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TB SIG E18

WAR DEPARTMENT TECHNICAL BULLETIN

JAPANESE RADIO SET

Model 97 Light Wireless Set

WAR DEPARTMENT

8 NOVEMBER 1944

RESTRICTED

DESTRUCTION NOTICE

DESTROY THIS SET COMPLETELY! THIS IS VITALLY IMPORTANT!

WHY — THIS IS THE ENEMY'S OWN EQUIPMENT! HE IS ALREADY FAMILIAR WITH ITS OPERATION. HE HAS ADEQUATE SUPPLIES OF REPLACEMENT PARTS. DON'T LET THIS SET FALL INTO HIS HANDS!

WHEN — When ordered to do so by your commander.

- HOW** —
1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools, etc.
 2. Cut — Use axes, handaxes, machetes, etc.
 3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades, etc.
 4. Explosives — Use firearms, grenades, TNT, etc.
 5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

- WHAT** —
1. Smash — Tubes, capacitors, coils, keys, headsets, microphones, panels, frames, antenna mast sections, and other electrical parts.
 2. Cut — All cables, wiring, and cords.
 3. Burn — Diagrams, charts, instruction books, wire.
 4. Bury or scatter — Any or all of the above pieces after destroying them.

DESTROY EVERYTHING!

RESTRICTED

JAPANESE HANDS ART
Model of Light Wavelength

TABLE OF CONTENTS

	<i>Paragraph</i>	<i>Page</i>
Description.....	1	1
Performance data.....	2	11
Battery substitution.....	3	12
Installation.....	4	13
Operation.....	5	17
Maintenance.....	6	23
Glossary.....	7	29
Appendix.....		33

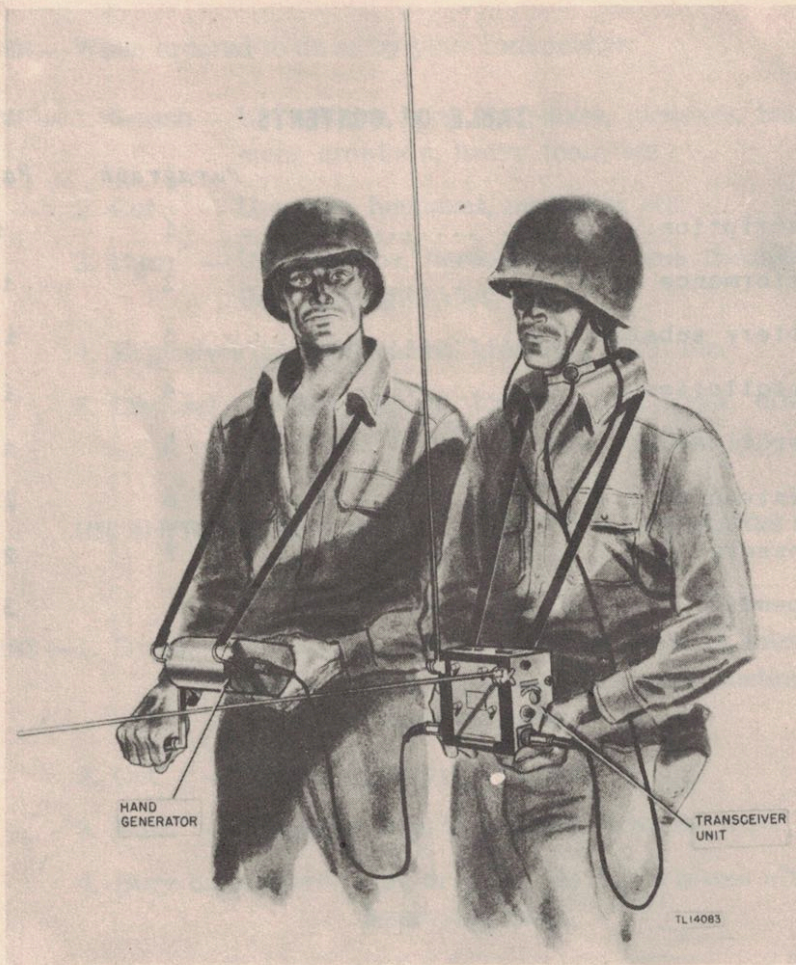


Figure 1. Japanese Radio Set Model 97 Light Wireless Set, portable operation by two men.

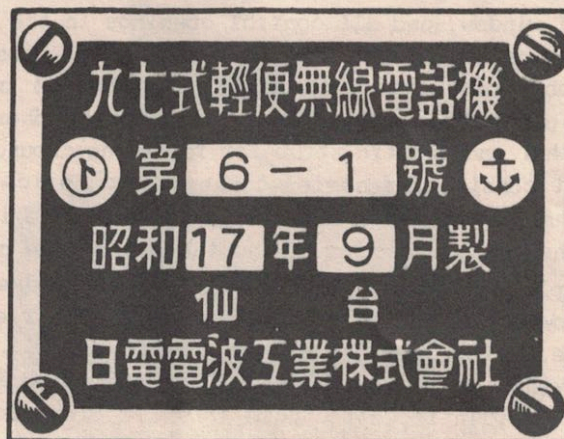
RESTRICTED

JAPANESE RADIO SET

Model 97 Light Wireless Set.

I. DESCRIPTION.

a. **The Set.** The Japanese radio set 九七式輕便無線電話機 (Model 97 Light Wireless Set)* will hereafter be referred to as "the set" or "the transceiver". The nameplate of the set and its American equivalent are shown in figures 2a and 2b below.



TL14084

Figure 2a. Nameplate of Japanese Radio Set Model 97 Light Wireless Set.

The transceiver is used for both tone and voice communication by naval and marine units, and can be used in nets with American amplitude-modulated radio sets within the frequency and distance range. The set is a lightweight and compact unit using one tube which operates in either the transmitting or receiving

* In this bulletin the Japanese characters are followed by their American military equivalents in parentheses.

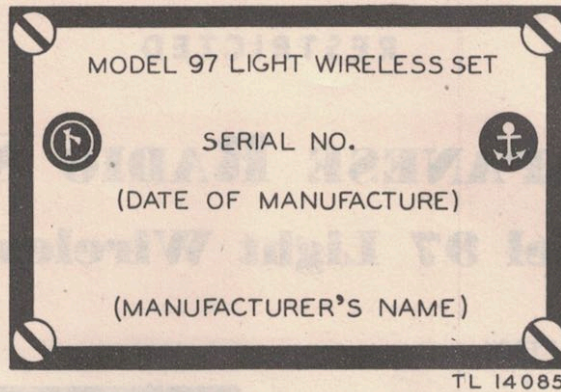


Figure 2b. Nameplate translation of Japanese Radio Set Model 97 Light Wireless Set.

circuit as required. A cast metal case houses the transceiver unit. Rubber seal-gaskets used on the removable case doors, meter, dial window, and all control openings in the case, provide a means of moistureproofing the set. For the same purpose, a soft rubber disk covers the 電鍵(key) (figs. 3 and 20). A 3-volt single-button carbon-type throat microphone is used with a leather and elastic strap for fastening around the neck. The headset consists of series-connected magnetic-type units of 2,000 ohms d-c resistance. Molded rubber cable is used between the headset, microphone, and the microphone and headset connector plug (fig. 4). The microphone and headset together with the power cables are carried in the accessories compartment of the battery pack carrying case (fig. 10). As a means of identifying the various Japanese set control designations, two groups of identification name tabs are provided which may be cut out and affixed to any Japanese set being used. These name tabs are shown in figures 29 and 30. Views of the set with name tabs are shown in figures 20, 21, 27, and 28.

b. Power Supply. Power may be supplied to the set either by a hand generator or by a battery pack. The use of the hand generator to supply power, requires two men for operation of the set (fig. 1). When it is desired that the set be transported and operated by one man (fig. 5), a battery pack is used to supply power.

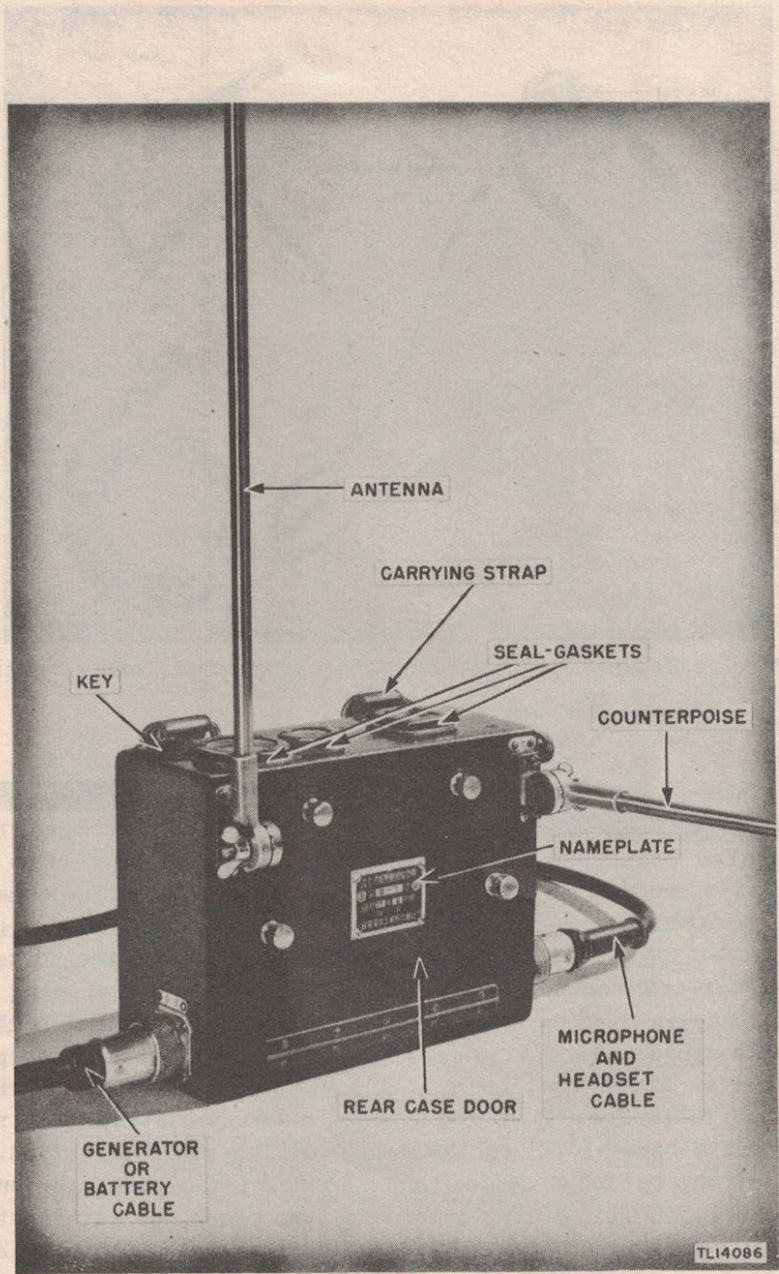


Figure 3. Japanese Radio Set Model 97 Light Wireless Set, left rear view.

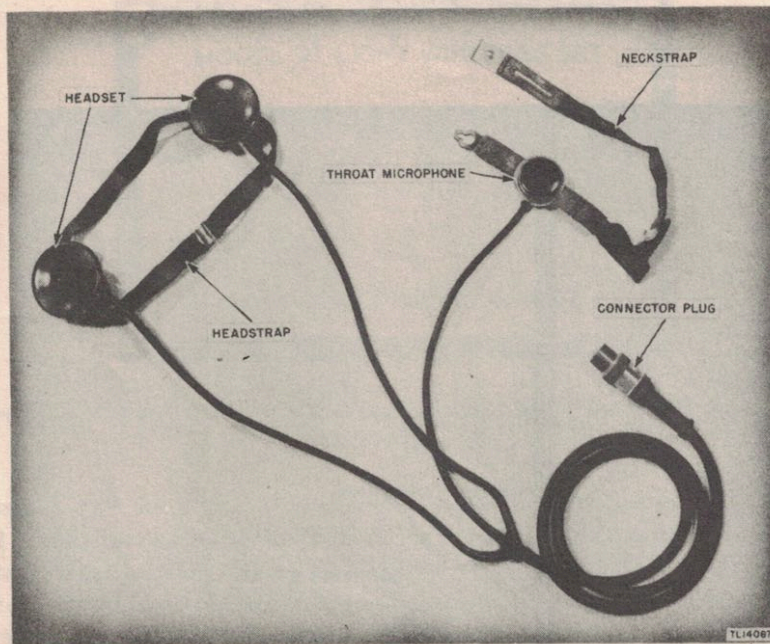
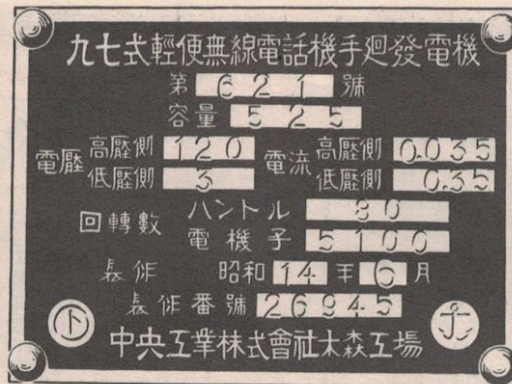


Figure 4. Headset, microphone, connecting cable, and connector plug.

(1) The hand generator issued for use with the set is **九七式輕便無線電話機** (Model 97 Light Wireless Set manually operated generator). The nameplate is shown in figure 6a with its American equivalent in figure 6b. The four-connector socket on the generator supplies 3 volts d-c and 120 volts d-c as marked on the phenolic insulation of the socket. A rubber-covered cable with a four-connector power plug on each end, is used as cordage from the generator output socket to the transceiver (fig. 11). A view of the generator output socket is shown in figure 7. The hand generator is carried for portable operation by means of a leather strap. Two retractable base plates on the bottom of the generator (figs. 7 and 8) may be drawn out and used to mount the generator on a supporting stand. A single folding-type crank for turning the generator is secured to the drive gear and ratchet assembly shaft by a steel pin. The armature is geared to the driving crank through the gear assembly at a ratio of 5,100 to 80.

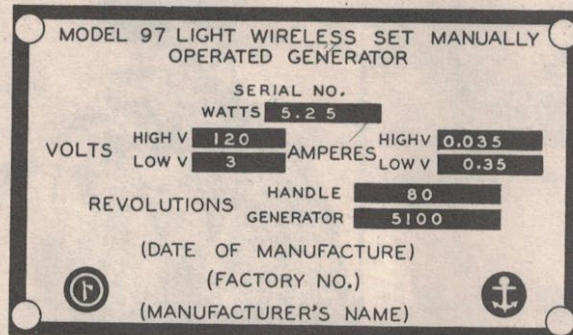


Figure 5. Japanese Radio Set Model 97 Light Wireless Set, portable operation by one man.



TL 14089

Figure 6a. Nameplate of Model 97 Light Wireless Set manually operated generator.



TL 14090

Figure 6b. Nameplate translation of Model 97 Light Wireless Set manually operated generator.

In order to obtain constant speed, a small flywheel is attached to one end of the armature shaft. There is no other provision for maintaining a constant voltage, either by a voltage regulator or by a meter.

(2) A battery pack is used for one-man operation of the set. The Japanese battery pack shown in figure 9, is made up of five $22\frac{1}{2}$ -volt batteries in series for the 120-volt supply and two 1.5-volt series-connected batteries for the 3-volt supply. The batteries are packed in a lightweight metal case. Fiber or paperboard insulation covers the interior of the case which provides protection to the batteries and prevents



Figure 7. Model 97 Light Wireless Set manually operated generator, rear view.

the metal cover from short circuiting the exposed battery terminals. The battery pack is fitted into a leather carrying case (fig. 10) designed for strapping on the operator's back. The plate and filament voltages are corded to the set with a rubber-covered cable. The cable terminates on one end with a four-connector power plug which is identical to the plugs on the generator cable. The other end terminates in four separate wires. The cable is clamped to the battery pack by means of the battery cable clamp (fig. 9). The two wires for the 3-volt battery connection are spade-tipped, and the remaining two wires for the 120-volt battery connection are pin-tipped. The battery cable and the generator cable are shown in figure 11. See paragraph 3 for detailed information on the substitution of American type batteries for Japanese batteries.

(3) For operation of the set other than portable, a secondary cell adapter is provided. By the use of this adapter, a combination of either primary or secondary cells or both may be used as a heavy-duty battery pack. The adapter is intended to work with a supply of 150 volts and 4 volts to provide

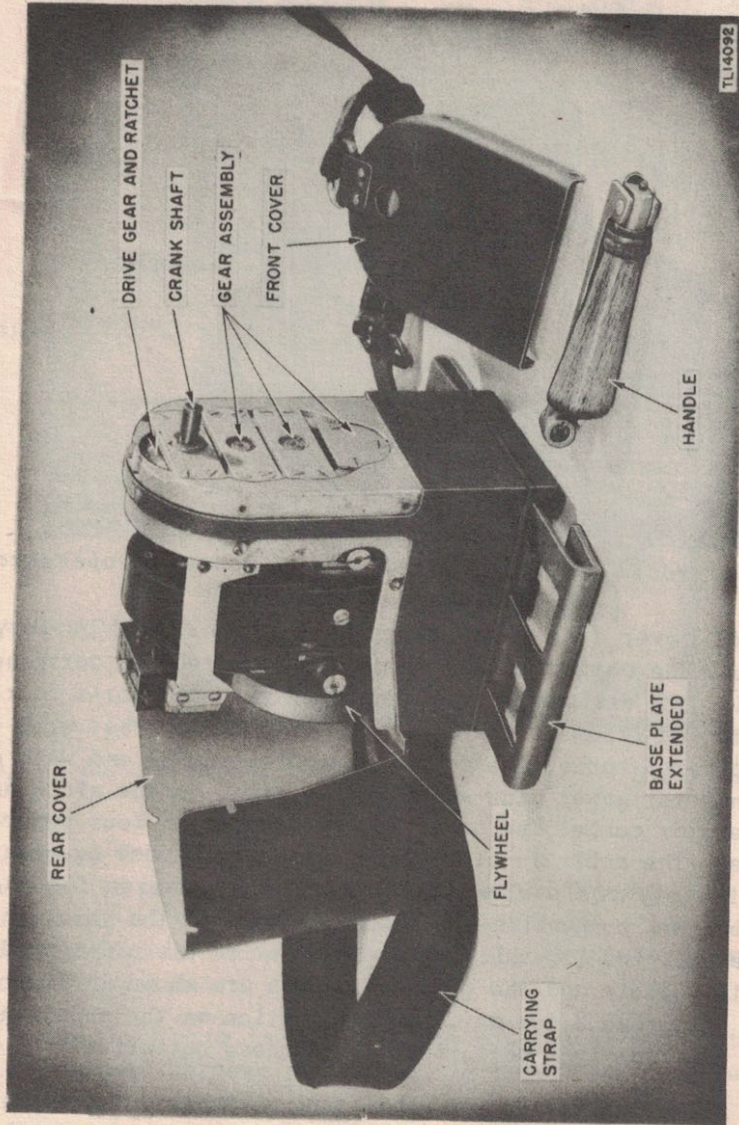


Figure 8. Model 97 Light Wireless Set manually operated generator, left front view, covers removed.

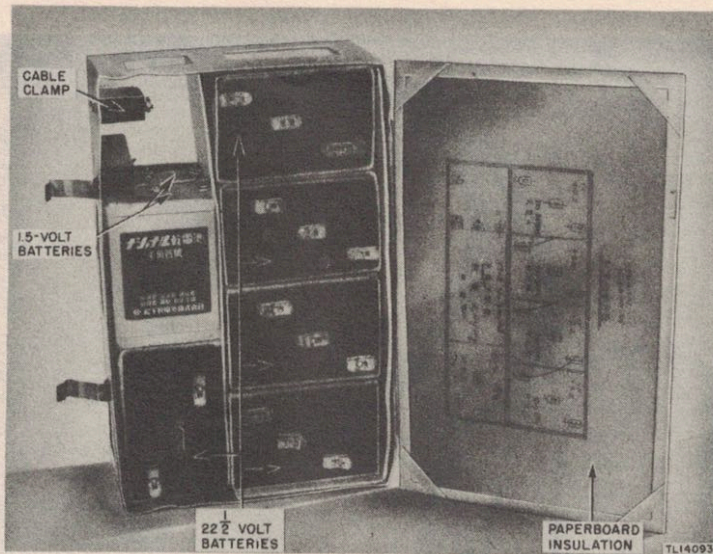


Figure 9. Japanese battery pack in metal case, cover open.

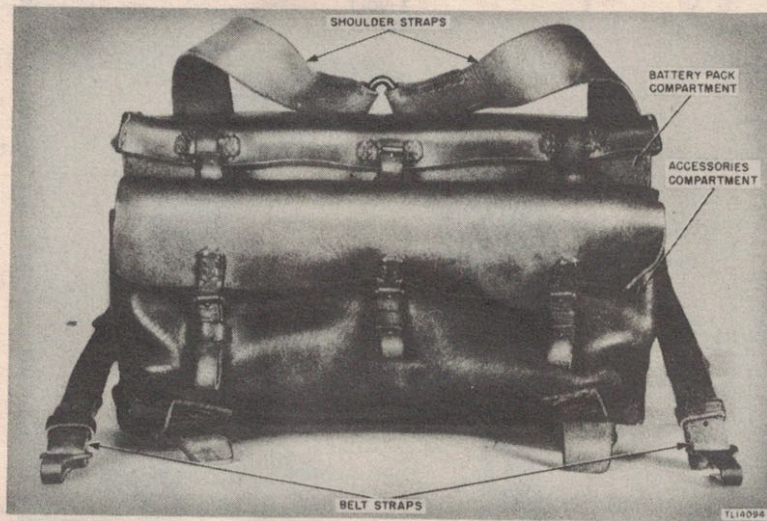


Figure 10. Carrying case for Japanese battery pack and accessories.

the proper 120 volts and 3 volts for operation of the set. See paragraph 4C for further details on the adapter.

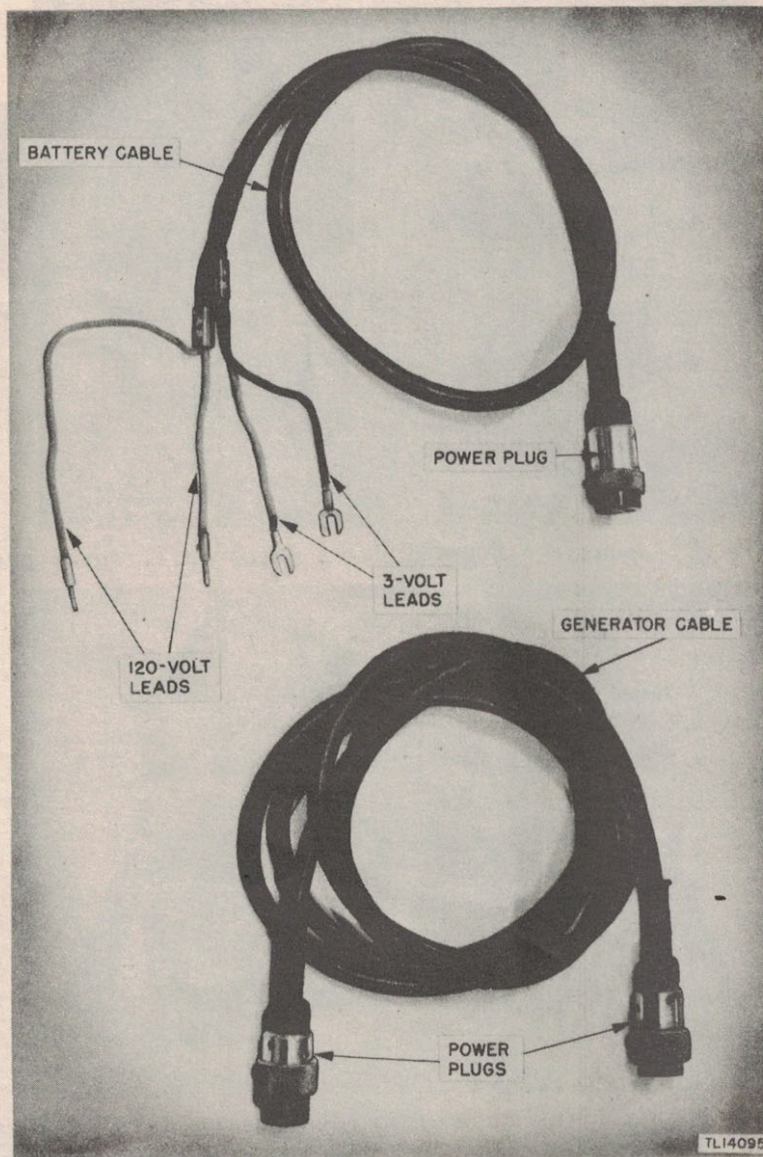


Figure 11. Battery cable and generator cable for Model 97 Light Wireless Set.

2. PERFORMANCE DATA.

The table below lists the performance data of the transceiver.

Frequency range:

Transmitting or receiving.....	23 to 34 mc
Can communicate with.....	Radio Set, SCR-194
Types of signals emitted.....	tone, voice
Types of signals which can be received...	tone, voice
Type of modulation.....	amplitude
Method of modulation.....	plate
Preset frequencies.....	none
Sidetone in set.....	available on tone and voice
Antenna type.....	rod, 2-section, 51 inches long, and a 23½-inch single-rod counterpoise .
Distance range:	
Voice.....	approximately 1.5 miles
Tone.....	approximately 1.5 miles
Tuning dial graduation.....	0 to 100
Type of transmitter.....	Hartley oscillator
Type of receiver.....	superregenerative
Number of tubes.....	4

2. PERFORMANCE DATA (contd).

Type of tube	Receiving function	Transmitting function
UZ34MC* } (Japanese twin triode)	Triode 1...detector	oscillator
	Triode 2...a-f amplifier	modulator and tone oscillator

Power output.....200 milliwatts

Power supply.....hand generator or battery pack

Power requirements:

Transmitter Receiver

Filament.....2 v 120 ma 2 v 120 ma

Plates.....120 v 28 ma 120 v 40 ma

*NOTE: There is no American tube which is directly interchangeable with the UZ34MC. See paragraph 6C for replacement data on the UZ34MC.

3. BATTERY SUBSTITUTION.

If the proper Japanese batteries are available, they may be used for all connections where a battery pack is specified. However, since a supply of Japanese batteries may not always be obtainable, cording diagrams shown in connection with the installation of the set may also be used for equivalent Signal Corps types. The expected life of substitute American batteries is given in the table below. Other batteries which will supply 3 volts for the filament and 120 volts for the plate may be used. The batteries listed will give reasonable life for a continuous filament drain of 120 milliamperes and a continuous plate drain of 30 milliamperes. These values represent maximum drain values and probably would not be realized in actual operation. Intermittent operation of the set will greatly increase the life of the batteries.

FILAMENT SUPPLY

Battery type	Number used	Connection	Delivered voltage	Life (hours)
BA-23	4	Series-parallel	3	400
	6	Series-parallel	3	750
BA-35	2	Series	3	250
	4	Series-parallel	3	475
BA-65	2	Series	3	250
	4	Series-parallel	3	475
BA-15A	8	Series-parallel	3	475
	12	Series-parallel	3	900

PLATE SUPPLY

Battery type	Number used	Connection	Delivered voltage	Life (hours)
BA-2	5	Series	112-1/2	9.
BA-41	2	Series	120	0.5
	4	Series-parallel	120	2.0
BA-102	5	Series	112-1/2	9.0
BA-141	2	Series	120	0.5
	4	Series-parallel	120	2.0
BA-211/U	5	Series	112-1/2	25.0

4. INSTALLATION.

a. **General.** The set is primarily intended to be used as a portable set operated by either one or two men. The transceiver unit and battery pack are slung on the operator by carrying straps, and the generator is carried by the second man as shown in figure 4. The set is carried for portable operation by

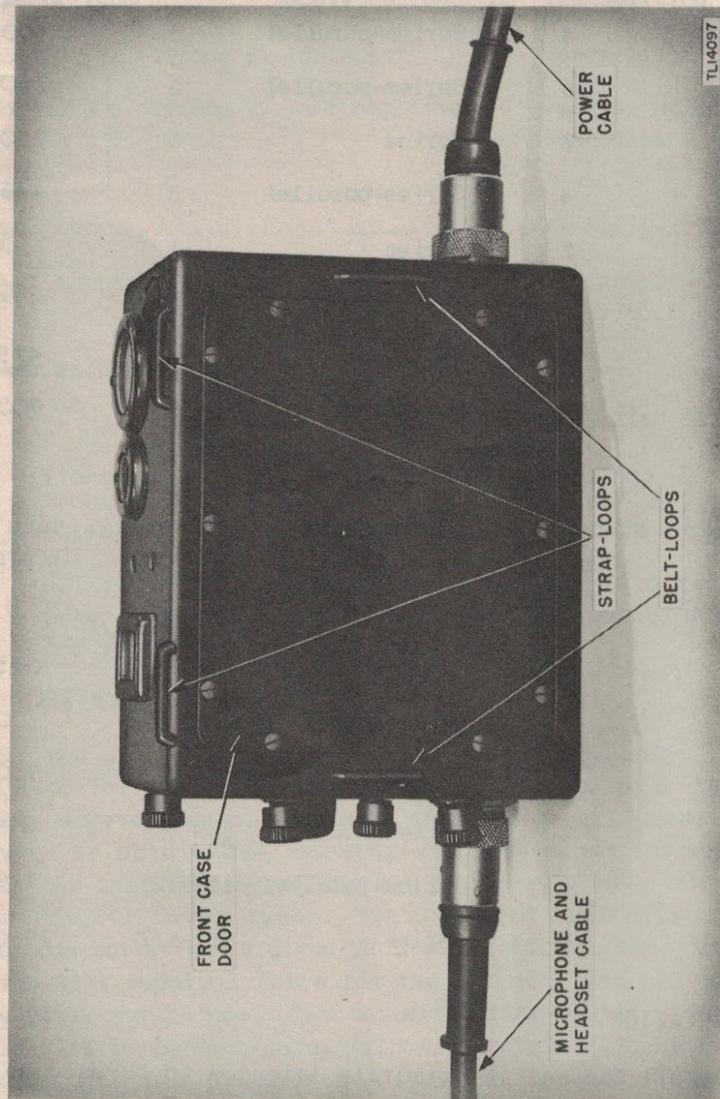


Figure 12. Japanese Radio Set Model 97 Light Wireless Set, front view.

a leather strap passed around the neck and fastened to the set through two strap-loops on the case. When a battery pack is used to provide the power supply, one man can carry and operate the entire set (fig. 5). If American type batteries are used to make up the battery pack, it may be necessary to discard the Japanese carrying case because of size limitations. If so, carry the battery pack in a musette bag or similar type of case. Two belt-loops (fig. 12) on the front of the transceiver unit case enable the operator to strap the set close to his body and prevent excessive movement during portable operation. For operation of the set as a fixed installation, the transceiver unit is placed on a firm supporting structure and the hand generator, if used, is mounted on a supporting stand by means of the base plates.

b. Antenna. A disassembled view of the antenna and counterpoise, and the canvas carrying case is shown in figure 13. Assemble the two antenna sections. Clamp the spade end of the antenna to the [] (antenna) terminal of the set (fig. 3). Clamp the spade end of the counterpoise to the [] (counterpoise) terminal of the set (fig. 3). The wingnut terminals are grooved in four relative positions to provide positive clamping action on the spade ends of the antenna and counterpoise rods. Each spade end has a single ridge on the rear surface which must be fitted into a groove on the wingnut terminals. Install the antenna in a vertical position with the counterpoise either vertical or horizontal.

c. Power Supply. (1) For operation of the set with the hand generator as the power source, use the generator cable and connect as shown in figure 14. An end view of the power socket on the set and of the power cable plug (either generator or battery) is shown in figure 15.

(2) To use the battery pack as the source of power for the set, refer to figure 16, and use the battery cable for connecting the set to the battery pack.

(3) When the set is used for other than portable operation, the [] (secondary cell adapter) is normally installed in conjunction with a heavy-duty power source. A view of the [] (secondary cell adapter) is shown in

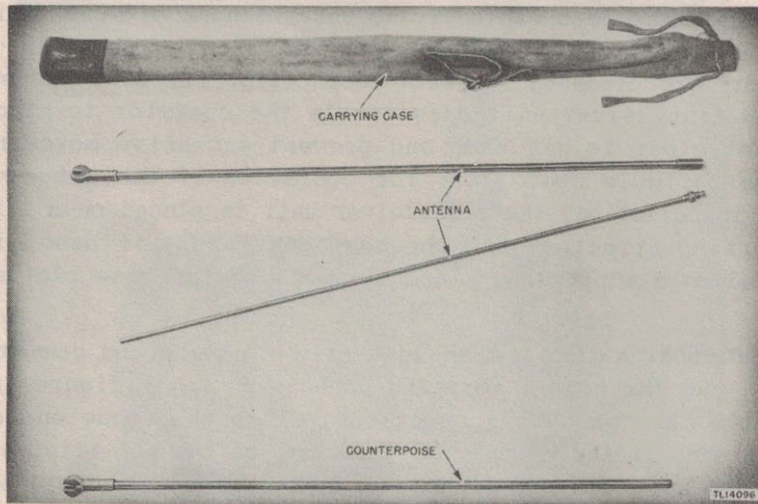


Figure 13. Antenna, counterpoise, and carrying case.

figure 17. The power source may be primary cells, secondary cells, or a combination of both. When the adapter is used, cording of the set will be done as shown in figure 18, and the generator cable will be used between the set and the secondary cell adapter. Battery wires must be of sufficient size to carry the current for the plate and filament circuits (par. 2) without excessive voltage drop.

d. Headset and Microphone. Refer to figures 4, 14, and 19. Plug the microphone and headset connector plug into the 送受話器 (microphone and headset) socket. This socket is located on the left side of the set. The pins of the socket on the set are numbered to coincide with the numbered pin jacks in the plug. Pins 1 and 2 of the socket are smaller than pins 3 and 4, thereby preventing incorrect insertion of the plug.

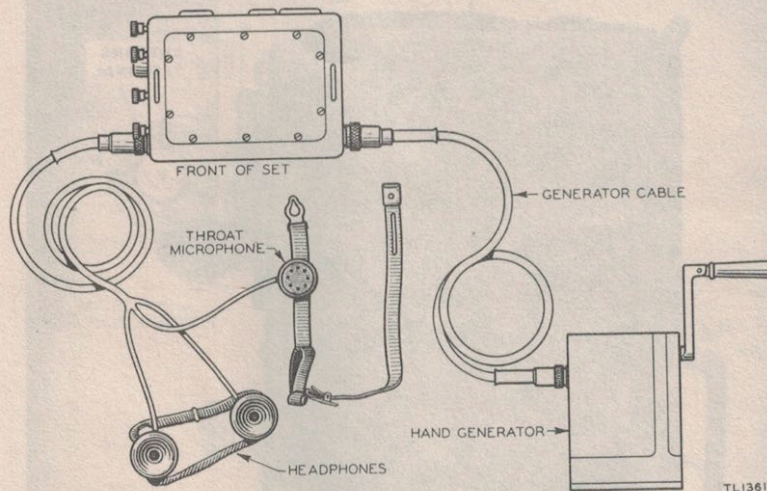


Figure 14. Cording diagram using hand generator for power supply.

5. OPERATION.

a. General. After the set is installed, it is prepared for operation as follows (see figures 19 and 20 for location of controls):

(1) Refer to the calibration chart on the inside of the rear case door (fig. 21) to determine the setting of the 同調 (tuning dial) for the desired frequency. The numbers on the 同調 (tuning dial) correspond with those on the bottom of the chart and the frequencies in megacycles appear on the left side of the chart. To obtain a dial setting for a specific frequency, read that frequency on the chart and move across to the right until that frequency line intersects the calibration curve. Then drop directly down to read the proper dial setting for that frequency.

EXAMPLE: To find the dial setting for 25 megacycles, read horizontally from 25 on the left side of the chart until an intersection is made with the calibration curve. Drop down at this point and the dial setting will read 40. (Each set is calibrated individually. The dial reading given in the example may not apply to every set.)

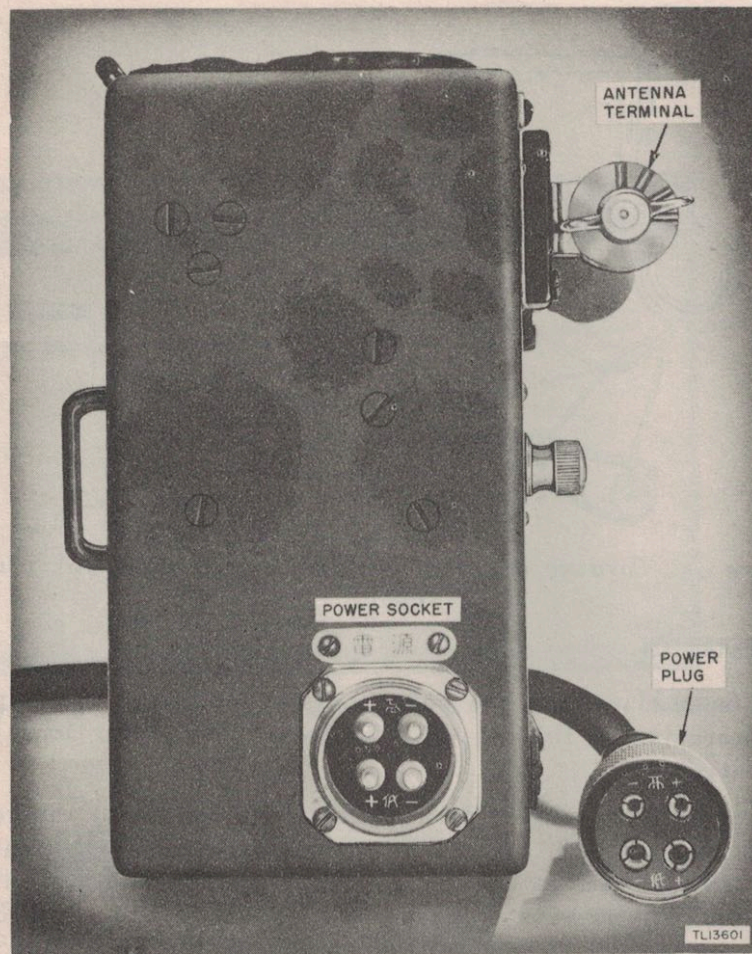


Figure 15. Japanese Radio Set Model 97 Light Wireless Set, right end view, with name tab.

(2) Turn the 繼係電壓 (filament voltage) control to the 減 (decrease) position.

(3) Place the 受信 休 送信 (receive-off-transmit) switch at the 受信 (receive) or left position.

(4) Slowly turn the 繼係電壓 (filament voltage) control toward the 増 (increase) position until the tube filament glows a dull red. The tube filament may be observed through the small circular window on the top of the transceiver unit case, located to the left of the antenna meter.

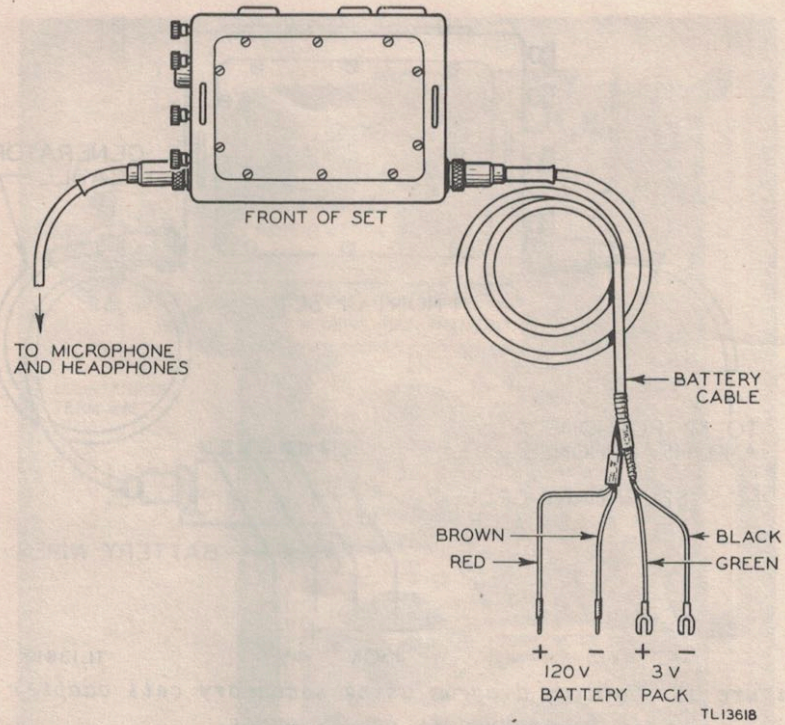


Figure 16. Wiring diagram using battery pack for power supply.

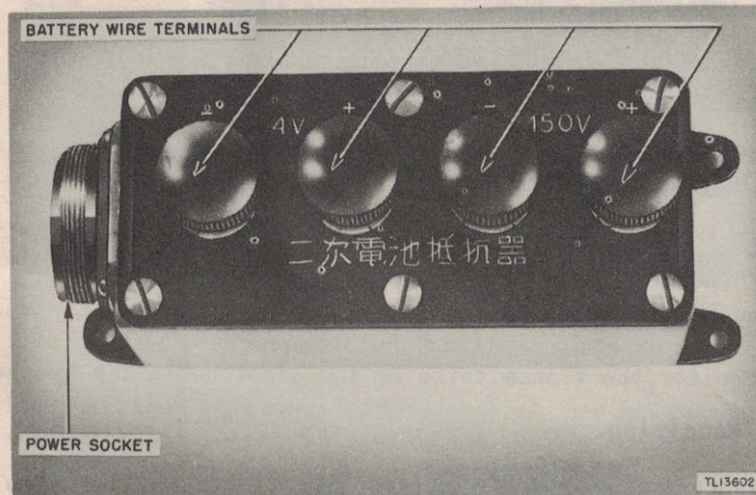


Figure 17. Secondary cell adapter for use with Japanese Radio Set Model 97 Light Wireless Set.

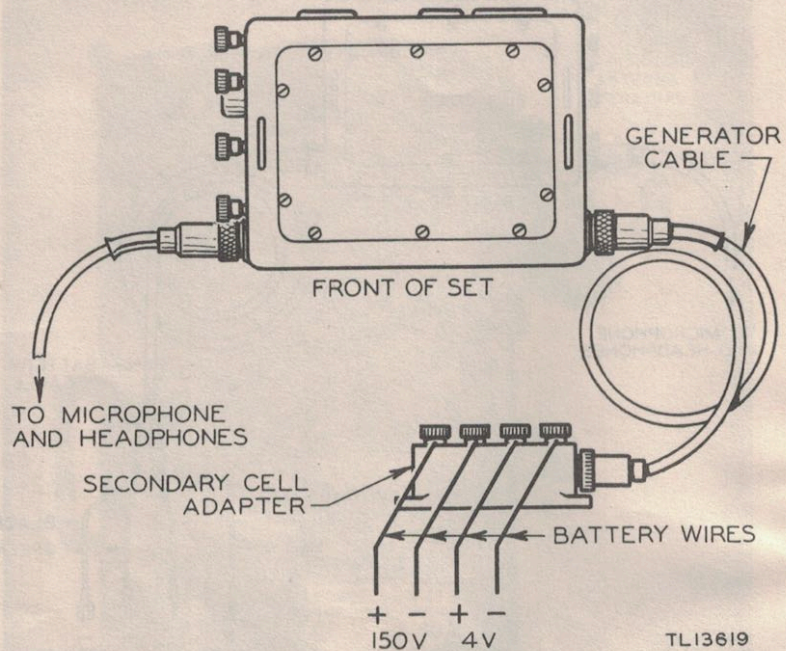


Figure 18. Cording diagram using secondary cell adapter and heavy-duty power source.

b. Transmitting.

- (1) Place the 受信 休 送信 (receive-off-transmit) switch at the 送信 (transmit) or right position.
- (2) To transmit voice, place the 電信 電話 (tone-voice) switch at the 電話 (voice) or right position, and talk.
- (3) To transmit tone, place the 電信 電話 (tone-voice) switch at the 電信 (tone) or left position, and key.
- (4) The antenna meter indicates antenna current.
- (5) Monitor the transmission by the sidetone in the headset.

c. Receiving.

- (1) Place the 受信 休 送信 (receive-off-transmit) switch at the 受信 (receive) or left position.

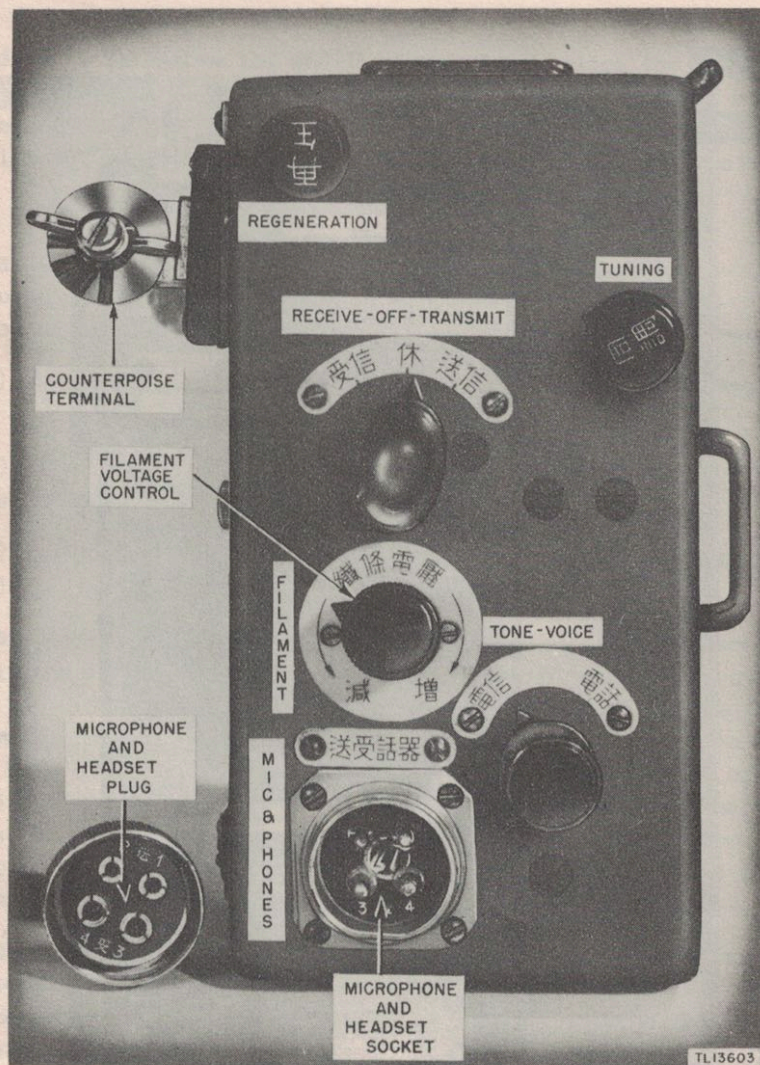


Figure 19. Japanese Radio Set Model 97 Light Wireless Set, left side view, operation controls, with name tabs..

- (2) Adjust the **再生** (regeneration) control for maximum sensitivity while listening to the signal in the headset.
- (3) The antenna meter should register, indicating typical radiation from the superregenerative detector.

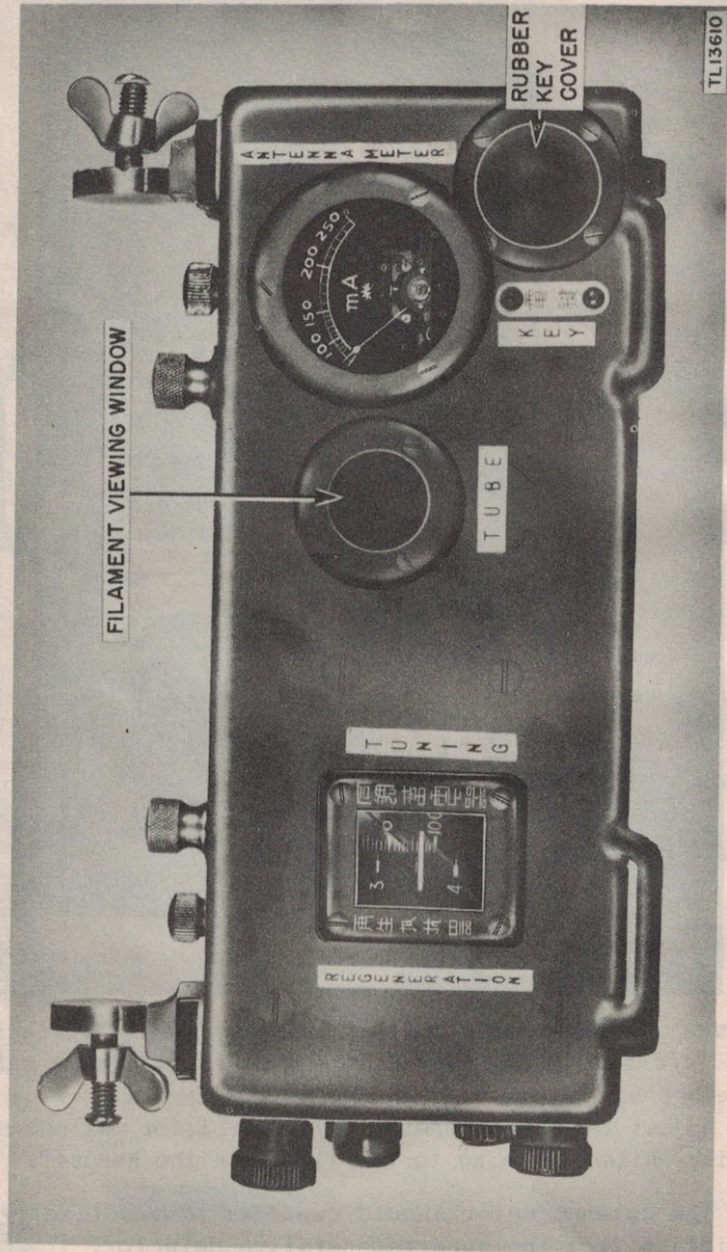


Figure 20. Japanese Radio Set Model 97 Light Wireless Set, top view, with name tabs.

d. **Off.** To remove the set from operation, place the 受信 休 送信 (receive-off-transmit) switch at the 休 (off) or middle position. If the set is to be dismantled, turn the filament voltage (filament voltage) control to the left or 減 (decrease) position.

6. MAINTENANCE.

a. **General.** Detailed maintenance instructions are not included in this bulletin. The following checks and operating precautions should be observed when the set fails to operate:

- (1) Check all cords, plugs, and switches to make sure they are in good order and in proper position.
- (2) If a battery pack is used as a power source for the set, check and replace batteries if necessary.
- (3) Replace the tube. For this operation see subparagraph b below.

b. **Chassis Inspection.** For a visual check of the transceiver unit and to replace the tube, two removable doors are provided on the sides of the transceiver unit case. To replace the tube, remove the four knurled bolts on the rear case door. The tube is held in a light metal clamp and is pulled outward on the swivel tube socket for replacement. The calibration chart is also mounted inside the rear case door (fig. 24). To open the front case door, remove the ten machine screws holding it in place. The remainder of the chassis is now accessible.

c. **Tubes.** There are no American tubes which are directly interchangeable with the UZ34MC. The UZ30MC, another Japanese type may be used to replace the UZ34MC by placing a 500-ohm resistor in parallel with the 530-ohm grid bias resistor. This is resistor 24 on the parts list.

d. **Schematic Diagrams.** Four schematic diagrams are shown in figures 23, 24, 25, and 26. These diagrams indicate circuit connections of the set as an entire unit. They also indicate the connections when the 受信 休 送信 (receive-off-transmit) switch is turned to either the 送信 (transmit) or 受信 (receive) position. As shown in figures 24 and 22, each part of the set is numbered and these numbers appear on the schematic diagrams.

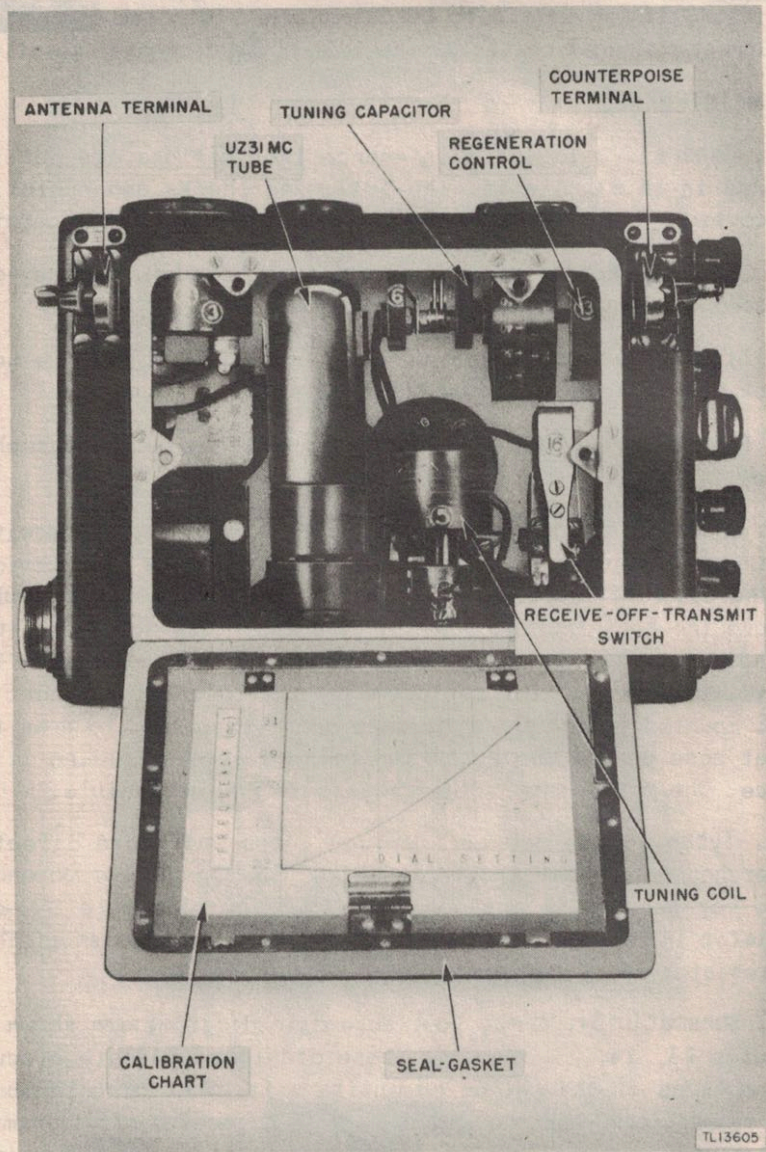


Figure 21. Japanese Radio Set Model 97 Light Wireless Set, rear case door open, with name tabs.

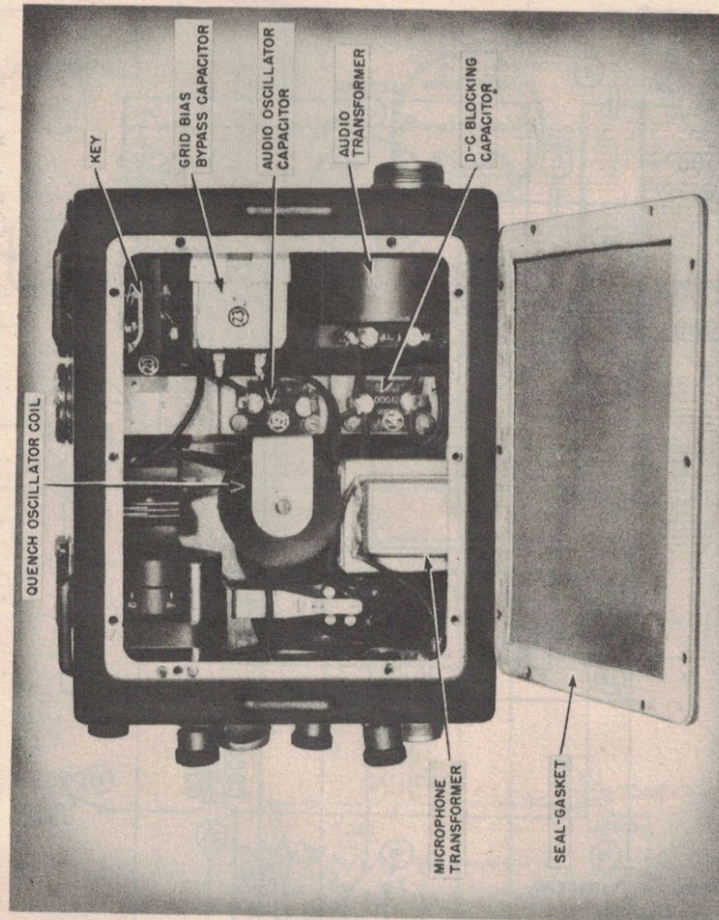


Figure 22. Japanese Radio Set Model 97 Light Wireless Set, front case door open.

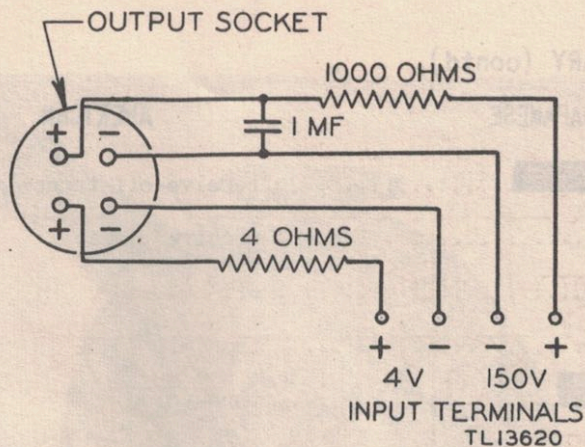


Figure 26. Schematic diagram, secondary cell adapter.

e. Parts List. See the appendix for a list of parts by number, function, value, and rating.

f. Detailed Maintenance. If the simple procedures outlined above do not make the set operate, send it back to a signal depot. The components may be used to repair other sets. WE CAN USE THE JAPANESE PARTS TO REPAIR OUR OWN AS WELL AS JAPANESE SETS.

7. GLOSSARY.

The Japanese terms on the set and their American military equivalent are presented below. For a more complete listing of Japanese communication terms and their American military equivalent, refer to TM 30-485.

JAPANESE	AMERICAN
五七式輕便無線電話機	Model 97 Light Wireless Set
九七式輕便無線電話機手動發電機	Model 97 Light Wireless Set manually operated generator
受話器	microphone and headset socket
調音	tuning
燈絲電壓	filament voltage

7. GLOSSARY (contd).

JAPANESE	AMERICAN
受信 休 送信	receive-off-transmit
受信	receive
休	off
送信	transmit
電信 電話	tone-voice
電信	tone
電話	voice
再生	regeneration
空	antenna
地	counterpoise
電源	power socket
電鍵	key

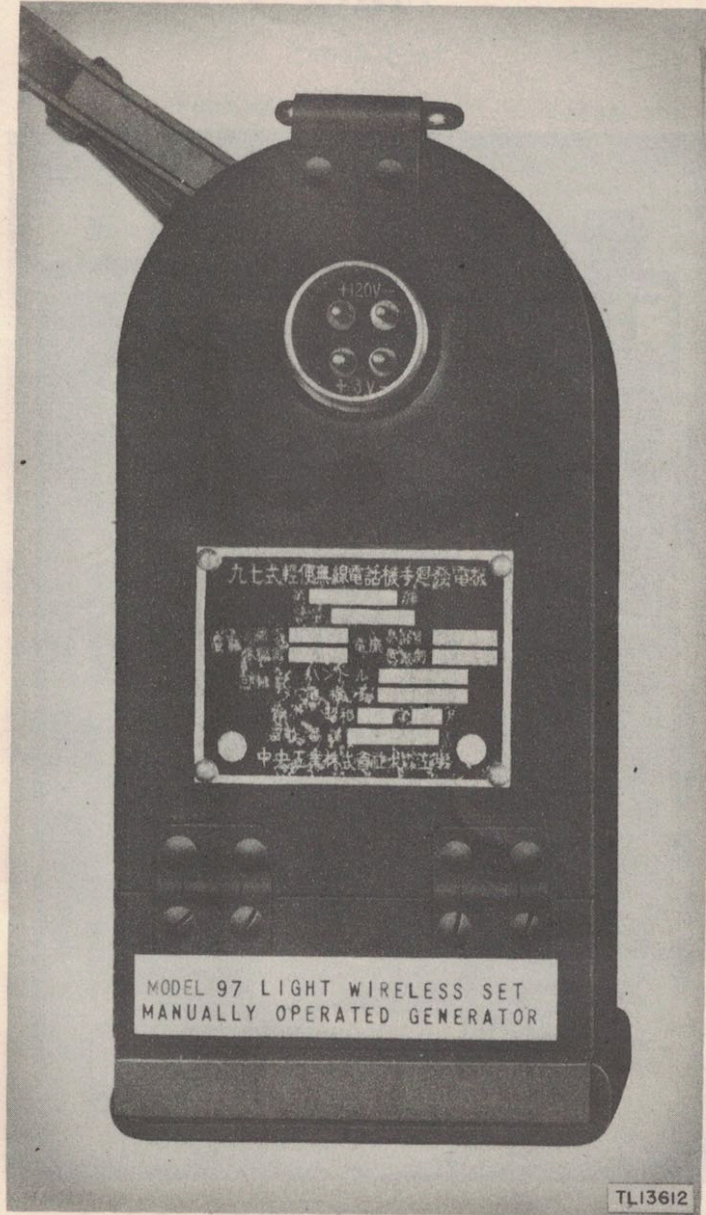


Figure 27. Japanese Radio Set Model 97 Light Wireless Set, manually operated generator, with name tab.

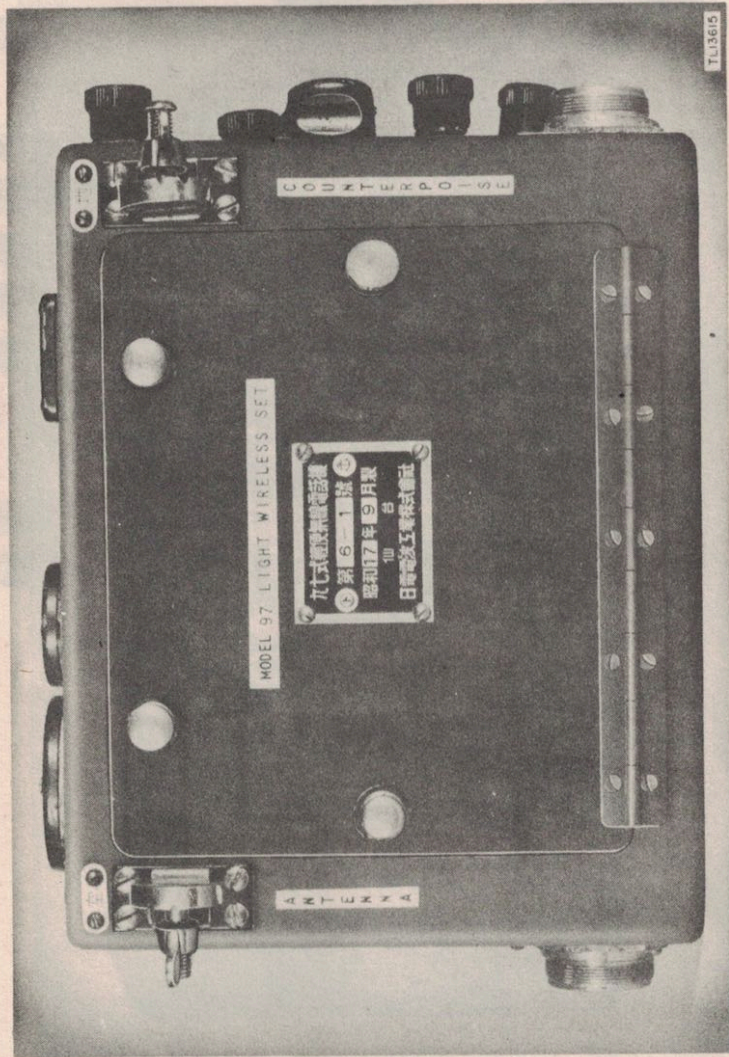


Figure 28. Japanese Radio Set Model 97 Light Wireless Set,
rear view, with name tabs.

APPENDIX
Parts List

Part No.	Part and Function	Value and Rating
1	Terminal, counterpoise	
2	Meter, antenna current	0-0.25 amp
3	Coil, meter shunt	
4	Capacitor, counterpoise coupling	500 mmf
5	Coil, tuning	
6	Capacitor, tuning, variable	5.5 mmf min, 35 mmf max
7	Capacitor, antenna coupling	500 mmf
8	Terminal, antenna	
9	Capacitor, quench oscillator	2000 mmf
10	Coil, quench oscillator	
11	Capacitor, grid coupling	500 mmf
12	Choke, grid	
13	Potentiometer, regeneration control	23,000 ohms
14	Capacitor, d-c blocking	2000 mmf
15	Socket, tube	
16	Switch, receive-off-transmit	
17	Resistor, sidetone	50,000 ohms
18	Switch, tone-voice	

APPENDIX
Parts List (contd).

Part No.	Part and Function	Value and Rating
19	Capacitor, audio oscillator	0.01 mf
20	Key	
21	Transformer, microphone	Ratio 1:20
22	Transformer, audio oscillator	Ratio 1:3.3
23	Capacitor, grid bias bypass	0.5 mf
24	Resistor, grid bias	530 ohms
25	Resistor, variable, filament voltage control	6 ohms, 2 watts
26	Socket, power	
27	Socket, microphone and headset	
28	Capacitor, grid bypass	500 mmf

RECEIVE-OFF-TRANSMIT	KEY	REGENERATION	TUNING	ANTENNA METER	ANTENNA	COUNTER POISE	FILAMENT	MIC & PHONES
REGENERATION								
TUNING								
TONE-VOICE								
TUBE								
POWER SOCKET								
FREQUENCY (mc)								
DIAL SETTING								

MODEL 97 LIGHT WIRELESS SET

MODEL 97 LIGHT WIRELESS SET
MANUALLY OPERATED GENERATOR

RECEIVE-OFF-TRANSMIT	KEY	REGENERATION	TUNING	ANTENNA METER	ANTENNA	COUNTER POISE	FILAMENT	MIC & PHONES
REGENERATION								
TUNING								
TONE-VOICE								
TUBE								
POWER SOCKET								
FREQUENCY (mc)								
DIAL SETTING								

MODEL 97 LIGHT WIRELESS SET

MODEL 97 LIGHT WIRELESS SET
MANUALLY OPERATED GENERATOR

TL13613

Figure 29. Name tabs for installation and operation of Japanese Radio Set Model 97 Light Wireless Set. These may be cut out and placed on the set.

MODEL 97 LIGHT WIRELESS SET MANUALLY OPERATED GENERATOR

SERIAL NO.

WATTS 5.25

VOLTS HIGH V 120 HIGHV 0.035
 LOW V 3 AMPERES LOW V 0.35

REVOLUTIONS HANDLE 80
 GENERATOR 5100

(DATE OF MANUFACTURE)
 (FACTORY NO.)
 (MANUFACTURER'S NAME)

TL 14090

MODEL 97 LIGHT WIRELESS SET MANUALLY OPERATED GENERATOR

SERIAL NO.

WATTS 5.25

VOLTS HIGH V 120 HIGHV 0.035
 LOW V 3 AMPERES LOW V 0.35

REVOLUTIONS HANDLE 80
 GENERATOR 5100

(DATE OF MANUFACTURE)
 (FACTORY NO.)
 (MANUFACTURER'S NAME)

TL 14090

Figure 30. Nameplate tabs for installation and operation of Model 97 Light Wireless Set manually operated generator. These may be cut out and placed on the set.