

WIRELESS *for the* **WARRIOR**

Pamphlet Series

No. 8 Charging Set Pedal Driven 60 Watt

WftW Pamphlet Series No. 8.

Cover and layout: Louis Meulstee.

Cover illustration: Charging Set, Pedal Driven, 60 Watt, No. 2, Mk.I.

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The Pamphlet Series.

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May 2023

WftW Pamphlet No. 8 Charging Set Pedal Driven 60 Watt.

About this publication.

WftW Pamphlet No. 8 is a follow-up of a description of Charging Set, Lightweight, 80 Watt in Pamphlet No. 7. Both charging sets formed the backbone of battery charging for wireless sets used by parachute forces.

Charging Set Pedal Driven 60 Watt was a small, collapsible and lightweight unit designed for charging 12 Volt batteries used with wireless equipment such as Wireless Sets Nos. 22, 62 and 76/R109. It was primarily developed for use by parachute and airborne troops. Described in this pamphlet are technical details, tools list, details of the history, difference between types and versions.

Added in the appendices are scans of a Working Instructions Card, scale of stores of a typical WS No. 62 Parachute station and EMERs workshop regulations, in addition to reports relating to the development of the pedal generators.

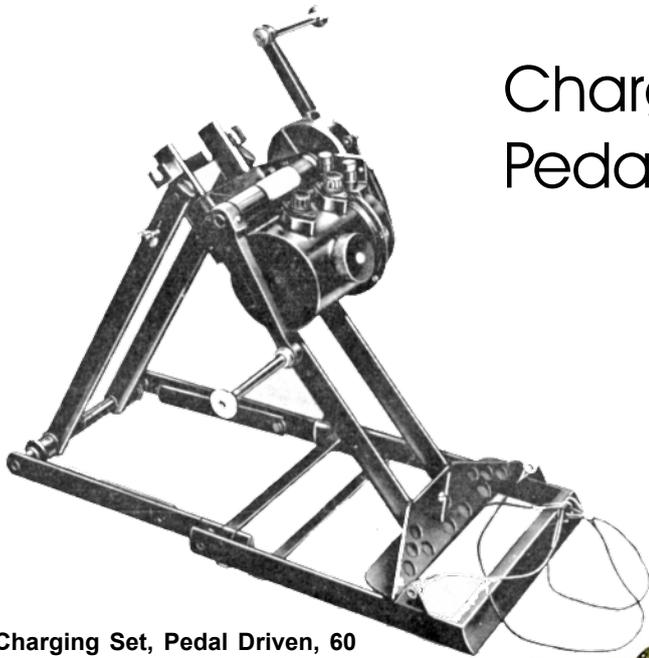
For more information about parachute and airborne forces communication, see the free to download WftW Volume 1 Amendment No. 2, entitled '*From Type 65 to Wireless Sender No. 76. A survey*'. This is a publication listed in the download section of www.wftw.nl

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Acknowledgements

Most of the information and illustrations in this pamphlet were retrieved from the Royal Signals Museum Archives with kind permission and assistance of current and past Directors and Staff of the Royal Signals Museum, Blandford Forum, U.K.

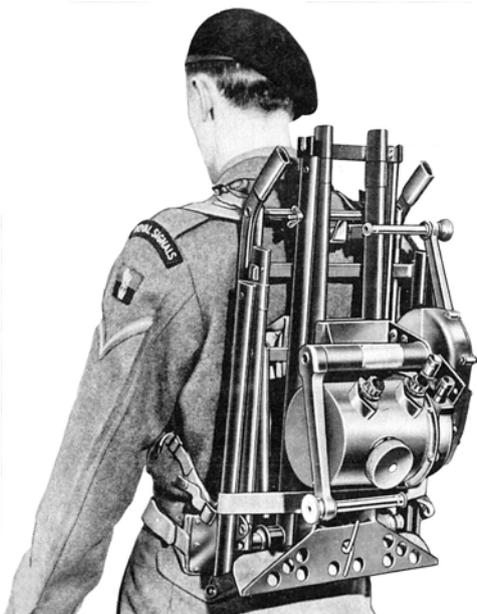
Charging Set Pedal Driven 60W.



Charging Set, Pedal Driven, 60 Watt No. 2, Mk.1 with framework erected for hand operation.



General view of Charging Set, Pedal Driven, 60 Watt No. 2 Mk.1



Charging Set, Pedal Driven, 60 Watt, No. 2 Mk. 1 carried as manpack.

Introduction

Charging Set, Pedal Driven, 60 Watt was a lightweight portable (manpack carried) charging set rated at 15V 4A DC for a pedal speed of 60rpm. It was developed for charging 12V batteries of Wireless Set No. 62 in manpack or parachute stations, also used with parachute stations Wireless Set No. 22, Wireless Stations Adm 5G (Mod.)/R109, 76/R109, and (with a different type of generator) envisaged to be used with the projected Wireless Set No. X42A. In practice its use was basically restricted to parachute operations.

The pedal generator featured a foldaway seat which fully collapsed into a backpack frame for easy transportation, consisting of two frameworks: the generator frame of which the generator was mounted, and a seat frame on which the harness and seat were attached. An important feature was that if an emergency was anticipated, the waist strap was not fastened, so that the load could be removed quickly by pulling the quick release straps of the breast strap (See page 5 and page 9, Fig. 1B item 11). The charging set could be erected either as a pedal generator or hand generator.

The generator evolved from Pedal Generator 70 Watt, developed in 1943, which comprised a frame with 3 legs, a saddle and the actual generator. It was bulky and could not easily be carried as manpack. For this reason it was believed to be redesigned as Charging Set, Pedal Generator 60 Watt, which possibly had the same type of generator, 3 foldable legs, a saddle and a carrying harness. (See page 6 for drawings of these prototype pedal generators). A complete redevelopment eventually led to Charging Set, Pedal Driven, 60W, No. 1, later upgraded to fully tropicalised types No. 2 and No. 2 Mk.1.

Still being considered as an interim in D Signals Liaison Note No. 35 issued April 1949:

...the prototype of a 60 Watt pedal driven charging set has now been produced. This is an interim equipment and will be succeeded by the 100 Watt charging set. It will therefore only be issued if stocks of existing equipment are insufficient. When the 100 Watt charging set is issued the 60 Watt pedal driven set will continue in service for use on the few occasions when a pedal driven set is required. Field trials of the prototype will be under the direction of CSO MELF and Commandant School of Signals, to each of whom one model of the equipment will be issued soon. These trials are required to test the suitability of the design for small scale use and to ascertain which points are particularly liked or disliked so that were applicable to the 100 Watt set they can be incorporated or omitted from that design...

As the use of charger with a capacity of only 60 Watts was limited and basically confined to parachute forces, not many were produced.

DATA SUMMARY

Manufacturer: E. Pass & Co Ltd.

Year of Introduction: 1944.

Purpose: Lightweight foldable pedal generating set for charging a 12 V lead-acid battery.

Operating modes: Pedal or hand operation.

Pedal Speed: 60 rpm.

Output: 15V DC, 4A, at pedal speed of 60 rpm $\pm 10\%$.

Dimensions (inch): Height width length
(Frame folded) 22 10 12

Weight: 34 lb.

Accessories:

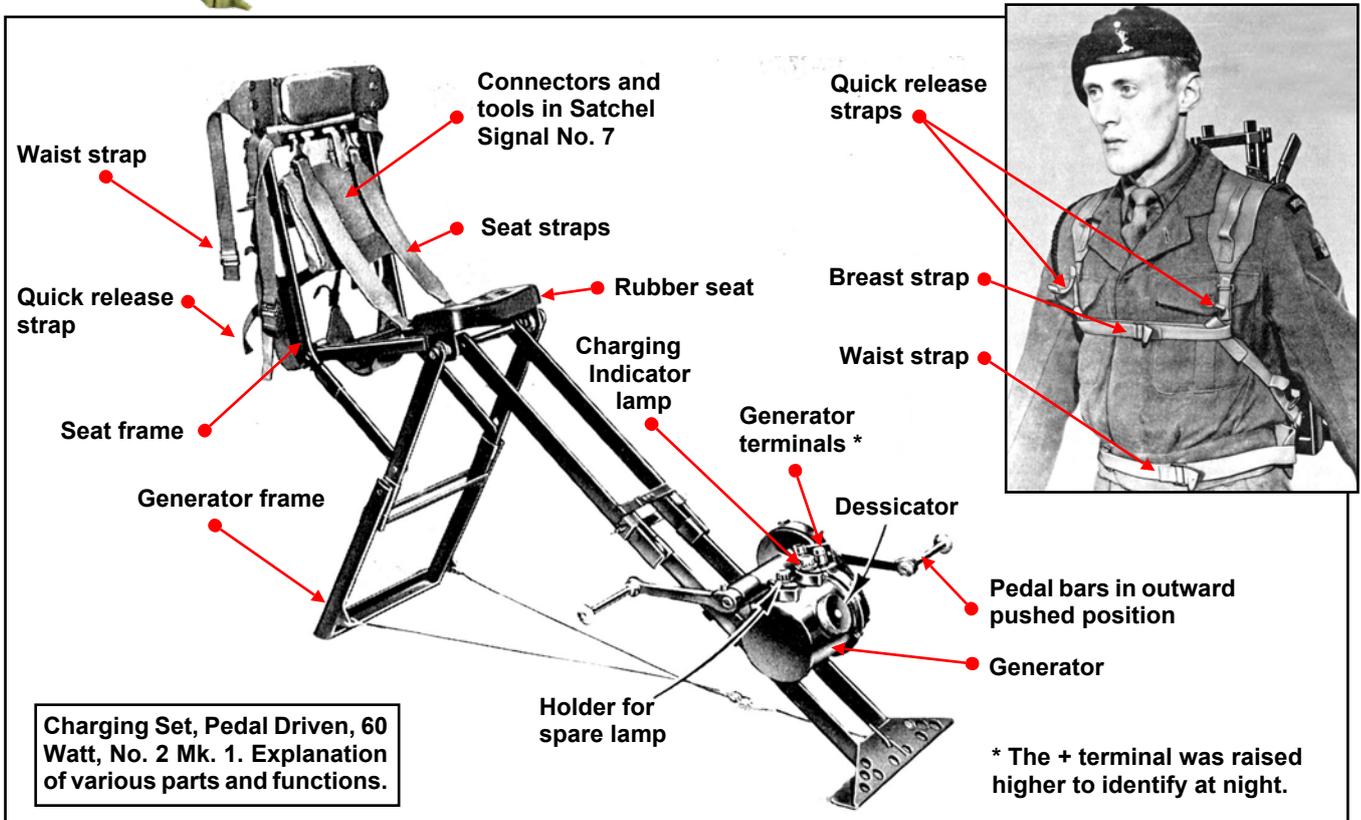
Connectors and tools carried in Satchel Signals No. 7.



Charging Set Pedal Driven, 60 Watt No. 2 Mk.1 folded up as manpack load, rear view (left) and front view (right).



Close-up view of type and serial number plate apparently missing the 'Mk.1' notation as the No. 2 had not a charging indicator lamp.

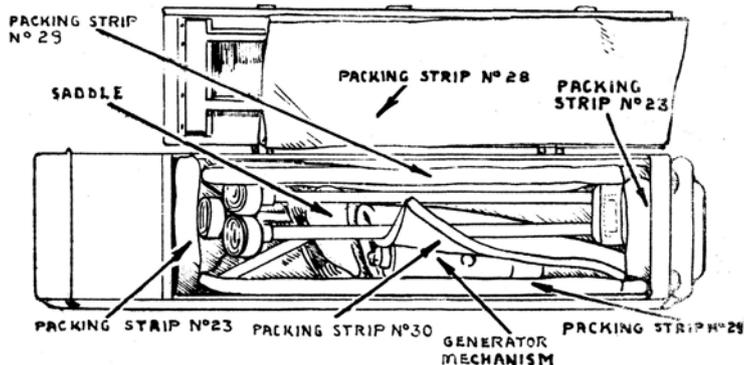


Type	Differences between types and versions (see also Page 6)	Date
Pedal Generator 70 Watt.	Generator fitted on a tripod frame with saddle. Trial model. No backpack harness.	1943
Charging Set, Pedal Driven, 60 Watt.	Generator fitted on a foldable tripod frame with saddle, based on Pedal Generator 70 Watt. Trial model. Backpack harness.	1943
Charging Set, Pedal Driven, 60 Watt, No. 1.	Redesigned model. Lightweight, miniaturised and collapsible with integrated backpack harness. Generator with external suppression and cut-out relay box.	1944
Charging Set, Pedal Driven, 60 Watt, No. 1, Mk.I. ZA 24579 *	As Type No. 1 but a new type generator with desiccator. Integrated suppression filter and cut-out relay.	1945
Charging Set, Pedal Driven, 60 Watt, No. 2.	As Type No. 1, Mk.I but fully tropicalised, and minor changes on the seat frame.	1945
Charging Set, Pedal Driven, 60 Watt, No. 2, Mk.1. ZA 31761.	As Type No. 2, but fitted with a charging indicator lamp, a different (wider) generator frame. Later production was fitted with a different type of cut-out relay.	1953

Notes: The dates of introduction are estimated and based on literature in the references on page 23. There is no accurate information when various types came into production.

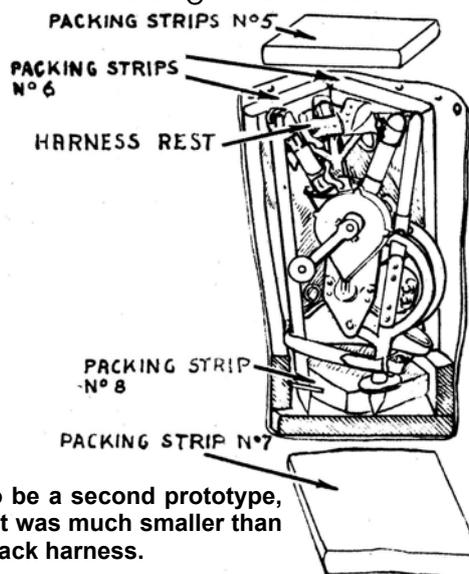
** This VAOS number was also given in an earlier Scale of stores of a Charging Set Pedal Driven 60W No. 1, (see WftW Volume 2, WS 62-33), which might be in error.*

Pedal Generator 70W in F type Container.



Pedal Generator 70W, ZA20476, (above) was probably a prototype having a three legs frame, generator mechanism, and a saddle. It was bulky, requiring the space of a full type F container, and could not be easily transported as a manpack.

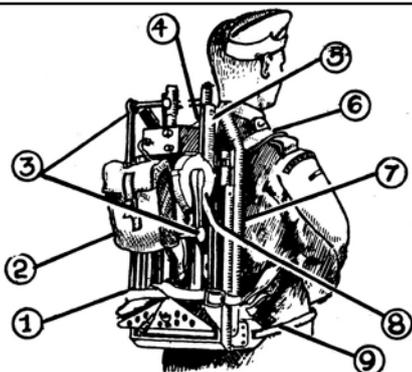
Charging Set Pedal driven in Kitbag Parachutists.



Charging Set 60W (right) was believed to be a second prototype, with a foldable 3 leg frame and a saddle. It was much smaller than the 70W Pedal Generator and had a manpack harness.

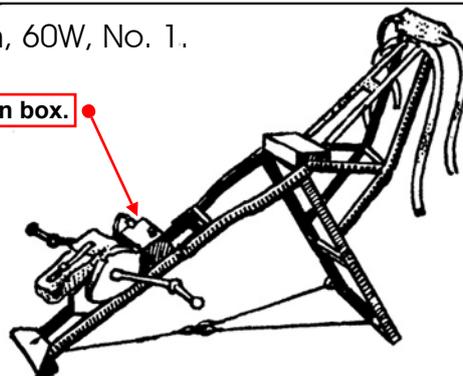
The drawings above were retrieved from Provisional Pamphlet No. 480A, 'Signal Equipment Packing Instructions (Airborne)', issued by SRDE in May 1944. A second reference to the Pedal Generator 70W was found in SRDE Pamphlet No. 427.

Charging Set, Pedal Driven, 60W, No. 1.

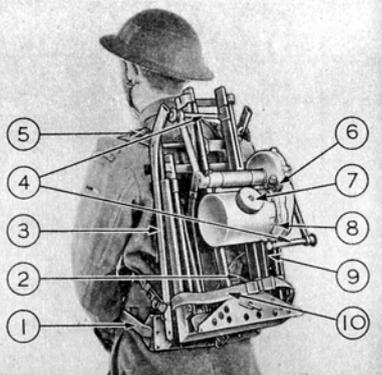


1. Holding strap.
2. Satchels signals No. 7 containing:
Connector, Single, No. 3;
Connector, Twin,
Spanners, box, 2 B.A. x O B.A.; special, No. 1.
3. Folding pedals.
4. Suppression box.
5. Main frame.
6. Shoulder straps.
7. Seat frame.
8. Generator.
9. Waist strap.

Suppression box.



Charging Set, Pedal Driven, 60W, No. 1 Mk.1 and No. 2.



- (1) Waiststrap.
- (2) Satchel, Signal, No.7 containing
Screwdriver, electrician,
3-in.
Spanners:-
B.A. Open jaw, D.E., 4-5
B.S.W. Open jaw, D.E.,
1/8 in. x 3/16 in.
Box 2 B.A. x O. B.A.,
special No.1.
Connectors Single No.157
" Twin No.317
& No.318
- (3) Seat Frame
- (4) Pedals
- (5) Shoulder straps
- (6) Terminals
- (7) Desiccator
- (8) Generator
- (9) Generator frame
- (10) Holding strap



For an illustration of carrying Charging Set, Pedal Driven, 60W, No. 2 Mk.1, see page 4.

Charging Set, Pedal Driven, 60W, No. 2 Mk.1.

The connectors and tools, listed below, are carried in a Satchels Signals, No.7, strapped to the seat frame.

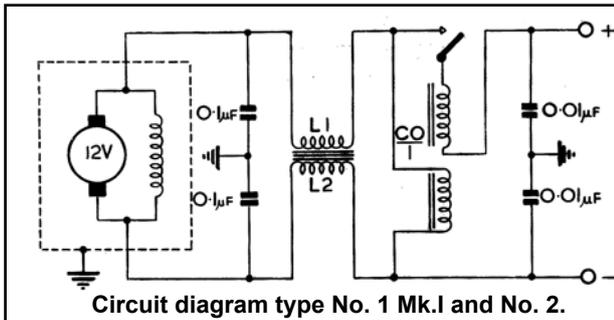
FA 16771	Screwdrivers, electricians, 3 in 1
	Spanners,	
FA 17190	B. A. Open jaw, D.E. 4-5 1
FA 17233	B. S. W. Open jaw, D.E. 1/8 in x 3/16 in	1
FA 17234	B. S. W. Open jaw, D.E. 1/4 in x 5/16 in	1
ZA 26289	Box, 2 B.A. x O.B.A., special No.1	... 1
	Connectors,	
ZA 32186	Single, No.157 1
ZA 32184	Twin, No.317 1
ZA 32185	Twin, No.318 1
XB 19075	Twin, 6 ft. 1

The designation of the lamp used in the charging indicator is:

Y3/X951129	Lamps, filament, Vac, MESC, clear, 2.5 V, 0.75 W.
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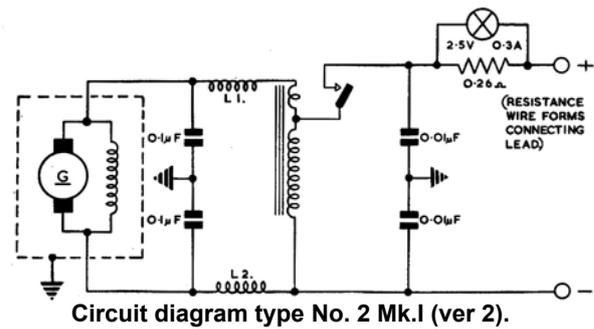
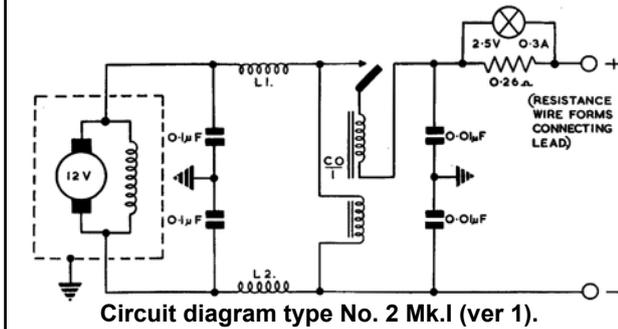


Electrical circuit diagrams.



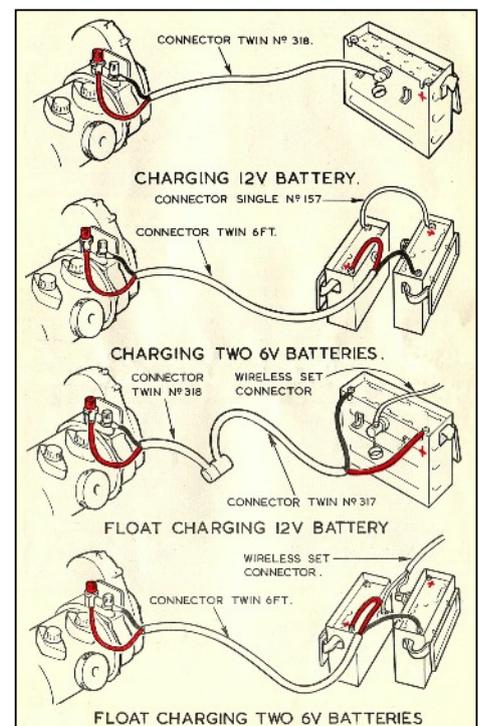
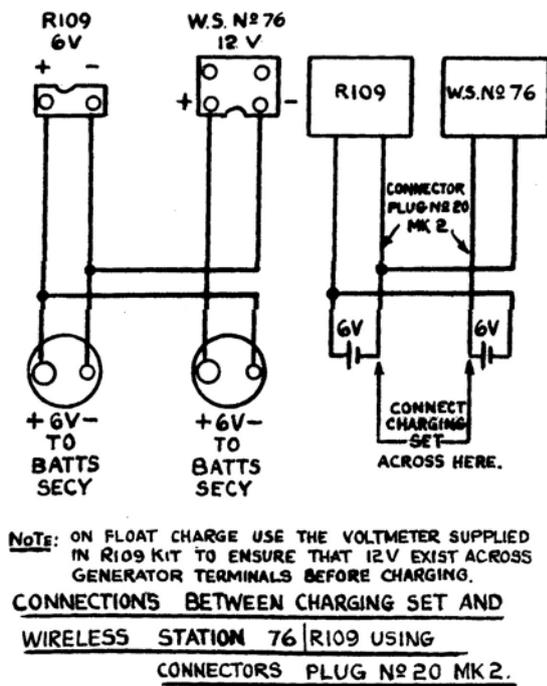
Electrical circuit diagram

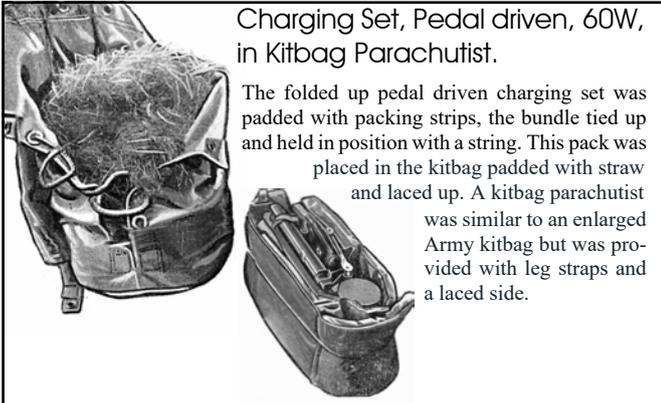
The DC generator had a commutator with brush gear which provided approximately 15V at no load. All types incorporated adequate filtering and a cut-out relay which made contact at a generator voltage of between 13½ and 14½V and should be open at 13V. The later issued Pedal Generator No. 2 Mk.1 had a charging indicator lamp fitted to the generator case. It was visible to the operator and lights when the charging current reached about 2½A. The automatic cutout relay prevented battery discharging through the generator when the output voltage was less than that of the battery. A later modification had an improved model of cut-out relay.



Connecting batteries.

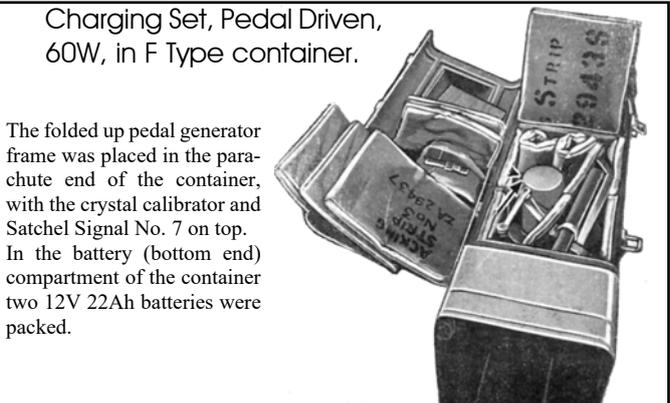
Charging Set Pedal Driven 60W was to be used for charging 12V batteries only. 6V batteries were connected in series with the connectors provided in the kit (See drawing below right). Float charging the batteries of a WS 76/R109 station required the use of a voltmeter to ensure to which terminals the spade terminals of the twin connector were connected. (See drawing below left).





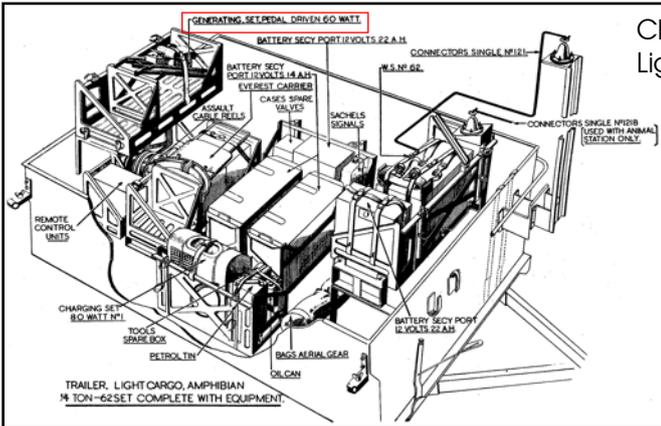
Charging Set, Pedal driven, 60W, in Kitbag Parachutist.

The folded up pedal driven charging set was padded with packing strips, the bundle tied up and held in position with a string. This pack was placed in the kitbag padded with straw and laced up. A kitbag parachutist was similar to an enlarged Army kitbag but was provided with leg straps and a laced side.



Charging Set, Pedal Driven, 60W, in F Type container.

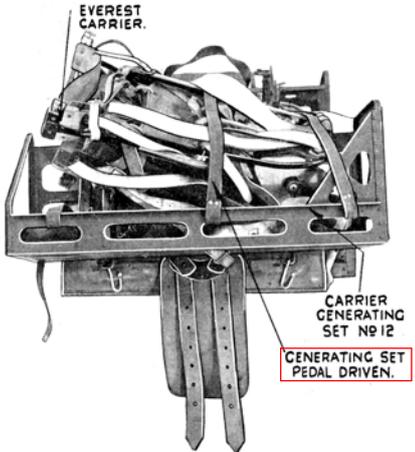
The folded up pedal generator frame was placed in the parachute end of the container, with the crystal calibrator and Satchel Signal No. 7 on top. In the battery (bottom end) compartment of the container two 12V 22Ah batteries were packed.



Charging Set, Pedal driven, 60W, in WS No. 62 Trailer Light Cargo, Amphibian, 1/4 ton (Trailer 10-cwt).

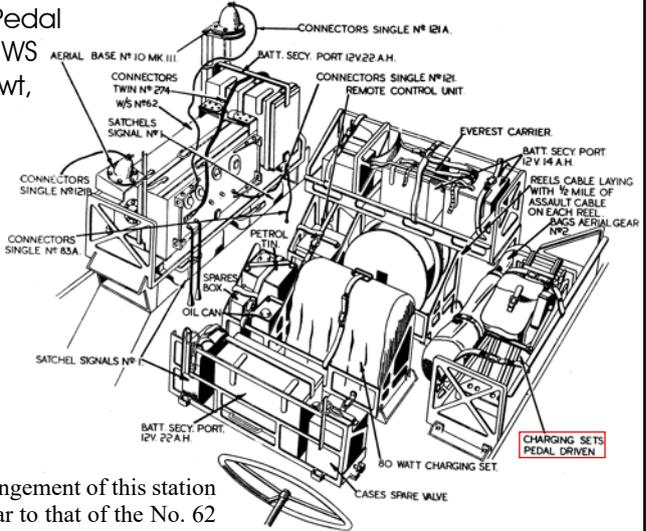
Charging Set Pedal Driven 60W as part of a Wireless Set No. 62 station fitted in a 10-cwt trailer with carriers for conversion to an animal pack station or manpack station. This station was principally similar to the No. 62 Set station fitted in a jeep (see below).

Charging Set, Pedal driven, 60W in WS No. 62 animal pack station .



Charging Set Pedal Driven 60W in Carrier Generating Set No. 12, carried on the near side of the 3rd animal.

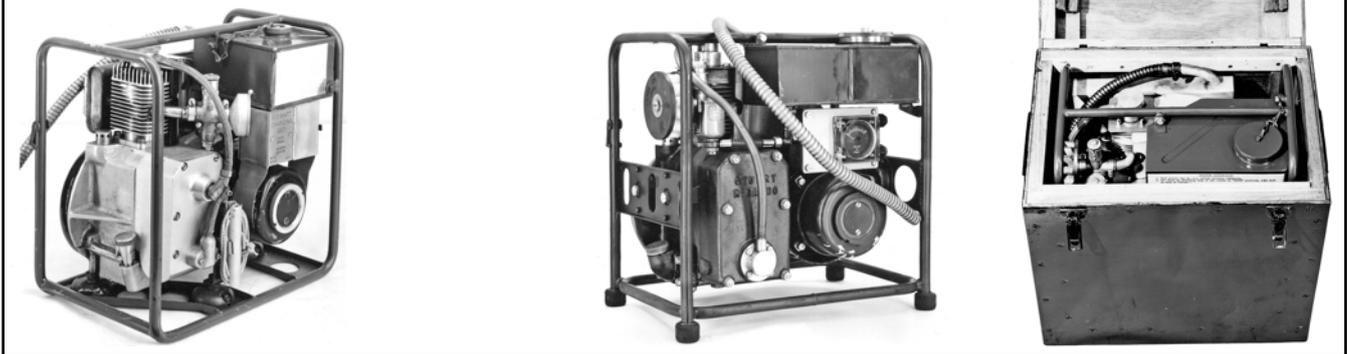
Charging Set, Pedal driven, 60W, in WS No. 62 Car 5-cwt, 4x4 station.



The equipment arrangement of this station was basically similar to that of the No. 62 Set 10-cwt trailer station above. It could be converted to a No. 62 animal pack or man pack station.

Charging Set 100 Watt.

Intended as a replacement of the Charging Set, Pedal Driven, 60 Watt, (and Charging Set 80 Watt) was a miniature petrol-driven engine driven Charging Set 100 Watt. Two trial versions of the 100 Watt charging sets were completed in the late 1940's. Due to a revised policy of requirements, the development of the 100 Watt Charging Set was abandoned.



CHARGING SETS, PEDAL DRIVEN

60-WATT No. 1

Working Instructions

This generator, rated at 15 V 4 A.D.C. (pedal speed 53 r.p.m.) is used for charging the batteries of the Wireless Sender No. 76 and Wireless Set No. 22 parachute, and Wireless Set No. 62 Manpack stations.

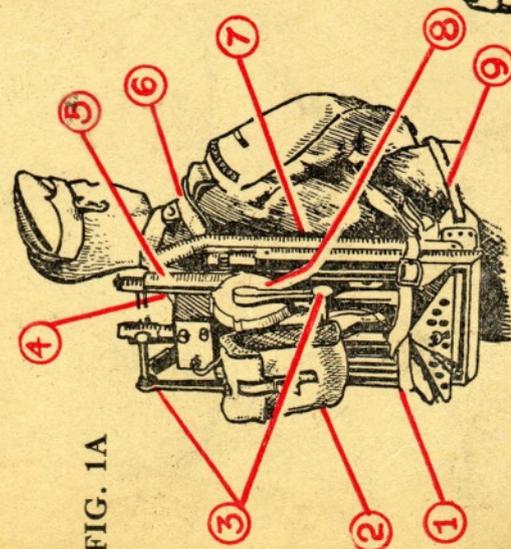


FIG. 1A

THE KIT comprises:—

- (See Fig. 1A)
1. Holding strap.
 2. Satchels signals No. 7 containing: Connector, Single, No. 3; Connector, Twin, No. 3.
 3. Spanners, box 2 B.A. x O B.A.; special, No. 1.
 4. Folding pedals.
 5. Suppression box.
 6. Main frame.
 7. Shoulder straps.
 8. Seat frame.
 9. Generator.
 10. Waist strap.

TO ERECT THE CHARGING SET (Fig. 1B)

1. Unfasten the waist strap (9) and the breast strap (10) and unload the pack (see Fig. 1B).

In cases of emergency only, the 'quick release' method of unloading should be used. It is then only necessary to unfasten the waist strap (9) and pull the 'quick release' tabs (11).

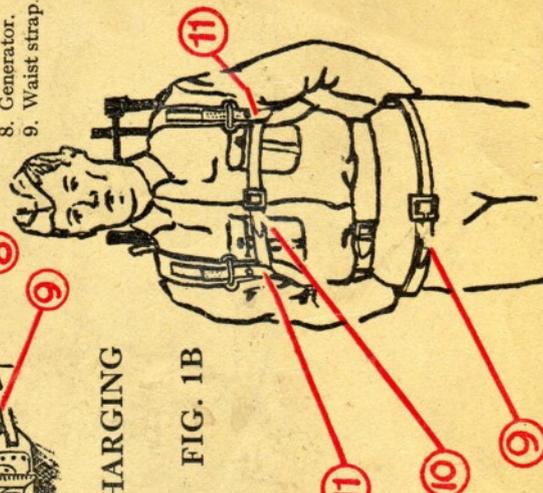


FIG. 1B

TO DISMANTLE

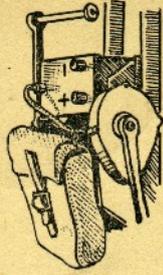
Reverse erecting instructions in both order and meaning.

NOTE: To ensure maximum comfort to the wearer, the straps attached to the seat must not come between the seat and the wearer's back. Therefore, before placing the seat in the folded position, unhook the brass clips (23) from the bar (24) (see Fig. 8), and let the straps attached to these clips (and seat) hang down. Push the seat into the folded position and hook the clips (23) onto bar (24). (See Fig. 7).

TO OPERATE

This equipment is to be used for charging 12 V batteries only.

Connect the output terminals to the 12 V battery to be charged. Using Connector, Twin, No. 199, connect the positive terminal on the generator to the positive terminal on the battery and the negative terminal on the generator to the negative terminal on the battery. Connector, Single, No. 3 is supplied for connecting in series two 6 V batteries when required.



Turn the pedals at the rate of 1 rev. per sec. (approx.).

NOTE: When *float* charging the batteries of the Wireless Sender required as Connector Plug No. 76 (and Receiver R109) Connector, Single, No. 3 is not performs the same function.

Remove a plug of Connector Plug No. 20 from one of the batteries. If the receiver still operates, connect the positive terminal of the battery from which the plug has been removed to the positive of the generator and the negative terminal of the *other* battery to the negative terminal on the generator.

If the receiver does not operate when one battery is disconnected replace the plug and remove the plug from the other battery. Make connections as in the paragraph above.

Remember to replace the plug of Connector Plug No. 20 in the battery socket.

It is important that the generator is connected to the correct battery terminals, otherwise the output may be short circuited. This can be felt as a heavy load when the pedals are turned and serious damage to the generator may result.

MAINTENANCE

See that the apparatus is kept CLEAN.

DO NOT refill the gearbox with grease. The gearbox is packed with special grease during assembly and should not require refilling.

Leads should be examined for wear, fraying, etc.

TO ERECT THE CHARGING SET

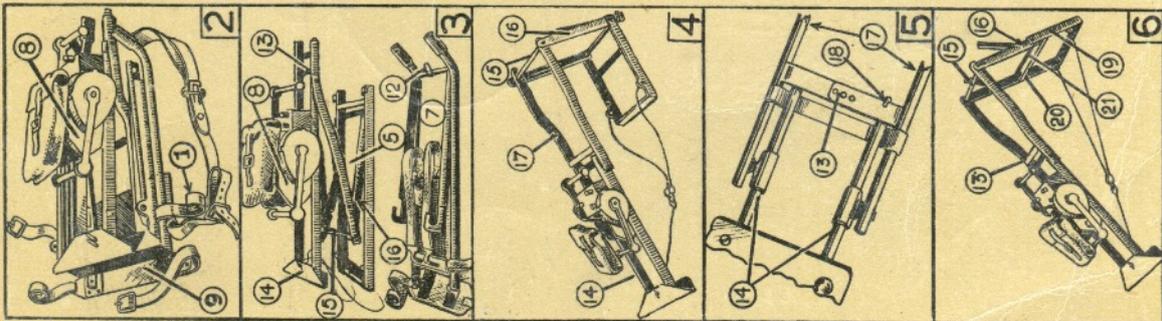


FIG. 2

- (a) Place the charging set on the ground with the generator (8) uppermost.
- (b) Untie the strap (1) fastened round the base of the apparatus.

FIG. 3

- (a) Separate the main frame (5) (bearing the generator (8)) from the seat frame (7) underneath. These frames are held together by a hook (12) on the seat frame (7) which slides onto a tie bar (13) near the generator (8).
- (b) Place the main frame (5) on the ground with the generator (8) facing upwards.
- (c) Pull section (14) outwards. At the same time grip the hinge (15) and raise section (16).

FIG. 4

- (a) Bring sections (14) and (17) into line.

FIG. 5

- (a) Make the joint between sections (14) and (17) by sliding the former inwards so that its ends fit under the tie bar (13).
- (b) See that the locking device (18) is in position.

FIG. 6

- (a) Raise the hinge (15) and bring sections (16) and (19) into line.
- (b) Make the joint between the sections (16) and (19) by pulling tie bars (20) and (21) together so that the ends of section (16) fit under the tie bar (21).

ERECTING INSTRUCTIONS

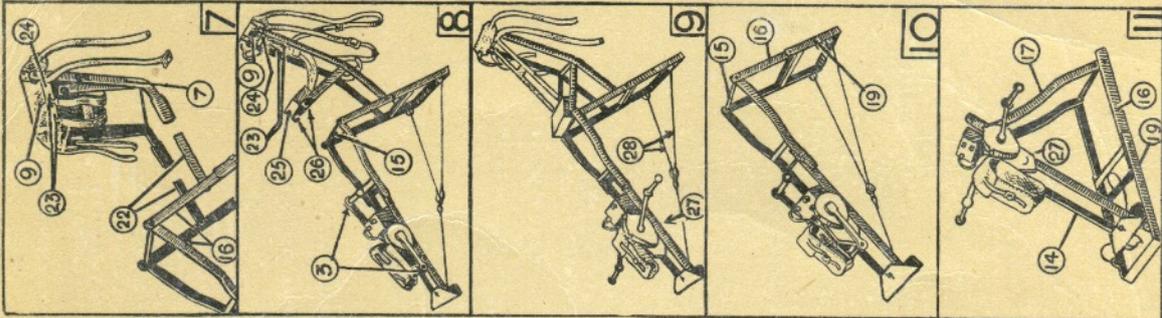


FIG. 7

- (a) Turn the back rest supports (22) (attached to section (16)) outwards.
- (b) Slide the ends of the seat frame (7) onto these supports (22).
- (c) Unhook the brass clips (23) from the bar (24) below the waist strap (9).

FIG. 8

- (a) Lower the seat (25), and hook the brass clips (23) onto the bar (24) again.
- (b) Clip the slotted ends (26) (beneath the rubber seat (25)) onto the hinge (15).
- (c) Turn the waist strap (9) so that it acts as a back support for the operator (see Fig. 9).
- (d) Pull the pedals (3) outwards.

FIG. 9

- (a) Undo the wing nut (27) underneath the generator and adjust the position of the latter to suit the operator.
- (b) See that the wire (28) is taut. See the section 'To Operate' below.

FIG. 10

To Erect the Charging Set, when the generator is to be hand-driven.

- (a) Proceed as in 2 and 3 opposite.
- (b) Raise the frame by gripping hinge (15) and make the joint between sections (16) and (19) as in 6 (b).

FIG. 11

- (a) Lay sections (16) and (19) on the ground.
- (b) Arrange sections (14) and (17) as shown in Fig. 11.
- (c) Loosen the wing nut (27) underneath the generator and slide the latter to a convenient position on section (14).

Appendix 2a

W.O. CODE No. 11198
SIGNAL EQUIPMENT CARD No. 2188

RESTRICTED

The information given in this document is not to be communicated, either directly or indirectly, to the Press or to any person not authorized to receive it.

SCALE OF STORES FOR
WIRELESS STATIONS, No. 62, Mk. 2, PARACHUTE

(i) This card contains a list of stores, tools and replacement spare parts provided with this Equipment. This list should always agree with A.F. G1098 Schedule No. 2188.

(ii) Items shown in the "x" column are essential and will always be issued to you with the equipment. Items shown in the "y" column are either not essential for immediate operations or may be improvised, and they may therefore, sometimes not be issued with the equipment but sent "to follow" it.

(iii) Amendments to this card will not be issued, but the items should be checked with the up-to-date and amended A.F. G1098 Schedule No. 2188 held at unit or sub-unit headquarters. Any alterations made to A.F. G1098 Schedule No. 2188 should be copied on this card, which is not an authority for demanding. Demands will be made on the A.F. G1098 Schedule only.

Cat. or Part No.	DESIGNATION	Quantity	
		"x" Items	"y" Items
1	2	3	4
	SIGNAL EQUIPMENT CARD No. 2188 <i>(This card will be amended in accordance with Schedules and amendments held by unit or sub-unit H.Q.)</i>		1

KEEP THIS CARD WITH YOUR EQUIPMENT - ALWAYS

Page 2

RESTRICTED

1	2	3	4
	SECTION X2		
X2/ZA 24579/1	CHARGING SETS, Pedal driven, 60-watt, No. 1, Kits, No. 1 <i>(See Appendix D)</i>	(a)	-
	SECTION Z1		
Z1/ZA 12641/1	AERIAL COUPLING EQUIPMENT J - Kits, No. 1 (or) <i>(See Appx. A)</i>	(a)	-
25914/1	Mk. 1/1, Kits, No. 1 <i>(See Appx. B)</i>	(a)	-
32171/1	CALIBRATORS, Crystal, No. 10, Kits, No. 1 <i>(See Appendix C)</i>	(a)	-
28363	CONNECTORS, twin, No. 273 <i>(Connects Charging set to batteries)</i>	(a)	1
32088/4	KITS, aerial gear, No. 4 <i>(See Appendix E)</i>	(a)	1
29434	PACKINGS, Transit, Tropical, No. 1, sets <i>(See Appendix F)</i>	(a)	-
	WIRELESS SETS -		
26554/4	No. 62 - Installation Kits, No. 3 <i>(See Appendix G)</i>	(a)	1
30714/1	No. 62, Mk. 2 - Set Kits, No. 1 <i>(See Appendix H)</i>	(a)	1
	SECTION Z9		
Z9/ZB 10118	BATTERIES, secy. - Port., 12-V., 22-Ah., Mk. 1 (or)	(a)	2
29/6140- 101531	Lead acid, 12-V., 22-Ah. <i>(This total includes one spare)</i>	(a)	-
	PUBLICATIONS		
	ELECTRICAL AND MECHANICAL ENGINEERING REGULATIONS - Tels. -		
	F. 510 <i>(To be demanded)</i>		-
	F. 512 <i>in accordance</i>		-
	F. 513 <i>with ACI 62/54)</i>		-
	I.E.M.E., Identification list		-
	E.S. 1360 (W.O. Code 5617) <i>(Issued on a scale laid down by War Office. Obtainable from Army Forms Depot, Kimber Road, Wandsworth, S.W.18)</i>		-

(a) For entitlement see Equipment Table of Unit concerned.

RESTRICTED
APPENDIX "A"

Page 3

AERIAL COUPLING EQUIPMENT J, KITS, No. 1.
(Z1/ZA 12641/1)

1	2	3	4
	SECTION Z1		
Z1/ZA 12641	AERIAL COUPLING EQUIPMENT - Aerial unit -		
25914	J, (or) Mk. 1/1	1	
2951	COVERS, protecting, No. 2 (or)		
27673	GRILLES, protecting, 5½-in. x 8½-in. x 3¼-in., No. 1		1
10562	COVERS, waterproof -		
29348	No. 9 (or) Mk. 1/1		1

APPENDIX "B"

AERIAL COUPLING EQUIPMENT J, Mk. 1/1, KITS, No. 1
(Z1/ZA 25914/1)

1	2	3	4
	SECTION Z1		
Z1/ZA 25914	AERIAL COUPLING EQUIPMENT, aerial unit J, Mk. 1/1	1	
29348	COVERS, waterproof, No. 9, Mk. 1/1		1
27673	GRILLES, protecting, 5½-in. x 8½-in. x 3¼-in., No. 1		1

Signal Equipment Card 2188 for No. 62 Set parachute station with scales of stores of Charging Set Pedal Driven No. 1 Mk.1 in Appendix 'D' (Pages 1-4).

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RESTRICTED
APPENDIX "C"

CALIBRATORS, CRYSTAL, No. 10, KITS, No. 1
(Z1/ZA 32171/1)

1	2	3	4
	SECTION Z		
Z/CV 286	VALVES, electronic - CV. 286		2
782	CV. 782		2
785	CV. 785		3
	SECTION Z1		
Z1/ZA 32171	CALIBRATORS, crystal, No. 10		1
	CONNECTORS -		
32275	Twin, No. 321		1
31107	3-point, No. 67		1
32898	INSTRUCTIONS, working, Calibrators, crystal, No. 10		1
	SATCHELS, signals		
6292	No. 1 (or)		
27294	Mk. 1/1		1

APPENDIX "D"

CHARGING SETS, PEDAL DRIVEN, 60-WATT, No. 1, KITS, No.1.
(X2/ZA 24579/1)

1	2	3	4
	SECTION X2		
X2/ZA 24579	CHARGING SETS, pedal driven, 60-watt, No. 1, Mk. 1	1	
X2/ZA 25007	INSTRUCTIONS, working, Charging sets, pedal driven, 60-watt, No.1		1
24805	SATCHELS, signals, No. 7		1
26289	SPANNERS, box, 2 B.A. x 0.B.A., special, No. 1		1

Appendix 2b

RESTRICTED
APPENDIX "E"

Page 5

KITS, AERIAL GEAR, No. 4
(Z1/ZA 32088/4)

1	2	3	4
SECTION Z1			
Z1/ZA 27624	AERIALS, 100-ft., No. 5	1	*1
32204	INSTRUCTIONS, working, aerials, 100-ft., No. 5 <i>(If unobtainable SRDE., Pamphlet No. 548 may be issued in lieu)</i>	1	

APPENDIX "F"

PACKINGS, TRANSIT, TROPICAL, No. 1, SETS.
(Z1/ZA 29434)

1	2	3	4
SECTION W8			
W8/WA 10122	SANDBAGS, proofed	3	
SECTION Z1			
Z1/ZA 30367	COVERS, protecting, No. 45	1	
	PACKING STRIPS - Tropical -		
29436	No. 2	4	
29437	No. 3	4	
29438	No. 4	4	
29440	No. 20, Mk. 1/1	1	
	PACKINGS, transit, battery -		
30870	No. 2, Mk. 1/1	10	
30869	No. 3, Mk. 1/1	10	

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RESTRICTED
APPENDIX "G"

WIRELESS SETS, No. 62, INSTALLATION KITS, No. 3.
(Z1/ZA 26554/4)

1	2	3	4
SECTION Y1			
Y1/ZA 17602	INSETS, microphone, moving coil, No. 2 <i>(Spare for use with Microphone and receivers, headgear assemblies, No. 10)</i>		*1
21514	MICROPHONE AND RECEIVERS, headgear assemblies, No. 10 (a)	1	*1
SECTION Y3			
Y3/WB 1042	CABLE, electric, L.T., P.11, Mk. 1 (a) yds.		*12
Y3/X. 951219	LAMPS, filament, vac., M.E.S.C., clear, 12-V., 2.2-W. <i>(For use in Lamps, operator, No. 6B. One of these items is an essential spare)</i>		2
SECTION Z			
Z/CV	VALVES, electronic -		
65	CV. 65	2	
281	CV. 281 (or)		
1347	CV. 1347	1	
1091	CV. 1091	1	
1306	CV. 1306	1	
1331	CV. 1331	4	
1510	CV. 1510	1	
SECTION Z1			
Z1/ZA	AERIALS, vertical -		
26286	4-ft. - No. 1 <i>(Carried in Cases,</i>	1	*1
26800	No. 2 <i>antennae rods,</i>	1	*1
27098	14-ft., No. 1 <i>No. 3)</i>	1	

RESTRICTED

Appendix "G - (Contd.)

Page 7

1	2	3	4
SECTION Z1 - (Contd.)			
Z1/ZA 28120	CASES - Carrying, antennae rods, No. 5 <i>(For storage of aerials, vertical).</i>	1	
28125	Spare valve, No. 4K <i>(For storage of spare valves etc.)</i>	1	
28364	CONNECTORS, twin, No. 274 <i>(Connects Wireless sets, No. 62, Mk. 2 to batteries)</i>	1	
3579	FUSES, cartridge, No. 1, 250-mA	10	
28656	KEY AND PLUG ASSEMBLIES, No. 19	1	
28365	LAMPS, operator, No. 6B		1
2784	LEADS, counterpoise, No. 2, Mk. 2	1	
	SATCHELS, signals -		
6292	No. 1 (or)		
27294	Mk. 1/1		2
Z2/ZB	SECTION Z2		
10119	CARRIERS, battery, secy., port. -		
22635	No. 7 (or)	1	1
	Mk. 1/1		

(a) Carried in satchels, signals.
* Essential spares.

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RESTRICTED
APPENDIX "H"

WIRELESS SETS, No. 62, Mk. 2, SET KITS, No. 1.
(Z1/ZA 30714/1)

1	2	3	4
SECTION Z			
Z/CV	VALVES, electronic -		
65	CV. 65	2	
281	CV. 281 (or)		
1347	CV. 1347	1	
1091	CV. 1091	1	
1306	CV. 1306	1	
1331	CV. 1331	5	
1510	CV. 1510	1	
Z1/ZA	SECTION Z1		
30504	AERIAL BASES, No. 23 <i>(Fitted on the side of Wireless sets, No. 62, Mk. 2)</i>	1	
30505	BRACKETS, insulated, No. 1 <i>(Used in conjunction with Aerial bases, No. 23)</i>	1	
30916	COVERS, waterproof, No. 26, Mk. 2 <i>(For use with Wireless sets, No. 62, Mk. 2)</i>		1
3579	FUSES, cartridge, No. 1, 250-mA <i>(Spares carried in spring clips inside set)</i>		*2
27690	INSTRUCTIONS, working, Wireless sets, No. 62 <i>(Carried in satchels, signals)</i>	1	
30714	WIRELESS SETS, No. 62, Mk. 2		

THE WAR OFFICE,
ORD. 2,
March, 1955.

0692G U 5/55

Signal Equipment Card 2188 for No. 62 Set parachute station with scales of stores of Charging Set Pedal Driven No. 1 Mk.1 in Appendix 'D' (Pages 5-8).

Appendix 3

Pedal Generators (Middle East R. Signals Monthly Summary of Information No. 12, pp 5, Dec. 1943).

Two pedal generators are under development in the UK, one for charging a 12V battery, and the other for both battery charging and sender HT supply for the single Wireless Set, No. X42A. Both have outputs of approximately 60 Watts, which is found to be the greatest output a man can maintain for any reasonable time. Half-an-

hour to one hour at a stretch seems to be the capacity of an average man.

The two sets use the same frame and pedal drive, the only difference being in the generator itself. The weight has been cut as low as possible and will exceed 25 lbs in a very small margin. The whole set folds up conveniently for manpack, and will fit into

a parachute container. One of the most difficult problems in the design is the reduction of noise from the gears in the drive. This remains audible at about 200 yards under really quiet conditions. While improvement is to be expected, it is improbable that complete silence will be achieved.

Appendix 4

Pedal generators for Wireless Sets No. 42 (D. Signals Liaison Notes No. 10, pp 8, April 1944).

Experiments have recently been carried out by the Medical Research Council to gauge the manpower required under tropical conditions to operate a pedal generator similar to the one being developed as part of a No. 42 Set station. A summary of their report is as follows:

The pedal-operated generator has been tested in severe hot dry and moist conditions. Two subjects have been used in the tests who were thoroughly acclimatised to hard work in hot climates. The generator was operated for six hours at 30, 48 and 60 Watt in three different types of climate.

Two men were able to operate the generator at a load of 30 Watts in all the three tests without undue rise of pulse or temperature. The average loss of sweat in these experiments was from 3-5½ litres in six hours, depending on the climate conditions.

Three men were able to operate the generator at 60 and 48 Watts in all the three tests, but working at 60 Watts, the body temperature may raise above 100.5°F when conditions are severe.

Two men were able to work at a rate of 48 Watts for six hours as experiments, but their temperatures and pulses rose unduly. Sweat losses ranged from 4-6½ litres.

It is suggested that in order to have a margin of safety, conditions giving raise to body temperature above 100.5°F be considered too severe.

It is tentatively recommended that as a general rule three men are required to operate the machine in tropics during the heat of the day.

When the operators are exposed to direct radiation from the sun, the man power and

water requirements will be increased. It is suggested, therefore, that some of the protection be carried for use where natural cover does not exist. The importance of replacing the water and salt lost in the sweat is stressed.

These recommendations are based on the assumption that the generator will be in continuous operation.

In considering this report it should be borne in mind that the pedal generator will be required for the No. 42 Set sender only and during 'Send' periods the output of the generator should be sufficient both to operate the sender and maintain the storage battery fully-charged. It is, therefore unlikely that the pedal generator will be required to function for more than one quarter of the total operating time (assuming a send/receive ratio 1 to 5).

Appendix 5

ELECTRICAL AND MECHANICAL ENGINEERING REGULATIONS

TELECOMMUNICATIONS
K 130

● CHARGING SETS, PEDAL-DRIVEN, 60W, NO. 1, MK. 1

DATA SUMMARY

Note. This issue supersedes Issue 1. Items marked thus ● have been amended.

PURPOSE

● Lightweight pedal generating set for charging a 12V lead-acid battery.

DESCRIPTION

Complete set consists of a folding frame, pedal-driven generator, and suppression and cut-out unit. Frame fitted with straps for man-pack carriage. The No. 2 is a tropical version of the No. 1.

PHYSICAL DATA

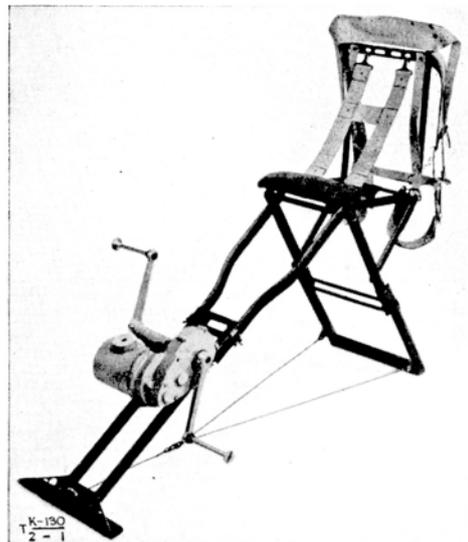
Weight : 34 lb.
Height : 22 in.
Length : 12 in. (frame folded)
Width : 10 in.

OUTPUT

15V, 4A, D.C. at pedal speed of 60 r.p.m. ± 10%.

REMARKS

Suitable for packing and dropping in a parachute container.



Issue 2, 10 Dec. 1946

END

Fig. 1—General view of the No. 2 charging set Page 1

Distribution—Class 870. Code No. 4

Appendix 6

ELECTRICAL AND MECHANICAL
ENGINEERING REGULATIONS

TELECOMMUNICATIONS
K 133

CHARGING SET, PEDAL-DRIVEN, 60W, NO. 1, MK. 1

FIRST ECHELON WORK

Note: This information is provisional and is supplied for guidance pending the issue of more complete instructions. All errors of a technical nature should be notified in accordance with Tels. A 009.

DAILY MAINTENANCE

General

1. Wipe the exterior of the set with an oily rag, avoiding electrical connections. See that the leads are clean and firmly connected. Keep the unit as clean and dry as possible. Examine the folding frame and straps for damage, erect it and check that it is firm and rigid. Report if it is not.

Cut-out

2. Keep clean, but do not oil it or attempt any sort of adjustment.

Operational check

3. Connect a 12V accumulator in the normal manner and turn the generator by hand, increasing speed up to 60 r.p.m.; note that the load due to the operation of the cut-out can be felt as this speed is reached. Decrease speed of rotation and note that load suddenly lightens as the cut-out releases.

MONTHLY MAINTENANCE

4. Once a month give the unit a more thorough overhaul as detailed in paras. 5-11.

Generator

5. Remove the cover plates from the commutator end of the generator casing and examine the brush gear. Check that the brushes are making firm contact with the commutator. Clean the commutator with a soft rag; if it is very dirty, the cleaning rag may be slightly moistened with petrol. Do not use any abrasive on the commutator. Carefully wipe out any accumulation of carbon dust around the brush gear and check that the field coil and brush pigtail connections are tight.

6. With an accumulator connected in the normal manner and the brush gear covers open, turn the generator at normal speed and check that no excessive sparking occurs at the brushes.

7. Insert an ammeter (0-10A D.C.) in the positive lead to the accumulator and turn the generator at normal speed, check that the cut-out closes at about 60 r.p.m. and that about 4A charging current can be obtained; the actual charging current will depend largely on the state of charge of the accumulator in use.

Gearbox

8. If the gearbox appears mechanically noisy add more lubricant. Use Grease, G.S. but avoid using an excessive amount.

Cut-out

9. Remove the cover from the cut-out unit and check that all connections are tight

and that the cut-out arm moves freely. Check the resistance of the voltage winding; with the generator disconnected this should be about 150Ω, measured across the tags of the generator lead. With the accumulator disconnected measure the resistance of the current winding. This should be about 0.1Ω, measured between the lower contact support and the + terminal of the unit, with the contacts held closed and infinity with the contacts open. A varying resistance when the contacts are closed will indicate dirty contacts. They may be carefully cleaned with very fine glass-paper, care being taken to keep the contact faces parallel.

Connections

10. Examine the connections for any damage and check continuity. Make temporary repairs where necessary and report the fault in order that a replacement may be obtained.

11. Reassemble the unit and check that its normal operation is satisfactory.

FAULT FINDING

12. In consequence of the simplicity of the unit, faults can usually be detected by a single test - the measurement of the output voltage at the generator terminals with the external circuit connected and disconnected. This localizes the fault as inside or outside the generator. Table 1 shows the more common faults.

13. With an accumulator connected in the normal manner and a voltmeter connected across the generator terminals, the cut-out should make at a voltage between 13.5V and 14.5V and should open at not more than 13V.

14. Always be certain that the accumulator is connected the correct way round, i.e., with the + terminal of the battery to the + terminal of the generator. If it is wrongly connected, a very heavy current will flow as soon as the cut-out closes and serious damage to the generator may result.

15. When the charging set is used for float-charging batteries supplying a receiving set, check that the suppressor unit is functioning correctly. This can be done by listening on the receiver and noting the difference in 'hash' in the charging and non-charging conditions. The increase in 'hash' when float-charging should be very slight.

Table 1 - Fault-finding table

Symptom	Probable cause	Action
1. Continuous load on turning handle, even below speed at which cut-out should operate	Mechanical defect in generator or gearbox	Check lubrication
2. No load on turning handle, even above speed at which cut-out should operate	(a) Faulty generator	(a) Measure output voltage at generator terminals with external circuit, (i) connected (ii) disconnected

Table 1 - Fault-finding table (contd.)

Symptom	Probable cause	Action
	<p>(b) Open-circuit outside generator</p> <p>(c) Faulty cut-out</p> <p>(d) Short-circuit on generator</p>	<p>If no, or very low, reading is obtained, in either case fault is in generator. If (i) gives no reading and (ii) correct reading, fault is outside generator</p> <p>(b) Correct reading at both (i) and (ii) indicates fault outside generator</p> <p>(c) Check cut-out as in para. 13 for mechanical or electrical fault</p> <p>(d) If short-circuit is on output side of cut-out unit, a faint chugging noise will be heard owing to the action of the cut-out. If short-circuit is on generator side of cut-out, the machine will not excite at all and there will be no load on the pedals</p>
3. Uneven load on turning handle, with chattering of cut-out	<p>(a) Loose connections on cut-out</p> <p>(b) Cut-out out of adjustment</p>	<p>(a) Check connections</p> <p>(b) Replace cut-out</p>
4. Excessive 'mush' in receiver headphones when batteries are being float-charged	<p>(a) Condenser or chokes on suppressor unit disconnected or defective</p> <p>(b) Dirty commutator</p>	<p>(a) Check connections to condensers and chokes. If these are correct, the defect is most probably due to one (or both) condensers being defective.</p> <p>(b) Clean commutator as described in para. 5</p>

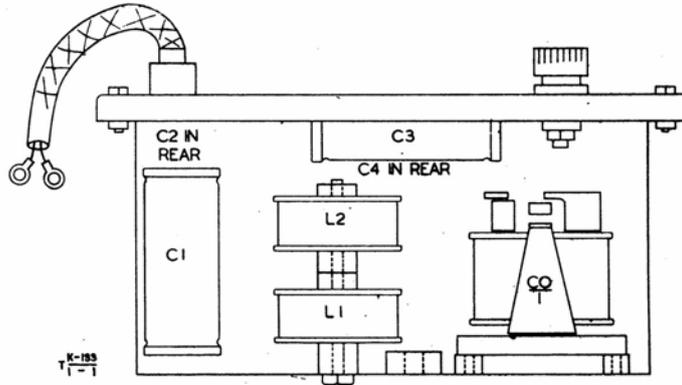


Fig. 1 - Suppressor and cut-out unit, component layout

END

CHARGING SET, PEDAL-DRIVEN, 60W, NO. 1SECOND TO FOURTH ECHELON WORK

Note: This information is provisional and is supplied for guidance pending the issue of more complete instructions. All errors of a technical nature should be notified in accordance with Tels. A 009.

MECHANICAL ADJUSTMENTS AND REPLACEMENTSCut-out adjustments

1. The unoperated gap between the armature and the core is 12 mils and the operated gap approximately 4 mils. All adjustments are carried out by bending the armature stop and the spring support. The angle (A in Fig. 1) to which the spring support is bent controls the spring tension, and the angle (B in Fig. 1) to which the armature stop is bent controls the unoperated gap. The two round-headed screws which secure the armature pass through oversize holes, allowing the armature to be lined up squarely and the operated gap adjusted. These adjustments are largely interdependent but should rarely need resetting.

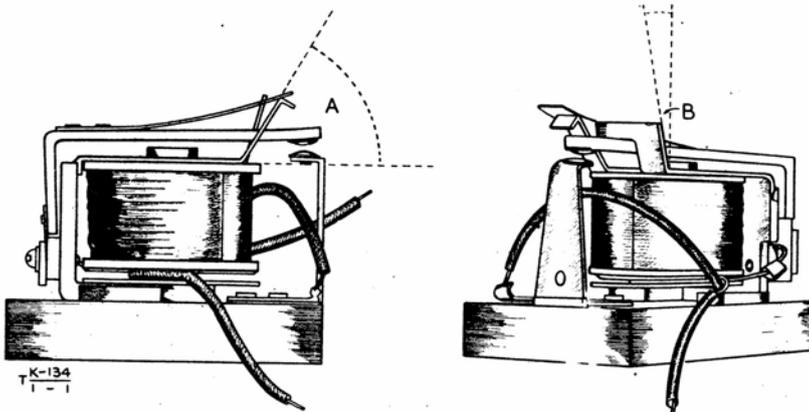


Fig. 1 - Cut-out

Dismantling the generator

2. Remove generator and gearcase assembly from the stand by releasing the wingnut which holds the frame clamp. Unscrew the two cover plates at the end remote from the gearbox, thus exposing the brush gear. Lift the springs from the brushes and disconnect the field connections from the brushholder terminals. Slacken off the two captive nuts on the rear of the brush casing; these fit on to long screws which pass right through the generator yoke to the gear casing. The brush casing can now be pulled off and the armature removed.

3. The generator yoke will also come away; this is located by a pin at each end engaging in a slot in the generator casing and brush housing. The armature ballraces are a push fit into the brush housing and the gear casing; they are not further secured in any way. These races and the gearbox races, with the exception of the forward middle gear shaft race which is SKF9, are all similar to SKF7. Care must be taken when removing and replacing the armature that the moulded brush holder is not damaged.

Dismantling the gearbox

4. Remove the cranks, which are held on the shaft by cotter pins, remove the cheese-headed screws which secure the front cover and remove the cover, taking care not to damage the oil seal round the crankshaft. This will expose the first gear and pinion. To expose the second and final gears, remove the screws which secure the casing on the generator side. All ballraces are a push fit into recesses in the gearcase, the gear wheels and pinions being keyed to their respective spindles. When replacing gears, the box should be refilled with clean Grease, G.S., the quantity required being 1/4 lb. per gearbox. Fig. 2 shows a sectional view of the gearing.

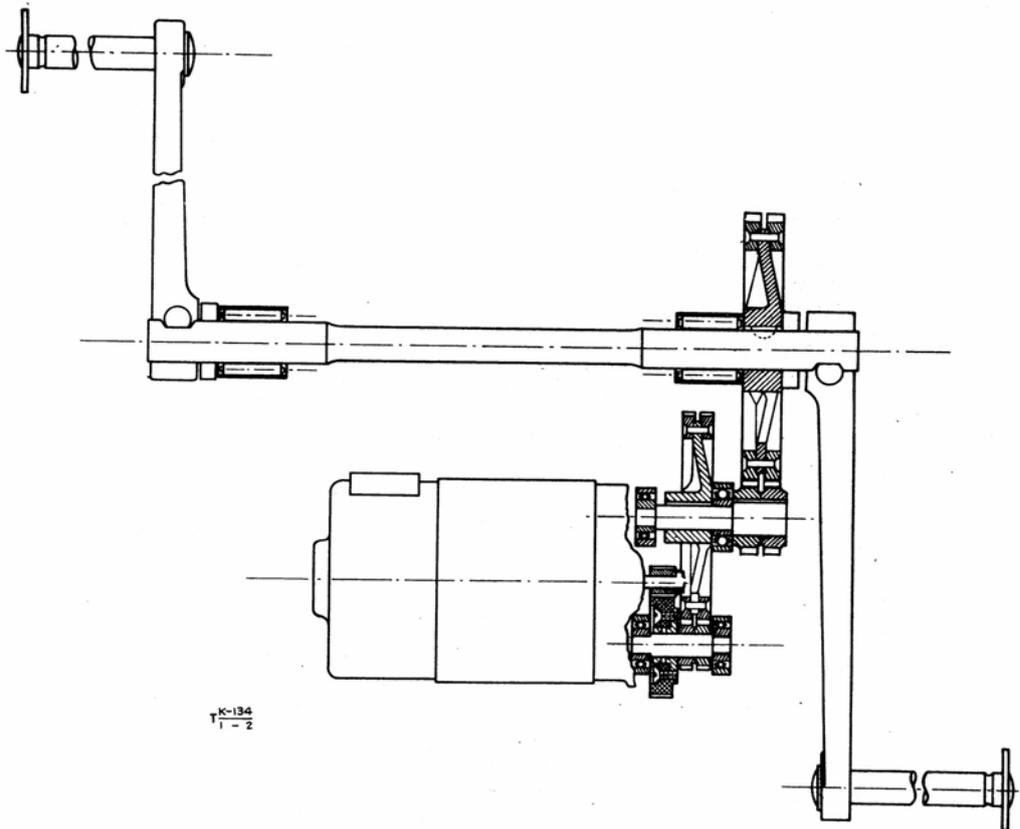


Fig. 2 - Sectional view of gearing

TEST SPECIFICATION

5. The following gear will be required to carry out the specification tests on the generator:-

- (a) Two multi-range D.C. meters (Avometer or Avominor).
- (b) 500V Megger.
- (c) Reception set R.107.
- (d) Receivers, headgear, C.L.R., Double, Mk. 3.
- (e) Test set, suppression, No. 1 or No. 2.
- (f) Connectors, special, reception set to test set suppression.
- (g) Dummy load capable of carrying the full current of 4A.

GENERATOR TESTS

Output test

6. When the generator is driven at a pedal speed of 60 r.p.m. $\pm 1\%$, it should give an output of 15V, 4A through a resistive load of 3.75 Ω .

Heat run

7. The generator should be driven at a speed to give an output of 15V, 4A into the load resistance. The temperature rise, measured by a thermometer on the yoke, should not exceed 32°C. after one hour's run in still air.

Insulation resistance

8. The insulation resistance before and after the heat run should not be less than 10M Ω , measured with a 500V Megger.

Flash test

9. After the heat run and after measuring the insulation resistance, the machine will be flash-tested at 500V D.C. for one minute.

Suppression test

10. This test should be carried out in a screened room, if possible, or in electrically quiet surroundings. The Reception set R.107 should be fed from filtered mains and the generator connected to the D.C. socket on the R.107 but not supplying the set (i.e., the R.107 is switched to A.C.), the generator being 4 ft. to 6 ft. from the aerial. The interference level should not be greater than 6db. above the set noise level at frequencies between 1.2Mc/s and 17.5Mc/s with the generator both on and off load. For all tests, the R.107 should be used for A.C. supplies with the vibrator removed altogether.

Setting-up and test procedure

11. Make the following connections to the Reception set R.107:-
- (a) Connect the 230V, 50c/s supply to the A.C. supply plug on the set.
 - (b) Connect one of the two DIPOLE terminals to the EARTH terminal with copper braid and to the inside screening of the screened room.
 - (c) Connect the other DIPOLE terminal to a 4 ft. rod aerial.
 - (d) Connect the input terminals of the Test set, suppression, to one of the 'phone sockets by means of the special connector.
 - (e) Connect headphones to the other phone socket.

12. Set the following controls on the R.107 to the positions indicated:-
- (a) L.S. switch OFF.
 - (b) SIDETONE switch OFF.
 - (c) AUDIO FILTER switch OFF.
 - (d) B.F.O. - A.V.C. switch OFF.
 - (e) LIM switch OFF.
 - (f) TEL. O/P at 10.
 - (g) R.F. GAIN at 10.
 - (h) Audio GAIN at 0.
13. To set up the Test set, suppression, proceed as follows:-
- (a) Switch on.
 - (b) Turn METER switch to L.T. and check that meter reads 2V. Turn to H.T. and check that meter reads approx. 60V. Turn switch to TEST position.
 - (c) Turn both attenuator knobs to OFF.
 - (d) Turn SET ZERO knob till meter reads ZERO.
 - (e) Turn both attenuators to 0.
14. Carry out the test as follows:-
- (a) Put POWER switch, on R.107, to ON.
 - (b) Set RANGE switch to appropriate range and main tuning dial to the frequency required.
 - (c) Increase AUDIO GAIN for a small deflection on the test set meter.
 - (d) Adjust AERIAL TRIMMER for maximum deflection on the test set meter.
 - (e) Adjust AUDIO GAIN until the test set meter reads SET LEVEL.
 - (f) Turn the attenuator on the Test set, suppression, to 30db.
 - (g) Start generator which is undergoing test and switch in load.
 - (h) Adjust the attenuator knobs so that the test set meter again reads SET LEVEL. The AERIAL TRIMMER and AUDIO GAIN controls must not be altered until another reading is taken.
 - (j) The interference level is now the sum of the readings of the two attenuator knobs.
 - (k) Move the tuning dial to the next test frequency, listening on the headphones to ensure that the noise level does not suddenly increase.
 - (l) Shut down generator and repeat the test from operation (b) for the next test frequency.
- Note that the AERIAL TRIMMER should be adjusted for maximum deflection at each frequency. Readings are taken at the following frequencies:-
- (i) Range 1 - 17.5, 16.0, 14.0, 12.0, 10.0 and 8.0 Mc/s.
 - (ii) Range 2 - 7.25, 6.0, 4.0 and 3.0 Mc/s.
 - (iii) Range 3 - 3.0, 2.5, 2.0, 1.5 and 1.2 Mc/s.

WINDING DETAILS

Generator armature

15. The windings consist of 13 coils of 0.030 double cotton-covered copper wire, wound direct on to the armature, of 7 + 7 turns per coil, totalling 28 conductors per slot. Coil span 1 - 7 details are shown in Fig. 3.

Generator field coils

16. Each coil consists of 500 turns of No. 29 S.W.G. enamelled copper wire, pre-wound on a wooden former and taped before assembly. The former dimensions are 1 3/4 in. x 7/8 in. with a slot width of 7/32 in. The two coils are connected in series.

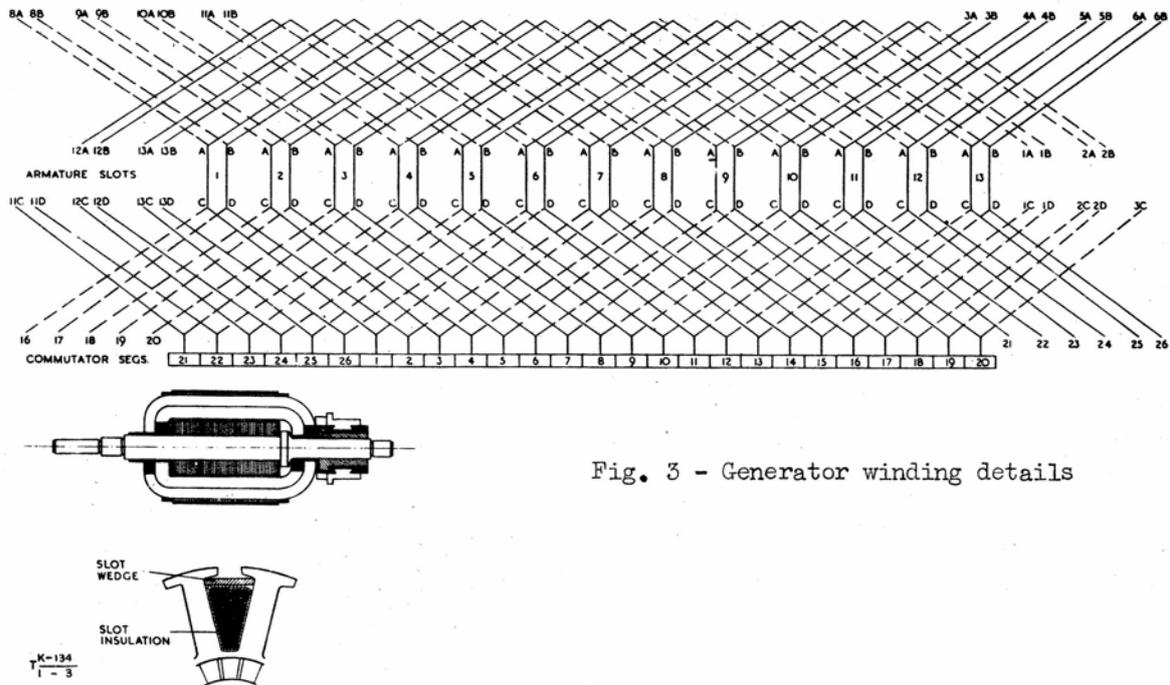


Fig. 3 - Generator winding details

Cut-out coil

17. Both windings are in the same direction. First winding, shunt, consists of 2,200 turns of No. 41 S.W.G. enamelled copper wire. Resistance should not be less than 14Ω . Insulate between windings with linen tape. Second winding, series, consists of four layers of No. 19 S.W.G. enamelled copper wire. Resistance should not be greater than 0.1Ω . Cover with oiled silk and bring all leads out at bottom of coil. Insulation resistance should not to be less than $10M\Omega$ at 500V D.C. between windings and between windings and core.

Filter chokes

18. Each bobbin is wound with 56 turns of No. 20 S.W.G. enamelled copper wire.

END

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- Charging Set 100 Watt, SRDE (Draft) Handbook No. 872, July 1954.
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Abbreviations

CSO = Chief Signal Officer.

MELF = Middle East Land Forces.

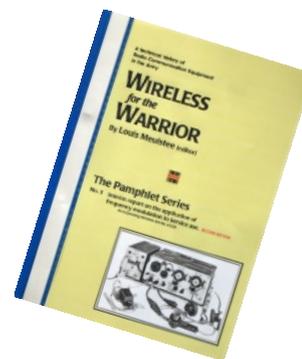
C.E.S. = Complete Equipment Schedule.

EMERs = Electrical and Mechanical Engineering Regulations.

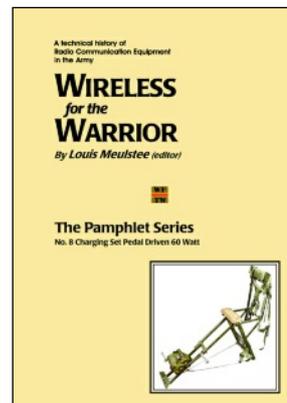
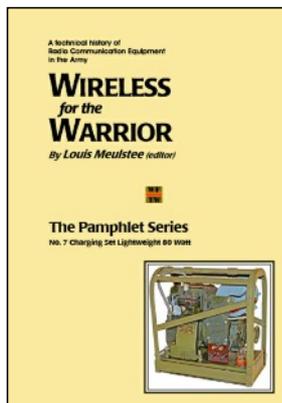
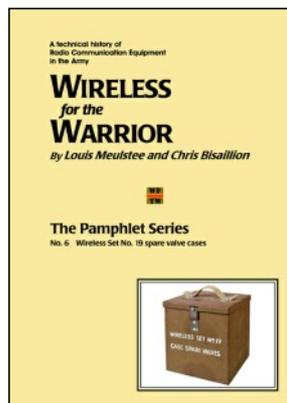
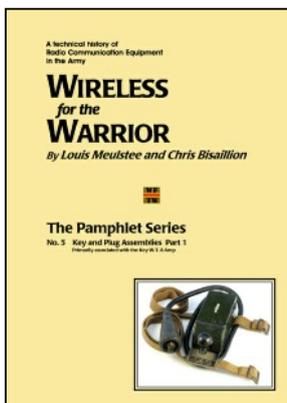
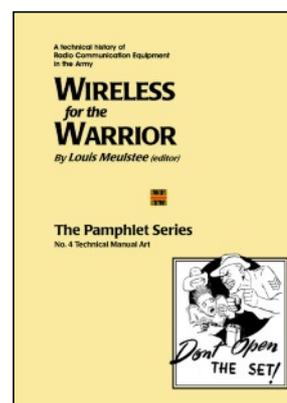
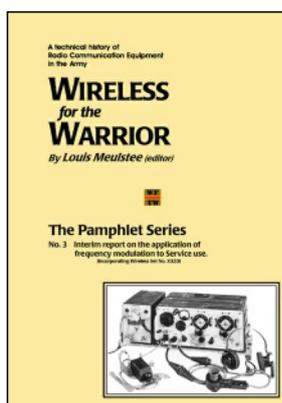
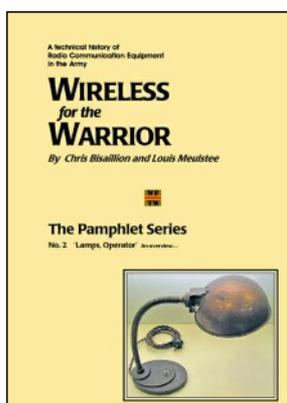
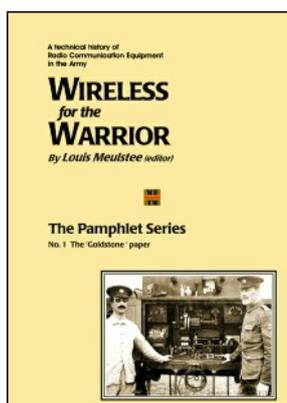
SRDE = Signals Research and Development Establishment.

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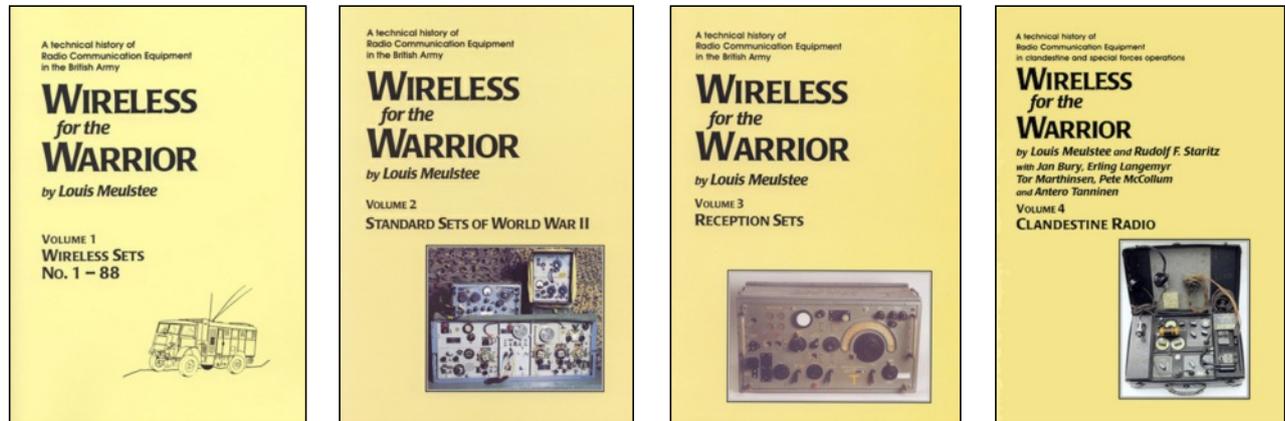


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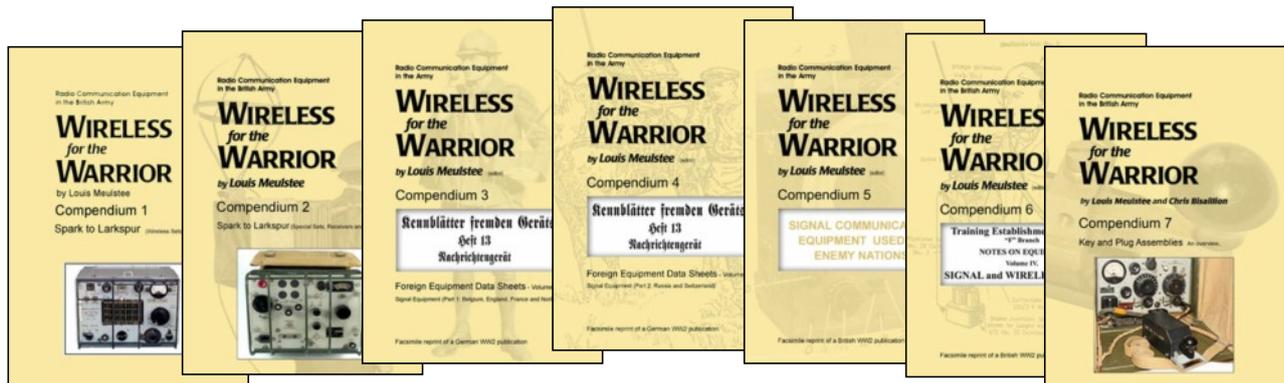
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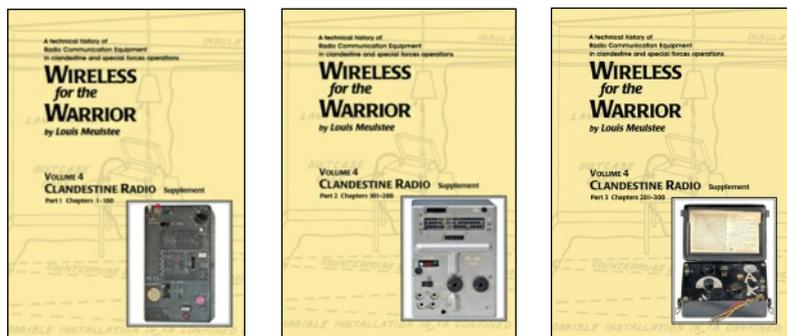
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