (30·4 kg).
Fitted cabinet 97 lb (44 kg).

Remarks

For details of mixer stage, frequency, 5820-99-943-3464, see Section 1, Sheet No. 11.

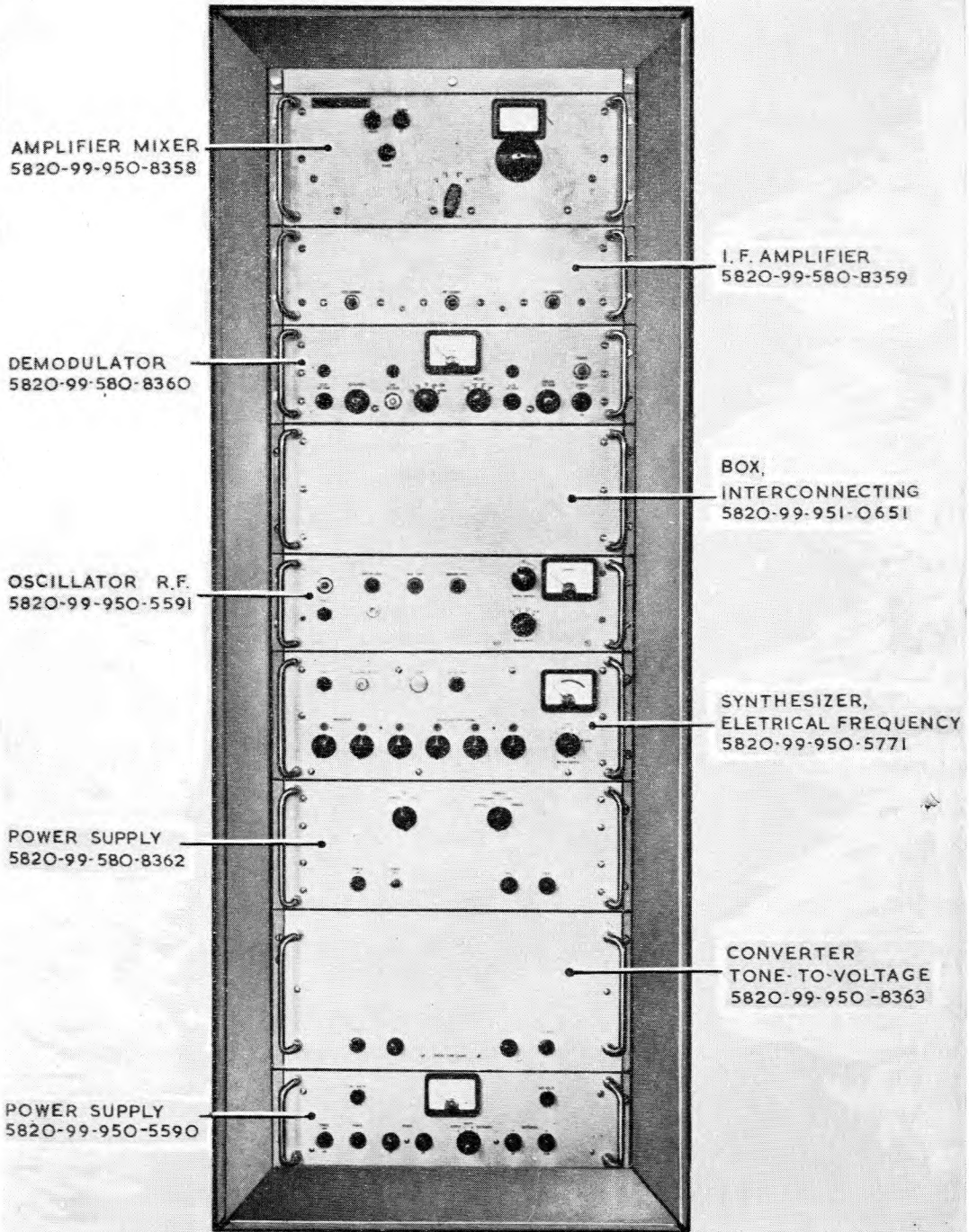
RECEIVING SET, RADIO

(5820-99-950-5773)

Relevant publications:—

A.P.116E-0127-1B, 1J

(formerly part of A.P.4808C, Vol. 1)



Receiving set, radio, 5820-99-950-5773

Function	A remotely controlled, h.f., superheterodyne receiver used with FGRI.23144 voice and telegraph transmitter and receiver station. The local oscillator uses a system of frequency synthesis, the standard frequency for which may be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz selected by the same switch for use as a standby in case of failure of the external source. The receiving set is housed in a single floor-standing cabinet in which the sub-unit chassis are attached to standard 19 inch front panels. <i>Sub-assembly details are given in Sect. 2, Sheet No. 13.</i>		
Origin	Racal Communications Ltd., Type RTA.191A.		
Frequency range	2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.		
Frequency accuracy and stability	Dependent upon reference standard. The synthesizer, electrical frequency, 5820-99-950-5771, incorporates a standby internal reference frequency source, a statement of the frequency stability and accuracy of which is included.		
Sensitivity	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).		
Tuning	(1) <i>Remote or local</i> – automatic control from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.		
Noise factor	Better than 10 dB.		
IF bandwidths (nominal)	<i>SSB</i> : 3.5 kHz. <i>AM</i> : 7 kHz. <i>CW (wide)</i> : 3.5 kHz. <i>CW (narrow)</i> : 350 Hz.		
BFO range	± 2.5 kHz nominal.		
Input impedance (r.f.)	75 ohms unbalanced.		
Overall a.f. response	300 Hz – 3400 Hz ± 2 dB.		
AF outputs	<i>Line</i> : 1 mW into 600 ohms (max.). <i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.		
Audio distortion	Better than 2% total harmonic.		
Automatic gain control	100 dB change of input causes change in a.f. output not exceeding 6 dB.		
Noise limiter (a.m. only)	Series limiter provided.		
Duration of tuning cycle	Average 12 seconds, maximum 20 seconds.		
Power supply	100-125V, 200-250V ($\pm 6\%$), 45-65 Hz, single phase.		
Power consumption	600 watts (approx.).		
Dimensions	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
Weight	600 lb (272 kg) approx.		

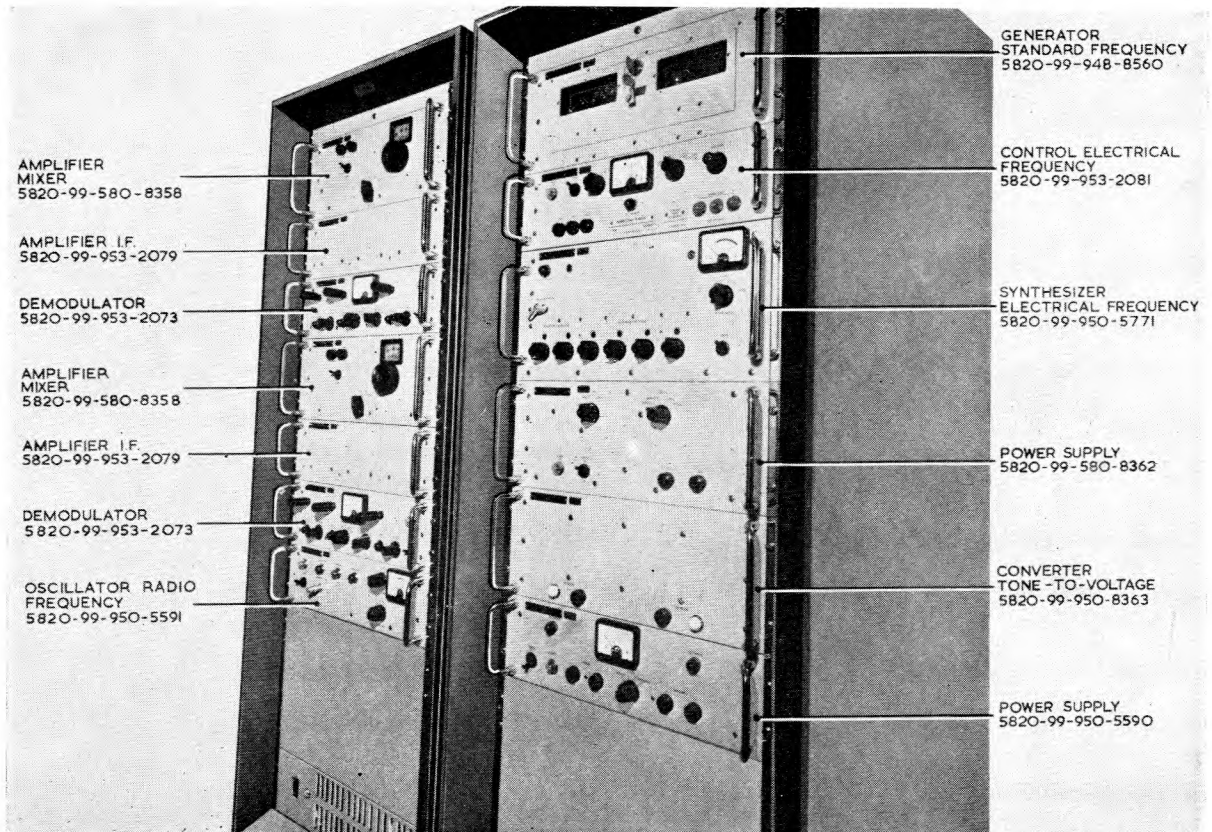
RECEIVING SET, RADIO

(5820-99-953-2075)

Relevant publications:—

A.P.116E-0127-1D, 1W

(formerly part of A.P.4808C, Vol. 1)



Receiving set, radio, 5820-99-953-2075

Function

A remotely controlled, h.f. superheterodyne receiving set comprising two receivers with a common local oscillator, enabling the set to be used for space diversity reception. The local oscillator uses a system of frequency synthesis, the standard frequency for which can be either an external source of 100 kHz, 200 KHz, 1MHz or 5 MHz selected by a switch, or an internal standard 1 MHz source selected by the same switch for use as a standby in case of failure of the external source. The receiving set is used with TGRI.(AT)26023/1 air transportable voice and telegraph transmitter/receiver station and is housed in two racks in which the sub-unit chassis are attached to standard 19 inch front panels. *Sub-assembly details are given in Sect. 2, Sheet No. 14.*

Origin

Racal Communications Ltd., Type RTA.241A.

Frequency range

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz

Frequency accuracy and stability (<i>controlled by external frequency standard source</i>).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.		
Sensitivity	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).		
Tuning	(1) <i>Remote or local</i> – automatic control, from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.		
Noise factor	Better than 10 dB.		
IF bandwidths	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.		
BFO range	±2.5 Hz nominal.		
Input impedance (<i>r.f.</i>)	75 ohms unbalanced.		
Overall a.f. response	300 Hz–6000 Hz.		
AF outputs	<i>Line</i> : 1 mW into 600 ohms. <i>Monitor jack</i> : nominally 1 W into 600 ohms (max.) adjustable.		
Audio distortion	Better than 2% total harmonic.		
Automatic gain control	100 dB change of input causes change in a.f. output not exceeding 6 dB.		
Noise limiter (<i>a.m. only</i>)	Series limiter provided.		
Automatic frequency control	Manual capture, after capture 1.6 MHz carrier held to ±50 Hz.		
Power supply	100–125V, 200–250V, 45–65 Hz, single phase.		
Power consumption	600 watts (approx.).		
Dimensions	<i>Height</i>	<i>Width</i>	<i>Depth</i>
Receiver rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
Control rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
Weights	600 lb (272 kg) approx., each rack.		

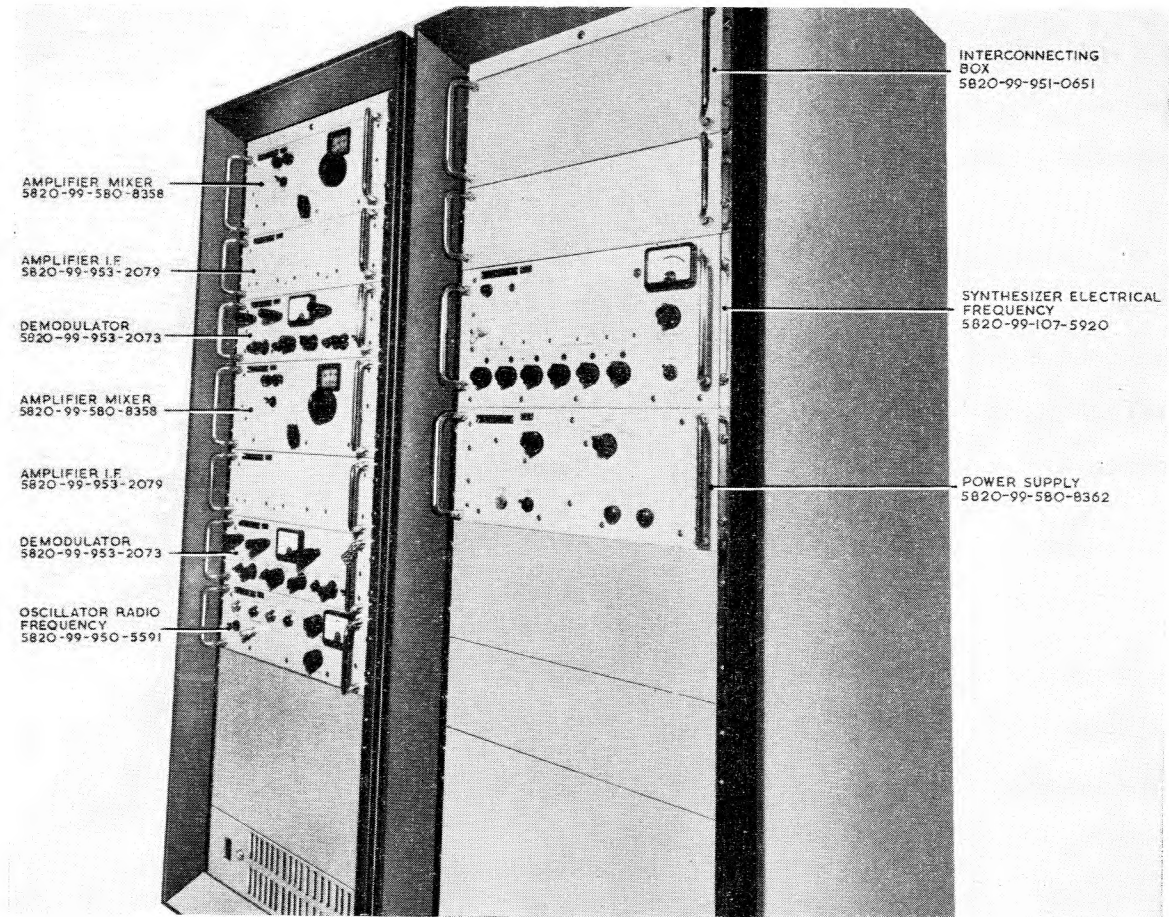
RECEIVING SET, RADIO

(5820-99-107-5921)

Relevant publications:—

A.P.116E-0127-1C, 1Y

(formerly part of A.P.4808C, Vol. 1)



Receiving set, radio, 5820-99-107-5921

Function

A locally controlled, h.f. superheterodyne receiving set comprising two receivers in which the common local oscillator uses a system of frequency synthesis, the standard frequency for which is the internal 1 MHz standard source from the synthesizer, electrical frequency.

The receiving set is used with FGRI.23186, voice and telegraph transmitter and receiver link station and is housed in two racks in which the sub-unit chassis are attached to standard 19-inch front panels. *Sub-assembly details are given in Sect. 2, Sheet No. 15.*

Origin

Racal Communications Ltd., Type RTA.241C.

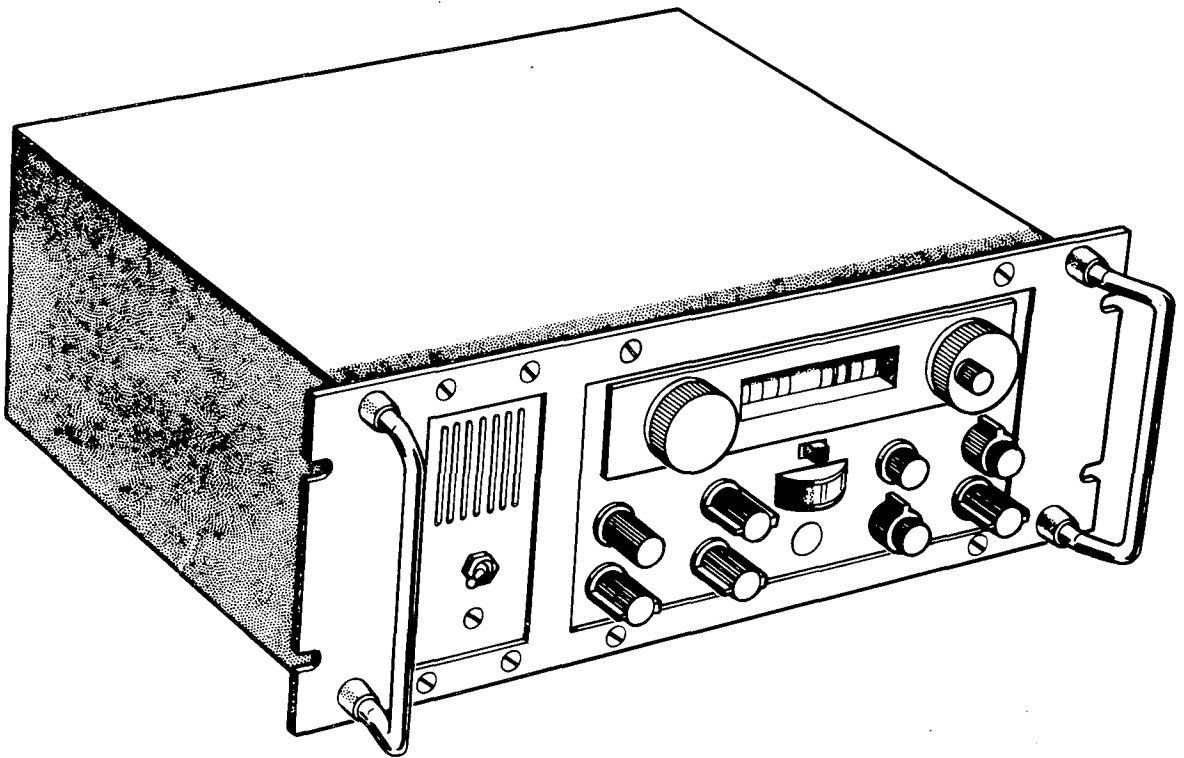
Frequency range

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

Frequency accuracy and stability (<i>controlled by synthesizer internal frequency standard source</i>)	Stability, including ageing over 24 hours, after 30 days operation less than ± 2 parts in 10^{-9} . Stability with change in ambient temperature $\pm 25^{\circ}\text{C}$ from 25°C , less than ± 2 parts in 10^{-8} .												
Sensitivity	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).												
Tuning	(1) <i>Local</i> – automatic from synthesizer. (2) <i>Manual</i> – mechanical override of the automatic system.												
Noise factor	Better than 10 dB.												
IF bandwidths (<i>nominal</i>)	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.												
BFO range	± 2.5 Hz nominal												
Input impedance (<i>r.f.</i>)	75 ohms unbalanced.												
Overall a.f. response	300 Hz–6000 Hz												
AF outputs	<i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.												
Audio distortion	Better than 2% total harmonic.												
Automatic gain control	100 dB change of input causes change in a.f. output not exceeding 6 dB.												
Noise limiter (<i>a.m. only</i>)	Series limiter is provided.												
Power supply	100–125V, 200–250V, ($\pm 6\%$), 45–65 Hz single phase.												
Power consumption	600 watts (approx.).												
Dimensions	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>Receiver rack</td> <td>5ft 10$\frac{1}{4}$in (178.4cm)</td> <td>2ft 0$\frac{1}{2}$in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> <tr> <td>Control rack</td> <td>5ft 10$\frac{1}{4}$in (178.4cm)</td> <td>2ft 0$\frac{1}{2}$in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)	Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>										
Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
Weights	600 lb (272 kg) approx., each rack.												

RECEIVER, RADIO
(5820-99-107-4926)

RELEVANT PUBLICATIONS
AP 116E-0732-1A and 1B



Receiver, radio 5820-99-107-4926

FUNCTION

A general purpose ground station h.f. communications receiver. The receiver, radio consists of receiver, radio 5820-99-107-1509 (less monitor loudspeaker facility) and amplifier, audio frequency 5820-99-195-0459 (fitted monitor loudspeaker); both equipments are fitted for rack mounting into frame, electrical equipment 5820-99-195-0460. Sub-assembly details are given in Section 2, Sheet No. 16.

ORIGIN

Racal Communications Ltd., Type RA.317.
Receiver, radio 5820-99-107-1509, Type RA.217R;
amplifier, audio frequency 5820-99-195-0459, Type MA.389.

FREQUENCY RANGE

1 to 30 MHz (300 to 10 metres).

CALIBRATION

A 100kHz signal derived from a 1MHz crystal oscillator, with a stability of 5 parts in 10^6 , provides check points at 100kHz intervals.

STABILITY

After 2 hours from switching on, ± 50 Hz over an 8-hour period with constant ambient temperatures and humidity.

SENSITIVITY

CW, SSB reception: $1\mu\text{V}$ for 15dB signal-to-noise ratio and 3kHz bandwidth.
MCW, DSB reception: $3\mu\text{V}$ for 15dB signal-to-noise ratio (30% modulated at 400Hz).

I.F. OUTPUT

With a.g.c. in operation:

- (1) at 1.6MHz: 0.1V at high impedance (nominal).
- (2) at 100kHz: 0.27V (1mW) nominal into 75 ohms.
- (3) at 455kHz: 0.22V (1mW) nominal into 50 ohms.

SELECTIVITY

Four alternative i.f. bandwidths are obtained by a selector switch; the nominal filter details are as follows:

<u>At -3dB points</u>	<u>At -60dB points</u>
13kHz	30kHz
3kHz	9kHz
1kHz	4kHz
0.2kHz	2kHz

NOISE FACTOR

Not greater than 10dB throughout entire range.

IMAGE AND SPURIOUS RESPONSE TO EXTERNAL SIGNALS

- (1) External signals less than 10% off-tune shall be greater than +60dB relative to $1\mu\text{V}$ in order to produce a spurious signal equivalent to $1\mu\text{V}$.
- (2) With a tuned aerial, external signals more than 10% off-tune shall be greater than +80dB relative to $1\mu\text{V}$ to produce a spurious signal equivalent to $1\mu\text{V}$.

INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 2dB above noise level in a 3kHz bandwidth.

INPUT IMPEDANCE

75 ohms (nominal) unbalanced.

B.F.O. RANGE

- (1) $\pm 8\text{kHz}$ variable
- (2) $\pm 1.5\text{kHz}$ crystal controlled.

B.F.O. STABILITY

- (1) $\pm 15\text{Hz}$ for less than 5 minutes.
- (2) $\pm 25\text{Hz}$ for less than 30 minutes.

A.F. RESPONSE

100 to 6000Hz, flat within 3dB.

A.F. OUTPUTS

- (1) 50mW (nominal), at less than 1% distortion, into 3-ohm loudspeaker.
- (2) 1mW into 600 ohms line output.

HUM LEVEL

40dB below rated 600-ohm line output.

POWER SUPPLIES

One of two alternative power units is fitted.

- (1) PU.408A:

Input: 100-125V or 200-250V, 40-400Hz.
Output: -16V d.c. at 180mA.
Consumption: 7VA approx.

(2) PU.409:

Input: 100-125V or 200-250V, 40-400Hz.

Outputs: -16V d.c. at 400mA and -24V d.c. at 40mA.

DIMENSIONS (excluding handles)

Height	Width	Depth
7 in (17.75cm)	19 in (48 cm)	13 1/8 in (33.3 cm)

WEIGHT

41 lb (18.75kg)

**AMPLIFIER, AUDIO FREQUENCY
(5820-99-195-0459)**

FUNCTION

To provide a monitor loudspeaker output for receiver, radio 5820-99-107-

ORIGIN

Racal Communications Ltd., Type MA.389.

INPUT LEVEL

10mW across 600 ohms.

OUTPUT POWER

50mW across 3 ohms.

DISTORTION

Less than 1%.

A.F.RESPONSE

100 to 6000Hz.

POWER SUPPLY

-16V d.c.

DIMENSIONS

Height	Width	Depth
6 1/4 in (17.5 cm)	3 1/4 in (8.25 cm)	7 in (17.75cm)

WEIGHT

1 lb (0.45 kg)

RECEIVER, RADIO
(10D/5820-99-618-1034)
(Racal type RA 1205/8)

RELEVANT AIR PUBLICATION
AP 116E-0751
(Topic 1 not issued)



Receiver, radio 5820-99-618-1034 (Racal RA 1205/8)

FUNCTION

An assembly of eight double superheterodyne single channel usb/cw receivers, each one operating at a preset frequency in the range 1.5 MHz to 24 MHz. Sub-assembly details are given in Sect.2, Sheet No.17.

ORIGIN Racal Communications Ltd., Type RA.1205/8.

TECHNICAL DATA

Frequency range	1.6 MHz. to 24 MHz (down to 1.5 MHz with slight performance degradation).
Frequency accuracy and stability	2 parts in 10^7 /day, and ± 30 Hz for a temperature change of 10°C within the range of -10°C to $+55^\circ\text{C}$.
Sensitivity	1 microvolt for 10 dB signal-to-noise ratio.
Tuning	Local preset.
I.F. bandwidth	2.6 kHz.
I.F. frequency	
1 st.	1.4 kHz
2 nd.	100 kHz.
BFO range	± 8 kHz, variable
Clarifier range	± 75 Hz, minimum.
AGC range	80 dB change of input causes change in a.f. output not exceeding 6 dB.
A.F. outputs	
Line	600 ohms balanced, adjustable between +6 dBm and -30 dBm.
Monitor jack.	600 ohms, adjustable between 0 dBm and -40 dBm.
Power consumption	7.5 VA per receiver module.

POWER SUPPLY REQUIRED

100-124V, 200-250V, 45-400 Hz single phase
or
12V \pm 10% d.c. (negative earth)

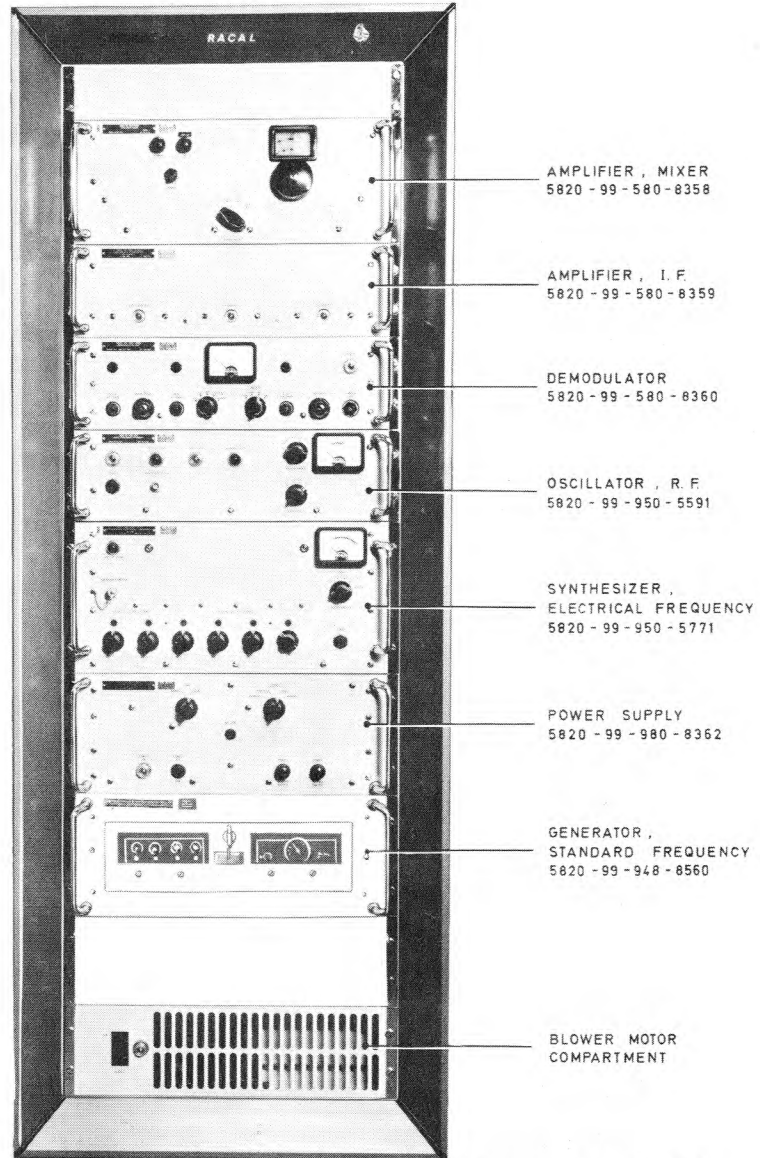
DIMENSIONS

Height	Width	Depth
178 mm (7 in.)	483 mm (19 in.)	483 mm (19 in.)

WEIGHT 24 kg (53 lb)

RECEIVING SET, RADIO
5820-99-119-3981
(Racal type RTA.191P)

RELEVANT AIR PUBLICATIONS
116E-0127-1D



Receiving set, radio, 5820-99-119-3981 (Racal RTA.191P)

FUNCTION

A locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraphy (keyed tone or frequency shift). The receiving set is used with TGRI (AT)26063/1 air transportable voice and telegraph transmitter/receiver station.

Sub-assembly details are given in Sect.2, Sheet No.18.

ORIGIN Racal Communications Ltd., Type RTA.191P

TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	SSB and CW 1 microvolt for 13 dB signal-to-noise ratio.
	AM 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING	
Local	Automatic control from synthesizer, electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	± 2.5 kHz nominal.
INPUT IMPEDANCE (R _i)	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
line	1 mW into 600 ohms.
monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.m. only)	Series limiter provided.
POWER SUPPLY	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

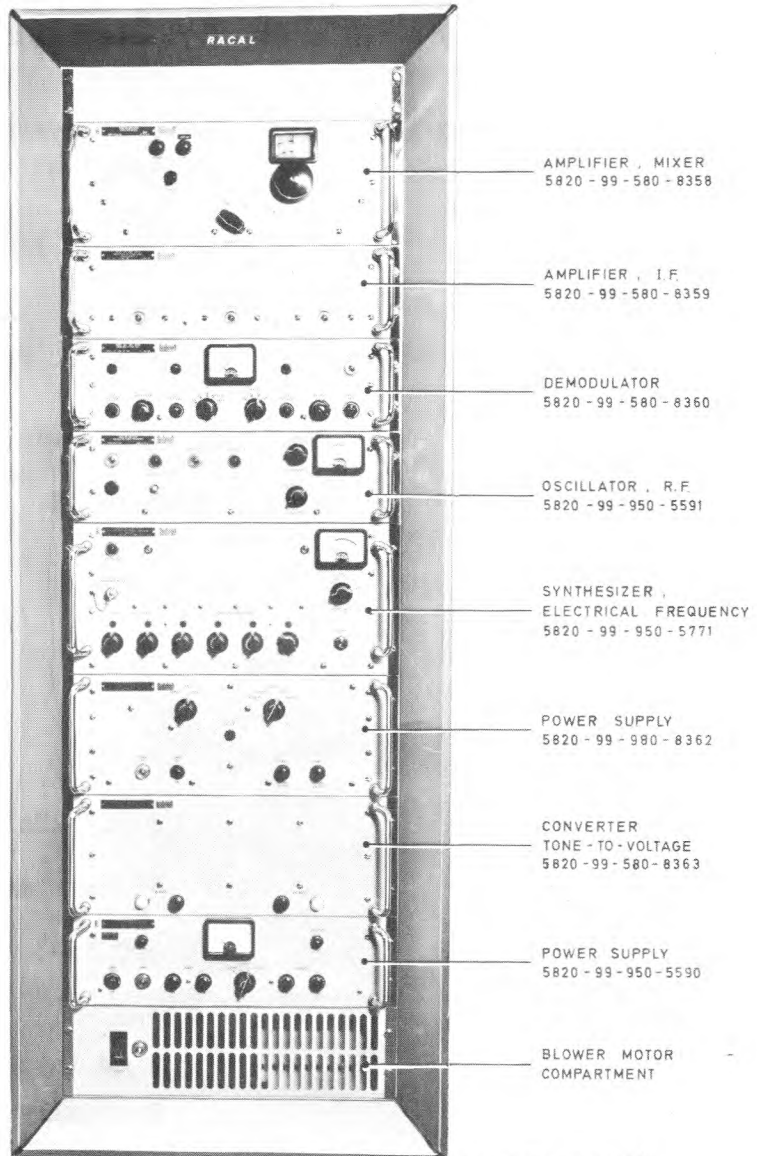
DIMENSIONS

	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)

WEIGHT 273 kg (600 lb)

RECEIVING SET, RADIO
5820-99-119-3979
(Racal type RTA.191Q)

RELEVANT AIR PUBLICATIONS
116E-0127-1D



Receiving set, radio, 5820-99-119-3979 (Racal RTA.191Q)

FUNCTION

A remote or locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraph (keyed tone or frequency shift). The receiving set is used with TGRI(AT)26063 air transportable voice and telegraph transmitter/receiver station.

Sub-assembly details are given in Sect.2, Sheet No.19.

ORIGIN Racal Communications Ltd., Type RTA.191Q.

TECHNICAL DATA

FREQUENCY RANGE 2.0 to 29.9999 MHz

FREQUENCY ACCURACY AND STABILITY (controlled by internal frequency standard source). Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.

SENSITIVITY SSB and CW 1 microvolt for 13 dB signal-to-noise ratio.

AM 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).

TUNING

Local Automatic control from synthesizer, electrical frequency.

Manual Mechanical override of the automatic system.

NOISE FACTOR Better than 10 dB.

IF BANDWIDTHS

SSB 3.5 kHz

AM 7 kHz.

CW (wide) 3.5 kHz.

CW (narrow) 350 Hz.

BFO RANGE ± 2.5 kHz nominal.

INPUT IMPEDANCE (RF) 75 ohms unbalanced.

OVERALL AF RESPONSE 300 Hz-3400 Hz.

AF OUTPUTS

LINE 1 mW into 600 ohms

MONITOR JACK Nominally 1 mW into 600 ohms (max.) adjustable.

AUDIO DISTORTION Better than 2% total harmonic.

AUTOMATIC GAIN CONTROL 100 dB change of input causes change in a.f. output not exceeding 6 dB.

NOISE LIMITER (a.m. only) Series limiter provided.

POWER SUPPLY

100-125V, 200-250V, 45-65 Hz, single phase.

POWER CONSUMPTION 600 watts (approx.)

DIMENSIONS

Receiver rack

Height

Width

Depth

178 cm
(70 in.)

61 cm
(24 in.)

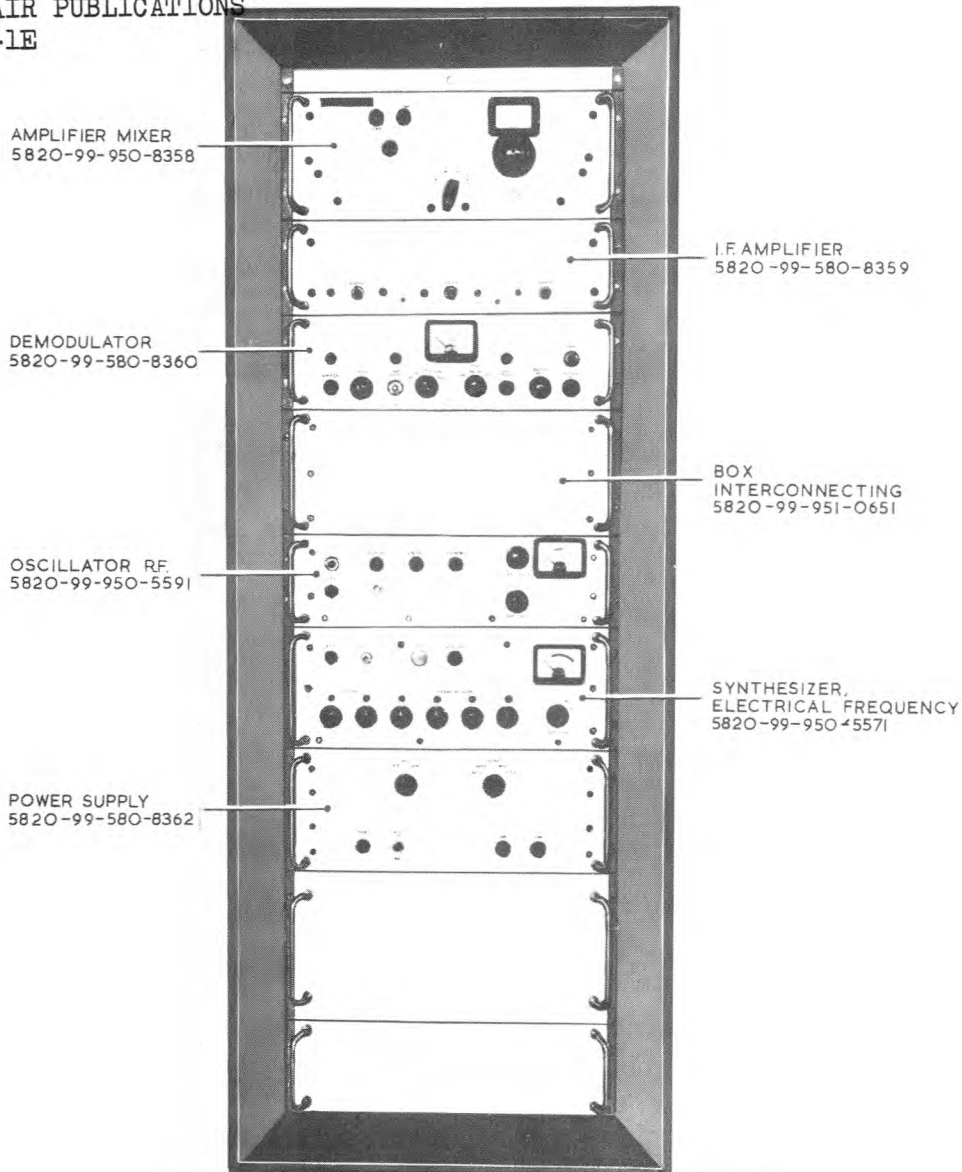
69 cm
(27 in.)

WEIGHT

273 kg (600 lb).

RECEIVING SET, RADIO
5820-99-951-0461
(Racal type RTA.191K)

RELEVANT AIR PUBLICATIONS
116E-0127-1E



Receiving set, radio, 5820-99-951-0461

FUNCTION

An h.f. superheterodyne receiving station with a frequency range of 2 to 30 MHz, capable of voice and telegraph communication. The possible modes of operation are single sideband (upper or lower sideband, suppressed or pilot carrier), compatible amplitude modulation, or c.w. telegraphy. Sub-assembly details are given in Sect.2, Sheet No.20.

ORIGIN

Racal Communications Ltd., Type RTA.191K.

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	
SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING:	
Local	Automatic control from synthesizer electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	± 2.5 kHz nominal.
INPUT IMPEDANCE (RF)	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
Line	1 mW into 600 ohms.
Monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.m. only)	Series limiter provided.
POWER SUPPLY	
	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

DIMENSIONS

	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)

WEIGHT 273 kg (600 lb)

RECEIVER, H.F.
5820-99-630-9620
(Racal type RA.1772)

RELEVANT AIR PUBLICATION
116E-0748-16



HF Receiver (Racal type RA.1772) 5820-99-630-9620

FUNCTION

General purpose ground station fully synthesized h.f. communications receiver.

The receiver may be rack or bench mounted.

ORIGIN

Racal Communications Ltd., Type RA.1772 (H/S2/R/B3/0/0)

TECHNICAL DATA

FREQUENCY RANGE

15 kHz to 30 MHz.

MODES OF RECEPTION

A1
A2, A2H, A2J
A3, A3A, A3B, A3H

TUNING

Switched selection of 1 MHz steps and a continuously tunable synthesizer in 10 Hz or 100 Hz steps over each 1 MHz band.

Electronic digital readout to 10 Hz.

OVERSPILL

20 kHz at either end of each 1 MHz band. Overrun indication is provided.

TUNING ACCURACY

Plus or minus 5 Hz relative to frequency of the wanted signal.

FREQUENCY STABILITY

Temperature	$\pm 1:10^8/^{\circ}\text{C}$
Longterm	$\pm 1.5:10^7$ over a 30 day period or $\pm 5:10^9$ per day

ANTENNA INPUT

50 ohms to 75 ohms nominal.
co-axial b.n.c. connector.

SENSITIVITY

c.w. and s.s.b. (A1, A2H, A3A, A3H, A3J)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

15 kHz-50 kHz, 15 dB with 10 μ V (emf) input
50 kHz-500 kHz, 15 dB with 3 μ V (emf) input
500 kHz-30 MHz, 15 dB with 1 μ V (emf) input

d.s.b. (A2, A3)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

- 15 kHz-50 kHz, 15 dB with 30 μ V(emf) input,
30% modulated
- 50 kHz-500 kHz, 15 dB with 10 μ V(emf) input,
30% modulated.
- 500 kHz-30 MHz, 15 dB with 3 μ V (emf) input,
30% modulated.

IF FREQUENCY

- 1 st 34 MHz
- 2 nd 1.4 MHz.

IF SELECTIVITY

SSB (A3A, A3J)

- Pass band at -6 dB 250 Hz to 3000 Hz
- Pass band at -60 dB -650 and +4100 Hz.

ISB (A3B)

- Pass band at -6 dB 250 Hz to 3000 Hz
- Pass band at -60 dB -400 and +4100 Hz

CW/MCW/AM (A1, A2, A3, A2H, A3H)

In addition to the mode-selected s.s.b or i.s.b filters, i.f. filters of the following nominal passbands are fitted:-

- 1 kHz, 3 kHz, 8 kHz.

CROSS MODULATION

With a wanted signal greater than 300 μ V emf, in a 3 kHz bandwidth, an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 300 mV emf, will produce an output 20 dB below the output produced by the wanted signal.

RECIPROCAL MIXING

With a wanted signal of less than 100 μ V emf, in a 3 kHz bandwidth an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 70 dB above the wanted signal level will give a noise level 20 dB below the output produced by the wanted signal.

BLOCKING

With a wanted signal of 1 mV emf.
an unwanted signal more than 20 kHz removed.
greater than 500 mV will reduce the output by 3 dB.

INTERMODULATION PRODUCTS

Out of band

With two 30 mV emf signals separated and removed from the wanted signal
by not less than 20 kHz.
The third order intermodulation products are not less than -85 dB
below either of the interfering signals and typically better than -90 dB

In band

Two in band signals of 30 mV emf will produce third-order intermodulation products of not greater than -40 dB.

SPURIOUS RESPONSE

External

External signals, 20 kHz removed from the wanted signal must be at least 80 dB above the level of the wanted signal to produce an equivalent output.

Internal

Not greater than 3 dB above noise level measured in a 3 kHz bandwidth.

AGC

Range

An increase in input of 100 dB above 2 microvolts emf will produce an output change of less than 6 dB.

Switched selection of AGC 'off' 'short' and long time constants.

BFO RANGE

± 3 kHz, variable by a slow-motion.

AUDIO CHARACTERISTICS

Output levels

Line outputs

1 mW nominal into 600 ohms balanced, adjustable by preset level control on front panel to +6 dBm.

Phone outputs

Balance, 10 mW nominal into 600 ohms.

Power output 50 mW into internal loudspeaker which is capable of being switched in or out of operations.

External speaker Connection for external speaker 1 watt into 8 ohms.

AF response

Line outputs Within 1 dB from 100 Hz to 6000 Hz relative to the level of a standard 1000 Hz tone.
(The overall a.f. response will be dependent upon the i.f. bandwidth selected).

AF distortion

Line outputs Not greater than 2% at specified output of 1 mW nominal.

Loudspeaker outputs Not greater than 5% at 50 mW output to internal loudspeaker and 1W output to external speaker.

Phone output Not greater than 5% at specified output of 10 mW nominal.

CROSS TALK (A3B)

With a wanted signal at a level of 1 mV and the AF output adjusted to 1 mW, the crosstalk from an equal signal in the opposite sideband, at greater than 400 Hz from the carrier, is not greater than -50 dB relative to 1 mW.

METERING

A meter is provided on the front panel to indicate r.f. level, a.f. level to line, f.s.k. tune, and suitable performance or supply test levels.

POWER SUPPLY

100V-125V or 200V-250V, $\pm 10\%$, 45-65 Hz

Power consumption: 60 VA (Approx.)

DIMENSIONS

Height	Width	Depth
178 mm (7 in.)	483 mm (19 in.)	410 mm (16.14 in.)

WEIGHT 20.4 kg (45 lb) (Approx.)

TRACKING RECEIVER
 DEFENCE ELECTRONIC INC. MODEL MTR-4B
 (PART OF SKYNET TELEMETRY AND COMMAND STATION UHF SYSTEM)

RELEVANT AIR PUBLICATION
 116E-0738-1



21.5 MHz tracking receiver D.E.I. Inc., Model MTR-4B

FUNCTION

A tracking receiver designed to process phase modulated 21.5 MHz r.f. input signals into video and conical scan tracking error information.

ORIGIN

Defence Electronics Inc., Rockville, Maryland USA 20854
 Model MTR-4B

GENERAL DESCRIPTION

The 21.5 MHz tracking receiver is completely solid state single channel unit designed to receive and process phase modulated 21.5 MHz r.f. input signal. The input signal is synchronously de-modulated to provide pulse modulated subcarrier video and conical scan tracking error information. The receiver features automatic search for lock in either wide or narrow adjustable sweep widths which include selectable sweep rates.

A crystal controlled oscillator contained in an oven generates the reference signal for phase detection.

The receiver is equipped with front panel tuning and signal level meters. Front panel calibration controls consist of zero and fullscale adjustment for the signal level meter. Switches are also provided on the front panel for selecting the acquisition and search modes, loop bandwidth, a.g.c. bandwidth, and wide sweep rate. Continuously adjustable controls associated with the selector switches are the wide and narrow sweep width, narrow sweep rate, and VCO tuning. An audio output connector with a level control is also provided on the front panel. In addition, indicators are also provided for visual indications of loop lock and power application.

TECHNICAL DATA

ELECTRICAL

Receiver type

single conversion fixed frequency,
21.5 MHz input, 4.5 MHz IF frequency.

Input characteristics

Frequency

21.5 MHz (nominal)

Impedance

50 ohms, each channel

VSWR

1.5:1 maximum

Levels

-120 to -20 dBm

Out-of-band rejection

50 dB minimum from d.c. to 20 MHz
and from 23 to 500 MHz with reference
to the 21.5 MHz input.

Passband

21.5 MHz \pm 250 kHz at 1 dB points

Noise figure

8 dB maximum

Acquisition modes

- a) wideband
- b) narrowband

Wideband characteristics:

Sweep width

1 kHz to 100 kHz, continuously adjustable; centered from 20 kHz above to 90 kHz below input centre frequency.

Sweep rate	10(± 1) kHz/sec or 30(± 3) kHz/sec, switch selectable.
Acquisition bandwidth	800 Hz
Narrowband characteristics	
Sweep width	500 Hz to 10 kHz, continuously adjustable.
Sweep rate	50 Hz/sec to 1500 Hz/sec, continuously adjustable
Acquisition loop bandwidth	50 Hz or 200 Hz, switch selectable
Frequency tracking rate	90 Hz/sec at 50 Hz loop b.w. (0.32 radians phase error) 900 Hz/sec at 200 Hz loop b.w. (0.32 radians phase error).
AGC bandwidth	10(± 2) Hz or 15(± 3) Hz, switch selectable
Power supply required	240V a.c. $\pm 10\%$, 50 Hz $\pm 5\%$, single phase.

ENVIRONMENTAL

Temperature range:

Operating	0°C to +32°C
Storage	-40°C to +52°C
Relative humidity	30 to 70%
Barometric pressure	610 to 775 mmHg.

MECHANICAL

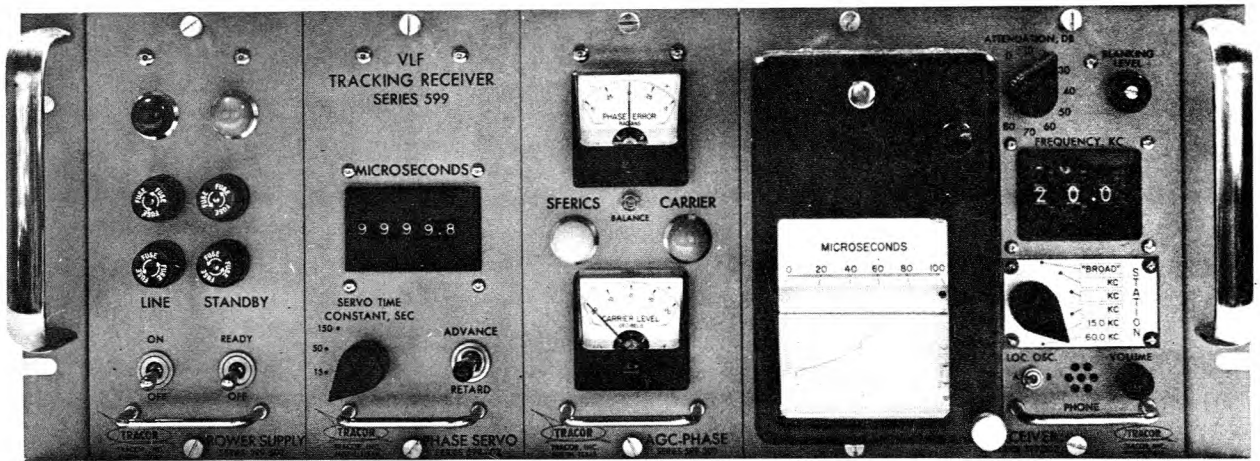
Dimensions

Height	Width	Depth
266 mm	483 mm	495 mm
(10 $\frac{1}{2}$ in)	(19 in)	(19 $\frac{1}{2}$ in)

Weight 40 lb (approximately)

VLF TRACKING RECEIVER
TRACOR INC., MODEL T599H

RELEVANT AIR PUBLICATION
116E-0735



VLF receiver model 559H

FUNCTION

Reception of very low highly stabilized reference carrier frequency transmissions from special global VLF stations for time and frequency calibration measurement and standardization purposes.

ORIGIN

Trackor Inc., USA Model T599H

GENERAL DESCRIPTION

The unit is completely solidstate, and it is designed for phase locked reception of v.l.f. Signals which gives long-term and short term accuracy several orders of magnitude better than that obtained by reception of WWV or WWVH.

Frequency measurements to an accuracy of 1 part in 10^9 can be achieved in intervals as short as 30 minutes; observation over 24-hour intervals gives a measurement accuracy of several parts in 10^{11} .

The receiver provides a reliable tracking of any one of the stations listed below from nearly anywhere in the world.

Transmitting station	Frequency kHz	Location	Sponsor, August 1964
WWVL	20.0	Ft. Collins, Colorado	Natl. Bureau of Standards
NBA	24.0	Baboa, Canal Zone	US Navy
NPM	19.8	Lualualei, Hawaii	US Navy
NAA	17.8	Cutler, Maine	US Navy
NPG	18.6	Jim Creek, Washington	US Navy
NSS	21.4	Annapolis, Maryland	US Navy
GBR	16.0	Rugby, England	British
OMEGA	10.2	Global net (various)	US Navy
OMEGA	13.6	Global net (various)	US Navy

Note:- All frequency standard transmissions are based on the UT2 time scale.

For reception of the Omega transmission, an auxiliary switch programmer is required for selection of a particular Omega station from the network of stations.

A total of 240 discrete channels in 100 Hz. steps is available between the lower limit of tracking operation at 8.0 kHz and the upper limit of 31.9 kHz.

Optional models of v.l.f. receiver track the 60 kHz transmission of WWVB operated by National Bureau of Standards.

The unit is a fully integrated receiving system and incorporates various major functional elements into single instrumentation packages v.h.f. receiver, phase comparator, servo phase shifter, frequency synthesizer and power supply. Only an external frequency standard and an antenna is connected to the unit.

Phase differences as small as 0.1 microsecond between the phase of incoming v.l.f. carrier frequency and phase derived from the local frequency source are detected by the front panel digital counter and a permanent record of the accumulated phase difference is made on a built-in stripchart recorder.

TECHNICAL DATA

ELECTRICAL

Frequency coverage

Standard receiver provides 240 channel tracking in 100 Hz increments for all carrier-stabilized VLF stations in the region 8.0 kHz-31.9 kHz. (Additional 60 kHz coverage available).

RF filter capability

Front panel five-position switch permits selection of either a broadband filter or narrow band filter in r.f. selection. Broadband filter position normally used in all-channel tracking capability; plug in narrow band filters provide image rejection and additional frequency selectivity at specified frequencies.

Frequency synthesizer

Frequency synthesizer generates coherent local oscillator signal, in 100 Hz increments, between 9.0 and 30.9 kHz. Digital thumb-wheel switch gives direct indication of desired v.l.f. station frequency; toggle switch permits selection of local oscillator frequency either 1 kHz above or below station frequency.

Time difference register

Front panel digital counter, pulsed by electronic phase servo, displays relative time difference between local standard and v.l.f. carrier; counter dial cumulative to 9999.9 μ S. Counter dial may be manually set to zero or other desired initial reading (independently of phase position of tracking servo).

Recording outputs

Built-in inkless chart recorder records relative phase difference between local standard and v.l.f. carrier. Chart speed: 1 inch per hour (other speeds available on request). Manual selection of either 100 μ S. or 10 μ S. phase sensitivity (fullscale deflection) of internal chart recorder. Phase and coherent carrier amplitude information is also available, for use with external chart recorder.

VLF Phase

Two independent analog outputs, having deflection sensitivities of 100 μ S. and 10 μ S. full scale, provided for use with external chart recorder; with independent controls to adjust span calibration for any nominal 1 mA recorder.

Coherent signal amplitude

Relative v.l.f. signal strength, equivalent to the receivers a.g.c. bias voltage, can be recorded on any nominal 1mA recorder; nominal logarithmic characteristic over a 40 dB range (chart records linear on a dB scale).

Meter display

Individual meters indicate

- a) Relative carrier level: 40 dB full-scale range
- b) Phase detector error voltage (on zero-centre meter)

Auxiliary outputs

- a) Amplified v.l.f. station signal, at 1 kHz intermediate frequency and phase coherent with r.f. carrier.
- b) Phase shifted 100 kHz square wave, 0.5 V peak to peak nominal
- c) Phase shifted 1kHz square wave, 0.5 V peak to peak nominal
- d) Phase shifted 100 Hz square wave, 0.5 V peak to peak nominal
- e) Reference frequency (L.O.) offset 1 kHz from v.l.f. carrier, square wave, 0.5 V peak to peak nominal

Audio output

Built-in speaker and volume control for aural monitoring of v.l.f. station at approximately 1 kHz.

Frequency standard input

Requires stable 1 MHz or 100 kHz from external frequency standard. Input level 0.5-5 volt r.m.s. into 1000 ohms.

Antenna requirements

Designed for use with loop, whip or simple wire antenna; shielded loop antenna (Model 599-600 or equal) recommended for high noise locations. Antenna may be located any distance from receiver. (100 ft of 50 ohm coaxial cable supplied with receiver).

Bandwidth

- a) RF bandwidth (narrow band filters) 500 Hz, nominal
- b) IF bandwidth 50 Hz, nominal
- c) Servo bandwidth (equivalent noise bandwidth): selectable from 0.002 Hz to 0.06 Hz (phase tracking servo)

Noise suppression

Blanking circuit rejects impulse noise either man-made or atmospheric ('sferics') Front panel lamp indicates presence of blanked noise impulse and facilitates adjustment of blanking circuit control.

Servo disable circuit

Electronic switch disables phase servo whenever v.l.f. carrier drops below minimal level; front panel warning lamp lights at same time. Tracking resumes automatically when carrier returns.

PERFORMANCE

Receiver sensitivity

0.01 microvolt signal (corresponding to 0.3 microvolt/meter field strength at 20.0 kHz with model 599-600 loop antenna) into receiver energizes carrier level switch and enables normal phase tracking; tracking maintained at an input signal-to-noise ratio of -50 dB (Gaussian noise measured in a 1 kHz bandwidth; servo time constant switch in 50 sec position).

Phase tracking servo

Front panel selector switch provides following servo response characteristics:

Nominal time Constant (sec)	Equivalent noise bandwidth (Hz),	Maximum tracking rate (nominal)
5	0.06	$\pm 1 \times 10^{-6}$
15	0.02	$\pm 3.3 \times 10^{-7}$
50	0.006	$\pm 1 \times 10^{-7}$
150	0.002	$\pm 3.3 \times 10^{-8}$

Nominal servo deadband:

Less than ± 0.1 sec. in all switch positions

Manual servo slewing

Momentary contact, centre-off toggle switch provided to advance or retard phase servo at a nominal $1 \mu\text{S. /sec.}$ rate.

Calibration accuracy

Short-term and long-term stability better than $\pm 0.5 \mu\text{S.}$ under normal laboratory conditions; intrinsic calibration accuracy (relative to received v.l.f. carrier) nominally better than $\pm 1 \times 10^{-11}$ on a 24-hour basis.

Synthesizer stability

Phase of the coherent local oscillator signal is absolutely fixed by the synthesizer setting; the synthesizer, after being switched to other frequencies, shows less than $\pm 0.05 \mu\text{s}$. shift when returned to its original setting.

AGC

Stable a.g.c. circuit assures full-reliability phase locked servo operation over a 40 dB range of carrier level with total variation of phase shift less than $0.5 \mu\text{s}$. (equivalent, at 20 kHz).

Dynamic range

Total signal level operating range in excess of 120 dB (including 80 dB manual gain control and 40dB a.g.c. range)

POWER SUPPLY REQUIRED

95-125 volt a.c., 48-62 Hz, 40 watts nominal, or d.c. source (e.g. +12 volt and -12 volt d.c. standby batteries)

External standby batteries, when used, automatically assume full operating load in the event of primary a.c. power failure. All receiver functions, including servo tracking, are sustained without interruption; however, chart drive motor in recorder stops during a.c. power off time. Standby current drain approximately 600 mA at +12 volt d.c. and 600 mA at -12 volt d.c.

MECHANICAL

DIMENSIONS

	Height	Width	Depth
(rack panel)	178 mm (7 in.)	483 mm (19 in.)	419 mm (16½ in.)

WEIGHT 20.5 kg (45 lb)

Ambient temperature limits

0°C to +50°C while operating (+65°C maximum storage temperature)

Packaging

Circuits are packed in the following modules:

Receiver/synthesizer/recorder	unit 202
AGC/phase error	unit 302
Phase servo	unit 402
Power supply	unit 502

LORAN-C

SECTION 2

RECEIVER SUB-ASSEMBLIES

Sheet No. 1

SUB-ASSEMBLY DETAILS
FOR
RECEIVER R.1392 VARIANTS

Receiver, Type R.1392D (10D/17745)
Receiver, Type R.1392E (10D/17768)

The following self-contained and completely screened sub-assemblies are mounted on the upper side of the main chassis. Different type and reference numbers are allotted for the tropicalized and non-tropicalized versions:—

- (1) Oscillator unit, Type 326 (10V/640) for R.1392D.
Oscillator unit, Type 329 (10V/641) for R.1392E.
- (2) Amplifying unit, Type 451 (10U/16580) for R.1392D.
Amplifying unit, Type 453 (10U/16581) for R.1392E.
- (3) Transformer units, Type 91 (10K/1689)
I.F.T.1, Type 92 (10K/1690) I.F.T.2, Type 93 (10K/1691) I.F.T.3 and Type 94 (10K/1692) I.F.T.4.
- (4) Oscillator unit, Type 165 (10V/585).

Receiver 62H (Naval) (10D/23989) (A.P.61357)
(A.P. denotes Admiralty Pattern)

The following units replace those detailed for R.1392D in order to increase the intermediate frequency from 4.86 to 9.72 MHz:—

- (1) Amplifier unit R/F 43D (A.P.61436).
- (2) Oscillator unit Design 7 (A.P.61437).
- (3) Transformers I/F Design 24 (A.P.61439)
Design 25 (A.P.61440), Design 26 (A.P.61441)
and Design 27 (A.P.61442).

Ancillary equipment

Power unit, Type 234A (10D/17395)

Provides H.T. and L.T. voltages to a number of receivers including R.1392D, E and J. Voltages supplied are 180 to 270 volts, adjustable by transformer primary and secondary tapping switches, 5V at 2A for the rectifier valve heater and 6.5V 4.3A for the receiver valve heaters, from an a.c. mains input of 230V, 50 Hz.

Power unit, A.P.W8356A

Provides H.T. and L.T. requirements for receiver 62H (Naval). Voltages supplied are 260 volts d.c. for H.T. and 6.3V 4.3A a.c. for L.T. Consumption is approximately 60W.

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-932-5695)

**Receiver, radio (formerly receiver, Type 7109,
10D/19231)**

The receiver comprises the following sub-assemblies:—

- (1) Receiver sub-assembly, 5820199-932-5703 (formerly receiver unit, Type 9095, 10P/13246).
- (2) Cooler, air, electronic equipment, 5820-99-999-2381 (formerly fan assembly, Type 7991, 10K/18821).
- (3) Cover electrical fitted, 5820-99-999-0841 (formerly cover assembly, 10AP/273).
- (4) Cable assembly, 5995-99-932-4016 (formerly cable assembly, Type 7804, 10HA/15277).
- (5) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011 (formerly cover front, Type 1068, 10AP/299).

Receiver sub-assembly (5820-99-932-5703)

The sub-assembly includes the following sub-units:—

- (1) Chassis electrical equipment, 5820-99-932-4002 (formerly chassis assembly, Type 7805, 10D/19796).
- (2) Power supply, 5820-99-932-4005, (formerly power unit, Type 7348, 10K/18134).
- (3) Frequency multiplier, 5820-99-911-8332 (formerly drive unit radio, Type 7110, 10D/19232).
- (4) Amplifier, radio frequency, 5820-99-911-8333 (formerly amplifying unit, Type 7111A, 10U/17122).
- (5) Amplifier, intermediate frequency, 5820-99-911-8334 (formerly amplifying unit, Type 7112, 10U/16654).
- (6) Amplifier, audio frequency, 5820-99-911-8335 (formerly amplifying unit, Type 7113, 10U/16655).
- (7) Mixer stage, frequency, 5820-99-911-8325 (formerly mixer unit, Type 7100, 10D/19228).
- (8) Comparator, signal, 5820-99-911-8324 (formerly comparator unit, Type 7101, 10D/19229).
- (9) Oscillator, radio frequency, 5820-99-911-8331 (formerly oscillator unit, Type 7106, 10V/667).
- (10) Relay assembly, 5945-99-932-3996 (formerly relay unit, Type 7347, 10F/17961).
- (11) Control, frequency selector, 5820-99-911-8327 (formerly selector unit, Type 7102, 10D/19230).
- (12) Control, frequency selector, 5820-99-911-8329 (formerly selector unit, Type 9008A, 10D/20576).

Ancillary equipment

Cooler, dry air, electrical equipment (5820-99-932-3995)

The cooler provides cooling air flow for R.7109 when required to operate in ambient temperatures from +37°C (100°F) to +55°C (131°F). The cooler comprises:—

- (1) Cover assembly, cooler, dry air, electrical equipment, 5820-99-932-4010 (formerly cover assembly, 10AP/236).
- (2) Cover, access, electrical equipment, fitted chassis, 5820-99-932-4011 (formerly cover front, Type 1068, 10AP/299).
- (3) Cooler air, electronic equipment, 5820-99-999-2648 (formerly fan assembly, Type 9672, 10K/19472).
- (4) Connector, 5995-99-911-8336 (formerly connector Type B4/50E/R5, 10HG/88).

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-932-5694)

**Receiver, radio (formerly receiver Type 7351,
10D/19267)**

The receiver comprises the following sub-assemblies:—

- (1) Receiver, sub-assembly, 5820-99-932-5702 (formerly receiver unit, Type 9096, 10P/13247).
- (2) Cover, electrical, fitted, 5820-99-999-0841 (formerly cover assembly, 10AP/273).
- (3) Cable assembly, 5995-99-932-4015 (formerly cable assembly Type 9097, 10QA/16707).
- (4) Cover, access, electric equipment, fitted chassis, 5820-99-932-4011 (formerly cover front, Type 1068, 10AP/299).

Receiver, sub-assembly (5820-99-932-5702)

The sub-assembly includes the following sub-units:—

- (1) Chassis electrical equipment, 5820-99-932-4001 (formerly chassis assembly Type 7354, 10D/19269).
- (2) Power supply, 5820-99-932-4004 (formerly power unit, Type 7352 (10K/18136).
- (3) Drive unit, radio, 5820-99-999-1348 (formerly drive unit radio, Type 7353, 10D/19268).
- (4) Amplifier, radio frequency, 5820-99-943-9509 (formerly amplifying unit, Type 7111, 10U/16653).
- (5) Amplifier, intermediate frequency, 5820-99-911-8334 (formerly amplifying unit, Type 7112, 10U/16654).
- (6) Amplifier, audio frequency, 5820-99-911-8335 (formerly amplifying unit, Type 7113, 10U/16655).

Ancillary equipment

**Cooler, dry air, electrical equipment
(5820-99-932-3995)**

Refer to Sheet No. 2 of this section for details.

Sheet No. 4

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-955-0769)

**Receiver, radio (formerly receiver,
Type R.8998, 10D/20755)**

Details to be issued later.

Ancillary equipment

**Receiver, radio, 5820-99-955-0771
(formerly receiver, Type R.10168,
10D/20459)**

Refer to Sheet No. 6 of this Section for details.

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO (5820-99-933-2369)

Receiver, radio (formerly receiver,
Type R.10149, 10D/20452)

The receiver consists of two steel cabinets (Sect. 1, Sheet No. 5) in which the fifteen units comprising the receiving equipment are mounted. All the units are numbered and all except the supply units may be withdrawn on extendible runners for servicing purposes. Units No. 1 and 16 are blanking panels and the others are identified as follows:—

- (1) Unit No. 2, Carrier Unit, Drg. No. W.37887, Ed. A-B.
- (2) Unit No. 3, SF and IF Unit (path A), Drg. No. W.32338.
- (3) Unit No. 4, Oscillator Unit, Drg. No. W.32339.
- (4) Unit No. 5, SF and IF Unit (path B), Drg. No. W.32338.
- (5) Unit No. 6, SF and IF Unit (path C), Drg. No. W.32338.
- (6) Unit No. 7, Stabilized Supply Unit, Drg. No. W.31691.
- (7) Unit No. 8, Supply Unit and Circuit Breaker, Drg. No. W.31693.
- (8) Unit No. 9, U.S.B. Filter Unit 2, Drg. No. W.37888.
- (9) Unit No. 10, L.S.B. Filter Unit 2, Drg. No. W.37888.
- (10) Unit No. 11, Monitor Unit, Drg. No. 37889, Ed. A and B.
- (11) Unit No. 12, U.S.B. Detector Unit, Drg. No. 37890, Ed. A.
- (12) Unit No. 13, L.S.B. Detector Unit, Drg. No. 37890, Ed. A.
- (13) Unit No. 14, U.S.B. Filter Unit 1, Drg. No. W.37439.
- (14) Unit No. 15, L.S.B. Filter Unit 1, Drg. No. W.37439.
- (15) Unit No. 17, Supply Unit and Circuit Breaker, Drg. No. W.31693.

Sheet No. 6

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-955-0771)

**Receiver, radio (formerly receiver
Type R.10168, 10D/20459)**

As this receiver is used as a sub-assembly in receiver
Type R.8998, any further breakdown will be given in
Part 7 of this publication.

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-955-0770)

**Receiver, radio (formerly receiver
Type R.10170, 10D/20461)**

As this receiver is used as a sub-assembly in rack assembly, Type 9352, any further breakdown will be given in Part 7 of this publication.

Associated equipment

Rack assembly, Type 9352 (10D/19932)

Comprises a dual-diversity h.f. receiver with frequency coverage 5 to 30 MHz in 5 ranges.

SUB-ASSEMBLY DETAILS

FOR

RECEIVER R.15095

(10D/20489)

Receiver Type R.15095

The receiver comprises the following sub-units:—

- (1) Magslip unit, Drg. No. W.43549, Ed. A.
- (2) Calibration unit, Drg. No. W.42504, Ed. A.
- (3) Receiver unit, Drg. No. W.43472, Ed. A.
- (4) Selector unit, Drg. No. H50-0206-01.
- (5) Regulating unit, Drg. No. H50-0208-01.
- (6) Supply unit A, Drg. No. W.43010, Ed. A.
- (7) Supply unit B, Drg. No. W.43021, Ed. A.
- (8) Cabinet (less units), Drg. No. W.51693, Ed. A.

Control unit, Type 15056 (10L/16618)

The receiver bandchange passband, 1st oscillator selector and h.f. gain controls may be operated remotely by means of control unit, Type 15056, through a four wire (2 pairs) line.

The control unit includes the following sub-units:—

- (1) Supply unit, Drg. No. W.40967, Ed. A.
- (2) Dekatron unit, Drg. No. W.43009, Ed. A.
- (3) Control unit, Drg. No. W.42496, Ed. A.
- (4) Tuning unit, Drg. No. W.51596, Ed. A.
- (5) Cabinet (less units), Drg. No. W.43561, Ed. A.

SUB-ASSEMBLY DETAILS

FOR

RECEIVER R.15172

(10D/22019)

Receiver Type R.15172

The receiver comprises eight sub-units mounted in a steel cabinet (Sect. 1, Sheet No. 9). All sub-units are numbered and, with the exception of the supply units, are mounted on extendible runners, for easy withdrawal when servicing. Identification details are given below:—

- (1) Unit No. 1. L.S.B. unit, Drg. No. W.66381, Ed. B.
- (2) Unit No. 2 S.F. and I.F.1 unit, Drg. No. W.32338, Ed. F.
- (3) Unit No. 3. Oscillator unit, Drg. No. W.32339, Ed. F.
- (4) Unit No. 4. Carrier and monitoring unit, Drg. No. W.63876, Ed. A.
- (5) Unit No. 5. S.F. and I.F.1 unit, Drg. No. W.32338, Ed. F.
- (6) Unit No. 6. L.S.B. unit, Drg. No. W.66381, Ed. B.
- (7) Unit No. 7. Stabilized supply unit, Drg. No. W.31691, Ed. B.
- (8) Unit No. 8. Supply unit, Drg. No. W.31693, Ed. C.

SUB-ASSEMBLY DETAILS

FOR

RECEIVING SET, RADIO

(5820-99-933-0813)

Receiving set, radio (A.M. Type S5/1)

The receiving set is assembled in one floor mounting steel cabinet, a fan with a removable filter assembly being fitted in the top of the cabinet for cooling purposes. All units comprising the receiving set, except for the meter panel, may be withdrawn on runners for servicing:—

(1) Converter, frequency, electrical (5820-99-933-0846) Qty. 2.

(2) Receiver, radio (5820-99-999-9292) A.M. Type S1/3, Qty. 2.

(3) Frequency converter/keyer (5805-99-933-0847) Qty. 1.

(4) Meter Panel (an external 80-0-80 volts supply is required for this unit and is not supplied as part of the equipment).

**Converter, frequency, electrical
(5820-99-933-0846)**

Frequency converter/keyer (5805-99-933-0847)

Receiver, A.M. Type S1/3 (5820-99-999-9292)

} See Part 7 for further details.

Concise details of this receiver are given in Sheet No. 12 of this section.

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-943-2775)

**Receiver, radio
(A.M. Type S1/1, S1/2 and S2/1)**

The receiver is designed for both bench (table) and rack mounting with or without the i.f. converter (mixer stage, frequency, 5820-99-943-3464) as denoted by the A.M. Type No. (Section 1, Sheet No. 11). For bench mounting, the receiver is fitted in a steel cabinet. The receiver chassis and sub-units are of cast construction and are identified as follows.

- (1) Main chassis assembly, 5820-99-943-3456.
- (2) Oscillator r.f. sub-assembly, 5820-99-943-3458. (1st v.f.o.).
- (3) Oscillator r.f., 5820-99-943-3459 (2nd v.f.o.).
- (4) Amplifier i.f., 5820-99-943-3455 (100 kHz i.f. amplifier).
- (5) Calibrator, frequency, 5820-99-943-3461 (crystal calibrator, unit).

SUB-ASSEMBLY DETAILS

FOR

RECEIVER, RADIO

(5820-99-999-9292)

**Receiver, radio
(A.M. Type S1/3, S1/4 and S2/2)**

The receiver is a later version of receiver, radio, 5820-99-943-2775 (Sheet No. 11), the description of construction and use being equally applicable. The differences between the two receivers are reflected in the sub-units, those for 5820-99-999-9292 being identified as follows:—

- (1) Main chassis assembly, 5820-99-943-3456.
- (2) Oscillator r.f. sub-assembly, 5820-99-913-1498 (1st v.f.o.).
- (3) Oscillator r.f. 5820-99-943-3459 (2nd v.f.o.).
- (4) Amplifier i.f., 5820-99-913-1497 (100 kHz i.f. amplifier).
- (5) Calibrator, frequency, 5820-99-943-6625 (crystal calibrator unit).

SUB-ASSEMBLY DETAILS
FOR
RECEIVING SET, RADIO
(5820-99-950-5773)

Receiving set, radio (Racal RTA.191A)

The set comprises the following sub-units:—

- (1) Amplifier – mixer, 5820-99-580-8358 (Racal RA.180).
- (2) Amplifier, intermediate frequency, 5820-99-580-8359 (Racal MA.219A).
- (3) Demodulator, 5820-99-580-8360 (Racal MA.185A).
- (4) Interconnecting box, 5820-99-951-0651 (Racal MA.603B).
- (5) Oscillator, radio frequency, 5820-99-950-5591 (Racal MA.275).
- (6) Synthesizer, electrical frequency, 5820-99-950-5771 (Racal MA.250G).
- (7) Power supply, 5820-99-580-8362 (Racal PV.225A).
- (8) Converter, tone-to-voltage, 5820-99-580-8363 (Racal LA.196A).
- (9) Power supply, 5820-99-950-5590 (Racal PV.238A).

Remarks

For further details of particular units see Index.

SUB-ASSEMBLY DETAILS FOR
FOR
RECEIVING SET, RADIO
(5820-99-953-2075)

Receiving set, radio (Racal RTA.241A)

As the receiving equipment is duplicated for dual-diversity reception, it is housed in two racks functionally termed the receiver and control racks respectively, items (1) to (4) being installed in the receiver rack and (5) to (10) in the control rack:—

- (1) Amplifier – mixer, 5820-99-580-8358 (Racal RA.180), Qty. 2.
- (2) Amplifier, intermediate frequency, 5820-99-953-2079 (Racal MA.229), Qty. 2.
- (3) Demodulator, 5820-99-953-2073 (Racal MA.185B), Qty. 2.
- (4) Oscillator, radio frequency, 5820-99-950-5591 (Racal MA.275).
- (5) Generator, standard frequency, 5820-99-948-8560 (Racal MA.259G).
- (6) Control, electrical frequency, 5820-99-953-2081 (Racal MA.246).
- (7) Synthesizer, electrical frequency, 5820-99-950-5771 (Racal MA.250G).
- (8) Power supply, 5820-99-580-8362 (Racal PU.225A).
- (9) Converter, tone-to-voltage, 5820-99-950-8363 (Racal LA.196A).
- (10) Power supply, 5820-99-950-5590 (Racal PU.238A).

Remarks

For further details of particular units see Index.

SUB-ASSEMBLY DETAILS
FOR
RECEIVING SET, RADIO
(5820-99-107-5921)

Receiving set, radio (Racal RTA.241C)

As the receiving equipment is duplicated for diversity reception, it is housed in two racks functionally termed the receiver and control racks respectively, items (1) to (4) being installed in the receiver rack and (5) to (7) in the control rack:—

- (1) Amplifier-mixer, 5820-99-580-8358 (Racal RA.180), Qty. 2.
- (2) Amplifier, intermediate frequency, 5820-99-953-2079 (Racal MA.229) Qty. 2.
- (3) Demodulator, 5820-99-953-2073 (Racal MA.185B), Qty. 2.
- (4) Oscillator, radio frequency, 5820-99-950-5591 (Racal MA.275).
- (5) Interconnecting box, 5820-99-951-0651 (Racal MA.603B).
- (6) Synthesizer, electrical frequency, 5820-99-107-5920 (Racal MA.250E).
- (7) Power supply, 5820-99-580-8362 (Racal PU.225A).

Remarks

For further details of particular units, see Index.

SUB-ASSEMBLY DETAILS
FOR
RECEIVER, RADIO
(5820-99-107-4926)

RECEIVER, RADIO (RACAL RA.317)

The receiver consists of two main assemblies fitted into a frame for 19 in rack mounting. The main assemblies are the receiver, radio and the amplifier, audio frequency (Sect.1, Sheet No.16). The sub-units of the receiver, radio 5820-99-107-1509 are mainly printed-wiring boards, mounted within a cast chassis, and are identified as follows:

- (1) Main chassis assembly, Racal DA33100
- (2) Amplifier, intermediate frequency 5820-99-001-0462
- (3) Filter, bandpass 5915-99-222-1263
- (4) Generator, Racal BA28284
- (5) Mixer stage, frequency 5820-99-194-6993
- (6) Mixer stage, frequency 5820-99-194-4918
- (7) Oscillator, radio frequency 5820-99-107-5641
- (8) Oscillator, radio frequency 5820-99-107-5642
- (9) Radio frequency unit 5820-99-194-6994
- (10) Filter, bandpass 5915-99-142-5783
- (11) Power supply 5820-99-222-2117, Type PU.408A,
or
- (12) Power supply 5820-99-195-2792, Type PU.409

The amplifier, audio frequency 5820-99-195-0459 contains one printed-wiring board

SUB-ASSEMBLY DETAILS
FOR
RECEIVER RADIO
10D/5820-99-618-1034
(Racal RA 1205/8)

Receiver, radio	(Racal RA.1205/8)
The set comprises the following sub-units:-	
Receiver, radio	(Racal RA.1250/8)
Power supply	(Racal PU.1150)
Cabinet	(Racal MA.606)

Remarks

Concise details for the above units are combined in Part 4, Sect.1,
Sheet No.17.

SUB-ASSEMBLY DETAILS
FOR
RECEIVING SET, RADIO
(5820-99-119-3981)

RECEIVING SET, RADIO 5820-99-119-3981
(Racal RTA.191P)

The set comprises the following sub-units:-

AMPLIFIER-MIXER	5820-99-580-8385 (Racal RA.180)
AMPLIFIER, INTERMEDIATE FREQUENCY	5820-99-580-8359 (Racal MA.219A)
DEMODULATOR	5820-99-580-8360 (Racal MA.185A)
GENERATOR, STANDARD FREQUENCY	5820-99-948-8560 (Racal MA.259G)
OSCILLATOR, RADIO FREQUENCY	5820-99-950-5591 (Racal MA.275)
SYNTHESIZER, ELECTRICAL FREQUENCY	5820-99-950-5771 (Racal MA.250G)
POWER SUPPLY	5820-99-580-8362 (Racal PU.225A).

Remarks:- For further details of particular units see Index.

SUB-ASSEMBLY DETAILS
FOR
RECEIVING SET, RADIO
(5820-99-119-3979)

RECEIVING SET, RADIO 5820-99-119-3979
(Racal RTA.191Q)

The set comprises the following sub units:-

AMPLIFIER-MIXER	5820-99-580-8358 (Racal RA.180)
AMPLIFIER, INTERMEDIATE FREQUENCY	5820-99-580-8359 (Racal MA.219A)
DEMODULATOR	5820-99-580-8360 (Racal MA.185A)
OSCILLATOR, RADIO FREQUENCY	5820-99-950-5591 (Racal MA.275)
SYNTHESIZER, ELECTRICAL FREQUENCY	5820-99-950-5571 (Racal MA.250G)
POWER SUPPLY	5820-99-580-8362 (Racal PU.225A)
CONVERTER, TONE-TO-VOLTAGE	5820-99-580-8363 (Racal LA.196A)
POWER SUPPLY	5820-99-950-5590 (Racal PU.238A)

Remarks:- For further details of particular units see Index.

SUB-ASSEMBLY DETAILS
FOR
RECEIVING SET, RADIO
(5820-99-951-0461)

RECEIVING SET, RADIO 5820-99-951-0461
(Racal RTA.191K)

The set comprises the following sub-units:-

AMPLIFIER-MIXER	5820-99-580-8358 (Racal RA.180)
AMPLIFIER, INTERMEDIATE FREQUENCY	5820-99-580-8359 (Racal MA.219A)
DEMODULATOR	5820-99-580-8360 (Racal MA.185A)
INTERCONNECTING BOX	5820-99-951-0651 (Racal MA.603B)
OSCILLATOR, RADIO FREQUENCY	5820-99-950-5591 (Racal MA.275)
SYNTHESIZER, ELECTRICAL FREQUENCY	5820-99-950-5771 (Racal MA.250G)
POWER SUPPLY	5820-99-580-8362 (Racal PU.225A)

Remarks:- For further details of particular units see Index.

PART 5

FREQUENCY GENERATION EQUIPMENT

PART 5

FREQUENCY GENERATION EQUIPMENT INTRODUCTION

1. In view of the extensive range of equipment covered by the generic title to this Part, information sheets will be confined to frequency generation and manipulation equipment designed as self-contained replaceable units common to particular ranges of communications equipment, the operation of which is significant to the functioning or mode of operation of the parent equipment e.g. synthesisers, modulators, oscillator units, s.s.b. converters, demodulators, diversity switching units etc.

2. Section 2 is incorporated to provide information on the audio and voice frequency processing equipment associated with the radio telephone and telegraph communication systems included in the earlier Parts of this Publication.

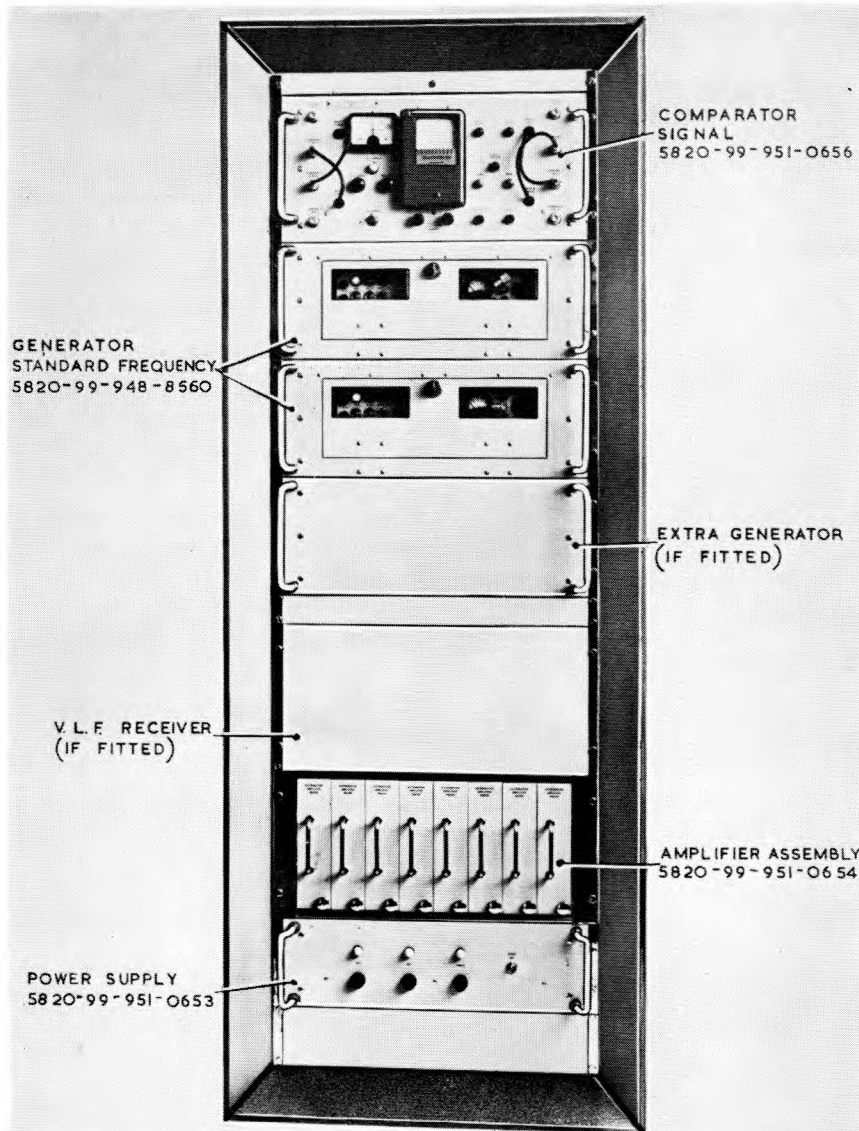
SECTION 1

**RADIO AND INTERMEDIATE FREQUENCY
GENERATION EQUIPMENT**

FREQUENCY STANDARD AND DISTRIBUTION UNITS (5820-99-951-0655) (5820-99-951-0657)

Relevant publications:—

A.P.116E-0127-1L, 1P, 1B, 1AE



Frequency standard and distribution unit, 5820-99-951-0655

Function

Frequency standard and distribution units, 5820-99-951-0655 (Racal MA.286B) and 5820-99-951-0657 (Racal MA.286A) provide a high stability standard frequency source at each receiver and each transmitter site respectively, for the frequency synthesis operations carried out in the receiver or exciter (transmitter) units. Each frequency standard and distribution unit can feed up to nineteen receivers or exciters. The only difference between the two units is in the number of generator, standard frequency sub-units fitted to each, the unit used on receiver sites (5820-99-951-0655) having two and the other having three of these sub-units fitted.

Construction

The units are housed in a standard 19 inch rack cabinet the sub-units being mounted on runners with lazy-arm supports for the interconnecting cables mounted at the rear of each sub-unit.

Sub-unit details

- (1) Generator, standard frequency, 5820-99-948-8560 (Racal MA.259G) (Qty. 2 fitted to 5820-99-951-0655 and Qty. 3 to 5820-99-951-0657).
- (2) Comparator, signal, 5820-99-951-0656 (Racal MA.290) Qty. 1.
- (3) Amplifier assembly, 5820-99-951-0654 (Racal MA.294A-2) up to Qty. 8.
- (4) Power supply, 5820-99-951-0653 (Racal PU.303) (18V output).

Note . . .

Space is provided in rack for mounting v.l.f. receiver for frequency calibration purposes, if required.

Functional particulars:

Output frequencies

Main: 1 MHz.

Ancillary: 5 MHz and 100 KHz.

Frequency accuracy

Set to within 1 part in 10^9 .

Frequency stability

(1) Not exceeding 2 parts in 10^{10} with a supply change of $\pm 6\%$ or a loading change of $\pm 20\%$ of nominal.

(2) Not exceeding 5 parts in 10^{10} with a temperature variation of 35°C in the range -10°C to 60°C .

Number of outlets

Main: 10, then to 73 in steps of 9.

Ancillary: One 5 MHz and 100 KHz from each generator signal.

Output level and impedance

Main: 1V into 50 ohms.

Ancillary: 1V into 50 ohms.

Comparator input

Recorder: 0-1 mA.

Chart speed: 6 inches/hour.

Change-over time: Less than 100 microseconds (in event of input failure).

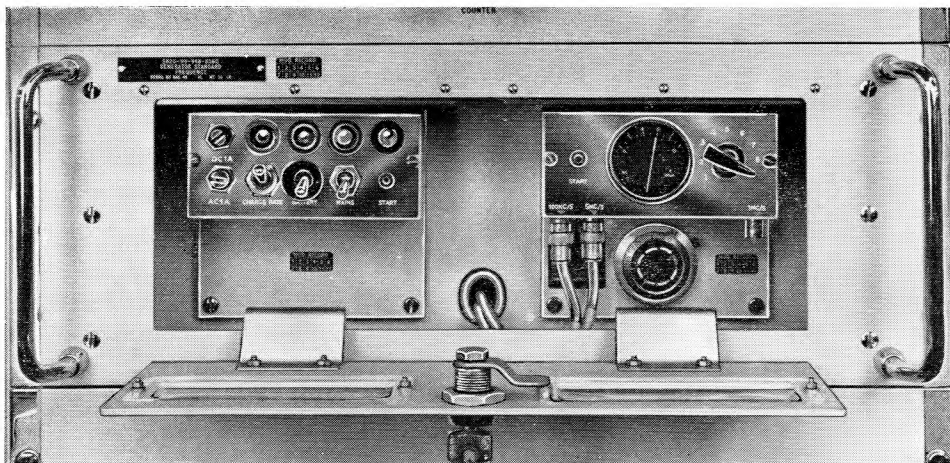
External alarm contacts: Single pole change-over contacts rated at 28V 1A.

Power supply

100-125V, 200-250V, 45-65 Hz.

Dimensions and weight

Refer to Part 1, Sect. 1, Sheet No. 9.

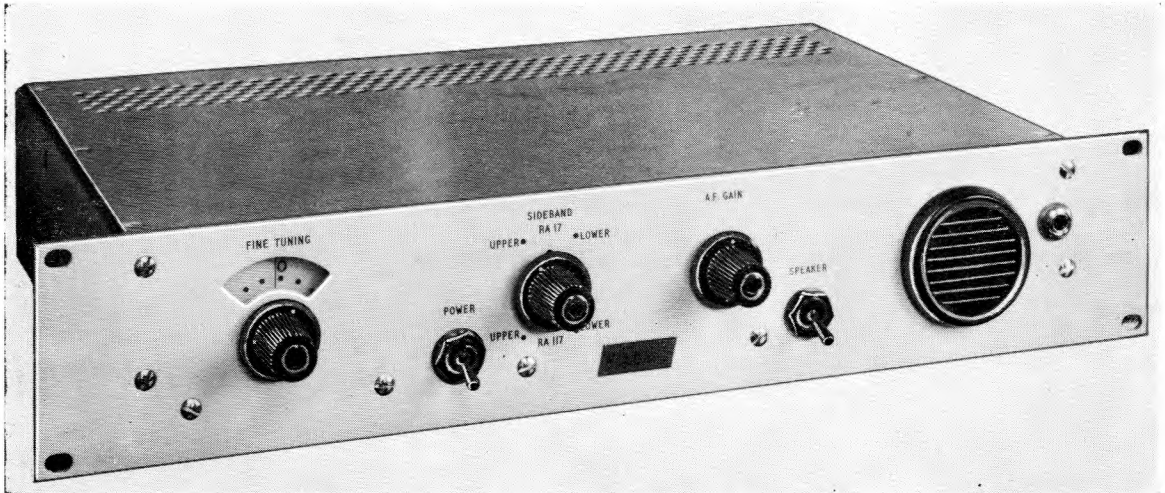


Generator, standard frequency, 5820-99-948-8560

CONVERTERS, SINGLE SIDEBAND (5820-99-949-4521) (5820-99-954-0538)

Relevant publications:—

A.P.116E-0707-1



Converter, single sideband

Function

The converters are variants of the Racal Type RA.63 single sideband adaptor which is designed to enable receiver Type RA.17 to be used for the reception of single sideband transmissions. Switched filters are used enabling either upper or lower sideband operation to be selected. These filters provide a bandwidth of 2,500 Hz with a sharp cut-off to ensure satisfactory suppression of the unwanted sideband and residual carrier. The unit is completely self-contained with its own power supply and a.f. circuits and is designed for rack mounting. The converters work from i.f. inputs of 100 kHz. Other variants are available to work from i.f. inputs of 455 kHz and 465 kHz.

Origin

Racal Communications Ltd., Types RA.63A (5820-99-949-4521) and RA.63G (5820-99-954-0538) for use with receivers having 100 Hz i.f. outputs, RA.63G is similar to RA.63A but is mechanically strengthened by the addition of side panels.

Other variants:—

- | | |
|---------|-------------------------------------------------------------------------------------|
| RA.63B | } As RA.63A but with North American Type plugs and sockets. RA.63H has side panels. |
| RA.63H | |
| RA.63C: | For use with receiver i.f. of 465 kHz. |
| RA.63E | } For use with receiver i.f. of 455 kHz. |
| RA.63L: | |

Input frequencies

- | | |
|-------------------|----------|
| RA.63A, B, G & H: | 100 kHz. |
| RA.63C: | 465 kHz |
| RA.63E & L: | 455 kHz. |

Input impedance	75 ohms unbalanced.		
Fine tuning	± 1 kHz.		
Sideband response	Upper or lower sideband with passband from 500 to 3000 Hz and within ± 5 dB.		
Audio outputs	<i>Impedance</i>	<i>Level</i>	
	3 ohms	50 mW	} <i>At rear of unit</i>
	600 ohms	3 mW	
	600 ohms	3 mW	
	600 ohms	3 mW	
	Note . . .		
	<i>3 ohm/50 mW output may be switched to monitor loudspeaker.</i>		
Power supplies	100–125V or 200–250V, 45–65 Hz.		
Power consumption	15W approx.		
Dimensions	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	3½in (9cm)	1ft 7in (48cm)	1ft 0¾in (32.5cm)
Weight	16½ lb (7.5 kg).		

SYNTHESIZER, ELECTRICAL FREQUENCY
(5820-99-971-7805)

RELEVANT PUBLICATION:
AP 116E-0250-1



Synthesizer, electrical frequency 5820-99-971-7805

FUNCTION

The synthesizer is designed for replacing the function of the 'kilocycles' v.f.o. in either the drive unit, transmitter 5820-99-107-3802 (Racal MA.79H) or receiver, radio 5820-99-949-4826 (Racal RA.117). It provides improved frequency setting accuracy and a high degree of frequency stability.

ORIGIN

Racal Communications Ltd., Type MA.350B

OUTPUT FREQUENCY RANGE

3.6001 - 4.6000MHz

CALIBRATION

Dial setting of 0000 corresponds to 4.6000MHz

Dial setting of 9999 corresponds to 3.6001MHz.

SETTING INCREMENTS

100kHz, 10kHz, 1kHz, 100Hz

INTERPOLATION OSCILLATOR

Variation over 10kHz, 1kHz or 100Hz decades, calibrated 0-100 with $\pm 1\%$ accuracy.

FREQUENCY STABILITY OF INTERNAL REFERENCE SOURCE

- (1) Crystal ageing
2 parts in 10^9 per day after 30 days continuous operation
- (2) Temperature variation
 - (i) A change in ambient temperature of $\pm 10^\circ\text{C}$, from 25°C , will produce a change in frequency not exceeding ± 2 parts in 10^9 .
 - (ii) A change in ambient temperature of $\pm 25^\circ\text{C}$, from 25°C , will produce a change in frequency not exceeding ± 1 part in 10^8 .
- (3) Supply voltage variation
A change in a.c. supply voltage $\pm 6\%$ on the nominal setting will produce a change in frequency not exceeding ± 1 part in 10^9 .

FREQUENCY STABILITY AND SETTING ACCURACY

- (1) 3.6-4.6MHz output without interpolation oscillator and fixed frequency outputs:
In accordance with the reference frequency source.
- (2) 3.6-4.6MHz output with interpolation between 100Hz steps:
 ± 1 part in 10^6 .

RESETTING TIME

Locking complete within 3 seconds of selection.

SPURIOUS OUTPUT LEVEL

Generally better than -60dB down except second harmonic which is better than -50dB down.

NOISE LEVEL

At frequency removed from carrier by more than 10kHz, the noise in the 150Hz bandwidth is better than -110dB down.

EXTERNAL RADIATION

Less than 4×10^{-10} watts

OUTPUT LEVELS

- (1) 3.6-4.6MHz:
Two outlets, 1V r.m.s. (+6dB, -0dB) into 70 ohms on each outlet.
- (2) 100kHz:
Two outlets, 1V r.m.s. (± 3 dB) into 70 ohms on either outlet.
- (3) 200kHz:
Two outlets, 1V r.m.s. (± 3 dB) into 70 ohms on each outlet.
- (4) 1MHz:
Two outlets, 1V r.m.s. (± 3 dB) into 70 ohms on each outlet.
- (5) 1.7MHz:
Two outlets, 1V r.m.s. minimum into 70 ohms on each outlet.

EXTERNAL REFERENCE FREQUENCY SOURCE

5MHz, 1MHz, 200kHz or 100kHz; level: 0.2V-2V r.m.s. into 70 ohms.

METER

Provides indication of:

- (i) Locking conditions for each decade
- (ii) Output level, 3.6-4.6MHz output only.

ENVIRONMENTAL CONDITIONS

Designed to operate within the ambient temperature range -5°C to $+55^{\circ}\text{C}$.

POWER SUPPLY

100-125V and 200-250V $\pm 6\%$, 45-65Hz, single phase.

POWER CONSUMPTION

35 watts, approx.

DIMENSIONS

Height	Width	Depth
$8\frac{3}{4}$ in (22.2 cm)	19 in (48.3 cm)	19 in (48.3 cm)

WEIGHT

60 lb (27.3kg) approx.

DRIVE UNIT, TRANSMITTER
(5820-99-107-3802)

RELEVANT PUBLICATION:
AP 116E-0249-1



Drive unit, transmitter 5820-99-107-3802

FUNCTION

The drive unit, transmitter provides a low-level r.f. output signal, in the h.f. band, suitable for directly driving a linear amplifier in the SSB, DSB, FSK or CW modes.

ORIGIN

Racal Communications Ltd., Type MA.79H

FREQUENCY RANGE

1.5MHz to 30MHz (200 to 10 metres).

FREQUENCY DETERMINATION

- (1) Six crystal-controlled channels
- (2) Continuous tuning calibrated at each kHz with vernier adjustment 500-0-500Hz.
- (3) External high-stability source, range, 3.6-4.6MHz, level 2V.

FREQUENCY STABILITY

VFO : 1.5-30MHz - better than $\pm 250\text{Hz}$.

Crystal: 1.5-5MHz - better than 5 parts in 10^6 , above 5MHz- better than 2 parts in 10^6 .

RF OUTPUT LEVEL

100mW into 75 ohms.

INPUT FREQUENCY

Audio: 300-3,500Hz, $\pm 2\text{dB}$
Keyed: 1,000Hz.

AF INPUT LEVEL

+10 dBm to -20 dBm.

AF INPUT IMPEDANCE

600 ohms balanced.

FSK or CW KEYING

Polar: 20-0-20V minimum

Neutral: -20V minimum

Contact-Closure : Maximum loop resistance 1500 ohms

CARRIER SHIFT (FSK)

Adjustable 100-1,000Hz.

CARRIER REINSERTION

Continuously variable from -26dB to -6dB.

CARRIER SUPPRESSION

SSB: -50dB
DSB: -30dB

DISTORTION

Total harmonic content -40dB
Two tone test -40dB referred to the level of either tone
Unwanted sideband suppression -48dB
Noise and hum -45dB
Other spurious output -50dB

METERING

- (1) RF output
- (2) FSK - VFO calibration

TYPES OF EMISSION

Telephony Suppressed, reduce or full carrier with selection of upper, lower or double sideband.
Telegraphy FSK or CW On/Off keying speeds up to 200 bauds.

CALIBRATION

Crystal check-points every 10kHz

FREQUENCY SETTING ACCURACY

VFO: $\pm 250\text{Hz}, \pm 1 \text{ part in } 10^6$.

SUPPLY VOLTAGE

100-125V or 200-250V, 45-60Hz, single phase, 150VA approx.

DIMENSIONS AND WEIGHT

<u>Height</u>	<u>Width</u>	<u>Depth</u>	<u>Weight</u>
10.5 in. 26.7 cm.	19 in. 48.3 cm	21.3 in. 54 cm.	60 lb. 27.2 kg.

CONTROL, FREQUENCY CONVERTOR
(5820-99-107-3801)
(H.F.Receiver pre-selection and protection unit)

RELEVANT PUBLICATIONS
AP 116E-2204-1



Control, frequency convertor
5820-99-107-3801

FUNCTION

The HF receiver pre-selection and protection unit is designed to enable h.f. receiver to be operated in close proximity to high-power transmitters; it also provides a high degree of pre-selection, thus reducing adjacent-channel interference and intermodulation products.

ORIGIN

Racal Communications Ltd., Type MA.197B-1.

FREQUENCY RANGES

1 to 30MHz in 6 ranges (300-10 metres).

INPUT IMPEDANCE

92 ohms (when used with common-aerial systems) and 75 ohms.

OUTPUT IMPEDANCE

75 ohms.

SELECTIVITY

86 to 100dB attenuation for signals 5% off-tune (2-24MHz only), direct connections through unit in 1-2MHz and 24-30MHz ranges.

NOISE FACTOR

12 dB over all ranges 1 to 5 when used with receiver, radio 5820-99-949-4826, providing switch on receiver is set to required range for 1-2MHz and to WIDEBAND for ranges 2 to 5. 15 dB for range 6 with receiver switch set to 24 to 30MHz.

OVERALL GAIN

6 dB nominal (2-24MHz, ranges 2-5 only).

POWER SUPPLY

100-125V or 200-250V, 44-65Hz.

POWER CONSUMPTION

25 watts approximately.

DIMENSIONS

<u>Height</u>	<u>Width</u>	<u>Depth</u>
7 in (17.8 cm)	19 in (48.2 cm)	18 7/8 in (48 cm)

WEIGHT

45 lb (20.5 kg).

SYNTHESIZERS, ELECTRICAL FREQUENCY
(5820-99-107-5920 and 5820-99-950-5771)

RELEVANT PUBLICATIONS:-

AP 116E-0127-IM (formerly AP 4808C)



Synthesizers, electrical frequency
5820-99-107-5920 and 5820-99-950-5771

FUNCTION

The synthesizers, electrical frequency provides a frequency source possessing the stability of crystal control but retaining the flexibility of a manually-tuned system. It provides immediate selection of any multiple of 100Hz throughout the frequency range of 1.6MHz to 31.6MHz with a stability which will not vary, from that of the frequency standard source, by more than one part in 10^{10} . The synthesizer 5820-99-107-5920 (Racal Type MA.250E) is fitted with a remote-tuning-information unit (Racal Type MA.283A) to assist the automatic tuning of associated transmitting or receiving equipment. The synthesizer 5820-99-950-5771 (Racal Type MA.250G/G-3) is fitted with the MA.383A together with a remote shaft-setting servo unit (Racal Type MA.276A) which enables the frequency setting to be carried out from a remote unit. Both synthesizers are self-powered and constructed for 19 in. G.P.O. rack mounting.

ORIGIN

Racal Communications Ltd., Types MA.250E and MA.250G/G-3.

OUTPUT FREQUENCY RANGE

1.6 - 31.6 MHz

CALIBRATION

Indicated frequency is output frequency minus 1.6 MHz.

SETTING INCREMENT

100Hz

SETTING ACCURACY

Deviation from reference source not greater than 1×10^{-10} .

FREQUENCY STABILITY AND AGEING

Dependent on Frequency Standard used. For internal standard:-

- (i) Stability, including ageing, over 24 hours after 30 days operation less than ± 2 parts in 10^9 .
- (ii) Stability with change in ambient temperature of $\pm 25^\circ\text{C}$, from 25°C , less than ± 2 parts in 10^8 .

RE-SETTING TIME

Locking complete within 3 seconds of selection.

SPURIOUS LEVEL

Less than -60 dB relative to fundamental at 1 volt for any non-harmonically related signal.

NOISE LEVEL

Less than -70 dB relative to 1 volt, in a bandwidth of 150Hz spaced kHz from fundamental.

HARMONIC DISTORTION LEVEL

For any harmonically related signal; less than -26 dB relative to fundamental, of level 1 volt in 50 ohms.

EXTERNAL RADIATION

Less than 4×10^{-10} W.

OUTPUT LEVELS

Main: 1V r.m.s. (adjustable in 50 ohms (3 outlets)
Variation of output with frequency ± 1 dB

Fixed: (i) 10 MHz: 1V in 50 ohms (± 3 dB).
(ii) 1.6 MHz: 1V (adjustable) in 50 ohms (3 outlets).
(iii) 1 MHz: 1V in 50 ohms (± 3 dB).
(iv) 100 kHz: 1V in 50 ohms (± 3 dB).

MUTING

Main output suppressed 60 dB during re-setting process.

REFERENCE FREQUENCY SOURCE

5 MHz, 1 MHz, 200 kHz or 100 kHz at 0.2-2v r.m.s. in 1000 ohms.

EXTERNAL INTERPOLATION

A signal in the range 300-400 kHz the level of which is 1 volt r.m.s. ± 3 dB in 100 ohms.

EXTERNAL A.F.C.

A signal at 600 kHz capable of being varied ± 500 Hz of level 100 mV r.m.s. ± 3 dB from a source impedance less than 500 ohms.

METER

Provides indication of

- (i) Locking conditions for each decade.
- (ii) Output level, main output only.

POWER SUPPLY

100-124V and 200-250V $\pm 6\%$, 45-65Hz a.c., 65 watts approx.

ENVIRONMENTAL CONDITIONS

Designed to meet specification DEF 133-L2, operating within the ambient temperature range of 0°C to $+55^{\circ}\text{C}$.

DIMENSIONS

Height	Width	Depth
$8\frac{3}{4}$ in (22.2 cm)	19 in (48.3 cm)	$18\frac{3}{4}$ in (47.7 cm)

WEIGHT

64 lb. (29.4 kg) approx. (MA.250E)
84 lb. (38.5 kg) approx. (MA.250G-3).

CONVERTERS, INDEPENDENT SIDEBAND

(5820-99-954-3240,
5820-99-142-5800,
5820-99-618-3703
and
5820-99-618-3704)

RELEVANT PUBLICATIONS

AP 116E-0729-1



Converters, independent sideband

FUNCTION

The converters are varieties of the Racal RA.98 independent sideband adaptor, which is designed to enable certain Racal receivers (see below) to be used for the reception of single or independent sideband transmissions. The converter can also be used for the single sideband reception of double sideband transmissions. An automatic frequency control (a.f.c.) system compensates for drift in the operating frequencies of the receiver or distant transmitter. Either a variable or a crystal-controlled local oscillator is employed for, respectively, pilot (or full) carrier or fully-suppressed carrier reception. Audio output from either sideband can be selected. The converters work from i.f. input signals at 100 kHz. The units are completely self-contained and are constructed for 19in rack mounting.

ORIGIN

Racal Communications Ltd., Types RA.98A (5820-99-954-3240) and RA.98D (5820-99-142-5800) for use with either of the Racal receivers Types RA.17L (5820-99-999-9242) and RA.117 (5820-99-949-4826); Types RA.98F (5820-99-618-3704) and RA.98E (5820-99-618-3703) for use with either of the Racal receivers Types RA.317-5820-99-107-4926) and RA.2118 (5820-99-624-0202).

MODES OF RECEPTION

I.S.B. (A3b)
S.S.B. (A3a, A3h, A3j)
D.S.B. (A3).

SIGNAL INPUT FREQUENCIES

100 kHz \pm 6 kHz.

SIGNAL INPUT LEVELS

50mV to 500mV r.m.s.

INPUT IMPEDANCE

75 ohms nominal, unbalanced.

SENSITIVITY

100mV input for 40mW audio outputs.

AUDIO OUTPUTS

- (i) U.S.B. Channel. Up to 40mW into 600 ohms, balanced.
- (ii) L.S.B. Channel. Up to 40mW into 600 ohms balanced.
- (iii) Monitoring. One attenuated output, switchable to either channel.

PASSBAND RESPONSE

Within 3dB from 300Hz to 6000Hz.

HARMONIC DISTORTION

Less than 5 per cent.

INTERMODULATION PRODUCTS

Not less than -40dB relative to peak sideband power.

SIDEBAND REJECTION LEVEL

Not less than -50dB between 500 and 5000Hz in the unwanted sideband.
Above 5000Hz, -40dB

CARRIER REJECTION LEVEL

Not less than -35dB.

AUTOMATIC GAIN CONTROL

A delayed a.g.c. voltage, derived from the carrier of the input signal, is applied to the receiver a.g.c. line. The combined receiver and adaptor a.g.c. characteristic is typically:-

A 60dB increase in r.f. signal input level above $1\mu\text{V}$ results in an increase of audio output not exceeding 6dB.

AUTOMATIC FREQUENCY CONTROL

An electro-mechanical system with 'memory' facility operates from pilot carrier levels from 0dB to -26dB relative to peak sideband power.

Captive range : $\pm 50\text{Hz}$
Correction range : 1 kHz
Correction rate : $\pm 50\text{Hz}$ per second, max.
Residual tuning error: less than $\pm 3\text{Hz}$.

TUNING ACCURACY, SUPPRESSED CARRIER WORKING

- (i) Using internal crystal oscillators, residual error is less than $\pm 2\text{Hz}$ (RA.98D and RA.98E).
- (ii) As determined by external reference signal (RA.98A and RA.98F).

POWER SUPPLY

100 to 25 volts or 200 to 250 volts, 45 to 65Hz, single phase

POWER CONSUMPTION

70 watts approx.

DIMENSIONS

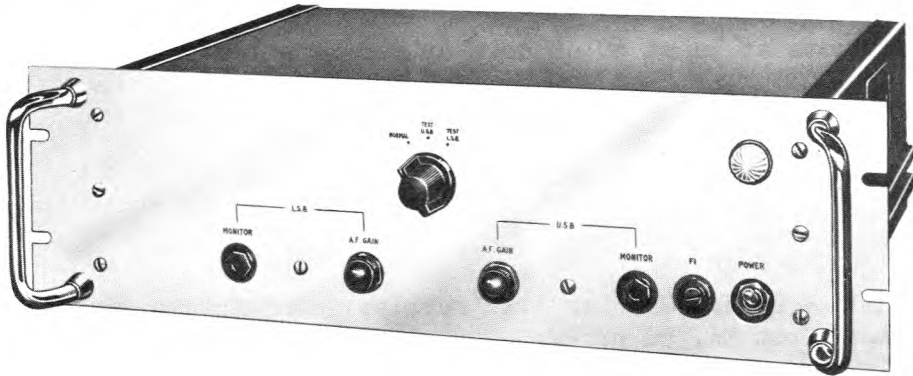
Height	Width	Depth
$5\frac{1}{4}$ in	19 in	14 in
(13.4 cm)	(48.2 cm)	(35.6 cm)

WEIGHT

38 lb (17.3 kg).

MODULATOR, RADIO TRANSMITTER
(5820-99-107-3800)

RELEVANT PUBLICATIONS
AP 116E-0251-1



Modulator, radio transmitter 5820-99-107-3800

FUNCTION

The modulator, radio transmitter is designed to enable either of the drive units, transmitter 5820-99-971-8011 (Racal Type MA 79G) or 5820-99-107-3802 (Racal Type MA.79H) to be used for the transmission of both single-sideband and independent sideband transmissions. The modulator has a built in l.t. supply for filaments, but obtains its h.t. supply from the drive unit, transmitter. It is constructed for 19 in G.P.O. rack mounting.

ORIGIN

Racal Communications Ltd., Type MA.175.

OPERATING FREQUENCY

1.4 MHz

A.F. INPUT LEVEL

-10 to +10 dBm (each channel).

A.F. INPUT IMPEDANCE

600 Ω balanced or unbalanced.

A.F. RESPONSE (MA.175)

300Hz to 3500Hz ± 3 dB..

OUTPUT

Upper and lower sideband, suppressed carrier.

CARRIER SUPPRESSION

-50 dB.

DISTORTION

Odd order products at least 50 dB down on two-tone test.

SPURIOUS NOISE

-50 dB relative to normal output.

POWER SUPPLY

100 - 125V, 200 - 250V, 50Hz for l.t. supply; consumption 15 watts.
230V, 35mA d.c. from MA.79G or H.

DIMENSIONS

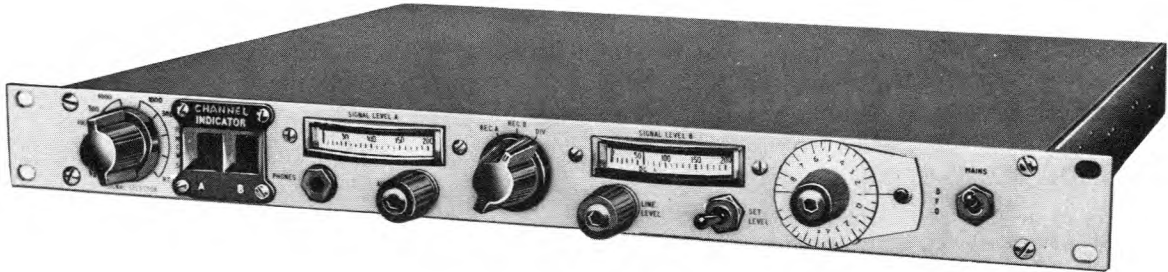
Height	Width	Depth
5 $\frac{1}{4}$ in	19 in	14 in
(13.4 cm)	(48.25 cm)	(35.6 cm)

WEIGHT

16 lb (7.25 kg) approx.

DIVERSITY SWITCHING UNIT
(5820-99-949-3472)

RELEVANT PUBLICATIONS
AP 116E-1707-1.



Diversity Switching Unit (5820-99-949-3472)

FUNCTION

The diversity switching unit 5820-99-949-3472 is a transistorized unit designed to reduce the effect of antenna signal fading resulting from adverse propagational conditions. The unit is essentially an electronic switching device which automatically selects the greater i.f. output (100kHz) of two receivers. The receivers must be fed by two diversity-spaced aerials of equal or nearly equal, noise characteristics. The unit is self-powered and will accept m.c.w. or c.w. signals of telegraph speeds up to 1000 bauds; r.t. or single sideband operation is possible. The unit is specifically designed to function with either receiver, radio 5820-99-999-9292 (Racal Type RA 17L) or receiver, radio 5820-99-949-4826 (Racal Type RA.117A).

ORIGIN

Racal Communications Ltd., Type MA.168B.

OVERALL GAIN

With b.f.o. on and an unmodulated i.f. output signal of 50 mV, a 1kHz audio output of 0 dBm \pm 1 dB into a 600-ohms load is obtainable. With b.f.o. off, the same input signal modulated by 30% by 1 kHz produces a similar a.f. output.

PATH SELECTION SWITCH OPERATION

With a nominal i.f. input signal of 10 mV to each path, the switch operates to select the greater signal when either input is varied by 6 dB. With a nominal i.f. input signal of 30 mV to each path, the switch operates to select the greater signal when either input is varied by 3 dB.

DIVERSITY I.F. OUTPUT

The output level measured across a 75-ohms load is within ± 3 dB of the input level for either path. The difference in output level of the two paths is less than 0.25 dB.

ATTENUATION OF PATH NOT IN USE

Greater than 40 dB relative to path in use.

PATH SWITCHING TRANSIENT

Does not exceed 10 mV measured across output of unit.

SWITCHING TIME

Less than 10 μ S for the i.f. switch control stage to change state.

B.F.O. BREAK-THROUGH

The break-through, measured across a 75-ohms load at the i.f. output, is less than 300 μ V.

INTERMODULATION PRODUCTS

Within the C.C.I.R. requirements for i.s.b. transmission 3rd order products better than -36 dB.

BANDWIDTH OF I.F. PATHS

Not less than ± 10 kHz to the 3 dB points.

BFO FREQUENCY VARIATION

Capable of ± 8.5 kHz minimum deviation from 100 kHz. Dial calibration in 500Hz intervals from 0 to 8 kHz. Dial accuracy ± 100 Hz.

BFO FREQUENCY STABILITY

Less than 50Hz in first hour. Less than 10Hz per hour at constant ambient temperature after initial 1-hour warm-up period. Drift less than 600Hz over a period of one hour during temperature rise from 0°C to 70°C. Maximum pulling occurring between no input signal and 200 mV signal input to mixer is 5Hz.

CW DISTORTION

Less than 7% total harmonic distortion of 1 kHz audio product with 200 mV actual i.f. signal; audio output level for this requirement is +2.5 dBm.

CW RESPONSE

Within 4 dB over the range of 500Hz to 8.5kHz.

AMPLITUDE MODULATION DETECTOR

Range of handling of i.f. signals, 10 mV to 150 mV with 30% modulation at 1 kHz. Distortion of a.f. output less than 5%. Response within 4 dB in the range of 500Hz to 8 kHz when either the Audio Gain or Line Level control has been adjusted to give an output level of +2 dBm with 150 mV input.

INPUT SIGNALS

Two 100 kHz inputs one from each receiver. Connections are made by BNC coaxial connectors.

OUTPUT SIGNALS

One diversity i.f. output 100 kHz within ± 3 dB of the input. Connections made by BNC coaxial connector. Impedance 75 ohms. 600 ohms audio output to line by rear mounted terminal strip; maximum output level of 2.5 dBm, balanced or unbalanced (c.w. or m.c.w.) input.

PHONE (MONITOR) OUTPUT

Phone jack socket providing +2.5 dBm audio output at 600 ohms (c.w. or m.c.w.) input).

RECEIVER PHASE LOCKING CONNECTIONS

RA.17L.

From each receiver, a second v.f.o. signal in the range 2.1 to 3.1 Mc/s at a level between 180 and 300 mV; these two signals are phase locked by a switch on the Diversity Unit. A special loaded cable for interconnecting the 1 MHz oscillators in each receiver; the oscillator in one of the receivers is rendered inoperative.

RA.117.

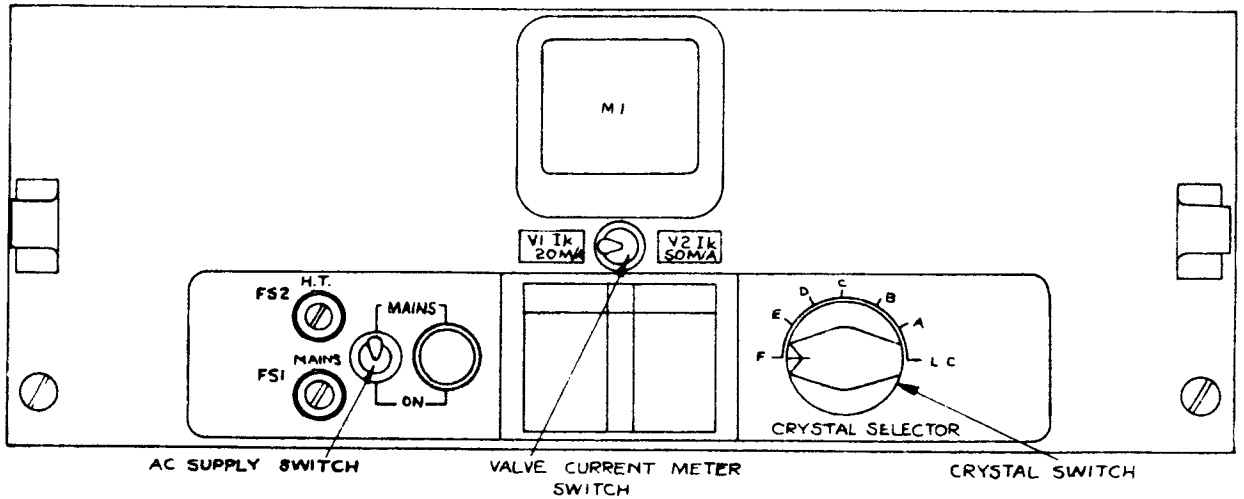
The 1 MHz, 1.7 MHz and 3.6 to 4.6 MHz oscillators in one of the receivers are rendered inoperative; three 75-ohm cables are used to connect the two receivers such that the above oscillators are common to both.

POWER REQUIREMENTS AND CONSUMPTION

100 to 120V or 200 to 250V in 10V steps, 45 to 65Hz a.c. Consumption 4.5 watts.

DRIVE UNIT, RADIO TYPE T10198
(Marconi HD26)

RELEVANT PUBLICATION
116E-0233-1



Drive unit, radio Type T10198, Marconi HD26 (Edition A)

FUNCTION

This unit provides six crystal-controlled spot frequency outputs in the range 1.4-8 MHz from six separate oscillator circuits.

GENERAL DESCRIPTION

The crystal drive unit consists of a crystal oscillator, power amplifier and a power supply unit. The Oscillator frequency is determined by one of the crystals as preselected. The unit also provides a facility to feed in an external L.C. oscillator via plugs and a position on the crystal selector switch. There are two models of the equipment known as Edition A and Edition B. Edition A is as illustrated and is runner mounted. Edition B has no meter (M1) and no valve current meter switch for oscillator and amplifier d.c. feed readings, but sockets are provided at the rear of the equipment for insertion of external metering (located on the drive unit radio Type 10157, HD20 to measure the amplifier and oscillator (V1 and V2) cathode currents).

This unit forms part of HD20 Series FSK drive assembly.

ORIGIN

Marconi Instruments Ltd., (HD26) (Hand book T3266).

TECHNICAL DATA

Frequency range:-	6 spot frequencies in the range 1.4 -- 8MHz.
Crystal type:-	AT-cut evacuated, with flat temperature co-efficient over one of the two ambient temperature ranges.
Frequency stability:-	For the frequency range 1.75 -- 8MHz. less than ± 10 in 10^6 per month.
Output impedance:-	75 ohms, unbalanced
Edition B model	

Insertion of external metering facilities are provided via

- 1) "Osc" jack (JKA) for a 0-1 mA 50 Ω meter (to measure V1 cathode current).
- 2) "Ampl" jack (JKB) for a 0-1 mA 50 Ω meter (to measure V2 cathode current).

DIMENSIONS

Width	Depth	Height
19 in. (48.3 cm)	10 in. (25.4 cm)	7 in. (17.8 cm)

WEIGHT

19 lb (8.6 kg).

Ambient temperature ranges:- (a) 5°C - 30°C (1.4 (1.4 -- 8MHz)
(b) 10°C - 40°C (2 -- 8MHz only)

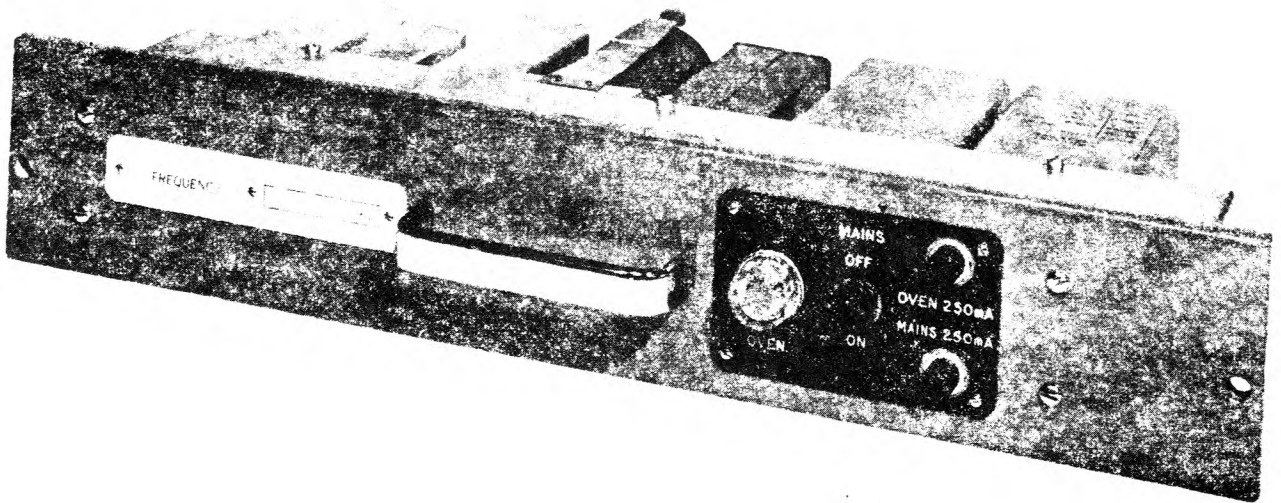
POWER SUPPLY INPUT

200-250 volts 50 Hz single phase a.c.

Power consumption:- 22 watts, 0.9 power factor (approx.)

DRIVE UNIT, RADIO TYPE T10159
(Marconi HD21)

RELEVANT PUBLICATION
116E-0237-1



Crystal drive unit type T10159, Marconi HD21 (10D/20456)

FUNCTION

The crystal drive unit provides a preset crystal controlled r.f. output in the range 1.6 MHz to 4 MHz or 4MHz to 8 MHz.

GENERAL DESCRIPTION

This unit provides an amplified preset spot frequency output from a single crystal controlled oscillator, jack sockets JKC and JKD are provided for insertion of external meters to meter the cathode currents of the internal oscillator and amplifier stages.

There are several models of the equipment known as Edition A to Edition G, each differing in a minor detail and these are listed in AP 116E-0237-1.

ORIGIN

Marconi Instruments Ltd., (HD21) (Handbook T2774)

Frequency range selection

Edition D only:- Via a tag board link
(frequency range 1.6 MHz to 8 MHz)

All other editions:- Via two-position range switch on front
panel (frequency range 2 MHz to 4 MHz
or 4 MHz to 8 MHz)

Crystal frequency control and amplifier tuning control are located at the rear of the panel.

Frequency stability:- Less than 5 in. 10^6 per month for
a change in temperature from 20°C
to 50°C.

Output:- 100 mW into 75 ohms unbalanced

PHYSICAL DATA

All models of the unit are designed for mounting in a standard 19 inch rack.

DIMENSIONS

Height	Width	Depth
8.9 cm ($3\frac{1}{2}$ in.)	48.3 cm (19 in.)	22.8 cm (9 in.)

WEIGHT: 5 kg (11 lb.)

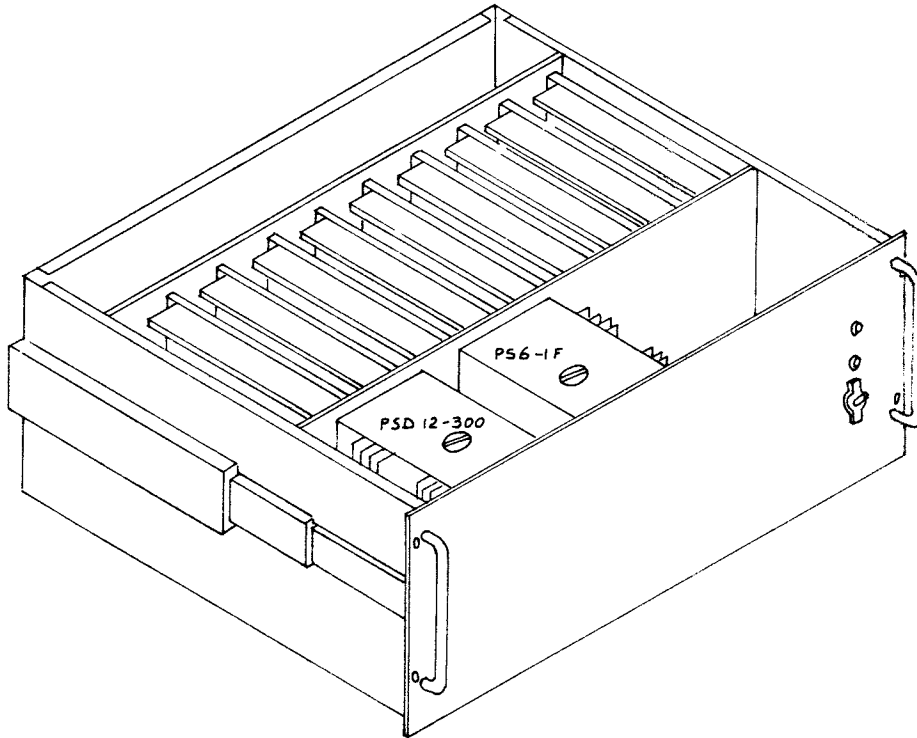
POWER SUPPLY INPUT REQUIREMENTS

200-250 volts, 40 or 50 Hz single phase a.c. mains (Model Edition A - WQ.13151 is for 40 Hz supply frequency only).

Power consumption:- 15W at 0.8 power factor (Approx.)

COMMAND TONE GENERATOR CTG-1001

RELEVANT AIR PUBLICATION
116E-0260



Command tone generator CTG-1001

FUNCTION

A multi-channel high stability oscillator delivering one of eight discrete frequencies between 0.512 kHz and 13.5 kHz to an external modulator in response to command voltage inputs to one or more internal channels.

ORIGIN

TMC Systems ARIZ Inc., Tempe, Arizona 85281

Type CTG-1001

TECHNICAL DATA

Output frequencies

Channel 100	.512 kHz
Channel 200	2.0 kHz
Channel 300	2.9 kHz
Channel 400	6.0 kHz
Channel 500	8.5 kHz
Channel 600	11.0 kHz
Channel 700	13.5 kHz

Output level	Adjustable -20 dBm(78 mV r.m.s.) to +10 dBm (2.45V r.m.s.)
Output load	600 ohm \pm 10% shunted by 200 pF max.
Stability of oscillators	1 part in 10^6 /hour
Environmental conditions	
Temperature limits	0°C to +43°C
Pressure limits	610 to 775 mm Hg
Relative humidity limits	10 to 98 per cent
Line voltage requirements	220 volts, 50 Hz, single phase
(d.c.operating voltages are provided by internal power supply modules PSD12-300 and PS6-IF- Trygon)	

DIMENSIONS

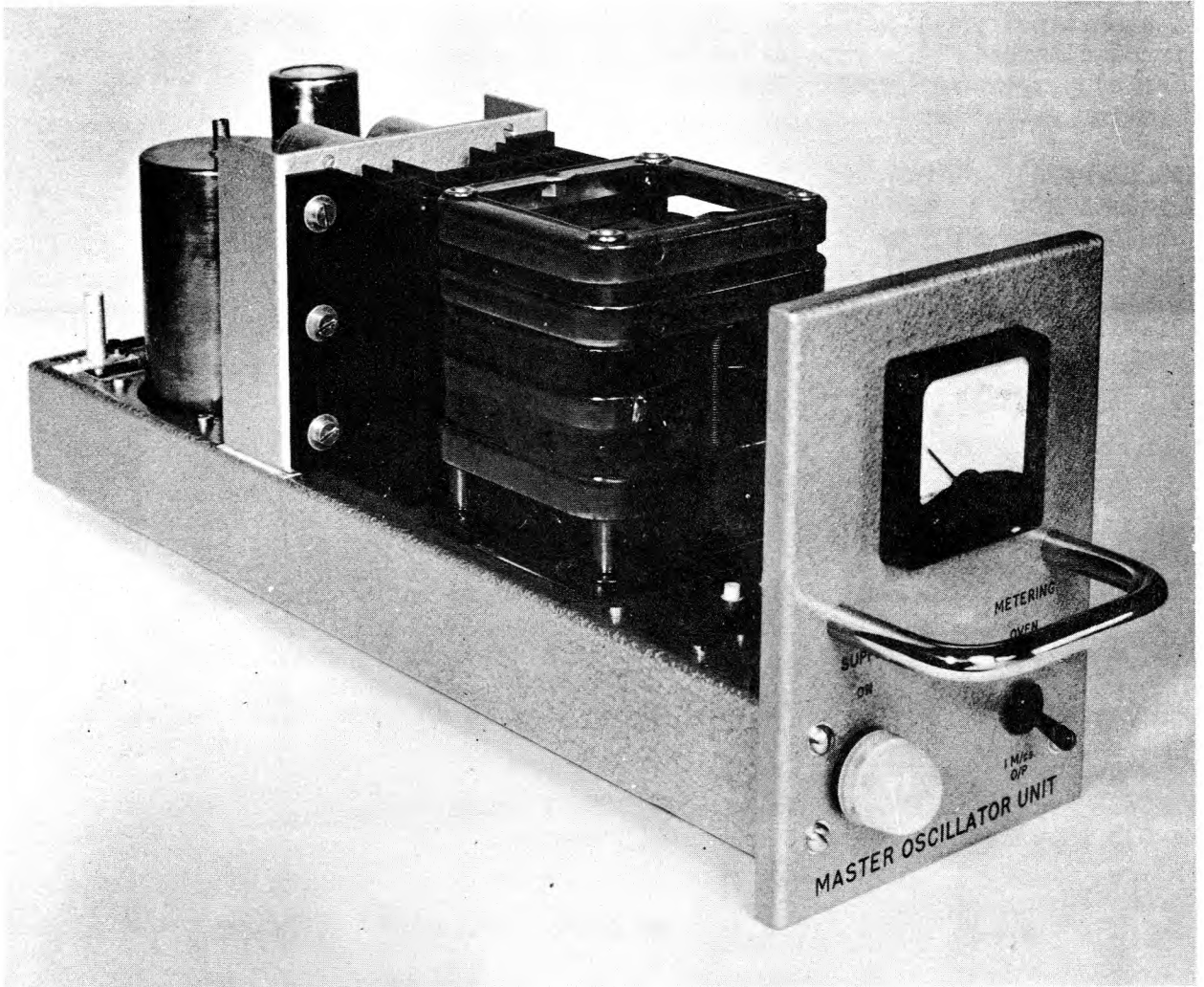
	Width	Depth	Height
Chassis	16.675 in	15.50 in	6.40 in
Front panel	18.375 in	.125 in	6.968 in

WEIGHT 31 lbs.

Center of gravity	From lower left corner, front panel
	7.25 inches along width
	3.75 inches along height
	6.30 inches in depth

1 MHz MASTER OSCILLATOR
Marconi type H1501

RELEVANT AIR PUBLICATION
116E-0246-1B



Master oscillator unit, 1 MHz Marconi type H1501

FUNCTION

The master oscillator is a crystal-controlled 5 MHz standard frequency source forming a primary drive for the Marconi range of frequency synthesizers. The output frequency is stepped down to 1 MHz and then amplified before being fed out.

ORIGIN

Marconi Co. Ltd.,

GENERAL DESCRIPTION

The unit is self-contained on a chassis with front panel and is designed for tray mounting with other apparatus in a standard rack. A 1 MHz standard frequency is fed out by a tuned buffer amplifier from a 5:1 frequency divider which is in turn fed by a temperature stabilized 5 MHz crystal oscillator.

A stabilized power supply is also incorporated and all circuits are transistorized. The crystal oscillator is housed in a hermetically sealed temperature controlled oven in which proportional control eliminates cycling variation.

TECHNICAL DATA

PERFORMANCE

Short term stability at constant ambient temperature and supply voltage
Better than 1 part in 10^8 (0.01 Hz in 1 MHz)

Stability over ambient temperature range -15°C to $+55^{\circ}\text{C}$ and with supply variation of $\pm 6\%$.

Better than ± 3 parts in 10^8 (0.03 Hz in 1 MHz)

Long term ageing

Better than 5 parts in 10^8 per month, positive

Fine trimming range

40 parts in 10^8

Coarse trimming range

Above 400 parts in 10^8 , negative

Output

8 to 16 m watts in 75 ohm coaxial

Harmonics

Better than 40 dB below output level.

POWER SUPPLY REQUIRED

100-135 volts or 200-260 volts, 50-60 Hz, 1 phase

0.3 Amps

0.15 amps

DIMENSIONS

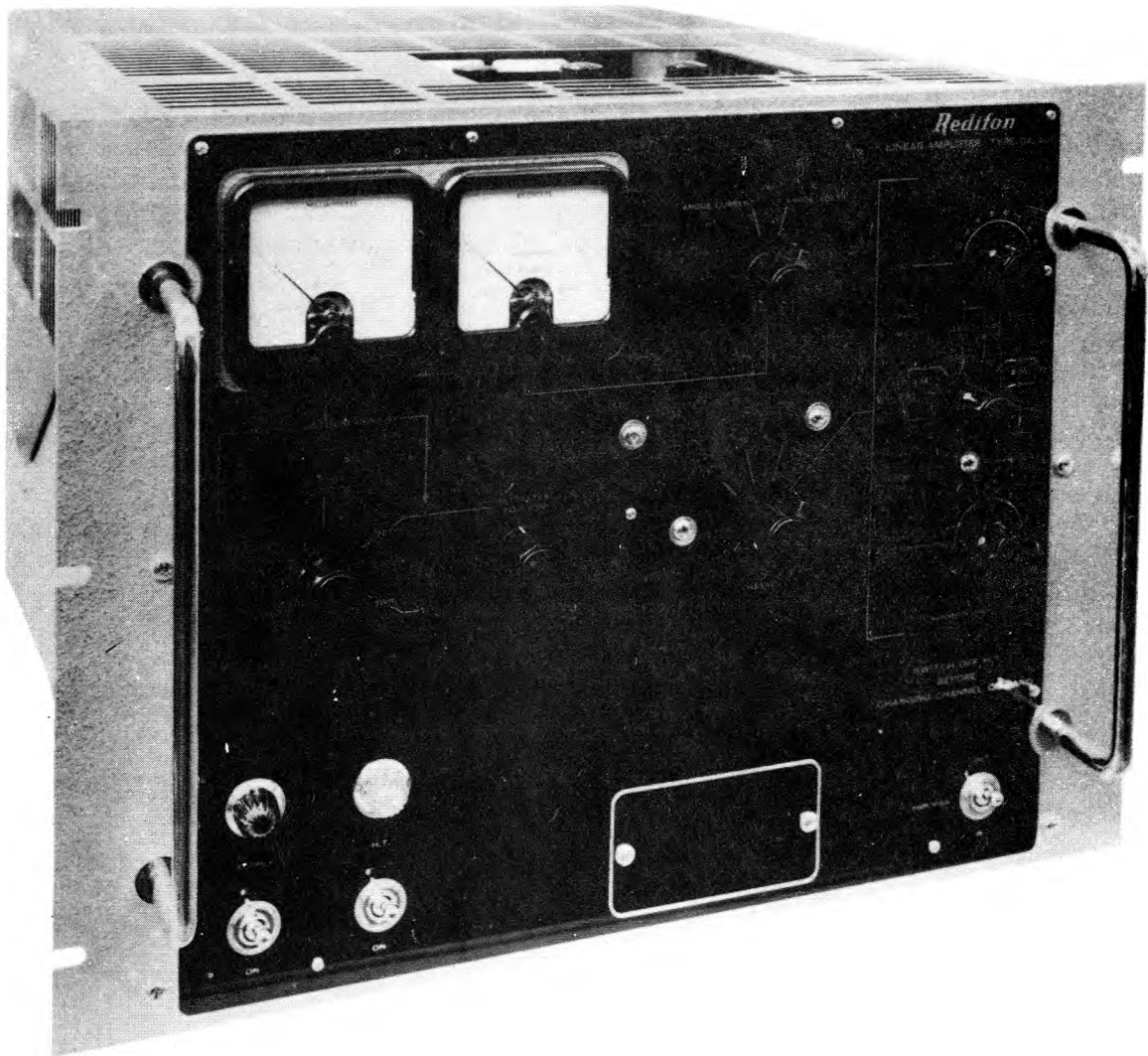
Height	Width	Depth
176 mm (7 in)	130 mm (5 1/8 in)	433 mm (17 in)

WEIGHT

7.7 kg (17 lb)

RADIO FREQUENCY AMPLIFIER
REDIFON TYPE GA406
(5895-99-955-3103)

RELEVANT AIR PUBLICATION
116E-1203



Linear radio frequency amplifier Redifon Type GA406

FUNCTION

The linear radio frequency amplifier type GA406 is designed to boost the output (up to 100 watts p.e.p.) of an external transmitter to 500/750 watts. on four switched spot frequencies in the 2-18 MHz frequency range.

ORIGIN Redifon Co. Ltd.

GENERAL DESCRIPTION

The r.f. linear amplifier type GA406 is designed for use with either the s.s.b.-h.f. radio-telephone type GR410 or the 'Radiplex', i.s.b. multi-channel h.f. system, the amplifier boosts the 100 watt p.e.p. output of an external transmitter to 500/750 watts maximum. On these spot frequency and one variable frequency in the 2-18 MHz frequency range.

The unit is provided for either 19-inch rack mounting or as a self contained unit housed in enclosed individual cabinet, with or without its associated drive equipments.

A facility to by-pass the amplifier in the absence of r.f. drive is provided for the reception of signals on a common antenna. Optional facilities are a remote channel selection from either a GR410 or a 'Radiplex' transmitting terminal type MC13, or from a separate remote control unit; a directional coupler to provide for v.s.w.r. indication on the internal multipurpose meter; and a range of aerial tuning and switching units to enable aerials of various characteristics to be used.

Automatic switching facility

A transistor switching circuit, operating from a rectified sample of the drive signal, provides an automatic amplifier in/out (send/receive) switching facility, with alternative switching time delays as follows:-

- (a) slow - for telephony (approx. 1 sec.)
- (b) medium - for hand-speed telephony (approx. 250 mS)
- (c) fast - for high-speed automatic telegraphy (approx. 100 mS)

Metering

Built-in meters provide indication of:-

- (a) Anode voltage and current
- (b) Screen and grid currents
- (c) RF output to feeder
- (d) Drive equipment r.f. output to feeder when the amplifier is switched OUT.
- (e) VSWR - in conjunction with directional coupler type 6375A.

Optional remote control facilities

Remote switching unit type 6374A provides for remote channel selection from either the GR410 or the MC13, or from a separate remote control unit type 6386A, using a multicore cable, at distances up to 300 ft.

A remote meter unit type 6386A is also available for v.s.w.r. indication.

TECHNICAL DATA

ELECTRICAL SPECIFICATIONS

Frequency coverage	2-18 MHz
4 channels	3-preset tuned 1-continuously tuned
RF power output	
CW (A1)	500 watts at 1:1 mark/space ratio (for a maximum ambient temperature of 55°C) (continuous operation on CW is 400 watts)
SSB (A3a)	750 watts p.e.p.
FSK (F1)	150 watts
Output impedance	50-100 ohms, unbalanced
RF input	50 to 100 watts p.e.p.
Input impedance	50-100 ohms, unbalanced
Intermodulation products	At least 30 dB below 750 watts p.e.p.

POWER SUPPLY REQUIRED

115 or 230 volts, 50-60 Hz, single phase.

Power consumption

Standby	230 VA
Quiescent	1300 VA
150 watt c.w.	1500 VA
750 watt p.e.p.	1750 VA

DIMENSIONS

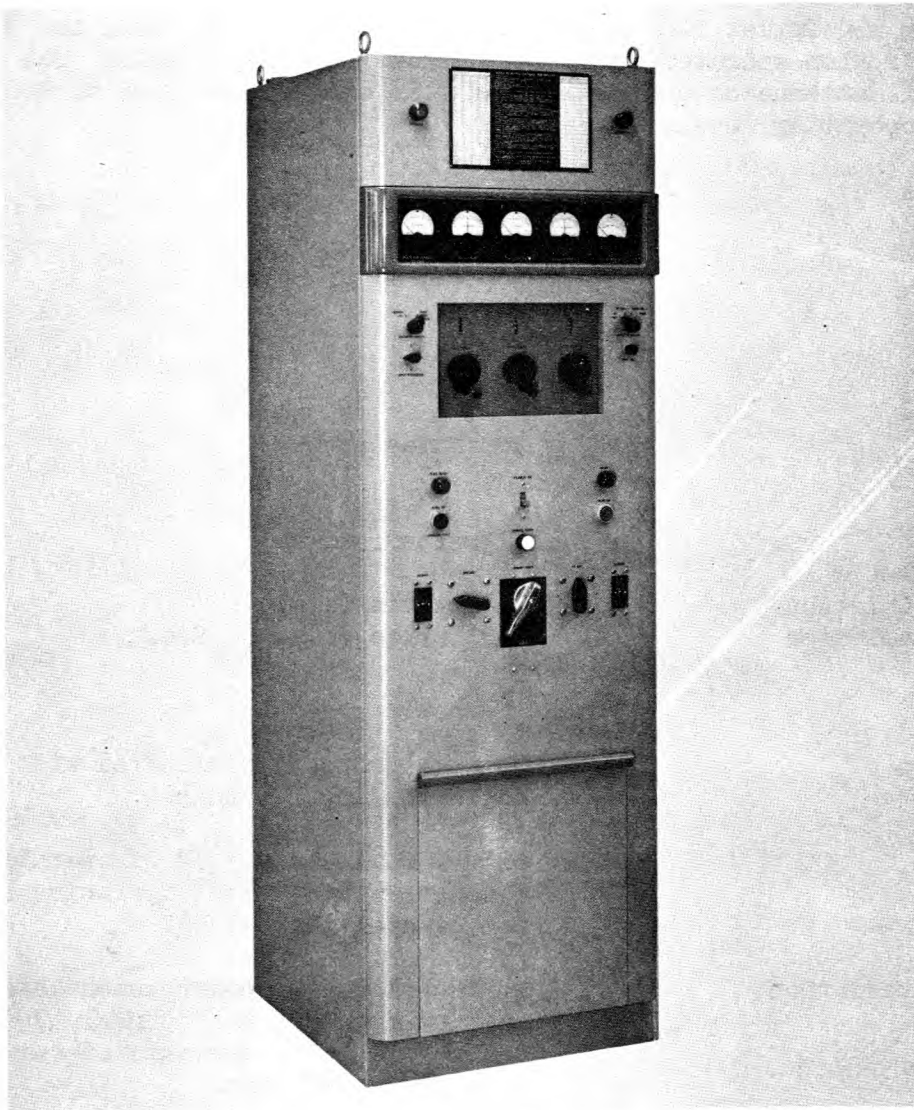
	Height	Width	Depth
RF amplifier (GA406)	355 mm (14 in)	480 mm (19 in)	475 mm 18 $\frac{3}{4}$ in)
Remote switching unit (6374A) not shown (optional)	222 mm (8 $\frac{3}{4}$ in)	115 mm (4 $\frac{1}{2}$ in)	140 mm (5 $\frac{1}{2}$ in)
Directional coupler (6375A) not shown (optional)	180 mm (7 in)	7 mm Dia (2 $\frac{1}{4}$ in)	

WEIGHT

RF amplifier	53 kg (118 lb)
Remote switching unit (optional)	2 kg (4 $\frac{1}{2}$ lb)
Directional coupler (optional)	0.3 kg ($\frac{3}{4}$ lb)

RADIO FREQUENCY AMPLIFIER
Electronic Comms, Inc., Model 96B

RELEVANT AIR PUBLICATIONS
116E-1204



Radio frequency amplifier ECI Model 96B

FUNCTION

This is a radio frequency linear high power amplifier for operation in the 225 to 400 MHz frequency range in a.m., f.m., or f.s.k. modulation mode. The r.f. amplifier amplifies a 50 to 70 watts modulated r.f. carrier power input to 2.5 kw for transmission.

ORIGIN

Electronic Communications Inc., of St. Petersburg, Florida.

GENERAL DESCRIPTION

The r.f. amplifier is a single unit, manually tuned, air cooled, linear power amplifier designed for fixed ground installations and to operate with a low power exciter providing 50 to 70 watts a.m. or f.m.-f.s.k. modulated carrier r.f. power in the 225 to 400 MHz frequency range. The r.f. amplifier provides 2.5 kw carrier r.f. power when operated in a.m. mode, and 3 kw carrier power when operated in f.m. or f.s.k. modulation mode. The internal variable r.f. attenuator can reduce the r.f. drive power down to 200 watts for a safe operating level.

TECHNICAL DATA

Frequency range	225 to 400 MHz
Duty cycle	continuous
Tuning	
Method	Manual
Time	2 minutes average
RF power	
Input	70 watts maximum
Output	
F1 emission	3000 watts (a.m.)
A3 emission	2500 watts (f.m. or f.s.k.)
Impedance	
Input	50 ohms
Output	50 ohms properly terminated with v.s.w.r. not exceeding 1.5 to 1
Bandwidth	±250 kHz within 0.5 dB of operating frequency (at 1 MHz of operating frequency not greater than -3dB).
Harmonic radiation	65 dB below full power unmodulated carrier from 225 to 235 MHz. 70 dB below full power unmodulated-carrier from 235 to 400 MHz.
Ambient temperature operating range	-29°C to 52°C
Warm up time	5 minutes maximum

POWER SUPPLY REQUIRED

Voltage limits	360 to 460V a.c.
Frequency limits	50 to 60 Hz
Phase	3-phase, or 3 or 4-wire
Power rating (maximum)	15 kVA at 90 percent power factor

DIMENSIONS

Height	Width	Depth
1879 mm	585 mm	712 mm
(74 in)	(23 in)	(28 in)

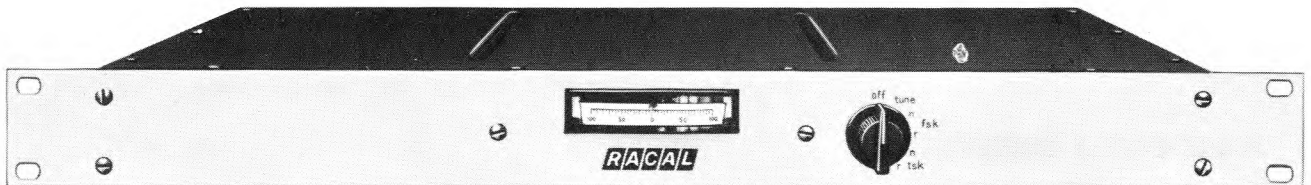
WEIGHT (complete) 613 kg (1350 lb)

SECTION 2

**VOICE/AUDIO FREQUENCY GENERATION
EQUIPMENT**

FREQUENCY CONVERTER
(5820-99-223-1327)
(Racal type RA 316, variant)

RELEVANT AIR PUBLICATION
116E-2212-1



Frequency converter, Racal type RA316 variant.

FUNCTION

Converts frequency shift or tone shift keyed signals into binary d.c. telegraphy information in single or double current mode.

ORIGIN. Racal Communications Ltd., type RA316D (DA 41 206/2)

GENERAL DESCRIPTION

This is a transistorized frequency/converter unit which converts the frequency shift or tone shift keyed signals with speeds up to 150 bauds into binary d.c. information suitable for operating a teleprinter, or similar device, either single or double current, using an external telegraph supply.

The frequency converter unit includes a built in -16 volt power supply (Racal type PUL151, 5820-99-142-7911).

TECHNICAL DATA

Input a)	I.F. output from receiver, centred on 100 kHz at 270 mV nominal, into 10k ohms, unbalanced.
b)	A.F. output from receiver, centred on 2550 Hz at 270 mV nominal, into 3k ohms, unbalanced.
Shift	85 to 850 Hz.
Data rate	Up to 150 bauds.
Meter indication	100-0-100 μ A, centre - zero meter, for indicating mark/space balance.
Output a)	Polar relay, dry contacts. Contact rating 120V, 60 mA, into an inductive load.
b)	Alternatively, a solid-state electronic relay may be fitted.

POWER SUPPLY REQUIREMENTS

100-125V or 200-250V, 45-400 Hz.
In-built power unit output
-16 Volts at 150 mA.

(5820-99-142-7911)
(Racal type PUL151)

DIMENSIONS

For rack mounting

Height	Width	Depth
44.5 mm (1 $\frac{3}{4}$ in.)	483 mm (19 in.)	405 mm (16 in.)

WEIGHT

6.8 kg. (15 lb) approximately.

PART 6

CONTROL AND MONITORING EQUIPMENT

PART 6

CONTROL AND MONITORING EQUIPMENT

INTRODUCTION

- 1.** The advent of ground radio communication systems with separate transmitting and receiving sites remotely-controlled from a central control location has resulted in the introduction of more complex control systems and an increase in the monitoring equipment required to check performance.
- 2.** Much of the equipment covered in this Publication comprises sub-assemblies and units incorporating controls and monitoring or test equipment built in a an integral part of the design. Part 6 covers self-contained or readily removable, normally rack-mounted units, usually common to a particular equipment range. Section 1 covers the remote control of transmitters and receivers and Section 2 the various types of monitoring equipment.

SECTION 1

**REMOTE CONTROL OF TRANSMITTING
AND RECEIVING EQUIPMENT**

CONSOLE COMMUNICATION

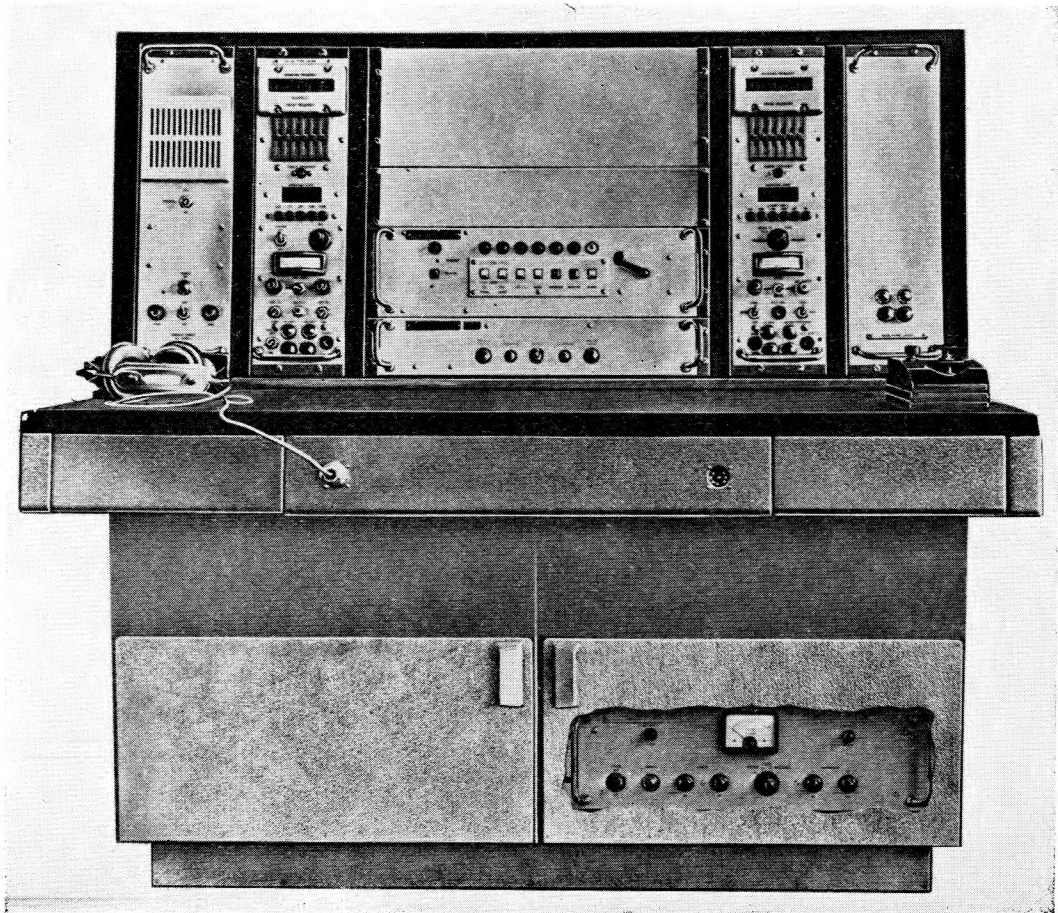
CONTROL

(5820-99-952-0403)

Relevant publications:—

A.P.116E-0127-1U, 1B, 1K, 1AE

A.P.116E-2202-1



Console, communication control, 5820-99-952-0403

Function

The console, communication control (5820-99-952-0403) is located at the control centre of remotely-controlled transmitter and receiver stations FGRI.23144 and FGRI.23196 and provides remote control of the transmitting and receiving sets, radio, used with those stations. It also incorporates associated general communication facilities including a telephone switchboard, oscillator-control, frequency selector (*selective calling equipment*) and loudspeaker, microphone, headsets, morse key, etc.

Construction

The unit is constructed in desk form with the main units housed in a sloping panel above and to the rear of the table top. The selcal and telephone switching control panels are housed in the centre, with the receiver and transmitter remote control panels located on the left-hand and right-hand sides respectively. The panels forming the top surface of the desk table are detachable for access to terminal blocks to which all sub-unit interconnections are made.

Console sub-unit details

(1) Control, radio set, 5820-99-950-5777 (Racal CSA.198) is that part of the receiver and transmitter remote control located at the control centre. It comprises the following four sub-units:—

- (a) Control, remote switching, 5820-99-580-8364 (Racal LA.186A) (*receiver control panel*).
- (b) Control, remote switching, 5820-99-950-5776 (Racal LA.182A) (*transmitter control panel*).
- (c) Oscillator assembly, 5820-99-580-8365 (Racal LA.224) (*tone generator*).
- (d) Power supply, 5820-99-950-5590 (Racal PU.238A) (+12-0-12V supply).

(2) Oscillator-control, frequency selector (*selcal*), 5820-99-954-2904, for the selective calling of a particular aircraft, comprises two sub-units:—

- (a) Control, frequency selector, 5820-99-951-9295 (Elliotts Type ESC-3).
- (b) Oscillator, audio frequency, 5820-99-951-9294 (Elliotts Type ES0-3).

(3) Loudspeaker panel, 5820-99-952-0327 (Racal MA.306).

(4) Panel, telephone switchboard, 5820-99-952-0328 (Racal LA.307).

(5) Power supply, 5820-99-952-0326 (Racal PU.305).

(6) Small line communication sub-units including:—

- (a) Battery nickel-cadmium SL14
- (b) Bell, telephone alarm 2146
- (c) Unit signalling AD2644 (10G/17589)
- (d) Unit speaking AD2237 (10G/15743)
- (e) Generator ringing Type 6 (10G/30)
- (f) Unit signalling AD2645 (10G/18420)
- (g) Keys, Morse, Type D (10F/7373)
- (h) Plug, Type 807 (10H/19736).

Functional particulars:

(Control radio set, 5820-99-950-5777)

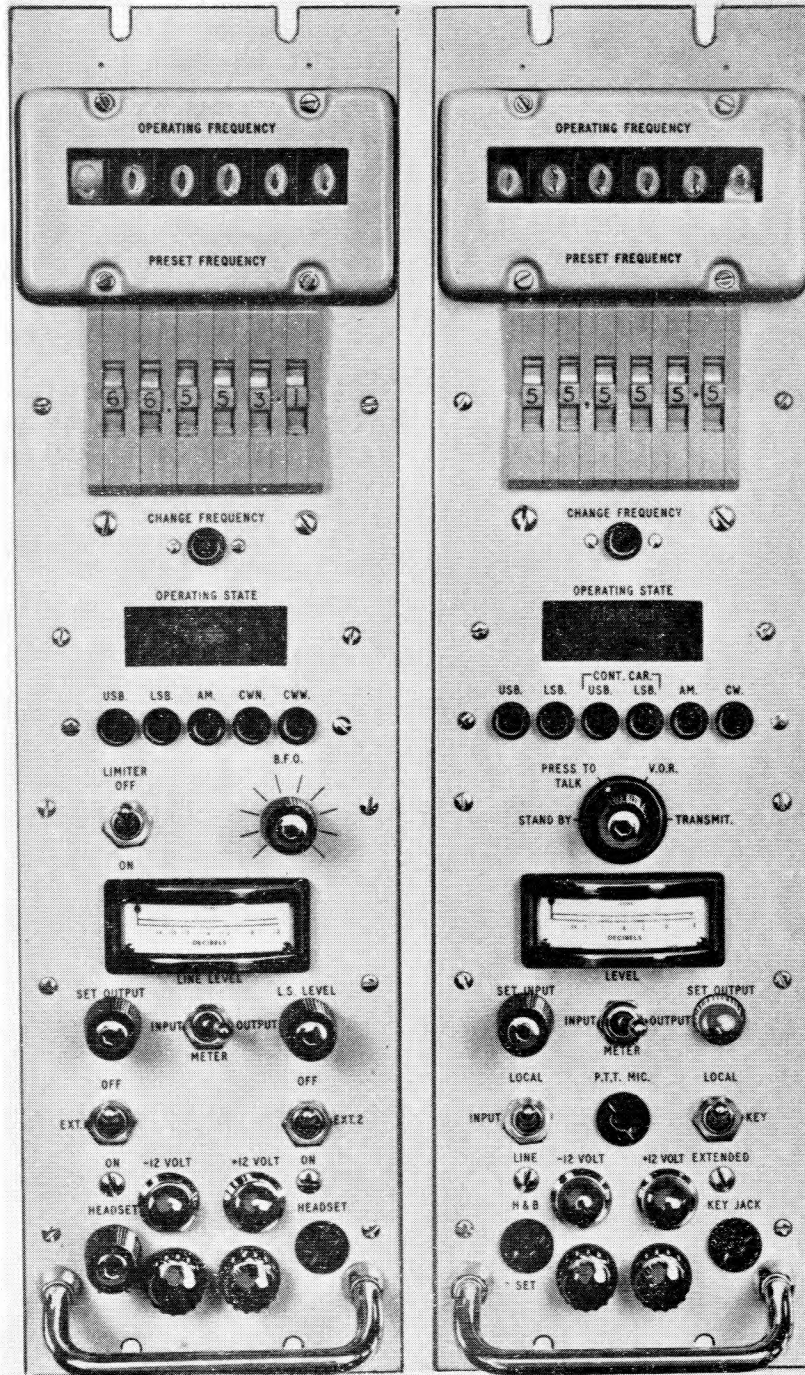
Transmitter control:

(1) *Selector facilities:*

- (a) Operating frequency
- (b) USB, LSB, AM, CW.
- (c) Controlled or suppressed carrier.
- (d) Standby, press-to-talk or VOR operation.

(2) *Control unit-input levels:*

- (a) Local (600 ohms) -25 to +7 dBm.
- (b) Line (600 ohms) -25 to +7 dBm.
- (c) Local key (contact closure)
- (d) Extended key (contact closure) (max. line loop resistance 100 ohms).



Receiver and transmitter control panels

(3) Control unit-output levels:

- (a) Transmitter line (600 ohms) -7 to 0 dBm.
- (b) Control line (600 ohms) -7 to 0 dBm.
- (c) Recorder (600 ohms) -7 to 0 dBm.

Receiver control:

- (1) *Selector facilities:*
 - (a) Operating frequency
 - (b) USB, LSB, AM, CW wideband width, CW narrow bandwidth.
 - (c) BFO adjustment
 - (d) Limiter On/Off (AM only)

- (2) *Control unit – input level:*
Audio line (600 ohms) –25 to 0 dBm.

- (3) *Control unit – output levels:*
 - (a) Loudspeaker (3 ohms) 200 mW max.*
 - (b) Headphones (600 ohms) 0 dBm max.*
 - (c) Line (600 ohms) 0 dBm or –7 dBm**
 - (d) Control line (600 ohms) –7 to 0 dBm (adjustable internally)
 - (e) Recorder (600 ohms) 0 dBm or –7 dBm**
 - (f) Extension 1 (600 ohms) 0 dBm or –7 dBm**
 - (g) Extension 2 (600 ohms) 0 dBm or –7 dBm**
 - (h) Spare (600 ohms) 0 dBm or –7 dBm**

**With separate level controls*

***Normally 0 dBm; attenuator pads fitted on each output which may be adjusted to give –7 dBm*

General:

- (1) *Control tone frequencies (nominal):* 2460 Hz, 1020 Hz, 1500 Hz, 1980 Hz
- (2) *BFO (adjust):* 350 to 890 Hz
- (3) *Signalling speed:* 20 impulses per second.

Power supplies
Dimensions and weight }

Refer to Part 1, Sect. 1, Sheet No. 9.

CONSOLE, TELEGRAPH SET (5895-99-957-0988)

Relevant publications:—

A.P.116K-0401-1 (2nd Edn.)

(the associated publications listed in the above A.P.
cover the installed equipment detailed in this sheet)

Function

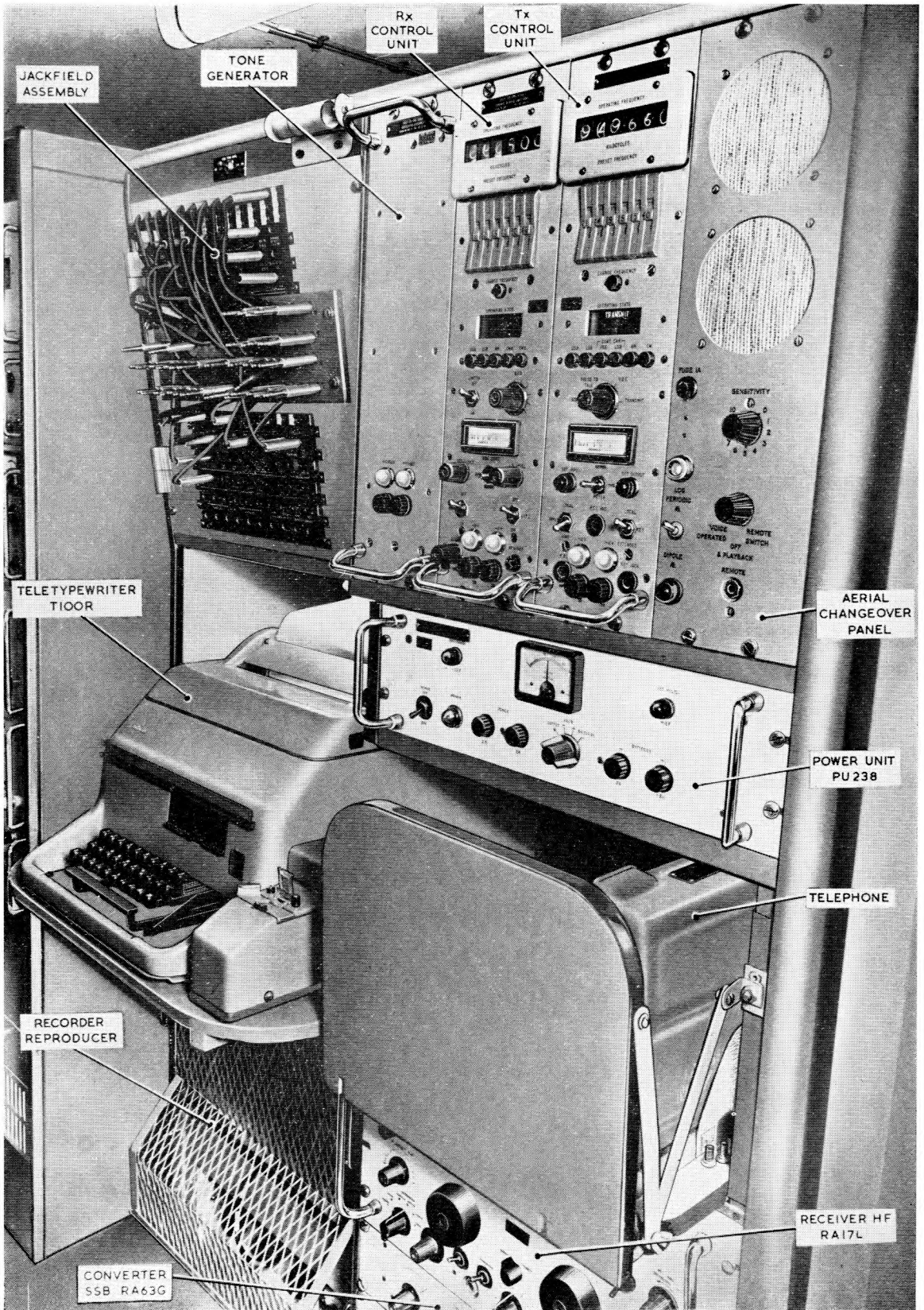
The console is installed in Cabin 2 (radio receiver, control group) of TGRI(AT)26023/1 (Part 1, Sect. 4) and is the focal point of communication control for the station. In addition to housing the remote control units for the main transmitter and receiver, the console is equipped with a jack-field for providing interconnection of the various cabin equipments (Part 1, Sect. 4, Sheet No. 12) and an exchange for the station field telephone system.

Construction

The console is a light alloy framework of desk form with a bench work-top separating the console into upper and lower sections. The upper section houses the jack-field and patch cord unit, control, radio set (CSA.198) and antenna change-over panel. The bench supports a teletypewriter (T100R), single-double current converter (PV.213A), telephone set Type 'L', switched power socket and morse hand key with mounting, together with a hinged flap for a writing surface. Compartments below the work-top accommodate a radio h.f. receiver (RA17L), SSB converter (RA.63G), sound recorder-reproducer (REH4) and oscillator-control, frequency selector (selcal).

Console sub-unit details

- (1) Control radio set, 5820-99-950-5777 (Racal CSA.198). See Sheet No. 1 of this Section for breakdown.
- (2) Panel control, 5895-99-107-3533 (antenna change-over panel).
- (3) Jack assembly, communication system, 5895-99-956-0443 (R.Veh./21400).
- (4) Panel, patching, communication, 5895-99-107-3532 (R.Veh.21448).
- (5) Electronic switch, 5820-99-104-2312 (Marconi F3070).
- (6) Amplifier, audio frequency, 5805-99-195-1269 (Racal MA.223, used with CSA.198).
- (7) Key, telegraph, 5805-99-901-7902 and plate, mounting, telegraph key, 5895-99-107-7073.
- (8) Fan, vane axial, 4150-99-195-4987 (Plannette, 1D907).
- (9) Power supply, 5820-99-950-5590 (Racal PU.238).
- (10) Telephone set, 5805-99-954-2905 (formerly 10G/15098).
- (11) Converter unit, teleprinter, 5815-99-102-5582 (Plessey PV.213A).
- (12) Teletypewriter, 5815-12-134-0147 (formerly 210G/1340147) (Siemens, T100R).
- (13) Recorder-reproducer, sound, 5835-99-943-8235 (Type REH.4).



Console, telegraph set, 5895-99-957-0988

Note . . .

Item (14) combined with item (15) in one cabinet forms Receiving Set, Radio, 5820-99-949-3256 (RA.101)

(14) Receiver, radio, 5820-99-999-9292 (Racal RA.17L).

(15) Converter, single sideband, 5820-99-954-0538 (Racal RA.63G).

(16) Oscillator-control, frequency selector, 5820-99-954-2904 (Elliotts 3041D2800).

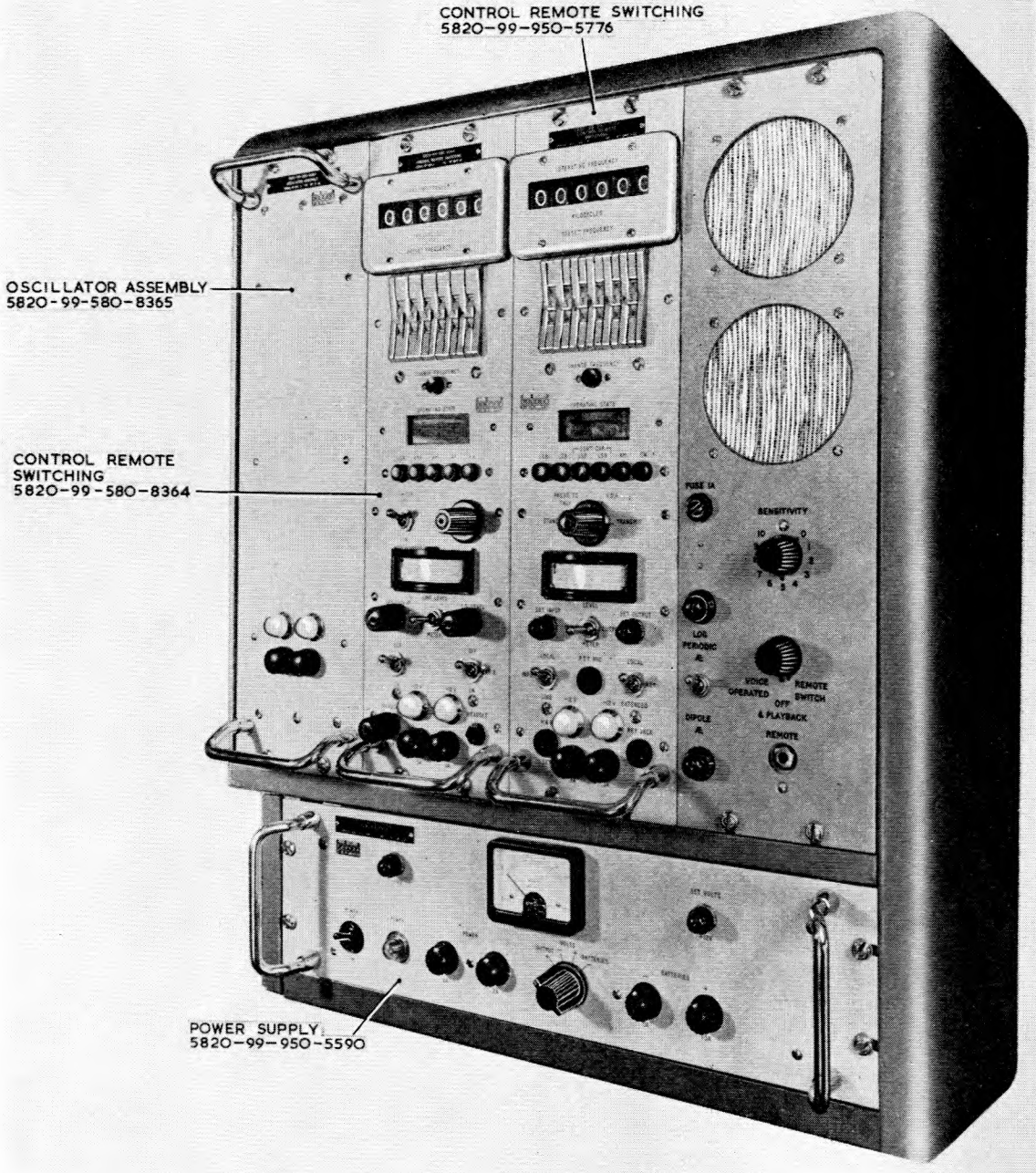
Functional particulars:

Control, radio set:
(5820-99-950-5777)

See Sheet No. 1 of this Section.

Receiver, radio:
(5820-99-999-9292)

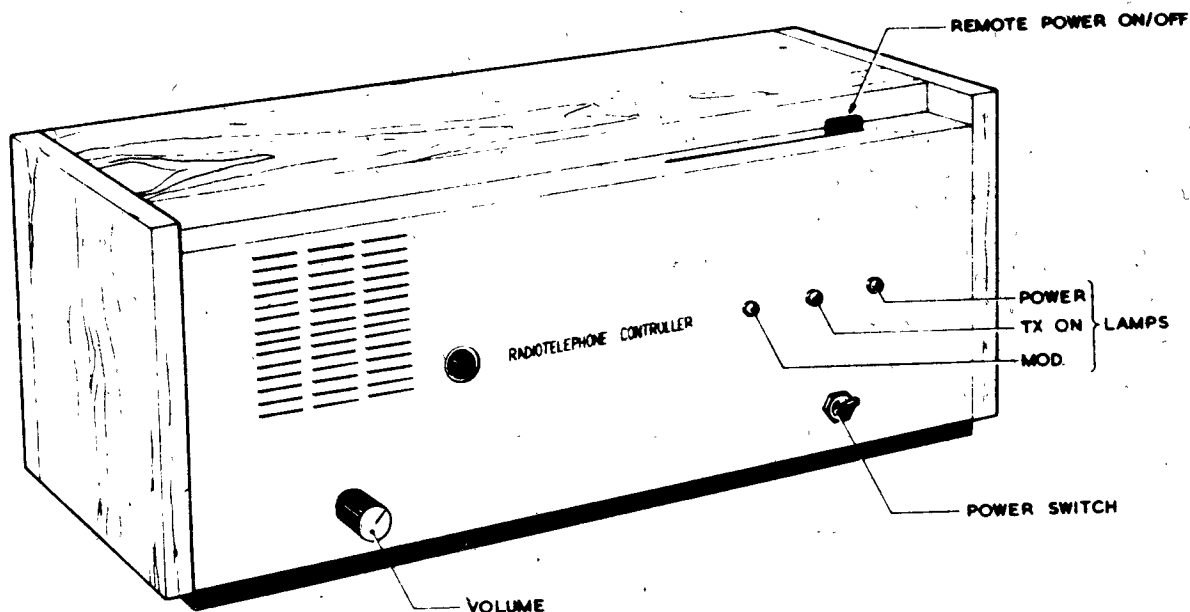
See Part 4, Sect. 1, Sheet No. 12.



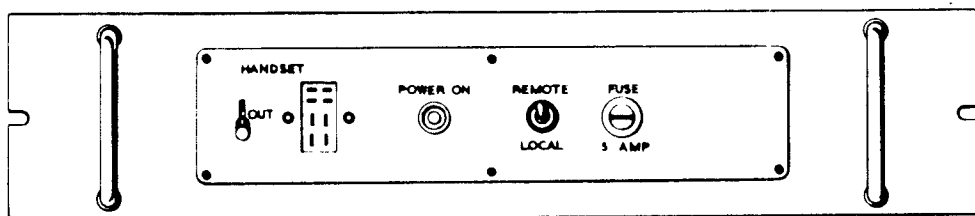
Control radio set, 5820-99-950-5777

TRANSMITTER-RECEIVER CONTROL GROUP (PYE PT RTC and PT RCP)
(Remote radio/telephone controller and radio control panel)

RELEVANT AIR PUBLICATIONS
116E-2209-1



Remote radio-telephone controller (Pye) (10J/5820-99-22-5322)



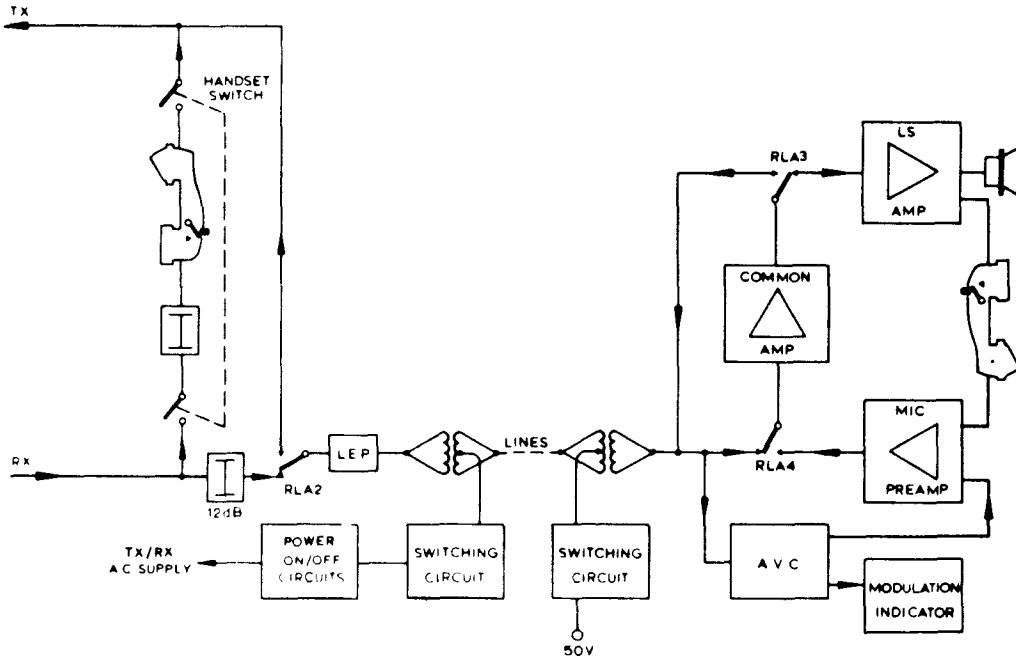
Local relay panel (Pye) (10D/5820-99-222-5321)

FUNCTION

A remote control system for remote control of a fixed base transmitter-receiver set via a local control panel fitted into the transmitter-receiver rack. For testing and tuning purposes the radio telephone control can be transferred to the local control panel via the switching and handset provided on the front panel.

GENERAL DESCRIPTION

The remote control equipment consists of remote radio telephone controller and local control panel and the associated electrical power cable assembly. The remote radio-telephone control unit is supplied with a handset and consists of a power supply unit, audio amplifiers for sending and receiving and a built-in loudspeaker. Removing the telephone receiver from the cradle switches the received speech from loudspeaker to the handset earpiece. The local control panel is mounted in the transmitter-receiver cabinet and has two relays energized via remote control panel to switch on power to transmitter-receiver and also has a connection facility for a handset and change over to local control switching for testing and tuning.



Local control panel fitted into TX/RX to control the TX/RX via Controller's remote radio telephone controller

TECHNICAL DATA

This system is designed to be used with either FGRI 26002/3A, 50 watt v.h.f. radio transmitter-receiver unit, AP 116E-0122-1 or FGRI 23081, 20 watt v.h.f. radio transmitter-receiver unit, AP 116E-0114-1.

RADIO-TELEPHONE CONTROLLER

Sensitivity

Receive 1 watt output for -20 dBm input at line terminals.

Transmit 0 dBm output at line terminals.

Frequency response

Receive Not more than 3 dB down at 300 and 3000 Hz.

Transmit Flat.

Speech compression

Output change does not exceed 6 dB for a 30 dB change in input.

Microphone

impedance 2400 ohms

response Follows a 6 dB per octave pre-emphasis slope (within ± 3 dB) from 300 to 3000 Hz.

Line

Impedance 600 ohms

Loop resistance

L1 to ground Not greater than 2000 ohms

L2 to ground Not greater than 2000 ohms

POWER SUPPLY REQUIREMENTS

100 - 150V or 190 - 240 Volts.

50 - 60 Hz.

Power consumption

Receive 16 watts.

Transmit 20 watts.

DIMENSIONS

	Height	Width	Depth
Remote radio-telephone controller	169 mm	413 mm	188 mm
10J/5820-99-222-5322	(6 5/8)	(16 1/4)	(7 3/8)
Local radio-control relay panel	90 mm	483 mm	241 mm
10D/5820-99-222-5321	(3 1/2)	(19)	(9 1/2)

WEIGHT

Remote radio-telephone controller 7.7 kg (16 $\frac{3}{4}$ lb)

Local radio-control relay panel 3.2 kg (7 $\frac{1}{4}$ lb)

Sub-assembly reference numbers

Handset: 10AH/5965-99-223-3389

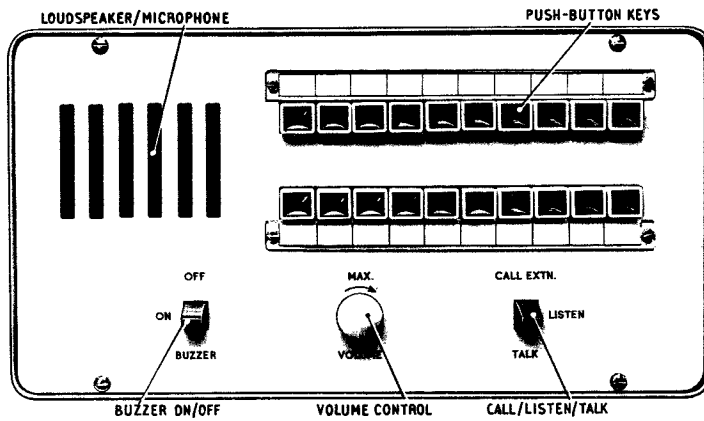
Electrical power cable assembly 10HG/5995-99-223-2476

SECTION 2

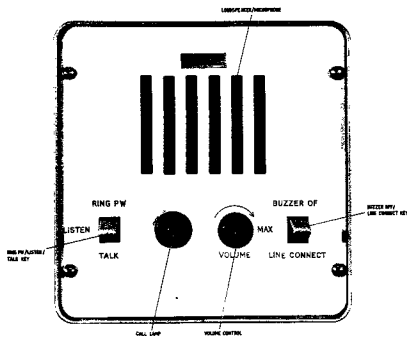
MONITORING EQUIPMENT

INTER-COMMUNICATION EQUIPMENT
Hadley intercom type PO AD5800 (series)

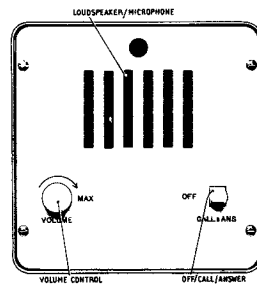
RELEVANT AIR PUBLICATION
116N-0205-15



20-line master unit



1-line master unit



Extension unit

FUNCTION

Designed to provide a voice (loud-speaking) two way simplex intercommunication facility between a master and one or more slave control units via telephone lines between isolated sites or rooms.

ORIGIN

Hadley Intercom Ltd., type PO AD5800 (Transcall)

GENERAL DESCRIPTION

Communication is provided between a master unit and a number of extensions. either individually or collectively but not between slave extensions. Master units may be connected together up to a maximum of ten units for master to master operation. The equipment is designed for long telephone lines and a single line master unit may be used as a slave over extended distances.

There are three types of master units, each of which operates with common extension unit as follows:

- 1) 20 line master unit (illustrated)
- 2) 10 line master unit (not illustrated) (identical to 20 line with only one row of push buttons)
- 3) 1 line master unit (illustrated)
- 4) Extension unit (illustrated)

The loop resistance of the line between master and slave is limited to 600 ohms and the earth return limited to 50 ohms.

Solid-state sub-assembly amplifiers are included into both master and extension units with facilities for switch connections to external bell or alarm devices.

The transistorized Hadley Teletalk PO type AD5800/4 series (Mk4) supersedes the obsolescent valve teletalk equipment PO type AD2779.

TECHNICAL DATA

INTERCOMMUNICATION UNITS

Master unit, intercom, 20-line	10G/5805-99-933-2226
Master unit, intercom, 10-line	10G/5805-99-933-2214
Master unit, intercom, 1-line	10G/5805-99-933-3708
Extension unit, intercom	10G/5805-99-933-2215
Amplifier, a.f. (incorporated in the above equipments)	10U/5808-99-933-2241
Power supply unit (PO Type 52A)	10K/5805-99-933-2216
Mains supply input	200V to 250V, 50 Hz
Outputs (2 off)	50V \pm 10%, 1A

AMPLIFIER SIGNAL LEVELS

Power output (master and extension units)	500 mW
Signal and speech level in 600 ohm extension line	Approx. 1V peak to peak

ENVIRONMENTAL LIMITS

Temperature limit for master and extension units	70°C (max.)
-----------------------------------------------------	-------------

POWER SUPPLY REQUIREMENTS

Power supply for master units (only)	50V d.c. \pm 10%, 500 mA
--------------------------------------	----------------------------

DIMENSIONS

	Height	Width	Depth
Master unit 20-line	203 mm (8 in)	305 mm (12 in)	152 mm (6 in)
Master unit 10-line	203 mm (8 in)	305 mm (12 in)	152 mm (6 in)
Master unit 1-line	165 mm (6½ in)	165 mm (6½ in)	114 mm (4½ in)
Extension unit	165 mm (6½ in)	165 mm (6½ in)	114 mm (4½ in)
Power supply unit	356 mm (14 in)	305 mm (12 in)	185 mm (7¼ in)

PART 7

**V.F. TERMINAL AND TELEGRAPH
EQUIPMENT**

PART 7

VF TERMINAL AND TELEGRAPH EQUIPMENT

INTRODUCTION

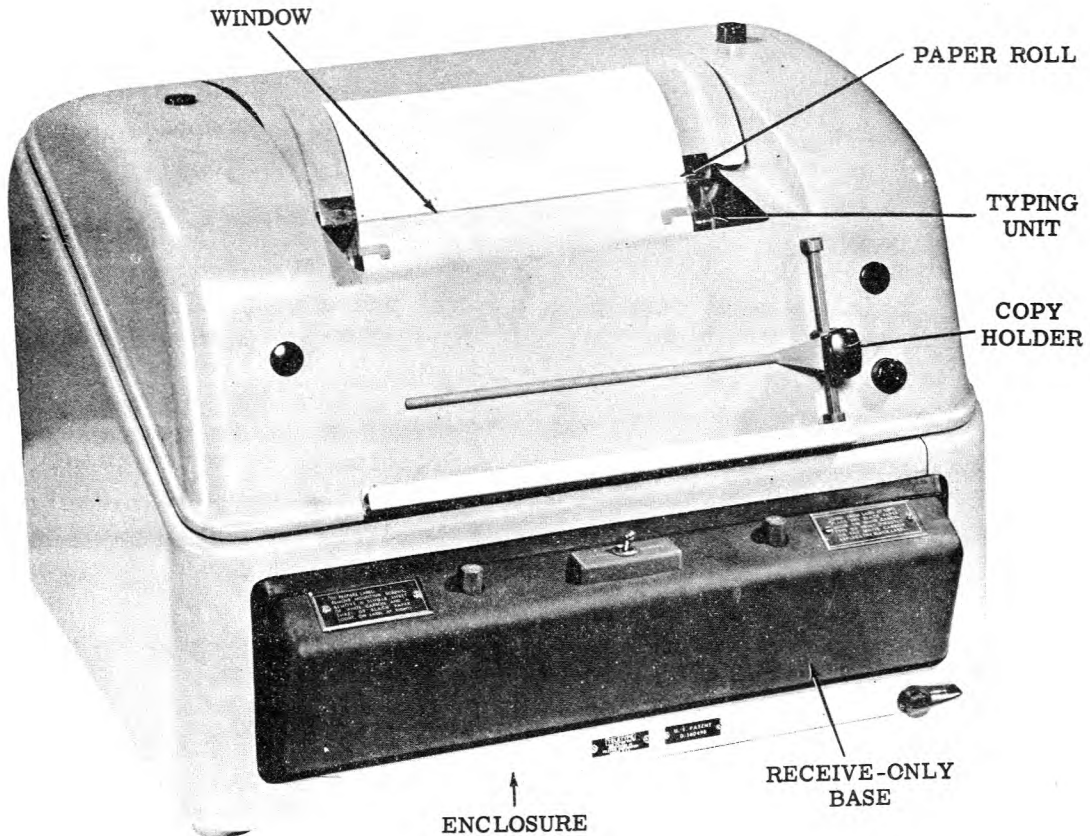
1. This Part contains general information on VF Terminal and Telegraph equipments which are in current use.

2. The Part is divided into several sections, each of which contains concise details of those equipments which are functionally similar. The section numbers and headings are listed below:

Section	1	Teletypewriters
Section	2	Automatic tape transmitters
Section	3	Perforators and reperforators
Section	4	High speed telegraph relays
Section	5	Convertors signals data
Section	6	Modems and voice frequency telegraph equipments
Section	7	Multiplexers, and demultiplexers
Section	8	Single/double current convertors
Section	9	Telegraph terminal racks and consoles
Section	10	Error detection and correction equipments
Section	11	Power supplies for telegraph equipments

TELEPRINTER, TELETYPE MODEL 28(RO)

RELEVANT PUBLICATION
AP 116M-0303-1A



Teleprinter, Teletype 28 (RO) table model

FUNCTION

A page printer without keyboard receives five-unit code messages with start and stop signals sent to it from other teletypewriter machines. If an 'answer-back' unit is included the teleprinter will respond to a 'who are you' (WHU) call automatically by transmitting (answering back) the telex number of the subscriber to the caller for confirmation.

BRIEF DESCRIPTION

The typing unit contains the mechanism necessary for translating electrical inputs (sequential code signals) into print of specific characters i.e. letters of alpha-numeric or functional control operations and accommodates

either sprocket or friction feed paper in single or multi-copy form, rolled or fan folded. A facility for the remote and automatic control of non printing functions such as carriage return, upper or lower case shift, line feed and switching is provided.

ORIGIN

Teletype Corporation (USA)

TECHNICAL DATA

Operating speeds: 45.5, 50, 56.9, 74.2 Bauds.

Unit code: 7.00 to 7.50

Signal Requirements:

Sequential 5-level code with a start and a stop pulses per character or function.

Printer:

Form widths 3 5/8 in. to 9 1/2 in.; friction or sprocket feed. Horizontal and vertical tabulation. 51 alphanumerics, plus special characters.

POWER SUPPLIES

115V d.c. or 115V a.c. 50 or 60 Hz.
Single phase.

Synchronous motor units: 115V a.c. \pm 10% 60 Hz. Single phase.

Governed motor units: (1) 115V a.c. \pm 10% 50-60 Hz.
Single phase.

(2) 115V d.c. with external resistance.

DIMENSIONS

	Height	Width	Depth
Floor model	39 in. (99 cm)	20.5 in. (52 cm)	21 in. (47 cm)
Table model	16 in. (41 cm)	20.5 in. (52 cm)	21 in. (53 cm)
Rack model	12 in. (30.5 cm)	17 in. (43 cm)	21 in. (53 cm)
Wall mounted	30 in. (76 cm)	16.5 in. (42 cm)	11.5 in. (29 cm)

WEIGHT

Floor model	115 lb (52.2 kg)
Table model	75 lb (34 kg)
Rack model	70 lb (32 kg)
Wall mounted	105 lb (48 kg)

OPTIONAL FEATURES

Low paper alarm

Horizontal and vertical tabulators.

A variety of platen sizes.

Dials and/or push buttons for modification to telephone line communications.

Friction or sprocket feed platens.

Answer-back drum.

TELEPRINTER SIEMENS T100R

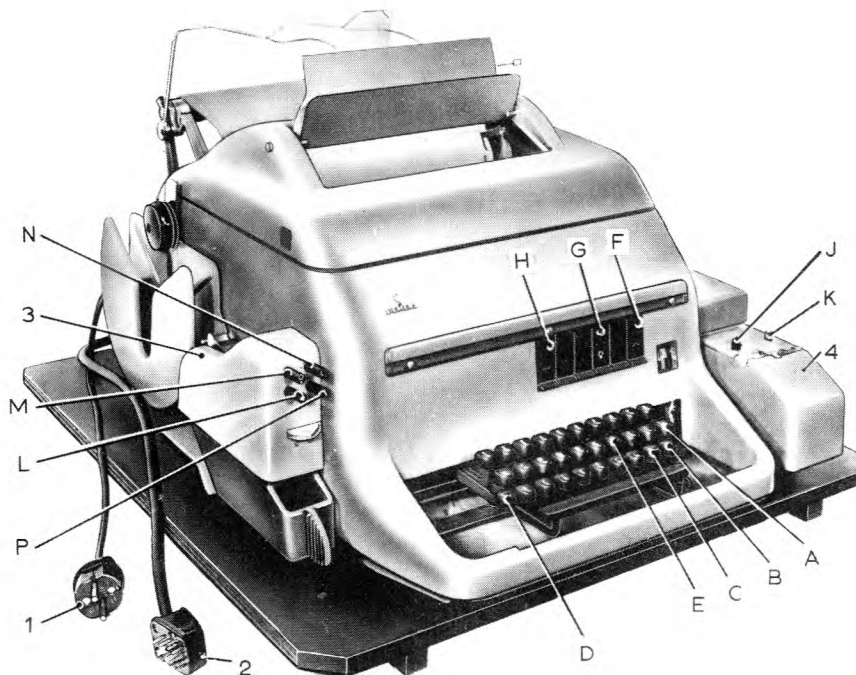
5815-12-134-0147

RELEVANT PUBLICATIONS

AP 116M-0301-15

(formerly AP4839A)

Vol. 1, Part 1, Chap. 5)



- | | |
|--------------------------------|------------------------------|
| 1. 2 or 3 pin power plug | F. Break key |
| 2. 8-way teleprinter plug | G. Internal lamp key |
| 3. Reperforator attachment | H. Runout (repeat) key |
| 4. Tape transmitter attachment | J. Switch on press button |
| A. Carriage return key | K. Switch off press button |
| B. Line feed key | L. Switch on press button |
| C. Letters shift key | M. Switch off press button |
| D. Figures shift key | N. Tape release press button |
| E. J/Bell key | P. Reverse press button |

Teleprinter T100R 5815-12-134-0147

FUNCTION

A page printing automatic telegraph machine providing direct communication with a distant station.

BRIEF DESCRIPTION

The teleprinter T100R is designed for single current working only and

replaces the teleprinter Type 7B, It will transmit and receive information in the form of capital letters, numerals and some symbols. A reperforator attachment, when fitted, enables printing of message tapes. Also a transmitter attachment enables message tapes to be transmitted automatically at full operating speed.

TECHNICAL DATA

Telegraph code: ITA Code No. 2, single current only, current mark.
Telegraph speed: 50 bauds (66 w.p.m.) by change of gears and carriage return spring, 75 bauds (100 w.p.m.).
Receive margin: ± 40 % minimum (supply 200-240V, 48-52 Hz)
Outgoing signal distortion: ± 5 % maximum (supply 200-240V, 48-52 Hz)
Start up time: less than 700 mS at 20°C and 220V.
Motor auto-start: on SPACE longer than 6 mS.
Motor auto-stop: after 30-67 seconds, (at 50 bauds) if no signal received.
Line length: 69 characters
Line spacing: 11/64, 1/4, 11/32in. (4.3, 6.4 and 8.5 mm).
Character spacing: 10 per in.
End of line bell: actuated by 59th character.
Alarm contact: provided on upper-case J key.

DIMENSIONS	Height	Width	Depth
Teleprinter without attachments	37cm(14.5in)	41cm(16in)	63.5cm(25in)
Teleprinter with attachments	37cm(14.5in)	53cm(21in)	63.5cm(25in)
Transport box	42cm(16.5in)	60cm(23.5in)	68 cm(26.5in)

WEIGHTS

Teleprinter with attachments 33 kg(72lb)

POWER SUPPLIES

190-240V at 40 to 60 Hz, 100 watts maximum.

OPERATING TEMPERATURE

4.4°C to 49°C (40°F to 120°F)

TELETYPEWRITER CREED MODEL 75

RELEVANT PUBLICATION
AP 116M-0330-1



Teletypewriter Creed Model 75

FUNCTION

A page printing automatic telegraph machine providing direct communication with a distant station.

BRIEF DESCRIPTION

The teletypewriter creed Model 75 is a single or double current, start, stop, teletypewriter with separate tape reader and/or reperforator attachments, as required. Different models operated at speeds of 45, 50 and 75 bauds, also a dual speed version can be fitted with manual speed control setting between 45 to 50 bauds.

TECHNICAL DATA

Code Characteristics:

Start signal, five code signal and stop signal. Start and code signals are of unit length appropriate to baud speed. Stop signal is a nominal $1\frac{1}{2}$ units in length, 5-level International Telex.

MODE OF OPERATION:

Single or double current. Multi-contact transmitter adjustable from one mode to the other.

Receiver margin: Greater than $\pm 40\%$ at 50 bauds
Greater than $\pm 35\%$ at 75 bauds

Paper used: Standard width $8\frac{1}{2}$ in. (21.5 cm).
With a 21.5 cm paper, margins are independently adjustable between 0.5 and 0.8 inches.

The teletypewriter will accept standard teleprinter roll, $3\frac{1}{2}$ in. (8.9 cm) dia. Larger externally mounted roll can be arranged.

SIGNALLING:

Voltages and currents: Single current, 120V, 50mA.
Double current, 80-0-80V at 25mA maximum

Code characteristics: Five level (5 hole tape) with additional a 'start' and a 'stop' signals for communication synchronization (Standard Telex System).

POWER SUPPLY

Total consumption: 100 watts (approximately)

Motor: either 1) 100-125V or 200-250V a.c., 40, 50 or 60Hz.
or 2) As in 1) plus a 160V d.c. for d.c. governed motors
3) 28V or 48V for shunt wound d.c. governed motors.

AMBIENT TEMPERATURE RANGE

4-4°C (40°C) to 37.8°C (100°F)

DIMENSIONS

	Height	Width	Depth
Receive only (RO)	11 in. (28 cm)	16 in. (41 cm)	13.5 in. (34 cm)
Keyboard Send Receive (KSR) (4 row Keyboard)	11 in. (25 cm)	16 in. (41 cm)	16.5 in. (42 cm)

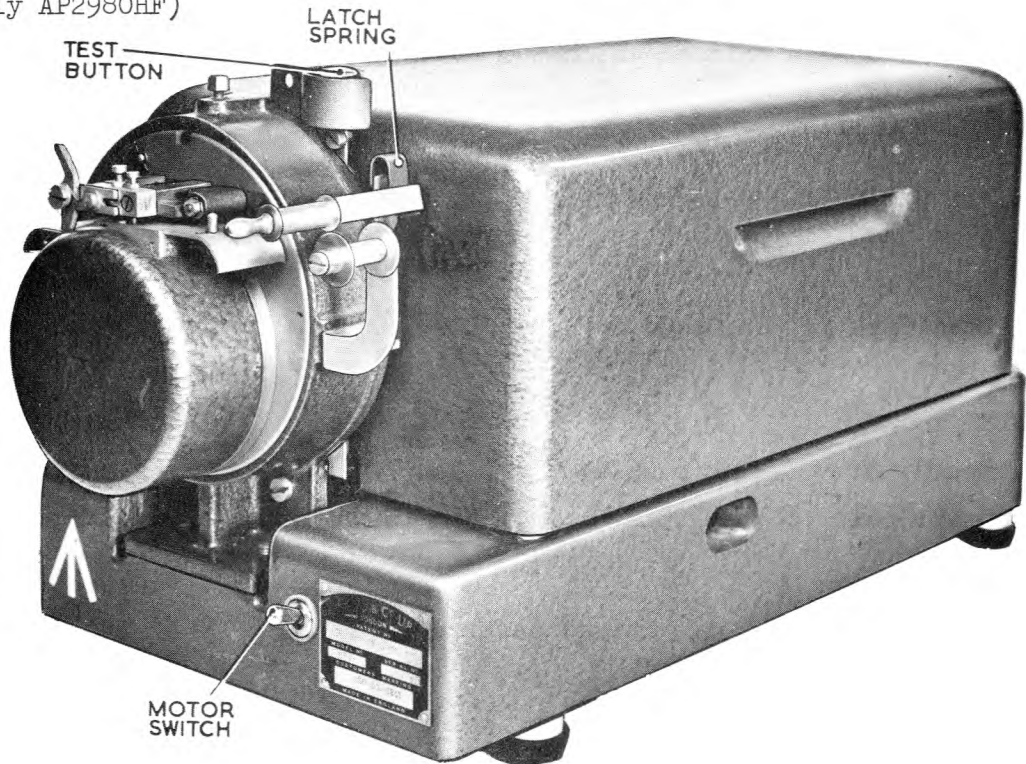
	Height	Width	Depth
With reperforator and/or tape reader attachments:	12.5 in (32 cm)	18.5 in. (47 cm)	16.5 in (42 cm)
Silencing Cover:	13 in. (33 cm)	16 in. (41 cm)	21 in. (53 cm)
Silencing Cover (with reperforator/and or Tape Reader attachments incl.):		13 in. (33 cm)	21 in. (53 cm)

WEIGHT

Receive only (RO)	36.5 lb (16.5kg)
Keyboard Send Receive (KSR) (4 row Keyboard)	45.3 lb (20.5kg)
With reperforator and/or tape reader attachments:	Add 10 lbs (4.5kg) Add 2 lbs (0.9kg)
Silencing Cover (with reperforator and/or Tape Reader attachments incl.)	Add 23 lbs (10.4kg)

TRANSMITTERS, AUTOMATIC TELEGRAPH TAPE
(Creed Model 6S/6 Series)

RELEVANT PUBLICATIONS
AP116M-0336-16
(formerly AP2980HF)



Transmitter automatic telegraph tape
(Creed Model 6S/6 Series)

FUNCTION

The automatic transmitter, Creed model 6S/6, is a single-wire, single head, automatic tape transmitter for use in 5-unit code telegraph systems. Its purpose is to translate the perforations in previously prepared tapes into electrical signals and sequentially to send these signals into a line. The Service version of the machine is arranged for $7\frac{1}{2}$ -unit operation at a speed of 50 bauds.

ORIGIN Creed Manufacturing Co. Ltd.

BRIEF DESCRIPTION

The transmitter Creed model 6S/6, consists of the following principal items:

- (1) Transmitting head, which contains the transmitting contact

assembly, 10G/19477.

- (2) Transmitting head stand, 10G/19527.
- (3) Tape control unit and send/receive switch, 10G/19528.
- (4) Electric motor 10K/20448.
- (5) Motor speed governor, 10G/18494.
- (6) Cover.
- (7) Main base unit on which the above are mounted, 10G/19526.

TAPE

11/16in. or 7/8in. fully-perforated or chadless centre of advanced feed.

MOTOR

Series motor Type 14368 (Creed ref. No. KBE/510) 1500 rev/min., 160V d.c. or 200/250V d.c. or 200/250V, 50-60Hz, 9 watts.

DIMENSIONS	Height	Width	Depth
Transmitter	21cm(8.25in.)	19cm(7.5in.)	41cm(16in.)
Transit case	63.5cm(25in.)	57cm(22.5in.)	81cm(32in.)

WEIGHT

Transmitter packed in transit case 89kg(196lb)

DIFFERENCE BETWEEN UNITS

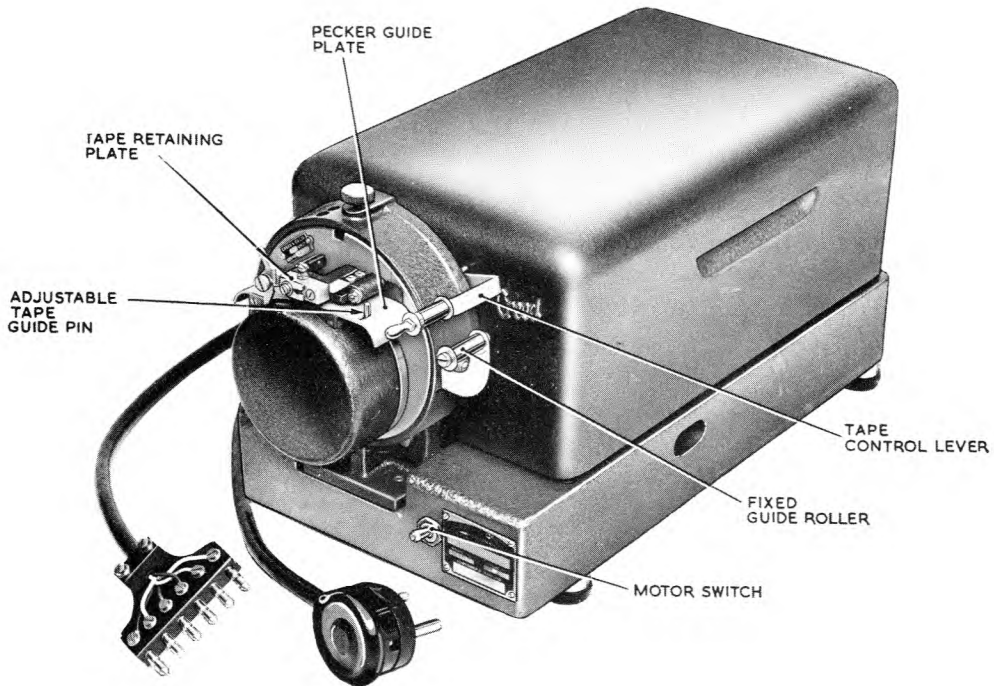
Transmitter automatic (Creed model 6S/6) is 7.5 unit working with mechanically controlled clutch.

Transmitter, automatic telegraph tape (Creed model 6S/6M) Ref. No. 10G/920 6223 is 7 unit working with magnetically controlled clutch.

Transmitter automatic telegraph tape Ref. No. 10G/933 2013 is as Creed model 6S/6M.

TRANSMITTER, AUTOMATIC, TELEGRAPH TAPE
(10G/18377) (Creed Model 6S/5)

RELEVANT PUBLICATIONS
AP116M-0319-16
(formerly AP2980HD)



Transmitter automatic telegraph tape
(Creed Model 6S/5)

FUNCTION

The automatic transmitter, Creed Model 6S/5, is a single wire single head automatic tape transmitter for use in 5-unit code telegraph systems. Its purpose is to translate the perforations in previously prepared tapes into electrical signals and sequentially to send these signals into a line. The Service version of the machine is arranged for $7\frac{1}{2}$ -unit operation at a speed of 50 bauds.

TAPE

11/16in., or 7/8in., fully perforated or chadless, centre or advanced feed-hole. (Some early machines will accept only 11/16in. tape).

MODE OF OPERATION

Single wire, single or double current.

MOTOR

Creed reference D110, 1500 rev/min., 160V d.c. or 230V, 50Hz.

DIMENSIONS	Height	Width	Depth
Transmitter	20cm(8in.)	19cm(7½in.)	39cm(15½in.)
Transit case	53cm(21in.)	58cm(23in.)	89cm(35in.)

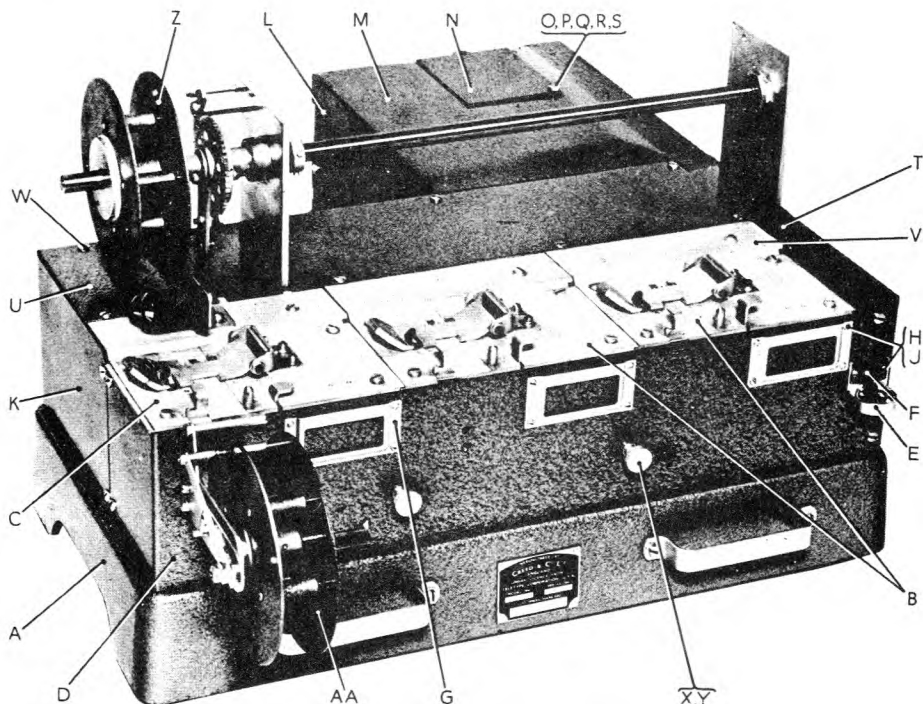
WEIGHTS

Transmitter only	14kg(30lb)
Transmitter packed in transit case.	62kg(137lb)

TRANSMITTERS, AUTOMATIC, TAPE

CREED - 74B, 74D, S6/1, S6/2, S6/3

RELEVANT PUBLICATIONS
AP 116M-0318-1



Transmitter, automatic Type 74B, 74D

- | | | | |
|--------|------------------------------|----|----------------------|
| A | Base assembly | O | Screw |
| B | Transmitter unit (message) | P | Shim |
| C | Transmitter unit (numbering) | Q | Spring washer |
| Covers | | R | Washer |
| D | Front cover | S | Nut |
| E | Switch guard | T | R.H. side cover |
| F | Signal plate | U | Top cover |
| G | Card holder | V | Top cover |
| H | Card holder | W | Screws |
| J | Nut | X | Washer |
| K | L.H. side cover | Y | Screw |
| L | Rear cover | Z | Tape winder assembly |
| M | Rear cover | AA | Tape reel assembly |
| N | Lid | | |

FUNCTION

The automatic transmitters, Type 74B, 74D, S6/1, S6/2 and S6/3, are 50 baud double current, single wire, multiple head, automatic tape transmitters for use in 5-unit code teletaph systems. They each incorporate two message heads, which operate alternately, and a numbering head, which automatically

inserts message serial numbers. The sequence of operations is controlled by a relay unit.

TAPE

11/16 in, chadless or fully perforated, centre or advanced feed-hole.

MOTOR

Creed reference 217 (G.P.O. motors, electric universal No.2), 300 rev/min 160V d.c. or 230V 50Hz.

RELAY UNIT SUPPLIES

+80/-80V signalling supply: +80V or -80V for control relays.

DIMENSIONS

	Height	Width	Depth
Transmitter with relay unit in position.	16cm (6 $\frac{1}{2}$ in.)	43cm (17 in.)	43cm (17 in.)
Relay unit only	15.8cm(6 $\frac{1}{4}$ in.)	23cm (9 $\frac{1}{4}$ in.)	15.8cm(6 $\frac{1}{4}$ in.)

WEIGHTS

Transmitter	22kg (48 lb)
Relay unit	5kg (11 lb)

DIFFERENCES BETWEEN UNITS

Creed Model 74B Mk.IV (10G/19646) is 7.5 unit working, free running, used in conjunction with relay unit Type 13034.

Creed Model 74D (10G/18909) is 7.42 unit working, free running, used in conjunction with relay unit Type 13034.

Type S6/1 (10G/933 174 6) is 7 unit working, pulsed, used in conjunction with relay Type S10/1.

Type S6/2 (10G/933 174 7): as Type S6/1

Type S6/3 (10G/933 174 8): as Type S6/1.

PRINTING REPERFORATOR, TELEGRAPH TAPE
ITT-CREED MODEL EPR/1 (RAF MODIFIED)
(10G/5815-99-618-4443)

RELEVANT PUBLICATIONS
AP 116M-0344-156



Printing reperforator, Creed model EPR/1

FUNCTION

An on line telegraph receiver designed to record messages or other data as coded perforations and typed characters on five-level paper tape (11/16" wide, 8" Dia, 1000 ft. roll).

ORIGIN:

ITT-Creed Co. Ltd.,

TECHNICAL DATA

Telegraph code:	International Telegraph Code No.2 or any other 5-Unit Code.
Code Characteristics:	Sequential $7\frac{1}{2}$ unit signals consisting of a single unit start pulse, 5-code signal element each of unit length and a $1\frac{1}{2}$ unit stop pulse. The machine can also accept 7 unit signals containing a unit length of stop pulse.
Speed:	50 bauds or 75 bauds standard (66 or 100 words per minute).
Mode of operation:	Single current or double current mode working for any amplitude and polarity of line signal input.
Signal line voltages or currents:	Single current working 6 to 120V, 8 to 70 mA. Double current working 6-0-6V to 80-0-80V, 8-70 mA.
Receive margin:	Up to $\pm 45\%$ at 50 and 75 bauds.
Motor:	Capacitive start and run, 2-pole asynchronous ungroverned induction motor, 115V-125V or 230-250V at 50-60 Hz.
Operating environment:	Temperature range -5°C to $+50^{\circ}\text{C}$ (up to 95% relative humidity at 45°C).
Characters/hole displacement:	Printing point is $8\frac{1}{2}$ hole pitches behind the centre of the corresponding punched code.
Alphabet size:	Up to 55 printed and punched characters or symbols and 3 punched only functions.
Print/punch out cycle time:	87-93 milliseconds.

DIMENSIONS

Height	Width	Depth
12 in. (31 cm)	15 in. (33 cm)	22 in. (56 cm)

WEIGHTS

Complete unit	60 lb (27.2 kg)
Electronics unit	18 lb (8.1 kg)
Mechanicals unit	42 lb (19.2 kg)

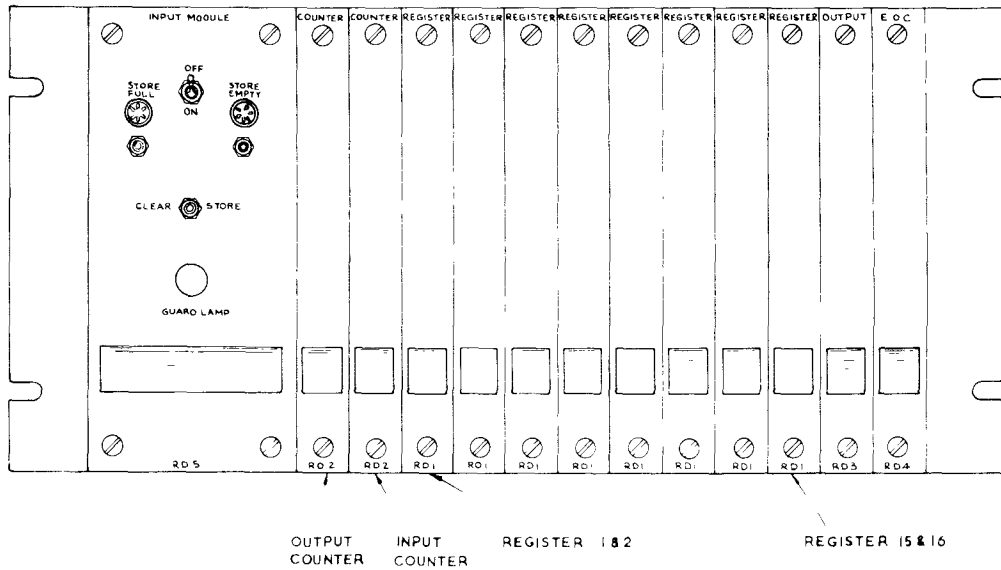
POWER SUPPLIES

115-125V or 230-250V, 50 or 60 Hz.

Power consumption 75 watts (approximately).

TELEGRAPH BUFFER STORE (16 CHARACTER)

RELEVANT PUBLICATION
 AP 116M-0602-1
 (Formerly AP4836B)



Telegraph buffer store (16 Characters)

BRIEF DESCRIPTION

The telegraph buffer store is capable of storing 16 - 7½ unit start stop telegraph characters, transmitted up to a maximum speed of 50 bauds. The characters are retained in the store until release pulses are applied, when the store is full or empty, the condition is indicated by lamps, relay contacts are provided for extending these conditions.

The unit stores groups of signals of binary nature 20 mS pulses each over 150 mS in length (up to 200 mS maximum), into individual stores (16 in all) sequentially timed in by an internal clock pulse timed to suit the external timing of telegraph system. The clocking is initiated by each start pulse of incoming signal.

ORIGIN

Recording Designs (EMI)Ltd.

TECHNICAL DATA

- Capacity: 16 telegraph character, each comprising 5 information elements one start element and one stop element.
- Serial inputs:
- a) $\pm 80V$ or $\pm 60V$ double current input impedance $1.4k\Omega \pm 10\%$.
 - b) $+6V$ double current input impedance $1.4k\Omega \pm 10\%$.
 - c) $-6V$ single current input impedance $725\Omega \pm 10\%$.
- Serial output: Sequential 6 unit telegraph signals and stop elements from telegraph relay at 50 bauds, double current 80-0-80 volts supplied externally via guard lamp on store. The stop element is dependent on EDC unit pulse rate.
- Input signal: 20mS duration, self clocking from the leading edge of the start element.
- Output initiation:
- a) $\pm 80V$, double current, input impedance $4k\Omega \pm 10\%$.
 - b) $+60V$, single current ON/OFF input impedance $2k\Omega \pm 10\%$.
- Each pulse 35-45mS duration, output signals commence 13mS after leading edge of output pulse.
- Clear store initiation: Via external contact closure, 20mS minimum duration or by operation of push button on front panel.
- Store empty indication:
- a) White lamp illuminated
 - b) Internal relay activated for maximum of 100V, 1 ampere, 30 watt indication facility.
- Store full indication:
- a) Red lamp illuminated when store contains 16 characters.
 - b) Red lamp extinguished when store contents reduced to 12 characters.

- c) Internal relay activated for maximum of 100V, 1 ampere, 30 watt indication facility, 120mS \pm 5% after front edge of final character.

Bulb test:

Lamp push buttons for bulb test facility is included.

PHYSICAL DESCRIPTION

The telegraph buffer store is a 19" rack mounting unit. The equipment consists of 13 plug-in modules. All modules house a printed circuit board and plug-in relays, push buttons and lamps. The power supply is a separate 19" rack mounting unit.

DIMENSIONS

	Height	Width	Depth
Buffer store unit:	22.2 cm (8 $\frac{3}{4}$ in.)	48.2 cm (19 in.)	35.6 cm (14 in.)
Power supply unit:	17.8 cm (7 in)	48.2 cm (19 in.)	12.6 cm (5 in.)

WEIGHTS

Buffer store unit:	13.6 kg (30 lb)
Power supply unit:	6.8 kg (15 lb)

INTERNAL POWER REQUIREMENTS

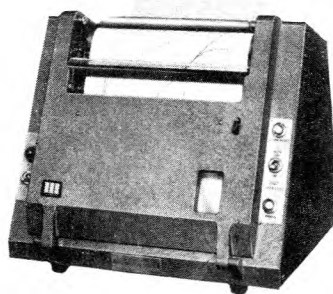
Power required by 1-store:	-12V at 500 mA +6V at 50 mA
Power supply unit output:	-12V at 2 Amp. +6V at 200 mA.

POWER REQUIREMENTS

Supply input:	100-125V or 200-250V, 45-65 Hz.
---------------	---------------------------------

MUFAX D900 FACSIMILE CHART RECORDING RECEIVER
WITH K19A and K19C CONCENTRATORS

RELEVANT PUBLICATION
AP 116M-0401-1
(Formerly AP4835A)



Mufax D900 Facsimile Receiver.

FUNCTION

Reception and automatic reproduction of black and white document transmission.

BRIEF DESCRIPTION

The equipment consists of two units, a receiver and a reproduction unit. On reception of document transmission, the receiver automatically starts a fast feed out of a short length of recording paper and rotates a helix (contact) wire on a drum in exact synchronism with the rotation of the transmitters drum containing the document. The transmitted signal is passed through the paper. The density of the mark produced depends upon the magnitude of the current through the moist electrosensitive paper of the reproducer, and so an exact reproduction of the transmitted document is built up. On completion of the reproduction the receiver sends back a satisfactory signal to the transmitter and returns to the stand-by condition.

TECHNICAL DATA

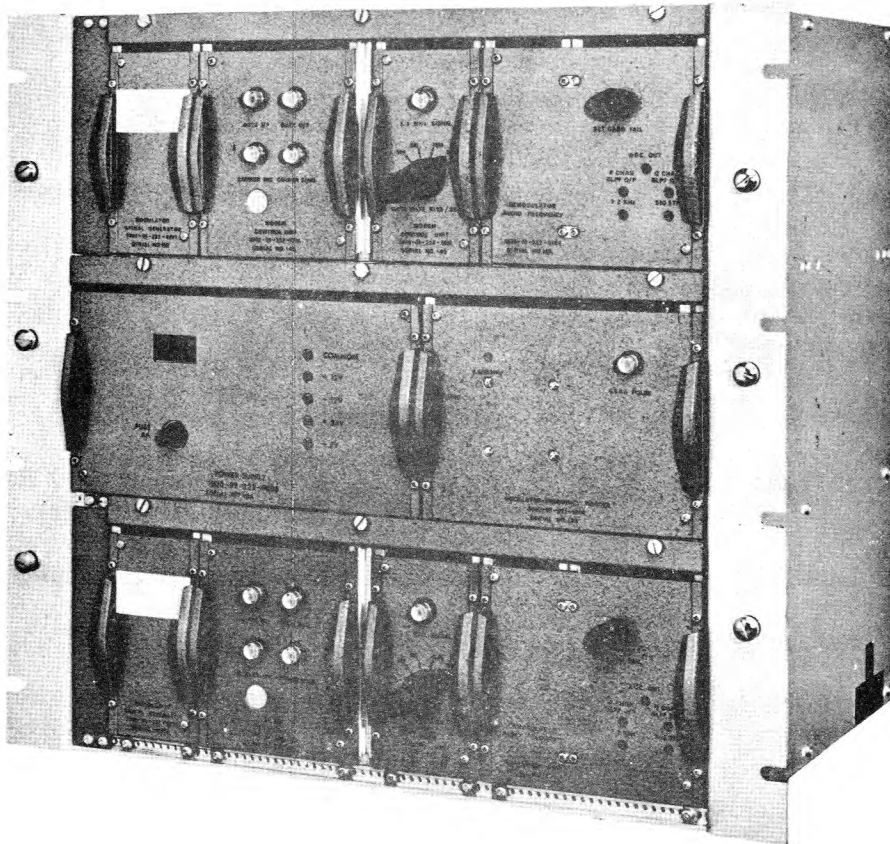
Index of co-operation:	264
Scanning density:	90 lines per inch.
Helix (horizontal) speed:	200 240 360 rev/min.
Reception time:	27 22-5 15 sec/inch.
Input carrier frequency:	1500Hz 2105kHz 5kHz.
Input signal:	AM Carrier black/white ratio 12dB.
Input level for black:	+5dB to 30dB (Ref. 1mW into 600 ohms)
"Satisfactory" signal:	1000Hz carrier frequency at 0dB (Ref. 1mW into 600 ohms).
Width of paper:	$9\frac{3}{4}$ inch.
Synchronizing frequency:	For types D/S and E/S - 1000Hz. other types same as mains supply frequency.

POWER SUPPLIES

105, 115, 125, 200, 220, 240V at 50, 50-60 and 50Hz.

2.4 KILOBAUD LINE MODEM EQUIPMENT

RELEVANT PUBLICATIONS
AP116M-0901-1



2.4 Kilobaud line modem

FUNCTION

The modem provides bidirectional transmission over 4-wire audio channel for SKYNET Voice Frequency Speech System. The modem converts the serial binary d.c. signals at 300, 600, 1200 and 2400 binary digits per second from an external Data Terminal Equipment (DTE) to a 4-condition quadrature-phase modulated voice frequency signal (in order to limit the noise ratio and also rate of transmission is reduced to reduce error) within a bandwidth of 3kHz to a receiving modem. The modem also converts the received four-condition differentially phase modulated VF Signal back to serial binary data to feed the external Data Terminal Equipments.

GENERAL DESCRIPTION

The modem equipment comprises two identical modems (sending and receiving) served by a common power supply and a common master timing oscillator frequency-divider to synchronize both the transmission and receiving. The master oscillator also synchronizes the external Data Terminal Equipments.

ELECTRICAL DATA

Transmission media:	Two separate four-wire channels to CCITT Specification (Transmission band - M89).
Transmission mode:	4-wire duplex.
Signalling rate:	2400, 1200, 600 or 300 bits per second synchronous.
Carrier frequency:	1800 Hz.
Modulation method:	Four condition differential phase.
Line circuit impedance:	600 ohms.
Line return loss against 600 ohms:	Not less than 20dB at 800 Hz; 15dB at 3400 Hz to 300 Hz.
Transmit level:	+1dbm to -17dbm in 2dB steps.
Receive level:	-1dbm to -40dbm.
Hum and noise output:	less than -60dbm.
Transmission error rate:	Better than 1 bit in 10^5 for a signal/noise ratio of 13db when feeding into an attenuator.
Timing generator stability:	Better than ± 5 parts in 10^7 .

ALARMS

- 1) Local and remote individual alarms for modem, interface and external DTE Equipment.
- 2) Individual signal present or absent lamp indication.
- 3) No carrier being received indication (Red Lamp).
- 4) Indication for presence of:-
 - a) 5.5MHz internal oscillator signal to modem.
 - b) Data input to modulator

- c) Data output from modulator
- d) Incoming VF Signal to demodulator
- e) Outgoing VF Signal from modulator
- f) 4.8 Kilo baud pulse.

Fail Safe

When the incoming signal is below the threshold level, the modem ceases to decode information and issues a steady 'mark' or 'space' signal determined by a pre-set control unit strapping.

PHYSICAL DESCRIPTION

The modem is constructed to Post Office 62 Type Equipment (19" Type rack) practice and meets the DEF 5000 Specification requirements.

Temperature range: 0 to 45 deg. C ambient.

DIMENSIONS

Height	Width	Depth
44.5 cm (17.5 in.)	39 cm (15.4 in.)	36 cm (14.3 in.)

WEIGHT

26 kg (57.5 lb)

POWER SUPPLIES

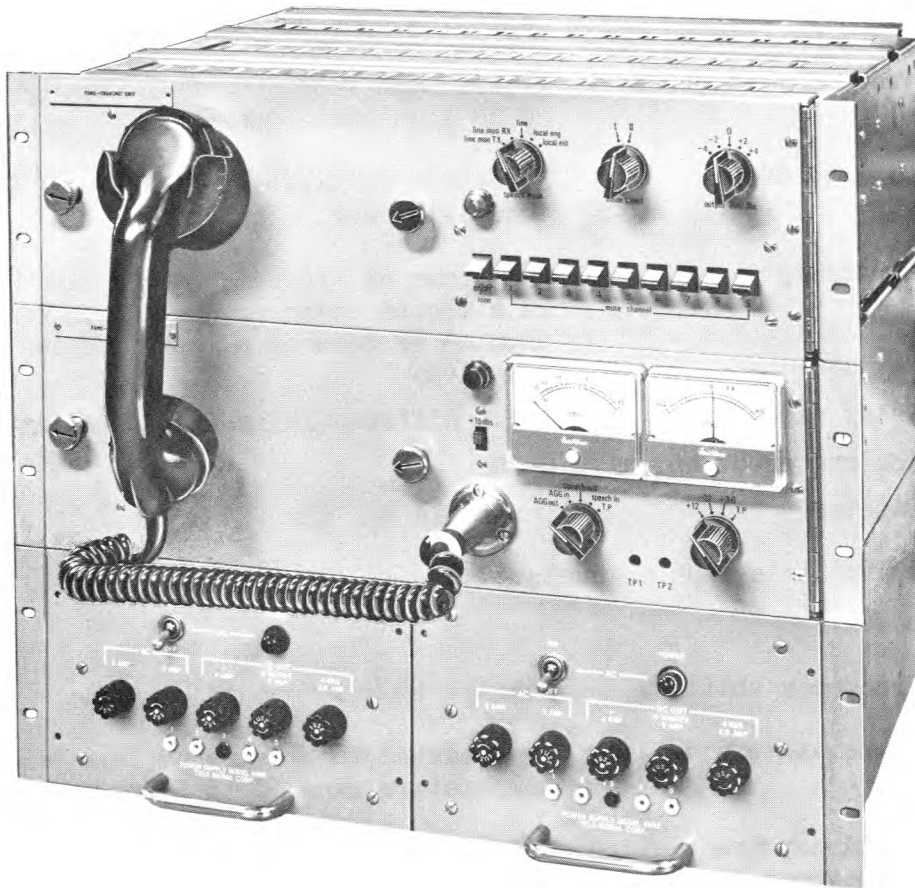
100 - 125V or 220 - 260V at 45 - 65 Hz.

CONSUMPTION

100 watts. (approximately)

TERMINAL, TELEGRAPH
(5810-99-223-2737)

RELEVANT PUBLICATIONS
AP 116M-1102-1



Terminal, telegraph 5810-99-223-2737

FUNCTION

The terminal, telegraph 5810-99-223-2737 (SKYNET frequency division multiplex equipment) comprises a multiplexer and de-multiplexer in which separate information channels are assembled and recovered, respectively. The equipment operates in either one of two modes, as follows:-

- Mode 1: one speech channel plus three 75-Baud telegraph channels;
- Mode 2: six 100-Baud plus three 75-Baud telegraph channels.

In either mode, a slow speed signalling channel can also be processed.

ORIGIN

Racal Communications Ltd., Type LA.1023.

ELECTRICAL

- 1 Speech channel
 - Input impedance Nominal 600 ohms.
 - Output impedance Between 1 ohm and approximately 300 ohms depending upon setting of speech output control.
 - Frequency response Within 3 dB from 400 to 2800Hz, greater than 20 dB down below 200Hz and above 3450Hz.
 - Gain at 800Hz Preset in multiplexer at +0.5 to -30.5 dB at tone interface.
 - Linearity Two tones of -10 dBm; 100Hz and 1500Hz result in a second order product at 2500Hz greater than 45 dB down on either when no channels are detailed.
 - Delay distortion 200 μ S differentially from 800Hz to 2800Hz.
 - Maximum power output 0 dBm.
 - Limiter Threshold + 2 dBm.

2. 100-Baud telegraph channels
 - General
 - Frequency shift Nominal \pm 60Hz, "space" higher.
 - Temperature stability Transmitted tones vary by less than \pm 1Hz over temperature range 0 to 55 $^{\circ}$ C.
 - Frequency translation tolerance Capable of accepting \pm 6Hz translation of received carrier.
 - Telegraph distortion Maximum 5% total at 100 Bauds when correctly adjusted.

Maximum 10% total, similarly, but with translation or temperature conditions. In both cases -25 dBm minimum tone level at tone interface.
 - Error rate 1 in 10⁴ with any digit pattern; tone level -15 dBm and white noise level over channel bandwidth of -28 dBm at tone interface.
 - Tone interface
 - Level Preset in multiplexer at +0.5 to -30.5 dBm when no channels are deleted.

Minimum received level (i.e. when not directly connected) Aggregate -25 dBm, i.e. individual tone -35 dBm at aggregate input.

Telegraph interface

Output

Space voltage Nominally +6 volts
Minimum +3 volts
Open-circuit +20 volts minimum

Mark voltage Nominally -6 volts
Minimum -3 volts
Open-circuit -20 volts maximum
(balanced within 10% of each other).

Output impedance Saturated 400 ohms approx.
Unsaturated 1000 ohms approx.
Capable of working into 5000 to 7000 ohms with 2500 pF in parallel.

Output impedance Saturated 400 ohms approx.
Unsaturated 1000 ohms approx.
Capable of working into 5000 to 7000 ohms with 2500 pF in parallel.

Rise and fall times Less than 3% of nominal signal element for transition between 50% amplitude of one polarity to 50% amplitude of other polarity when working into a load of 3000 ohms minimum.

More than 5% of nominal signal element for transition between 80% amplitude of one polarity to 80% amplitude of other polarity when working into a load of 3000 ohms minimum.

Input

Space voltage Nominally +6 volts
Minimum +3 volts
Open-circuit +20 volts minimum

Mark voltage Nominally -6 volts
Minimum -3 volts
Open-circuit -20 volts minimum.

Residual voltage ±2 volts maximum remaining at the input when disconnected.

3. 75-Baud telegraph channels

General

Frequency shift	Nominal ± 42.5 Hz, "space" higher.
Temperature stability	Transmitted tones to vary by less than ± 2 Hz over temperature range 0 to 55°C .
Frequency translation tolerance	Capable of accepting ± 7 Hz translation of received carrier.
Telegraph distortion	Maximum 3% total at 50 Bauds and 5% total at 75 Bauds when correctly adjusted. Maximum 6% total at 50 Bauds and 10% total at 75 Bauds, similarly, but with translation or temperature conditions. In both cases -25 dBm minimum tone level at tone interface.
Minimum error rate	1 in 10^4 with any digit pattern; tone level -15 dBm and white noise level over channel bandwidth of -28 dBm at tone interface.
Tone interface	As for 200-Baud telegraph channels.
Telegraph interfaces	As for 100-Baud telegraph interfaces.

4 Aggregate interface

Level	+4dBm maximum output and input.
Adjustment	8 dB attenuator in 2 dB steps.
Individual levels	Individual levels depend on settings of individual keyers and speech channel. Normal settings in Mode II are for the nine telegraph channels to have equal level, and in Mode I are for the speech channel to have level equal to the total of the six deleted channels, whilst the three remaining channels have the same level as for the Mode II.
Maintaining constant aggregate level	Muting any of the nine telegraph channels, in Mode I or II, by the front panel switch is compensated by the aggregate amplifier of the multiplexer so that the aggregate is held within ± 2 dB the same as it was with all channels present.
Output impedance	(a) Without attenuator 0.01 ohm. (b) With attenuator 100-500 phms depending upon position of attenuator switch.
Input impedance	Nominal 600 ohms.

5. Tone on-off signalling channel

Input	Requires isolated contact-closure or contact-to-common.
Output	Isolated contacts rated at minimum of 100V, 50 mA non-productive.
Tone interface levels	Preset at 0 to -30 dBm when no channels are deleted.
Tone on-off ratio	30 dB.
Minimum received level	-30 dBm tone to operate, measured at tone interface.
Response	Output contacts operated within 100 milliseconds of operation of input contacts.

Combined with aggregate of channels.

6. Handset connection

Microphone input	+4 dBm when connected to the speech channel input.
Earphone input	Preset adjustment provides a comfortable listening level from any monitored point.

7. Test facilities

Keying waveform

Frequency	30 Bauds to 100 Bauds (preset).
Waveform	1:1, mark-to-space ratio square-wave.

Test Tone

Frequency	Nominal 1 kHz
Level	Preset maximum of -10 dBm at test point, and link removed for 0 dBm.
Impedance	Less than 600 ohms.

Keyed test tone

Frequency	As tone and keying waveform above.
Level	As test tone above.
Impedance	Less than 600 ohms.

8. Monitoring meter (VU)
- Type Scaled peak-reading rectifier.
- Range +5 dBm to -30 dBm (referred to 600 ohms).
- Accuracy ± 1 dB.
9. Power supply meter (DC)
- Type Centre zero d.c.
- Range ± 12 volts.
- Uses Power supplies and general; also to indicate bias distortion in keyed waveform by measurement of waveform d.c. level.
10. Power supplies
- Input 115/240V $\pm 8\%$ at 45 to 65Hz, single phase.
- Consumption 65 watts (approx.) with both power supplies switched on.
45 watts with one power unit switched on.
At 240V, current with both power supplies on is 0.55A lagging.
- Output +3.6V regulated
+12V
-12V
11. General
- Carrier fail indication If none of the telegraph demodulators receives a carrier, a front panel lamp illuminates and relay contacts close. The contacts are rated at 30V, 500 mA non-inductive.

MECHANICAL

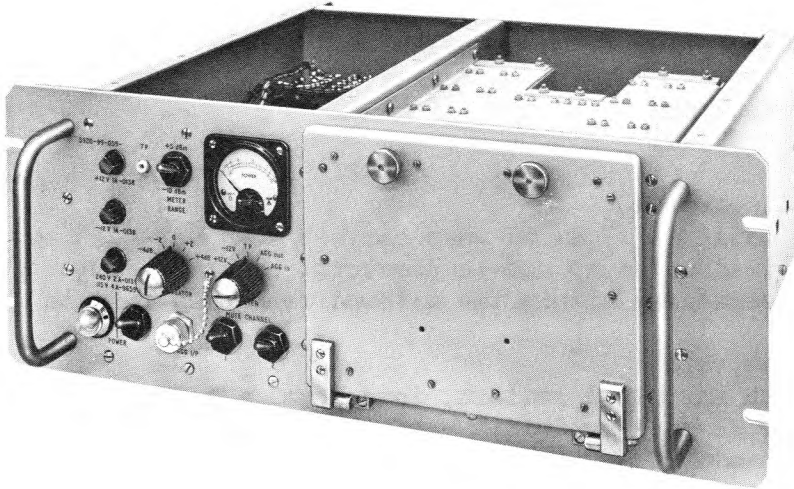
Dimensions (approx.)	Height	Width	Depth
Multiplexer	5 $\frac{1}{4}$ in (13.4 cm)	19 in (48.25cm)	13.5 in (34.3 cm)
De-multiplexer	5 $\frac{1}{4}$ in (13.4 cm)	19 in (48.25cm)	13.5 in (34.3 cm)
Power supply assembly	5 $\frac{1}{4}$ in (13.4 cm)	19 in (48.25cm)	13.4 in (34.3 cm)

Weight (approx.)

Multiplexer	35 lb (16 kg)
De-multiplexer	35 lb (16 kg)
Power supply assembly	58 lb (26.4 kg)

TERMINAL, TELEGRAPH
(Racal LA.1022B)

Relevant publications:-
AP 116M-1102-1



Terminal, telegraph (Racal LA 1022B)

FUNCTION

The terminal, telegraph (Racal LA.1022B) consists of a multiplexer and a de-multiplexer in which two separate information channels are assembled and recovered respectively.

ORIGIN

Racal Communications Ltd., Type LA.1022B.

ELECTRICAL

1. 75-Baud telegraph channels

General

Frequency shift.

Nominal $\pm 42.5\text{Hz}$, "space" higher.

Frequency translation tolerance.

Capable of accepting $\pm 7\text{Hz}$ translation of received carrier.

Centre frequencies.

3805Hz and 3995Hz.

Telegraph distortion.

Maximum 5% total at 75 Bauds when correctly adjusted at any temperature. If correctly adjusted at mid-temperature, only the distortion at extreme temperatures within the allowed range may rise to 10%.

Minimum error rate.

1 in 10^5 with any digit pattern, tone level -15dBm and white noise level - over channel bandwidth - of -30dBm at tone interface with all channels operating.

Tone interface.

Level.

Preset in multiplexer at $+0.5$ to -30dBm when neither channel is deleted.

Minimum received level.

Individual tones -35dBm at aggregate input (not back-to-back working).

Telegraph interface output.

Space voltage.

Nominally +6 volts

Minimum +3 volts

Open-circuit +20 volts maximum.

Mark voltage.

Nominally -6 volts

Minimum -3 volts

Open-circuit -20 volts maximum.

Output impedance.

Saturated 400 ohms approx.

Unsaturated 1000 ohms approx.

Capable of working into 5,000 to 7,000 ohms with $2,500\text{pF}$ in parallel.

Telegraph interface inputs

Space voltage.

Nominally +6 volts

Minimum +3 volts

Open-circuit +20 volts maximum.

Mark voltage.

Nominally -6 volts

Minimum -3 volts

Open-circuit -20 volts maximum.

Input impedance.

5,000 ohms minimum in parallel with 300pF maximum.

Residual voltage.

±2 volts maximum remaining at input when disconnected.

2. Aggregate interface

Level.

+4dBm maximum output and input.

Adjustment.

8dB attenuator in 2dB steps.

Individual levels.

Individual levels depend on setting of individual keyers.

Maintaining constant aggregate level.

Muting of either of the two telegraph channels is compensated for by the aggregate amplifier such that the output is held constant within ±1db

Output impedance.

(a) Without attenuator 1 ohm.

(b) With attenuator 100 to 500 ohms depending on position of attenuator switch.

Input impedance.

Nominal 600 ohms.

3. Carrier fail indicators.

If neither of the telegraph demodulators receives a carrier, relay contacts close; the contacts are rated at 30 volts, 500mA non-inductive.

4. Monitoring meter

Ranges.

Power

+5dBm to -30dBm (two ranges) referred to 600 ohms.

Voltage.

0 to +12 volts d.c.

0 to -12 volts d.c.

Connection.

By switching and patch lead.

5. Power supplies

Input.

115/240V ± 8% at 45 to 65Hz.

Output.

+ 3.6V regulated

+ 12V regulated

- 12V regulated.

Consumption.

25 watts approx.

At 240V, current drawn is approx. 0.2A lagging.

MECHANICAL

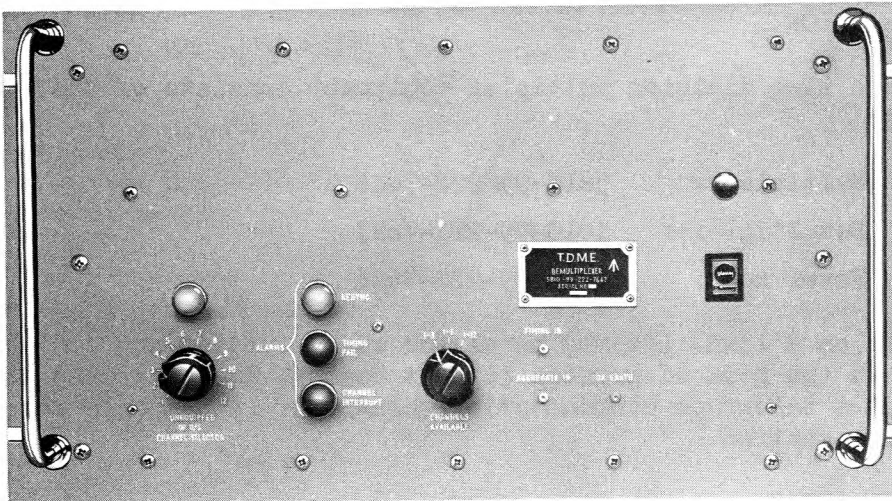
Note

The multiplexer, de-multiplexer and power supply assemblies are all contained within one shelf unit.

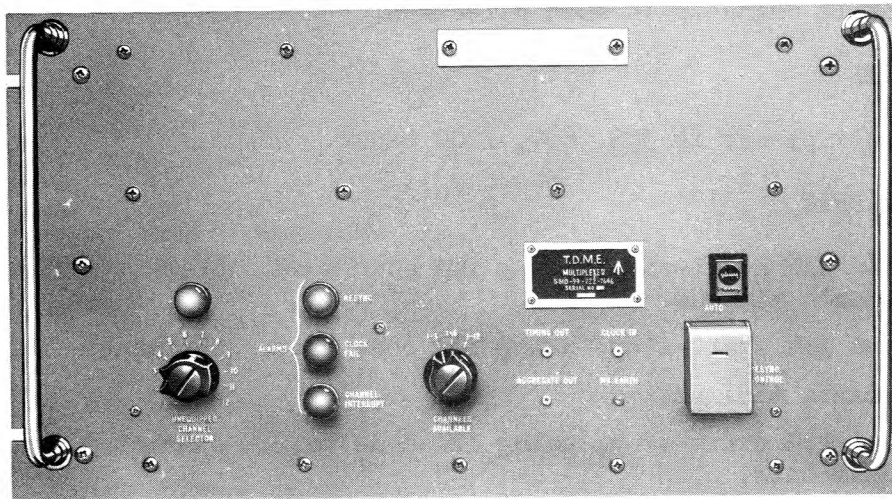
Dimensions (approx. and less handles)	Height	Width	Depth
	7 18	19 48	16 in 41 cm
Weight	13 kg (30 lb).		

TELEGRAPH TIME DIVISION MULTIPLEX EQUIPMENT

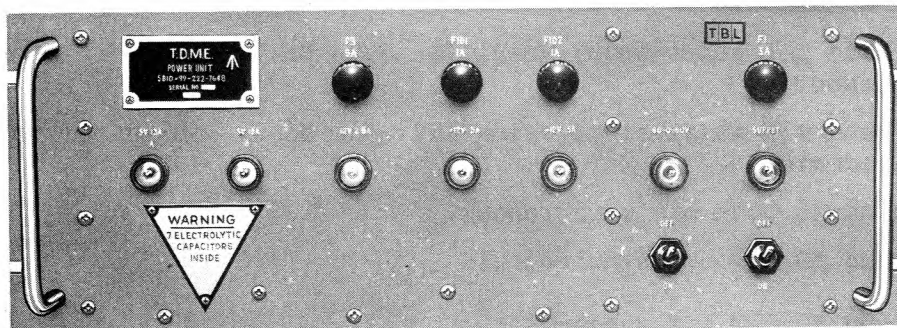
RELEVANT PUBLICATIONS
AP116M-1101-1



DEMULTIPLEXER



MULTIPLEXER



POWER UNIT

Telegraph time division multiplex equipment

FUNCTION

A telegraph terminal station which, using time division multiplex techniques, permits simultaneous transmission of up to 12 channels of telegraph traffic in each direction.

BRIEF DESCRIPTION

The telegraph time division multiplex equipment consists of the following three units:

- (1) Multiplexer 5810-99-222-7646
- (2) Demultiplexer 5810-99-222-7647
- (3) Power unit 5810-99-222-7648

Each unit is on a 19in. (483mm) panel for rack mounting and contains sub assemblies in the form of printed circuit boards. The equipment is normally installed at a telegraph communications centre or in a mobile satellite communication station.

NUMBER OF CHANNELS

A maximum of 12 channels in each direction.

TRAFFIC RATES

Output of multiplexer is 300, 600, 1200 bauds.

TYPES OF TRAFFIC

- | | | |
|----|-----------------------------------------------------|-----------------------------------------|
| A1 | 50 baud $\pm 1\%$ start-stop, using ITA code No.2. | Character format
7 elements minimum. |
| A2 | 75 baud $\pm 1\%$ start-stop, using ITA code No.2. | Character format
7 elements minimum. |
| A3 | 50 baud $\pm 5\%$ start-stop, using ITA code No.2. | Character format
7.42 elements. |
| A4 | 75 baud $\pm 5\%$ start-stop, using ITA code No.2. | Character format
7.42 elements. |
| B1 | 100 baud $\pm 1\%$ start-stop, using ITA code No.5. | Character format
10 elements. |
| B2 | 110 baud $\pm 1\%$ start-stop, using ITA code No.5. | Character format
11 elements. |
| D | 96 baud $\pm 0.005\%$ bit synchronous. | |
| E1 | 50 baud $\pm 0.01\%$ bit synchronous. | |
| E2 | 75 baud $\pm 0.01\%$ bit synchronous. | |
| F | 61.142 baud $\pm 0.01\%$ bit synchronous. | |

GAIN OR LOSS OF CHARACTER ELEMENTS

Average gain or loss of characters or character elements due to a random error rate on the aggregate digital stream of 1 in 10⁵ will be less than once per 72 operational hours per channel expressed at a confidence factor of 63%.

DELAY TIME

For type D traffic, the time from the arrival of a given element at the input of a single telegraph channel at the multiplexer to its output from the demultiplexer, when the aggregate output from the multiplexer is connected directly to the input of the demultiplexer, will not be greater than 60 milliseconds.

SIGNAL VOLTAGE

6-0-6V or 80-0-80V.

DIMENSIONS

	Height	Depth
Multiplexer	267mm(10.5in.)	313mm(12.3in.)
Demultiplexer	267mm(10.5in.)	313mm(12.3in.)
Power unit	178mm(7in.)	313mm(12.3in.)

WEIGHT

Total without rack 59kg(130lb)

POWER SUPPLIES

240V a.c. ±6%, 45 to 60Hz, single phase, 190 watt.

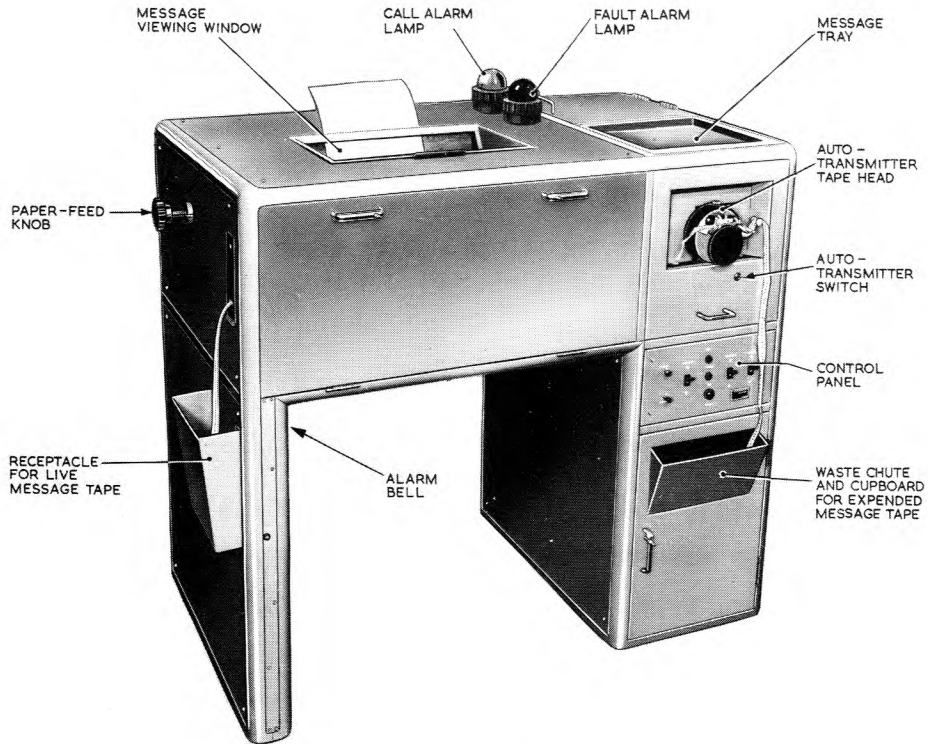
ENVIRONMENTAL CONDITIONS

The equipment is designed to be accommodated in a building. An air conditioned environment is recommended but is not essential. It is unaffected by storage over the temperature range -10°C to +70°C, and is capable of operation over the temperature range +10°C to +42°C.

TELEGRAPH CONSOLE TYPE 11413 (10G/18441)

RELEVANT PUBLICATIONS

A.P. 116M-0170-1
(formerly A.P.2980X
Vol.1, Part 1, Sect.1)



Telegraph console Type 11413

FUNCTION

The reception and onward transmission of aircraft-movement messages between Air Traffic Control Centres.

BRIEF DESCRIPTION

The Console Type 11413 consists of a teleprinter/ tape perforator and automatic tape transmitter both of which are housed in a sound-proofed console. The equipment is commonly used at Air Traffic Control Centres as the primary instrument in the Airmove Communications Network and is also used in similar networks in the meteorological service.

MODE OF OPERATION

Start-stop, 5-unit, 50 baud, negative mark.

TAPE

Fully punched 11/16in. wide:

White No 8	10G/7530-99-901-1482
Brown No 11	10G/7530-99-901-1485
Blue	10G/7530-99-901-1483

MESSAGE PAPER

1 - ply, white:	10G/10204
4 - ply, white:	10G/7530-99-901-0803

MAIN ITEMS OF INSTALLATION

Telegraph console, Type 11413 comprising:

(1)	Teleprinter, Model 8B:	10G/18398
	or	
	Teleprinter, Model 8B R/P:	10G/18387
(2)	Automatic transmitter, Model 6S/5:	10G/18377
(3)	Rectifier, Type 70A:	10D/18786

Note ...

Teleprinter Model 8B is installed at terminal stations to produce page copy only.

DIMENSIONS

	Height	Width	Depth
Console	137cm(54in.)	142cm(56in.)	99cm(39in.)
Teleprinter	66cm(26in.)	107cm(42in.)	97cm(38in.)
Auto-transmitter	53cm(21in.)	89cm(35in.)	58.4cm(23in.)

WEIGHTS

Console complete:	172kg(380lb.)
Console, (less sub-assembly items)	127kg(280lb.)
Teleprinter, Model 8B	30kg(66lb.)
Teleprinter Model 8B R/P	32kg(71lb.)
Auto-transmitter Model 6S/5	14kg (30lb.)

Console (less sub assy items)packed for transit overseas:	290kg(640lb.)
Teleprinter, packed for transit overseas:	104kg(230lb.)
Auto-transmitter, packed for transit overseas:	62kg(137lb.)

POWER SUPPLIES

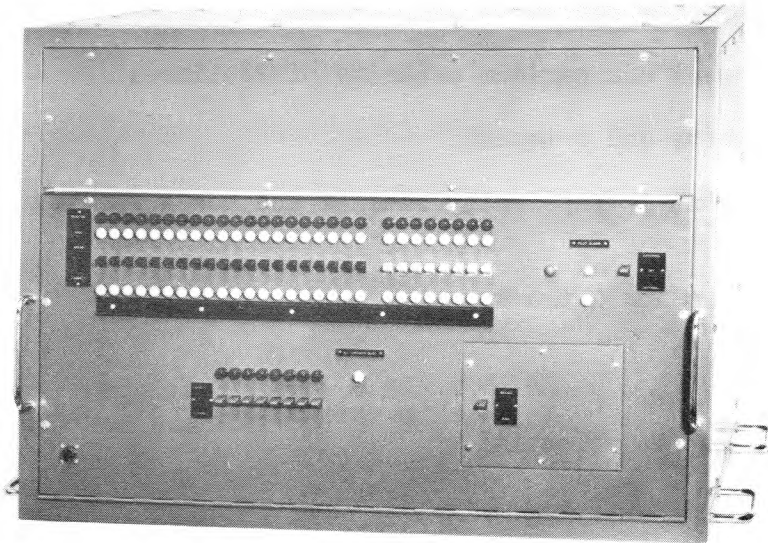
230/240V a.c. 50Hz single-phase.

EXCHANGE, TELEPHONE, MANUAL 5805-99-115-1491
(Analogue zone exchange, mobile, STC Type 5101)

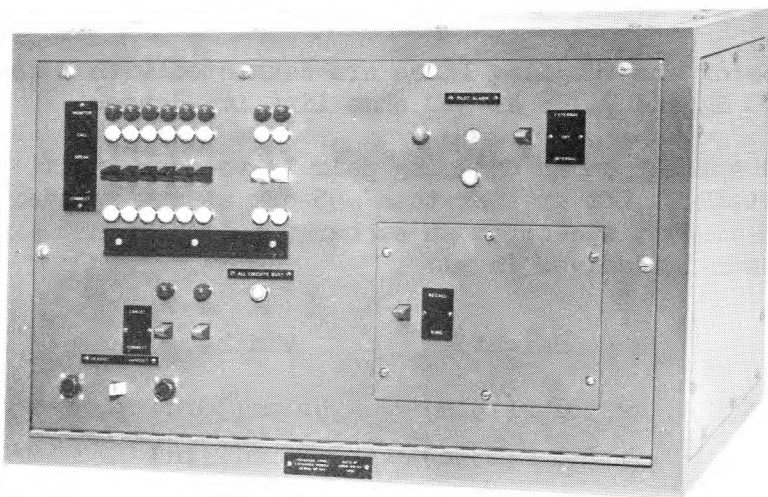
EXCHANGE, TELEPHONE, MANUAL 5905-99-115-1471
(Analogue zone exchange, static, STC Type 5100)

RELEVANT PUBLICATIONS

AP 116M-0198-16



ANALOGUE ZONE EXCHANGE (STATIC)
5805-99-115-1476



ANALOGUE ZONE EXCHANGE (MOBILE)
5905-99-115-1491

Analogue zone exchange

FUNCTION

The analogue zone exchange is used in the SKYNET speech system for the local connection of analogue speech circuits (balanced 4-wire) and for the connection of local subscribers, in the analogue mode, to the digital speech trunks.

BRIEF DESCRIPTION

There are two forms of analogue zone exchange: one is for static installations, while the other is for mobile use.

The static equipment has maximum capacity of 28 lines:

20 subscribers and 8 trunks.

The mobile equipment is physically smaller and has a maximum capacity of 8 lines:

6 subscribers and 2 trunks.

ORIGIN

Standard Telephones & Cables Ltd.

ELECTRICAL DATA

Operators communications: by direct analogue or through BID200 and to DZE operators in the UK by means of 2.4k bit trunk line using associated equipment (i.e. BID820 and modem).

Dialling: when working into BID200 equipment the dial provides loop impulsing at 10 ± 1 i.p.s, $33 \frac{1}{3}\%$ make.

Quality: incoming and outgoing lines are connected with a loss of less than 3 dB between 70 Hz and 7 kHz at 300 ohms line impedance.

Cross talk and noise: on an outgoing pair to vocoder input, the total noise hum and cross-talk is not greater than -55 dBm at the vocoder input. Cross-talk and other-circuit speech on an exchange pair does not exceed -80 dB relative to nominal receiver level.

DIMENSIONS	Height	Width	Depth
Static exchange	381mm(15in)	762mm(30in)	457mm(18in)
Mobile exchange	381mm(15in)	610mm(24in)	457mm(18in)

WEIGHT

Static exchange	135 kg (2971b)
Mobile exchange	161 kg (3551b)

CLIMATIC RANGE OF BOTH VERSIONS

Temperature	0°C to +50°C (+32°F to +122°F)
Maximum humidity	95%.

TRANSPORTATION

The mobile version of AZE can withstand the shocks of road transportation and meets the conditions of Air-portability Code FMB/L (X2).

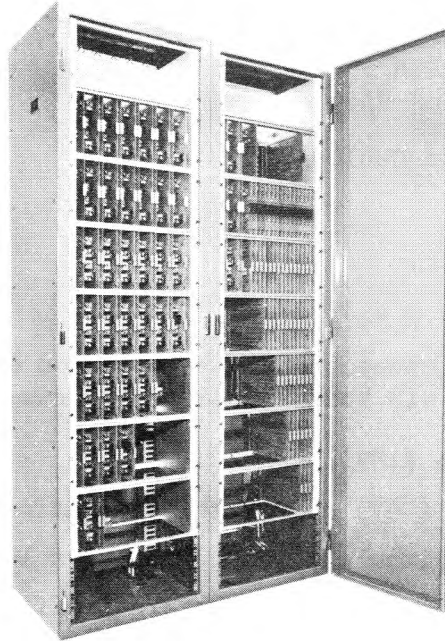
POWER REQUIREMENTS

Mobile exchange	24 - 0 - 24V d.c.
Static exchange	24 - 0 - 24V d.c. from separate power unit also standby battery for emergencies.
Power unit input	200-260V, 50-60 Hz single phase.

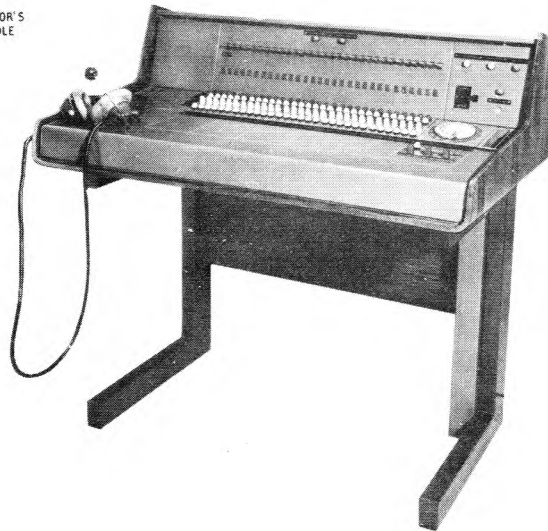
EXCHANGE, TELEPHONE, MANUAL 5805-99-115-1475
(Digital zone exchange, STC Type 5000)

RELEVANT PUBLICATIONS
AP 116M-0197-16

EQUIPMENT
CABINET



OPERATOR'S
CONSOLE



Digital zone exchange

FUNCTION

A cordless 30-line manual telephone exchange which is used at the UK end of the SKYNET speech system for the connection of local circuits (equipped with BID.820 and signal interface units No. 1 and No. 2) to trunk circuits (equipped with KGI3 and line modems) and from there to overseas installations via the satellite link.

The exchange detects mark, space or traffic conditions on an incoming line and applies those conditions to an outgoing line.

ORIGIN

Standard Telephones and Cables Ltd.

ELECTRICAL DATA

Signalling conditions

Incoming and outgoing connections have a common signal format of 6 - 0 - 6V binary at rates up to 4.8 kbit/s used as follows:

Idle	Space (+6V)
Call	mark (-6V) or 2.4 kbit/s traffic stream (6 - 0 - 6V).
Dial	loop impulsing at 10 i.p.s. \pm 10% 33 1/3% make.
Hold	mark (-6V) or 2.4 kbit/s traffic stream (6 - 0 - 6V).
Operator answer	2.4 kbit/s traffic stream (6 - 0 - 6V).
Traffic	variable 2.4 kbit/s in 48 - element frames (6 - 0 - 6V).
Clear	space (+6V) for a minimum of 3 sec.
Recall (slave exchange unit to DZE)	space (+6V) for between 100 mS and 500 mS.
Recall DZE to AZE	space (+6V) for between 1 sec. and 2 sec.

Mark detector

Nominal signal level	-6V
Minimum detectable signal	-3V
Maximum input signal	\pm 30V
Resistance to ground	greater than 6 kilohms

Data and timing lines

Space and mark source resistance	100 ohms
Capacitance to ground	less than 1000 pf
Capacitance between lines	less than 200 pf
Total resistance of switching path	less than 5 ohms

Operator's communications

The operator's headset and boom microphone with amplifier are connected to signal interface units No.1 and No. 2 with a BID.820 to provide digital communication with local subscribers and other zone exchanges.

Monitoring

The operator may speak to either subscriber individually and when the operator enters a connection each subscriber receives a warning tone.

Inadvertent coupling

It is impossible for the operator to enter more than one connection at a time or inadvertently to couple two connecting circuits.

Routing

To overseas trunks by verbal instructions between operators. To local slave exchange units by mark/space dialling via conversion units in signal interface units No. 1 and No. 2.

Alarms

Alarms are provided for the following conditions:

- Power failure
- Operator's BID.820 failure
- Exchange timing failure
- Fuse failure
- Line fault
- Pilot alarm

Analogue performance (operators circuit)

The total level of noise, hum and cross-talk from the receive leg and cross-talk from all other circuits at the operators BID.820 analogue input is -55 dBm over the range 100 Hz to 7000 Hz. Under quiet receive line and listening conditions, the receive cross-talk is better than -80 dB relative to 0.5V into 600 ohms.

In conjunction with a high quality telephone (AP 116Z-0422-16), the transmit circuit provides a frequency response, at the operator's BID.820 analogue

input, flat to within ± 3 dB over the range 100 Hz to 7000 Hz. The receive circuit frequency response is flat to within ± 3 dB over the range 200 Hz to 4000 Hz.

Digital cross talk: less than 250 mV

Length of exchange connections

The BID.820 and line equipment (i.e. the signal interface unit No. 1) associated with outgoing lines are located within the exchange complex.

Transmission path length	46m maximum (50yd)
Connecting line resistance	Not greater than 250 Ohms
Insulation between wires	Not less than 500 kilohms

POWER REQUIREMENTS

Primary power supply is 200V to 260V, 45 Hz to 60 Hz, single phase.

Control d.c. supply is 24-0-24V $\pm 10\%$ with 7.5A available for external use. An exchange battery (24-0-24V) ensures continuity of operation for 2 hours after mains supply failure.

Signalling d.c. supply is 6-0-6V with 1A available for external use.

CLIMATIC RANGE

Maximum humidity	75%
Temperature range	+5°C to +35°C (+41°F to +95°F)

MAIN ITEMS OF INSTALLATION

Exchange, telephone, manual 5805-99-115-1475 comprising:

Panel, electronic circuit	5805-99-115-1487
Panel, electronic circuit	5805-99-115-1488
Panel, electronic circuit	5805-99-115-1489
Panel, electronic circuit	5805-99-115-1490
Panel, electronic circuit	5805-99-119-1986
Panel, electronic circuit	5805-99-119-1987
Panel, electronic circuit	5805-99-115-1483
Panel, electronic circuit	5805-99-115-5739

OVERALL DIMENSIONS

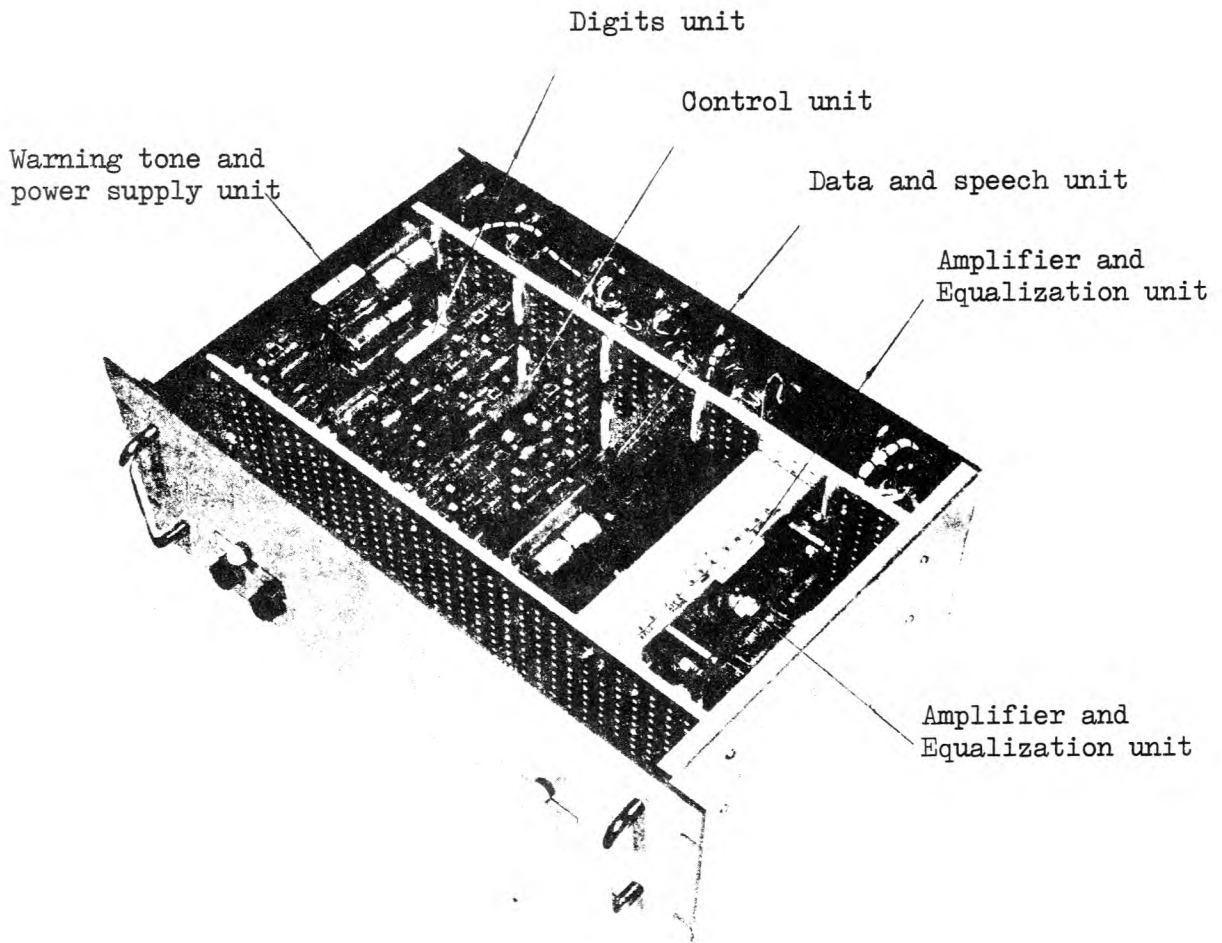
	Height	Width	Depth
Operators console	914mm (36in)	940mm (37in)	610mm (24in)
Equipment cabinet	2.13m (84in)	1.17m (46in)	610mm (24in)
Power supply and battery	2.13m (84in)	1.83m (72in)	457mm (18in)

WEIGHTS

Operators console	45.4 kg	(100lb)
Equipment cabinet	113.5 kg	(250lb)

SIGNAL INTERFACE UNIT No.1
(5805-99-115-1478)

RELEVANT PUBLICATION
116M-0199-16



Signal interface unit No.1

FUNCTION

Signal interface unit No.1 provides the analogue to digital and digital to analogue speech conversion in the SKYNET speech system.

GENERAL DESCRIPTION

The unit has an analogue and a digital section, the analogue side accepts and puts out loop/disconnect line conditions, while the digital side accepts and puts out mark/space traffic conditions.

ORIGIN

Standard Telephones & Cables Ltd., Part No.5400

ELECTRICAL DATA

Quality of analogue transmission
To BID-820

Frequency range:-	50 Hz to 7000 Hz
Frequency response:-	Flat within ± 3 dB
Power Level:-	$\frac{1}{2}$ mW (maximum) into 600 ohms
Distortion -	Less than 2%

From BID.820

Frequency range:	200 Hz to 4000 Hz
Terminating impedance:-	300 ohms
Distortion:-	Less than 5%

Cross talk, noise, hum etc.,

Noise:- Cross talk from receive leg and other circuits (measured at BID.820 input):- Not greater than 55 dBm over the range 100 Hz to 7000 Hz.

Receive cross-talk:- Better than -80 dB relative to nominal receive level.

Analogue input to BID.820

Amplifier adjustment:-	± 12 dB
Frequency ranges:-	100 Hz to 400 Hz 4000 Hz to 7000 Hz.

ALARMS

Local and remote alarms for

D.C. power failure to SIU. No.1	
Fuse failure in SIU. No.1	
A.C. failure to BID.820	

De-Synchronization of BID.820

Incoming loop signal on analogue input
Incoming space signal on digital input.

FAIL SAFE

Any de-synchronization in the SIU.No.1 or BID.820 stops transmission of intelligence from SIU. No.1.

POWER REQUIREMENTS

(c/o local analogue or digital zone exchange)
500 mA at +24 volts
200 mA at -24 Volts.

PHYSICAL DATA

The signal interface unit is designed for mounting in a standard 19 inch rack.

DIMENSIONS

Width	Height	Depth
483 mm (19 in.)	178 mm (7 in.)	407 mm (16 in.)

Weight:- 5.5 kg (12 lb)

Climatic range

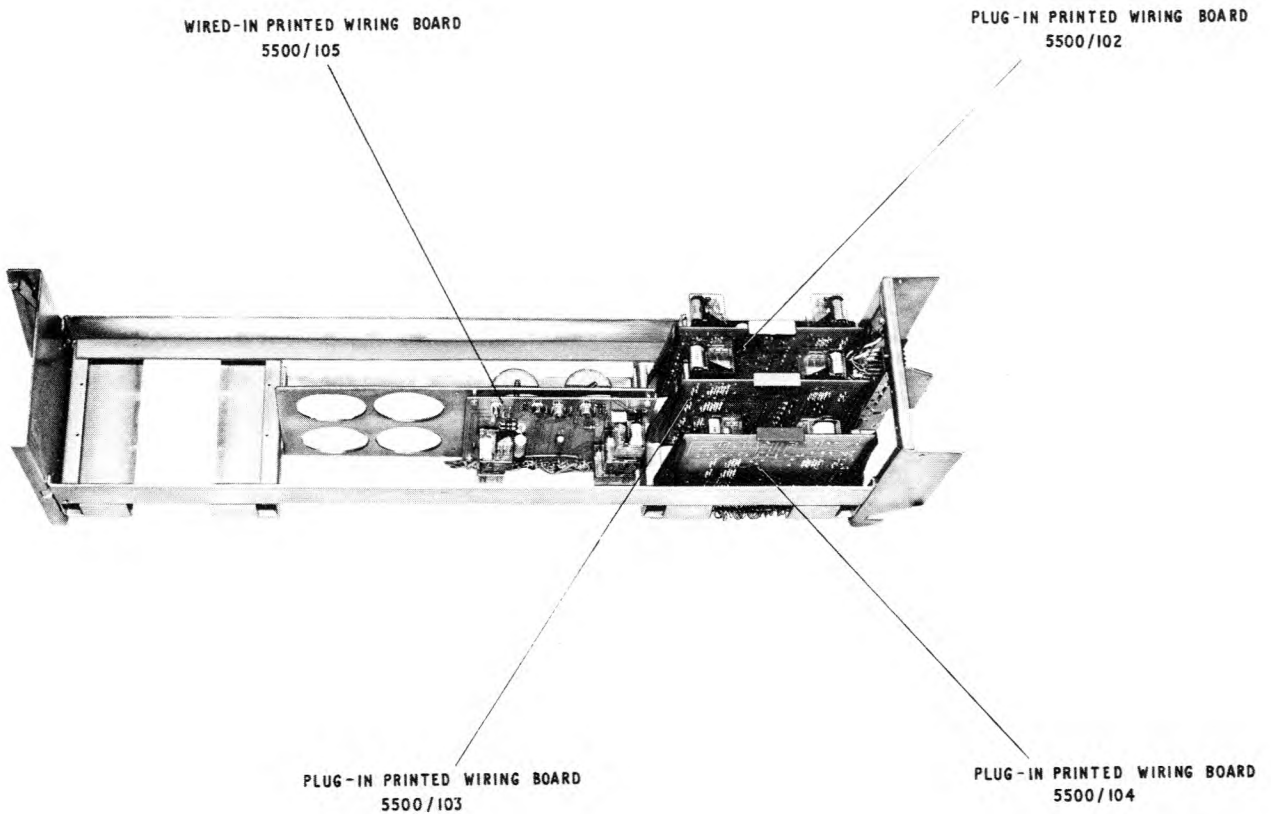
Maximum humidity:	95%
Temperature range:-	-10°C to +55°C (+14°F) (+131°F)

Portability

The signal interface unit No.1 is designed to Air-portability code FMB/L (X2) and can withstand the mechanical shocks of road transportation.

SIGNAL INTERFACE UNIT No.2
5805-99-115-1479

RELEVANT PUBLICATIONS
AP 116M-01100-16



Signal interface unit No.2

FUNCTION

The signal interface unit No.2 is used in the Skynet Speech System to provide loop/impulse dialling to push-button signalling conversion for incoming calls to the slave exchange unit (AP 116M-0196-16).

One signal interface unit No.2 is provided for every trunk line out of the slave exchange unit.

ORIGIN

Standard Telephones and Cables Ltd., Type 5500.

ELECTRICAL DATA

Maximum attenuation between slave exchange unit and Signal Interface unit No.1 or Pickwick Exchange in either direction:

5dB at 7kHz.

Attenuation through S.I.U No.2 in either direction:

Less than 3dB at 7kHz.

Between S.I.U No.2 and slave exchange unit:-

- (1) Line impedance (pair): 300 ohms.
- (2) Power level (pair): 2mW max.
- (3) D.C. loop resistance (pair): Not greater than 75 ohms.

Between S.I.U Type No.2 and S.I.U No.1 (or Pickwick Exchange):

- (1) Line impedance (pair): 600 ohms.
- (2) Power level (pair): 1mW max.
- (3) D.C. loop resistance (pair): Not greater than 120 ohms

Quality of transmission:-

- From slave exchange: Frequency range 70Hz to 7kHz; distortion less than 2%.
- Cross talk, noise, hum from all other circuits: Not greater than -55dBm from 100Hz to 7kHz.
- Receive cross talk: -80dB relative to nominal receive level of 500mV r.m.s. into 600 ohms.

D.C. conditions between S.I.U. No.2 and slave exchange unit.

- Potential between any pair: 56V maximum.
- Current in input pair: 3mA maximum.
- Current in output pair: 20mA maximum.

D.C. conditions between S.I.U. No.2 and S.I.U. No.1

- Potential between any pair: 56V maximum.
- Current in input pair: 20mA maximum.

D.C. conditions between S.I.U. No.2 and Pickwick Exchange

- Potential on impulse wire: 24V
- Current on impulse wire: 80mA maximum.

PHYSICAL DATA:

Up to ten-signal interface units No.2 can be housed in a cabinet having the following overall dimensions:-

DIMENSIONS

	Height	Width	Depth
Cabinet	2292mm (90.4 in.)	930mm (36.6 in.)	475mm (18.7 in.)
S.I.U Type 2	158mm (6.25 in.)	778mm (31 in.)	178mm (7 in.)

WEIGHTS

Cabinet, fully equipped:	120kg (264 lb)
S.I.U. No.2	6kg (13.2 lb)

CLIMATIC RANGE

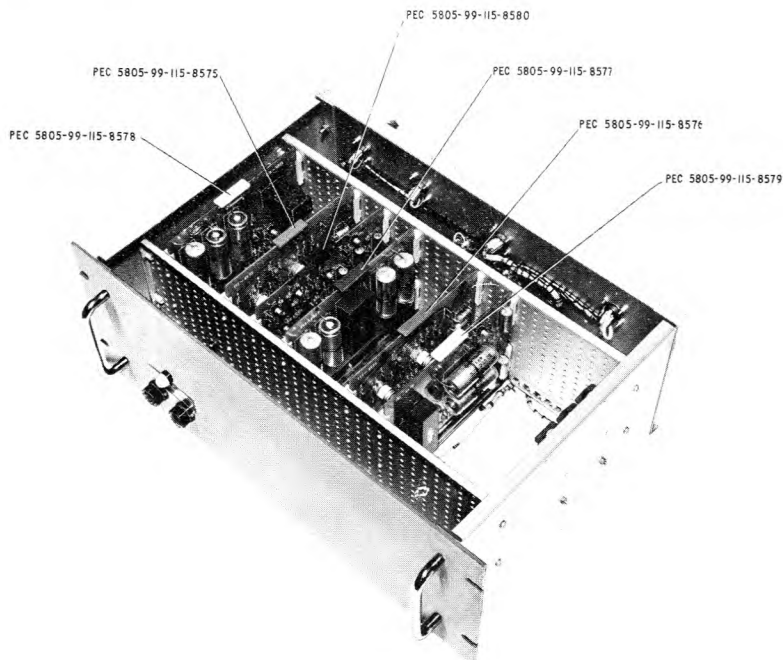
Maximum humidity:	75%
Temperature range:	+5°C (+41°F) to +35°C (+95°F)

POWER REQUIREMENTS

24-0-24V±10% at 500mA per unit.

SIGNAL INTERFACE UNIT No.3
(5805-99-115-1480)

RELEVANT PUBLICATIONS
AP 116M-01101-16



Signal interface unit No.3

FUNCTION

The unit is designed to provide an analogue interface between the four-wire analogue zone exchange, and the two-wire BID.200 circuits in the SKYNET speech system.

ORIGIN

Standard Telephones and Cables Ltd.,

4-WIRE CIRCUIT DATA

Circuit Isolation:	Better than 60dB over the range 100Hz and 7kHz when terminated in 600 ohms.
Amplifier gain:	Up to 40dB in both directions.

Input from analogue zone exchange:-

Frequency range: 200Hz to 4kHz
Input level: -27dBm
Impedance: 300 ohms
Source impedance 300 ohms

Output to analogue zone exchange:-

Frequency range: 200Hz to 4kHz
Output level: -21dBm
Impedance: 300 ohms
Load impedance: 300 ohms

Distortion without echo suppressor: Less than 1%.

2-WIRE CIRCUIT DATA

Input from automatic exchange:-

Frequency range: 200Hz to 4kHz.
Input level: -24dBm
Impedance: 600 ohms
Source impedance: 600 ohms \pm 50%

Distortion without echo suppressor: Less than 1%.

DIMENSIONS

Height	Width	Depth
178 mm (7 in.)	483 mm (19 in.)	356 mm (14 in.)

WEIGHT

4.7 kg (10.5 lb)

CLIMATIC RANGE

Maximum humidity: 95%
Temperature range: +10°C (+50°F) to +40°C (104°C)

POWER REQUIREMENTS

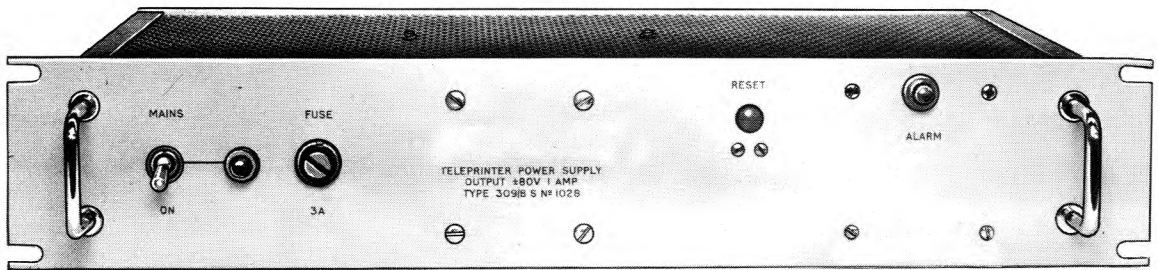
24-0-24V \pm 10% at 300mA (+ve) and 100mA (-ve)

Portability

The signal interface unit No.3 meets the Air-portability Code FMB/L (X2) and can withstand the shocks of road transportation.

TELEPRINTER POWER SUPPLY
AC TO DC TYPE S69/1
(TRANSIPACK TYPE 309/B)
6130-99-933-2877

RELEVANT PUBLICATION
AP 116M-1001-16



Teleprinter power supply a.c. to d.c. Type S69/1

BRIEF DESCRIPTION

The Transipack 309/B power supply is a transistorised unit providing a stabilized supply for one typical teleprinter.

It performs a similar function to the rectifier set No. 66C and fits into a 19" rack.

TECHNICAL DATA

Input : 100, 200, 220, 240V, 50 Hz.
Output: +80V at 1 A
 -80V at 1 A
Stability: $\pm 6\%$ output and mains variation
Regulation: $\pm 5\%$ against load variation
Ripple: less than 2%

DIMENSIONS

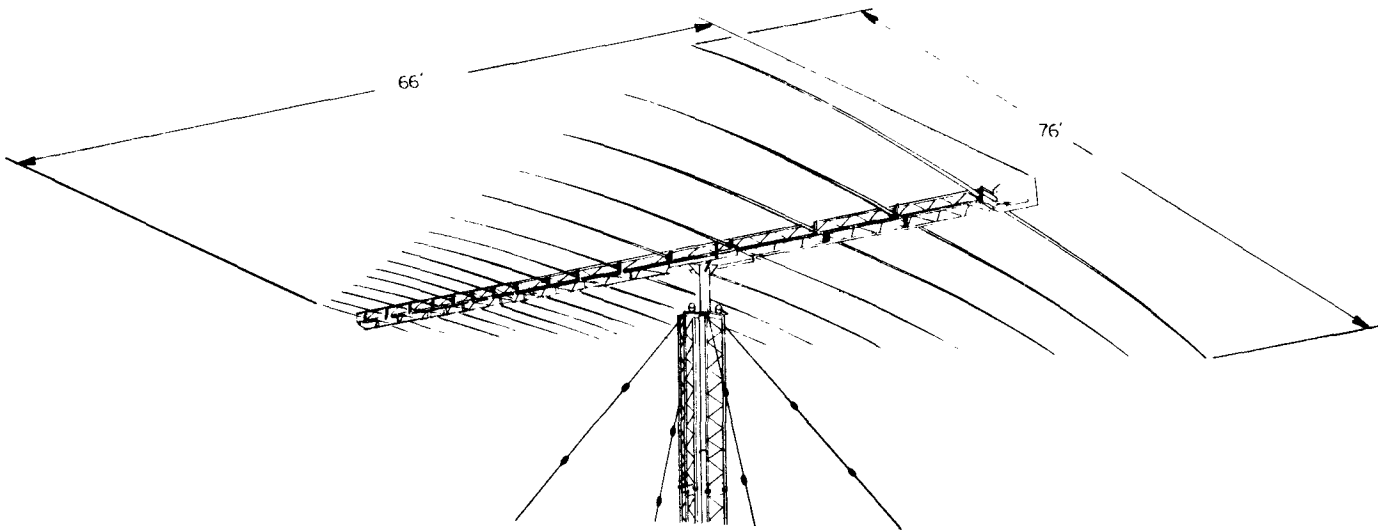
Height	Width	Depth
3 $\frac{1}{2}$ in(8.9cm)	19in(48.3cm)	8in(20.3cm)

WEIGHT

14lb(6.35 kg)

ANTENNA ROTATABLE, LOG-PERIODIC
(Racal type LPH-9 (modified))

RELEVANT AIR PUBLICATION
116E-1737



ANTENNA ARRAY

FUNCTION

Rotatable log-periodic h.f. tx. rx. antenna for fixed station installations. Designed for use with medium to long range transmitting or receiving equipments.

ORIGIN Racal Antennas Ltd., Type LPH-9 (modified)

TECHNICAL DATA

Frequency range	6.5 to 32 MHz.
Application	Transmitting or receiving.
Power capability	Up to 25 kW average (continuous) 50 kW p.e.p. at any frequency in the specified band.
Input impedance	50 ohms (nominal).
VSWR	2:1 maximum at any frequency in the specified band.
Gain	14 dB over isotropic (assuming perfect ground plane) .

Polarization	Horizontal
Azimuth beam width	65 degrees, average
Front-to-back ratio	20 dB average, 14 dB minimum
Side lobe suppression	20 dB.
Pressurization	A 10 lb/in ² purging valve is located at the end of the transmission line.

POWER SUPPLY REQUIRED

415V, 50-60 Hz, 3-phase, 4-wire.

DIMENSIONS

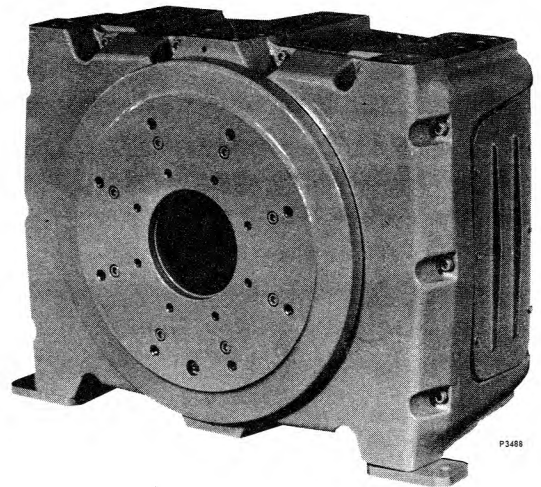
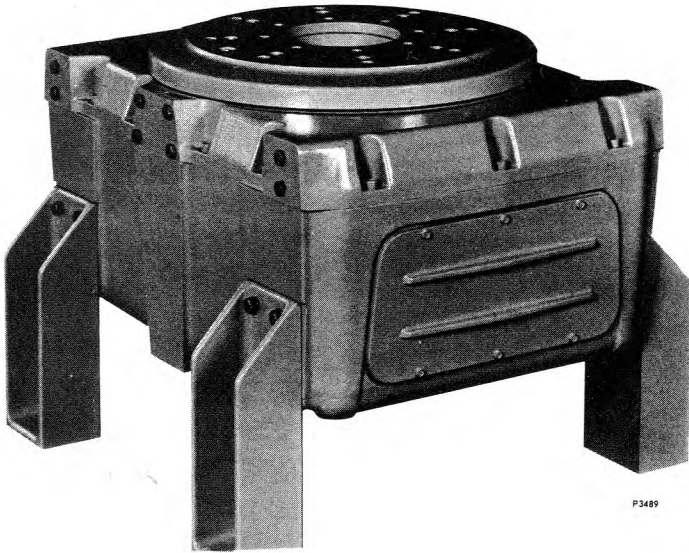
Antenna beam length	20.1m (66 feet)
Longest element length	23.2m (76 feet)
Turning radius	14.6m (48 feet)
Mast height (above pedestal)	6.1m (20 feet)

WEIGHT

Antenna array	453.6 kg (1000 lb)
Pedestal	344.7 kg (760 lb)
Control	3.2 kg (7 lb)

SINGLE-AXIS POSITIONERS
SCIENTIFIC ATLANTA MODELS 5625, 5626 and 5109

RELEVANT AIR PUBLICATION
116E-1723-1B



Single-axis positioners series 5109 and series 5620

FUNCTION

Model 5109 is a medium-duty azimuth positioner used to support and position antennas or other devices under test. Models 5625 and 5626 are polarization positioners used to rotate antennas, and for such application as cross-polarization and polarization pattern measurements.

ORIGIN

Scientific Atlanta Inc. USA.

Models 5625, 5626, 5109

TECHNICAL DATA

Specific capabilities and characteristics of the single axis series 5109 and 5620 positioners are listed below.

Model Number	5625	5109-3A	5626A	5626B	5626C	5626D	5626E	5626F
Max full-load operating speed r/min	1.25	1.5	1.5	10.0	15.0	30.0	60.0	100.0
Delivered torque (ft-lbf)	230	500	500	120	80	45	35	25
Withstand torque (ft-lbf)	640	640	640	—	—	—	—	—
Maximum vertical load (lb)	—	5000	—	—	—	—	—	—
Maximum radial load (lb)	3000	—	3000	3000	3000	3000	3000	3000
Max bending moment about turntable (ft-lbf)	3000	3000	3000	3000	3000	3000	3000	3000
Max polar moment of Inertia of load (slug-ft ²)	100	170	170	2000	1500	1000	1000	600
Self locking drive train	Yes	Yes	Yes	No	No	No	No	No
Readout position accuracy (°)	0.03	0.03	0.03	0.5	0.5	0.5	0.5	—
Max total drive gear backlash (°)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Drive motor, hp & type	1/4 ac. 60 Hz-1φ. 115V.	1/3 dc. 115V.	1/3 dc. 115V.	1/3 dc. 115V.	1/3 dc. 115V.	1/3 dc. 115V.	3/4 dc. 115V.	3/4 dc. 115V.
Limit switches	Installed	Optional	Optional	No	No	No	No	No
Limit-to-limit rotation with limit Sw., (20°min, 860°max)	90°	400°	400°	—	—	—	—	—
Max overall dimensions on standard mtg. brackets:								
Height	19.5	19.1	19.5	19.5	19.5	19.5	19.5	19.5
Width	26.5	25.0	26.5	26.5	26.5	26.5	26.5	26.5
Depth (in)	16.2	23.9	16.2	16.2	16.2	16.2	16.2	16.2
Useable turntable dia	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Min through hole dia (in)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Net weight	220	230	220	220	220	220	220	220
Shipping weight (lb)	280	290	280	280	280	280	280	280

Terminology used in technical data is defined as follows.

Delivered torque - The output torque at the positioner turntable when the drive motor is drawing rated current.

Withstand torque - The amount of external torque that can be safely applied to the positioner turntable. This torque value represents the design rating of the drive gears and includes a safety factor.

Maximum vertical load - The maximum weight that can be safely supported by the positioner turntable in a normal direction.

Maximum radial load - The maximum weight that can be safely supported by the turntable parallel to its surface.

Maximum bending moment - The moment of couple at the turntable surface, which is the product of a force and a distance. The force may be the weight of the antenna assembly or the summation of the wind pressure on all the surfaces of the antenna assembly.

Maximum polar moment of inertia of load - The product of the load's mass in slugs and the square of its radius of gyration in ft., about the positioners axis of rotation.

Self locking drive train - A drive train that will not permit rotation when external torque loads act on the turntable. This is due to the non-overhauling character of the higher ratio worm gear speed reducers used in low-speed positioners.

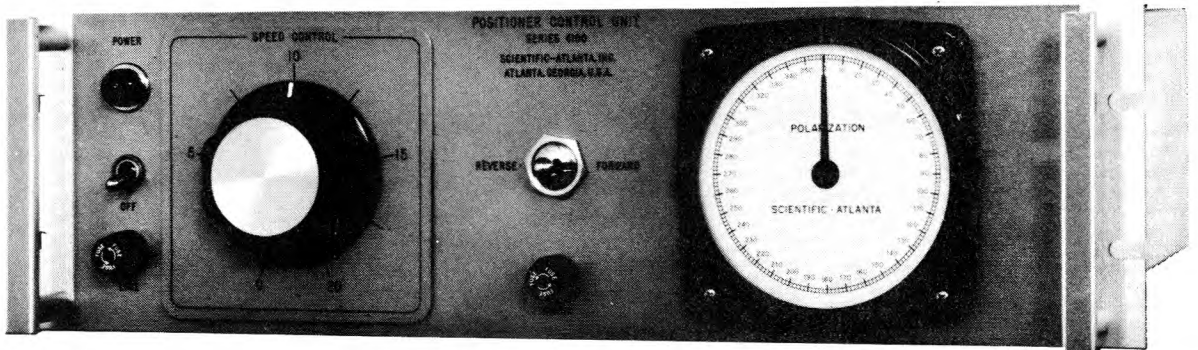
Readout position accuracy - The maximum static error of the turntable position relative to the chart-indicated position, using the 10-degree scale expansion of a Scientific-Atlanta rectangular antenna pattern recorder. The values are for antenna positioners in a "no-load" condition. The addition of weight, bending moment, or torque loads to an azimuth axis usually produces no significant increase in the indicated position error.

Total drive gear backlash - Total measured angular movement of a turntable about its axis with 10% rated delivered torque load applied in one direction and followed by an equal load applied in the opposite direction.

Drive motor horsepower - The continuous-duty power rating of the drive motor with rated current applied to the motor terminals.

POSITIONER CONTROL UNIT
SCIENTIFIC ATLANTA MODEL 4111

RELEVANT AIR PUBLICATION
116E-1723-1A



P-603

Positioner control unit (serial No.48 and above)

FUNCTION

Positional control unit is designed to control the speed and direction of a d.c. motor-operated device.

ORIGIN

Scientific Atlanta Inc., USA Model 4111

GENERAL DESCRIPTION

The model 4111 position control units are designed for remote control of the speed and direction of a d.c. motor-operated device. The unit is designed for single axis control and compactness and to be used in the smaller instrumentation installation. An optional series 4400 indicator unit, installed in the unit provides remote position indication.

This unit is used in conjunction with single axis positioners listed in Part 8, Sect.3, Sheet No.1(116E-1723-1B).

TECHNICAL DATA

POSITIONER CONTROL UNIT

Maximum motor size $\frac{3}{4}$ horsepower, d.c. shunt, continuously
(up to 1 horsepower with a 50% duty cycle)

Output power

Armature voltage

0-120 volts d.c. continuously variable

Armature current

6.5 amperes maximum, continuous

8.5 amperes with 50% duty cycle (on period less than 10 min)

Field voltage

105 volts d.c. fixed

Field current

0.6 amperes maximum, continuous

DIMENSIONS

Height	Width	Depth
134 mm (5 $\frac{1}{4}$ in)	484 mm (19 in)	305 mm (12 in)

(standard 19 inch EIA panel)

WEIGHT

Net	8.6 kg (19 lb)
Shipping	11.4 kg (25 lb)

INDICATOR UNIT

Accuracy

Model 4402	± 0.03 degree
Model 4403	± 0.03
Model 4405	± 0.03
Model 4406	± 0.03
Model 4401	± 1 degree
Model 4404	± 1 degree

Synchro receiver

23TR6

115/90 volts

DIMENSIONS

Height	Width	Depth
122 mm (4 $\frac{3}{4}$ in)	122 mm (4 $\frac{3}{4}$ in)	166 mm (6 $\frac{1}{2}$ in)

WEIGHT

One-synchro model	1.4 kg	(3 $\frac{1}{2}$ lb)
Two-synchro model	2.268 kg	(5 lb)